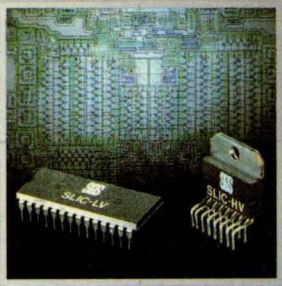
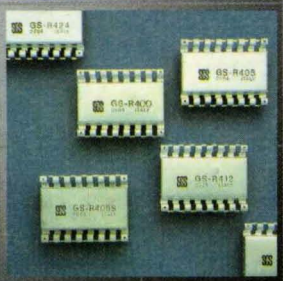
SHORTFORM

SEMICONDUCTOR PRODUCTS





SGS Technology and Service

SEMICONDUCTOR PRODUCTS

SEMICONDUCTOR PRODUCTS

This publication aims to provide condensed information on the vast range of standard devices currently produced by SGS.
For easy consultation the products have been divided into several sections according to the main product families and in some cases depending on the main application sectors.
Each device is presented along with its essential electrical characteristics. If further information is required SGS will provide individual data sheets for all the devices on request.
All the data sheets for the individual devices are collected in "databooks". These can be acquired through SGS sales network.

EDITION 85/86

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TABLE OF CONTENTS

ALPHA-NUMERICAL INDEX

ALPHA-NUMERICAL INDEX

ALPHA-NUMERICAL INDEX

ALPHA-NUMERICAL INDEX

ALPHA-NUMERICAL INDEX

ALPHA-NUMERICAL INDEX

ALPHA-NUMERICAL INDEX

ALPHA-NUMERICAL INDEX

ALPHA-NUMERICAL INDEX

ALPHA-NUMERICAL INDEX

ALPHA-NUMERICAL INDEX

ALPHA-NUMERICAL INDEX

ALPHA-NUMERICAL INDEX

TELECOMMUNICATIONS PRODUCTS

Telecommunications is for SGS a priority market. The company sees its present and near future technology as being exactly suited to this market.
In addition the IRI-STET group (of which SGS-ATES is a member) has a heavy bias towards telecommunications which naturally gives an added incentive to the company's commitment to telecomms.
To date SGS has been involved in a number of projects with both Italian and other worldwide telecommunications manufacturers.
SGS has a wide range of products, both actual and under development for telecomms, that can roughly be split into two groups, telephone and centralized equipment.
In the sector of telephone equipment SGS has developed a lead in the production of integrated speech circuits and has produced, in addition to the world's first integrated speech circuit, the LS285, the LS156 for the Italian market and the LS288 according to German specifications.
At present the SGS telephone range includes:

- speech circuit
- dual tone MF generators
- line interface circuits
- loop disconnect diallers
- electronic bells
- protection circuits

The range of devices for centralized equipment includes:

- crosspoints
- balanced modulators
- channel amplifiers
- expandors
- CODECs and COMBO
- op-amps.
- digital switching matrix
- crosspoints for PABX's

For trasmission is included:

- Modem

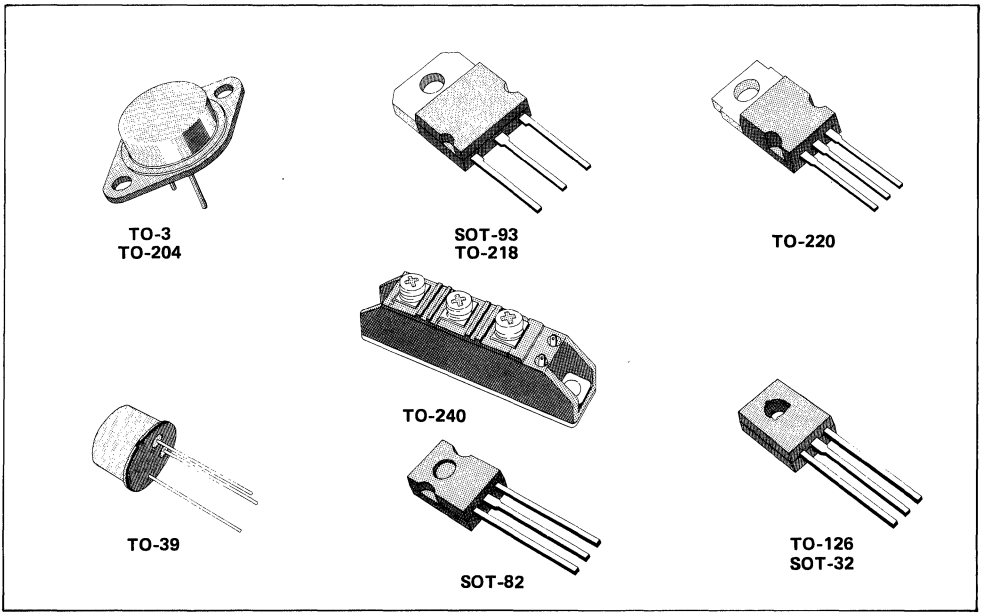
Other products not specifically intended for the telecomms market included a wide range of switching transistors, linear and digital integrated circuits.
These products coupled with the range of microprocessors which include the Z8, Z80, Z8000 and M3870 families, give SGS a very strong presence in the telecomms field.

TELECOMMUNICATIONS PRODUCTS

INDEX OF THE SGS PRODUCT RANGE

DISCRETE POWER

SGS power transistors cover a wide range of technologies optimized for almost every application.
These include epitaxial base (medium voltage, high ruggedness, general purpose) epitaxial planar (high speed with good voltage capability) multiepitaxial planar (high current switching) and multiepitaxial mesa (high voltage-high power switching) and N-channel POWER MOS.
A wide choice of packages are available.
In order to be easy to use the following power transistor selector guides cover only a part of the complete range. Other voltage ratings and gain selections shown on the full data sheets are equally available.
Many older devices which are less popular for new designs are also in production. Your nearest SGS sales office or distributor has full details available on request.



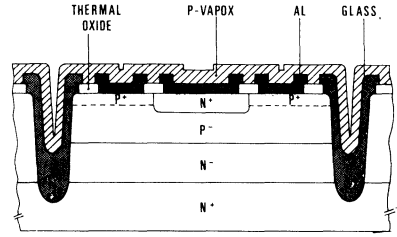
CONTENTS

POWER TRANSISTORS

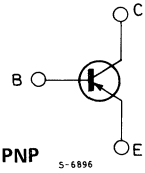
GENERAL PURPOSE

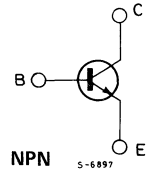
EPITAXIAL BASE - I_{CM} 1 to 3A; V_{CEO} 22 to 100V

NPN and PNP types
(perfect complementary pairs)
Medium V_{CEO} range (22 to 100V)
Medium switching speed
Medium f_T (2 to 20 MHz)
High ruggedness



INTERNAL SCHEMATIC DIAGRAMS





EPITAXIAL BASE

I_C (A)	V_{CBO} (V)	V_{CEO} (V)	P_{tot} (W)	Package	TYPE NPN	TYPE PNP	@ h_{FE} min	@ I_C (A)	@ V_{CE} (V)	@ V_{CEsat} max(V)	@ I_C (A)	@ I_B (mA)
1	40	40	30	SOT-32	**2N4921**	**2N4918**	30	0.5	1	0.6	1	100
1	40	40	30	TO-220	**TIP29**	**TIP30**	15	1	4	0.7	1	125
1	60	60	30	SOT-32	**2N4922**	**2N4919**	30	0.5	1	0.6	1	100
1	60	60	30	TO-220	**TIP29A**	**TIP30A**	15	1	4	0.7	1	125
1	80	80	30	SOT-32	**2N4923**	**2N4920**	30	0.5	1	0.6	1	100
1	80	80	30	TO-220	**TIP29B**	**TIP30B**	15	1	4	0.7	1	125
1	100	100	30	TO-220	**TIP29C**	**TIP30C**	15	1	4	0.7	1	125
2	45	45	25	SOT-32	**BD233**	**BD234**	25	1	2	0.6	1	100
2	55	45	30	TO-220	**BD239**	**BD240**	15	1	4	0.7	1	200
2	60	60	25	SOT-32	**BD235**	**BD236**	25	1	2	0.6	1	100
2	70	60	30	TO-220	**BD239A**	**BD240A**	15	1	4	0.7	1	200
2	90	80	30	TO-220	**BD239B**	**BD240B**	15	1	4	0.7	1	200
2	100	80	25	SOT-32	**BD237**	**BD238**	25	1	2	0.6	1	100
2	115	100	30	TO-220	**BD239C**	**BD240C**	15	1	4	0.7	1	200
3	30	30	25	SOT-32	**MJE520**	**MJE370**	25	1	1	—	—	—
3	30	30	25	SOT-82	**SGS520**		25	1	1	—	—	—
3	40	40	40	TO-220	**TIP31**	**TIP32**	25	1	4	1.2	3	375
3	45	45	30	SOT-32	**BD175**	**BD176**	40	0.15	2	0.8	1	100
3	45	45	30	SOT-32	**BD175-10**	**BD176-10**	63	0.15	2	0.8	1	100
3	45	45	30	SOT-32	**BD175-16**	**BD176-16**	100	0.15	2	0.8	1	100

POWER TRANSISTORS

EPITAXIAL BASE (continued)

I_C (A)	V_{CBO} (V)	V_{CEO} (V)	P_{tot} (W)	Package	TYPE NPN	TYPE PNP	@ h_{FE} min	@ I_C (A)	@ V_{CE} (V)	V_{CEsat} max(V)	@ I_C (A)	I_B (mA)
3	45	45	30	SOT-32	**BD175-6**	**BD176-6**	40	0.15	2	0.8	1	100
3	55	45	40	TO-220	**BD241**	**BD242**	25	1	4	1.2	3	600
3	60	60	30	SOT-32	**BD177**	**BD178**	40	0.15	2	0.8	1	100
3	60	60	30	SOT-32	**BD177-10**	**BD178-10**	63	0.15	2	0.8	1	100
3	60	60	30	SOT-32	**BD177-6**	**BD178-6**	40	0.15	2	0.8	1	100
3	60	60	40	TO-220	**TIP31A**	**TIP32A**	25	1	4	1.2	3	375
3	70	60	40	TO-220	**BD241A**	**BD242A**	25	1	4	1.2	3	600
3	80	80	30	SOT-32	**BD179**	**BD180**	40	0.15	2	0.8	1	100
3	80	80	30	SOT-32	**BD179-10**	**BD180-10**	63	0.15	2	0.8	1	100
3	80	80	30	SOT-32	**BD179-6**	**BD180-6**	40	0.15	2	0.8	1	100
3	80	80	40	TO-220	**TIP31B**	**TIP32B**	25	1	4	1.2	3	375
3	90	80	40	TO-220	**BD241B**	**BD242B**	25	1	4	1.2	3	600
3	100	100	40	TO-220	**TIP31C**	**TIP32C**	25	1	4	1.2	3	375
3	115	100	40	TO-220	**BD241C**	**BD242C**	25	1	4	1.2	3	600
4	22	22	36	SOT-32	**BD433**	**BD434**	50	2	1	0.5	2	200
4	32	32	36	SOT-32	**BD435**	**BD436**	50	2	1	0.5	2	200
4	40	40	40	SOT-32	**MJE521**	**MJE371**	40	1	1	—	—	—
4	40	40	40	SOT-32	**2N5190**	**2N5193**	25	1.5	2	0.6	1.5	150
4	45	45	36	SOT-32	**BD437**	**BD438**	40	2	1	0.6	2	200
4	45	45	40	TO-220	**2N6121**	**2N6124**	25	1	2	0.6	1.5	150
4	60	60	36	SOT-32	**BD439**	**BD440**	25	2	1	0.8	2	200
4	60	60	40	SOT-32	**2N5191**	**2N5194**	25	1.5	2	0.6	1.5	150
4	60	60	40	TO-220	**2N6122**	**2N6125**	25	1.5	2	0.6	1.5	150
4	80	80	36	SOT-32	**BD441**	**BD442**	15	2	1	0.8	2	200
4	80	80	40	SOT-32	**2N5192**	**2N5195**	20	1.5	2	0.6	1.5	150
4	80	80	40	TO-220	**2N6123**	**2N6126**	20	1.5	2	0.6	1.5	150
5	40	25	15	SOT-32	**MJE200**	**MJE210**	70	0.5	1	0.3	0.5	50
6	40	40	65	TO-220	**TIP41**	**TIP42**	15	3	4	1.5	6	600
6	45	45	65	TO-220	**BD243**	**BD244**	15	3	4	1.5	6	1000
6	60	60	65	TO-220	**BD243A**	**BD244A**	15	3	4	1.5	6	1000
6	60	60	65	TO-220	**TIP41A**	**TIP42A**	15	3	4	1.5	6	600
6	80	80	65	TO-220	**BD243B**	**BD244B**	15	3	4	1.5	6	1000
6	80	80	65	TO-220	**TIP41B**	**TIP42B**	15	3	4	1.5	6	600
6	100	100	65	TO-220	**BD243C**	**BD244C**	15	3	4	1.5	6	1000
6	100	100	65	TO-220	**TIP41C**	**TIP42C**	15	3	4	1.5	6	600
7	40	30	40	TO-220	**2N6288**	**2N6111**	30	4	3	1	3	300
7	60	50	40	TO-220	**2N6290**	**2N6109**	30	4	2.5	1	2.5	250
7	80	70	40	TO-220	**2N6292**	**2N6107**	30	4	2	1	2	200
8	45	45	50	TO-220	**BD533**	**BD534**	25	2	2	0.8	2	200
8	60	60	50	TO-220	**BD535**	**BD536**	25	2	2	0.8	2	200
8	80	80	50	TO-220	**BD537**	**BD538**	15	2	2	0.8	2	200

POWER TRANSISTORS

EPITAXIAL BASE (continued)

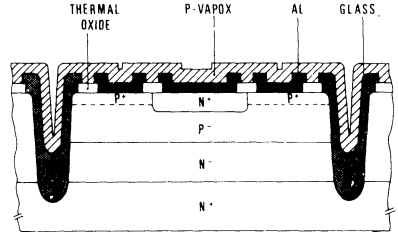
I_C (A)	V_{CBO} (V)	V_{CEO} (V)	P_{tot} (W)	Package	TYPE		@				@	
					NPN	PNP	h_{FE} min	I_C (A)	V_{CE} (V)	V_{CEsat} max (V)	I_C (A)	I_B (mA)
10	60	60	150	TO-3	2N5877	2N5875	20	4	4	1	5	500
10	70	60	75	TO-220	MJE3055T	MJE2955T	20	4	4	1.1	4	400
10	80	60	150	TO-3	2N3715	2N3791	30	3	2	0.8	5	500
10	80	80	150	TO-3	2N5878	2N5876	20	4	4	1	5	500
10	100	80	150	TO-3	2N3716	2N3792	30	3	2	0.8	5	500
12	45	45	75	TO-220	BD705	BD706	20	4	4	1	4	400
12	60	60	75	TO-220	BD707	BD708	15	4	4	1	4	400
12	80	80	75	TO-220	BD709	BD710	15	4	4	1	4	400
12	100	100	75	TO-220	BD711	BD712	15	4	4	1	4	400
15	50	40	150	TO-3	2N3771		15	15	4	1.4	10	1000
15	45	45	90	TO-220	BD905	BD906	15	5	4	1	5	500
15	45	45	125	TO-3	BDW51	BDW52	20	5	4	1	5	500
15	50	50	75	TO-220	2N6486	2N6489	20	5	4	1.3	5	500
15	60	60	100	TO-220	BD907	BD908	15	5	4	1	5	500
15	60	60	125	TO-3	BDW51A	BDW52A	20	5	4	1	5	500
15	70	60	90	SOT-93	TIP3055	TIP2955	20	4	4	1.1	4	400
15	100	60	115	TO-3	2N3055	MJ2955	20	4	4	1.1	4	400
15	100	60	150	TO-3	2N3772		15	10	4	2	15	1500
15	100	60	150	TO-3	SGS3055		20	4	4	1	5	500
15	70	70	75	TO-220	2N6487	2N6490	20	5	4	1.3	5	500
15	80	80	90	TO-220	BD909	BD910	15	5	4	1	5	500
15	80	80	125	TO-3	BDW51B	BDW52B	20	5	4	1	5	500
15	90	90	75	TO-220	2N6488	2N6491	20	5	4	1.3	5	500
15	100	100	90	TO-220	BD911	BD912	15	5	4	1	5	500
15	100	100	125	TO-3	BDW51C	BDW52C	20	5	4	1	5	500
16	100	100	200	TO-3	2N5629	2N6029	25	8	2	1	10	1000
20	80	80	200	TO-3	2N5303	2N5745	40	1	2	1	10	1000
25	60	60	125	SOT-93	TIP35A	TIP36A	25	1.5	4	1.8	15	1500
25	60	60	200	TO-3	2N5885	2N5883	35	3	4	1	15	1500
25	80	80	125	SOT-93	TIP35B	TIP36B	25	1.5	4	1.8	15	1500
25	80	80	130	SOT-93	SGSD110	SGSD210	15	5	4	1.5	16	2000
25	80	80	200	TO-3	2N5886	2N5884	35	3	4	1	15	1500
25	100	100	125	SOT-93	TIP35C	TIP36C	25	1.5	4	1.8	15	1500
30	40	40	200	TO-3	2N5301	2N4398	40	1	2	0.75	10	1000
30	60	60	200	TO-3	2N5302	2N4399	40	1	2	0.75	10	1000
30	100	90	200	TO-3	MJ802	MJ4502	25	7.5	2	0.8	7.5	750

POWER DARLINGTONS

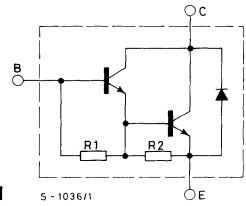
HIGH GAIN GENERAL PURPOSE

EPITAXIAL BASE - I_{CM} 2 to 30A; V_{CE} 45 to 180V

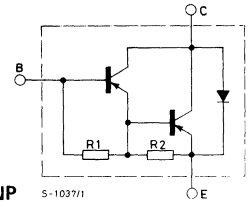
NPN and PNP types
Medium V_{CEO} range (45 to 180V)
Medium Switching speed
Medium f_T (2 to 20 MHz)
High ruggedness
Monolithic Darlingtons



INTERNAL SCHEMATIC DIAGRAMS



NPN



PNP

EPITAXIAL BASE

I_C (A)	V_{CBO} (V)	V_{CEO} (V)	P_{tot} (W)	Package	TYPE NPN	TYPE PNP	@ h_{FE} min	@ I_C (A)	@ V_{CE} (V)	V_{CEsat} max (V)	@ I_C (A)	@ I_B (mA)
2	45	45	40	SOT-32	**BD675**	**BD676**	750	1.5	3	2.5	1.5	30
2	60	60	50	SOT-82	**SGS110**	**SGS115**	1000	1	4	2.5	2	8
2	60	60	50	TO-220	**TIP110**	**TIP115**	1000	1	4	2.5	2	8
2	80	80	50	SOT-82	**SGS111**	**SGS116**	1000	1	4	2.5	2	8
2	80	80	50	TO-220	**TIP111**	**TIP116**	1000	1	4	2.5	2	8
2	100	100	50	SOT-82	**SGS112**	**SGS117**	1000	1	4	2.5	2	8
2	100	100	50	TO-220	**TIP112**	**TIP117**	1000	1	4	2.5	2	8
4	40	40	40	SOT-32	**2N6037**	**2N6034**	500	0.5	3	2	2	8
4	45	45	40	SOT-32	**BD675A**	**DB676A**	750	2	3	2.8	2	40
4	60	60	40	SOT-32	**2N6038**	**2N6035**	500	0.5	3	2	2	8
4	60	60	40	SOT-32	**BD677**	**BD678**	750	1.5	3	2.5	1.5	30
4	60	60	40	SOT-32	**BD677A**	**BD678A**	750	2	3	2.8	2	40
4	60	60	40	SOT-32	**MJE800**	**MJE700**	100	4	3	3	4	40
4	60	60	40	SOT-32	**MJE801**	**MJE701**	100	4	3	3	4	40
4	80	80	40	SPT-32	**2N6039**	**2N6036**	500	0.5	3	2	2	8

POWER DARLINGTONS

EPITAXIAL BASE (continued)

I_C (A)	V_{CBO} (V)	V_{CEO} (V)	P_{tot} (W)	Package	TYPE NPN	TYPE PNP	@ h_{FE} min	@ I_C (A)	@ V_{CE} (V)	V_{CEsat} max (V)	@ I_C (A)	I_B (mA)
4	80	80	40	SOT-32	BD679	BD680	750	1.5	3	2.5	1.5	30
4	80	80	40	SOT-32	BD679A	BD680A	750	2	3	2.8	2	40
4	80	80	40	SOT-32	MJE802	MJE702	100	4	3	3	4	40
4	80	80	40	SOT-32	MJE803	MJE703	100	4	3	3	4	40
4	100	100	40	SOT-32	BD681	BD682	750	1.5	3	2.5	1.5	30
4	180	180	10	TO-39	BDW91	BDW92	1000	2	5	2	2	4
5	60	60	65	SOT-82	SGS120	SGS125	1000	3	3	2	3	12
5	60	60	65	TO-220	TIP120	TIP125	1000	3	3	2	3	12
5	80	80	65	SOT-82	SGS121	SGS126	1000	3	3	2	3	12
5	80	80	65	TO-220	TIP121	TIP126	1000	3	3	2	3	12
5	100	100	65	SOT-82	SGS122	SGS127	1000	3	3	2	3	12
5	100	100	65	TO-220	TIP122	TIP127	1000	3	3	2	3	12
6	45	45	50	TO-220	BDW23	BDW24	750	2	3	2	2	8
6	60	60	50	TO-220	BDW23A	BDW24A	750	2	3	2	2	8
6	60	60	60	SOT-82	BD331	BD332	750	3	3	2	3	12
6	80	80	50	TO-220	BDW23B	BDW24B	750	2	3	2	2	8
6	80	80	60	SOT-82	BD333	BD334	750	3	3	2	3	12
6	100	100	50	TO-220	BDW23C	BDW24C	750	2	3	2	2	8
6	100	100	60	SOT-82	BD335	BD336	750	3	3	2	3	12
6	140	140	60	TO-220	BDX53E	BDX54E	500	2	5	2	2	10
6	150	150	15	TO-39	BDX53S	BDX54S	500	2	5	2	2	8
6	160	160	60	TO-220	BDX53F	BDX54F	500	2	5	2	2	10
8	40	40	65	TO-220	2N6386		1000	3	3	2	3	6
8	40	40	65	SOT-82	SGS6386		1000	3	3	2	3	6
8	45	45	60	TO-220	BDX53	BDX54	750	3	3	2	3	12
8	60	60	60	TO-220	BDX53A	BDX54A	750	3	3	2	3	12
8	60	60	65	SOT-82	SGS130	SGS135	1000	4	4	2	4	16
8	60	60	70	TO-220	TIP130	TIP135	1000	4	4	2	4	16
8	60	60	75	TO-220	2N6043	2N6040	1000	4	4	2	4	16
8	60	60	80	TO-220	TIP100	TIP105	1000	3	4	2	3	6
8	60	60	90	TO-3	MJ1000	MJ900	1000	3	3	2	3	12
8	80	80	60	TO-220	BDX53B	BDX54B	750	3	3	2	3	12
8	80	80	65	SOT-82	SGS131	SGS136	1000	4	4	2	4	16
8	80	80	70	TO-220	TIP131	TIP136	1000	4	4	2	4	16
8	80	80	75	TO-220	2N6044	2N6041	1000	4	4	2	4	16
8	80	80	80	TO-220	TIP101	TIP106	1000	3	4	2	3	6
8	80	80	90	TO-3	MJ1001	MJ901	1000	3	3	2	3	12
8	100	100	60	TO-220	BDX53C	BDX54C	750	3	3	2	3	12
8	100	100	65	SOT-82	SGS132	SGS137	1000	4	4	2	4	16
8	100	100	70	TO-220	TIP132	TIP137	1000	4	4	2	4	16
8	100	100	75	TO-220	2N6045	2N6042	1000	3	4	2	3	12
8	100	100	80	TO-220	TIP102	TIP107	1000	3	4	2	3	6

POWER DARLINGTONS

EPITAXIAL BASE (continued)

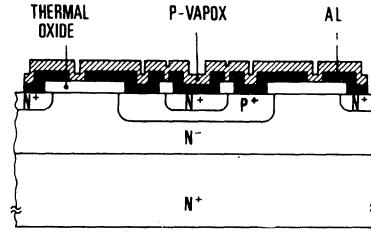
I_C (A)	V_{CBO} (V)	V_{CEO} (V)	P_{tot} (W)	Package	TYPE NPN	TYPE PNP	@ h_{FE} min	@ I_C (A)	@ V_{CE} (V)	V_{CEsat} max (V)	@ I_C (A)	I_B (mA)
10	45	45	70	TO-220	**BDX33**	**BDX34**	750	4	3	2.5	4	8
10	45	45	100	TO-3	**BDX85**	**BDX86**	1000	3	3	2	4	16
10	60	60	65	TO-220	**2N6387**		1000	5	3	2	5	10
10	60	60	65	SOT-82	**SGS6387**		1000	5	3	2	5	10
10	60	60	70	TO-220	**BDX33A**	**BDX34A**	750	4	3	2.5	4	8
10	60	60	100	TO-3	**BDX85A**	**BDX86A**	1000	3	3	2	4	16
10	60	60	125	SOT-93	**TIP140**	**TIP145**	1000	5	4	3	10	40
10	60	60	150	TO-3	**MJ3000**	**MJ2500**	1000	5	3	2	5	20
10	80	80	100	TO-3	**BDX85B**	**BDX86B**	1000	3	3	2	4	16
10	80	80	65	TO-220	**2N6388**		1000	5	3	2	5	10
10	80	80	65	SOT-82	**SGS6388**		1000	5	3	2	5	10
10	80	80	70	TO-220	**BDX33B**	**BDX34B**	750	3	3	2.5	3	6
10	80	80	125	SOT-93	**TIP141**	**TIP146**	1000	5	4	3	10	40
10	80	80	150	TO-3	**MJ3001**	**MJ2501**	1000	5	3	2	5	20
10	100	100	70	TO-220	**BDX33C**	**BDX34C**	750	3	3	2.5	3	6
10	100	100	100	TO-3	**BDX85C**	**BDX86C**	1000	3	3	2	4	16
10	100	100	125	SOT-93	**TIP142**	**TIP147**	1000	5	4	3	10	40
12	45	45	80	TO-220	**BDW93**	**BDW94**	750	5	3	2	5	20
12	45	45	120	TO-3	**BDX87**	**BDX88**	1000	5	3	2	6	24
12	60	60	80	TO-220	**BDW93A**	**BDW94A**	750	5	3	2	5	20
12	60	60	120	TO-3	**BDX87A**	**BDX88A**	1000	5	3	2	6	24
12	60	60	125	SOT-93	**BDV65**	**BDV64**	1000	5	4	2	5	20
12	80	80	80	TO-220	**BDW93B**	**BDW94B**	750	5	3	2	5	20
12	80	80	120	TO-3	**BDX87B**	**BDX88B**	1000	5	3	2	6	24
12	80	80	125	SOT-93	**BDV65A**	**BDV64A**	1000	5	4	2	5	20
12	100	100	80	TO-220	**BDW93C**	**BDW94C**	750	5	3	2	5	20
12	100	100	120	TO-3	**BDX87C**	**BDX88C**	1000	5	3	2	6	24
12	100	100	125	SOT-93	**BDV65B**	**BDV64B**	1000	5	4	2	5	20
16	60	60	150	TO-3	**MJ4033**	**MJ4030**	1000	10	3	4	16	80
16	80	80	150	TO-3	**MJ4034**	**MJ4031**	1000	10	3	4	16	80
16	100	100	150	TO-3	**MJ4035**	**MJ4032**	1000	10	3	4	16	80
20	60	60	160	TO-3	**2N6282**	**2N6285**	750	10	3	3	20	200
20	80	80	160	TO-3	**2N6283**	**2N6286**	750	10	3	3	20	200
20	100	100	160	TO-3	**2N6284**	**2N6287**	750	10	3	3	20	200
25	80	80	130	SOT-93	**SGSD100**	**SGSD200**	300	20	3	1.75	10	40
30	60	60	200	TO-3	**MJ11012**	**MJ11011**	1000	20	5	4	30	300
30	90	90	200	TO-3	**MJ11014**	**MJ11013**	1000	20	5	4	30	300
30	120	120	200	TO-3	**MJ11016**	**MJ11015**	1000	20	5	4	30	300

POWER TRANSISTORS

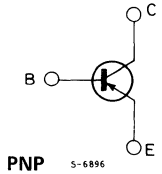
LOW POWER FAST SWITCHING

EPITAXIAL PLANAR - I_{CM} 0.3 to 10A; V_{CEO} 40 to 350V

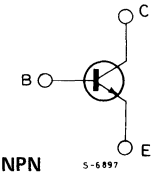
NPN and PNP types
Good voltage capability (V_{CES} up to 450V)
Low saturation voltage
Low leakage
Very high f_T (up to 100 MHz)
Very high speed
Moderate ruggedness
Total base-collector passivation



INTERNAL SCHEMATIC DIAGRAMS



PNP S-6896



NPN S-6897

EPITAXIAL PLANAR

I_C (A)	V_{CBO} (V)	V_{CEO} (V)	P_{tot} (W)	Package	TYPE NPN	TYPE PNP	@ h_{FE} min	@ I_C (A)	@ V_{CE} (V)	V_{CEsat} max (V)	@ I_C (A)	@ I_B (mA)
0.3	350	250	15	SOT-32	MJE3440		30	0.002	10	0.5	0.05	4
0.3	350	250	15	SOT-82	SGS3440		30	0.002	10	0.5	0.05	4
0.3	450	350	15	SOT-32	MJE3439		30	0.002	10	0.5	0.05	4
0.3	450	350	15	SOT-82	SGS3439		30	0.002	10	0.5	0.05	4
0.5	275	250	20	SOT-32	2N5655		25	0.05	10	1	0.1	10
0.5	275	250	20	SOT-32	BD157		30	0.05	10	–	–	–
0.5	275	250	20	SOT-82	SGS157		30	0.05	10	–	–	–
0.5	300	300	20	SOT-32	MJE340	MJE350	30	0.05	10	–	–	–
0.5	300	300	20	SOT-82	SGS340	SGS350	30	0.05	10	–	–	–
0.5	325	300	20	SOT-32	2N5656		25	0.05	10	1	0.1	10
0.5	325	300	20	SOT-32	BD158		30	0.05	10	–	–	–
0.5	325	300	20	SOT-82	SGS158		30	0.05	10	–	–	–
0.5	375	350	20	SOT-32	2N5657		25	0.05	10	1	0.1	10
0.5	375	350	20	SOT-32	BD159		30	0.05	10	–	–	–
0.5	375	350	20	SOT-82	SGS159		30	0.05	10	–	–	–

POWER TRANSISTORS

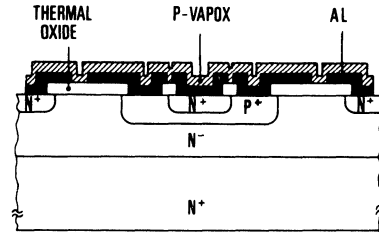
EPITAXIAL PLANAR (continued)

I_C (A)	V_{CBO} (V)	V_{CEO} (V)	P_{tot} (W)	Package	TYPE		@			@		
					NPN	PNP	h_{FE} min	I_C (A)	V_{CE} (V)	V_{CEsat} max (V)	I_C (A)	I_B (mA)
1	45	45	12	SOT-32	**BD135**	**BD136**	40	0.15	2	0.5	0.5	50
1	45	45	12	SOT-32	**BD135-10**	**BD136-10**	63	0.15	2	0.5	0.5	50
1	45	45	12	SOT-32	**BD135-16**	**BD136-16**	100	0.15	2	0.5	0.5	50
1	45	45	12	SOT-32	**BD135-6**	**BD136-6**	40	0.15	2	0.5	0.5	50
1	60	60	12	SOT-32	**BD137**	**BD138**	40	0.15	2	0.5	0.5	50
1	60	60	12	SOT-32	**BD137-10**	**BD138-10**	63	0.15	2	0.5	0.5	50
1	60	60	12	SOT-32	**BD137-6**	**BD138-6**	40	0.15	2	0.5	0.5	50
1	80	80	12	SOT-32	**BD139**	**BD140**	40	0.15	2	0.5	0.5	50
1	80	80	12	SOT-32	**BD139-10**	**BD140-10**	63	0.15	2	0.5	0.5	50
1	80	80	12	SOT-32	**BD139-6**	**BD140-6**	40	0.15	2	0.5	0.5	50
1	120	120	10	TO-39	**2N5682**	**2N5680**	40	0.25	2	1	0.5	50
1	200	200	10	TO-39		**2N5415**	30	0.05	10	2.5	0.05	5
1	300	250	10	TO-39	**2N3440**		40	0.02	10	0.5	0.05	4
1	350	300	10	TO-39		**2N5416**	30	0.05	10	2.5	0.05	5
1	450	350	10	TO-39	**2N3439**		40	0.02	10	0.5	0.05	4
1.5	120	120	5	TO-39	**BSW67**		15	1	5	1	1	150
1.5	150	150	5	TO-39	**BSW68**		15	1	5	1	1	150
2	50	45	25	SOT-32	**BD375**	**BD376**	40	0.15	2	1	1	100
2	75	60	25	SOT-32	**BD377**	**BD378**	40	0.15	2	1	1	100
2	100	80	25	SOT-32	**BD379**	**BD380**	40	0.15	2	1	1	100
3	40	40	6	TO-39		**2N4234**	30	0.25	1	0.6	1	125
3	60	40	12	SOT-32	**MJE180**	**MJE170**	30	0.5	1	0.3	0.5	50
3	80	60	12	SOT-32	**MJE181**	**MJE171**	50	0.1	1	0.3	0.5	50
3	100	80	12	SOT-32	**MJE182**	**MJE172**	50	0.1	1	0.3	0.5	50
3	250	150	10	TO-39	**BU125S**		30	0.25	3	1.5	0.5	50
3	250	200	10	TO-39	**BUY49S**		40	0.5	5	0.2	0.5	50
5	65	60	5	TO-39		**BSS44**	40	2	2	1	5	500
5	100	60	5	TO-39	**BFX34**		40	2	2	1	5	500
5	100	80	12	TO-39	**2N5154**	**2N5153**	70	2.5	5	0.7	2.5	250
5	150	80	7	TO-39	**2N4897**		40	2	2	1	5	500
5	100	100	6	TO-39	**2N5338**		20	5	2	1.2	5	500
5	100	100	6	TO-39	**2N5339**		40	5	2	1.2	5	500
7	100	60	10	TO-39	**BUY68**		40	1	1	1	5	500
7	130	60	10	TO-39	**BU125**		15	5	2	1	5	500
7	150	120	10	TO-39	**BUY47**		15	5	5	1	5	500
7	200	170	10	TO-39	**BUY48**		15	5	5	1	5	500
10	80	60	60	TO-3	**BDY92**		20	10	5	0.5	5	500
10	100	80	60	TO-3	**BDY91**		20	10	5	0.5	5	500
10	120	120	60	TO-3	**BDY90**		20	10	5	0.5	5	500

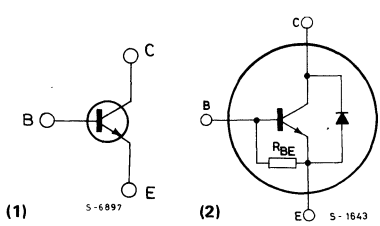
MONOCHROME DEFLECTION CIRCUITS

EPITAXIAL PLANAR - I_{CM} 7 to 8A; V_{CEO} 150 to 200V

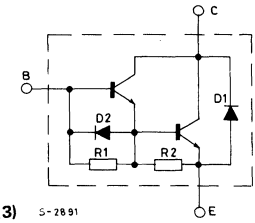
NPN types
Good voltage capability (V_{CES} up to 400V)
Low saturation voltage
Low leakage
Very high f_T (up to 100 MHz)
Very high speed
Moderate ruggedness
Total base-collector passivation



INTERNAL SCHEMATIC DIAGRAMS



NPN TRANSISTOR



NPN DARLINGTON

EPITAXIAL PLANAR (NPN)

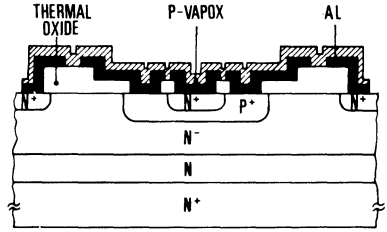
I_C (A)	V_{CBO} (V)	V_{CEO} (V)	P_{tot} (W)	Package	TYPE	@ h_{FE} (min)	@ I_C (A)	@ V_{CE} (V)	V_{CEsat} max (V)	@ I_C (A)	@ I_B (mA)
7	330	150	60	TO-220	**BU407** (1)	10	5	1	1	5	500
7	400	200	60	TO-220	**BU406** (1)	10	5	1	1	5	500
7	400	200	60	TO-220	**BU408** (1)	5	5	1	1	6	1200
7	330	150	60	TO-220	**BU407D** (2)	8	5	1	1	5	650
7	400	200	60	TO-220	**BU406D** (2)	8	5	1	1	5	650
7	400	200	60	TO-220	**BU408D** (2)	5	5	1	1	6	1200
8	330	150	60	TO-220	**BU807** (3)	100	5	2	1.5	5	50
8	400	200	60	TO-220	**BU806** (3)	100	5	2	1.5	5	50

POWER TRANSISTORS

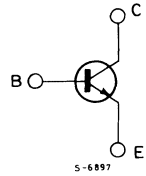
HIGH POWER FAST SWITCHING

MULTIEPITAXIAL PLANAR - I_{CM} 1 to 70A; V_{CEO} 30 to 400V

NPN types
I_C range up to 70A
Good h_{FE} linearity
Very low leakage
High switching speed
High $E_{s/b}$ capability
Total base-collector passivation



INTERNAL SCHEMATIC DIAGRAM



MULTIPEPITAXIAL PLANAR (NPN)

I_C (A)	V_{CBO} (V)	V_{CEO} (V)	P_{tot} (W)	Package	TYPE	@ h_{FE} (min)	@ I_C (A)	@ V_{CE} (V)	V_{CEsat} max (V)	@ I_C (A)	@ I_B (mA)
1	350	250	40	TO-220	**TIP47**	10	1	10	1	1	200
1	400	300	40	TO-220	**TIP48**	10	1	10	1	1	200
1	450	350	40	TO-220	**TIP49**	10	1	10	1	1	200
1	500	400	40	TO-220	**TIP50**	10	1	10	1	1	200
3	200	200	25	SOT-32	**BU325**	30	0.5	5	1.5	0.5	50
3	250	200	15	SOT-32	**BUY49P**	40	0.5	5	0.2	0.5	50
4	40	30	30	TO-220	**D44C1**	25	0.2	1	0.5	1	100
4	40	30	30	TO-220	**D44C2**	100	0.2	1	0.5	1	50
4	40	30	30	TO-220	**D44C3**	40	0.2	1	0.5	1	50
4	55	45	30	TO-220	**D44C4**	25	0.2	1	0.5	1	100
4	55	45	30	TO-220	**D44C5**	100	0.2	1	0.5	1	50
4	55	45	30	TO-220	**D44C6**	40	0.2	1	0.5	1	50
4	70	60	30	TO-220	**D44C7**	25	0.2	1	0.5	1	100
4	70	60	30	TO-220	**D44C8**	100	0.2	1	0.5	1	50
4	70	60	30	TO-220	**D44C9**	40	0.2	1	0.5	1	50
4	90	80	30	TO-220	**D44C10**	25	0.2	1	0.5	1	100
4	90	80	30	TO-220	**D44C11**	100	0.2	1	0.5	1	50
4	90	80	30	TO-220	**D44C12**	40	0.2	1	0.5	1	50
4	200	125	31	TO-220	**D44Q1**	30	0.2	10	1	2	200
4	250	175	31	TO-220	**D44Q3**	30	0.2	10	1	2	200
4	300	225	31	TO-220	**D44Q5**	30	0.2	10	1	2	200

POWER TRANSISTORS

MULTIEPITAXIAL PLANAR (continued)

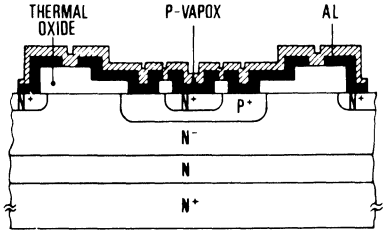
I_C (A)	V_{CBO} (V)	V_{CEO} (V)	P_{tot} (W)	Package	TYPE	@ h_{FE} (min)	@ I_C (A)	@ V_{CE} (V)	V_{CEsat} max (V)	@ I_C (A)	@ I_B (mA)
7	140	90	50	TO-220	**2N6702**	20	5	2	0.8	5	500
10	30	30	50	TO-220	**D44H1**	35	2	1	1	8	800
10	30	30	50	TO-220	**D44H2**	60	2	1	1	8	400
10	45	45	50	TO-220	**D44H4**	35	2	1	1	8	800
10	45	45	50	TO-220	**D44H5**	60	2	1	1	8	400
10	60	60	50	TO-220	**D44H7**	35	2	1	1	8	800
10	60	60	50	TO-220	**D44H8**	60	2	1	1	8	400
10	80	80	50	TO-220	**D44H10**	35	2	1	1	8	800
10	80	80	50	TO-220	**D44H11**	60	2	1	1	8	400
12	300	250	120	TO-3	**BUX42**	8	6	4	1.2	4	400
15	250	200	120	TO-3	**BUX41**	8	8	4	1.2	4	400
18	220	160	120	TO-3	**BUX41N**	8	12	4	1.2	8	800
20	120	75	140	TO-3	**2N5039**	20	10	5	1	10	1000
20	160	90	140	TO-3	**2N5038**	20	12	5	1	12	1200
20	160	125	120	TO-3	**BUX40**	8	15	4	1.2	10	1000
20	220	160	150	TO-3	**BUX11N**	10	15	4	0.6	8	800
20	250	200	150	TO-3	**BUX11**	10	12	4	0.6	6	600
20	300	250	150	TO-3	**BUX12**	10	10	4	1	5	500
25	120	80	175	TO-3	**BDY57**	20	10	4	1.4	10	1000
25	160	125	106	SOT-93	**BUX10P**	10	20	4	0.6	10	1000
25	160	125	150	TO-3	**BUX10**	10	20	4	0.6	10	1000
25	160	125	175	TO-3	**BDY58**	20	10	4	1.4	10	1000
25	160	140	106	SOT-93	**BU999**	12	25	2	0.8	10	1000
30	120	90	140	TO-3	**2N5671**	20	15	2	0.75	15	1200
30	150	120	140	TO-3	**2N5672**	20	15	2	0.75	15	1200
40	150	120	140	TO-3	**2N6033**	10	40	2	1	40	4000
40	250	200	250	TO-3	**BUV21**	10	25	4	0.6	12	1200
40	300	200	250	TO-3	**BUR21**	10	25	4	0.6	12	1200
40	300	250	250	TO-3	**BUV22**	10	20	4	1	10	1000
40	300	250	350	TO-3	**BUX22**	10	20	4	1	10	1000
40	350	250	250	TO-3	**BUR22**	10	20	4	1	10	1000
50	120	90	140	TO-3	**2N6032**	10	50	2.6	1.3	50	5000
50	160	125	250	TO-3	**BUV20**	10	50	4	0.6	25	2500
50	200	125	250	TO-3	**BUR20**	10	50	4	1	25	2000
60	300	200	350	TO-3	**BUR51**	15	50	4	1	30	2000
60	350	250	350	TO-3	**BUR52**	15	40	4	1.8	25	2000
70	200	125	350	TO-3	**BUR50**	15	50	4	1	35	2000
70	200	125	350	TO-3	**BUR50S**	15	50	4	1	35	2000

POWER DARLINGTONS

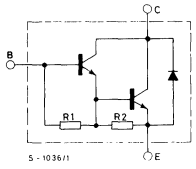
AUTOMOTIVE IGNITION

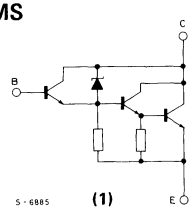
MULTIEPITAXIAL PLANAR - I_{CM} 6 to 15A; V_{CEO} 350 to 450V

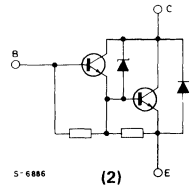
NPN types
I_C range up to 15A
Good h_{FE} linearity
Very low leakage
High switching speed
High $E_{s/b}$ capability
Total base collector passivation



INTERNAL SCHEMATIC DIAGRAMS







MULTIEPITAXIAL PLANAR (NPN)

I_C (A)	V_{CBO} (V)	V_{CEO} (V)	P_{tot} (W)	Package	TYPE	@ h_{FE} (min)	@ I_C (A)	@ V_{CE} (V)	V_{CEsat} max (V)	@ I_C (A)	I_B (mA)
6	400	350	60	TO-220	**BU910**	20	4	1.8	1.8	2.5	50
6	400	350	60	SOT-82	**SGS910**	20	4	1.8	1.8	2.5	50
6	450	400	60	TO-220	**BU911**	20	4	1.8	1.8	2.5	50
6	450	400	60	SOT-82	**SGS911**	20	4	1.8	1.8	2.5	50
6	500	450	60	TO-220	**BU912**	20	4	1.8	1.8	2	50
6	500	450	60	SOT-82	**SGS912**	20	4	1.8	1.8	2	50
8	650	400	70	TO-220	**SGSD00020** (1)	7000	1	5	4	3	3
10	400	350	105	SOT-93	**BU920P**	50	7	1.8	1.8	5	50
10	450	400	105	SOT-93	**BU921P**	50	7	1.8	1.8	5	50
10	500	450	105	SOT-93	**BU922P**	50	7	1.8	1.8	5	50
10	400	350	125	TO-3	**BU920**	50	7	1.8	1.8	5	50
10	450	400	125	TO-3	**BU921**	50	7	1.8	1.8	5	50
10	500	450	125	TO-3	**BU922**	50	7	1.8	1.8	5	50
15	350	350	150	SOT-93	**BU930ZP** • (2)	80	8	1.8	2	10	150
15	350	350	175	TO-3	**BU930Z** • (2)	80	8	1.8	2	10	150
15	400	350	105	SOT-93	**BU930P**	40	10	1.8	1.8	8	100
15	450	400	105	SOT-93	**BU931P**	40	10	1.8	1.8	8	100
15	450	400	105	SOT-93	**BU931RP** *	40	10	1.8	1.8	8	100
15	500	450	105	SOT-93	**BU932P**	53	8	1.8	1.8	8	150
15	500	450	105	SOT-93	**BU932RP**	53	8	1.8	1.8	8	150
15	450	400	175	TO-3	**BU931R** *	40	10	1.8	1.8	8	100
15	500	450	175	TO-3	**BU932R**	53	8	1.8	1.8	8	150

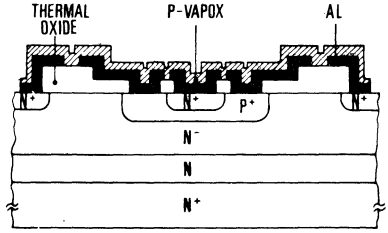
(•) BU930Z and BU930ZP zener diode is guaranteed to clamp the collector voltage before transistor breakdown is reached.
(*) BU931R and BU931RP series are specially designed for regulated current applications.

POWER DARLINGTONS

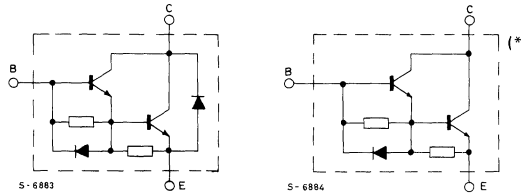
HIGH VOLTAGE FAST SWITCHING

MULTIEPITAXIAL PLANAR - I_{CM} 2 to 28A; V_{CEO} 350 to 400V

NPN types
I_C range up to 28A
Monolithic speed-up diode
Very low leakage
High switching speed
High $E_{s/b}$ capability
Total base-collector passivation



INTERNAL SCHEMATIC DIAGRAMS



MULTIEPITAXIAL PLANAR (NPN)

I_C (A)	V_{CBO} (V)	V_{CEO} (V)	P_{tot} (W)	Package	TYPE	@ h_{FE} (min)	@ I_C (A)	@ V_{CE} (V)	V_{CEsat} max (V)	@ I_C (A)	@ I_B (mA)
3	600	400	35	SOT-32	**BU801**	100	1	3	2.2	1	15
7	600	400	75	TO-220	**BU810**	100	2	2	2.5	4	200
16	450	350	125	SOT-93	**SGS10004P**	40	8	5	1.8	8	400
16	450	350	175	TO-3	**SGS10004**	40	8	5	1.8	8	400
16	500	400	125	SOT-93	**SGS10005P**	40	8	5	1.8	8	400
16	500	400	175	TO-3	**SGS10005**	40	8	5	1.8	8	400
20	400	350	150	SOT-93	**MJ10004P**	50	5	5	1.9	10	400
20	400	350	175	TO-3	**MJ10004**	50	5	5	1.9	10	400
20	450	400	150	SOT-93	**MJ10005P**	50	5	5	1.9	10	400
20	450	400	175	TO-3	**MJ10005**	50	5	5	1.9	10	400
28	650	400	150	SOT-93	**SGSD00030** *	120	12	2.5	2.5	12	100
28	650	400	150	TO-3	**SGSD00031** *	120	12	2.5	2.5	12	100
28	600	400	150	SOT-93	**SGSD311** *	30	10	5	2.5	18	1800
28	600	400	150	TO-3	**SGSD310** *	30	10	5	2.5	18	1800

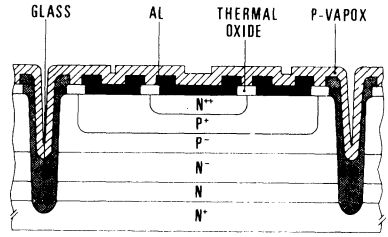
*Without parasitic CE diode

POWER TRANSISTORS

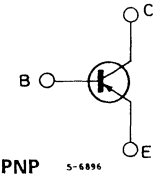
HIGH VOLTAGE FAST SWITCHING

MULTIEPITAXIAL MESA - I_{CM} 1.5 to 30A; V_{CEO} 300 to 700V

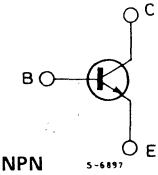
NPN and PNP types
High voltage (V_{CBO} up to 1200V)
High power
Very good $I_{s/b}$ and $E_{s/b}$ performance
High switching speed
Good stability



INTERNAL SCHEMATIC DIAGRAMS



PNP 5-6896



NPN 5-6897

MULTIEPITAXIAL MESA

I_C (A)	V_{CBO} (V)	V_{CEO} (V)	P_{tot} (W)	Package	TYPE NPN	TYPE PNP	@ h_{FE} (min)	@ I_C (A)	@ V_{CE} (V)	V_{CEsat} max (V)	@ I_C (A)	@ I_B (mA)
1.5	600	300	50	SOT-82	**SGS13002**		5	1	2	1	1	250
1.5	600	300	50	TO-220	**SGS13002T**		5	1	2	1	1	250
1.5	700	400	50	SOT-82	**SGS13003**		5	1	2	1	1	250
1.5	700	400	50	TO-220	**SGS13003T**		5	1	2	1	1	250
2	800	400	40	TO-220	**BUX84**		5	1	3	1.5	0.3	30
2	800	400	40	TO-220	**BUX84A**		5	1	1	0.8	0.3	30
2	1000	450	40	TO-220	**BUX85**		5	1	1	1	1	200
4	600	300	75	TO-220	**MJE13004**		10	1	5	0.6	2	500
4	700	400	75	TO-220	**MJE13005**		10	1	5	0.6	2	500
5	350	250	80	TO-220	**2N6497**		10	2.5	10	1	1.5	500
5	350	250	100	SOT-93	**TIP51**		10	3	10	1.5	3	600
5	400	300	80	TO-220	**2N6498**		10	2	10	1.25	2.5	500
5	400	300	100	SOT-93	**TIP52**		10	3	10	1.5	3	600
5	450	350	80	TO-220	**2N6499**		10	2.5	10	1.5	2.5	500
5	450	350	100	SOT-93	**TIP53**		10	3	10	1.5	3	600
5	500	400	100	SOT-93	**TIP54**		10	3	10	1.5	3	600
5	850	400	85	TO-220	**BUV46**		5	3.5	5	1.5	2.5	500

POWER TRANSISTORS

MULTIEPITAXIAL MESA (continued)

I_C (A)	V_{CBO} (V)	V_{CEO} (V)	P_{tot} (W)	Package	TYPE NPN	TYPE PNP	@ h_{FE} (min)	@ I_C (A)	@ V_{CE} (V)	V_{CEsat} max (V)	@ I_C (A)	@ I_B (mA)
5	850	400	100	TO-220	**BUT11**		5	3	1.5	1.5	3	600
5	850	400	100	SOT-93	**BUW11**		5	3	1.5	1.5	3	600
5	1000	450	100	TO-220	**BUT11A**		5	2.5	1.5	1.5	2.5	500
5	1000	450	100	SOT-93	**BUW11A**		5	2.5	1.5	1.5	2.5	500
6	400	350	60	TO-220		**BUW22P**	12	0.5	5	1.5	2.5	1000
6	400	350	75	TO-3		**BUW22**	12	0.5	5	1.5	2.5	1000
6	450	400	60	TO-220		**BUW22AP**	12	0.5	5	1.5	2.5	1000
6	450	400	75	TO-3		**BUW22A**	12	0.5	5	1.5	2.5	1000
6	800	375	75	TO-3	**BU326***		25	1	5	1.5	2.5	500
6	800	375	113	SOT-93	**BU426***		25	1	5	1.5	2.5	500
6	800	400	60	TO-3	**BU326S**		3.5	4	5	1.5	2.5	500
6	900	400	75	TO-3	**BU326A***		15	1	5	1.5	2.5	500
6	900	400	113	SOT-93	**BU426A***		15	0.6	5	1.5	2.5	500
8	600	300	80	TO-220	**MJE13006**		8	2	5	1.5	5	1000
8	450	400	80	TO-220		**MJE5852**	15	2	5	2	4	1000
8	450	400	120	TO-3	**BUX44**		8	4	4	1.5	4	800
8	700	400	80	TO-220	**MJE13007**		8	2	5	1.5	5	1000
8	850	400	80	TO-220	**MJE13007A**		8	2	5	1.5	5	1000
8	850	400	125	SOT-93	**BUW12**		5	6	1.5	1.5	6	1200
8	850	400	125	TO-3	**BUS12**		5	6	1.5	1,5	6	1200
8	850	400	125	TO-3	**2N6545**		4	8	5	1.5	5	1000
8	1000	450	125	SOT-93	**BUW12A**		5	5	1.5	1.5	5	1000
8	1000	450	125	TO-3	**BUS12A**		5	5	1.5	1.5	5	1000
9	850	400	120	SOT-93	**BUV47**		3.2	8	3	1.5	5	1000
9	850	400	125	TO-3	**BUX47**		3	9	3	1.5	6	1200
9	1000	450	120	SOT-93	**BUV47A**		3.2	8	3	1.5	5	1000
9	1000	450	120	TO-3	**BUX47A**		3	9	3	1.5	6	1200
10	800	325	100	TO-3	**BUY69B**		15	2.5	10	3.3	8	2500
10	400	350	105	TO-220		**BUW32P**	12	1	5	1.5	5	1500
10	400	350	125	TO-3		**BUW32**	12	1	5	1.5	5	1500
10	450	400	105	TO-220		**BUW32AP**	12	1	5	1.5	5	1500
10	450	400	125	TO-3		**BUW32A**	12	1	5	1.5	5	1500
10	325	400	120	TO-3	**BUX43**		8	5	4	2	5	1000
10	450	400	150	TO-3	**BUX14**		8	6	4	1.6	6	1200
10	500	400	125	TO-3	**BUW34**		15	1	5	1.5	5	1000
10	800	400	100	TO-3	**BUX80**		5	5	1.5	1.5	5	1000
10	800	400	125	TO-3	**BUW35**		15	1	5	1.5	5	1000
10	1000	400	100	TO-3	**BUY69A**		15	2.5	10	3.3	8	2500
10	900	450	125	TO-3	**BUW36**		15	1	5	1.5	5	1000
12	600	300	100	TO-220	**MJE13008**		8	5	5	1.5	8	1600
12	700	400	100	TO-220	**MJE13009**		8	5	5	1.5	8	1600

POWER TRANSISTORS

MULTIEPITAXIAL MESA (continued)

I_C (A)	V_{CBO} (V)	V_{CEO} (V)	P_{tot} (W)	Package	TYPE NPN	TYPE PNP	@ h_{FE} (min)	@ I_C (A)	V_{CE} (V)	@ $V_{CE sat}$ max (V)	@ I_C (A)	I_B (mA)
15	400	350	105	TO-220		**BUW42P**	12	3	5	1.5	10	3000
15	400	350	150	TO-3		**BUW42**	12	3	5	1.5	10	3000
15	450	400	105	TO-220		**BUW42AP**	12	3	5	1.5	10	3000
15	450	400	150	TO-3		**BUW42A**	12	3	5	1.5	10	3000
15	400	325	160	TO-3	**BUX13**		8	8	4	1.5	8	1600
15	500	400	175	TO-3	**BUW44**		6	6	1.5	3	10	2000
15	800	400	175	TO-3	**BUW45**		7	7	1.5	1.5	10	2000
15	850	400	150	SOT-93	**BUW13**		5	10	1.5	1.5	10	2000
15	850	400	150	SOT-93	**BUV48**		5	15	5	1.5	10	2000
15	850	400	175	TO-3	**2N6547**		5	15	5	1.5	10	2000
15	850	400	175	TO-3	**BUX48**		5	15	3	1.5	10	2000
15	850	400	175	TO-3	**BUS13**		5	10	2	1.5	10	2000
15	900	450	175	TO-3	**BUW46**		7	7	1.5	1.5	10	2000
15	1000	450	150	SOT-93	**BUV48A**		5	12	5	1.5	8	1600
15	1000	450	150	SOT-93	**BUW13A**		5	8	1.5	1.5	8	1600
15	1000	450	175	TO-3	**BUX48A**		5	12	3	1.5	8	1600
15	1000	450	175	TO-3	**BUS13A**		5	8	1.6	1.8	8	1600
15	500	500	250	TO-3	**BUV25**		15	4	4	1	8	1600
15	1200	600	150	SOT-93	**BUV48B**		15	1	10	2	8	2500
15	1200	600	175	TO-3	**BUX48B**		15	1	10	2	8	2500
15	1200	700	150	SOT-93	**BUV48C**		2.5	10	3	1.5	6	1500
15	1200	700	175	TO-3	**BUX48C**		2.5	10	3	1.5	6	1500
20	450	400	250	TO-3	**BUV24**		15	6	4	1	12	2400
30	400	325	250	TO-3	**BUV23**		15	8	4	1	16	3200
30	850	400	250	TO-3	**BUS14**		5	20	1.5	1.5	20	4000
30	850	400	250	TO-3	**BUX98**		5	20	1.5	1.5	20	4000
30	1000	450	250	TO-3	**BUS14A**		5	16	1.5	1.5	16	3200
30	1000	450	250	TO-3	**BUX98A**		5	16	1.5	1.5	16	3200
30	500	500	350	TO-3	**BUX25**		8	8	4	1	8	1600
30	1000	600	250	TO-3	**BUX98B**		4	12	1.5	1.5	12	3000
30	1200	700	250	TO-3	**BUX98C**		4	12	1.5	1.5	12	3000

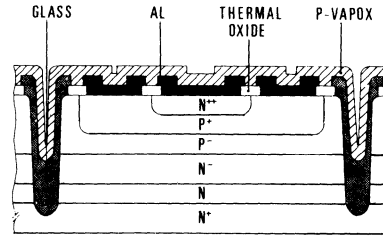
* h_{FE} is typical

POWER TRANSISTORS

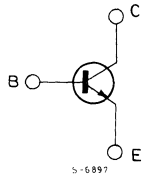
COLOUR DEFLECTION CIRCUITS

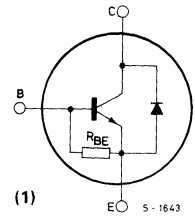
MULTIEPITAXIAL MESA - I_{CM} 8A; V_{CEO} 700V

NPN types
High voltage (V_{CBO} up to 1500V)
High power
Very good $I_{s/b}$ and $E_{s/b}$ performance
High switching speed
Good stability



INTERNAL SCHEMATIC DIAGRAMS





(1)

MULTIEPITAXIAL MESA (NPN)

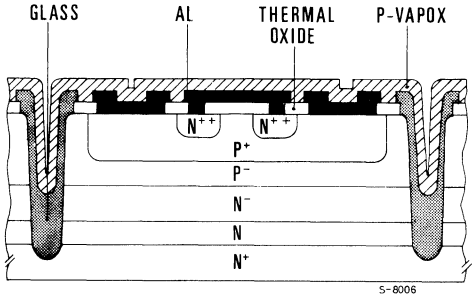
I_C (A)	V_{CBO} (V)	V_{CEO} (V)	P_{tot} (W)	Package	TYPE		@ h_{FE} (min)	@ I_C (A)	@ V_{CE} (V)	@ V_{CEsat} max (V)	@ I_C (A)	@ I_B (mA)
8	1500	700	125	SOT-93	**BU508**		2.25	4.5	5	5	4.5	2000
8	1500	700	125	SOT-93	**BU508A**		2.25	4.5	1	1	4.5	2000
8	1500	700	125	SOT-93	**BU508D**	(1)	2.25	4.5	1	1	4.5	2000
8	1500	700	150	TO-3	**BU208**		2.25	4.5	5	5	4.5	2000
8	1500	700	150	TO-3	**BU208A**		2.25	4.5	1	1	4.5	2000
8	1500	700	150	TO-3	**BU208D**	(1)	2.25	4.5	1	1	4.5	2000

POWER TRANSISTORS

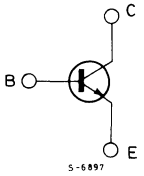
HIGH VOLTAGE VERY FAST SWITCHING

MULTIEPITAXIAL MESA FASTSWITCH™ - I_{CM} 5 to 12A; V_{CEO} 400 to 450V

Suitable for 50KHz to 100KHz switching power supplies
NPN types
High voltage (V_{CBO} up to 1000V)
High power
Very good $I_{s/b}$ and $E_{s/b}$ performance
Very high switching speed
Good stability



INTERNAL SCHEMATIC DIAGRAM



MULTIEPITAXIAL MESA FASTSWITCH™ (NPN)

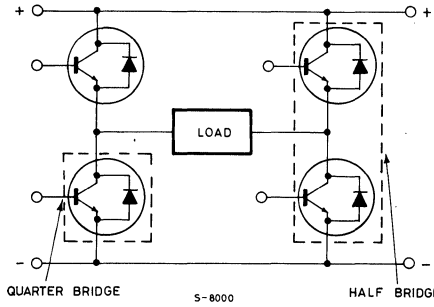
I_C (A)	V_{CBO} (V)	V_{CEO} (V)	P_{tot} (W)	Package	TYPE	@ h_{FE} (min)	@ I_C (A)	@ V_{CE} (V)	V_{CEsat} max (V)	@ I_C (A)	@ I_B (mA)
5	700	400	90	TO-220	**SGSD00042**	4	4	1	1	4	1000
5	1000	450	90	TO-220	**SGSD00044**	4	3.2	1	1	3.2	800
8	700	400	90	TO-220	**SGSD00040**	5	6	1.5	1.5	6	1200
8	700	400	120	SOT-93	**SGSD00037**	5	6	1.5	1.5	6	1200
8	700	400	120	TO-3	**SGSD00036**	5	6	1.5	1.5	6	1200
8	1000	450	90	TO-220	**SGSD00041**	5	6	1.5	1.5	6	1200
8	1000	450	120	SOT-93	**SGSD00039**	5	6	1.5	1.5	6	1200
8	1000	450	120	TO-3	**SGSD00038**	5	6	1.5	1.5	6	1200
12	700	400	150	SOT-93	**SGSD00033**	5	10	1.5	1.5	10	2000
12	700	400	175	TO-3	**SGSD00032**	5	10	1.5	1.5	10	2000
12	1000	450	150	SOT-93	**SGSD00035**	5	8	1.5	1.5	8	1600
12	1000	450	175	TO-3	**SGSD00034**	5	8	1.5	1.5	8	1600

POWER TRANSISTORS

POWER MODULES

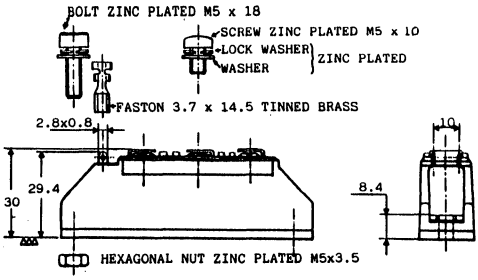
- A FRIENDLY FACE: the TO-240-AA is a well established outline in the industrial electronics field.
- SGS offers a WIDE CHOICE of transistors in different configurations to cope with the different application requirements.
- HIGH QUALITY AND RELIABILITY is insured by the proven high volume transistor tecnology of SGS power discretes.
- OPTIMUM INTERNAL BALANCE has the been achieved by an optimized internal layout via computer simulation and direct verification.
- LOW OPERATING TEMPERATURE is the result both of optimization by infrared direct analysis of the assembly structure and of minimum switching losses using very fast transistor and diode chips.

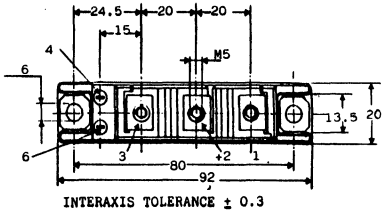
HIGHER POWER SWITCHING FULL BRIDGE CONFIGURATION



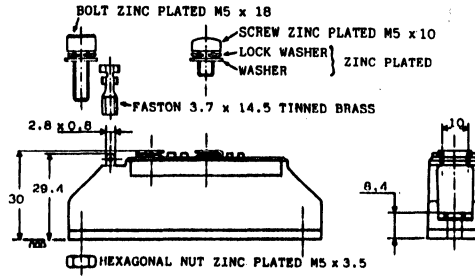
MECHANICAL DATA (Dimensions in mm)

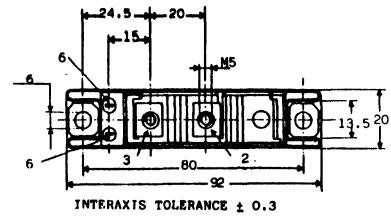
TO-240-AA for half bridge configuration





TO-240-AA for quarter bridge configuration



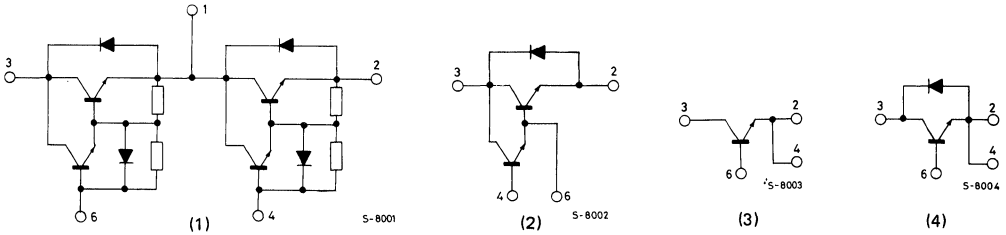


POWER TRANSISTORS

- DC MOTOR CONTROLS & UPS
- AC MOTOR CONTROLS
- OFF LINE SMPS
- UNINDERRUPTABLE POWER SUPPLIES

High power handling capability (current up to 120A, voltage up to 1200V)
Very fast switching
Easy driving
Internal insulation @ 2.5KV
Very fast freewheeling diode

INTERNAL SCHEMATIC DIAGRAMS



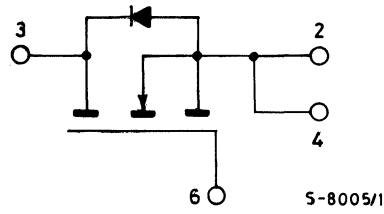
I_C (A)	V_{CBO} (V)	V_{CEO} (V)	P_{tot} (W)	Configuration	TYPE	@ h_{FE} (min)	@ I_C (A)	@ V_{CE} (V)	V_{CEsat} max (V)	@ I_C (A)	I_B (mA)
23	1000	700	300	1	**SGS15DB070D**	15	15	5	3	15	1500
23	1200	800	300	1	**SGS15DB080D**	15	15	5	3	15	1500
37	1000	700	300	1	**SGS25DB070D**	30	25	5	3	25	2500
37	1200	800	300	1	**SGS25DB080D**	30	25	5	3	25	2500
45	500	400	300	1	**SGS30DB040D**	40	30	5	3	30	2000
45	600	450	300	1	**SGS30DB045D**	40	30	5	3	30	2000
45	1000	600	300	2	**SGS30DA060D**	80	30	5	2.5	30	1500
45	1200	700	300	2	**SGS30DA070D**	80	30	5	2.5	30	1500
60	850	450	300	3	**SGS40TA045**	7	40	3	2	40	8000
60	850	450	300	4	**SGS40TA045D**	7	40	3	2	40	8000
75	500	400	300	1	**SGS50DB040D**	70	50	5	3	50	5000
75	600	450	300	1	**SGS50DB045D**	70	50	5	3	50	5000
75	850	450	300	2	**SGS50DA045D**	80	50	5	2.5	50	2000
120	300	200	300	2	**SGS80DA020D**	500	80	5	2	80	1000

POWER MOS MODULES

- DC MOTOR CONTROL
- AC MOTOR CONTROL
- VERY HIGH FREQUENCY SMPS

High power handling capability (current up to 100A, voltage up to 500V)
Extremely low drive power requirements
Extremely low on-resistance
Ultra fast switching
Internal insulation @2.5KV
Optimum thermal and electrical balance

INTERNAL SCHEMATIC DIAGRAM



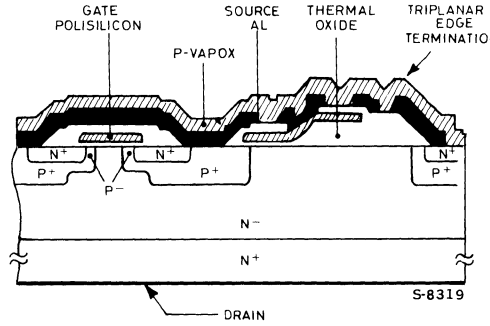
$V_{(BR)DSS}$ (V)	$R_{DS(on)}$ (Ω) @	I_D (A)	TYPE	I_D(max) (A)	P_{tot} (W)	g_{fs} (℧)	C_{iss} (pF)
100	0.018	50	**SGS100MA010D1**	100	300	36	7200
500	0.250	15	**SGS30MA050D1**	30	300	36	700

N-CHANNEL POWER MOS TRANSISTORS

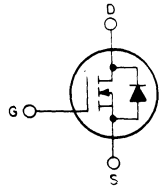
VERY FAST SWITCHING AND/OR EASY DRIVING

Very fast switching and/or easy driving:

- SMPS
- DC-DC CONVERTERS
- SYNCHRONOUS RECTIFIERS
- DRIVERS



INTERNAL SCHEMATIC DIAGRAM



SEF ≡ IRF
SEFP ≡ MTP
SEFM ≡ MTM

$V_{(BR)DSS}$ (V)	$R_{DS(on)}$ (max) (Ω)	@ I_D (A)	Package	Type	I_D(max) (A)	P_{tot} (W)	g_{fs}(min) (℧)	C_{iss}(max) (pF)
50	0.6	2.5	TO-220	**SEFP5N05**	5.0	50	0.75	250
50	0.3	3.5	SOT-82	**SGSP258**	7.0	40	1.5	270
50	0.3	3.5	TO-220	**SGSP358**	7.0	50	1.5	270
50	0.3	3.5	TO-39	**SGSP158**	5.0	15	1.5	270
50	0.28	5.0	TO-220	**SEFP10N05**	10.0	75	2.5	550
50	0.28	5.0	TO-3	**SEFM10N05**	10.0	75	2.5	550
50	0.2	6.0	TO-220	**SEFP12N05**	12.0	75	3.0	550
50	0.2	6.0	TO-3	**SEFM12N05**	12.0	75	3.0	550
50	0.16	7.5	TO-220	**SEFP15N05**	15.0	75	3.5	550
50	0.16	7.5	TO-3	**SEFM15N05**	15.0	75	3.5	550
50	0.13	5.0	SOT-82	**SGSP222**	10.0	50	3.0	550
50	0.13	5.0	SOT-93	**SGSP422**	10.0	75	3.0	550
50	0.13	5.0	TO-220	**SGSP322**	10.0	75	3.0	550
50	0.13	5.0	TO-3	**SGSP522**	10.0	75	3.0	550
50	0.13	3.5	TO-39	**SGSP122**	7.0	15	2.5	550
50	0.12	6.0	TO-220	**BUZ10A**	12.0	75	3.0	550
50	0.12	6.0	TO-220	**BUZ71A**	12.0	40	3.0	550
50	0.1	6.0	TO-220	**BUZ10**	12.0	75	3.0	550
50	0.1	6.0	TO-220	**BUZ71**	12.0	40	3.0	550
50	0.08	12.5	TO-220	**SEFP25N05**	25.0	100	5.0	1400
50	0.08	12.5	TO-3	**SEFM25N05**	25.0	100	5.0	1400
50	0.06	12.0	SOT-93	**SGSP482**	24.0	125	5.0	1400
50	0.06	12.0	TO-220	**SGSP382**	24.0	100	5.0	1400

N-CHANNEL POWER MOS TRANSISTORS

VERY FAST SWITCHING AND/OR EASY DRIVING (continued)

$V_{(BR)DSS}$ (V)	$R_{DS(on)}$ (max) (Ω) @	I_D (A)	Package	Type	I_D(max) (A)	P_{tot} (W)	g_{fs}(min) (℧)	C_{iss}(max) (pF)
50	0.06	12.0	TO-3	**SGSP582**	24.0	125	5.0	1400
50	0.055	17.5	SOT-93	**SEFH35N05**	35.0	150	8.0	2500
50	0.055	17.5	TO-3	**SEFM35N05**	35.0	150	8.0	2500
50	0.033	20.0	SOT-93	**SGSP492**	40.0	150	10.0	2400
50	0.033	20.0	TO-3	**SGSP592**	40.0	150	10.0	2400
60	0.8	2.0	TO-220	**SEF513**	3.5	20	1.0	250
60	0.6	2.0	TO-220	**SEF511**	4.0	20	1.0	250
60	0.6	2.5	TO-220	**SEFP5N06**	5.0	50	0.75	250
60	0.4	4.0	TO-220	**SEF523**	7.0	40	1.5	480
60	0.4	4.0	TO-3	**SEF123**	7.0	40	1.5	480
60	0.4	3.0	TO-39	**SEFF123**	5.0	20	1.5	480
60	0.3	3.5	SOT-82	**SGSP257**	7.0	40	1.5	270
60	0.3	4.0	TO-220	**SEF521**	8.0	40	1.5	480
60	0.3	3.5	TO-220	**SGSP357**	7.0	50	1.5	270
60	0.3	4.0	TO-3	**SEF121**	8.0	40	1.5	480
60	0.3	3.0	TO-39	**SEFF121**	6.0	20	1.5	480
60	0.3	3.5	TO-39	**SGSP157**	5.0	15	1.5	270
60	0.28	5.0	TO-220	**SEFP10N06**	10.0	75	2.5	550
60	0.28	5.0	TO-3	**SEFM10N06**	10.0	75	2.5	550
60	0.25	8.0	TO-220	**SEF533**	12.0	75	3.0	1200
60	0.25	8.0	TO-3	**SEF133**	12.0	75	4.0	1200
60	0.2	6.0	TO-220	**SEFP12N06**	12.0	75	3.0	550
60	0.2	6.0	TO-3	**SEFM12N06**	12.0	75	3.0	550
60	0.18	8.0	TO-220	**SEF531**	14.0	75	3.0	1200
60	0.18	8.0	TO-3	**SEF131**	14.0	75	4.0	1200
60	0.16	7.5	TO-220	**SEFP15N06**	15.0	75	3.5	1200
60	0.16	7.5	TO-3	**SEFM15N06**	15.0	75	3.5	550
60	0.13	5.0	SOT-82	**SGSP221**	10.0	50	3.0	550
60	0.13	5.0	SOT-93	**SGSP421**	10.0	75	3.0	550
60	0.13	5.0	TO-220	**SGSP321**	10.0	75	3.0	550
60	0.13	5.0	TO-3	**SGSP521**	10.0	75	3.0	550
60	0.13	3.5	TO-39	**SGSP121**	7.0	15	2.5	550
60	0.11	12.0	TO-220	**SEF543**	24.0	125	5.0	1600
60	0.11	15.0	TO-3	**SEF143**	24.0	125	6.0	2200
60	0.085	15.0	TO-220	**SEF541**	27.0	125	5.0	1600
60	0.085	15.0	TO-3	**SEF141**	27.0	125	6.0	2200
60	0.08	12.5	TO-220	**SEFP25N06**	25.0	100	5.0	1400
60	0.08	20.0	TO-3	**SEF153**	33.0	150	9.0	2200
60	0.08	12.5	TO-3	**SEFM25N06**	25.0	100	5.0	1400
60	0.06	12.0	SOT-93	**SGSP481**	24.0	125	5.0	1400
60	0.06	12.0	TO-220	**SGSP381**	24.0	100	5.0	1400
60	0.06	12.0	TO-3	**SGSP581**	24.0	125	5.0	1400
60	0.055	17.5	SOT-93	**SEFH35N06**	35.0	150	8.0	2500
60	0.055	20.0	TO-3	**SEF151**	40.0	150	9.0	2200

N-CHANNEL POWER MOS TRANSISTORS

VERY FAST SWITCHING AND/OR EASY DRIVING (continued)

$V_{(BR)DSS}$ (V)	$R_{DS(on)}$ (max) (Ω) @	I_D (A)	Package	Type	I_D (max) (A)	P_{tot} (W)	g_{fs} (min) (℧)	C_{iss} (max) (pF)
60	0.055	17.5	TO-3	**SEFM35N06**	35.0	150	8.0	2500
60	0.05	20.0	SOT-93	**SGSP491**	40.0	150	10.0	2400
60	0.05	20.0	TO-3	**SGSP591**	40.0	150	10.0	2400
80	1.4	0.75	SOT-82	**SGSP202**	1.5	18	0.5	125
80	1.4	0.75	TO-220	**SGSP302**	1.5	18	0.5	125
80	1.4	0.75	TO-39	**SGSP102**	1.5	15	0.5	125
80	0.45	2.5	SOT-82	**SGSP252**	5.0	40	1.5	250
80	0.45	2.5	TO-220	**SGSP352**	5.0	50	1.5	250
80	0.45	2.5	TO-39	**SGSP152**	5.0	15	1.5	250
80	0.33	5.0	TO-220	**SEFP10N08**	10.0	75	2.5	480
80	0.33	5.0	TO-3	**SEFM10N08**	10.0	75	2.5	480
80	0.3	3.5	SOT-82	**SGSP212**	7.0	50	2.0	480
80	0.3	3.5	TO-220	**SGSP312**	7.0	75	2.0	480
80	0.3	3.5	TO-3	**SGSP512**	7.0	75	2.0	480
80	0.3	2.5	TO-39	**SGSP112**	5.0	15	2.0	480
80	0.25	6.0	TO-220	**SEFP12N08**	12.0	75	3.0	1200
80	0.25	6.0	TO-3	**SEFM12N08**	12.0	75	3.0	1200
80	0.1	8.0	SOT-93	**SGSP462**	16.0	125	4.5	1200
80	0.1	8.0	TO-220	**SGSP362**	16.0	100	4.5	1200
80	0.1	8.0	TO-3	**SGSP562**	16.0	125	4.5	1200
80	0.075	12.5	SOT-93	**SEFH25N08**	25.0	150	5.0	2200
80	0.075	12.5	TO-3	**SEFM25N08**	25.0	150	5.0	2200
80	0.05	15.0	SOT-93	**SGSP472**	30.0	150	9.0	2200
80	0.05	15.0	TO-3	**SGSP572**	30.0	150	9.0	2200
100	1.4	0.75	SOT-82	**SGSP201**	1.5	18	0.5	125
100	1.4	0.75	TO-220	**SGSP301**	1.5	18	0.5	125
100	1.4	0.75	TO-39	**SGSP101**	1.5	15	0.5	125
100	0.8	2.0	TO-220	**SEF512**	3.5	20	1.0	250
100	0.6	2.0	TO-220	**SEF510**	4.0	20	1.0	250
100	0.45	2.5	SOT-82	**SGSP251**	5.0	40	1.5	250
100	0.45	2.5	TO-220	**SGSP351**	5.0	50	1.5	250
100	0.45	2.5	TO-39	**SGSP151**	5.0	15	1.5	250
100	0.4	4.0	TO-220	**SEF522**	7.0	40	1.5	480
100	0.4	4.0	TO-3	**SEF122**	7.0	40	1.5	480
100	0.4	3.0	TO-39	**SEFF122**	5.0	20	1.5	480
100	0.33	5.0	TO-220	**SEFP10N10**	10.0	75	2.5	480
100	0.33	5.0	TO-3	**SEFM10N10**	10.0	75	2.0	480
100	0.3	3.5	SOT-82	**SGSP211**	7.0	50	2.0	480
100	0.3	4.0	TO-220	**SEF520**	8.0	40	1.5	480
100	0.3	3.5	TO-220	**SGSP311**	7.0	75	2.0	480
100	0.3	4.0	TO-3	**SEF120**	8.0	40	1.5	480
100	0.3	3.5	TO-3	**SGSP511**	7.0	75	2.0	480
100	0.3	3.0	TO-39	**SEFF120**	6.0	20	1.5	480

N-CHANNEL POWER MOS TRANSISTORS

VERY FAST SWITCHING AND/OR EASY DRIVING (continued)

$V_{(BR)DSS}$ (V)	$R_{DS(on)}$ (max) (Ω)	@ I_D (A)	Package	Type	1_D (max) (A)	P_{tot} (W)	g_{fs} (min) (℧)	C_{iss} (max) (pF)
100	0.3	2.5	TO-39	**SGSP111**	5.0	15	2.0	480
100	0.25	5.0	TO-220	**BUZ72A**	9.0	40	2.7	480
100	0.25	8.0	TO-220	**SEF532**	12.0	75	4.0	1200
100	0.25	6.0	TO-220	**SEFP12N10**	12.0	75	3.0	1200
100	0.25	8.0	TO-3	**SEF132**	12.0	75	4.0	1200
100	0.25	6.0	TO-3	**SEFM12N10**	12.0	75	3.0	1200
100	0.18	8.0	TO-220	**SEF530**	14.0	75	4.0	1200
100	0.18	8.0	TO-3	**SEF130**	14.0	75	4.0	1200
100	0.15	8.0	SOT-93	**SGSP461**	16.0	125	4.5	1200
100	0.15	8.0	TO-220	**SGSP361**	16.0	100	4.5	1200
100	0.15	8.0	TO-3	**SGSP561**	16.0	125	4.5	1200
100	0.11	15.0	TO-220	**SEF542**	24.0	125	5.0	1600
100	0.11	15.0	TO-3	**SEF142**	24.0	125	6.0	2200
100	0.085	15.0	TO-3	**SEF140**	27.0	125	6.0	2200
100	0.08	20.0	TO-3	**SEF152**	33.0	150	9.0	2200
100	0.075	12.5	SOT-93	**SEFH25N10**	25.0	150	5.0	2200
100	0.075	15.0	SOT-93	**SGSP471**	30.0	150	9.0	2200
100	0.075	12.5	TO-3	**SEFM25N10**	25.0	150	5.0	2200
100	0.075	15.0	TO-3	**SGSP571**	30.0	150	9.0	2200
100	0.055	20.0	TO-3	**SEF150**	40.0	150	9.0	2200
150	1.2	2.5	TO-220	**SEF623**	4.0	40	1.3	500
150	1.2	2.5	TO-3	**SEF223**	4.0	40	1.3	500
150	0.8	2.5	TO-220	**SEF621**	5.0	40	1.3	500
150	0.8	2.5	TO-3	**SEF221**	5.0	40	1.3	500
150	0.6	5.0	TO-220	**SEF633**	8.0	75	3.0	1200
150	0.6	5.0	TO-3	**SEF233**	8.0	75	3.0	1200
150	0.4	5.0	TO-220	**SEF631**	9.0	75	3.0	1200
150	0.4	5.0	TO-3	**SEF231**	9.0	75	3.0	1200
150	0.22	10.0	TO-3	**SEF243**	16.0	125	6.0	2200
150	0.18	10.0	TO-3	**SEF241**	18.0	125	6.0	2200
180	1.0	2.5	TO-220	**SEFP5N18**	5.0	75	1.5	500
180	1.0	2.5	TO-3	**SEFM5N18**	5.0	75	1.5	500
180	0.4	4.0	TO-220	**SEFP8N18**	8.0	75	3.0	1200
180	0.4	4.0	TO-3	**SEFM8N18**	8.0	75	3.0	1200
180	0.16	7.5	SOT-93	**SEFH15N18**	15.0	150	4.0	2500
180	0.16	7.5	TO-3	**SEFM15N18**	15.0	150	4.0	2500
200	1.2	2.5	TO-220	**SEF622**	4.0	40	1.3	500
200	1.2	2.5	TO-3	**SEF222**	4.0	40	1.3	500
200	1.0	2.5	TO-220	**SEFP5N20**	5.0	75	1.5	500
200	1.0	2.5	TO-3	**SEFM5N20**	5.0	75	1.5	500
200	0.8	2.5	TO-220	**SEF620**	5.0	40	1.3	500
200	0.8	2.5	TO-3	**SEF220**	5.0	40	1.3	500
200	0.75	3.0	SOT-82	**SGSP217**	6.0	50	1.5	500

N-CHANNEL POWER MOS TRANSISTORS

VERY FAST SWITCHING AND/OR EASY DRIVING (continued)

$V_{(BR)DSS}$ (V)	$R_{DS(on)}$ (max) (Ω)	@ I_D (A)	Package	Type	I_D (max) (A)	P_{tot} (W)	g_{fs} (min) (℧)	C_{iss} (max) (pF)
200	0.75	3.0	TO-220	**SGSP317**	6.0	75	1.5	500
200	0.75	3.0	TO-3	**SGSP517**	6.0	75	1.5	500
200	0.75	2.0	TO-39	**SGSP117**	4.0	15	1.5	500
200	0.6	5.0	TO-220	**SEF632**	8.0	75	3.0	1200
200	0.6	5.0	TO-3	**SEF232**	8.0	75	3.0	1200
200	0.4	5.0	TO-220	**SEF630**	9.0	75	3.0	1200
200	0.4	4.0	TO-220	**SEFP8N20**	8.0	75	3.0	1200
200	0.4	5.0	TO-3	**SEF230**	9.0	75	3.0	1200
200	0.4	4.0	TO-3	**SEFM8N20**	8.0	75	3.0	1200
200	0.33	5.0	SOT-93	**SGSP467**	10.0	100	3.0	1200
200	0.33	5.0	TO-220	**SGSP367**	10.0	100	3.0	1200
200	0.33	5.0	TO-3	**SGSP567**	10.0	125	3.0	1200
200	0.22	10.0	TO-3	**SEF242**	16.0	125	6.0	2200
200	0.18	10.0	TO-3	**SEF240**	18.0	125	6.0	2200
200	0.17	10.0	SOT-93	**SGSP477**	20.0	150	8.0	2200
200	0.17	10.0	TO-3	**SGSP577**	20.0	150	8.0	2200
200	0.16	7.5	SOT-93	**SEFH15N20**	15.0	150	4.0	2500
200	0.16	7.5	TO-3	**SEFM15N20**	15.0	150	4.0	2500
250	1.2	3.0	SOT-82	**SGSP216**	6.0	50	1.5	500
250	1.2	3.0	TO-220	**SGSP316**	6.0	75	1.5	500
250	1.2	3.0	TO-3	**SGSP516**	6.0	75	1.5	500
250	1.2	2.0	TO-39	**SGSP116**	4.0	15	1.5	500
250	0.45	5.0	SOT-93	**SGSP463**	10.0	100	3.0	1200
250	0.45	5.0	TO-220	**SGSP363**	10.0	100	3.0	1200
250	0.45	5.0	TO-3	**SGSP563**	10.0	125	3.0	1200
250	0.22	10.0	SOT-93	**SGSP473**	20.0	150	8.0	2200
250	0.22	10.0	TO-3	**SGSP573**	20.0	150	8.0	2200
350	20.0	0.3	SOT-82	**SGSP242**	0.6	18	0.2	105
350	20.0	0.3	TO-220	**SGSP342**	0.6	18	0.2	105
350	20.0	0.3	TO-39	**SGSP142**	0.6	15	0.2	105
350	5.0	0.75	SOT-82	**SGSP256**	1.5	40	0.85	250
350	5.0	0.8	TO-220	**SEF713**	1.3	20	0.5	450
350	5.0	0.75	TO-220	**SGSP356**	1.5	50	0.85	250
350	5.0	0.75	TO-39	**SGSP156**	1.5	15	0.85	250
350	3.6	0.8	TO-220	**SEF711**	1.5	20	0.5	450
350	3.3	1.5	TO-220	**SEFP3N35**	3.0	75	0.75	450
350	3.3	1.5	TO-3	**SEFM3N35**	3.0	75	0.75	450
350	2.5	1.5	SOT-82	**SGSP232**	3.0	50	1.5	450
350	2.5	1.5	TO-220	**SEF723**	2.5	40	1.0	1000
350	2.5	1.5	TO-220	**SGSP332**	3.0	75	1.5	450
350	2.5	1.5	TO-3	**SEF323**	2.5	40	1.0	1000
350	2.5	1.5	TO-3	**SGSP532**	3.0	75	1.5	450
350	2.5	1.5	TO-39	**SGSP132**	3.0	15	1.5	450

N-CHANNEL POWER MOS TRANSISTORS

VERY FAST SWITCHING AND/OR EASY DRIVING (continued)

$V_{(BR)DSS}$ (V)	$R_{DS(on)}$ (max) (Ω) @	I_D (A)	Package	Type	I_D(max) (A)	P_{tot} (W)	g_{fs}(min) (℧)	C_{iss}(max) (pF)
350	2.0	2.5	TO-220	**SEFP5N35**	5.0	75	2.0	1000
350	1.8	1.5	TO-220	**SEF721**	3.0	40	1.0	1000
350	1.8	1.5	TO-3	**SEF321**	3.0	40	1.0	1000
350	1.5	3.0	TO-220	**SEF733**	4.5	75	3.0	1000
350	1.5	3.0	TO-3	**SEF333**	4.5	75	3.0	1000
350	1.0	3.0	SOT-93	**SGSP466**	6.0	125	3.0	1000
350	1.0	3.0	TO-220	**SEF731**	5.5	75	3.0	1000
350	1.0	3.0	TO-220	**SGSP366**	6.0	100	3.0	1000
350	1.0	3.0	TO-3	**SEF331**	5.5	75	3.0	1000
350	1.0	2.5	TO-3	**SEFM5N35**	5.0	75	2.0	1000
350	1.0	3.0	TO-3	**SGSP566**	6.0	125	3.0	1000
350	0.8	4.0	SOT-93	**SEFH8N35**	8.0	150	3.0	2100
350	0.8	5.0	TO-3	**SEF343**	8.0	125	4.0	2100
350	0.8	4.0	TO-3	**SEFM8N35**	8.0	150	3.0	2100
350	0.55	6.0	SOT-93	**SGSP476**	12.0	150	6.0	2100
350	0.55	5.0	TO-3	**SEF341**	10.0	125	4.0	2100
350	0.55	6.0	TO-3	**SGSP576**	12.0	150	6.0	2100
400	20.0	0.3	SOT-82	**SGSP241**	0.6	18	0.2	105
400	20.0	0.3	TO-220	**SGSP341**	0.6	75	0.2	105
400	20.0	0.3	TO-39	**SGSP141**	0.6	15	0.2	105
400	5.0	0.75	SOT-82	**SGSP255**	1.5	40	0.85	250
400	5.0	0.75	TO-220	**SGSP355**	1.5	50	0.85	250
400	5.0	0.75	TO-39	**SGSP155**	1.5	15	0.85	250
400	5.0	0.8	TO-220	**SEF712**	1.3	20	0.5	450
400	3.6	0.8	TO-220	**SEF710**	1.5	20	0.5	450
400	3.3	1.5	TO-220	**SEFP3N40**	3.0	75	0.75	450
400	3.3	1.5	TO-3	**SEFM3N40**	3.0	75	0.75	450
400	2.5	1.5	SOT-82	**SGSP231**	3.0	50	1.5	450
400	2.5	1.5	TO-220	**BUZ76A**	2.6	40	2.0	450
400	2.5	1.5	TO-220	**SEF722**	2.5	40	1.0	1000
400	2.5	1.5	TO-220	**SGSP331**	3.0	75	1.5	450
400	2.5	1.5	TO-3	**SEF322**	2.5	40	1.0	1000
400	2.5	1.5	TO-3	**SGSP531**	3.0	75	1.5	450
400	2.5	1.5	TO-39	**SGSP131**	3.0	15	1.5	450
400	1.8	1.5	TO-220	**BUZ76**	3.0	40	2.0	450
400	1.8	1.5	TO-220	**SEF720**	3.0	40	1.0	1000
400	1.8	1.5	TO-3	**SEF320**	3.0	40	1.0	1000
400	1.5	3.0	TO-220	**SEF732**	4.5	75	3.0	1000
400	1.5	3.0	TO-3	**SEF332**	4.5	75	3.0	1000
400	1.0	3.0	SOT-93	**SGSP465**	6.0	125	3.0	1000
400	1.0	3.0	TO-220	**SEF730**	5.5	75	3.0	1000
400	1.0	2.5	TO-220	**SEFP5N40**	5.0	75	2.0	1000
400	1.0	3.0	TO-220	**SGSP365**	6.0	100	3.0	1000
400	1.0	3.0	TO-3	**SEF330**	5.5	75	3.0	1000

N-CHANNEL POWER MOS TRANSISTORS

VERY FAST SWITCHING AND/OR EASY DRIVING (continued)

$V_{(BR)DSS}$ (V)	$R_{DS(on)}$ (max) (Ω)	@ I_D (A)	Package	Type	I_D (max) (A)	P_{tot} (W)	g_{fs} (min) (℧)	C_{iss} (max) (pF)
400	1.0	2.5	TO-3	SEFM5N40	5.0	75	2.0	1000
400	1.0	3.0	TO-3	SGSP565	6.0	125	3.0	1000
400	0.8	5.0	TO-3	SEF342	8.0	125	4.0	2100
400	0.55	4.0	SOT-93	SEFH8N40	8.0	150	3.0	2100
400	0.55	6.0	SOT-93	SGSP475	12.0	150	6.0	2100
400	0.55	5.0	TO-3	SEF340	10.0	125	4.0	2100
400	0.55	4.0	TO-3	SEFM8N40	8.0	150	3.0	2100
400	0.55	6.0	TO-3	SGSP575	12.0	150	6.0	2100
450	20.0	0.3	SOT-82	SGSP240	0.6	18	0.2	105
450	20.0	0.3	TO-220	SGSP340	0.6	18	0.2	105
450	20.0	0.3	TO-39	SGSP140	0.6	15	0.2	105
450	6.5	0.75	SOT-82	SGSP254	1.5	40	0.85	250
450	6.5	0.75	TO-220	SGSP354	1.5	50	0.85	250
450	6.5	0.75	TO-39	SGSP154	1.5	15	0.85	250
450	4.0	1.0	TO-220	SEF823	2.0	40	1.0	800
450	4.0	1.0	TO-220	SEFP2N45	2.0	75	1.0	500
450	4.0	1.0	TO-3	SEF423	2.0	40	1.0	800
450	4.0	1.0	TO-3	SEFM2N45	4.0	75	1.0	500
450	3.0	1.5	SOT-82	SGSP230	3.0	50	1.5	450
450	3.0	1.0	TO-220	SEF821	2.5	40	1.0	800
450	3.0	1.5	TO-220	SGSP330	3.0	75	1.5	450
450	3.0	1.0	TO-3	SEF421	2.5	40	1.0	800
450	3.0	1.5	TO-3	SGSP530	3.0	75	1.5	450
450	3.0	1.5	TO-39	SGSP130	3.0	15	1.5	450
450	2.0	2.5	TO-220	SEF833	4.0	75	2.5	1200
450	2.0	2.5	TO-3	SEF433	4.0	75	2.5	1200
450	1.5	3.0	SOT-93	SGSP464	6.0	125	3.0	1000
450	1.5	2.5	TO-220	SEF830	4.5	75	2.5	1200
450	1.5	2.5	TO-220	SEF831	4.5	75	2.5	1200
450	1.5	2.0	TO-220	SEFP4N45	4.0	75	1.5	1000
450	1.5	3.0	TO-220	SGSP364	6.0	100	3.0	1000
450	1.5	2.5	TO-3	SEF431	4.5	75	2.5	1200
450	1.5	2.0	TO-3	SEFM4N45	4.0	75	1.5	1000
450	1.5	3.0	TO-3	SGSP564	6.0	125	3.0	1000
450	1.1	4.0	TO-3	SEF443	7.0	125	4.0	2100
450	0.85	4.0	TO-3	SEF441	8.0	125	4.0	2100
450	0.8	3.5	SOT-93	SEFH7N45	7.0	150	2.0	2100
450	0.7	6.0	SOT-93	SGSP474	12.0	150	6.0	2100
450	0.8	3.5	TO-3	SEFM7N45	7.0	150	2.0	2100
450	0.7	6.0	TO-3	SGSP574	12.0	150	6.0	2100
500	40.0	0.3	SOT-82	SGSP249	0.5	18	0.18	95
500	40.0	0.3	TO-220	SGSP349	0.5	18	0.18	95
500	40.0	0.3	TO-39	SGSP149	0.5	15	0.18	95

N-CHANNEL POWER MOS TRANSISTORS

VERY FAST SWITCHING AND/OR EASY DRIVING (continued)

$V_{(BR)DSS}$ (V)	$R_{DS(on)}$ (max) (Ω) @	I_D (A)	Package	Type	I_D (max) (A)	P_{tot} (W)	g_{fs} (min) (℧)	C_{iss} (max) (pF)
500	8.5	0.6	SOT-82	**SGSP239**	1.2	40	0.65	220
500	8.5	0.6	TO-220	**SGSP339**	1.2	50	0.65	220
500	8.5	0.6	TO-39	**SGSP139**	1.2	15	0.65	220
500	4.0	1.0	TO-220	**SEF822**	2.0	40	1.0	800
500	4.0	1.0	TO-3	**SEF422**	2.0	40	1.0	800
500	3.8	1.0	SOT-82	**SGSP219**	2.0	50	1.2	380
500	3.8	1.0	TO-220	**SGSP319**	2.0	75	1.2	380
500	3.8	1.0	TO-3	**SGSP519**	2.0	75	1.2	380
500	3.8	1.0	TO-39	**SGSP119**	2.0	15	1.2	380
500	3.0	1.0	TO-220	**SEF820**	2.5	40	1.0	800
500	3.0	1.0	TO-3	**SEF420**	2.5	40	1.0	800
500	2.0	2.5	TO-220	**SEF832**	4.0	75	2.5	1200
500	2.0	2.5	TO-3	**SEF432**	4.0	75	2.5	1200
500	1.5	2.5	SOT-93	**SGSP469**	5.0	125	3.0	800
500	1.5	2.5	TO-220	**SGSP369**	5.0	100	3.0	800
500	1.5	2.5	TO-3	**SGSP569**	5.0	125	3.0	800
500	1.5	2.0	TO-220	**SEFP4N50**	4.0	75	1.5	1200
500	1.5	2.5	TO-3	**SEF430**	4,5	75	2.5	1200
500	1.5	2.0	TO-3	**SEFM4N50**	4.0	75	1.5	1200
500	1.1	4.0	TO-3	**SEF442**	7.0	125	4.0	2100
500	0.85	4.0	TO-3	**SEF440**	8.0	125	4.0	2100
500	0.8	3.5	SOT-93	**SEFH7N50**	7.0	150	2.0	1900
500	0.8	3.5	TO-3	**SEFM7N50**	7.0	150	2.0	1900
500	0.7	5.0	SOT-93	**SGSP479**	10.0	150	5.0	1900
500	0.7	5.0	TO-3	**SGSP579**	10.0	150	5.0	1900
550	40.0	0.3	SOT-82	**SGSP248**	0.5	18	0.18	95
550	40.0	0.3	TO-220	**SGSP348**	0.5	18	0.18	95
550	40.0	0.3	TO-39	**SGSP148**	0.5	15	0.18	95
550	11.0	0.6	SOT-82	**SGSP238**	1.2	40	0.65	220
550	11.0	0.6	TO-220	**SGSP338**	1.2	50	0.65	220
550	11.0	0.6	TO-39	**SGSP138**	1.2	15	0.65	220
550	4.5	1.0	SOT-82	**SGSP218**	2.0	50	1.2	380
550	4.5	1.0	TO-220	**SGSP318**	2.0	75	1.2	380
550	4.5	1.0	TO-3	**SGSP518**	2.0	75	1.2	380
550	4.5	1.0	TO-39	**SGSP118**	2.0	15	1.2	380
550	2.5	2.5	SOT-93	**SGSP468**	5.0	125	3.0	800
550	2.5	1.5	TO-220	**SEFP3N55**	3.0	75	1.5	1200
550	2.5	2.5	TO-220	**SGSP368**	5.0	100	3.0	800
550	2.5	1.5	TO-3	**SEFM3N55**	2.5	75	1.5	1600
550	2.5	2.5	TO-3	**SGSP568**	5.0	125	3.0	800
550	1.5	3.0	SOT-93	**SEFH6N55**	6.0	150	2.0	1900
550	1.5	3.0	TO-3	**SEFM6N55**	6.0	150	2.0	1900
550	1.0	5.0	SOT-93	**SGSP478**	10.0	150	5.0	1900
550	1.0	5.0	TO-3	**SGSP578**	10.0	150	5.0	1900

SMALL SIGNAL TRANSISTORS

SGS has a range of small signal silicon transistors optimized to cover the widest possible range while maintaining the high economy demanded by this market.

CONTENTS

SMALL SIGNAL TRANSISTORS

NPN GENERAL PURPOSE TRANSISTORS – TO-18

V_{CEO} V_{CER}* (V)	h_{FE} @ I_C min/max	(mA)	Type	$V_{CE(sat)}$ @ I_C (V) max	(mA)	f_T (MHz) min	t_s t_{off}* (ns)	P_{tot} (mW)	ALSO AVAILABLE
55	50/–	50	**BSX33**	0.3	150	60	800*	500	
25	75/260	100	**BC377**	0.7	500	300 typ.	–	375	
40	75/260	100	**BC378**	0.7	500	300 typ.	–	375	
30	100/300	150	**2N2222**	1.6	500	250	225	500	2N2221
40	100/300	150	**2N2222A**	1	500	250	225	500	2N2221A
50*	100/300	150	**2N956**	1.5	150	70	–	500	2N718A
55	60/180	150	**BFR18**	0.25	150	60	–	500	
80	40/–	150	**2N720A**	5	150	50	–	500	
80	100/300	150	**2N3700**	0.5	500	100 typ.	–	500	2N3302

NPN GENERAL PURPOSE TRANSISTORS – TO-39

V_{CEO} V_{CER}* (V)	h_{FE} @ I_C min/max	(mA)	Type	$V_{CE(sat)}$ @ I_C (V) max	(mA)	f_T (MHz) min	t_s t_{off}* (ns)	P_{tot} (mW)	ALSO AVAILABLE
40	40/250	100	**BC140**	0.35 typ.	500	50	850*	800	h_{FE} groups
60	40/250	100	**BC141**	0.35 typ.	500	50	850*	800	-6, -10, -16
30	40/–	150	**BFY51**	0.35	150	50	160 typ.	800	BFY52
30	100/300	150	**2N2219**	1.6	500	250	225	800	2N2218
35	30/–	150	**BFY50**	0.2	150	60	140 typ.	800	
40	50/250	150	**2N3053**	1.4	150	100 typ.	–	800	
40	100/300	150	**2N2219A**	1	500	250	225	800	2N2218A
50*	40/120	150	**2N1613**	1.5	150	60	–	800	
50*	100/300	150	**2N1711**	1.5	150	70	–	800	
55	40/120	150	**BFY56A**	0.25	150	60	800*	800	BFY56
60	40/120	150	**2N3108**	1.4	150	100 typ.	–	800	2N3110
60	100/300	150	**2N3107**	1.4	150	100 typ.	–	800	2N3109
65	40/120	150	**2N2102**	0.5	150	60	30*	1000	

SMALL SIGNAL TRANSISTORS

NPN GENERAL PURPOSE TRANSISTORS – TO-39 (continued)

V_{CEO} V_{CER}* (V)	h_{FE} @ I_C min/max	(mA)	Type	$V_{CE(sat)}$ @ I_C (V) max	(mA)	f_T (MHz) min	t_s t_{off}* (ns)	P_{tot} (mW)	ALSO AVAILABLE
80	40/120	150	**2N1893**	5	150	50	–	800	
80	40/120	150	**2N3020**	0.5	500	80 typ.	–	800	
80	100/300	150	**2N3019**	0.5	500	100 typ.	–	800	
40	40/240	500	**BC440**	1	1000	50	–	1000	
50	40/250	500	**2N5321**	0.8	500	50	800*	1000	
60	40/240	500	**BC441**	1	1000	50	–	1000	
75	30/130	500	**2N5320**	0.5	500	50	800*	1000	

PNP GENERAL PURPOSE TRANSISTORS – TO-18

V_{CEO} (V)	h_{FE} @ I_C min/max	(mA)	Type	$V_{CE(sat)}$ @ I_C/I_B (V) max	(mA)	f_T (MHz) min	t_s t_{off}* (ns)	P_{tot} (mW)	ALSO AVAILABLE
30	90/–	10	**BFX48**	0.3	50/5	400	160*	360	
40	50/–	10	**BCY70**	0.5	50/5	250	350	350	
40	100/300	10	**2N3251**	0.5	50/5	300	200	360	2N3250
40	150/300	10	**2N4035**	0.3	50/5	450	150*	360	
45	100/600	10	**BCY71**	0.5	50/5	200	–	350	BCY72
40	100/300	150	**2N2907**	0.4	150/15	200	80	400	
45	100/300	150	**2N3504**	0.4	150/15	200	40	400	2N3505
60	40/120	150	**2N2906A**	0.4	150/15	200	80	400	2N2906
60	100/300	150	**2N2907A**	0.4	150/15	200	80	400	

SMALL SIGNAL TRANSISTORS

PNP GENERAL PURPOSE TRANSISTORS – TO-39

V_{CEO} (V)	h_{FE} @ I_C min/max	(mA)	Type	$V_{CE(sat)}$ @ I_C/I_B (V) max	(mA)	f_T (MHz) min	t_s t_{off}* (ns)	P_{tot} (mW)	ALSO AVAILABLE
55	85/–	100	**BFX38**	0.5	500/50	100	350	800	BFX39
75	40/–	100	**BFX41**	0.5	500/50	100	350	800	
75	85/–	100	**BFX40**	0.5	500/50	100	350	800	
80	100/300	100	**2N4033**	0.5	500/50	150	350	800	2N4031/2
40	50/250	150	**2N4037**	0.3	150/15	100	110	700	
40	100/230	150	**2N2905**	0.4	150/15	200	80	600	
60	40/120	150	**2N2904A**	0.4	150/15	200	80	600	2N2904
60	100/300	150	**2N2905A**	0.4	150/15	200	80	600	
65	40/140	150	**2N4036**	0.65	150/15	60	700*	1000	
40	40/250	500	**BC460**	1	1000/100	50	–	1000	
60	40/250	500	**BC461**	1	1000/100	50	–	1000	
75	30/130	500	**2N5322**	0.7	500/50	50	1000*	1000	2N5323

NPN TRANSISTORS FOR LOW LEVEL, LOW NOISE APPLICATIONS – TO-18

V_{CEO} (V)	h_{FE} @ I_C min/max	(mA)	Type	$V_{CE(sat)}$ @ I_C/I_B (V) max	(mA)	f_T (MHz) min	NF (dB)	P_{tot} (mW)	ALSO AVAILABLE
45	100/500	0.01	**2N930**	1	10/0.5	30	3	300	
60	100/500	0.01	**2N2484**	0.35	1/0.1	60	3	360	2N2483
60	130/–	0.01	**BFR17**	0.35	1/0.1	70	3	360	
60	150/300	1	**BFY76**	0.35	1/01	100	4	360	
20	110/800*	2	**BC108**	0.6	100/5	100	10	300	
20	200/800*	2	**BC109**	0.6	100/5	100	4	300	
45	110/450*	2	**BC107**	0.6	100/5	100	10	300	
45	120/630	2	**BCY59**	0.7	100/2.5	100	6	360	BCY58

* h_{fe} @ 1 KHz.

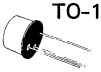
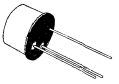
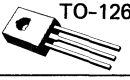
SMALL SIGNAL TRANSISTORS

PNP TRANSISTORS FOR LOW LEVEL, LOW NOISE APPLICATIONS – TO-18

V_{CEO} (V)	h_{FE} @ I_C min/max	(mA)	Type	$V_{CE(sat)}$ (V) @ I_C/I_B max	(mA)	f_T (MHz) min	NF (dB)	P_{tot} (mW)	ALSO AVAILABLE
45	250/500	0.01	**2N3964**	0.25	10/0.5	50	2	360	2N3965
80	70/230	0.01	**BFX37**	0.4	50/5	40	3.5	360	
80	100/300	0.01	**2N3963**	0.25	10/0.5	40	3	360	2N3962
25	125/500*	2	**BC178**	0.25	50/5	200 typ.	10	300	BC179
45	120/460	2	**BCY79**	0.8	100/2.5	180 typ.	6	390	BCY78
45	125/500*	2	**BC177**	0.25	50/5	200 typ.	10	300	
50	110/450	2	**BC478**	0.25	50/5	150 typ.	6	360	BC479
80	110/250	2	**BC477**	0.25	50/5	150 typ.	10	360	

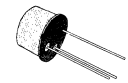
* h_{fe} @ 1 KHz.

HIGH VOLTAGE TRANSISTORS

Polarity	V_{CEO} (V)	h_{FE} @ I_C min/max	(mA)	Type	$V_{CE(sat)}$ (V) @ I_C/I_B max	(mA)	f_T (MHz) min	P_{tot} (mW)	PACKAGE
PNP	150	40/–	10	**BFW43**	0.5	10/1	60	400	TO-18 
NPN	180	30/–	10	**BC394**	0.3	10/1	50	400	
PNP	180	50/–	10	**BC393**	0.3	10/1	50	400	
NPN	200	40/–	30	**BSS72S**	0.5	50/5	200	500	
PNP	200	40/250	30	**BSS75S**	0.4	30/3	200	500	
PNP	150	40/–	10	**BFW44**	0.5	10/1	60	700	TO-39 
PNP	180	80/300	10	**BFX91**	0.25	10/1	40	700	
PNP	180	80/300	10	**2N3931**	0.25	10/1	60	700	
PNP	200	30/150	10	**2N5415S**	2.5	50/5	15	1000	
NPN	250	25/–	30	**BF258**	1	30/6	90 typ.	1000	
NPN	150	30/–	30	**2N3114**	1	50/5	40	800	
NPN	250	30/–	30	**BF458**	1	50/10	90 typ.	1250	TO-126 
NPN	300	30/–	30	**BF459**	1	50/10	90 typ.	1250	

SMALL SIGNAL TRANSISTORS

NPN TRANSISTORS FOR FAST AND ULTRA FAST SWITCHING

V_{CEO} (V)	h_{FE} @ I_C min/max	(mA)	Type	$V_{CE(sat)}$ @ I_C/I_B (V) max	(mA)	f_T (MHz) min	t_s t_{off}* (ns)	P_{tot} (mW)	PACKAGE
12	30/120	10	**BSX28**	0.25	30/3	400	13	360	TO-18
15	30/120	10	**2N708**	0.4	10/1	300	75*	360	
15	30/120	10	**2N914**	0.7	200/20	300	20	360	
15	40/120	10	**BSX20**	0.6	100/10	450	13	360	
15	40/120	10	**2N2369**	0.25	10/1	500	13	360	
15	40/120	10	**2N2369A**	0.2	10/1	500	13	360	
15	30/120	30	**BSX26**	0.5	300/30	350	18	360	
20	30/120	30	**2N3014**	0.18	100/10	350	18	360	
20	40/120	30	**BSX39**	0.28	100/10	350	18	360	
15	25/—	100	**2N3013**	0.5	300/30	350	18	360	
30	60/150	100	**2N4013**	0.20	100/10	300	60*	500	
30	30/120	150	**2N2845**	0.4	150/15	350	40*	360	
40	60/150	100	**BSX32**	0.5	500/50	300	60*	800	TO-39
50	60/150	100	**2N3725**	0.52	500/50	300	60*	800	

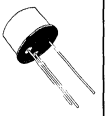
PNP TRANSISTORS FOR FAST AND ULTRA FAST SWITCHING

V_{CEO} (V)	h_{FE} @ I_C min/max	(mA)	Type	$V_{CE(sat)}$ @ I_C/I_B (V) max	(mA)	f_T (MHz) min	t_{off} (ns)	P_{tot} (mW)	PACKAGE
12	30/120	30	**BSX29**	0.2	30/3	400	90	360	TO-18
12	40/120	30	**2N2894**	0.2	100/10	400	90	360	
20	30/120	30	**2N3209**	0.2	30/3	400	90	360	

SMALL SIGNAL TRANSISTORS

TRANSISTORS FOR RF APPLICATIONS

Polar.	Max. ratings		Type	Main function	Trans. freq.		Noise figure			Gain		PACKAGE
	V_{CEO} (V)	I_C (mA)			f_T (MHz)	@ I_C (mA)	NF (dB)	and I_C (mA)	f (MHz)	P_G (dB)	f MHz)	
PNP	35	20	**BF272S**	VHF/UHF amp.	900	3	3	3	800	16	800	TO-72
PNP	35	20	**BF316A**	VHF/UHF osc.	600	3	5	3	800	12	800	
PNP	35	20	**BFR38**	VHF/UBF amp.	1000	3	3.5	3	800	14	800	
NPN	25	25	**BF271**	IF amplifier	900	10	–	–	–	24	36	
NPN	30	25	**BFY90**	Wide-band amp.	1400	25	5.5	2	800	8	800	
NPN	12	50	**2N5179**	VHF amplifier	1400	5	3	1.5	200	21	200	
NPN	15	50	**2N918**	UHF oscillator	900	4	5	1	60	21	200	
NPN	25	150	**BFW16A**	Wide-band amp.	1200	150	5	30	200	6.5	800	TO-39
NPN	30	200	**BFR36**	VHF/UHF amp.	1400	70	4.5	70	200	16	200	
NPN	20	400	**2N5109**	Wide-band amp.	1500	50	3	10	200	13	200	
NPN	20	500	**2N4427**	VHF/UHF amp.	800	50	–	–	–	–	–	
NPN	30	500	**2N3866**	VHF/UHF amp.	800	50	–	–	–	–	–	



LINEAR INTEGRATED CIRCUITS

The linear integrated circuits listed in the following pages cover audio amplifiers, industrial circuits, operational amplifiers, radio and tape recorder circuits, telecommunications circuits, television circuits and voltage regulators. They are available in all the standard packages and in certain cases they are also available in micropackages for mounting in hybrid circuits.

CONTENTS

LINEAR INTEGRATED CIRCUITS

INDUSTRIAL CIRCUITS

BRIDGE DRIVERS

Type	Function	Description	PACKAGE
L293	Quad Push-Pull Driver	Four 1A/36V push-pull drivers for use singly or as two bridges. Each driver controlled by logic input; each bridge controlled by enable input. Connects directly to low level logic.	DIP-16
L293C		44V-0.6A with split-supplies for each air of drivers.	DIP-20
L293D		36V-0.6A with internal calmp diodes.	DIP-16
L293E		Same as L293 plus external emitter connections to driver for load current sensing.	DIP-20
L298	Dual Bridge Drivers	Four 2A/50V push-pull drivers for use as two bridges. Each driver controlled by logic input; each bridge controlled by enable input. External connections to each bridge for load current sensing. Connects directly to low level logic.	Multiwatt 15
L6208		Same as L298, rated at 2A/24V.	
PBL3717A	Stepper motor driver	Controls and drivers are phase at a bipolar stepper motor with output currents up to 1A and supply voltages to 46V. The output current can be controlled digitally by two inputs.	DIP-16

SWITCHMODE DRIVERS

Type	Function	Description	PACKAGE
L292	Switchmode DC motor driver	Output current, regulated by internal PWM chopper proportional to input voltage. Delivers up to 2A at 36V with bridge output stage. With L290 and L291 forms complete DC motor servopositioning system.	Multiwatt 15
L294	Switchmode solenoid driver	Controlled by TTL-compatible logic input, delivers 4A at 50V to drive high speed solenoids. Current regulated by constant ripple PWM chopper and externally adjustable. Features latched diagnostic output and protection circuits.	Multiwatt 11
L6212		Same as L294, with an output current capability of 6A.	Multiwatt 15
L295	Dual Switchmode Driver	Two 50V/2.5A switchmode drivers controlled by TTL - compatible logic inputs. Current regulated by constant frequency PWM circuit and externally adjustable.	Multiwatt 15

LINEAR INTEGRATED CIRCUITS

SPECIAL FUNCTIONS

Type	Function	Description	PACKAGE
L290	Tachometer converter	Processes signal from optical encoder to give tacho and position outputs. Also generates reference voltage and pulse outputs. With L291 and L292 forms 3-chip DC motor servopositioning system.	DIP-16
L291	D/A converter and error amplifier	Contains 5-bit D/A converter with switchable polarity, error amplifier and position amplifier. With L290 and L292 forms complete 3-chip DC motor servopositioning system.	DIP-16
L297	Stepper motor controller	Contains translator plus PWM choppers for two-phase bipolar and four-phase unipolar PM motors. Driven by step clock and direction inputs and generates normal, wave drive and half step sequences. With L293E, L298 or L6208 forms complete bipolar step motor interface.	DIP-20
L297A		As L297A plus pulse doubler on step clock input for double stepping.	DIP-20
L6505 **L6506**		Contains PWM chopper for two-phase bipolar and four-phase unipolar stepper motors. Together with bridge drivers like L293E, L298, L6208 or with darlington arrays like L7150, L7180 forms complete stepper motor interface.	DIP-18
L3654 **L3654S**	Printer driver	Ten bit SIPO shift register with open collector outputs handling 250mA each at up to 45V. Serial output allows cascading without limit. L3654S can be supplied with 5V.	DIP-16
L5832	Solenoid controller	With one or two external darlingtons drives solenoids efficiency with PWM regulated current. Can provide single or two level current waveforms and the waveshape is externally adjustable.	DIP-16
L6222	Quad transistor switches	– Inputs TTL/CMOS compatible. – 1.5A outputs current. Quad transistor switches rated at 1.2A, 50V with logic interface circuitry. The inputs are TTL compatible and a common enable input is available.	DIP-16

LINEAR INTEGRATED CIRCUITS

TELECOM CIRCUITS

TELEPHONE SPEECH CIRCUITS

TYPE	FUNCTION	FEATURES	PACKAGE
LS 285 LS 285A	Speech circuit	Replaces hybrid circuit (2/4 wire interface) in telephones. Provides automatic gain control and works typically with dynamic transducers.	DIP-14
LS 288	Programmable speech circuit	Telephone speech circuit with programmable gains, automatic gain control and fixed gain operation. Suitable for both piezoceramic and dynamic transducers.	DIP-16
LS 156	Speech circuit with MF tone interface	Telephone speech circuit incorporating MF interface. Automatic gain control for voice signals. Designed for piezoceramic transducers. Automatically adjusts balancing impedance to match line.	DIP-16
LS 356	Speech circuit with MF tone interface	Telephone speech circuit incorporating MF interface. Features automatic gain control for voice signal and fixed gain mode. Used typically with dynamic transducers but a small loudspeaker can be used as receiver thanks to high current available at output.	DIP-16
LS 656	Speech circuit with MF tone interface and low drop	Same as LS 356 plus low voltage drop.	DIP-16
LS 388	Low consumption speech circuit	Telephone speech circuit with programmable gain, automatic gain control and fixed gain operation. Both send and receive gains can be set to very high level. Special features include low voltage drop and very low current consumption.	DIP-16
LS 588	Programmable speech circuit with power down	Similar to LS 288 + Mute.	DIP-16
L 3211	Low voltage Low current Speech circuit	Designed for USA market. Min. Operating Conditions: 5mA/1.5V. Multifrequency interface included.	DIP-16

OTHER TELECOM CIRCUITS

TYPE	FUNCTION	FEATURES	PACKAGE
LS 188	Microphone preamplifier	Designed for use with a magnetic or piezo-ceramic transducer to replace carbon microphone in conventional telephones. Pin-programmable gain.	Minidip
LS 1240 LS 1240A LS 1241 LS 3240	Electronic two-tone ringers	Replaces mechanical bell in telephones. Features include low current consumption, integrated rectifier bridge and low component count. The LS 1240 and LS 1241 are pin to pin replacent for Siemens PSB 6520/6521. The LS 1240A is designed to drive low impedance transducers. The L 3240 has a bridge output for increased power to piezo-buzzer.	Minidip
LS 346	Polarity guard with very low voltage drop	Integrated polarity guard, designed for MF dialling telephones. Drop is typically 100 mV with 10 mA line current.	Minidip
LS 5018 LS 5060 LS 5120	Bidirectional overvoltage protection circuits	Integrated transient overvoltage suppressors for crowbar applications where very large transients (lightning, induced etc) can damage sensitive components. Breakover voltage (18V, 60V, or 10V) is independent of transient rise time. Other features include very high current capability and failsafe operation.	Minidip
L 3100 L 3101	Overvoltage Overcurrent protection circuit	Monodirectional. Fully programmable breakover (up to 340V/120V). Current control operation allowed.	Minidip
LS 496	Quad relay driver	Contains four drivers for bipolar relays. Each driver controlled by logic inputs all four drivers controlled by common disable input. All outputs short circuit protected.	DIP-16
LS 342	DTMF interface circuit	Interface a DTMF generator to the line providing proper gain and V/I characteristics.	Minidip

LINEAR INTEGRATED CIRCUITS

AUTOMOTIVE CIRCUITS

IGNITION CONTROL

TYPE	FUNCTION	FEATURES	PACKAGE
L482	Electronic ignition controller (Hall-effect pickup)	For Hall-effect pickup breakerless ignition systems. Drivers an external darlington to provide regulated current in ignition coil with low power dissipation. Can also be used as dwell control section and driver stage in microprocessor-controlled systems. Includes protection against permanent conduction, overvoltage and dump transients to 100V.	DIP-16 and Microwatt (16-pin power micropackage)
L497	Electronic ignition controller (Hall-effect pickup)	For Hall-effect pickup breakerless ignition systems. Drives and external darlington to provide regulated current in the ignition coil with low power dissipation. Can also be used as dwell control section and driver stage in microprocessor-controller systems. Includes protection against permanent conduction overvoltages and dump transients to 100V. Built in timer for calibrated control of dwell angle when 90% of required coil current not reached.	DIP-16 and Microwatt (16-pin power micropackage)
L484	Electronic ignition controller (Magnetic pickup)	For breakerless ignition systems with magnetic pickup. Drives an external darlington to provide regulated current with low dissipation. Features zero crossing detection plus protection against overvoltages and dump transients to 100V. Pickup signal referred to ground. Can be programmed for various pickup waveforms.	DIP-16 and Microwatt (16-pin power micropackage)
L530	Electronic ignition interface	Ideal for microprocessor controlled ignition systems. Direct drive of external power darlington. Adjustable coil current limiting. Operates with hall effect and magnetic pickup sensors.	Microwatt

FUEL INJECTION

L583	Injector solenoid controller	Connected directly to control micro and driving two external darlingtons, provides a time programmable plateau at high current peak to open injector then lower holding current to keep it open. Includes switchmode regulation and dump protection up to 80V.	Powerdip 12 + 2 + 2
L9335 L9336	Injector solenoid driver	Connected directly to control micro, provides high current peak (4A) to open injector then lower holding current (1A) to keep it open. includes dump protection up to 60V.	Pentawatt

LINEAR INTEGRATED CIRCUITS

SPECIAL FUNCTIONS

TYPE	FUNCTION	FEATURES	PACKAGE
L485	Alternator voltage regulator	High precision trimmed reference. Complete fault diagnostics. 100V dump protection.	DIP-16 and Microwatt
L486	Direction indicator driver	Drives flashing direction indicators in automobiles. Faults indicated by automatic speedup of flash rate. Features high current capability (1A) and dump protection to 80V.	Minidip
L4620	Liquid level alarm	Drives 300mA alarm load. Digital timing and programmable delay. Overvoltage protection.	Minidip
L9305 L9306	Dual Power Comparator	1A output current. Single supply 3.5V to 18V. Thermal protection.	12 + 2 + 2
		0.3A output current. Single supply 3.5V to 18V. Thermal protection.	Minidip
L9222	Quad transistor switch	Inputs TTL/CMOS compatible. 1.5A output current.	12 + 2 + 2

AUTOMOTIVE VOLTAGE REGULATORS

L487	Very low drop 5V regulator with reset	– Output current of 500mA with 0.6V drop. – Includes reset function and ± 80V dump protection.	Pentawatt
L2600 series	Low drop fixed regulators (5, 8.5 & 10V)	– Output current of 500mA. – Include ± 100V dump protection.	Versawatt
L4700 series	Very low drop fixed regulators (5, 8.5 & 10V)	– Output current 500mA with 0.5V drop. – Include ± 80V dump protection.	Versawatt
L4800 series	Very low drop fixed regulators (5, 8.5, 10V, 12V)	– Output current of 400mA with 0.4V drop. – Include ± 60V dump protection plus foldback current limiting.	Versawatt
LM2930A	Very low drop 5V regulator	– Output current 400mA with 0.4V drop. – Includes ± 40V dump protection and foldback current limiting.	Versawatt
LM2931A	Very low drop 5V regulator	– Output current 400mA with 0.4V drop. – Includes ± 60V dump protection and foldback current limiting.	Versawatt
LM2935	5V dual regulator	Output current up to 750 mA. Low quiescent current standby regulator. Dump and reverse transient protection.	Pentawatt
L4920	Low-drop variable voltage regulator	Output current 400mA with 0.5V drop. ± 60V protection.	Pentawatt

LINEAR INTEGRATED CIRCUITS

STANDARD POSITIVE VOLTAGE REGULATORS

$I_o$max (A)	Type	Regulated output voltage (V)											Package
			5	6	7.5	8	9	10	12	15	18	20	24	
2 (*)	L78S00CV		●		●		●	●	●	●	●		●	TO-220
	L78S00CT/T		●		●		●	●	●	●	●		●	TO-3
1.5	LM117K	1.2V ← adjustable → 37V												TO-3
	LM217K													TO-3
	LM317K													TO-3
	LM317T													TO-220
1	L7800CV		●	●		●			●	●	●	●	●	TO-220
	L7800ACV (**)		●	●		●			●	●	●	●	●	TO-220
	L7800CT/T		●	●		●			●	●	●	●	●	TO-3
0.5	L78M00CV		●	●		●			●	●	●	●	●	TO-220
	L78M00CX		●	●		●			●	●	●	●	●	SOT-82
0.15	LM723CD	2V ← adjustable → 36V												SO-14
	LM723CH													TO-100
	LM723CJ													DIP-14C
	LM723CN													DIP-14P
	LM723J													DIP-14C
	LM723H													TO-100

STANDARD NEGATIVE VOLTAGE REGULATORS

$I_o$max (A)	Type	Regulated output voltage (V)									Package
			-5	-5.2	-8	-12	-15	-18	-20	-24	
1	L7900ACV (**)		●	●	●	●	●	●	●	●	TO-220
	L7900CV		●	●	●	●	●	●	●	●	TO-220
	L7900CT/T		●	●	●	●	●	●	●	●	TO-3

(*) Proprietary SGS selection
(**) Output voltage = ± 2%

LINEAR INTEGRATED CIRCUITS

LOW DROP VOLTAGE REGULATORS

Type	Low drop	Very low drop	Transient protection				Reset	Short circuit protection	Reverse voltage protection	Output voltage			
			± 100	± 80	± 60	± 40				5V	8.5V	10V	12V
L387		●					●	●	●	●			
L487		●		●			●	●	●	●			
L2605	●		●					●	●	●			
L2685	●		●					●	●		●		
L2610	●		●					●	●			●	
L4705		●		●				●	●	●			
L4785		●		●				●	●		●		
L4710		●		●				●	●			●	
L4805		●			●			●	●	●			
L4885		●			●			●	●		●		
L4810		●			●			●	●			●	
L4812		●			●			●	●				●
LM2930A		●				●		●	●	●			
LM2931A		●			●			●	●	●			
LM2935 (*)		●			●		●	●	●	●			

PROPRIETARY VOLTAGE REGULATORS

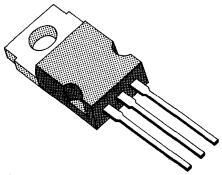
I_o max (A)	Type	Regulated output voltage (V)						Package
			5	8.5	10	12		
4	L296 (**)	5.1V ← adjustable → 40V						Multiwatt 15
	L4964 (**)	5.1V ← adjustable → 28V						
2.5	L4960 (**)	5V ← adjustable → 40V						Heptawatt
2	L200CH/CV L200CT/T	2.9V ← adjustable → 36V						Pentawatt TO-3 (4 lead)
1.5	L4962 (**)	5V ← adjustable → 40V						Powerdip 12 + 2 + 2
0.5	L387		●					Pentawatt
	L487		●					Pentawatt
	L2600V		●	●	●			TO-220
	L4700CV		●	●	●			TO-220
	L4800CV		●	●	●	●		TO-220
	L4800CX		●	●	●	●		SOT-82
	L4901 (*)		●					Heptawatt
	L4902 (*)		●					Heptawatt
	L4916			●				Minidip

(*) Dual regulator (**) Switch-mode

LINEAR INTEGRATED CIRCUITS

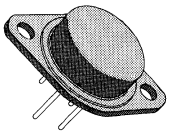
SWITCH-MODE POWER SUPPLY PWM CONTROLLERS

TYPE	FEATURES	PACKAGE
SG1524 SG2524 SG3524	For single ended and push-pull applications.	DIP-16
UC1524A UC2524A UC3524A	– Advanced version of SG1524 (pin to pin compatible). – Pulse by pulse current limiting. – Reference ± 1%.	DIP-16
SG1525A SG1527A SG2525A SG2527A SG3525A SG3527A	– For push-pull applications. – Dual source/sink output drivers. – Particularly suited to powermos drive. – Reference ± 1%.	DIP-16
UC1840 UC2840 UC3840	– For single ended applications. – Feed forward control. – Pulse by pulse current limiting with current fault shutdown. – Reference ± 1%.	DIP-18

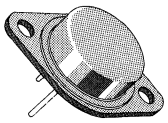


TO-220/Versawatt

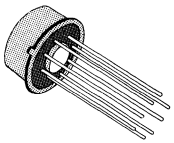
SOT-82



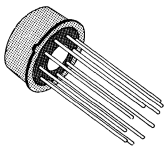
TO-3 (4-lead)



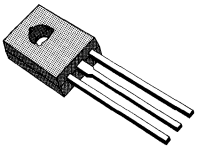
TO-3



TO-99



TO-100



TO-126/SOT-32

STANDARD QUAD OPERATIONAL AMPLIFIERS

Type	Temperature Range (°C)	Input Bias Current (nA)	Input Offset Voltage (mV)	Slew Rate (V/μs)	Supply Current (mA)	Max Supply (V)	Package
LM224 D	0 to 70	45	2	–	1.5	± 16	SO-14
LM324 D	0 to 70	45	2	–	1.5	± 16	
LM2902 D	-40 to 85	45	2	–	1.5	± 13	
LS404 CM	0 to 70	100	1	1	1.5	± 18	
LS404 M	-25 to 85	50	1	1.5	1.3	± 18	
MC3403 D	0 to 70	200	2	0.6	2.8	± 18	
LM224 N	-25 to 85	45	2	–	1.5	± 16	Plastic DIP-14
LM324 AN	0 to 70	45	2	–	1.5	± 16	
LM324 N	0 to 70	45	2	–	1.5	± 16	
LM2902 N	-40 to 85	45	2	–	1.5	± 13	
LS404 CB	0 to 70	100	1	1	1.5	± 18	
MC3303 P	-40 to 85	200	2	0.6	2.8	± 18	
MC3403 P	0 to 70	200	2	0.6	2.8	± 18	
LM124 AJ	-55 to 125	20	1	–	1.5	± 16	Ceramic DIP-14
LM124 J	-55 to 125	45	2	–	1.5	± 16	
LM224 AJ	-25 to 85	40	1	–	1.5	± 16	
LM224 J	-25 to 85	45	2	–	1.5	± 16	
LM324 AJ	0 to 70	45	2	–	1.5	± 16	
LM324 J	0 to 70	45	2	–	1.5	± 16	
LM2902J	-40 to 85	45	2	–	1.5	± 13	
MC3303 L	-40 to 85	200	2	0.6	2.8	± 18	
MC3403 L	0 to 70	200	2	0.6	2.8	± 18	
MC3503 L	-55 to 125	200	2	0.6	2.8	± 18	

JFET-INPUT QUAD OPERATIONAL AMPLIFIERS

Type	Temperature Range (°C)	Slew Rate (V/μs)	Input Offset Voltage (mV)	Input Noise Voltage (nV/√Hz)	Supply Current (mA)	Max Supply (V)	Package
TL084 CD	0 to 70	13	5	25	5.6	± 18	SO-14
TL084 ID	-25 to 85	13	5	25	5.6	± 18	
MC34004 BP	0 to 70	13	3	25	5.6	± 18	
MC34004 P	0 to 70	13	5	25	5.6	± 18	
TL074 ACN	0 to 70	13	3	18	5.6	± 18	
TL074 BCN	0 to 70	13	2	18	5.6	± 18	Plastic
TL074 CN	0 to 70	13	5	18	5.6	± 18	DIP-14
TL074 IN	-25 to 85	13	5	18	5.6	± 18	
TL084 ACN	0 to 70	13	3	25	5.6	± 18	
TL084 BCN	0 to 70	13	2	25	5.6	± 18	
TL084 CN	0 to 70	13	5	25	5.6	± 18	
TL084 IN	-25 to 85	13	5	25	5.6	± 18	
MC34004 BL	0 to 70	13	3	25	5.6	± 18	
MC34004 L	0 to 70	13	5	25	5.6	± 18	
TL074 ACJ	0 to 70	13	3	18	5.6	± 18	
TL074 BCJ	0 to 70	13	2	18	5.6	± 18	Ceramic
TL074 CJ	0 to 70	13	5	18	5.6	± 18	DIP-14
TL074 IJ	-25 to 85	13	5	18	5.6	± 18	
TL084 ACJ	0 to 70	13	3	25	5.6	± 18	
TL084 BCJ	0 to 70	13	2	25	5.6	± 18	
TL084 CJ	0 to 70	13	5	25	5.6	± 18	
TL084 IJ	-25 to 85	13	5	25	5.6	± 18	
TL084 MJ	-55 to 125	13	3	25	5.6	± 18	

STANDARD DUAL OPERATIONAL AMPLIFIERS

Type	Temperature Range (°C)	Input Bias Current (mA)	Input Offset Voltage (mV)	Slew Rate (V/μs)	Supply Current (mA)	Max Supply (V)	Package
LM258 D	-25 to 85	45	2	–	1	± 16	SO-8
LM358 D	0 to 70	45	2	–	1	± 16	
LM2904 D	-40 to 85	45	2	–	1	± 13	
LS204 CM	0 to 70	100	0.5	1	0.8	± 18	
LS204 M	-25 to 85	50	0.5	1.5	0.7	± 18	
MC1458 CD	0 to 70	80	2	0.5	2.3	± 18	
MC1458 D	0 to 70	80	2	0.5	2.3	± 18	
NE532 D	0 to 70	45	2	–	1	± 16	
LM258 N	-25 to 85	45	2	–	1	± 16	Plastic Minidip
LM358 AN	0 to 70	45	2	–	1	± 16	
LM358 N	0 to 70	45	2	–	1	± 16	
LM2904 N	-40 to 85	45	2	–	1	± 13	
LS204 CB	0 to 70	100	0.5	1	0.8	± 18	
MC1458 CP1	0 to 70	80	2	0.5	2.3	± 18	
MC1458 P1	0 to 70	80	2	0.5	2.3	± 18	
NE532 N	0 to 70	45	2	–	–	± 16	
TDA2320	0 to 70	100	2	1.5	0.8	± 10	
TDA2320A	0 to 70	150	1	1.6	0.8	± 18	
LM158 AJ	-55 to 125	20	1	–	1	± 16	Ceramic Minidip
LM158 J	-55 to 125	45	2	–	1	± 16	
LM258 AJ	-25 to 85	40	2	–	1	± 16	
LM258 J	-25 to 85	45	2	–	1	± 16	
LM358 AJ	0 to 70	45	2	–	1	± 16	
LM358 J	0 to 70	45	2	–	1	± 16	
LM2904 J	-40 to 85	45	2	–	1	± 16	
MC1458 CU	0 to 70	80	2	0.5	2.3	± 18	
MC1458 U	0 to 70	80	2	0.5	2.3	± 18	
MC1558 U	-55 to 125	80	1	0.5	2.3	± 22	
NE532 FE	0 to 70	45	2	–	1	± 16	
LS204 ATB	-55 to 125	50	0.5	1.5	0.7	± 18	TO-99
LS204 CTB	0 to 70	100	0.5	1	0.8	± 18	
LS204 TB	-25 to 85	50	0.5	1.5	0.7	± 18	

JFET-INPUT DUAL OPERATIONAL AMPLIFIERS

Type	Temperature Range (°C)	Slew Rate (V/μs)	Input Offset Voltage (mV)	Input Noise Voltage (mV/√Hz)	Supply Current (mA)	Max Supply (V)	Package
TL082 CD	0 to 70	13	5	25	2.8	± 18	SO-8
TL082 ID	-25 to 85	13	5	25	2.8	± 18	
MC34002 AP	0 to 70	13	1	25	2.8	± 18	Plastic Minidip
MC34002 BP	0 to 70	13	3	25	2.8	± 18	
MC34002 P	0 to 70	13	5	25	2.8	± 18	
TL072 ACP	0 to 70	13	3	18	2.8	± 18	
TL072 BCP	0 to 70	13	2	18	2.8	± 18	
TL072 CP	0 to 70	13	5	18	2.8	± 18	
TL072 IP	-25 to 85	13	5	18	2.8	± 18	
TL082 ACP	0 to 70	13	3	25	2.8	± 18	
TL082 BCP	0 to 70	13	2	25	2.8	± 18	
TL082 CP	0 to 70	13	5	25	2.8	± 18	
TL082 IP	-25 to 85	13	5	25	2.8	± 18	
MC34002 AU	0 to 70	13	1	25	2.8	± 18	Ceramic Minidip
MC34002 BU	0 to 70	13	3	25	2.8	± 18	
MC34002 U	0 to 70	13	5	25	2.8	± 18	
TL072 ACJG	0 to 70	13	3	18	2.8	± 18	
TL072 BCJG	0 to 70	13	2	18	2.8	± 18	
TL072 CJG	0 to 70	13	5	18	2.8	± 18	
TL072 IJG	-25 to 85	13	5	18	2.8	± 18	
TL082 ACJG	0 to 70	13	3	25	2.8	± 18	
TL082 BCJG	0 to 70	13	2	25	2.8	± 18	
TL082 CJG	0 to 70	13	5	25	2.8	± 18	
TL082 IJG	-25 to 85	13	5	25	2.8	± 18	
TL082 MJG	-55 to 125	13	3	25	2.8	± 18	

LINEAR INTEGRATED CIRCUITS

SINGLE OPERATIONAL AMPLIFIERS

Type	Temperature Range (°C)	Frequency Compensat.	CMR (dB)	Input Bias Current (nA)	Slew Rate (V/μs)	Max Supply (V)	Package
LM201 AD	-25 to 85		96	30	–	± 22	SO-8
LM301 AD	0 to 70		90	70	–	± 18	
LM741 CD	0 to 70	●	90	80	0.5	± 18	
LM741 ID	-25 to 85	●	90	80	0.5	± 18	
LM748 CD	0 to 70		90	80	–	± 22	
LM748 ID	-25 to 85		90	80	–	± 22	
MC1776 CD	0 to 70	●	90	15	0.8	± 18	
MC1776 ID	-25 to 85	●	90	15	0.8	± 18	
LM201 AN	0 to 70		96	30	–	± 22	Plastic Minidip
LM301 AN	0 to 70		90	70	–	± 18	
LM741 CN	0 to 70	●	90	80	0.5	± 18	
LM741 EN	0 to 70	●	90	80	0.5	± 18	
LM748 CN	0 to 70		90	80	–	± 22	
MC1776 CP1	0 to 70	●	90	15	0.8	± 18	
LS709 CB	0 to 70		90	300	0.25	± 18	Plastic DIP 14
LM101 AJ	-55 to 125		96	30	–	± 22	Ceramic Minidip
LM201 AJ	-25 to 85		96	30	–	± 22	
LM301 AJ	0 to 70		90	70	–	± 18	
LM741 CJ	0 to 70	●	90	80	0.5	± 18	
LM741 EJ	0 to 70	●	90	80	0.5	± 18	
LM741 J	-55 to 125	●	90	80	0.5	± 18	
LM748 CJ	0 to 70		90	80	–	± 22	
LM748 J	-55 to 125		90	80	–	± 22	
MC1776 CU	0 to 70	●	90	15	0.8	± 18	
MC1776 U	-55 to 125	●	90	15	0.8	± 18	
LM101 AH	-55 to 125		96	30	–	± 22	TO-99
LM201 AH	-25 to 85		96	30	–	± 22	
LM301 AH	0 to 70		90	70	–	± 18	
LM741 AH	-55 to 125	●	95	30	0.7	± 22	
LM741 CH	0 to 70	●	90	80	0.5	± 18	
LM741 H	0 to 70	●	90	80	0.5	± 18	
LM748 CH	0 to 70		90	80	–	± 22	
LM748 H	-55 to 125		90	80	–	± 22	
MC1776 CG	0 to 70	●	90	15	0.8	± 18	
MC1776 G	0 to 70	●	90	15	0.8	± 18	
LS709 ATB	-55 to 125		110	100	0.25	± 18	
LS709 CTB	0 to 70		90	300	0.25	± 18	
LS709 TB	-55 to 125		90	200	0.25	± 18	

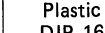
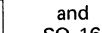
LINEAR INTEGRATED CIRCUITS

COMPARATORS

Type		Temperature Range (°C)	Input Bias Current (mA)	Input Offset Voltage (mV)	Supply Current (mA)	Max Supply (V)	Package
LM239 D	QUAD	-25 to 85	25	2	0.8	36	SO-14
LM339 D	QUAD	0 to 70	25	2	0.8	36	
LM2901 D	QUAD	-40 to 85	25	2	0.8	36	
MC3302 D	QUAD	-40 to 85	30	3	0.8	28	
LM293 D	DUAL	-25 to 85	25	2	0.4	36	SO-8
LM311 D	SINGLE	0 to 70	100	2	5.1	36	
LM393 D	DUAL	0 to 70	25	2	0.4	36	
LM2903 D	DUAL	-40 to 85	25	2	0.4	36	
LM239 N	QUAD	-25 to 85	25	2	0.8	36	Plastic DIP-14
LM339 AN	QUAD	0 to 70	25	2	0.8	36	
LM339 N	QUAD	0 to 70	25	2	0.8	36	
LM2901 N	QUAD	-40 to 85	25	2	0.8	36	
MC3302 P	QUAD	-40 to 85	30	3	0.8	28	
LM293 N	DUAL	-25 to 85	25	2	0.4	36	Plastic Minidip
LM311 N	SINGLE	0 to 70	100	2	5.1	36	
LM393 AN	DUAL	0 to 70	25	2	0.4	36	
LM393 N	DUAL	0 to 70	25	2	0.4	36	
LM2903 N	DUAL	-40 to 85	25	2	0.4	36	
LM193 AJ	DUAL	-55 to 125	25	1	0.4	36	Ceramic Minidip
LM193 J	DUAL	-55 to 125	25	2	0.4	36	
LM293 AJ	DUAL	-25 to 85	25	2	0.4	36	
LM293 J	DUAL	-25 to 85	25	2	0.4	36	
LM311 J	SINGLE	0 to 70	100	2	5.1	36	
LM393 AJ	DUAL	0 to 70	25	2	0.4	36	
LM393 J	DUAL	0 to 70	25	2	0.4	36	
LM2903 J	DUAL	-40 to 85	25	2	0.4	36	
LM139 AJ	QUAD	-55 to 125	25	1	0.8	36	Ceramic DIP-14
LM139 J	QUAD	-55 to 125	25	2	0.8	36	
LM239 AJ	QUAD	-25 to 85	25	2	0.8	36	
LM239 J	QUAD	-25 to 85	25	2	0.8	36	
LM339 AJ	QUAD	0 to 70	25	2	0.8	36	
LM339 J	QUAD	0 to 70	25	2	0.8	36	
LM2901 J	QUAD	-40 to 85	25	2	0.8	36	
MC3302 L	QUAD	-40 to 85	30	3	0.8	28	

LINEAR INTEGRATED CIRCUITS

DARLINGTON ARRAYS

Type	N°	V_{CEX}	I_o	Input	Configuration	PACKAGE
L601	8	90V	0.5A	General purpose		Plastic DIP-16
L602	8	90V	0.4A	14 - 25V PMOS		
L603	8	90V	0.4A	5V TTL/CMOS		
L604	8	90V	0.4A	6 - 15V CMOS/PMOS		
L702B	4	90V	2A	5V TTL		
L702N	4	90V	2A	5V TTL		Multiwatt 11
L7150	4	50V	1.5A	5V TTL/CMOS		Multiwatt 15
L7152	4	50V	1.5A	6 - 15V CMOS/PMOS		
L7180	4	80V	1.5A	5V TTL/CMOS		
L7182	4	80V	1.5A	6 - 15V CMOS/PMOS		
ULN2001A/D	7	50V	0.5A	General Purpose		Plastic DIP-16 and SO-16
ULN2002A/D	7	50V	0.5A	14 - 25V PMOS		
ULN2003A/D	7	50V	0.5A	5V TTL/CMOS		
ULN2004A/D	7	50V	0.5A	6 - 15V CMOS/PMOS		
ULQ2001R	7	50V	0.5A	General purpose		Ceramic DIP-16
ULQ2002R	7	50V	0.5A	14 - 25V PMOS		
ULQ2003R	7	50V	0.5A	5V TTL/CMOS		
ULQ2004R	7	50V	0.5A	6 - 15V CMOS/PMOS		
ULN2064B	4	50V	1.5A	5V TTL/CMOS		Plastic DIP-16

DARLINGTON ARRAYS (continued)

Type	N°	V_{CEX}	I_O	Input	Configuration	PACKAGE
ULN2065B	4	80V	1.5A	5V TTL/CMOS	● →|←	Plastic DIP-16
ULN2066B	4	50V	1.5A	6 - 15V CMOS/PMOS	● →|←	
ULN2067B	4	80V	1.5A	6 - 15V CMOS/PMOS	● →|←	
ULN2068B	4	50V	1.5A	5V CMOS/TTL	▷ ● →|←	
ULN2069B	4	80V	1.5A	5V CMOS/TTL	▷ ● →|←	
ULN2070B	4	50V	1.5A	6 - 15V CMOS/PMOS	▷ ● →|←	
ULN2071B	4	80V	1.5A	6 - 15V CMOS/PMOS	▷ ● →|←	
ULN2074B	4	50V	1.5A	General purpose	■	
ULN2075B	4	80V	1.5A	General purpose	■	
ULN2076B	4	50V	1.5A	6 - 15V CMOS/PMOS	■	
ULN2077B	4	80V	1.5A	6 - 15V CMOS/PMOS	■	
ULN2801A	8	50V	0.5A	General purpose	● →|←	Plastic DIP-18
ULN2802A	8	50V	0.5A	14 - 25V PMOS	● →|←	
ULN2803A	8	50V	0.5A	5V TTL/CMOS	● →|←	
ULN2804A	8	50V	0.5A	6 - 15V CMOS/PMOS	● →|←	
ULN2805A	8	50V	0.5A	High Output TTL	● →|←	

● = common emitters.
→|← = integral suppression diodes.
■ = isolated darlingtons.
▷ = predriver stage.

LINEAR INTEGRATED CIRCUITS

QUAD LINE DRIVERS/RECEIVERS

Type	Function	Temperature Range (°C)	Rise Time (ns)	Delay Time (ns)	Supply Current (mA)	Max Supply (V)	Package
MC1488 D	DRIVER	0 to 75	55	110/275	18	30	SO-14
MC1489 D MC1489 AD	RECEIVERS	0 to 75	120 120	25 25	16 16	10	
MC1488 P	DRIVER	0 to 75	55	110/275	18	30	Plastic DIP-14
MC1489 AP MC1489 P	RECEIVERS	0 to 75	120 120	25 25	16 16	10	
MC1488 L	DRIVER	0 to 75	55	110/275	18	30	Ceramic DIP-14
MC1489 AL MC1489 L	RECEIVERS	0 to 75	120 120	25 25	16 16	10	

TIMERS

Type		Temperature Range (°C)	Max. Operat. Freq. (KHz)	Supply Current (mA)	Max. Supply (V)	Package
NE555 D	SINGLE	0 to 70	500	3	16	SO-8
NE556 D	DUAL	0 to 70	500	6	16	SO-14
NE555 N	SINGLE	0 to 70	500	3	16	Plastic Minidip
SE555 N		-40 to 85	500	3	16	
NE556 N	DUAL	0 to 70	500	6	16	Plastic DIP-14
SE556 N		-40 to 85	500	6	16	
NE555 FE	SINGLE	0 to 70	500	3	16	Ceramic Minidip
SE555 FE		-55 to 125	500	6	18	
NE556 F	DUAL	0 to 70	500	6	16	Ceramic DIP-14
SE556 F		-55 to 125	500	6	18	

TRANSISTOR ARRAYS

Type	Temperature Range (°C)	V_{CBO} (V)	I_{cmax} (mA)	Input offset voltage (mV)	f_t (MHz)	Package
LM3046 D	-40 to 85	20	50	0.45	550	SO-14
LM3046 N	-40 to 85	20	50	0.45	550	Plastic DIP-14
TBA331	0 to 85	20	50	0.45	550	
LM3045 J	-55 to 125	20	50	0.45	550	Ceramic DIP-14
LM3046 J	-40 to 85	20	50	0.45	550	

LINEAR DRIVERS

Type	Function	Description	Package
L 149	4A Linear Driver	Push-pull current booster delivering up to 4A with current gain typically 10000. Operates at up to 40V and features 30V/μs slew rate.	Pentawatt®
L165	Power op. amp.	3A power op. amp. with supply voltage to 36V and slew rate of 8V/μs. Inputs are ground compatible and device is SOA protected.	Pentawatt®
L465A	Power op. amp.	3.5A high efficiency power op. amp. with supply voltage to 36V and slew rate of 14V/μs. Inputs are ground compatible and device is SOA protected.	Pentawatt®
L272	Dual power op. amp.	Two 1.5A/28V power op. amp. for DC motor driving power-supply applications. Features low saturations, ground compatible inputs plus large common-mode and differential mode range.	Plastic DIP-16
L 272M	Dual power op. amp.	Same as L272 except packaged in Minidip for applications where dissipation is lower.	Plastic Minidip

LINEAR INTEGRATED CIRCUITS

AUDIO AMPLIFIERS

AUDIO AMPLIFIERS FOR CAR RADIO

TYPE	FUNCTION	FEATURES	PACKAGE
TDA2002	8W car radio amplifier	– Very few components. – High output current (3.5A). – Low distortion. – 8V - 18V supply. – Short circuit protection. – Thermal protection. – 40V load dump protection.	Pentawatt
TDA2003	10W car radio amplifier		
TDA2004	10 + 10W stereo amplifier for car radio	– High current capability (3.5A). – Loads down to 1.6Ω. – Low distortion/noise. – Output AC short circuit to ground. – 40V load dump protection.	Multiwatt-11
TDA2005	20W bridge amplifier for car radio	– High current capability (3.5A). – Low distortion/noise. – Output DC/AC short circuit to ground. – 40V load dump protection. – Protects ludspeaker in short circuits.	Multiwatt-11

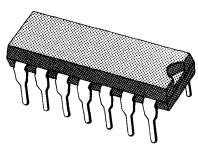
AUDIO AMPLIFIERS FOR TV/RADIO

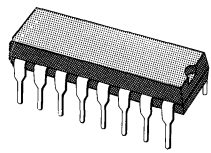
TDA1904	4W audio amplifier	– Output 3.5V into 4Ω at 12V. – Supply 4V - 20V.	Powerdip 8 + 8
TDA1905	6W audio amplifier with mounting	– Output 5.5W into 4Ω at 14V. – Supply 4V - 30V.	DIP-16
TDA1908 TDA1908A	8W audio amplifier	– Output 8W into 8Ω at 22V. – Supply 8V to 30V.	Findip-H/I
TDA1910	10W audio amplifier with muti	– Output 10W into 8Ω at 24V. – Supply 8V - 30V. Designed for high quality TV sets.	Multiwatt-11
TDA2006	10W audio amplifier	– Output 12W into 4Ω at 24V. – Supply 12V to 30V.	Pentawatt
TDA2008	12W audio amplifier	– Output 12W into 4Ω at 24W. – Supply 10V to 28V.	Pentawatt
TDA2009	10 + 10W stereo amplifier	– Output 10 + 10W stereo into 4Ω. – Low distortion (0.5%) and 8V - 28V supply range.	Multiwatt-11
TDA2822M	1 + 1W stereo amplifier	– For portable radios and cassette players. Delivers 1 + 1W stereo at 2W bridge. Supply range 1.8V-15V, low distortion and low quiescent current (6mA).	Minidip
TDA2822	3.5W Bridge 1.8 + 1.8W stereo	– Similar to TDA2822M, but in 16-DIP.	Powerdip 12 + 2 + 2
TDA7236	Very low voltage audio bridge	– P_O = 15mW (V_S = 1.25V, R_L = 32Ω). – Min. supply voltage = 0.9V.	Minidip and SO-8

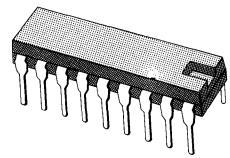
LINEAR INTEGRATED CIRCUITS

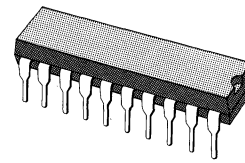
HiFi POWER AMPLIFIERS

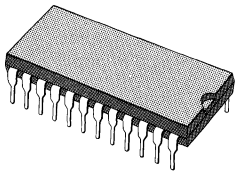
TYPE	FUNCTION	FEATURES	PACKAGE
TDA2030	HiFi Power amplifier	– Output 14W into 4Ω at ± 14V. – Distortion 0.5% at 15kHz and maximum supply ± 18V.	Pentawatt
TDA2030A	HiFi Power amplifier	– Output 18W into 4Ω at ± 16V. – Distortion 0.5% at 15kHz. – Maximum supply ± 22V. – Delivers 32W with two devices in bridge configuration.	Pentawatt
TDA2040 TDA2040A	HiFi Power amplifier	– Output 22W into 4Ω at ± 16V. – Distortion 0.5% at 1kHz. – Maximum supply ± 20V.	Pentawatt
TDA7250	15W to 50W Dual Audio Bridge	– Supply voltage range from 16V to 70V (split supply ± 8V to ± 35V). – Very low distortion (0.02% @ 20kHz). – Automatic quiescent current control.	DIP-20

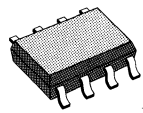

DIP-14

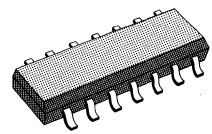

DIP-16

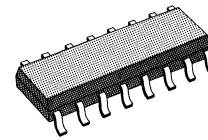

DIP-18

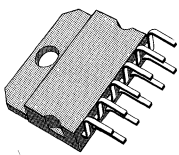

DIP-20

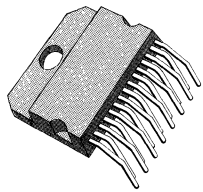

DIP-24

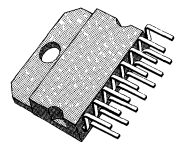

SO-8

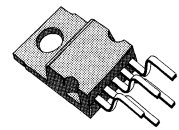

SO-14

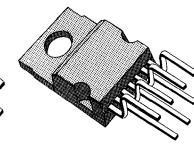

SO-16/Microwatt


Multiwatt 11


Multiwatt 15 (HOR)


Multiwatt 15


Pentawatt


Heptawatt

LINEAR INTEGRATED CIRCUITS

RADIO & TV CIRCUITS

RADIO CIRCUITS

TYPE	FUNCTION	FEATURES	PACKAGE
TCA3089	FM-IF Radio system	– High limiting sensitivity. – High AMR. – High recovered audio. – Low distortion.	DIP-16
TCA3189	FM-IF high quality radio system	– Very low distortion. – Improved S/N. – Programmable audio level.	DIP-16
TDA1220B TDA7220	Low voltage AM/FM radio	– Design. for use in 3V-4.5V-6V portable radio. – High sensitivity. – Very low "tweet". – High signal handing. – Low battery drain.	DIP-16
TDA1225 TDA7225			SO-16
TDA2220	High quality AM/FM receiver	– Intended for car radio and portable/ home radio. – Ratio or quadrature dector. – AM/FM field meter.	DIP-20
TDA7211	FM tuner	– 1.3V Min. supply voltage. – Balanced mixer with 30MHz to 150MHz operating frequency.	Minidip
TDA7212	FM tuner for cordless		
TEA1330	Stereo decoder	– Requires no inductors. – Wide supply range: 3V to 14V. – Excellent channel separation. – Low distortion.	DIP-16
TDA7230	Stereo decoder and headphone amplifier	– Operating voltage from 1.8V to 6V. – Stereo/mono switch. – Led driving for stereo indication.	DIP-16
TDA7359 TDA7361	Narrow band FM-IF demodulator for cordless	– Oscillator, mixer, limiting amplifier, quad-rature discrim. – Squelch and mute. Designed for dual conversion cordless receivers.	DIP-18 DIP-16

TV SOUND CHANNELS

TDA1190Z	Complete TV sound channel	– High limiting sensitivity (40μV). – High AM rejection. – Low distortion. – High output power (4.2W into 16Ω at 24V). – DC volume control.	Findip
TDA3190	Complete TV sound channel		Powerdip 12 + 2 + 2
TDA4190 TDA8190	Complete TV sound channel	– DC volume and tone control. – Muting function. – Output power 4W into 16Ω at 24V. – VCR in/out function.	Powerdip 16 + 2 + 2

TV DEFLECTION CIRCUITS

TYPE	FUNCTION	FEATURES	PACKAGE
TDA 1180P	Horizontal processor	– Includes complete horizontal processor function and protection circuits.	DIP-16
TDA 1170S TDA 1170N	Vertical deflection system	Incorporates: – Synch. circuit – Oscillator and ramp generator – Power amplifier. – Flyback generator. – Voltage regulator.	Findip
TDA 1670A	Vertical deflection circuit	– Direct drive of 110° colour yoke (3.5A out, f = 50 Hz). – CRT screen protection. – Flyback generator. – Precision blanking pulse generator.	Multiwatt-15
TDA 1770A		– 2.2A out, f = 50 Hz. – Flyback generator. – Precision blanking pulse generator. – CRT screen protection.	Powerdip 16 + 2 + 2
TDA 2170	TV vertical output circuit	– High efficiency power booster. – Reference voltage. – Flyback generator.	Multiwatt-15
TDA 2270			Powerdip 16 + 2 + 2
TDA 8170			Heptawatt
TDA 8180	Deflection processor	– No frequency or phase adjustments. – Countdown timing logic. – Automatic 50 Hz/60 Hz.	DIP-24

LINEAR INTEGRATED CIRCUITS

TV VIDEO CIRCUITS

TYPE	FUNCTION	FEATURES	PACKAGE
TDA440S	TV vision IF system	– Gain controlled vision IF amplifier. – Synchronous detector. – Positive and negative outputs.	DIP-16
TDA4420	TV vision IF system with AFC	– High gain - high stability. – Low intermodulation. – Fast AGC gating. – Large AFC out swing.	DIP-18
TDA8150	RGB video output amplifier	– Three independent video amplifiers – 250V max. supply voltage. – 5MHz bandwidth. – Flashover protection.	Multiwatt-15

OTHER TV CIRCUITS

TYPE	FUNCTION	FEATURES	PACKAGE
TDA4431/33	TV signal identification circuit and AFC interface	– Identification of TV stations. – Digital control signal for automatic search and AFC – Ideal for electronic program memory tuning systems.	DIP-14
TDA4092	5 bit binary to 7 segment Decoder Driver	– ROM mask option. – Standard configuration 2 digit (displays 1 to 32). – 5V supply.	DIP-24
TDA2320	Infrared Receiver for Remote Control	– $V_S = 5V$ – Suitable for flash and carrier transmissions.	Minidip
TDA4950 TDA8145	East-West correction	– Field correction in East-West direction. – Single alignment. – Low dissipation.	Minidip
TDA4601	Switchmode Power supply controllers	– For high voltage transistor.	DIP-14
TDA8130		– For high voltage darlington.	Minidip

LINEAR INTEGRATED CIRCUITS

TAPE RECORDER/PLAYER CIRCUITS

PREAMPLIFIERS

TYPE	FUNCTION	FEATURES	PACKAGE
TDA1054M TDA2054M	Preamplifiers with ALC for cassette recorders	– V_S = 4V to 20V. – Large ALC range. – Good SVR. – Low distortion.	DIP-16
TDA3410 LM1837	Dual low noise tape preamplifier with autoreverse	– Very low noise. – High gain. – Low distortion. – Single supply operation (8V to 30V).	DIP-16
TDA3420	Dual very low noise preamplifier		
TDA2320A	Minidip stereo preamplifier	– Intended for portable cassette players and music centers. – Single/split supply. – Wide supply range (3V to 36V). – Very low consumption (0.8mA). – Very low distortion. – Low noise.	Minidip

MOTOR SPEED REGULATORS

TYPE	FUNCTION	FEATURES	PACKAGE
TCA900 TCA910 TDA1151	Motor speed regulators	– Intended for use as speed regulator for small DC motors. – Excellent stability vs. temperature. – $V_{S\,max}$ = 20V. – P_{tot} = 5W.	TO-126
TDA7272	High performance motor speed regulator	– Bridge output for current up to 1A. – Particularly suitable for autoreverse car cassette players. – Digitally selected functions (inputs microprocessor compatible). – 5V to 18V supply. – Speed control without sensor.	Powerdip 16 + 2 + 2
TDA7270S	Multifunction system for tape players	– Motor speed regulator. – Automatic stop. – Manual stop. – Pause cassette ejection. – Radio/player automatic switching. – Supply voltage: 6V to 18V.	Powerdip 8 + 8

LINEAR INTEGRATED CIRCUITS

CUSTOM CIRCUITS

FULL CUSTOM

SGS designs and produces custom bipolar ICs for a large number of leading manufacturers. Specialising in advanced technologies and packages for demanding applications, SGS is particularly strong in the industrial, automotive and telecommunications sectors.

A wide range of technologies is available for custom circuits, including low voltage, low noise, high voltage, high current and mixed analog/digital processes. SGS also offers packages of almost every type, ranging from the 8-pin small outline micropackage to the 15-lead Multiwatt plastic power package.

If you are interested in discussing custom chip designs contact your nearest sales office for more information.

ZODIAC CELL LIBRARY

Zodiac is a library cell system which allows customers with no specific knowledge of IC technology to design their own mixed analog/digital signal processing circuits. The library consists of 17 analog blocks, 16 I^2L logic blocks and an ECL prescaler. Individual transistors, diodes, capacitors and resistors can also be integrated.

The customer designs and evaluates the proposed design with the help of a series of development parts, each containing one or more of the library cells. When the breadboard functions correctly SGS takes the final drawings and lays out the appropriate cells in the smallest possible silicon area.

Zodiac is almost as fast as pre-diffused arrays but uses the silicon area more effectively. Zodiac chips are therefore cheap to develop and cheap to produce.

CMOS B SERIES DEVICES

FEATURES

- Very low power dissipation: typically 10 mW/gate; 10 μW/package (MSI)
- Wide supply voltage range: 3 to 18V for HCC 4000B/4500B/40100B series
  3 to 15V for HCF 4000B/4500B/40100B series
- High noise immunity: 45% of supply voltage/typ (1V min. guaranteed)
- High speed operation: 10 MHz for gates and flip-flops; 5 MHz for MSI
- Direct interface with HLL (H 100 family): V_{DD} = 10.8 to 18V for HCC 4000B/4500B/40100B series
  V_{DD} = 10.8 to 15V for HCF 4000B/4500B/40100B series
  No external components or special rules needed
- DTL and TTL compatibility
- Output drive current standardized for HCC and HCF 4000B/4500B/40100B series
- Excellent temperature stability: ± 1.5% shift in transfer characteristics over -55°C to + 125°C
- Inputs fully protected
- High input impedance: 10^{12} Ω typ.
- Low output impedance
- Single phase clock
- HCC/HCF 4000B/4500B/40100B types meet all requirements of Jedec "Standard specifications for description of B-series CMOS devices".
- Packages: Plastic DIP HCF 4XXXBEY
  Ceramic DIP HCC 4XXXBD
  Frit-seal DIP HCC/HCF 4XXXBF
  Ceramic flat package HCC 4XXXBK
  Ceramic chip carrier HCC 4XXXBZ
  Plastic micropackage HCF 4XXXBM1
  also available in chip form.

ABSOLUTE MAXIMUM RATINGS

V_{DD}	DC supply voltage: -0.5 to + 20V for HCC 4000B/4500B/40100B series -0.5 to + 18V for HCF 4000B/4500B/40100B series
P_{tot}	Total power dissipation (per package): 200 mW
V_I	Input voltage: -0.5 to V_{DD} + 0.5V
T_{op}	Operating temperature: HCC types: - 55°C to + 125°C HCF types: - 40°C to + 85°C
T_{stg}	Storage temperature: - 65°C to + 150°C

RECOMMENDED OPERATING CONDITIONS

V_{DD}	Supply voltage	= 3 to 18V for HCC 4000B/4500B/40100B series = 3 to 15V for HCF 4000B/4500B/40100B series
V_I	Input voltage	= 0 to V_{DD}

CONTENTS

CMOS B SERIES DEVICES

HCC/HCF 4000B/4500B/40100B STANDARD SERIES

Type	Function	Package DIP
GATES		
NOR/NAND		
*4000B	Dual 3-input NOR gate plus inverter	14
*4001B	Quad 2-input NOR gate	14
*4002B	Dual 4-input NOR gate	14
*4011B	Quad 2-input NAND gate	14
*4012B	Dual 4-input NAND gate	14
*4023B	Triple 3-input NAND gate	14
*4025B	Triple 3-input NOR gate	14
*4068B	8-input NAND/AND gate	14
*4078B	8-input NOR/OR gate	14
*40107B	Dual 2-input NAND buffer/driver	8-14
OR/AND		
*4068B	8-input AND/NAND gate	14
*4071B	Quad 2-input OR gate	14
*4072B	Dual 4-input OR gate	14
*4073B	Triple 3-input AND gate	14
*4075B	Triple 3-input OR gate	14
*4078B	8-input OR/NOR gate	14
*4081B	Quad 2-input AND gate	14
*4082B	Dual 4-input AND gate	14
Interface Circuit		
*40109B	Quad low-to-high voltage level shifter	16
Buffers and Inverters		
*4010B	Hex buffer/converter	16
*4007UB	Dual complementary pari plus inverter	14
*4041UB	Quad true/complement buffer	14
*4049UB	Hex buffer/converter (inverting)	16
*4050B	Hex buffer/converter (non-inverting)	16
*4069UB	Hex inverter	14
*4502B	Strobed hex inverter/buffer	16
*4053B	Hex buffer (3-state non-inverting)	16
Multilevel/Functional		
*4019B	Quad AND/OR select gate	16
*4030B	Quad exclusive OR gate	14
*4048B	Expandable 8-input gate (3-state out.)	16
*4070B	Quad exclusive OR gate	14
*4077B	Quad exclusive NOR gate	14
*4085B	Dual 2-wide, 2-input AND/OR inverter (AOI)	14
*4086B	Expandable 4-wide, 2-input AND/OR inverter (AOI)	14
Decoders/Encoders		
*4028B	BCD-to-decimal decoder	16
4514B	4-bit latch/4-to-16 line decoder (outputs high)	24
4515B	4-bit latch/4-to-16 line decoder (outputs low)	24
*4532B	8-input priority encoder	16
*4555B	Dual 1-of-4 decod./demult. (out/high)	16
*4556B	Dual 1-of-4 decod./demult. (out low)	16

* Available in micropakage

CMOS B SERIES DEVICES

HCC/HCF 4000B/4500B/40100B STANDARD SERIES (continued)

Type	Function	Package DIP
GATES (continued)		
Schmitt Trigger		
*4093B	Quad 2-input NAND Schmitt trigger	14
*40106B	Hex schmitt triggers	14
MULTIVIBRATORS		
*4047B	Monostable/astable multivibrator	14
*4098B	Dual monostable multivibrator	16
FLIP-FLOPS		
*4013B	Dual "D" with set/reset capability	14
*4027B	Dual "J-K" master-slave with set/reset capability	16
*4076B	4-bit "D" with 3-state outputs	16
*4095B	Gated "J-K" master-slave (non invert.)	14
*4096B	Gated "J-K" master-slave (inverting and non-inverting)	14
*40174B	Hex "D"	16
LATCHES		
*4042B	Quad clocked "D" latch	16
*4043B	Quad NOR R/S (3-state outputs)	16
*4044B	Quad NAND R/S (3-state outputs)	16
*4099B	8-bit addressable latch	16
4508B	Dual 4-bit latch (3-state outputs)	24
40117B	Progr. Dual 4-bit terminator	14
REGISTERS		
Shift Registers Static		
*4006B	18-stage static shift register	14
*4014B	8-stage with sync. parallel or serial input/serial output	16
*4015B	Dual 4-stage with serial input/parallel output	16
*4021B	8-stage with async. parallel input or sync. serial input/serial output	16
4031B	64-stage static shift register	16
4034B	8-stage bidirectional parallel or serial input/parallel output	24
*4035B	4-stage parallel-in/parallel-out with "J-K" input and true/compl. out.	16
*4094B	8-stage shift and-store bus register	16
4517B	Dual 64-stage static shift register	16
*40100B	32-stage static left/right shift register	16
40104B	4-bit bidirect. universal shift register	16
40194B	4-bit bidirect. universal shift register	16
Storage Register		
*4076B	4-bit "D" with 3-state outputs	16
*4099B	8-bit addressable latch	16
40108B	4 x 4 multiport register	24
40208B	4 x 4 multiport register	24

* Available in micropakage

HCC/HCF 4000B/4500B/40100B STANDARD SERIES (continued)

Type	Function	Package DIP
REGISTERS (continued)		
Fifo Registers		
40105B	4-bit x 16 word	16
COUNTERS		
Clock Timer		
***4045B**	21-stage counter for clock timer appl.	16
4541B	Programmable timer	14
4536B	Programmable timer	16
Binary Ripple		
***4020B**	14-stage binary/ripple counter	24
***4024B**	7-stage binary/ripple counter	14
***4040B**	12-stage binary/ripple counter	16
***4060B**	14-stage counter/driver and oscillator	16
Synchronous		
***4017B**	Decade counter/driver plus 10 decoded decimal outputs	16
***4018B**	Presettable divider-by-"N" counter, fixed or programmable	
4022B	Divide-by-8 counter/divider with 8 decimal outputs	16
***4029B**	Presettable Up/Down counter, binary or BCD-decade	16
4510B	Preset. 4-bit BCD up/down counter	16
4516B	Preset. 4-bit binary up/down counter	16
***4518B**	Dual BCD up counter	16
***4520B**	Dual binary up counter	16
40102B	Preset. 2-decade BCD down counter	16
40103B	Preset. 8-bit binary down counter	16
***40160B**	Decade counter/asynchronous clear	16
***40161B**	Binary counter/asynchronous clear	16
***40162B**	Decade counter/synchronous clear	16
***40163B**	Binary counter/synchronous clear	16
40192B	Preset. 4-bit up/down counter	16
40193B	Preset. 4-bit binary up/down counter	16
DISPLAY DRIVERS		
With counter		
4026B	Decade counter/divider with 7-segment display out. and display enable	16
4033B	Decade counter/divider with 7-segment display out. and ripple blanking	16
40110B	Decade up down counter/decoder/latch/driver	16
For liquid - crystal - display drive		
***4054B**	4-line	16
***4055B**	BCD-to-7 segment decoder/driver with "display-frequency" output	
***4056B**	BCD-to-7 segment decoder/driver with strobed latch function	16

* Available in micropackage

CMOS B SERIES DEVICES

HCC/HCF 4000B/4500B/40100B STANDARD SERIES (continued)

Type	Function	Package DIP
DISPLAY DRIVERS (continued)		
For light - emetting - diode drive		
*4511B	BCD-to-7 seg. latch-decoder/driver	16
MULTIPLEXERS/DEMULTIPLEXERS		
Analog Digital		
*4016B	Quad bilateral switch	14
*4019B	Quad AND/OR select	16
*4051B	Single 8-channel	16
*4052B	Differential 4-channel	16
*4053B	Triple 2-channel	16
*4066B	Quad bilateral switch	14
4067B	Single 16-channel	24
4097B	Differential 8-channel	24
*4555B	Dual 1-of-4 decoder/demultiplexer (outputs high)	16
*4556B	Dual 1-of-4 decoder/demultiplexer (outputs low)	16
Data Selector		
*4512B	8-channel data selector with 3-state output	16
*40257B	Quad 2-line-to-1-line data selector/ multiplexer	16
PHASE LOCKED LOOP		
4046B	Micropower phase locked loop	16
ARITHMETIC CIRCUITS		
Adders/Comparators		
*4008B	4-bit full adder with parallel carry out	16
*4030B	Quad exclusive-OR gate	14
*4032B	Triple serial adder, positive logic	16
*4038B	Triple serial adder, negative logic	16
*4063B	4-bit magnitude comparator	16
*4070B	Quad exclusive-OR gate	14
*4077B	Quad exclusive-NOR gate	14
*4585B	4-bit magnitude comparator	14
*40101B	9-bit parity generator/checher	14
ALU/Rate Multipliers		
4089B	Binary rate multiplier	16
4527B	BCD rate multiplier	16
40181B	4-bit arithmetic logic unit	24
*40182B	Look-ahead carry generator	16

* Available in micropackage

NEW HS-C²MOS™

M54HC/74HC SERIES – LSTTL SPEED WITH CMOS LOW POWER

Use of the latest micro-lithography techniques employed in VLSI memory and microprocessor has resulted in the silicon-gate CMOS M54/74HC Series with an operating speed ten times higher than the existing CMOS B logic family.
The combination of LSTTL speed and the advantages of CMOS which are extremely low power dissipation and wide operating supply voltage range will not only realize remarkably low total power dissipation of high speed digital systems, but also develop new application fields such as high speed portable instruments which could not be achieved with current LSTTL or CMOS devices.

M54/74HC SERIES OFFERS

- High speed operation . . . . . LSTTL speed f_{MAX}= 60 MHz (typ.)
- Low power dissipation . . . . . Micro Watt dissipation of standard CMOS B
- High output current . . . . . Fan-out of 10 LSTTL loads (15 for bus Buffer)
- Symmetrical output buffer . . . . . Equal I_{OH} and I_{OL}
- High noise immunity . . . . . 28% V_{CC} at high and low level
- Wide operating voltage range . . . . . V_{CC} = 2 to 6V
- Pin and Function compatible with equivalent LSTTL and some popular types of HCF 4000 series.
- Wide range of products. Over 180 types planned.
- Second source available.

PACKAGES

Plastic DIP	M74HCXXXB1	Plastic Leaded Chip Carrier	M74HCXXXC1
Frit Seal DIP	M54HCXXXF1 M74HCXXXF1	Plastic Small Outline "So" Package	M74HCXXXM1

ABSOLUTE MAXIMUM RATINGS

V_{CC}	Supply voltage	−0.5 to 7 V
V_I	Input voltage	−0.5 to V_{CC} + 0.5V
V_O	Output voltage	−0.5 to V_{CC} + 0.5V
I_{OK}	Output current	± 20 mA
I_O	Output current (Buffer)	± 35 mA
P_d	Total power dissipation	500 mW
T_{stg}	Storage temperature	−65 to 150 °C

RECOMMENDED OPERATING CONDITIONS

V_{CC}	Supply voltage	2 to 6 V
V_I	Input voltage	0 to V_{CC} V
T_A	Operating temperature (74 series)	-40 to 85°C
T_A	Operating temperature (54 series)	-55 to 125°C

NEW HS-C²MOS

M54/74HC SERIES

Type Number	Function	Package DIP
HC00	Quad 2-Input NAND Gate	14
HC02	Quad 2-Input NOR Gate	14
HC03	Quad 2-Input NAND (open drain)	14
HC04	Hex Inverter	14
HCT04	Hex Inverter	14
HCU04	Hex Inverter (Single stage)	14
HC08	Quad 2-Input AND Gate	14
HC10	Triple 3-Input NAND Gate	14
HC11	Triple 3-Input AND Gate	14
HC14	Hex Schmitt inverter	14
HC20	Dual 4-Input NAND Gate	14
HC21	Dual 4-Input AND Gate	14
HC27	Triple 3-Input NOR Gate	14
HC30	8-Input NAND Gate	14
HC32	Quad 2-Input OR Gate	14
HC42	BCD to Decimal Decoder	16
HC51	Dual 2W-2I AND/OR Inverter Gate	14
HC73	Dual J-K Flip-Flop with clear	14
HC74	Dual D-type Flip-Flop with preset and clear	14
HC75	4-Bit D-type latch	16
HC76	Dual J-K Flip-Flop with preset and Clear	16
HC77	Quad D-type latch	14
HC85	4-Bit magnitude comparator	16
HC86	Quad exclusive OR Gate	14
HC107	Dual J-K Flip-Flop	14
HC109	Dual J-K Flip-Flop with preset and clear	16
HC112	Dual J-K Flip-Flop with preset and Clear	16
HC113	Dual J-K Flip-Flop with preset	14
HC123	Dual monostable multivibrator with clear	16
HC125	Quad bus buffer (3-State)	14
HC126	Quad bus buffer (3-State)	14
HC131	3 to 8 line decoder latch	16
HC132	Quad 2-Input schmitt NAND	14
HC133	13 Input NAND Gate	16
HC137	3 to 8 line decoder latch (Inv.)	16
HCT137	3 to 8 line decoder latch (Inv.)	16
HC138	3 to 8 line decoder (Inv.)	16
HCT138	3 to 8 line decoder (Inv.)	16
HC139	Dual 2 to 4 line decoder/demultiplexer	16
HC147	10 to 4 line priority encoder	16
HC148	8 to 3 line priority encoder	16
HC151	8-Channel multiplexer	16
HC153	Dual 4-Channel multiplexer	16
HC154	4 to 16 decoder/demultiplexer	24
HC155	Dual 2 to 4 line decoder	16

M54/74HC SERIES (continued)

Type Number	Function	Package DIP
HC157	Quad 2-Channel multiplexer	16
HC158	Quad 2-Channel multiplexer (Inv.)	16
HC160	Sync. decade counter with async. clear	16
HC161	Sync. binary counter with async. clear	16
HC162	Sync. decade counter with sync. clear	16
HC163	Sync. binary counter with sync. clear	16
HC164	8 bit SIPO shift register	14
HC165	8 bit PISO shift register	16
HC166	8 bit PISO shift register	16
HC173	Quad D-type register (3-state)	16
HC174	Hex D-type Flip-Flop with clear	16
HC175	Quad D-type Flip-Flop with clear	16
HC181	Arithmetic logic unit	24
HC182	Look ahead carry generator	16
HC190	BCD sync. up/down counter	16
HC191	4 bit sync. binary up/down counter	16
HC192	Sync. up/down decade counter	16
HC193	Sync. up/down binary counter	16
HC194	4 bit PIPO shift register	16
HC195	4 bit PIPO shift register	16
HC221	Dual monostable multivibrator	16
HC237	3 to 8 line decoder latch	16
HC238	3 to 8 line decoder	16
HC240	Octal bus buffer (3-state/Inv.)	20
HCT240	Octal buffer (3-state/Inv.)	20
HC241	Octal bus buffer (3-state)	20
HCT241	Octal bus buffer (3-state)	20
HC242	Quad bus transceiver (3-state/Inv.)	14
HC243	Quad bus transceiver (3-state)	14
HC244	Octal bus buffer (3-state)	20
HCT244	Octal buffer (3-state)	20
HC245	Octal bus transceiver (3-state)	20
HCT245	Octal bus transceiver (3-state)	20
HC251	8-channel multiplexer (3-state)	16
HC253	Dual 4-channel multiplexer (3-state)	16
HC257	Quad 2-channel multiplexer	16
HC258	Quad 2-channel multiplexer (3-state/Inv.)	16
HC259	8 bit addressable latch	16
HC273	Octal D-type Flip-Flop with clear	20
HC279	Quad S-R latch	16
HC280	9 bit parity generator	14
HC283	4 bit binary full adder	16
HC298	Quad 2-channel multiplexer register	16
HC299	8 bit PIPO shift register (3-state)	20
HC323	8 bit PIPO shift register (3-state)	20

M54/74HC SERIES (continued)

Type Number	Function	Package DIP
HC354	8 channel multiplexer/register (3-state)	20
HC356	8 channel multiplexer/register (3-state)	20
HC365	Hex bus buffer	16
HC366	Hex bus buffer (Inv.)	16
HC367	Hex bus buffer (3-state)	16
HC368	Hex bus buffer (3-state/Inv.)	16
HC373	Octal D-type latch (3-state)	20
HCT373	Octal D-type latch (3-state)	20
HC374	Octal D-type flip-flop (3-state)	20
HCT374	Octal D-type flip-flop (3-state)	20
HC375	Quad D-type latch	16
HC377	Octal D-type flip-flop	20
HC386	Quad exclusive OR Gate	14
HC390	Dual decade counter	16
HC393	Dual binary counter	14
HC423	Dual monostable multivibrator with clear	16
HC533	Octal D-type latch (3-state/Inv.)	20
HC534	Octal D-type flip-flop (3-state/Inv.)	20
HC540	Octal bus buffer (3-state/Inv.)	20
HCT540	Octal bus buffer (3-state/Inv.)	20
HC541	Octal bus buffer (3-state)	20
HCT541	Octal bus buffer (3-state)	20
HC563	Octal D-type latch (3-state/Inv.)	20
HCT563	Octal D-type latch (3-state/Inv.)	20
HC564	Octal D-type flip-flop (3-state/Inv.)	20
HCT564	Octal D-flip-flop (3-state/Inv.)	20
HC573	Octal D-type latch (3-state)	20
HCT573	Octal D-latch (3-state)	20
HC574	Octal D-type flip-flop (3-state)	20
HCT574	Octal D-flip-flop (3-state)	20
HC590	8 bit binary counter register (3-state)	16
HC592	8 bit register binary counter	16
HC593	8 bit register binary counter (3-state)	20
HC595	8 bit shift register latch (3-state)	16
HC597	8 bit latch shift register	16
HC620	Octal bus transceiver (3-state/Inv.)	20
HC623	Octal bus transceiver (3-state)	20
HC640	Octal bus transceiver (3-state/Inv.)	20
HCT640	Octal bus transceiver (3-state/Inv.)	20
HC643	Octal bus transceiver (3-state)	20
HCT643	Octal bus transceiver (3-state)	20
HC646	Octal bus transceiver register (3-state)	24
HCT646	Octal bus transceiver register (3-state)	24
HC648	Octal bus transceiver register (3-state/Inv.)	24
HCT648	Octal bus transceiver register (3-state/Inv.)	24
HC651	Octal bus transceiver register (3-state/Inv.)	24

M54/74HC SERIES (continued)

Type Number	Function	Package DIP
HCT651	Octal bus transceiver register (3-state/Inv.)	24
HC652	Octal bus transceiver register (3-state)	24
HCT652	Octal bus transceiver register (3-state)	24
HC670	4 word x 4 bit register file (3-state)	16
HC688	8 bit equality comparator	20
HC690	Decade counter register (3-state)	20
HC691	4 bit binary counter register (3-state)	20
HC692	Decade counter register (3-state)	20
HC693	4 bit binary counter register (3-state)	20
HC696	U/D decade counter register (3-state)	20
HC697	U/D 4-bit binary cfr./register (3-state)	20
HC698	U/D decade counter register (3-state)	20
HC699	U/D 4-bit binary ctr./register (3-state)	20
HC4002	Dual 4-input NOR Gate	14
HC4017	Decade counter/divider	16
HC4020	14-stage binary counter	16
HC4022	Octal counter/divider	16
HC4024	7-stage binary counter	14
HC4028	BCD to decimal decoder	16
HC4040	12-stage binary counter	16
HC4049B	Hex buffer/converter (Inv.)	16
HC4050B	Hex buffer/converter	16
HC4051	8 channel analog multiplexer	16
HC4052	Dual 4-channel analog multiplexer	16
HC4053	Triple 2-channel analog multiplexer	16
HC4060	14-stage binary counter/osc.	16
HC4066	Quad bilateral switch	14
HC4072	Dual 4 Input OR Gate	14
HC4075	Triple 3-input OR Gate	14
HC4078	8-input NOR/OR Gate	14
HC4094	8 bit SIPO shift register latch (3-state)	16
HC4511	BCD to 7-segment L/D/D (LED)	16
HC4514	4 to 16 line decoder latch	24
HC4515	4 to 16 line decoder latch (Inv.)	24
HC4518	Dual decade counter	16
HC4520	Dual 4 bit binary counter	16
HC4538	Dual monostable multivibrator	16
HC4543	BCD to 7-segment L/D/D (LCD)	16
HC7266	Quad esclusive NOR Gate	14
HC7292	Programmable divider/timer	16
HC7294	Programmable divider/timer	16
HCT7007	Hex Buffer	14
HC40102	Dual BCD programmable down counter	16
HC40103	8 bit binary prog. down counter	16

M54/74HC SERIES (continued)

Function			Standard Code
GATE BUFFER	NAND		HC00, HC03, HC10, HC20, HC30, HC133
	NOR		HC02, HC27, HC4002, HC4078
	AND		HC08, HC11, HC21
	OR		HC32, HC4075, HC4072, HC4078
	INVERTER		HCU04, HC04, HCT04
	BUFFER		HCT7007, HC4049B, HC4050B
		3-STATE	HC125, HC126, HC240, HCT240, HC241, HCT241, CH244, HCT244, HC365, HC366, HC367, HC368, HC540, HCT540, HC541, HCT541
		BIDIRECTIONAL	HC242, HC243, HC245, HCT245, HC620, HC623, HC640, HCT640, HC643, HCT643
	MULTIFUNCTION		HC51, HC86, HC386, HC7226
	SCHMITT TRIGGER		HC14, HC132
FLIP-FLOP	J-K FLIP-FLOP		HC73, HC76, HC107, HC109, HC112, HC113
	D FLIP-FLOP		HC74, HC174, HC175, HC273, HC377
		3-STATE	HC374, HCT374, HC534, HC564, HCT564, HC574, HCT574, HC646, HCT646, HC648, HCT648, HC651, HCT651, HC652, HCT652
LATCH			HC75, HC77, HC259, HC279, HC375
		3-STATE	HC373, HCT373, HC533, HC563, HCT563, HC573, HCT573
MULTIVIBRATOR			HC123, HC221, HC423, HC4538
DECODER			HC42, HC131, HC137, HCT137, HC138, HCT138, HC139, HC154, HC155, HC237, HC238, HC4028, HC4514, HC4515
	7-SEGMENT		HC4511, HC4543
ENCODER			HC147, HC148
REGISTER			HC164, HC165, HC166, HC173, HC194, HC195, HC299, HC323, HC595, HC597, HC670, HC4094
COUNTER		BINARY	HC161, HC163, HC191, HC193, HC393, HC590, HC592, HC593, HC691, HC693, HC697, HC699, HC4520
		DECADE	HC160, HC162, HC190, HC192, HC390, HC690, HC692, HC696, HC698, HC4518
		DIVIDER	HC4017, HC4020, HC4022, HC4024, HC4040, HC4060, HC40102, HC40103, HC7292, HC7294
MULTIPLEXER		ANALOG	HC4051, HC4052, HC4053, HC4066
		DIGITAL	HC151, HC153, HC157, HC158, HC251, HC253, HC257, HC258, HC298, HC354, HC356
OTHERS		COMPARATORS	HC85, HC688
		ADDER	HC283
		ALU	HC181, HC182
		PARITY TREE	HC280

LOW POWER SCHOTTKY TTL

SGS Low Power Schottky devices cover all the popular functions available in standard TTL. They offer a good compromise between cost, speed, power consumption and ease of use. Low Power Schottky devices are available in 14, 16, 20 and 24-lead ceramic or plastic dip packages and micropackage.

GUARANTEED OPERATING RANGES

PART NUMBERS	SUPPLY VOLTAGE			TEMPERATURE
	Min.	Typ.	Max.	
T54LS00X	4.5V	5.0V	5.5V	-55°C to + 125°C
T74LS00X	4.75V	5.0V	5.25V	0°C to + 70°C

X = Package
B1 = Plastic
D1 = Ceramic (frit-seal) Industrial
M1 = Micropackage
D2 = Ceramic Military

CONTENTS

LOW POWER SCHOTTKY TTL

TTL-T 74/T 54 LS SERIES

Type	Function	t_{pd} (typ) (ns)	P_D (typ) (mW)	Fanout	Package DIP
NAND GATES					
T 74/54 LS 00	Quad 2-input	5	12	20	14
T 74/54 LS 03	Quad 2-input open-collector	10	12	–	14
T 74/54 LS 04	Hex inverter	5	18	20	14
T 74/54 LS 05	Hex inverter open-collector	10	18	–	14
T 74/54 LS 10	Triple 3-input	6	9	20	14
T 74/54 LS 13	Dual 4-input schmitt trigger	20	60	20	14
T 74/54 LS 14	Hex schmitt trigger	20	60	20	14
T 74/54 LS 20	Dual 4-input	5	6	20	14
T 74/54 LS 22	Dual 4-input open-collector	10	6	–	14
T 74/54 LS 26	Quad 2-input high voltage	10	12	–	14
T 74/54 LS 30	8-input	7	3	20	14
T 74/54 LS 37	Quad 2-input buffer	20	30	60	14
T 74/54 LS 38	Quad 2-input buffer open-collector	20	30	–	14
T 74/54 LS 40	Dual 4-input buffer	10	15	60	14
T 74/54 LS 132	Quad 2-input schmitt trigger	20	41	20	14
T 74/54 LS 133	13-input	20	3	20	16
NOR GATES					
T 74/54 LS 02	Quad 2-input	5	12	20	14
T 74/54 LS 27	Triple 3-input	8	17	20	14
T 74/54 LS 28	Quad 2-input buffer	9	55	60	14
T 74/54 LS 33	Quad 2-input open-collector	7	50	–	14
T 74/54 LS 260	Dual 5-input	12	10	20	14
AND GATES					
T 74/54 LS 08	Quad 2-input AND gate	7.5	22	20	14
T 74/54 LS 09	Quad 2-input AND gate open-collector	10	22	–	14
T 74/54 LS 11	Triple 3-input AND gate	7.5	16	20	14
T 74/54 LS 15	Triple 3-input AND gate open-collector	10	16	–	14
T 74/54 LS 21	Dual 4-input AND gate	8	11	20	14
OR GATE					
T 74/54 LS 32	Quad 2-input	7	24	20	14
AND-OR INVERTER GATES					
T 74/54 LS 51	Dual	8	7	20	14
T 74/54 LS 54	2-3-3-2 input	10	5	20	14
T 74/54 LS 55	2 wide 4-input	10	5	20	14
EXCLUSIVE-OR GATES					
T 74/54 LS 86	Quad	12	30	20	14
T 74/54 LS 136	Quad open collector	23	30	–	14
EXCLUSIVE-NOR GATE					
T 74/54 LS 266	Quad 2-input open-collector	23	20	–	14
COMPARATORS					
T 74/54 LS 85	4-bit Magnitude	25	55	20	16

LOW POWER SCHOTTKY TTL

SGS®

TTL-T 74/T 54 LS SERIES (continued)

Type	Function	t_{pd} (typ) (ns)	P_D (typ) (mW)	Fanout	Package DIP
BUFFERS, GATES AND DRIVERS					
T 74/54 LS 125	Quad 3-state buffer (low enable)	15	50	60	14
T 74/54 LS 126	Quad 3-state buffer (high enable)	15	75	60	14
T 74/54 LS 240	Octal buffer with 3-state	14	177	60	20
T 74/54 LS 241	Octal buffer with 3-state	18	182	60	20
T 74/54 LS 244	Octal buffer with 3-state	18	182	60	20
T 74/54 LS 365 A	Hex buffer, 3-state common enable	10	67	60	16
T 74/54 LS 366 A	Hex inverter, 3-state common enable	10	60	60	16
T 74/54 LS 367 A	Hex buffer, 3-state, 4 bit and 2-bit	10	67	60	16
T 74/54 LS 368 A	Hex inverter, 3-state, 4-bit and 2-bit	10	60	60	16
DUAL FLIP-FLOPS					
T 74/54 LS 74 A	Dual D	10	20	20	14
T 74/54 LS 109	Dual J K	10	20	20	16
T 74/54 LS 112 A	Dual J K edge-trigger	10	20	20	16
T 74/54 LS 113	Dual J K edge-trigger	10	20	20	14
T 74/54 LS 114	Dual J K edge-trigger	10	20	20	14
MULTIPLE FLIP-FLOPS					
T 74/54 LS 174	Hex D with clear	12	80	20	16
T 74/54 LS 175	Quad with clear	8	55	20	16
T 74/54 LS 273	Octal D-type	20	85	20	20
T 74/54 LS 298	Quad 2 multiplexer with output register	16	65	20	16
T 74/54 LS 374	Octal D type flip-flop	45	135	60	20
T 74/54 LS 378	Hex D-type	20	80	20	16
T 74/54 LS 379	4-bit	20	80	20	16
LATCHES					
T 74/54 LS 170	4x4 register file	45	125	–	16
T 74/54 LS 197	4 bit D	8	60	20	14
T 74/54 LS 256	Dual 4-bit addressable	11	70	20	16
T 74/54 LS 259	8 bit addressable	15	60	20	16
T 74/54 LS 279	Quad set-reset	20	18	20	16
T 74/54 LS 373	Octal transparent	25	120	20	20
T 74/54 LS 670	4x4 register file with 3-state outputs	25	150	20	16
REGISTERS					
T 74/54 LS 95 B	PIPO	20	65	20	14
T 74/54 LS 164	8-bite serial-in parallel-out	15	180	20	14
T 74/54 LS 170	4x4 register file	45	125	–	16
T 74/54 LS 174	Hex D flip-flop with clear	12	65	20	16
T 74/54 LS 175	Quad flip-flop with clear	8	45	20	16
T 74/54 LS 194 A	4-bit bidirectional	13	75	20	16
T 74/54 LS 195 A	4-bit shift register	8	70	20	16
T 74/54 LS 273	8-bit register	20	85	20	20
T 74/54 LS 295 A	4-bit shift register, 3-stage	17	75	20	14
T 74/54 LS 298	Quad 2-input multiplexer with output reg.	16	65	20	16
T 74/54 LS 374	Octal D-type flip-flop	45	135	60	20
T 74/54 LS 377	Octal D-flip-flop	27	85	20	20
T 74/54 LS 378	Parallel D register	27	65	20	16
T 74/54 LS 379	Quad parallel register	20	75	20	16
T 74/54 LS 395	4-bit shift register with 3-state outputs	20	95	20	16
T 74/54 LS 670	4x4 register file with 3-state outputs	29	150	20	16

LOW POWER SCHOTTKY TTL

TTL-T 74/T 54 LS SERIES (continued)

Type	Function	t_{pd} (typ) (ns)	P_D (typ) (mW)	Fanout	Package DIP
ARITHMETIC OPERATORS					
T 74/54 LS 83 A	4-bit full adder	17	95	20	16
*T 74/54 LS 181	4-bit ALU	20	105	20	24
T 74/54 LS 283	4-bit full adder	15	95	20	16
MULTIPLEXERS					
T 74/54 LS 151	8-input	11	30	20	16
T 74/54 LS 152	8-input	11	28	20	14
T 74/54 LS 153	Dual 4-input	10	31	20	16
T 74/54 LS 157	Quad 2-input	22	49	20	16
T 74/54 LS 158	Quad 2-input	20	24	20	16
T 74/54 LS 251	8-input, 3-state	11	35	20	16
T 74/54 LS 253	Dual 4-input	10	43	20	16
T 74/54 LS 257	Quad 2-input, 3-state (non inverting)	15	50	20	16
T 74/54 LS 258	Quad 2-input, 3-state (inverting)	15	35	20	16
T 74/54 LS 298	Quad 2 with output register	16	65	20	16
T 74/54 LS 352	Dual 4-input	20	30	20	16
T 74/54 LS 353	Dual 4-input	18	43	20	16
DECODERS/DEMULTIPLEXERS					
T 74/54 LS 42	1 of 10 decoder	11	35	20	16
T 74/54 LS 138	1 of 8	11	34	20	16
T 74/54 LS 139	Dual 1-of-4	15	34	20	16
T 74/54 LS 155	Dual 1-of-4	15	31	20	16
T 74/54 LS 156	Dual 1-of-4 decoder open-collector	15	31	20	16
T 74/54 LS 256	Dual 1-of-4	20	60	20	16
T 74/54 LS 259	8 bit addressable	15	60	20	16
COUNTERS					
T 74/54 LS 90	Decade	25	45	20	14
T 74/54 LS 92	Divide-by-twelve	25	45	20	14
T 74/54 LS 93	Divide-by-sixteen counter	25	45	20	14
T 74/54 LS 160	BCD decoder async. reset	9	95	20	16
T 74/54 LS 161	4-bit binary async.	9	95	20	16
T 74/54 LS 162	BCD decade sync. reset	9	95	20	16
T 74/54 LS 163	4-bit binary sync. reset	9	95	20	16
T 74/54 LS 168	Synchronous bidirectional BCD decade	25	100	20	16
T 74/54 LS 169	Synchronous bidirec. modulo-16 binary	25	100	20	16
T 74/54 LS 190	Up/down decade	20	95	20	16
T 74/54 LS 191	Up/down binary	20	95	20	16
T 74/54 LS 192	Presettable 4-bit binary up/down	20	85	20	16
T 74/54 LS 193	Up/down binary	20	85	20	16
T 74/54 LS 196	Decade	26	60	20	14
T 74/54 LS 197	4-bit binary	26	60	20	14
T 74/54 LS 290	BCD decade	25	45	20	14
T 74/54 LS 293	Modulo-16 binary	25	45	20	14
T 74/54 LS 390	Dual decade	30	100	20	16
T 74/54 LS 393	Dual 4-stage binary	30	100	20	14
T 74/54 LS 490	Dual decade	6	95	20	16

* Not available in micropackage

Note: Fanout has been calculated as the minimum value between $|I_{OL}/I_{IL}|$ and $|I_{OH}/I_{IH}|$, where the input currents are normalized to the following values: I_{IL} = 0.40mA, I_{IH} = 20μA.

HCMOS GATE ARRAYS

Systems Board In Silicon is probably the most succint description of gate arrays. They are in fact a large number of standard circuit elements, up to 6000 sets of basic logic elements (i.e. 2 N-channel and 2 P-channel MOS transistors), on a single chip. These are interconnected using custom generated metalization masks to produce all the logic functions the customer desires.

CONTENTS

HCMOS GATE ARRAYS

HSG 3000 SERIES

Features

- Silicon-gate 3.5-micron (drawn) HCMOS technology.
- Single-layer metal interconnection.
- HTTL and LSTTL speeds – 5 ns through a 2-input NAND gate and interconnection, T_A = 25 degrees C, fanout = 2, V_{DD} = 5V.
- Optimal block structure of 2N and 2P transistors.
- Complexities ranging from 272 to 2550 blocks.
- Pin counts ranging up to 104.
- Fully supported by LDS™.
- Extensive macrocell and macrofunction libraries.
- All non-power pads configurable as inputs, outputs or bidirectional.
- TTL/CMOS I/O compatibility.
- Configurable output drive up to 4.8mA.
- All inputs and outputs protected from overvoltage and latch-up.
- Full Military capability.
- Ceramic and plastic packages.
- Alternately-sourced.
- HSG3110Q evalutation device available.

Product Outline

Device Number	Gate Complexity	Max[3] I/O	V_{DD} Pads	V_{SS} Pads	Max Pads	Gate Speed (ns)[1]	
						Typ.	Max[2]
HSG 3020	272	32	1	3	36	5.0	9.0
HSG 3030	342	36	1	3	40	5.0	9.0
HSG 3040	420	40	1	3	44	5.0	9.0
HSG 3060	600	48	1	3	52	5.0	9.0
HSG 3080	812	56	1	3	60	5.0	9.0
HSG 3110	1056	64	1	3	68	5.0	9.0
HSG 3130	1332	72	1	3	76	5.0	9.0
HSG 3170	1722	82	1	3	86	5.0	9.0
HSG 3210	2162	92	1	3	96	5.0	9.0
HSG 3250	2550	100	1	3	104	5.0	9.0

Notes: 1. 2-input NAND gate, fanout = 2, statistically necessary metal interconnection
2. T_A = 0 to 70 degrees C, V_{DD} = 5V ± 5%
3. It may be necessary to configure additional I/O pads for V_{DD} and V_{SS}, depending on the number and drive of the outputs buffers. See section on 'V_{DD} and V_{SS} Requirements'.

Absolute Maximum Ratings (Referenced to V_{SS})

Parameter	Symbol	Limits	Unit
DC Supply Voltage	V_{DD}	-3.0 to + 7	V
Input Voltage	V_I	-0.3 to V_{DD} + 0.3	V
DC Inmut Current	I_I	± 10	mA
Storage Temperature Range (Ceramic)	T_{STG}	-65 to + 150	°C
Storage Temperature Range (Plastic)	T_{STG}	-40 to + 125	°C

Recommended Operating Conditions

Parameter	Symbol	LImits	Unit
DC Supply Voltage	V_{DD}	+ 3 to + 6	V
Operating Ambient Temperature Range Military	T_A	-55 to + 125	°C
Industrial Range	T_A	-40 to + 85	°C
Commercial Range	T_A	0 to + 70	°C

Package Selector Guide for the HSG3000 Series

Devices Number	Max Pins	Dual-in-line Packages		Chip Carriers		Pin Grid Arrays
		Plastic	Ceramic	Plastic	Ceramic	
HSG 3020	36	16 +	16 +	20 +	28 +	64
HSG 3030	40	16 +	16 +	20 +	28 +	64
HSG 3040	44	16 +	16 +	20 +	28 +	64
HSG 3060	52	18 +	16 +	20 +	28 +	64
HSG 3080	60	20 +	24 +	44 +	28 +	64
HSG 3110	68	24 +	24 +	44 +	28 +	64 +
HSG 3130	76	24 +	24 +	44 +	28 +	64 +
HSG 3170	86	24 +	24 +	44 +	44 +	64 +
HSG 3210	96	24 +	24 +	44 +	44 +	64 +
HSG 3250	104	40 +	24 +	44 +	44 +	64 +

Package families include:
Ceramic DIPs – 24, 28, 40, 48 leads.
Plastic DIPs – 24, 28, 40, 48 leads.
Ceramic chip carriers – 28, 44, 52, 68, 84 and 100 leads.
Plastic chip carriers – 20, 44, 68, 84 leads
Ceramic Pin-grid arrays – 64, 68, 84, 100 and 120 leads.

HCMOS GATE ARRAYS

HSG 5000 SERIES

Features

- Silicon-gate 3-micron (drawn) HCMOS technology.
- Double-layer metal interconnection
- Shottky TTL speeds – 2.5 ns through 2-input NAND gate and interconnection, $T_A = 25°C$, fanout = 2, $V_{DD} = 5V$.
- Optimal block structure of 2N and 2P transistors.
- Complexities ranging from 880 to 6000 blocks.
- Pin counts ranging up to 180.
- Fully supported by LDS™.
- Extensive macrocell and macrofunction libraries.
- All non-power pads configurable as inputs, outputs or bidirectional.
- TTL/CMOS I/O compatibility.
- Configurable output drive up to 9.0 mA.
- All inputs and outputs protected from overvoltage and latch-up.
- Full military compatibility.
- Ceramic and plastic packages.
- Alternately-sourced.
- HSG5220Q evalutation device available.

Product Outline

Device Number	Gate Complexity	Max[3] I/O	V_{DD} Pads	V_{SS} Pads	Max Pads	Gate Speed (ns)[1]	
						Typ.	Max[2]
HSG5080	880	66	2	6	74	2.5	4.5
HSG5140	1404	84	2	6	92	2.5	4.5
HSG5220	2224	106	2	6	114	2.5	4.5
HSG5320	3192	130	2	6	138	2,5	4.5
HSG5420	4202	144	4	8	156	2.5	4.5
HSG5600	6000	168	4	8	180	2.5	4.5

Notes: 1. 2-input NAND gate, fanout = 2, and statistically necessary interconnection.
2. $T_A = 0$ to 70° C, $V_{DD} = 5V \pm 5\%$
3. It may be necessary to configure additional I/O pads for V_{DD} and V_{SS}, depending on the number and drive of the output buffers. See section on V_{DD} and V_{SS} Requirements'.

Absolute Maximum Ratings (Referenced to V_{SS})

Parameter	Symbol	Limits	Unit
DC Supply Voltage	V_{DD}	-0.3 to +7	V
Input Voltage	V_I	-0.3 to V_{DD} + 0.3	V
DC Input Current	I_I	± 10	mA
Storage Temperature Range (Ceramic)	T_{STG}	-65 to + 150	°C
Storage Temperature Range (Plastic)	T_{STG}	-40 to + 125	°C

Recommended Operating Conditions

Parameter	Symbol	Limits	Unit
DC Supply Voltage	V_{DD}	+ 3 to + 6	V
Operating Ambient Temperature Range Military	T_A	-55 to + 125	°C
Industrial Range	T_A	-40 to + 85	°C
Commercial Range	T_A	0 to + 70	°C

Package Selector Guide for the HSG5000 Series

Device Number	Max Pins	Dual-in-line Packages		Chip Carriers		Pin Grid Arrays
		Plastic	Ceramic	Plastic	Ceramic	
HSG 5080	74	24 +	24 +	44 +	28 +	64 +
HSG 5140	92	24 +	24 +	44 +	44 +	64 +
HSG 5220	114	24 +	24 +	44 +	44 +	64 +
HGS 5320	138	—	—	68 +	68 +	64 +
HSG 5420	156	—	—	68 +	68 +	64 +
HGS 5600	180	—	—	68 +	68 +	68 +

Package families include:
Ceramic DIPs – 24, 28 40, 48 leads.
Plastic DIPs – 24, 28, 40, 48 leads.
Ceramic chip carriers – 28, 44, 52, 68, 84 and 100 leads.
Plastic chip carriers – 68, 84 leads
Ceramic pin-grid arrays – 64, 68, 84, 100, 120, 144 and 180 leads.

DEDICATED MOS ICs (ASICs)

The devices listed in the following pages include dedicated products for Telecommunication, Consumer and Automotive markets.

CONTENTS

DEDICATED MOS ICs (ASICs)

SGS MOS PRODUCTION PROCESSES
N-MOS

PROCESS	CHARACTERISTICS	PRODUCTS
N-MOS	**PH DOPING** GATE LENGTH 6 μm GATE OXIDE THICKNESS 900 Å SINGLE/DOUBLE POLY (EPM) 5V V_{CC} 12V V_{CC} 25V V_{PP}	ASICs*
N-MOS H1	**AS DOPING** GATE LENGTH 3/4 μm GATE OXIDE THICKNESS 500 Å 5V V_{CC}	ROMs MICROPROCESSORS AND MCUs ASICs
N-MOS H2	**AS DOPING** GATE LENGTH 2.5 μm GATE OXIDE THICKNESS 350 Å 5V V_{CC}	ROMs MICROPROCESSORS AND MCUs ASICs
N-MOS E	**PH DOPING** GATE LENGTH 4 μm GATE OXIDE THICKNESS 1100 Å 5V V_{CC}, 25V V_{PP} DOUBLE POLY	EPROM (M2716)
N-MOS E1	**AS DOPING** GATE LENGTH 3 μm GATE OXIDE THICKNESS 700 Å 5V V_{CC}, 21V V_{PP} DOUBLE POLY	EPROM (M2732A)
N-MOS E2	**AS DOPING** GATE LENGTH 2 μm GATE OXIDE THICKNESS 700 Å 5V V_{CC}, 21V V_{PP}	EPROM (M2764)
N-MOS E3	**AS DOPING** GATE LENGTH 1.5 μm GATE OXIDE THICKNESS 350 Å V_{CC} = 5V V_{PP} = 12.5V	EPROM (M2764A) (M2764AP) (M27128A) (M27256)
N-MOS F1	**AS DOPING** GATE LENGTH 3.5 μm GATE OXIDE THICKNESS 800 Å 5V V_{CC} DOUBLE POLY	EEPROMs M2816 M8572 (64 x 16) M9306 (16 x 16) MCU WITH SHADOW RAM (M38SH72)

C-MOS

AI-GATE ST	**B/PH DOPING** GATE LENGTH 7.5 μm GATE OXIDE THICKNESS 1200 Å V_{DD} 3 to 18V	4000B FAMILY ASICs
AI-GATE LOVAG	**AS ABOVE BUT** GATE LENGTH 6 μm GATE OXIDE THICKNESS 900 Å V_{DD} 1.5 to 5V	ASICs
SI-GATE H0	**B/PH DOPING** GATE LENGTH 6 μm GATE OXIDE THICKNESS 700 Å V_{DD} 2 to 10V	ASICs
SI-GATE H1	**B/AS DOPING** GATE LENGTH N 3 μm GATE LENGTH P 4 μm GATE OXIDE THICKNESS 700 Å V_{DD} 2 to 6V	HIGH SPEED CMOS FAMILY ASICs GATE ARRAYS (3000 series)
SI-GATE H2	**B/AS DOPING** GATE LENGTH N 3 μm GATE LENGTH P 4 μm GATE OXIDE THICKNESS 700 Å V_{DD} 2 to 6V	ASICs GATE ARRAYS (5000 series) MICROPROCESSORS

* ASICs: Application Specific Integrated Circuits

DEDICATED MOS ICs (ASICs)

TELECOMMUNICATIONS

Type	Function	Technology	Supply voltage (V)	Temperatura range (°C)	PACKAGE
M044	128x128 Digital switching matrix	N-MOS	5	0 to 70	DIP28C
M079	2x2x2 crosspoint	N-MOS	18	0 to 70	DIP14
M088	256x256 Digital switching matrix	N-MOS	5	0 to 70	DIP40CM
M089/M099	2x8 crosspoint matrix	N-MOS	16	0 to 70	DIP16, DIP16F DIP16C
M093	12x8 crosspoint	N-MOS	18	0 to 70	DIP40, DIP40CM
M116	PCM Conference circuit	N-MOS	5	0 to 70	DIP24C
M761	Dual tone multifreq. with 1 contact per key	CMOS	2.5 to 5	-25 to 70	DIP18 DIP18F
M764/A	Tone ringer	CMOS	7 to 18	-25 to 80	DIP18, DIP16 DIP16F, DIP18F
M774	Tone ringer	CMOS	7 to 15	-25 to 70	DIP14
M2560A	Pulse dialler	CMOS	5	-25 to 70	DIP18Co, DIP18F
M5116	μ-Law companding Codec	CMOS	± 5	0 to 70	DIP16C, DIP16F
M5156	A-Law companding Codec	CMOS	±5	0 to 70	DIP16C, DIP16F
M5912	PCM Filter	CMOS	±5	0 to 70	DIP16C, DIP16F
M5913*	PCM Combo (Synchronous)	CMOS	±5	0 to 70	DIP20C
M5914*	PCM Combo (Sync/ Async./Signalling)	CMOS	±5	0 to 70	DIP24C
M5916*	μ-Law PCM Combo	CMOS	±5	0 to 70	DIP16C
M5917*	A-Law PCM Combo	CMOS	±5	0 to 70	DIP16C
M6569	DTMF with redial	CMOS	5	-25 to 70	DIP16
M6579	DTMF with redial and flash	CMOS	5	-25 to 70	DIP16
M8950	High quality speech. synthesizer	N-MOS	5	0 to 70	DIP28
M9910*	FSK Programmable MODEM	N-MOS	5	0 to 70	DIP28
M22100	4x4 crosspoint switch with control memory	CMOS	18	-40 to 85	DIP16F, DIP16
M22101/102	4x4x2 crosspoint switch with control memory	CMOS	18	-40 to 85	DIP24, DIP24F

* Coming soon

DEDICATED MOS ICs (ASICs)

MUSIC

Type	Function	Technology	Supply voltage (V)	Temperature range (°C)	PACKAGE
M082/A	Tone generator	NMOS	12	0 to 50	DIP16
M083/A	Tone generator	NMOS	12	0 to 50	DIP16
M086/A	Tone generator	NMOS	12	0 to 50	DIP16
M108	Single chip organ	NMOS	12	0 to 50	DIP40
M112	Polyphonic sound generator	NMOS	12	0 to 70	DIP40
M114*	Digital sound processor	NMOS	5	0 to 70	DIP40
M208	Single chip organ	NMOS	12	0 to 50	DIP40
M747	7-stage divider	CMOS	12	-40 to 85	DIP14

* Coming soon

TV/RADIO/VCR

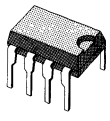
Type	Function	Technology	Supply voltage (V)	Temperature range (°C)	PACKAGE
M104	PCM RC rec. (serial Bus)	NMOS	5	0 to 70	DIP28
M105	PCM RC receiver	NMOS	5	0 to 70	DIP24
M190	16-key keyboard encoder and latch	NMOS	12	0 to 70	DIP18
M192	4 bit to 7 segment decoder driver	CMOS	12	0 to 70	DIP16
M206	PLL tuning microprocessor interface	NMOS	5/25	0 to 70	DIP28
M293	Electronic Program Memory (32 stations)	NMOS	5/25	0 to 70	DIP28
M490	Single chip tuning system (single dot display)	NMOS	5/25	0 to 70	DIP40
M491	Single chip tuning system (7-segment display)	NMOS	5/25	0 to 70	DIP40
M705	15/16 divider for PLL (M206)	CMOS	5	0 to 70	DIP8
M708	PCM Remote Contr. trans. (30 commands x 4 add.)	CMOS	4.5 to 10.5	0 to 70	DIP20
M708A			3 to 10.5		
M708L			2.2 to 5		
M709	PCM Remote Contr. trans. (40 commands x 16 add.)	CMOS	4.5 to 10.5	0 to 70	DIP24
M709A			3 to 10.5		
M709L			2.2 to 5		
M710	PCM Remote Contr. trans. (64 commands x 16 add.)	CMOS	4.5 to 10.5	0 to 70	DIP28
M710A			3 to 10.5		
M3004	PCM RC transmitter (38KHz carrier)	CMOS	4 to 10.5	0 to 70	DIP20
M3005	PCM RC transmitter (500KHz)	CMOS	4 to 10.5	0 to 70	DIP20
M8716	Clock-calendar with Serial I^2C Bus	CMOS	2 to 5.5	0 to 70	DIP8
M8722	Data interface for VCR	CMOS	5	0 to 70	DIP20
M8793*	Stereo processor for TV (German system)	CMOS	5	0 to 70	DIP28

* Coming soon

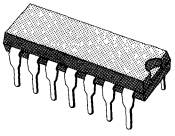
DEDICATED MOS ICs (ASICs)

OTHER FUNCTIONS

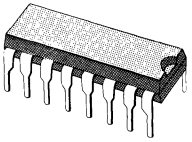
Type	Function	Technology	Supply voltage (V)	Temperature range (° C)	PACKAGE
M706	16 stage counter Analog Car Clock	CMOS	3 to 16	-40 to 85	DIP8
M5450	LED Driver (34 segments)	NMOS	5 to 12	-25 to 85	DIP40
M5451	LED Driver (35 segments)	NMOS	5 to 12	-25 to 85	DIP40
M5480	LED Driver (23 segments)	NMOS	5 to 12	-25 to 85	DIP28
M5481	LED Driver (14 segments)	NMOS	5 to 12	-25 to 85	DIP20Co
M5482	LED Driver (15 segments)	NMOS	5 to 12	-25 to 85	DIP20Co
M8438	LCD Driver (32 segments static)	CMOS	3 to 10	-40 to 85	DIE-DIP40 PLLC44
M145026	RC Encoder	CMOS	4.5 to 18	0 to 70	DIP16
M145027	RC Decoder	CMOS	4.5 to 18	0 to 70	DIP16
M145028	RC Decoder	CMOS	4.5 to 18	0 to 70	DIP16



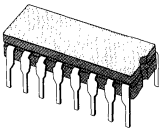
DIP8



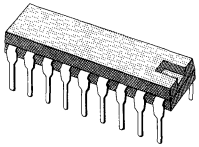
DIP14 (Plastic)



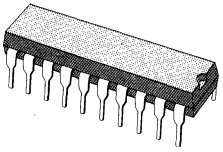
DIP16 (Plastic)



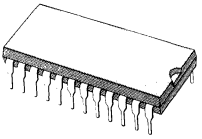
DIP16F (Frit-seal)



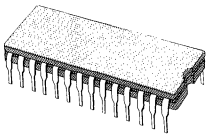
DIP18 (Plastic)



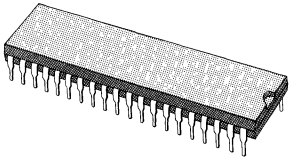
DIP20Co (Copper fr. 0.4)



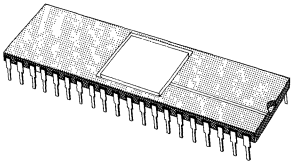
DIP24 (Plastic)



DIP28F (Frit-seal)



DIP40 (Plastic)



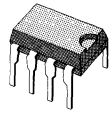
DIP40CM (Multi-layer Ceramic)

MOS MEMORIES

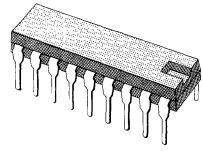
ROM/EPROM/EEPROM

Type	Mode	Organization	Technology	Supply voltage (V)	Current cons. max. (mA)	t_{acc} (ms)	PACKAGE
M120D	EEPROM	256x4 bit	NMOS	12/25	35	950	DIP18Co, DIP18F
M2316H	ROM	2048x8 bit	NMOS H1	5	100	300	DIP24
M2332	ROM	4096x8 bit	NMOS H1	5	100	250	DIP24
M2333	ROM	4096x8 bit	NMOS H1	5	100	250	DIP24
M2364	ROM	8192x8 bit	NMOS H2	5	80	250	DIP24
M2365	ROM	8192x8 bit	NMOS H2	5	80	250	DIP28
M23256A	ROM	32768x8 bit	NMOS H2	5	100	250	DIP28
M2716F1	UV-EPROM	2048x8 bit	NMOS E0	5	100	450	DIP24CL
M2716-1F1	UV-EPROM	2048x8 bit	NMOS E0	5	100	350	DIP24CL
M2716P	OTP-EPROM	2048x8 bit	NMOS E0	5	100	450	DIP24
M2732AF1	UV-EPROM	4096x8 bit	NMOS E1	5	125	250	DIP24CL
M2732A-2F1	UV-EPROM	4096x8 bit	NMOS E1	5	125	200	DIP24CL
M2732A-4F1	UV-EPROM	4096x8 bit	NMOS E1	5	125	450	DIP24CL
M2732AP	OTP-EPROM	4096x8 bit	NMOS E1	5	125	450	DIP24
M2764F1	UV-EPROM	8192x8 bit	NMOS E2	5	100	250	DIP28CL
M2764-2F1	UV-EPROM	8192x8 bit	NMOS E2	5	100	200	DIP28CL
M2764-4F1	UV-EPROM	8192x8 bit	NMOS E2	5	100	450	DIP28CL
M27128AF1	UV-EPROM	16384x8 bit	NMOS E3	5	85	250	DIP28CL
M27256AF1	UV-EPROM	32768x8 bit	NMOS E3	5	100	250	DIP28CL
M9306	Serial EEPROM	16x16 bit	NMOS F1	5	10	*100KHz	DIP8
M8572	Serial EEPROM	128x8 bit	NMOS F1	5	15	*125KHz	DIP8
M36000	ROM	8192x8 bit	NMOS H1	5	40	300	DIP24, DIP24CM DIP24F

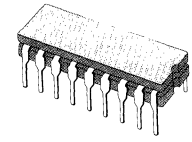
* max serial clock frequency



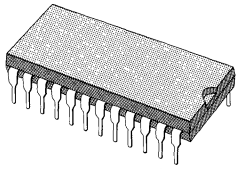
DIP8



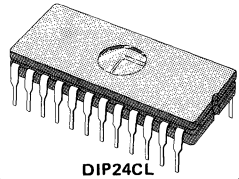
DIP18Co (Plastic Copper fr. 0.4)



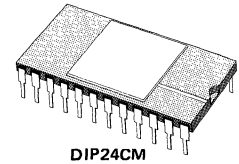
DIP18F (Frit-seal)



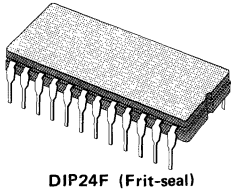
DIP24 (Plastic)



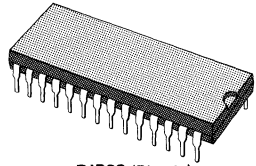
DIP24CL
(Ceramic frit-seal cap glass lens)



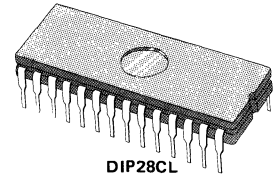
DIP24CM
(Multi-layer Ceramic)



DIP24F (Frit-seal)



DIP28 (Plastic)



DIP28CL
(Ceramic frit-seal cap glass lens)

MICROCOMPUTERS AND MICROPROCESSORS

Using advanced MOS processing steps SGS manufactures a world leading range of single chip microcomputers and multichip microprocessor families. Many types in these families are packaged in plastic and ceramic packages and specified for temperature ranges from 0/70°C up to the full military range of -55/+125°C. Products are manufactured in conformance to MIL-STD-883. Customer support is provided by full documentation, training courses and development systems.

CONTENTS

MICROCOMPUTERS AND MICROPROCESSORS

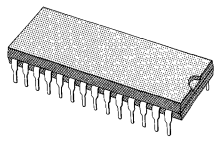
M3870 MICROCOMPUTER UNIT (MCU) FAMILY

The M3870 family are economical 8 bit single chip microcomputers with ROM capacity of 2K, 4K and 6K bytes, 64 bytes of scratchpad RAM and 0 to 64 bytes of general purpose RAM. The M3875 features a battery back-up "power-down" mode that preserves the RAM memory content when the supply fails. The new M38730 series, will feature serial I/O.
All types cover 0 to 70°C and -40/+85°C temperature ranges.
The M3870 family have 4x8 bit I/O ports (3 bits are used for serial I/O on the M38730 series and two bits for battery back-up on the M3875.
M2870 family will provide the same powerfull architecture and memory capacity as the M3870 family but with the I/O reduced to enable the product to be packaged in a 28 pin package.
For further information please contact local sales office.

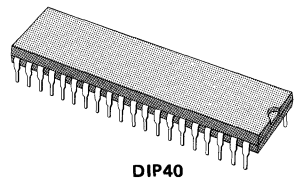
Type	Description	Power supply (V)	Clock Freq. (MHz)	ROM Bytes	RAM Bytes	I/O Bits	PACKAGE
M3870	Microcomputer Unit	+5	4	2K	64	32	DIP40 DIP40CM DIP40F LCC44 LCC44C
M3872		+5	4	4K	64 + 64	32	
M3875		+5*	4	4K	64 + 64*	30	
M3876		+5	4	6K	64 + 64	32	
M38730	Serial I/O MCU	+5	4	2K	64	29 + S	
M38733		+5	4	4K	64 + 64	29 + S	
M2870	Microcomputer Unit	+5	4	2K	64	20	DIP28 DIP28CM DIP28F
M2872		+5	4	4K	64 + 64	20	
M2875		+5*	4	4K	64 + 64*	18	
M2876		+5	4	6K	64 + 64	20	
M28730	Serial I/O MCU	+5	4	2K	64	17 + S	
M28733		+5	4	4K	64 + 64	17 + S	

* Battery back up 3.2V min. for 64 byte RAM

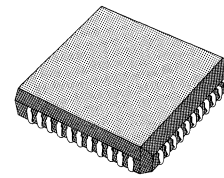
S indicates serial I/O



DIP28
(Plastic)



DIP40
(Plastic)



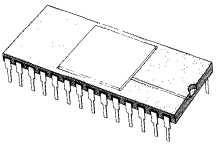
LCC44
(Chip-Carrier Plastic)

MICROCOMPUTERS AND MICROPROCESSORS

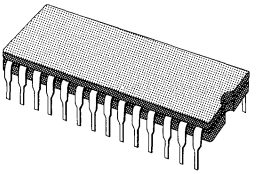
DEDICATED M3870 MICROCOMPUTER

New dedicated products have been introduced to cover consummer application areas as: non volatile Shadow-RAM which automatically saves the 64-byte content of the Exec.-RAM whenever power is turned off; 8-bit analog-digital converter with a conversion time of 100μs. end of conversion can generate an interrupt request; serial bus interface (SGS S-BUS) a three wire bidirectional data-bus, compatible with Philips I^2C bus.

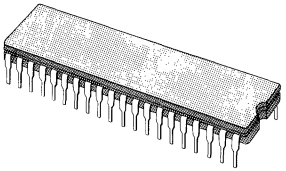
Type	Description	Power supply (V)	Clock Freq. (MHz)	ROM Bytes	RAM Bytes	I/O Bits	PACKAGE
M38SH72	Non Volatile Shadow RAM MCU	+5	4	4K	64 + 64 + 64 Non Volatile	31	DIP40 DIP40CM LCC44 LCC44C
M38ADP70	8 Bits Analog to Digital Converter Input MCU	+5	4	2K	64	24 + 8 High Current	
M38SB72	Serial Bus MCU	+5	4	4K	64 + 64	29	



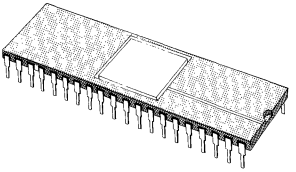
DIP28CM
(Multi-layer Ceramic)



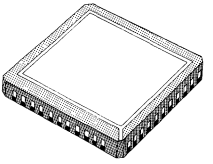
DIP28F
(Ceramic frit-seal)



DIP40F
(Ceramic frit-seal)



DIP40CM
(Multi-layer Ceramic)



LCC44C
(Chip Carrier Ceramic)

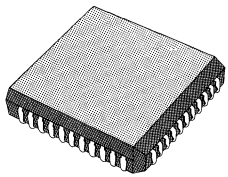
MICROCOMPUTERS AND MICROPROCESSORS

Z8* MICROCOMPUTER UNIT (MCU) FAMILY

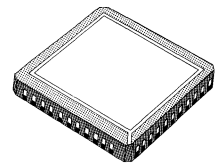
The Z8 family are flexible 8 bit single chip microcomputers with ROM capacity of 2K, 4K and 8K bytes and 144 bytes of RAM register file. I/O facilities are software programmable. The Z8 includes six levels of vectored interrupt, an on-chip UART, and two 8 bit counter/times with 6 bit prescalers. Development types - a 64 pin version with address/data lines brough out to package pins. New products will be introduced in the year: BASIC/Debug Interpreter version, that is one of a line of preprogrammed chips; and a 4K and 8K EPROM version to speed design and prototy ping phases.
The Z8 will be introduced in 1982 and will be available in 0/+70°C and -40/+85°C temperature ranges.

Type	Description	Power supply (V)	Clock Freq. (MHz)	ROM Bytes	RAM File Bytes	I/O Bits*	PACKAGE
Z8601 **Z8601A**	Microcomputer Unit	+5	8 12	2K	124	32	DIP40 DIP40CM LCC44 LCC44C
Z8611 **Z8611A**	Microcomputer Unit	+5	8 12	4K	124	32	
Z8621 **Z8621A**	Microcomputer Unit	+5	8 12	8K	–	32	
Z8671 **Z8671A**	MCU BASIC/Debug Interpreter	+5	8 12	2K	124	32	
Z8681 **Z8681A**	MCU ROMless (1)	+5	8 12	EXT. 64K	124 + EXT. 64K	32	
Z8682 **Z8682A**	MCU ROMless (2)	+5	8 12	EXT. 62K	124 + EXT. 62K	32	
Z86E11	MCU 4K EPROM	+5	8	4K	124	32	DIP40CL
Z86E21	MCU 8K EPROM	+5	8	8K	–	32	

* Function of I/O bits is programmable and includes address/data lines, external interrupts, I/O handshake and serial I/O
(1) EXT. RAM starting at 0
(2) EXT. RAM starting at 2K



LCC44
(Chip-Carrier Plastic)



LCC44C
(Chip-Carrier Ceramic)

MICROCOMPUTERS AND MICROPROCESSORS

Z80* MICROPROCESSOR UNIT (MPU) FAMILY

The Z80 microprocessor family is the world's leasing 8 bit chip set. The high speed Z80H features 8 MHz clock operation.
The family is composed of the Central Processing Unit and five highly integrated peripheral devices, which include all of the circuitry necessary to built high-performance microcomputer systems with virtually no other logic and a minimum of low cost memory elements.
The range covers consumer to military temperature ranges and is available in five packages options.

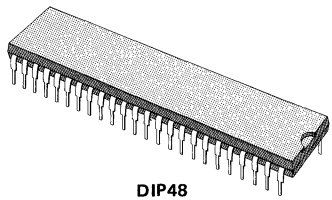
Type	Description	Power supply (V)	Clock Freq. (MHz)	PACKAGE
Z8400 **Z8400A** **Z8400B** **Z8400H**	Central Processing Unit	+5	2,5 4 6 8	DIP40 DIP40F DIP40CM LCC44 LCC44C
Z8410 **Z8410A**	Direct Memory Access	+5	2,5 4	
Z8420 **Z8420A** **Z8420B**	Pheripheral Input Output	+5	2.5 4 6	
Z8430 **Z8430A** **Z8430B**	Counter Timer Circuit	+5	2.5 4 6	
Z8440/1/2 **Z8440/1A/2A** **Z8440/1B/2B** **Z8444/A/B**	Serial Input Output (Dual) *(Chip carrier only)*	+5	2,5 4 6	
Z8449 **Z8449A** **Z8449B** **Z8444/A/B**	Serial Input Output (Single) *(Chip carrier only)*	+5	2,5 4 6	
Z8470 **Z8470A** **Z8470B**	Dual Async. Receiver/Transmitter	+5	2,5 4 6	
M8719	Clock Generator for Microprocessor	+5	16	DIP16/DIP16F

MICROCOMPUTERS AND MICROPROCESSORS

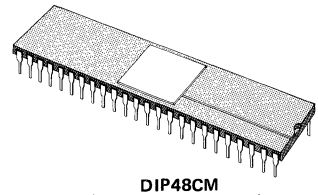
Z80 CMOS FAMILY

An important technology evolution to extend the possible applications for the Z80 Family.

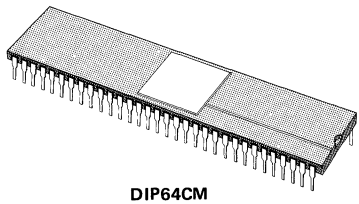
Type	Description	Power supply (V)	Clock Freq. (MHz)	PACKAGE
Z84C00	Control Processing Unit	+5	4	DIP40 DIP40CM
Z84C20	Parallel Input/Output	+5	4	
Z84C30	Counter Timer Circuit	+5	4	
Z84C40/1/2	Serial Input/Output	+5	4	



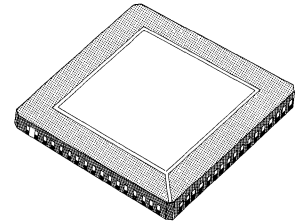
DIP48
(Plastic)



DIP48CM
(Multi-layer Ceramic)



DIP64CM
(Multi-layer Ceramic)



LCC68C
(Chip-Carrier Ceramic)

MICROCOMPUTERS AND MICROPROCESSORS

Z8000* MICROPROCESSOR UNIT (MCU) FAMILY

The Z8000 microprocessor family is a new, powerfull 16 bit chip set. The family has a unique, new architecture, the main features of which are Operating System software support, Compiler support and memory management.
The chip set is highly integrated, each LSI peripheral device performing an intelligent function; in addition a Universal Peripheral Controller microcomputer and multimicro facilities on the Z8000 CPU chip, enable multi microprocessor system to be realised. All devices interface via a common, well defined, Z-BUS™ bus structure.
Two versions of the CPU are available to match the family to a wide range of target applications from fast process control to large microcomputers.

Type	Description	Clock Freq. (MHz)	PACKAGE
Z8001 **Z8001A** **Z8001B**	Z8000 16 bit Segmented CPU, 48 pin, 8M byte address range	4 6 10	DIP48 DIP48CM DIP48F
Z8002 **Z8002A** **Z8002B**	Z8000 16 bit Non Segmented CPU, 40 pin, 64K byte address range	4 6 10	DIP40/40F DIP40CM LCC44/44C
Z8003 **Z8003A**	Z8000 VMPU Segmented, virtual memory CPU, 48 pin	4 6	DIP48/48F DIP48CM
Z8004 **Z8004A**	Z8000 VMPU Non Segmented, virtual memory CPU, 40 pin	4 6	DIP40/40F DIP40CM LCC44/44C
Z8010 **Z8010A** **Z8010B**	Z8000 MMU Memory Management Unit for Z8001 SEGCPU	4 6 10	DIP48 DIP48CM DIP48F
Z8015 **Z8015A**	Z8000 PMMU Paged Memory Management Unit	4 6	DIP64CM LCC68C
Z8030 **Z8030A** **Z8030L/A**	Z8000 SCC Serial Communication Controller (Dual) *(Chip-Carrier only)*	4 6	DIP40/40F DIP40CM LCC44/44C
Z8031 **Z8031A**	Z8000 ASCC Asynchronous Serial Communication Controller	4 6	DIP40/40F DIP40CM
Z8036 **Z8036A** **Z8036L/A**	Z8000 CIO Counter/Timer and Parallel Input/Output *(Chip-Carrier only)*	4 6	DIP40/40F DIP40CM LCC44/44C
Z8038 **Z8038A**	Z8000 FIFO Input/Output Interface	4 6	DIP40/40F DIP40CM LCC44/44C
Z8060 **Z8060A**	Z8000 FIFO Buffer Unit and Z8038 Expander	4 6	DIP28/28F DIP28CM

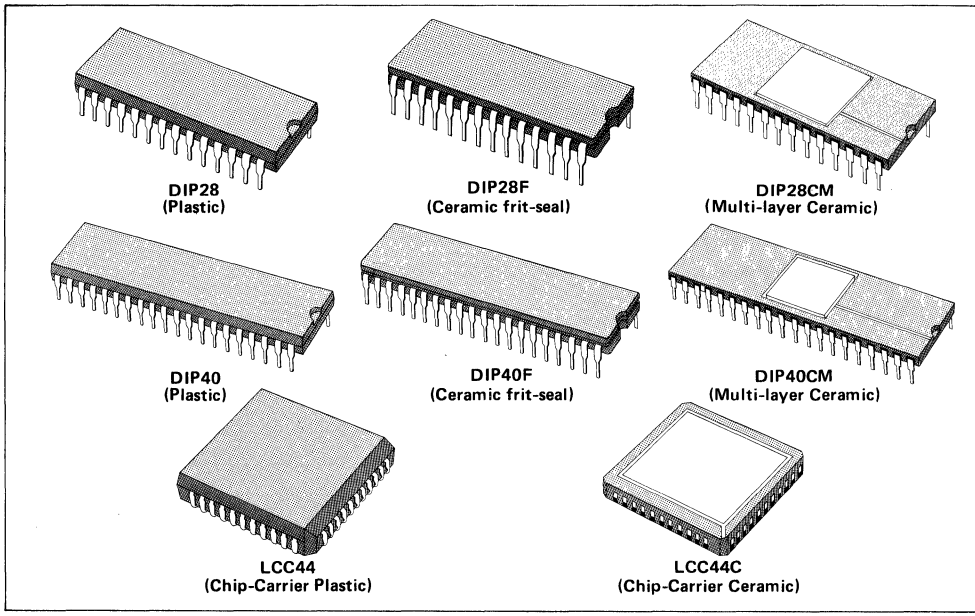
For availability please contact local sales office.

MICROCOMPUTERS AND MICROPROCESSORS

Z8500 UNIVERSAL PERIPHERALS

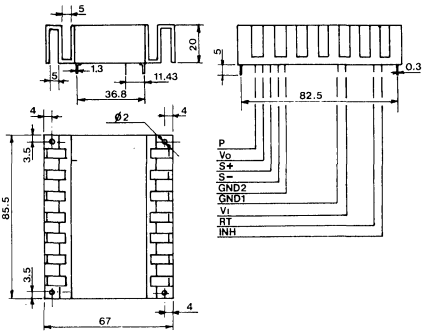
Selected Z8000 LSI peripheral components feature alternative versions with modified bus interfacing suitable for use with other CPU's such as the Z80.

Type	Description	Clock Freq. (MHz)	PACKAGE
Z8530 **Z8530A** **Z8030L/A**	SCC - Serial Communications Controller (Dual) *(Chip-Carrier only)*	4 6	DIP40/40F DIP40CM LCC44/44C
Z8531 **Z8531A**	ASCC - Asynchronous Serial Communication Controller	4 6	DIP40/40F DIP40CM
Z8536 **Z8536A** **Z8036L/A**	CIO Counter/Timer and Parallel Input/Output *(Chip-Carrier only)*	4 6	DIP40/40F DIP40CM LCC44/44C
Z8038 **Z8038A**	Z8000 FIFO Input/Output Interface	4 6	DIP40/40F DIP40CM LCC44/44C
Z8060 **Z8060A**	Z8000 FIFO Buffer Unit and Z8038 Expander	4 6	DIP28/28F DIP28CM



GS-R400 FAMILY

The GS-R400 series is a complete family of High-Current, High-Voltage regulators available in output voltages from 5 to 40 Volt. These DC/DC Converter modules, shielded for EMI, can provide local on-card regulation, or be used in central power supply systems in both commercial and industrial applications. All of the family takes advantage of extra features like thermal protection, remote voltage sensing, soft start, load crowbar protection, logic inhibit/enable, foldback current limitation, system reset output (405S only) and adjustable output voltage (400V only), that allow the implementation of highly sofisticated power supply systems.



TYPE	Input Voltage V	Output Voltage V	Output Current A	Current Limit A	Line Regulation dB	Load Regulation mV/A	Temp. Stability mV/°C	Crowbar Intervention V	Output Noise mV	Efficiency
GS-R405	8-48	5	4	5	60	20	0.2	6	25	75
GS-R405S	8-48	5	4	5	60	20	0.2	6	25	75
GS-R412	15-48	12	4	5	60	40	0.5	15	30	85
GS-R415	18-48	15	4	5	60	60	0.6	18	40	90
GS-R424	27-48	24	4	5	60	90	1	29	50	90
GS-R400V	V_o+3-48	5-40 ADJUST	4	5	60	20/90	0.2/1.6	1.2 V_o	25/50	75/90

PIN	FUNCTION
INH	**Inhibit.** TTL compatible input. When high, module is disabled. Connect to ground if not used.
RT	**Reset Output.** On GS-R405R only. RT is high (5V) 100 ms after output voltage reaches nominal value (5V).
V_I	**Input.** Unregulated DC input. Maximum voltage must not exceed 48V.
GND_1	**Ground.** Common ground for input voltage.
GND_2	**Ground.** Common ground of high current path. Case of module must be isolated from ground.
S^-	**Sensing negative.** Senses the actual ground of a remote load.
S^+	**Sensing positive.** Senses voltages on a remote load.
V_o	**Output.** Regulated and stabilized DC voltage. Max output current is 4A. Protected against short circuit to ground or to supply.
P	**Output voltage regulation.** On GS-R400V only. A variable resistor (18KΩ max) connected between this pin and S^+ can adjust the output voltage.

SURFACE MOUNTING ICs

Surface Mounting Integrated Circuits are devices designed to be mounted on the surface of a PCB rather than being iserted in holes through the PCB.
Surface Mounting Integrated Circuits have many advantages over their conventional through-hole mounting counter parts in terms of both cost and performance.
That's why there is a continuing trend towards surface mounting packages.
The range of SGS integrated circuits available in surface mounting packages in one of the widest in the industry. The range includes all of the popular logic families, linear commodities and application specific integrated circuits, microprocessor, microcomputers and gate arrays.

CONTENTS

QUALITY AND RELIABILITY

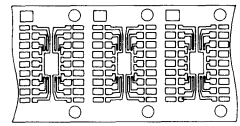
The quality of SMICs has been proved to be at least as good as the quality of devices in standard DIP packages and all SGS SMICs are subject to the stringent quality standards as laid down in the company's own SURE 4 program. This program is fully documented and freely available. Average Outgoing Quality (AOQ) is already 200 to 400 PPM, depending on product, and is improving steadily.

Reliability, which can be defined as a measure of how long a system continues to perform correctly, is enhanced with the use of surface mounting components. First of all without the need to drill and plate-through holes a significant problem area is eliminated. Added to this is the fact that PCBs for surface mounting have fewer layers — another common source of problems. Furthermore, systems using SMICs can often have significantly reduced backplane wiring, reducing once again a contributory factor to system reliability problems. And of course the SGS SMICs all have guaranteed high level reliability as shown here with results taken from bipolar SO reliability tests performed on the production lots.

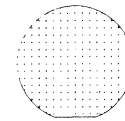
TEST	CONDITIONS	REJECTS
High temperature reverse bias	Tamb = 150°C (1000 hours)	0.6%
Temperature Humidity bias	85°C/85% RH (1000 hours)	1%
Thermal shocks	−65 to 150°C (1000 cycles)	0
Solderability	232°C/2s	0
Thermal-cycles	−65 to 150°C (1000 cycles)	0

The steps and checks shown here are same very brief examples from the SGS SURE 4 program

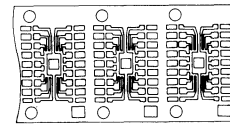
BUILT IN QUALITY



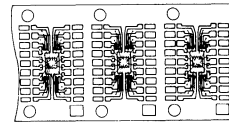
Incoming Inspection
Incoming frames are inspected following written specifications and records are maintained for tracebility.



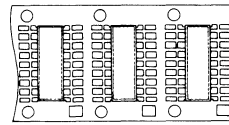
Electrical Wafer Sort
Each die is electrically tested to ensure it meets electrical requirements. Dice are inspected and selected at high magnification.



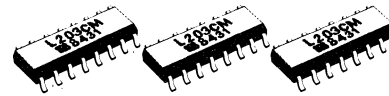
Die Attach
Regular visual and mechanical check on die attach quality – die stear strength and orientation etc.



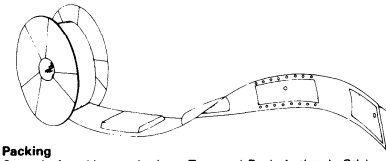
Wire Bond
Regular visual and mechanical checks on bond strength Assembled but unsealed units are individually inspected at low and high power magnification.



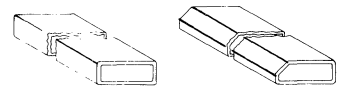
Moulding
Moulding and stabilization bake according to internal specification. Sealing atmosphere control monitors moisture content. Gross and fine leack checks.



Singulation/Marking/Electrical Testing
Raw line inspection visual and mechanical checks, group B and C tests, electrical testing and group A inspection on finished products.



Packing
Control of packing methods — Tape and Reel, Antistatic Sticks, Vacuum sealed Antistatic Bags — control of quantity, device type, boxing labelling documentation and other special requirements.



SURFACE MOUNTING ICs

BIPOLAR LINEAR DEVICES

STANDARD LINEARS

SALES TYPE	FUNCTION	PACKAGE
LM201AD	General purpose operational/amplifier	SO-8
LM224D	Quad operational/amplifier	SO-14G
LM329D	Quad comparator	SO-14G*
LM258D	Dual operational/amplifier	SO-8
LM293D	Dual comparator	SO-8
LM301AD	General purpose operational/amplifier	SO-8
LM311D	Comparator	SO-8
LM324D	Quad operational/amplifier	SO-14G
LM339D	Quad comparator	SO-14G*
LM358D	Dual operational/amplifier	SO-8
LM393D	Dual comparator	SO-8
LM723CD	Precision voltage regulator	SO-14G*
LM741ID	General purpose operational/amplifier	SO-8
LM741CD	General purpose operational/amplifier	SO-8
LM748ID	General purpose operational/amplifier	SO-8
LM748CD	General purpose operational/amplifier	SO-8
LM2901D	Quad comparator	SO-14G*
LM2902D	Quad operational/amplifier	SO-14G
LM2903D	Dual comparator	SO-8
LM2904D	Operational/amplifier	SO-8
LM3046D	Five transistor array	SO-14G*
MC1458D	Dual operational/amplifier	SO-8
MC1458ID	Dual operational/amplifier	SO-8
MC1458CD	Dual operational/amplifier	SO-8
MC1488D	Quad line driver	SO-14G*
MC1489D	Quad line receiver	SO-14G*
MC1776ID	Programmable operational/amplifier	SO-8
MC1776CD	Programmable operational/amplifier	SO-8
MC3302D	Quad comparator	SO-14G*
MC3303D	Quad operational/amplifier	SO-14G*
MC3403D	Qaud operational/amplifier	SO-14G*
NE532D	Dual operational/amplifier	SO-8
NE555D	Timer	SO-8
NE556D	Dual timer	SO-14G
SG3524D	SMPS controller	SO-16G
TL072CD	JFET input dual operational/amplifier	SO-8G
TL072ID	JFET input dual operational/amplifier	SO-8G
TL082CD	JFET input dual operational/amplifier	SO-8
TL082ID	JFET input dual operational/amplifier	SO-8

SURFACE MOUNTING ICs

BIPOLAR LINEAR DEVICES (continued)

STANDARD LINEARS (continued)

SALES TYPE	FUNCTION	PACKAGE
ULN2001D	7-channel darlington drivers	SO-16G
ULN2002D	7-channel darlington drivers	SO-16G
ULN2003D	7-channel darlington drivers	SO-16G
ULN2004D	7-channel darlington drivers	SO-16G

* Also available in SO-14 package

AUTOMOTIVE

SALES TYPE	FUNCTION	PACKAGE
L482P	Electronic ignition (hall effect sensor)	SO-16P
L484P	Electronic ignition (magnetic pickup)	SO-16P
L485	Alternator regulator	SO-16P
L497A	Electronic ignition (hall effect sensor)	SO-16P
L530	Electronic ignition interface for microprocessor	SO-16P

TELECOM

SALES TYPE	FUNCTION	PACKAGE
LS025M	Balanced modulator	SO-14G
LS204CM	High performance dual operational/amplifier	SO-8G
LS204M	High performance dual operational/amplifier	SO-8G
LS404CM	High performance dual operational/amplifier	SO-14G
LS404M	High performance dual operational/amplifier	SO-14G
LS4558NM	High performance dual operational/amplifier	SO-8G

RADIO

SALES TYPE	FUNCTION	PACKAGE
TDA1225	AM/FM Radio	SO-16G
TDA7215	FM Tuner	SO-8G
TDA7225	Low Voltage AM/FM Radio	SO-16G

SURFACE MOUNTING ICs

HS-C²MOS LOGIC

SALES TYPE	FUNCTION	PACKAGE	
M74HC00M1	Quad 2-Input NAND Gate	SO-14	
M74HC02M1	Quad 2-Input NOR Gate	SO-14	
M74HC03M1	Quad 2-Input NAND (Open Drain)	SO-14	
M74HC04M1	Hex Inverter	SO-14	
M74HCT04M1	Hex Inverter	SO-14	
M74HCU04M1	Hex Inverter (Single Stage)	SO-14	
M74HC08M1	Quad 2-Input AND Gate	SO-14	
M74HC10M1	Triple 3-Input NAND Gate	SO-14	
M74HC11M1	Triple 3-Input AND Gate	SO-14	
M74HC14M1	Hex Schmitt Inverter	SO-14	
M74HC20M1	Dual 4-Input NAND Gate	SO-14	
M74HC21M1	Dual 4-Input AND Gate	SO-14	
M74HC27M1	Triple 3-Input NOR Gate	SO-14	
M74HC30M1	8-Input NAND Gate	SO-14	
M74HC32M1	Quad 2-Input OR Gate	SO-14	
M74HC51M1	Dual 2W-2I AND/OR Inverter Gate	SO-14	
M74HC73M1	Dual J-K Flip-Flop with Clear	SO-14	
M74HC74M1	Dual D-Type Flip-Flop with Preset and Clear	SO-14	
M74HC86M1	Quad Exclusive OR Gate	SO-14	
M74HC107M1	Dual J-K Flip Flop	SO-14	
M74HC113M1	Dual J-K Flip-Flop with Preset	SO-14	
M74HC132M1	Quad 2-Input Schmitt NAND	SO-14	
M74HC280M1	9-Bit Parity Generator	SO-14	
M74HC386M1	Quad Exclusive OR Gate	SO-14	
M74HC4002M1	Dual 4-Input NOR Gate	SO-14	
M74HC4024M1	7-Stage Binary Counter	SO-14	
M74HC4066M1	Quad Bilateral Switch	SO-14	
M74HC4072M1	Dual 4-Input OR Gate	SO-14	
M74HC4075M1	Triple 3-Input OR Gate	SO-14	
M74HC4078M1	8-Input NOR Gate	SO-14	
M74HC42M1	BCD to Decimal Decoder	SO-16L	○
M74HC75M1	4-Bit D-Type Latch	SO-16L	○
M74HC76M1	Dual J-K Flip-Flop with Preset and Clear	SO-16L	○
M74HC85M1	4-Bit Magnitude Comparator	SO-16L	○
M74HC109M1	Dual J-K Flip-Flop with Preset and Clear	SO-16	
M74HC112M1	Dual J-K Flip-Flop	SO-16L	○
M74HC123M1	Dual Monostable Multivibrator with Clear	SO-16L	○
M74HC131M1	3 to 8-Line Decoder Latch	SO-16L	○

SURFACE MOUNTING ICs

HS-C²MOS LOGIC (continued)

SALES TYPE	FUNCTION	PACKAGE	
M74HC133M1	13-Input NAND Gate	SO-16	
M74HC137M1	3 to 8-Line Decoder Latch (Inv)	SO-16L	○
M74HCT137M1	3 to 8-Line Decoder Latch (Inv)	SO-16	
M74HC138M1	3 to 8-Line Decoder (Inv)	SO-16L	○
M74HC139M1	Dual 2 to 4-Line Decoder/Demultiplexer	SO-16	
M74HC147M1	10 to 4-Line Priority Encoder	SO-16	
M74HC148M1	8 to 3-Line Priority Encoder	SO-16L	○
M74HC151M1	8-Channel Multiplexer	SO-16L	○
M74HC153M1	Dual 4-Channel Multiplexer	SO-16L	○
M74HC155M1	Dual 2 to 4-Line Decoder	SO-16L	○
M74HC157M1	Quad 2-Channel Multiplexer	SO-16L	○
M74HC158M1	Quad 2-Channel Multiplexer (Inv.)	SO-16L	○
M74HC160M1	Sync. Decade Counter with Async. Clear	SO-16L	○
M74HC161M1	Sync. Binary Counter with Async. Clear	SO-16L	○
M74HC162M1	Sync. Decade Counter with Sync. Clear	SO-16L	○
M74HC163M1	Sync. Binary Counter with Sync. Clear	SO-16L	○
M74HC165M1	8-Bit PISO Shift Register	SO-16L	○
M74HC166M1	8-Bit PISO Shift Register	SO-16	
M74HC173M1	Quad D-Type Register (3-States)	SO-16L	○
M74HC174M1	Hex D-Type Flip-Flop with Clear	SO-16L	○
M74HC175M1	Quad D-Type Flip-Flop with Clear	SO-16L	○
M74HC190M1	BCD Sync. Up/Down Counter	SO-16L	○
M74HC191M1	4-Bit Sync. Binary Up/Down Counter	SO-16L	○
M74HC192M1	Sync. Up/Down Decade Counter	SO-16L	○
M74HC193M1	Sync. Up/Down Binary Counter	SO-16L	○
M74HC194M1	4-Bit PIPO Shift Register	SO-16L	○
M74HC195M1	4-Bit PIPO Shift Register	SO-16L	○
M74HC221M1	Dual Monostable Multivibrator	SO-16L	○
M74HC238M1	3 to 8-Line Decoder	SO-16L	○
M74HC251M1	8-Channel Multiplexer (3-State)	SO-16L	○
M74HC253M1	Dual 4-Channel Multiplexer (3-State)	SO-16L	○
M74HC257M1	Quad 2-Channel Multiplexer (3-State)	SO-16L	○
M74HC258M1	Quad 2-Channel Multiplexer (3-State/Inv.)	SO-16L	○
M74HC259M1	8-Bit Addressable Latch	SO-16L	○
M74HC279M1	Quad S-R Latch	SO-16	
M74HC283M1	4-Bit Binary Full Adder	SO-16L	○
M74HC298M1	Quad 2-Channel Multiplexer Register	SO-16	
M74HC365M1	Hex Bus Buffer	SO-16L	○
M74HC366M1	Hex Bus Buffer (Inv.)	SO-16L	○

HS-C²MOS LOGIC (continued)

SALES TYPE	FUNCTION	PACKAGE	
M74HC367M1	Hex Bus Buffer (3-State)	SO-16L	○
M74HC368M1	Hex Bus Buffer (3-State/Inv.)	SO-16L	○
M74HC375M1	Quad D-Type Latch	SO-16	
M74HC390M1	Dual Decade Counter	SO-16L	○
M74HC592M1	8-Bit Register Binary Counter	SO-16L	○
M74HC597M1	8-Bit Latch Shift Register	SO-16L	○
M74HC670M1	4 Word x 4 Bit Register File (3-State)	SO-16L	○
M74HC4017M1	Decade Counter/Driver	SO-16L	○
M74HC4020M1	14-Stage Binary Counter	SO-16L	○
M74HC4022M1	Octal Counter/Divider	SO-16L	○
M74HC4028M1	BCD to Decimal Decoder	SO-16L	○
M74HC4040M1	12-Stage Binary Counter	SO-16L	○
M74HC4049M1	Hex Buffer/Converter (Inv.)	SO-16	
M74HC4050M1	Hex Buffer/Converter	SO-16	
M74HC4060M1	14-Stage Binary Counter/Osc.	SO-16L	○
M74HC4094M1	8-Bit SIPO Shift Register Latch (3-State)	SO-16L	○
M74HC4511M1	BCD to 7-Segment L/D/D (LED)	SO-16L	○
M74HC4538M1	Dual Monostable Multivibrator	SO-16L	○
M74HC4543M1	BCD Monostable Multivibrator	SO-16L	○
M74HC240M1	Octal Bus Buffer (3-State/Inv.)	SO-20	△
M74HCT240M1	Octal bus Buffer (3-State/Inv.)	SO-20	△
M74HCT241M1	Octal Bus Buffer (3-State)	SO-20	△
M74HC241M1	Octal Bus Buffer (3-State)	SO-20	△
M74HC244M1	Octal Bus Buffer (3-State)	SO-20	△
M74HCT244M1	Octal Bus Buffer (3-State)	SO-20	△
M74HC273M1	Octal D-Type Flip-Flop with Clear	SO-20	△
M74HC354M1	8-Channel Multiplexer/Register (3-State)	SO-20	△
M74HC356M1	8-Channel Multiplexer/Register (3-State)	SO-20	△
M74HC373M1	Octal D-Type Latch (3-State)	SO-20	△
M74HC374M1	Octal D-Type Flip-Flop (3-State)	SO-20	△
M74HC377M1	Octal D-Type Flip-Flop	SO-20	△
M74HC533M1	Octal D-Type Latch (3-State/Inv.)	SO-20	△
M74HC534M1	Octal D-Type Flip-Flop (3-State/Inv.)	SO-20	△
M74HC540M1	Octal Bus Buffer (3-State/Inv.)	SO-20	△
M74HCT540M1	Octal Bus Buffer (3-State/Inv.)	SO-20	△
M74HC541M1	Octal Bus Buffer (3-State)	SO-20	△
M74HCT541M1	Octal Bus Buffer (3-State)	SO-20	△
M74HC563M1	Octal D-Type Latch (3-State/Inv.)	SO-20	△
M74HCT563M1	Octal D-Latch (3-State/Inv.)	SO-20	△

HS-C²MOS LOGIC (continued)

SALES TYPE	FUNCTION	PACKAGE	
M74HC564M1	Octal D-Type Flip-Flop (3-State-Inv.)	SO-20	△
M74HCT564M1	Octal D-Type Flip-Flop (3-State/Inv.)	SO-20	△
M74HC573M1	Octal D-Type Latch (3-State)	SO-20	△
M74HCT573M1	Octal D-Type Latch (3-State)	SO-20	△
M74HC574M1	Octal D-Type Flip-Flop (3-State)	SO-20	△
M74HCT574M1	Octal D-Type Flip-Flop (3-State)	SO-20	△
M74HC688M1	8-Bit Equality Comparator	SO-20	△
M74HCT7007M1	Hex Buffer	SO-14	
M74HC7266M1	Quad Exclusive NOR Gate	SO-14	
M74HC7294M1	Programmable Divider/Timer	SO-16L	○

○ SO-16L Available in Q4 '85 △ SO-20 Available in '86

LOW POWER SCHOTTKY TTL

SALES TYPE	FUNCTION	PACKAGE	
T74LS00M1	Quad 2-Input NAND Gate	SO-14	
T74LS01M1	Quad 2-Input NAND Gate (Open Collector)	SO-14	□
T74LS02M1	Quad 2-Input NOR Gate	SO-14	
T74LS03M1	Quad 2-Input NAND Gate (Open Collector)	SO-14	
T74LS04M1	Hex Inverter	SO-14	
T74LS05M1	Hex Inverter (Open Collector)	SO-14	
T74LS08M1	Quad 2-Input AND Gate	SO-14	
T74LS09M1	Quad 2-Input AND Gate (Open Collector)	SO-14	
T74LS10M1	Triple 3-Input NAND Gate	SO-14	
T74LS11M1	Triple 3-Input AND Gate	SO-14	
T74LS12M1	Triple 3-Input NAND Gate (Open Collector)	SO-14	□
T74LS13M1	Dual 4-Input NAND Schmitt Trigger	SO-14	
T74LS14M1	Hex Schmitt Trigger Inverter	SO-14	
T74LS15M1	Triple 3-Input AND Gate (Open Collector)	SO-14	
T74LS18M1	Dual 4-Input NAND Schmitt Trigger	SO-14	□
T74LS19M1	Hex Schmitt Trigger Inverter	SO-14	□
T74LS20M1	Dual 4-Input NAND Gate	SO-14	
T74LS21M1	Dual 4-Input AND Gate	SO-14	
T74LS22M1	Dual 4-Input NAND Gate (Open Collector)	SO-14	
T74LS24M1	Quad 2-Input NAND Schmitt Trigger	SO-14	□
T74LS26M1	Quad 2-Input NAND Buffer (Open Collector)	SO-14	

SURFACE MOUNTING ICs

LOW POWER SCHOTTKY TTL (continued)

SALES TYPE	FUNCTION	PACKAGE	
T74LS27M1	Triple 3-Input NOR Gate	SO-14	
T74LS28M1	Quad 2-Input NOR Buffer	SO-14	
T74LS30M1	8-Input NAND Gate	SO-14	
T74LS32M1	Quad 2-Input OR Gate	SO-14	
T74LS33M1	Quad 2-Input NOR Buffer (Open Collector)	SO-14	
T74LS37M1	Quad 2-Input NAND Buffer	SO-14	
T74LS38M1	Quad 2-Input NAND Buffer (Open Collector)	SO-14	
T74LS40M1	Dual 4-Input NAND Buffer	SO-14	
T74LS42M1	1-of-10 Decoder	SO-16	
T74LS51M1	Dual 2-Wide 2-Input/3-Input AND-OR-INVERT Gate	SO-14	
T74LS54M1	2-3-3-2-Input AND-OR-INVERT Gate	SO-14	
T74LS55M1	2-Wide 4-Input AND-OR-INVERT Gate	SO-14	
T74LS73AM1	Dual JK Negative Edge-Triggered Flip-Flop	SO-14	☐
T74LS74AM1	Dual D-Type Positive Edge-Triggered Flip-Flop	SO-14	
T74LS75M1	4-Bit D Latch	SO-16	☐
T74LS76AM1	Dual JK Flip-Flop with Set and Clear	SO-16	☐
T74LS78AM1	Dual JK Flip-Flop with Preset	SO-14	☐
T74LS83AM1	4-Bit Full Adder with Fast Carry	SO-16	
T74LS85M1	4-Bit Magnitude Comparators	SO-16	
T74LS86M1	Quad 2-Input Exclusive OR Gate	SO-14	
T74LS90M1	Decade Counter	SO-14	
T74LS91M1	8-Bit Shift Register Serial-In Serial-Out	SO-14	☐
T74LS92M1	Divide-by-12 Counter	SO-14	
T74LS93M1	4-Bit Binary Counter	SO-14	
T74LS95BM1	4-Bit Shift Register	SO-14	
T74LS96M1	5-Bit Shift Register	SO-16	☐
T74LS107AM1	Dual JK Flip-Flop with Clear	SO-14	☐
T74LS109M1	Dual JK Positive Edge-Triggered Flip-Flop	SO-16	
T74LS109AM1	Dual JK Positive Edge-Triggered Flip-Flop	SO-16	☐
T74LS112AM1	Dual JK Negative Edge-Triggered Flip-Flop	SO-16	
T74LS113M1	Dual JK Negative Edge-Triggered Flip-Flop	SO-14	
T74LS113AM1	Dual JK Negative Edge-Triggered Flip-Flop	SO-14	☐
T74LS114M1	Dual JK Negative Edge-Triggered Flip-Flop	SO-14	
T74LS114AM1	Dual JK Negative Edge-Triggered Flip-Flop	SO-14	☐
T74LS122M1	Retriggerable Monostable Multivibrators	SO-14	☐
T74LS123M1	Dual Retriggerable Monostable Multivibrators	SO-16	☐
T74LS125M1	Quad 3-State Buffer (LOW Enable)	SO-14	
T74LS125AM1	Quad 3-State Buffer (LOW Enable)	SO-14	☐
T74LS126M1	Quad 3-State Buffer (HIGH Enable)	SO-14	

SURFACE MOUNTING ICs

LOW POWER SCHOTTKY TTL (continued)

SALES TYPE	FUNCTION	PACKAGE	
T74LS126AM1	Quad 3-State Buffer (HIGH Enable)	SO-14	□
T74LS132M1	Quad 2-Input Schmitt Trigger NAND Gate	SO-14	
T74LS133M1	13-Input NAND Gate	SO-16	
T74LS136M1	Quad 2-Input Exclusive OR Gate (Open Collector)	SO-14	
T74LS138M1	1-of-8 Decoder/Demultiplexer	SO-16	
T74LS139M1	Dual 1-of-4 Decoder/Demultiplexer	SO-16	
T74LS145M1	1-of-10 Decoder/Driver (Open Collector)	SO-16	
T74LS147M1	10-Line to 4-Line Priority Encoder	SO-16	□
T74LS148M1	8-Input to 3-Line Priority Encoder	SO-16	□
T74LS151M1	8-Input Multiplexer	SO-16	
T74LS152M1	8-Input Multiplexer	SO-14	
T74LS153M1	Dual 4-Input Multiplexer	SO-16	
T74LS155M1	Dual 1-of-4 Decoder/Demultiplexer	SO-16	
T74LS156M1	Dual 1-of-4 Decoder/Demultiplexer (Open Collector)	SO-16	
T74LS157M1	Quad 2-Input Multiplexer (Non inverting)	SO-16	
T74LS158M1	Quad 2-Input Multiplexer (Inverting)	SO-16	
T74LS160M1	BCD Decade Counter, Asynchronous Reset	SO-16L	○
T74LS160AM1	BCD Decade Counter, Asynchronous Reset	SO-16	□
T74LS161M1	4-Bit Binary Counter, Asynchronous Reset	SO-16L	○
T74LS161AM1	4-Bit Binary Counter, Asynchronous Reset	SO-16	□
T74LS162M1	BCD Decade Counter, Synchronous Reset	SO-16L	○
T74LS162AM1	BCD Decade Counter, Synchronous Reset	SO-16	□
T74LS163M1	4-Bit Binary Counter, Synchronous Reset	SO-16L	○
T74LS163AM1	4-Bit Binary Counter, Synchronous Reset	SO-16	□
T74LS164M1	8-Bit Shift Register (Serial-In Parallel-Out)	SO-14	
T74LS166M1	8-Bit Shift Register (Parallel-In Serial-Out)	SO-16	□
T74LS168M1	Up/Down Decade Counter	SO-16L	○
T74LS169M1	Up/Down Binary Counter	SO-16L	○
T74LS170M1	4x4 Register File (Open Collector)	SO-16L	□
T74LS173AM1	4-Bit D-Type Register (3-State)	SO-16	□
T74LS174M1	Hex D-Type Flip-Flop with Clear	SO-16	
T74LS175M1	Quad D-Type Flip-Flop with Clear	SO-16	
T74LS183M1	Dual Carry-Save Full Adder	SO-14	□
T74LS190M1	Presettable BCD/Decade Up/Down Counter	SO-16L	○
T74LS191M1	Presettable 4-Bit Binary Up/Down Counter	SO-16L	○
T74LS192M1	Presettable BCD/Decade Up/Down Counter	SO-16	
T74LS193M1	Presettable 4-Bit Binary Up/Down Counter	SO-16	□
T74LS194AM1	4-Bit Right/Left Shift Register	SO-16L	○
T74LS195AM1	4-Bit Shift Register	SO-16	

SURFACE MOUNTING ICs

LOW POWER SCHOTTKY TTL (continued)

SALES TYPE	FUNCTION	PACKAGE	
T74LS196M1	Decade Counter	SO-14	
T74LS197M1	4-Bit Binary Counter	SO-14	
T74LS221M1	Dual Monostable Multivibrator	SO-16	□
T74LS240M1	Octal Inverting Bus/Line Driver (3-State)	SO-20	△
T74LS241M1	Octal Bus Line Driver (3-State)	SO-20	△
T74LS242M1	Quad Inverting Bus Transceiver (3-State)	SO-14	□
T74LS243M1	Quad Non Inverting Bus Transceiver (3-State)	SO-14	□
T74LS244M1	Octal Non Inverting Driver (3-State)	SO-20	△
T74LS245M1	Octal Non Inverting Bus Transceiver (3-State)	SO-20	□
T74LS247M1	BCD to 7-Segment Decoder/Driver (Open Collector)	SO-16	□
T74LS248M1	BCD to 7-Segment Decoder/Driver with Pull-Ups	SO-16	□
T74LS251M1	8-Input Multiplexer (3-State)	SO-16	
T74LS253M1	Dual 4-Input Multiplexer (3-State)	SO-16	
T74LS256M1	Dual 4-Bit Addressable Latch	SO-16	
T74LS257M1	Quad 2-Input Multiplexer (3-State)	SO-16	
T74LS257AM1	Quad 2-Input Multiplexer (3-State)	SO-16	□
T74LS258M1	Quad 2-Input Multiplexer (3-State)	SO-16	
T74LS258AM1	Quad 2-Input Multiplexer (3-State)	SO-16	□
T74LS259M1	8-Bit Addressable Latch	SO-16	
T74LS260M1	Dual 5-Input NOR Gate	SO-14	
T74LS266M1	Quad 2-Input Exclusive NOR Gate (Open Collector)	SO-14	□
T74LS273M1	Octal D-Type Flip-Flop with Master Reset	SO-20	△
T74LS279M1	Quad Set-Reset Latch	SO-16	
T74LS280M1	9-Bit Odd/Even Parity Generator/Checker	SO-14	□
T74LS283M1	4-Bit Binary Full Adder (Rotated LS83A)	SO-16L	○
T74LS290M1	Decade Counter	SO-14	
T74LS293M1	4-Bit Binary Counter	SO-14	
T74LS295AM1	4-Bit Shift Register (3-State)	SO-14	○
T74LS298M1	Quad 2-Input Multiplexer with Output Latches	SO-16	
T74LS299M1	8-Bit Shift/Storage Register (3-State)	SO-20	□
T74LS322AM1	8-Bit Shift/Register with Sign Extend (3-State)	SO-20	□
T74LS323M1	8-Bit Shift/Storage Register (3-State)	SO-20	□
T74LS348M1	8-Input to 3 Line Priority Encoder (3-State)	SO-16	□
T74LS352M1	Dual 4-Input Multiplexer (Inverting LS153)	SO-16	
T74LS353M1	Dual 4-Input Multiplexer (3-State LS352)	SO-16	
T74LS365AM1	Hex Buffer with Common Enable (3-State)	SO-16	
T74LS366AM1	Hex Inverter Buffer with Common Enable (3-State)	SO-16	
T74LS367AM1	Hex Buffer, 4-Bit and 2-Bit (3-State)	SO-16	
T74LS373M1	Octal Transparent Latch (3-State)	SO-20	△

LOW POWER SCHOTTKY TTL (continued)

SALES TYPE	FUNCTION	PACKAGE	
T74LS374M1	Octal D-Type Flip-Flop (3-State)	SO-20	□
T74LS377M1	Octal D-Type Flip-Flop with Common Enable	SO-20	□
T74LS378M1	Hex D-Type Flip-Flop with Enable	SO-16	
T74LS379M1	4-Bit D-Type Flip-Flop with Enable	SO-16	
T74LS386M1	Quad 2-Input Exclusive OR Gate	SO-14	□
T74LS390M1	Dual Decade Counter	SO-16	
T74LS393M1	Dual 4-Bit Binary Counter	SO-14	
T74LS395M1	4-Bit Shift Register (3-State)	SO-16	□
T74LS395AM1	4-Bit Shift Register (3-State)	SO-16	□
T74LS398M1	Quad 2-Input Multiplexer with Output Register	SO-20	□
T74LS399M1	Quad 2-Input Multiplexer with Output Register	SO-16	□
T74LS465M1	Octal Buffer Gated Enable-Inverted (3-State)	SO-20	□
T74LS490M1	Dual Decade Counter	SO-16	
T74LS533M1	Octal Transparent Latch (3-State)	SO-20	□
T74LS534M1	Octal D-Type Flip-Flop (3-State)	SO-20	□
T74LS540M1	Octal Inverting Buffer/Line Driver (3-State)	SO-20	□
T74LS541M1	Octal Buffer/Line Driver (3-State)	SO-20	□
T74LS568M1	Decade Up/Down Counter (3-State)	SO-20	□
T74LS569M1	Binary Up/Down Counter (3-State)	SO-20	□
T74LS573M1	Octal D-Type Latch (3-State)	SO-20	□
T74LS574M1	Octal D-Type Flip-Flops (3-State)	SO-20	□
T74LS640M1	Octal Bus Transceiver (3-State)	SO-20	□
T74LS641M1	Octal Non Inverting Bus Transceiver (3-State)	SO-20	□
T74LS645M1	Octal Non Inverting Bus Transceiver (3-State)	SO-20	□
T74LS670M1	4x4 Register File (3-State)	SO-16	
T74LS682M1	8-Bit Magnitude Comparator (3-State)	SO-20	□

□ New Type in Development ○ SO-16L Available in Q4 '85 △ SO-20 Available in '86

SURFACE MOUNTING ICs

CMOSB SERIES

SALES TYPE	FUNCTION	PACKAGE
HCF4000BM1	Dual 3-Input NOR Gate Plus Inverter	SO-14
HCF4001BM1	Quad 2-Input NOR Gate	SO-14
HCF4002BM1	Dual 4-Input NOR Gate	SO-14
HCF4006BM1	18-Stage Static Shift Register	SO-14
HCF4007UBM1	Dual Complementary Pair Plus Inverter	SO-14
HCF4008BM1	4-Bit Full Adder	SO-16L
HCF4011BM1	Quad 2-Input NAND Gate	SO-14
HCF4012BM1	Dual 4-Input NAND Gate	SO-14
HCF4013BM1	Dual D Flip-Flop	SO-14
HCF4014BM1	8-Stage Static Sync. Shift Register	SO-16L
HCF4015BM1	Dual 4-Stage Static Shift Register	SO-16L
HCF4016BM1	Quad Bilateral Switch	SO-14
HCF4017BM1	Decade Counter/Divider	SO-16L
HCF4018BM1	Presettable Divide-By-N- Counter	SO-16L
HCF4019BM1	Quad AND/OR Select Gate	SO-16
HCF4020BM1	14-Stage Binary/Ripple Counter	SO-16L
HCF4021BM1	8-Stage Static Shift Register	SO-16L
HCF4023BM1	Triple 3-Input NAND Gate	SO-14
HCF4024BM1	7-Stage Binary/Ripple Counter	SO-14
HCF4025BM1	Triple 3-Input NOR Gate	SO-14
HCF4027BM1	Dual J-K Mater-Slave Flip-Flop	SO-16
HCF4028BM1	BCD-to-Decimal Decoder	SO-16
HCF4029BM1	Presettable Up-Down Counter	SO-16L
HCF4030BM1	Quad Ex-OR Gate	SO-14
HCF4032BM1	Triple Serial Adder	SO-16L
HCF4035BM1	4-stage Parallel I/O Shift Register	SO-16L
HCF4038BM1	Triple Serial Adder	SO-16L
HCF4040BM1	12-Stage Binary/Ripple Counter	SO-16L
HCF4041UBM1	Quad True/Complement Buffer	SO-14
HCF4042BM1	Quad Clocked D Latch	SO-16
HCF4043BM1	Quad 3-State NOR R/S Latch	SO-16L
HCF4044BM1	Quad 3-State NAND R/S Latch	SO-16L
HCF4045BM1	21-Stage Counter	SO-16
HCF4047BM1	Monostable/Astable Multivibrator	SO-14
HCF4048BM1	Multifunction Expandable 8-Input Gate	SO-16L
HCF4049UBM1	Hex Inverting Buffer/Converter	SO-16
HCF4050BM1	Hex Non-Inverting Buffer/ Converter	SO-16
HCF4051BM1	Single-8 Channel Analog Multiplexer/Demultiplexer	SO-16
HCF4052BM1	Differential 4-Channel Analog Multiplexer/Demultiplexer	SO-16

SURFACE MOUNTING ICs

CMOSB SERIES (continued)

SALES TYPE	FUNCTION	PACKAGE
HCF4053BM1	Triple 2-Channel Analog Multiplexer/Demultiplexer	SO-16
HCF4054BM1	4-Segment Display Driver	SO-16
HCF4055BM1	BCD to 7-Segment Decoder/Driver	SO-16L
HCF4056BM1	BCD to 7-Segment Decoder/Driver	SO-16L
HCF4060BM1	14-Stage Counter/Divider and Oscillator	SO-16L
HCF4063BM1	4-Bit Magnitude Comparator	SO-16
HCF4066BM1	Quad Bilateral Switch	SO-14
HCF4068BM1	8-Input NAND/AND Gate	SO-14
HCF4069BM1	Hex Inverter	SO-14
HCF4070BM1	Quad Ex-OR Gate	SO-14
HCF4071BM1	Quad 2-Input OR Gate	SO-14
HCF4072BM1	Dual 4-Input OR Gate	SO-14
HCF4073BM1	Triple 3-Input AND Gate	SO-14
HCF4075BM1	Triple 3-Input OR Gate	SO-14
HCF4076BM1	4-Bit D-Type Register	SO-16L
HCF4077BM1	Quad Ex-NOR Gate	SO-14
HCF4078BM1	8-Input NOR/OR Gate	SO-14
HCF4081BM1	Quad 2-Input AND Gate	SO-14
HCF4082BM1	Dual 4-Input AND Gate	SO-14
HCF4085BM1	Dual 2-Wide 2-Input AND-OR-Inverter Gate	SO-14
HCF4086BM1	Expandable 4-Wide 2-Input AND-OR-Inverter Gate	SO-14
HCF4093BM1	Quad 2-Input NAND Schmitt Trigger	SO-14
HCF4094BM1	8-Stage Shift-and-Store Bus Register	SO-16L
HCF4095BM1	Gated J-K Master-Slave Flip-Flop	SO-14
HCF4096BM1	Gated J-K Master-Slave Flip-Flop	SO-14
HCF4098BM1	Dual Monostable Multivibrator	SO-16
HCF4099BM1	8-Bit Addressable Latch	SO-16L
HCF4502BM1	Strobe Hex Inverter/Buffer	SO-16L
HCF4503BM1	Hex 3-Stage Buffer	SO-16L
HCF4511BM1	BCD to 7-Segment Latch/Decoder/Driver	SO-16L
HCF4512BM1	8- Channel Data Selector	SO-16
HCF4518BM1	Dual BCD Up-Counter	SO-16L
HCF4520BM1	Dual Binary Up-Counter	SO-16L
HCF4532BM1	8-Bit Priority Encoder	SO-16L
HCF4555BM1	Dual Binary to 1 of 4 Decoder/Demultiplexer	SO-16L
HCF4556BM1	Dual Binary to 1 of 4 Decoder/Demultiplexer	SO-16L
HCF4585BM1	4-Bit Magnitude Comparator	SO-16L
HCF40100BM1	32-Stage Static Left/Right Shift Register	SO-16L
HCF40101BM1	9-Bit Parity Generator Checker	SO-16L

SURFACE MOUNTING ICs

CMOSB SERIES (continued)

SALES TYPE	FUNCTION	PACKAGE
HCF40106BM1	Hex Schmitt Trigger	SO-14
HCF40109BM1	Quad Low-to-High Voltage Level Shifter	SO-16L
HCF40160BM1	Programmable Decade Counter	SO-16L
HCF40161BM1	Programmable Binary Counter	SO-16L
HCF40162BM1	Programmable Decade Counter	SO-16L
HCF40163BM1	Programmable Binary Counter	SO-16L
HCF40174BM1	Hex D-Type Flip-Flop	SO-16L
HCF40182BM1	Look Ahead Carry Generator	SO-16
HCF40257BM1	Quad 2-Line-to-1 Data Selector/Multiplexer	SO-16

Note: SO-16L Available in Q4 '85

GATE ARRAY PACKAGES

ARRAY	20PLCC	44PLCC	68PLCC	84PLCC	28LCCC	44LCCC	52LCCC	68LCCC	84LCCC	100LCCC
HSG3020	●	●			●					
HSG3030	●	●			●					
HSG3040	●	●			●					
HSG3060		●			●	●	●			
HSG3080		●			●	●	●			
HSG3110		●	●		●	●	●			
HSG3130		●	●	●	●	●	●	●	●	
HSG3170			●	●		●	●	●	●	
HSG3210			●	●		●	●	●	●	
HSG3250			●	●		●	●	●	●	
HSG5080		●	●	●	●	●	●			
HSG5140			●	●		●	●	●	●	
HSG5220			●	●		●	●	●	●	
HSG5320			●	●				●	●	●
HSG5420			●	●				●	●	●
HSG5600			●	●					●	●

SURFACE MOUNTING ICs

MICROPROCESSORS

Z80 FAMILY

TYPE	FUNCTION	CLOCK	PACKAGE
Z8400C	Z80CPU Central Processing Unit	2.5MHz	PLCC44
Z8400AC	Z80ACPU Central Processing Unit	4MHz	PLCC44
Z8400BC	Z80BCPU Central Processing Unit	6MHz	PLCC44
Z8400HC	Z80HCPU Central Processing Unit	8MHz	PLCC44
Z8400K	Z80CPU Central Processing Unit	2.5MHz	LCCC44
Z8400AK	Z80ACPU Central Processing Unit	4MHz	LCCC44
Z8400BK	Z80BCPU Central Processing Unit	6MHz	LCCC44
Z8400HK	Z80HCPU Central Processing Unit	8MHz	LCCC44
Z8410C	Z80DMA Direct Memory Access	2.5MHz	PLCC44
Z8410AC	Z80ADMA Direct Memory Access	4MHz	PLCC44
Z8410K	Z80DMA Direct Memory Access	2.5MHz	LCCC44
Z8410AK	Z80ADMA Direct Memory Access	4MHz	LCCC44
Z8420C	Z80PIO Parallel Input Output	2.5MHz	PLCC44
Z8420AC	Z80APIO Parallel Input Output	4MHz	PLCC44
Z8420BC	Z80BPIO Parallel Input Output	6MHz	PLCC44
Z8420K	Z80PIO Parallel Input Output	2.5MHz	LCCC44
Z8420AK	Z80APIO Parallel Input Output	4MHz	LCCC44
Z8420BK	Z80BPIO Parallel Input Output	6MHz	LCCC44
Z8430C	Z80CTC Counter Timer Circuit	2.5MHz	PLCC44
Z8430AC	Z80ACTC Counter Timer Circuit	4MHz	PLCC44
Z8430BC	Z80BCTC Counter Timer Circuit	6MHz	PLCC44
Z8430K	Z80CTC Counter Timer Circuit	2.5MHz	LCCC44
Z8430AK	Z80ACTC Counter Timer Circuit	4MHz	LCCC44
Z8430BK	Z80BCTC Counter Timer Circuit	6MHz	LCCC44
Z8444C	Z80SIO Dual Serial Input Output	2.5MHz	PLCC44
Z8444AC	Z80ASIO Dual Serial Input Output	4MHz	PLCC44
Z8444BC	Z80BSIO Dual Serial Input Output	6MHz	PLCC44
Z8444K	Z80SIO Dual Serial Input Output	2.5MHz	LCCC44
Z8444AK	Z80ASIO Dual Serial Input Output	4MHz	LCCC44
Z8444BK	Z80BSIO Dual Serial Input Output	6MHz	LCCC44
Z8470C	Z80DART Dual Async. Receiver/Transmitter	2.5MHz	PLCC44
Z8470AC	Z80ADART Dual Async. Receiver/Transmitter	4MHz	PLCC44
Z8470BC	Z80BDART Dual Async. Receiver/Transmitter	6MHz	PLCC44
Z8470K	Z80DART Dual Async. Receiver/Transmitter	2.5MHz	LCCC44
Z8470AK	Z80ADART Dual Async. Receiver/Transmitter	4MHz	LCCC44
Z8470BK	Z80BDART Dual Async. Receiver/Transmitter	6MHz	LCCC44

SURFACE MOUNTING ICs

MICROPROCESSORS (continued)

Z8000 FAMILY

TYPE	FUNCTION	CLOCK	PACKAGE
Z8002C	Z8000 16 bit Non-Segmented CPU, 40 pin, 60K byte address range ...	4MHz	PLCC44
Z8002AC	Z8000 16 bit Non-Segmented CPU, 40 pin, 60K byte address range ...	6MHz	PLCC44
Z8002BC	Z8000 16 bit Non-Segmented CPU, 40 pin, 60K byte address range ...	10MHz	PLCC44
Z8002K	Z8000 16 bit Non-Segmented CPU, 40 pin, 60K byte address range ...	4MHz	LCCC44
Z8002AK	Z8000 16 bit Non-Segmented CPU, 40 pin, 60K byte address range ...	6MHz	LCCC44
Z8002BK	Z8000 16 bit Non-Segmented CPU, 40 pin, 60K byte address range ...	10MHz	LCCC44
Z8004C	Z8000 VMPU Non-Segmented Virtual Memory CPU, 40 pin	4MHz	PLCC44
Z8004AC	Z8000 VMPU Non-Segmented Virtual Memory CPU, 40 pin	6MHz	PLCC44
Z8004K	Z8000 VMPU Non-Segmented Virtual Memory CPU, 40 pin	4MHz	LCCC44
Z8004AK	Z8000 VMPU Non-Segmented Virtual Memory CPU, 40 pin	6MHz	LCCC44
Z8015K	Z8000 PMMU Paged Memory Management Unit	4MHz	LCCC68
Z8015AK	Z8000 PMMU Paged Memory Management Unit	6MHz	LCCC68
Z8030C	Z8000 SCC Serial Communications Controller (Dual)	4MHz	PLCC44
Z8030AC	Z8000 SCC Serial Communications Controller (Dual)	6MHz	PLCC44
Z8030K	Z8000 SCC Serial Communications Controller (Dual)	4MHz	LCCC44
Z8030AK	Z8000 SCC Serial Communications Controller (Dual)	6MHz	LCCC44
Z8036C	Z8000 CIO Counter/Timer and Parallel Input/Output	4MHz	PLCC44
Z8036AC	Z8000 CIO Counter/Timer and Parallel Input/Output	6MHz	PLCC44
Z8036K	Z8000 CIO Counter/Timer and Parallel Input/Output	4MHz	LCCC44
Z8036AK	Z8000 CIO Counter/Timer and Parallel Input/Output	6MHz	LCCC44
Z8038C	Z8000 FIFO Input/Output Interface	4MHz	PLCC44
Z8038AC	Z8000 FIFO Input/Output Interface	6MHz	PLCC44
Z8038K	Z8000 FIFO Input/Output Interface	4MHz	LCCC44
Z8038AK	Z8000 FIFO Input/Output Interface	6MHz	LCCC44

SURFACE MOUNTING ICs

MICROCOMPUTERS

Z8 FAMILY

TYPE	FUNCTION	CLOCK	ROM	PACKAGE
Z8601C	Z8 Microcomputer	8MHz	2K	PLCC44
Z8601AC	Z8 Microcomputer	12MHz	2K	PLCC44
Z8601K	Z8 Microcomputer	8MHz	2K	LCCC44
Z8601AK	Z8 Microcomputer	12MHz	2K	LCCC44
Z8611C	Z8 Microcomputer	8MHz	4K	PLCC44
Z8611AC	Z8 Microcomputer	12MHz	4K	PLCC44
Z8611K	Z8 Microcomputer	8MHz	4K	LCCC44
Z8611AK	Z8 Microcomputer	12MHz	4K	LCCC44
Z8621C	Z8 Microcomputer	8MHz	8K	PLCC44
Z8621K	Z8 Microcomputer	8MHz	8K	LCCC44
Z8671C	Z8 MCU Tiny Basic	8MHz	2K	PLCC44
Z8671K	Z8 MCU Tiny Basic	8MHz	2K	LCCC44
Z8681C	Z8 MCU ROMless External memory starts at 0	8MHz	Ext64K	PLCC44
Z8681AC	Z8 MCU ROMless External memory starts at 0	12MHz	Ext64K	PLCC44
Z8681K	Z8 MCU ROMless External memory starts at 0	8MHz	Ext64K	LCCC44
Z8681AK	Z8 MCU ROMless External memory starts at 0	12MHz	Ext64K	LCCC44
Z8682C	Z8 MCU ROMless External memory starts at 2K	8MHz	Ext62K	PLCC44
Z8682AC	Z8 MCU ROMless External memory starts at 2K	12MHz	Ext62K	PLCC44
Z8682K	Z8 MCU ROMless External memory starts at 2K	8MHz	Ext62K	LCCC44
Z8682AK	Z8 MCU ROMless External memory starts at 2K	12MHz	Ext62K	LCCC44

SURFACE MOUNTING ICs

MICROCOMPUTERS (continued)

M3870 Family

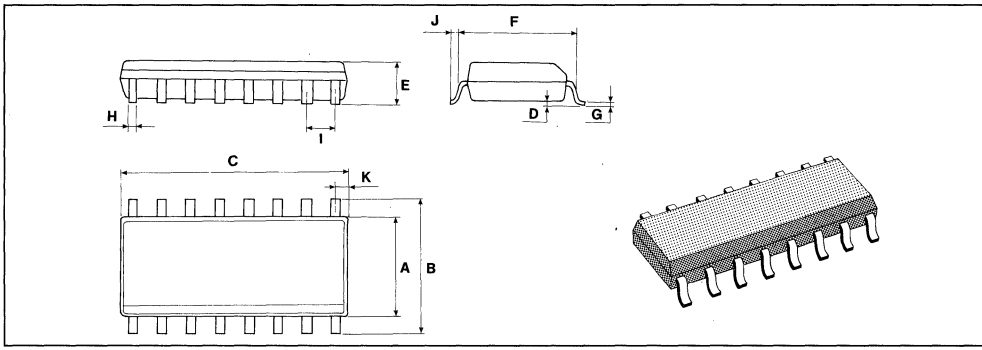
TYPE	FUNCTION	CLOCK	ROM	PACKAGE
M3870C	Microcomputer Unit	4MHz	2K	PLCC44
M3870K	Microcomputer Unit	4MHz	2K	LCCC44
M3872C	Microcomputer Unit	4MHz	4K	PLCC44
M3872K	Microcomputer Unit	4MHz	4K	LCCC44
M3875C	Microcomputer Unit (Battery back-up)	4MHz	4K	PLCC44
M3875K	Microcomputer Unit (Battery back-up)	4MHz	4K	LCCC44
M3876C	Microcomputer Unit	4MHz	6K	PLCC44
M3876K	Microcomputer Unit	4MHz	6K	LCCC44
M38730C	Serial I/O MCU	4MHz	2K	PLCC44
M38730K	Serial I/O MCU	4MHz	2K	LCCC44
M38733C	Serial I/O MCU	4MHz	4K	PLCC44
M38733K	Serial I/O MCU	4MHz	4K	LCCC44
M38SH72C	NV Shadow RAM MCU (Dedicated micro)	4MHz	4K	PLCC44
M38SH72K	NV Shadow RAM MCU (Dedicated micro)	4MHz	4K	LCCC44
M38ADP70C	8-Bit A/D Converter Input MCU (Dedicated micro)	4MHz	2K	PLCC44
M38ADP70K	8-Bit A/D Converter Input MCU (Dedicated micro)	4MHz	2K	LCCC44
M38SB72C	S-Bus/I² CBus MCU (Dedicated micro)	4MHz	4K	PLCC44
M38SB72K	S-Bus/I² CBus MCU (Dedicated micro)	4MHz	4K	LCCC44

SURFACE MOUNTING ICs

PACKAGES

The range of surface mounting package types available from SGS meets most of the industries'needs today and an ongoing development program will ensure that SGS will be there in the future with the products you need.

SMALL OUTLINE PACKAGES — The SGS range of SO packages includes both standard JEDEC types plus a range of packages with slightly larger body dimensions. These special SO packages are of course foot-print compatible with standard JEDEC types thus allowing SGS to offer an increased product range without reducing your automation options or creating extra costs for PCB manufacturers. In addition SGS has developed a special improved dissipation package — called the MICROWATT® and given a P suffix — which will allow the SGS product range to include devices with higher power dissipation. And of course the new package is completely foot-print compatible with standard JEDEC SO packages.



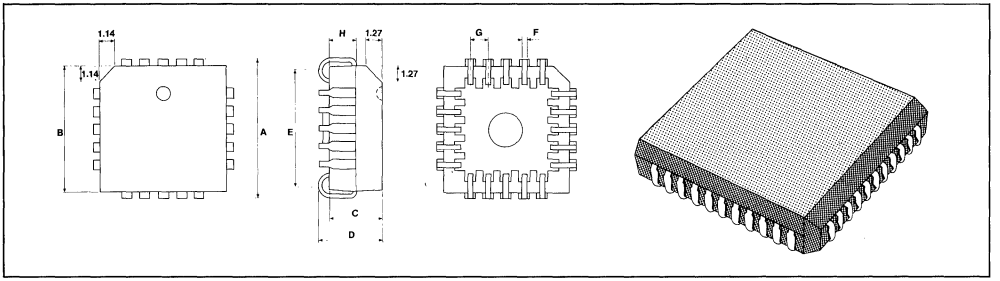
PACKAGE	A	B	C	D	E	F	G	H	I	J	K
SO-14	4.0	6.2	8.75	0.1	1.75	5.3	0.2	0.4	1.27	0.5	0.55
SO-16	4.0	6.2	10.0	0.1	1.75	5.3	0.2	0.4	1.27	0.5	0.6
SO-16L	7.5	10.3	10.3	0.15	2.5	9.0	0.25	0.43	1.27	0.5	0.7
SO-20	7.5	10.3	12.7	0.15	2.5	9.0	0.25	0.43	1.27	0.5	0.63
SO-8G	4.5	6.3	5.08	0.1	2.0	5.3	0.2	0.4	1.27	0.25	0.63
SO-14G	4.5	6.3	10.16	0.1	2.0	5.3	0.2	0.4	1.27	0.25	1.27
SO-16G	4.5	6.3	10.16	0.1	2.0	5.3	0.2	0.4	1.27	0.25	0.63
SO-16P	4.5	6.3	10.16	0.1	2.0	5.3	0.25	0.4	1.27	0.25	0.63

All dimensions in mm

SURFACE MOUNTING ICs

PACKAGES (continued)

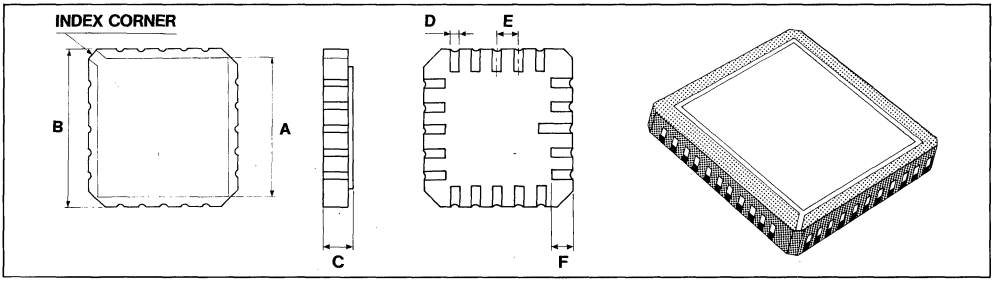
PLASTIC LEADED CHIP CARRIERS — Designed to take circuits with high pin-outs, like microprocessors, SGS PLCCs are available in 20, 44, 68 and 84 pin versions. In this type of package the leads are folded under the package ready for surface mounting.
This configuration also has the advantage of reducing the risk of lead bending during shipping — a real problem with standard DIP packages.



PACKAGE	A	B	C	D	E	F	G	H
PLCC20	9.69	8.96	3.81	4.42	8.35	0.38	1.27	2.54
PLCC44	17.65	16.66	3.81	4.42	16.00	0.38	1.27	2.54
PLCC68	24.93	24.2	3.81	4.42	23.5	0.38	1.27	2.54
PLCC84	30.2	29.2	3.81	4.42	28.4	0.38	1.27	2.54

All dimensions in mm

LEADLESS CERAMIC CHIP CARRIERS — Designed originally for the demanding military markets, LCCCs are now used in many applications with special environmental conditions and wherever high reliability is of prime importance. SGS LCCCs come in 20, 44, 52, 68, 84 and 100 pin packages.

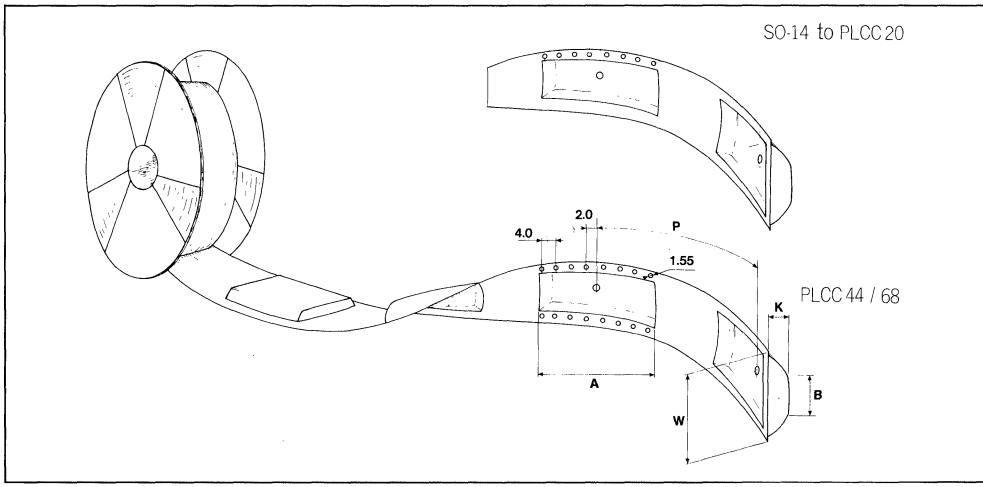


PACKAGE	A	B	C	D	E	F
LCCC20	8.89	8.00	1.85	0.63	1.27	1.27
LCCC44	16.31	13.4	1.85	0.63	1.27	1.27
LCCC52	19.05	13.4	1.85	0.63	1.27	1.27
LCCC68	24.13	15.8	1.85	0.63	1.27	1.27
LCCC84	29.21	18.6	2.03	0.63	1.27	1.27
LCCC100	36.5	19.5	2.03	0.63	1.27	1.27

All dimensions in mm

SHIPPING METHODS

Two main shipping methods are available for SGS SMICs. Firstly there is the traditional antistatic stick commonly used for standard DIP packages. This is the optimum solution when small numbers of SMICs are being used in mixed surface and through-hole mounting assemblies. Where a higher volume of surface mounted components is used with fully automated placement equipment, the optimum solution is tape and reel.



TAPE AND REEL

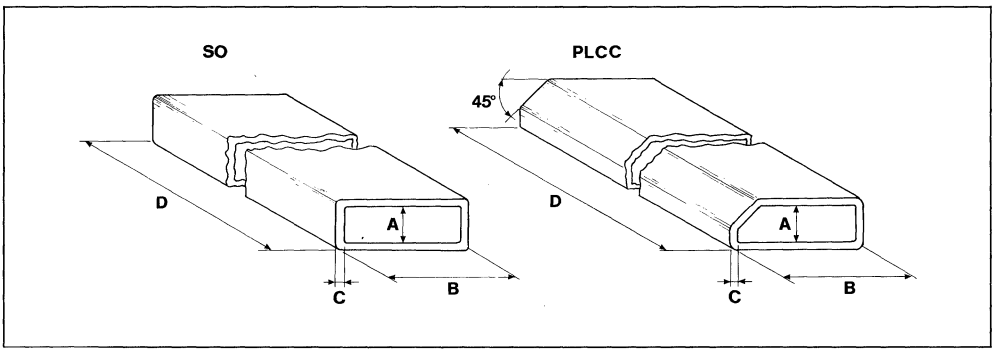
PACKAGE	A (mm)	B (mm)	W (mm)	P (mm)	K (mm)	OPTION 1		OPTION 2	
						LENGTH	QTY	LENGTH	QTY
SO-14	6.5	9.5	16	8	2.2	6m	750	27m	3375
SO-16	6.5	10.3	16	8	2.2	6m	750	27m	3375
SO-16L	10.9	10.76	24	12	3.0	4m	330	18m	1500
SO-20	10.9	19.3	24	12	3.0	4m	330	18m	1500
SO-8	6.4	5.2	12	8	2.2	6m	750	27m	3375
SO-14G	6.5	9.5	16	8	2.2	6m	750	27m	3375
SO-16G	6.5	10.3	16	8	2.2	6m	750	27m	3375
SO-16P	6.5	10.3	16	8	2.2	6m	750	27m	3375
PLCC20	10.3	10.3	16	12	5.0	—	—	16m	1330
PLCC44	18.0	18.0	32	24	5.0	—	—	15m	625
PLCC68	25.6	25.6	44	32	5.0	—	—	14m	430

SHIPPING METHODS (continued)

ANTISTATIC STICKS

PACKAGE	A		B		C		D		QTY
	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
SO-14	2.2	2.5	6.4	6.7	0.5	0.7	520	521	56
SO-16	2.2	2.5	6.4	6.7	0.5	0.7	520	521	50
SO-16L	3.0	3.3	10.7	11.0	0.5	0.7	540	541	50
SO-20	3.0	3.3	10.7	11.0	0.5	0.7	540	541	40
SO-8	2.2	2.5	6.4	6.7	0.5	0.7	520	521	100
SO-14G	2.2	2.5	6.4	6.7	0.5	0.7	520	521	50
SO-16G	2.2	2.5	6.4	6.7	0.5	0.7	520	521	50
SO-16P	2.2	2.5	6.4	6.7	0.5	0.7	520	521	50
PLCC20	4.8	5.2	10.5	10.9	1.05	1.15	573	574	50
PLCC44	4.8	5.2	18.15	18.55	1.05	1.15	573	574	30
PLCC68	4.8	5.2	25.75	26.15	1.05	1.15	573	574	20
PLCC84	4.8	5.2	31.05	31.56	1.05	1.15	573	574	16

All dimensions in mm



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