

**SYMBOLS & CODES EXPLAINED**

**SYMBOLS & CODES COMMON TO MORE THAN ONE TECHNICAL SECTION**

**LINE No.**  
 ▼ - New Type  
 ♦ - Revised Specifications  
 # - Non-JEDEC type manufactured outside U.S.A.

**TYPE No.**  
 † - Switching type, also listed in Section 12  
 ∅ - Chopper, also listed in Section 13, Category 10  
 \* - These types also included elsewhere with other characteristics. See Type No. Cross Index for alternate line number.  
 § - Radiation Resistant Devices, also listed in Section 13, Category 13.

**STRUCTURE (All Sections)**  
 A - Alloy Except 6 & 7)  
 AN - Annular  
 D - Diffused or drift  
 DM - Diffused mesa  
 E - Epitaxial  
 EA - Epitaxial annular  
 EM - Epitaxial mesa  
 F - Fused  
 G - Grown  
 GA - Gallium Arsenide  
 H - Hometaxial  
 MA - Mico alloy  
 MD - Micro alloy diffused  
 ME - Mesa  
 MOS - Metal oxide silicon  
 PA - Precision alloy  
 PC - Point contact  
 PD - Precision alloy diffused  
 PE - Planar epitaxial  
 PL - Planar  
 S - Surface barrier  
 \* - Matched pair  
 Δ - Switching, other uses  
 □ - Chopper, other uses  
 ∅ - Noise figure 8db or below  
 † - Plastic package  
 % - Overlay

**12. SWITCHING TRANSISTORS** \* THESE TYPES ALSO INCLUDED ELSEWHERE WITH OTHER CHARACTERISTICS SEE TYPE NO. CROSS INDEX FOR ADDITIONAL PAGE & LINE NO.

LINE No.	TYPE No.	fab (Hz)	MAX RISE TIME tr (s)	MAX DELAY TIME td (s)	MAX STORE TIME ts (s)	MAX FALL TIME tf (s)	MAX. P <sub>c</sub> IN FREE AIR @ 25°C (W)	BIAS			MAX. SAT. RES. (Ω)	C <sub>ob</sub> (F)	r <sub>bb</sub> X C <sub>ob</sub> (s)	STRUCTURE	DESCRIPTION	L C O A D E
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		

† -  $f \alpha_e$   
 § - Gain bandwidth product ( $f_T$ )  
 \* - Maximum frequency of oscillation  
 ∅ - Figure of merit (frequency for unity power gain)  
 Δ - Minimum □ - Maximum

§ - Charge storage time constant  
 ▼ - Stored base charge - picocoulomb  
 ♦ - Total switching time  
 ∅ -  $T_{on} = t_r + t_d$   
 † - Typical Value

∅ -  $T_{off} = t_s + t_f$   
 † - Typical Value  
 \* -  $T_{on} + T_{off} = t_d + t_r + t_f + t_s$

∅ -  $V_{CE}$   
 ∅ -  $I_C$   
 Δ -  $I_B$   
 † -  $h_{fe}$   
 # - Pulsed  
 Δ - Minimum  
 □ - Maximum  
 \* - Available to selected range narrower than indicated  
 § -  $Y_{fs}$  in millimho (FET's only). Bias values are  $V_{DS}$  &  $I_D$   
 ∅ - With infinite heat sink  
 Following symbols indicate temperature at which derating starts:  
 † - 40°C § - 70°C  
 \* - 45°C ♦ - 100°C or greater  
 # - 50°C ∅ - 80°C  
 □ - 60°C Δ - Pulsed

† -  $r'_{bb}$   
 □ - Maximum  
 § -  $C_{cb}$   
 § -  $C_{iss}$  (FET's only)

§ - Tetrode  
 N - NPN or "N" Channel  
 P - PNP or "P" Channel  
 § - Field Effect Transistor  
 # - Radiation Resistant Device (See above also)

A - Ambient  
 C - Case  
 J - Junction  
 S - Storage

**13. MISCELLANEOUS TRANSISTORS**

LINE No.	TYPE No.	1 CATEGORY	2 U STRUCTURE	3 M A T	DWG. No.	L C O A D E	DESCRIPTION
1	2	3	4	5	6	7	8

- 1 - Avalanche Mode
- 2 - Bi-directional
- 3 - Field Effect
- 4 - Hook Collector
- 5 - Complementary Symmetry (PNP & NPN) Matched Pair
- 6 - Matched Pair
- 7 - Phototransistor
- 8 - Tetrode
- 9 - Unijunction: N-N-type emitter (P-type Base) P-P-type emitter (N-type Base)
- 10 - Chopper
- 11 - Unmatched Composite (Dual)
- 12 - Cryogenic
- 13 - Radiation Resistant Devices
- 14 - Pressure Sensitive
- 15 - Transistor chips
- 16 - Darlington
- 17 - Microwave

Ge - Germanium  
 Si - Silicon  
 N - NPN or N Channel  
 P - PNP or P Channel (See above also)

See "TECHNICAL TERM DEFINITIONS" Section

## 13. MISCELLANEOUS TRANSISTORS

IN ORDER OF (1) CATEGORY & (2) TYPE No.

LINE No.	2 TYPE No.	1 CATEGORY	U S E	M A T	DWG # Y200 s/a TO200 Ser.	L E O D E	DESCRIPTION
1	SA2738*	6	N	Si	L2t		Pt-6W;hFE1/2-90 min;VBE(1-2)-1.5mV max; $\Delta$ VBE(1-2)/ $\Delta$ T-3uV/deg.C.
2	SA2739*	6	N	Si	L2t		Pt-6W;hFE1/2-90 min;VBE(1-2)-2.5mV max; $\Delta$ VBE(1-2)/ $\Delta$ T-5uV/deg.C.
3	SD5010*	6	P-MOS	Si	L53		Pt 325mW(each side) at 25°C Case temp;Vfs 1/2 800m min;VGS(1-2) 70mV.
4	SD5011*	6	P-MOS	Si	L54		Pt 325mW(each side) at 25°C Case temp;Vfs 1/2 800m min;VGS(1-2) 70mV.
5	SD5012*	6	P-MOS	Si	L53		Pt 325mW(each side) at 25°C Case temp;Vfs 1/2 800m min;VGS(1-2) 70mV.
6	SD5013*	6	P-MOS	Si	L54		Pt 325mW(each side) at 25°C Case temp;Vfs 1/2 800m min;VGS(1-2) 70mV.
7	SD5014*	6	P-MOS	Si	L53		Pt-325mW(each side) at 25°C case temp;Vfs 1/2 .80min;VGS 1/2-200mV max.
8	SD5015*	6	P-MOS	Si	L54		Pt-325mW(each side) at 25°C case temp;Vfs 1/2 .80min;VGS 1/2-200mV max.
9	SD5050*	6	N-MOS	Si	L53		Pt-325mW(each side) at 25°C casetemp;Vfs 1/2 .80min;VGS 1/2-200mV max.
10	SD5051*	6	N-MOS	Si	L54		Pt-325mW(each side) at 25°C case temp;Vfs 1/2 .80min;VGS 1/2-200mV max.
11#	SL360	6	NPN	Si	L44a		BVCEO 15V;BVCEO 4V min;hFE 30 min;VCE(sat) 400mV max;Ic 10uA.
12	SMT100	6	P	Si	L17a		BVCEO-45V;IC-30mA max;Pt-60W;VBE(1-2)-20mV;Cob-6.0pf.
13	SMT101	6	P	Si	L17a		BVCEO-45V;IC-30mA max;Pt-60W;VBE(1-2)-10mV;hFE1/hFE2-80 min.
14	SMT102	6	P	Si	L17a		BVCEO-45V;IC-30mA max;Pt-60W;VBE(1-2)-10mV;hFE1/hFE2-80 min.
15	SMT103	6	P	Si	L17a		BVCEO-45V;IC-30mA max;Pt-60W;VBE(1-2)-5.0mV;hFE1/hFE2-90 min.
16	SMT104	6	P	Si	L17a		BVCEO-45V;IC-30mA max;Pt-60W;VBE(1-2)-5.0mV;hFE1/hFE2-90 min.
17	SMT105	6	P	Si	L17a		BVCEO-45V;IC-30mA max;Pt-60W;VBE(1-2)-5.0mV;hFE1/hFE2-90 min.
18	SP8300	6	N-PL	Si	L8a		Pc-30W;BVCEO-40V;hFE-30 min/IC-10mA;ICBO-025uA max.
19	SP8302	6	N-PL	Si	L8a		Pc-50W;BVCEO-100V;hFE-75 min/IC-10mA;ICBO-025mA max.
20	SP8303	6	N-PL	Si	L8a		Pc-50W;BVCEO-100V;hFE-35 min/IC-10mA;ICBO-025mA max.
21	SP8304	6	N-PL	Si	L8a		Pc-30W;BVCEO-40V;hFE-30 min/IC-10mA;ICBO-025uA max.
22	SP8307	6	P-PL	Si	L8a		Pc-30W;BVCEO-20V;hFE-35 min/IC-10mA;ICBO-01uA max.
23	SP8309	6	N-PL	Si	L8a		Pc-50W;BVCEO-75V;hFE-40 min/IC-150mA;ICBO-01uA max.
24	SP8310	6	N-PL	Si	L8a		Pc-50W;BVCEO-75V;hFE-100 min/IC-150mA;ICBO-01uA max.
25	SP8311	6	N-PL	Si	L8a		Pc-50W;BVCEO-120V;hFE-40 min/IC-150mA;ICBO-01uA max.
26	SP10801	6	N-DPL	Si	TO89		hFE1/hFE2-0.8min $\Delta$ VBE1-VBE2-1.6mV max;NF-4.0db max.
27	SP10810	6	P-DPE	Si	TO89		hFE1/hFE2-0.8min $\Delta$ VBE1-VBE2-4.0mV max;hFE-35min at 10mA-1.0V.
28	SU2074*	6	N	Si	L21		Pt-300mW; gm 1/2-95 min;VGS(1-2)-15mV max; $\Delta$ VGS(1-2)/ $\Delta$ T-10uV/deg.C.
29	SU2075*	6	N	Si	L21		Pt-300mW; gm 1/2-95 min;VGS(1-2)-15mV max; $\Delta$ VGS(1-2)/ $\Delta$ T-15uV/deg.C.
30	SU2076*	6	N	Si	L21		Pt-250mW; gm 1/2-95 min;VGS(1-2)-15mV max; $\Delta$ VGS(1-2)/ $\Delta$ T-10uV/deg.C.
31	SU2077*	6	N	Si	L21		Pt-250mW; gm 1/2-95 min;VGS(1-2)-15mV max; $\Delta$ VGS(1-2)/ $\Delta$ T-25uV/deg.C.
32	SU2078*	6	N	Si	L21		Pt-250mW; gm 1/2-95 min;VGS(1-2)-15mV max; $\Delta$ VGS(1-2)/ $\Delta$ T-35uV/deg.C.
33	SU2079*	6	N	Si	L21		Pt-250mW; gm 1/2-95 min;VGS(1-2)-15mV max; $\Delta$ VGS(1-2)/ $\Delta$ T-60uV/deg.C.
34#	TA-M93	6	NPN	Si	TO5		Dual 2N3903-10% hFE match;5.0mV VBE match;hFE at 10uA-50 min.
35	U205*	6	N	Si	TO71		Pt-30W;IG(1-2)-5.0mA max;VGS(1-2)-5.0mV max;gfs 1/2-95 min.
36	U206*	6	N	Si	TO71		Pt-30W;IG(1-2)-5.0mA max;VGS(1-2)-10mV max;gfs 1/2-95 min.
37	U207*	6	N	Si	TO71		Pt-30W;IG(1-2)-5.0mA max;VGS(1-2)-15mV max;gfs 1/2-95 min.
38	UD1000	6	P-PE	Si	L38		Pt(Both Sides)-200mW;BVCEO-50V;Vo(1-2)-100uV max;IB and IC-20mA.
39	UD2000	6	P-PE	Si	L2n		Pt-400mW;BVCEO-50V;VBE1/2-5mV max;hFE1/2-90 min; $\Delta$ VBE1-2-10uV/degC
40	JAN1N4378	7	N $\Delta$	Si	X69		Pt-50mW;ID-1.0nAmax;IL-9.0mAmax;tr-1.5uSmax;VCE-50V;VEC-8V.
41	2N318	7	P-A	Ge			Pc-50mW; VCE-12V max; Sens-25uA/ft can;fab-750kc.
42	2N577	7	P	Ge			Pt-25mW; IC-10mA; Idark-300uA; Photosens-30A/lumen.
43	800	7	N-G	Ge			Max. Coll. Dist. 65mW; BVCE 20V; IC 5.0mA; Max. Temp. 75 deg.C.
44#	BPX30	7	N $\Delta$	Si	X8	A $\emptyset$	Pt-500mW;ICE(D)-1.0uA max;Sens-100mA/mW/cm <sup>2</sup> ;tr-3.0usec;tf-3.0usec.
45#	BPX59	7	N $\Delta$	Si	X8k	A $\emptyset$	Darlington;Pt-200mW;Ic 5.0mA at EA 100 $\times$ ;tr 200us;tf 150us;Max spectral Sens 780nm.
46#	BPY62	7	N-PE	Si	X8a	A $\emptyset$	Pt-20W;IC-1.0mA min;at B-1000 lux;Sens-1.0uM;VCE-15V.
47#	BPY66	7	N-DPL	Si	X52	A $\emptyset$	ID-1.0uA max;IL-80mA min;BVCEO-5.0V min.
48	CLR2090	7	N-PE $\Delta$	Si	L3k		Darlington;Pd 250mW;BVCEO 40V min;IL 600uA min at 20uW/cm sq;tr 100us;tf 150us.
49	CLR2191	7	N-PE $\Delta$	Si	L3k		Darlington;Pd 250mW;BVCEO 40V min;IL 4.0mA min at 20uW/cm sq;tr 100us;tf 150us.
50	CLT4160	7	N-PE $\Delta$	Si	u85a		Pd 50mW;BVCEO 50V;BVCEO 5.0V, IL 3.0mA max;ID 10nA max;tr 1.5us typ;tf 1.5us typ.
51	CLT4170	7	N-PE $\Delta$	Si	u85a		Pd 50mW;BVCEO 40V;BVCEO 5.0V, IL 5.0mA max;ID 10nA max;tr 1.5us typ;tf 1.5us typ.
52	EIP	7	P	Ge			Idk-10uA; Ilt-10mA; Sens-300uA/1m.
53	EP120	7	P $\emptyset$	Si	R110c	DB	Pt 250mW;Sin 400nA/mW/cm sq;IG(DARK) 30pA max;Icss(DARK) 500pA max;Vp 10V max.
54	EP121	7	P $\emptyset$	Si	R110c	DB	Pt 250mW;Sin 400nA/mW/cm sq;IG(DARK) 30pA max;Icss(DARK) 500pA max;Vp 1.5V max.
55	EP122	7	P $\emptyset$	Si	R110c	DB	Pt 250mW;Sin 400nA/mW/cm sq;IG(DARK) 30pA max;Icss(DARK) 500pA max;Vp 4.0V max.
56	EP123	7	P $\emptyset$	Si	R110c	DB	Pt 250mW;Sin 400nA/mW/cm sq;IG(DARK) 30pA max;Icss(DARK) 500pA max;Vp 10V max.
57#	ES3501	7	P-A	Ge	R71		Pc-36mW at 45 deg. C;BVCEO-10V; Ic-10mA max;Photosens-20uA/fc.
58#	ES3511	7	P-A	Ge	R88		Pc-50mW; BVCEO-25V; IC-20mA max; Photosens-1.0uA/Lux
59	FF400*	7	N-E $\Delta$	Si	TO72	DH	IG(Light)-15nA/FC min;ID(Light)-30uA/FC typ;tr-30ns;tf-50ns.
60	FPM100	7	N-PL	Si	X52		Pt-75mW max;ID-1.0uA max;IL-80mA max;BVCEO-5.0V min.
61	FPN100	7	N-PL	Si			Phototrans;Pd-75mW;ID-1.0uA max;IL-80mA min.
62	FPO100	7	N-PL	Si	X52a		Pt-75mW max;ID-1.0uA max;IL-80mA max.
63	FPT100	7	N-PL $\Delta$	Si	R124	A	Pt-100mW max;ID-101nA max;IC-25mA;tr-3.0usec.
64	FSP5	7	N-PL	Si	X8		Pc-50W max; BVCEO-100V; Photo-Sens-1.0uA/fc min.
65	GS100	7	N-PL $\Delta$	Si	u54		Pt-50mW;IL-1.0mA min;ID-1.0nA;VCE (SAT)-30V;tr-7.0us max;tf-40us max.
66	GS102	7	N-PL $\Delta$	Si	u54		Pt-50mW;IL-1.0mA min;ID-1.0nA;VCE (SAT)-30V;tr-7.0us max;tf-40us max.
67	GS170	7	N-PL $\Delta$	Si	u54		Pt-50mW;IL-1.0mA min;ID-20nA;VCE (SAT)-30V;tr-7.0us max;tf-40us max.
68	GS172	7	N-PL $\Delta$	Si	u54		Pt-50mW;IL-1.0mA min;ID-20nA;VCE (SAT)-30V;tr-7.0us max;tf-40us max.
69	GS300	7	N-PL $\Delta$	Si	X90a		Pt-50mW;IL-1.0mA min;ID-1.0nA;VCE (SAT)-30V;tr-7.0us max;tf-40us max.
70	GS302	7	N-PL $\Delta$	Si	X90a		Pt-50mW;IL-1.0mA min;ID-1.0nA;VCE (SAT)-30V;tr-7.0us max;tf-40us max.
71	GS370	7	N-PL $\Delta$	Si	X90a		Pt-50mW;IL-1.0mA min;ID-20nA;VCE (SAT)-30V;tr-7.0us max;tf-40us max.
72	GS372	7	N-PL $\Delta$	Si	X90a		Pt-50mW;IL-1.0mA min;ID-20nA;VCE (SAT)-30V;tr-7.0us max;tf-40us max.
73	GS600L	7	N-PL $\Delta$	Si	X29		Pt-25W; IL-30mA; ID-10nA; VCE-10V max; Sens-75uA/fc
74	GS601	7	N-PL $\Delta$	Si	X29		Pt-25W; IL-20mA; ID-20nA; VCE-5.0V max; Sens-50uA/fc
75	GS611	7	N-PL $\Delta$	Si	X29		Pt-25W; IL-3.0mA;ID-(12V)-1.0nA;VCE-12V max;Sens-7.5uA/fc
76	GS614	7	N-PL $\Delta$	Si	X29		Pt-150mW;IL-5.0mA min;ID-1.0nA;VCE (SAT)-30V;tr-1.5us max;tf-2.0us max.
77	GS680	7	N-PL $\Delta$	Si	X29		Pt-25W; IL-40mA; ID-10nA; VCE-5.0V max; Sens-100uA/fc
78	HFA4202	7	N	Si	X40		BVCEO-25V; fae-120Kc; Cob-9.0pf; hFE-400 typ.
79	ME510	7	N-PE	Si	TO18		BVCEO-10V; Photosens-2.0uA/fc min. at VCE-5.0V, IB-0.0
80	MRD100*	7	NANT $\Delta$	Si	u43	B	Pd-50mW;BVCEO-80V;BVCEO-40V;ICEO(dark)-100nAmax;Sens.Rad.CEO-100nA/mW/sq.cm.
81	MRD200	7	N-AN	Si	X83		Pt-05W;ICEO(dark)-25nA;BVCEO-50V;Sens-2.0uA/lum/ft.sq. min.
82	MRD210	7	N	Si	X83a		BVCEO-50V;ICEO-25nA at 25deg C;SICE-4uA/lum/ft-2min;LS-8um typ.
83	MRD250	7	N	Si	X83a		BVCEO-50V;ICEO-25nA at 25deg C;SICE-8uA/lum/ft-2min;LS-8um typ.
84	OCP71	7	P	Ge	R9		Pt-50mW; BVCEO-25V; IC-20mA; Sens-30A/lm
85#	OS13	7	P	Ge	X1		Pc-15mW max; BVCEO-30V; Ic-2mA max.
86#	OS15	7	N	Si	X1		Pc-30mW max;BVCEO-30Vmax;Ic-200uA max; Photo-Sens-1uA/500 Lumen.
87#	OS16	7	N	Si	X1		Pc-30mW max;BVCEO-30Vmax;Ic-200uA max; Photo-Sens-4uA/500 Lumen.
88#	OS17	7	N	Si	X1		Pc-30mW max;BVCEO-30Vmax;Ic-200uA max; Photo-Sens-7uA/500 Lumen.
89	PD3L	7	P	Ge			Pc-10W max; BVCEO-50V; IC-5.0mA max.
90	PD6	7	P	Ge			Pc-20mW max; BVCEO-50V; IC-5.0mA max.
91	PFN3066*	7	N-E	Si	TO18	DB	IGSS(light) 3.0nA/fc;ID(light) 2.0uA/fc.
92	PFN3069*	7	N-E	Si	TO18	DB	IGSS(light) 8.0nA/fc;ID(light) 14uA/fc.
93	PFN3458*	7	N-E	Si	TO18	DB	IGSS(light) 10nA/fc;ID(light) 35uA/fc.
94#	PH244N*	7	N-PE $\Delta$	Si	X8f	DB $\emptyset$	Pd 300mW; IGSS(light) 15nA/FC;ID(light) 100uA/FC.
95	TIL58	7	NPL $\Delta$	Si	X69a		Pd-50mW;ID-25nAmax;IL-1.0mAmin;tr-2.0usec;BVceo-50V;BVceo-8.0V;tf-15usec.
96	TIL78	7	N	Si			Pc-50mW max; fab-200Mc; IC-2.0mA max.
97	3N25	8	PGD	Si			Pc-125W max; BVCEO-30V; Ic-10mA; Gain 18 db ICBO-2uA
98	3N35A	8	N	Si	TO12		Pd-125W;Rsat-300 ohms;res-20 ohms min;Coep-3.0pf
99	3N56	8	N- $\Delta$	Si	TO5		Pc-15W max; BVCEO-18V; IC-30mA max.
100	3N57	8	N- $\Delta$	Si	TO5		Pc-15W max; BVCEO-18V; IC-30mA max.
101#	3S001	8	N-D	Si			Pc-125mW;BVCEO-30V;Ic-10mA; Gain 18 db ICBO-2uA
102#	3S002	8	N-GD	Si	TO12		Pc-125W max; fab-100Mc; BVCEO-30V; Ic-10mA max.
103#	3S003	8	N-D	Si			Pc-125mW;BVCEO-30V;Ic-10mA; Gain 20 db ICBO-2uA
104#	3S004	8	N-GD S	Si	TO1	2	Pc-125W max; fab-150Mc; BVCEO-30V; Ic-10mA max.
105	GTA3	8	P	Ge			Pc-2.5mW; fab-200Mc; BVCEO-15V; Ic-2.0mA max.
106	JAN2N489	9	P-N	Si	R33		Pc-45W max;VE-60V max;ISR-62 max;RBBO-6.8k $\Omega$ max.
107	JAN2N490	9	P-N	Si	R33		Pc-45W max;VE-60V max;ISR-62 max;RBBO-6.8k $\Omega$ max.
108	JAN2N491	9	P-N	Si	R33		Pc-45W max;VE-60V max;ISR-68 max;RBBO-6.8k $\Omega$ max.
109	JAN2N492	9	P-N	Si	R33		Pc-45W max;VE-60V max;ISR-68 max;RBBO-6.8k $\Omega$ max.
110	JAN2N493	9	P-N	Si	R33		Pc-45W max;VE-60V max;ISR-75 max;RBBO-6.8k $\Omega$ max.