

# SYMBOLS & CODES EXPLAINED

## IN TYPE No. CROSS-INDEX & TECHNICAL SECTIONS

- $\Delta$  } Indicators of separate manufacturers producing same type number (non-JEDEC) whose characteristics are not the same.
- $\square$  } This manufacturer-identifying symbol (assigned by D.A.T.A.) is an integral part of the type number (in Type No. Cross Index, Technical Data Sections) to avoid the possibility of confusing the devices of one manufacturer with the devices of others.
- $\%$  } Technical Data Sections)
- RT ... Replacement Type; consult manufacturer.

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

### LINE No.

- $\nabla$  - New Type
- $\blacklozenge$  - Revised Specifications
- # - Non-JEDEC Type manufactured outside U.S.A.

### TYPE No.

- $\dagger$  - Switching type, also listed in Section 12
- $\emptyset$  - Chopper, also listed in Section 13, Category 10
- \* - These types also included elsewhere with other characteristics. See Type No. Cross Index for alternate line no.
- $\S$  - 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
- $\Delta$  - Switching, other uses
- $\square$  - Chopper, other uses
- $\emptyset$  - Noise figure 8db or below
- $\dagger$  - Plastic package
- $\%$  - Overlay

## 2. GERMANIUM PNP 3. GERMANIUM NPN 4. SILICON PNP 5. SILICON NPN -- Low Power Transistors

LINE No.	TYPE No.	MAX. COLL. DISS. @25°C (W)	DERATE IN FREE AIR W/°C	M E X P	ABS. MAX. RATINGS @25°C			TYPICAL 'h' PARAMETERS					Cob (F)	STRUC-TURE	DWG # s/a TO200 Ser.	C A D E
					$V_{cb0}$ (V)	$V_{ce0}$ (V)	$V_{eb0}$ (V)	$I_{c0}$ (A)	$I_{cb0}$ @MAX $V_{cb}$ (A)	$V_{cb}$ (V)	BIAS $I_e$ (A)	$h_{fe}$				
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																

$\emptyset$  - With infinite heat sink  
Following symbols indicate temperature at which derating starts:

$\dagger$ - 40°C	$\square$ - 60°C	$\S$ - 100°C
* - 45°C	$\S$ - 70°C	$\blacklozenge$ - Min.
# - 50°C	$\Delta$ - 85°C	

$\dagger$  -  $f_{ae}$   
 $\S$  - Gain bandwidth product ( $f_t$ )  
\* - Maximum frequency of oscillation  
 $\emptyset$  - Figure of merit (frequency for unity power gain)  
 $\Delta$  - Minimum  
 $\square$  - Maximum

$\emptyset$  - With infinite heat sink

* - 50-65°C	A - Ambient
$\emptyset$ - 70-80°C	C - Case
# - 85-100°C	J - Junction
$\blacklozenge$ - 110-125°C	S - Storage
$\dagger$ - 130-135°C	
$\S$ - 140-165°C	
$\square$ - 170-200°C	
$\nabla$ - Over 200°C	

$\emptyset$  -  $I_C$      $\Delta$  -  $I_B$

$\emptyset$  -  $V_{CE}$

$\emptyset$  - At  $V_{CB} < \text{Max. } V_{CB}$  (See Mfr. Spec.)  
# -  $I_{CEX}$      $\S$  - Typical  
 $\S$  -  $I_{CES}$     \* -  $I_{CER}$   
 $\dagger$  - At Temp.  $> 25^\circ\text{C}$      $\Delta$  -  $I_{CEO}$   
 $\blacklozenge$  - At Temp.  $25^\circ\text{C}$  Case

# - Pulsed or Peak  
 $\S$  - Minimum

# -  $BV_{CEX}$  or punch-through  
 $\emptyset$  -  $BV_{CES}$      $\square$  -  $BV_{ce0(sus)}$   
 $\S$  -  $BV_{CER}$     \* - Pulsed  
 $\$$  - Indicates min. values given for  $BV_{cb0}$ ,  $BV_{ce0}$ , and  $BV_{eb0}$ .

b - h parameters are  $h_{ob}$ ,  $h_{ib}$ ,  $h_{rb}$   
 $\square$  - Maximum

$\dagger$  -  $h_{FE}$      $\Delta$  - Minimum  
# - Pulsed     $\square$  - Maximum  
 $\S$  -  $h_{FC}$   
\* - Available in selected ranges

$\square$  - Maximum     $\S$  -  $C_{cb}$      $\dagger$  -  $C_{re}$

$\$$  - Tetrode  
# - Radiation Resistant Device (Also See Above)



**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  
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 \* - 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.	CATEGORY	STRUCTURE	MATERIAL	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

