

FEATURES

- Available as "HR" (high reliability) screened per MIL-PRF-19500, JANTX level. Add "HR" suffix to base part number.
- Available as non-RoHS (Sn/Pb plating), standard, and as RoHS by adding "-PBF" suffix.

MAXIMUM RATINGS

Ratings	Symbol	2N4231A 2N6312	2N4232A 2N6313	2N4233A 2N6314	Unit
Collector-Emitter Voltage	V_{CEO}	40	60	80	V
Collector-Base Voltage	V_{CBO}	40	60	80	V
Emitter-Base Voltage	V_{EBO}	5.0			V
Base Current	I_B	2.0			A
Collector Current	I_C	5.0			A
Peak		10			
Total Power Dissipation $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	75 0.43			W W/ $^\circ\text{C}$
Operating & Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200			$^\circ\text{C}$
Maximum Thermal Resistance Junction to Case	$R_{\theta JC}$	2.32			$^\circ\text{C}/\text{W}$

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise specified)

Characteristics	Symbol	Min.	Max.	Unit
OFF CHARACTERISTICS				
Collector-Emitter Sustaining Voltage $I_C = 200\text{mA}, I_B = 0$	2N4231A, 2N6312 2N4232A, 2N6313 2N4233A, 2N6314	$V_{CEO(sus)}$	40 60 80	- - - V
Collector Cutoff Current $V_{CE} = 30\text{V}, I_B = 0$ $V_{CE} = 50\text{V}, I_B = 0$ $V_{CE} = 70\text{V}, I_B = 0$	2N4231A, 2N6312 2N4232A, 2N6313 2N4233A, 2N6314	I_{CEO}	- - -	1.0 1.0 1.0 mA
Collector Cutoff Current $V_{CE} = 40\text{V}, V_{BE(off)} = 1.5\text{V}$ $V_{CE} = 60\text{V}, V_{BE(off)} = 1.5\text{V}$ $V_{CE} = 80\text{V}, V_{BE(off)} = 1.5\text{V}$ $V_{CE} = 40\text{V}, V_{BE(off)} = 1.5\text{V}, T_C = 125^\circ\text{C}$ $V_{CE} = 60\text{V}, V_{BE(off)} = 1.5\text{V}, T_C = 125^\circ\text{C}$ $V_{CE} = 80\text{V}, V_{BE(off)} = 1.5\text{V}, T_C = 125^\circ\text{C}$	2N4231A, 2N6312 2N4232A, 2N6313 2N4233A, 2N6314 2N4231A, 2N6312 2N4232A, 2N6313 2N4233A, 2N6314	I_{CEX}	- - - - - -	0.1 0.1 0.1 1.0 1.0 1.0 mA
Collector Cutoff Current $V_{CE} = 40\text{V}, I_B = 0$ $V_{CE} = 60\text{V}, I_B = 0$ $V_{CE} = 80\text{V}, I_B = 0$	2N4231A, 2N6312 2N4232A, 2N6313 2N4233A, 2N6314	I_{CBO}	- - -	50 50 50 μA
Emitter Cutoff Current $V_{EB} = 5.0\text{V}, I_C = 0$		I_{EBO}	-	0.5 m

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise specified)

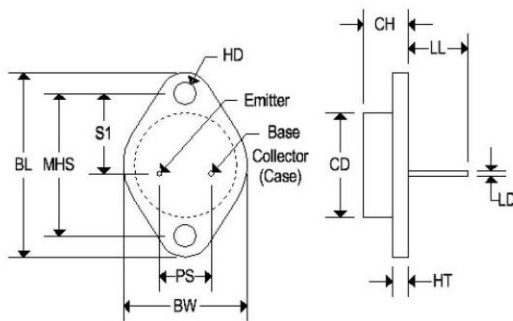
Characteristics	Symbol	Min.	Max.	Unit
ON CHARACTERISTICS⁽¹⁾				
DC Current Gain $I_C = 0.5\text{ A}, V_{CE} = 2.0\text{V}$ $I_C = 1.5\text{ A}, V_{CE} = 2.0\text{V}$ $I_C = 3.0\text{ A}, V_{CE} = 2.0\text{V}$ $I_C = 5.0\text{ A}, V_{CE} = 4.0\text{V}$	h_{FE}	40 25 10 4.0	- 100 - -	-
Collector-Emitter Saturation Voltage $I_C = 1.5\text{ A}, I_B = 0.15\text{ A}$ $I_C = 3.0\text{ A}, I_B = 0.3\text{ A}$ $I_C = 5.0\text{ A}, I_B = 1.25\text{ A}$	$V_{CE(sat)}$	- - -	0.7 2.0 4.0	V
Base-Emitter Saturation Voltage $I_C = 1.5\text{ A}, I_B = 0.15\text{ A}$	$V_{BE(sat)}$	-	1.4	V
DYNAMIC CHARACTERISTICS				
Current Gain – Bandwidth Product⁽²⁾ $I_C = 0.5\text{ A}, V_{CE} = 10\text{V}, f = 1.0\text{MHz}$	f_T	4.0	-	MHz
Output Capacitance $V_{CB} = 10\text{V}, I_E = 0, f = 0.1\text{MHz}$	C_{ob}	-	300	pF
Small-Signal Current Gain $I_C = 0.5\text{A}, V_{CE} = 10\text{V}, f = 1.0\text{KHz}$	h_{re}	20	-	-

Note 1: Pulse Test: Pulse Width = 300 μs , Duty Cycle $\leq 2.0\%$

Note 2: $f_T = |h_{re}| * f_{test}$

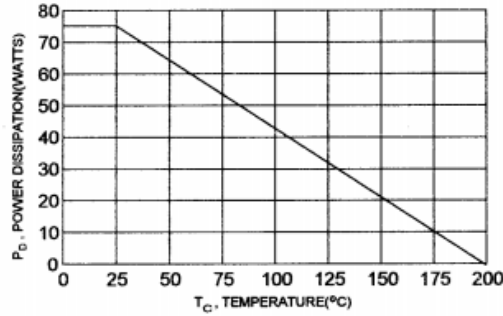
MECHANICAL CHARACTERISTICS

Case	TO-66
Marking	Alpha-numeric
Polarity	See below

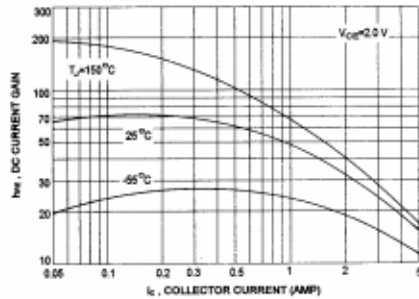


Dim	TO-66			
	Inches		Millimeters	
	Min	Max	Min	Max
BL	1.205	1.280	30.60	32.50
CD	0.445	0.557	11.303	14.148
CH	0.257	0.284	6.540	7.220
LL	0.374	0.413	9.500	10.50
BW	0.680	0.727	17.26	18.46
LD	0.030	0.036	0.760	0.920
HT	0.054	0.065	1.380	1.650
MHS	0.951	0.976	24.16	24.78
S1	0.545	0.614	13.84	15.60
HD	0.131	0.154	3.320	3.920
PS	0.191	0.210	4.860	5.340

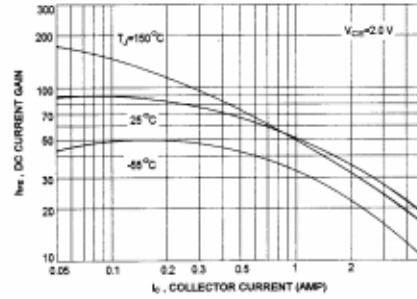
FIGURE -1 POWER DERATING



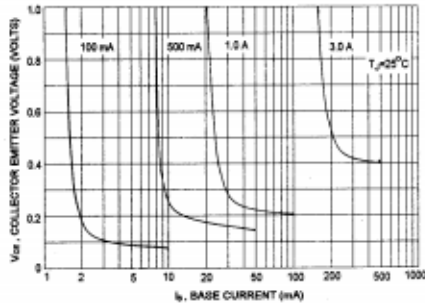
NPN 2N4231A thru 2N4233A
DC CURRENT GAIN



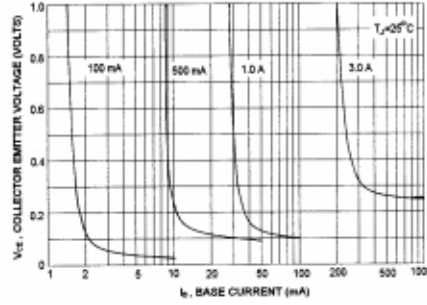
PNP 2N6212 thru 2N6314
DC CURRENT GAIN



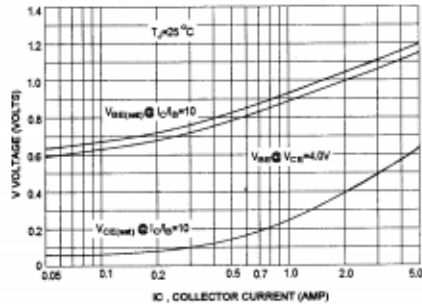
COLLECTOR SATURATION REGION



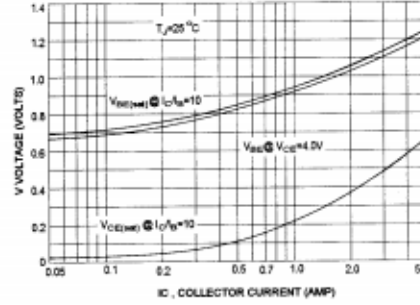
COLLECTOR SATURATION REGION

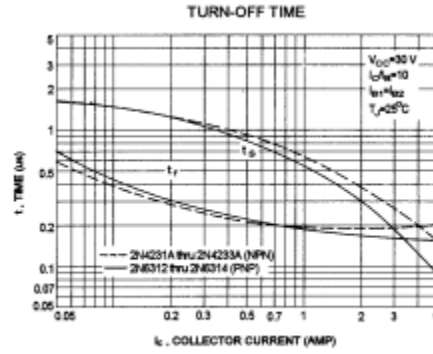
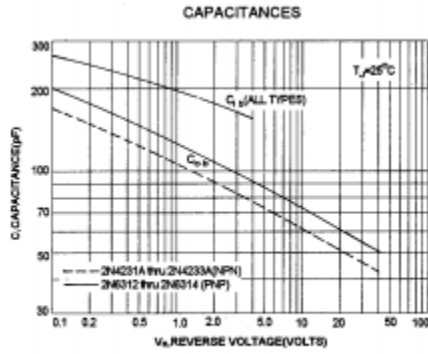


"ON" VOLTAGES



"ON" VOLTAGES





ACTIVE-REGION SAFE OPERATING AREA (SOA)

