

2N6338, 2N6341

NPN SILICON POWER TRANSISTORS

FEATURES:

- Available as "HR" (high reliability) screened per MIL-PRF-19500, JANTX level. Add "HR" suffix to base part number
- Available Non-RoHS (standard) or RoHS compliant (add PBF suffix)

MAXIMUM RATINGS

Ratings	Symbol	2N6338	2N6341	Unit
Collector-Base Voltage	V_{CBO}	120	180	V
Collector-Emitter Voltage	V_{CEO}	100	150	V
Emitter-Base Voltage	V_{EBO}	6		V
Collector Current	I_C	25		A
Base Current	I_B	10		A
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	200 1.14		W W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{STG}	-65 to +200		$^\circ\text{C}$
Maximum Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.875		$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS @ 25°C unless otherwise noted

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Sustaining Voltage ⁽¹⁾ ($I_C = 50\text{ mA}, I_B = 0$)	$V_{CEO(sus)}$	100 150	- -	V
Collector Cutoff Current ($V_{CE} = 50\text{ V}, I_B = 0$) ($V_{CE} = 75\text{ V}, I_B = 0$)	I_{CEO}	- -	50 50	μA
Collector Cutoff Current ($V_{CE} = \text{Rated } V_{CEO}, V_{EB(OFF)} = 1.5\text{ V}$) ($V_{CE} = \text{Rated } V_{CEO}, V_{EB(OFF)} = 1.5\text{ V}, T_C = 150^\circ\text{C}$)	I_{CEX}	- -	10 1.0	μA mA
Collector Cutoff Current ($V_{CB} = \text{Rated } V_{CBO}, I_E = 0$)	I_{CBO}	-	10	μA
Emitter Cutoff Current ($V_{BE} = 6.0\text{ V}, I_C = 0$)	I_{EBO}	-	100	μA
ON CHARACTERISTICS⁽¹⁾				
DC Current Gain ($I_C = 0.5\text{ A}, V_{CE} = 2.0\text{ V}$) ($I_C = 10\text{ A}, V_{CE} = 2.0\text{ V}$) ($I_C = 25\text{ A}, V_{CE} = 2.0\text{ V}$)	h_{fe}	50 30 12	- 120 -	-
Collector-Emitter Saturation Voltage ($I_C = 10\text{ A}, I_B = 1.0\text{ A}$) ($I_C = 25\text{ A}, I_B = 2.5\text{ A}$)	$V_{CE(sat)}$	- -	1.0 1.8	V
Base-Emitter Saturation Voltage ($I_C = 10\text{ A}, I_B = 1.0\text{ A}$) ($I_C = 25\text{ A}, I_B = 2.5\text{ A}$)	$V_{BE(sat)}$	- -	1.8 2.5	V
Base-Emitter On Voltage ($I_C = 10\text{ A}, V_{CE} = 2.0\text{ V}$)	$V_{BE(on)}$	-	1.8	V

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DYNAMIC CHARACTERISTICS				
Current Gain–Bandwidth Product ⁽²⁾ ($I_C = 1.0A$, $V_{CE} = 10V$, $f_{test} = 10MHz$)	f_T	40	-	MHz
Output Capacitance ($V_{CB} = 10V$, $I_E = 0$, $f = 1.0MHz$)	C_{OB}	-	300	pF
SWITCHING CHARACTERISTICS				
Rise Time ($V_{CC} \approx 80V$, $I_C = 10A$, $I_{B1} = 1.0A$, $V_{BE(off)} = -6.0V$)	t_r	-	0.3	us
Storage Time ($V_{CC} \approx 80V$, $I_C = 10A$, $I_{B1} = I_{B2} = 1.0A$)	t_s	-	1.0	us
Fall Time ($V_{CC} \approx 80V$, $I_C = 10A$, $I_{B1} = I_{B2} = 1.0A$)	t_f	-	0.25	us

Note 1: Pulse test = 300 μ s, Duty Cycle \leq 2%.

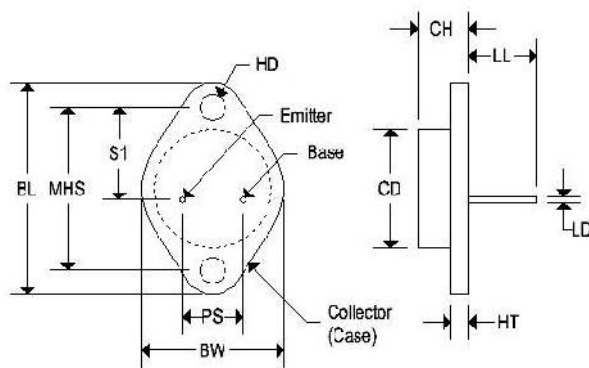
Note 2: $f_T = |h_{fe}| \cdot f_{test}$.

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MECHANICAL CHARACTERISTICS

Case	TO-3
Marking	Alpha-numeric
Pin out	See below



	Dimensions			
	TO-3			
	Inches		Millimeters	
	Min	Max	Min	Max
BL	1.550 REF		39.37 REF	
CD	-	0.830	-	21.08
CH	0.250	0.335	6.35	8.51
LL	0.440	0.480	11.18	12.19
BW	-	1.050	-	26.67
LD	0.036	0.043	0.920	1.090
HT	0.055	0.070	1.40	1.77
MHS	1.187 BSC		30.15 BSC	
SI	0.665 BSC		16.89 BSC	
HD	0.131	0.188	3.33	4.77
PS	0.430 BSC		10.92	
Note: 1. Dimensions listed as BSC (Basic Spacing Between Centers) have tolerance of 0.005 inches from center.				

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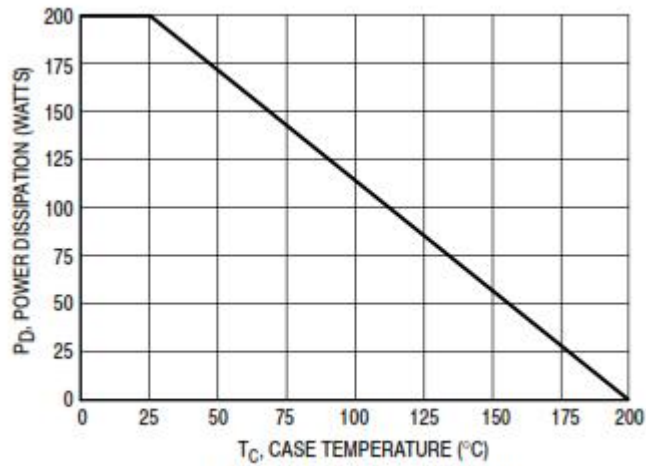
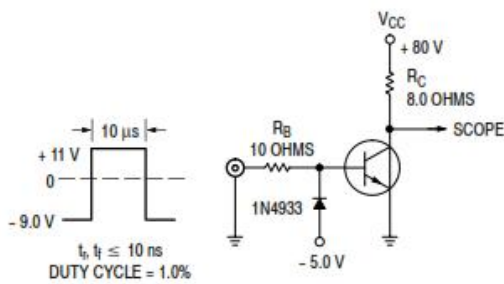


Figure 1. Power Derating



NOTE: For information on Figures 3 and 6, R_B and R_C were varied to obtain desired test conditions.

Figure 2. Switching Time Test Circuit

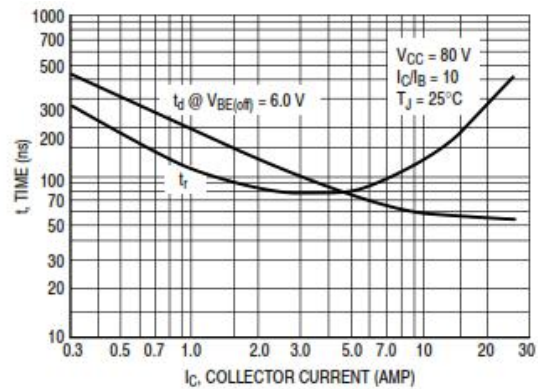


Figure 3. Turn-On Time

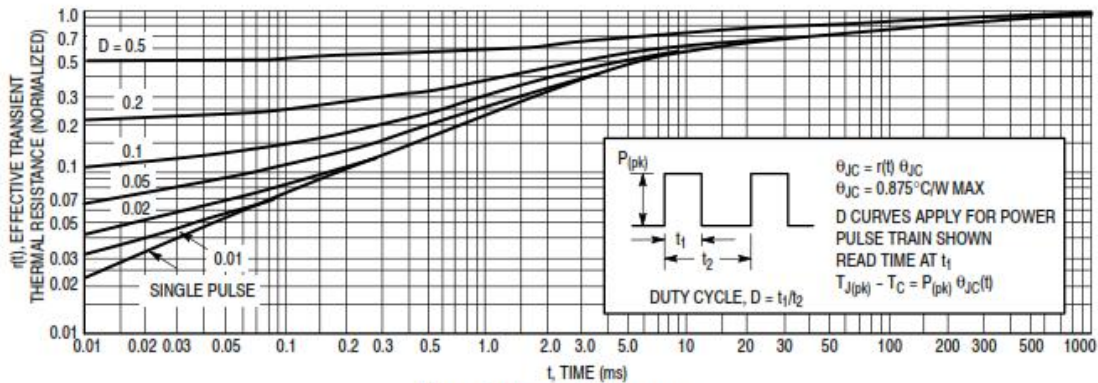


Figure 4. Thermal Response

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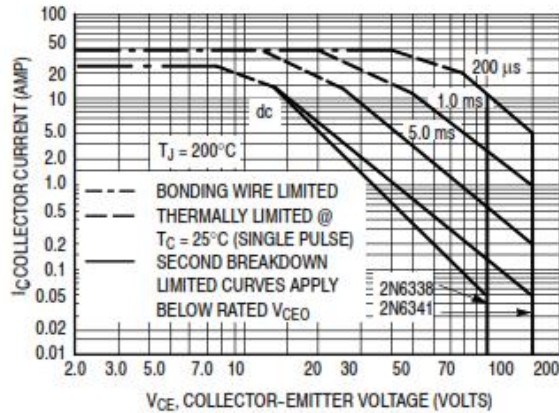


Figure 5. Active Region Safe Operating Area

There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate I_C - V_{CE} limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figure 5 is based on $T_{J(pk)} = 200^\circ\text{C}$; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} \leq 200^\circ\text{C}$. $T_{J(pk)}$ may be calculated from the data in Figure 4. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

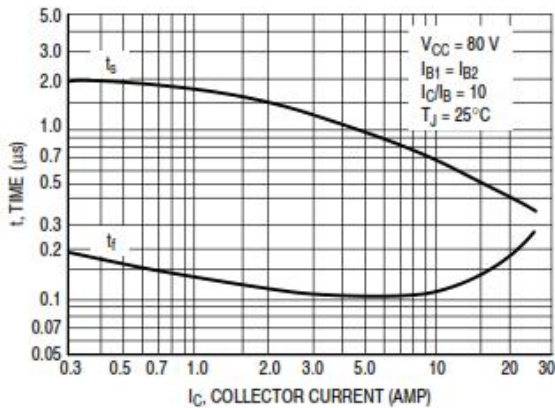


Figure 6. Turn-Off Time

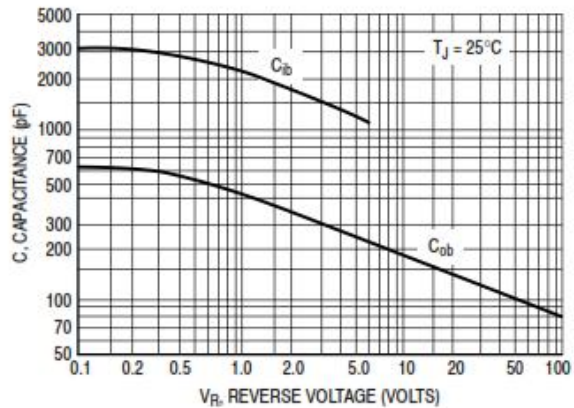


Figure 7. Capacitance

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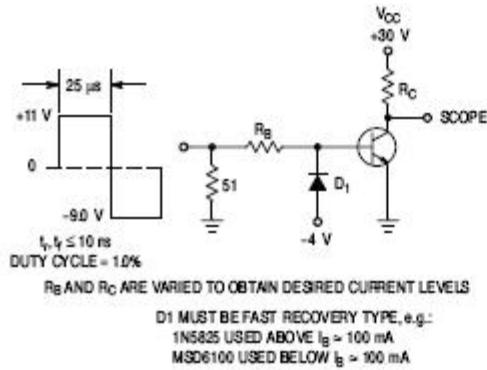


Figure 4. Switching Time Test Circuit

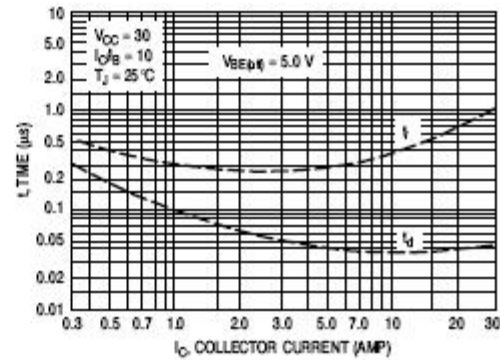


Figure 5. Turn-On Time

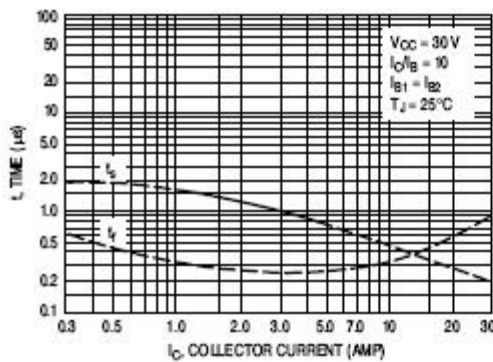


Figure 6. Turn-Off Time

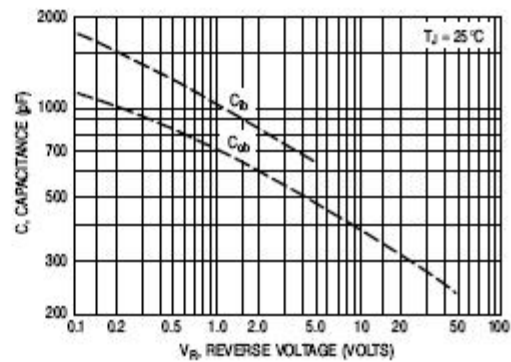


Figure 7. Capacitance

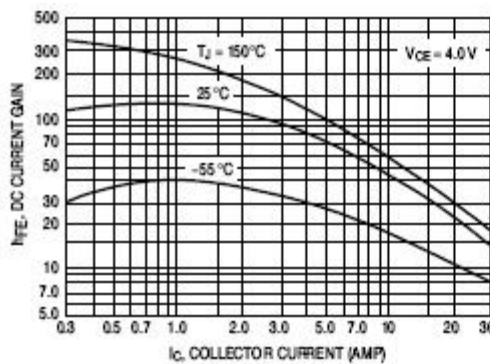


Figure 8. DC Current Gain

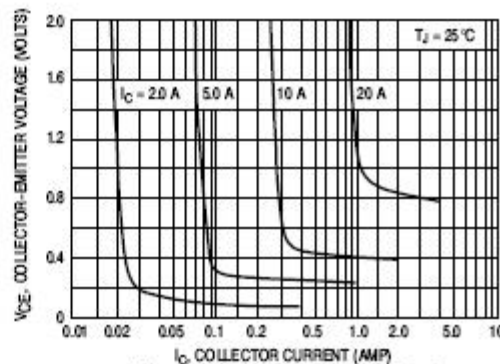


Figure 9. Collector Saturation Region