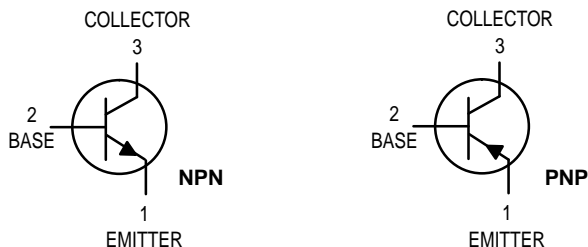


High Voltage Transistors

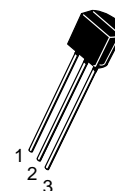


NPN
2N6515
2N6517
PNP
2N6519
2N6520

Voltage and current are negative
for PNP transistors

MAXIMUM RATINGS

Rating	Symbol	2N6515	2N6519	2N6517 2N6520	Unit
Collector–Emitter Voltage	V_{CEO}	250	300	350	Vdc
Collector–Base Voltage	V_{CBO}	250	300	350	Vdc
Emitter–Base Voltage 2N6515, 2N6516, 2N6517 2N6519, 2N6520	V_{EBO}	6.0 5.0			Vdc
Base Current	I_B	250			mAdc
Collector Current — Continuous	I_C	500			mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	625 5.0			mW mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	1.5 12			Watts mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	–55 to +150			$^\circ\text{C}$



CASE 29–04, STYLE 1
TO–92 (TO–226AA)

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	200	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	83.3	$^\circ\text{C}/\text{W}$

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

Characteristic	Symbol	Min	Max	Unit
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OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage ⁽¹⁾ ($I_C = 1.0$ mAdc, $I_B = 0$)	$V_{(BR)CEO}$	250 300 350	— — —	Vdc
Collector–Base Breakdown Voltage ($I_C = 100$ μ Adc, $I_E = 0$)	$V_{(BR)CBO}$	250 300 350	— — —	Vdc
Emitter–Base Breakdown Voltage ($I_E = 10$ μ Adc, $I_C = 0$)	$V_{(BR)EBO}$	6.0 5.0	— —	Vdc

1. Pulse Test: Pulse Width ≤ 300 μs , Duty Cycle $\leq 2.0\%$.

NPN 2N6515 2N6517 PNP 2N6519 2N6520
ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted) (Continued)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS (Continued)				
Collector Cutoff Current ($V_{CB} = 150\text{ Vdc}$, $I_E = 0$) ($V_{CB} = 200\text{ Vdc}$, $I_E = 0$) ($V_{CB} = 250\text{ Vdc}$, $I_E = 0$)	I_{CBO}	—	50	nAdc
			50	
			50	
Emitter Cutoff Current ($V_{EB} = 5.0\text{ Vdc}$, $I_C = 0$) ($V_{EB} = 4.0\text{ Vdc}$, $I_C = 0$)	I_{EBO}	—	50	nAdc
			50	

ON CHARACTERISTICS⁽¹⁾

DC Current Gain ($I_C = 1.0\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$)	h_{FE}	35	—	—
		30	—	
		20	—	
($I_C = 10\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$)		50	—	
		45	—	
		30	—	
($I_C = 30\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$)		50	300	
		45	270	
		30	200	
($I_C = 50\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$)		45	220	
		40	200	
		20	200	
($I_C = 100\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$)		25	—	
		20	—	
		15	—	
Collector–Emitter Saturation Voltage ($I_C = 10\text{ mAdc}$, $I_B = 1.0\text{ mAdc}$) ($I_C = 20\text{ mAdc}$, $I_B = 2.0\text{ mAdc}$) ($I_C = 30\text{ mAdc}$, $I_B = 3.0\text{ mAdc}$) ($I_C = 50\text{ mAdc}$, $I_B = 5.0\text{ mAdc}$)	$V_{CE(sat)}$	—	0.30	Vdc
			0.35	
			0.50	
			1.0	
Base–Emitter Saturation Voltage ($I_C = 10\text{ mAdc}$, $I_B = 1.0\text{ mAdc}$) ($I_C = 20\text{ mAdc}$, $I_B = 2.0\text{ mAdc}$) ($I_C = 30\text{ mAdc}$, $I_B = 3.0\text{ mAdc}$)	$V_{BE(sat)}$	—	0.75	Vdc
			0.85	
			0.90	
Base–Emitter On Voltage ($I_C = 100\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$)	$V_{BE(on)}$	—	2.0	Vdc

SMALL–SIGNAL CHARACTERISTICS

Current–Gain — Bandwidth Product ⁽¹⁾ ($I_C = 10\text{ mAdc}$, $V_{CE} = 20\text{ Vdc}$, $f = 20\text{ MHz}$)	f_T	40	200	MHz
Collector–Base Capacitance ($V_{CB} = 20\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$)	C_{cb}	—	6.0	pF
Emitter–Base Capacitance ($V_{EB} = 0.5\text{ Vdc}$, $I_C = 0$, $f = 1.0\text{ MHz}$)	C_{eb}	—	80	pF
			100	

SWITCHING CHARACTERISTICS

Turn–On Time ($V_{CC} = 100\text{ Vdc}$, $V_{BE(off)} = 2.0\text{ Vdc}$, $I_C = 50\text{ mAdc}$, $I_{B1} = 10\text{ mAdc}$)	t_{on}	—	200	μs
Turn–Off Time ($V_{CC} = 100\text{ Vdc}$, $I_C = 50\text{ mAdc}$, $I_{B1} = I_{B2} = 10\text{ mAdc}$)	t_{off}	—	3.5	μs

1. Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2.0\%$.

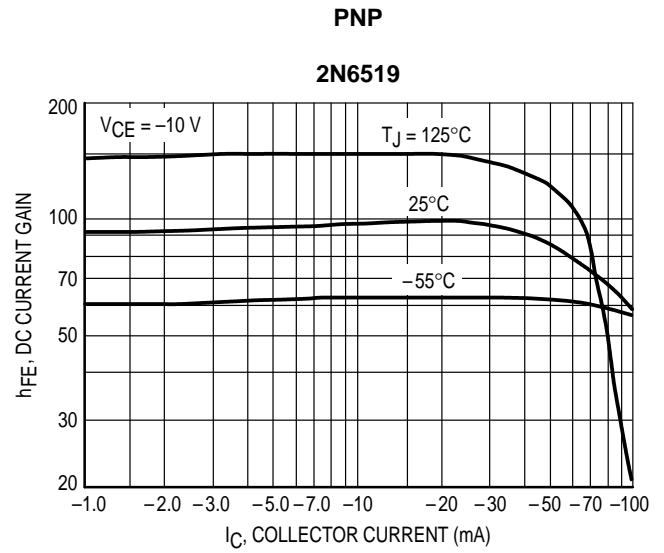
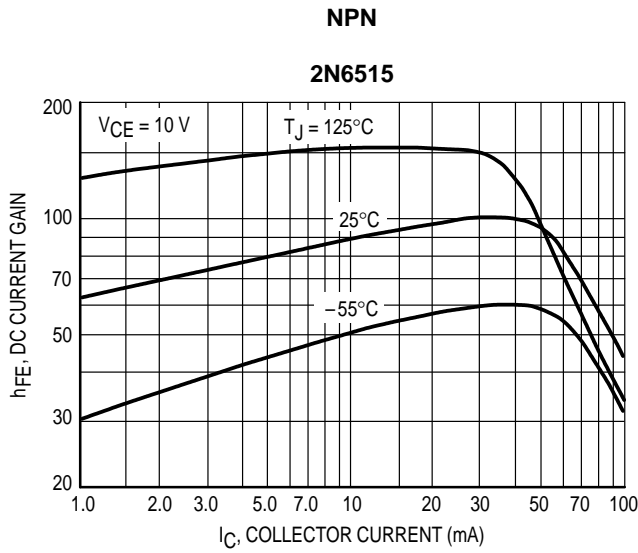


Figure 1. DC Current Gain

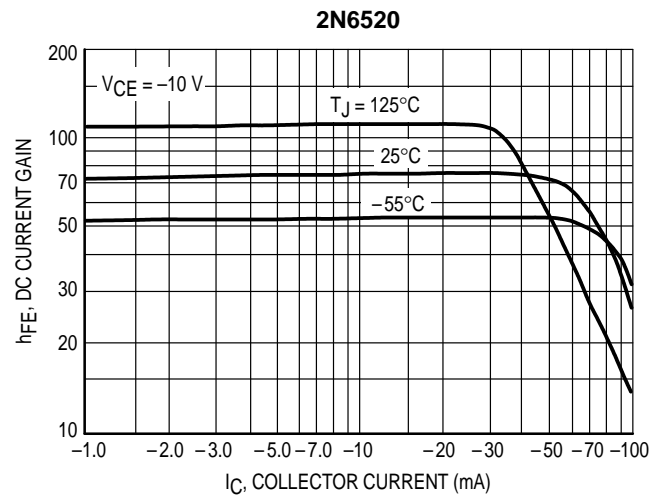
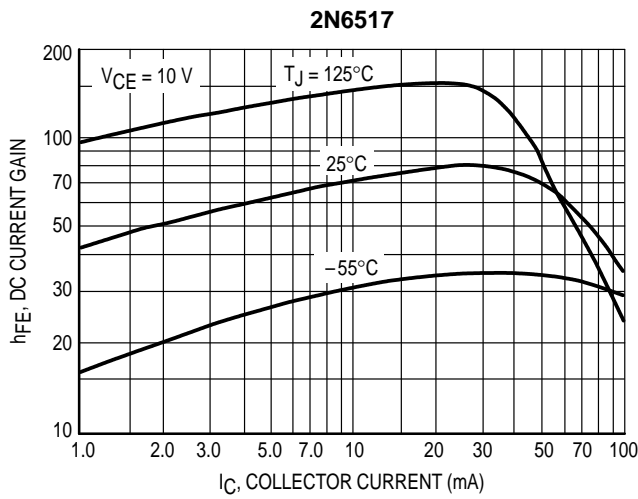


Figure 2. DC Current Gain

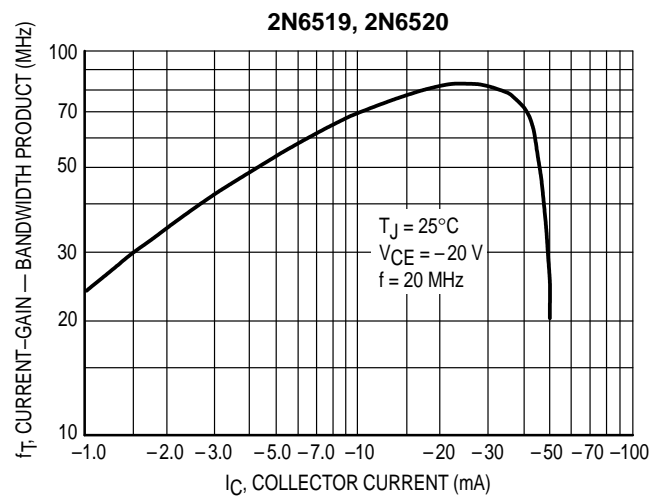
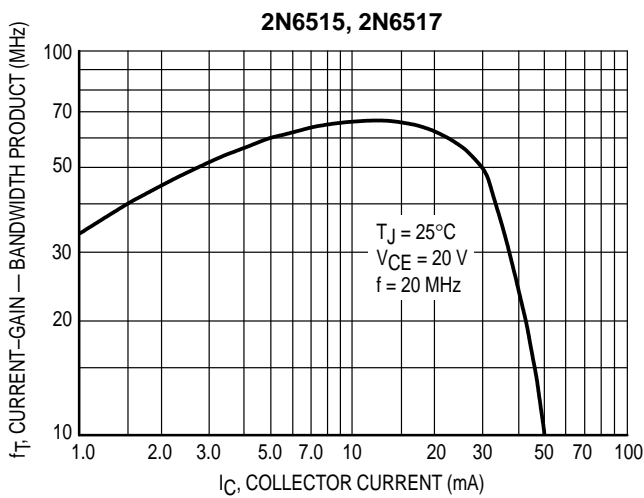
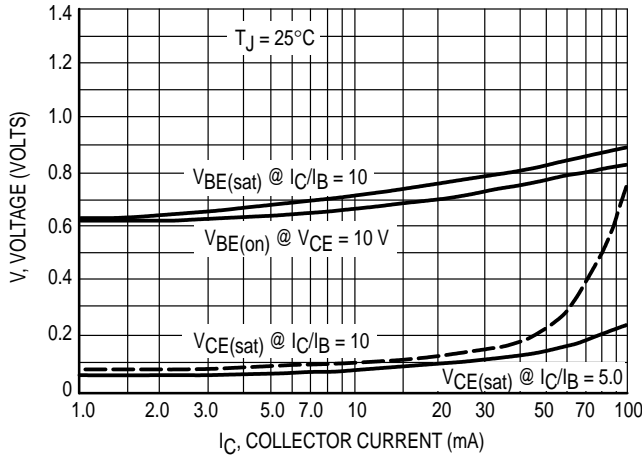


Figure 3. Current-Gain — Bandwidth Product

NPN

2N6515, 2N6517



PNP

2N6519, 2N6520

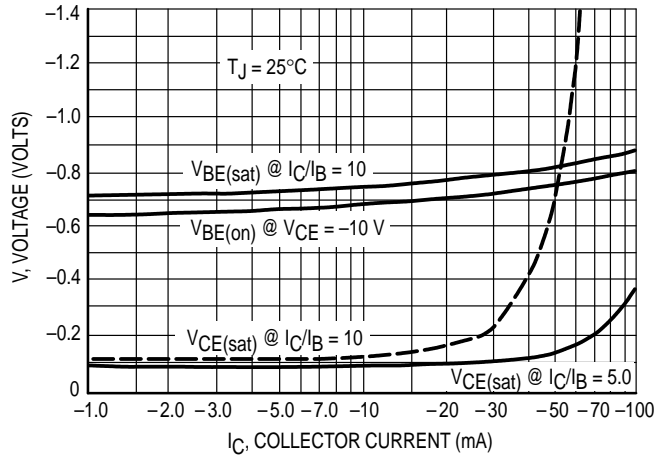
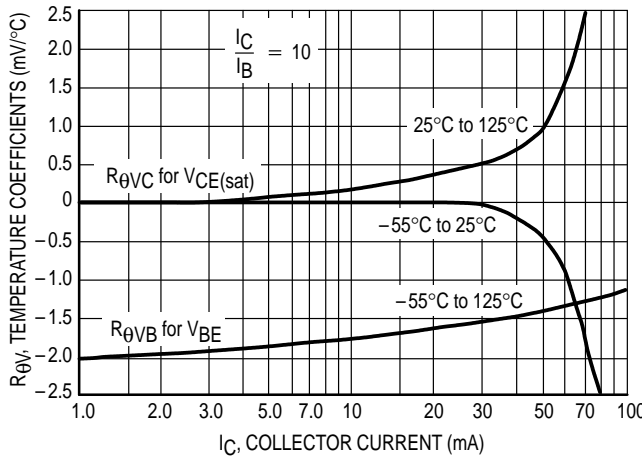


Figure 4. "On" Voltages

2N6515, 2N6517



2N6519, 2N6520

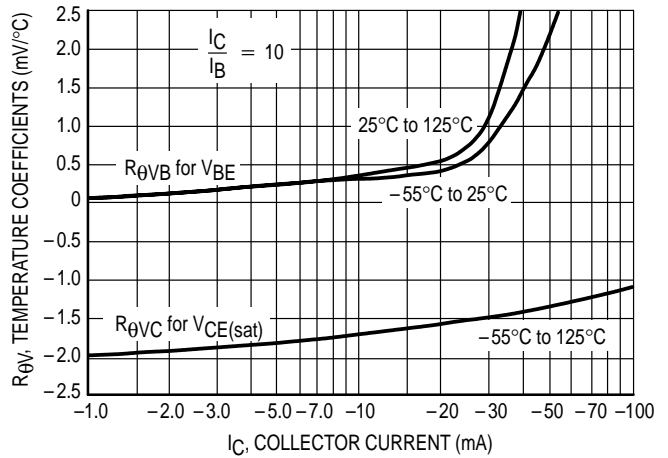
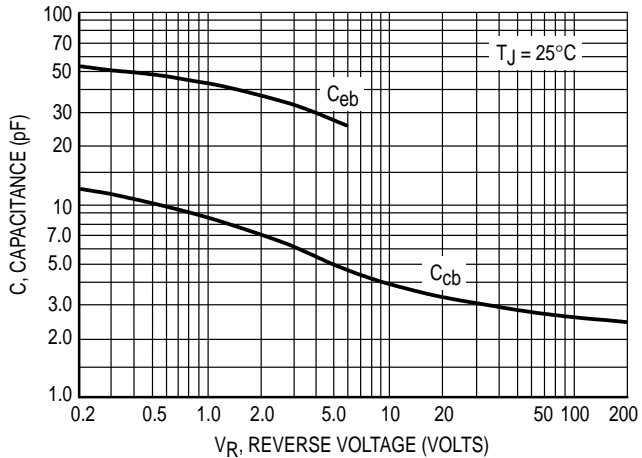


Figure 5. Temperature Coefficients

2N6515, 2N6517



2N6519, 2N6520

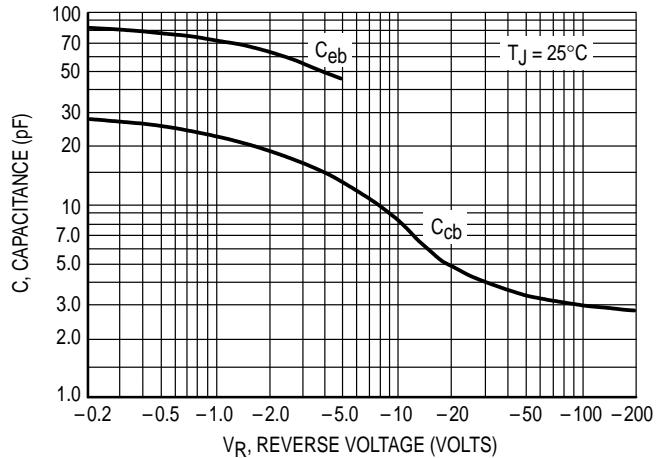


Figure 6. Capacitance

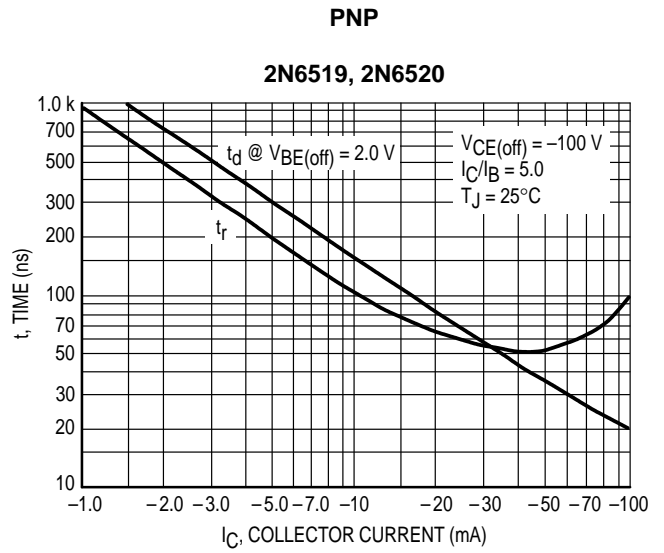
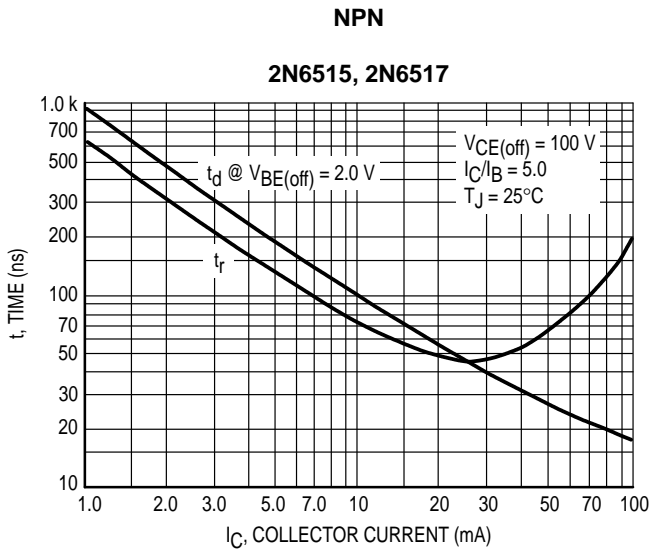


Figure 7. Turn-On Time

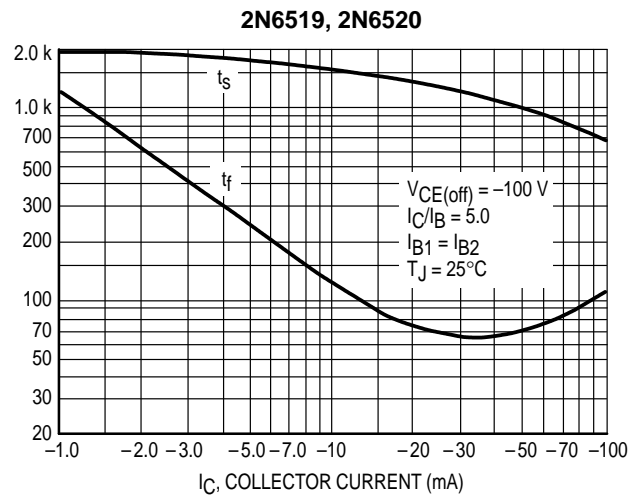
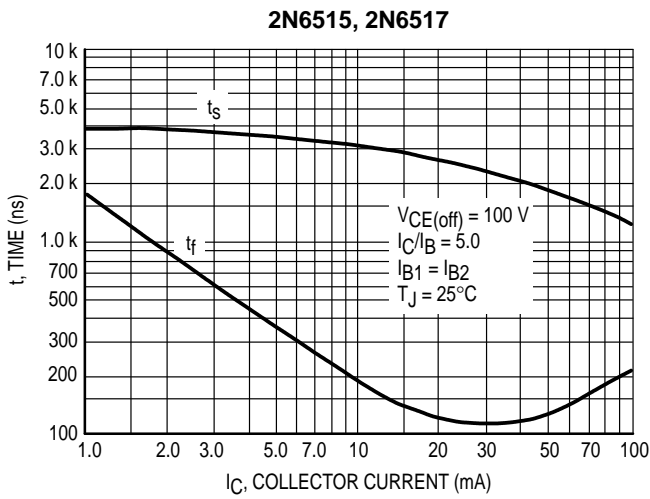


Figure 8. Turn-Off Time

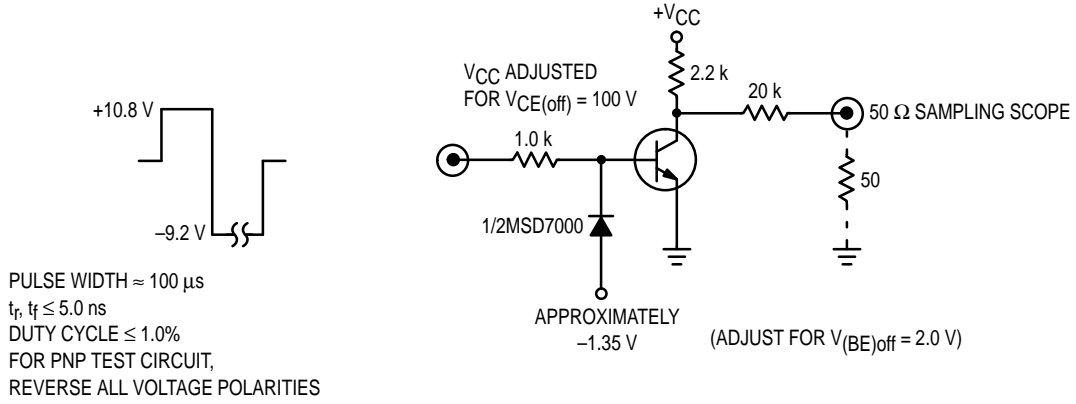


Figure 9. Switching Time Test Circuit

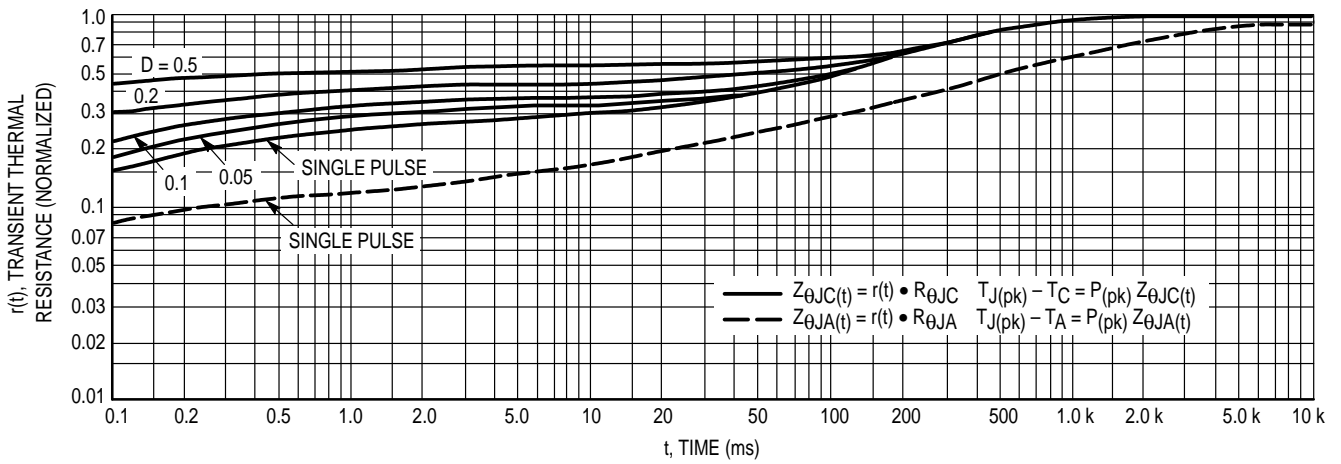


Figure 10. Thermal Response

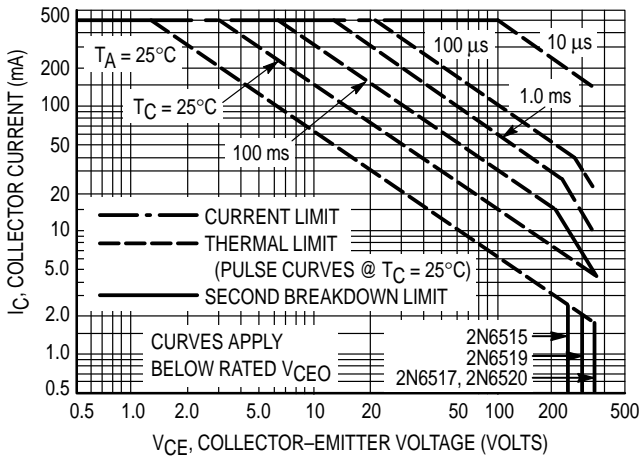
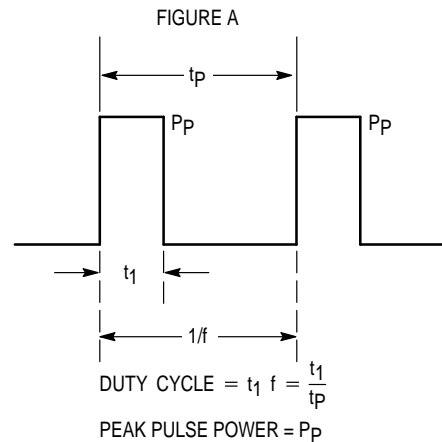
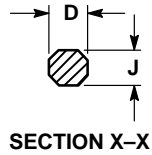
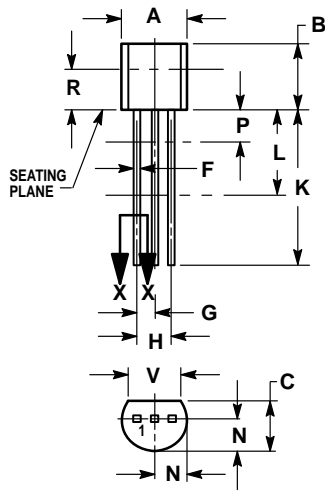


Figure 11. Active Region Safe Operating Area



Design Note: Use of Transient Thermal Resistance Data

PACKAGE DIMENSIONS



**CASE 029-04
(TO-226AA)
ISSUE AD**


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. DIMENSION F APPLIES BETWEEN P AND L. DIMENSION D AND J APPLY BETWEEN L AND K. MINIMUM LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.175	0.205	4.45	5.20
B	0.170	0.210	4.32	5.33
C	0.125	0.165	3.18	4.19
D	0.016	0.022	0.41	0.55
F	0.016	0.019	0.41	0.48
G	0.045	0.055	1.15	1.39
H	0.095	0.105	2.42	2.66
J	0.015	0.020	0.39	0.50
K	0.500	—	12.70	—
L	0.250	—	6.35	—
N	0.080	0.105	2.04	2.66
P	—	0.100	—	2.54
R	0.115	—	2.93	—
V	0.135	—	3.43	—

STYLE 1:

- PIN 1. EMITTER
2. BASE
3. COLLECTOR

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