2N6515, 2N6517, 2N6520

High Voltage Transistors

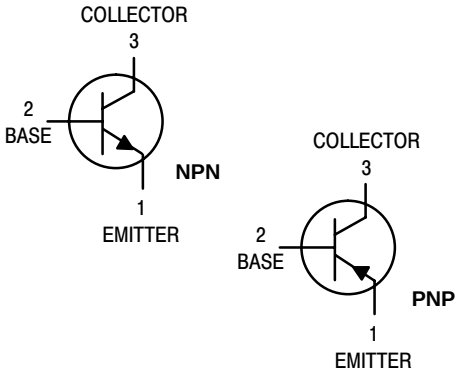
NPN and PNP

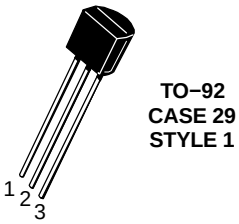
Features

- Voltage and Current are Negative for PNP Transistors
- Pb−Free Package is Available*

ON Semiconductor®

http://onsemi.com





TO−92
CASE 29
STYLE 1

MAXIMUM RATINGS

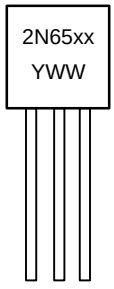
Rating	Symbol	2N6515	2N6517 2N6520	Unit
Collector − Emitter Voltage	V_{CEO}	250	350	Vdc
Collector − Base Voltage	V_{CBO}	250	350	Vdc
Emitter − Base Voltage 2N6515, 2N6516, 2N6517 2N6519, 2N6520	V_{EBO}	6.0 5.0		Vdc
Base Current	I_B	250		mAdc
Collector Current − Continuous	I_C	500		mAdc
Total Device Dissipation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

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

THERMAL CHARACTERISTICS

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

MARKING DIAGRAM



Y = Year
WW = Work Week

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 3 of this data sheet.

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector−Emitter Breakdown Voltage (Note 1)		$V_{(BR)CEO}$			Vdc
(I_C = 1.0 mAdc, I_B = 0)	2N6515		250	−	
	2N6517, 2N6520		350	−	
Collector−Base Breakdown Voltage		$V_{(BR)CBO}$			Vdc
(I_C = 100 μAdc, I_E = 0)	2N6515		250	−	
	2N6517, 2N6520		350	−	
Emitter−Base Breakdown Voltage		$V_{(BR)EBO}$			Vdc
(I_E = 10 μAdc, I_C = 0)	2N6515, 2N6517		6.0	−	
	2N6520		5.0	−	
Collector Cutoff Current		I_{CBO}			nAdc
(V_{CB} = 150 Vdc, I_E = 0)	2N6515		−	50	
(V_{CB} = 250 Vdc, I_E = 0)	2N6517, 2N6520		−	50	
Emitter Cutoff Current		I_{EBO}			nAdc
(V_{EB} = 5.0 Vdc, I_C = 0)	2N6515, 2N6517		−	50	
(V_{EB} = 4.0 Vdc, I_C = 0)	2N6520		−	50	
ON CHARACTERISTICS (Note 1)					
DC Current Gain		h_{FE}			−
(I_C = 1.0 mAdc, V_{CE} = 10 Vdc)	2N6515		35	−	
	2N6517, 2N6520		20	−	
(I_C = 10 mAdc, V_{CE} = 10 Vdc)	2N6515		50	−	
	2N6517, 2N6520		30	−	
(I_C = 30 mAdc, V_{CE} = 10 Vdc)	2N6515		50	300	
	2N6517, 2N6520		30	200	
(I_C = 50 mAdc, V_{CE} = 10 Vdc)	2N6515		45	220	
	2N6517, 2N6520		20	200	
(I_C = 100 mAdc, V_{CE} = 10 Vdc)	2N6515		25	−	
	2N6517, 2N6520		15	−	
Collector−Emitter Saturation Voltage		$V_{CE(sat)}$			Vdc
(I_C = 10 mAdc, I_B = 1.0 mAdc)			−	0.30	
(I_C = 20 mAdc, I_B = 2.0 mAdc)			−	0.35	
(I_C = 30 mAdc, I_B = 3.0 mAdc)			−	0.50	
(I_C = 50 mAdc, I_B = 5.0 mAdc)			−	1.0	
Base−Emitter Saturation Voltage		$V_{BE(sat)}$			Vdc
(I_C = 10 mAdc, I_B = 1.0 mAdc)			−	0.75	
(I_C = 20 mAdc, I_B = 2.0 mAdc)			−	0.85	
(I_C = 30 mAdc, I_B = 3.0 mAdc)			−	0.90	
Base−Emitter On Voltage		$V_{BE(on)}$	−	2.0	Vdc
(I_C = 100 mAdc, V_{CE} = 10 Vdc)					

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

SMALL−SIGNAL CHARACTERISTICS

Current−Gain − Bandwidth Product (Note 1) (I_C = 10 mAdc, V_{CE} = 20 Vdc, f = 20 MHz)		f_T	40	200	MHz
Collector−Base Capacitance (V_{CB} = 20 Vdc, I_E = 0, f = 1.0 MHz)		C_{cb}	−	6.0	pF
Emitter−Base Capacitance (V_{EB} = 0.5 Vdc, I_C = 0, f = 1.0 MHz)	2N6515, 2N6517 2N6520	C_{eb}	− −	80 100	pF

SWITCHING CHARACTERISTICS

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

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

ORDERING INFORMATION

Device	Package	Shipping†
2N6515	TO−92	5000 Unit / Bulk
2N6515RLRM	TO−92	2000 Tape & Ammo Box
2N6517	TO−92	5000 Unit / Bulk
2N6517RLRA	TO−92	2000 Tape & Reel
2N6517RLRP	TO−92	2000 Tape & Ammo Box
2N6520RLRA	TO−92	2000 Tape & Reel
2N6520RLRAG	TO−92 (Pb−Free)	2000 Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

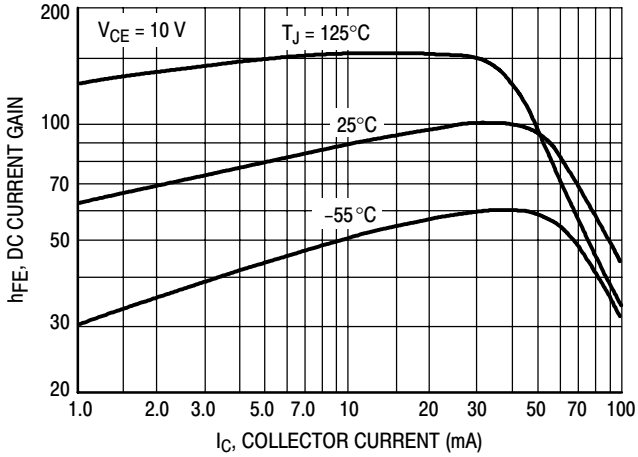


Figure 1. DC Current Gain
NPN 2N6515

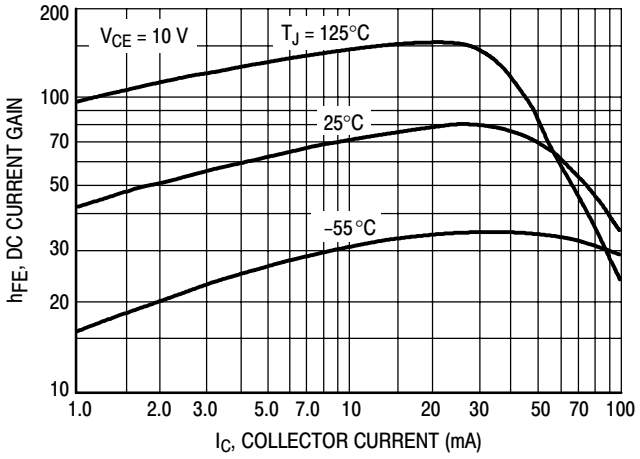


Figure 2. DC Current Gain
NPN 2N6517

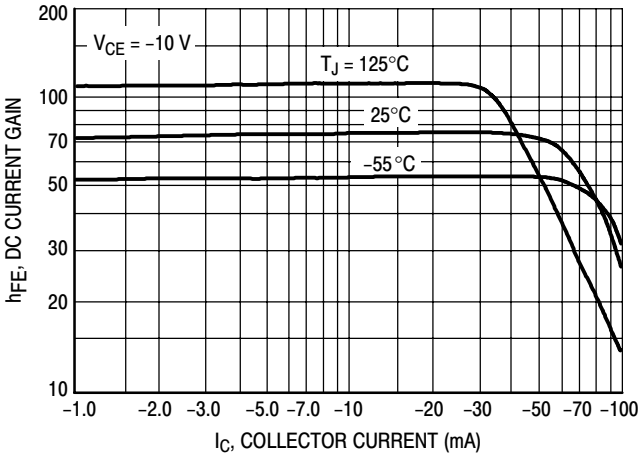


Figure 3. DC Current Gain
PNP 2N6520

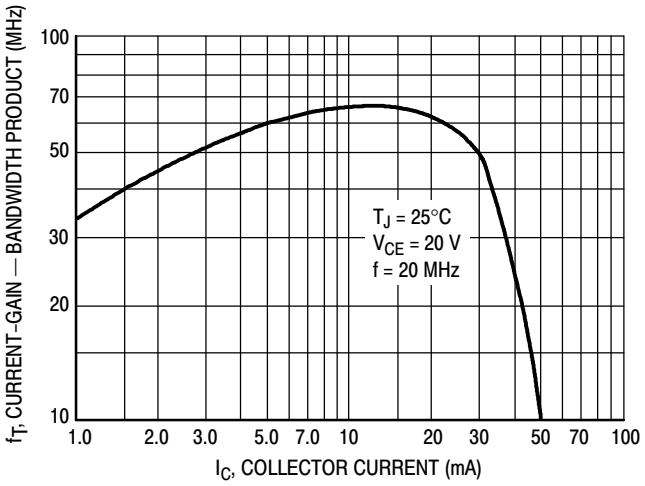


Figure 4. Current−Gain − Bandwidth Product
NPN 2N6515, 2N6517

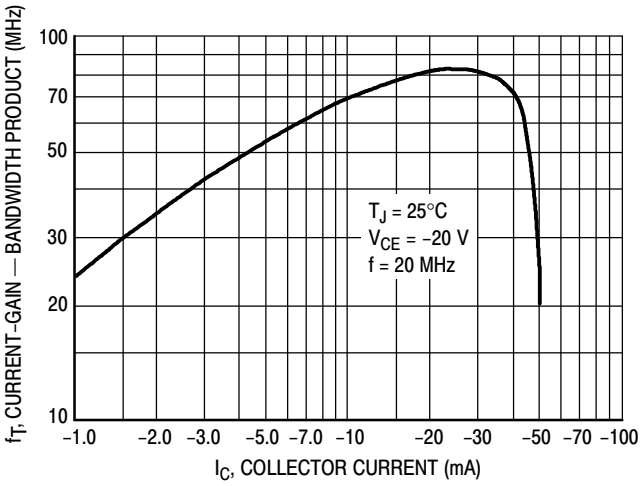


Figure 5. Current−Gain − Bandwidth Product
PNP 2N6520

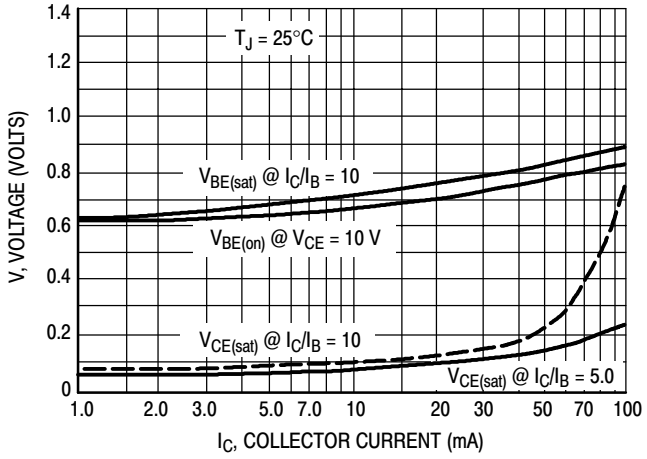


Figure 6. "On" Voltages
NPN 2N6515, 2N6517

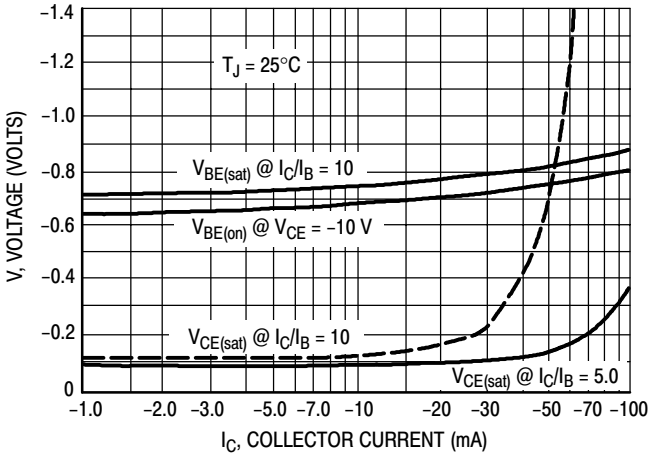


Figure 7. "On" Voltages
PNP 2N6520

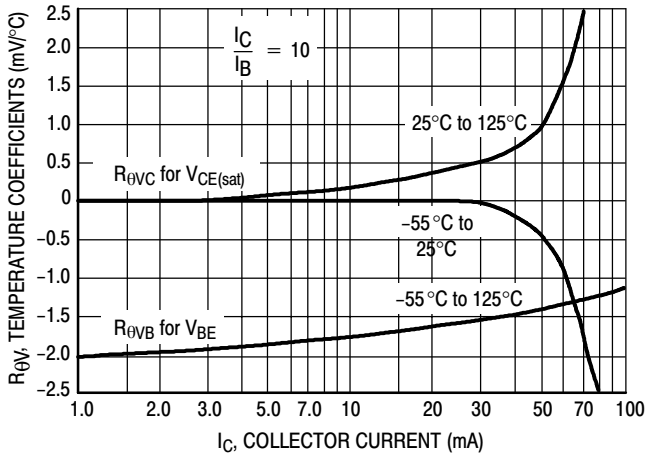


Figure 8. Temperature Coefficients
NPN 2N6515, 2N6517

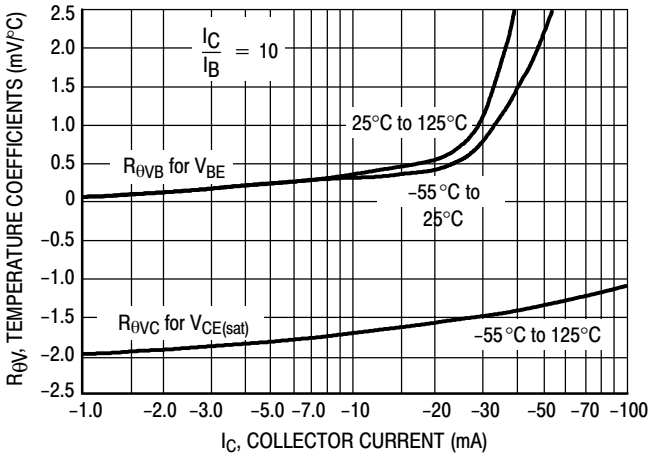


Figure 9. Temperature Coefficients
PNP 2N6520

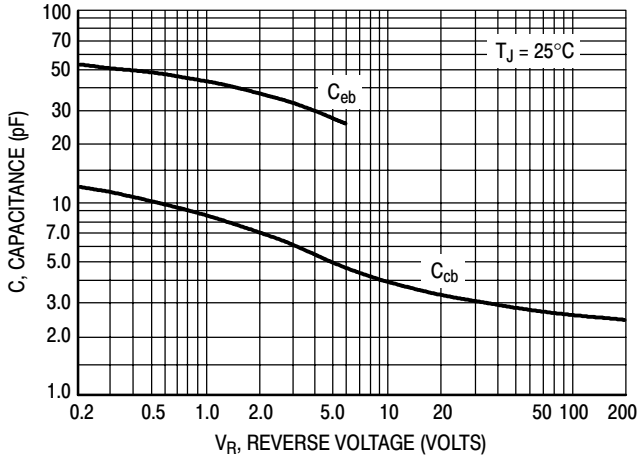


Figure 10. Capacitance
NPN 2N6515, 2N6517

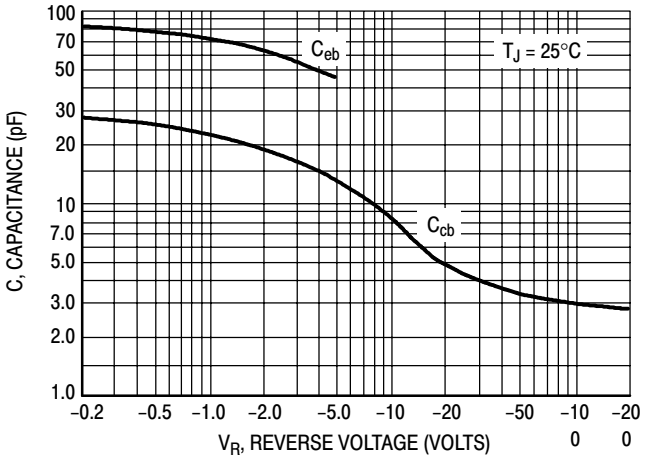


Figure 11. Capacitance
PNP 2N6520

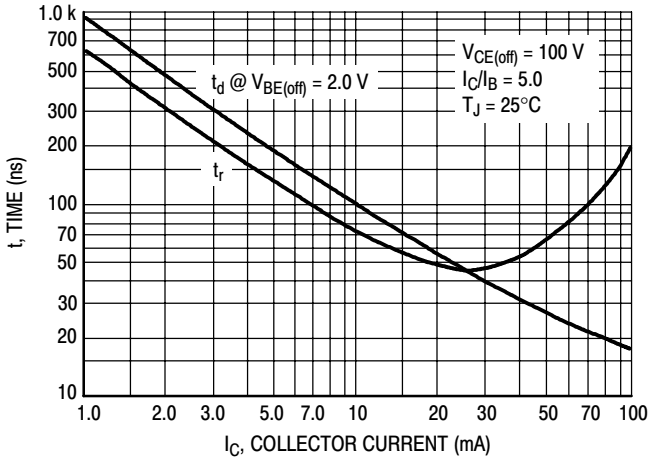


Figure 12. Turn−On Time
NPN 2N6515, 2N6517

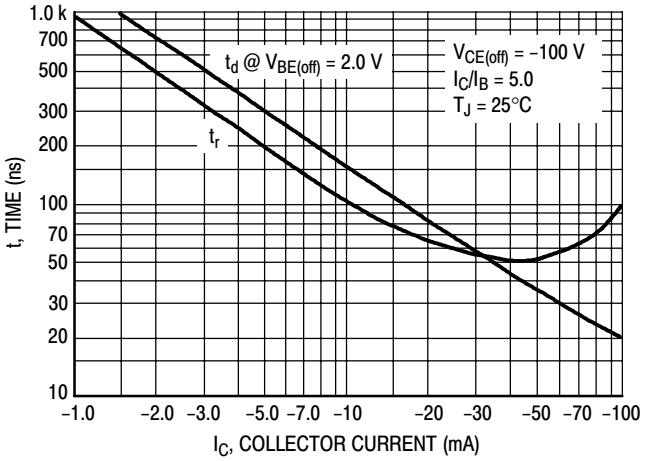


Figure 13. Turn−On Time
PNP 2N6520

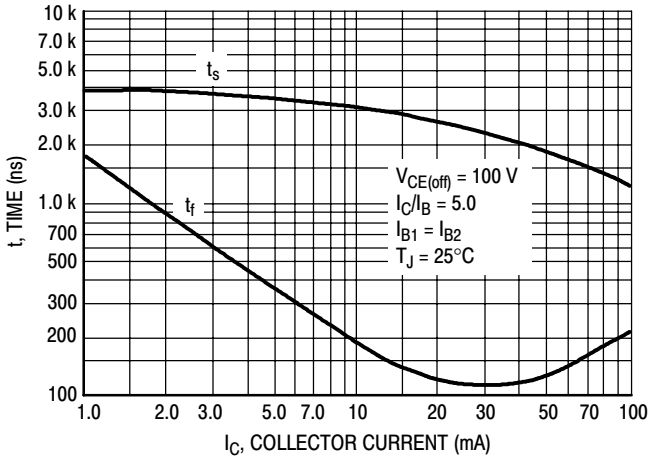


Figure 14. Turn−Off Time
NPN 2N6515, 2N6517

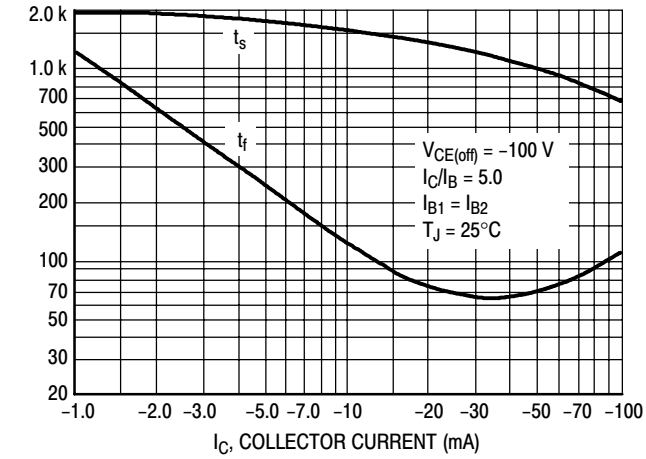


Figure 15. Turn−Off Time
PNP 2N6520

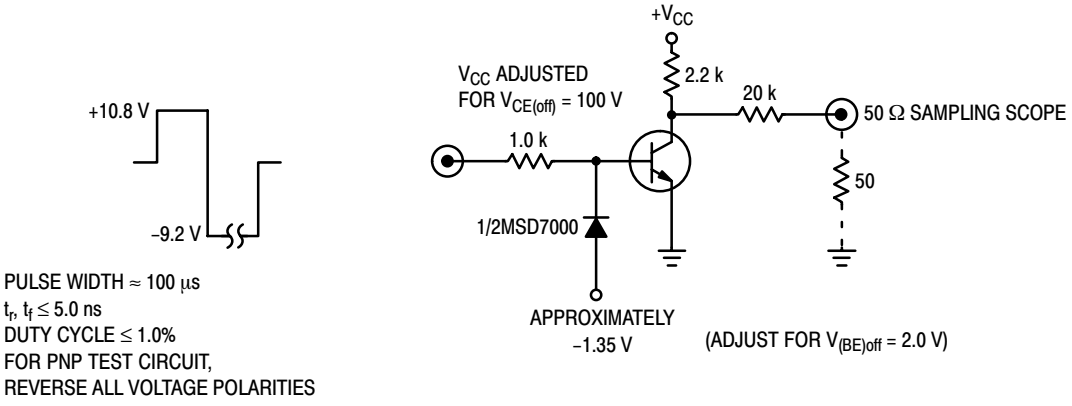


Figure 16. Switching Time Test Circuit

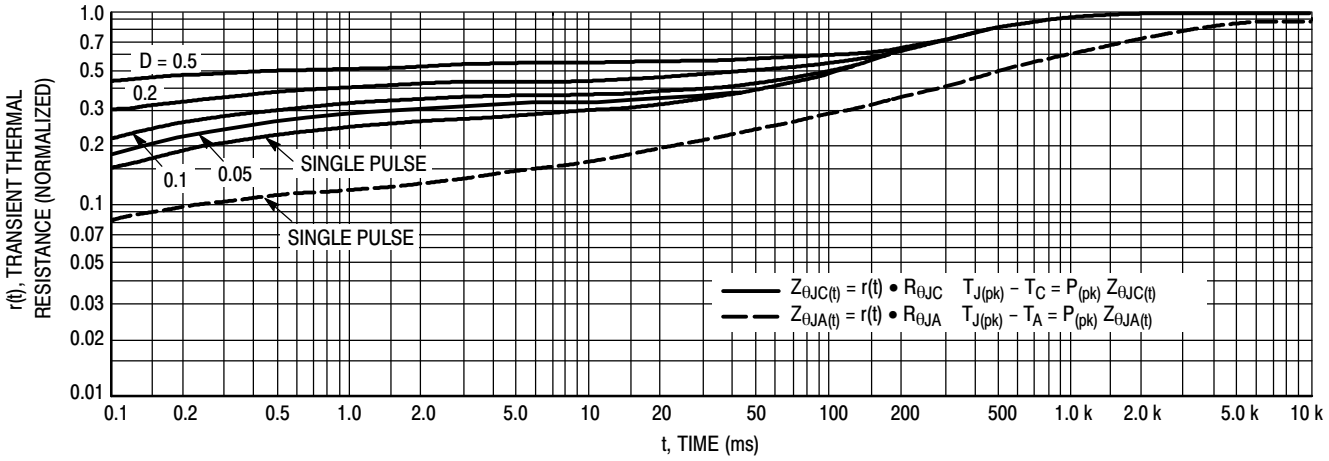


Figure 17. Thermal Response

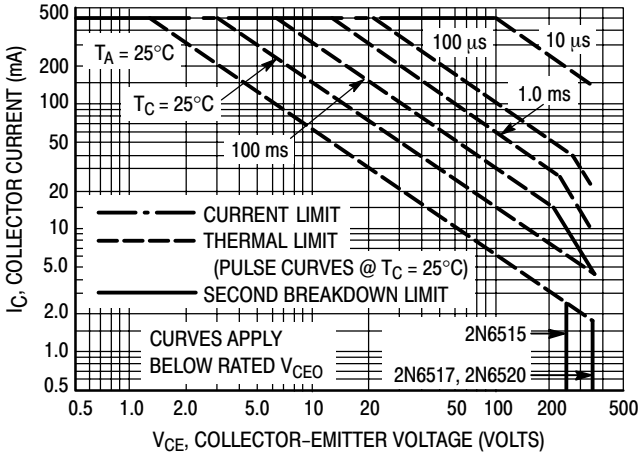
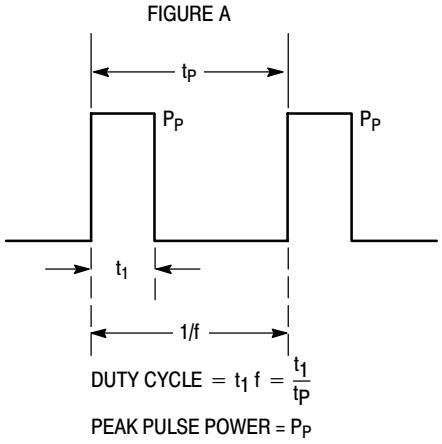


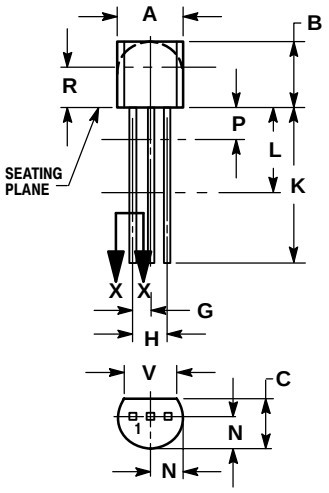
Figure 18. Active Region Safe Operating Area

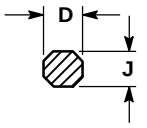


Design Note: Use of Transient Thermal Resistance Data

PACKAGE DIMENSIONS

TO−92
CASE 29−11
ISSUE AL





SECTION X−X

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

	INCHES		MILLIMETERS	
DIM	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	0.021	0.407	0.533
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

PUBLICATION ORDERING INFORMATION

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