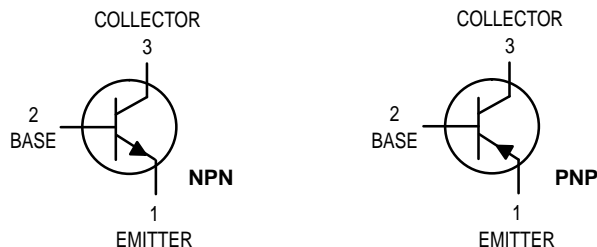


# Amplifier Transistors



**NPN**  
**MPSA05**  
**MPSA06\***  
**PNP**  
**MPSA55**  
**MPSA56\***

Voltage and current are negative  
for PNP transistors

\*Motorola Preferred Device

## MAXIMUM RATINGS

Rating	Symbol	MPSA05 MPSA55	MPSA06 MPSA56	Unit
Collector–Emitter Voltage	$V_{CEO}$	60	80	Vdc
Collector–Base Voltage	$V_{CBO}$	60	80	Vdc
Emitter–Base Voltage	$V_{EBO}$	4.0		Vdc
Collector Current – Continuous	$I_C$	500		mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	625	5.0	mW mW/°C
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	1.5	12	Watts mW/°C
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	–55 to +150		°C

## THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}^{(1)}$	200	°C/W
Thermal Resistance, Junction to Case	$R_{\theta JC}$	83.3	°C/W

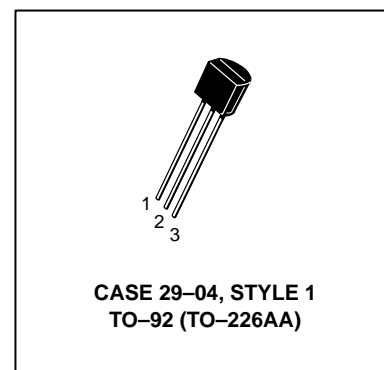
## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
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## OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage <sup>(2)</sup> ( $I_C = 1.0$ mAdc, $I_B = 0$ )	MPSA05, MPSA55 MPSA06, MPSA56	$V_{(BR)CEO}$	60 80	—	Vdc
Emitter–Base Breakdown Voltage ( $I_E = 100$ $\mu$ Adc, $I_C = 0$ )		$V_{(BR)EBO}$	4.0	—	Vdc
Collector Cutoff Current ( $V_{CE} = 60$ Vdc, $I_B = 0$ )		$I_{CES}$	—	0.1	$\mu$ Adc
Collector Cutoff Current ( $V_{CB} = 60$ Vdc, $I_E = 0$ ) ( $V_{CB} = 80$ Vdc, $I_E = 0$ )	MPSA05, MPSA55 MPSA06, MPSA56	$I_{CBO}$	— —	0.1 0.1	$\mu$ Adc

- $R_{\theta JA}$  is measured with the device soldered into a typical printed circuit board.
- Pulse Test: Pulse Width  $\leq 300$   $\mu$ s, Duty Cycle  $\leq 2.0\%$ .



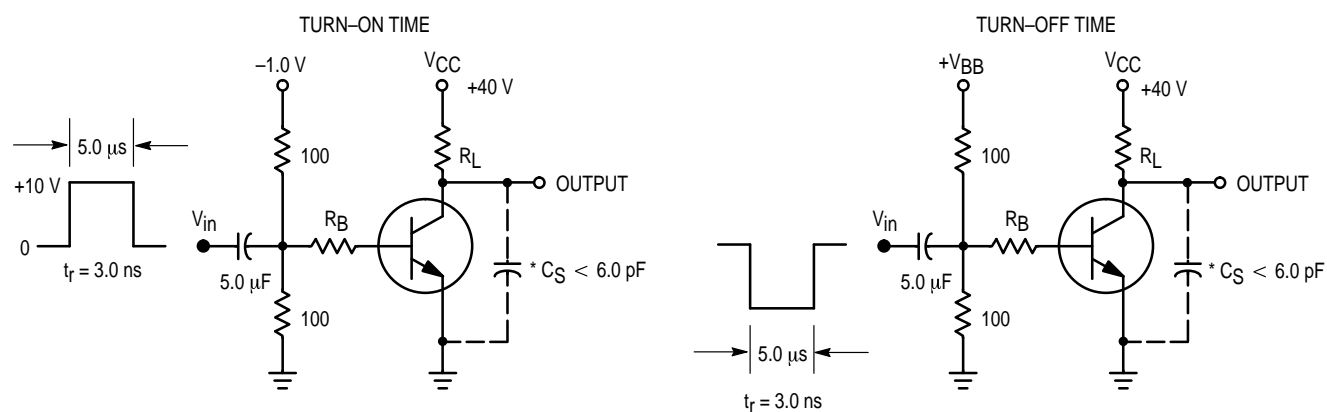
Preferred devices are Motorola recommended choices for future use and best overall value.

# NPN MPSA05 MPSA06 PNP MPSA55 MPSA56

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

Characteristic	Symbol	Min	Max	Unit
<b>ON CHARACTERISTICS</b>				
DC Current Gain ( $I_C = 10\text{ mAdc}$ , $V_{CE} = 1.0\text{ Vdc}$ ) ( $I_C = 100\text{ mAdc}$ , $V_{CE} = 1.0\text{ Vdc}$ )	$h_{FE}$	100 100	— —	—
Collector–Emitter Saturation Voltage ( $I_C = 100\text{ mAdc}$ , $I_B = 10\text{ mAdc}$ )	$V_{CE(sat)}$	—	0.25	Vdc
Base–Emitter On Voltage ( $I_C = 100\text{ mAdc}$ , $V_{CE} = 1.0\text{ Vdc}$ )	$V_{BE(on)}$	—	1.2	Vdc
<b>SMALL–SIGNAL CHARACTERISTICS</b>				
Current–Gain — Bandwidth Product <sup>(3)</sup> ( $I_C = 10\text{ mA}$ , $V_{CE} = 2.0\text{ V}$ , $f = 100\text{ MHz}$ )  ( $I_C = 100\text{ mAdc}$ , $V_{CE} = 1.0\text{ Vdc}$ , $f = 100\text{ MHz}$ )	$f_T$	100  50	—  —	MHz
		MPSA05 MPSA06		
		MPSA55 MPSA56		

3.  $f_T$  is defined as the frequency at which  $|h_{fe}|$  extrapolates to unity.



\* Total Shunt Capacitance of Test Jig and Connectors  
For PNP Test Circuits, Reverse All Voltage Polarities

**Figure 1. Switching Time Test Circuits**

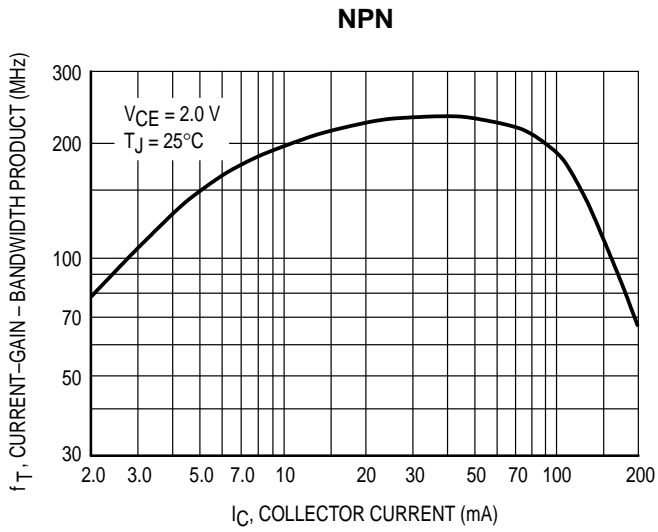


Figure 2. MPSA05/06 Current-Gain — Bandwidth Product

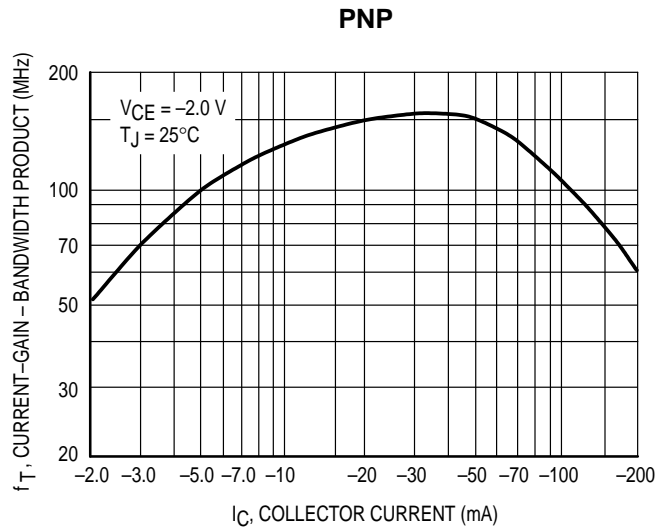


Figure 3. MPSA55/56 Current-Gain — Bandwidth Product

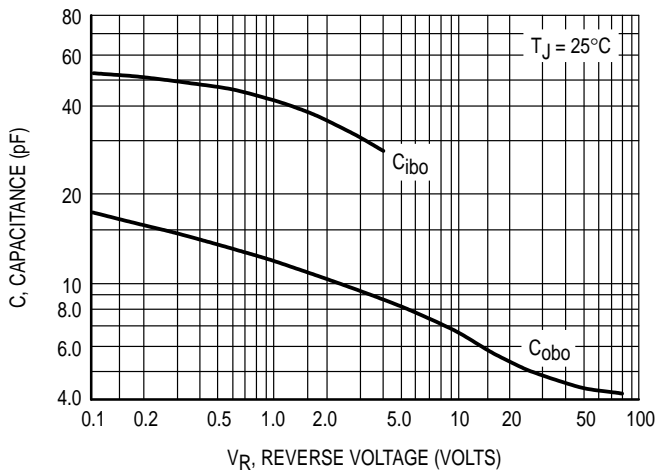


Figure 4. MPSA05/06 Capacitance

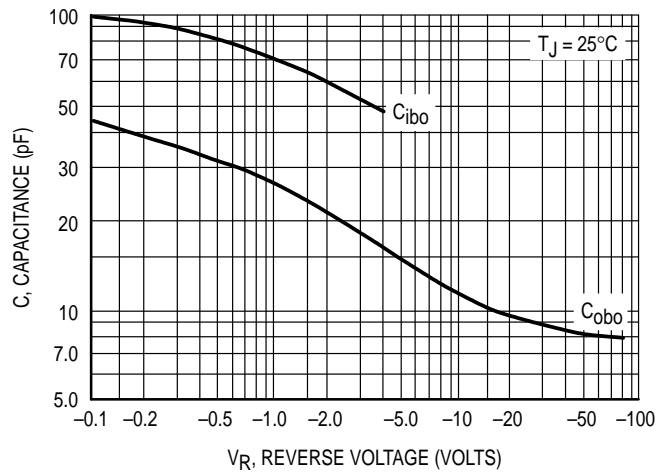


Figure 5. MPSA55/56 Capacitance

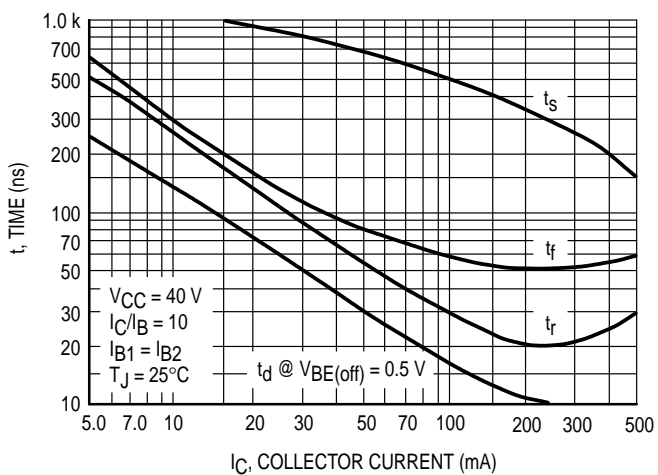


Figure 6. MPSA05/06 Switching Time

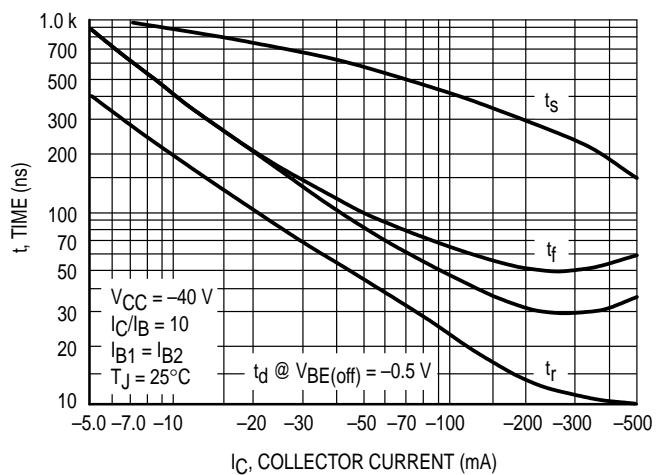


Figure 7. MPSA55/56 Switching Time

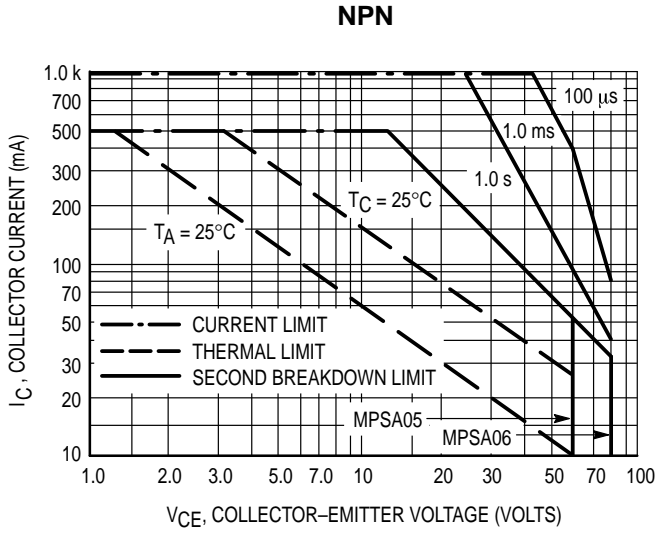


Figure 8. MPSA05/06 Active-Region Safe Operating Area

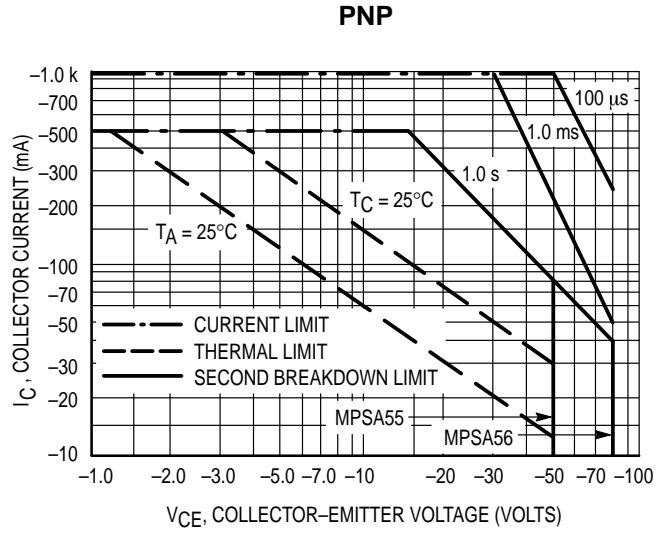


Figure 9. MPSA55/56 Active-Region Safe Operating Area

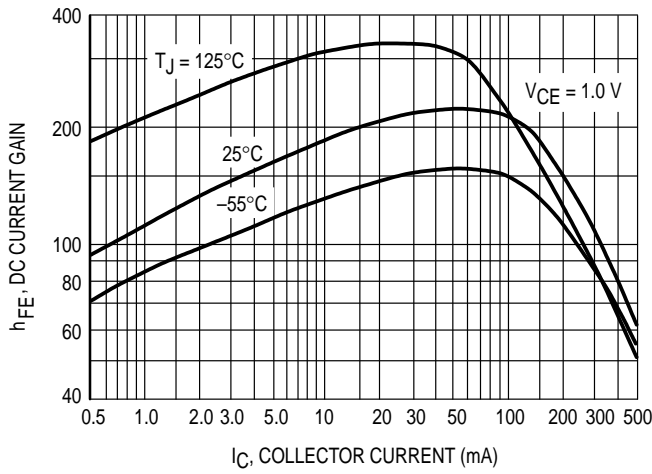


Figure 10. MPSA05/06 DC Current Gain

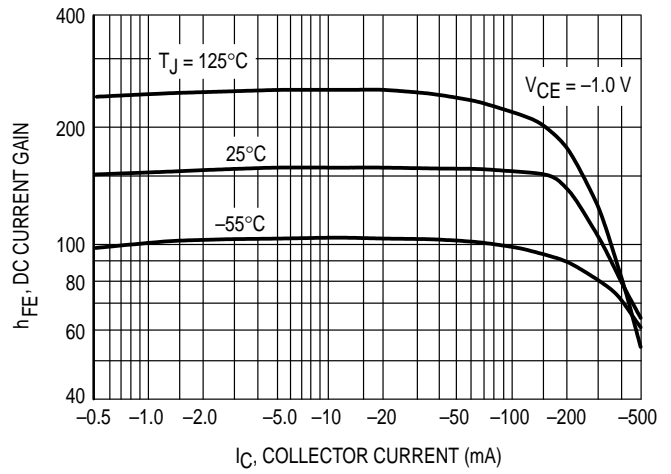


Figure 11. MPSA55/56 DC Current Gain

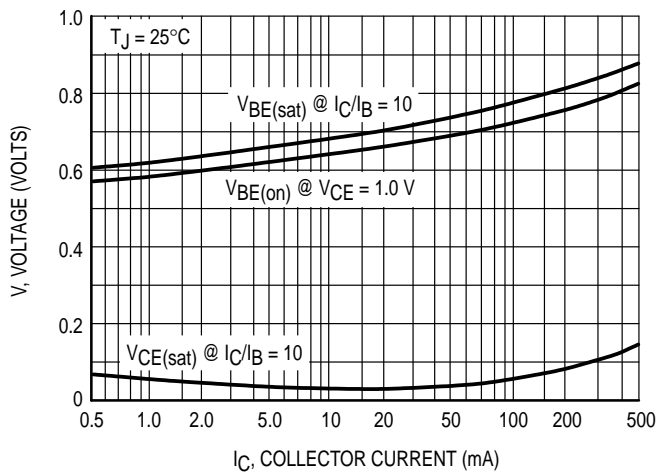


Figure 12. MPSA05/06 "ON" Voltages

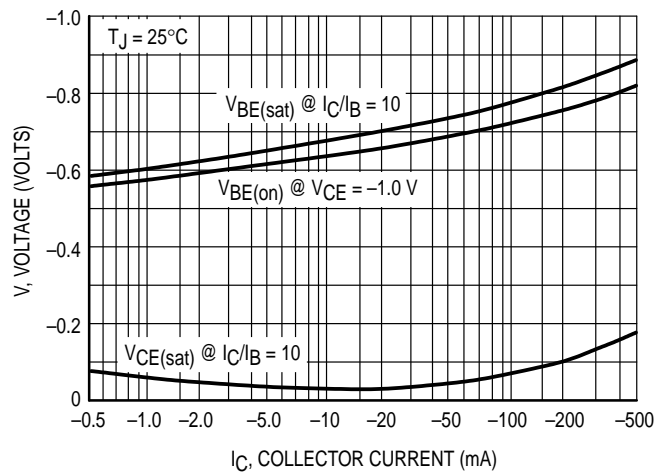


Figure 13. MPSA55/56 "ON" Voltages

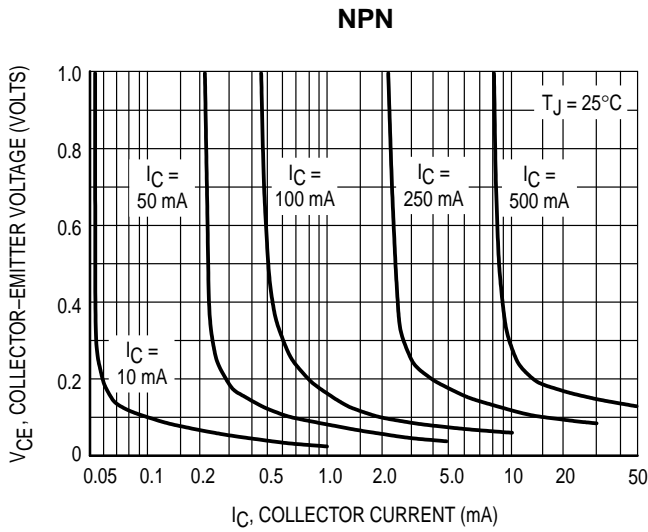


Figure 14. MPSA05/06 Collector Saturation Region

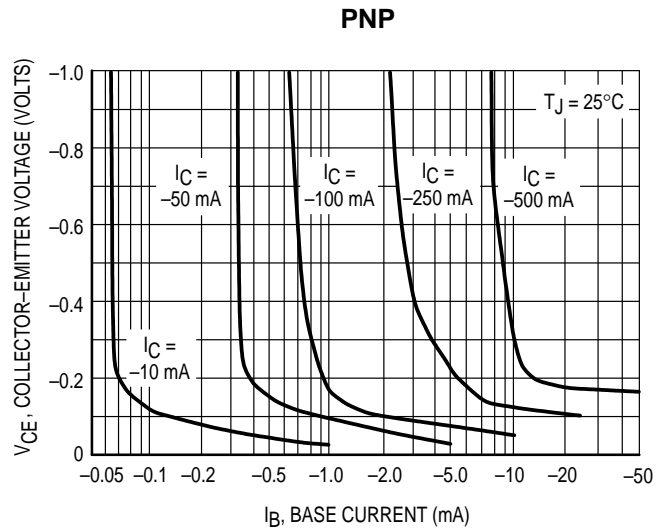


Figure 15. MPSA55/56 Collector Saturation Region

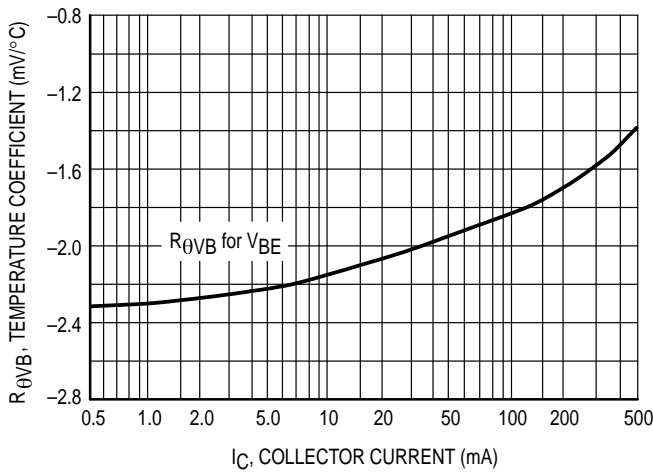


Figure 16. MPSA05/06 Base-Emitter Temperature Coefficient

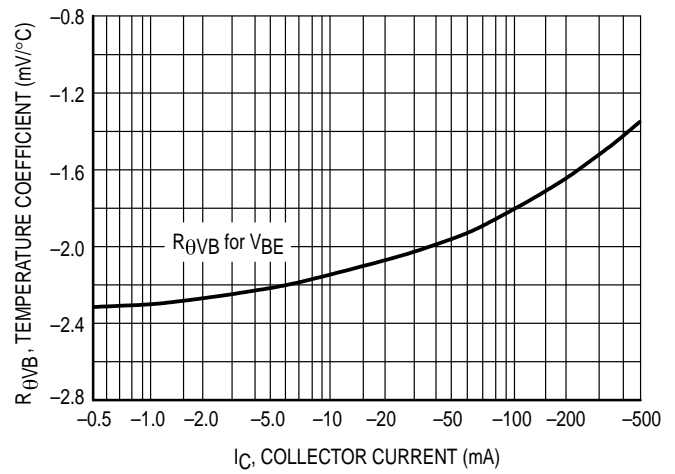


Figure 17. MPSA55/56 Base-Emitter Temperature Coefficient

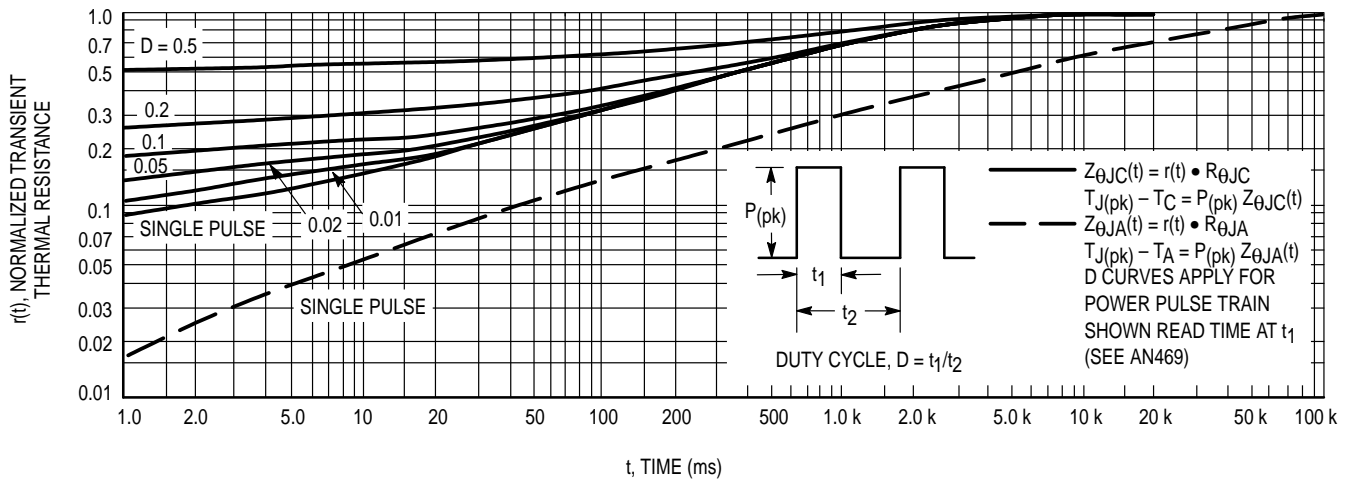


Figure 18. MPSA05, MPSA06, MPSA55 and MPSA56 Thermal Response

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:

1. EMITTER
2. BASE
3. COLLECTOR

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