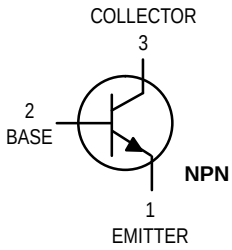
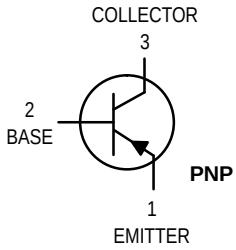
Amplifier Transistors

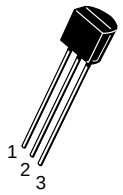




NPN
MPSA05
MPSA06*
PNP
MPSA55
MPSA56*

Voltage and current are negative for PNP transistors

***Motorola Preferred Device**



CASE 29–04, STYLE 1
TO–92 (TO–226AA)

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°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

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°C unless otherwise noted)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector–Emitter Breakdown Voltage(2) (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 μAdc, I_C = 0)		$V_{(BR)EBO}$	4.0	—	Vdc
Collector Cutoff Current (V_{CE} = 60 Vdc, I_B = 0)		I_{CES}	—	0.1	μAdc
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	μAdc

1. $R_{\theta JA}$ is measured with the device soldered into a typical printed circuit board.
2. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

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

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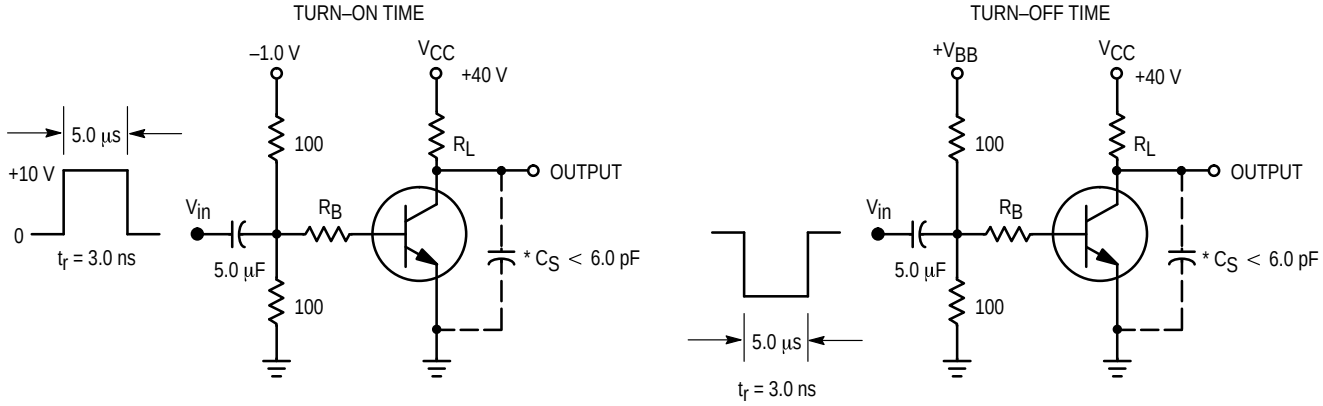
ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted) (Continued)

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

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

NPN

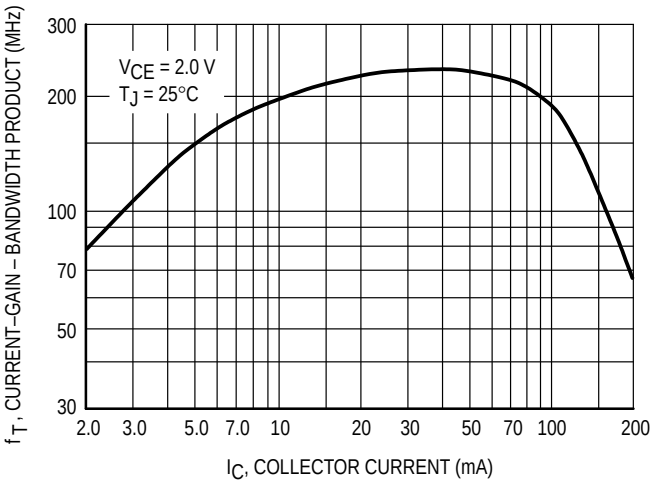


Figure 2. MPSA05/06 Current–Gain — Bandwidth Product

PNP

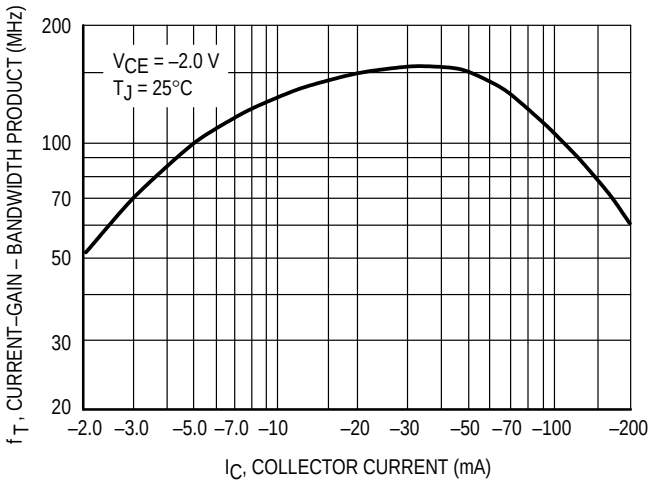


Figure 3. MPSA55/56 Current–Gain — Bandwidth Product

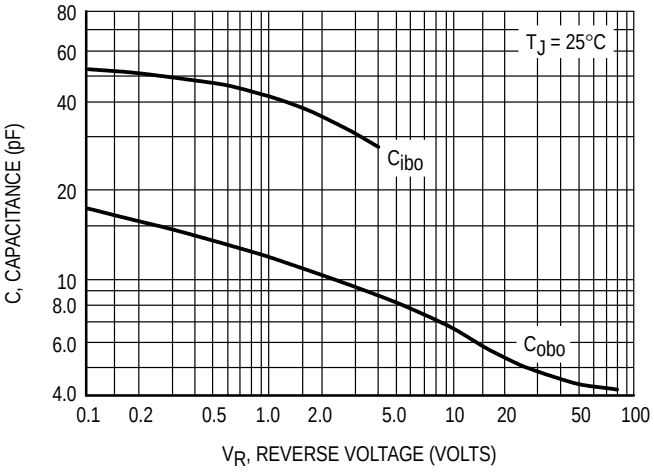


Figure 4. MPSA05/06 Capacitance

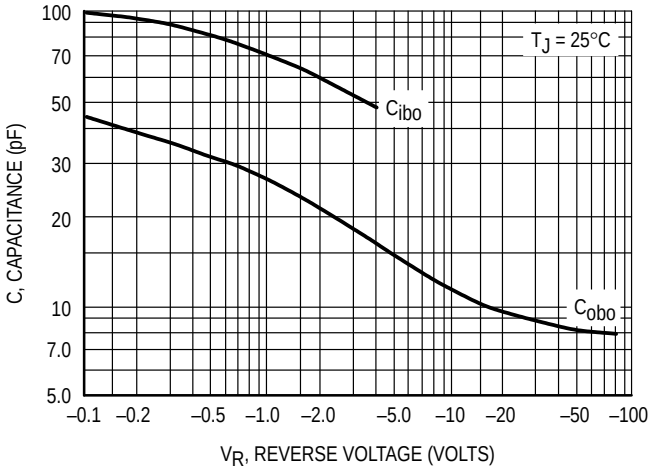


Figure 5. MPSA55/56 Capacitance

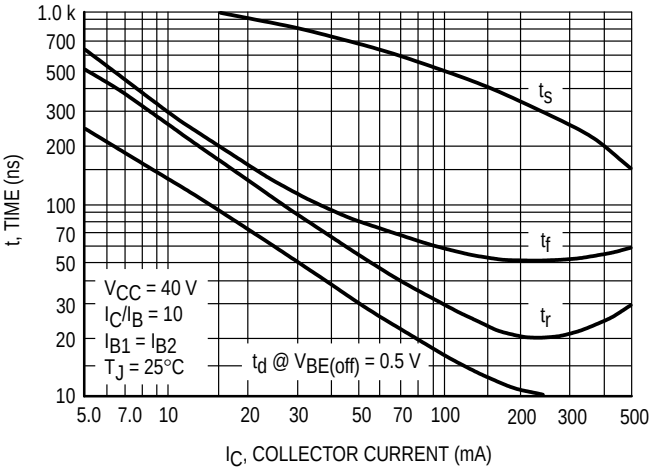


Figure 6. MPSA05/06 Switching Time

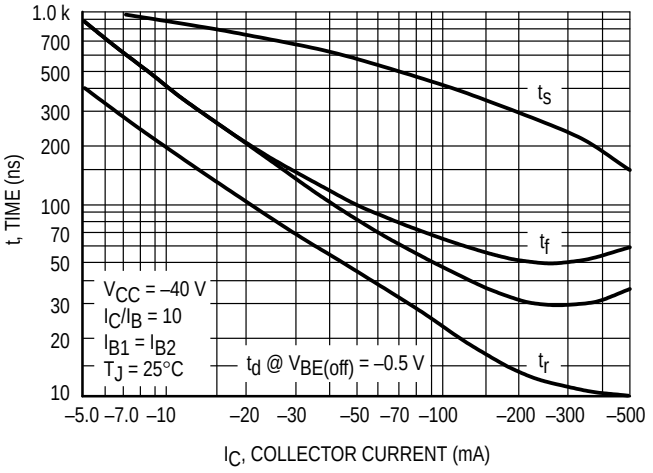


Figure 7. MPSA55/56 Switching Time

NPN

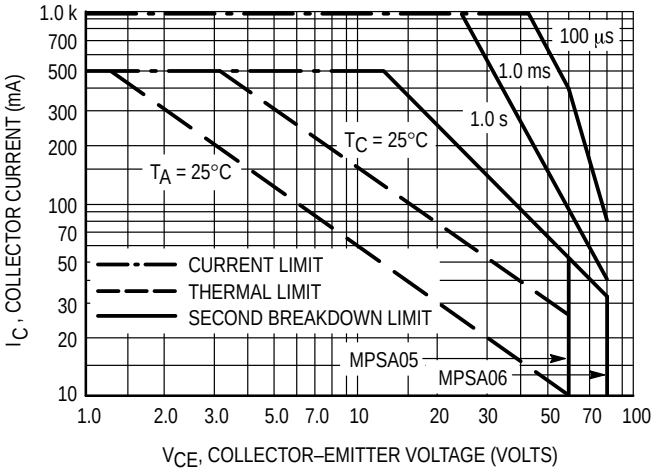


Figure 8. MPSA05/06 Active–Region Safe Operating Area

PNP

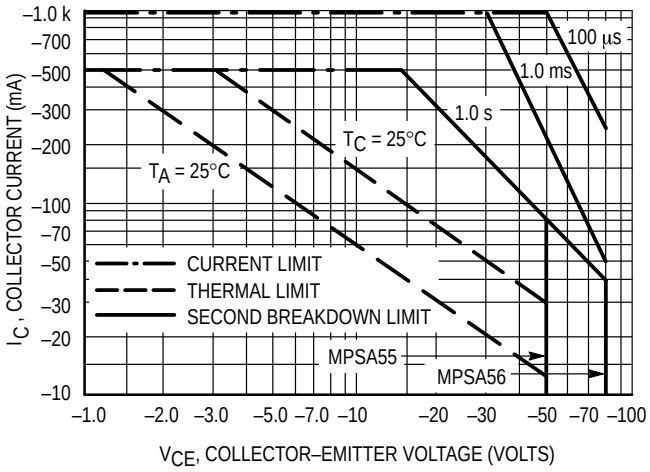


Figure 9. MPSA55/56 Active–Region Safe Operating Area

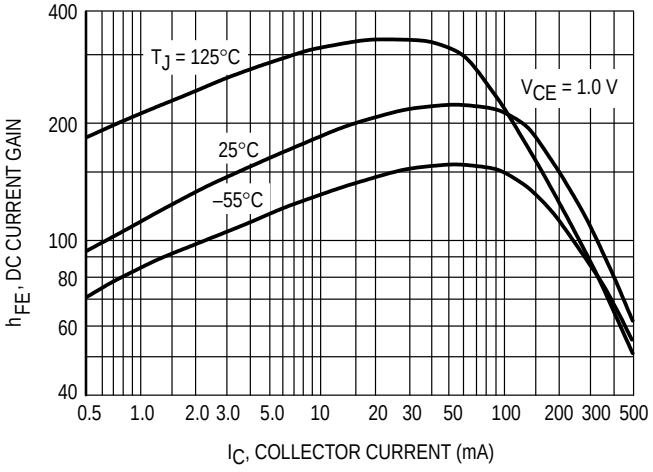


Figure 10. MPSA05/06 DC Current Gain

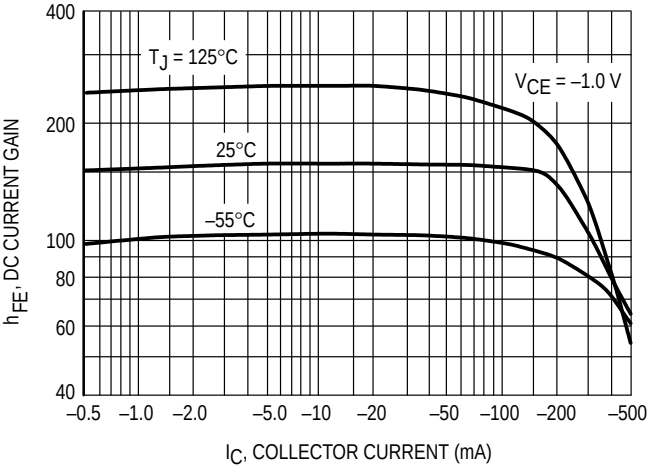


Figure 11. MPSA55/56 DC Current Gain

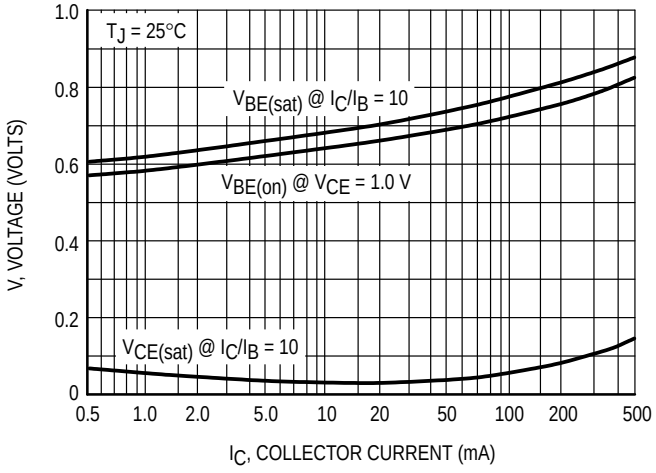


Figure 12. MPSA05/06 “ON” Voltages

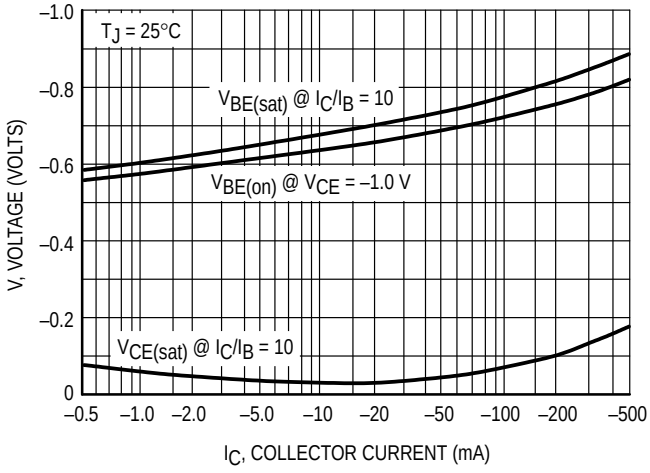


Figure 13. MPSA55/56 “ON” Voltages

NPN

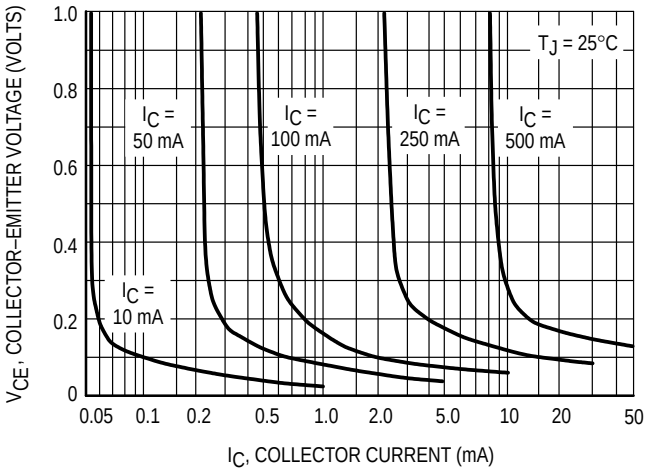


Figure 14. MPSA05/06 Collector Saturation Region

PNP

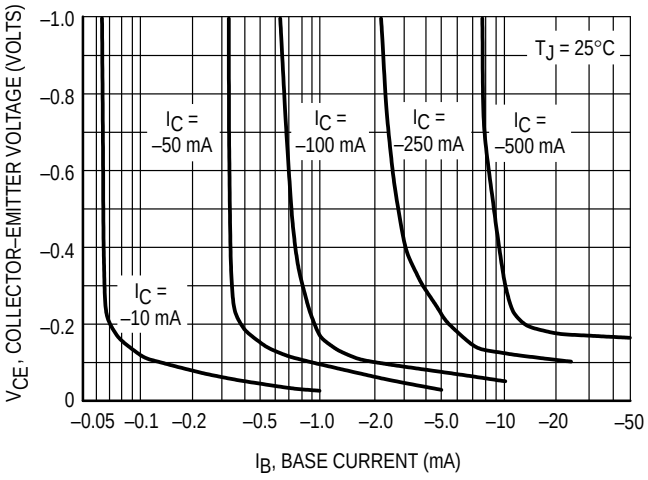


Figure 15. MPSA55/56 Collector Saturation Region

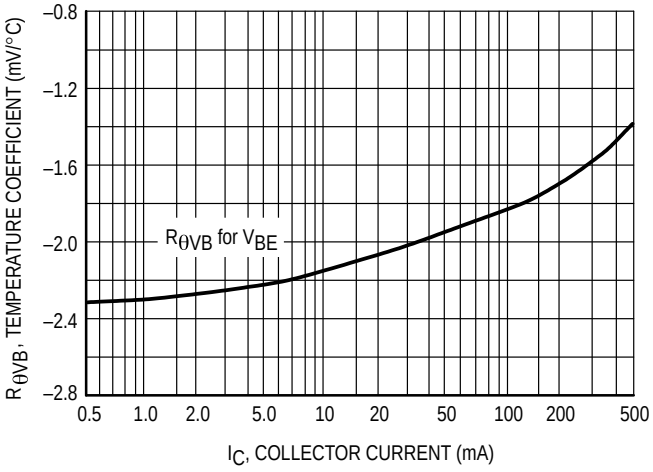


Figure 16. MPSA05/06 Base–Emitter Temperature Coefficient

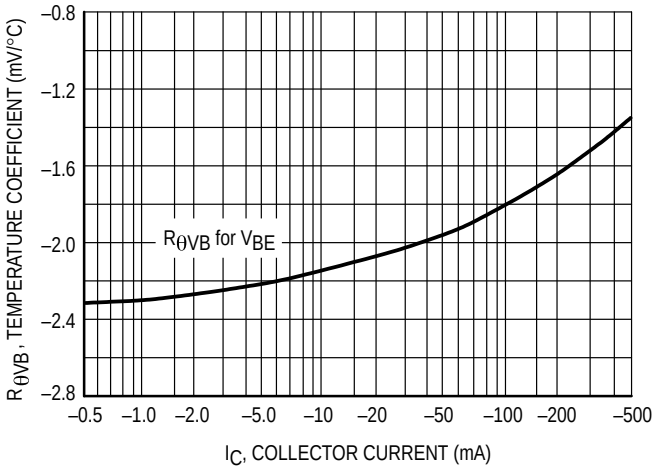


Figure 17. MPSA55/56 Base–Emitter Temperature Coefficient

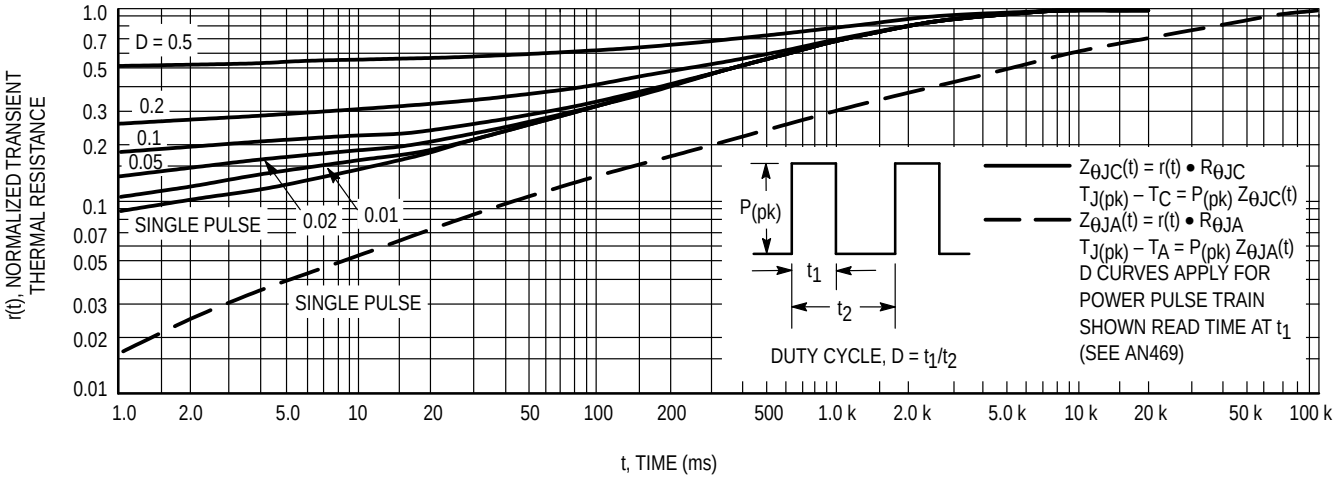
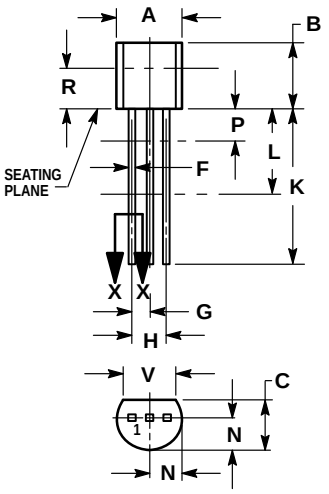
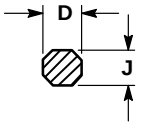


Figure 18. MPSA05, MPSA06, MPSA55 and MPSA56 Thermal Response

PACKAGE DIMENSIONS





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. 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.

	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	0.022	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	—

CASE 029–04
(TO–226AA)
ISSUE AD

STYLE 1:
PIN 1. EMITTER
2. BASE
3. COLLECTOR

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