

# NPN - MPSA05, MPSA06\*; PNP - MPSA55, MPSA56\*

\*Preferred Devices



ON Semiconductor®

<http://onsemi.com>

## Amplifier Transistors

Voltage and Current are Negative  
for PNP Transistors

### Features

- Pb-Free Packages are Available\*

### MAXIMUM RATINGS

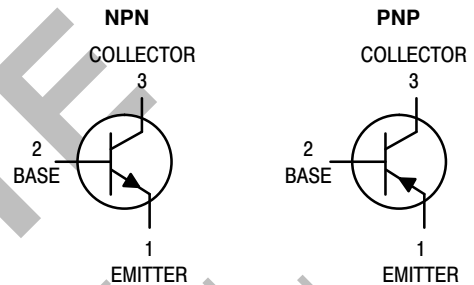
Rating	Symbol	Value	Unit
Collector - Emitter Voltage MPSA05, MPSA55 MPSA06, MPSA56	$V_{CEO}$	60 80	Vdc
Collector - Base Voltage MPSA05, MPSA55 MPSA06, MPSA56	$V_{CBO}$	60 80	Vdc
Emitter - Base Voltage	$V_{EBO}$	4.0	Vdc
Collector Current - Continuous	$I_C$	500	mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$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

### THERMAL CHARACTERISTICS

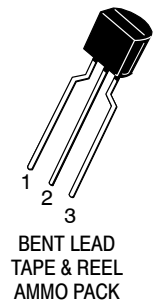
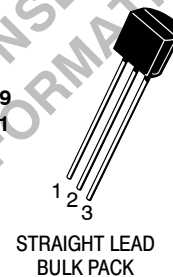
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Ambient (Note 1)	$R_{\theta JA}$	200	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	83.3	$^\circ\text{C}/\text{W}$

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

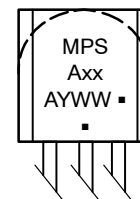
- $R_{\theta JA}$  is measured with the device soldered into a typical printed circuit board.



TO-92  
CASE 29  
STYLE 1



### MARKING DIAGRAM



- xx = 05, 06, 55, or 56
- A = Assembly Location
- Y = Year
- WW = Work Week
- = Pb-Free Package

(Note: Microdot may be in either location)

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

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

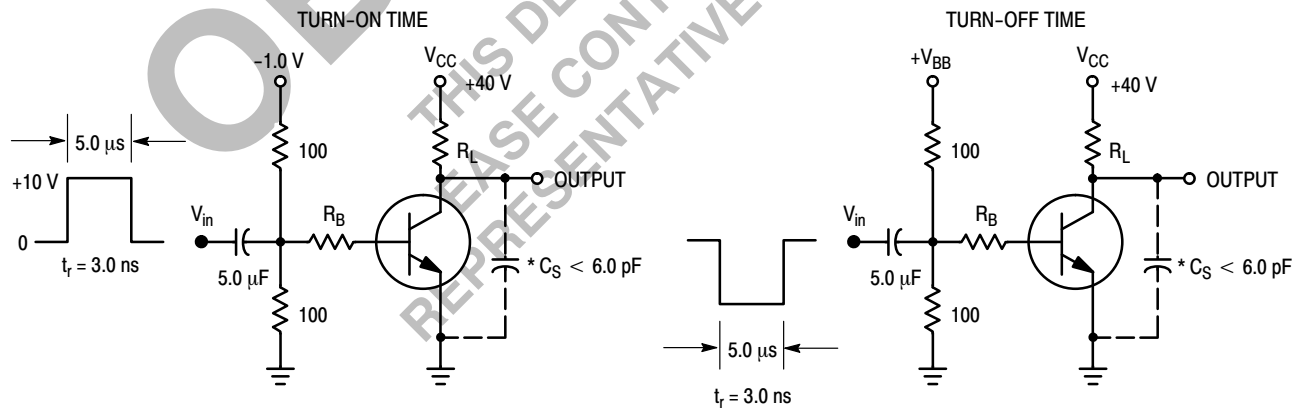
\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

# NPN – MPSA05, MPSA06\*; PNP – MPSA55, MPSA56\*

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector – Emitter Breakdown Voltage (Note 2) (I <sub>C</sub> = 1.0 mA, I <sub>B</sub> = 0)	V <sub>(BR)CEO</sub>	60 80	–	Vdc
Emitter – Base Breakdown Voltage (I <sub>E</sub> = 100 μA, I <sub>C</sub> = 0)	V <sub>(BR)EBO</sub>	4.0	–	Vdc
Collector Cutoff Current (V <sub>CE</sub> = 60 Vdc, I <sub>B</sub> = 0)	I <sub>CES</sub>	–	0.1	μA
Collector Cutoff Current (V <sub>CB</sub> = 60 Vdc, I <sub>E</sub> = 0) (V <sub>CB</sub> = 80 Vdc, I <sub>E</sub> = 0)	I <sub>CBO</sub>	–	0.1 0.1	μA
<b>ON CHARACTERISTICS</b>				
DC Current Gain (I <sub>C</sub> = 10 mA, V <sub>CE</sub> = 1.0 Vdc) (I <sub>C</sub> = 100 mA, V <sub>CE</sub> = 1.0 Vdc)	h <sub>FE</sub>	100 100	–	–
Collector – Emitter Saturation Voltage (I <sub>C</sub> = 100 mA, I <sub>B</sub> = 10 mA)	V <sub>CE(sat)</sub>	–	0.25	Vdc
Base – Emitter On Voltage (I <sub>C</sub> = 100 mA, V <sub>CE</sub> = 1.0 Vdc)	V <sub>BE(on)</sub>	–	1.2	Vdc
<b>SMALL – SIGNAL CHARACTERISTICS</b>				
Current – Gain – Bandwidth Product (Note 3) (I <sub>C</sub> = 10 mA, V <sub>CE</sub> = 2.0 V, f = 100 MHz)  (I <sub>C</sub> = 100 mA, V <sub>CE</sub> = 1.0 Vdc, f = 100 MHz)	f <sub>T</sub>	100 50	–	MHz

2. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
3. f<sub>T</sub> is defined as the frequency at which |h<sub>fe</sub>| 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 – MPSA05, MPSA06\*; PNP – MPSA55, MPSA56\*

NPN

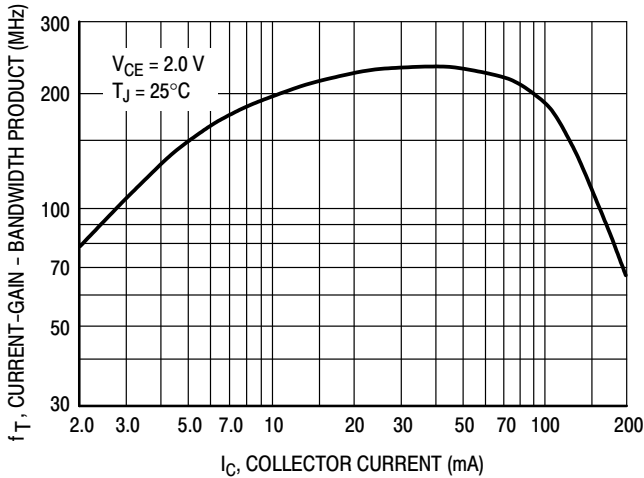


Figure 2. MPSA05/06 Current-Gain — Bandwidth Product

PNP

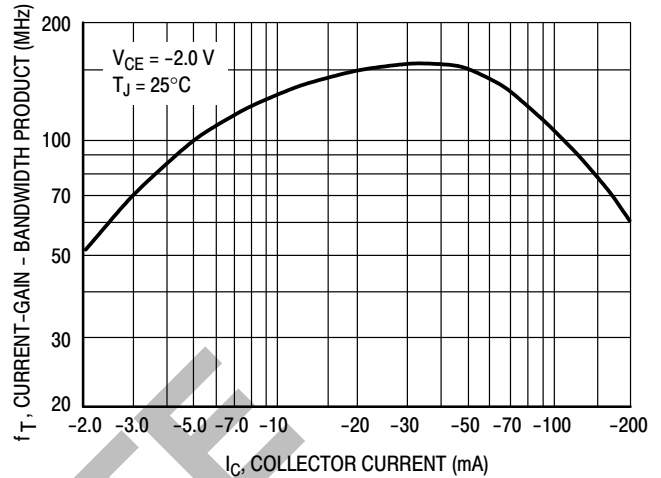


Figure 3. MPSA55/56 Current-Gain — Bandwidth Product

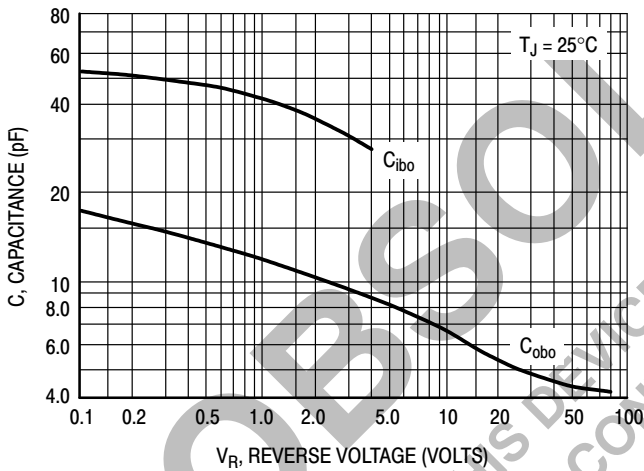


Figure 4. MPSA05/06 Capacitance

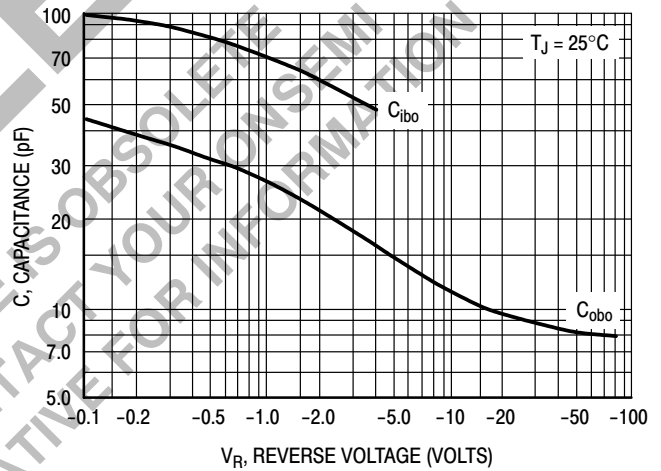


Figure 5. MPSA55/56 Capacitance

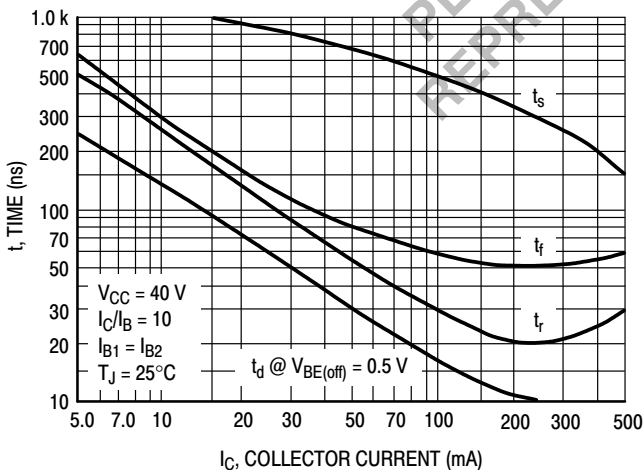


Figure 6. MPSA05/06 Switching Time

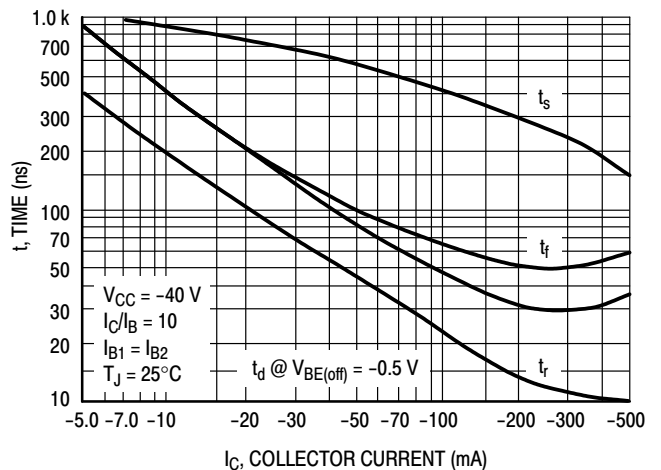


Figure 7. MPSA55/56 Switching Time

NPN – MPSA05, MPSA06\*; PNP – MPSA55, MPSA56\*

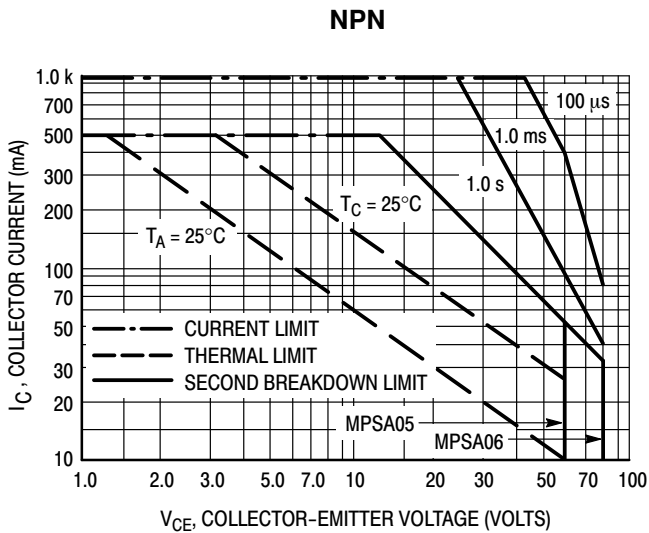


Figure 8. MPSA05/06 Active-Region Safe Operating Area

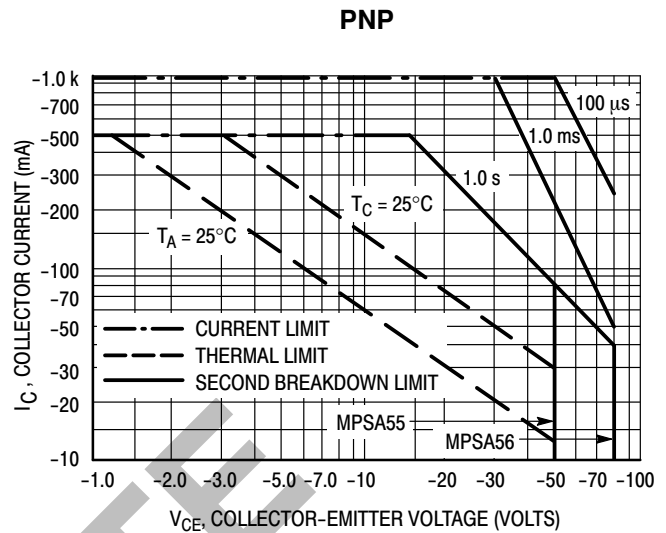


Figure 9. MPSA55/56 Active-Region Safe Operating Area

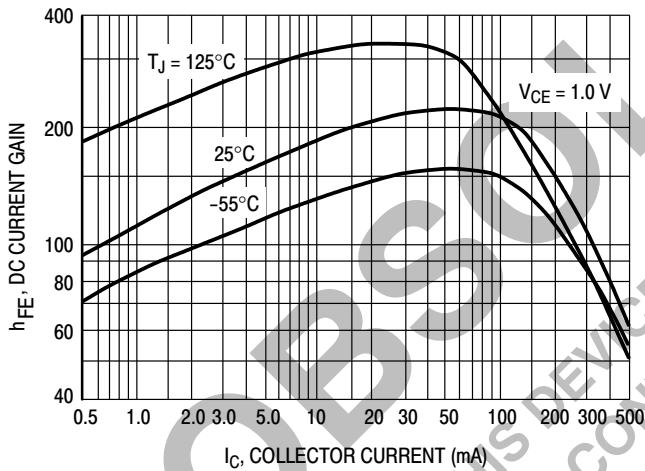


Figure 10. MPSA05/06 DC Current Gain

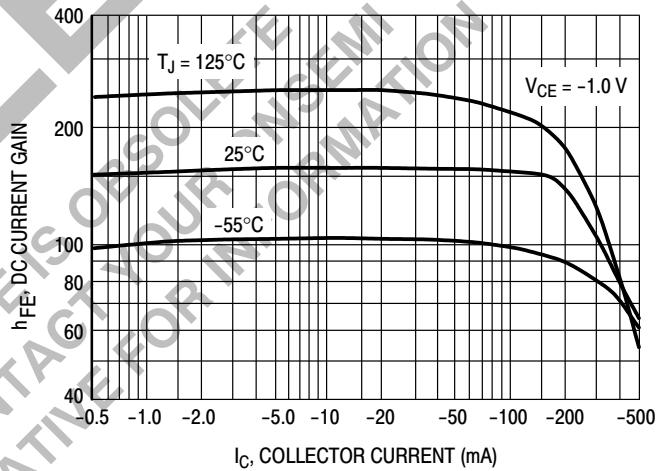


Figure 11. MPSA55/56 DC Current Gain

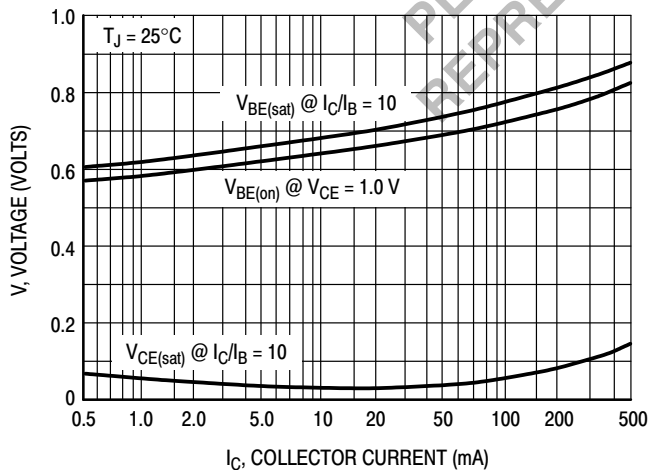


Figure 12. MPSA05/06 "ON" Voltages

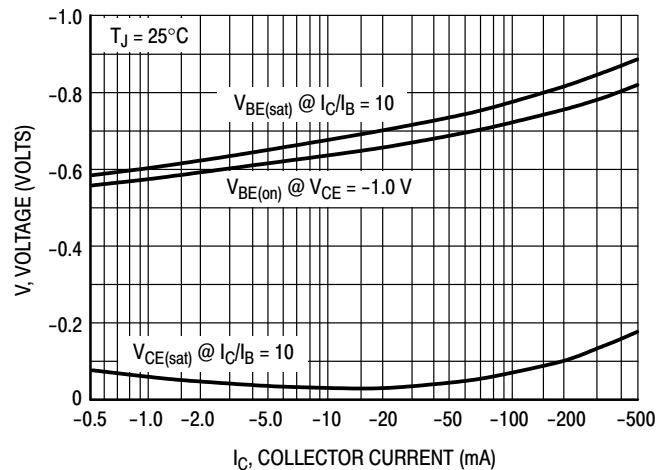


Figure 13. MPSA55/56 "ON" Voltages

NPN – MPSA05, MPSA06\*; PNP – MPSA55, MPSA56\*

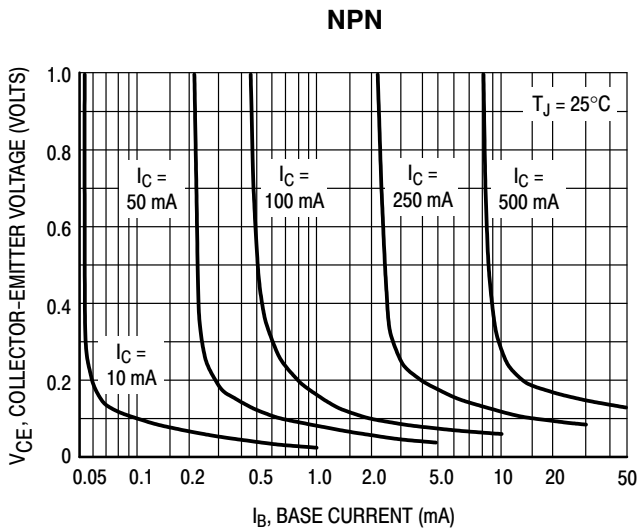


Figure 14. MPSA05/06 Collector Saturation Region

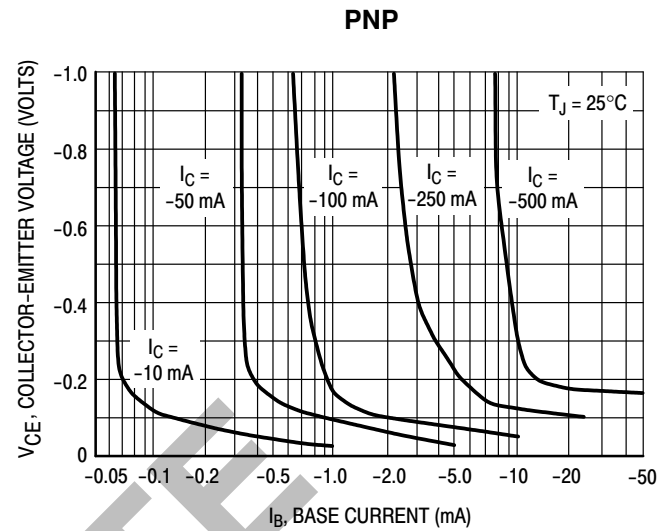


Figure 15. MPSA55/56 Collector Saturation Region

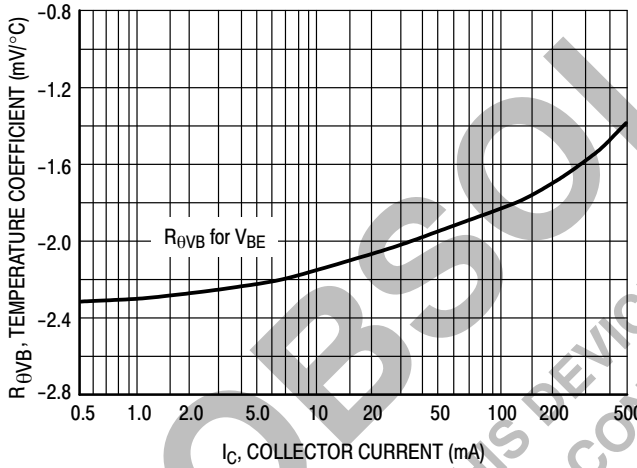


Figure 16. MPSA05/06 Base-Emitter Temperature Coefficient

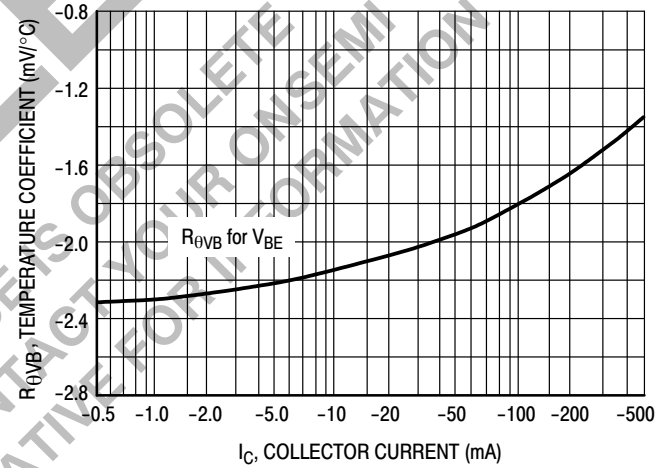


Figure 17. MPSA55/56 Base-Emitter Temperature Coefficient

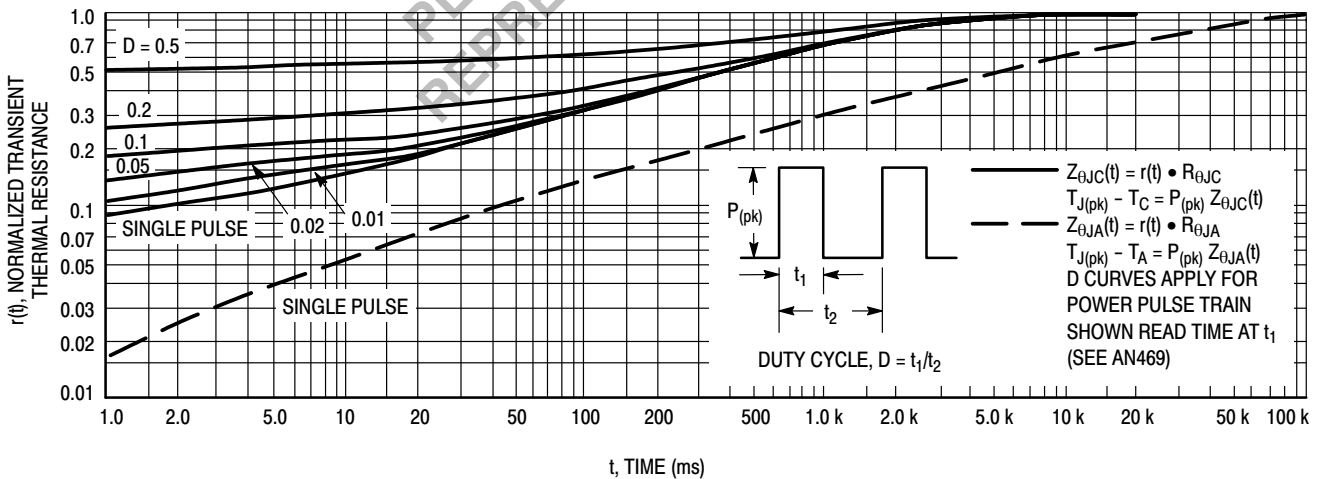


Figure 18. MPSA05, MPSA06, MPSA55 and MPSA56 Thermal Response

## NPN – MPSA05, MPSA06\*; PNP – MPSA55, MPSA56\*

### ORDERING INFORMATION

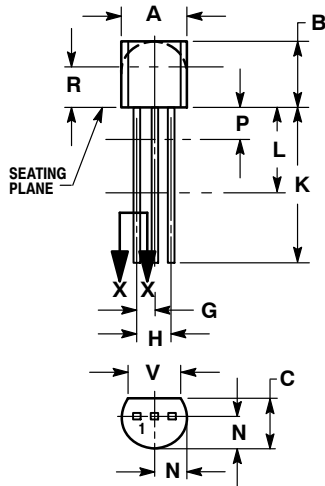
Device	Package	Shipping†
MPSA05	TO-92	5000 Units / Bulk
MPSA05G	TO-92 (Pb-Free)	5000 Units / Bulk
MPSA05RLRA	TO-92	2000 / Tape & Reel
MPSA05RLRAG	TO-92 (Pb-Free)	2000 / Tape & Reel
MPSA05RLRM	TO-92	2000 / Ammo Pack
MPSA05RLRMG	TO-92 (Pb-Free)	2000 / Ammo Pack
MPSA06	TO-92	5000 Units / Bulk
MPSA06G	TO-92 (Pb-Free)	5000 Units / Bulk
MPSA06RL1G	TO-92 (Pb-Free)	2000 / Tape & Reel
MPSA06RLG	TO-92 (Pb-Free)	2000 / Tape & Reel
MPSA06RLRA	TO-92	2000 / Tape & Reel
MPSA06RLRAG	TO-92 (Pb-Free)	2000 / Tape & Reel
MPSA06RLRM	TO-92	2000 / Ammo Pack
MPSA06RLRMG	TO-92 (Pb-Free)	2000 / Ammo Pack
MPSA06RLRP	TO-92	2000 / Ammo Pack
MPSA06RLRPG	TO-92 (Pb-Free)	2000 / Ammo Pack
MPSA55G	TO-92 (Pb-Free)	5000 Units / Bulk
MPSA55RLRA	TO-92	2000 / Tape & Reel
MPSA55RLRAG	TO-92 (Pb-Free)	2000 / Tape & Reel
MPSA56	TO-92	5000 Units / Bulk
MPSA56G	TO-92 (Pb-Free)	5000 Units / Bulk
MPSA56RLRA	TO-92	2000 / Tape & Reel
MPSA56RLRAG	TO-92 (Pb-Free)	2000 / Tape & Reel
MPSA56RLRM	TO-92	2000 / Ammo Pack
MPSA56RLRMG	TO-92 (Pb-Free)	2000 / Ammo Pack
MPSA56RLRP	TO-92	2000 / Ammo Pack
MPSA56RLRPG	TO-92 (Pb-Free)	2000 / Ammo Pack
MPSA56ZL1	TO-92	2000 / Ammo Pack
MPSA56ZL1G	TO-92 (Pb-Free)	2000 / Ammo Pack

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

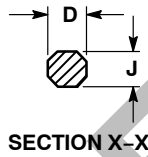
# NPN – MPSA05, MPSA06\*; PNP – MPSA55, MPSA56\*

## PACKAGE DIMENSIONS

TO-92 (TO-226)  
CASE 29-11  
ISSUE AM



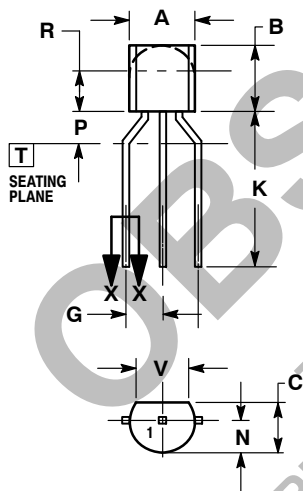
STRAIGHT LEAD  
BULK PACK



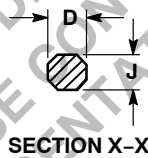
NOTES:

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.

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	0.021	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	---



BENT LEAD  
TAPE & REEL  
AMMO PACK



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

DIM	MILLIMETERS	
	MIN	MAX
A	4.45	5.20
B	4.32	5.33
C	3.18	4.19
D	0.40	0.54
G	2.40	2.80
J	0.39	0.50
K	12.70	---
N	2.04	2.66
P	1.50	4.00
R	2.93	---
V	3.43	---

STYLE 1:

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

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