

# (NPN) MPSA05, MPSA06\*, (PNP) MPSA55, MPSA56\*

\*Preferred Devices

## 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	$^\circ\text{C}/\text{W}$

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.

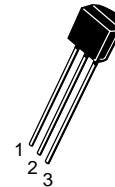
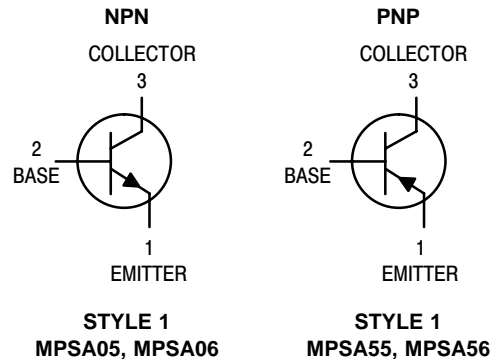
- $R_{\theta JA}$  is measured with the device soldered into a typical printed circuit board.

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



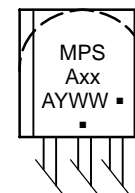
ON Semiconductor®

<http://onsemi.com>



TO-92  
CASE 29-11  
STYLE 1

### MARKING DIAGRAM



MPSAxx = Device Code  
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.

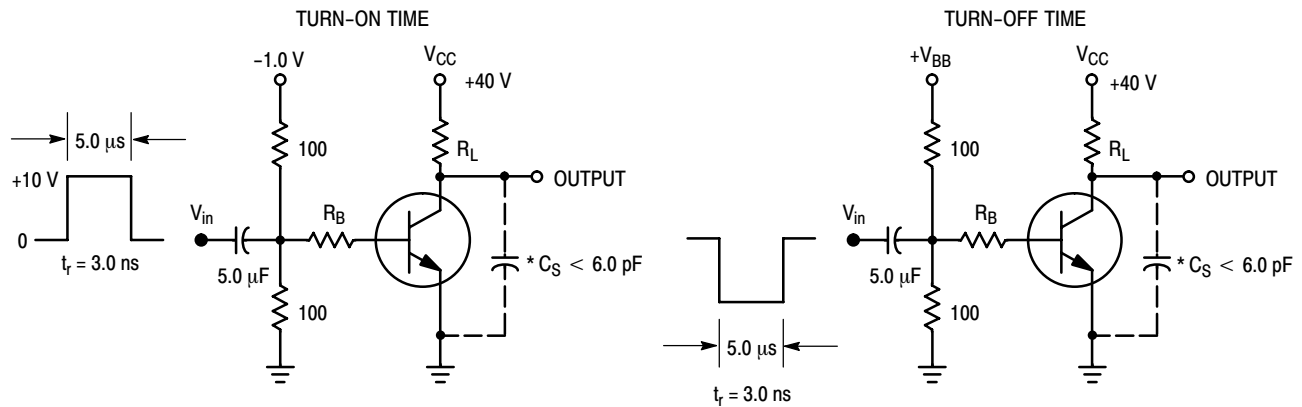
Preferred devices are recommended choices for future use and best overall value.

# (NPN) MPSA05, MPSA06\*, (PNP) MPSA55, MPSA56\*

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

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector–Emitter Breakdown Voltage (Note 2) ( $I_C = 1.0\text{ mAdc}$ , $I_B = 0$ )	$V_{(BR)CEO}$	60 80	– –	Vdc
Emitter–Base Breakdown Voltage ( $I_E = 100\ \mu\text{Adc}$ , $I_C = 0$ )	$V_{(BR)EBO}$	4.0	–	Vdc
Collector Cutoff Current ( $V_{CE} = 60\text{ Vdc}$ , $I_B = 0$ )	$I_{CES}$	–	0.1	$\mu\text{Adc}$
Collector Cutoff Current ( $V_{CB} = 60\text{ Vdc}$ , $I_E = 0$ ) ( $V_{CB} = 80\text{ Vdc}$ , $I_E = 0$ )	$I_{CBO}$	– –	0.1 0.1	$\mu\text{Adc}$
<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 (Note 3) ( $I_C = 10\text{ mA}$ , $V_{CE} = 2.0\text{ V}$ , $f = 100\text{ MHz}$ )  ( $I_C = 100\text{ mAdc}$ , $V_{CE} = 1.0\text{ Vdc}$ , $f = 100\text{ MHz}$ )	$f_T$	100 50	– –	MHz

- Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2\%$ .
- $f_T$  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) MPSA05, MPSA06\*, (PNP) MPSA55, MPSA56\*

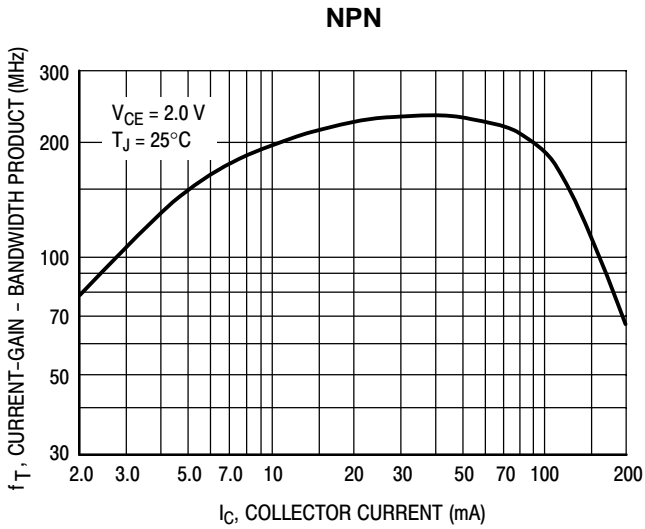


Figure 2. MPSA05/06 Current-Gain — Bandwidth Product

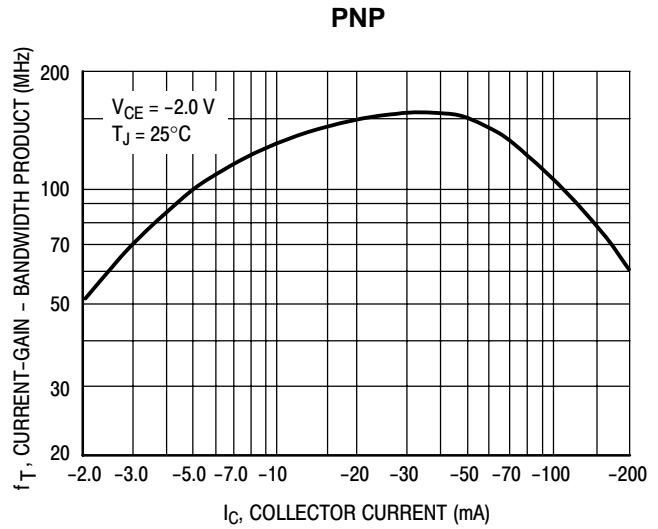


Figure 3. MPSA55/56 Current-Gain — Bandwidth Product

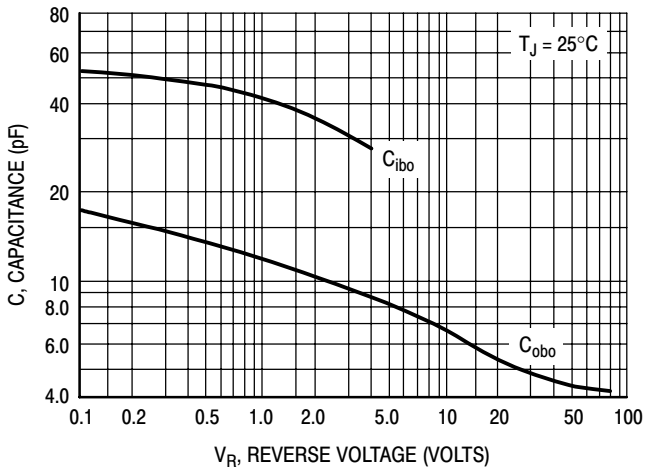


Figure 4. MPSA05/06 Capacitance

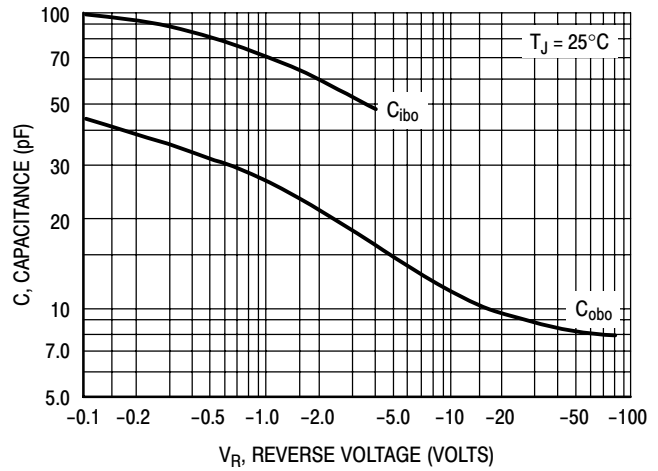


Figure 5. MPSA55/56 Capacitance

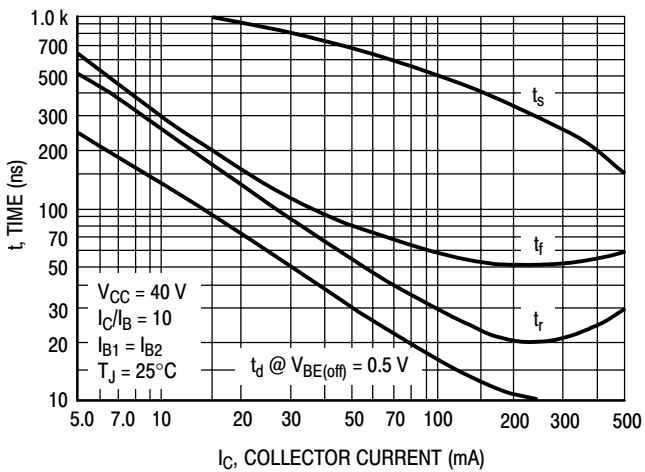


Figure 6. MPSA05/06 Switching Time

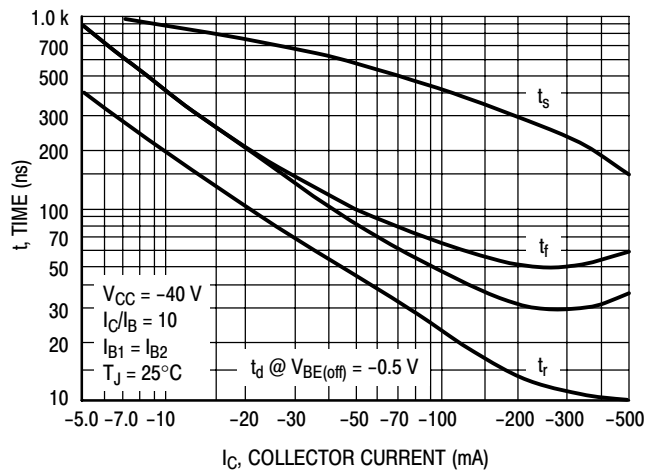


Figure 7. MPSA55/56 Switching Time

(NPN) MPSA05, MPSA06\*, (PNP) MPSA55, MPSA56\*

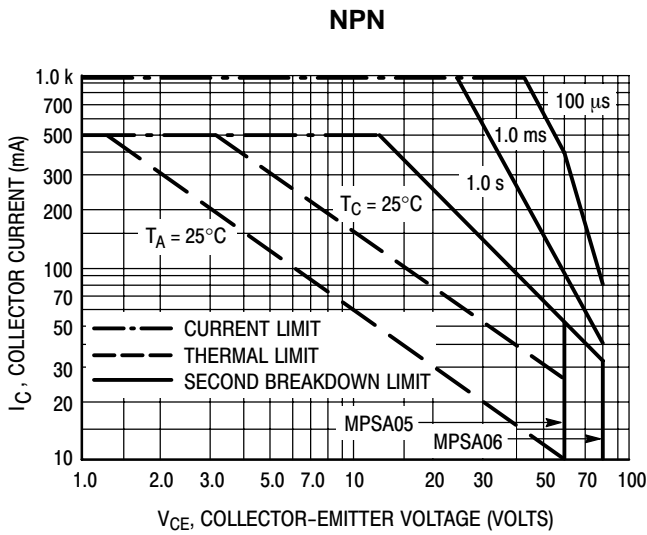


Figure 8. MPSA05/06 Active-Region Safe Operating Area

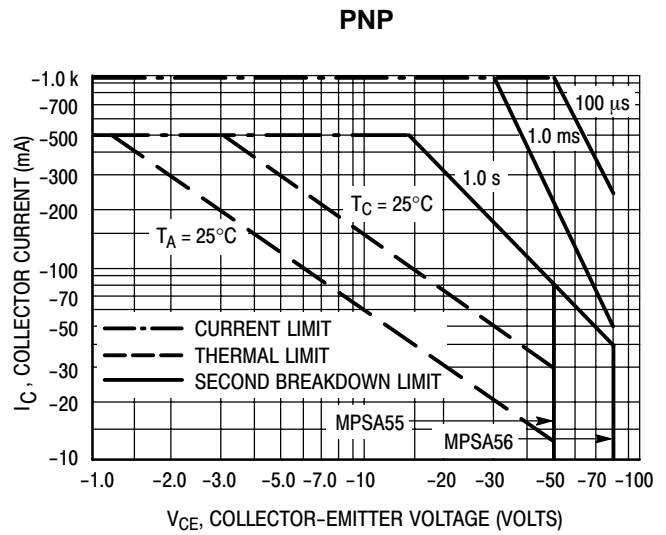


Figure 9. MPSA55/56 Active-Region Safe Operating Area

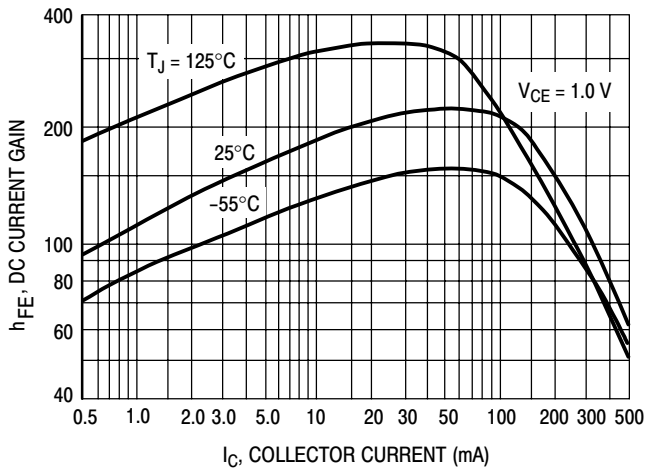


Figure 10. MPSA05/06 DC Current Gain

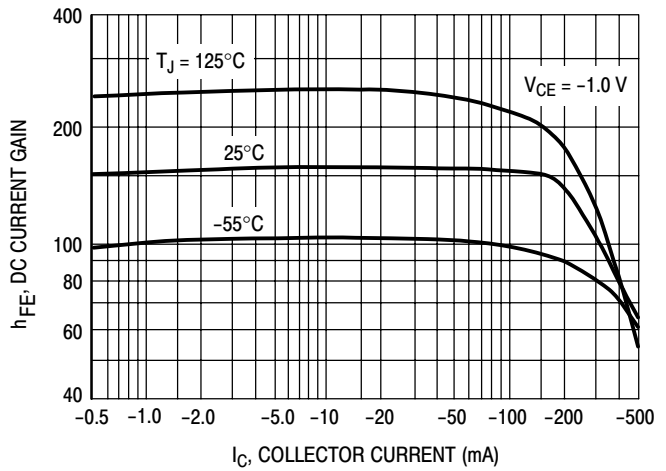


Figure 11. MPSA55/56 DC Current Gain

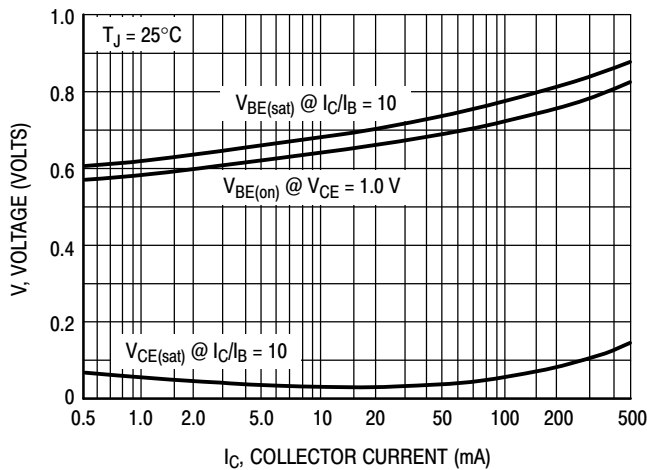


Figure 12. MPSA05/06 "ON" Voltages

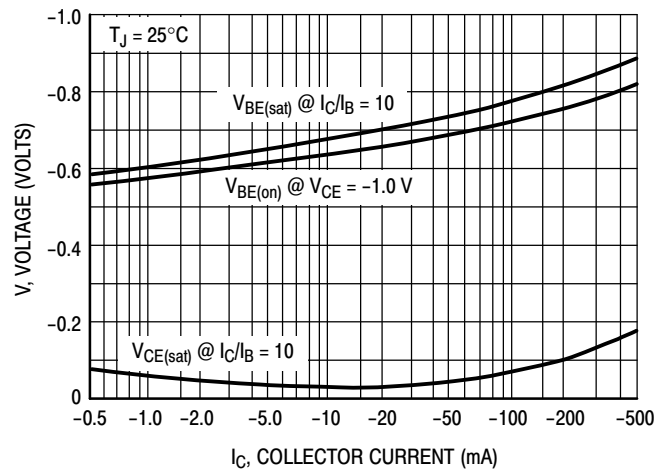


Figure 13. MPSA55/56 "ON" Voltages

(NPN) MPSA05, MPSA06\*, (PNP) MPSA55, MPSA56\*

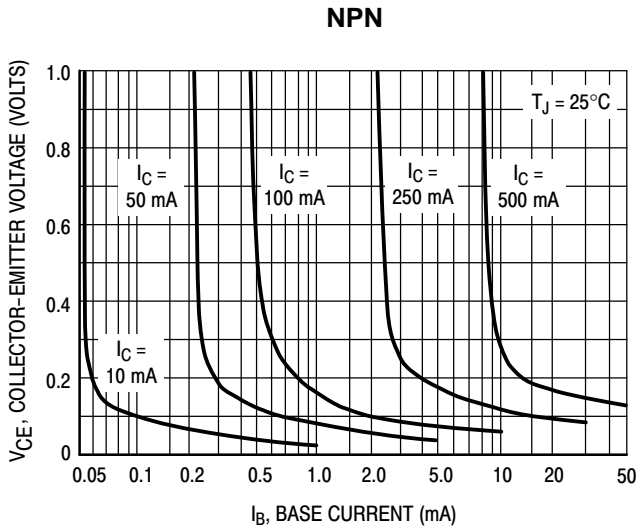


Figure 14. MPSA05/06 Collector Saturation Region

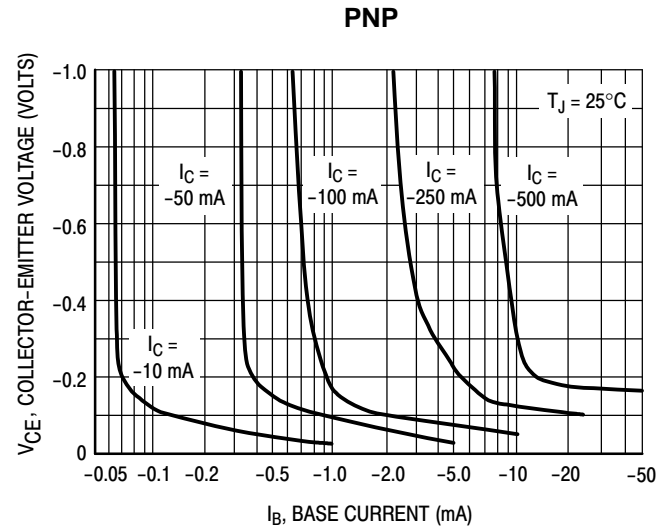


Figure 15. MPSA55/56 Collector Saturation Region

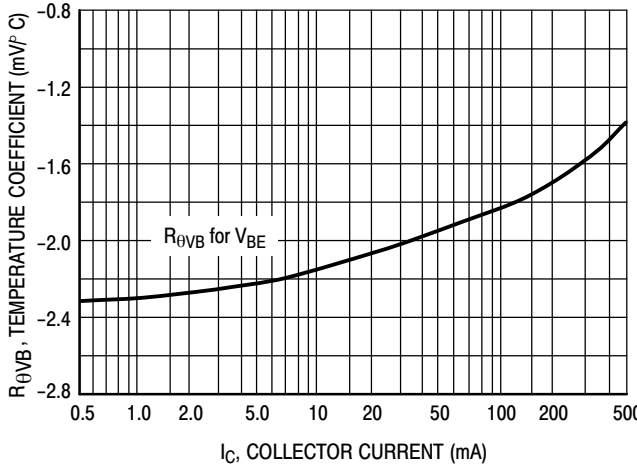


Figure 16. MPSA05/06 Base-Emitter Temperature Coefficient

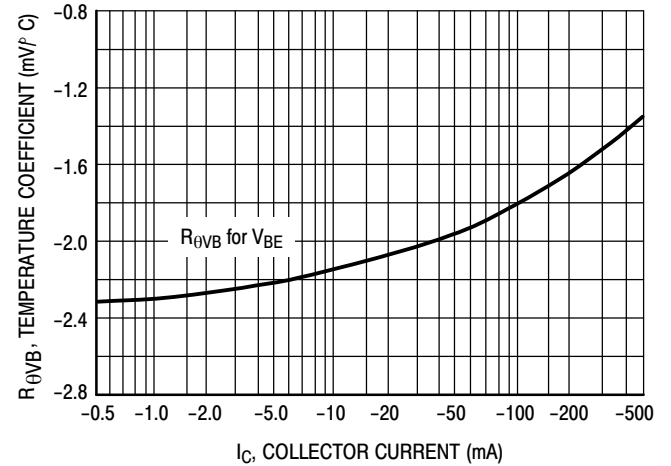


Figure 17. MPSA55/56 Base-Emitter Temperature Coefficient

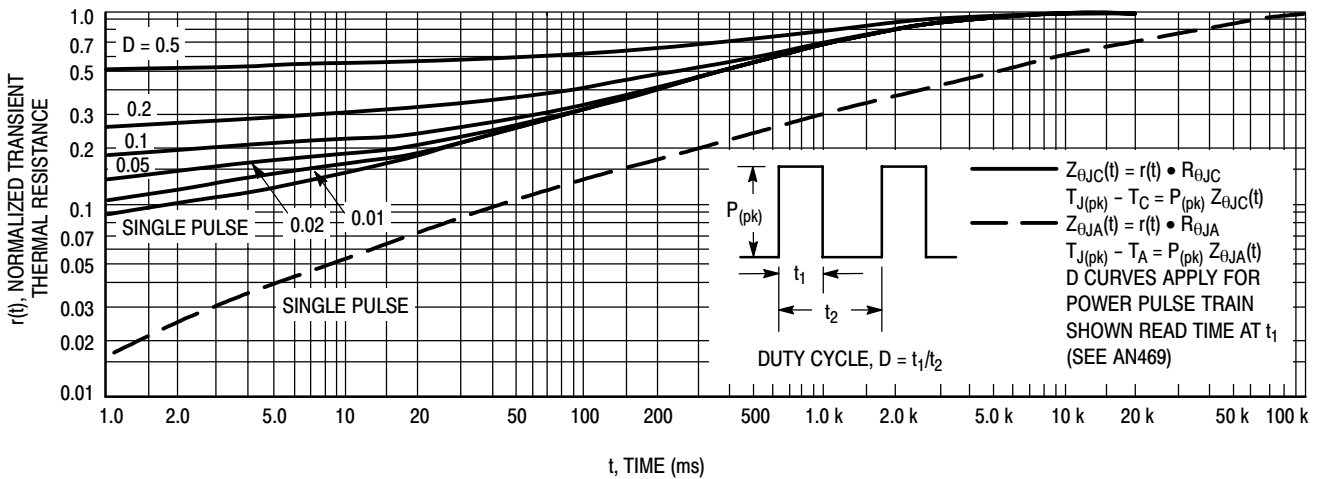


Figure 18. MPSA05, MPSA06, MPSA55 and MPSA56 Thermal Response

## (NPN) MPSA05, MPSA06\*, (PNP) MPSA55, MPSA56\*

### ORDERING INFORMATION

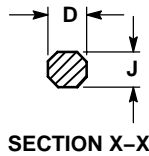
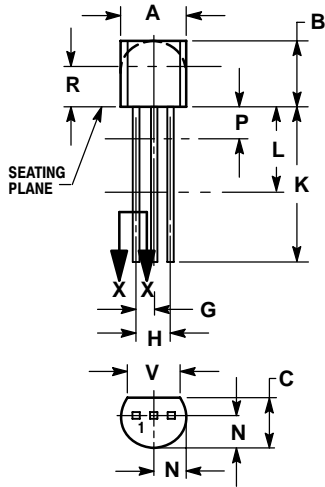
Device	Package	Shipping†
MPSA05	TO-92	5,000 Units / Box
MPSA05G	TO-92 (Pb-Free)	5,000 Units / Box
MPSA05RLRA	TO-92	2,000 / Tape & Reel
MPSA05RLRAG	TO-92 (Pb-Free)	2,000 / Tape & Reel
MPSA05RLRM	TO-92	2,000 / Ammo Pack
MPSA05RLRMG	TO-92 (Pb-Free)	2,000 / Ammo Pack
MPSA06	TO-92	5,000 Units / Box
MPSA06G	TO-92 (Pb-Free)	5,000 Units / Box
MPSA06RL1	TO-92	2,000 / Tape & Reel
MPSA06RL1G	TO-92 (Pb-Free)	2,000 / Tape & Reel
MPSA06RL	TO-92	2,000 / Tape & Reel
MPSA06RLG	TO-92 (Pb-Free)	2,000 / Tape & Reel
MPSA06RLRA	TO-92	2,000 / Tape & Reel
MPSA06RLRAG	TO-92 (Pb-Free)	2,000 / Tape & Reel
MPSA06RLRM	TO-92	2,000 / Ammo Pack
MPSA06RLRMG	TO-92 (Pb-Free)	2,000 / Ammo Pack
MPSA06RLRP	TO-92	2,000 / Ammo Pack
MPSA06RLRPG	TO-92 (Pb-Free)	2,000/Ammo Pack
MPSA55	TO-92	5,000 Units / Box
MPSA55G	TO-92 (Pb-Free)	5,000 Units / Box
MPSA55RLRA	TO-92	2,000 / Tape & Reel
MPSA55RLRAG	TO-92 (Pb-Free)	2,000 / Tape & Reel
MPSA56	TO-92	5,000 Units / Box
MPSA56G	TO-92 (Pb-Free)	5,000 Units / Box
MPSA56RLRA	TO-92	2,000 / Tape & Reel
MPSA56RLRAG	TO-92 (Pb-Free)	2,000 / Tape & Reel
MPSA56RLRM	TO-92	2,000 / Ammo Pack
MPSA56RLRMG	TO-92 (Pb-Free)	2,000 / Ammo Pack
MPSA56RLRP	TO-92	2,000 / Ammo Pack
MPSA56RLRPG	TO-92 (Pb-Free)	2,000 / Ammo Pack
MPSA56ZL1	TO-92	2,000 / Ammo Pack
MPSA56ZL1G	TO-92 (Pb-Free)	2,000 / 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 AL




### 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	---

### STYLE 1:

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

ON Semiconductor and  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

### PUBLICATION ORDERING INFORMATION

#### LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor  
P.O. Box 61312, Phoenix, Arizona 85082-1312 USA  
Phone: 480-829-7710 or 800-344-3860 Toll Free USA/Canada  
Fax: 480-829-7709 or 800-344-3867 Toll Free USA/Canada  
Email: [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

N. American Technical Support: 800-282-9855 Toll Free  
USA/Canada

Japan: ON Semiconductor, Japan Customer Focus Center  
2-9-1 Kamimeguro, Meguro-ku, Tokyo, Japan 153-0051  
Phone: 81-3-5773-3850

ON Semiconductor Website: <http://onsemi.com>

Order Literature: <http://www.onsemi.com/litorder>

For additional information, please contact your  
local Sales Representative.