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www.onsemi.com

NPN - MPS8099; PNP - MPS8599

Preferred Device

Amplifier Transistors

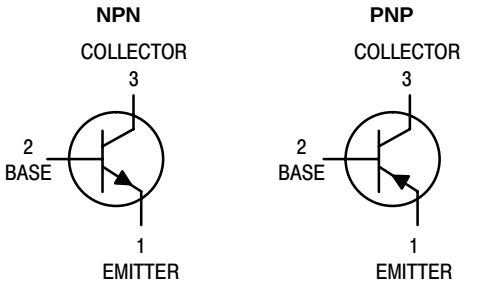
Voltage and Current are Negative for PNP Transistors

ON Semiconductor®

http://onsemi.com

Features

- Pb−Free Packages are Available*



MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector−Emitter Voltage	V_{CEO}	80	Vdc
Collector−Base Voltage	V_{CBO}	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	W mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−55 to +150	°C

THERMAL CHARACTERISTICS

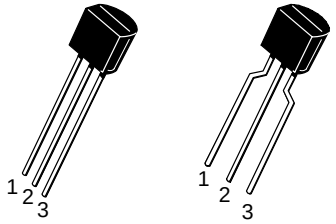
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction−to−Ambient (Note 1)	$R_{\theta JA}$	200	°C/W
Thermal Resistance, Junction−to−Case	$R_{\theta JC}$	83.3	°C/W

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.

1. $R_{\theta JA}$ 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.

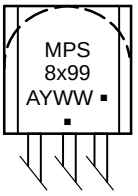
TO−92
CASE 29
STYLE 1



STRAIGHT LEAD
BULK PACK

BENT LEAD
TAPE & REEL
AMMO PACK

MARKING DIAGRAM



x = 0 or 5
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 3 of this data sheet.

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

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector−Emitter Breakdown Voltage (Note 2) (I_C = 10 mAdc, I_B = 0)	$V_{(BR)CEO}$	80	−	Vdc
Collector−Base Breakdown Voltage (I_C = 100 μAdc, I_E = 0)	$V_{(BR)CBO}$	80	−	Vdc
Emitter−Base Breakdown Voltage (I_E = 10 μAdc, I_C = 0)	$V_{(BR)EBO}$	5.0	−	Vdc
Collector Cutoff Current (V_{CE} = 60 Vdc, I_B = 0)	I_{CES}	−	0.1	μAdc
Collector Cutoff Current (V_{CB} = 80 Vdc, I_E = 0)	I_{CBO}	−	0.1	μAdc
Emitter Cutoff Current (V_{EB} = 4.0 Vdc, I_C = 0)	I_{EBO}	−	0.1	μAdc
ON CHARACTERISTICS (Note 2)				
DC Current Gain (I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc) (I_C = 10 mAdc, V_{CE} = 5.0 Vdc) (I_C = 100 mAdc, V_{CE} = 5.0 Vdc)	h_{FE}	 100 100 75	 300 − −	−
Collector−Emitter Saturation Voltage (I_C = 100 mAdc, I_B = 5.0 mAdc) (I_C = 100 mAdc, I_B = 10 mAdc)	$V_{CE(sat)}$	 − −	 0.4 0.3	Vdc
Base−Emitter On Voltage (I_C = 10 mAdc, V_{CE} = 5.0 Vdc)	$V_{BE(on)}$	0.6	0.8	Vdc
SMALL−SIGNAL CHARACTERISTICS				
Current−Gain − Bandwidth Product (I_C = 10 mAdc, V_{CE} = 5.0 Vdc, f = 100 MHz)	f_T	150	−	MHz
Output Capacitance (V_{CB} = 5.0 Vdc, I_E = 0, f = 1.0 MHz)	C_{obo}	−	8.0	pF
Input Capacitance (V_{EB} = 0.5 Vdc, I_C = 0, f = 1.0 MHz)	C_{ibo}	−	30	pF

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

ORDERING INFORMATION

Device	Package	Shipping†
MPS8099	TO−92	5000 Units / Bulk
MPS8099G	TO−92 (Pb−Free)	5000 Units / Bulk
MPS8099RLRA	TO−92	2000 / Tape & Reel
MPS8099RLRAG	TO−92 (Pb−Free)	2000 / Tape & Reel
MPS8099RLRP	TO−92	2000 / Ammo Pack
MPS8099RLRPG	TO−92 (Pb−Free)	2000 / Ammo Pack
MPS8599RLRA	TO−92	2000 / Tape & Reel
MPS8599RLRAG	TO−92 (Pb−Free)	2000 / Tape & Reel
MPS8599RLRMG	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.

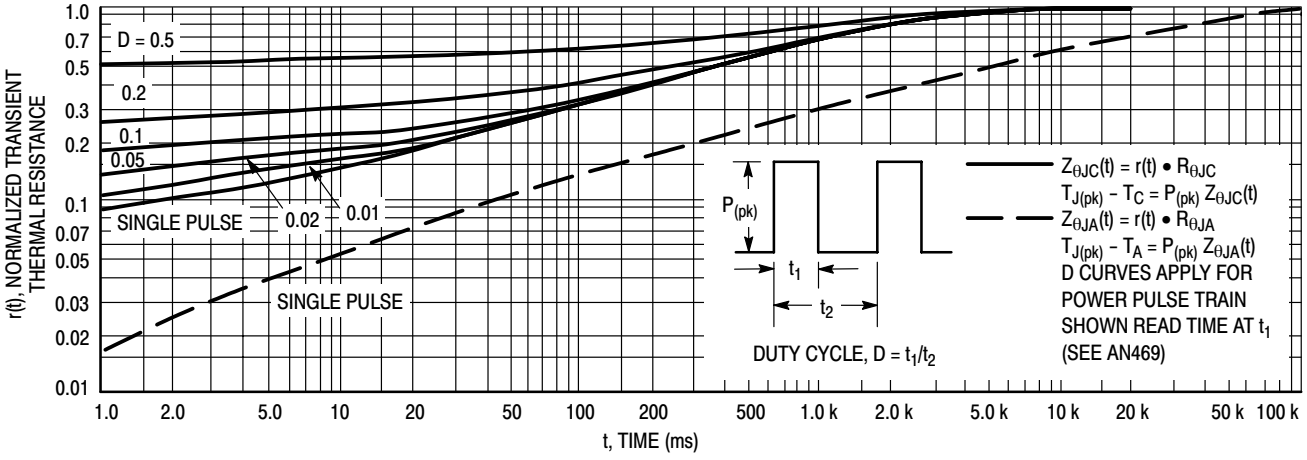
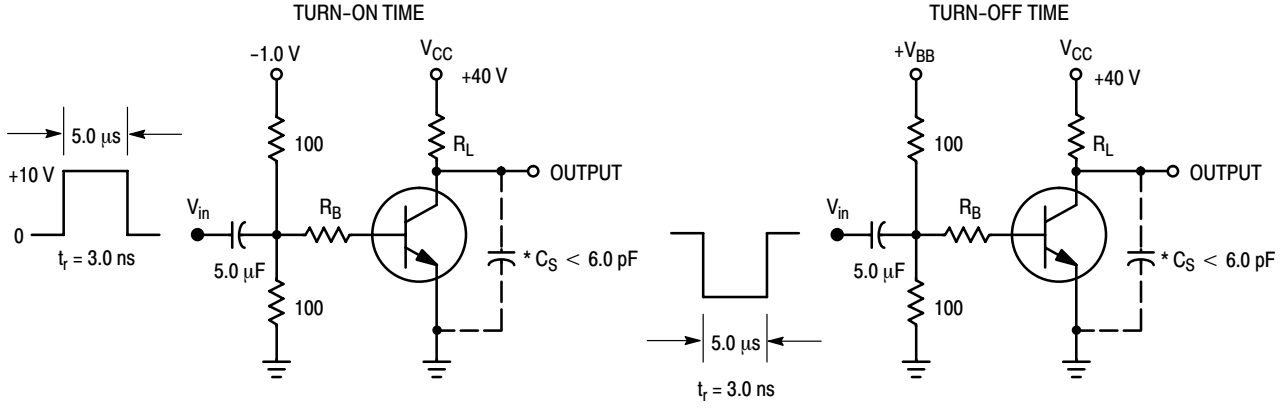


Figure 1. Thermal Response



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

Figure 2. Switching Time Test Circuits

NPN

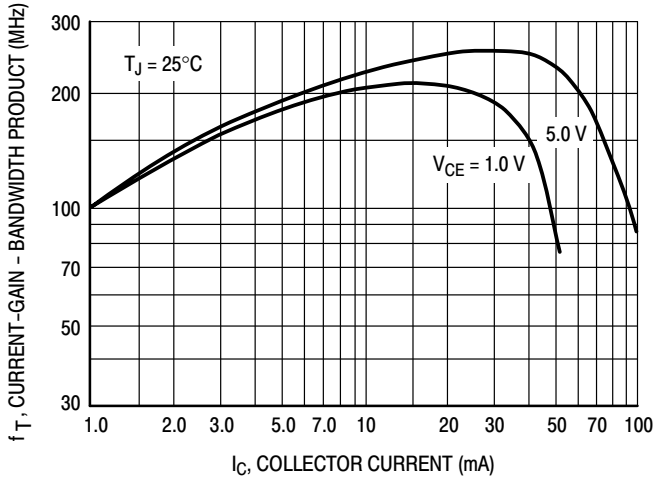


Figure 3. Current−Gain − Bandwidth Product

PNP

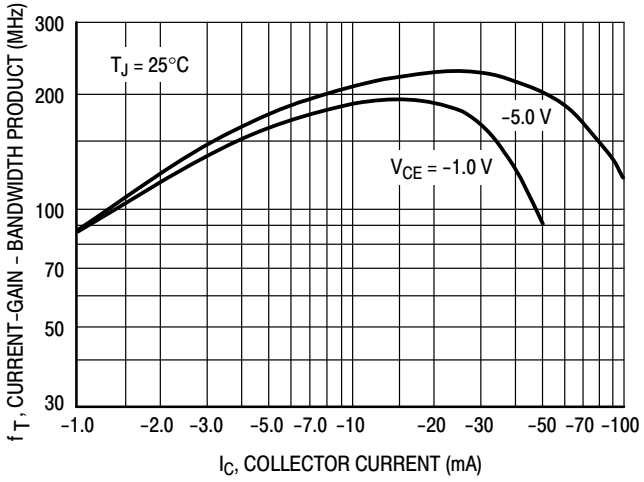


Figure 4. Current−Gain − Bandwidth Product

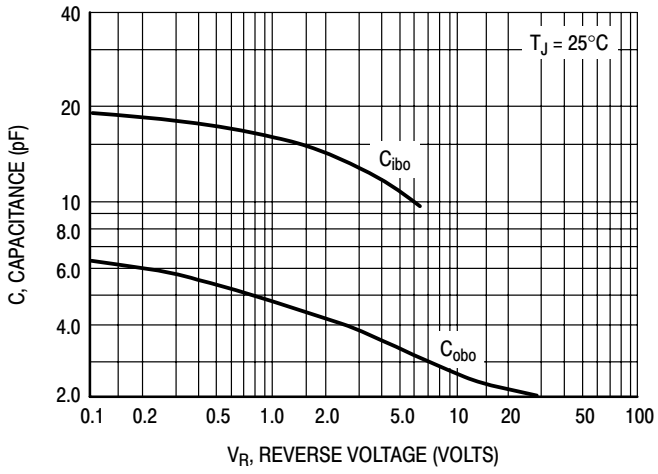


Figure 5. Capacitance

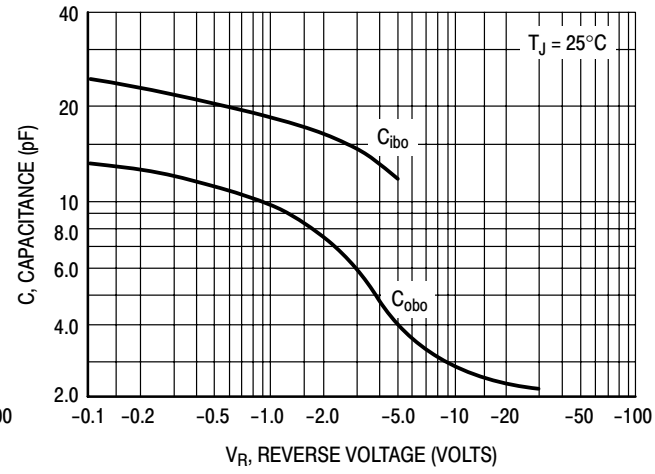


Figure 6. Capacitance

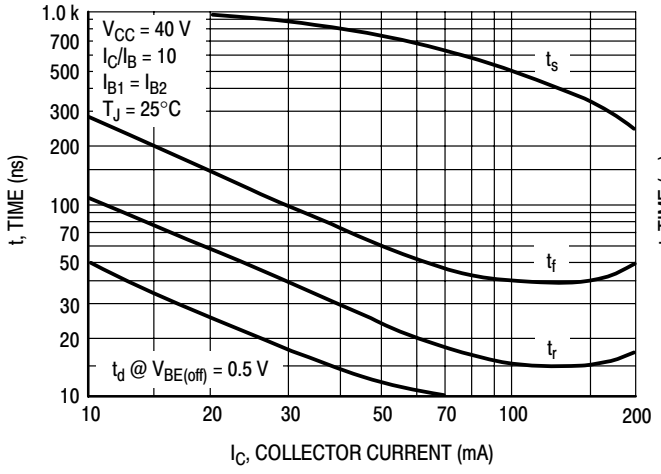


Figure 7. Switching Times

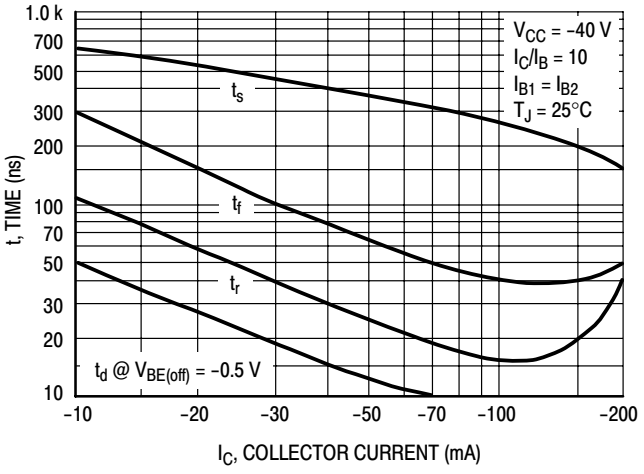


Figure 8. Switching Times

NPN

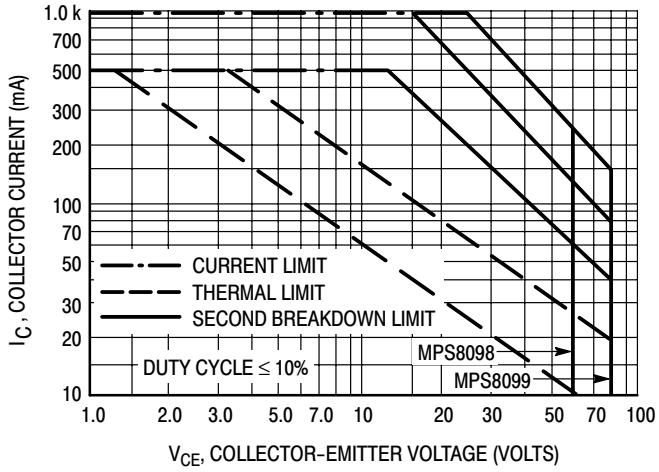


Figure 9. Active−Region Safe Operating Area

PNP

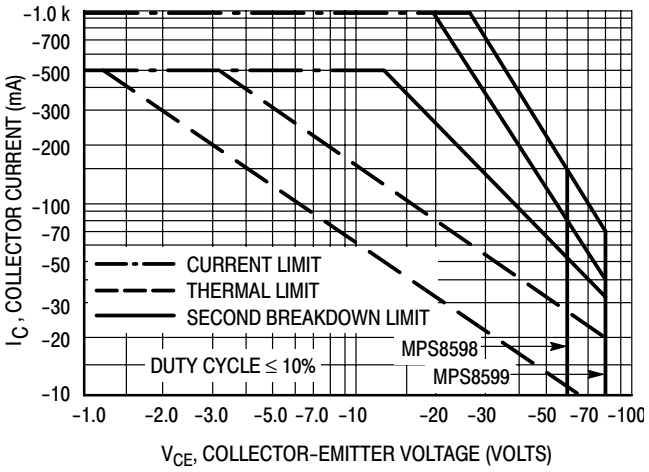


Figure 10. Active−Region Safe Operating Area

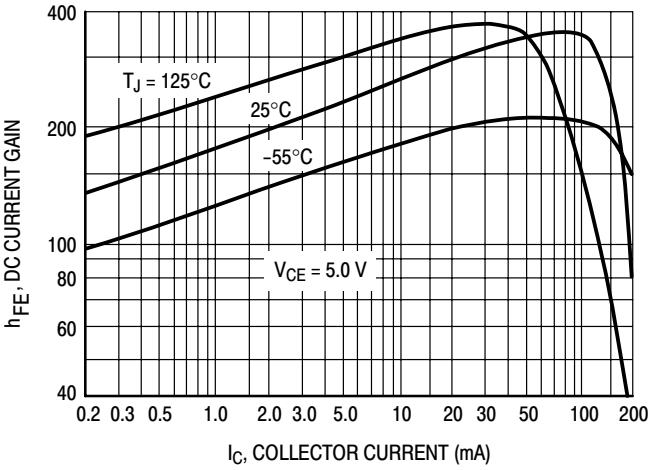


Figure 11. DC Current Gain

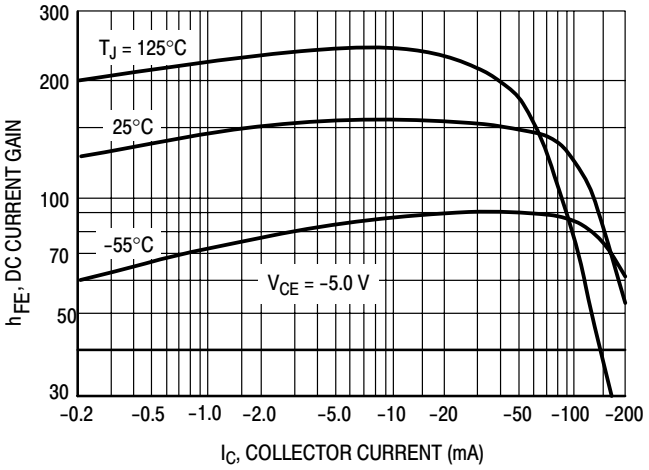


Figure 12. DC Current Gain

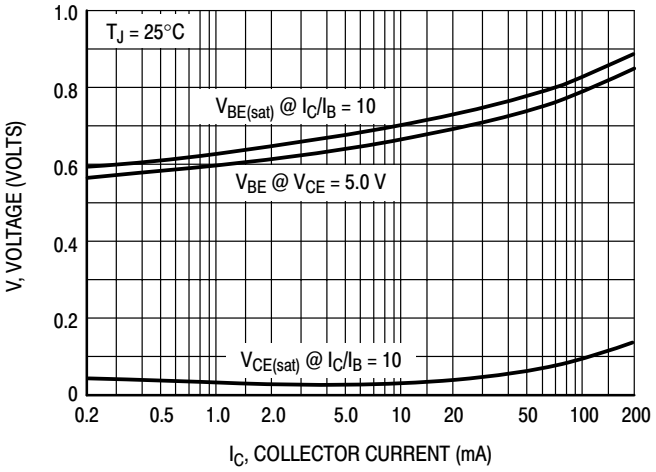


Figure 13. “ON” Voltages

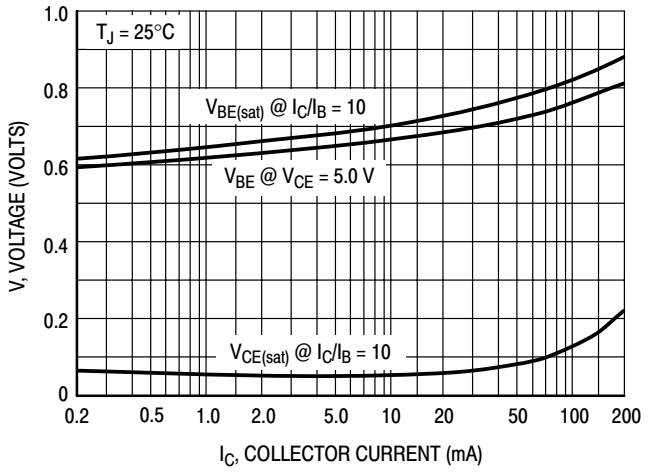


Figure 14. “ON” Voltages

NPN

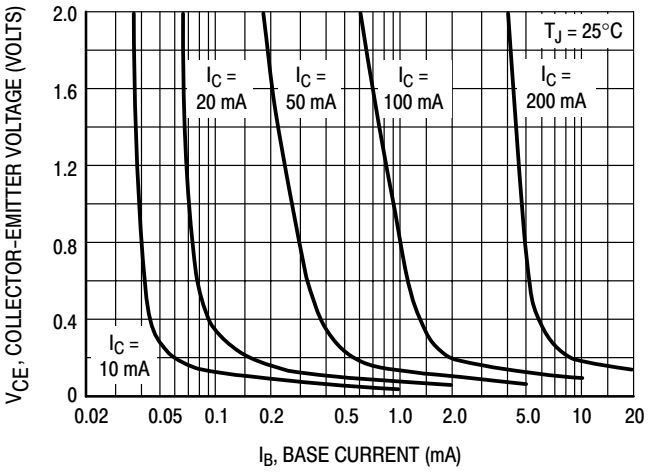


Figure 15. Collector Saturation Region

PNP

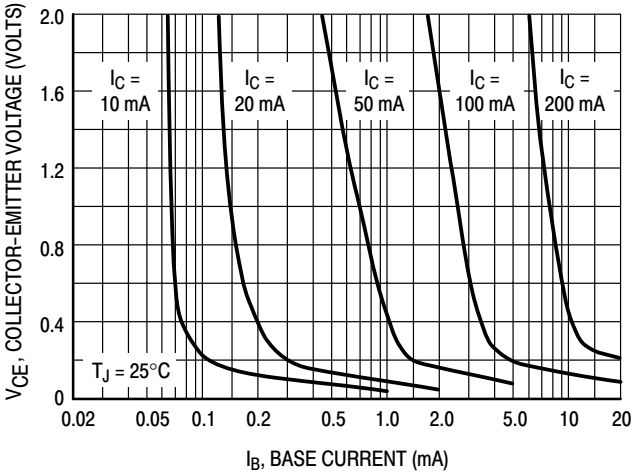


Figure 16. Collector Saturation Region

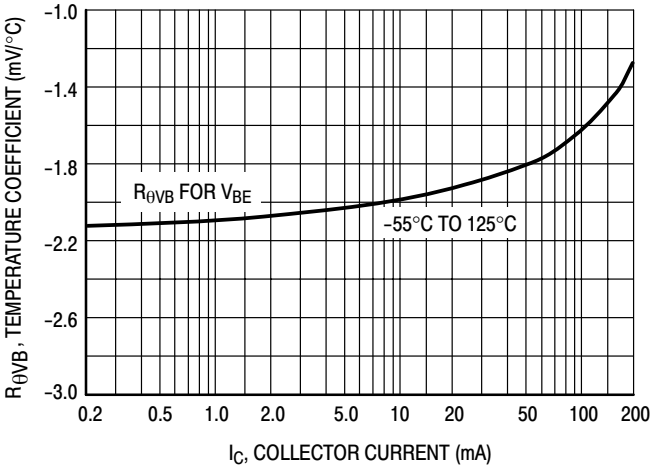


Figure 17. Base−Emitter Temperature Coefficient

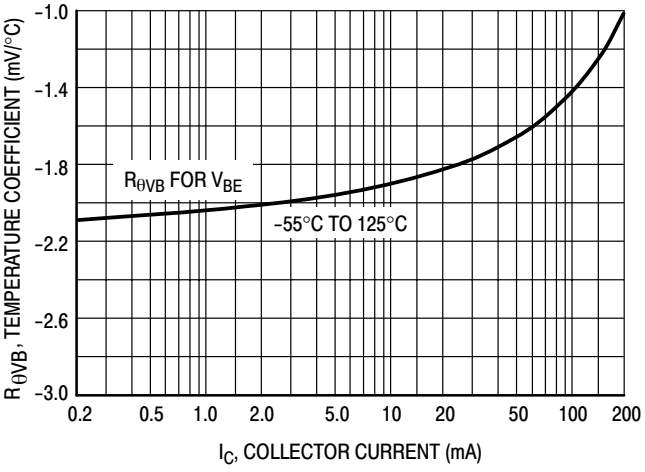
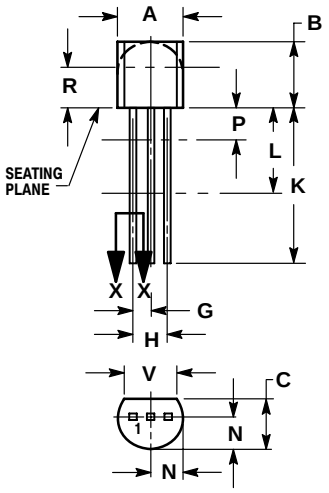


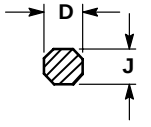
Figure 18. Base−Emitter Temperature Coefficient

PACKAGE DIMENSIONS

TO−92 (TO−226)
CASE 29−11
ISSUE AM



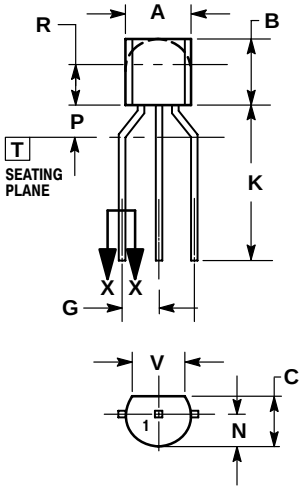
STRAIGHT LEAD
BULK PACK



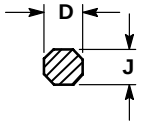
SECTION X−X

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	---



BENT LEAD
TAPE & REEL
AMMO PACK



SECTION X−X

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.

	MILLIMETERS	
DIM	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:
PIN 1. EMITTER
2. BASE
3. COLLECTOR

PUBLICATION ORDERING INFORMATION

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