

# ON Semiconductor

## Is Now

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# MPS2907A Series

## General Purpose Transistors

### PNP Silicon

#### Features

- These are Pb-Free Devices\*

#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector - Emitter Voltage	$V_{CEO}$	-60	Vdc
Collector - Base Voltage	$V_{CBO}$	-60	Vdc
Emitter - Base Voltage	$V_{EBO}$	-5.0	Vdc
Collector Current - Continuous	$I_C$	-600	mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	625 5.0	mW 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	$R_{\theta JA}$	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.

#### DEVICE MARKING

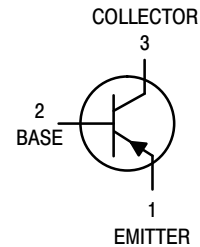
Device	Line 1	Line 2
MPS2907AG	MPS	2907A
MPS2907ARLG	MPS2	907A
MPS2907ARLRAG	MPS	2907
MPS2907ARLRPG	MPS	2907

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

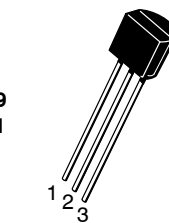


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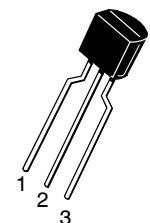
<http://onsemi.com>



TO-92  
CASE 29  
STYLE 1

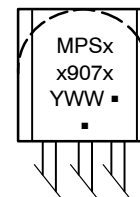


STRAIGHT LEAD  
BULK PACK



BENT LEAD  
TAPE & REEL  
AMMO PACK

#### MARKING DIAGRAM



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 4 of this data sheet.

# MPS2907A Series

## 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 1) (I <sub>C</sub> = –10 mAdc, I <sub>B</sub> = 0)	V <sub>(BR)CEO</sub>	–60	–	Vdc	
Collector – Base Breakdown Voltage (I <sub>C</sub> = –10 μAdc, I <sub>E</sub> = 0)	V <sub>(BR)CBO</sub>	–60	–	Vdc	
Emitter – Base Breakdown Voltage (I <sub>E</sub> = –10 μAdc, I <sub>C</sub> = 0)	V <sub>(BR)EBO</sub>	–5.0	–	Vdc	
Collector Cutoff Current (V <sub>CE</sub> = –30 Vdc, V <sub>EB(off)</sub> = –0.5 Vdc)	I <sub>CEX</sub>	–	–50	nAdc	
Collector Cutoff Current (V <sub>CB</sub> = –50 Vdc, I <sub>E</sub> = 0) (V <sub>CB</sub> = –50 Vdc, I <sub>E</sub> = 0, T <sub>A</sub> = 150°C)	I <sub>CBO</sub>	–	–0.01 –10	μAdc	
Base Current (V <sub>CE</sub> = –30 Vdc, V <sub>EB(off)</sub> = –0.5 Vdc)	I <sub>B</sub>	–	–50	nAdc	
<b>ON CHARACTERISTICS</b>					
DC Current Gain (I <sub>C</sub> = –0.1 mAdc, V <sub>CE</sub> = –10 Vdc) (I <sub>C</sub> = –1.0 mAdc, V <sub>CE</sub> = –10 Vdc) (I <sub>C</sub> = –10 mAdc, V <sub>CE</sub> = –10 Vdc) (I <sub>C</sub> = –150 mAdc, V <sub>CE</sub> = –10 Vdc) (Note 1) (I <sub>C</sub> = –500 mAdc, V <sub>CE</sub> = –10 Vdc) (Note 1)	h <sub>FE</sub>	75 100 100 100 50	– – – 300 –	–	
Collector – Emitter Saturation Voltage (Note 1) (I <sub>C</sub> = –150 mAdc, I <sub>B</sub> = –15 mAdc) (I <sub>C</sub> = –500 mAdc, I <sub>B</sub> = –50 mAdc)	V <sub>CE(sat)</sub>	– –	–0.4 –1.6	Vdc	
Base – Emitter Saturation Voltage (Note 1) (I <sub>C</sub> = –150 mAdc, I <sub>B</sub> = –15 mAdc) (I <sub>C</sub> = –500 mAdc, I <sub>B</sub> = –50 mAdc)	V <sub>BE(sat)</sub>	– –	–1.3 –2.6	Vdc	
<b>SMALL – SIGNAL CHARACTERISTICS</b>					
Current – Gain – Bandwidth Product (Notes 1 and 2), (I <sub>C</sub> = –50 mAdc, V <sub>CE</sub> = –20 Vdc, f = 100 MHz)	f <sub>T</sub>	200	–	MHz	
Output Capacitance (V <sub>CB</sub> = –10 Vdc, I <sub>E</sub> = 0, f = 1.0 MHz)	C <sub>obo</sub>	–	8.0	pF	
Input Capacitance (V <sub>EB</sub> = –2.0 Vdc, I <sub>C</sub> = 0, f = 1.0 MHz)	C <sub>ibo</sub>	–	30	pF	
<b>SWITCHING CHARACTERISTICS</b>					
Turn-On Time	(V <sub>CC</sub> = –30 Vdc, I <sub>C</sub> = –150 mAdc, I <sub>B1</sub> = –15 mAdc) (Figures 1 and 5)	t <sub>on</sub>	–	45	ns
Delay Time		t <sub>d</sub>	–	10	ns
Rise Time		t <sub>r</sub>	–	40	ns
Turn-Off Time	(V <sub>CC</sub> = –6.0 Vdc, I <sub>C</sub> = –150 mAdc, I <sub>B1</sub> = I <sub>B2</sub> = 15 mAdc) (Figure 2)	t <sub>off</sub>	–	100	ns
Storage Time		t <sub>s</sub>	–	80	ns
Fall Time		t <sub>f</sub>	–	30	ns

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
2. f<sub>T</sub> is defined as the frequency at which |h<sub>fe</sub>| extrapolates to unity.

# MPS2907A Series

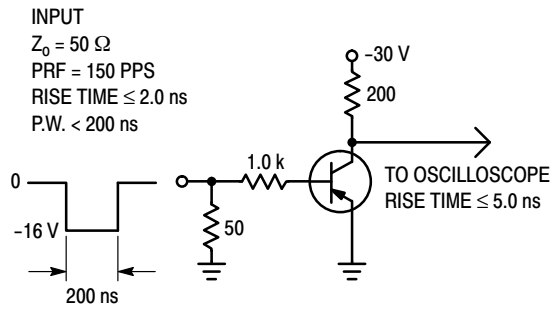


Figure 1. Delay and Rise Time Test Circuit

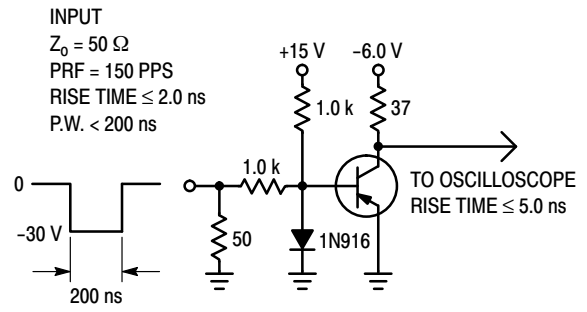


Figure 2. Storage and Fall Time Test Circuit

## TYPICAL CHARACTERISTICS

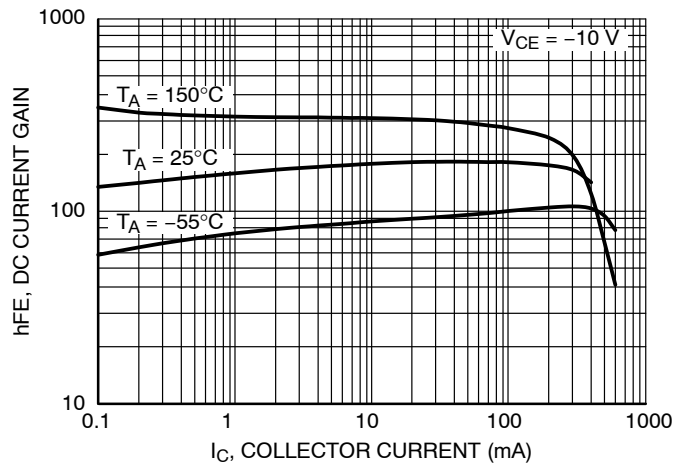


Figure 3. DC Current Gain

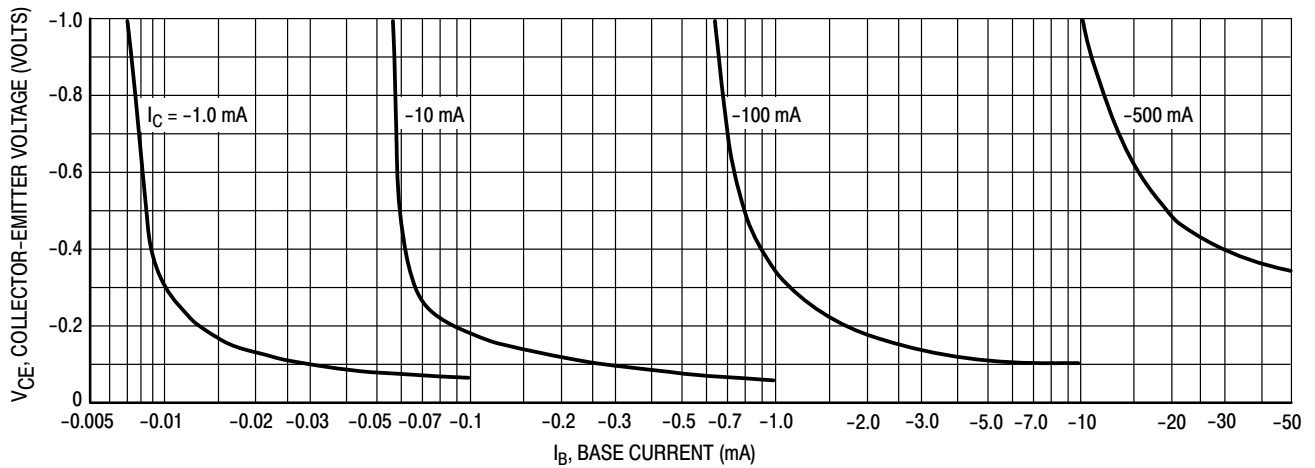


Figure 4. Collector Saturation Region

# MPS2907A Series

## ORDERING INFORMATION

Device	Package	Shipping†
MPS2907AG	TO-92 (Pb-Free)	5000 Units / Bulk
MPS2907ARLG	TO-92 (Pb-Free)	2000 / Tape & Reel
MPS2907ARLRAG	TO-92 (Pb-Free)	
MPS2907ARLRPG	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 Specifications Brochure, BRD8011/D.

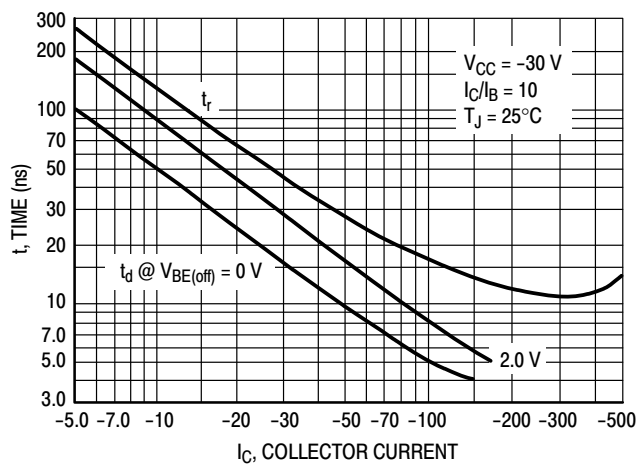


Figure 5. Turn-On Time

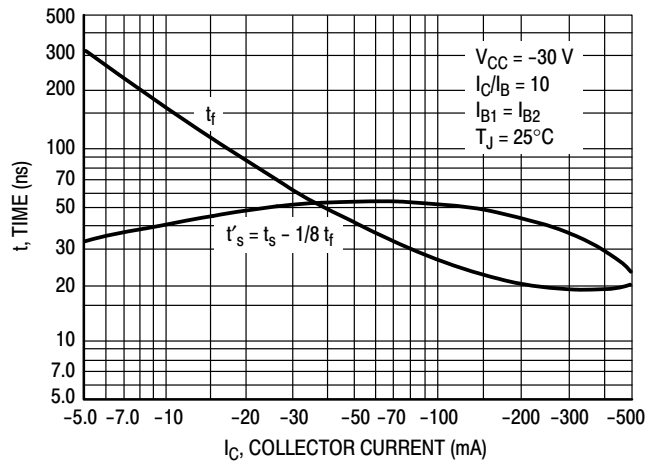


Figure 6. Turn-Off Time

# MPS2907A Series

## TYPICAL SMALL-SIGNAL CHARACTERISTICS NOISE FIGURE

$V_{CE} = 10 \text{ Vdc}$ ,  $T_A = 25^\circ\text{C}$

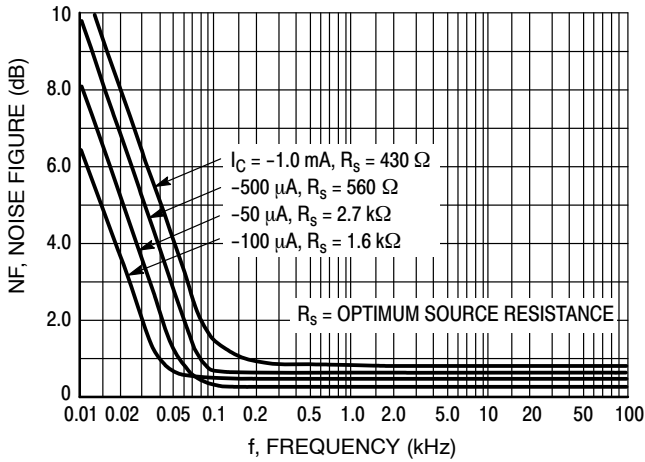


Figure 7. Frequency Effects

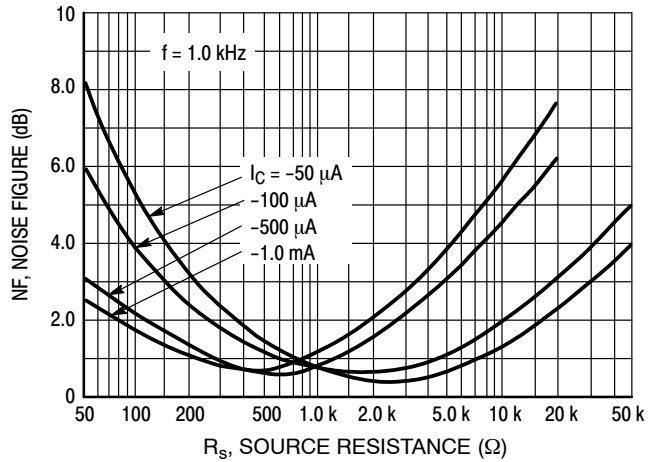


Figure 8. Source Resistance Effects

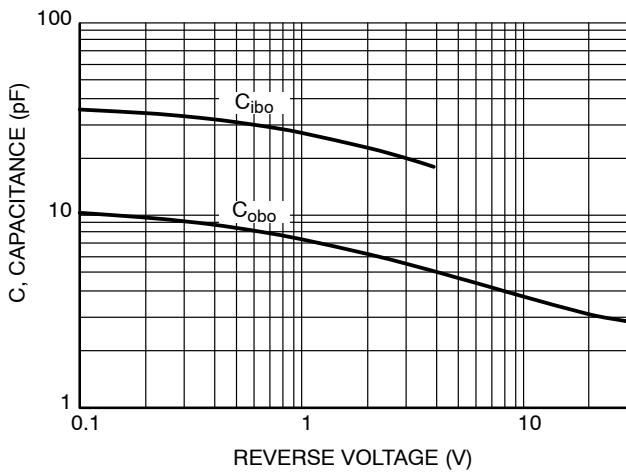


Figure 9. Capacitances

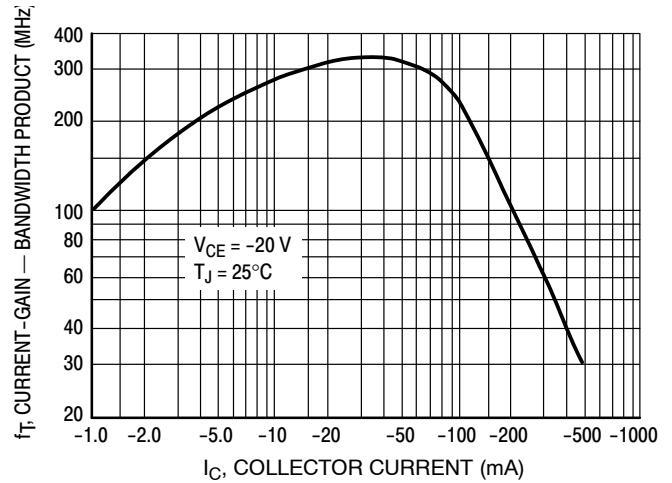


Figure 10. Current-Gain - Bandwidth Product

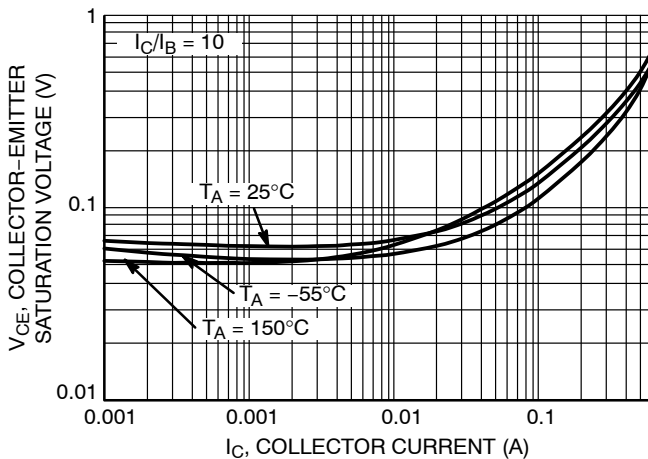


Figure 11. Collector-Emitter Saturation Voltage vs. Collector Current

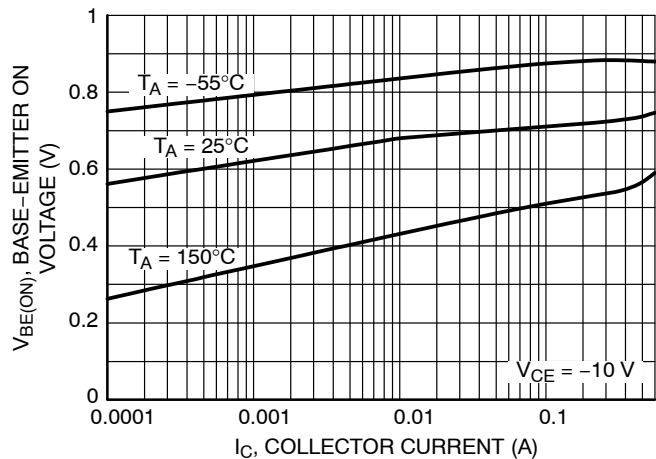
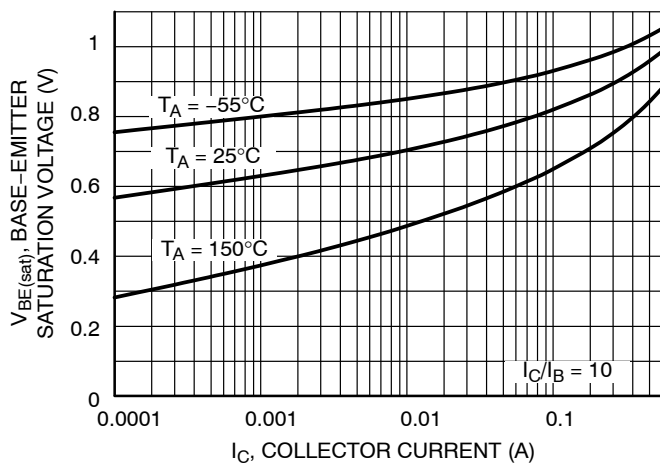
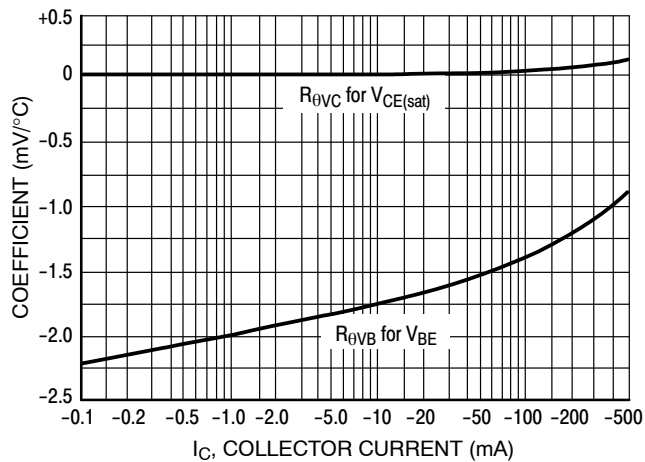


Figure 12. Base-Emitter Turn-ON Voltage vs. Collector Current

# MPS2907A Series



**Figure 13. Base Emitter Saturation Voltage vs. Collector Current**



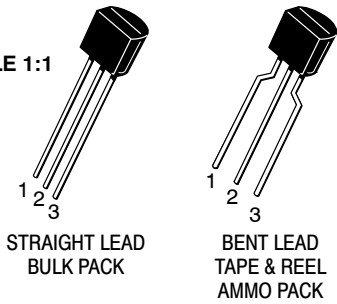
**Figure 14. Temperature Coefficients**

# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

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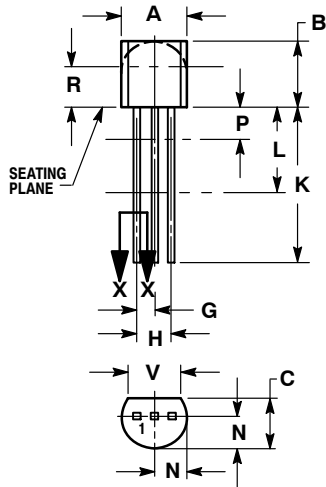


SCALE 1:1

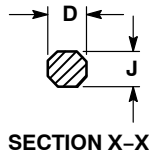


TO-92 (TO-226)  
CASE 29-11  
ISSUE AM

DATE 09 MAR 2007



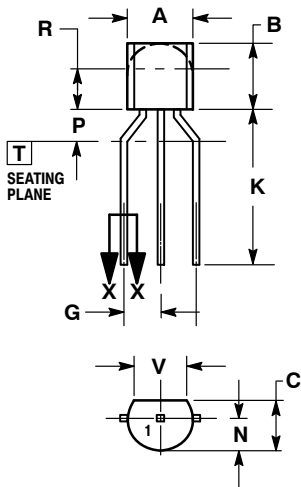
STRAIGHT LEAD  
BULK PACK



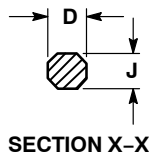
NOTES:

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	---

STYLES ON PAGE 2

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

DATE 09 MAR 2007

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

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

STYLE 3:  
 PIN 1. ANODE  
 2. ANODE  
 3. CATHODE

STYLE 4:  
 PIN 1. CATHODE  
 2. CATHODE  
 3. ANODE

STYLE 5:  
 PIN 1. DRAIN  
 2. SOURCE  
 3. GATE

STYLE 6:  
 PIN 1. GATE  
 2. SOURCE & SUBSTRATE  
 3. DRAIN

STYLE 7:  
 PIN 1. SOURCE  
 2. DRAIN  
 3. GATE

STYLE 8:  
 PIN 1. DRAIN  
 2. GATE  
 3. SOURCE & SUBSTRATE

STYLE 9:  
 PIN 1. BASE 1  
 2. EMITTER  
 3. BASE 2

STYLE 10:  
 PIN 1. CATHODE  
 2. GATE  
 3. ANODE

STYLE 11:  
 PIN 1. ANODE  
 2. CATHODE & ANODE  
 3. CATHODE

STYLE 12:  
 PIN 1. MAIN TERMINAL 1  
 2. GATE  
 3. MAIN TERMINAL 2

STYLE 13:  
 PIN 1. ANODE 1  
 2. GATE  
 3. CATHODE 2

STYLE 14:  
 PIN 1. EMITTER  
 2. COLLECTOR  
 3. BASE

STYLE 15:  
 PIN 1. ANODE 1  
 2. CATHODE  
 3. ANODE 2

STYLE 16:  
 PIN 1. ANODE  
 2. GATE  
 3. CATHODE

STYLE 17:  
 PIN 1. COLLECTOR  
 2. BASE  
 3. EMITTER

STYLE 18:  
 PIN 1. ANODE  
 2. CATHODE  
 3. NOT CONNECTED

STYLE 19:  
 PIN 1. GATE  
 2. ANODE  
 3. CATHODE

STYLE 20:  
 PIN 1. NOT CONNECTED  
 2. CATHODE  
 3. ANODE

STYLE 21:  
 PIN 1. COLLECTOR  
 2. EMITTER  
 3. BASE

STYLE 22:  
 PIN 1. SOURCE  
 2. GATE  
 3. DRAIN

STYLE 23:  
 PIN 1. GATE  
 2. SOURCE  
 3. DRAIN

STYLE 24:  
 PIN 1. EMITTER  
 2. COLLECTOR/ANODE  
 3. CATHODE

STYLE 25:  
 PIN 1. MT 1  
 2. GATE  
 3. MT 2

STYLE 26:  
 PIN 1. V<sub>CC</sub>  
 2. GROUND 2  
 3. OUTPUT

STYLE 27:  
 PIN 1. MT  
 2. SUBSTRATE  
 3. MT

STYLE 28:  
 PIN 1. CATHODE  
 2. ANODE  
 3. GATE

STYLE 29:  
 PIN 1. NOT CONNECTED  
 2. ANODE  
 3. CATHODE

STYLE 30:  
 PIN 1. DRAIN  
 2. GATE  
 3. SOURCE

STYLE 31:  
 PIN 1. GATE  
 2. DRAIN  
 3. SOURCE

STYLE 32:  
 PIN 1. BASE  
 2. COLLECTOR  
 3. EMITTER

STYLE 33:  
 PIN 1. RETURN  
 2. INPUT  
 3. OUTPUT

STYLE 34:  
 PIN 1. INPUT  
 2. GROUND  
 3. LOGIC

STYLE 35:  
 PIN 1. GATE  
 2. COLLECTOR  
 3. EMITTER

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