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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°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	$R_{\theta JA}$	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.

DEVICE MARKING

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

COLLECTOR
3

2
BASE

1
EMITTER

**TO−92
CASE 29
STYLE 1**

STRAIGHT LEAD
BULK PACK

BENT LEAD
TAPE & REEL
AMMO PACK

1
2
3

1
2
3

MARKING DIAGRAM

MPSx
x907x
YWW ▪

Y = Year
WW = Work Week
▪ = Pb−Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

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

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

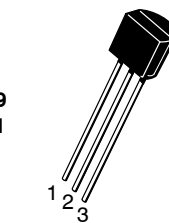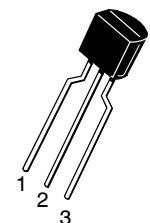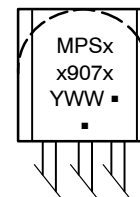| Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector – Emitter Breakdown Voltage (Note 1) (I_C = –10 mAdc, I_B = 0)	$V_{(BR)CEO}$	–60	–	Vdc
Collector – Base Breakdown Voltage (I_C = –10 μAdc, I_E = 0)	$V_{(BR)CBO}$	–60	–	Vdc
Emitter – Base Breakdown Voltage (I_E = –10 μAdc, I_C = 0)	$V_{(BR)EBO}$	–5.0	–	Vdc
Collector Cutoff Current (V_{CE} = –30 Vdc, $V_{EB(off)}$ = –0.5 Vdc)	I_{CEX}	–	–50	nAdc
Collector Cutoff Current (V_{CB} = –50 Vdc, I_E = 0) (V_{CB} = –50 Vdc, I_E = 0, T_A = 150°C)	I_{CBO}	– –	–0.01 –10	μAdc
Base Current (V_{CE} = –30 Vdc, $V_{EB(off)}$ = –0.5 Vdc)	I_B	–	–50	nAdc
ON CHARACTERISTICS				
DC Current Gain (I_C = –0.1 mAdc, V_{CE} = –10 Vdc) (I_C = –1.0 mAdc, V_{CE} = –10 Vdc) (I_C = –10 mAdc, V_{CE} = –10 Vdc) (I_C = –150 mAdc, V_{CE} = –10 Vdc) (Note 1) (I_C = –500 mAdc, V_{CE} = –10 Vdc) (Note 1)	h_{FE}	75 100 100 100 50	– – – 300 –	–
Collector – Emitter Saturation Voltage (Note 1) (I_C = –150 mAdc, I_B = –15 mAdc) (I_C = –500 mAdc, I_B = –50 mAdc)	$V_{CE(sat)}$	– –	–0.4 –1.6	Vdc
Base – Emitter Saturation Voltage (Note 1) (I_C = –150 mAdc, I_B = –15 mAdc) (I_C = –500 mAdc, I_B = –50 mAdc)	$V_{BE(sat)}$	– –	–1.3 –2.6	Vdc
SMALL–SIGNAL CHARACTERISTICS				
Current – Gain – Bandwidth Product (Notes 1 and 2), (I_C = –50 mAdc, V_{CE} = –20 Vdc, f = 100 MHz)	f_T	200	–	MHz
Output Capacitance (V_{CB} = –10 Vdc, I_E = 0, f = 1.0 MHz)	C_{obo}	–	8.0	pF
Input Capacitance (V_{EB} = –2.0 Vdc, I_C = 0, f = 1.0 MHz)	C_{ibo}	–	30	pF

SWITCHING CHARACTERISTICS

Characteristic	Conditions	Symbol	Min	Max	Unit
Turn–On Time	(V_{CC} = –30 Vdc, I_C = –150 mAdc, I_{B1} = –15 mAdc) (Figures 1 and 5)	t_{on}	–	45	ns
Delay Time		t_d	–	10	ns
Rise Time		t_r	–	40	ns
Turn–Off Time	(V_{CC} = –6.0 Vdc, I_C = –150 mAdc, I_{B1} = I_{B2} = 15 mAdc) (Figure 2)	t_{off}	–	100	ns
Storage Time		t_s	–	80	ns
Fall Time		t_f	–	30	ns

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
2. f_T is defined as the frequency at which $|h_{fe}|$ extrapolates to unity.
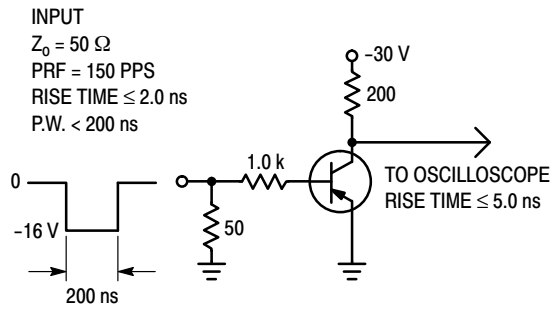
MPS2907A Series

INPUT
Z_0 = 50 Ω
PRF = 150 PPS
RISE TIME ≤ 2.0 ns
P.W. < 200 ns

Figure 1. Delay and Rise Time Test Circuit

INPUT
Z_0 = 50 Ω
PRF = 150 PPS
RISE TIME ≤ 2.0 ns
P.W. < 200 ns
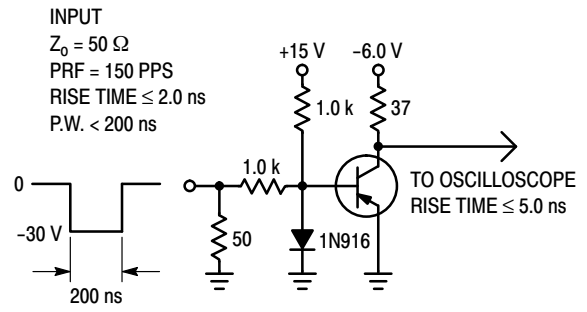
Figure 2. Storage and Fall Time Test Circuit

TYPICAL CHARACTERISTICS
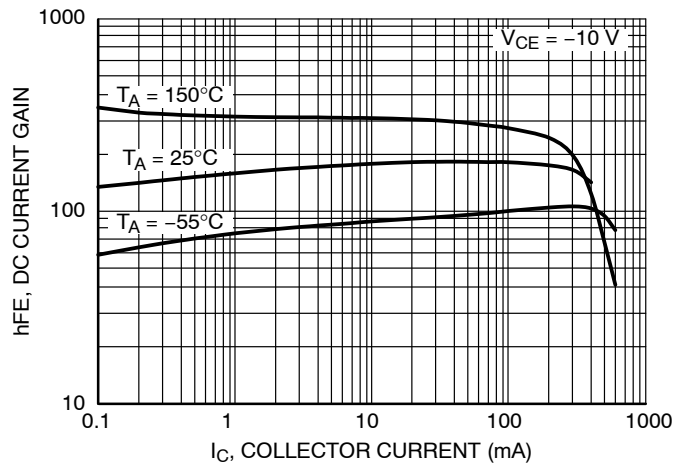
Figure 3. DC Current Gain
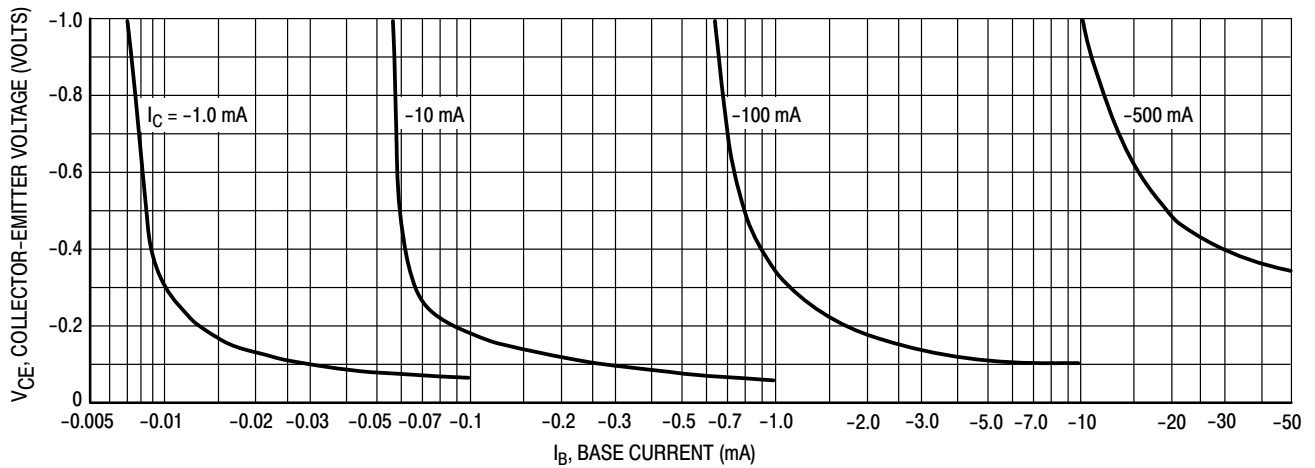
Figure 4. Collector Saturation Region

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)	2000 / Tape & Reel
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.
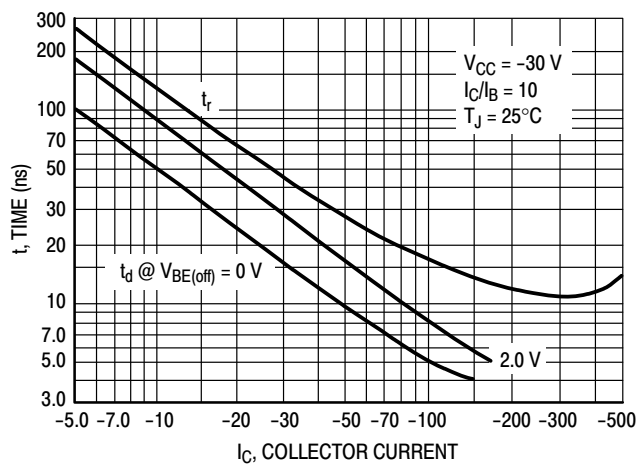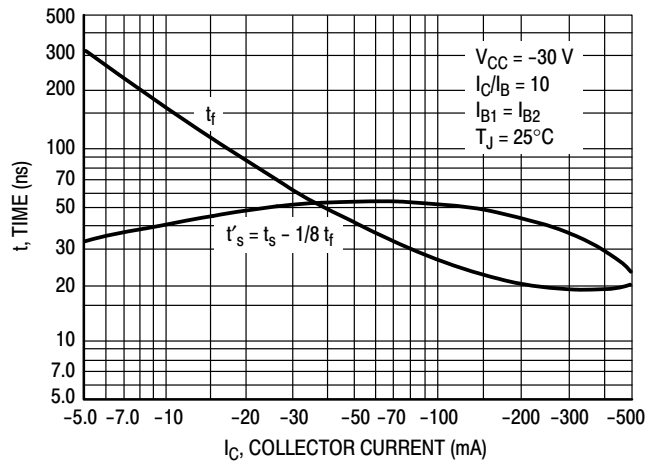

Figure 5. Turn−On Time

Figure 6. Turn−Off Time

TYPICAL SMALL−SIGNAL CHARACTERISTICS
NOISE FIGURE
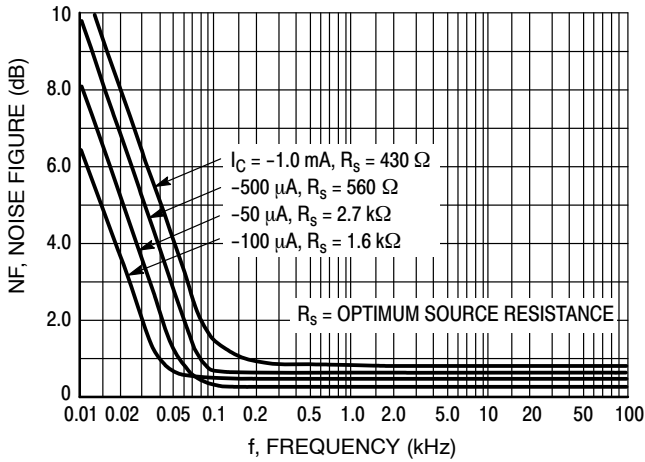V_{CE} = 10 Vdc, T_A = 25°C
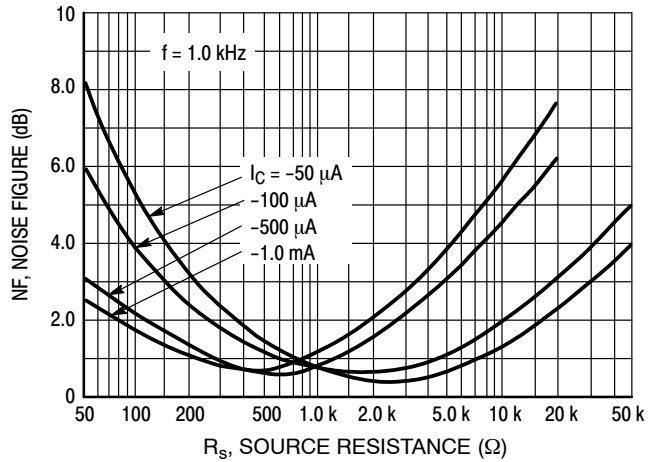

Figure 7. Frequency Effects

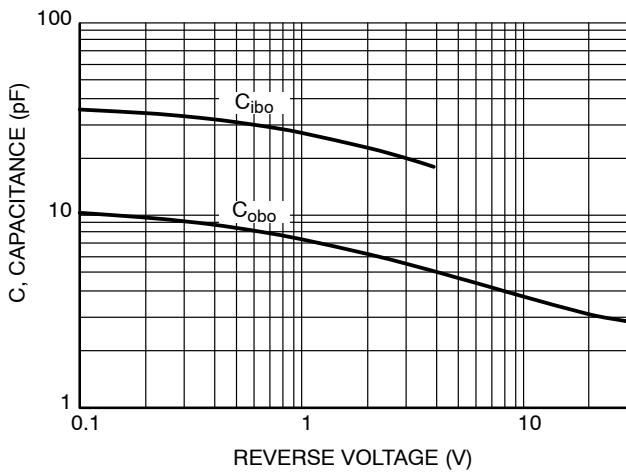
Figure 8. Source Resistance Effects
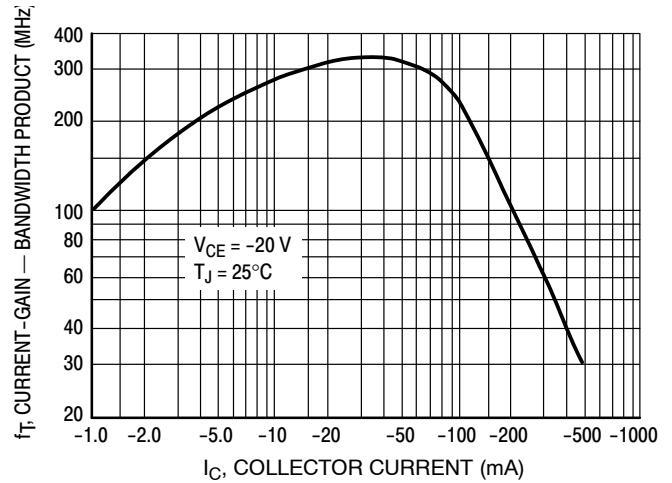

Figure 9. Capacitances

Figure 10. Current−Gain − Bandwidth Product

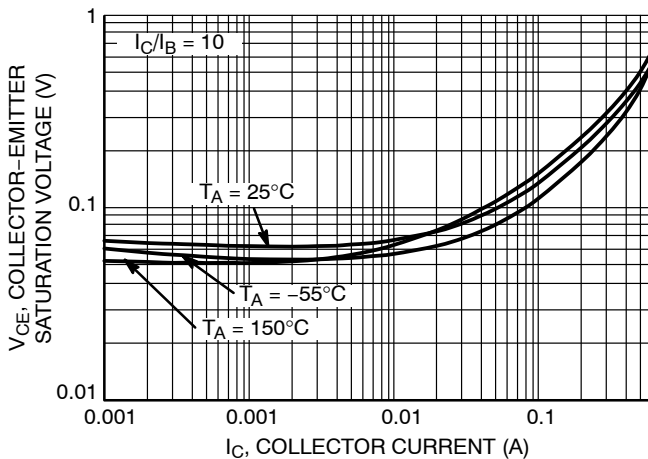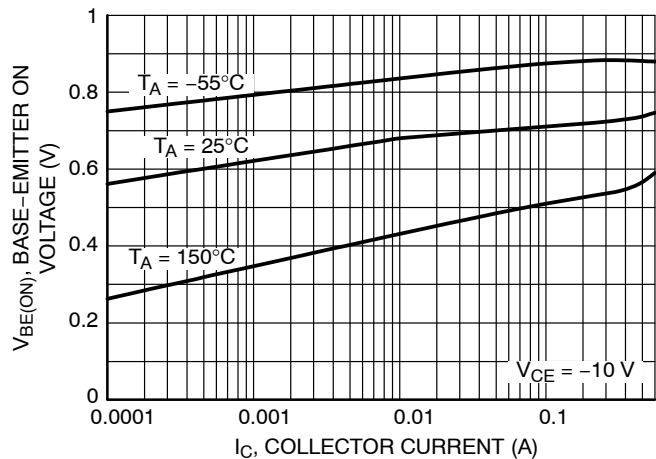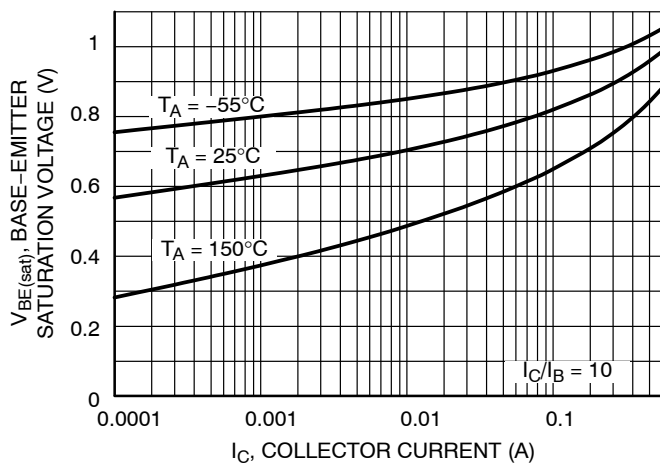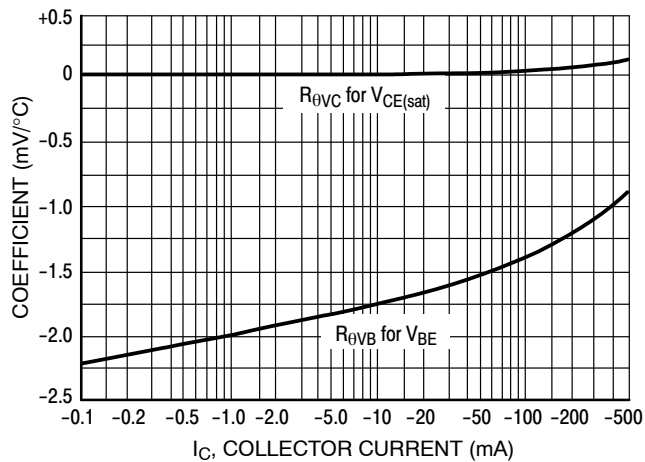Figure 11. Collector−Emitter Saturation
Voltage vs. Collector Current

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

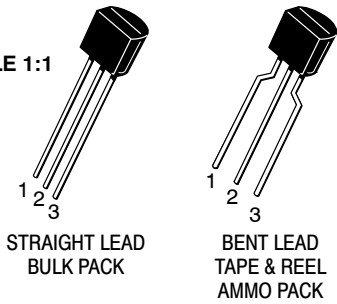**Figure 13. Base Emitter Saturation Voltage vs.
Collector Current**

Figure 14. Temperature Coefficients

MECHANICAL CASE OUTLINE
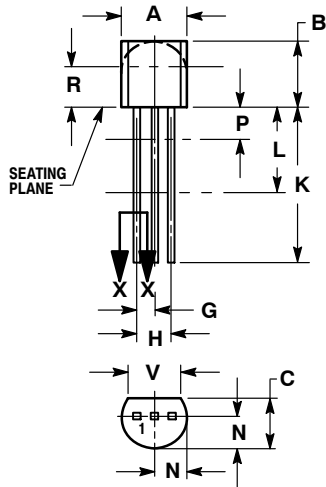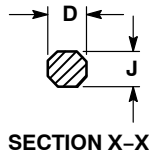## PACKAGE DIMENSIONS

ON Semiconductor®

TO−92 (TO−226)
CASE 29−11
ISSUE AM

DATE 09 MAR 2007

SCALE 1:1

1 2 3

STRAIGHT LEAD
BULK PACK

BENT LEAD
TAPE & REEL
AMMO PACK
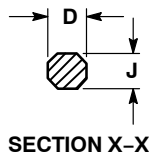
STRAIGHT LEAD
BULK PACK

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.

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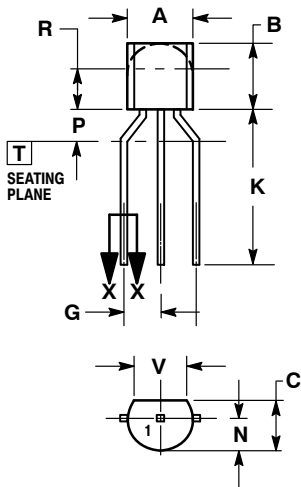
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

DIM	MILLIMETERS MIN	MILLIMETERS 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

DOCUMENT NUMBER:	**98ASB42022B**
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PAGE 1 OF 3

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_{CC}
    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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NEW STANDARD:		
DESCRIPTION:	TO−92 (TO−226)	PAGE 2 OF 3

ISSUE	REVISION	DATE
AM	ADDED BENT–LEAD TAPE & REEL VERSION. REQ. BY J. SUPINA.	09 MAR 2007

PUBLICATION ORDERING INFORMATION

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