

# 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	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	83.3	$^\circ\text{C/W}$

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

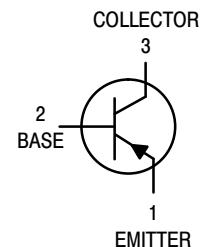
Device	Line 1	Line 2
MPS2907AG	MPS	2907A
MPS2907ARLG	MPS2	907A
MPS2907ARLRAG	MPS	2907
MPS2907ARLRPG	MPS	2907

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

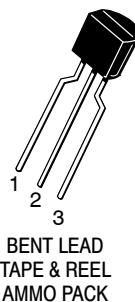
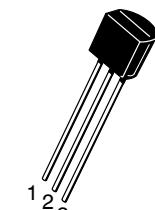


ON Semiconductor®

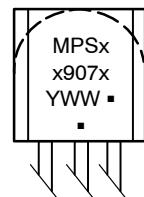
<http://onsemi.com>



TO-92  
CASE 29  
STYLE 1



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

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector – Emitter Breakdown Voltage (Note 1) ( $I_C = -10 \text{ mA}_\text{dc}$ , $I_B = 0$ )	$V_{(\text{BR})\text{CEO}}$	-60	-	Vdc
Collector – Base Breakdown Voltage ( $I_C = -10 \mu\text{A}_\text{dc}$ , $I_E = 0$ )	$V_{(\text{BR})\text{CBO}}$	-60	-	Vdc
Emitter – Base Breakdown Voltage ( $I_E = -10 \mu\text{A}_\text{dc}$ , $I_C = 0$ )	$V_{(\text{BR})\text{EBO}}$	-5.0	-	Vdc
Collector Cutoff Current ( $V_{\text{CE}} = -30 \text{ Vdc}$ , $V_{\text{EB}(\text{off})} = -0.5 \text{ Vdc}$ )	$I_{\text{CEX}}$	-	-50	nAdc
Collector Cutoff Current ( $V_{\text{CB}} = -50 \text{ Vdc}$ , $I_E = 0$ ) ( $V_{\text{CB}} = -50 \text{ Vdc}$ , $I_E = 0$ , $T_A = 150^\circ\text{C}$ )	$I_{\text{CBO}}$	-	-0.01 -10	$\mu\text{Adc}$
Base Current ( $V_{\text{CE}} = -30 \text{ Vdc}$ , $V_{\text{EB}(\text{off})} = -0.5 \text{ Vdc}$ )	$I_B$	-	-50	nAdc

## ON CHARACTERISTICS

DC Current Gain ( $I_C = -0.1 \text{ mA}_\text{dc}$ , $V_{\text{CE}} = -10 \text{ Vdc}$ ) ( $I_C = -1.0 \text{ mA}_\text{dc}$ , $V_{\text{CE}} = -10 \text{ Vdc}$ ) ( $I_C = -10 \text{ mA}_\text{dc}$ , $V_{\text{CE}} = -10 \text{ Vdc}$ ) ( $I_C = -150 \text{ mA}_\text{dc}$ , $V_{\text{CE}} = -10 \text{ Vdc}$ ) (Note 1) ( $I_C = -500 \text{ mA}_\text{dc}$ , $V_{\text{CE}} = -10 \text{ Vdc}$ ) (Note 1)	$h_{\text{FE}}$	75 100 100 100 50	- - - 300 -	-
Collector – Emitter Saturation Voltage (Note 1) ( $I_C = -150 \text{ mA}_\text{dc}$ , $I_B = -15 \text{ mA}_\text{dc}$ ) ( $I_C = -500 \text{ mA}_\text{dc}$ , $I_B = -50 \text{ mA}_\text{dc}$ )	$V_{\text{CE}(\text{sat})}$	- -	-0.4 -1.6	Vdc
Base – Emitter Saturation Voltage (Note 1) ( $I_C = -150 \text{ mA}_\text{dc}$ , $I_B = -15 \text{ mA}_\text{dc}$ ) ( $I_C = -500 \text{ mA}_\text{dc}$ , $I_B = -50 \text{ mA}_\text{dc}$ )	$V_{\text{BE}(\text{sat})}$	- -	-1.3 -2.6	Vdc

## SMALL-SIGNAL CHARACTERISTICS

Current – Gain – Bandwidth Product (Notes 1 and 2), ( $I_C = -50 \text{ mA}_\text{dc}$ , $V_{\text{CE}} = -20 \text{ Vdc}$ , $f = 100 \text{ MHz}$ )	$f_T$	200	-	MHz
Output Capacitance ( $V_{\text{CB}} = -10 \text{ Vdc}$ , $I_E = 0$ , $f = 1.0 \text{ MHz}$ )	$C_{\text{obo}}$	-	8.0	pF
Input Capacitance ( $V_{\text{EB}} = -2.0 \text{ Vdc}$ , $I_C = 0$ , $f = 1.0 \text{ MHz}$ )	$C_{\text{ibo}}$	-	30	pF

## SWITCHING CHARACTERISTICS

Turn-On Time	$(V_{\text{CC}} = -30 \text{ Vdc}$ , $I_C = -150 \text{ mA}_\text{dc}$ , $I_{\text{B}1} = -15 \text{ mA}_\text{dc}$ ) (Figures 1 and 5)	$t_{\text{on}}$	-	45	ns
Delay Time		$t_d$	-	10	ns
Rise Time		$t_r$	-	40	ns
Turn-Off Time	$(V_{\text{CC}} = -6.0 \text{ Vdc}$ , $I_C = -150 \text{ mA}_\text{dc}$ , $I_{\text{B}1} = I_{\text{B}2} = 15 \text{ mA}_\text{dc}$ ) (Figure 2)	$t_{\text{off}}$	-	100	ns
Storage Time		$t_s$	-	80	ns
Fall Time		$t_f$	-	30	ns

1. Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

2.  $f_T$  is defined as the frequency at which  $|h_{\text{fe}}|$  extrapolates to unity.

# MPS2907A Series

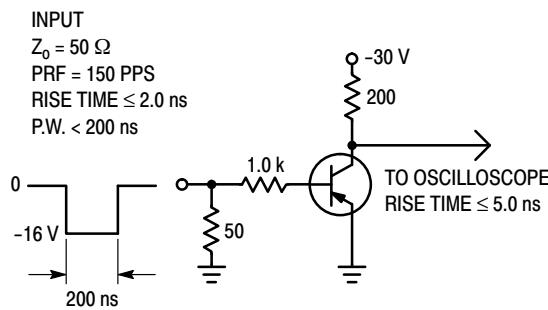


Figure 1. Delay and Rise Time Test Circuit

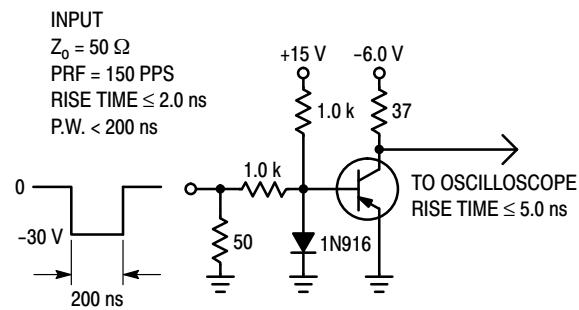


Figure 2. Storage and Fall Time Test Circuit

## TYPICAL CHARACTERISTICS

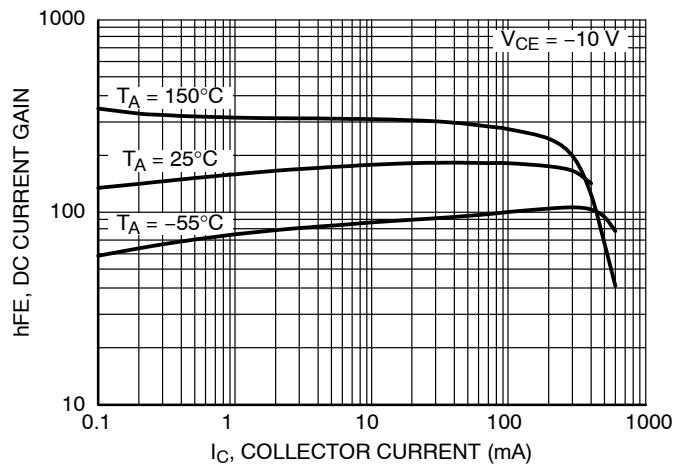


Figure 3. DC Current Gain

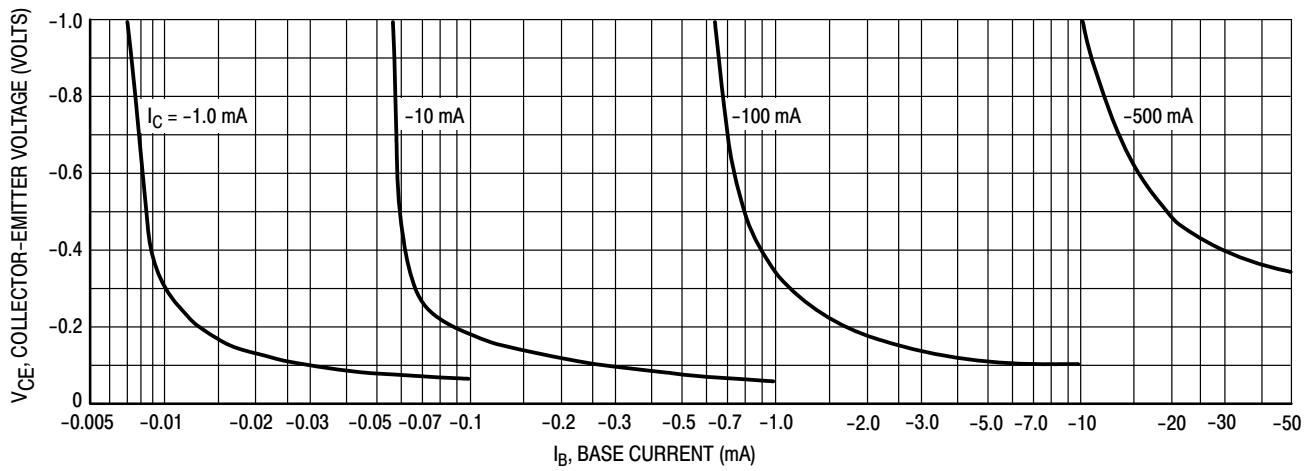


Figure 4. Collector Saturation Region

# MPS2907A Series

## ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
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

<sup>†</sup>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.

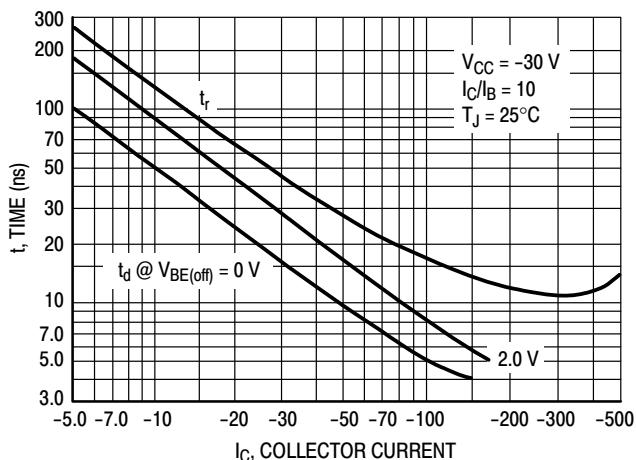


Figure 5. Turn-On Time

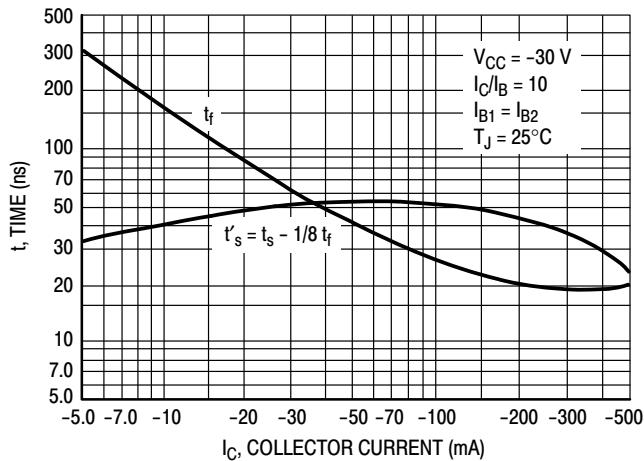


Figure 6. Turn-Off Time

TYPICAL SMALL-SIGNAL CHARACTERISTICS

NOISE FIGURE

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

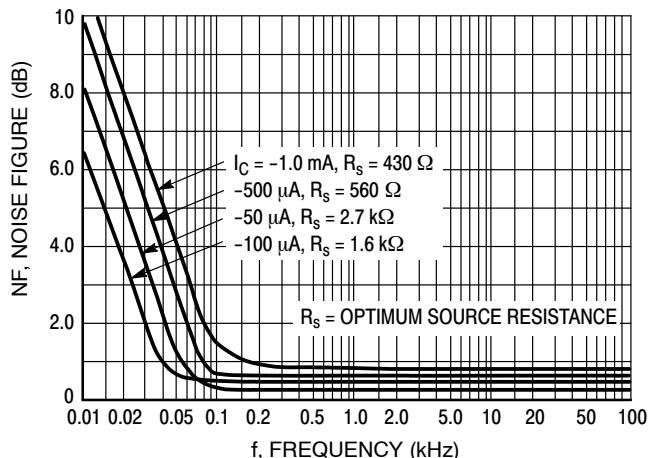


Figure 7. Frequency Effects

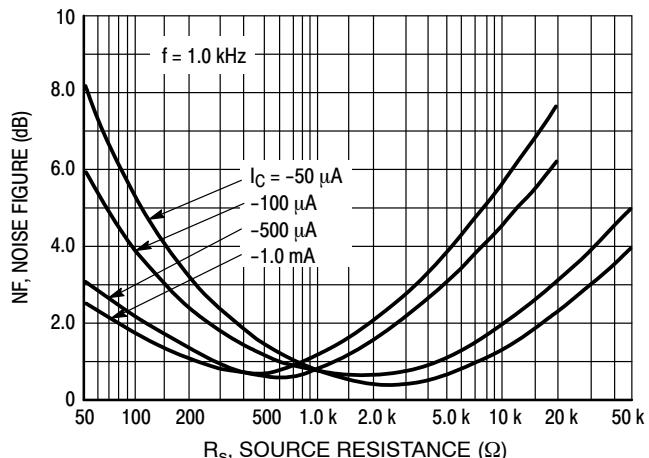


Figure 8. Source Resistance Effects

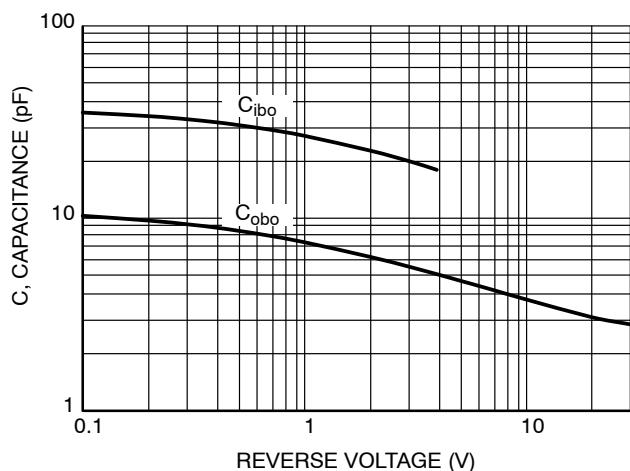


Figure 9. Capacitances

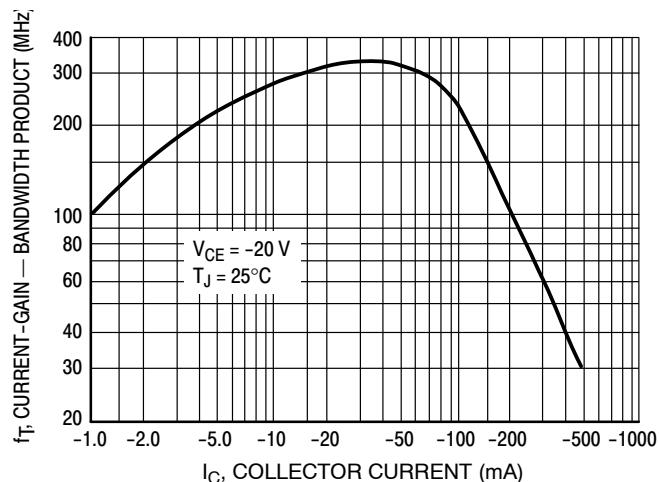


Figure 10. Current-Gain - Bandwidth Product

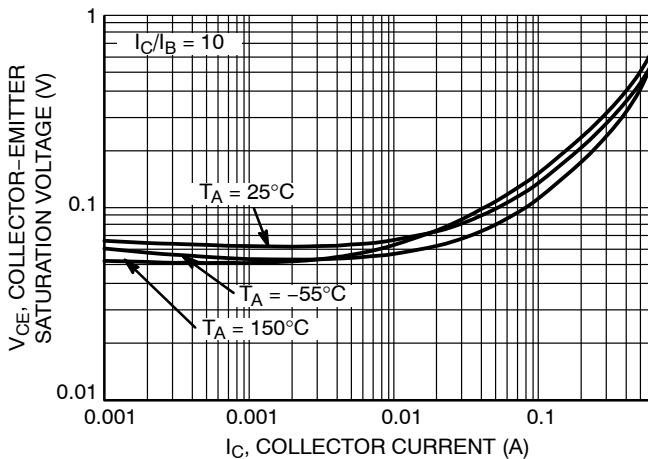


Figure 11. Collector-Emitter Saturation Voltage vs. Collector Current

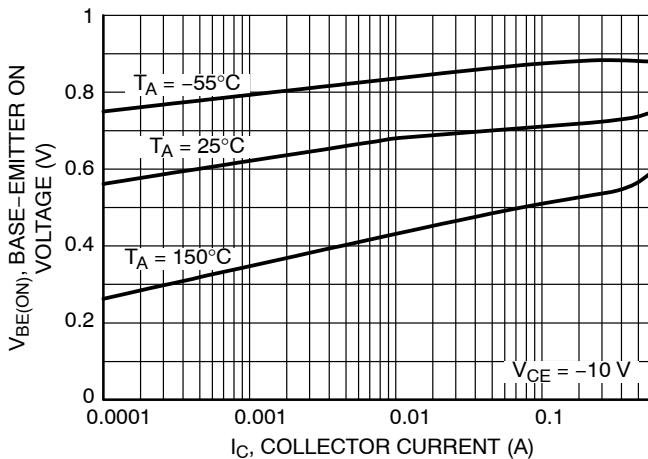
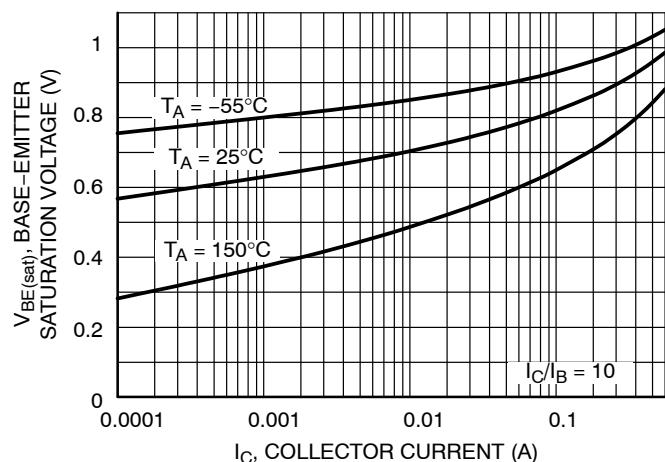
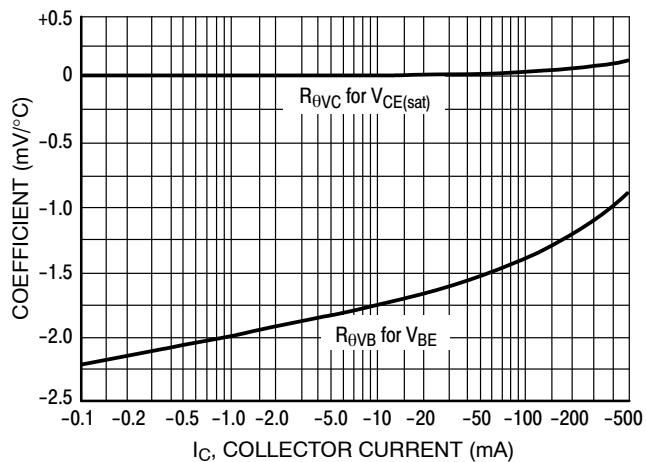


Figure 12. Base-Emitter Turn-ON Voltage vs. Collector Current

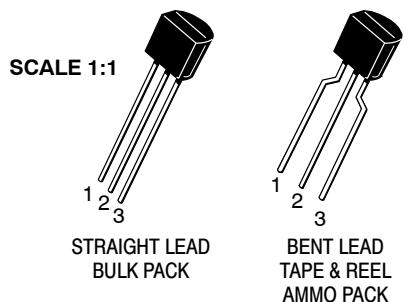
## MPS2907A Series



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

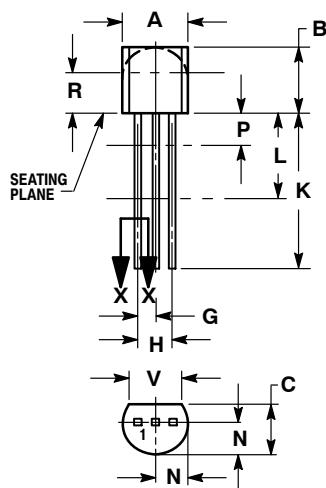


**Figure 14. Temperature Coefficients**



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

DATE 09 MAR 2007



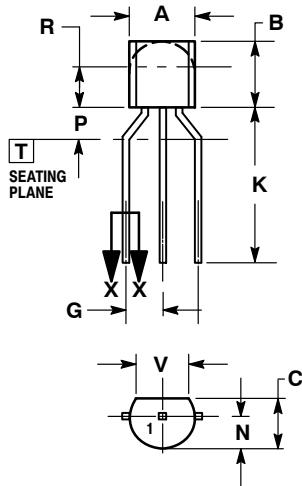
STRAIGHT LEAD BULK PACK

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	---

SECTION X-X



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	---

SECTION X-X

STYLES ON PAGE 2

DOCUMENT NUMBER:	98ASB42022B	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	TO-92 (TO-226)	PAGE 1 OF 2

onsemi and Onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi 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. onsemi does not convey any license under its patent rights nor the rights of others.

**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

DOCUMENT NUMBER:	98ASB42022B	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	TO-92 (TO-226)	PAGE 2 OF 2

**onsemi** and **ONSEMI** are trademarks of Semiconductor Components Industries, LLC dba **onsemi** or its subsidiaries in the United States and/or other countries. **onsemi** reserves the right to make changes without further notice to any products herein. **onsemi** makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does **onsemi** 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. **onsemi** does not convey any license under its patent rights nor the rights of others.

**onsemi**, **ONSEMI**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** 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. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** 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. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** 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 **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## ADDITIONAL INFORMATION

### TECHNICAL PUBLICATIONS:

Technical Library: [www.onsemi.com/design/resources/technical-documentation](http://www.onsemi.com/design/resources/technical-documentation)  
onsemi Website: [www.onsemi.com](http://www.onsemi.com)

### ONLINE SUPPORT: [www.onsemi.com/support](http://www.onsemi.com/support)

For additional information, please contact your local Sales Representative at  
[www.onsemi.com/support/sales](http://www.onsemi.com/support/sales)

