

Amplifier Transistors

NPN Silicon

BC546B, BC547A, B, C, BC548B, C

Features

- Pb-Free Packages are Available*

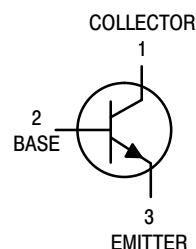
MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector - Emitter Voltage	V_{CEO}		Vdc
BC546		65	
BC547		45	
BC548		30	
Collector - Base Voltage	V_{CBO}		Vdc
BC546		80	
BC547		50	
BC548		30	
Emitter - Base Voltage	V_{EBO}	6.0	Vdc
Collector Current – Continuous	I_C	100	mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$	P_D	625	mW
Derate above 25°C		5.0	$\text{mW}/^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$	P_D	1.5	W
Derate above 25°C		12	$\text{mW}/^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-55 to +150	°C

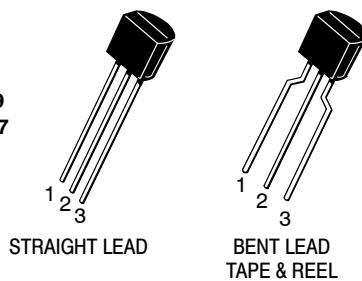
THERMAL CHARACTERISTICS

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

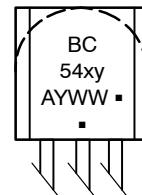
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.



TO-92
CASE 29
STYLE 17



MARKING DIAGRAM



x = 6, 7, or 8
 y = A, B or C
 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 5 of this data sheet.

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

BC546B, BC547A, B, C, BC548B, C

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector – Emitter Breakdown Voltage ($I_C = 1.0 \text{ mA}, I_B = 0$)	$V_{(\text{BR})\text{CEO}}$	BC546 BC547 BC548	65 45 30	– – –	– – –
Collector – Base Breakdown Voltage ($I_C = 100 \mu\text{A}$)	$V_{(\text{BR})\text{CBO}}$	BC546 BC547 BC548	80 50 30	– – –	– – –
Emitter – Base Breakdown Voltage ($I_E = 10 \mu\text{A}, I_C = 0$)	$V_{(\text{BR})\text{EBO}}$	BC546 BC547 BC548	6.0 6.0 6.0	– – –	– – –
Collector Cutoff Current ($V_{CE} = 70 \text{ V}, V_{BE} = 0$) ($V_{CE} = 50 \text{ V}, V_{BE} = 0$) ($V_{CE} = 35 \text{ V}, V_{BE} = 0$) ($V_{CE} = 30 \text{ V}, T_A = 125^\circ\text{C}$)	I_{CES}	BC546 BC547 BC548 BC546/547/548	– – – –	0.2 0.2 0.2 –	15 15 15 4.0
ON CHARACTERISTICS					
DC Current Gain ($I_C = 10 \mu\text{A}, V_{CE} = 5.0 \text{ V}$)	h_{FE}	BC547A BC546B/547B/548B BC548C	– – –	90 150 270	– – –
($I_C = 2.0 \text{ mA}, V_{CE} = 5.0 \text{ V}$)		BC546 BC547 BC548 BC547A BC546B/547B/548B BC547C/BC548C	110 110 110 110 200 420	– – – 180 290 520	450 800 800 220 450 800
($I_C = 100 \text{ mA}, V_{CE} = 5.0 \text{ V}$)		BC547A/548A BC546B/547B/548B BC548C	– – –	120 180 300	– – –
Collector – Emitter Saturation Voltage ($I_C = 10 \text{ mA}, I_B = 0.5 \text{ mA}$) ($I_C = 100 \text{ mA}, I_B = 5.0 \text{ mA}$) ($I_C = 10 \text{ mA}, I_B = \text{See Note 1}$)	$V_{CE(\text{sat})}$		– – –	0.09 0.2 0.3	0.25 0.6 0.6
Base – Emitter Saturation Voltage ($I_C = 10 \text{ mA}, I_B = 0.5 \text{ mA}$)	$V_{BE(\text{sat})}$		–	0.7	–
Base – Emitter On Voltage ($I_C = 2.0 \text{ mA}, V_{CE} = 5.0 \text{ V}$) ($I_C = 10 \text{ mA}, V_{CE} = 5.0 \text{ V}$)	$V_{BE(\text{on})}$		0.55 –	– –	0.7 0.77
SMALL-SIGNAL CHARACTERISTICS					
Current – Gain – Bandwidth Product ($I_C = 10 \text{ mA}, V_{CE} = 5.0 \text{ V}, f = 100 \text{ MHz}$)	f_T	BC546 BC547 BC548	150 150 150	300 300 300	– – –
Output Capacitance ($V_{CB} = 10 \text{ V}, I_C = 0, f = 1.0 \text{ MHz}$)	C_{obo}		–	1.7	4.5
Input Capacitance ($V_{EB} = 0.5 \text{ V}, I_C = 0, f = 1.0 \text{ MHz}$)	C_{ibo}		–	10	–
Small – Signal Current Gain ($I_C = 2.0 \text{ mA}, V_{CE} = 5.0 \text{ V}, f = 1.0 \text{ kHz}$)	h_{fe}	BC546 BC547/548 BC547A BC546B/547B/548B BC547C/548C	125 125 125 240 450	– – 220 330 600	500 900 260 500 900
Noise Figure ($I_C = 0.2 \text{ mA}, V_{CE} = 5.0 \text{ V}, R_S = 2 \text{ k}\Omega, f = 1.0 \text{ kHz}, \Delta f = 200 \text{ Hz}$)	NF	BC546 BC547 BC548	– – –	2.0 2.0 2.0	10 10 10

1. I_B is value for which $I_C = 11 \text{ mA}$ at $V_{CE} = 1.0 \text{ V}$.

BC546B, BC547A, B, C, BC548B, C

BC547/BC548

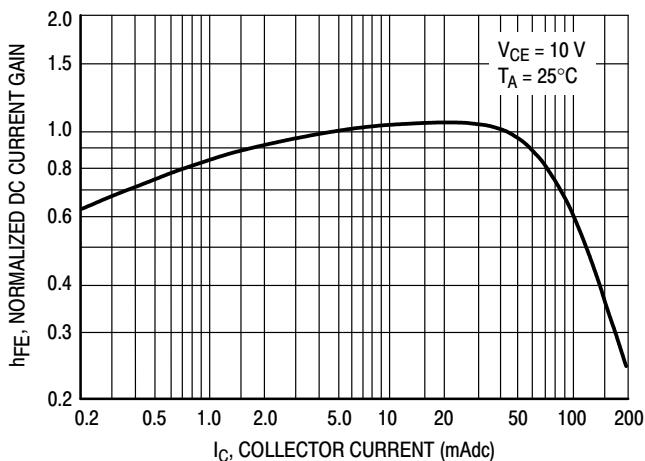


Figure 1. Normalized DC Current Gain

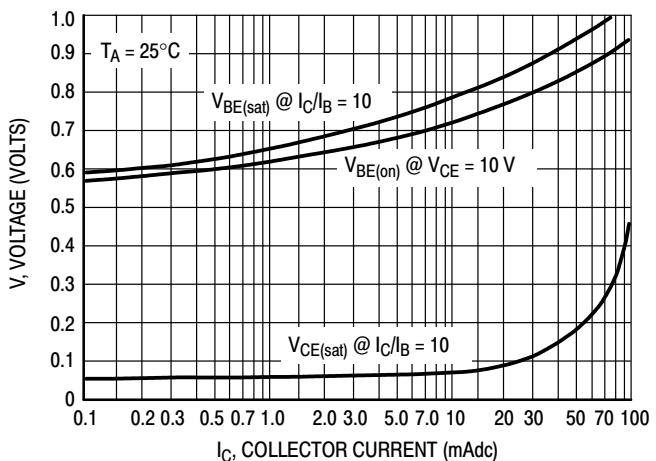


Figure 2. “Saturation” and “On” Voltages

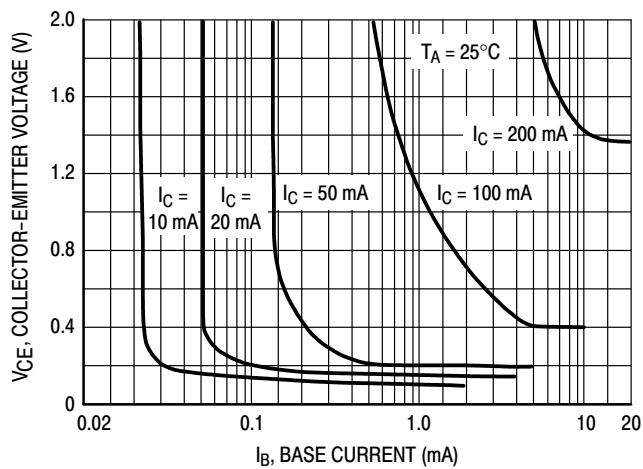


Figure 3. Collector Saturation Region

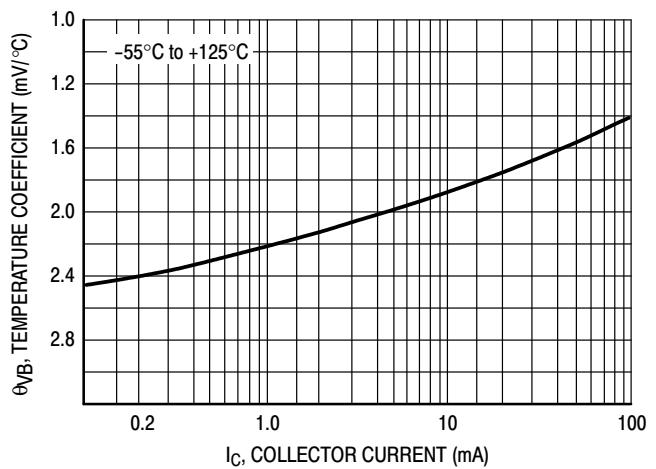


Figure 4. Base–Emitter Temperature Coefficient

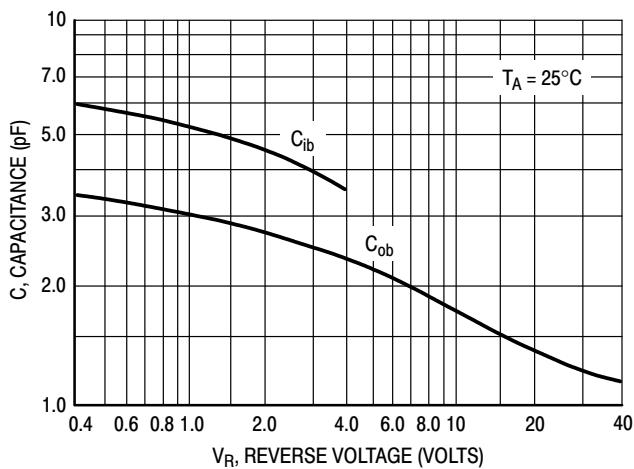


Figure 5. Capacitances

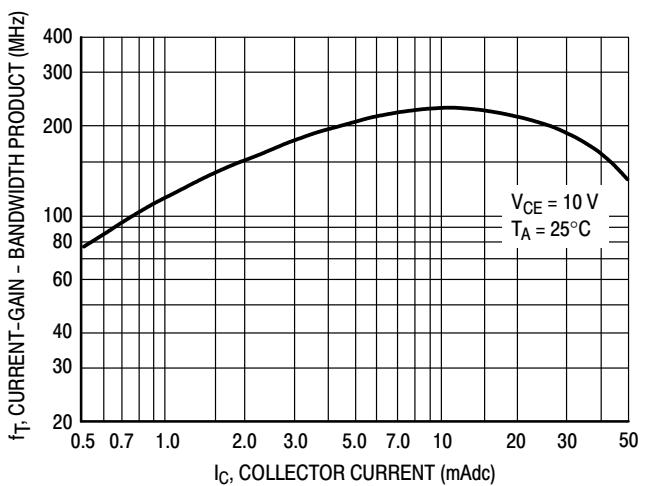


Figure 6. Current–Gain – Bandwidth Product

BC546B, BC547A, B, C, BC548B, C

BC546

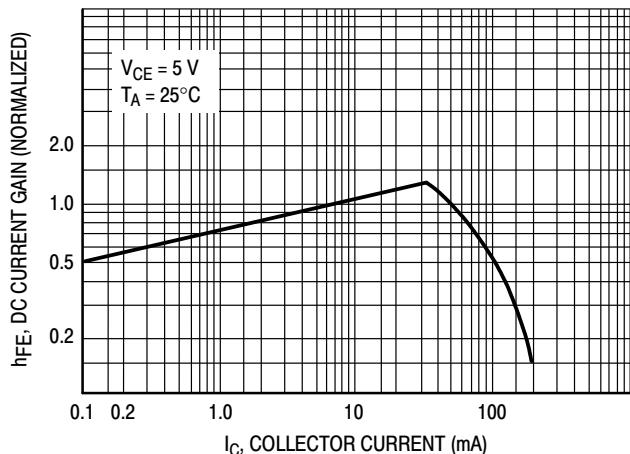


Figure 7. DC Current Gain

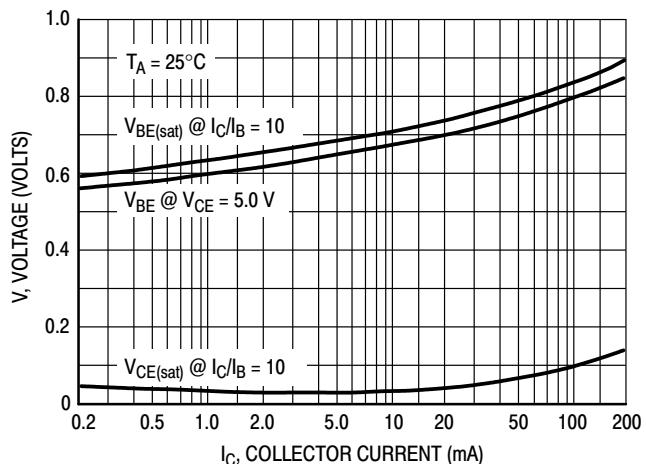


Figure 8. "On" Voltage

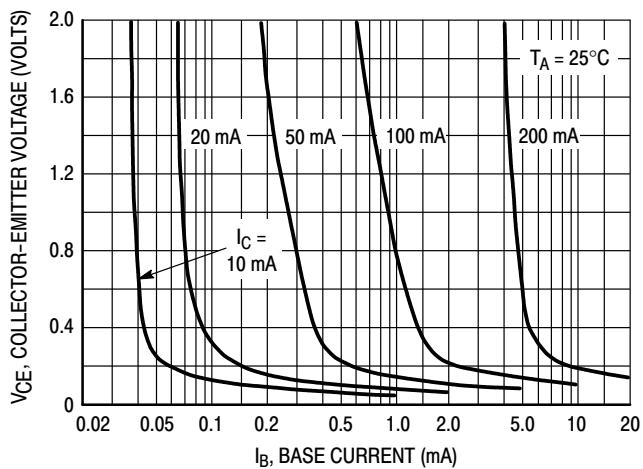


Figure 9. Collector Saturation Region

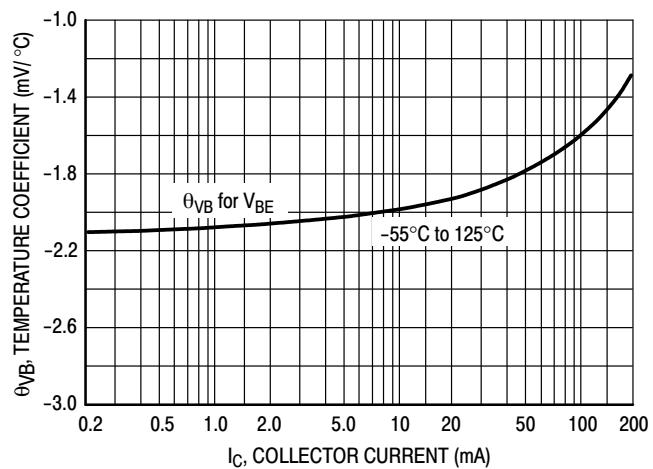


Figure 10. Base-Emitter Temperature Coefficient

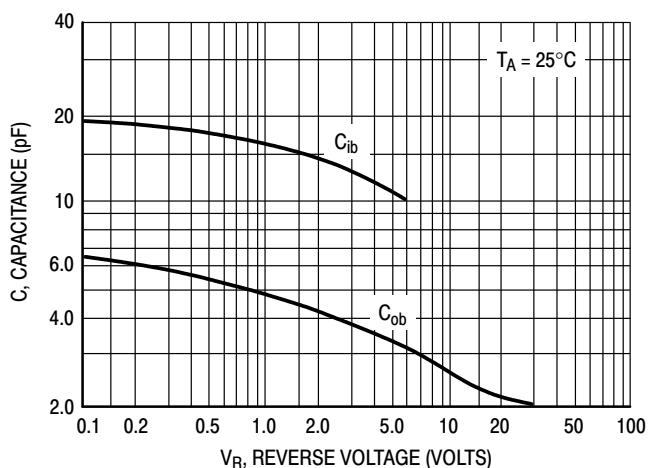


Figure 11. Capacitance

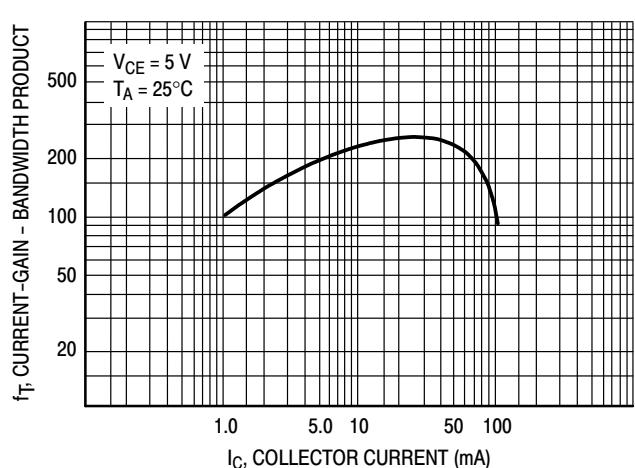


Figure 12. Current-Gain – Bandwidth Product

BC546B, BC547A, B, C, BC548B, C

ORDERING INFORMATION

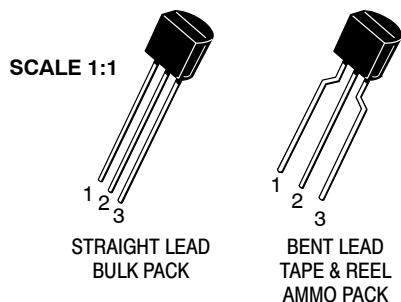
Device	Package	Shipping [†]
BC546B	TO-92	5000 Units / Bulk
BC546BG	TO-92 (Pb-Free)	5000 Units / Bulk
BC546BRL1	TO-92	2000 / Tape & Reel
BC546BRL1G	TO-92 (Pb-Free)	2000 / Tape & Reel
BC546BZL1G	TO-92 (Pb-Free)	2000 / Ammo Box
BC547ARL	TO-92	2000 / Tape & Reel
BC547ARLG	TO-92 (Pb-Free)	2000 / Tape & Reel
BC547AZL1G	TO-92 (Pb-Free)	2000 / Ammo Box
BC547BG	TO-92 (Pb-Free)	5000 Units / Bulk
BC547BRL1G	TO-92 (Pb-Free)	2000 / Tape & Reel
BC547BZL1G	TO-92 (Pb-Free)	2000 / Ammo Box
BC547CG	TO-92 (Pb-Free)	5000 Units / Bulk
BC547CZL1G	TO-92 (Pb-Free)	2000 / Ammo Box
BC548BG	TO-92 (Pb-Free)	5000 Units / Bulk
BC548BRL1G	TO-92 (Pb-Free)	2000 / Tape & Reel
BC548BZL1G	TO-92 (Pb-Free)	2000 / Ammo Box
BC548CG	TO-92 (Pb-Free)	5000 Units / Bulk
BC548CZL1G	TO-92 (Pb-Free)	2000 / Ammo Box

[†]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.

MECHANICAL CASE OUTLINE

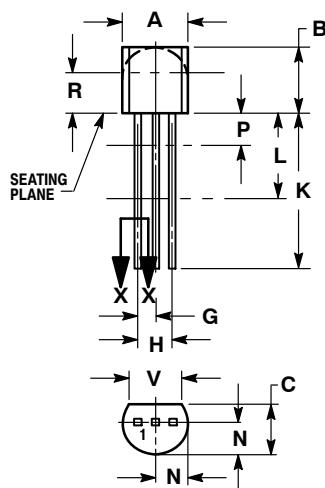
PACKAGE DIMENSIONS

ON Semiconductor®



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

DATE 09 MAR 2007

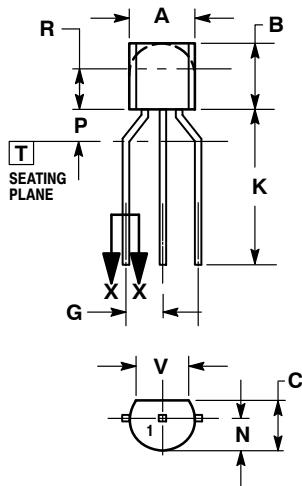


STRAIGHT LEAD
BULK PACK

- 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.
STATUS:	ON SEMICONDUCTOR STANDARD	
NEW STANDARD:		
DESCRIPTION:	TO-92 (TO-226)	PAGE 1 OF 3

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 _{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

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.
STATUS:	ON SEMICONDUCTOR STANDARD	
NEW STANDARD:		
DESCRIPTION:	TO-92 (TO-226)	PAGE 2 OF 3



ON Semiconductor®

**DOCUMENT NUMBER:
98ASB42022B**

PAGE 3 OF 3

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.

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. **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.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Email Requests to: orderlit@onsemi.com

TECHNICAL SUPPORT

North American Technical Support:

Voice Mail: 1 800-282-9855 Toll Free USA/Canada

Phone: 011 421 33 790 2910

Europe, Middle East and Africa Technical Support:

Phone: 00421 33 790 2910

For additional information, please contact your local Sales Representative