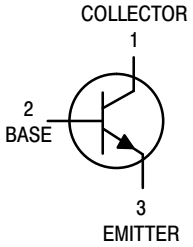
Amplifier Transistors

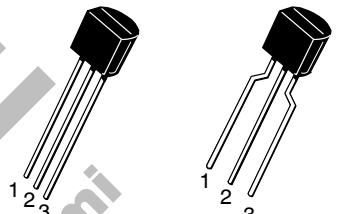
NPN Silicon

BC546B, BC547A, B, C, BC548B, C



Features

- Pb−Free Packages are Available*



MAXIMUM RATINGS

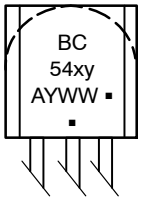
Rating	Symbol	Value	Unit
Collector - Emitter Voltage BC546 BC547 BC548	V_{CEO}	 65 45 30	Vdc
Collector - Base Voltage BC546 BC547 BC548	V_{CBO}	 80 50 30	Vdc
Emitter - Base Voltage	V_{EBO}	6.0	Vdc
Collector Current − Continuous	I_C	100	mAdc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	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 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.

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.

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

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

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

BC547/BC548

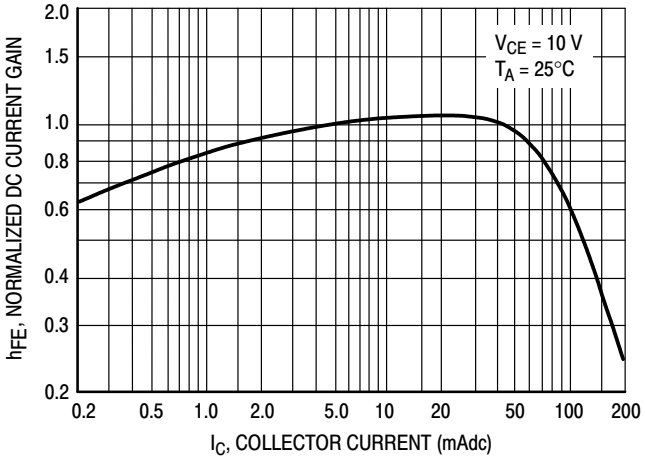


Figure 1. Normalized DC Current Gain

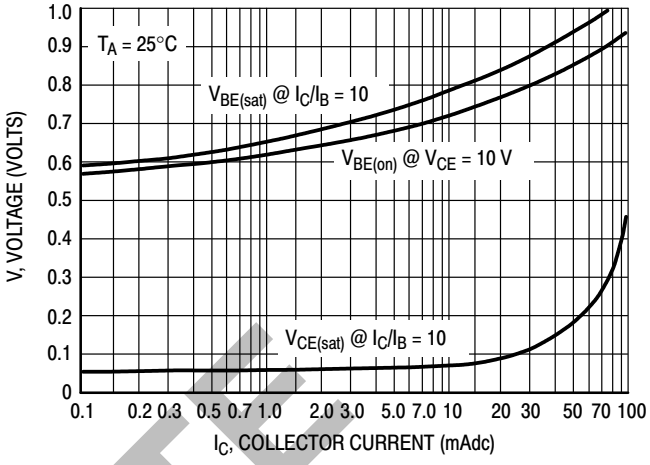


Figure 2. "Saturation" and "On" Voltages

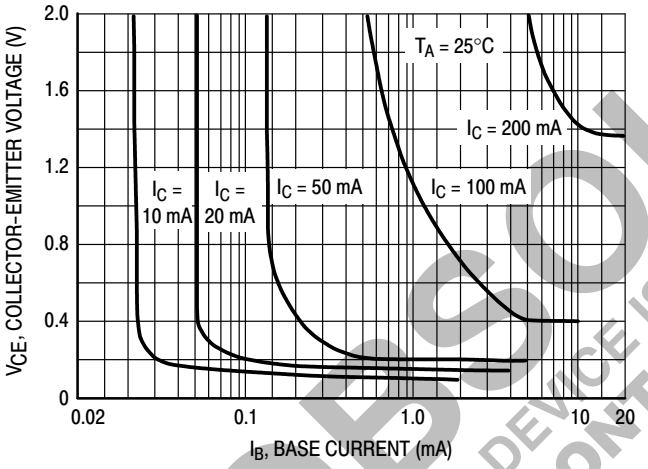


Figure 3. Collector Saturation Region

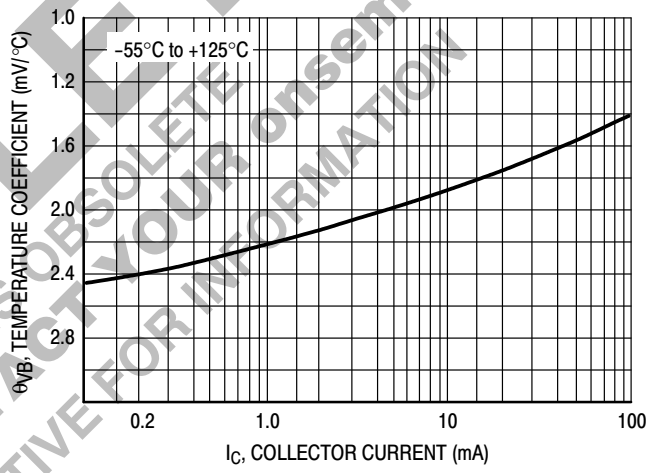


Figure 4. Base−Emitter Temperature Coefficient

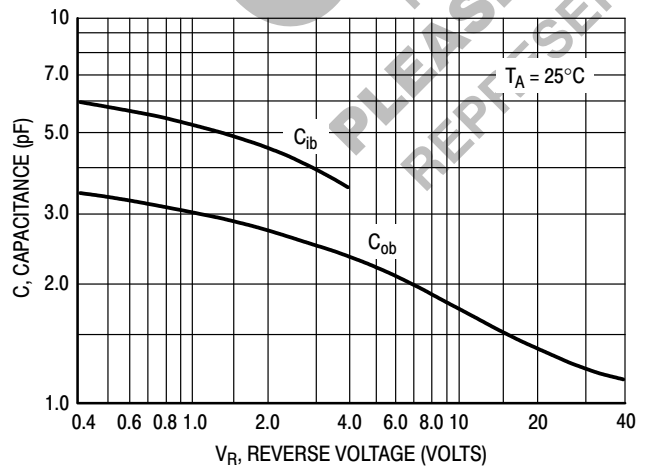


Figure 5. Capacitances

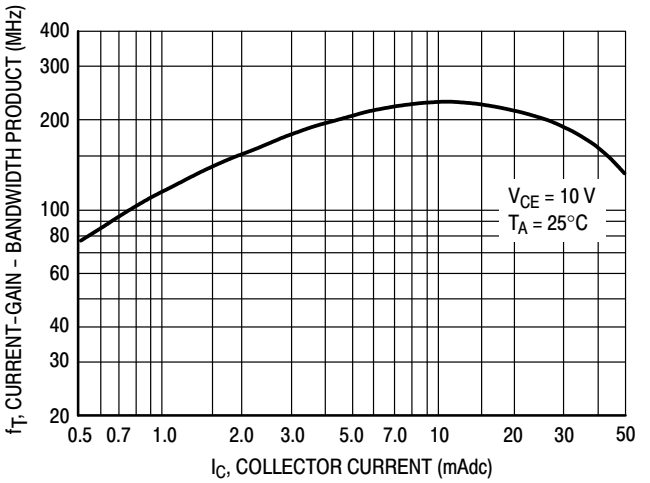


Figure 6. Current−Gain − Bandwidth Product

BC546

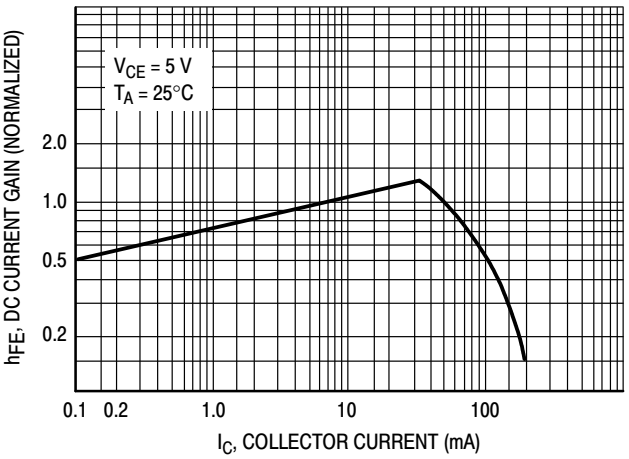


Figure 7. DC Current Gain

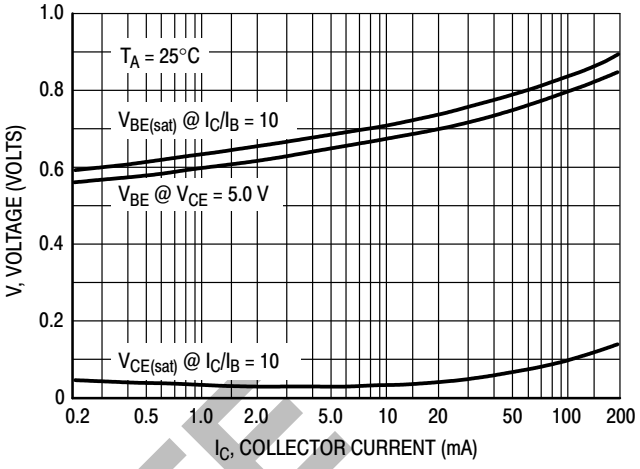


Figure 8. "On" Voltage

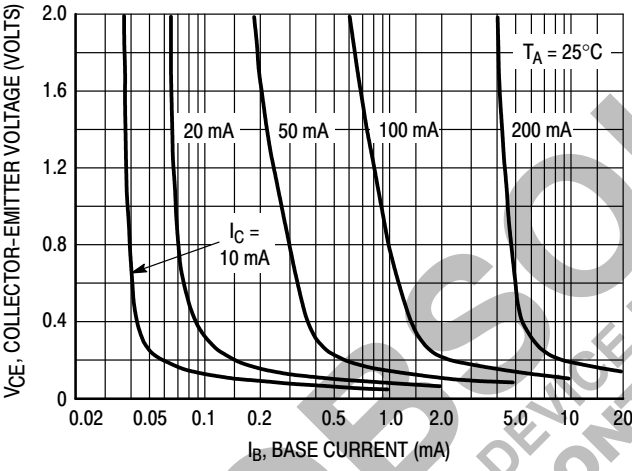


Figure 9. Collector Saturation Region

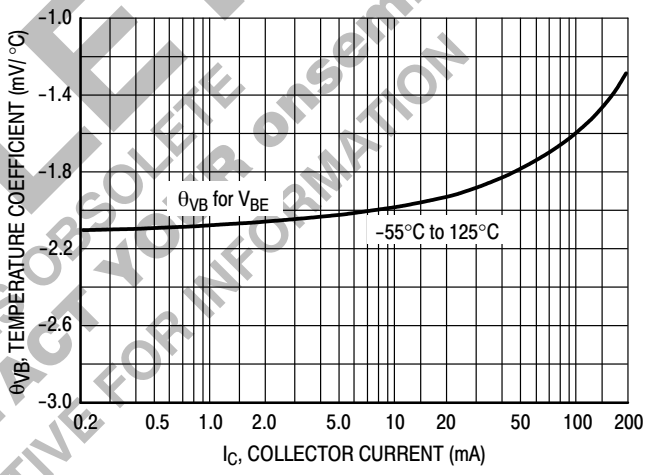


Figure 10. Base−Emitter Temperature Coefficient

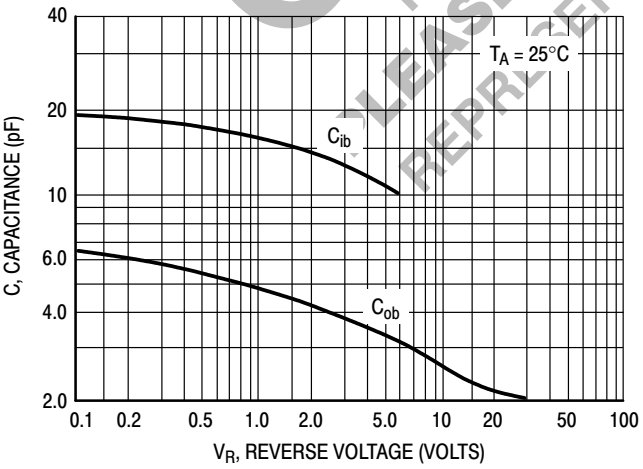


Figure 11. Capacitance

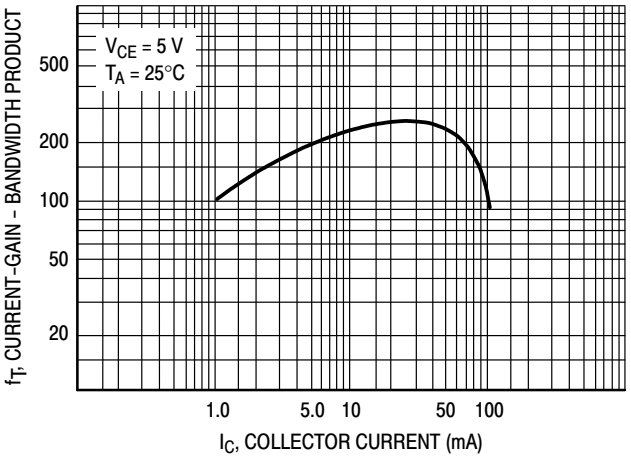


Figure 12. Current−Gain − Bandwidth Product

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

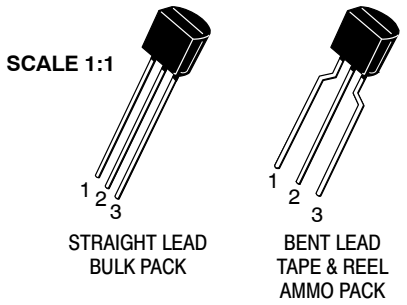
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

ON Semiconductor®

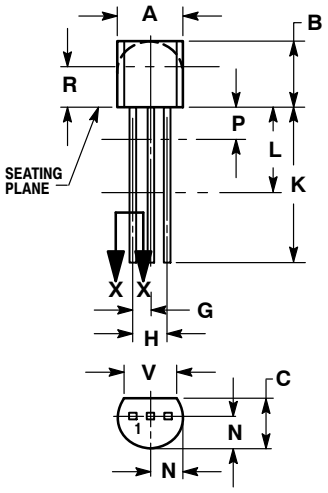
TO–92 (TO–226)
CASE 29–11
ISSUE AM

DATE 09 MAR 2007

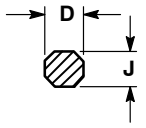


STRAIGHT LEAD
BULK PACK

BENT LEAD
TAPE & REEL
AMMO PACK



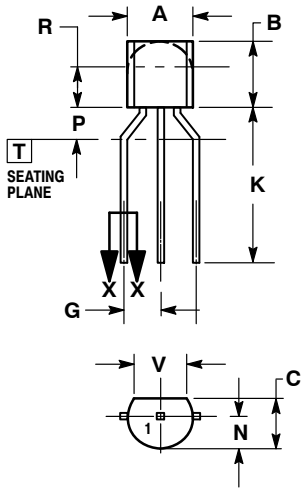
STRAIGHT LEAD
BULK PACK



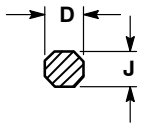
SECTION X–X

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.

	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	---

STYLES ON PAGE 2

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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

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

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:
Technical Library: www.onsemi.com/design/resources/technical−documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support
For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales