

# BC635, BC637, BC639, BC639-16

## High Current Transistors

### NPN Silicon

#### Features

- Pb-Free Package is Available\*

#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	45 60 80	Vdc
Collector-Base Voltage	$V_{CBO}$	45 60 80	Vdc
Emitter-Base Voltage	$V_{EBO}$	5.0	Vdc
Collector Current – Continuous	$I_C$	1.0	Adc
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 $25^\circ\text{C}$	$P_D$	800 12	mW mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

#### THERMAL CHARACTERISTICS

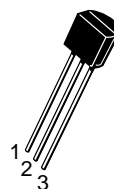
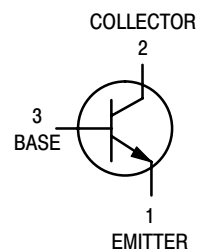
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	200	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	83.3	$^\circ\text{C}/\text{W}$

\*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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TO-92  
CASE 29  
STYLE 14

#### MARKING DIAGRAM



BC63xx = Specific Device Code  
Y = Year  
WW = Work Week  
▪ = Pb-Free Package

#### ORDERING INFORMATION

Device	Package	Shipping†
BC635RL1	TO-92	2000/Tape & Reel
BC635ZL1	TO-92	2000/Ammo Pack
BC637	TO-92	5000 Units/Box
BC639	TO-92	5000 Units/Box
BC639RL1	TO-92	2000/Tape & Reel
BC639ZL1	TO-92	2000/Ammo Pack
BC639-16ZL1	TO-92	2000/Ammo Pack
BC639-16ZL1G	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.

## BC635, BC637, BC639, BC639-16

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

Characteristic	Symbol	Min	Typ	Max	Unit	
<b>OFF CHARACTERISTICS</b>						
Collector – Emitter Breakdown Voltage <sup>(1)</sup> ( $I_C = 10\ \mu\text{Adc}$ , $I_B = 0$ )	BC635 BC637 BC639	$V_{(BR)CEO}$	45 60 80	– – –	– – –	Vdc
Collector – Emitter Zero–Gate Breakdown Voltage <sup>(1)</sup> ( $I_C = 100\ \mu\text{Adc}$ , $I_B = 0$ )	BC639–16	$V_{(BR)CES}$	120	–	–	Vdc
Collector – Base Breakdown Voltage ( $I_C = 100\ \mu\text{Adc}$ , $I_E = 0$ )	BC635 BC637 BC639	$V_{(BR)CBO}$	45 60 80	– – –	– – –	Vdc
Emitter – Base Breakdown Voltage ( $I_E = 10\ \mu\text{Adc}$ , $I_C = 0$ )		$V_{(BR)EBO}$	5.0	–	–	Vdc
Collector Cutoff Current ( $V_{CB} = 30\ \text{Vdc}$ , $I_E = 0$ ) ( $V_{CB} = 30\ \text{Vdc}$ , $I_E = 0$ , $T_A = 125^\circ\text{C}$ )		$I_{CBO}$	– –	– –	100 10	nAdc $\mu\text{Adc}$

### ON CHARACTERISTICS (Note 1)

DC Current Gain ( $I_C = 5.0\ \text{mAdc}$ , $V_{CE} = 2.0\ \text{Vdc}$ ) ( $I_C = 150\ \text{mAdc}$ , $V_{CE} = 2.0\ \text{Vdc}$ )	BC635 BC637 BC639 BC639–16ZLT1	$h_{FE}$	25 40 40 40 100 25	– – – – – –	– 250 160 160 250 –	–
Collector – Emitter Saturation Voltage ( $I_C = 500\ \text{mAdc}$ , $I_B = 50\ \text{mAdc}$ )		$V_{CE(sat)}$	–	–	0.5	Vdc
Base – Emitter On Voltage ( $I_C = 500\ \text{mAdc}$ , $V_{CE} = 2.0\ \text{Vdc}$ )		$V_{BE(on)}$	–	–	1.0	Vdc

### DYNAMIC CHARACTERISTICS

Current – Gain – Bandwidth Product ( $I_C = 50\ \text{mAdc}$ , $V_{CE} = 2.0\ \text{Vdc}$ , $f = 100\ \text{MHz}$ )		$f_T$	–	200	–	MHz
Output Capacitance ( $V_{CB} = 10\ \text{Vdc}$ , $I_E = 0$ , $f = 1.0\ \text{MHz}$ )		$C_{ob}$	–	7.0	–	pF
Input Capacitance ( $V_{EB} = 0.5\ \text{Vdc}$ , $I_C = 0$ , $f = 1.0\ \text{MHz}$ )		$C_{ib}$	–	50	–	pF

1. Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle 2.0%.

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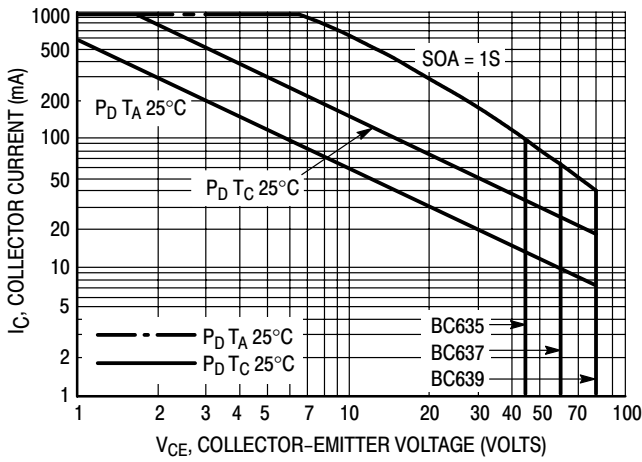


Figure 1. Active Region Safe Operating Area

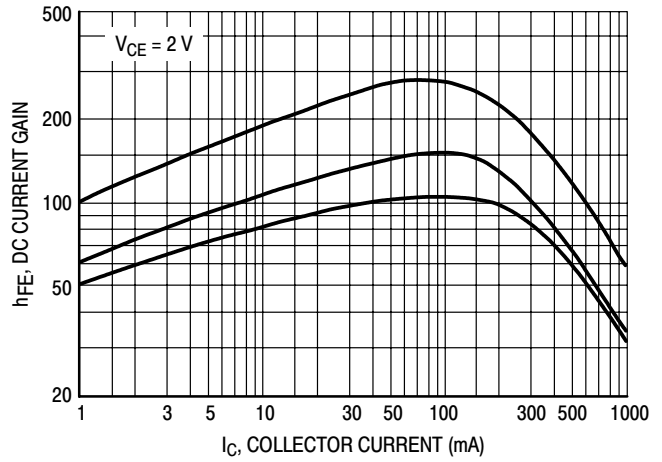


Figure 2. DC Current Gain

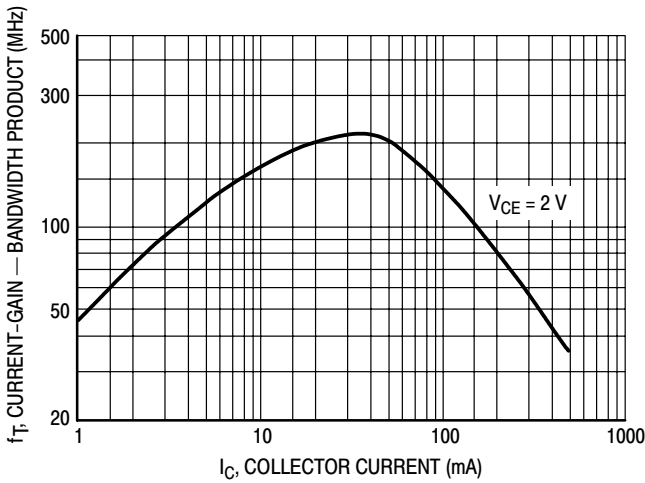


Figure 3. Current-Gain — Bandwidth Product

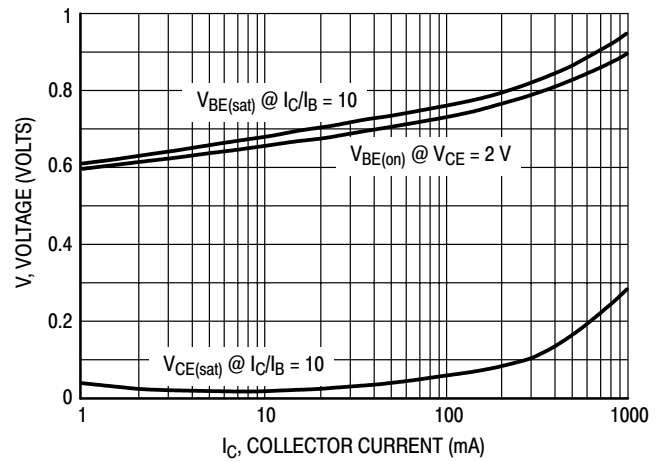


Figure 4. "Saturation" and "On" Voltages

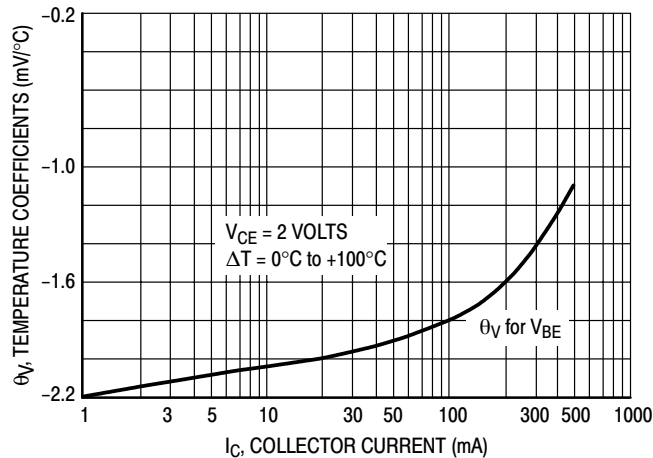
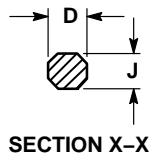
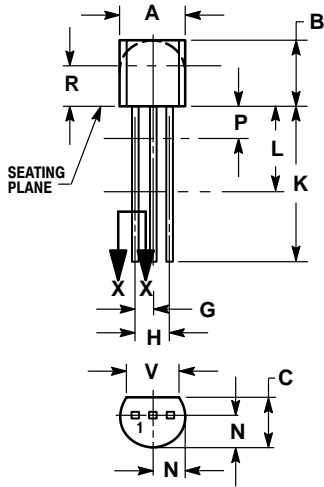


Figure 5. Temperature Coefficients

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## PACKAGE DIMENSIONS

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




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	---

STYLE 14:

1. EMITTER
2. COLLECTOR
3. BASE

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