

# BC638, BC640, BC640-16

## High Current Transistors

### PNP Silicon

#### Features

- Pb-Free Packages are Available\*

#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage BC638 BC640	$V_{CEO}$	-60 -80	Vdc
Collector-Base Voltage BC638 BC640	$V_{CBO}$	-60 -80	Vdc
Emitter-Base Voltage	$V_{EBO}$	-5.0	Vdc
Collector Current – Continuous	$I_C$	-0.5	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 $25^\circ\text{C}$	$P_D$	1.5 12	W 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.

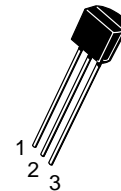
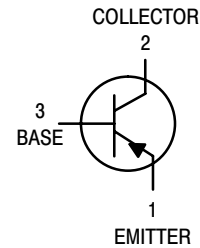
#### THERMAL CHARACTERISTICS

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	$^\circ\text{C}/\text{W}$



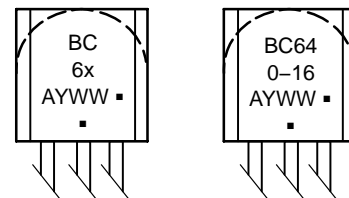
ON Semiconductor®

<http://onsemi.com>



TO-92  
CASE 29  
STYLE 14

#### MARKING DIAGRAMS



BC6x = Device Code  
x = 3 or 4  
BC640-16 = Specific Device Code  
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 2 of this data sheet.

\*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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## ORDERING INFORMATION

Device	Package	Shipping
BC638	TO-92	5000 Units / Box
BC638G	TO-92 (Pb-Free)	5000 Units / Box
BC638ZL1	TO-92	2000 Units / Ammo Box
BC638ZL1G	TO-92 (Pb-Free)	2000 Units / Ammo Box
BC640	TO-92	5000 Units / Box
BC640G	TO-92 (Pb-Free)	5000 Units / Box
BC640ZL1	TO-92	2000 Units / Ammo Box
BC640ZL1G	TO-92 (Pb-Free)	2000 Units / Ammo Box
BC640-16	TO-92	5000 Units / Box
BC640-16G	TO-92 (Pb-Free)	5000 Units / Box

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

Characteristic	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Collector - Emitter Breakdown Voltage ( $I_C = -10\text{ mA}$ , $I_B = 0$ )	BC638 BC640	$V_{(BR)CEO}$	-60 -80	- -	- -	Vdc
Collector - Base Breakdown Voltage ( $I_C = -100\text{ }\mu\text{A}$ , $I_E = 0$ )	BC638 BC640	$V_{(BR)CBO}$	-60 -80	- -	- -	Vdc
Emitter - Base Breakdown Voltage ( $I_E = -10\text{ }\mu\text{A}$ , $I_C = 0$ )		$V_{(BR)EBO}$	-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 ( $I_C = -5.0\text{ mA}$ , $V_{CE} = -2.0\text{ Vdc}$ ) ( $I_C = -150\text{ mA}$ , $V_{CE} = -2.0\text{ Vdc}$ )  ( $I_C = -500\text{ mA}$ , $V_{CE} = -2.0\text{ V}$ )	BC638 BC640 BC640-16	$h_{FE}$	25 40 40 100 25	- - - - -	- 160 160 250 -	-
Collector - Emitter Saturation Voltage ( $I_C = -500\text{ mA}$ , $I_B = -50\text{ mA}$ )		$V_{CE(sat)}$	- -	-0.25 -0.5	-0.5 -	Vdc
Base - Emitter On Voltage ( $I_C = -500\text{ mA}$ , $V_{CE} = -2.0\text{ Vdc}$ )		$V_{BE(on)}$	-	-	-1.0	Vdc

### DYNAMIC CHARACTERISTICS

Current Gain - Bandwidth Product ( $I_C = -50\text{ mA}$ , $V_{CE} = -2.0\text{ Vdc}$ , $f = 100\text{ MHz}$ )		$f_T$	-	150	-	MHz
Output Capacitance ( $V_{CB} = -10\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )		$C_{ob}$	-	9.0	-	pF
Input Capacitance ( $V_{EB} = -0.5\text{ Vdc}$ , $I_C = 0$ , $f = 1.0\text{ MHz}$ )		$C_{ib}$	-	110	-	pF

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

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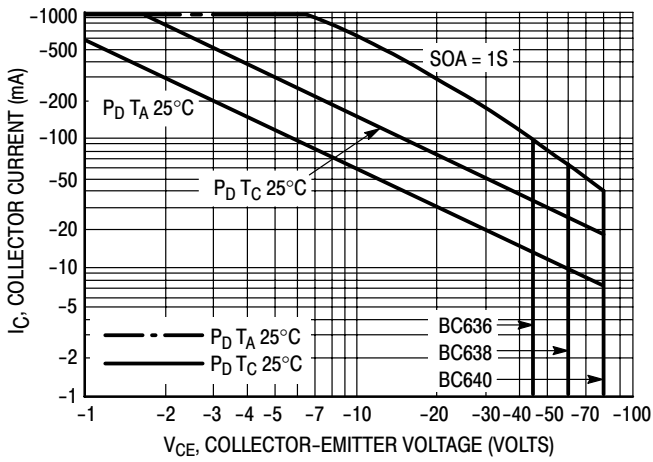


Figure 1. Active Region Safe Operating Area

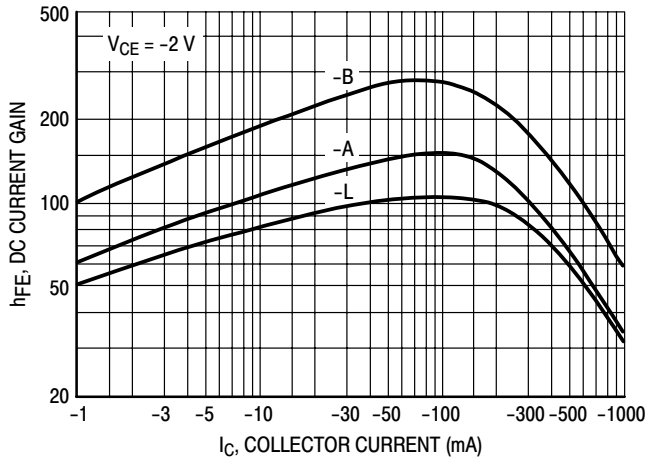


Figure 2. DC Current Gain

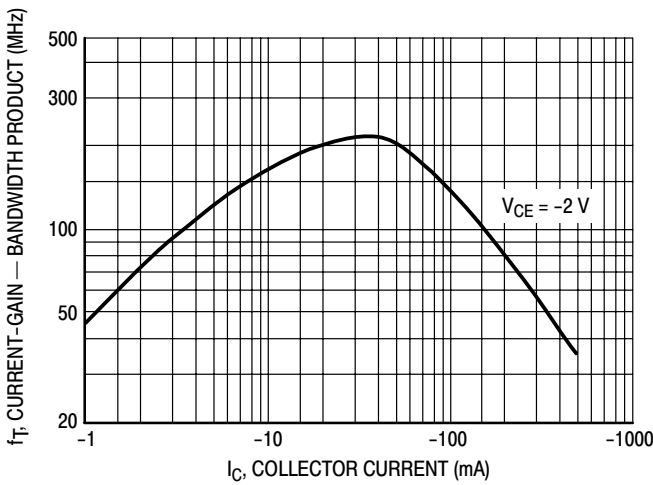


Figure 3. Current Gain Bandwidth Product

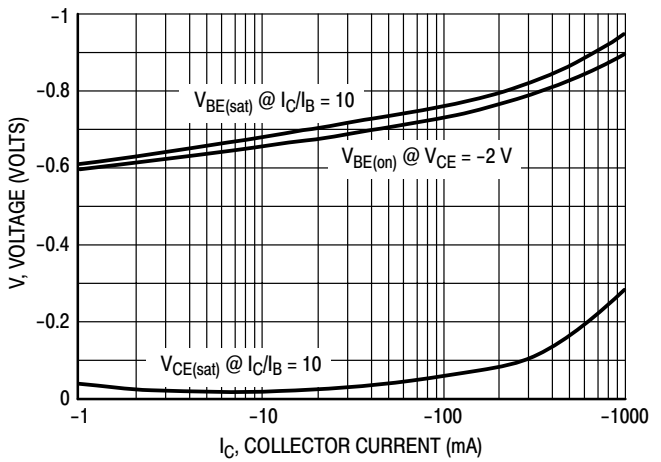


Figure 4. "Saturation" and "On" Voltages

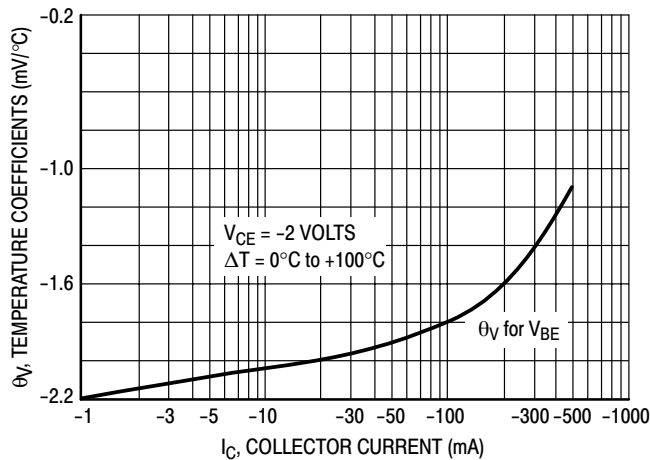
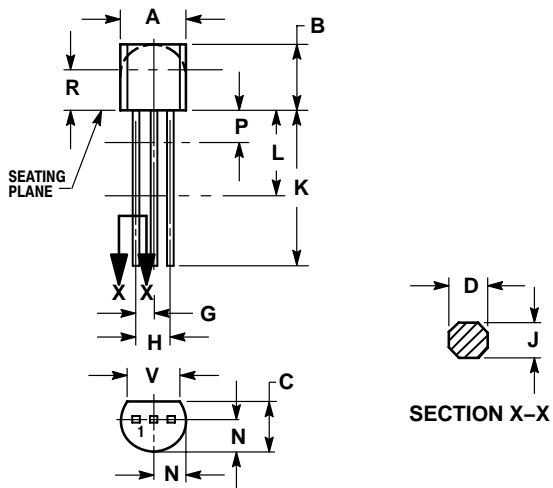


Figure 5. Temperature Coefficients

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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. PIN 1. EMITTER
2. COLLECTOR
3. BASE

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