# **Amplifier Transistors**

## **NPN Silicon**

### **Features**

• Pb-Free Packages are Available\*

#### **MAXIMUM RATINGS**

Rating	Symbol	BC337	BC338	Unit	
Collector – Emitter Voltage	$V_{CEO}$	45	25	Vdc	
Collector - Base Voltage	V <sub>CBO</sub>	50 30		Vdc	
Emitter – Base Voltage	V <sub>EBO</sub>	5.0		Vdc	
Collector Current – Continuous	I <sub>C</sub>	800		mAdc	
Total Device Dissipation @ T <sub>A</sub> = 25°C Derate above 25°C	P <sub>D</sub>	625 5.0		mW mW/°C	
Total Device Dissipation @ T <sub>C</sub> = 25°C Derate above 25°C	P <sub>D</sub>	1.5 12		W mW/°C	
Operating and Storage Junction Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-55 to +150		°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.

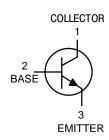
## THERMAL CHARACTERISTICS

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



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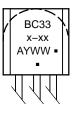
### http://onsemi.com





TO-92 CASE 29 STYLE 17

### MARKING DIAGRAM



BC33x-xx = Device Code

(Refer to page 4)

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 4 of this data sheet.

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

# **ELECTRICAL CHARACTERISTICS** (T<sub>A</sub> = 25°C unless otherwise noted)

Characteristi	С	Symbol	Min	Тур	Max	Unit
OFF CHARACTERISTICS		•		•	•	•
Collector – Emitter Breakdown Voltage (I <sub>C</sub> = 10 mA, I <sub>B</sub> = 0) BC338	BC337	V <sub>(BR)CEO</sub>	45 25	- -	- -	Vdc
Collector – Emitter Breakdown Voltage ( $I_C = 100 \mu A, I_E = 0$ )	BC337 BC338	V <sub>(BR)CES</sub>	50 30	- -	- -	Vdc
Emitter – Base Breakdown Voltage ( $I_E = 10 \mu A, I_C = 0$ )		V <sub>(BR)EBO</sub>	5.0	_	-	Vdc
Collector Cutoff Current (V <sub>CB</sub> = 30 V, I <sub>E</sub> = 0) (V <sub>CB</sub> = 20 V, I <sub>E</sub> = 0)	BC337 BC338	I <sub>CBO</sub>	- -	- -	100 100	nAdc
Collector Cutoff Current $(V_{CE} = 45 \text{ V}, V_{BE} = 0)$ $(V_{CE} = 25 \text{ V}, V_{BE} = 0)$	BC337 BC338	I <sub>CES</sub>	- -	_ _	100 100	nAdc
Emitter Cutoff Current (V <sub>EB</sub> = 4.0 V, I <sub>C</sub> = 0)		I <sub>EBO</sub>	-	_	100	nAdc
ON CHARACTERISTICS						
DC Current Gain ( $I_C$ = 100 mA, $V_{CE}$ = 1.0 V) ( $I_C$ = 300 mA, $V_{CE}$ = 1.0 V)	BC337 BC337-16 BC337-25/BC338-25 BC337-40	h <sub>FE</sub>	100 100 160 250 60	- - - -	630 250 400 630	-
Base–Emitter On Voltage (I <sub>C</sub> = 300 mA, V <sub>CE</sub> = 1.0 V)		V <sub>BE(on)</sub>	_	-	1.2	Vdc
Collector – Emitter Saturation Voltage (I <sub>C</sub> = 500 mA, I <sub>B</sub> = 50 mA)		V <sub>CE(sat)</sub>	_	_	0.7	Vdc
SMALL-SIGNAL CHARACTERISTICS			•			<u> </u>
Output Capacitance $(V_{CB} = 10 \text{ V, } I_E = 0, f = 1.0 \text{ MHz})$		C <sub>ob</sub>	-	15	_	pF
Current – Gain – Bandwidth Product ( $I_C = 10 \text{ mA}, V_{CE} = 5.0 \text{ V}, f = 100 \text{ MHz}$ )		f <sub>T</sub>	-	210	-	MHz

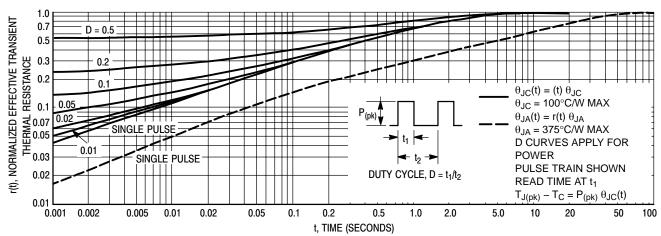


Figure 1. Thermal Response

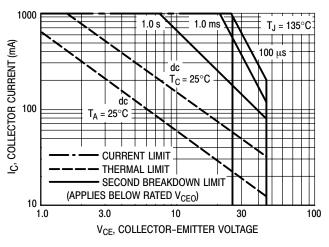


Figure 2. Active Region - Safe Operating Area

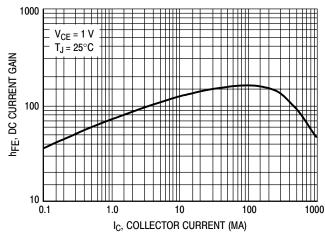


Figure 3. DC Current Gain

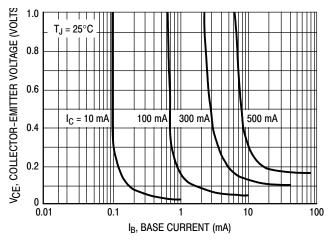


Figure 4. Saturation Region

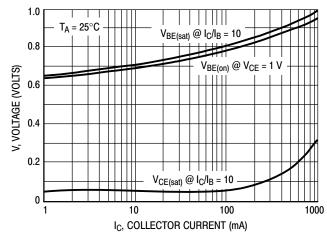


Figure 5. "On" Voltages

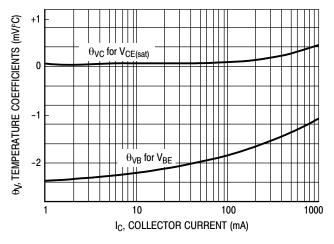


Figure 6. Temperature Coefficients

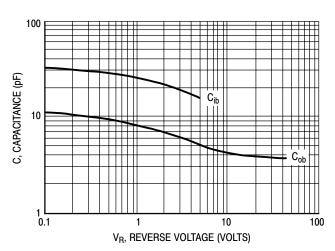


Figure 7. Capacitances

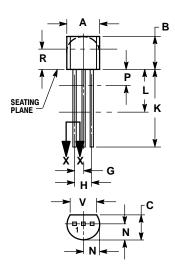
## **ORDERING INFORMATION**

Device	Package	Marking	Shipping <sup>†</sup>
BC337	TO-92	7	5000 Units / Box
BC337G	TO-92 (Pb-Free)	7	5000 Units / Box
BC337RL1	TO-92	7	2000 / Tape & Reel
BC337RL1G	TO-92 (Pb-Free)	7	2000 / Tape & Reel
BC337ZL1	TO-92	7	2000 / Ammo Box
BC337ZL1G	TO-92 (Pb-Free)	7	2000 / Ammo Box
BC337-16	TO-92	7–16	5000 Units / Box
BC337-16G	TO-92 (Pb-Free)	7–16	5000 Units / Box
BC337-16RL1	TO-92	7–16	2000 / Tape & Reel
BC337-16RL1G	TO-92 (Pb-Free)	7–16	2000 / Tape & Reel
BC337-16ZL1	TO-92	7–16	2000 / Ammo Box
BC337-16ZL1G	TO-92 (Pb-Free)	7–16	2000 / Ammo Box
BC337-25	TO-92	7–25	5000 Units / Box
BC337-25G	TO-92 (Pb-Free)	7–25	5000 Units / Box
BC337-25RL1	TO-92	7–25	2000 / Tape & Reel
BC337-25RL1G	TO-92 (Pb-Free)	7–25	2000 / Tape & Reel
BC337-25ZL1	TO-92	7–25	2000 / Ammo Box
BC337-25ZL1G	TO-92 (Pb-Free)	7–25	2000 / Ammo Box
BC337-40	TO-92	7–40	5000 Units / Box
BC337-40G	TO-92 (Pb-Free)	7–40	5000 Units / Box
BC337-40RL1	TO-92	7–40	2000 / Tape & Reel
BC337-40RL1G	TO-92 (Pb-Free)	7–40	2000 / Tape & Reel
BC337-40ZL1	TO-92	7–40	2000 / Ammo Box
BC337-40ZL1G	TO-92 (Pb-Free)	7–40	2000 / Ammo Box
BC338-25ZL1	TO-92	8–25	2000 / Ammo Box
BC338-25ZL1G	TO-92 (Pb-Free)	8–25	2000 / Ammo Box

<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.

### PACKAGE DIMENSIONS

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





#### NOTES:

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  Y14.5M. 1982.
- 2. CONTROLLING DIMENSION: INCH.
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	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
Α	0.175	0.205	4.45	5.20
В	0.170	0.210	4.32	5.33
С	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
Н	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 17:

PIN 1. COLLECTOR

2. BASE

3. EMITTER

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