

# BC212, BC212B, BC213, BC214

## Amplifier Transistors

PNP Silicon



ON Semiconductor™

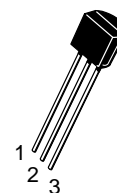
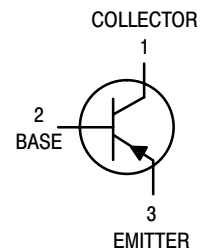
<http://onsemi.com>

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage BC212 BC213 BC214	$V_{CEO}$	-50 -30 -30	Vdc
Collector-Base Voltage BC212 BC213 BC214	$V_{CBO}$	-60 -45 -45	Vdc
Emitter-Base Voltage	$V_{EBO}$	-5.0	Vdc
Collector Current – Continuous	$I_C$	-100	mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	350 2.8	mW mW/°C
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	1.0 8.0	Watts mW/°C
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-55 to +150	°C

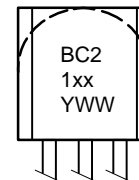
### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	357	°C/W
Thermal Resistance, Junction to Case	$R_{\theta JC}$	125	°C/W



TO-92  
CASE 29  
STYLE 17

### MARKING DIAGRAMS



BC21xx = Specific Device Code  
xx = 2, 2B, 3 or 4  
Y = Year  
WW = Work Week

### ORDERING INFORMATION

Device	Package	Shipping
BC212	TO-92	5000 Units/Box
BC212B	TO-92	5000 Units/Box
BC212BRL1	TO-92	2000/Tape & Reel
BC212BZL1	TO-92	2000/Ammo Pack
BC213	TO-92	5000 Units/Box
BC214	TO-92	5000 Units/Box
BC214RL1	TO-92	2000/Tape & Reel

# BC212, BC212B, BC213, BC214

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

Characteristic		Symbol	Min	Typ	Max	Unit
Collector–Emitter Breakdown Voltage (I <sub>C</sub> = –2.0 mA <sub>dc</sub> , I <sub>B</sub> = 0)	BC212	V <sub>(BR)CEO</sub>	–50	–	–	V <sub>dc</sub>
	BC213		–30	–	–	
	BC214		–30	–	–	
Collector–Base Breakdown Voltage (I <sub>C</sub> = –10 μA, I <sub>E</sub> = 0)	BC212	V <sub>(BR)CBO</sub>	–60	–	–	V <sub>dc</sub>
	BC213		–45	–	–	
	BC214		–45	–	–	
Emitter–Base Breakdown Voltage (I <sub>E</sub> = –10 μA <sub>dc</sub> , I <sub>C</sub> = 0)	BC212	V <sub>(BR)EBO</sub>	–5	–	–	V <sub>dc</sub>
	BC213		–5	–	–	
	BC214		–5	–	–	
Collector–Emitter Leakage Current (V <sub>CB</sub> = –30 V)	BC212	I <sub>CBO</sub>	–	–	–15	nA <sub>dc</sub>
	BC213		–	–	–15	
	BC214		–	–	–15	
Emitter–Base Leakage Current (V <sub>EB</sub> = –4.0 V, I <sub>C</sub> = 0)	BC212	I <sub>EBO</sub>	–	–	–15	nA <sub>dc</sub>
	BC213		–	–	–15	
	BC214		–	–	–15	

## ON CHARACTERISTICS

DC Current Gain (I <sub>C</sub> = –10 μA <sub>dc</sub> , V <sub>CE</sub> = –5.0 V <sub>dc</sub> )	BC212	h <sub>FE</sub>	40	–	–	–
	BC213		40	–	–	
	BC214		100	–	–	
(I <sub>C</sub> = –2.0 mA <sub>dc</sub> , V <sub>CE</sub> = –5.0 V <sub>dc</sub> )	BC212		60	–	–	
	BC213		80	–	–	
	BC214		140	–	600	
(I <sub>C</sub> = –100 mA <sub>dc</sub> , V <sub>CE</sub> = –5.0 V <sub>dc</sub> ) (Note 1.)	BC212, BC214		–	120	–	
	BC213		–	140	–	
Collector–Emitter Saturation Voltage (I <sub>C</sub> = –10 mA <sub>dc</sub> , I <sub>B</sub> = –0.5 mA <sub>dc</sub> ) (I <sub>C</sub> = –100 mA <sub>dc</sub> , I <sub>B</sub> = –5.0 mA <sub>dc</sub> ) (Note 1.)		V <sub>CE(sat)</sub>	–	–0.10	–	V <sub>dc</sub>
			–	–0.25	–0.6	
Base–Emitter Saturation Voltage (I <sub>C</sub> = –100 mA <sub>dc</sub> , I <sub>B</sub> = –5.0 mA <sub>dc</sub> )		V <sub>BE(sat)</sub>	–	–1.0	–1.4	V <sub>dc</sub>
Base–Emitter On Voltage (I <sub>C</sub> = –2.0 mA <sub>dc</sub> , V <sub>CE</sub> = –5.0 V <sub>dc</sub> )		V <sub>BE(on)</sub>	–0.6	–0.62	–0.72	V <sub>dc</sub>

## DYNAMIC CHARACTERISTICS

Current–Gain – Bandwidth Product (I <sub>C</sub> = –10 mA <sub>dc</sub> , V <sub>CE</sub> = –5.0 V <sub>dc</sub> , f = 100 MHz)	BC212	f <sub>T</sub>	–	280	–	MHz
	BC214		–	320	–	
	BC213		–	360	–	
Common–Base Output Capacitance (V <sub>CB</sub> = –10 V <sub>dc</sub> , I <sub>C</sub> = 0, f = 1.0 MHz)		C <sub>ob</sub>	–	–	6.0	pF
Noise Figure (I <sub>C</sub> = –0.2 mA <sub>dc</sub> , V <sub>CE</sub> = –5.0 V <sub>dc</sub> , R <sub>S</sub> = 2.0 kΩ, f = 1.0 kHz)	BC214	NF	–	–	2	dB
	BC212, BC213		–	–	10	
Small–Signal Current Gain (I <sub>C</sub> = –2.0 mA <sub>dc</sub> , V <sub>CE</sub> = –5.0 V <sub>dc</sub> , f = 1.0 kHz)	BC212	h <sub>fe</sub>	60	–	–	–
	BC213		80	–	–	
	BC214		140	–	–	
	BC212B		200	–	400	

1. Pulse Test: T<sub>p</sub> 300 s, Duty Cycle 2.0%.

# BC212, BC212B, BC213, BC214

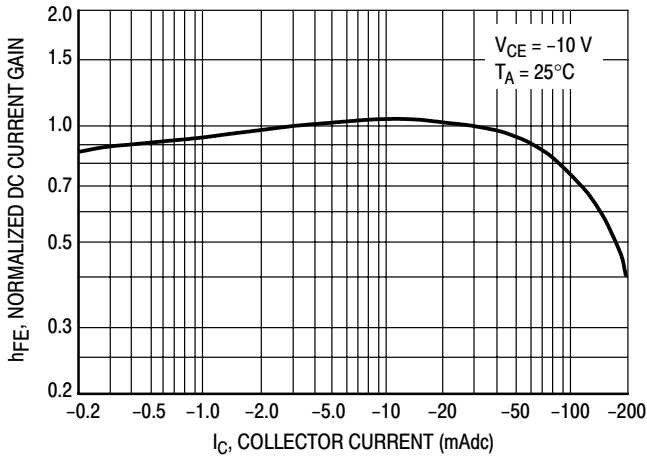


Figure 1. Normalized DC Current Gain

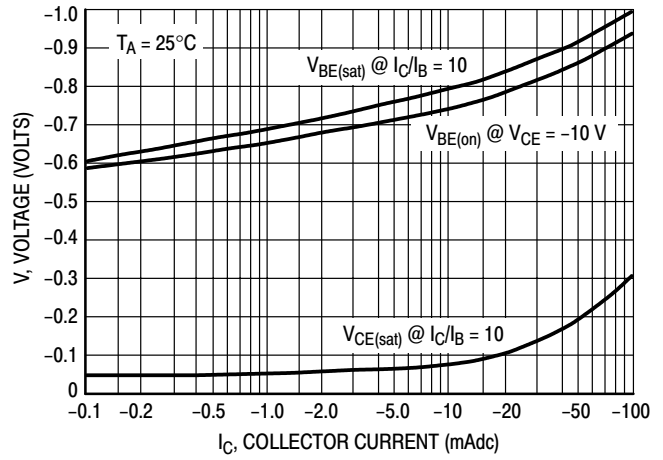


Figure 2. "Saturation" and "On" Voltages

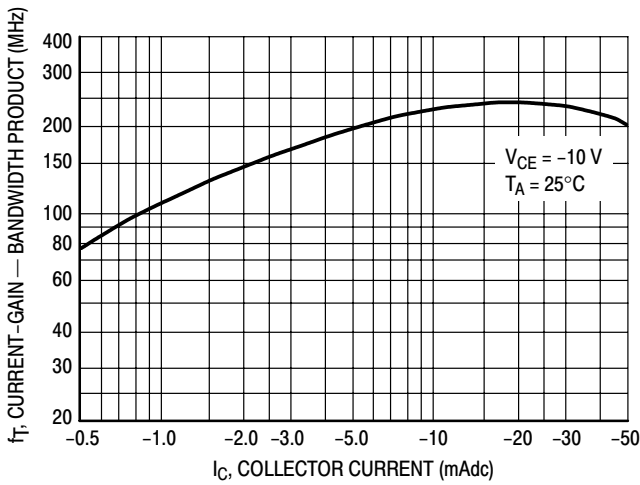


Figure 3. Current-Gain — Bandwidth Product

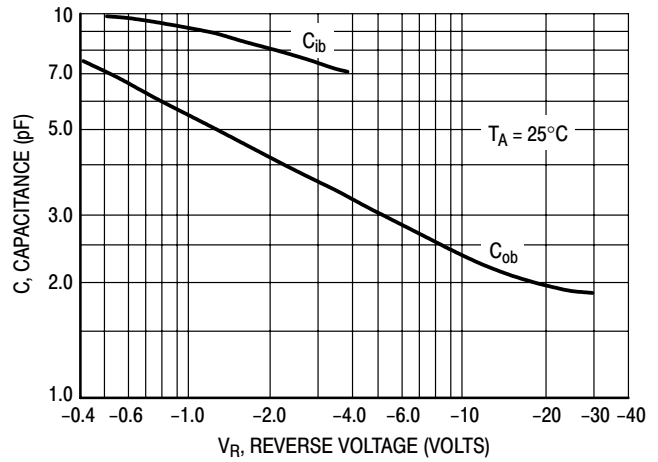


Figure 4. Capacitances

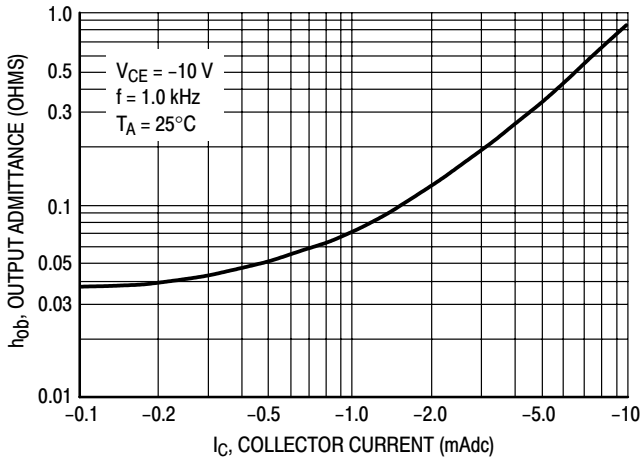


Figure 5. Output Admittance

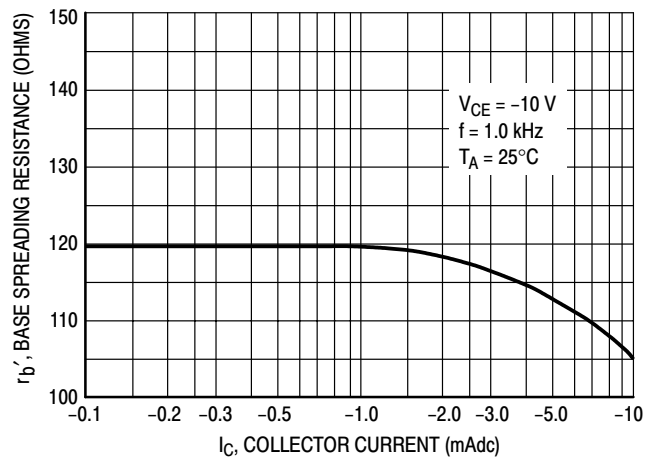
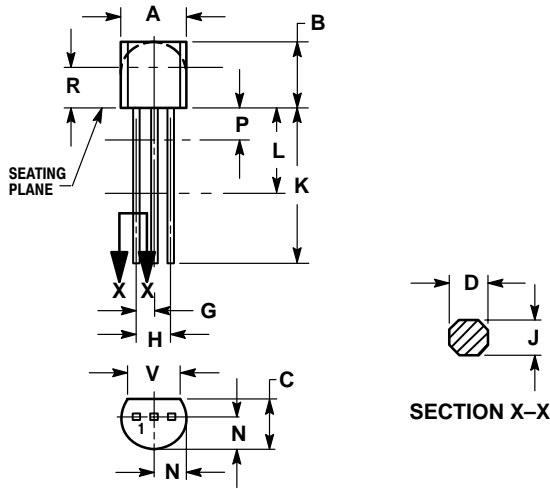


Figure 6. Base Spreading Resistance

# BC212, BC212B, BC213, BC214

## 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 17:

1. COLLECTOR
2. BASE
3. EMITTER

**ON Semiconductor** and  are 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.

## PUBLICATION ORDERING INFORMATION

### NORTH AMERICA Literature Fulfillment:

Literature Distribution Center for ON Semiconductor  
P.O. Box 5163, Denver, Colorado 80217 USA  
**Phone:** 303-675-2175 or 800-344-3860 Toll Free USA/Canada  
**Fax:** 303-675-2176 or 800-344-3867 Toll Free USA/Canada  
**Email:** ONlit@hibbertco.com  
Fax Response Line: 303-675-2167 or 800-344-3810 Toll Free USA/Canada

### N. American Technical Support: 800-282-9855 Toll Free USA/Canada

### EUROPE: LDC for ON Semiconductor – European Support

**German Phone:** (+1) 303-308-7140 (Mon-Fri 2:30pm to 7:00pm CET)  
**Email:** ONlit-german@hibbertco.com  
**French Phone:** (+1) 303-308-7141 (Mon-Fri 2:00pm to 7:00pm CET)  
**Email:** ONlit-french@hibbertco.com  
**English Phone:** (+1) 303-308-7142 (Mon-Fri 12:00pm to 5:00pm GMT)  
**Email:** ONlit@hibbertco.com

### EUROPEAN TOLL-FREE ACCESS\*: 00-800-4422-3781

\*Available from Germany, France, Italy, UK, Ireland

### CENTRAL/SOUTH AMERICA:

**Spanish Phone:** 303-308-7143 (Mon-Fri 8:00am to 5:00pm MST)  
**Email:** ONlit-spanish@hibbertco.com  
**Toll-Free from Mexico:** Dial 01-800-288-2872 for Access –  
then Dial 866-297-9322

### ASIA/PACIFIC: LDC for ON Semiconductor – Asia Support

**Phone:** 303-675-2121 (Tue-Fri 9:00am to 1:00pm, Hong Kong Time)  
**Toll Free from Hong Kong & Singapore:**  
**001-800-4422-3781**  
**Email:** ONlit-asia@hibbertco.com

### JAPAN: ON Semiconductor, Japan Customer Focus Center

4-32-1 Nishi-Gotanda, Shinagawa-ku, Tokyo, Japan 141-0031  
**Phone:** 81-3-5740-2700  
**Email:** r14525@onsemi.com

### ON Semiconductor Website: <http://onsemi.com>

For additional information, please contact your local Sales Representative.