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# BC517

## Darlington Transistors

### NPN Silicon

#### Features

- Pb-Free Packages are Available\*

#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	$V_{CES}$	30	Vdc
Collector–Base Voltage	$V_{CB}$	40	Vdc
Collector–Emitter Voltage	$V_{EB}$	10	Vdc
Collector Current – Continuous	$I_C$	1.0	Adc
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $T_A = 25^\circ\text{C}$	$P_D$	625 12	mW mW/°C
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $T_A = 25^\circ\text{C}$	$P_D$	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

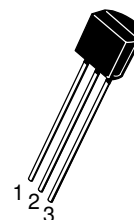
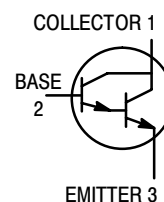
Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur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

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



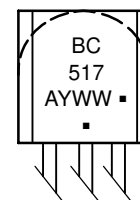
ON Semiconductor®

<http://onsemi.com>



TO-92  
CASE 29  
STYLE 17

#### MARKING DIAGRAM



A = Assembly Location  
Y = Year  
WW = Work Week  
■ = Pb-Free Package

(Note: Microdot may be in either location)

#### ORDERING INFORMATION

Device	Package	Shipping†
BC517	TO-92	5000 Units / Bulk
BC517G	TO-92 (Pb-Free)	5000 Units / Bulk
BC517RL1	TO-92	2000 / Tape & Reel
BC517RL1G	TO-92 (Pb-Free)	2000 / Tape & Reel
BC517ZL1	TO-92	2000 / Ammo Pack
BC517ZL1G	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.

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## 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 ( $I_C = 2.0\text{ mA}$ , $I_{BE} = 0$ )	$V_{(BR)CES}$	30	–	–	Vdc
Collector–Base Breakdown Voltage ( $I_C = 10\text{ }\mu\text{A}$ , $I_E = 0$ )	$V_{(BR)CBO}$	40	–	–	Vdc
Emitter–Base Breakdown Voltage ( $I_E = 100\text{ }\mu\text{A}$ , $I_C = 0$ )	$V_{(BR)EBO}$	10	–	–	Vdc
Collector Cutoff Current ( $V_{CE} = 30\text{ Vdc}$ )	$I_{CES}$	–	–	500	nAdc
Collector Cutoff Current ( $V_{CB} = 30\text{ Vdc}$ , $I_E = 0$ )	$I_{CBO}$	–	–	100	nAdc
Emitter Cutoff Current ( $V_{CB} = 10\text{ Vdc}$ , $I_C = 0$ )	$I_{EBO}$	–	–	100	nAdc

## ON CHARACTERISTICS (Note 1)

DC Current Gain ( $I_C = 20\text{ mA}$ , $V_{CE} = 2.0\text{ Vdc}$ )	$h_{FE}$	30,000	–	–	–
Collector–Emitter Saturation Voltage ( $I_C = 100\text{ mA}$ , $I_B = 0.1\text{ mA}$ )	$V_{CE(sat)}$	–	–	1.0	Vdc
Collector–Emitter Saturation Voltage ( $I_C = 10\text{ mA}$ , $V_{CE} = 5.0\text{ Vdc}$ )	$V_{BE(on)}$	–	–	1.4	Vdc

## SMALL-SIGNAL CHARACTERISTICS

Current–Gain – Bandwidth Product (Note 2) ( $I_C = 10\text{ mA}$ , $V_{CE} = 5.0\text{ Vdc}$ , $f = 100\text{ MHz}$ )	$f_T$	–	200	–	MHz
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1. Pulse Test: Pulse Width = 300  $\mu\text{s}$ , Duty Cycle 2.0%.
2.  $f_T = |h_{fe}| \cdot f_{test}$

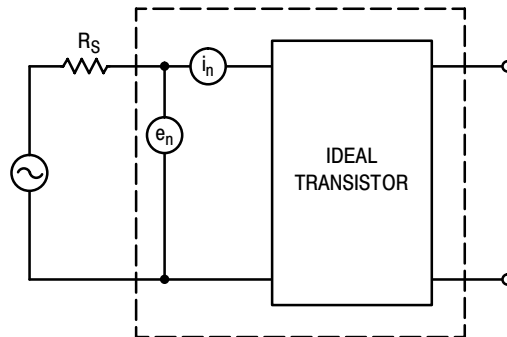


Figure 1. Transistor Noise Model

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## NOISE CHARACTERISTICS

( $V_{CE} = 5.0 \text{ Vdc}$ ,  $T_A = 25^\circ\text{C}$ )

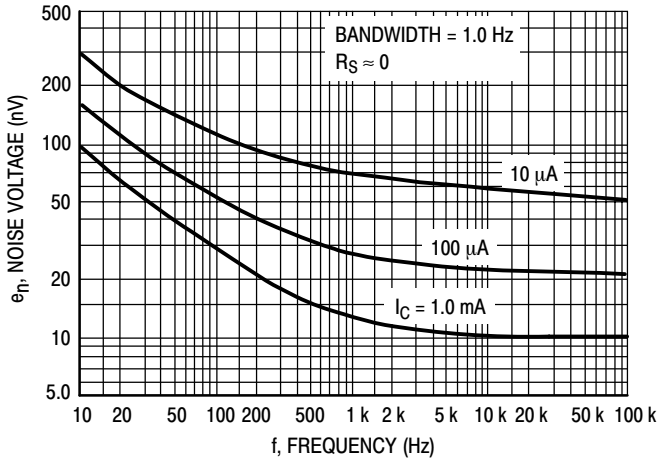


Figure 2. Noise Voltage

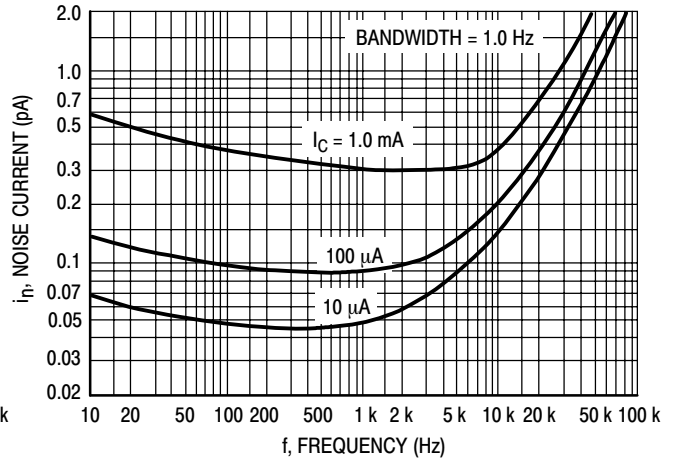


Figure 3. Noise Current

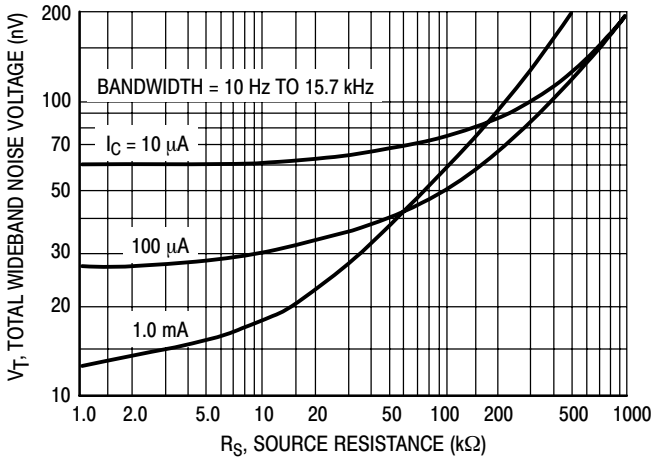


Figure 4. Total Wideband Noise Voltage

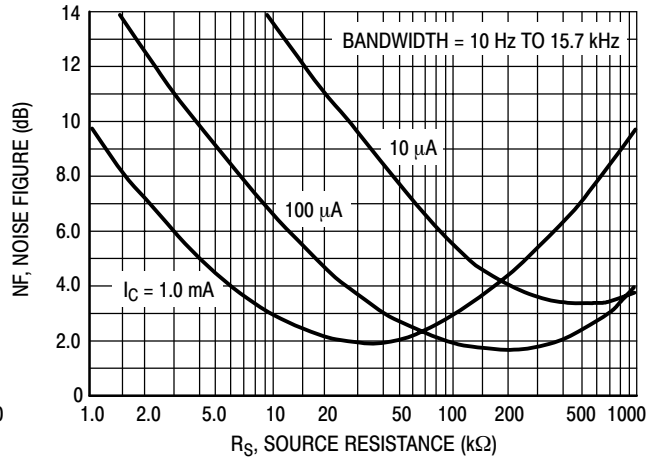


Figure 5. Wideband Noise Figure

SMALL-SIGNAL CHARACTERISTICS

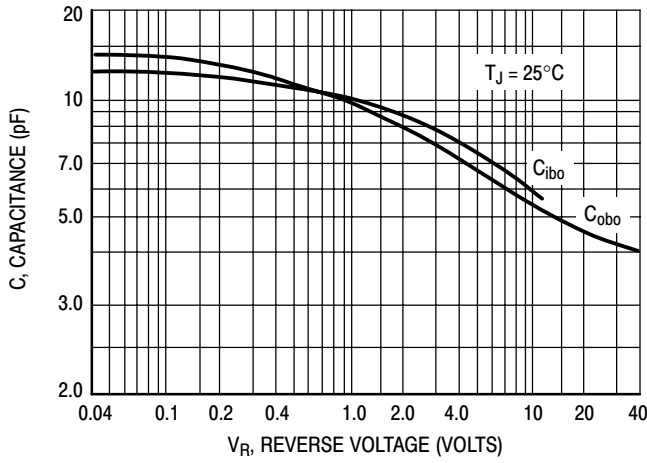


Figure 6. Capacitance

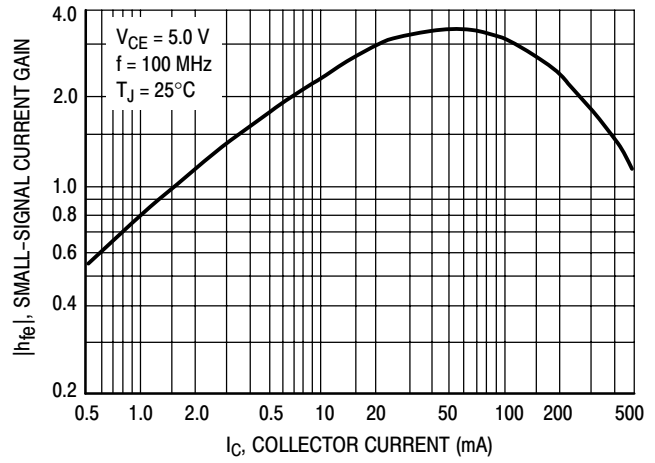


Figure 7. High Frequency Current Gain

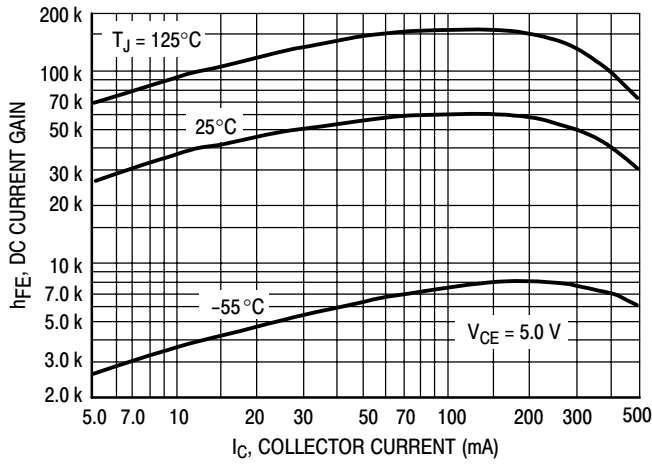


Figure 8. DC Current Gain

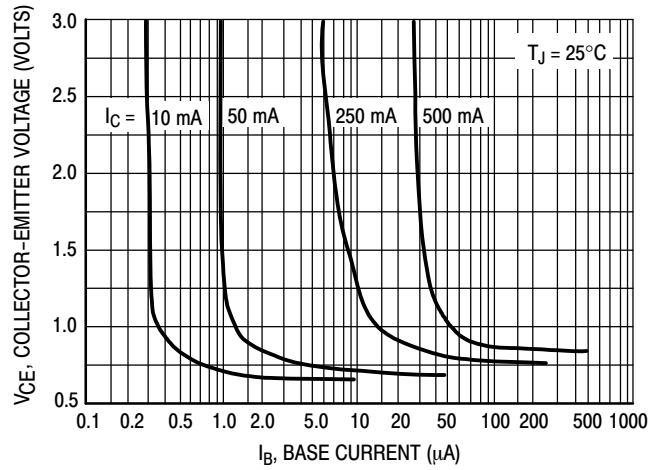


Figure 9. Collector Saturation Region

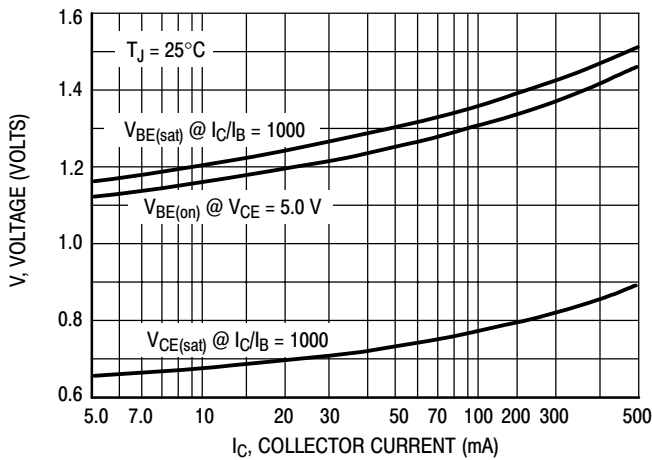


Figure 10. "On" Voltages

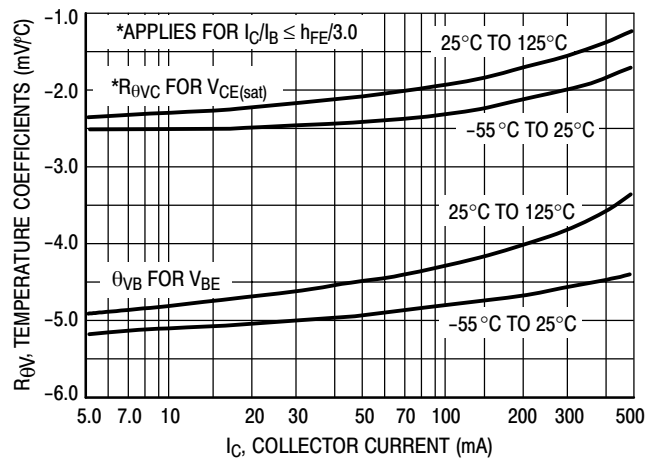


Figure 11. Temperature Coefficients

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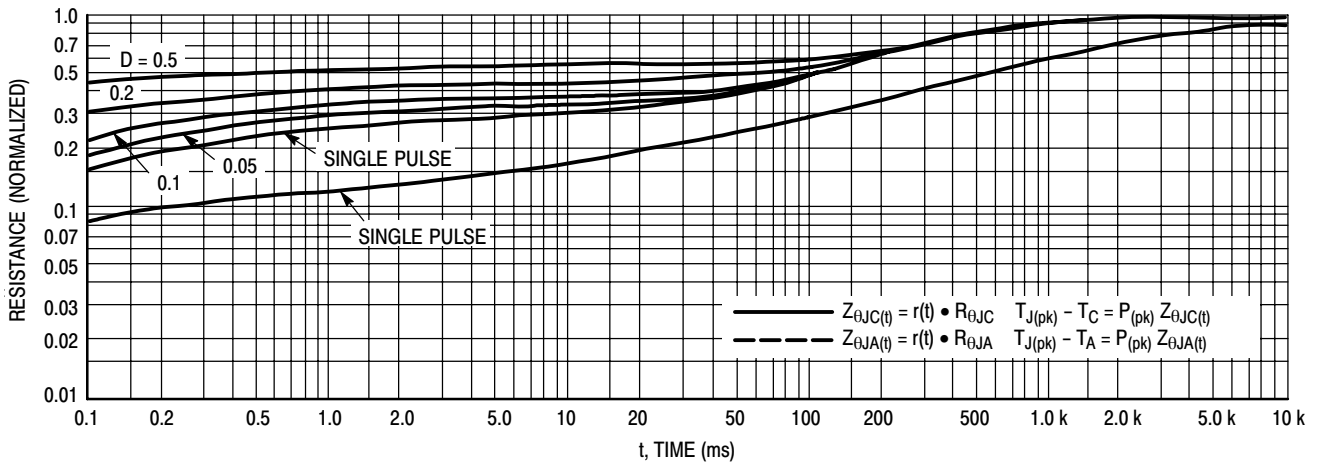


Figure 12. Thermal Response

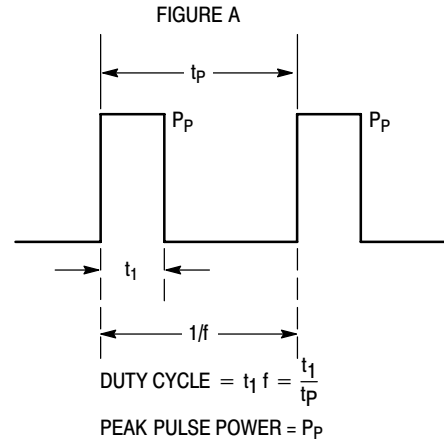
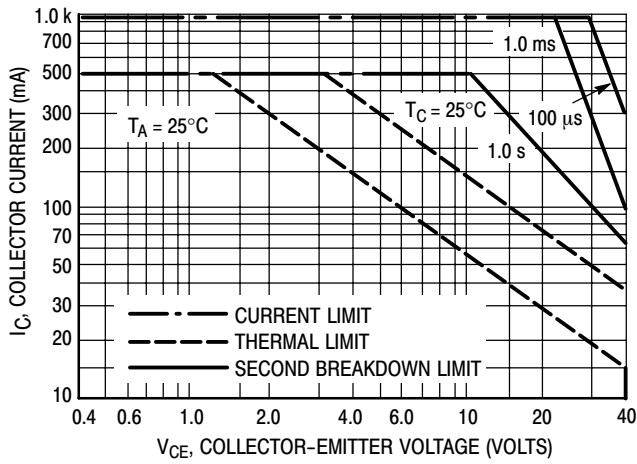
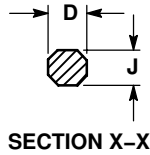
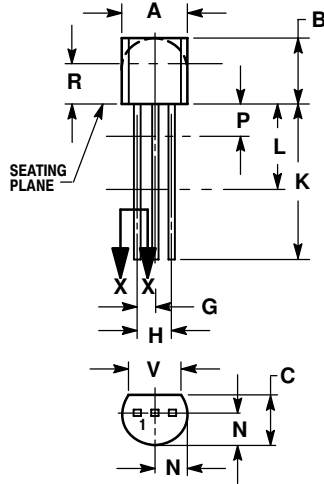


Figure 13. Active Region Safe Operating Area Design Note: Use of Transient Thermal Resistance Data

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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 17:**

- PIN 1. COLLECTOR
- BASE
- EMITTER

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