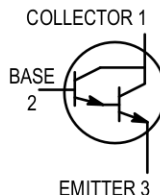


# Darlington Transistors

## NPN Silicon

**BC618**



CASE 29-04, STYLE 17  
TO-92 (TO-226AA)

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	$V_{CEO}$	55	Vdc
Collector–Base Voltage	$V_{CBO}$	80	Vdc
Emitter–Base Voltage	$V_{EBO}$	12	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 $25^\circ\text{C}$	$P_D$	1.5 12	Watts mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

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

### 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 ( $I_C = 10 \text{ mA}_{dc}, V_{BE} = 0$ )	$V_{(BR)CEO}$	55	—	—	Vdc
Collector–Base Breakdown Voltage ( $I_C = 100 \mu\text{A}_{dc}, I_E = 0$ )	$V_{(BR)CBO}$	80	—	—	Vdc
Emitter–Base Breakdown Voltage ( $I_E = 10 \mu\text{A}_{dc}, I_C = 0$ )	$V_{(BR)EBO}$	12	—	—	Vdc
Collector Cutoff Current ( $V_{CE} = 60 \text{ Vdc}, V_{BE} = 0$ )	$I_{CES}$	—	—	50	nAdc
Collector Cutoff Current ( $V_{CB} = 60 \text{ Vdc}, I_E = 0$ )	$I_{CBO}$	—	—	50	nAdc
Emitter Cutoff Current ( $V_{EB} = 10 \text{ Vdc}, I_C = 0$ )	$I_{EBO}$	—	—	50	nAdc

# BC618

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

Characteristic	Symbol	Min	Typ	Max	Unit
<b>ON CHARACTERISTICS</b>					
Collector–Emitter Saturation Voltage ( $I_C = 200\text{ mA}$ , $I_B = 0.2\text{ mA}$ )	$V_{CE(sat)}$	—	—	1.1	Vdc
Base–Emitter Saturation Voltage ( $I_C = 200\text{ mA}$ , $I_B = 0.2\text{ mA}$ )	$V_{BE(sat)}$	—	—	1.6	Vdc
DC Current Gain ( $I_C = 100\ \mu\text{A}$ , $V_{CE} = 5.0\text{ Vdc}$ ) ( $I_C = 10\text{ mA}$ , $V_{CE} = 5.0\text{ Vdc}$ ) ( $I_C = 200\text{ mA}$ , $V_{CE} = 5.0\text{ Vdc}$ ) ( $I_C = 1.0\text{ A}$ , $V_{CE} = 5.0\text{ Vdc}$ )	$h_{FE}$	2000 4000 10000 4000	— — — —	— — 50000 —	—

## DYNAMIC CHARACTERISTICS

Current–Gain — Bandwidth Product ( $I_C = 500\text{ mA}$ , $V_{CE} = 5.0\text{ Vdc}$ , $P = 100\text{ MHz}$ )	$f_T$	150	—	—	MHz
Output Capacitance ( $V_{CB} = 10\text{ V}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )	$C_{ob}$	—	4.5	7.0	pF
Input Capacitance ( $V_{EB} = 5.0\text{ V}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )	$C_{ib}$	—	5.0	9.0	pF

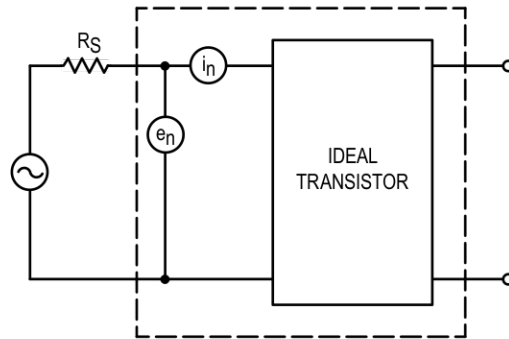


Figure 1. Transistor Noise Model

NOISE CHARACTERISTICS

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

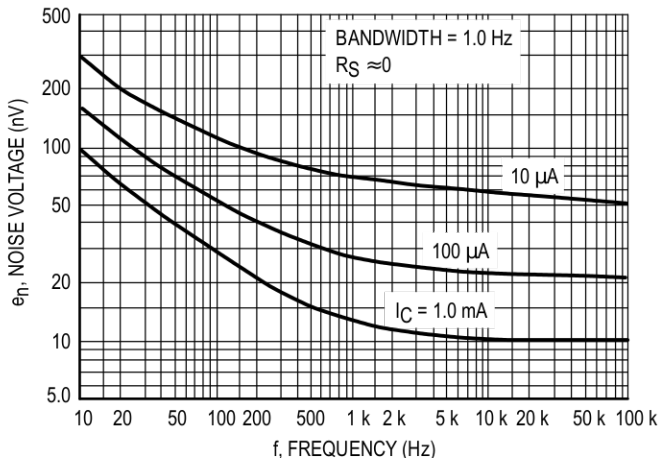


Figure 2. Noise Voltage

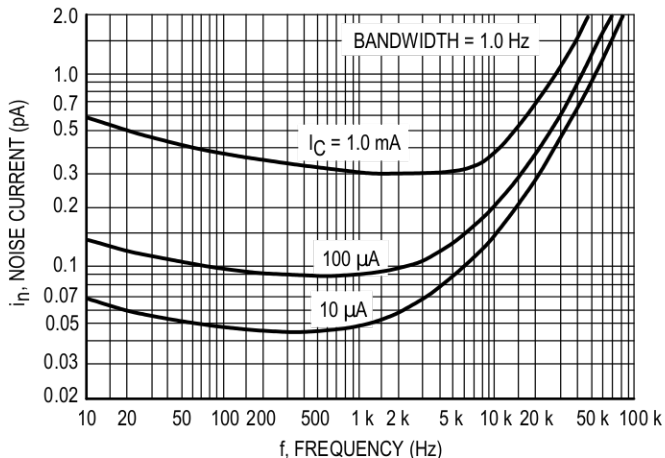


Figure 3. Noise Current

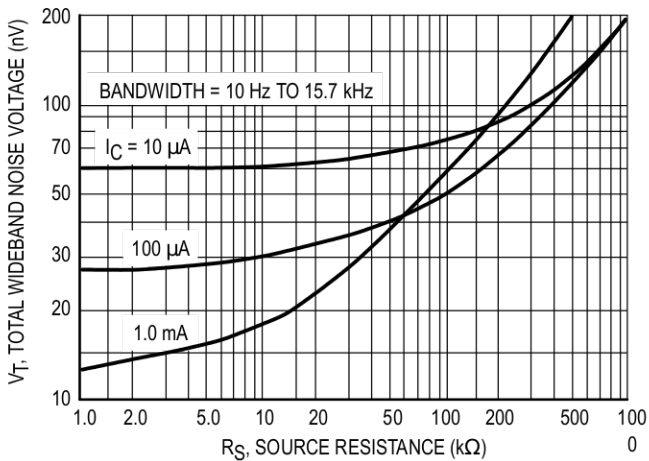


Figure 4. Total Wideband Noise Voltage

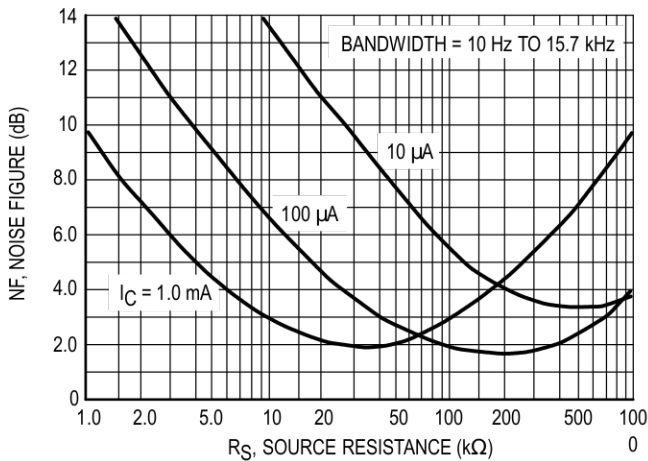


Figure 5. Wideband Noise Figure

SMALL-SIGNAL CHARACTERISTICS

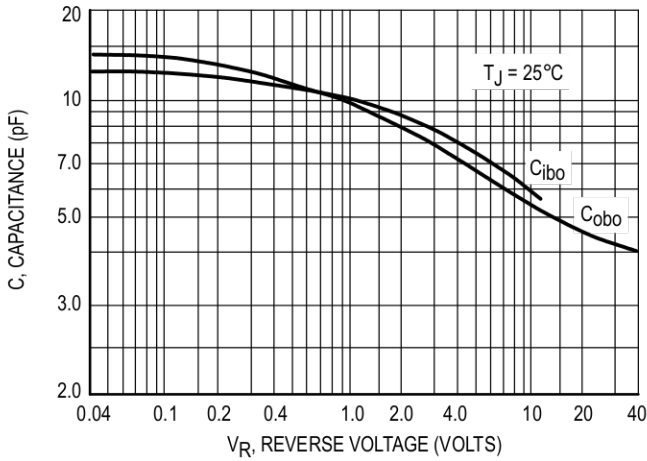


Figure 6. Capacitance

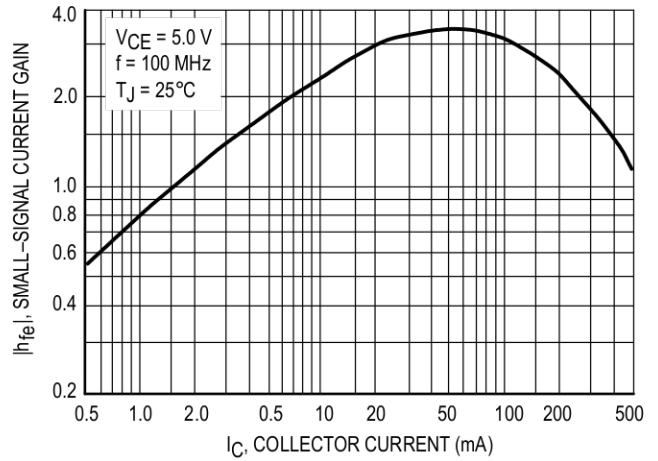


Figure 7. High Frequency Current Gain

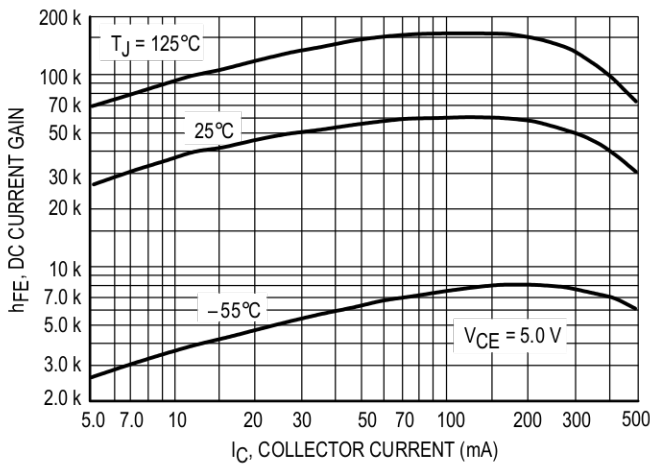


Figure 8. DC Current Gain

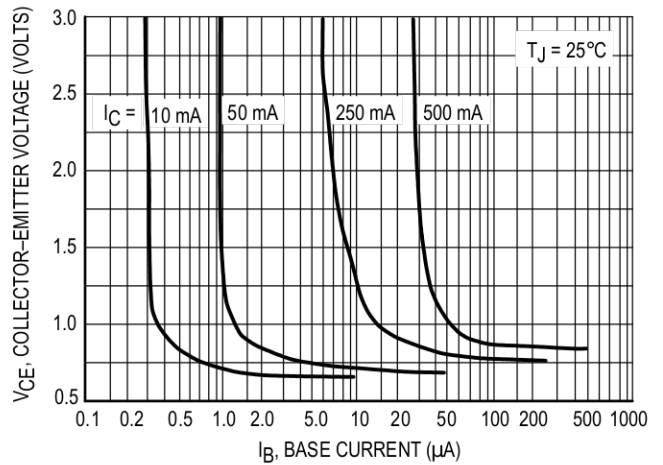


Figure 9. Collector Saturation Region

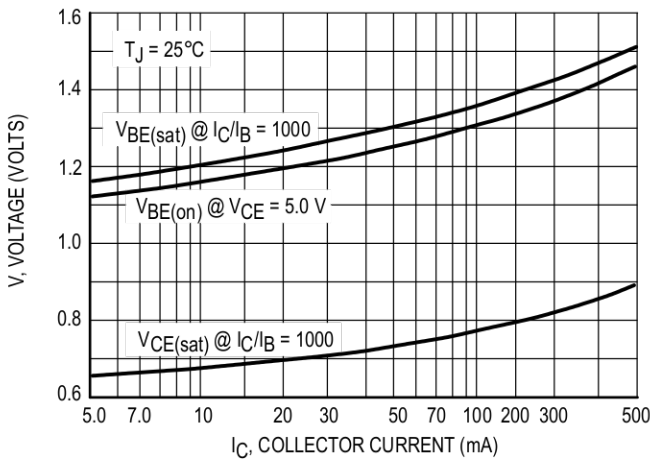


Figure 10. "On" Voltages

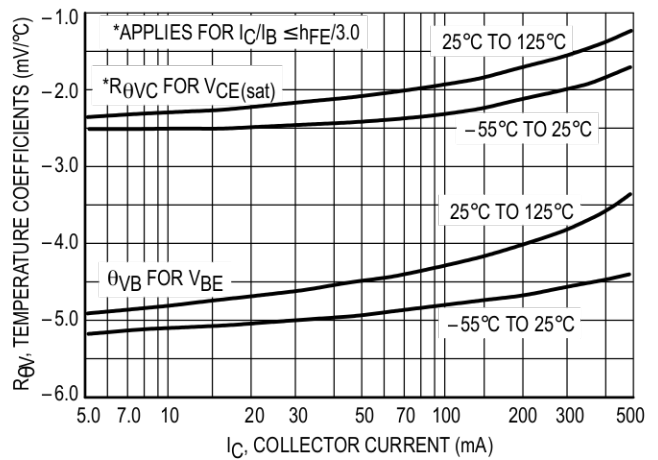


Figure 11. Temperature Coefficients

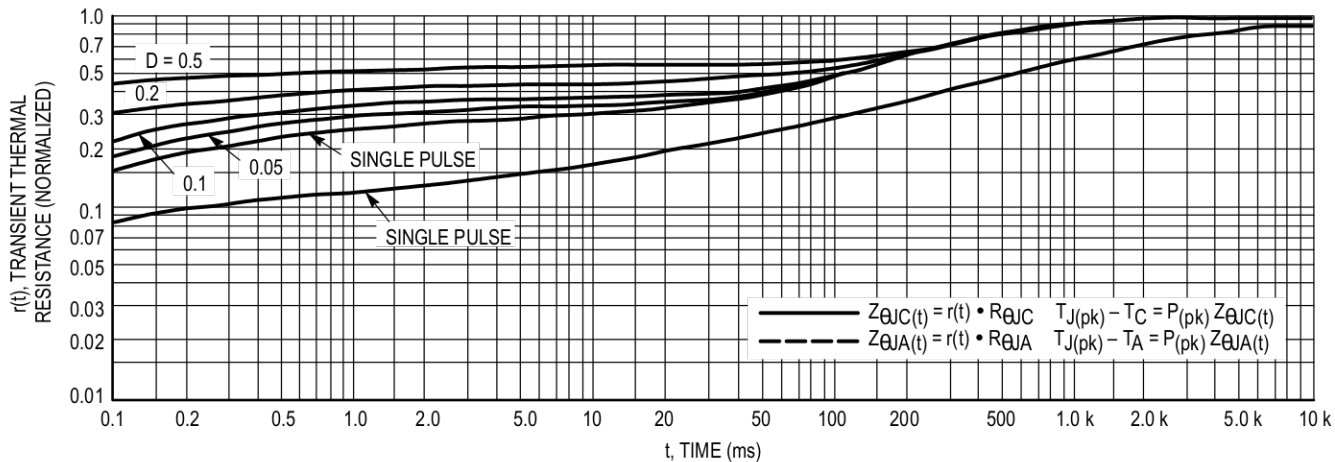


Figure 12. Thermal Response

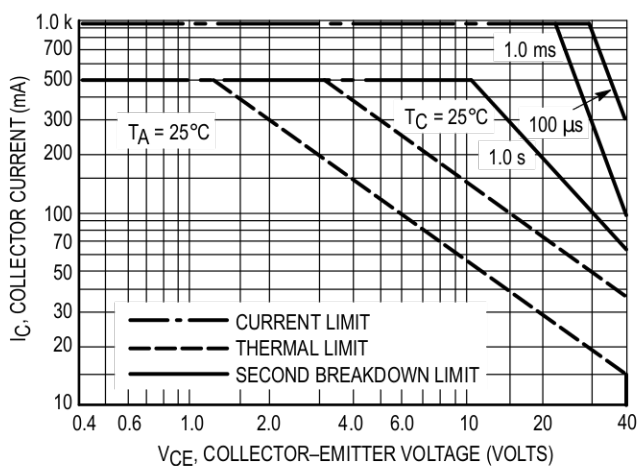
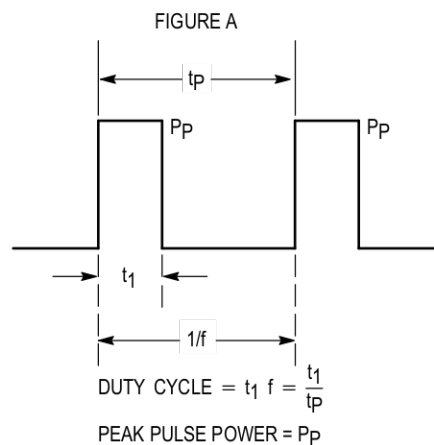
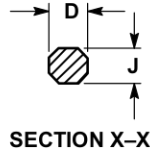
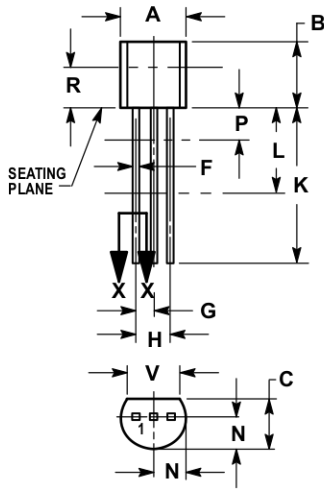


Figure 13. Active Region Safe Operating Area



Design Note: Use of Transient Thermal Resistance Data

PACKAGE DIMENSIONS



**CASE 029-04  
(TO-226AA)  
ISSUE AD**

- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
  4. DIMENSION F APPLIES BETWEEN P AND L. DIMENSION D AND J APPLY BETWEEN L AND K. MINIMUM 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	0.022	0.41	0.55
F	0.016	0.019	0.41	0.48
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

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