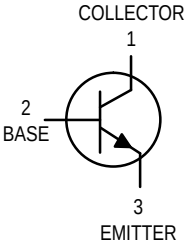
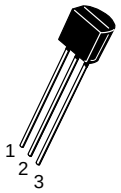
Low Noise Transistors

NPN Silicon

BC549B,C
BC550B,C





CASE 29–04, STYLE 17
TO–92 (TO–226AA)

MAXIMUM RATINGS

Rating	Symbol	BC549	BC550	Unit
Collector–Emitter Voltage	V_{CEO}	30	45	Vdc
Collector–Base Voltage	V_{CBO}	30	50	Vdc
Emitter–Base Voltage	V_{EBO}	5.0		Vdc
Collector Current — Continuous	I_C	100		mAdc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	625 5.0		mW mW/°C
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	1.5 12		Watt 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

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Collector–Emitter Breakdown Voltage (I_C = 10 mAdc, I_B = 0)	 BC549B,C BC550B,C	$V_{(BR)CEO}$	 30 45	 — —	 — —	Vdc
Collector–Base Breakdown Voltage (I_C = 10 μAdc, I_E = 0)	 BC549B,C BC550B,C	$V_{(BR)CBO}$	 30 50	 — —	 — —	Vdc
Emitter–Base Breakdown Voltage (I_E = 10 μAdc, I_C = 0)		$V_{(BR)EBO}$	5.0	—	—	Vdc
Collector Cutoff Current (V_{CB} = 30 V, I_E = 0) (V_{CB} = 30 V, I_E = 0, T_A = +125°C)		I_{CBO}	 — —	 — —	 15 5.0	 nAdc μAdc
Emitter Cutoff Current (V_{EB} = 4.0 Vdc, I_C = 0)		I_{EBO}	—	—	15	nAdc

© Motorola, Inc. 1996

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted) (Continued)

Characteristic		Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS						
DC Current Gain		h_{FE}				—
(I_C = 10 μAdc, V_{CE} = 5.0 Vdc)	BC549B/550B		100	150	—	
	BC549C/550C		100	270	—	
(I_C = 2.0 mAdc, V_{CE} = 5.0 Vdc)	BC549B/550B		200	290	450	
	BC549C/550C		420	500	800	
Collector–Emitter Saturation Voltage		$V_{CE(sat)}$				Vdc
(I_C = 10 mAdc, I_B = 0.5 mAdc)			—	0.075	0.25	
(I_C = 10 mAdc, I_B = see note 1)			—	0.3	0.6	
(I_C = 100 mAdc, I_B = 5.0 mAdc, see note 2)			—	0.25	0.6	
Base–Emitter Saturation Voltage		$V_{BE(sat)}$	—	1.1	—	Vdc
(I_C = 100 mAdc, I_B = 5.0 mAdc)						
Base–Emitter On Voltage		$V_{BE(on)}$				Vdc
(I_C = 10 μAdc, V_{CE} = 5.0 Vdc)			—	0.52	—	
(I_C = 100 μAdc, V_{CE} = 5.0 Vdc)			—	0.55	—	
(I_C = 2.0 mAdc, V_{CE} = 5.0 Vdc)			0.55	0.62	0.7	
SMALL–SIGNAL CHARACTERISTICS						
Current–Gain — Bandwidth Product		f_T	—	250	—	MHz
(I_C = 10 mAdc, V_{CE} = 5.0 Vdc, f = 100 MHz)						
Collector–Base Capacitance		C_{cbo}	—	2.5	—	pF
(V_{CB} = 10 Vdc, I_E = 0, f = 1.0 MHz)						
Small–Signal Current Gain		h_{fe}				—
(I_C = 2.0 mAdc, V_{CE} = 5.0 V, f = 1.0 kHz)	BC549B/BC550B		240	330	500	
	BC549C/BC550C		450	600	900	
Noise Figure						dB
(I_C = 200 μAdc, V_{CE} = 5.0 Vdc, R_S = 2.0 kΩ, f = 1.0 kHz)		NF_1	—	0.6	2.5	
(I_C = 200 μAdc, V_{CE} = 5.0 Vdc, R_S = 100 kΩ, f = 1.0 kHz)		NF_2	—	—	10	

NOTES:
1. I_B is value for which I_C = 11 mA at V_{CE} = 1.0 V.
2. Pulse test = 300 μs – Duty cycle = 2%.

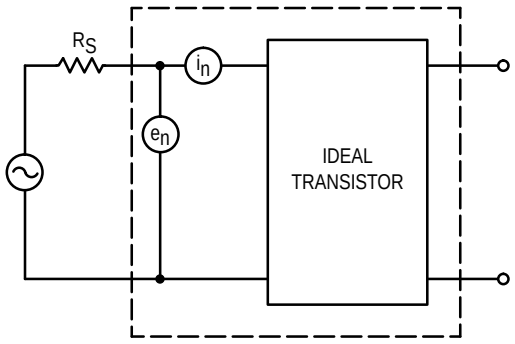


Figure 1. Transistor Noise Model

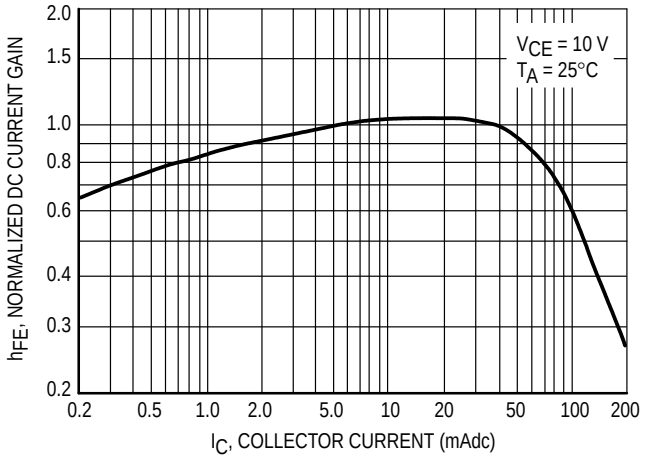


Figure 2. Normalized DC Current Gain

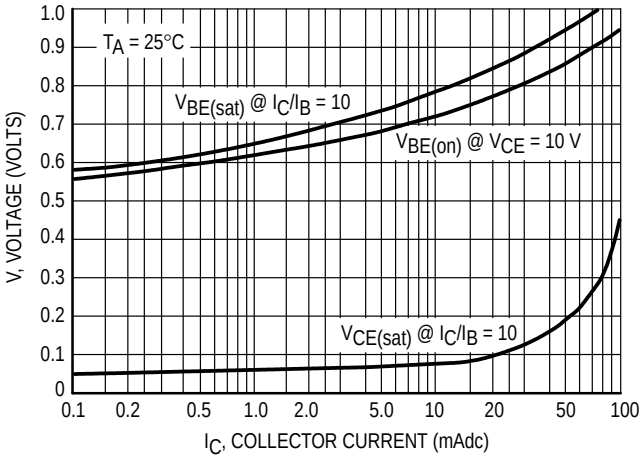


Figure 3. “Saturation” and “On” Voltages

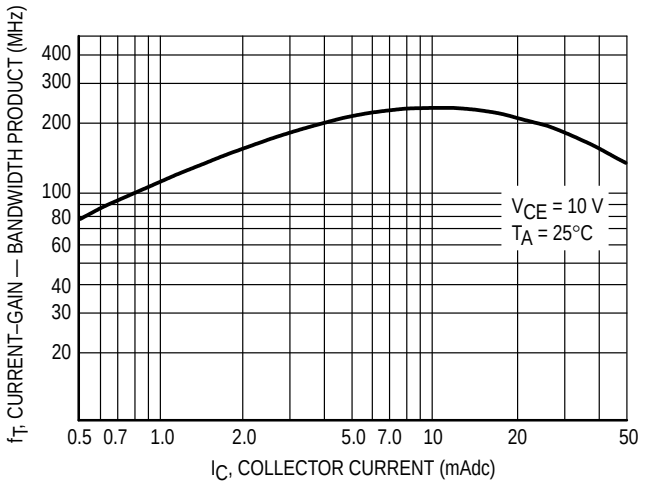


Figure 4. Current–Gain — Bandwidth Product

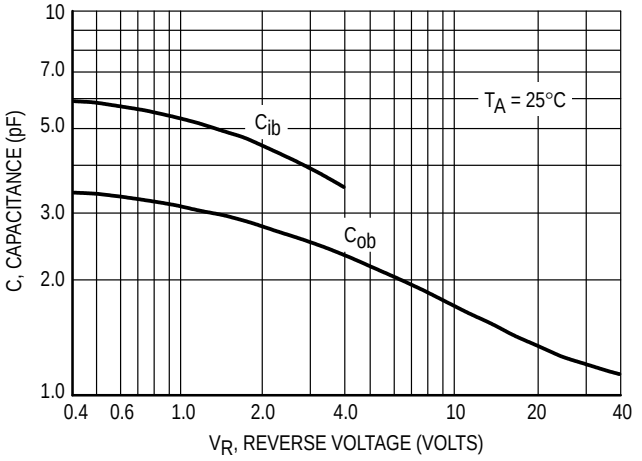


Figure 5. Capacitance

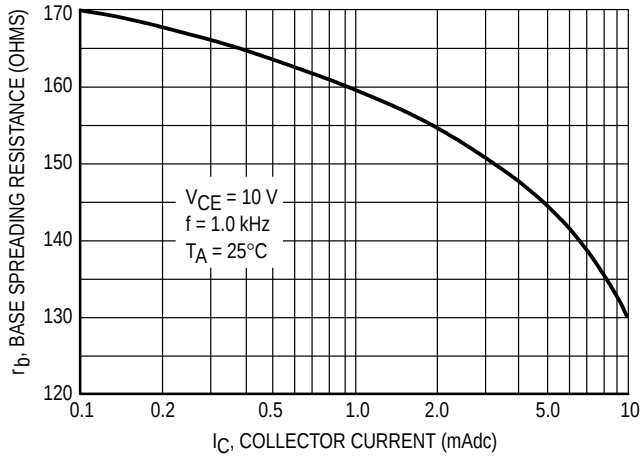
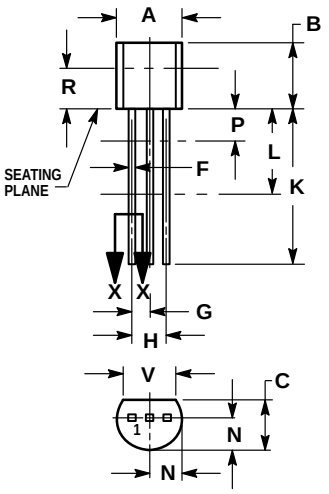
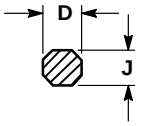


Figure 6. Base Spreading Resistance

PACKAGE DIMENSIONS





SECTION X–X

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.

	INCHES		MILLIMETERS	
DIM	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:
PIN 1. COLLECTOR
2. BASE
3. EMITTER

CASE 029–04
(TO–226AA)
ISSUE AD

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola 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 consequential or incidental damages. “Typical” parameters can and do vary in different applications. All operating parameters, including “Typicals” must be validated for each customer application by customer’s technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola 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 Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola 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 Motorola was negligent regarding the design or manufacture of the part. Motorola and Ⓜ are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

How to reach us:
USA/EUROPE: Motorola Literature Distribution;
P.O. Box 20912; Phoenix, Arizona 85036. 1–800–441–2447

MFAX: RMFAX0@email.sps.mot.com – TOUCHTONE (602) 244–6609
INTERNET: http://Design–NET.com

JAPAN: Nippon Motorola Ltd.; Tatsumi–SPD–JLDC, Toshikatsu Otsuki,
6F Seibu–Butsuryu–Center, 3–14–2 Tatsumi Koto–Ku, Tokyo 135, Japan. 03–3521–8315

HONG KONG: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852–26629298