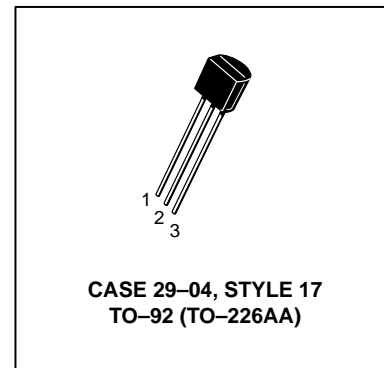


# Amplifier Transistors

## PNP Silicon

**BC556,B**  
**BC557A,B,C**  
**BC558B**



### MAXIMUM RATINGS

Rating	Symbol	BC 556	BC 557	BC 558	Unit
Collector–Emitter Voltage	$V_{CEO}$	-65	-45	-30	Vdc
Collector–Base Voltage	$V_{CBO}$	-80	-50	-30	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 $25^\circ\text{C}$	$P_D$	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			Watt 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	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	83.3	$^\circ\text{C/W}$

### 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 ( $I_C = -2.0$ mAdc, $I_B = 0$ )	BC556 BC557 BC558	$V_{(BR)CEO}$	-65 -45 -30	— — —	— — —	V
Collector–Base Breakdown Voltage ( $I_C = -100$ $\mu$ Adc)	BC556 BC557 BC558	$V_{(BR)CBO}$	-80 -50 -30	— — —	— — —	V
Emitter–Base Breakdown Voltage ( $I_E = -100$ $\mu$ Adc, $I_C = 0$ )	BC556 BC557 BC558	$V_{(BR)EBO}$	-5.0 -5.0 -5.0	— — —	— — —	V
Collector–Emitter Leakage Current ( $V_{CES} = -40$ V) ( $V_{CES} = -20$ V)	BC556 BC557 BC558	$I_{CES}$	— — —	-2.0 -2.0 -2.0	-100 -100 -100	nA
( $V_{CES} = -20$ V, $T_A = 125^\circ\text{C}$ )	BC556 BC557 BC558		— — —	— — —	-4.0 -4.0 -4.0	$\mu$ A

**BC556,B BC557A,B,C BC558B**
**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted) (Continued)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>ON CHARACTERISTICS</b>					
DC Current Gain ( $I_C = -10 \mu\text{Adc}$ , $V_{CE} = -5.0 \text{ V}$ )	$h_{FE}$	—	90	—	—
	BC557A	—	150	—	—
	BC556B/557B/558B	—	270	—	—
	BC557C	—	270	—	—
( $I_C = -2.0 \text{ mAdc}$ , $V_{CE} = -5.0 \text{ V}$ )	BC556	120	—	500	—
	BC557	120	—	800	—
	BC558	120	—	800	—
	BC557A	120	170	220	—
	BC556B/557B/558B	180	290	460	—
	BC557C	420	500	800	—
( $I_C = -100 \text{ mAdc}$ , $V_{CE} = -5.0 \text{ V}$ )	BC557A	—	120	—	—
	BC556B/557B/558B	—	180	—	—
	BC557C	—	300	—	—
Collector–Emitter Saturation Voltage ( $I_C = -10 \text{ mAdc}$ , $I_B = -0.5 \text{ mAdc}$ ) ( $I_C = -10 \text{ mAdc}$ , $I_B = \text{see Note 1}$ ) ( $I_C = -100 \text{ mAdc}$ , $I_B = -5.0 \text{ mAdc}$ )	$V_{CE(\text{sat})}$	—	-0.075	-0.3	V
		—	-0.3	-0.6	
		—	-0.25	-0.65	
Base–Emitter Saturation Voltage ( $I_C = -10 \text{ mAdc}$ , $I_B = -0.5 \text{ mAdc}$ ) ( $I_C = -100 \text{ mAdc}$ , $I_B = -5.0 \text{ mAdc}$ )	$V_{BE(\text{sat})}$	—	-0.7	—	V
		—	-1.0	—	
Base–Emitter On Voltage ( $I_C = -2.0 \text{ mAdc}$ , $V_{CE} = -5.0 \text{ Vdc}$ ) ( $I_C = -10 \text{ mAdc}$ , $V_{CE} = -5.0 \text{ Vdc}$ )	$V_{BE(\text{on})}$	-0.55	-0.62	-0.7	V
		—	-0.7	-0.82	

**SMALL–SIGNAL CHARACTERISTICS**

Current–Gain — Bandwidth Product ( $I_C = -10 \text{ mA}$ , $V_{CE} = -5.0 \text{ V}$ , $f = 100 \text{ MHz}$ )	$f_T$	—	280	—	MHz
	BC556	—	320	—	
	BC557	—	360	—	
	BC558	—	360	—	
Output Capacitance ( $V_{CB} = -10 \text{ V}$ , $I_C = 0$ , $f = 1.0 \text{ MHz}$ )	$C_{ob}$	—	3.0	6.0	pF
Noise Figure ( $I_C = -0.2 \text{ mAdc}$ , $V_{CE} = -5.0 \text{ V}$ , $R_S = 2.0 \text{ k}\Omega$ , $f = 1.0 \text{ kHz}$ , $\Delta f = 200 \text{ Hz}$ )	NF	—	2.0	10	dB
	BC556	—	2.0	10	
	BC557	—	2.0	10	
	BC558	—	2.0	10	
Small–Signal Current Gain ( $I_C = -2.0 \text{ mAdc}$ , $V_{CE} = -5.0 \text{ V}$ , $f = 1.0 \text{ kHz}$ )	$h_{fe}$	125	—	500	—
	BC556	125	—	900	
	BC557/558	125	220	260	
	BC557A	240	330	500	
	BC556B/557B/558B	450	600	900	
	BC557C	450	600	900	

Note 1:  $I_C = -10 \text{ mAdc}$  on the constant base current characteristics, which yields the point  $I_C = -11 \text{ mAdc}$ ,  $V_{CE} = -1.0 \text{ V}$ .

BC557/BC558

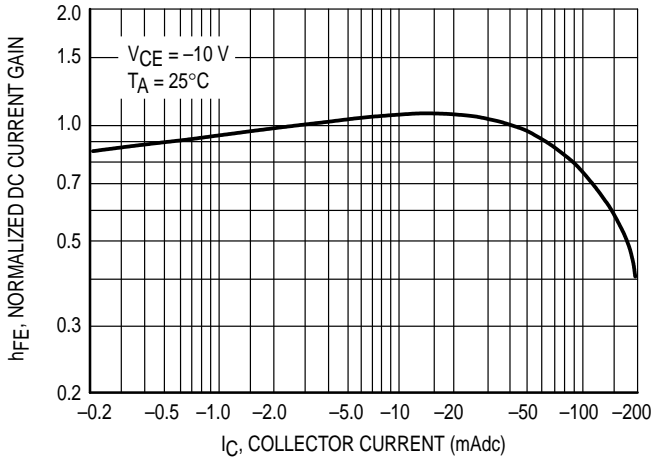


Figure 1. Normalized DC Current Gain

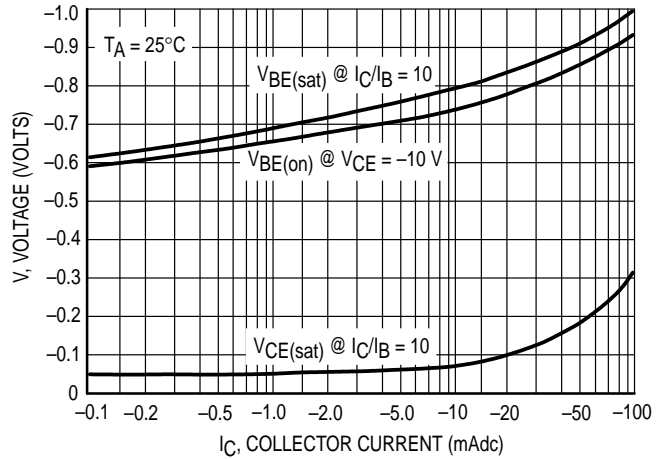


Figure 2. "Saturation" and "On" Voltages

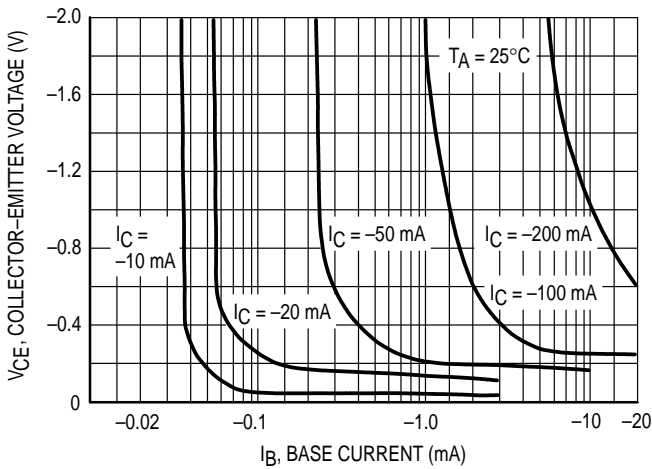


Figure 3. Collector Saturation Region

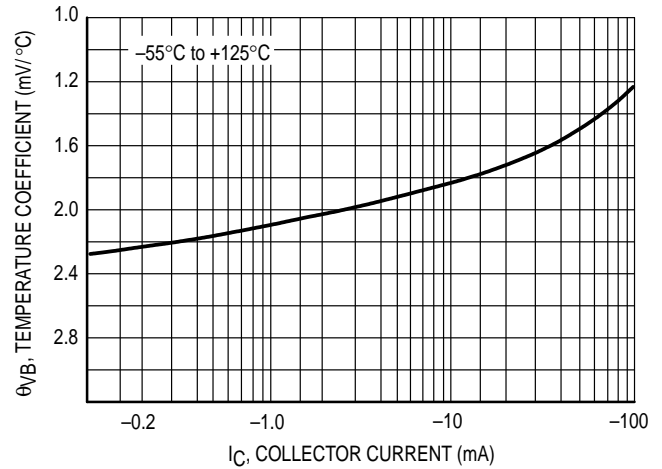


Figure 4. Base-Emitter Temperature Coefficient

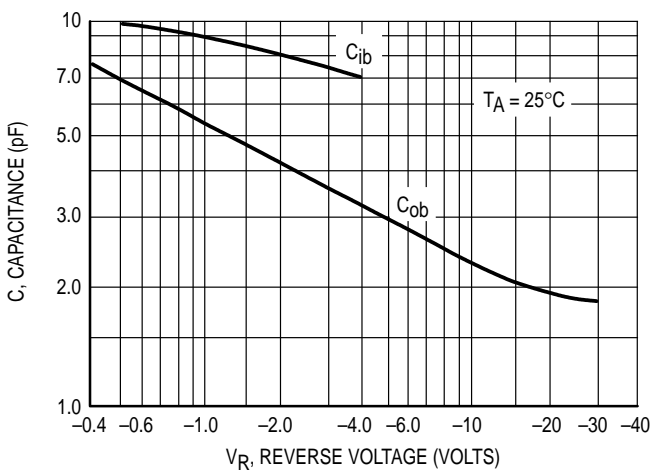


Figure 5. Capacitances

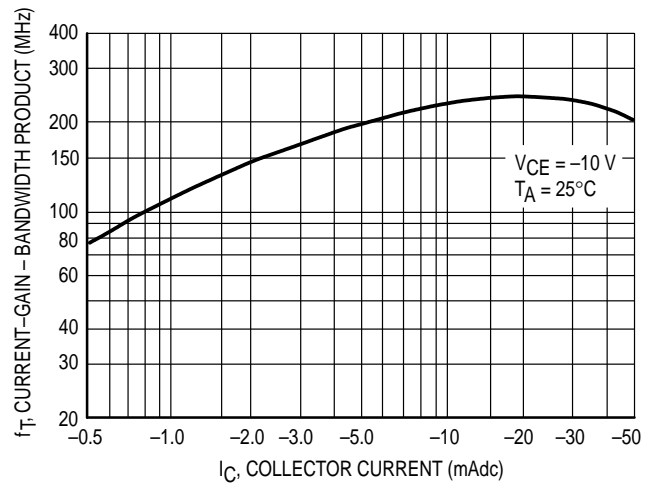


Figure 6. Current-Gain - Bandwidth Product

BC556

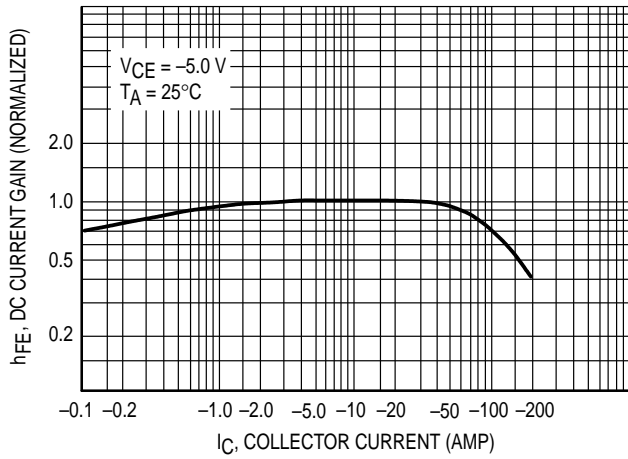


Figure 7. DC Current Gain

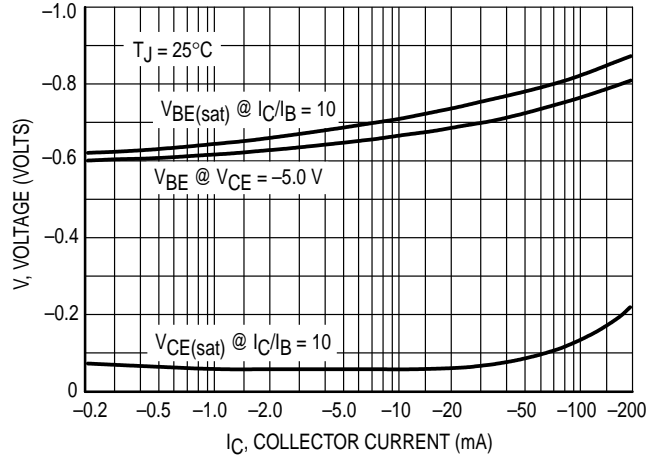


Figure 8. "On" Voltage

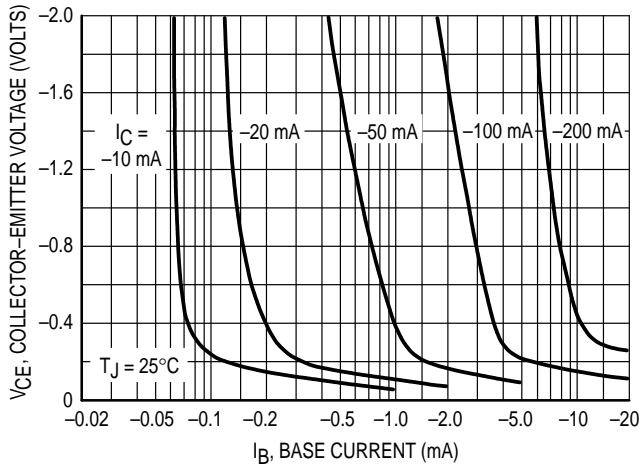


Figure 9. Collector Saturation Region

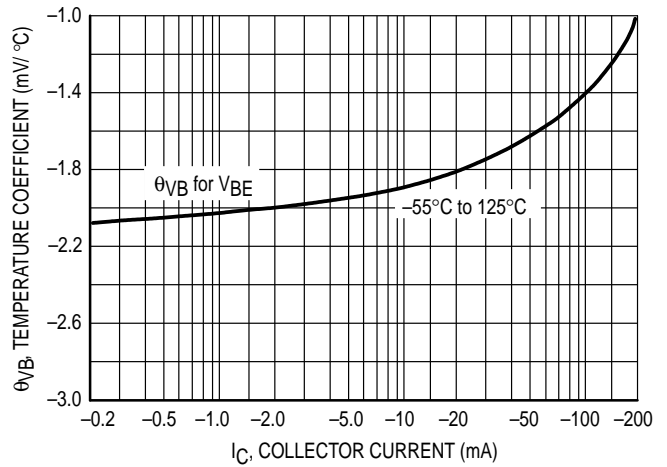


Figure 10. Base-Emitter Temperature Coefficient

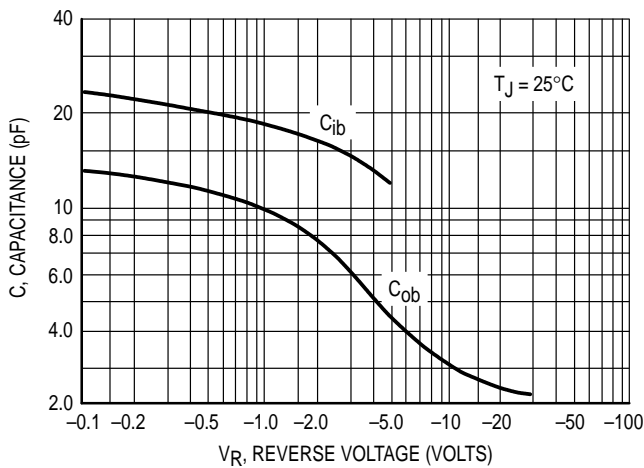


Figure 11. Capacitance

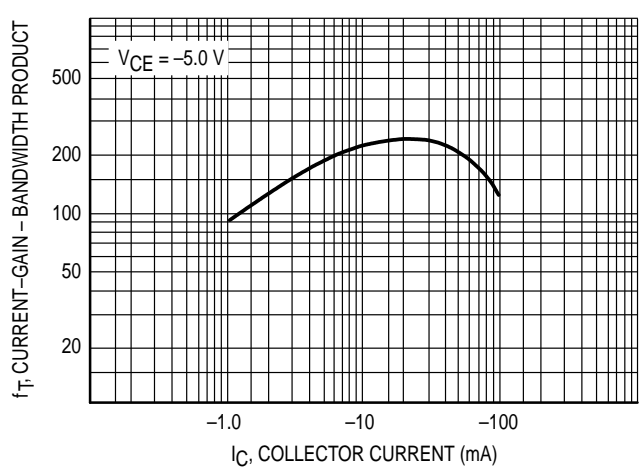


Figure 12. Current-Gain - Bandwidth Product

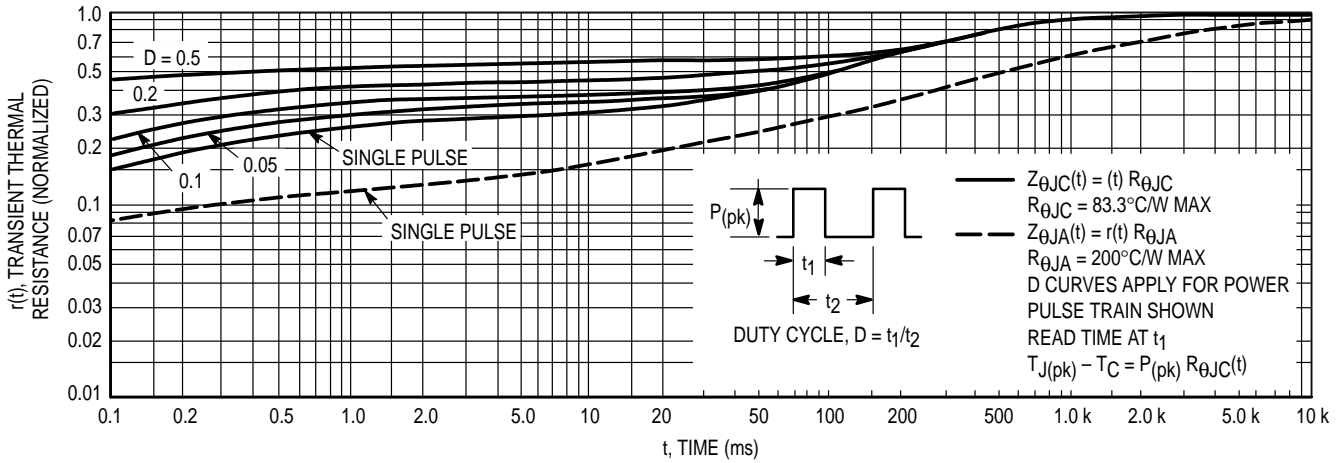


Figure 13. Thermal Response

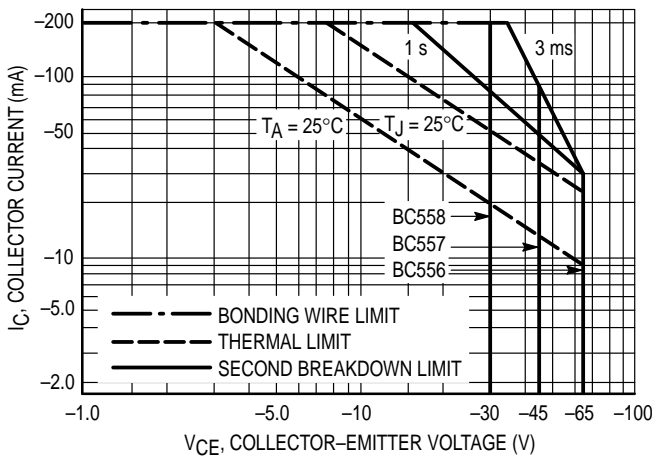


Figure 14. Active Region — Safe Operating Area

The safe operating area curves indicate  $I_C$ - $V_{CE}$  limits of the transistor that must be observed for reliable operation. Collector load lines for specific circuits must fall below the limits indicated by the applicable curve.

The data of Figure 14 is based upon  $T_{J(pk)} = 150^\circ\text{C}$ ;  $T_C$  or  $T_A$  is variable depending upon conditions. Pulse curves are valid for duty cycles to 10% provided  $T_{J(pk)} \leq 150^\circ\text{C}$ .  $T_{J(pk)}$  may be calculated from the data in Figure 13. At high case or ambient temperatures, thermal limitations will reduce the power than can be handled to values less than the limitations imposed by second breakdown.

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:

- PIN 1. COLLECTOR
2. BASE
3. EMITTER

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How to reach us:

USA/EUROPE: Motorola Literature Distribution;  
P.O. Box 20912; Phoenix, Arizona 85036. 1-800-441-2447

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

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

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

