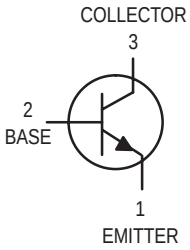
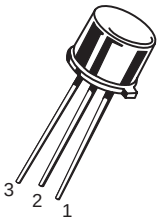
General Purpose Transistor
NPN Silicon



2N1893

2N1711
For Specifications,
See 2N1711 Data



CASE 79–04, STYLE 1
TO–39 (TO–205AD)

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CEO}	80	Vdc
Collector–Emitter Voltage	V_{CER}	100	Vdc
Collector–Base Voltage	V_{CBO}	120	Vdc
Emitter–Base Voltage	V_{EBO}	7.0	Vdc
Collector Current — Continuous	I_C	0.5	Adc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	0.8 4.57	Watts mW/°C
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	3.0 17.2	Watts mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	–65 to +200	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	219	°C/W
Thermal Resistance, Junction to Case	$R_{\theta JC}$	58	°C/W

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector–Emitter Breakdown Voltage (I_C = 100 mAdc, R_{BE} = 10 Ω)(1)	$V_{CER(sus)}$	100	—	Vdc
Collector–Emitter Sustaining Voltage (I_C = 30 mAdc, I_B = 0)(1)	$V_{CEO(sus)}$	80	—	
Collector–Base Breakdown Voltage (I_C = 100 μAdc, I_E = 0)	$V_{(BR)CBO}$	120	—	Vdc
Emitter–Base Breakdown Voltage (I_E = 100 μAdc, I_C = 0)	$V_{(BR)EBO}$	7.0	—	Vdc
Collector Cutoff Current (V_{CB} = 90 Vdc, I_E = 0) (V_{CB} = 90 Vdc, I_E = 0, T_A = 150°C)	I_{CBO}	— —	0.01 15	μAdc
Emitter Cutoff Current (V_{EB} = 5.0 Vdc, I_C = 0)	I_{EBO}	—	0.01	μAdc
ON CHARACTERISTICS				
DC Current Gain (I_C = 0.1 mAdc, V_{CE} = 10 Vdc) (I_C = 10 mAdc, V_{CE} = 10 Vdc)(1) (I_C = 10 mAdc, V_{CE} = 10 Vdc, T_A = –55°C)(1) (I_C = 150 mAdc, V_{CE} = 10 Vdc)(1)	h_{FE}	 20 35 20 40	 — — — 120	—
Collector–Emitter Saturation Voltage(1) (I_C = 50 mAdc, I_B = 5.0 mAdc) (I_C = 150 mAdc, I_B = 15 mAdc)	$V_{CE(sat)}$	 — —	 1.2 0.5	Vdc
Base–Emitter Saturation Voltage(1) (I_C = 50 mAdc, I_B = 5.0 mAdc) (I_C = 150 mAdc, I_B = 15 mAdc)	$V_{BE(sat)}$	 — —	 0.9 1.3	Vdc

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

REV 1

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

Characteristic	Symbol	Min	Max	Unit
SMALL–SIGNAL CHARACTERISTICS				
Current–Gain — Bandwidth Product (I_C = 50 mAdc, V_{CE} = 10 Vdc, f = 20 MHz)	f_T	50	—	MHz
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 1.0 MHz)	C_{obo}	—	15	pF
Input Capacitance (V_{EB} = 0.5 Vdc, I_C = 0, f = 1.0 MHz)	C_{ibo}	—	85	pF
Input Impedance (I_C = 1.0 mAdc, V_{CB} = 5.0 Vdc, f = 1.0 kHz) (I_C = 5.0 mAdc, V_{CB} = 10 Vdc, f = 1.0 kHz)	h_{ib}	 20 4.0	 30 8.0	Ω
Voltage Feedback Ratio (I_C = 1.0 mAdc, V_{CB} = 5.0 Vdc, f = 1.0 kHz) (I_C = 5.0 mAdc, V_{CB} = 10 Vdc, f = 1.0 kHz)	h_{rb}	 — —	 1.25 1.5	X 10^{-4}
Small–Signal Current Gain (I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc, f = 1.0 kHz) (I_C = 5.0 mAdc, V_{CE} = 10 Vdc, f = 1.0 kHz)	h_{fe}	 30 45	 100 —	—
Output Admittance (I_C = 1.0 mAdc, V_{CB} = 5.0 Vdc, f = 1.0 kHz) (I_C = 5.0 mAdc, V_{CB} = 10 Vdc, f = 1.0 kHz)	h_{ob}	 — —	 0.5 0.5	μmhos

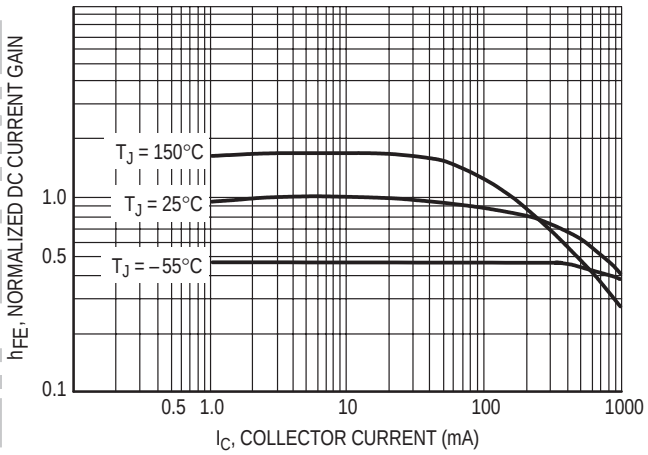


Figure 1. DC Current Gain

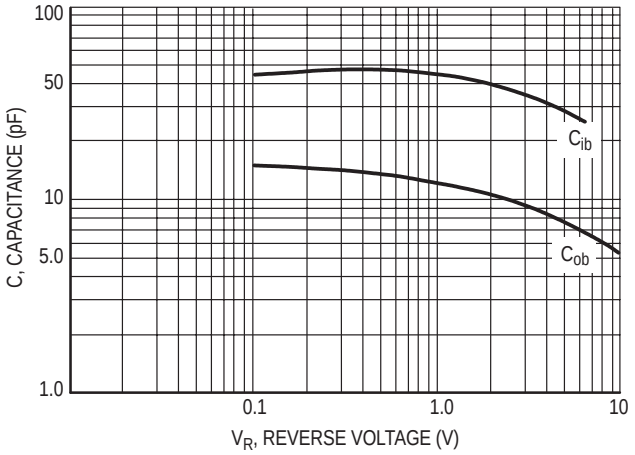


Figure 2. Capacitance

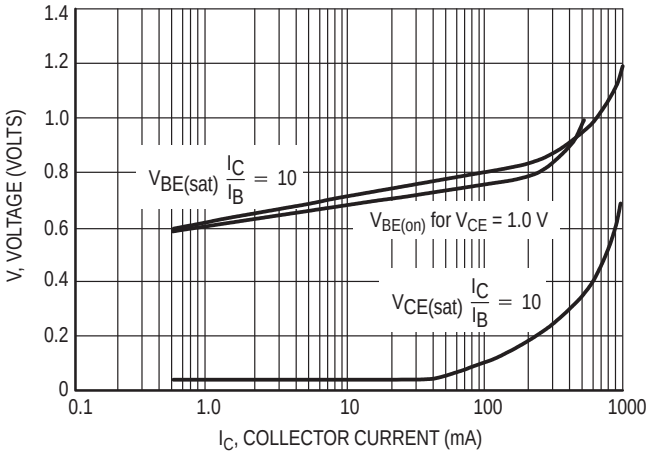


Figure 3. “On” Voltages

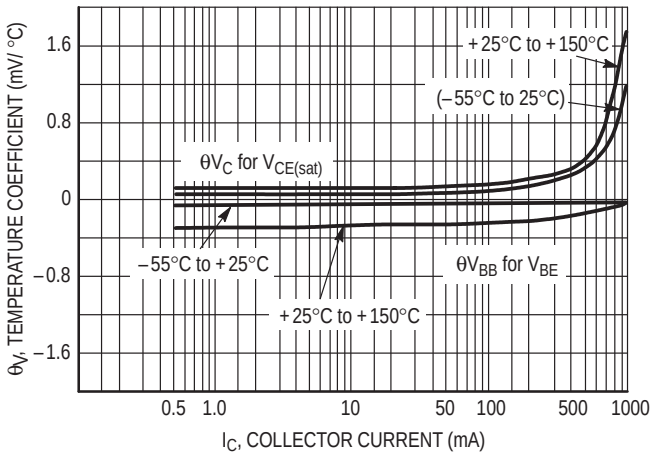


Figure 4. Temperature Coefficients

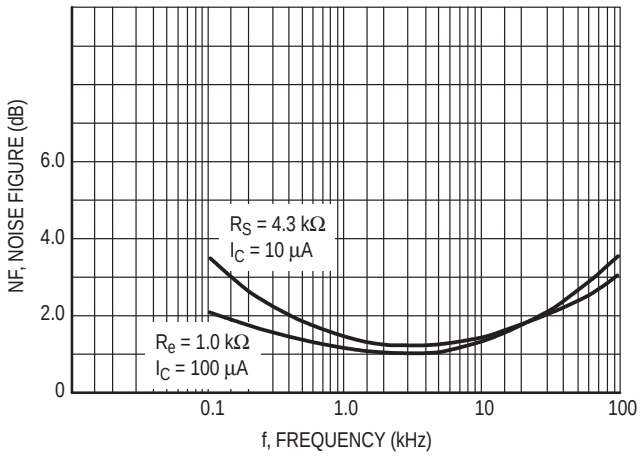


Figure 5. Frequency Effects

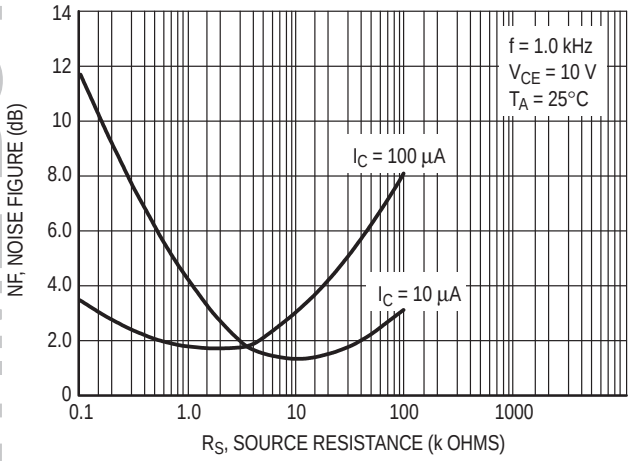


Figure 6. Source Resistance Effects

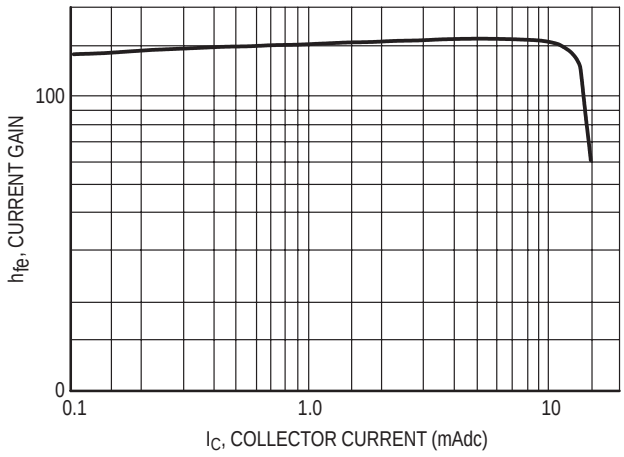


Figure 7. Current Gain Bandwidth Product versus Collector Current — 1.0 kHz h_{fe}

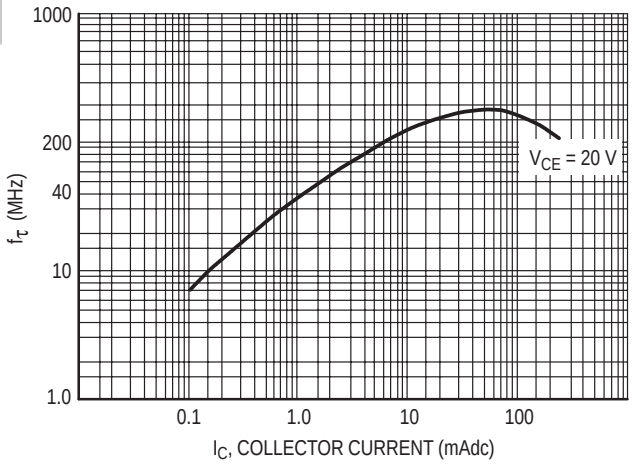


Figure 8. Current Gain — Bandwidth Product

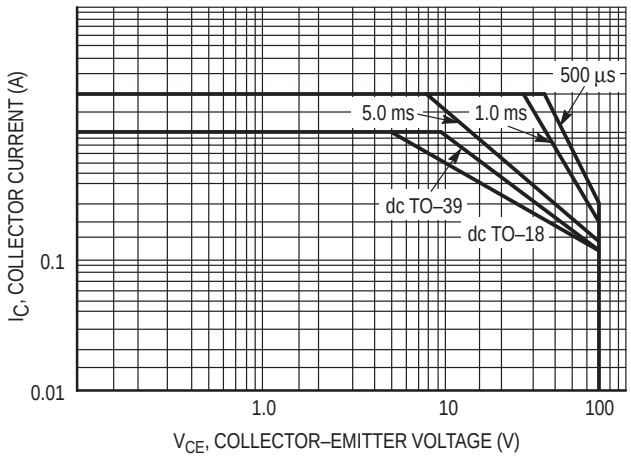
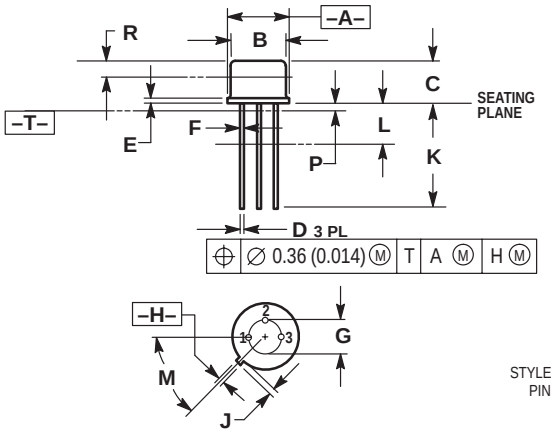


Figure 9. Active Region Safe Operating Area

PACKAGE DIMENSIONS



STYLE 1:
PIN 1. EMITTER
2. BASE
3. COLLECTOR

CASE 079–04
(TO–205AD)
ISSUE N

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION J MEASURED FROM DIMENSION A MAXIMUM.
4. DIMENSION B SHALL NOT VARY MORE THAN 0.25 (0.010) IN ZONE R. THIS ZONE CONTROLLED FOR AUTOMATIC HANDLING.
5. DIMENSION F APPLIES BETWEEN DIMENSION P AND L. DIMENSION D APPLIES BETWEEN DIMENSION L AND K MINIMUM. LEAD DIAMETER IS UNCONTROLLED IN DIMENSION P AND BEYOND DIMENSION K MINIMUM.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.335	0.370	8.51	9.39
B	0.305	0.335	7.75	8.50
C	0.240	0.260	6.10	6.60
D	0.016	0.021	0.41	0.53
E	0.009	0.041	0.23	1.04
F	0.016	0.019	0.41	0.48
G	0.200 BSC		5.08 BSC	
H	0.028	0.034	0.72	0.86
J	0.029	0.045	0.74	1.14
K	0.500	0.750	12.70	19.05
L	0.250	—	6.35	—
M	45 °BSC		45 °BSC	
P	—	0.050	—	1.27
R	0.100	—	2.54	—

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