MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

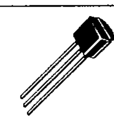
NPN Silicon High Frequency Transistors

MPS571
MXR571
MMBR571

LOW NOISE
HIGH RF GAIN

... designed for low noise, wide dynamic range front-end amplifiers and low-noise VCO's. Available in two surface-mountable plastic package styles, as well as the popular TO-92 package. This Motorola series of small-signal plastic transistors offers superior quality and performance at low cost.

- High Gain-Bandwidth Product
  f_T = 8 GHz (Typ) @ 50 mA
- Low Noise Figure
  NF = 2 dB (Typ) @ 500 MHz
- High Gain
  G_{NF} = 17 dB (Typ) @ 30 mA/500 MHz
- State-of-the-Art Technology
  Fine Line Geometry
  Ion-Implanted Arsenic Emitters
  Gold Top Metallization and Wires
  Silicon Nitride Passivation
- Tape and Reel Packaging Options
- MMBR571 Available in Low Profile, Add L Suffix



TO-92
CASE 29
MPS571

SOT-89
CASE 345
MXR571

SOT-23
CASE 318
MMBR571
Standard and Low Profile

3

MAXIMUM RATINGS

Ratings	Symbol	MPS571	MXR571	MMBR571	Unit
Collector-Emitter Voltage	V_{CEO}		10		Vdc
Collector-Base Voltage	V_{CBO}		20		Vdc
Emitter-Base Voltage	V_{EBO}		3		Vdc
Collector Current — Continuous	I_C		80		mA
Power Dissipation @ T_A = 25°C	P_D	625	400 (Free Air)	200 (Free Air)	mW
Storage Temperature	T_{stg}		−55 to +150		°C

MPS571, MXR571, MMBR571

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 0.1 mAdc, I_B = 0)	$V_{(BR)CEO}$	10	12	—	Vdc
Collector-Base Breakdown Voltage (I_C = 1 mAdc, I_E = 0)	$V_{(BR)CBO}$	20	—	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 50 μAdc, I_C = 0)	$V_{(BR)EBO}$	2.5	—	—	Vdc
Collector Cutoff Current (V_{CB} = 8 Vdc, I_E = 0)	I_{CBO}	—	—	10	μAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 30 mAdc, V_{CE} = 5 Vdc)	h_{FE}	50	—	300	—
DYNAMIC CHARACTERISTICS					
Collector-Base Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 1 MHz)	C_{cb}	—	0.7	1	pF
Current Gain-Bandwidth Product (V_{CE} = 5 Vdc, I_C = 50 mAdc, f = 1 GHz) MPS571	f_T	—	6	—	GHz
MXR571		—	7	—	
MMBR571		—	8	—	
FUNCTIONAL TESTS					
Gain @ Noise Figure (I_C = 10 mAdc, V_{CE} = 5 Vdc) MPS571 f = 0.5 GHz	G_{NF}	—	14	—	dB
f = 1 GHz		—	9	—	
MXR571 f = 0.5 GHz		—	15	—	
f = 1 GHz		—	9.5	—	
MMBR571 f = 0.5 GHz		—	16.5	—	
f = 1 GHz		—	10.5	—	
Noise Figure (I_C = 10 mAdc, V_{CE} = 5 Vdc) MPS571 f = 0.5 GHz	NF	—	2	—	dB
f = 1 GHz		—	2.6	—	
MXR571 f = 0.5 GHz		—	2.1	—	
f = 1 GHz		—	2.7	—	
MMBR571 f = 0.5 GHz		—	2	—	
f = 1 GHz		—	2.6	—	

Figure 1. Maximum Available Gain versus Frequency

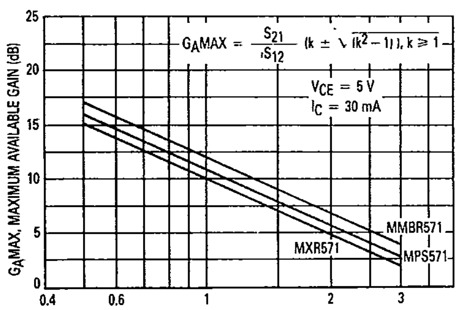
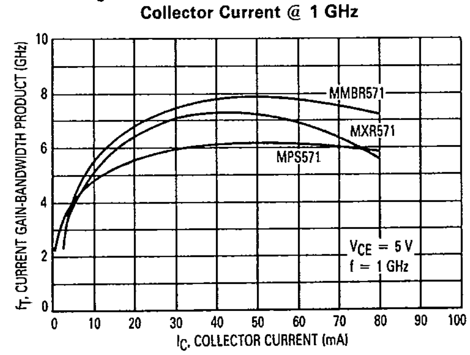


Figure 2. Current Gain-Bandwidth versus Collector Current @ 1 GHz



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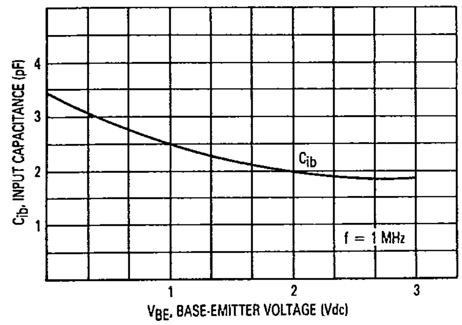
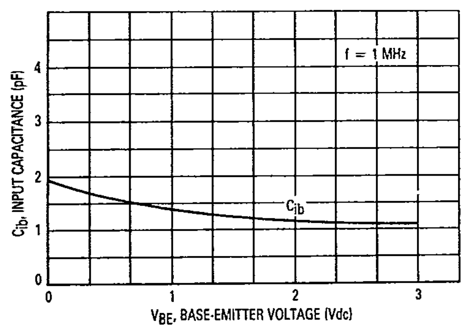
MPS571, MXR571, MMBR571

Figure 3. Input Capacitance versus Emitter Base Voltage

(a) TO-92 MPS571



(b) SOT-89 MXR571



(c) SOT-23 MMBR571

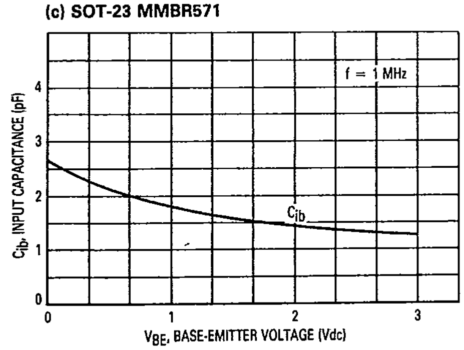
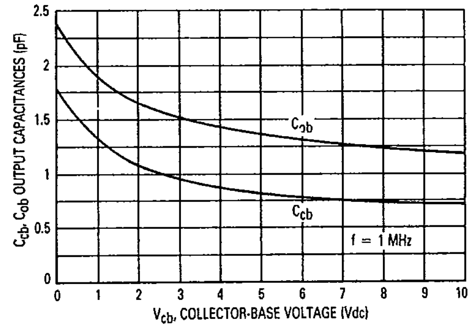
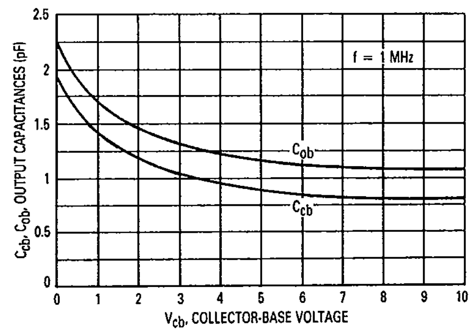


Figure 4. Output Capacitances versus Collector-Base Voltage

(a) TO-92 MPS571



(b) SOT-89 MXR571



(c) SOT-23 MMBR571

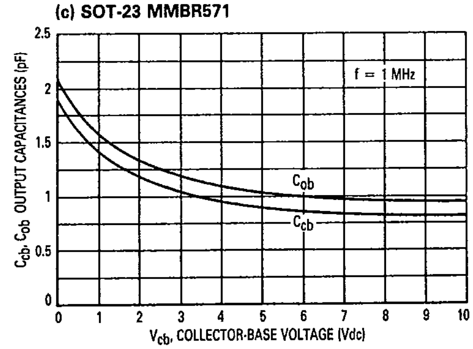
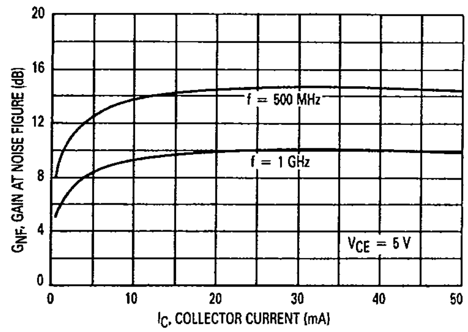
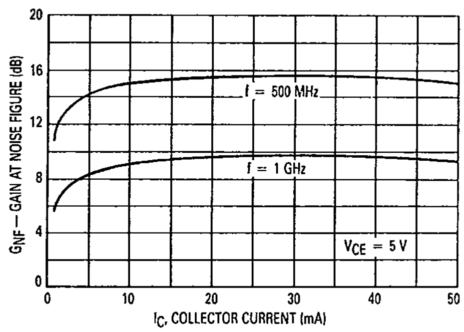


Figure 5. Gain at Noise Figure versus Collector Current

(a) TO-92 MPS571



(b) SOT-89 MXR571



(c) SOT-23 MMBR571

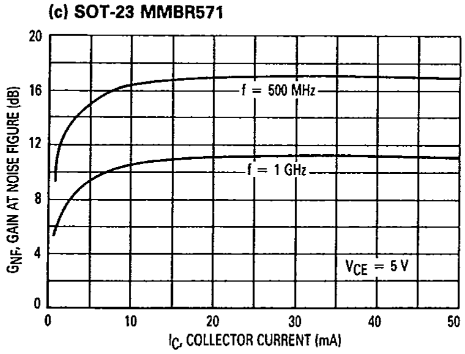
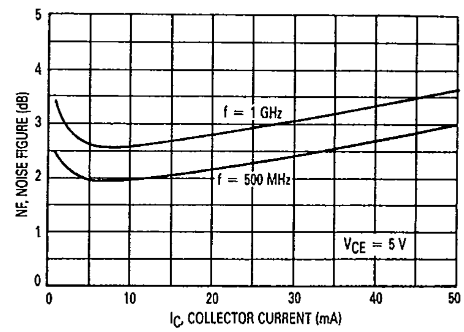
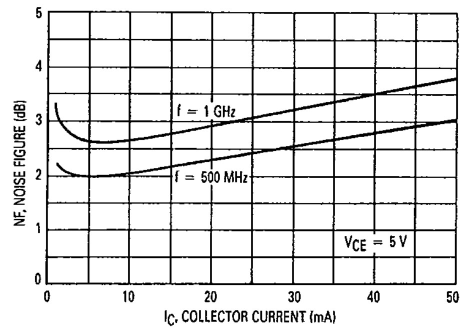


Figure 6. Noise Figure versus Collector Current

(a) TO-92 MPS571



(b) SOT-89 MXR571



(c) SOT-23 MMBR571

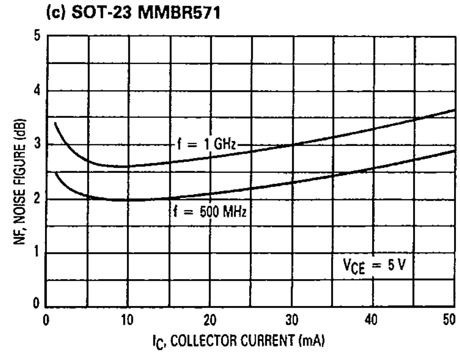


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Figure 7. Gain at Noise Figure and Noise Figure versus Frequency

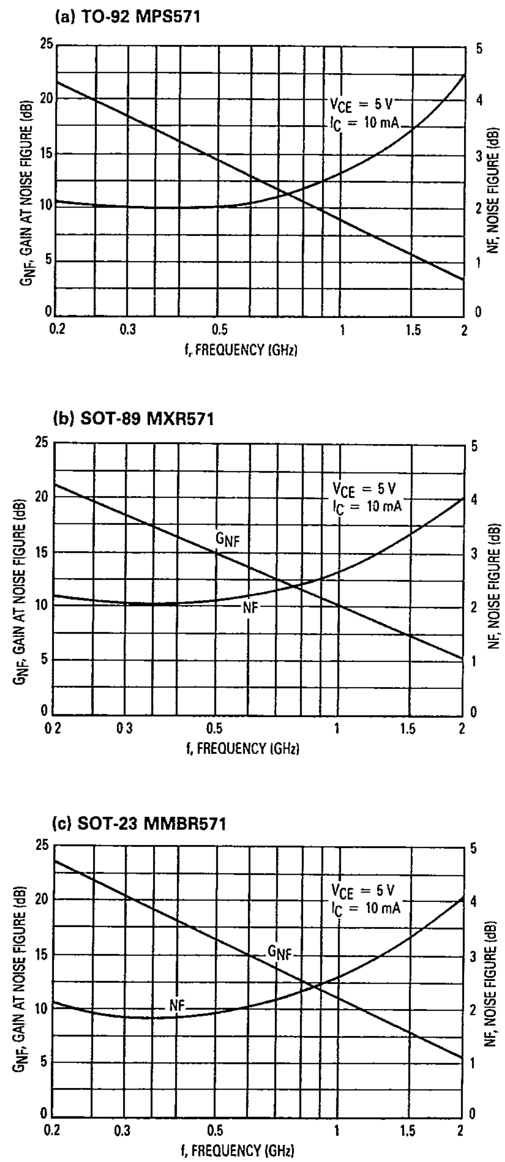
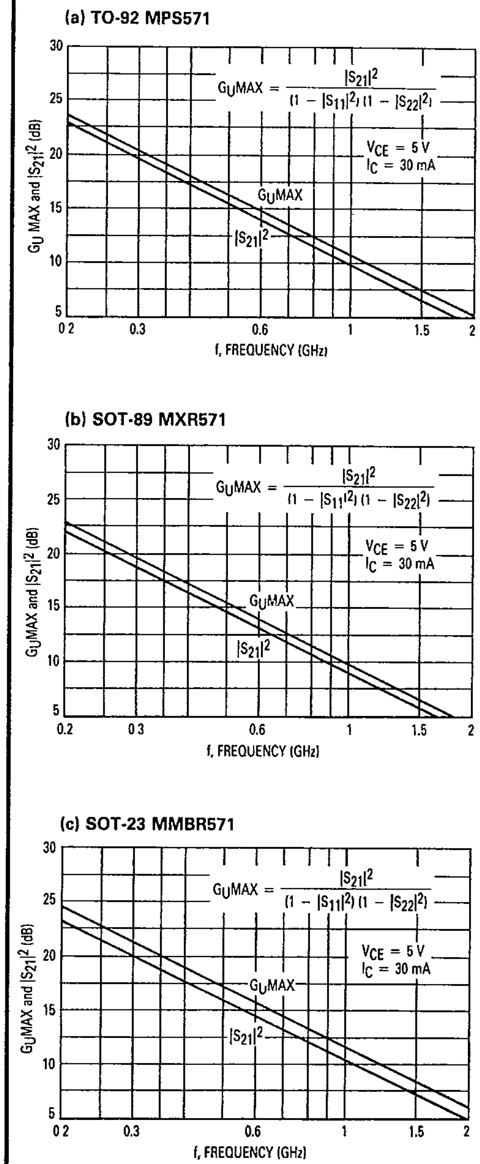


Figure 8. Maximum Unilateral Gain and Insertion Gain versus Frequency



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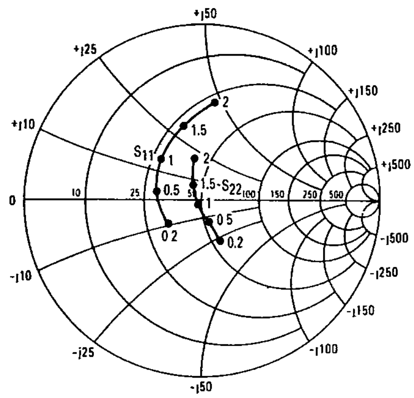
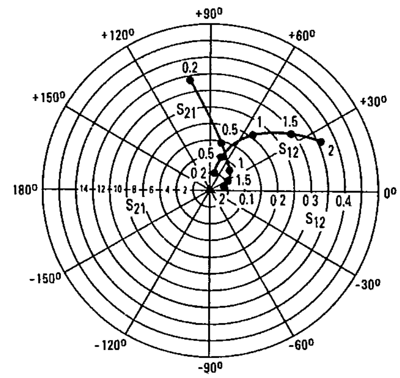
MPS571, MXR571, MMBR571

TO-92 MPS571

INPUT/OUTPUT REFLECTION COEFFICIENTS versus FREQUENCY
V_{CE} = 5 V, I_C = 30 mA



FORWARD/REVERSE TRANSMISSION COEFFICIENTS versus FREQUENCY
V_{CE} = 5 V, I_C = 30 mA



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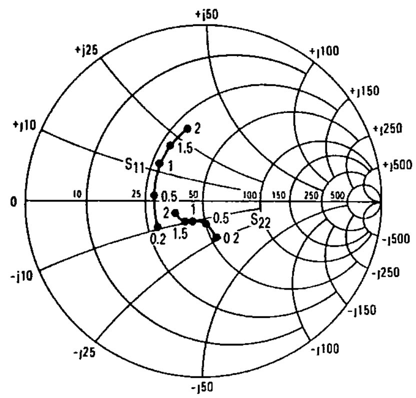
COMMON EMITTER S-PARAMETERS

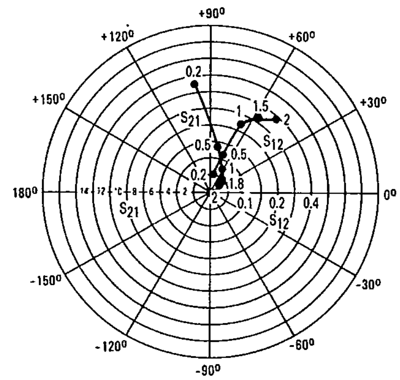
V_{CE} (Volts)	I_C (mA)	f (MHz)	S_{11} $\|S_{11}\|$	S_{11} ∠φ	S_{21} $\|S_{21}\|$	S_{21} ∠φ	S_{12} $\|S_{12}\|$	S_{12} ∠φ	S_{22} $\|S_{22}\|$	S_{22} ∠φ
5	5	200	0.62	−80	8.22	122	0.07	56	0.63	−44
		500	0.40	−148	4.52	87	0.11	50	0.36	−68
		1000	0.39	155	2.51	54	0.16	48	0.23	−78
		1500	0.46	122	1.86	32	0.23	42	0.15	−114
		2000	0.59	100	1.50	14	0.31	33	0.14	173
	15	200	0.33	−121	12.88	105	0.05	67	0.37	−59
		500	0.28	−175	5.62	79	0.10	65	0.18	−67
		1000	0.32	143	2.99	53	0.19	55	0.08	−94
		1500	0.40	117	2.14	32	0.27	42	0.07	171
		2000	0.55	95	1.74	17	0.35	30	0.198	117
	30	200	0.23	−143	13.65	99	0.05	75	0.26	−62
		500	0.23	169	5.75	76	0.11	70	0.13	−68
		1000	0.30	130	3.05	50	0.21	55	0.04	−136
		1500	0.41	106	2.11	28	0.29	38	0.12	130
		2000	0.56	85	1.70	11	0.36	23	0.26	102
	50	200	0.21	−158	13.96	96	0.05	79	0.21	−61
		500	0.23	162	5.82	75	0.11	72	0.11	−66
		1000	0.30	128	3.09	49	0.21	56	0.03	−149
		1500	0.41	105	2.11	28	0.29	39	0.12	127
		2000	0.56	84	1.70	11	0.36	23	0.27	100

SOT-89 MXR571

INPUT/OUTPUT REFLECTION COEFFICIENTS versus FREQUENCY
V_{CE} = 5 V, I_C = 30 mA



FORWARD/REVERSE TRANSMISSION COEFFICIENTS versus FREQUENCY
V_{CE} = 5 V, I_C = 30 mA



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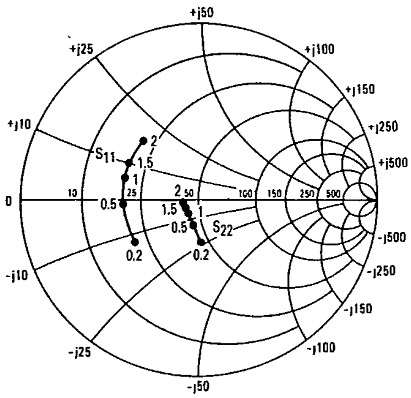
COMMON EMITTER S-PARAMETERS

V_{CE} (Volts)	I_C (mA)	f (MHz)	S_{11} $\|S_{11}\|$	S_{11} ∠φ	S_{21} $\|S_{21}\|$	S_{21} ∠φ	S_{12} $\|S_{12}\|$	S_{12} ∠φ	S_{22} $\|S_{22}\|$	S_{22} ∠φ
5	5	200	0.60	−84	7.94	120	0.08	56	0.58	−45
		500	0.39	−152	4.17	86	0.11	54	0.34	−56
		1000	0.39	161	2.32	62	0.19	58	0.27	−71
		1500	0.44	132	1.64	45	0.26	55	0.25	−90
		2000	0.49	106	1.33	31	0.32	52	0.26	−106
	15	200	0.33	−126	11.89	101	0.06	67	0.32	−63
		500	0.29	−178	5.13	81	0.11	69	0.18	−73
		1000	0.33	148	2.75	62	0.22	65	0.15	−99
		1500	0.37	123	1.93	47	0.30	56	0.16	−118
		2000	0.42	100	1.55	34	0.37	49	0.17	−139
	30	200	0.28	−149	12.74	97	0.05	74	0.23	−69
		500	0.27	174	5.37	79	0.11	73	0.13	−82
		1000	0.32	144	2.85	62	0.22	66	0.13	−112
		1500	0.36	120	2.02	47	0.31	57	0.15	−132
		2000	0.40	98	1.62	35	0.38	49	0.17	−152
	50	200	0.26	−162	13.03	94	0.05	77	0.18	−71
		500	0.27	169	5.43	79	0.12	75	0.11	−85
		1000	0.32	142	2.88	62	0.22	67	0.12	−117
		1500	0.36	119	2.02	47	0.31	57	0.15	−137
		2000	0.40	97	1.60	35	0.38	49	0.17	−155

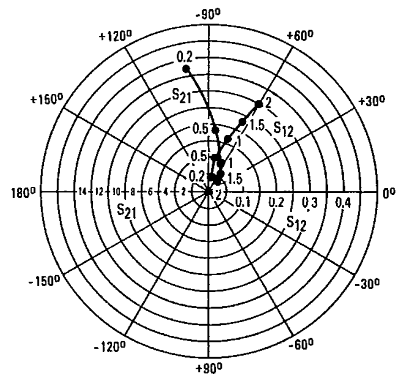
MPS571, MXR571, MMBR571

SOT-23 MMBR571

INPUT/OUTPUT REFLECTION COEFFICIENTS versus FREQUENCY
V_{CE} = 5 V, I_C = 30 mA



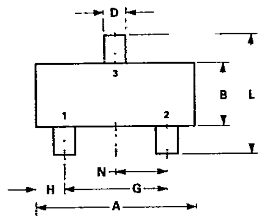
FORWARD/REVERSE TRANSMISSION COEFFICIENTS versus FREQUENCY
V_{CE} = 5 V, I_C = 30 mA



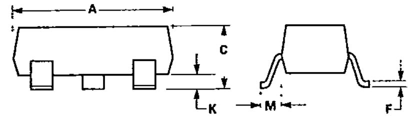
COMMON EMITTER S-PARAMETERS

V_{CE} (Volts)	I_C (mA)	f (MHz)	S_{11}		S_{21}		S_{12}		S_{22}	
			$\|S_{11}\|$	$\angle\phi$	$\|S_{21}\|$	$\angle\phi$	$\|S_{12}\|$	$\angle\phi$	$\|S_{22}\|$	$\angle\phi$
5	5	200	0.68	−82	8.41	126	0.07	53	0.61	−45
		500	0.52	−142	4.62	93	0.10	46	0.35	−60
		1000	0.50	179	2.57	72	0.14	53	0.26	−71
		1500	0.51	161	1.82	57	0.19	58	0.24	−77
		2000	0.52	143	1.48	45	0.24	59	0.22	−86
	15	200	0.46	−125	13.65	108	0.05	60	0.35	−73
		500	0.43	−169	6.03	86	0.09	66	0.17	−94
		1000	0.44	168	3.20	72	0.16	67	0.14	−111
		1500	0.45	152	2.21	58	0.22	64	0.11	−118
		2000	0.46	137	1.80	48	0.29	59	0.10	−131
	30	200	0.42	−148	14.79	102	0.04	68	0.26	−87
		500	0.41	−177	6.31	84	0.09	72	0.14	−115
		1000	0.42	165	3.35	71	0.16	70	0.12	−135
		1500	0.44	151	2.29	59	0.23	65	0.11	−144
		2000	0.44	135	1.84	48	0.30	60	0.10	−157
	50	200	0.41	−159	15.14	98	0.04	73	0.21	−96
		500	0.42	179	6.38	83	0.09	75	0.13	−124
		1000	0.43	163	3.35	70	0.16	71	0.12	−143
		1500	0.44	148	2.32	58	0.23	66	0.10	−151
		2000	0.45	134	1.84	48	0.30	60	0.09	−163

OUTLINE DIMENSIONS



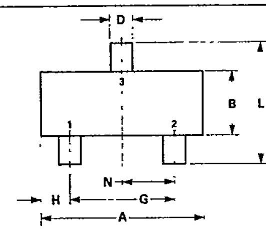
SOT-23
CASE 318-02
TO-236AA
Standard



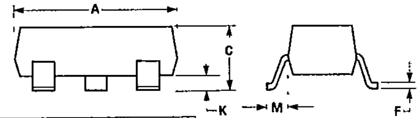
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.80	3.04	0.1102	0.1197
B	1.20	1.40	0.0472	0.0551
C	0.85	1.20	0.033	0.0472
D	0.37	0.46	0.0150	0.0177
F	0.065	0.130	0.0034	0.0051
G	1.78	2.04	0.0701	0.0807
H	0.51	0.60	0.0200	0.0236
K	0.10	0.25	0.0040	0.0098
L	2.10	2.50	0.0830	0.0984
M	0.45	0.60	0.0180	0.0236
N	0.83	1.02	0.0350	0.0401

STYLE 6:
PIN 1. BASE
2. EMITTER
3. COLLECTOR

NOTES
1. DIMENSIONING AND TOLERANCING PER ANSI
2. Y14.5M, 1982.
CONTROLLING DIMENSION: MILLIMETERS



SOT-23
CASE 318-03
TO-236AB
Low Profile



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.60	3.04	0.1102	0.1197
B	1.20	1.40	0.0472	0.0551
C	0.89	1.11	0.035	0.044
D	0.37	0.46	0.015	0.0177
F	0.065	0.130	0.0034	0.0051
G	1.78	2.04	0.0701	0.0807
H	0.51	0.60	0.0200	0.0236
K	0.013	0.100	0.0005	0.0040
L	2.10	2.50	0.0830	0.0984
M	0.45	0.60	0.018	0.0236
N	0.89	1.02	0.0350	0.0401

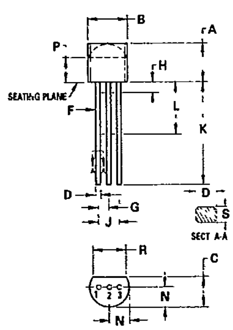
STYLE 6
PIN 1. BASE
2. EMITTER
3. COLLECTOR

NOTES
1. DIMENSIONING AND TOLERANCING PER ANSI
2. Y14.5M, 1982
CONTROLLING DIMENSION: MILLIMETERS

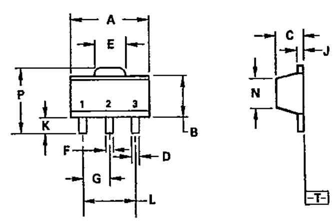
NOTES
1. CONTOUR OF PACKAGE BEYOND ZONE "P" IS UNCONTROLLED.
2. DIM "F" APPLIES BETWEEN "H" AND "L". DIM "D" & "S" APPLIES BETWEEN "L" & 12.70 mm (0.5") FROM SEATING PLANE. LEAD DIM IS UNCONTROLLED IN "H" & BEYOND 12.70 mm (0.5") FROM SEATING PLANE.

TO-92
CASE 29-02
TO-226AA
PLASTIC

STYLE 2
PIN 1. BASE
2. EMMITTER
3. COLLECTOR



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.32	5.33	0.170	0.210
B	4.44	5.21	0.175	0.205
C	3.18	4.19	0.125	0.165
D	0.41	0.56	0.016	0.022
F	0.41	0.48	0.016	0.019
G	1.14	1.40	0.045	0.055
H	—	2.54	—	0.100
J	2.41	2.67	0.095	0.105
K	12.70	—	0.500	—
L	6.35	—	0.250	—
N	2.03	2.67	0.080	0.105
P	2.92	—	0.115	—
R	3.43	—	0.135	—
S	0.36	0.41	0.014	0.016



SOT-89
CASE 345-01
PLASTIC

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.40	4.60	0.174	0.181
B	2.29	2.60	0.091	0.102
C	1.40	1.60	0.056	0.062
D	0.36	0.48	0.015	0.018
E	1.62	1.80	0.064	0.070
F	0.44	0.53	0.018	0.020
G	1.50 BSC		0.059 BSC	
J	0.35	0.44	0.014	0.017
K	0.80	1.04	0.032	0.040
L	3.00 BSC		0.118 BSC	
N	2.04	2.28	0.081	0.089
P	3.94	4.25	0.156	0.167

STYLE 1
PIN 1 BASE
2. COLLECTOR
3 EMITTER

NOTES
1 DIMENSIONS A AND B ARE DATUMS.
2 -T- IS SEATING PLANE.
3 POSITIONAL TOLERANCE FOR LEADS
| ⌖ | 0.10 (0.004) Ⓜ | T | B Ⓢ | A Ⓢ |
4. DIMENSIONING AND TOLERANCING PER ANSI Y14.5, 1973
5 CONTROLLING DIM. MILLIMETERS

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