MPS901
MPS1983

2.4 dB @ 900 MHz

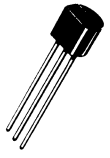
HIGH FREQUENCY TRANSISTOR

NPN SILICON

NPN SILICON HIGH-FREQUENCY TRANSISTOR

. . . designed primarily for use in high-gain, low-noise small-signal amplifiers.

- High Current-Gain-Bandwidth Product — f_T = 4.5 GHz (Typ) @ I_C = 15 mAdc
- High Power Gain — G_{pe} = 12 dB (Typ) @ f = 900 MHz
- Low Noise Figure — NF = 2.4 dB (Typ) @ f = 900 MHz
- Low Feedback Capacitance — C_{cb} = 0.5 pF (Typ) @ V_{cb} = 10 V
- Die Source Same as MRF901

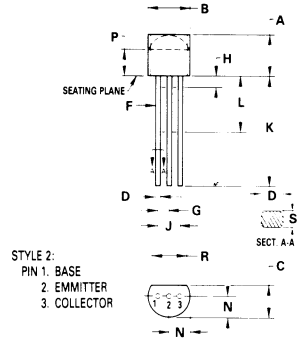


MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	15	Vdc
Collector-Base Voltage	V_{CBO}	25	Vdc
Emitter-Base Voltage	V_{EBO}	2.0	Vdc
Collector Current — Continuous	I_C	30	mA
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	300 3.0	mW mW/°C
Operating Junction Temperature	T_J	150	°C
Storage Temperature Range	T_{stg}	−55 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	200	°C/W



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

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.

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES 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

All JEDEC dimensions and notes apply

CASE 29-02
TO-226AA

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 1.0 mAdc, I_B = 0)	$V_{(BR)CEO}$	15	—	—	Vdc
Collector-Base Breakdown Voltage (I_C = 0.1 mAdc, I_E = 0)	$V_{(BR)CBO}$	25	—	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 0.1 mAdc, I_C = 0)	$V_{(BR)EBO}$	2.0	—	—	Vdc
Collector Cutoff Current (V_{CB} = 15 Vdc, I_E = 0)	I_{CBO}	—	—	50	nAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 10 mAdc, V_{CE} = 10 Vdc)	h_{FE}	30	80	200	—
DYNAMIC CHARACTERISTICS					
Current-Gain-Bandwidth Product I_C = 15 mAdc, V_{CE} = 10 Vdc, f = 1.0 GHz)	f_T	—	4.5	—	GHz
Collector-Base Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 1.0 MHz)	C_{cb}	—	0.5	1.0	pF
Noise Figure (Figure 1) (I_C = 5.0 mAdc, V_{CE} = 10 Vdc, f = 900 MHz)	NF	—	2.4	—	dB
FUNCTIONAL TESTS					
Common-Emitter Amplifier Power Gain (Figure 1) (I_C = 10 mA, V_{CE} = 10 Vdc, f = 900 MHz)	G_{pe}	—	12	—	dB

3

FIGURE 1 — 900 MHz TEST CIRCUIT SCHEMATIC

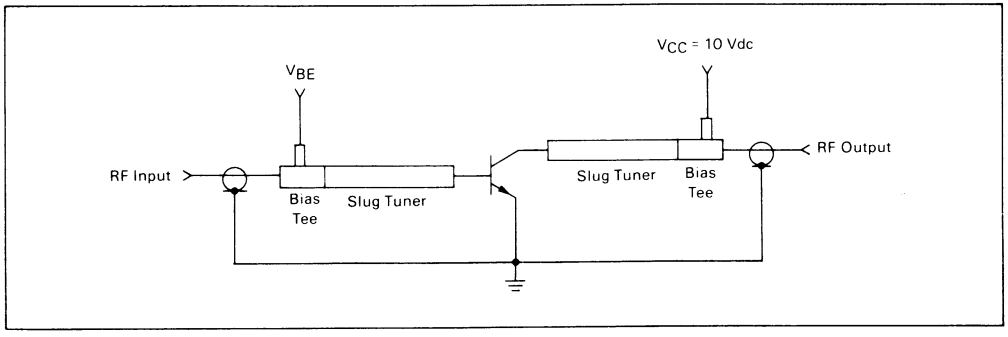


FIGURE 2 — CURRENT GAIN-BANDWIDTH PRODUCT versus COLLECTOR CURRENT

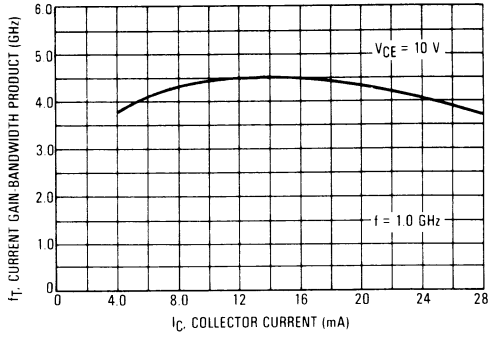


FIGURE 3 — MAXIMUM AVAILABLE GAIN versus COLLECTOR CURRENT

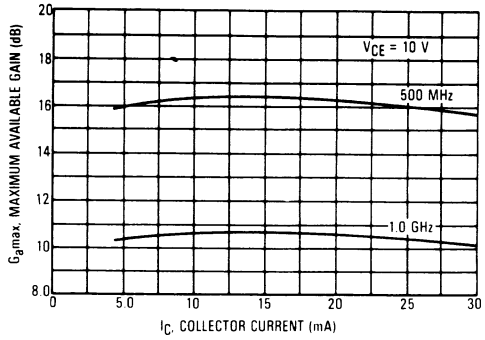


FIGURE 4 — $|S_{21}|^2$ versus FREQUENCY

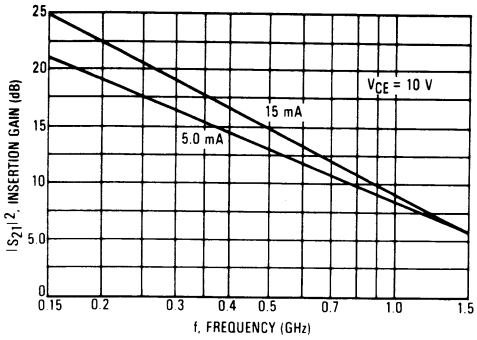


FIGURE 5 — NOISE FIGURE versus COLLECTOR CURRENT

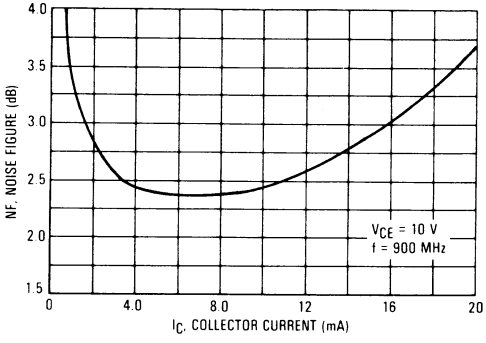


FIGURE 6 — NOISE FIGURE versus FREQUENCY

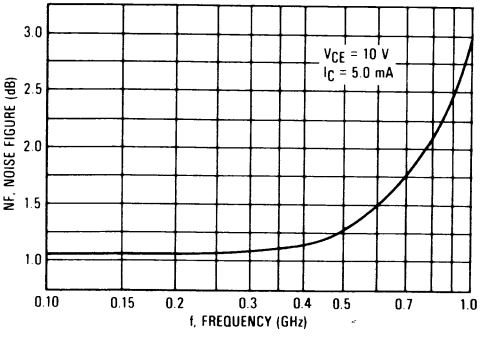


FIGURE 7 — INPUT CAPACITANCE versus EMITTER-BASE VOLTAGE

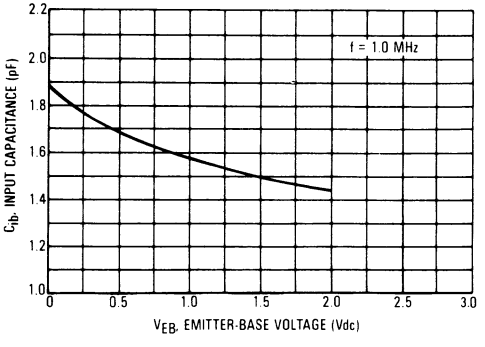


FIGURE 8 — COLLECTOR-BASE CAPACITANCE versus COLLECTOR-BASE VOLTAGE

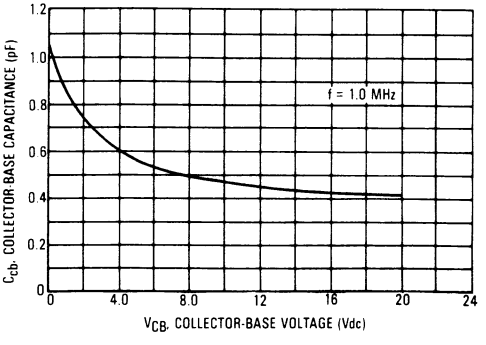


TABLE I

V_{CE} (Volts)	I_C (mA)	f (MHz)	S_{11}		S_{21}		S_{12}		S_{22}	
			$\|S_{11}\|$	$\angle\phi$	$\|S_{21}\|$	$\angle\phi$	$\|S_{12}\|$	$\angle\phi$	$\|S_{22}\|$	$\angle\phi$
5.0	5.0	100	0.76	-35	9.42	142	0.03	67	0.85	-18
		200	0.60	-63	7.98	122	0.05	58	0.70	-26
		500	0.28	-127	4.79	84	0.09	55	0.53	-35
		1000	0.27	148	2.71	50	0.15	51	0.42	-51
		1500	0.43	113	2.02	23	0.21	42	0.28	-79
	10	100	0.57	-51	14.80	131	0.03	65	0.75	-22
		200	0.36	-87	10.80	108	0.04	62	0.60	-26
		500	0.18	-151	5.23	77	0.08	62	0.48	-31
		1000	0.25	136	2.86	47	0.15	55	0.39	-48
		1500	0.42	109	2.12	22	0.22	42	0.25	-75
	15	100	0.42	-67	17.80	123	0.02	66	0.69	-22
		200	0.26	-105	11.50	101	0.04	66	0.56	-23
		500	0.17	-169	5.27	74	0.08	66	0.47	-28
		1000	0.26	131	2.86	46	0.15	57	0.39	-47
		1500	0.43	108	2.12	21	0.22	44	0.25	-73
	20	100	0.33	-82	18.66	117	0.02	67	0.66	-21
		200	0.22	120	11.54	98	0.03	68	0.55	-21
		500	0.17	-171	5.16	72	0.08	67	0.48	-27
		1000	0.28	129	2.80	45	0.15	58	0.40	-45
		1500	0.45	107	2.07	19	0.22	45	0.27	-71
	25	100	0.28	103	18.11	113	0.02	68	0.64	-20
		200	0.22	138	11.03	95	0.03	70	0.55	-19
		500	0.20	169	4.94	71	0.08	68	0.50	-25
		1000	0.32	128	2.68	43	0.15	60	0.42	-44
		1500	0.49	106	1.98	17	0.22	47	0.30	-71
	30	100	0.31	127	16.10	109	0.02	67	0.64	-16
		200	0.28	156	9.69	93	0.03	70	0.57	-16
		500	0.28	160	4.32	69	0.07	70	0.53	-25
		1000	0.39	125	2.37	41	0.14	63	0.46	-44
		1500	0.55	104	1.73	15	0.21	51	0.34	-72

TABLE II

V_{CE} (Volts)	I_C (mA)	f (MHz)	S_{11}		S_{21}		S_{12}		S_{22}	
			$\|S_{11}\|$	$\angle\phi$	$\|S_{21}\|$	$\angle\phi$	$\|S_{12}\|$	$\angle\phi$	$\|S_{22}\|$	$\angle\phi$
10	5.0	100	0.79	-33	9.36	144	0.03	68	0.88	-15
		200	0.63	-58	7.97	124	0.04	58	0.74	-22
		500	0.28	-117	4.87	86	0.07	57	0.60	-31
		1000	0.23	153	2.80	53	0.13	56	0.50	-46
		1500	0.38	116	2.09	26	0.19	48	0.38	-69
	10	100	0.60	-48	14.87	132	0.02	66	0.79	-18
		200	0.39	-79	11.06	110	0.03	63	0.65	-21
		500	0.16	-135	5.38	79	0.07	64	0.56	-28
		1000	0.20	138	2.97	50	0.13	59	0.47	-44
		1500	0.37	111	2.21	25	0.20	49	0.36	-66
	15	100	0.46	-61	18.20	124	0.02	66	0.74	-18
		200	0.28	-94	11.94	102	0.03	66	0.62	-19
		500	0.14	-154	5.45	76	0.07	67	0.55	-26
		1000	0.22	131	2.97	48	0.13	61	0.48	-42
		1500	0.38	109	2.21	24	0.20	50	0.36	-64
	20	100	0.37	-72	19.38	119	0.02	67	0.71	-17
		200	0.23	-105	11.97	99	0.03	68	0.61	-18
		500	0.14	-172	5.36	74	0.07	69	0.56	-24
		1000	0.23	128	2.91	47	0.13	62	0.48	-41
		1500	0.40	108	2.16	22	0.20	51	0.37	-64
	25	100	0.32	-86	19.40	115	0.02	68	0.70	-16
		200	0.22	-119	11.67	97	0.03	69	0.61	-16
		500	0.19	-176	5.28	74	0.06	70	0.57	-23
		1000	0.26	127	2.82	46	0.13	63	0.50	-41
		1500	0.43	107	2.09	21	0.19	53	0.40	-63
	30	100	0.29	-103	18.29	112	0.02	68	0.70	-14
		200	0.22	-135	10.86	95	0.03	70	0.62	-15
		500	0.20	165	4.82	72	0.06	72	0.59	-22
		1000	0.31	125	2.63	44	0.12	66	0.53	-41
		1500	0.47	106	1.95	19	0.19	55	0.43	-64

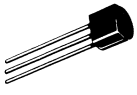
NPN Silicon High Frequency Transistors

MPS911
MXR911
MMBR911

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 = 7 GHz (Typ) @ 30 mA
- Low Noise Figure
  NF = 1.7 dB (Typ) @ 500 MHz
- High Gain
  G_{NF} = 17 dB (Typ) @ 10 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
- MMBR911 Available in Low Profile, Add L Suffix



TO-92
CASE 29
MPS911

SOT-89
CASE 345
MXR911

SOT-23
CASE 318
MMBR911
Standard and Low Profile

MAXIMUM RATINGS

Ratings	Symbol	MPS911	MXR911	MMBR911	Unit
Collector-Emitter Voltage	V_{CEO}	12			Vdc
Collector-Base Voltage	V_{CBO}	20			Vdc
Emitter-Base Voltage	V_{EBO}	3			Vdc
Collector Current — Continuous	I_C	60			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

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

Characteristic			Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS							
Collector-Emitter Breakdown Voltage (I_C = 1 mAdc, I_B = 0)			$V_{(BR)CEO}$	12	—	—	Vdc
Collector-Base Breakdown Voltage (I_C = 0.1 mAdc, I_E = 0)			$V_{(BR)CBO}$	20	—	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 0.1 mA, I_C = 0)			$V_{(BR)EBO}$	3	—	—	Vdc
Collector Cutoff Current (V_{CB} = 15 Vdc, I_E = 0)			I_{CBO}	—	—	50	nAdc
ON CHARACTERISTICS							
DC Current Gain (I_C = 30 mAdc, V_{CE} = 10 Vdc)			h_{FE}	30	—	200	—
DYNAMIC CHARACTERISTICS							
Collector-Base Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 1 MHz)			C_{cb}	—	—	1	pF
Current Gain-Bandwidth Product (V_{CE} = 10 Vdc, I_C = 30 mAdc, f = 1 GHz)	MPS911		f_T	—	7	—	GHz
	MXR911			—	7	—	
	MMBR911			—	6	—	
FUNCTIONAL TESTS							
Gain @ Noise Figure (I_C = 10 mAdc, V_{CE} = 10 Vdc)	MPS911	f = 0.5 GHz	G_{NF}	—	16.5	—	dB
		f = 1 GHz		—	11	—	
	MXR911	f = 0.5 GHz		—	16	—	
		f = 1 GHz		—	8.5	—	
	MMBR911	f = 0.5 GHz		—	17	—	
		f = 1 GHz		—	11	—	
Noise Figure (I_C = 10 mAdc, V_{CE} = 10 Vdc)	MPS911	f = 0.5 GHz	NF	—	1.7	—	dB
		f = 1 GHz		—	2.7	—	
	MXR911	f = 0.5 GHz		—	2	—	
		f = 1 GHz		—	2.6	—	
	MMBR911	f = 0.5 GHz		—	2	—	
		f = 1 GHz		—	2.9	—	

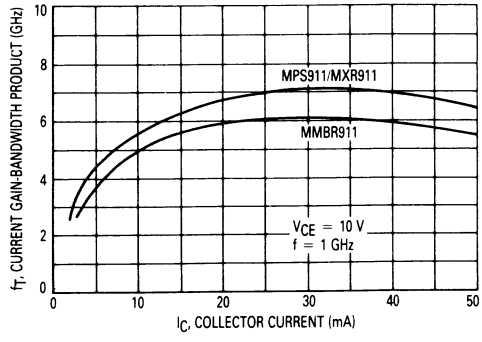
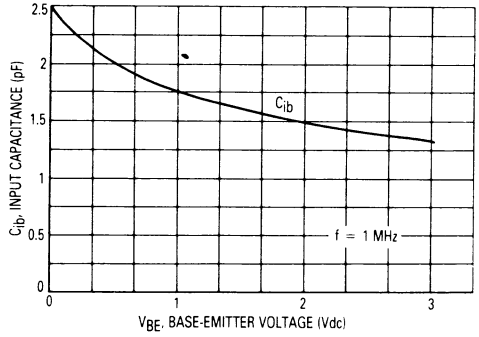
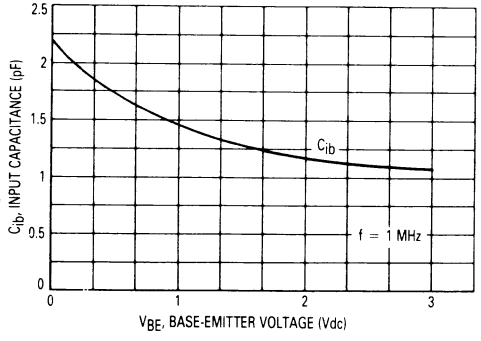


Figure 1. Current Gain-Bandwidth versus Collector Current @ 1 GHz

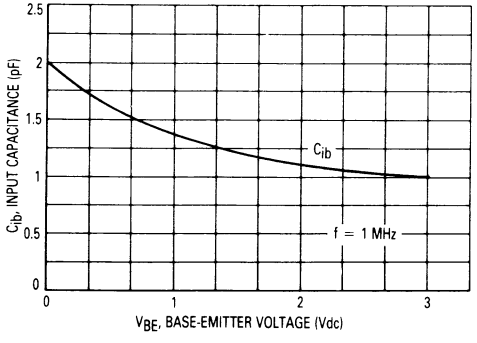
Figure 2. Input Capacitance versus Base-Emitter Voltage



(a) TO-92 MPS911

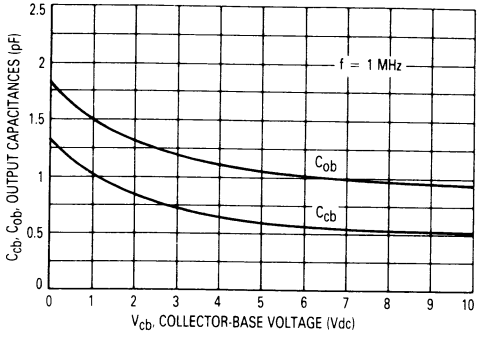


(b) SOT-89 MXR911

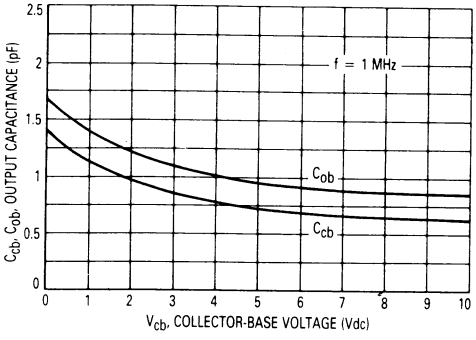


(c) SOT-23 MMBR911

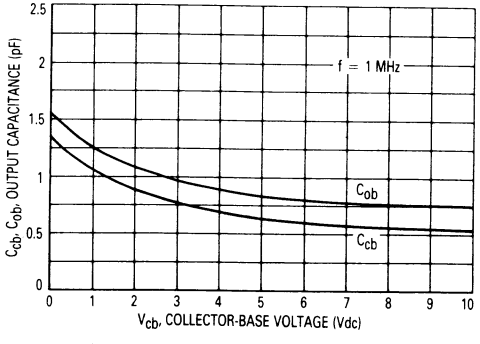
Figure 3. Output Capacitances versus Collector-Base Voltage



(a) TO-92 MPS911

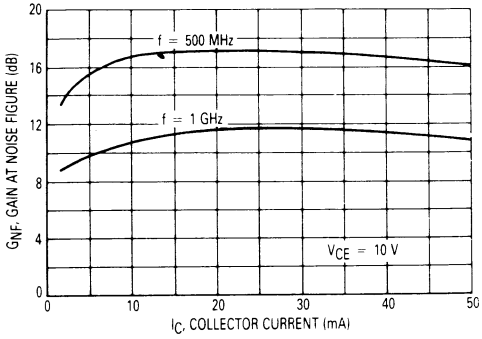


(b) SOT-89 MXR911

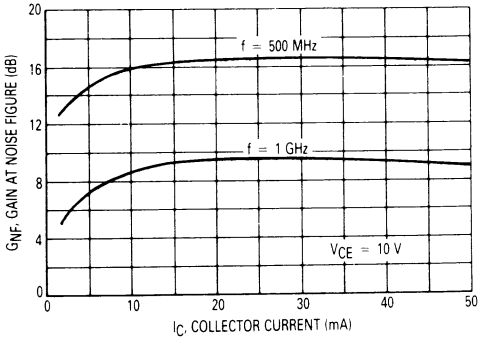


(c) SOT-23 MMBR911

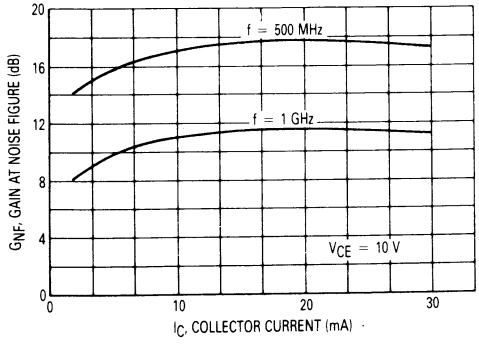
Figure 4. Gain at Noise Figure versus Collector Current



(a) TO-92 MPS911

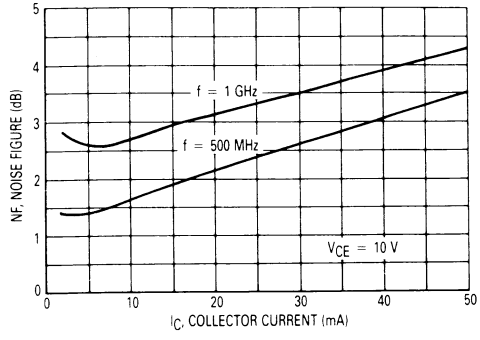


(b) SOT-89 MXR911

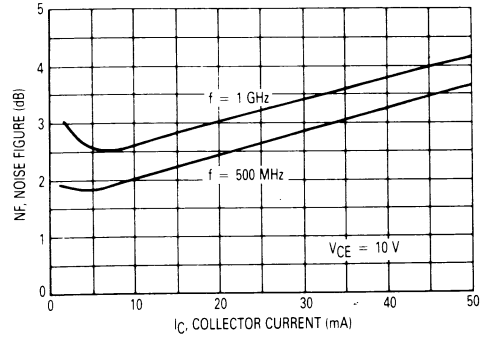


(c) SOT-23 MMBR911

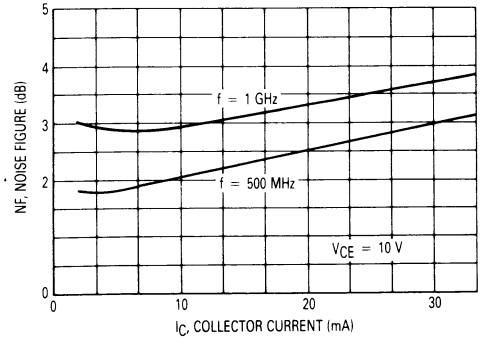
Figure 5. Noise Figure versus Collector Current



(a) TO-92 MPS911

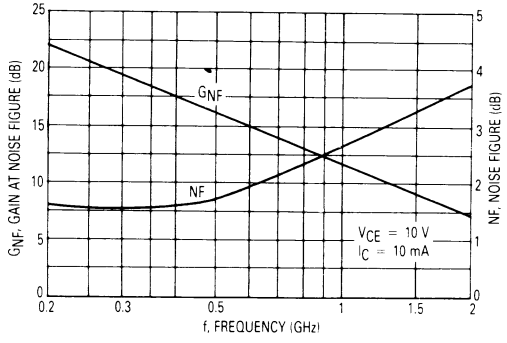


(b) SOT-89 MXR911

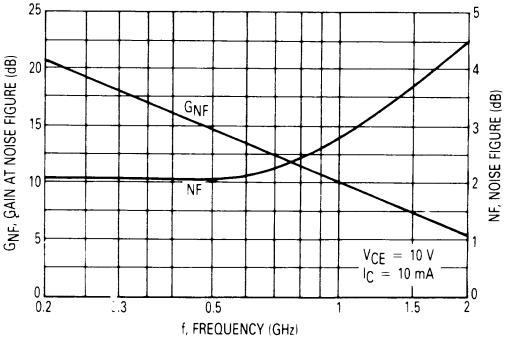


(c) SOT-23 MMBR911

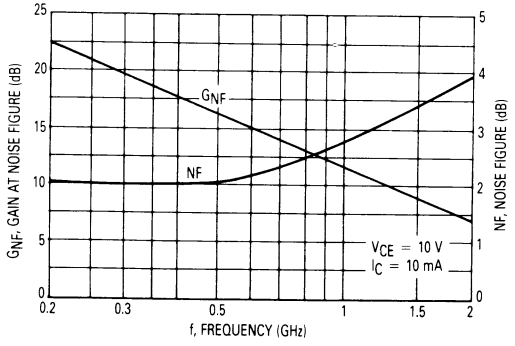
Figure 6. Gain at Noise Figure and Noise Figure versus Frequency



(a) TO-92 MPS911

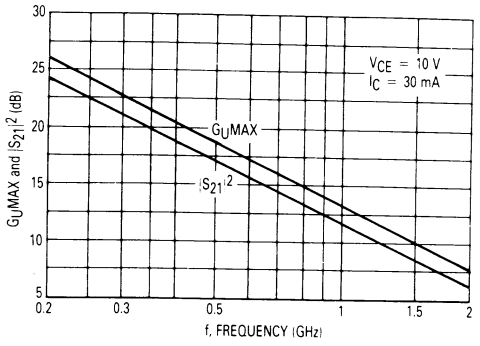


(b) SOT-89 MXR911

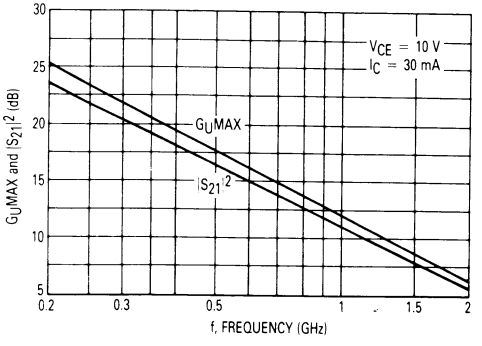


(c) SOT-23 MMBR911

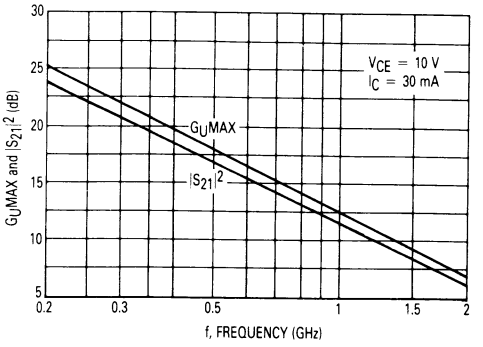
Figure 7. Maximum Unilateral Gain and Insertion Gain versus Frequency



(a) TO-92 MPS911



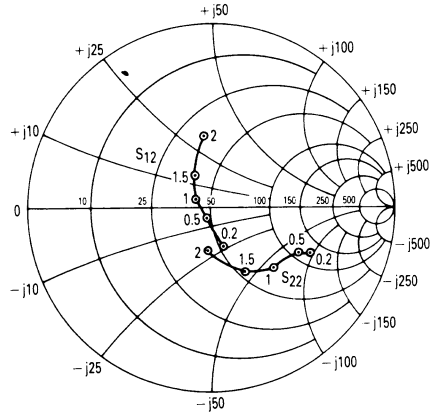
(b) SOT-89 MXR911



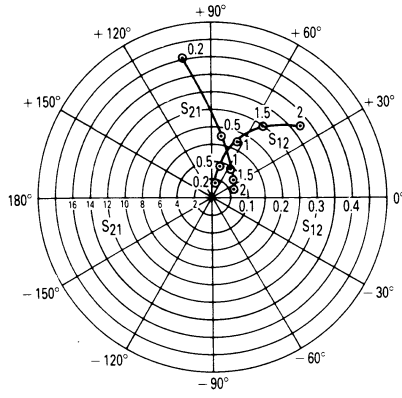
(c) SOT-23 MMBR911

3

TO-92 MPS911



INPUT AND OUTPUT REFLECTION COEFFICIENTS
versus FREQUENCY
V_{CE} = 10 V, I_C = 30 mA

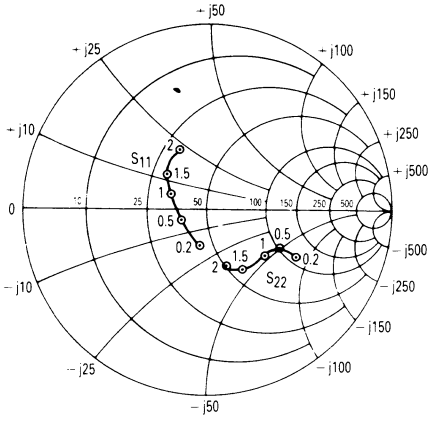


FORWARD AND REVERSE TRANSMISSION
COEFFICIENTS versus FREQUENCY
V_{CE} = 10 V, I_C = 30 mA

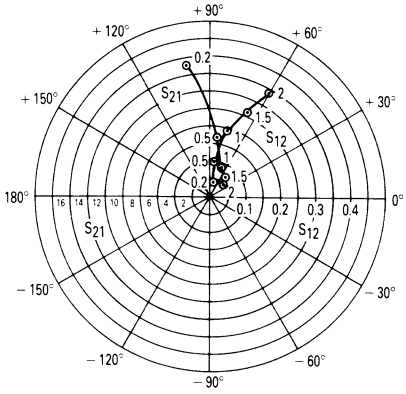
COMMON EMITTER S-PARAMETERS

V_{CE} (Volts)	I_C (mA)	f (MHz)	S_{11}		S_{21}		S_{12}		S_{22}	
			$\|S_{11}\|$	$\angle\phi$	$\|S_{21}\|$	$\angle\phi$	$\|S_{12}\|$	$\angle\phi$	$\|S_{22}\|$	$\angle\phi$
10	2	200	0.78	−46	4.42	134	0.06	69	0.95	−18
		500	0.46	−107	3.35	98	0.10	56	0.78	−30
		1000	0.30	172	2.23	61	0.14	54	0.66	−48
		1500	0.41	118	1.66	34	0.20	51	0.57	−70
		2000	0.60	89	1.43	11	0.29	45	0.46	−107
	5	200	0.72	−55	8.75	126	0.05	68	0.87	−23
		500	0.31	−107	5.23	92	0.09	63	0.68	−31
		1000	0.18	178	3.05	61	0.15	60	0.57	−46
		1500	0.27	122	2.22	38	0.22	52	0.50	−66
		2000	0.45	94	1.90	17	0.30	43	0.38	−97
	10	200	0.48	−64	12.79	114	0.04	73	0.74	−24
		500	0.16	−100	6.19	85	0.09	71	0.60	−29
		1000	0.09	165	3.45	59	0.17	63	0.50	−44
		1500	0.22	112	2.50	36	0.25	50	0.41	−65
		2000	0.41	90	2.14	16	0.32	38	0.26	−98
	20	200	0.29	−67	15.30	106	0.04	78	0.65	−23
		500	0.08	−92	6.76	82	0.09	75	0.55	−27
		1000	0.06	144	3.71	58	0.17	64	0.46	−43
		1500	0.20	108	2.65	30	0.25	51	0.37	−63
		2000	0.38	89	2.25	18	0.32	38	0.23	−94
	30	200	0.20	−70	16.04	103	0.04	80	0.61	−22
		500	0.05	−97	6.90	81	0.09	77	0.53	−25
		1000	0.07	138	3.76	58	0.17	66	0.46	−41
		1500	0.20	109	2.68	38	0.25	52	0.37	−61
		2000	0.38	90	2.28	20	0.32	40	0.24	−91
	50	200	0.13	−78	15.26	99	0.04	82	0.62	−18
		500	0.03	−145	6.48	79	0.09	78	0.56	−23
		1000	0.11	126	3.55	56	0.17	67	0.49	−40
		1500	0.24	105	2.56	36	0.25	53	0.39	−62
		2000	0.43	87	2.17	17	0.32	40	0.25	−95

SOT-89 MXR911



INPUT/OUTPUT REFLECTION COEFFICIENTS versus FREQUENCY
V_{CE} = 10 V, I_C = 30 mA

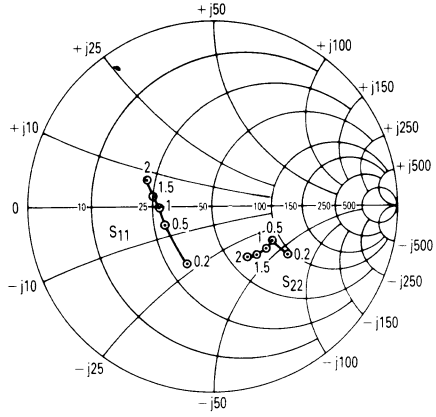


FORWARD AND REVERSE TRANSMISSION COEFFICIENTS versus FREQUENCY
V_{CE} = 10 V, I_C = 30 mA

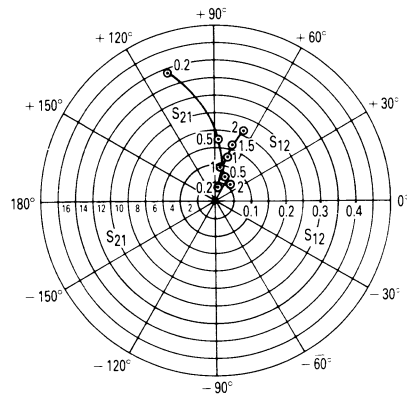
COMMON EMITTER S-PARAMETERS

V_{CE} (Volts)	I_C (mA)	f (MHz)	S_{11}		S_{21}		S_{12}		S_{22}	
			$\|S_{11}\|$	$\angle\phi$	$\|S_{21}\|$	$\angle\phi$	$\|S_{12}\|$	$\angle\phi$	$\|S_{22}\|$	$\angle\phi$
10	2	200	0.80	−46	5.04	130	0.07	67	0.91	−18
		500	0.52	−100	3.58	100	0.11	56	0.74	−27
		1000	0.36	−173	2.32	72	0.16	59	0.64	−37
		1500	0.41	147	1.71	51	0.21	63	0.59	−50
		2000	0.48	118	1.36	37	0.27	65	0.56	−64
	5	200	0.65	−60	8.65	128	0.06	67	0.81	−24
		500	0.34	−115	5.10	93	0.10	65	0.61	−30
		1000	0.26	177	2.90	71	0.17	67	0.54	−38
		1500	0.32	143	2 11	53	0.23	64	0.49	−50
		2000	0.40	116	1.67	39	0.30	62	0.45	−65
	10	200	0.44	−72	11.87	118	0.05	70	0.70	−27
		500	0.21	−123	6.04	89	0.10	71	0.53	−31
		1000	0.19	171	3.27	70	0.18	70	0.47	−39
		1500	0.27	140	2.35	53	0.25	65	0.42	−53
		2000	0.35	115	1.88	41	0.32	60	0.38	−68
	20	200	0.27	−83	14.16	108	0.05	74	0.59	−28
		500	0.13	−138	6.57	85	0.10	75	0.47	−29
		1000	0.16	161	3.48	69	0.19	72	0.42	−39
		1500	0.24	135	2.49	53	0.26	65	0.37	−54
		2000	0.33	113	1.98	41	0.34	59	0.33	−71
	30	200	0.18	−95	14.93	103	0.04	77	0.54	−26
		500	0.11	−153	6.70	83	0.10	76	0.44	−27
		1000	0.16	156	3.52	68	0.19	73	0.41	−38
		1500	0.24	133	2.50	54	0.26	66	0.36	−54
		2000	0.33	112	2.00	42	0.34	60	0.32	−71
	50	200	0.15	−111	14.26	101	0.04	79	0.53	−22
		500	0.12	−160	6.45	82	0.09	77	0.46	−24
		1000	0.19	152	3.39	68	0.18	73	0.43	−37
		1500	0.27	130	2.41	53	0.26	67	0.38	−51
		2000	0.35	110	1.92	41	0.33	61	0.34	−68

SOT-23 MMBR911



INPUT/OUTPUT REFLECTION COEFFICIENTS
versus FREQUENCY
V_{CE} = 10 V, I_C = 30 mA



FORWARD AND REVERSE TRANSMISSION
COEFFICIENTS versus FREQUENCY
V_{CE} = 10 V, I_C = 30 mA

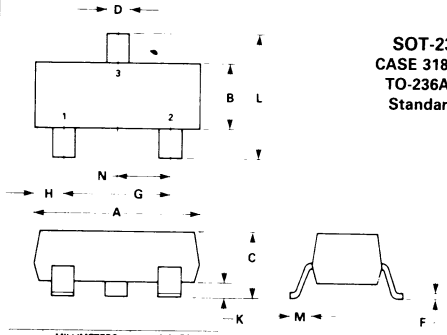
3

COMMON EMITTER S-PARAMETERS

V_{CE} (Volts)	I_C (mA)	f (MHz)	S_{11}		S_{21}		S_{12}		S_{22}	
			$\|S_{11}\|$	$\angle\phi$	$\|S_{21}\|$	$\angle\phi$	$\|S_{12}\|$	$\angle\phi$	$\|S_{22}\|$	$\angle\phi$
10	2	200	0.82	−45	4.14	145	0.06	66	0.88	−16
		500	0.60	−96	3.23	112	0.09	49	0.71	−27
		1000	0.47	−149	2.16	85	0.11	49	0.62	−34
		1500	0.46	−179	1.59	71	0.13	55	0.58	−43
		2000	0.47	162	1.35	57	0.16	62	0.56	−51
	5	200	0.66	−63	8.63	134	0.05	64	0.75	−25
		500	0.43	−117	5.29	100	0.07	58	0.55	−31
		1000	0.37	−163	3.05	82	0.11	63	0.48	−36
		1500	0.38	176	2.17	70	0.15	65	0.45	−44
		2000	0.40	160	1.81	57	0.19	65	0.43	−51
	10	200	0.49	−83	12.70	124	0.04	65	0.62	−30
		500	0.33	−134	6.42	94	0.07	66	0.44	−32
		1000	0.32	−171	3.53	80	0.12	70	0.41	−36
		1500	0.35	173	2.46	69	0.16	69	0.38	−45
		2000	0.37	159	2.04	58	0.20	66	0.35	−52
	20	200	0.36	−103	15.25	114	0.03	69	0.52	−32
		500	0.28	−149	6.95	90	0.06	72	0.39	−30
		1000	0.29	−176	3.73	78	0.12	73	0.37	−35
		1500	0.33	172	2.60	68	0.17	71	0.34	−43
		2000	0.36	158	2.14	58	0.21	67	0.32	−52
	30	200	0.32	−114	15.64	109	0.03	71	0.48	−29
		500	0.27	−156	6.92	88	0.06	73	0.38	−27
		1000	0.29	−178	3.71	78	0.12	74	0.37	−33
		1500	0.34	170	2.58	68	0.16	72	0.34	−44
		2000	0.37	156	2.13	57	0.21	68	0.32	−51

OUTLINE DIMENSIONS

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

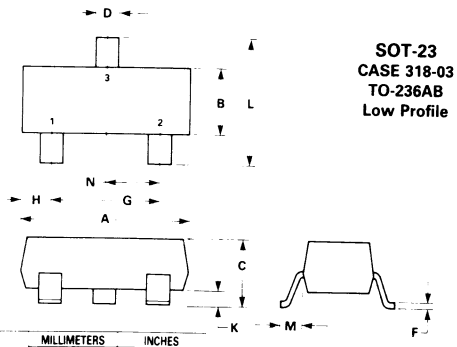


DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	2.80	3.04	0.1102	0.1197
B	1.20	1.40	0.0472	0.0551
C	0.85	1.20	0.033	0.0472
D	0.37	0.46	0.015C	0.0177
F	0.085	0.130	0.0034	0.005'
G	1.78	2.04	0.0701	0.0807
H	0.51	0.60	0.0200	0.0236
K	0.10	0.25	0.0040	0.0098
L	2.10	2.50	0.0830	0.0984
M	0.45	0.60	0.0180	0.0236
N	0.89	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

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



DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	2.80	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	0.085	0.130	0.0034	0.005'
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

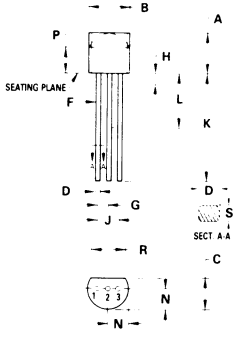
STYLE 6:
PIN 1. BASE
2. EMITTER
3. COLLECTOR

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

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

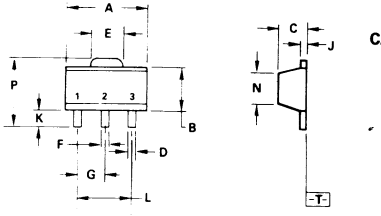
NOTES:
1. CONTOUR OF PACKAGE BEYOND ZONE P IS UNCONTROLLED.
2. DIM F APPLIES BETWEEN H AND L. DIM D & S APPLIES BETWEEN L & 12.70 mm (0.5') FROM SEATING PLANE. LEAD DIM IS UNCONTROLLED IN H & BEYOND 12.70 mm (0.5') FROM SEATING PLANE.

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



DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES 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 MIN	MILLIMETERS MAX	INCHES MIN	INCHES 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

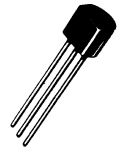
NOTES:
1. DIMENSIONS A AND B ARE DATUMS.
2. -T- IS SEATING PLANE.
3. POSITIONAL TOLERANCE FOR LEADS:
⌀ 0.10 (0.004) Ⓜ T BⓈ AⓈ
4. DIMENSIONING AND TOLERANCING PER ANSI Y14.5, 1973.
5. CONTROLLING DIM: MILLIMETERS.

MPS3866

Die Source Same as 2N3866

AMPLIFIER TRANSISTOR

NPN SILICON



CASE 29-02, STYLE 1
TO-92
(TO-226AA)

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	30	Vdc
Collector-Base Voltage	V_{CBO}	55	Vdc
Emitter-Base Voltage	V_{EBO}	3.5	Vdc
Collector Current — Continuous	I_C	0.4	Adc
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	Watts 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 Case	$R_{\theta JC}$	83.3	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	200	°C/W

3

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage (I_C = 5.0 mAdc, R_{BE} = 10 Ω)	$V_{CER(sus)}$	55	—	Vdc
Collector-Emitter Sustaining Voltage (I_C = 5.0 mAdc, I_B = 0)	$V_{CEO(sus)}$	30	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 100 μAdc, I_C = 0)	$V_{(BR)EBO}$	3.5	—	Vdc
Collector Cutoff Current (V_{CE} = 28 Vdc, I_B = 0)	I_{CEO}	—	0.02	mAdc
Collector Cutoff Current (V_{CE} = 30 Vdc, V_{BE} = −1.5 Vdc (Rev.), T_C = 150°C) (V_{CE} = 55 Vdc, V_{BE} = −1.5 Vdc (Rev.)	I_{CEX}	— —	5.0 0.1	mAdc
Emitter Cutoff Current (V_{BE} = 3.5 Vdc, I_C = 0)	I_{EBO}	—	0.1	mAdc
ON CHARACTERISTICS				
DC Current Gain (I_C = 360 mAdc, V_{CE} = 5.0 Vdc)(1) (I_C = 50 mAdc, V_{CE} = 5.0 Vdc)	h_{FE}	5.0 10	— 200	—
Collector-Emitter Saturation Voltage (I_C = 100 mAdc, I_B = 20 mAdc)	$V_{CE(sat)}$	—	1.0	Vdc
SMALL-SIGNAL CHARACTERISTICS				
Current-Gain — Bandwidth Product (I_C = 50 mAdc, V_{CE} = 15 Vdc, f = 200 MHz)	f_T	500	—	MHz
Output Capacitance (V_{CB} = 28 Vdc, I_E = 0, f = 1.0 MHz)	C_{obo}	—	3.0	pF
FUNCTIONAL TEST				
Amplifier Power Gain (V_{CC} = 28 Vdc, P_{out} = 1.0 W, f = 400 MHz)	G_{pe}	10	—	dB
Collector Efficiency (V_{CC} = 28 Vdc, P_{out} = 1.0 W, f = 400 MHz)	η	45	—	%

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