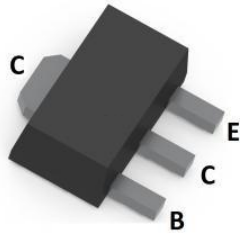
NPN Silicon RF Transistor

FEATURES

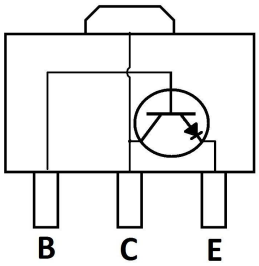
- Low Noise and High Gain
  NF = 1.1 dB TYP., G_a = 8.0 dB TYP.
  @V_{CE} = 10 V, I_C = 7 mA, f = 1.0 GHz
  NF = 1.8 dB TYP., G_a = 9.0 dB TYP.
  @V_{CE} = 10 V, I_C = 40 mA, f = 1.0 GHz



SOT-89

APPLICATIONS

- Designed for low noise amplifier at VHF, UHF and CATV band.



MECHANICAL DATA

- Case: SOT-89
- Case Material: Molded Plastic. UL flammability
- Classification Rating: 94V-0
- Weight: 0.055 grams (approximate)

MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Parameter	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	20	V
Collector-emitter voltage	V_{CEO}	12	V
Emitter-base voltage	V_{EBO}	3.0	V
Collector current	I_C	100	mA
Total power dissipation	P_T*	1.2	W
Junction temperature	T_j	150	℃
Storage temperature	T_{stg}	-65 to +150	℃
Thermal Resistance	$R_{th(j-a)}$*	62.5	℃/W

* mounted on 16 cm^2 X 0.7 mm(t) Ceramic Substrate

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

Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Collector cutoff current	I_{CBO}	V_{CB} = 10V,I_E=0			1.0	μ A
Emitter cutoff current	I_{EBO}	V_{EB} = 1.0V,I_C=0			1.0	μ A
DC current gain	h_{FE} *1	V_{CE} =10V,Ic=20mA	50	120	250	
Insertion Power Gain	$\|S_{21e}\|^2$	V_{CE} = 10 V, I_C = 20 mA, f = 1.0 GHz		9		dB
Noise Figure	NF	V_{CE} = 10 V, I_C = 7 mA, f = 1.0 GHz		1.1		dB
		V_{CE} = 10 V, I_C = 40 mA, f = 1.0 GHz		1.8	3.0	dB
Output Capacitance	C_{ob}	V_{CB} = 10 V, I_E = 0, f = 1.0 MHz		0.65	1.0	pF
Transition frequency	f_T	V_{CE} = 10V ,Ic=20mA		6.5		GHz

*1 Pulse Measurement PW ≤ 350 ms, Duty Cycle ≤ 2 %

*2 The emitter terminal and the case shall be connected to the guard terminal of the three-terminal capacitance bridge.

CLASSIFICATION OF h_{FE}

Marking	RH	RF	RE
Rank	RH	RF	RE
hFE	20~100	80~160	125~250

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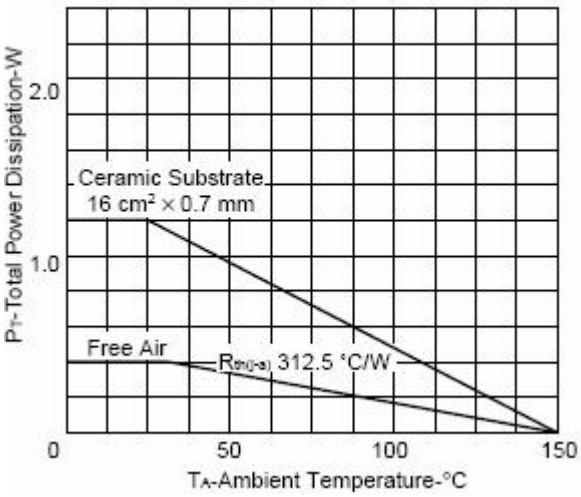
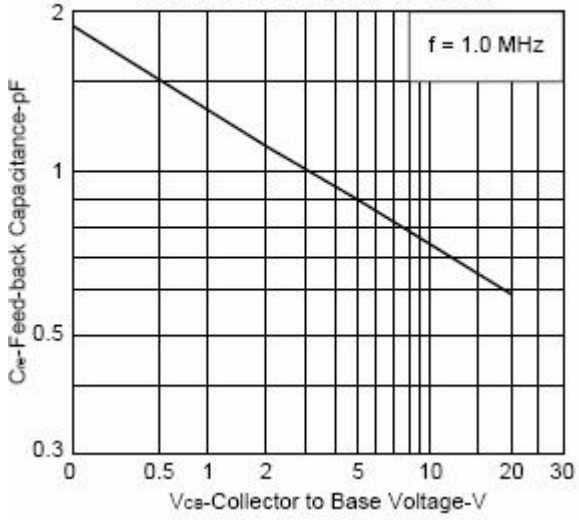
Typical Characteristics

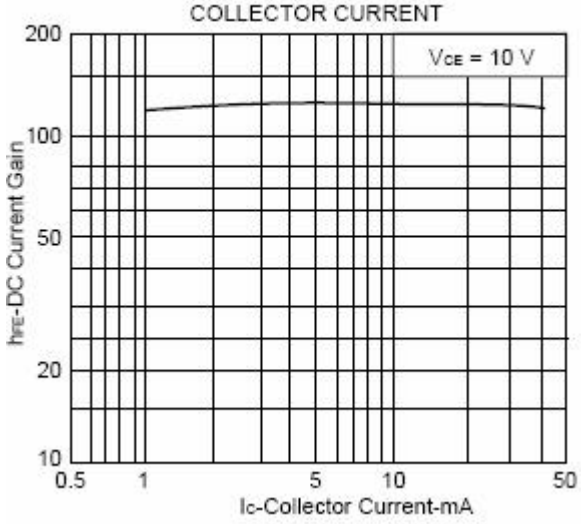
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



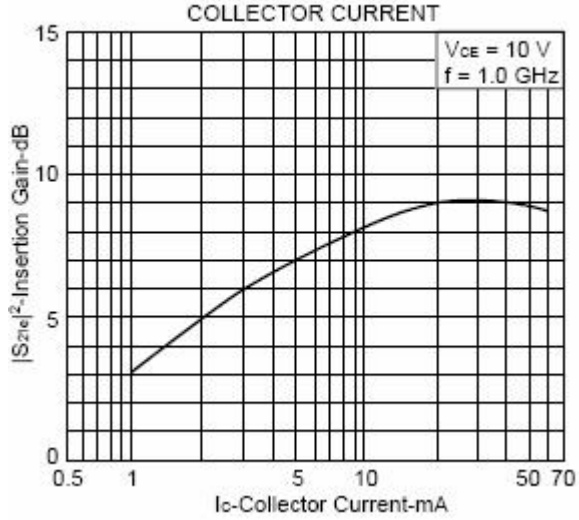
FEED-BACK CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



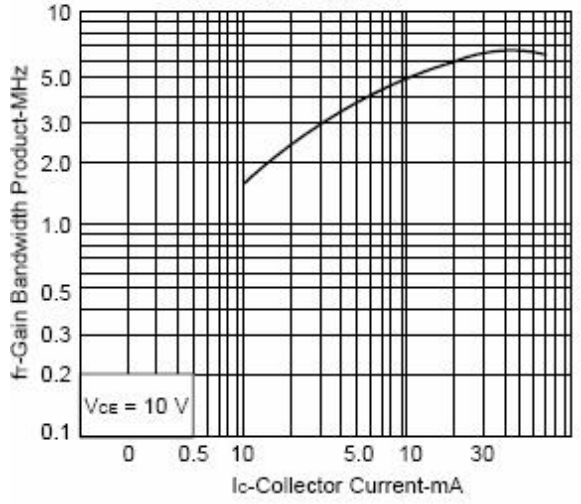
DC CURRENT GAIN vs. COLLECTOR CURRENT



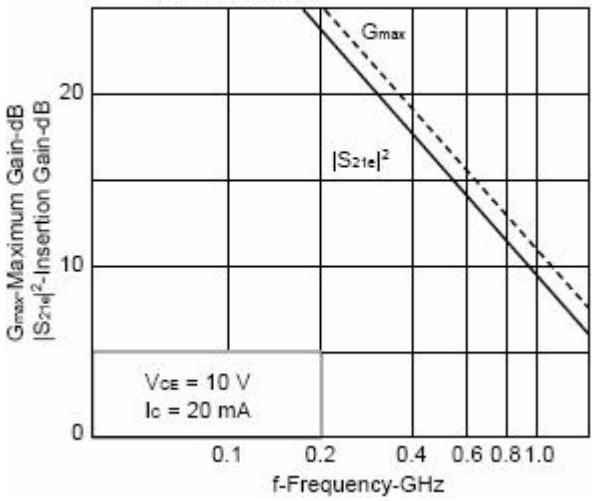
INSERTION GAIN vs. COLLECTOR CURRENT



GAIN BANDWIDTH PROUDCT vs. COLLECTOR CURRENT



INSERTION GAIN, MAXIMUM GAIN vs. FREQUENCY



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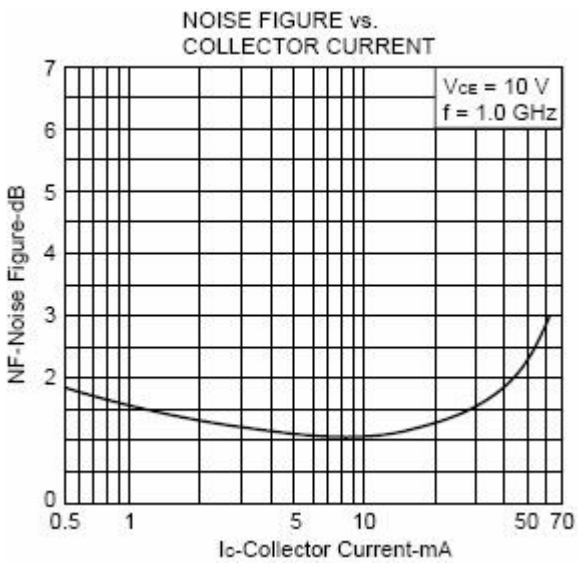
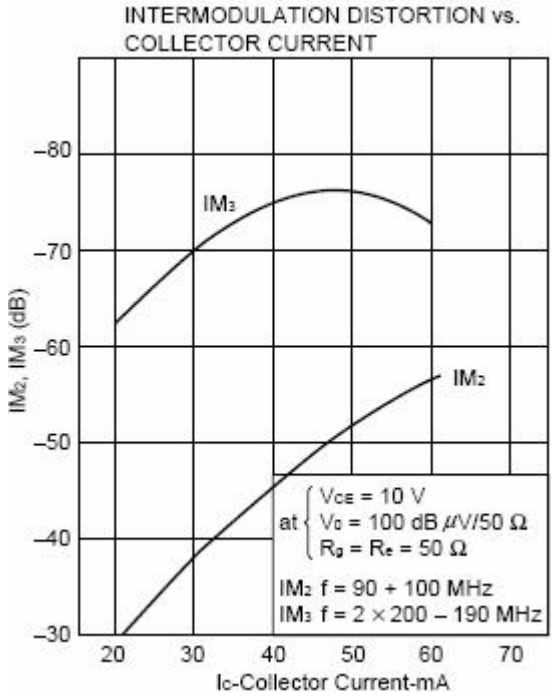




S-PARAMETER

V_{CE} = 10 V, I_C = 40 mA, Z_O = 50 Ω

f (MHz)	$\lvert S_{11} \rvert$	$\angle S_{11}$	$\lvert S_{21} \rvert$	$\angle S_{21}$	$\lvert S_{12} \rvert$	$\angle S_{12}$	$\lvert S_{22} \rvert$	$\angle S_{22}$
200	0.196	-94.4	13.023	102.4	0.043	74.5	0.444	-21.1
400	0.103	-118.3	6.852	89.2	0.081	77.4	0.398	-25.3
600	0.056	-131.1	4.632	78.3	0.118	77.5	0.399	-26.9
800	0.024	-43.7	3.527	75.9	0.152	78.0	0.414	-28.9
1000	0.008	-2.0	2.854	68.7	0.188	78.4	0.440	-33.5
1200	0.039	13.1	2.421	65.7	0.218	75.7	0.461	-33.3
1400	0.072	11.8	2.118	59.0	0.255	71.7	0.479	-36.3
1600	0.102	9.6	1.887	57.1	0.278	73.1	0.499	-35.5
1800	0.129	8.6	1.681	52.5	0.308	71.3	0.515	-38.8
2000	0.151	9.8	1.579	51.4	0.339	71.8	0.537	-35.9

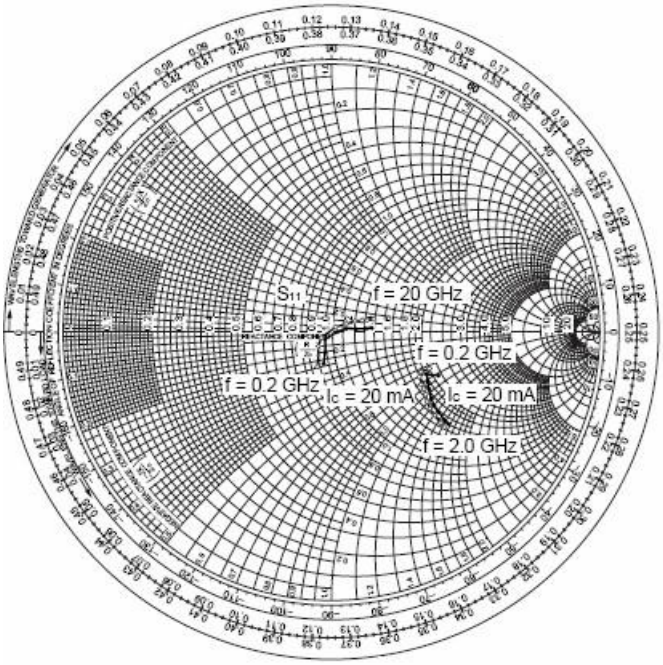
NPN Silicon RF Transistor

V_{CE} = 10 V, I_C = 20 mA, Z_O = 50 Ω

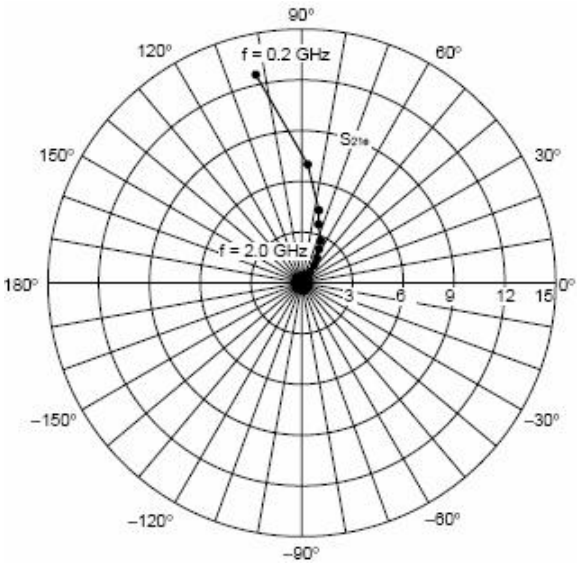
f (MHz)	$\lvert S_{11} \rvert$	$\angle S_{11}$	$\lvert S_{21} \rvert$	$\angle S_{21}$	$\lvert S_{12} \rvert$	$\angle S_{12}$	$\lvert S_{22} \rvert$	$\angle S_{22}$
200	0.130	-109.2	13.430	98.1	0.042	79.0	0.403	-22.1
400	0.073	-134.1	6.930	87.2	0.081	80.6	0.382	-24.7
600	0.037	-146.6	4.690	79.4	0.119	79.4	0.392	-25.6
800	0.010	177.1	3.560	75.2	0.154	79.7	0.412	-27.1
1000	0.024	23.7	2.878	68.2	0.191	76.5	0.440	-31.9
1200	0.056	17.2	2.439	65.4	0.220	76.8	0.463	-32.3
1400	0.093	13.8	2.133	59.0	0.257	72.9	0.483	-35.7
1600	0.124	12.0	1.898	57.3	0.280	74.0	0.504	-35.3
1800	0.151	11.0	1.693	52.9	0.311	72.4	0.519	-38.4
2000	0.174	13.4	1.591	52.0	0.341	72.8	0.542	-36.3

S-P ARAMETER

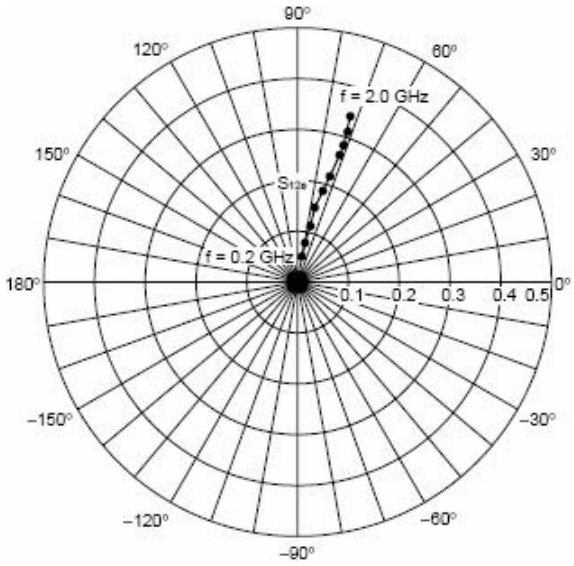
S_{11e}, S_{22e}-FREQUENCY CONDITION V_{CE} = 10 V



S_{21e}-FREQUENCY CONDITION V_{CE} = 10 V
I_C = 20 mA

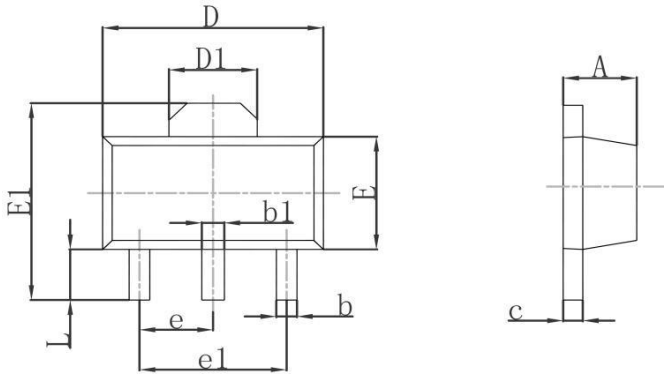


S_{12e}-FREQUENCY CONDITION V_{CE} = 10 V
I_C = 20 mA



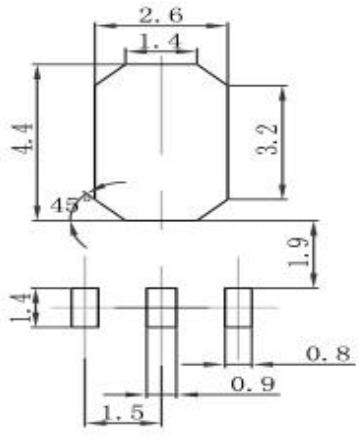
NPN Silicon RF Transistor

SOT-89 Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550REF		0.061REF	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500TYP		0.060TYP	
e1	3.000TYP		0.118TYP	
L	0.900	1.200	0.035	0.047

SOT-89 Suggested Pad Layout



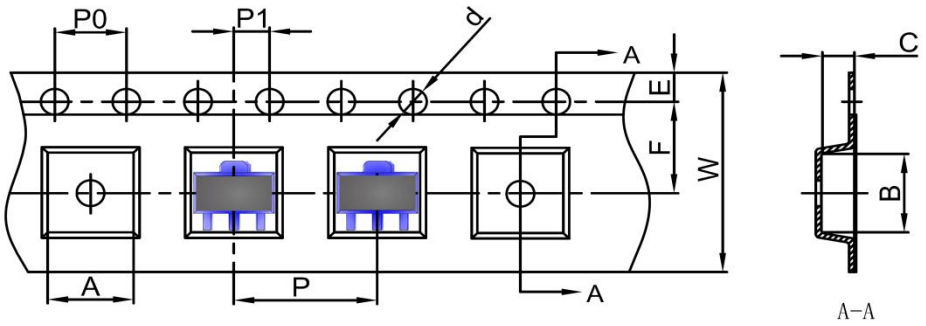
Note:

1. Controlling dimension: in millimeters
2. General tolerance: ±0.05mm
3. The pad layout is for reference purposes only

NPN Silicon RF Transistor

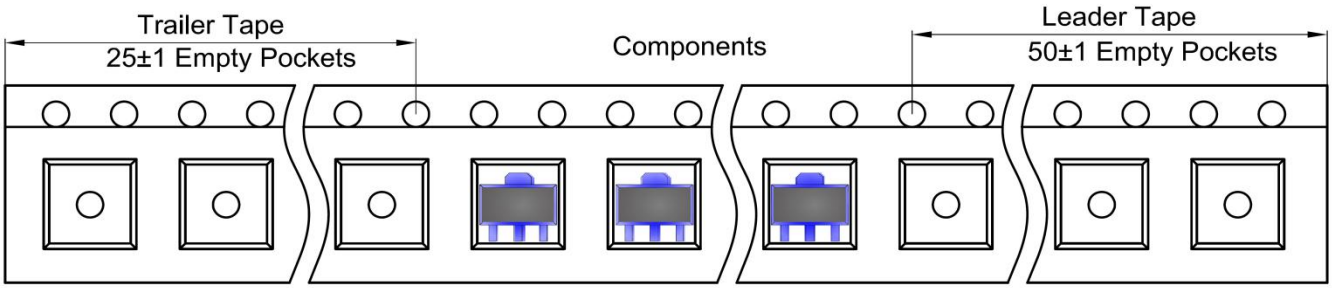
SOT-89 Tape and Reel

SOT-89 Embossed Carrier Tape

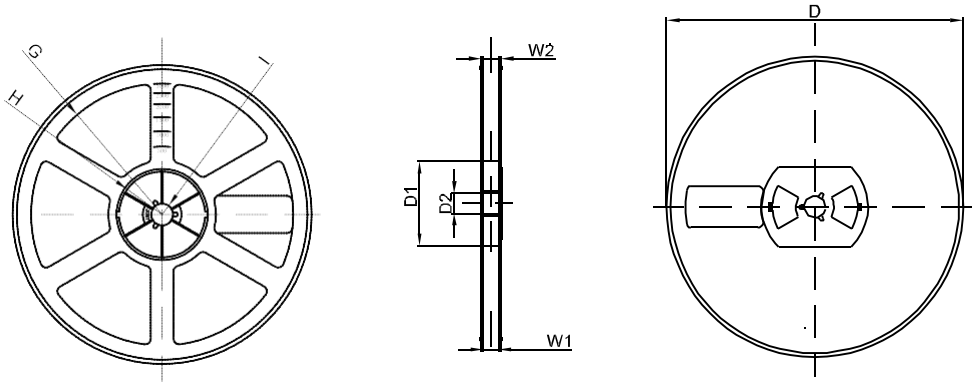


	DIMENSIONS ARE IN MILLIMETER									
TYPE	A	B	C	d	E	F	P0	P	P1	W
SOT-89	4.85	4.45	1.85	Ø1.50	1.75	5.50	4.00	8.00	2.00	12.00
TOLERANCE	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1

SOT-89 Tape Leader and Trailer



SOT-89 Reel



	DIMENSIONS ARE IN MILLIMETER							
REEL OPTION	D	D1	D2	G	H	I	W1	W2
7" DIA	Ø178	54.40	13.00	R78	R25.60	R6.50	13.20	16.50
TOLERANCE	±2	±1	±1	±1	±1	±1	±1	±1