NEC

SILICON TRANSISTOR
2SC4956

HIGH FREQUENCY LOW NOISE AMPLIFIER
NPN SILICON EPITAXIAL TRANSISTOR
4 PINS MINI MOLD

FEATURES

- Low Noise, High Gain
- Low Voltage Operation
- Low Feedback Capacitance
  C_{re} = 0.20 pF TYP.

ORDERING INFORMATION

PART NUMBER	QUANTITY	PACKING STYLE
2SC4956-T1	3 Kpcs/Reel.	Embossed tape 8 mm wide. Pin3 (Base), Pin4 (Emitter) face to perforation side of the tape.
2SC4956-T2	3 Kpcs/Reel.	Embossed tape 8 mm wide. Pin1 (Collector), Pin2 (Emitter) face to perforation side of the tape.

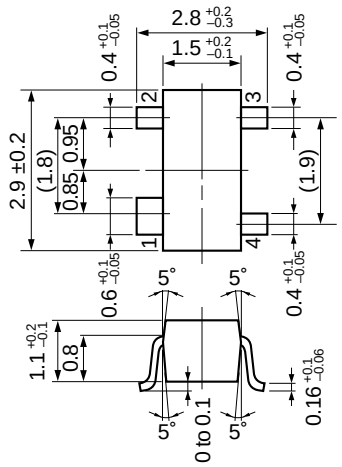
***** Please contact with responsible NEC person, if you require evaluation sample. Unit sample quantity shall be 50 pcs. (Part No.: 2SC4956)

ABSOLUTE MAXIMUM RATINGS (T_A = 25 ˚C)

Collector to Base Voltage	V_{CBO}	9	V
Collector to Emitter Voltage	V_{CEO}	6	V
Emitter to Base Voltage	V_{EBO}	2	V
Collector Current	I_C	10	mA
Total Power Dissipation	P_T	60	mW
Junction Temperature	T_j	150	˚C
Storage Temperature	T_{stg}	–65 to +150	˚C

PACKAGE DIMENSIONS

in millimeters



PIN CONNECTIONS

1. Collector
2. Emitter
3. Base
4. Emitter

Caution; Electrostatic Sensitive Device.

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ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Collector Cutoff Current	I_{CBO}			0.1	μA	V_{CB} = 5 V, I_E = 0
Emitter Cutoff Current	I_{EBO}			0.1	μA	V_{EB} = 1 V, I_C = 0
DC Current Gain	h_{FE}	75		150		V_{CE} = 3 V, I_C = 5 mA**1
Gain Bandwidth Product	f_T		12		GHz	V_{CE} = 3 V, I_C = 5 mA, f = 2.0 GHz
Feed back Capacitance	C_{re}		0.2	0.4	pF	V_{CB} = 3 V, I_E = 0, f = 1 MHz**2
Insertion Power Gain	$\|S_{21e}\|^2$	9	11		dB	V_{CE} = 3 V, I_C = 5 mA, f = 2.0 GHz
Noise Figure	NF		2.5	4.0	dB	V_{CE} = 3 V, I_C = 3 mA, f = 2.0 GHz

***1** Pulse Measurement; PW ≤ 350 μs, Duty Cycle ≤ 2 % Pulsed.

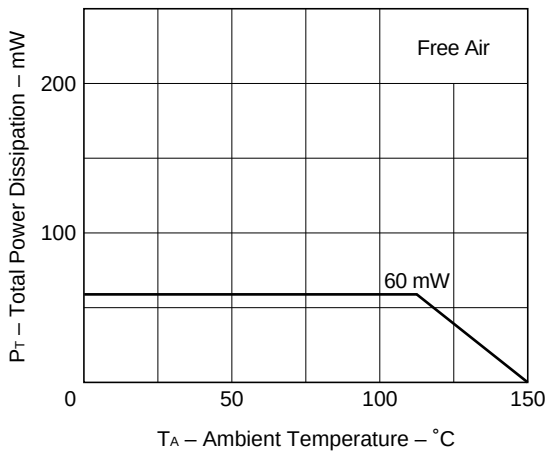
***2** Measured with 3 terminals bridge, Emitter and Case should be grounded.

h_{FE} Classification

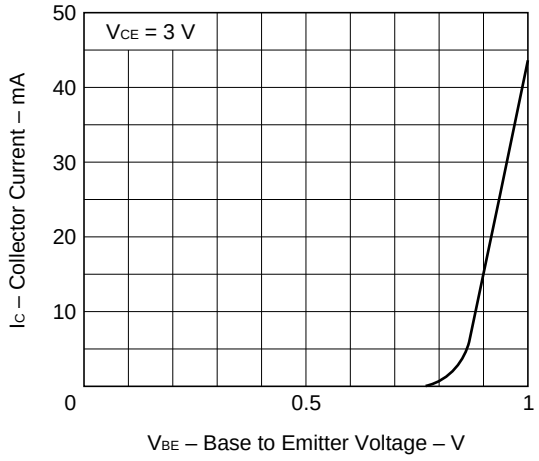
Rank	T82
Marking	T82
h_{FE}	75 to 150

TYPICAL CHARACTERISTICS (T_A = 25 °C)

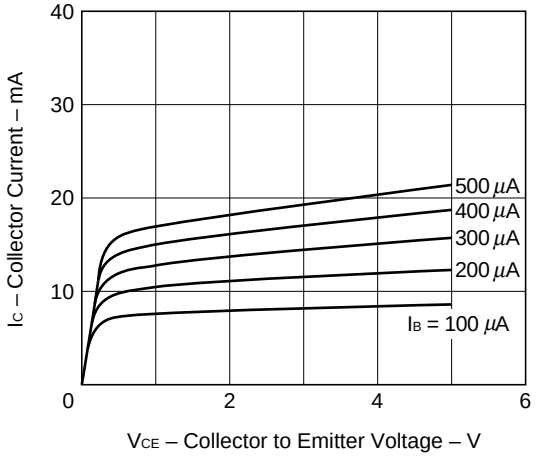
TOTAL POWER DISSIPATION
vs. AMBIENT TEMPERATURE



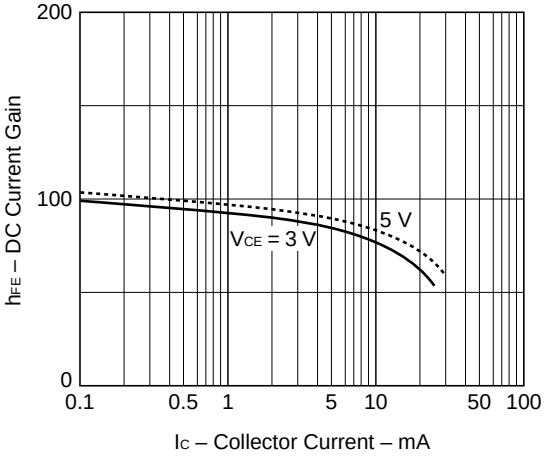
COLLECTOR CURRENT
vs. BASE TO EMITTER VOLTAGE



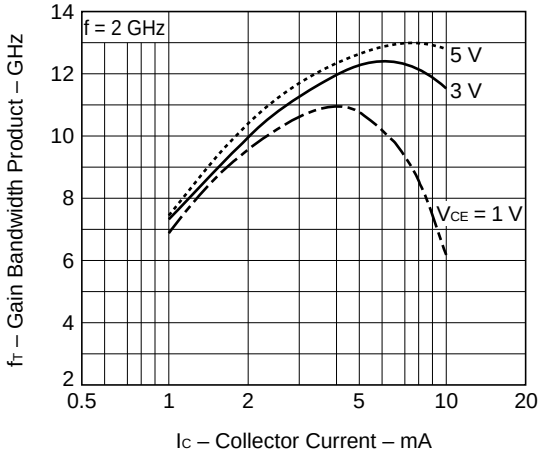
COLLECTOR CURRENT
vs. COLLECTOR TO EMITTER VOLTAGE



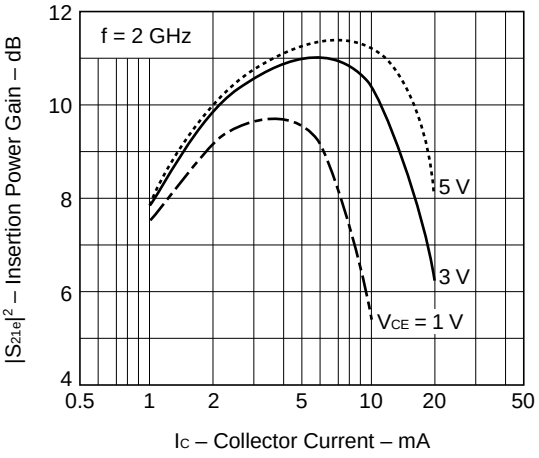
DC CURRENT GAIN
vs. COLLECTOR CURRENT



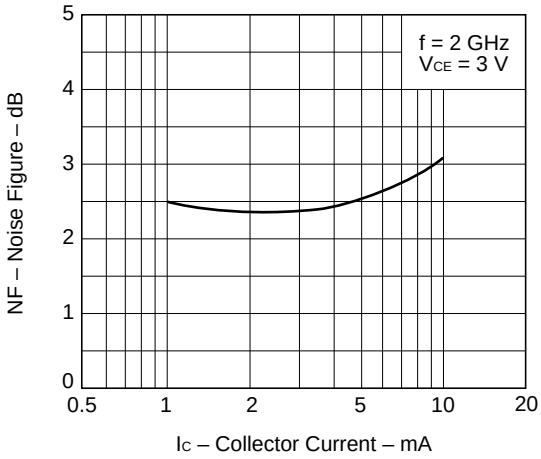
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



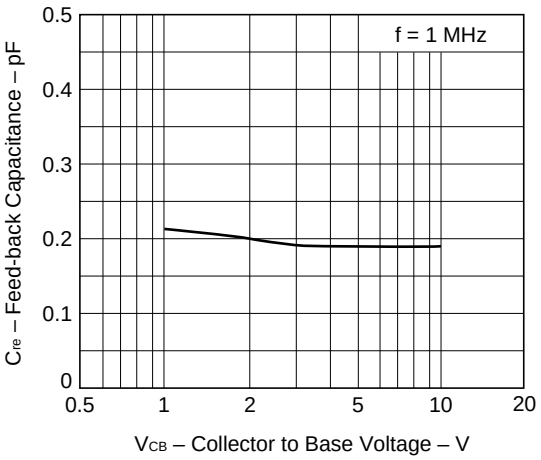
INSERTION POWER GAIN
vs. COLLECTOR CURRENT



NOISE FIGURE
vs. COLLECTOR CURRENT



FEED-BACK CAPACITANCE
vs. COLLECTOR TO BASE VOLTAGE



S-PARAMETER

(V_{CE} = 3 V, I_C = 1 mA, Z_O = 50 Ω)

f	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.200	0.9570	–8.1	3.2990	169.6	0.0210	88.3	0.9910	–5.8
0.400	0.9200	–15.5	3.1190	158.2	0.0400	81.3	0.9840	–10.8
0.600	0.8920	–24.1	3.1280	149.0	0.0700	69.7	0.9600	–17.0
0.800	0.8330	–31.0	3.0280	138.7	0.0850	68.1	0.9260	–21.7
1.000	0.7910	–38.7	2.9450	129.2	0.1030	62.3	0.8800	–26.8
1.200	0.7370	–46.5	2.9190	119.4	0.1260	55.3	0.8520	–32.6
1.400	0.6590	–54.0	2.7560	111.2	0.1430	51.6	0.8190	–37.1
1.600	0.5980	–60.7	2.6260	102.3	0.1530	48.7	0.7840	–41.2
1.800	0.5420	–66.6	2.4840	93.7	0.1640	42.9	0.7320	–46.8
2.000	0.4630	–73.6	2.3700	86.2	0.1740	41.6	0.6960	–50.4
2.200	0.4080	–82.7	2.3120	78.8	0.1920	36.1	0.6710	–56.3
2.400	0.3560	–89.3	2.2100	71.9	0.1980	32.6	0.6330	–58.7
2.600	0.3220	–96.9	2.0970	66.3	0.1920	32.8	0.6060	–65.9
2.800	0.2550	–110.8	1.9980	58.7	0.2060	29.1	0.5720	–72.0
3.000	0.2190	–118.1	1.9210	53.9	0.2320	22.8	0.5320	–77.4

(V_{CE} = 3 V, I_C = 3 mA, Z_O = 50 Ω)

f	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.200	0.8730	–13.5	7.7390	162.0	0.0230	84.8	0.9630	–9.0
0.400	0.7880	–24.1	6.8700	145.7	0.0440	78.6	0.9250	–15.8
0.600	0.7090	–34.8	6.3160	133.1	0.0570	68.6	0.8750	–22.8
0.800	0.6030	–42.7	5.6650	121.1	0.0710	58.9	0.8040	–27.5
1.000	0.5280	–50.4	5.1110	110.7	0.0820	59.1	0.7360	–31.5
1.200	0.4530	–56.7	4.7060	101.4	0.1000	59.3	0.6910	–36.0
1.400	0.3720	–62.0	4.1970	93.8	0.1120	54.4	0.6570	–39.6
1.600	0.3160	–67.3	3.8590	86.0	0.1320	50.9	0.6130	–42.7
1.800	0.2650	–70.2	3.4780	78.9	0.1360	51.4	0.5820	–46.3
2.000	0.2080	–75.0	3.2210	72.7	0.1400	49.0	0.5530	–49.7
2.200	0.1460	–84.0	3.0510	66.9	0.1560	46.2	0.5210	–55.2
2.400	0.1250	–94.7	2.8660	61.0	0.1680	39.9	0.4920	–53.7
2.600	0.1070	–103.5	2.6500	56.5	0.1790	42.4	0.4750	–62.6
2.800	0.0670	–128.8	2.5070	50.5	0.1790	35.7	0.4460	–66.1
3.000	0.0410	–175.4	2.3660	45.5	0.1860	34.4	0.4210	–72.9

S-PARAMETER

(V_{CE} = 3 V, I_C = 5 mA, Z_O = 50 Ω)

f	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.200	0.8040	–16.5	10.2510	157.1	0.0200	76.7	0.9490	–10.8
0.400	0.6940	–28.1	8.6340	138.6	0.0420	74.7	0.8910	–18.4
0.600	0.5950	–39.3	7.5490	125.1	0.0580	67.5	0.8100	–24.7
0.800	0.4830	–46.5	6.5000	113.2	0.0670	65.6	0.7490	–28.0
1.000	0.4210	–53.1	5.6980	103.3	0.0830	63.1	0.6800	–32.4
1.200	0.3410	–58.3	5.1160	94.6	0.0930	56.9	0.6330	–35.5
1.400	0.2810	–63.4	4.5060	87.8	0.1030	59.5	0.6050	–37.9
1.600	0.2770	–68.8	4.0840	80.7	0.1150	57.4	0.5710	–41.0
1.800	0.1840	–64.8	3.6580	74.0	0.1260	53.5	0.5390	–43.3
2.000	0.1300	–61.9	3.3690	68.8	0.1400	48.5	0.5090	–47.4
2.200	0.0880	–78.7	3.1690	63.1	0.1490	49.1	0.4840	–53.6
2.400	0.0540	–98.6	2.9460	57.9	0.1690	47.0	0.4710	–53.8
2.600	0.0190	–67.4	2.7220	53.5	0.1760	45.3	0.4450	–60.7
2.800	0.0200	132.7	2.5900	47.8	0.1770	42.8	0.4290	–63.6
3.000	0.0450	106.6	2.4410	42.7	0.2010	40.2	0.4000	–72.4