

To our customers,

Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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

FEATURES

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

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.

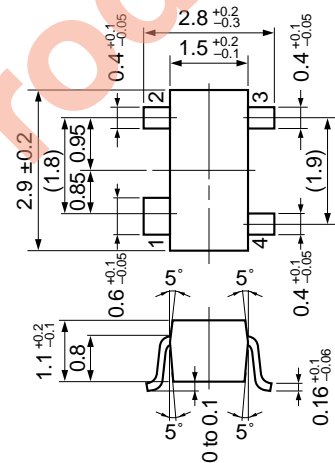
* Please contact with responsible NEC person, if you require evaluation sample. Unit sample quantity shall be 50 pcs. (Part No.: 2SC4956)

ABSOLUTE MAXIMUM RATINGS ($T_A = 25 \text{ }^\circ\text{C}$)

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	$^\circ\text{C}$
Storage Temperature	T_{stg}	-65 to +150	$^\circ\text{C}$

PACKAGE DIMENSIONS

in millimeters



PIN CONNECTIONS

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

Caution; Electrostatic Sensitive Device.

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Collector Cutoff Current	I _{CB0}			0.1	μA	V _{CB} = 5 V, I _E = 0
Emitter Cutoff Current	I _{EB0}			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

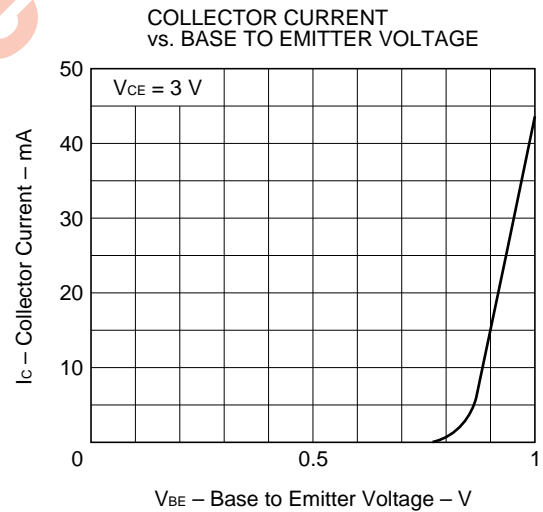
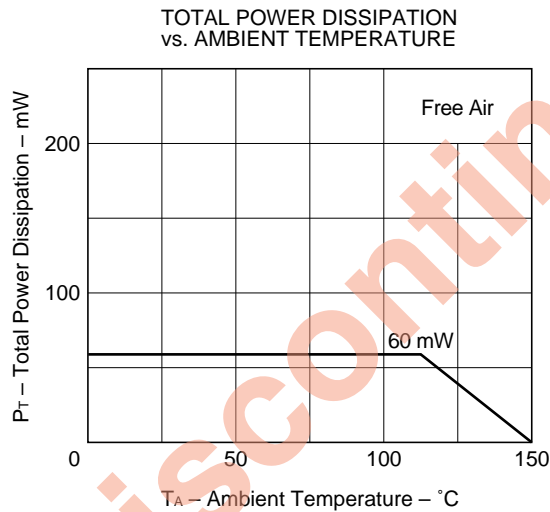
*1 Pulse Measurement; PW ≤ 350 μs, Duty Cycle ≤ 2 % Pulsed.

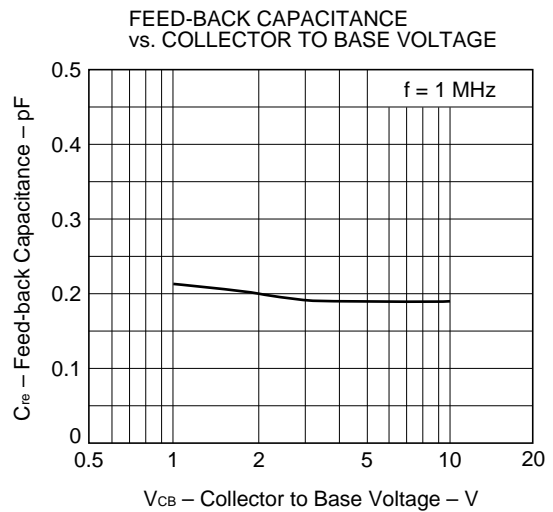
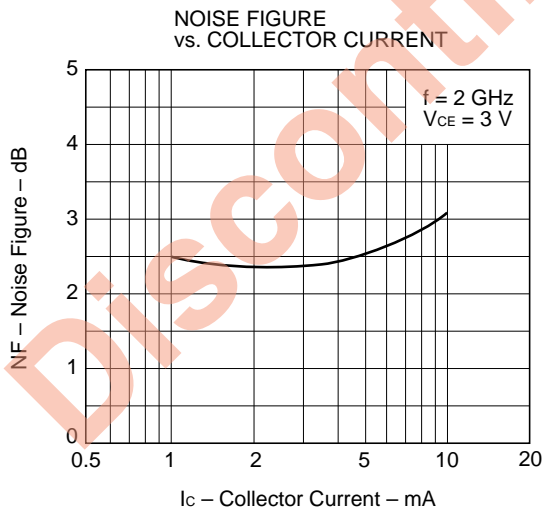
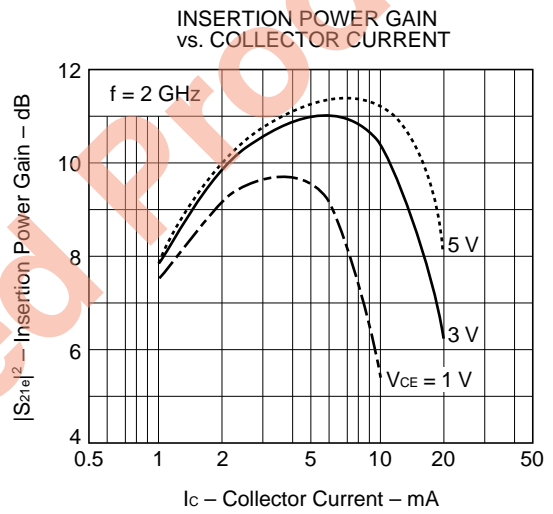
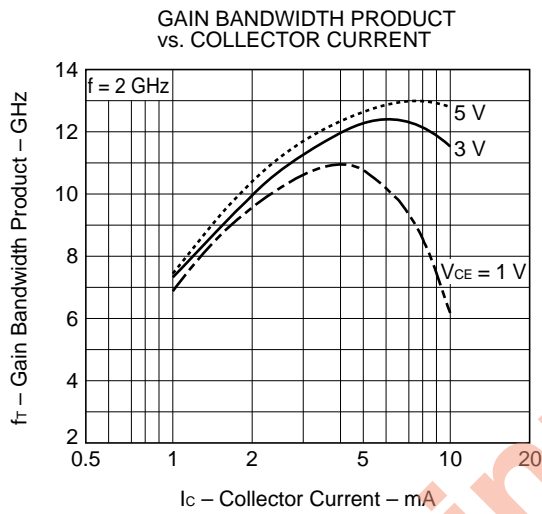
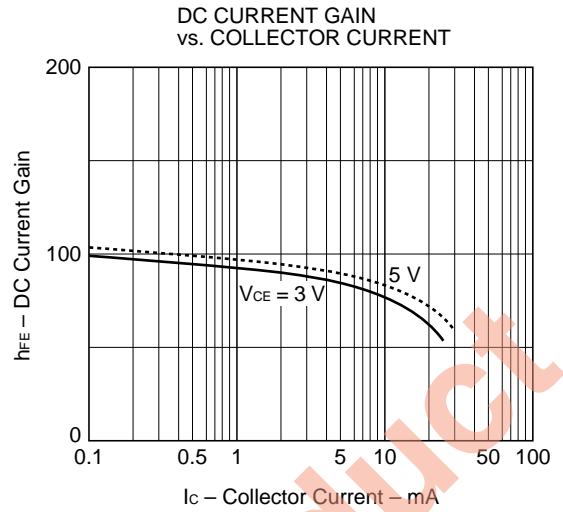
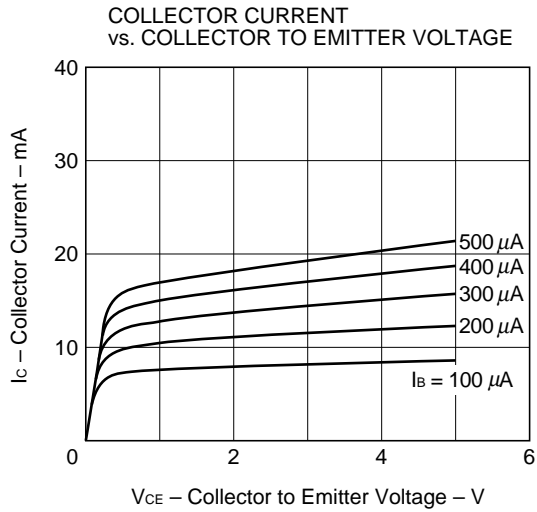
*2 Measured with 3 terminals bridge, Emitter and Case should be grounded.

h_{FE} Classification

Rank	T82
Marking	T82
h _{FE}	75 to 150

TYPICAL CHARACTERISTICS (T_A = 25 °C)





S-PARAMETER

($V_{CE} = 3\text{ V}$, $I_C = 1\text{ mA}$, $Z_o = 50\ \Omega$)

f (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	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

($V_{CE} = 3\text{ V}$, $I_C = 3\text{ mA}$, $Z_o = 50\ \Omega$)

f (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	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

($V_{CE} = 3\text{ V}$, $I_c = 5\text{ mA}$, $Z_o = 50\ \Omega$)

f (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	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

Discontinued Product

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Special: Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)

Specific: Aircrafts, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

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