

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.

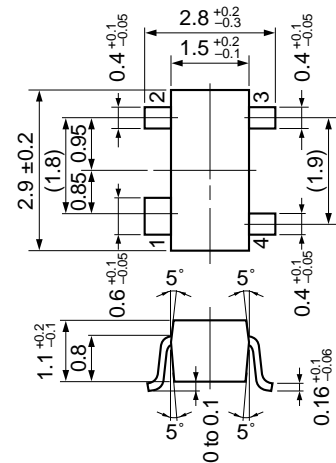
\* Please contact with responsible NEC person, if you require evaluation sample. Unit sample quantity shall be 50 pcs. (Part No.: 2SC4956)

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<sub>A</sub> = 25 °C)**

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Collector Cutoff Current	I <sub>CB0</sub>			0.1	μA	V <sub>CB</sub> = 5 V, I <sub>E</sub> = 0
Emitter Cutoff Current	I <sub>EB0</sub>			0.1	μA	V <sub>EB</sub> = 1 V, I <sub>C</sub> = 0
DC Current Gain	h <sub>FE</sub>	75		150		V <sub>CE</sub> = 3 V, I <sub>C</sub> = 5 mA* <sup>1</sup>
Gain Bandwidth Product	f <sub>T</sub>		12		GHz	V <sub>CE</sub> = 3 V, I <sub>C</sub> = 5 mA, f = 2.0 GHz
Feed back Capacitance	C <sub>re</sub>		0.2	0.4	pF	V <sub>CB</sub> = 3 V, I <sub>E</sub> = 0, f = 1 MHz* <sup>2</sup>
Insertion Power Gain	S <sub>21e</sub>   <sup>2</sup>	9	11		dB	V <sub>CE</sub> = 3 V, I <sub>C</sub> = 5 mA, f = 2.0 GHz
Noise Figure	NF		2.5	4.0	dB	V <sub>CE</sub> = 3 V, I <sub>C</sub> = 3 mA, f = 2.0 GHz

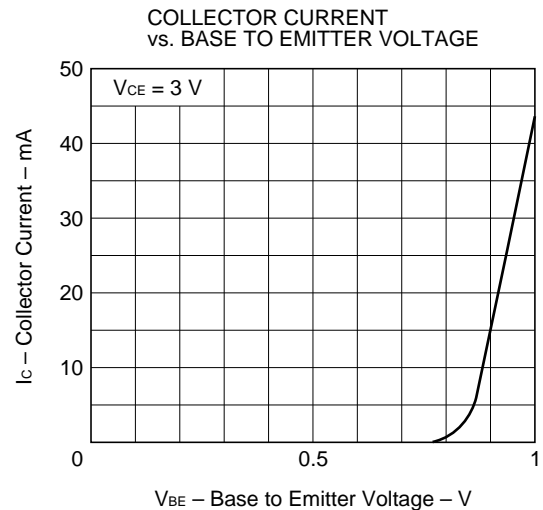
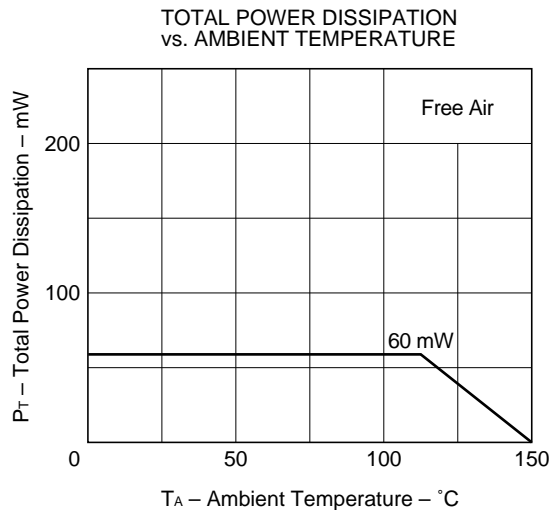
\*1 Pulse Measurement; PW ≤ 350 μs, Duty Cycle ≤ 2 % Pulsed.

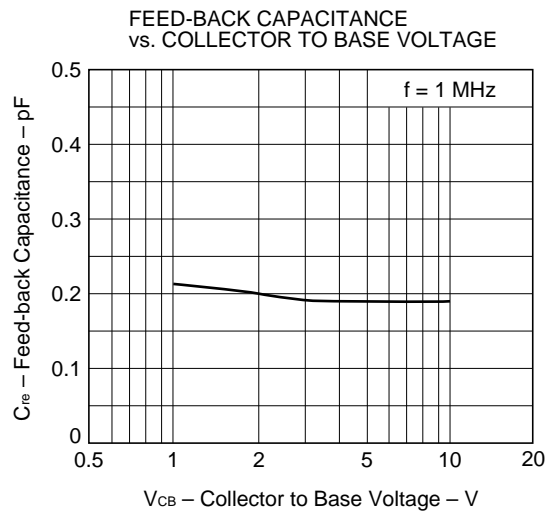
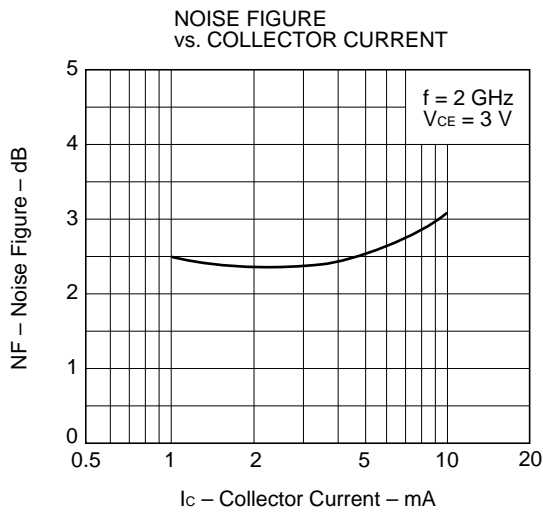
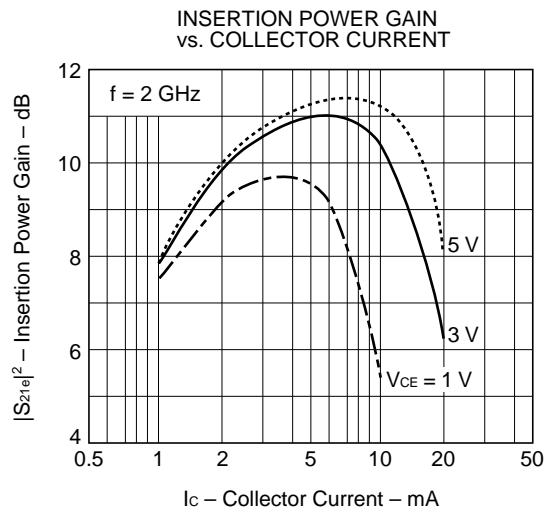
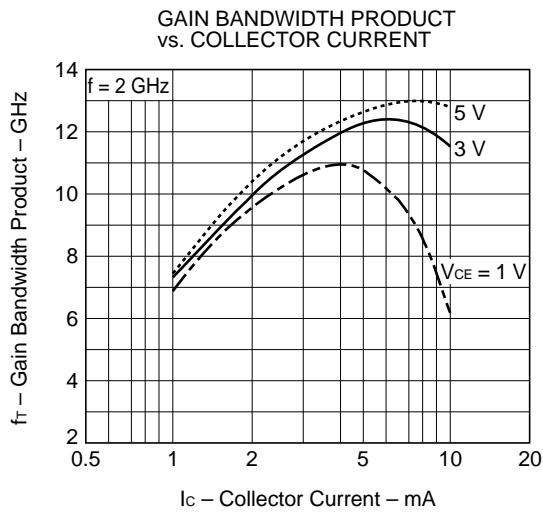
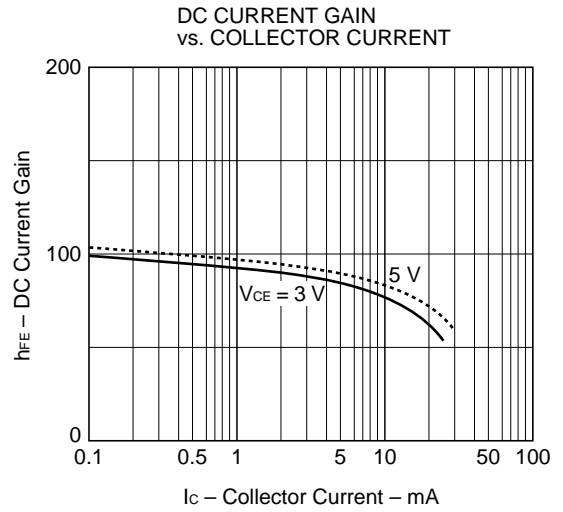
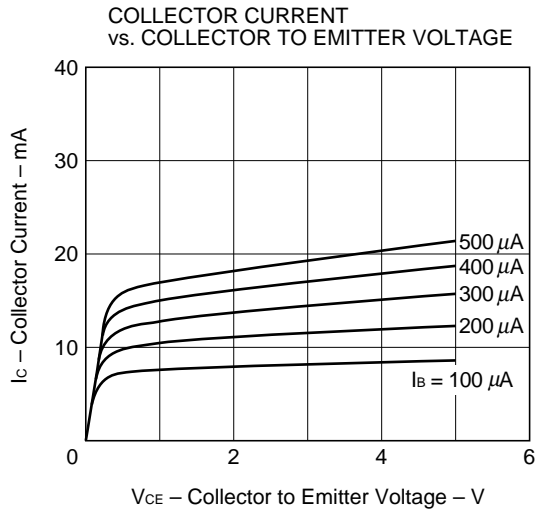
\*2 Measured with 3 terminals bridge, Emitter and Case should be grounded.

**h<sub>FE</sub> Classification**

Rank	T82
Marking	T82
h <sub>FE</sub>	75 to 150

**TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**





**S-PARAMETER**

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

f (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	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 <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	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 <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	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

No part of this document may be copied or reproduced in any form or by any means without the prior written consent of NEC Corporation. NEC Corporation assumes no responsibility for any errors which may appear in this document.

NEC Corporation does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from use of a device described herein or any other liability arising from use of such device. No license, either express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC Corporation or others.

While NEC Corporation has been making continuous effort to enhance the reliability of its semiconductor devices, the possibility of defects cannot be eliminated entirely. To minimize risks of damage or injury to persons or property arising from a defect in an NEC semiconductor device, customer must incorporate sufficient safety measures in its design, such as redundancy, fire-containment, and anti-failure features.

NEC devices are classified into the following three quality grades:

"Standard", "Special", and "Specific". The Specific quality grade applies only to devices developed based on a customer designated "quality assurance program" for a specific application. The recommended applications of a device depend on its quality grade, as indicated below. Customers must check the quality grade of each device before using it in a particular application.

Standard: Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots

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.

The quality grade of NEC devices in "Standard" unless otherwise specified in NEC's Data Sheets or Data Books. If customers intend to use NEC devices for applications other than those specified for Standard quality grade, they should contact NEC Sales Representative in advance.

Anti-radioactive design is not implemented in this product.



LittleDiode supplies new, hard to find or obsolete electronic components and semiconductors all over the world.

With over two million different components listed you are sure to find the part you need.

Feel free to visit us today at our online store:

[LittleDiode.com](http://LittleDiode.com)

Looking forward to providing you with the best possible service.