

HIGH FREQUENCY LOW NOISE AMPLIFIER
NPN SILICON EPITAXIAL TRANSISTOR
SUPER MINI MOLD

FEATURES

- Low Noise, High Gain
 - Low Voltage Operation
 - Low Feedback Capacitance
- $C_{re} = 0.3 \text{ pF TYP.}$

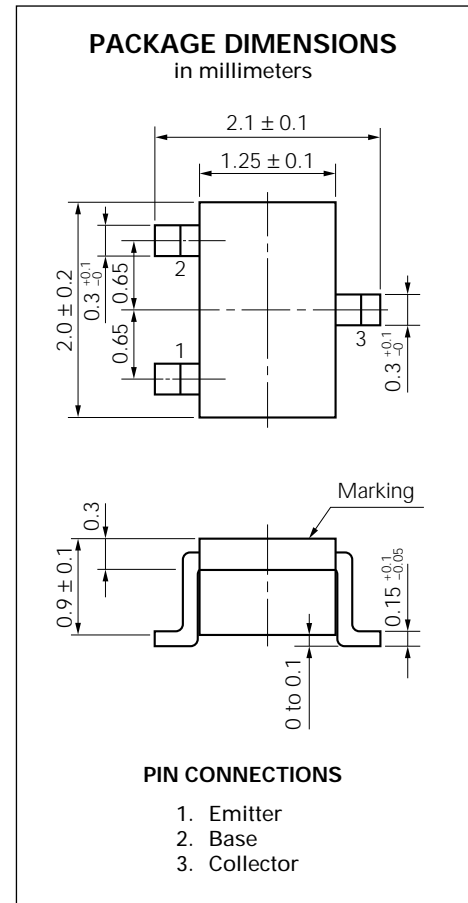
ORDERING INFORMATION

PART NUMBER	QUANTITY	PACKING STYLE
2SC4958-T1	3 Kpcs/Reel.	Embossed tape 8 mm wide. Pin3 (Collector) face to perforation side of the tape.
2SC4958-T2	3 Kpcs/Reel.	Embossed tape 8 mm wide. Pin1 (Emitter), Pin2 (Base) 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.: 2SC4958)

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	$^\circ\text{C}$



Caution; Electrostatic sensitive Device.

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 _{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}		0.3	0.5	pF	V _{CB} = 3 V, I _E = 0, f = 1 MHz ^{*2}
Insertion Power Gain	S _{21e} ²	7	8.5		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.

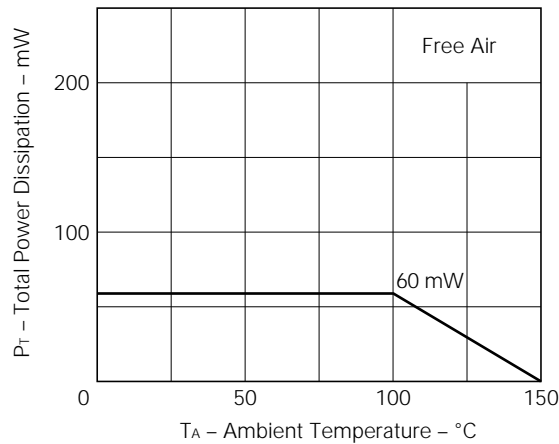
*2 Measured with 3 terminals bridge, Emitter and Case should be grounded.

h_{FE} Classification

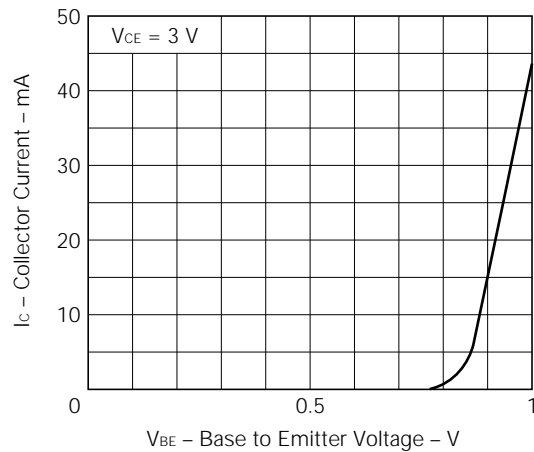
Rank	T82
Marking	T82
h _{FE}	75 to 150

TYPICAL CHARACTERISTICS (T_A = 25 °C)

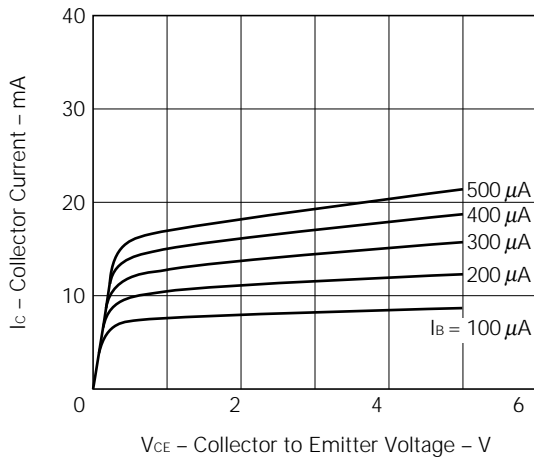
TOTAL POWER DISSIPATION vs.AMBIENT TEMPERATURE



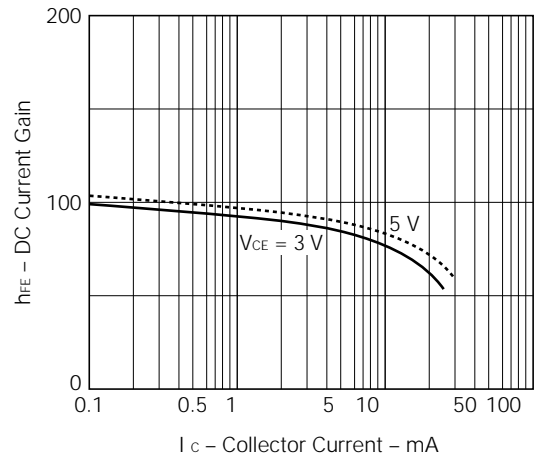
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



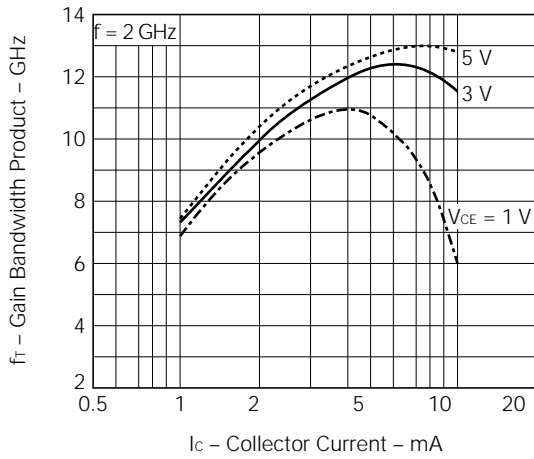
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



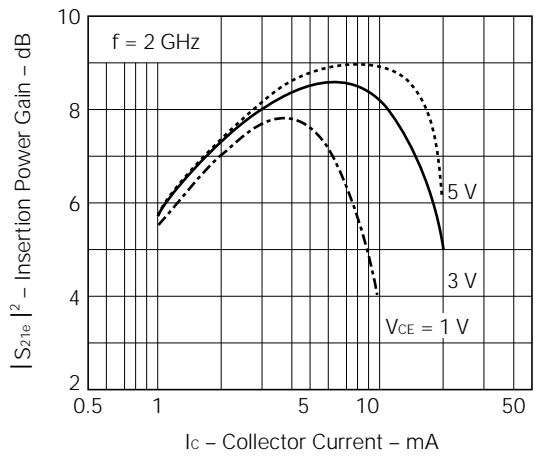
DC CURRENT GAIN vs. COLLECTOR CURRENT



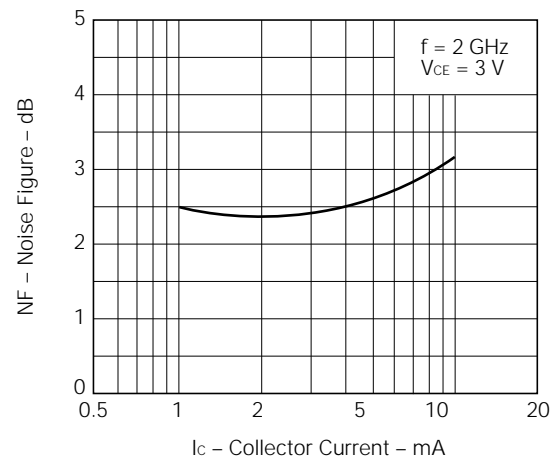
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



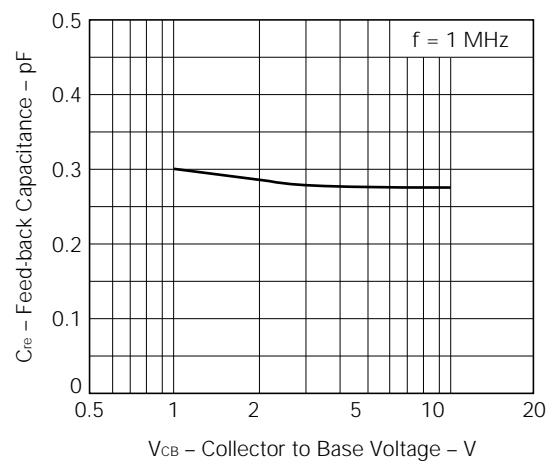
INSERTION POWER GAIN vs. COLLECTOR CURRENT



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 (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.200	0.9410	-9.3	3.3070	167.3	0.0330	82.8	0.9900	-6.8
0.400	0.9280	-17.7	3.1860	156.0	0.0650	78.5	0.9540	-13.7
0.600	0.8670	-26.0	3.0130	144.9	0.0930	71.1	0.9250	-19.5
0.800	0.8150	-33.6	2.8740	134.6	0.1160	67.0	0.8730	-24.9
1.000	0.7280	-41.5	2.6360	124.4	0.1330	59.7	0.8250	-29.5
1.200	0.6700	-47.3	2.5360	115.5	0.1480	59.1	0.7920	-33.6
1.400	0.5970	-51.7	2.3840	107.7	0.1710	53.6	0.7640	-36.6
1.600	0.5430	-56.3	2.2170	100.7	0.1820	52.0	0.7180	-39.9
1.800	0.5040	-60.7	2.0650	95.0	0.1990	49.8	0.6810	-42.4
2.000	0.4350	-64.4	2.0420	88.3	0.2040	51.6	0.6600	-46.9
2.200	0.3920	-69.4	1.9690	82.0	0.2270	48.3	0.6210	-50.1
2.400	0.3560	-71.5	1.8470	76.6	0.2320	50.1	0.6040	-51.8
2.600	0.3240	-81.1	1.7690	71.1	0.2420	46.4	0.5840	-53.6
2.800	0.3120	-76.7	1.7240	68.1	0.2520	45.1	0.5660	-57.6
3.000	0.2450	-85.1	1.6690	63.2	0.2670	45.3	0.5410	-58.3

(V_{CE} = 3 V, I_c = 3 mA, Z_o = 50 Ω)

f (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.200	0.8480	-15.9	7.7420	158.5	0.0320	79.4	0.9640	-11.3
0.400	0.7640	-27.6	6.8190	141.1	0.0560	68.2	0.8730	-20.5
0.600	0.6470	-37.3	5.8070	127.1	0.0770	66.9	0.7950	-26.1
0.800	0.5600	-44.1	5.0060	116.0	0.1000	64.5	0.7140	-30.2
1.000	0.4650	-49.4	4.2790	106.6	0.1110	64.1	0.6540	-33.0
1.200	0.4050	-51.9	3.8350	98.8	0.1250	62.2	0.6250	-34.4
1.400	0.3470	-53.4	3.4290	92.4	0.1340	62.6	0.5850	-36.3
1.600	0.3040	-55.0	3.0820	86.6	0.1570	60.9	0.5530	-38.2
1.800	0.2790	-55.7	2.7740	82.3	0.1840	60.8	0.5450	-39.3
2.000	0.2260	-53.6	2.6370	77.1	0.1910	57.5	0.5140	-42.2
2.200	0.2090	-57.9	2.4900	72.2	0.2090	59.4	0.5020	-45.3
2.400	0.1820	-53.8	2.2890	67.9	0.2260	58.1	0.4850	-46.1
2.600	0.1600	-67.3	2.1710	63.7	0.2280	53.4	0.4680	-47.9
2.800	0.1650	-58.5	2.0820	61.3	0.2580	57.0	0.4650	-51.6
3.000	0.1210	-51.3	2.0030	57.3	0.2670	52.6	0.4490	-51.4

S-PARAMETER

(V_{CE} = 3 V, I_c = 5 mA, Z_o = 50 Ω)

f (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.200	0.7750	-19.9	10.2330	153.0	0.0290	78.0	0.9310	-14.1
0.400	0.6530	-32.4	8.4080	133.2	0.0560	66.1	0.8150	-23.3
0.600	0.5270	-39.8	6.7610	119.0	0.0730	70.0	0.7170	-27.3
0.800	0.4470	-45.7	5.5980	108.5	0.0880	67.6	0.6390	-30.3
1.000	0.3590	-49.6	4.6700	100.0	0.1110	66.9	0.5950	-31.2
1.200	0.3140	-50.3	4.1180	92.7	0.1230	67.5	0.5650	-32.4
1.400	0.2790	-48.1	3.6300	87.1	0.1400	66.8	0.5450	-34.4
1.600	0.2460	-46.9	3.2460	82.1	0.1540	64.1	0.5190	-35.9
1.800	0.2190	-46.8	2.8850	78.1	0.1780	62.0	0.5210	-37.0
2.000	0.1780	-43.6	2.7470	73.7	0.1940	62.9	0.5000	-38.9
2.200	0.1650	-44.7	2.5810	68.8	0.2010	62.0	0.4780	-43.1
2.400	0.1490	-37.6	2.3820	64.8	0.2240	60.1	0.4550	-43.1
2.600	0.1370	-50.0	2.2440	61.4	0.2410	60.9	0.4710	-43.9
2.800	0.1320	-47.6	2.1380	59.0	0.2530	57.7	0.4490	-47.9
3.000	0.1030	-33.7	2.0440	55.3	0.2650	55.3	0.4380	-47.0

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.