

To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

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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MICROWAVE LOW NOISE AMPLIFIER

NPN SILICON EPITAXIAL TRANSISTOR

DESCRIPTION

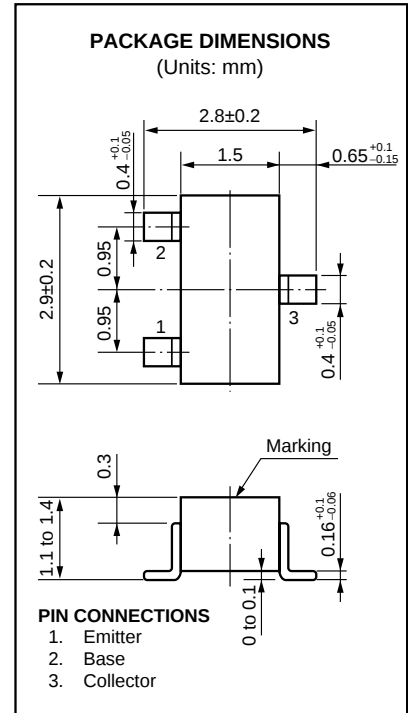
The 2SC3583 is an NPN epitaxial silicon transistor designed for use in low-noise and small signal amplifiers from VHF band to UHF band. Low-noise figure, high gain, and high current capability achieve a very wide dynamic range and excellent linearity. This is achieved by direct nitride passivated base surface process (DNP process) which is an NEC proprietary new fabrication technique.

FEATURES

- NF 1.2 dB TYP. @f = 1.0 GHz
- Ga 13 dB TYP. @f = 1.0 GHz

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

Collector to Base Voltage	V _{CBO}	20	V
Collector to Emitter Voltage	V _{CEO}	10	V
Emitter to Base Voltage	V _{EBO}	1.5	V
Collector Current	I _C	65	mA
Total Power Dissipation	P _T	200	mW
Junction Temperature	T _j	150	°C
Storage Temperature	T _{stg}	-65 to +150	°C



ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Collector Cutoff Current	I _{CBO}			1.0	μA	V _{CB} = 10 V, I _E = 0
Emitter Cutoff Current	I _{EBO}			1.0	μA	V _{EB} = 1 V, I _E = 0
DC Current Gain	h _{FE} *	50	100	250		V _{CE} = 8 V, I _C = 20 mA
Gain Bandwidth Product	f _T		9		GHz	V _{CE} = 8 V, I _C = 20 mA
Feed-Back Capacitance	C _{re} **		0.35	0.9	pF	V _{CB} = 10 V, I _E = 0, f = 1.0 MHz
Insertion Power Gain	S _{21e} ²	11	13		dB	V _{CE} = 8 V, I _C = 20 mA, f = 1.0 GHz
Maximum Available Gain	MAG		15		dB	V _{CE} = 8 V, I _C = 20 mA, f = 1.0 GHz
Noise Figure	NF		1.2	2.5	dB	V _{CE} = 8 V, I _E = 7 mA, f = 1.0 GHz

* Pulse Measurement PW ≤ 350 μs, Duty Cycle ≤ 2 %

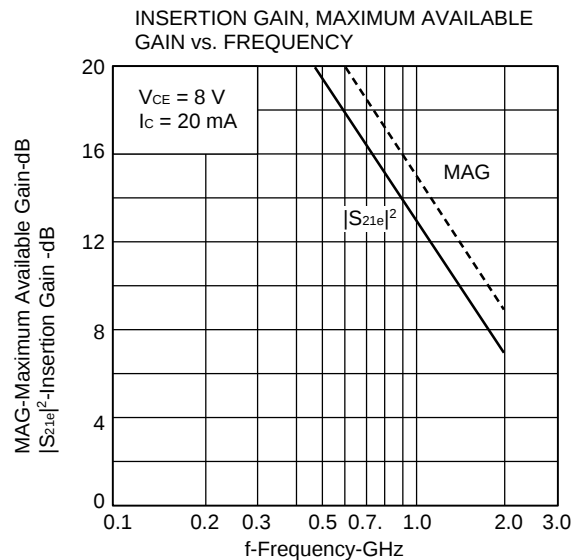
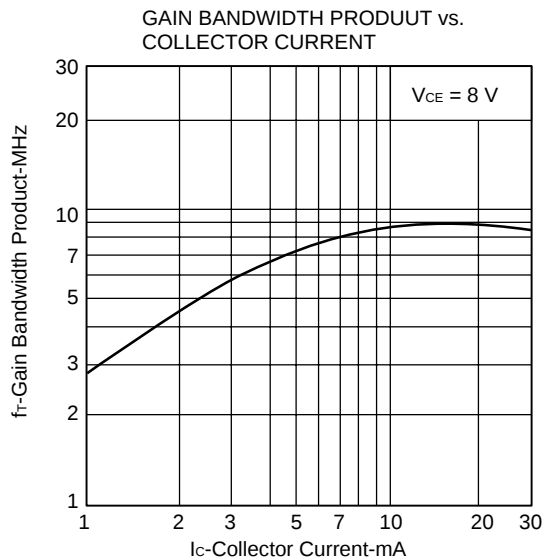
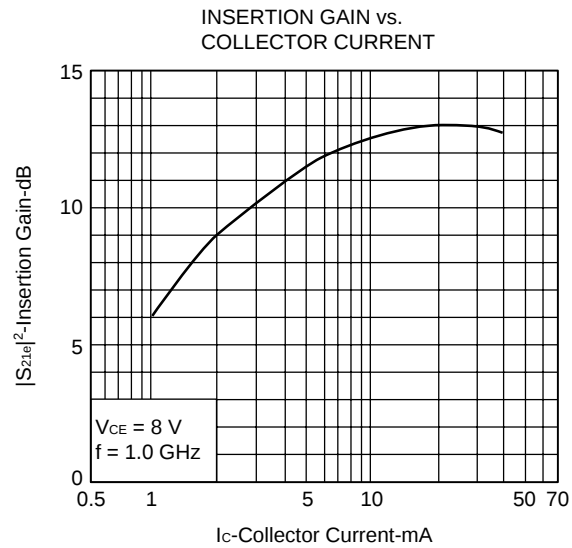
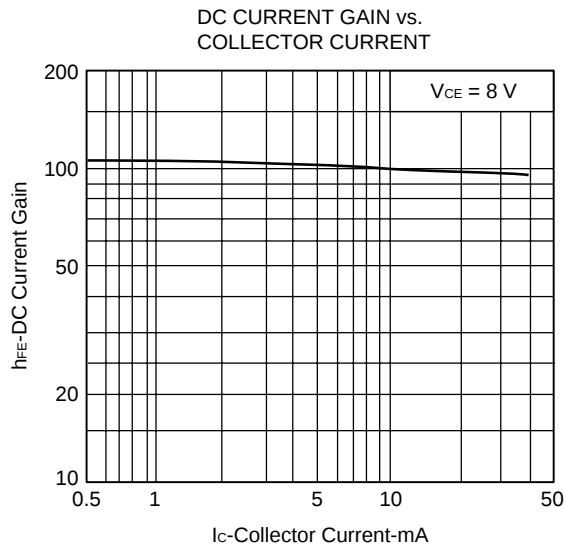
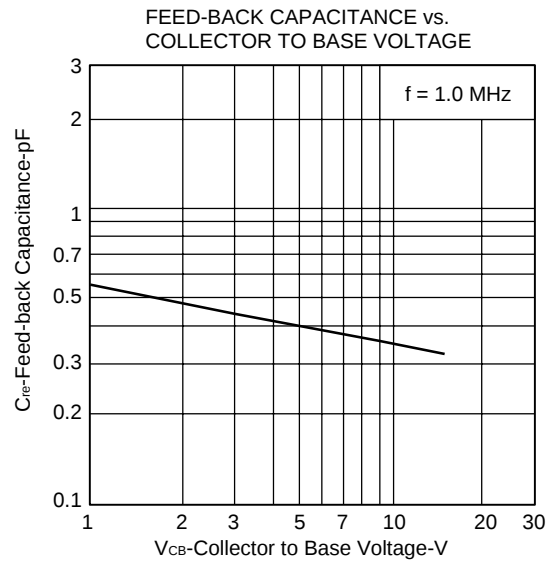
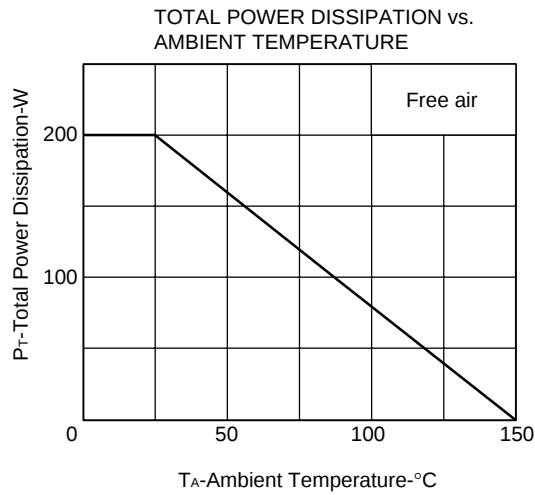
** The emitter terminal and the case shall be connected to the ground terminal of the three-terminal capacitance bridge.

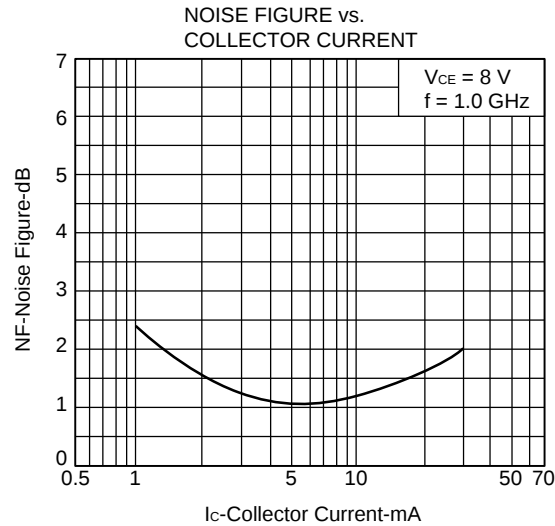
h_{FE} Classification

Class	R33/Q *	R34/R *	R35/S *
Marking	R33	R34	R35
h _{FE}	50 to 100	80 to 160	125 to 250

* Old Specification / New Specification

TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)





S-PARAMETER

$V_{CE} = 8.0\text{ V}$, $I_c = 5.0\text{ mA}$, $Z_o = 50\ \Omega$

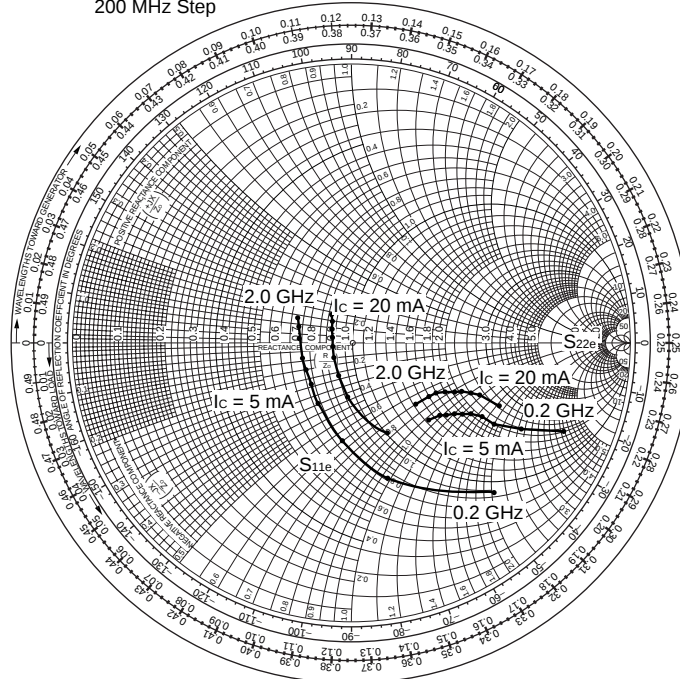
f (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.728	-45.3	12.107	138.7	0.036	66.2	0.825	-21.6
400	0.490	-74.5	8.097	114.2	0.065	61.6	0.675	-26.6
600	0.343	-93.2	6.260	102.3	0.079	61.6	0.582	-29.0
800	0.253	-110.1	4.623	90.1	0.090	61.2	0.529	-28.6
1000	0.202	-131.1	4.004	83.6	0.101	61.3	0.500	-30.1
1200	0.176	-148.9	3.250	75.8	0.125	60.8	0.470	-31.4
1400	0.176	-162.8	3.021	69.4	0.144	60.0	0.448	-33.4
1600	0.179	-173.9	2.575	63.4	0.160	59.8	0.427	-34.8
1800	0.186	-163.3	2.520	58.9	0.188	59.1	0.406	-37.5
2000	0.211	-151.1	2.183	53.4	0.202	58.9	0.386	-44.5

$V_{CE} = 8.0\text{ V}$, $I_c = 20\text{ mA}$, $Z_o = 50\ \Omega$

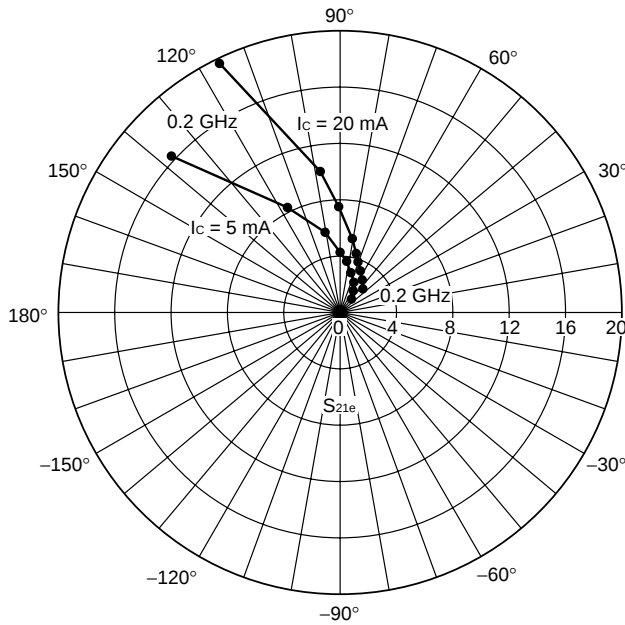
f (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.366	-66.8	19.757	116.9	0.033	62.6	0.587	-22.5
400	0.194	-88.9	10.502	98.8	0.055	70.6	0.485	-23.8
600	0.124	-104.3	7.591	91.1	0.072	74.6	0.453	-24.3
800	0.077	-132.0	5.446	82.0	0.095	73.2	0.419	-23.2
1000	0.063	-156.4	4.653	77.6	0.107	72.1	0.413	-24.2
1200	0.065	-179.5	3.754	71.6	0.135	72.1	0.392	-26.4
1400	0.074	-168.0	3.460	66.5	0.164	70.1	0.369	-29.9
1600	0.108	-147.0	2.934	61.9	0.178	69.6	0.347	-32.2
1800	0.116	-137.6	2.870	58.2	0.205	66.3	0.333	-34.3
2000	0.134	-131.2	2.479	53.4	0.221	64.0	0.312	-42.1

S-PARAMETER

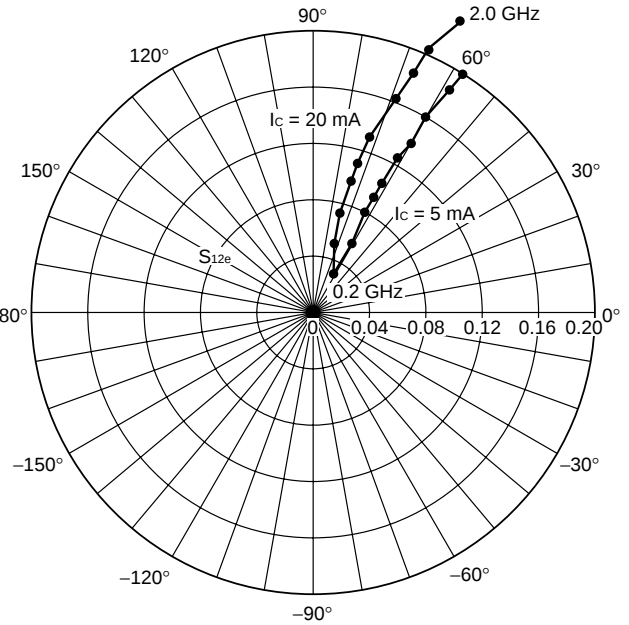
S_{11e} , S_{22e} -FREQUENCY CONDITION $V_{CE} = 8\text{ V}$
200 MHz Step



S_{21e} -FREQUENCY CONDITION $V_{CE} = 8\text{ V}$



S_{12e} -FREQUENCY CONDITION $V_{CE} = 8\text{ V}$



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"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.

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Anti-radioactive design is not implemented in this product.