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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NPN SILICON RF TRANSISTOR
2SC4536

NPN EPITAXIAL SILICON RF TRANSISTOR FOR HIGH-FREQUENCY LOW-NOISE AMPLIFICATION 3-PIN POWER MINIMOLD

DESCRIPTION

The 2SC4536 is designed for use in middle power, low distortion low noise figure RF amplifier. It features excellent linearity and large dynamic range, which make it suitable for CATV, telecommunication, and other use, it employs plastic surface mount type package (SOT-89).

FEATURES

★ • Low distortion: IM_2 = 59.0 dBc TYP., IM_3 = 82.0 dBc TYP. @ V_{CE} = 10 V, I_C = 50 mA

★ • Low noise: NF = 2.0 dB TYP. @ V_{CE} = 10 V, I_C = 50 mA, f = 1 GHz

• Large P_{tot} : P_{tot} = 2.0 W (Mounted on double-sided copper-clad 16 $cm^2 \times 0.7$ mm (t) ceramic substrate)

• Small package : 3-pin power minimold package

★ ORDERING INFORMATION

Part Number	Quantity	Supplying Form
2SC4536	25 pcs (Non reel)	• 12 mm wide embossed taping
2SC4536-T1	1 kpcs/reel	• Collector face the perforation side of the tape

Remark To order evaluation samples, contact your nearby sales office.
The unit sample quantity is 25 pcs.

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C)

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	V_{CBO}	30	V
Collector to Emitter Voltage	V_{CEO}	15	V
Emitter to Base Voltage	V_{EBO}	3.0	V
Collector Current	I_C	250	mA
Total Power Dissipation	P_{tot} Note	2.0	W
Junction Temperature	T_j	150	°C
Storage Temperature	T_{stg}	–65 to +150	°C

Note Mounted on double-sided copper-clad 16 $cm^2 \times 0.7$ mm (t) ceramic substrate

Caution Observe precautions when handling because these devices are sensitive to electrostatic discharge.

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The mark ★ shows major revised points.

ELECTRICAL CHARACTERISTICS (T_A = +25°C)

	Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
	DC Characteristics						
	Collector Cut-off Current	I_{CBO}	V_{CB} = 20 V, I_E = 0 mA	–	–	5.0	μA
	Emitter Cut-off Current	I_{EBO}	V_{EB} = 2 V, I_C = 0 mA	–	–	5.0	μA
★	DC Current Gain	h_{FE} Note 1	V_{CE} = 10 V, I_C = 50 mA	60	–	200	–
	RF Characteristics						
★	Insertion Power Gain	$\|S_{21e}\|^2$	V_{CE} = 10 V, I_C = 50 mA, f = 1 GHz	5.5	7.2	–	dB
	Noise Figure (1)	NF Note 2	V_{CE} = 10 V, I_C = 50 mA, f = 500 MHz	–	1.5	–	dB
	Noise Figure (2)	NF Note 2	V_{CE} = 10 V, I_C = 50 mA, f = 1 GHz	–	2.0	–	dB
★	2nd Order Intermoduration Distortion	IM_2	V_{CE} = 10 V, I_C = 50 mA, R_S = R_L = 75 Ω, V_O = 105 dBμV/75 Ω, f_1 = 190 MHz, f_2 = 90 MHz, f = $f_1 - f_2$	–	59.0	–	dBc
★	3rd Order Intermoduration Distortion	IM_3	V_{CE} = 10 V, I_C = 50 mA, R_S = R_L = 75 Ω, V_O = 105 dBμV/75 Ω, f_1 = 190 MHz, f_2 = 200 MHz, f = $2 \times f_1 - f_2$	–	82.0	–	dBc

Notes 1. Pulse measurement: PW ≤ 350 μs, Duty Cycle ≤ 2%

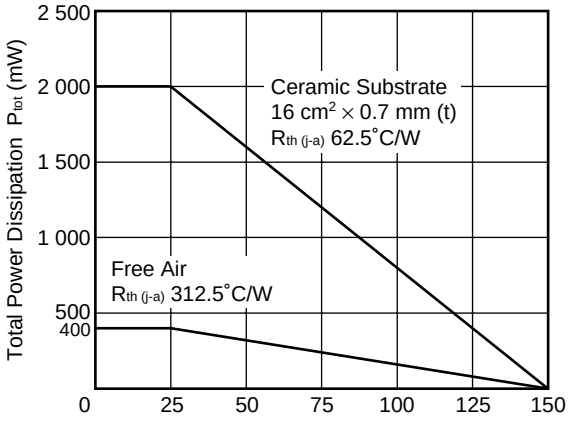
2. R_S = R_L = 50 Ω, tuned

★ h_{FE} CLASSIFICATION

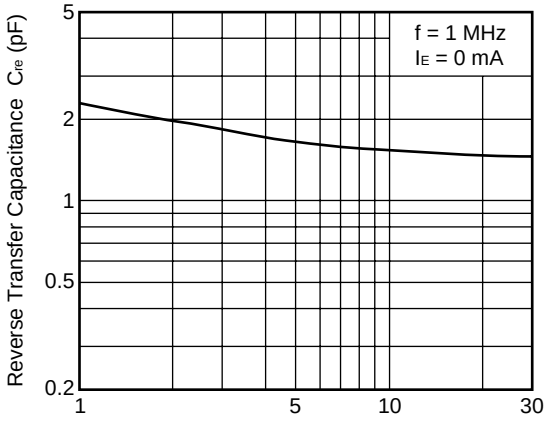
Rank	QR	QS
Marking	QR	QS
h_{FE} Value	60 to 120	100 to 200

★ TYPICAL CHARACTERISTICS (T_A = +25°C)

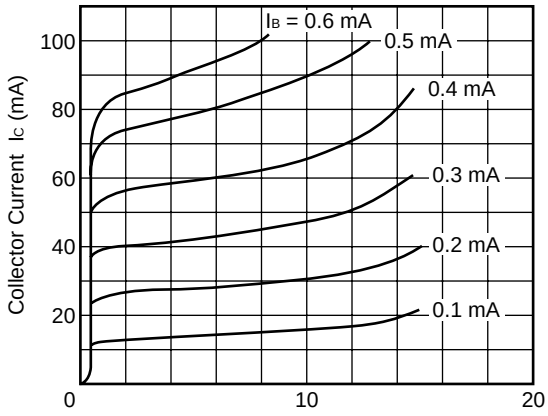
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



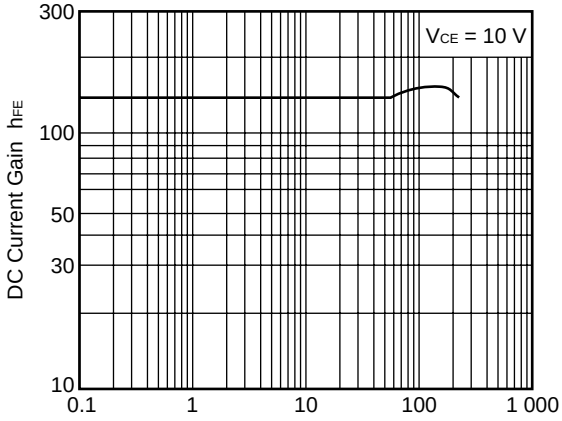
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



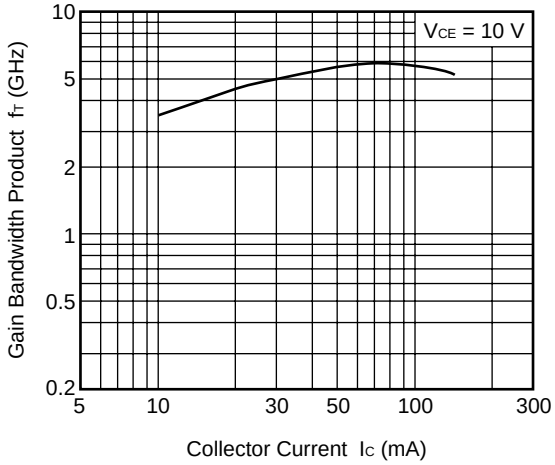
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



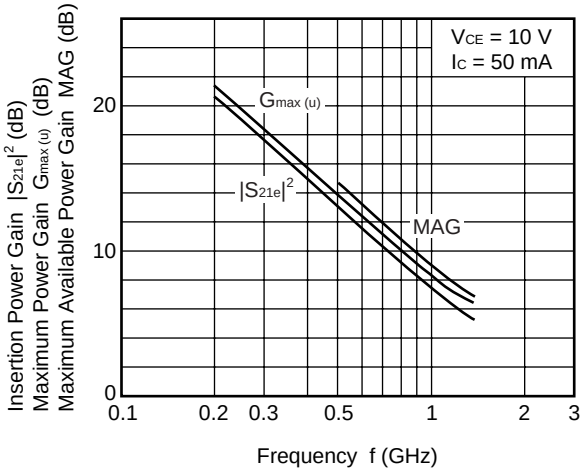
DC CURRENT GAIN vs. COLLECTOR CURRENT



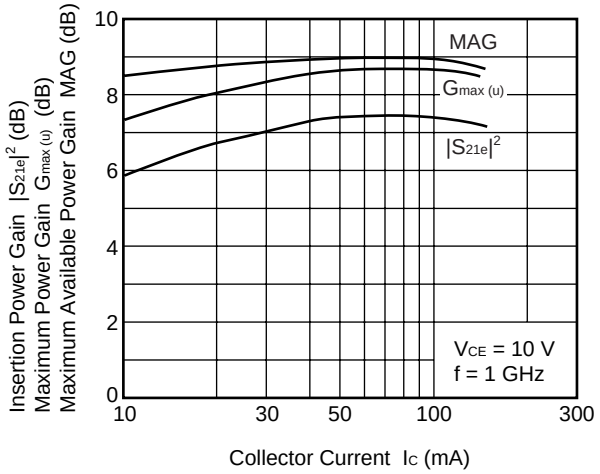
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



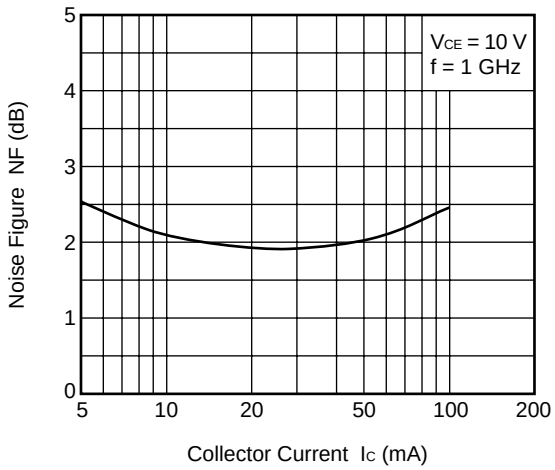
INSERTION POWER GAIN, MAXIMUM POWER GAIN, MAG vs. FREQUENCY



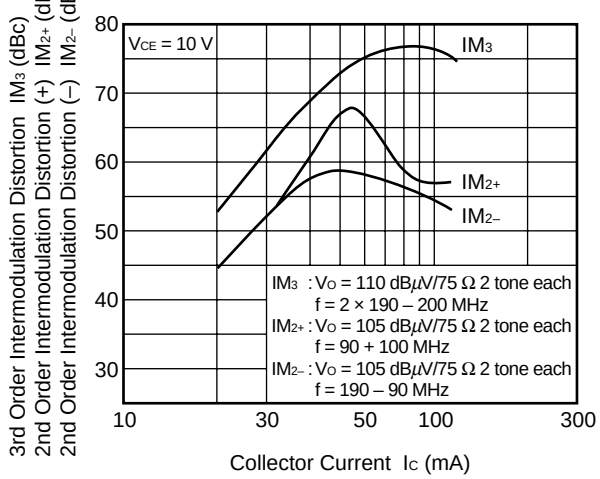
INSERTION POWER GAIN, MAXIMUM POWER GAIN, MAG vs. COLLECTOR CURRENT



NOISE FIGURE vs. COLLECTOR CURRENT



IM3, IM2+, IM2– vs. COLLECTOR CURRENT



Remark The graphs indicate nominal characteristics.

S-PARAMETERS

S-parameters/Noise parameters are provided on the NEC Compound Semiconductor Devices Web site in a form (S2P) that enables direct import to a microwave circuit simulator without keyboard input.

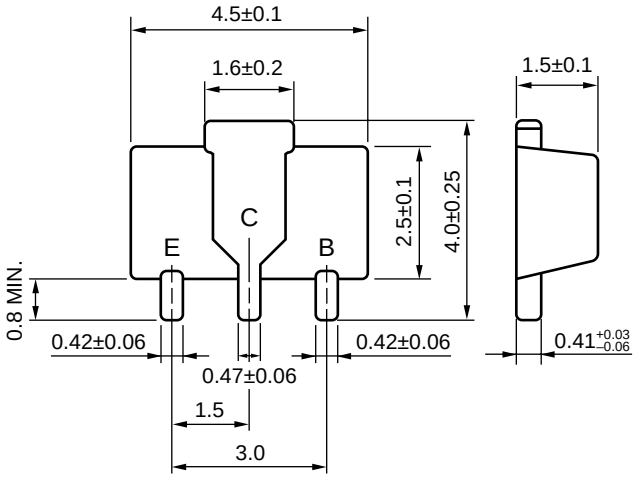
Click here to download S-parameters.

[RF and Microwave] → [Device Parameters]

URL http://www.csd-nec.com/

★ **PACKAGE DIMENSIONS**

3-PIN POWER MINIMOLD (UNIT: mm)



PIN CONNECTIONS

E : Emitter
C : Collector (Fin)
B : Base

(IEC : SOT-89)

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