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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RENESAS

SILICON TRANSISTOR
2SC3587

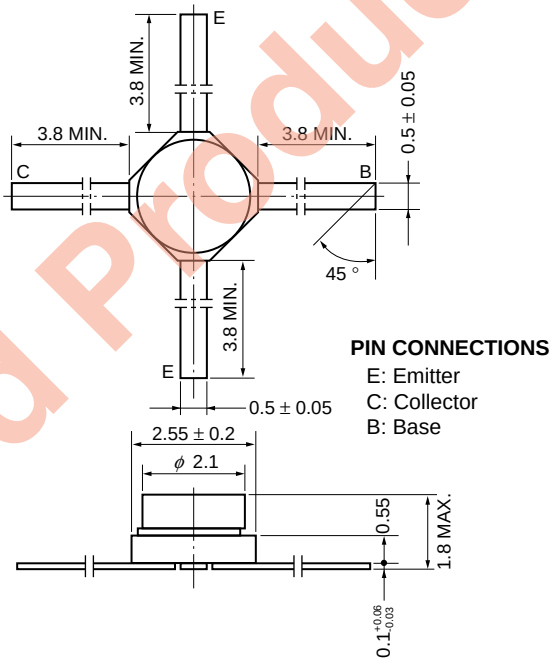
NPN EPITAXIAL SILICON TRANSISTOR
FOR MICROWAVE LOW-NOISE AMPLIFICATION

The 2SC3587 is an NPN epitaxial transistor designed for low-noise amplification at 0.5 to 6.0 GHz. This transistor has low-noise and high-gain characteristics in a wide collector current region, and has a wide dynamic range.

FEATURES

- Low noise : NF = 1.7 dB TYP. @ f = 2 GHz
  NF = 2.6 dB TYP. @ f = 4 GHz
- High power gain : G_A = 12.5 dB TYP. @ f = 2 GHz
  G_A = 8.0 dB TYP. @ f = 4 GHz

PACKAGE DIMENSIONS (in mm)



PIN CONNECTIONS
E: Emitter
C: Collector
B: Base

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

PARAMETER	SYMBOL	RATING	UNIT
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	35	mA
Total Power Dissipation	$P_{T\ (T_C = 25\ °C)}$	580	mW
Junction Temperature	T_j	200	°C
Storage Temperature	T_{stg}	−65 to +150	°C

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	I_{CBO}	V_{CB} = 10 V				1.0	μA
Emitter Cut-off Current	I_{EBO}	V_{EB} = 1 V				1.0	μA
DC Current Gain	h_{FE}	V_{CE} = 6 V, I_C = 10 mA Pulse		50	100	250	
Gain Bandwidth Product	f_T	V_{CE} = 6 V, I_C = 10 mA			10.0		GHz
Reverse Transfer Capacitance	C_{re}	V_{CB} = 10 V, f = 1 MHz			0.2	0.7	pF
Noise Figure	NF[Note]	V_{CE} = 6 V, I_C = 5 mA	f = 2 GHz		1.7	2.4	dB
			f = 4 GHz		2.6		dB
Insertion Gain	$\|S_{21e}\|^2$	V_{CE} = 6 V, I_C = 10 mA	f = 2 GHz	10.5	12.5		dB
			f = 4 GHz		7.5		dB
Maximum Available Gain	MAG	V_{CE} = 6 V, I_C = 10 mA, f = 4 GHz			10		dB
Power Gain	G_A	V_{CE} = 6 V, I_C = 5 mA	f = 2 GHz		12.5		dB
			f = 4 GHz		8.0		dB

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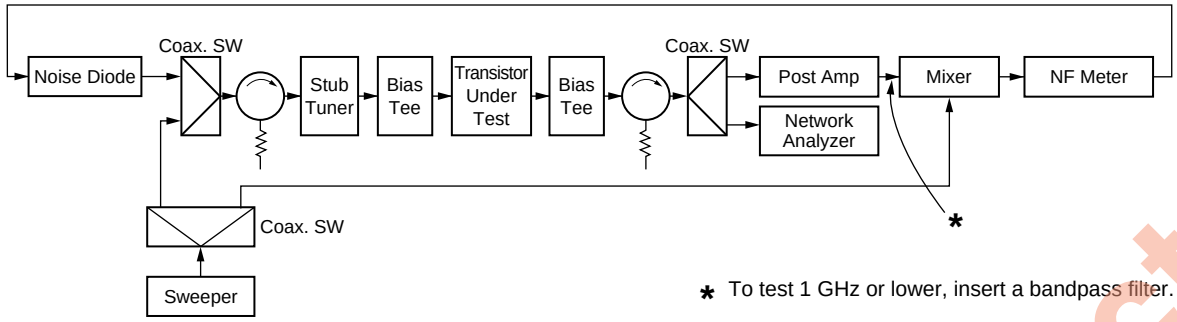
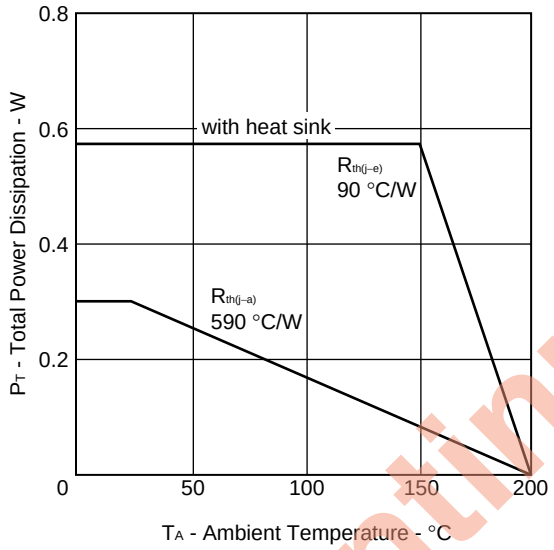
Note Test block diagram



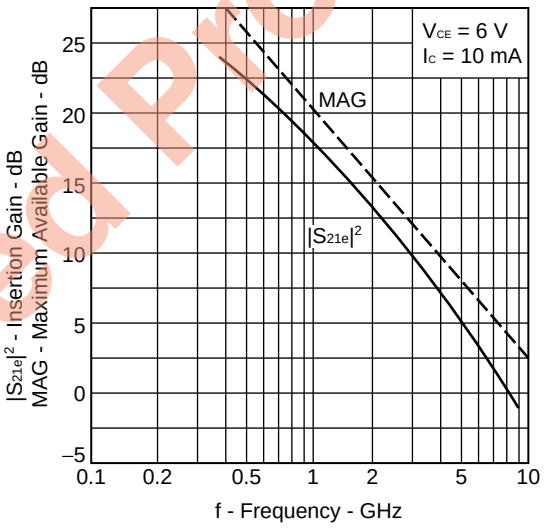
* To test 1 GHz or lower, insert a bandpass filter.

TYPICAL CHARACTERISTICS (T_A = 25 °C)

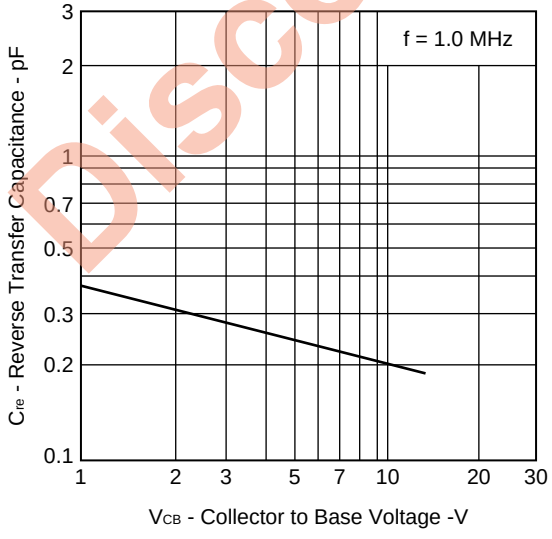
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



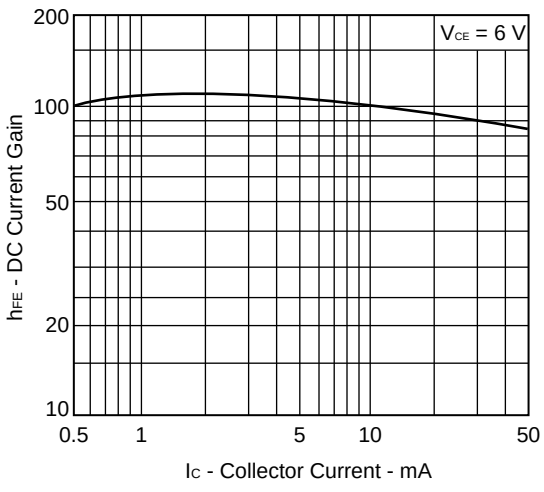
MAG AND INSERTION GAIN vs. FREQUENCY



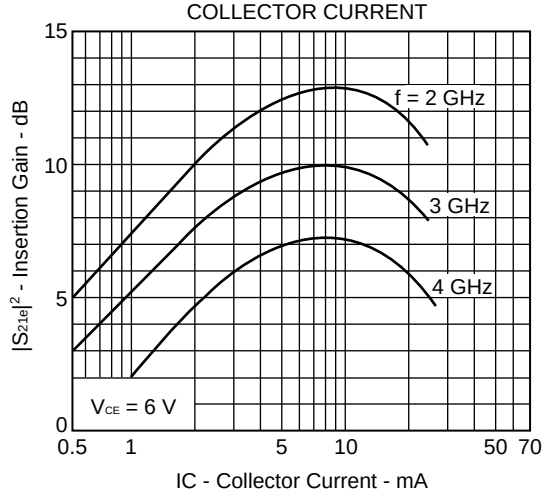
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



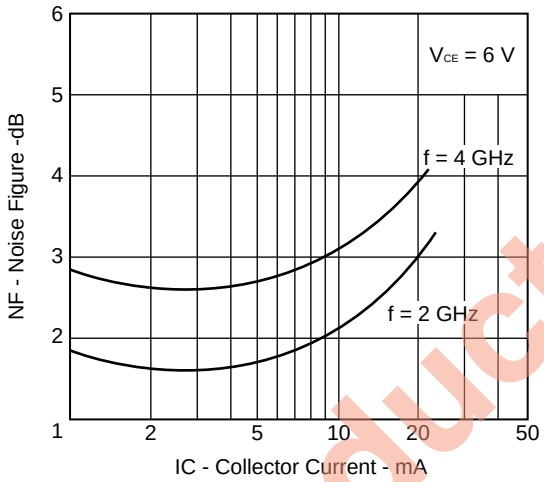
DC CURRENT GAIN vs. COLLECTOR CURRENT



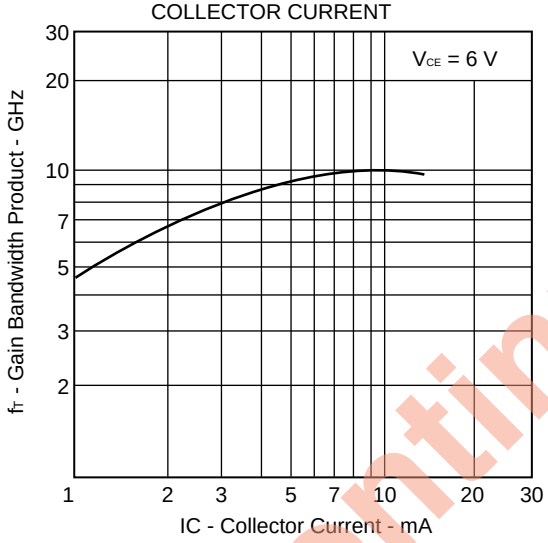
INSERTION GAIN vs.
COLLECTOR CURRENT



NOISE FIGURE vs. COLLECTOR CURRENT



GAIN BANDWIDTH PRODUCT vs.
COLLECTOR CURRENT



S PARAMETER

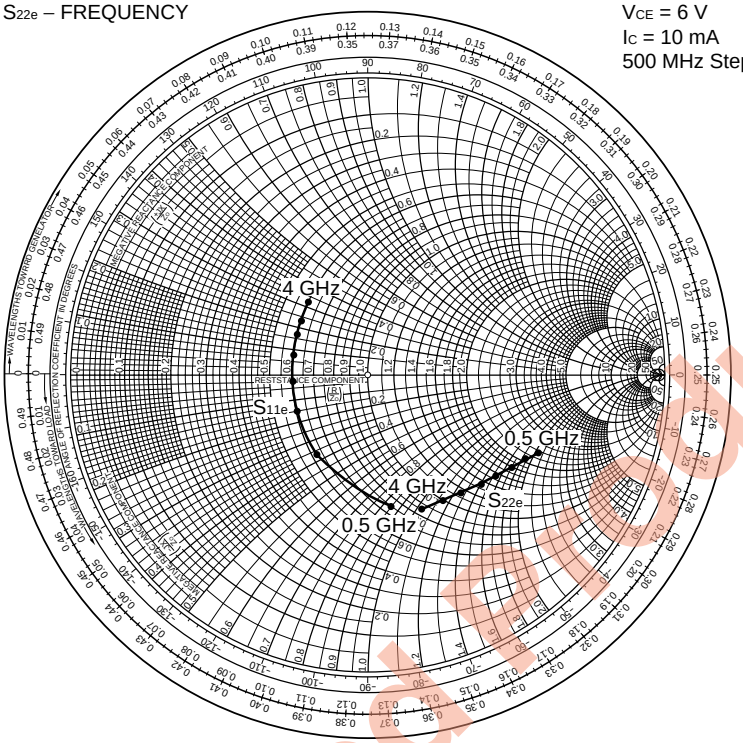
V_{CE} = 6 V, I_C = 10 mA, Z_O = 50 Ω

f (MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
500	.466	−82.1	13.209	120.8	.0288	50.9	.634	−25.0
1000	.322	−123.8	8.371	95.7	.0424	54.2	.610	−29.4
1500	.271	−153.7	5.672	78.7	.0561	54.5	.579	−33.5
2000	.256	−176.6	4.304	66.9	.0697	54.1	.549	−38.7
2500	.262	167.3	3.456	58.6	.0848	51.9	.531	−46.2
3000	.270	152.0	3.095	46.1	.0955	48.0	.507	−52.8
3500	.294	142.0	2.595	35.0	.106	43.2	.498	−61.0
4000	.327	129.7	2.231	27.6	.127	35.2	.500	−68.4

S PARAMETER

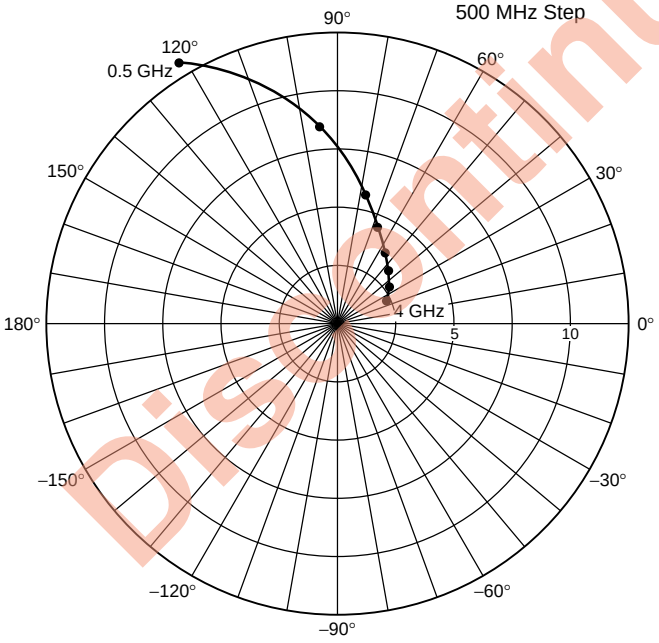
S_{11e}, S_{22e} – FREQUENCY

V_{CE} = 6 V
I_C = 10 mA
500 MHz Step



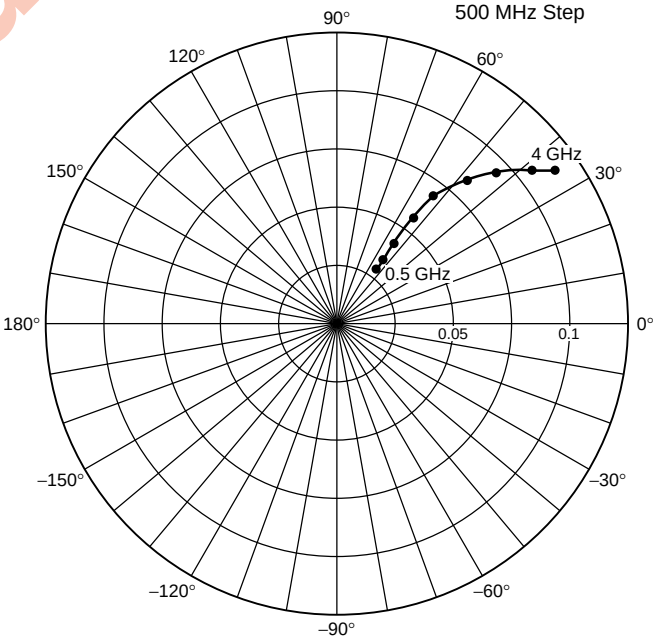
S_{21} – FREQUENCY

V_{CE} = 6 V
I_C = 10 mA
500 MHz Step



S_{12} – FREQUENCY

V_{CE} = 6 V
I_C = 10 mA
500 MHz Step



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