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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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NPN SILICON RF TRANSISTOR

2SC5338

NPN SILICON RF TRANSISTOR FOR HIGH-FREQUENCY LOW DISTORTION AMPLIFIER 4-PIN POWER MINIMOLD

FEATURES

- High gain: $|S_{21e}|^2 = 10 \text{ dB TYP}$. @ VcE = 5 V, Ic = 50 mA, f = 1 GHz
- Low distortion, low voltage: $IM_2 = -55$ dB TYP., $IM_3 = -76$ dB TYP. @ VCE = 5 V, IC = 50 mA, $V_{in} = 105$ dB μ V/75 Ω
- · 4-pin power minimold package with improved gain from the 2SC4703

★ ORDERING INFORMATION

Part Number	Quantity	Supplying Form
2SC5338	25 pcs (Non reel)	Magazine case
2SC5338-T1	1 kpcs/reel	12 mm wide embossed tapingCollector face the perforation side of the tape

Remark To order evaluation samples, consult your NEC sales representative. Unit sample quantity is 25 pcs.

ABSOLUTE MAXIMUM RATINGS (TA = +25°C)

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	Vсво	25	V
Collector to Emitter Voltage	Vceo	12	V
Emitter to Base Voltage	VEBO	2.5	V
Collector Current	lc	150	mA
Total Power Dissipation	Ptot Note	1.8	W
Junction Temperature	Tj	150	°C
Storage Temperature	T _{stg}	-65 to +150	°C

Note Mounted on 16 cm $^2 \times 0.7$ mm (t) ceramic substrate (Copper plating)

Because this product uses high-frequency technology, avoid excessive static electricity, etc.

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Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.



ELECTRICAL CHARACTERISTICS (TA = +25°C)

Parameter	Symbol	Test Conditions		MIN.	TYP.	MAX.	Unit
DC Characteristics							
Collector Cut-off Current	Ісво	Vcb = 20 V, IE = 0 mA		_	_	1.5	μΑ
Emitter Cut-off Current	ІЕВО	VBE = 2 V, Ic = 0 mA		-	-	1.5	μΑ
DC Current Gain	hfE Note 1	Vce = 5 V, Ic = 50 mA		50	-	250	-
RF Characteristics							
Gain Bandwidth Product	f⊤	VcE = 5 V, Ic = 50 mA		_	6.0	_	GHz
Insertion Power Gain	S _{21e} ²	VcE = 5 V, Ic = 50 mA, f = 1 GHz		8.5	10	_	dB
Noise Figure	NF	Vce = 5 V, Ic = 50 mA, f = 1 GHz		_	-	3.5	dB
Reverse Transfer Capacitance	Cre Note 2	Vcb = 5 V, IE = 0 mA, f = 1 MHz		_	1.0	2.0	pF
2nd Order Intermoduration Distortion	IM ₂	Ic = 50 mA,	Vce = 5 V	-	-55	-	dB
		$V_{in} = 105 \text{ dB}\mu\text{V}/75 \Omega,$ f = 190 - 90 MHz	Vce = 10 V		-63	-	
3rd Order Intermoduration Distortion	IМз	Ic = 50 mA,	Vce = 5 V	_	-76	_	dB
		$V_{in} = 105 \text{ dB}\mu\text{V}/75 \Omega,$ $f = 2 \times 190 - 200 \text{ MHz}$	VCE = 10 V	_	-83	-	

Notes 1. Pulse measurement: PW \leq 350 μ s, Duty Cycle \leq 2%

2. Collector to base capacitance when the emitter grounded

hfe CLASSIFICATION

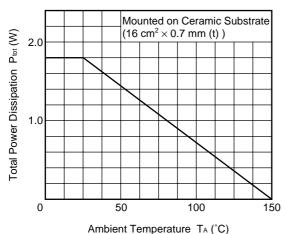
Rank	SH	SF	SE
Marking	SH	SF	SE
h _{FE} Value	50 to 100	80 to 160	125 to 250

2

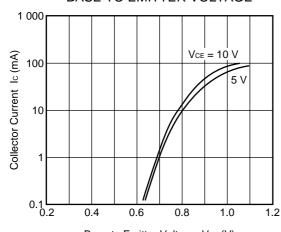
NEC

TYPICAL CHARACTERISTICS (Unless otherwise specified, $T_A = +25$ °C)

TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE

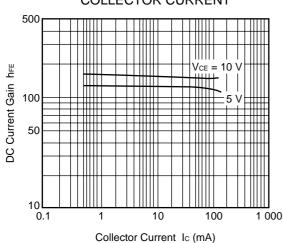


COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE

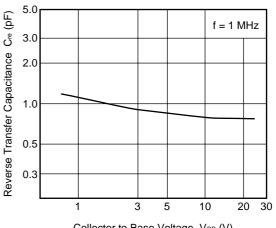


Base to Emitter Voltage VBE (V)

DC CURRENT GAIN vs. COLLECTOR CURRENT

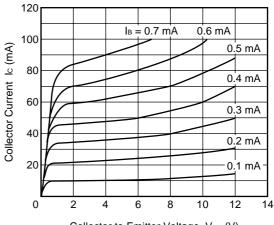


REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



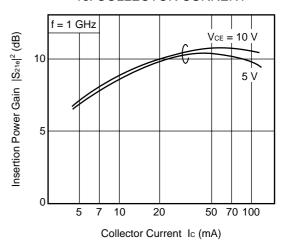
Collector to Base Voltage VcB (V)

COLLECTOR CURRENT vs. **COLLECTOR TO EMITTER VOLTAGE**



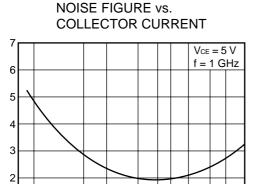
Collector to Emitter Voltage VcE (V)

INSERTION POWER GAIN vs. COLLECTOR CURRENT



3

Noise Figure NF (dB)



Collector Current Ic (mA)

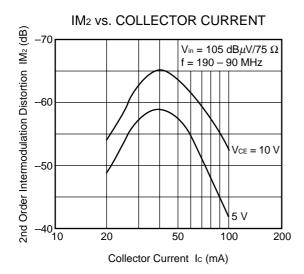
10

20

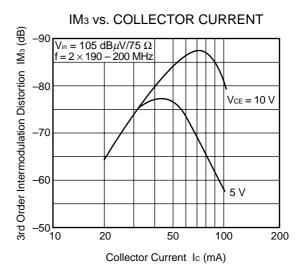
50

100

3 5



Remark The graphs indicate nominal characteristics.





S-PARAMETERS

Vce	= 5	V	Ic = 50	0 mA

VCE - J V, IC	= 50 IIIA							
Frequency		S ₁₁	S	21	S	12		22
(GHz)	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
		(deg.)		(deg.)		(deg.)		(deg.)
0.1	0.642	-61.5	19.689	138.5	0.026	64.9	0.603	-39.7
0.2	0.521	-103.0	13.393	116.8	0.045	53.1	0.461	-62.1
0.3	0.464	-123.8	9.708	106.3	0.053	57.8	0.359	-72.8
0.4	0.428	-137.2	7.480	99.5	0.059	62.1	0.304	-75.7
0.5	0.408	-147.7	6.078	94.5	0.072	63.7	0.289	-79.4
0.6	0.390	-154.3	5.104	91.3	0.080	65.9	0.275	-83.2
0.7	0.374	-161.1	4.394	88.6	0.088	66.2	0.277	-82.8
0.8	0.360	-163.9	3.880	86.2	0.097	68.9	0.261	-85.0
0.9	0.348	-168.0	3.527	84.5	0.110	72.1	0.271	-81.6
1.0	0.351	-175.1	3.224	83.3	0.119	72.0	0.268	-79.9
1.1	0.329	-179.9	3.111	81.8	0.125	76.4	0.276	-75.5
1.2	0.328	179.8	3.078	78.9	0.144	73.7	0.321	-75.3
1.3	0.319	171.9	2.914	69.6	0.157	77.8	0.320	-82.4
1.4	0.297	168.9	2.501	66.2	0.166	75.7	0.291	-83.6
1.5	0.307	165.2	2.285	65.3	0.182	77.7	0.325	-83.4
1.6	0.308	159.6	2.115	63.9	0.192	77.7	0.305	-82.7
1.7	0.303	156.6	1.993	62.9	0.201	77.4	0.313	-81.7
1.8	0.309	154.1	1.880	62.0	0.219	75.5	0.327	-83.5
1.9	0.312	150.3	1.786	60.8	0.222	74.9	0.321	-86.3
2.0	0.315	148.4	1.704	59.9	0.242	75.9	0.341	-91.2
Vce = 5 V, Ic	= 100 mA							
Vce = 5 V, Ic		S ₁₁	S	21	S	12	S	22
	9							
Frequency		ANG.	S. MAG.	ANG.	S MAG.	ANG. (deg.)	S MAG.	ANG.
Frequency	9					ANG.		
Frequency	9	ANG.		ANG.		ANG.		ANG.
Frequency (GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
Frequency (GHz)	MAG. 0.647	ANG. (deg.)	MAG. 21.091	ANG. (deg.) 134.7	MAG. 0.039	ANG. (deg.) 58.3	MAG. 0.793	ANG. (deg.) -45.3
Frequency (GHz) 0.1 0.2	MAG. 0.647 0.529	ANG. (deg.) -73.2 -112.8	MAG. 21.091 13.280	ANG. (deg.) 134.7 113.6	MAG. 0.039 0.060	ANG. (deg.) 58.3 53.9	MAG. 0.793 0.561	ANG. (deg.) -45.3 -71.0
(GHz) 0.1 0.2 0.3	MAG. 0.647 0.529 0.480	ANG. (deg.) -73.2 -112.8 -133.5	MAG. 21.091 13.280 9.390	ANG. (deg.) 134.7 113.6 103.3	0.039 0.060 0.072	ANG. (deg.) 58.3 53.9 54.2	0.793 0.561 0.409	ANG. (deg.) -45.3 -71.0 -82.3
(GHz) 0.1 0.2 0.3 0.4	0.647 0.529 0.480 0.459	ANG. (deg.) -73.2 -112.8 -133.5 -146.3	MAG. 21.091 13.280 9.390 7.213	ANG. (deg.) 134.7 113.6 103.3 96.7	0.039 0.060 0.072 0.079	ANG. (deg.) 58.3 53.9 54.2 55.6	MAG. 0.793 0.561 0.409 0.360	ANG. (deg.) -45.3 -71.0 -82.3 -86.1
(GHz) 0.1 0.2 0.3 0.4 0.5	0.647 0.529 0.480 0.459 0.443	ANG. (deg.) -73.2 -112.8 -133.5 -146.3 -155.4	MAG. 21.091 13.280 9.390 7.213 5.826	ANG. (deg.) 134.7 113.6 103.3 96.7 92.0	0.039 0.060 0.072 0.079 0.090	ANG. (deg.) 58.3 53.9 54.2 55.6 58.6	0.793 0.561 0.409 0.360 0.333	ANG. (deg.) -45.3 -71.0 -82.3 -86.1 -90.2
0.1 0.2 0.3 0.4 0.5 0.6	0.647 0.529 0.480 0.459 0.443 0.424	ANG. (deg.) -73.2 -112.8 -133.5 -146.3 -155.4 -160.9	MAG. 21.091 13.280 9.390 7.213 5.826 4.890	ANG. (deg.) 134.7 113.6 103.3 96.7 92.0 89.2	0.039 0.060 0.072 0.079 0.090 0.102	ANG. (deg.) 58.3 53.9 54.2 55.6 58.6 57.6	0.793 0.561 0.409 0.360 0.333 0.315	ANG. (deg.) -45.3 -71.0 -82.3 -86.1 -90.2 -95.6
0.1 0.2 0.3 0.4 0.5 0.6 0.7	0.647 0.529 0.480 0.459 0.443 0.424 0.406	ANG. (deg.) -73.2 -112.8 -133.5 -146.3 -155.4 -160.9 -166.8	MAG. 21.091 13.280 9.390 7.213 5.826 4.890 4.206	ANG. (deg.) 134.7 113.6 103.3 96.7 92.0 89.2 86.9	0.039 0.060 0.072 0.079 0.090 0.102 0.111	ANG. (deg.) 58.3 53.9 54.2 55.6 58.6 57.6 61.4	0.793 0.561 0.409 0.360 0.333 0.315 0.297	ANG. (deg.) -45.3 -71.0 -82.3 -86.1 -90.2 -95.6 -96.0
0.1 0.2 0.3 0.4 0.5 0.6 0.7	0.647 0.529 0.480 0.459 0.443 0.424 0.406 0.401	ANG. (deg.) -73.2 -112.8 -133.5 -146.3 -155.4 -160.9 -166.8 -169.8	MAG. 21.091 13.280 9.390 7.213 5.826 4.890 4.206 3.711	ANG. (deg.) 134.7 113.6 103.3 96.7 92.0 89.2 86.9 84.3	0.039 0.060 0.072 0.079 0.090 0.102 0.111 0.120	ANG. (deg.) 58.3 53.9 54.2 55.6 58.6 57.6 61.4 64.2	MAG. 0.793 0.561 0.409 0.360 0.333 0.315 0.297 0.292	ANG. (deg.) -45.3 -71.0 -82.3 -86.1 -90.2 -95.6 -96.0 -95.6
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8	0.647 0.529 0.480 0.459 0.443 0.424 0.406 0.401 0.396	ANG. (deg.) -73.2 -112.8 -133.5 -146.3 -155.4 -160.9 -166.8 -169.8 -173.9	MAG. 21.091 13.280 9.390 7.213 5.826 4.890 4.206 3.711 3.372	ANG. (deg.) 134.7 113.6 103.3 96.7 92.0 89.2 86.9 84.3 82.7	MAG. 0.039 0.060 0.072 0.079 0.090 0.102 0.111 0.120 0.135	ANG. (deg.) 58.3 53.9 54.2 55.6 58.6 57.6 61.4 64.2 66.9	MAG. 0.793 0.561 0.409 0.360 0.333 0.315 0.297 0.292 0.288	ANG. (deg.) -45.3 -71.0 -82.3 -86.1 -90.2 -95.6 -96.0 -95.6 -93.9
Frequency (GHz) 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0	0.647 0.529 0.480 0.459 0.443 0.424 0.406 0.401 0.396 0.391	ANG. (deg.) -73.2 -112.8 -133.5 -146.3 -155.4 -160.9 -166.8 -169.8 -173.9 -178.9	MAG. 21.091 13.280 9.390 7.213 5.826 4.890 4.206 3.711 3.372 3.093	ANG. (deg.) 134.7 113.6 103.3 96.7 92.0 89.2 86.9 84.3 82.7 81.8	MAG. 0.039 0.060 0.072 0.079 0.090 0.102 0.111 0.120 0.135 0.143	ANG. (deg.) 58.3 53.9 54.2 55.6 58.6 57.6 61.4 64.2 66.9 67.0	MAG. 0.793 0.561 0.409 0.360 0.333 0.315 0.297 0.292 0.288 0.294	ANG. (deg.) -45.3 -71.0 -82.3 -86.1 -90.2 -95.6 -96.0 -95.6 -93.9 -91.3
Frequency (GHz) 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3	0.647 0.529 0.480 0.459 0.443 0.424 0.406 0.401 0.396 0.391 0.361	ANG. (deg.) -73.2 -112.8 -133.5 -146.3 -155.4 -160.9 -166.8 -169.8 -173.9 -178.9 176.3	MAG. 21.091 13.280 9.390 7.213 5.826 4.890 4.206 3.711 3.372 3.093 2.950	ANG. (deg.) 134.7 113.6 103.3 96.7 92.0 89.2 86.9 84.3 82.7 81.8 80.4 77.2 67.5	MAG. 0.039 0.060 0.072 0.079 0.090 0.102 0.111 0.120 0.135 0.143 0.157	ANG. (deg.) 58.3 53.9 54.2 55.6 58.6 57.6 61.4 64.2 66.9 67.0 67.4 67.9 68.5	MAG. 0.793 0.561 0.409 0.360 0.333 0.315 0.297 0.292 0.288 0.294 0.298	ANG. (deg.) -45.3 -71.0 -82.3 -86.1 -90.2 -95.6 -96.0 -95.6 -93.9 -91.3 -86.5 -86.4 -94.6
Frequency (GHz) 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4	0.647 0.529 0.480 0.459 0.443 0.424 0.406 0.401 0.396 0.391 0.361 0.366	ANG. (deg.) -73.2 -112.8 -133.5 -146.3 -155.4 -160.9 -166.8 -169.8 -173.9 -178.9 176.3 175.3 167.7 165.3	MAG. 21.091 13.280 9.390 7.213 5.826 4.890 4.206 3.711 3.372 3.093 2.950 2.984	ANG. (deg.) 134.7 113.6 103.3 96.7 92.0 89.2 86.9 84.3 82.7 81.8 80.4 77.2 67.5 64.6	MAG. 0.039 0.060 0.072 0.079 0.090 0.102 0.111 0.120 0.135 0.143 0.157 0.166 0.178 0.192	ANG. (deg.) 58.3 53.9 54.2 55.6 58.6 57.6 61.4 64.2 66.9 67.0 67.4 67.9	MAG. 0.793 0.561 0.409 0.360 0.333 0.315 0.297 0.292 0.288 0.294 0.298 0.338	ANG. (deg.) -45.3 -71.0 -82.3 -86.1 -90.2 -95.6 -96.0 -95.6 -93.9 -91.3 -86.5 -86.4 -94.6 -95.5
Frequency (GHz) 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5	0.647 0.529 0.480 0.459 0.443 0.424 0.406 0.401 0.396 0.391 0.361 0.366 0.363	ANG. (deg.) -73.2 -112.8 -133.5 -146.3 -155.4 -160.9 -166.8 -169.8 -173.9 -178.9 176.3 175.3 167.7	MAG. 21.091 13.280 9.390 7.213 5.826 4.890 4.206 3.711 3.372 3.093 2.950 2.984 2.788	ANG. (deg.) 134.7 113.6 103.3 96.7 92.0 89.2 86.9 84.3 82.7 81.8 80.4 77.2 67.5	MAG. 0.039 0.060 0.072 0.079 0.090 0.102 0.111 0.120 0.135 0.143 0.157 0.166 0.178 0.192 0.210	ANG. (deg.) 58.3 53.9 54.2 55.6 58.6 57.6 61.4 64.2 66.9 67.0 67.4 67.9 68.5	MAG. 0.793 0.561 0.409 0.360 0.333 0.315 0.297 0.292 0.288 0.294 0.298 0.338 0.359	ANG. (deg.) -45.3 -71.0 -82.3 -86.1 -90.2 -95.6 -96.0 -95.6 -93.9 -91.3 -86.5 -86.4 -94.6 -95.5 -96.3
Frequency (GHz) 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4	0.647 0.529 0.480 0.459 0.443 0.424 0.406 0.401 0.396 0.391 0.361 0.366 0.363 0.337	ANG. (deg.) -73.2 -112.8 -133.5 -146.3 -155.4 -160.9 -166.8 -169.8 -173.9 -178.9 176.3 175.3 167.7 165.3	MAG. 21.091 13.280 9.390 7.213 5.826 4.890 4.206 3.711 3.372 3.093 2.950 2.984 2.788 2.413 2.194 2.017	ANG. (deg.) 134.7 113.6 103.3 96.7 92.0 89.2 86.9 84.3 82.7 81.8 80.4 77.2 67.5 64.6 63.4 61.7	MAG. 0.039 0.060 0.072 0.079 0.090 0.102 0.111 0.120 0.135 0.143 0.157 0.166 0.178 0.192	ANG. (deg.) 58.3 53.9 54.2 55.6 58.6 57.6 61.4 64.2 66.9 67.0 67.4 67.9 68.5 71.3	MAG. 0.793 0.561 0.409 0.360 0.333 0.315 0.297 0.292 0.288 0.294 0.298 0.338 0.359 0.320	ANG. (deg.) -45.3 -71.0 -82.3 -86.1 -90.2 -95.6 -96.0 -95.6 -93.9 -91.3 -86.5 -86.4 -94.6 -95.5 -96.3 -92.3
Frequency (GHz) 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7	0.647 0.529 0.480 0.459 0.443 0.424 0.406 0.401 0.396 0.391 0.366 0.363 0.363 0.337 0.352 0.349	ANG. (deg.) -73.2 -112.8 -133.5 -146.3 -155.4 -160.9 -166.8 -169.8 -173.9 -178.9 176.3 175.3 167.7 165.3 160.9 157.0	MAG. 21.091 13.280 9.390 7.213 5.826 4.890 4.206 3.711 3.372 3.093 2.950 2.984 2.788 2.413 2.194 2.017 1.900	ANG. (deg.) 134.7 113.6 103.3 96.7 92.0 89.2 86.9 84.3 82.7 81.8 80.4 77.2 67.5 64.6 63.4 61.7 60.9	MAG. 0.039 0.060 0.072 0.079 0.090 0.102 0.111 0.120 0.135 0.143 0.157 0.166 0.178 0.192 0.210 0.220 0.236	ANG. (deg.) 58.3 53.9 54.2 55.6 58.6 57.6 61.4 64.2 66.9 67.0 67.4 67.9 68.5 71.3 70.8 68.8 69.4	MAG. 0.793 0.561 0.409 0.360 0.333 0.315 0.297 0.292 0.288 0.294 0.298 0.338 0.359 0.320 0.322 0.314 0.329	ANG. (deg.) -45.3 -71.0 -82.3 -86.1 -90.2 -95.6 -96.0 -95.6 -93.9 -91.3 -86.5 -86.4 -94.6 -95.5 -96.3 -92.3 -91.1
Frequency (GHz) 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8	0.647 0.529 0.480 0.459 0.443 0.424 0.406 0.401 0.396 0.391 0.361 0.366 0.363 0.337 0.352 0.349 0.352	ANG. (deg.) -73.2 -112.8 -133.5 -146.3 -155.4 -160.9 -166.8 -169.8 -173.9 -178.9 176.3 175.3 167.7 165.3 160.9 157.0 154.7	MAG. 21.091 13.280 9.390 7.213 5.826 4.890 4.206 3.711 3.372 3.093 2.950 2.984 2.788 2.413 2.194 2.017 1.900 1.810	ANG. (deg.) 134.7 113.6 103.3 96.7 92.0 89.2 86.9 84.3 82.7 81.8 80.4 77.2 67.5 64.6 63.4 61.7 60.9 60.3	MAG. 0.039 0.060 0.072 0.079 0.090 0.102 0.111 0.120 0.135 0.143 0.157 0.166 0.178 0.192 0.210 0.220 0.236 0.248	ANG. (deg.) 58.3 53.9 54.2 55.6 58.6 57.6 61.4 64.2 66.9 67.0 67.4 67.9 68.5 71.3 70.8 68.8 69.4 69.1	MAG. 0.793 0.561 0.409 0.360 0.333 0.315 0.297 0.292 0.288 0.294 0.298 0.338 0.359 0.320 0.322 0.314 0.329 0.339	ANG. (deg.) -45.3 -71.0 -82.3 -86.1 -90.2 -95.6 -96.0 -95.6 -93.9 -91.3 -86.5 -86.4 -94.6 -95.5 -96.3 -92.3 -91.1 -93.7
Frequency (GHz) 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7	0.647 0.529 0.480 0.459 0.443 0.424 0.406 0.401 0.396 0.391 0.366 0.363 0.363 0.337 0.352 0.349	ANG. (deg.) -73.2 -112.8 -133.5 -146.3 -155.4 -160.9 -166.8 -169.8 -173.9 -178.9 176.3 175.3 167.7 165.3 160.9 157.0	MAG. 21.091 13.280 9.390 7.213 5.826 4.890 4.206 3.711 3.372 3.093 2.950 2.984 2.788 2.413 2.194 2.017 1.900	ANG. (deg.) 134.7 113.6 103.3 96.7 92.0 89.2 86.9 84.3 82.7 81.8 80.4 77.2 67.5 64.6 63.4 61.7 60.9	MAG. 0.039 0.060 0.072 0.079 0.090 0.102 0.111 0.120 0.135 0.143 0.157 0.166 0.178 0.192 0.210 0.220 0.236	ANG. (deg.) 58.3 53.9 54.2 55.6 58.6 57.6 61.4 64.2 66.9 67.0 67.4 67.9 68.5 71.3 70.8 68.8 69.4	MAG. 0.793 0.561 0.409 0.360 0.333 0.315 0.297 0.292 0.288 0.294 0.298 0.338 0.359 0.320 0.322 0.314 0.329	ANG. (deg.) -45.3 -71.0 -82.3 -86.1 -90.2 -95.6 -96.0 -95.6 -93.9 -91.3 -86.5 -86.4 -94.6 -95.5 -96.3 -92.3 -91.1

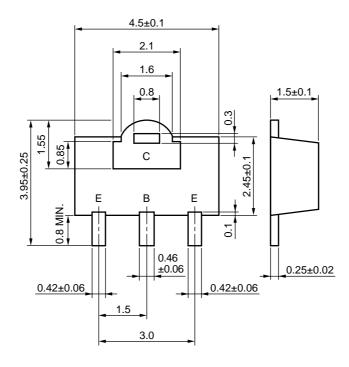
5

VCE = 10	V, Ic =	50 mA
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Frequency	S	511	S	21	S	12	S	22
(GHz)	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
, ,		(deg.)		(deg.)		(deg.)		(deg.)
0.1	0.699	-59.3	21.061	140.1	0.037	68.2	0.860	-37.6
0.2	0.540	-97.0	14.088	118.4	0.057	57.8	0.629	-62.0
0.3	0.461	-119.1	10.216	107.1	0.066	55.0	0.464	-72.1
0.4	0.423	-133.2	7.898	99.9	0.076	56.4	0.409	-77.1
0.5	0.403	-144.4	6.431	95.0	0.087	56.6	0.375	-80.6
0.6	0.383	-150.8	5.407	91.8	0.099	58.7	0.363	-86.2
0.7	0.355	-158.1	4.640	89.3	0.110	59.6	0.327	-87.7
0.8	0.338	-161.3	4.093	86.7	0.118	61.4	0.323	-87.8
0.9	0.333	-165.1	3.723	84.9	0.129	63.9	0.310	-86.0
1.0	0.322	-172.7	3.406	84.0	0.137	66.0	0.324	-83.2
1.1	0.303	-177.8	3.245	82.6	0.150	65.6	0.333	-79.9
1.2	0.306	-178.3	3.278	79.5	0.159	66.2	0.371	-80.5
1.3	0.295	171.3	3.074	69.9	0.168	67.6	0.377	-86.5
1.4	0.276	171.0	2.644	67.0	0.180	69.7	0.347	-86.7
1.5	0.283	164.5	2.397	66.2	0.198	70.5	0.363	-88.4
1.6	0.282	159.5	2.208	64.7	0.208	69.1	0.342	-85.6
1.7	0.283	157.3	2.088	64.1	0.220	70.0	0.344	-86.0
1.8	0.287	154.8	1.986	62.6	0.232	70.0	0.366	-87.8
1.9	0.290	150.4	1.886	61.7	0.247	69.4	0.371	-89.3
2.0	0.300	148.7	1.787	60.7	0.254	68.4	0.361	-92.9
Vce = 10 V, Ic	= 100 mA							
Frequency		511	S	04	9	512	S	22
	_	711	3					ANG.
(011-)	1440	4410	1110					ANG
(GHz)	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	(deg.)	MAG.	(deg.)
, ,		(deg.)		(deg.)		(deg.)		(deg.)
0.1	0.651	(deg.) -64.8	21.694	(deg.) 136.2	0.029	(deg.) 62.4	0.588	(deg.) -43.4
0.1 0.2	0.651 0.520	(deg.) -64.8 -106.4	21.694 14.288	(deg.) 136.2 114.6	0.029 0.042	(deg.) 62.4 53.0	0.588 0.435	(deg.) -43.4 -62.7
0.1 0.2 0.3	0.651 0.520 0.460	(deg.) -64.8 -106.4 -126.5	21.694 14.288 10.214	(deg.) 136.2 114.6 104.5	0.029 0.042 0.051	(deg.) 62.4 53.0 56.6	0.588 0.435 0.330	-43.4 -62.7 -73.0
0.1 0.2 0.3 0.4	0.651 0.520 0.460 0.420	(deg.) -64.8 -106.4 -126.5 -140.1	21.694 14.288 10.214 7.822	(deg.) 136.2 114.6 104.5 98.1	0.029 0.042 0.051 0.061	(deg.) 62.4 53.0 56.6 58.4	0.588 0.435 0.330 0.284	-43.4 -62.7 -73.0 -77.1
0.1 0.2 0.3 0.4 0.5	0.651 0.520 0.460 0.420 0.395	(deg.) -64.8 -106.4 -126.5 -140.1 -150.0	21.694 14.288 10.214 7.822 6.355	(deg.) 136.2 114.6 104.5 98.1 93.2	0.029 0.042 0.051 0.061 0.070	(deg.) 62.4 53.0 56.6 58.4 65.6	0.588 0.435 0.330 0.284 0.270	(deg.) -43.4 -62.7 -73.0 -77.1 -78.8
0.1 0.2 0.3 0.4 0.5 0.6	0.651 0.520 0.460 0.420 0.395 0.384	(deg.) -64.8 -106.4 -126.5 -140.1 -150.0 -156.3	21.694 14.288 10.214 7.822 6.355 5.314	(deg.) 136.2 114.6 104.5 98.1 93.2 90.3	0.029 0.042 0.051 0.061 0.070 0.077	(deg.) 62.4 53.0 56.6 58.4 65.6 67.0	0.588 0.435 0.330 0.284 0.270 0.257	(deg.) -43.4 -62.7 -73.0 -77.1 -78.8 -82.2
0.1 0.2 0.3 0.4 0.5 0.6 0.7	0.651 0.520 0.460 0.420 0.395 0.384 0.367	(deg.) -64.8 -106.4 -126.5 -140.1 -150.0 -156.3 -162.9	21.694 14.288 10.214 7.822 6.355 5.314 4.569	(deg.) 136.2 114.6 104.5 98.1 93.2 90.3 87.8	0.029 0.042 0.051 0.061 0.070 0.077 0.089	(deg.) 62.4 53.0 56.6 58.4 65.6 67.0 70.9	0.588 0.435 0.330 0.284 0.270 0.257	(deg.) -43.4 -62.7 -73.0 -77.1 -78.8 -82.2 -82.1
0.1 0.2 0.3 0.4 0.5 0.6 0.7	0.651 0.520 0.460 0.420 0.395 0.384 0.367 0.350	(deg.) -64.8 -106.4 -126.5 -140.1 -150.0 -156.3 -162.9 -165.5	21.694 14.288 10.214 7.822 6.355 5.314 4.569 4.037	(deg.) 136.2 114.6 104.5 98.1 93.2 90.3 87.8 85.6	0.029 0.042 0.051 0.061 0.070 0.077 0.089 0.095	(deg.) 62.4 53.0 56.6 58.4 65.6 67.0 70.9 71.6	0.588 0.435 0.330 0.284 0.270 0.257 0.258 0.241	(deg.) -43.4 -62.7 -73.0 -77.1 -78.8 -82.2 -82.1 -82.9
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9	0.651 0.520 0.460 0.420 0.395 0.384 0.367 0.350 0.343	(deg.) -64.8 -106.4 -126.5 -140.1 -150.0 -156.3 -162.9 -165.5 -169.3	21.694 14.288 10.214 7.822 6.355 5.314 4.569 4.037 3.649	(deg.) 136.2 114.6 104.5 98.1 93.2 90.3 87.8 85.6 83.8	0.029 0.042 0.051 0.061 0.070 0.077 0.089 0.095 0.106	(deg.) 62.4 53.0 56.6 58.4 65.6 67.0 70.9 71.6 72.5	0.588 0.435 0.330 0.284 0.270 0.257 0.258 0.241 0.257	(deg.) -43.4 -62.7 -73.0 -77.1 -78.8 -82.2 -82.1 -82.9 -79.5
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9	0.651 0.520 0.460 0.420 0.395 0.384 0.367 0.350 0.343 0.339	(deg.) -64.8 -106.4 -126.5 -140.1 -150.0 -156.3 -162.9 -165.5 -169.3 -177.1	21.694 14.288 10.214 7.822 6.355 5.314 4.569 4.037 3.649 3.353	(deg.) 136.2 114.6 104.5 98.1 93.2 90.3 87.8 85.6 83.8 82.8	0.029 0.042 0.051 0.061 0.070 0.077 0.089 0.095 0.106 0.117	(deg.) 62.4 53.0 56.6 58.4 65.6 67.0 70.9 71.6 72.5 73.9	0.588 0.435 0.330 0.284 0.270 0.257 0.258 0.241 0.257 0.258	(deg.) -43.4 -62.7 -73.0 -77.1 -78.8 -82.2 -82.1 -82.9 -79.5 -79.3
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0	0.651 0.520 0.460 0.420 0.395 0.384 0.367 0.350 0.343 0.339 0.316	(deg.) -64.8 -106.4 -126.5 -140.1 -150.0 -156.3 -162.9 -165.5 -169.3 -177.1 177.9	21.694 14.288 10.214 7.822 6.355 5.314 4.569 4.037 3.649 3.353 3.193	(deg.) 136.2 114.6 104.5 98.1 93.2 90.3 87.8 85.6 83.8 82.8 81.0	0.029 0.042 0.051 0.061 0.070 0.077 0.089 0.095 0.106 0.117 0.125	(deg.) 62.4 53.0 56.6 58.4 65.6 67.0 70.9 71.6 72.5 73.9 75.0	0.588 0.435 0.330 0.284 0.270 0.257 0.258 0.241 0.257 0.258 0.261	(deg.) -43.4 -62.7 -73.0 -77.1 -78.8 -82.2 -82.1 -82.9 -79.5 -79.3 -73.6
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1	0.651 0.520 0.460 0.420 0.395 0.384 0.367 0.350 0.343 0.339 0.316 0.315	(deg.) -64.8 -106.4 -126.5 -140.1 -150.0 -156.3 -162.9 -165.5 -169.3 -177.1 177.9 179.4	21.694 14.288 10.214 7.822 6.355 5.314 4.569 4.037 3.649 3.353 3.193 3.217	(deg.) 136.2 114.6 104.5 98.1 93.2 90.3 87.8 85.6 83.8 82.8 81.0 78.4	0.029 0.042 0.051 0.061 0.070 0.077 0.089 0.095 0.106 0.117 0.125 0.142	(deg.) 62.4 53.0 56.6 58.4 65.6 67.0 70.9 71.6 72.5 73.9 75.0 75.5	0.588 0.435 0.330 0.284 0.270 0.257 0.258 0.241 0.257 0.258 0.261 0.311	(deg.) -43.4 -62.7 -73.0 -77.1 -78.8 -82.2 -82.1 -82.9 -79.5 -79.3 -73.6 -72.3
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2	0.651 0.520 0.460 0.420 0.395 0.384 0.367 0.350 0.343 0.339 0.316 0.315 0.309	(deg.) -64.8 -106.4 -126.5 -140.1 -150.0 -156.3 -162.9 -165.5 -169.3 -177.1 177.9 179.4 170.1	21.694 14.288 10.214 7.822 6.355 5.314 4.569 4.037 3.649 3.353 3.193 3.217 3.026	(deg.) 136.2 114.6 104.5 98.1 93.2 90.3 87.8 85.6 83.8 82.8 81.0 78.4 69.1	0.029 0.042 0.051 0.061 0.070 0.077 0.089 0.095 0.106 0.117 0.125 0.142 0.152	(deg.) 62.4 53.0 56.6 58.4 65.6 67.0 70.9 71.6 72.5 73.9 75.0 75.5 78.1	0.588 0.435 0.330 0.284 0.270 0.257 0.258 0.241 0.257 0.258 0.261 0.311 0.324	(deg.) -43.4 -62.7 -73.0 -77.1 -78.8 -82.2 -82.1 -82.9 -79.5 -79.3 -73.6 -72.3 -80.4
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3	0.651 0.520 0.460 0.420 0.395 0.384 0.367 0.350 0.343 0.339 0.316 0.315 0.309 0.287	(deg.) -64.8 -106.4 -126.5 -140.1 -150.0 -156.3 -162.9 -165.5 -169.3 -177.1 177.9 179.4 170.1 165.6	21.694 14.288 10.214 7.822 6.355 5.314 4.569 4.037 3.649 3.353 3.193 3.217 3.026 2.592	(deg.) 136.2 114.6 104.5 98.1 93.2 90.3 87.8 85.6 83.8 82.8 81.0 78.4 69.1 65.9	0.029 0.042 0.051 0.061 0.070 0.077 0.089 0.095 0.106 0.117 0.125 0.142 0.152	(deg.) 62.4 53.0 56.6 58.4 65.6 67.0 70.9 71.6 72.5 73.9 75.0 75.5 78.1 75.6	0.588 0.435 0.330 0.284 0.270 0.257 0.258 0.241 0.257 0.258 0.261 0.311 0.324 0.280	(deg.) -43.4 -62.7 -73.0 -77.1 -78.8 -82.2 -82.1 -82.9 -79.5 -79.3 -73.6 -72.3 -80.4 -81.0
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4	0.651 0.520 0.460 0.420 0.395 0.384 0.367 0.350 0.343 0.339 0.316 0.315 0.309	(deg.) -64.8 -106.4 -126.5 -140.1 -150.0 -156.3 -162.9 -165.5 -169.3 -177.1 177.9 179.4 170.1 165.6 161.9	21.694 14.288 10.214 7.822 6.355 5.314 4.569 4.037 3.649 3.353 3.193 3.217 3.026 2.592 2.374	(deg.) 136.2 114.6 104.5 98.1 93.2 90.3 87.8 85.6 83.8 82.8 81.0 78.4 69.1 65.9 65.2	0.029 0.042 0.051 0.061 0.070 0.077 0.089 0.095 0.106 0.117 0.125 0.142 0.152	(deg.) 62.4 53.0 56.6 58.4 65.6 67.0 70.9 71.6 72.5 73.9 75.0 75.5 78.1 75.6 80.5	0.588 0.435 0.330 0.284 0.270 0.257 0.258 0.241 0.257 0.258 0.261 0.311 0.324 0.280 0.308	(deg.) -43.4 -62.7 -73.0 -77.1 -78.8 -82.2 -82.1 -82.9 -79.5 -79.3 -73.6 -72.3 -80.4 -81.0 -82.6
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3	0.651 0.520 0.460 0.420 0.395 0.384 0.367 0.350 0.343 0.339 0.316 0.315 0.309 0.287 0.303	(deg.) -64.8 -106.4 -126.5 -140.1 -150.0 -156.3 -162.9 -165.5 -169.3 -177.1 177.9 179.4 170.1 165.6	21.694 14.288 10.214 7.822 6.355 5.314 4.569 4.037 3.649 3.353 3.193 3.217 3.026 2.592	(deg.) 136.2 114.6 104.5 98.1 93.2 90.3 87.8 85.6 83.8 82.8 81.0 78.4 69.1 65.9	0.029 0.042 0.051 0.061 0.070 0.077 0.089 0.095 0.106 0.117 0.125 0.142 0.152 0.164 0.173	(deg.) 62.4 53.0 56.6 58.4 65.6 67.0 70.9 71.6 72.5 73.9 75.0 75.5 78.1 75.6	0.588 0.435 0.330 0.284 0.270 0.257 0.258 0.241 0.257 0.258 0.261 0.311 0.324 0.280	(deg.) -43.4 -62.7 -73.0 -77.1 -78.8 -82.2 -82.1 -82.9 -79.5 -79.3 -73.6 -72.3 -80.4 -81.0
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6	0.651 0.520 0.460 0.420 0.395 0.384 0.367 0.350 0.343 0.339 0.316 0.315 0.309 0.287 0.303 0.293	(deg.) -64.8 -106.4 -126.5 -140.1 -150.0 -156.3 -162.9 -165.5 -169.3 -177.1 177.9 179.4 170.1 165.6 161.9 157.9	21.694 14.288 10.214 7.822 6.355 5.314 4.569 4.037 3.649 3.353 3.193 3.217 3.026 2.592 2.374 2.179	(deg.) 136.2 114.6 104.5 98.1 93.2 90.3 87.8 85.6 83.8 82.8 81.0 78.4 69.1 65.9 65.2 63.5	0.029 0.042 0.051 0.061 0.070 0.077 0.089 0.095 0.106 0.117 0.125 0.142 0.152 0.164 0.173 0.187	(deg.) 62.4 53.0 56.6 58.4 65.6 67.0 70.9 71.6 72.5 73.9 75.0 75.5 78.1 75.6 80.5 78.1	0.588 0.435 0.330 0.284 0.270 0.257 0.258 0.241 0.257 0.258 0.261 0.311 0.324 0.280 0.308 0.295	(deg.) -43.4 -62.7 -73.0 -77.1 -78.8 -82.2 -82.1 -82.9 -79.5 -79.3 -73.6 -72.3 -80.4 -81.0 -82.6 -81.4 -78.7
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7	0.651 0.520 0.460 0.420 0.395 0.384 0.367 0.350 0.343 0.339 0.316 0.315 0.309 0.287 0.303 0.293 0.301	(deg.) -64.8 -106.4 -126.5 -140.1 -150.0 -156.3 -162.9 -165.5 -169.3 -177.1 177.9 179.4 170.1 165.6 161.9 157.9 153.7	21.694 14.288 10.214 7.822 6.355 5.314 4.569 4.037 3.649 3.353 3.193 3.217 3.026 2.592 2.374 2.179 2.054	(deg.) 136.2 114.6 104.5 98.1 93.2 90.3 87.8 85.6 83.8 82.8 81.0 78.4 69.1 65.9 65.2 63.5 62.4	0.029 0.042 0.051 0.061 0.070 0.077 0.089 0.095 0.106 0.117 0.125 0.142 0.152 0.164 0.173 0.187 0.200	(deg.) 62.4 53.0 56.6 58.4 65.6 67.0 70.9 71.6 72.5 73.9 75.0 75.5 78.1 75.6 80.5 78.1 78.2	0.588 0.435 0.330 0.284 0.270 0.257 0.258 0.241 0.257 0.258 0.261 0.311 0.324 0.280 0.308 0.295 0.307	(deg.) -43.4 -62.7 -73.0 -77.1 -78.8 -82.2 -82.1 -82.9 -79.5 -79.3 -73.6 -72.3 -80.4 -81.0 -82.6 -81.4
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8	0.651 0.520 0.460 0.420 0.395 0.384 0.367 0.350 0.343 0.339 0.316 0.315 0.309 0.287 0.303 0.293 0.301 0.303	(deg.) -64.8 -106.4 -126.5 -140.1 -150.0 -156.3 -162.9 -165.5 -169.3 -177.1 177.9 179.4 170.1 165.6 161.9 157.9 153.7	21.694 14.288 10.214 7.822 6.355 5.314 4.569 4.037 3.649 3.353 3.193 3.217 3.026 2.592 2.374 2.179 2.054 1.945	(deg.) 136.2 114.6 104.5 98.1 93.2 90.3 87.8 85.6 83.8 82.8 81.0 78.4 69.1 65.9 65.2 63.5 62.4 61.4	0.029 0.042 0.051 0.061 0.070 0.077 0.089 0.095 0.106 0.117 0.125 0.142 0.152 0.164 0.173 0.187 0.200	(deg.) 62.4 53.0 56.6 58.4 65.6 67.0 70.9 71.6 72.5 73.9 75.0 75.5 78.1 75.6 80.5 78.1 78.2 75.9	0.588 0.435 0.330 0.284 0.270 0.257 0.258 0.241 0.257 0.258 0.261 0.311 0.324 0.280 0.308 0.295 0.307 0.313	(deg.) -43.4 -62.7 -73.0 -77.1 -78.8 -82.2 -82.1 -82.9 -79.5 -79.3 -73.6 -72.3 -80.4 -81.0 -82.6 -81.4 -78.7 -82.1

★ PACKAGE DIMENSIONS

4-PIN POWER MINIMOLD (UNIT: mm)



PIN CONNECTIONS

E: Emitter C: Collector

B: Base

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