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)

Send any inquiries to http://www.renesas.com/inquiry.

Notice

1. All information included in this document is current as of the date this document is issued. Such information, however, is subject to change without any prior notice. Before purchasing or using any Renesas Electronics products listed herein, please confirm the latest product information with a Renesas Electronics sales office. Also, please pay regular and careful attention to additional and different information to be disclosed by Renesas Electronics such as that disclosed through our website.
2. Renesas Electronics does not assume any liability for infringement of patents, copyrights, or other intellectual property rights of third parties by or arising from the use of Renesas Electronics products or technical information described in this document. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
3. You should not alter, modify, copy, or otherwise misappropriate any Renesas Electronics product, whether in whole or in part.
4. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation of these circuits, software, and information in the design of your equipment. Renesas Electronics assumes no responsibility for any losses incurred by you or third parties arising from the use of these circuits, software, or information.
5. When exporting the products or technology described in this document, you should comply with the applicable export control laws and regulations and follow the procedures required by such laws and regulations. You should not use Renesas Electronics products or the technology described in this document for any purpose relating to military applications or use by the military, including but not limited to the development of weapons of mass destruction. Renesas Electronics products and technology may not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations.
6. Renesas Electronics has used reasonable care in preparing the information included in this document, but Renesas Electronics does not warrant that such information is error free. Renesas Electronics assumes no liability whatsoever for any damages incurred by you resulting from errors in or omissions from the information included herein.
7. Renesas Electronics products are classified according to the following three quality grades: "Standard", "High Quality", and "Specific". The recommended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below. You must check the quality grade of each Renesas Electronics product before using it in a particular application. You may not use any Renesas Electronics product for any application categorized as "Specific" without the prior written consent of Renesas Electronics. Further, you may not use any Renesas Electronics product for any application for which it is not intended without the prior written consent of Renesas Electronics. Renesas Electronics shall not be in any way liable for any damages or losses incurred by you or third parties arising from the use of any Renesas Electronics product for an application categorized as "Specific" or for which the product is not intended where you have failed to obtain the prior written consent of Renesas Electronics. The quality grade of each Renesas Electronics product is "Standard" unless otherwise expressly specified in a Renesas Electronics data sheets or data books, etc.

   "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.

   "High Quality": 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": Aircraft; aerospace equipment; submersible repeaters; nuclear reactor control systems; medical equipment or systems for life support (e.g. artificial life support devices or systems), surgical implantations, or healthcare intervention (e.g. excision, etc.), and any other applications or purposes that pose a direct threat to human life.
8. You should use the Renesas Electronics products described in this document within the range specified by Renesas Electronics, especially with respect to the maximum rating, operating supply voltage range, movement power voltage range, heat radiation characteristics, installation and other product characteristics. Renesas Electronics shall have no liability for malfunctions or damages arising out of the use of Renesas Electronics products beyond such specified ranges.
9. Although Renesas Electronics endeavors to improve the quality and reliability of its products, semiconductor products have specific characteristics such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Further, Renesas Electronics products are not subject to radiation resistance design. Please be sure to implement safety measures to guard them against the possibility of physical injury, and injury or damage caused by fire in the event of the failure of a Renesas Electronics product, such as safety design for hardware and software including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult, please evaluate the safety of the final products or system manufactured by you.
10. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. Please use Renesas Electronics products in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. Renesas Electronics assumes no liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
11. This document may not be reproduced or duplicated, in any form, in whole or in part, without prior written consent of Renesas Electronics.
12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products, or if you have any other inquiries.

(Note 1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its majority-owned subsidiaries.

(Note 2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.

NPN SILICON RF TWIN TRANSISTOR

Phase-out/Discontinued

μPA873TC

NPN SILICON RF TRANSISTOR (WITH 2 ELEMENTS) IN A FLAT-LEAD 6-PIN THIN-TYPE ULTRA SUPER MINIMOLD

FEATURES

- Low phase distortion transistor suited for OSC applications
  f_T = 4.5 GHz TYP., $|S_{21e}|^2$ = 4.0 dB TYP. @ V_{CE} = 1 V, I_C = 5 mA, f = 2 GHz
- Built-in 2 transistors (2 × 2SC5800)
- Flat-lead 6-pin thin-type ultra super minimold package

BUILT-IN TRANSISTORS

	Q1, Q2
3-pin thin-type ultra super minimold part No.	2SC5800

ORDERING INFORMATION

Part Number	Quantity	Supplying Form
μPA873TC	50 pcs (Non reel)	• 8 mm wide embossed taping • Pin 6 (Q1 Base), Pin 5 (Q2 Base), Pin 4 (Q2 Emitter) face the perforation side of the tape
μPA873TC-T1	3 kpcs/reel	

Remark To order evaluation samples, contact your nearby sales office.
Unit sample quantity is 50 pcs.

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

Document No. PU10166EJ01V0DS (1st edition)
Date Published June 2002 CP(K)
Printed in Japan

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C)

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	V_{CBO}	9	V
Collector to Emitter Voltage	V_{CEO}	5.5	V
Emitter to Base Voltage	V_{EBO}	1.5	V
Collector Current	I_C	100	mA
Total Power Dissipation	P_{tot} Note	200 in 1 element	mW
		230 in 2 elements	
Junction Temperature	T_j	150	°C
Storage Temperature	T_{stg}	–65 to +150	°C

Note Mounted on 1.08 $cm^2 \times 1.0$ mm (t) glass epoxy PCB

ELECTRICAL CHARACTERISTICS (T_A = +25°C)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Collector Cut-off Current	I_{CBO}	V_{CB} = 5 V, I_E = 0 mA	–	–	600	nA
Emitter Cut-off Current	I_{EBO}	V_{EB} = 1 V, I_C = 0 mA	–	–	600	nA
DC Current Gain	h_{FE} Note 1	V_{CE} = 1 V, I_C = 5 mA	100	–	145	–
Gain Bandwidth Product (1)	f_T	V_{CE} = 1 V, I_C = 5 mA, f = 2 GHz	3.0	4.5	–	GHz
Gain Bandwidth Product (2)	f_T	V_{CE} = 1 V, I_C = 15 mA, f = 2 GHz	5.0	6.5	–	GHz
Insertion Power Gain (1)	$\lvert S_{21e} \rvert^2$	V_{CE} = 1 V, I_C = 5 mA, f = 2 GHz	3.0	4.0	–	dB
Insertion Power Gain (2)	$\lvert S_{21e} \rvert^2$	V_{CE} = 1 V, I_C = 15 mA, f = 2 GHz	4.5	5.5	–	dB
Noise Figure	NF	V_{CE} = 1 V, I_C = 10 mA, f = 2 GHz, $Z_S = Z_{opt}$	–	1.9	2.5	dB
Reverse Transfer Capacitance	C_{re} Note 2	V_{CB} = 0.5 V, I_E = 0 mA, f = 1 MHz	–	0.6	0.8	pF

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

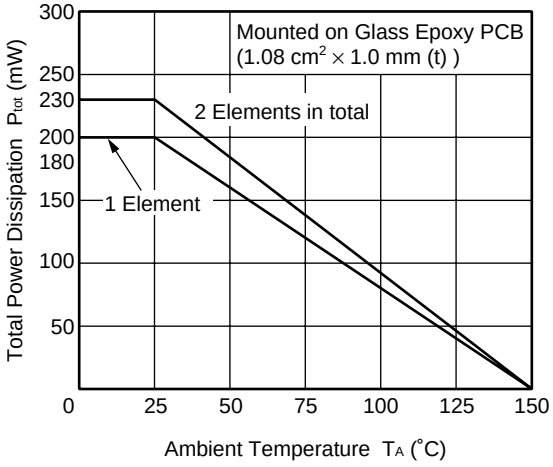
2. Collector to base capacitance when the emitter grounded

h_{FE} CLASSIFICATION

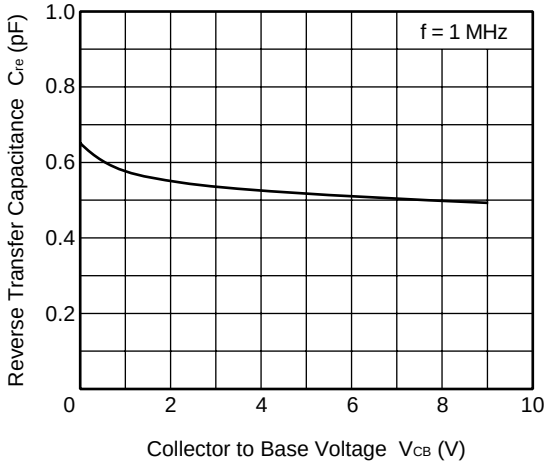
Rank	FB
Marking	3F
h_{FE}	100 to 145

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

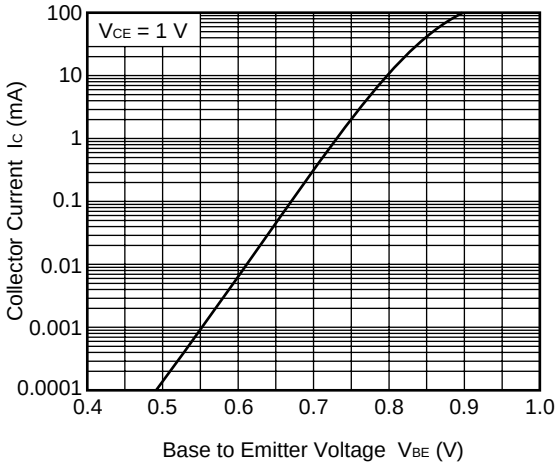
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



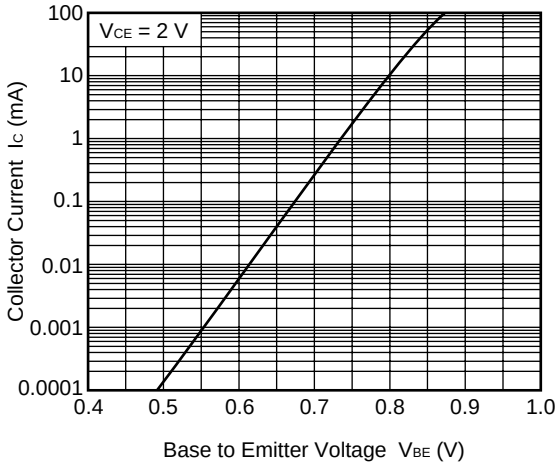
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



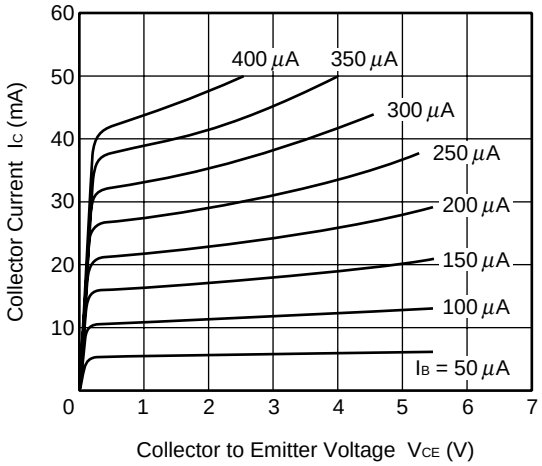
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



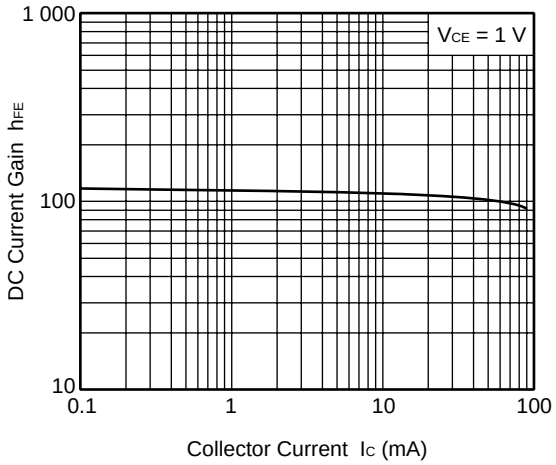
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



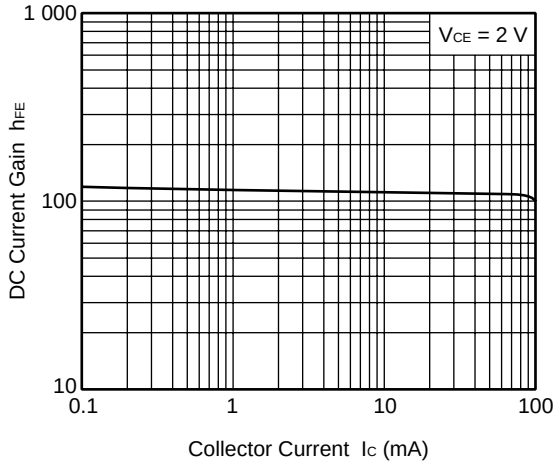
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



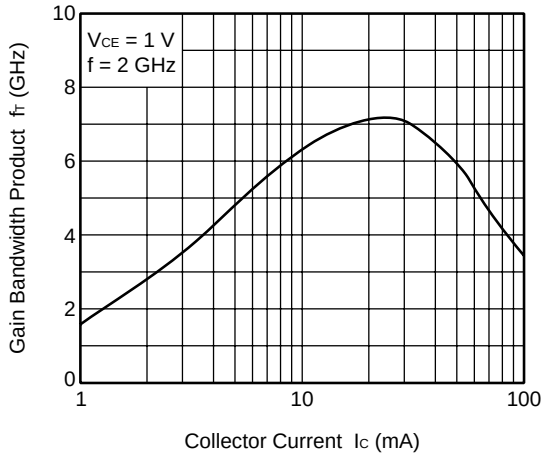
DC CURRENT GAIN vs. COLLECTOR CURRENT



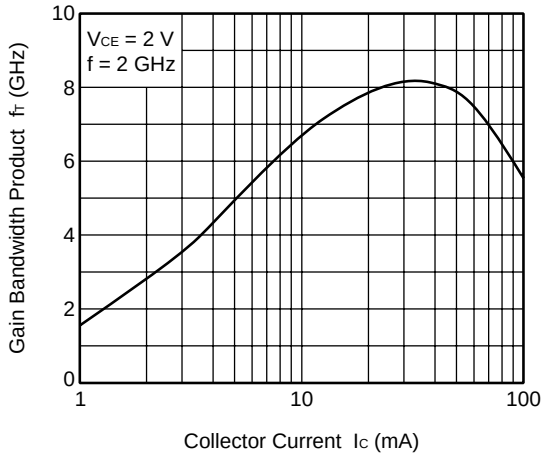
DC CURRENT GAIN vs. COLLECTOR CURRENT



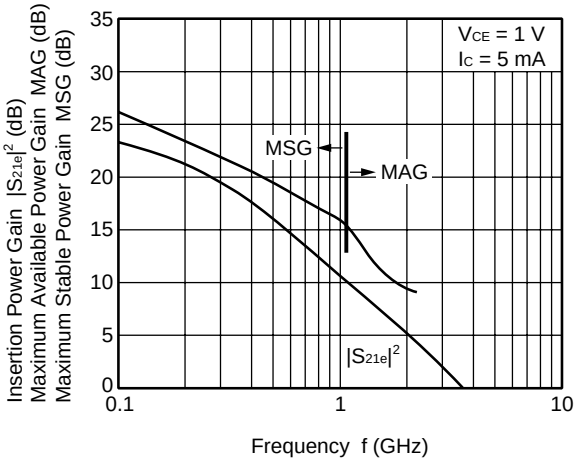
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



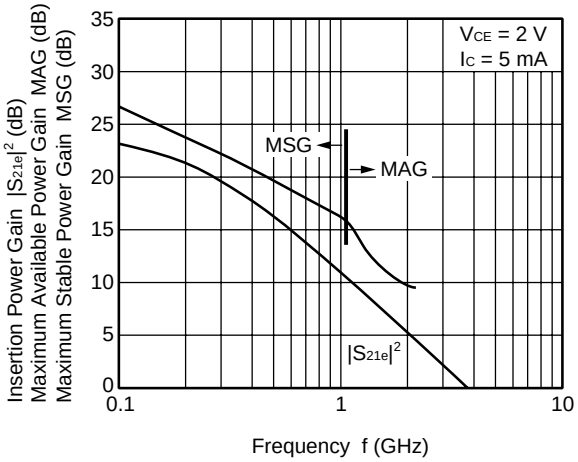
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



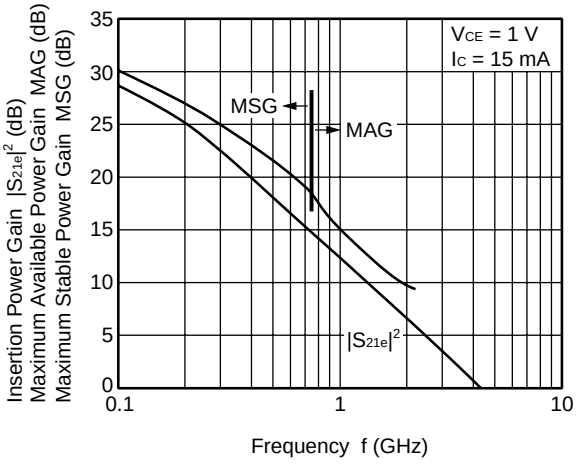
INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



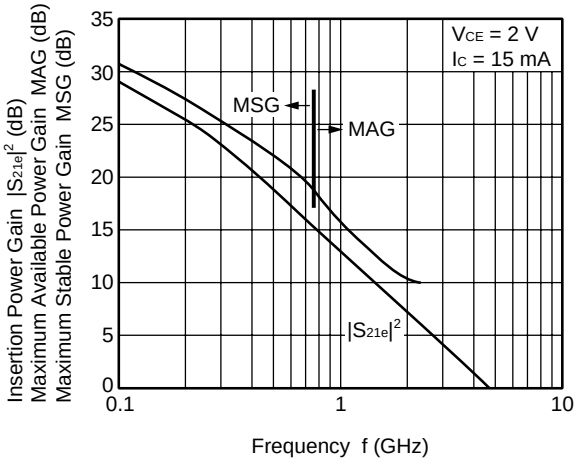
INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



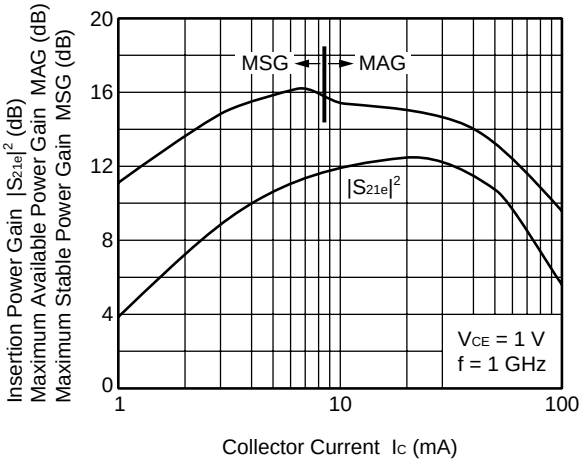
INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



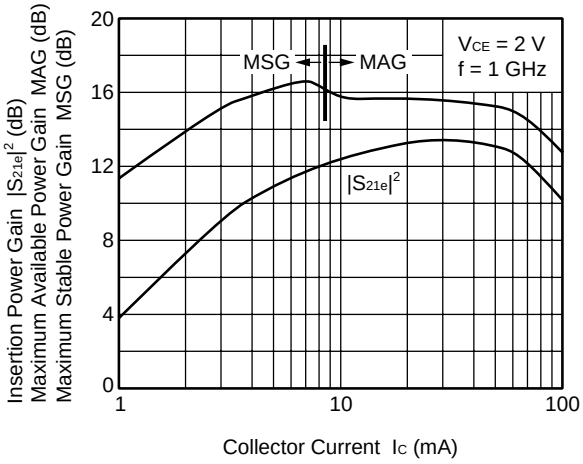
INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



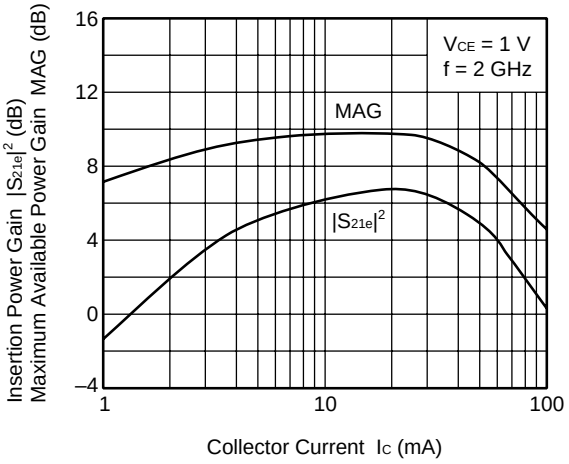
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



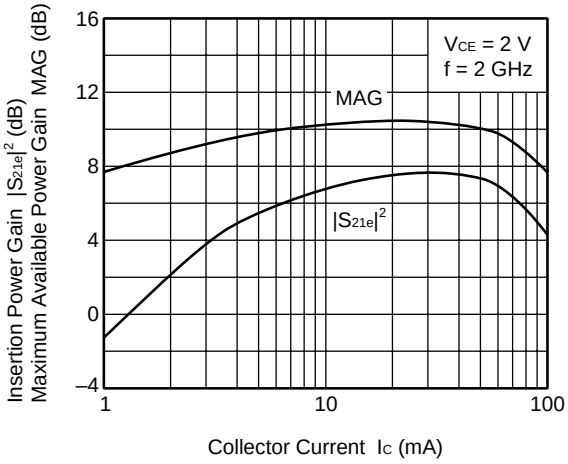
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



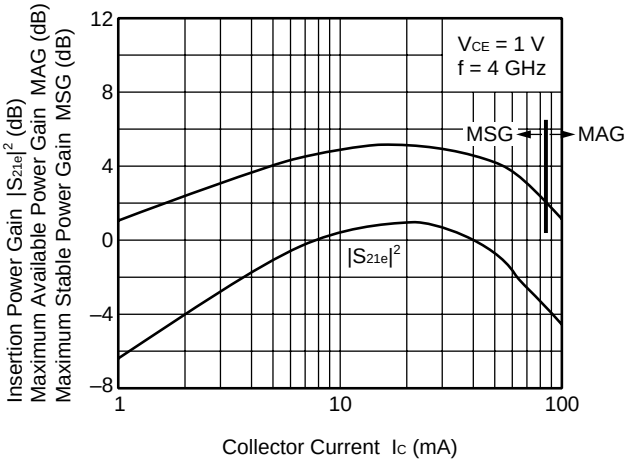
INSERTION POWER GAIN, MAG vs. COLLECTOR CURRENT



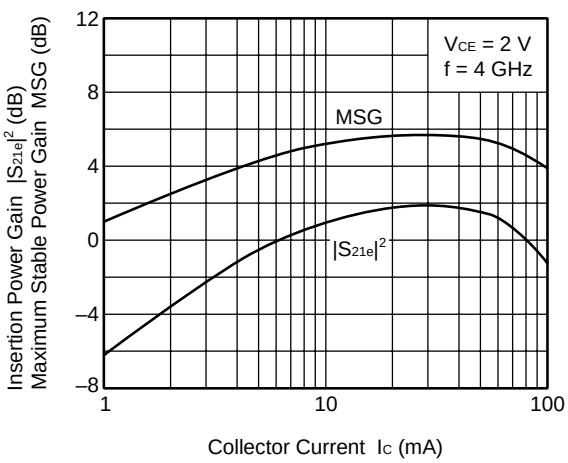
INSERTION POWER GAIN, MAG vs. COLLECTOR CURRENT



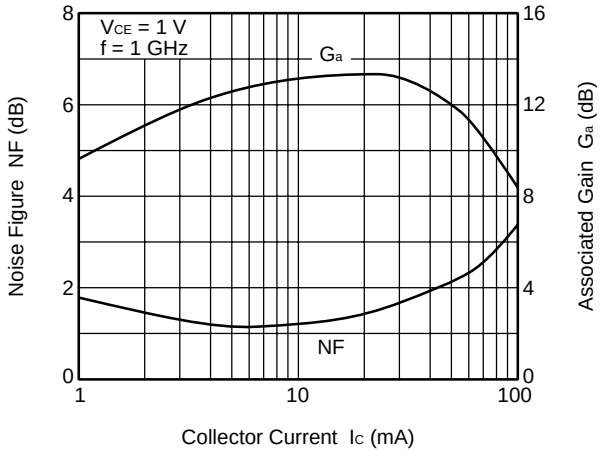
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



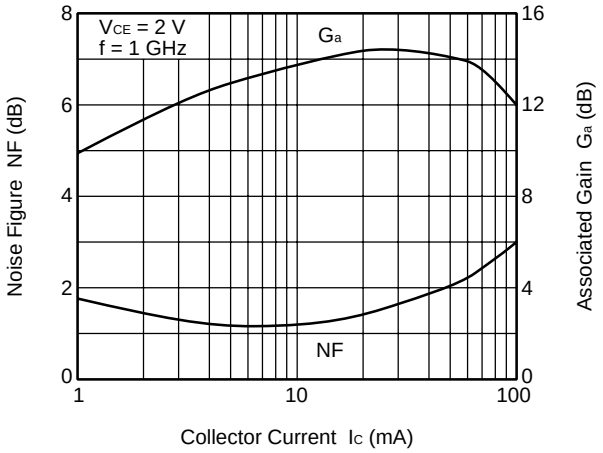
INSERTION POWER GAIN, MSG vs. COLLECTOR CURRENT



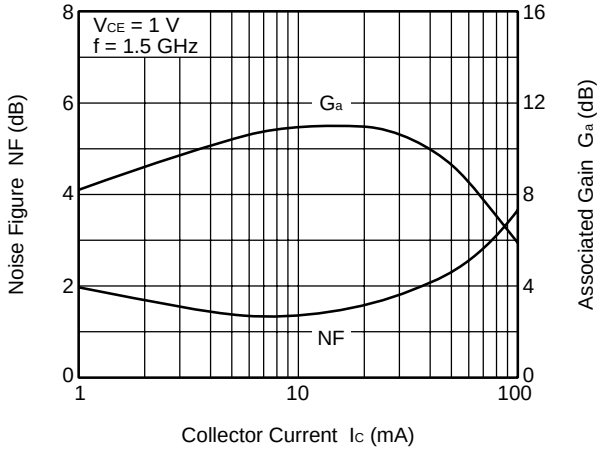
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



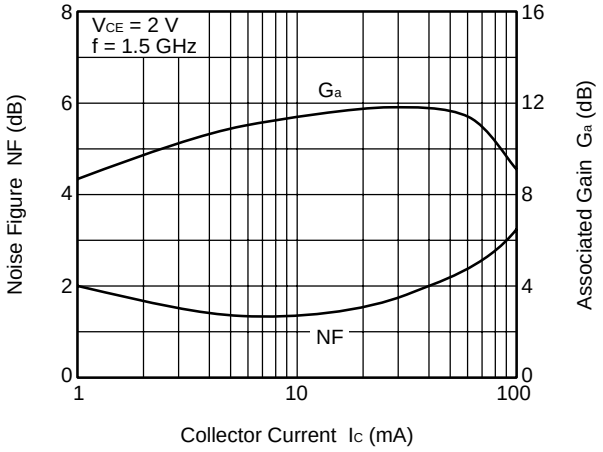
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



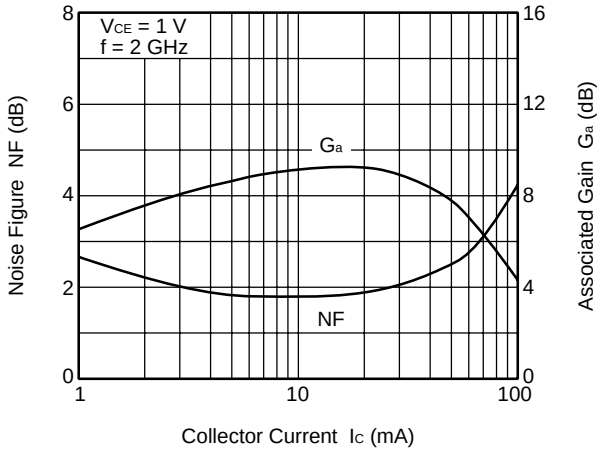
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



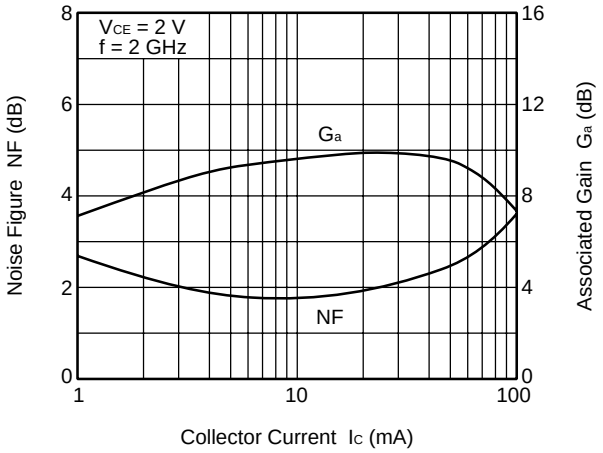
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



Remark The graphs indicate nominal characteristics.

S-PARAMETERS

V_{CE} = 1 V, I_C = 1 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.952	–23.2	3.464	165.0	0.039	75.8	0.987	–7.5
0.2	0.932	–46.1	3.323	148.7	0.069	63.4	0.948	–14.3
0.3	0.908	–67.1	3.079	135.6	0.094	52.4	0.899	–19.9
0.4	0.868	–84.6	2.757	123.7	0.111	42.6	0.850	–24.5
0.5	0.840	–99.6	2.469	113.6	0.121	35.0	0.807	–28.4
0.6	0.819	–112.9	2.226	105.2	0.127	28.6	0.770	–31.9
0.7	0.802	–124.0	2.006	97.2	0.129	23.4	0.742	–34.9
0.8	0.788	–133.7	1.821	90.3	0.128	19.4	0.719	–37.8
0.9	0.781	–142.1	1.671	84.2	0.125	15.9	0.698	–40.8
1.0	0.778	–149.9	1.539	78.8	0.121	13.4	0.683	–43.9
1.1	0.771	–156.4	1.426	73.5	0.115	11.7	0.670	–47.2
1.2	0.771	–162.7	1.333	68.5	0.108	10.7	0.658	–50.6
1.3	0.774	–168.2	1.243	64.0	0.101	10.9	0.649	–54.1
1.4	0.771	–173.4	1.168	59.7	0.094	12.3	0.644	–57.9
1.5	0.773	–178.5	1.101	55.6	0.086	15.2	0.638	–61.8
1.6	0.775	177.1	1.045	51.8	0.080	19.8	0.635	–65.8
1.7	0.779	172.9	0.989	48.0	0.075	26.6	0.631	–70.1
1.8	0.780	168.4	0.940	44.3	0.072	35.0	0.629	–74.6
1.9	0.783	164.5	0.891	41.1	0.073	44.5	0.629	–79.4
2.0	0.787	160.5	0.852	37.5	0.078	53.7	0.629	–84.1
2.1	0.794	157.0	0.810	34.5	0.086	60.9	0.630	–88.9
2.2	0.797	153.6	0.775	32.5	0.098	66.3	0.632	–93.8
2.3	0.802	150.5	0.739	30.4	0.111	69.8	0.633	–98.8
2.4	0.804	147.5	0.704	28.1	0.127	71.7	0.636	–103.8
2.5	0.805	144.8	0.675	26.5	0.144	72.0	0.639	–108.6
2.6	0.805	142.0	0.646	24.3	0.161	71.1	0.642	–113.4
2.7	0.807	140.1	0.621	23.0	0.174	69.1	0.643	–117.9
2.8	0.812	138.2	0.595	21.4	0.183	68.8	0.648	–122.0
2.9	0.812	135.6	0.580	20.1	0.196	69.2	0.648	–126.4
3.0	0.820	133.2	0.560	19.9	0.213	68.8	0.652	–131.1
4.0	0.836	113.0	0.477	13.6	0.377	47.5	0.671	–178.4
5.0	0.847	100.5	0.457	7.3	0.441	26.6	0.725	140.3

V_{CE} = 1 V, I_C = 3 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.885	–34.7	9.492	158.3	0.035	71.4	0.945	–14.6
0.2	0.819	–65.5	8.394	137.9	0.060	56.0	0.834	–25.9
0.3	0.764	–90.2	7.116	123.5	0.075	45.8	0.726	–32.8
0.4	0.719	–108.8	5.951	112.3	0.084	39.1	0.640	–37.4
0.5	0.689	–122.9	5.062	103.5	0.088	34.9	0.574	–40.2
0.6	0.671	–134.8	4.394	96.6	0.091	32.4	0.528	–42.8
0.7	0.663	–144.2	3.853	90.4	0.092	31.2	0.494	–44.5
0.8	0.652	–152.1	3.424	84.9	0.092	30.7	0.467	–46.5
0.9	0.647	–158.9	3.091	80.2	0.092	31.1	0.446	–48.6
1.0	0.648	–165.0	2.813	75.9	0.093	32.4	0.429	–51.0
1.1	0.646	–170.2	2.585	71.7	0.092	34.1	0.415	–53.5
1.2	0.649	–175.2	2.396	67.8	0.093	36.2	0.403	–56.5
1.3	0.651	–179.4	2.226	64.0	0.094	38.6	0.394	–59.6
1.4	0.651	176.5	2.081	60.4	0.096	41.4	0.387	–63.0
1.5	0.658	172.4	1.953	57.0	0.099	44.4	0.381	–66.7
1.6	0.662	169.0	1.849	53.6	0.102	47.2	0.377	–70.5
1.7	0.669	165.5	1.749	50.4	0.107	50.2	0.373	–74.7
1.8	0.670	161.9	1.659	47.0	0.112	52.7	0.371	–79.1
1.9	0.675	158.9	1.575	44.0	0.119	55.0	0.370	–83.7
2.0	0.684	155.4	1.505	40.6	0.126	57.1	0.371	–88.3
2.1	0.691	152.7	1.432	37.7	0.135	58.6	0.373	–93.1
2.2	0.693	149.9	1.371	35.2	0.144	59.8	0.375	–97.9
2.3	0.703	147.6	1.316	32.7	0.154	60.5	0.379	–102.9
2.4	0.707	145.1	1.254	30.1	0.165	60.8	0.385	–107.7
2.5	0.712	143.0	1.204	27.7	0.177	60.5	0.392	–112.4
2.6	0.716	140.7	1.150	25.0	0.189	59.7	0.400	–117.0
2.7	0.724	139.5	1.109	23.1	0.197	58.4	0.406	–121.3
2.8	0.732	137.7	1.065	20.9	0.203	58.0	0.414	–125.2
2.9	0.734	135.5	1.036	18.8	0.212	58.4	0.419	–129.6
3.0	0.743	133.4	0.999	17.1	0.224	58.4	0.425	–133.9
4.0	0.800	115.7	0.736	0.7	0.354	44.2	0.493	–178.7
5.0	0.843	102.3	0.578	–7.8	0.424	26.5	0.619	140.5

V_{CE} = 1 V, I_C = 5 mA, Z_O = 50 Ω

Frequency (GHz)	S_{11} MAG.	S_{11} ANG. (deg.)	S_{21} MAG.	S_{21} ANG. (deg.)	S_{12} MAG.	S_{12} ANG. (deg.)	S_{22} MAG.	S_{22} ANG. (deg.)
0.1	0.795	–43.5	14.399	152.4	0.035	68.5	0.899	–20.7
0.2	0.726	–80.0	11.772	130.2	0.053	52.6	0.734	–34.2
0.3	0.674	–105.5	9.387	116.0	0.063	44.8	0.602	–41.1
0.4	0.635	–122.9	7.583	105.9	0.069	40.5	0.511	–45.0
0.5	0.613	–135.9	6.305	98.1	0.073	39.2	0.447	–47.1
0.6	0.603	–146.7	5.395	92.2	0.076	38.9	0.402	–48.9
0.7	0.597	–155.0	4.690	86.8	0.079	39.6	0.370	–50.2
0.8	0.594	–161.6	4.142	82.1	0.082	41.0	0.346	–51.8
0.9	0.591	–167.4	3.722	77.9	0.085	42.5	0.327	–53.6
1.0	0.596	–172.4	3.372	74.2	0.088	44.3	0.311	–55.9
1.1	0.594	–177.1	3.091	70.5	0.092	46.2	0.299	–58.3
1.2	0.601	178.8	2.861	66.8	0.096	47.9	0.288	–61.3
1.3	0.605	175.1	2.651	63.6	0.101	49.7	0.279	–64.5
1.4	0.608	171.6	2.474	60.3	0.106	51.3	0.273	–68.2
1.5	0.611	168.1	2.322	57.2	0.112	52.9	0.267	–72.0
1.6	0.613	164.9	2.195	54.1	0.118	54.2	0.263	–76.1
1.7	0.624	162.0	2.073	51.1	0.124	55.4	0.260	–80.6
1.8	0.628	158.6	1.965	48.1	0.131	56.2	0.259	–85.4
1.9	0.632	156.0	1.865	45.3	0.139	57.1	0.258	–90.4
2.0	0.640	152.9	1.780	42.0	0.147	57.7	0.260	–95.3
2.1	0.649	150.4	1.698	39.3	0.156	58.1	0.263	–100.5
2.2	0.652	147.9	1.627	36.8	0.164	58.3	0.266	–105.6
2.3	0.661	145.8	1.561	34.4	0.173	58.1	0.271	–110.7
2.4	0.666	143.9	1.492	32.0	0.184	57.8	0.279	–115.6
2.5	0.672	141.7	1.434	29.6	0.194	57.1	0.286	–120.3
2.6	0.677	139.9	1.372	26.9	0.205	55.9	0.296	–124.8
2.7	0.685	138.6	1.322	25.0	0.211	54.6	0.304	–129.0
2.8	0.696	137.1	1.274	22.8	0.216	54.1	0.313	–132.9
2.9	0.699	135.2	1.244	20.5	0.224	54.3	0.319	–137.1
3.0	0.707	133.0	1.202	18.8	0.234	54.1	0.325	–141.2
4.0	0.778	116.5	0.890	0.3	0.345	41.6	0.405	176.4
5.0	0.836	103.5	0.677	–11.5	0.413	25.9	0.559	138.3

V_{CE} = 1 V, I_C = 7 mA, Z_O = 50 Ω

Frequency (GHz)	S_{11} MAG.	S_{11} ANG. (deg.)	S_{21} MAG.	S_{21} ANG. (deg.)	S_{12} MAG.	S_{12} ANG. (deg.)	S_{22} MAG.	S_{22} ANG. (deg.)
0.1	0.752	–51.4	18.241	148.0	0.033	64.7	0.856	–25.8
0.2	0.663	–91.2	13.998	124.7	0.048	51.0	0.655	–40.3
0.3	0.621	–116.6	10.735	111.1	0.055	45.6	0.516	–46.9
0.4	0.587	–132.7	8.506	102.0	0.061	43.7	0.427	–50.2
0.5	0.573	–144.3	7.006	95.0	0.065	44.0	0.368	–51.8
0.6	0.567	–154.3	5.951	89.6	0.069	44.7	0.327	–53.4
0.7	0.566	–161.5	5.152	84.7	0.074	46.3	0.298	–54.6
0.8	0.565	–167.4	4.538	80.5	0.079	48.1	0.276	–56.0
0.9	0.563	–172.4	4.069	76.6	0.084	49.6	0.258	–57.8
1.0	0.568	–177.0	3.681	73.2	0.089	51.3	0.244	–60.2
1.1	0.572	178.9	3.370	69.8	0.094	52.6	0.232	–62.7
1.2	0.574	175.2	3.112	66.4	0.100	53.8	0.223	–66.1
1.3	0.581	172.0	2.880	63.3	0.107	54.8	0.214	–69.6
1.4	0.583	168.6	2.687	60.2	0.113	55.8	0.209	–73.6
1.5	0.590	165.5	2.520	57.2	0.120	56.6	0.204	–78.0
1.6	0.593	162.5	2.381	54.4	0.127	57.2	0.201	–82.6
1.7	0.601	159.7	2.250	51.6	0.135	57.6	0.198	–87.7
1.8	0.605	156.6	2.130	48.5	0.143	57.9	0.198	–93.1
1.9	0.610	154.0	2.027	46.0	0.150	57.9	0.199	–98.4
2.0	0.621	151.1	1.930	42.8	0.159	58.0	0.202	–103.8
2.1	0.630	149.0	1.839	40.2	0.168	57.8	0.205	–109.4
2.2	0.632	146.6	1.762	37.8	0.176	57.6	0.211	–114.6
2.3	0.641	144.5	1.695	35.4	0.185	57.0	0.217	–119.9
2.4	0.645	142.4	1.621	33.1	0.195	56.5	0.225	–124.8
2.5	0.650	140.8	1.558	30.8	0.205	55.4	0.234	–129.3
2.6	0.657	139.0	1.489	28.2	0.215	54.1	0.245	–133.6
2.7	0.665	137.8	1.438	26.5	0.221	52.6	0.254	–137.6
2.8	0.676	136.4	1.388	24.0	0.225	52.1	0.263	–141.4
2.9	0.682	134.3	1.356	21.7	0.232	52.1	0.270	–145.4
3.0	0.687	132.7	1.312	20.1	0.242	51.8	0.276	–149.2
4.0	0.764	117.0	0.976	1.0	0.341	39.8	0.362	170.8
5.0	0.832	104.1	0.742	–11.8	0.407	25.2	0.525	135.7

V_{CE} = 1 V, I_C = 10 mA, Z_O = 50 Ω

Frequency (GHz)	S_{11} MAG.	S_{11} ANG. (deg.)	S_{21} MAG.	S_{21} ANG. (deg.)	S_{12} MAG.	S_{12} ANG. (deg.)	S_{22} MAG.	S_{22} ANG. (deg.)
0.1	0.662	–62.3	22.776	142.2	0.030	61.0	0.795	–32.1
0.2	0.598	–104.8	16.175	119.0	0.041	50.5	0.564	–47.2
0.3	0.571	–128.5	11.965	106.3	0.048	48.0	0.427	–53.3
0.4	0.547	–143.2	9.328	98.2	0.054	48.2	0.345	–56.2
0.5	0.538	–153.6	7.599	92.0	0.059	49.6	0.292	–57.5
0.6	0.536	–161.8	6.421	87.1	0.065	51.4	0.256	–59.1
0.7	0.542	–167.8	5.548	82.8	0.071	53.1	0.230	–60.3
0.8	0.539	–173.2	4.849	78.9	0.078	54.8	0.211	–61.8
0.9	0.540	–177.2	4.361	75.4	0.084	56.1	0.195	–64.0
1.0	0.546	178.6	3.945	72.2	0.091	57.2	0.182	–66.9
1.1	0.549	175.2	3.605	69.0	0.098	58.0	0.172	–69.9
1.2	0.554	171.6	3.327	65.9	0.105	58.6	0.163	–74.0
1.3	0.560	168.7	3.077	63.0	0.113	59.0	0.156	–78.3
1.4	0.564	165.7	2.869	60.1	0.121	59.3	0.153	–83.2
1.5	0.570	162.7	2.690	57.2	0.129	59.4	0.149	–88.6
1.6	0.577	160.1	2.538	54.5	0.136	59.3	0.147	–94.0
1.7	0.585	157.6	2.398	51.8	0.145	59.3	0.147	–100.0
1.8	0.587	154.8	2.267	49.0	0.153	58.9	0.149	–106.3
1.9	0.595	152.4	2.155	46.5	0.161	58.5	0.151	–112.3
2.0	0.602	149.3	2.053	43.5	0.170	58.2	0.156	–118.1
2.1	0.611	147.3	1.957	40.9	0.179	57.7	0.162	–123.8
2.2	0.615	145.2	1.879	38.6	0.188	57.1	0.169	–129.0
2.3	0.623	143.3	1.807	36.4	0.196	56.2	0.178	–134.1
2.4	0.628	141.6	1.728	34.1	0.205	55.4	0.187	–138.7
2.5	0.634	139.9	1.662	31.8	0.215	54.1	0.197	–142.7
2.6	0.639	138.1	1.588	29.4	0.224	52.7	0.208	–146.5
2.7	0.648	137.3	1.537	27.6	0.230	51.1	0.218	–150.0
2.8	0.660	135.7	1.484	25.4	0.234	50.5	0.228	–153.5
2.9	0.664	133.9	1.449	23.1	0.241	50.4	0.236	–157.2
3.0	0.673	131.9	1.405	21.2	0.250	49.9	0.242	–160.5
4.0	0.749	117.2	1.051	2.4	0.340	38.0	0.330	163.1
5.0	0.821	104.5	0.803	–11.7	0.401	24.4	0.498	131.8

V_{CE} = 1 V, I_C = 20 mA, Z_O = 50 Ω

Frequency (GHz)	S_{11} MAG.	S_{11} ANG. (deg.)	S_{21} MAG.	S_{21} ANG. (deg.)	S_{12} MAG.	S_{12} ANG. (deg.)	S_{22} MAG.	S_{22} ANG. (deg.)
0.1	0.525	–92.4	30.494	130.7	0.024	60.9	0.639	–45.6
0.2	0.514	–132.1	18.912	109.2	0.032	54.6	0.397	–61.1
0.3	0.515	–149.5	13.262	99.0	0.039	56.4	0.282	–67.0
0.4	0.509	–160.0	10.156	92.6	0.047	58.8	0.219	–70.4
0.5	0.509	–167.4	8.208	87.5	0.055	61.2	0.178	–72.6
0.6	0.513	–173.6	6.884	83.5	0.063	62.6	0.152	–76.0
0.7	0.518	–177.9	5.922	79.9	0.071	63.4	0.132	–79.0
0.8	0.520	177.9	5.173	76.5	0.080	64.1	0.118	–82.4
0.9	0.522	174.8	4.631	73.4	0.089	64.4	0.107	–87.3
1.0	0.530	171.6	4.172	70.4	0.097	64.4	0.100	–93.3
1.1	0.535	168.6	3.818	67.5	0.106	64.4	0.093	–99.5
1.2	0.541	166.0	3.518	64.6	0.115	63.9	0.091	–106.9
1.3	0.547	163.6	3.254	62.0	0.124	63.5	0.089	–114.3
1.4	0.551	161.1	3.033	59.3	0.133	63.0	0.092	–121.5
1.5	0.559	158.5	2.844	56.6	0.142	62.4	0.094	–129.1
1.6	0.565	156.2	2.678	54.1	0.151	61.7	0.099	–135.5
1.7	0.571	153.8	2.530	51.6	0.160	60.8	0.106	–141.9
1.8	0.577	151.4	2.393	49.0	0.168	59.9	0.114	–147.3
1.9	0.581	149.2	2.275	46.7	0.177	59.0	0.121	–152.4
2.0	0.590	146.8	2.164	43.7	0.186	58.2	0.131	–156.5
2.1	0.598	144.7	2.062	41.5	0.196	57.1	0.141	–160.5
2.2	0.605	142.7	1.979	39.3	0.204	56.1	0.151	–163.9
2.3	0.614	140.9	1.903	37.1	0.213	55.0	0.162	–167.0
2.4	0.617	139.3	1.822	34.9	0.222	53.8	0.173	–169.6
2.5	0.620	137.8	1.750	32.8	0.231	52.3	0.184	–172.0
2.6	0.629	136.2	1.676	30.3	0.240	50.6	0.195	–173.9
2.7	0.637	135.5	1.624	28.8	0.245	49.0	0.206	–176.0
2.8	0.649	134.2	1.566	26.4	0.249	48.2	0.217	–178.3
2.9	0.653	132.2	1.534	24.2	0.255	48.0	0.225	179.0
3.0	0.658	130.7	1.488	22.5	0.263	47.3	0.229	176.3
4.0	0.739	116.9	1.117	4.0	0.341	34.8	0.318	147.7
5.0	0.812	104.6	0.868	–10.4	0.394	22.4	0.481	123.7

V_{CE} = 2 V, I_C = 1 mA, Z_O = 50 Ω

Frequency (GHz)	S_{11} MAG.	S_{11} ANG. (deg.)	S_{21} MAG.	S_{21} ANG. (deg.)	S_{12} MAG.	S_{12} ANG. (deg.)	S_{22} MAG.	S_{22} ANG. (deg.)
0.1	0.954	–23.0	3.401	166.0	0.036	76.3	0.987	–6.9
0.2	0.938	–44.8	3.285	149.6	0.064	64.8	0.953	–13.2
0.3	0.915	–65.3	3.061	137.0	0.087	53.2	0.908	–18.5
0.4	0.877	–82.7	2.752	125.3	0.103	43.9	0.865	–23.1
0.5	0.846	–97.5	2.483	115.1	0.113	36.2	0.823	–26.7
0.6	0.821	–110.7	2.238	106.9	0.119	29.8	0.789	–30.1
0.7	0.805	–122.1	2.021	99.0	0.121	24.6	0.762	–33.0
0.8	0.791	–131.9	1.841	92.0	0.120	20.4	0.739	–35.8
0.9	0.784	–140.2	1.687	86.0	0.118	17.1	0.719	–38.6
1.0	0.778	–148.0	1.557	80.6	0.114	14.7	0.704	–41.7
1.1	0.774	–154.9	1.443	75.4	0.108	13.0	0.692	–44.7
1.2	0.771	–161.5	1.351	70.3	0.101	12.1	0.680	–48.1
1.3	0.773	–167.1	1.264	66.0	0.094	12.3	0.672	–51.5
1.4	0.772	–172.3	1.185	61.5	0.087	14.1	0.665	–55.2
1.5	0.773	–177.2	1.117	57.5	0.080	17.4	0.660	–58.9
1.6	0.774	178.0	1.062	53.6	0.073	22.3	0.657	–62.8
1.7	0.780	173.7	1.005	49.9	0.069	29.9	0.653	–66.9
1.8	0.779	169.1	0.955	46.4	0.067	39.3	0.651	–71.3
1.9	0.783	165.3	0.909	43.0	0.069	49.2	0.648	–75.9
2.0	0.786	161.0	0.867	39.4	0.075	58.4	0.649	–80.4
2.1	0.793	157.4	0.822	36.6	0.084	65.5	0.648	–85.2
2.2	0.793	154.2	0.789	34.5	0.096	70.7	0.649	–89.9
2.3	0.800	150.9	0.753	32.2	0.110	73.8	0.649	–94.9
2.4	0.800	148.0	0.716	29.8	0.126	75.5	0.653	–99.7
2.5	0.802	145.1	0.689	28.3	0.143	75.4	0.654	–104.5
2.6	0.804	142.3	0.656	26.1	0.160	74.2	0.655	–109.2
2.7	0.804	140.3	0.633	24.8	0.173	72.2	0.656	–113.5
2.8	0.809	138.6	0.607	23.1	0.182	71.6	0.660	–117.7
2.9	0.810	136.0	0.590	21.9	0.195	71.9	0.659	–122.0
3.0	0.817	133.4	0.570	21.7	0.213	71.5	0.662	–126.7
4.0	0.831	113.2	0.486	15.0	0.380	49.5	0.675	–174.2
5.0	0.842	100.7	0.468	8.2	0.445	28.0	0.720	143.3

V_{CE} = 2 V, I_C = 3 mA, Z_O = 50 Ω

Frequency (GHz)	S_{11} MAG.	S_{11} ANG. (deg.)	S_{21} MAG.	S_{21} ANG. (deg.)	S_{12} MAG.	S_{12} ANG. (deg.)	S_{22} MAG.	S_{22} ANG. (deg.)
0.1	0.878	–32.8	9.466	159.1	0.033	72.4	0.950	–13.5
0.2	0.821	–62.6	8.449	139.3	0.057	57.8	0.850	–23.8
0.3	0.773	–87.1	7.237	125.1	0.070	47.4	0.748	–30.5
0.4	0.721	–105.2	6.092	113.9	0.079	40.4	0.666	–34.8
0.5	0.689	–119.6	5.200	105.1	0.084	36.3	0.602	–37.6
0.6	0.670	–131.7	4.528	98.2	0.086	33.5	0.557	–39.9
0.7	0.656	–141.6	3.977	92.0	0.087	32.2	0.522	–41.5
0.8	0.649	–149.6	3.542	86.5	0.087	31.9	0.495	–43.5
0.9	0.641	–156.5	3.200	81.8	0.087	32.3	0.474	–45.4
1.0	0.641	–163.1	2.912	77.4	0.088	33.6	0.457	–47.6
1.1	0.638	–168.2	2.678	73.3	0.088	35.3	0.443	–50.1
1.2	0.642	–173.3	2.483	69.2	0.088	37.5	0.431	–52.8
1.3	0.644	–177.8	2.309	65.6	0.089	40.1	0.421	–55.8
1.4	0.644	178.0	2.158	62.0	0.091	43.1	0.415	–59.0
1.5	0.647	173.9	2.029	58.5	0.094	46.3	0.408	–62.4
1.6	0.651	170.2	1.919	55.2	0.097	49.4	0.403	–66.0
1.7	0.656	166.9	1.814	52.0	0.102	52.3	0.399	–70.0
1.8	0.663	162.9	1.721	48.6	0.107	55.0	0.396	–74.1
1.9	0.666	159.9	1.638	45.6	0.114	57.3	0.394	–78.5
2.0	0.672	156.7	1.560	42.2	0.121	59.7	0.394	–82.9
2.1	0.679	153.5	1.484	39.3	0.130	61.3	0.394	–87.5
2.2	0.684	150.9	1.426	36.9	0.139	62.5	0.396	–92.1
2.3	0.693	148.3	1.363	34.3	0.149	63.2	0.398	–97.0
2.4	0.695	146.0	1.302	31.7	0.160	63.4	0.403	–101.8
2.5	0.702	143.9	1.251	29.4	0.172	63.1	0.408	–106.4
2.6	0.706	141.4	1.196	26.5	0.184	62.3	0.415	–111.0
2.7	0.712	140.1	1.149	24.7	0.193	60.8	0.420	–115.2
2.8	0.722	138.5	1.105	22.5	0.199	60.5	0.427	–119.4
2.9	0.726	136.2	1.077	20.1	0.208	60.9	0.430	–123.6
3.0	0.732	134.0	1.037	18.7	0.221	60.9	0.436	–128.0
4.0	0.794	116.1	0.771	1.6	0.354	46.4	0.492	–173.4
5.0	0.839	102.8	0.595	–7.9	0.426	28.0	0.612	144.0

V_{CE} = 2 V, I_C = 5 mA, Z_O = 50 Ω

Frequency (GHz)	S_{11} MAG.	S_{11} ANG. (deg.)	S_{21} MAG.	S_{21} ANG. (deg.)	S_{12} MAG.	S_{12} ANG. (deg.)	S_{22} MAG.	S_{22} ANG. (deg.)
0.1	0.809	–40.7	14.445	153.7	0.031	66.0	0.910	–19.0
0.2	0.734	–76.3	12.020	132.0	0.050	54.3	0.757	–31.5
0.3	0.678	–101.4	9.665	117.7	0.060	46.1	0.629	–38.2
0.4	0.633	–119.1	7.866	107.6	0.066	42.0	0.539	–41.7
0.5	0.607	–132.3	6.561	99.8	0.069	40.4	0.477	–43.6
0.6	0.595	–143.5	5.632	93.8	0.073	40.0	0.432	–45.4
0.7	0.587	–151.9	4.903	88.3	0.075	40.7	0.400	–46.5
0.8	0.581	–159.1	4.333	83.6	0.078	42.0	0.376	–47.8
0.9	0.579	–164.9	3.897	79.4	0.081	43.6	0.356	–49.4
1.0	0.582	–170.2	3.533	75.6	0.084	45.5	0.340	–51.4
1.1	0.583	–174.9	3.240	71.9	0.088	47.4	0.327	–53.6
1.2	0.586	–179.4	3.000	68.3	0.092	49.2	0.316	–56.3
1.3	0.588	176.9	2.778	65.1	0.096	51.0	0.307	–59.2
1.4	0.592	173.3	2.595	61.8	0.101	52.9	0.300	–62.6
1.5	0.596	169.7	2.437	58.7	0.107	54.5	0.293	–66.0
1.6	0.599	166.4	2.304	55.6	0.113	55.9	0.288	–69.8
1.7	0.607	163.2	2.177	52.7	0.119	57.2	0.284	–73.9
1.8	0.612	159.9	2.062	49.6	0.126	58.2	0.282	–78.4
1.9	0.615	157.2	1.960	46.7	0.134	58.9	0.280	–83.1
2.0	0.626	154.1	1.866	43.6	0.142	59.7	0.280	–87.7
2.1	0.634	151.6	1.779	40.8	0.150	60.1	0.281	–92.7
2.2	0.638	149.1	1.707	38.5	0.159	60.2	0.283	–97.5
2.3	0.646	146.7	1.640	36.0	0.168	60.2	0.287	–102.5
2.4	0.651	144.8	1.567	33.5	0.178	59.9	0.292	–107.4
2.5	0.657	142.7	1.503	31.2	0.189	59.1	0.298	–112.2
2.6	0.663	140.8	1.440	28.6	0.199	58.1	0.306	–116.7
2.7	0.672	139.5	1.387	26.7	0.207	56.6	0.313	–121.1
2.8	0.681	138.1	1.339	24.3	0.211	56.2	0.321	–125.2
2.9	0.686	135.9	1.305	22.0	0.219	56.4	0.325	–129.4
3.0	0.695	134.0	1.263	20.3	0.230	56.3	0.331	–133.6
4.0	0.766	117.6	0.936	1.3	0.343	43.8	0.399	–177.3
5.0	0.834	104.1	0.710	–11.2	0.415	27.5	0.547	142.1

V_{CE} = 2 V, I_C = 7 mA, Z_O = 50 Ω

Frequency (GHz)	S_{11} MAG.	S_{11} ANG. (deg.)	S_{21} MAG.	S_{21} ANG. (deg.)	S_{12} MAG.	S_{12} ANG. (deg.)	S_{22} MAG.	S_{22} ANG. (deg.)
0.1	0.750	–48.3	18.478	149.4	0.029	65.5	0.870	–23.5
0.2	0.666	–86.4	14.439	126.5	0.044	52.5	0.682	–37.1
0.3	0.615	–111.7	11.202	112.9	0.052	46.9	0.545	–43.4
0.4	0.578	–128.7	8.918	103.6	0.058	44.7	0.457	–46.3
0.5	0.563	–140.7	7.370	96.4	0.062	45.0	0.397	–47.7
0.6	0.553	–151.0	6.260	91.0	0.066	45.8	0.356	–49.0
0.7	0.546	–158.5	5.415	86.1	0.071	47.4	0.327	–49.8
0.8	0.546	–165.0	4.769	81.8	0.075	48.9	0.305	–50.9
0.9	0.546	–170.1	4.296	78.0	0.080	50.7	0.287	–52.5
1.0	0.550	–174.9	3.887	74.5	0.085	52.3	0.272	–54.5
1.1	0.551	–178.9	3.555	71.1	0.090	53.9	0.260	–56.6
1.2	0.556	177.0	3.286	67.7	0.096	55.1	0.250	–59.5
1.3	0.560	173.6	3.042	64.8	0.102	56.1	0.241	–62.5
1.4	0.563	170.2	2.837	61.7	0.108	57.2	0.235	–66.1
1.5	0.567	166.8	2.662	58.7	0.115	58.1	0.228	–69.9
1.6	0.575	163.9	2.519	55.8	0.122	58.6	0.224	–73.9
1.7	0.581	161.1	2.378	53.1	0.130	59.1	0.220	–78.5
1.8	0.587	157.8	2.253	50.1	0.137	59.5	0.218	–83.5
1.9	0.590	155.4	2.141	47.5	0.145	59.6	0.217	–88.5
2.0	0.600	152.4	2.042	44.4	0.153	59.7	0.218	–93.6
2.1	0.608	150.1	1.946	41.8	0.162	59.6	0.220	–99.0
2.2	0.611	148.0	1.869	39.4	0.171	59.4	0.223	–104.2
2.3	0.621	145.8	1.790	37.1	0.180	58.9	0.227	–109.4
2.4	0.627	143.8	1.712	34.8	0.189	58.3	0.233	–114.4
2.5	0.632	142.1	1.646	32.5	0.199	57.3	0.240	–119.3
2.6	0.637	140.2	1.574	29.9	0.209	56.1	0.249	–123.8
2.7	0.646	139.2	1.522	28.1	0.215	54.5	0.257	–128.2
2.8	0.658	137.5	1.467	25.7	0.220	54.0	0.265	–132.3
2.9	0.663	135.6	1.431	23.3	0.226	54.1	0.270	–136.4
3.0	0.670	133.9	1.385	21.8	0.236	53.8	0.276	–140.4
4.0	0.749	118.2	1.039	2.3	0.339	41.9	0.349	177.5
5.0	0.822	105.0	0.785	–11.5	0.407	26.9	0.510	139.5

V_{CE} = 2 V, I_C = 10 mA, Z_O = 50 Ω

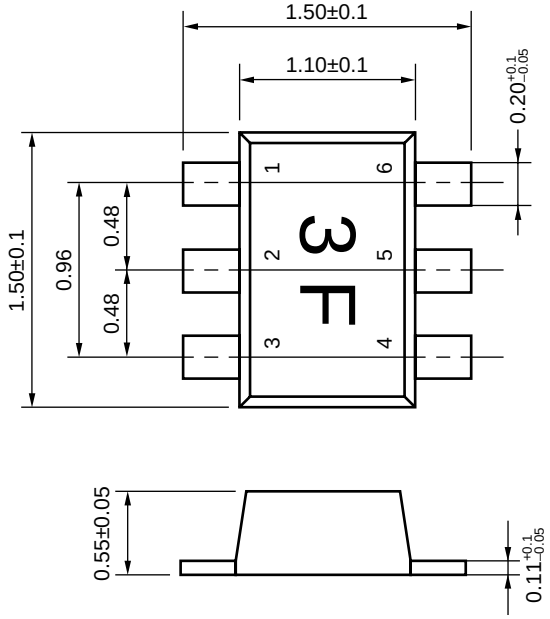
Frequency (GHz)	S_{11} MAG.	S_{11} ANG. (deg.)	S_{21} MAG.	S_{21} ANG. (deg.)	S_{12} MAG.	S_{12} ANG. (deg.)	S_{22} MAG.	S_{22} ANG. (deg.)
0.1	0.674	–58.6	23.287	144.2	0.027	64.1	0.815	–29.1
0.2	0.598	–99.1	16.892	120.9	0.039	52.1	0.594	–43.4
0.3	0.557	–123.3	12.619	108.1	0.046	49.4	0.458	–48.9
0.4	0.531	–138.4	9.887	99.8	0.052	49.4	0.375	–51.2
0.5	0.518	–149.6	8.083	93.4	0.057	51.0	0.322	–52.0
0.6	0.517	–158.4	6.837	88.5	0.062	52.5	0.285	–53.2
0.7	0.516	–165.0	5.894	84.2	0.068	54.1	0.259	–53.8
0.8	0.517	–170.4	5.186	80.3	0.075	55.6	0.239	–54.8
0.9	0.517	–175.1	4.645	76.7	0.081	57.1	0.223	–56.4
1.0	0.520	–179.2	4.196	73.7	0.087	58.3	0.210	–58.6
1.1	0.525	177.0	3.840	70.5	0.094	59.1	0.199	–60.9
1.2	0.528	173.6	3.545	67.3	0.101	59.7	0.189	–64.2
1.3	0.534	170.4	3.280	64.4	0.108	60.1	0.181	–67.7
1.4	0.538	167.5	3.060	61.5	0.116	60.5	0.176	–71.8
1.5	0.546	164.5	2.868	58.7	0.123	60.8	0.170	–76.3
1.6	0.550	161.5	2.708	56.0	0.131	60.7	0.167	–81.1
1.7	0.558	159.2	2.556	53.5	0.139	60.7	0.164	–86.3
1.8	0.564	156.0	2.420	50.6	0.147	60.4	0.163	–92.1
1.9	0.569	153.8	2.303	48.2	0.156	60.0	0.163	–97.9
2.0	0.579	150.8	2.194	45.0	0.164	59.7	0.165	–103.6
2.1	0.587	148.8	2.087	42.7	0.173	59.3	0.169	–109.7
2.2	0.590	146.5	2.007	40.3	0.181	58.6	0.173	–115.1
2.3	0.599	144.5	1.926	38.1	0.190	57.9	0.179	–120.7
2.4	0.607	142.8	1.844	35.8	0.199	57.0	0.187	–125.7
2.5	0.610	141.1	1.769	33.6	0.209	55.9	0.195	–130.3
2.6	0.617	139.3	1.695	31.1	0.218	54.4	0.205	–134.7
2.7	0.629	138.5	1.640	29.3	0.224	52.8	0.214	–138.8
2.8	0.639	137.3	1.583	27.1	0.228	52.3	0.223	–142.8
2.9	0.643	135.1	1.547	24.7	0.234	52.2	0.228	–146.9
3.0	0.652	133.3	1.499	23.0	0.244	51.8	0.233	–150.5
4.0	0.733	118.6	1.125	3.7	0.336	39.9	0.312	170.0
5.0	0.812	105.7	0.858	–10.9	0.400	26.1	0.477	135.9

V_{CE} = 2 V, I_C = 20 mA, Z_O = 50 Ω

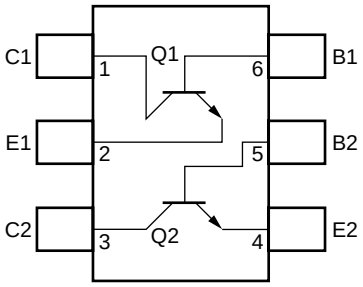
Frequency (GHz)	S_{11} MAG.	S_{11} ANG. (deg.)	S_{21} MAG.	S_{21} ANG. (deg.)	S_{12} MAG.	S_{12} ANG. (deg.)	S_{22} MAG.	S_{22} ANG. (deg.)
0.1	0.528	–81.5	31.976	133.4	0.022	59.6	0.681	–40.7
0.2	0.487	–124.3	20.409	111.5	0.031	55.8	0.436	–54.6
0.3	0.475	–143.7	14.456	100.8	0.038	57.2	0.317	–58.8
0.4	0.472	–155.2	11.107	94.2	0.045	59.5	0.251	–60.4
0.5	0.472	–163.4	8.988	89.0	0.053	62.1	0.209	–61.0
0.6	0.477	–170.1	7.554	85.1	0.060	63.4	0.182	–62.5
0.7	0.479	–175.1	6.482	81.3	0.068	64.3	0.161	–63.6
0.8	0.482	–179.1	5.689	78.0	0.076	65.0	0.145	–65.0
0.9	0.485	177.4	5.099	74.9	0.085	65.3	0.133	–67.7
1.0	0.490	173.8	4.584	72.1	0.093	65.4	0.122	–71.3
1.1	0.495	171.2	4.194	69.2	0.102	65.4	0.113	–75.1
1.2	0.503	168.3	3.865	66.4	0.110	65.1	0.107	–80.6
1.3	0.506	165.7	3.575	63.8	0.118	64.6	0.101	–86.3
1.4	0.512	163.1	3.330	61.1	0.127	64.2	0.099	–93.0
1.5	0.520	160.5	3.120	58.6	0.136	63.7	0.097	–100.0
1.6	0.522	158.1	2.942	56.1	0.144	62.9	0.097	–107.2
1.7	0.530	155.9	2.777	53.6	0.153	62.3	0.098	–114.7
1.8	0.539	153.2	2.625	51.1	0.162	61.4	0.103	–122.0
1.9	0.543	150.9	2.496	48.8	0.170	60.5	0.107	–128.9
2.0	0.553	148.5	2.375	46.0	0.179	59.7	0.114	–135.0
2.1	0.561	146.4	2.266	43.6	0.188	58.7	0.122	–140.7
2.2	0.565	144.6	2.174	41.5	0.197	57.7	0.130	–145.6
2.3	0.578	142.4	2.091	39.2	0.205	56.7	0.139	–150.1
2.4	0.583	141.0	1.999	37.1	0.214	55.5	0.149	–154.1
2.5	0.586	139.6	1.922	35.0	0.224	54.0	0.160	–157.3
2.6	0.593	138.0	1.844	32.7	0.232	52.4	0.171	–160.1
2.7	0.603	137.3	1.782	31.0	0.238	50.7	0.182	–163.2
2.8	0.615	136.0	1.726	28.9	0.241	50.0	0.192	–166.4
2.9	0.620	134.1	1.686	26.5	0.247	49.8	0.199	–169.7
3.0	0.625	132.4	1.634	24.8	0.256	49.1	0.203	–172.8
4.0	0.713	118.7	1.231	5.8	0.336	36.9	0.285	154.7
5.0	0.798	106.3	0.954	–9.3	0.392	24.4	0.452	127.9

PACKAGE DIMENSIONS

FLAT-LEAD 6-PIN THIN-TYPE ULTRA SUPER MINIMOLD (UNIT: mm)



(Top View)



PIN CONNECTIONS

1. Collector (Q1)
2. Emitter (Q1)
3. Collector (Q2)
4. Emitter (Q2)
5. Base (Q2)
6. Base (Q1)

- **The information in this document is current as of June, 2002. The information is subject to change without notice. For actual design-in, refer to the latest publications of NEC's data sheets or data books, etc., for the most up-to-date specifications of NEC semiconductor products. Not all products and/or types are available in every country. Please check with an NEC sales representative for availability and additional information.**
- No part of this document may be copied or reproduced in any form or by any means without prior written consent of NEC. NEC assumes no responsibility for any errors that may appear in this document.
- NEC does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from the use of NEC semiconductor products listed in this document or any other liability arising from the use of such products. No license, express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC or others.
- Descriptions of circuits, software and other related information in this document are provided for illustrative purposes in semiconductor product operation and application examples. The incorporation of these circuits, software and information in the design of customer's equipment shall be done under the full responsibility of customer. NEC assumes no responsibility for any losses incurred by customers or third parties arising from the use of these circuits, software and information.
- While NEC endeavours to enhance the quality, reliability and safety of NEC semiconductor products, customers agree and acknowledge that the possibility of defects thereof cannot be eliminated entirely. To minimize risks of damage to property or injury (including death) to persons arising from defects in NEC semiconductor products, customers must incorporate sufficient safety measures in their design, such as redundancy, fire-containment, and anti-failure features.
- NEC semiconductor products are classified into the following three quality grades:
  "Standard", "Special" and "Specific". The "Specific" quality grade applies only to semiconductor products developed based on a customer-designated "quality assurance program" for a specific application. The recommended applications of a semiconductor product depend on its quality grade, as indicated below. Customers must check the quality grade of each semiconductor product 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": Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems and medical equipment for life support, etc.
  The quality grade of NEC semiconductor products is "Standard" unless otherwise expressly specified in NEC's data sheets or data books, etc. If customers wish to use NEC semiconductor products in applications not intended by NEC, they must contact an NEC sales representative in advance to determine NEC's willingness to support a given application.
  (Note)
  (1) "NEC" as used in this statement means NEC Corporation, NEC Compound Semiconductor Devices, Ltd. and also includes its majority-owned subsidiaries.
  (2) "NEC semiconductor products" means any semiconductor product developed or manufactured by or for NEC (as defined above).

M8E 00.4-0110

►**Business issue**

NEC Compound Semiconductor Devices, Ltd.
5th Sales Group, Sales Division TEL: +81-3-3798-6372 FAX: +81-3-3798-6783 E-mail: salesinfo@csd-nec.com

NEC Compound Semiconductor Devices Hong Kong Limited
Hong Kong Head Office TEL: +852-3107-7303 FAX: +852-3107-7309
Taipei Branch Office TEL: +886-2-8712-0478 FAX: +886-2-2545-3859
Korea Branch Office TEL: +82-2-528-0301 FAX: +82-2-528-0302

NEC Electron Devices European Operations http://www.nec.de/
TEL: +49-211-6503-101 FAX: +49-211-6503-487

California Eastern Laboratories, Inc. http://www.cel.com/
TEL: +1-408-988-3500 FAX: +1-408-988-0279

►**Technical issue**

NEC Compound Semiconductor Devices, Ltd. http://www.csd-nec.com/
Sales Engineering Group, Sales Division
E-mail: techinfo@csd-nec.com FAX: +81-44-435-1918