

2SC4784

Silicon NPN Epitaxial

REJ03G0730-0300
(Previous ADE-208-1121A)
Rev.3.00
Aug.10.2005

Application

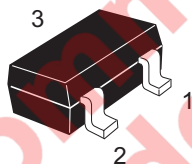
VHF / UHF wide band amplifier

Features

- High gain bandwidth product
 $f_T = 10$ GHz Typ.
- High gain, low noise figure
PG = 15.0 dB Typ, NF = 1.2 dB Typ at $f = 900$ MHz

Outline

RENESAS Package code: PTSP0003ZA-A
(Package name: CMPAK[®])



1. Emitter
2. Base
3. Collector

Note: Marking is "YA-".

*CMPAK is a trademark of Renesas Technology Corp.

Attention: This is electrostatic sensitive device.

Absolute Maximum Ratings

($T_a = 25^\circ\text{C}$)

Item	Symbol	Ratings	Unit
Collector to base voltage	V_{CBO}	15	V
Collector to emitter voltage	V_{CEO}	8	V
Emitter to base voltage	V_{EBO}	1.5	V
Collector current	I_C	20	mA
Collector power dissipation	P_C	100	mW
Junction temperature	T_j	150	$^\circ\text{C}$
Storage temperature	T_{stg}	-55 to +150	$^\circ\text{C}$

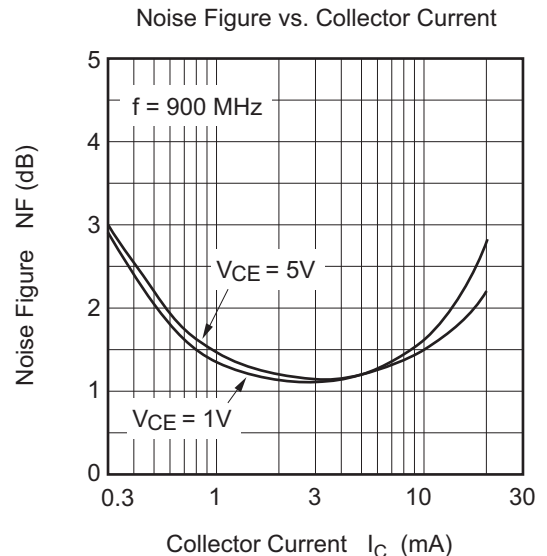
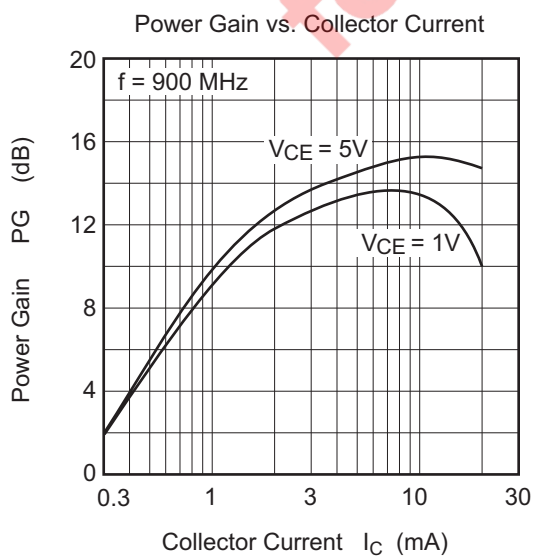
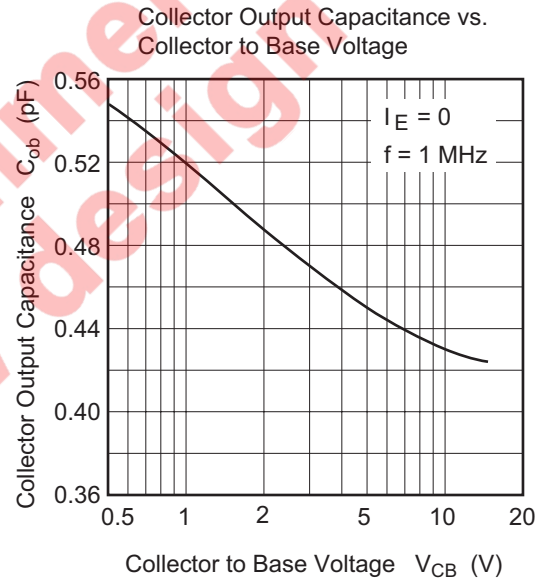
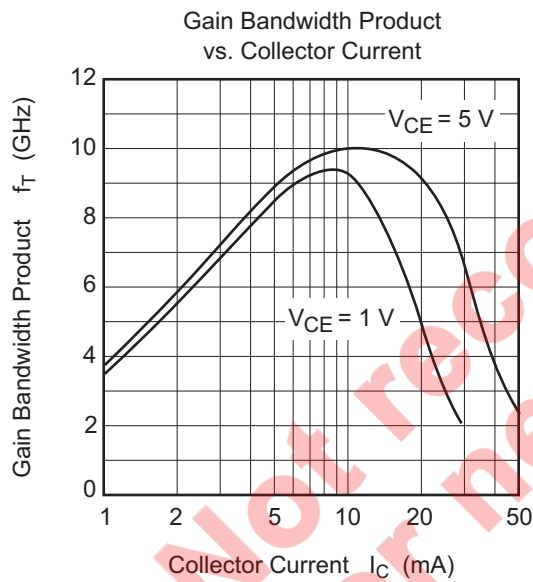
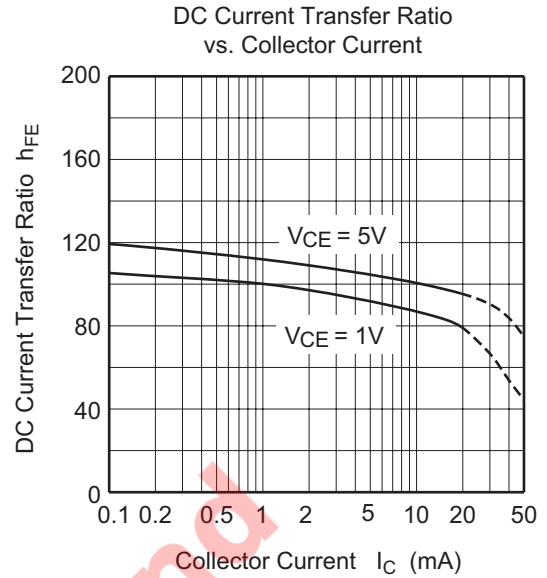
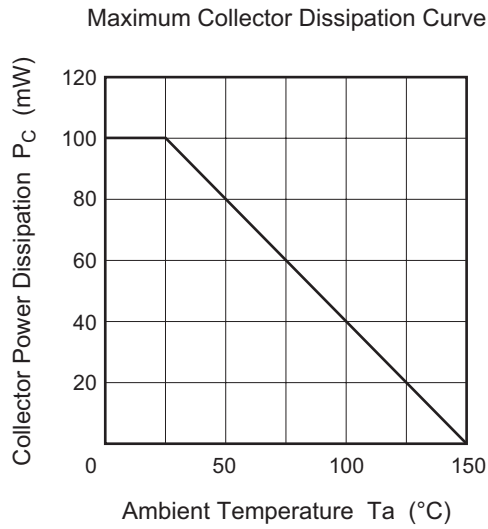
Electrical Characteristics

(Ta = 25°C)

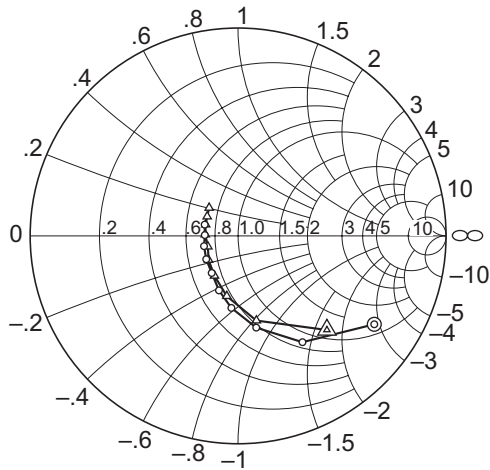
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector cutoff current	I_{CBO}	—	—	10	μA	$V_{CB} = 15\text{ V}, I_E = 0$
	I_{CEO}	—	—	1	mA	$V_{CE} = 8\text{ V}, R_{BE} = \infty$
Emitter cutoff current	I_{EBO}	—	—	10	μA	$V_{EB} = 1.5\text{ V}, I_C = 0$
DC current transfer ratio	h_{FE}	50	120	250		$V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$
Collector output capacitance	C_{ob}	—	0.45	0.8	pF	$V_{CB} = 5\text{ V}, I_E = 0, f = 1\text{ MHz}$
Gain bandwidth product	f_T	7.0	10.0	—	GHz	$V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$
Power gain	PG	12.0	15.0	—	dB	$V_{CE} = 5\text{ V}, I_C = 10\text{ mA},$ $f = 900\text{ MHz}$
Noise figure	NF	—	1.2	2.5	dB	$V_{CE} = 5\text{ V}, I_C = 5\text{ mA},$ $f = 900\text{ MHz}$

Not recommend
for new design

Main Characteristics

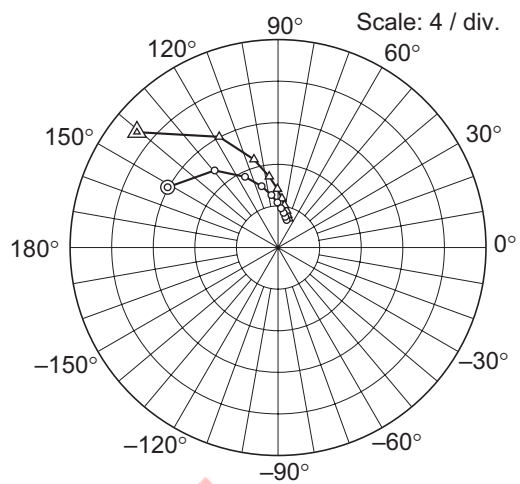


S11 Parameter vs. Frequency



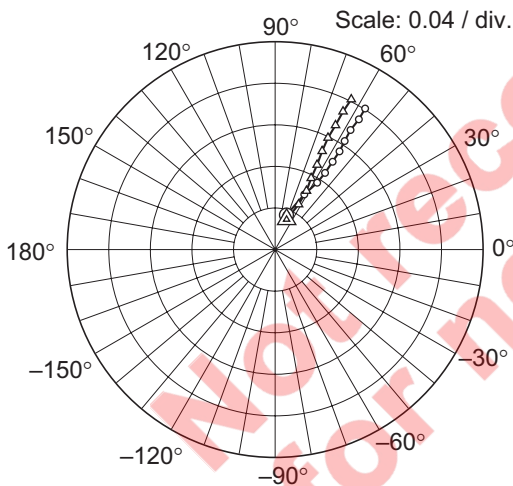
Condition: $V_{CE} = 5\text{ V}$, $Z_o = 50\ \Omega$
 200 to 2000 MHz (200 MHz step)
 ○ — ○ ($I_C = 5\text{ mA}$)
 △ — △ ($I_C = 10\text{ mA}$)

S21 Parameter vs. Frequency



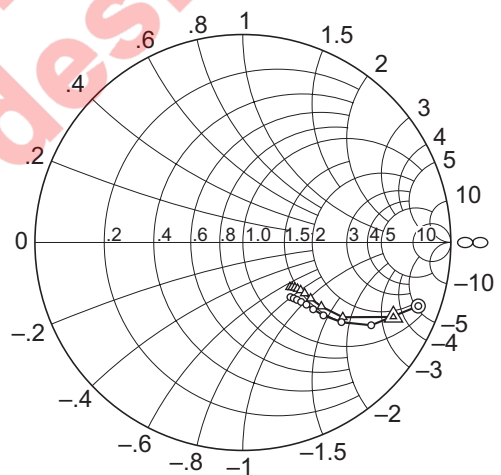
Condition: $V_{CE} = 5\text{ V}$, $Z_o = 50\ \Omega$
 200 to 2000 MHz (200 MHz step)
 ○ — ○ ($I_C = 5\text{ mA}$)
 △ — △ ($I_C = 10\text{ mA}$)

S12 Parameter vs. Frequency



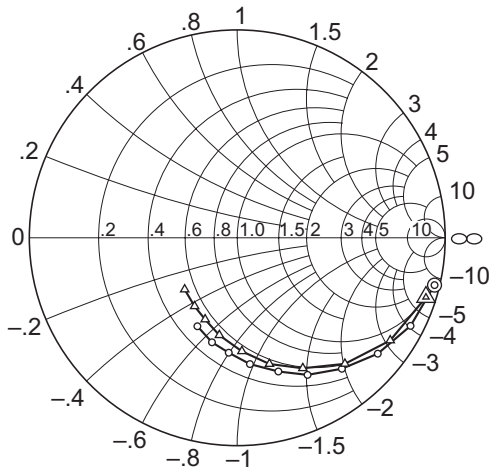
Condition: $V_{CE} = 5\text{ V}$, $Z_o = 50\ \Omega$
 200 to 2000 MHz (200 MHz step)
 ○ — ○ ($I_C = 5\text{ mA}$)
 △ — △ ($I_C = 10\text{ mA}$)

S22 Parameter vs. Frequency



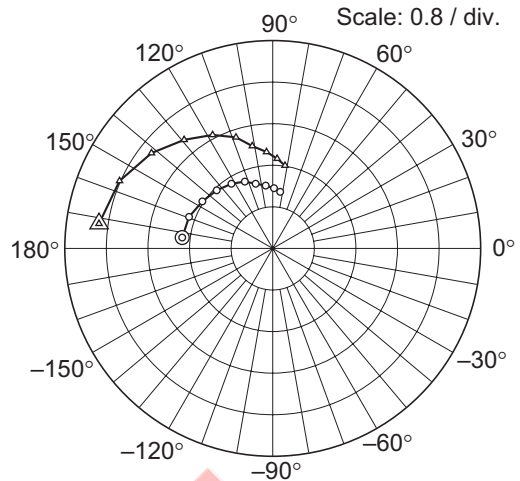
Condition: $V_{CE} = 5\text{ V}$, $Z_o = 50\ \Omega$
 200 to 2000 MHz (200 MHz step)
 ○ — ○ ($I_C = 5\text{ mA}$)
 △ — △ ($I_C = 10\text{ mA}$)

S11 Parameter vs. Frequency



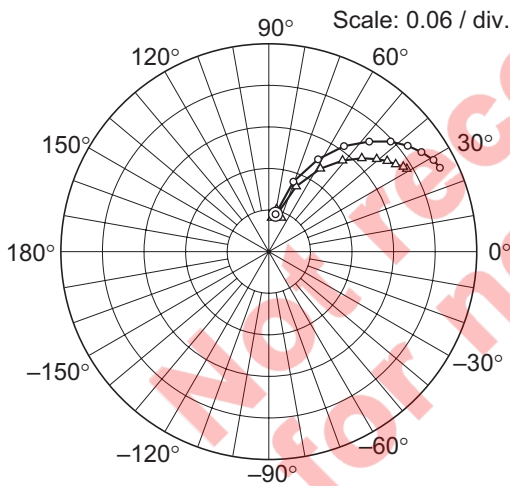
Condition: $V_{CE} = 1\text{ V}$, $Z_o = 50\ \Omega$
 200 to 2000 MHz (200 MHz step)
 ○ (IC = 0.5 mA)
 △ (IC = 1 mA)

S21 Parameter vs. Frequency



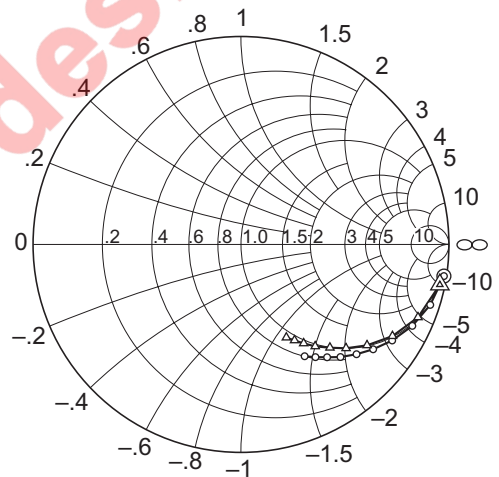
Condition: $V_{CE} = 1\text{ V}$, $Z_o = 50\ \Omega$
 200 to 2000 MHz (200 MHz step)
 ○ (IC = 0.5 mA)
 △ (IC = 1 mA)

S12 Parameter vs. Frequency



Condition: $V_{CE} = 1\text{ V}$, $Z_o = 50\ \Omega$
 200 to 2000 MHz (200 MHz step)
 ○ (IC = 0.5 mA)
 △ (IC = 1 mA)

S22 Parameter vs. Frequency



Condition: $V_{CE} = 1\text{ V}$, $Z_o = 50\ \Omega$
 200 to 2000 MHz (200 MHz step)
 ○ (IC = 0.5 mA)
 △ (IC = 1 mA)

S Parameter

(V_{CE} = 5 V, I_C = 5 mA, Z_O = 50 Ω, Emitter Common)

Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100	0.850	-17.1	13.203	164.8	0.018	80.4	0.965	-10.5
200	0.781	-33.0	12.116	151.3	0.035	72.0	0.898	-19.9
300	0.689	-47.5	10.894	139.0	0.049	65.9	0.815	-27.5
400	0.598	-58.8	9.620	129.5	0.060	62.2	0.735	-32.8
500	0.523	-69.4	8.489	121.6	0.069	59.5	0.667	-36.4
600	0.450	-78.8	7.534	115.1	0.076	57.9	0.610	-38.9
700	0.394	-87.1	6.760	109.9	0.083	57.1	0.563	-40.6
800	0.348	-95.3	6.129	105.1	0.088	57.0	0.523	-42.1
900	0.306	-102.7	5.550	100.7	0.095	56.6	0.493	-42.7
1000	0.278	-109.3	5.113	97.4	0.101	56.8	0.467	-43.5
1100	0.243	-117.8	4.716	94.0	0.107	57.0	0.445	-44.2
1200	0.219	-125.4	4.342	91.0	0.113	56.8	0.428	-44.3
1300	0.203	-132.4	4.057	88.5	0.118	57.1	0.416	-45.1
1400	0.190	-143.7	3.804	85.9	0.124	57.4	0.401	-45.5
1500	0.167	-153.7	3.580	83.8	0.130	57.5	0.390	-45.9
1600	0.171	-163.2	3.391	81.1	0.136	57.8	0.380	-46.6
1700	0.161	-172.5	3.207	79.2	0.143	57.7	0.371	-47.0
1800	0.160	178.6	3.051	77.1	0.149	57.3	0.364	-47.6
1900	0.167	169.4	2.921	75.0	0.155	57.6	0.356	-48.3
2000	0.170	161.4	2.788	73.1	0.161	57.5	0.349	-48.9

S Parameter

(V_{CE} = 5 V, I_C = 10 mA, Z_O = 50 Ω, Emitter Common)

Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100	0.730	-25.1	20.636	158.3	0.017	77.3	0.929	-15.0
200	0.622	-46.7	17.551	140.7	0.031	69.3	0.808	-26.3
300	0.508	-64.4	14.512	127.1	0.041	64.0	0.689	-33.0
400	0.417	-77.8	12.064	118.0	0.049	62.8	0.600	-36.8
500	0.349	-89.5	10.223	111.0	0.057	62.1	0.534	-38.7
600	0.295	-100.6	8.803	105.3	0.064	62.1	0.487	-39.2
700	0.256	-110.7	7.735	101.0	0.070	62.9	0.451	-39.3
800	0.223	-120.6	6.899	97.1	0.077	63.4	0.423	-39.6
900	0.195	-129.7	6.178	93.5	0.084	63.6	0.403	-39.4
1000	0.183	-140.7	5.644	90.7	0.091	63.8	0.385	-39.5
1100	0.173	-151.8	5.167	88.0	0.098	64.3	0.372	-39.6
1200	0.154	-160.4	4.743	85.5	0.105	64.6	0.361	-39.6
1300	0.158	-171.4	4.423	83.5	0.112	64.5	0.353	-40.0
1400	0.158	177.6	4.121	81.4	0.119	64.8	0.345	-40.3
1500	0.157	165.9	3.866	79.1	0.126	64.7	0.338	-40.6
1600	0.165	160.7	3.648	77.0	0.133	64.2	0.332	-41.0
1700	0.172	154.4	3.460	75.1	0.141	64.1	0.327	-41.8
1800	0.176	147.9	3.277	73.7	0.148	63.9	0.321	-42.3
1900	0.187	140.9	3.129	71.6	0.155	63.7	0.317	-42.8
2000	0.194	136.0	2.982	69.8	0.162	63.2	0.312	-43.5

S Parameter

 $(V_{CE} = 1 \text{ V}, I_C = 0.5 \text{ mA}, Z_O = 50 \Omega, \text{Emitter Common})$

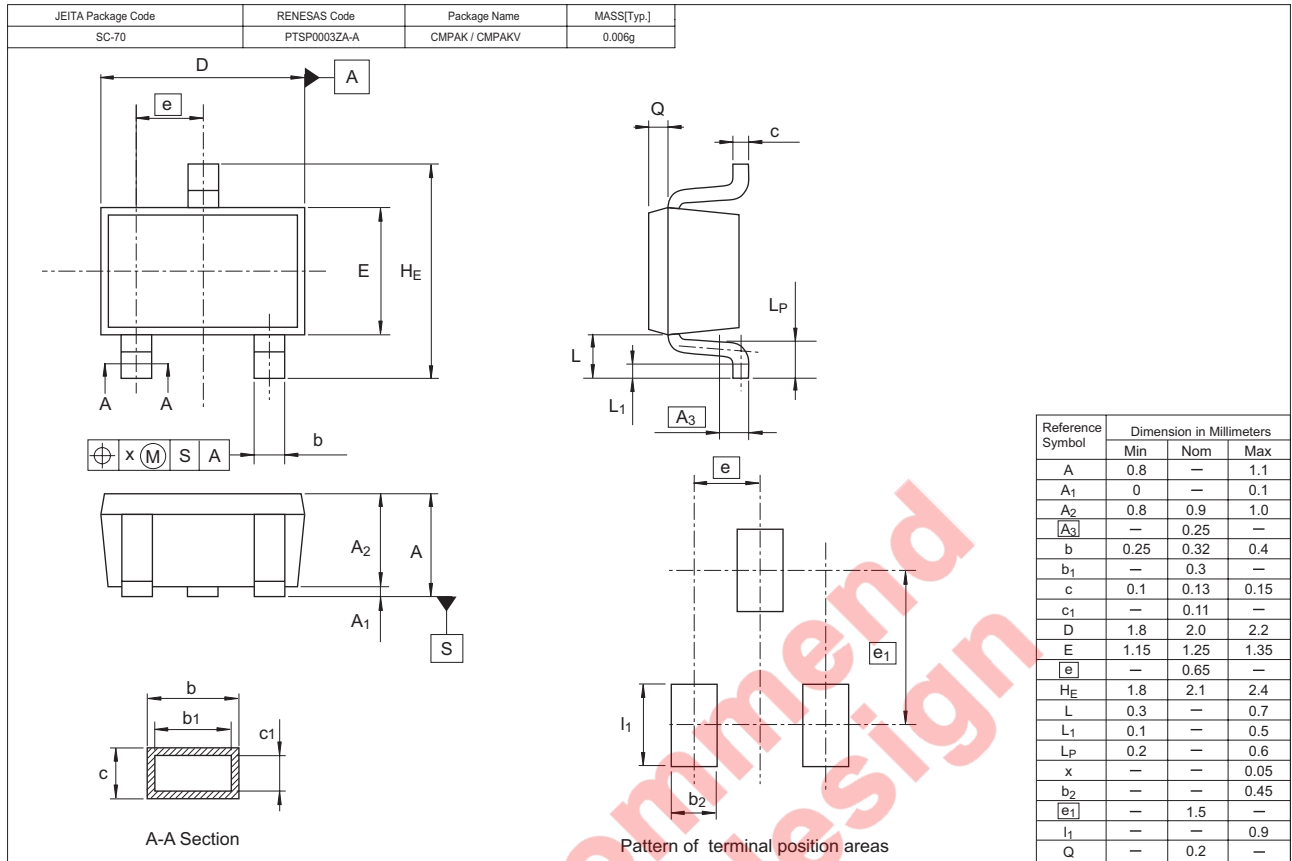
Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100	0.983	-6.8	1.755	173.2	0.027	84.6	0.995	-4.5
200	0.975	-13.4	1.721	166.6	0.055	79.9	0.987	-8.8
300	0.957	-20.2	1.722	159.4	0.082	75.0	0.974	-13.3
400	0.933	-26.9	1.706	152.9	0.107	70.6	0.956	-17.7
500	0.910	-33.2	1.629	146.3	0.130	66.2	0.937	-21.4
600	0.879	-39.5	1.597	139.8	0.151	61.9	0.913	-25.4
700	0.845	-45.8	1.553	134.0	0.170	58.1	0.890	-28.9
800	0.804	-51.4	1.528	128.1	0.187	54.4	0.862	-32.4
900	0.778	-57.3	1.475	122.6	0.203	51.1	0.838	-35.2
1000	0.739	-62.9	1.432	117.8	0.215	47.6	0.813	-38.4
1100	0.706	-68.6	1.392	112.7	0.227	44.9	0.790	-41.1
1200	0.671	-73.0	1.317	107.8	0.237	42.1	0.767	-43.5
1300	0.643	-78.5	1.286	104.8	0.245	39.7	0.745	-46.1
1400	0.609	-84.4	1.261	100.0	0.252	37.3	0.723	-48.5
1500	0.573	-88.6	1.215	96.4	0.258	35.3	0.702	-50.4
1600	0.553	-94.4	1.186	92.6	0.263	33.1	0.683	-52.6
1700	0.531	-100.1	1.158	88.8	0.267	31.1	0.667	-54.5
1800	0.516	-103.8	1.128	85.7	0.272	29.1	0.650	-56.5
1900	0.485	-109.6	1.098	82.5	0.273	27.7	0.634	-58.4
2000	0.466	-114.5	1.070	78.9	0.275	26.1	0.619	-60.3

S Parameter

 $(V_{CE} = 1 \text{ V}, I_C = 1 \text{ mA}, Z_O = 50 \Omega, \text{Emitter Common})$

Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100	0.962	-8.8	3.376	172.0	0.027	83.7	0.991	-5.9
200	0.950	-17.5	3.268	164.5	0.054	78.2	0.975	-11.4
300	0.919	-26.2	3.223	156.2	0.080	72.6	0.951	-17.2
400	0.885	-33.8	3.139	148.7	0.102	67.2	0.920	-22.4
500	0.839	-41.8	2.969	141.8	0.123	62.2	0.887	-26.8
600	0.797	-49.5	2.833	135.1	0.141	58.1	0.851	-31.2
700	0.748	-56.3	2.699	129.2	0.157	54.5	0.815	-35.1
800	0.701	-63.3	2.611	123.2	0.169	51.1	0.776	-38.7
900	0.664	-69.9	2.473	117.9	0.181	47.9	0.743	-41.8
1000	0.625	-75.7	2.363	113.1	0.190	45.2	0.710	-44.7
1100	0.577	-82.3	2.254	108.3	0.198	43.0	0.680	-47.3
1200	0.545	-87.7	2.109	104.2	0.205	40.7	0.655	-49.3
1300	0.515	-93.8	2.011	101.3	0.210	39.1	0.633	-51.8
1400	0.475	-100.5	1.946	97.0	0.215	37.5	0.606	-54.0
1500	0.446	-105.5	1.863	93.7	0.219	36.2	0.584	-55.7
1600	0.421	-111.6	1.800	90.1	0.222	34.6	0.563	-57.7
1700	0.403	-117.9	1.732	87.2	0.225	33.7	0.545	-59.2
1800	0.387	-122.1	1.663	84.4	0.229	32.2	0.528	-60.9
1900	0.366	-129.0	1.614	81.6	0.230	31.7	0.512	-62.7
2000	0.354	-135.7	1.554	78.6	0.232	31.0	0.498	-64.1

Package Dimensions



Ordering Information

Part Name	Quantity	Shipping Container
2SC4784YA-TL-E	3000	φ 178 mm Reel, 8 mm Emboss Taping

Note: For some grades, production may be terminated. Please contact the Renesas sales office to check the state of production before ordering the product.

Renesas Technology Corp. Sales Strategic Planning Div. Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan

Keep safety first in your circuit designs!

1. Renesas Technology Corp. puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage. Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

Notes regarding these materials

1. These materials are intended as a reference to assist our customers in the selection of the Renesas Technology Corp. product best suited to the customer's application; they do not convey any license under any intellectual property rights, or any other rights, belonging to Renesas Technology Corp. or a third party.
2. Renesas Technology Corp. assumes no responsibility for any damage, or infringement of any third-party's rights, originating in the use of any product data, diagrams, charts, programs, algorithms, or circuit application examples contained in these materials.
3. All information contained in these materials, including product data, diagrams, charts, programs and algorithms represents information on products at the time of publication of these materials, and are subject to change by Renesas Technology Corp. without notice due to product improvements or other reasons. It is therefore recommended that customers contact Renesas Technology Corp. or an authorized Renesas Technology Corp. product distributor for the latest product information before purchasing a product listed herein.
The information described here may contain technical inaccuracies or typographical errors.
Renesas Technology Corp. assumes no responsibility for any damage, liability, or other loss rising from these inaccuracies or errors.
Please also pay attention to information published by Renesas Technology Corp. by various means, including the Renesas Technology Corp. Semiconductor home page (<http://www.renesas.com>).
4. When using any or all of the information contained in these materials, including product data, diagrams, charts, programs, and algorithms, please be sure to evaluate all information as a total system before making a final decision on the applicability of the information and products. Renesas Technology Corp. assumes no responsibility for any damage, liability or other loss resulting from the information contained herein.
5. Renesas Technology Corp. semiconductors are not designed or manufactured for use in a device or system that is used under circumstances in which human life is potentially at stake. Please contact Renesas Technology Corp. or an authorized Renesas Technology Corp. product distributor when considering the use of a product contained herein for any specific purposes, such as apparatus or systems for transportation, vehicular, medical, aerospace, nuclear, or undersea repeater use.
6. The prior written approval of Renesas Technology Corp. is necessary to reprint or reproduce in whole or in part these materials.
7. If these products or technologies are subject to the Japanese export control restrictions, they must be exported under a license from the Japanese government and cannot be imported into a country other than the approved destination.
Any diversion or reexport contrary to the export control laws and regulations of Japan and/or the country of destination is prohibited.
8. Please contact Renesas Technology Corp. for further details on these materials or the products contained therein.



RENEASAS SALES OFFICES

<http://www.renesas.com>

Refer to "<http://www.renesas.com/en/network>" for the latest and detailed information.

Renesas Technology America, Inc.

450 Holger Way, San Jose, CA 95134-1368, U.S.A
Tel: <1> (408) 382-7500, Fax: <1> (408) 382-7501

Renesas Technology Europe Limited

Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.
Tel: <44> (1628) 585-100, Fax: <44> (1628) 585-900

Renesas Technology Hong Kong Ltd.

7th Floor, North Tower, World Finance Centre, Harbour City, 1 Canton Road, Tsimshatsui, Kowloon, Hong Kong
Tel: <852> 2265-6688, Fax: <852> 2730-6071

Renesas Technology Taiwan Co., Ltd.

10th Floor, No.99, Fushing North Road, Taipei, Taiwan
Tel: <886> (2) 2715-2888, Fax: <886> (2) 2713-2999

Renesas Technology (Shanghai) Co., Ltd.

Unit2607 Ruijing Building, No.205 Maoming Road (S), Shanghai 200020, China
Tel: <86> (21) 6472-1001, Fax: <86> (21) 6415-2952

Renesas Technology Singapore Pte. Ltd.

1 Harbour Front Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: <65> 6213-0200, Fax: <65> 6278-8001

Renesas Technology Korea Co., Ltd.

Kukje Center Bldg. 18th Fl., 191, 2-ka, Hangang-ro, Yongsan-ku, Seoul 140-702, Korea
Tel: <82> 2-796-3115, Fax: <82> 2-796-2145

Renesas Technology Malaysia Sdn. Bhd.

Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No.18, Jalan Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: <603> 7955-9390, Fax: <603> 7955-9510