

## 2SC5894

Silicon NPN Epitaxial  
High Frequency Low Noise Amplifier / Oscillator

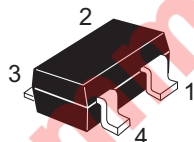
REJ03G0764-0200  
(Previous ADE-208-1605A)  
Rev.2.00  
Aug.10.2005

### Features

- High gain bandwidth product  
 $f_T = 20$  GHz typ.
- High power gain and low noise figure;  
PG = 17.5 dB typ., NF = 1.8 dB typ. at  $f = 1.8$  GHz

### Outline

RENESAS Package code: PTSP0004ZA-A  
(Package name: CMPAK-4)



1. Emitter
2. Collector
3. Emitter
4. Base

Note: Marking is "WJ-".

### Absolute Maximum Ratings

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

Item	Symbol	Ratings	Unit
Collector to base voltage	$V_{CB0}$	12	V
Collector to emitter voltage	$V_{CE0}$	4.0	V
Emitter to base voltage	$V_{EB0}$	1.5	V
Collector current	$I_C$	12	mA
Collector power dissipation	$P_C$	50	mW
Junction temperature	$T_j$	150	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$

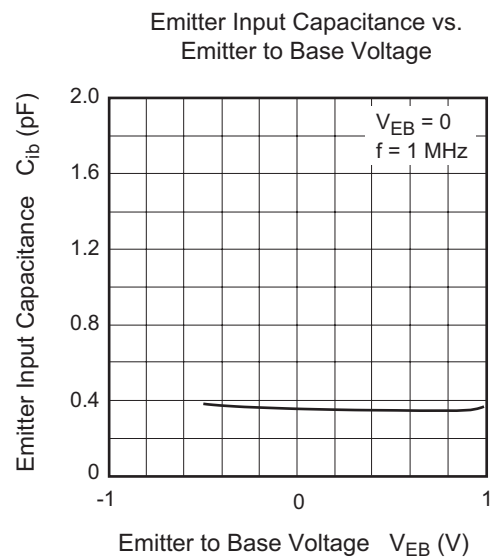
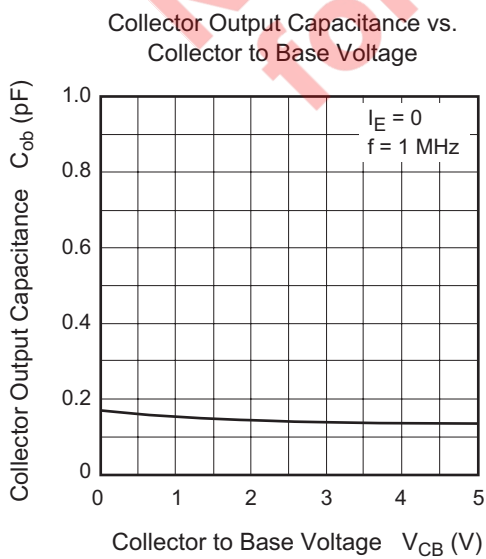
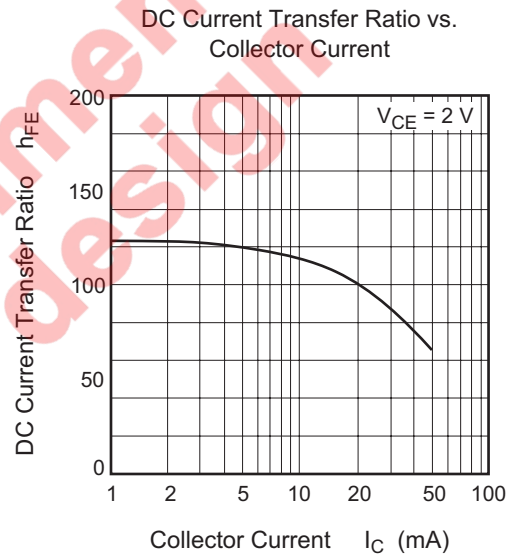
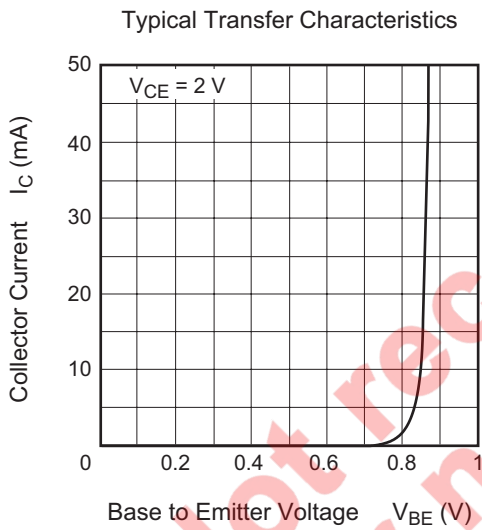
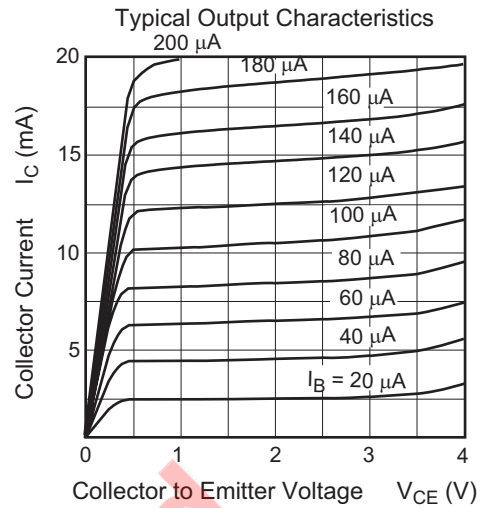
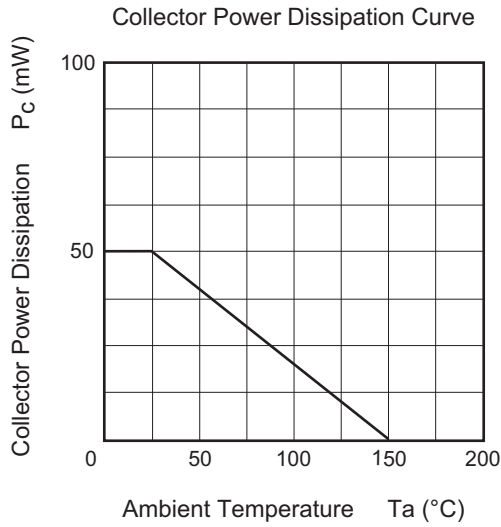
## Electrical Characteristics

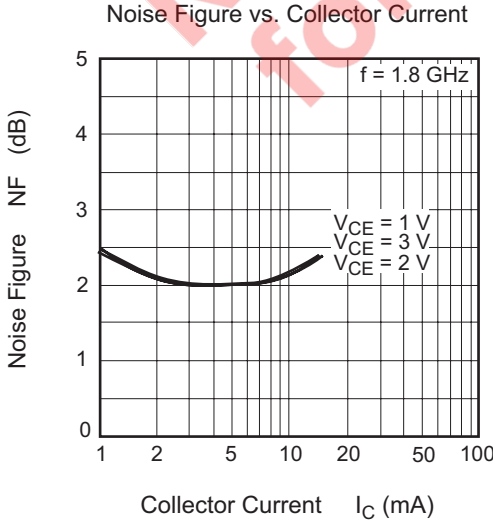
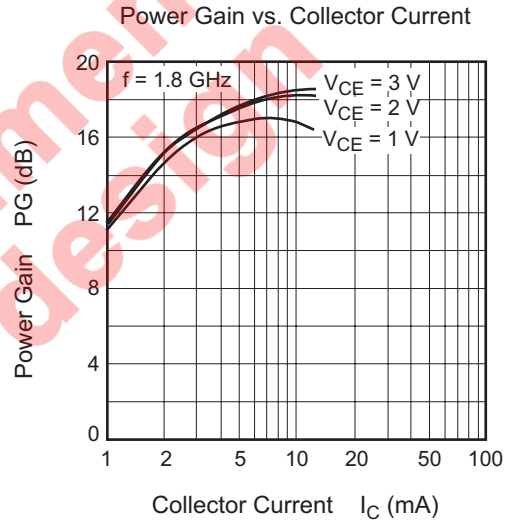
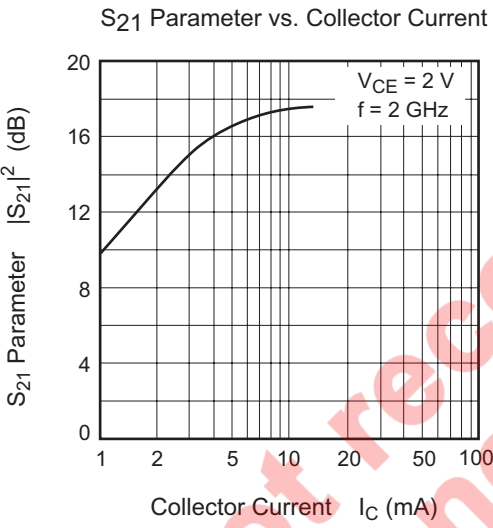
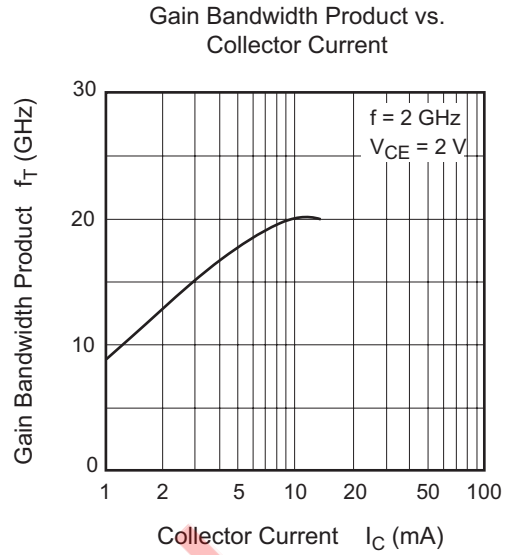
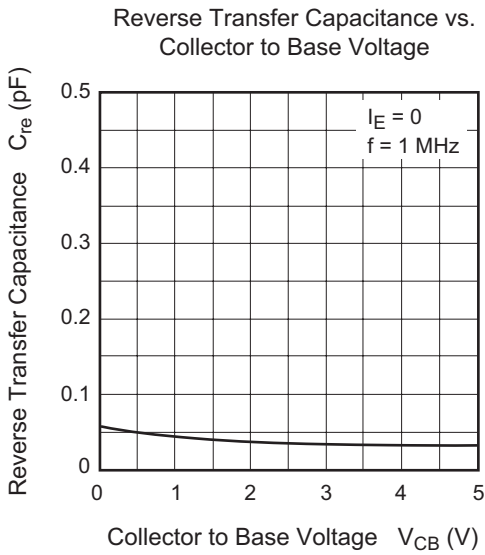
(Ta = 25°C)

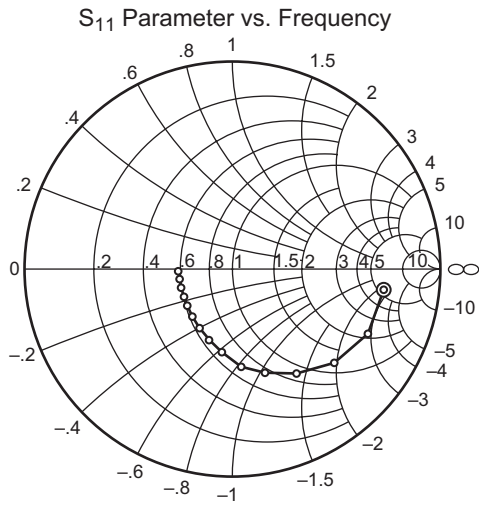
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector cutoff current	$I_{CBO}$	—	—	1	$\mu\text{A}$	$V_{CB} = 12\text{ V}, I_E = 0$
Collector cutoff current	$I_{CEO}$	—	—	1	$\mu\text{A}$	$V_{CE} = 4\text{ V}, R_{BE} = \infty$
Emitter cutoff current	$I_{EBO}$	—	—	10	$\mu\text{A}$	$V_{EB} = 1.5\text{ V}, I_C = 0$
DC current transfer ratio	$h_{FE}$	70	110	150		$V_{CE} = 2\text{ V}, I_C = 10\text{ mA}$
Collector output capacitance	$C_{ob}$	—	0.16	0.4	pF	$V_{CB} = 2\text{ V}, I_E = 0, f = 1\text{ MHz}$
Gain bandwidth product	$f_T$	16	20	—	GHz	$V_{CE} = 2\text{ V}, I_C = 10\text{ mA}$ $f = 2\text{ GHz}$
Power gain	PG	13	17.5	—	dB	$V_{CE} = 2\text{ V}, I_C = 10\text{ mA}$ , $f = 1.8\text{ GHz}$
Noise figure	NF	—	1.8	2.4	dB	$V_{CE} = 2\text{ V}, I_C = 3\text{ mA}$ , $f = 1.8\text{ GHz}$

Not recommend  
for new design

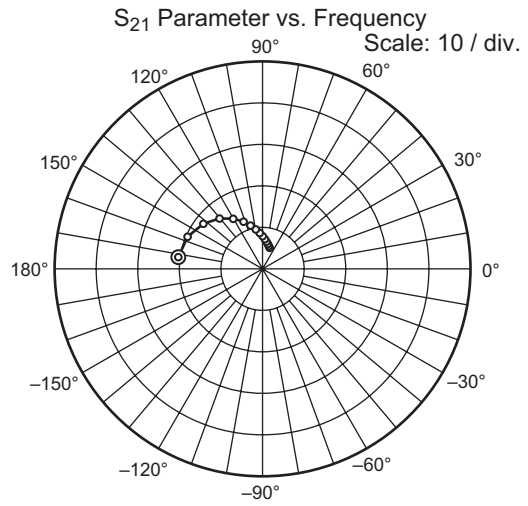
Main Characteristics



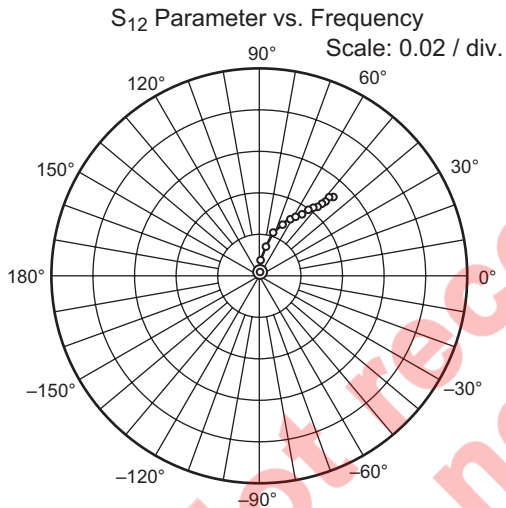




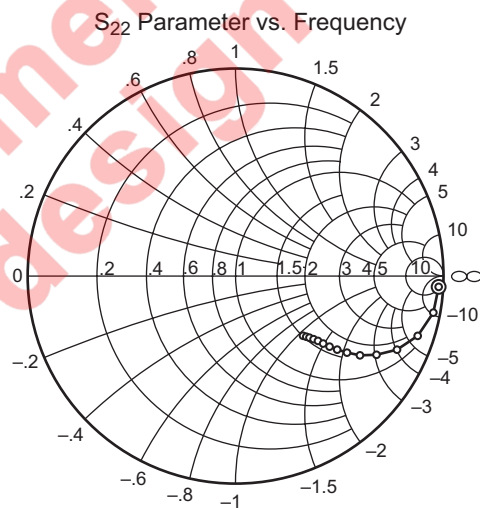
Condition:  $V_{CE} = 2\text{ V}$ ,  $Z_O = 50\ \Omega$   
 100 to 2900 MHz (200 MHz Step)  
 ◎—○ ( $I_C = 10\text{ mA}$ )



Condition:  $V_{CE} = 2\text{ V}$ ,  $Z_O = 50\ \Omega$   
 100 to 2900 MHz (200 MHz Step)  
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Condition:  $V_{CE} = 2\text{ V}$ ,  $Z_O = 50\ \Omega$   
 100 to 2900 MHz (200 MHz Step)  
 ◎—○ ( $I_C = 10\text{ mA}$ )

## Sparameter

 $(V_{CE} = 2V, I_C = 3mA, Z_o = 50\Omega)$ 

f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.890	-4.5	9.05	175.5	0.0030	85.7	0.992	-2.0
200	0.892	-9.2	8.88	171.1	0.0064	89.8	0.994	-4.5
300	0.910	-13.9	8.84	166.5	0.0105	91.0	0.991	-6.7
400	0.885	-18.7	8.69	162.1	0.0139	90.5	0.984	-9.4
500	0.876	-23.6	8.57	157.8	0.0185	87.8	0.978	-12.0
600	0.857	-28.5	8.45	153.4	0.0231	84.4	0.966	-14.6
700	0.838	-33.6	8.46	149.2	0.0271	81.0	0.953	-17.2
800	0.825	-38.3	8.13	145.0	0.0316	77.6	0.935	-19.5
900	0.801	-43.0	7.93	141.1	0.0355	73.4	0.914	-21.8
1000	0.776	-47.5	7.56	137.4	0.0392	70.9	0.895	-23.6
1100	0.793	-52.0	7.27	133.2	0.0432	66.5	0.872	-25.9
1200	0.728	-56.8	7.35	129.9	0.0459	63.5	0.849	-28.0
1300	0.700	-61.3	7.15	126.4	0.0487	60.5	0.827	-29.9
1400	0.674	-65.6	6.94	123.1	0.0510	57.0	0.804	-31.4
1500	0.649	-69.7	6.73	120.0	0.0531	54.5	0.783	-33.0
1600	0.624	-74.0	6.54	117.0	0.0555	52.5	0.763	-34.6
1700	0.598	-78.1	6.34	113.9	0.0576	50.7	0.741	-35.9
1800	0.567	-82.7	6.22	111.0	0.0581	48.6	0.719	-37.3
1900	0.554	-86.7	6.00	107.8	0.0610	45.8	0.699	-38.4
2000	0.526	-89.8	5.81	106.2	0.0613	44.9	0.685	-39.6
2100	0.501	-95.3	5.67	102.5	0.0624	42.4	0.660	-40.5
2200	0.487	-97.3	5.33	101.4	0.0642	40.6	0.657	-41.3
2300	0.471	-102.5	5.32	98.0	0.0646	39.5	0.629	-42.4
2400	0.455	-106.5	5.17	95.6	0.0658	38.0	0.615	-43.4
2500	0.434	-111.3	5.08	93.1	0.0663	36.1	0.596	-44.4
2600	0.424	-114.1	4.87	91.5	0.0666	35.2	0.590	-45.2
2700	0.405	-119.3	4.79	88.7	0.0665	35.1	0.572	-46.0
2800	0.396	-121.9	4.63	87.6	0.0677	33.4	0.567	-47.1
2900	0.385	-127.7	4.56	84.3	0.0685	32.2	0.547	-47.5
3000	0.374	-132.6	4.49	81.6	0.0677	31.1	0.530	-48.1

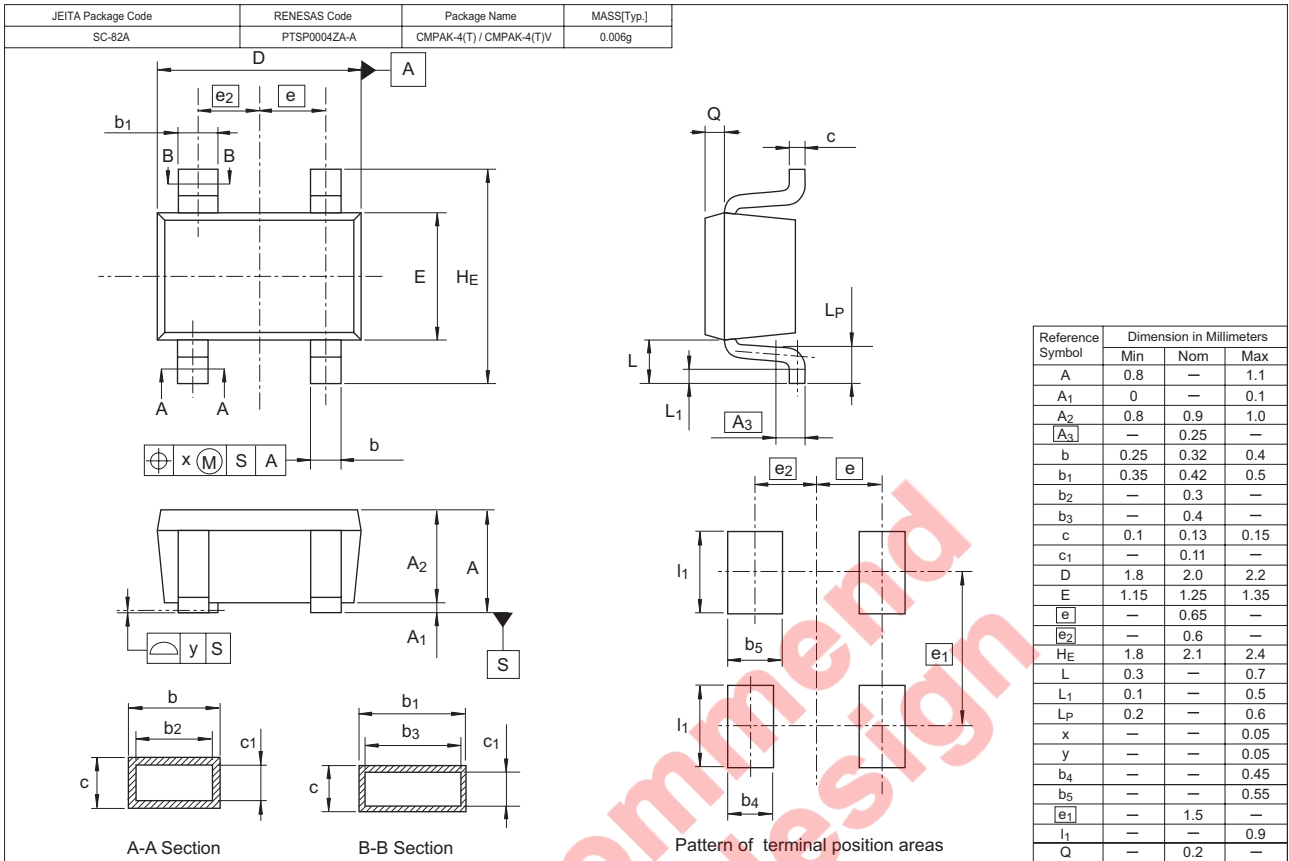
f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.831	-5.8	13.33	174.2	0.0032	85.5	0.988	-2.4
200	0.835	-11.9	13.12	168.6	0.0065	90.4	0.989	-5.4
300	0.844	-18.0	13.04	162.9	0.0101	89.2	0.985	-8.2
400	0.821	-24.2	12.70	157.4	0.0133	88.6	0.974	-11.4
500	0.804	-30.4	12.41	152.0	0.0174	84.4	0.962	-14.5
600	0.779	-36.7	12.07	146.7	0.0216	81.4	0.944	-17.6
700	0.747	-42.7	11.79	141.8	0.0253	77.7	0.921	-20.5
800	0.727	-48.7	11.27	136.8	0.0291	73.9	0.894	-23.1
900	0.695	-54.4	10.82	132.4	0.0319	69.5	0.865	-25.5
1000	0.666	-59.9	10.26	128.0	0.0350	67.6	0.838	-27.4
1100	0.661	-64.8	9.78	123.8	0.0383	62.8	0.808	-29.6
1200	0.601	-70.4	9.57	120.3	0.0399	60.6	0.778	-31.5
1300	0.570	-75.5	9.16	116.7	0.0421	57.8	0.753	-33.1
1400	0.542	-80.3	8.78	113.4	0.0439	55.3	0.726	-34.4
1500	0.516	-85.0	8.40	110.3	0.0454	53.3	0.702	-35.7
1600	0.491	-89.6	8.06	107.4	0.0476	52.5	0.680	-36.8
1700	0.466	-94.2	7.74	104.5	0.0489	50.1	0.658	-37.8
1800	0.440	-99.2	7.48	101.7	0.0492	49.1	0.636	-38.7
1900	0.423	-103.7	7.17	98.9	0.0509	46.8	0.616	-39.5
2000	0.403	-107.6	6.88	97.2	0.0521	46.0	0.603	-40.4
2100	0.383	-113.4	6.65	93.9	0.0522	43.8	0.580	-40.8
2200	0.373	-116.2	6.30	92.6	0.0539	42.9	0.575	-41.5
2300	0.358	-121.5	6.18	89.8	0.0543	42.5	0.553	-42.2
2400	0.347	-125.9	5.97	87.7	0.0554	40.9	0.540	-42.8
2500	0.333	-131.2	5.81	85.5	0.0557	40.7	0.524	-43.5
2600	0.326	-134.6	5.57	83.9	0.0558	40.4	0.519	-44.0
2700	0.314	-140.2	5.43	81.5	0.0579	39.8	0.505	-44.6
2800	0.311	-143.3	5.24	80.3	0.0586	38.4	0.500	-45.4
2900	0.304	-149.0	5.12	77.6	0.0593	38.0	0.484	-45.6
3000	0.301	-153.8	5.00	75.4	0.0585	37.0	0.471	-46.1

$(V_{CE} = 2V, I_C = 10mA, Z_o = 50\Omega)$ 

f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.730	-8.4	20.44	172.0	0.0032	93.3	0.978	-3.0
200	0.728	-17.0	20.06	164.3	0.0060	87.1	0.977	-6.8
300	0.722	-25.5	19.61	156.7	0.0090	88.5	0.967	-10.4
400	0.694	-34.2	18.78	149.4	0.0123	86.4	0.946	-14.4
500	0.666	-42.6	17.90	142.5	0.0158	79.7	0.922	-18.2
600	0.630	-50.8	16.93	136.0	0.0191	77.0	0.888	-21.6
700	0.590	-58.5	15.94	130.4	0.0219	73.3	0.853	-24.5
800	0.559	-65.8	14.95	124.9	0.0250	70.9	0.815	-27.0
900	0.523	-72.5	13.98	120.2	0.0271	66.4	0.776	-29.2
1000	0.491	-79.2	13.06	115.8	0.0294	65.3	0.742	-30.7
1100	0.472	-84.8	12.25	111.8	0.0310	62.0	0.709	-32.5
1200	0.430	-91.4	11.57	108.4	0.0331	60.2	0.678	-33.5
1300	0.403	-97.2	10.90	105.2	0.0337	58.6	0.651	-34.5
1400	0.381	-102.9	10.29	102.2	0.0359	56.6	0.627	-35.2
1500	0.360	-108.2	9.73	99.4	0.0365	55.4	0.604	-35.9
1600	0.342	-113.7	9.22	96.8	0.0386	55.2	0.585	-36.5
1700	0.325	-119.0	8.77	94.3	0.0400	53.6	0.566	-36.9
1800	0.309	-124.8	8.36	91.9	0.0404	53.5	0.549	-37.3
1900	0.299	-130.0	7.97	89.6	0.0423	51.8	0.533	-37.6
2000	0.289	-134.9	7.61	87.8	0.0437	52.4	0.522	-38.0
2100	0.279	-140.9	7.28	85.3	0.0439	50.0	0.505	-38.2
2200	0.274	-144.7	6.95	83.7	0.0451	50.0	0.498	-38.6
2300	0.268	-150.1	6.72	81.7	0.0464	49.2	0.484	-39.0
2400	0.264	-154.8	6.46	79.8	0.0478	48.9	0.475	-39.5
2500	0.262	-160.0	6.23	77.9	0.0483	48.5	0.464	-39.8
2600	0.260	-163.9	6.00	76.4	0.0494	47.9	0.458	-40.2
2700	0.258	-169.2	5.80	74.5	0.0510	48.6	0.449	-40.6
2800	0.259	-172.6	5.60	73.1	0.0516	47.4	0.445	-41.1
2900	0.261	-177.2	5.43	71.1	0.0525	47.0	0.434	-41.5
3000	0.263	178.8	5.27	69.3	0.0533	46.4	0.427	-41.8



### Package Dimensions



### Ordering Information

Part Name	Quantity	Shipping Container
2SC5894WJ-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

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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