

To all our customers

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Renesas Technology Corp.
Customer Support Dept.
April 1, 2003

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2SC5772

Silicon NPN Epitaxial
UHF / VHF wide band amplifier

RENESAS

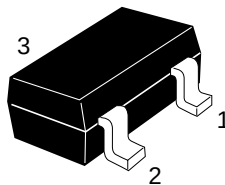
ADE-208-1390 (Z)
Preliminary 1st. Edition
Mar. 2001

Features

- High gain bandwidth product
 $f_T = 9 \text{ GHz typ.}$
- High power gain and low noise figure ;
 $PG = 13 \text{ dB typ., } NF = 1.1 \text{ dB typ. at } f = 900 \text{ MHz}$

Outline

MPAK



1. Emitter
2. Base
3. Collector

Note: Marking is "FR-".

Absolute Maximum Ratings (Ta = 25°C)

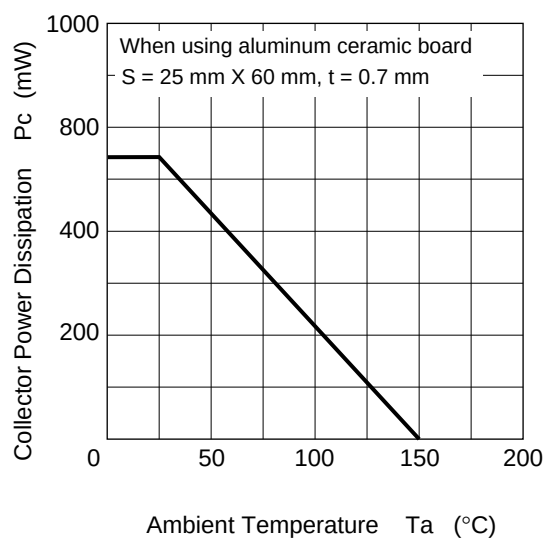
Item	Symbol	Ratings	Unit
Collector to base voltage	V_{CBO}	15	V
Collector to emitter voltage	V_{CEO}	9	V
Emitter to base voltage	V_{EBO}	1.5	V
Collector current	I_C	75	mA
Collector power dissipation	Pc	700*	mW
Junction temperature	Tj	150	°C
Storage temperature	Tstg	–55 to +150	°C

* When using aluminium ceramic board (25 x 60 x 0.7 mm)

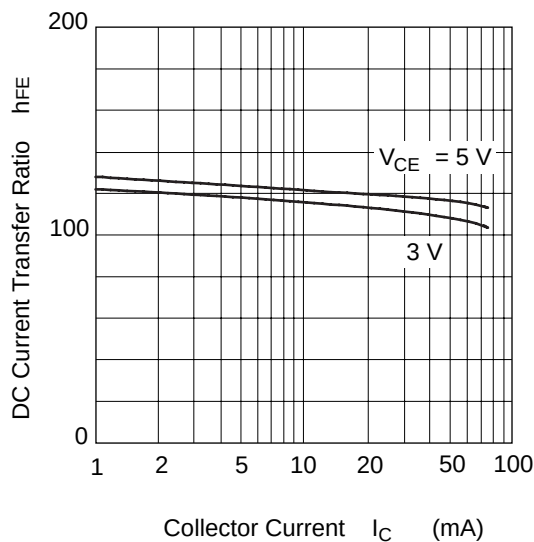
Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Collector to base breakdown voltage	$V_{(BR)CBO}$	15	—	—	V	$I_C = 10\mu\text{A}$, $I_E = 0$
Collector cutoff current	I_{CBO}	—	—	1	μA	$V_{CB} = 12\text{ V}$, $I_E = 0$
Collector cutoff current	I_{CEO}	—	—	1	mA	$V_{CE} = 9\text{ V}$, $R_{BE} = \infty$
Emitter cutoff current	I_{EBO}	—	—	10	μA	$V_{EB} = 1.5\text{ V}$, $I_C = 0$
DC current transfer ratio	h_{FE}	80	120	160	V	$V_{CE} = 5\text{ V}$, $I_C = 20\text{ mA}$
Collector output capacitance	Cob	—	0.9	1.5	pF	$V_{CB} = 5\text{ V}$, $I_E = 0$ $f = 1\text{ MHz}$
Reverse transfer capacitance	Cre	—	0.7	—	pF	$V_{CB} = 5\text{ V}$, $I_E = 0$ $f = 1\text{ MHz}$
Gain bandwidth product	f_T	6	9	—	GHz	$V_{CE} = 5\text{ V}$, $I_C = 20\text{ mA}$ $f = 1\text{ GHz}$
S_{21} parameter	$ S_{21} ^2$	—	11.8	—	dB	$V_{CE} = 5\text{ V}$, $I_C = 20\text{ mA}$ $f = 1\text{ GHz}$
Power gain	PG	9.5	13	—	dB	$V_{CE} = 5\text{ V}$, $I_C = 20\text{ mA}$ $f = 900\text{ MHz}$
Noise figure	NF	—	1.1	1.9	dB	$V_{CE} = 5\text{ V}$, $I_C = 5\text{ mA}$ $f = 900\text{ MHz}$

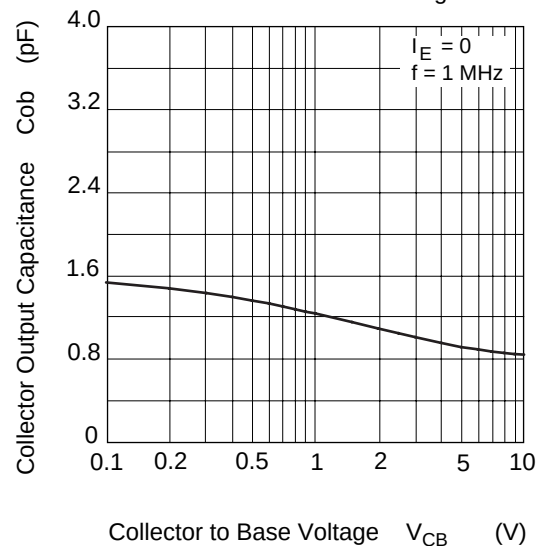
Collector Power Dissipation Curve



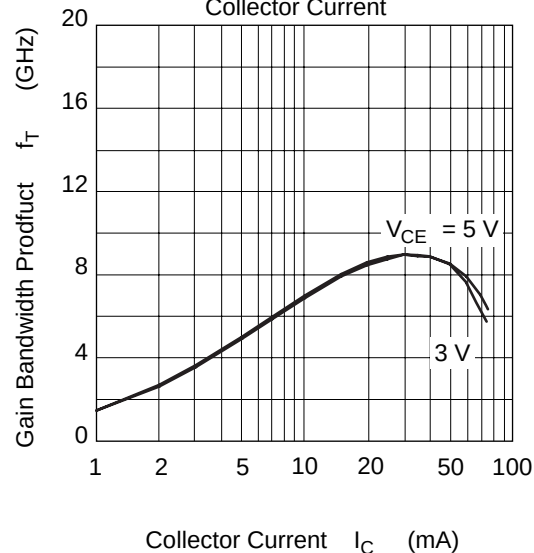
DC Current Transfer Ratio vs. Collector Current

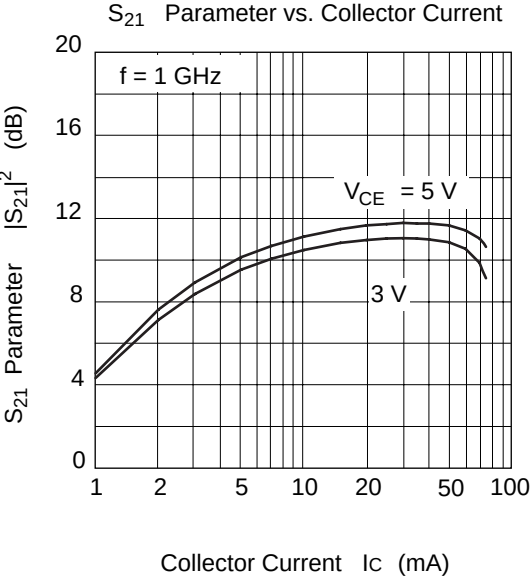
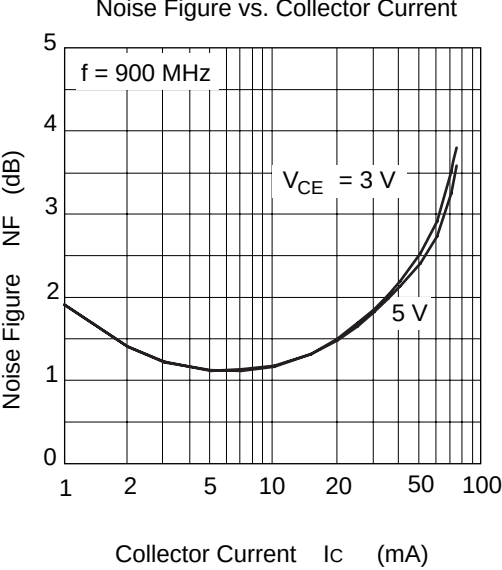
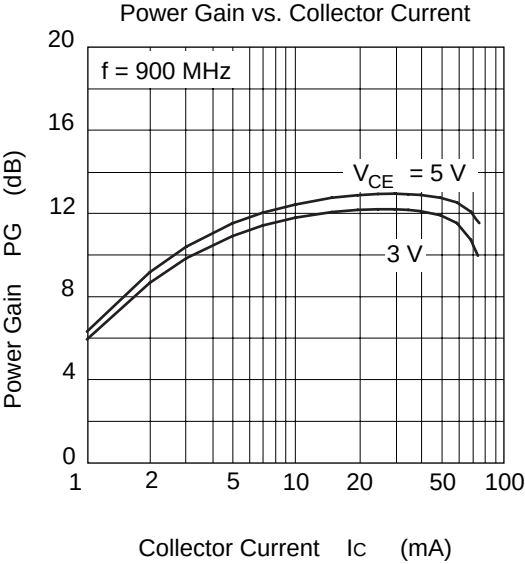


Collector Output Capacitance vs. Collector to Base Voltage

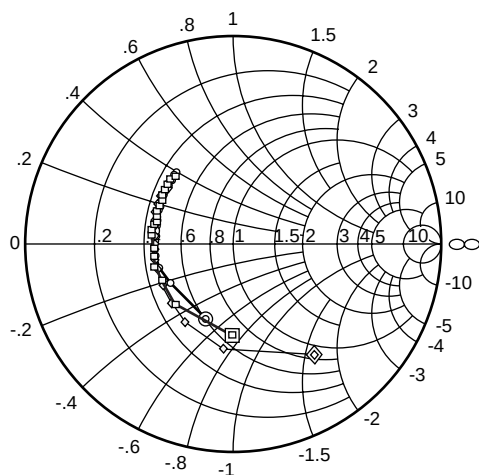


Gain Bandwidth Product vs. Collector Current





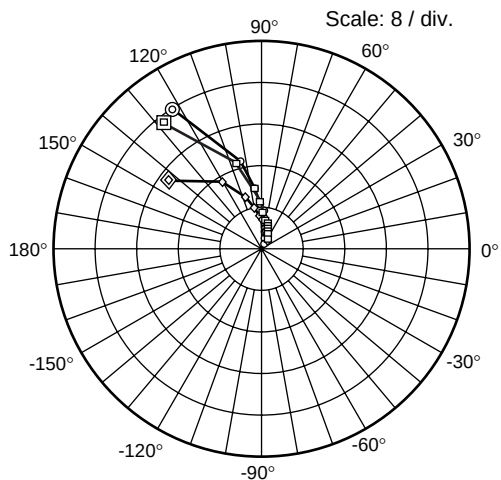
S11 Parameter vs. Frequency



Condition: $V_{CE} = 3\text{ V}$, $Z_O = 50\ \Omega$
100 to 2000 MHz (100 MHz Step)

○ (IC = 50 mA)
□ (IC = 30 mA)
◇ (IC = 10 mA)

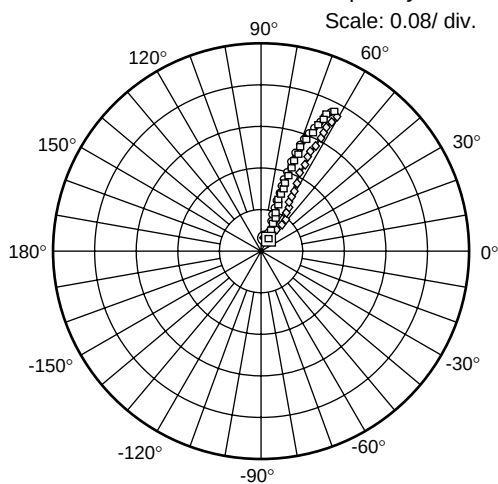
S21 Parameter vs. Frequency



Condition: $V_{CE} = 3\text{ V}$, $Z_O = 50\ \Omega$
100 to 2000 MHz (100 MHz Step)

○ (IC = 50 mA)
□ (IC = 30 mA)
◇ (IC = 10 mA)

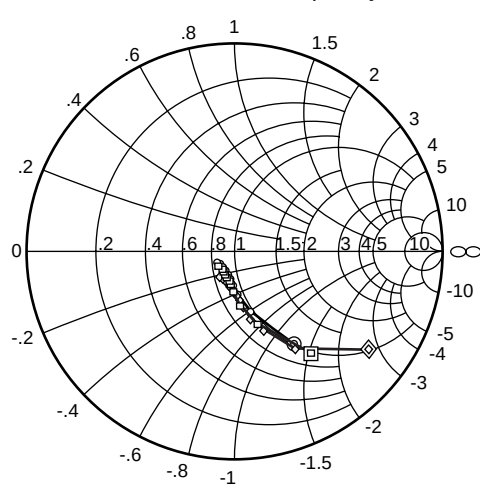
S12 Parameter vs. Frequency



Condition: $V_{CE} = 3\text{ V}$, $Z_O = 50\ \Omega$
100 to 2000 MHz (100 MHz Step)

○ (IC = 50 mA)
□ (IC = 30 mA)
◇ (IC = 10 mA)

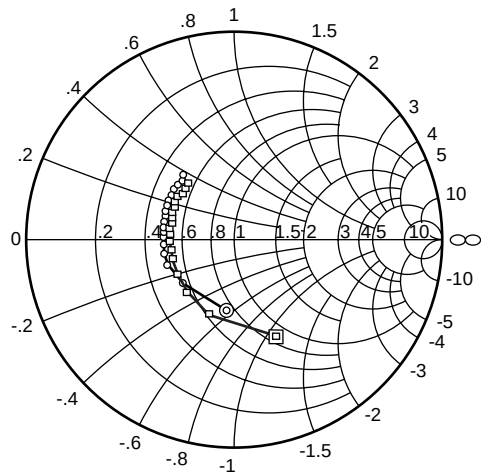
S22 Parameter vs. Frequency



Condition: $V_{CE} = 3\text{ V}$, $Z_O = 50\ \Omega$
100 to 2000 MHz (100 MHz Step)

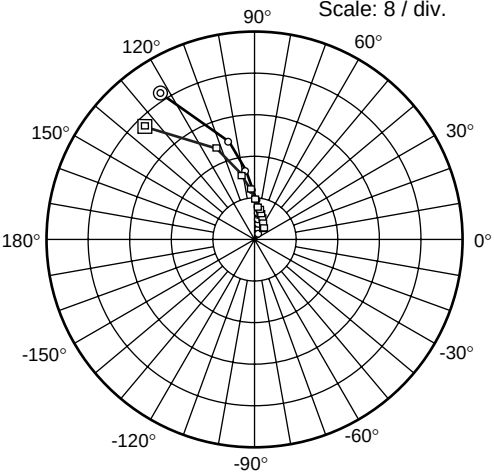
○ (IC = 50 mA)
□ (IC = 30 mA)
◇ (IC = 10 mA)

S11 Parameter vs. Frequency



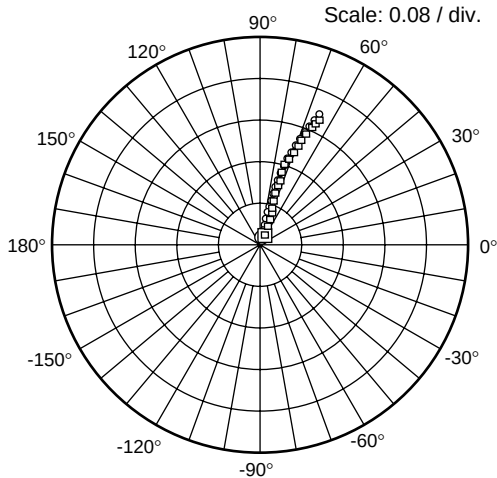
Condition: VCE = 5 V, ZO = 50 Ω
100 to 2000 MHz (100 MHz Step)
○ (IC = 50 mA)
□ (IC = 20 mA)

S21 Paramter vs. Frequency



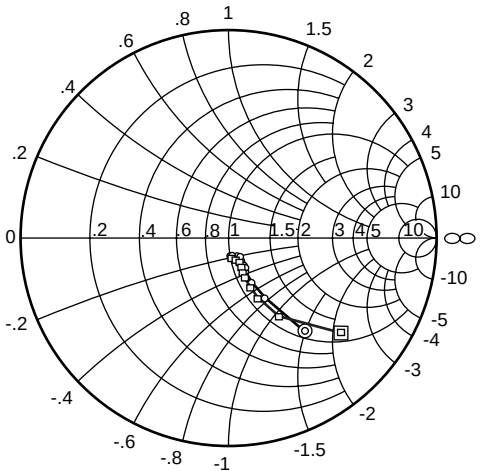
Condition: VCE = 5 V, ZO = 50 Ω
100 to 2000 MHz (100 MHz Step)
○ (IC = 50 mA)
□ (IC = 20 mA)

S12 Parameter vs. Frequency



Condition: VCE = 5 V, ZO = 50 Ω
100 to 2000 MHz (100 MHz Step)
○ (IC = 50 mA)
□ (IC = 20 mA)

S22 Parameter vs. Frequency



Condition: VCE = 5 V, ZO = 50 Ω
100 to 2000 MHz (100 MHz Step)
○ (IC = 50 mA)
□ (IC = 20 mA)

Sparameter ($V_{CE} = 3\text{ V}$, $I_C = 10\text{ mA}$, $Z_0 = 50\ \Omega$)

f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.651	-53.8	21.22	142.8	0.035	65.6	0.802	-35.5
200	0.502	-93.8	14.62	120.0	0.054	56.9	0.554	-56.2
300	0.431	-119.6	10.48	107.6	0.067	56.0	0.401	-66.9
400	0.396	-136.4	8.09	99.8	0.079	56.9	0.317	-72.8
500	0.381	-149.9	6.57	94.2	0.091	58.9	0.263	-77.2
600	0.364	-158.7	5.54	89.7	0.103	60.3	0.227	-80.4
700	0.365	-167.2	4.78	85.9	0.116	61.6	0.201	-83.3
800	0.364	-174.6	4.22	82.5	0.128	62.5	0.183	-85.6
900	0.362	179.5	3.75	79.3	0.141	63.1	0.168	-88.3
1000	0.362	173.4	3.41	76.4	0.154	63.6	0.158	-90.2
1100	0.366	168.8	3.12	73.9	0.167	63.7	0.150	-92.7
1200	0.366	164.6	2.89	71.2	0.179	63.8	0.144	-95.0
1300	0.373	160.3	2.69	68.8	0.192	63.6	0.138	-97.0
1400	0.372	155.8	2.51	66.4	0.205	63.4	0.135	-99.0
1500	0.379	152.6	2.37	64.3	0.217	63.2	0.133	-101.7
1600	0.382	149.1	2.24	62.0	0.231	62.8	0.131	-103.7
1700	0.386	145.0	2.14	60.1	0.243	62.5	0.130	-106.0
1800	0.393	142.2	2.03	58.0	0.254	61.8	0.129	-108.2
1900	0.390	139.2	1.94	55.9	0.268	61.6	0.129	-110.5
2000	0.400	135.4	1.87	54.0	0.278	60.7	0.129	-112.1

Sparameter (V_{CE} = 3 V, I_C = 30 mA, Zo = 50 Ω)

f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.419	-90.2	30.42	127.3	0.026	63.9	0.608	-53.5
200	0.366	-132.9	17.49	107.6	0.040	64.4	0.357	-74.3
300	0.358	-151.9	11.80	98.6	0.055	67.0	0.247	-85.0
400	0.355	-163.8	8.88	93.1	0.070	69.5	0.193	-91.9
500	0.354	-173.3	7.14	89.0	0.085	70.6	0.162	-98.0
600	0.356	-178.8	5.97	85.5	0.100	71.5	0.141	-102.8
700	0.356	174.3	5.13	82.4	0.115	71.5	0.127	-107.4
800	0.364	169.5	4.51	79.6	0.130	71.4	0.117	-111.3
900	0.361	165.9	4.01	77.0	0.146	71.0	0.111	-114.9
1000	0.359	160.6	3.64	74.6	0.160	70.6	0.105	-118.5
1100	0.367	157.8	3.33	72.2	0.176	70.0	0.103	-121.5
1200	0.370	153.6	3.07	70.2	0.190	69.4	0.101	-124.5
1300	0.368	150.1	2.86	67.7	0.204	68.3	0.099	-127.0
1400	0.376	146.5	2.67	65.9	0.218	68.0	0.099	-129.3
1500	0.382	144.2	2.52	63.9	0.232	67.2	0.098	-131.8
1600	0.387	141.0	2.38	61.8	0.247	66.4	0.099	-133.9
1700	0.388	137.3	2.27	59.9	0.260	65.6	0.100	-135.8
1800	0.393	134.9	2.15	58.0	0.274	64.6	0.100	-138.0
1900	0.394	132.8	2.07	56.3	0.288	63.8	0.102	-139.9
2000	0.393	129.3	1.98	54.5	0.298	62.6	0.103	-140.6

Sparameter ($V_{CE} = 3\text{ V}$, $I_C = 50\text{ mA}$, $Z_0 = 50\ \Omega$)

f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.365	-111.0	31.77	122.3	0.023	65.4	0.530	-58.5
200	0.363	-147.7	17.40	104.2	0.037	68.1	0.299	-77.7
300	0.370	-162.8	11.60	96.2	0.052	71.0	0.207	-87.5
400	0.368	-172.3	8.71	91.0	0.068	72.8	0.163	-94.0
500	0.374	-179.4	6.97	87.3	0.083	73.4	0.137	-99.7
600	0.375	174.9	5.84	84.0	0.099	73.8	0.121	-104.7
700	0.378	170.4	5.02	81.2	0.114	73.6	0.110	-108.8
800	0.383	165.8	4.41	78.4	0.129	73.4	0.103	-112.5
900	0.381	161.7	3.91	76.0	0.146	72.7	0.099	-116.4
1000	0.384	157.4	3.55	73.3	0.161	72.4	0.095	-119.2
1100	0.389	153.7	3.25	71.2	0.177	71.6	0.093	-122.6
1200	0.394	150.4	3.00	69.0	0.190	70.7	0.092	-125.1
1300	0.395	147.3	2.80	66.7	0.204	69.7	0.091	-127.8
1400	0.398	144.1	2.61	64.8	0.219	69.2	0.092	-129.7
1500	0.407	141.7	2.46	62.9	0.233	68.2	0.092	-132.2
1600	0.410	139.0	2.33	60.8	0.248	67.4	0.093	-134.0
1700	0.407	135.2	2.21	59.0	0.262	66.5	0.095	-135.9
1800	0.414	133.5	2.10	57.2	0.275	65.5	0.096	-137.7
1900	0.412	130.3	2.02	55.0	0.289	64.8	0.098	-139.5
2000	0.423	127.6	1.93	53.1	0.300	63.6	0.099	-140.4

Sparameter (V_{CE} = 5 V, I_C = 20 mA, Zo = 50 Ω)

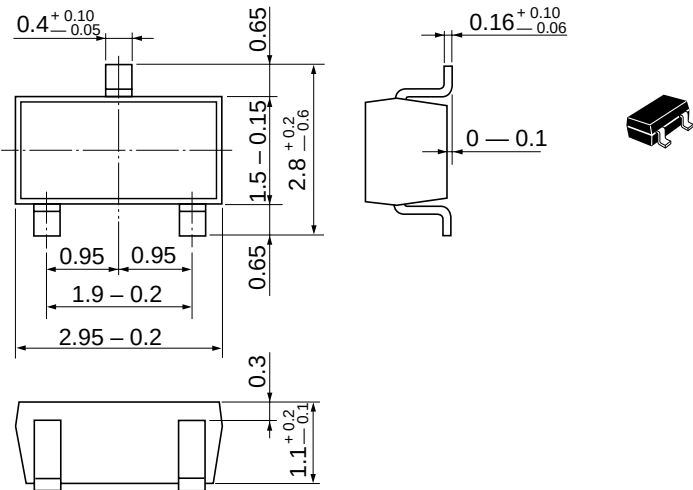
f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.505	-66.9	29.11	134.6	0.026	65.8	0.707	-40.5
200	0.381	-108.9	18.04	112.9	0.040	62.3	0.448	-57.3
300	0.337	-132.7	12.44	102.5	0.053	64.6	0.318	-63.3
400	0.320	-148.4	9.46	96.2	0.065	66.7	0.252	-65.8
500	0.311	-161.0	7.63	91.6	0.079	68.2	0.211	-67.2
600	0.305	-168.4	6.40	87.7	0.092	69.2	0.184	-67.9
700	0.308	-176.8	5.51	84.5	0.105	69.7	0.165	-68.5
800	0.306	177.7	4.84	81.4	0.119	70.1	0.152	-69.2
900	0.311	172.1	4.30	78.8	0.133	70.0	0.142	-70.5
1000	0.309	166.8	3.90	76.1	0.145	69.8	0.134	-71.1
1100	0.313	163.3	3.57	73.7	0.159	69.5	0.128	-72.7
1200	0.321	158.2	3.29	71.4	0.172	69.0	0.124	-74.2
1300	0.318	154.7	3.06	69.1	0.184	68.3	0.119	-75.5
1400	0.323	150.1	2.86	67.2	0.198	67.9	0.117	-77.2
1500	0.333	147.6	2.69	65.1	0.210	67.3	0.114	-79.1
1600	0.338	145.0	2.53	63.0	0.223	66.6	0.113	-80.9
1700	0.338	139.3	2.41	61.0	0.236	66.1	0.113	-83.2
1800	0.344	136.8	2.29	59.1	0.248	65.1	0.111	-85.5
1900	0.344	134.7	2.19	57.3	0.260	64.5	0.110	-88.0
2000	0.351	131.2	2.10	55.5	0.271	63.4	0.110	-89.6

Sparameter ($V_{CE} = 5\text{ V}$, $I_C = 50\text{ mA}$, $Z_o = 50\ \Omega$)

f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.360	-99.4	34.20	124.3	0.020	66.9	0.567	-48.7
200	0.329	-139.8	19.03	105.6	0.034	68.2	0.330	-60.7
300	0.323	-157.8	12.76	97.1	0.047	71.6	0.233	-63.2
400	0.323	-168.1	9.58	92.1	0.061	73.6	0.186	-63.4
500	0.326	-176.6	7.69	88.2	0.075	74.1	0.160	-63.3
600	0.328	177.5	6.42	85.0	0.089	74.6	0.142	-63.4
700	0.326	172.1	5.51	82.0	0.103	74.4	0.131	-63.6
800	0.332	166.9	4.85	79.2	0.117	74.1	0.122	-63.9
900	0.335	163.3	4.30	76.9	0.131	73.6	0.116	-65.2
1000	0.336	159.3	3.90	74.3	0.145	73.3	0.112	-65.9
1100	0.338	155.0	3.56	72.2	0.158	72.4	0.108	-67.9
1200	0.349	151.7	3.28	69.9	0.172	72.0	0.106	-69.5
1300	0.347	148.8	3.05	67.9	0.185	71.0	0.103	-70.9
1400	0.350	144.3	2.85	65.9	0.198	70.4	0.102	-73.3
1500	0.360	142.0	2.67	64.0	0.210	69.7	0.101	-75.5
1600	0.362	139.2	2.52	62.1	0.224	68.7	0.101	-77.7
1700	0.361	135.3	2.40	60.1	0.237	67.9	0.101	-80.0
1800	0.373	133.4	2.28	58.1	0.249	66.9	0.101	-82.5
1900	0.366	130.6	2.19	56.3	0.262	66.2	0.101	-85.5
2000	0.383	127.4	2.10	54.6	0.272	65.2	0.102	-87.1

Package Dimensions

Unit: mm



Hitachi Code	MPAK
JEDEC	
EIAJ	Conforms
Mass (reference value)	0.011 g

Cautions

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