To all our customers

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

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Keep safety first in your circuit designs!

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   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.

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2SC5772

Silicon NPN Epitaxial
UHF / VHF wide band amplifier

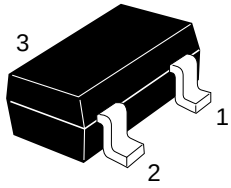
ADE-208-1390 (Z)
Preliminary 1st. Edition
Mar. 2001

Features

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

Outline

MPAK



1. Emitter
2. Base
3. Collector

Note: Marking is “FR-”.

Absolute Maximum Ratings (Ta = 25°C)

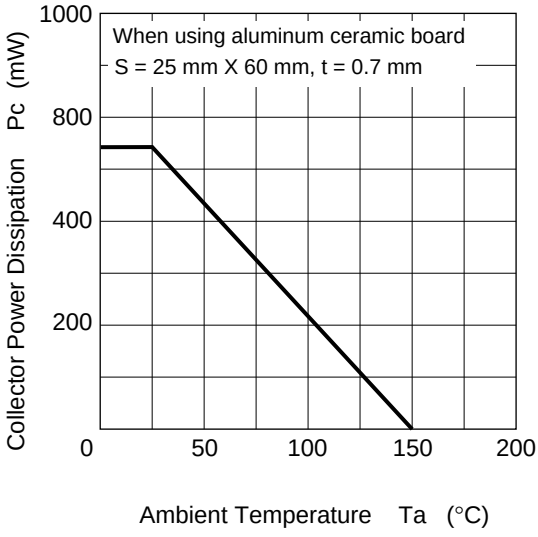
Item	Symbol	Ratings	Unit
Collector to base voltage	V_{CBO}	15	V
Collector to emitter voltage	V_{CEO}	9	V
Emitter to base voltage	V_{EBO}	1.5	V
Collector current	I_C	75	mA
Collector power dissipation	Pc	700*	mW
Junction temperature	Tj	150	°C
Storage temperature	Tstg	–55 to +150	°C

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

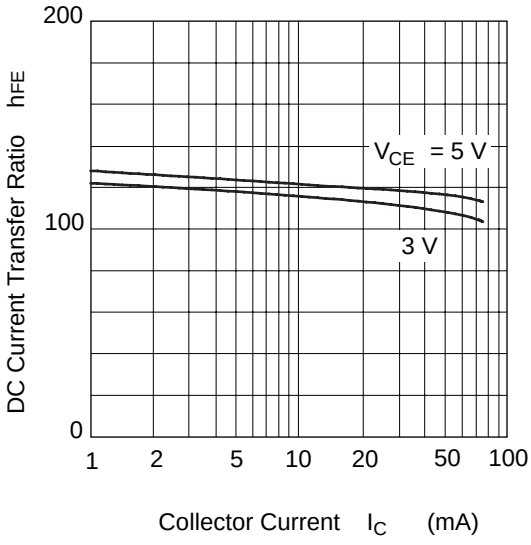
Electrical Characteristics (Ta = 25°C)

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

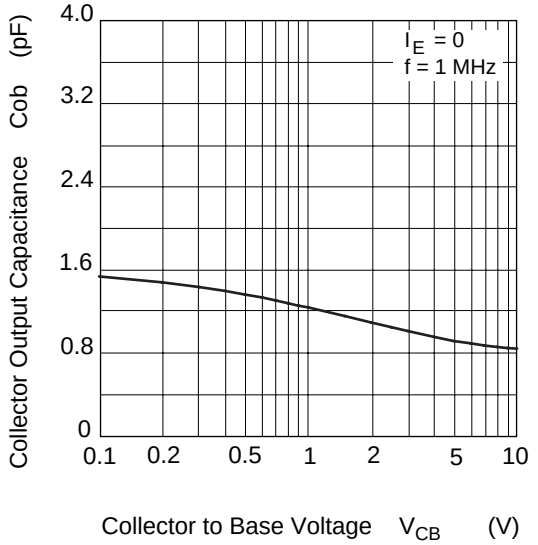
Collector Power Dissipation Curve



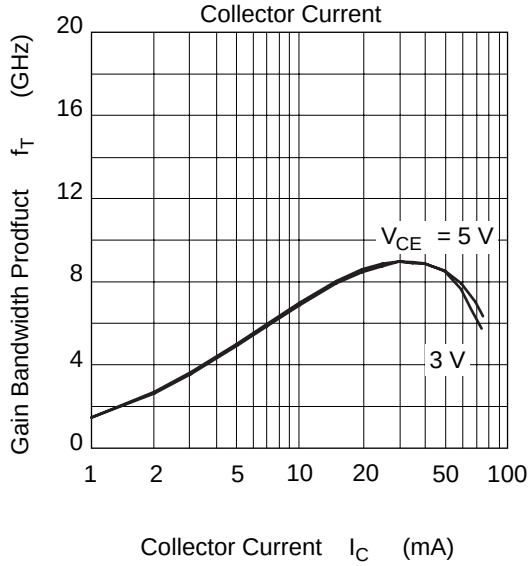
DC Current Transfet Ratio vs. Collector Current



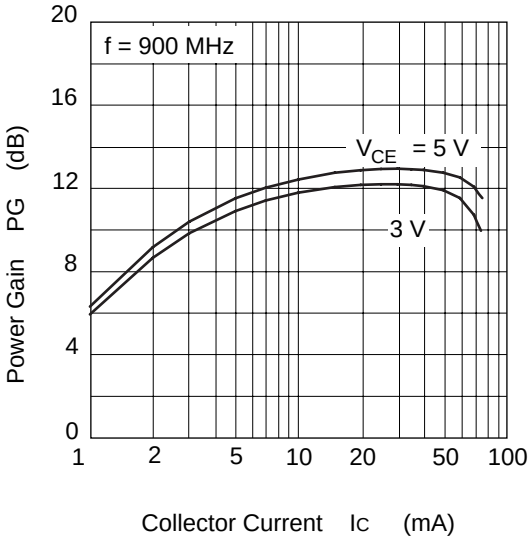
Collector Output Capacitance vs. Collector to Base Voltage



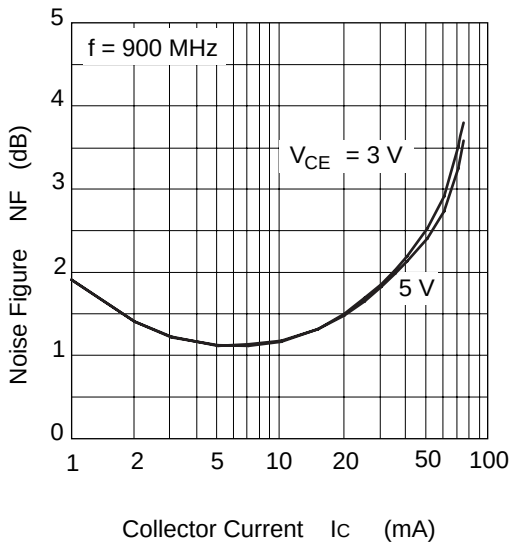
Gain Bandwidth Product vs. Collector Current



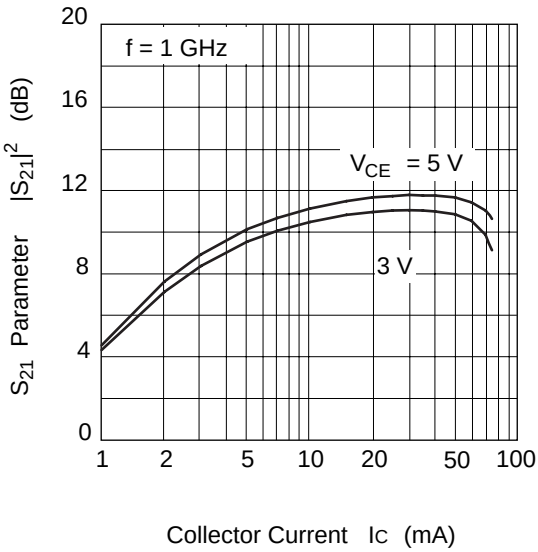
Power Gain vs. Collector Current



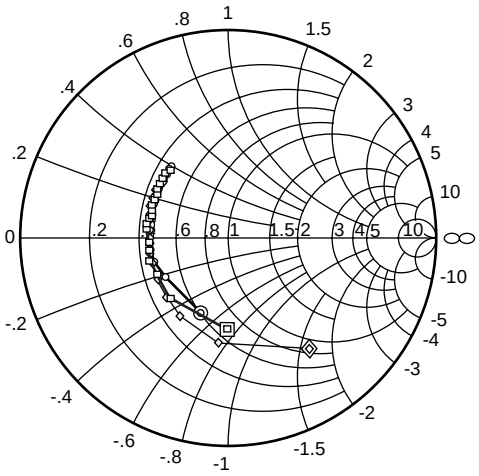
Noise Figure vs. Collector Current



S_{21} Parameter vs. Collector Current

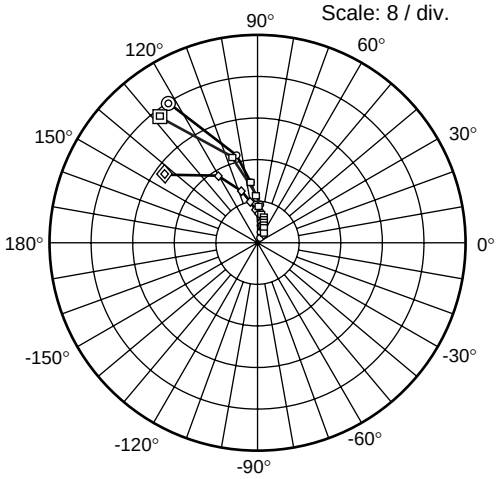


S11 Parameter vs. Frequency



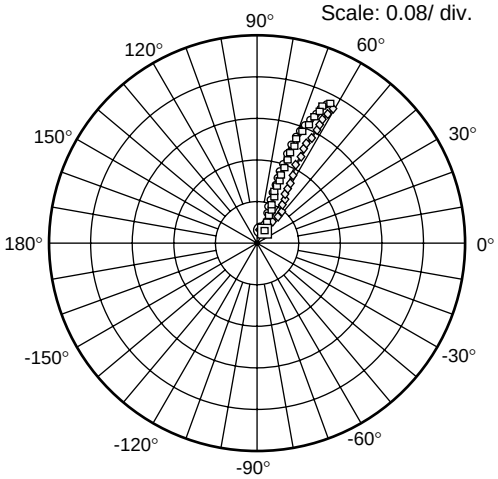
Condition: V_{CE} = 3 V, Z_O = 50 Ω
100 to 2000 MHz (100 MHz Step)
(I_C = 50 mA)
(I_C = 30 mA)
(I_C = 10 mA)

S21 Paramter vs. Frequency



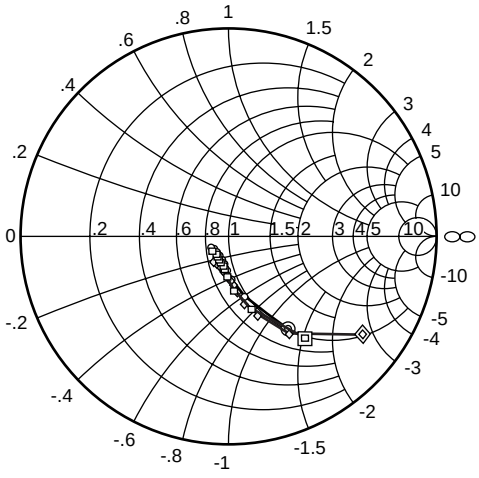
Condition: V_{CE} = 3 V, Z_O = 50 Ω
100 to 2000 MHz (100 MHz Step)
(I_C = 50 mA)
(I_C = 30 mA)
(I_C = 10 mA)

S12 Parameter vs. Frequency



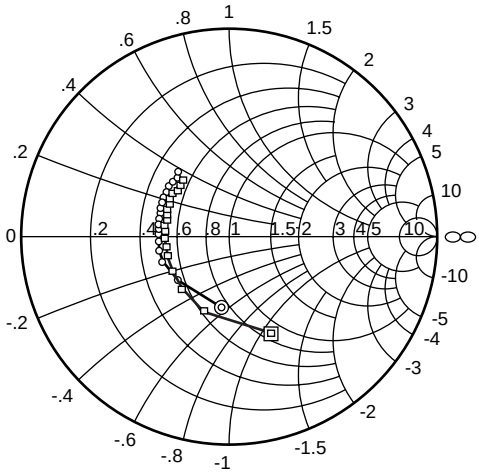
Condition: V_{CE} = 3 V, Z_O = 50 Ω
100 to 2000 MHz (100 MHz Step)
(I_C = 50 mA)
(I_C = 30 mA)
(I_C = 10 mA)

S22 Parameter vs. Frequency



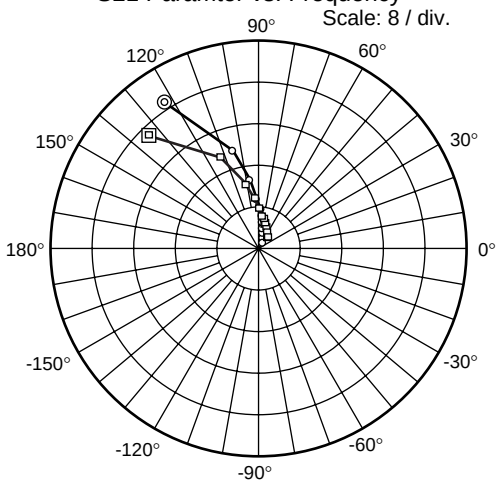
Condition: V_{CE} = 3 V, Z_O = 50 Ω
100 to 2000 MHz (100 MHz Step)
(I_C = 50 mA)
(I_C = 30 mA)
(I_C = 10 mA)

S11 Parameter vs. Frequency



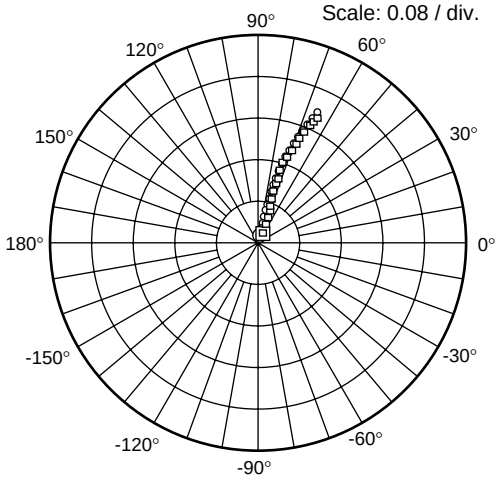
Condition: V_{CE} = 5 V, Z_O = 50 Ω
100 to 2000 MHz (100 MHz Step)
(I_C = 50 mA)
(I_C = 20 mA)

S21 Paramter vs. Frequency



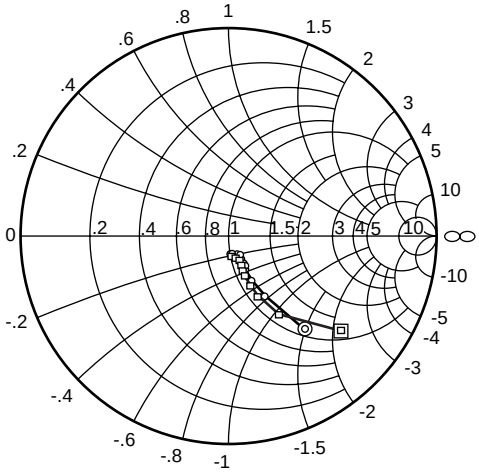
Condition: V_{CE} = 5 V, Z_O = 50 Ω
100 to 2000 MHz (100 MHz Step)
(I_C = 50 mA)
(I_C = 20 mA)

S12 Parameter vs. Frequency



Condition: V_{CE} = 5 V, Z_O = 50 Ω
100 to 2000 MHz (100 MHz Step)
(I_C = 50 mA)
(I_C = 20 mA)

S22 Parameter vs. Frequency



Condition: V_{CE} = 5 V, Z_O = 50 Ω
100 to 2000 MHz (100 MHz Step)
(I_C = 50 mA)
(I_C = 20 mA)

Sparameter (V_{CE} = 3 V, I_C = 10 mA, Zo = 50 Ω)

	S11		S21		S12		S22	
f (MHz)	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)

	S11		S21		S12		S22	
f (MHz)	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 V, I_C = 50 mA, Zo = 50 Ω)

	S11		S21		S12		S22	
f (MHz)	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)

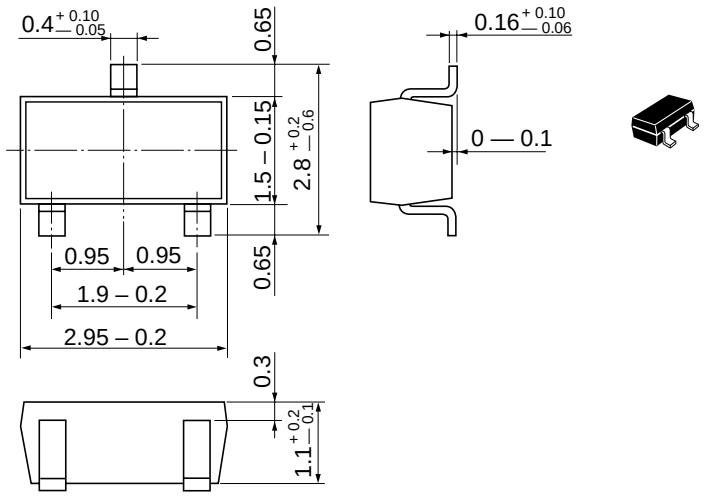
	S11		S21		S12		S22	
f (MHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.505	-66.9	29.11	134.6	0.026	65.8	0.707	-40.5
200	0.381	-108.9	18.04	112.9	0.040	62.3	0.448	-57.3
300	0.337	-132.7	12.44	102.5	0.053	64.6	0.318	-63.3
400	0.320	-148.4	9.46	96.2	0.065	66.7	0.252	-65.8
500	0.311	-161.0	7.63	91.6	0.079	68.2	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 V, I_C = 50 mA, Zo = 50 Ω)

	S11		S21		S12		S22	
f (MHz)	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

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