BB305C

Built in Biasing Circuit MOS FET IC
VHF RF Amplifier

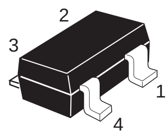
REJ03G0828-0600
(Previous ADE-208-608D)
Rev.6.00
Aug.10.2005

Features

- Built in Biasing Circuit; To reduce using parts cost & PC board space.
- Superior cross modulation characteristics.
- High gain; (PG = 28 dB typ. at f = 200 MHz)
- Wide supply voltage range;
  Applicable with 5 V to 9 V supply voltage.
- Withstanding to ESD;
  Built in ESD absorbing diode. Withstand up to 200V at C = 200 pF, Rs = 0 conditions.
- Provide mini mold packages; CMPAK-4 (SOT-343mod)

Outline

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



1. Source
2. Gate1
3. Gate2
4. Drain

Notes: 1. Marking is “EW –”.
2. BB305C is individual type number of RENESAS BBFET.

Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DS}	12	V
Gate1 to source voltage	V_{G1S}	+10 –0	V
Gate2 to source voltage	V_{G2S}	+10	V
Drain current	I_D	25	mA
Channel power dissipation	Pch	100	mW
Channel temperature	Tch	150	°C
Storage temperature	Tstg	–55 to +150	°C

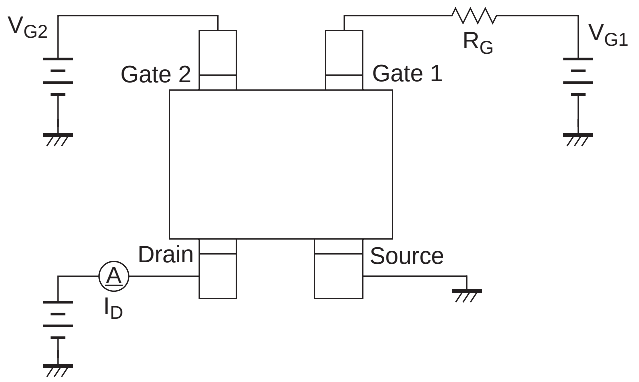
Electrical Characteristics

(Ta = 25°C)

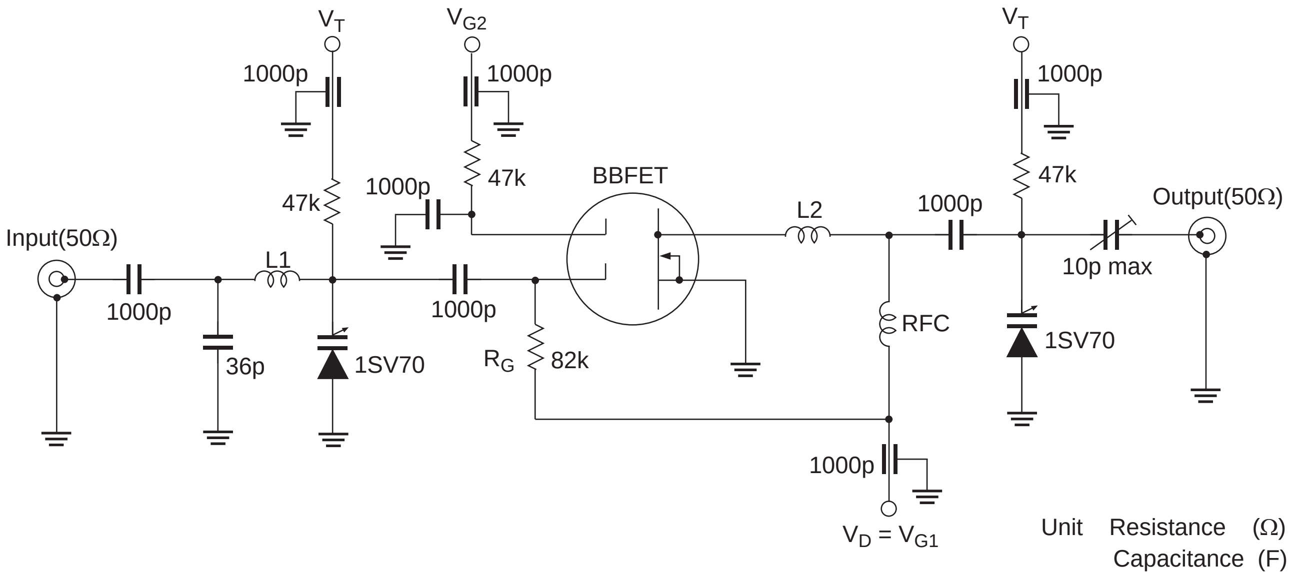
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	12	—	—	V	I_D = 200 µA, $V_{G1S} = V_{G2S}$ = 0
Gate1 to source breakdown voltage	$V_{(BR)G1SS}$	+10	—	—	V	I_{G1} = +10 µA, $V_{G2S} = V_{DS}$ = 0
Gate2 to source breakdown voltage	$V_{(BR)G2SS}$	±10	—	—	V	I_{G2} = ±10 µA, $V_{G1S} = V_{DS}$ = 0
Gate1 to source cutoff current	I_{G1SS}	—	—	+100	nA	V_{G1S} = +9 V, $V_{G2S} = V_{DS}$ = 0
Gate2 to source cutoff current	I_{G2SS}	—	—	±100	nA	V_{G2S} = ±9 V, $V_{G1S} = V_{DS}$ = 0
Gate1 to source cutoff voltage	$V_{G1S(off)}$	0.4	—	1.0	V	V_{DS} = 5 V, V_{G2S} = 4 V, I_D = 100 µA
Gate2 to source cutoff voltage	$V_{G2S(off)}$	0.4	—	1.0	V	V_{DS} = 5 V, V_{G1S} = 5 V, I_D = 100 µA
Input capacitance	Ciss	2.3	2.8	3.5	pF	V_{DS} = 5 V, V_{G1} = 5 V V_{G2S} = 4 V, R_G = 82 kΩ, f = 1 MHz
Output capacitance	Coss	1.1	1.5	1.9	pF	
Reverse transfer capacitance	Crss	—	0.017	0.04	pF	
Drain current	$I_{D(op)}$ 1	10	15	20	mA	V_{DS} = 5 V, V_{G1} = 5 V, V_{G2S} = 4 V, R_G = 82 kΩ
	$I_{D(op)}$ 2	—	13	—	mA	V_{DS} = 9 V, V_{G1} = 9 V, V_{G2S} = 6 V, R_G = 220 kΩ
Forward transfer admittance	$|y_{fs}|$1	23	28	—	mS	V_{DS} = 5 V, V_{G1} = 5 V, V_{G2S} = 4 V R_G =82 kΩ, f = 1 kHz
	$|y_{fs}|$2	—	28	—	mS	V_{DS} = 9 V, V_{G1} = 9 V, V_{G2S} = 6 V, R_G = 220 kΩ, f = 1 kHz
Power gain	PG1	24	28	—	dB	V_{DS} = 5 V, V_{G1} = 5 V, V_{G2S} = 4 V, R_G = 82 kΩ, f = 200 MHz
	PG2	—	28	—	dB	V_{DS} = 9 V, V_{G1} = 9 V, V_{G2S} = 6 V, R_G = 220 kΩ, f = 200 MHz
Noise figure	NF1	—	1.3	1.8	dB	V_{DS} = 5 V, V_{G1} = 5 V, V_{G2S} =4 V, R_G = 82 kΩ, f = 200 MHz
	NF2	—	1.3	—	dB	V_{DS} = 9 V, V_{G1} = 9 V, V_{G2S} = 6 V, R_G = 220 kΩ, f = 200 MHz

Main Characteristics

Test Circuit for Operating Items ($I_{D(op)}$, |yfs|, Ciss, Coss, Crss, NF, PG)



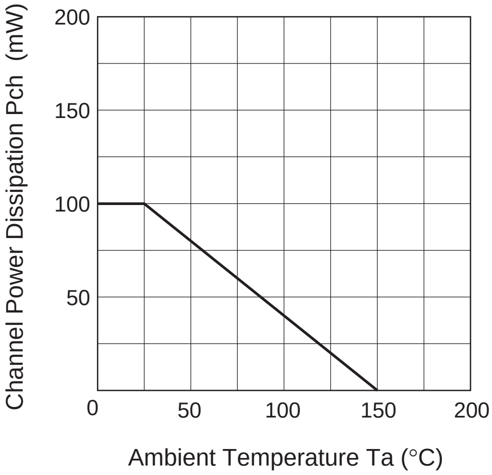
200MHz Power Gain, Noise Figure Test Circuit



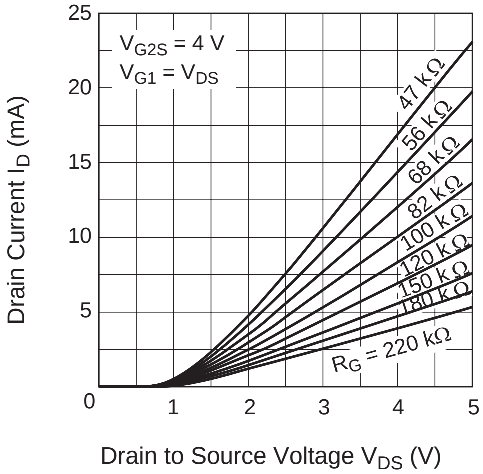
Unit Resistance (Ω)
Capacitance (F)

L1 : ϕ1mm Enameled Copper Wire,Inside dia 10mm, 2Turns
L2 : ϕ1mm Enameled Copper Wire,Inside dia 10mm, 2Turns
RFC : ϕ1mm Enameled Copper Wire,Inside dia 5mm, 2Turns

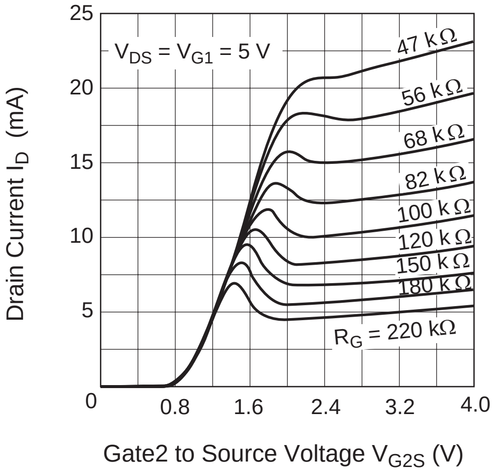
Maximum Channel Power
Dissipation Curve



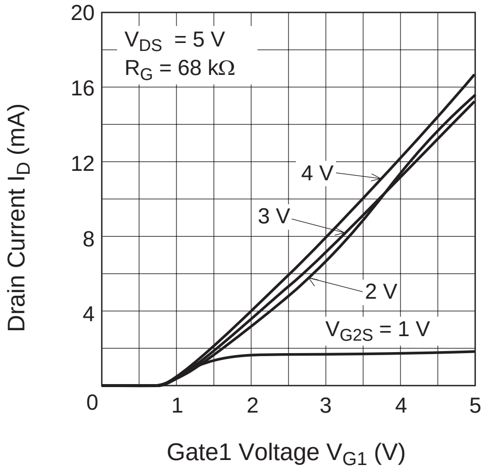
Typical Output Characteristics



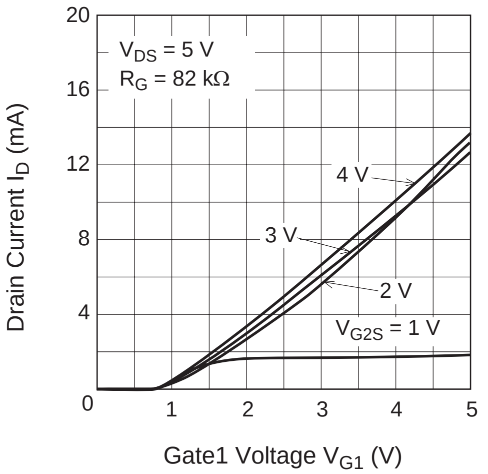
Drain Current vs.
Gate2 to Source Voltage



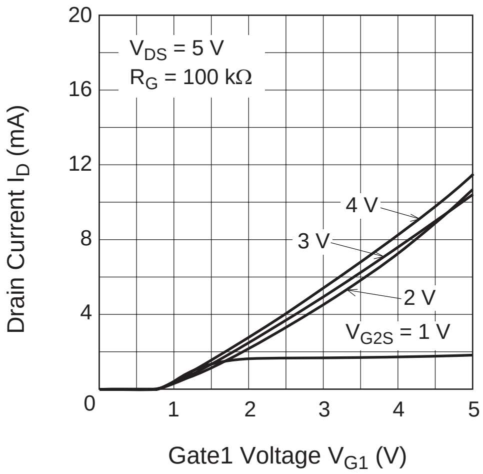
Drain Current vs. Gate1 Voltage



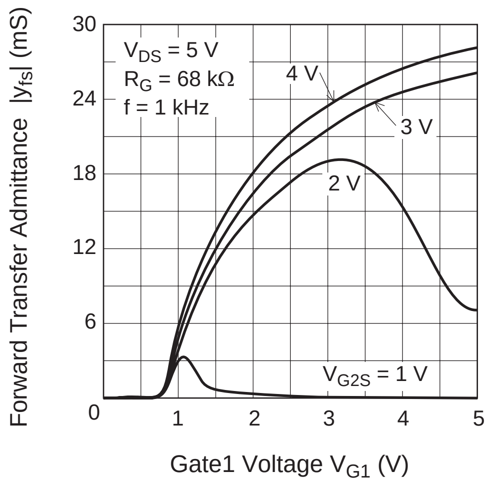
Drain Current vs. Gate1 Voltege



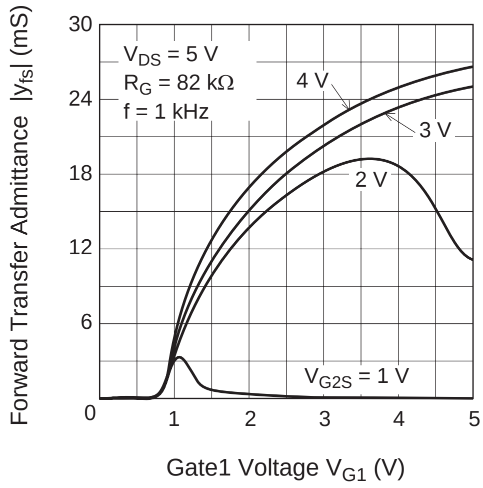
Drain Current vs. Gate1 Voltege



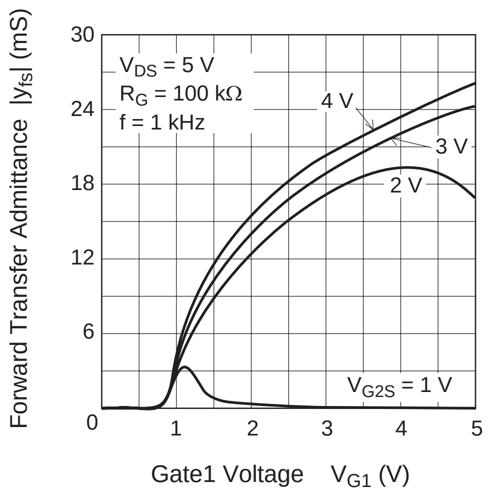
Forward Transfer Admittance vs. Gate1 Voltage



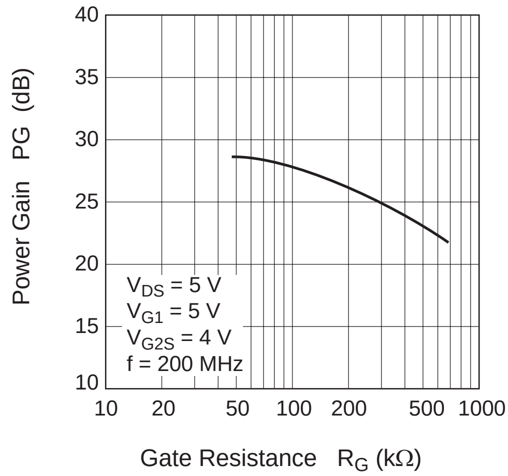
Forward Transfer Admittance vs. Gate1 Voltage



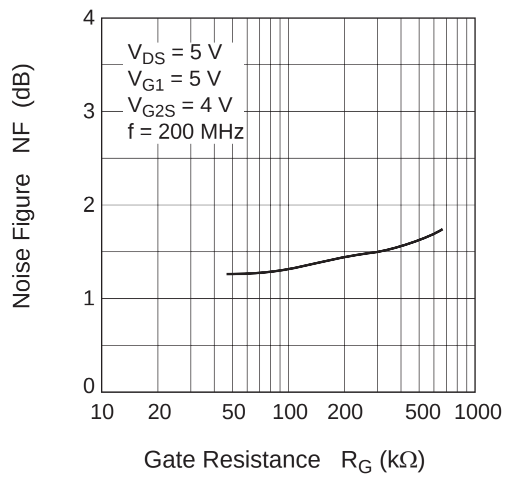
Forward Transfer Admittance vs. Gate1 Voltage



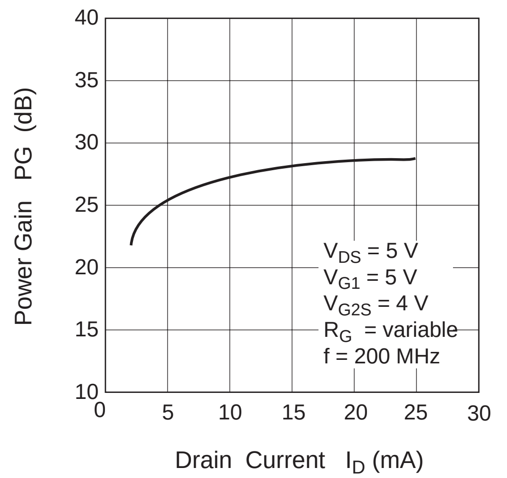
Power Gain vs. Gate Resistance



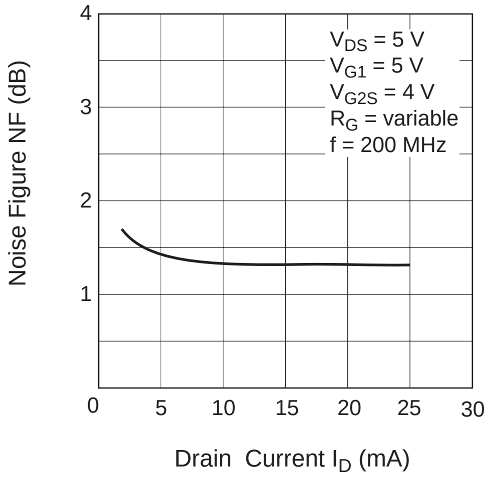
Noise Figure vs. Gate Resistance



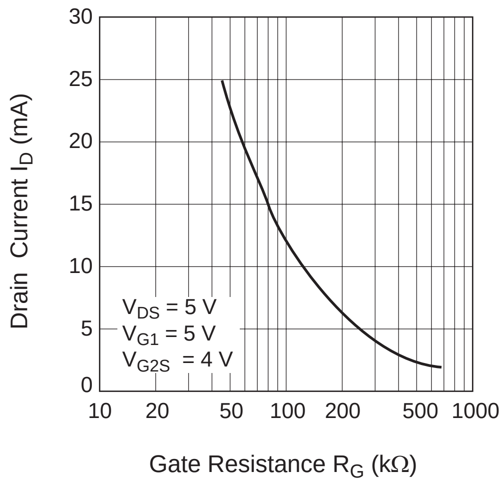
Power Gain vs. Drain Current



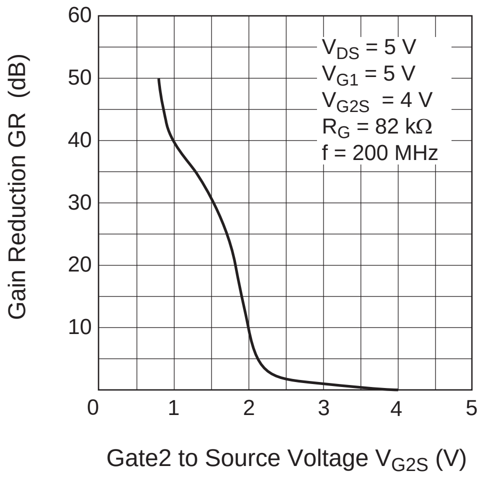
Noise Figure vs. Drain Current



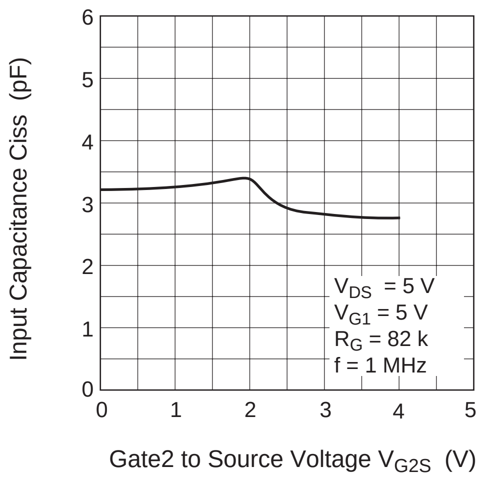
Drain Current vs. Gate Resistance



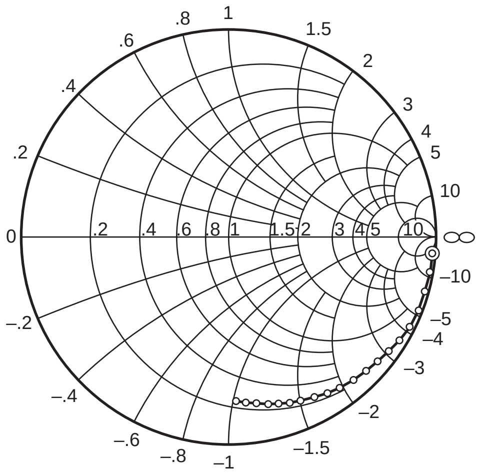
Gain Reduction vs.
Gate2 to Source Voltage



Input Capacitance vs.
Gate2 to Source Voltage



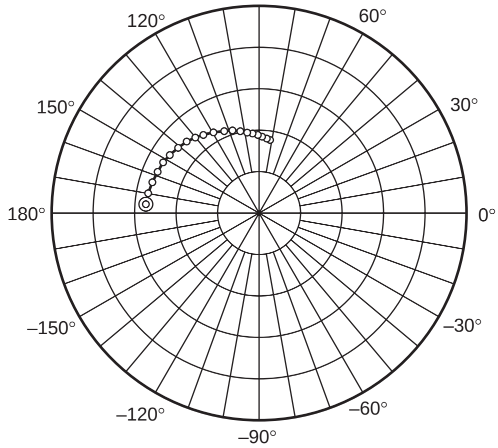
S11 Parameter vs. Frequency



Test Condition : V_{DS} = 5 V , V_{G1} = 5 V
V_{G2S} = 4 V , R_G = 82 kΩ
50 — 1000 MHz (50 MHz step)

S21 Parameter vs. Frequency

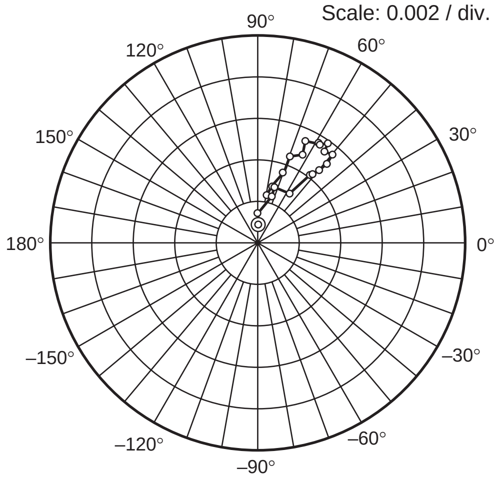
Scale: 1 / div.



Test Condition : V_{DS} = 5 V , V_{G1} = 5 V
V_{G2S} = 4 V , R_G = 82 kΩ
50 — 1000 MHz (50 MHz step)

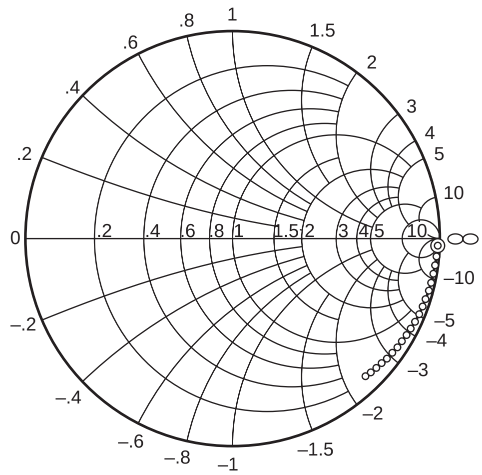
S12 Parameter vs. Frequency

Scale: 0.002 / div.



Test Condition : V_{DS} = 5 V , V_{G1} = 5 V
V_{G2S} = 4 V , R_G = 82 kΩ
50 — 1000 MHz (50 MHz step)

S22 Parameter vs. Frequency



Test Condition : V_{DS} = 5 V , V_{G1} = 5 V
V_{G2S} = 4 V , R_G = 82 kΩ
50 — 1000 MHz (50 MHz step)

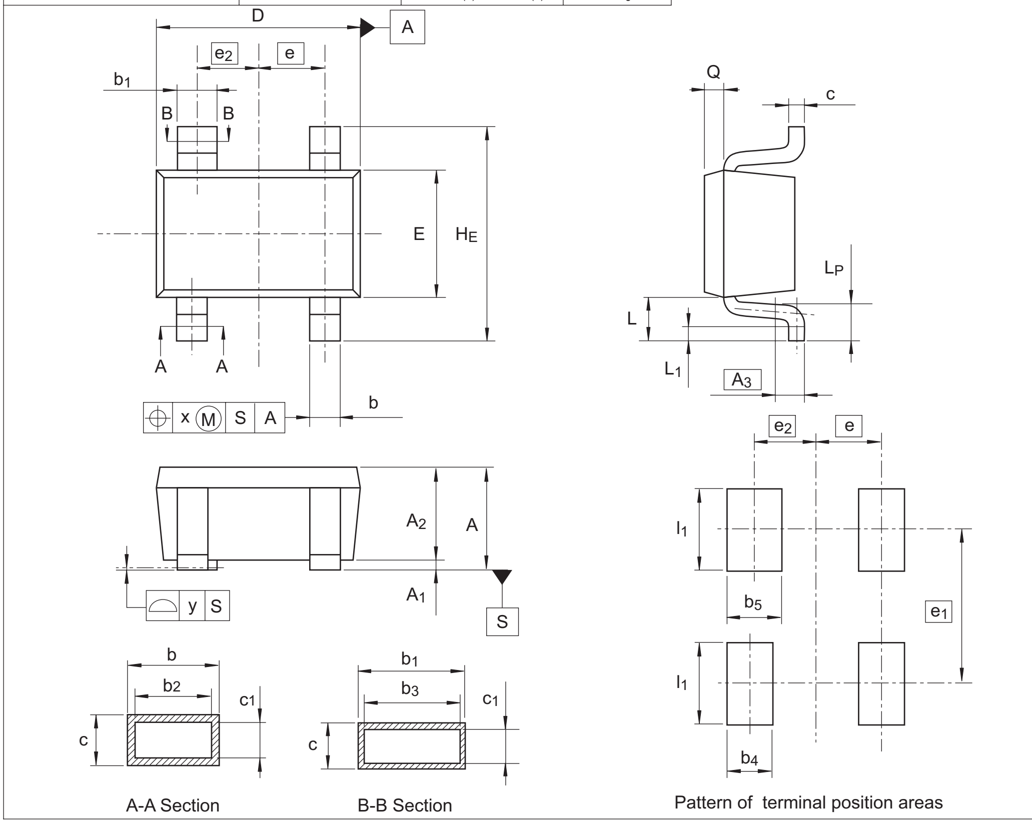
S Parameter

($V_{DS} = V_{G1} = 5V$, $V_{G2S} = 4V$, $R_G = 82k\Omega$, $Zo = 50\Omega$)

f(MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
50	0.991	–4.8	2.69	174.9	0.00090	91.4	0.991	–2.2
100	0.991	–9.9	2.68	169.3	0.00153	90.5	0.992	–4.8
150	0.982	–15.4	2.66	163.4	0.00243	73.8	0.991	–7.5
200	0.975	–20.7	2.62	157.5	0.00293	74.9	0.989	–9.9
250	0.972	–25.6	2.60	152.0	0.00370	70.1	0.985	–12.6
300	0.956	–30.6	2.54	146.3	0.00444	69.0	0.981	–15.0
350	0.942	–35.5	2.47	140.9	0.00478	63.7	0.977	–17.3
400	0.928	–40.1	2.42	135.7	0.00535	64.8	0.973	–19.7
450	0.920	–44.9	2.38	130.5	0.00551	56.8	0.967	–22.0
500	0.906	–49.2	2.32	125.7	0.00549	58.6	0.962	–24.5
550	0.894	–53.6	2.25	120.8	0.00584	54.4	0.957	–26.9
600	0.880	–57.8	2.18	116.2	0.00542	53.3	0.952	–29.2
650	0.868	–62.1	2.12	111.5	0.00562	49.5	0.944	–31.5
700	0.854	–66.2	2.06	106.8	0.00509	48.6	0.939	–33.8
750	0.842	–70.3	2.00	102.5	0.00465	49.7	0.933	–36.1
800	0.835	–73.9	1.94	98.4	0.00427	51.6	0.927	–38.3
850	0.820	–77.7	1.89	94.0	0.00416	53.3	0.921	–40.5
900	0.802	–81.5	1.83	89.6	0.00289	57.9	0.915	–42.7
950	0.801	–84.7	1.78	85.6	0.00288	72.9	0.909	–44.9
1000	0.789	–87.9	1.73	82.1	0.00241	78.9	0.904	–47.1

Package Dimensions

JEITA Package Code	RENESAS Code	Package Name	MASS[Typ.]
SC-82A	PTSP0004ZA-A	CMPAK-4(T) / CMPAK-4(T)V	0.006g



Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
A	0.8	—	1.1
A_1	0	—	0.1
A_2	0.8	0.9	1.0
A_3	—	0.25	—
b	0.25	0.32	0.4
b_1	0.35	0.42	0.5
b_2	—	0.3	—
b_3	—	0.4	—
c	0.1	0.13	0.15
c_1	—	0.11	—
D	1.8	2.0	2.2
E	1.15	1.25	1.35
e	—	0.65	—
e_2	—	0.6	—
H_E	1.8	2.1	2.4
L	0.3	—	0.7
L_1	0.1	—	0.5
L_P	0.2	—	0.6
x	—	—	0.05
y	—	—	0.05
b_4	—	—	0.45
b_5	—	—	0.55
e_1	—	1.5	—
l_1	—	—	0.9
Q	—	0.2	—

Ordering Information

Part Name	Quantity	Shipping Container
BB305CEW-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

RENESAS

RENESAS SALES OFFICES

http://www.renesas.com

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

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Colophon .3.0