

TBB1016

Twin Built in Biasing Circuit MOS FET IC VHF/VHF RF Amplifier

REJ03G1327-0200

Rev.2.00

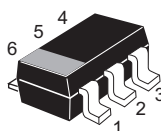
Aug 22, 2006

Features

- Small SMD package CMPAK-6 built in twin BBFET; To reduce using parts cost & PC board space.
- Very useful for total tuner cost reduction.
- Suitable for World Standard Tuner RF amplifier.
- High gain; PG = 32 dB at 200 MHz
- Low noise; NF = 1.0 dB at 200 MHz
- Power supply voltage: 5 V

Outline

RENESAS Package code: PTSP0006JA-A
(Package name: CMPAK-6)



1. Drain(1)
2. Source
3. Drain(2)
4. Gate-1(2)
5. Gate-2
6. Gate-1(1)

- Notes:
1. Marking is "RM".
 2. TBB1016 is individual type number of RENESAS TBBFET.

Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DS}	6	V
Gate1 to source voltage	V_{G1S}	+6 -0	V
Gate2 to source voltage	V_{G2S}	+6 -0	V
Drain current	I_D	30	mA
Channel power dissipation	P_{ch} ^{Note3}	250	mW
Channel temperature	Tch	150	°C
Storage temperature	Tstg	-55 to +150	°C

Note: 3. Value on the glass epoxy board (50 mm × 40 mm × 1 mm)

Electrical Characteristics

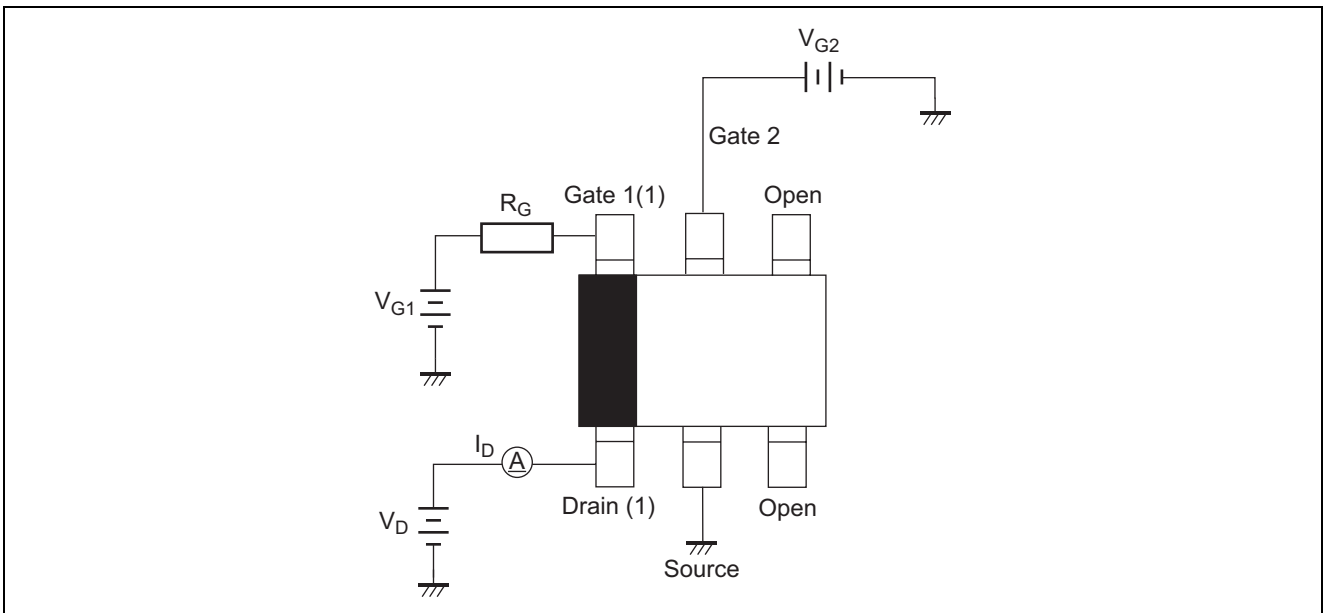
- The below specification are applicable for FET1 and FET2 unit

(Ta = 25°C)

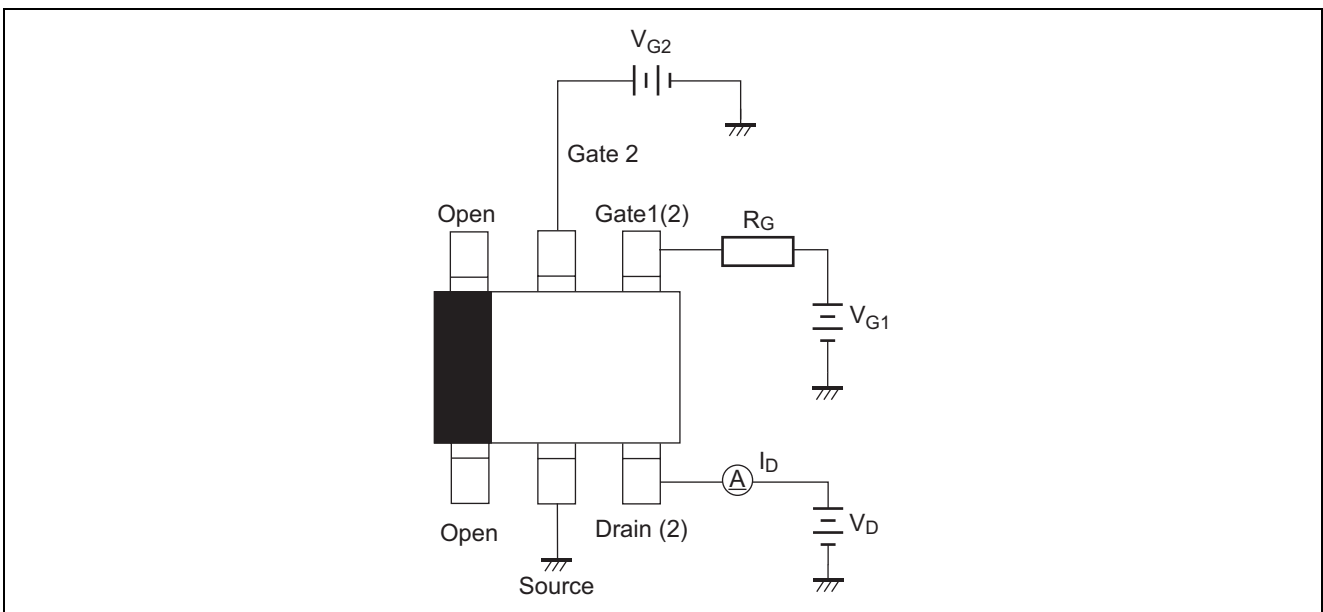
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	6	—	—	V	$I_D = 200 \mu A, V_{G1S} = V_{G2S} = 0$
Gate1 to source breakdown voltage	$V_{(BR)G1SS}$	+6	—	—	V	$I_{G1} = +10 \mu A, V_{G2S} = V_{DS} = 0$
Gate2 to source breakdown voltage	$V_{(BR)G2SS}$	+6	—	—	V	$I_{G2} = +10 \mu A, V_{G1S} = V_{DS} = 0$
Gate1 to source cutoff current	I_{G1SS}	—	—	+100	nA	$V_{G1S} = +5 V, V_{G2S} = V_{DS} = 0$
Gate2 to source cutoff current	I_{G2SS}	—	—	+100	nA	$V_{G2S} = +5 V, V_{G1S} = V_{DS} = 0$
Gate1 to source cutoff voltage	$V_{G1S(off)}$	0.5	0.8	1.1	V	$V_{DS} = 5 V, V_{G2S} = 4 V, I_D = 100 \mu A$
Gate2 to source cutoff voltage	$V_{G2S(off)}$	0.4	0.7	1.0	V	$V_{DS} = 5 V, V_{G1S} = 5 V, I_D = 100 \mu A$
Drain current	$I_{D(op)}$	11	15	19	mA	$V_{DS} = 5 V, V_{G1} = 5 V$ $V_{G2S} = 4 V, R_G = 120 k\Omega$
Forward transfer admittance	$ y_{fs} $	30	35	42	mS	$V_{DS} = 5 V, V_{G1} = 5 V, V_{G2S} = 4 V,$ $f = 1 kHz, R_G = 120 k\Omega$
Input capacitance	C_{iss}	1.8	2.2	2.6	pF	$V_{DS} = 5 V, V_{G1} = 5 V, V_{G2S} = 4 V,$ $f = 1 MHz, R_G = 120 k\Omega$
Output capacitance	C_{oss}	0.9	1.3	1.7	pF	$f = 1 MHz, R_G = 120 k\Omega$
Power gain	PG	27	32	37	dB	$V_{DS} = 5 V, V_{G1} = 5 V, V_{G2S} = 4 V,$ $R_G = 120 k\Omega, f = 200 MHz$
Noise figure	NF	—	1.0	1.7	dB	$R_G = 120 k\Omega, f = 200 MHz$

DC Biasing Circuit for Operating Characteristic Items ($I_{D(op)}$, $|y_{fs}|$, C_{iss} , C_{oss} , NF , PG)

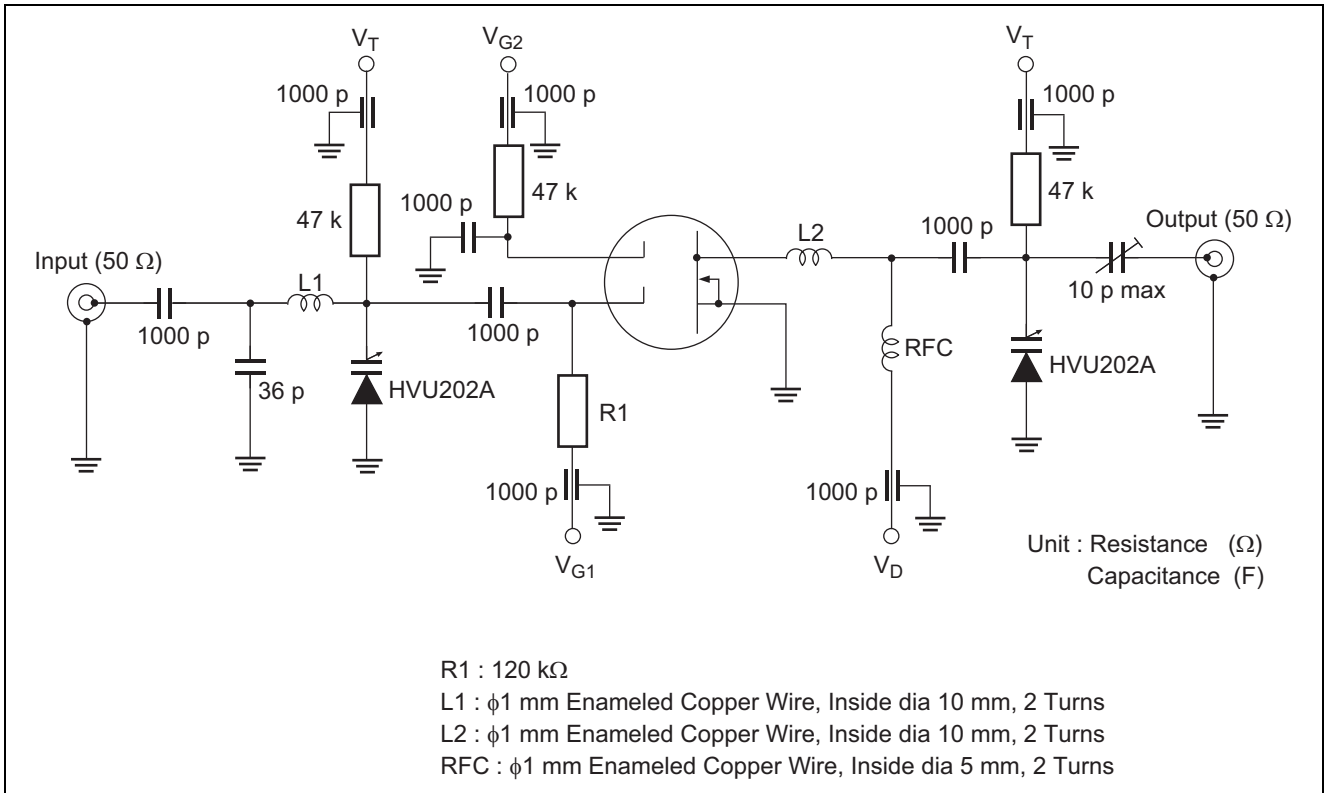
• Measurement of FET1



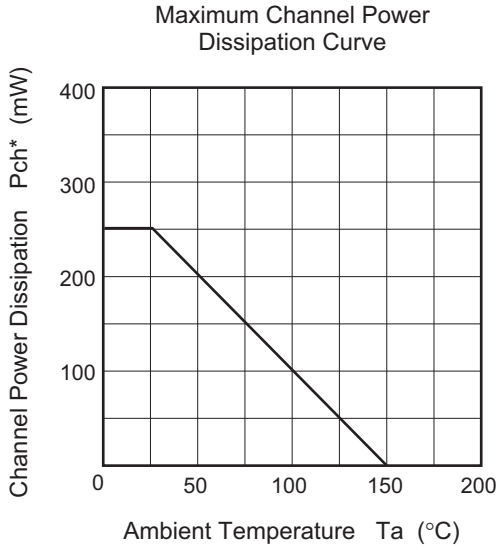
• Measurement of FET2



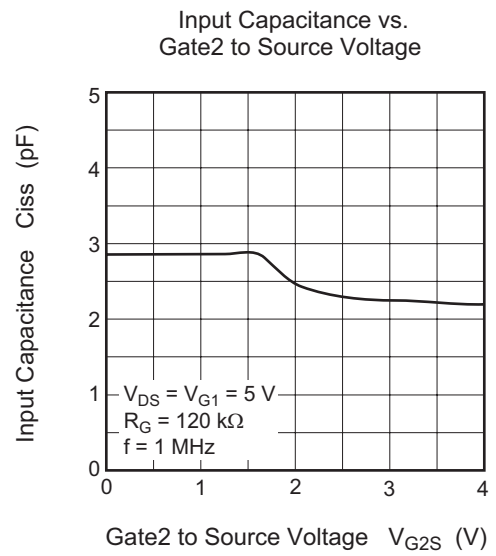
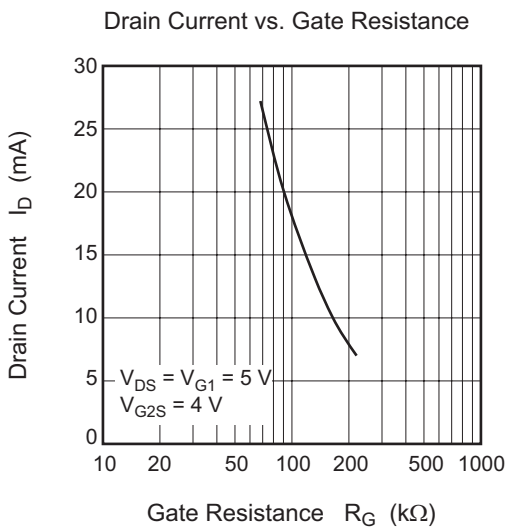
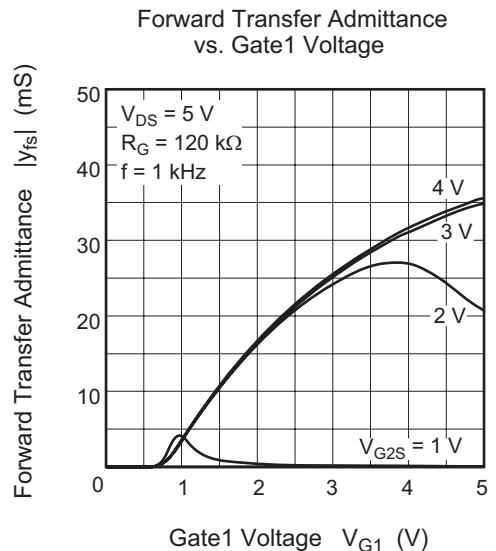
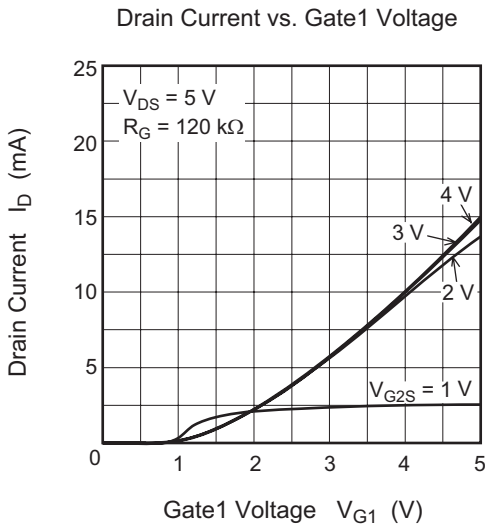
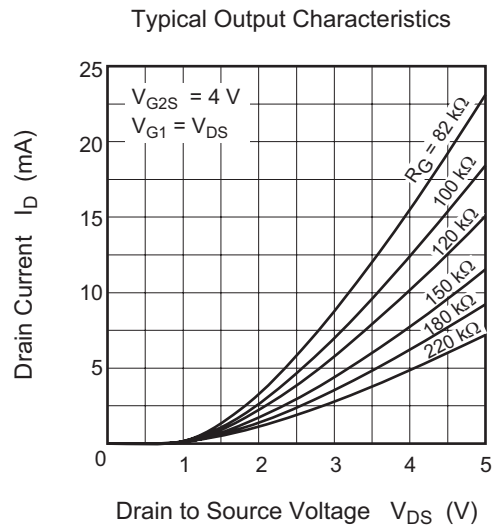
200 MHz Power Gain, Noise Figure Test Circuit



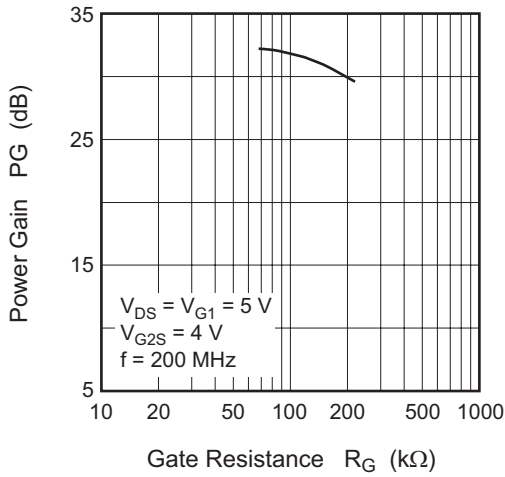
Main Characteristics



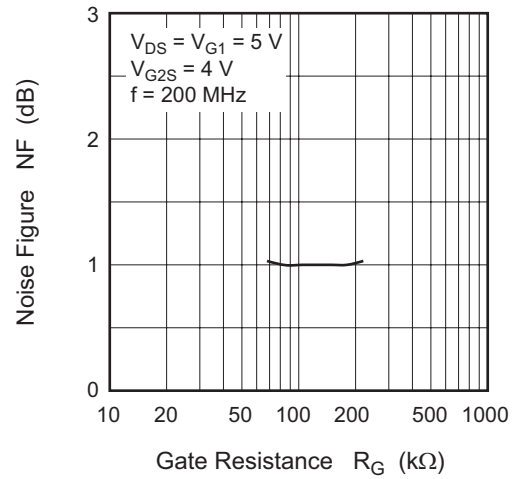
* Value on the glass epoxy board (50 mm × 40 mm × 1 mm)



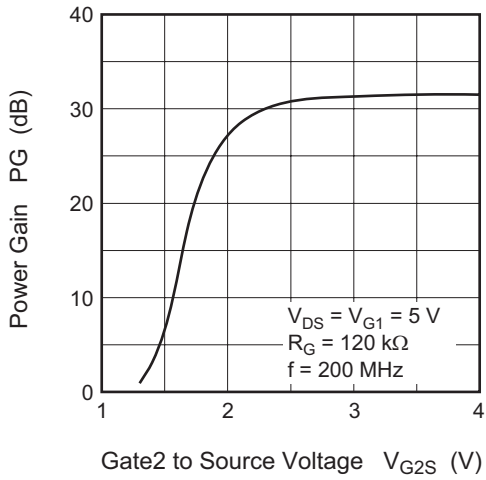
Power Gain vs. Gate Resistance



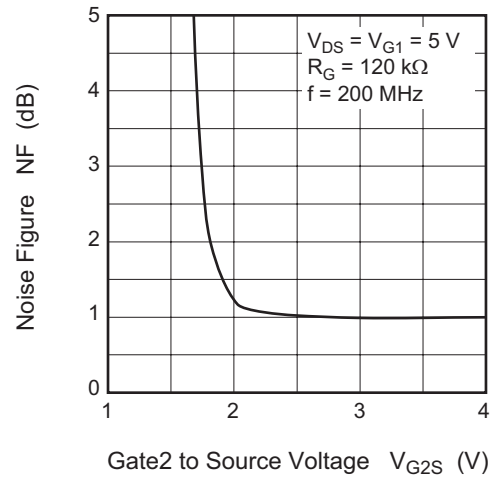
Noise Figure vs. Gate Resistance



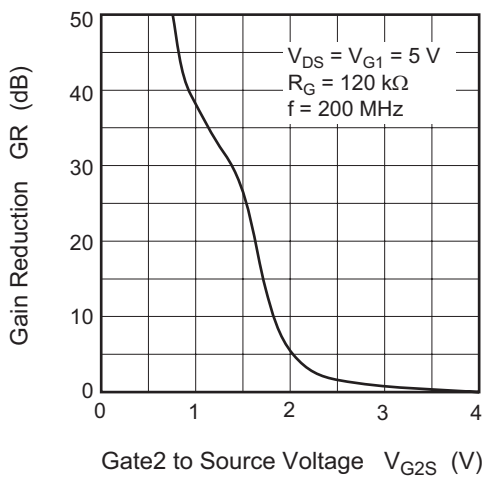
Power Gain vs. Gate2 to Source Voltage



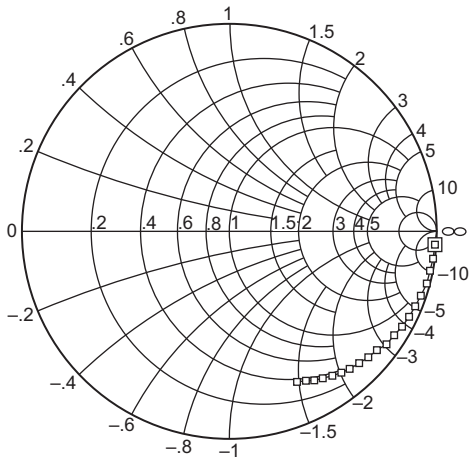
Noise Figure vs. Gate2 to Source Voltage



Gain Reduction vs. Gate2 to Source Voltage

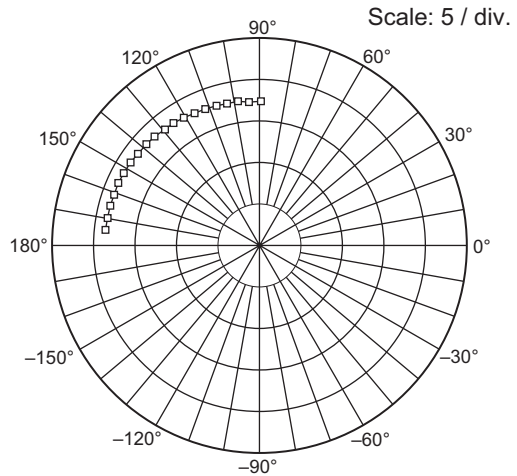


S11 Parameter vs. Frequency



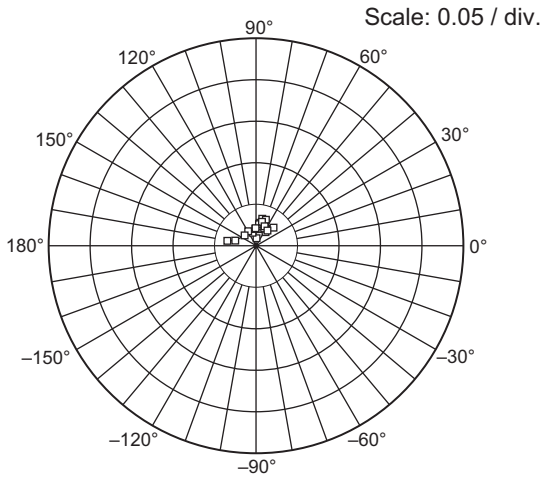
Test condition: $V_{DS} = 5\text{ V}$, $V_{G1} = 5\text{ V}$,
 $V_{G2S} = 4\text{ V}$, $R_G = 120\text{ k}\Omega$
 0.05 to 1.0 GHz (0.05 GHz step)

S21 Parameter vs. Frequency



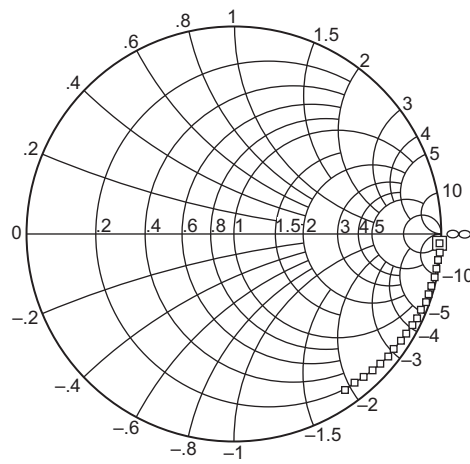
Test condition: $V_{DS} = 5\text{ V}$, $V_{G1} = 5\text{ V}$,
 $V_{G2S} = 4\text{ V}$, $R_G = 120\text{ k}\Omega$
 0.05 to 1.0 GHz (0.05 GHz step)

S12 Parameter vs. Frequency



Test condition: $V_{DS} = 5\text{ V}$, $V_{G1} = 5\text{ V}$,
 $V_{G2S} = 4\text{ V}$, $R_G = 120\text{ k}\Omega$
 0.05 to 1.0 GHz (0.05 GHz step)

S22 Parameter vs. Frequency



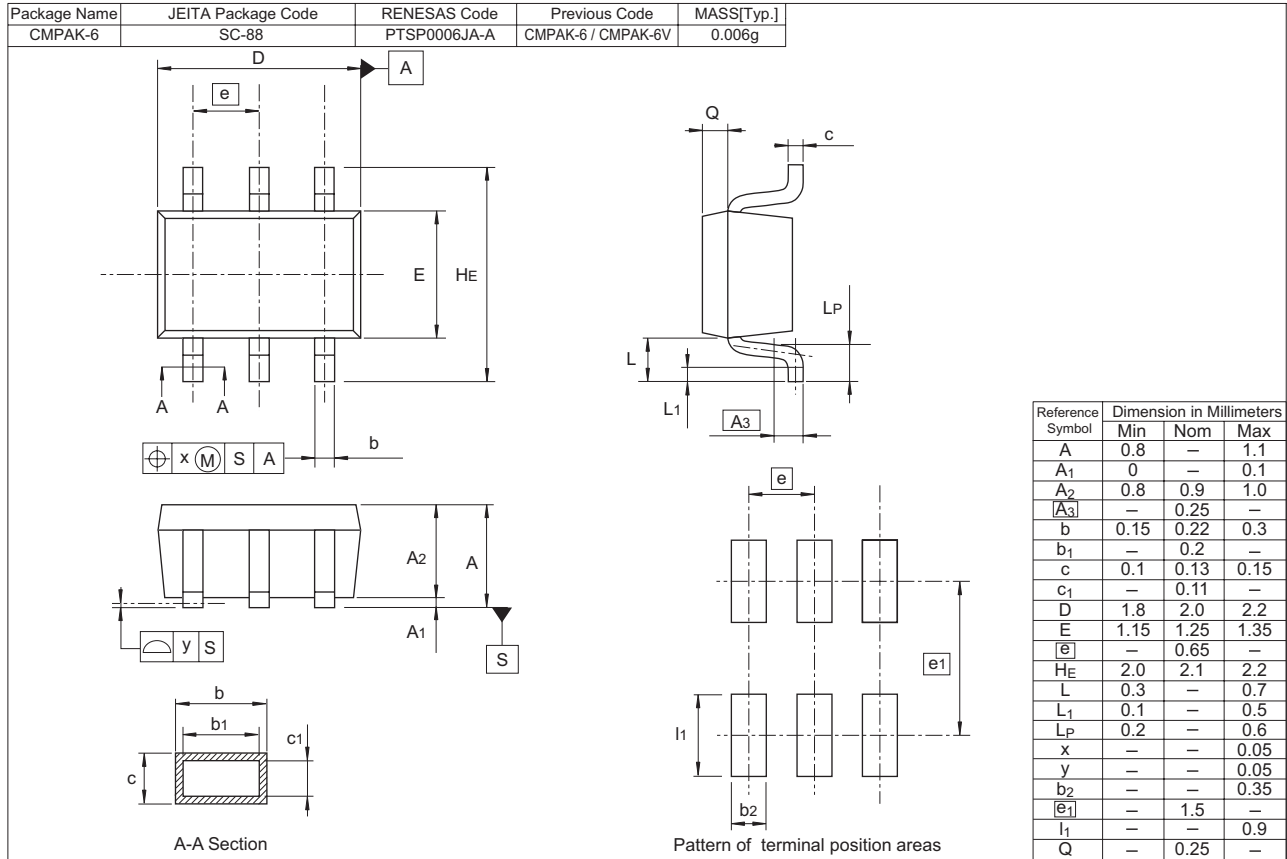
Test condition: $V_{DS} = 5\text{ V}$, $V_{G1} = 5\text{ V}$,
 $V_{G2S} = 4\text{ V}$, $R_G = 120\text{ k}\Omega$
 0.05 to 1.0 GHz (0.05 GHz step)

S parameter

 $(V_{DS} = 5\text{ V}, V_{G1} = 5\text{ V}, V_{G2S} = 4\text{ V}, R_G = 120\text{ k}\Omega, Z_O = 50\text{ }\Omega)$

Freq. (MHz)	S11		S21		S12		S22	
	Mag	Deg	Mag	Deg	Mag	Deg	Mag	Deg
50	0.994	-3.7	3.73	175.3	0.002	88.4	0.992	-2.4
100	0.992	-7.6	3.72	170.7	0.003	107.7	0.996	-5.1
150	0.987	-11.1	3.72	166.1	0.004	54.7	0.992	-7.2
200	0.985	-14.8	3.70	161.7	0.004	62.4	0.990	-9.6
250	0.975	-18.6	3.71	157.0	0.005	81.1	0.990	-12.0
300	0.967	-21.9	3.69	152.9	0.005	83.3	0.984	-14.6
350	0.960	-25.4	3.68	148.1	0.004	65.3	0.982	-17.1
400	0.952	-28.9	3.65	143.8	0.006	68.8	0.982	-19.4
450	0.940	-32.2	3.64	138.9	0.006	77.6	0.972	-21.9
500	0.934	-35.7	3.62	134.7	0.006	69.3	0.971	-24.6
550	0.914	-38.8	3.58	130.0	0.006	77.0	0.965	-26.9
600	0.904	-42.1	3.58	125.9	0.006	45.7	0.959	-29.9
650	0.892	-45.4	3.55	121.4	0.005	66.8	0.955	-32.5
700	0.881	-48.8	3.52	116.9	0.004	52.5	0.948	-35.6
750	0.870	-51.5	3.51	112.5	0.004	93.5	0.949	-38.3
800	0.855	-54.4	3.49	107.9	0.004	92.7	0.941	-41.4
850	0.839	-57.5	3.47	103.7	0.004	121.0	0.936	-44.4
900	0.827	-60.3	3.48	99.3	0.004	140.2	0.929	-47.7
950	0.809	-62.8	3.43	95.0	0.005	167.7	0.921	-50.9
1000	0.796	-65.7	3.43	90.3	0.007	171.4	0.921	-54.5

Package Dimensions



Ordering Information

Part Name	Quantity	Shipping Container
TBB1016RMTL-E	3000 pcs	φ178mm reel, 8mm 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.

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