

TBB1002

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

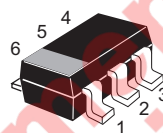
R07DS0313EJ1000
(Previous: REJ03G0841-0900)
Rev.10.00
Mar 28, 2011

Features

- Small SMD package CMPAK-6 built in twin BBFET; To reduce using parts cost & PC board space.
- Suitable for World Standard Tuner RF amplifier.
- Very useful for total tuner cost reduction.
- Withstanding to ESD; Built in ESD absorbing diode. Withstand up to 200 V at C = 200 pF, Rs = 0 conditions.
- Provide mini mold packages; CMPAK-6

Outline

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



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

- Notes:
1. Marking is "BM".
 2. TBB1002 is individual type number of RENESAS TWIN BBFET.

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} ^{*3}	250	mW
Channel temperature	T _{ch}	150	°C
Storage temperature	T _{stg}	-55 to +150	°C

Notes: 3. Value on the glass epoxy board (49mm × 38mm × 1mm).

Electrical Characteristics

The below specification are applicable for UHF unit (FET1)

(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	0.75	1.0	V	$V_{DS} = 5 V, V_{G2S} = 4 V$ $I_D = 100 \mu A$
Gate2 to source cutoff voltage	$V_{G2S(off)}$	0.5	0.75	1.0	V	$V_{DS} = 5 V, V_{G1S} = 5 V$ $I_D = 100 \mu A$
Drain current	$I_{D(op)}$	13	17	21	mA	$V_{DS} = 5 V, V_{G1} = 5 V$ $V_{G2S} = 4 V, R_G = 100 k\Omega$
Forward transfer admittance	$ y_{fs} $	21	26	31	mS	$V_{DS} = 5 V, V_{G1} = 5 V, V_{G2S} = 4 V$ $R_G = 100 k\Omega, f = 1 kHz$
Input capacitance	C_{iss}	1.4	1.8	2.2	pF	$V_{DS} = 5 V, V_{G1} = 5 V$
Output capacitance	C_{oss}	1.0	1.4	1.8	pF	$V_{G2S} = 4 V, R_G = 100 k\Omega$
Reverse transfer capacitance	C_{rss}	—	0.02	0.04	pF	$f = 1 MHz$
Power gain	PG	16	21	—	dB	$V_{DS} = V_{G1} = 5 V, V_{G2S} = 4 V$
Noise figure	NF	—	1.7	2.5	dB	$R_G = 100 k\Omega, f = 900 MHz$ $Z_i = S11^*, Z_o = S22^* (:PG)$ $Z_i = S11opt (:NF)$

The below specification are applicable for VHF unit (FET2)

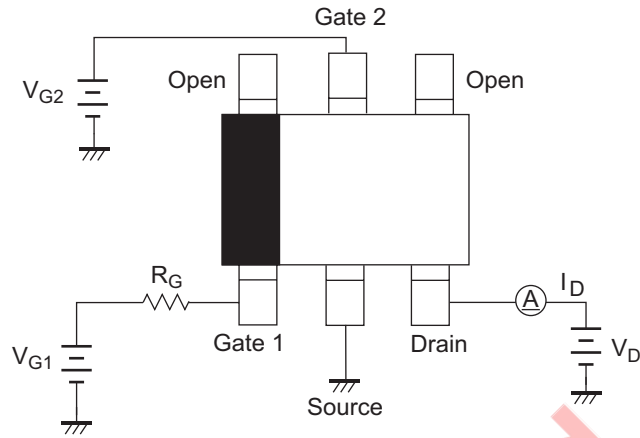
(Ta = 25°C)

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	0.75	1.0	V	$V_{DS} = 5 V, V_{G2S} = 4 V$ $I_D = 100 \mu A$
Gate2 to source cutoff voltage	$V_{G2S(off)}$	0.5	0.75	1.0	V	$V_{DS} = 5 V, V_{G1S} = 5 V$ $I_D = 100 \mu A$
Drain current	$I_{D(op)}$	14	18	22	mA	$V_{DS} = 5V, V_{G1} = 5 V, V_{G2S} = 4 V$ $R_G = 82 k\Omega$
Forward transfer admittance	$ y_{fs} $	20	25	30	mS	$V_{DS} = 5 V, V_{G1} = 5 V$ $V_{G2S} = 4 V, R_G = 82 k\Omega$ $f = 1 kHz$
Input capacitance	C_{iss}	2.2	2.6	3.0	pF	$V_{DS} = 5 V, V_{G1} = 5 V$
Output capacitance	C_{oss}	1.2	1.6	2.0	pF	$V_{G2S} = 4 V, R_G = 82 k\Omega$
Reverse transfer capacitance	C_{rss}	—	0.03	0.05	pF	$f = 1 MHz$
Power gain	PG	22	27	—	dB	$V_{DS} = V_{G1} = 5 V, V_{G2S} = 4 V$
Noise figure	NF	—	1.2	1.7	dB	$R_G = 82 k\Omega, f = 200 MHz$

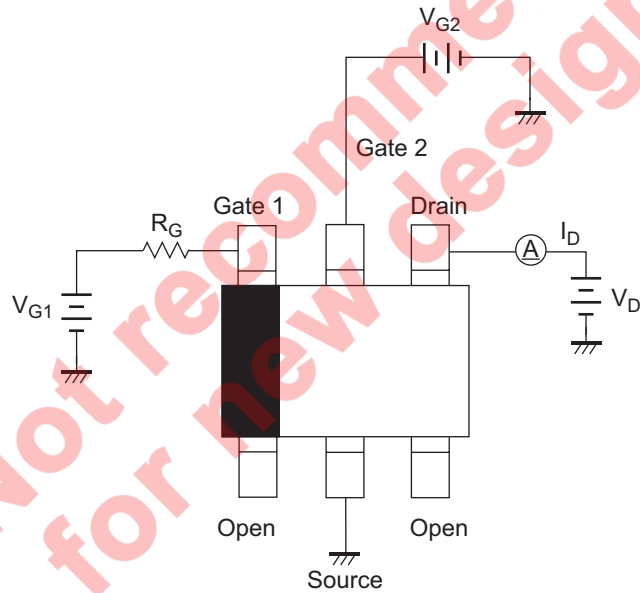
Test Circuits

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

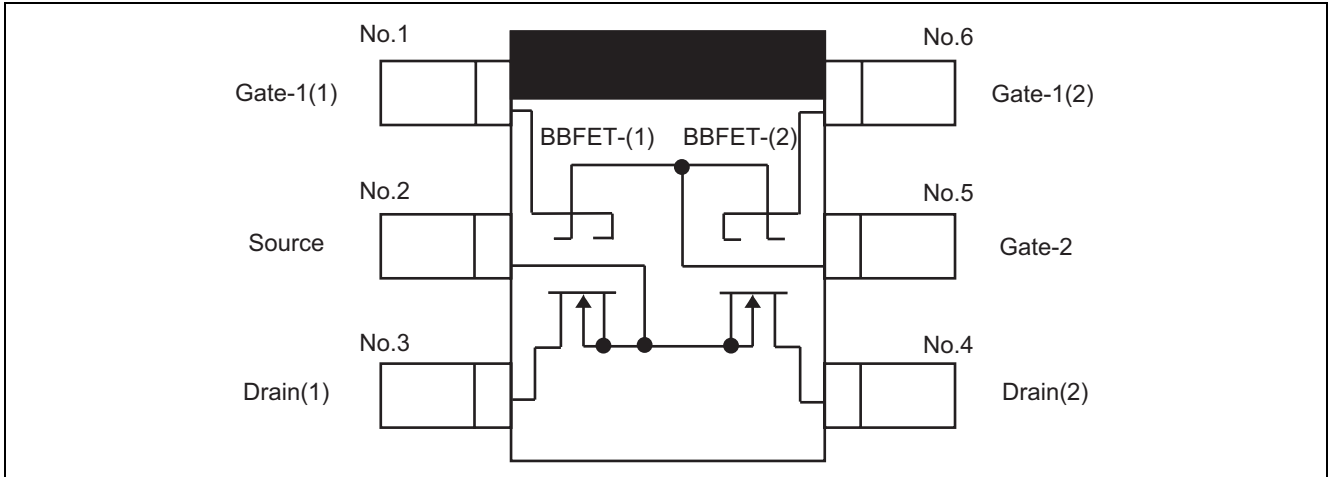
Measurement of FET1



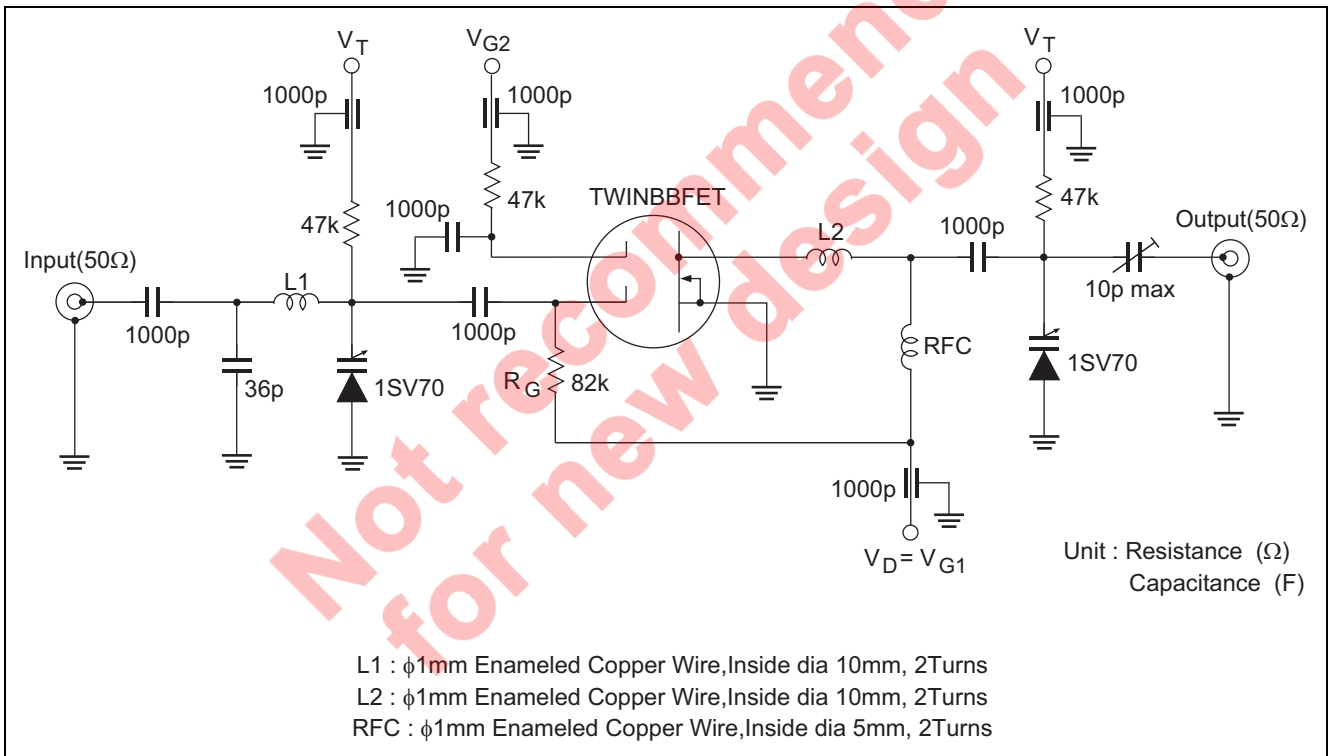
Measurement of FET2



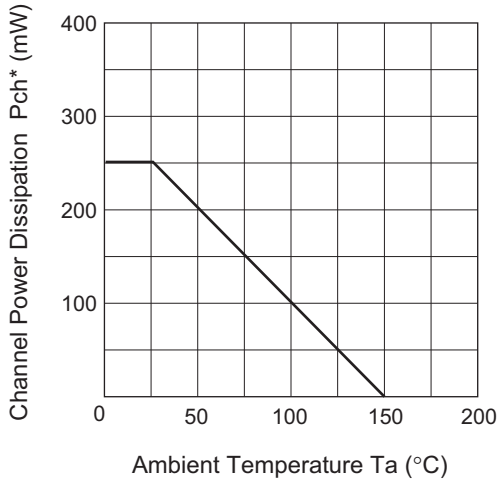
• Equivalent Circuit



• 200 MHz Power Gain, Noise Figure Test Circuit

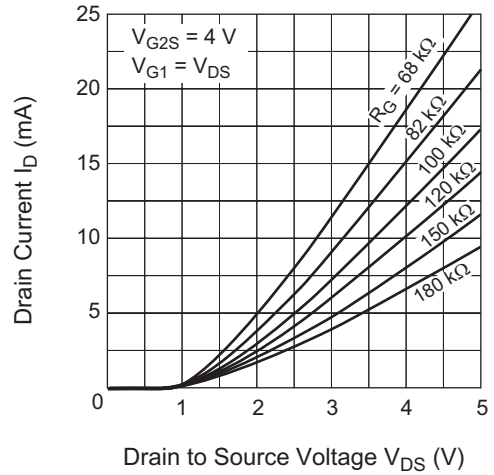


Maximum Channel Power Dissipation Curve

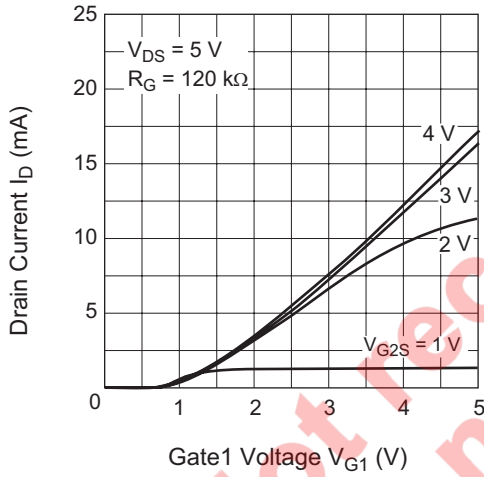


* Value on the glass epoxy board (49mm × 38mm × 1mm)

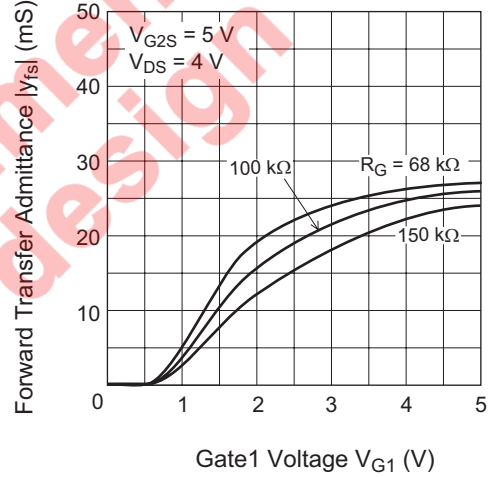
Typical Output Characteristics (FET1)



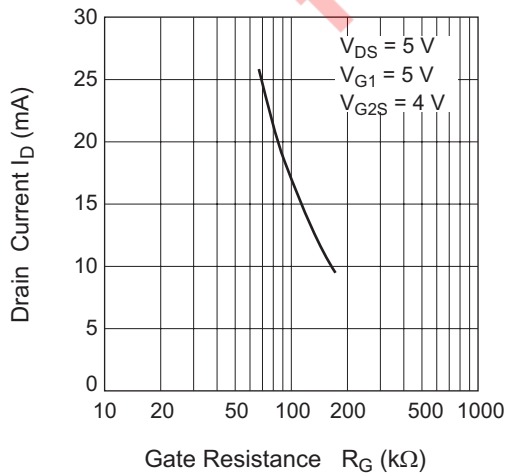
Drain Current vs. Gate1 Voltage (FET1)



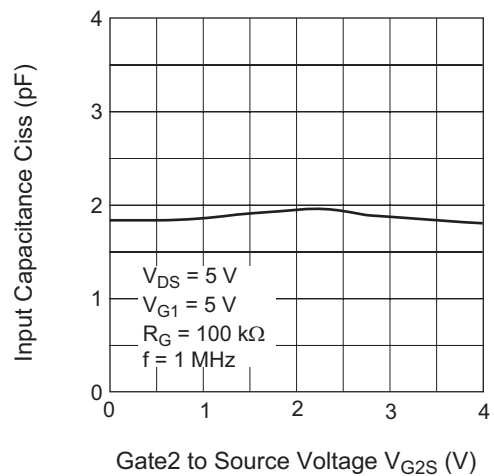
Forward Transfer Admittance vs. Gate1 Voltage (FET1)

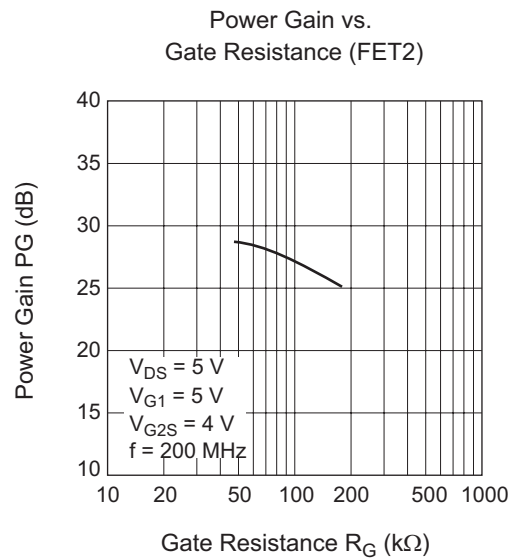
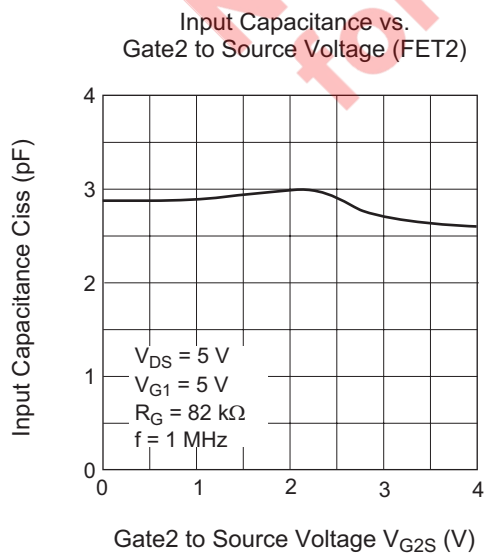
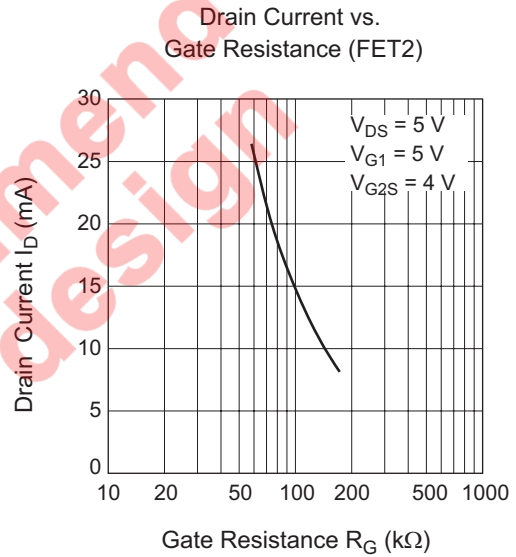
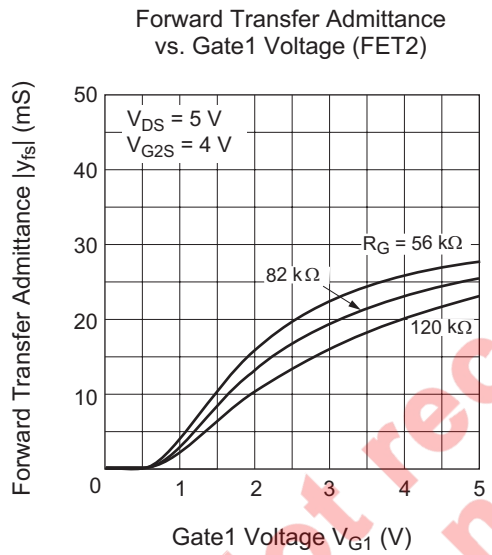
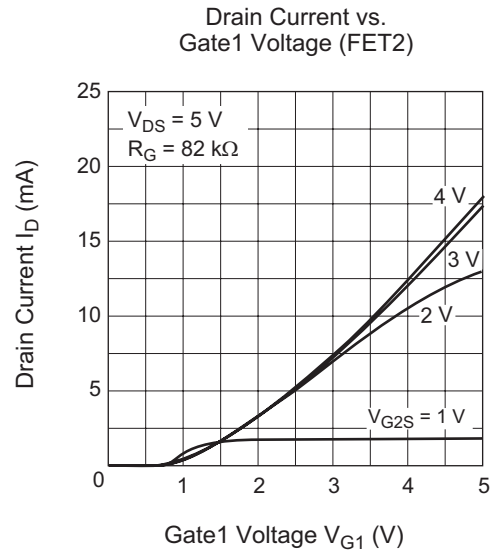
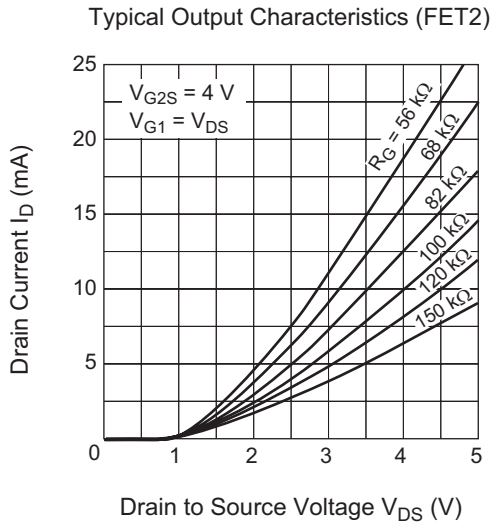


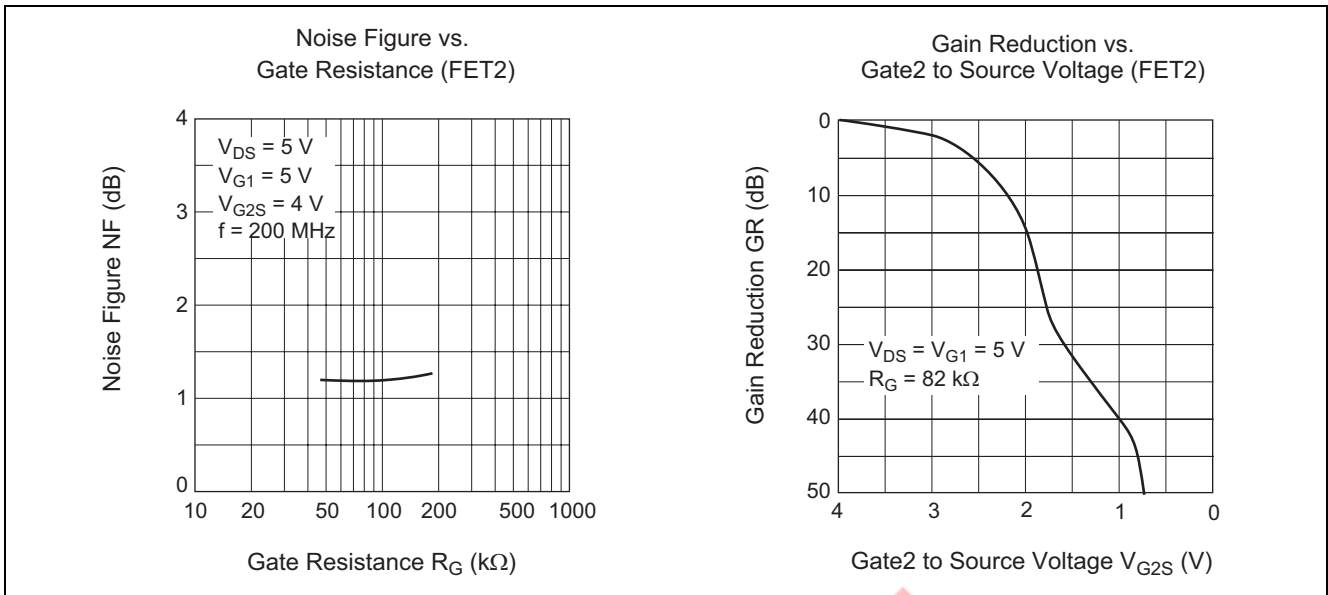
Drain Current vs. Gate Resistance (FET1)



Input Capacitance vs. Gate2 to Source Voltage (FET1)

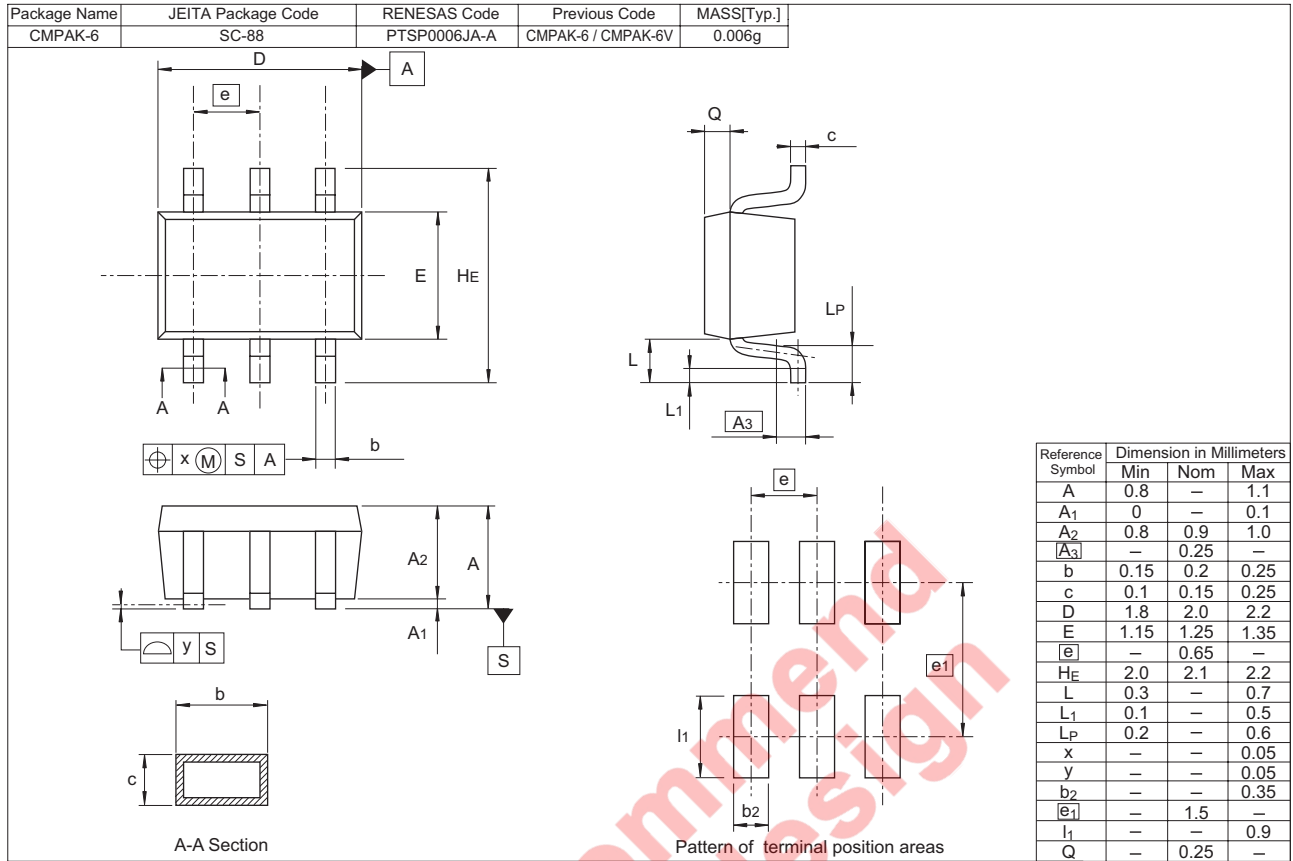






Not recommend
for new design

Package Dimensions



Ordering Information

Orderable Part Number	Quantity	Shipping Container
TBB1002BMTL-E TBB1002BMTL-H	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.

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Renesas Electronics America Inc.

2880 Scott Boulevard Santa Clara, CA 95050-2554, U.S.A.
Tel: +1-408-586-6000, Fax: +1-408-588-6130

Renesas Electronics Canada Limited

1101 Nicholson Road, Newmarket, Ontario L3Y 9C3, Canada
Tel: +1-905-898-5441, Fax: +1-905-898-3220

Renesas Electronics Europe Limited

Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.
Tel: +44-1628-585-100, Fax: +44-1628-585-900

Renesas Electronics Europe GmbH

Arcadiastrasse 10, 40472 Düsseldorf, Germany
Tel: +49-211-65030, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.

7th Floor, Quantum Plaza, No.27 ZhiChunLu Haidian District, Beijing 100083, P.R.China
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.

Unit 204, 205, AZIA Center, No.1233 Lujiazui Ring Rd., Pudong District, Shanghai 200120, China
Tel: +86-21-5877-1818, Fax: +86-21-6887-7858 / -7898

Renesas Electronics Hong Kong Limited

Unit 1601-1613, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: +852-2886-9318, Fax: +852 2886-9022/9044

Renesas Electronics Taiwan Co., Ltd.

13F, No. 363, Fu Shing North Road, Taipei, Taiwan
Tel: +886-2-8175-9600, Fax: +886 2-8175-9670

Renesas Electronics Singapore Pte. Ltd.

1 HarbourFront Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: +65-6213-0200, Fax: +65-6276-8001

Renesas Electronics Malaysia Sdn.Bhd.

Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

Renesas Electronics Korea Co., Ltd.

11F., Samik Lavied' or Bldg., 720-2 Yeoksam-Dong, Kangnam-Ku, Seoul 135-080, Korea
Tel: +82-2-558-3737, Fax: +82-2-558-5141