TBB1010

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

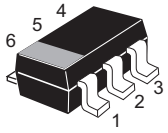
R07DS0316EJ0600
(Previous: REJ03G0844-0500)
Rev.6.00
Mar 28, 2011

Features

- Small SMD package CMPAK-6 built in twin BBFET; To reduce using parts cost & PC board space.
- High |yfs|=29mS × 2
- 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. Drain(1)
2. Source
3. Drain(2)
4. Gate-1(2)
5. Gate-2
6. Gate-1(1)

Notes: 1. Marking is “KM”.
2. TBB1010 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	Pch[*3]	250	mW
Channel temperature	Tch	150	°C
Storage temperature	Tstg	–55 to +150	°C

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

Electrical Characteristics

(Ta = 25°C)

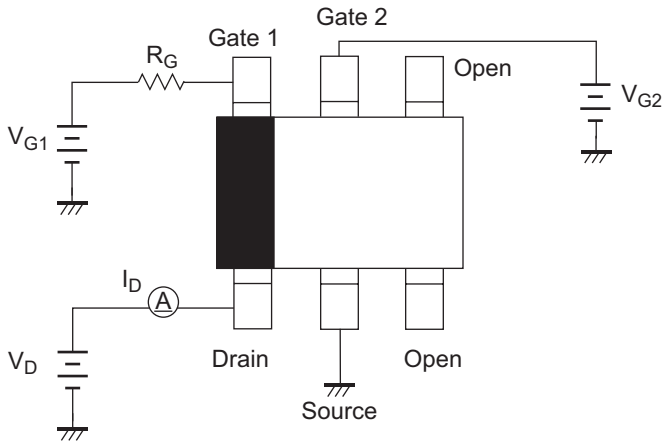
The below specification are applicable for FET1 and FET2 unit

Item	Symbol	Min	Typ	Max	Unit	Test conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	6	—	—	V	I_D = 200 μA, V_{G1S} = V_{G2S} = 0
Gate1 to source breakdown voltage	$V_{(BR)G1SS}$	+6	—	—	V	I_{G1} = +10 μA, V_{G2S} = V_{DS} = 0
Gate2 to source breakdown voltage	$V_{(BR)G2SS}$	+6	—	—	V	I_{G2} = +10 μA, 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	$V_{G1S(off)}$	0.6	—	1.1	V	V_{DS} = 5 V, V_{G2S} = 4 V, I_D = 100 μA
Gate2 to source cutoff voltage	$V_{G2S(off)}$	0.6	—	1.1	V	V_{DS} = 5 V, V_{G1S} = 5 V, I_D = 100 μA
Drain current	$I_{D(op)}$	12	16	20	mA	V_{DS} = 5 V, V_{G1} = 5 V V_{G2S} = 4 V, R_G = 120 kΩ
Forward transfer admittance	$\|y_{fs}\|$	24	29	—	mS	V_{DS} = 5 V, V_{G1} = 5 V, V_{G2S} = 4 V R_G = 120 kΩ, f = 1 kHz
Input capacitance	Ciss	1.7	2.1	2.5	pF	V_{DS} = 5 V, V_{G1} = 5 V V_{G2S} = 4 V, R_G = 120 kΩ f = 1 MHz
Output capacitance	Coss	1.0	1.4	1.8	pF	
Reverse transfer capacitance	Crss	—	0.03	0.05	pF	
Power gain	PG	25	30	—	dB	V_{DS} = V_{G1} = 5 V, V_{G2S} = 4 V R_G = 120 kΩ, f = 200 MHz
Noise figure	NF	—	1.1	1.8	dB	

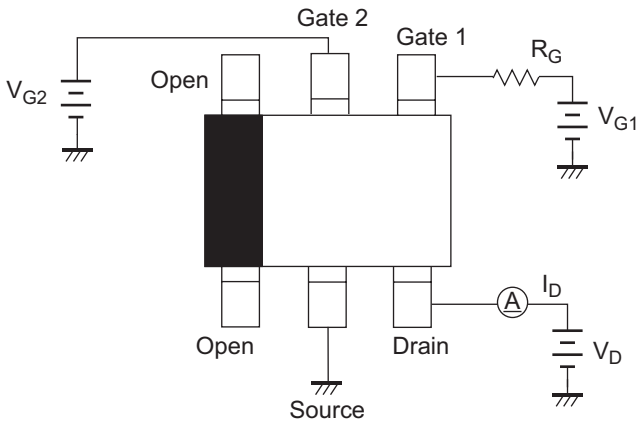
Test Circuits

- **DC Biasing Circuit for Operating Characteristic Items** ($I_{D(op)}$, |yfs|, Ciss, Coss, Crss, NF, PG)

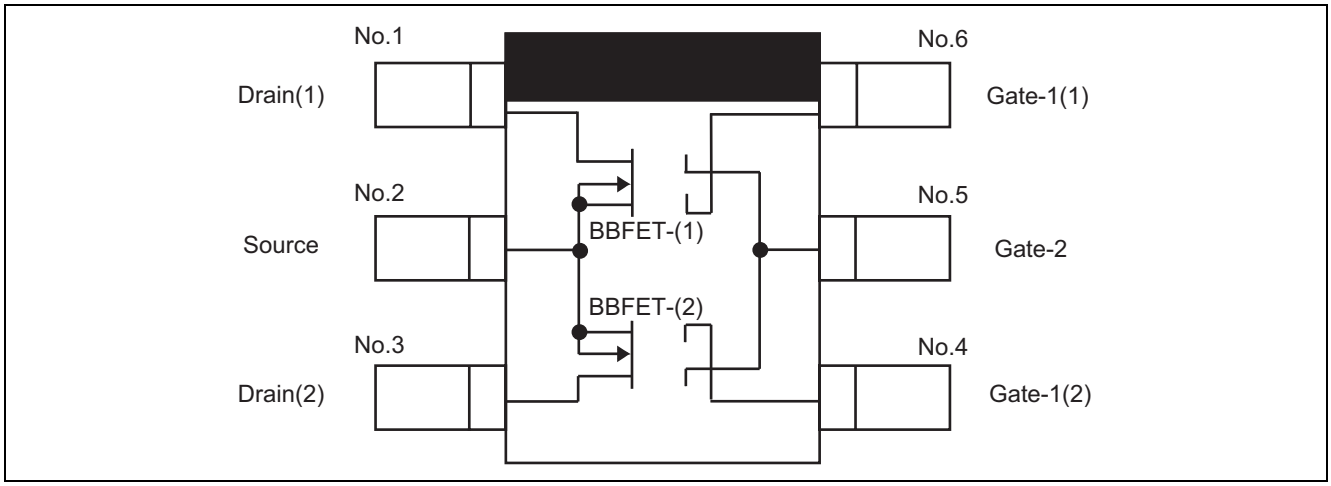
Measurment of FET1



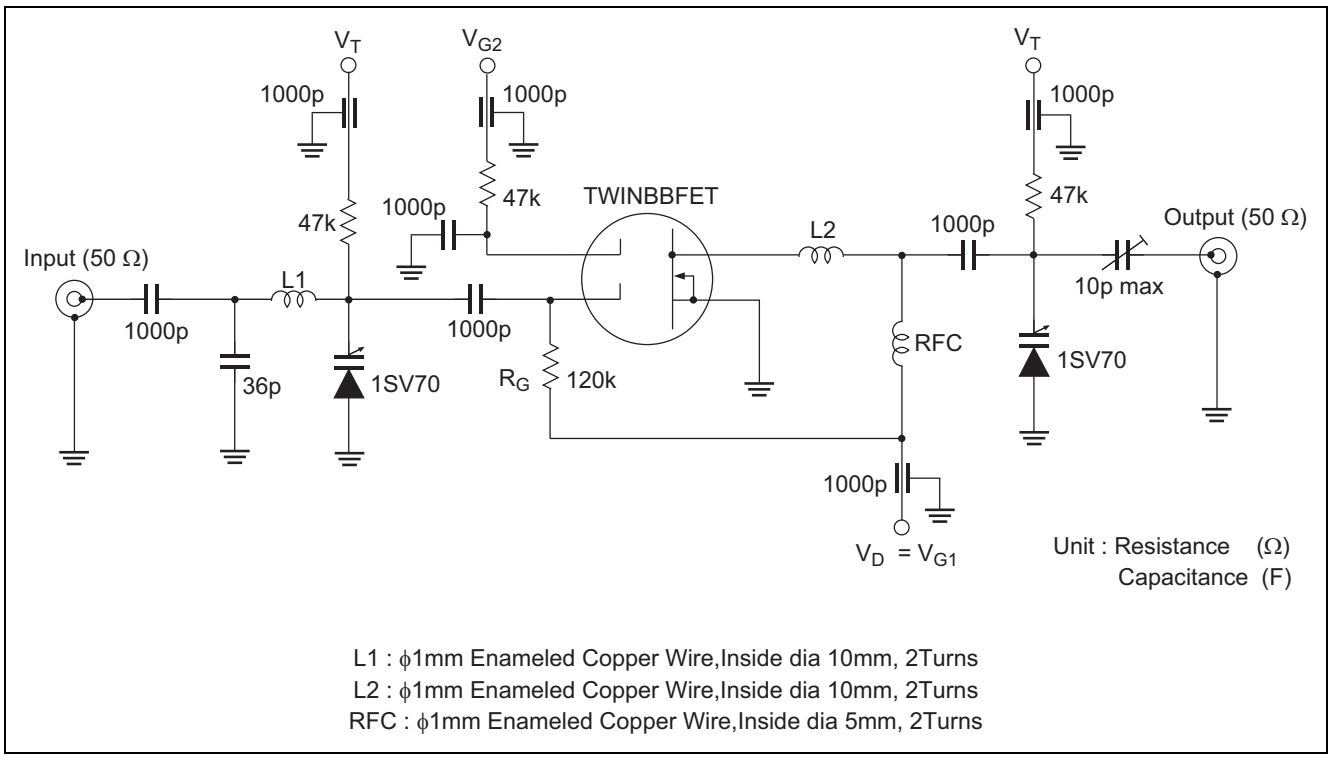
Measurment of FET2



- **Equivalent Circuit**

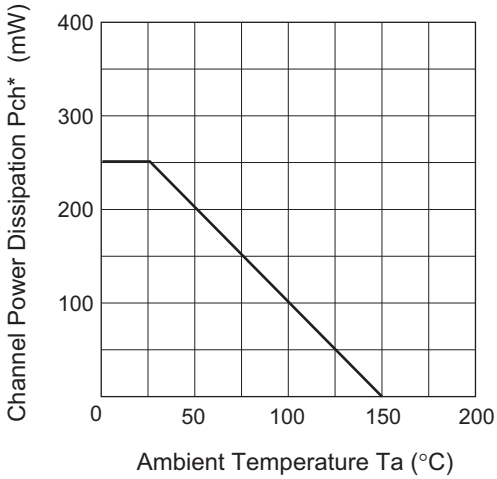


- **200 MHz Power Gain, Noise Figure Test Circuit**



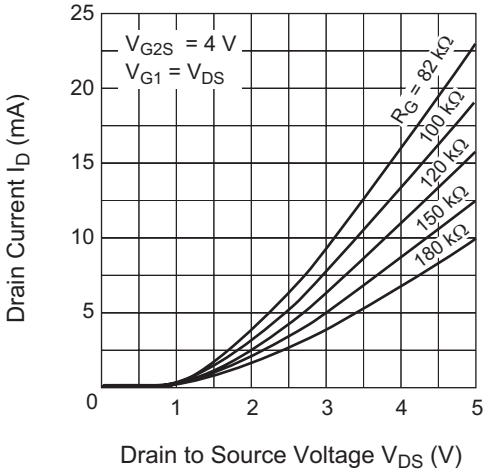
L1 : ϕ1mm Enameled Copper Wire,Inside dia 10mm, 2Turns
L2 : ϕ1mm Enameled Copper Wire,Inside dia 10mm, 2Turns
RFC : ϕ1mm Enameled Copper Wire,Inside dia 5mm, 2Turns

Maximum Channel Power Dissipation Curve

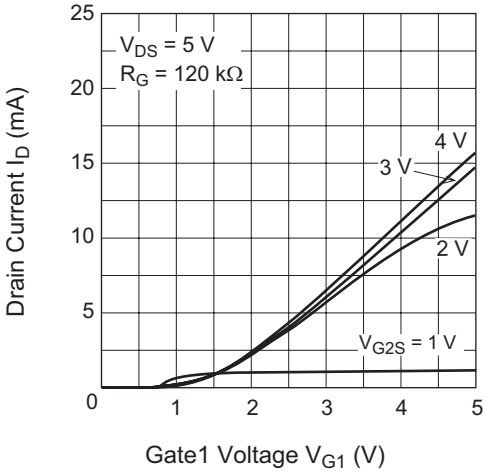


* Value on the glass epoxy board (50mm × 40mm × 1mm)

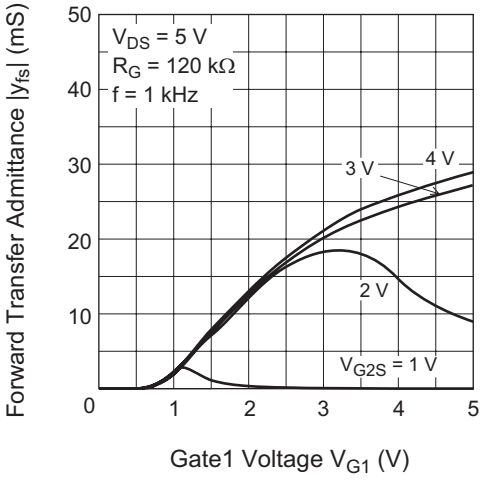
Typical Output Characteristics



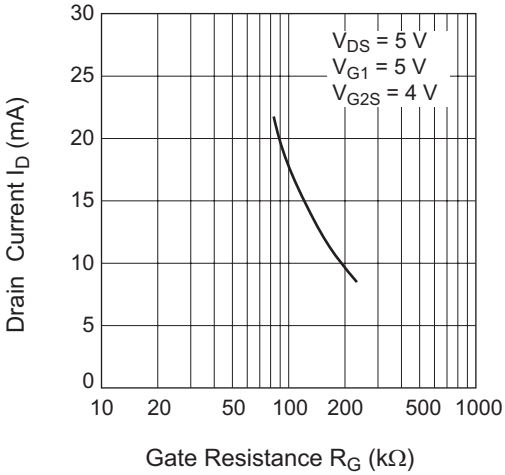
Drain Current vs. Gate1 Voltage



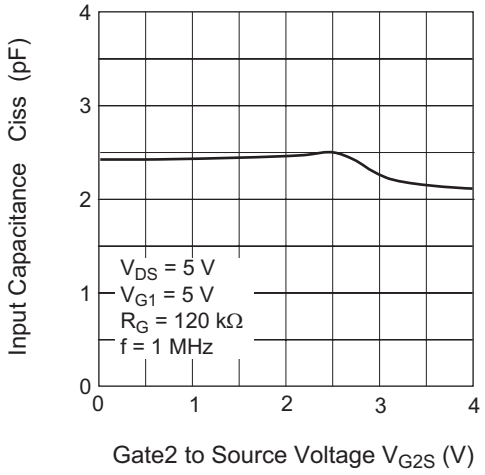
Forward Transfer Admittance vs. Gate1 Voltage



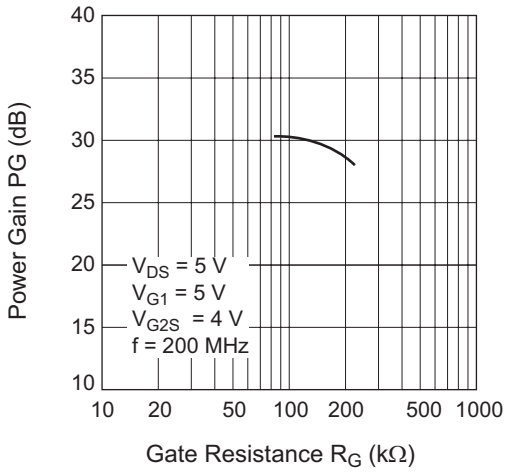
Drain Current vs. Gate Resistance



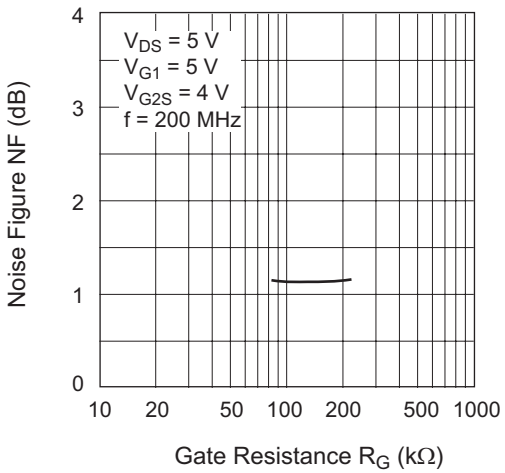
Input Capacitance vs. Gate2 to Source Voltage



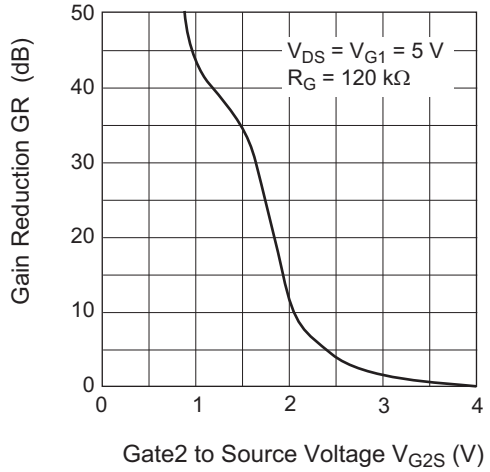
Power Gain vs. Gate Resistance



Noise Figure vs. Gate Resistance

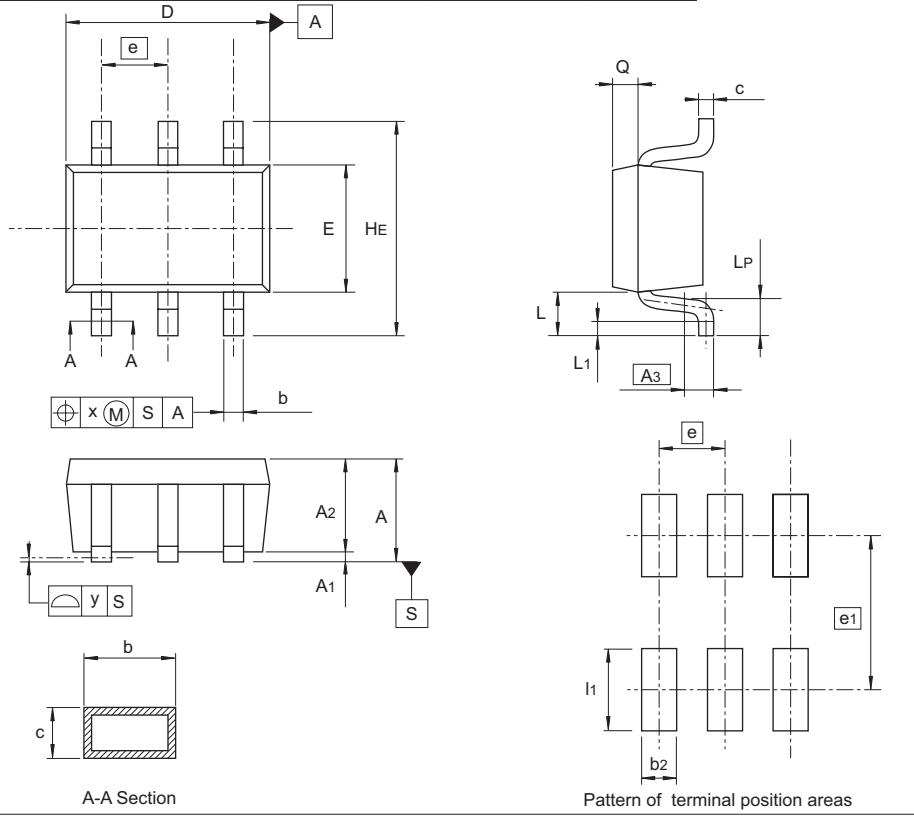


Gain Reduction vs.
Gate2 to Source Voltage



Package Dimensions

Package Name	JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
CMPAK-6	SC-88	PTSP0006JA-A	CMPAK-6 / CMPAK-6V	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
$\boxed{A_3}$	–	0.25	–
b	0.15	0.2	0.25
c	0.1	0.15	0.25
D	1.8	2.0	2.2
E	1.15	1.25	1.35
$\boxed{e}$	–	0.65	–
H_E	2.0	2.1	2.2
L	0.3	–	0.7
L_1	0.1	–	0.5
L_P	0.2	–	0.6
x	–	–	0.05
y	–	–	0.05
b_2	–	–	0.35
$\boxed{e_1}$	–	1.5	–
l_1	–	–	0.9
Q	–	0.25	–

Ordering Information

Orderable Part Number	Quantity	Shipping Container
TBB1010KMTL-E TBB1010KMTL-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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