MITSUBISHI ELECTRIC

< Silicon RF Power MOS FET (Discrete) >

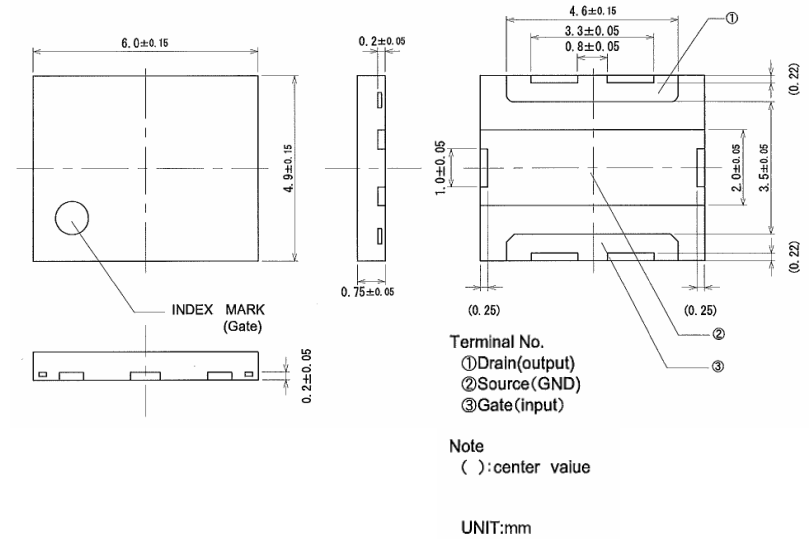
RD06HHS2

RoHS Compliance, Silicon MOSFET Power Transistor 30MHz, 175MHz, 6W, 12.5V

DESCRIPTION

RD06HHS2 is a MOS FET type transistor specifically designed for HF/VHF RF power amplifiers applications.

OUTLINE DRAWING



FEATURES

High power and High efficiency

P_{out}=6Wmin, ηd=55%min@V_{DD}=12.5V,f=30MHz

P_{out}=6Wmin, ηd=60%min@V_{DD}=12.5V,f=175MHz

Gate protection diode

APPLICATION

For output stage of high power amplifiers in HF/VHF band mobile radio sets.

RoHS COMPLIANT

RD06HHS2 is a RoHS compliant product.

ORDERING INFORMATION

ODER NUMBER	SUPPLY FORM
RD06HHS2-601	Pallet (25pcs/pallet), for evaluation
RD06HHS2-T6102	Tape & Reel(200pcs/reel)
RD06HHS2-T612	Tape & Reel(2,000pcs/reel)

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ABSOLUTE MAXIMUM RATINGS (Ta=25°C, Z_G=Z_L=50Ω UNLESS OTHERWISE NOTED)

SYMBOL	PARAMETER	CONDITIONS	RATINGS	UNIT
V_{DSS}	Drain to Source Voltage	V_{GS}=0V	50	V
V_{GSS}	Gate to Source Voltage	V_{DS}=0V	-5/+10	V
P_D*	Channel Dissipation	Tc=25°C	43	W
P_{in} 1	Input Power 1	f=175MHz	0.6	W
P_{in} 2	Input Power 2	f=30MHz	0.3	W
I_{DS}	Drain Current	-	3.0	A
$Tj_{(op)}$	Operating junction Temperature	-	150	°C
T_{stg}	Storage Temperature	-	-40 to +125	°C

Note : Above parameters are guaranteed independently.

* Theoretical value in case of mounted on infinite heat sink

ELECTRICAL CHARACTERISTICS (Ta=25°C UNLESS OTHERWISE NOTED)

SYMBOL	PARAMETER	CONDITIONS	LIMITS			UNIT
			MIN	TYP	MAX.	
I_{DSS}	Zero Gate Voltage Drain Leakage Current	V_{DS}=17V, V_{GS}=0V	-	-	10	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS}=10V, V_{DS}=0V	-	-	1	μA
V_{th}	Gate Threshold Voltage	V_{DS}=12V, I_{DS}=1mA	1.9	-	4.9	V
P_{out} 1	Output Power 1	f=175MHz, P_{in}=0.3W, V_{DD}=12.5V, I_{DQ}=300mA (V_{GG} adjust) Z_G=Z_L=50Ω	6	10	-	W
η_D 1	Drain Efficiency 1		60	72	-	%
P_{out} 2	Output Power 2	f=30MHz, P_{in}=0.15W, V_{DD}=12.5V, I_{DQ}=500mA (V_{GG} adjust) Z_G=Z_L=50Ω	6	10	-	W
η_D 2	Drain Efficiency 2		55	66	-	%
VSWRT	Load ruggedness test	f=30MHz, V_{DD}=15.2V, I_{DQ}=500mA (V_{GG} adjust), P_{out}=6W(Pin adjust@Z_G=Z_L=50Ω), Load VSWR=20:1 (All Phase)	No destroy			-

Note : Above parameters , ratings , limits and conditions are subject to change.

TEMPERATURE CHARACTERISTICS (Ta=25°C UNLESS OTHERWISE NOTED)

SYMBOL	PARAMETER	CONDITIONS	LIMITS			UNIT
			MIN	TYP	MAX	
Rthj-c	Thermal Resistance	ΔVF method	-	2.1	2.9	°C /W

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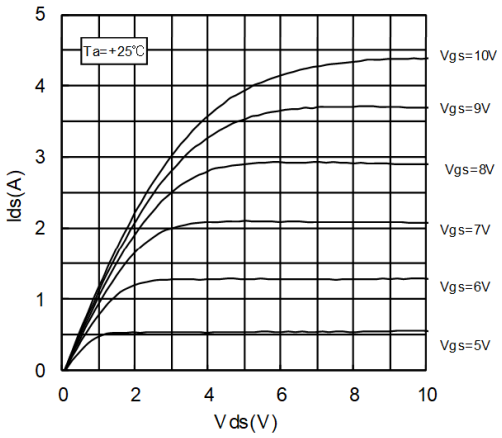
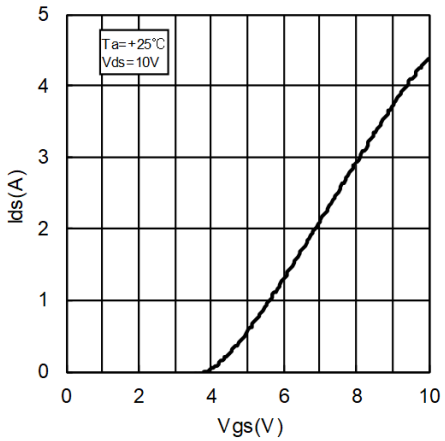
TYPICAL CHARACTERISTICS

(These are only typical curves and devices are not necessarily guaranteed at these curves.)

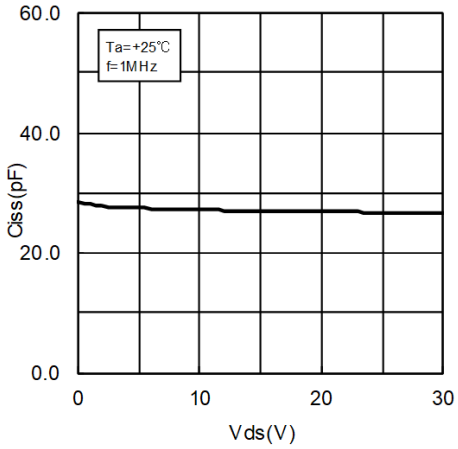
Vds-Ids CHARACTERISTICS



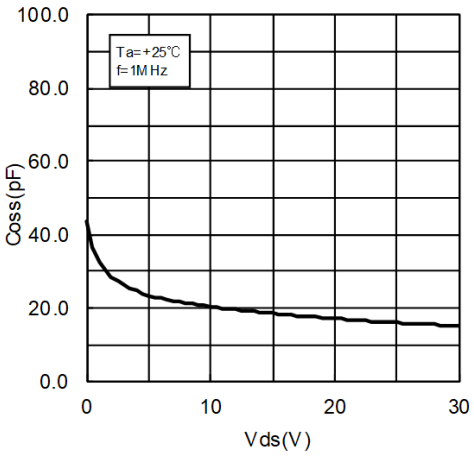
Vgs-Ids CHARACTERISTICS



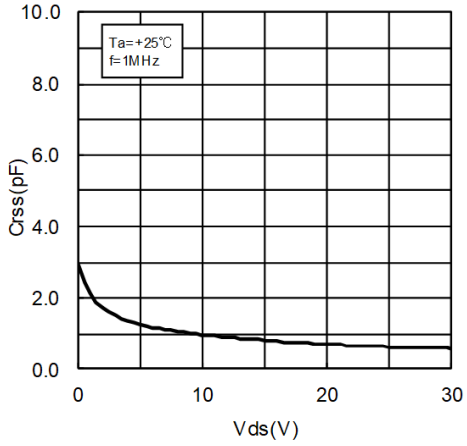
Vds VS. Ciss CHARACTERISTICS



Vds VS. Coss CHARACTERISTICS



Vds VS. Crss CHARACTERISTICS



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TYPICAL CHARACTERISTICS (175MHz)

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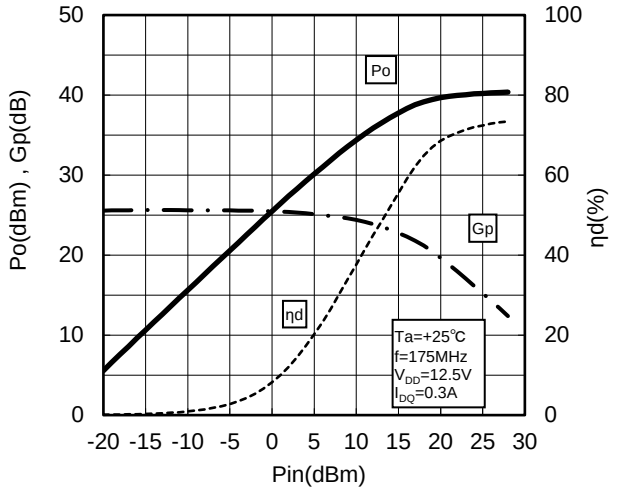
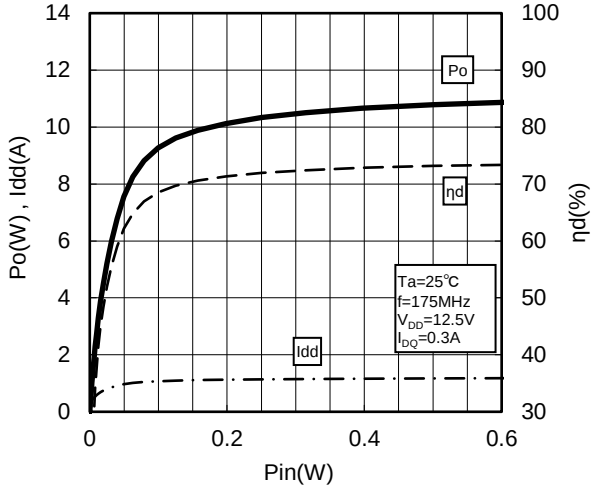
Pin-Po CHARACTERISTICS1



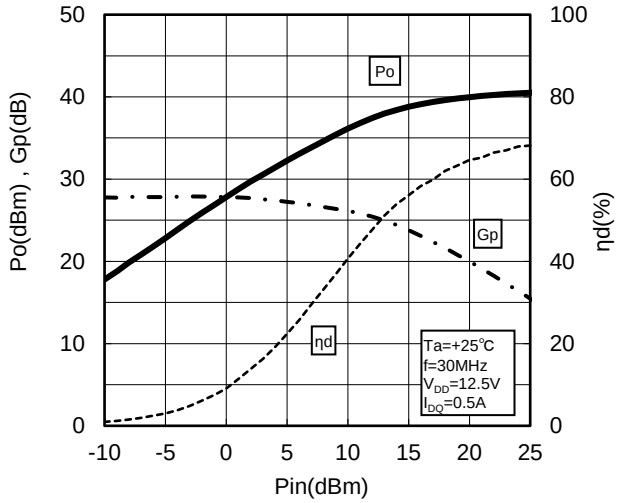
Pin-Po CHARACTERISTICS2



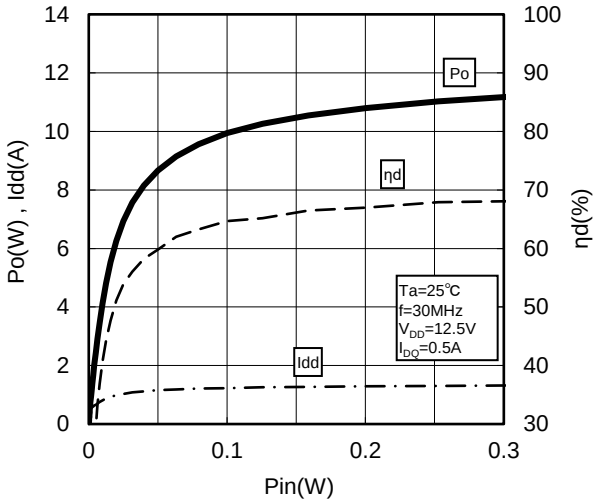
TYPICAL CHARACTERISTICS (30MHz)

(These are only typical curves and devices are not necessarily guaranteed at these curves.)

Pin-Po CHARACTERISTICS1



Pin-Po CHARACTERISTICS2



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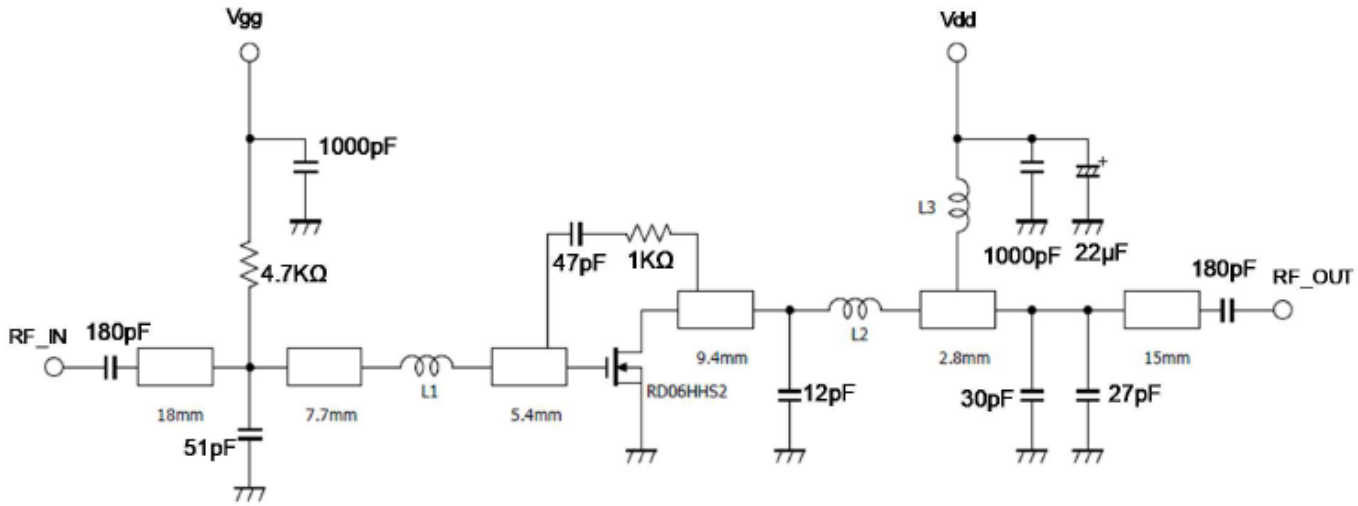
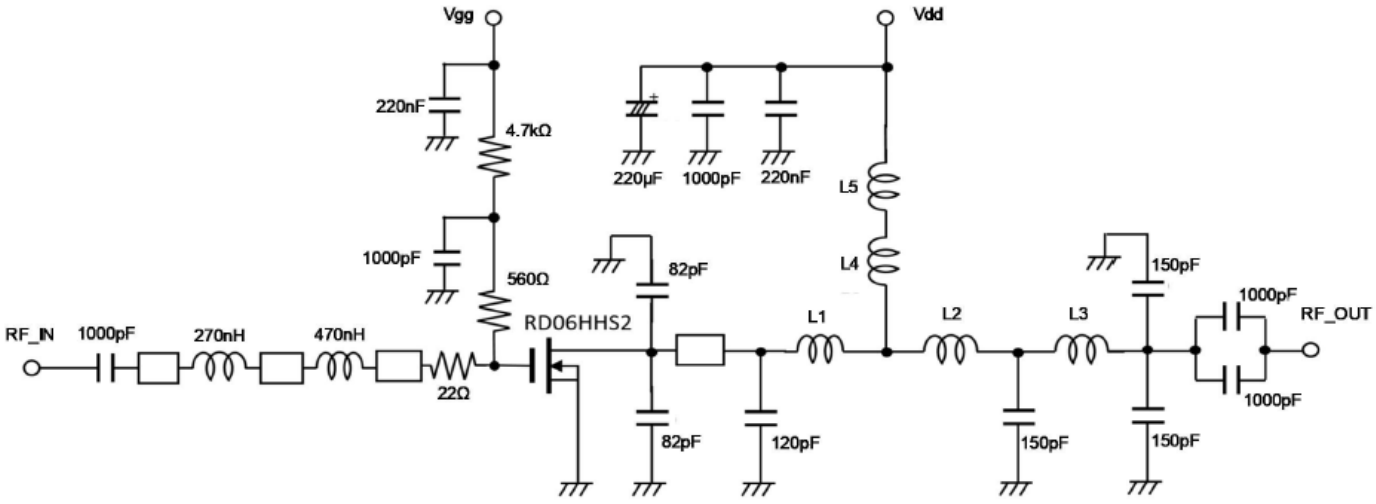
EQUIVALENT CIRCUITRY of EVB (f=175MHz)



L1 : Enameled wire 7Turns, D 0.23mm, O.D 1.62mm
L2 : Enameled wire 4Turns, D 0.23mm, O.D 1.62mm
L3 : Enameled wire 11Turns, D 0.23mm, O.D 1.62mm

<Note>
Board Material : Glass - Epoxy Substrate (er=4.8, t=0.8mm)
Micro strip line width=1.3mm / 50 ohm

EQUIVALENT CIRCUITRY of EVB (f=30MHz)



L1 : Enameled wire 6Turns, D 0.4mm, O.D 2.46mm
L2 : Enameled wire 5Turns, D 0.4mm, O.D 2.46mm
L3,L4,L5 : Enameled wire 7Turns, D 0.4mm, O.D 2.46mm

<Note>
Board material: Glass-Epoxy Substrate (εr=4.8, t=0.8mm)
Micro Strip Line width=1.3mm / 50Ω

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RD06HHS2 S-PARAMETER DATA (Vds=12.5V, Id=500mA)

Freq	S11		S21		S12		S22	
[MHz]	Mag	Ang	Mag	Ang	Mag	Ang	Mag	Ang
30	0.997	-51.4	43.5	153.3	0.015	67.4	0.869	-22.2
40	0.945	-66.0	40.1	140.2	0.018	48.1	0.841	-39.6
50	0.903	-77.8	36.1	130.0	0.020	41.9	0.765	-53.9
60	0.870	-88.1	32.6	121.3	0.022	32.6	0.740	-65.1
70	0.834	-96.3	29.2	114.0	0.024	24.7	0.728	-74.1
80	0.820	-103.5	26.5	107.9	0.024	21.0	0.700	-82.3
90	0.798	-109.4	24.0	102.6	0.025	12.6	0.682	-89.7
100	0.791	-115.4	22.0	97.7	0.023	10.3	0.674	-95.9
150	0.770	-133.1	14.7	79.4	0.025	-6.0	0.672	-114.7
200	0.777	-145.2	10.6	65.2	0.024	-21.8	0.691	-126.4
250	0.798	-154.2	8.16	54.2	0.022	-27.9	0.732	-136.7
300	0.810	-161.1	6.38	44.3	0.021	-38.8	0.757	-144.5
350	0.829	-166.7	5.16	36.1	0.019	-43.2	0.786	-150.8
400	0.842	-171.8	4.25	29.1	0.018	-51.6	0.803	-156.1
450	0.852	-176.9	3.54	22.0	0.016	-54.0	0.822	-161.0
500	0.861	178.7	2.98	16.0	0.015	-62.3	0.847	-165.7

ATTENTION:

1.High Temperature ; This product might have a heat generation while operation,Please take notice that have a possibility to receive a burn to touch the operating product directly or touch the product until cold after switch off. At the near the product,do not place the combustible material that have possibilities to arise the fire.

2.Generation of High Frequency Power ; This product generate a high frequency power. Please take notice that do not leakage the unnecessary electric wave and use this products without cause damage for human and property per normal operation.

3.Before use; Before use the product,Please design the equipment in consideration of the risk for human and electric wave obstacle for equipment.

PRECAUTIONS FOR THE USE OF MITSUBISHI SILICON RF POWER DEVICES:

1. The specifications of mention are not guarantee values in this data sheet. Please confirm additional details regarding operation of these products from the formal specification sheet. For copies of the formal specification sheets, please contact one of our sales offices.

2.RA series products (RF power amplifier modules) and RD series products (RF power transistors) are designed for consumer mobile communication terminals and were not specifically designed for use in other applications. In particular, while these products are highly reliable for their designed purpose, they are not manufactured under a quality assurance testing protocol that is sufficient to guarantee the level of reliability typically deemed necessary for critical communications elements and In the application, which is base station applications and fixed station applications that operate with long term continuous transmission and a higher on-off frequency during transmitting, please consider the derating, the redundancy system, appropriate setting of the maintain period and others as needed. For the reliability report which is described about predicted operating life time of Mitsubishi Silicon RF Products , please contact Mitsubishi Electric Corporation or an authorized Mitsubishi Semiconductor product distributor.

3. RD series products use MOSFET semiconductor technology. They are sensitive to ESD voltage therefore appropriate ESD precautions are required.

4. In the case of use in below than recommended frequency, there is possibility to occur that the device is deteriorated or destroyed due to the RF-swing exceed the breakdown voltage.

5. In order to maximize reliability of the equipment, it is better to keep the devices temperature low. It is recommended to utilize a sufficient sized heat-sink in conjunction with other cooling methods as needed (fan, etc.) to keep the channel temperature for RD series products lower than 120deg/C(in case of Tchmax=150deg/C) ,140deg/C(in case of Tchmax=175deg/C) under standard conditions.

6. Do not use the device at the exceeded the maximum rating condition. In case of plastic molded devices, the exceeded maximum rating condition may cause blowout, smoldering or catch fire of the molding resin due to extreme short current flow between the drain and the source of the device. These results causes in fire or injury.

7. For specific precautions regarding assembly of these products into the equipment, please refer to the supplementary items in the specification sheet.

8. Warranty for the product is void if the products protective cap (lid) is removed or if the product is modified in any way from it’s original form.

9. For additional “Safety first” in your circuit design and notes regarding the materials, please refer the last page of this data sheet.

10. Please avoid use in the place where water or organic solvents can adhere directly to the product and the environments with the possibility of caustic gas, dust, salinity, etc.
    Reliability could be markedly decreased and also there is a possibility failures could result causing a serious accident. Likewise, there is a possibility of causing a serious accident if used in an explosive gas environment. Please allow for adequate safety margin in your designs.

11. Please refer to the additional precautions in the formal specification sheet.

Keep safety first in your circuit designs!

Mitsubishi Electric Corporation puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage. 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 non-flammable material or (iii) prevention against any malfunction or mishap.

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