MITSUBISHI ELECTRIC

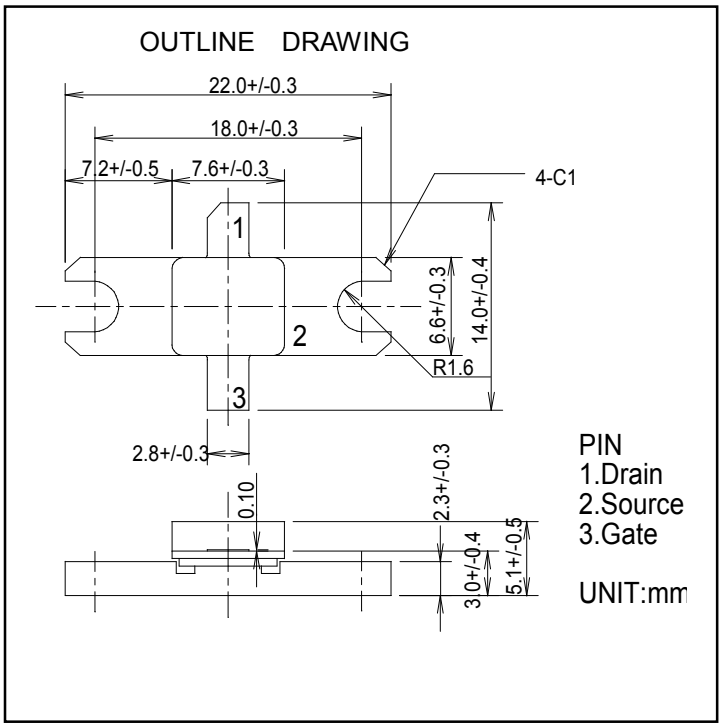
< Silicon RF Power MOS FET (Discrete) >

RD20HMF1

RoHS Compliance, Silicon MOSFET Power Transistor,900MHz,20W

DESCRIPTION

RD20HMF1 is a MOS FET type transistor specifically designed for 900MHz-band RF power amplifiers applications.



FEATURES

High power gain:

Pout>20W, Gp>8.2dB @Vdd=12.5V,f=900MHz

High Efficiency: 55%typ.

APPLICATION

For output stage of high power amplifiers in 900MHz band Mobile radio sets.

RoHS COMPLIANT

RD20HMF1-101 is a RoHS compliant products.

RoHS compliance is indicate by the letter “G” after the Lot Marking.

ABSOLUTE MAXIMUM RATINGS

(Tc=25°C UNLESS OTHERWISE NOTED)

SYMBOL	PARAMETER	CONDITIONS	RATINGS	UNIT
V_{DSS}	Drain to source voltage	Vgs=0V	30	V
V_{GSS}	Gate to source voltage	Vds=0V	+/-20	V
Pch	Channel dissipation	Tc=25°C	71.4	W
Pin	Input power	Zg=Zl=50Ω	6	W
ID	Drain current	-	6	A
Tch	Channel temperature	-	175	°C
Tstg	Storage temperature	-	-40 to +175	°C
Rth j-c	Thermal resistance	junction to case	2.1	°C/W

Note 1: Above parameters are guaranteed independently.

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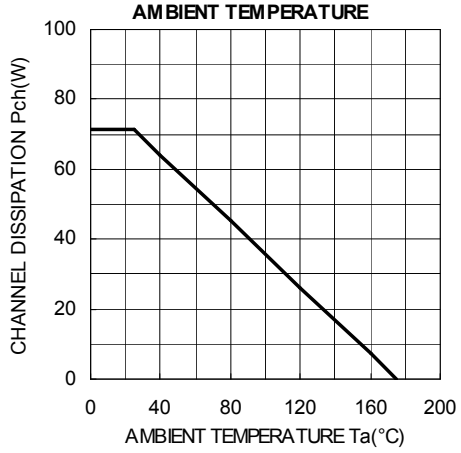
ELECTRICAL CHARACTERISTICS (Tc=25°C, UNLESS OTHERWISE NOTED)

SYMBOL	PARAMETER	CONDITIONS	LIMITS			UNIT
			MIN	TYP	MAX.	
I_{DSS}	Zero gate voltage drain current	V_{DS}=17V, V_{GS}=0V	-	-	5	uA
I_{GSS}	Gate to source leak current	V_{GS}=10V, V_{DS}=0V	-	-	1	uA
V_{TH}	Gate threshold voltage	V_{DS}=12V, I_{DS}=1mA	1.0	-	3.0	V
Pout	Output power	f=900MHz ,V_{DD}=12.5V	20	25	-	W
ηD	Drain efficiency	Pin=3.0W, Idq=1.0A	50	55	-	%
	Load VSWR tolerance	V_{DD}=15.2V,Po=20W(PinControl) Idq=1.0A,Zg=50Ω Load VSWR=20:1(All Phase)	No destroy			-

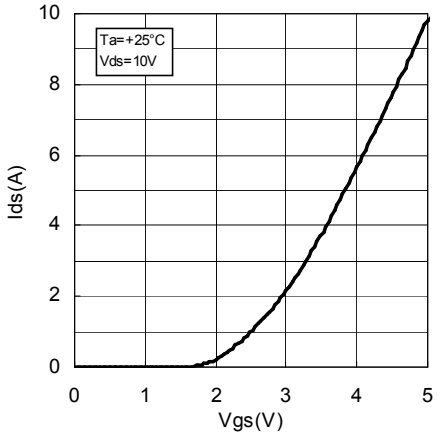
Note : Above parameters , ratings , limits and conditions are subject to change.

TYPICAL CHARACTERISTICS

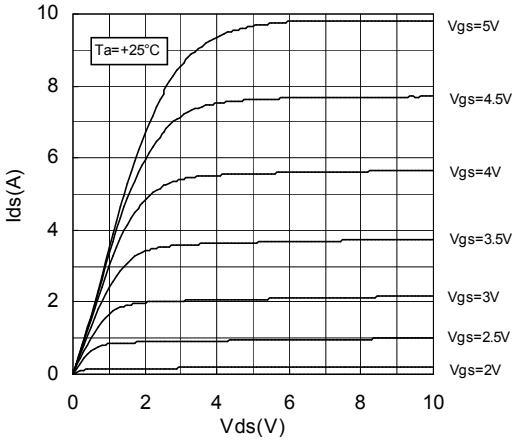
CHANNNEL DISSIPATION VS. AMBIENT TEMPERATURE



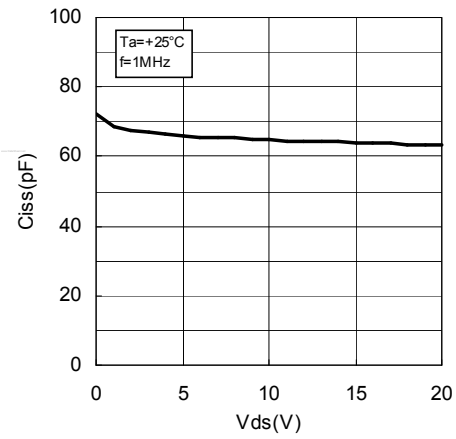
Vgs-Ids CHARACTERISTICS



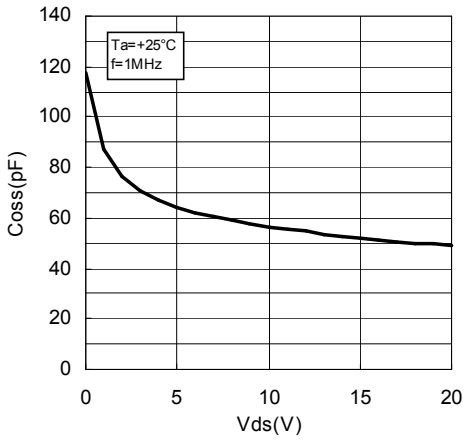
Vds-Ids CHARACTERISTICS



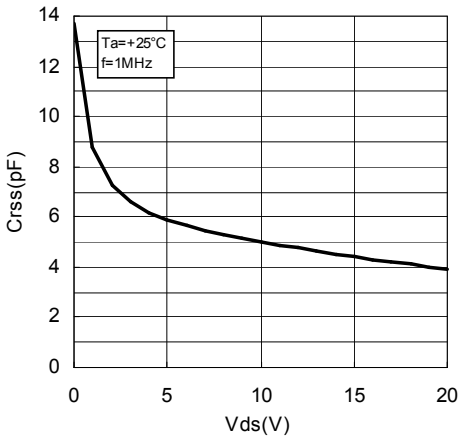
Vds VS. Ciss CHARACTERISTICS



Vds VS. Coss CHARACTERISTICS

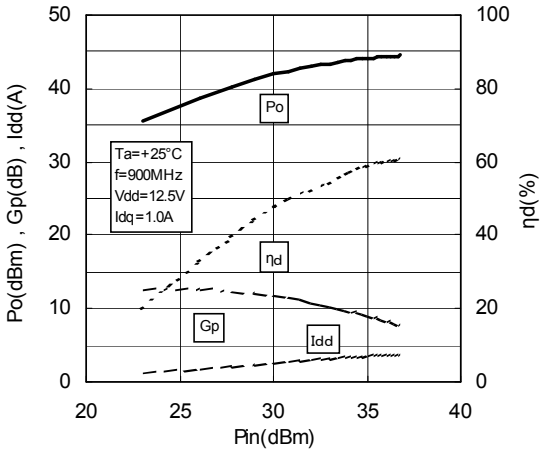


Vds VS. Crss CHARACTERISTICS

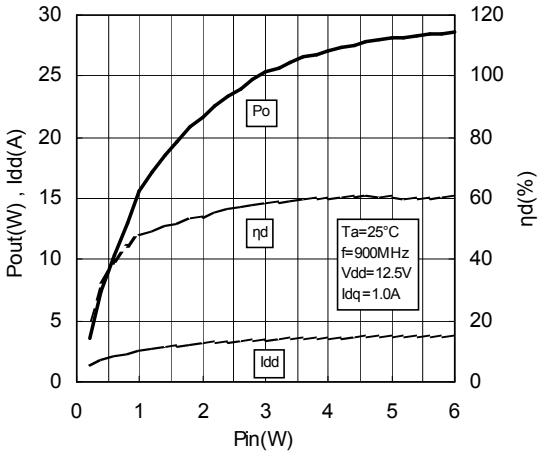


TYPICAL CHARACTERISTICS

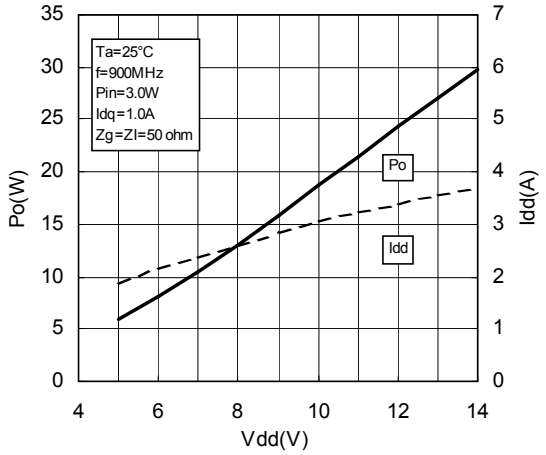
Pin-Po CHARACTERISTICS



Pin-Po CHARACTERISTICS



Vdd-Po CHARACTERISTICS



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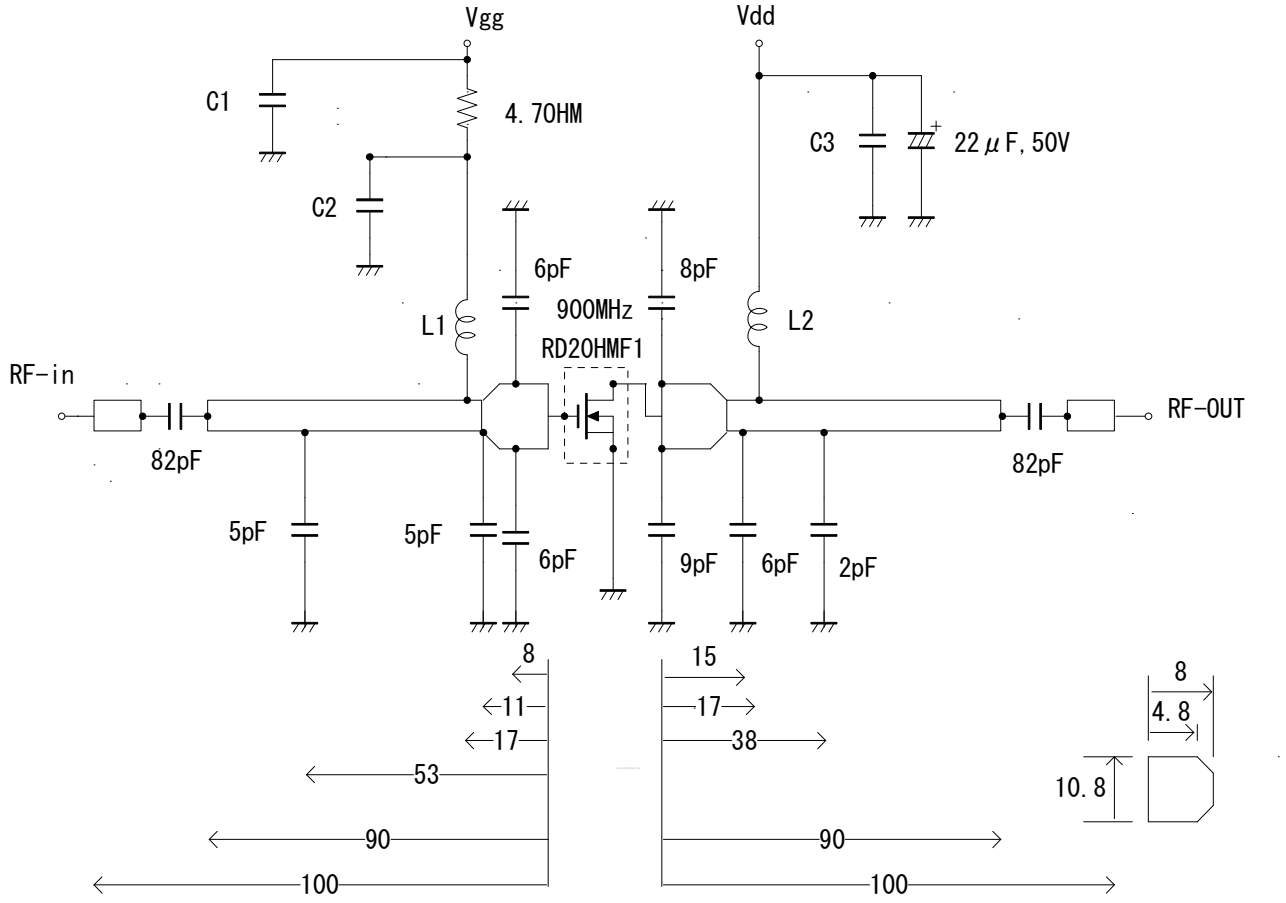
TEST CIRCUIT(f=900MHz)



C1:1000pF,22000pF in parallel

C2:100pF*2 in parallel

C3:1000pF,22000pF in parallel

L1:1Turn,I.D3mm,D1.5mm silver plateted copper wire

L2:1Turn,I.D3mm,D1.5mm silver plateted copper wire

Note:Board material PTFE substrate

micro strip line width=4.2mm/50OHM,er:2.7,t=1.6mm

Dimensions:mm

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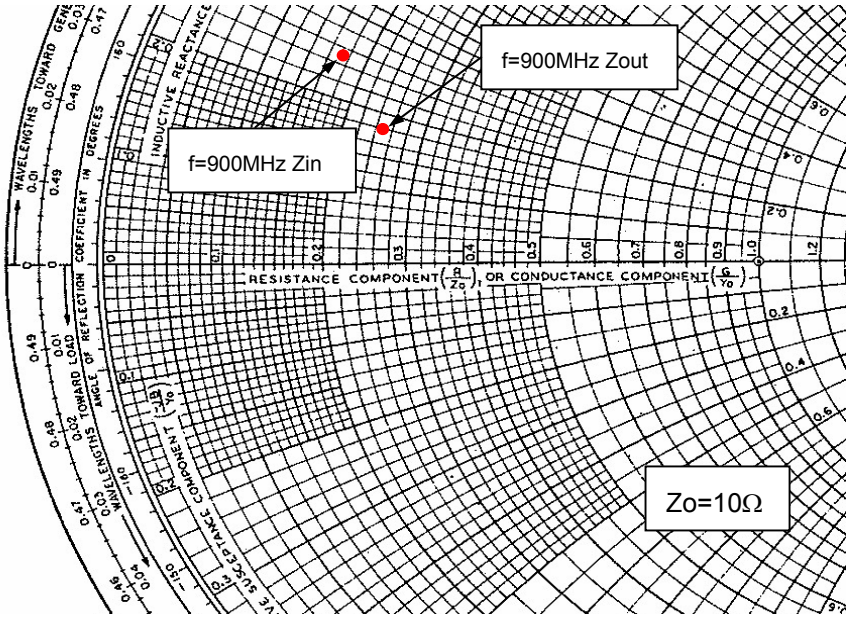
INPUT/OUTPUT IMPEDANCE VS.FREQUENCY CHARACTERISTICS



Zin , Zout

f	Zin	Zout	
(MHz)	(ohm)	(ohm)	Conditions
900	1.78+j2.50	2.52+j1.76	Po=20W, Vdd=12.5V,Pin=3W

RD20HMF1 S-PARAMETER DATA (@Vdd=12.5V,Id=800mA)

Freq	S11		S21		S12		S22	
[MHz]	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)
100	0.862	−168.4	8.814	83.5	0.016	−4.3	0.798	−172.5
200	0.868	−173.3	4.213	70.7	0.014	−10.9	0.813	−173.9
300	0.872	−174.8	2.614	60.4	0.012	−11.0	0.834	−174.6
400	0.882	−174.8	1.820	52.2	0.011	−16.2	0.856	−174.8
500	0.897	−176.1	1.343	44.6	0.009	−12.5	0.876	−175.6
600	0.912	−176.8	1.028	38.7	0.007	−5.3	0.887	−175.6
700	0.917	−177.8	0.812	33.5	0.006	7.6	0.907	−176.6
800	0.926	−178.6	0.663	29.4	0.005	25.8	0.920	−177.9
900	0.934	−179.3	0.560	25.9	0.006	43.8	0.930	−178.6
1000	0.947	179.5	0.482	23.0	0.007	54.0	0.941	−179.0
1100	0.953	178.6	0.421	19.7	0.008	62.2	0.947	−179.9
1200	0.959	177.2	0.358	16.8	0.009	68.5	0.950	179.3
1300	0.962	176.4	0.320	14.3	0.011	70.8	0.949	178.5
1400	0.966	174.8	0.292	12.3	0.013	75.6	0.951	177.8
1500	0.965	173.6	0.269	10.2	0.015	74.7	0.954	176.7
1600	0.963	172.0	0.244	8.1	0.016	75.4	0.944	175.4
1700	0.958	170.4	0.222	6.2	0.018	76.9	0.946	174.7
1800	0.956	168.8	0.202	3.8	0.020	74.8	0.949	173.2
1900	0.955	166.9	0.186	1.9	0.022	74.8	0.945	171.8
2000	0.953	165.2	0.177	0.3	0.024	73.3	0.947	170.1
2100	0.954	163.2	0.168	−2.0	0.026	74.1	0.945	168.6
2200	0.954	160.9	0.160	−3.6	0.028	71.7	0.945	166.9
2300	0.956	159.0	0.151	−6.2	0.030	70.0	0.943	164.7
2400	0.951	156.6	0.139	−8.1	0.032	67.4	0.935	162.6
2500	0.954	154.8	0.129	−10.0	0.034	65.4	0.935	160.4
2600	0.946	152.6	0.124	−12.1	0.037	63.6	0.936	158.0
2700	0.949	150.4	0.114	−13.3	0.039	60.1	0.934	155.2
2800	0.942	148.1	0.105	−13.0	0.040	56.5	0.933	152.4
2900	0.946	146.1	0.099	−12.1	0.041	54.0	0.932	149.9
3000	0.938	144.1	0.094	−10.3	0.044	51.0	0.931	147.2

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 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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