

< Silicon RF Power MOS FET (Discrete) >

RD70HVF1

RoHS Compliance, Silicon MOSFET Power Transistor, 175MHz70W 520MHz,50W

DESCRIPTION

RD70HVF1 is a MOS FET type transistor specifically designed for VHF/UHF High power amplifiers applications.

FEATURES

High power and High Gain:

$P_{out} > 70W$, $G_p > 10.6dB$ @ $V_{dd} = 12.5V, f = 175MHz$

$P_{out} > 50W$, $G_p > 7.0dB$ @ $V_{dd} = 12.5V, f = 520MHz$

High Efficiency: 60%typ.on VHF Band

High Efficiency: 55%typ.on UHF Band

APPLICATION

For output stage of high power amplifiers in VHF/UHF Band mobile radio sets.

RoHS COMPLIANT

RD70HVF1-101 is a RoHS compliant products.

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

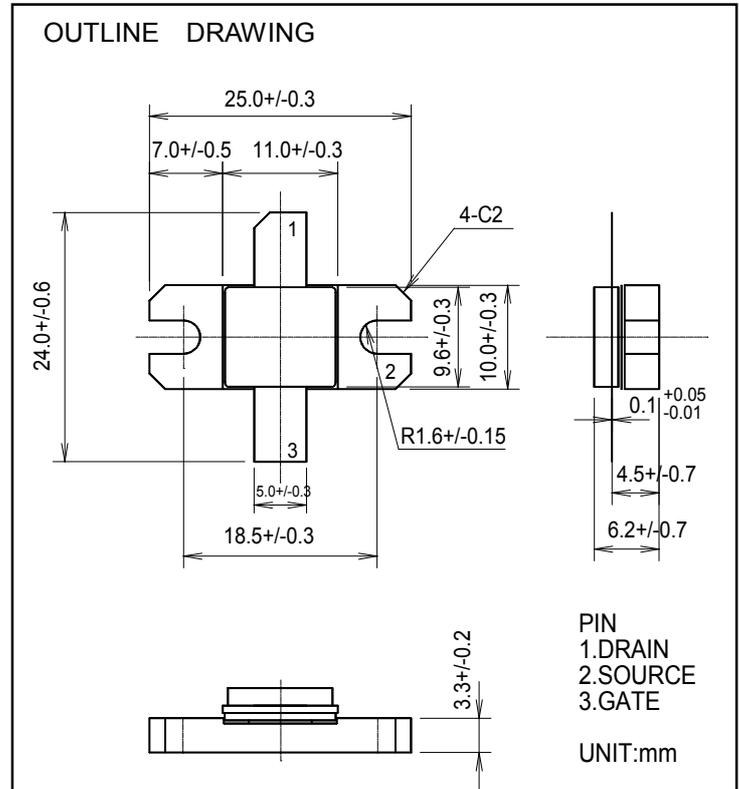
ABSOLUTE MAXIMUM RATINGS

($T_c = 25^\circ C$ UNLESS OTHERWISE NOTED)

SYMBOL	PARAMETER	CONDITIONS	RATINGS	UNIT
V_{DSS}	Drain to source voltage	$V_{gs} = 0V$	30	V
V_{GSS}	Gate to source voltage	$V_{ds} = 0V$	+/-20	V
P_{ch}	Channel dissipation	$T_c = 25^\circ C$	150	W
P_{in}	Input power	$Z_g = Z_l = 50\Omega$	10(Note2)	W
I_D	Drain current	-	20	A
T_{ch}	Channel temperature	-	175	$^\circ C$
T_{stg}	Storage temperature	-	-40 to +175	$^\circ C$
$R_{th\ j-c}$	Thermal resistance	junction to case	1.0	$^\circ C/W$

Note 1: Above parameters are guaranteed independently.

Note 2: Over 300MHz use spec is 20W



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

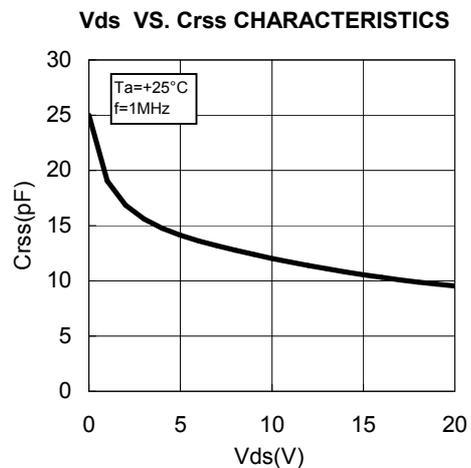
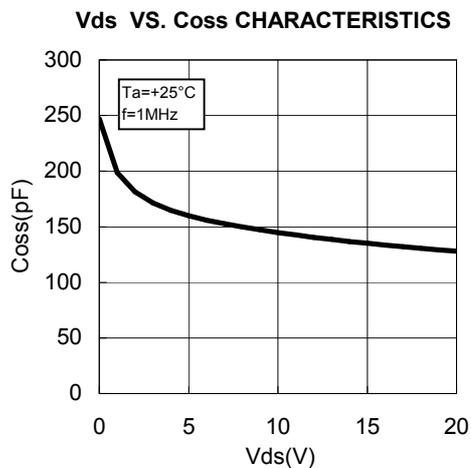
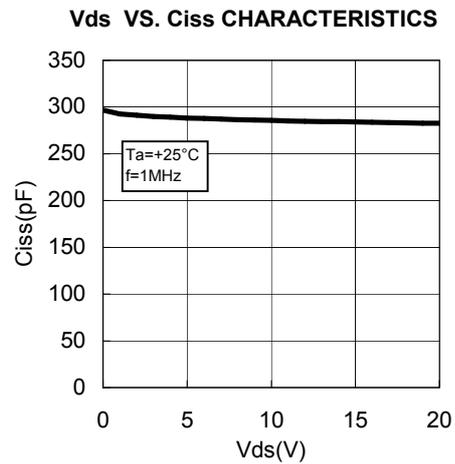
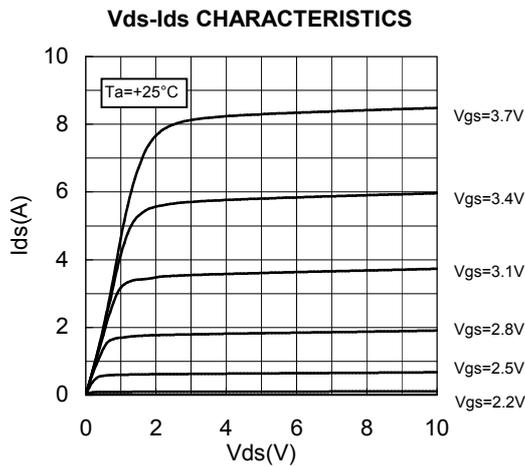
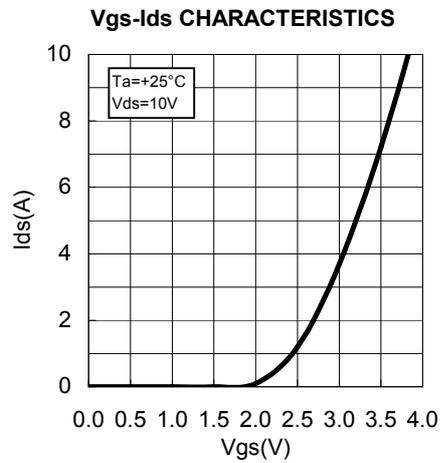
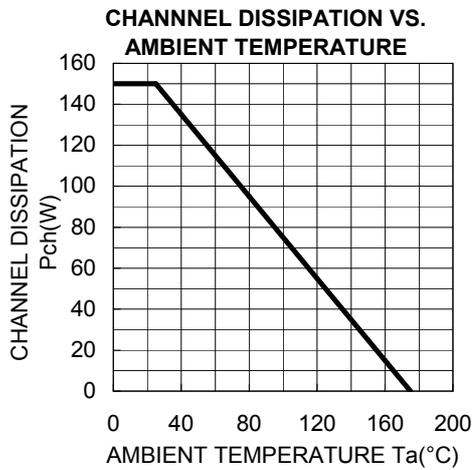
SYMBOL	PARAMETER	CONDITIONS	LIMITS			UNIT
			MIN	TYP	MAX.	
IdSS	Zerogate voltage drain current	VDS=17V, VGS=0V	-	-	300	uA
IgSS	Gate to source leak current	VGS=10V, VDS=0V	-	-	5	uA
VTH	Gate threshold voltage	VDS=12V, IdS=1mA	1.3	1.8	2.3	V
Pout	Output power	f=175MHz, VDD=12.5V	70	75	-	W
ηD	Drain efficiency	Pin=6W, Idq=2.0A	55	60	-	%
Pout	Output power	f=520MHz, VDD=12.5V	50	55	-	W
ηD	Drain efficiency	Pin=10W, Idq=2.0A	50	55	-	%
	Load VSWR tolerance	VDD=15.2V, Po=70W(PinControl) f=175MHz, Idq=2.0A, Zg=50Ω LoadVSWR=20:1(All phase)	No destroy			-
	Load VSWR tolerance	VDD=15.2V, Po=50W(PinControl) f=520MHz, Idq=2.0A, Zg=50Ω Load VSWR=20:1(All phase)	No destroy			-

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

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TYPICAL CHARACTERISTICS

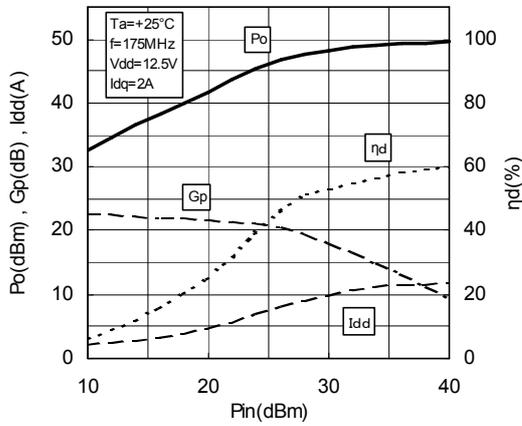


RD70HVF1

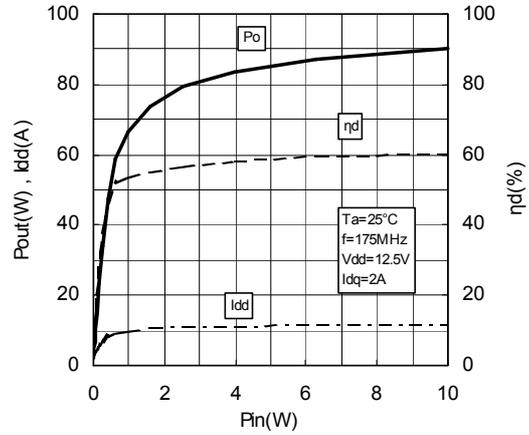
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TYPICAL CHARACTERISTICS

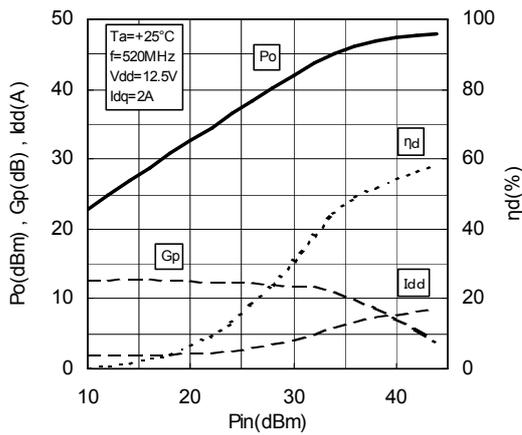
Pin-Po CHARACTERISTICS @f=175MHz



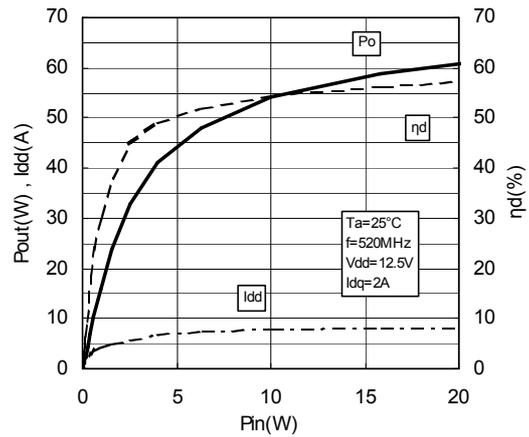
Pin-Po CHARACTERISTICS @f=175MHz



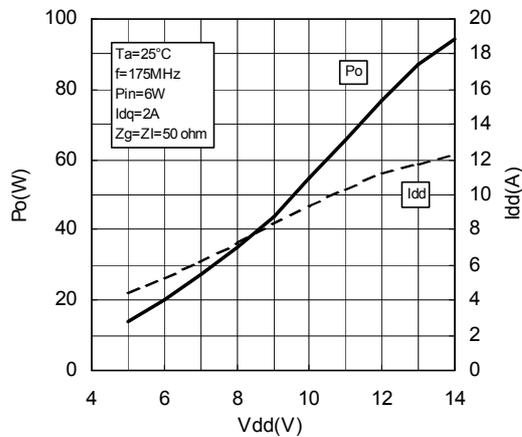
Pin-Po CHARACTERISTICS @f=520MHz



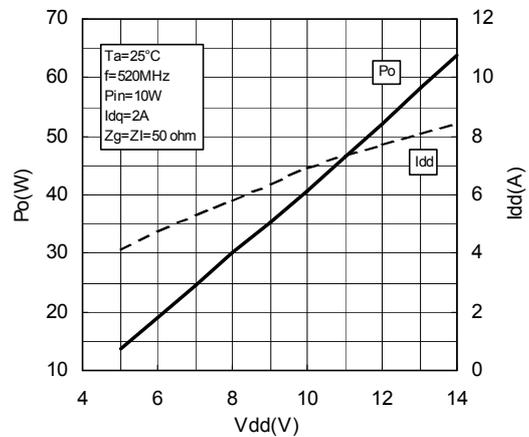
Pin-Po CHARACTERISTICS @f=520MHz



Vdd-Po CHARACTERISTICS @f=175MHz



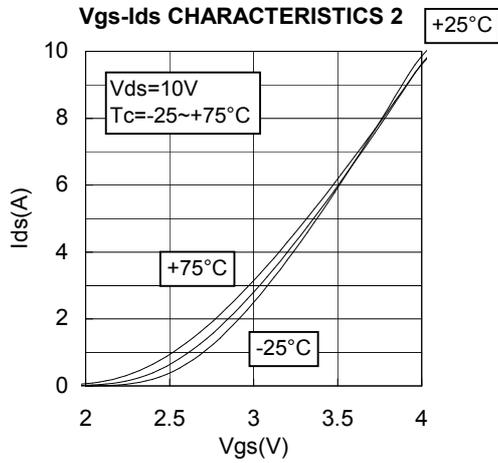
Vdd-Po CHARACTERISTICS @f=520MHz



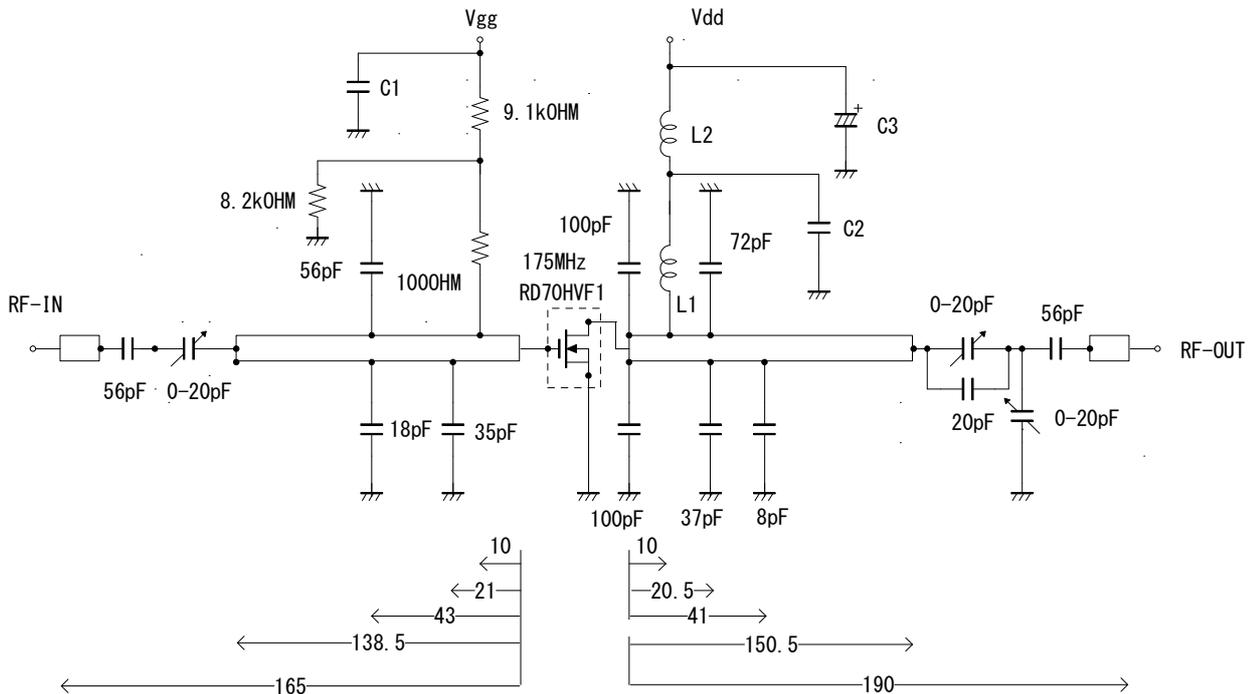
RD70HVF1

RoHS Compliance, Silicon MOSFET Power Transistor, 175MHz70W 520MHz,50W

TYPICAL CHARACTERISTICS



TEST CIRCUIT(f=175MHz)



C1:2200pF 10uF in parallel

C2:2200pF*2 in parallel

C3:2200pF, 330uF in parallel

L1:5Turns, I. D6mm, D1.6mm P=1 silver plated copper wire

L2:4Turns, I. D6mm, D1.6mm P=2 silver plated copper wire

Note:Board material PTFE substrate

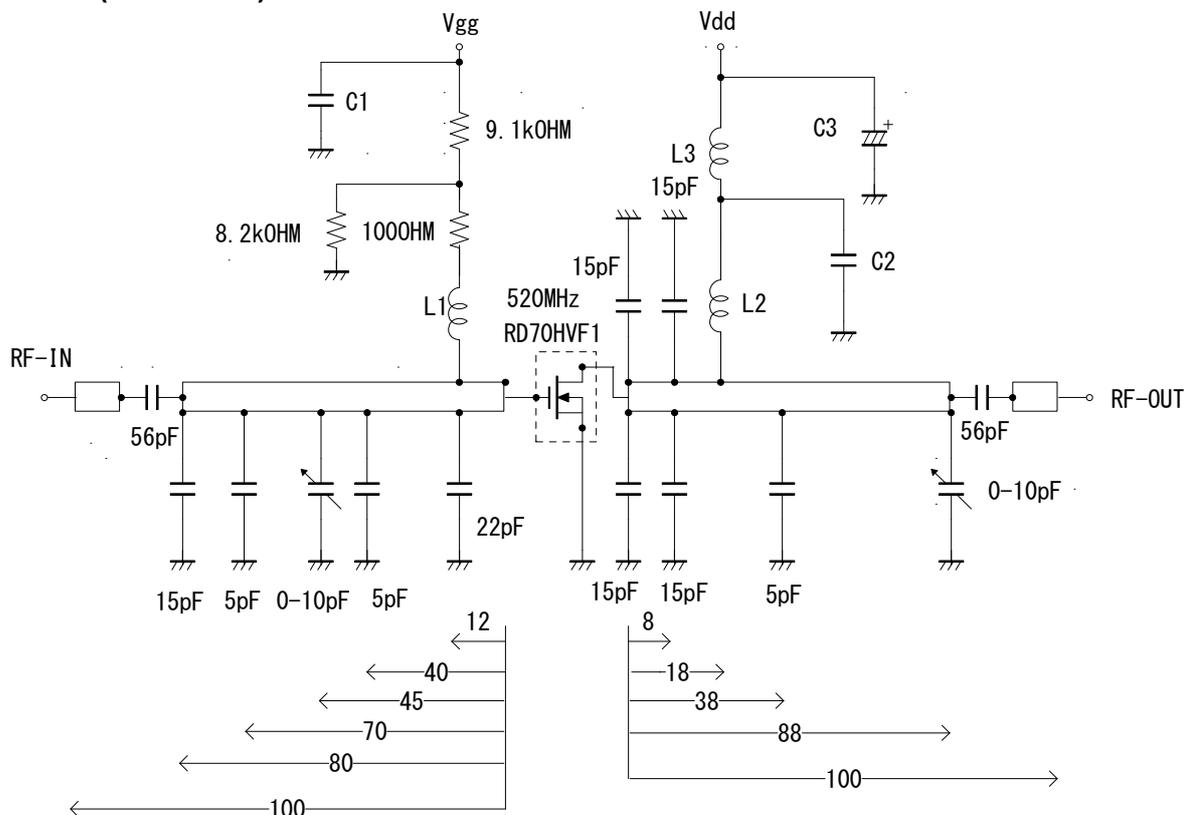
micro strip line width=4.2mm/500HM, er:2.7, t=1.6mm

Dimensions:mm

RD70HVF1

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TEST CIRCUIT(f=520MHz)



C1:2200pF 10uF in parallel

C2:2200pF*2 in parallel

C3:2200pF, 330uF in parallel

L1:4Turns, I. D6mm, D1.6mm P=1 silver plateted copper wire

L2:2Turns, I. D6mm, D1.6mm P=2 silver plateted copper wire

L3:4Turns, I. D6mm, D1.6mm P=1 silver plateted copper wire

Note:Board material PTFE substrate

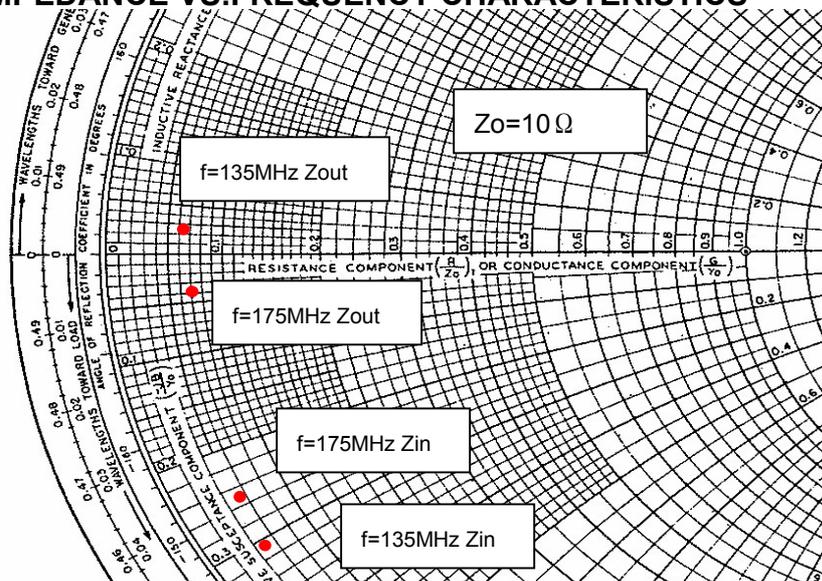
micro strip line width=4.2mm/500HM, er:2.7, t=1.6mm

Dimensions:mm

RD70HVF1

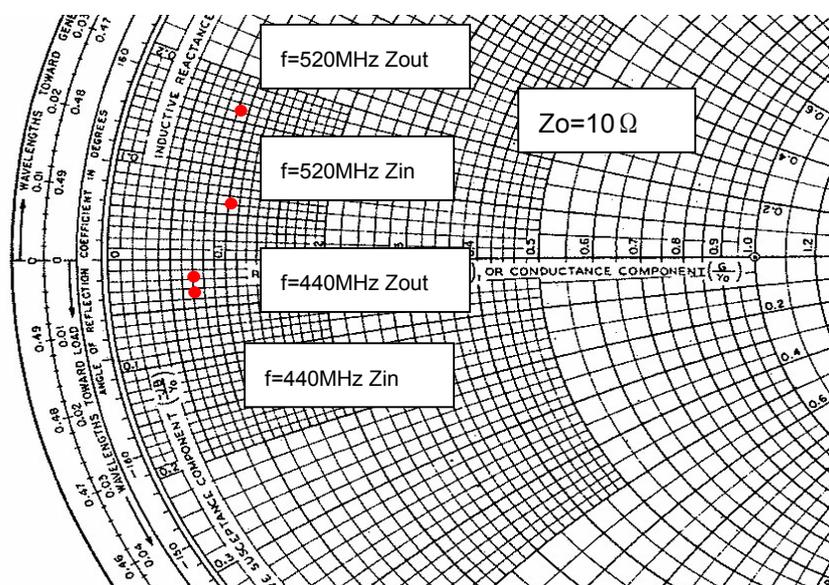
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INPUT/OUTPUT IMPEDANCE VS.FREQUENCY CHARACTERISTICS



Zin, Zout

f (MHz)	Zin (ohm)	Zout (ohm)	Conditions
135	0.43-j3.19	0.70+j0.25	
175	0.55-j2.53	0.72-j0.36	Po=80W, Vdd=12.5V,Pin=6W



Zin, Zout

f (MHz)	Zin (ohm)	Zout (ohm)	Conditions
440	0.74-j0.34	0.71-j0.18	
520	1.04+j0.63	0.93+j1.62	Po=55W, Vdd=12.5V,Pin=10W

RD70HVF1

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RD70HVF1 S-PARAMETER DATA (@Vdd=12.5V, Id=500mA)

Freq. [MHz]	S11		S21		S12		S22	
	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)
50	0.885	-174.0	8.441	72.4	0.013	-16.2	0.745	-170.3
100	0.906	-176.8	3.713	55.3	0.011	-30.9	0.805	-170.5
150	0.930	-179.0	2.095	41.2	0.008	-39.5	0.860	-173.3
175	0.939	179.8	1.647	35.9	0.007	-44.3	0.874	-174.6
200	0.946	178.7	1.337	32.3	0.006	-46.6	0.897	-175.6
250	0.957	176.7	0.908	24.8	0.004	-46.5	0.933	-178.1
300	0.967	174.7	0.661	19.4	0.002	-40.8	0.935	179.4
350	0.969	173.0	0.495	13.6	0.001	-23.4	0.952	177.2
400	0.976	171.0	0.378	12.2	0.002	38.2	0.965	175.0
450	0.974	169.6	0.316	5.4	0.003	73.6	0.965	172.9
500	0.980	168.0	0.276	2.3	0.003	75.6	0.973	171.4
520	0.978	167.2	0.247	0.9	0.003	75.3	0.974	170.6
550	0.980	166.2	0.216	-0.2	0.004	69.2	0.975	169.5
600	0.980	164.6	0.176	-1.5	0.005	74.3	0.974	167.8
650	0.982	163.3	0.156	-1.4	0.007	79.3	0.979	166.3
700	0.985	162.0	0.126	-3.3	0.007	75.4	0.983	164.9
750	0.982	160.7	0.108	-2.0	0.007	76.7	0.982	163.6
800	0.982	159.4	0.106	-1.1	0.009	77.1	0.984	162.0
850	0.984	158.1	0.107	-9.0	0.009	72.6	0.989	160.9
900	0.983	157.0	0.078	-13.4	0.010	72.1	0.983	159.6
950	0.984	155.9	0.079	-4.5	0.011	74.4	0.987	158.2
1000	0.985	154.6	0.067	-5.3	0.011	72.7	0.993	157.3

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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.

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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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