

< Silicon RF Power MOS FET (Discrete) >

RD09MUP2

RoHS Compliance, Silicon MOSFET Power Transistor, 520 MHz, 8 W, 7.2V

DESCRIPTION

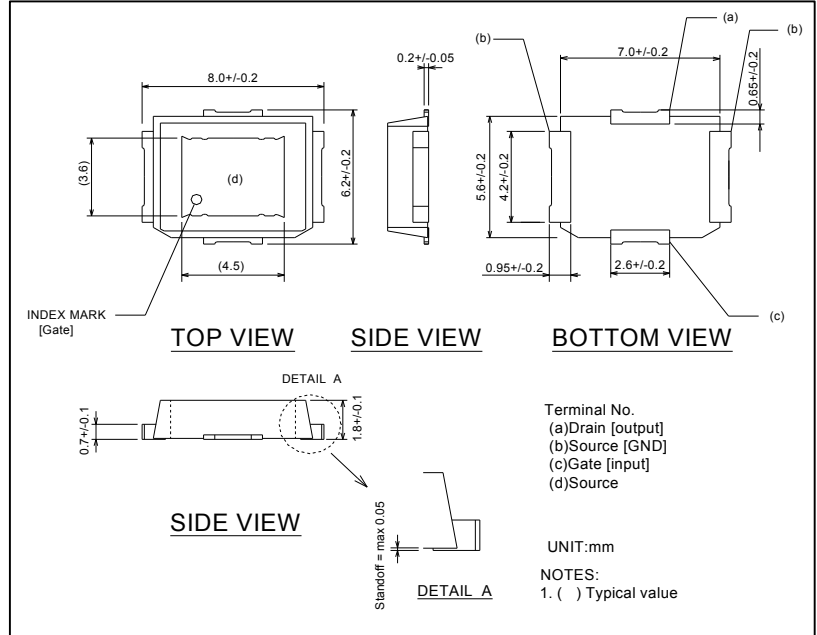
RD09MUP2 is a MOS FET type transistor specifically designed for UHF RF power amplifiers applications.

FEATURES

- High power gain:
P_{out}>8 W, G_p>10 dB@V_{dd}=7.2 V, f=520 MHz
- High Efficiency: 50 %min. (520 MHz)
- Integrated gate protection diode

APPLICATION

For output stage of high power amplifiers in UHF band mobile radio sets.



RoHS COMPLIANT

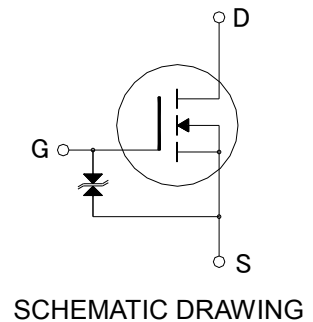
RD09MUP2-501, T512 is EU RoHS compliant.

RoHS compliance is indicating by the letter "G" after the Lot Marking. This product includes the lead in high melting temperature type solders. However, it is applicable to the following exceptions of RoHS Directions.

1. Lead in high melting temperature type solders (i.e. tin-lead older alloys containing more than 85 % lead.)

ABSOLUTE MAXIMUM RATINGS (T_c=25°C UNLESS OTHERWISE NOTED)

SYMBOL	PARAMETER	CONDITIONS	RATINGS	UNIT
V _{DSS}	Drain to source voltage	V _{GS} =0 V	40	V
V _{GSS}	Gate to source voltage	V _{DS} =0 V	-5 to +10	V
I _D	Drain Current	-	4.0	A
P _{in}	Input Power	Z _G =Z _L =50 Ω	1.6	W
P _{ch} *	Channel dissipation	T _c =25 °C	83	W
T _j	Junction Temperature	-	150	°C
T _{stg}	Storage temperature	-	-40 to +125	°C
R _{th j-c}	Thermal resistance	Junction to case	1.5	°C/W



Note: Above parameters are guaranteed independently.

* Theoretical value in case of mounted on infinite heat sink.

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

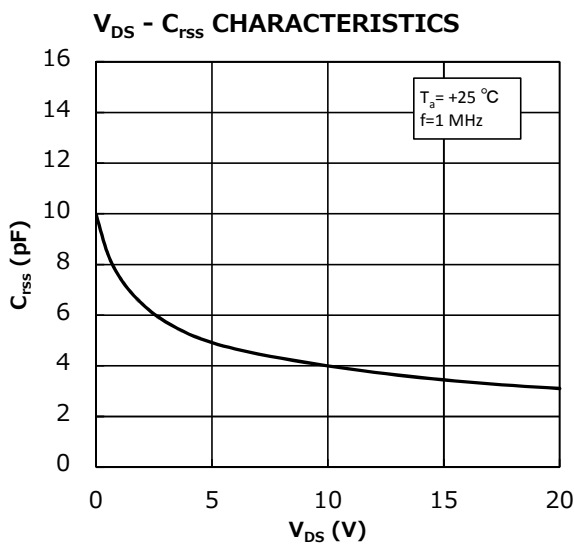
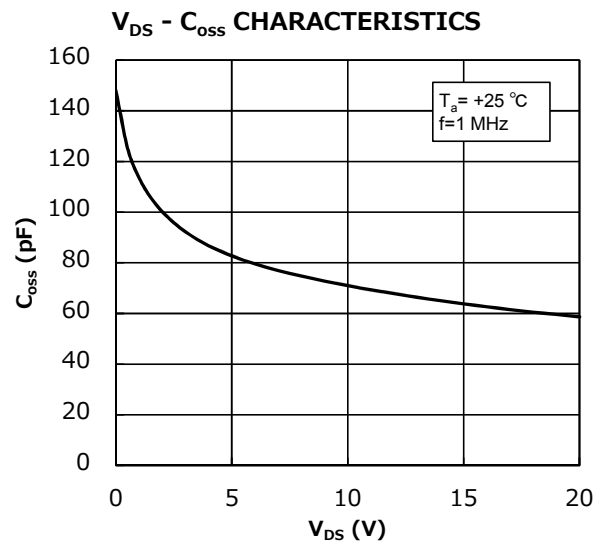
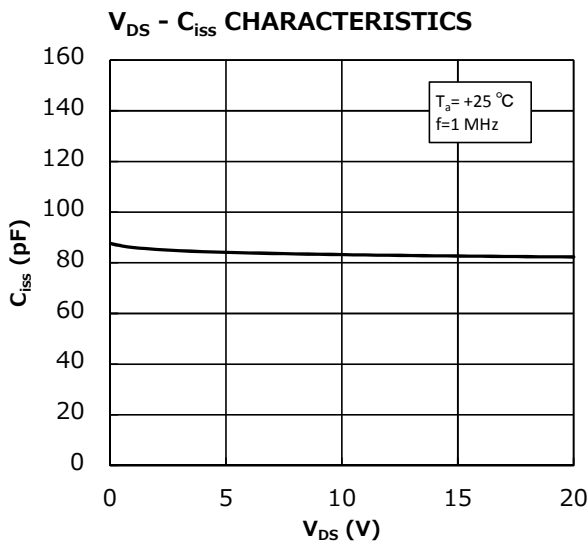
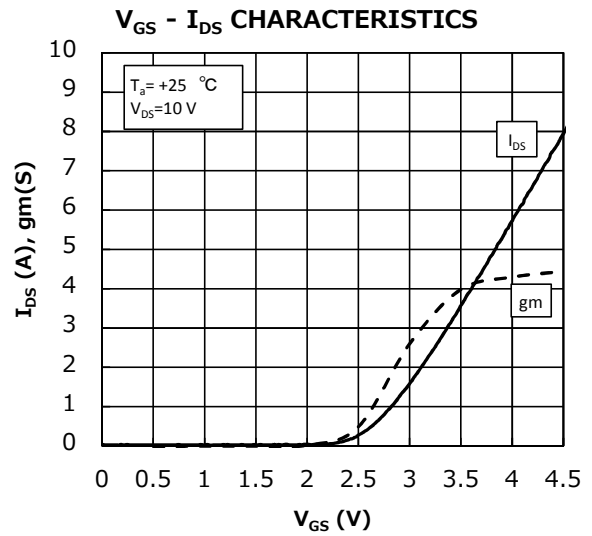
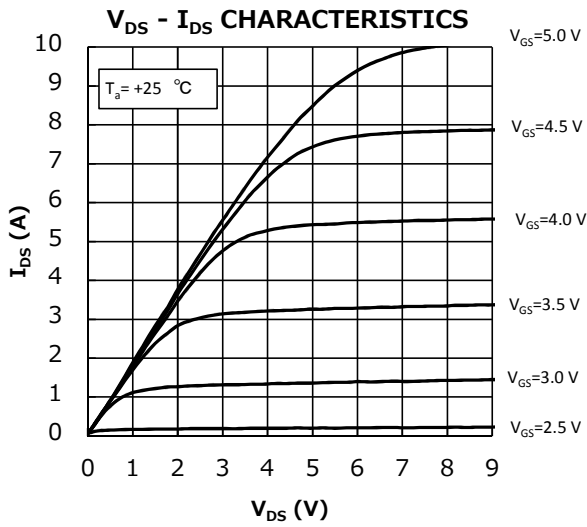
SYMBOL	PARAMETER	CONDITIONS	LIMITS			UNIT
			MIN	TYP	MAX.	
I _{DSS}	Zero gate voltage drain current	V _{DS} =17 V, V _{GS} =0 V	-	-	10	μA
I _{GSS}	Gate to source leak current	V _{GS} =10 V, V _{DS} =0 V	-	-	1	μA
V _{TH}	Gate threshold Voltage	V _{DS} =12 V, I _{DS} =1 mA	0.5	-	2.5	V
P _{out}	Output power	f=520 MHz, V _{DD} =7.2 V	8	9	-	W
η _D	Drain efficiency	P _{in} =0.8 W, I _{dq} =1.0 A	50	-	-	%
VSWRT	Load VSWR tolerance	V _{DD} =9.5 V, P _o =8 W(Pin Control) f=520 MHz, I _{DQ} =1.0 A, Z _G =50 Ω 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

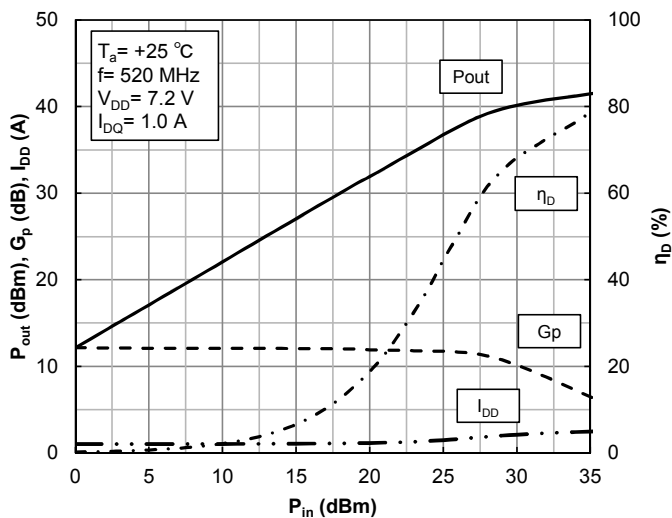


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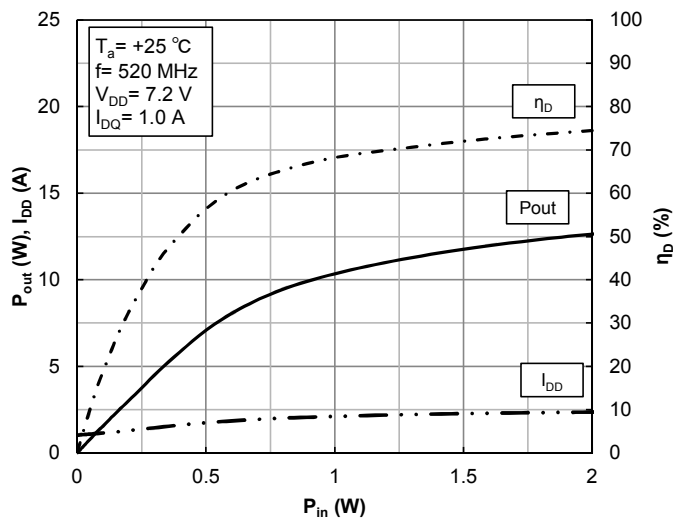
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TYPICAL CHARACTERISTICS

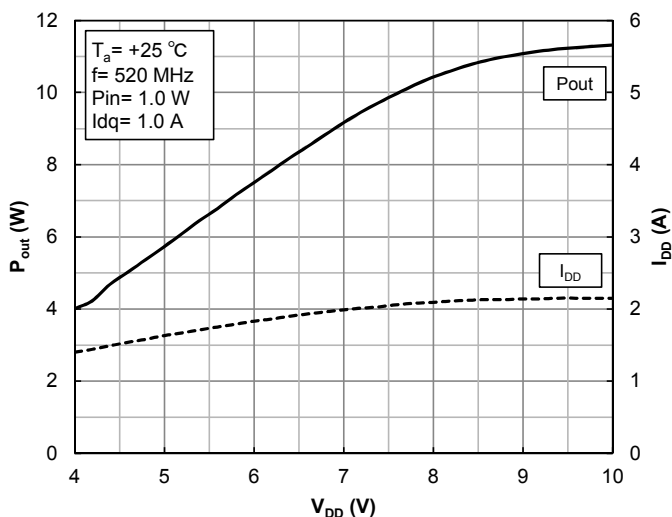
$P_{in} - P_{out}$ CHARACTERISTICS @f=520 MHz



$P_{in} - P_{out}$ CHARACTERISTICS @f=520 MHz



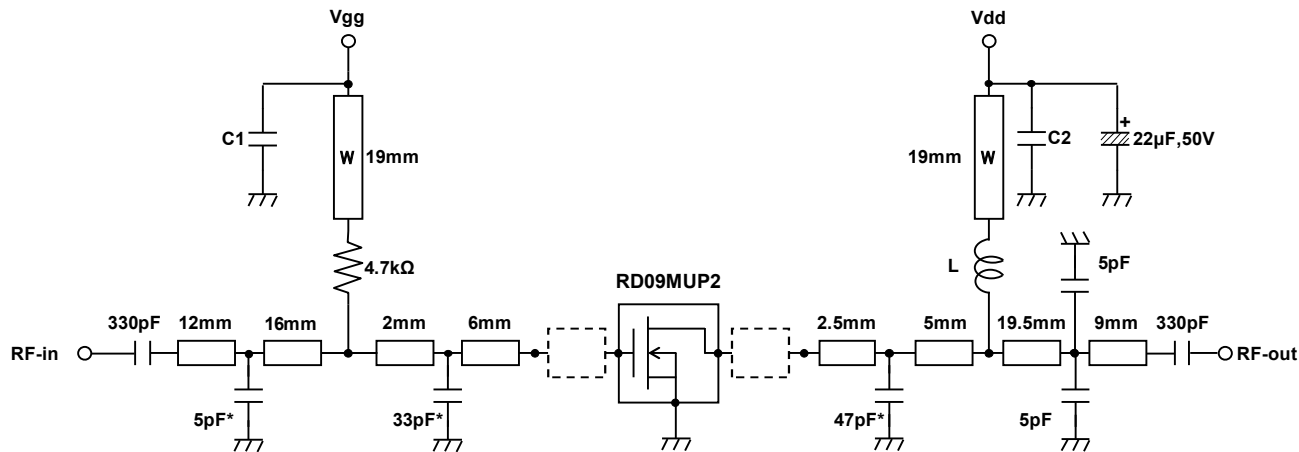
$V_{DD} - P_{out}$ CHARACTERISTICS @f=520 MHz



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TEST CIRCUIT (f=520MHz)



<Note>

Board material: Glass-Epoxy Substrate($\epsilon_r=4.8$, $t=0.8\text{mm}$)

Micro strip line width=1.3mm / 50 Ω

W line width=1.0mm

[---] : Spring(gilding), X=3mm, Y=2.5mm

L : 29nH, 6turns, D=0.43mm, ϕ 2.46mm(outside diameter)

C1, C2 : 2200pF

C : GRM21, *mark C : GQM21

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RD09MUP2 S-PARAMETER DATA (@V_{DS}=7.2 V, I_{DQ}=900 mA)

Freq. (MHz)	S11		S21		S12		S22	
	(mag.)	(Ang.)	(mag.)	(Ang.)	(mag.)	(Ang.)	(mag.)	(Ang.)
100	0.850	-171.3	9.794	79.0	0.011	2.3	0.812	-173.1
120	0.853	-172.4	8.077	75.6	0.010	1.9	0.818	-173.5
140	0.856	-173.1	6.846	72.4	0.010	2.2	0.825	-173.7
160	0.861	-173.6	5.905	69.4	0.010	2.2	0.832	-173.8
180	0.866	-174.0	5.168	66.4	0.009	3.3	0.839	-173.8
200	0.870	-174.4	4.569	63.7	0.009	4.6	0.847	-174.0
220	0.876	-174.8	4.077	61.0	0.008	6.3	0.854	-174.1
240	0.881	-175.1	3.667	58.5	0.008	8.9	0.862	-174.3
260	0.886	-175.4	3.314	56.1	0.008	11.5	0.868	-174.3
280	0.891	-175.7	3.015	53.8	0.008	15.3	0.876	-174.5
300	0.897	-176.0	2.752	51.6	0.007	18.9	0.882	-174.7
320	0.901	-176.3	2.524	49.5	0.007	23.0	0.887	-175.0
340	0.906	-176.6	2.324	47.4	0.007	27.9	0.894	-175.2
360	0.911	-176.9	2.145	45.5	0.007	32.9	0.899	-175.4
380	0.915	-177.2	1.986	43.6	0.007	37.8	0.905	-175.7
400	0.920	-177.5	1.843	41.8	0.007	42.6	0.910	-176.1
420	0.924	-177.9	1.713	40.0	0.008	47.0	0.914	-176.3
440	0.927	-178.2	1.596	38.4	0.008	51.4	0.918	-176.5
460	0.931	-178.5	1.489	36.9	0.008	55.6	0.921	-176.7
480	0.934	-178.8	1.393	35.4	0.009	58.7	0.923	-177.0
500	0.938	-179.1	1.306	34.0	0.009	61.9	0.925	-177.2
520	0.941	-179.4	1.226	32.7	0.010	64.7	0.928	-177.4
540	0.944	-179.7	1.152	31.4	0.010	66.7	0.930	-177.6
560	0.947	180.0	1.085	30.3	0.011	68.7	0.932	-177.8
580	0.949	179.7	1.024	29.2	0.011	70.5	0.934	-177.9
600	0.952	179.4	0.968	28.2	0.012	71.7	0.937	-178.1
620	0.954	179.1	0.916	27.3	0.013	73.1	0.940	-178.2
640	0.956	178.8	0.869	26.2	0.013	73.9	0.944	-178.4
660	0.958	178.5	0.826	25.3	0.014	74.3	0.946	-178.5
680	0.960	178.2	0.785	24.4	0.015	75.1	0.949	-178.7
700	0.962	178.0	0.749	23.5	0.015	76.0	0.953	-178.9
720	0.963	177.7	0.714	22.7	0.016	76.7	0.954	-179.1
740	0.965	177.4	0.681	21.7	0.017	76.8	0.957	-179.4
760	0.966	177.1	0.651	21.1	0.017	76.9	0.960	-179.6
780	0.968	176.8	0.622	20.3	0.018	76.9	0.963	-179.9
800	0.969	176.6	0.596	19.6	0.019	76.9	0.963	179.9
820	0.970	176.3	0.571	18.8	0.019	76.0	0.965	179.7
840	0.971	176.1	0.547	18.2	0.020	76.2	0.965	179.5
860	0.972	175.8	0.524	17.6	0.021	75.8	0.967	179.3
880	0.974	175.5	0.504	16.9	0.021	75.6	0.969	179.2
900	0.974	175.3	0.484	16.5	0.021	76.0	0.970	179.0
920	0.975	175.1	0.466	15.8	0.022	76.2	0.971	178.8
940	0.976	174.8	0.448	15.4	0.022	76.1	0.971	178.6
960	0.977	174.6	0.433	14.6	0.023	76.4	0.972	178.4
980	0.978	174.3	0.417	14.4	0.023	76.9	0.974	178.3
1000	0.978	174.1	0.402	14.0	0.024	77.1	0.974	178.2

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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.

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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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