ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

MITSUBISHI RF POWER MOS FET

# RD07MVS1

**RoHS Compliance, Silicon MOSFET Power Transistor,175MHz,520MHz,7W**

## DESCRIPTION

RD07MVS1 is a MOS FET type transistor specifically designed for VHF/UHF RF power amplifiers applications.

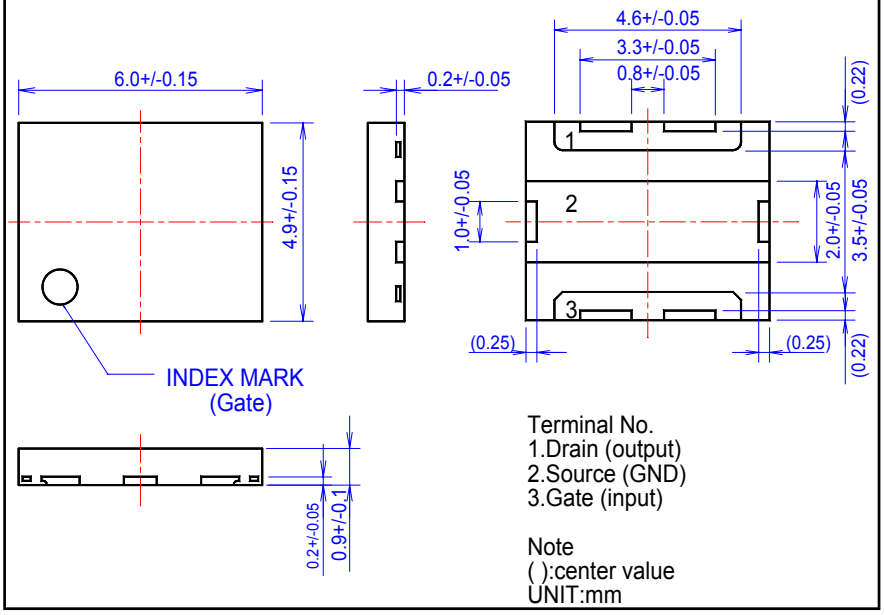
## FEATURES

High power gain:
Pout>7W, Gp>10dB@Vdd=7.2V,f=520MHz
High Efficiency: 60%typ. (175MHz)
High Efficiency: 55%typ. (520MHz)

## APPLICATION

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

OUTLINE DRAWING




## RoHS COMPLIANT

RD07MVS1-101,T112 is a RoHS compliant products.
RoHS compliance is indicate by the letter “G” after the Lot Marking.
This product include the lead in high melting temperature type solders.
How ever,it applicable to the following exceptions of RoHS Directions.
1.Lead in high melting temperature type solders(i.e.tin-lead solder alloys containing more than85% lead.)

## ABSOLUTE MAXIMUM RATINGS

(Tc=25°C UNLESS OTHERWISE NOTED)

| SYMBOL | PARAMETER | CONDITIONS | RATINGS | UNIT |
|---|---|---|---|---|
| VDSS | Drain to source voltage | Vgs=0V | 30 | V |
| VGSS | Gate to source voltage | Vds=0V | +/- 20 | V |
| Pch | Channel dissipation | Tc=25°C | 50 | W |
| Pin | Input Power | Zg=Zl=50Ω | 1.5 | W |
| ID | Drain Current | - | 3 | A |
| Tch | Junction Temperature | - | 150 | °C |
| Tstg | Storage temperature | - | -40 to +125 | °C |
| Rth j-c | Thermal resistance | Junction to case | 2.5 | °C/W |

Note 1: Above parameters are guaranteed independently.

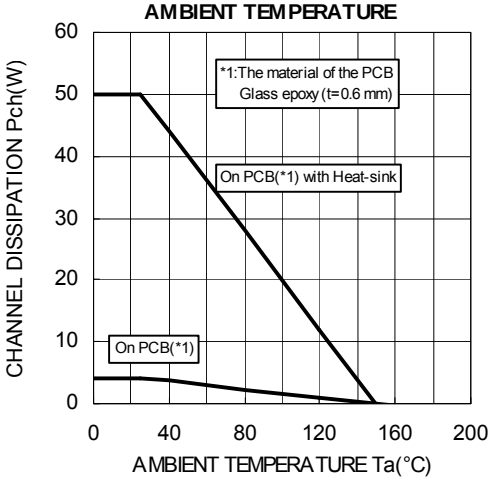
## ELECTRICAL CHARACTERISTICS (Tc=25°C, UNLESS OTHERWISE NOTED)

| SYMBOL | PARAMETER | CONDITIONS | LIMITS | | | UNIT |
|---|---|---|---|---|---|---|
| | | | MIN | TYP | MAX. | |
| IDSS | Zero gate voltage drain current | VDS=17V, VGS=0V | - | - | 200 | uA |
| IGSS | Gate to source leak current | VGS=10V, VDS=0V | - | - | 1 | uA |
| VTH | Gate threshold Voltage | VDS=12V, IDS=1mA | 1.4 | 1.7 | 2.4 | V |
| Pout1 | Output power | f=175MHz , VDD=7.2V | 7 | 8 | - | W |
| ηD1 | Drain efficiency | Pin=0.3W,Idq=700mA | 55 | 60 | - | % |
| Pout2 | Output power | f=520MHz , VDD=7.2V | 7 | 8 | - | W |
| ηD2 | Drain efficiency | Pin=0.7W,Idq=750mA | 50 | 55 | - | % |
| | Load VSWR tolerance | VDD=9.2V,Po=7W(Pin Control)<br>f=175MHz,Idq=700mA,Zg=50Ω<br>Load VSWR=20:1(All Phase) | No destroy | | | - |
| | Load VSWR tolerance | VDD=9.2V,Po=7W(Pin Control)<br>f=520MHz,Idq=750mA,Zg=50Ω<br>Load VSWR=20:1(All Phase) | No destroy | | | - |

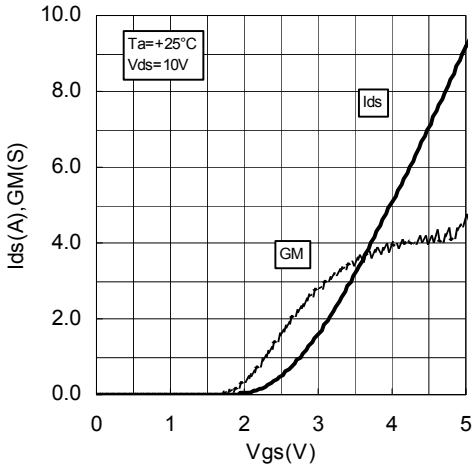
Note : Above parameters , ratings , limits and conditions are subject to change.

## TYPICAL CHARACTERISTICS

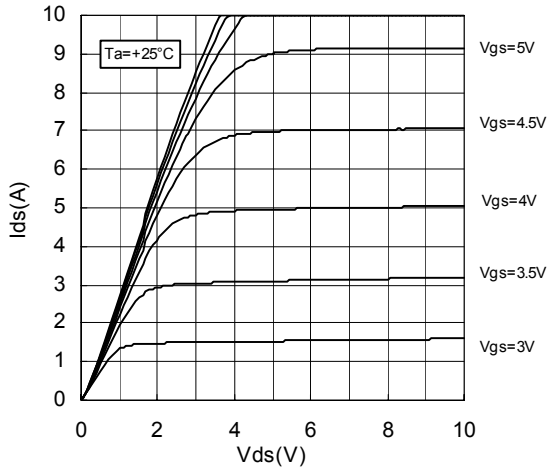
DRAIN DISSIPATION VS. AMBIENT TEMPERATURE



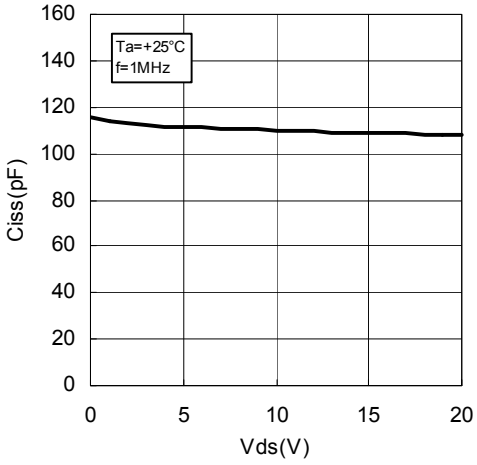

Vgs-Ids CHARACTERISTICS



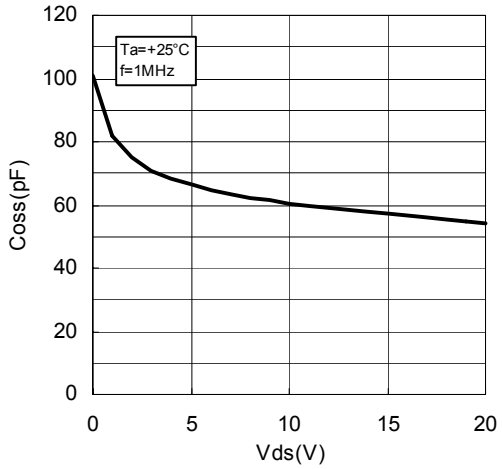

Vds-Ids CHARACTERISTICS



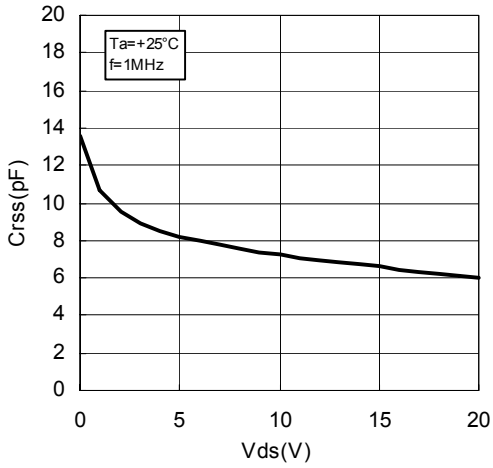

Vds VS. Ciss CHARACTERISTICS




Vds VS. Coss CHARACTERISTICS

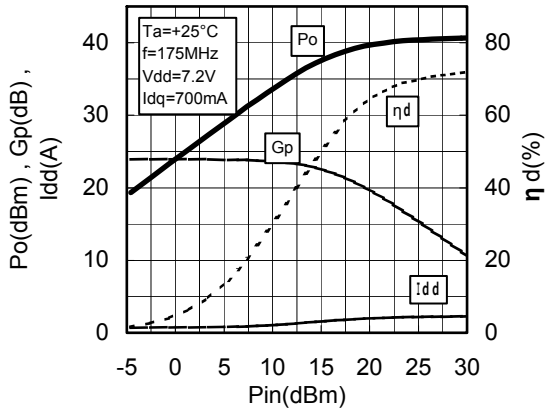



Vds VS. Crss CHARACTERISTICS

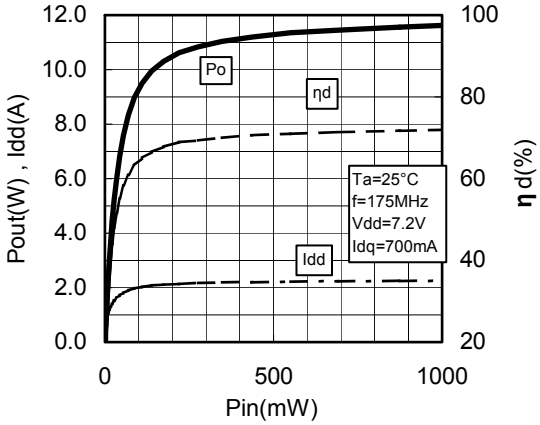


## TYPICAL CHARACTERISTICS

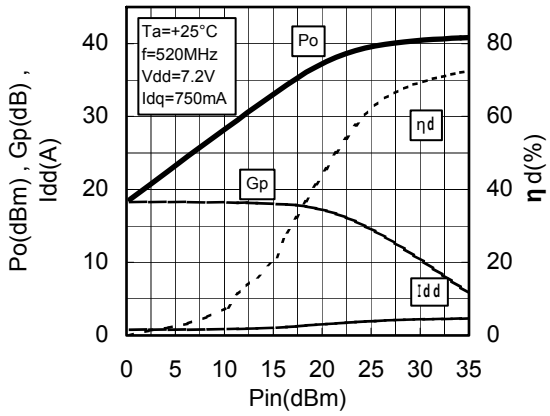
**Pin-Po CHARACTERISTICS**
**@f=175MHz**



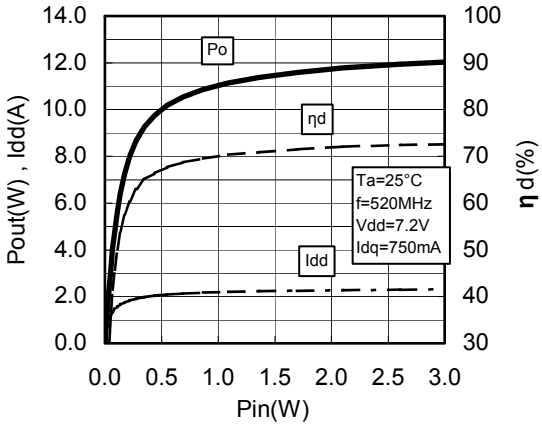

**Pin-Po CHARACTERISTICS**
**@f=175MHz**



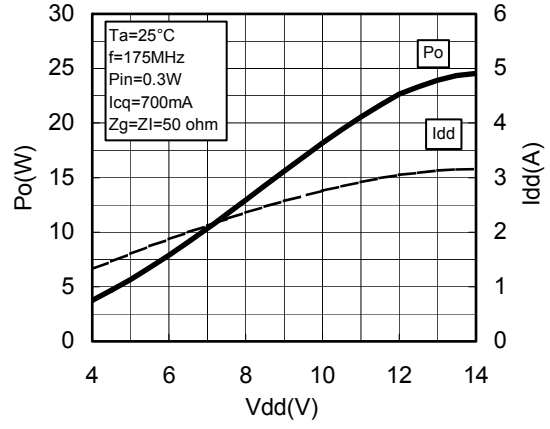

**Pin-Po CHARACTERISTICS**
**@f=520MHz**



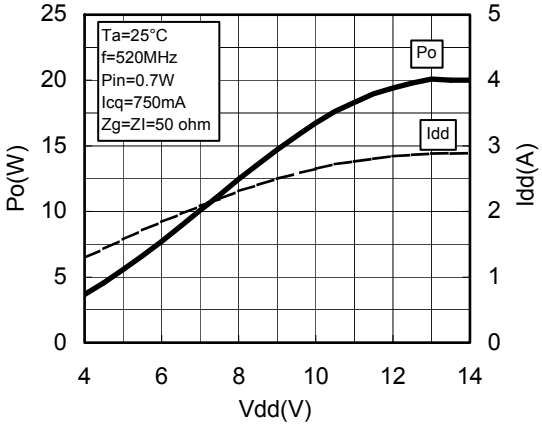

**Pin-Po CHARACTERISTICS**
**@f=520MHz**



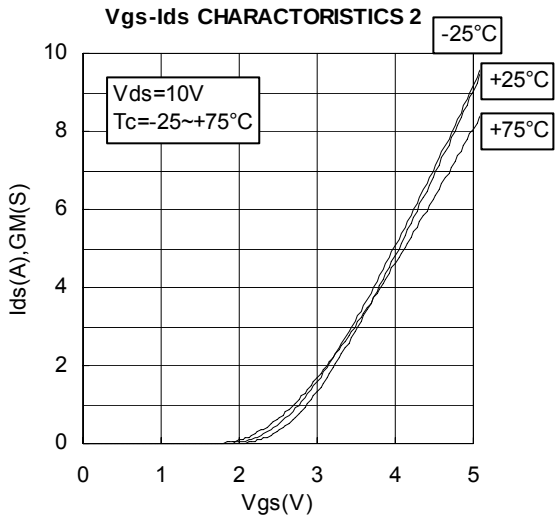

**Vdd-Po CHARACTERISTICS**
**@f=175MHz**



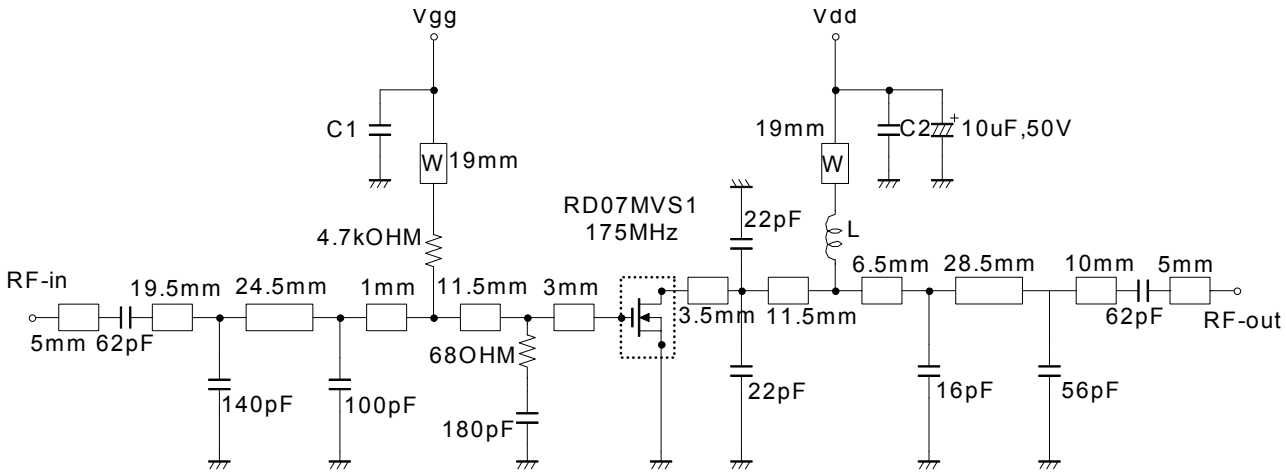

**Vdd-Po CHARACTERISTICS**
**@f=520MHz**



## TYPICAL CHARACTERISTICS



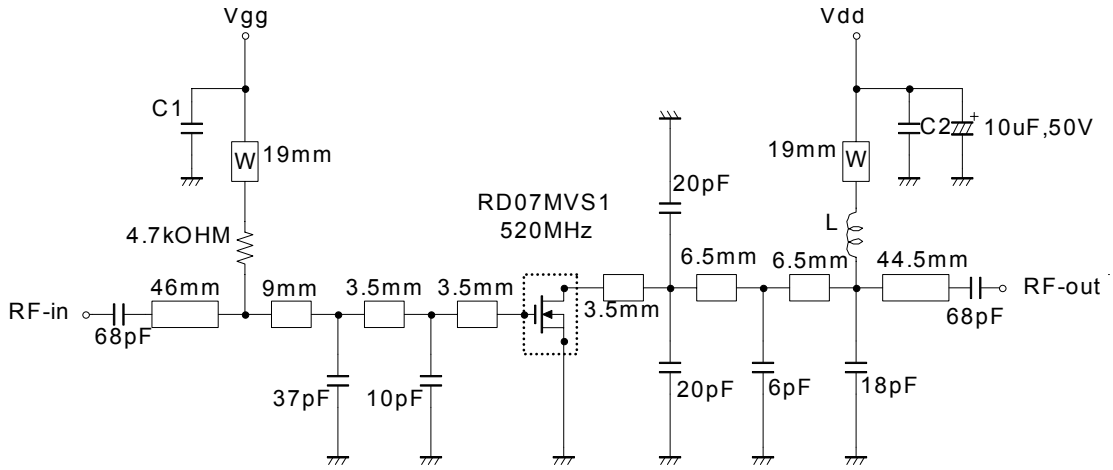
## TEST CIRCUIT(f=175MHz)




L: Enameled wire 7Turns,D:0.43mm,2.46mmO.D
C1,C2:1000pF,0.022uF in parallel

Note:Board material- Teflon substrate
Micro strip line width=2.2mm/50OHM,er:2.7,t=0.8mm
W:line width=1.0mm

## TEST CIRCUIT(f=520MHz)

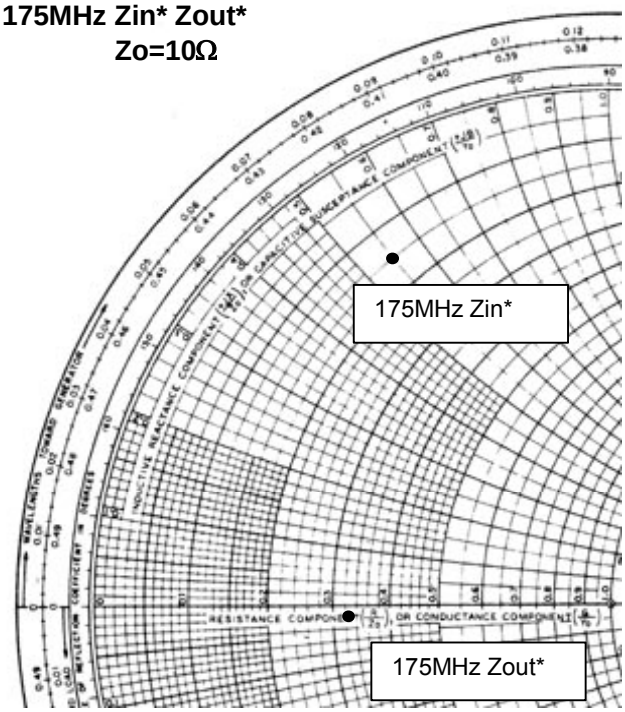



L: Enameled wire 5Turns,D:0.43mm,2.46mmO.D
C1,C2:1000pF,0.022uF in parallel

Note:Board material- Teflon substrate
Micro strip line width=2.2mm/50OHM,er:2.7,t=0.8mm
W:ine width=1.0mm

## INPUT/OUTPUT IMPEDANCE VS. FREQUENCY CHARACTERISTICS

**175MHz Zin* Zout***
**Zo=10Ω**

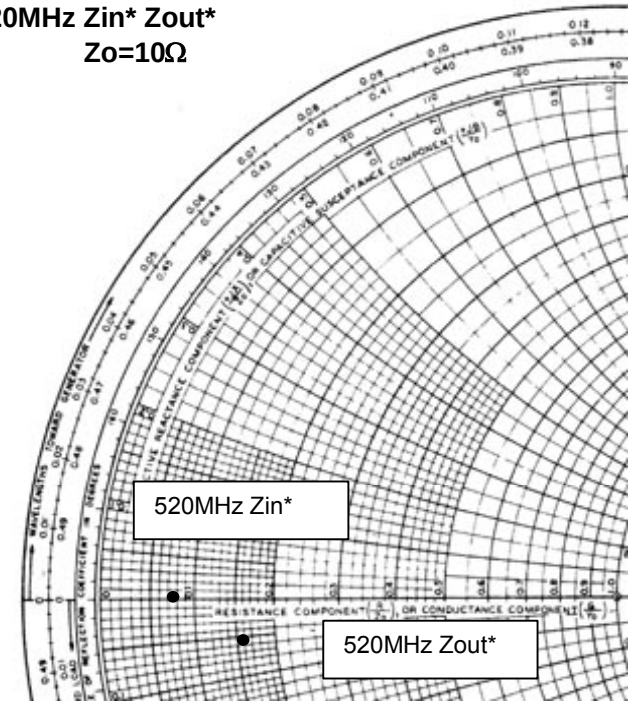



Vdd=7.2V, Idq=700mA(Vgg adj.),Pin=0.28W

**Zin*=1.55+j5.53**
**Zout*=3.24-j0.26**

Zin*: Complex conjugate of input impedance
Zout*: Complex conjugate of input impedance

**520MHz Zin* Zout***
**Zo=10Ω**




Vdd=7.2V, Idq=750mA(Vgg adj.),Pin=0.7W

**Zin*=0.76+j0.06**
**Zout*=1.61-j0.52**

Zin*: Complex conjugate of input impedance
Zout*: Complex conjugate of input impedance

## RD07MVS1 S-PARAMETER DATA (@Vdd=7.2V, Id=750mA)

| Freq. | S11 | | S21 | | S12 | | S22 | |
|---|---|---|---|---|---|---|---|---|
| [MHz] | (mag) | (ang) | (mag) | (ang) | (mag) | (ang) | (mag) | (ang) |
| 100 | 0.890 | -174.1 | 5.508 | 82.1 | 0.016 | -3.6 | 0.790 | -172.8 |
| 150 | 0.897 | -175.6 | 3.613 | 75.0 | 0.015 | -8.5 | 0.801 | -174.0 |
| 175 | 0.899 | -176.0 | 3.028 | 72.4 | 0.015 | -9.6 | 0.802 | -174.1 |
| 200 | 0.901 | -176.3 | 2.604 | 70.1 | 0.014 | -10.9 | 0.815 | -174.0 |
| 250 | 0.907 | -176.7 | 2.019 | 65.6 | 0.014 | -12.7 | 0.844 | -174.1 |
| 300 | 0.913 | -177.0 | 1.614 | 60.7 | 0.012 | -15.3 | 0.843 | -174.1 |
| 350 | 0.918 | -177.3 | 1.308 | 57.1 | 0.011 | -15.8 | 0.860 | -174.4 |
| 400 | 0.924 | -177.8 | 1.102 | 54.1 | 0.010 | -14.2 | 0.879 | -175.0 |
| 450 | 0.928 | -178.0 | 0.929 | 50.1 | 0.009 | -14.8 | 0.882 | -175.1 |
| 500 | 0.933 | -178.3 | 0.790 | 48.6 | 0.008 | -9.6 | 0.895 | -175.5 |
| 520 | 0.935 | -178.5 | 0.753 | 47.6 | 0.007 | -7.7 | 0.901 | -175.8 |
| 550 | 0.937 | -178.8 | 0.692 | 45.3 | 0.007 | -5.6 | 0.906 | -176.2 |
| 600 | 0.940 | -179.2 | 0.595 | 43.6 | 0.006 | 0.4 | 0.907 | -176.6 |
| 650 | 0.942 | -179.4 | 0.529 | 42.4 | 0.006 | 17.1 | 0.916 | -177.2 |
| 700 | 0.944 | -179.8 | 0.467 | 40.2 | 0.005 | 21.8 | 0.923 | -177.6 |
| 750 | 0.947 | 179.8 | 0.416 | 39.4 | 0.005 | 40.9 | 0.921 | -178.0 |
| 800 | 0.948 | 179.4 | 0.374 | 38.6 | 0.004 | 52.0 | 0.930 | -178.8 |
| 850 | 0.949 | 179.0 | 0.343 | 37.6 | 0.005 | 67.1 | 0.933 | -178.9 |
| 900 | 0.951 | 178.6 | 0.304 | 36.5 | 0.005 | 72.6 | 0.932 | -179.3 |
| 950 | 0.951 | 178.2 | 0.284 | 37.6 | 0.006 | 85.8 | 0.937 | 179.8 |
| 1000 | 0.952 | 177.9 | 0.262 | 35.1 | 0.007 | 85.1 | 0.938 | 179.7 |
| 1050 | 0.950 | 177.4 | 0.234 | 36.0 | 0.008 | 89.8 | 0.938 | 179.3 |
| 1100 | 0.952 | 176.9 | 0.226 | 35.8 | 0.009 | 93.4 | 0.940 | 178.2 |

## RD07MVS1 S-PARAMETER DATA (@Vdd=12.5V, Id=750mA)

| Freq. | S11 | | S21 | | S12 | | S22 | |
|---|---|---|---|---|---|---|---|---|
| [MHz] | (mag) | (ang) | (mag) | (ang) | (mag) | (ang) | (mag) | (ang) |
| 100 | 0.883 | -172.1 | 6.013 | 81.0 | 0.017 | -5.3 | 0.748 | -170.4 |
| 150 | 0.891 | -174.1 | 3.914 | 72.8 | 0.016 | -10.7 | 0.765 | -171.4 |
| 175 | 0.894 | -174.6 | 3.269 | 69.8 | 0.016 | -13.1 | 0.769 | -171.4 |
| 200 | 0.897 | -175.0 | 2.798 | 67.2 | 0.015 | -14.9 | 0.786 | -171.3 |
| 250 | 0.906 | -175.6 | 2.144 | 62.1 | 0.014 | -18.3 | 0.822 | -171.4 |
| 300 | 0.914 | -176.0 | 1.697 | 56.9 | 0.012 | -20.4 | 0.828 | -171.6 |
| 350 | 0.920 | -176.4 | 1.361 | 53.0 | 0.011 | -21.6 | 0.848 | -172.0 |
| 400 | 0.927 | -177.0 | 1.134 | 49.9 | 0.010 | -21.2 | 0.871 | -172.9 |
| 450 | 0.932 | -177.4 | 0.949 | 45.8 | 0.009 | -21.8 | 0.876 | -173.2 |
| 500 | 0.937 | -177.8 | 0.800 | 44.2 | 0.007 | -16.9 | 0.892 | -173.7 |
| 520 | 0.938 | -178.0 | 0.761 | 43.2 | 0.007 | -16.0 | 0.898 | -174.1 |
| 550 | 0.940 | -178.3 | 0.697 | 41.1 | 0.006 | -13.3 | 0.904 | -174.6 |
| 600 | 0.944 | -178.8 | 0.594 | 39.3 | 0.005 | -7.2 | 0.906 | -175.1 |
| 650 | 0.946 | -179.1 | 0.527 | 38.2 | 0.004 | 4.5 | 0.917 | -175.9 |
| 700 | 0.948 | -179.5 | 0.464 | 36.1 | 0.004 | 17.4 | 0.924 | -176.3 |
| 750 | 0.950 | -179.9 | 0.412 | 35.5 | 0.004 | 28.0 | 0.922 | -176.9 |
| 800 | 0.951 | 179.6 | 0.368 | 34.5 | 0.004 | 56.9 | 0.931 | -177.8 |
| 850 | 0.953 | 179.2 | 0.336 | 33.6 | 0.004 | 66.4 | 0.934 | -178.0 |
| 900 | 0.954 | 178.8 | 0.297 | 32.3 | 0.005 | 78.3 | 0.933 | -178.3 |
| 950 | 0.954 | 178.4 | 0.276 | 33.8 | 0.006 | 87.4 | 0.939 | -179.4 |
| 1000 | 0.954 | 178.0 | 0.254 | 31.1 | 0.006 | 90.9 | 0.941 | -179.5 |
| 1050 | 0.952 | 177.5 | 0.226 | 32.2 | 0.007 | 94.7 | 0.940 | -179.9 |
| 1100 | 0.954 | 177.0 | 0.219 | 32.0 | 0.008 | 98.0 | 0.943 | 178.9 |

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.

**warning !**

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.