

**ELECTROSTATIC SENSITIVE DEVICE**  
OBSERVE HANDLING PRECAUTIONS

MITSUBISHI RF POWER MOS FET

# RD15HVF1

Silicon MOSFET Power Transistor, 175MHz15W 520MHz,15W

## DESCRIPTION

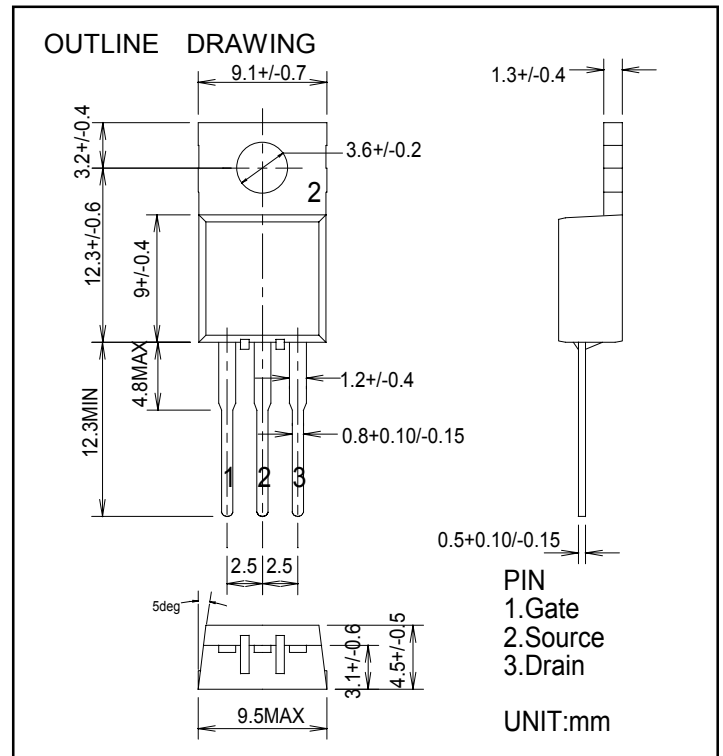
RD15HVF1 is a MOS FET type transistor specifically designed for VHF/UHF High power amplifiers applications.

## FEATURES

- High power and High Gain:  
Pout>15W, Gp>14dB @Vdd=12.5V,f=175MHz  
Pout>15W, Gp>7dB @Vdd=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.



## 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          | 48          | W    |
| Pin     | Input power             | Zg=Zl=50Ω        | 1.5(Note2)  | W    |
| ID      | Drain current           | -                | 4           | A    |
| Tch     | Channel temperature     | -                | 150         | °C   |
| Tstg    | Storage temperature     | -                | -40 to +150 | °C   |
| Rth j-c | Thermal resistance      | junction to case | 2.6         | °C/W |

Note 1: Above parameters are guaranteed independently.

Note 2: Over 300MHz use spec is 6W

## 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  | -          | -   | 100  | uA   |
| IGSS   | Gate to source leak current     | VGS=10V, VDS=0V  | -          | -   | 1    | uA   |
| VTH    | Gate threshold Voltage          | VDS=12V, IDS=1mA   | 1.5        | 2.0 | 2.5  | V    |
| Pout1  | Output power                    | VDD=12.5V, Pin=0.6W,   | 15         | 18  | -    | W    |
| ηD1    | Drain efficiency                | f=175MHz, Idq=0.5A   | 55         | 60  | -    | %    |
| Pout2  | Output power                    | VDD=12.5V, Pin=3W,   | 15         | 18  | -    | W    |
| ηD2    | Drain efficiency                | f=520MHz, Idq=0.5A   | 50         | 55  | -    | %    |
|        | Load VSWR tolerance             | VDD=15.2V, Po=15W (PinControl)<br>f=175MHz, Idq=0.5A, Zg=50Ω<br>Load VSWR=20:1 (All Phase) | No destroy |     |      | -    |
|        | Load VSWR tolerance             | VDD=15.2V, Po=15W (PinControl)<br>f=520MHz, Idq=0.5A, Zg=50Ω<br>Load VSWR=20:1 (All Phase) | No destroy |     |      | -    |

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



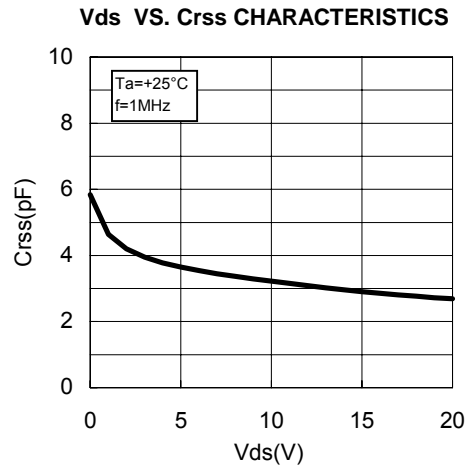
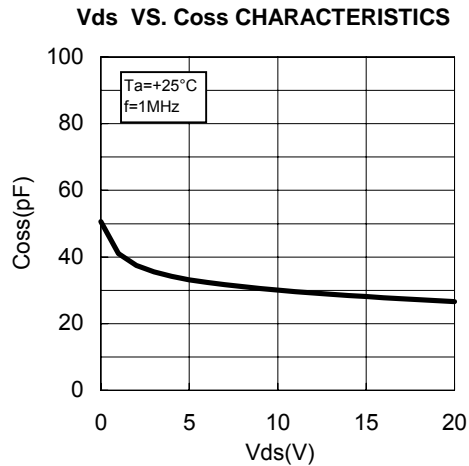
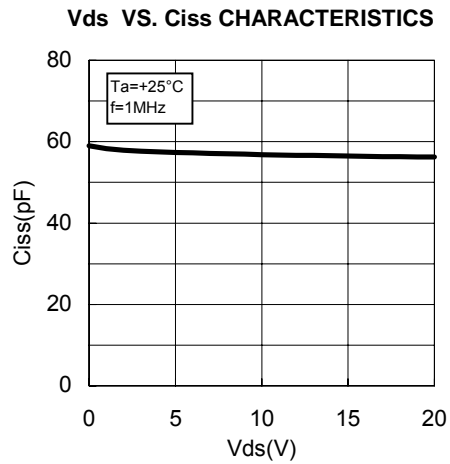
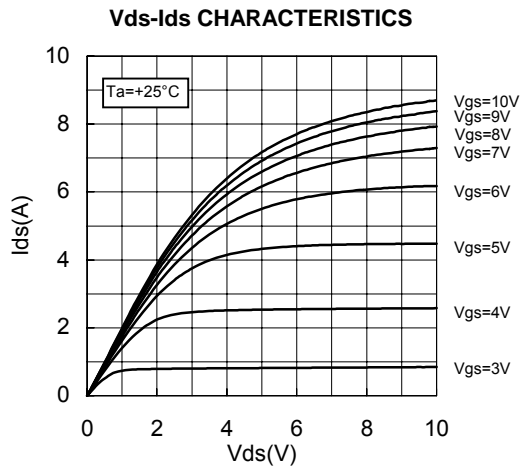
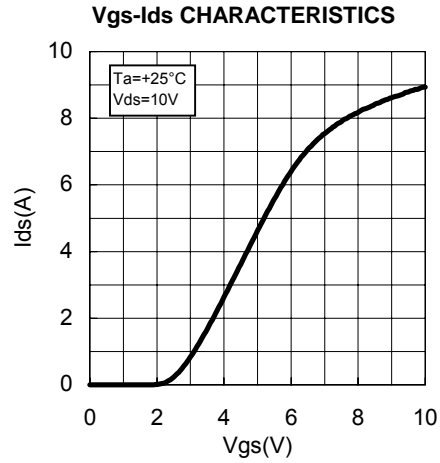
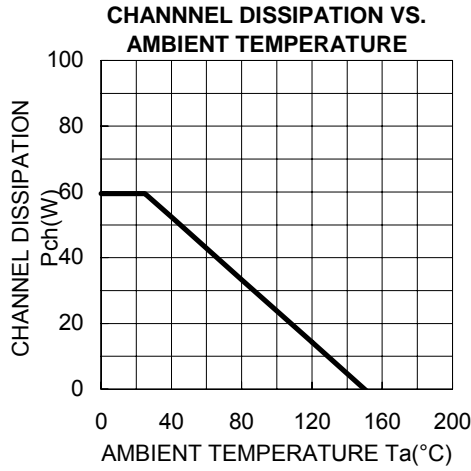
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Silicon MOSFET Power Transistor, 175MHz15W 520MHz,15W

## TYPICAL CHARACTERISTICS





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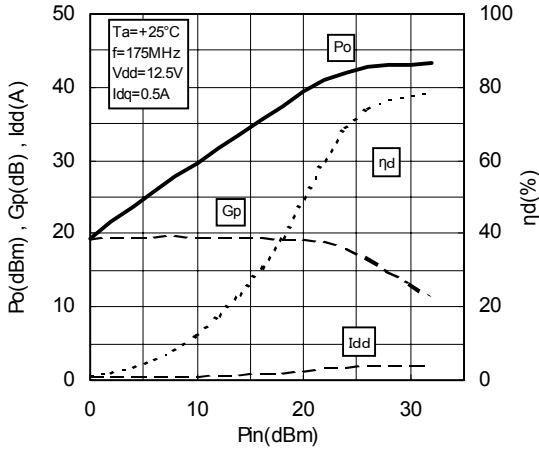
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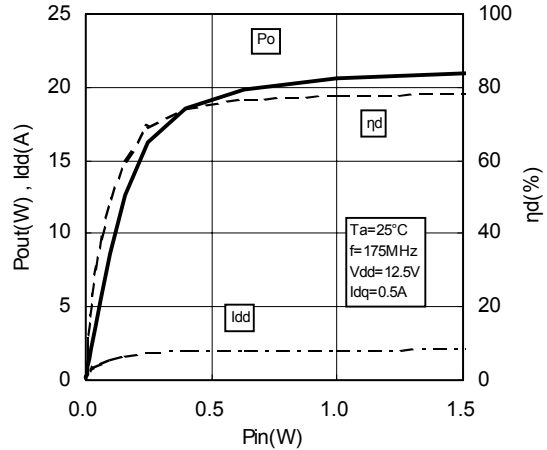
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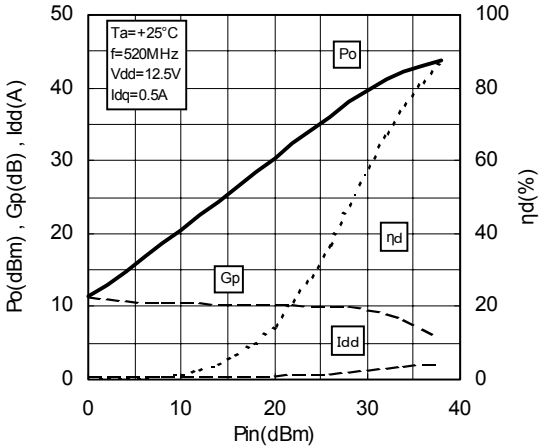
Pin-Po CHARACTERISTICS



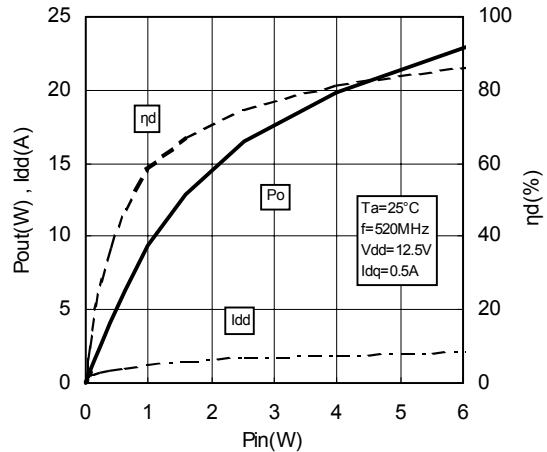
Pin-Po CHARACTERISTICS



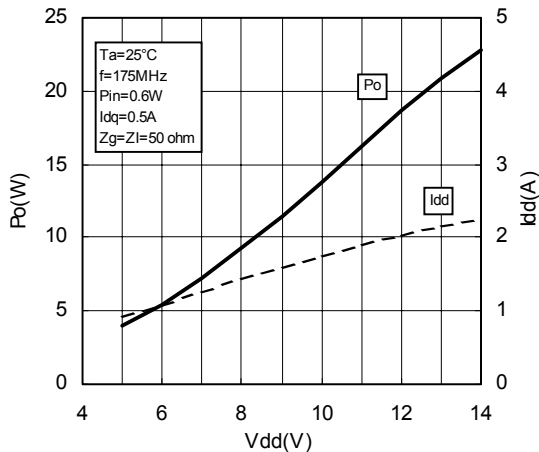
Pin-Po CHARACTERISTICS



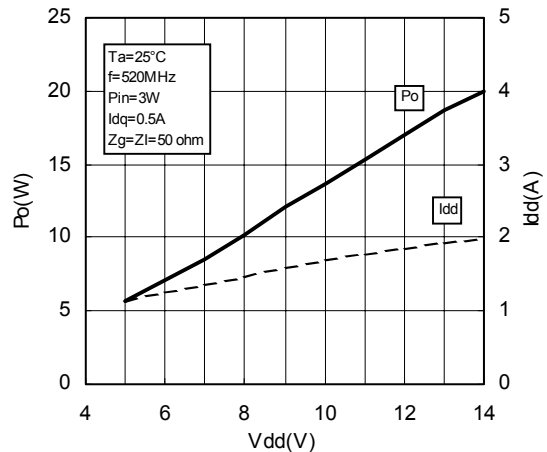
Pin-Po CHARACTERISTICS



Vdd-Po CHARACTERISTICS



Vdd-Po CHARACTERISTICS





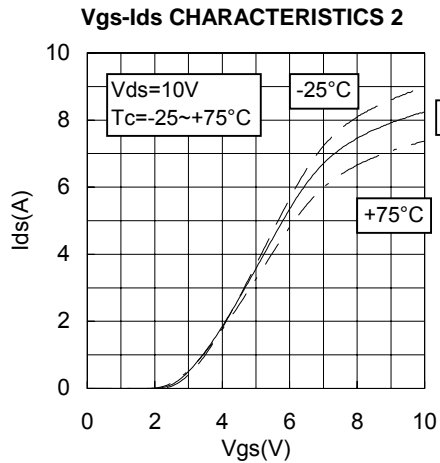
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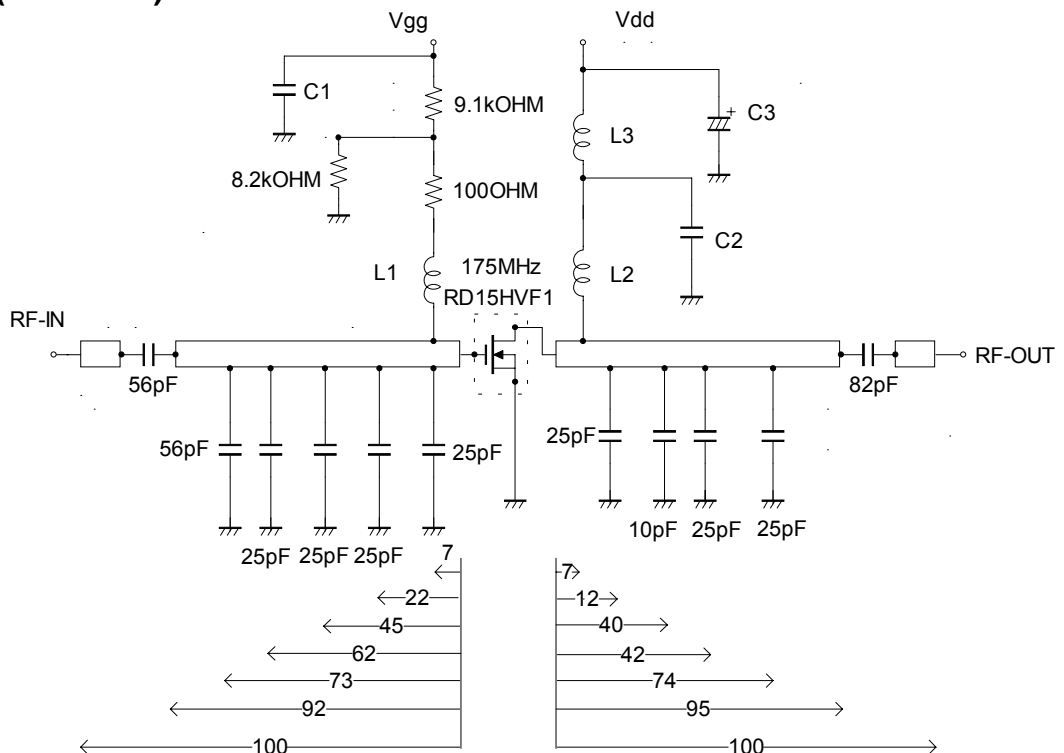
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## TYPICAL CHARACTERISTICS



## TEST CIRCUIT(f=175MHz)



- C1:2200pF 10uF in parallel
- C2:2200pF\*2 in parallel
- C3:2200pF,330uF in parallel

- L1:4Turns,I.D6mm,D1.6mm P=1 silver plated copper wire
- L2:5Turns,I.D6mm,D1.6mm P=1 silver plated copper wire
- L3:4Turns,I.D6mm,D1.6mm P=1 silver plated copper wire

Note:Board material-Teflon substrate  
micro strip line width=4.2mm/50OHM,er:2.7,t=1.6mm

Dimensions:mm



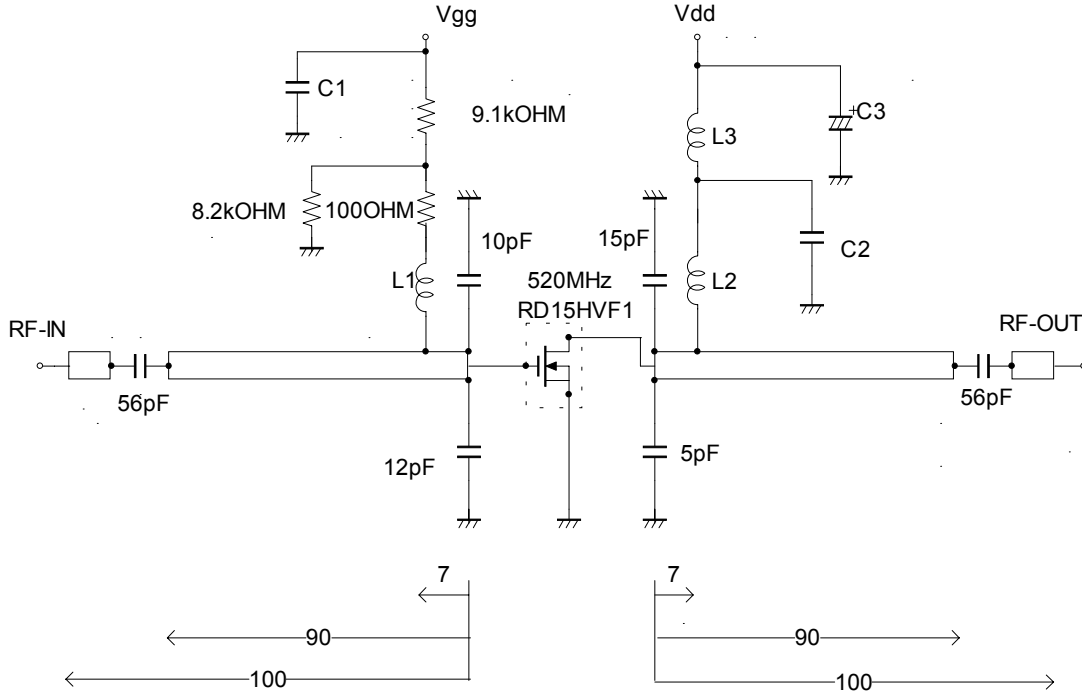
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## TEST CIRCUIT(f=520MHz)



C1:2200pF 10uF in parallel

C2:2200pF\*2 in parallel

C3:2200pF,330uF in parallel

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

L2:2Turns,I.D6mm,D1.6mm P=1 silver plated copper wire

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

Note:Board material-Teflon substrate

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

Dimensions:mm



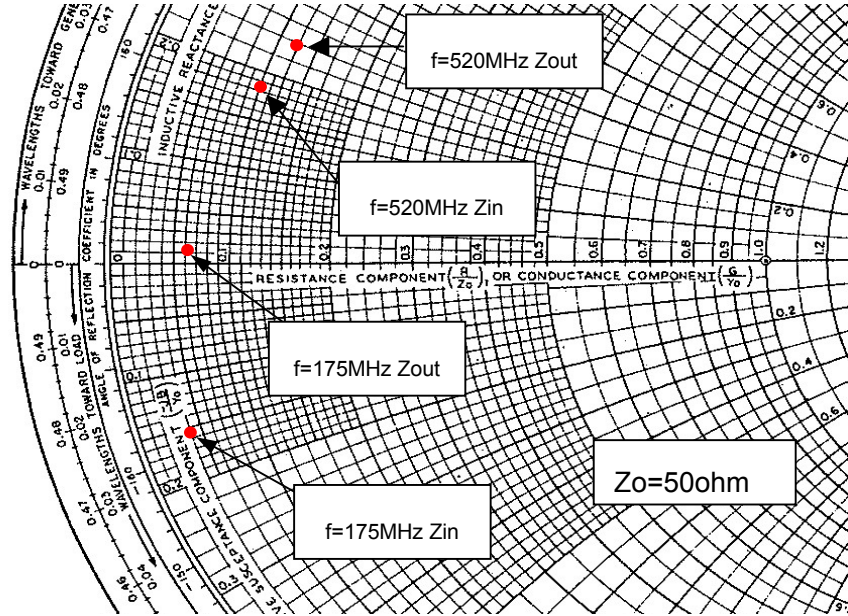
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**INPUT/OUTPUT IMPEDANCE VS.FREQUENCY CHARACTERISTICS**



Zin , Zout

| f<br>(MHz) | Zin<br>(ohm) | Zout<br>(ohm) | Conditions                  |
|------------|--------------|---------------|-----------------------------|
| 175        | 2.34-j8.01   | 3.06+j0.74    | Po=15W, Vdd=12.5V, Pin=0.6W |
| 520        | 5.42+j9.22   | 6.02+j12.34   | Po=15W, Vdd=12.5V, Pin=3.0W |



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RD15HVF1 S-PARAMETER DATA (@V<sub>dd</sub>=12.5V, I<sub>d</sub>=500mA)

| Freq.<br>[MHz] | S11   |        | S21    |       | S12   |       | S22   |        |
|----------------|-------|--------|--------|-------|-------|-------|-------|--------|
|                | (mag) | (ang)  | (mag)  | (ang) | (mag) | (ang) | (mag) | (ang)  |
| 50             | 0.717 | -145.9 | 23.274 | 101.8 | 0.023 | 26.0  | 0.556 | -130.2 |
| 100            | 0.726 | -163.9 | 12.054 | 85.7  | 0.024 | 27.7  | 0.547 | -150.4 |
| 150            | 0.744 | -171.1 | 8.049  | 74.7  | 0.025 | 36.1  | 0.560 | -157.8 |
| 175            | 0.748 | -173.6 | 6.804  | 70.2  | 0.025 | 41.8  | 0.571 | -160.1 |
| 200            | 0.755 | -175.9 | 5.886  | 66.3  | 0.026 | 48.1  | 0.588 | -161.8 |
| 250            | 0.770 | -179.0 | 4.622  | 58.6  | 0.030 | 57.7  | 0.625 | -164.3 |
| 300            | 0.787 | 177.6  | 3.731  | 51.5  | 0.036 | 65.3  | 0.647 | -167.5 |
| 350            | 0.804 | 174.6  | 3.092  | 45.3  | 0.044 | 70.3  | 0.683 | -170.9 |
| 400            | 0.821 | 171.2  | 2.623  | 39.1  | 0.053 | 73.5  | 0.716 | -173.7 |
| 450            | 0.838 | 168.2  | 2.229  | 33.2  | 0.062 | 74.6  | 0.734 | -176.8 |
| 500            | 0.849 | 165.1  | 1.938  | 28.3  | 0.072 | 73.9  | 0.765 | 179.4  |
| 520            | 0.854 | 163.7  | 1.845  | 26.1  | 0.076 | 73.9  | 0.777 | 178.0  |
| 550            | 0.862 | 161.7  | 1.695  | 22.9  | 0.082 | 72.6  | 0.788 | 176.3  |
| 800            | 0.900 | 145.0  | 0.971  | 4.2   | 0.135 | 62.8  | 0.859 | 159.0  |
| 850            | 0.904 | 141.3  | 0.864  | 0.0   | 0.143 | 59.6  | 0.870 | 155.7  |
| 900            | 0.909 | 137.9  | 0.790  | -1.4  | 0.153 | 57.8  | 0.877 | 152.4  |
| 950            | 0.910 | 134.6  | 0.738  | -4.4  | 0.163 | 54.8  | 0.880 | 149.0  |
| 1000           | 0.910 | 131.2  | 0.662  | -6.8  | 0.170 | 51.4  | 0.886 | 145.7  |
| 1050           | 0.911 | 127.5  | 0.612  | -8.4  | 0.178 | 49.4  | 0.892 | 142.1  |



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—————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.