



**ELECTROSTATIC SENSITIVE DEVICE**  
OBSERVE HANDLING PRECAUTIONS

**MITSUBISHI RF POWER MOS FET**

# RD16HHF1

**RoHS Compliance, Silicon MOSFET Power Transistor 30MHz,16W**

## DESCRIPTION

RD16HHF1 is a MOS FET type transistor specifically designed for HF RF power amplifiers applications.

## FEATURES

High power gain:

$P_{out} > 16W$ ,  $G_p > 16dB$  @  $V_{dd} = 12.5V$ ,  $f = 30MHz$

## APPLICATION

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

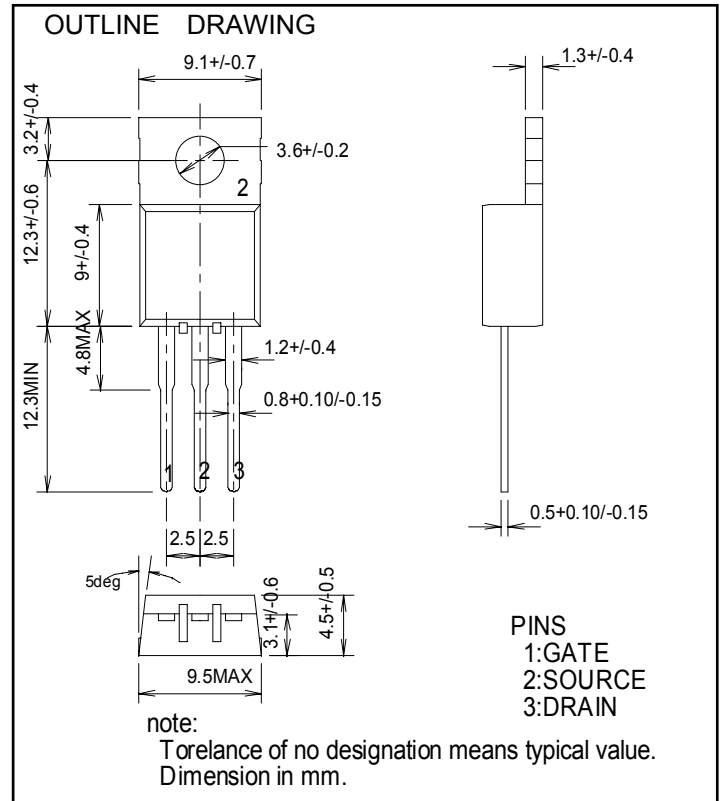
## RoHS COMPLIANT

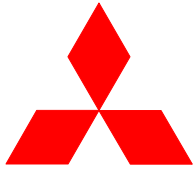
RD16HHF1-101 is a RoHS compliant products.  
RoHS compliance is indicate by the letter "G" after the lot marking.

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.)





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## ABSOLUTE MAXIMUM RATINGS

(Tc=25°C UNLESS OTHERWISE NOTED)

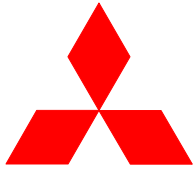
SYMBOL	PARAMETER	CONDITIONS	RATINGS	UNIT
Vdss	Drain to source voltage	Vgs=0V	50	V
Vgss	Gate to source voltage	Vds=0V	+/- 20	V
Pch	Channel dissipation	Tc=25°C	56.8	W
Pin	Input power	Zg=Zl=50Ω	0.8	W
ID	Drain to source current	-	5	A
Tch	Channel temperature	-	150	°C
Tstg	Storage temperature	-	-40 to +150	°C
Rth j-c	Thermal resistance	junction to case	2.2	°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	-	-	10	uA
IGSS	Gate to source leak current	VGS=10V, VDS=0V	-	-	1	uA
VTH	Gate threshold voltage	VDS=12V, IDS=1mA	1.7	-	4.7	V
Pout	Output power	VDD=12.5V, Pin=0.4W,	16	19	-	W
ηD	Drain efficiency	f=30MHz, Idq=0.5A	55	65	-	%
	Load VSWR tolerance	VDD=15.2V, Po=16W(Pin Control) f=30MHz, Idq=0.5A, Zg=50Ω Load VSWR=20:1(All Phase)	No destroy			-

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



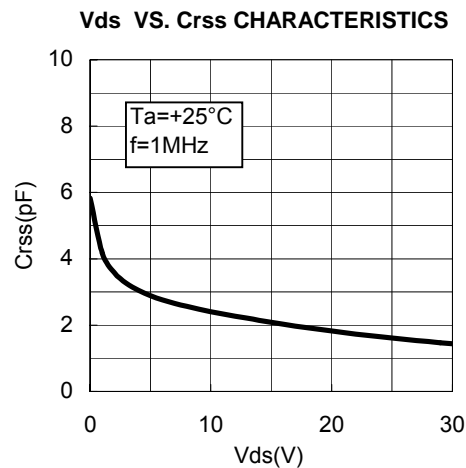
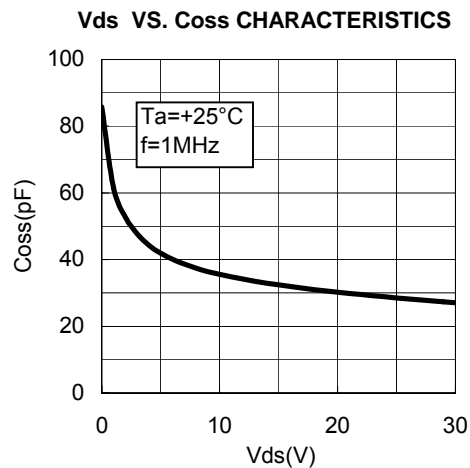
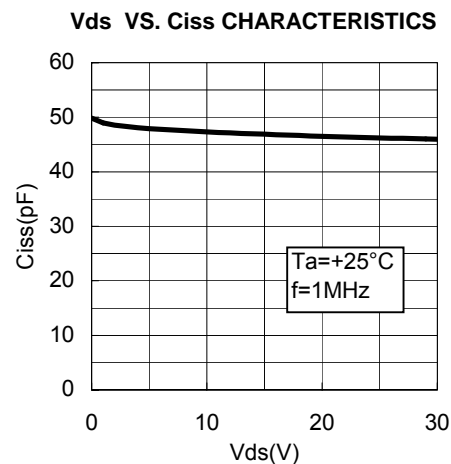
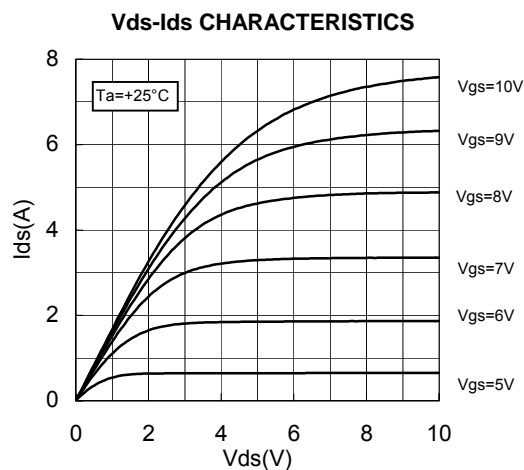
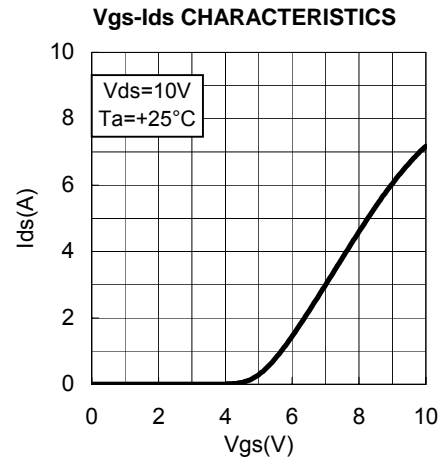
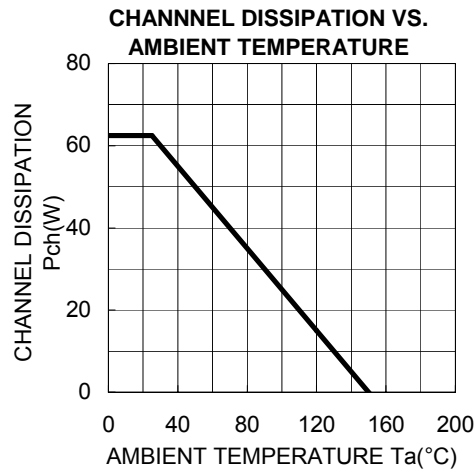
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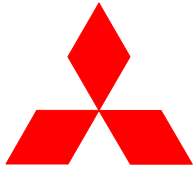
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## TYPICAL CHARACTERISTICS





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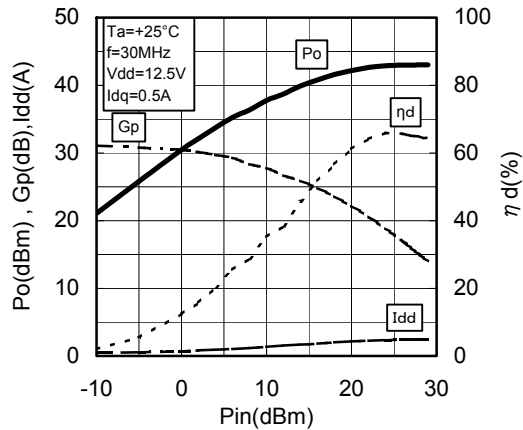
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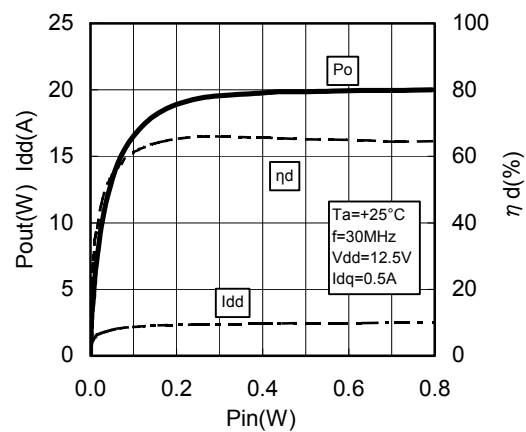
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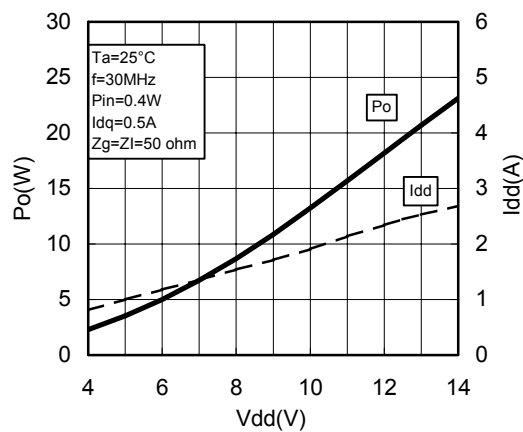
**Pin-Po CHARACTERISTICS**



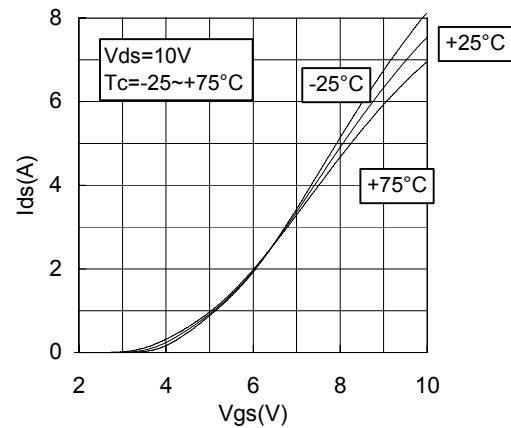
**Pin-Po CHARACTERISTICS**



**Vdd-Po CHARACTERISTICS**



**Vgs-Ids CHARACTERISTICS 2**





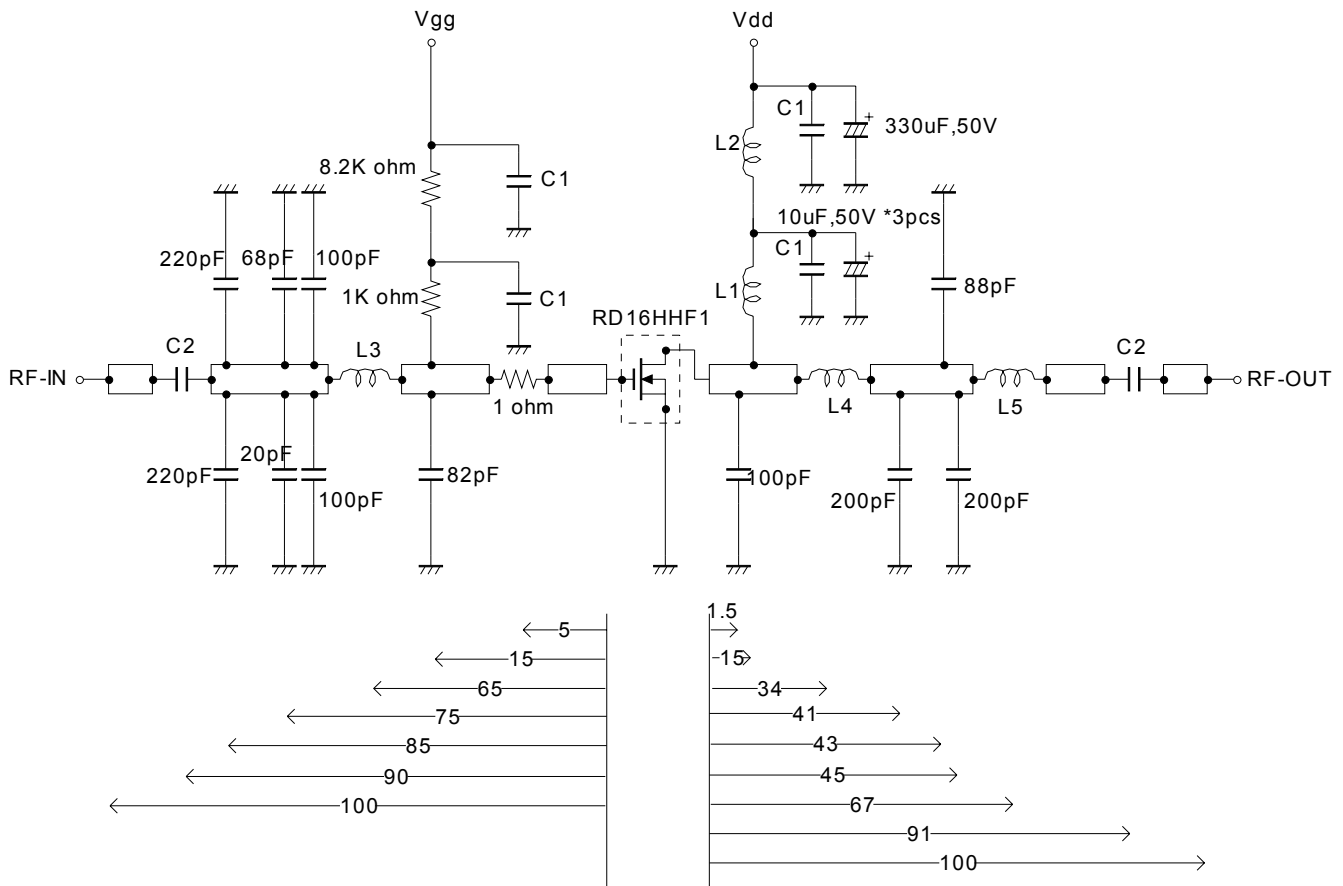
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## TEST CIRCUIT(f=30MHz)

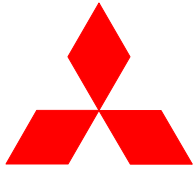


C1:100pF,0.022uF,0.1uF in parallel  
C2:470pF\*2 in parallel

L1:10Turns,I.D8mm,D0.9mm copper wire  
L2:10Turns,I.D6mm,D1.6mm silver plated copper wire  
L3:9Turns,I.D5.6mm,D0.9mm copper wire  
L4:4Turns,I.D5.6mm,D0.9mm,P=0.5mm copper wire  
L5:5Turns,I.D5.6mm,D0.9mm,P=1mm copper wire

Dimensions:mm

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



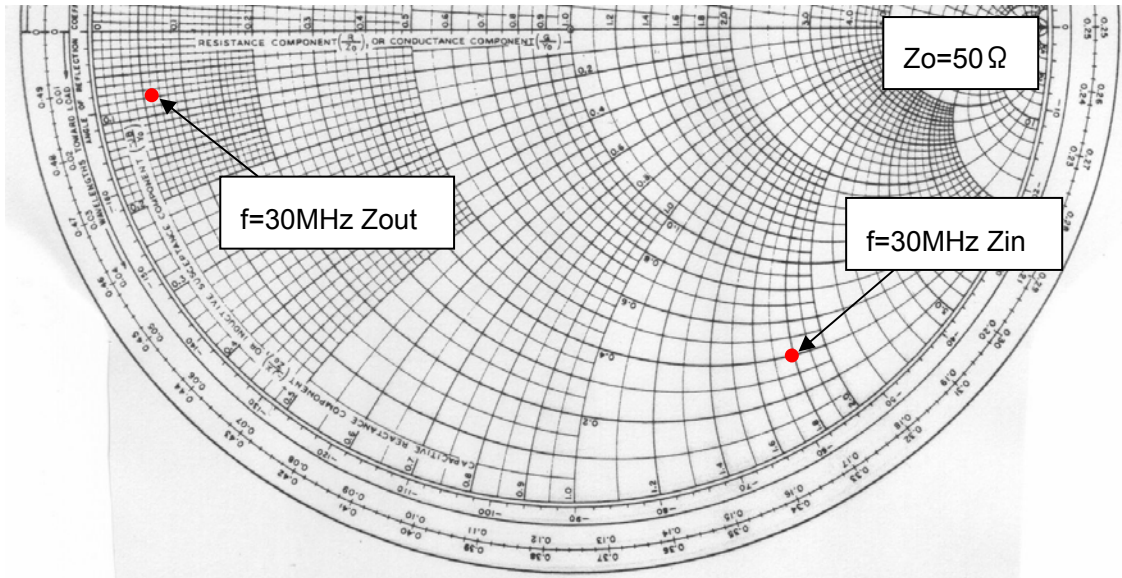
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## INPUT/OUTPUT IMPEDANCE VS.FREQUENCY CHARACTERISTICS



Zin , Zout

f	Zin	Zout	Conditions
(MHz)	(ohm)	(ohm)	
30	20.02-j89.42	2.99-j3.66	Po=20W, Vdd=12.5V, Pin=0.4W



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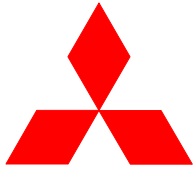
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RD16HHF1 S-PARAMETER DATA (@V<sub>dd</sub>=12.5V, I<sub>d</sub>=800mA)

Freq. [MHz]	S11		S21		S12		S22	
	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)
10	0.928	-43.2	50.035	150.2	0.013	60.6	0.705	-44.6
30	0.761	-96.8	32.680	117.1	0.025	34.3	0.588	-92.6
50	0.676	-121.9	22.018	101.3	0.027	24.3	0.540	-116.9
100	0.650	-145.8	11.543	81.0	0.025	20.3	0.543	-138.4
150	0.679	-156.4	7.560	66.2	0.023	27.0	0.586	-147.1
200	0.709	-162.7	5.380	55.7	0.022	46.4	0.633	-153.2
250	0.742	-168.0	4.126	45.9	0.026	63.2	0.698	-158.1
300	0.775	-173.0	3.208	36.9	0.034	74.4	0.727	-163.2
350	0.801	-177.7	2.592	29.6	0.045	78.3	0.769	-168.0
400	0.826	-177.7	2.133	22.6	0.056	78.4	0.805	-172.8
450	0.844	-173.2	1.775	16.6	0.069	78.1	0.822	-176.8
500	0.861	-169.0	1.509	11.3	0.081	75.3	0.851	-178.9
550	0.874	-164.8	1.283	5.9	0.093	73.1	0.867	-174.7
600	0.884	-160.7	1.114	2.1	0.104	69.8	0.877	-170.9
650	0.892	-156.9	0.974	-1.9	0.117	67.2	0.894	-166.9
700	0.900	-153.0	0.855	-5.3	0.129	63.7	0.897	-163.4
750	0.903	-149.1	0.759	-8.4	0.140	60.6	0.904	-159.6
800	0.908	-145.5	0.678	-11.3	0.150	56.8	0.914	-155.9
850	0.912	-141.7	0.614	-13.5	0.161	53.8	0.915	-152.9
900	0.912	-137.9	0.559	-15.3	0.172	50.4	0.917	-149.0
950	0.913	-134.3	0.509	-17.3	0.180	47.1	0.922	-145.4
1000	0.913	-130.7	0.467	-17.9	0.190	43.6	0.920	-142.4



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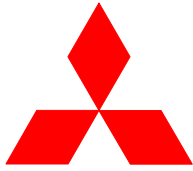
## **ATTENTION:**

- 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. 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. Examples of critical communications elements would include transmitters for base station applications and fixed station applications that operate with long term continuous transmission and a higher on-off frequency during transmitting, especially for systems that may have a high impact to society.
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  $T_{chmax}=150deg/C$ ), 140deg/C(in case of  $T_{chmax}=175deg/C$ ) 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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## 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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