

< Silicon RF Power MOS FET (Discrete) >

RD30HVF1

RoHS Compliance, Silicon MOSFET Power Transistor, 175MHz, 30W

DESCRIPTION

RD30HVF1 is a MOS FET type transistor specifically designed for VHF RF power amplifiers applications.

FEATURES

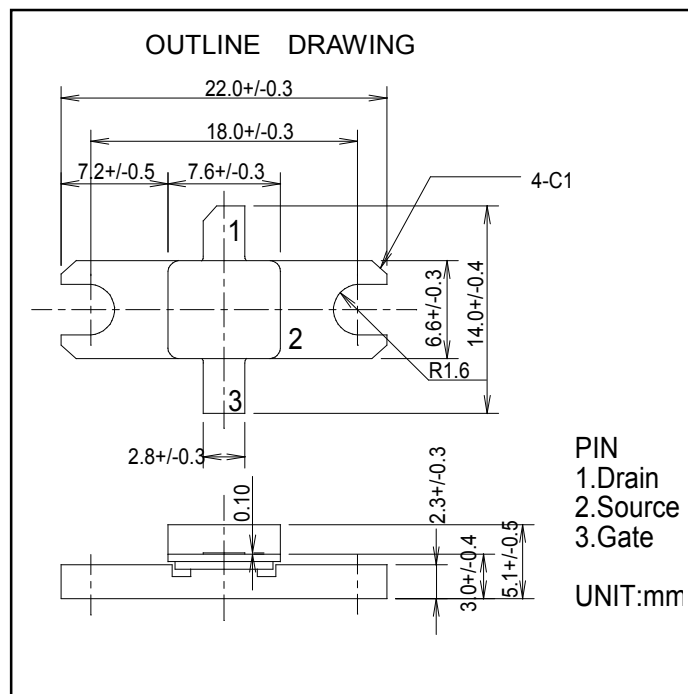
High power gain:

$P_{out} > 30W$, $G_p > 14.7dB$ @ $V_{dd} = 12.5V$, $f = 175MHz$

High Efficiency: 60%typ.

APPLICATION

For output stage of high power amplifiers in VHF band
Mobile radio sets.



RoHS COMPLIANT

RD30HVF1-101 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	$T_c = 25^\circ C$	75	W
P_{in}	Input power	$Z_g = Z_l = 50\Omega$	2.5	W
I_D	Drain current	-	7	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	2.0	$^\circ C/W$

Note 1: Above parameters are guaranteed independently.

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

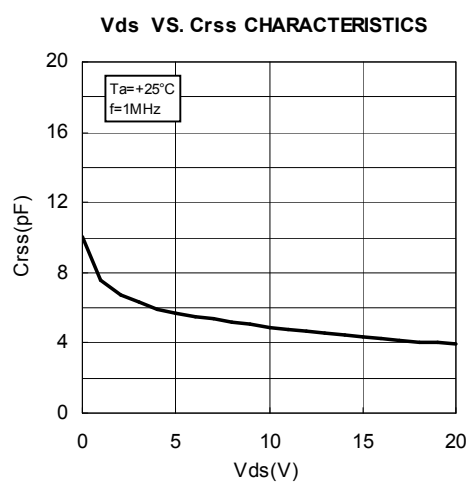
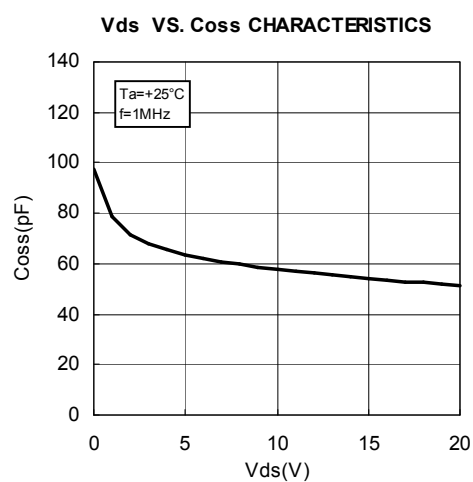
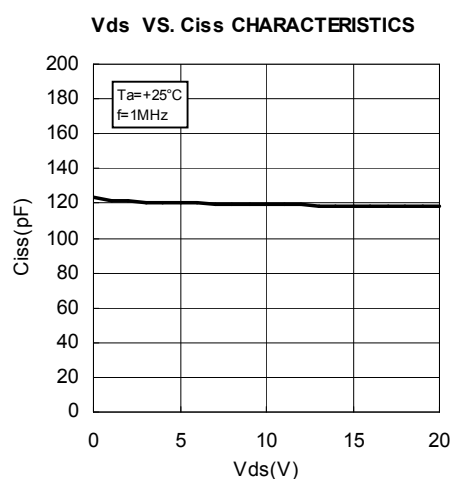
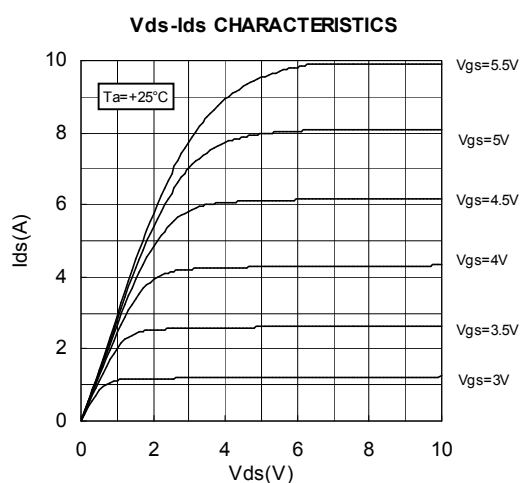
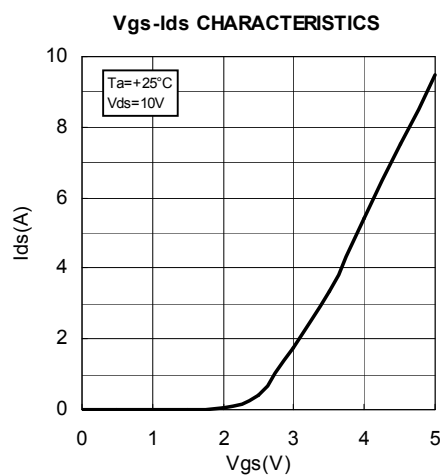
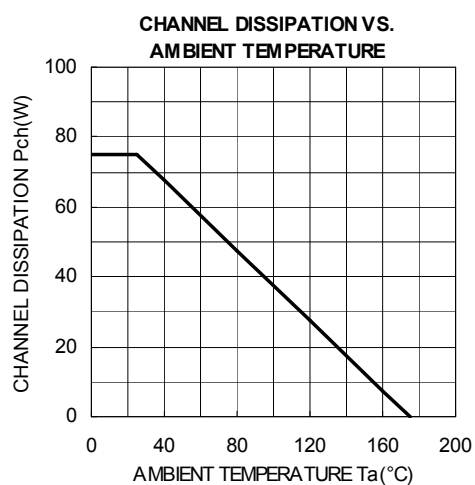
SYMBOL	PARAMETER	CONDITIONS	LIMITS			UNIT
			MIN	TYP	MAX.	
I _{DSS}	Zero gate voltage drain current	V _{DS} =17V, V _{GS} =0V	-	-	130	uA
I _{GSS}	Gate to source leak current	V _{GS} =10V, V _{DS} =0V	-	-	1	uA
V _{TH}	Gate threshold voltage	V _{DS} =12V, I _{DS} =1mA	1.3	1.8	2.3	V
P _{out}	Output power	f=175MHz, V _{DD} =12.5V	30	35	-	W
η _D	Drain efficiency	P _{in} =1.0W, I _{dq} =0.5A	55	60	-	%
	Load VSWR tolerance	V _{DD} =15.2V, P _o =30W(PinControl) f=175MHz, I _{dq} =0.5A, Z _g =50Ω Load VSWR=20:1(All Phase)	No destroy			-

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

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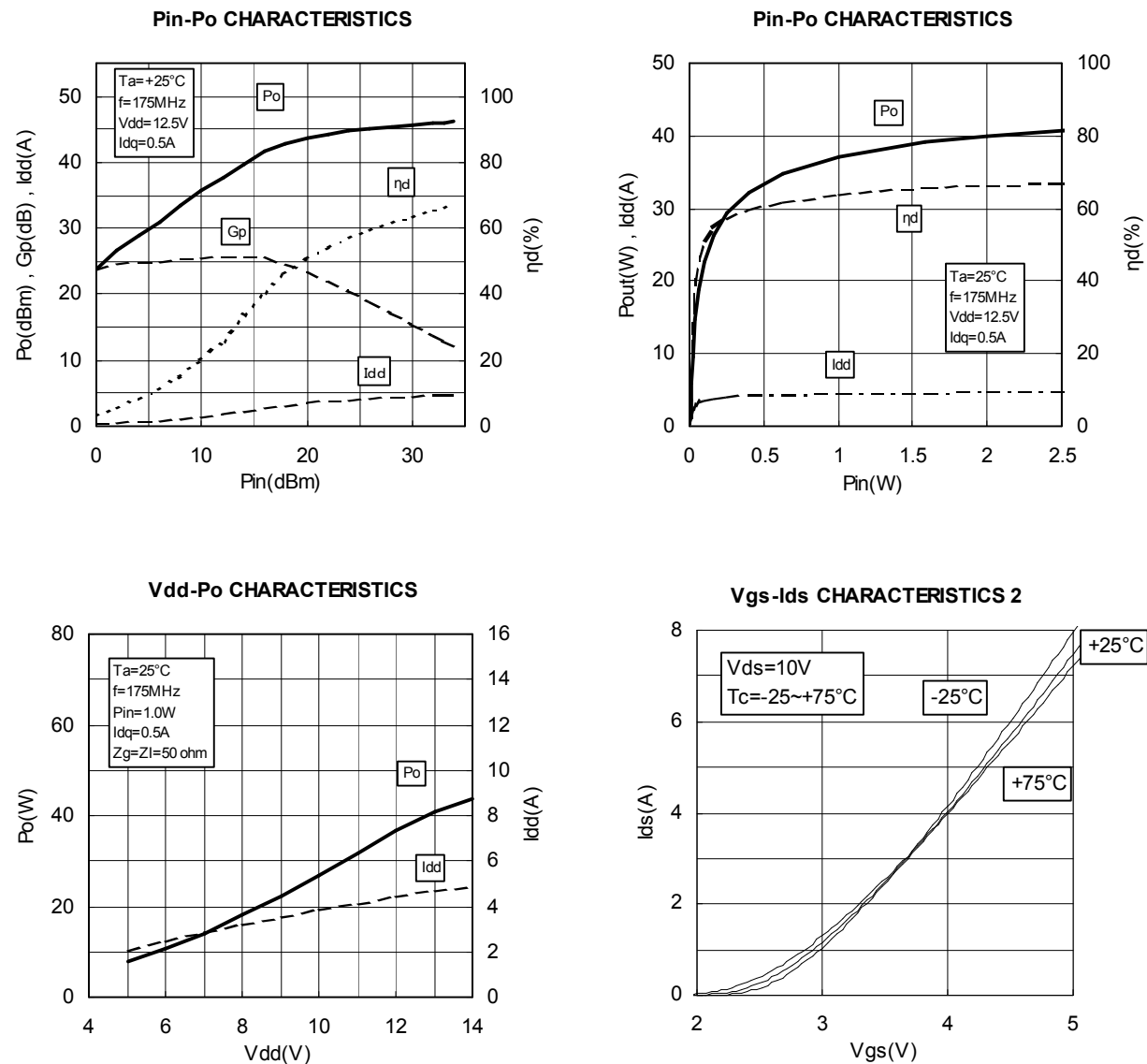
TYPICAL CHARACTERISTICS



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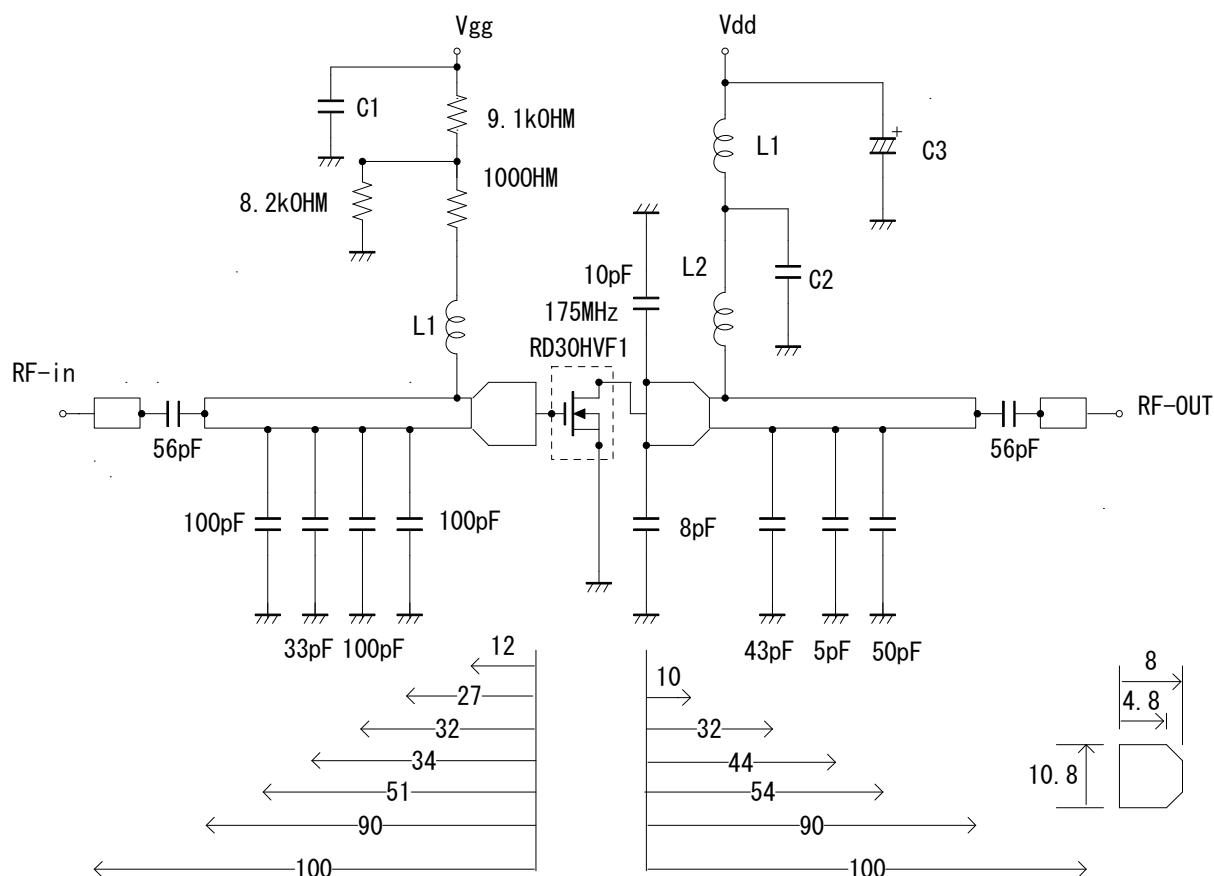
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TYPICAL CHARACTERISTICS



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TEST CIRCUIT($f=175\text{MHz}$)



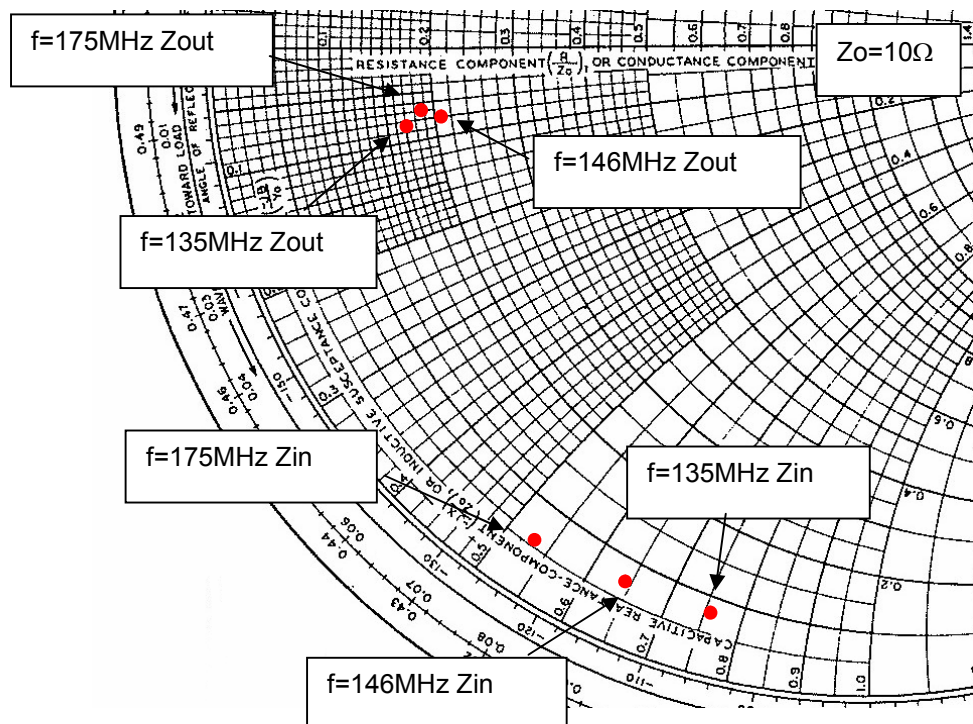
L1:4Turns, I. D6mm, D1.6mm P=1 silver plateted copper wire
L2:5Turns, I. D6mm, D1.6mm P=1 silver plateted copper wire

Note: Board material PTFE substrate
micro strip line width=4.2mm/500HM, er:2.7, t=1.6mm
Dimensions:mm

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INPUT/OUTPUT IMPEDANCE VS. FREQUENCY CHARACTERISTICS



Z_{in} , Z_{out}

f	Z_{in}	Z_{out}	Conditions
(MHz)	(ohm)	(ohm)	
135	$0.71-j7.67$	$1.72-j0.86$	$P_o=40\text{W}$, $V_{dd}=12.5\text{V}$, $P_{in}=1.0\text{W}$
146	$0.94-j6.46$	$2.12-j0.78$	$P_o=38\text{W}$, $V_{dd}=12.5\text{V}$, $P_{in}=1.0\text{W}$
175	$0.53-j5.34$	$1.87-j0.70$	$P_o=35\text{W}$, $V_{dd}=12.5\text{V}$, $P_{in}=1.0\text{W}$

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RD30HVF1 S-PARAMETER DATA (@V_{dd}=12.5V, I_d=500mA)

Freq. [MHz]	S11		S21		S12		S22	
	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)
100	0.867	-172.4	8.747	72.7	0.015	-11.6	0.687	-166.3
150	0.879	-176.3	5.523	61.2	0.014	-18.8	0.723	-168.8
175	0.885	-177.5	4.571	56.4	0.013	-22.2	0.740	-169.6
200	0.888	-179.1	3.852	52.4	0.012	-24.2	0.760	-170.5
250	0.905	178.5	2.877	44.1	0.010	-26.2	0.806	-172.5
300	0.915	176.2	2.202	37.1	0.009	-27.0	0.825	-174.8
350	0.926	174.1	1.754	31.4	0.007	-24.4	0.853	-177.1
400	0.933	171.8	1.422	25.8	0.006	-18.5	0.879	-179.4
450	0.936	169.5	1.167	20.9	0.005	-8.2	0.887	178.4
500	0.945	167.6	0.985	17.2	0.004	8.0	0.902	176.1
550	0.950	165.6	0.842	13.3	0.005	21.6	0.914	174.1
600	0.951	163.6	0.725	9.8	0.005	35.6	0.918	172.2
650	0.954	161.7	0.635	7.2	0.005	45.7	0.928	170.2
700	0.957	159.9	0.559	3.7	0.007	53.5	0.933	168.4
750	0.962	158.2	0.495	1.3	0.007	58.4	0.936	166.6
800	0.963	156.5	0.449	-0.5	0.008	61.6	0.943	164.8
850	0.963	154.8	0.407	-3.8	0.009	60.7	0.947	163.3
900	0.963	153.2	0.366	-5.2	0.011	61.5	0.947	161.7
950	0.962	151.6	0.337	-6.6	0.011	63.1	0.953	159.9
1000	0.964	150.1	0.315	-9.9	0.013	65.6	0.955	158.7
1100	0.966	146.9	0.275	-12.1	0.015	62.3	0.958	155.5

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ATTENTION:

1. High Temperature ; This product might have a heat generation while operation. Please take notice that there is a possibility to receive a burn if you 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 has possibilities to arise the fire.
2. Generation of High Frequency Power ; This product generates a high frequency power. Please take notice that do not leakage the unnecessary electric wave and use this product 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 $T_{chmax}=150deg/C$), 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 its 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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