MITSUBISHI ELECTRIC

< Silicon RF Power MOS FET (Discrete) >

RD06HHF1

RoHS Compliance, Silicon MOSFET Power Transistor 30MHz,6W

DESCRIPTION

RD06HHF1 is a MOS FET type transistor specifically designed for HF RF power amplifiers applications.

FEATURES

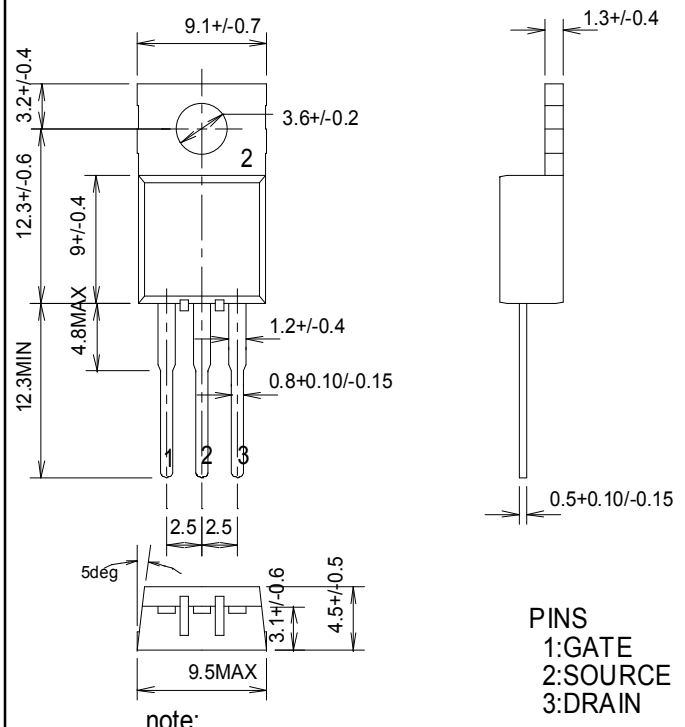
High power gain:

Pout>6W, Gp>16dB @Vdd=12.5V,f=30MHz

APPLICATION

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

OUTLINE DRAWING



note:
Torelance of no designation means typical value.

RoHS COMPLIANT

RD06HHF1-101 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 temperaturetype solders.

However,it is 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
V_{DSS}	Drain to source voltage	Vgs=0V	50	V
V_{GSS}	Gate to source voltage	Vds=0V	+/- 20	V
Pch	Channel dissipation	Tc=25°C	27.8	W
Pin	Input power	Zg=Zl=50Ω	0.3	W
ID	Drain current	-	3	A
Tch	Channel temperature	-	150	°C
Tstg	Storage temperature	-	-40 to +150	°C
Rth j-c	Thermal resistance	junction to case	4.5	°C/W

Note 1: Above parameters are guaranteed independently.

ELECTRICAL CHARACTERISTICS

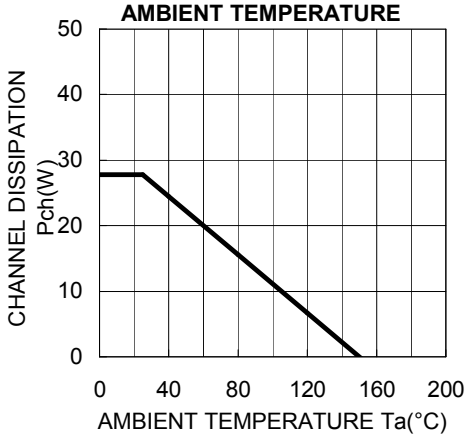
(Tc=25°C, UNLESS OTHERWISE NOTED)

SYMBOL	PARAMETER	CONDITIONS	LIMITS			UNIT
			MIN	TYP	MAX.	
I_{DSS}	Drain cutoff current	V_{DS}=17V, V_{GS}=0V	-	-	10	uA
I_{GSS}	Gate cutoff current	V_{GS}=10V, V_{DS}=0V	-	-	1	uA
V_{TH}	Gate threshold Voltage	V_{DS}=12V, I_{DS}=1mA	1.9	-	4.9	V
Pout	Output power	V_{DD}=12.5V, Pin=0.15W,	6	10	-	W
ηD	Drain efficiency	f=30MHz, Idq=0.5A	55	65	-	%
	Load VSWR tolerance	V_{DD}=15.2V,Po=6W(Pin Control) f=30MHz,Idq=0.5A,Zg=50Ω Load VSWR=20:1(All Phase)	No destroy			-

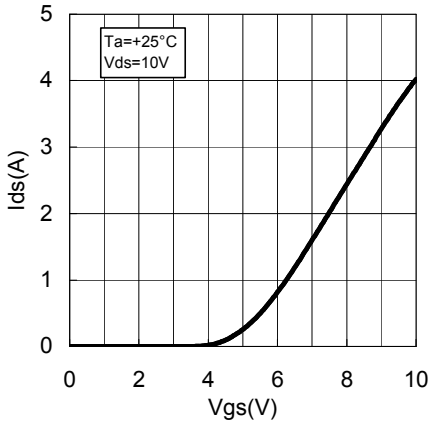
Note : Above parameters , ratings , limits and conditions are subject to change.

TYPICAL CHARACTERISTICS

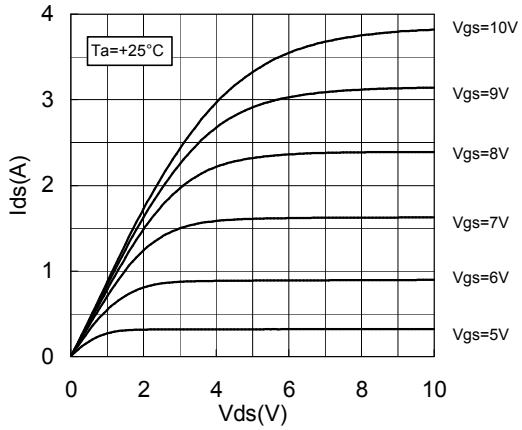
CHANNNEL DISSIPATION VS. AMBIENT TEMPERATURE



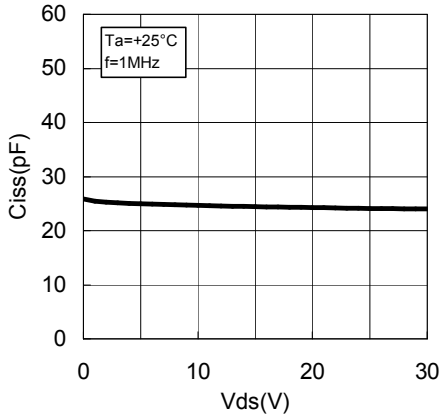
Vgs-Ids CHARACTERISTICS



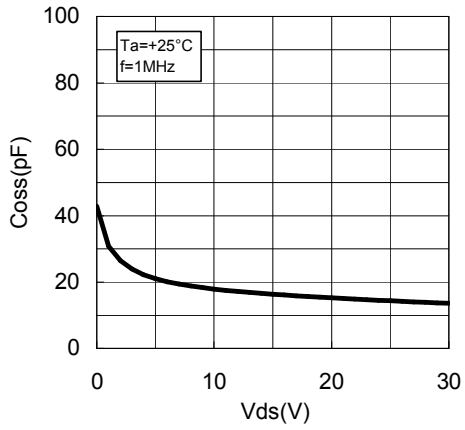
Vds-Ids CHARACTERISTICS



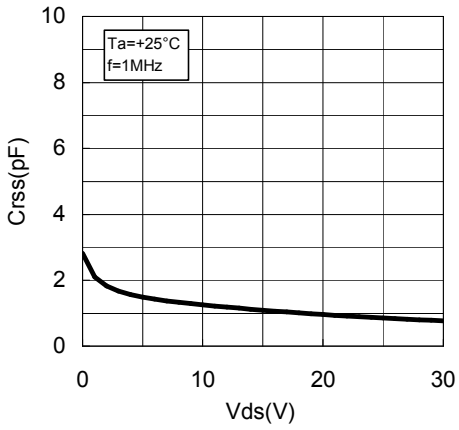
Vds VS. Ciss CHARACTERISTICS



Vds VS. Coss CHARACTERISTICS

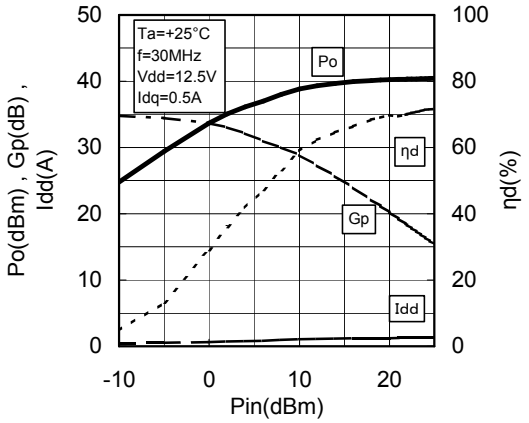


Vds VS. Crss CHARACTERISTICS

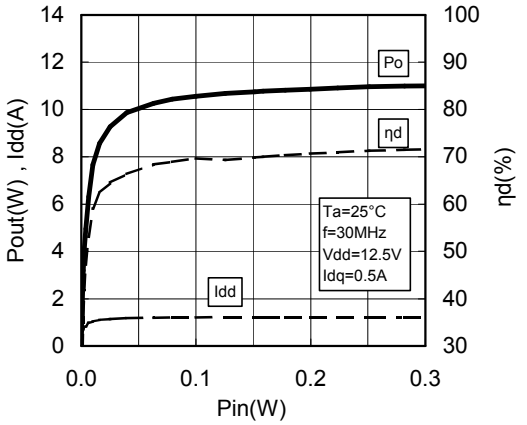


TYPICAL CHARACTERISTICS

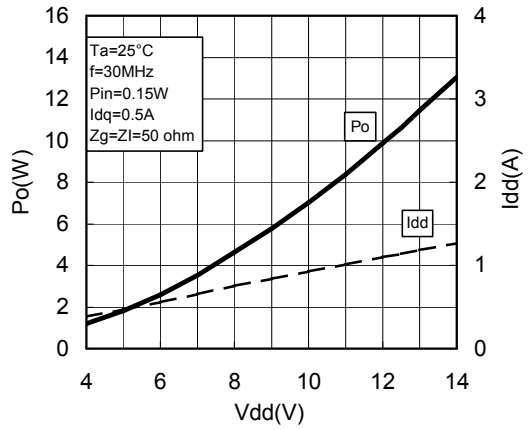
Pin-Po CHARACTERISTICS



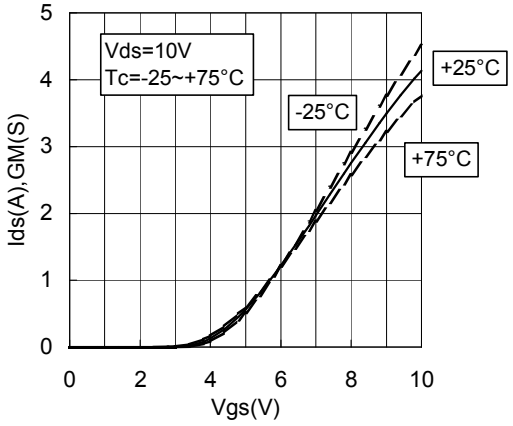
Pin-Po CHARACTERISTICS



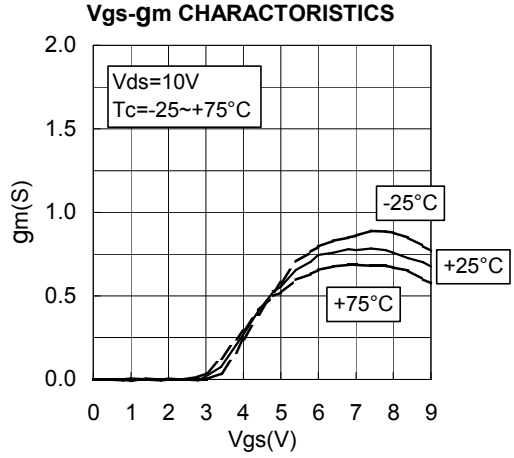
Vdd-Po CHARACTERISTICS



Vgs-Ids CHARACTORISTICS 2



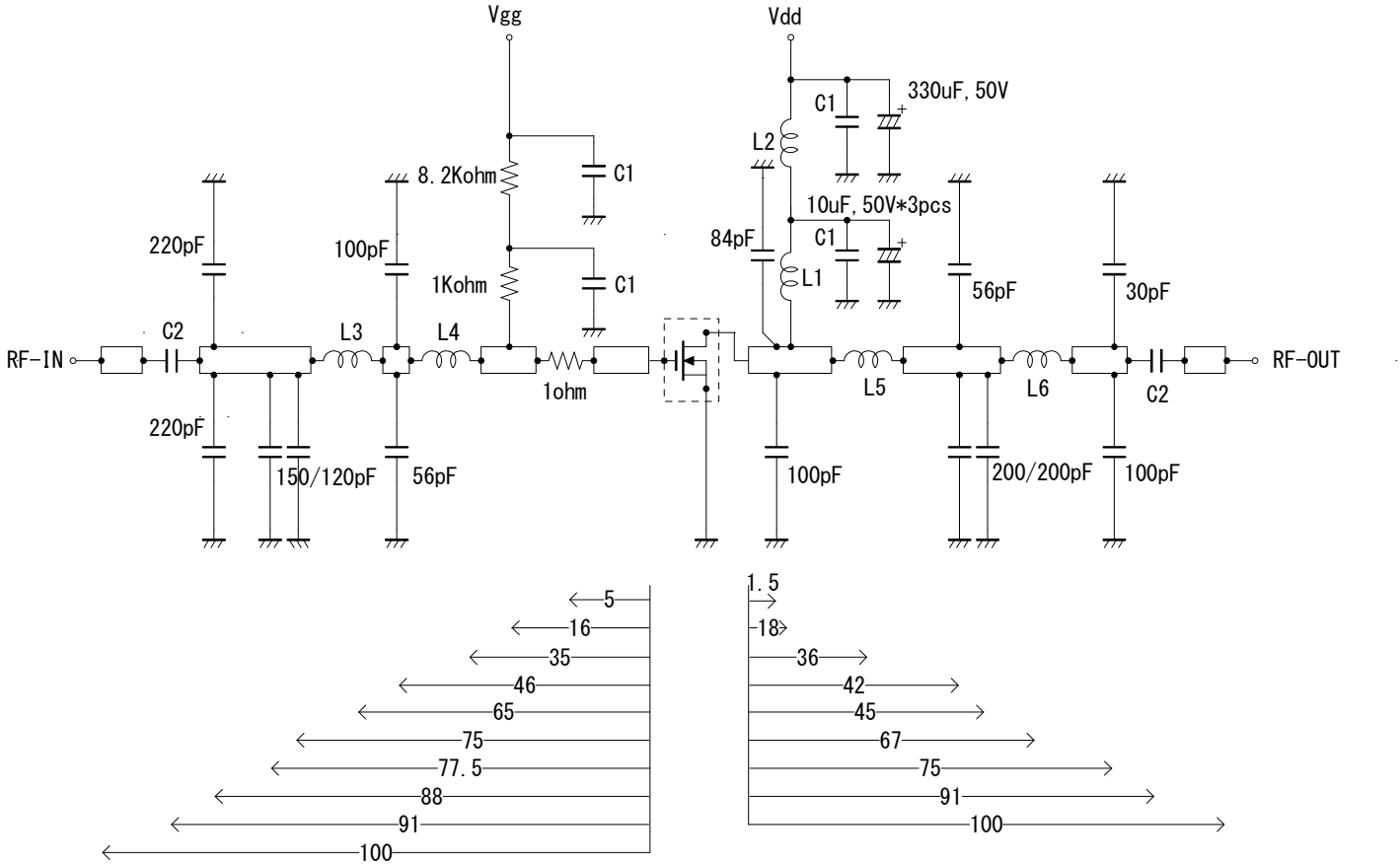
Vgs-gm CHARACTORISTICS



RD06HHF1

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TEST CIRCUIT(f=30MHz)



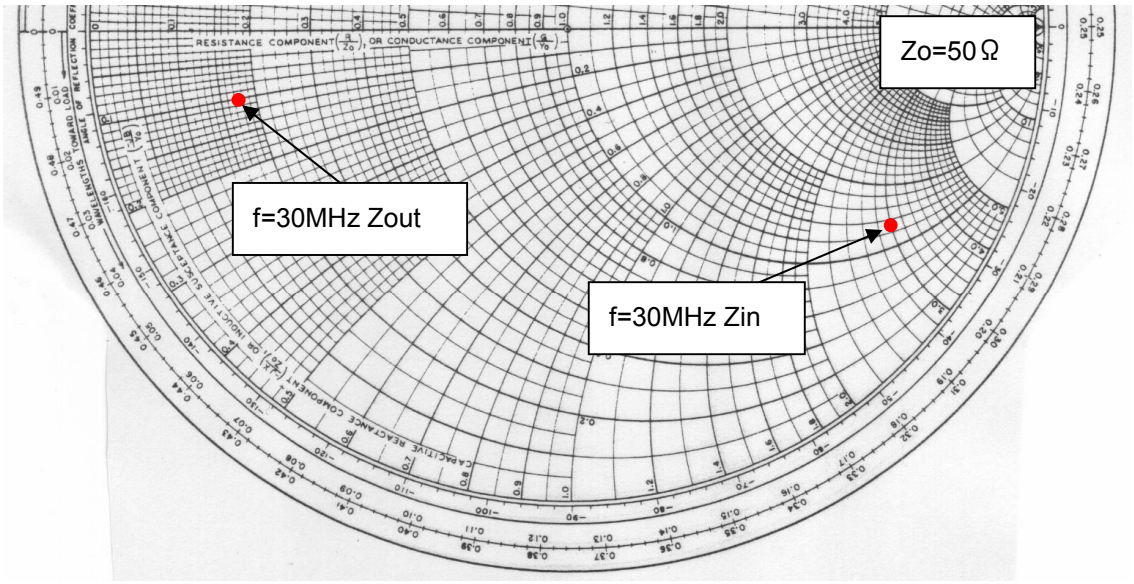
C1:100pF, 0.022uF, 0.1uF in parallel
C2:470pF*2 in parallel

L1:10Turns, I.D8mm, D0.9mm copper wire
L2:10Turns, I.D6mm, D1.6mm silver plated copper wire
L3:5Turns, I.D5.6mm, D0.9mm copper wire
L4:6Turns, I.D5.6mm, D0.9mm copper wire
L5:4Turns, I.D5.6mm, D0.9mm copper wire P=0.5mm
L6:7Turns, I.D5.6mm, D0.9mm copper wire

Dimensions:mm

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

INPUT/OUTPUT IMPEDANCE VS.FREQUENCY CHARACTERISTICS



Zin , Zout

f	Zin	Zout	
(MHz)	(ohm)	(ohm)	Conditions
30	65.06-j150.9	8.75-j4.92	Po=10W, Vdd=12.5V,Pin=0.15W

RD06HHF1 S-PARAMETER DATA (@Vdd=12.5V, Id=500mA)

Freq.	S11		S21		S12		S22	
[MHz]	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)
10	0.985	-18.8	34.407	165.9	0.008	76.2	0.826	-17.3
30	0.900	-50.4	30.427	143.3	0.021	59.4	0.767	-43.6
50	0.799	-74.4	24.979	126.1	0.029	43.2	0.677	-65.0
100	0.667	-109.6	15.565	100.7	0.032	27.3	0.547	-96.8
150	0.636	-129.0	10.953	85.1	0.032	23.1	0.523	-113.4
200	0.630	-140.1	8.194	73.7	0.029	25.3	0.528	-124.7
250	0.645	-148.2	6.528	63.9	0.027	34.5	0.561	-132.7
300	0.663	-155.0	5.315	55.2	0.027	49.1	0.588	-139.6
350	0.685	-160.7	4.437	47.4	0.031	61.8	0.622	-145.9
400	0.708	-165.9	3.771	39.9	0.039	71.0	0.657	-151.7
450	0.729	-170.8	3.233	33.2	0.048	75.8	0.686	-157.0
500	0.752	-175.4	2.826	26.8	0.059	77.9	0.715	-162.3
550	0.771	179.9	2.475	20.7	0.070	76.9	0.743	-167.6
600	0.789	175.4	2.186	15.2	0.083	76.1	0.763	-172.3
650	0.804	171.2	1.943	9.7	0.095	73.7	0.789	-177.3
700	0.819	166.9	1.738	4.6	0.108	71.0	0.804	178.1
750	0.834	162.6	1.560	0.0	0.120	68.1	0.820	173.5
800	0.842	158.5	1.410	-4.5	0.133	65.0	0.837	169.0
850	0.851	154.3	1.275	-8.7	0.145	61.6	0.847	164.8
900	0.859	150.3	1.160	-12.6	0.157	58.2	0.858	160.2
950	0.866	146.2	1.058	-16.9	0.167	54.5	0.869	155.7
1000	0.870	142.3	0.963	-20.0	0.179	51.0	0.876	151.8

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.

10. 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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