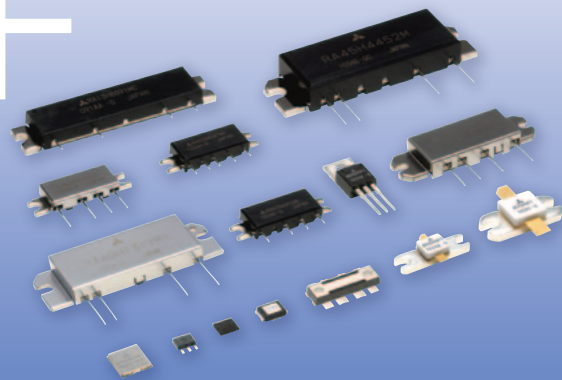


Better Performance for Radio Communication Network

# Silicon RF Devices



for a greener tomorrow



# Better Performance for Radio Communication Network

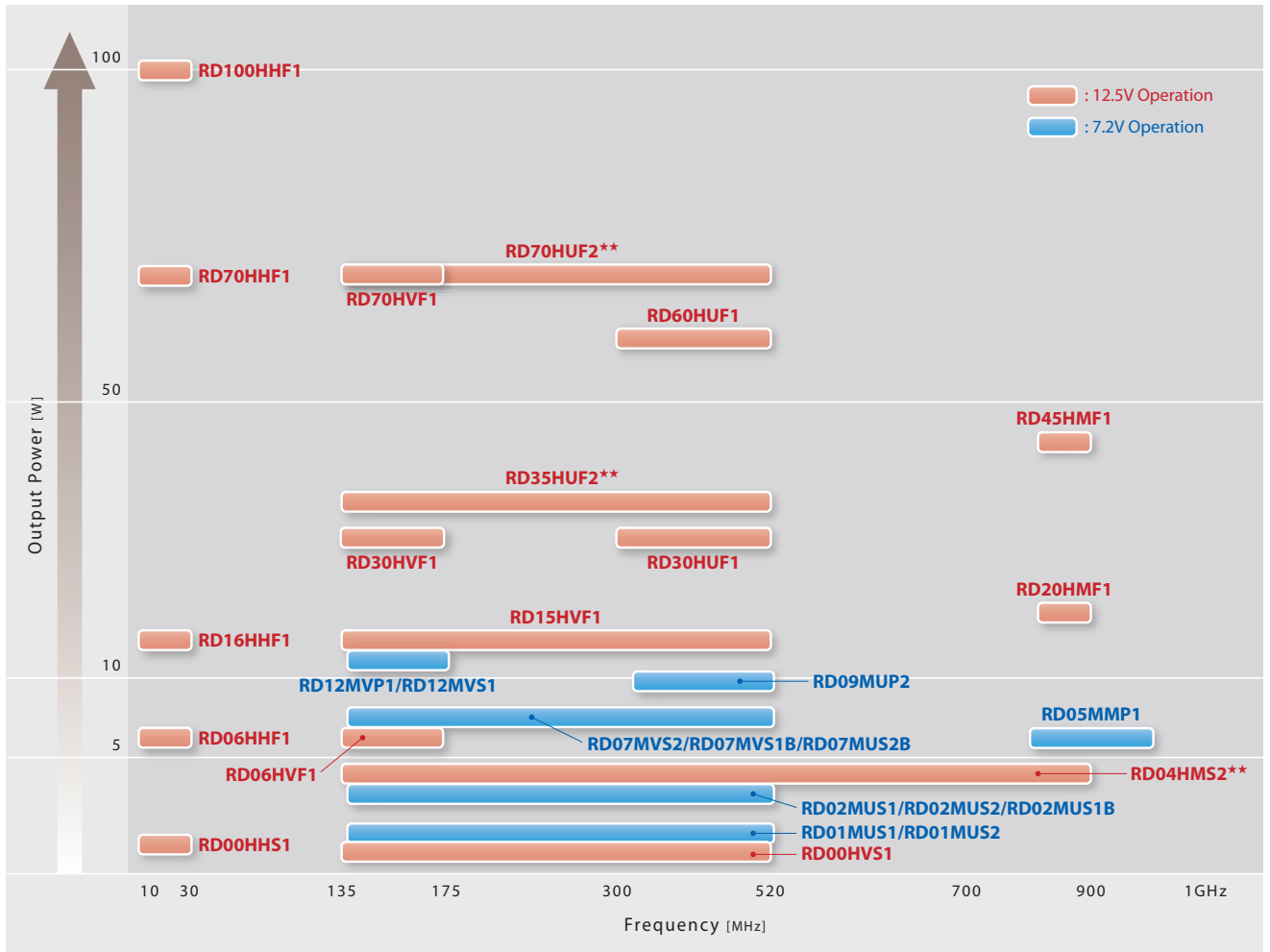
MITSUBISHI Silicon RF Devices are Key parts of RF Power Amplifications for various kind of Mobile Radio, Professional Mobile Radios, Amateur Radios, Car Phones for GSM/AMPS and TELEMATICS for automotive. MITSUBISHI Silicon RF Devices strongly support for Radio communication network.

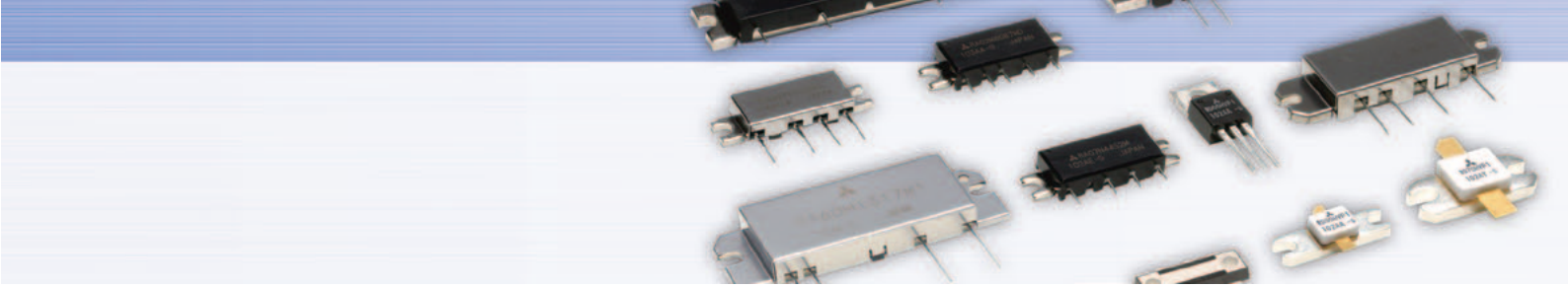
## LINE UP

Silicon RF Devices	FET	Hybrid IC	MAP For SELECTION	PRODUCT LIST
			Page	Page
			1	3
			1	3
			2	5
			2	5
			2	6

## MAP FOR SELECTION

### HIGH OUTPUT POWER Si MOS FET (DISCRETE)





## HIGH OUTPUT POWER Si MOS FET MODULE



LINE UP

MAP FOR SELECTION

PRODUCT LIST

APPLICATION

PACKAGE OUTLINE

PRODUCT LIST

7.2V OPERATION HIGH OUTPUT POWER Si MOS FET (DISCRETE)

Type Number	Structure	Max.ratings		Vdd [V]	f [MHz]	Pin [W]	Po (min) [W]	nd (min) [%]	Package Outline
		VDSS [V]	Pch [W]						
RD01MUS1	Si, MOS	30	3.6	7.2	520	0.03	0.8	50	SOT-89
RD01MUS2	Si, MOS <sup>†</sup>	30	3.6	7.2	520	0.03	0.8	50	SOT-89
RD02MUS1	Si, MOS	30	21.9	7.2	175/520	0.05/0.05	2/2	55/50	SLP
RD02MUS1B	Si, MOS	30	21.9	7.2	175/520	0.05/0.05	2/2	55/50	SLP
RD02MUS2	Si, MOS <sup>†</sup>	30	21.9	7.2	175/520	0.05/0.05	2/2	55/50	SLP
RD05MMP1	Si, MOS	30	73	7.2	941	0.7	5.5	43	PMM
RD07MUS2B	Si, MOS <sup>†</sup>	25	50	7.2	135~175	0.3	6.3	58	SLP
					450~527	0.4	7	58	
RD07MVS1B	Si, MOS	30	50	7.2	175/520	0.3/0.7	7/7	55/50	SLP
RD07MVS2	Si, MOS <sup>†</sup>	30	50	7.2	175/520	0.3/0.7	7/7	55/50	SLP
RD09MUP2	Si, MOS <sup>†</sup>	30	83	7.2	520	0.8	8	50	PMM
RD12MVP1	Si, MOS	50	125	7.2	175	0.5	10	55	PMM
RD12MVS1	Si, MOS	50	50	7.2	175	1	11.5	55	SLP

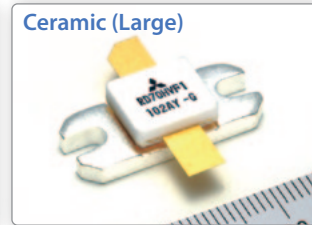
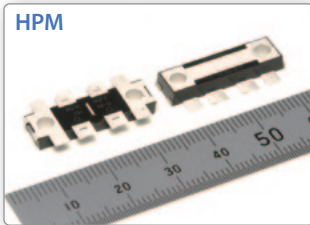
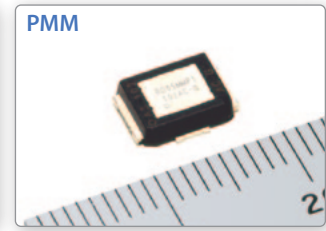
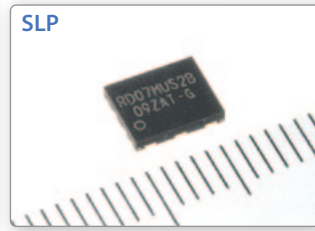
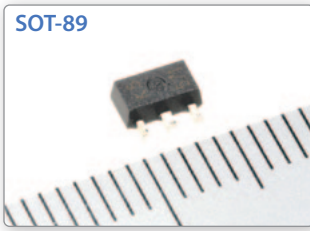
Ta=25°C †: Gate Protection Diode

12.5V OPERATION HIGH OUTPUT POWER Si MOS FET (DISCRETE)

Type Number	Structure	Max.ratings		Vdd [V]	f [MHz]	Pin [W]	Po (min) [W]	nd (min) [%]	Package Outline
		VDSS [V]	Pch [W]						
RD00HHS1	Si, MOS	30	3.1	12.5	30	0.004	0.3	55	SOT-89
RD00HVS1	Si, MOS	30	3.1	12.5	175	0.005	0.5	50	SOT-89
RD04HMS2	Si, MOS <sup>†</sup>	40	50	12.5	135~175	0.2	5.5typ.	73typ.	SLP
					380~470	0.2	6typ.	62typ.	
					890~950	0.2	5typ.	53typ.	
RD06HHF1	Si, MOS	50	27.8	12.5	30	0.15	6	55	TO-220S
RD06HVF1	Si, MOS	50	27.8	12.5	175	0.3	6	60	TO-220S
RD15HVF1	Si, MOS	30	48	12.5	175/520	0.6/3	15/15	55/50	TO-220S
RD16HHF1	Si, MOS	50	56.8	12.5	30	0.4	16	55	TO-220S
RD20HMF1	Si, MOS	30	71.4	12.5	900	3	20	50	Ceramic (Small)
RD30HVF1	Si, MOS	30	75	12.5	175	1	30	55	Ceramic (Small)
RD30HUF1	Si, MOS	30	75	12.5	520	3	30	50	Ceramic (Small)
RD35HUF2	Si, MOS <sup>†</sup>	40	166	12.5	135~175	3	45typ.	72typ.	HPM
					450~530	3	43typ.	60typ.	
RD45HMF1	Si, MOS	30	125	12.5	900	15	45	45	Ceramic (Large)
RD60HUF1	Si, MOS	30	150	12.5	520	10	60	50	Ceramic (Large)
RD70HHF1	Si, MOS	50	150	12.5	30	3.5	70	55	Ceramic (Large)
RD70HVF1	Si, MOS	30	150	12.5	175/520	6/10	70/50	55/50	Ceramic (Large)
RD70HUF2	Si, MOS <sup>†</sup>	40	300	12.5	135~175	4	84typ.	74typ.	HPM
					450~530	5.5	75typ.	64typ.	
RD100HHF1	Si, MOS	50	176.5	12.5	30	7	100	55	Ceramic (Large)

Ta=25°C †: Gate Protection Diode

LINE UP  
MAP FOR SELECTION  
PRODUCT LIST  
APPLICATION  
PACKAGE OUTLINE



## Silicon RF Devices Naming System

### HIGH OUTPUT POWER Si MOS FET (Discrete Devices)

**RD 07 M V S 1**

**A B C D E F**

**A** Si MOS FET (Discrete)

**C** Operation Voltage (V)

**D** Frequency Range (MHz)

**E** Outline

**F** Serial Number

**B** Output Power (W)

Symbol	Voltage
M	7.2V
N	9.6V
H	12.5V

Symbol	Frequency Range
H	30MHz
V	175MHz
U	520MHz
M	800MHz

Symbol	Segment
S	Mold
F	Flange
P	Power Mold Mini

### HIGH OUTPUT POWER Si MOS FET MODULE

**RA 07 M 4452 M**

**A B C D E**

**A** Module

**C** Operation Voltage (V)

**D** Frequency Range (MHz)

**E** Frequency Unit

**B** Output Power (W)

Symbol	Voltage
M	7.2V
N	9.6V
H	12.5V

Symbol (Example)	Frequency Range (Example)
4452	440~520MHz
1317	135~175MHz

Symbol	Unit
M	MHz
G	GHz

Note: Type number show the outline of products. For detail specification, Please confirm a formal specification.

PRODUCT LIST

3.3V/7.2V OPERATION HIGH OUTPUT POWER Si MOS FET MODULE

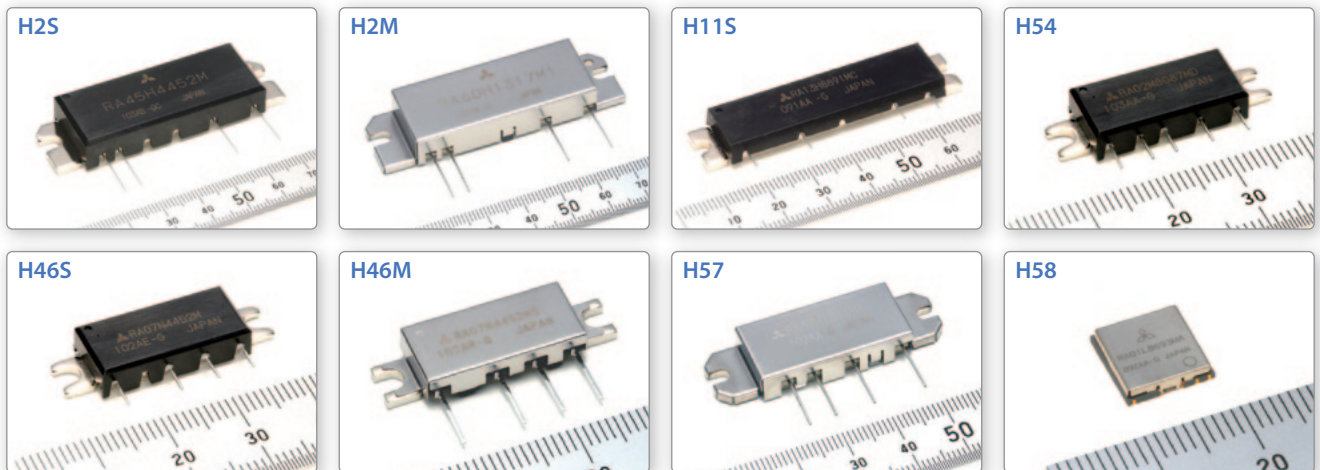
Type Number	Max.ratings Vdd [V]	f [MHz]		Vdd [V]	Pin [W]	Po (min) [W]	nd (min) [%]	Package Outline
		min	max					
RA01L8693MA	6	865	928	3.3	0.03	1.4	38	H58
RA01L9595M	6	952	954	3.3	0.03	1.4	35	H58
RA02M8087MD	9.2	806	869	7.2	0.01	1.2	30*	H54
RA03M3540MD	9.2	350	400	7.2	0.01	3.2	34**	H54
RA03M4043MD	9.2	400	430	7.2	0.01	3.2	34**	H54
RA03M4547MD	9.2	450	470	7.2	0.01	3.2	34**	H54
RA03M8087M	9.2	806	870	7.2	0.05	3.6	32	H46S
RA03M8894M	9.2	889	941	7.2	0.05	3.6	32	H46S
RA07M0608M	9.2	66	88	7.2	0.03	7	45	H46S
RA07M1317M	9.2	135	175	7.2	0.02	6.5	45	H46S
RA07M1317MSA	9.2	135	175	7.2	0.02	6.7	45	H46M
RA07M2127M	9.2	215	270	7.2	0.02	7	45	H46S
RA07M3340M	9.2	330	400	7.2	0.05	7	40	H46S
RA07M3843M	9.2	378	430	7.2	0.05	7	40	H46S
RA07M4047M	9.2	400	470	7.2	0.05	7	40	H46S
RA07M4047MSA	9.2	400	470	7.2	0.05	7	40	H46M
RA07M4452M	9.2	440	520	7.2	0.05	7	40	H46S
RA07M4452MSA	9.2	440	520	7.2	0.05	7	40	H46M

Ta=25°C \*: When Po=2.5W \*\*: When Po=6.3W

9.6V OPERATION HIGH OUTPUT POWER Si MOS FET MODULE

Type Number	Max.ratings Vdd [V]	f [MHz]		Vdd [V]	Pin [W]	Po (min) [W]	nd (min) [%]	Package Outline
		min	max					
RA07N3340M	12.5	330	400	9.6	0.02	7.5	43	H46S
RA07N4047M	12.5	400	470	9.6	0.02	7.5	43	H46S
RA07N4452M	12.5	440	520	9.6	0.02	7.5	43	H46S
RA08N1317M	12.5	135	175	9.6	0.02	8	50	H46S

Ta=25°C



LINE UP

MAP FOR SELECTION

PRODUCT LIST

APPLICATION

PACKAGE OUTLINE

## 12.5V OPERATION HIGH OUTPUT POWER Si MOS FET MODULE

Type Number	Max.ratings Vdd [V]	f [MHz]		Vdd [V]	Pin [W]	Po (min) [W]	nd (min) [%]	Package Outline
		min	max					
RA03M9595M	9.2	952	954	8	0.05	3	-	H46S
RA05H8693M	17	866	928	14	0.001	5	-	H11S
RA05H9595M	17	952	954	14	0.001	5	-	H11S
RA06H8285M	17	820	851	12.5	0.001	6	35	H11S
RA07H0608M	13.2	68	88	12.5	0.03	7	38	H46S
RA07H3340M	13.2	330	400	12.5	0.02	7	40	H46S
RA07H4047M	13.2	400	470	12.5	0.02	7	40	H46S
RA07H4452M	13.2	440	520	12.5	0.02	7	40	H46S
RA08H1317M	13.2	135	175	12.5	0.02	8	40	H46S
RA08H3843MD	17	380	430	13.2	1.4m	6.3	15	H2S (5-pins)
RA08H4547MD	18	450	470	12.5	0.3m	7.9	17	H2S (5-pins)
RA13H1317M	17	135	175	12.5	0.05	13	40	H2S
RA13H3340M	17	330	400	12.5	0.05	13	40	H2S
RA13H4047M	17	400	470	12.5	0.05	13	40	H2S
RA13H4452M	17	440	520	12.5	0.05	13	40	H2S
RA13H8891MA	17	889	915	12.5	0.2	13	30	H2S
RA13H8891MB	17	880	915	12.5	0.001	13	35	H11S
RA20H8087M	17	806	870	12.5	0.05	20	25	H2S
RA20H8994M	17	896	941	12.5	0.05	20	25	H2S
RA30H0608M	17	66	88	12.5	0.05	30	40	H2S
RA30H1317M	17	135	175	12.5	0.05	30	40	H2S
RA30H1317M1	17	135	175	12.5	0.05	30	40	H2M
RA30H1721M	17	175	215	12.5	0.05	30	40	H2S
RA30H2127M	17	210	270	12.5	0.05	30	40	H2S
RA30H3340M	17	330	400	12.5	0.05	30	40	H2S
RA30H4047M	17	400	470	12.5	0.05	30	40	H2S
RA30H4047M1	17	400	470	12.5	0.05	30	42	H2M
RA30H4452M	17	440	520	12.5	0.05	30	40	H2S
RA30H4552M1	17	450	520	12.5	0.05	30	42	H2M
RA33H1516M1	17	154	162	12.5	0.01	33	50	H57
RA35H1516M	17	154	162	12.5	0.05	40	50	H2S
RA45H4045MR	17	400	450	12.5	0.05	45	35	H2RS
RA45H4047M	17	400	470	12.5	0.05	45	35	H2S
RA45H4452M	17	440	520	12.5	0.05	45	35	H2S
RA45H7687M1	17	763	870	12.8	0.05	45	33	H2M
RA45H8994M1	17	896	941	12.8	0.05	45	33	H2M
RA55H3340M	17	330	400	12.5	0.05	55	35	H2S
RA55H3847M	17	380	470	12.5	0.05	55	38	H2S
RA55H4047M	17	400	470	12.5	0.05	55	35	H2S
RA55H4452M	17	440	520	12.5	0.05	45 (490-520)	35 (490-520)	H2S
						55 (440-490)	43 (440-490)	
RA60H1317M	17	135	175	12.5	0.05	60	40	H2S
RA60H1317M1A	17	136	174	12.5	0.05	60	45	H2M
RA60H3847M1	17	378	470	12.5	0.05	60	40	H2M
RA60H4047M1	17	400	470	12.5	0.05	60	40	H2M
RA60H4452M1	17	440	520	12.5	0.05	60	40	H2M

Ta=25°C

All Products Here Are RoHS Compliant

LINE UP

MAP FOR SELECTION

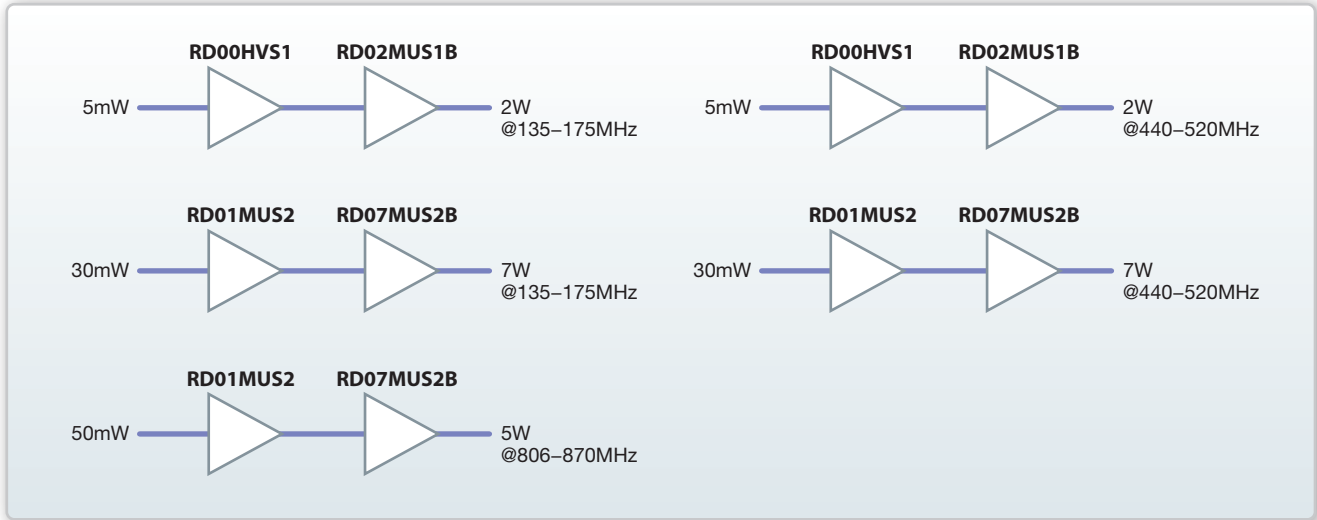
PRODUCT LIST

APPLICATION

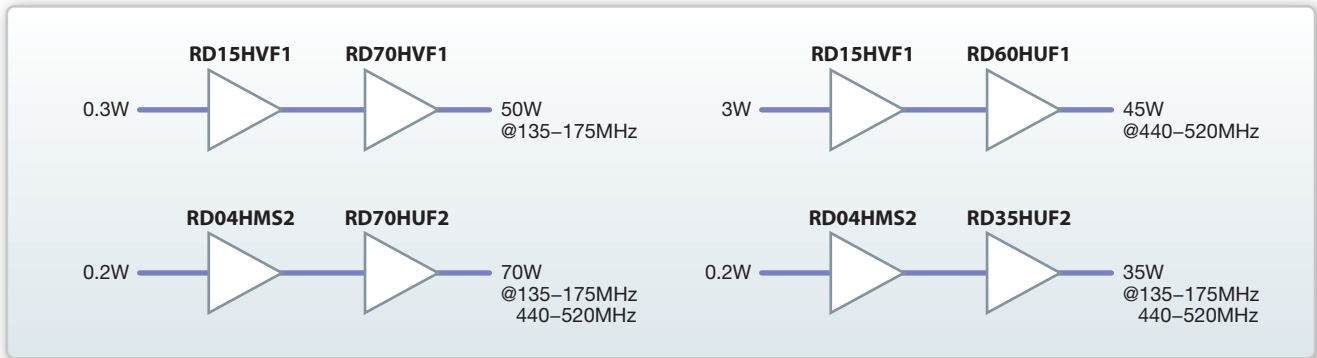
PACKAGE OUTLINE

APPLICATION

VHF~800MHZ BAND 7.2V OPERATION RECOMMENDED LINE UP



VHF~UHF BAND 12.5V OPERATION RECOMMENDED LINE UP



LINE UP

MAP FOR SELECTION

PRODUCT LIST

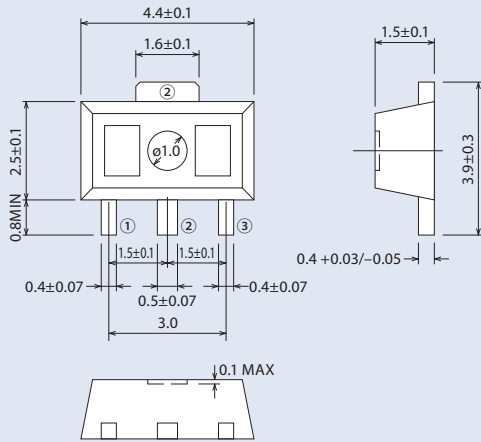
APPLICATION

PACKAGE OUTLINE

# PACKAGE OUTLINE

## SOT-89

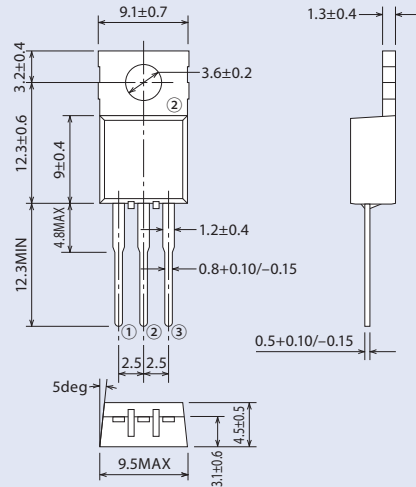
- ① Gate
- ② Source
- ③ Drain



UNIT: mm

## TO-220S

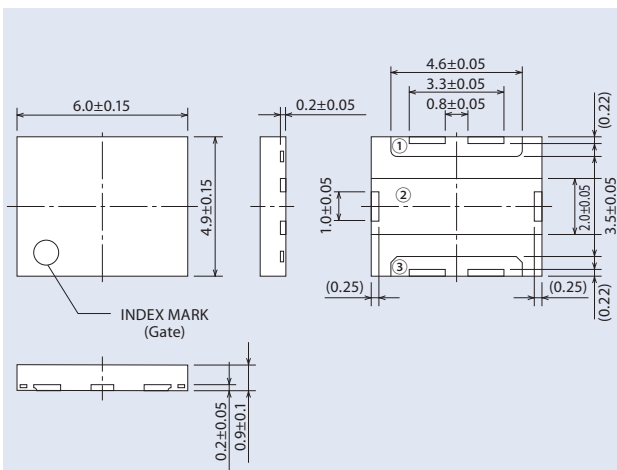
- ① Gate
- ② Source
- ③ Drain



UNIT: mm

## SLP

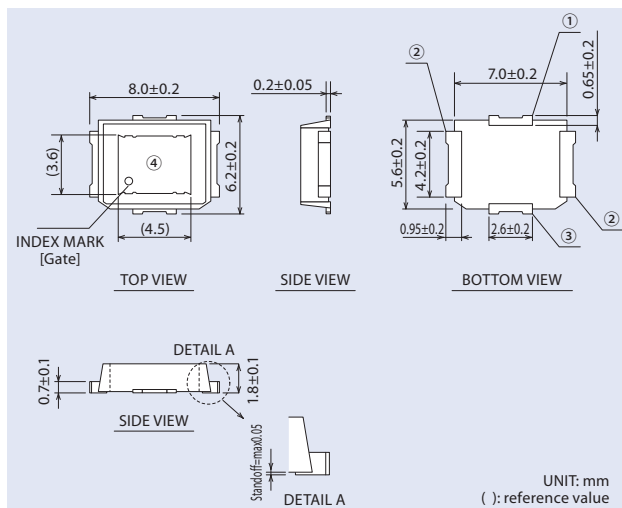
- ① Drain
- ② Source
- ③ Gate



UNIT: mm  
( ): reference value

## PMM

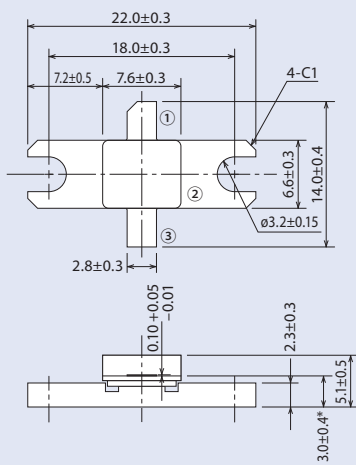
- ① Drain [output]
- ② Source [GND]
- ③ Gate [input]
- ④ Source



UNIT: mm  
( ): reference value

## Ceramic (Small)

- ① Drain
- ② Source
- ③ Gate

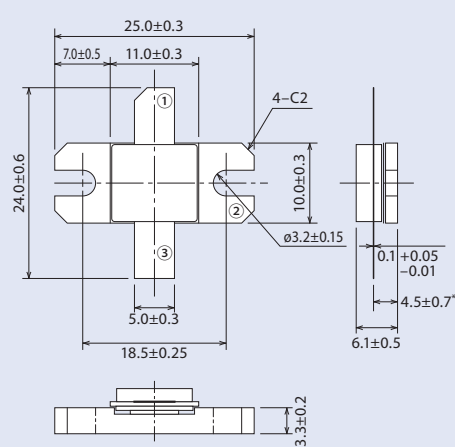


\* The height of terminals shows root.

UNIT: mm

## Ceramic (Large)

- ① Drain
- ② Source
- ③ Gate



\* The height of terminals shows root.

UNIT: mm

PACKAGE OUTLINE

LINE UP

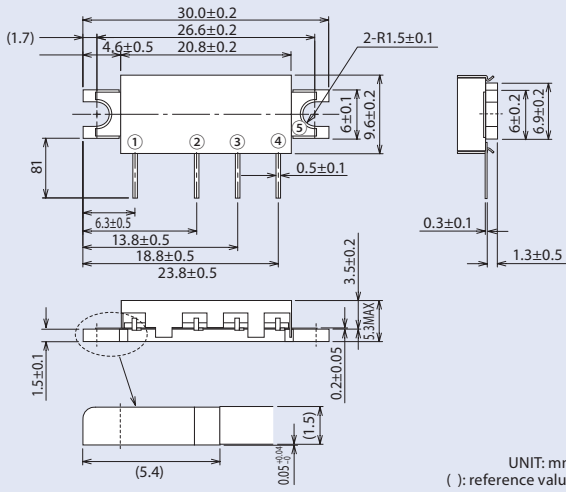
MAP FOR SELECTION

PRODUCT LIST

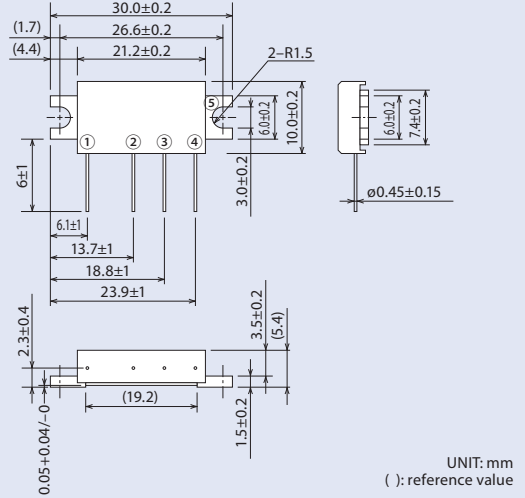
APPLICATION

PACKAGE OUTLINE

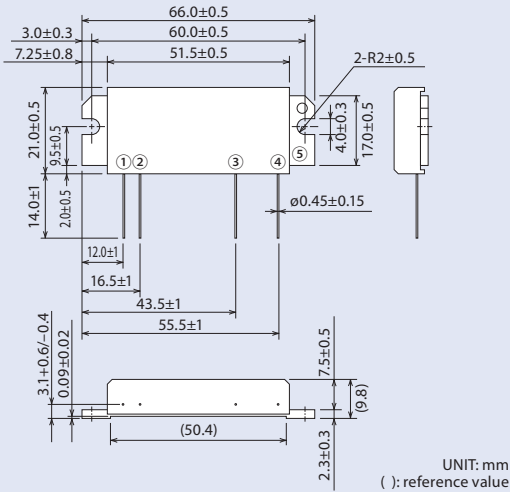
**H46M** ①RF Input(Pin) ③Drain Voltage(VDD) ⑤RF Ground(Fin)  
②Gate Voltage(VGg) ④RF Output(Pout)



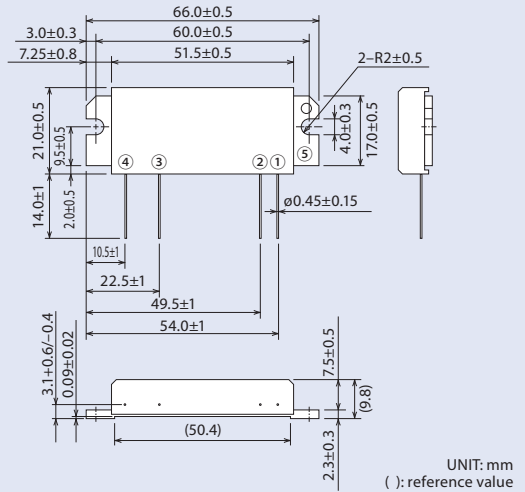
**H46S** ①RF Input(Pin) ③Drain Voltage(VDD) ⑤RF Ground(Fin)  
②Gate Voltage(VGg) ④RF Output(Pout)



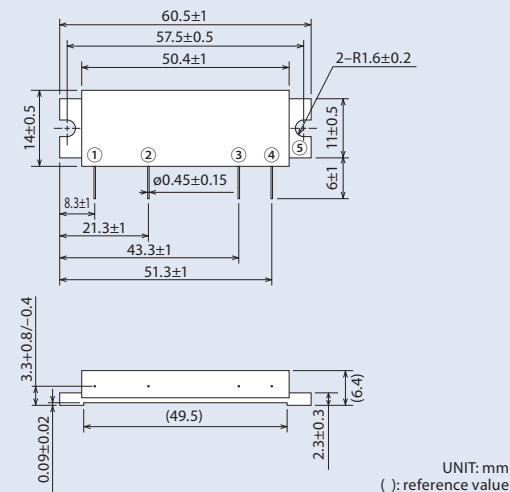
**H2S** ①RF Input(Pin) ③Drain Voltage(VDD) ⑤RF Ground(Fin)  
②Gate Voltage(VGg) ④RF Output(Pout)



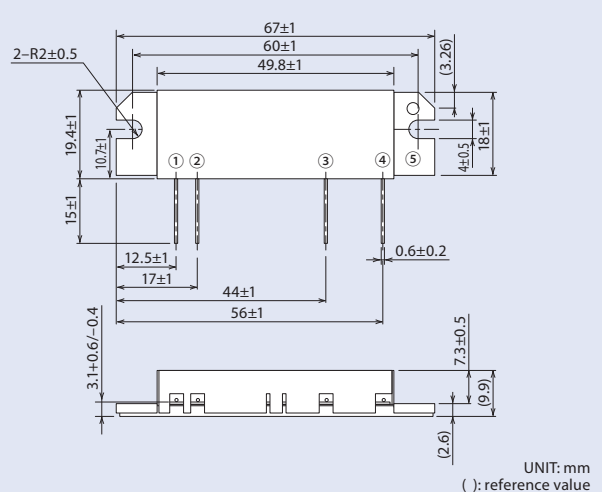
**H2RS** ①RF Input(Pin) ③Drain Voltage(VDD) ⑤RF Ground(Fin)  
②Gate Voltage(VGg) ④RF Output(Pout)



**H11S** ①RF Input(Pin) ③Drain Voltage(VDD) ⑤RF Ground(Fin)  
②Gate Voltage(VGg) ④RF Output(Pout)

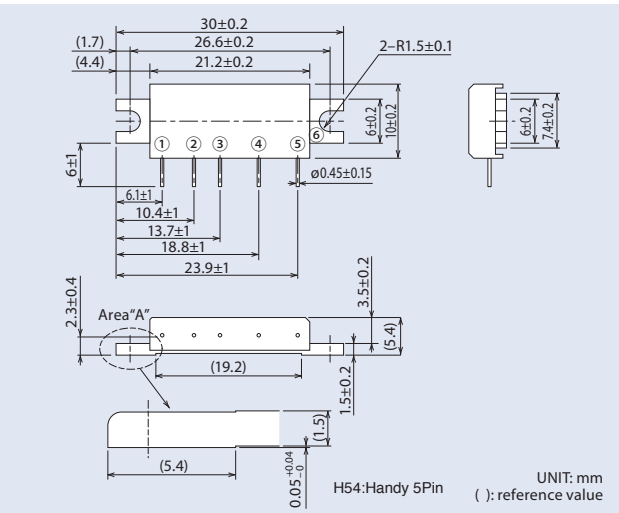


**H2M** ①RF Input(Pin) ③Drain Voltage(VDD) ⑤RF Ground(Fin)  
②Gate Voltage(VGg) ④RF Output(Pout)

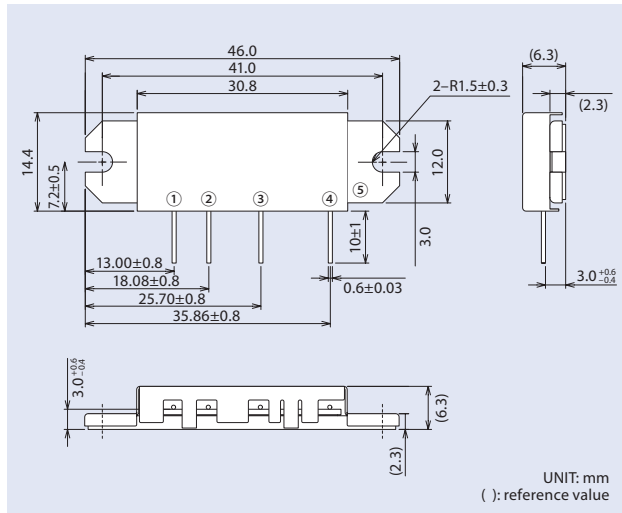


**H54**

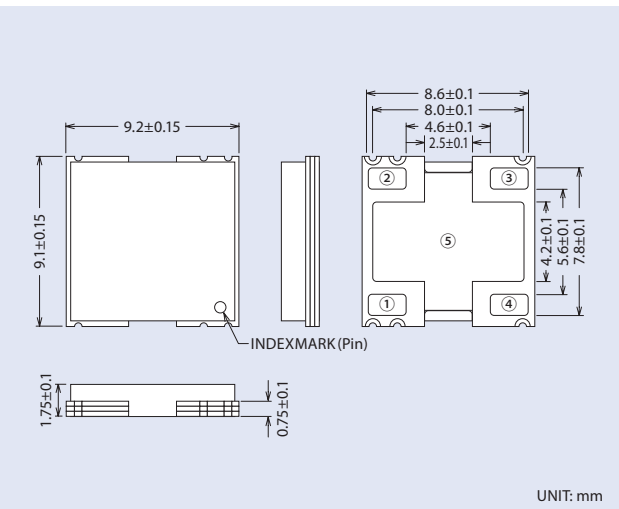
① RF Input(P<sub>in</sub>)      ③ Final Stage Gate Voltage(V<sub>Gc2</sub>)      ⑤ RF Output(P<sub>out</sub>)  
 ② First Stage Gate Voltage(V<sub>Gc1</sub>)      ④ Drain Voltage(V<sub>DD</sub>)      ⑥ RF Ground(Fin)

**H57**

① RF Input(P<sub>in</sub>)      ③ Drain Voltage(V<sub>DD</sub>)      ⑤ RF Ground(Fin)  
 ② Gate Voltage(V<sub>Gc</sub>)      ④ RF Output(P<sub>out</sub>)

**H58**

① RF Input(P<sub>in</sub>)      ③ Drain Voltage(V<sub>DD</sub>)      ⑤ RF Ground(Fin)  
 ② Gate Voltage(V<sub>Gc</sub>)      ④ RF Output(P<sub>out</sub>)



## Precautions for the use of MITSUBISHI silicon RF power amplifier devices

1. This general catalog does not guarantee the product specifications. 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 from the list of contact addresses listed on the last page for further information.
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. 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. RA series and RD series products use MOSFET semiconductor technology. They are sensitive to ESD voltage therefore appropriate ESD precautions are required.
4. 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 case temperature for RA series products lower than 60deg/C under standard conditions, and less than 90deg/C under extreme conditions.
5. RA series products are designed to operate into a nominal load impedance of 50 ohms. Under the condition of operating into a severe high load VSWR approaching an open or short, an over load condition could occur. In the worst case there is risk for burn out of the transistors and smoking of other parts including the substrate in the module.
6. The formal specification includes a guarantee against parasitic oscillation under a specified maximum load mismatch condition. The inspection for parasitic oscillation is performed on a sample basis on our manufacturing line. It is recommended that verification of no parasitic oscillation be performed at the completed equipment level also.
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 manual.
10. Please refer to the additional precautions in the formal specification sheet.

MITSUBISHI ELECTRIC  
 SEMICONDUCTORS  
 GLOBAL WEB SITE

<http://global.mitsubishielectric.com/products/device/>

Please see here in detail.

<http://global.mitsubishielectric.com/>

#### 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.

#### Notes regarding these materials

- These materials are intended as a reference to assist our customers in the selection of the Mitsubishi semiconductor product best suited to the customer's application; they do not convey any license under any intellectual property rights, or any other rights, belonging to Mitsubishi Electric Corporation or a third party.
- Mitsubishi Electric Corporation assumes no responsibility for any damage, or infringement of any third-party's rights, originating in the use of any product data, diagrams, charts, programs, algorithms, or circuit application examples contained in these materials.
- All information contained in these materials, including product data, diagrams, charts, programs and algorithms represents information on products at the time of publication of these materials, and are subject to change by Mitsubishi Electric Corporation without notice due to product improvements or other reasons. It is therefore recommended that customers contact Mitsubishi Electric Corporation or an authorized Mitsubishi Semiconductor product distributor for the latest product information before purchasing a product listed herein.
- The information described here may contain technical inaccuracies or typographical errors. Mitsubishi Electric Corporation assumes no responsibility for any damage, liability, or other loss rising from these inaccuracies or errors. Please also pay attention to information published by Mitsubishi Electric Corporation by various means, including the Mitsubishi Semiconductor home page (<http://www.mitsubishichips.com>).
- When using any or all of the information contained in these materials, including product data, diagrams, charts, programs, and algorithms, please be sure to evaluate all information as a total system before making a final decision on the applicability of the information and products. Mitsubishi Electric Corporation assumes no responsibility for any damage, liability or other loss resulting from the information contained herein.
- Mitsubishi Electric Corporation semiconductors are not designed or manufactured for use in a device or system that is used under circumstances in which human life is potentially at stake. Please contact Mitsubishi Electric Corporation or an authorized Mitsubishi Semiconductor product distributor when considering the use of a product contained herein for any specific purposes, such as apparatus or systems for transportation, vehicular, medical, aerospace, nuclear, or underwater repeater use.
- The prior written approval of Mitsubishi Electric Corporation is necessary to reprint or reproduce in whole or in part these materials.
- If these products or technologies are subject to the Japanese export control restrictions, they must be exported under a license from the Japanese government and cannot be imported into a country other than the approved destination.
- Any diversion or reexport contrary to the export control laws and regulations of Japan and/or the country of destination is prohibited.
- Please contact Mitsubishi Electric Corporation or an authorized Mitsubishi Semiconductor product distributor for further details on these materials or the products contained therein.

 **MITSUBISHI ELECTRIC CORPORATION**  
HEAD OFFICE: TOKYO BLDG., 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN