

SiRF Device Family for RF Power Amplification
General Catalog

Better Performance For Radio Communication Network



**Professional
Mobile Radio**



**Marine
Radio**



**Telematics
AMPS/GSM**

SiRF

Features

Full Line up

Frequency : 30-900MHz

Output Power : 0.3-100W

Operation Voltage : 7.2-12.5V

Select Map

1

Products List

3

Application

7

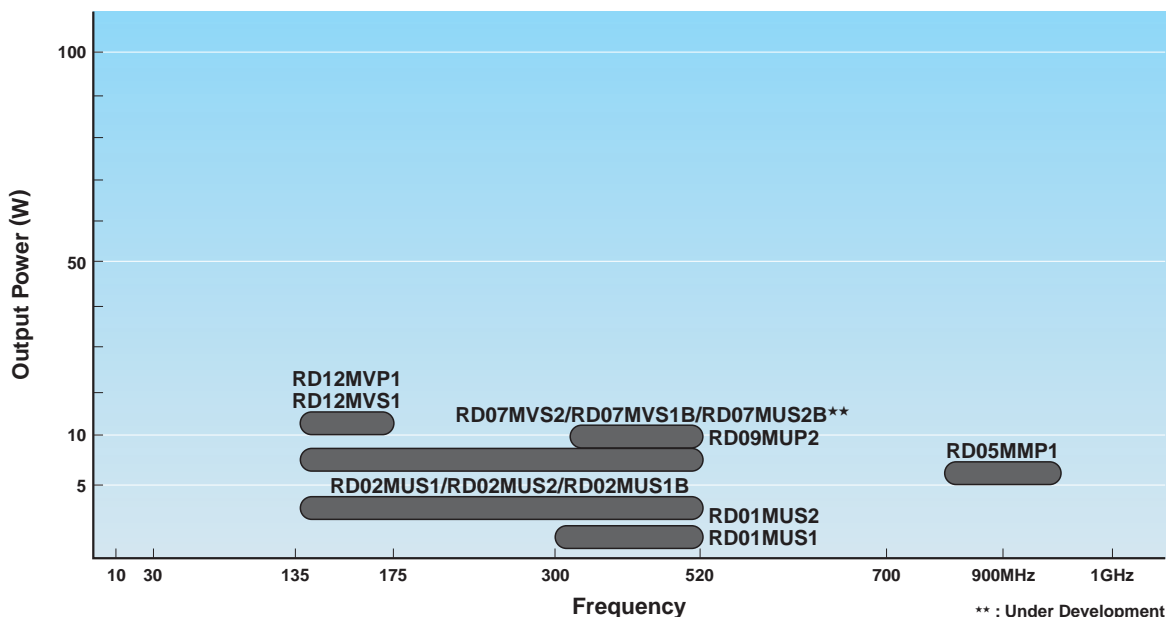
Package Outline

8

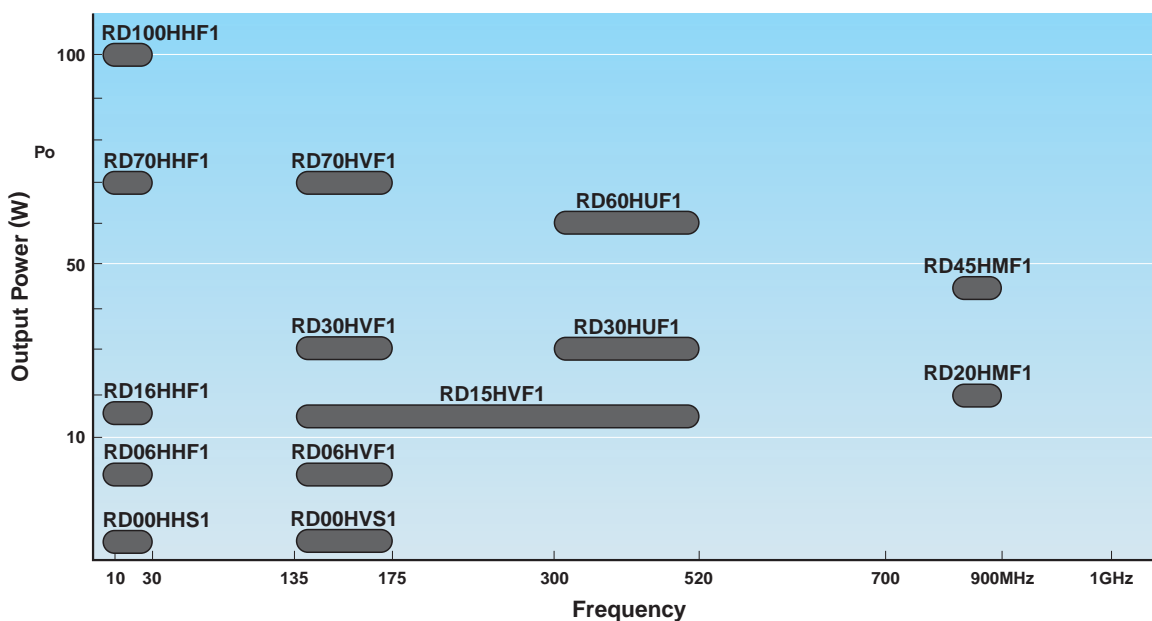
Better Performance For Radio Communication Network

MITSUBISHI SiRF 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 SiRF Devices strongly support for Radio communication network.

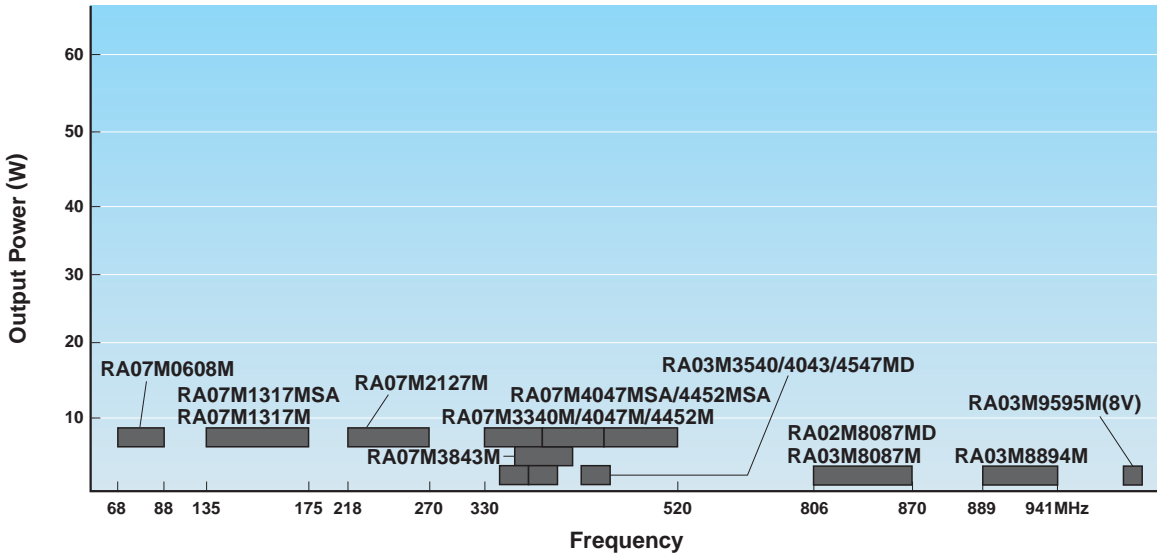
7.2V operation High Output Power Si MOS FET (Discrete)



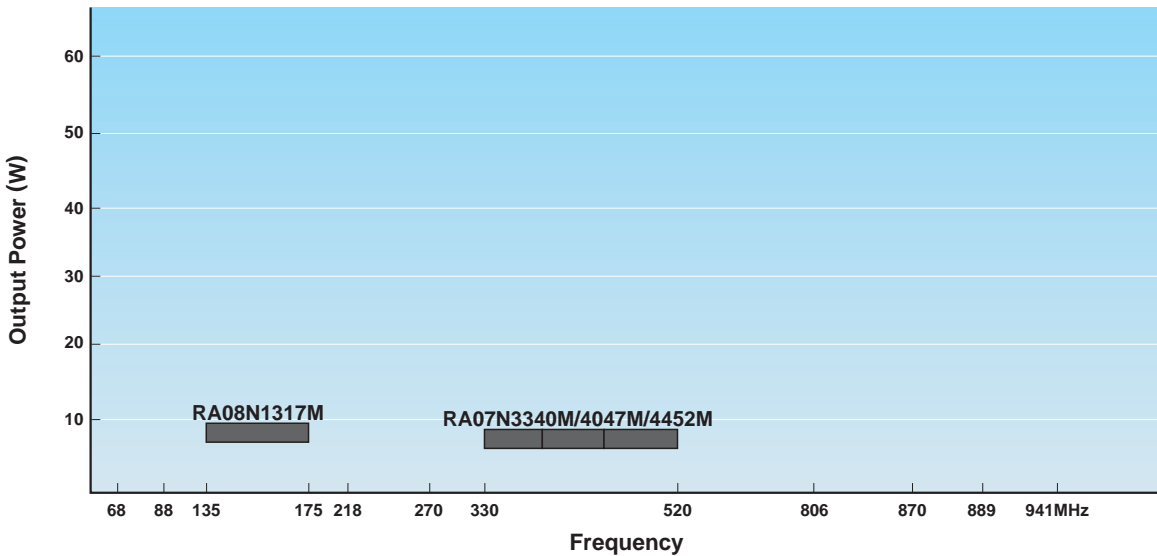
12.5V operation High Output Power Si MOS FET (Discrete)



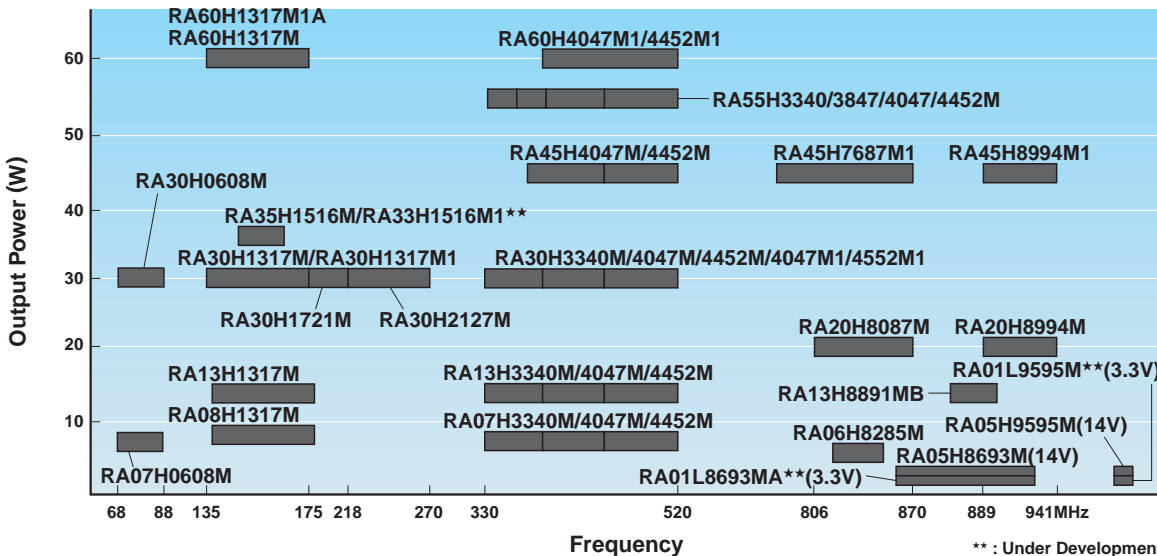
7.2V operation High Output Power Si MOS FET Module



9.6V operation High Output Power Si MOS FET Module



12.5V operation High Output Power Si MOS FET Module



** : Under Development

High Output Power Si MOS FET (Discrete)

■30MHz Band

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
RD06HHF1	Si,MOS	50	27.8	12.5	30	0.15	6	55	TO-220S
RD16HHF1	Si,MOS	50	56.8	12.5	30	0.4	16	55	TO-220S
RD70HHF1	Si,MOS	50	150	12.5	30	3.5	70	55	Ceramic(Large)
RD100HHF1	Si,MOS	50	176.5	12.5	30	7	100	55	Ceramic(Large)

Tc=25°C

■175/520MHz Band

Type Number	Structure	Max.ratings		Vdd (V)	f (MHz)	Pin (W)	Po(min) (W)	nd(min) (%)	Package outline
		VDSS (V)	Pch (W)						
RD00HVS1	Si,MOS	30	3.1	12.5	175	0.005	0.5	50	SOT-89
RD01MUS1	Si,MOS	30	3.6	7.2	520	0.03	0.8	50	SOT-89
RD01MUS2	Si,MOS [†]	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 [†]	30	21.9	7.2	175/520	0.05/0.05	2/2	55/50	SLP
RD06HVF1	Si,MOS	50	27.8	12.5	175	0.3	6	60	TO-220S
RD07MVS1B	Si,MOS	30	50	7.2	175/520	0.3/0.7	7/7	55/50	SLP
RD07MVS2	Si,MOS [†]	30	50	7.2	175/520	0.3/0.7	7/7	55/50	SLP
RD07MSU2B**	Si,MOS [†]	25	50	7.2	135~175	0.3	6.3	58	SLP
					450~527	0.4	7		
RD09MUP2	Si,MOS [†]	30	83	7.2	520	0.8	8	50	PMM
RD12MVS1	Si,MOS	50	50	7.2	175	1	11.5	55	SLP
RD12MVP1	Si,MOS	50	125	7.2	175	0.5	10	55	PMM
RD15HVF1	Si,MOS	30	48	12.5	175/520	0.6/3	15/15	55/50	TO-220S
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)
RD70HVF1	Si,MOS	30	150	12.5	175/520	6/10	70/50	55/50	Ceramic(Large)
RD60HUF1	Si,MOS	30	150	12.5	520	10	60	50	Ceramic(Large)

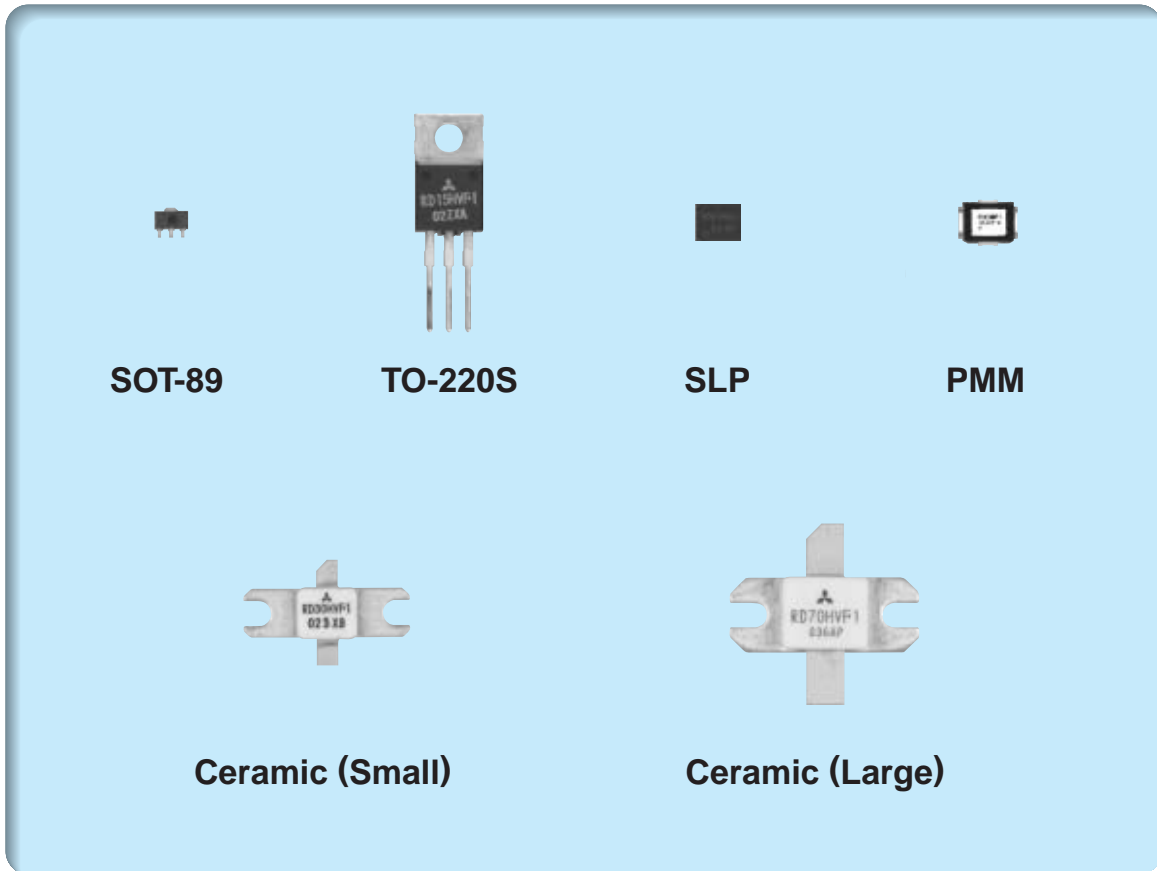
Tc=25°C

** : Under Development † : Gate Protection Diode

■900MHz Band

Type Number	Structure	Max.ratings		Vdd (V)	f (MHz)	Pin (W)	Po(min) (W)	nd(min) (%)	Package outline
		VDSS (V)	Pch (W)						
RD05MMP1	Si,MOS	30	73	7.2	941	0.7	5.5	43	PMM
RD20HMF1	Si,MOS	30	71.4	12.5	900	3	20	50	Ceramic(Small)
RD45HMF1	Si,MOS	30	125	12.5	900	15	45	45	Ceramic(Large)

Tc=25°C



Type Number

High Output Power Si MOS FET (Discrete)

RD 07 M V S 1

- Si MOS FET (Discrete)
- Output Power (W)
- Operation Voltage (V)
- Frequency Range (MHz)
- Outline
- Suffix

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

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

High Output Power Si MOS FET Module

■66-88MHz Band

Type Number	Max.ratings Vdd(V)	f(MHz)		Vdd (V)	Pin (W)	Po(min) (W)	nd(min) (%)	Package outline
		min	max					
RA07M0608M	9.2	66	88	7.2	0.03	7	45	H46S
RA07H0608M	13.2	68	88	12.5	0.03	7	38	H46S
RA30H0608M	17	66	88	12.5	0.05	30	40	H2S

Tc=25°C

■135-215MHz Band

Type Number	Max.ratings Vdd(V)	f(MHz)		Vdd (V)	Pin (W)	Po(min) (W)	nd(min) (%)	Package outline
		min	max					
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
RA08N1317M	12.5	135	175	9.6	0.02	8	50	H46S
RA08H1317M	13.2	135	175	12.5	0.02	8	40	H46S
RA13H1317M	17	135	175	12.5	0.05	13	40	H2S
RA30H1317M	17	135	175	12.5	0.05	30	40	H2S
RA30H1317M1	17	135	175	12.5	0.05	30	40	H2M
RA60H1317M	17	135	175	12.5	0.05	60	40	H2S
RA60H1317M1A	17	136	174	12.5	0.05	60	45	H2M
RA33H1516M1	17	154	162	12.5	0.01	33	50	H57
RA35H1516M	17	154	162	12.5	0.05	40	50	H2S
RA30H1721M	17	175	215	12.5	0.05	30	40	H2S

Tc=25°C

■215-270MHz Band

Type Number	Max.ratings Vdd(V)	f(MHz)		Vdd (V)	Pin (W)	Po(min) (W)	nd(min) (%)	Package outline
		min	max					
RA07M2127M	9.2	215	270	7.2	0.02	7	45	H46S
RA30H2127M	17	210	270	12.5	0.05	30	40	H2S

Tc=25°C

■330-520MHz Band

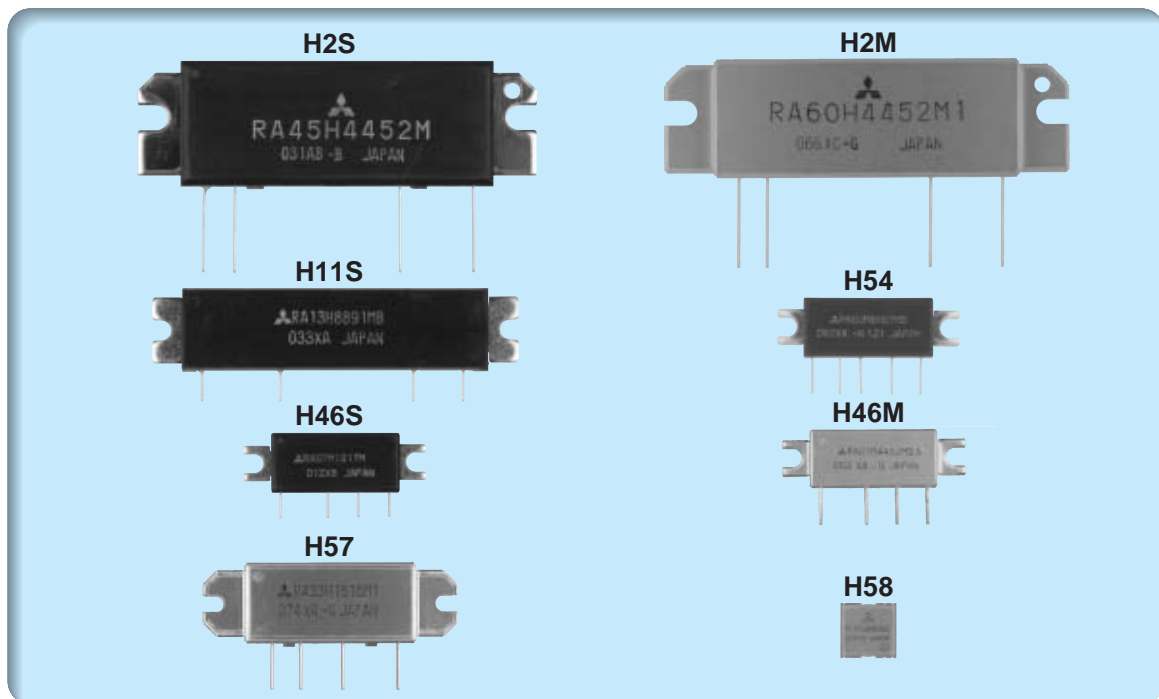
Type Number	Max.ratings Vdd(V)	f(MHz)		Vdd (V)	Pin (W)	Po(min) (W)	nd(min) (%)	Package outline
		min	max					
RA03M3540MD	9.2	350	400	7.2	0.08	6.3	35	H54
RA03M4043MD	9.2	400	430	7.2	0.08	6.3	35	H54
RA03M4547MD	9.2	450	470	7.2	0.08	6.3	35	H54
RA07M3340M	9.2	330	400	7.2	0.05	7	40	H46S
RA07M3843M	9.2	378	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
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
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
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
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
RA45H4047M	17	400	470	12.5	0.05	45	35	H2S
RA45H4045MR	17	400	450	12.5	0.05	45	35	H2RS
RA45H4452M	17	440	520	12.5	0.05	45	35	H2S
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	55(440-490) 45(490-520)	43(440-490) 35(490-520)	H2S
RA60H4047M1	17	400	470	12.5	0.05	60	40	H2M
RA60H4452M1	17	440	520	12.5	0.05	60	40	H2M

Tc=25°C

■900MHz Band

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	-	2.5	30	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
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
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
RA45H7687M1	17	764	870	12.8	0.05	45	33	H2M
RA45H8994M1	17	896	941	12.8	0.05	45	33	H2M

Tc=25°C ** : Under Development



Type Number

■High Output Power Si MOS FET Module

RA 07 M 4452 M

- Module
- Output Power (W)
- Operation Voltage (V)
- Frequency Range (MHz)
- Frequency Unit

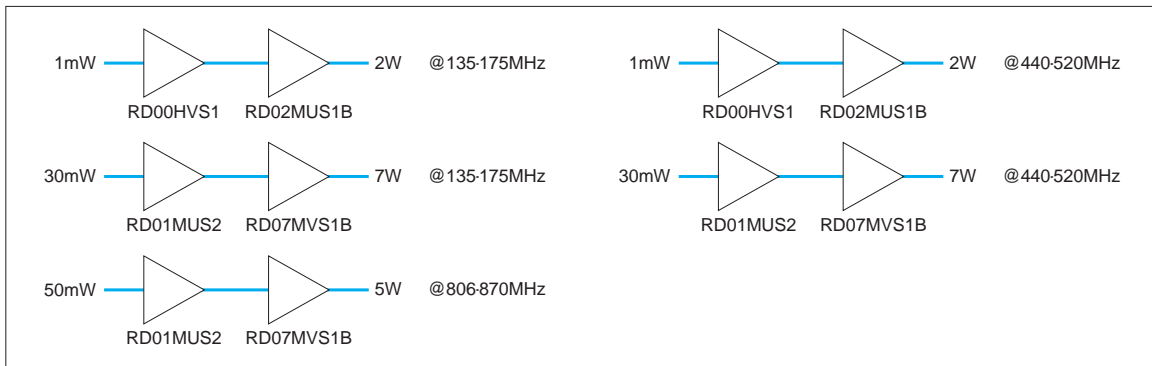
Symbol	Voltage
M	7.2V
N	9.6V
H	12.5V

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

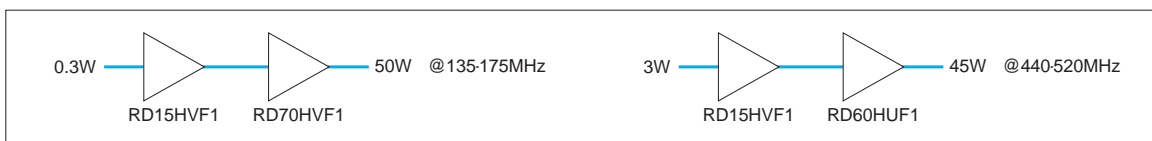
Symbol	Unit
M	MHz
G	GHz

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

VHF~800MHz Band 7.2V operation Recommended Line up



VHF~UHF Band 12.5V operation Recommended Line up

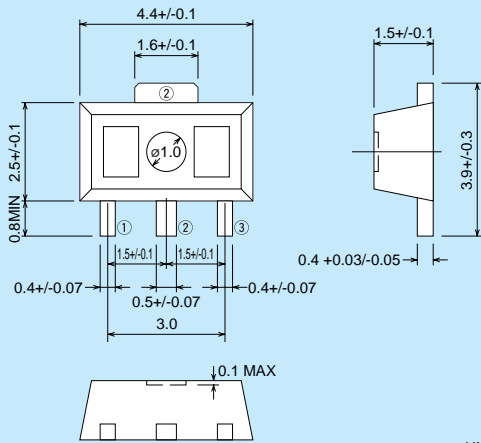


Application Note

ANGEN006D	SiRF power devices precaution & recommendation
ANGEN030C	SiRF power devices reliability concept
ANGEN026E	RA series ESD data
ANGEN042B	Thermal compound apply method
ANGEN001	Thermal compound characteristic
ANUHF078	Electro Static Sensitivity for RA60H4452M1 and RA60H4047M1
ANUHF083B	Electro Static Sensitivity for RA30H4552M1 and RA30H4047M1
AN900026	Recommendation of the output power control for RA45H7687M1
AN900027	AM-AM, AM-PM and Vgg2-PM for RA45H8994M1 and RA45H7687M1
ANGEN034C	RD07MVS1, RD02MUS1 mount & precaution
ANGEN038	RD series ESD data
ANUHF019	RD01MUS1 VHF UHF RF characteristic
ANUHF017	RD02MUS1 VHF UHF RF characteristic
ANUHF018B	RD07MVS1 VHF UHF RF characteristic
ANUHF085	RD01MUS2 & RD07MVS1B RF characteristic data at Vds=7.2V, 400-470MHz
AN900028	RD01MUS1 & RD07MVS1B 2stage amplifier RF performance f=740-870MHz
ANVHF034	RD12MVP1 135-175MHz RF characteristic data
ANUHF072	RD09MUP2 400-520MHz RF characteristic data

SOT-89

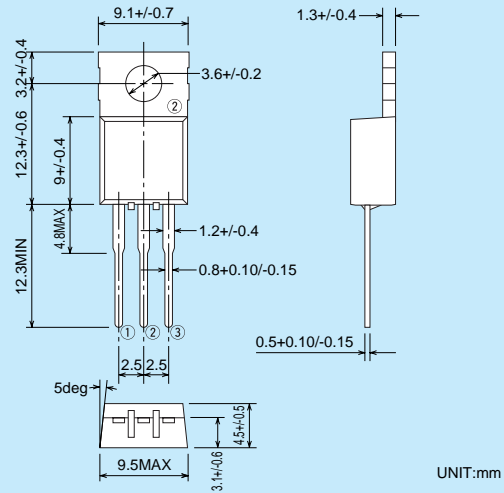
① Gate ③ Drain
② Source



UNIT:mm

TO-220S

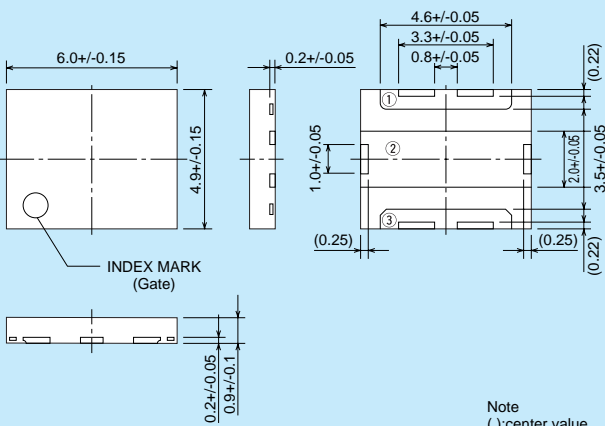
① Gate ③ Drain
② Source



UNIT:mm

SLP

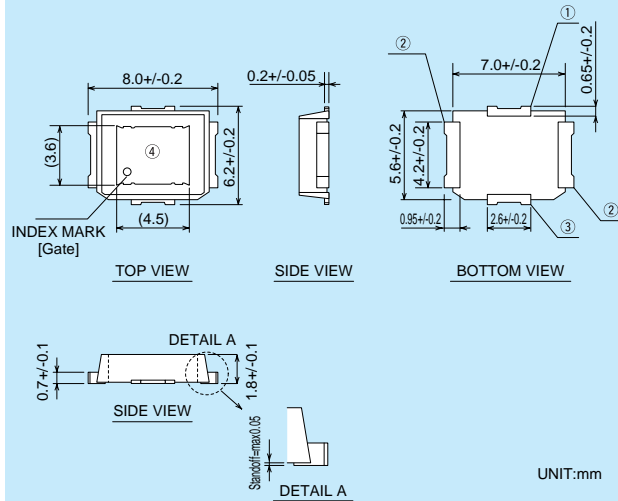
① Drain ③ Gate
② Source



Note
(): center value
UNIT:mm

PMM

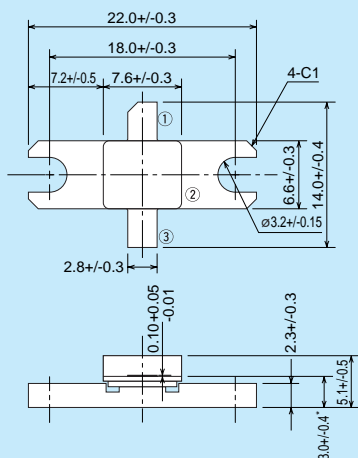
① Drain [output] ③ Gate [input]
② Source [GND] ④ Source



UNIT:mm

Ceramic(Small)

① Drain ③ Gate
② Source

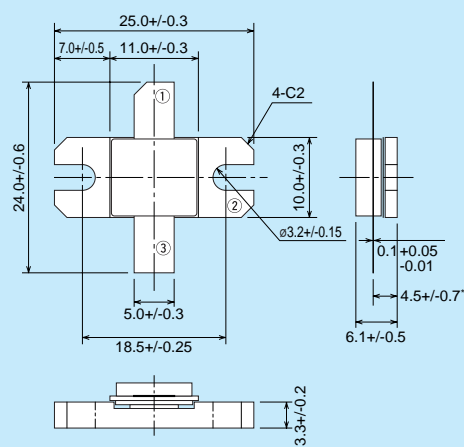


* The height of terminals shows root.

UNIT:mm

Ceramic(Large)

① Drain ③ Gate
② Source

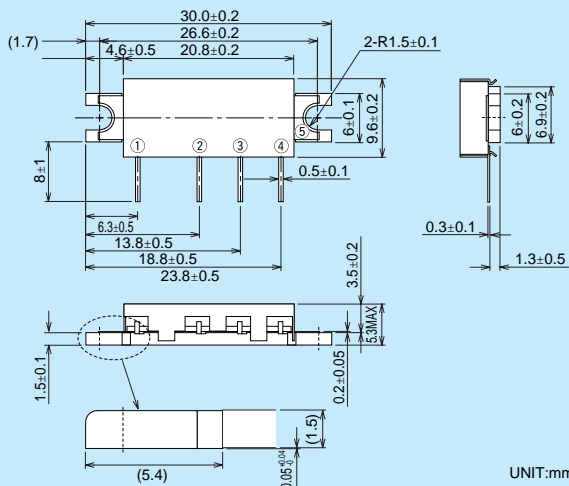


* The height of terminals shows root.

UNIT:mm

H46M

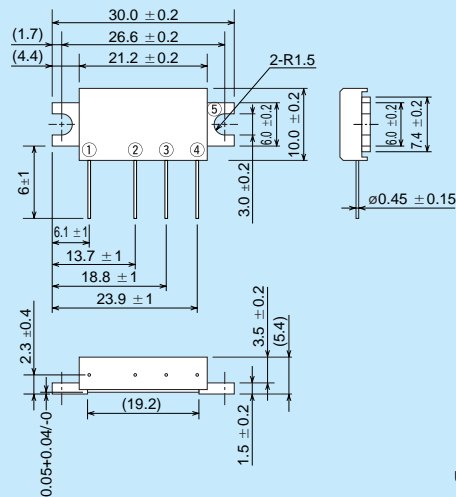
① RF Input (P_{in}) ③ Drain Voltage (V_{DD}) ⑤ RF Ground (Fin)
 ② Gate Voltage (V_{GS}) ④ RF Output (P_{out})



UNIT:mm

H46S

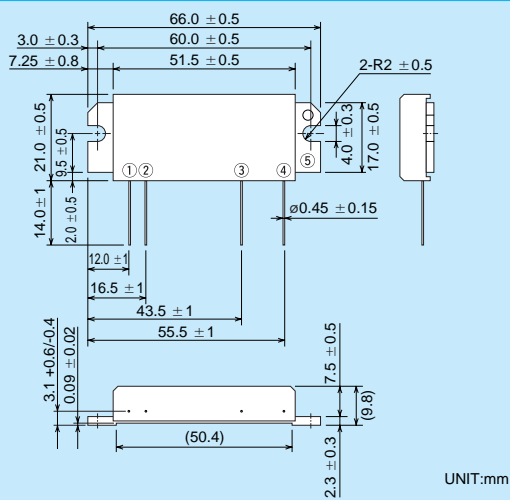
① RF Input (P_{in}) ③ Drain Voltage (V_{DD}) ⑤ RF Ground (Fin)
 ② Gate Voltage (V_{GS}) ④ RF Output (P_{out})



UNIT:mm

H2S

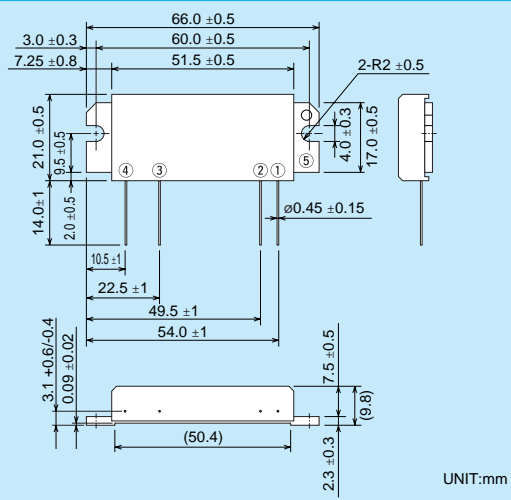
① RF Input (P_{in}) ③ Drain Voltage (V_{DD}) ⑤ RF Ground (Fin)
 ② Gate Voltage (V_{GS}) ④ RF Output (P_{out})



UNIT:mm

H2RS

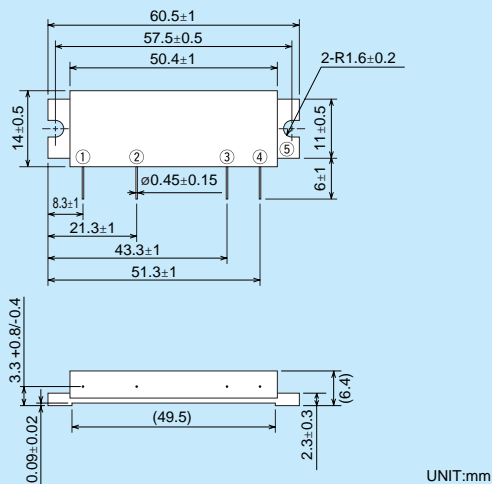
① RF Input (P_{in}) ③ Drain Voltage (V_{DD}) ⑤ RF Ground (Fin)
 ② Gate Voltage (V_{GS}) ④ RF Output (P_{out})



UNIT:mm

H11S

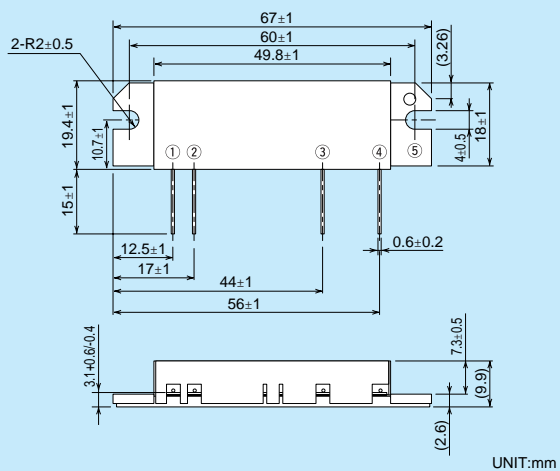
① RF Input (P_{in}) ③ Drain Voltage (V_{DD}) ⑤ RF Ground (Fin)
 ② Gate Voltage (V_{GS}) ④ RF Output (P_{out})



UNIT:mm

H2M

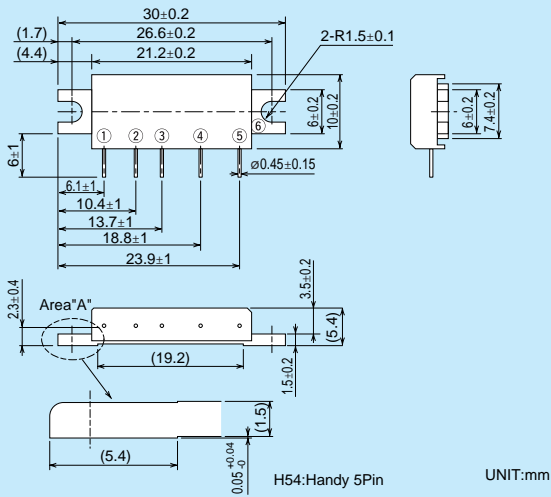
① RF Input (P_{in}) ③ Drain Voltage (V_{DD}) ⑤ RF Ground (Fin)
 ② Gate Voltage (V_{GS}) ④ RF Output (P_{out})



UNIT:mm

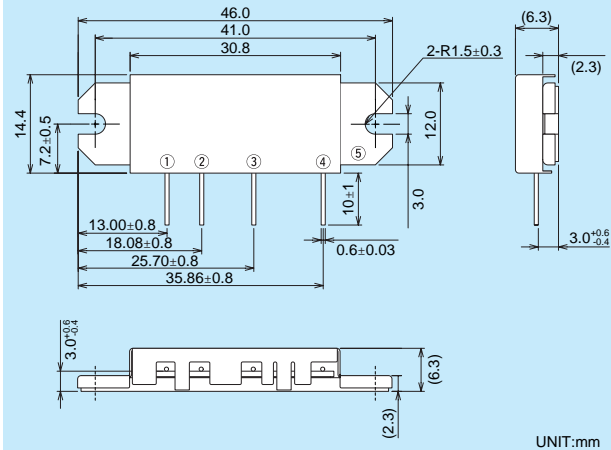
H54

- ① RF Input (P_{in}) ③ Final Stage Gate Voltage (V_{GS2}) ⑤ RF Output (P_{out})
 ② First Stage Gate Voltage (V_{GS1}) ④ Drain Voltage (V_{DD}) ⑥ RF Ground (Fin)



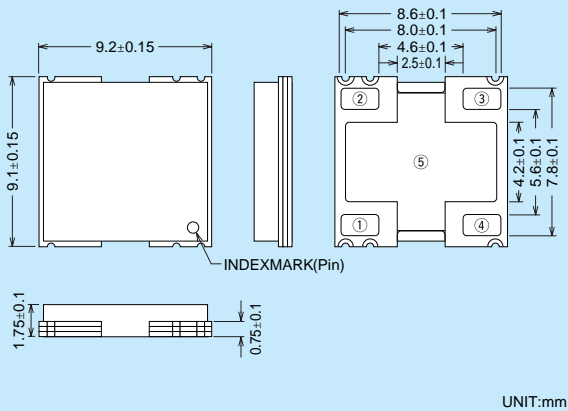
H57

- ① RF Input (P_{in}) ③ Drain Voltage (V_{DD}) ⑤ RF Ground (Fin)
 ② Gate Voltage (V_{GS}) ④ RF Output (P_{out})



H58

- ① RF Input (P_{in}) ③ Drain Voltage (V_{DD}) ⑤ RF Ground (Fin)
 ② Gate Voltage (V_{GS}) ④ RF Output (P_{out})



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.