

SILICON RF DEVICES

The background is a solid blue color with several abstract geometric shapes and patterns. A large, light blue pentagon is centered in the upper half. A series of parallel yellow lines radiate from the top right towards the center. A vertical column of thin blue lines is located in the lower right quadrant. A dark blue pentagon is in the bottom left corner.

Silicon RF
Devices

Better Performance for Radio Communication Network

Mitsubishi Electric Silicon RF Devices are Key parts of RF Power Amplifications for various kind of Mobile Radio, Professional Mobile Radios, Amateur Radios and TELEMATICS for automotive.
Mitsubishi Electric Silicon RF Devices strongly support for Radio communication network.

Please visit our website for further details.

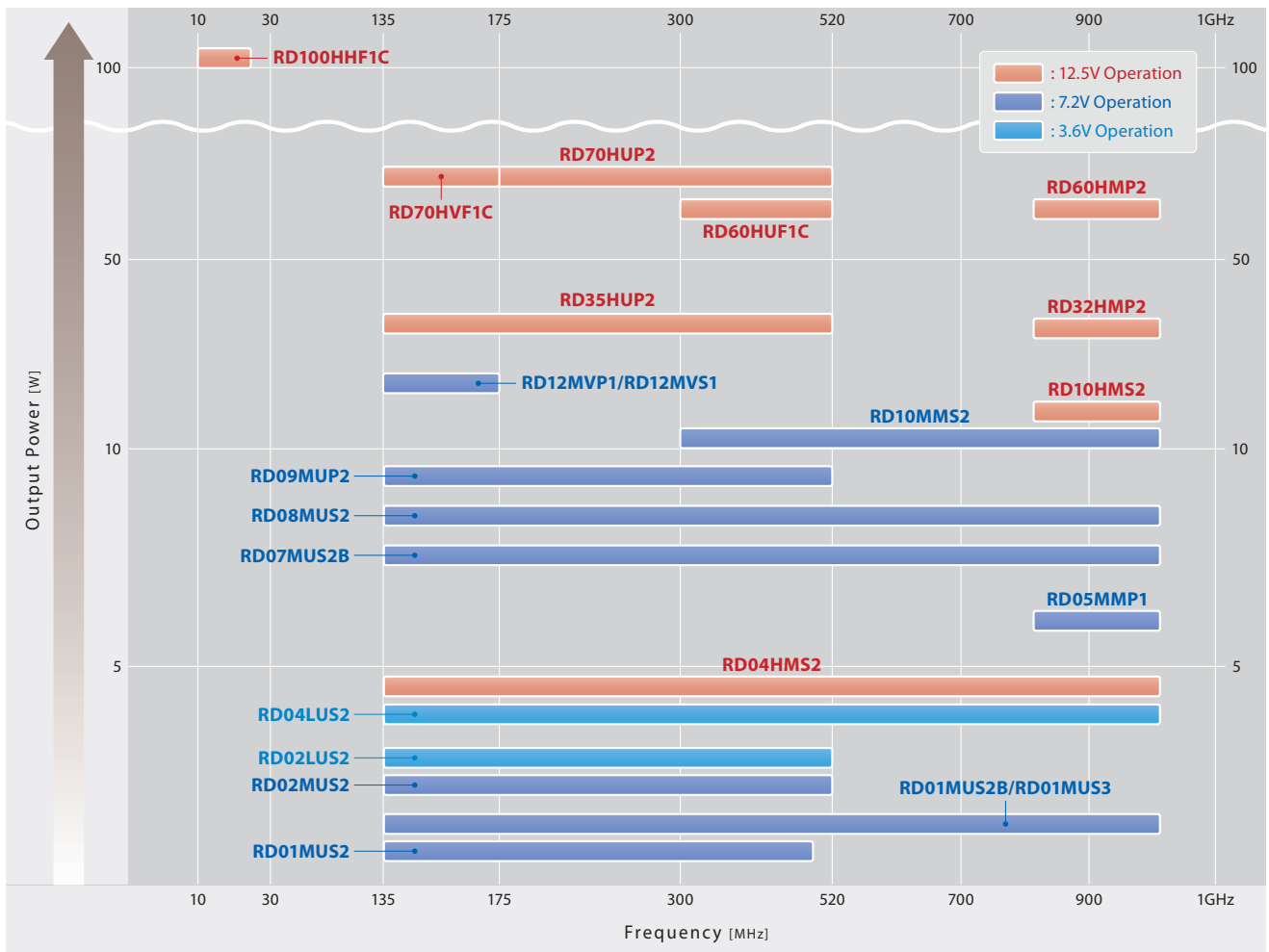


LINE UP

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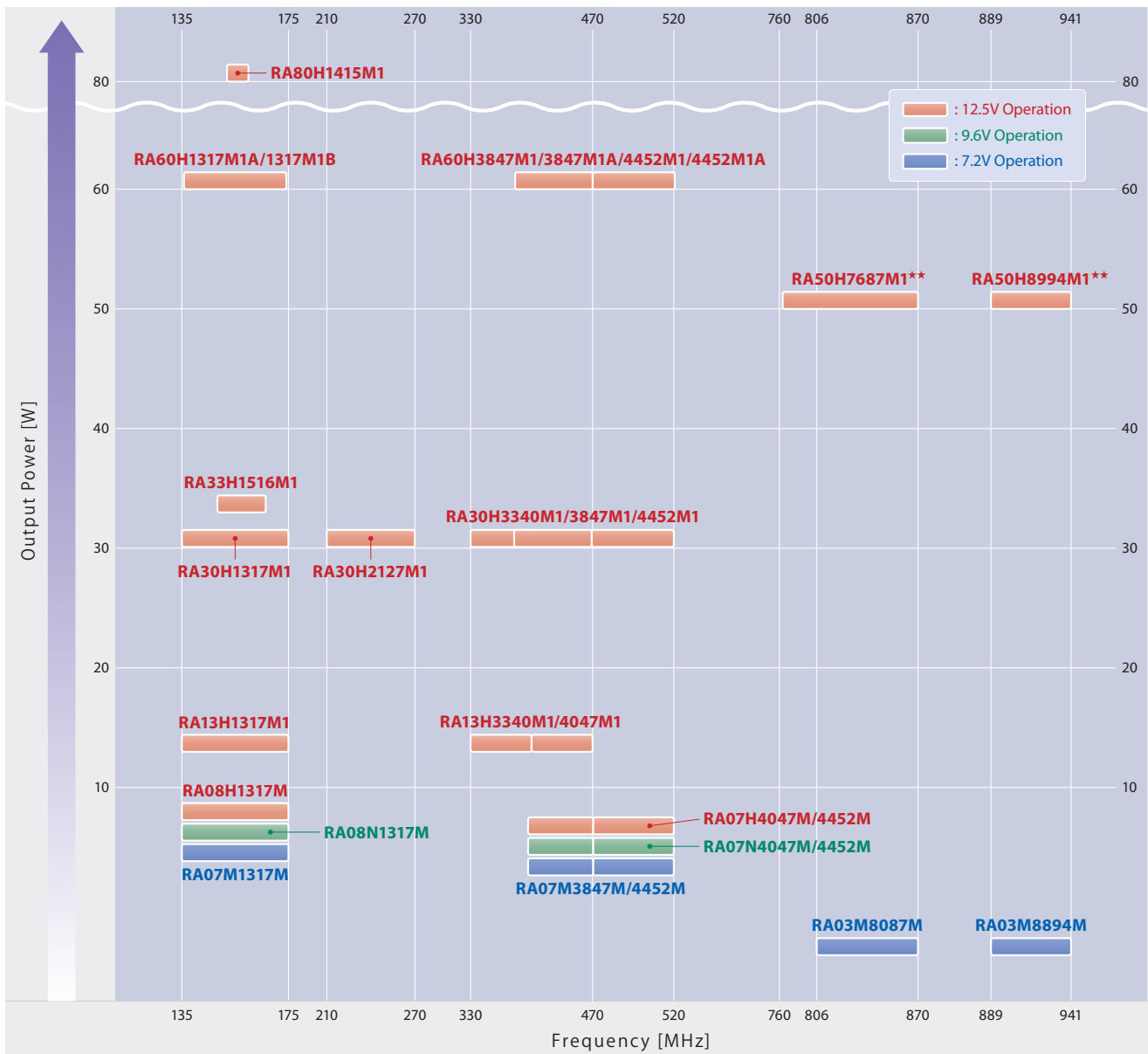
SELECTION MAP

HIGH OUTPUT POWER Si MOS FET (DISCRETE)



LINE UP
SELECTION MAP
PRODUCT LIST
APPLICATION
PACKAGE OUTLINE

HIGH OUTPUT POWER Si MOS FET MODULE



★★: Under development

PRODUCT LIST

3.6V OPERATION HIGH OUTPUT POWER Si MOS FET (DISCRETE)

| Type Number | Structure | Max.ratings | | V _{DD} [V] | Frequency Band | Pin [W] | Po (Typ.) [W] | η _D (Typ.) [%] | Package Type |
|-------------|----------------------|----------------------|---------------------|---------------------|----------------|---------|---------------|---------------------------|--------------|
| | | V _{bss} [V] | P _{ch} [W] | | | | | | |
| RD02LUS2 | Si, MOS [†] | 25 | 15.6 | 3.6 | UHF | 0.2 | 2.3 | 70 | SOT-89 |
| RD04LUS2 | Si, MOS [†] | 25 | 46.3 | 3.6 | UHF | 0.4 | 4.5 | 65 | SLP |

Ta=25°C †: Gate Protection Diode

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

| Type Number | Structure | Max.ratings | | V _{DD} [V] | Frequency Band | Pin [W] | Po (Typ.) [W] | η _D (Typ.) [%] | Package Type |
|-------------|----------------------|----------------------|---------------------|---------------------|----------------|---------|---------------|---------------------------|--------------|
| | | V _{bss} [V] | P _{ch} [W] | | | | | | |
| RD01MUS2 | Si, MOS [†] | 40 | 12.5 | 7.2 | UHF | 0.03 | 1.3 | 65 | SOT-89 |
| RD01MUS2B | Si, MOS [†] | 25 | 12.5 | 7.2 | VHF | 0.03 | 1.4 | 75 | SOT-89 |
| | | | | | UHF | 0.03 | 1.6 | 70 | |
| | | | | | 900 | 0.03 | 1.5 | 65 | |
| RD02MUS2 | Si, MOS [†] | 40 | 50 | 7.2 | VHF | 0.05 | 3 | 65 | SLP |
| | | | | | UHF | 0.05 | 3 | 65 | |
| RD05MMP1 | Si, MOS [†] | 30 | 73 | 7.2 | 900 | 0.7 | 6 | 46 | PMM |
| RD07MUS2B | Si, MOS [†] | 30 | 50 | 7.2 | VHF | 0.3 | 7.2 | 65 | SLP |
| | | | | | UHF | 0.4 | 8 | 63 | |
| | | | | | 900 | 0.5 | 7 | 58 | |
| RD08MUS2 | Si, MOS [†] | 25 | 46 | 7.2 | VHF | 0.2 | 8.5 | 65 | SLP |
| | | | | | UHF | 0.2 | 8.5 | 65 | |
| | | | | | 900 | 0.25 | 7 | 55 | |
| RD09MUP2 | Si, MOS [†] | 40 | 83 | 7.2 | VHF | 0.7 | 9 | 72 | PMM |
| | | | | | UHF | 0.8 | 9 | 60 | |
| RD10MMS2 | Si, MOS [†] | 40 | 62 | 7.2 | 900 | 1 | 12 | 58 | SLP |
| RD12MVP1 | Si, MOS [†] | 50 | 125 | 7.2 | VHF | 0.5 | 12 | 57 | PMM |
| RD12MVS1 | Si, MOS [†] | 50 | 50 | 7.2 | VHF | 1 | 12 | 57 | SLP |

Ta=25°C †: Gate Protection Diode

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

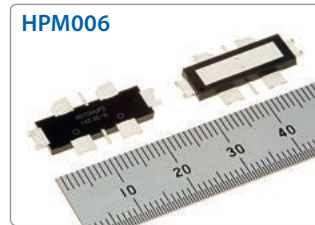
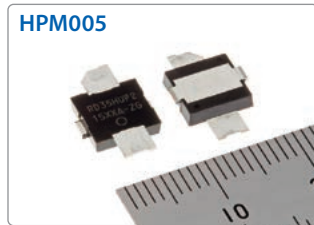
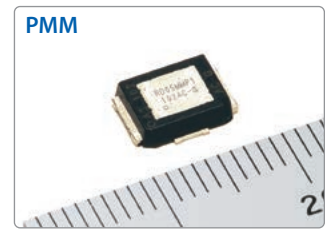
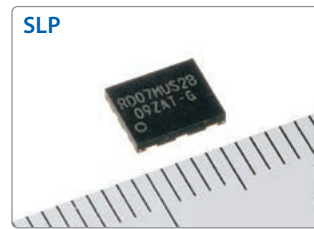
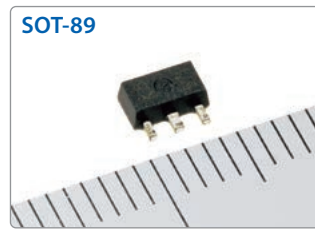
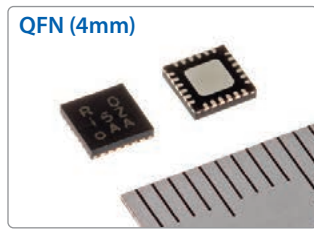
| Type Number | Structure | Max.ratings | | V _{DD} [V] | Frequency Band | Pin [W] | Po (Typ.) [W] | η _D (Typ.) [%] | Package Type |
|-------------|----------------------|----------------------|---------------------|---------------------|----------------|---------|---------------|---------------------------|--------------|
| | | V _{bss} [V] | P _{ch} [W] | | | | | | |
| RD04HMS2 | Si, MOS [†] | 40 | 50 | 12.5 | VHF | 0.2 | 5.5 | 73 | SLP |
| | | | | | UHF | 0.2 | 6 | 62 | |
| | | | | | 900 | 0.2 | 5 | 58 | |
| RD10HMS2 | Si, MOS [†] | 40 | 50 | 12.5 | 900 | 0.6 | 11 | 65 | SLP |
| RD32HMP2 | Si, MOS [†] | 40 | 197 | 12.5 | 900 | 5 | 35 | 64 | HPM005 |
| RD35HUP2 | Si, MOS [†] | 40 | 166 | 12.5 | UHF | 3 | 35 | 55 | HPM005 |
| RD60HUF1C | Si, MOS [†] | 30 | 150 | 12.5 | UHF | 10 | 65 | 55 | Ceramic |
| RD60HMP2 | Si, MOS [†] | 40 | 385 | 12.5 | 900 | 7 | 70 | 65 | HPM006 |
| RD70HVF1C | Si, MOS [†] | 30 | 150 | 12.5 | VHF | 4 | 75 | 60 | Ceramic |
| | | | | | UHF | 10 | 55 | 55 | |
| RD70HUP2 | Si, MOS [†] | 40 | 300 | 12.5 | VHF | 4 | 84 | 74 | HPM006 |
| | | | | | UHF | 5 | 75 | 64 | |
| RD100HHF1C | Si, MOS | 50 | 176.5 | 12.5 | HF | 7 | 110 | 60 | Ceramic |

Ta=25°C †: Gate Protection Diode

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

| Type Number | Structure | Max.ratings | | V _{DD} [V] | Frequency Band | Pin [W] | Po (Typ.) [W] | η _D (Typ.) [%] | Package Type |
|-------------|----------------------|----------------------|---------------------|---------------------|----------------|---------|---------------|---------------------------|--------------|
| | | V _{DSS} [V] | P _{ch} [W] | | | | | | |
| RD01MUS3 | Si, MOS [†] | 25 | 6.2 | 7.2 | UHF | 0.001 | 0.15 | 60 | QFN (4mm) |
| | Si, MOS [†] | 25 | 8.3 | 7.2 | UHF | 0.1 | 1.8 | 70 | |

Ta=25°C †: Gate Protection Diode



Type Name Definition of Silicon RF Devices

HIGH OUTPUT POWER Si MOS FET (Discrete Devices)

RD 08 M U S 2

A Si MOS FET (Discrete)

B Output Power (W)

C Operation Voltage (V)

| Symbol | Voltage |
|--------|---------|
| L | 3.6V |
| M | 7.2V |
| H | 12.5V |

D Frequency Range (MHz)

| Symbol | Frequency Range |
|--------|-----------------|
| H | 30MHz |
| V | 175MHz |
| U | 520MHz |
| M | 900MHz |

E Outline

| Symbol | Segment |
|--------|-----------------|
| S | Mold |
| F | Flange |
| P | Power Mold Mini |

F Serial Number

HIGH OUTPUT POWER Si MOS FET MODULE

RA 07 M 4452 M

A Module

B Output Power (W)

C Operation Voltage (V)

| Symbol | Voltage |
|--------|---------|
| M | 7.2V |
| N | 9.6V |
| H | 12.5V |

D Frequency Range (MHz)

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

E Frequency Unit

| Symbol | Unit |
|--------|------|
| M | MHz |
| G | GHz |

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

PRODUCT LIST

7.2V OPERATION HIGH OUTPUT POWER Si MOS FET MODULE

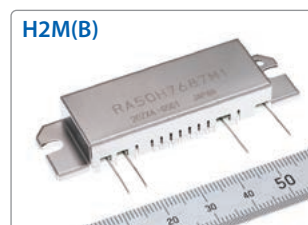
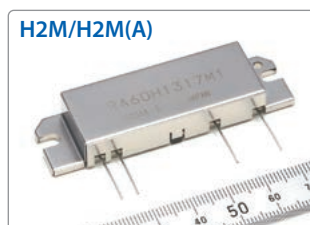
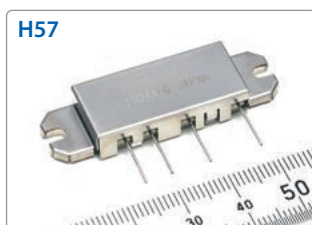
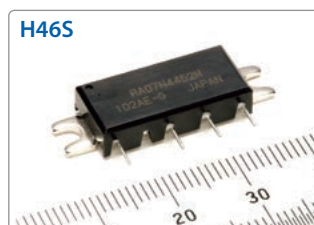
| Type Number | Max.ratings V _{DD} [V] | f [MHz] | | V _{DD} [V] | Pin [W] | Po (min) [W] | η _T (min) [%] | Package Type |
|-------------|------------------------------------|---------|-----|---------------------|---------|-----------------|-----------------------------|-----------------|
| | | min | max | | | | | |
| RA03M8087M | 9.2 | 806 | 870 | 7.2 | 0.05 | 3.6 | 32* ¹ | H46S |
| RA03M8894M | 9.2 | 889 | 941 | 7.2 | 0.05 | 3.6 | 32* ¹ | H46S |
| RA07M1317M | 9.2 | 135 | 175 | 7.2 | 0.02 | 6.5 | 45* ² | H46S |
| RA07M3847M | 9.2 | 378 | 470 | 7.2 | 0.05 | 7 | 40* ³ | H46S |
| RA07M4452M | 9.2 | 440 | 520 | 7.2 | 0.05 | 7 | 40* ³ | H46S |

T_a=25°C *1: Po=3.6W時 *2: Po=6W時 *3: Po=6.5W時

9.6V OPERATION HIGH OUTPUT POWER Si MOS FET MODULE

| Type Number | Max.ratings V _{DD} [V] | f [MHz] | | V _{DD} [V] | Pin [W] | Po (min) [W] | η _T (min) [%] | Package Type |
|-------------|------------------------------------|---------|-----|---------------------|---------|-----------------|-----------------------------|-----------------|
| | | min | max | | | | | |
| RA08N1317M | 13.2 | 135 | 175 | 9.6 | 0.02 | 8 | 50* ¹ | H46S |
| RA07N4047M | 13.2 | 400 | 470 | 9.6 | 0.05 | 7.5 | 43* ² | H46S |
| RA07N4452M | 13.2 | 440 | 520 | 9.6 | 0.05 | 7.5 | 43* ² | H46S |

T_a=25°C *1: When Po=8W *2: When Po=7W



12.5V OPERATION HIGH OUTPUT POWER Si MOS FET MODULE

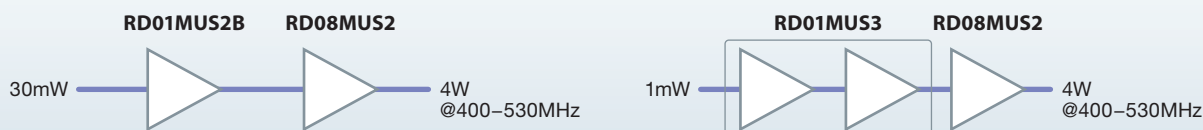
| Type Number | Max.ratings V _{DD} [V] | f [MHz] | | V _{DD} [V] | P _{in} [W] | P _o (min) [W] | η _T (min) [%] | Package Type |
|---------------|------------------------------------|---------|-----|---------------------|---------------------|-----------------------------|-----------------------------|-----------------|
| | | min | max | | | | | |
| RA08H1317M | 13.2 | 135 | 175 | 12.5 | 0.02 | 8 | 40* ¹ | H46S |
| RA07H4047M | 13.2 | 400 | 470 | 12.5 | 0.02 | 7 | 40* ² | H46S |
| RA07H4452M | 13.2 | 440 | 520 | 12.5 | 0.02 | 7 | 40* ² | H46S |
| RA13H1317M1 | 17 | 135 | 175 | 12.5 | 0.05 | 13 | 40 | H2M |
| RA13H3340M1 | 17 | 330 | 400 | 12.5 | 0.05 | 13 | 35 | H2M |
| RA13H4047M1 | 17 | 400 | 470 | 12.5 | 0.05 | 13 | 35 | H2M |
| RA30H1317M1 | 17 | 135 | 175 | 12.5 | 0.05 | 35 | 40 | H2M |
| RA30H2127M1 | 17 | 210 | 275 | 12.5 | 0.05 | 30 | 40 | H2M |
| RA30H3340M1 | 17 | 330 | 400 | 12.5 | 0.05 | 30 | 40 | H2M |
| RA30H3847M1 | 17 | 378 | 470 | 12.5 | 0.05 | 30 | 42 | H2M |
| RA30H4452M1 | 17 | 440 | 520 | 12.5 | 0.05 | 30 | 42 | H2M |
| RA33H1516M1 | 17 | 154 | 164 | 12.5 | 0.01 | 33 | 50 | H57 |
| RA50H7687M1** | 17 | 763 | 870 | 12.5 | 0.05 | 50 | 40 | H2M(B) |
| RA50H8994M1** | 17 | 896 | 944 | 12.5 | 0.05 | 50 | 40 | H2M(B) |
| RA60H1317M1A | 17 | 136 | 174 | 12.5 | 0.05 | 60 | 45 | H2M |
| RA60H1317M1B* | 17 | 136 | 174 | 12.5 | 0.05 | 60 | 45 | H2M(A) |
| RA60H3847M1 | 17 | 378 | 470 | 12.5 | 0.05 | 60 | 40 | H2M |
| RA60H3847M1A* | 17 | 378 | 470 | 12.5 | 0.05 | 60 | 40 | H2M(A) |
| RA60H4452M1 | 17 | 440 | 520 | 12.5 | 0.05 | 60 | 40 | H2M |
| RA60H4452M1A* | 17 | 440 | 520 | 12.5 | 0.05 | 60 | 40 | H2M(A) |
| RA80H1415M1 | 17 | 144 | 148 | 12.5 | 0.05 | 80 | 50 | H2M |
| | | 136 | 174 | | | 60 | | |

T_a=25°C *: V_{G1}, V_{G2} Separation type *1: When P_o=8W *2: When P_o=7W **: Under development

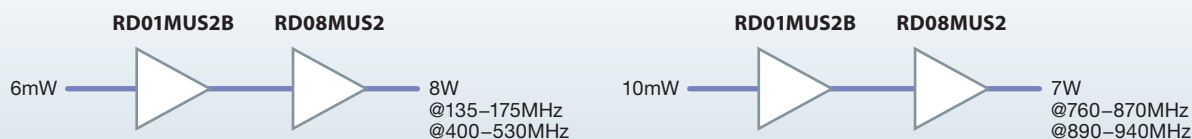
SiRF devices are compliant with the **RoHS** (2011/65/EU, (EU)2015/863).

APPLICATION

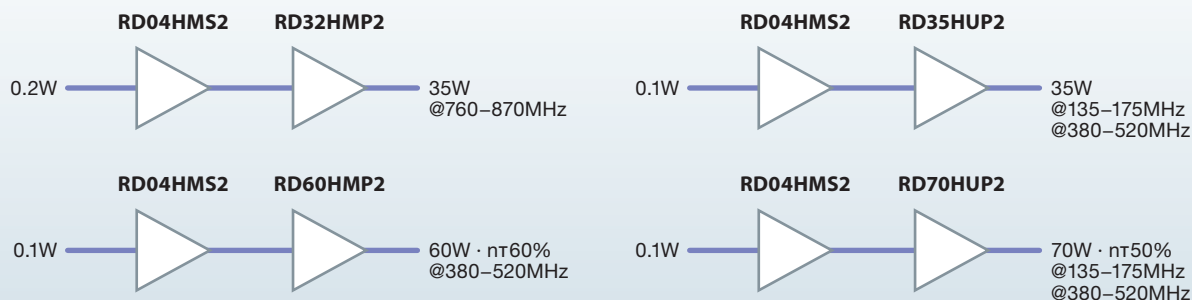
3.6V OPERATION RECOMMENDED LINE UP



7.2V OPERATION RECOMMENDED LINE UP



12.5V OPERATION RECOMMENDED LINE UP



Precautions for the use of Mitsubishi Electric silicon RF devices

- 01.This general catalog do 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.
- 02.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.
- 03.RA series and RD series products use MOSFET semiconductor technology. They are sensitive to ESD voltage therefore appropriate ESD precautions are required.
- 04.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.
- 05.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.
- 06.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.
- 07.For specific precautions regarding assembly of these products into the equipment, please refer to the supplementary items in the specification sheet.
- 08.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.
- 09.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 & Devices Website

www.MitsubishiElectric.com/semiconductors/



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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