

# Notice for TAIYO YUDEN products

Please read this notice before using the TAIYO YUDEN products.

## REMINDERS

- Product information in this catalog is as of October 2010. All of the contents specified herein are subject to change without notice due to technical improvements, etc. Therefore, please check for the latest information carefully before practical application or usage of the Products.

Please note that Taiyo Yuden Co., Ltd. shall not be responsible for any defects in products or equipment incorporating such products, which are caused under the conditions other than those specified in this catalog or individual specification.

- Please contact Taiyo Yuden Co., Ltd. for further details of product specifications as the individual specification is available.
- Please conduct validation and verification of products in actual condition of mounting and operating environment before commercial shipment of the equipment.
- All electronic components or functional modules listed in this catalog are developed, designed and intended for use in general electronics equipment.(for AV, office automation, household, office supply, information service, telecommunications, (such as mobile phone or PC) etc.). Before incorporating the components or devices into any equipment in the field such as transportation,( automotive control, train control, ship control), transportation signal, disaster prevention, medical, public information network (telephone exchange, base station) etc. which may have direct influence to harm or injure a human body, please contact Taiyo Yuden Co., Ltd. for more detail in advance. Do not incorporate the products into any equipment in fields such as aerospace, aviation, nuclear control, submarine system, military, etc. where higher safety and reliability are especially required.

In addition, even electronic components or functional modules that are used for the general electronic equipment, if the equipment or the electric circuit require high safety or reliability function or performances, a sufficient reliability evaluation check for safety shall be performed before commercial shipment and moreover, due consideration to install a protective circuit is strongly recommended at customer's design stage.

- The contents of this catalog are applicable to the products which are purchased from our sales offices or distributors (so called "TAIYO YUDEN' s official sales channel").  
It is only applicable to the products purchased from any of TAIYO YUDEN' s official sales channel.
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- Caution for export  
Certain items in this catalog may require specific procedures for export according to "Foreign Exchange and Foreign Trade Control Law" of Japan, "U.S. Export Administration Regulations", and other applicable regulations. Should you have any question or inquiry on this matter, please contact our sales staff.



## FEATURES

- Compact and Low-profile
- Wide bandwidth and High Gain
- Stable temperature characteristics

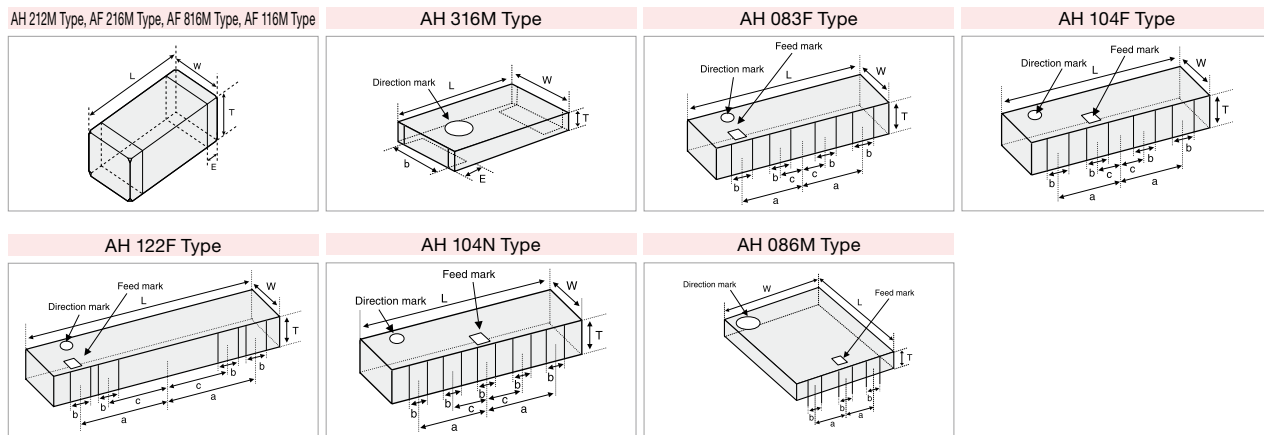
## APPLICATIONS

- Bluetooth®, Wireless LAN, GPS, WiMAX, ZigBee, UWB

## ORDERING CODE

|                                             |   |                                 |   |                                                                                                                                         |   |   |                                                   |   |                                                                                                                                          |   |                                 |   |   |   |                |  |
|---------------------------------------------|---|---------------------------------|---|-----------------------------------------------------------------------------------------------------------------------------------------|---|---|---------------------------------------------------|---|------------------------------------------------------------------------------------------------------------------------------------------|---|---------------------------------|---|---|---|----------------|--|
| A                                           | F | △                               | 2 | 1                                                                                                                                       | 6 | M | 2                                                 | 4 | 5                                                                                                                                        | 0 | 0                               | 1 | — | T |                |  |
| ①Type                                       |   | ②Electrode Code                 |   | ③Dimensions (case size) [mm]                                                                                                            |   |   | ④Special Code                                     |   | ⑤Frequency [MHz]                                                                                                                         |   | ⑥Spec Code                      |   |   |   | ⑦Packaging     |  |
| AH Multilayer Antenna<br>AF Helical Antenna |   | △ With Plating<br>△=Blank space |   | 212 2.0×1.25<br>216 2.5×1.6<br>816 8.0×1.6<br>116 11.0×1.6<br>316 3.2×1.6<br>083 8.0×3.0<br>104 10.0×4.0<br>122 12.0×2.0<br>086 8.0×6.0 |   |   | F Inverted F<br>M Mono Pole<br>N Mono Pole (Dual) |   | example<br>1575 1574.397~1576.443<br>2450 2400~2500<br>5550 3100~8000<br>1. Describe Center Frequency<br>2. Lower Frequency for Dualband |   | 01~<br>S1~ Applicable to AH104F |   |   |   | —T Tape & Reel |  |

## EXTERNAL DIMENSIONS/STANDARD QUANTITY



| Type    | L                                 | W        | T        | E       | a       | b        | c        | Standard Quantity (pcs)<br>Embossed Tape |
|---------|-----------------------------------|----------|----------|---------|---------|----------|----------|------------------------------------------|
| AF 216M | 2.5±0.2                           | 1.6±0.2  | 1.6±0.2  | 0.5±0.3 | —       | —        | —        | 2000                                     |
| AF 816M | 8±0.2                             | 1.6±0.2  | 1.6±0.2  | 0.5±0.3 | —       | —        | —        |                                          |
| AF 116M | 11±0.2                            | 1.6±0.2  | 1.6±0.2  | 0.5±0.3 | —       | —        | —        |                                          |
| AH212M  | 2 <sup>+0.3</sup> <sub>-0.1</sub> | 1.25±0.2 | 0.85±0.2 | 0.5±0.3 | —       | —        | —        | 4000                                     |
| AH 316M | 3.2±0.15                          | 1.6±0.15 | 0.5±0.1  | 0.5±0.2 | —       | 1.0 min. | —        | 3000                                     |
| AH 083F | 8±0.3                             | 3±0.3    | 1±0.3    | —       | 3.1±0.3 | 1±0.3    | 1.15±0.3 | 1000                                     |
| AH 104F | 10±0.3                            | 4±0.3    | 1±0.3    | —       | 2.5±0.3 | 1±0.3    | 1±0.3    | 2000                                     |
| AH 122F | 12±0.3                            | 2±0.3    | 0.95±0.3 | —       | 5.1±0.3 | 1±0.3    | 3.1±0.3  |                                          |
| AH 104N | 10±0.3                            | 4±0.3    | 1±0.3    | —       | 3±0.3   | 0.8±0.3  | 1.5±0.3  |                                          |
| AH 086M | 8±0.3                             | 6±0.3    | 1±0.3    | —       | 1.8±0.2 | 1±0.3    | —        | 1000                                     |

Unit : mm (inch)

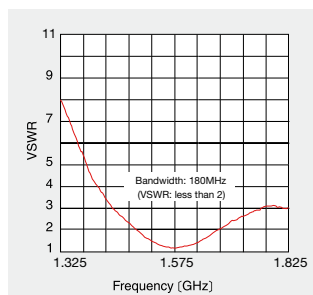
## PART NUMBERS

| Applications                                             | Ordering Code | External Dimensions (mm) | Center Frequency (MHz) |
|----------------------------------------------------------|---------------|--------------------------|------------------------|
| GPS                                                      | AF 816M157502 | 8.0×1.6×1.6              | 1575                   |
|                                                          | AF 116M157502 | 11.0×1.6×1.6             | 1575                   |
|                                                          | AH 316M157501 | 3.2×1.6×0.5              | 1575                   |
| W-LAN (2.4GHz)<br>Bluetooth®<br>WiMAX (2.5GHz)<br>ZigBee | AF 216M245001 | 2.5×1.6×1.6              | 2450                   |
|                                                          | AH 212M245001 | 2.0×1.25×0.85            | 2450                   |
|                                                          | AH 316M245001 | 3.2×1.6×0.5              | 2450                   |
|                                                          | AH 083F245001 | 8.0×3.0×1.0              | 2450                   |
|                                                          | AH 104F2450S1 | 10.0×4.0×1.0             | 2450                   |
|                                                          | AH 104F2650S1 | 10.0×4.0×1.0             | 2650                   |
|                                                          | AH 122F245001 | 12.0×2.0×0.95            | 2450                   |
| W-LAN (2.4GHz / 5GHz)                                    | AH 104N2450D1 | 10.0×4.0×1.0             | 2450/5400              |
| UWB & WiMAX (3.5GHz)                                     | AH 086M555003 | 8.0×6.0×1.0              | 5550                   |

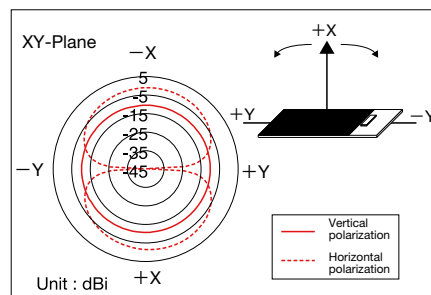
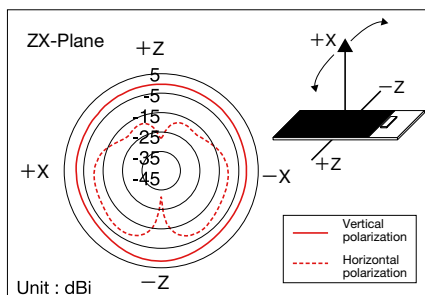
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Typical Characteristics on Taiyo Yuden evaluation board

● **AF 816M157502**

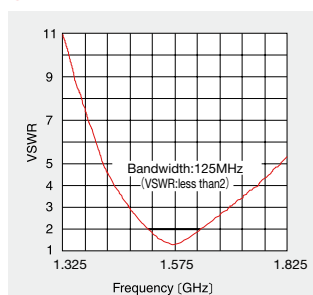


Typical characteristics of VSWR

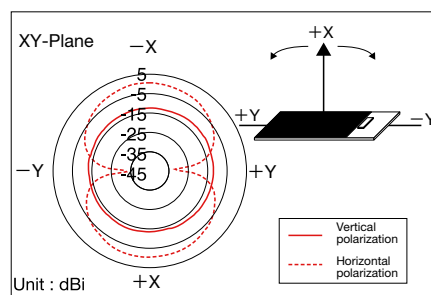
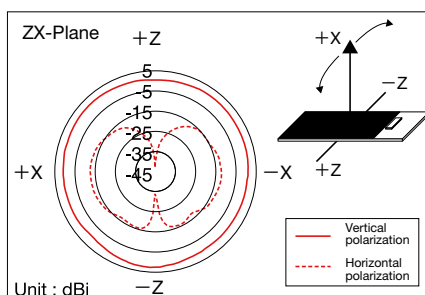


Typical characteristics of radiation pattern (@1.575GHz)

● **AH 116M157502**

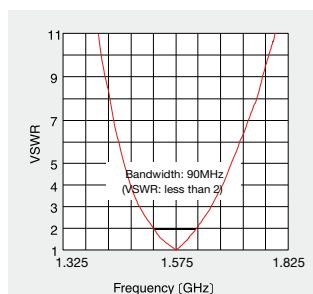


Typical characteristics of VSWR

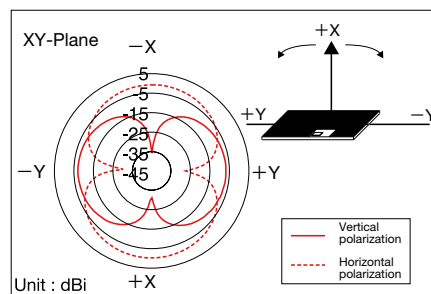
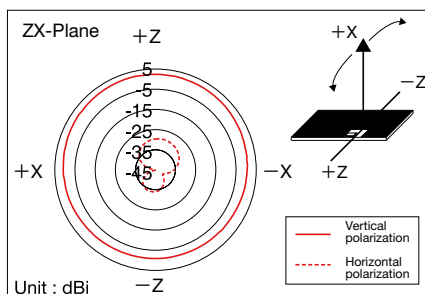


Typical characteristics of radiation pattern (@1.575GHz)

● **AH 316M157501**

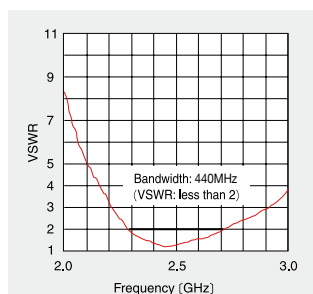


Typical characteristics of VSWR

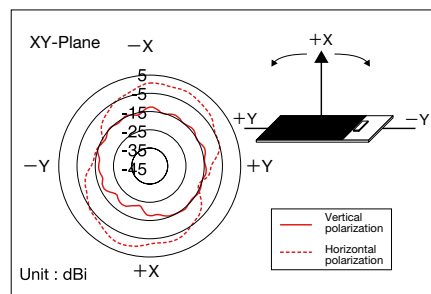
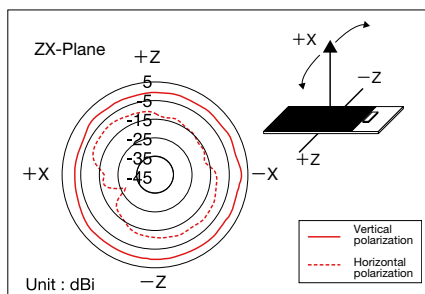


Typical characteristics of radiation pattern (@1.575GHz)

● **AF 216M245001**

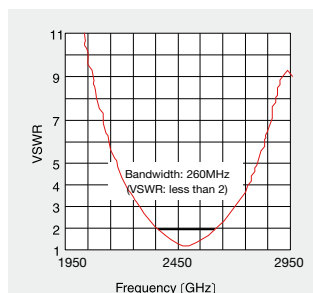


Typical characteristics of VSWR

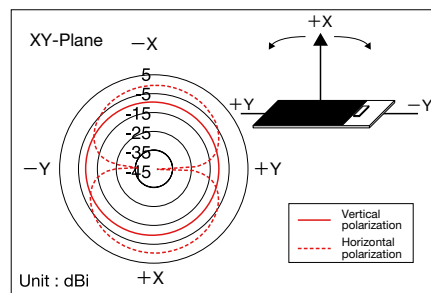
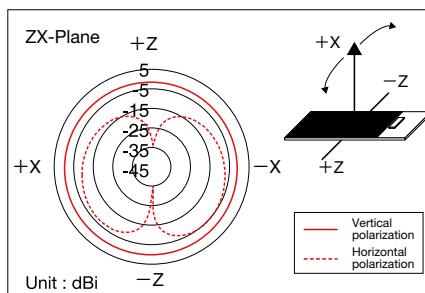


Typical characteristics of radiation pattern (@2.45GHz)

● **AH 212M245001**



Typical characteristics of VSWR



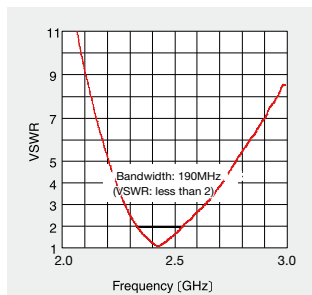
Typical characteristics of radiation pattern (@2.45GHz)

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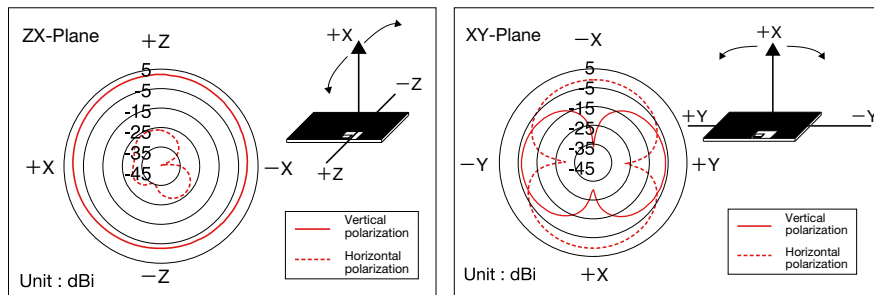
## ELECTRICAL CHARACTERISTICS-TYPICAL CHARACTERISTICS

Typical Characteristics on Taiyo Yuden evaluation board

### ●AH 316M245001

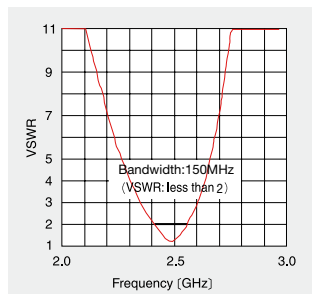


Typical characteristics of VSWR

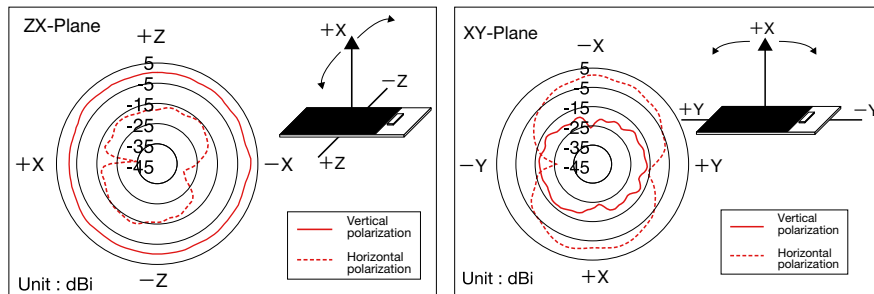


Typical characteristics of radiation pattern (@2.45GHz)

### ●AH 083F245001

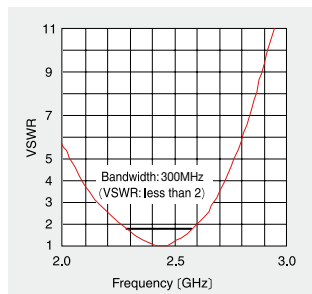


Typical characteristics of VSWR

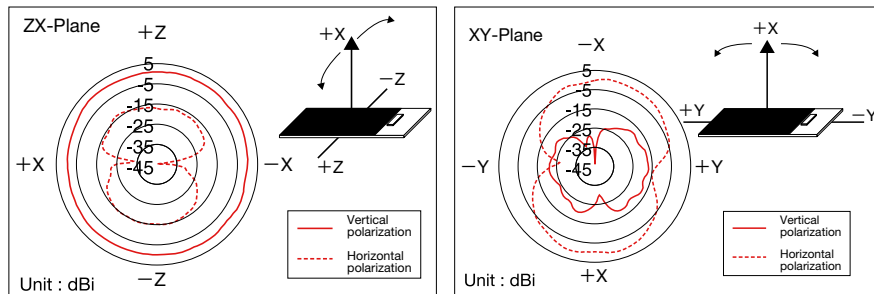


Typical characteristics of radiation pattern (@2.45GHz)

### ●AH 104F2450S1

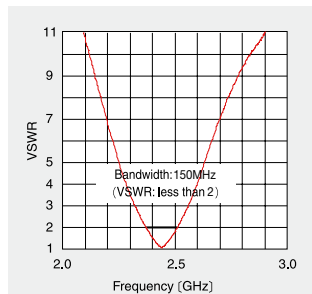


Typical characteristics of VSWR

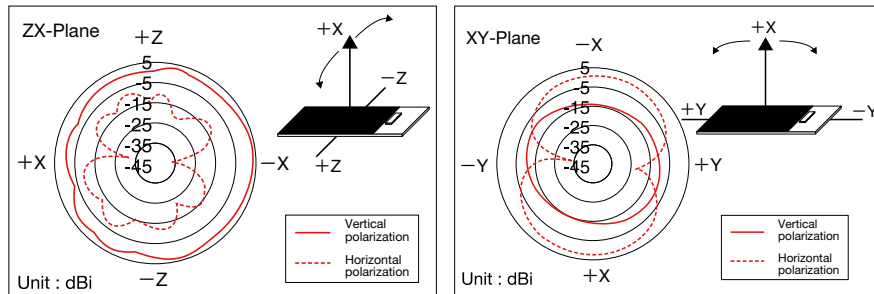


Typical characteristics of radiation pattern (@2.45GHz)

### ●AH 122F245001



Typical characteristics of VSWR

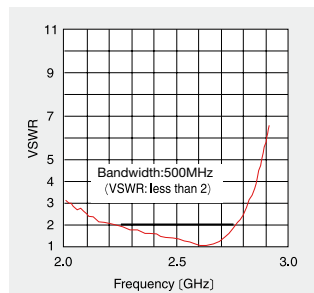


Typical characteristics of radiation pattern (@2.45GHz)

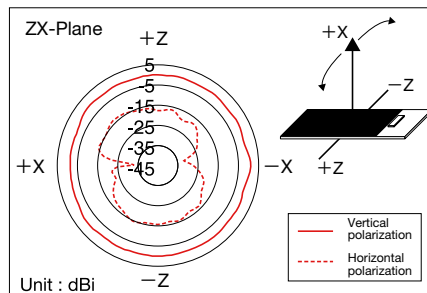
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Typical Characteristics on Taiyo Yuden evaluation board

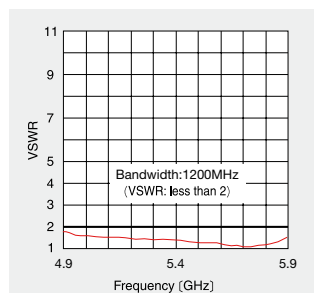
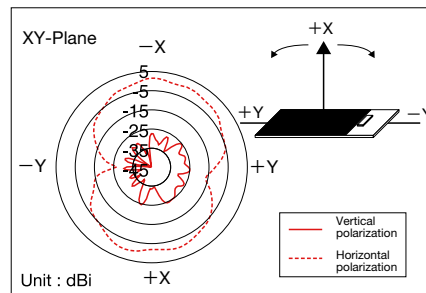
● AH 104N2450D1



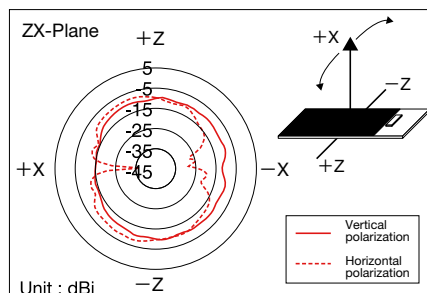
Typical characteristics of VSWR (2GHz band)



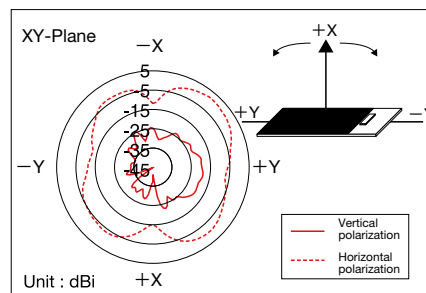
Typical characteristics of radiation pattern (@2.45GHz)



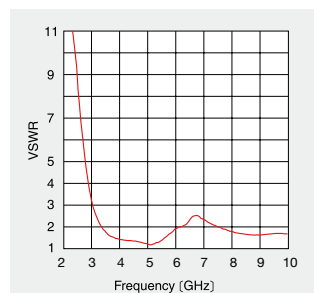
Typical characteristics of VSWR (5GHz band)



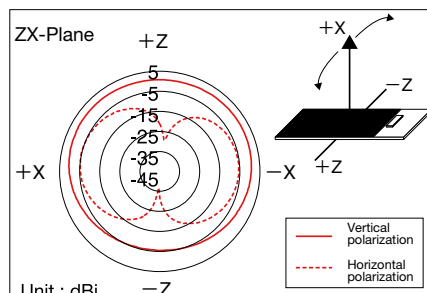
Typical characteristics of radiation pattern (@5.25GHz)



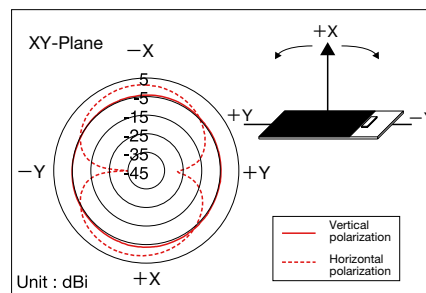
● AH 086M555003



Typical characteristics of VSWR



Typical characteristics of radiation pattern (@3.96GHz)



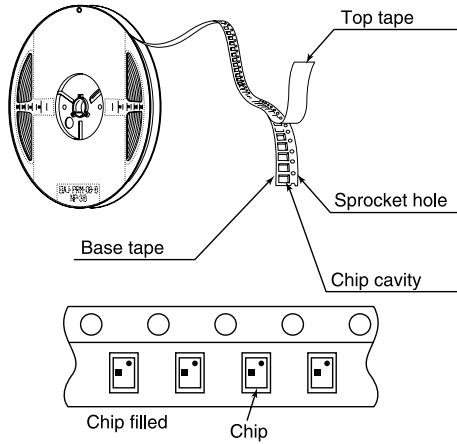
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① Minimum Quantity

| Type                                           | Standard Quantity (pcs)<br>Embossed Tape |
|------------------------------------------------|------------------------------------------|
| AF216M, AF816M, AF116M, AH104F, AH122F, AH104N | 2000                                     |
| AH316M                                         | 3000                                     |
| AH083F, AH086M                                 | 1000                                     |
| AH212M                                         | 4000                                     |

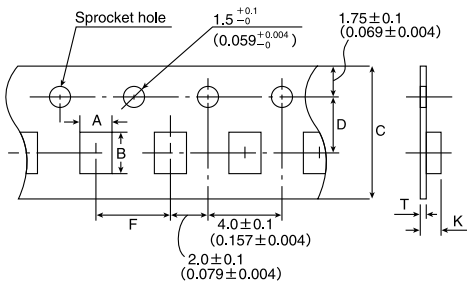
② Tape Material

Embossed Tape

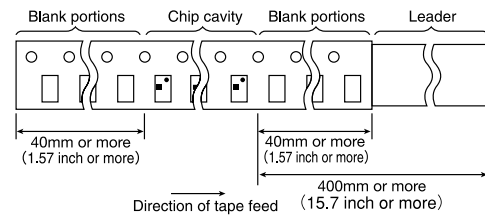


③ Taping Dimensions

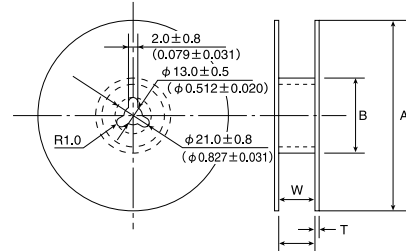
● Embossed Tape



④ Leader and Blank Portion



⑤ Reel size

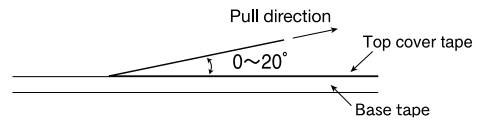


| Type                             | A                        | B                        | W                         | T                       |
|----------------------------------|--------------------------|--------------------------|---------------------------|-------------------------|
| AF216M, AH212M<br>AH316M         | 178±2.0<br>(7.0±0.08)    | 50 min.<br>(2.0 min.)    | 10.0±1.5<br>(0.394±0.06)  | 3.0 max.<br>(0.12 max.) |
| AF816M<br>AH083F                 | 178±2.0<br>(7.0±0.08)    | 50 min.<br>(2.0 min.)    | 17.0±1.0<br>(0.67±0.04)   | 2.5 max.<br>(0.1 max.)  |
| AF116M, AH104F<br>AH122F, AH104N | 330±2.0<br>(13.0±0.08)   | 100±1.0<br>(3.94±0.04)   | 25.5±1.0<br>(1.0±0.04)    | 3.0 max.<br>(0.12 max.) |
| AH086M                           | 330 ± 2.0<br>(13.0±0.08) | 100 ± 1.0<br>(3.94±0.04) | 17.0 ± 1.0<br>(0.67±0.04) | 2.5 max.<br>(0.1 max.)  |

Unit : mm (inch)

⑥ Top Tape Strength

The top tape requires a peel-off force of 0.1~0.7N in the direction of the arrow as illustrated below.



| Type              | Chip Cavity               |                            | Tape Widthness          |                           | Insertion Pitch         | Tape Thickness MAX. |                 |
|-------------------|---------------------------|----------------------------|-------------------------|---------------------------|-------------------------|---------------------|-----------------|
|                   | A                         | B                          | C                       | D                         | F                       | K                   | T               |
| AF216M            | 1.85±0.2<br>(0.073±0.008) | 2.75±0.2<br>(0.108±0.008)  | 8±0.2<br>(0.315±0.008)  | 3.5±0.1<br>(0.138±0.004)  | 4±0.1<br>(0.157±0.004)  | 1.95<br>(0.077)     | 0.3<br>(0.012)  |
| AF816M            | 1.95±0.2<br>(0.077±0.008) | 8.4±0.2<br>(0.331±0.008)   | 16±0.3<br>(0.630±0.012) | 7.5±0.1<br>(0.296±0.004)  | 4±0.1<br>(0.157±0.004)  | 2.05<br>(0.081)     | 0.35<br>(0.014) |
| AF116M            | 1.95±0.2<br>(0.077±0.008) | 11.4±0.2<br>(0.449±0.008)  | 24±0.3<br>(0.945±0.012) | 11.5±0.1<br>(0.453±0.004) | 4±0.1<br>(0.157±0.004)  | 2.05<br>(0.081)     | 0.35<br>(0.014) |
| AH316M            | 1.9±0.2<br>(0.075±0.008)  | 3.5±0.2<br>(0.138±0.008)   | 8±0.2<br>(0.315±0.012)  | 3.5±0.1<br>(0.138±0.004)  | 4±0.1<br>(0.157±0.004)  | 0.85<br>(0.033)     | 0.3<br>(0.012)  |
| AH083F            | 3.35±0.2<br>(0.132±0.008) | 8.35±0.2<br>(0.329±0.008)  | 16±0.3<br>(0.630±0.012) | 7.5±0.1<br>(0.295±0.004)  | 8±0.1<br>(0.315±0.004)  | 1.55<br>(0.061)     | 0.3<br>(0.012)  |
| AH104F,<br>AH104N | 4.35±0.2<br>(0.171±0.008) | 10.35±0.2<br>(0.407±0.008) | 24±0.3<br>(0.945±0.012) | 11.5±0.1<br>(0.435±0.004) | 8±0.1<br>(0.315±0.004)  | 1.55<br>(0.061)     | 0.3<br>(0.012)  |
| AH122F            | 2.3±0.2<br>(0.091±0.008)  | 12.3±0.2<br>(0.484±0.008)  | 24±0.3<br>(0.945±0.012) | 11.5±0.1<br>(0.435±0.004) | 4±0.1<br>(0.157±0.004)  | 1.45<br>(0.057)     | 0.35<br>(0.014) |
| AH086M            | 6.25±0.2<br>(0.246±0.008) | 8.26±0.2<br>(0.325±0.008)  | 16±0.3<br>(0.630±0.012) | 7.5±0.1<br>(0.296±0.004)  | 12±0.1<br>(0.473±0.004) | 1.3<br>(0.051)      | 0.3<br>(0.012)  |
| AH212M            | 1.5±0.2<br>(0.059±0.008)  | 2.3±0.2<br>(0.091±0.008)   | 8±0.3<br>(0.315±0.012)  | 3.5±0.1<br>(0.138±0.004)  | 4±0.1<br>(0.157±0.004)  | 1.5<br>(0.059)      | 0.3<br>(0.012)  |

Unit : mm (inch)

## RELIABILITY DATA

|                                                                                                                                                                                                        |                                                                               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| 1. Operating Temperature Range                                                                                                                                                                         |                                                                               |
| Specified Value                                                                                                                                                                                        | −20~+80℃                                                                      |
| 2. Storage Temperature Range                                                                                                                                                                           |                                                                               |
| Specified Value                                                                                                                                                                                        | −40~+85℃                                                                      |
| 【Test Methods and Remarks】<br>※with being taped, −20~+35℃                                                                                                                                              |                                                                               |
| 3. Solderability                                                                                                                                                                                       |                                                                               |
| Specified Value                                                                                                                                                                                        | At least 90% of immersed terminal surface is covered by new solder.           |
| 【Test Methods and Remarks】<br>Solder temperature : 230±5℃<br>Duration : 3±1 sec.<br>Preconditioning : Preheating at 150℃ after immersion into flux.                                                    |                                                                               |
| 4. Thermal Shock                                                                                                                                                                                       |                                                                               |
| Specified Value                                                                                                                                                                                        | Shall satisfy required VSWR value of individual specifications for each item. |
| 【Test Methods and Remarks】<br>1 hour of recovery after 10 times of 30min.immersion alternately at −40℃ and 85℃ of temperature, followed by evaluating electrical characteristics.                      |                                                                               |
| 5. High Temperature Storage Test                                                                                                                                                                       |                                                                               |
| Specified Value                                                                                                                                                                                        | Shall satisfy required VSWR value of individual specifications for each item. |
| 【Test Methods and Remarks】<br>1 hour of recovery under standard condition after 96 hours recovery with 85℃ of temperature, followed by evaluating electrical characteristics.                          |                                                                               |
| 6. Low Temperature Storage Test                                                                                                                                                                        |                                                                               |
| Specified Value                                                                                                                                                                                        | Shall satisfy required VSWR value of individual specifications for each item. |
| 【Test Methods and Remarks】<br>1 hour of recovery under standard condition after 96 hours recovery with −40℃ of temperature, followed by evaluating electrical characteristics.                         |                                                                               |
| 7. Humidity Storage Test                                                                                                                                                                               |                                                                               |
| Specified Value                                                                                                                                                                                        | Shall satisfy required VSWR value of individual specifications for each item. |
| 【Test Methods and Remarks】<br>1 hour of recovery under standard condition after 96 hours recovery with 60℃ of temperature, 90~95% relative humidity followed by evaluating electrical characteristics. |                                                                               |
| 8. Resistance to Reflow                                                                                                                                                                                |                                                                               |
| Specified Value                                                                                                                                                                                        | Shall satisfy required VSWR value of individual specifications for each item. |
| 【Test Methods and Remarks】<br>Two times of reflow soldering by recommended profile attached, followed by evaluating electrical characteristics.                                                        |                                                                               |

\* This catalog contains the typical specification only due to the limitation of space. When you consider the purchase of our products, please check our specification.  
For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (<http://www.ty-top.com/>) or CD catalogs.

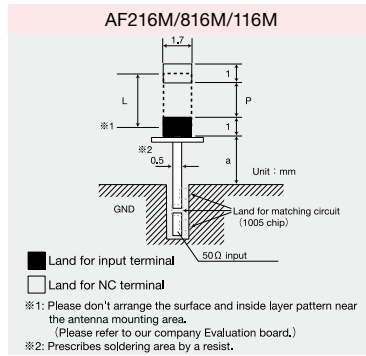
## PRECAUTIONS

### 1. PCB Design

**◆ Land pattern design**  
Please do not arrange the surface and inside layer pattern near the antenna mounting area.

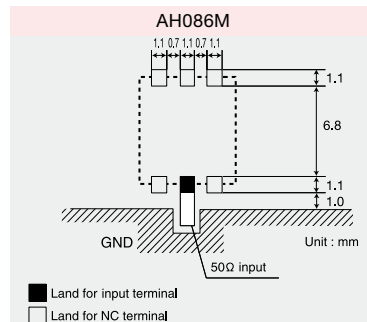
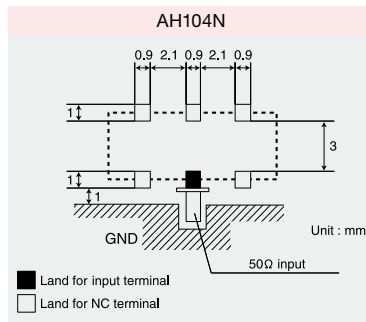
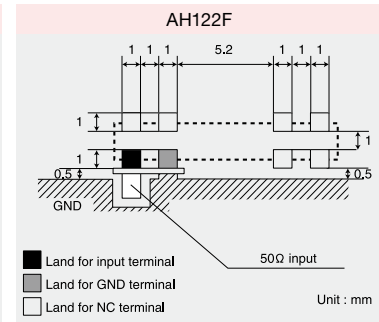
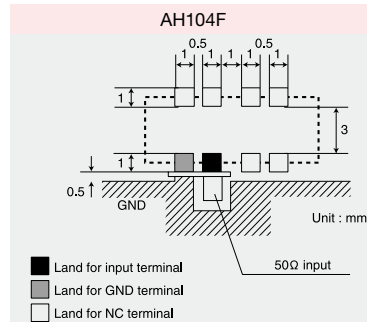
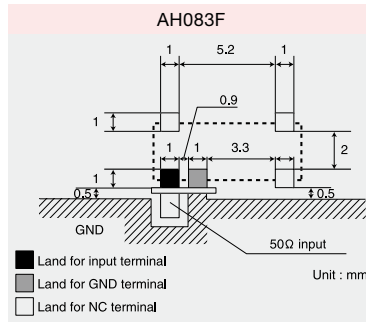
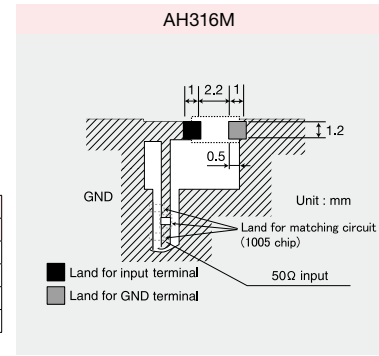
**◆ Land pattern design**  
Land pattern dimension examples and recommended antenna land pattern

Technical Considerations



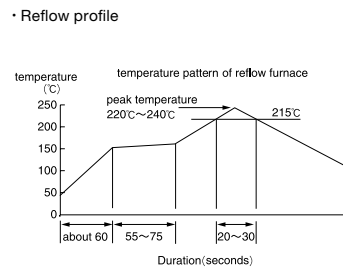
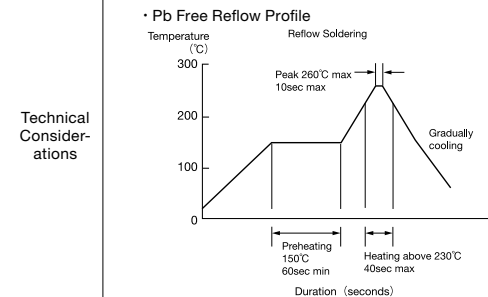
| Type   | Dimensions |     |   |
|--------|------------|-----|---|
|        | L          | P   | a |
| AF216M | 2.5        | 1.5 | 3 |
| AF816M | 8          | 7   | 5 |
| AF116M | 11         | 10  | 3 |
| AH212M | 2          | 1   | 3 |

Unit : mm



### 2. Soldering

**◆ Conditions of Reflow soldering (for reference)**



※ Components should be preheated to within 100 to 130°C from soldering temperature.  
※ Assured to be reflow soldering for 2 times.

Note : The above profiles are the maximum allowable soldering condition, therefore these profiles are not always recommended.

### 3. Storage Conditions

**◆ Storage conditions**

1. The Products should not be used in the following environments :

- exposure to special gases such as (C12, NH3, SOx, NOx)
- exposure to volatile gas or inflammable gas
- exposure to a lot of dust
- exposure to water or condensation
- exposure to direct sunlight or freezing

Precautions

2. The Products should be kept in the following conditions :

- Temperature : -10~+40°C
- Humidity : 15~85%RH

3. The products should be used within 6 months after delivery. In case of storage over 6 months, solderability shall be checked before actual usage.

■ Please contact our offices for further details of specifications.  
All of the standard values listed here are subject to change without notice due to technical improvements.  
Therefore, please check the specifications carefully before use.

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