

# RF Components

## Ceramic Patch Antennas

### For Bluetooth™ and 2.4GHz Wireless LAN

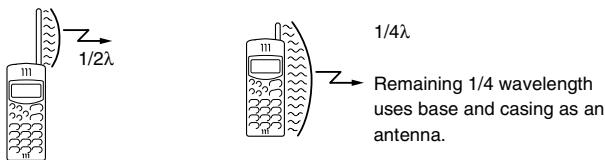
## CABPB1240A(12×12×4mm Type)

#### FEATURES

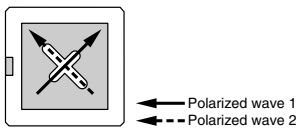
- Stable operation and simple design for mounting  
TDK patch antenna is of  $1/2$  wavelength ( $\lambda$ ) operation type. An antenna itself is grounded, so the antenna is hardly affected by environment and stable operation is achievable. This antenna can be mounted substantially without any restriction and can be designed easily.

#### Differences between $1/2\lambda$ and $1/4\lambda$ operation type antennas

At present, there are two kinds of Bluetooth antenna, namely,  $1/2\lambda$  and  $1/4\lambda$  operation type. Compared with  $1/4\lambda$  operation type which employs its base and casing as part of the antenna, a patch type antenna, namely,  $1/2\lambda$  operation type, employs antenna element itself as a complete antenna. For this reason, the patch type antenna shows stable operation properties without being hardly affected by environment.



- Stable transmission/reception properties not depending on the antenna direction of other communication parties  
In the application of Bluetooth, the antenna direction (polarization) of other communication parties is not constant, so gain loss is apt to be caused by polarization mismatch between transmission and reception. Since this antenna utilizes two orthogonal polarizations, it is hardly affected by a dead zone due to polarization mismatch.



- High gain and low-profile type antenna  
This antenna is high gain type with +2dBi max. It is most suitable for a notebook computer and peripheral equipment which have relative large antenna mounting space and require high gain. Compared with other makers' antenna with the same gain, this antenna is lower in height (4mm).

#### TEMPERATURE AND HUMIDITY RANGES

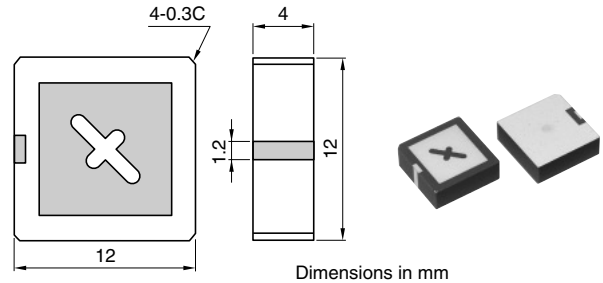
Operating temperature range	-30 to +85°C
Storage temperature range	-40 to +85°C
Humidity range	0 to 90(%)RH [Maximum wet-bulb temperature: 38°C]

#### ELECTRICAL CHARACTERISTICS

Frequency	2442MHz
Band width	85MHz
Return loss	-6dB max.[2400 to 2485MHz]
Antenna gain	+2dBi max.[2400 to 2485MHz]
Input impedance	50Ω[2400 to 2485MHz]
VSWR	3 max.

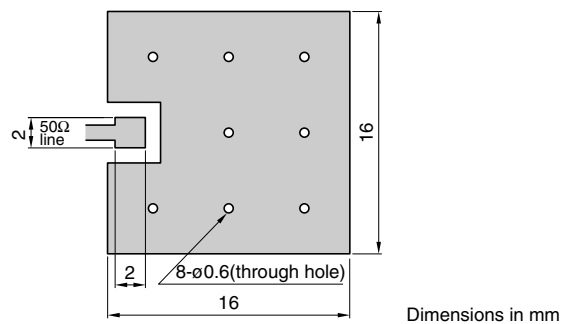
- Evaluated with 40×40mm TDK STD evaluation base.

#### SHAPES AND DIMENSIONS

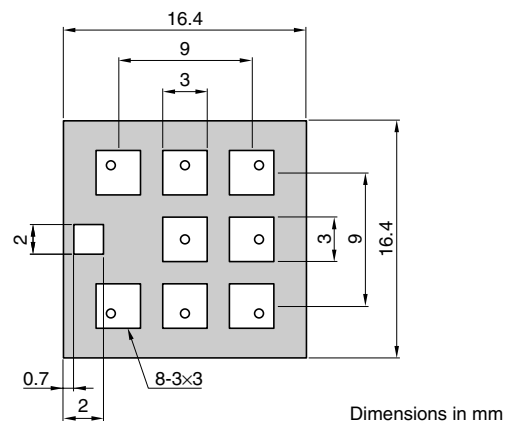


#### RECOMMENDED PC BOARD PATTERNS

##### LAND

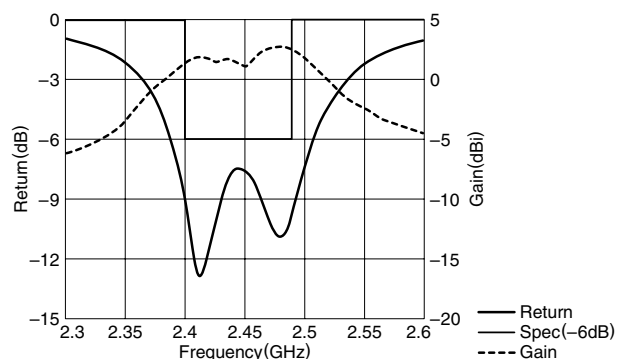


##### SOLDER RESIST



#### TYPICAL ELECTRICAL CHARACTERISTICS

##### RETURN LOSS AND GAIN



- Evaluated with 40×40mm TDK STD evaluation base.

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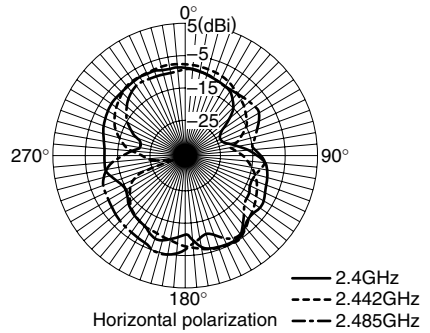
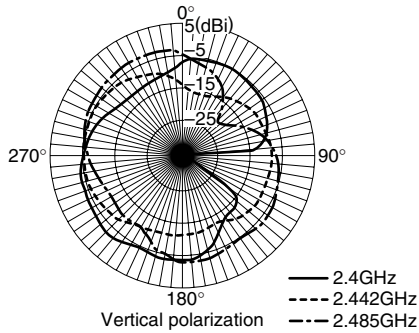
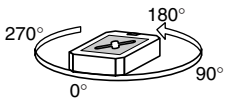
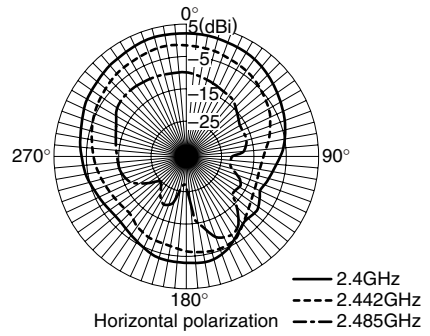
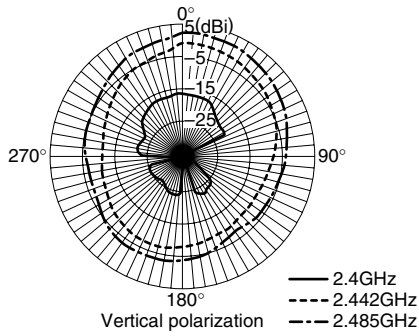
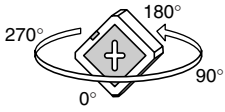
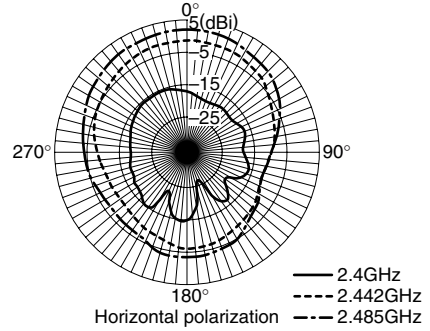
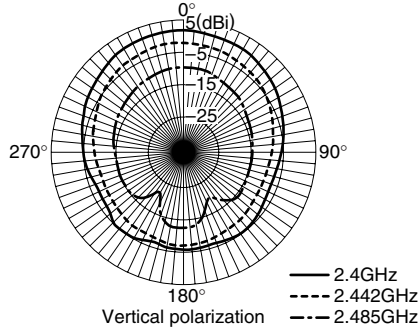
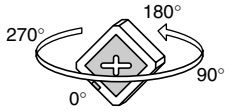
## For Bluetooth™ and 2.4GHz Wireless LAN

### RADIATION PATTERN

Directivity angle

Vertical polarization

Horizontal polarization



- The radiation pattern is measured by mounting the antenna on 40×40mm TDK STD evaluation base.
- Standard antenna: Standard dipole(Anritsu)  
Tx antenna: Horn(Condor Systems)

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## Ceramic Patch Antennas

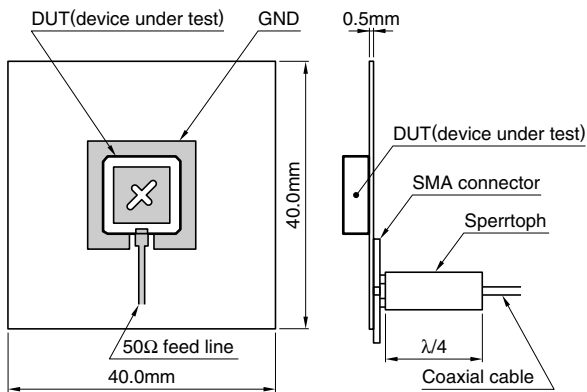
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#### MEASURING METHOD

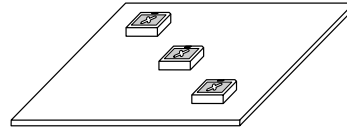
TDK STD evaluation base and configuration for directivity measurement

- Material: Glass-epoxy (FR4)
- Thickness: 0.5mm
- Copper foil thickness: 35μm
- The whole back face is covered with grounding pattern.

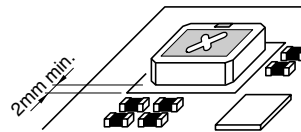


#### ANTENNA MOUNTING METHOD

This antenna can be mounted in any position on a main board.



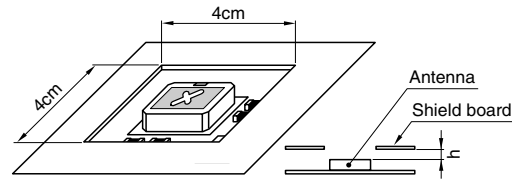
Other components should be mounted about 2mm apart from the antenna (Our recommended land pattern is 16×16mm).



#### SURROUNDINGS AROUND MOUNTED ANTENNA

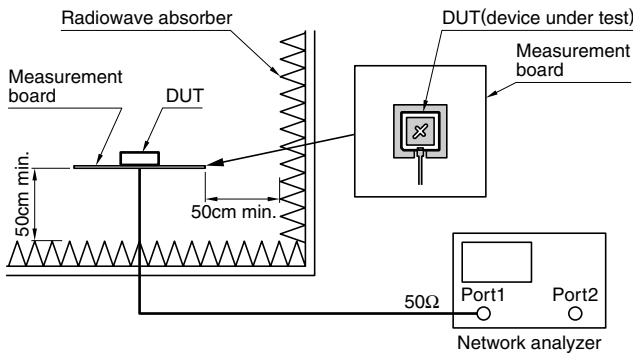
The surroundings around the mounted antenna should be preferably free from any metal piece, because the gain and directivity are affected by a metal piece.

If the antenna is incorporated in equipment with electromagnetic shielding, open a 4×4cm or larger window through the shielding (h=0mm). Then its gain hardly lower (If h is high, make the window larger).



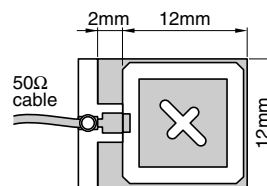
#### MEASURING CIRCUITS

##### RETURN LOSS

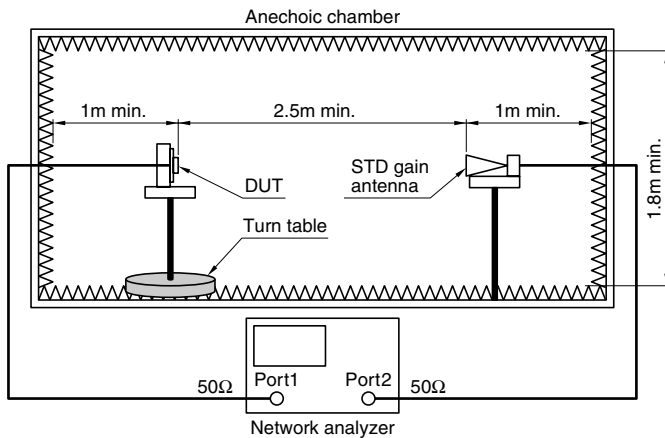


##### IN THE CASE OF SPECIAL ANTENNA BASE

A special antenna base should be larger than a size shown below for ensuring the operation of the antenna. We recommend to make a cable as short as possible to avoid gain loss due to the cable.



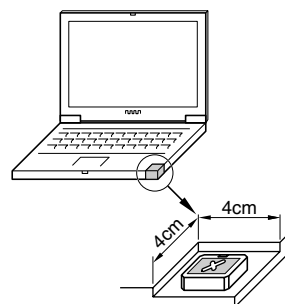
##### GAIN



#### PRECAUTIONS FOR USE

The frequency band may change slightly due to TDK STD evaluation base, metal pieces around the antenna and plastic cover of equipment. In such a case, please consult us about custom product.

#### APPLICATION EXAMPLE OF NOTEBOOK PC



The directivity is measured using a mockup of A4-sized notebook computer with a built-in antenna. The mockup is made of copper plate which scatters electric wave from the antenna. Open a 4×4cm window and install the antenna mounted on TDK STD evaluation base.

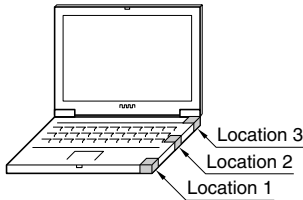
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It is assumed that the antenna is incorporated in the notebook computer. The changes of the average gain and directivity are measured according to the mounting position of the antenna. At



the locations 1 and 3, the average gain is -7.4dBi or over with the good balance of the vertical and horizontal polarizations. In a horizontal plane, no gain loss was observed with display closed.

### AVERAGE GAIN(2465MHz)

Unit: dBi

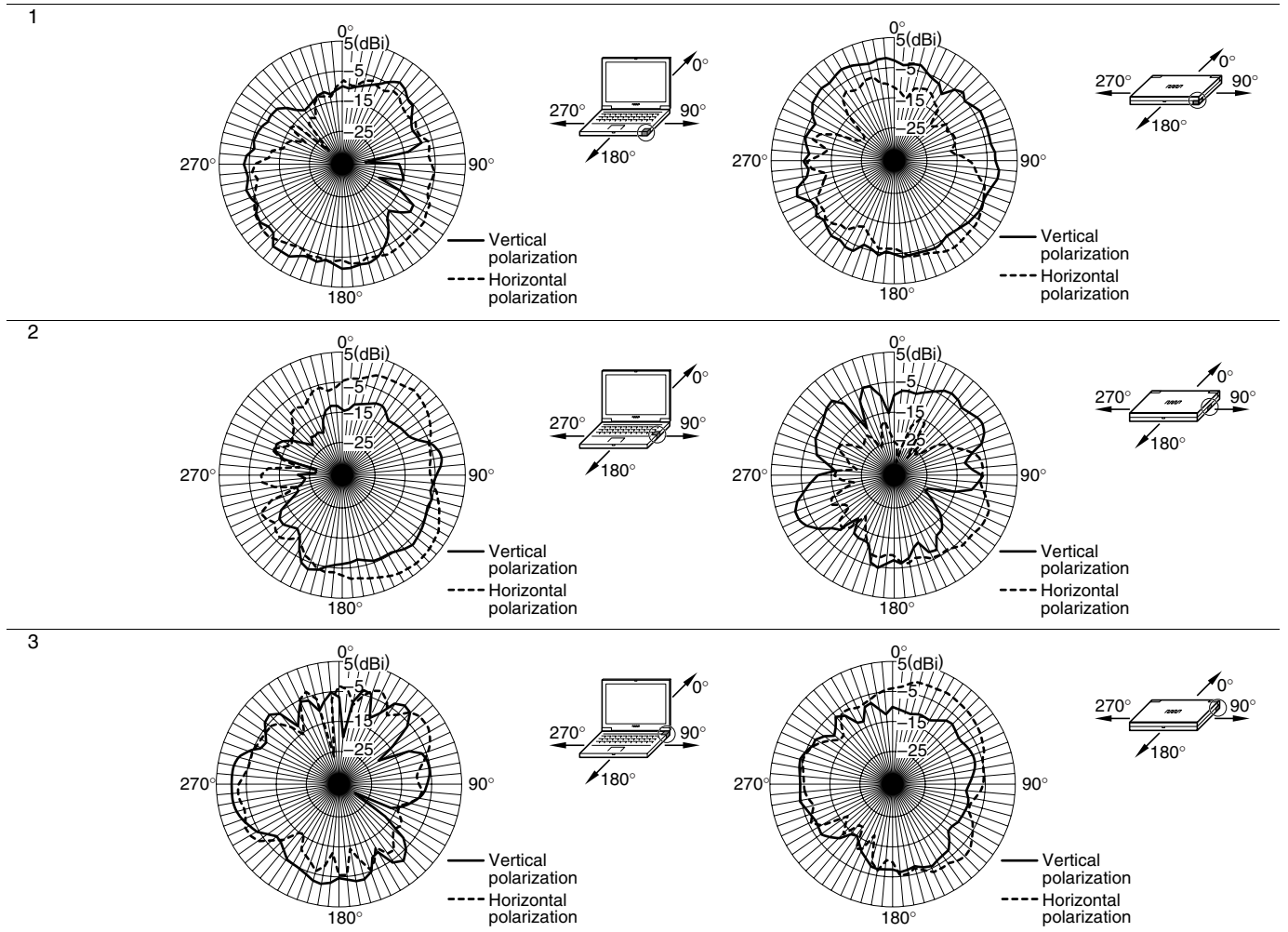
Polarization	Vertical		Horizontal		Average value of vertical and horizontal	
	Open	Closed	Open	Closed	Open	Closed
Location 1	-7.4	-3.7	-7.4	-9.2	-7.4	-6.4
Location 2	-10.6	-5.2	-8.5	-14.0	-9.5	-9.6
Location 3	-6.3	-7.0	-8.5	-6.4	-7.4	-6.7

### RADIATION PATTERN(2465MHz)

Antenna location

Display-Open

Display-Closed



### Electrical Characteristics (Antenna with cable)

Frequency	2442MHz
Cable Lose	0.1dB
Antenna Gain (without cable)	+2.0 dBi max
Antenna Gain (with cable)	+1.9 dBi max
Connector	U.FL
Impedance	50 ohm

Photo: The ceramic patch antenna and cable

