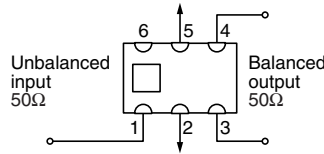
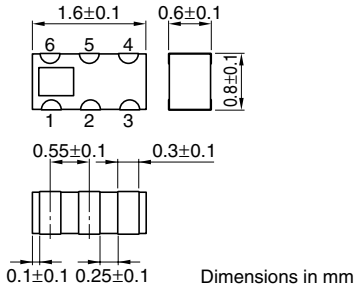


# Multilayer Baluns, HHM Series

## HHM1710D1 For Bluetooth & IEEE802.11b/g

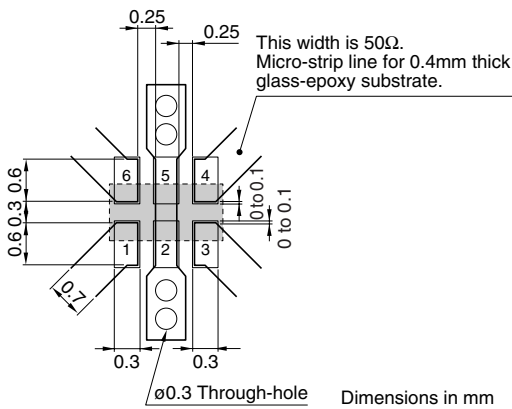
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



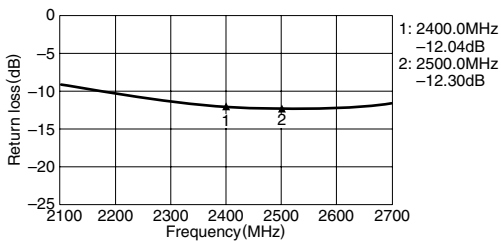
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	50Ω
Frequency range	2400 to 2500MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg
Amplitude impedance at balanced port	0±2.0dB
Insertion loss	1.2dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	4000pieces/reel

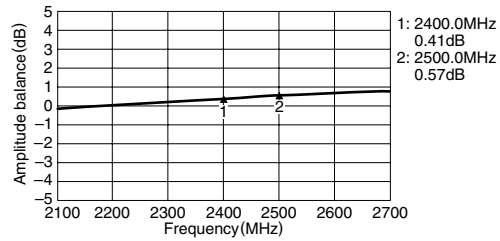
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 50Ω

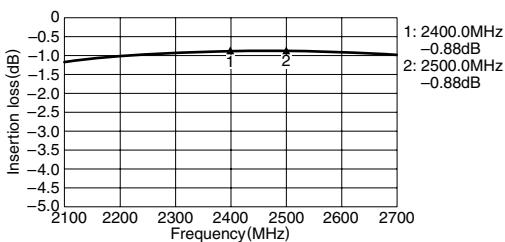
#### RETURN LOSS



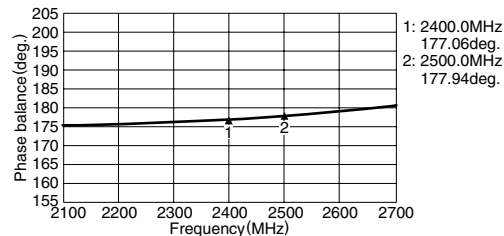
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE



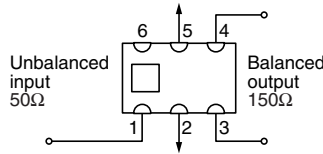
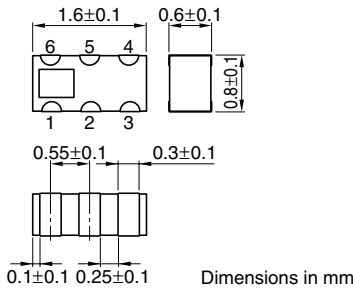
• All specifications are subject to change without notice.



# Multilayer Baluns, HHM Series

## HHM1712D1 For Bluetooth & IEEE802.11b/g

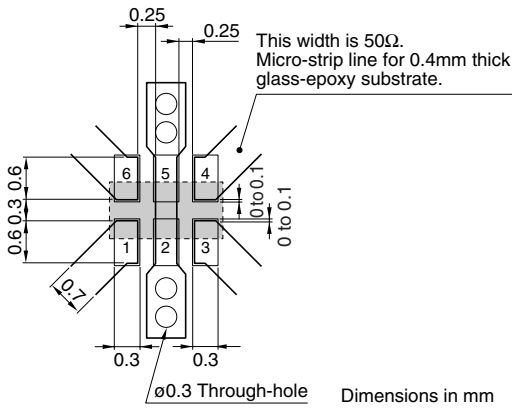
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



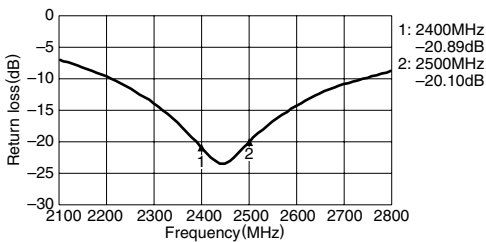
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	150Ω
Frequency range	2400 to 2500 MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg
Amplitude impedance at balanced port	0±2.0dB
Insertion loss	1.2dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	4000pieces/reel

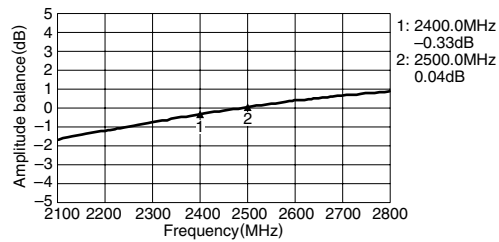
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 150Ω

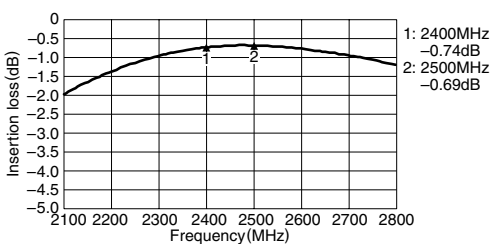
#### RETURN LOSS



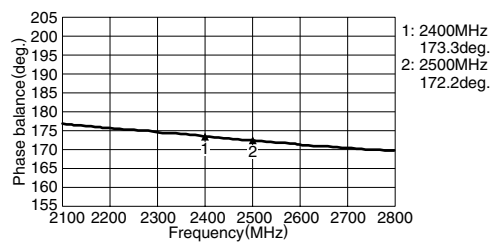
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

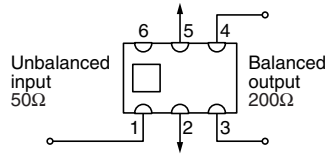
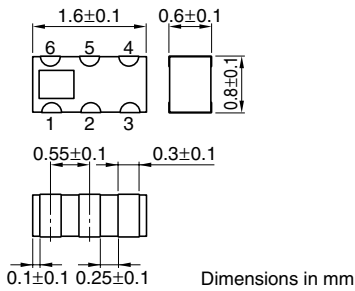


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1713D1 For Bluetooth & IEEE802.11b/g

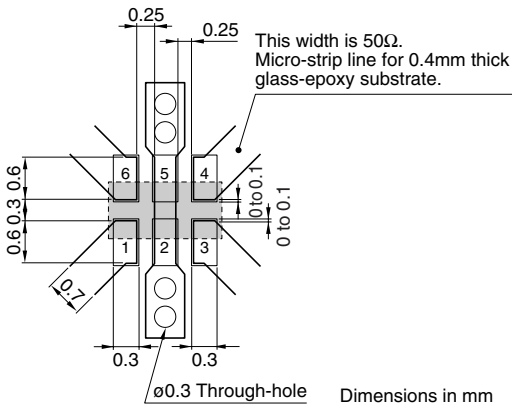
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



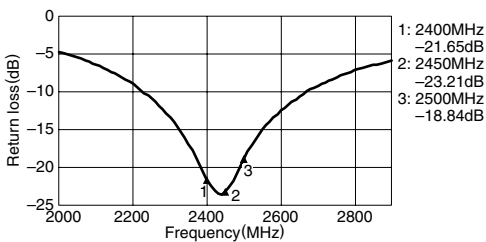
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	200Ω
Frequency range	2400 to 2500 MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg
Amplitude impedance at balanced port	0±2.0dB
Insertion loss	1.2dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	4000pieces/reel

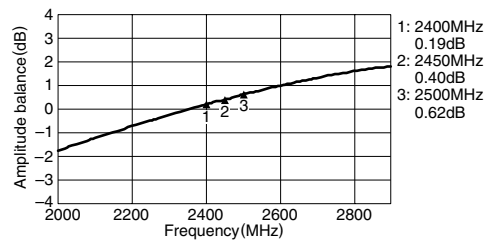
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

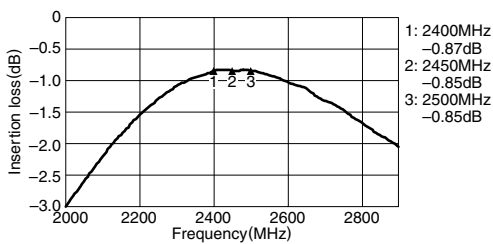
#### RETURN LOSS



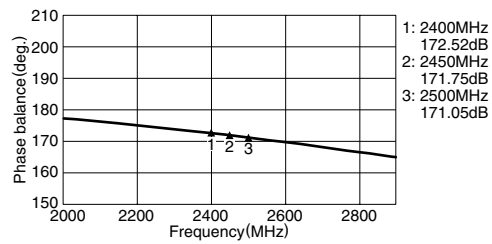
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

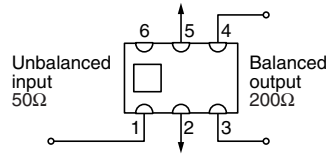
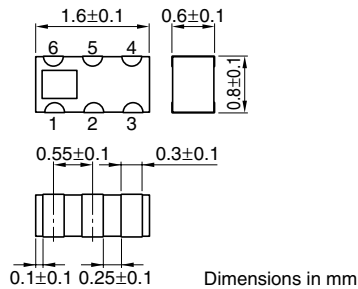


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1720A1 For EGSM

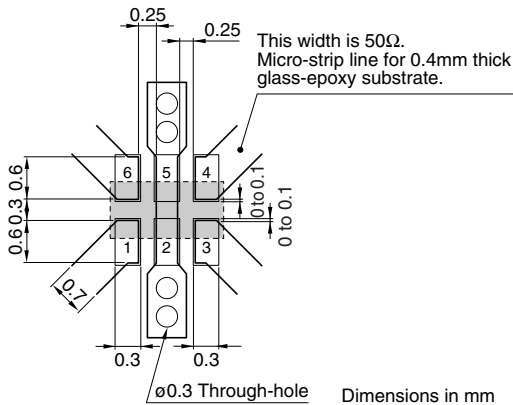
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



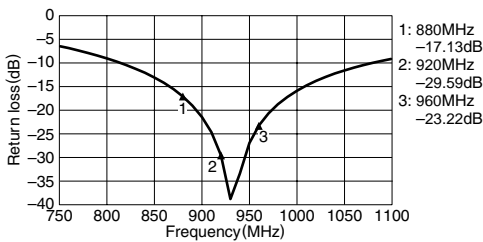
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	200Ω
Frequency range	880 to 960 MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg
Amplitude impedance at balanced port	0±1.0dB
Insertion loss	1.4dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	4000pieces/reel

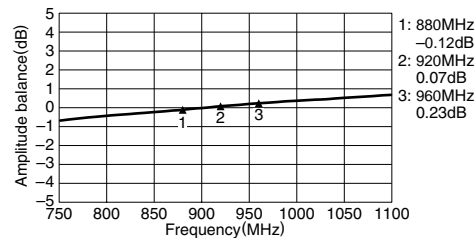
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

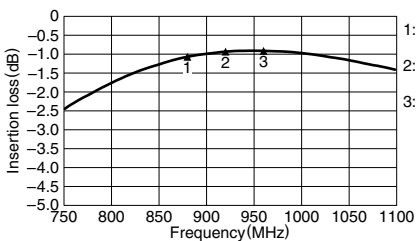
#### RETURN LOSS



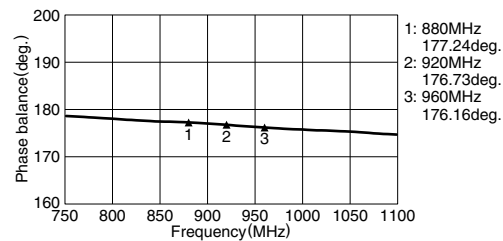
#### AMPLITUDE BALANCE



#### INSERTION LOSS



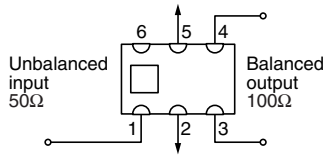
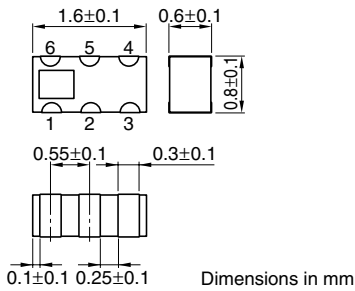
#### PHASE BALANCE



# Multilayer Baluns, HHM Series

## HHM1726L1 For PDC800/Tx+Rx

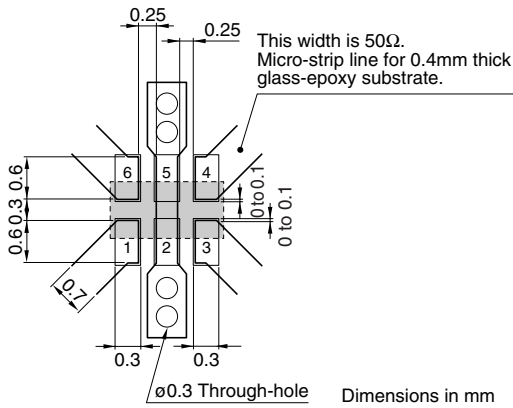
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



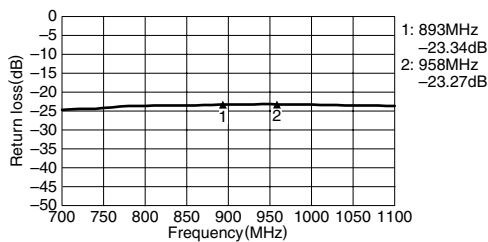
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	100Ω
Frequency range	893 to 958 MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±15deg
Amplitude impedance at balanced port	0±1.5dB
Insertion loss	1.0dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	4000pieces/reel

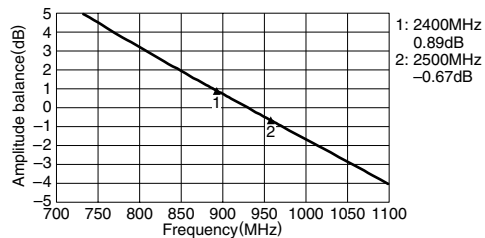
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

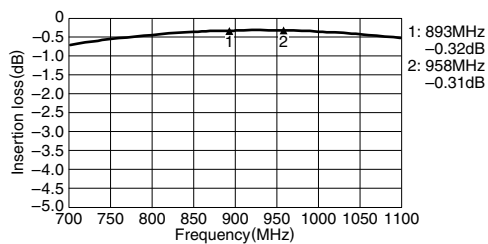
#### RETURN LOSS



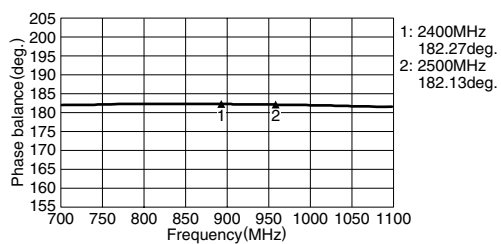
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

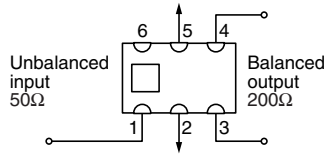
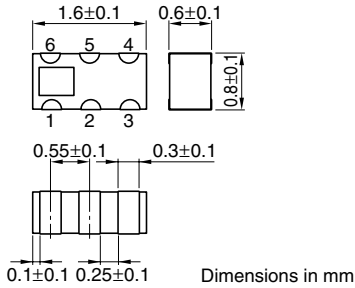


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1731A2 For DCS/Tx+Rx

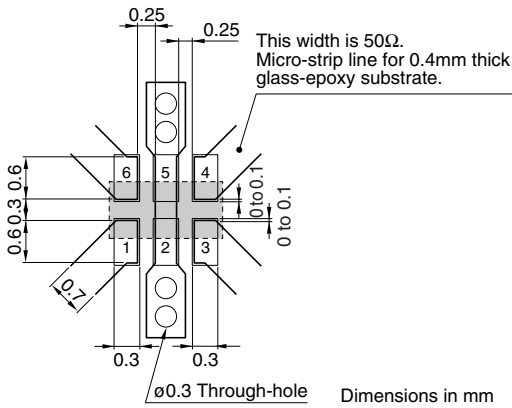
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



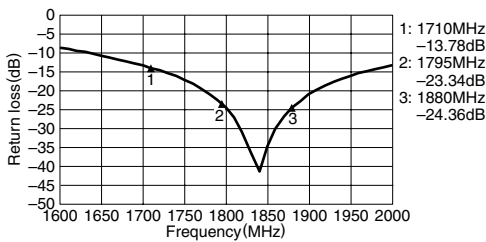
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	200Ω
Frequency range	1710 to 1880 MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg
Amplitude impedance at balanced port	0±2.0dB
Insertion loss	1.2dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	4000pieces/reel

### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

#### RETURN LOSS



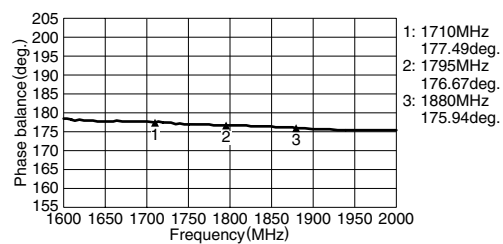
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

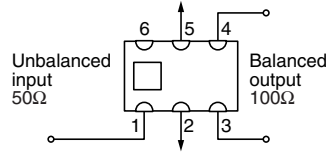
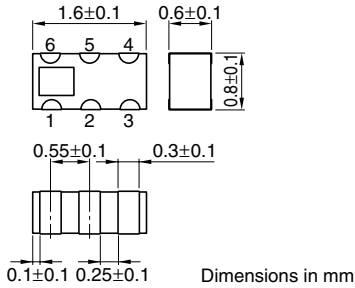


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1732B1 For W-LAN

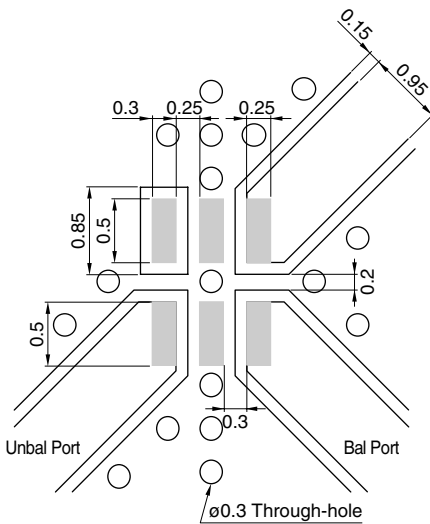
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



Line width be designed to match 50Ω characteristic impedance depending on PCB material and thickness.

Dimensions in mm

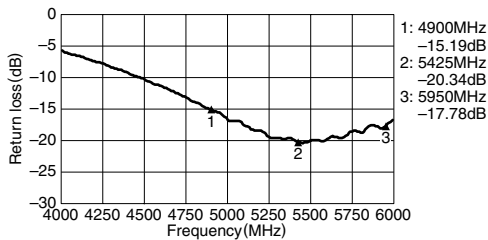
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	100Ω
Frequency range	4900 to 5950 MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg
Amplitude impedance at balanced port	0±2.0dB
Insertion loss	1.0dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	4000pieces/reel

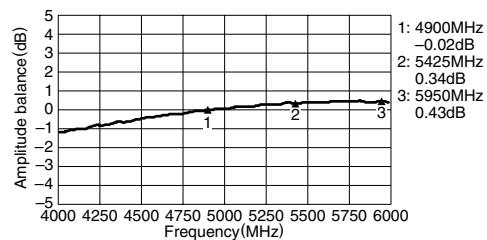
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

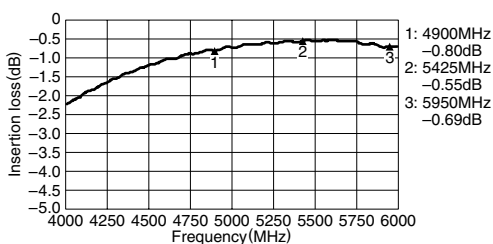
#### RETURN LOSS



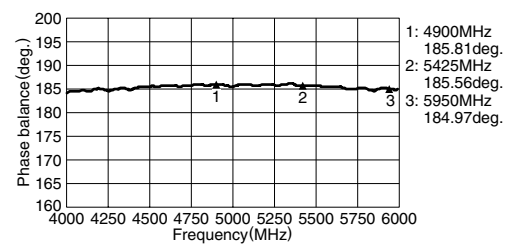
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE



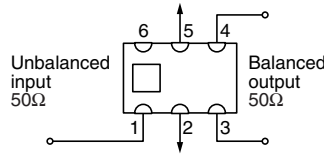
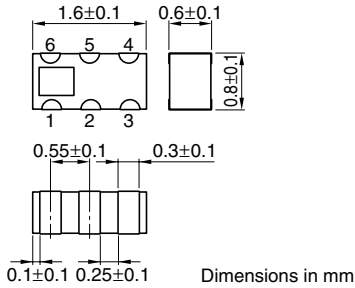
• All specifications are subject to change without notice.



# Multilayer Baluns, HHM Series

## HHM1733B1 For W-LAN

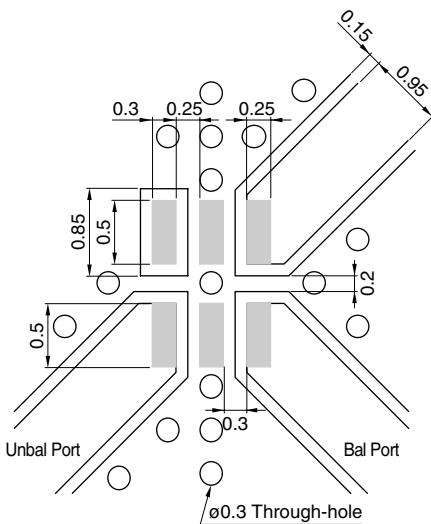
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



Line width be designed to match 50Ω characteristic impedance depending on PCB material and thickness.

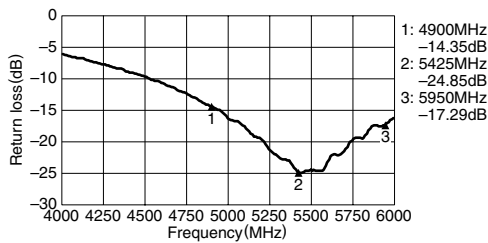
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	50Ω
Frequency range	4900 to 5950 MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg
Amplitude impedance at balanced port	0±1.0dB
Insertion loss	1.2dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	4000pieces/reel

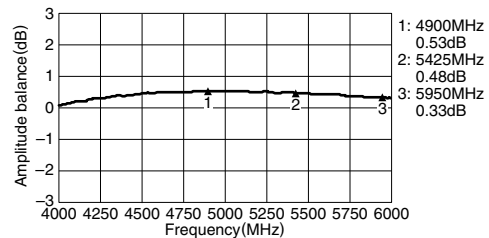
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 50Ω

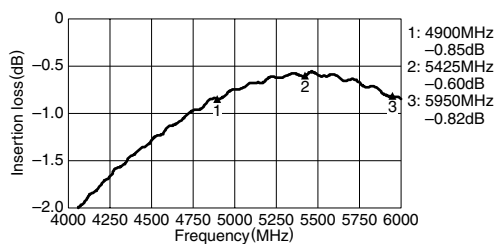
#### RETURN LOSS



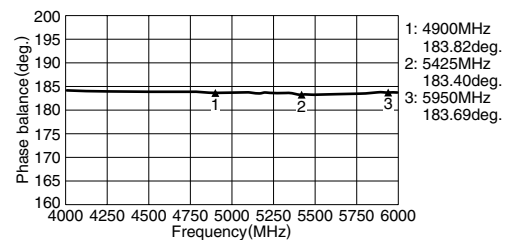
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

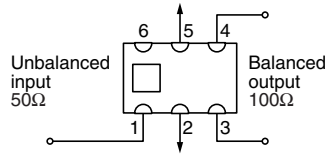
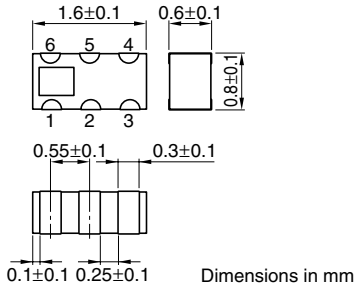


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1743L1 For PDC1500/Local

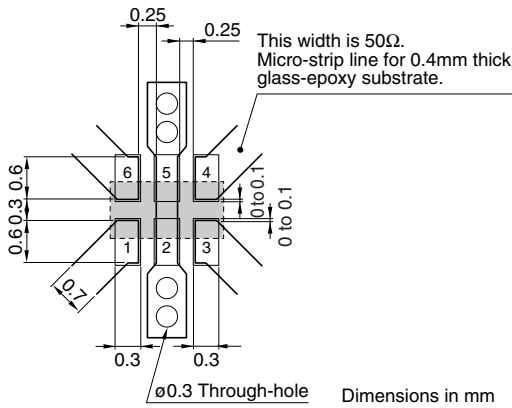
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



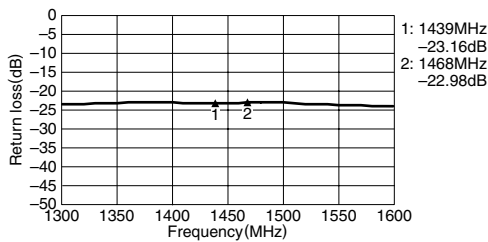
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	100Ω
Frequency range	1439 to 1468 MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±15deg
Amplitude impedance at balanced port	0±1.5dB
Insertion loss	1.0dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	4000pieces/reel

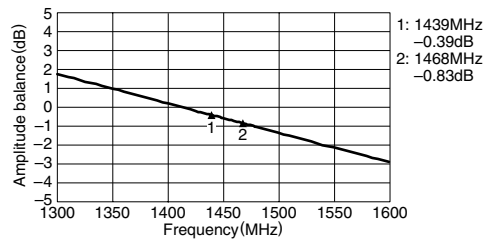
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

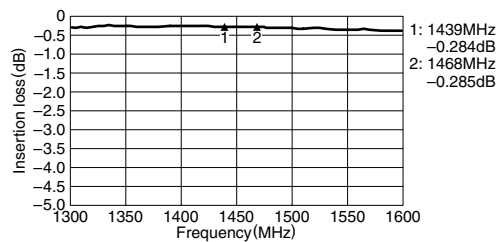
#### RETURN LOSS



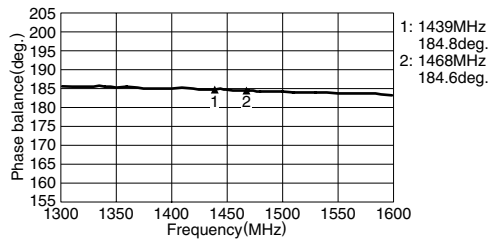
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

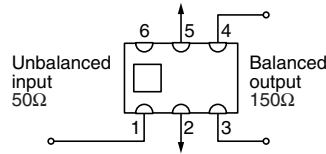
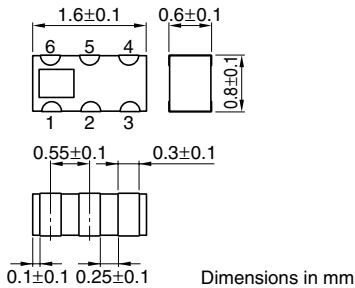


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1748A2 For DCS/Tx+Rx

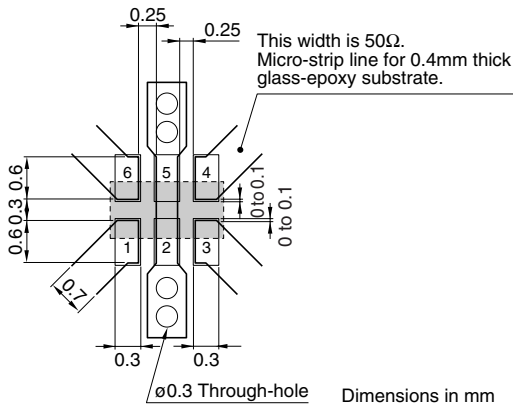
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



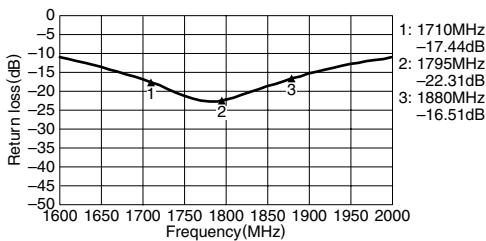
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	150Ω
Frequency range	1710 to 1880 MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg
Amplitude impedance at balanced port	0±2.0dB
Insertion loss	1.2dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	4000pieces/reel

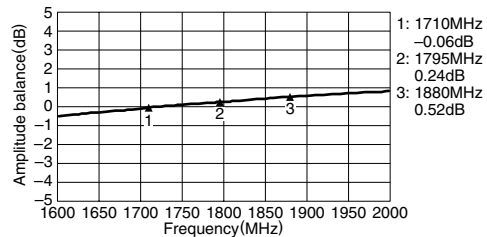
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 150Ω

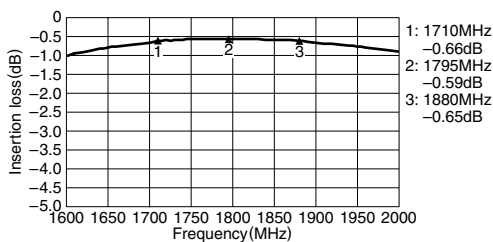
#### RETURN LOSS



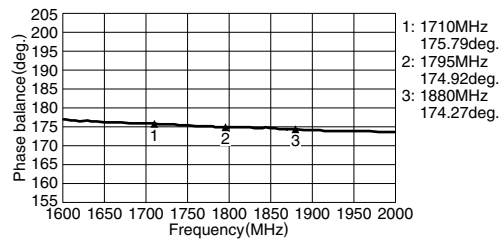
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

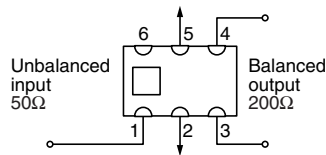
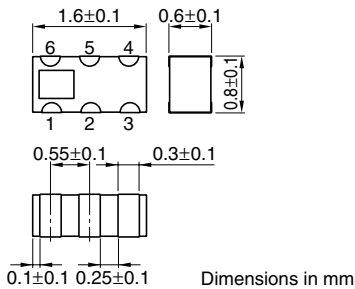


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1752A1 For W-LAN

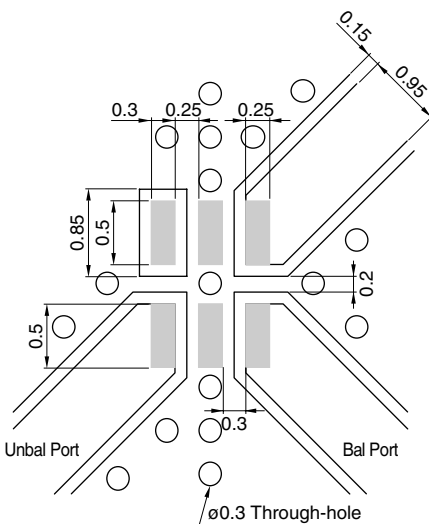
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



Line width be designed to match 50Ω characteristic impedance depending on PCB material and thickness.

Dimensions in mm

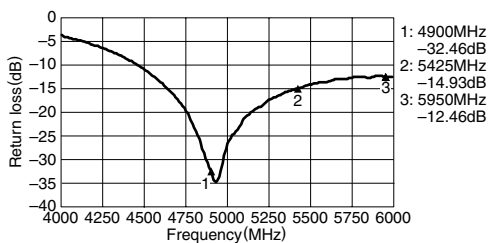
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	200Ω
Frequency range	4900 to 5950 MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg
Amplitude impedance at balanced port	0±2.0dB
Insertion loss	1.2dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	4000pieces/reel

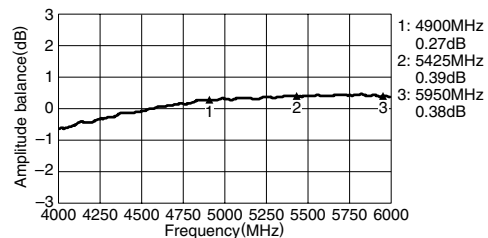
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

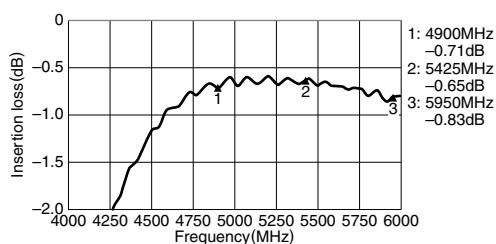
#### RETURN LOSS



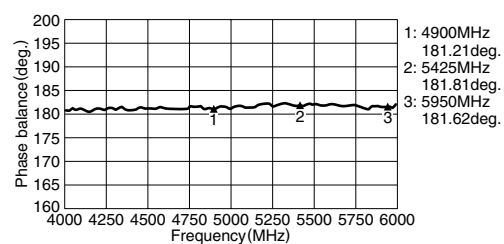
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

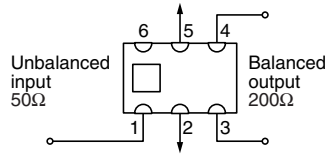
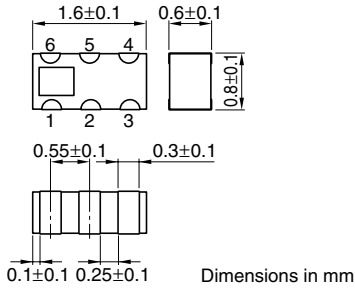


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1752A2 For W-LAN

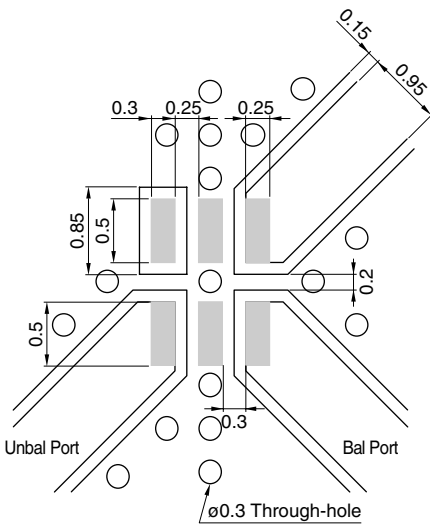
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



Line width be designed to match 50Ω characteristic impedance depending on PCB material and thickness.

Dimensions in mm

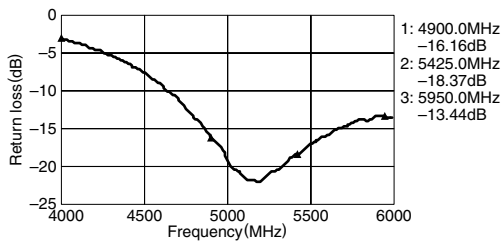
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	200Ω
Frequency range	4900 to 5950 MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg
Amplitude impedance at balanced port	0±1.5dB
Insertion loss	1.2dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	4000pieces/reel

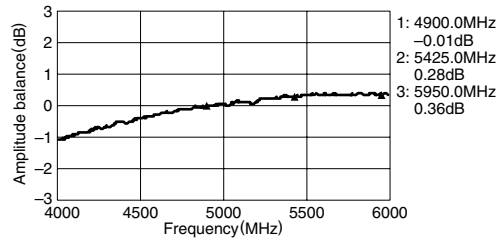
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

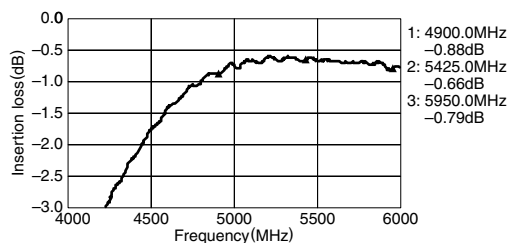
#### RETURN LOSS



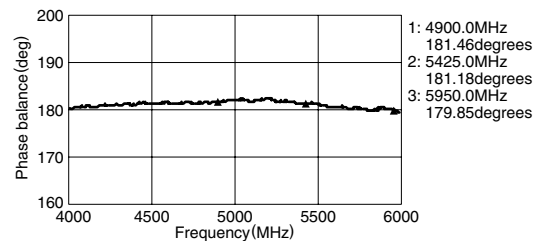
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

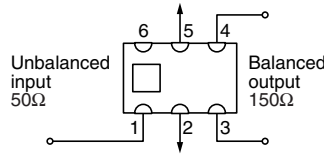
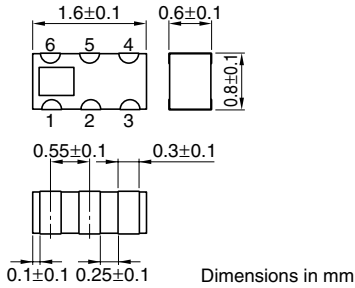


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1763A1 For EGSM

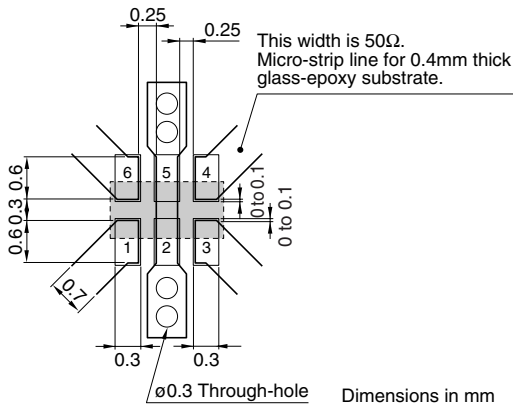
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



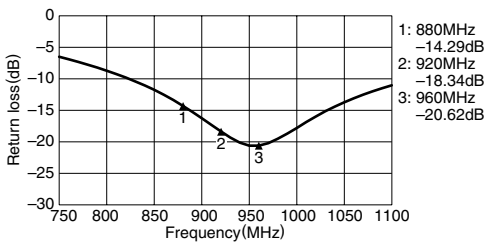
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	150Ω
Frequency range	880 to 960 MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg
Amplitude impedance at balanced port	0±1.0dB
Insertion loss	1.4dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	4000pieces/reel

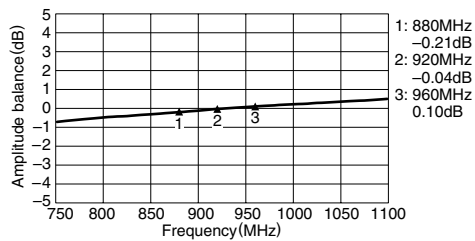
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 150Ω

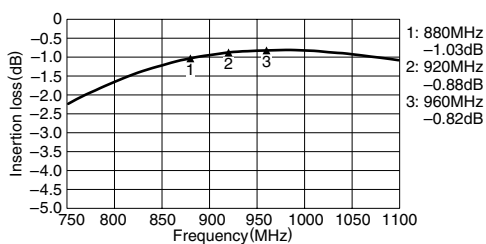
#### RETURN LOSS



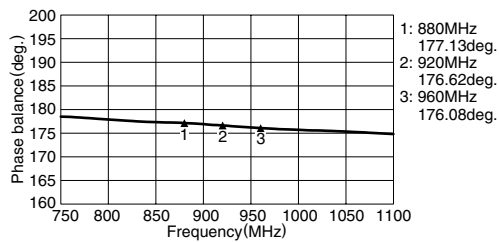
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

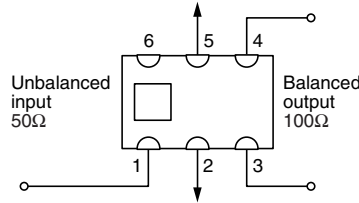
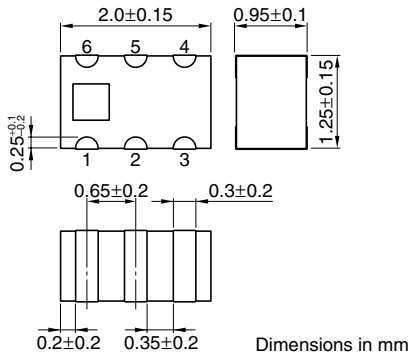


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1502 For DCS/Local

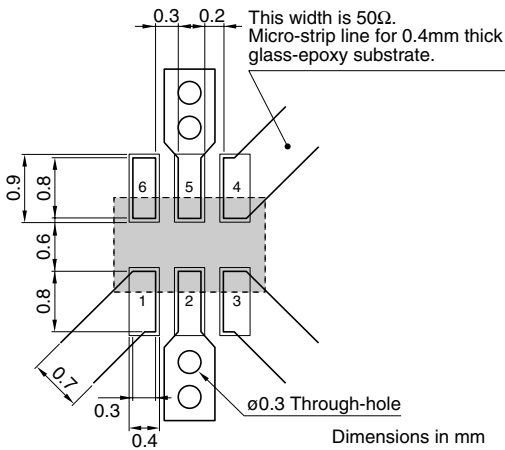
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN

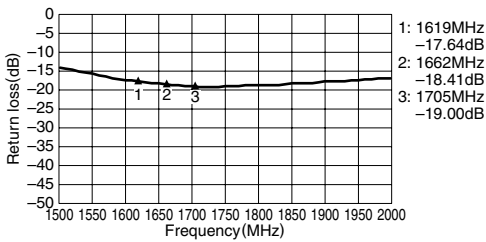


### ELECTRICAL CHARACTERISTICS

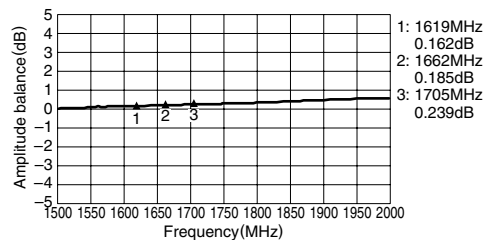
Unbalanced impedance	50Ω
Balanced impedance	100Ω
Frequency range	1662±43 MHz
Unbalanced port return loss	12dB min.
Phase impedance at balanced port	180±5deg.
Amplitude impedance at balanced port	0±1.0dB
Insertion loss	0.8dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

### FREQUENCY CHARACTERISTICS

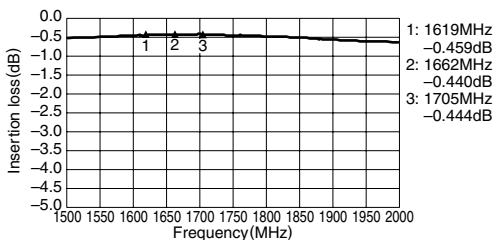
Unbalance 50Ω/Balance 100Ω  
RETURN LOSS



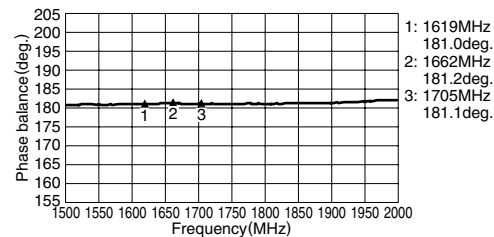
### AMPLITUDE BALANCE



### INSERTION LOSS



### PHASE BALANCE

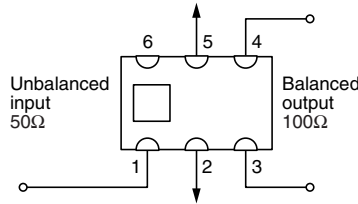
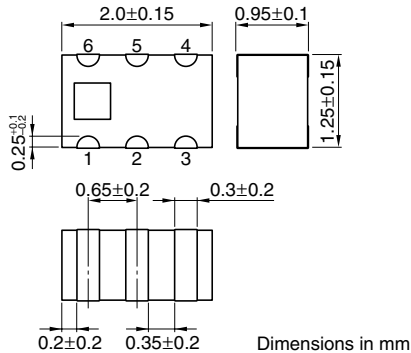


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1506 For W-CDMA/Tx-Rx

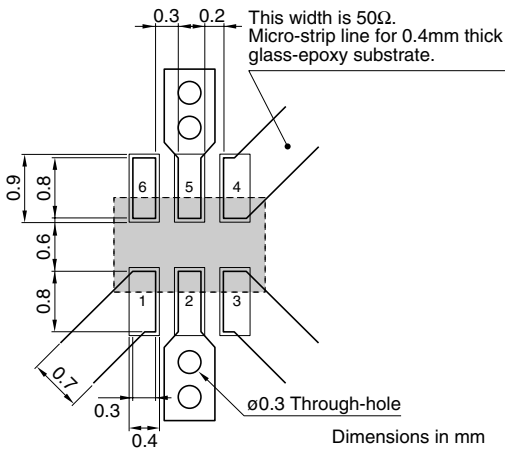
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



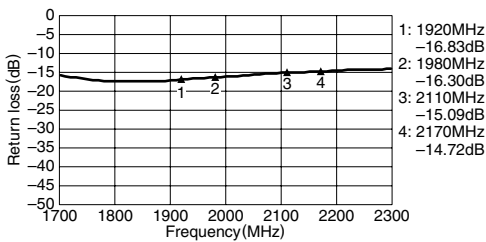
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	100Ω
Frequency range	1920 to 1980, 2110 to 2170MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg.
Amplitude impedance at balanced port	0±2.0dB
Insertion loss	1.0dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

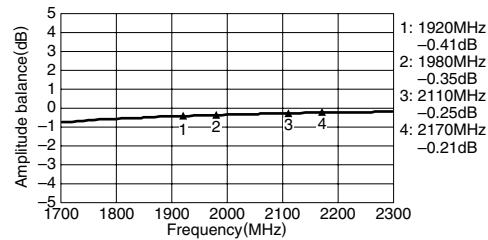
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

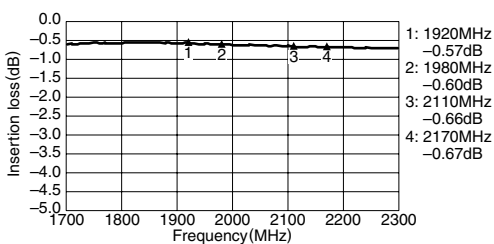
#### RETURN LOSS



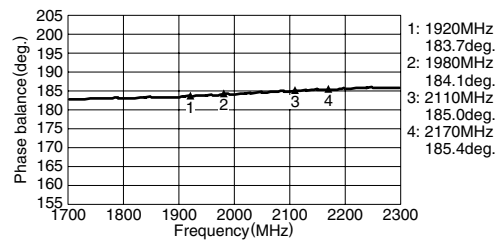
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

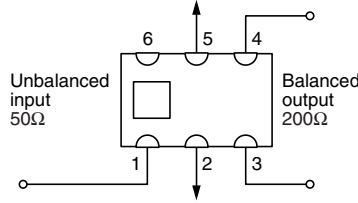
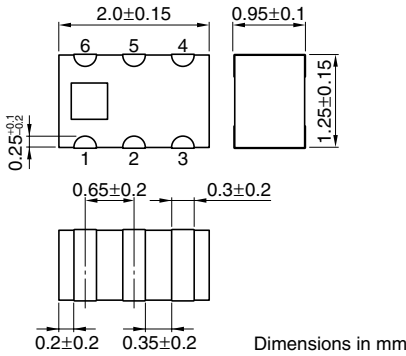




# Multilayer Baluns, HHM Series

## HHM1509 For EGSM-DCS/Local

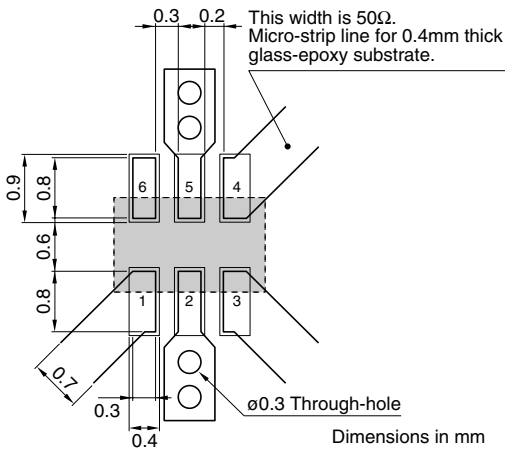
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN

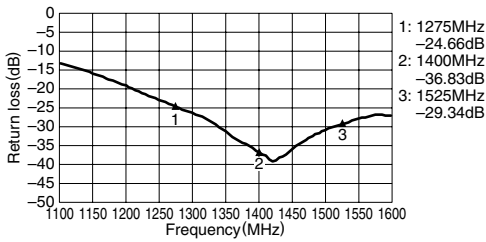


### ELECTRICAL CHARACTERISTICS

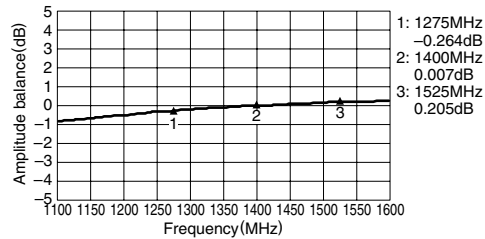
Unbalanced impedance	50Ω
Balanced impedance	200Ω
Frequency range	1275 to 1525MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg.
Amplitude impedance at balanced port	0±2.0dB
Insertion loss	1.0dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

### FREQUENCY CHARACTERISTICS

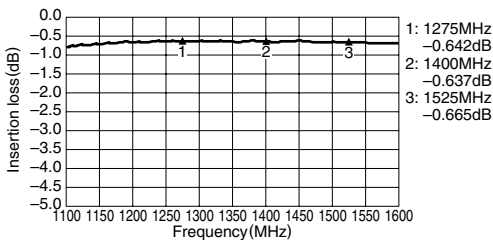
Unbalance 50Ω/Balance 200Ω  
RETURN LOSS



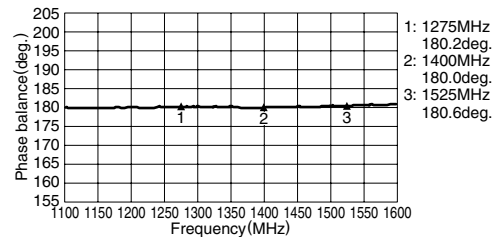
### AMPLITUDE BALANCE



### INSERTION LOSS



### PHASE BALANCE

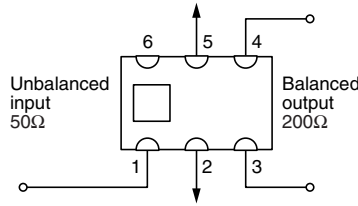
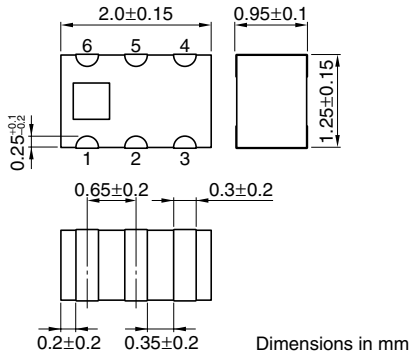


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1515B2 For EGSM/Tx-Rx

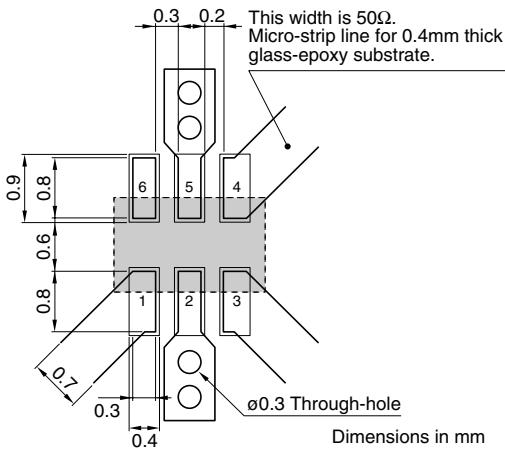
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



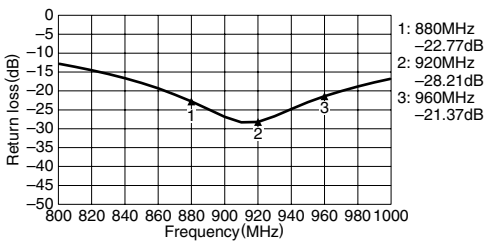
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	200Ω
Frequency range	880 to 960MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg.
Amplitude impedance at balanced port	0±1.0dB
Insertion loss	1.0dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

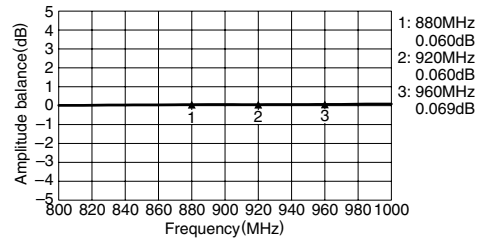
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

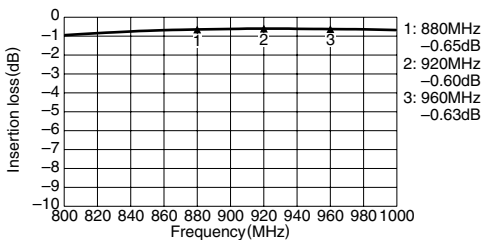
#### RETURN LOSS



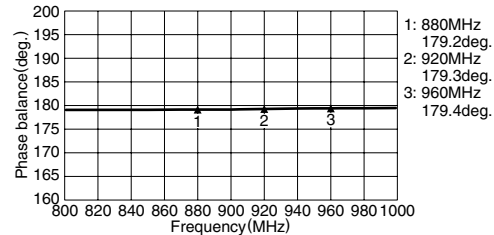
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

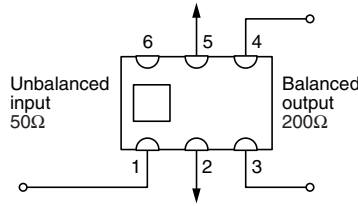
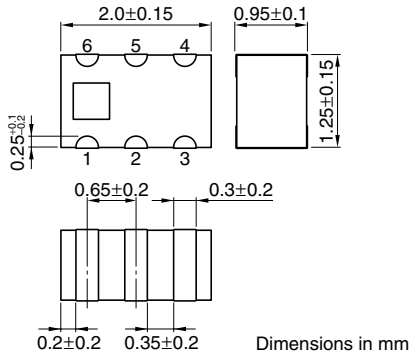


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1516 For DCS-PCS/Tx-Rx

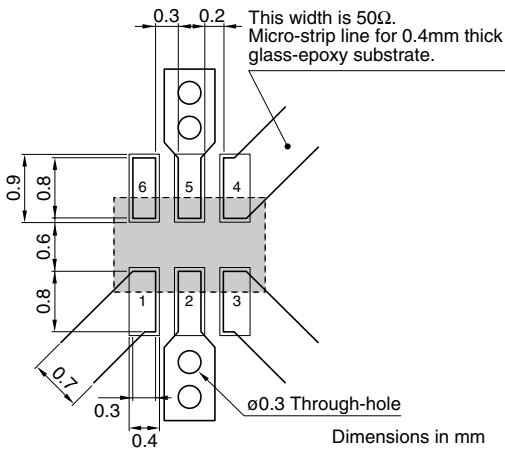
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN

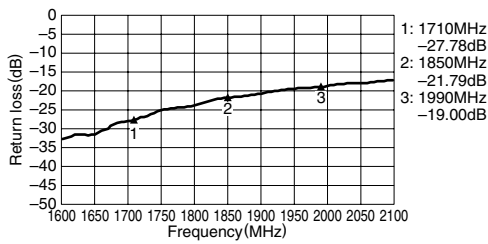


### ELECTRICAL CHARACTERISTICS

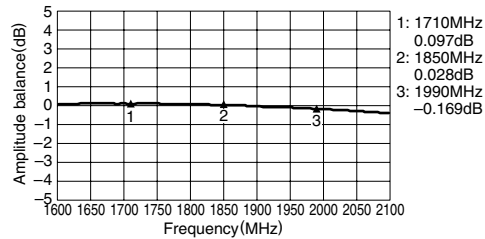
Unbalanced impedance	50Ω
Balanced impedance	200 Ω
Frequency range	1710 to 1990MHz
Unbalanced port return loss	10dB Min.
Phase impedance at balanced port	180±10deg.
Amplitude impedance at balanced port	0±1.0dB
Insertion loss	1.0dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

### FREQUENCY CHARACTERISTICS

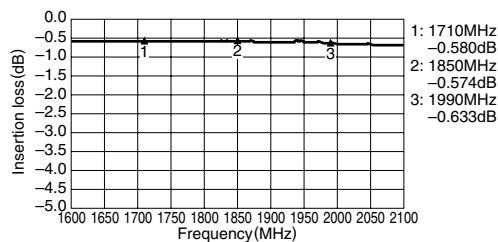
Unbalance 50Ω/Balance 200Ω  
RETURN LOSS



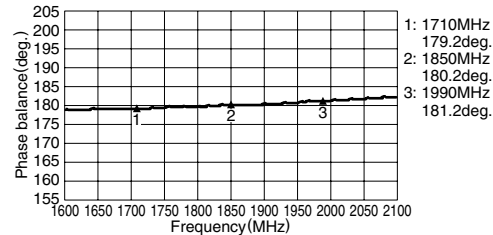
### AMPLITUDE BALANCE



### INSERTION LOSS



### PHASE BALANCE

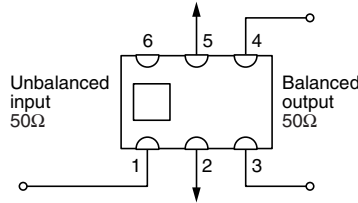
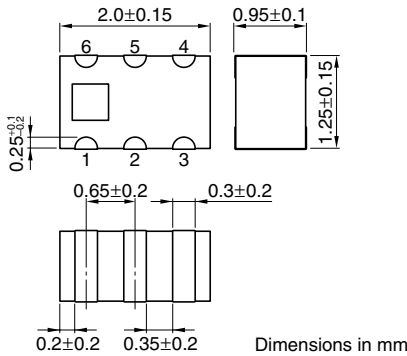


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1517 For Bluetooth&IEEE802.11b/g

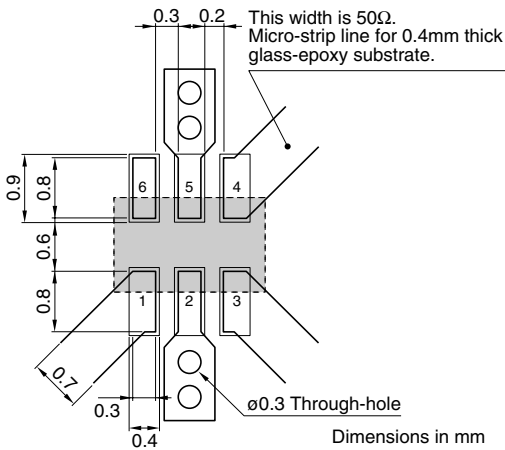
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



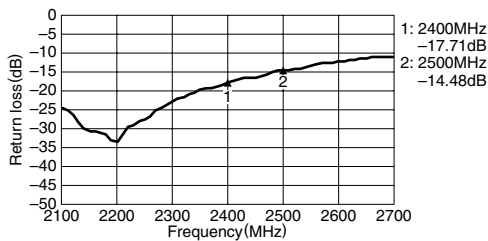
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	50 Ω
Frequency range	2400 to 2500MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg.
Amplitude impedance at balanced port	0±2.0dB
Insertion loss	1.2dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

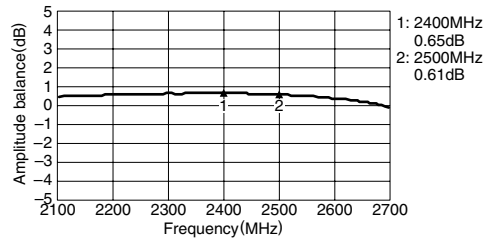
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 50Ω

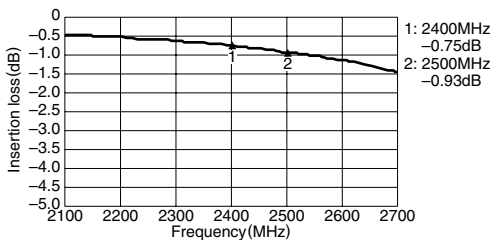
#### RETURN LOSS



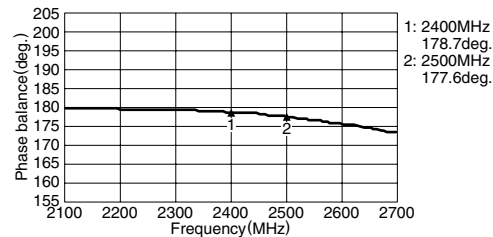
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

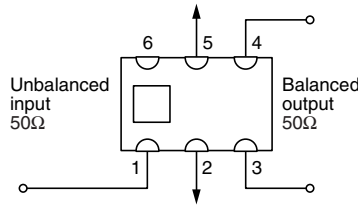
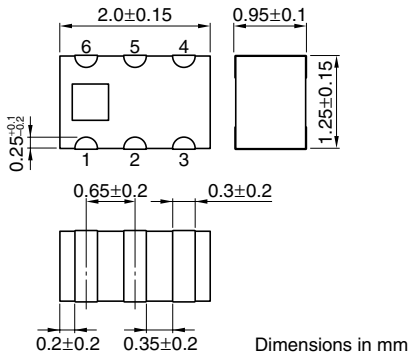


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

HHM1517A2 For Bluetooth&IEEE802.11b/g

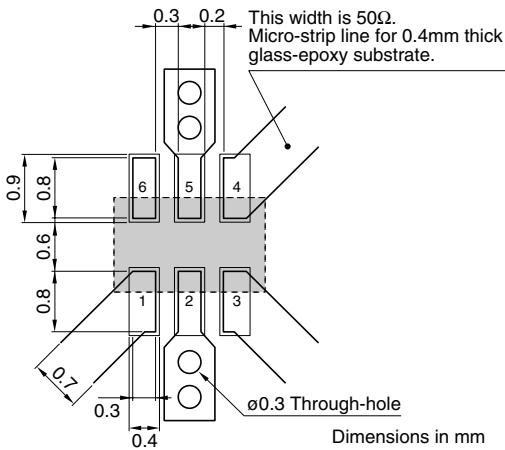
## SHAPES AND DIMENSIONS/CIRCUIT



## TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

## RECOMMENDED PCB PATTERN



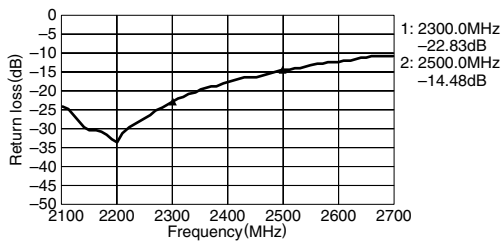
## ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	50Ω
Frequency range	2300 to 2500MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg.
Amplitude impedance at balanced port	0±2.0dB
Insertion loss	1.2dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

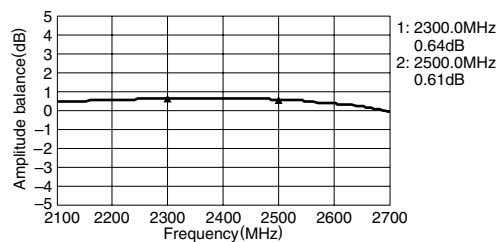
## FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 50Ω

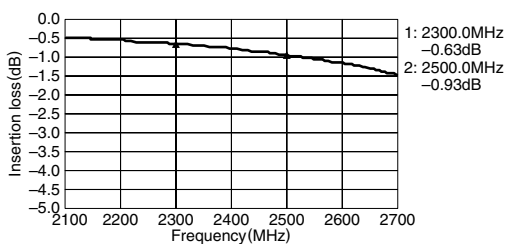
### RETURN LOSS



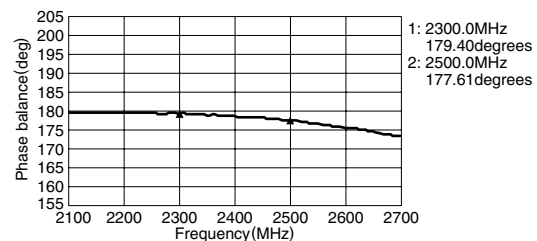
### AMPLITUDE BALANCE



### INSERTION LOSS



### PHASE BALANCE

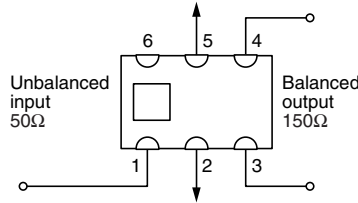
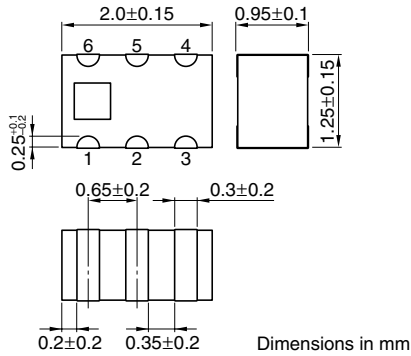


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1518A3 For DCS-PCS/Tx-Rx

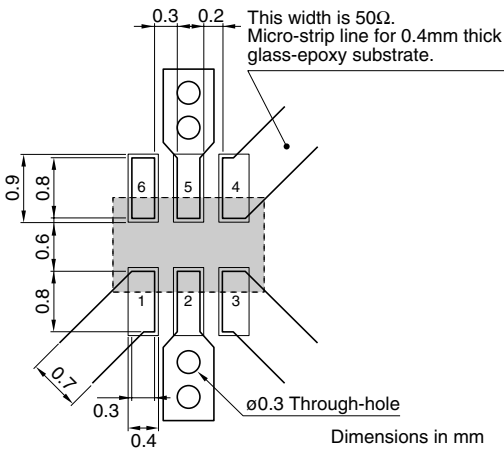
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



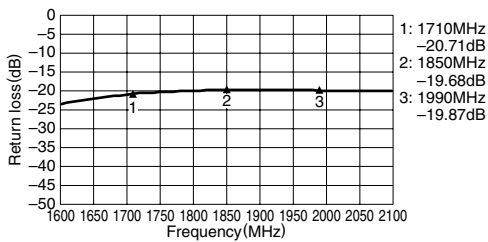
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	150Ω
Frequency range	1710 to 1990MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg.
Amplitude impedance at balanced port	0±1.0dB
Insertion loss	1.0dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

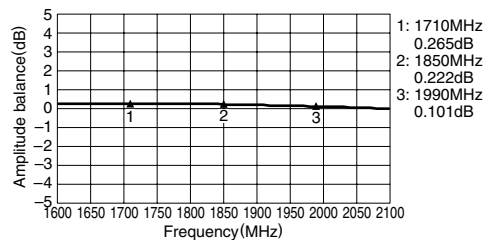
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 150Ω

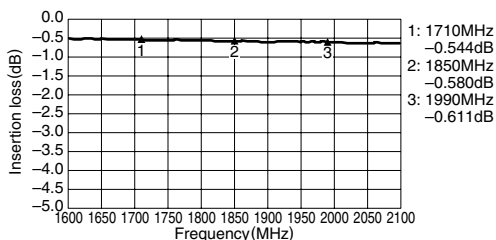
#### RETURN LOSS



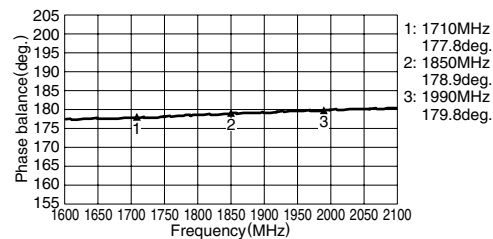
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

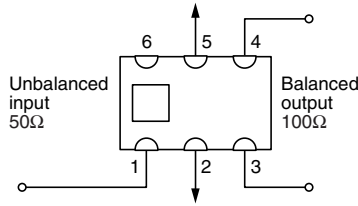
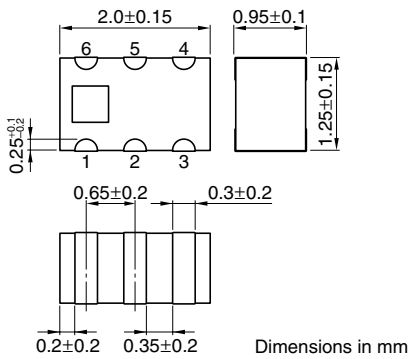


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

HHM1520 For Bluetooth&IEEE802.11b/g

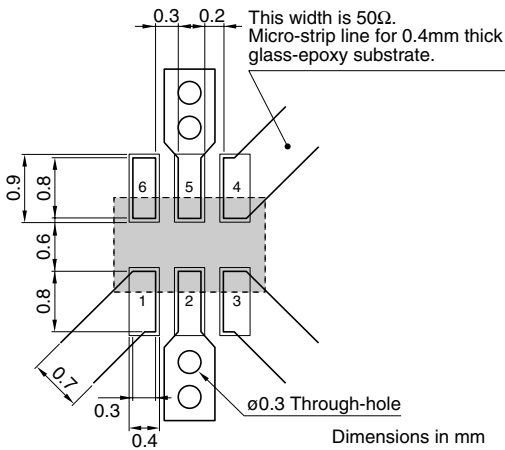
## SHAPES AND DIMENSIONS/CIRCUIT



## TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

## RECOMMENDED PCB PATTERN



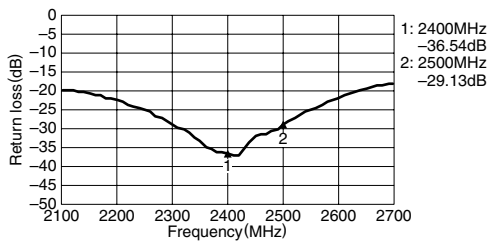
## ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	100Ω
Frequency range	2400 to 2500MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg.
Amplitude impedance at balanced port	0±2.0dB
Insertion loss	1.0dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

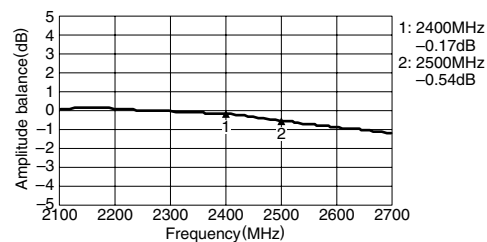
## FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

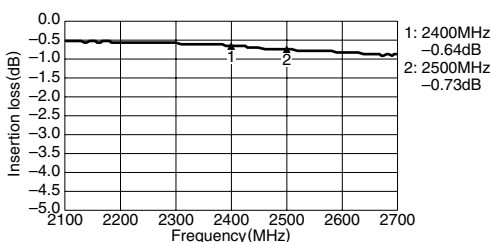
### RETURN LOSS



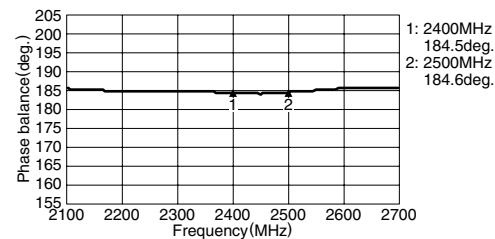
### AMPLITUDE BALANCE



### INSERTION LOSS



### PHASE BALANCE

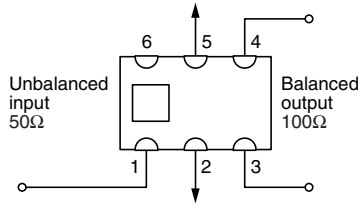
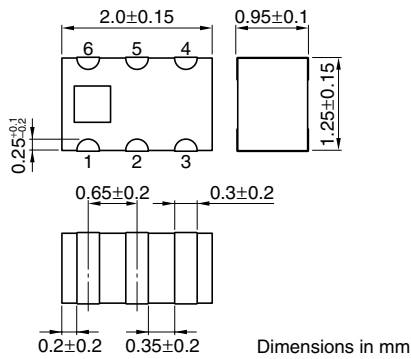


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

HHM1520A2 For Bluetooth&IEEE802.11b/g

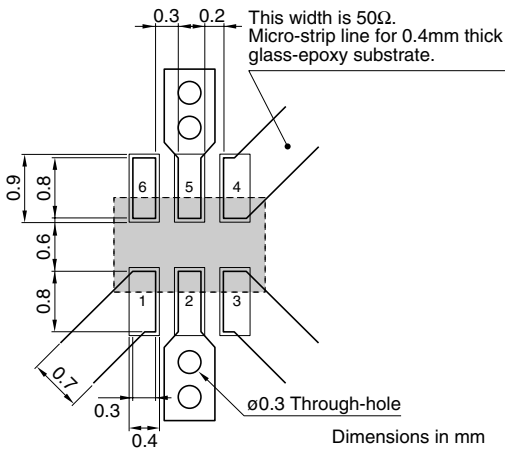
## SHAPES AND DIMENSIONS/CIRCUIT



## TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

## RECOMMENDED PCB PATTERN

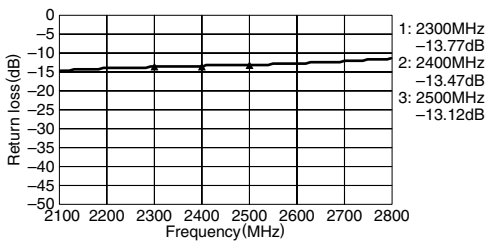


## ELECTRICAL CHARACTERISTICS

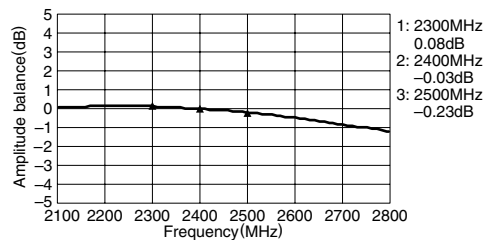
Unbalanced impedance	50Ω
Balanced impedance	100Ω
Frequency range	2300 to 2500MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg.
Amplitude impedance at balanced port	0±2.0dB
Insertion loss	1.0dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

## FREQUENCY CHARACTERISTICS

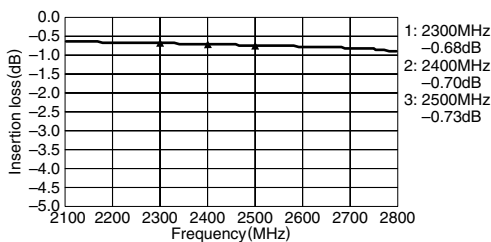
Unbalance 50Ω/Balance 100Ω  
RETURN LOSS



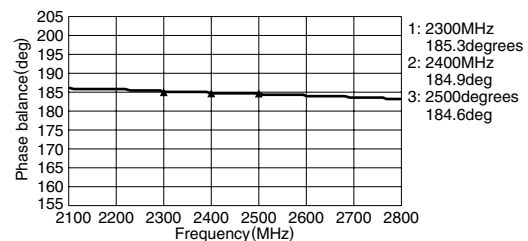
## AMPLITUDE BALANCE



## INSERTION LOSS



## PHASE BALANCE



• All specifications are subject to change without notice.

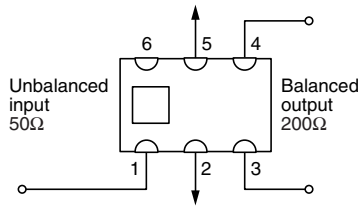
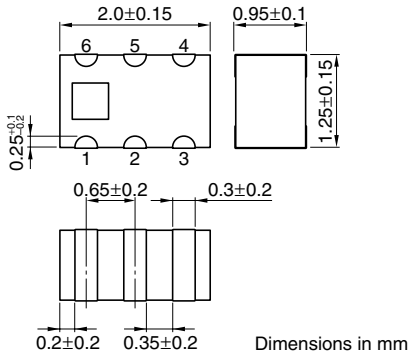




# Multilayer Baluns, HHM Series

## HHM1521A2 For Bluetooth&IEEE802.11b/g

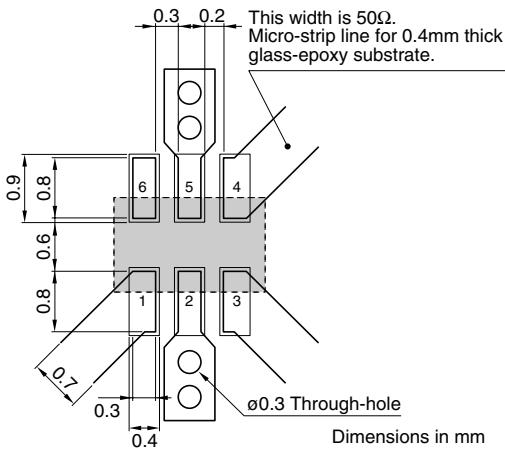
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



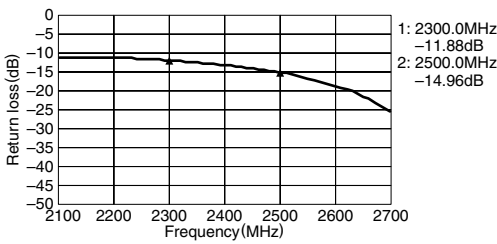
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	200Ω
Frequency range	2300 to 2500MHz
Unbalanced port return loss	9.5dB min.
Phase impedance at balanced port	180±10deg.
Amplitude impedance at balanced port	0±2.0dB
Insertion loss	1.1dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

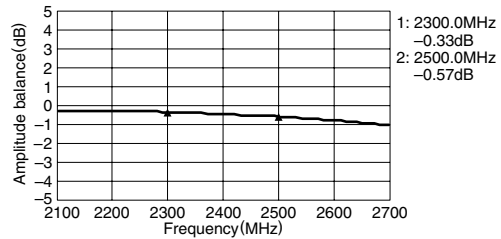
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

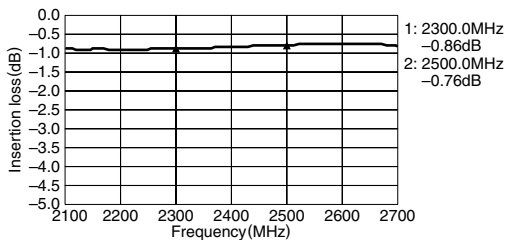
#### RETURN LOSS



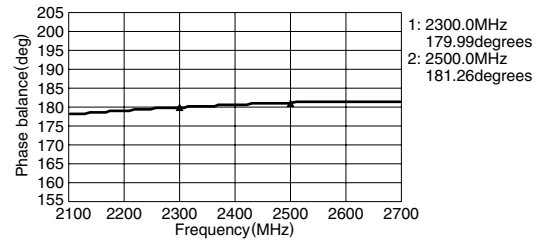
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE



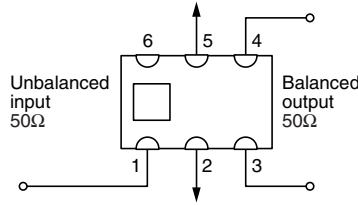
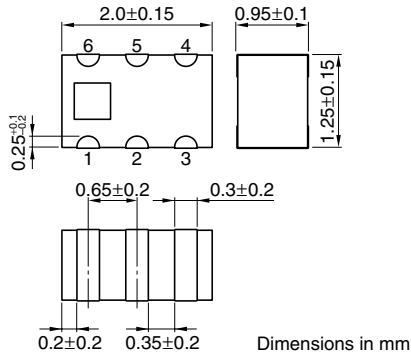
• All specifications are subject to change without notice.



# Multilayer Baluns, HHM Series

## HHM1522B1 For EGSM/Tx-Rx

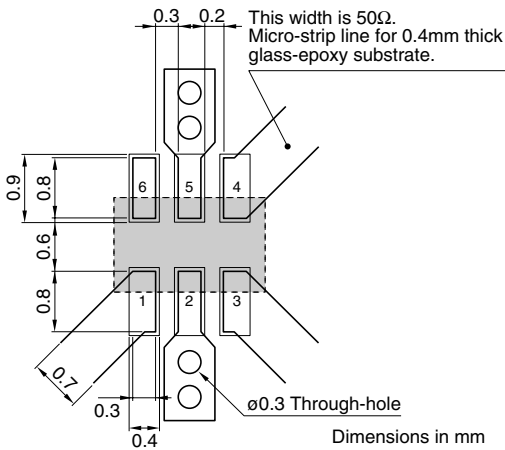
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



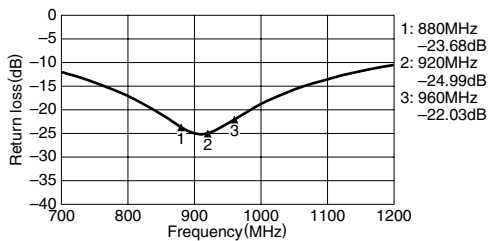
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	50Ω
<b>Frequency range</b>	<b>880 to 960MHz</b>
Unbalanced port return loss	12dB min.
Phase impedance at balanced port	180±10deg.
Amplitude impedance at balanced port	0±1.0dB
Insertion loss	1.3dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

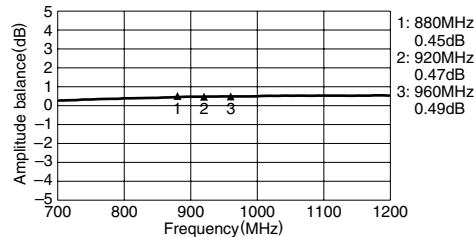
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 50Ω

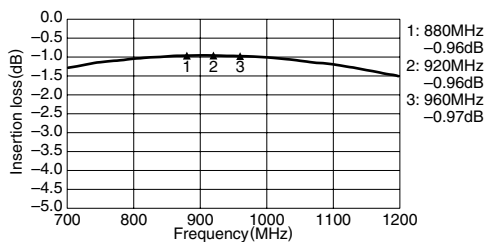
#### RETURN LOSS



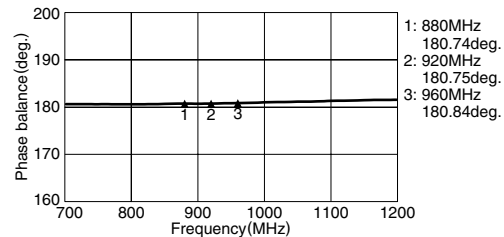
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

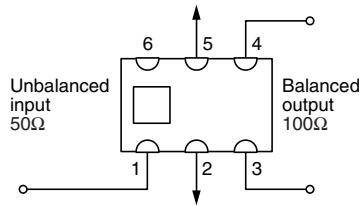
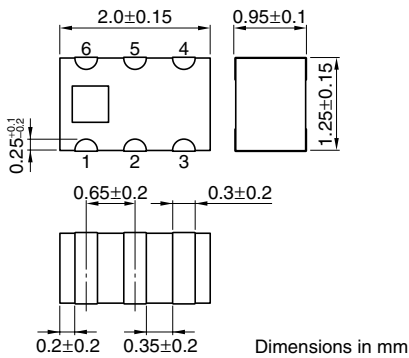


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1523B3 For AGSM/Tx-Rx

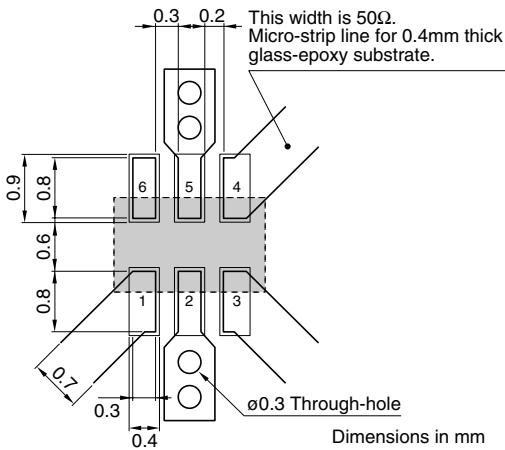
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



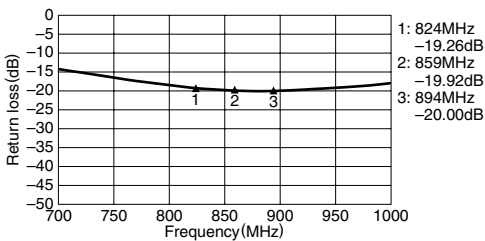
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	100Ω
Frequency range	824 to 894MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg.
Amplitude impedance at balanced port	0±1.0dB
Insertion loss	1.2dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

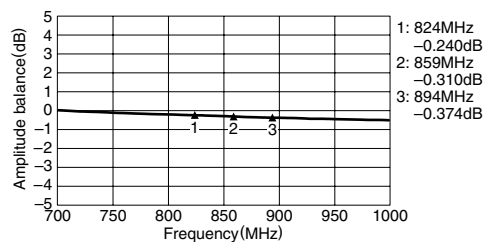
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

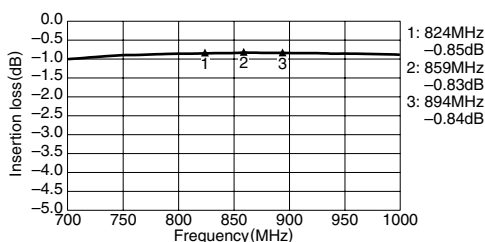
#### RETURN LOSS



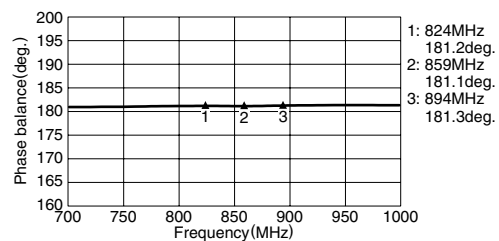
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

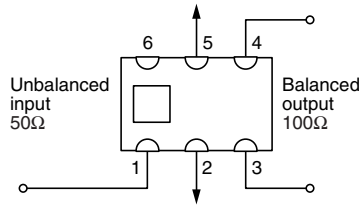
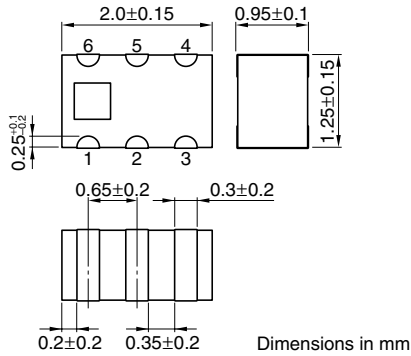


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1523C1 For EGSM/Tx-Rx

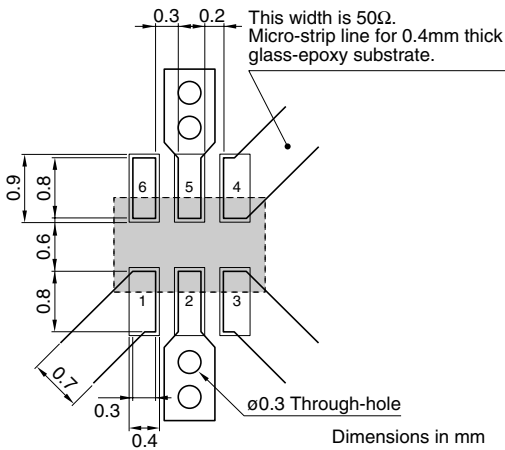
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



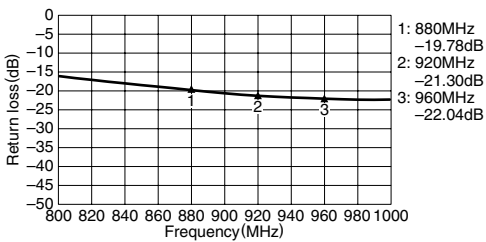
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	100Ω
Frequency range	880 to 960MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg.
Amplitude impedance at balanced port	0±1.0dB
Insertion loss	1.1dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

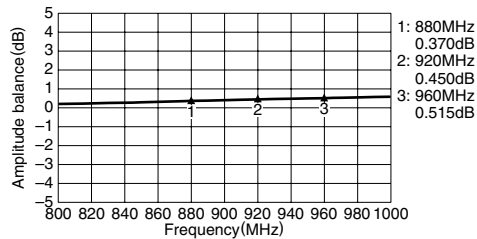
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

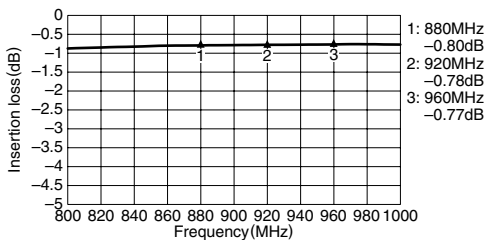
#### RETURN LOSS



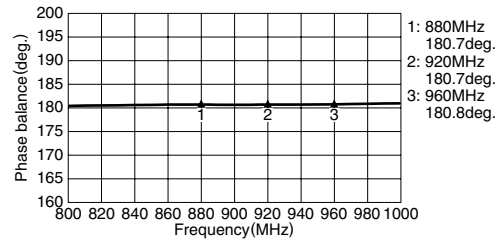
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

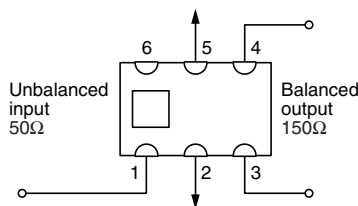
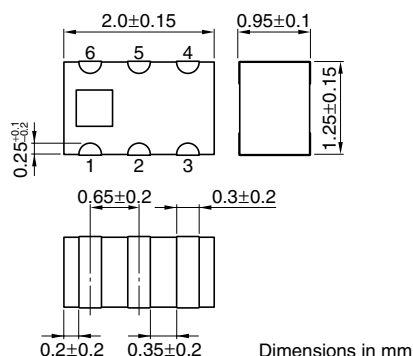


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1524B1 For EGSM/Tx-Rx

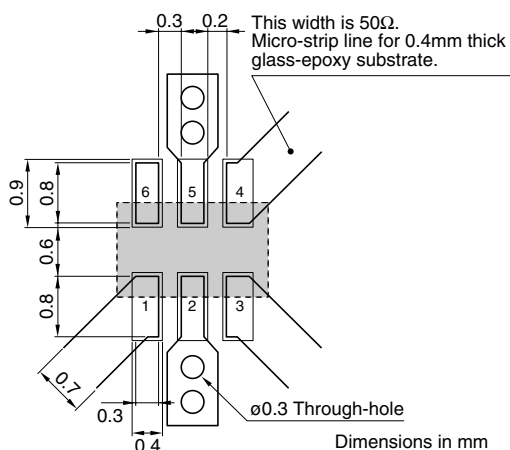
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



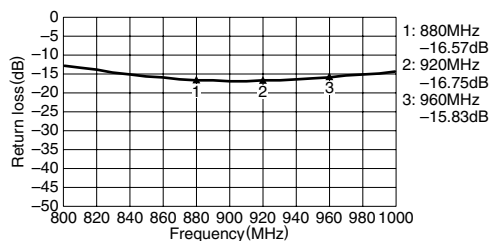
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	150Ω
Frequency range	880 to 960MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg.
Amplitude impedance at balanced port	0±1.0dB
Insertion loss	1.0dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

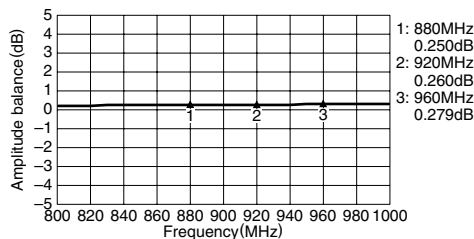
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 150Ω

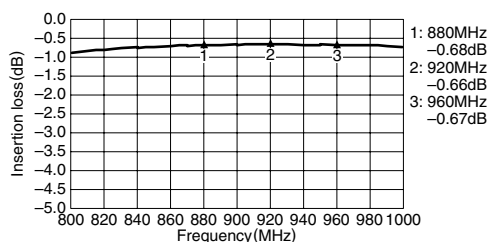
#### RETURN LOSS



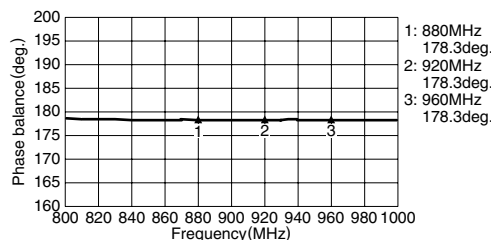
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

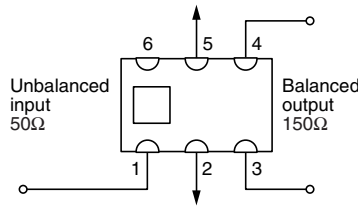
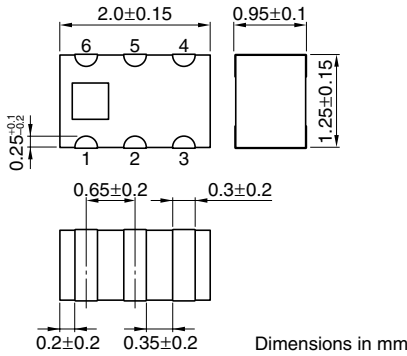


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1524B4 For AGSM/Tx-Rx

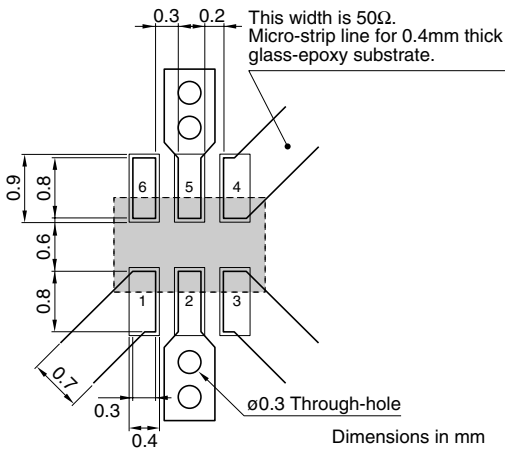
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



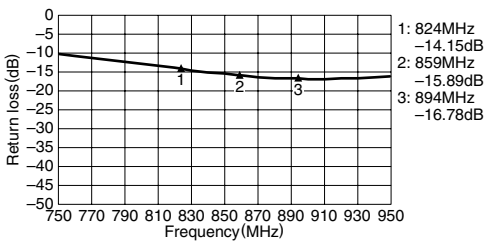
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	150Ω
Frequency range	824 to 894MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg.
Amplitude impedance at balanced port	0±1.0dB
Insertion loss	1.0dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

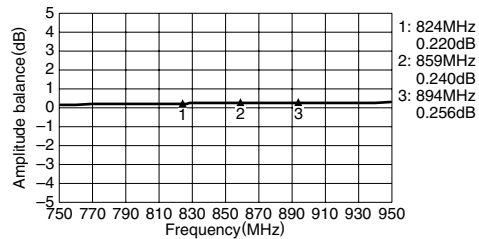
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 150Ω

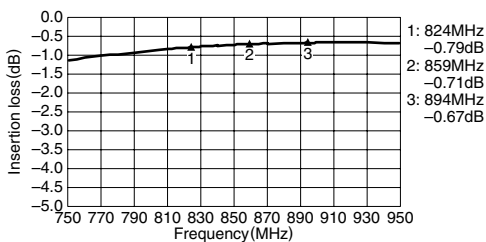
#### RETURN LOSS



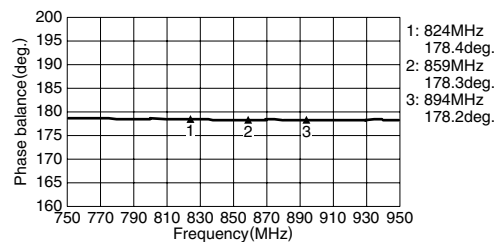
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE



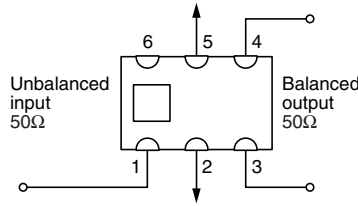
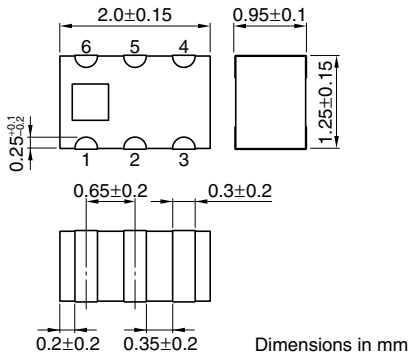
• All specifications are subject to change without notice.



# Multilayer Baluns, HHM Series

## HHM1525 For DCS-PCS/Tx-Rx

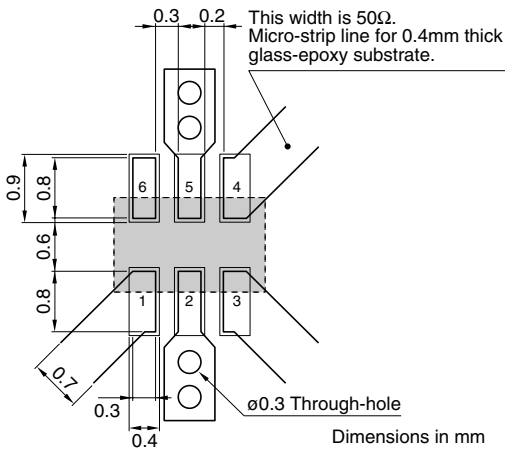
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



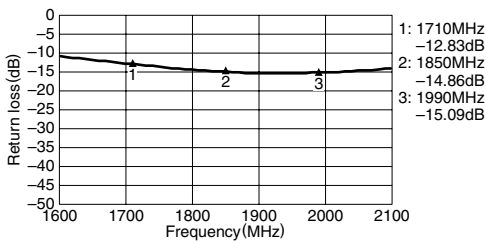
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	50Ω
Frequency range	1710 to 1990MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg.
Amplitude impedance at balanced port	0±1.0dB
Insertion loss	1.0dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

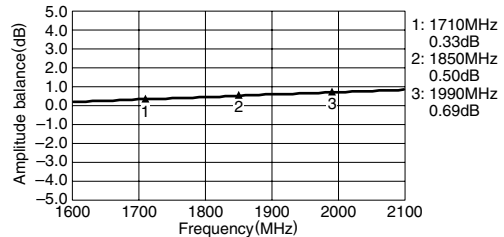
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 50Ω

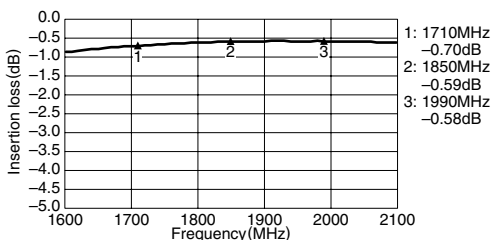
#### RETURN LOSS



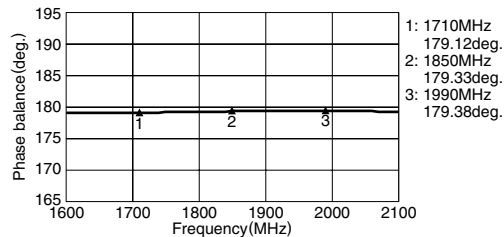
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

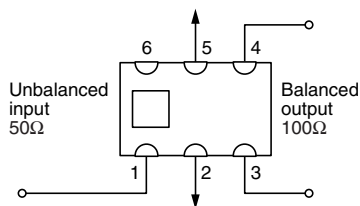
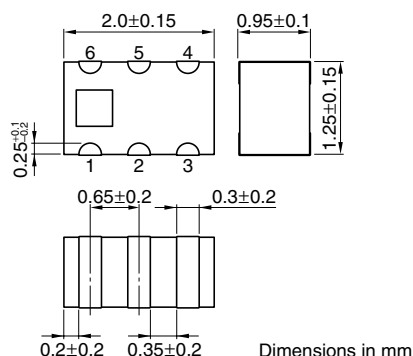


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1526 For DCS-PCS/Tx-Rx

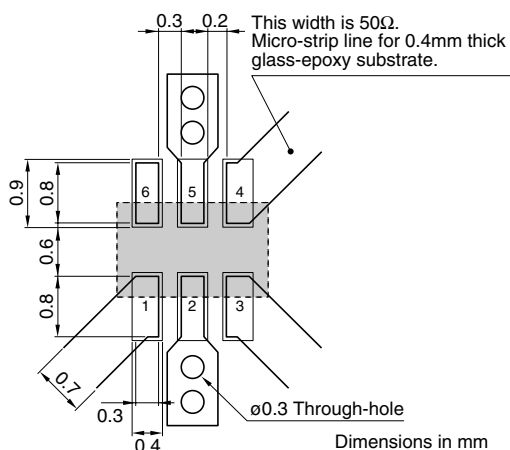
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



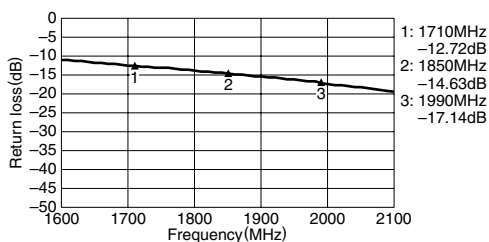
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	100Ω
Frequency range	1710 to 1990MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±9deg.
Amplitude impedance at balanced port	0±1.0dB
Insertion loss	0.8dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

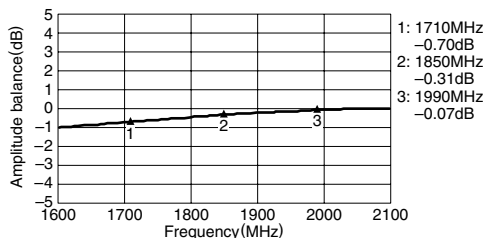
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

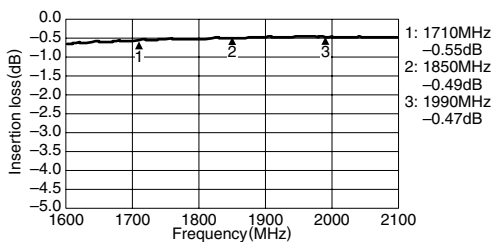
#### RETURN LOSS



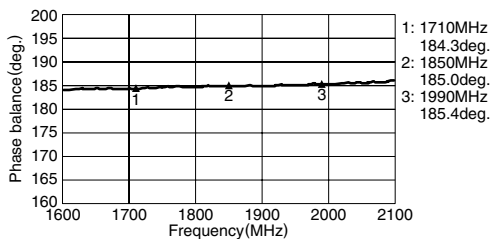
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

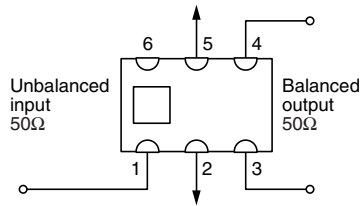
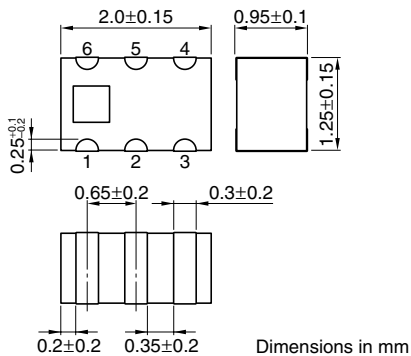


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1533 For W-CDMA/Tx-Rx

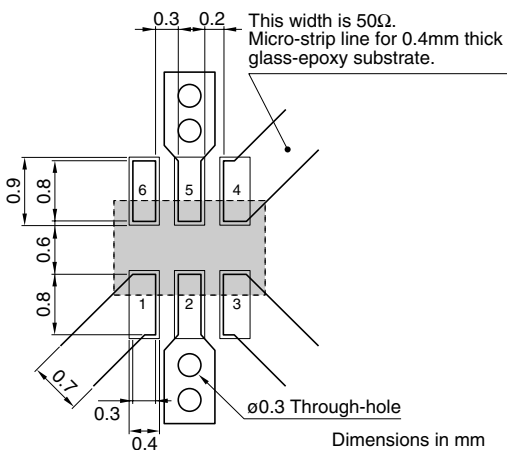
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

Terminal	Function
1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



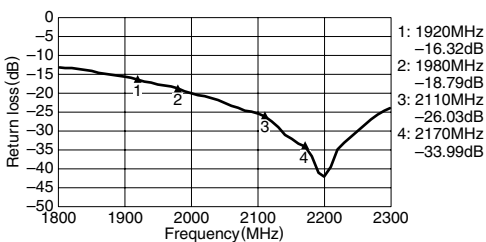
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	50Ω
Frequency range	1920 to 1980, 2110 to 2170MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg.
Amplitude impedance at balanced port	0±2.0dB
Insertion loss	0.8dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

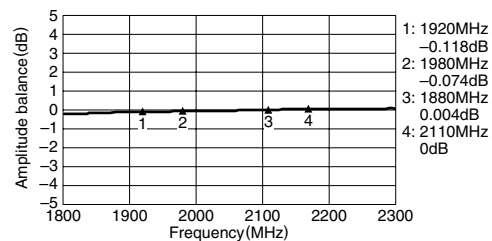
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 50Ω

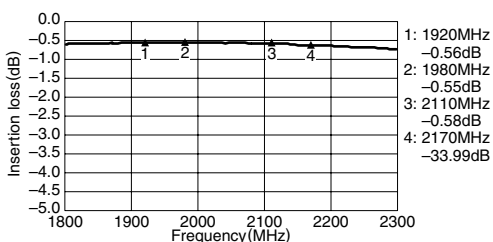
#### RETURN LOSS



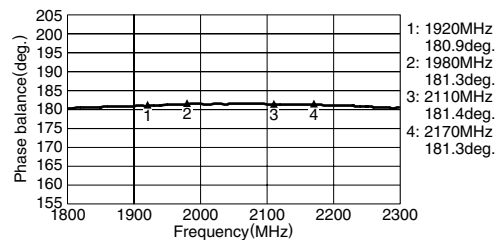
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE



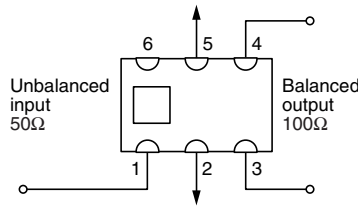
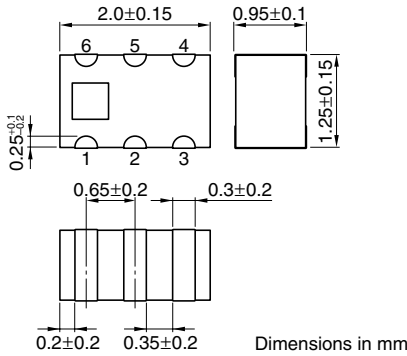
• All specifications are subject to change without notice.



# Multilayer Baluns, HHM Series

## HHM1536B1 For 3.7GHz

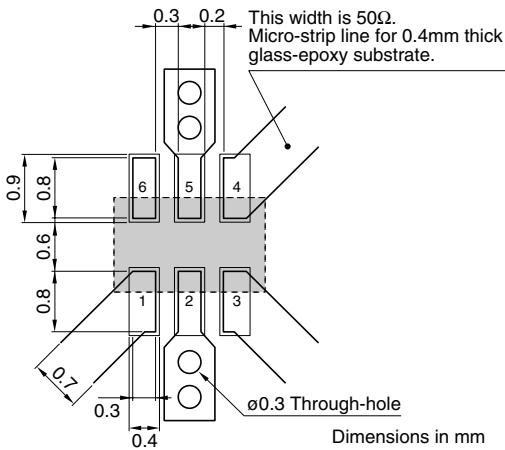
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN

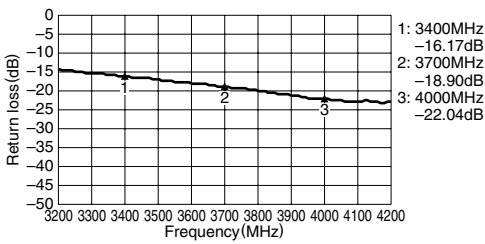


### ELECTRICAL CHARACTERISTICS

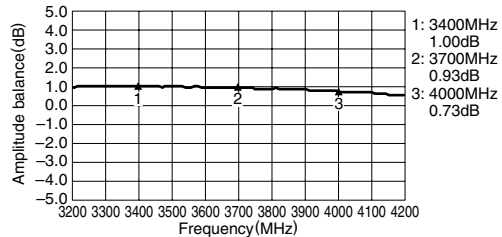
Unbalanced impedance	50Ω
Balanced impedance	100Ω
Frequency range	3400 to 4000MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±20deg.
Amplitude impedance at balanced port	0±2.0dB
Insertion loss	1.2dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

### FREQUENCY CHARACTERISTICS

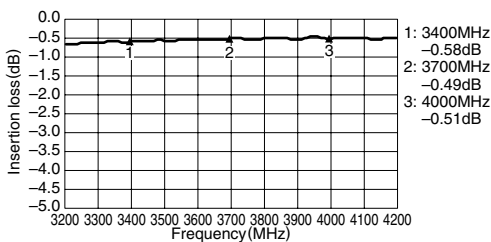
Unbalance 50Ω/Balance 100Ω  
RETURN LOSS



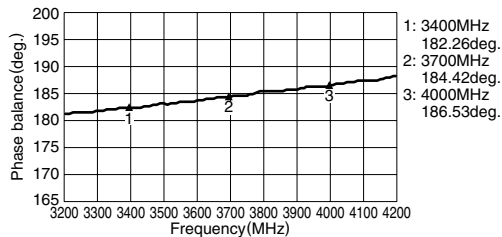
### AMPLITUDE BALANCE



### INSERTION LOSS



### PHASE BALANCE

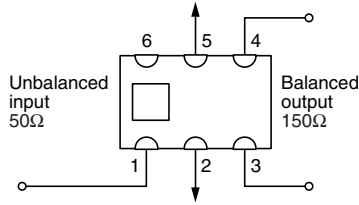
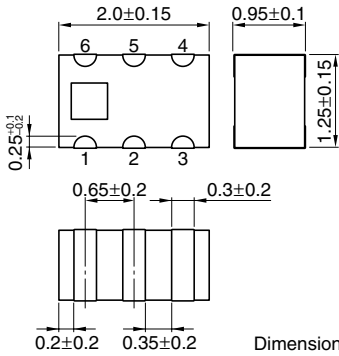


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1537 For W-CDMA/Tx-Rx

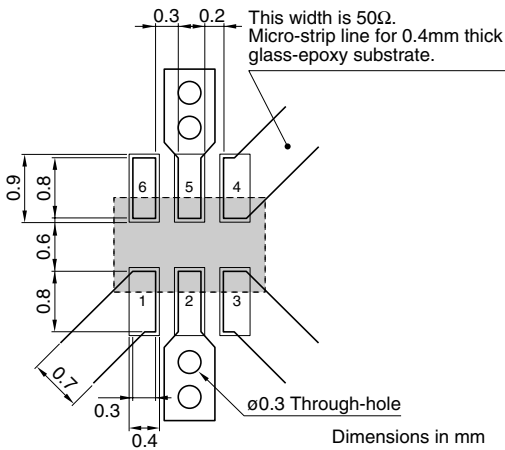
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



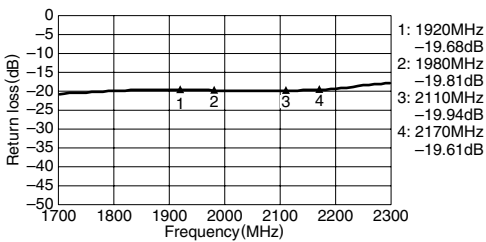
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	150Ω
Frequency range	1920 to 1980, 2110 to 2170MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg.
Amplitude impedance at balanced port	0±2.0dB
Insertion loss	1.0dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

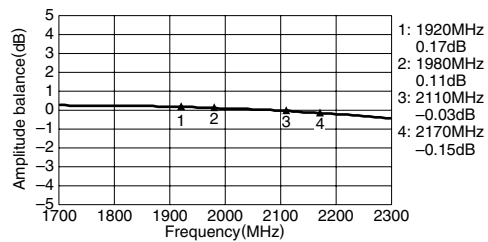
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 150Ω

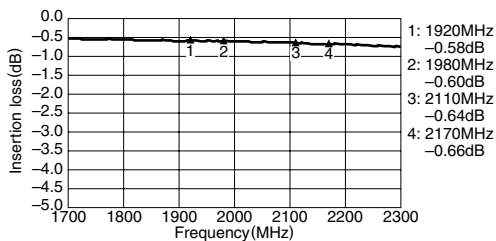
#### RETURN LOSS



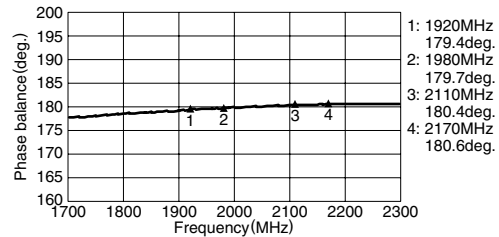
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

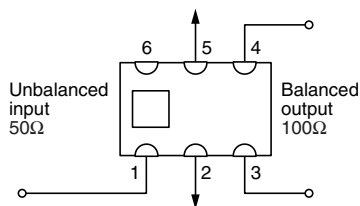
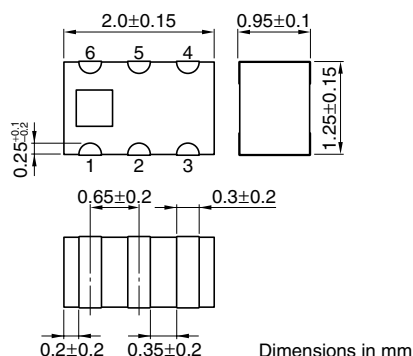


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1538 For DCS/Local

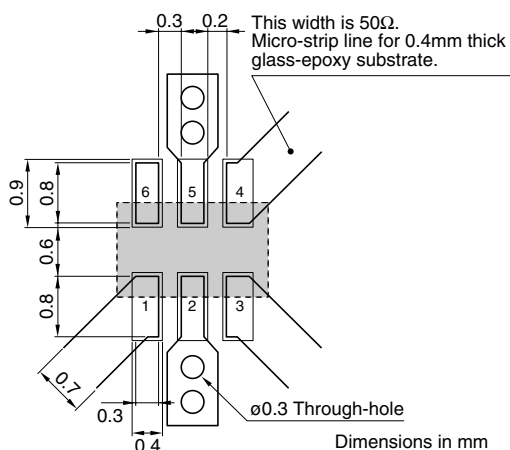
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



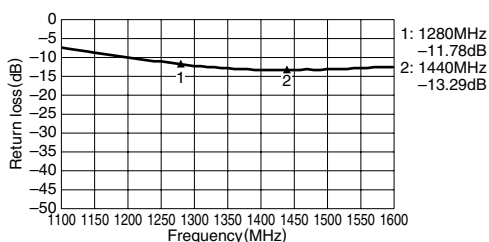
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω	
Balanced impedance	100Ω	
Frequency range	1280 to 1440MHz	
Unbalanced port return loss	10dB min.	
Phase impedance at balanced port	180±10deg.	
Amplitude impedance at balanced port	0±2.0dB	
Insertion loss	25°C	0.9dB max.
	-40 to +85°C	1.0dB max.
Temperature range	Operating	-40 to +85°C
	Storage	-40 to +85°C
Packaging style and quantities	2000pieces/reel	

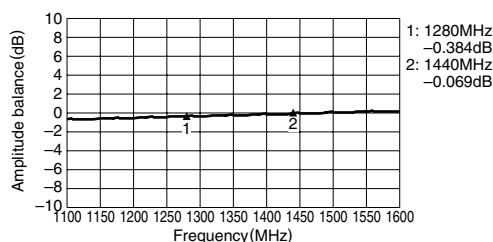
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

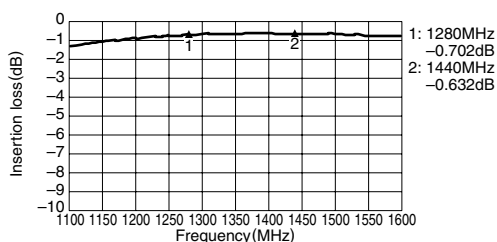
#### RETURN LOSS



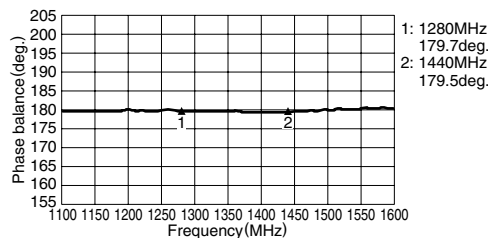
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

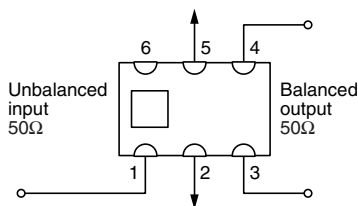
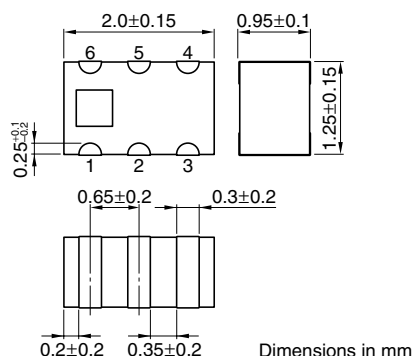


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

HHM1541 For Bluetooth&IEEE802.11b/g

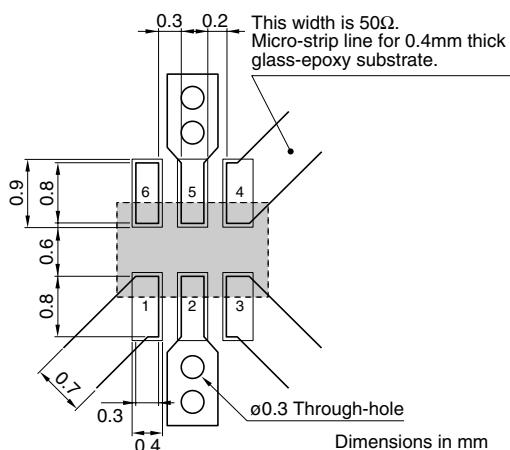
## SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

## RECOMMENDED PCB PATTERN



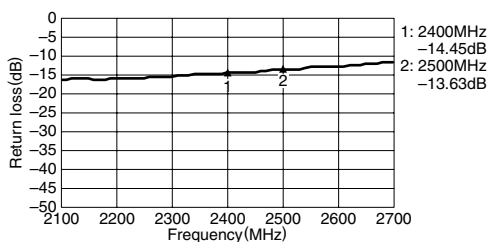
## ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	75Ω
Frequency range	2400 to 2500MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg.
Amplitude impedance at balanced port	0±2.0dB
Insertion loss	1.2dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

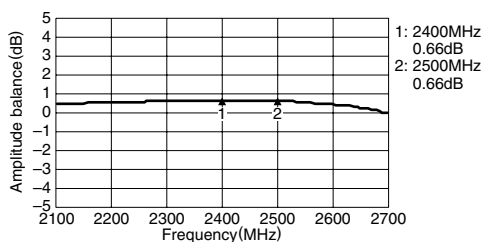
## FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 75Ω

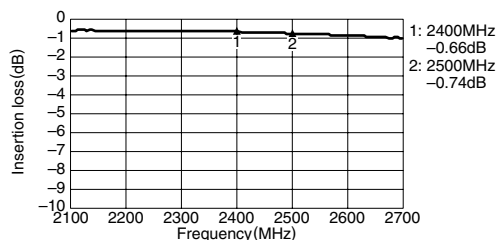
### RETURN LOSS



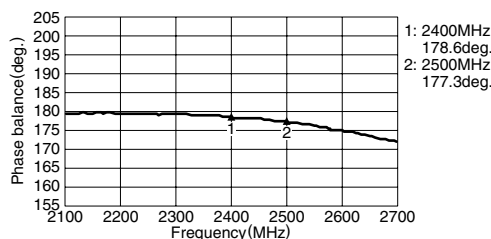
### AMPLITUDE BALANCE



### INSERTION LOSS



### PHASE BALANCE



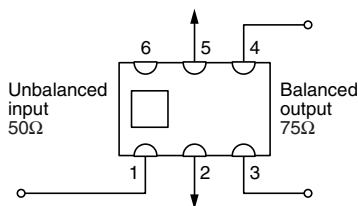
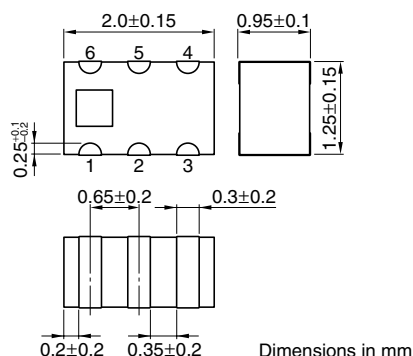
• All specifications are subject to change without notice.



# Multilayer Baluns, HHM Series

## HHM1541E1 For Bluetooth

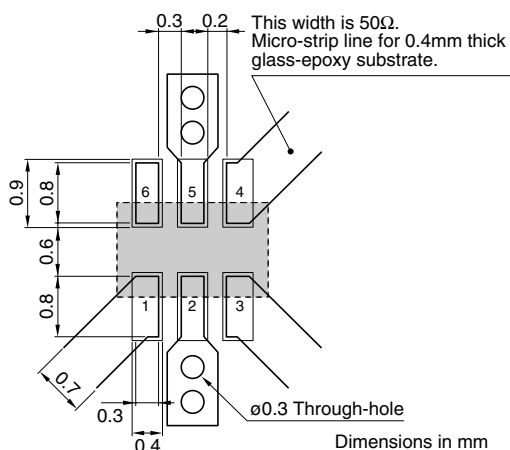
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



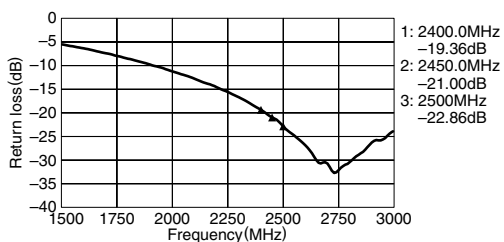
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	75Ω
Frequency range	2300 to 2500MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg.
Amplitude impedance at balanced port	0±1.5dB
Insertion loss	1.0dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

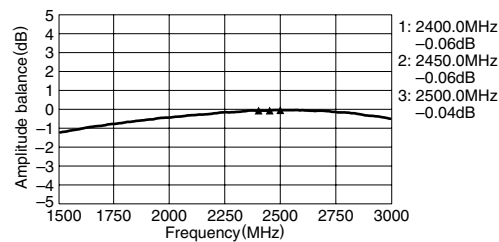
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 75Ω

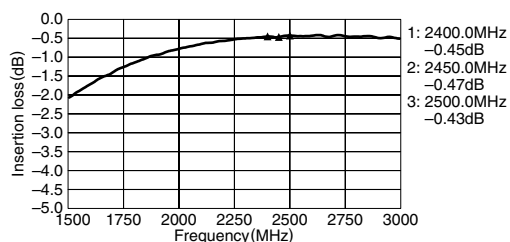
#### RETURN LOSS



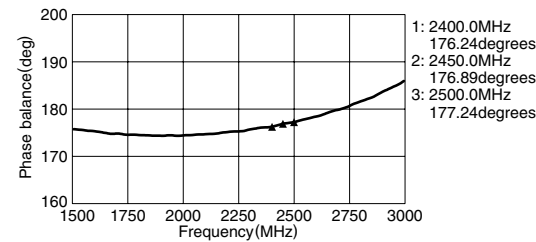
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

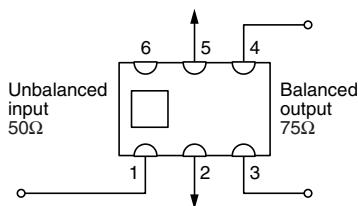
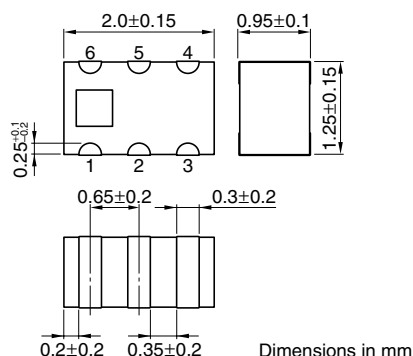


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

HHM1541E2 For Bluetooth&IEEE802.11b/g

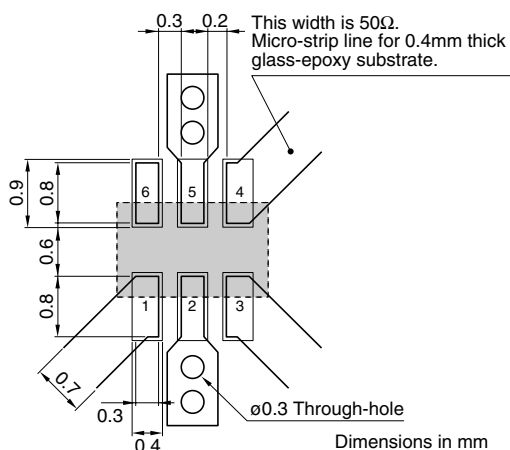
## SHAPES AND DIMENSIONS/CIRCUIT



## TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

## RECOMMENDED PCB PATTERN



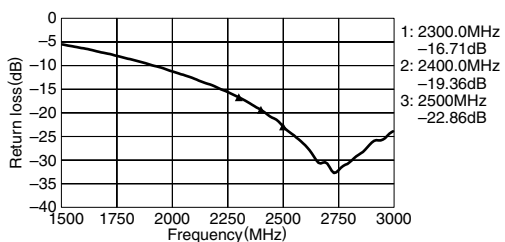
## ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	75Ω
Frequency range	2300 to 2500MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg.
Amplitude impedance at balanced port	0±1.5dB
Insertion loss	1.0dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

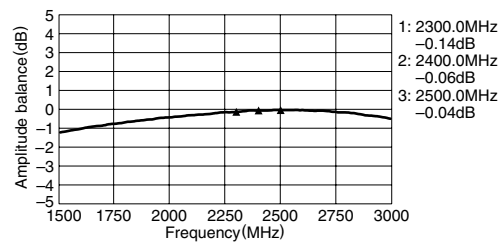
## FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 75Ω

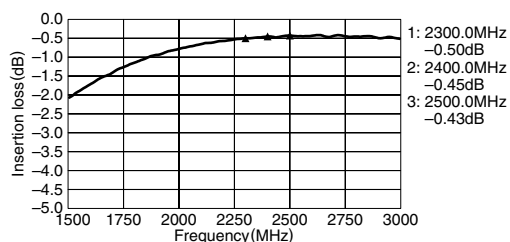
### RETURN LOSS



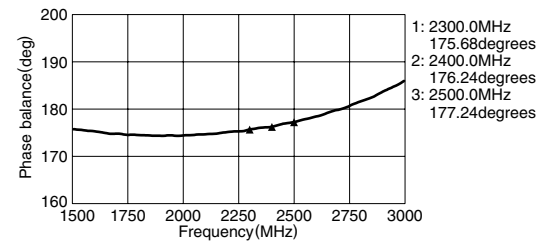
### AMPLITUDE BALANCE



### INSERTION LOSS



### PHASE BALANCE

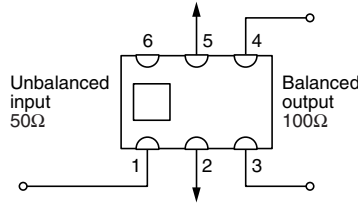
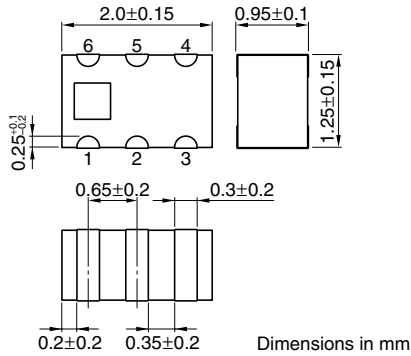


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1544 For W-LAN

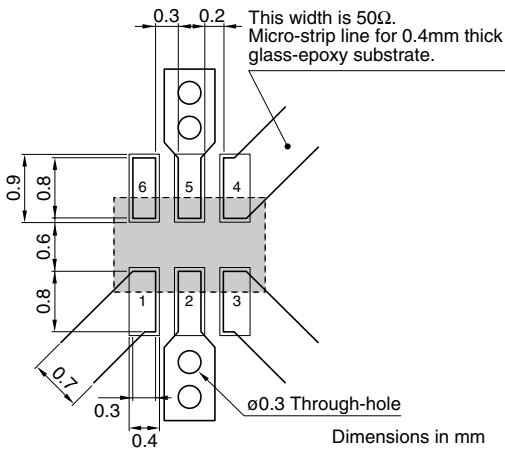
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



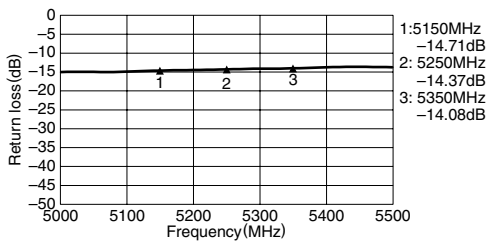
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	100Ω
Frequency range	5150 to 5350MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±20deg.
Amplitude impedance at balanced port	0±1.5dB
Insertion loss	1.2dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

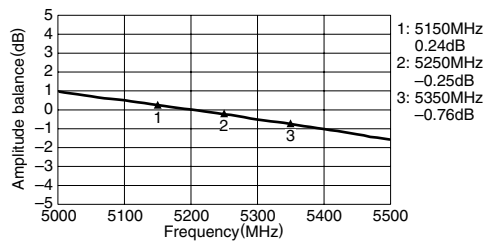
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

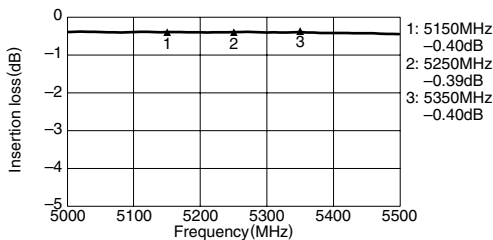
#### RETURN LOSS



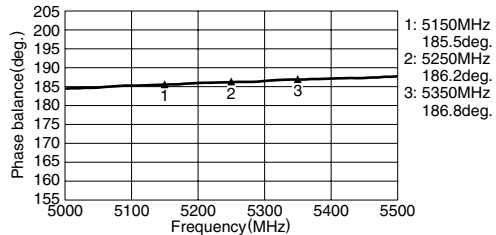
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

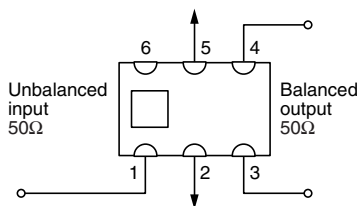
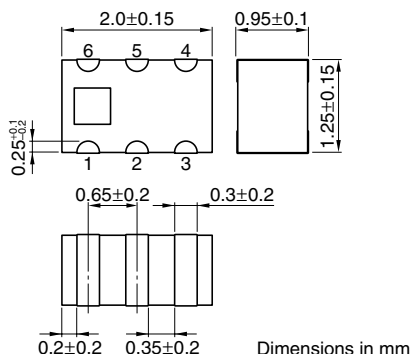


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1545 For 3.7GHz

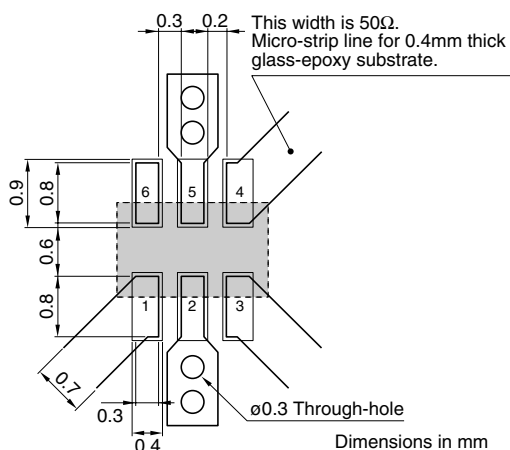
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



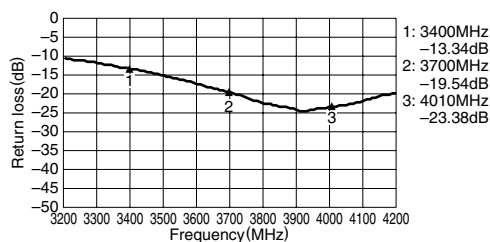
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	50Ω
Frequency range	3400 to 4010MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg.
Amplitude impedance at balanced port	0±1.0dB
Insertion loss	1.2dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

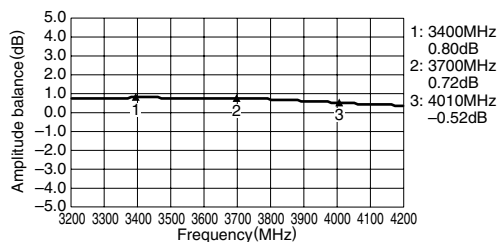
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 50Ω

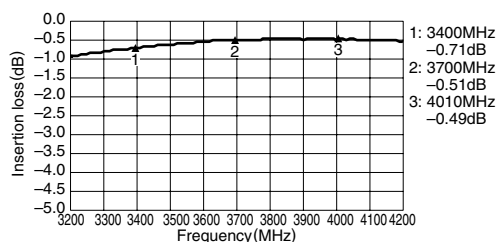
#### RETURN LOSS



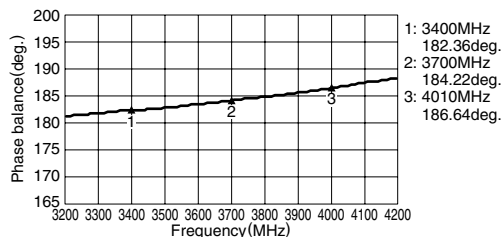
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

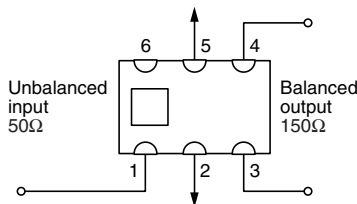
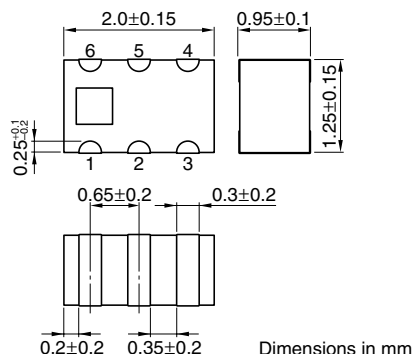


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1547 For 3.7GHz

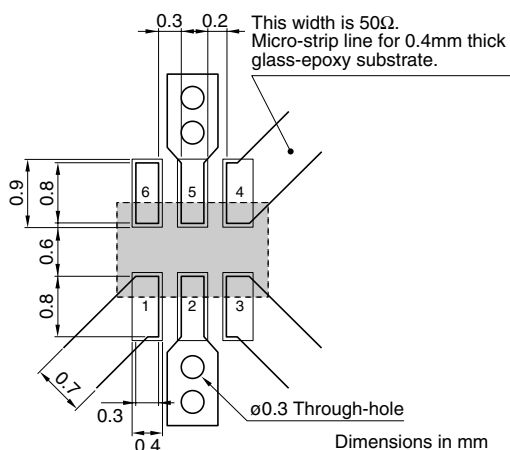
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



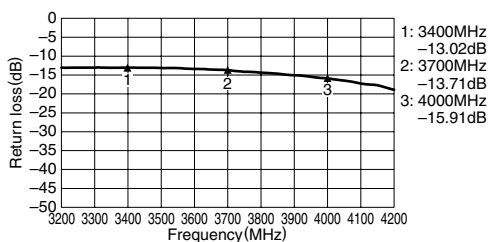
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	150Ω
Frequency range	3400 to 4000MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±20deg.
Amplitude impedance at balanced port	0±2.0dB
Insertion loss	1.2dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

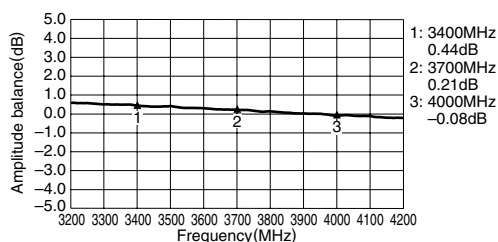
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 150Ω

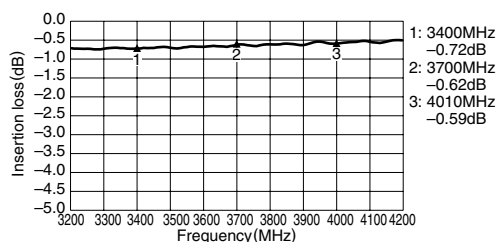
#### RETURN LOSS



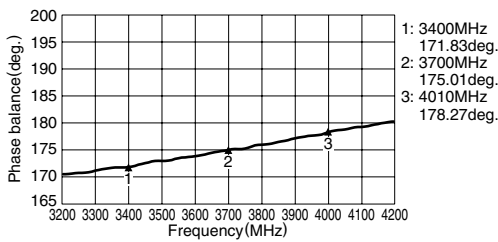
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

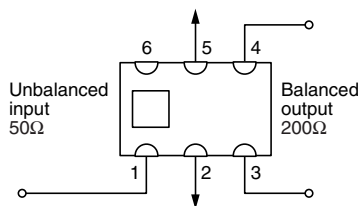
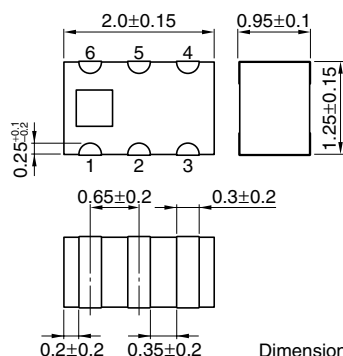


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1548A2 For 3.7GHz

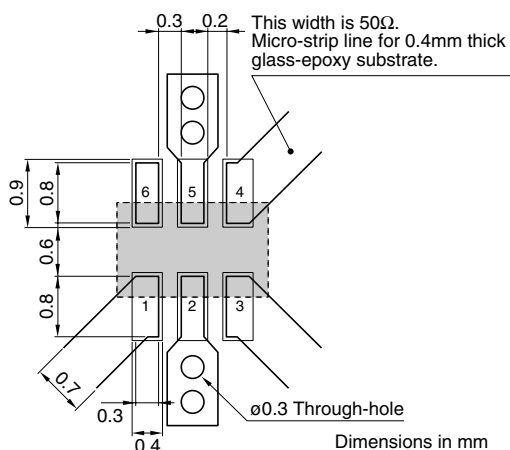
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



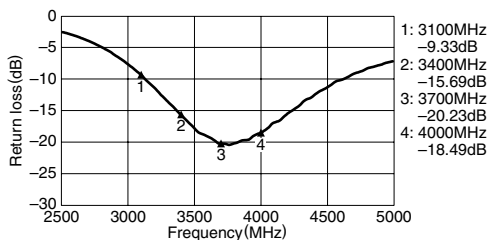
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω	50Ω
Balanced impedance	200Ω	200Ω
Frequency range	3100 to 3400MHz	3400 to 4000MHz
Unbalanced port return loss	6dB min.	9dB min.
Phase impedance at balanced port		178±20deg. at 3400MHz
		180±20deg. at 3700MHz
		185±20deg. at 4000MHz
Amplitude impedance at balanced port	1±2.0dB	1±2.0dB
Insertion loss	1.5db max.	1.2dB max.
Temperature range	Operating	-40 to +85°C
	Storage	-40 to +85°C
Packaging style and quantities	2000pieces/reel	

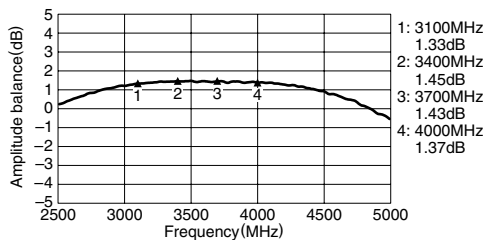
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

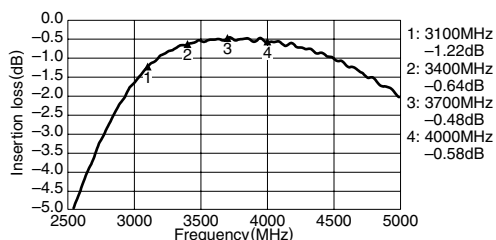
#### RETURN LOSS



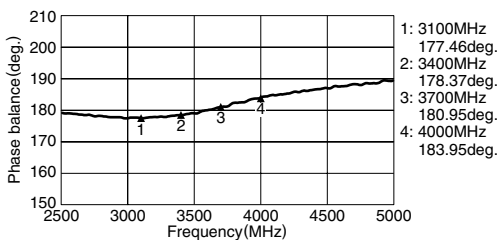
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

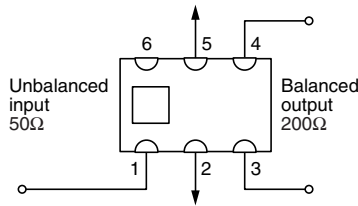
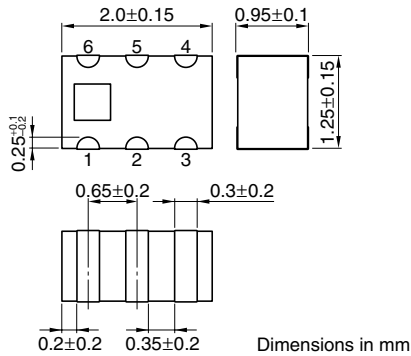


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1548C2 For 3.7GHz

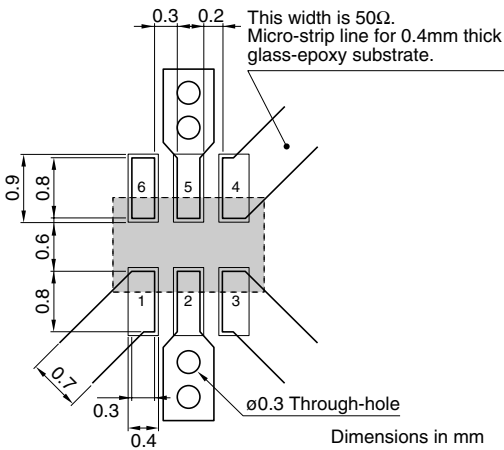
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN

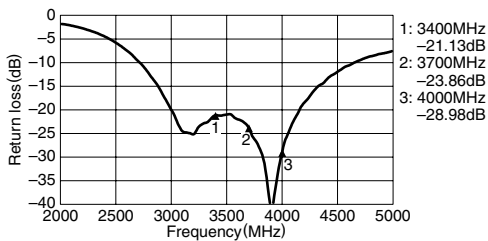


### ELECTRICAL CHARACTERISTICS

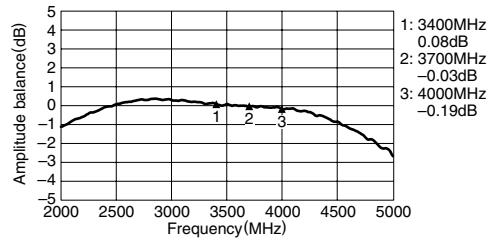
Unbalanced impedance	50Ω
Balanced impedance	200Ω
Frequency range	3400 to 4000MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±20deg.
Amplitude impedance at balanced port	0±2.0dB
Insertion loss	1.0dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

### FREQUENCY CHARACTERISTICS

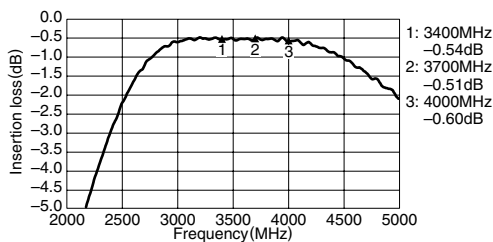
Unbalance 50Ω/Balance 200Ω  
RETURN LOSS



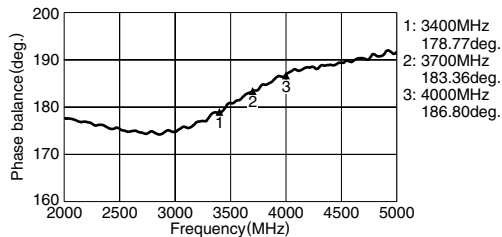
### AMPLITUDE BALANCE



### INSERTION LOSS



### PHASE BALANCE

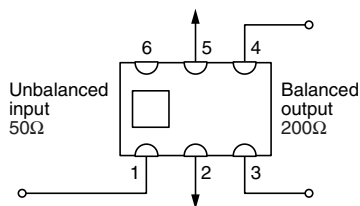
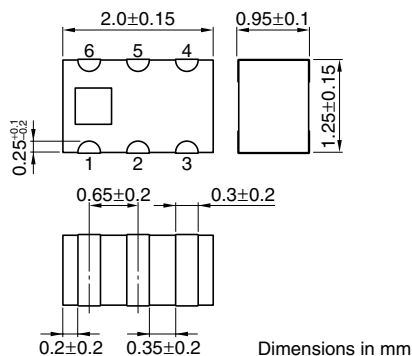


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1548E1 For 3.7GHz

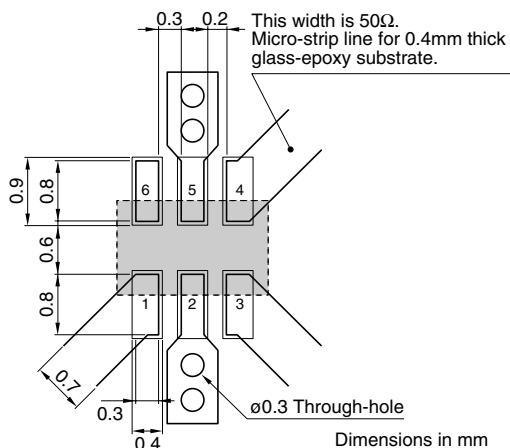
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



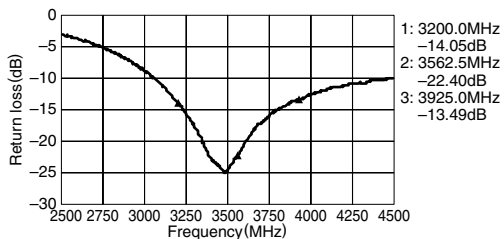
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	200Ω
Frequency range	3200 to 3925MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg.
Amplitude impedance at balanced port	0±1.0dB
Insertion loss	1.2dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

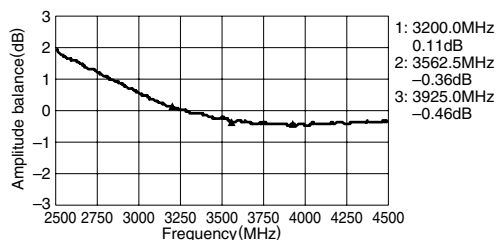
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

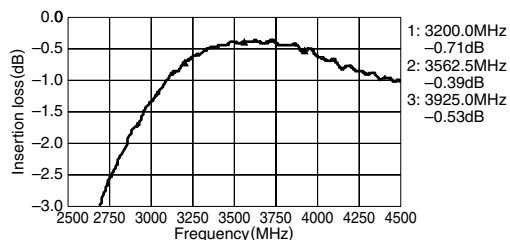
#### RETURN LOSS



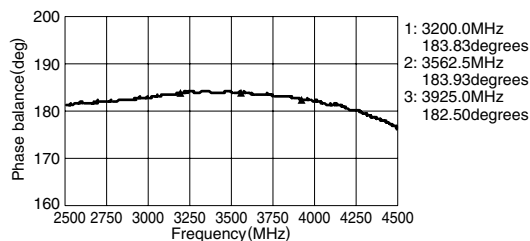
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE



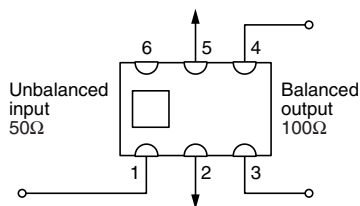
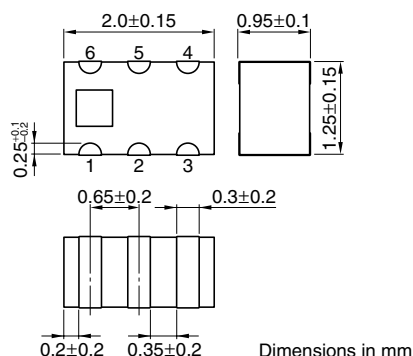
• All specifications are subject to change without notice.



# Multilayer Baluns, HHM Series

## HHM1562B For W-LAN

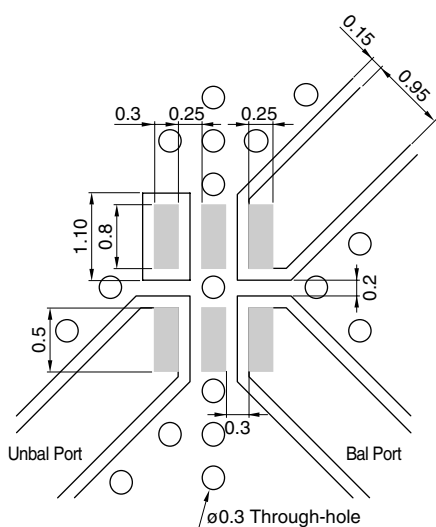
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



Line width be designed to match 50Ω characteristic impedance depending on PCB material and thickness.

Dimensions in mm

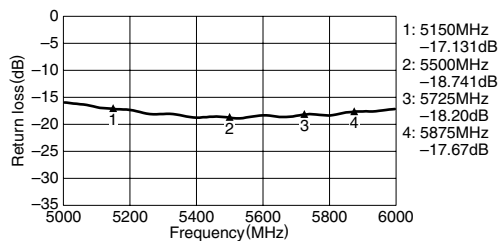
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω	
Balanced impedance	100Ω	
Frequency range	5150 to 5875MHz	
Unbalanced port return loss	10dB min.	
Phase impedance at balanced port	180±10deg.	
Amplitude impedance at balanced port	0±2.0dB	
Insertion loss	1.0 max.	
Temperature range	Operating	-40 to +85°C
	Storage	-40 to +85°C
Packaging style and quantities	2000pieces/reel	

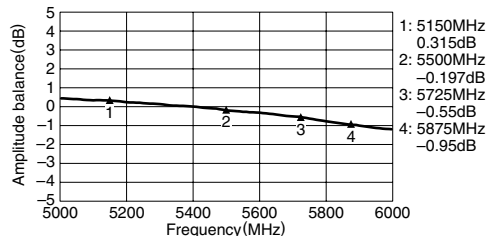
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

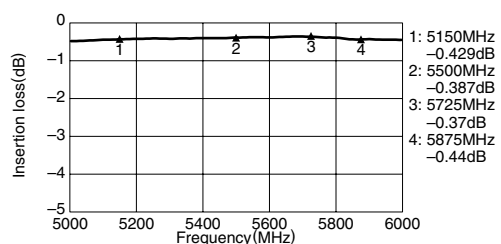
#### RETURN LOSS



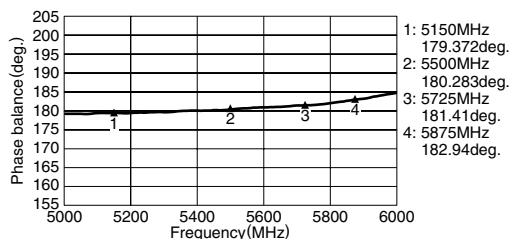
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

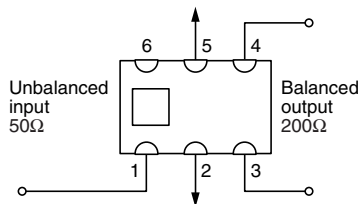
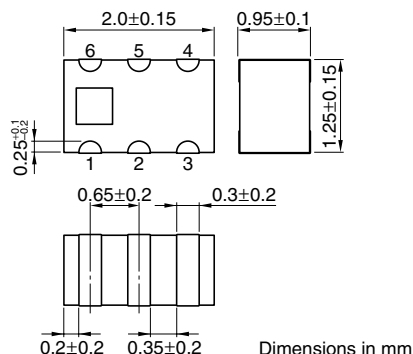


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1564A4 For AGSM/Tx-Rx

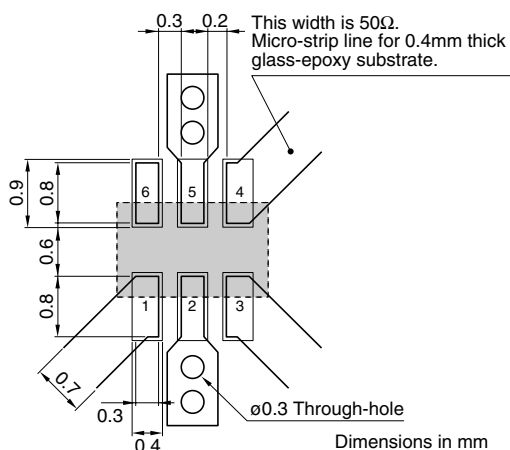
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



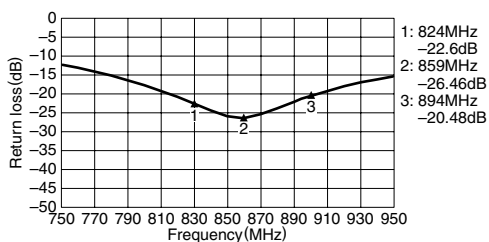
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	200Ω
Frequency range	824 to 894MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg.
Amplitude impedance at balanced port	0±1.0dB
Insertion loss	1.0dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

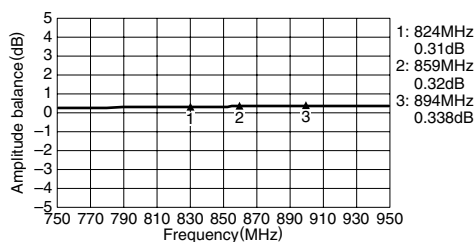
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

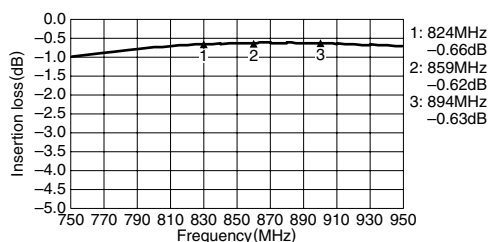
#### RETURN LOSS



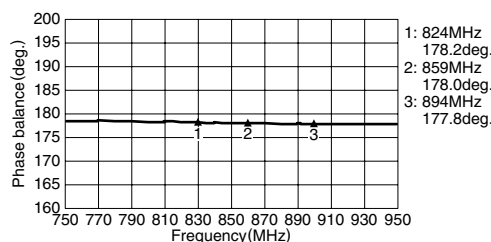
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

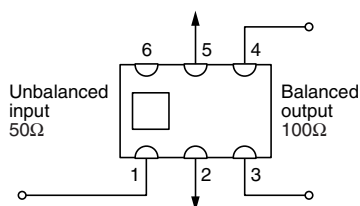
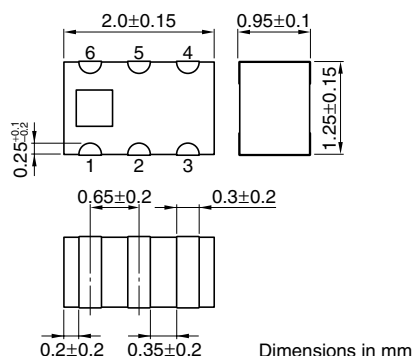


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1570B1 For W-LAN

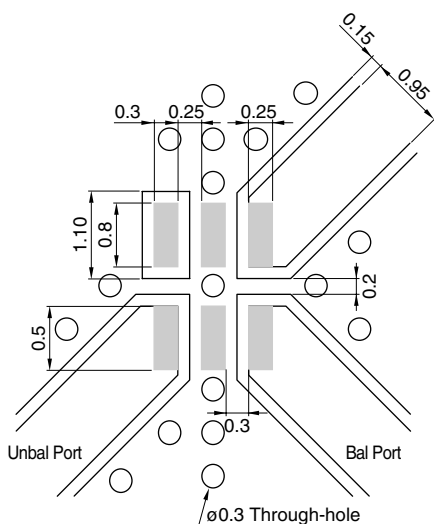
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



Line width be designed to match 50Ω characteristic impedance depending on PCB material and thickness.

Dimensions in mm

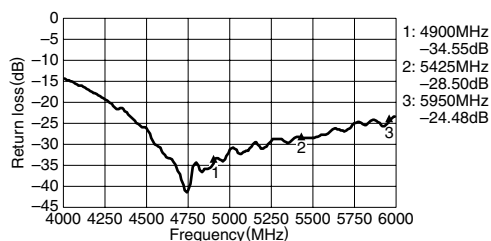
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω	
Balanced impedance	100Ω	
Frequency range	4900 to 5950MHz	
Unbalanced port return loss	10dB min.	
Phase impedance at balanced port	180±10deg.	
Amplitude impedance at balanced port	0±2.0dB	
Insertion loss	1.0 max.	
Temperature range	Operating	-40 to +85°C
	Storage	-40 to +85°C
Packaging style and quantities	2000pieces/reel	

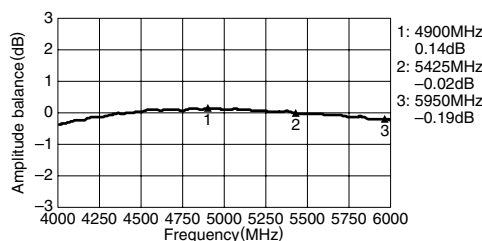
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

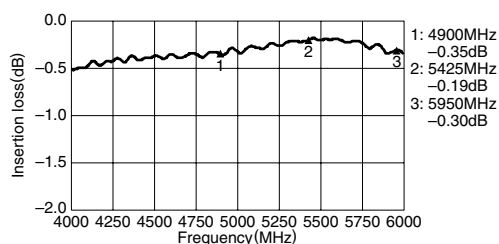
#### RETURN LOSS



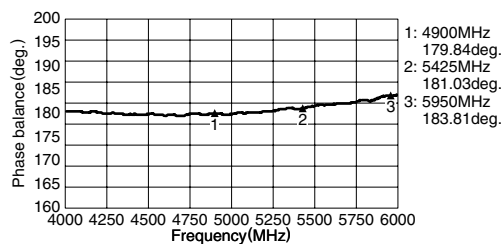
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

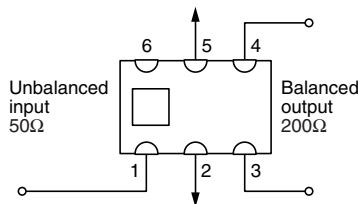
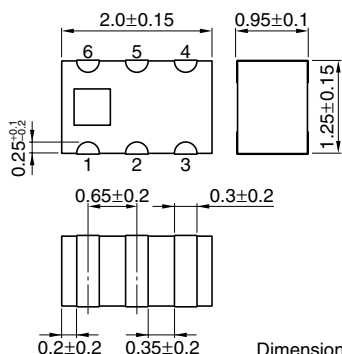


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

HHM1582A1 For 2218 to 2458MHz

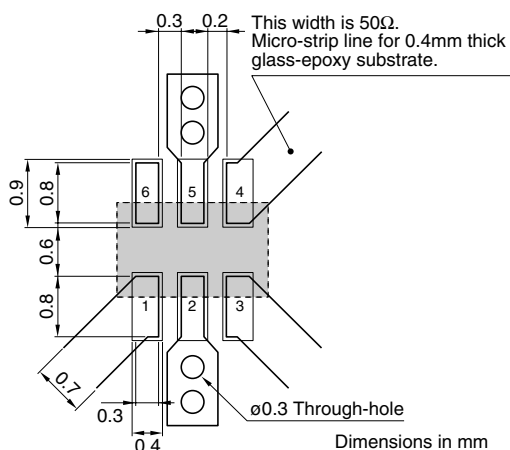
## SHAPES AND DIMENSIONS/CIRCUIT



## TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

## RECOMMENDED PCB PATTERN



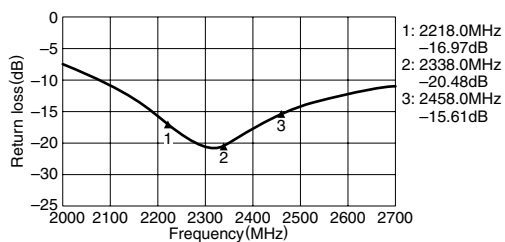
## ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	200Ω
Frequency range	2218 to 2458MHz
Unbalanced port return loss	10dB min.
Phase impedance at balanced port	180±10deg.
Amplitude impedance at balanced port	0±2.0dB
Insertion loss	0.9dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

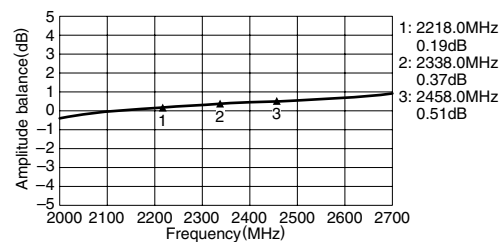
## FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

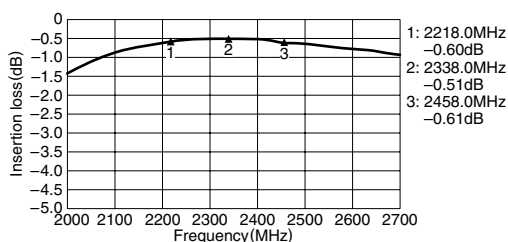
### RETURN LOSS



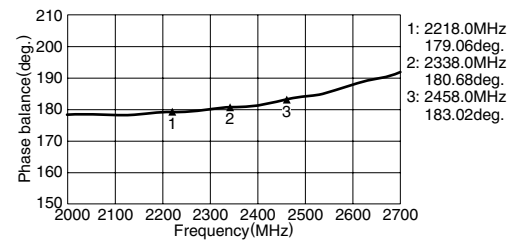
### AMPLITUDE BALANCE



### INSERTION LOSS



### PHASE BALANCE

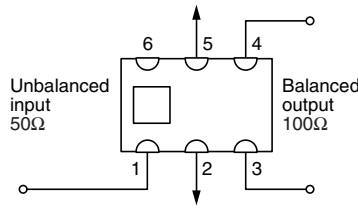
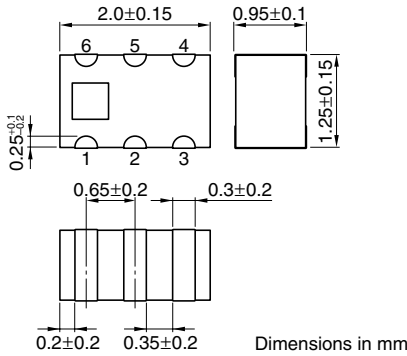


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# Multilayer Baluns, HHM Series

## HHM1583B1 For UWB

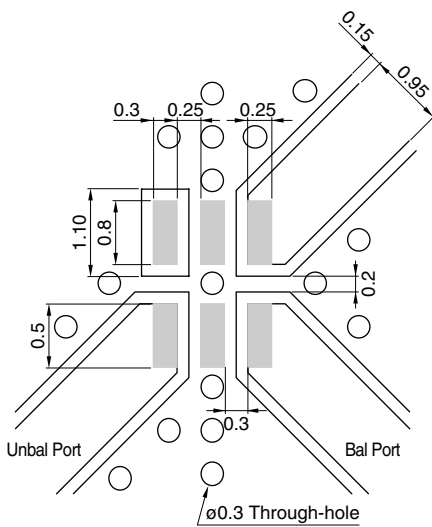
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

### RECOMMENDED PCB PATTERN



Line width be designed to match 50Ω characteristic impedance depending on PCB material and thickness.

Dimensions in mm

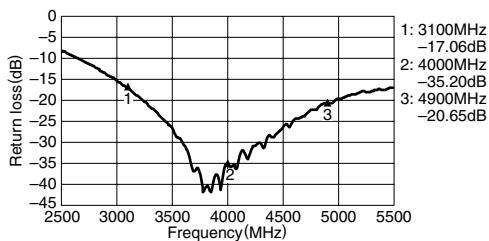
### ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	100Ω
Frequency range	3100 to 4900MHz
Unbalanced port return loss	10.0dB min.
Phase impedance at balanced port	180±10deg.
Amplitude impedance at balanced port	0±1.5dB
Insertion loss	1.0 max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

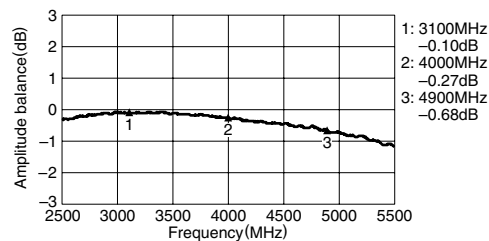
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

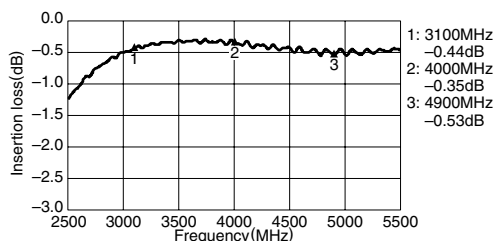
#### RETURN LOSS



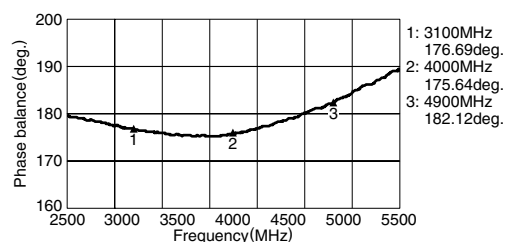
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE



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