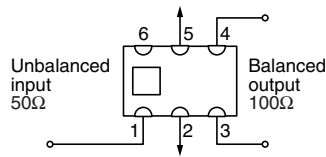
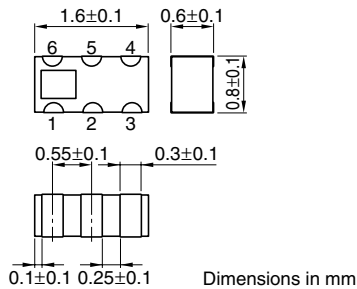


Multilayer Baluns, HHM Series

HHM1711D1 For Bluetooth & IEEE802.11b/g

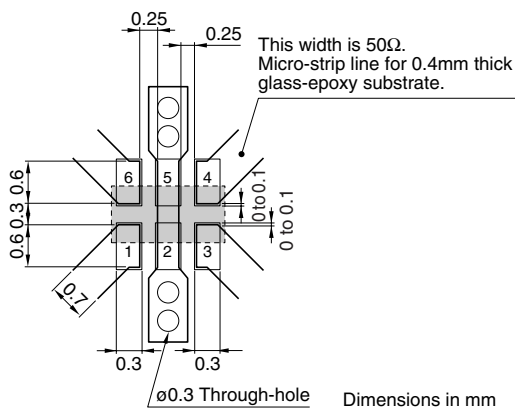
SHAPES AND DIMENSIONS/CIRCUIT



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



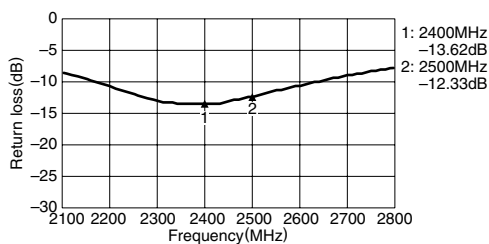
ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	100Ω
Frequency range	2400 to 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

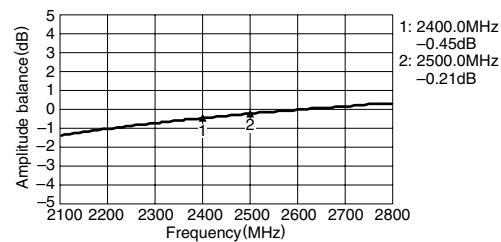
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

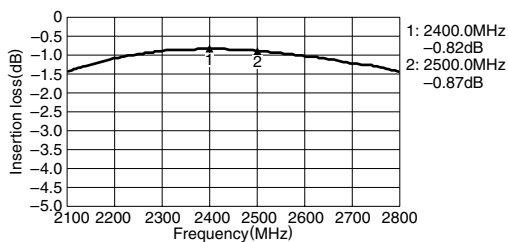
RETURN LOSS



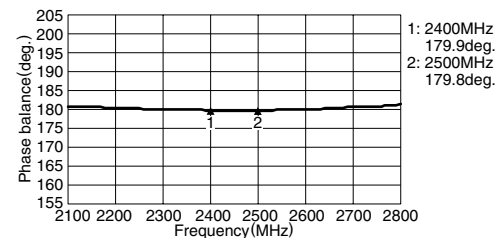
AMPLITUDE BALANCE



INSERTION LOSS



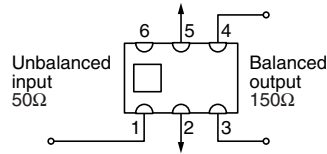
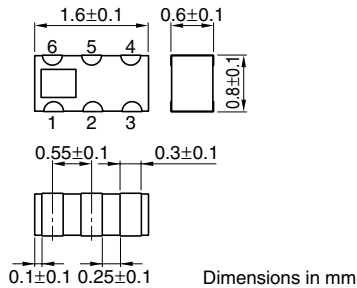
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1712D1 For Bluetooth & IEEE802.11b/g

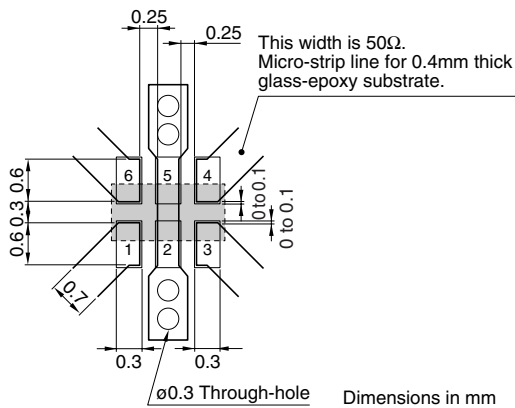
SHAPES AND DIMENSIONS/CIRCUIT



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



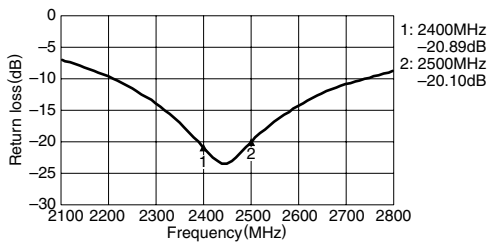
ELECTRICAL CHARACTERISTICS

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

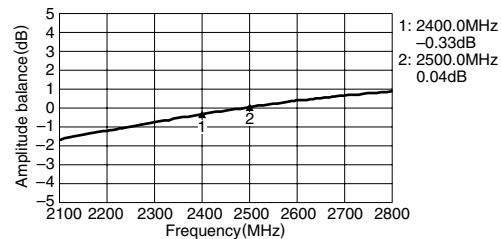
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 150Ω

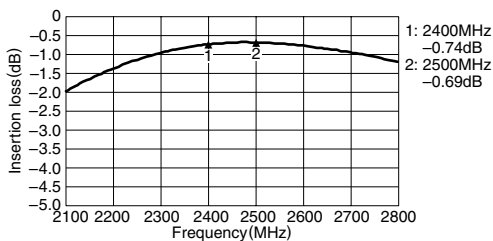
RETURN LOSS



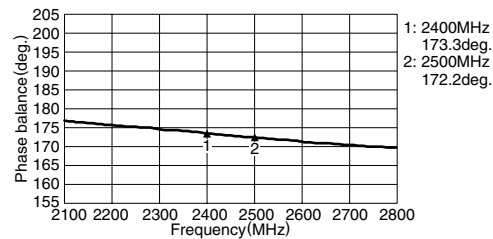
AMPLITUDE BALANCE



INSERTION LOSS



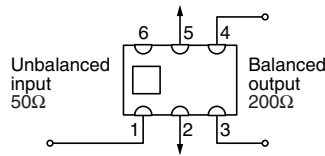
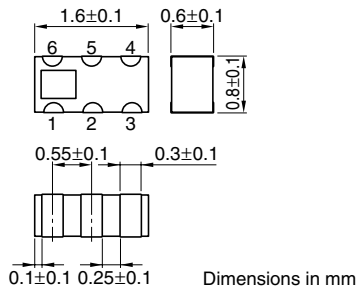
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1713D1 For Bluetooth & IEEE802.11b/g

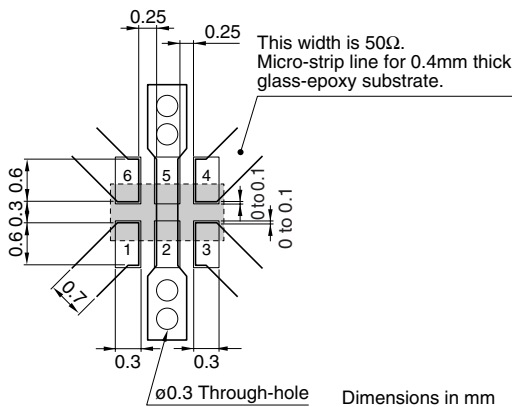
SHAPES AND DIMENSIONS/CIRCUIT



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



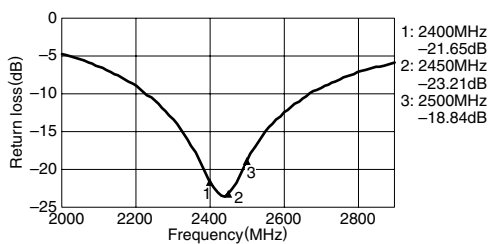
ELECTRICAL CHARACTERISTICS

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

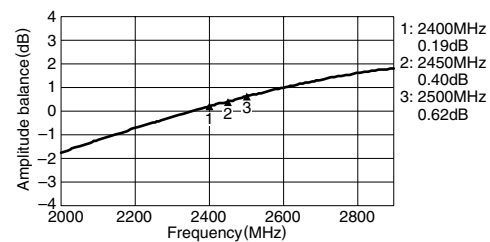
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

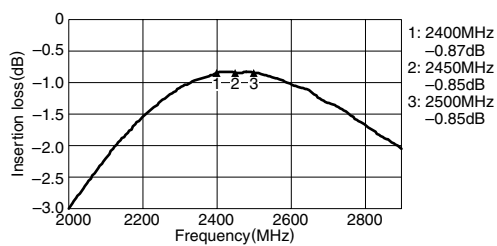
RETURN LOSS



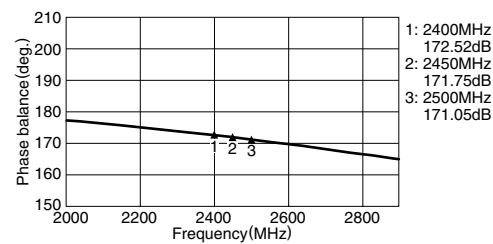
AMPLITUDE BALANCE



INSERTION LOSS



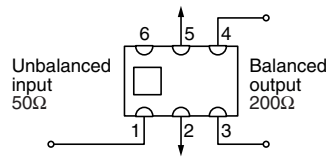
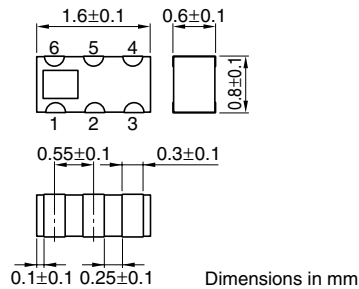
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1720A1 For EGSM

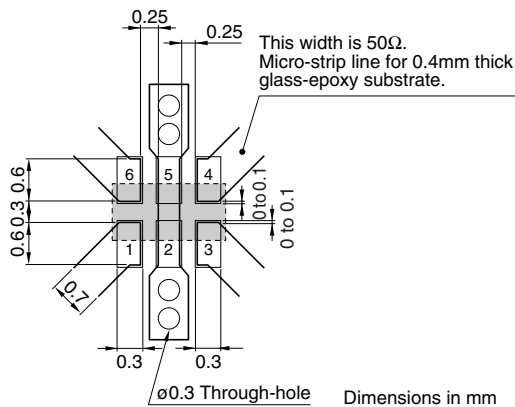
SHAPES AND DIMENSIONS/CIRCUIT



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



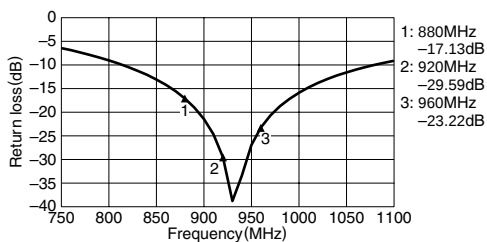
ELECTRICAL CHARACTERISTICS

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

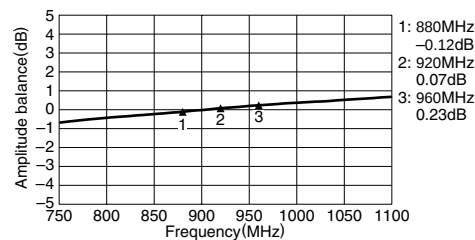
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

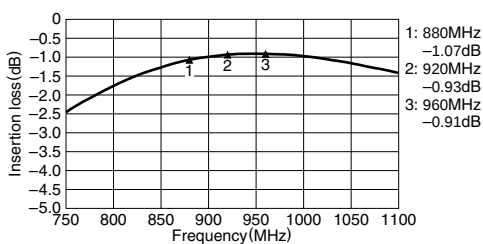
RETURN LOSS



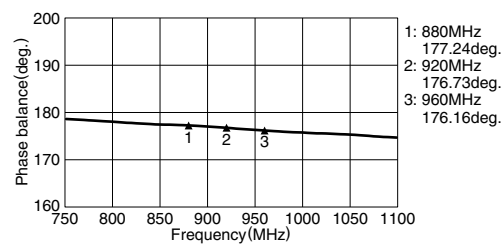
AMPLITUDE BALANCE



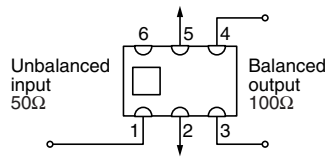
INSERTION LOSS



PHASE BALANCE



HHM1726L1 For PDC800/Tx+Rx



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

This width is 50Ω.
Micro-strip line for 0.4mm thick glass-epoxy substrate.

Dimensions in mm

0.25
0.25
0.6 to 0.3
0.1 to 0.1
0.3
0.3
ø0.3 Through-hole

Diagram illustrating the dimensions of a micro-strip line layout on a 50Ω substrate. The layout consists of six rectangular pads arranged in two rows of three, numbered 1 through 6. The pads are connected by micro-strip lines. Key dimensions include:

- Pad width: 0.6 to 0.3 mm
- Pad height: 0.1 to 0.1 mm
- Pad spacing (center-to-center): 0.3 mm
- Through-hole diameter: ø0.3 mm
- Micro-strip line width: 0.25 mm

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

The graph displays the return loss in decibels (dB) as a function of frequency in megahertz (MHz). Two specific points are highlighted:

Frequency (MHz)	Return Loss (dB)
893	-23.34
958	-23.27

1: 2400MHz
0.89dB
2: 2500MHz
-0.67dB

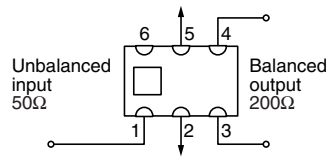
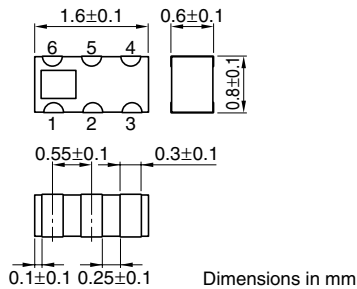
Graph of Insertion loss (dB) vs Frequency (MHz) for the 1000 MHz band. The graph shows two curves: 1: 893MHz (-0.32dB) and 2: 958MHz (-0.31dB). The insertion loss is relatively flat across the frequency range from 700 MHz to 1100 MHz, with values between -0.5 dB and -0.3 dB.

1: 2400MHz
182.27deg.
2: 2500MHz
182.13deg.

Multilayer Baluns, HHM Series

HHM1731A2 For DCS/Tx+Rx

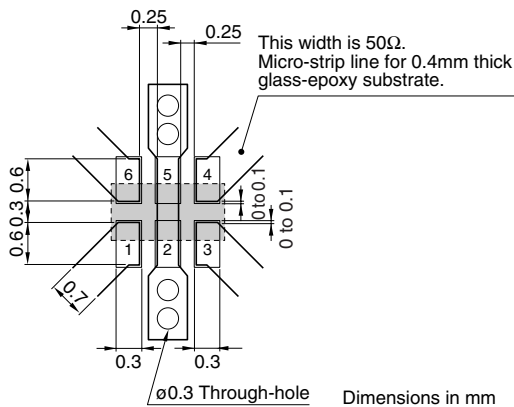
SHAPES AND DIMENSIONS/CIRCUIT



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



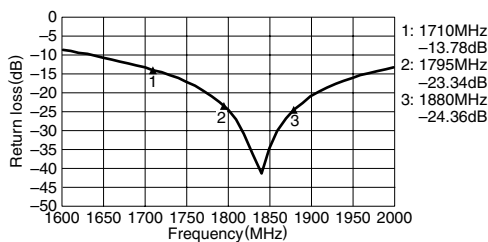
ELECTRICAL CHARACTERISTICS

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

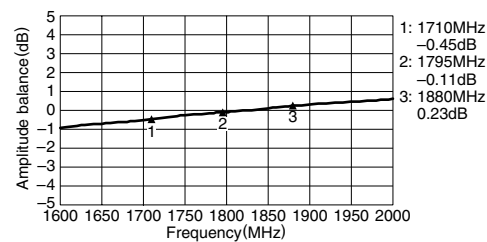
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

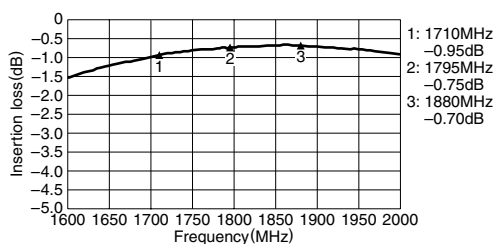
RETURN LOSS



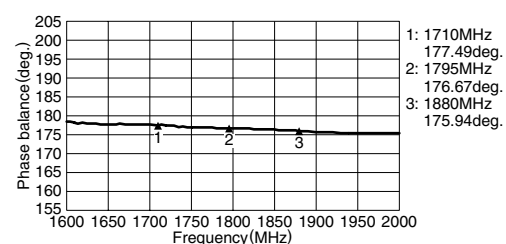
AMPLITUDE BALANCE



INSERTION LOSS



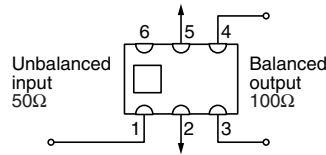
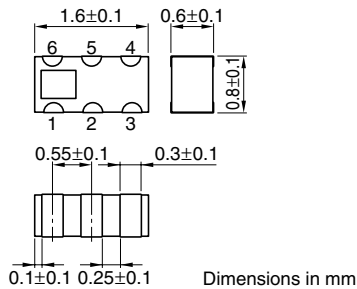
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1732B1 For W-LAN

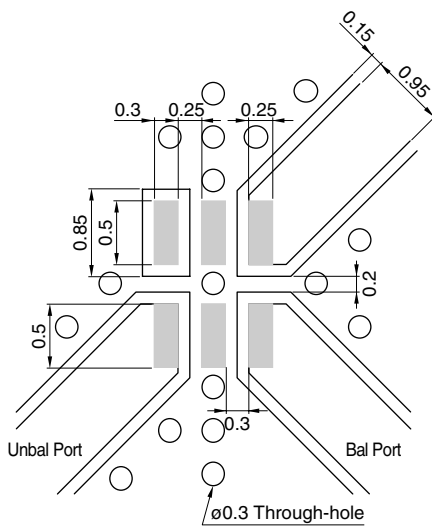
SHAPES AND DIMENSIONS/CIRCUIT



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

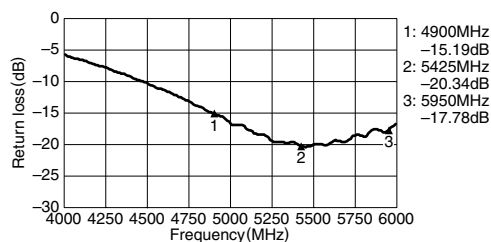
ELECTRICAL CHARACTERISTICS

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

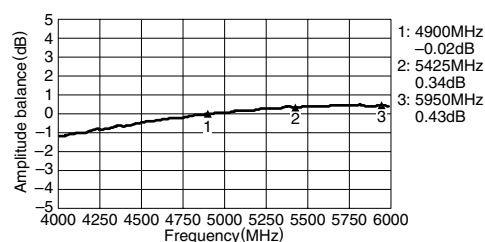
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

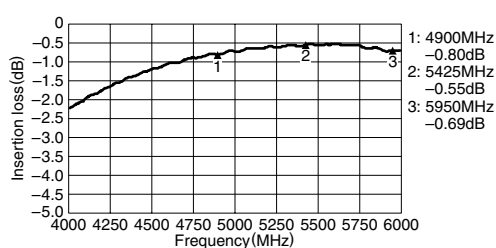
RETURN LOSS



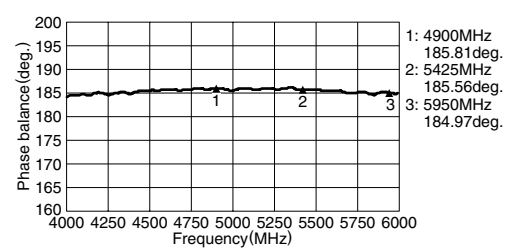
AMPLITUDE BALANCE



INSERTION LOSS



PHASE BALANCE

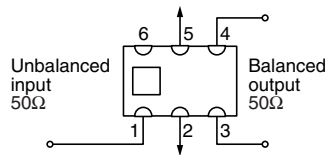
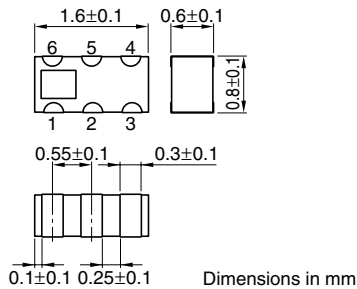


• All specifications are subject to change without notice.

Multilayer Baluns, HHM Series

HHM1733B1 For W-LAN

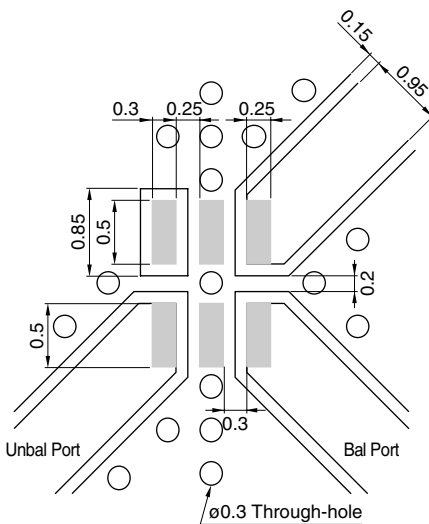
SHAPES AND DIMENSIONS/CIRCUIT



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.

Dimensions in mm

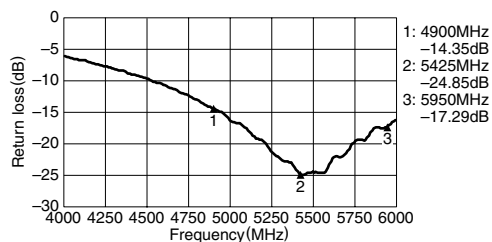
ELECTRICAL CHARACTERISTICS

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

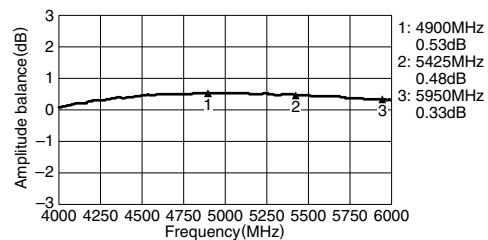
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 50Ω

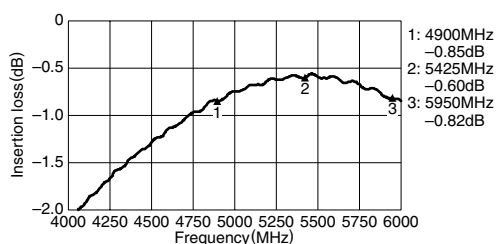
RETURN LOSS



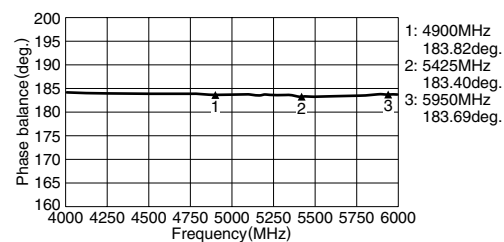
AMPLITUDE BALANCE



INSERTION LOSS

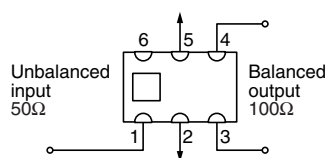


PHASE BALANCE



• All specifications are subject to change without notice.

HHM1743L1 For PDC1500/Local



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

This width is 50Ω.
Micro-strip line for 0.4mm thick glass-epoxy substrate.

Dimensions in mm

0.7
0.6
0.3
0.3
0.25
0.25
0.1 to 0.1
0.1 to 0.1
Ø0.3 Through-hole

The diagram shows a central vertical microstrip line with six circular through-holes arranged in two columns of three. The holes are labeled 1 through 6. Dimensions include hole diameter (Ø0.3), hole pitch (0.7), pad diameters (0.6), pad-to-hole gaps (0.3), and various strip widths (0.25, 0.1 to 0.1). A note specifies the 0.25mm width corresponds to a 50Ω impedance.

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

1: 1439MHz
-23.16dB
2: 1468MHz
-22.98dB

1: 1439MHz
-0.39dB

2: 1468MHz
-0.83dB

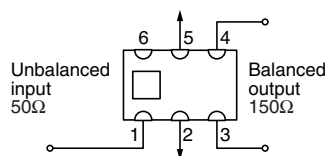
Frequency (MHz)	Amplitude balance (dB)
1300	2.0
1350	1.0
1400	0.0
1439	-0.39
1468	-0.83
1500	-1.5
1550	-2.5
1600	-3.0

1: 1439MHz
184.8deg.

2: 1468MHz
184.6deg.

HHM1748A2 For DCS/Tx+Rx

Technical drawing of a mechanical part with dimensions in mm. The part has a rectangular base with a width of 1.6 ± 0.1 mm and a height of 0.8 ± 0.1 mm. It features a central rectangular cutout with a width of 0.6 ± 0.1 mm and a height of 0.3 ± 0.1 mm. The cutout is positioned 0.1 ± 0.1 mm from the left edge and 0.25 ± 0.1 mm from the bottom edge. The part is divided into six sections by vertical lines, with dimensions 0.55 ± 0.1 mm and 0.3 ± 0.1 mm indicated for the top sections.



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

This width is 50Ω.
Micro-strip line for 0.4mm thick glass-epoxy substrate.

0.6
0.3
0.6

0.7

0.25

0.25

0 to 0.1

0.3

0.3

$\phi 0.3$ Through-hole

Dimensions in mm

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	

1: 1710MHz
-17.44dB
2: 1795MHz
-22.31dB
3: 1880MHz
-16.51dB

1: 1710MHz
-0.06dB
2: 1795MHz
0.24dB
3: 1880MHz
0.52dB

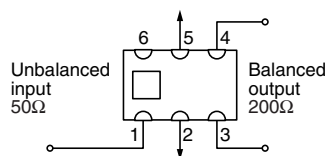
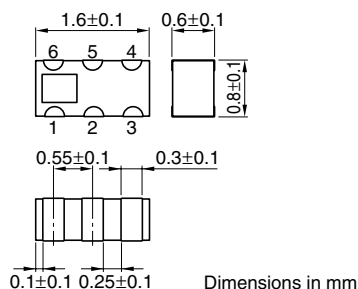
1: 1710MHz
-0.66dB
2: 1795MHz
-0.59dB
3: 1880MHz
-0.65dB

Frequency (MHz)	Phase balance (deg.)
1710	175.79
1795	174.92
1880	174.27

Multilayer Baluns, HHM Series

HHM1752A1 For W-LAN

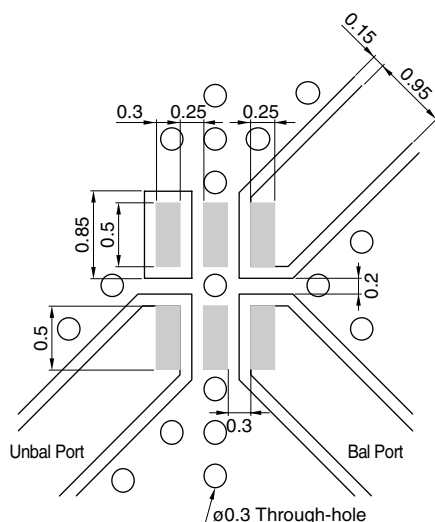
SHAPES AND DIMENSIONS/CIRCUIT



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

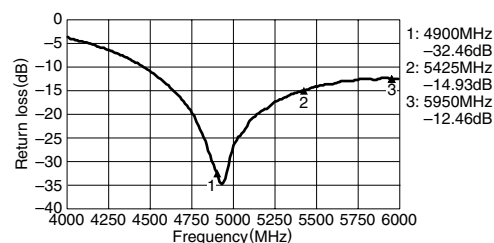
ELECTRICAL CHARACTERISTICS

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

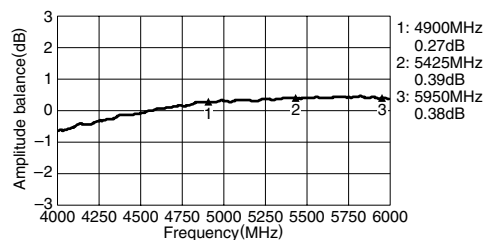
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

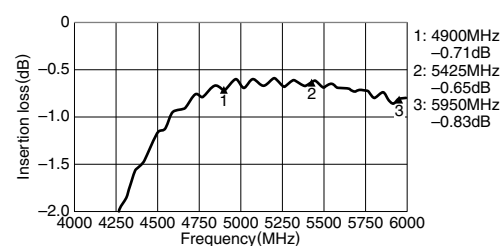
RETURN LOSS



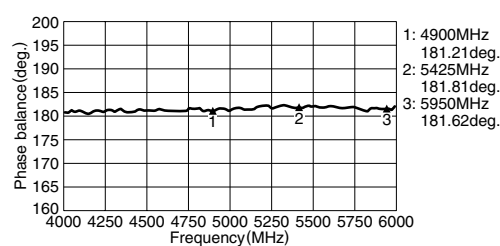
AMPLITUDE BALANCE



INSERTION LOSS

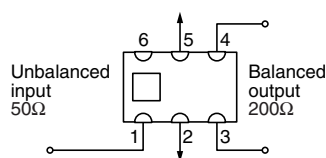


PHASE BALANCE



• All specifications are subject to change without notice.

HHM1752A2 For W-LAN

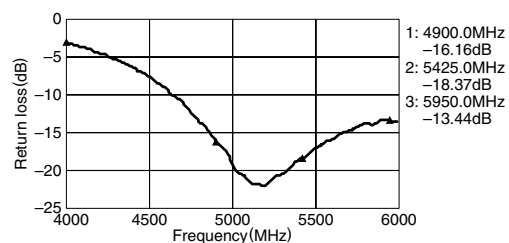


1	Unbalanced Port
2	GND or DC feed+ RF GND
3	Balanced Port
4	Balanced Port
5	GND
6	N.C.

Dimensions in mm

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

RETURN LOSS



Amplitude balance (dB)

Frequency (MHz)

1: 4900.0MHz
-0.01dB
2: 5425.0MHz
0.28dB
3: 5950.0MHz
0.36dB
4: 5950.0MHz
0.36dB

1: 4900.0MHz
-0.88dB
2: 5425.0MHz
-0.66dB
3: 5950.0MHz
-0.79dB

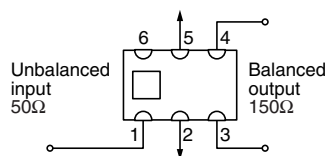
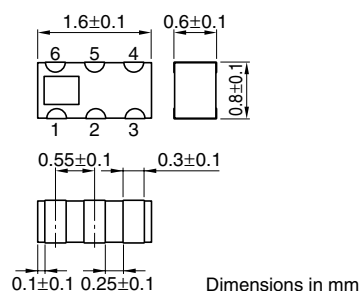
Graph showing Phase balance (deg) versus Frequency (MHz) for three different frequencies. The y-axis ranges from 160 to 200 degrees, and the x-axis ranges from 4000 to 6000 MHz. The data points are plotted for three frequencies: 4900.0MHz, 5425.0MHz, and 5950.0MHz. The phase balance is relatively constant across the frequency range, with slight variations around 5000 MHz.

Frequency (MHz)	Phase balance (deg)
4900.0	181.46
5425.0	181.18
5950.0	179.85

Multilayer Baluns, HHM Series

HHM1763A1 For EGSM

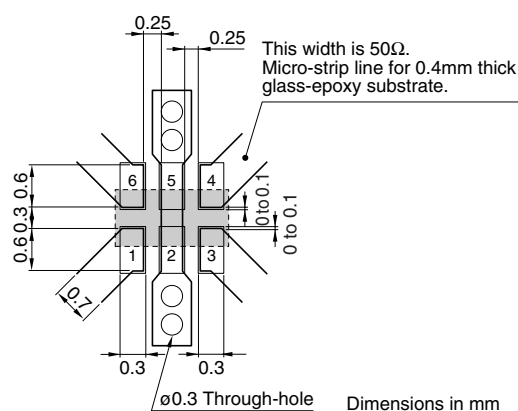
SHAPES AND DIMENSIONS/CIRCUIT



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



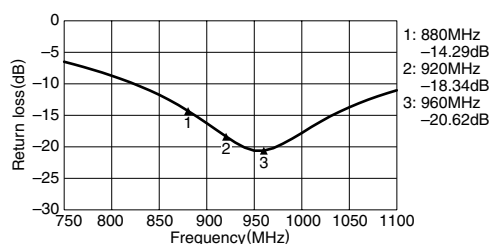
ELECTRICAL CHARACTERISTICS

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

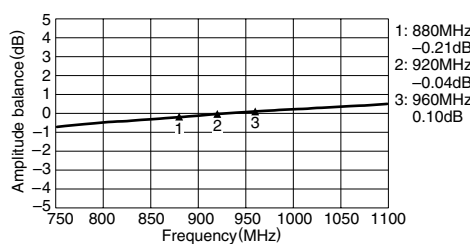
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 150Ω

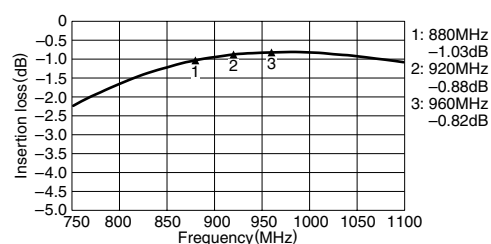
RETURN LOSS



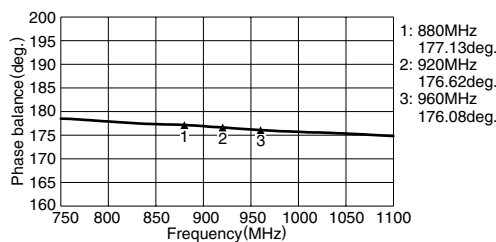
AMPLITUDE BALANCE



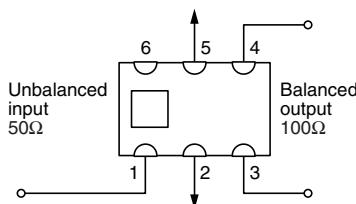
INSERTION LOSS



PHASE BALANCE



HHM1502 For DCS/Local



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

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

1: 1619MHz
-17.64dB
2: 1662MHz
-18.41dB
3: 1705MHz
-19.00dB

Graph showing Amplitude balance (dB) versus Frequency (MHz) for three frequencies:

- 1: 1619MHz, 0.162dB
- 2: 1662MHz, 0.185dB
- 3: 1705MHz, 0.239dB

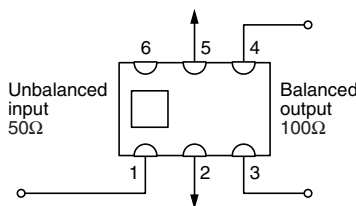
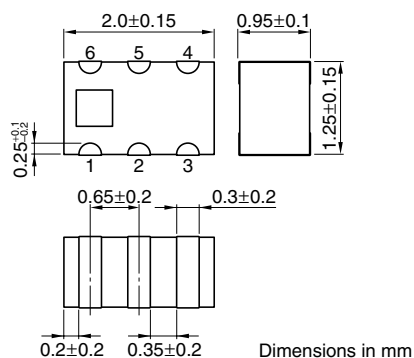
1: 1619MHz
-0.459dB
2: 1662MHz
-0.440dB
3: 1705MHz
-0.444dB

1: 1619MHz
181.0deg.
2: 1662MHz
181.2deg.
3: 1705MHz
181.1deg.

Multilayer Baluns, HHM Series

HHM1506 For W-CDMA/Tx-Rx

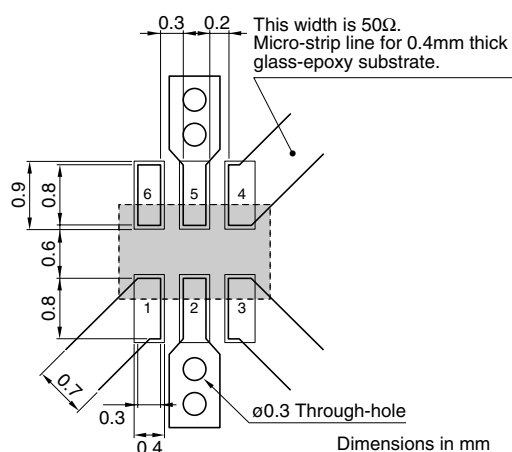
SHAPES AND DIMENSIONS/CIRCUIT



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



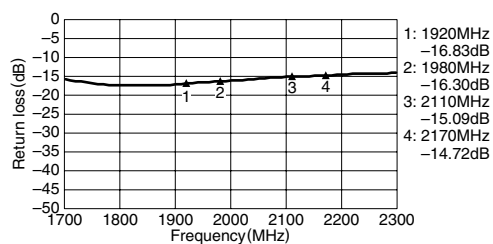
ELECTRICAL CHARACTERISTICS

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

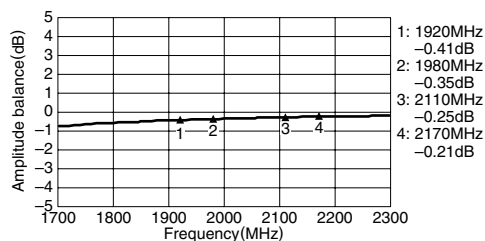
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

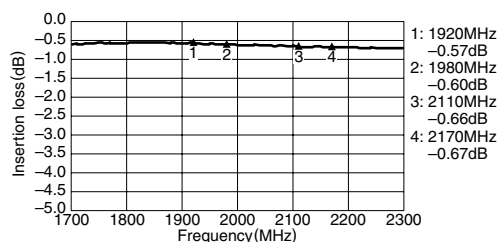
RETURN LOSS



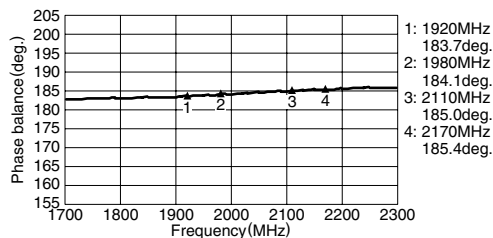
AMPLITUDE BALANCE



INSERTION LOSS



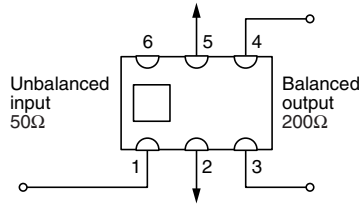
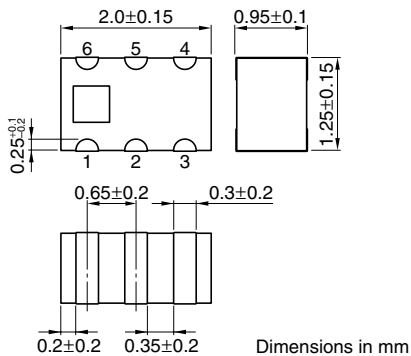
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1509 For EGSM-DCS/Local

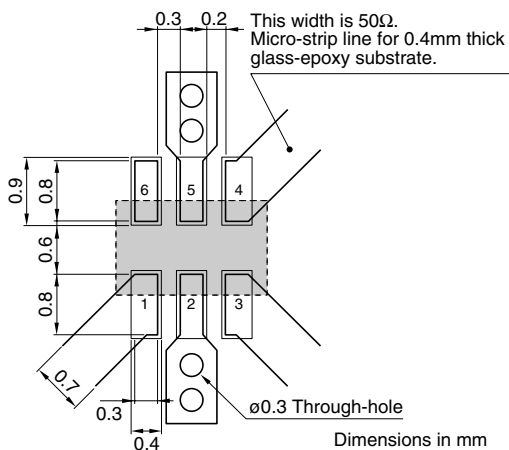
SHAPES AND DIMENSIONS/CIRCUIT



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



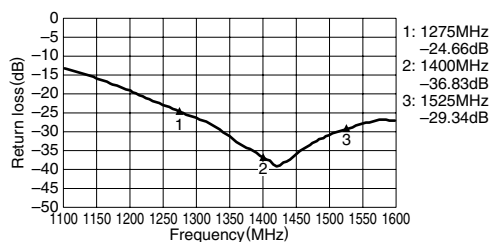
ELECTRICAL CHARACTERISTICS

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

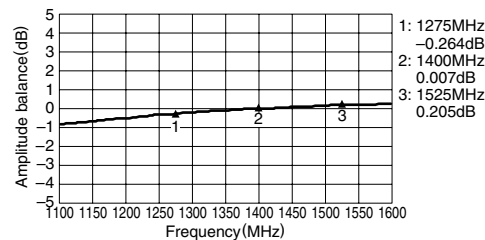
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

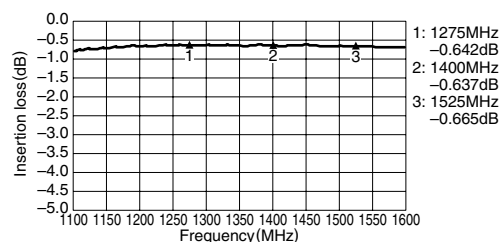
RETURN LOSS



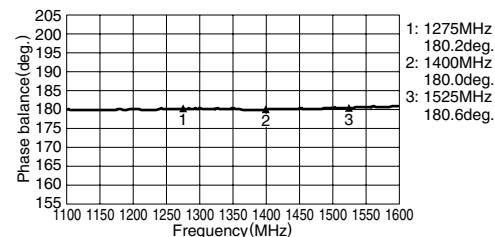
AMPLITUDE BALANCE



INSERTION LOSS

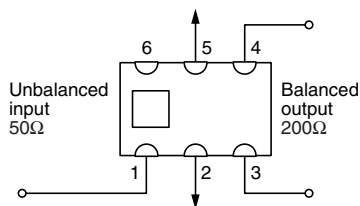


PHASE BALANCE



HHM1515B2 For EGSM/Tx-Rx

Technical drawing of a mechanical part with dimensions in mm. The drawing shows a top view and a side view. The top view is a rectangle with a width of 2.0 ± 0.15 mm and a height of 1.25 ± 0.15 mm. It features six semi-circular features: three along the top edge (labeled 6, 5, 4) and three along the bottom edge (labeled 1, 2, 3). A small square feature is located on the left side. The side view shows a height of 0.95 ± 0.1 mm and a width of 0.3 ± 0.2 mm. The top view also shows a width of 0.65 ± 0.2 mm for the central section and a width of 0.2 ± 0.2 mm for the left section. The side view shows a width of 0.35 ± 0.2 mm for the central section.



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

This width is 50Ω.
Micro-strip line for 0.4mm thick glass-epoxy substrate.

Dimensions in mm

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	

1: 880MHz
-22.77dB

2: 920MHz
-28.21dB

3: 960MHz
-21.37dB

Graph showing Amplitude balance (dB) versus Frequency (MHz) for three channels. The Y-axis ranges from -5 dB to 5 dB, and the X-axis ranges from 800 MHz to 1000 MHz. The data points are as follows:

Channel	Frequency (MHz)	Amplitude balance (dB)
1	880	0.060
2	920	0.060
3	960	0.069

Graph showing Insertion loss (dB) versus Frequency (MHz) for three different frequencies:

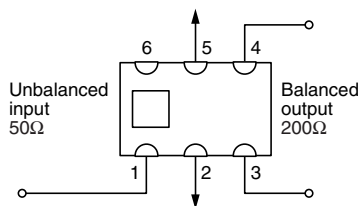
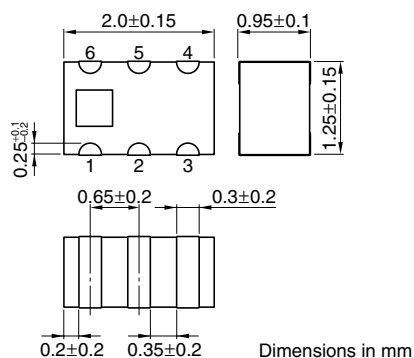
- 1: 880MHz -0.65dB
- 2: 920MHz -0.60dB
- 3: 960MHz -0.63dB

1: 880MHz
179.2deg.
2: 920MHz
179.3deg.
3: 960MHz
179.4deg.

Multilayer Baluns, HHM Series

HHM1516 For DCS-PCS/Tx-Rx

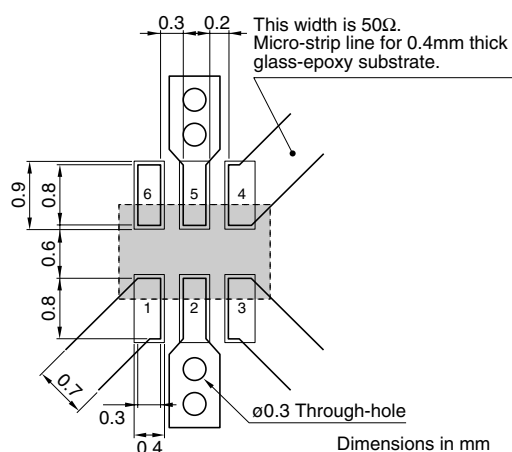
SHAPES AND DIMENSIONS/CIRCUIT



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



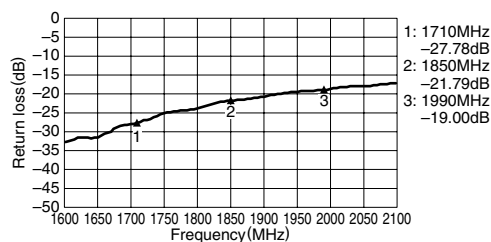
ELECTRICAL CHARACTERISTICS

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

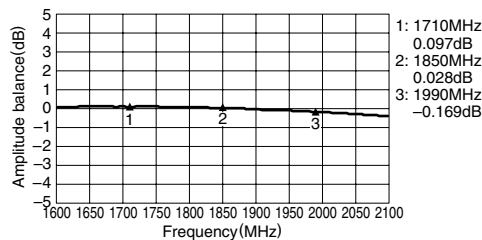
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

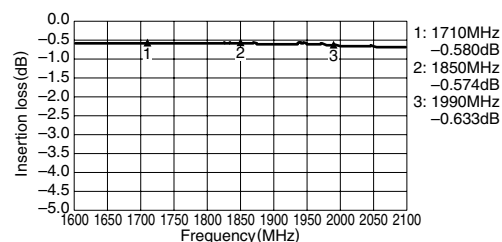
RETURN LOSS



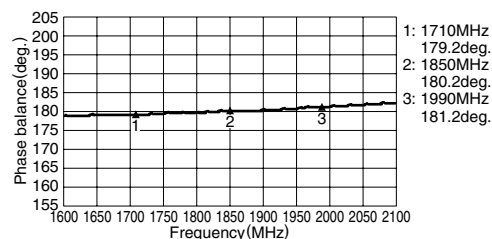
AMPLITUDE BALANCE



INSERTION LOSS



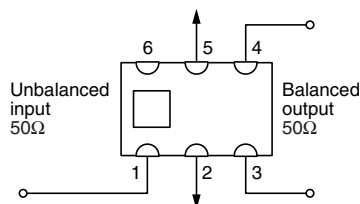
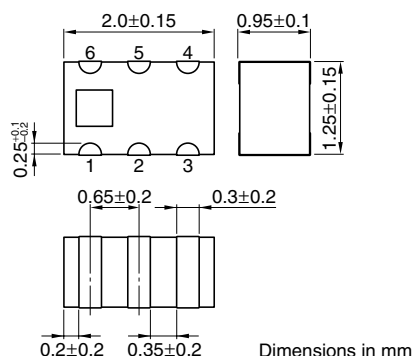
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1517 For Bluetooth&IEEE802.11b/g

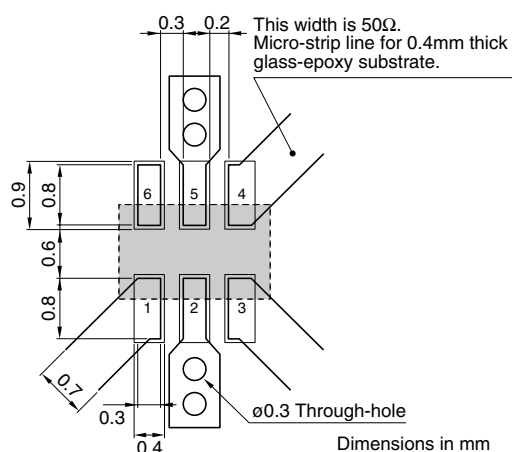
SHAPES AND DIMENSIONS/CIRCUIT



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



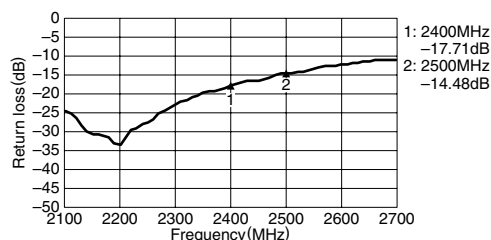
ELECTRICAL CHARACTERISTICS

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

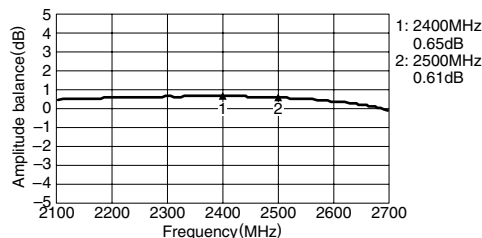
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 50Ω

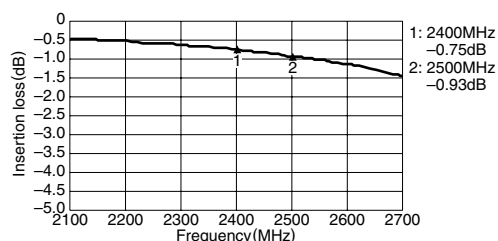
RETURN LOSS



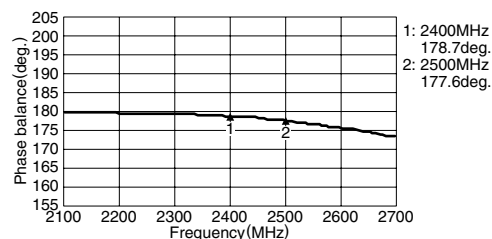
AMPLITUDE BALANCE



INSERTION LOSS



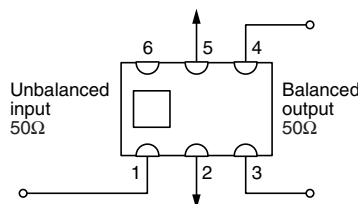
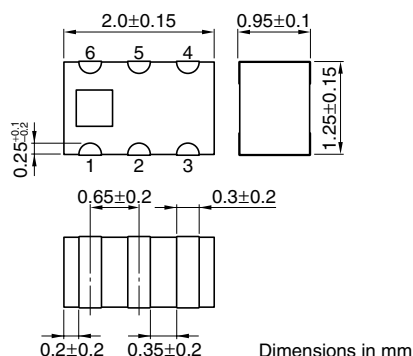
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1517A2 For Bluetooth&IEEE802.11b/g

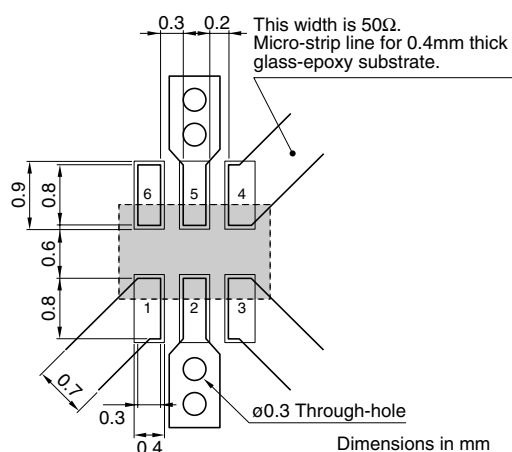
SHAPES AND DIMENSIONS/CIRCUIT



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



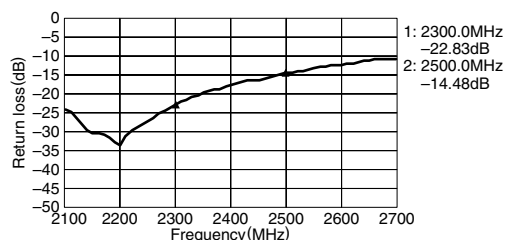
ELECTRICAL CHARACTERISTICS

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

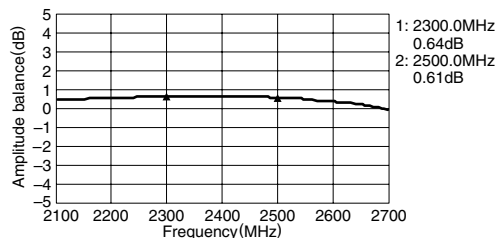
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 50Ω

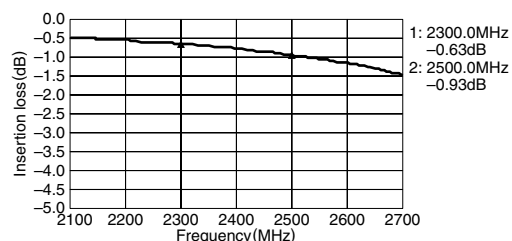
RETURN LOSS



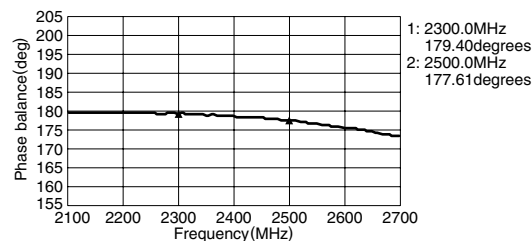
AMPLITUDE BALANCE



INSERTION LOSS



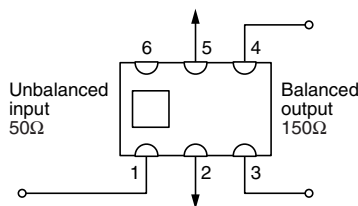
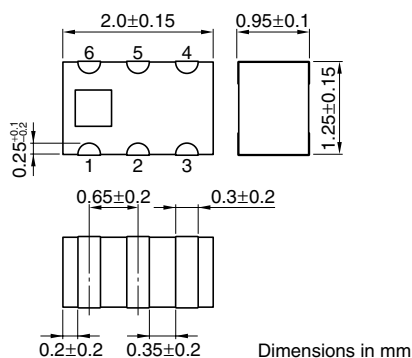
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1518A3 For DCS-PCS/Tx-Rx

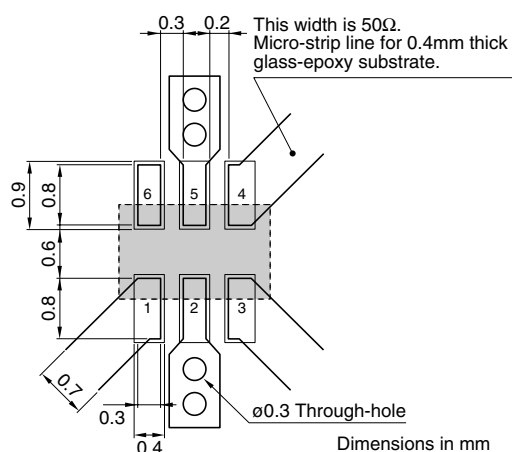
SHAPES AND DIMENSIONS/CIRCUIT



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



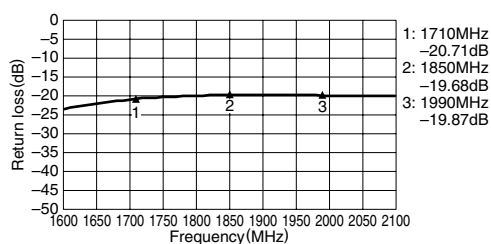
ELECTRICAL CHARACTERISTICS

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

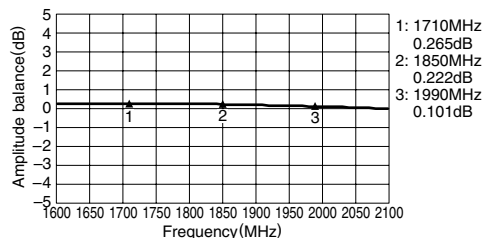
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 150Ω

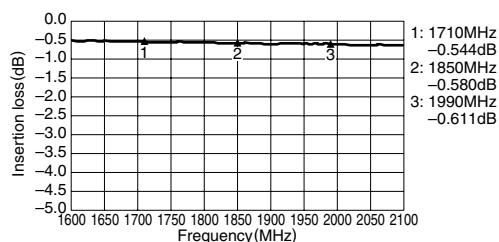
RETURN LOSS



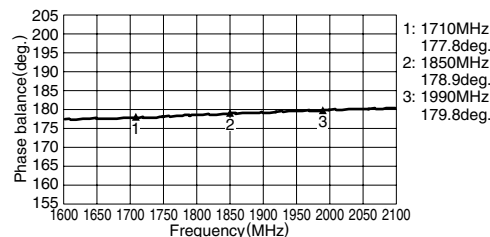
AMPLITUDE BALANCE



INSERTION LOSS



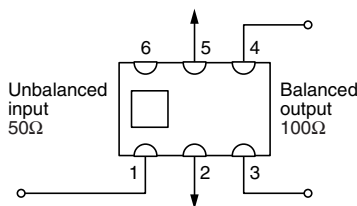
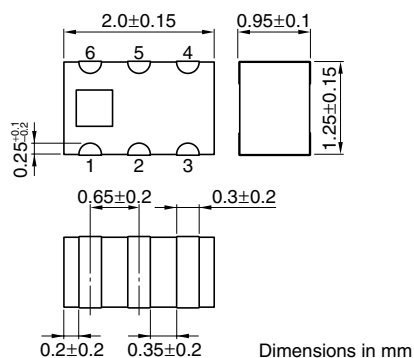
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1520 For Bluetooth&IEEE802.11b/g

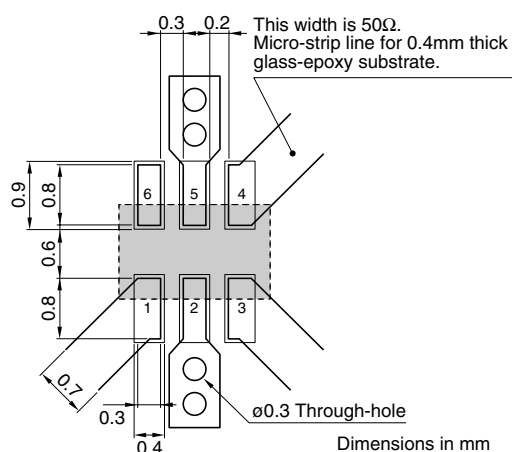
SHAPES AND DIMENSIONS/CIRCUIT



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



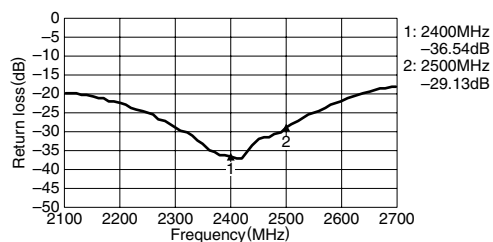
ELECTRICAL CHARACTERISTICS

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

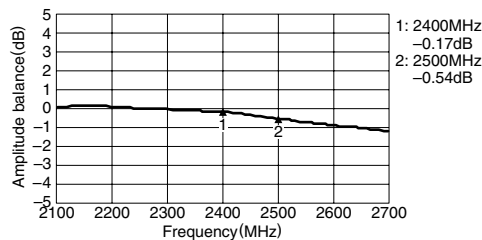
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

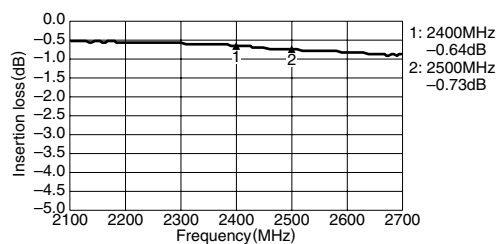
RETURN LOSS



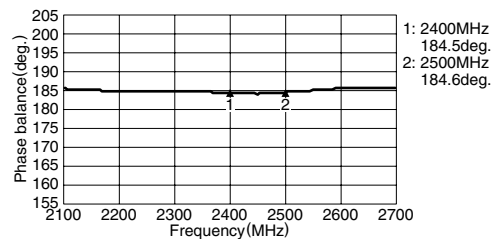
AMPLITUDE BALANCE



INSERTION LOSS



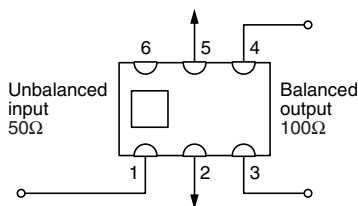
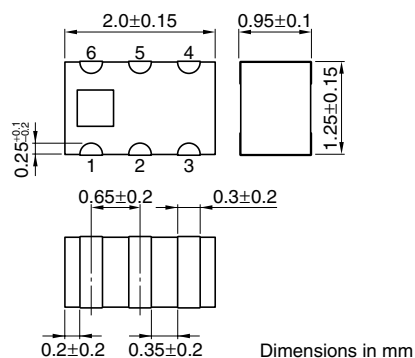
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1520A2 For Bluetooth&IEEE802.11b/g

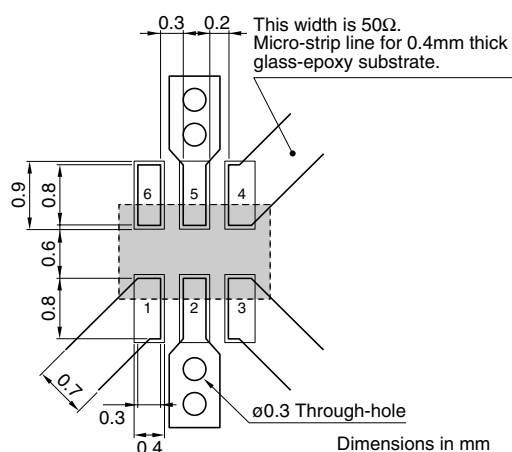
SHAPES AND DIMENSIONS/CIRCUIT



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



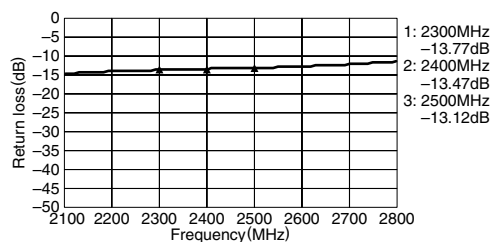
ELECTRICAL CHARACTERISTICS

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

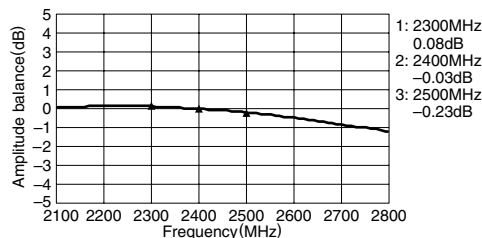
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

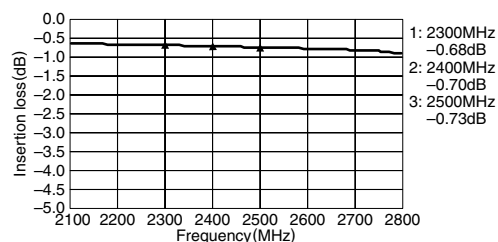
RETURN LOSS



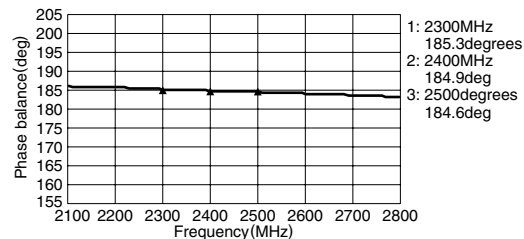
AMPLITUDE BALANCE



INSERTION LOSS



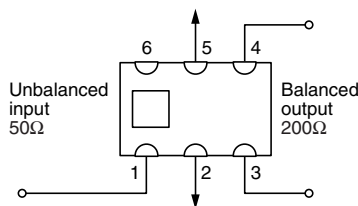
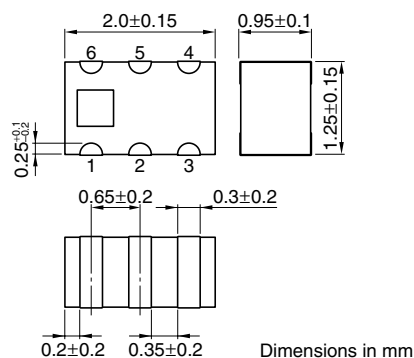
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1521 For Bluetooth&IEEE802.11b/g

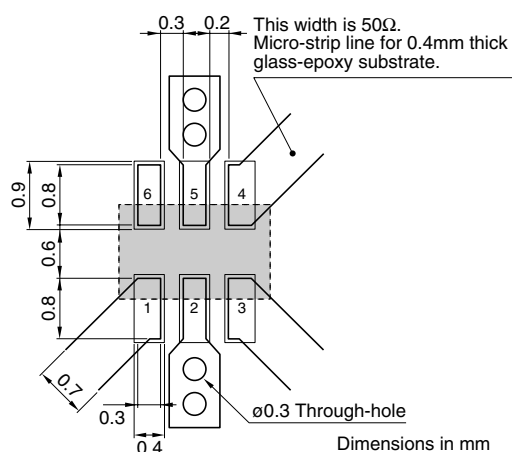
SHAPES AND DIMENSIONS/CIRCUIT



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



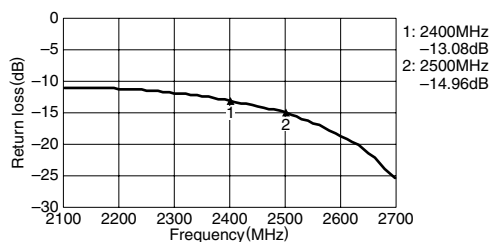
ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	200Ω
Frequency range	2400 to 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

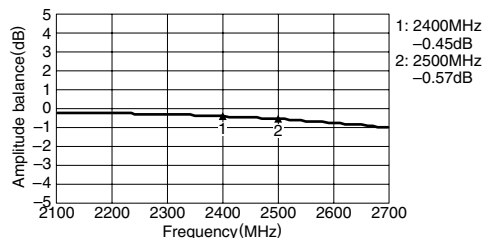
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

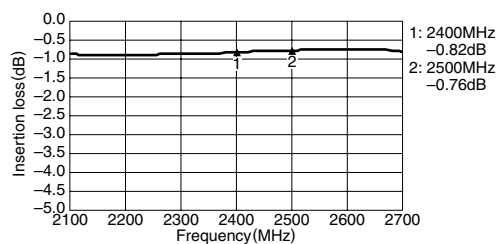
RETURN LOSS



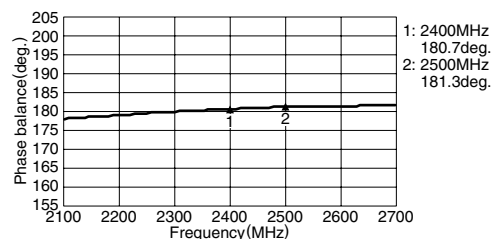
AMPLITUDE BALANCE



INSERTION LOSS



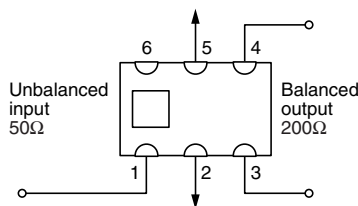
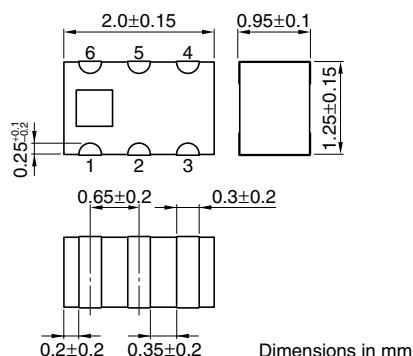
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1521A2 For Bluetooth&IEEE802.11b/g

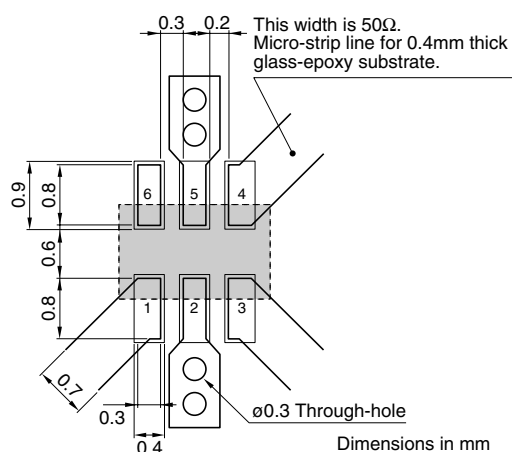
SHAPES AND DIMENSIONS/CIRCUIT



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



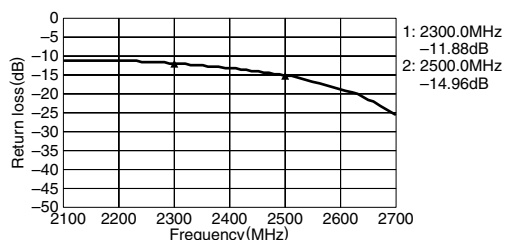
ELECTRICAL CHARACTERISTICS

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

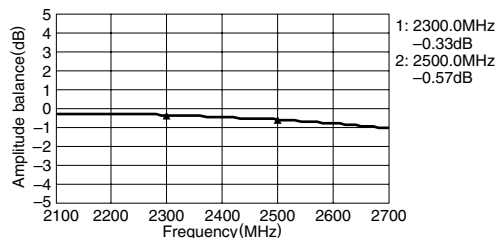
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

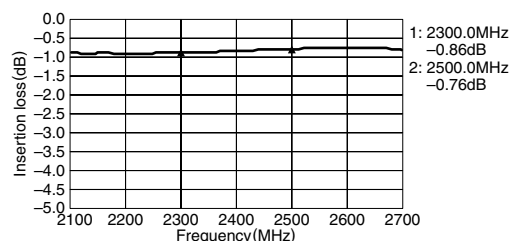
RETURN LOSS



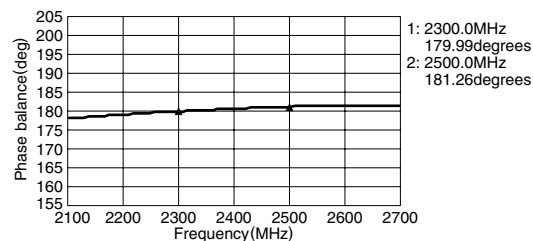
AMPLITUDE BALANCE



INSERTION LOSS



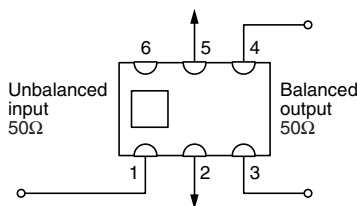
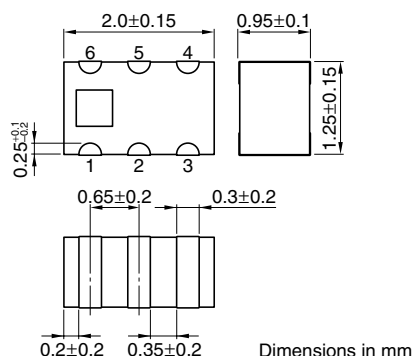
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1522A7 For AGSM/Tx-Rx

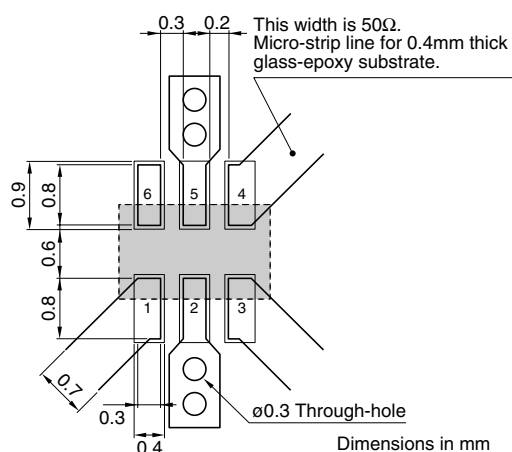
SHAPES AND DIMENSIONS/CIRCUIT



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



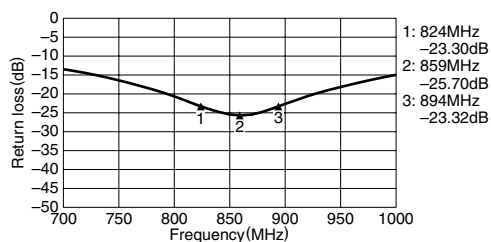
ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	50Ω
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	1.4dB max.
Temperature range	Operating: -40 to +85°C Storage: -40 to +85°C
Packaging style and quantities	2000pieces/reel

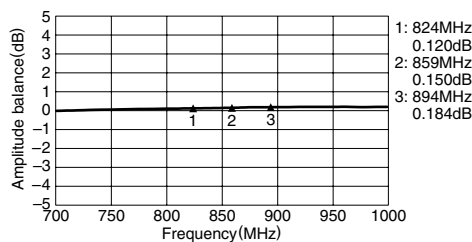
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 50Ω

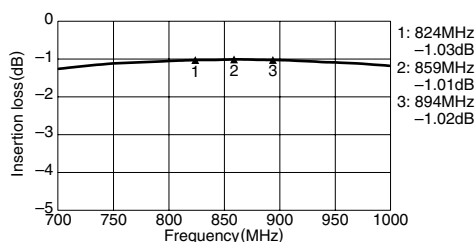
RETURN LOSS



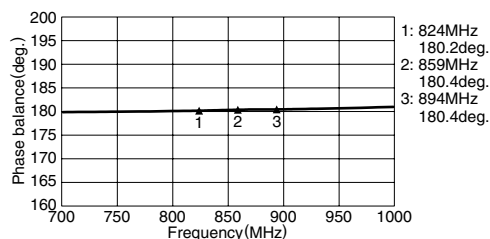
AMPLITUDE BALANCE



INSERTION LOSS



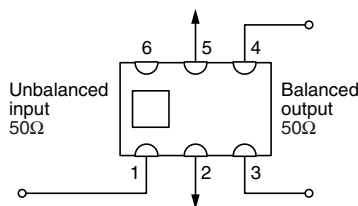
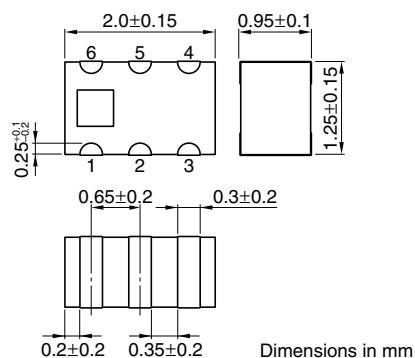
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1522B1 For EGSM/Tx-Rx

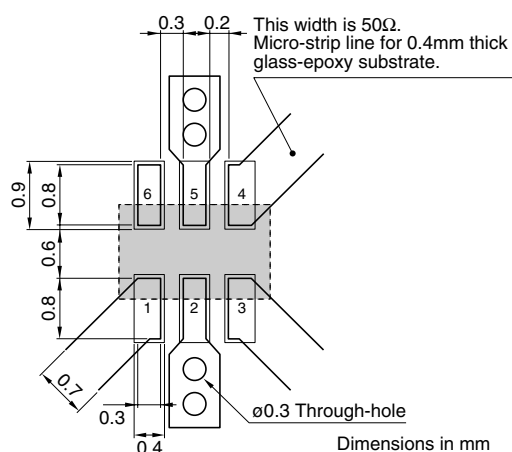
SHAPES AND DIMENSIONS/CIRCUIT



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



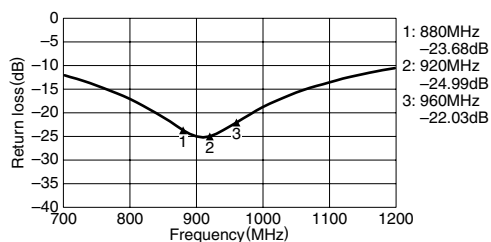
ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	50Ω
Frequency range	880 to 960MHz
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

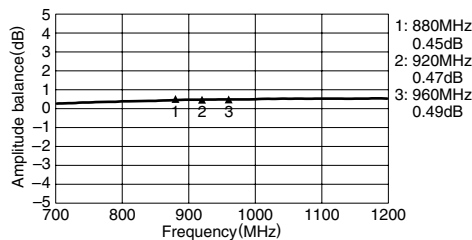
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 50Ω

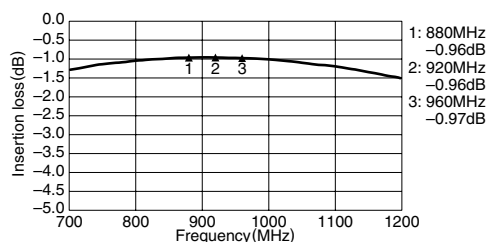
RETURN LOSS



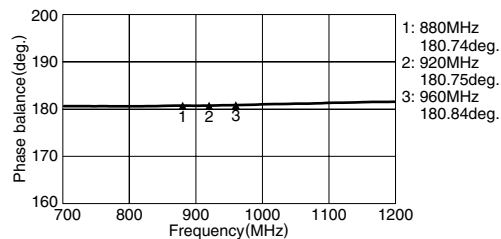
AMPLITUDE BALANCE



INSERTION LOSS



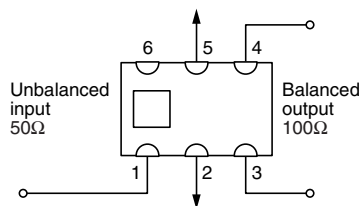
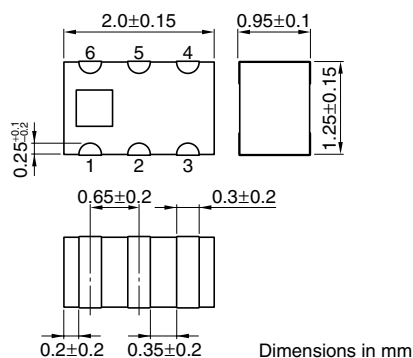
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1523B3 For AGSM/Tx-Rx

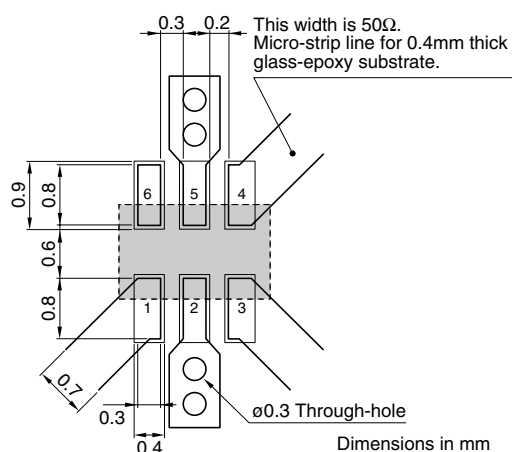
SHAPES AND DIMENSIONS/CIRCUIT



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



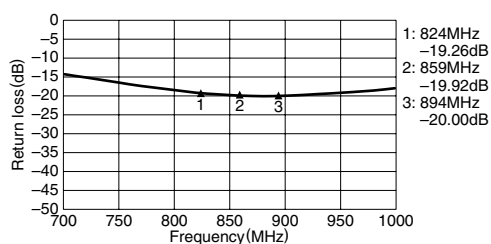
ELECTRICAL CHARACTERISTICS

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

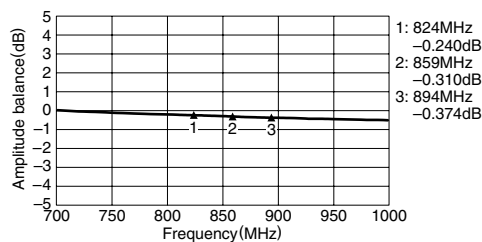
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

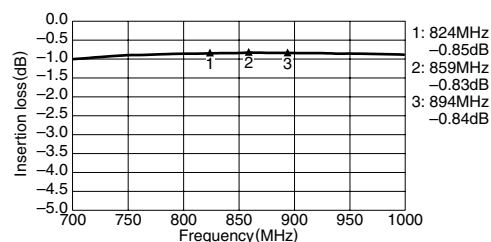
RETURN LOSS



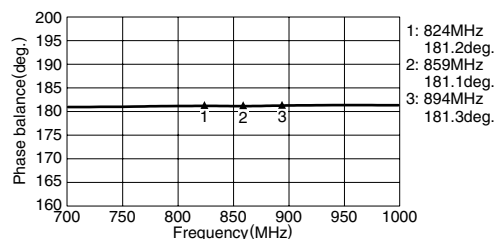
AMPLITUDE BALANCE



INSERTION LOSS



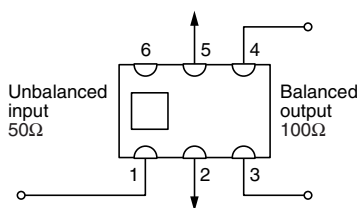
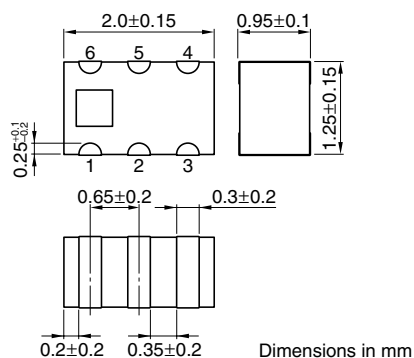
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1523C1 For EGSM/Tx-Rx

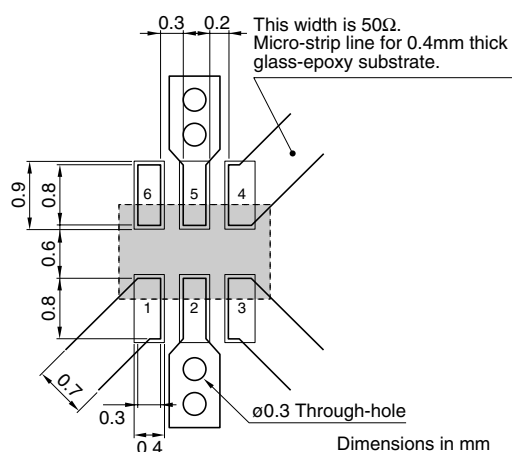
SHAPES AND DIMENSIONS/CIRCUIT



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



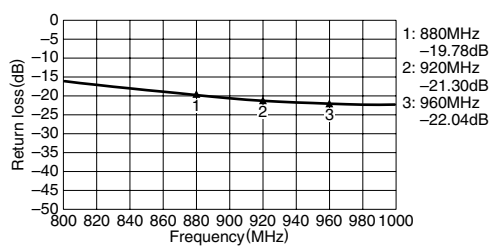
ELECTRICAL CHARACTERISTICS

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

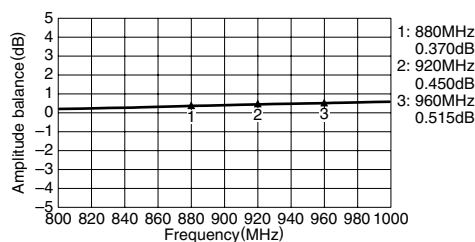
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

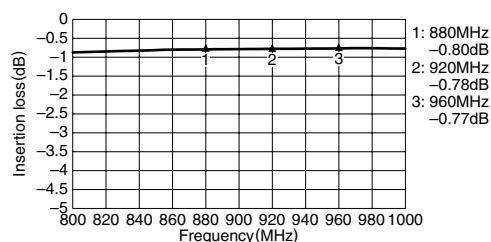
RETURN LOSS



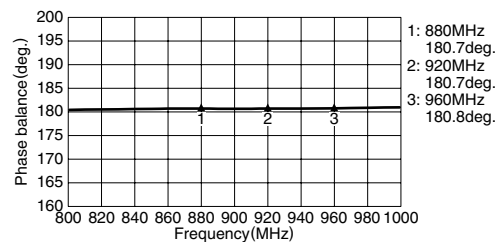
AMPLITUDE BALANCE



INSERTION LOSS



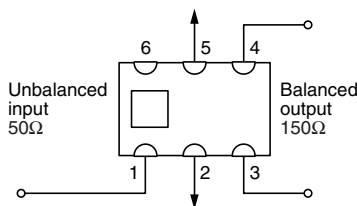
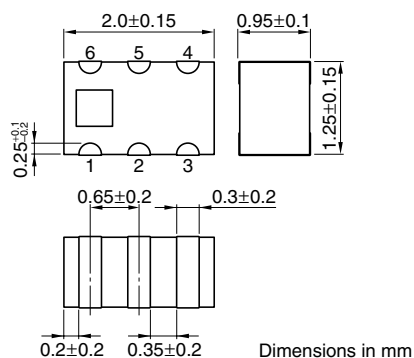
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1524B1 For EGSM/Tx-Rx

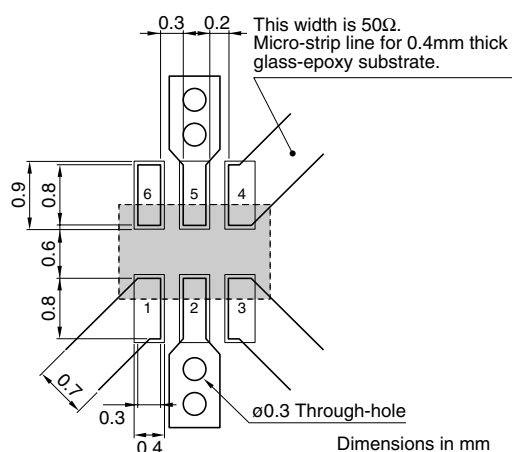
SHAPES AND DIMENSIONS/CIRCUIT



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



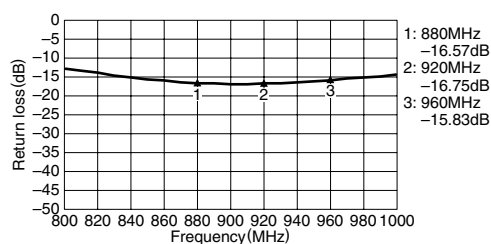
ELECTRICAL CHARACTERISTICS

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

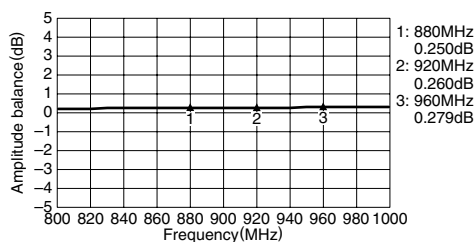
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 150Ω

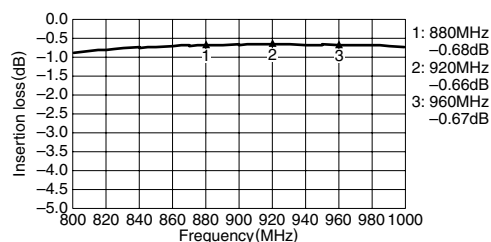
RETURN LOSS



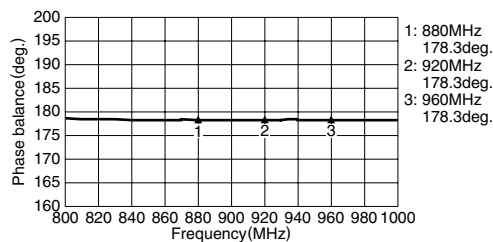
AMPLITUDE BALANCE



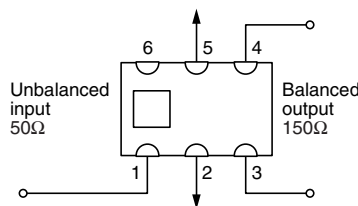
INSERTION LOSS



PHASE BALANCE



HHM1524B4 For AGSM/Tx-Rx



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

This width is 50Ω.
Micro-strip line for 0.4mm thick glass-epoxy substrate.

0.9
0.8
0.6
0.8
0.3
0.2
0.3
0.4
0.7
1
2
3
4
5
6
Ø0.3 Through-hole

Dimensions in mm

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

1: 824MHz
-14.15dB
2: 859MHz
-15.89dB
3: 894MHz
-16.78dB

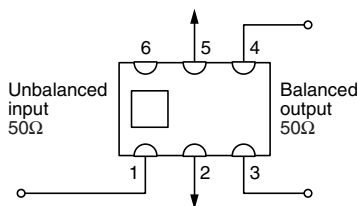
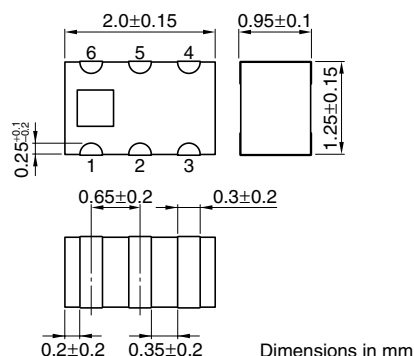
1: 824MHz
-0.79dB
2: 859MHz
-0.71dB
3: 894MHz
-0.67dB

1: 824MHz
178.4deg.
2: 859MHz
178.3deg.
3: 894MHz
178.2deg.

Multilayer Baluns, HHM Series

HHM1525 For DCS-PCS/Tx-Rx

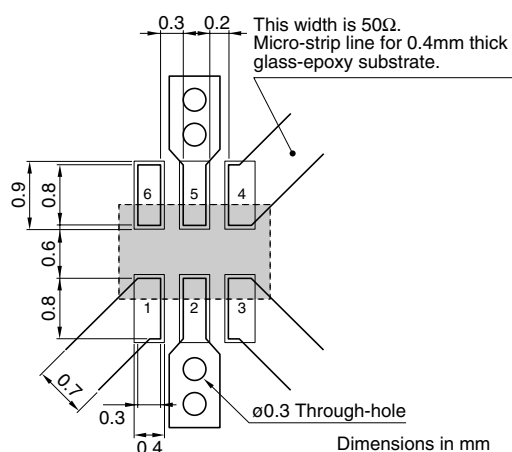
SHAPES AND DIMENSIONS/CIRCUIT



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



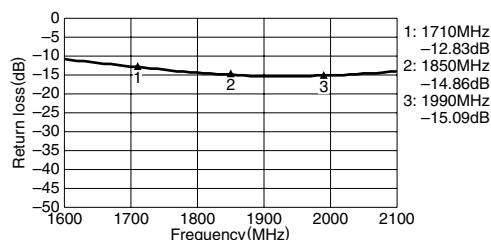
ELECTRICAL CHARACTERISTICS

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

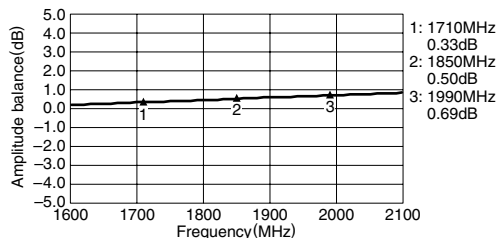
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 50Ω

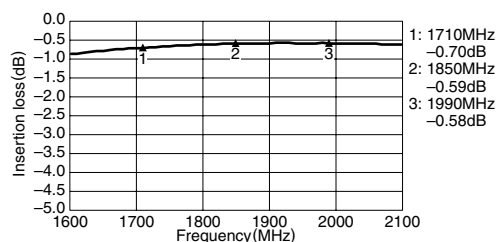
RETURN LOSS



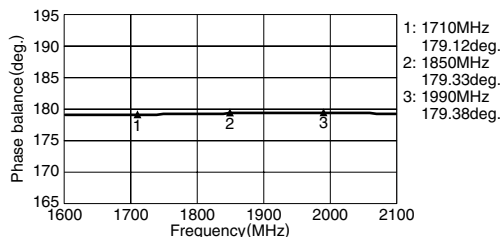
AMPLITUDE BALANCE



INSERTION LOSS



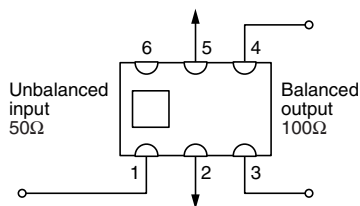
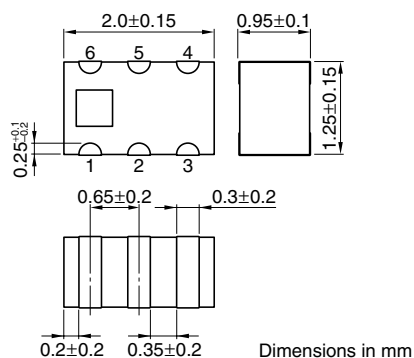
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1526 For DCS-PCS/Tx-Rx

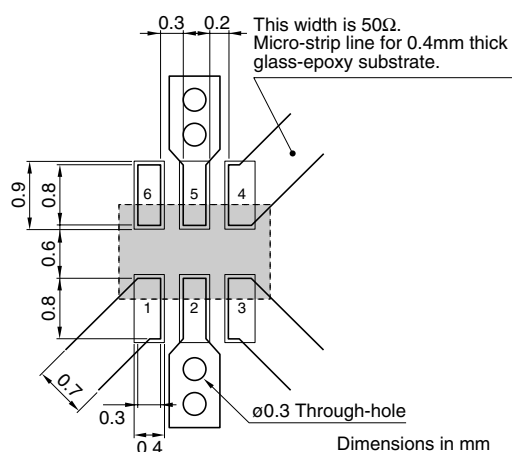
SHAPES AND DIMENSIONS/CIRCUIT



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



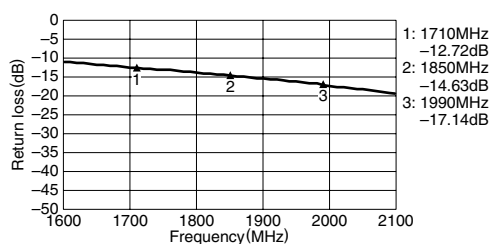
ELECTRICAL CHARACTERISTICS

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

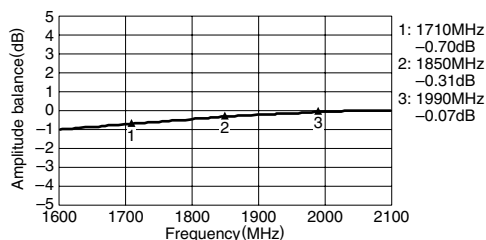
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

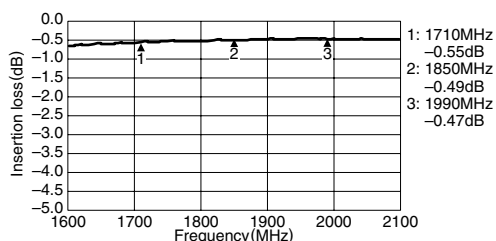
RETURN LOSS



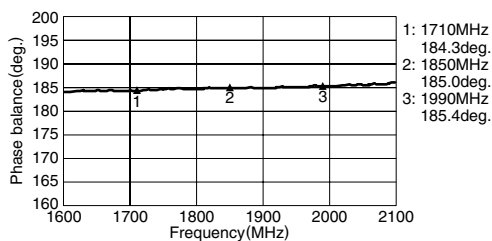
AMPLITUDE BALANCE



INSERTION LOSS



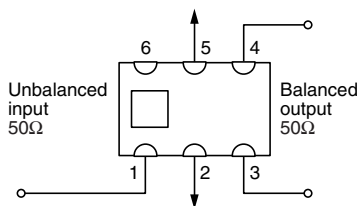
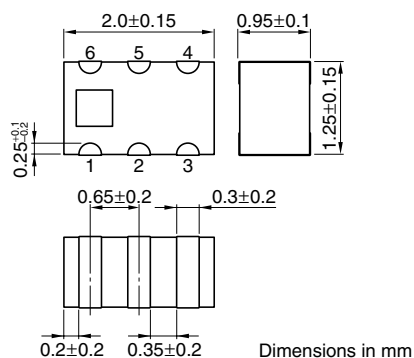
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1533 For W-CDMA/Tx-Rx

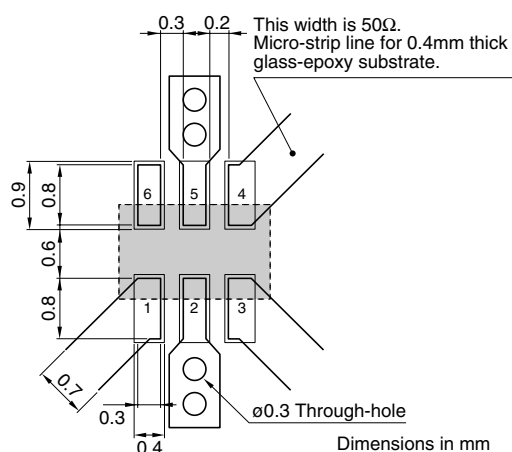
SHAPES AND DIMENSIONS/CIRCUIT



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



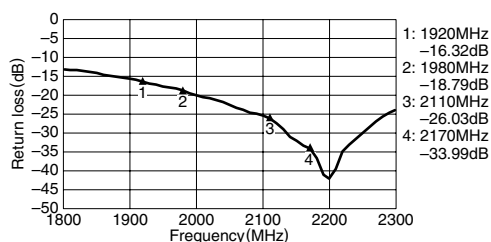
ELECTRICAL CHARACTERISTICS

Unbalanced impedance	50Ω
Balanced impedance	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

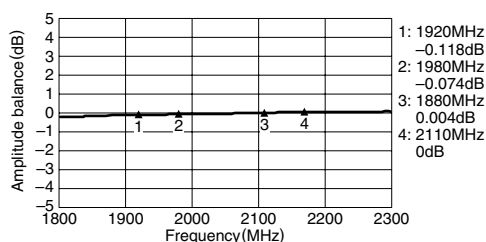
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 50Ω

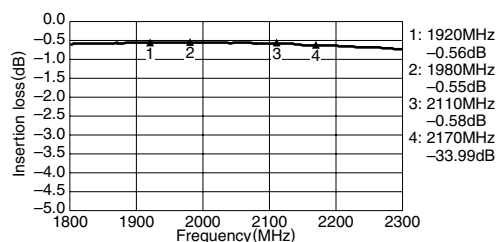
RETURN LOSS



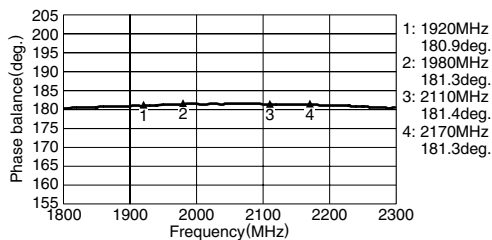
AMPLITUDE BALANCE



INSERTION LOSS

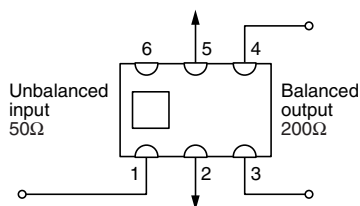


PHASE BALANCE



HHM1534 For W-CDMA/Tx-Rx

Technical drawing of a mechanical part with dimensions in mm. The drawing shows a top view and a side view. The top view is a rectangle with a width of 2.0 ± 0.15 mm and a height of 1.25 ± 0.15 mm. It features six semi-circular features: three along the top edge (labeled 6, 5, 4) and three along the bottom edge (labeled 1, 2, 3). A small square feature is located on the left side. The side view shows a height of 0.95 ± 0.1 mm. The bottom view shows a width of 0.65 ± 0.2 mm and a height of 0.3 ± 0.2 mm. The drawing is labeled "Dimensions in mm".



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

This width is 50Ω.
Micro-strip line for 0.4mm thick
glass-epoxy substrate.

0.3 0.2

0.9 0.8 0.6 0.8 0.7

6 5 4

1 2 3

0.3 0.4

ø0.3 Through-hole

Dimensions in mm

Unbalanced impedance	50Ω	
Balanced impedance	200Ω	
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	

1: 1920MHz
-20.12dB
2: 1980MHz
-19.10dB
3: 2110MHz
-17.18dB
4: 2170MHz
-16.73dB

Frequency (MHz)	Amplitude balance (dB)
1920	-0.04
1980	-0.09
2110	-0.32
2170	-0.43

Figure 10 is a line graph showing Insertion loss (dB) versus Frequency (MHz) for the 1920MHz band. The x-axis represents Frequency (MHz) from 1700 to 2300, and the y-axis represents Insertion loss (dB) from -5.0 to 0.0. The graph shows a relatively flat line around -0.6 dB across the frequency range. Four specific points are marked:

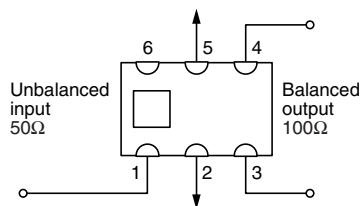
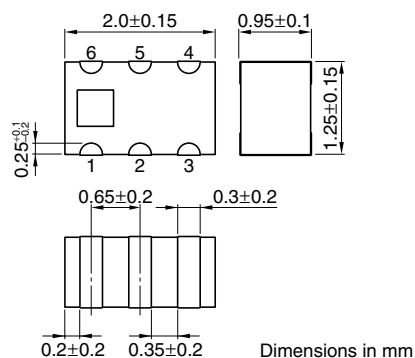
- 1: 1920MHz -0.60dB
- 2: 1980MHz -0.62dB
- 3: 2110MHz -0.68dB
- 4: 2170MHz -0.72dB

Frequency (MHz)	Phase balance (deg.)
1920	180.9
1980	181.6
2110	182.7
2170	183.0

Multilayer Baluns, HHM Series

HHM1536B1 For 3.7GHz

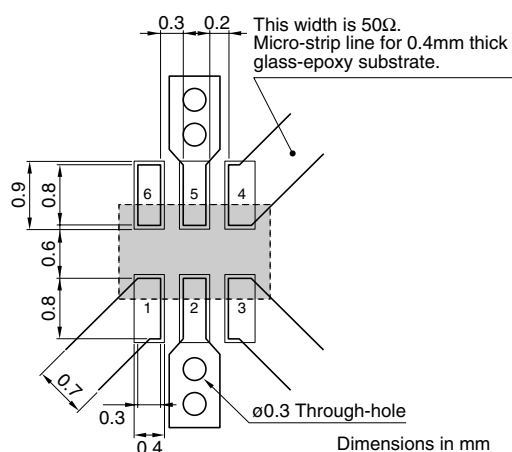
SHAPES AND DIMENSIONS/CIRCUIT



TERMINAL FUNCTIONS

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

RECOMMENDED PCB PATTERN



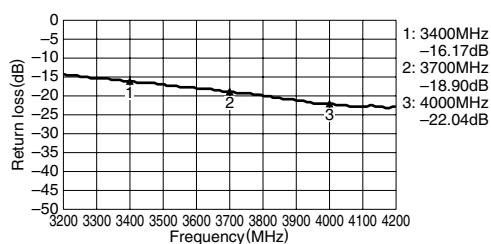
ELECTRICAL CHARACTERISTICS

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

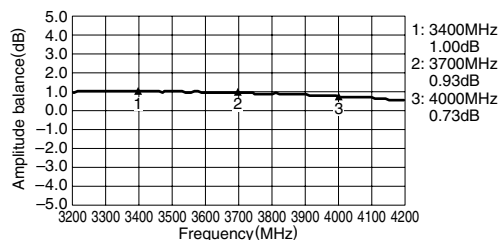
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

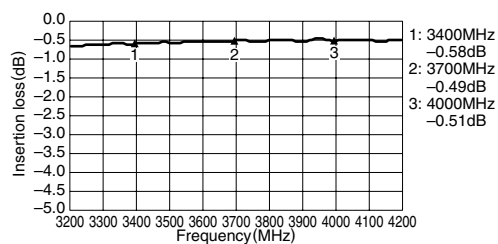
RETURN LOSS



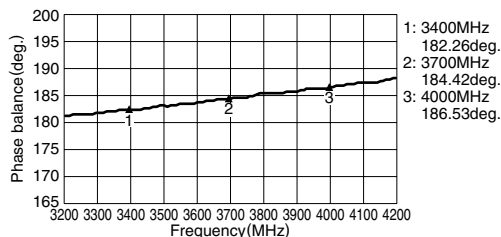
AMPLITUDE BALANCE



INSERTION LOSS



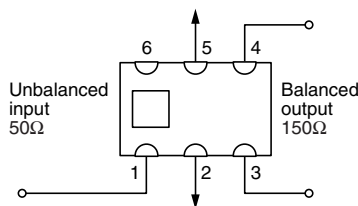
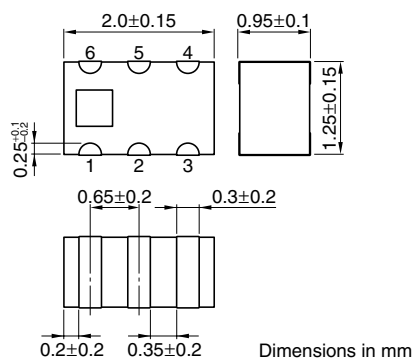
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1537 For W-CDMA/Tx-Rx

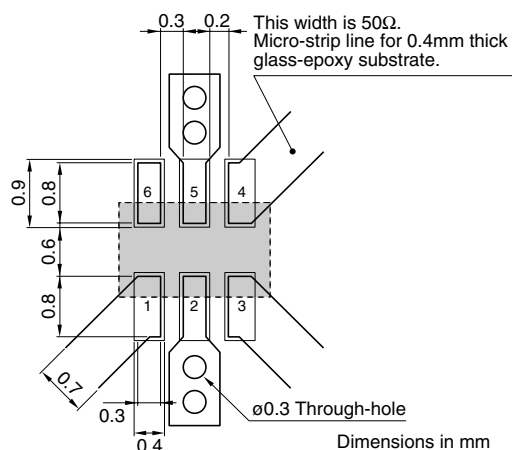
SHAPES AND DIMENSIONS/CIRCUIT



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



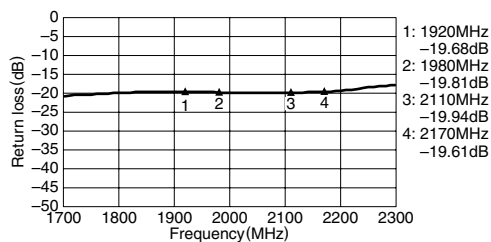
ELECTRICAL CHARACTERISTICS

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

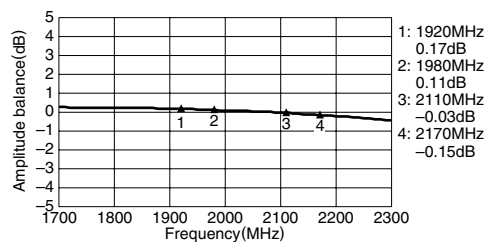
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 150Ω

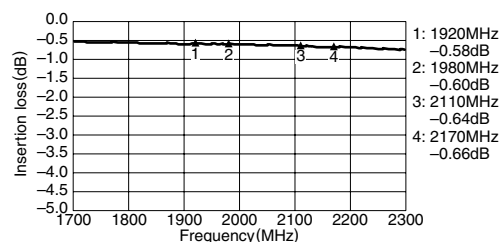
RETURN LOSS



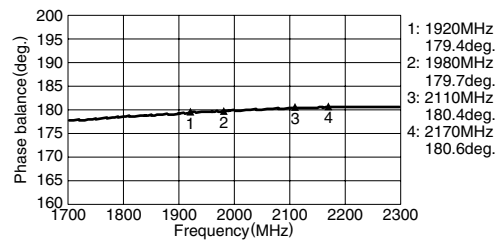
AMPLITUDE BALANCE



INSERTION LOSS



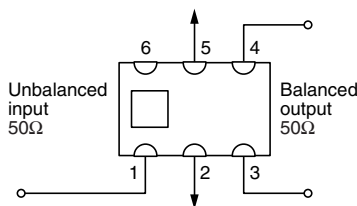
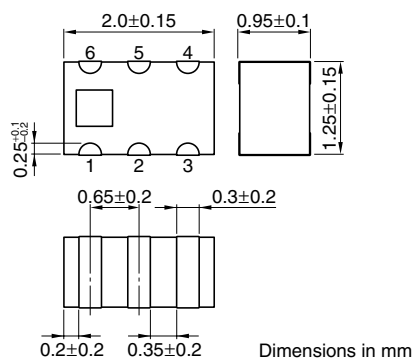
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1541 For Bluetooth&IEEE802.11b/g

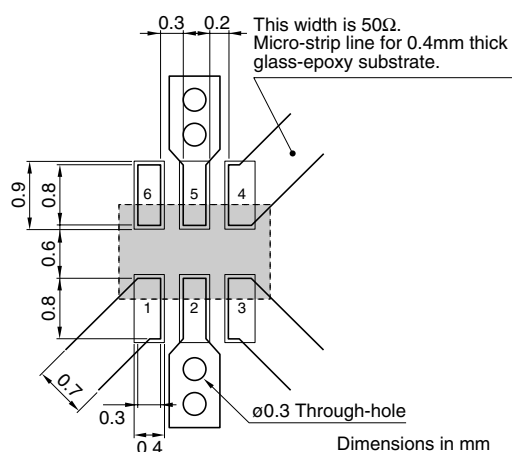
SHAPES AND DIMENSIONS/CIRCUIT



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



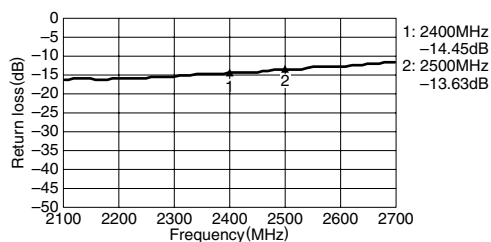
ELECTRICAL CHARACTERISTICS

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

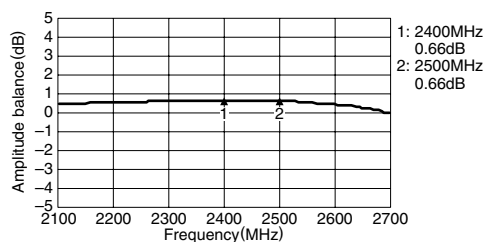
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 75Ω

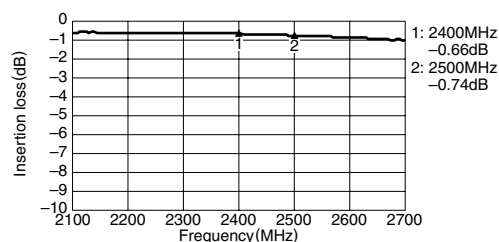
RETURN LOSS



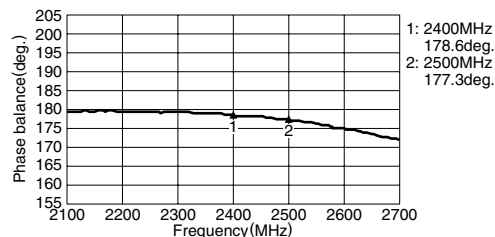
AMPLITUDE BALANCE



INSERTION LOSS



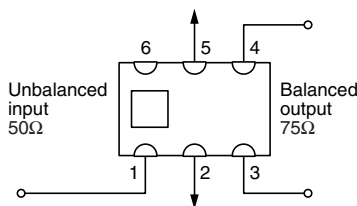
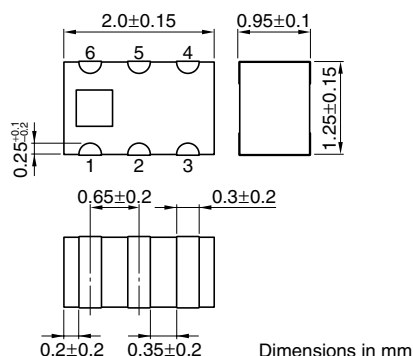
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1541E1 For Bluetooth

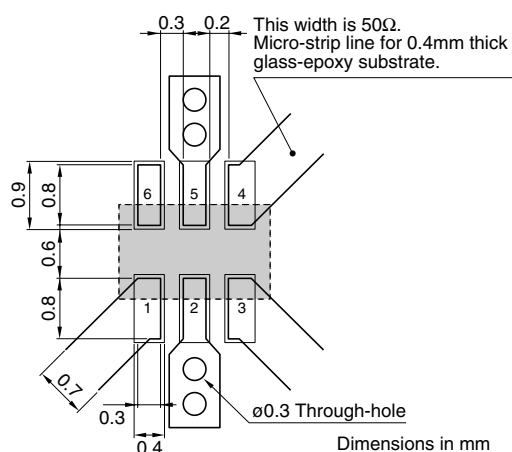
SHAPES AND DIMENSIONS/CIRCUIT



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



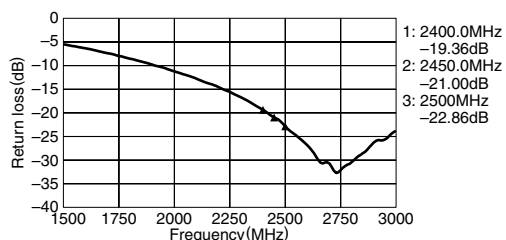
ELECTRICAL CHARACTERISTICS

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

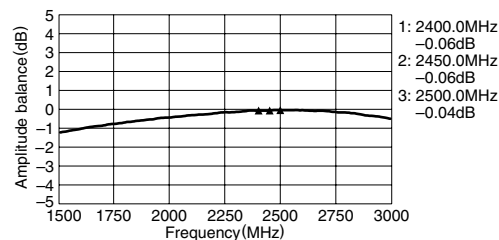
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 75Ω

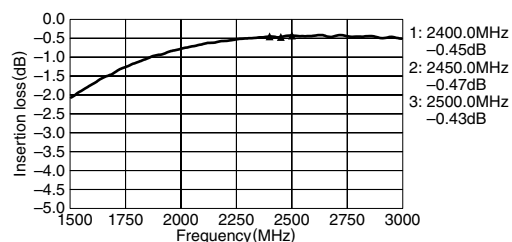
RETURN LOSS



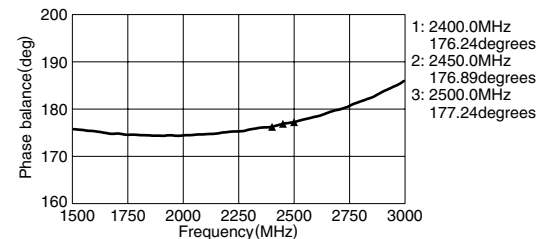
AMPLITUDE BALANCE



INSERTION LOSS



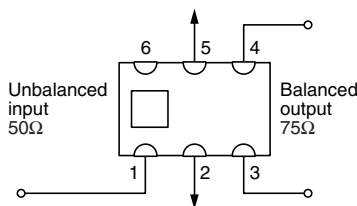
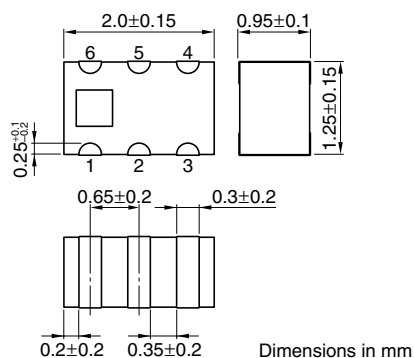
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1541E2 For Bluetooth&IEEE802.11b/g

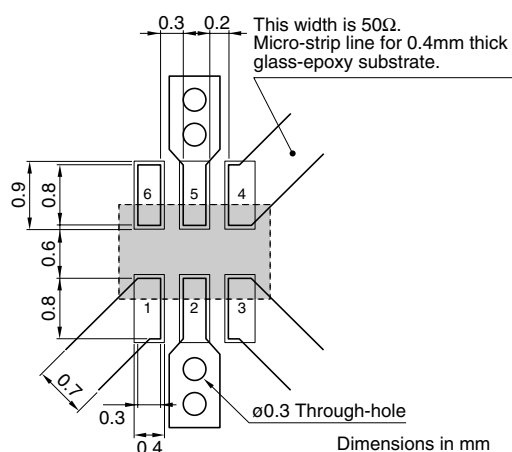
SHAPES AND DIMENSIONS/CIRCUIT



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



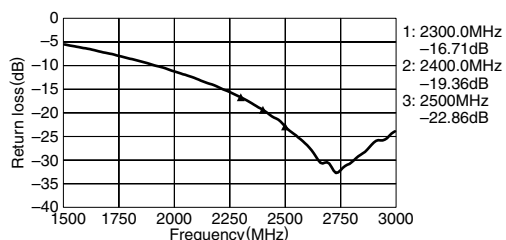
ELECTRICAL CHARACTERISTICS

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

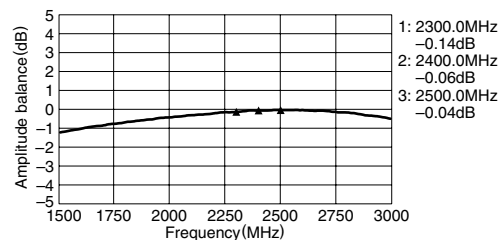
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 75Ω

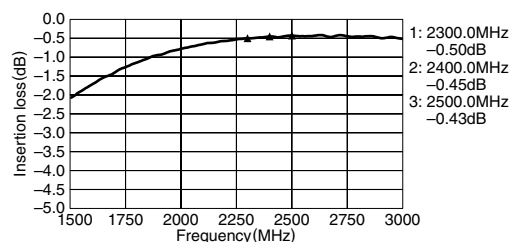
RETURN LOSS



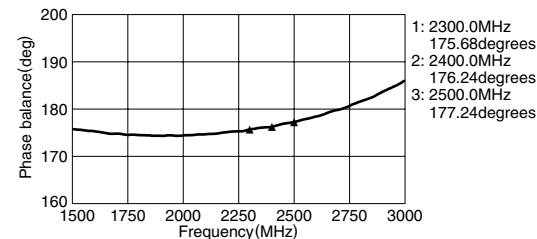
AMPLITUDE BALANCE



INSERTION LOSS



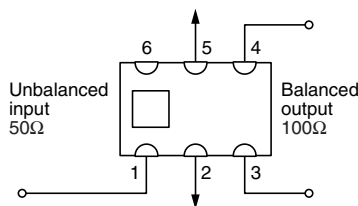
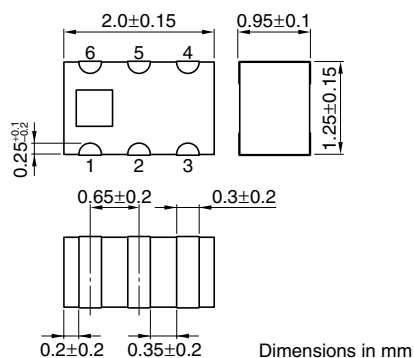
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1544 For W-LAN

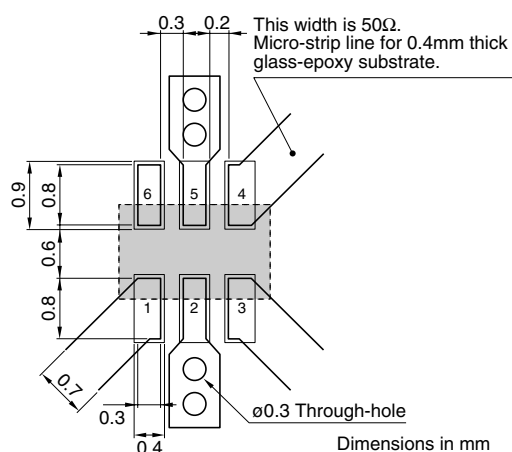
SHAPES AND DIMENSIONS/CIRCUIT



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



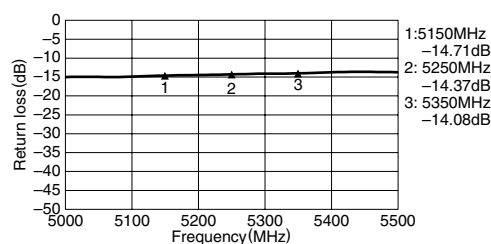
ELECTRICAL CHARACTERISTICS

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

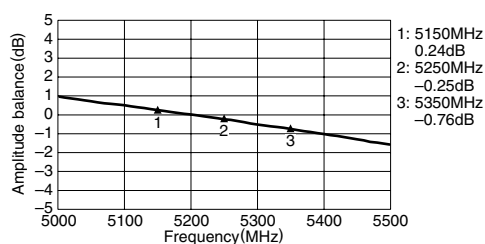
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

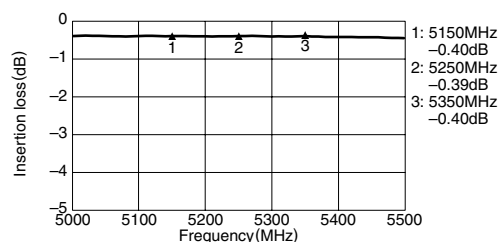
RETURN LOSS



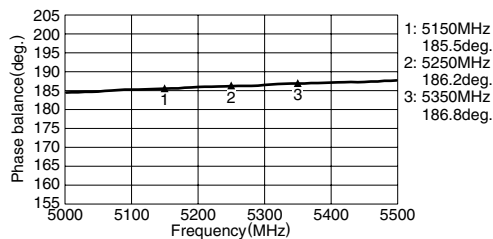
AMPLITUDE BALANCE



INSERTION LOSS



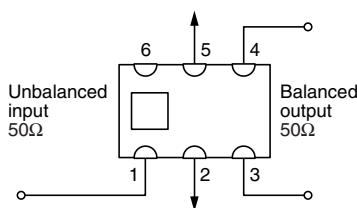
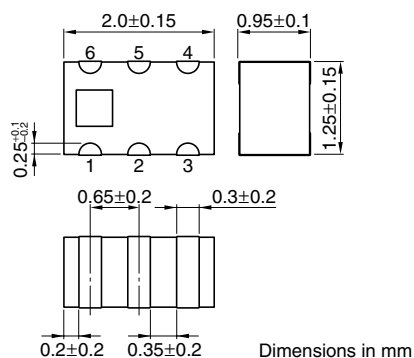
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1545 For 3.7GHz

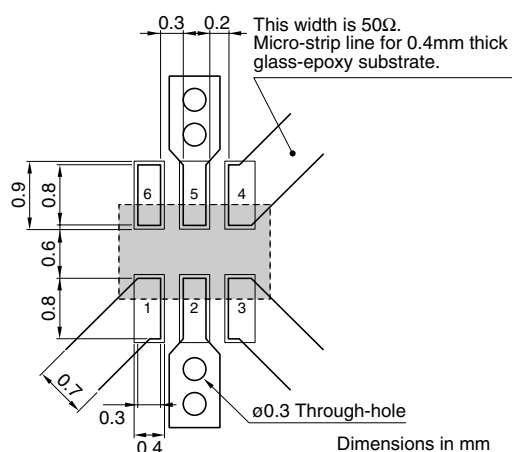
SHAPES AND DIMENSIONS/CIRCUIT



TERMINAL FUNCTIONS

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

RECOMMENDED PCB PATTERN



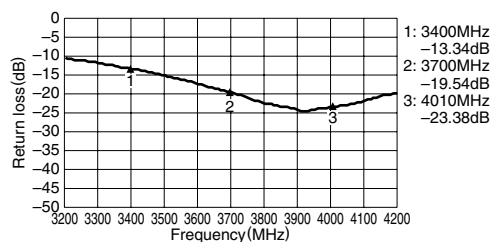
ELECTRICAL CHARACTERISTICS

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

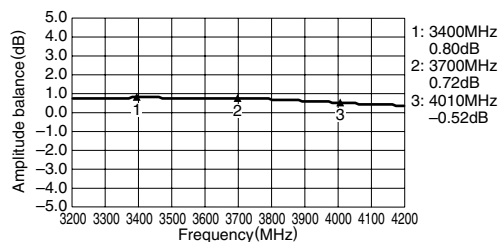
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 50Ω

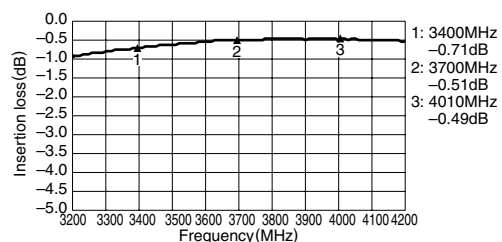
RETURN LOSS



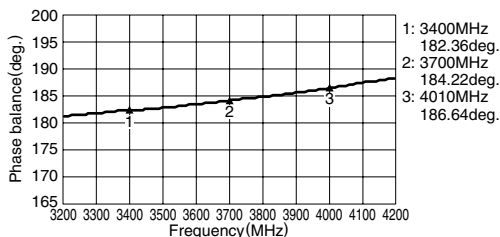
AMPLITUDE BALANCE



INSERTION LOSS



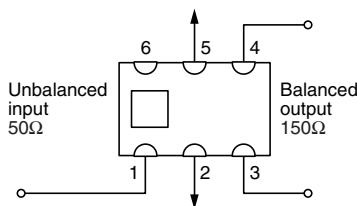
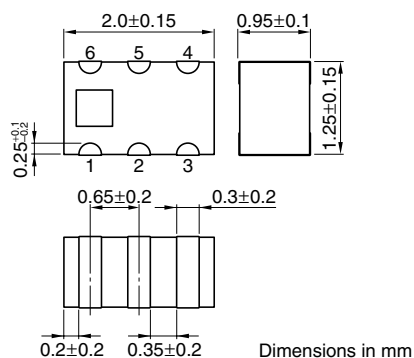
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1547 For 3.7GHz

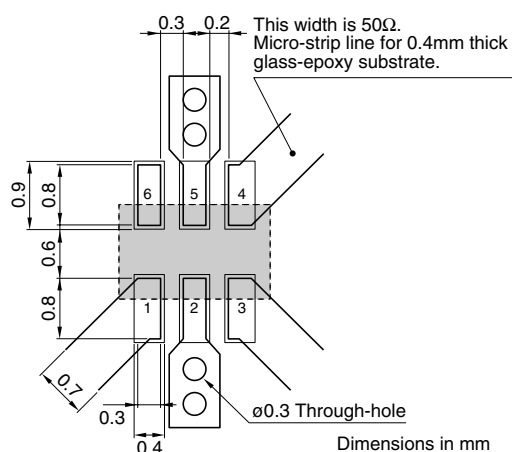
SHAPES AND DIMENSIONS/CIRCUIT



TERMINAL FUNCTIONS

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

RECOMMENDED PCB PATTERN



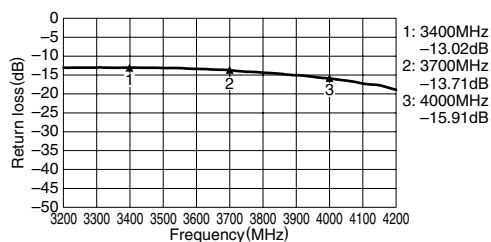
ELECTRICAL CHARACTERISTICS

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

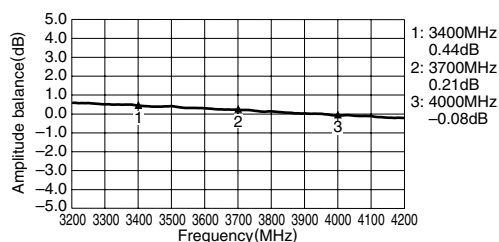
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 150Ω

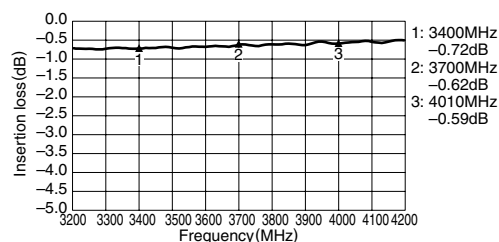
RETURN LOSS



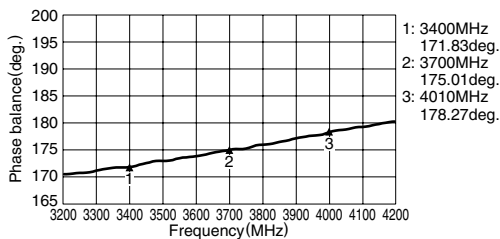
AMPLITUDE BALANCE



INSERTION LOSS



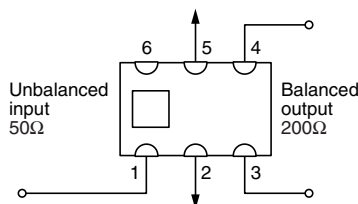
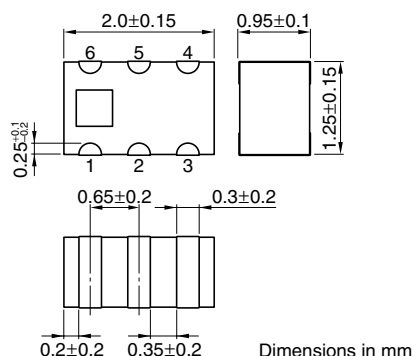
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1548A2 For 3.7GHz

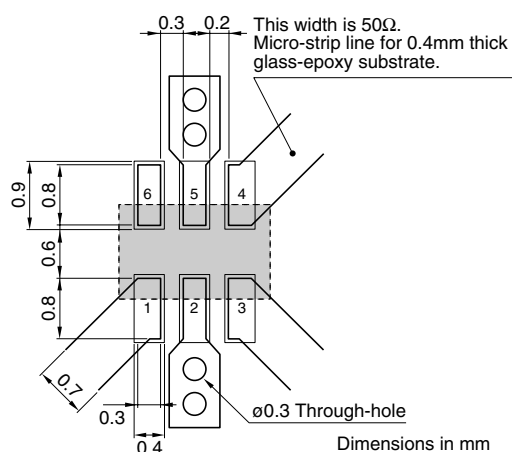
SHAPES AND DIMENSIONS/CIRCUIT



TERMINAL FUNCTIONS

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

RECOMMENDED PCB PATTERN



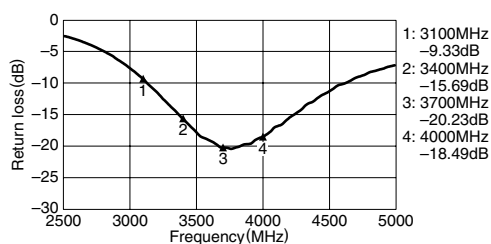
ELECTRICAL CHARACTERISTICS

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	177±20deg.	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	

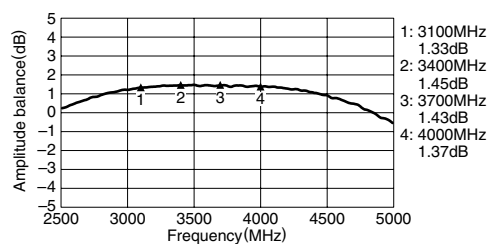
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

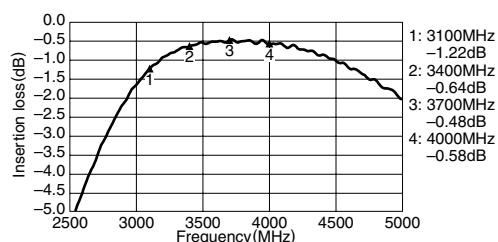
RETURN LOSS



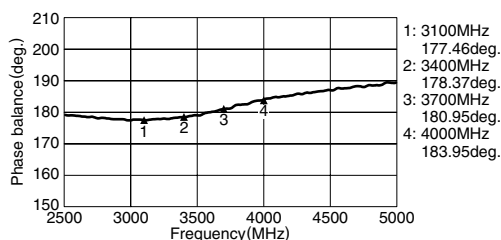
AMPLITUDE BALANCE



INSERTION LOSS



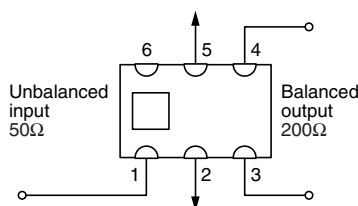
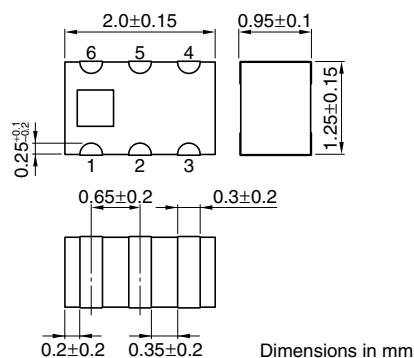
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1548C2 For 3.7GHz

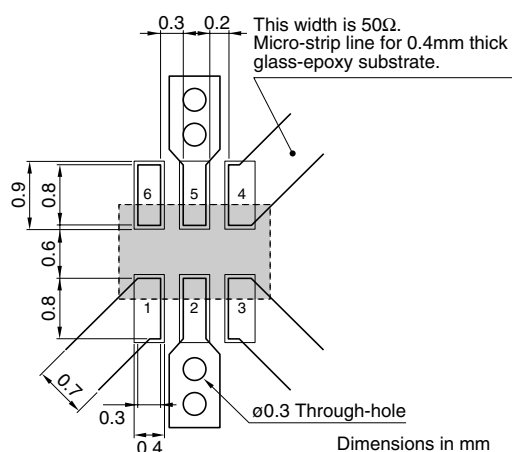
SHAPES AND DIMENSIONS/CIRCUIT



TERMINAL FUNCTIONS

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

RECOMMENDED PCB PATTERN



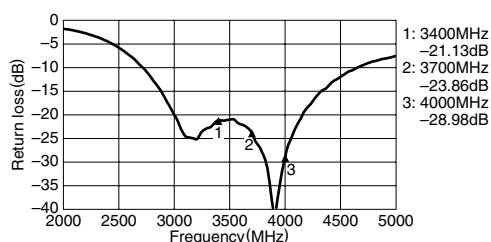
ELECTRICAL CHARACTERISTICS

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

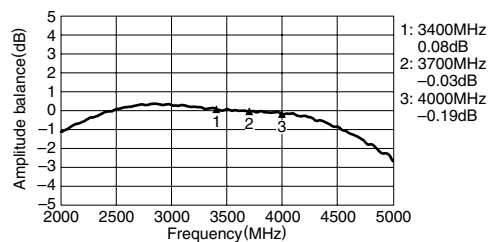
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

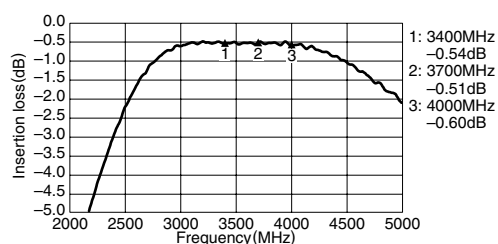
RETURN LOSS



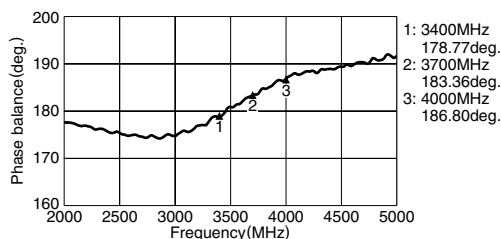
AMPLITUDE BALANCE



INSERTION LOSS



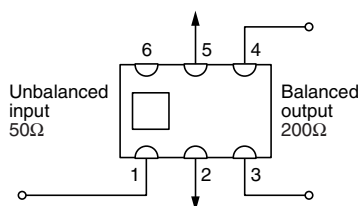
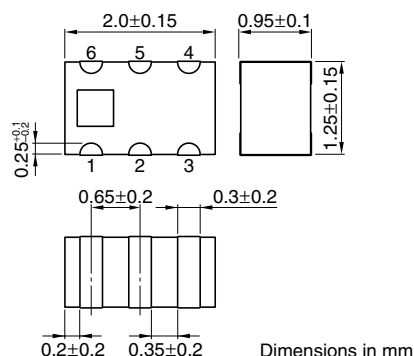
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1548E1 For 3.7GHz

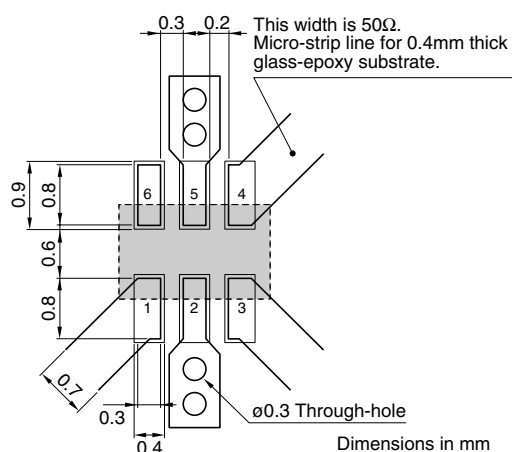
SHAPES AND DIMENSIONS/CIRCUIT



TERMINAL FUNCTIONS

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

RECOMMENDED PCB PATTERN



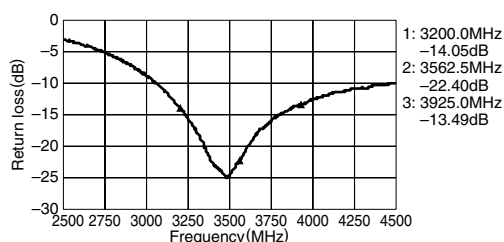
ELECTRICAL CHARACTERISTICS

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

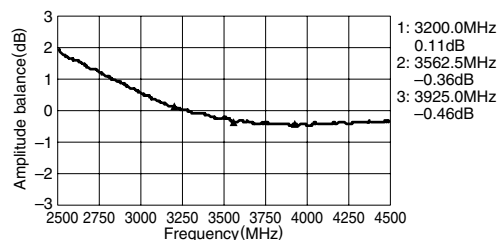
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

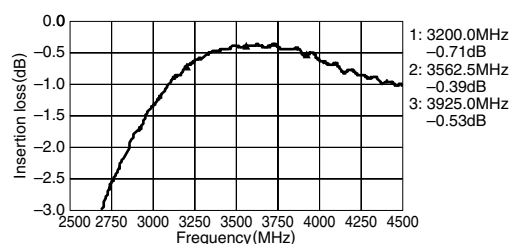
RETURN LOSS



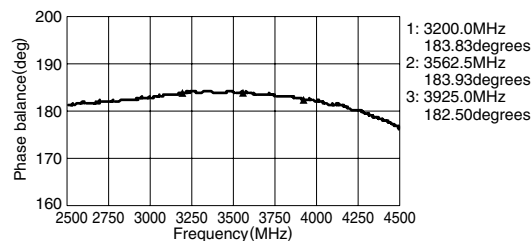
AMPLITUDE BALANCE



INSERTION LOSS



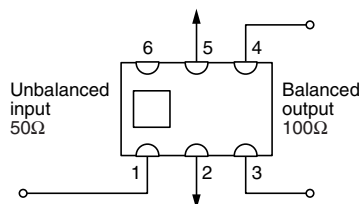
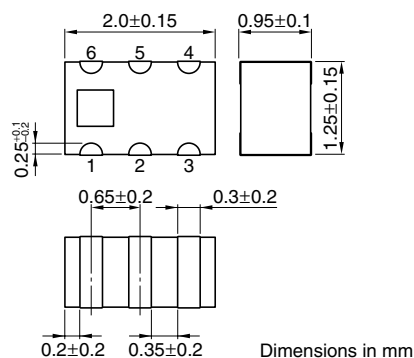
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1562B For W-LAN

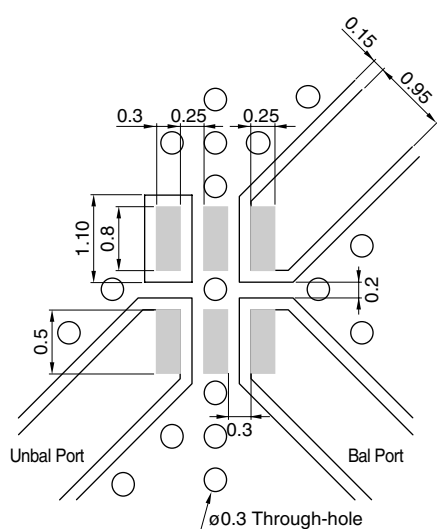
SHAPES AND DIMENSIONS/CIRCUIT



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

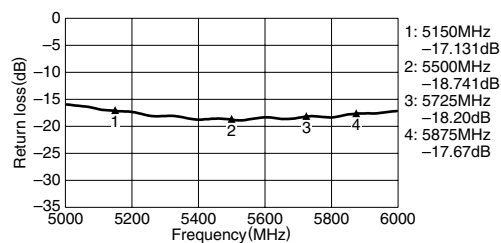
ELECTRICAL CHARACTERISTICS

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

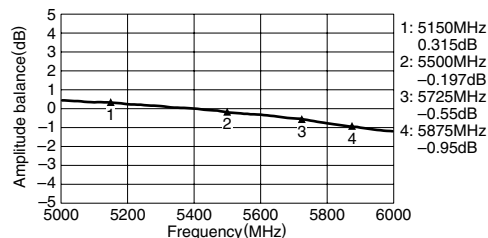
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

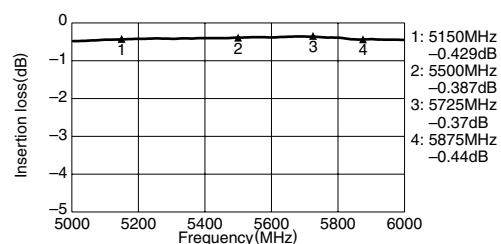
RETURN LOSS



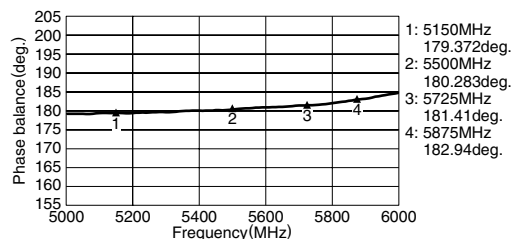
AMPLITUDE BALANCE



INSERTION LOSS



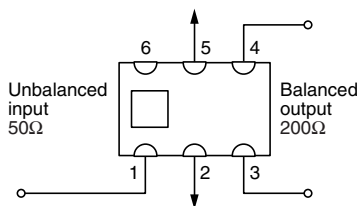
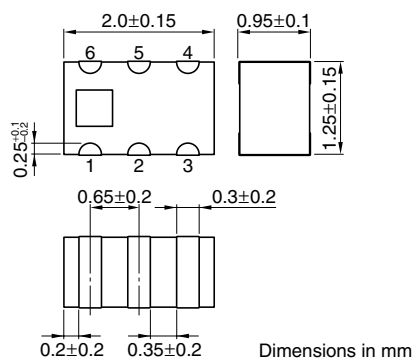
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1564A4 For AGSM/Tx-Rx

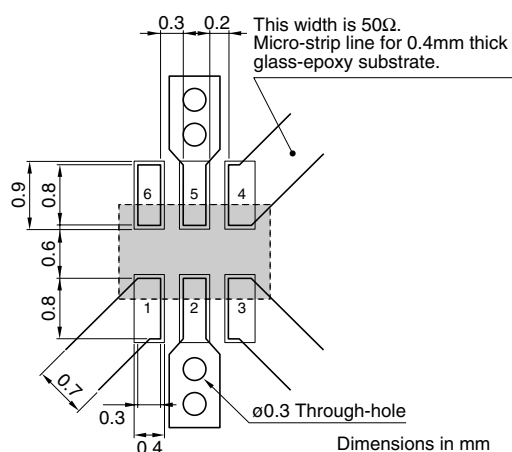
SHAPES AND DIMENSIONS/CIRCUIT



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



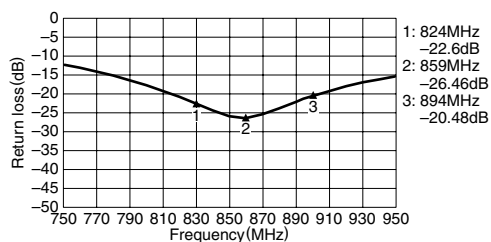
ELECTRICAL CHARACTERISTICS

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

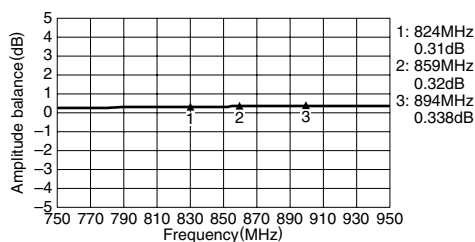
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

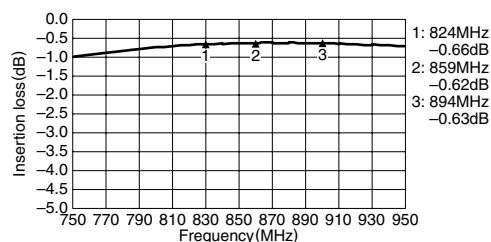
RETURN LOSS



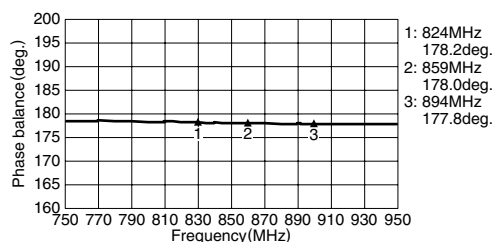
AMPLITUDE BALANCE



INSERTION LOSS



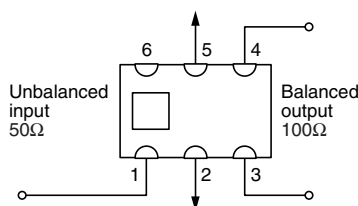
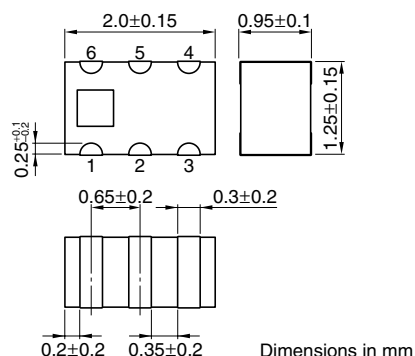
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1570B1 For W-LAN

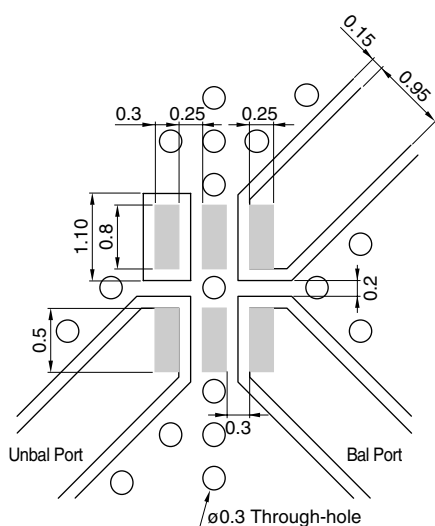
SHAPES AND DIMENSIONS/CIRCUIT



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

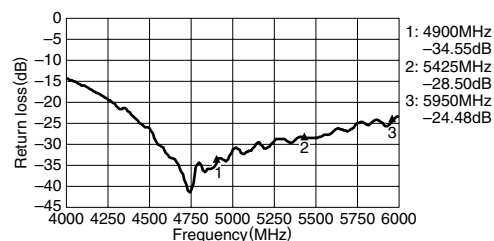
ELECTRICAL CHARACTERISTICS

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

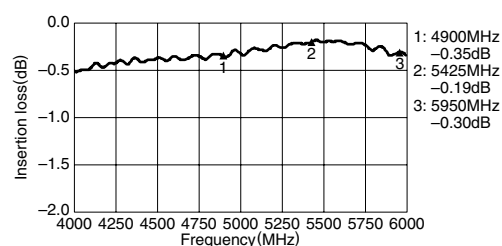
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

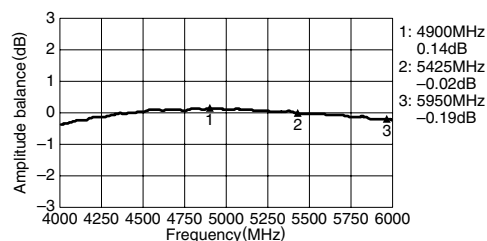
RETURN LOSS



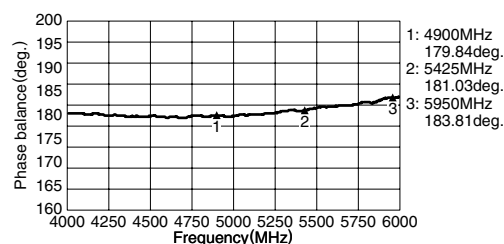
INSERTION LOSS



AMPLITUDE BALANCE



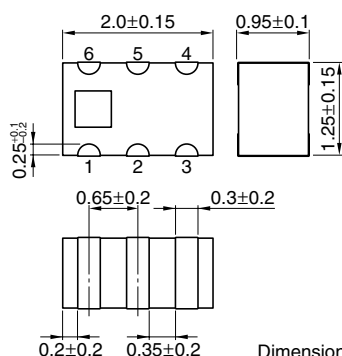
PHASE BALANCE



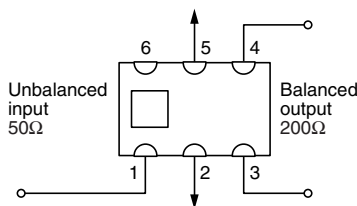
Multilayer Baluns, HHM Series

HHM1582A1 For 2218 to 2458MHz

SHAPES AND DIMENSIONS/CIRCUIT



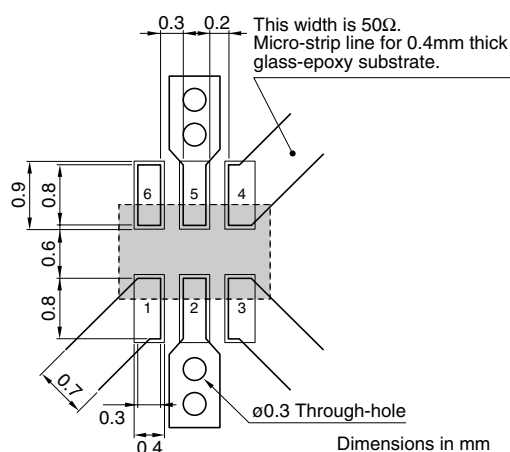
Dimensions in mm



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



Dimensions in mm

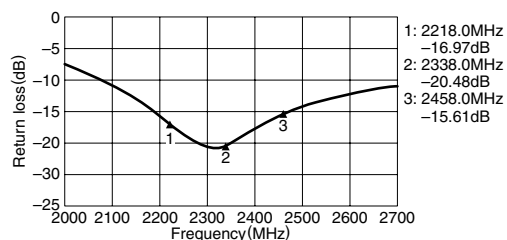
ELECTRICAL CHARACTERISTICS

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

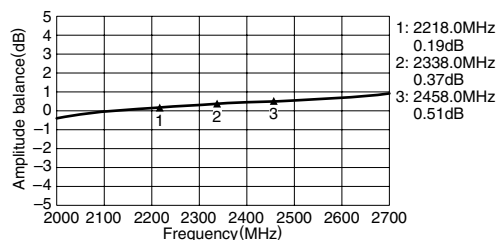
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

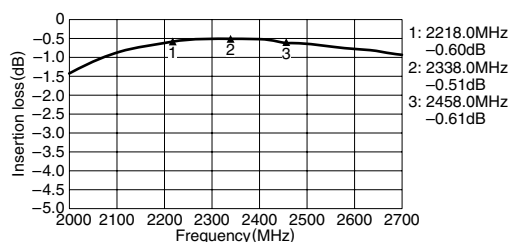
RETURN LOSS



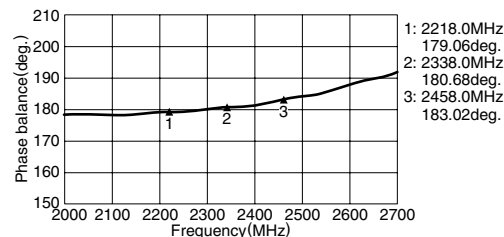
AMPLITUDE BALANCE



INSERTION LOSS



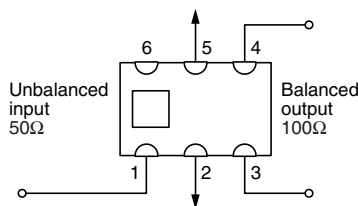
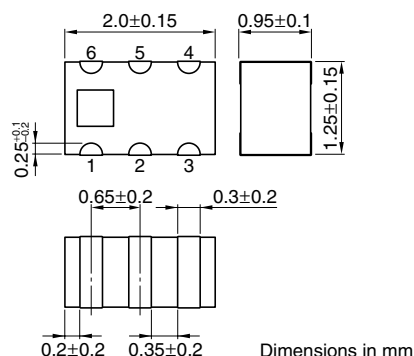
PHASE BALANCE



Multilayer Baluns, HHM Series

HHM1583B1 For UWB

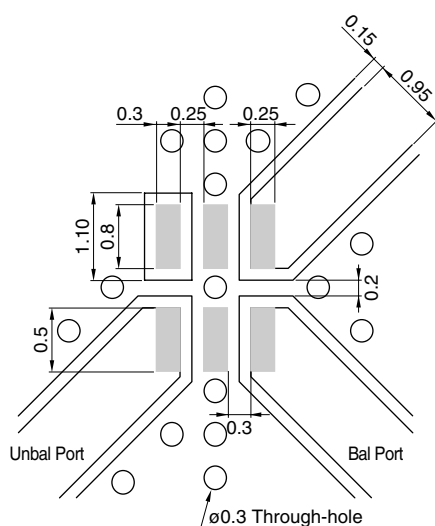
SHAPES AND DIMENSIONS/CIRCUIT



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

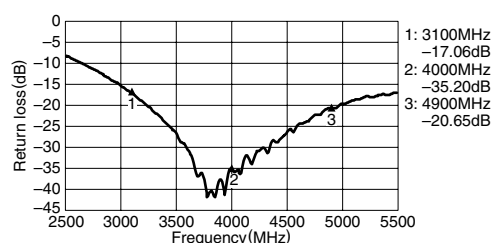
ELECTRICAL CHARACTERISTICS

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

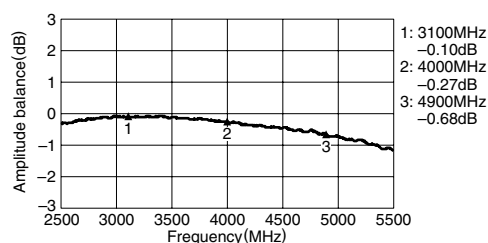
FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

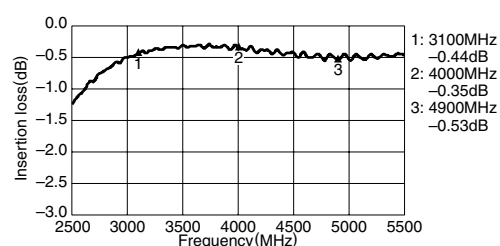
RETURN LOSS



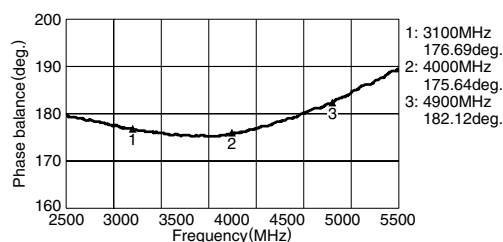
AMPLITUDE BALANCE



INSERTION LOSS



PHASE BALANCE



• All specifications are subject to change without notice.