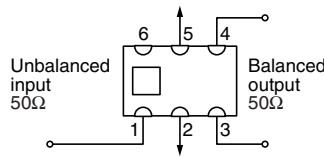
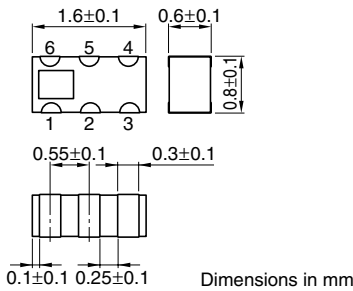


# Multilayer Baluns, HHM Series

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

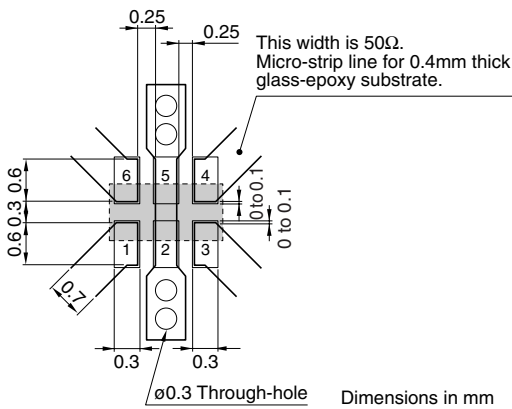
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



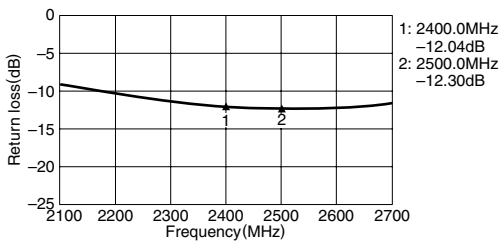
### ELECTRICAL CHARACTERISTICS

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

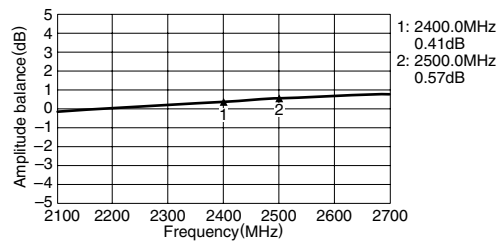
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

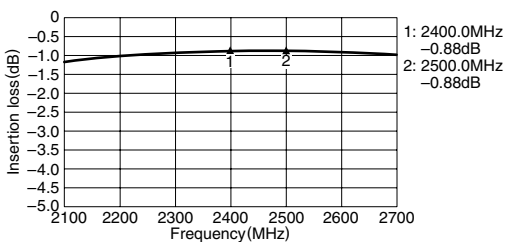
#### RETURN LOSS



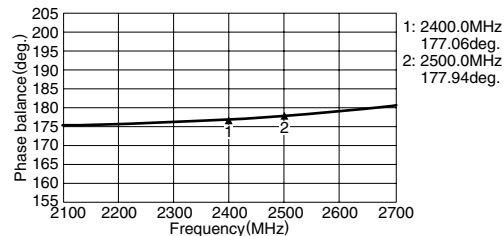
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

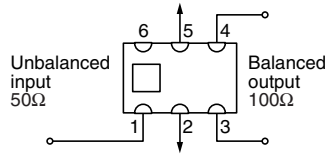
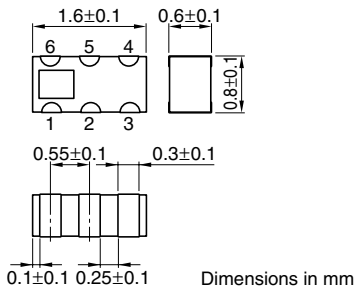


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1711D1 For Bluetooth & IEEE802.11b/g

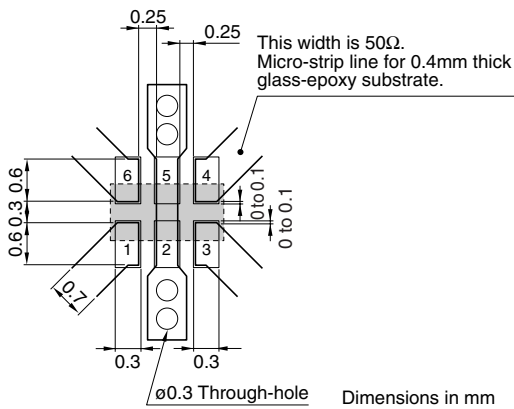
### SHAPES AND DIMENSIONS/CIRCUIT



### 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



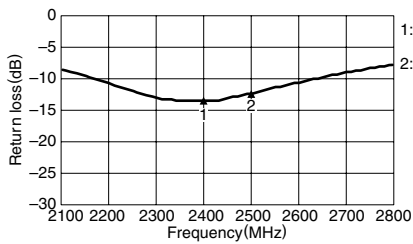
### ELECTRICAL CHARACTERISTICS

|                                      |  |
|--------------------------------------|--|
| 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<br>Storage: -40 to +85°C |
| Packaging style and quantities       | 4000pieces/reel                                  |

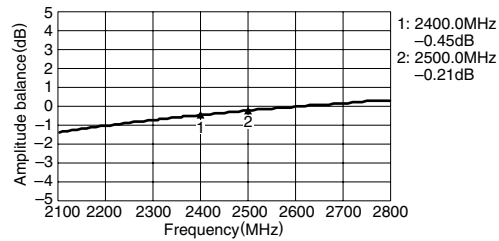
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

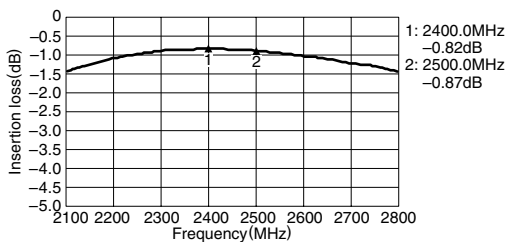
#### RETURN LOSS



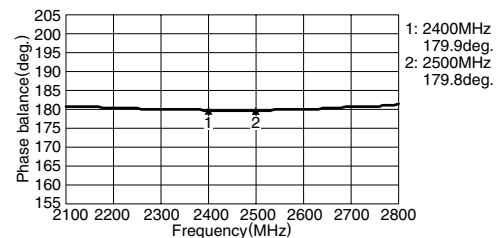
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

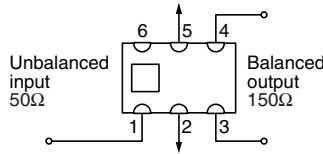
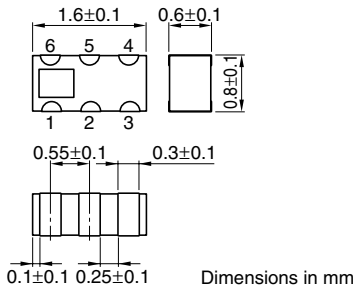


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

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

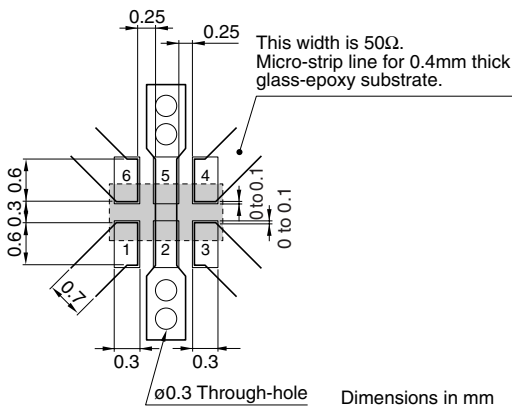
### SHAPES AND DIMENSIONS/CIRCUIT



### 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



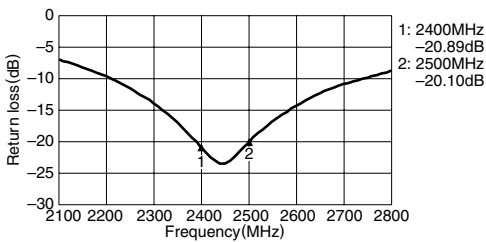
### ELECTRICAL CHARACTERISTICS

|                                      |  |
|--------------------------------------|--|
| 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<br>Storage: -40 to +85°C |
| Packaging style and quantities       | 4000pieces/reel                                  |

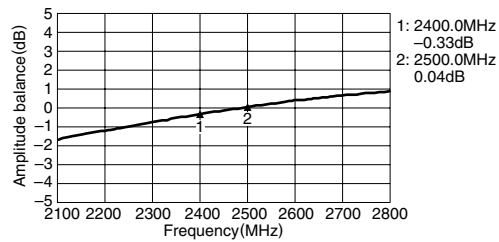
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 150Ω

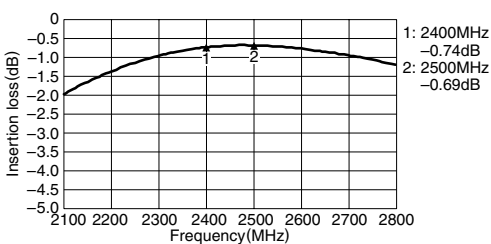
#### RETURN LOSS



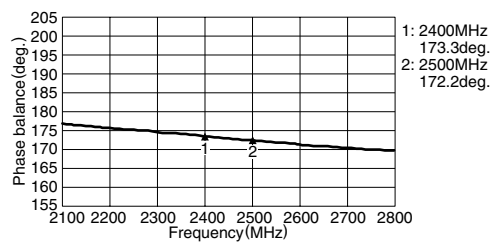
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

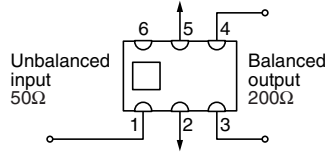
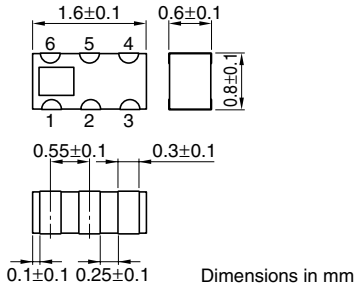


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

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

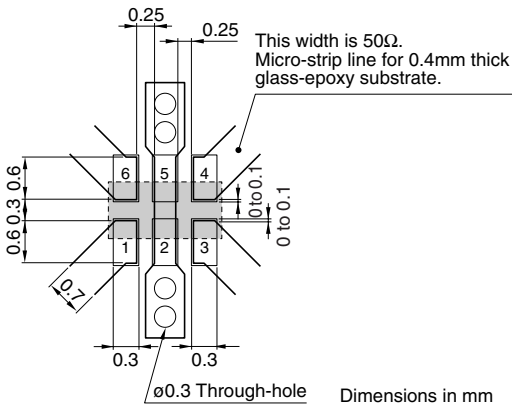
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



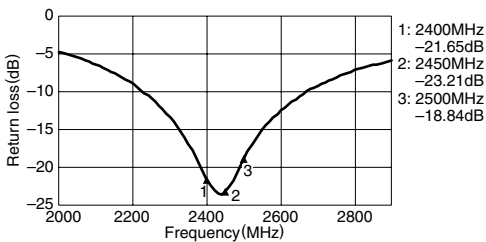
### ELECTRICAL CHARACTERISTICS

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

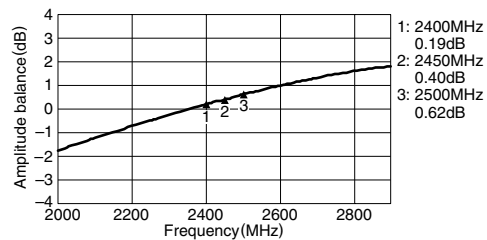
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

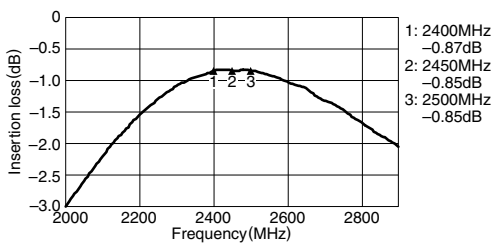
#### RETURN LOSS



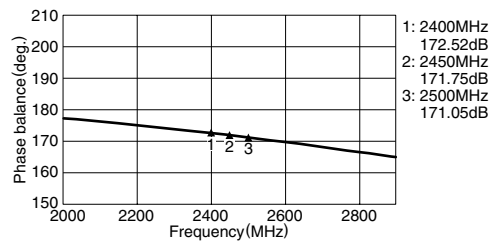
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

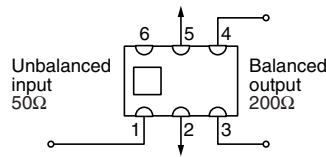
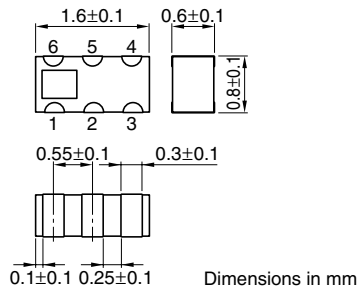


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1720A1 For EGSM

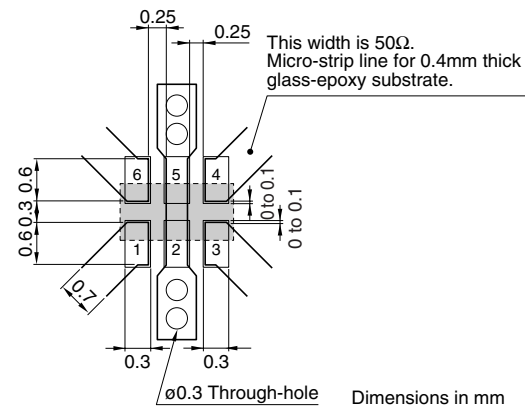
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



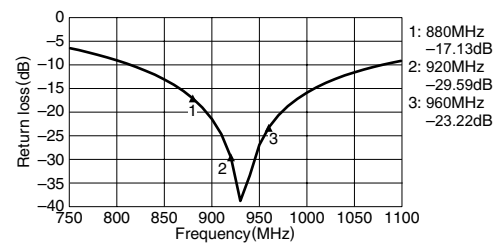
### ELECTRICAL CHARACTERISTICS

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

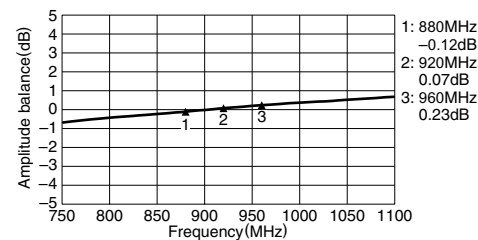
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

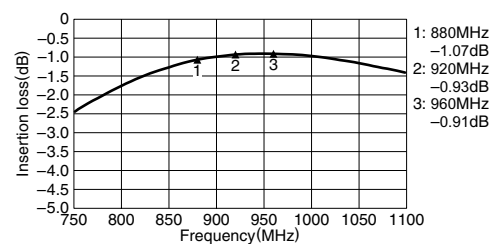
#### RETURN LOSS



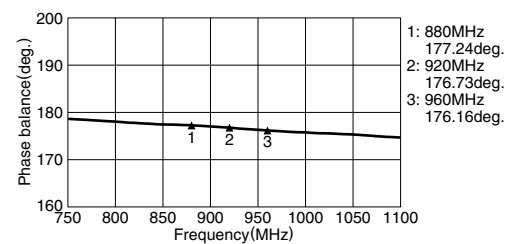
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

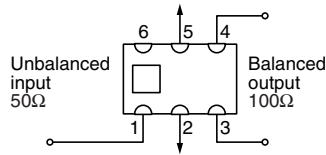
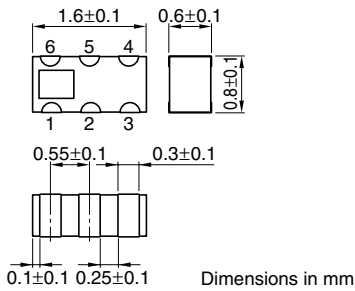


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1726L1 For PDC800/Tx+Rx

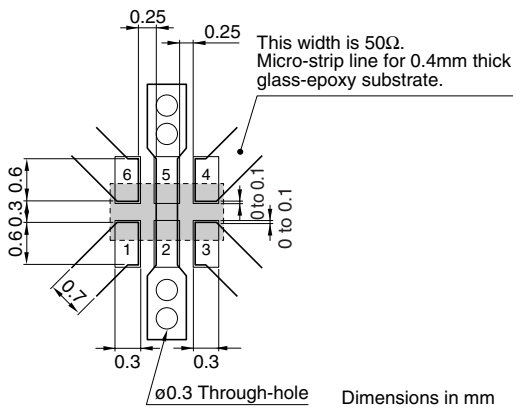
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



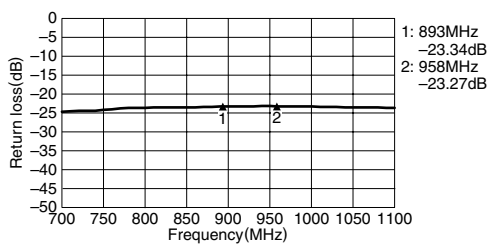
### ELECTRICAL CHARACTERISTICS

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

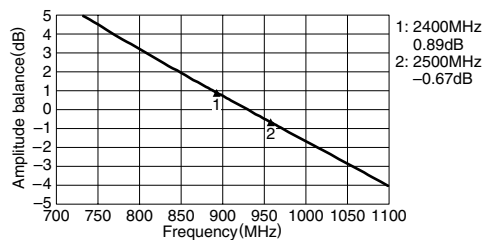
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

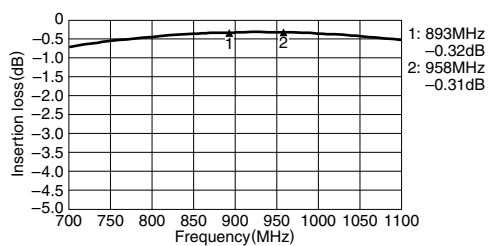
#### RETURN LOSS



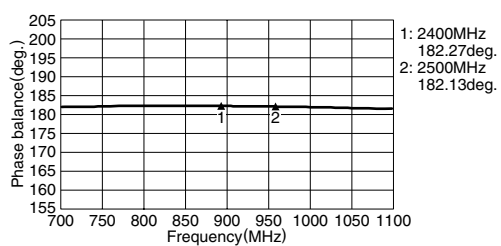
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

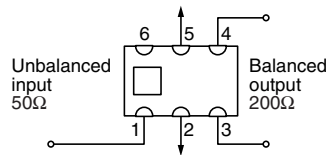
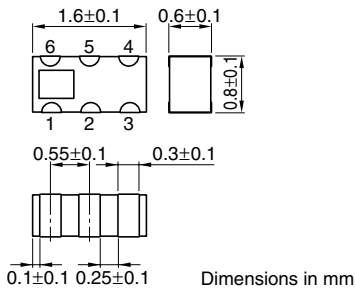


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1731A2 For DCS/Tx+Rx

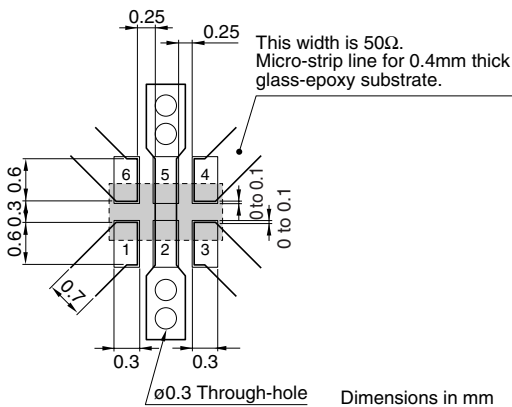
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



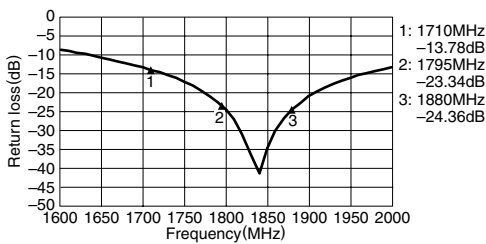
### ELECTRICAL CHARACTERISTICS

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

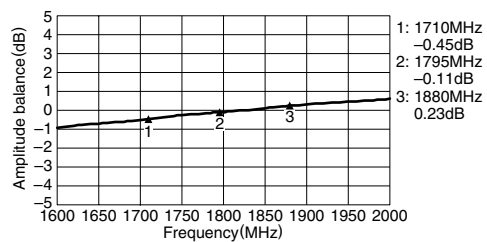
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

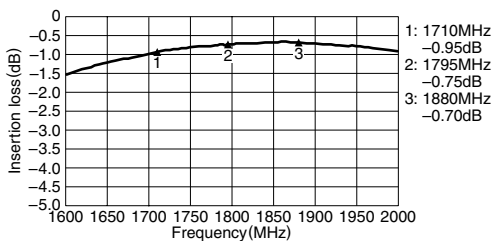
#### RETURN LOSS



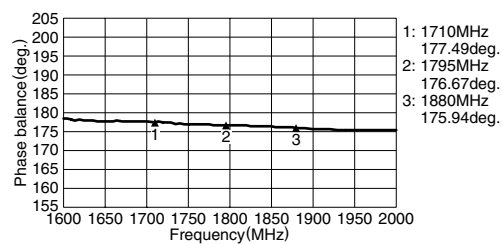
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

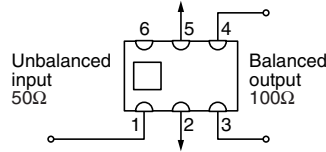
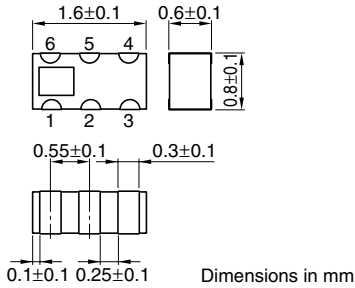


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1732B1 For W-LAN

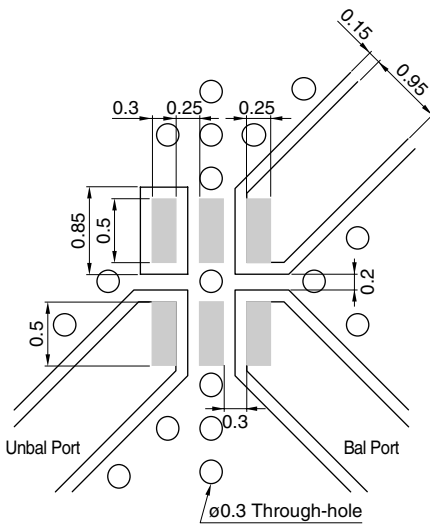
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



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

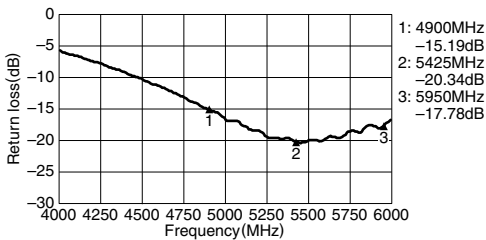
### ELECTRICAL CHARACTERISTICS

|                                      |  |
|--------------------------------------|--|
| 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<br>Storage: -40 to +85°C |
| Packaging style and quantities       | 4000pieces/reel                                  |

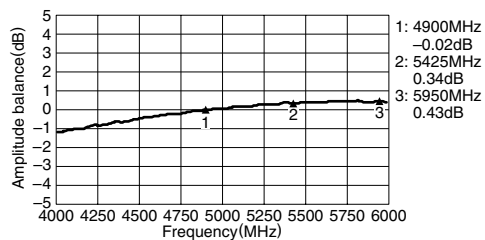
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

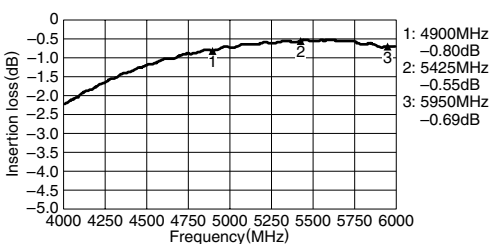
#### RETURN LOSS



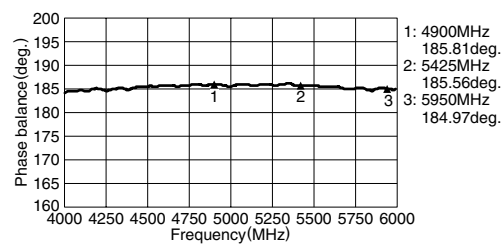
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE



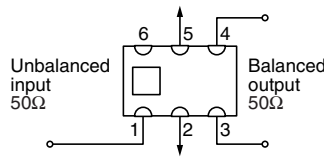
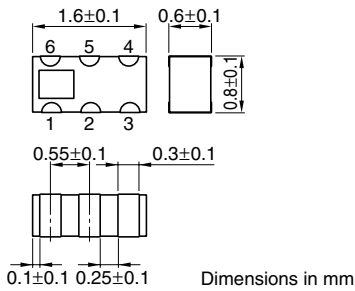
• All specifications are subject to change without notice.



# Multilayer Baluns, HHM Series

## HHM1733B1 For W-LAN

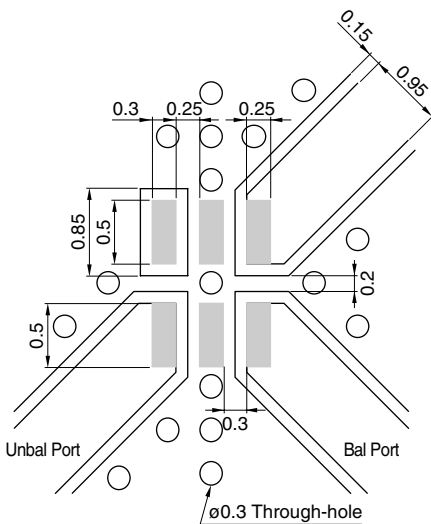
### SHAPES AND DIMENSIONS/CIRCUIT



### 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

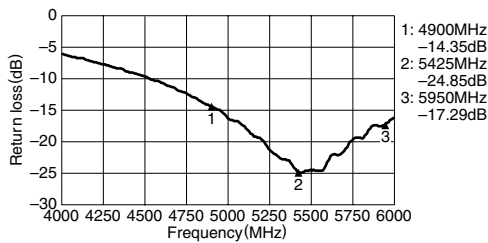
### ELECTRICAL CHARACTERISTICS

|                                      |                  |              |
|--------------------------------------|------------------|--------------|
| 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  |              |

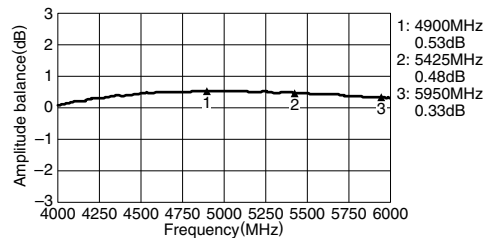
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 50Ω

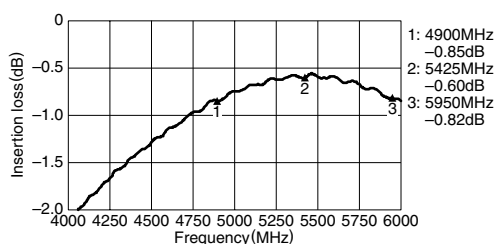
#### RETURN LOSS



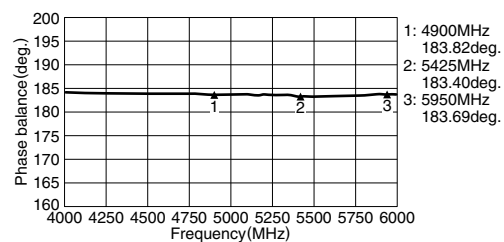
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

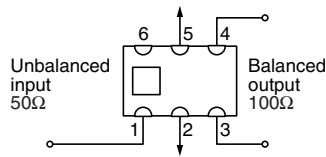
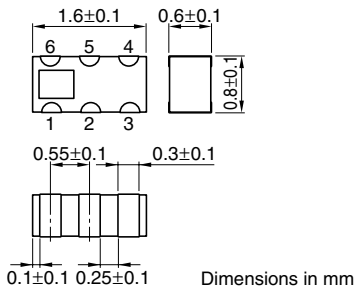


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1743L1 For PDC1500/Local

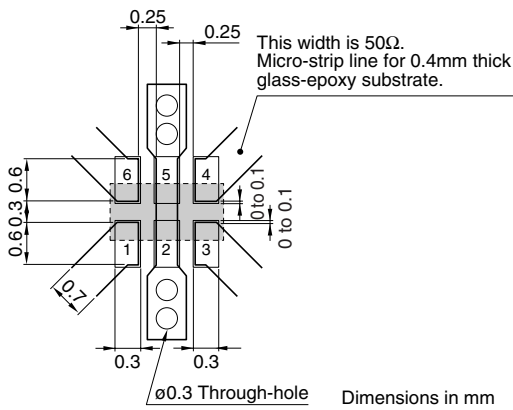
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



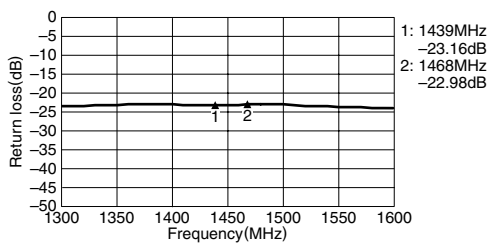
### ELECTRICAL CHARACTERISTICS

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

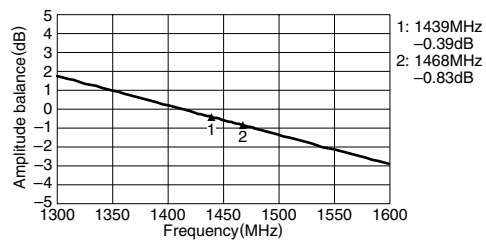
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

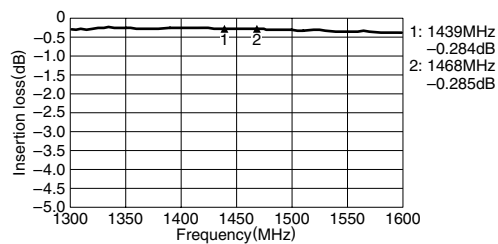
#### RETURN LOSS



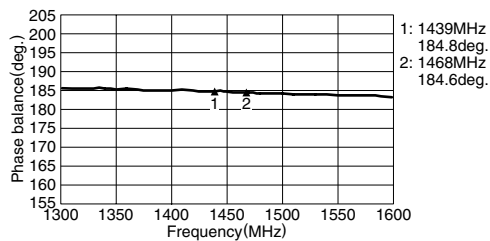
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

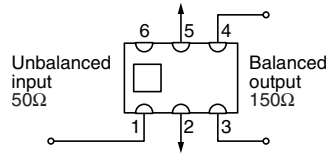
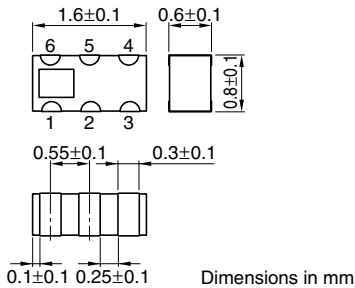


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1748A2 For DCS/Tx+Rx

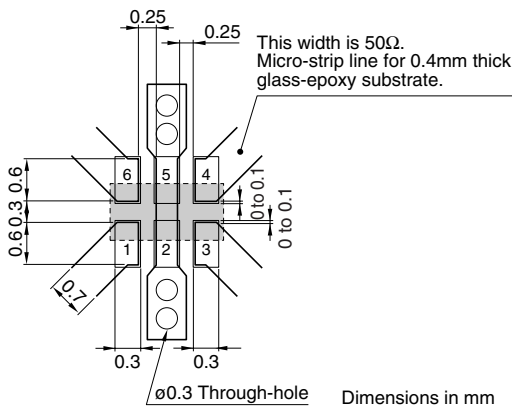
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



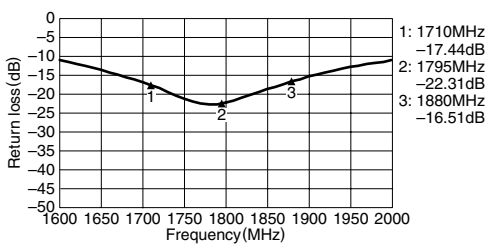
### ELECTRICAL CHARACTERISTICS

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

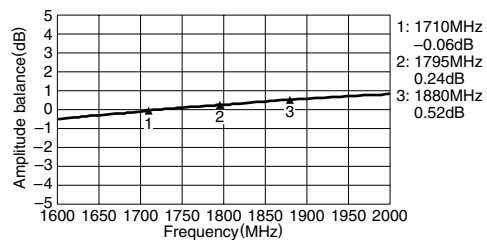
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 150Ω

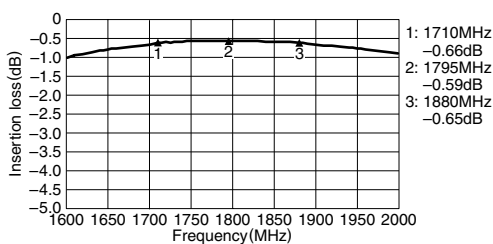
#### RETURN LOSS



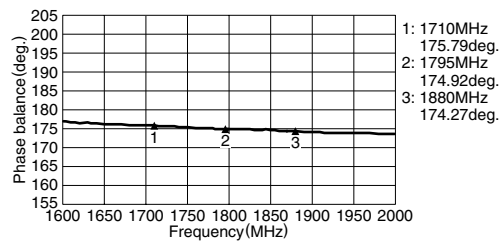
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

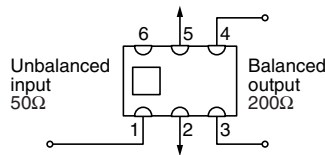
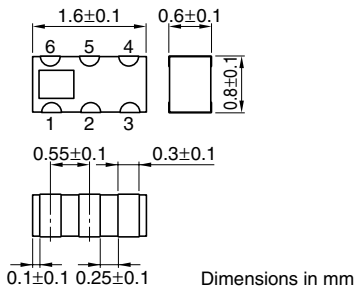


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1752A1 For W-LAN

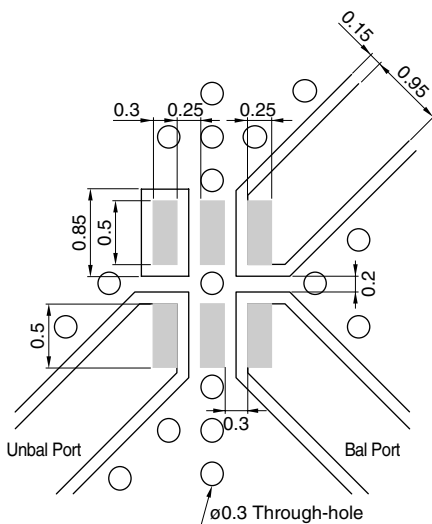
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



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

Dimensions in mm

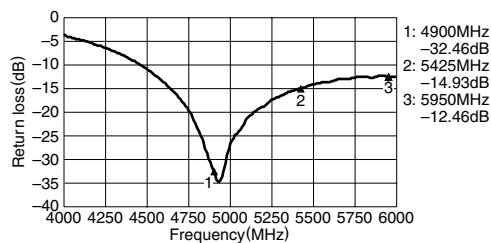
### ELECTRICAL CHARACTERISTICS

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

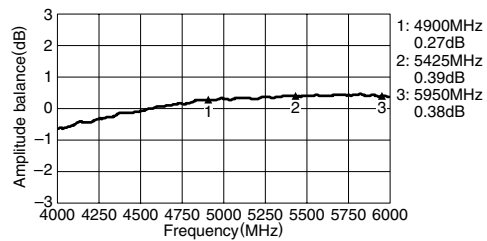
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

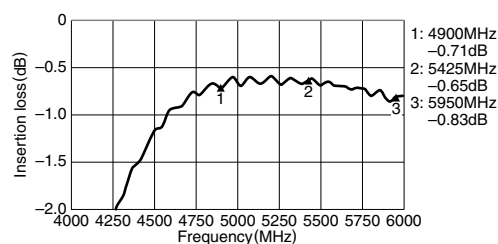
#### RETURN LOSS



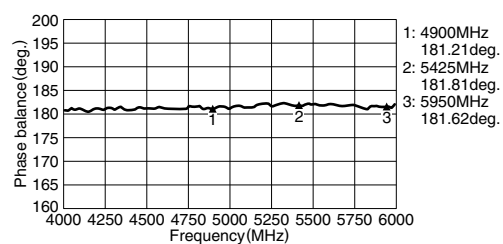
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

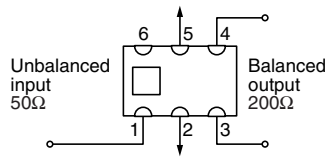
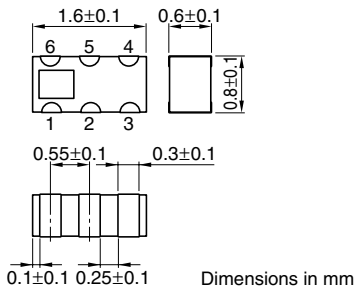


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1752A2 For W-LAN

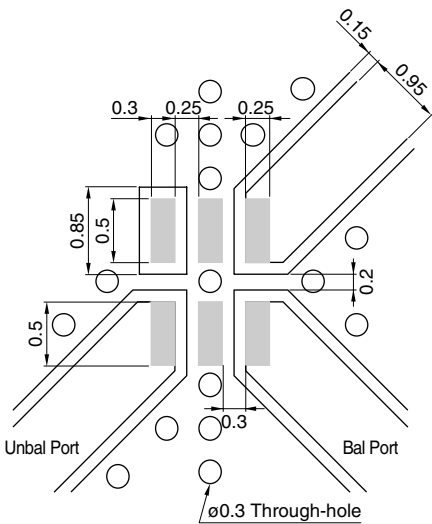
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



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

Dimensions in mm

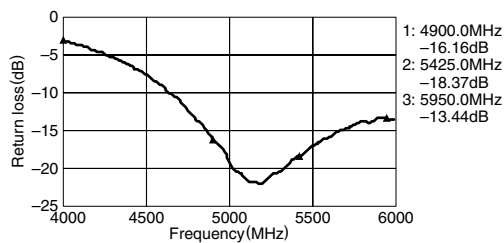
### ELECTRICAL CHARACTERISTICS

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

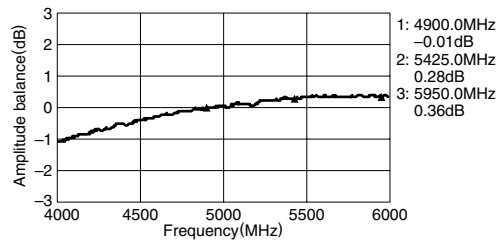
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

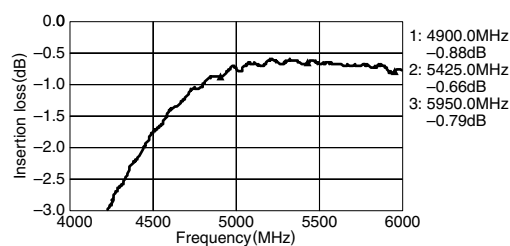
#### RETURN LOSS



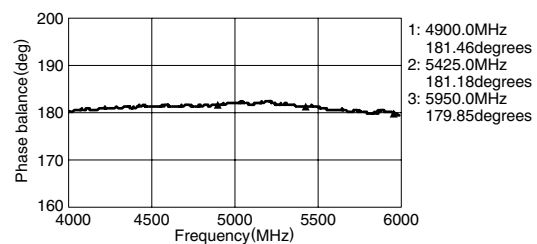
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

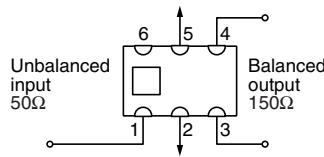
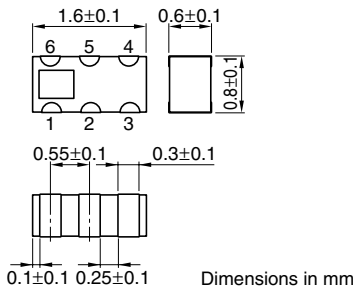


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1763A1 For EGSM

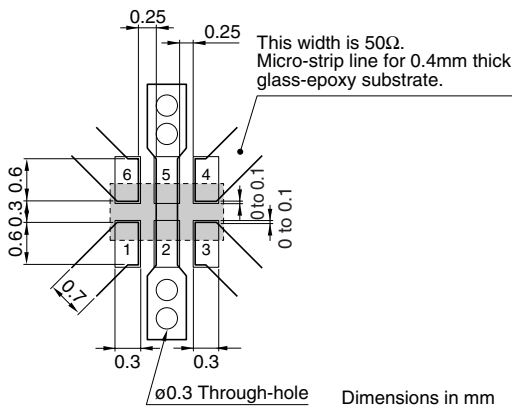
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



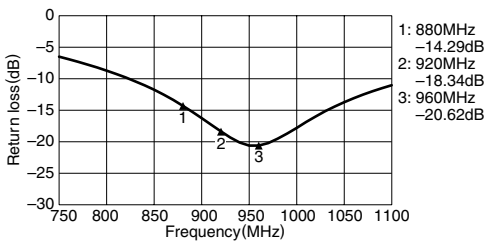
### ELECTRICAL CHARACTERISTICS

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

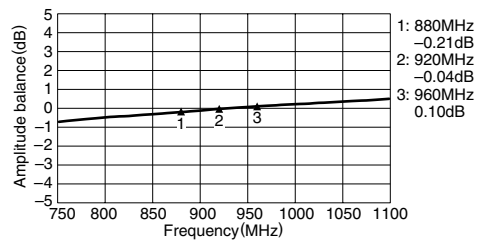
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

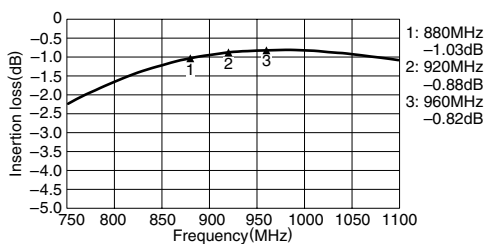
#### RETURN LOSS



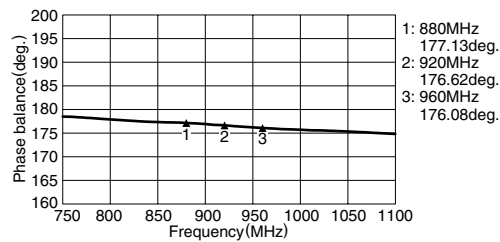
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

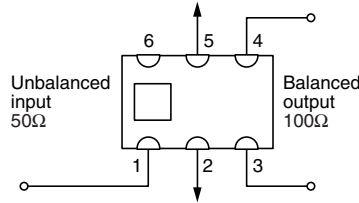
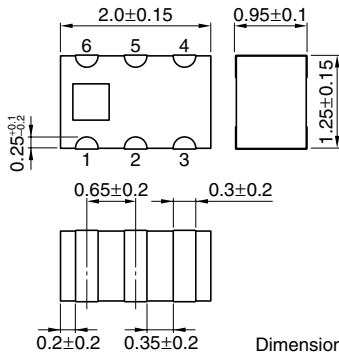


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1502 For DCS/Local

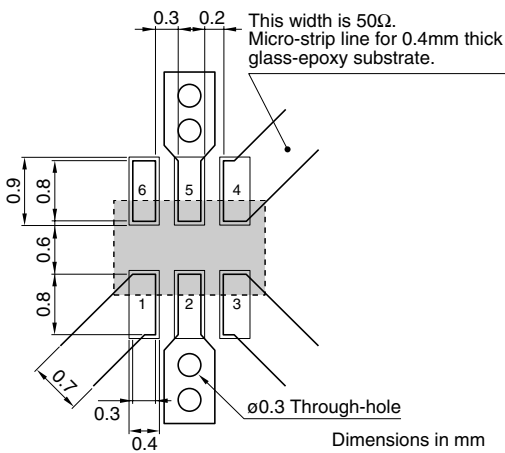
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



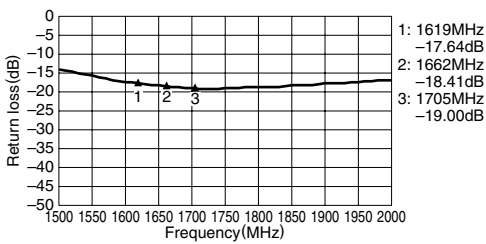
### ELECTRICAL CHARACTERISTICS

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

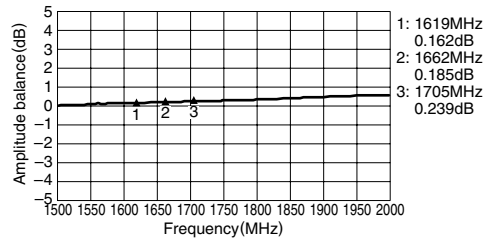
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

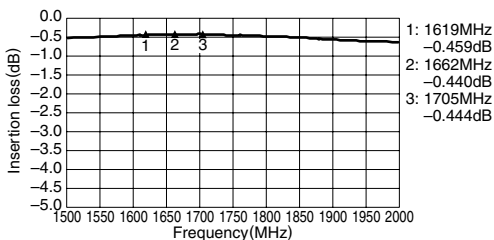
#### RETURN LOSS



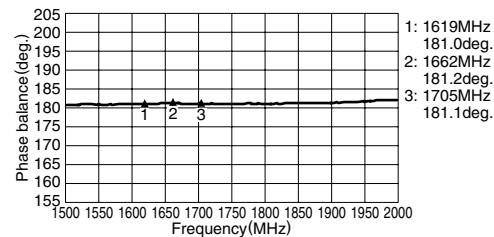
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

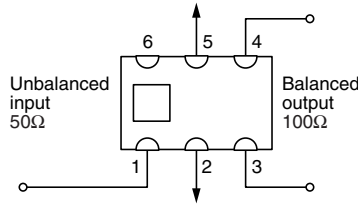
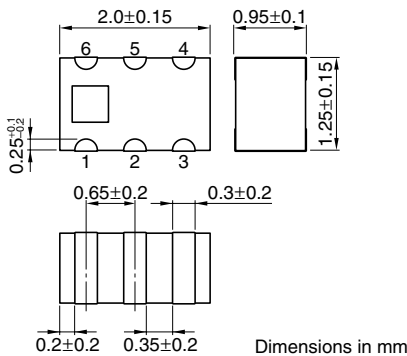


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1506 For W-CDMA/Tx-Rx

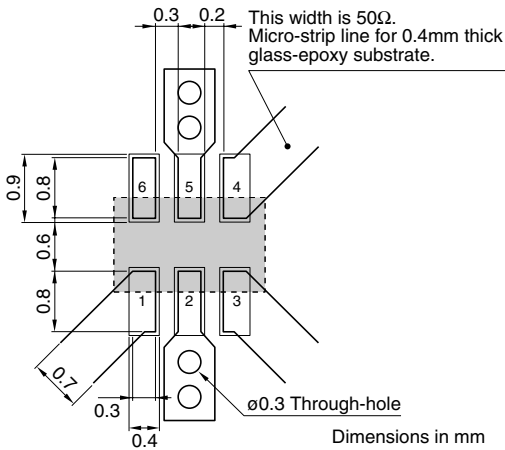
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



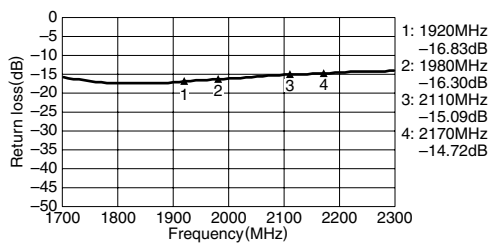
### ELECTRICAL CHARACTERISTICS

|                                      |  |
|--------------------------------------|--|
| Unbalanced impedance                 | 50Ω  |
| Balanced impedance                   | 100Ω   |
| Frequency range                      | 1920 to 1980,<br>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<br>Storage -40 to +85°C |
| Packaging style and quantities       | 2000pieces/reel                                |

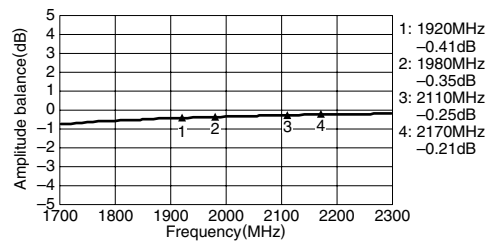
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

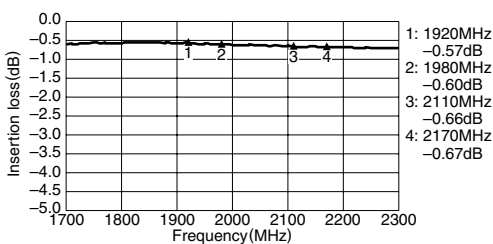
#### RETURN LOSS



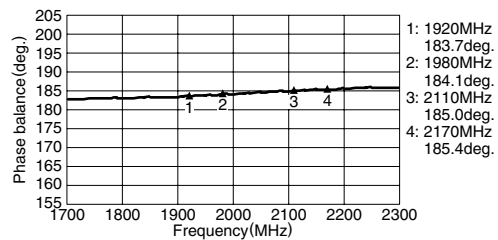
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE



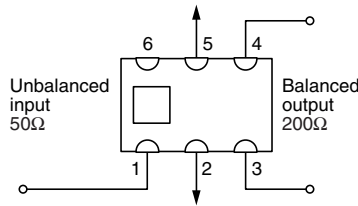
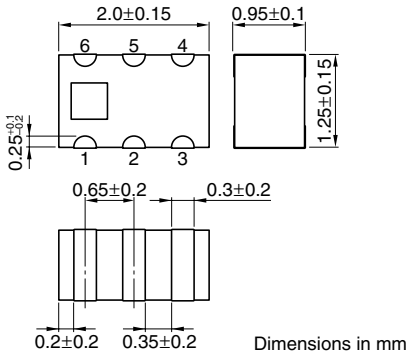
• All specifications are subject to change without notice.



# Multilayer Baluns, HHM Series

## HHM1509 For EGSM-DCS/Local

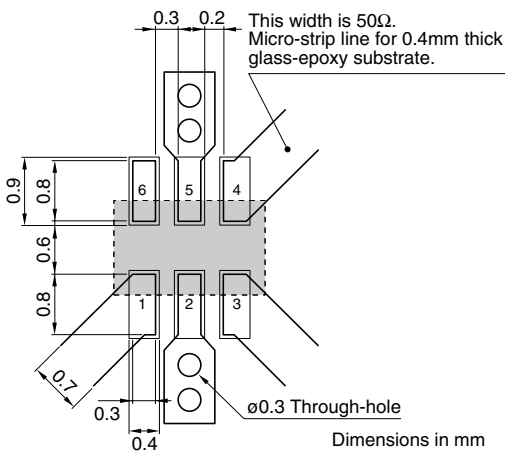
### SHAPES AND DIMENSIONS/CIRCUIT



### 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



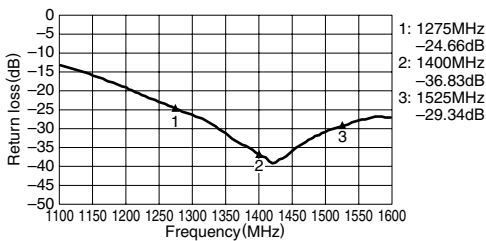
### ELECTRICAL CHARACTERISTICS

|                                      |  |
|--------------------------------------|--|
| 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<br>Storage: -40 to +85°C |
| Packaging style and quantities       | 2000pieces/reel                                  |

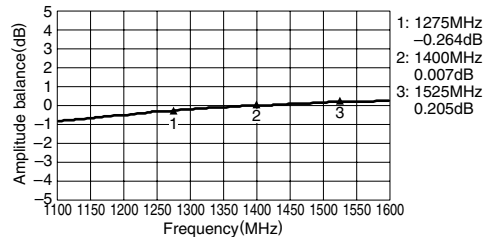
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

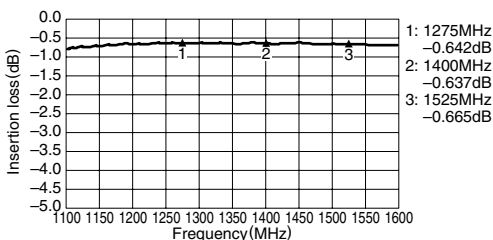
#### RETURN LOSS



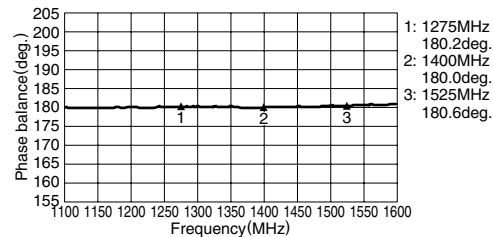
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

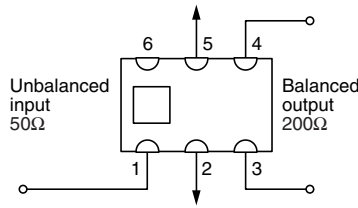
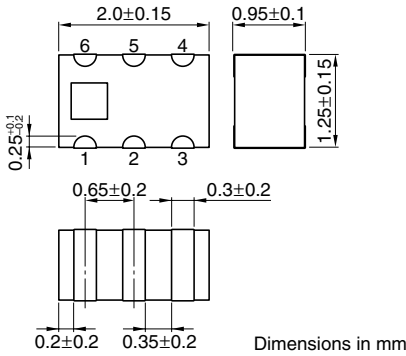


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1515B2 For EGSM/Tx-Rx

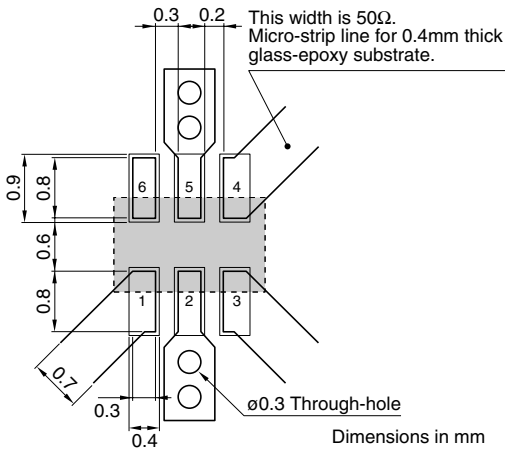
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



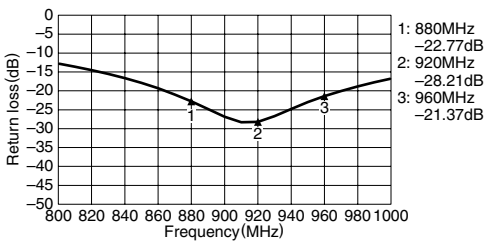
### ELECTRICAL CHARACTERISTICS

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

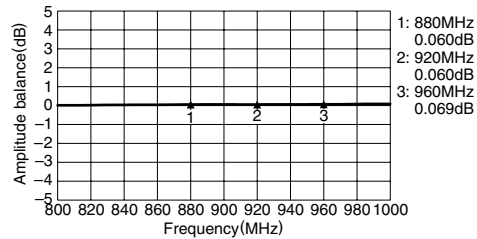
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

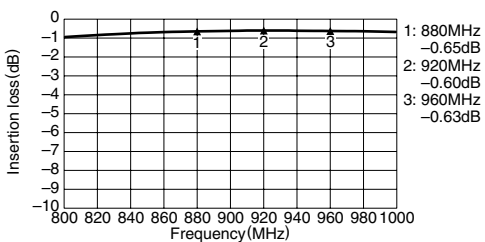
#### RETURN LOSS



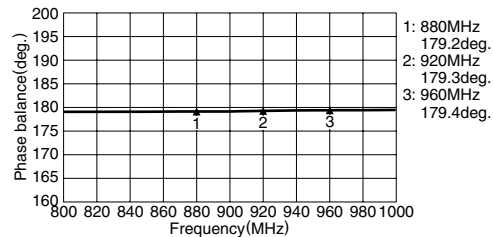
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

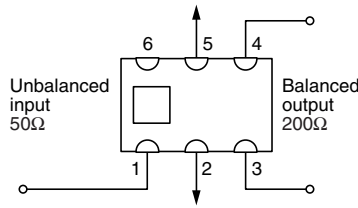
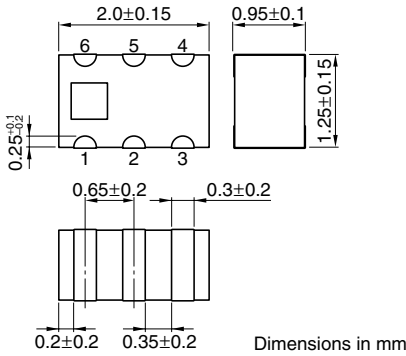


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1516 For DCS-PCS/Tx-Rx

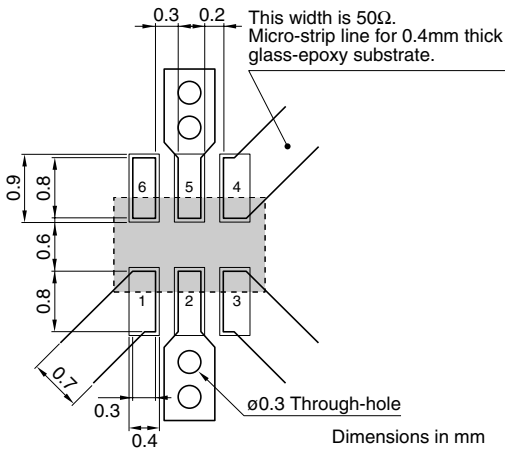
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



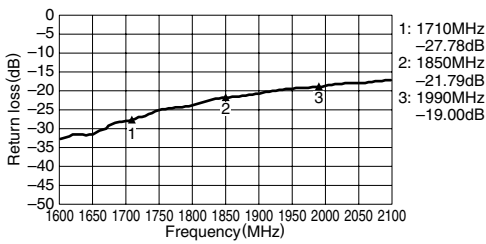
### ELECTRICAL CHARACTERISTICS

|                                      |  |
|--------------------------------------|--|
| Unbalanced impedance                 | 50Ω  |
| Balanced impedance                   | 200Ω   |
| 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<br>Storage: -40 to +85°C |
| Packaging style and quantities       | 2000pieces/reel                                  |

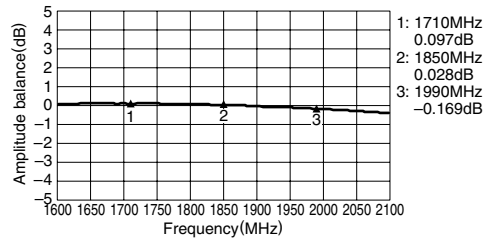
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

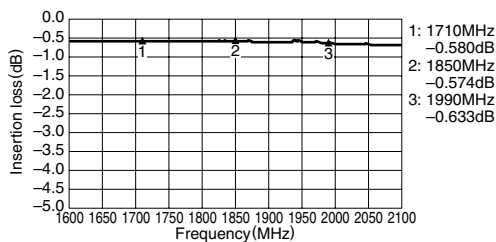
#### RETURN LOSS



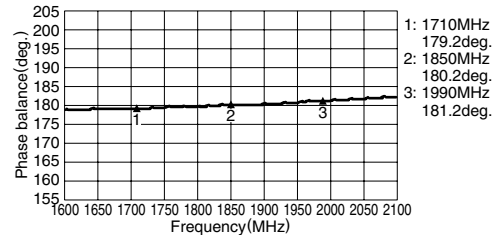
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

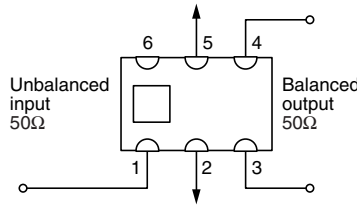
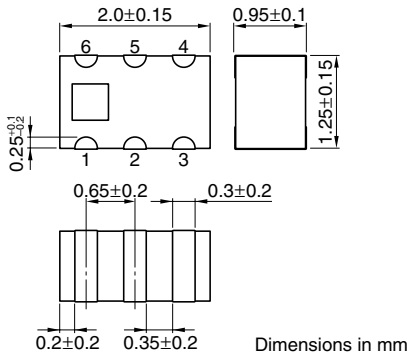


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

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

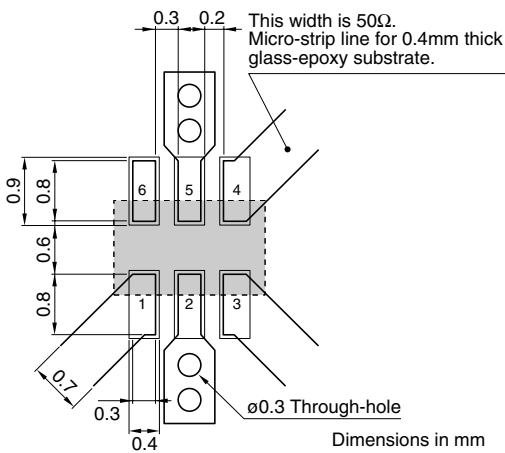
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



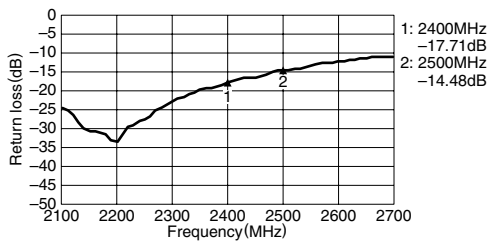
### ELECTRICAL CHARACTERISTICS

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

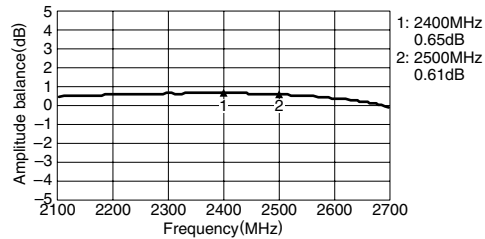
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 50Ω

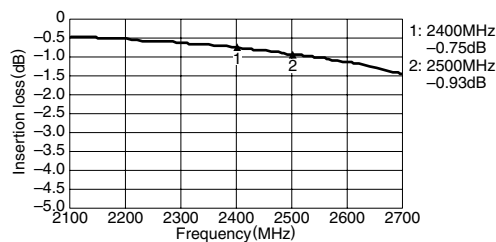
#### RETURN LOSS



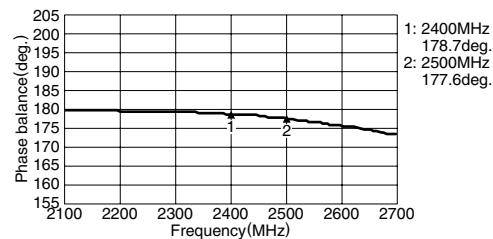
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

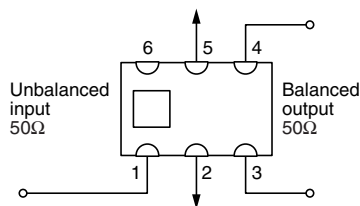
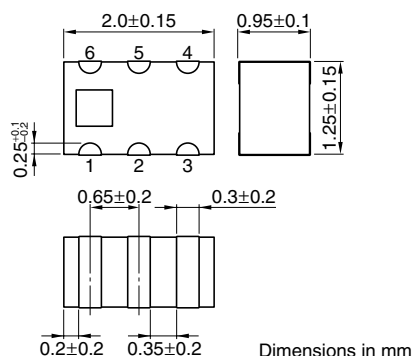


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

HHM1517A2 For Bluetooth&IEEE802.11b/g

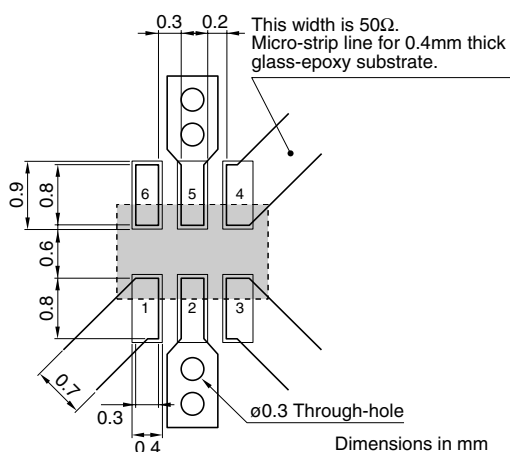
## SHAPES AND DIMENSIONS/CIRCUIT



## TERMINAL FUNCTIONS

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

## RECOMMENDED PCB PATTERN



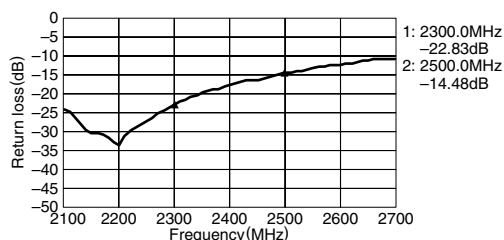
## ELECTRICAL CHARACTERISTICS

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

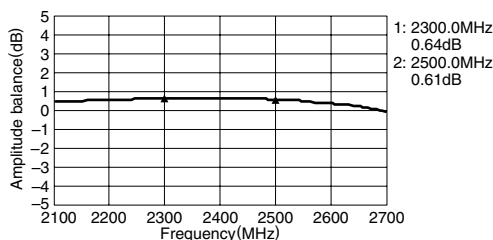
## FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 50Ω

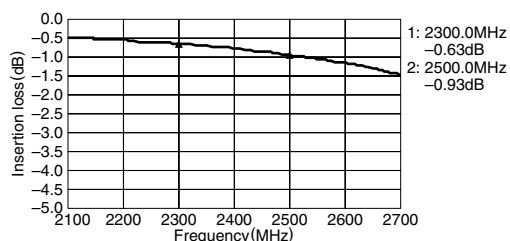
### RETURN LOSS



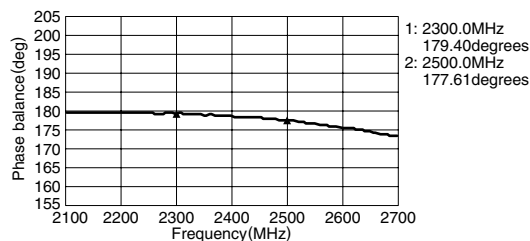
### AMPLITUDE BALANCE



### INSERTION LOSS



### PHASE BALANCE

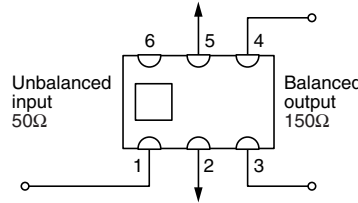
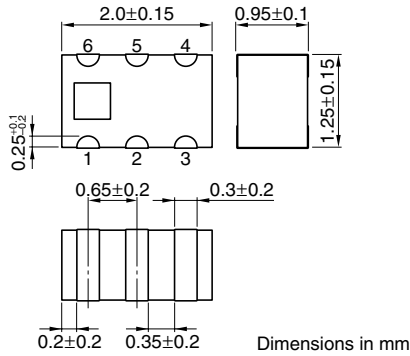


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1518A3 For DCS-PCS/Tx-Rx

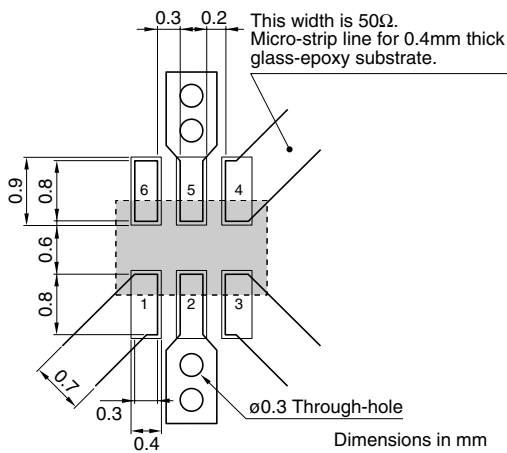
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



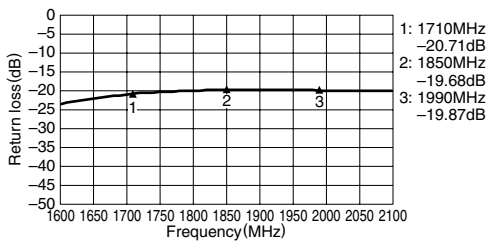
### ELECTRICAL CHARACTERISTICS

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

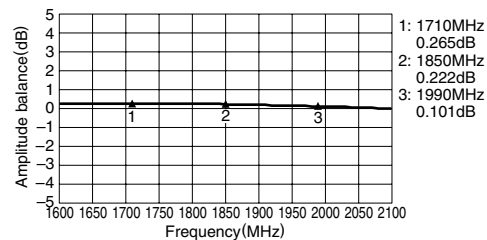
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 150Ω

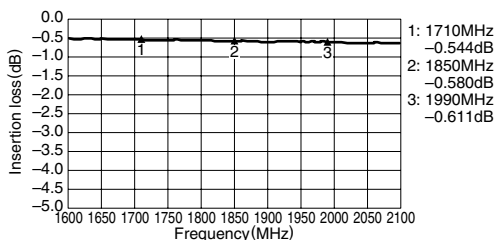
#### RETURN LOSS



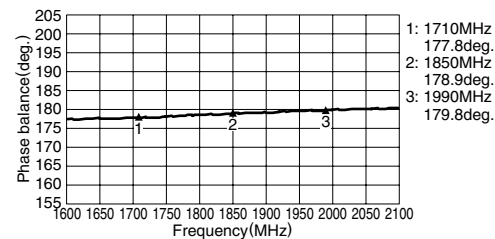
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

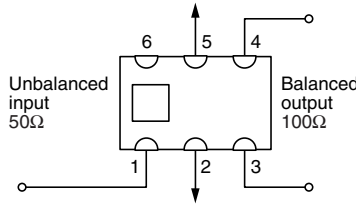
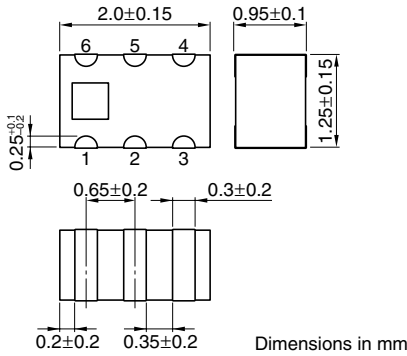


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1520 For Bluetooth&IEEE802.11b/g

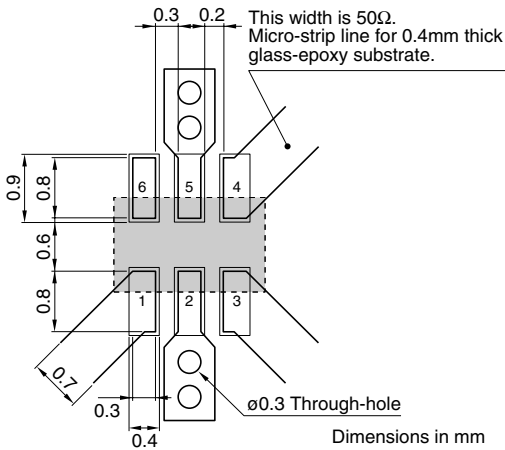
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



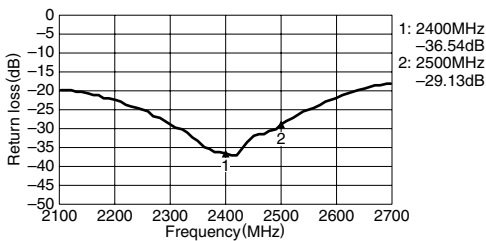
### ELECTRICAL CHARACTERISTICS

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

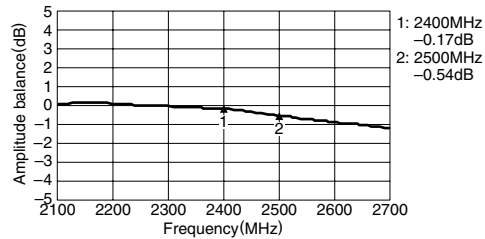
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

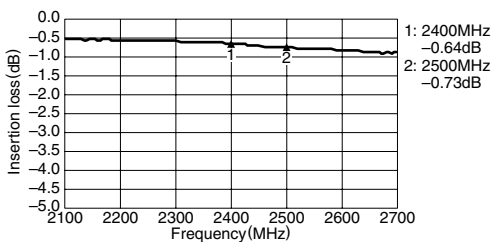
#### RETURN LOSS



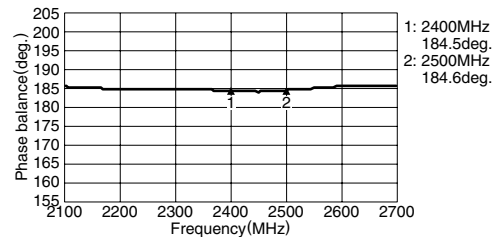
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

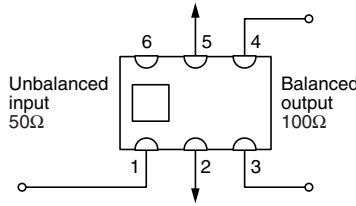
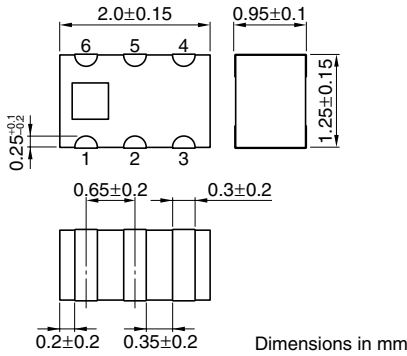


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

HHM1520A2 For Bluetooth&IEEE802.11b/g

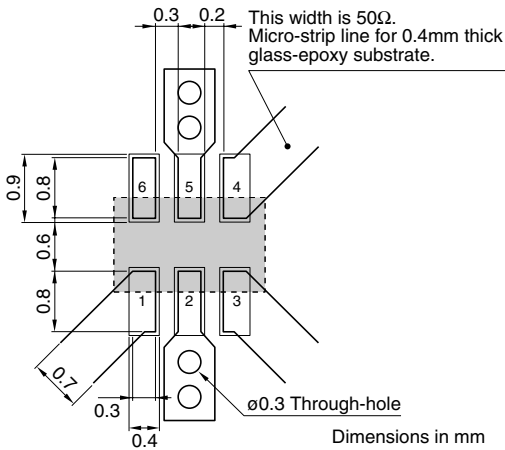
## SHAPES AND DIMENSIONS/CIRCUIT



## TERMINAL FUNCTIONS

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

## RECOMMENDED PCB PATTERN



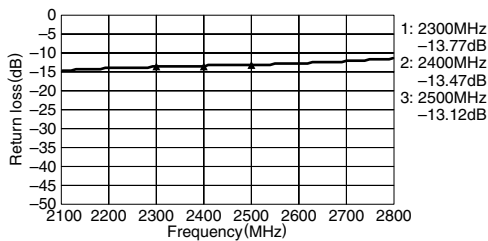
## ELECTRICAL CHARACTERISTICS

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

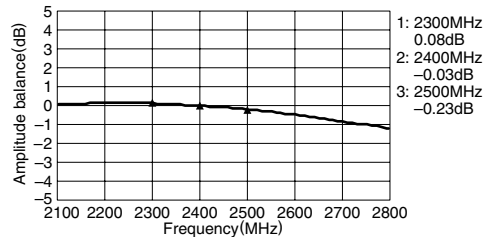
## FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

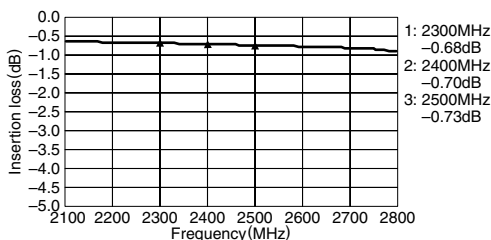
### RETURN LOSS



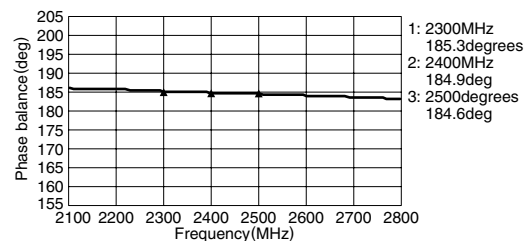
### AMPLITUDE BALANCE



### INSERTION LOSS



### PHASE BALANCE



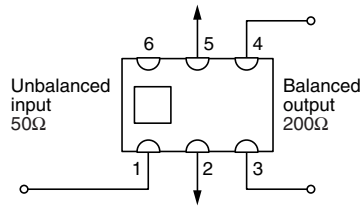
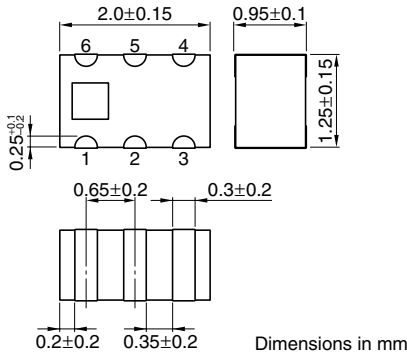
• All specifications are subject to change without notice.



# Multilayer Baluns, HHM Series

## HHM1521 For Bluetooth&IEEE802.11b/g

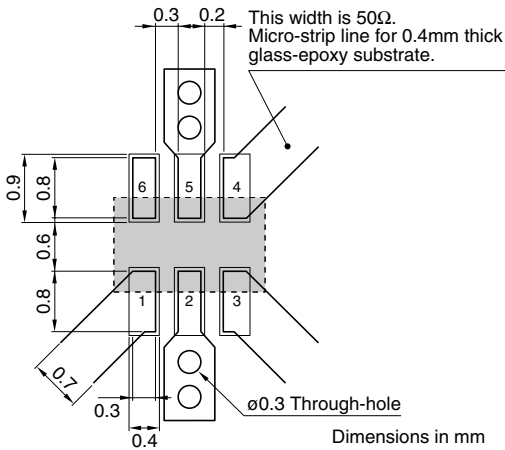
### SHAPES AND DIMENSIONS/CIRCUIT



### 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



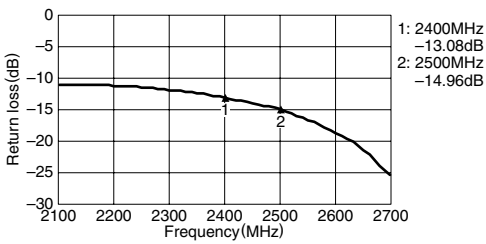
### ELECTRICAL CHARACTERISTICS

|                                      |  |
|--------------------------------------|--|
| 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<br>Storage: -40 to +85°C |
| Packaging style and quantities       | 2000pieces/reel                                  |

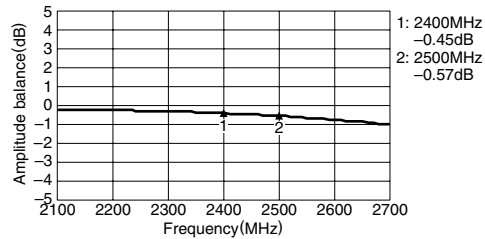
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

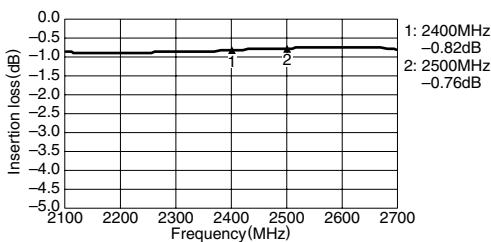
#### RETURN LOSS



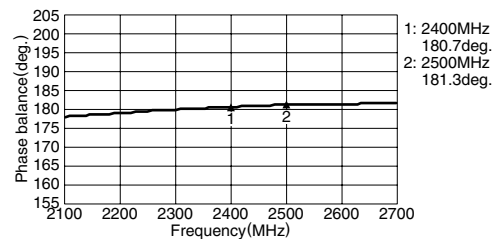
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

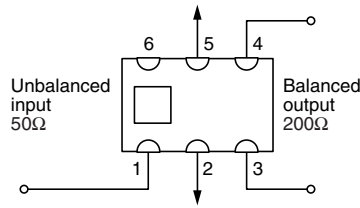
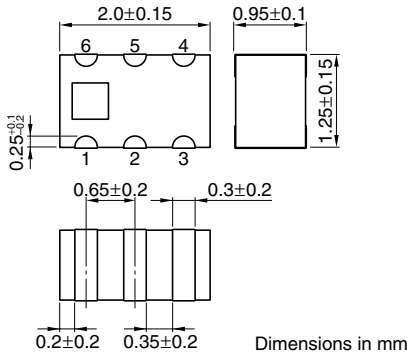


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

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

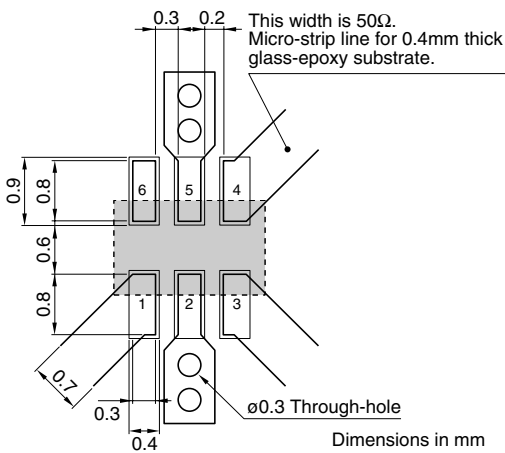
### SHAPES AND DIMENSIONS/CIRCUIT



### 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



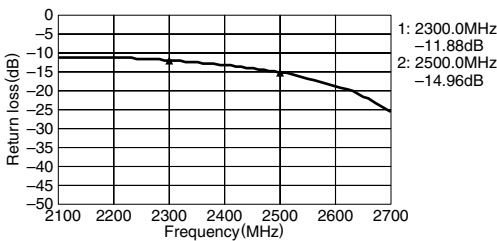
### ELECTRICAL CHARACTERISTICS

|                                      |  |
|--------------------------------------|--|
| 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<br>Storage: -40 to +85°C |
| Packaging style and quantities       | 2000pieces/reel                                  |

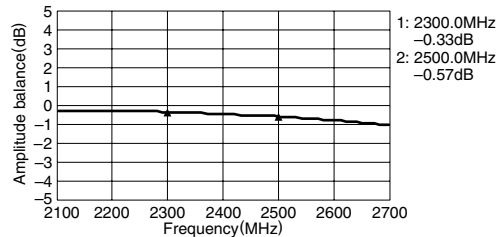
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

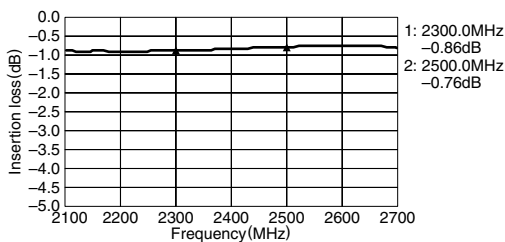
#### RETURN LOSS



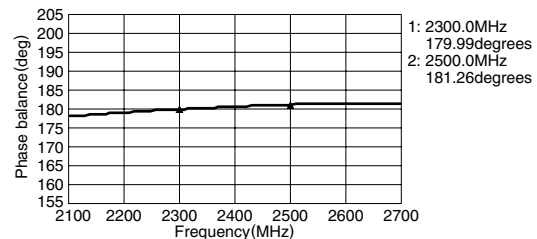
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

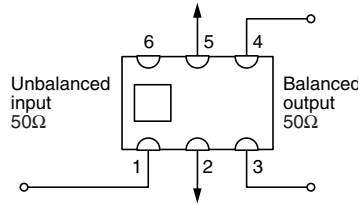
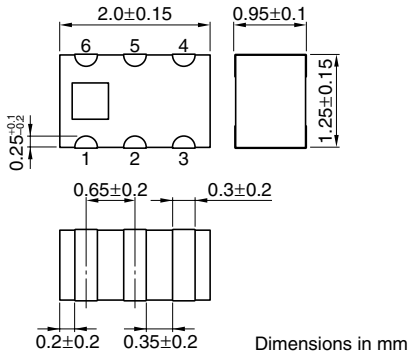


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1522A7 For AGSM/Tx-Rx

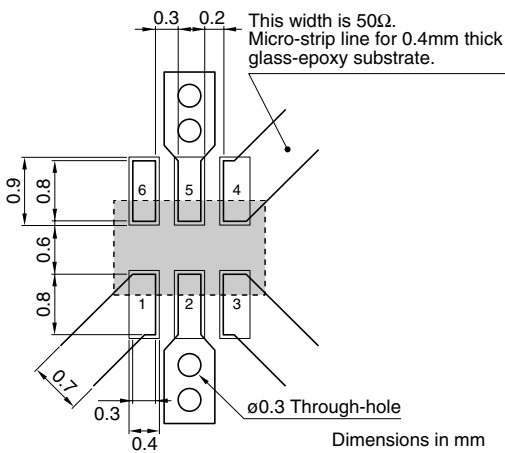
### SHAPES AND DIMENSIONS/CIRCUIT



### 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



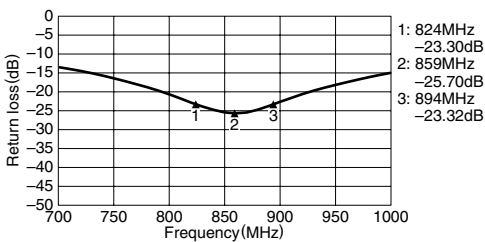
### ELECTRICAL CHARACTERISTICS

|                                      |  |
|--------------------------------------|--|
| 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<br>Storage: -40 to +85°C |
| Packaging style and quantities       | 2000pieces/reel                                  |

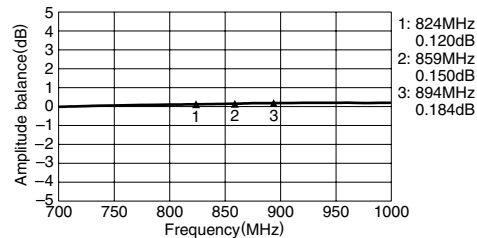
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 50Ω

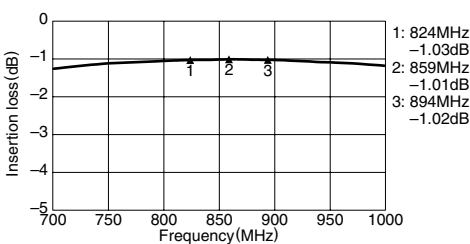
#### RETURN LOSS



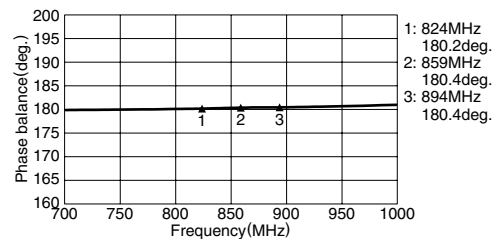
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

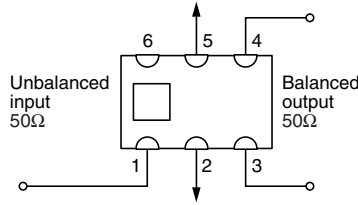
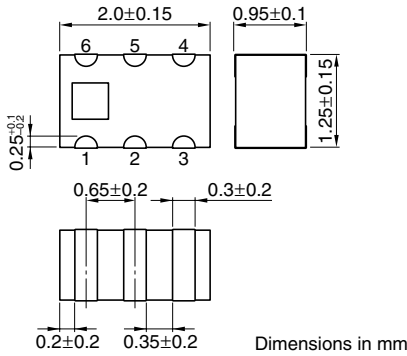


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1522B1 For EGSM/Tx-Rx

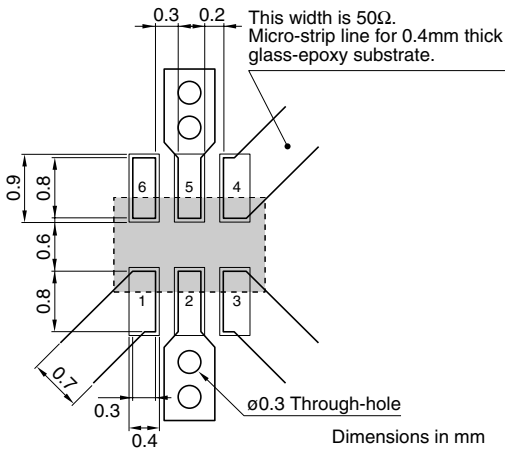
### SHAPES AND DIMENSIONS/CIRCUIT



### 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



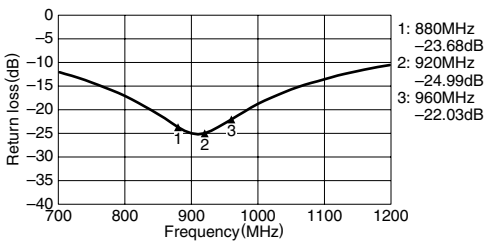
### ELECTRICAL CHARACTERISTICS

|                                      |  |
|--------------------------------------|--|
| 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<br>Storage: -40 to +85°C |
| Packaging style and quantities       | 2000pieces/reel                                  |

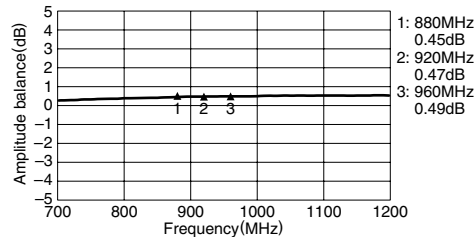
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 50Ω

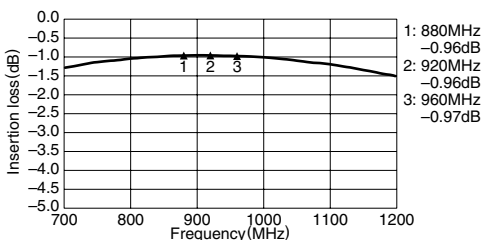
#### RETURN LOSS



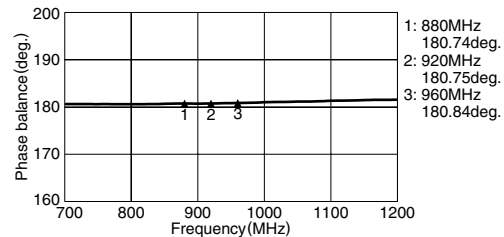
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

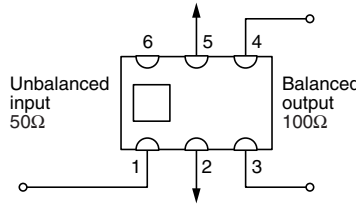
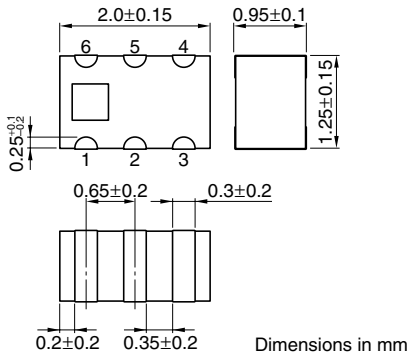


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1523B3 For AGSM/Tx-Rx

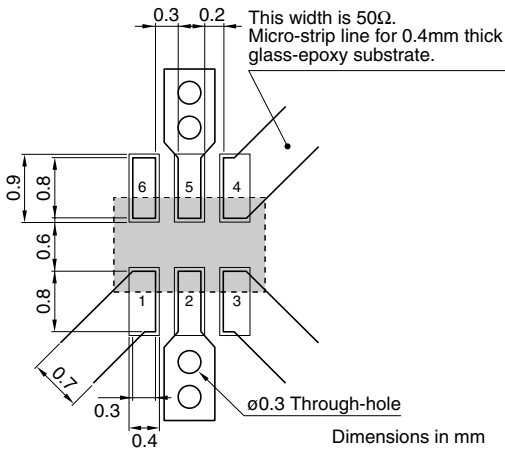
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



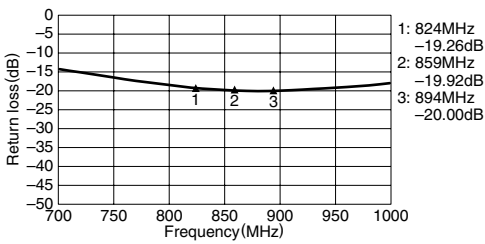
### ELECTRICAL CHARACTERISTICS

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

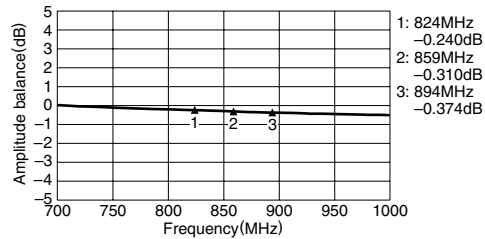
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

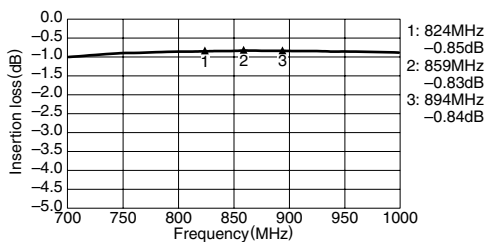
#### RETURN LOSS



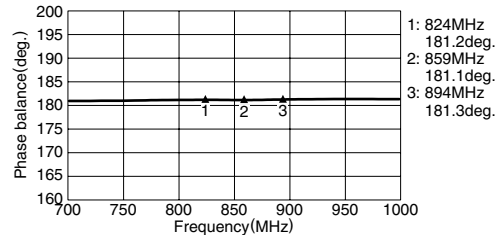
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

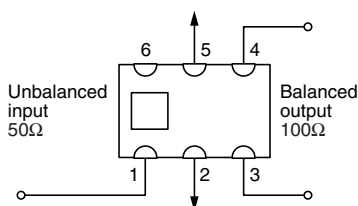
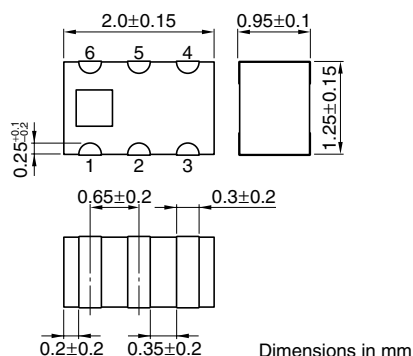


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1523C1 For EGSM/Tx-Rx

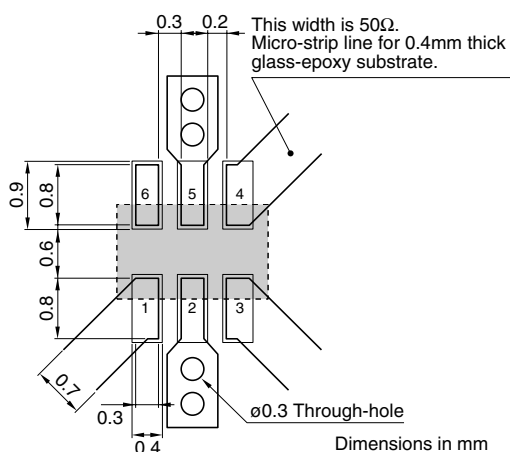
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



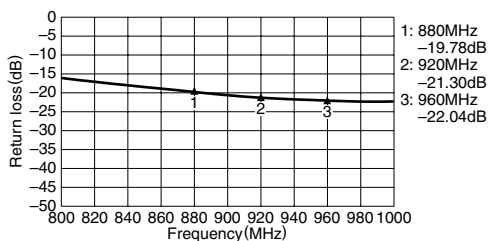
### ELECTRICAL CHARACTERISTICS

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

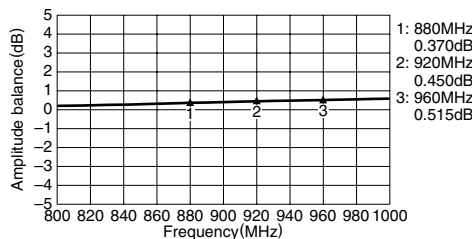
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

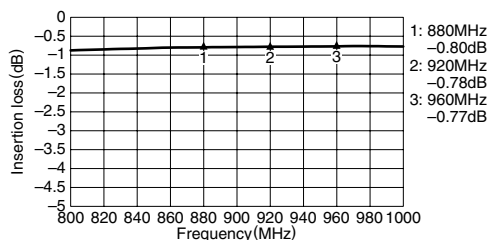
#### RETURN LOSS



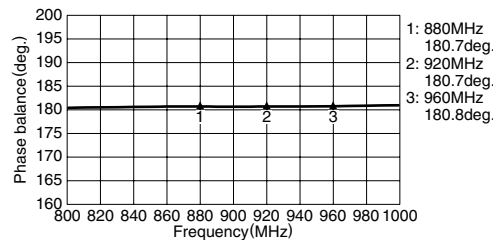
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

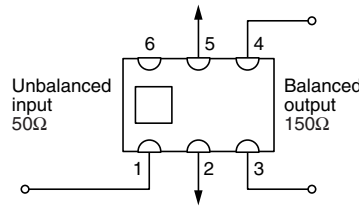
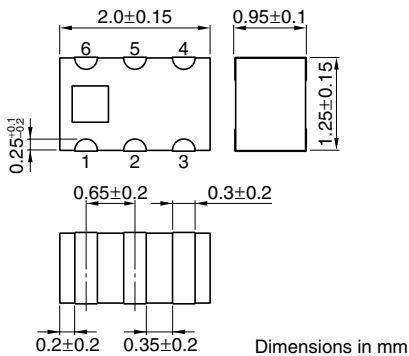


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1524B1 For EGSM/Tx-Rx

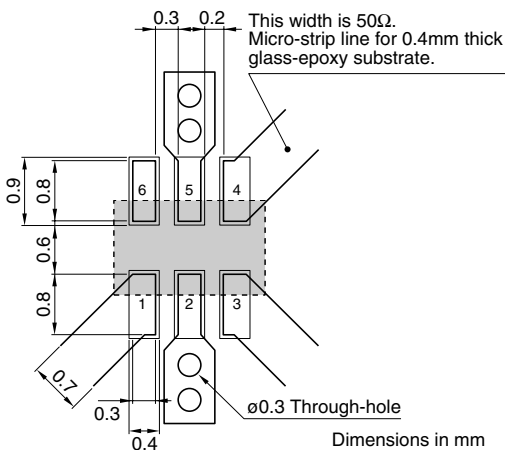
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



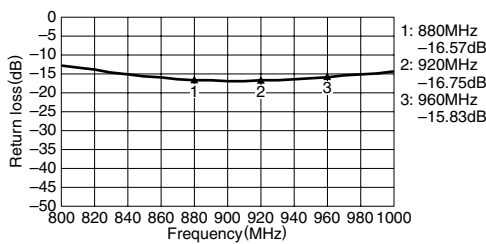
### ELECTRICAL CHARACTERISTICS

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

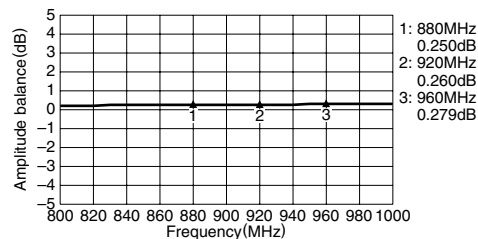
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 150Ω

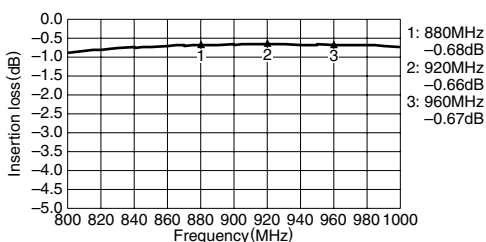
#### RETURN LOSS



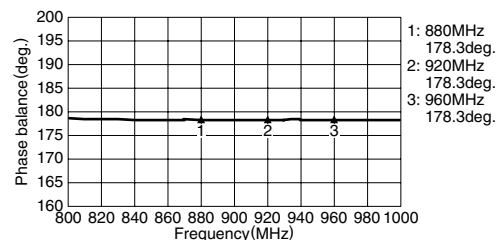
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

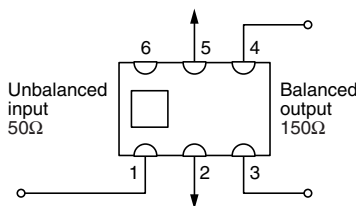
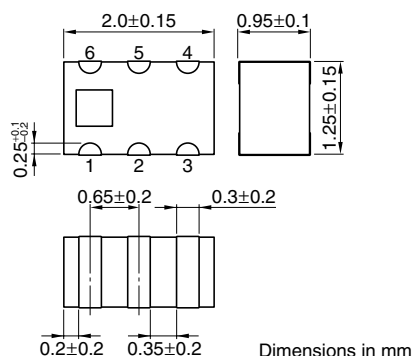


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1524B4 For AGSM/Tx-Rx

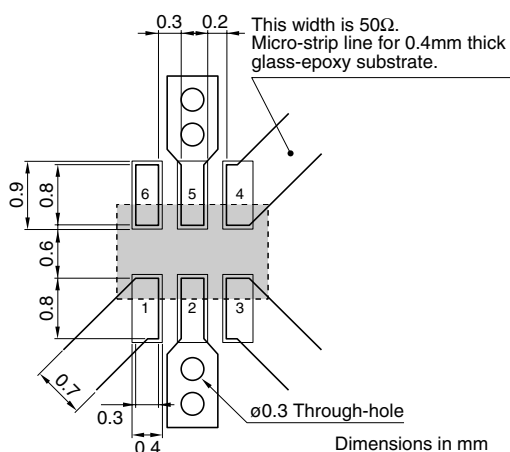
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



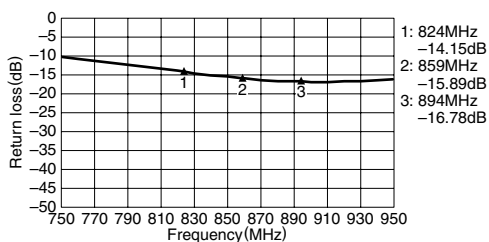
### ELECTRICAL CHARACTERISTICS

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

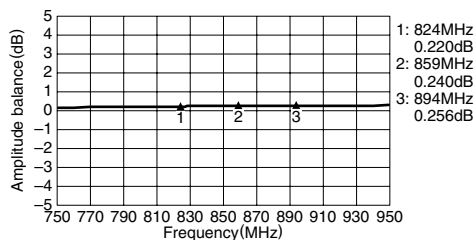
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 150Ω

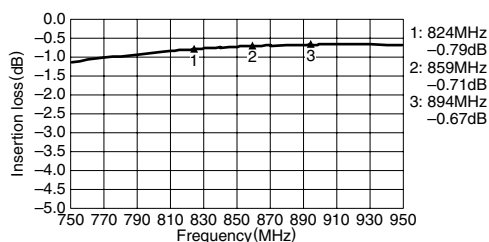
#### RETURN LOSS



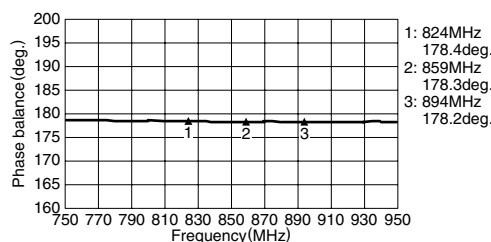
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE



• All specifications are subject to change without notice.

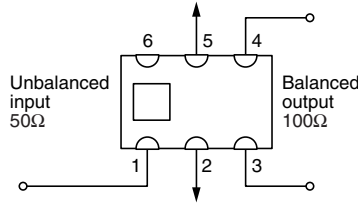
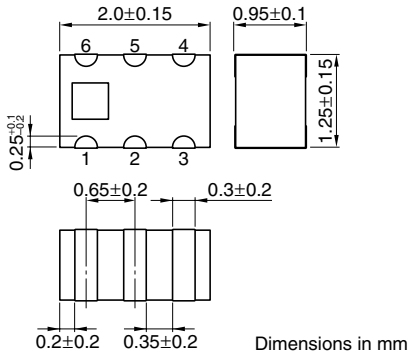




# Multilayer Baluns, HHM Series

## HHM1526 For DCS-PCS/Tx-Rx

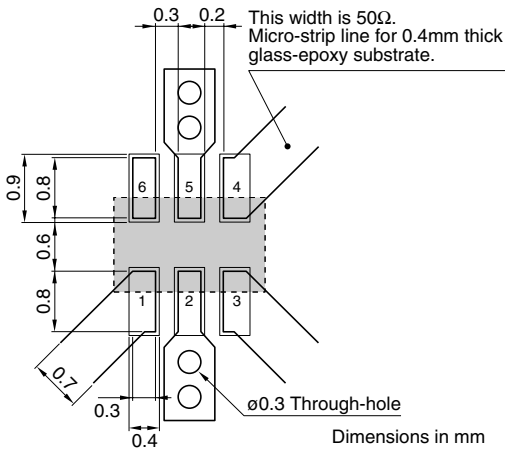
### SHAPES AND DIMENSIONS/CIRCUIT



### 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



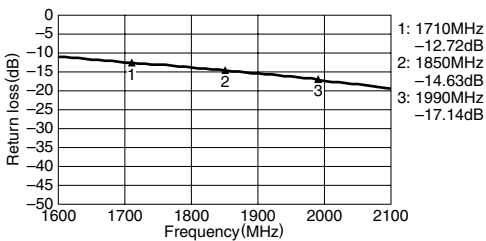
### ELECTRICAL CHARACTERISTICS

|                                      |  |
|--------------------------------------|--|
| 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<br>Storage: -40 to +85°C |
| Packaging style and quantities       | 2000pieces/reel                                  |

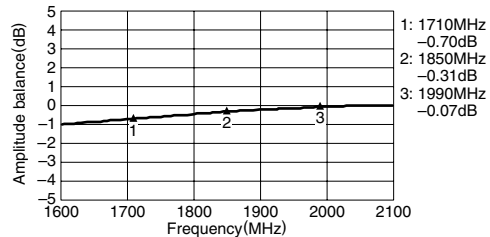
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

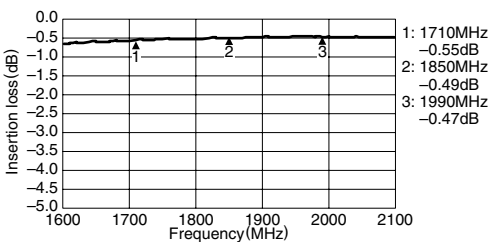
#### RETURN LOSS



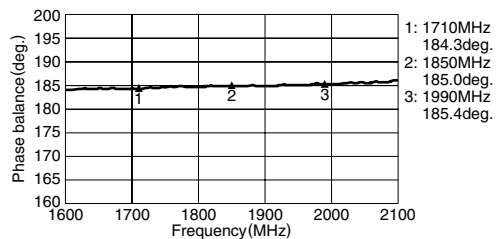
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

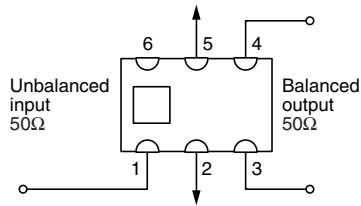
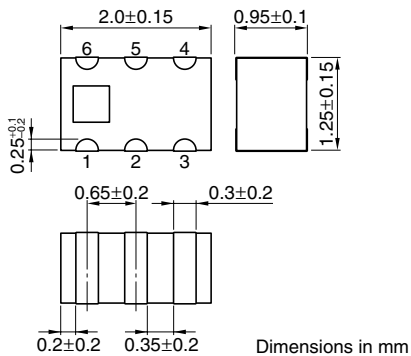


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1533 For W-CDMA/Tx-Rx

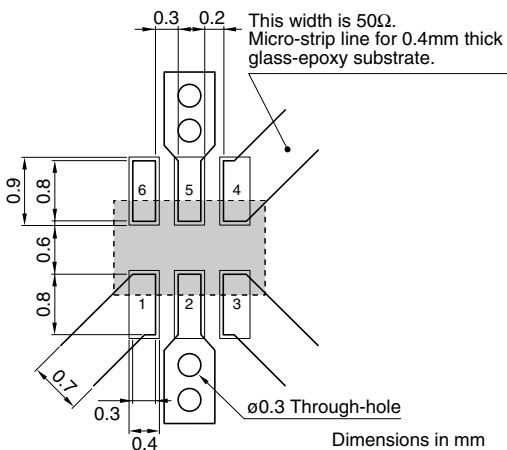
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



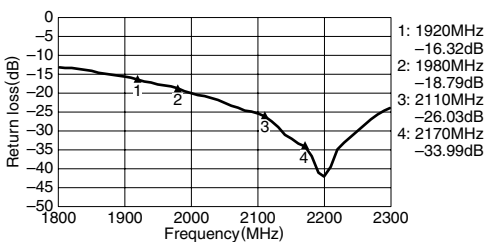
### ELECTRICAL CHARACTERISTICS

|                                      |  |
|--------------------------------------|--|
| Unbalanced impedance                 | 50Ω  |
| Balanced impedance                   | 50Ω  |
| Frequency range                      | 1920 to 1980,<br>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<br>Storage: -40 to +85°C |
| Packaging style and quantities       | 2000pieces/reel                                  |

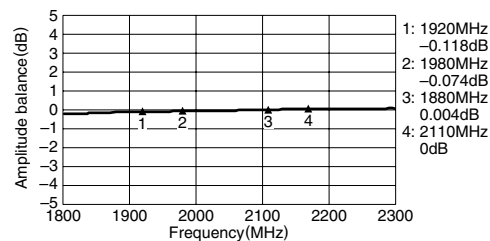
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 50Ω

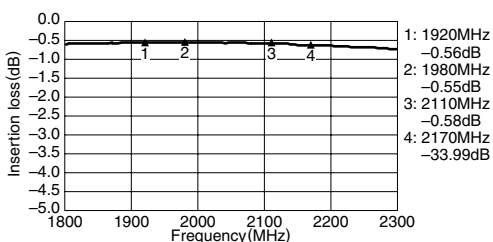
#### RETURN LOSS



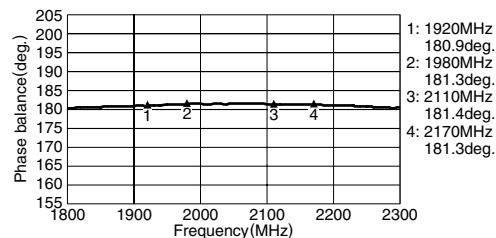
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

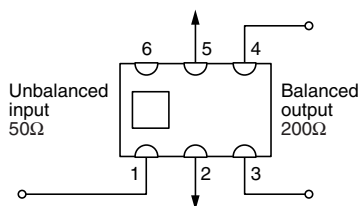
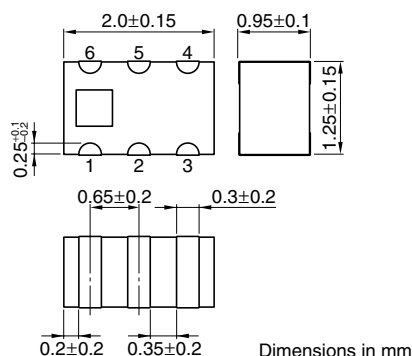


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1534 For W-CDMA/Tx-Rx

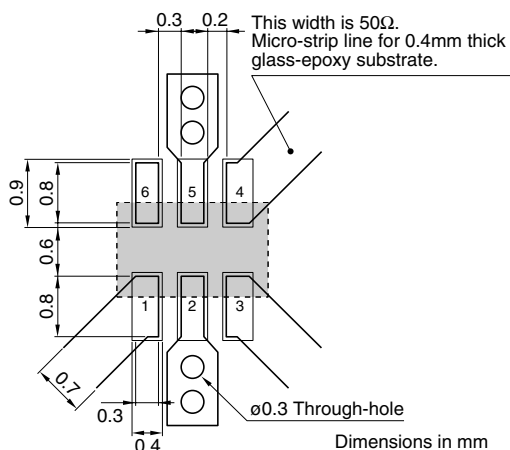
### SHAPES AND DIMENSIONS/CIRCUIT



### 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



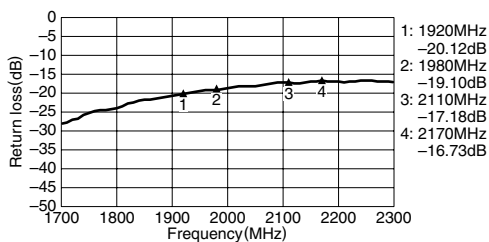
### ELECTRICAL CHARACTERISTICS

|                                      |  |
|--------------------------------------|--|
| Unbalanced impedance                 | 50Ω  |
| Balanced impedance                   | 200Ω   |
| Frequency range                      | 1920 to 1980,<br>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<br>Storage -40 to +85°C |
| Packaging style and quantities       | 2000pieces/reel                                |

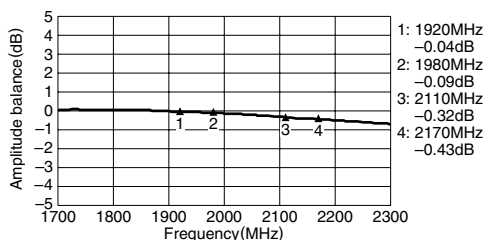
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

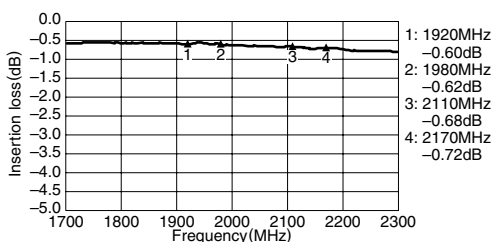
#### RETURN LOSS



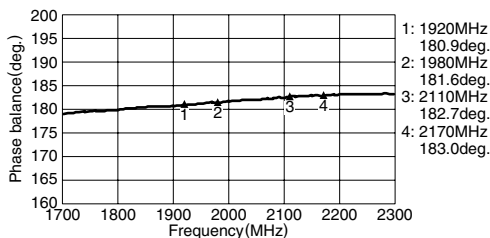
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

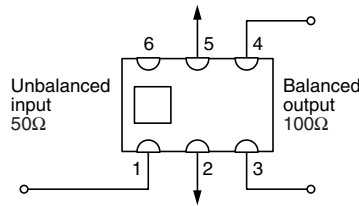
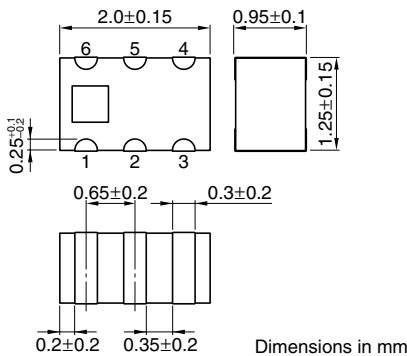


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1536B1 For 3.7GHz

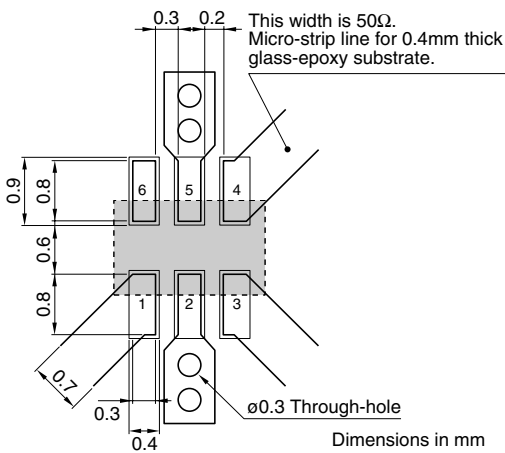
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



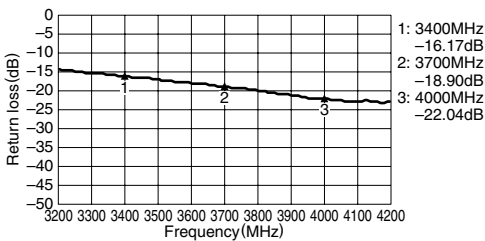
### ELECTRICAL CHARACTERISTICS

|                                      |  |
|--------------------------------------|--|
| 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<br>Storage: -40 to +85°C |
| Packaging style and quantities       | 2000pieces/reel                                  |

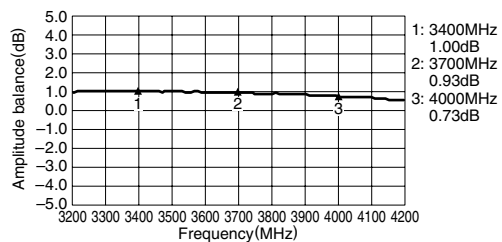
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

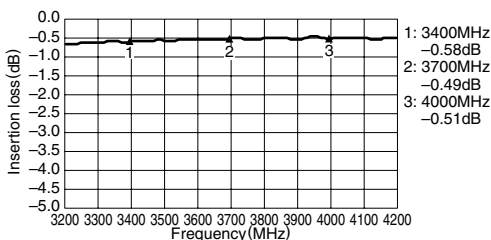
#### RETURN LOSS



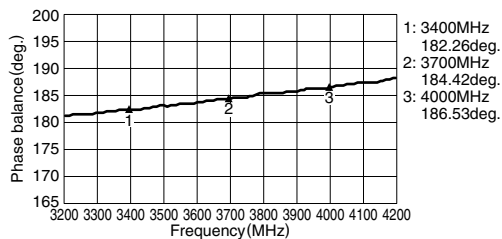
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

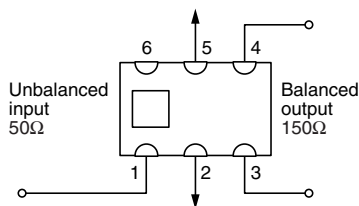
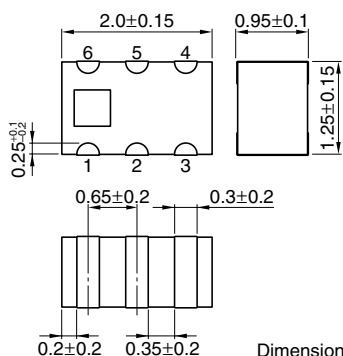


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1537 For W-CDMA/Tx-Rx

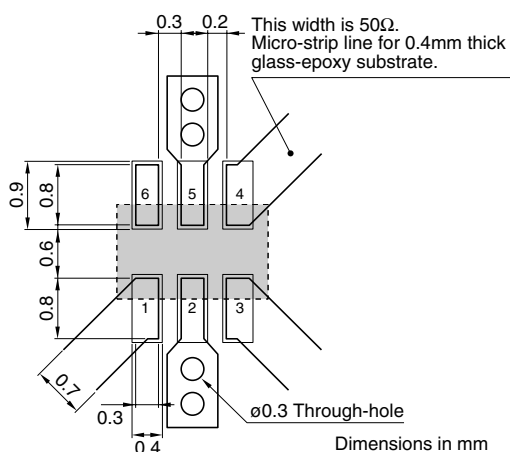
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



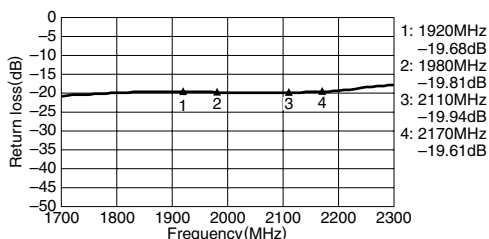
### ELECTRICAL CHARACTERISTICS

|                                      |  |
|--------------------------------------|--|
| Unbalanced impedance                 | 50Ω  |
| Balanced impedance                   | 150Ω   |
| Frequency range                      | 1920 to 1980,<br>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<br>Storage: -40 to +85°C |
| Packaging style and quantities       | 2000pieces/reel                                  |

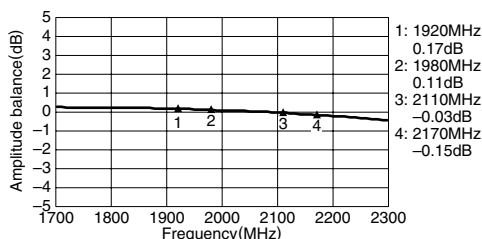
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 150Ω

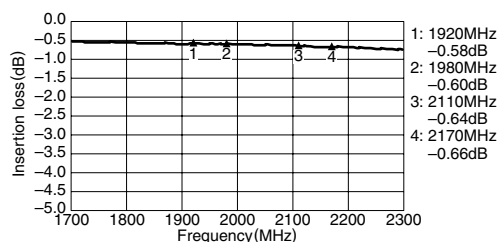
#### RETURN LOSS



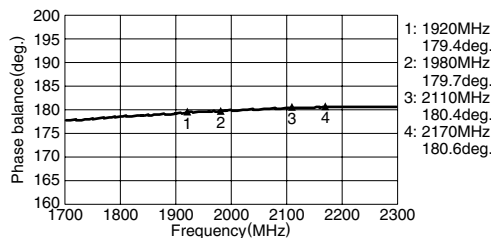
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

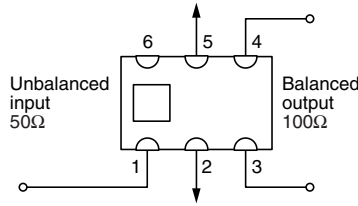
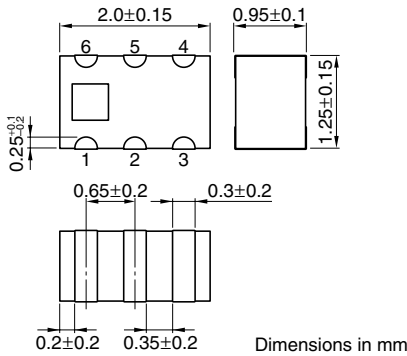


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1538 For DCS/Local

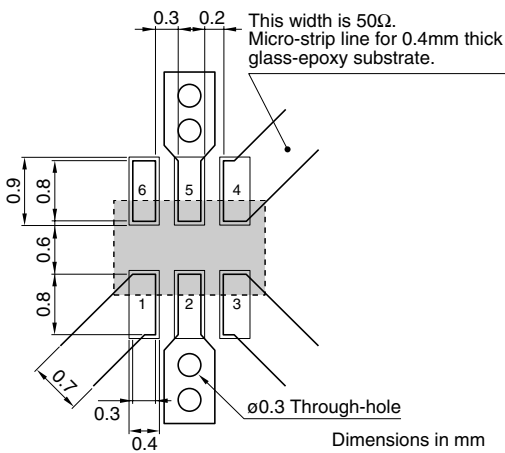
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



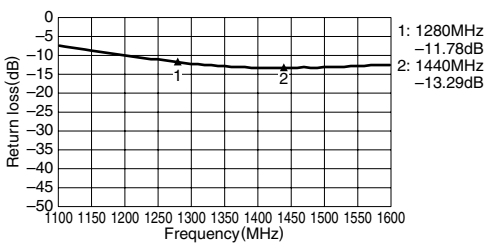
### ELECTRICAL CHARACTERISTICS

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

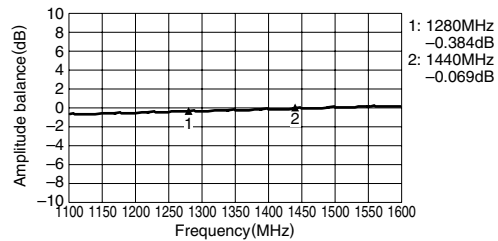
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

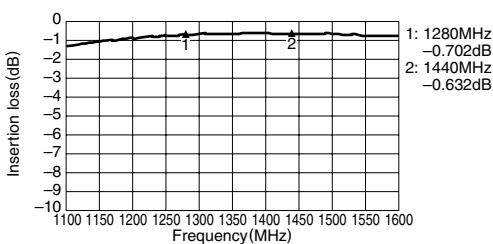
#### RETURN LOSS



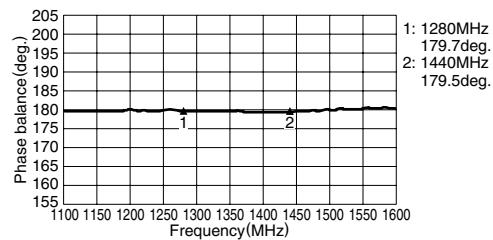
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

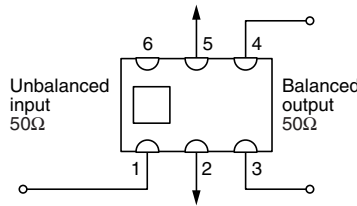
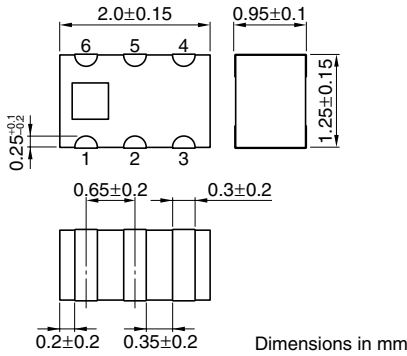


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1541 For Bluetooth&IEEE802.11b/g

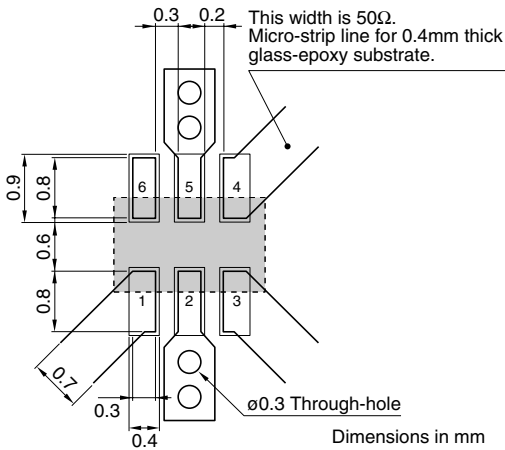
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



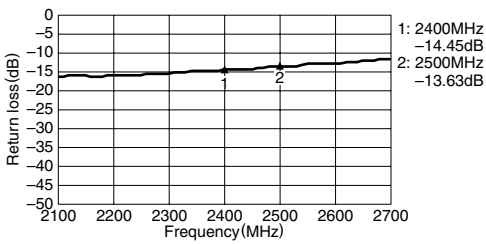
### ELECTRICAL CHARACTERISTICS

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

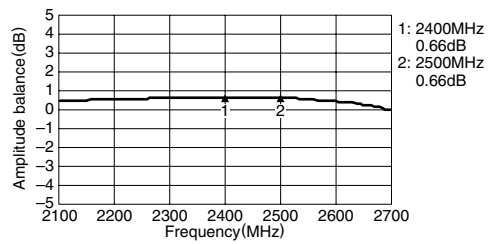
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 75Ω

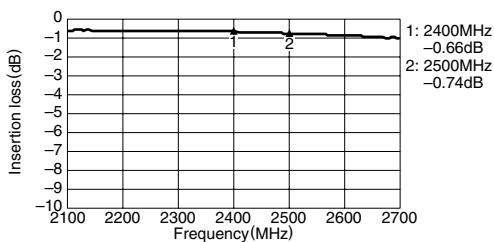
#### RETURN LOSS



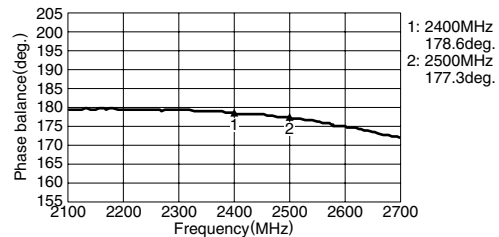
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE



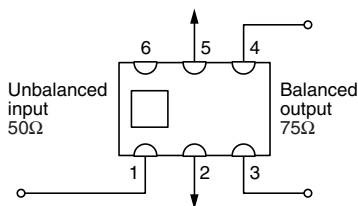
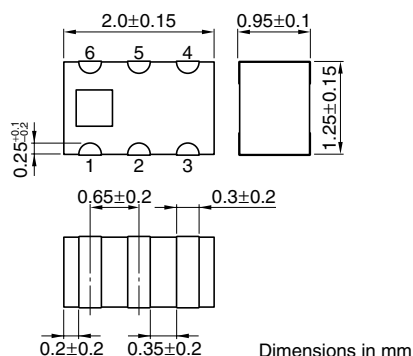
• All specifications are subject to change without notice.



# Multilayer Baluns, HHM Series

## HHM1541E1 For Bluetooth

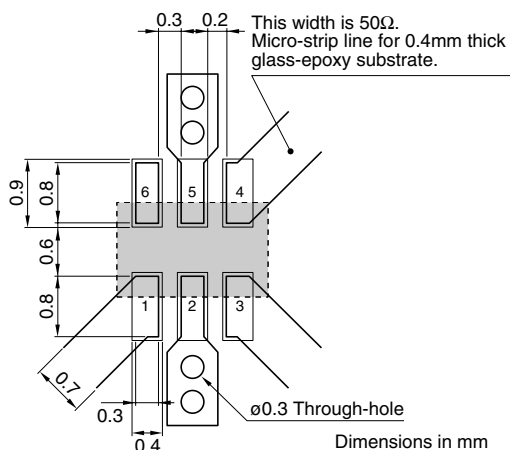
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



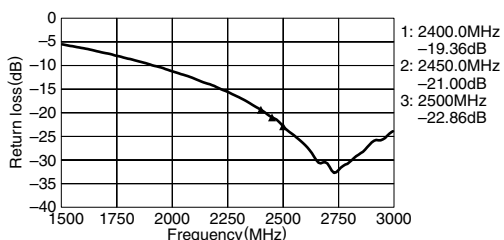
### ELECTRICAL CHARACTERISTICS

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

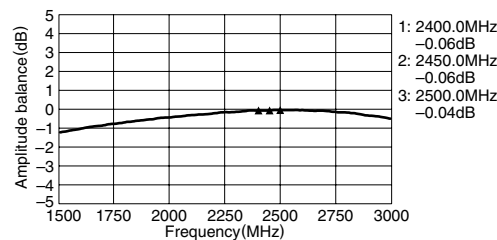
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 75Ω

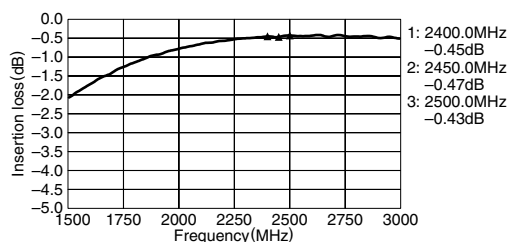
#### RETURN LOSS



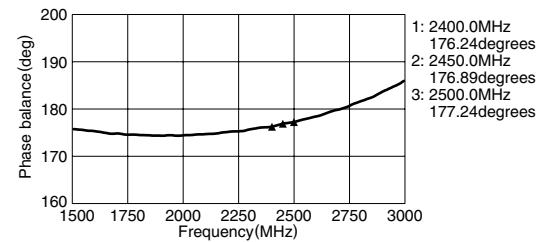
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

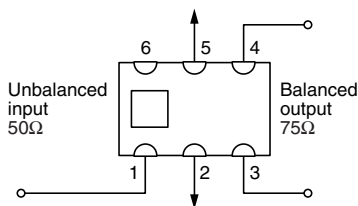
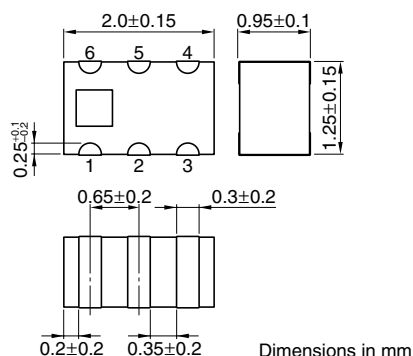


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

HHM1541E2 For Bluetooth&IEEE802.11b/g

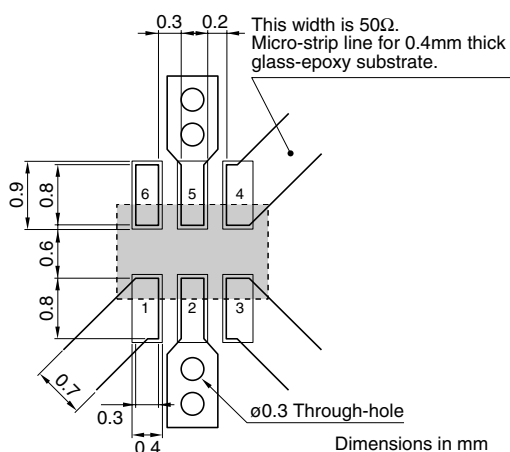
## SHAPES AND DIMENSIONS/CIRCUIT



## TERMINAL FUNCTIONS

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

## RECOMMENDED PCB PATTERN



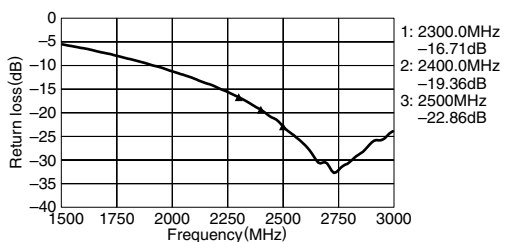
## ELECTRICAL CHARACTERISTICS

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

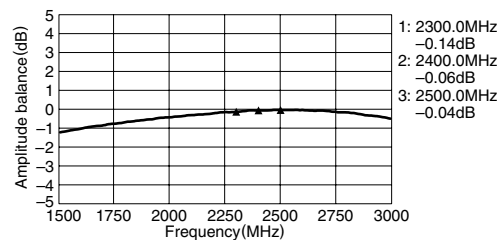
## FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 75Ω

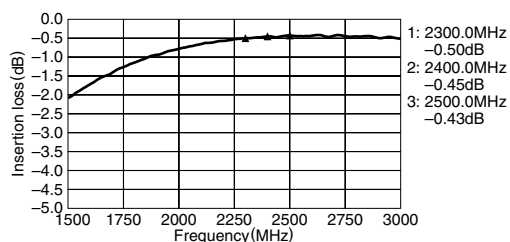
### RETURN LOSS



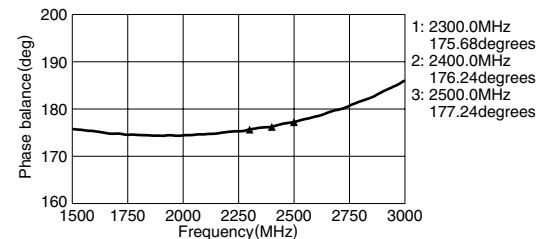
### AMPLITUDE BALANCE



### INSERTION LOSS



### PHASE BALANCE

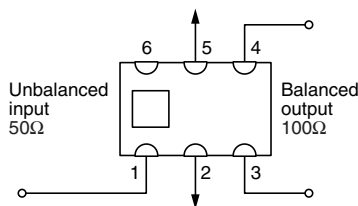
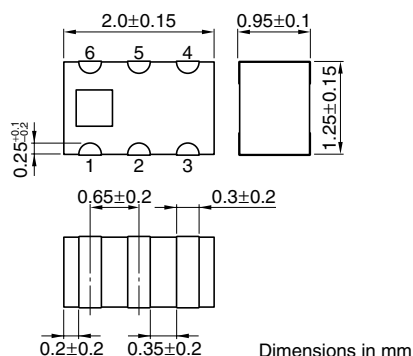


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1544 For W-LAN

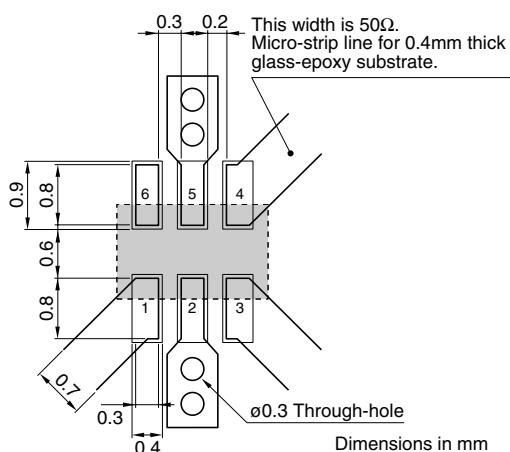
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



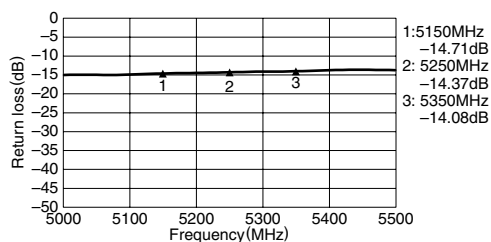
### ELECTRICAL CHARACTERISTICS

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

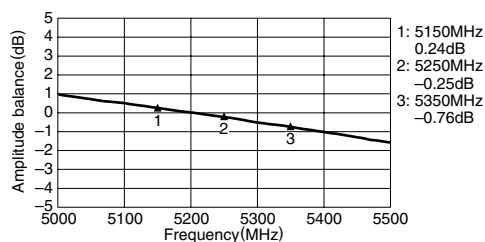
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

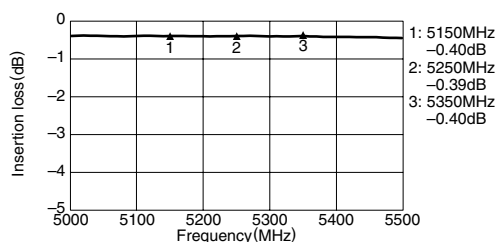
#### RETURN LOSS



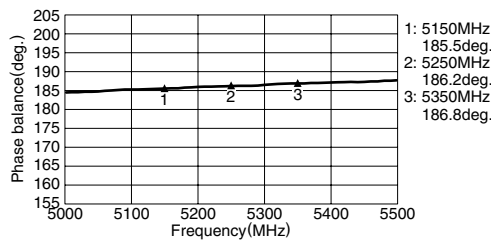
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

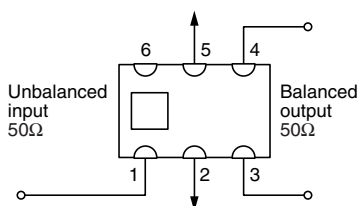
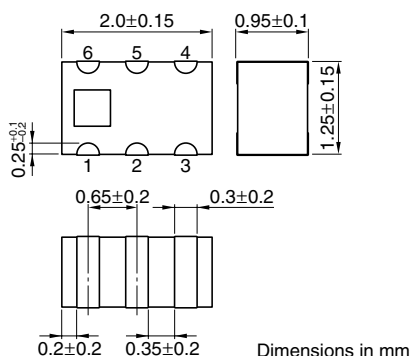


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1545 For 3.7GHz

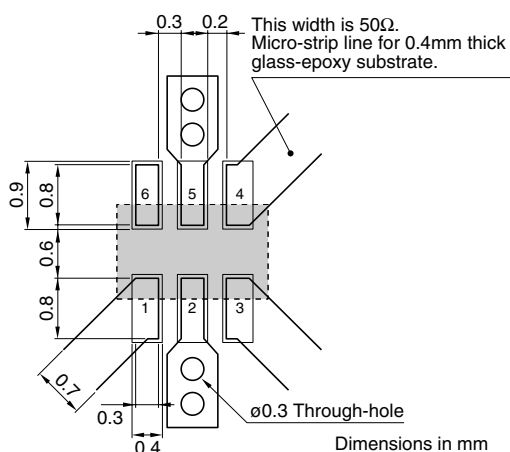
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



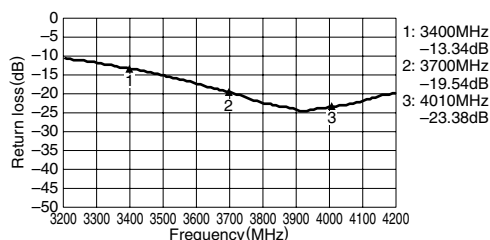
### ELECTRICAL CHARACTERISTICS

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

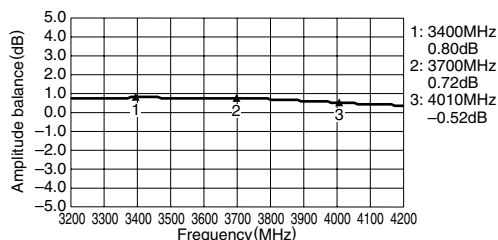
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 50Ω

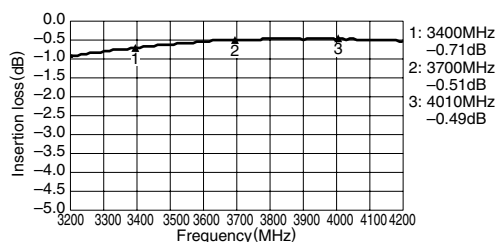
#### RETURN LOSS



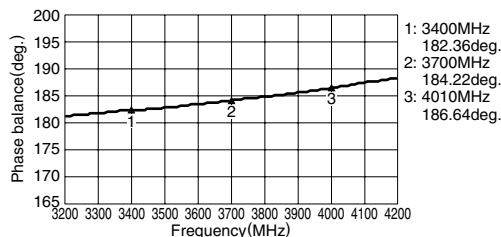
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE



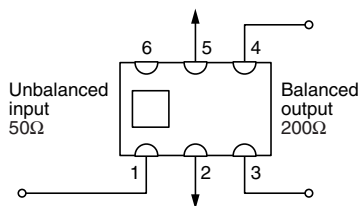
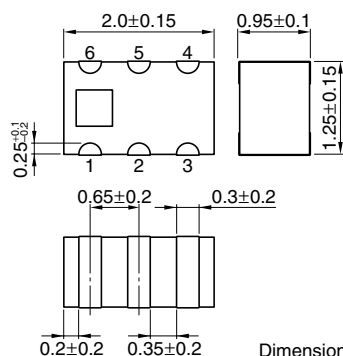
• All specifications are subject to change without notice.



# Multilayer Baluns, HHM Series

## HHM1548A2 For 3.7GHz

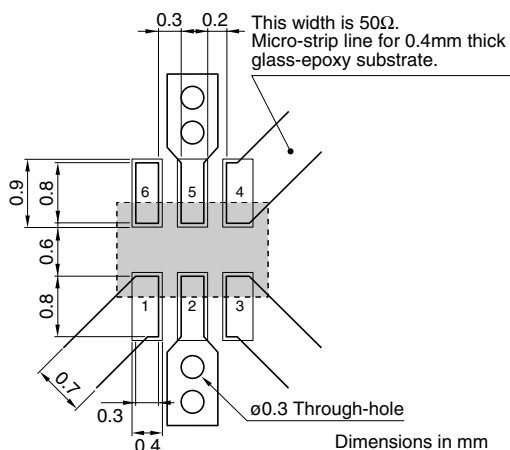
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



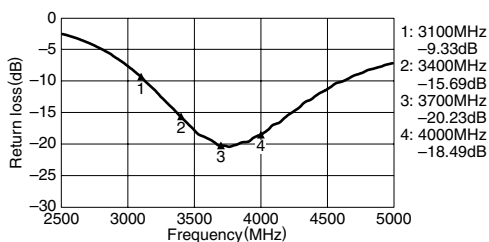
### ELECTRICAL CHARACTERISTICS

|                                      |  |   |
|--------------------------------------|--|---|
| 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<br>180±20deg. at 3700MHz<br>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<br>Storage -40 to +85°C |   |
| Packaging style and quantities       | 2000pieces/reel                                |   |

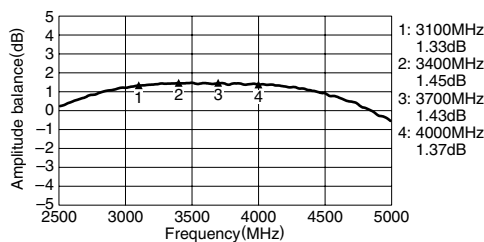
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

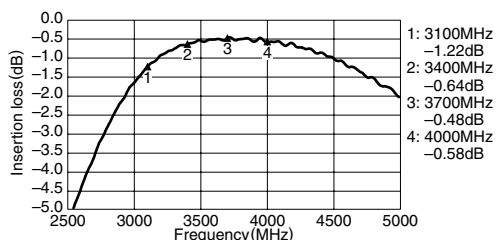
#### RETURN LOSS



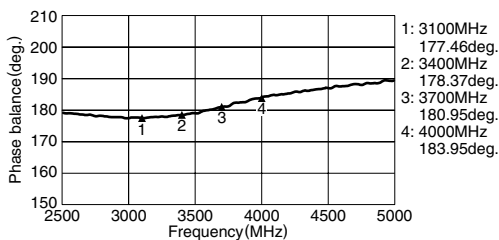
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

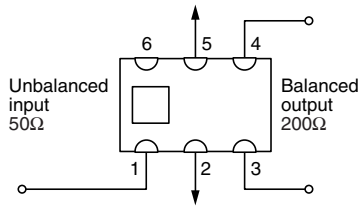
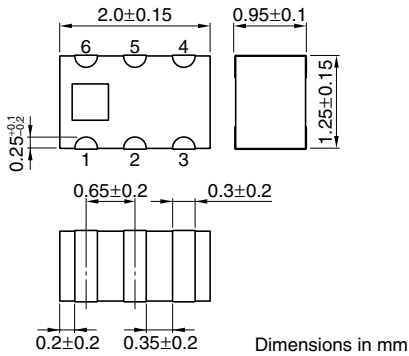


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1548C2 For 3.7GHz

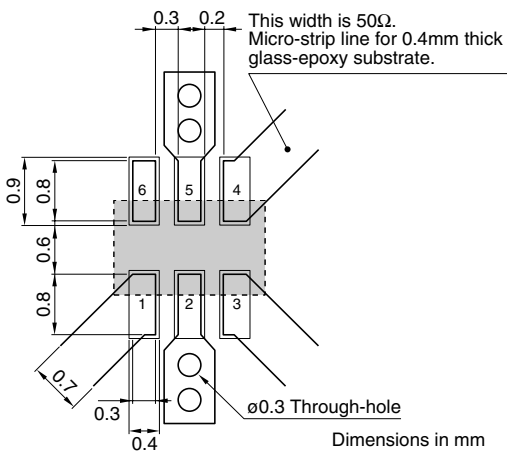
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



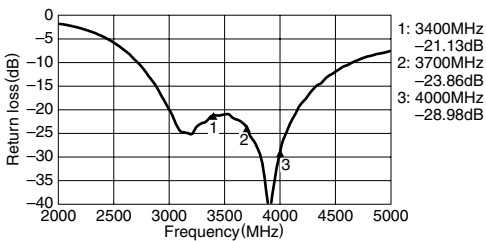
### ELECTRICAL CHARACTERISTICS

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

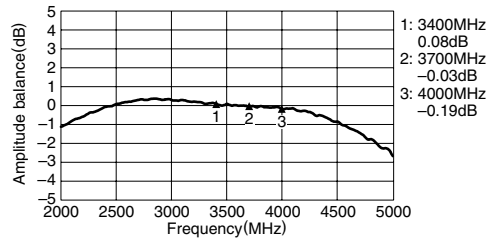
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

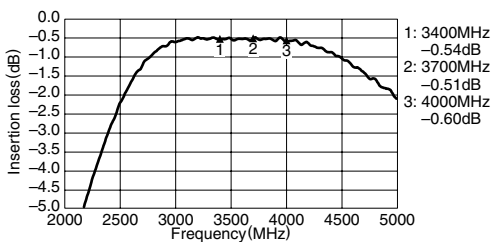
#### RETURN LOSS



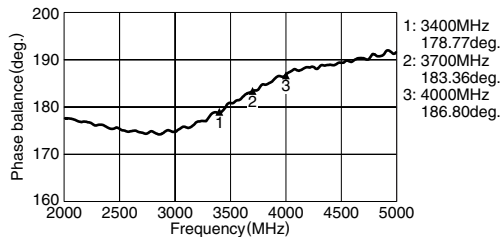
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

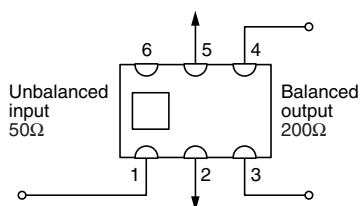
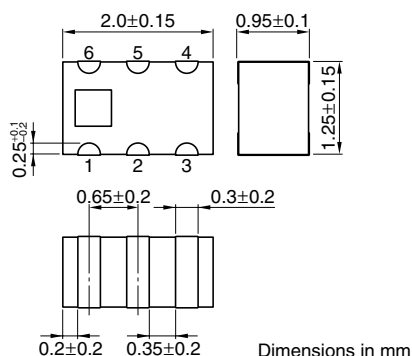


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1548E1 For 3.7GHz

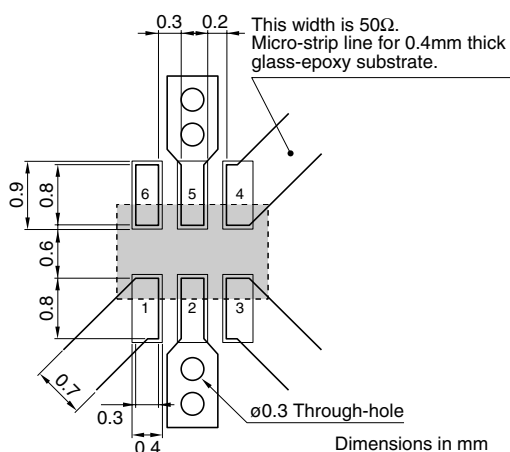
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



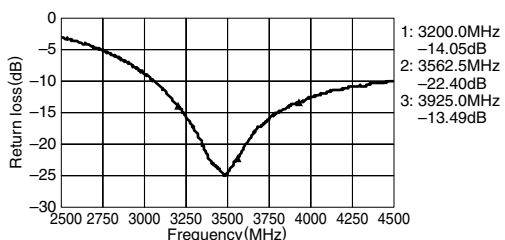
### ELECTRICAL CHARACTERISTICS

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

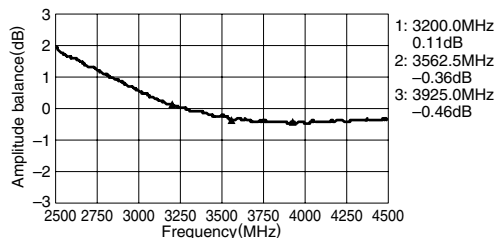
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

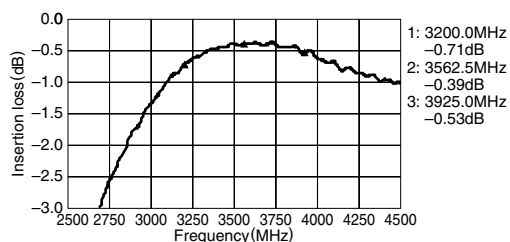
#### RETURN LOSS



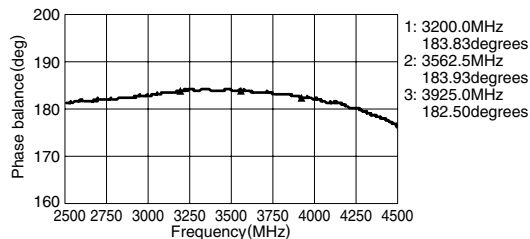
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE



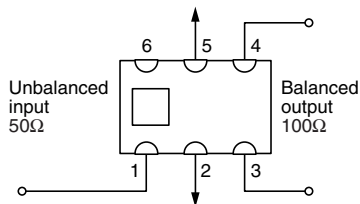
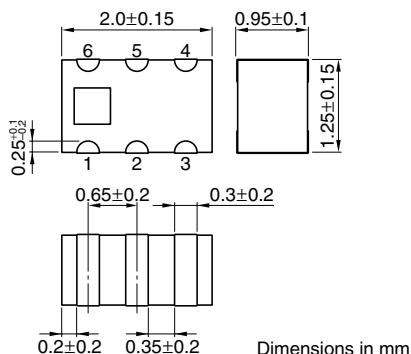
• All specifications are subject to change without notice.



# Multilayer Baluns, HHM Series

## HHM1562B For W-LAN

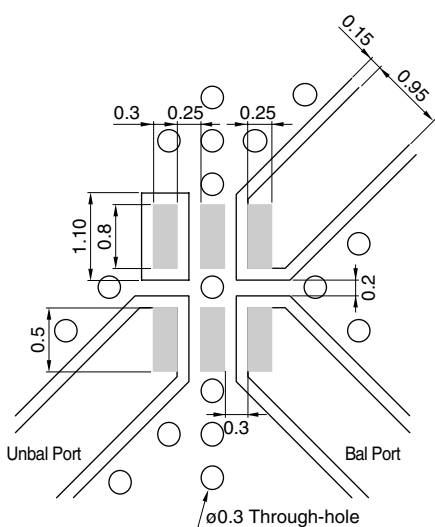
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



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

Dimensions in mm

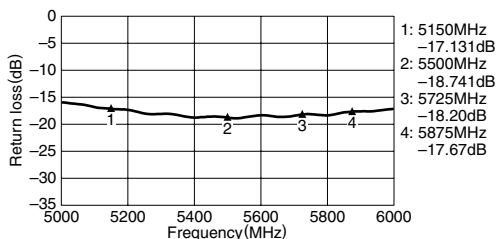
### ELECTRICAL CHARACTERISTICS

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

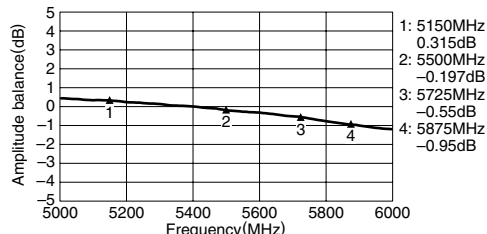
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

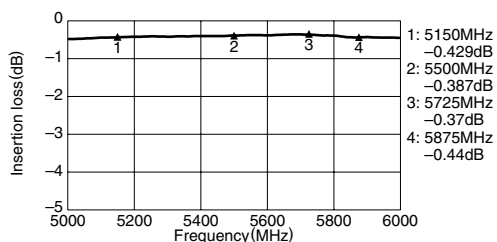
#### RETURN LOSS



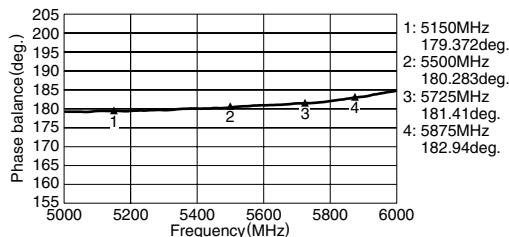
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

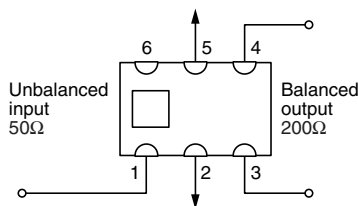
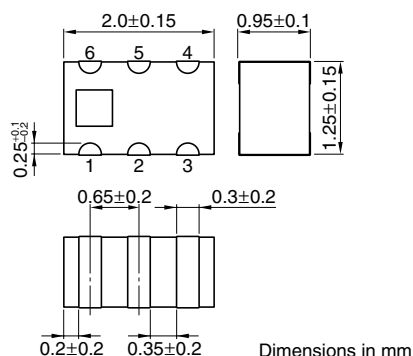


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1564A4 For AGSM/Tx-Rx

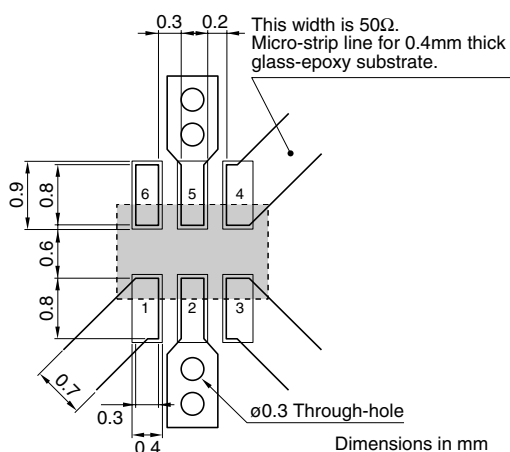
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



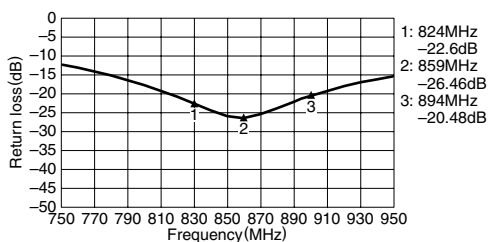
### ELECTRICAL CHARACTERISTICS

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

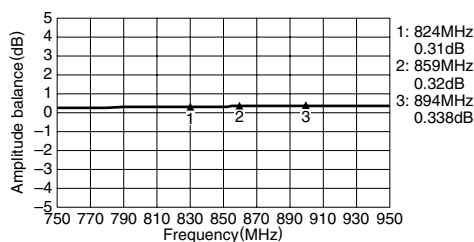
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

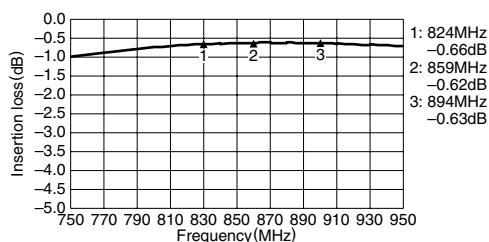
#### RETURN LOSS



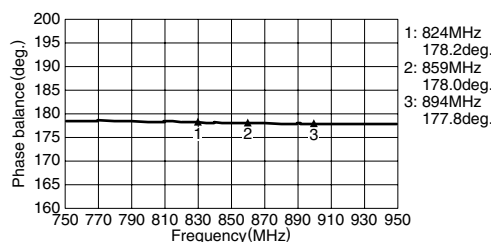
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

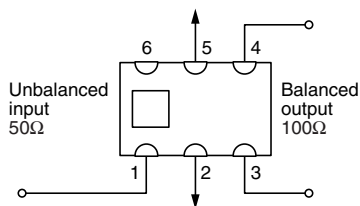
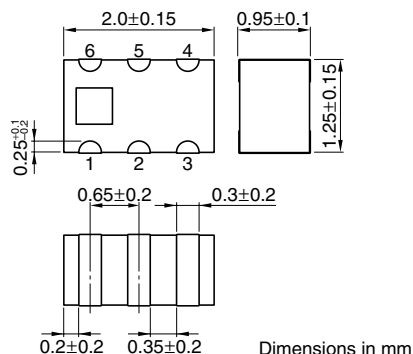


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1570B1 For W-LAN

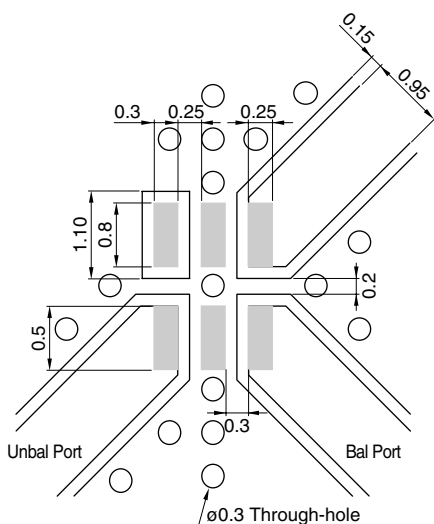
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



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

Dimensions in mm

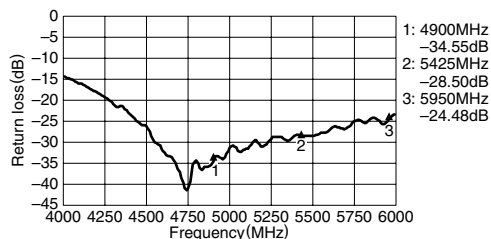
### ELECTRICAL CHARACTERISTICS

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

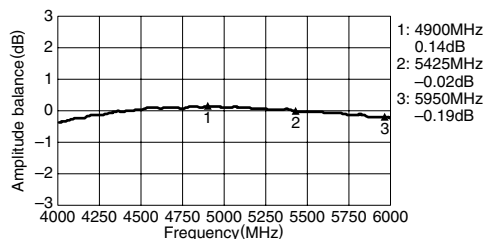
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

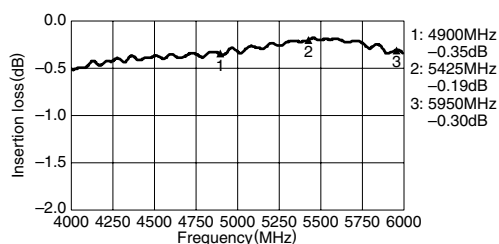
#### RETURN LOSS



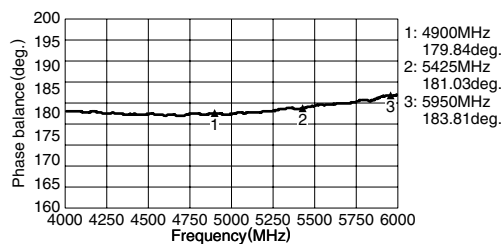
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

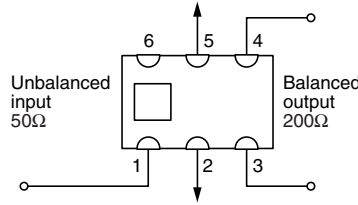
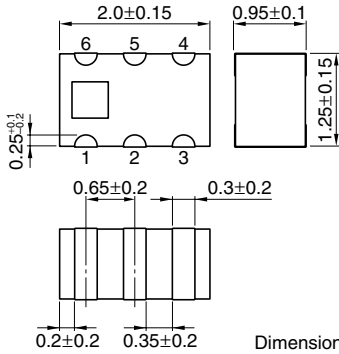


• All specifications are subject to change without notice.

# Multilayer Baluns, HHM Series

## HHM1582A1 For 2218 to 2458MHz

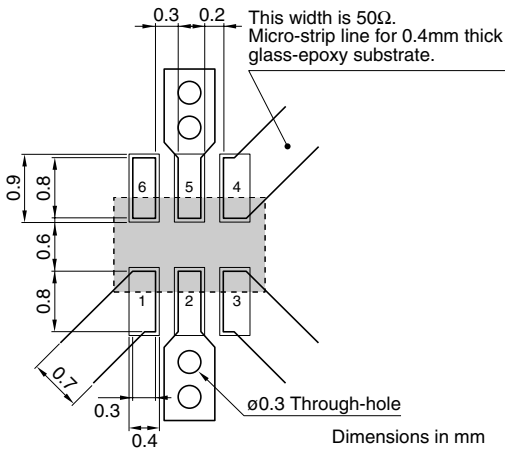
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



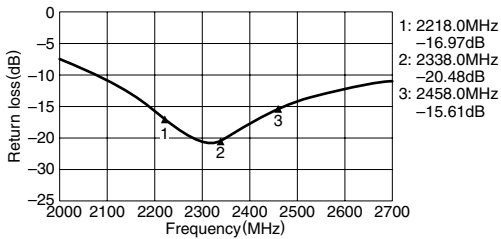
### ELECTRICAL CHARACTERISTICS

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

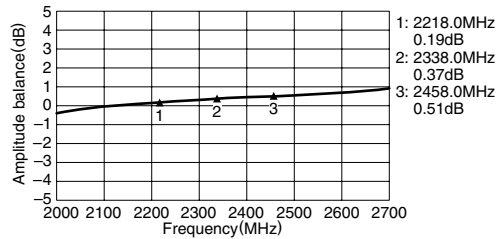
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 200Ω

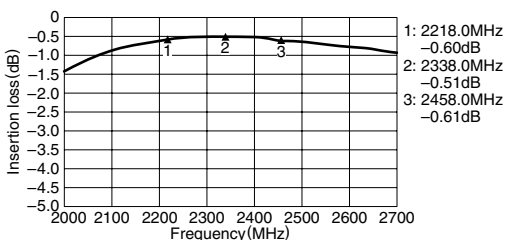
#### RETURN LOSS



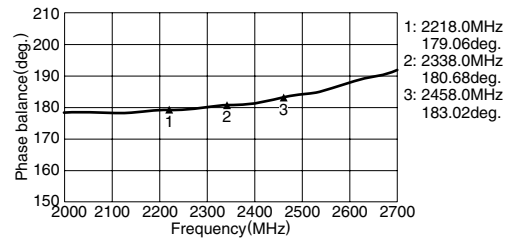
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE

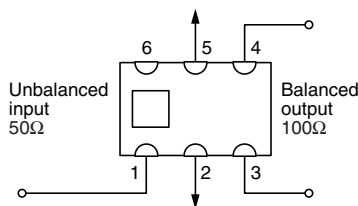
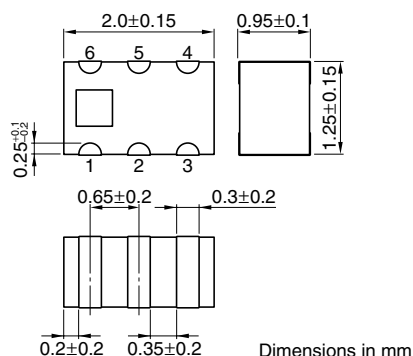


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# Multilayer Baluns, HHM Series

## HHM1583B1 For UWB

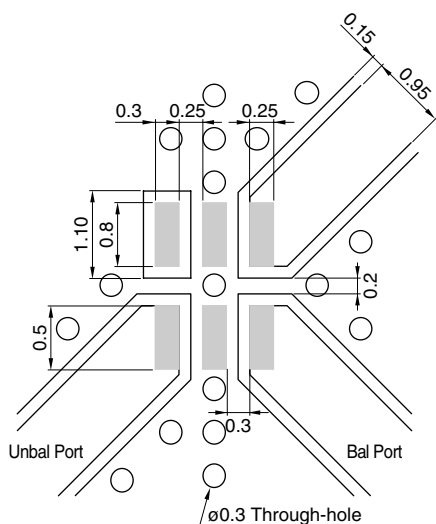
### SHAPES AND DIMENSIONS/CIRCUIT



### TERMINAL FUNCTIONS

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

### RECOMMENDED PCB PATTERN



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

Dimensions in mm

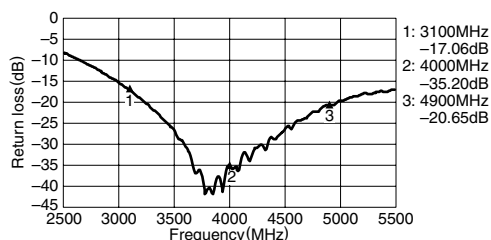
### ELECTRICAL CHARACTERISTICS

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

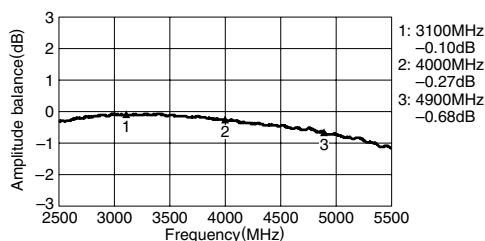
### FREQUENCY CHARACTERISTICS

Unbalance 50Ω/Balance 100Ω

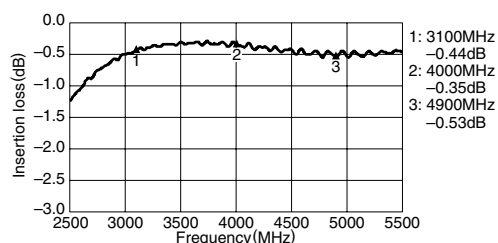
#### RETURN LOSS



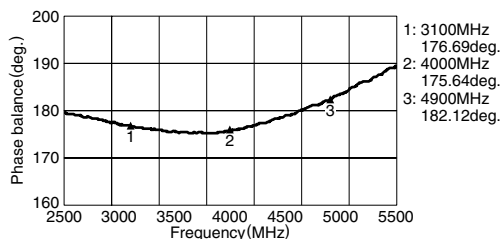
#### AMPLITUDE BALANCE



#### INSERTION LOSS



#### PHASE BALANCE



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