

# MHC0900M03

## 3dB 90° Hybrid Coupler



### APPLICATIONS

1. Low Insertion Loss For Precision GNSS Antenna
2. PCS/DCS
3. Balanced Amplifiers
4. Small Cell & Pico



### Features

1. Low Insertion Loss 0.3dB typ based on PTFE.
2. High Isolation, 25 dB typ.
3. Compliance (Pb-Free) & Small Size 6.35 X 5.08 X 1.5mm<sup>3</sup>
4. Excellent high-power capacity up to average 30 watts
5. RoHS compliance (Pb-Free)

Size 6.35 X 5.08

### Description

The MHC0900M03 is a low cost, high performance 3 dB coupler in an easy use surface mount package. The MHC0900M03 is ideal for balanced power and low noise amplifiers, plus signal distribution and other applications where low insertion loss and tight amplitude and phase balance are required. MHC0900M03 is constructed from ceramic filled PTFE composites which possess excellent electrical and mechanical stability. All components are 100% RF tested.

### Characteristics

Table 1. MHC0900M03 Characteristics

| Item            | Min.  | Type.@25°C | Max.     | Unit    |
|-----------------|-------|------------|----------|---------|
| Frequency Range | 700   |            | 1100 MHz |         |
| Isolation       | 18    | 25         |          | dB      |
| Insertion Loss  |       | 0.35       | 0.6      | dB      |
| Phase Unbalance | -3    | 2          | +3       | degrees |
| Amplitude       | -0.35 | 0.2        | +0.35    | dB      |
| VSWR (:1)       |       | 1.20       | 1.35     | :1      |
| Operating Temp. | -55   |            | +105     | °C      |
| Power           |       |            | 30       | W       |

1) All the above data are based on specified demo board and tested in 25° environment.

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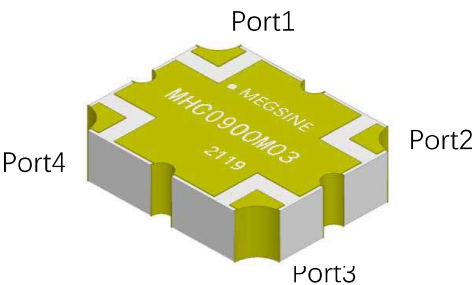
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### PORT CONFIGURATIONS

Figure 1. MHC0900M03 (Top View)



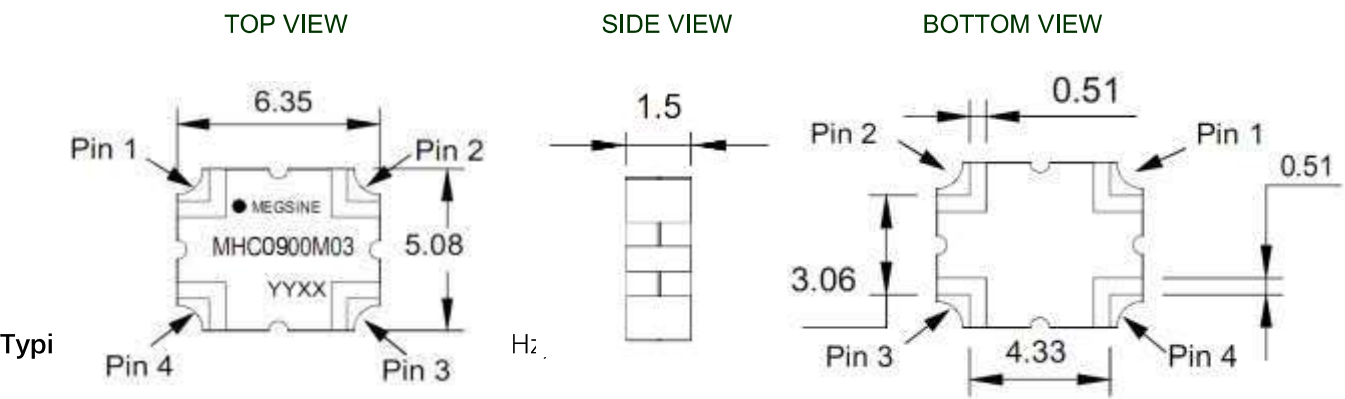
The MHC0900M03 port configurations depending on how input signals are split. The Case 1, Case 2, Case 3, and Case 4 configurations mean that one input signal is split into two output signals. When port 1 is defined, the other ports are defined automatically

Table 2. MHC0900M03 Port Configurations

| Configuration | Port 1            | Port 2            | Port 3            | Port 4            |
|---------------|-------------------|-------------------|-------------------|-------------------|
| Case1.        | Input             | Isolated          | Output -3dB, -90° | Coupling -3dB, 0° |
| Case2.        | Isolated          | Input             | Coupling -3dB, 0° | Output -3dB, -90° |
| Case3.        | Output -3dB, -90° | Coupling -3dB, 0° | Input             | Isolated          |
| Case4.        | Coupling -3dB, 0° | Output -3dB, -90° | Isolated          | Input             |

### Outline Drawing

Figure 2. MHC0900M03 Outline      Unit: mm



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Figure 3. MHC0900M03 Coupling & Transmission

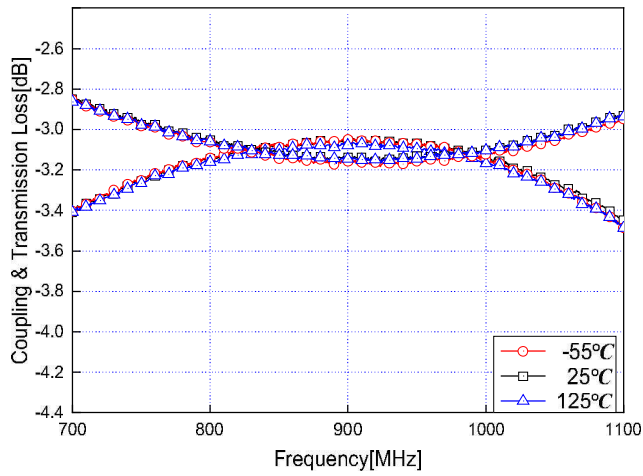


Figure 4. MHC0900M03 Port1 Return Loss

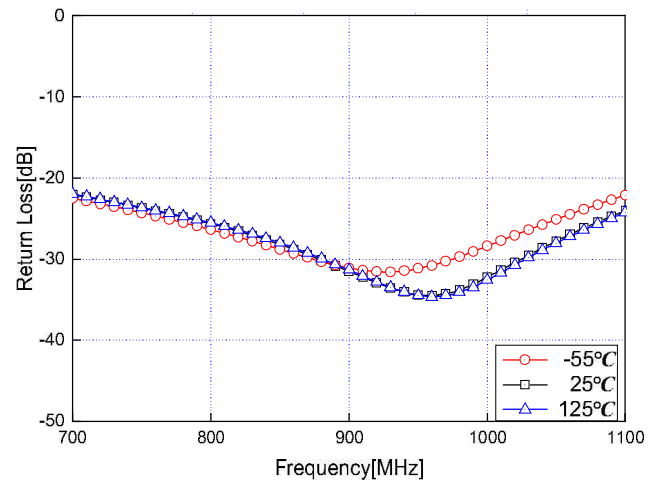


Figure 5. MHC0900M03 Port2 Return Loss

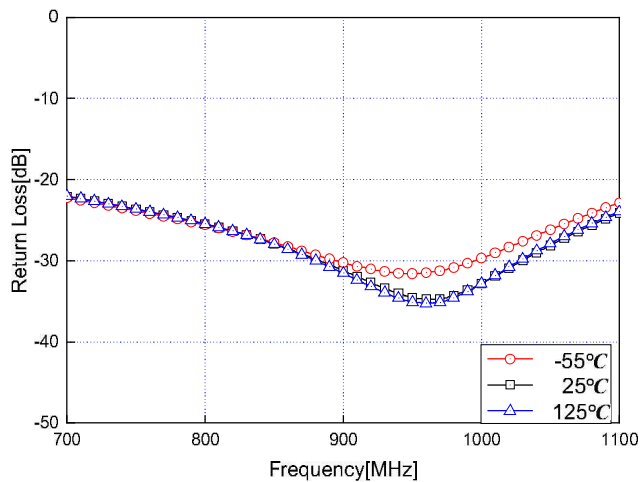
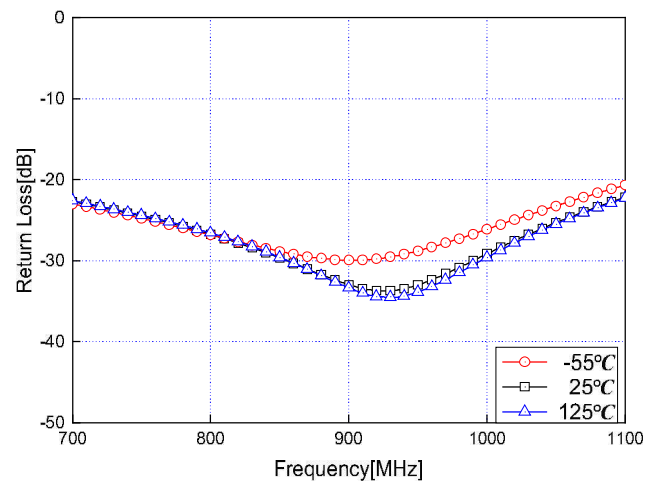


Figure 6. MHC0900M03 Port3 Return Loss



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Figure7. MHC0900M03 Port4 Return Loss

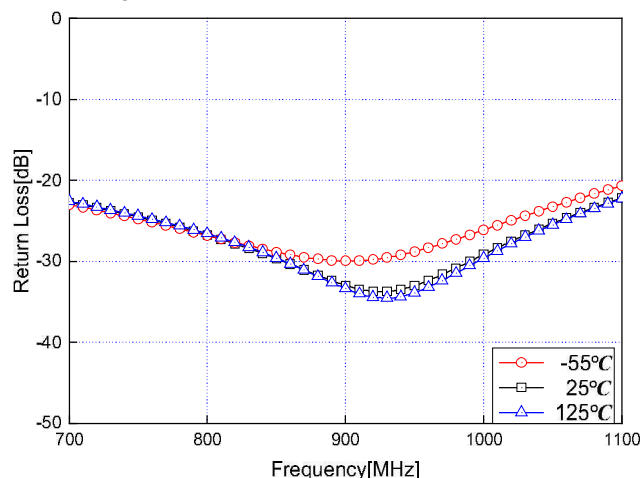
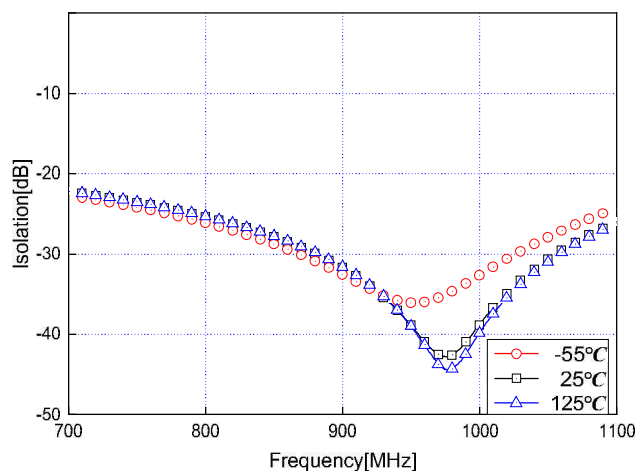


Figure 8. MHC0900M03 Isolation



### Characteristics

Table 3. Mathematical Formula for the MHC0900M03 Parameters

| Parameter                             | Definition                                                                                             | Mathematical Representation                                                                                              |
|---------------------------------------|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| VSWR<br>(Voltage Standing Wave Ratio) | The impedance match of the coupler to a 50W system. A VSWR of 1:1 is optimal.                          | $VSWR = \frac{V_{max}}{V_{min}}$<br>Vmax = voltage maxima of a standing wave<br>Vmin = voltage minima of a standing wave |
| Return Loss                           | The impedance match of the coupler to a 50W system. Return Loss is an alternate means to express VSWR. | $Return\ Loss\ (dB) = 20\log\frac{VSWR+1}{VSWR-1}$                                                                       |
| Insertion Loss                        | The input power divided by the sum of the power at the two output ports.                               | $Insertion\ Loss(dB) = 10\log\frac{P_{in}}{P_{cp1}+P_{transmission}}$                                                    |
| Isolation                             | The input power divided by the power at the isolated port.                                             | $Isolation(dB) = 10\log\frac{P_{in}}{P_{iso}}$                                                                           |
| Phase Balance                         | The difference in phase angle between the two output ports.                                            | Phase at coupled port – Phase at transmission port                                                                       |
| Amplitude Balance                     | The power at each output divided by the average power of the two outputs.                              | $10\log\frac{P_{cp1}}{P_{cp1}+P_{transmission}}$ and $10\log\frac{P_{transmission}}{P_{cp1}+P_{transmission}}$           |

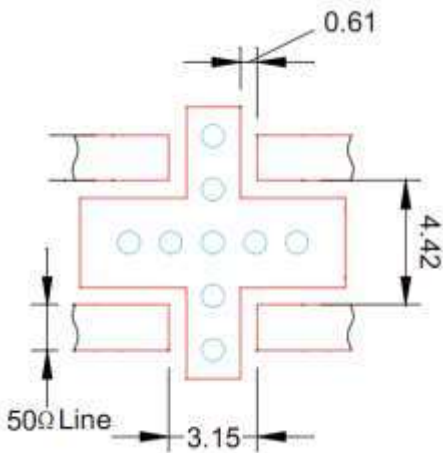
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Figure 9. Recommended PCB Layout and Solder Mask Pattern



### REFLOW PROFILE

Figure 10. Thermal Reflow Profile

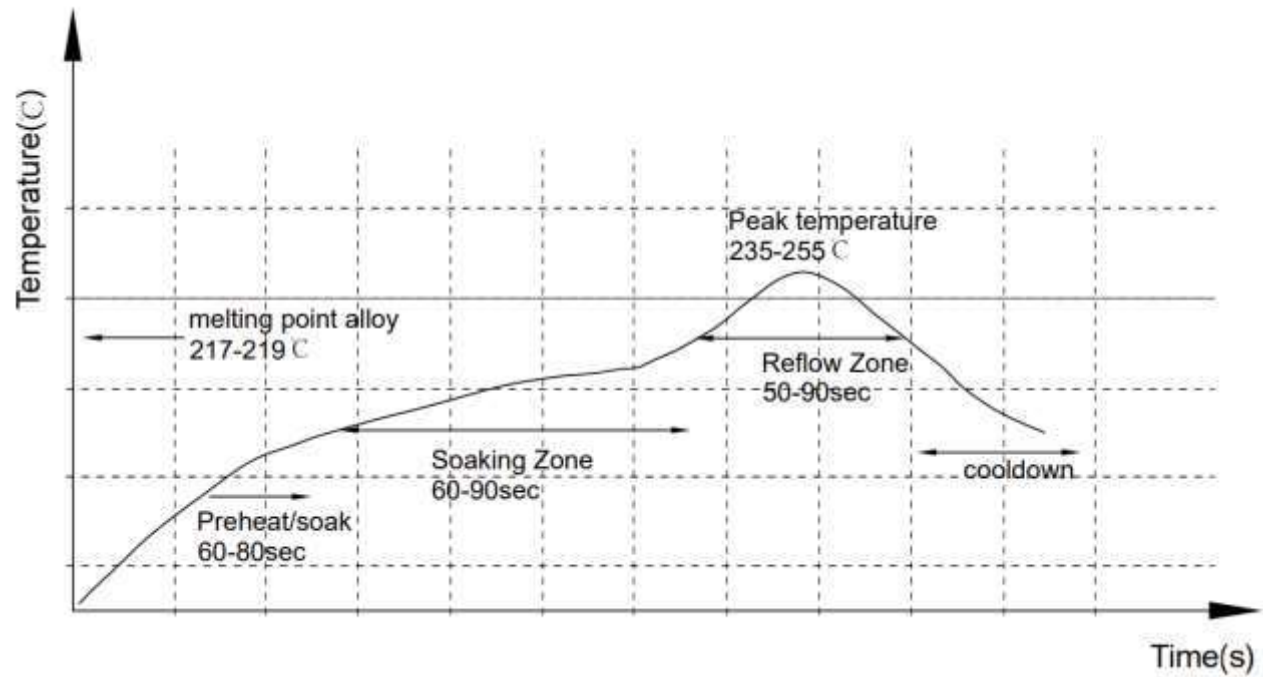


Table4. Thermal Reflow Profile

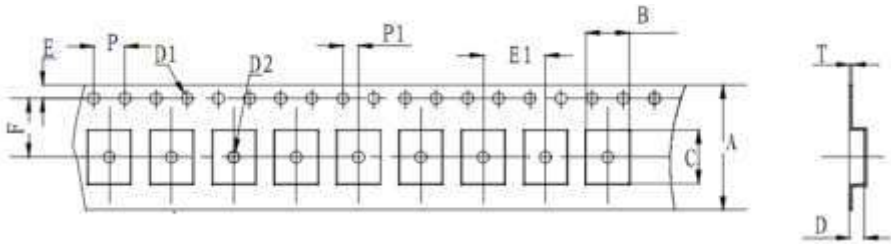
|                 | Ramp Up    | Pre-Heating  | Peak       | Soaking     |
|-----------------|------------|--------------|------------|-------------|
| Temperature(°C) | T1:160±5°C | T2:180±5°C   | T4:260±5°C | T3:230±5°C  |
| Time(sec)       | t1:60±5sec | t2:100±15sec | t3:30±5sec | t4:60±10sec |

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### Packaging and Ordering Information



| ITEM    | A    | B    | C    | D    | E    | F    | E1   | D1   | D2   | P    | P1   | T     | 7"      |
|---------|------|------|------|------|------|------|------|------|------|------|------|-------|---------|
| DIM(mm) | 16.0 | 5.50 | 6.80 | 1.90 | 8.00 | 7.50 | 1.75 | 1.50 | 1.50 | 4.00 | 2.00 | 0.30  | P/R     |
| TOLE    | +0.3 | +0.1 | +0.1 | +0.1 | +0.1 | +0.1 | +0.1 | +0.1 | +0.1 | +0.1 | +0.1 | +0.05 | 1000pcs |

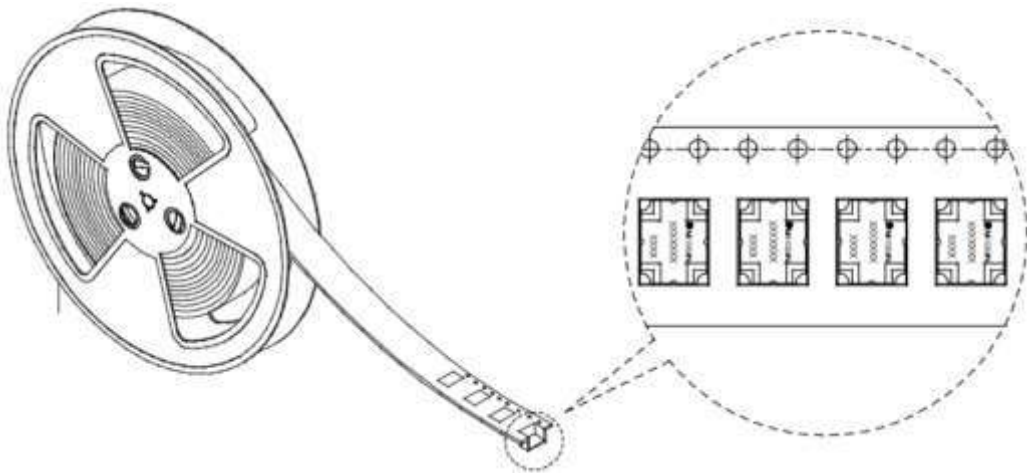
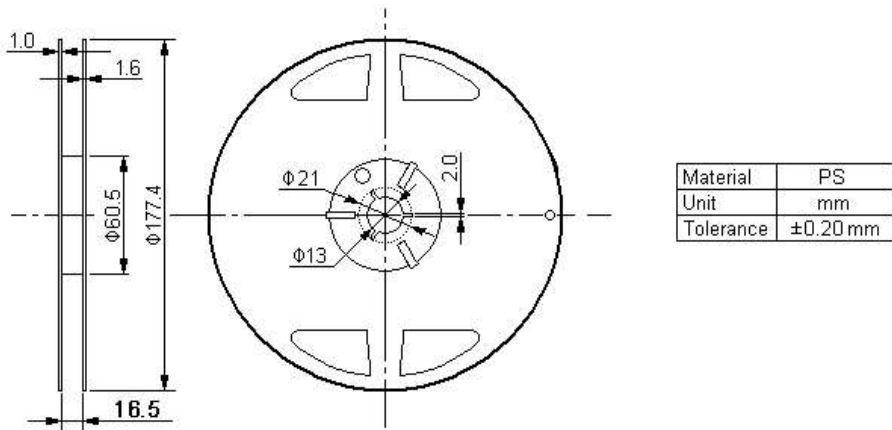


Table4 Packing & Shipping

| Device     | Package | Reel | Shipping  |
|------------|---------|------|-----------|
| MHC0900M03 | SMD     | 7"   | 1000/Reel |

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| Revision | Description | Date     |
|----------|-------------|----------|
| Rev0     | Preliminary | 2022/6/9 |
|          |             |          |
|          |             |          |
|          |             |          |
|          |             |          |
|          |             |          |
|          |             |          |

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