

# MHC2100M03

## 3dB 90° Hybrid Coupler



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### Applications

- 1, Low Insertion Loss For Power Combining
- 2, Doherty Power Amplifier
- 3, Small Cell & Pico
- 4, GNSS Antenna

### Features

- 1, Low Insertion Loss
- 2, High Isolation, 25 dB typ.
- 3, Excellent high-power capacity up to 30W
- 4, RoHS compliance (Pb-Free)
- 5, AEC-Q200 qualified

### Description

The MHC2100M03 is a low cost, high performance 3 dB hybrid coupler in an easy used surface mount package. The MHC2100M03 is ideal for doherty power amplifier, circular polarized antenna and other applications where low insertion loss and tight amplitude and phase balance are required. MHC2100M03 is constructed from ceramic filled PTFE composites which possess excellent electrical and mechanical stability. All components are 100% RF tested.

### Characteristics

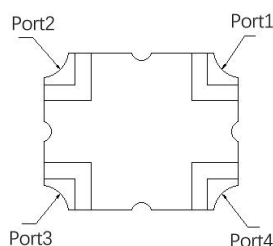
Table 1. MHC2100M03 Characteristics

| Item            | Min.  | Type | Max.  | Unit    |
|-----------------|-------|------|-------|---------|
| Frequency Range | 1700  |      | 2200  | MHz     |
| Isolation       | 24    | -25  | 36    | dB      |
| Insertion Loss  | 0.25  | 0.3  | 0.40  | dB      |
| Phase Unbalance | -3    |      | +3    | degrees |
| Amplitude       | -0.35 | 0.2  | +0.35 | dB      |
| Return Loss     | 22    | 25   |       | dB      |
| Operating Temp. | -55   |      | +125  | °C      |
| Power           |       |      | 30    | W       |

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

### Port Configuration

Figure 1. MHC2100M03 (Bottom View)



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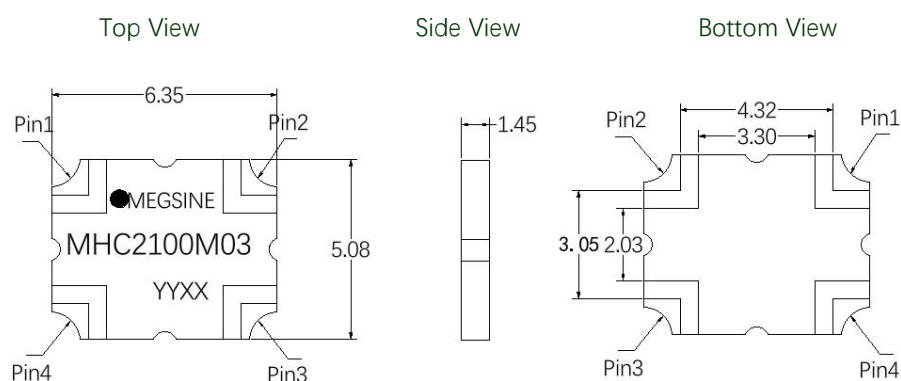
The MHC2100M03 port configurations depending on how input signals are split. The Case 1, Case 2, Case 3, and Case 4, configurations mean that one input signal is split into two output signals. When port 1 is defined, the other ports are defined automatically

Table 2. MHC2100M03 Port Configurations

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

### Outline Drawing

Figure 2. MHC2100M03 Outline Drawing



Unit: mm

### Typical Performance (25°C, 1700-2200 MHz)

Figure 3. MHC2100M03 Coupling

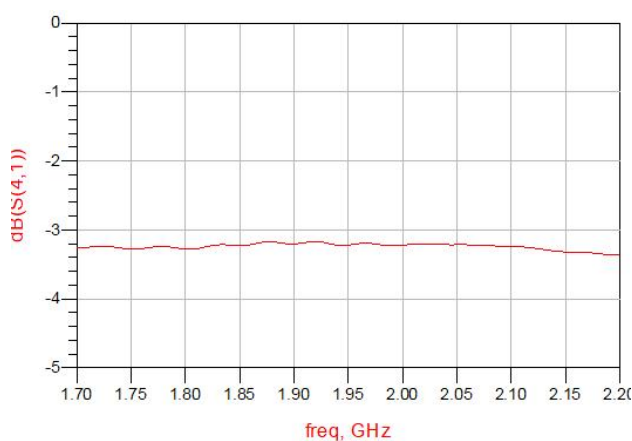
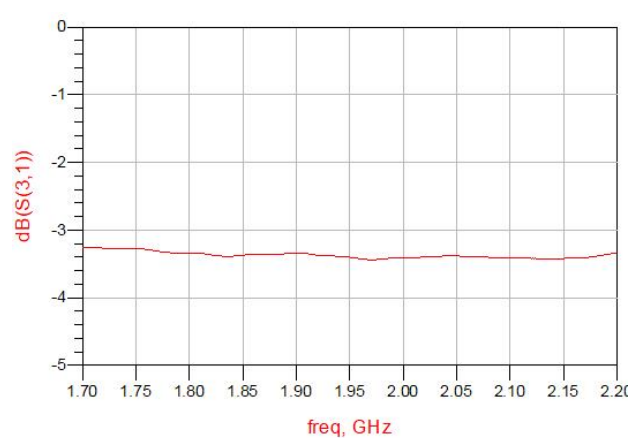


Figure 4. MHC2100M03 Transmission



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Figure 5. MHC2100M03 Return Loss (S11)

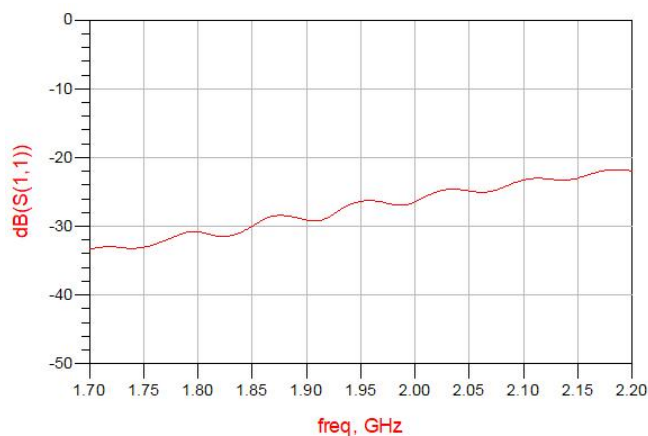


Figure 6. MHC2100M03 Return Loss (S22)

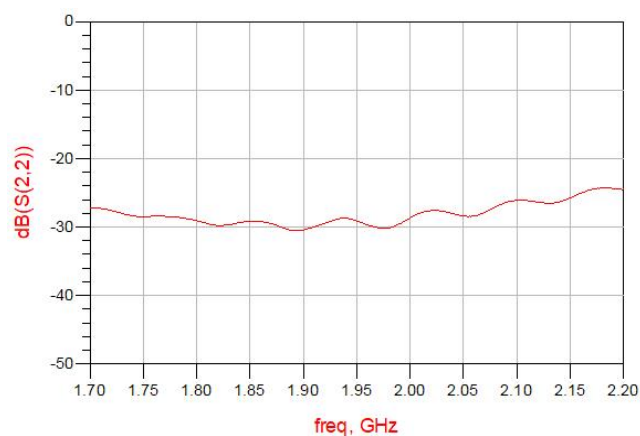


Figure 7. MHC2100M03 Return Loss (S33)

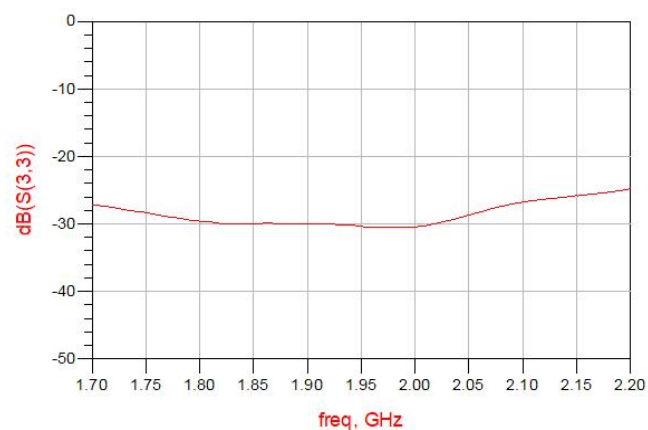


Figure 8. MHC2100M03 Return Loss (S44)

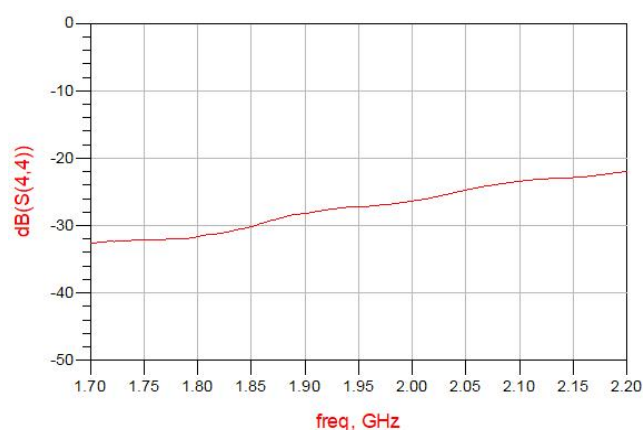


Figure 9. MHC2100M03 Isolation

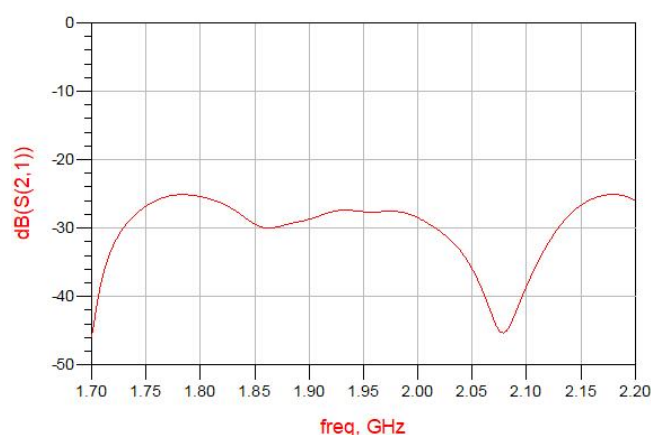
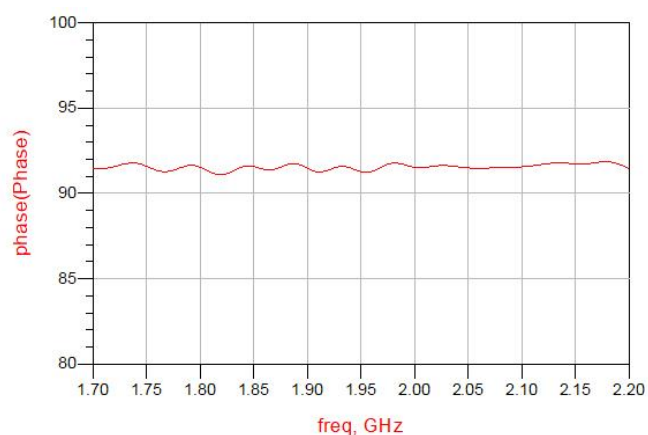


Figure 10. MHC2100M03 Phase



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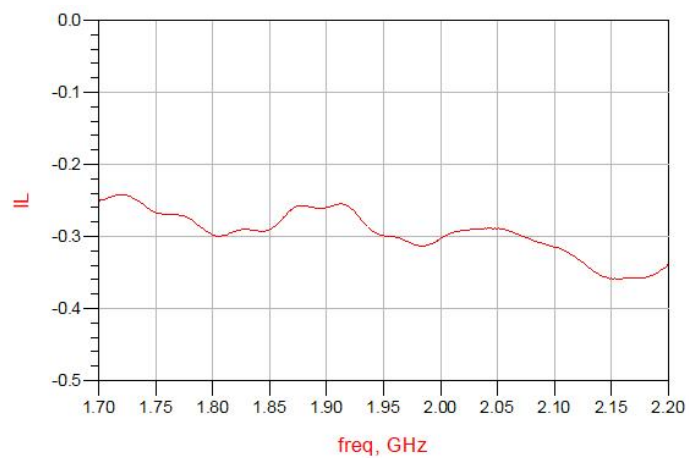
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Figure 11. MHC2100M03 IL



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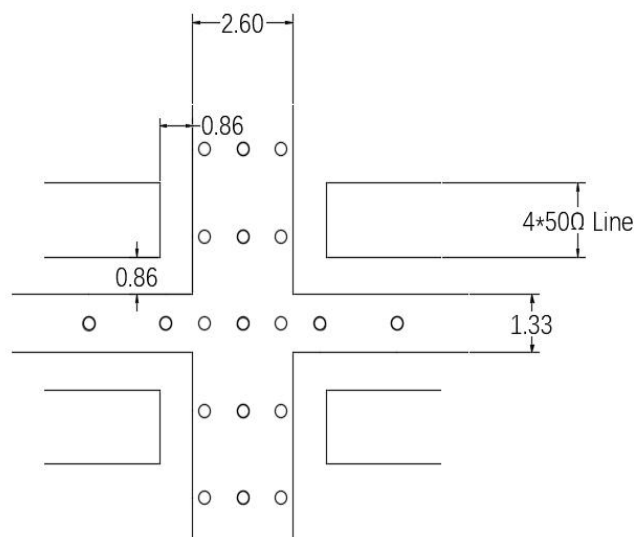
### Definition of Measured Specifications

Table 3. Mathematical Formula for the MHC2100M03 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. | $\text{Return Loss (dB)} = 20 \log \frac{VSWR+1}{VSWR-1}$                                                                                         |
| Insertion Loss                        | The input power divided by the sum of the power at the two output ports.                               | $\text{Insertion Loss(dB)} = 10 \log \frac{P_{in}}{P_{cp1} + P_{transmission}}$                                                                   |
| Isolation                             | The input power divided by the power at the isolated port.                                             | $\text{Isolation(dB)} = 10 \log \frac{P_{in}}{P_{iso}}$                                                                                           |
| 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.                              | $10 \log \frac{P_{cp1}}{\frac{P_{cp1} + P_{transmission}}{2}} \text{ and } 10 \log \frac{P_{transmission}}{\frac{P_{cp1} + P_{transmission}}{2}}$ |

### Recommended PCB Layout

Figure 12. Recommended PCB Layout



50Ω Line mm/inch

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# MHC2100M03

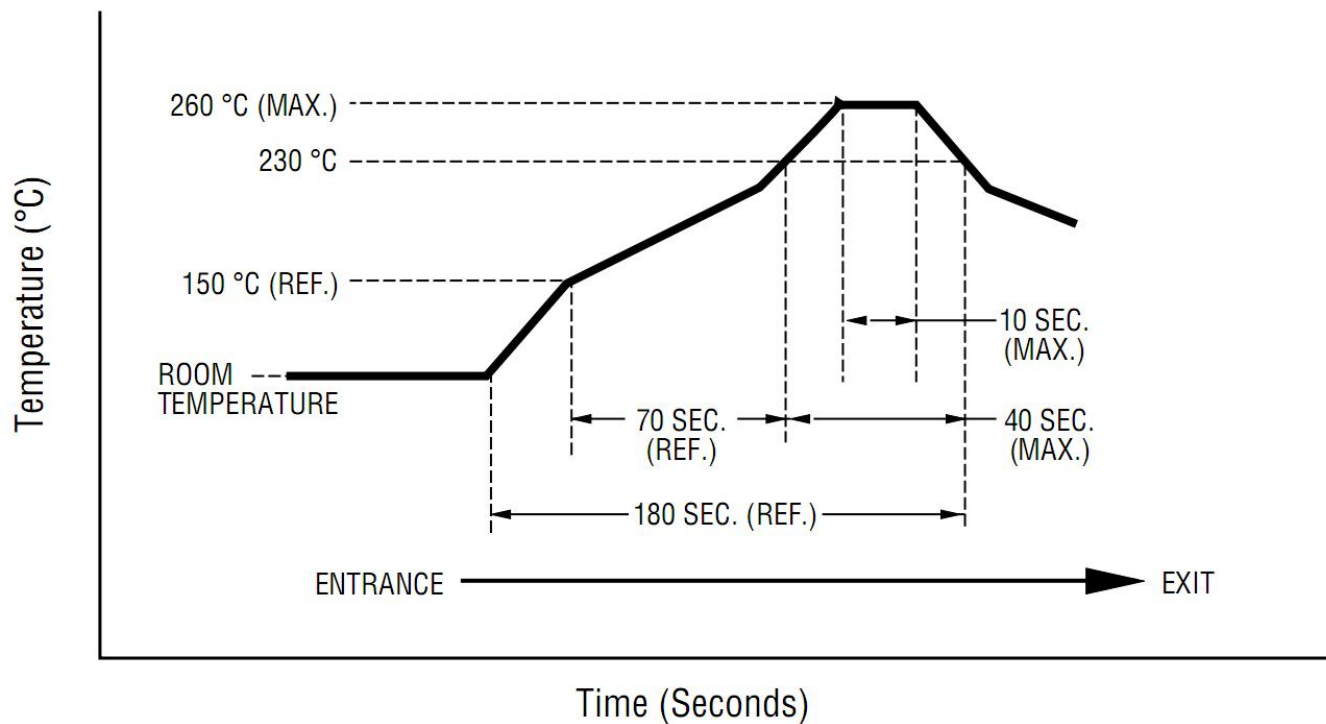
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### Reflow Profile

Figure 13. MHC2100M03 Thermal Reflow Profile



### Packaging and Ordering Information

Table 4. MHC2100M03 Ordering Information

| Device     | Package     | Reel | Shipping  |
|------------|-------------|------|-----------|
| MHC2100M03 | 6.35*5.08mm | 7"   | 1000 Reel |

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| Revision | Description | Date      |
|----------|-------------|-----------|
| Rev0     | Preliminary | 2023/5/29 |
| Rev1     | Update      | 2026/9/10 |
|          |             |           |
|          |             |           |

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