MHC1400C03L

3dB 90° Directional Coupler

MiPD

MEGSINE兆讯

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, 20 dB typ.
3，Excellent high-power capacity up to 30W
4，RoHS compliance (Pb-Free)

Description

The MHC1400C03L is a low cost, high performance 3 dB hybrid coupler in an easy used surface mount package. The MHC1400C03L is ideal for doherty power amplifier, circular polarized antenna and other applications where low insertion loss and tight amplitude and phase balance are required. MHC1400C03L is constructed from ceramic filled PTFE composites which possess excellent electrical and mechanical stability. All components are 100% RF tested.

Characteristics

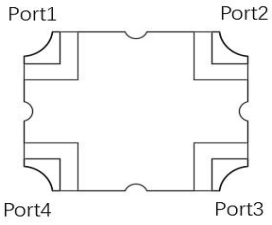
Table 1. MHC1400C03L Characteristics

Item	Min.	Type	Max.	Unit
Frequency Range	1150		1650	MHz
Isolation	20	23		dB
Insertion Loss		0.3	0.4	dB
Phase Unbalance	-3		+3	degrees
Amplitude	-0.5		+0.5	dB
Return Loss	20	23		dB
Operating Temp.	-55		+105	°C
Power			30	W

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

Port Configuration

Figure 1. MHC1400C03L (Bottom View)



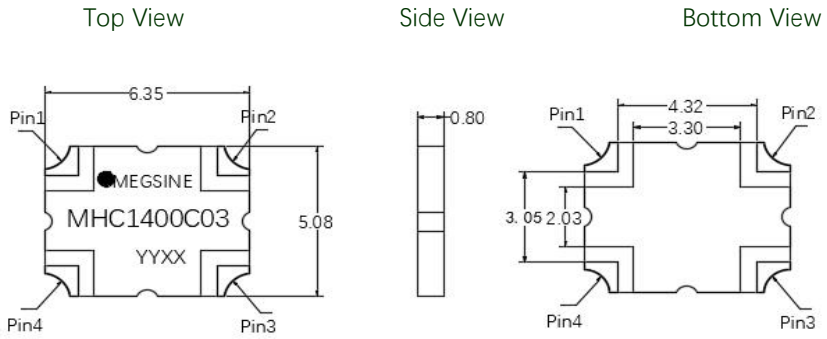
The MHC1400C03L port configurations depending on how input signals are split. The Case 1, Case 2, Case 3, and Case 4, configurations mean that one input signal is split into two output signals. When port 1 is defined, the other ports are defined automatically

Table 2. MHC1400C03L 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. MHC1400C03L Outline Drawing



Unit: mm

Typical Performance (25°C, 1150-1650 MHz)

Figure 3. MHC1400C03L Coupling

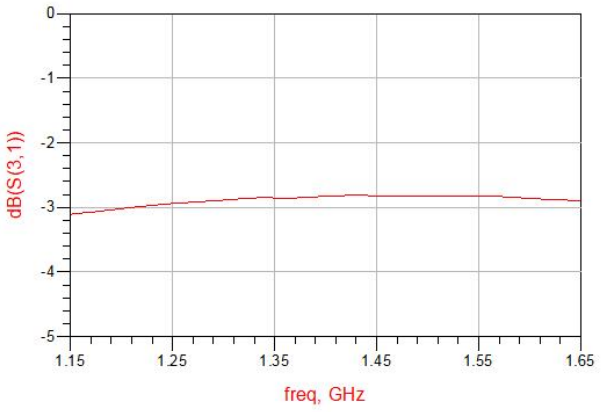


Figure 4. MHC1400C03L Transmission

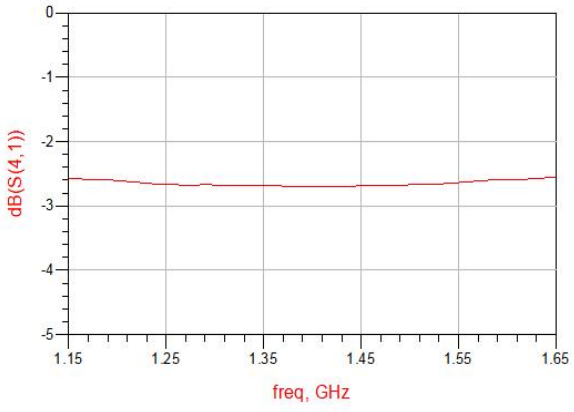


Figure 5. MHC1400C03L Return Loss (S11)

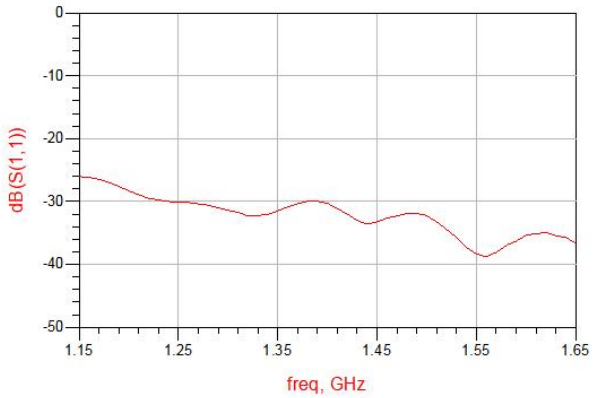


Figure 6. MHC1400C03L Return Loss (S22)

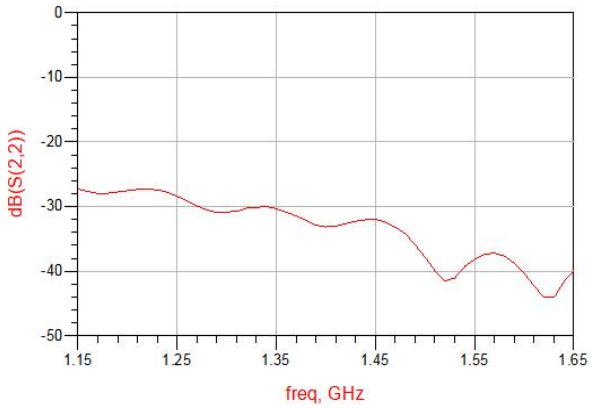


Figure 7. MHC1400C03L Return Loss (S33)

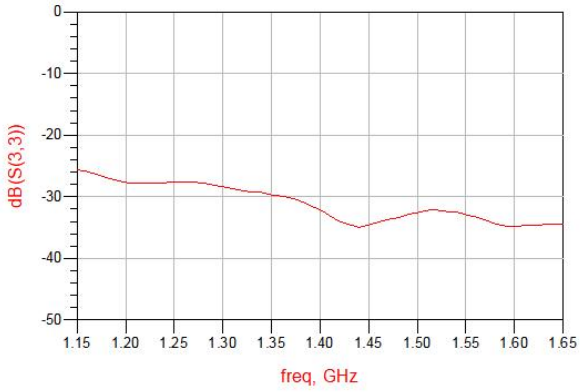


Figure 8. MHC1400C03L Return Loss (S44)

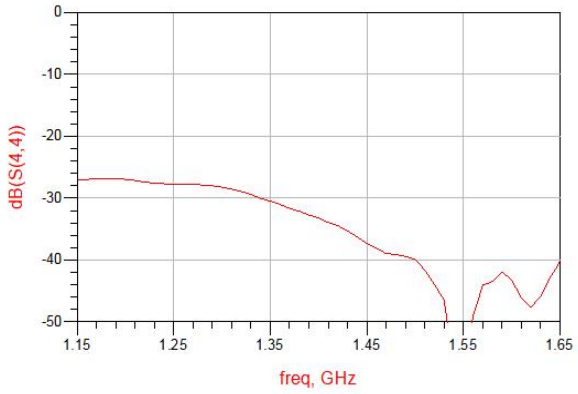


Figure 9. MHC1400C03L Isolation

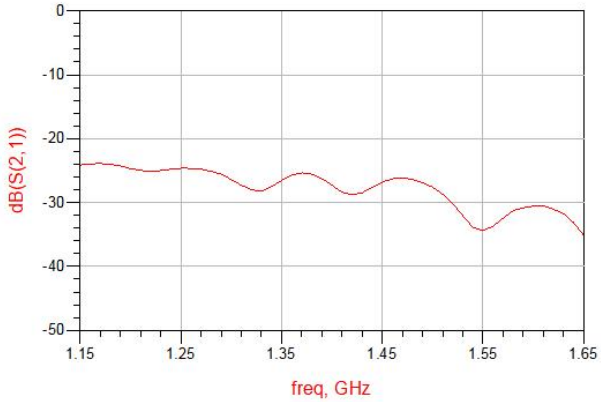


Figure 10. MHC1400C03L Phase

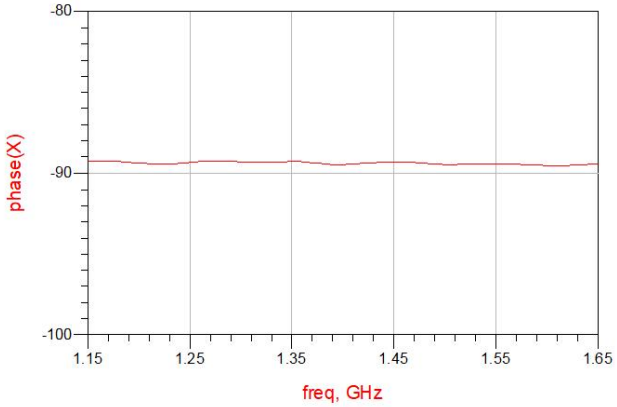
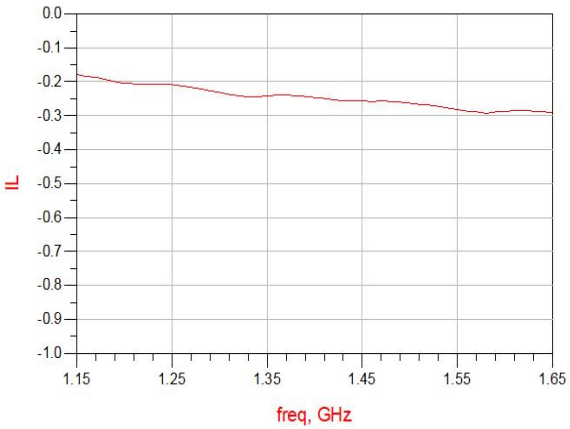


Figure 10. MHC1400C03L IL



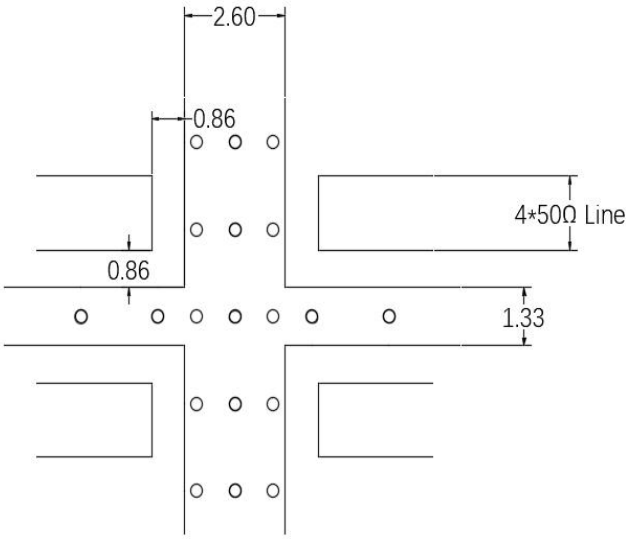
Definition of Measured Specifications

Table 3. Mathematical Formula for the MHC1400C03L Parameters

Parameter	Definition	Mathematical Representation
VSWR (Voltage Standing Wave Ratio)	The impedance match of the coupler to a 50W system. A VSWR of 1:1 is optimal.	$VSWR = \frac{V_{max}}{V_{min}}$ Vmax = voltage maxima of a standing wave 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 transmisson port
Amplitude Balance	The power at each output divided by the average power of the two outputs.	$10\log\frac{P_{cp1}}{\frac{P_{cp1}+P_{transmission}}{2}}$ and $10\log\frac{P_{transmission}}{\frac{P_{cp1}+P_{transmission}}{2}}$

Recommended PCB Layout

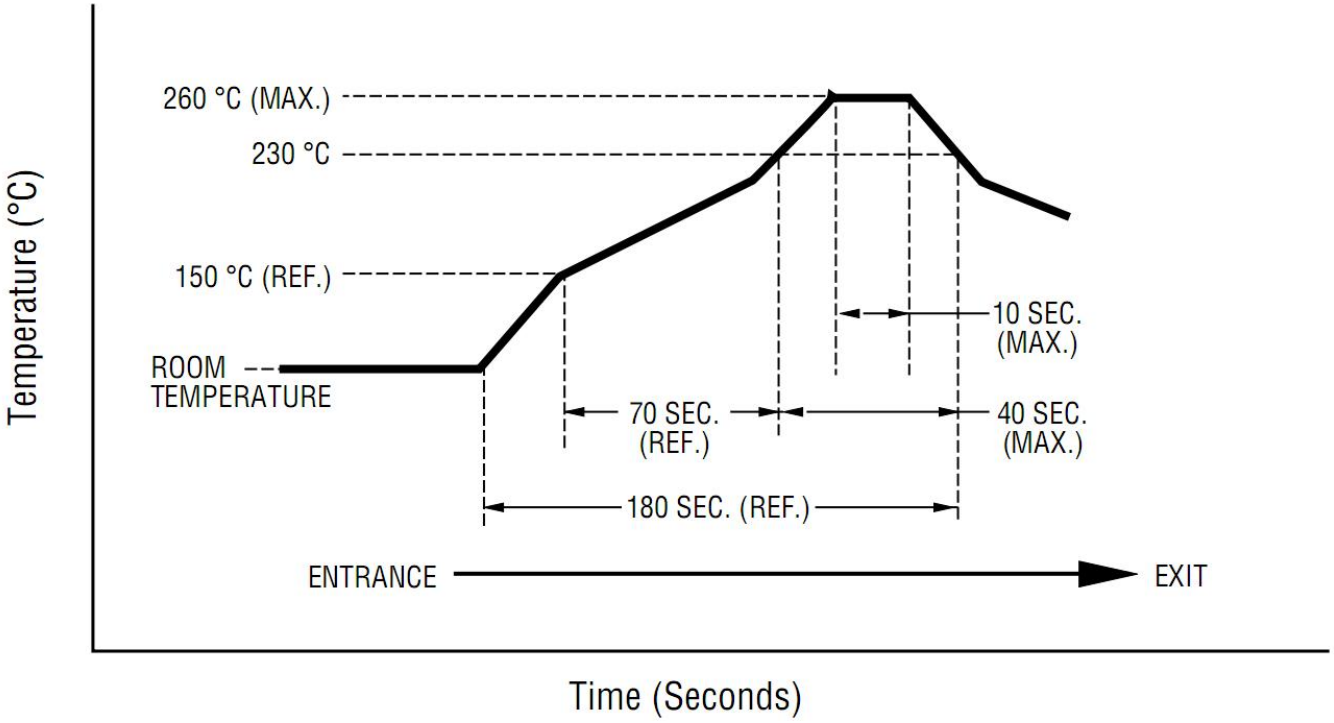
Figure 11. Recommended PCB Layout



50Ω Line mm/inch

Reflow Profile

Figure 12. MHC1400C03L Thermal Reflow Profile



Packaging and Ordering Information

Table 4. MHC1400C03L Ordering Information

Device	Package	Reel	Shipping
MHC1400C03L	6.35*5.08mm	7''	1000 Reel

Revison	Description	Date
Rev0	Preliminary	2024/2/26
Rev1	Update	2025/7/31
Rev2	Update	2025/8/4