

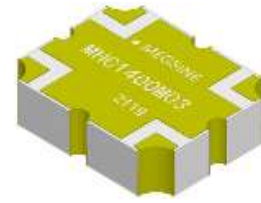
MHC1400M03

3dB 90° Hybrid Coupler



APPLICATIONS

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



Size 6.35 X 5.08

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 1.5mm³
4. Excellent high-power capacity up to average 30 watts
5. RoHS compliance (Pb-Free)
6. AEC-Q200 qualified

Description

The MHC1400M03 is a low cost, high performance 3 dB coupler in an easy use surface mount package. The MHC1400M03 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. MHC1400M03 is constructed from ceramic filled PTFE composites which possess excellent electrical and mechanical stability. All components are 100% RF tested.

Characteristics

Table 1. MHC1400M03 Characteristics

Item	Min.	Type.@25°C	Max.	Unit
Frequency Range	1150		1650	MHz
Isolation	18	25		dB
Insertion Loss		0.3	0.65	dB
Phase Unbalance	-3	±1	+3	degrees
Amplitude	-0.35	0.2	+0.35	dB
VSWR (:1)		1.15	1.30	:1
Operating Temp.	-55		+125	°C
Power			30	W

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

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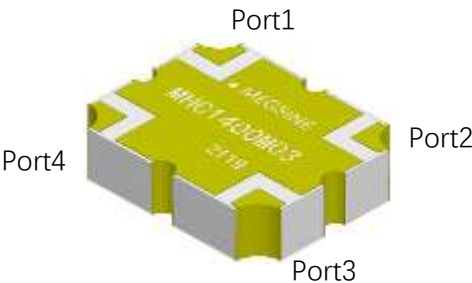
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PORT CONFIGURATIONS

Figure 1. MHC1400M03 (Top View)



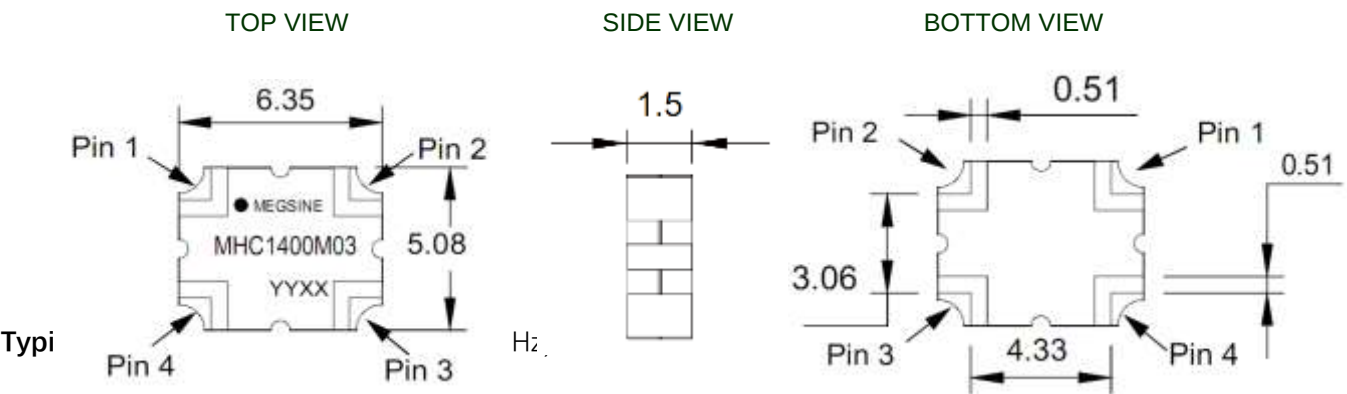
The MHC1400M03 port configurations depending on how input signals are split. The Case 1, Case 2, Case 3, and Case 4 configurations mean that one input signal is split into two output signals. When port 1 is defined, the other ports are defined automatically

Table 2. MHC1400M03 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. MHC1400M03 Outline Unit: mm



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Figure 3. MHC1400M03 Coupling & Transmission

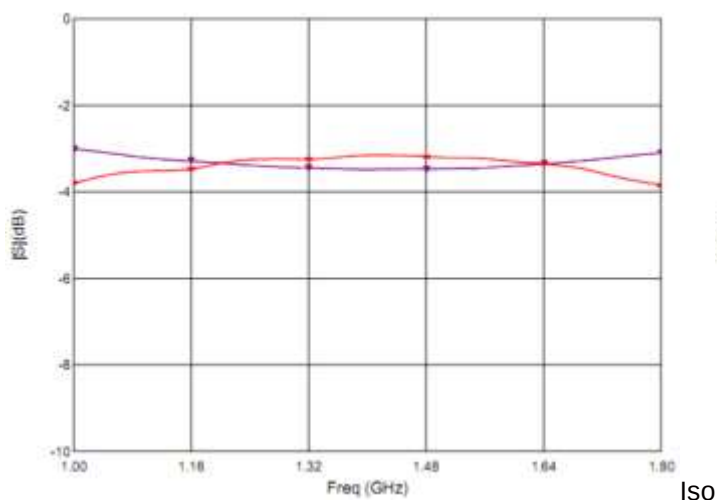


Figure 4. MHC1400M03 Port1 Return Loss

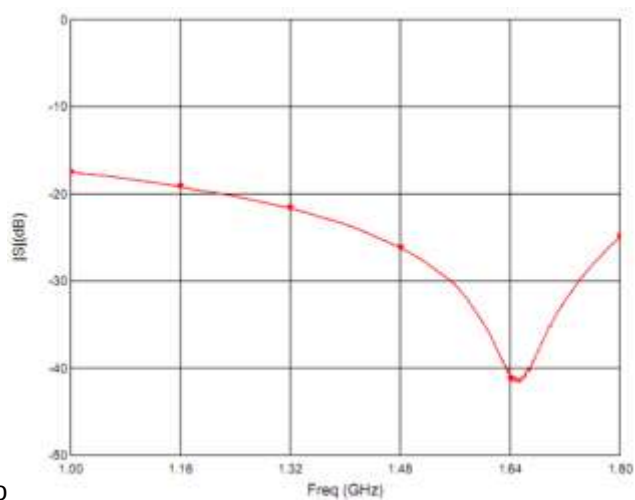


Figure 5. MHC1400M03 Port2 Return Loss

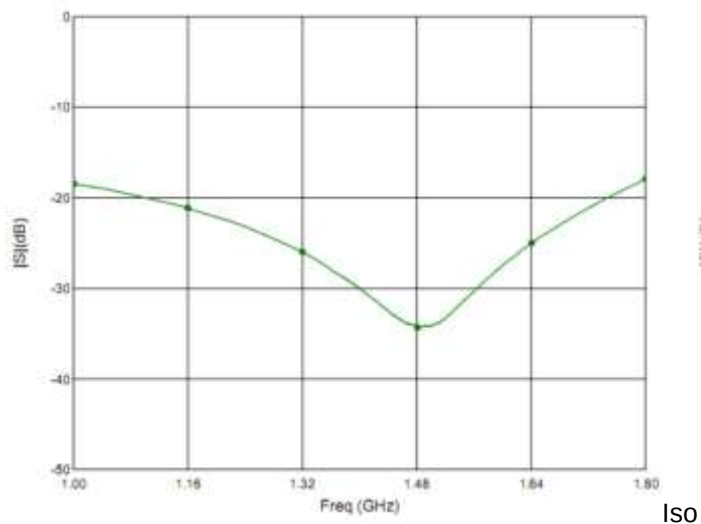
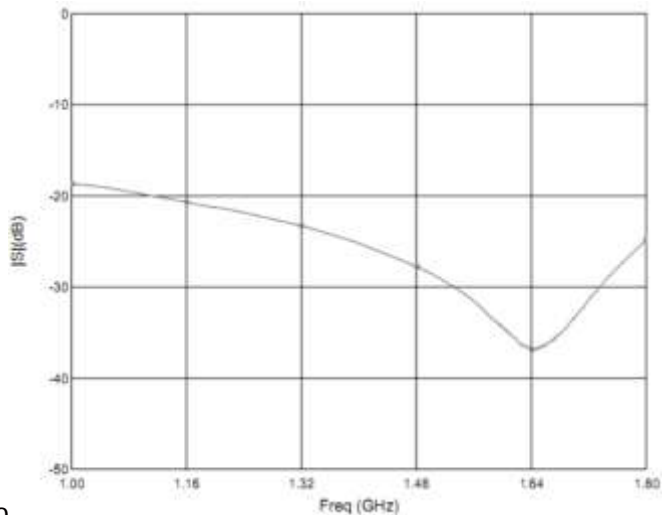


Figure 6. MHC1400M03 Port3 Return Loss



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Figure7. MHC1400M03 Port4 Return Loss

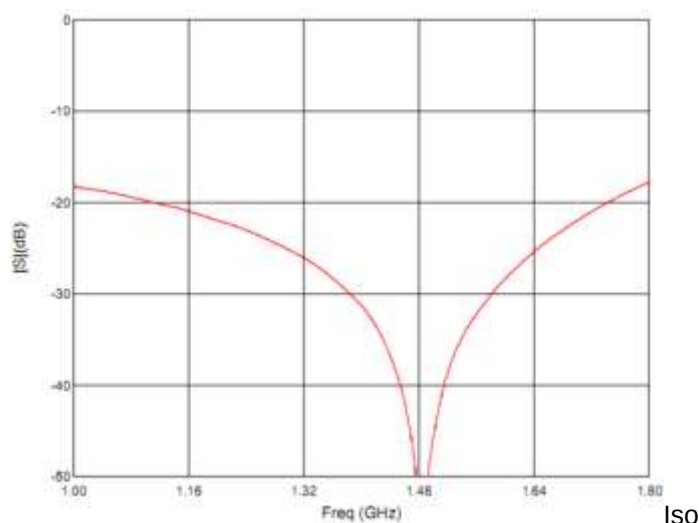
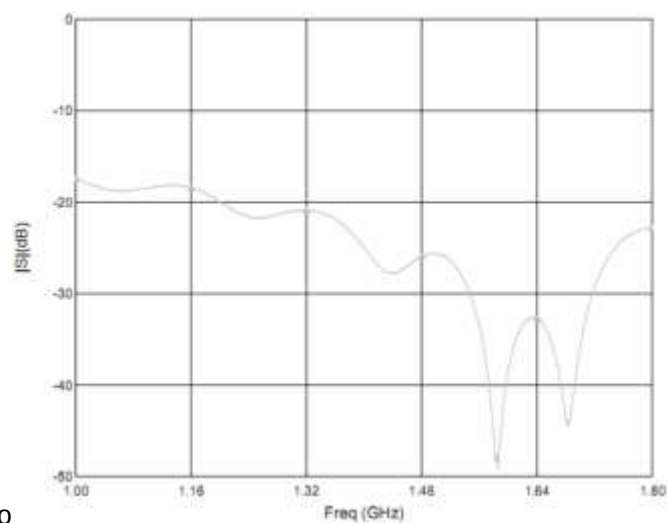


Figure 8. MHC1400M03 Isolation



Characteristics

Table 3. Mathematical Formula for the CMX03A03 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 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 $10\log\frac{P_{transmission}}{P_{cp1}+P_{transmission}}$

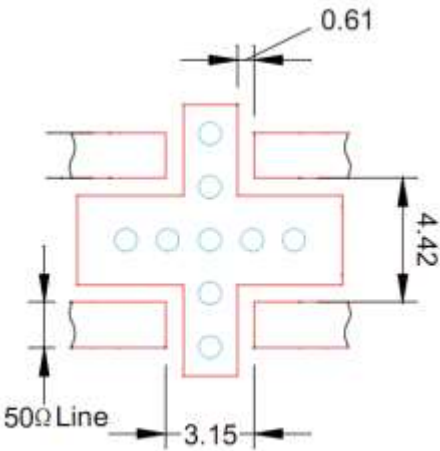
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Figure 9. Recommended PCB Layout and Solder Mask Pattern



REFLOW PROFILE

Figure 10. Thermal Reflow Profile

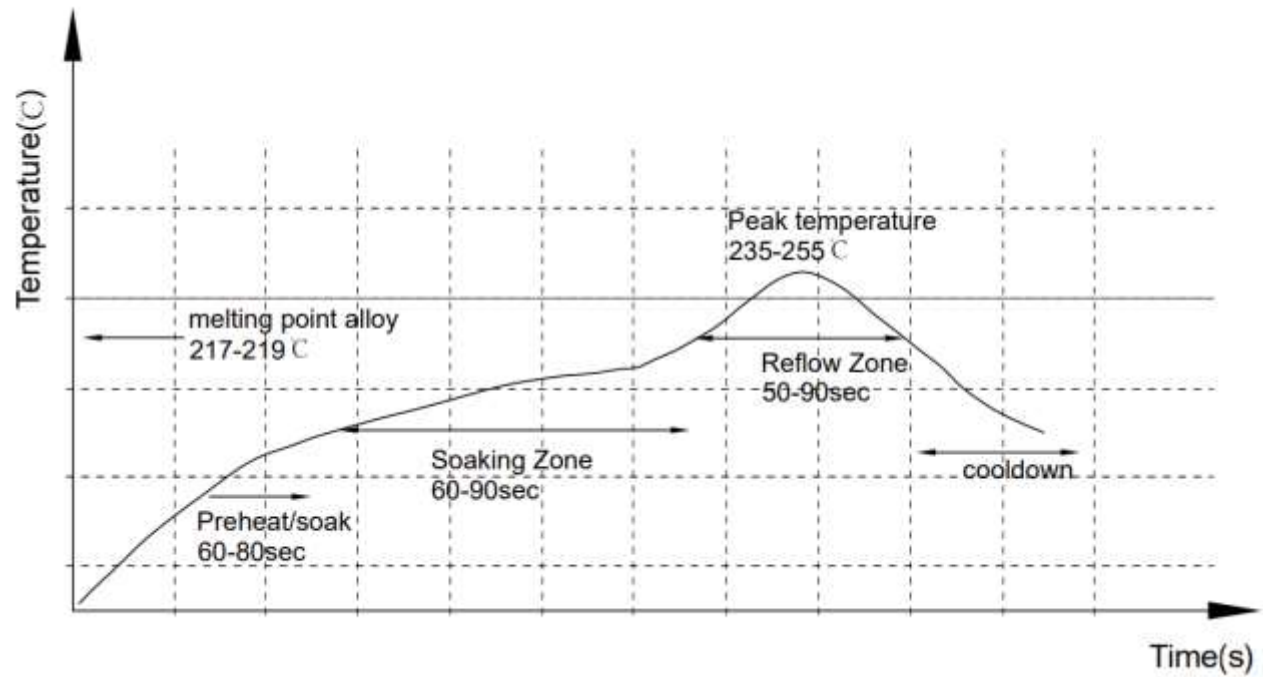


Table4. Thermal Reflow Profile

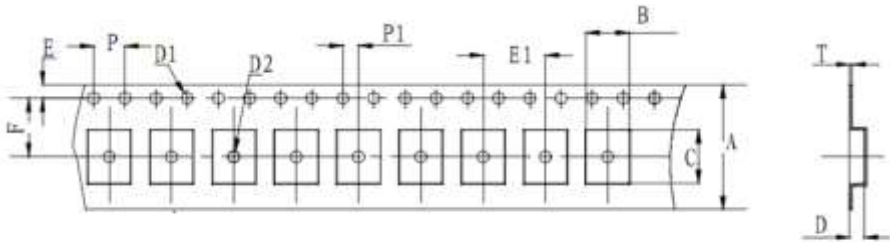
	Ramp Up	Pre-Heating	Peak	Soaking
Temperature(°C)	T1:160±5°C	T2:180±5°C	T4:260±5°C	T3:230±5°C
Time(sec)	t1:60±5sec	t2:100±15sec	t3:30±5sec	t4:60±10sec

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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

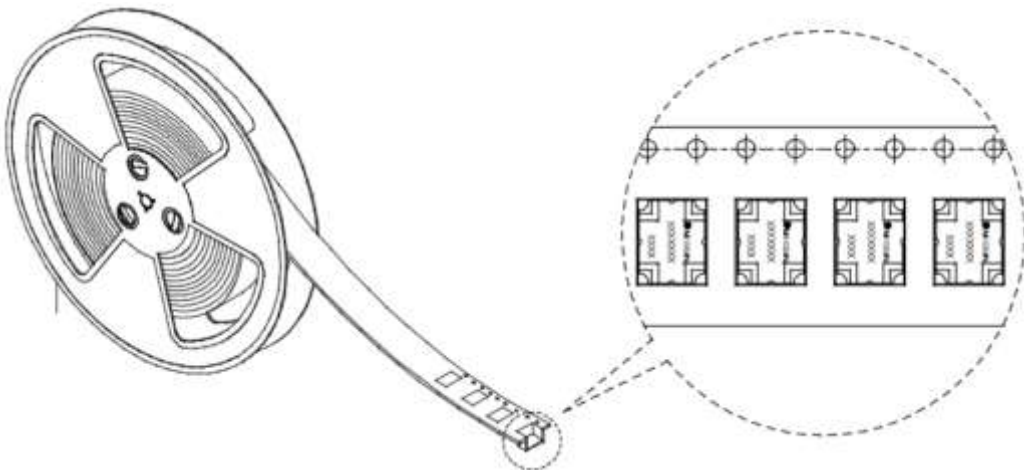
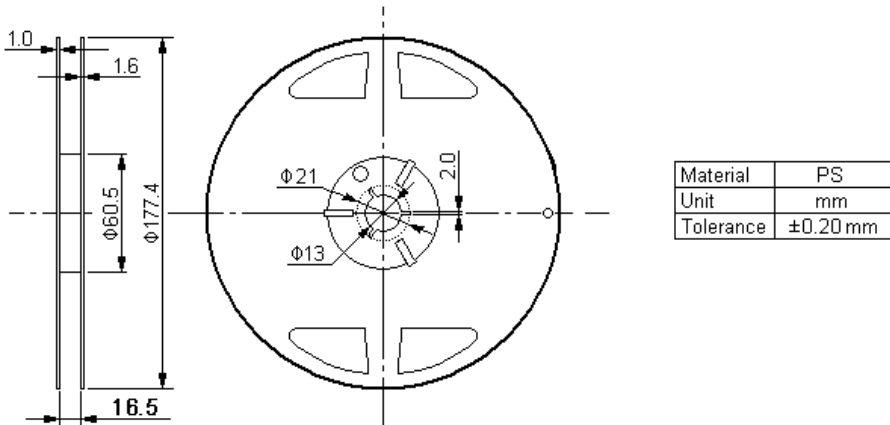


Table4 Packing & Shipping

Device	Package	Reel	Shipping
MHC1400M03	SMD	7"	1000/Reel

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Revision	Description	Date
Rev0	Preliminary	2020/3/29
Rev1	Update	2021/6/9
Rev2	Update	2022/12/29

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