

MHC38X03

3dB 90° Hybrid Coupler



Applications

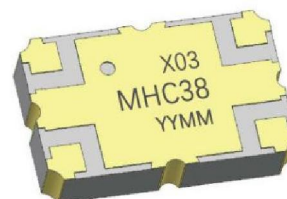
- 1, Low Insertion Loss For Power Combining
- 2, Doherty Power Amplifier
- 3, Small Cell & Pico
- 4, Circular Polarized Antenna

Features

- 1, Low Insertion Loss
- 2, High Isolation, 23 dB typ.
- 3, Excellent high-power Capacity
- 4, RoHS Compliance (Pb-Free)

Description

The MHC38X03 is a low cost, high performance 3 dB coupler in an easy to use surface mount package. The MHC38X03 is ideal for Doherty power amplifier, circular polarized antenna and other applications where low insertion loss and tight amplitude and phase balance are required. MHC38X03 is constructed from ceramic filled PTFE composites which possess excellent electrical and mechanical stability. All components are 100% RF tested.



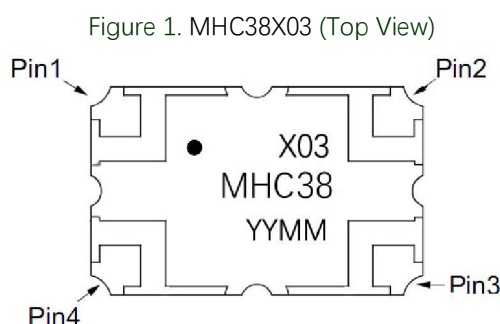
Characteristics

Table 1. MHC38X03 Characteristics

Item	Min.	Type	Max.	Unit
Frequency Range	3300		4200	MHz
Isolation	20	23		dB
Insertion Loss		0.2	0.35	dB
Phase Unbalance	-3.5		+3.5	degrees
Amplitude	-0.5		+0.5	dB
VSWR (:1)		1.15	1.25	:1
Operating Temp.	-45		+125	°C
Power			30	W

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

PORT CONFIGURATIONS



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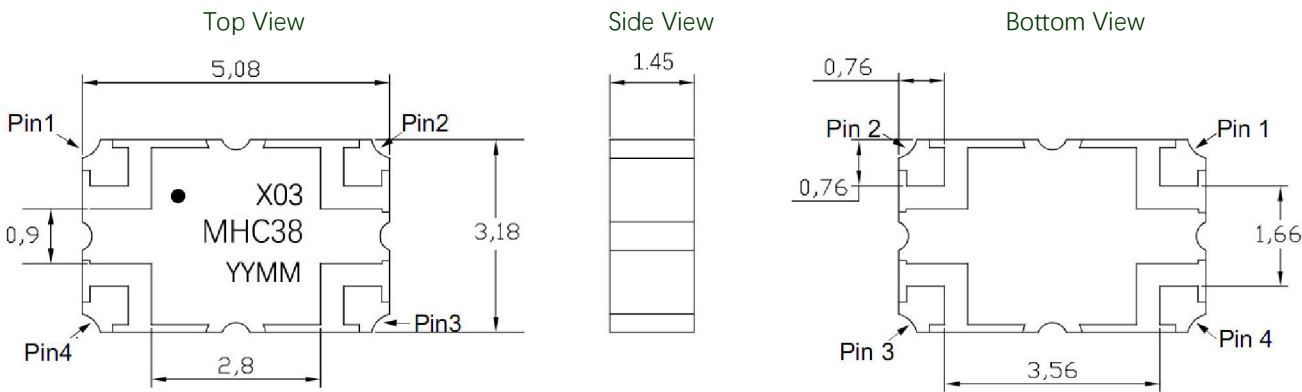
The MHC38X03 port configurations depending on how input signals are split. The Case 1, Case 2, Case 3, and Case 4, configurations mean that one input signal is split into two output signals. When port 1 is defined, the other ports are defined automatically

Table 2. MHC38X03 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. MHC38X03 Outline Drawing



Unit: mm

Typical Performance (25°C, 3200-3800 MHz)

Figure 3. MHC38X03 Coupling

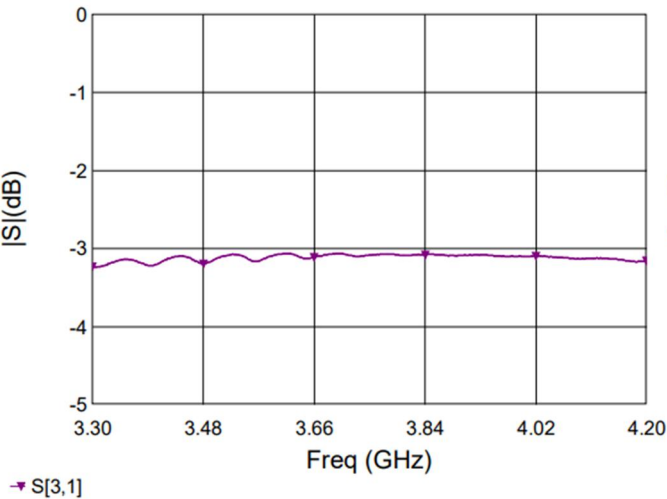
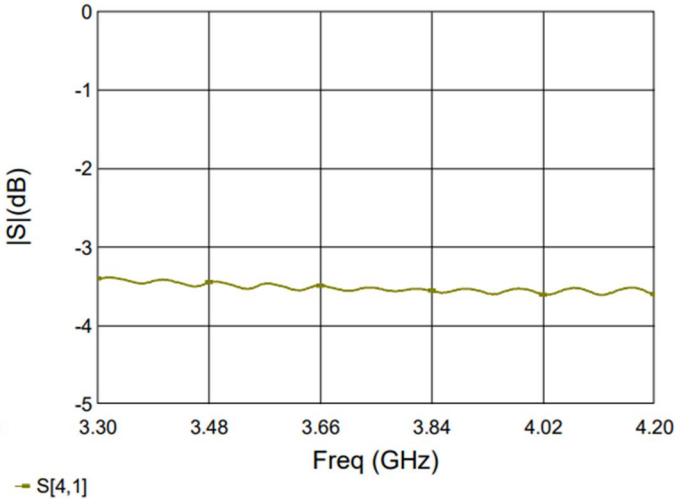


Figure 4. MHC38X03 Transmission



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Figure 5. MHC38X03 Return Loss (S11)

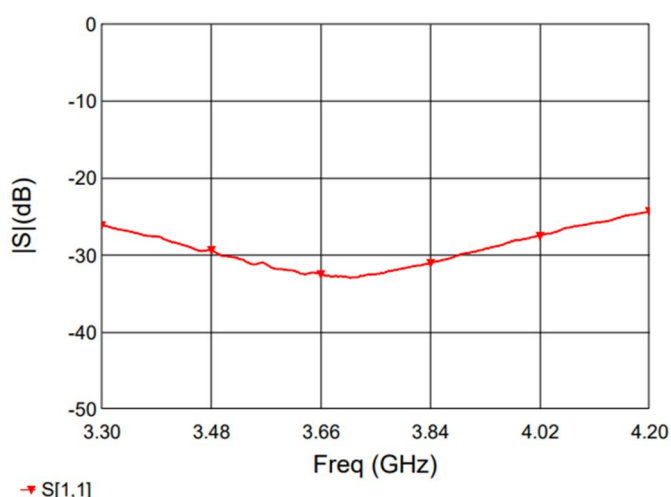


Figure 6. MHC38X03 Return Loss (S22)

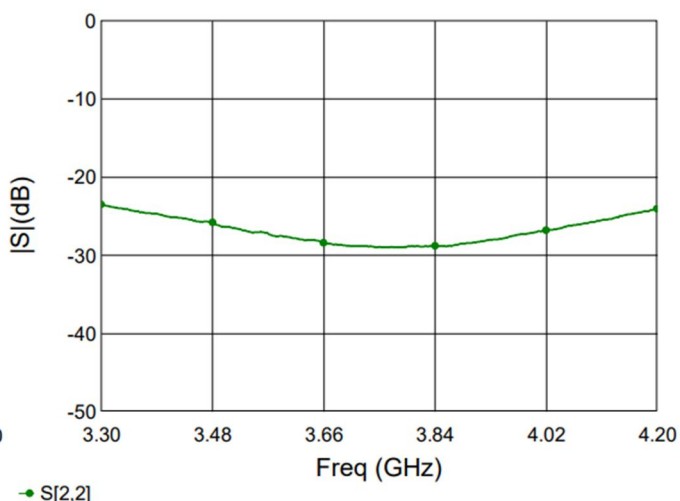


Figure 7. MHC38X03 Return Loss (S33)

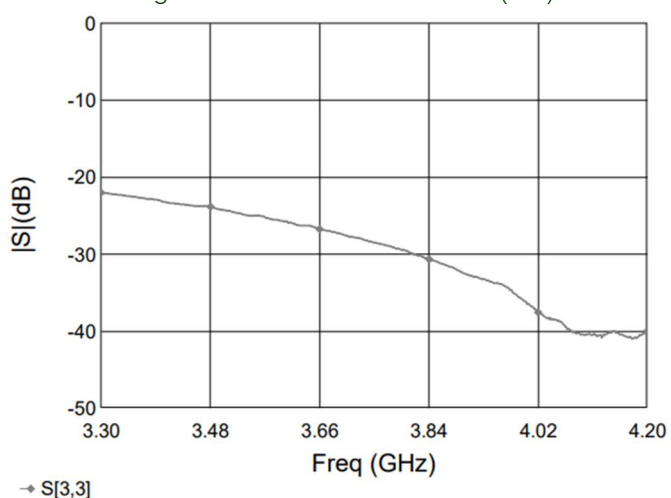


Figure 8. MHC38X03 Return Loss (S44)

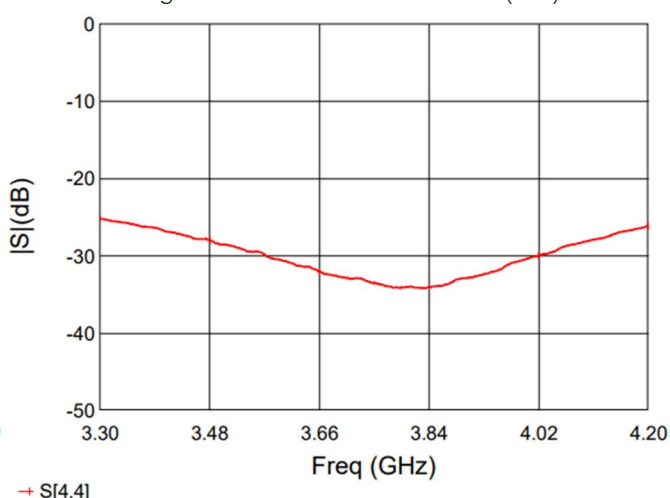


Figure 9. MHC38X03 Isolation

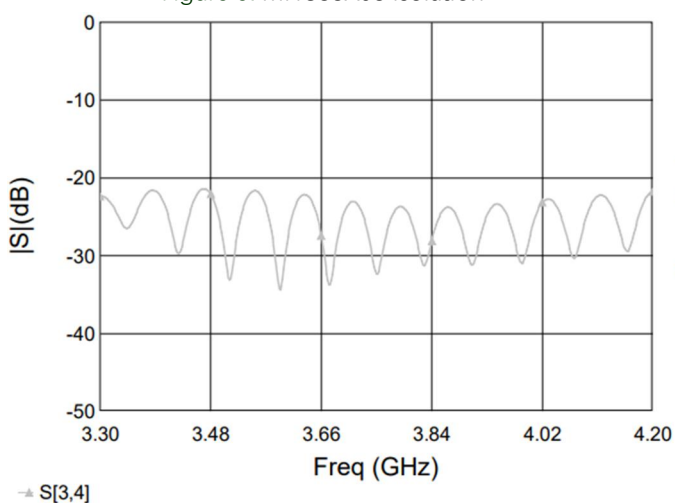
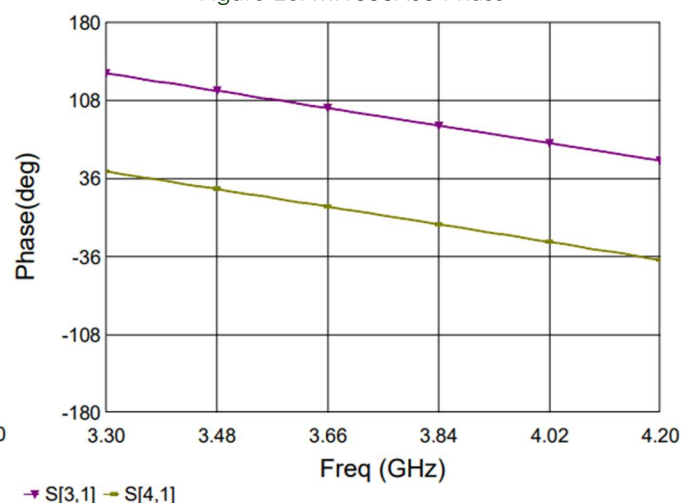


Figure 10. MHC38X03 Phase



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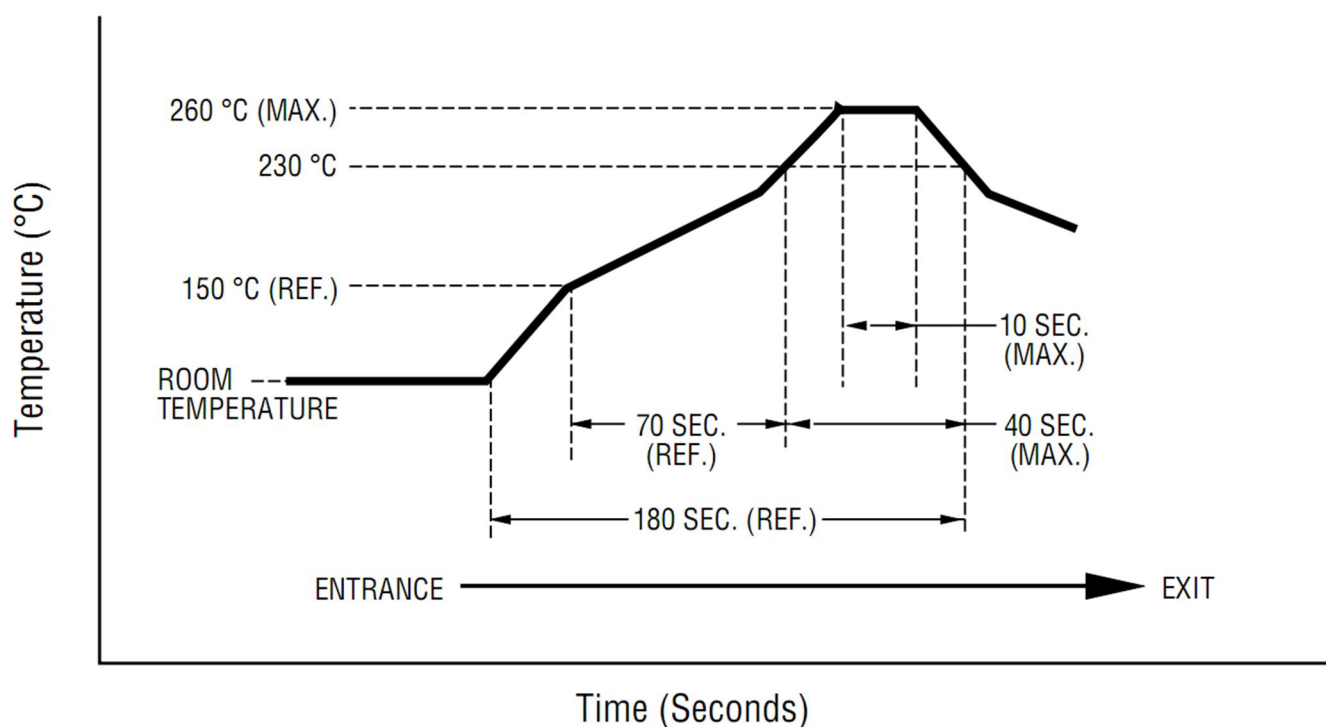
Definition of Measured Specifications

Table 3. Mathematical Formula for the MHC38X03 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.	$\text{Return Loss (dB)} = 20 \log \frac{VSWR+1}{VSWR-1}$
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.	$10 \log \frac{P_{cp1}}{P_{cp1} + P_{transmission}}$ and $10 \log \frac{P_{transmission}}{P_{cp1} + P_{transmission}}$

REFLOW PROFILE

Figure 11. MHC38X03 Thermal Reflow Profile



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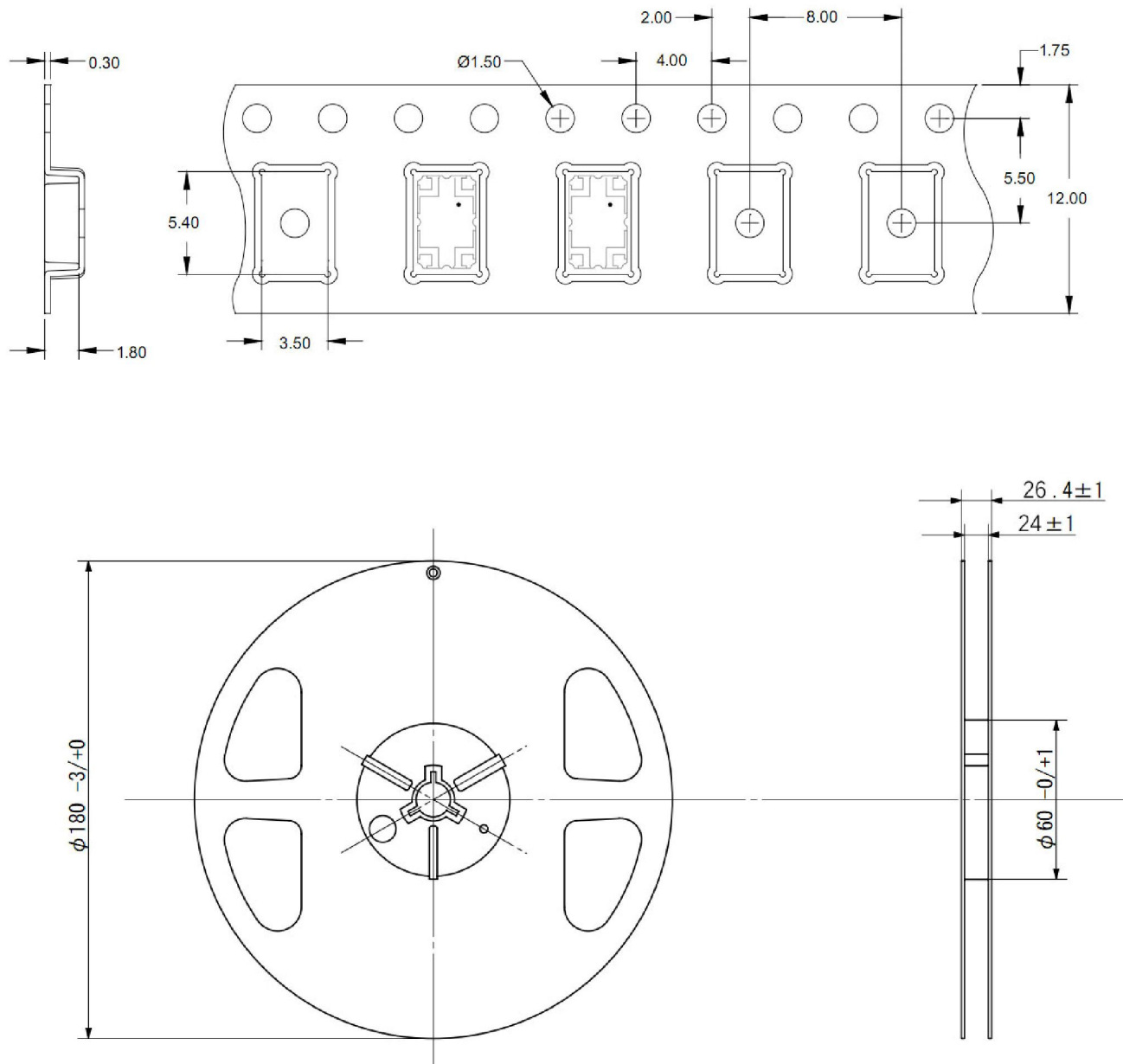
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Packaging and Ordering Information

Figure 12. MHC38X03 Packaging Information



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Table 4. MHC38X03 Ordering Information

Device	Package	Reel	Shipping
MHC38X03	5.08*3.18mm	7"	2000 Reel

Revision	Description	Date
Rev0	Preliminary	2023/5/29