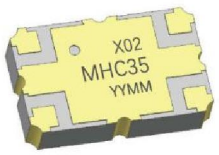
MHC35X02

2dB 90° Directional Coupler

Applications

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



Features

1, Low Insertion Loss
2, High Isolation, 22 dB typ.
3, Excellent high-power Capacity
4, RoHS compliance (Pb-Free)

Description

The MHC35X02 is a low cost, high performance directional coupler in an easy to use surface mount package. The MHC35X02 is ideal for Doherty power amplifier, circular polarized antenna and other applications where low insertion loss and tight amplitude and phase balance are required. MHC35X02 is constructed from ceramic filled PTFE composites which possess excellent electrical and mechanical stability. All components are 100% RF tested.

Characteristics

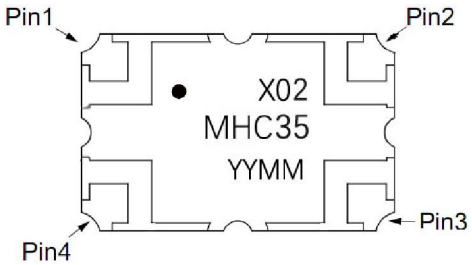
Table 1. MHC35X02 Characteristics

Item	Min.	Type	Max.	Unit
Frequency Range	3200		3700	MHz
Isolation	20	22		dB
Insertion Loss		0.2	0.35	dB
Phase Unbalance	-2.5		+2.5	degrees
Coupling		2		dB
Directivity	22			dB
VSWR (:1)		1.20	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

Figure 1. MHC35X02 (Top View)



MHC35X02

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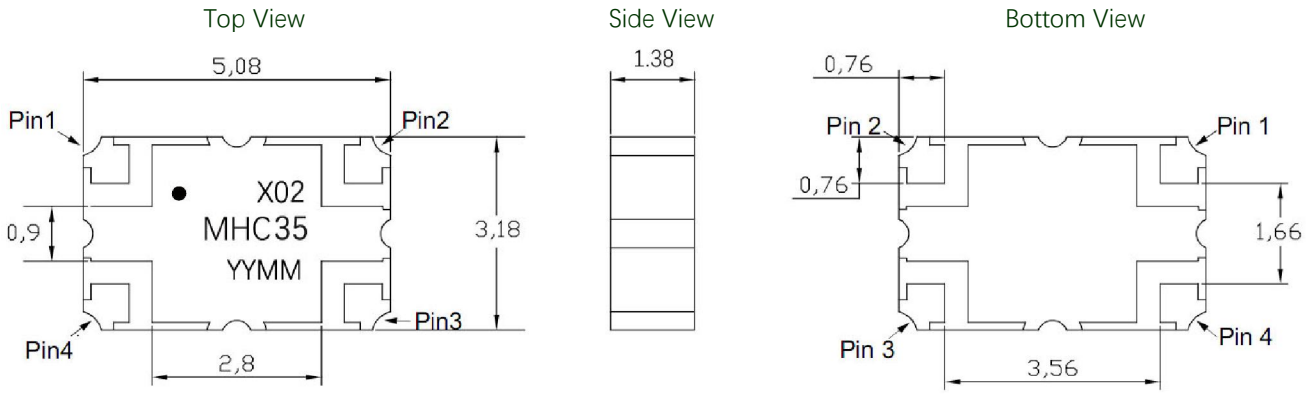
The MHC35X02 port configurations depending on how input signals are split. The Case 1, Case 2, Case 3, and Case 4, configurations mean that one input signal is split into two output signals. When port 1 is defined, the other ports are defined automatically

Table 2. MHC35X02 Port Configurations

Configuration	Port 1	Port 2	Port 3	Port 4
Case1.	Input	Isolated	Output -5dB, -90°	Coupling -2dB, 0°
Case2.	Isolated	Input	Coupling -2dB, 0°	Output -5dB, -90°
Case3.	Output -5dB, -90°	Coupling -2dB, 0°	Input	Isolated
Case4.	Coupling -2dB, 0°	Output -5dB, -90°	Isolated	Input

Outline Drawing

Figure 2. MHC35X02 Outline Drawing



Unit: mm

Typical Performance (25°C, 690-1000 MHz)

Figure 3. MHC35X02 Coupling

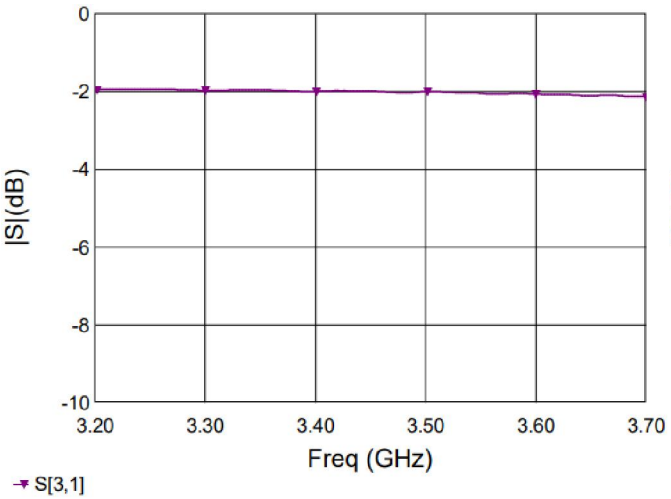


Figure 4. MHC35X02 Transmission

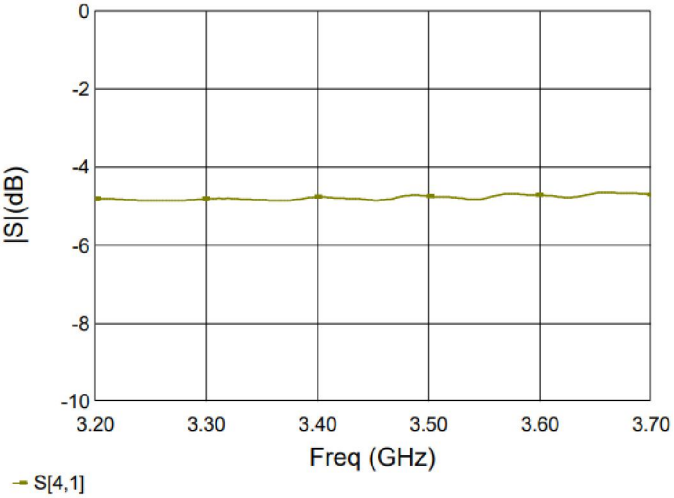


Figure 5. MHC35X02 Return Loss (S11)

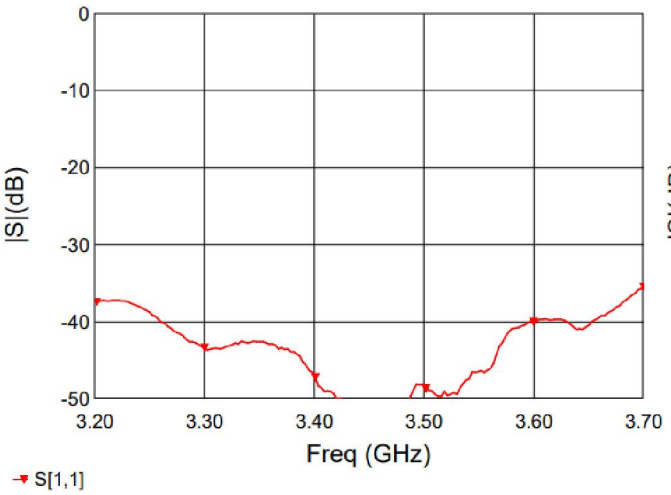


Figure 6. MHC35X02 Return Loss (S22)

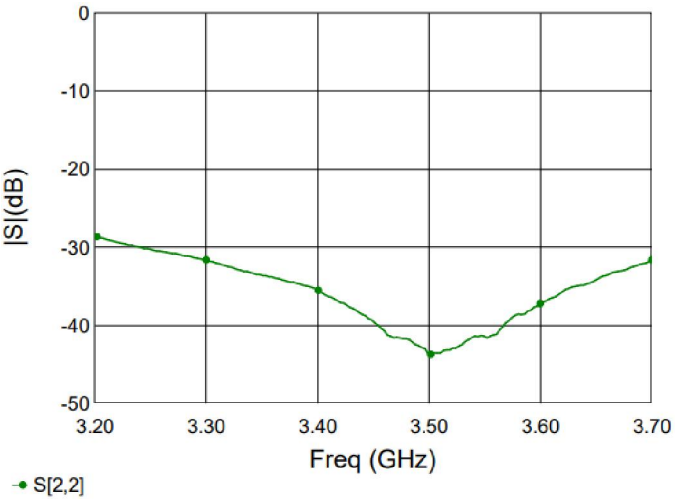


Figure 7. MHC35X02 Return Loss (S33)

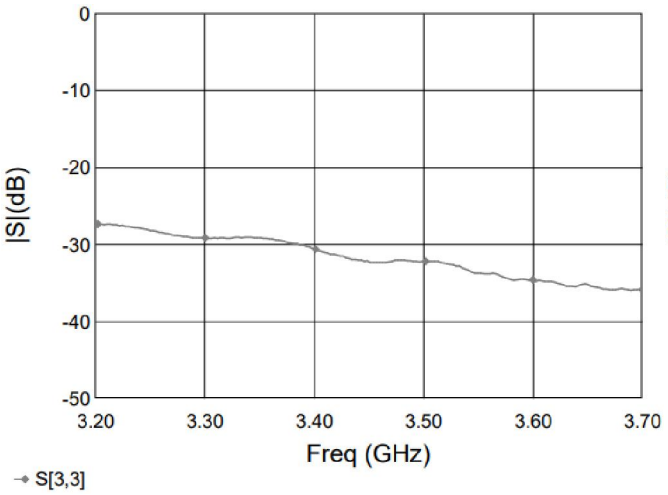


Figure 8. MHC35X02 Return Loss (S44)

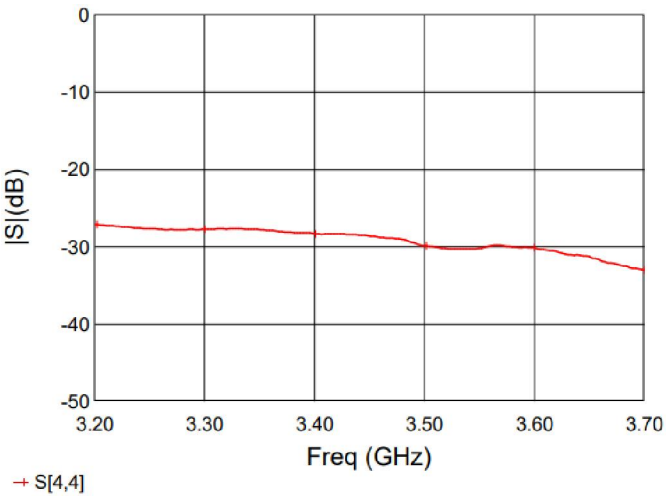


Figure 9. MHC35X02 Isolation

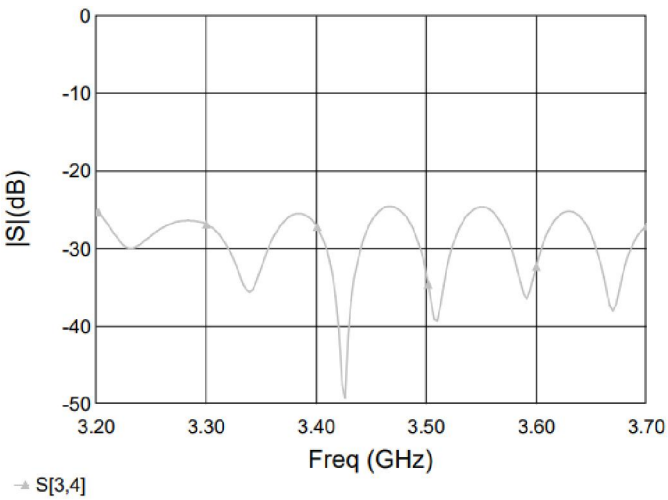
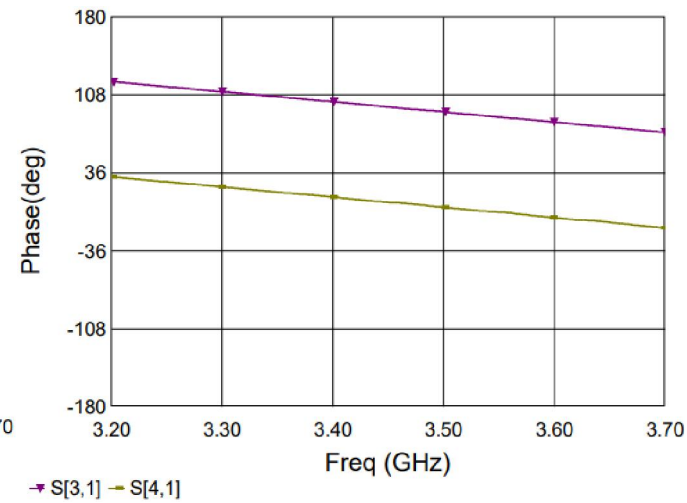


Figure 10. MHC35X02 Phase



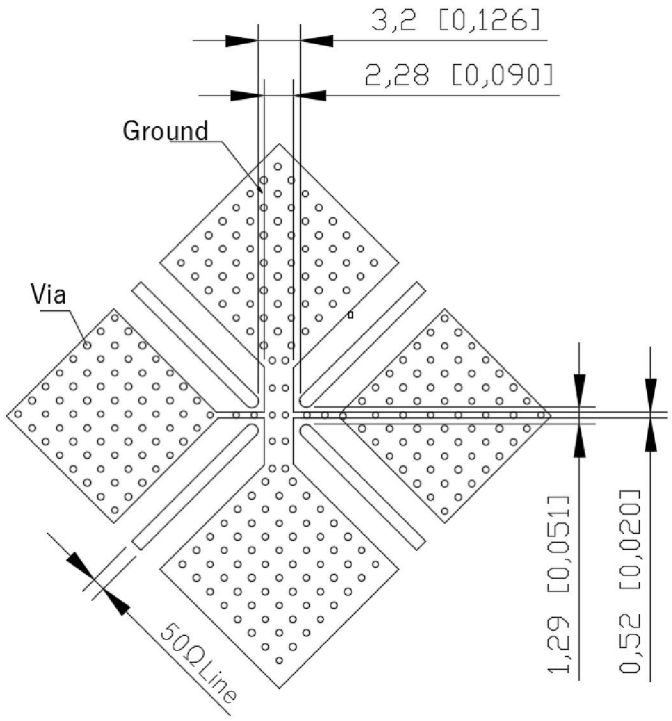
Definition of Measured Specifications

Table 3. Mathematical Formula for the MHC35X02 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.	$VSWR = \frac{V_{max}}{V_{min}}$ V_{max} = voltage maxima of a standing wave V_{min} = 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 $10\log\frac{P_{transmission}}{\frac{P_{cp1}+P_{transmission}}{2}}$

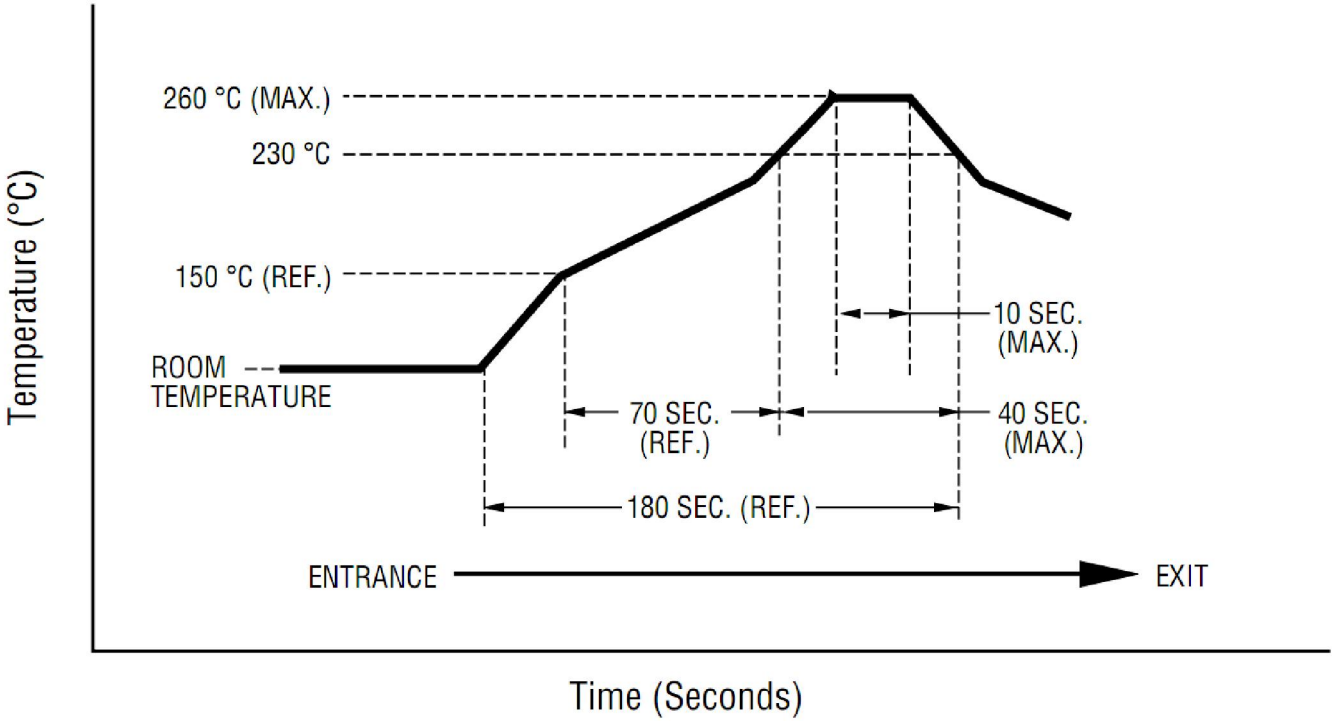
Recommended PCB Layout

Figure 11. MHC35X02 Recommended PCB Layout



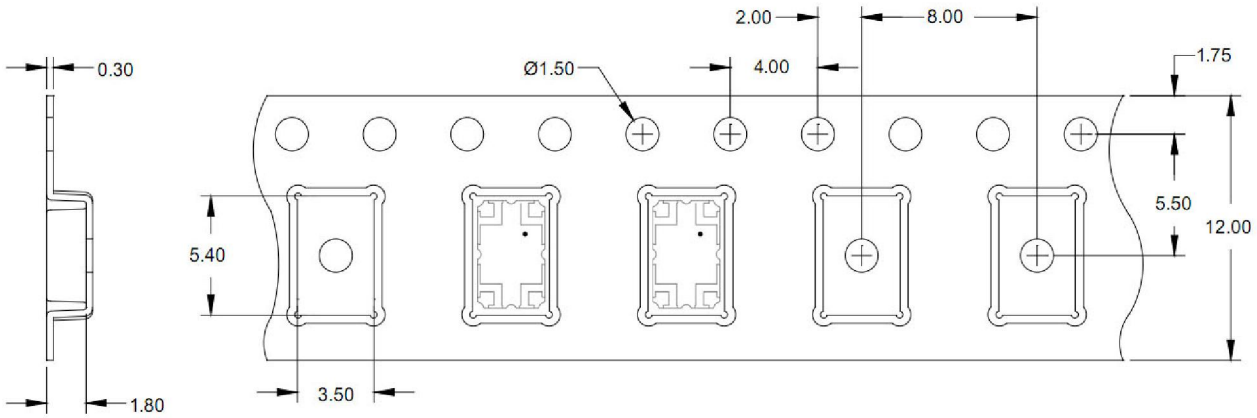
Reflow Profile

Figure 12. MHC35X02 Thermal Reflow Profile



Packaging and Ordering Information

Figure 13. MHC35X02 Packaging Information



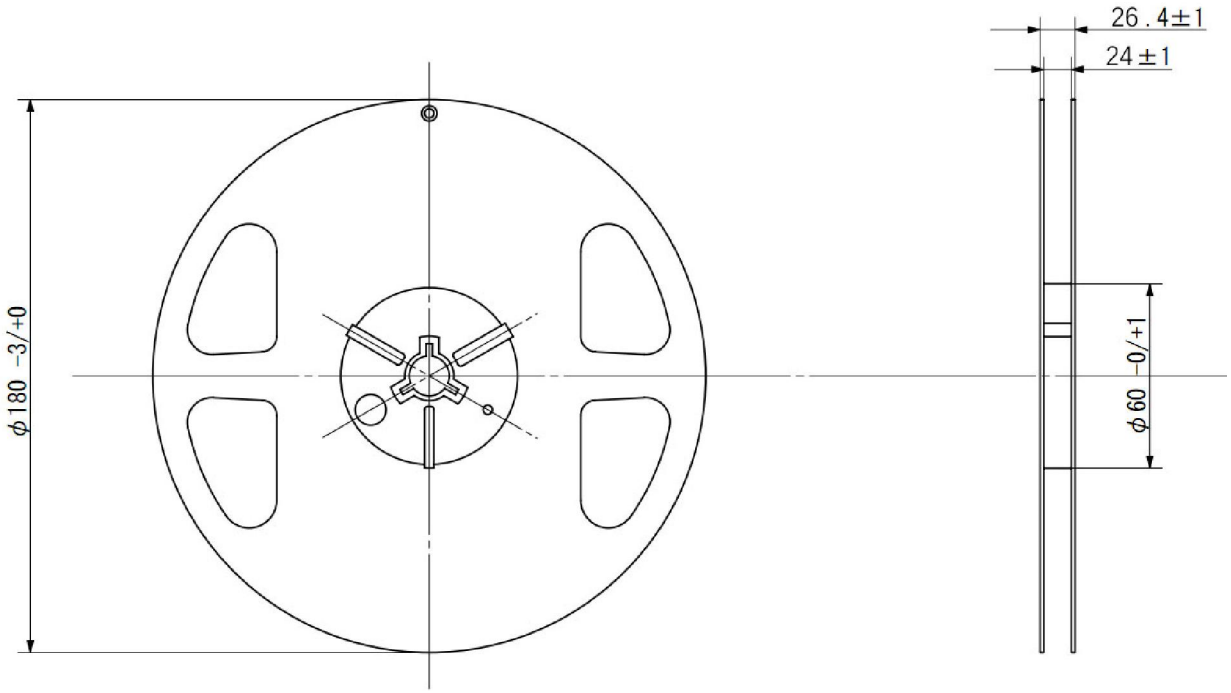


Table 4. MHC35X02 Ordering Information

Device	Package	Reel	Shipping
MHC35X02	5.08*3.18mm	7''	2000 Reel

Revison	Description	Date
Rev0	Preliminary	2023/5/29