Model 1C403

Rev. B

Hybrid Couplers
3 dB, 90°

Description

The 1C403 is a low profile, miniature 3dB hybrid coupler in an easy to use surface mount package designed for AMPS applications. The 1C403 is designed for balanced amplifiers and signal distribution and is an ideal solution for the ever-increasing demands of the wireless industry for smaller printed circuit boards. Parts have been subjected to rigorous qualification testing and units are 100% tested. They are manufactured using materials with x and y thermal expansion coefficients compatible with common substrates such as FR4, G-10 and polyamide.

Features:

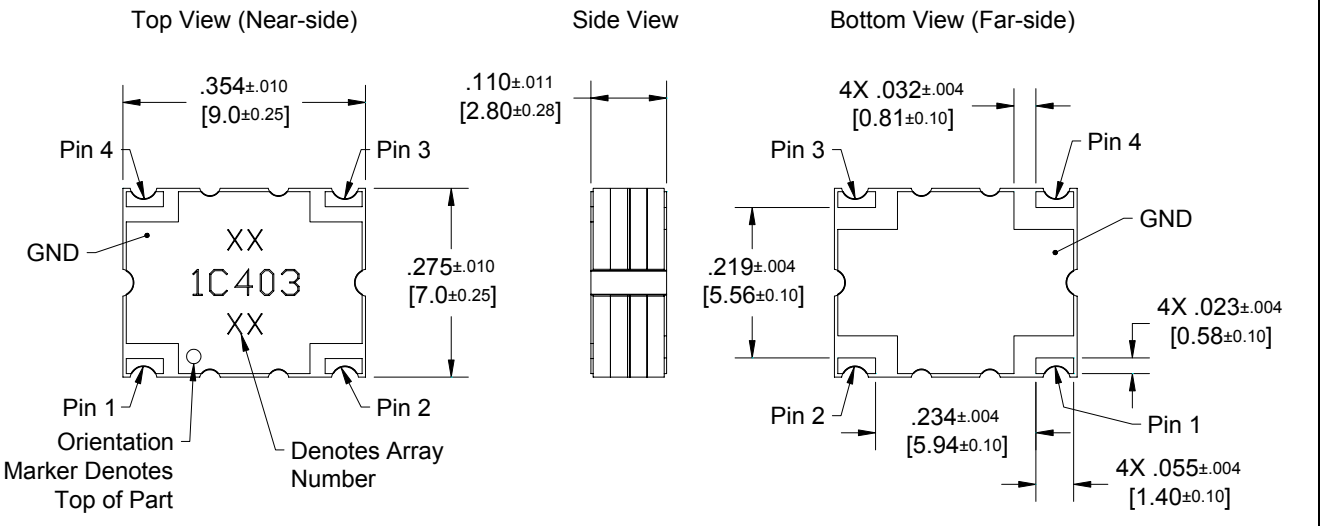
- **810 - 885 MHz**
- **High Power**
- **Very Low Loss**
- **High Isolation**
- **90° Quadrature**
- **Surface Mountable**
- **Tape and Reel**
- **Convenient Package**
- **100% Tested**

ELECTRICAL SPECIFICATIONS**

Frequency	Isolation	Insertion Loss	VSWR	
MHz	*dB Min*	*dB Max*	*Max:1*	
810 - 885	20	0.30	1.20	
Amplitude Balance	**Phase Balance**	**Power**	**ΘJC**	**Operating Temp.**
dB Max	*Degrees*	*Ave. CW Watts*	*°C/Watt*	*°C*
± 0.25	± 3	115	25.4	-55 to +85

**Specification based on performance of unit properly installed on microstrip printed circuit boards with 50 Ω nominal impedance. Specifications subject to change without notice.

Outline Drawing



Dimensions are in Inches [Millimeters]
1C403 Rev A Mechanical Outline

Tolerances are Non-Cumulative

Available on Tape and Reel For Pick and Place Manufacturing.

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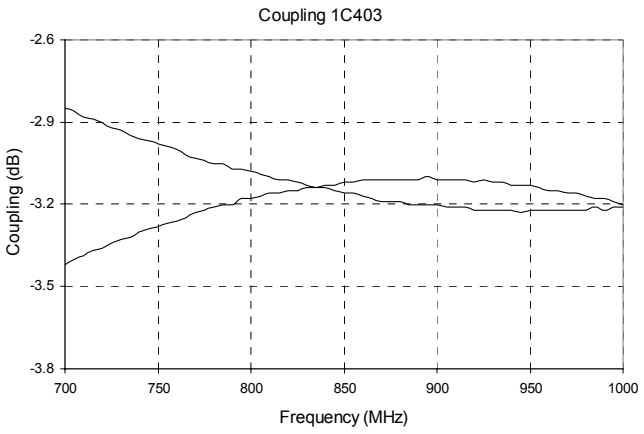
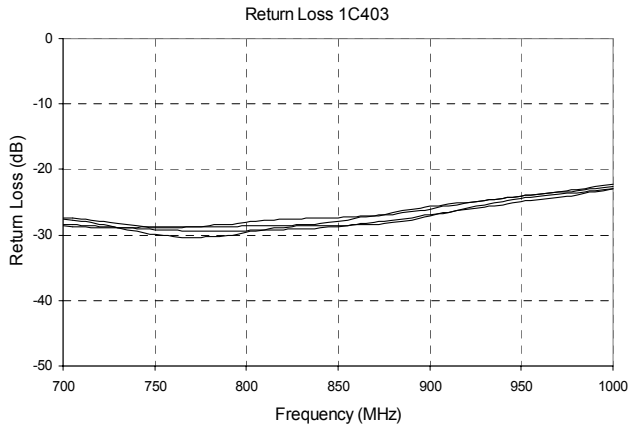
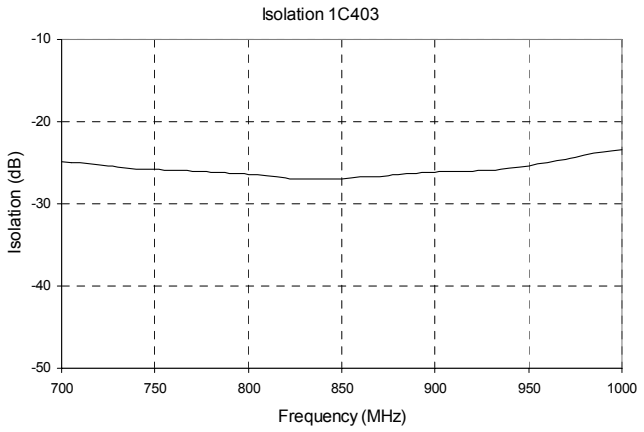
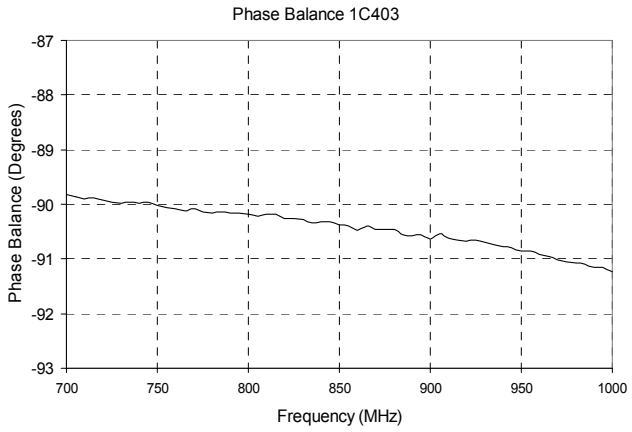
Typical Performance: 700 MHz. to 1000 MHz.









AMPLITUDE BALANCE

3dB hybrids are a type of backward wave coupler. In the design of these couplers, the even mode impedance was chosen to 'critically couple' or slightly 'over couple' at mid band to maximize performance and bandwidth. The amplitude balance specification is defined as the decibel difference between the two output curves.

PHASE BALANCE

In theory, output ports of a backward wave hybrid coupler remain in perfect phase quadrature independent of frequency. In practice, factors associated with the manufacturing processes slightly degrade performance. The specification is typically two to three degrees maximum. In practice, phase is statistically better than the specified value (<1^{o}).

VSWR & ISOLATION

Similar to phase balance, the VSWR and isolation of a coupler are theoretically perfect; where the input and output ports are perfectly matched and no power is coupled to the isolated port. In practice, factors associated with the design and manufacturing processes limit VSWR and isolation. The significant limitations are associated with limitations of building perfect 50Ω transitions at the input and output ports of the device.

INSERTION LOSS

Coupler insertion loss is defined as the difference of the input power from the sum of the output power. In practice, loss is typically 0.20 dB. Specification limits are somewhat higher due to imperfect test conditions; as the couplers must be tested in fixtures that negatively affect results.

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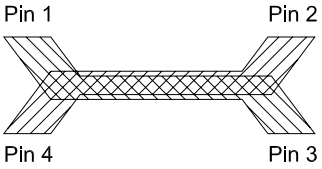
PIN CONFIGURATION



Hybrid Coupler Pin Configruation				
	Pin 1	Pin 2	Pin 3	Pin 4
Configuration #1	Input	Isolated	-3dB, -90°	-3dB, 0°
Configuration #2	Isolated	Input	-3dB, 0°	-3dB, -90°
Configuration #3	-3dB, -90°	-3dB, 0°	Input	Isolated
Configuration #4	-3dB, 0°	-3dB, -90°	Isolated	Input

The 1C403's have an orientation marker to denote the topside of the part. The part however can be rotated about the z-axis so that any pin can be used as the input port as described by the chart above.

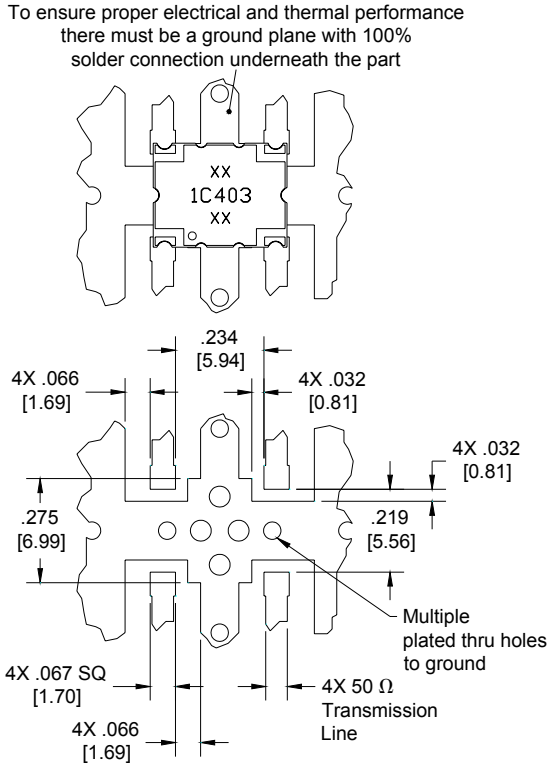
MOUNTING

In order for Xinger surface mount couplers to work optimally, there must be 50Ω transmission lines leading to and from all of the RF ports. Also, there must be a very good ground plane under the part to ensure proper electrical performance. If either of these two conditions are not satisfied, insertion loss, coupling, VSWR and isolation may not meet published specifications.

Overall ground is improved if a dense population of plated through holes connect the top and bottom ground layers of the PCB. This minimizes ground inductance and improves ground continuity. All of the Xinger hybrid and directional couplers are constructed from ceramic filled PTFE composites that possess excellent electrical and mechanical stability having X and Y thermal coefficient of expansion (CTE) of 17 ppm/°C.

When a surface mount hybrid coupler is mounted to a printed circuit board, the primary concerns are; ensuring the RF pads of the device are in contact with the circuit trace of the PCB and insuring the ground plane of neither the component nor the PCB is in contact with the RF signal. As long as the geometry of the unit fits onto the layout of the circuit trace on the PCB, and the conditions of the previous paragraph are followed, the coupler's performance is ensured. An example of how the PCB footprint could look is shown below. In specific designs, the 50Ω lines need to be adjusted to the unique dielectric coefficients and thicknesses as well as varying pick and place equipment tolerances. To ensure proper electrical and thermal performance there must be a ground plane with 100% solder connection underneath the part.

SUGGESTED FOOTPRINT



Dimensions are in Inches [Millimeters]
1C403 Rev A Mounting Footprint

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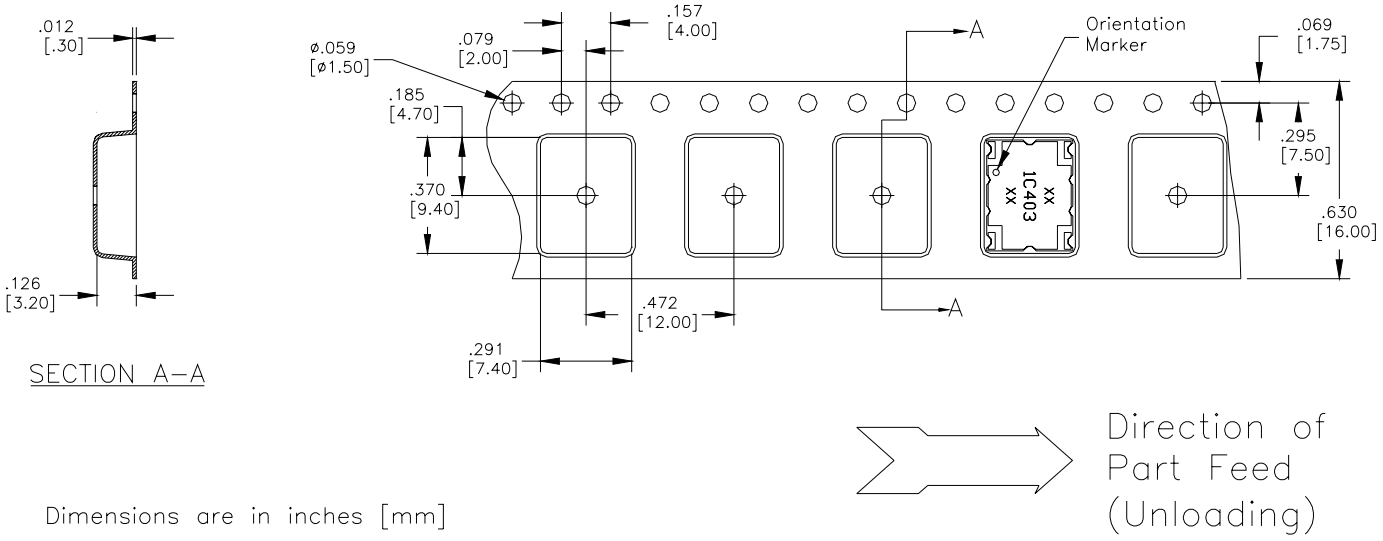
PACKAGING

Packaging follows EIA-481-2. Parts are oriented in tape as shown below.



Xinger® Tape & Reel Diagram

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