Xinger®

Hybrid Coupler
3dB, 90°

Features:

- **870 - 1600 MHz**
- **High Power 400W (AVG)**
- **UHF & L-Band (1-2GHz) COTS Mil-Aero applications**
- **Peak to Average Ratio 12dB**
- **Very Low Loss (<0.25dB)**
- **Tight Amplitude Balance**
- **High Isolation (>20dB)**
- **Surface Mountable**
- **Production Friendly**
- **Tape & Reel**
- **RoHS Compliant**
- **100% Tested**
- **ENIG Finish**
- **Convenient Package**

Description:

The XMC1020A4-03G is a low-profile, high performance 3dB hybrid coupler, with a high-power rating of 400 Watts (AVG) and a peak to average ratio of 12dB in a new easy to use, Xinger style manufacturing friendly surface mount package. It is designed particularly for UHF and L-band applications in COTS Mil-Aero and all other end markets. The component is designed particularly for balanced power and low noise amplifiers, plus signal distribution and other applications where low insertion loss and tight amplitude and phase balance is required. High reliability applications in the 870 MHz to 1600 MHz range.

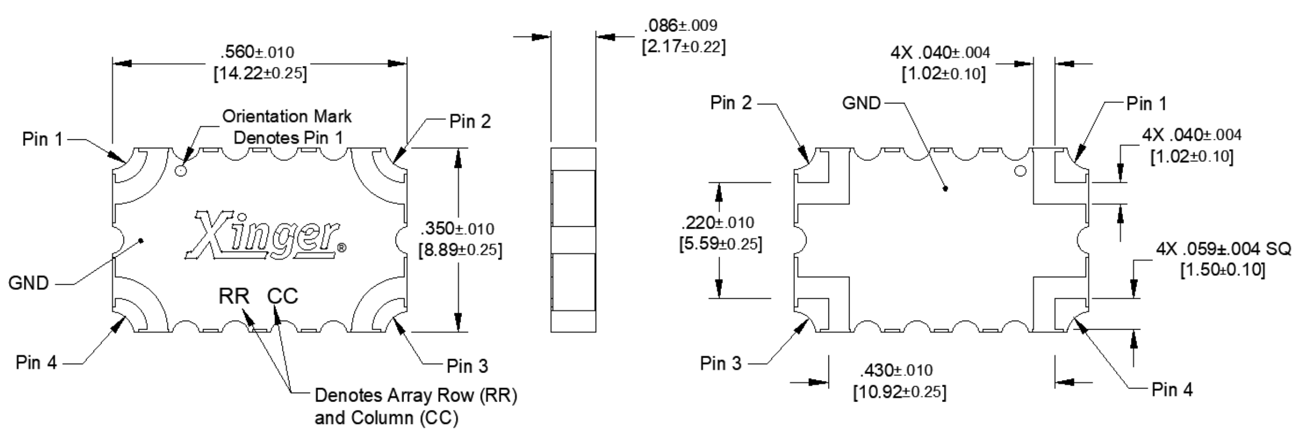
Parts have been subjected to rigorous Xinger qualification testing and are manufactured using materials with coefficients of thermal expansion (CTE) compatible with common substrates such as FR4, G-10, RF-35, RO4350 and polyimide. Available in 6 of 6 ENIG RoHS compliant finish.

Electrical Specifications*:

Frequency	**Isolation**	**Insertion Loss**	**VSWR**
MHz	*dB Min*	*dB Max*	*Max: 1*
900 – 930	23	0.20	1.15
870 – 1600	20	0.25	1.20
Phase	**Power**	**Amplitude Balance**	**Operating Temp.**
Degrees	*AVG Watts @85°C*	*dB Max*	*ºC*
90 ± 3.0	400	± 0.20	-55 to +150
90 ± 4.0	180	± 0.60	-55 to +150

*Power Handling for commercial, non-life critical applications. See derating chart for other applications. Specification based on performance of unit properly installed on a TTM test board with small signal applied. Specifications subject to change without notice. Refer to parameter definitions for details.

Mechanical Outline:

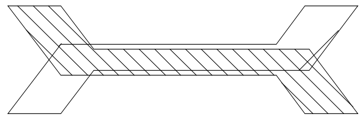


Dimensions are in Inches [Millimeters]
XMC1020A4-03G Mechanical Outline

Tolerances are Non-Cumulative

Pin Configuration

The component has an orientation marker to denote Pin 1. Once port one has been identified the other ports are known automatically. Please see the chart below for clarification:



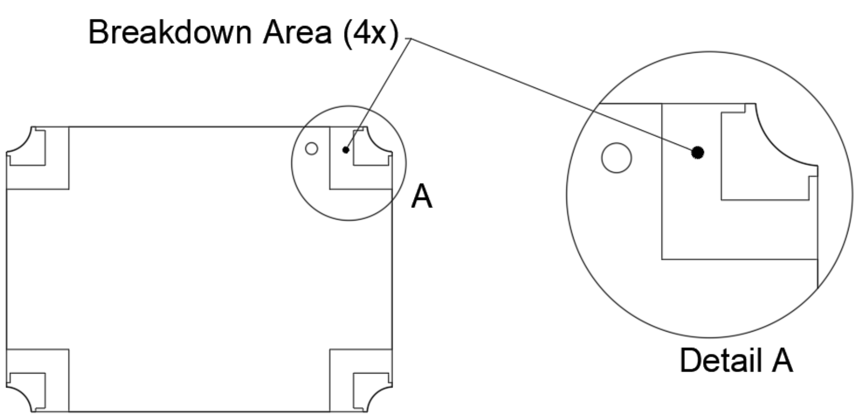
3dB Coupler Pin Configuration

Configuration	Pin 1	Pin 2	Pin 3	Pin 4
Splitter	Input	Isolated	-3dB ∠*θ - 90*	-3dB ∠*θ*
Splitter	Isolated	Input	-3dB ∠*θ*	-3dB ∠*θ - 90*
Splitter	-3dB ∠*θ - 90*	-3dB ∠*θ*	Input	Isolated
Splitter	-3dB ∠*θ*	-3dB ∠*θ - 90*	Isolated	Input
***Combiner**	A ∠*θ - 90*	A ∠*θ*	Isolated	Output
***Combiner**	A ∠*θ*	A ∠*θ - 90*	Output	Isolated
***Combiner**	Isolated	Output	A ∠*θ - 90*	A ∠*θ*
***Combiner**	Output	Isolated	A ∠*θ*	A ∠*θ - 90*

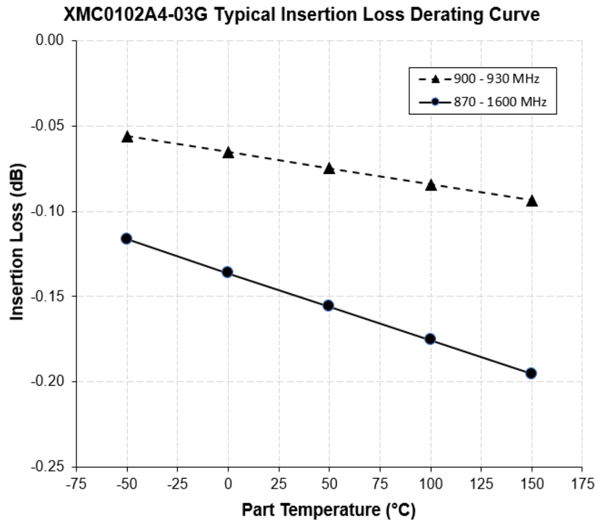
*Note: "A" is the amplitude of the applied signals. When two quadrature signals with equal amplitudes are applied to the component as described in the table, they will combine at the output port. If the amplitudes are not equal, some of the applied energy will be directed to the isolated port.

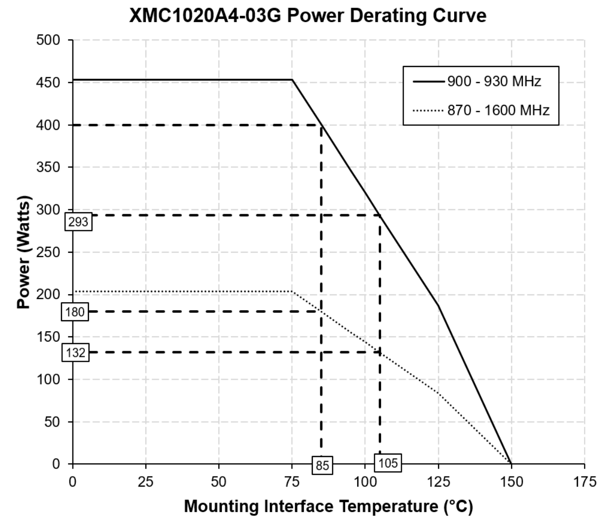
Peak Power Handling:

High-Pot testing of these components during the qualification procedure resulted in a minimum breakdown voltage of 2.20 kV (minimum recorded value). This voltage level corresponds to a breakdown resistance capable of handling at least 12dB peak over average power levels, for very short durations. The breakdown location consistently occurred across the air interface at the component contact pads (see illustration below). The breakdown levels at these points will be affected by any contamination in the gap area around these pads. These areas must be kept clean for optimum performance. It is recommended that the user test for voltage breakdown under the maximum operating conditions and over worst-case modulation induced power peaking. This evaluation should also include extreme environmental conditions (such as high humidity).



Insertion Loss and Power Derating Curves:





Insertion Loss Derating:

The insertion loss, at a given frequency, of the component is measured at 25°C and then averaged. The measurements are performed under small signal conditions (i.e. using a Vector Network Analyzer). The process is repeated at -55°C, 85°C and 150°C. A best-fit line for the measured data is computed and then plotted from -55°C to 150°C.

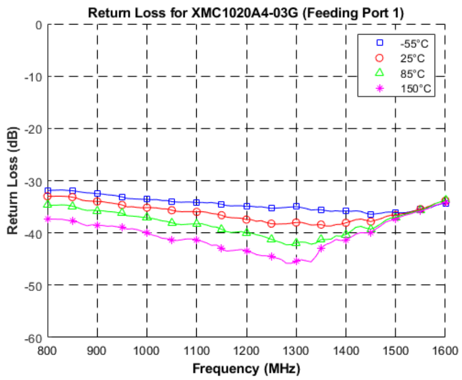
Power Derating:

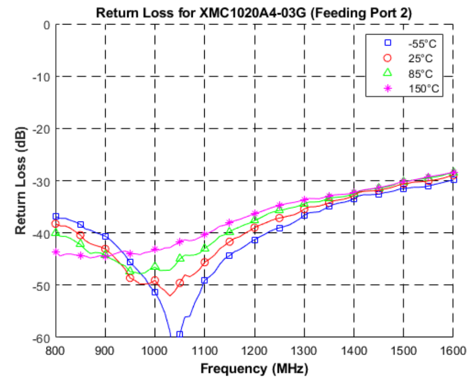
The power handling and corresponding power derating plots are a function of the thermal resistance, mounting surface temperature (base plate temperature), maximum continuous operating temperature of the component, and the thermal insertion loss. The thermal insertion loss is defined in the Power Handling section of the data sheet.

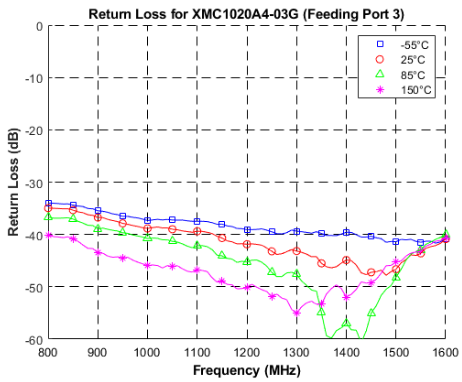
As the mounting interface temperature approaches the maximum continuous operating temperature, the power handling decreases to zero.

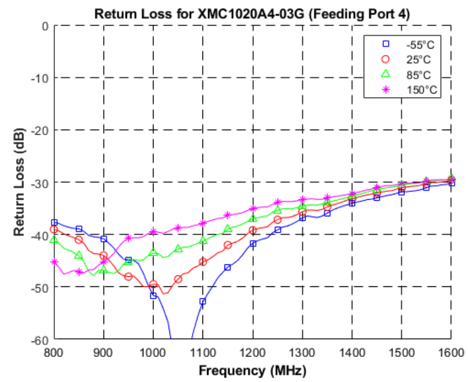
If mounting temperature is greater than 85°C and input power is derated to the curve above, then the Xinger component will perform reliably well.

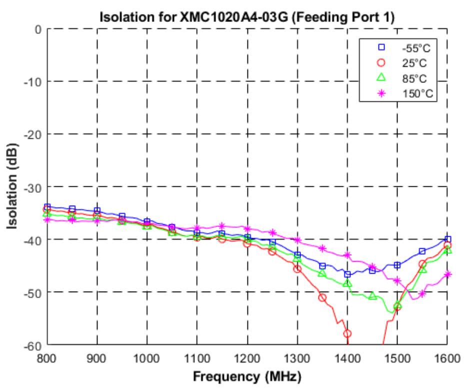
Typical Temperature Performance Plots:

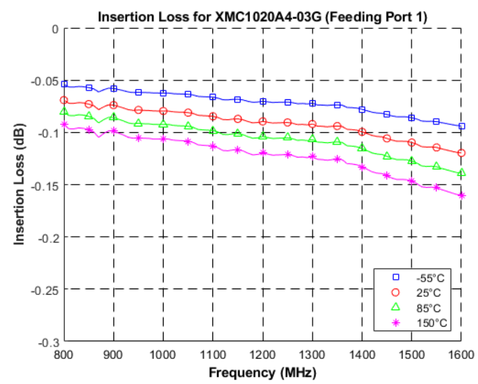


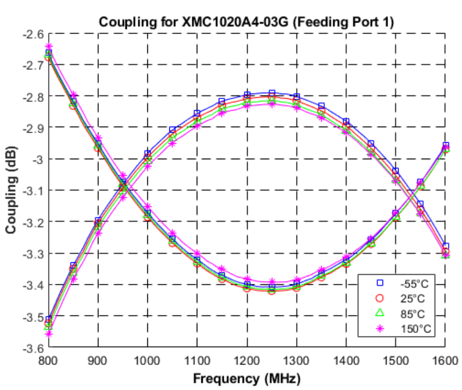


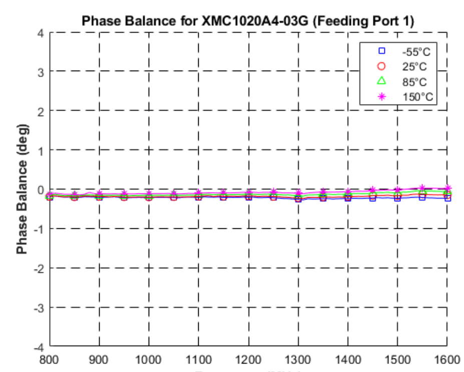










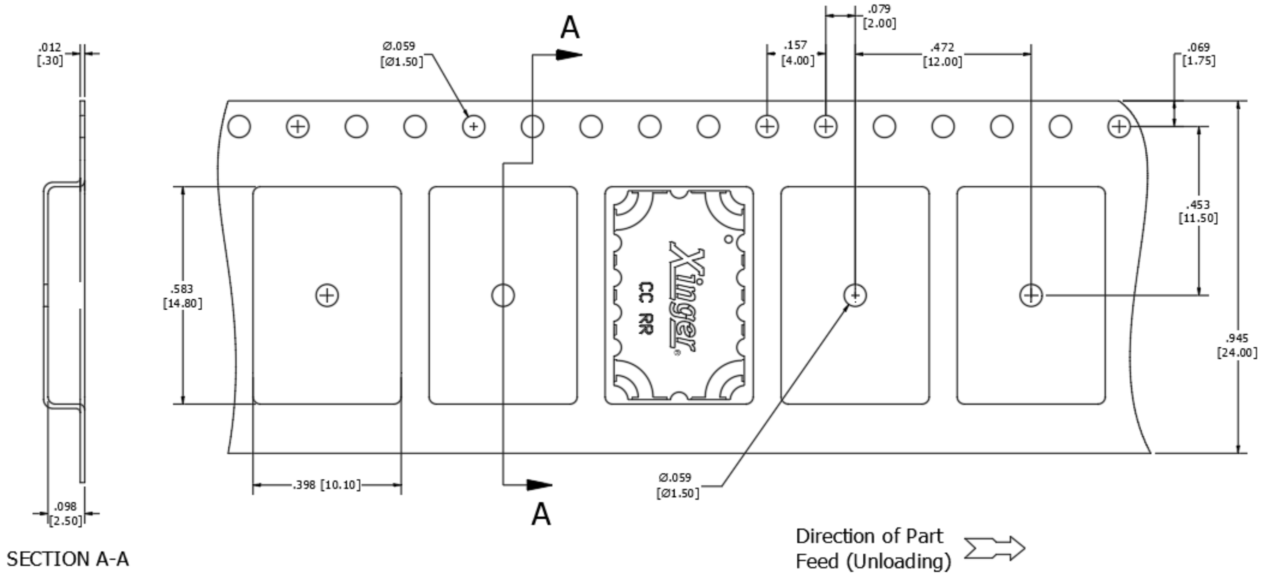


Definition of Measured Specifications:

Parameter	Definition	Mathematical Representation
VSWR (Voltage Standing Wave Ratio)	The impedance match of the coupler to a 50Ω system. A VSWR of 1:1 is optimal.	$\mathrm{VSWR} = \frac{V_{max}}{V_{min}}$ Vmax = voltage maxima of a standing wave Vmin = voltage minima of a standing wave
Return Loss	The impedance match of the coupler to a 50Ω system. Return Loss is an alternate means to express VSWR.	$\mathrm{Return\ Loss(dB)} = 20\log\frac{\mathrm{VSWR}+1}{\mathrm{VSWR}-1}$
Insertion Loss	The input power divided by the sum of the power at the two output ports.	$\mathrm{Insertion\ Loss(dB)} = 10\log\frac{P_{in}}{P_{cpl}+P_{direct}}$
Isolation	The input power divided by the power at the isolated port.	$\mathrm{Isolation(dB)} = 10\log\frac{P_{in}}{P_{iso}}$
Phase Balance	The difference in phase angle between the two output ports.	Phase at coupled port – Phase at direct port
Amplitude Balance	The power at each output divided by the average power of the two outputs.	$10\log\frac{P_{cpl}}{(P_{cpl}+P_{direct})/2}$ and $10\log\frac{P_{direct}}{(P_{cpl}+P_{direct})/2}$

Packaging and Ordering Information:

Parts are available in reels. Packaging follows EIA-481 for reels. Parts are oriented in tape and reel as shown below. Parts are available in 2000 and 500 pcs per reel.



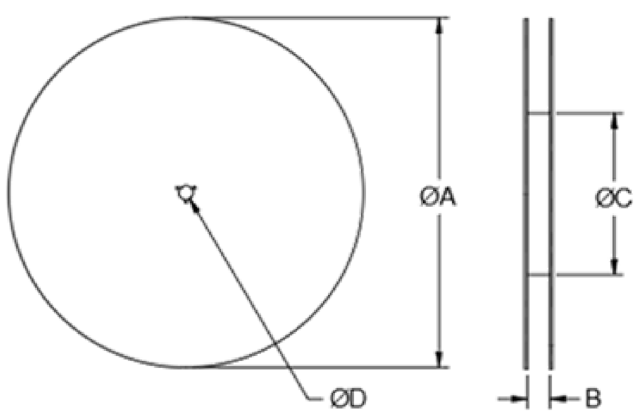


TABLE 1: 2000pc
REEL DIMENSIONS: inches [mm]

∅A	13.0 [330.00]
B	0.945 [24.00]
∅C	4.017 [102.03]
∅D	0.512 [13.00]

TABLE 2: 500pc
REEL DIMENSIONS: inches [mm]

∅A	13.0 [330.00]
B	0.945 [24.00]
∅C	7.00 [177.80]
∅D	0.512 [13.00]

Part Naming Convention

XMC 1020 A 4 – 03 G

Function & Family	Frequency	Package Size	Power Handling	Coupling	Finish
XMC = Mil-Aero Coupler	1020 = typ freq range 1.0 to 2.0 GHz	A = 0.560" x 0.350"	4 = 301-400W	03 = 3dB	G = ENIG

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