



**Directional Coupler
20 dB**

Description:

The XMC1020F1-20G is a low profile, high performance 20dB directional coupler, with a power rating of 50 Watts (AVG), with a peak to average performance of 12dB in a new easy to use, Xinger style manufacturing friendly surface mount package. It is designed particularly for L-band applications in COTS Mil-Aero and all other end markets. The component is designed particularly for balanced power and frequency detection, as well as VSMR monitoring where tightly controlled coupling and low insertion loss is required.

Parts have been subjected to rigorous Xinger qualification testing and they 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 compliant finish.

Features:

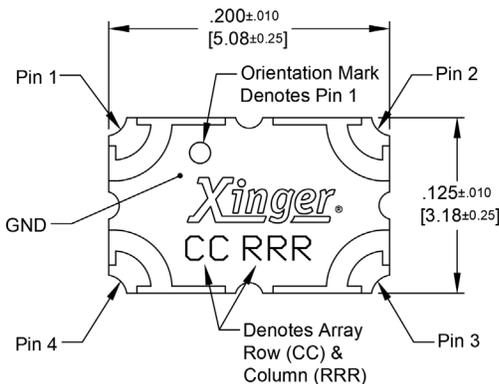
- 1000 - 2000 MHz
- L-band, COTS Mil-Aero Applications
- Power 50W (AVG)
- Peak to Average Ratio 12dB
- Low Loss (<0.10dB)
- Tight Coupling (± 1.0 dB)
- High Directivity (>23dB)
- Surface Mountable
- Production Friendly
- Tape & Reel
- RoHS Compliant
- 100% Tested
- ENIG Finish
- Convenient Package

Electrical Specifications*:

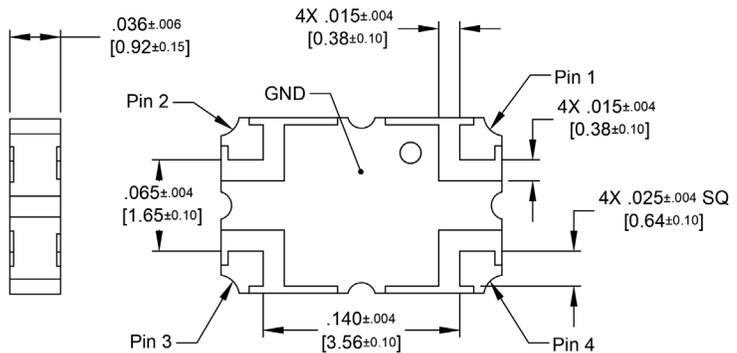
| Frequency | Mean Coupling | Insertion Loss | Return Loss |
|-----------------------|---------------|------------------|-----------------|
| MHz | dB | dB Max | dB Min |
| 1000 - 2000 | 20 \pm 1.0 | 0.10 | 23 |
| Frequency Sensitivity | Directivity | Power | Operating Temp. |
| dB Max | dB Min | AVG Watts @ 85°C | °C |
| ± 1.20 | 23 | 50 | -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:



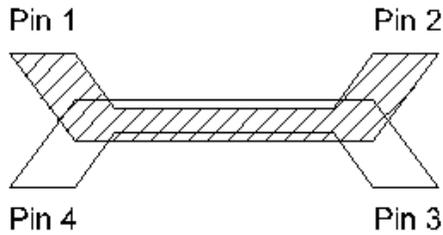
Dimensions are in Inches [Millimeters]



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:



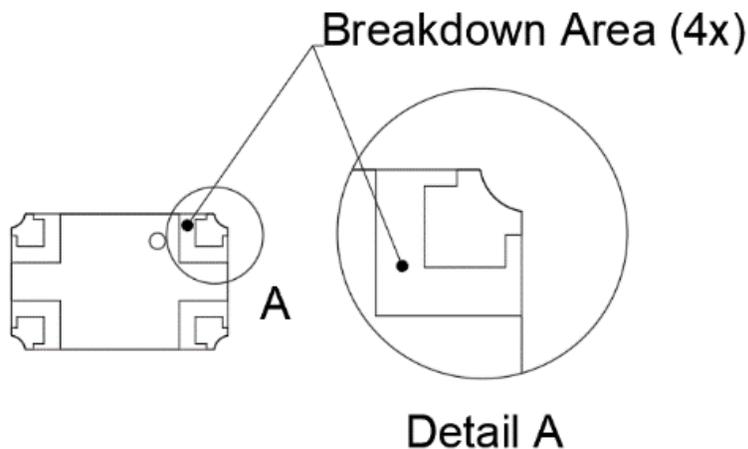
20dB Coupler Pin Configuration

| Pin 1 | Pin 2 | Pin 3 | Pin 4 |
|--------|--------|----------|----------|
| Input | Direct | Isolated | Coupled |
| Direct | Input | Coupled | Isolated |

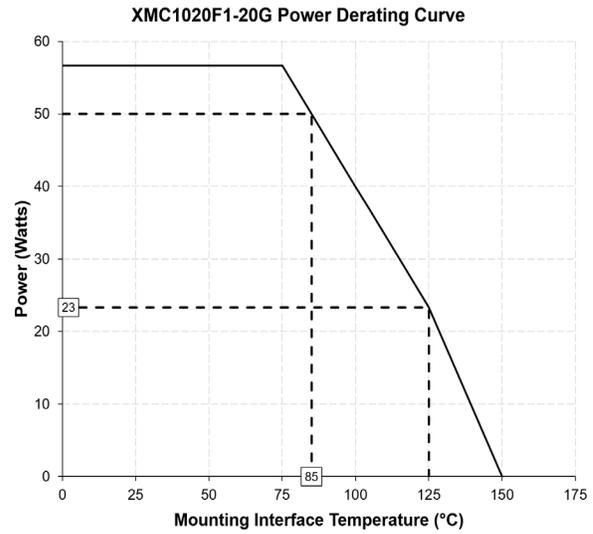
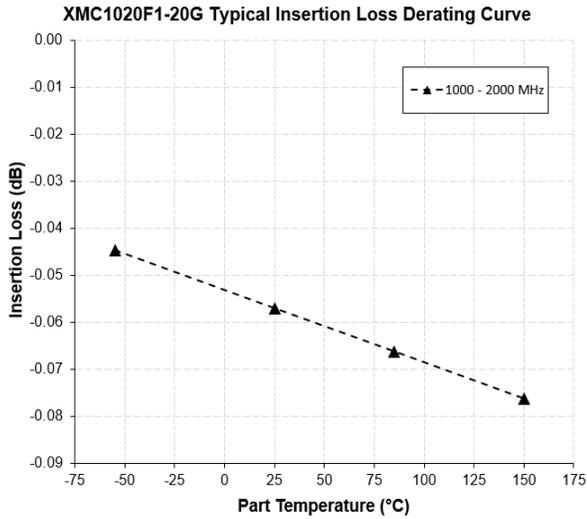
*Note: The direct port has a DC connection to the input port and the coupled port has a DC connection to the isolated port. For optimum IL and power handling performance, use Pin 1 or Pin 2 as inputs.

Peak Power Handling:

High-Pot testing of these component during the qualification procedure resulted in a minimum breakdown voltage of 1.20 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.

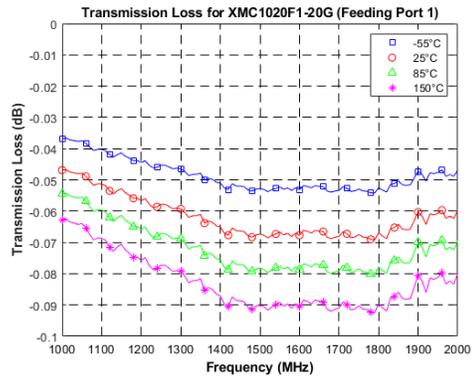
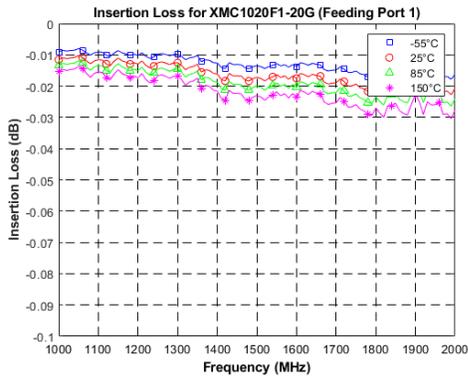
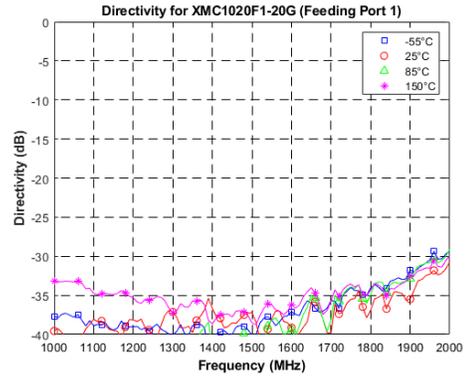
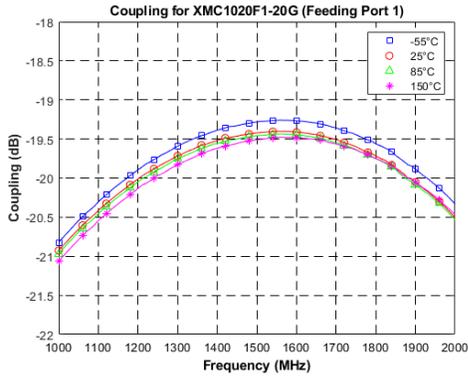
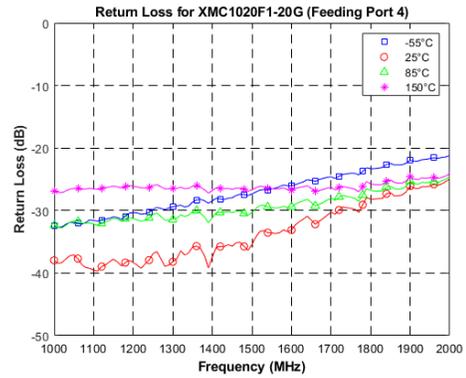
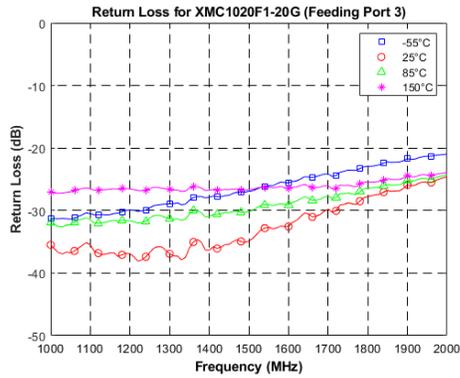
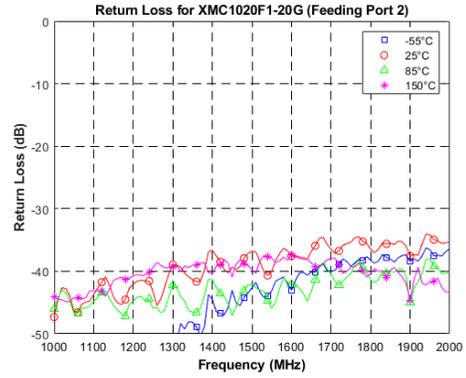
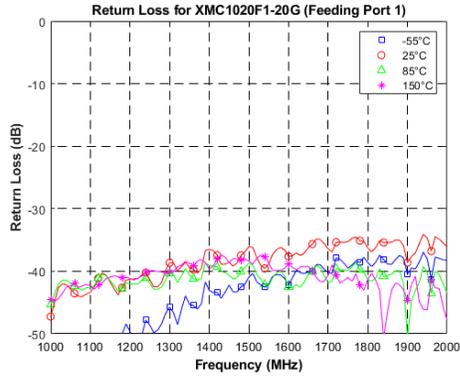
Power Derating:

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:

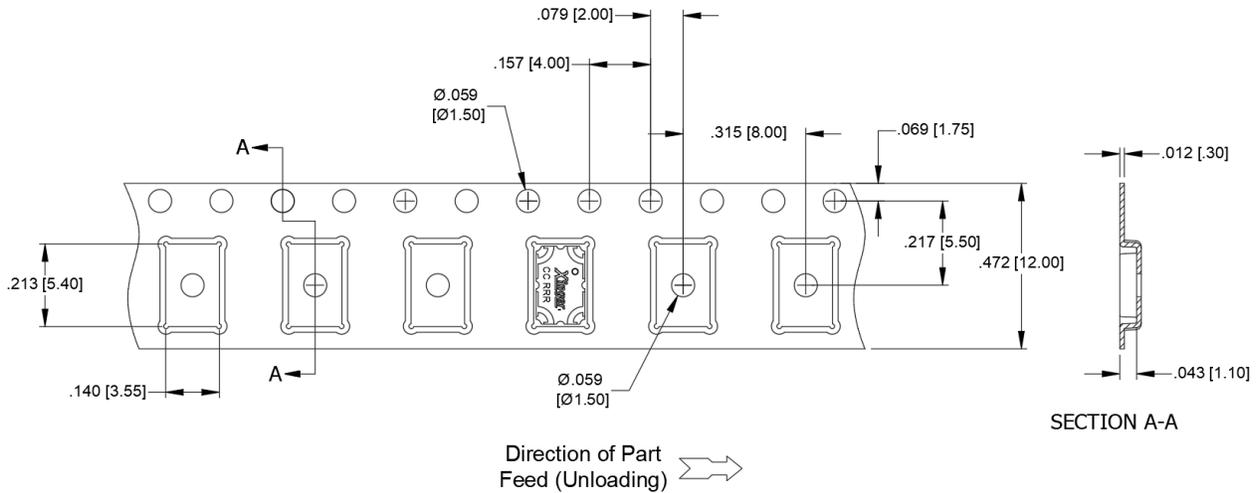


Definition of Measured Specifications

| 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. | $VSWR = \frac{V_{max}}{V_{min}}$ 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. | $Return\ Loss(dB) = 20\log \frac{VSWR + 1}{VSWR - 1}$ |
| Mean Coupling | At a given frequency (ω_n), coupling is the input power divided by the power at the coupled port. Mean coupling is the average value of the coupling values in the band. N is the number of frequencies in the band. | $Coupling(dB) = C(\omega_n) = 10\log \frac{P_{in}(\omega_n)}{P_{cpt}(\omega_n)}$ $Mean\ Coupling(dB) = \frac{\sum_{n=1}^N C(\omega_n)}{N}$ |
| Insertion Loss | The input power divided by the sum of the power at the two output ports. | $Insertion\ Loss(dB) = 10\log \frac{P_{in}}{P_{cpt} + P_{direct}}$ |
| Transmission Loss | The input power divided by the power at the direct port. | $10\log \frac{P_{in}}{P_{direct}}$ |
| Directivity | The power at the coupled port divided by the power at the isolated port. | $10\log \frac{P_{cpt}}{P_{iso}}$ |
| Frequency Sensitivity | The decibel difference between the maximum in band coupling value and the mean coupling, and the decibel difference between the minimum in band coupling value and the mean coupling. | Max Coupling (dB) – Mean Coupling (dB) and Min Coupling (dB) – Mean Coupling (dB) |

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. Tape and reel is available in 4000 pcs or 250 pcs per reel.



Dimensions are in Inches [Millimeters]

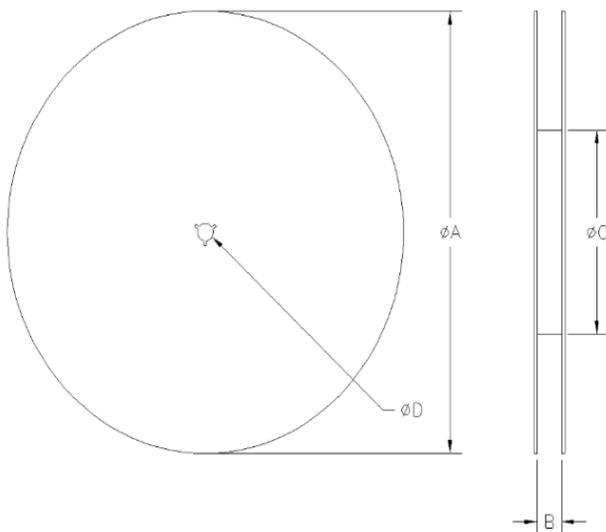


TABLE 1: 4000pc REEL DIMENSIONS: inches [mm]

| | |
|----------|----------------|
| ϕA | 13.0 [330.00] |
| B | 0.472 [12.00] |
| ϕC | 4.017 [102.03] |
| ϕD | 0.512 [13.00] |

TABLE 2: 250pc REEL DIMENSIONS: inches [mm]

| | |
|----------|---------------|
| ϕA | 7.0 [177.80] |
| B | 0.472 [12.00] |
| ϕC | 2.00 [50.80] |
| ϕD | 0.512 [13.00] |

Part Naming Convention

XMC 1020 F 1 - 20 G

| Function & Family | Frequency | Package Size | Power Handling | Coupling | Finish |
|------------------------|--------------------------------------|---------------------|----------------|-----------|----------|
| XMC = Mil-Aero Coupler | 1020 = typ freq range 1.0 to 2.0 GHz | F = 0.200" x 0.125" | 1 = 1-100W | 20 = 20dB | G = ENIG |

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