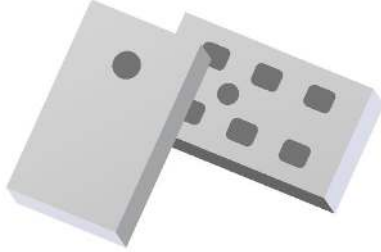


# Xinger<sup>®</sup>IV

## Ultra Low Profile 060 4dB Directional Coupler



### Description:

The X4C20L1-04G is a low cost, low profile sub-miniature high performance 4 dB directional coupler in a new easy to use, manufacturing friendly surface mount package. It is designed for 1700-2300MHz applications including 5G applications.

Parts have been subjected to rigorous 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, RO4003 and polyimide. Produced with 6 of 6 RoHS compliant ENIG finish.

### Features:

- 1700-2300 MHz
- 5G Applications
- Very Low Loss
- Tight Coupling
- High Isolation
- Production Friendly
- Tape and Reel
- RoHS Compliant
- Halogen Free

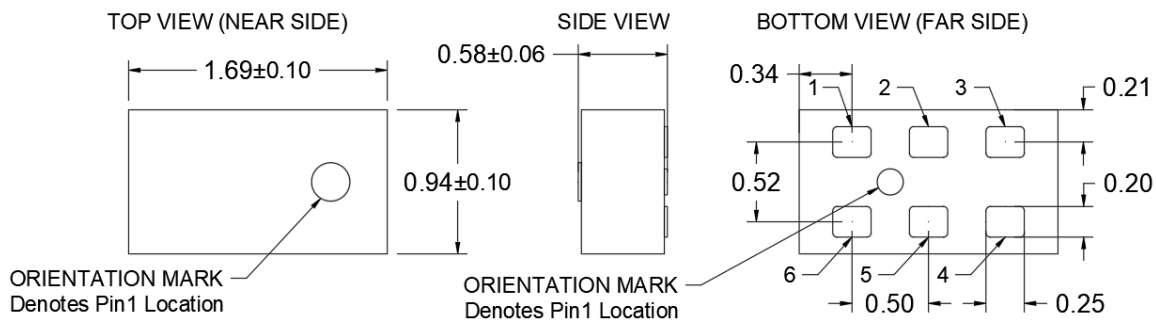
### Electrical Specifications\*\*

Frequency	Coupling	Insertion Loss	Return Loss
<i>MHz</i>	<i>dB</i>	<i>dB Max</i>	<i>dB Min</i>
1700-2000	4.1 ± 0.5	0.4	20
2000-2300	3.8 ± 0.5	0.4	20
Directivity	Phase Balance	Power	Operating Temp.
<i>dB Min</i>	<i>Degrees</i>	<i>Avg. CW Watts @105 °C</i>	<i>°C</i>
20	90 ± 4	3*	-55 to +140
20	90 ± 4	3*	-55 to +140

\*\*Specification based on performance of unit properly installed on TTM Test Board with small signal applied.

\*Specifications subject to change without notice. Refer to parameter definitions for details.

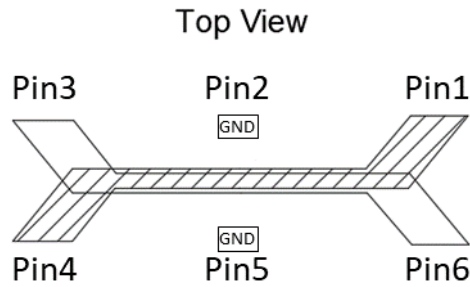
### Mechanical Outline:



Dimensions are in Millimeters  
Tolerance are Non-Cumulative

## Directional Coupler Pin Configuration

The X4C20L1-04G 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:



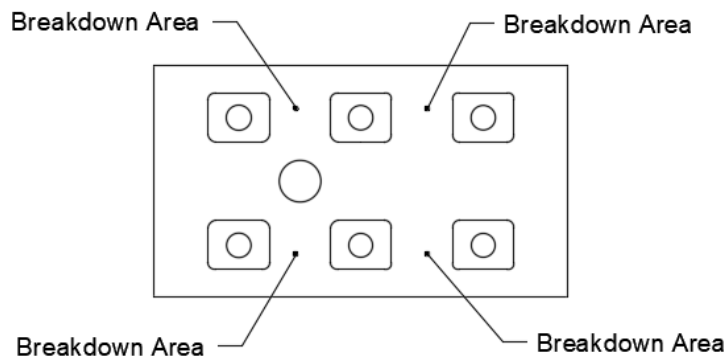
**4dB Coupler Pin Configuration**

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 3 as inputs.

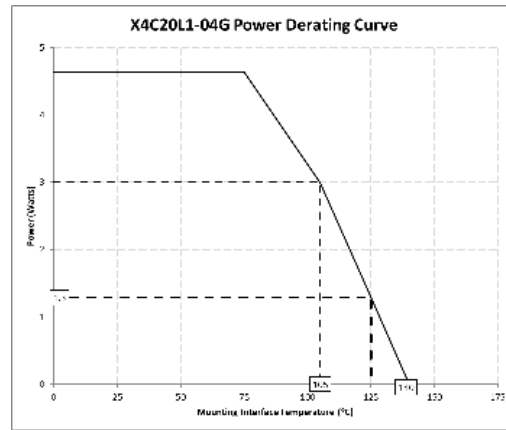
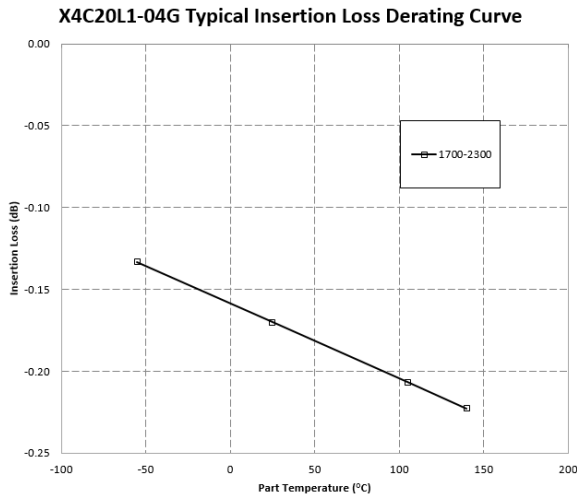
Configuration	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6
Splitter	Input	GND	Isolated	-2.2dB $\angle\theta-90$	GND	-4dB $\angle\theta$
Splitter	Isolated	GND	Input	-4dB $\angle\theta$	GND	-2.2dB $\angle\theta-90$
Splitter	-2.2dB $\angle\theta-90$	GND	-4dB $\angle\theta$	Input	GND	Isolated
Splitter	-4dB $\angle\theta$	GND	-2.2dB $\angle\theta-90$	Isolated	GND	Input

## Peak Power Handling:

High-Pot testing of these components during the qualification procedure resulted in a minimum breakdown voltage of 1Kv (minimum recorded value). This voltage level corresponds to a breakdown resistance capable of handling at least 12dB peaks over average power levels, for very short durations. The breakdown location consistently occurred across the pads and the ground bar (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 a group of couplers 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, 105°C and 140°C. A best-fit line for the measured data is computed and then plotted from -55°C to 140°C.

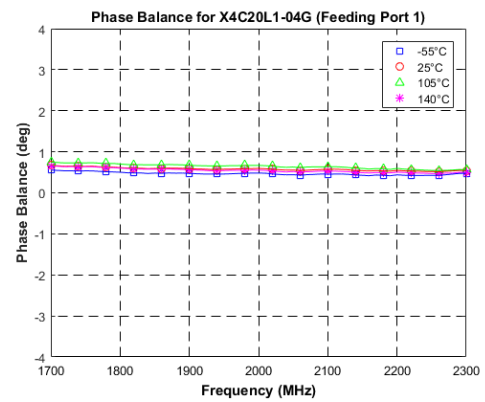
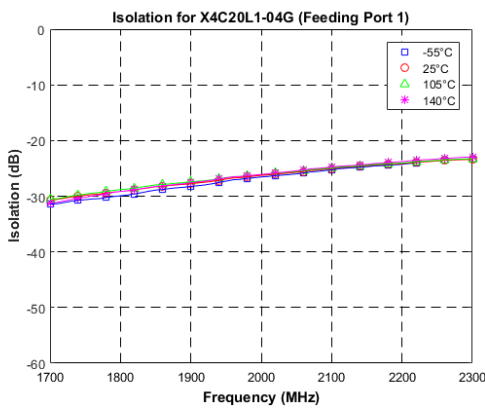
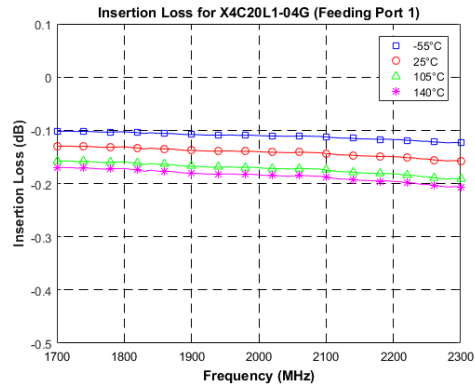
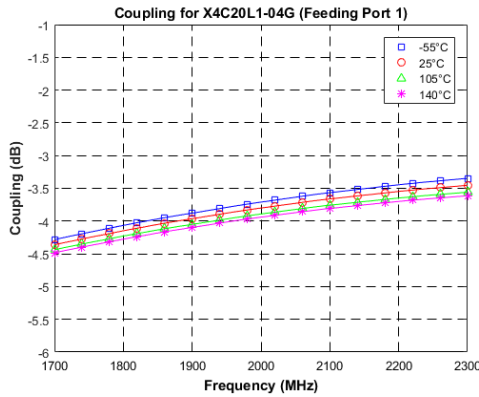
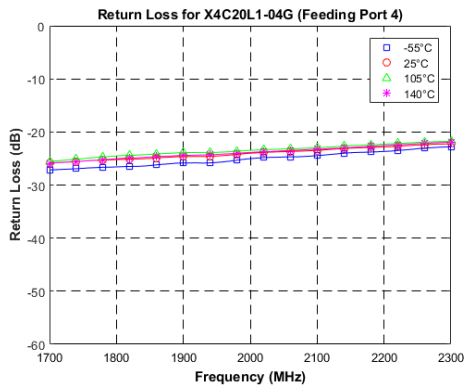
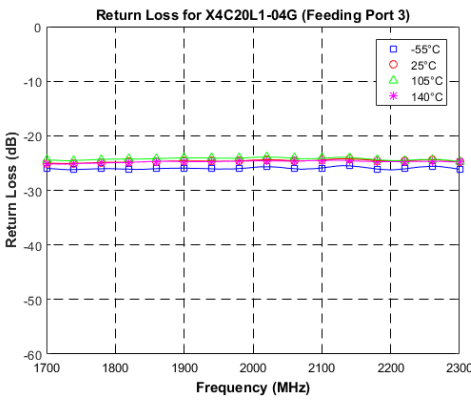
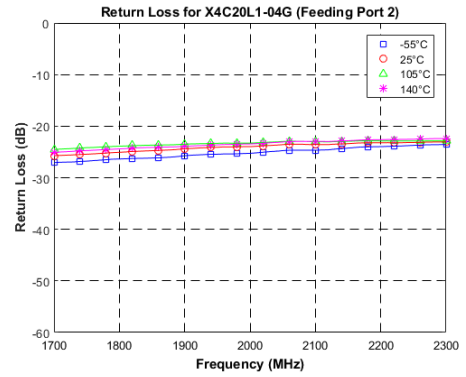
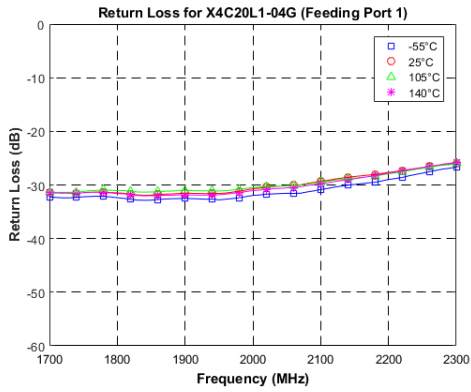
### Power Derating:

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 coupler, 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 105°C, Xinger coupler will perform reliably as long as the input power is derated to the curve above.

**Typical Performance (at -55, 25, 105 and 140°C): 1700 - 2300 MHz**



## Definition of Measured Specifications

Parameter	Definition	Mathematical Representation
<b>VSWR</b> (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
<b>Return Loss</b>	The impedance match of the coupler to a 50Ω system. Return Loss is an alternate means to express VSWR.	$\text{Return Loss(dB)} = 20\log \frac{VSWR + 1}{VSWR - 1}$
<b>Insertion Loss</b>	The input power divided by the sum of the power at the two output ports.	$\text{Insertion Loss(dB)} = 10\log \frac{P_{in}}{P_{cpl} + P_{direct}}$
<b>Isolation</b>	The input power divided by the power at the isolated port.	$\text{Isolation(dB)} = 10\log \frac{P_{in}}{P_{iso}}$
<b>Phase Balance</b>	The difference in phase angle between the two output ports.	Phase at coupled port – Phase at direct port
<b>Coupling</b>	At a given frequency ( $\omega_n$ ), coupling is the input power divided by the power at the coupled port.	$\text{Coupling(dB)} = C(\omega_n) = 10\log \frac{P_{in}(\omega_n)}{P_{cpl}(\omega_n)}$
<b>Group Delay</b>	Group delay is average of group delay's from input port to the coupled port	Average (GD-C)

**Packaging and Ordering Information:**

Parts are available in reel and are packaged per EIA 481. Parts are oriented in tape and reel as shown below. Minimum order quantities are 4000 per reel.

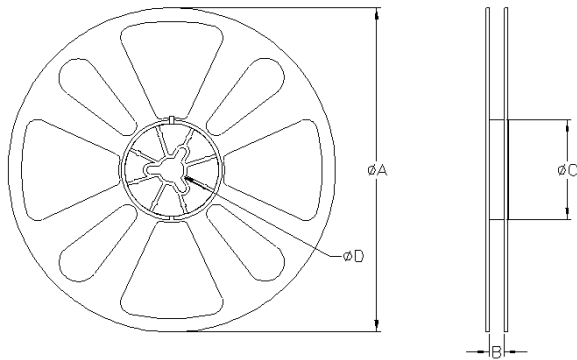
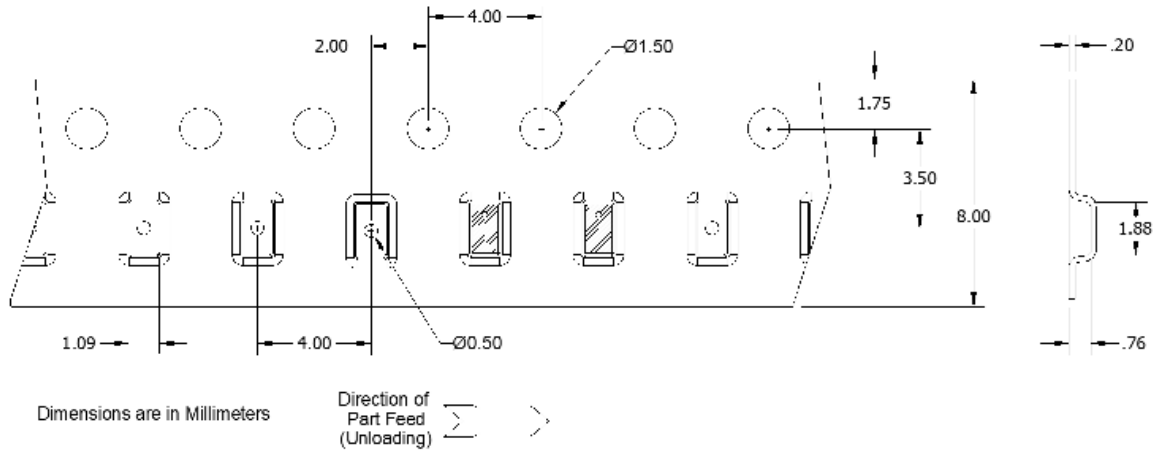


TABLE 1		
QUANTITY/REEL	REEL DIMENSIONS mm	
4000	ØA	177.80
	B	8.00
	ØC	50.80
	ØD	13.00

Contact us:  
[rf&s\\_support@ttm.com](mailto:rf&s_support@ttm.com)