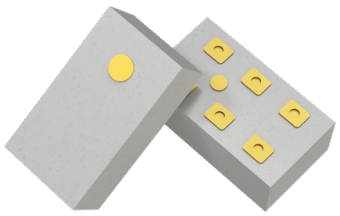
XingerIV

Ultra Low Profile 0603
20dB Directional Coupler



Description:

The X4C20L1-20G is a cost effective, low profile sub-miniature (0603) high performance 20dB directional coupler, with a power rating of 7 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 1700-2300 MHz applications in end markets including: LTE wireless communications and COTS Mil-Aero. The X4C20L1-20G is designed particularly for RF power and frequency detection, as well as for VSWR 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, RF-35, RO4350 and polyimide. Produced with 6 of 6 RoHs compliant ENIG final finish.

Features:

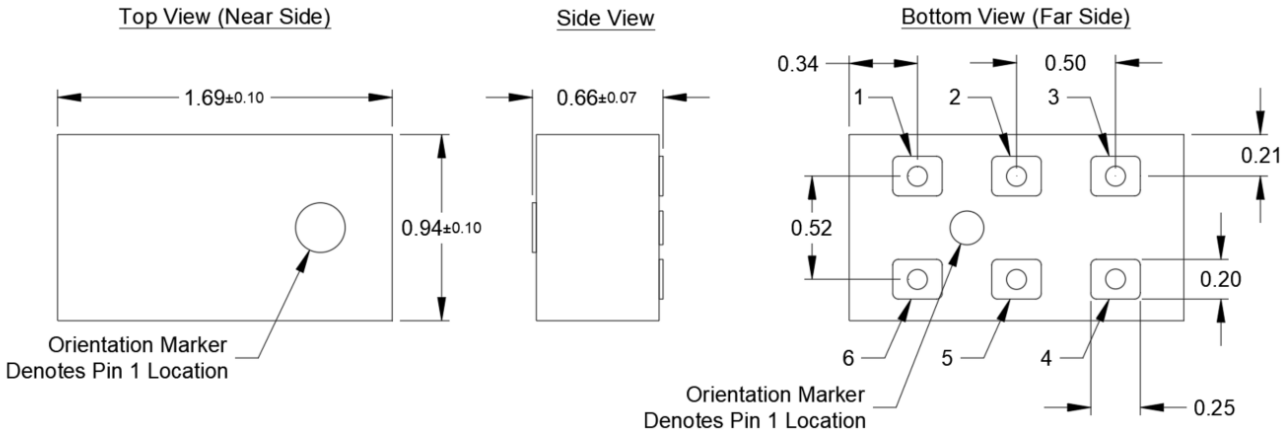
- **1700-2300 MHz**
- **LTE & COTS Mil-Aero**
- **Power 7W (AVG)**
- **Peak to Average Ratio 12dB**
- **0.66mm Height Profile**
- **Very Low Loss (<0.1db)**
- **Tight Coupling (±1.0)**
- **High Directivity (18 dB)**
- **Production Friendly**
- **Tape and Reel**
- **Lead Free**
- **Made in the USA**

Electrical Specifications*:

Frequency	Coupling	Insertion Loss	VSWR
MHz	*dB*	*dB Max*	*Max : 1*
1700-2300	20.0 ± 1.0	0.1	1.29
Frequency Sensitivity	**Directivity**	**Power**	**Operating Temp.**
dB	*dB Min*	*AVG Watts @105°C*	*°C*
± 0.30	18	7	-55 to +140

*Specification based on performance of unit properly installed on TTM Technologies Test Board with small signal applied. Specifications subject to change without notice. Refer to parameter definitions for details.

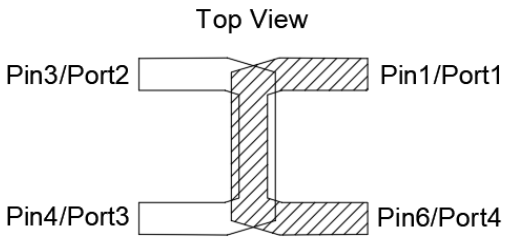
Mechanical Outline:



-Dimensions are in Millimeters
-Tolerances are Non-Cumulative

Pin Configuration:

The X4C20L1-20G 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:



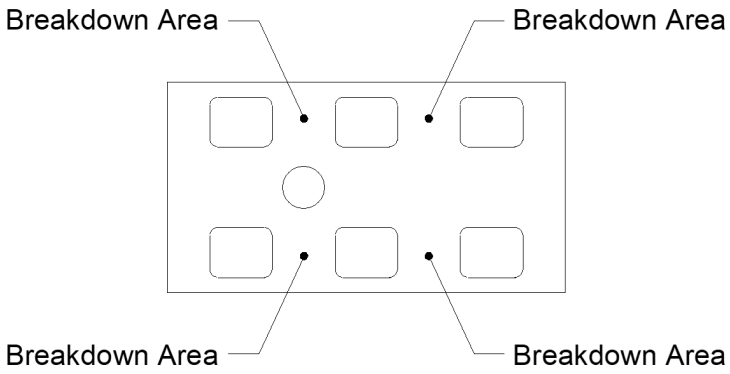
20dB Coupler Pin Configuration (0603)

Configuration	Pin 1/Port 1	Pin 2	Pin 3/Port 2	Pin 4/Port 3	Pin 5	Pin 6/Port 4
Configuration-1	Input	Gnd	Coupled	Isolated	Gnd	Direct
Configuration-2	Direct	Gnd	Isolated	Coupled	Gnd	Input

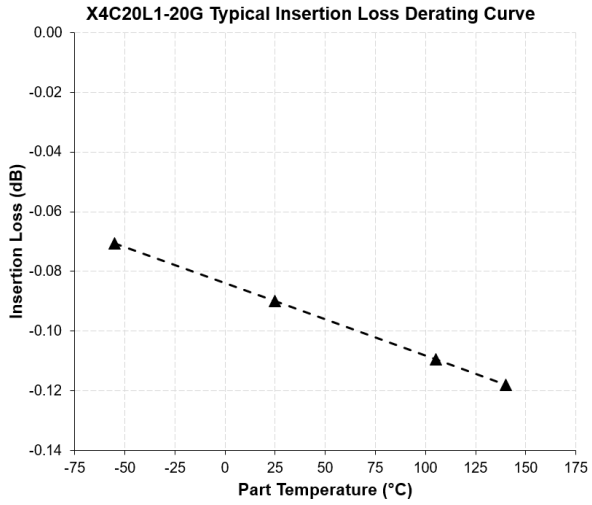
Note: The direct port has a DC connection to the input port and the coupled port has a DC connection to the isolated port. For optimum IL and power handling performance, use Pin 1 or Pin 6 as inputs.

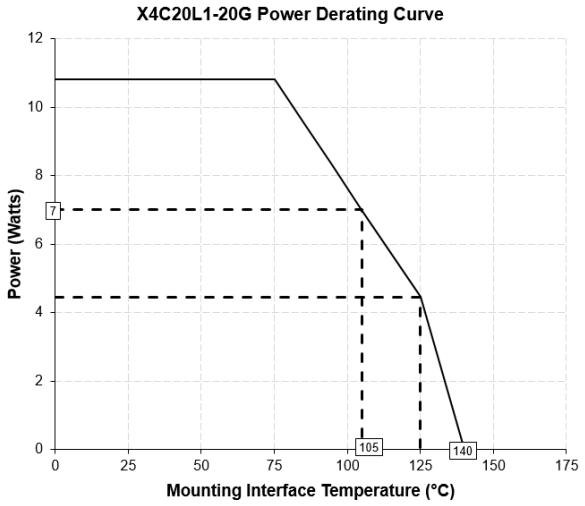
Peak Power Handling

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 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, 105°C and 140°C. A best-fit line for the measured data is computed and then plotted from -55°C to 140°C.

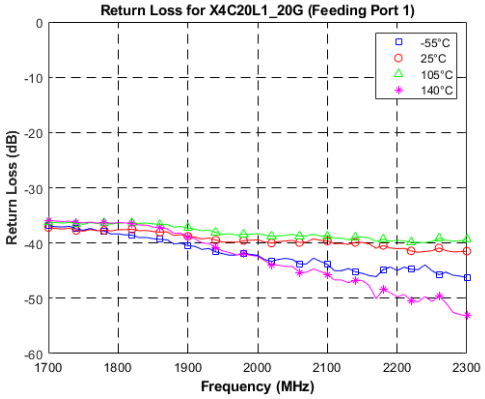
Power Derating:

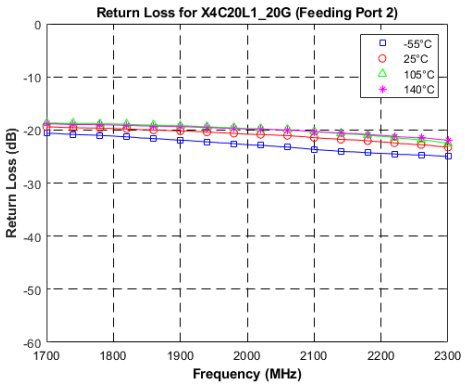
The power handling and corresponding power derating plots are a function of the thermal resistance, mounting surface temperature (base plate temperature), maximum continuous operating temperature of the component, and the thermal insertion loss. The thermal insertion loss is defined in the Power Handling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

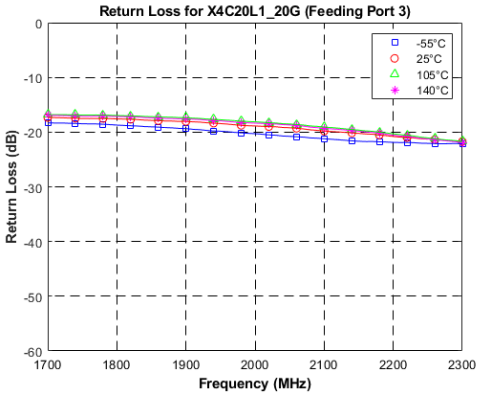
As the mounting interface temperature approaches the maximum continuous operating temperature, the power handling decreases to zero.

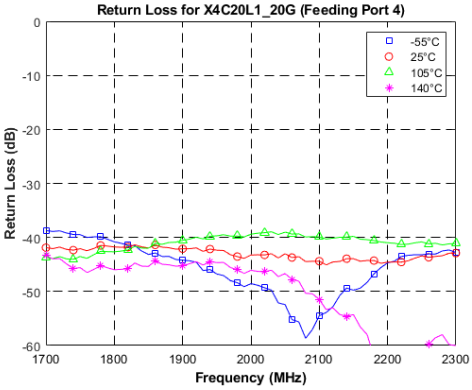
If mounting temperature is greater than 105°C, the Xinger® component will perform reliably as long as the input power is derated to the curve above.

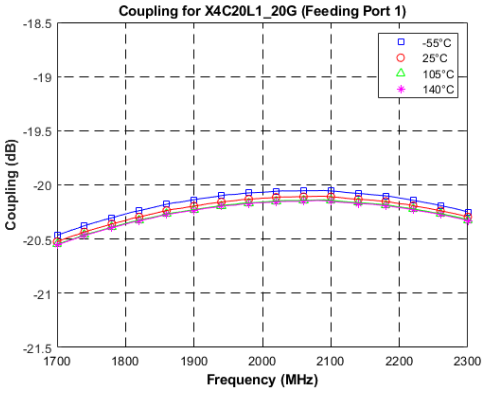
Typical Performance: 2300 to 2700 MHz

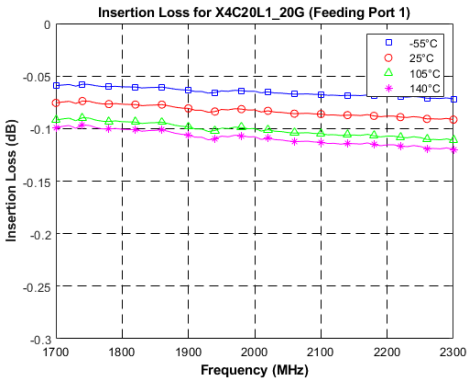


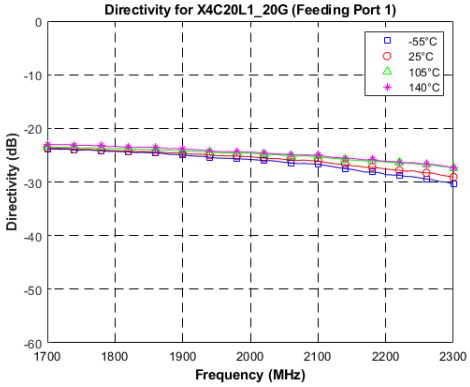


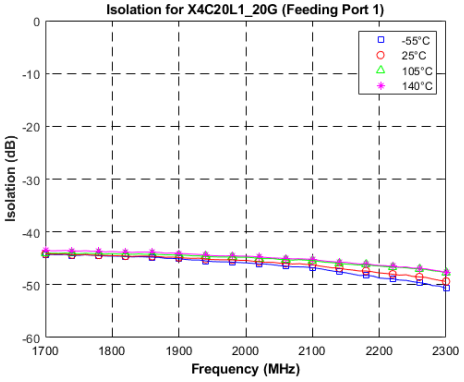










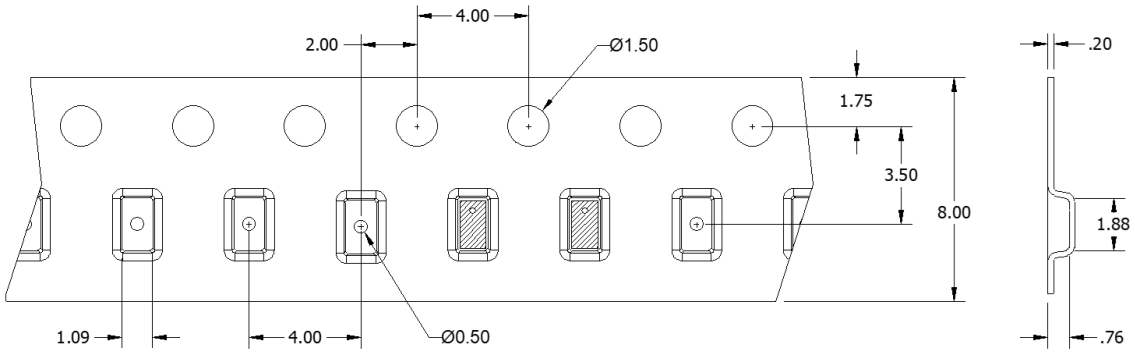


Definition of Measured Specification:

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.	$Return\ Loss(dB) = 20log\ \frac{VSWR+1}{VSWR-1}$
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.	$Coupling(dB) = C(\omega_n) = 10log\ \frac{P_{in}(\omega_n)}{P_{cpl}(\omega_n)}$ $Mean\ Coupling(dB) = \frac{\sum_{n=1}^{N} C(\omega_n)}{N}$
Insertion Loss	The input power divided by the sum of the power at the two output ports.	$Insertion\ Loss(dB) = 10log\ \frac{P_{in}}{P_{cpl}+P_{direct}}$
Transmission Loss	The input power divided by the power at the direct port.	$10log\ \frac{P_{in}}{P_{direct}}$
Directivity	The power at the coupled port divided by the power at the isolated port.	$10log\ \frac{P_{cpl}}{P_{iso}}$
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:

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



Dimensions are in Millimeters

Direction of Part Feed (Unloading)

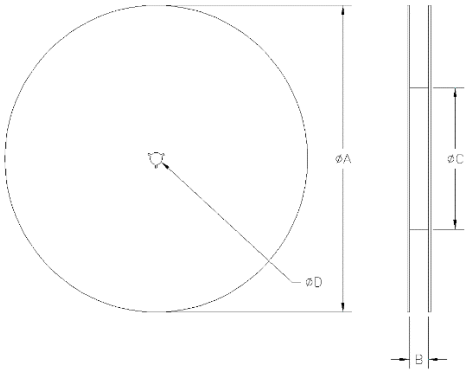


TABLE 1		
QUANTITY/REEL	REEL DIMENSIONS mm	
4000	øA	177.80
	B	8.00
	øC	50.80
	øD	13.00

Contact us:
rf&s_support@ttm.com