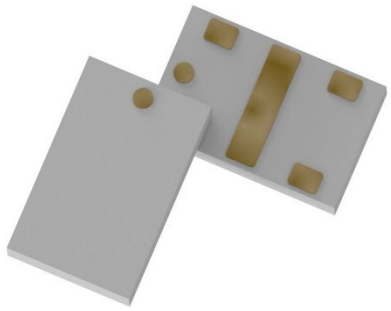
XingerIV

Ultra Low Profile 0805
20dB Directional Coupler



Description:

The X4C60J1-20G is a is a cost effective, low profile sub-miniature high performance 20 dB directional coupler in a new easy to use, Xinger style manufacturing friendly surface mount package. It is designed for 4400-7100 MHz applications including: 5G, LTE and C-Band Mil-Aero. X4C60J1-20G is designed particularly for power and frequency detection, as well as for return loss monitoring, where tightly controlled coupling and low insertion loss is required. It can be used in power applications up to 10 Watts (CW).

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, RO4003 and polyimide. Produced with 6 of 6 RoHS compliant ENIG finish.

Features:

- **4400-7100 MHz**
- **0.59mm Height Profile**
- **5G, LTE, C-Band Mil Aero**
- **Power 10W (CW)**
- **Very Low Loss**
- **High Directivity**
- **Production Friendly**
- **Tape and Reel**
- **RoHS Compliant**
- **Halogen Free**

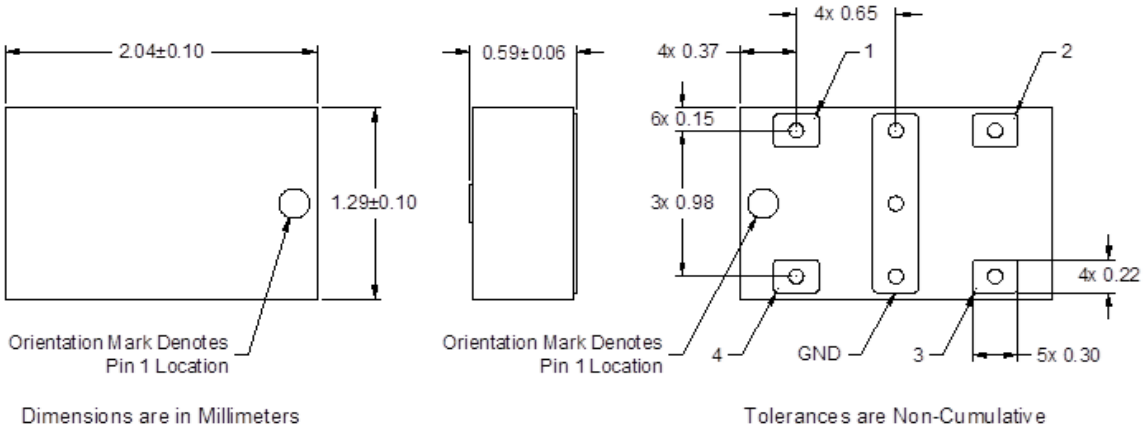
Electrical Specifications*:

Frequency	Mean Coupling	Insertion Loss	Return Loss
MHz	*dB*	*dB Max*	*dB Min*
4400-5100	20 ±1.5	0.15	18
5100-6000	20 ±1.5	0.15	18
6000-6300	20 ±1.5	0.15	18
6300-7100	20 ±1.5	0.15	18

Directivity	Frequency Sensitivity	Power	Operating Temp.
dB Min	*dB Max*	*Avg. CW Watts @ 105°C*	*°C*
18	±0.4	10	-55 to +140
18	±0.2	10	-55 to +140
18	±0.1	10	-55 to +140
18	±0.7	10	-55 to +140

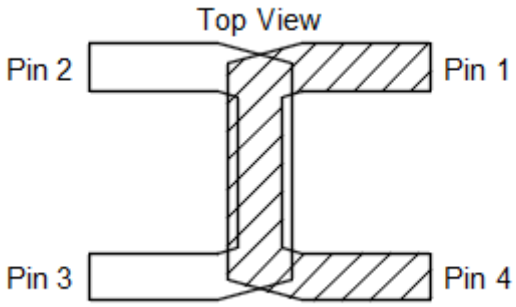
*Specification based on performance of unit properly installed on TTM Test Board with small signal applied. Specifications subject to change without notice. Refer to parameter definitions for details.

Mechanical Outline:



Directional Coupler Pin Configuration:

The X4C60J1-20G 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.

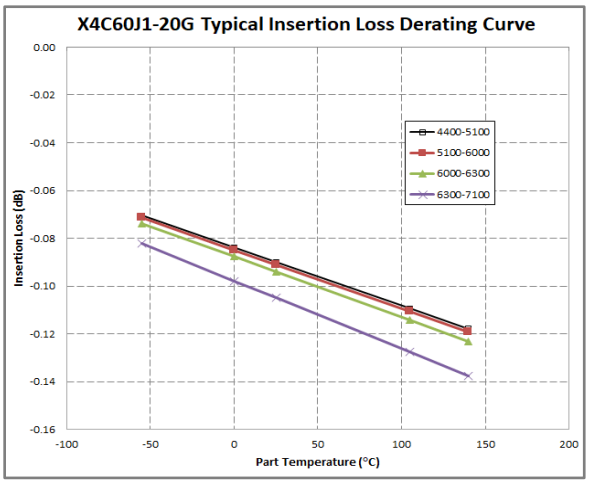


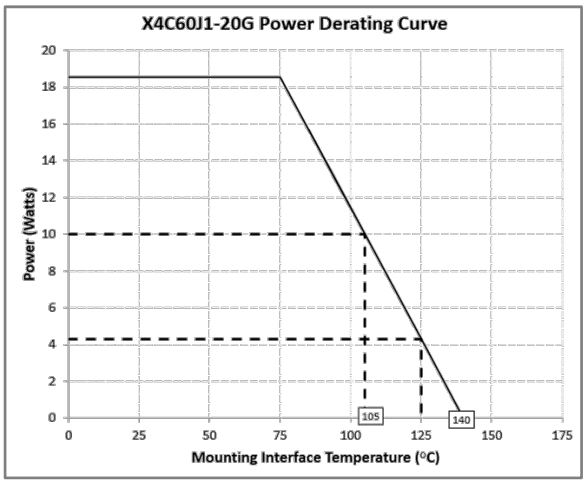
20dB Coupler Pin Configuration

Configuration	Pin 1	Pin 2	Pin 3	Pin 4
Configuration-1	Input	Coupled	Isolated	Direct
Configuration-2	Direct	Isolated	Coupled	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 4 as inputs.

Insertion Loss and Power Derating Curves:





Insertion Loss Derating

The insertion loss, at a given frequency, of the coupler 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.

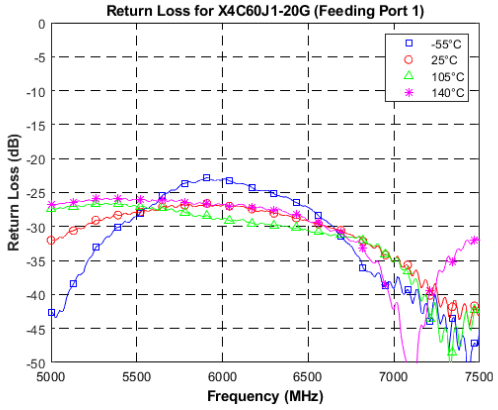
Power Derating

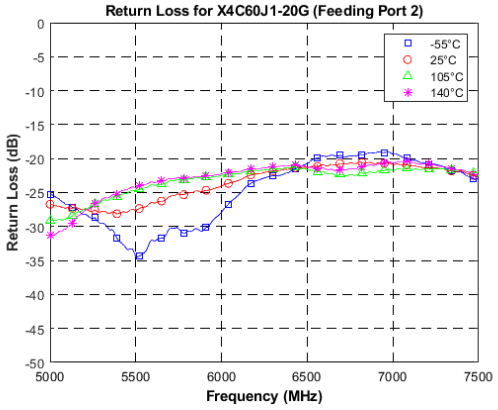
The power handling and corresponding power derating plots are a function of the thermal resistance, mounting surface temperature (base plate temperature), maximum continuous operating temperature of the coupler, and the thermal insertion loss. The thermal insertion loss is defined in the Power Handling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

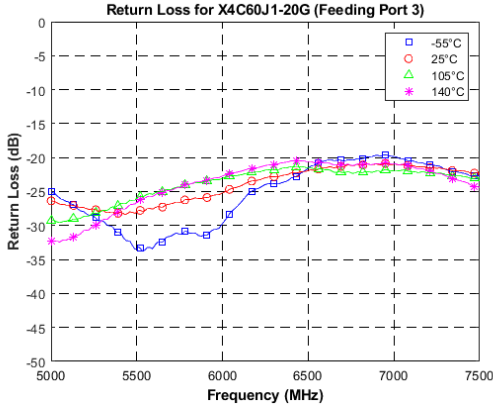
As the mounting interface temperature approaches the maximum continuous operating temperature, the power handling decreases to zero.

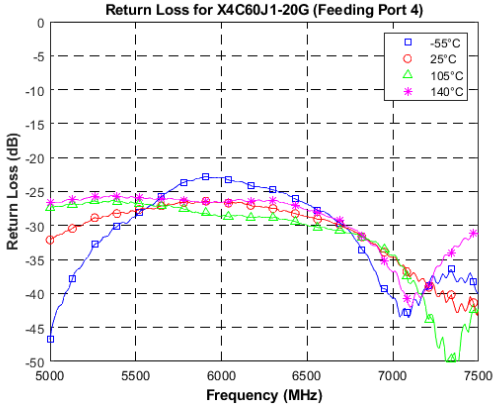
If mounting temperature is greater than 105°C, the Xinger coupler will perform reliably as long as the input power is derated to the curve above.

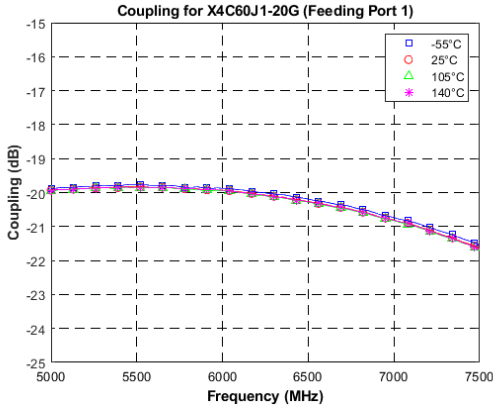
Typical Performance 5000 MHz to 7500 MHz (Configuration 1)

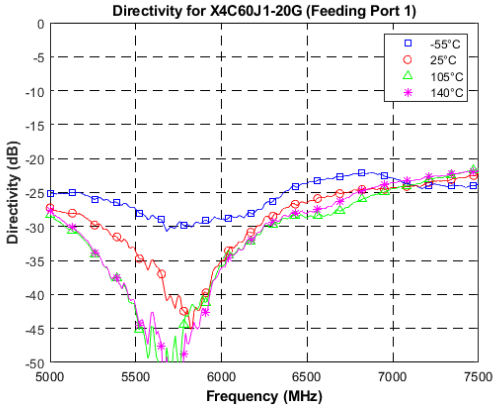


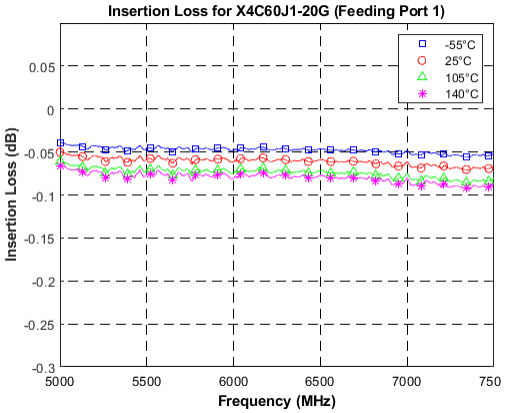


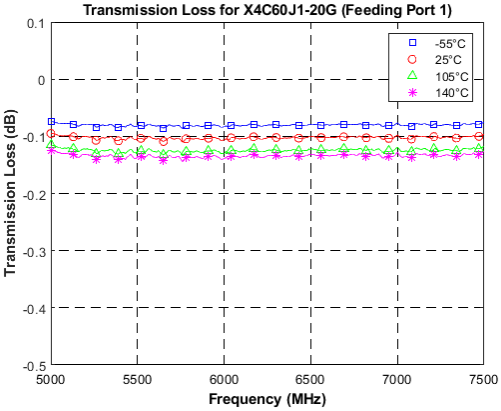












Definition of Measured Specifications:

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.	$Return\ Loss(dB) = 20log\ \frac{VSWR+1}{VSWR-1}$
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)
Group Delay	Group delay is average of group delay's from input port to the coupled port	Average (GD-C)
Group Delay (GD-DC)	Group delay is average of group delay's from input port to the direct port	Average (GD-DC)

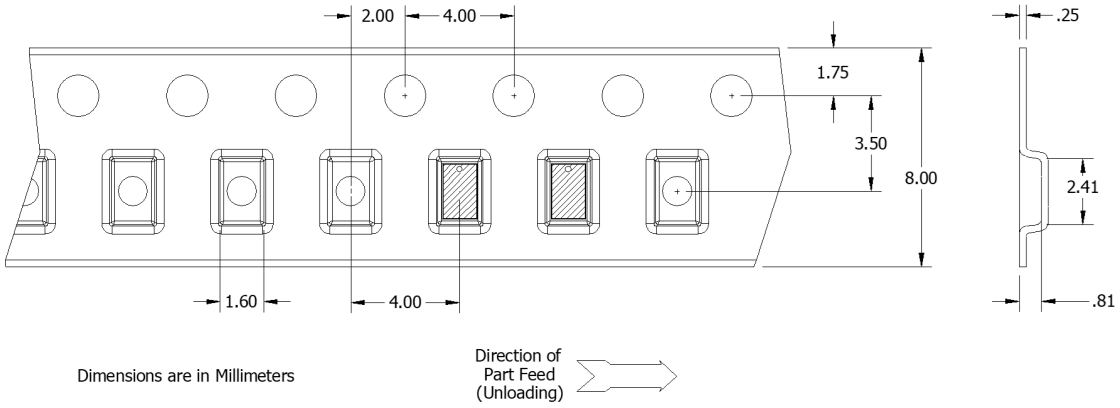
*100% RF test is performed per spec definition for pin configuration 1 and 2.

Peak Power Handling:

High-Pot testing of these couplers 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 peak over average power levels, for very short durations. The breakdown location consistently occurred across the pads and the ground bar. 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).

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.



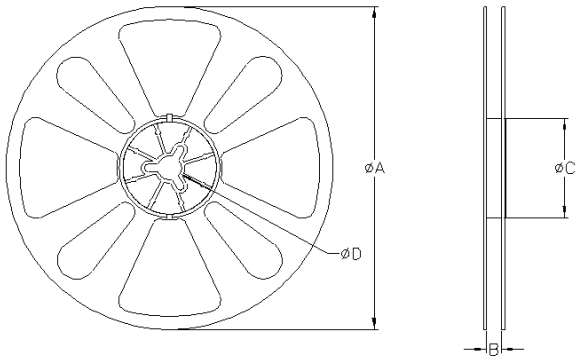


TABLE 1		
QUANTITY/REEL	REEL DIMENSIONS mm	
4000	øA	177.80
	B	8.00
	øC	50.80
	øD	13.00

Contact us:
rf&s_support@ttm.com