



**Directional Coupler,  
30 dB**



**Description:**

Introducing the Next Generation Xinger product; XNGC20F2-30S — a next-generation of virtually lossless, low-profile 30 dB directional couplers, that sets new performance standards. The new Xinger\_NG surface-mount package delivers exceptional loss and directivity, with 200 W average power capability at 125°C for LTE, 5G and L- & S-band applications. The XNGC20F2-30S uses CTE-matched materials to common PCB substrates, having RoHS-compliant Immersion Tin plating, and gives customers a compact, high-reliability solution that accelerates time to market. The device is ideal for power/frequency detection and VSWR monitoring where tightly controlled coupling and low insertion loss are required.

For guaranteed performance, this package requires a ground plane spacing dimension of 0.020" and recommended board stack-up. Relevant layout application notes are on construction for exact ground-plane spacing and layout examples.

**Features:**

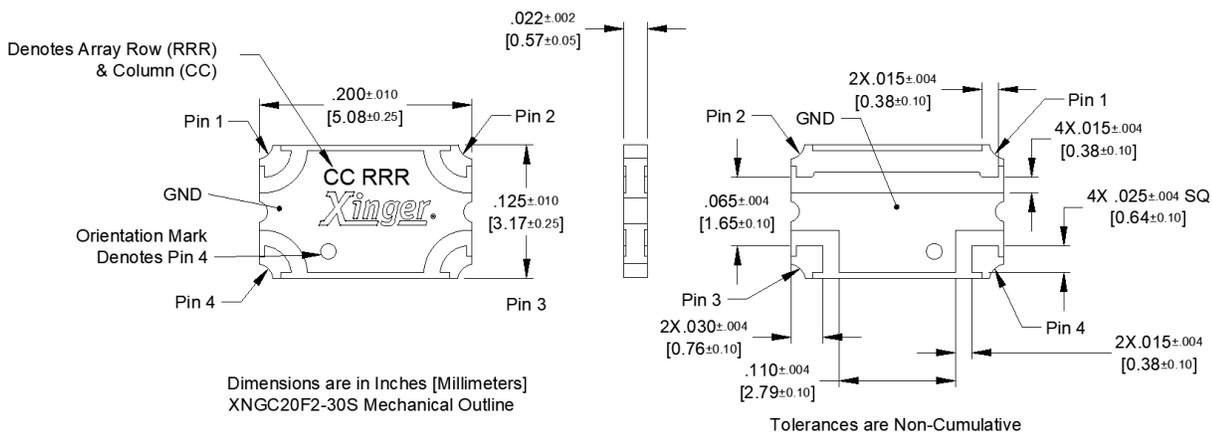
- 1400-2700 MHz
- 5G, LTE, L&S-Band COTS Mil-Aero
- Requires mounting on ground plane spacing of 0.020"
- High power 200W (AVG)
- Peak to Average Ratio 12dB
- Very Low Loss (<0.02dB)
- High Directivity (>23dB)
- Production Friendly
- Tape and Reel

**Electrical Specifications\*:**

Frequency	Mean Coupling	Insertion Loss	Return Loss
MHz	dB	dB Max	dB
1400-2700	30.0 ±1.5	0.02	23
Frequency Sensitivity	Directivity	Power	Operating Temp.
dB	dB Min	Avg. Watts @125°C	°C
±2.0	23	200	-55 to +140

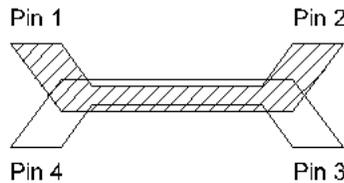
\*Specification based on performance of unit properly installed on TTM Test Board with small signal applied. Specifications subject to change without notice. Refer to parameter definitions for details.

**Mechanical Outline:**



### Directional Coupler Pin Configuration:

The XNGC20F2-30S 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.



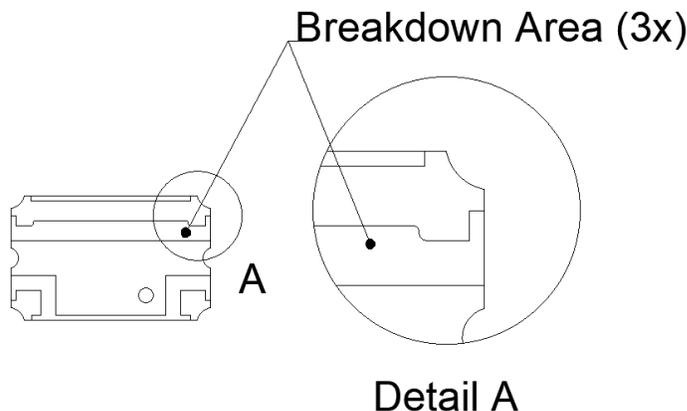
Pin 1	Pin 2	Pin 3	Pin 4
Input	Direct	Isolated	Coupled
Direct	Input	Coupled	Isolated

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.

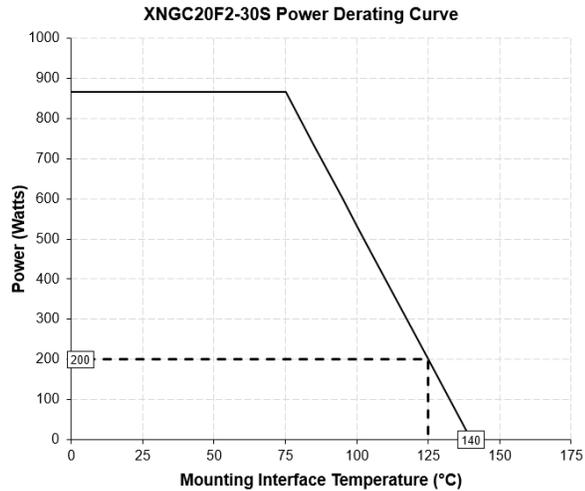
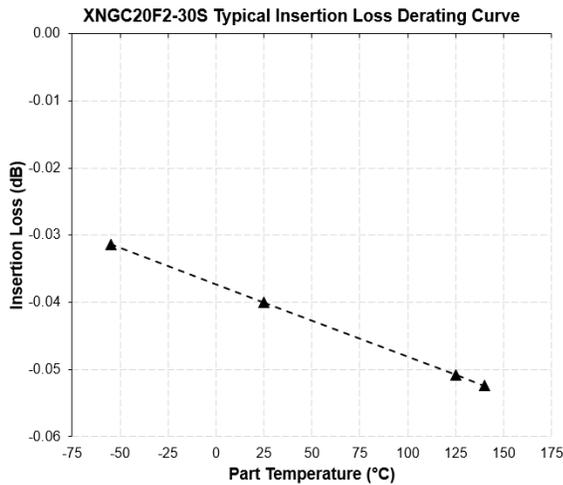
This package requires controlled ground-plane spacing and recommended stack-up to meet the specified IL and directivity. Refer to the Xinger application note or contact RF Engineering for the recommended ground-plane spacing and layout guidelines.

### Peak Power Handling:

High-Pot testing of these couplers during the qualification procedure resulted in a minimum breakdown voltage of 1.24Kv (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 coupler 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 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 125°C and 140°C. A best-fit line for the measured data is computed and then plotted from -55°C to 140°C.

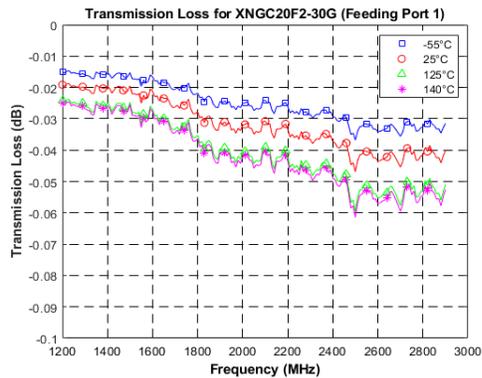
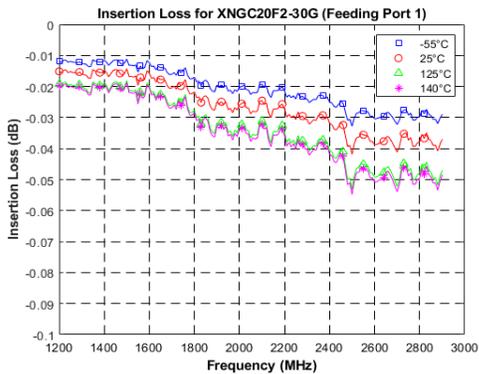
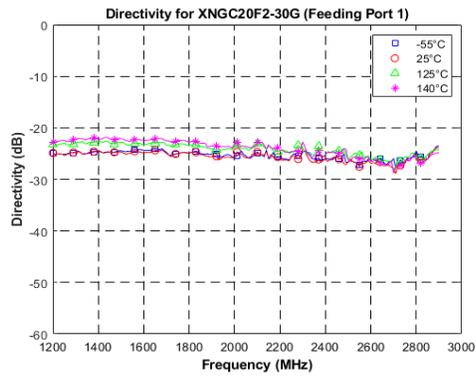
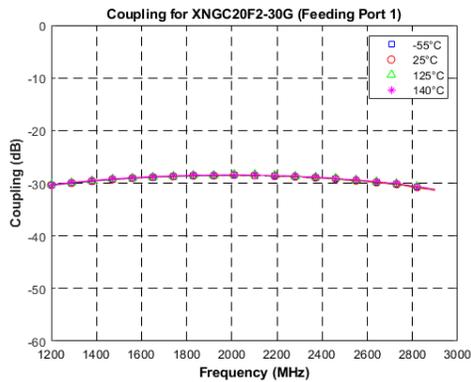
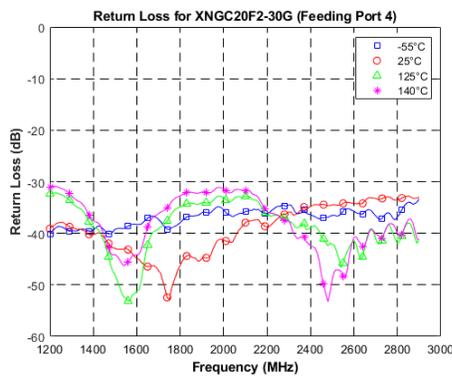
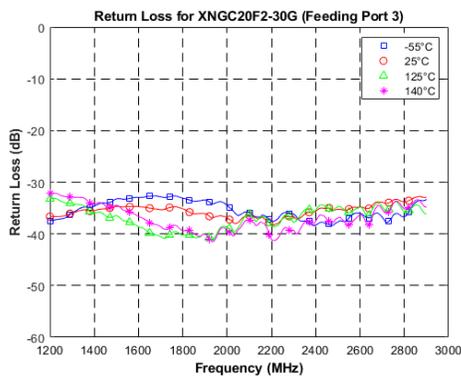
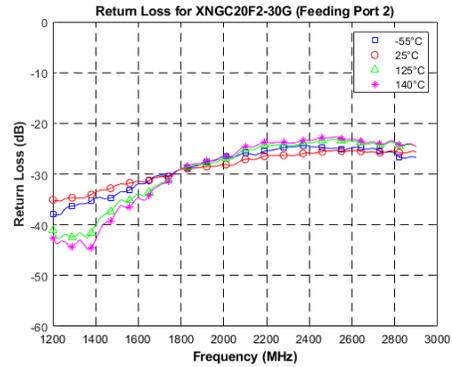
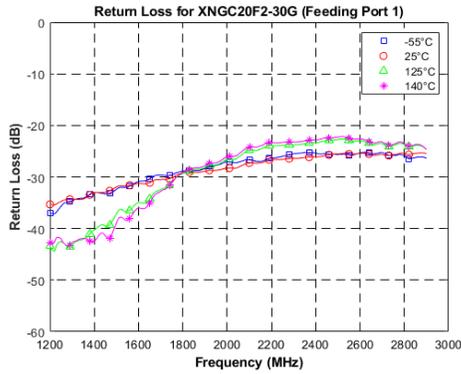
### Power Derating:

The power handling and corresponding power derating plots are a function of 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 125°C, the Xinger coupler will perform reliably if the input power is derated to the curve above.

### Typical Performance:

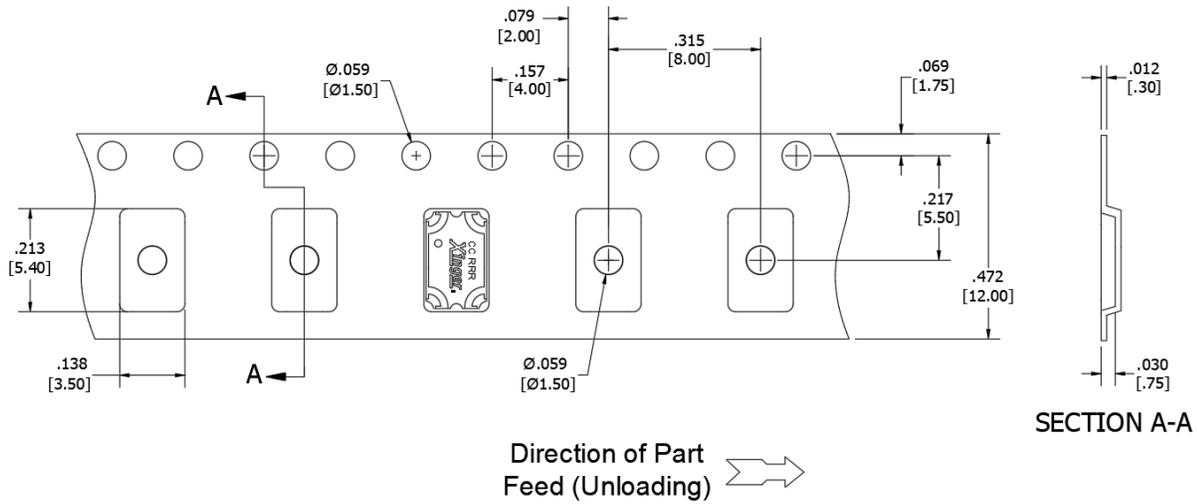


**Definition of Measured Specifications:**

Parameter	Definition	Mathematical Representation
<b>VSWR (Voltage Standing Wave Ratio)</b>	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.	$Return\ Loss(dB) = 20\log \frac{VSWR + 1}{VSWR - 1}$
<b>Mean Coupling</b>	At a given frequency ( $\omega_n$ ), 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.	$Coupling(dB) = C(\omega_n) = 10\log \frac{P_{in}(\omega_n)}{P_{cpl}(\omega_n)}$ $Mean\ Coupling(dB) = \frac{\sum_{n=1}^N C(\omega_n)}{N}$
<b>Insertion Loss</b>	The input power divided by the sum of the power at the two output ports.	$Insertion\ Loss(dB) = 10\log \frac{P_{in}}{P_{cpl} + P_{direct}}$
<b>Transmission Loss</b>	The input power divided by the power at the direct port.	$10\log \frac{P_{in}}{P_{direct}}$
<b>Directivity</b>	The power at the coupled port divided by the power at the isolated port.	$10\log \frac{P_{cpl}}{P_{iso}}$

### 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.



Dimensions are in Inches [Millimeters]

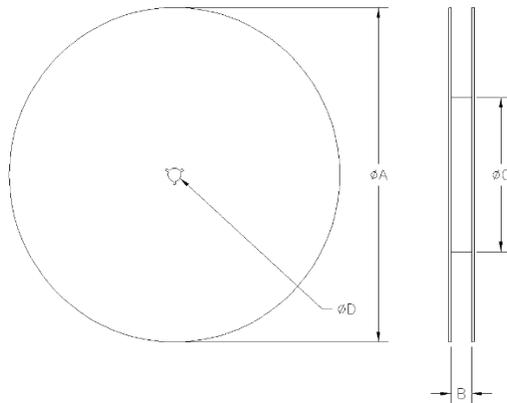


TABLE 1	
REEL DIMENSIONS (inches [mm])	
$\phi A$	13.0 [330.0]
B	.472 [12.0]
$\phi C$	7.0 [177.80]
$\phi D$	0.512 [13.0]

**Part Naming Convention:**

**XNGC 20 F 2 - 30 S**

Function & Family	Frequency	Package Size	Power Handling	Coupling	Finish
XNGC = Xinger Next Generation Coupler	20 = mid freq 2.0 GHz	F = 0.200" x 0.125"	2 = 101-200W	30 = 30dB	S = Immersion Tin

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