Uneven Split Quadrature Coupler
2 dB, 90°

Description:

The X3C35P1-02S is a low profile, high performance uneven split quadrature 2dB hybrid coupler with a power rating of 80 Watts (AVG) and a peak to average ratio of 12dB, in a new easy to use, Xinger style manufacturing friendly surface mount package. The component is designed particularly for the 5G and C-Band applications in all end markets including Telecom and Mil-Aero. The component is particularly used as power splitters in Doherty power amplifiers, where low insertion loss, tight power splitting ratio control and phase balance control are 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, RO4003 and polyimide. Produced with 6 of 6 RoHS compliant tin immersion finish.

Features:

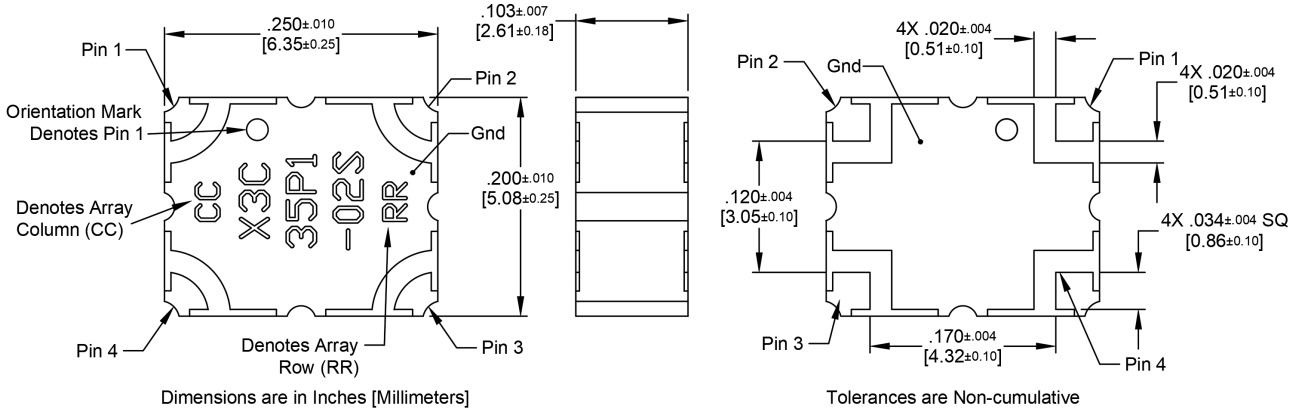
- **3400-3600 MHz**
- **5G, C-Band and COTS Mil-Aero applications**
- **Power 80 Watts (AVG)**
- **Peak to Average Ratio 12dB**
- **Low Insertion Loss (≤0.20dB)**
- **Tight Coupling**
- **Tight Phase Balance**
- **High Isolation**
- **Surface Mountable**
- **Production Friendly**
- **Tape & Reel**
- **RoHS Compliant**
- **Convenient Package**

Electrical Specifications*:

Frequency	Isolation	Insertion Loss	Return Loss
MHz	*dB Min*	*dB Max*	*dB Min*
3400 - 3600	20	0.20	20
Coupling	**Phase Balance**	**Power**	**Operating Temp.**
dB max	*Degrees*	*AVG Watts @ 95°C*	*°C*
2.0 ± 0.25	90 ± 4.0	80	-55 to +150

*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:

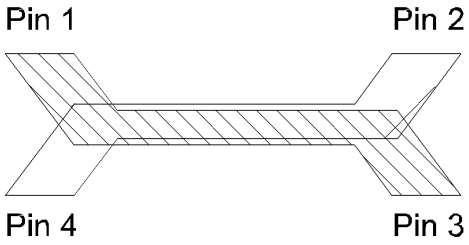


Dimensions are in Inches [Millimeters]

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:

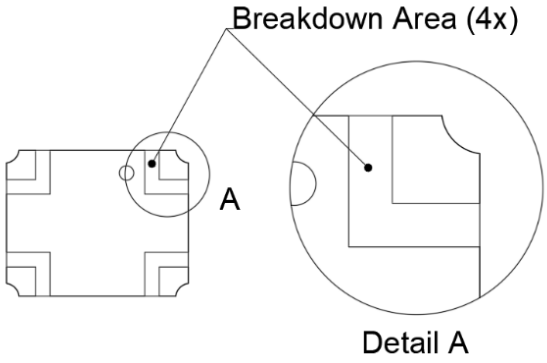


2 dB Coupler Pin Configuration

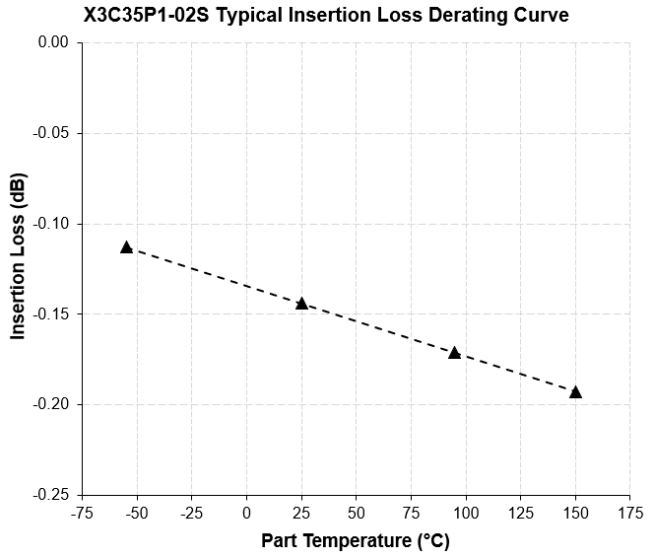
Configuration	Pin 1	Pin 2	Pin 3	Pin 4
Splitter	Input	Isolated	-5dB < Θ -90	-2dB < Θ
Splitter	Isolated	Input	-2dB < Θ	-5dB < Θ -90
Splitter	-5dB < Θ -90	-2dB < Θ	Input	Isolated
Splitter	-2dB < Θ	-5dB < Θ -90	Isolated	Input

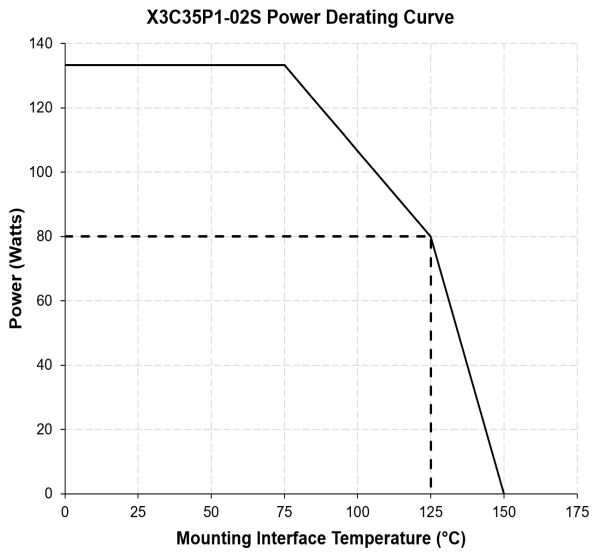
Peak Power Handling:

High-Pot testing of these couplers during the qualification procedure resulted in a minimum breakdown voltage of 1.24 Kv (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 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 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, 95°C and 150°C. A best-fit line for the measured data is computed and then plotted from -55°C to 150°C.

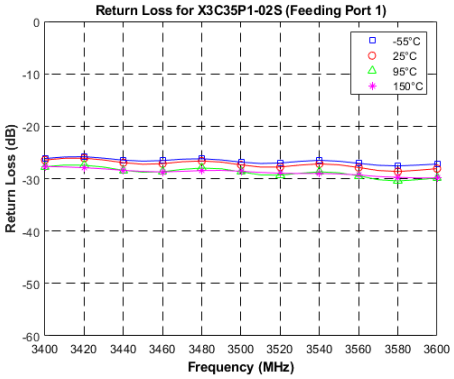
Power Derating:

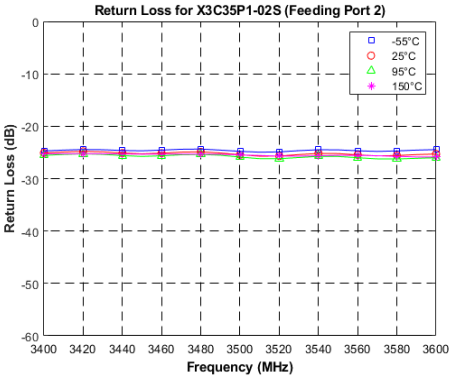
The power handling and corresponding power derating plots are a function of the thermal resistance, mounting surface temperature (base plate temperature), maximum continuous operating temperature of the component, and the thermal insertion loss. The thermal insertion loss is defined in the Power Handling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

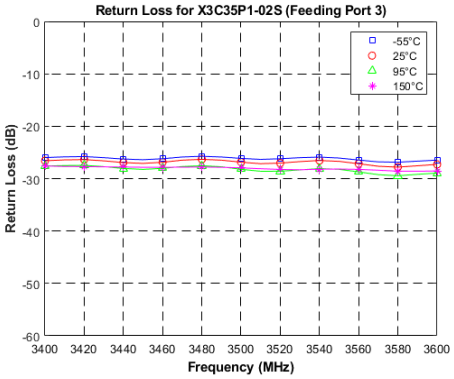
As the mounting interface temperature approaches the maximum continuous operating temperature, the power handling decreases to zero.

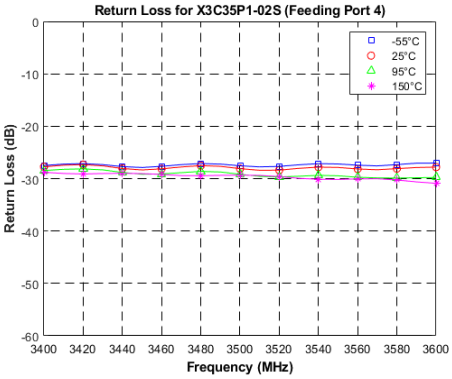
If mounting temperature is greater than 95°C, the component will perform reliably as long as the input power is derated to the curve above.

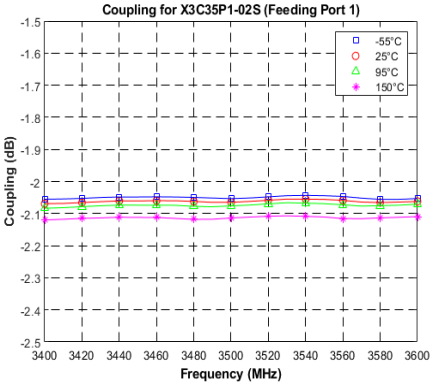
Typical Temperature Performance Plots:

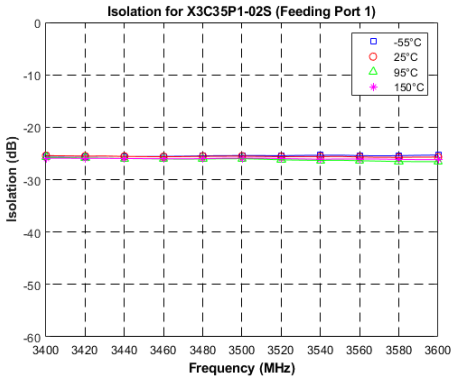


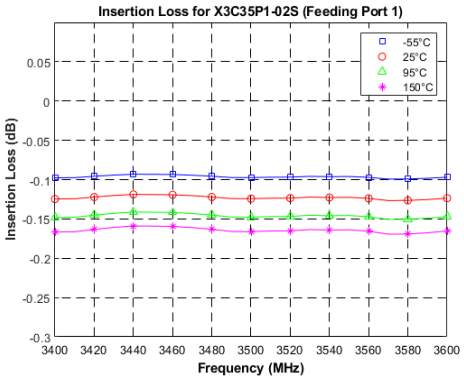


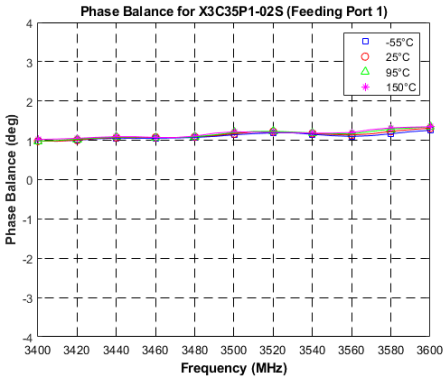










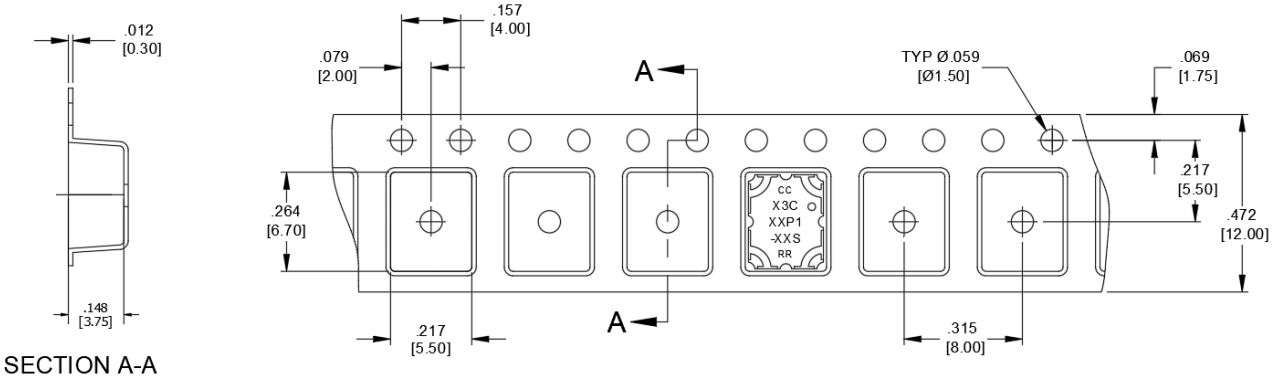


Definition of Measured Specifications:

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

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. Minimum Order quantities are available in 2000 parts per reel.



Dimensions are in Inches [Millimeters]

Direction of Part Feed (Unloading)

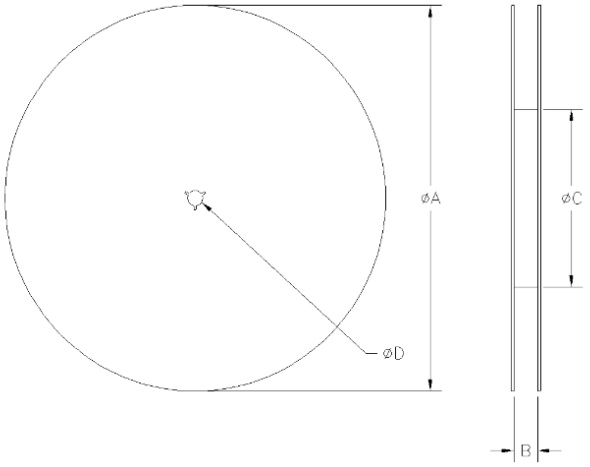


TABLE 1: 2000pc
REEL DIMENSIONS: inches [mm]

∅A	13.0 [330.00]
B	0.472 [12.00]
∅C	4.017 [102.03]
∅D	0.512 [13.00]

Part Naming Convention

X3C 35 P 1 – 02 S

Function & Family	Frequency	Package Size	Power Handling	Coupling	Finish
X3C = Xinger 3 Coupler	35 = typ freq 3.5 GHz	P = 0.250" x 0.200"	1 = 1-100W	02 = 2dB	S = Immersion Tin

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