WINSOURCE ELECTRONICS

THE DATASHEET OF

X3C19F1-20S

Xinger®

Directional Coupler
20 dB



Description:

The X3C19F1-20S is a low profile, high performance 20dB directional coupler in a new easy to use, manufacturing friendly surface mount package. It is designed for AMPS, GSM, WCDMA and LTE band applications. The X3C19F1-20S is designed particularly for balanced power and low noise amplifiers, plus signal distribution and other applications where low insertion loss and tight amplitude and phase balance is required. It can be used in high power applications up to 25 watts.

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 tin immersion finish.

Features:

- **1400-2700 MHz**
- **AMPS, GSM, WCDMA & LTE**
- **High Power**
- **Very Low Loss**
- **Tight Amplitude Balance**
- **High Isolation**
- **Production Friendly**
- **Tape and Reel**
- **Lead-Free**

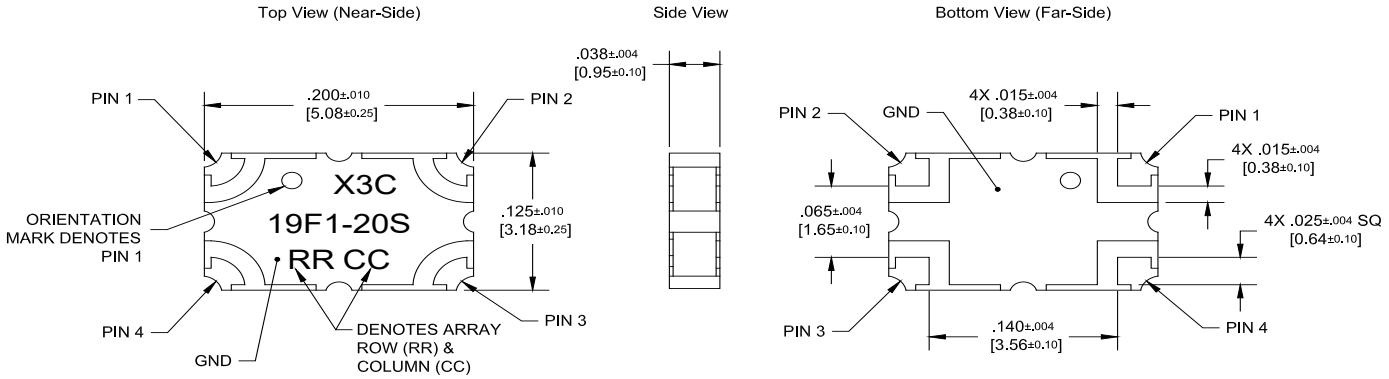
Electrical Specifications**

Frequency	Mean Coupling	Insertion Loss	VSWR	Group Delay (GD-C)
MHz	*dB*	*dB Max*	*Max : 1*	*ns*
1400-2700	20.0 ±1.5	0.10	1.22	0.11±0.03
1700-2200	20.0 ±1.0	0.05	1.15	0.11±0.03
1805-1880	19.5 ±0.5	0.05	1.12	0.11±0.03
1930-1990	19.5 ±0.5	0.05	1.12	0.11±0.03
2110-2170	19.5 ±0.5	0.05	1.15	0.11±0.03

Group Delay (GD-DC)	Directivity	Power	Operating Temp.
ns	*dB Min*	*Avg. CW Watts @95degC*	*°C*
0.05±0.015	20	25	-55 to +140
0.05±0.015	23	25	-55 to +140
0.05±0.015	25	25	-55 to +140
0.05±0.015	25	25	-55 to +140
0.05±0.015	25	25	-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:

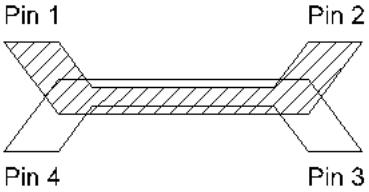


Dimensions are in Inches [Millimeters]
X3C19F1-20S Mechanical Outline

Tolerances are Non-Cumulative

Directional Coupler Pin Configuration

The X3C19F1-20S 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:



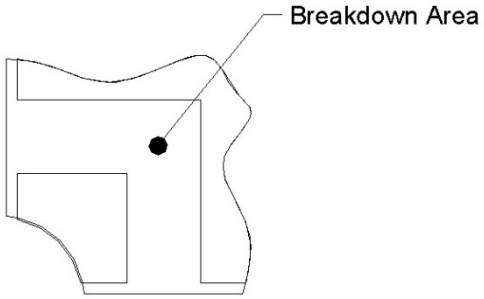
20dB Coupler Pin Configuration

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

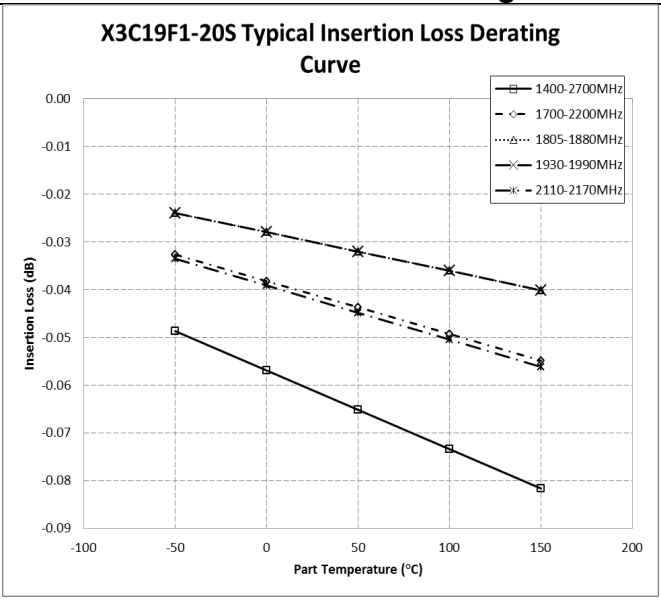
Note: The direct port has a DC connection to the input port and the coupled port has a DC connection to the isolated port.
For optimum IL and power handling performance, use Pin 1 or Pin 2 as inputs.

Peak Power Handling

High-Pot testing of these couplers during the qualification procedure resulted in a minimum breakdown voltage of 1.12Kv (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).

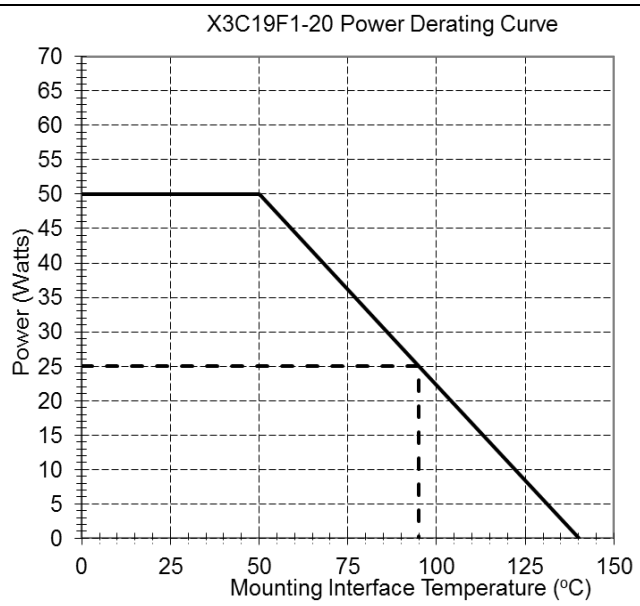


Insertion Loss and Power Derating Curves



Insertion Loss Derating

The insertion loss, at a given frequency, of 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 85°C and 150°C. A best-fit line for the measured data is computed and then plotted from -55°C to 150°C.



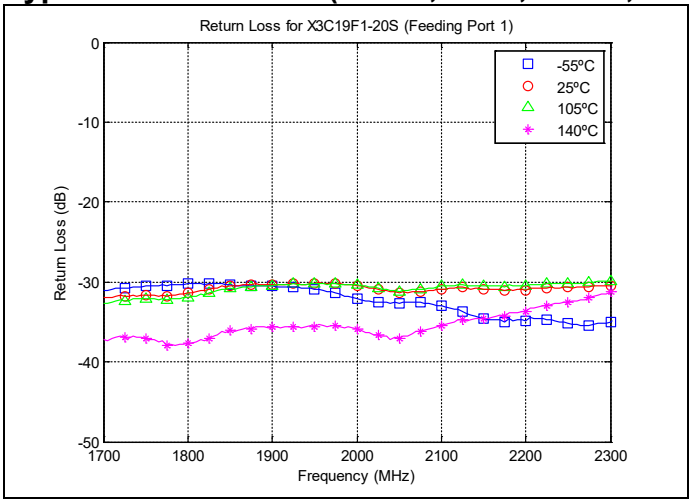
Power Derating

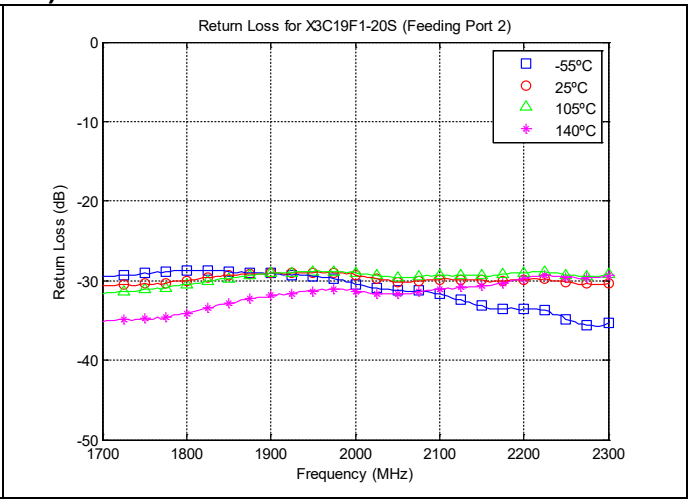
The power handling and corresponding power derating plots are a function of the thermal resistance, mounting surface temperature (base plate temperature), maximum continuous operating temperature of the coupler, and the thermal insertion loss. The thermal insertion loss is defined in the Power Handling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

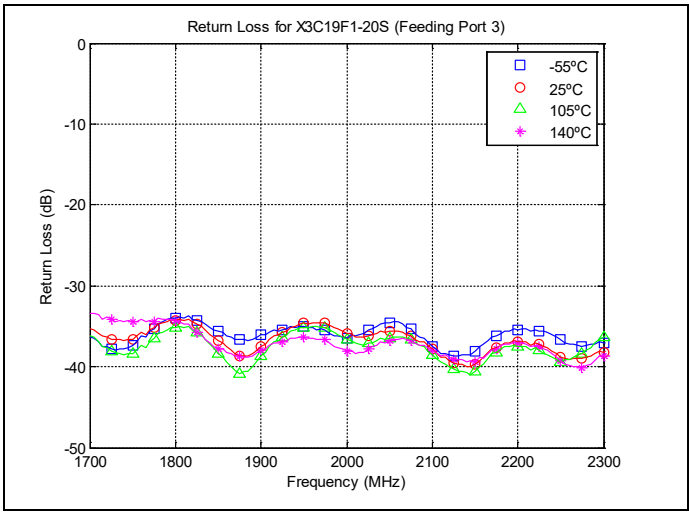
As the mounting interface temperature approaches the maximum continuous operating temperature, the power handling decreases to zero.

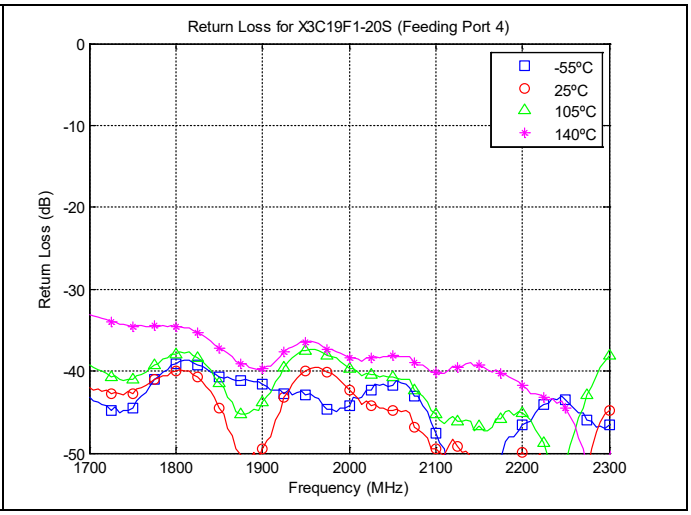
If mounting temperature is greater than 95°C, Xinger coupler will perform reliably as long as the input power is derated to the curve above.

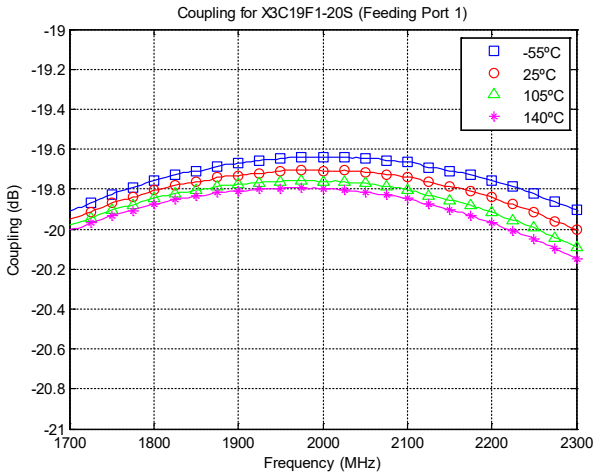
Typical Performance (-55°C , 25°C, 105°C, 140°C)

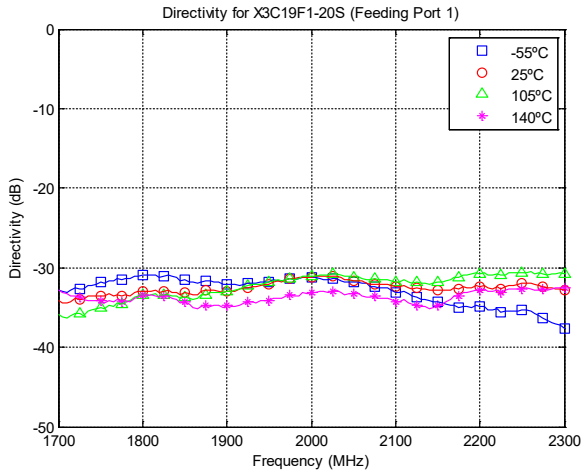


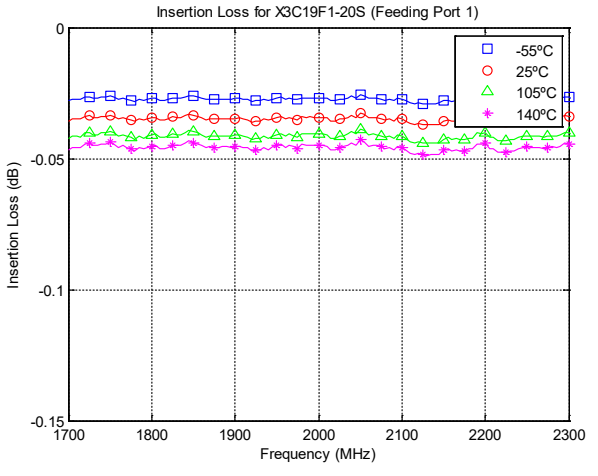


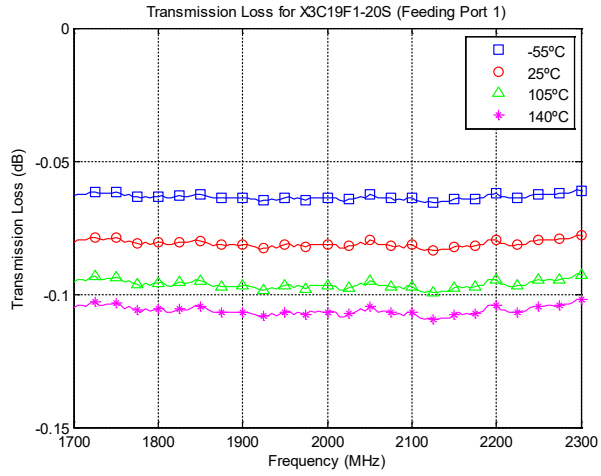





Coupling for X3C19F1-20S (Feeding Port 1)
Coupling (dB)
Frequency (MHz)
-55°C
25°C
105°C
140°C


Directivity for X3C19F1-20S (Feeding Port 1)
Directivity (dB)
Frequency (MHz)
-55°C
25°C
105°C
140°C


Insertion Loss for X3C19F1-20S (Feeding Port 1)
Insertion Loss (dB)
Frequency (MHz)
-55°C
25°C
105°C
140°C


Transmission Loss for X3C19F1-20S (Feeding Port 1)
Transmission Loss (dB)
Frequency (MHz)
-55°C
25°C
105°C
140°C

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)

Packaging and Ordering Information:

Parts are available in reels. Packaging follows EIA 481-D for reels. Parts are oriented in tape and reel as shown below. Tape and reel is available in 4000 pcs per reel.

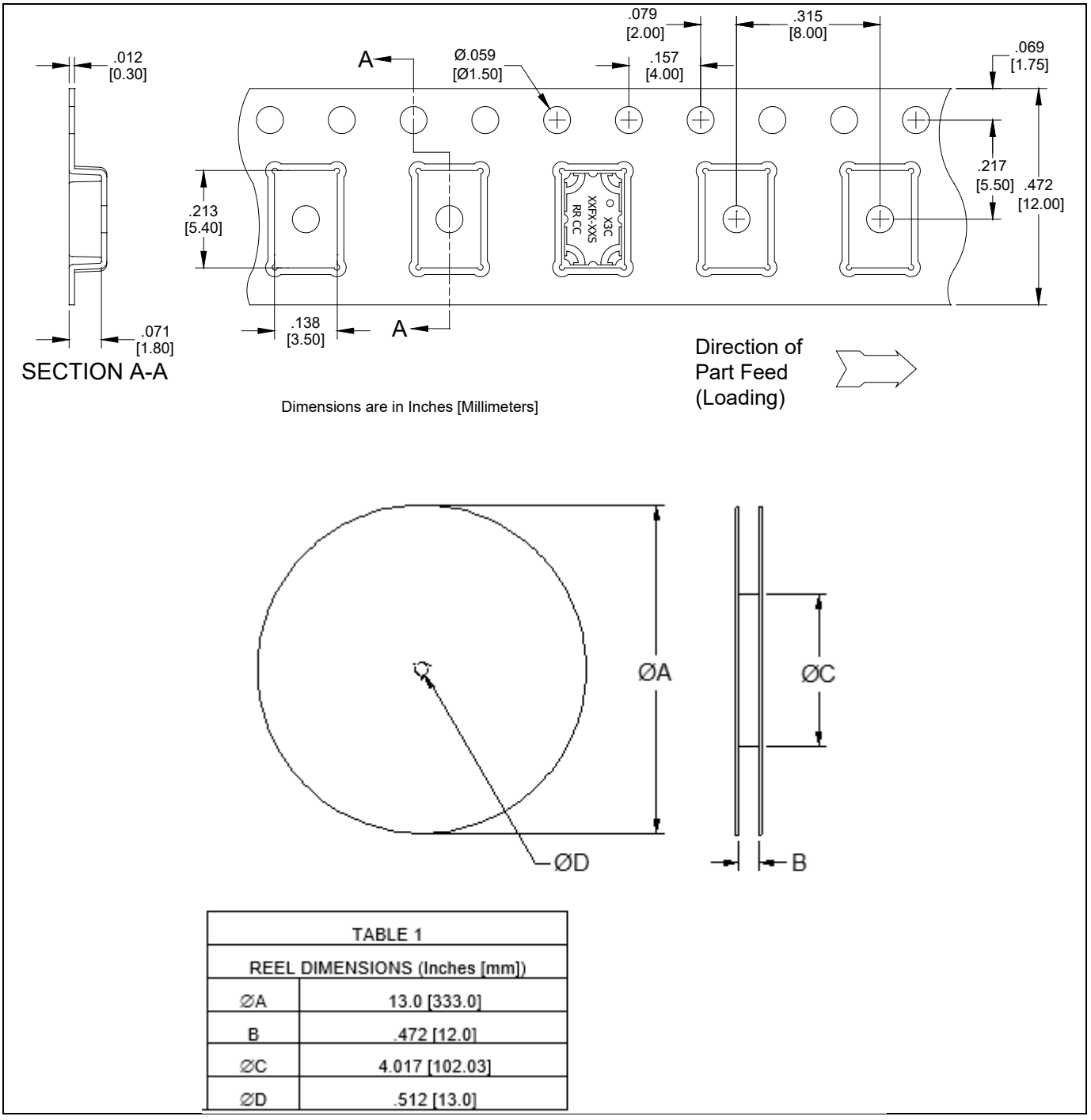


TABLE 1	
REEL DIMENSIONS (Inches [mm])	
ØA	13.0 [333.0]
B	.472 [12.0]
ØC	4.017 [102.03]
ØD	.512 [13.0]

Contact us:
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