

## 1 Device Overview



QFN

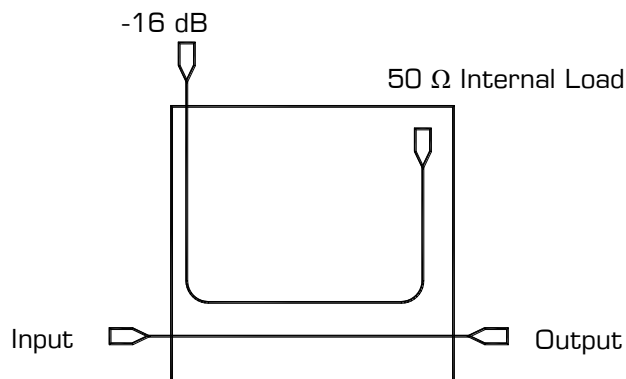
### 1.1 General Description

MC16-0222SM is a MMIC 2-22 GHz Directional Coupler. Passive GaAs MMIC technology allows production of smaller constructions that replace larger form factor circuit board constructions. Tight fabrication tolerances result in less unit to unit variation than traditional coupler technologies, allowing for accurate simulations using the provided S3P file taken from measured production units. The MC16-0222SM is available as a 4 X 4 mm QFN package. Evaluation boards are also available.

### 1.2 Features

- Broadband Performance
- Low VSWR
- High Directivity
- RoHS Compliant
- S3P data [MC16-0222SM.zip](#)

### 1.3 Functional Block Diagram



### 1.4 Part Ordering Options<sup>1</sup>

Part Number	Description	Package	Green Status	Product Lifecycle	Export Classification
MC16-0222SM	4 X 4 mm QFN	SM	RoHS	Active	EAR99
EVAL-MC16-0222	Connectorized Evaluation Fixture	Eval	RoHS	Active	EAR99

<sup>1</sup> Refer to our [website](#) for a list of definitions for terminology presented in this table.

## Table of Contents

1	Device Overview .....	1	3	Specifications .....	4
1.1	General Description .....	1	3.1	Absolute Maximum Ratings .....	4
1.2	Features .....	1	3.2	Package Information .....	4
1.3	Functional Block Diagram .....	1	3.3	Electrical Specifications <sup>1</sup> .....	4
1.4	Part Ordering Options .....	1	3.4	Typical Performance Plots .....	5
2	Port Configurations and Functions .....	3	4	Mechanical Data .....	6
2.1	Port Diagram .....	3	4.1	SM Package Outline Drawing .....	6
2.2	Port Functions .....	3	4.2	SM Package Footprint .....	6
			4.3	Evaluation Board outline .....	7

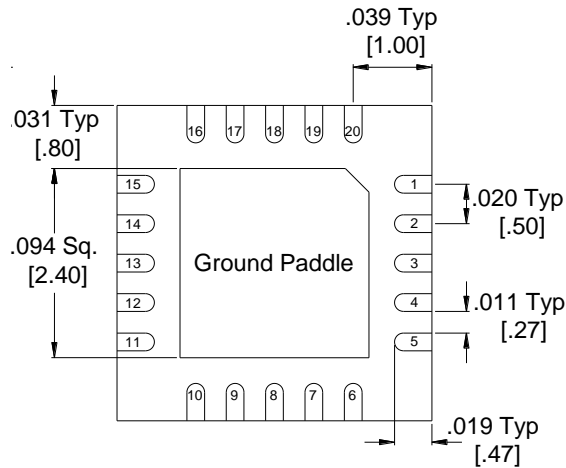
## Revision History

Revision Code	Revision Date	Comment
-	July 2020	Initial Datasheet Release
A	August 2020	Updated Return Loss Plots

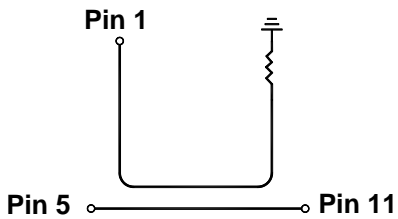
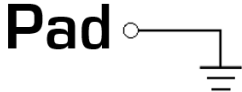
## 2 Port Configurations and Functions

### 2.1 Port Diagram

A bottom-up view of the MC16-0222SM's SM package outline drawing is shown below.



### 2.2 Port Functions

Port	Function	Description	Equivalent Circuit
Pin 1	Coupled	The coupled port is DC connected to a 50 $\Omega$ load.	
Pin 5	Input	The input port is DC short to the output port and open to ground.	
Pin 11	Output	The output port is DC short to the input port and open to ground.	
Pad	Ground	SM package ground path is provided through the ground paddle.	

### 3 Specifications

#### 3.1 Absolute Maximum Ratings

The Absolute Maximum Ratings indicate limits beyond which damage may occur to the device. If these limits are exceeded, the device may be inoperable or have a reduced lifetime.

Parameter	Maximum Rating	Units
DC Current at any port	60	mA
Power Handling, at any Port	TBD	dBm
Operating Temperature	-55 to +100	°C
Storage Temperature	-65 to +125	°C

#### 3.2 Package Information

Parameter	Details	Rating
ESD	Human Body Model (HBM), per MIL-STD-750, Method 1020	N/A

#### 3.3 Electrical Specifications<sup>2</sup>

The electrical specifications apply at  $T_A=+25^\circ\text{C}$  in a  $50\Omega$  system.

Min and Max limits are guaranteed at  $T_A=+25^\circ\text{C}$ .

Parameter	Frequency (GHz)	Min	Typ.	Max	Units
Direct Line Insertion Loss	DC-12		1.2	2.5	dB
	12-22		2	3.5	dB
Coupling	2-22		16		dB
VSWR			1.22		
Directivity	2-12	14	23		dB
	12-22		15		dB
Impedance			50		$\Omega$

<sup>2</sup> All measured data is taken from the eval board with de-embedding of the connectors and traces, but group delay may vary.

### 3.4 Typical Performance Plots<sup>2</sup>

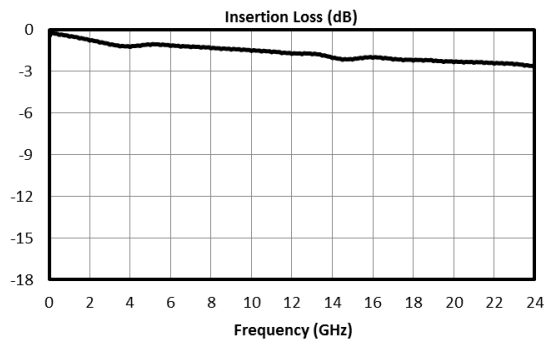


Fig. 1. Direct Line Insertion Loss

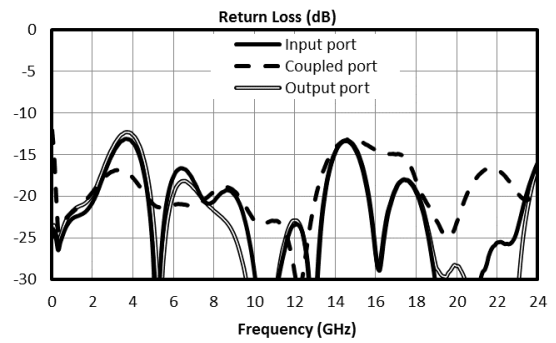


Fig. 2. Return Loss.

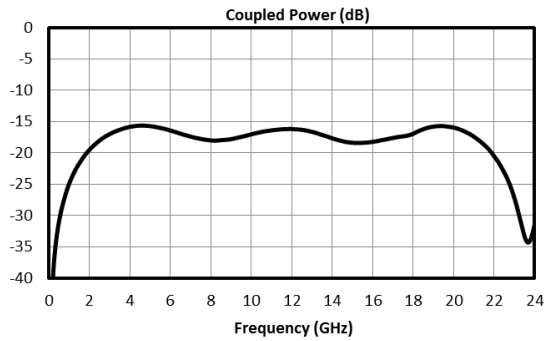


Fig. 3. Coupled Port Power

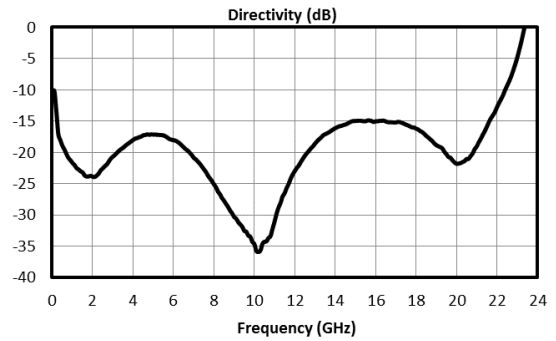
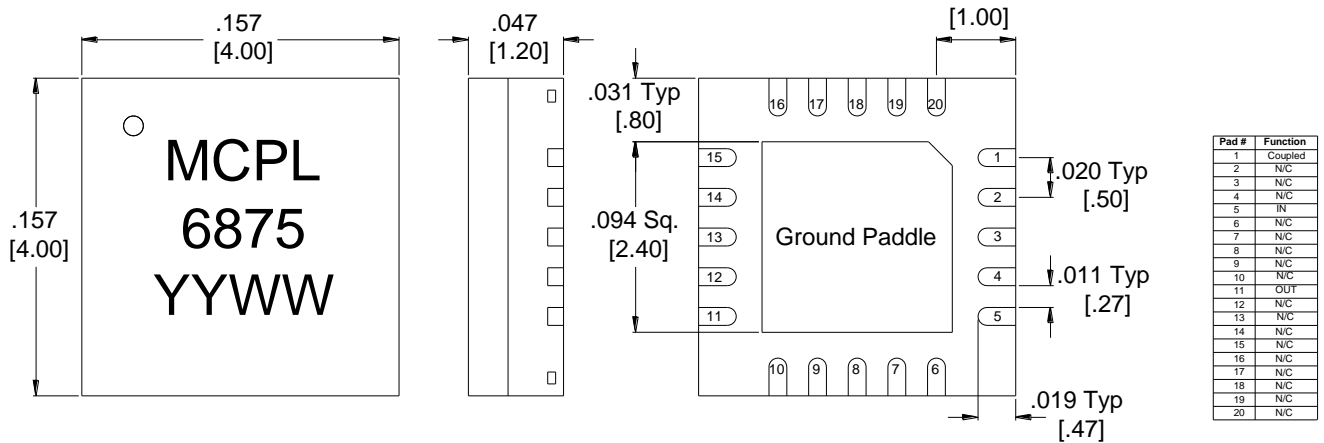


Fig. 4. Typical Directivity

<sup>2</sup> All measured data is taken from the eval board with de-embedding of the connectors and traces, but group delay may vary.

## 4 Mechanical Data

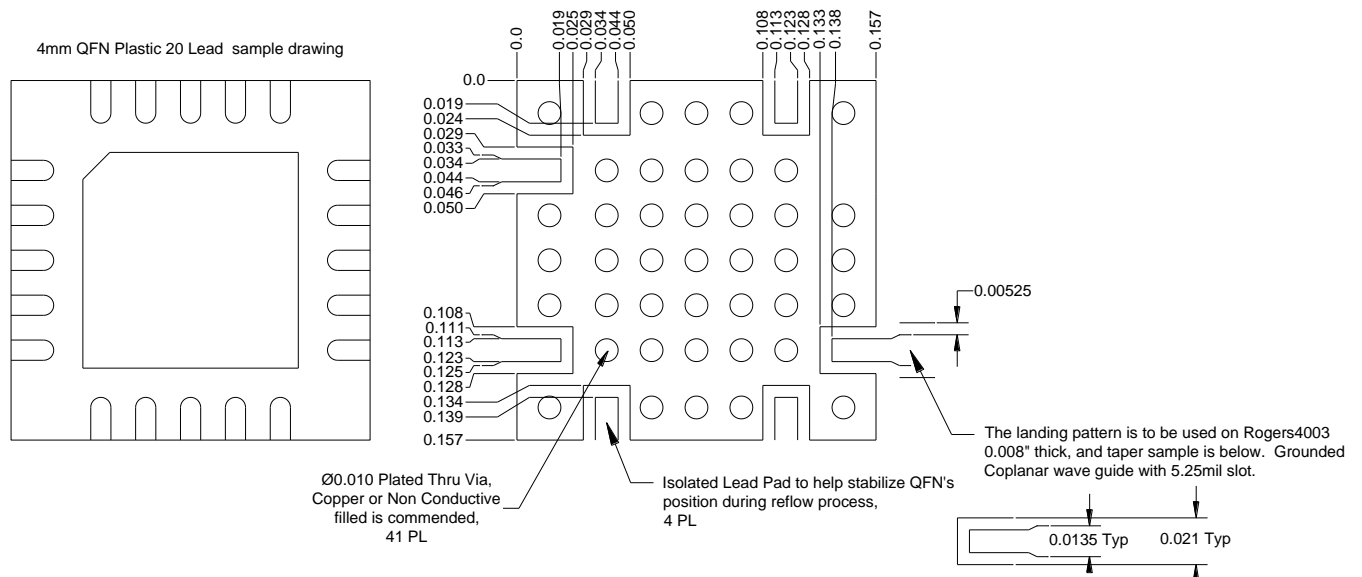
### 4.1 SM Package Outline Drawing



Notes:

- Substrate material is LCP.
- I/O Leads and Ground Paddle plating is (from base to finish):  
 Ni: 0.5um MIN  
 Pd: 0.02um MIN  
 Au: 0.05um MAX
- All unconnected pins should be connected to PCB RF ground.

### 4.2 SM Package Footprint

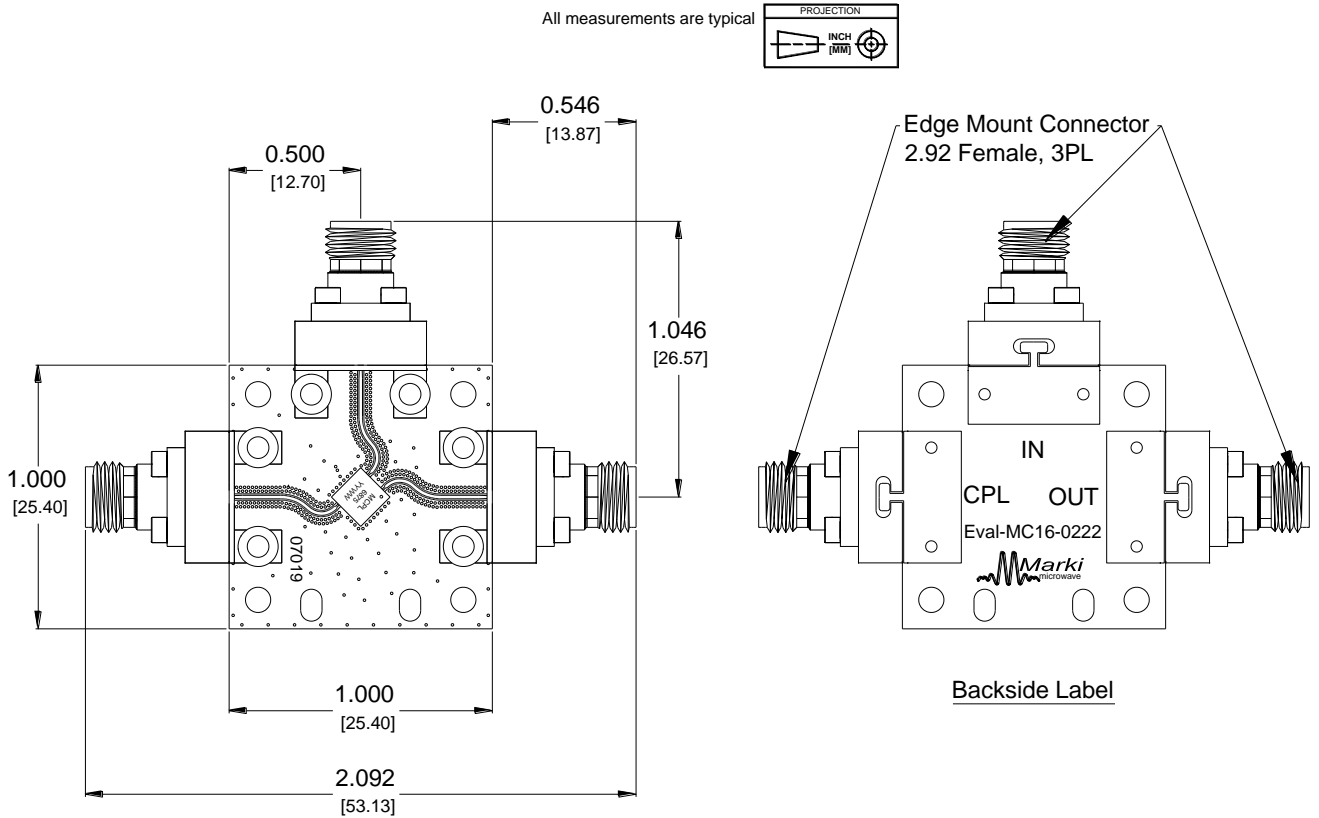


QFN-Package Surface-Mount Landing Pattern

[Click here for a DXF of the above layout.](#)

[Click here for leaded solder reflow.](#) [Click here for lead-free solder reflow.](#)

### 4.3 Evaluation Board outline



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