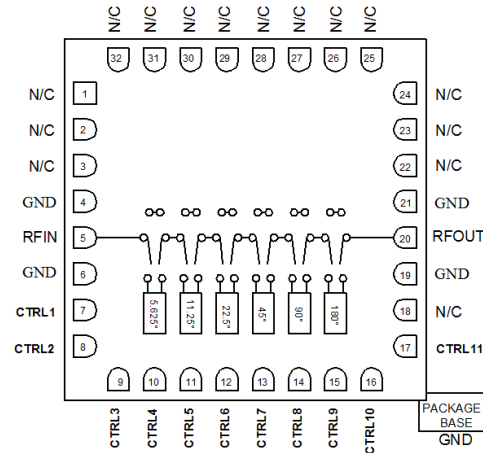


**Features**

- Frequency: 19-21GHz
- 6-Bit Digital Control Phase Shifter
- Phase Shift Range: 360°
- Minimum Phase Shift: 5.625°
- Phase Shift Accuracy RMS: 3.0°
- Insertion Loss: 9.5dB Typical
- Amplitude Variation: 1.6dB Typical
- Input/Output: 50Ω
- Package Size : 5x5x1.0mm

**Typical Applications**

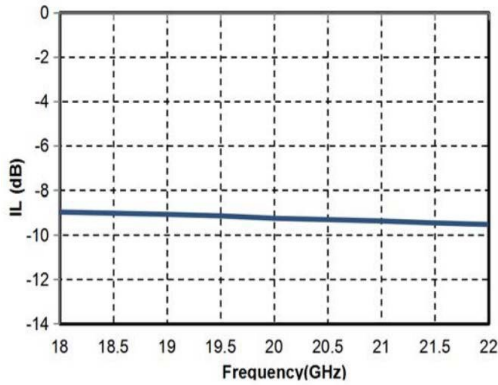
- Test Instrumentation
- Microwave Radio & VSAT
- Military & Space
- Telecom Infrastructure
- Fiber Optics

**Functional Block Diagram**

**Electrical Specifications**

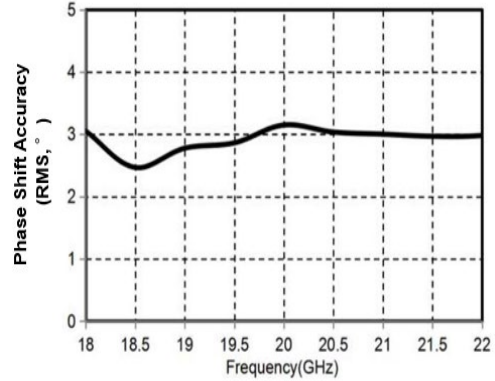
TA = +25°C, Vctl = 0/-5V

Parameters	Min.	Typ.	Max.	Units
Frequency	19		21	GHz
Insertion Loss		9.5	10	dB
Insertion Loss Variation		1.6		dB
Phase Shift Accuracy RMS		3.0		°
Phase-shifting Amplitude Modulation		±1.0		dB
Amplitude Variation		1.6		dB
Input Return Loss		13		dB
Output Return Loss		15		dB
P1dB - Input 1dB Compression		21		dBm
Switching Speed		30		ns

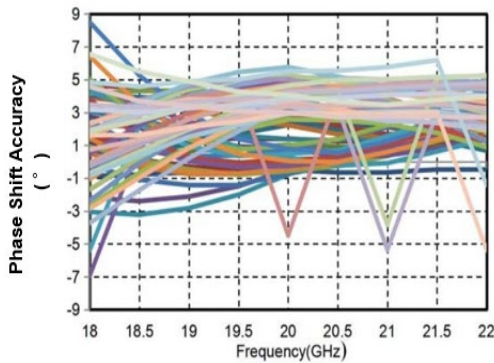
**Insertion Loss vs. Frequency**



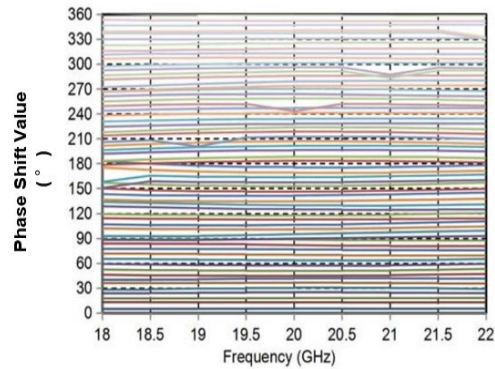
**Phase Shift Accuracy (RMS) vs. Frequency**



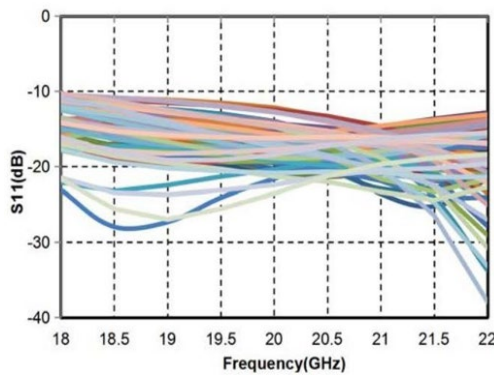
**Phase Shift Accuracy vs. Frequency**



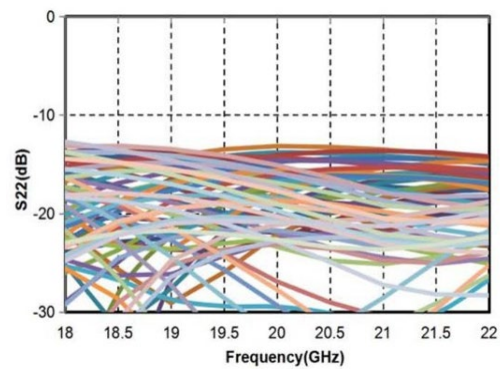
**Phase Shift Value vs. Frequency**



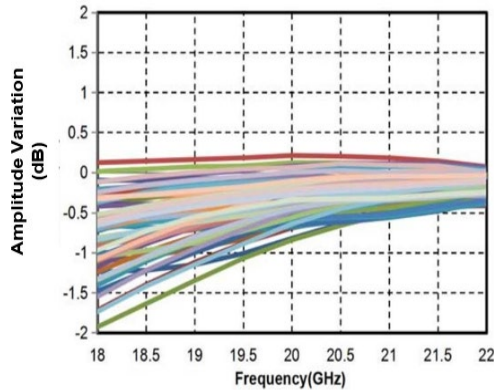
**Input Return Loss vs. Frequency**



**Output Return Loss vs. Frequency**



### Amplitude Variation



### Absolute Maximum Ratings

Control Voltage, Vctl	-8V
RF Input Power	+23dBm
Operating Temperature	-55°C to +85 °C
Storage Temperature	-55°C to +150 °C

### Recommended Operating Conditions

Parameter	Min.	Typ.	Max.	Units
CTRL	-5		0	V



**ELECTROSTATIC SENSITIVE DEVICE  
OBSERVE HANDLING PRECAUTIONS**

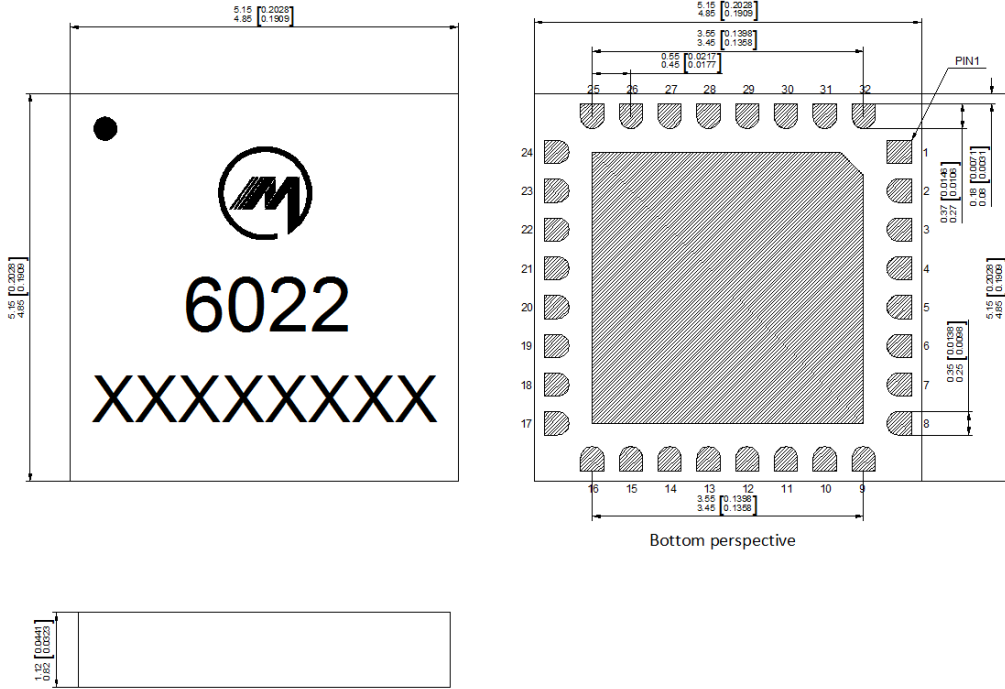
### Truth Table

Phase Shifter Setting	45°		5.625°	90°		11.25°		22.5°		180°	
	CTRL1	CTRL2	CTRL3	CTRL4	CTRL5	CTRL6	CTRL7	CTRL8	CTRL9	CTRL10	CTRL11
0°(Reference)	1	0	0	1	0	0	1	0	1	1	0
5.625°	1	0	1	1	0	0	1	0	1	1	0
11.25°	1	0	0	1	0	1	0	0	1	1	0
22.5°	1	0	0	1	0	0	1	1	0	1	0
45°	0	1	0	1	0	0	1	0	1	1	0
90°	1	0	0	0	1	0	1	0	1	1	0
180°	1	0	0	1	0	0	1	0	1	0	1
354.38°	0	0	1	0	1	1	0	1	0	0	1

Logic "0" = LOW(-5V), Logic "1" = High(0V)



### Outline Drawing: All Dimensions in mm[inches]

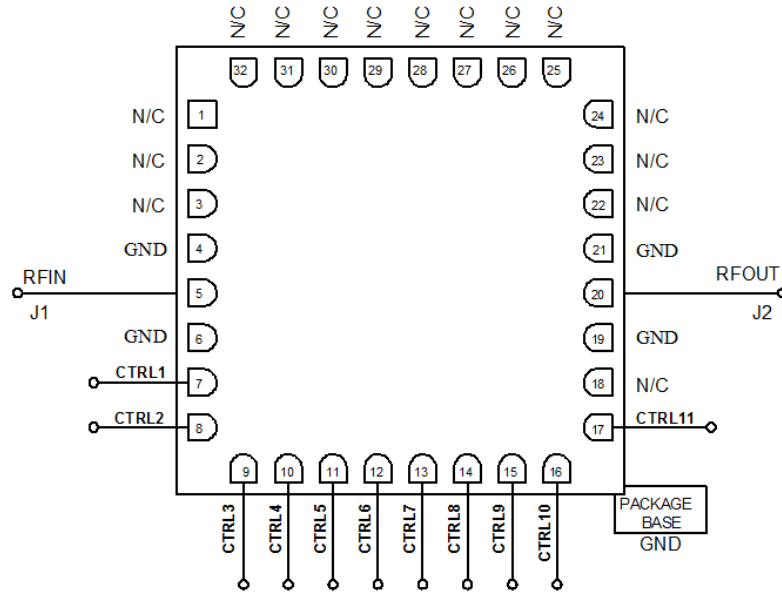


#### Notes:

1. Package body material : Alumina.
2. Lead and ground paddle plating: Gold flash over nickel.
3. Dimensions are in millimeters(inches).
4. Lead spacing tolerance is non-cumulative.



### Assembly Drawing



### Pin Descriptions

No	Function	Description
1,2,3,18,22,23,24,25,26,27,28,29,30,31,32	NC	No connection. These pins may be connected to RF ground. Performance will not be affected.
5	RF IN	RF Signal Input.
20	RF OUT	RF Signal Output.
7,8,9,10,11,12,13,14,15,16,17	CTRL	Control Ports
4,6,19,21	GND	These pins & exposed ground paddle must be connected to RF/DC ground
	GND	Package bottom must be connected to RF/DC ground



# MILLER MMIC

## MM6022Q5B

V1.0.0

GaAs Plastic QFN 5x5mm  
6-Bit Digital Control Phase Shifter  
19-21GHz

MM6022Q5B

GaAs QFN 5x5mm 6-Bit Digital Control Phase Shifter 19-21GHz

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