MILLER MMIC

MM6010

V1.0.0

GaAs pHEMT MMIC
6-Bit Digital Control Phase Shifter
5-6GHz

MM6010

6-BIT DIGITAL CONTROL PHASE SHIFTER - MMIC 5-6GHz

Features

- Phase Shift Accuracy RMS: 1.3 °
- Insertion Loss: 6dB (Typ.)
- Insertion Loss Variation: 1dB
- Impedance: 50Ω
- Die Size: 4 x 1.61 x 0.1 mm

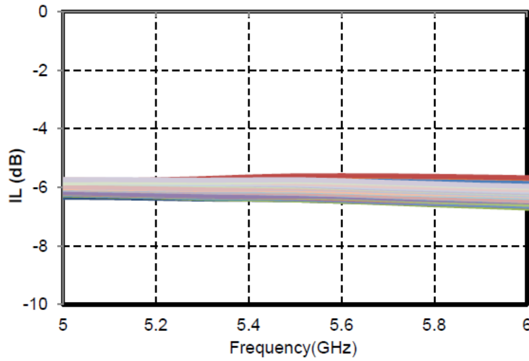
Typical Applications

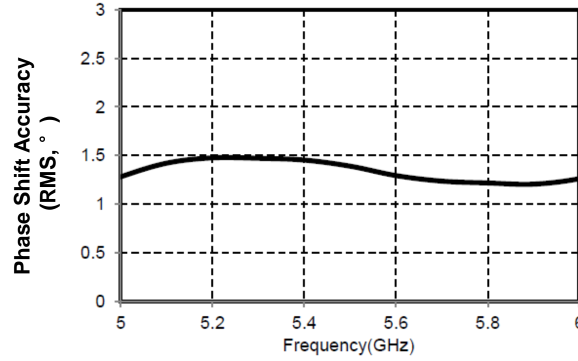
- Test Instrumentation
- Microwave Radio & VSAT
- Military & Space
- Telecom Infrastructure
- Fiber Optics

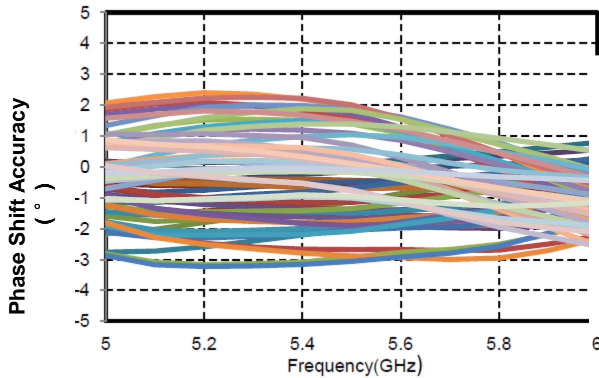
Electrical Specifications

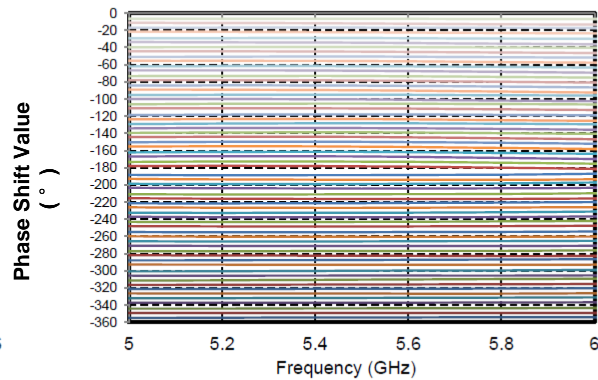
TA = +25ºC, Vctl = 0/-5V

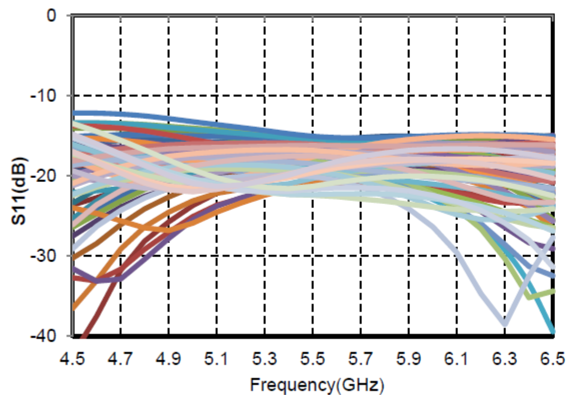
Parameters	Min.	Typ.	Max.	Units
Frequency		5-6		GHz
Insertion Loss		6.0	7.0	dB
Insertion Loss Variation		±0.5		dB
Phase Shift Accuracy RMS		1.3		°
Amplitude Variation		1.3		dB
Input Return Loss	13	18		dB
Output Return Loss	14	21		dB
Switching Speed		20		ns

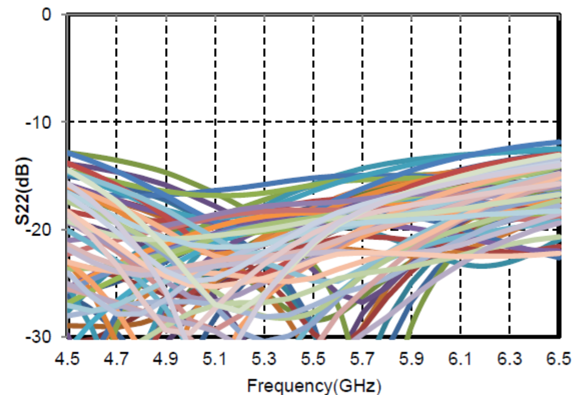

Insertion Loss
IL (dB)
0
-2
-4
-6
-8
-10
5
5.2
5.4
5.6
5.8
6
Frequency(GHz)

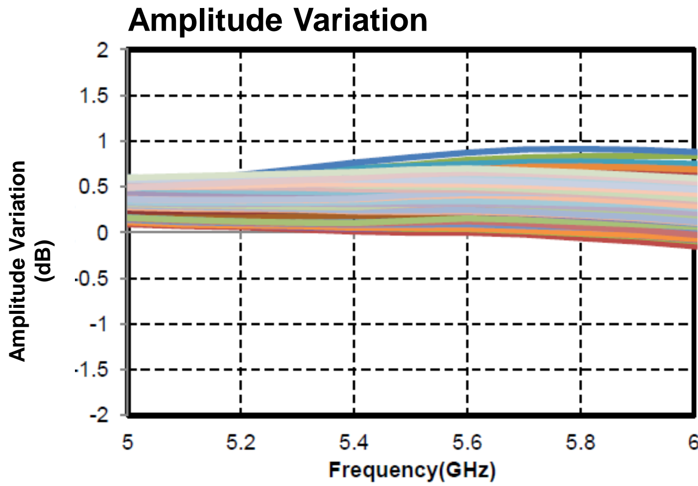

Phase Shift Accuracy (RMS)
Phase Shift Accuracy (RMS, °)
3
2.5
2
1.5
1
0.5
0
5
5.2
5.4
5.6
5.8
6
Frequency(GHz)


Phase Shift Accuracy
Phase Shift Accuracy (°)
5
4
3
2
1
0
-1
-2
-3
-4
-5
5
5.2
5.4
5.6
5.8
6
Frequency(GHz)


Phase Shift Value
Phase Shift Value (°)
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
-200
-220
-240
-260
-280
-300
-320
-340
-360
5
5.2
5.4
5.6
5.8
6
Frequency (GHz)

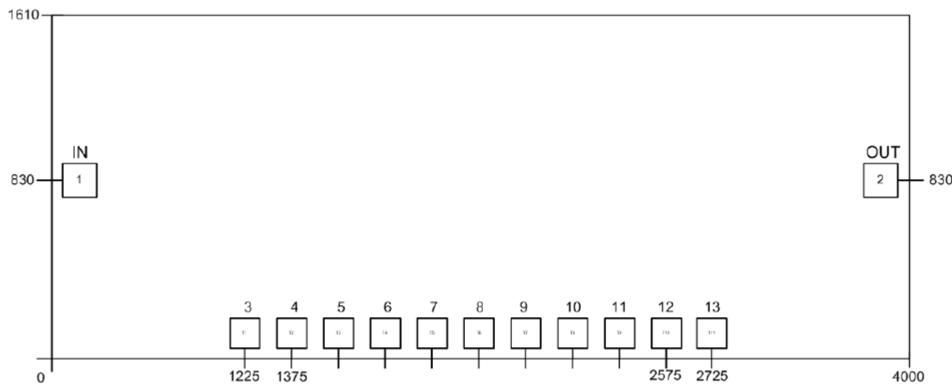

Input Return Loss
S11(dB)
0
-10
-20
-30
-40
4.5
4.7
4.9
5.1
5.3
5.5
5.7
5.9
6.1
6.3
6.5
Frequency(GHz)


Output Return Loss
S22(dB)
0
-10
-20
-30
4.5
4.7
4.9
5.1
5.3
5.5
5.7
5.9
6.1
6.3
6.5
Frequency(GHz)



Outline Drawing:

All Dimensions in um



Pad Description

PAD	Function	Description
1	RF IN	RF Input Port
2	RF OUT	RF Output Port
3-13	CTRL	Control Port
GND	GND	Die bottom must be connected to RF/DC ground

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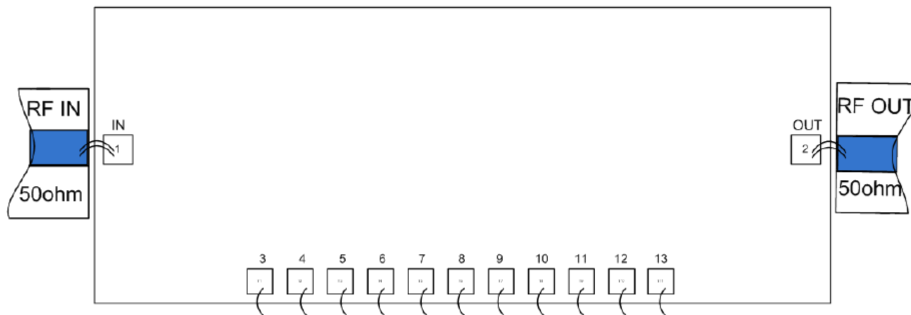
Truth Table

	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11
0	-5	0	-5	-5	0	-5	0	0	-5	0	-5
5.625	-5	0	0	-5	0	-5	0	0	-5	0	-5
11.25	-5	0	-5	-5	0	0	-5	0	-5	0	-5
22.5	-5	0	-5	-5	0	-5	0	-5	0	0	-5
45	-5	0	-5	0	-5	-5	0	0	-5	0	-5
90	-5	0	-5	-5	0	-5	0	0	-5	-5	0
168.75	-5	0	-5	0	-5	0	-5	-5	0	-5	0
174.375	-5	0	0	0	-5	0	-5	-5	0	-5	0
180	0	-5	-5	-5	0	-5	0	0	-5	0	-5
354.375	0	-5	0	0	-5	0	-5	-5	0	-5	0

Assembly Drawing



Notes:
1. Die thickness: 100um
2. Typical bond pad is 100*100 μm^2
3. Bond pad metalization: Gold
4. Backside metalization: Gold
5. Backside of the die (GND)
6. No connection required for unlabeled bond pads

Maximum Ratings:
1. RF input power: +23dBm
2. Control voltage range: -8V~0.5V
3. Storage temperature: -65℃ to +150℃
4. Operating temperature: -55℃ to +85℃