

PMI MODEL NUMBER PS-360-16G22G-10B-SFF IS A 16.0 TO 22.0 GHz DIGITALLY CONTROLLED ANALOG PHASE SHIFTER WITH CAPABILITY FOR PHASE SHIFTING FROM 0° TO 360° WITH 10-BIT ACCURACY



**DESIGNED BY:
PMI ENGINEERING**

**TESTED BY:
Eric K**

**REPORTED BY:
Robert S**

**DATE
February 5, 2024**

PRODUCT FEATURE

DESCRIPTION:

PMI MODEL NUMBER PS-360-16G22G-10B-SFF IS A 16.0 TO 22.0 GHz DIGITALLY CONTROLLED ANALOG PHASE SHIFTER WITH CAPABILITY FOR PHASE SHIFTING FROM 0° TO 360° WITH 10-BIT ACCURACY.

ZONE	REV	DESCRIPTION	DATE	APPROVED
A1		ORIGINAL RELEASE	7/11/2021	
A2		ECN # 24-0030	2/23/24	

SPECIFICATIONS:

- FREQUENCY RANGE:..... 16.0 TO 22.0 GHz
 - INSERTION LOSS:..... 11.5 dB TYP
 - VSWR:..... 2 : 1 MAX
 - PHASE ACCURACY:..... ±5° TYP ±7.5° MAX (@ 25°C & -20 dBm INPUT)
 - SWITCHING SPEED:..... 500 ns MAX
 - OPERATING POWER:..... -20 dBm CW MAX*
 - SURVIVAL POWER:..... +25 dBm CW MAX
 - CONTROL:..... 10 BIT TTL
 - POWER SUPPLY:..... +12V to +15V @ 50 mA MAX
 - SIZE:..... (L) 2.0" X (W) 2.1" X (H) 0.5"
 - FINISH:..... PAINTED BLUE
- * UNIT CALIBRATED @ -20 dBm INPUT POWER, PHASE SHIFT WILL VARY WITH POWER LEVELS ABOVE -20 dBm.

J3 PIN FUNCTIONS	
PIN NUMBER	FUNCTION
1	N/C
2	+12V TO +15V
3	N/C
4	1.4°
5	5.6°
6	45.0°
7	180.0° (MSB)
8	90.0°
9	GROUND
10	0.7°
11	22.5°
12	2.8°
13	11.3°
14	0.35° (LSB)
15	N/C

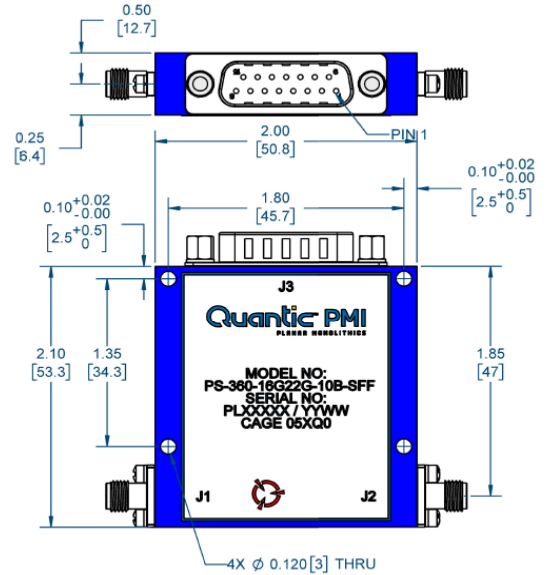
INPUT/OUTPUT INFORMATION:

- BIDIRECTIONAL UNIT
- DATA TAKEN:
J1 - INPUT
J2 - OUTPUT

ENVIRONMENTAL RATINGS:

- TEMPERATURE:..... -55°C TO +85°C (OPERATING)
..... -65°C TO +125°C (STORAGE)
- HUMIDITY:..... MIL-STD-202, METHOD 103B COND. B
- SHOCK:..... MIL-STD-202, METHOD 213B COND. B
- VIBRATION:..... MIL-STD-202, METHOD 204D COND. B
- ALTITUDE:..... MIL-STD-202, METHOD 105C COND. B
- TEMPERATURE CYCLE:..... MIL-STD-202, METHOD 107D COND. A

NOTE: SPECIFICATIONS WILL VARY OVER TEMPERATURE
NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION



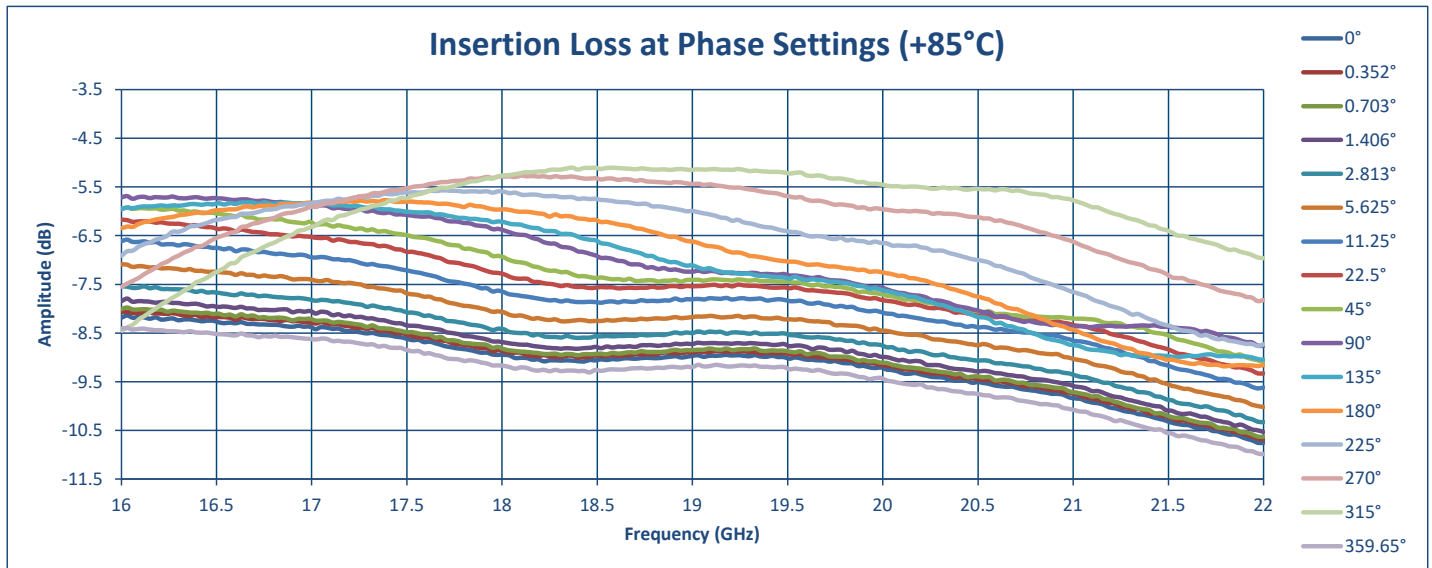
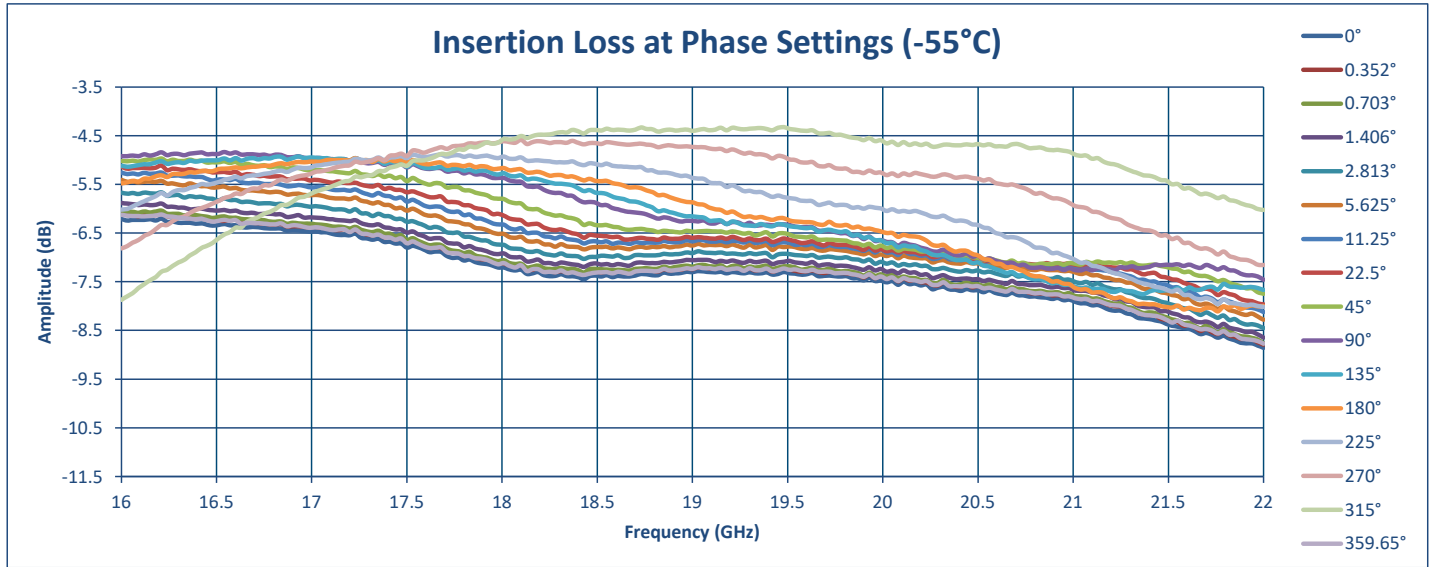
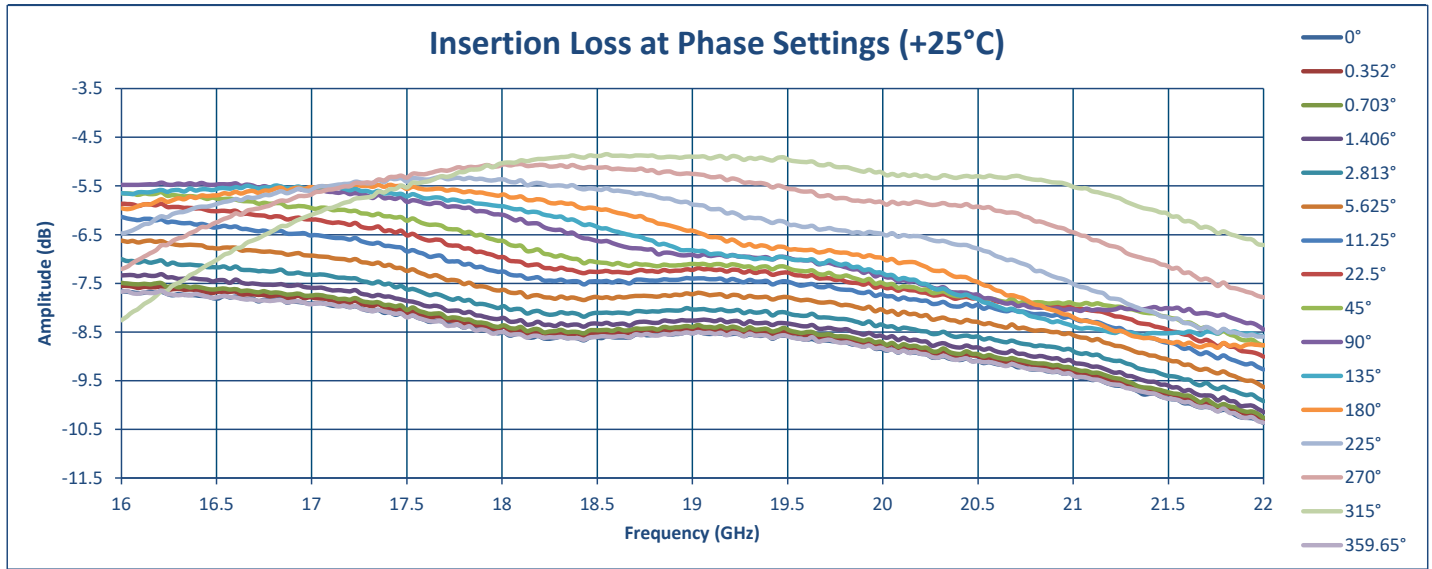
PMI CONFIDENTIAL AND PROPRIETARY

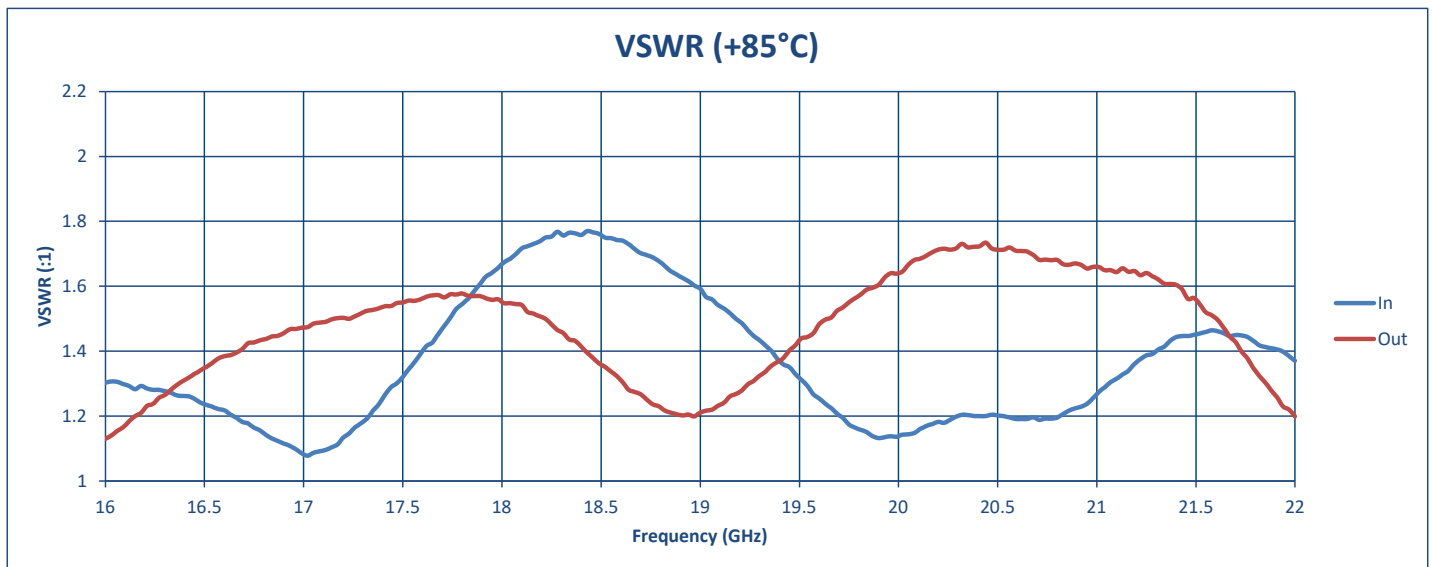
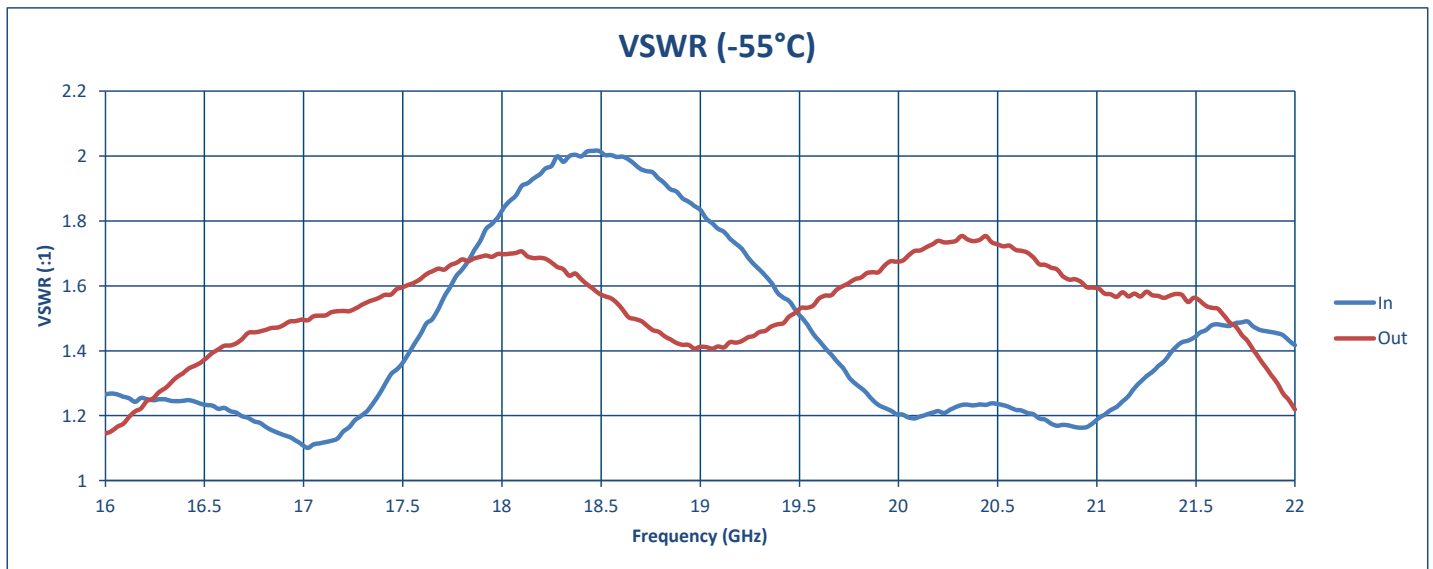
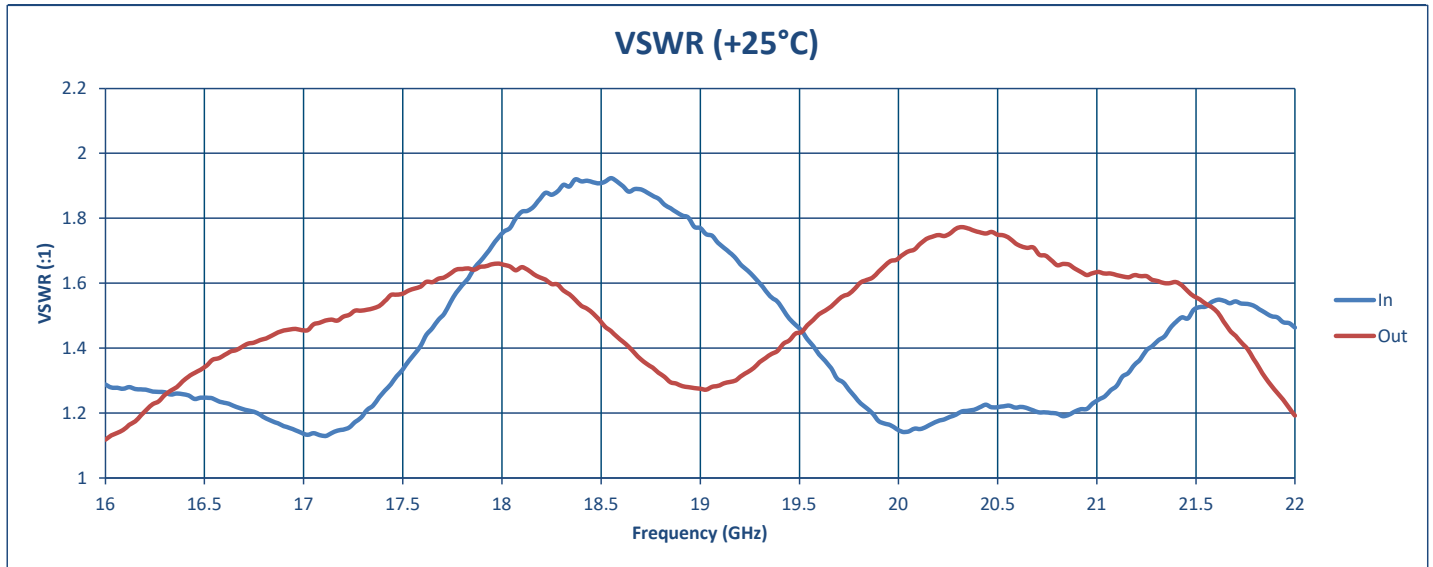
APPROVALS		DATE	TITLE
DESIGNED	R. SIRIK	7/21/2021	OUTLINE
ISSUED			
SIZE	B	FIGURE NO.	27046820
SCALE	1:1	DWG NO.	27046820
		REV	A2
		SHEET	1 OF 1

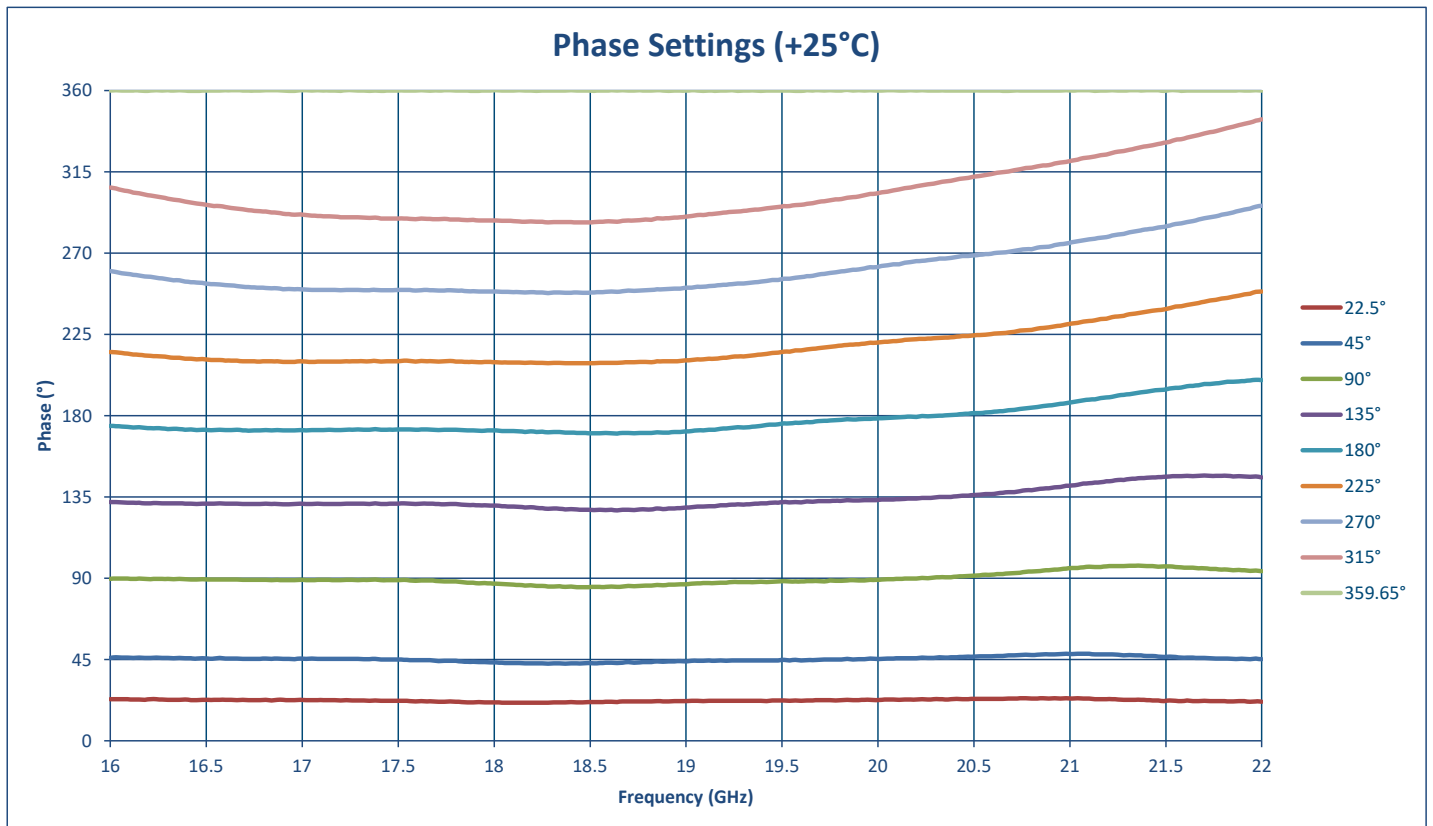
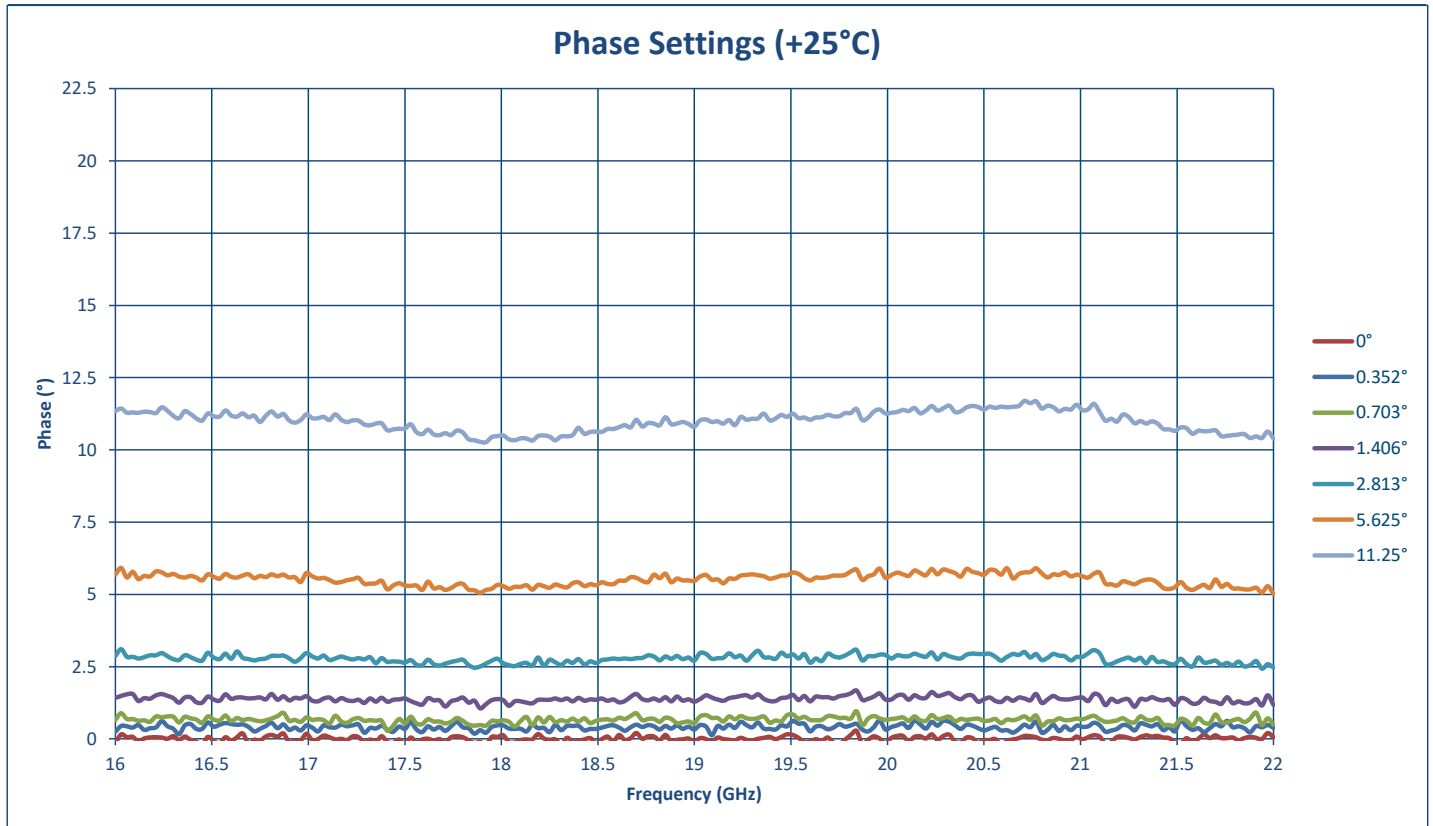
TEST DATA
Data Taken at -20 dBm

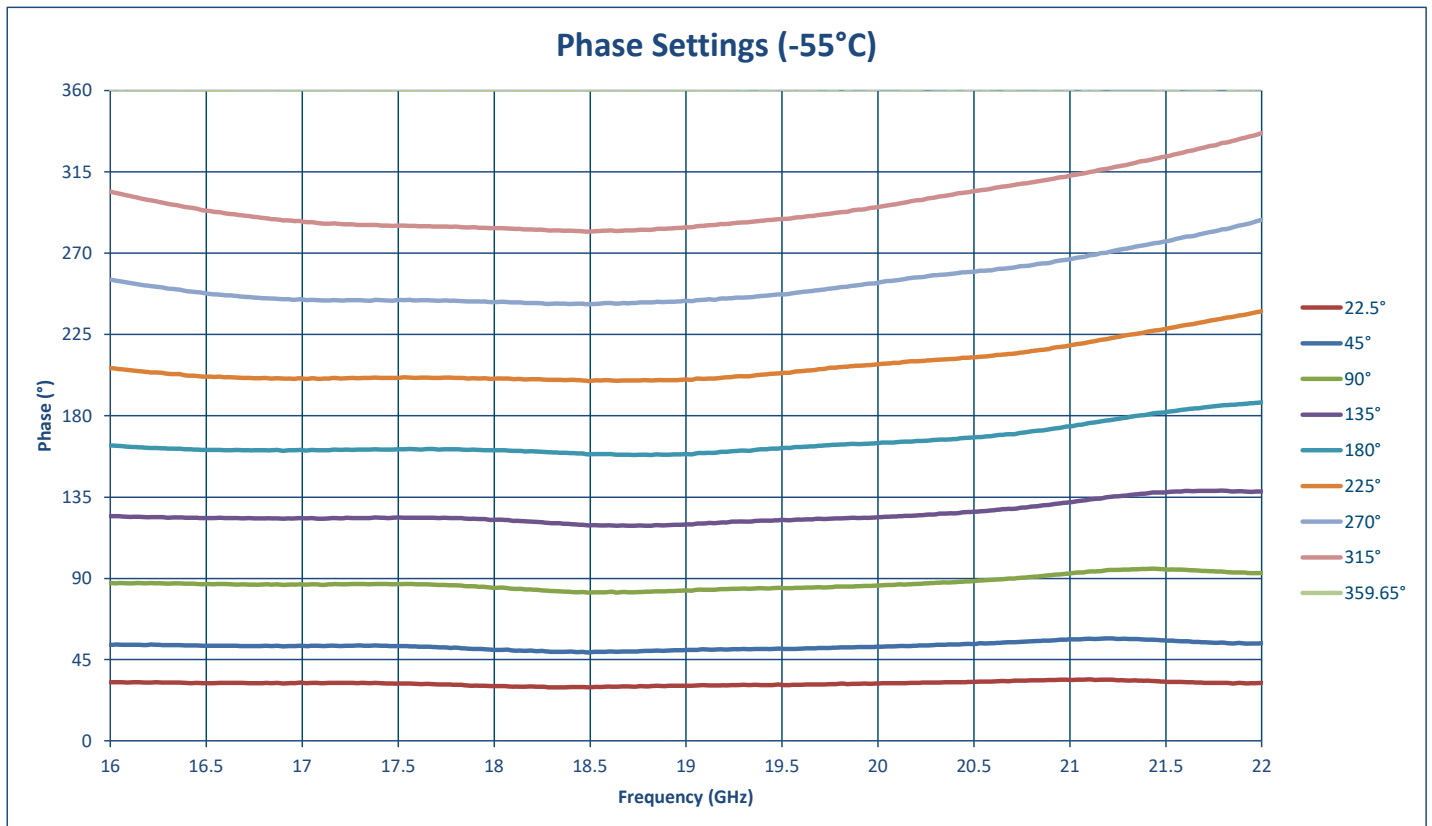
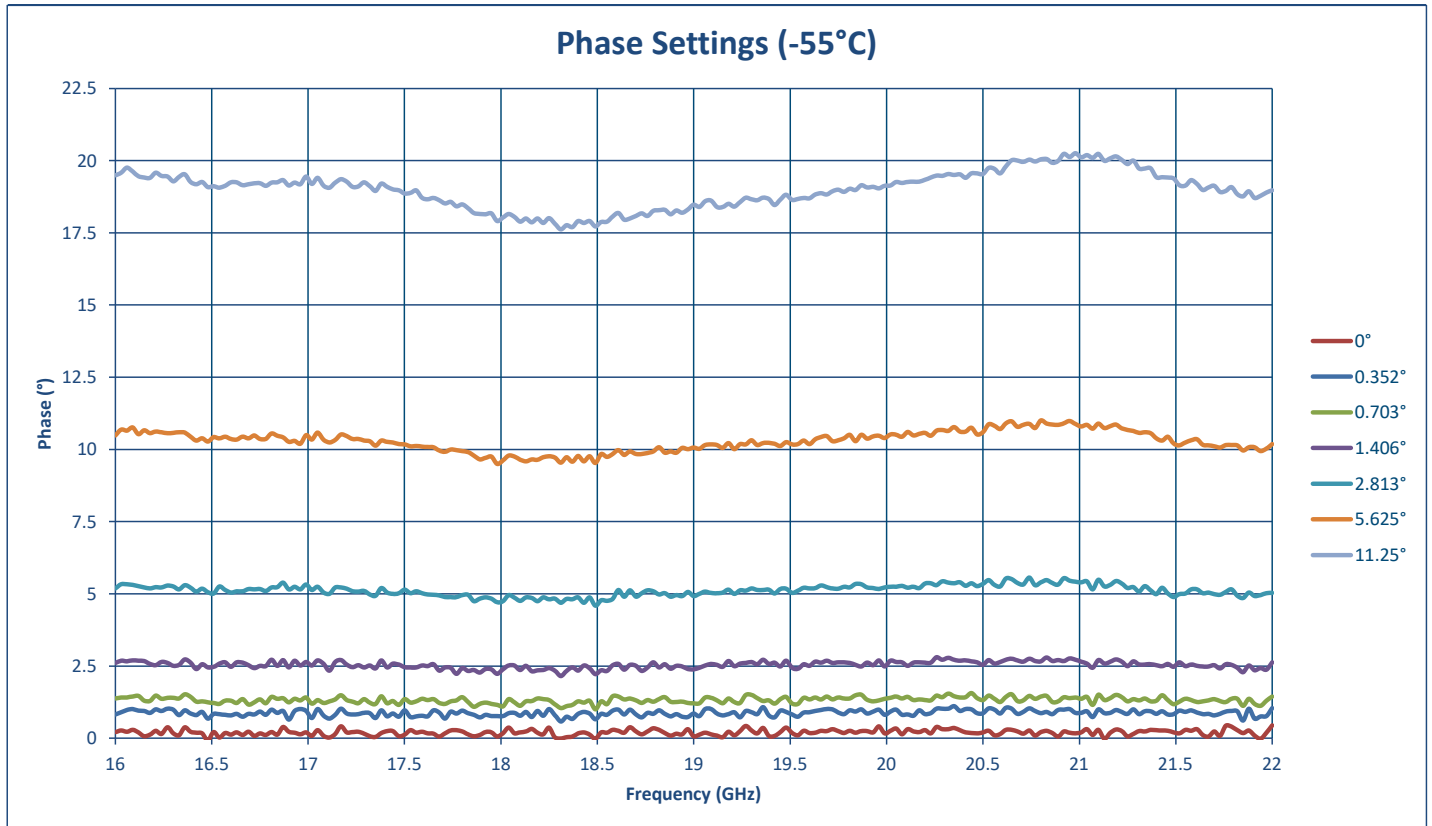
TEST ITEM NO.	PARAMETERS	SPECIFIED VALUE	Test Results		
			-55°C	+25°C	+85°C
1	Frequency Range:	16.0 GHz to 22.0 GHz	16.0 GHz to 22.0 GHz		
2	Insertion Loss:	11.5 dB Typ.	9.19 dB See Plot	10.37 dB See Plot	10.99 dB See Plot
3	VSWR:	2.0:1 Max	2.02:1	1.92:1	1.77:1
4	Phase Shift Error:	±5° Typ., ±7.5° Max. (@ 25°C & -20 dBm Input)	9.3° See Plot	5° See Plot	19.1° See Plot
5	Switching Speed:	500 ns Max.	440 ns		
6	Operating Power:	+10 dBm CW Max	+10 dBm CW Max		
7	Survival Power:	+25 dBm CW Max.	+25 dBm CW Max.		
8	Control:	10 Bit TTL	10 Bit TTL		
9	Power Supply:	+15V @ 50 mA Max.	+15V @ 35 mA	+15V @ 41 mA	+15V @ 48 mA

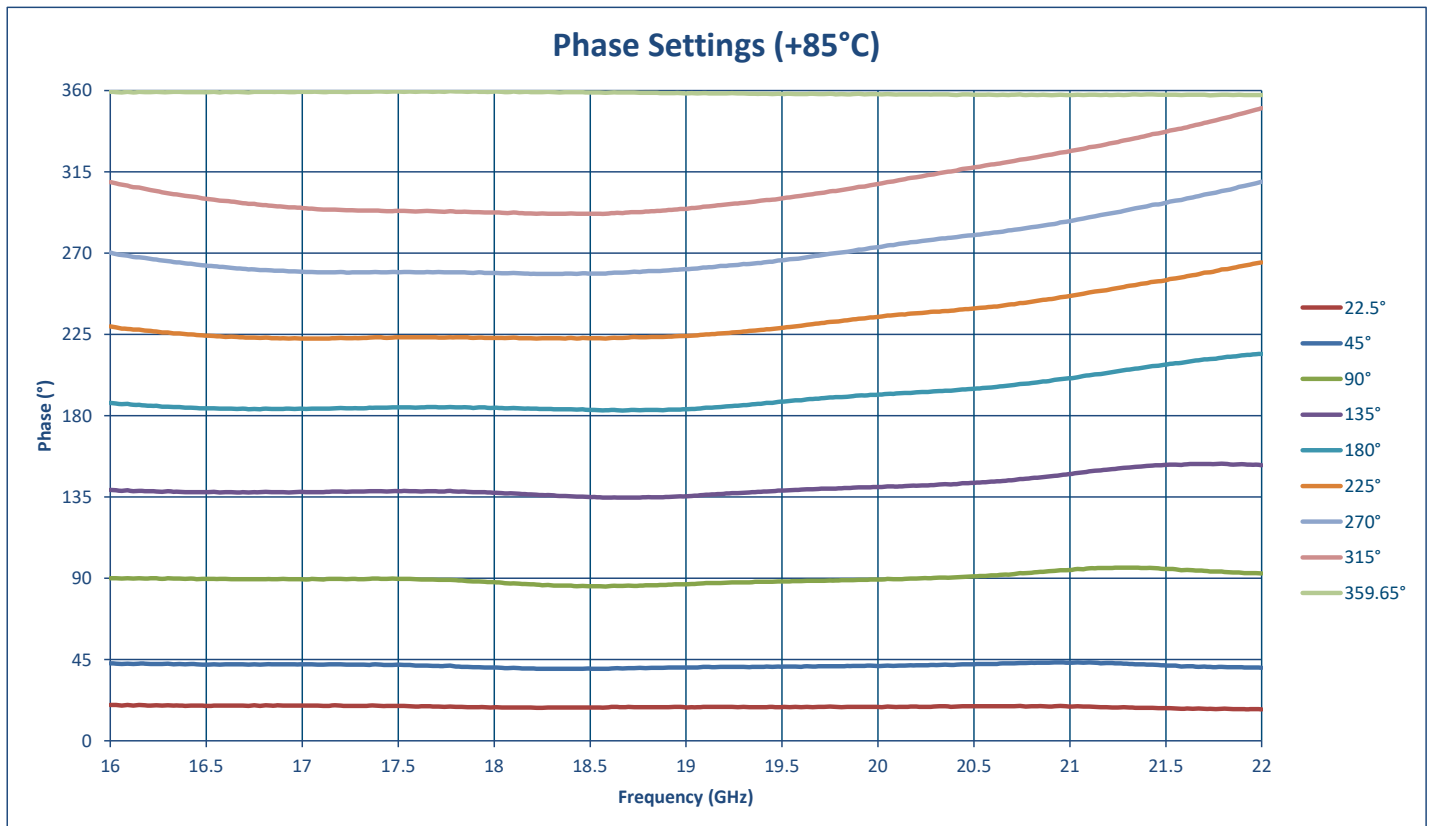
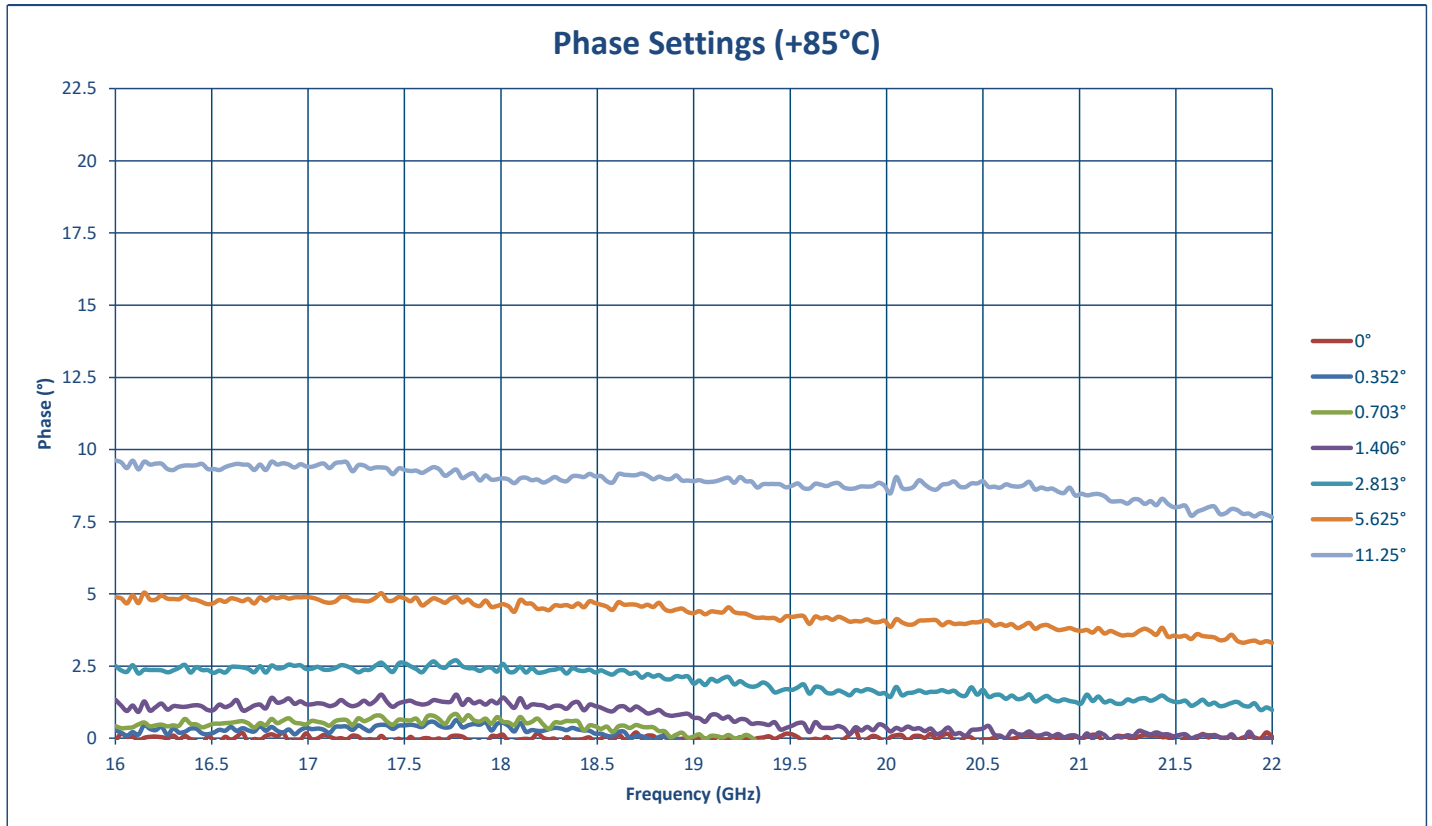
TYPICAL CHARACTERISTICS
ON
PS-360-16G22G-10B-SFF
 Data Taken at -20 dBm

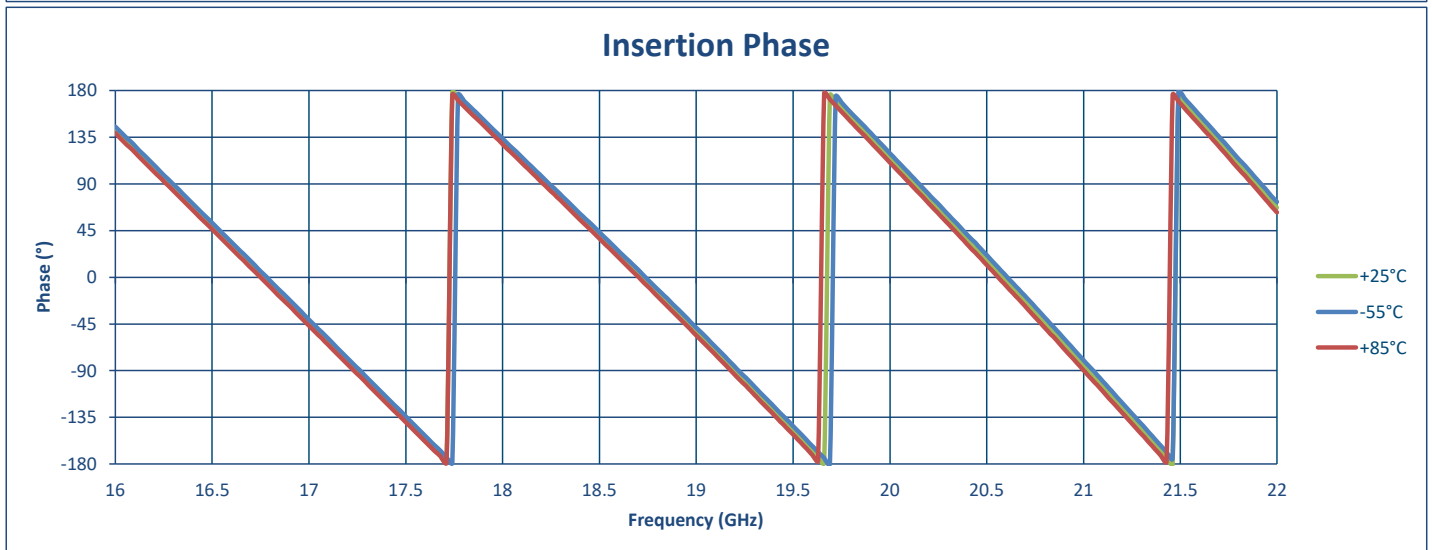
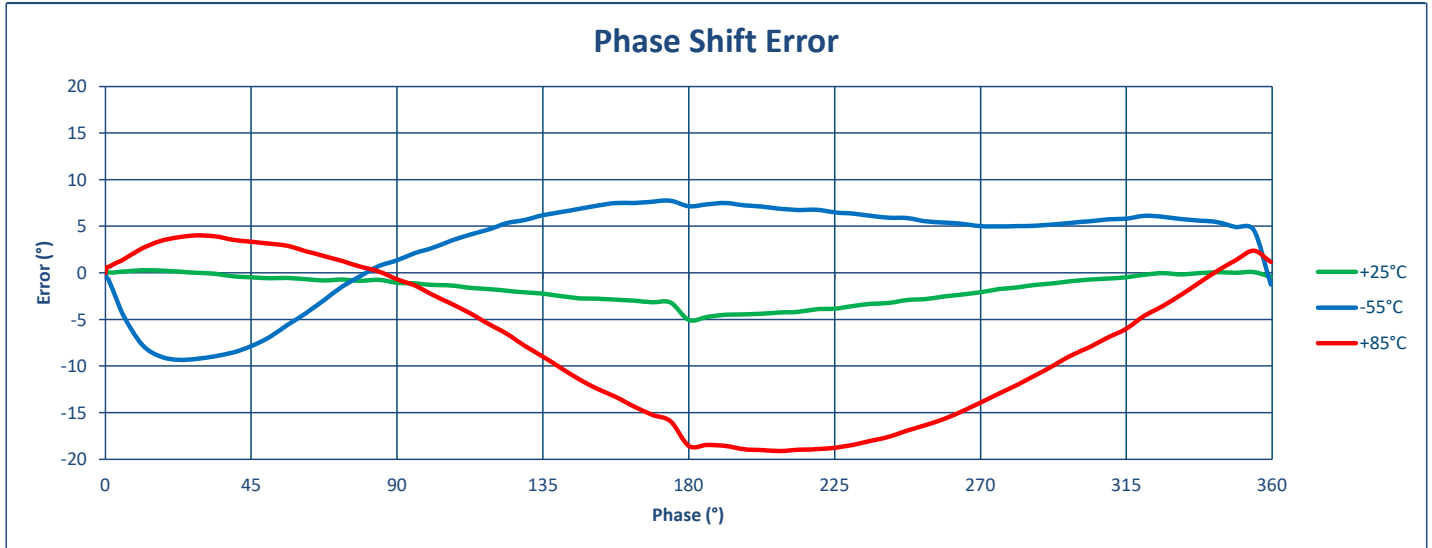






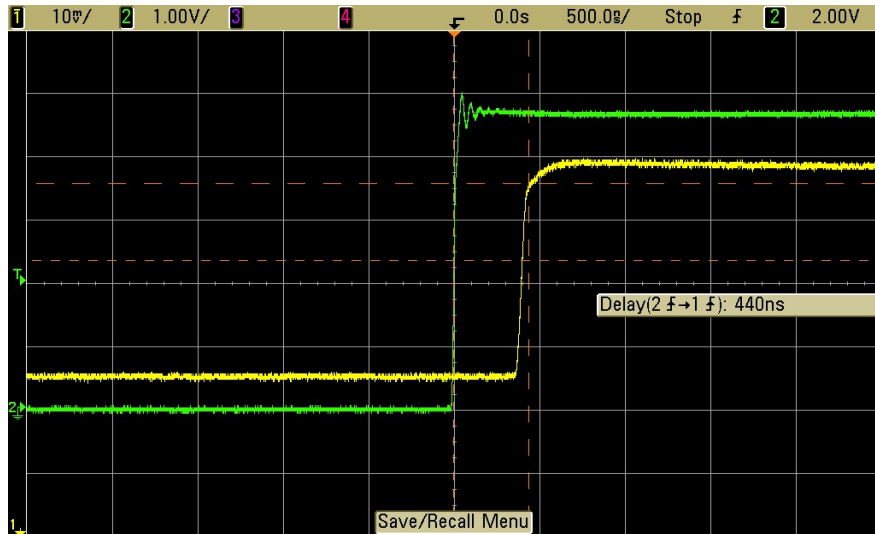




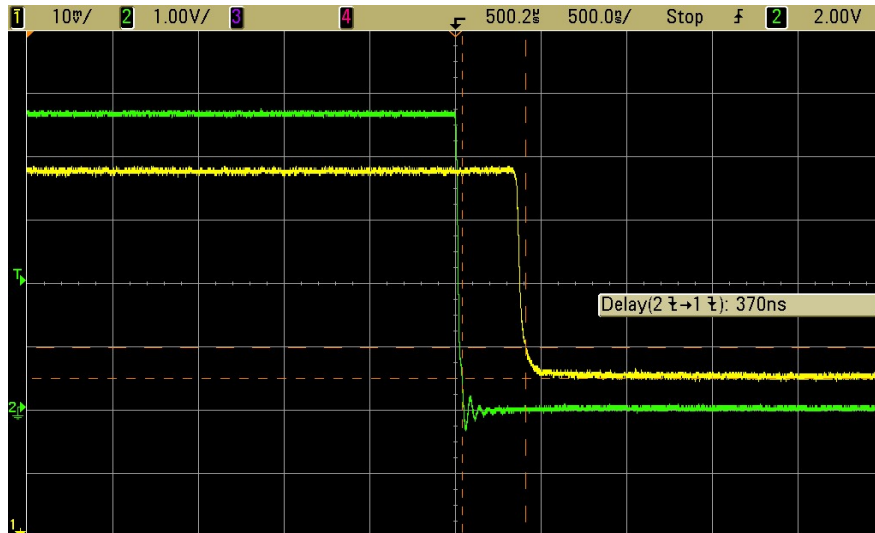


SWITCHING SPEED

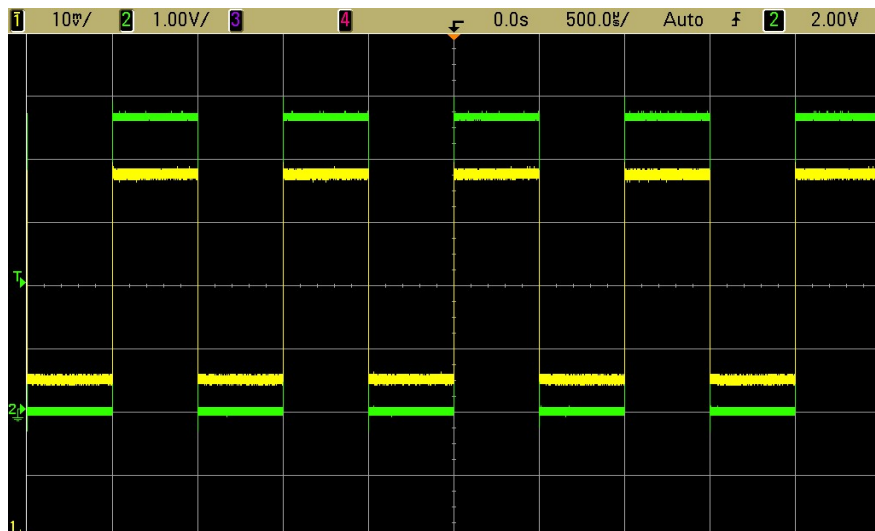
Delay On - 440 ns



Delay Off - 370 ns

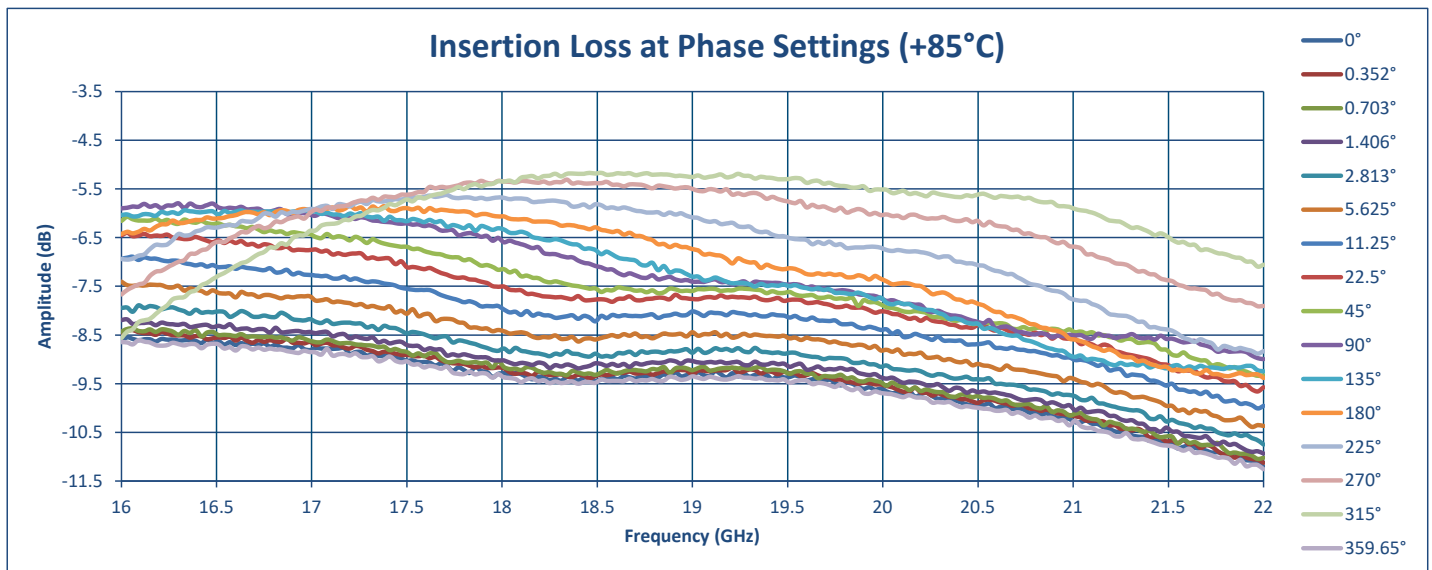
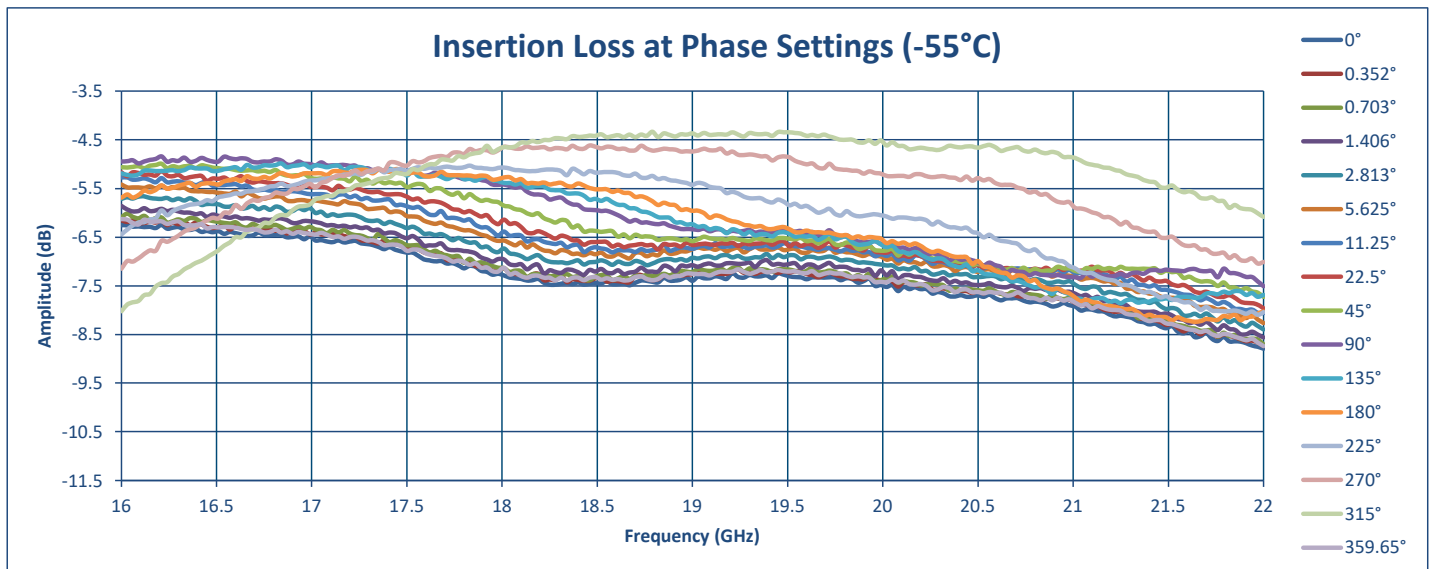
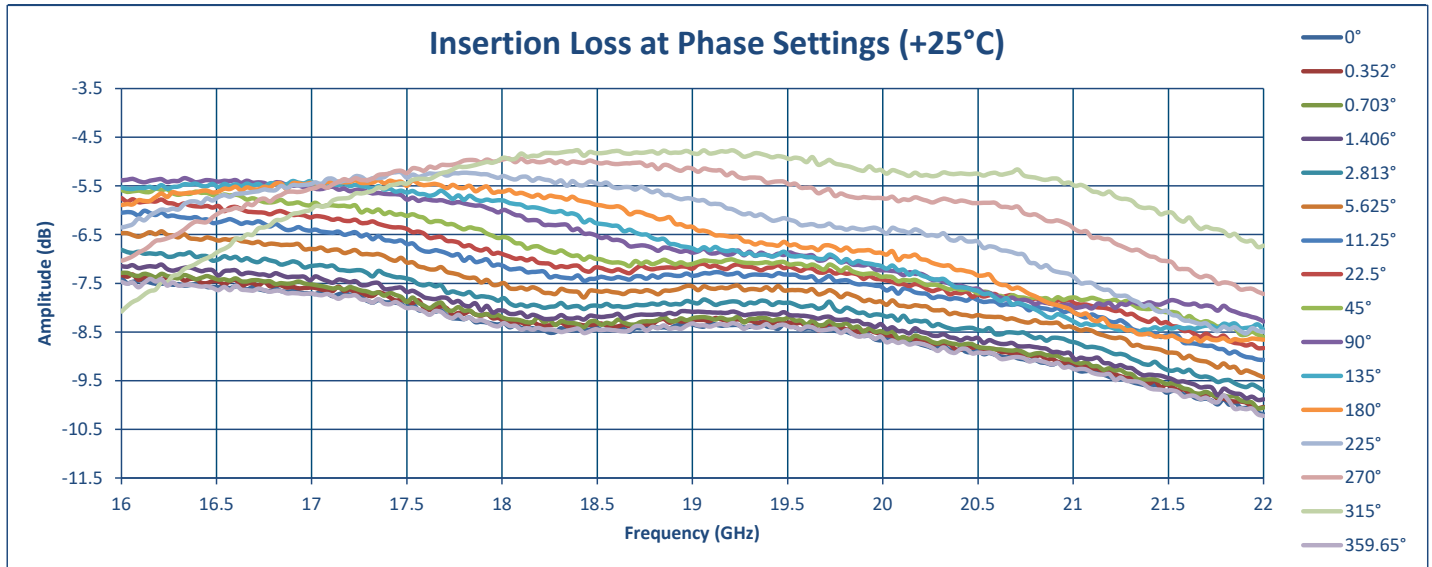


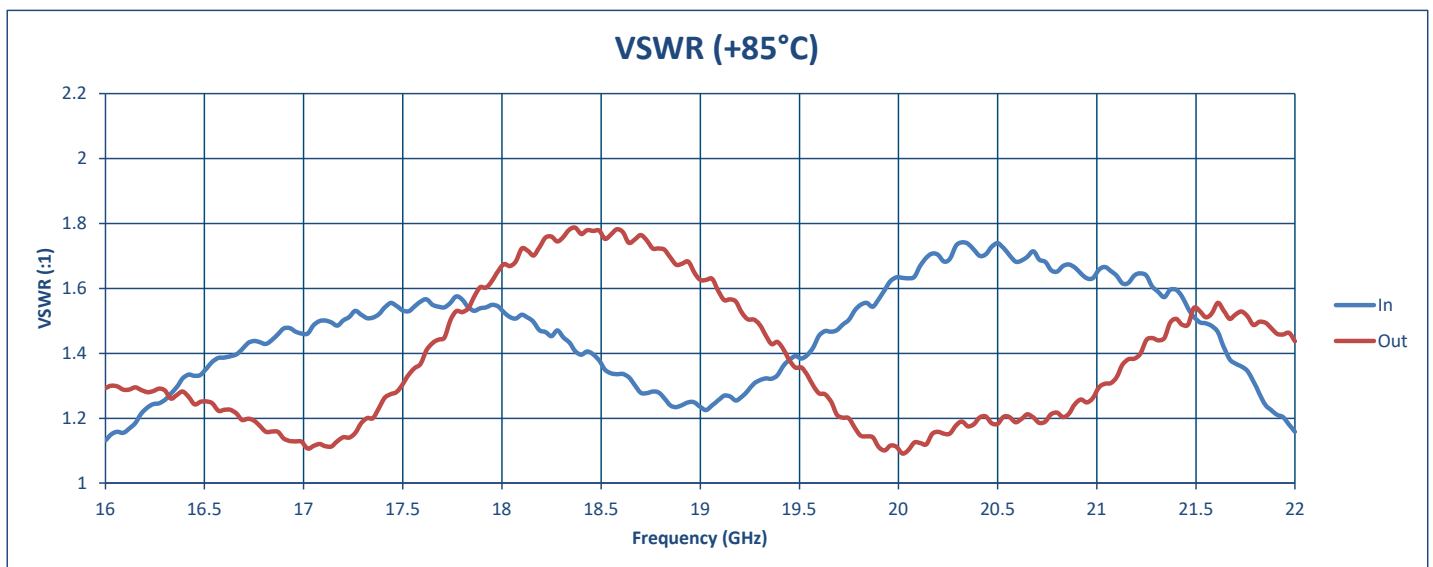
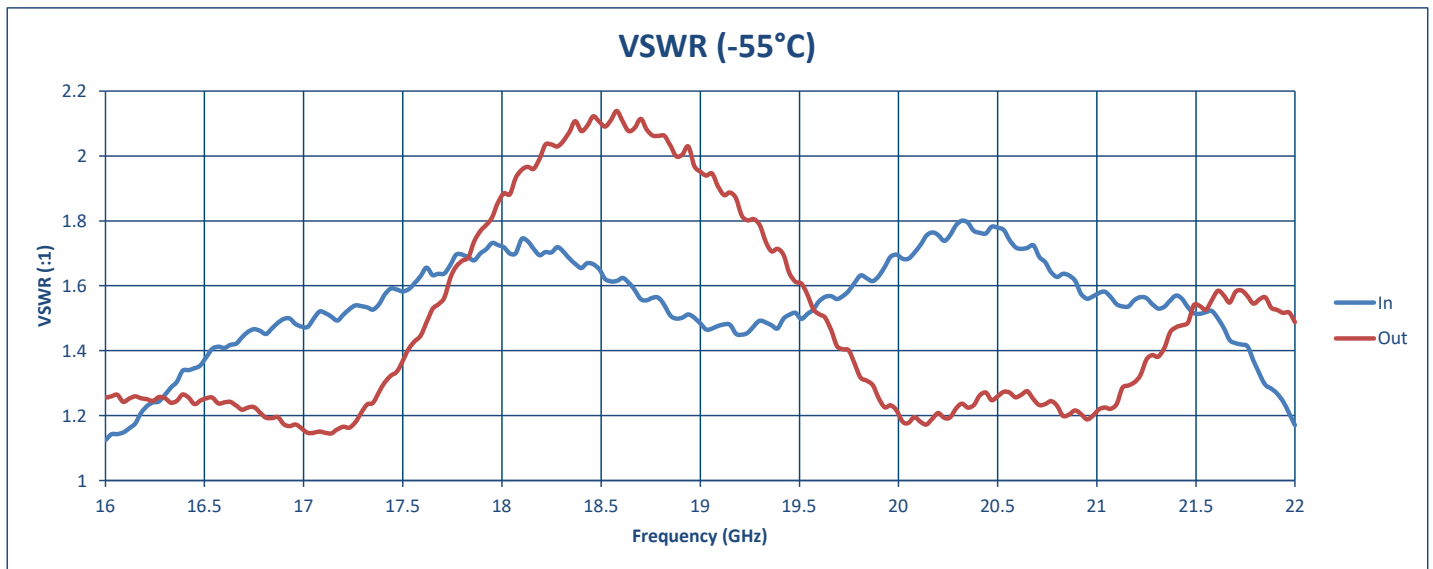
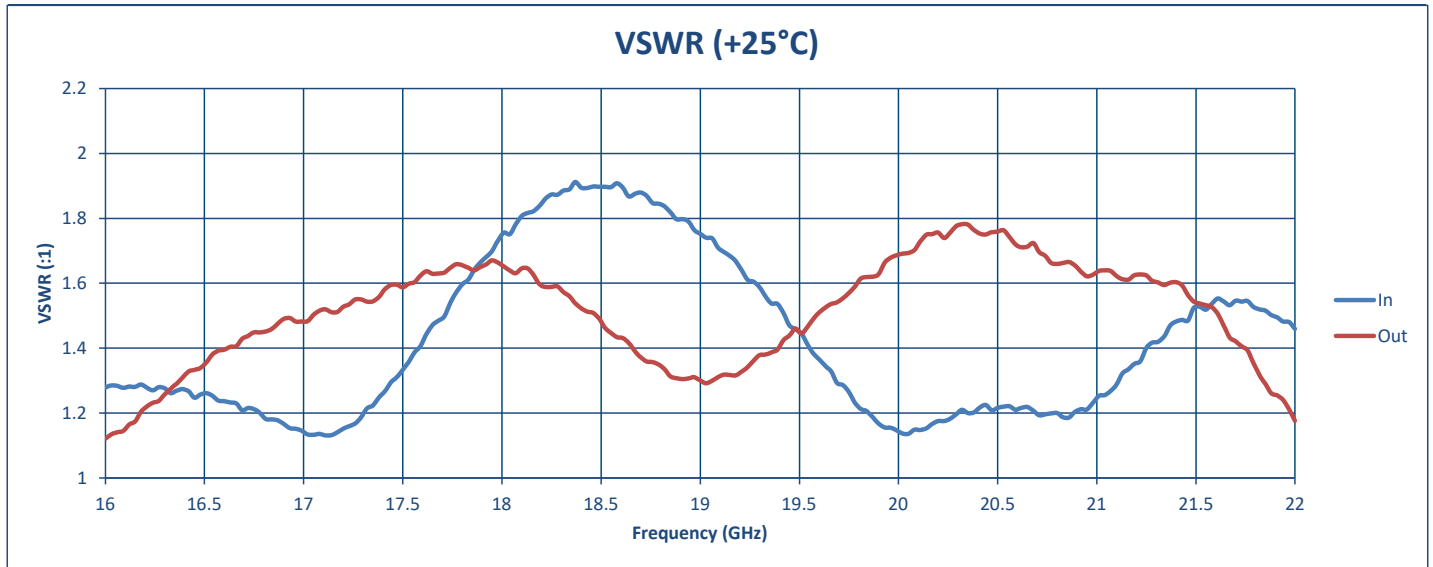
Full Pulse

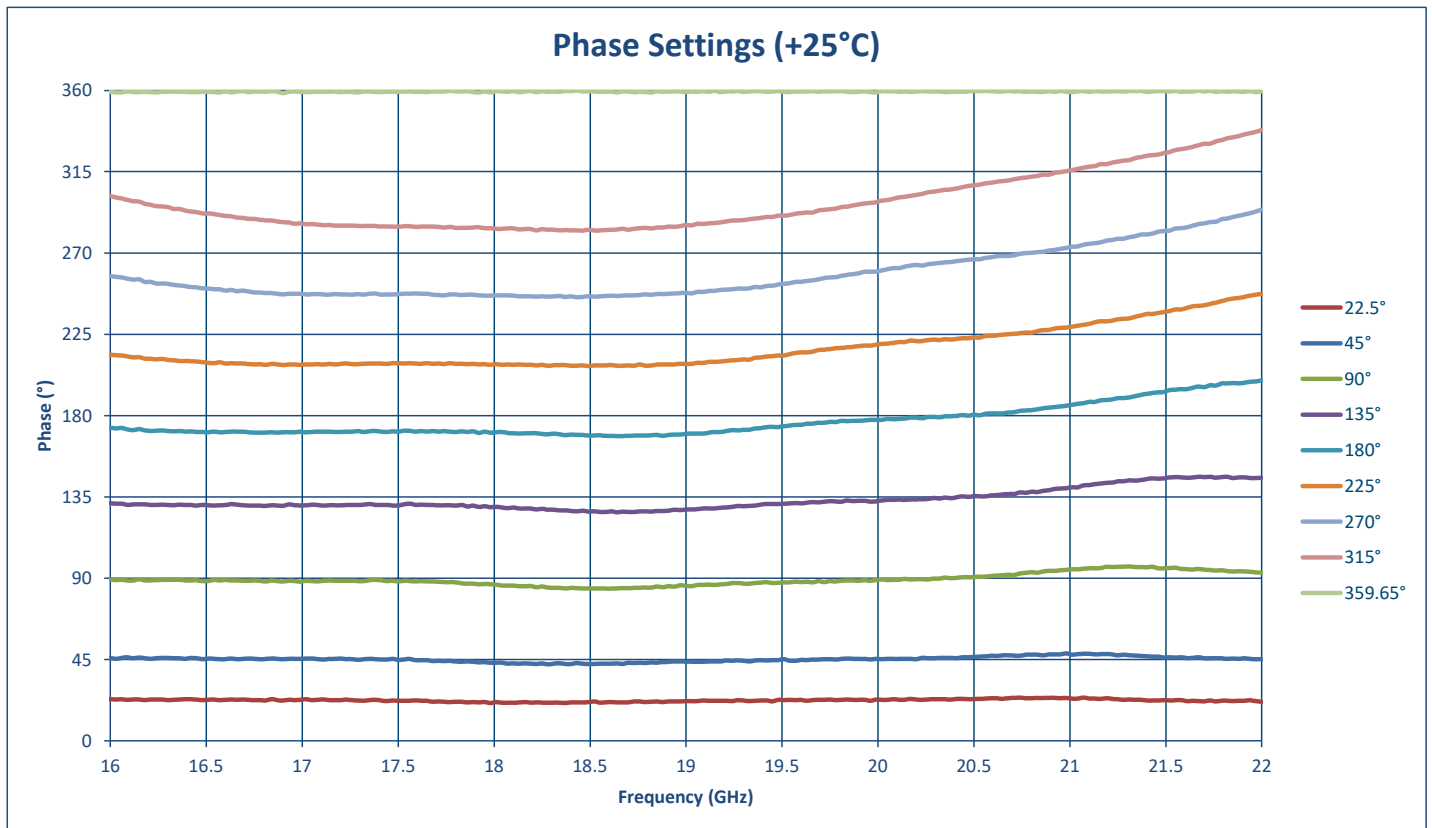
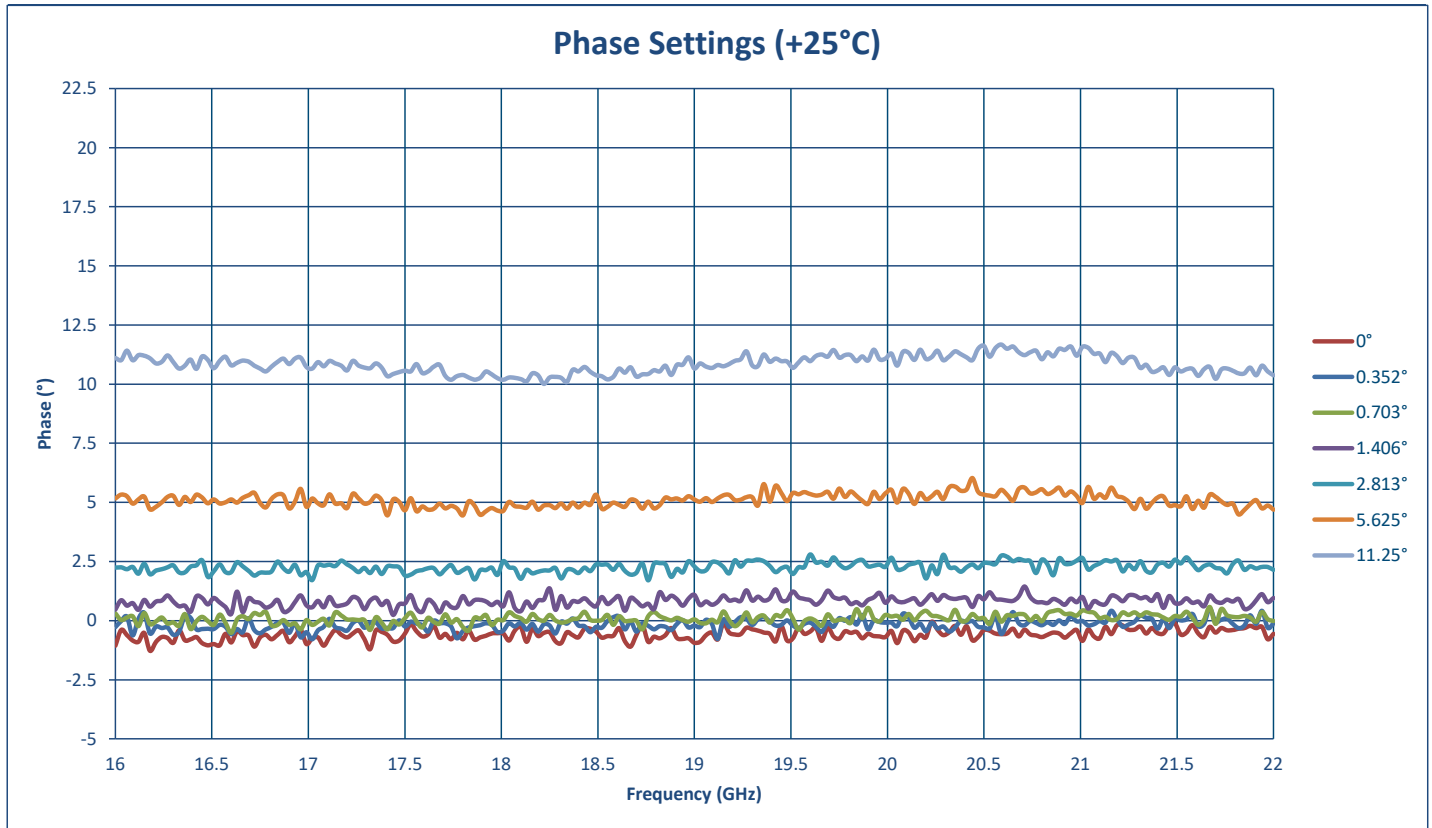


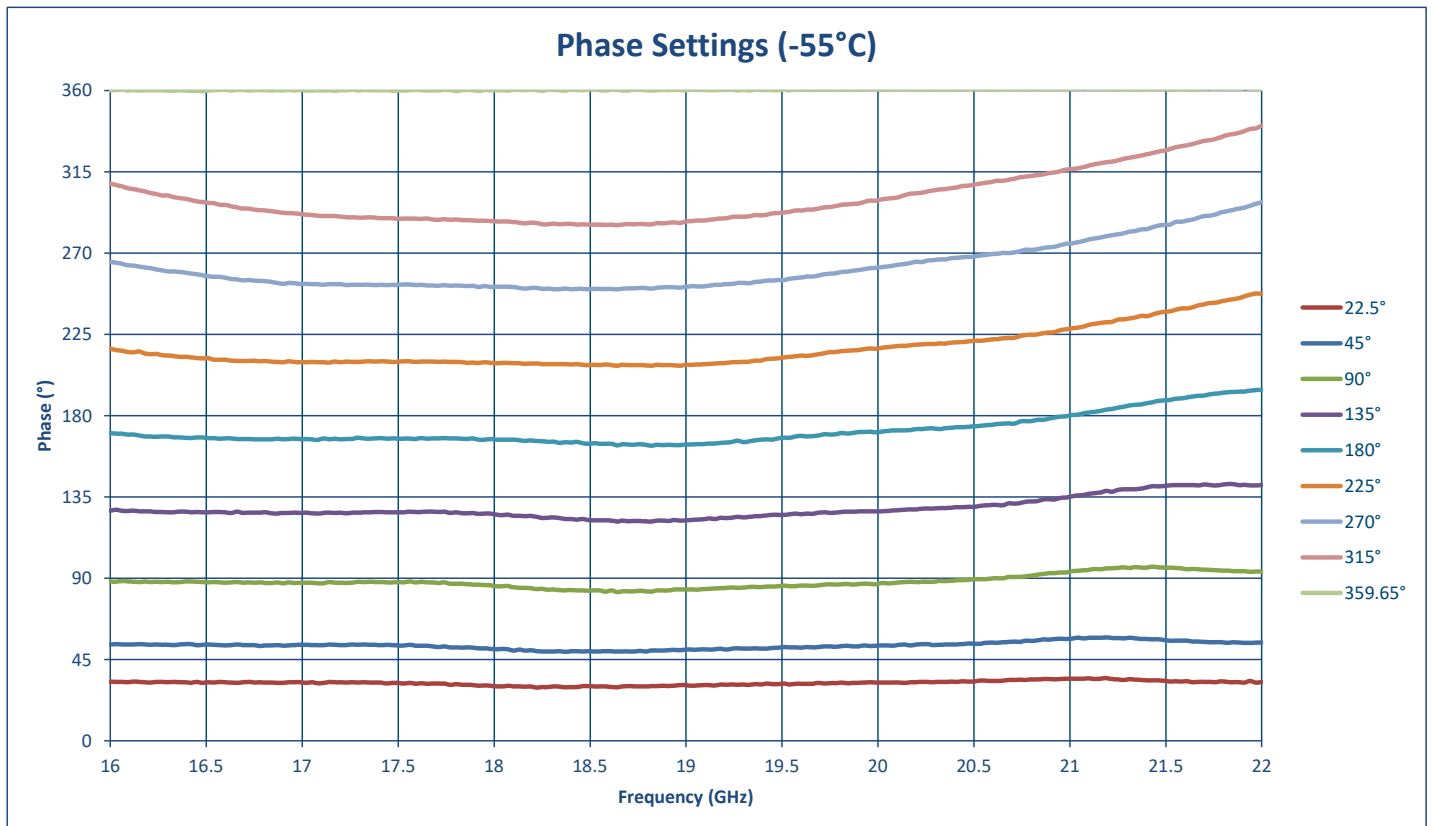
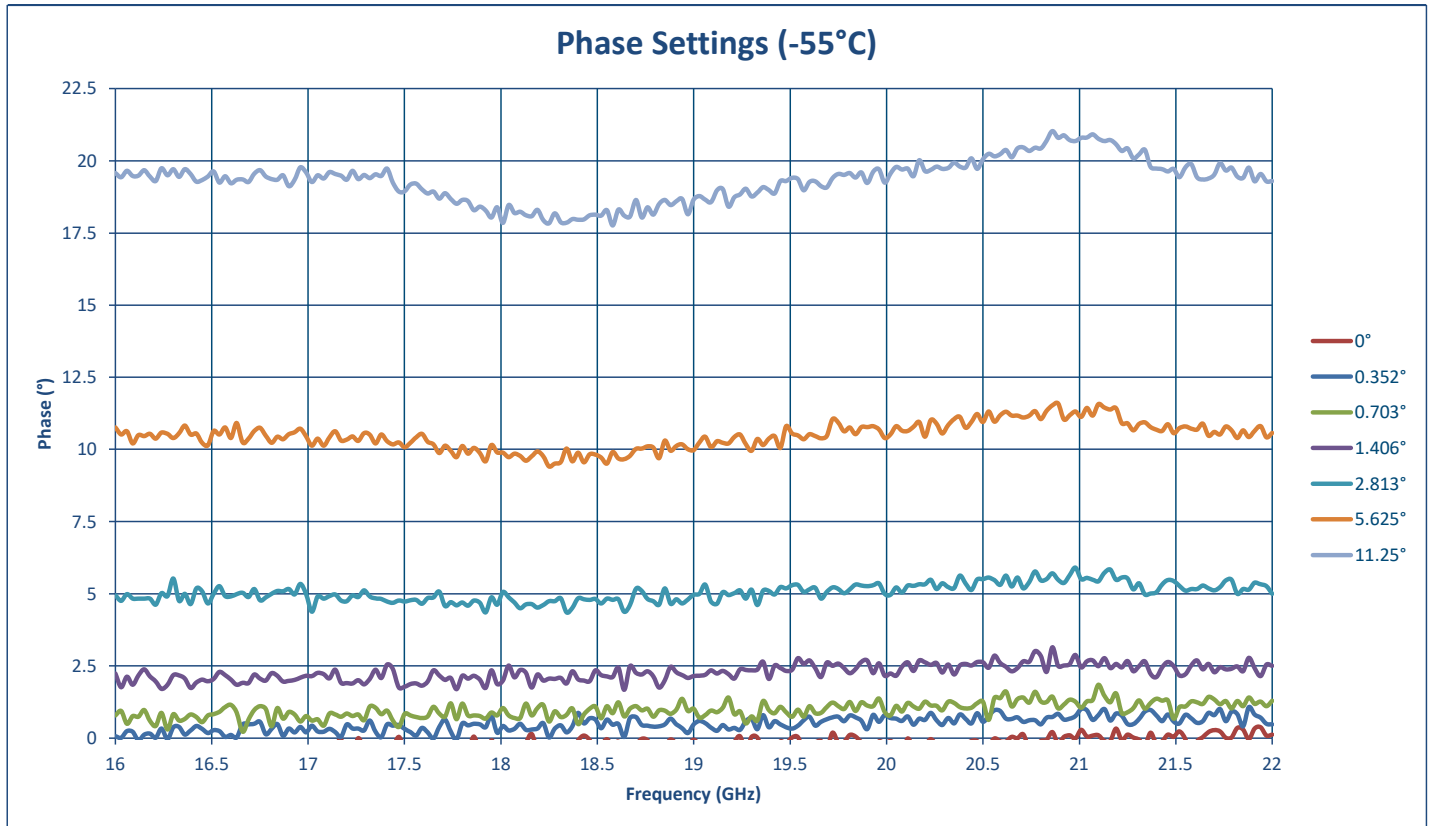
TEST DATA
Data Taken at -30 dBm

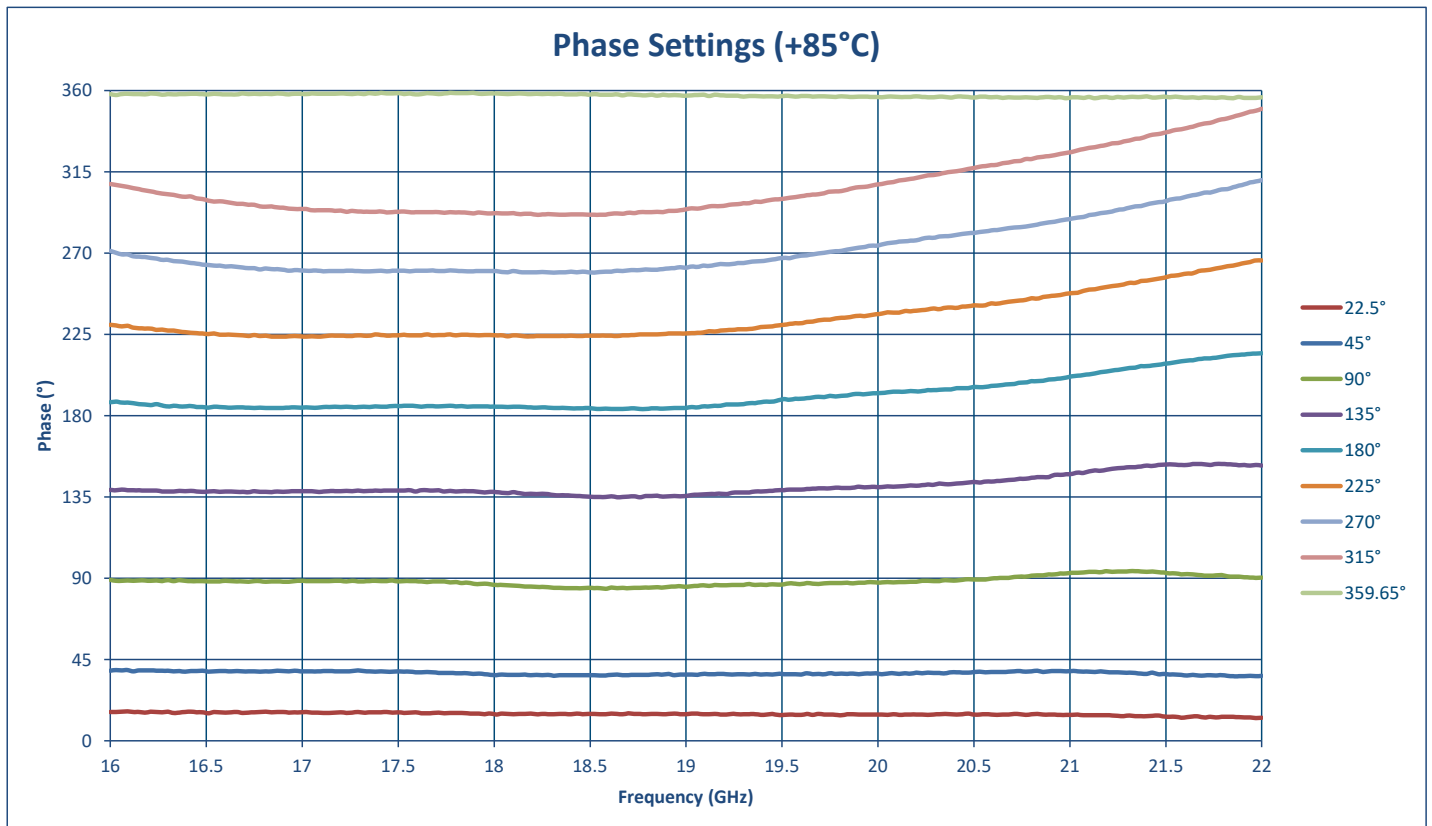
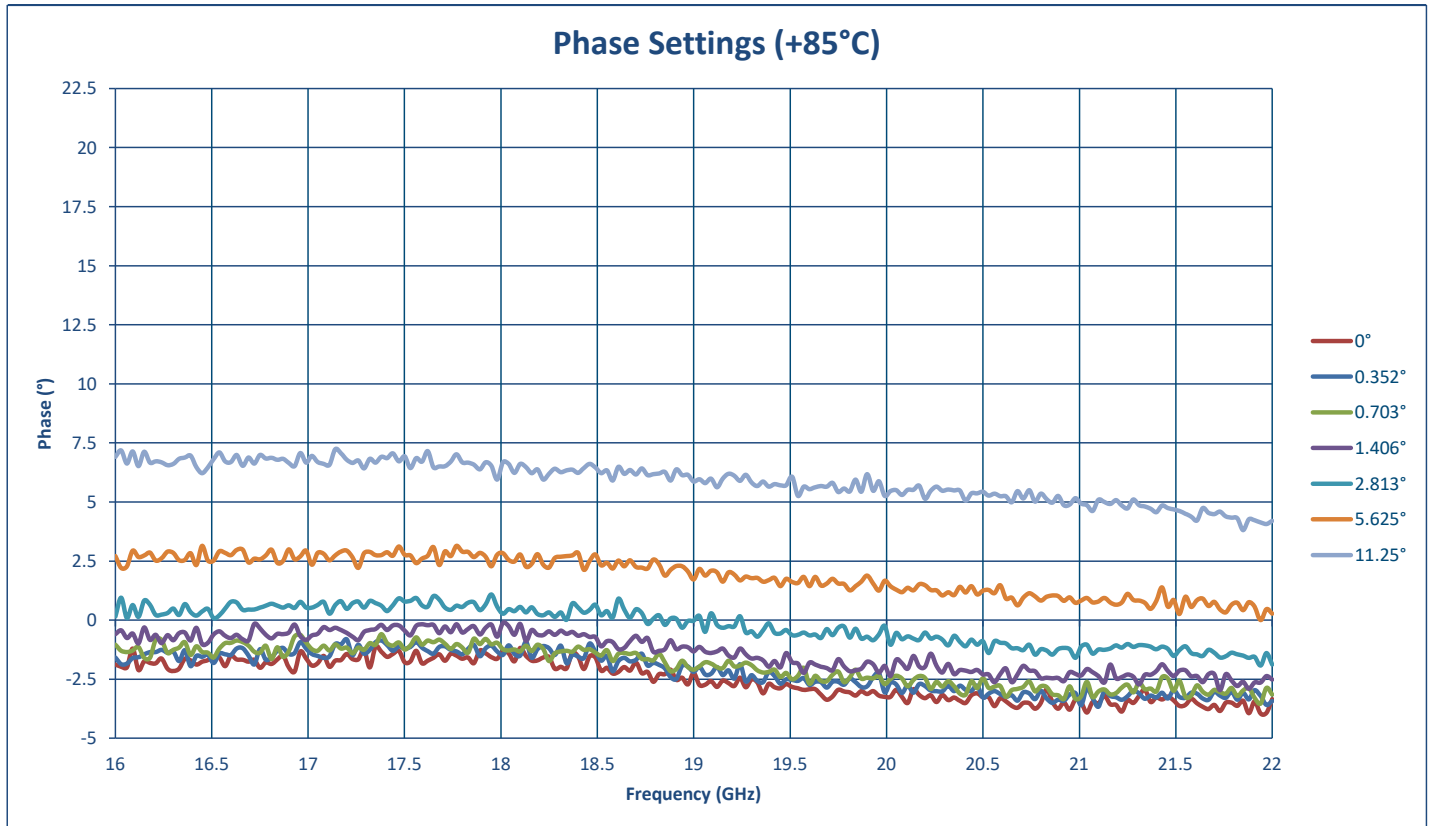
TEST ITEM NO.	PARAMETERS	SPECIFIED VALUE	Test Results		
			-55°C	+25°C	+85°C
1	Frequency Range:	16.0 GHz to 22.0 GHz	16.0 GHz to 22.0 GHz		
2	Insertion Loss:	11.5 dB Typ.	9.11 dB See Plot	10.22 dB See Plot	11.25 dB See Plot
3	VSWR:	2.0:1 Max	2.14:1	1.91:1	1.79:1
4	Phase Shift Error:	±5° Typ., ±7.5° Max. (@ 25°C & -20 dBm Input)	9.6° See Plot	5.8° See Plot	20.4° See Plot
5	Switching Speed:	500 ns Max.	440 ns		
6	Operating Power:	+10 dBm CW Max	+10 dBm CW Max		
7	Survival Power:	+25 dBm CW Max	+25 dBm CW Max		
8	Control:	10 Bit TTL	10 Bit TTL		
9	Power Supply:	+15V @ 50 mA	+15V @ 26 mA	+15V @ 26 mA	+15V @ 26 mA

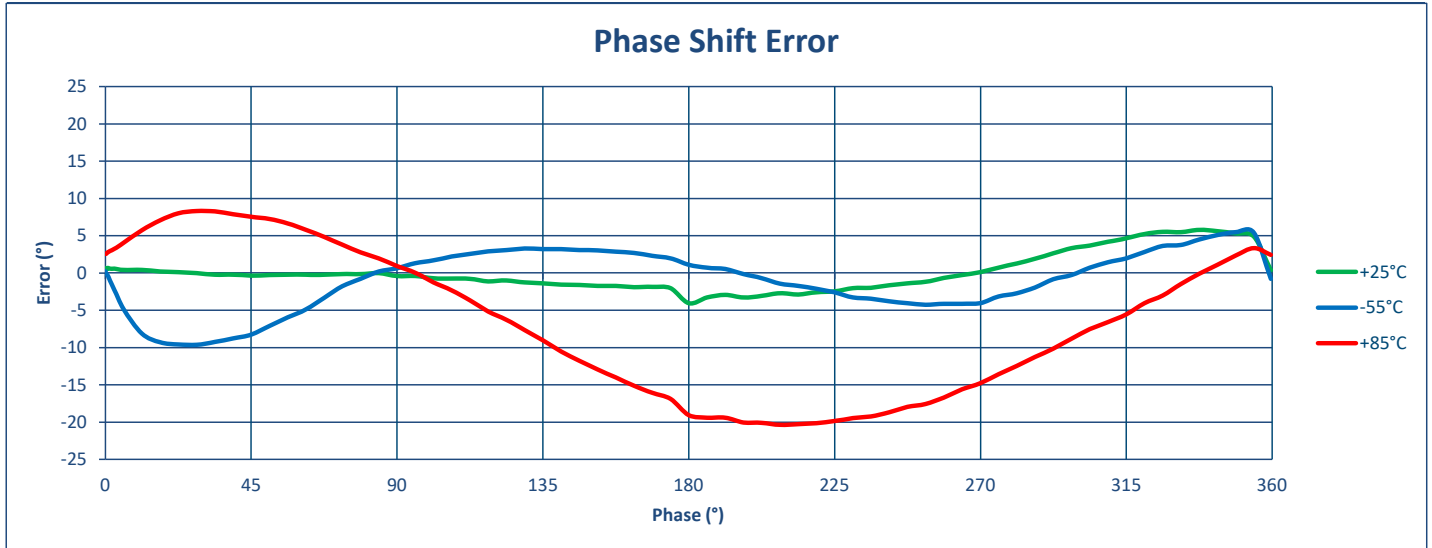








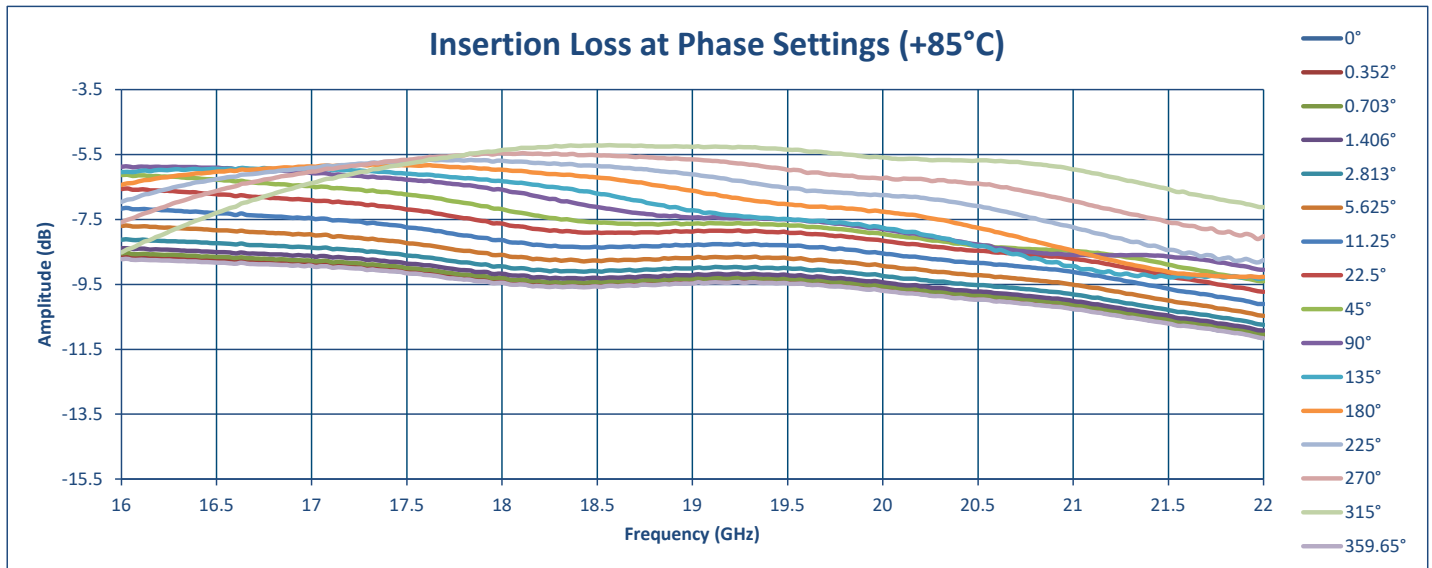
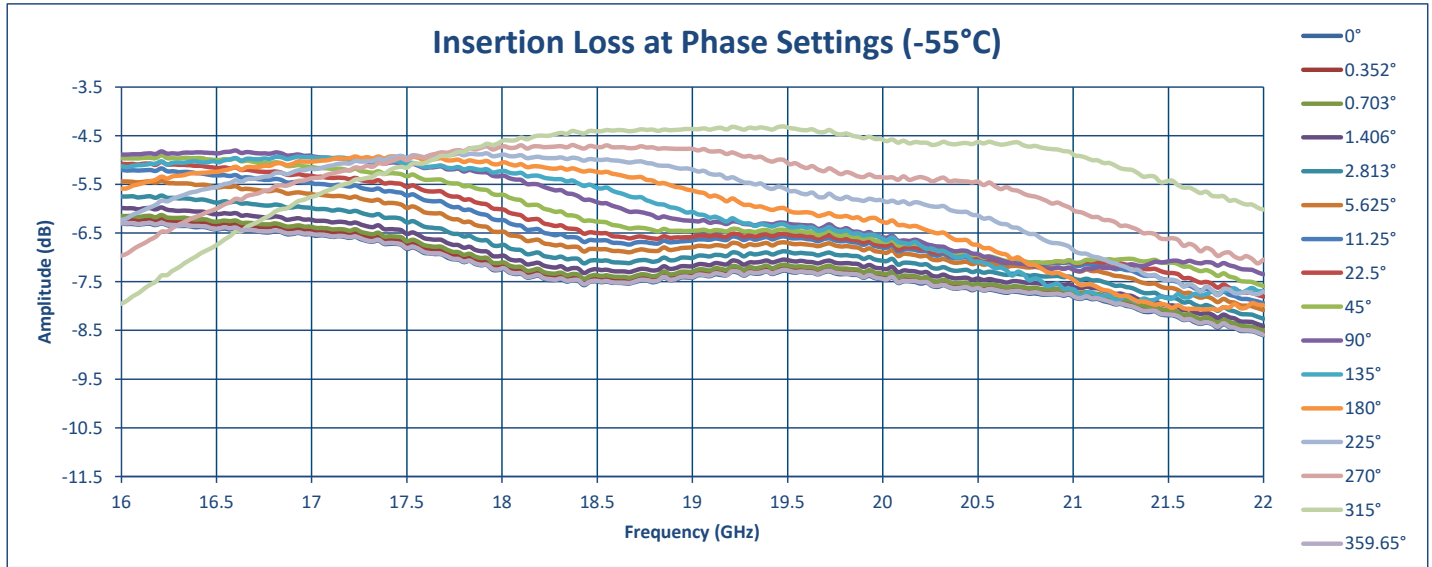
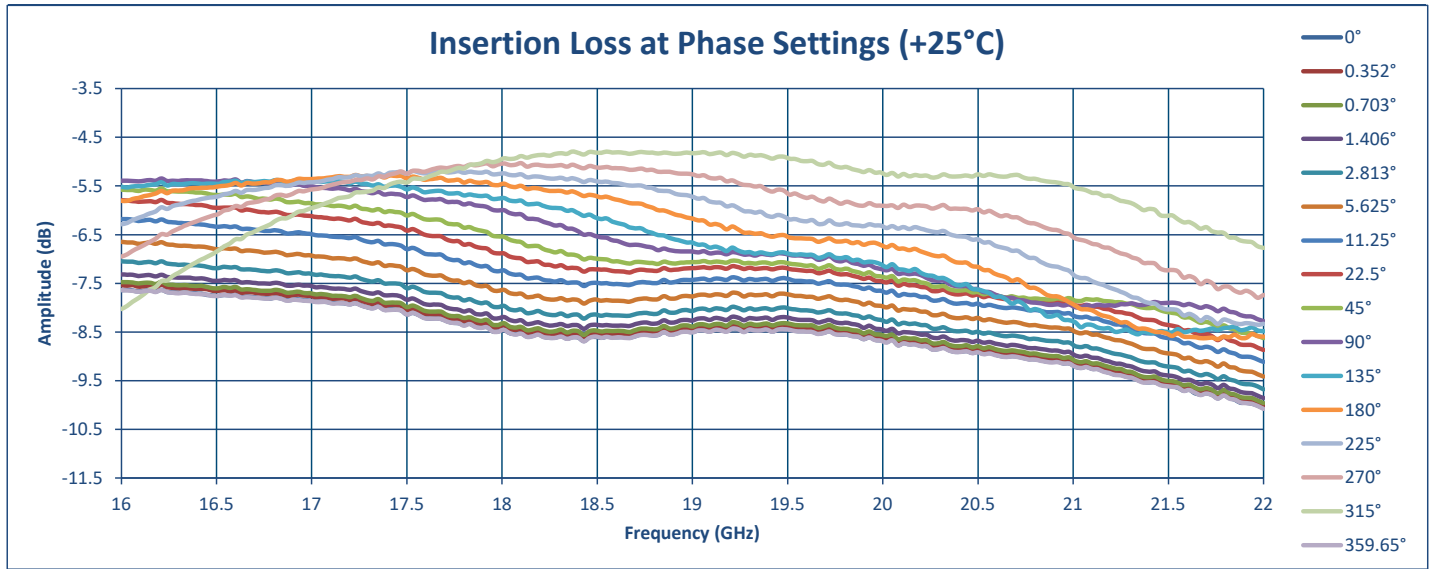


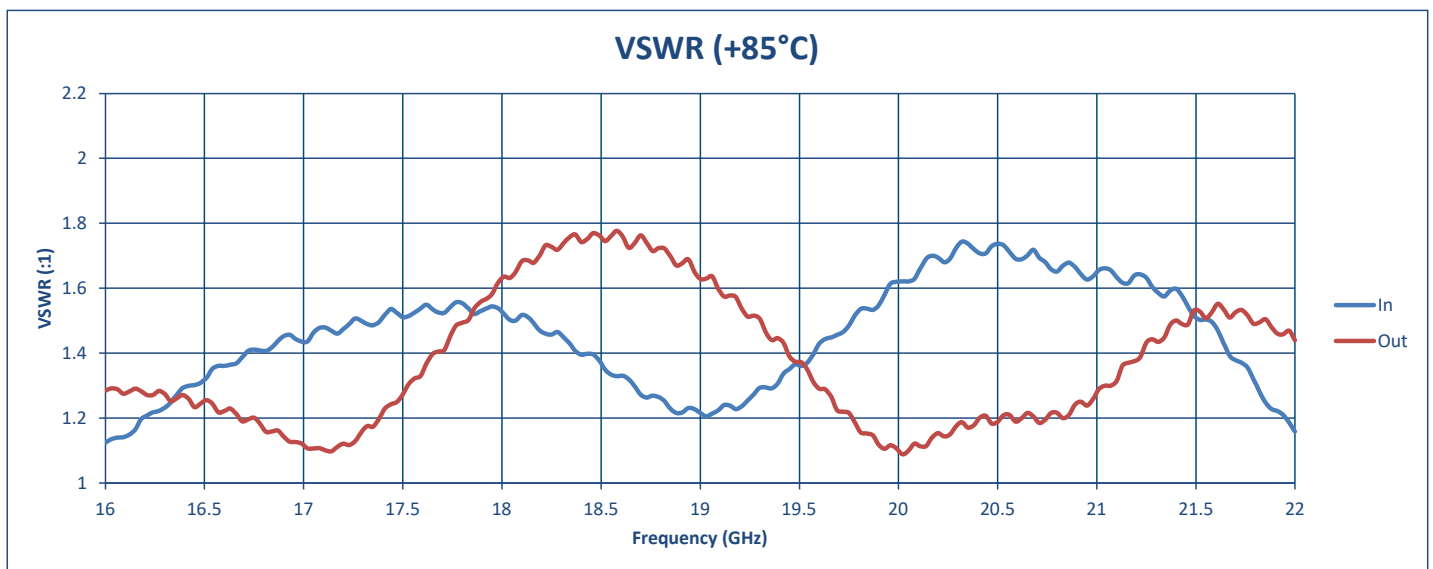
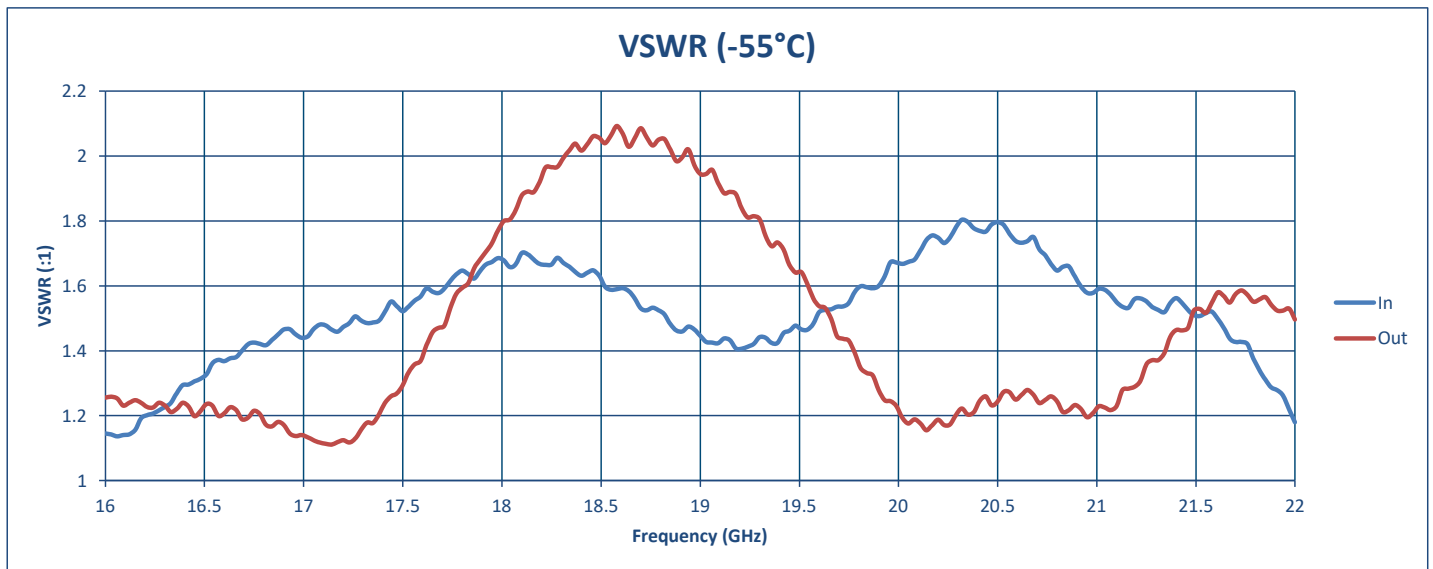
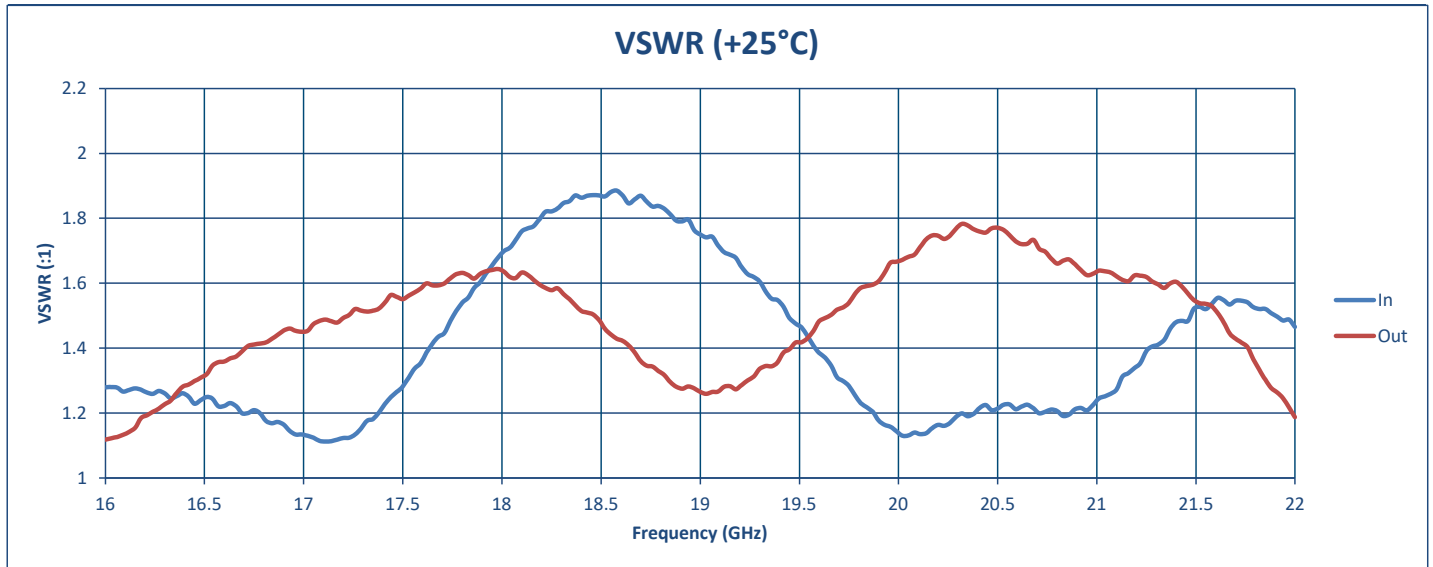


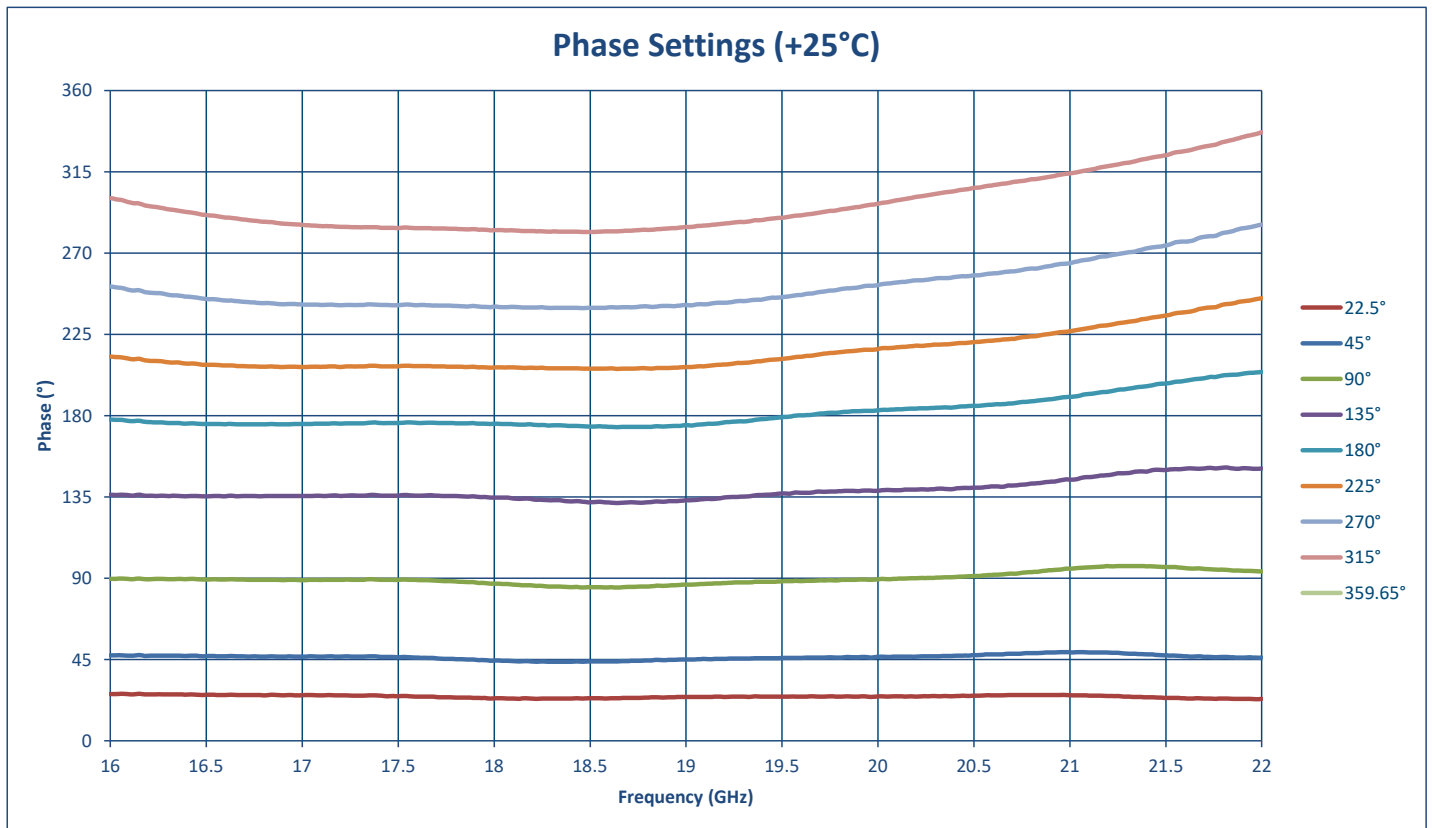
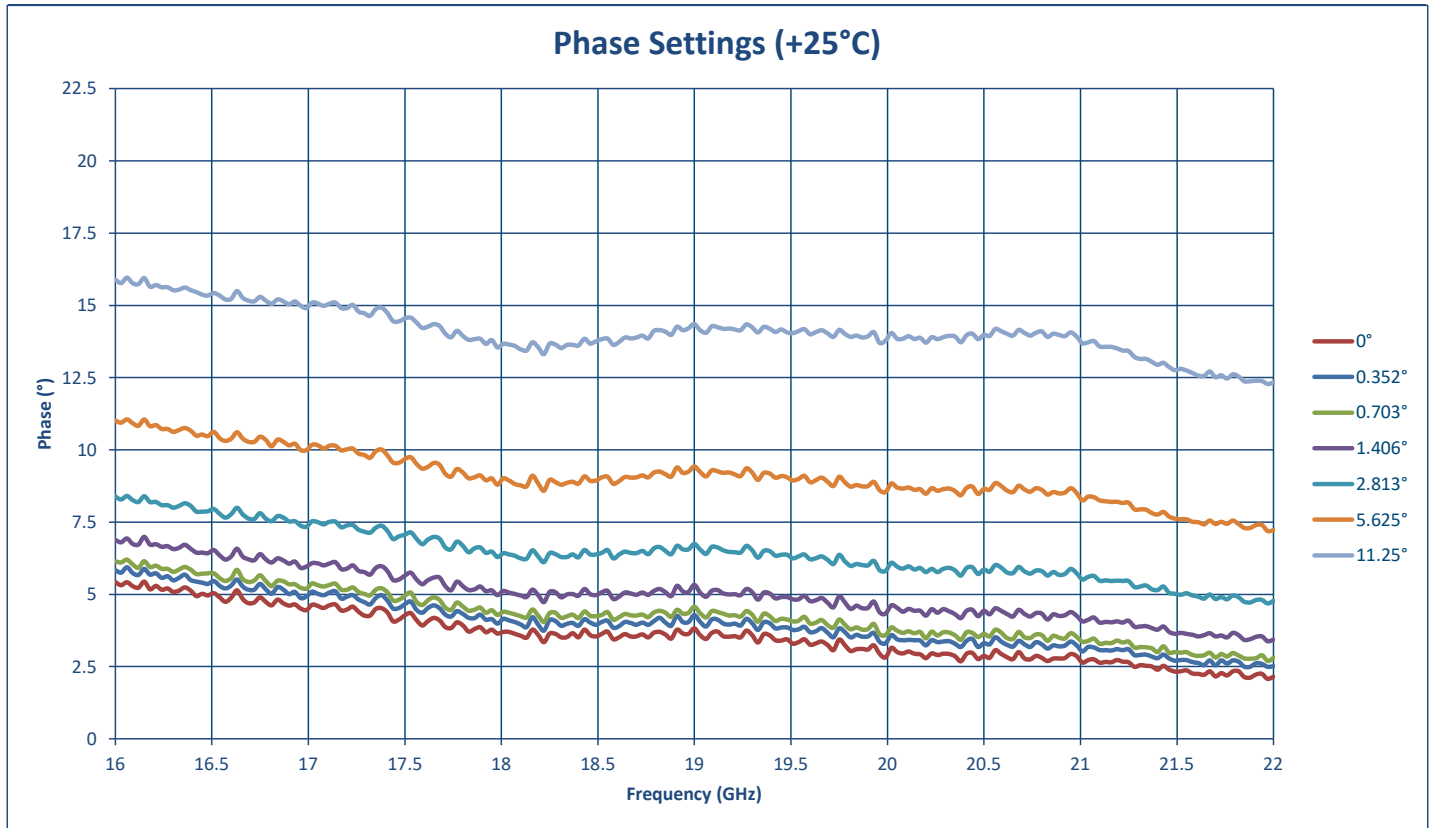
TEST DATA
Data Taken at -10 dBm

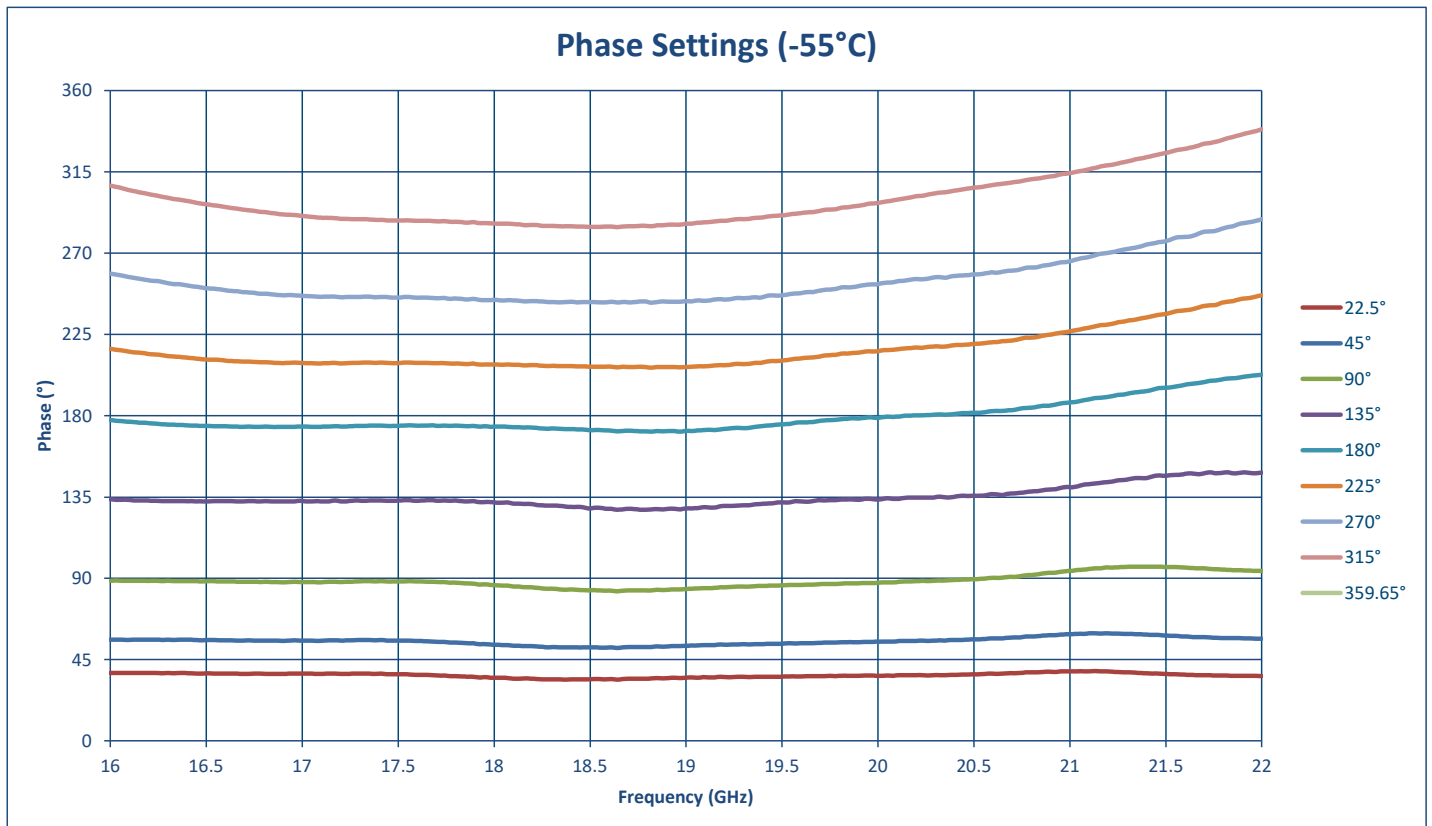
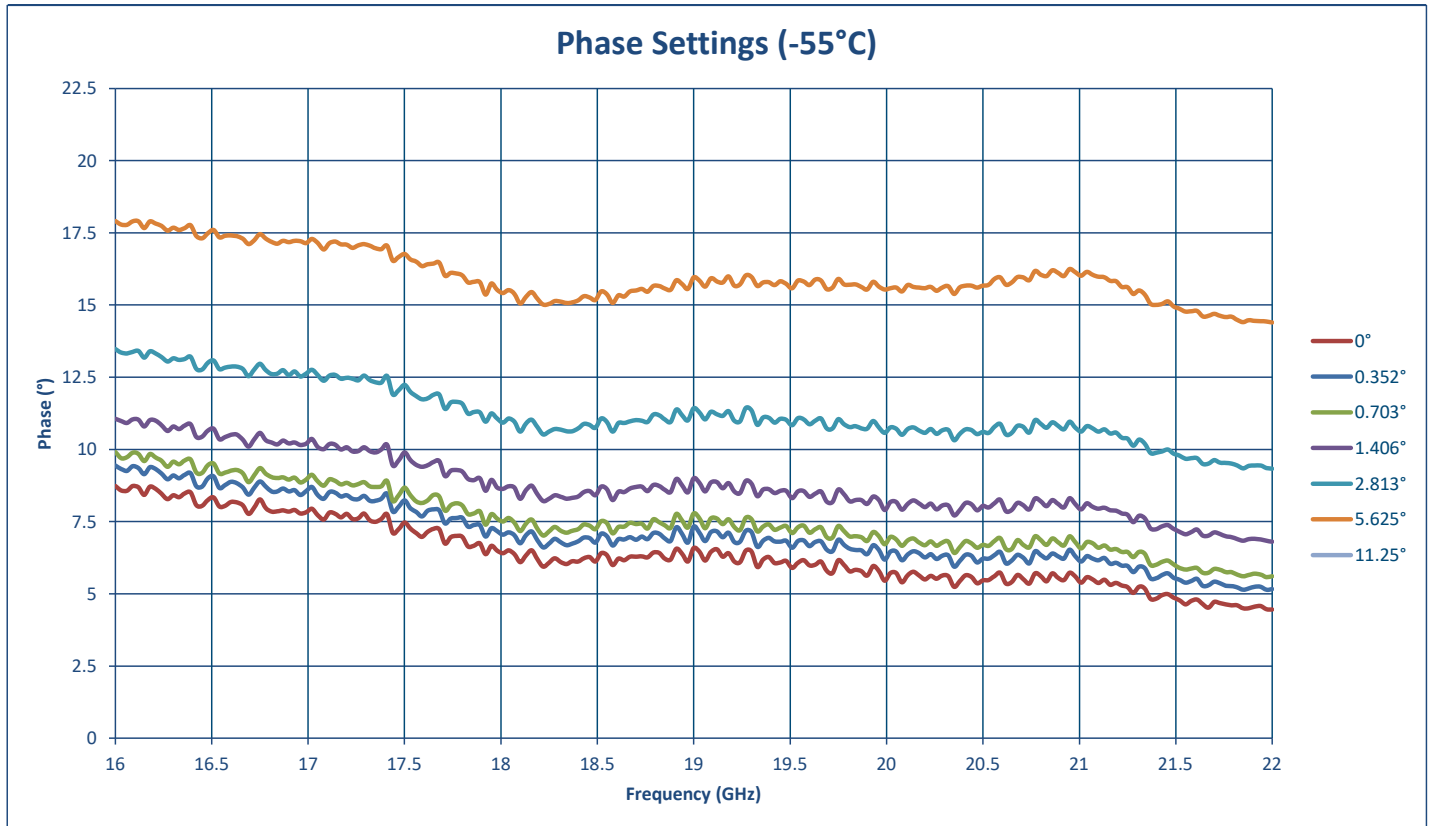
TEST ITEM NO.	PARAMETERS	SPECIFIED VALUE	Test Results		
			-55°C	+25°C	+85°C
1	Frequency Range:	16.0 GHz to 22.0 GHz	16.0 GHz to 22.0 GHz		
2	Insertion Loss:	11.5 dB Typ.	9.13 dB See Plot	10.08 dB See Plot	11.16 dB See Plot
3	VSWR:	2.0:1 Max	2.09:1	1.89:1	1.78:1
4	Phase Shift Error:	±5° Typ., ±7.5° Max. (@ 25°C & -20 dBm Input)	13.7° See Plot	8.9° See Plot	22.7° See Plot
5	Switching Speed:	500 ns Max.	440 ns		
6	Operating Power:	+10 dBm CW Max	+10 dBm CW Max		
7	Survival Power:	+25 dBm CW Max	+25 dBm CW Max		
8	Control:	10 Bit TTL	10 Bit TTL		
9	Power Supply:	+15V @ 50 mA	+15V @ 26 mA	+15V @ 26 mA	+15V @ 26 mA

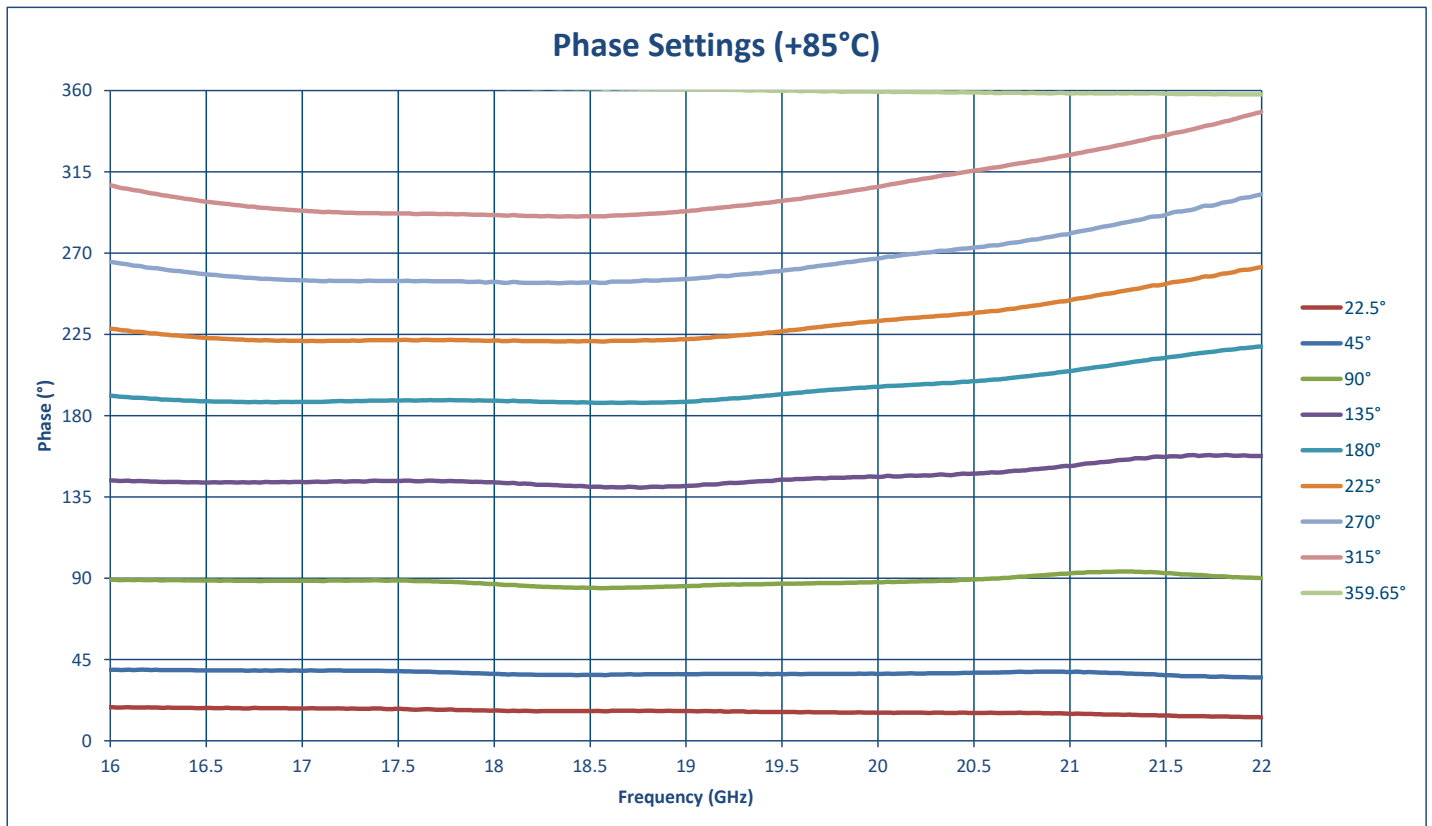
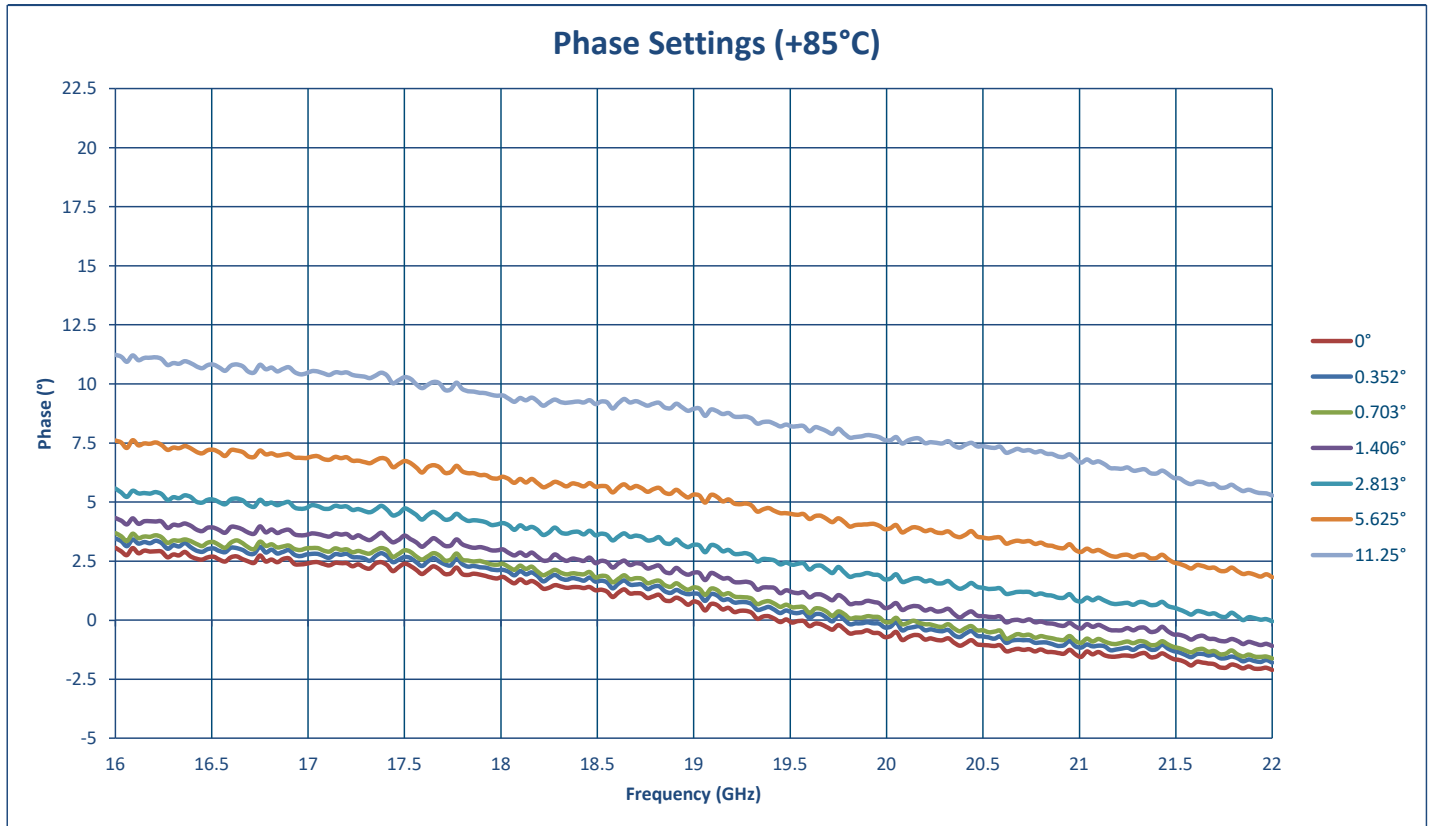
TYPICAL CHARACTERISTICS
ON
PS-360-16G22G-10B-SFF
Data Taken at -10 dBm

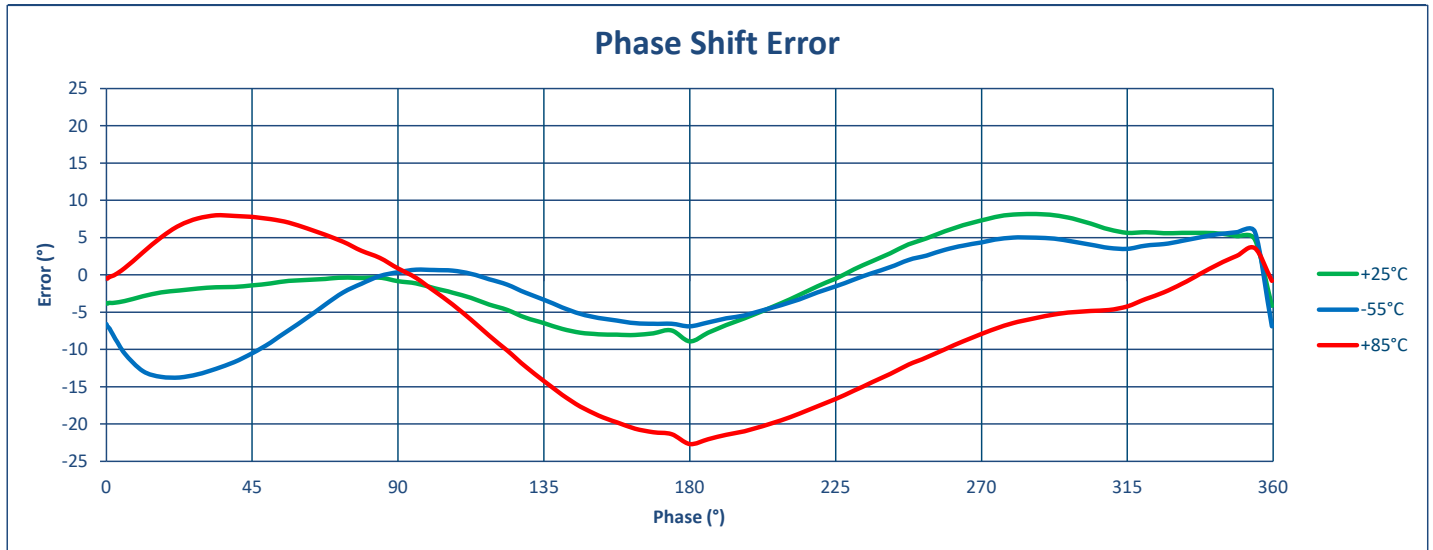








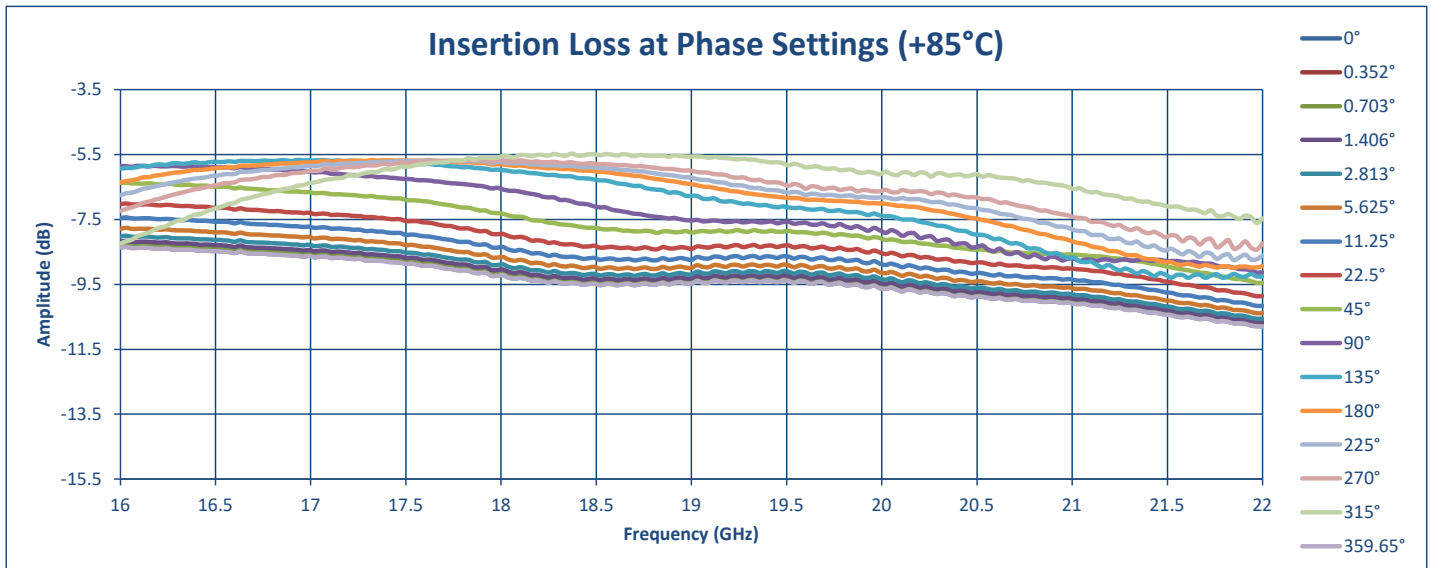
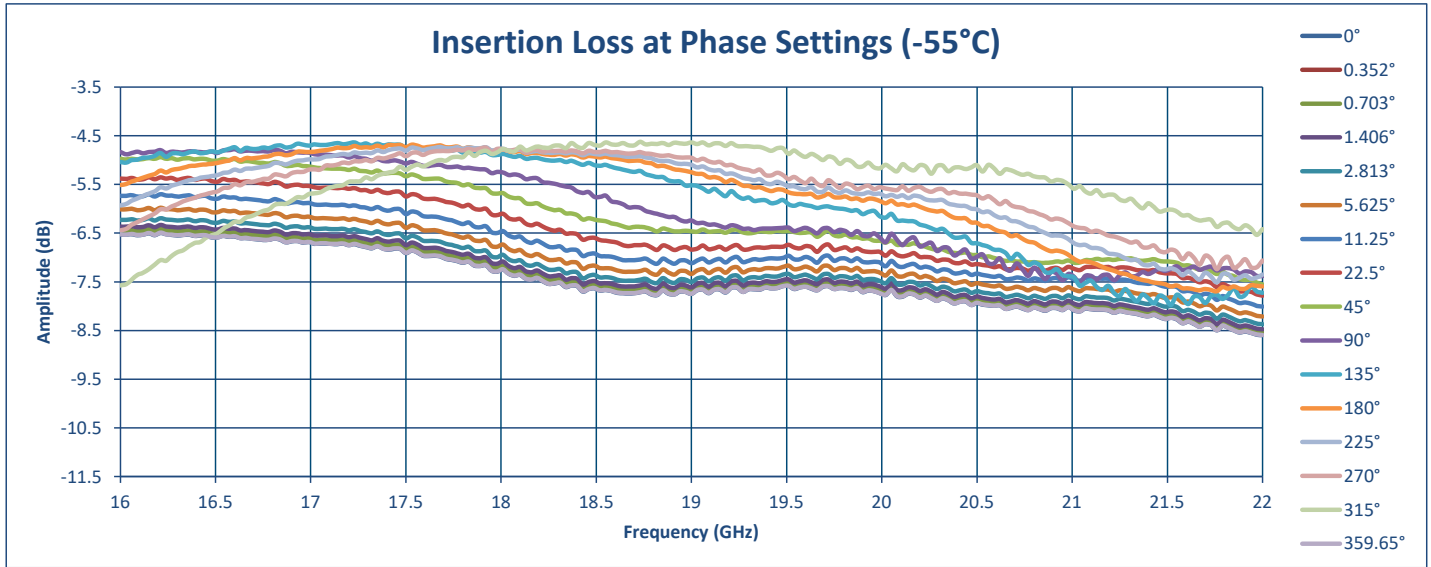
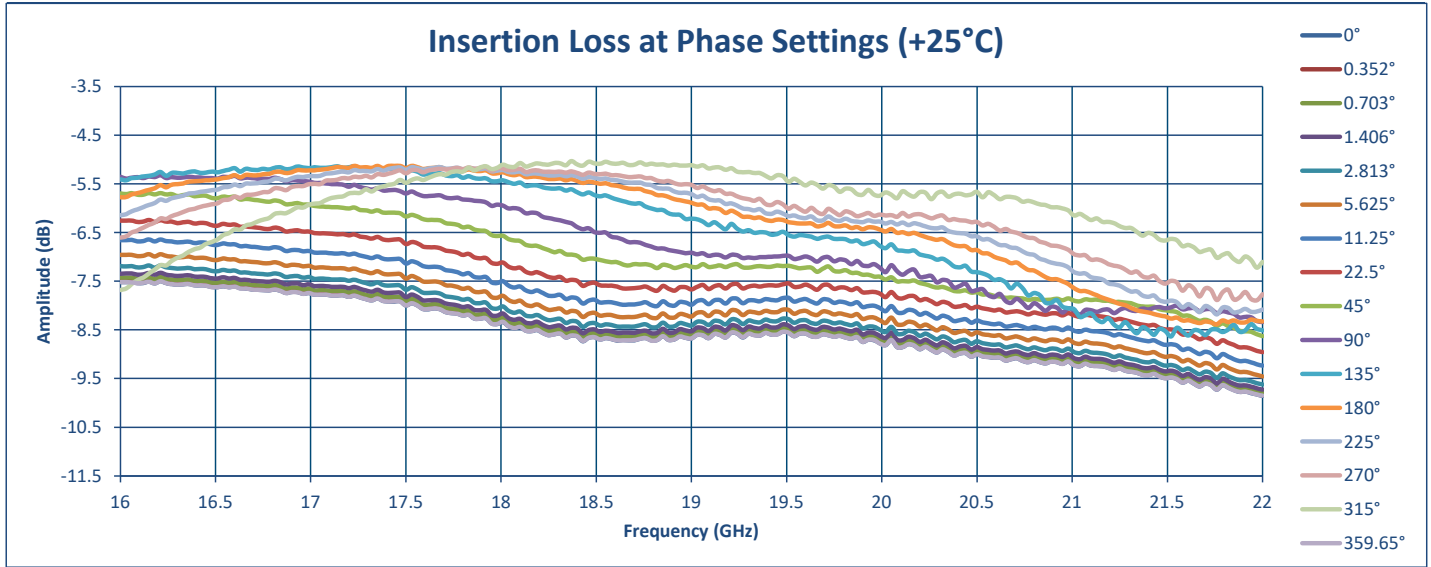




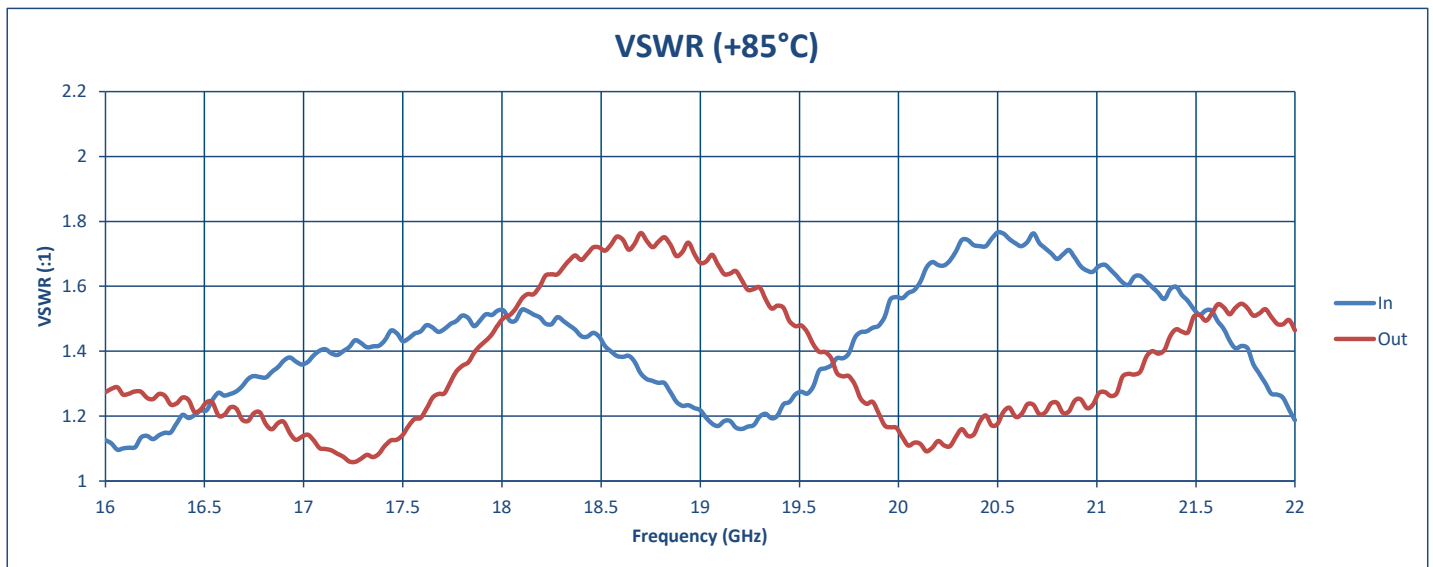
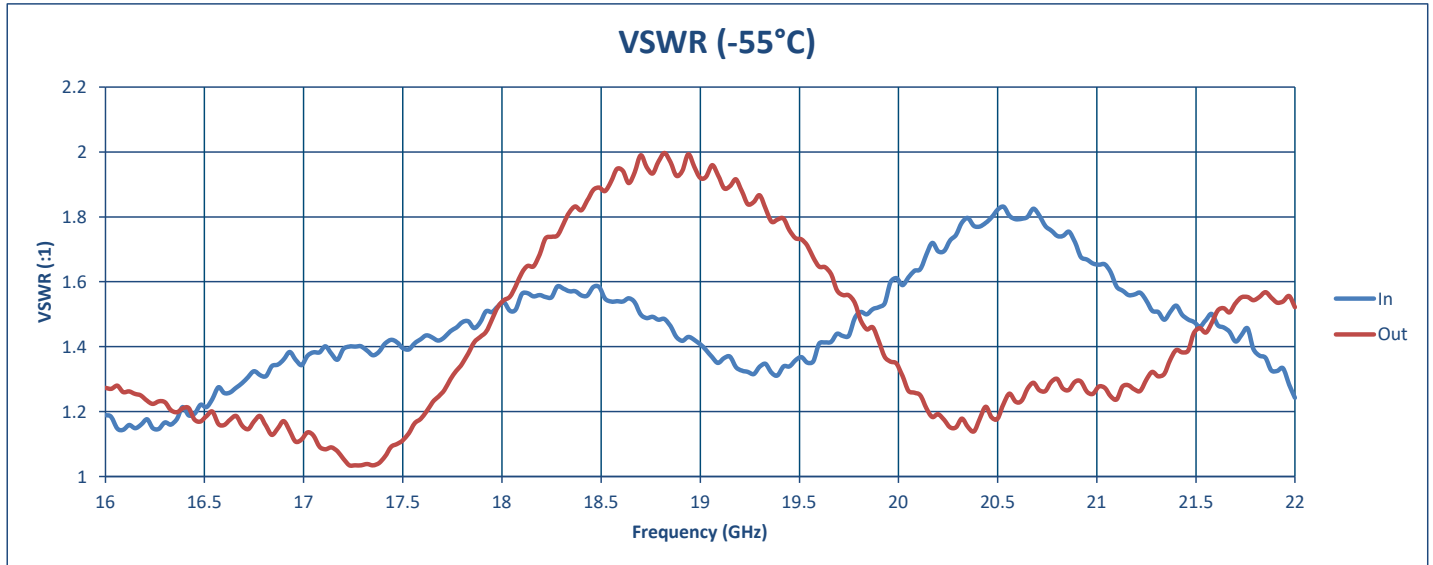
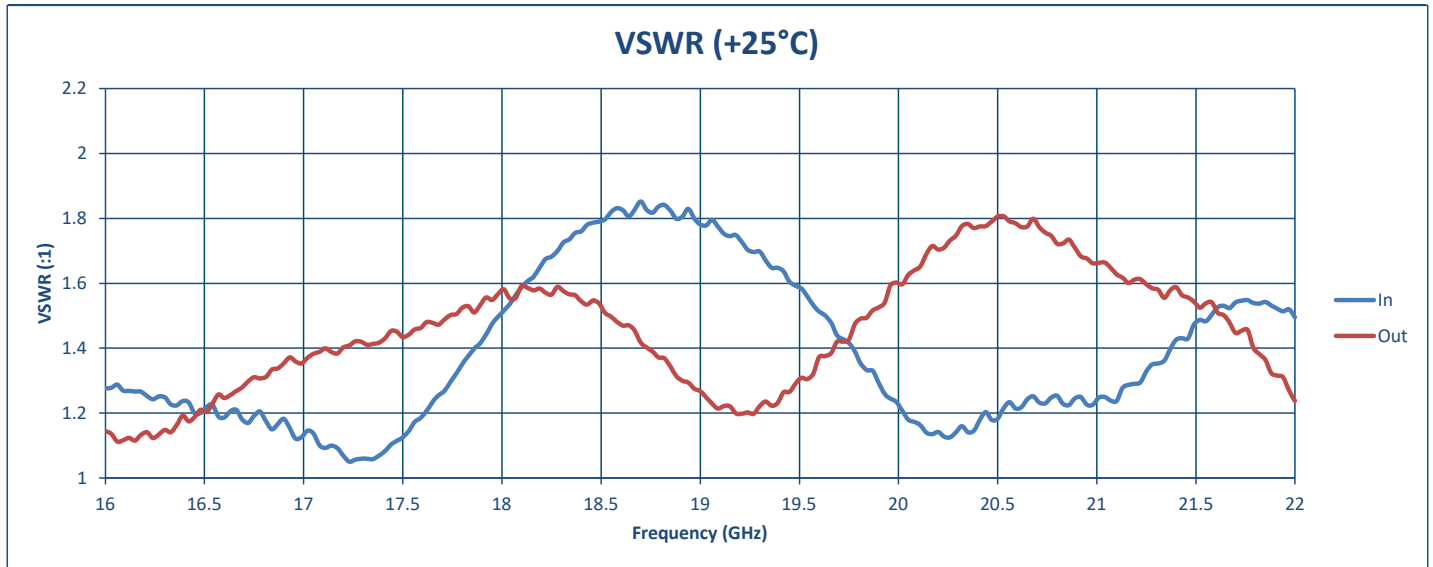
TEST DATA
Data Taken at 0 dBm

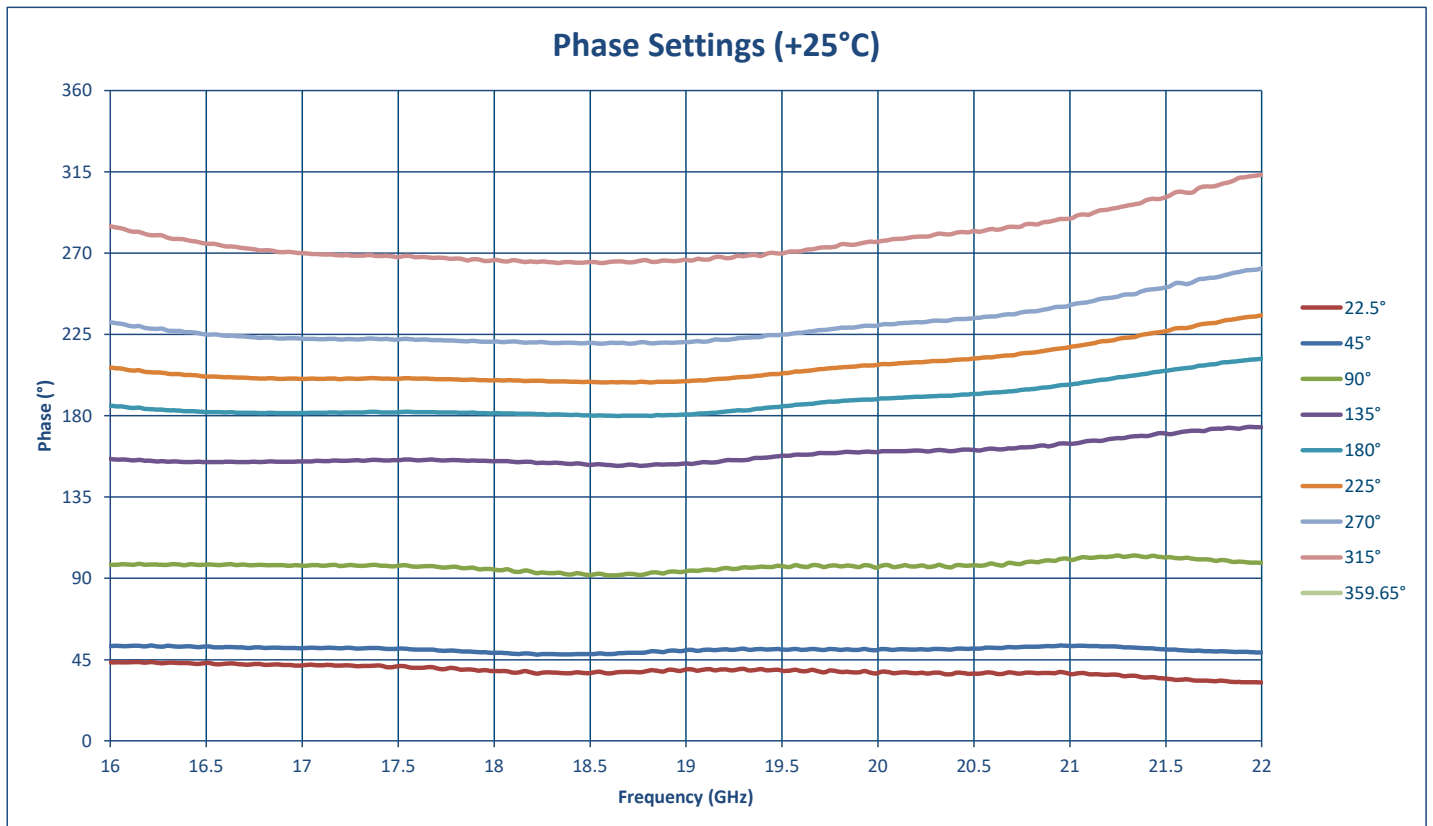
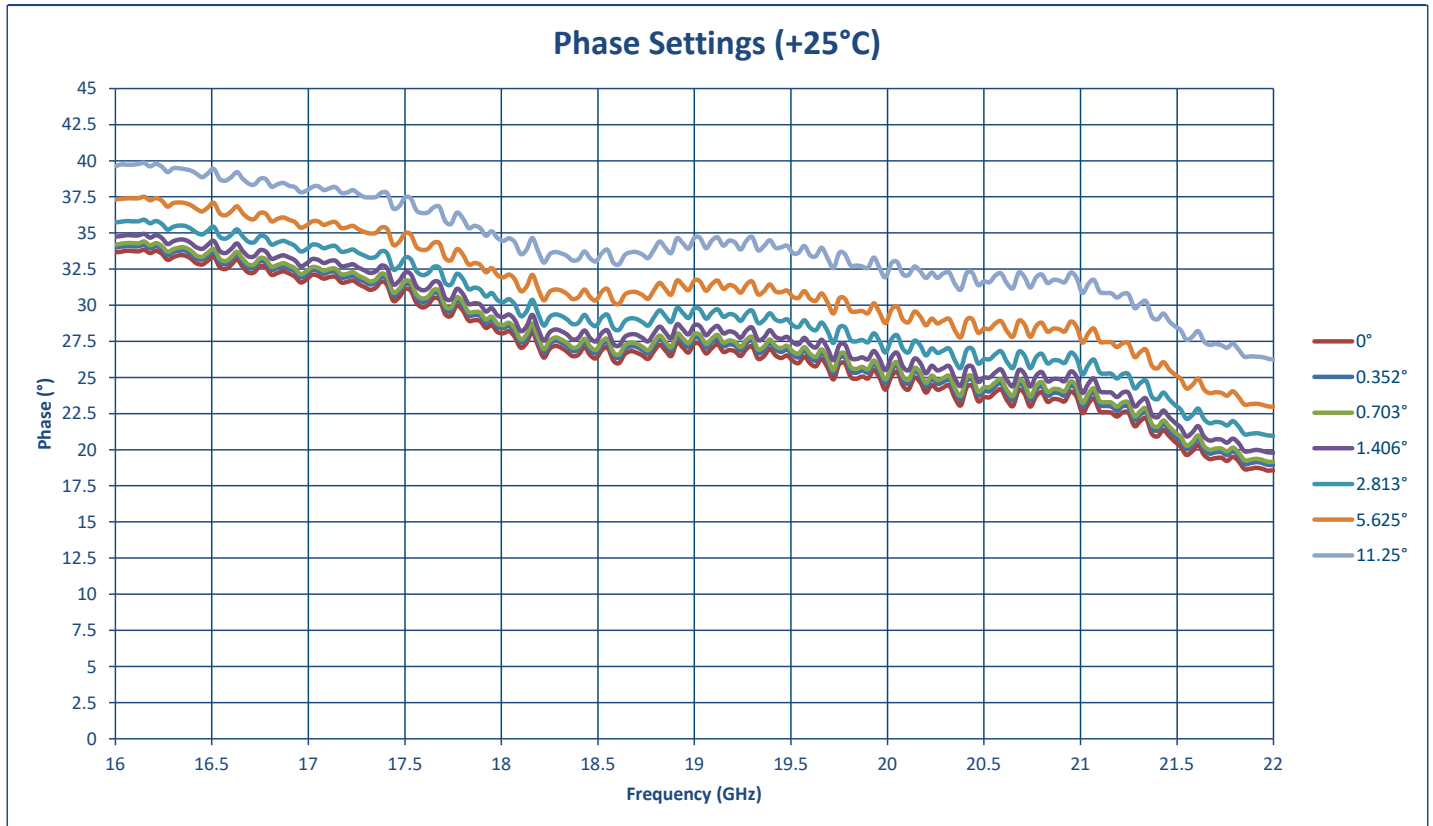
TEST ITEM NO.	PARAMETERS	SPECIFIED VALUE	Test Results		
			-55°C	+25°C	+85°C
1	Frequency Range:	16.0 GHz to 22.0 GHz	16.0 GHz to 22.0 GHz		
2	Insertion Loss:	11.5 dB Typ.	9.08 dB See Plot	9.85 dB See Plot	10.8 dB See Plot
3	VSWR:	2.0:1 Max	2:1	1.85:1	1.77:1
4	Phase Shift Error:	±5° Typ., ±7.5° Max. (@ 25°C & -20 dBm Input)	35.8° See Plot	34.1° See Plot	34.2° See Plot
5	Switching Speed:	500 ns Max.	440 ns		
6	Operating Power:	+10 dBm CW Max	+10 dBm CW Max		
7	Survival Power:	+25 dBm CW Max	+25 dBm CW Max		
8	Control:	10 Bit TTL	10 Bit TTL		
9	Power Supply:	+15V @ 50 mA	+15V @ 26 mA	+15V @ 26 mA	+15V @ 26 mA

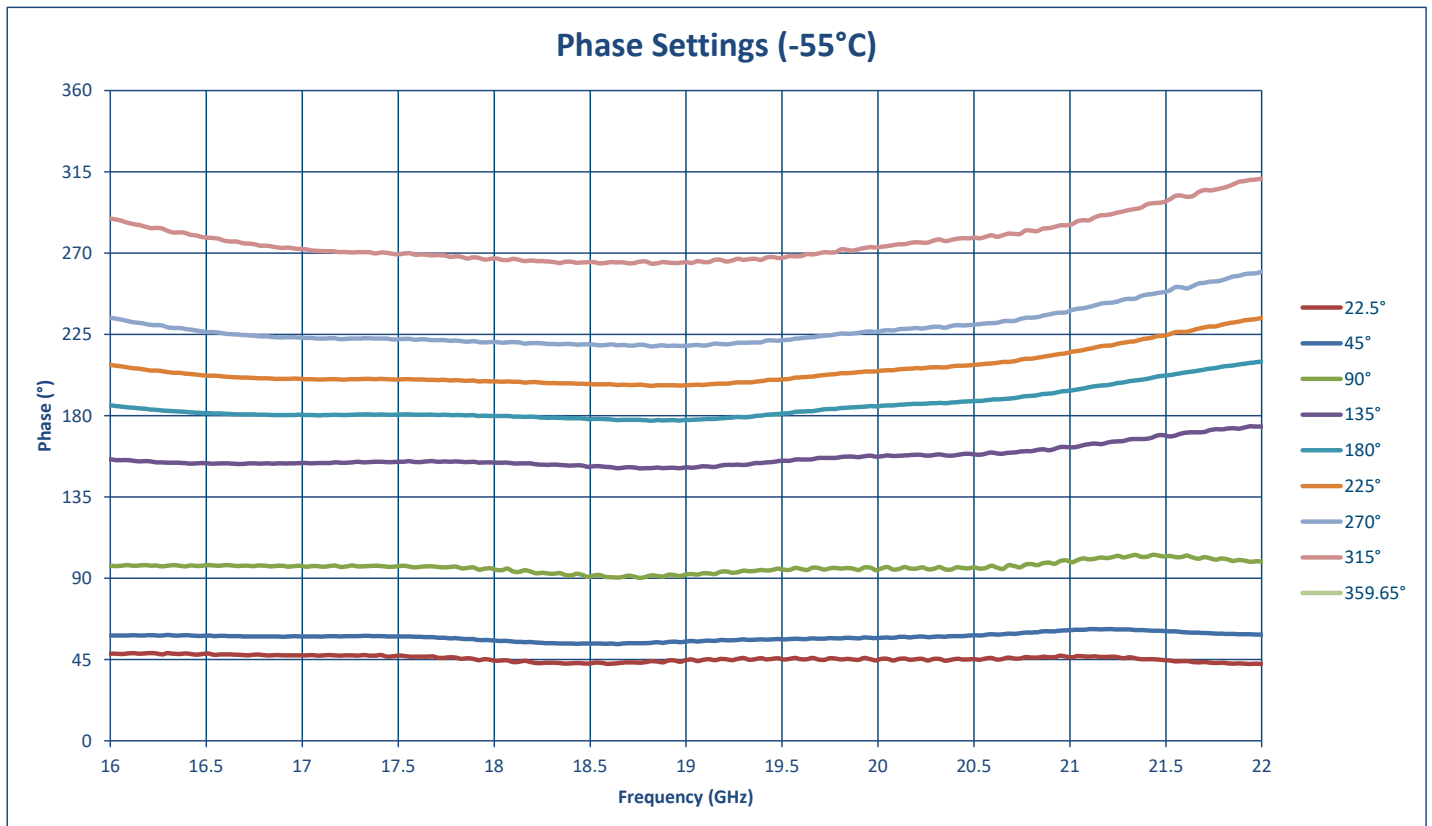
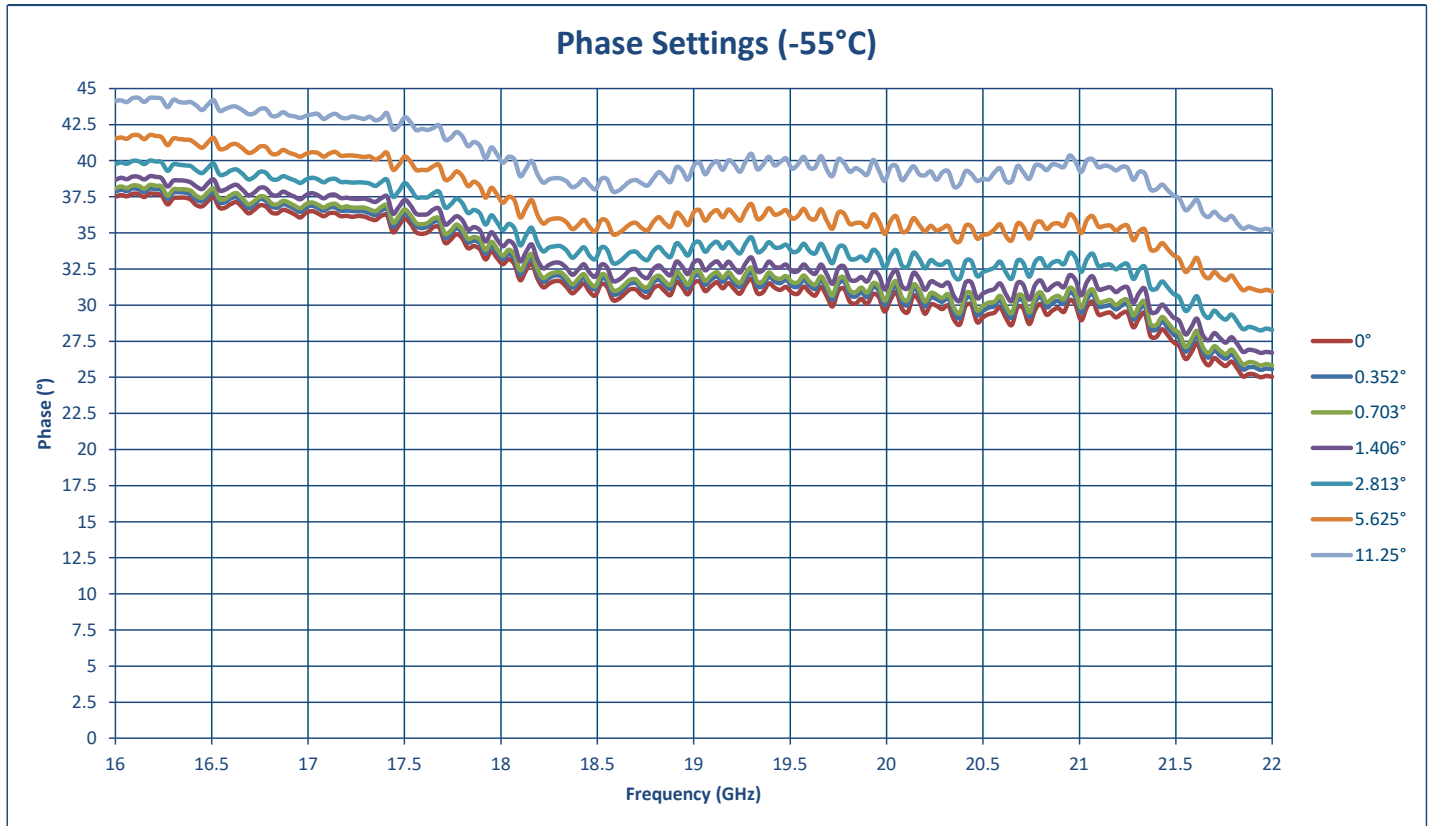
TYPICAL CHARACTERISTICS
ON
PS-360-16G22G-10B-SFF
 Data Taken at 0 dBm

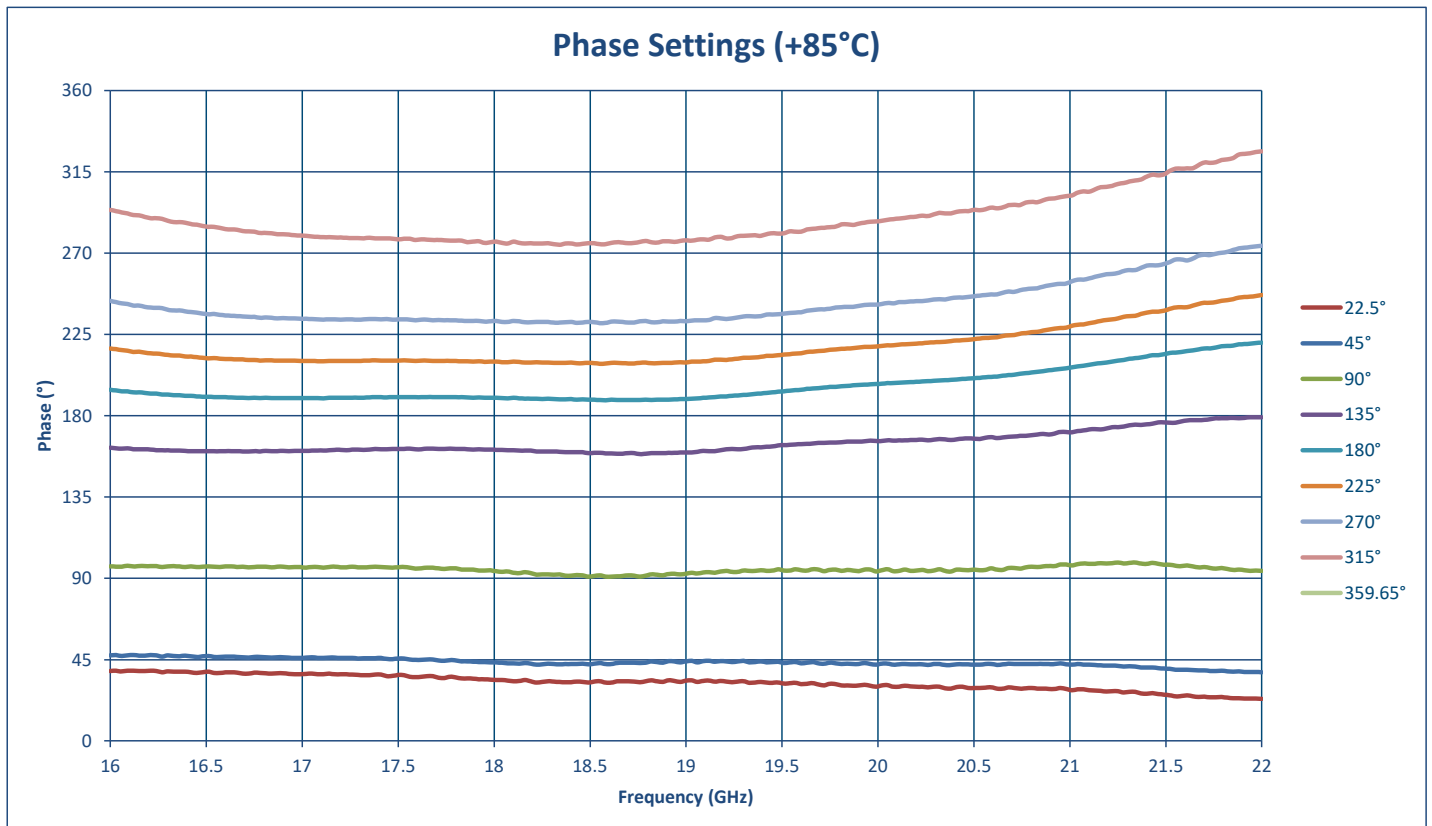
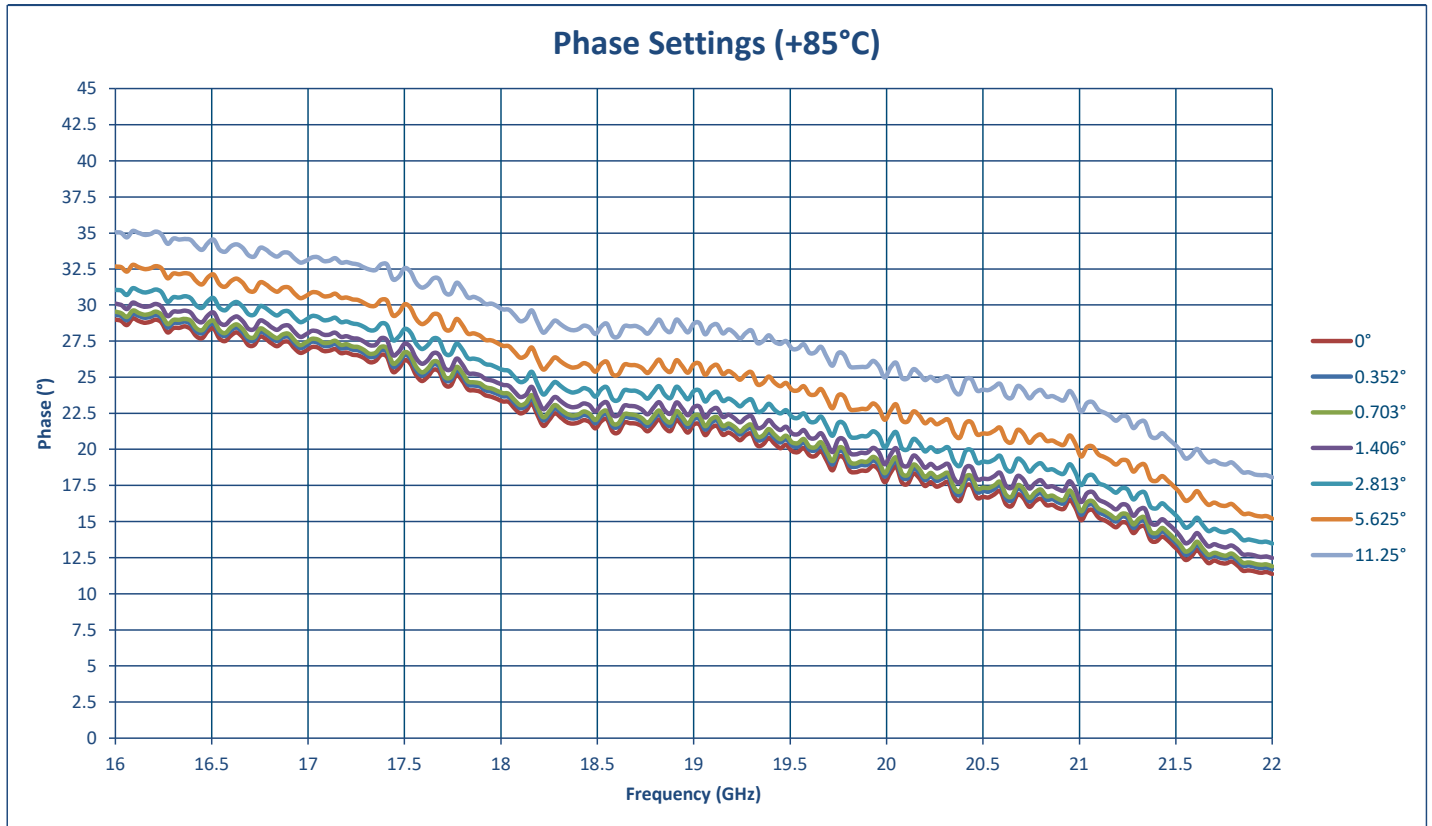


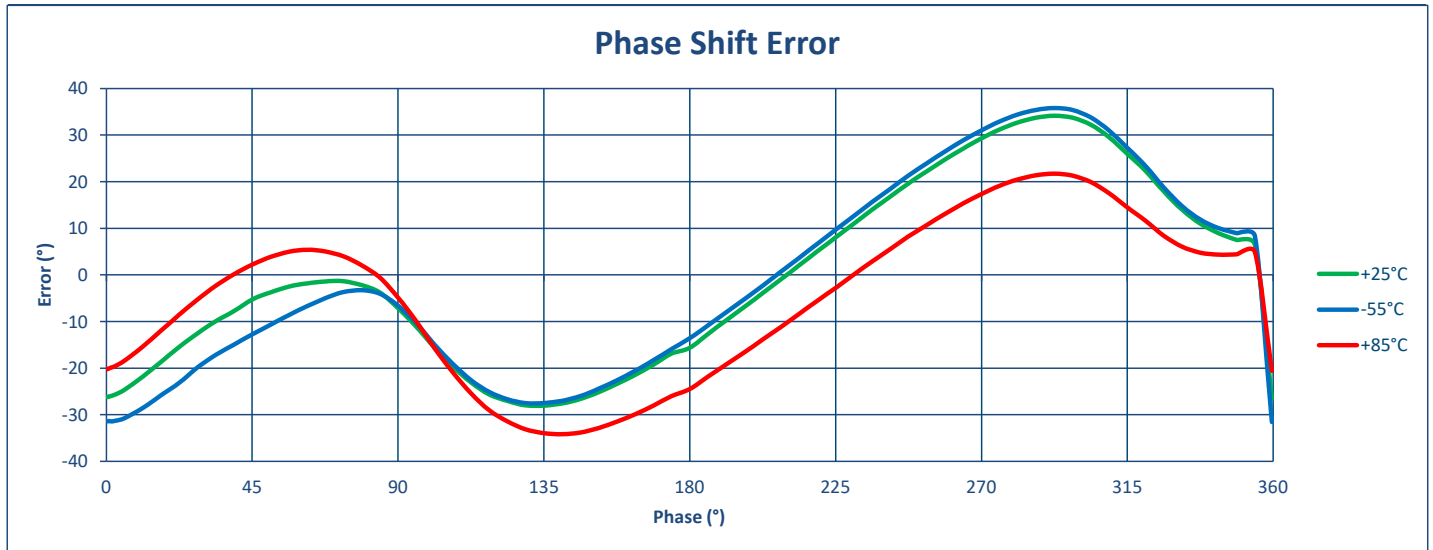
TYPICAL CHARACTERISTICS
ON
PS-360-16G22G-10B-SFF
Data Taken at 0 dBm







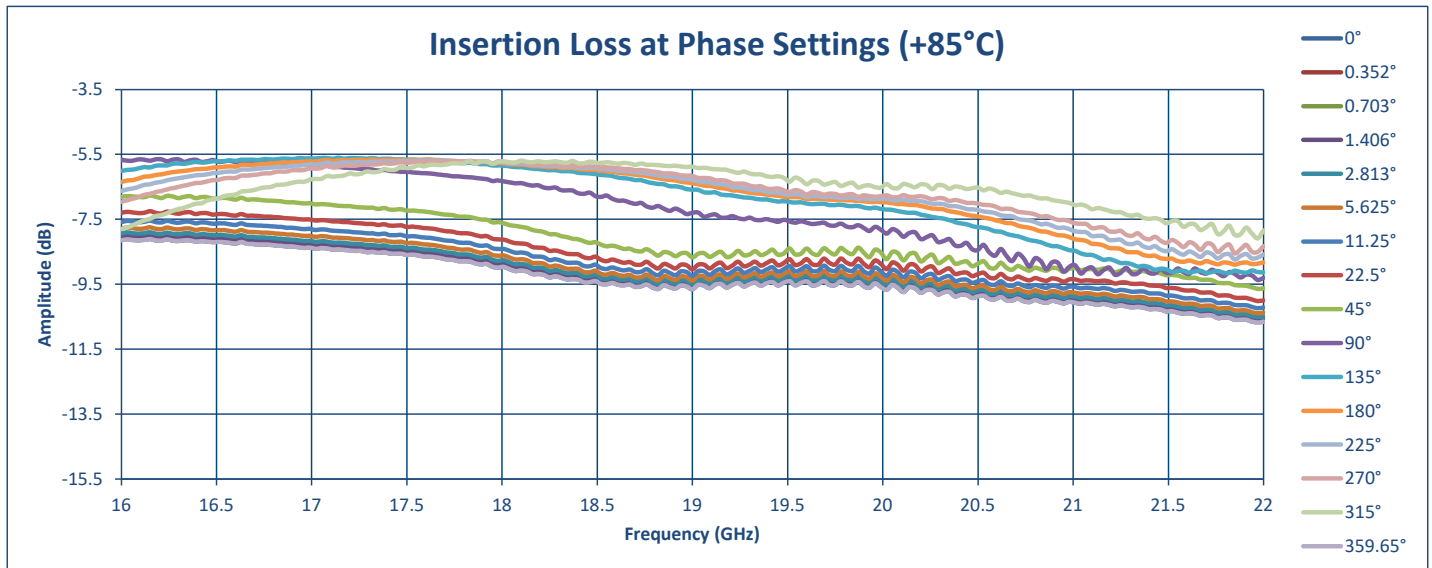
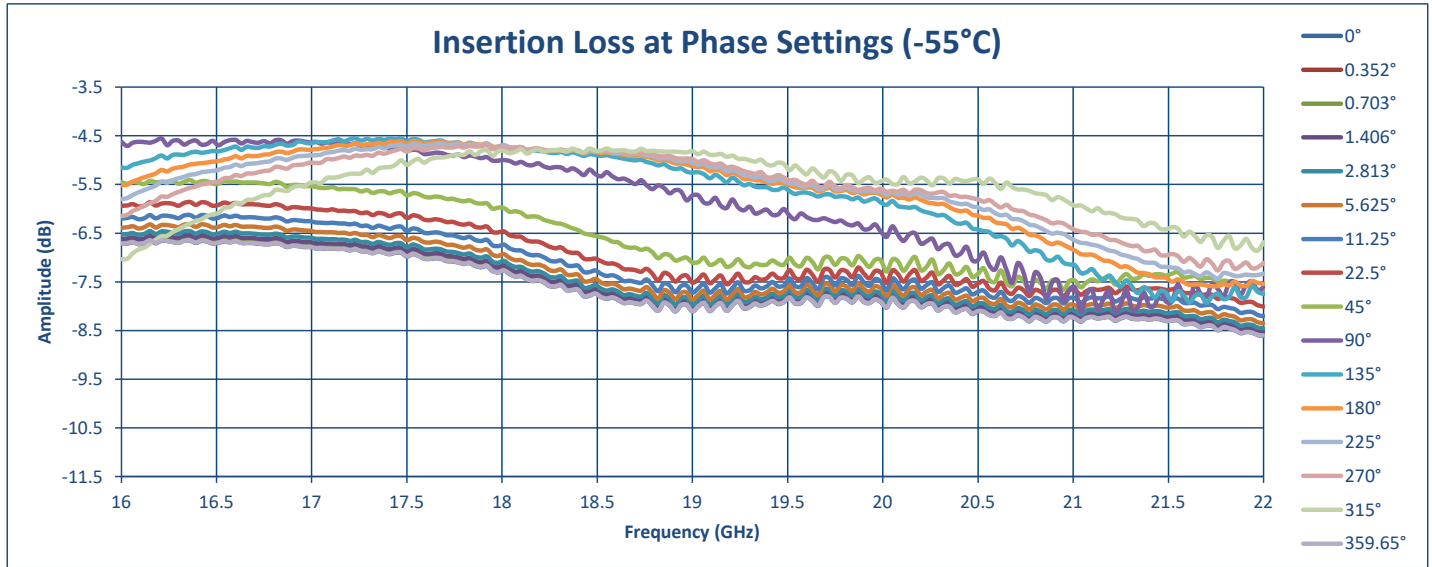
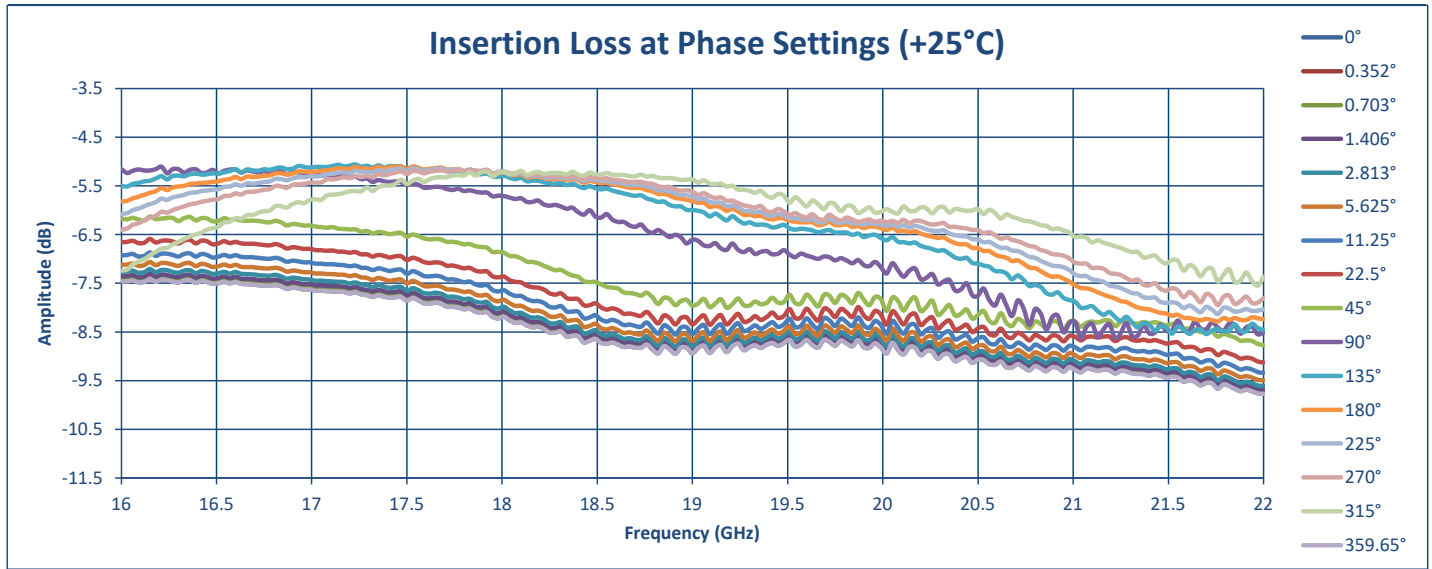




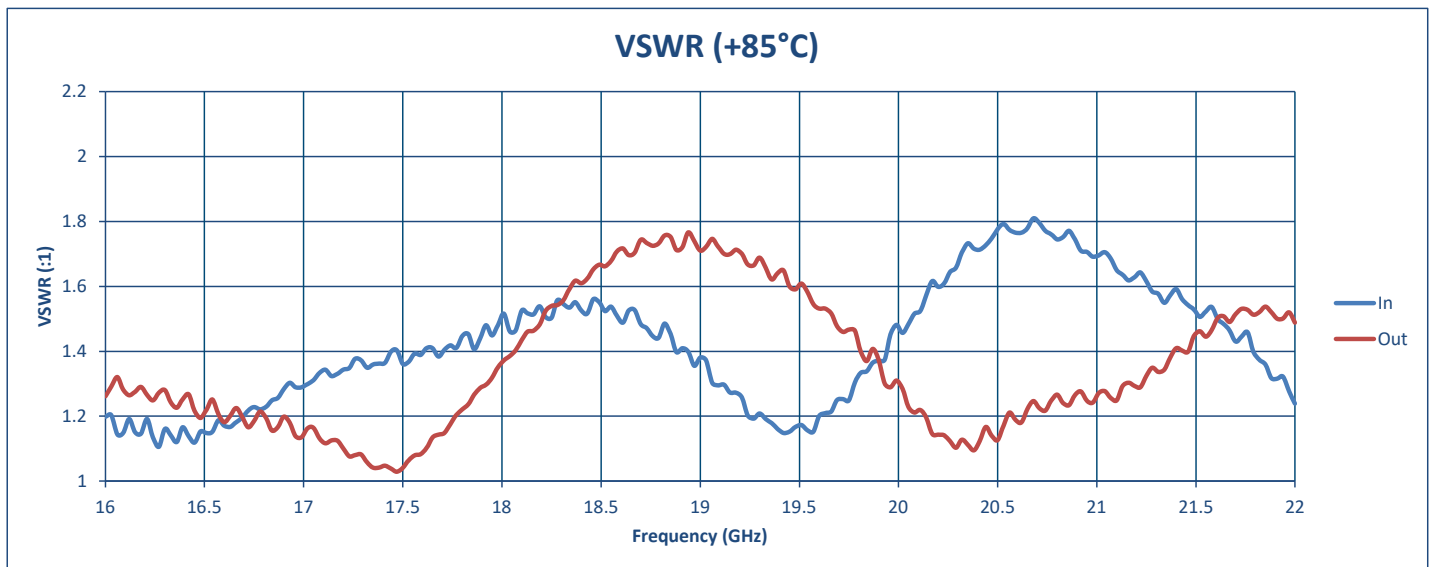
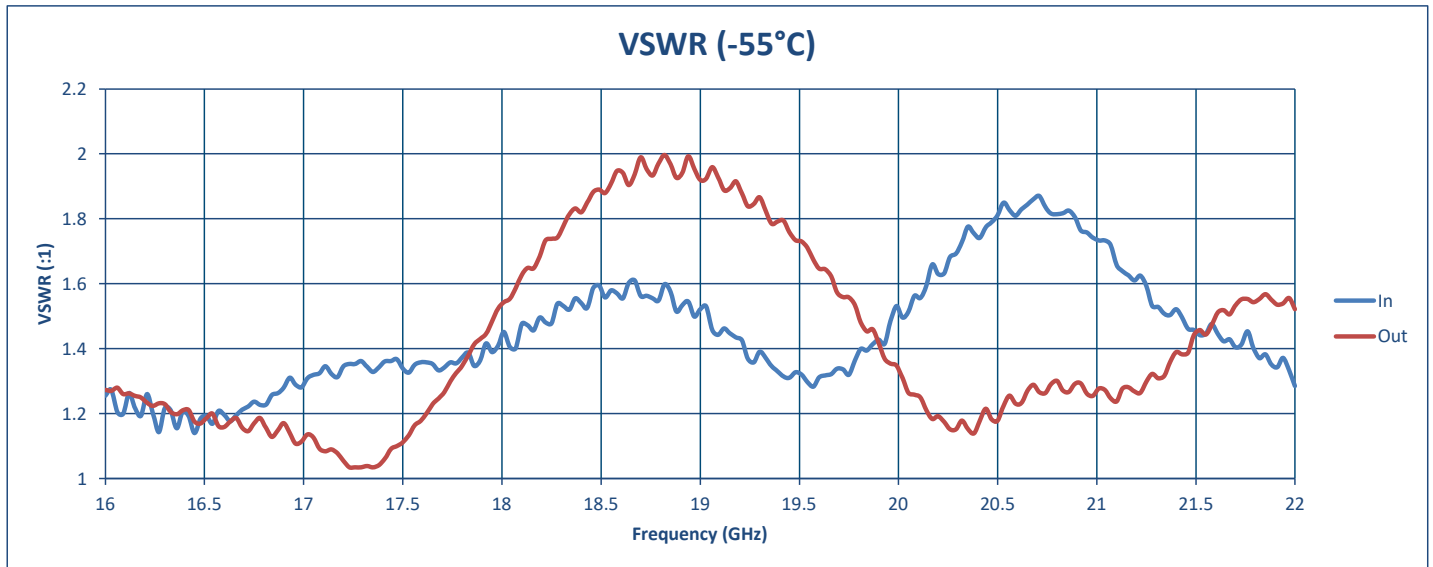
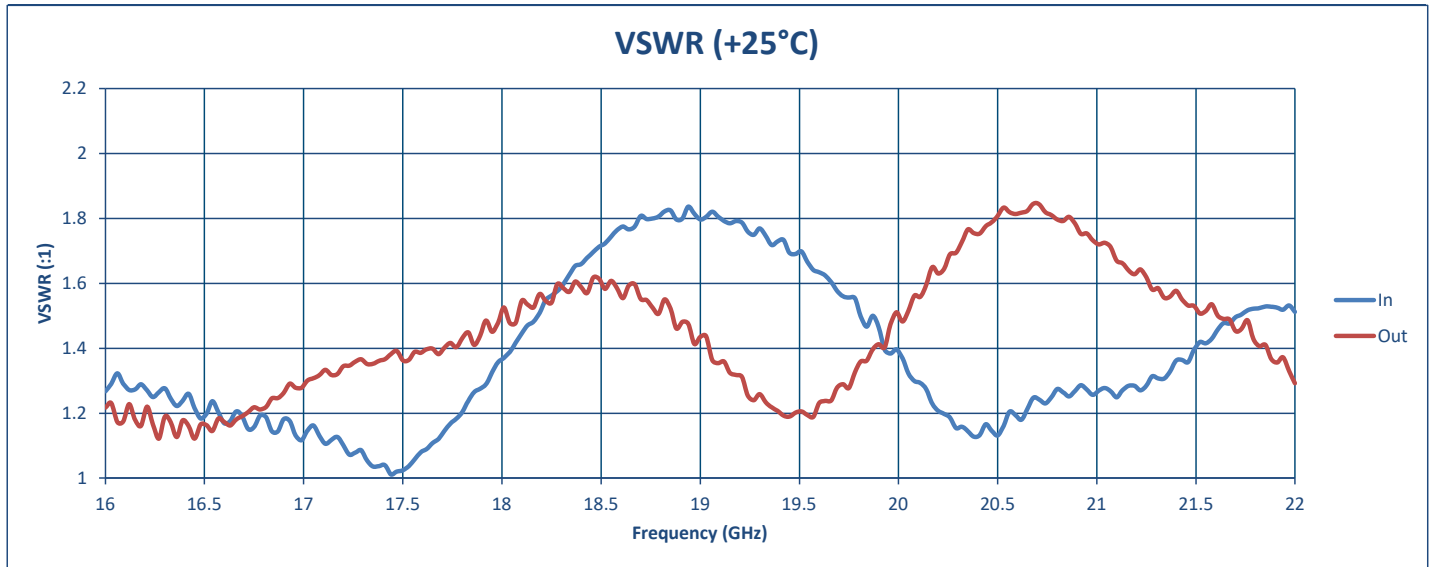
TEST DATA
Data Taken at 5 dBm

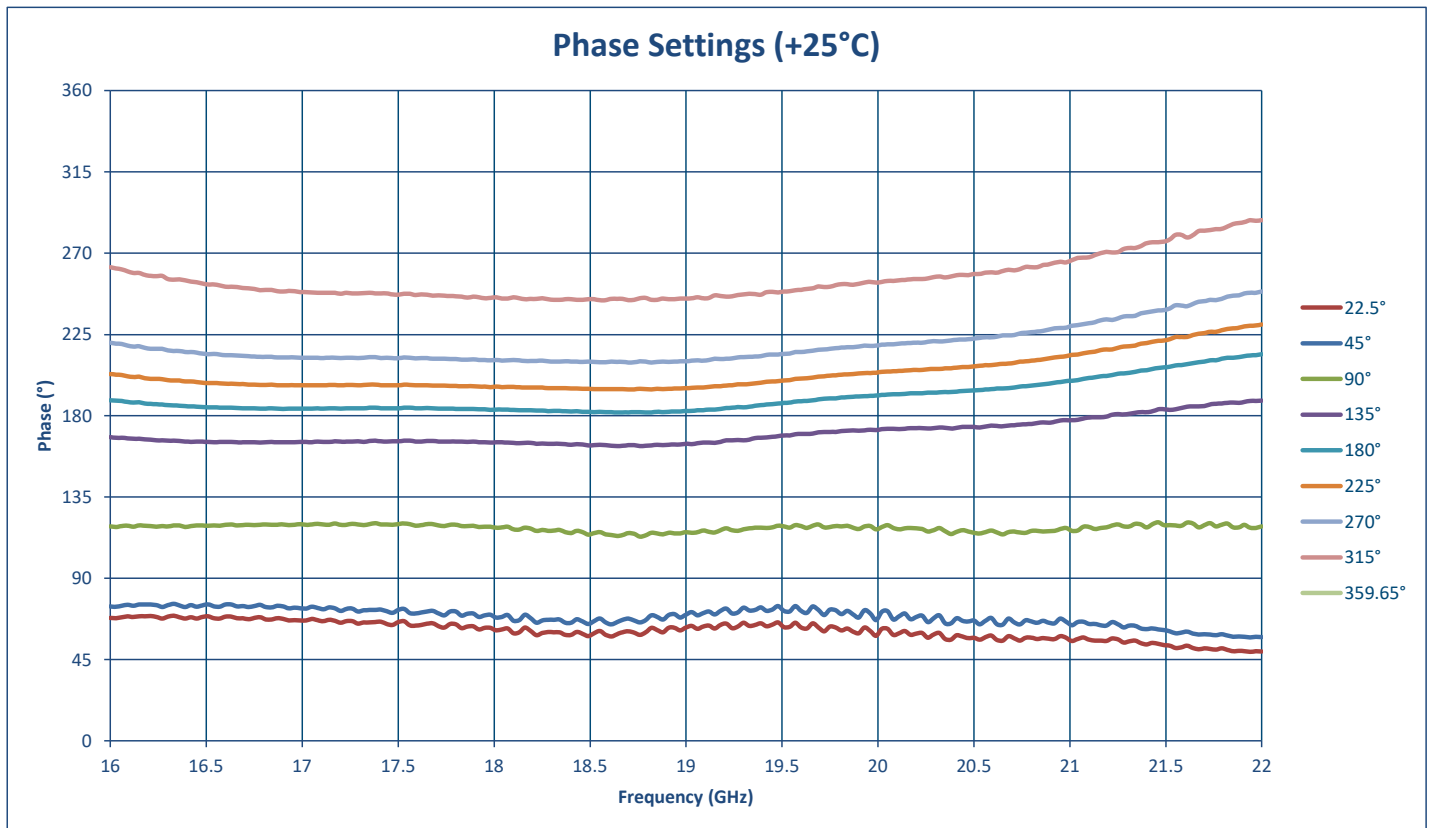
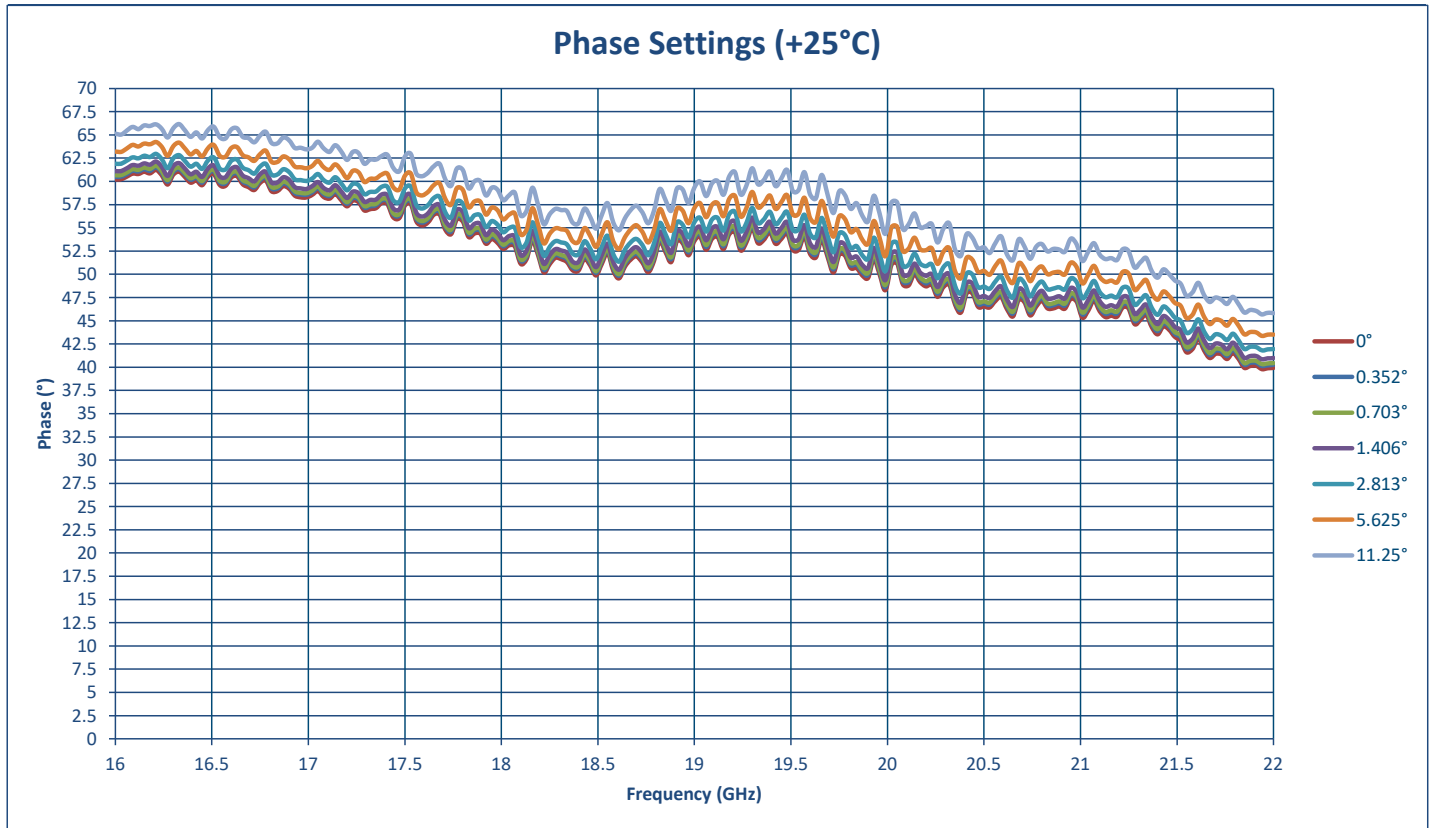
TEST ITEM NO.	PARAMETERS	SPECIFIED VALUE	Test Results		
			-55°C	+25°C	+85°C
1	Frequency Range:	16.0 GHz to 22.0 GHz	16.0 GHz to 22.0 GHz		
2	Insertion Loss:	11.5 dB Typ.	8.84 dB See Plot	9.77 dB See Plot	10.68 dB See Plot
3	VSWR:	2.0:1 Max	1.96:1	1.85:1	1.81:1
4	Phase Shift Error:	±5° Typ., ±7.5° Max. (@ 25°C & -20 dBm Input)	54.3° See Plot	51.8° See Plot	45.7° See Plot
5	Switching Speed:	500 ns Max.	440 ns		
6	Operating Power:	+10 dBm CW Max	+10 dBm CW Max		
7	Survival Power:	+25 dBm CW Max	+25 dBm CW Max		
8	Control:	10 Bit TTL	10 Bit TTL		
9	Power Supply:	+15V @ 50 mA	+15V @ 26 mA	+15V @ 26 mA	+15V @ 26 mA

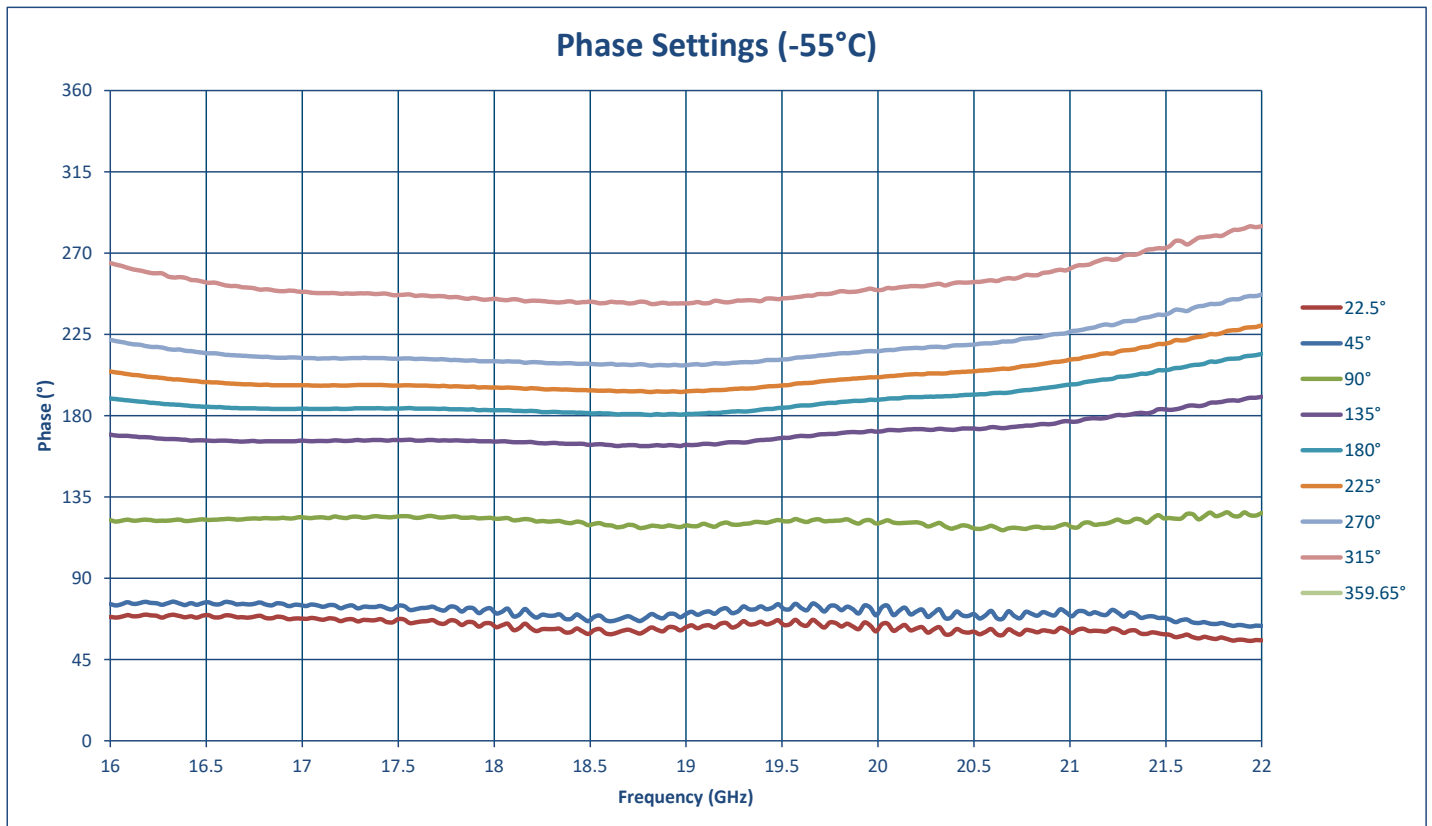
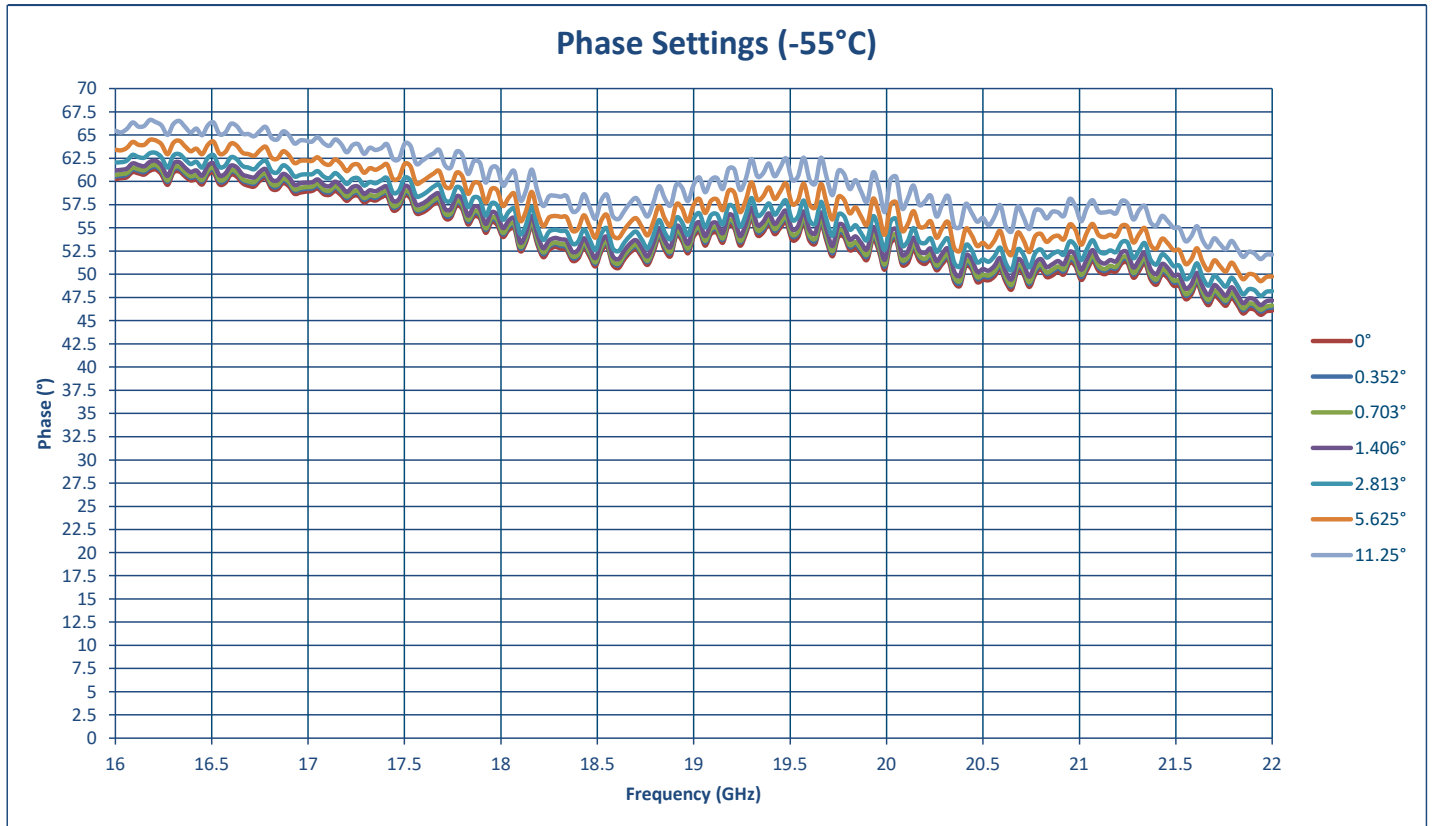
TYPICAL CHARACTERISTICS
ON
PS-360-16G22G-10B-SFF
Data Taken at 5 dBm

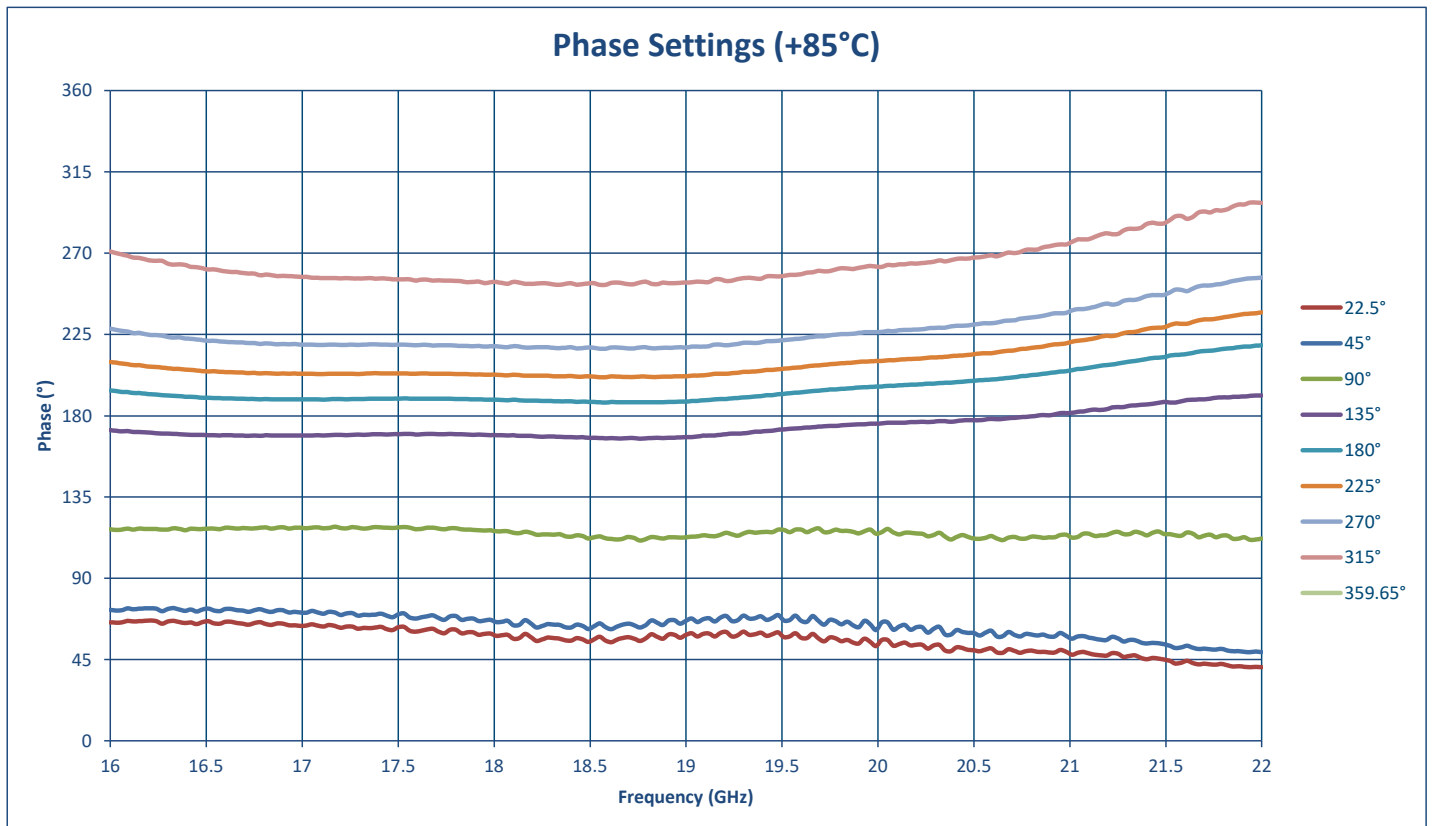
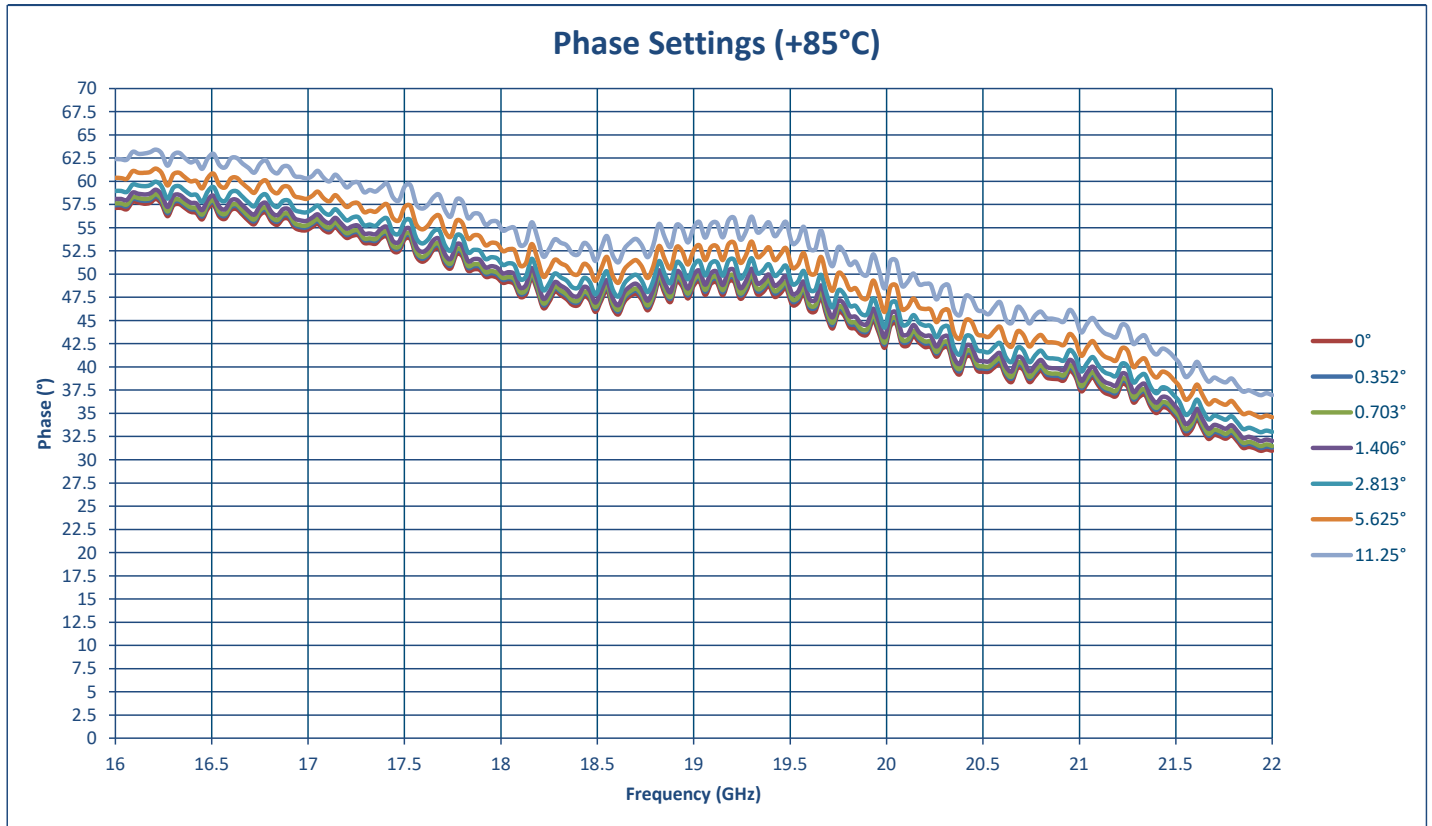


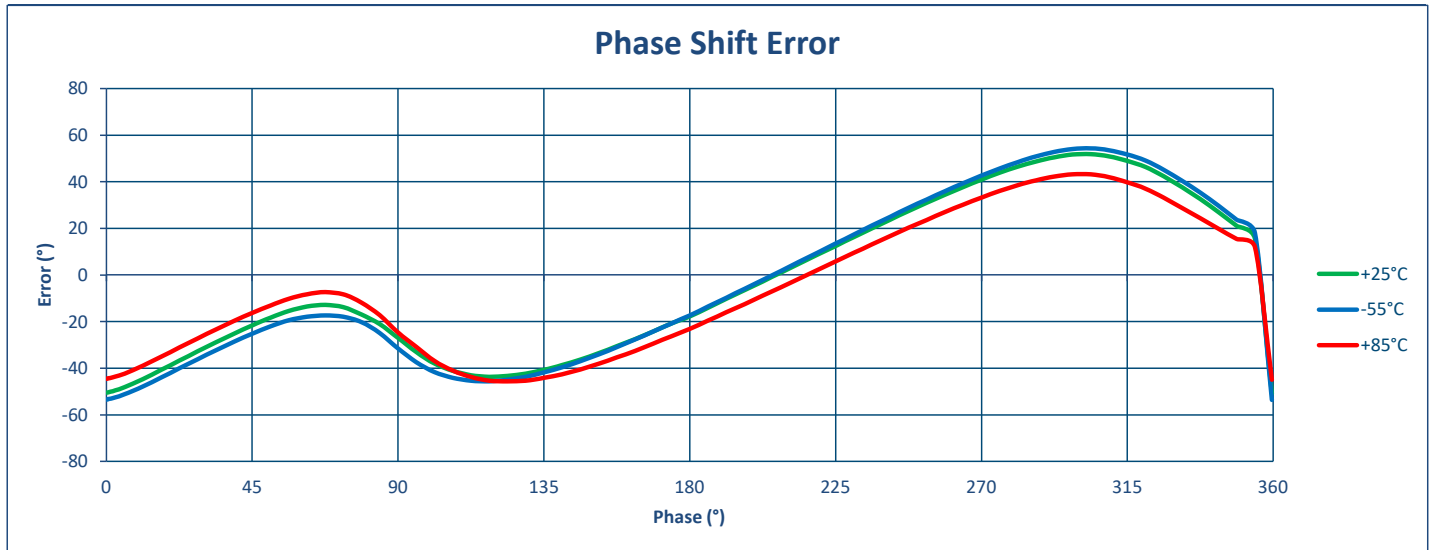
TYPICAL CHARACTERISTICS
ON
PS-360-16G22G-10B-SFF
 Data Taken at 5 dBm

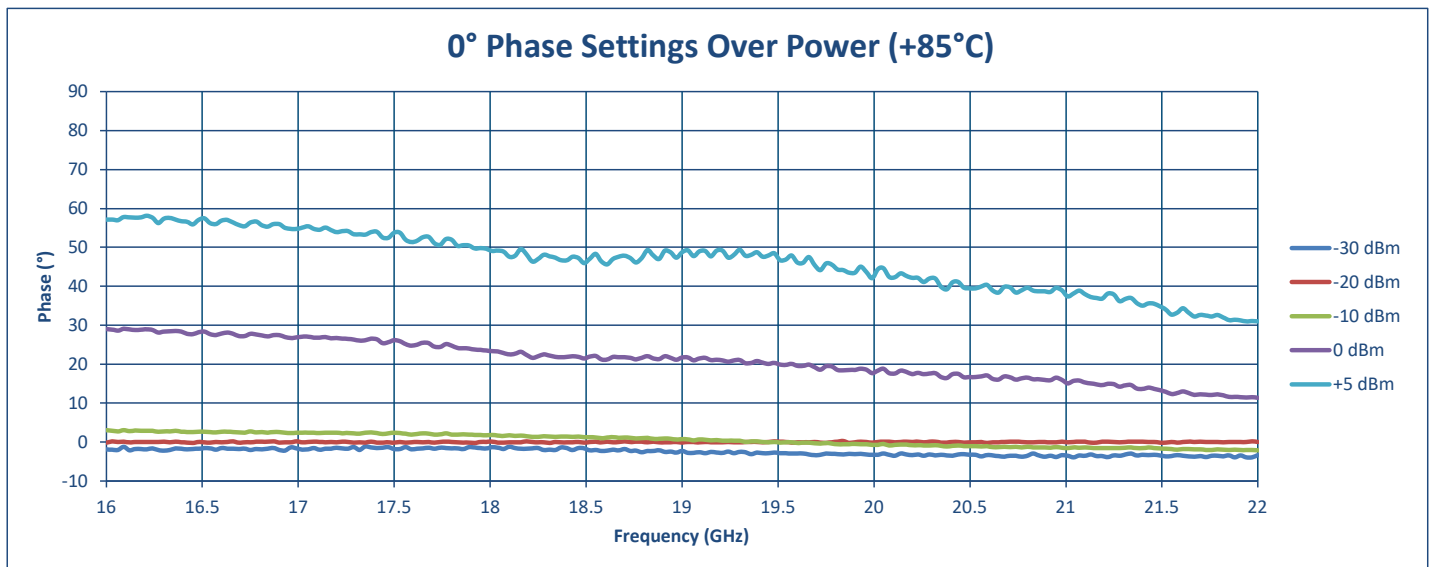
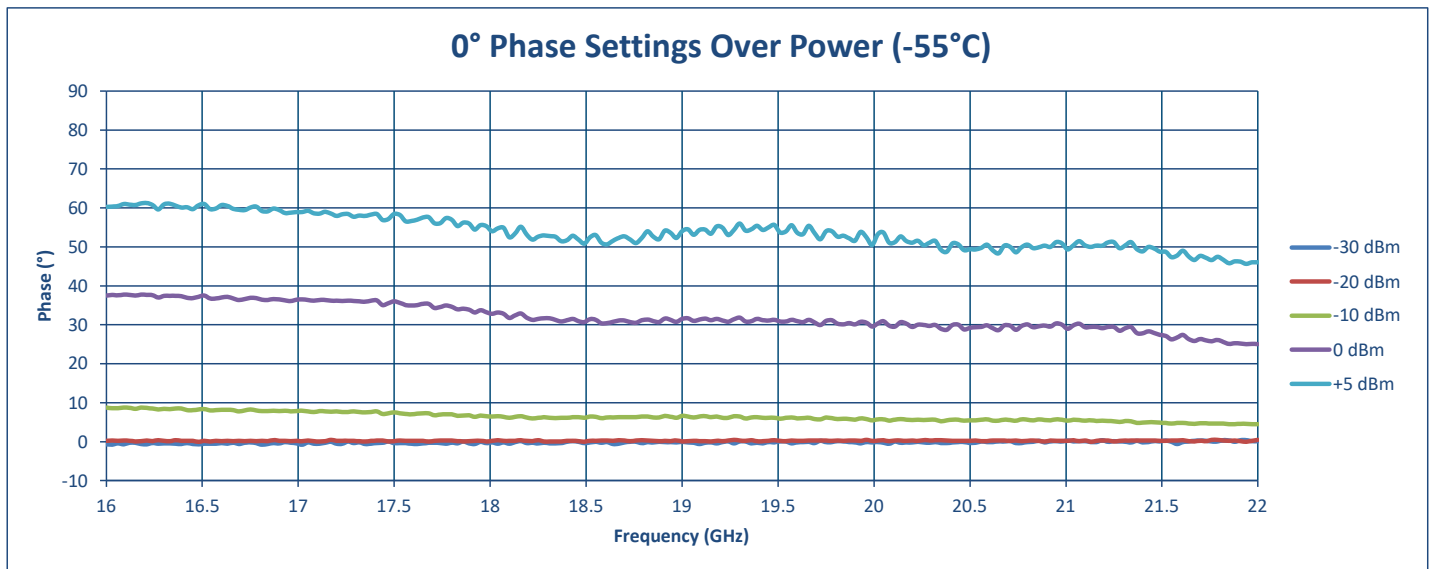
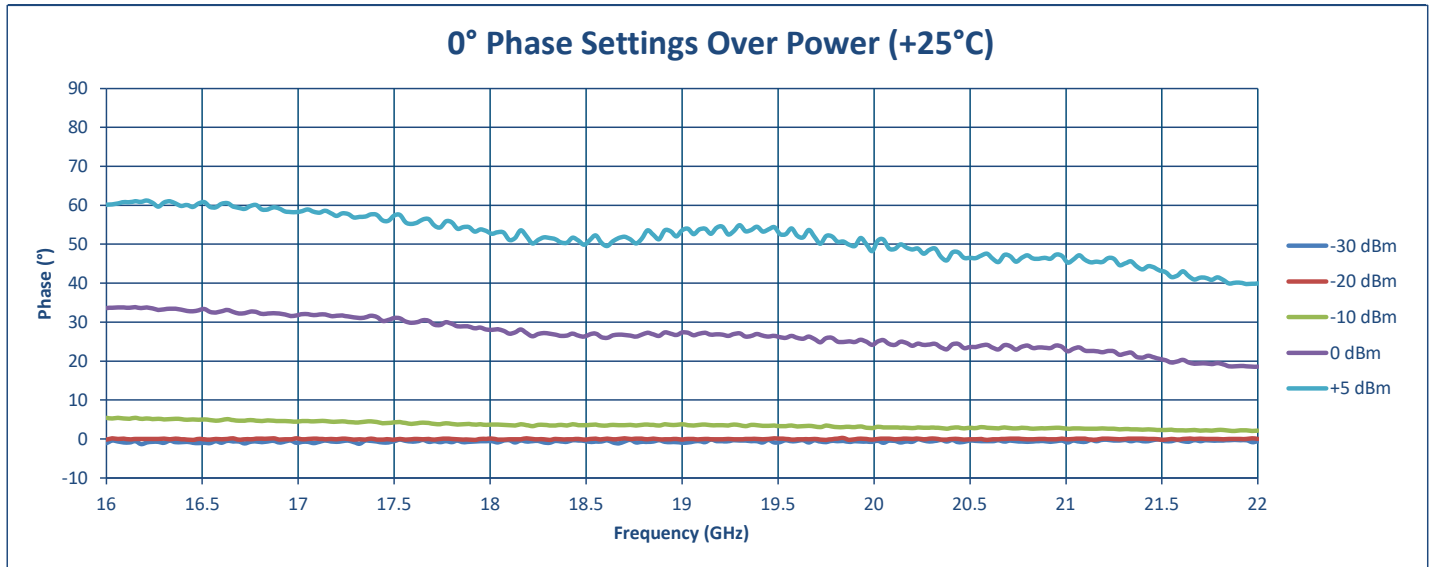




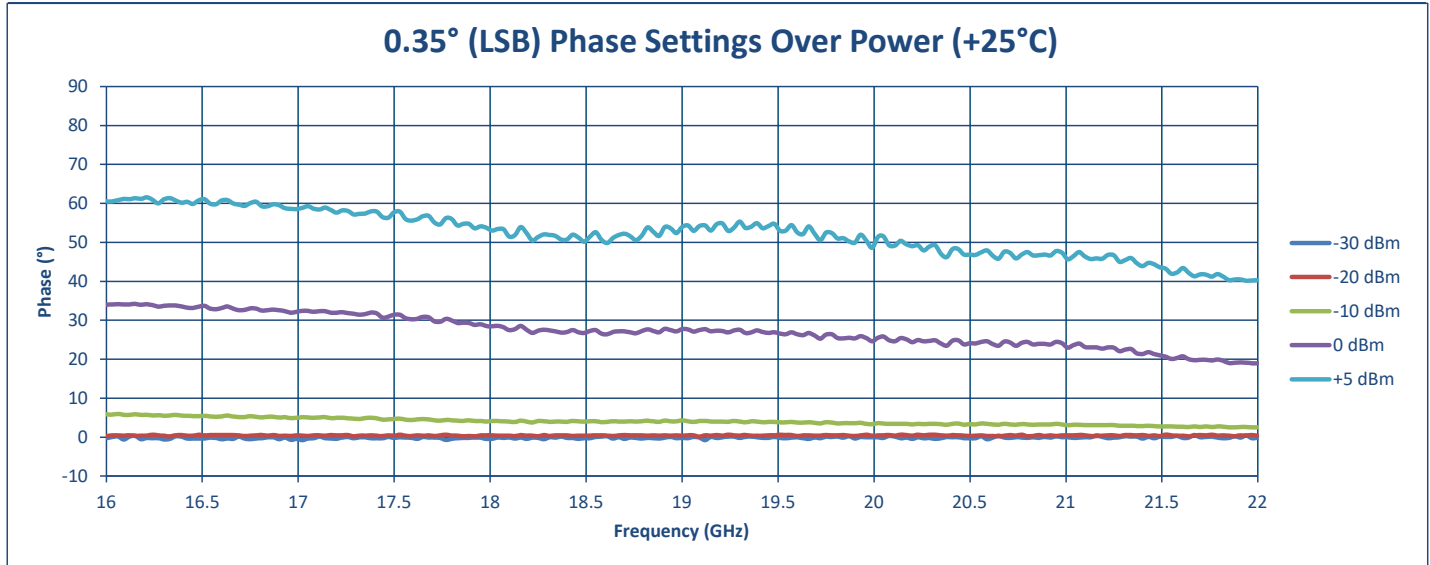




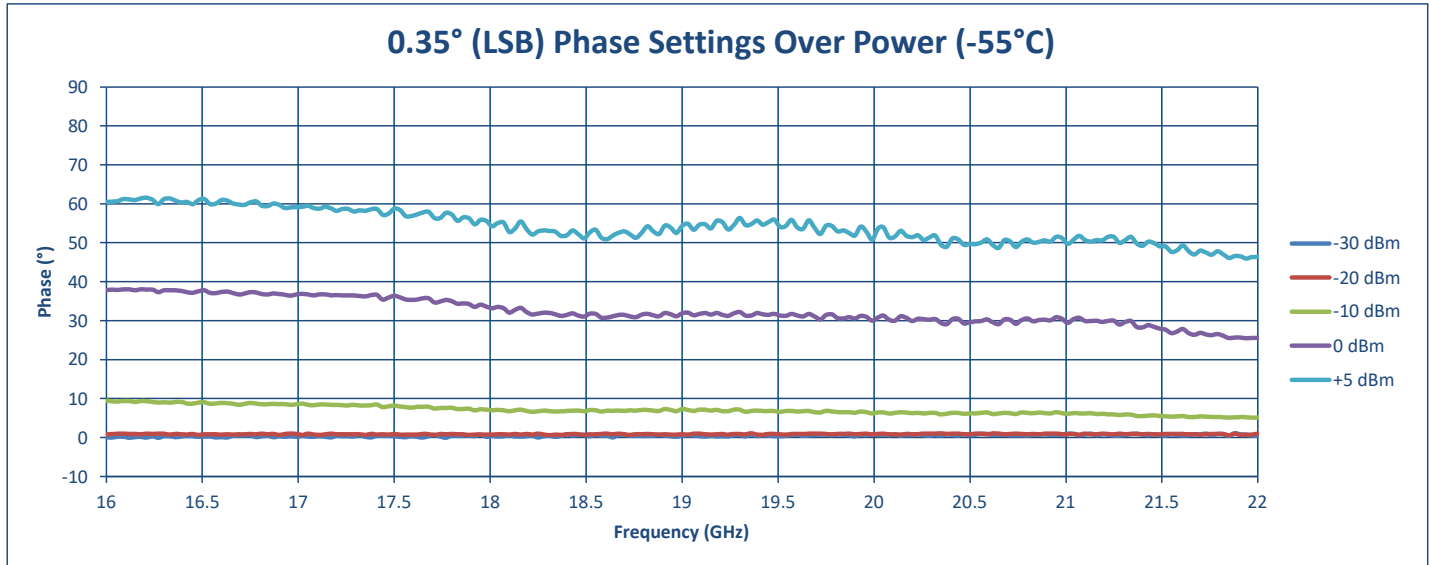




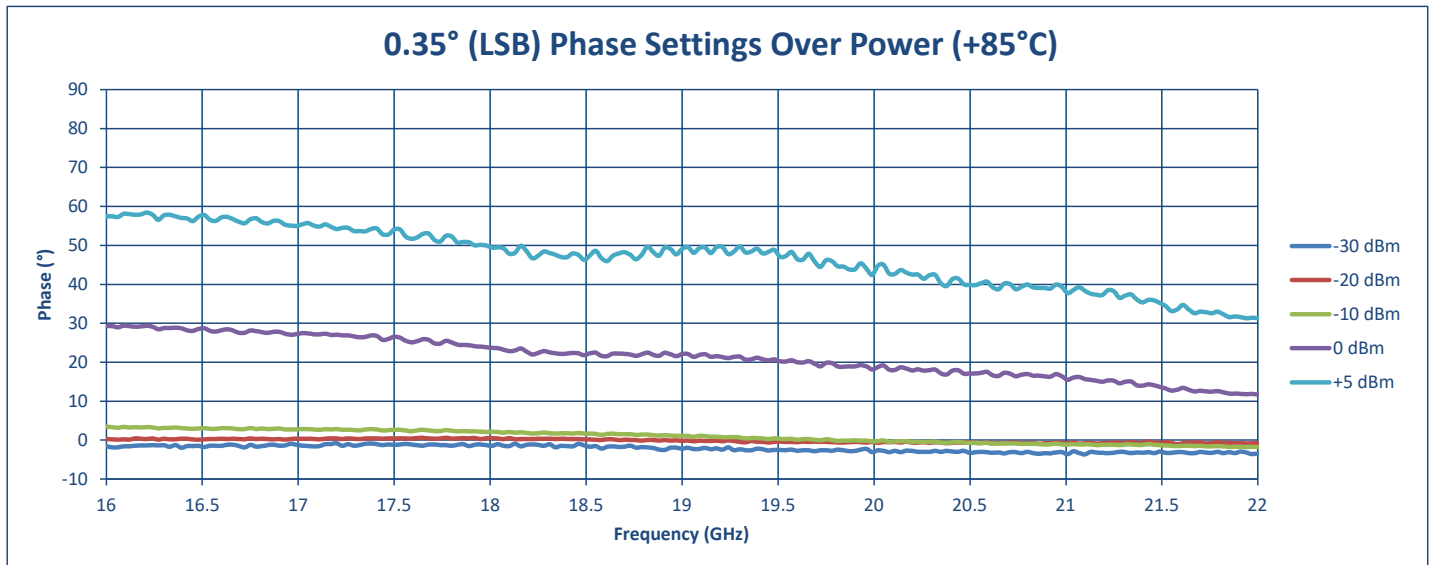
0.35° (LSB) Phase Settings Over Power (+25°C)

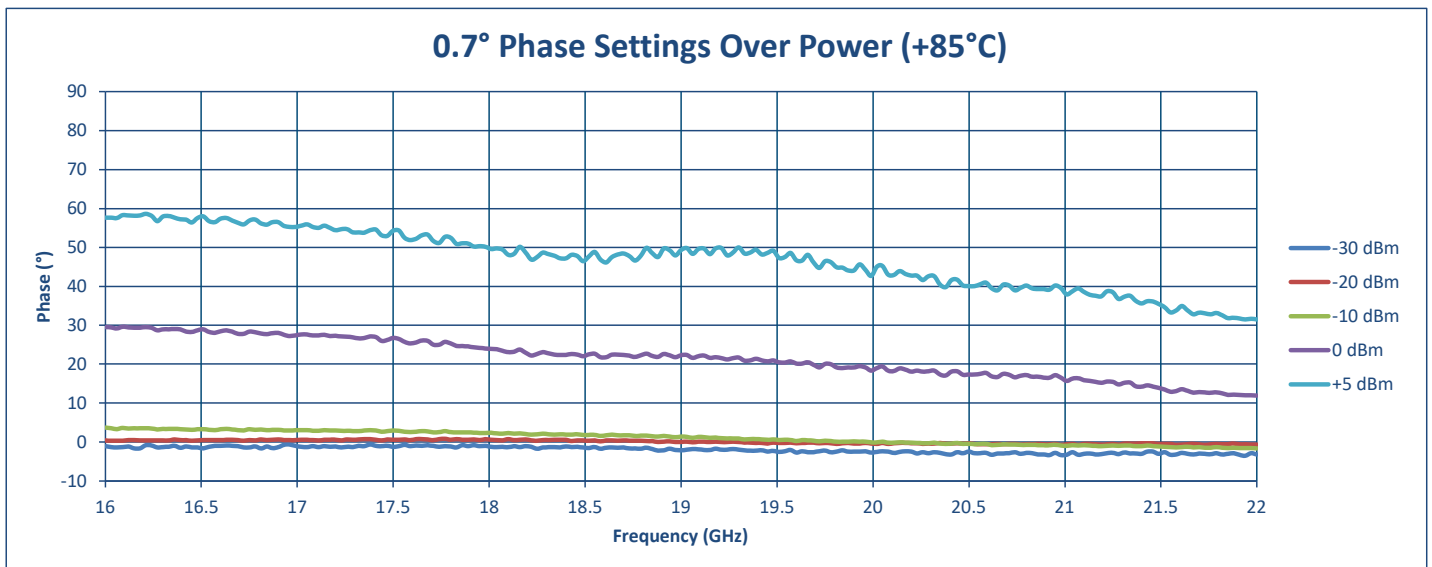
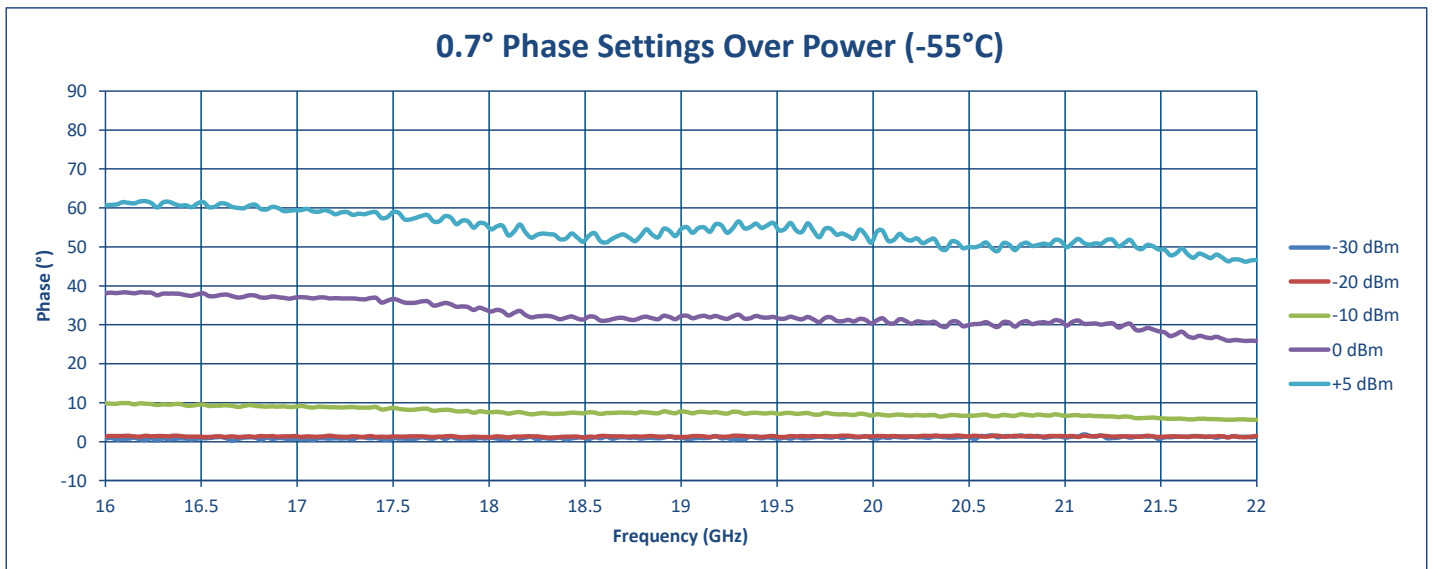
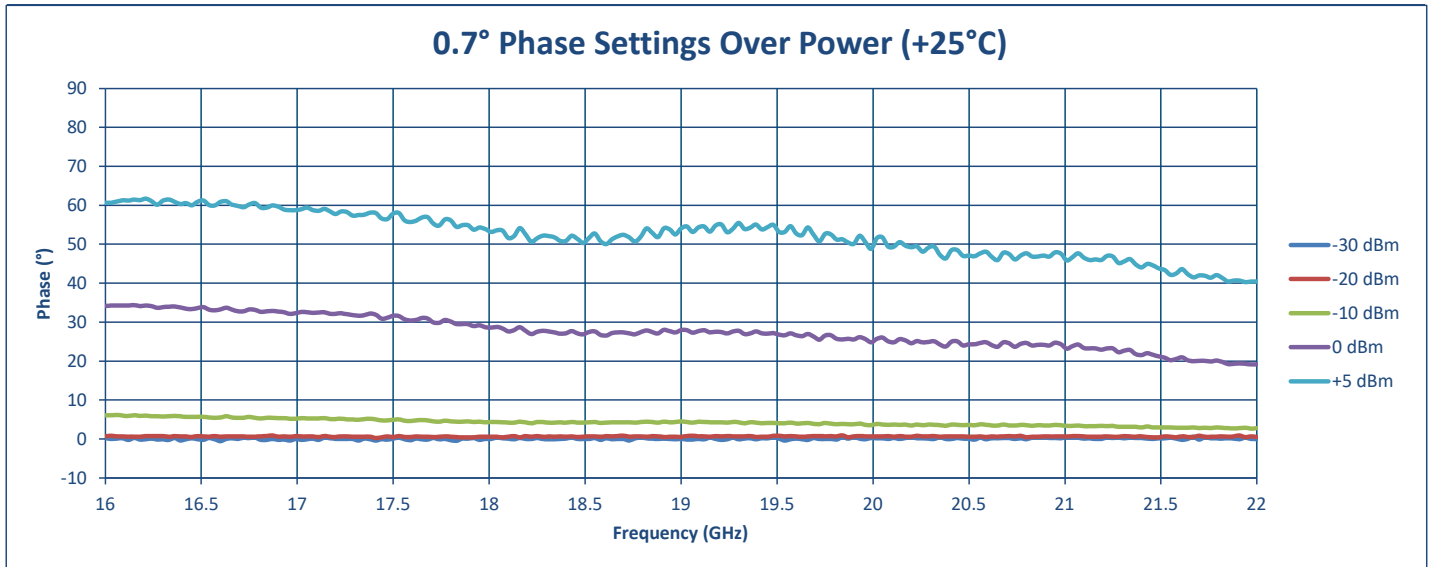


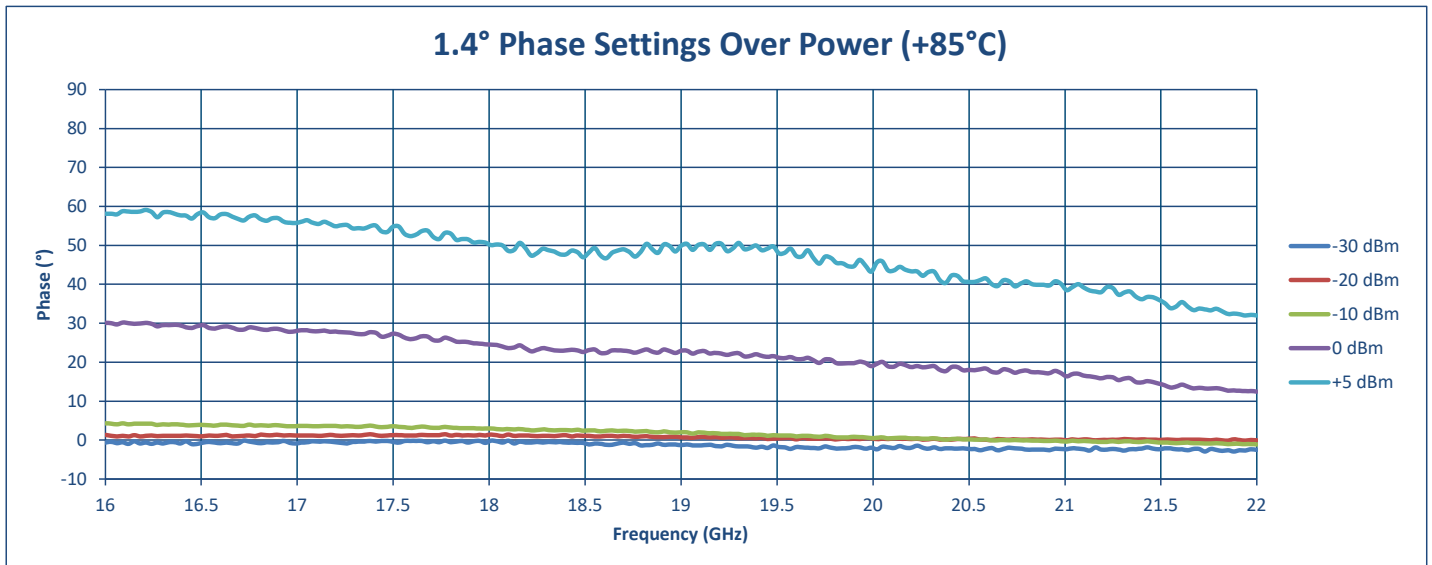
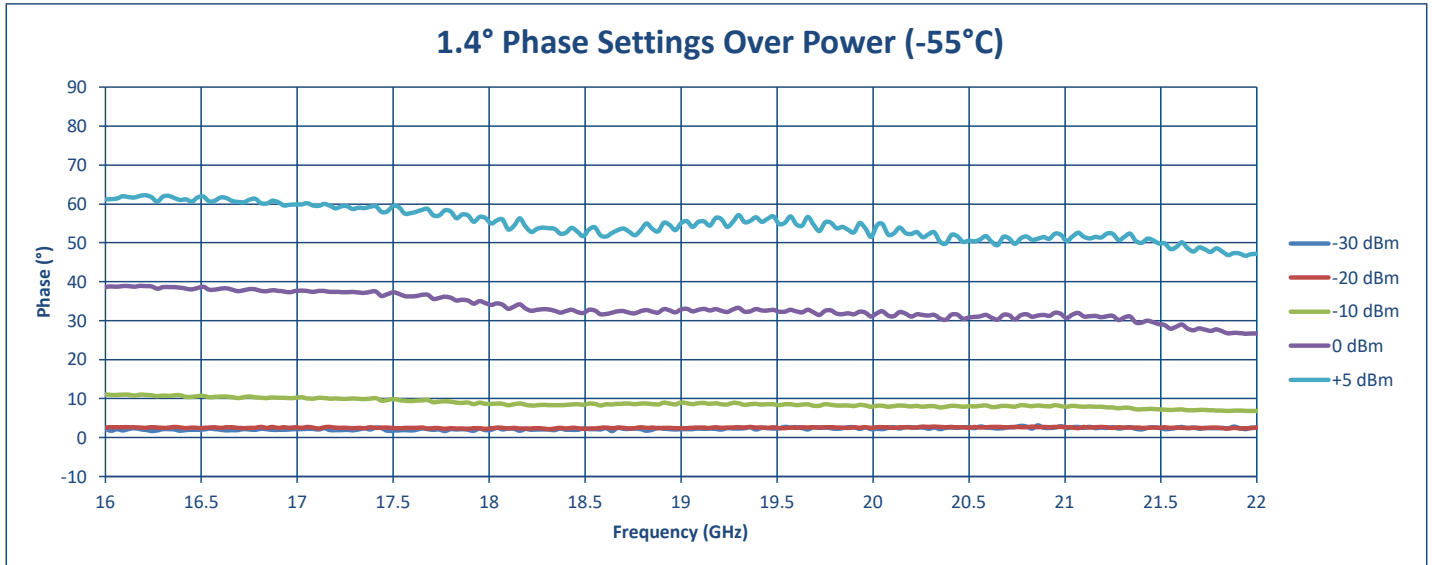
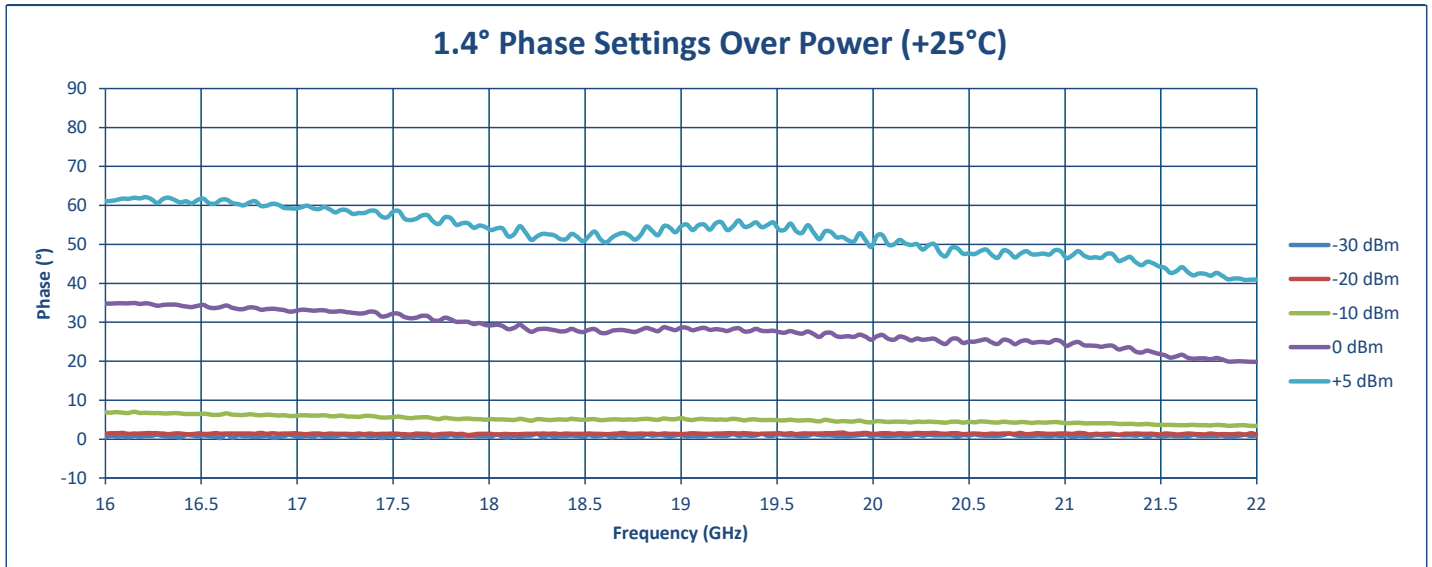
0.35° (LSB) Phase Settings Over Power (-55°C)

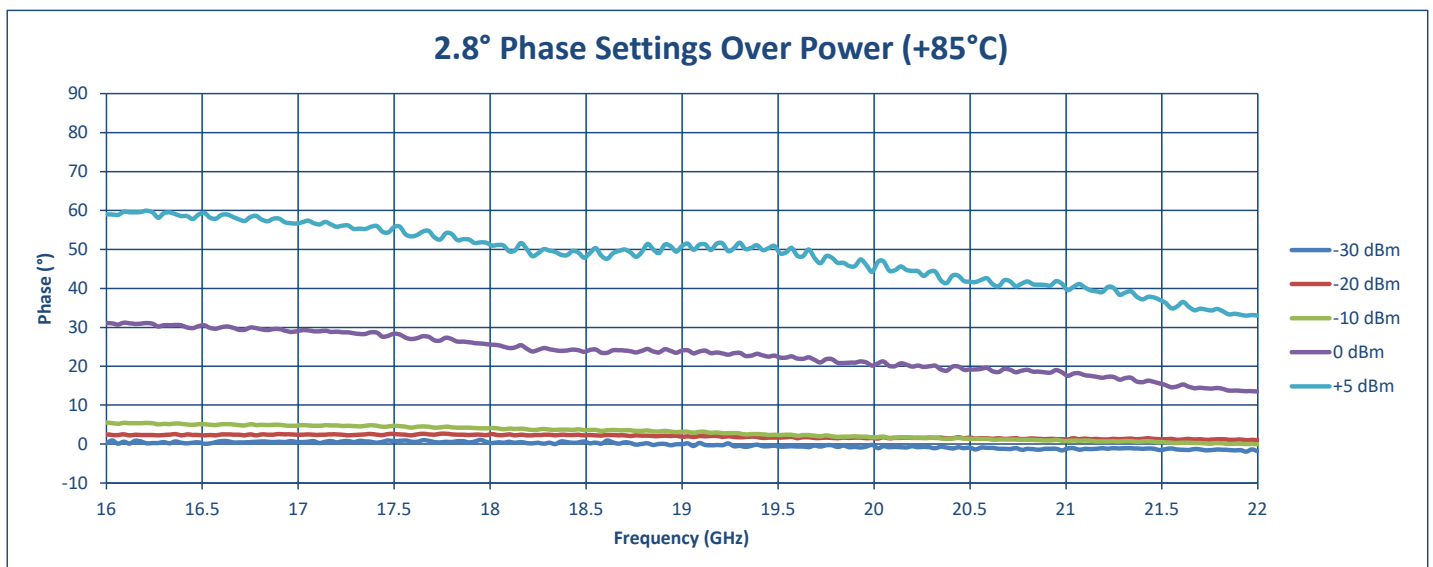
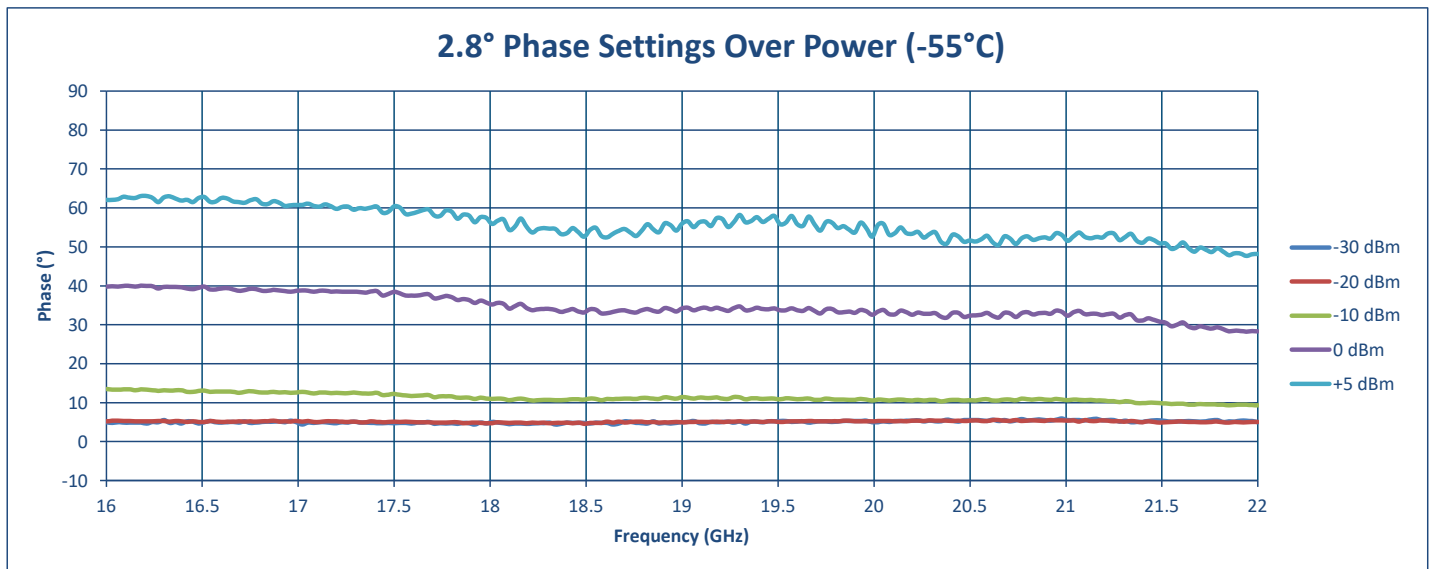
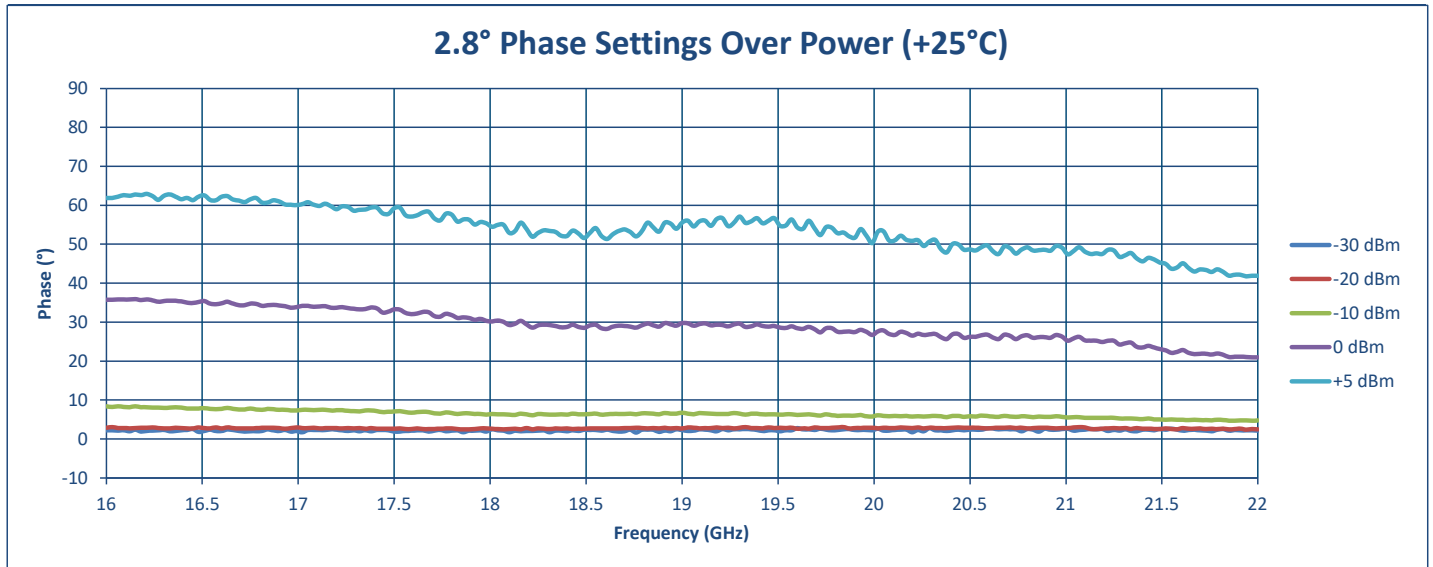


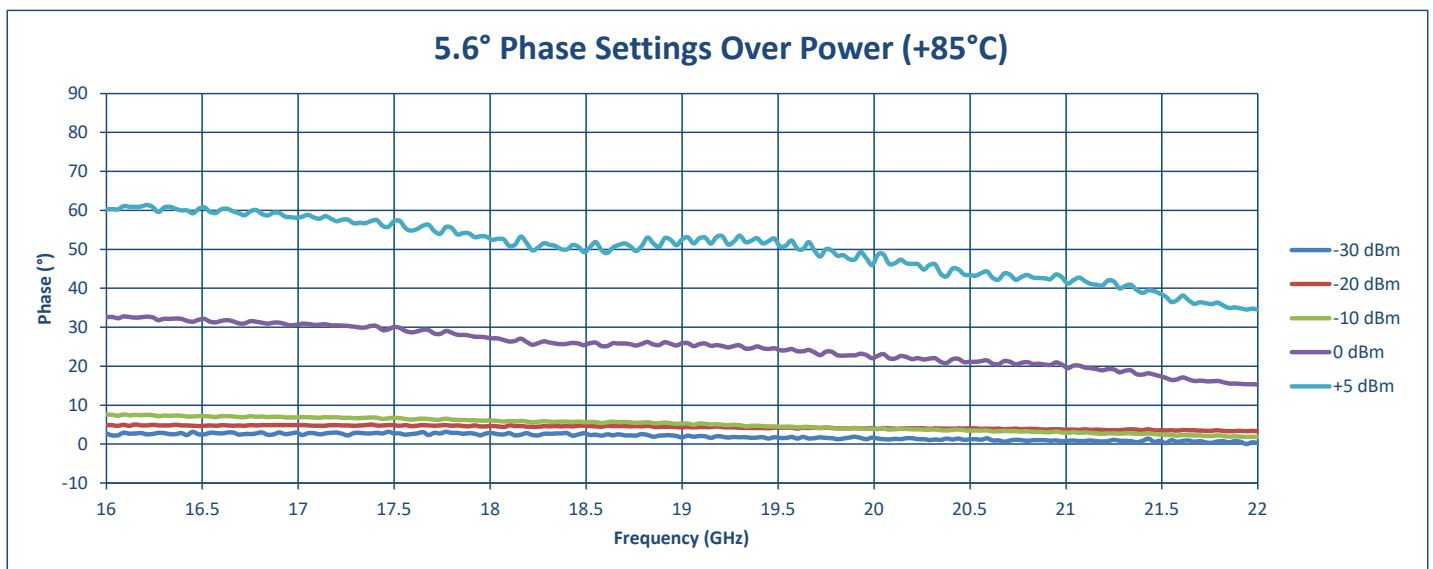
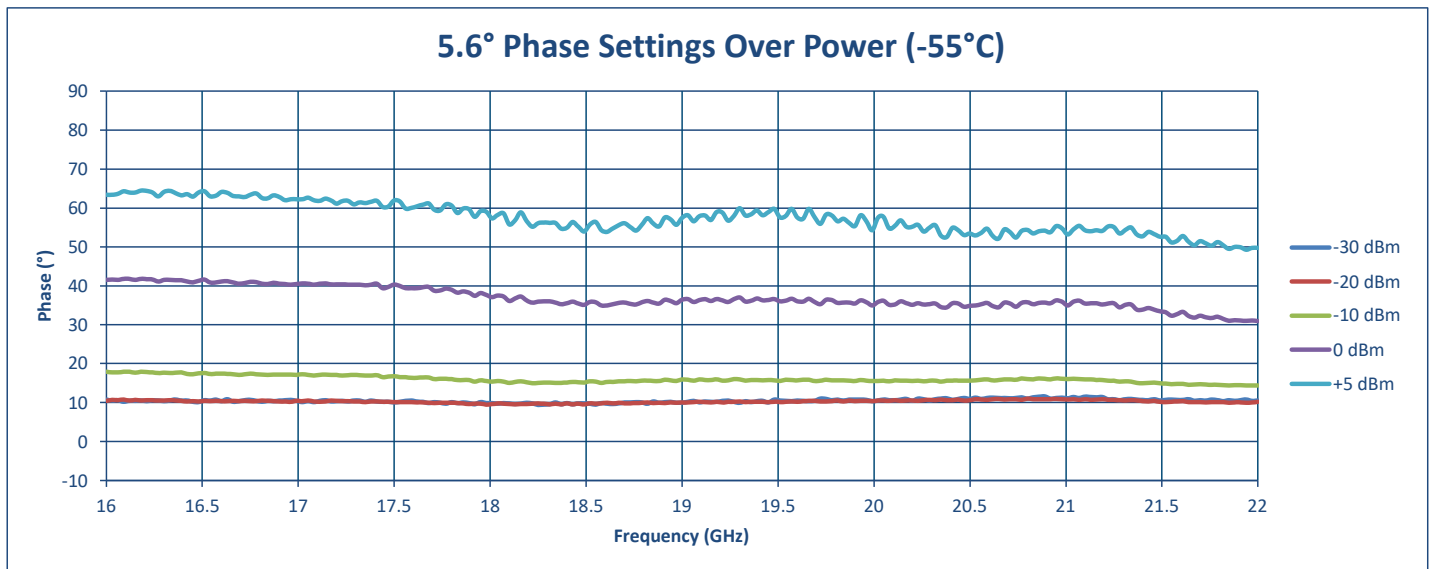
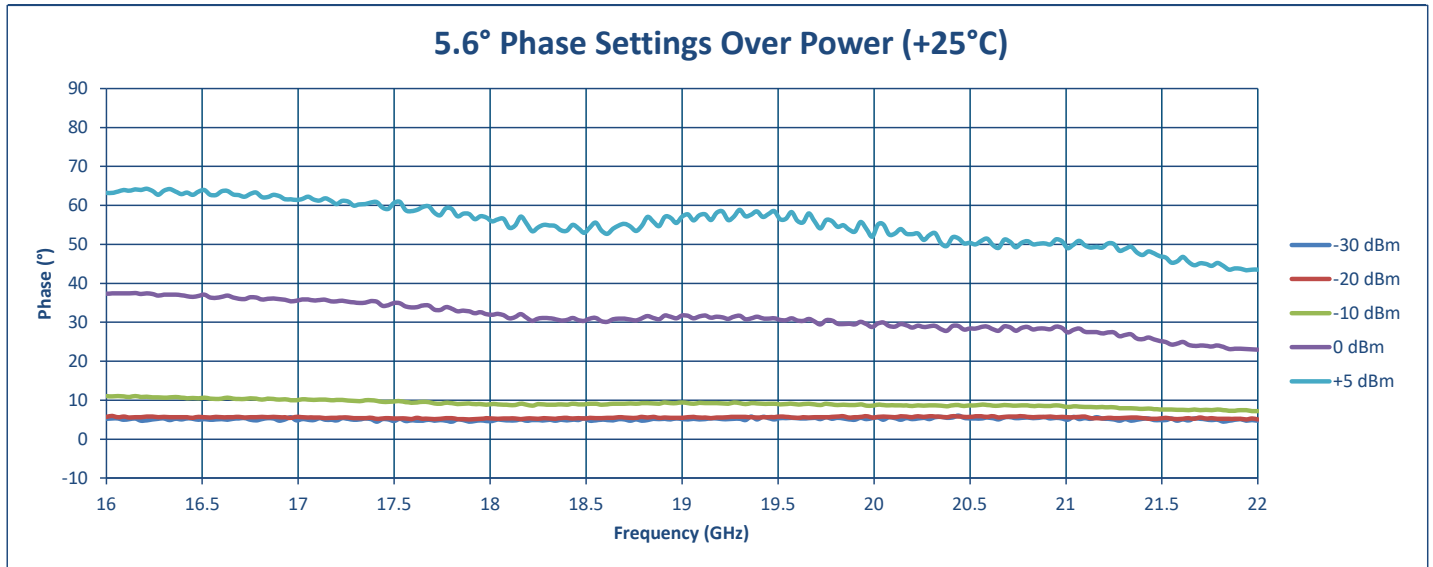
0.35° (LSB) Phase Settings Over Power (+85°C)

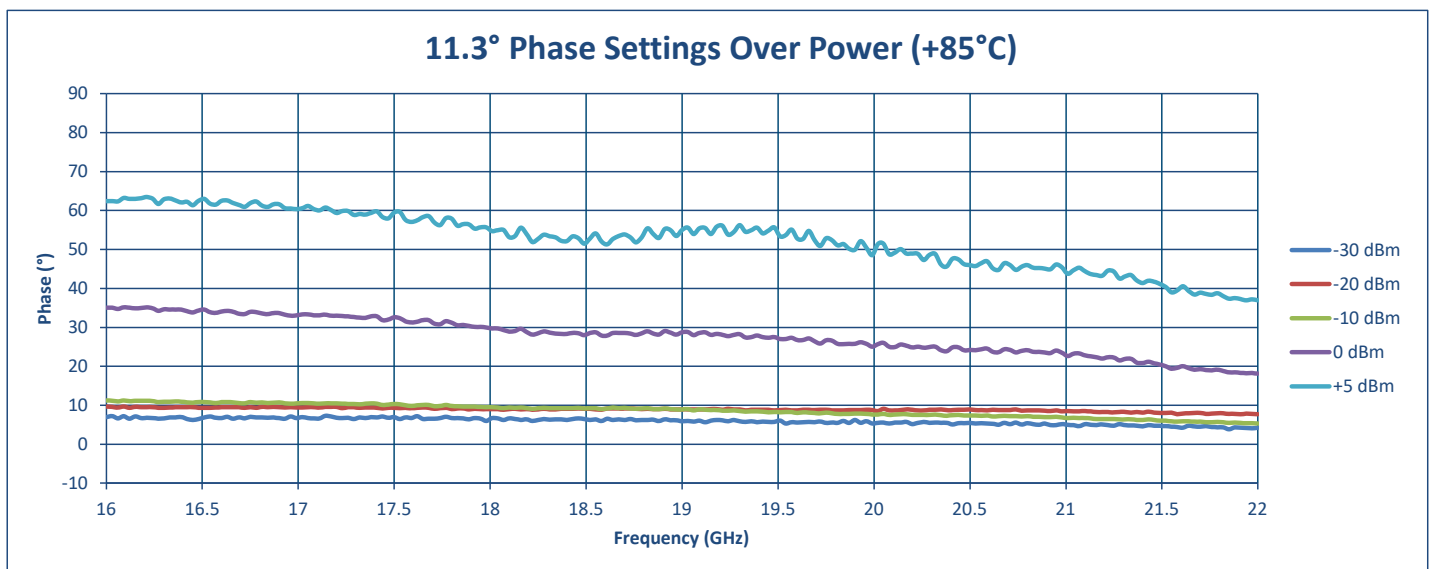
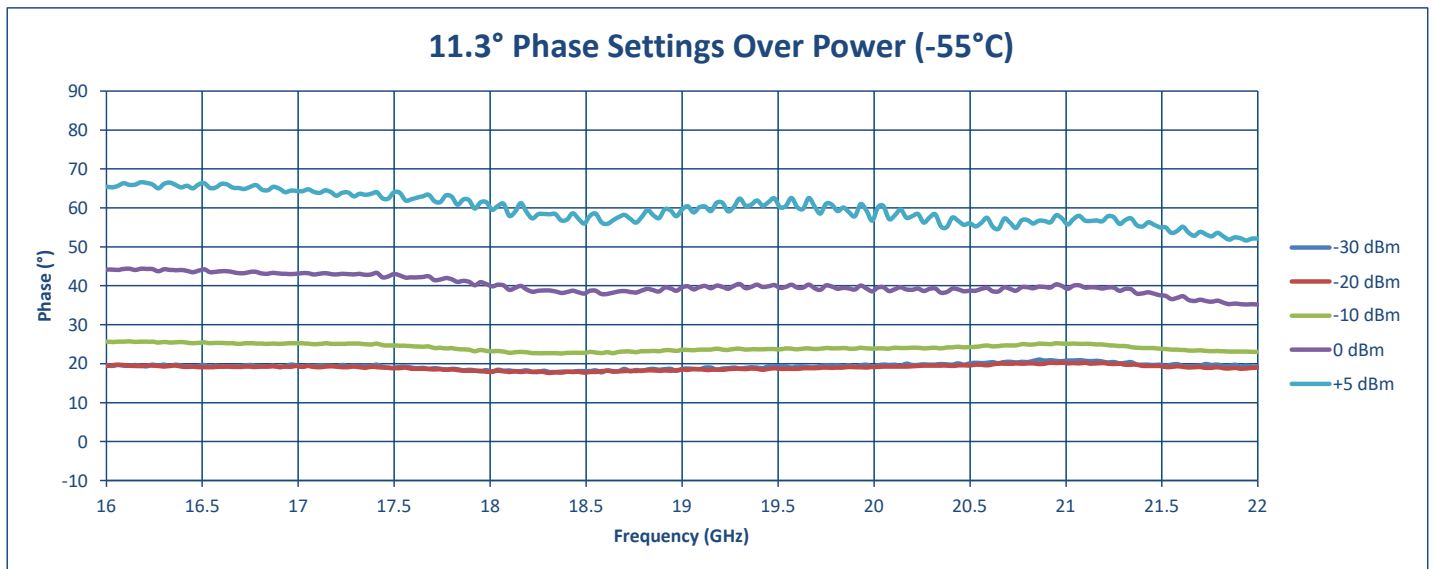
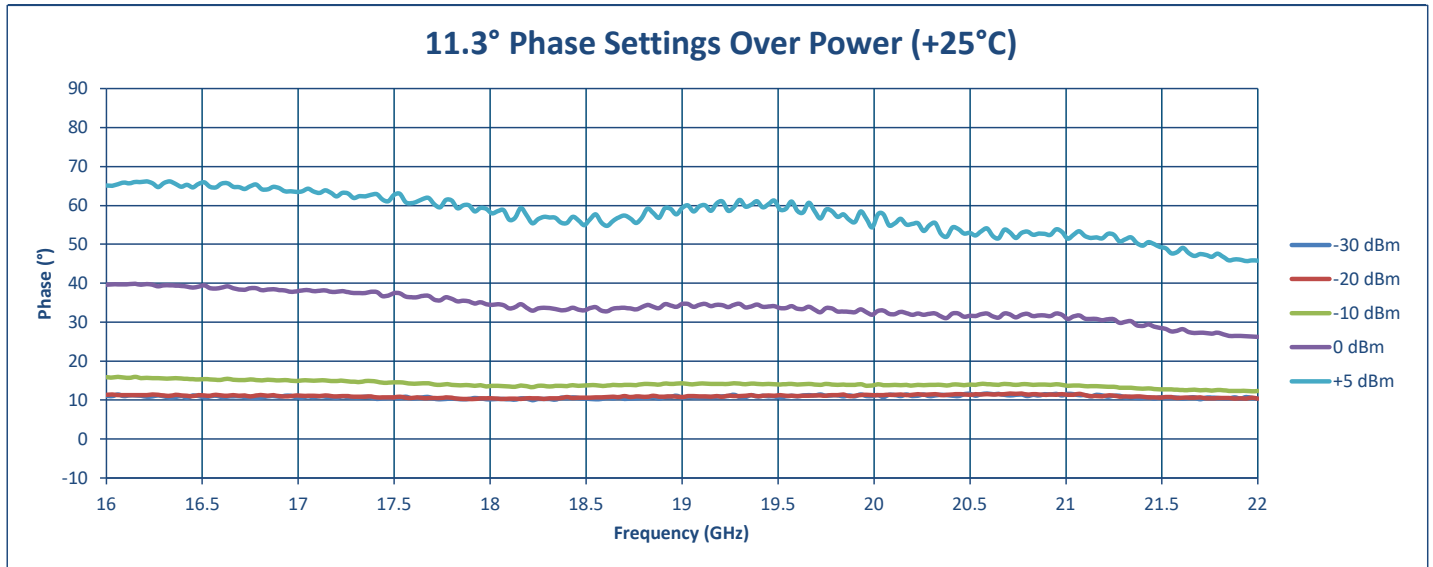


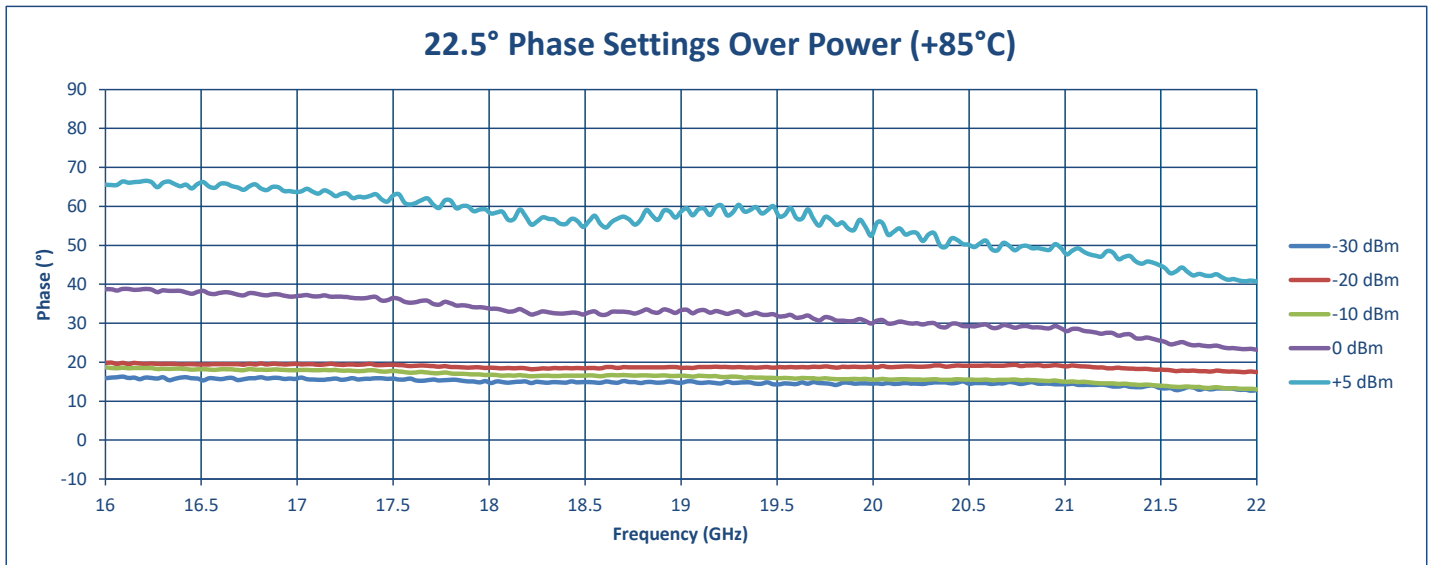
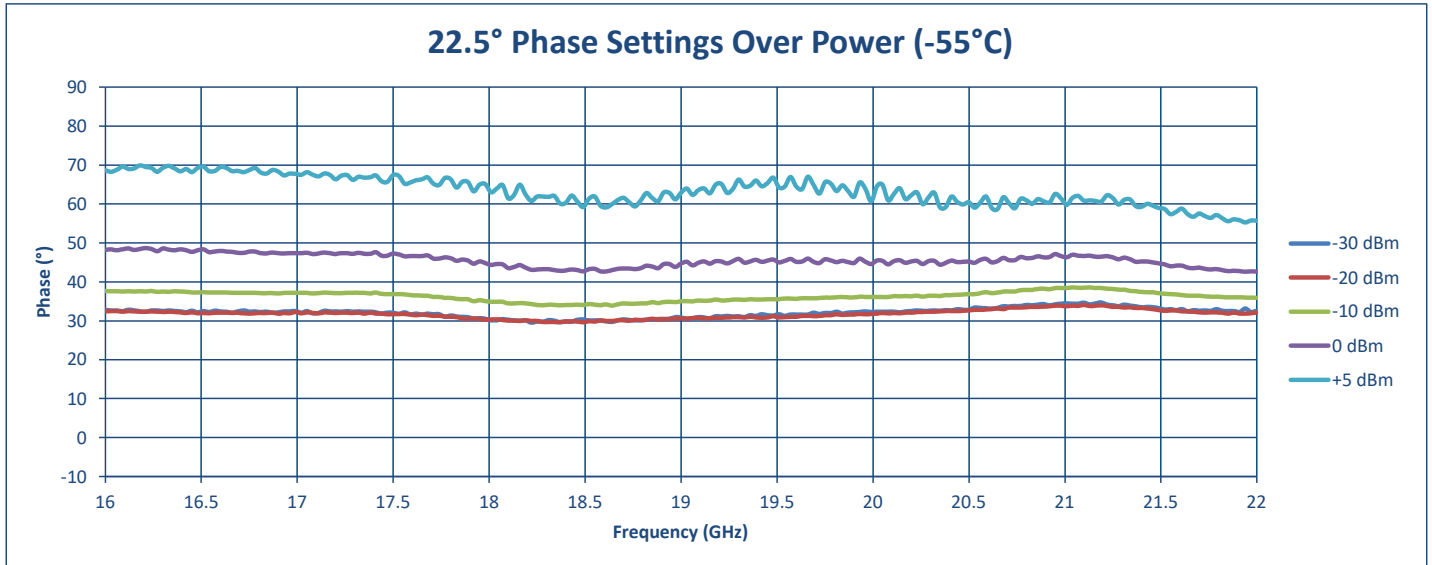
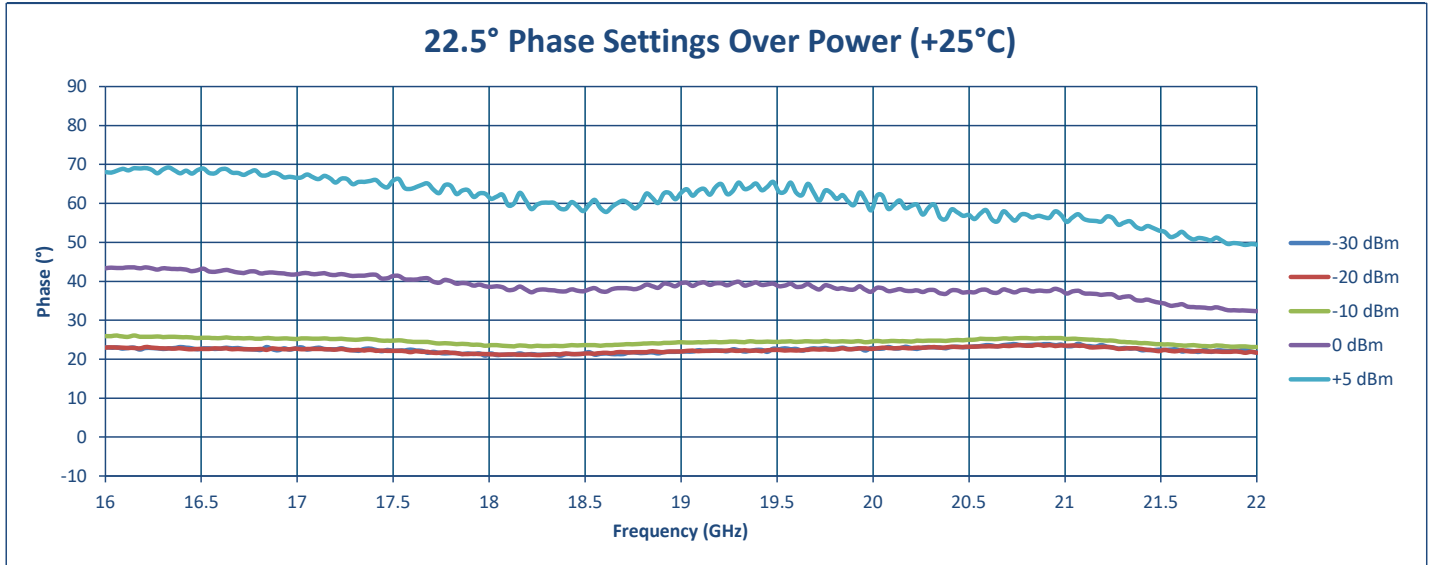


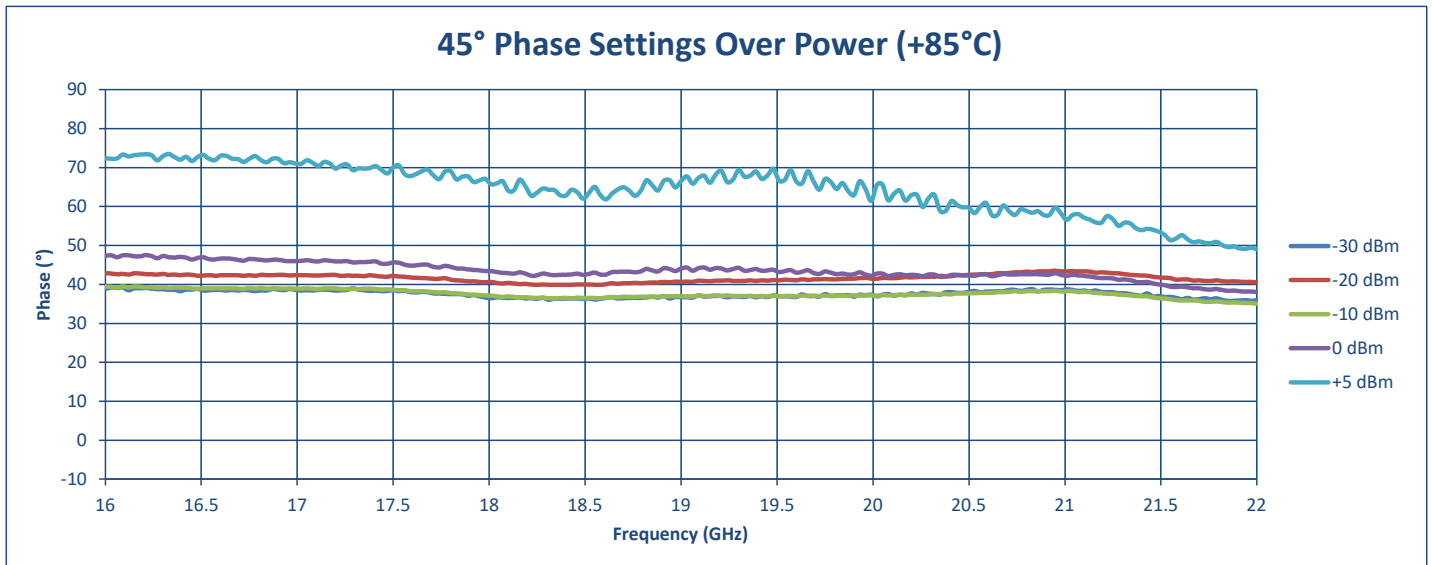
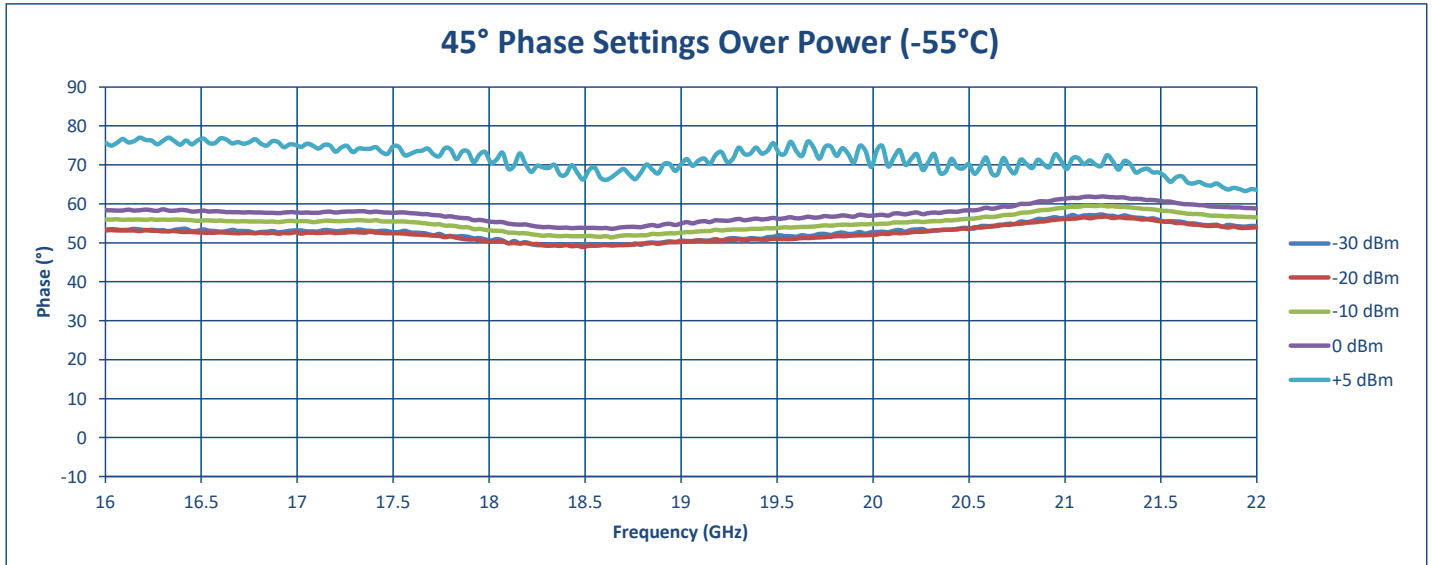
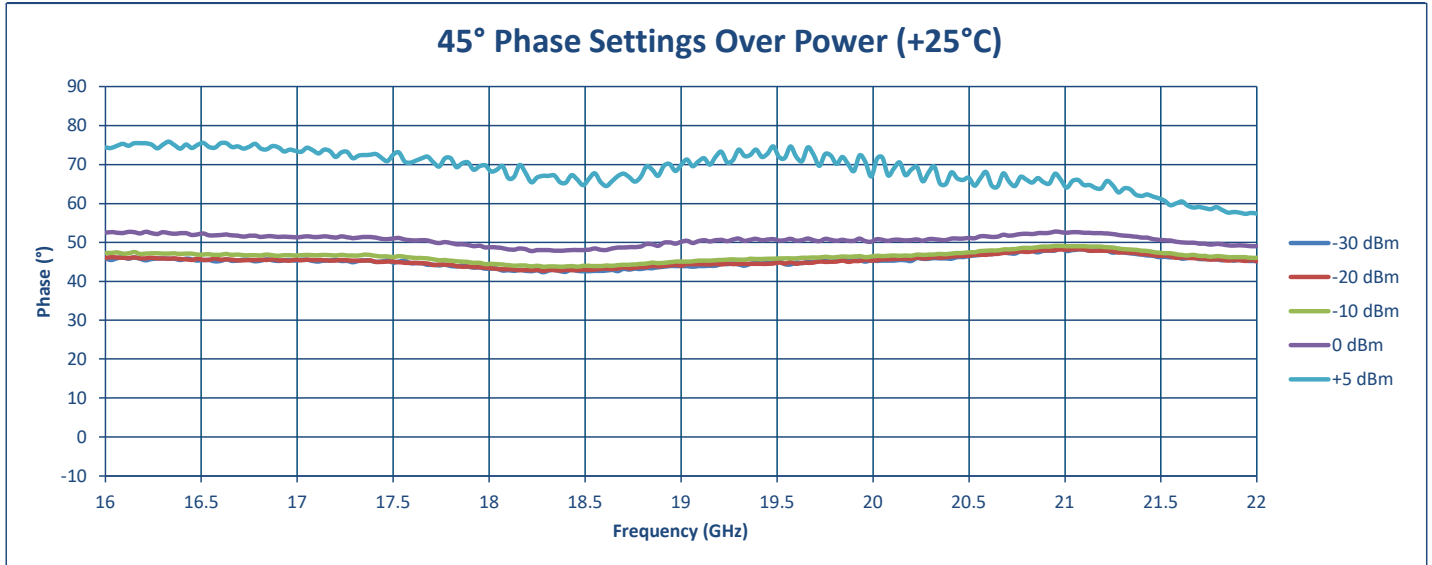


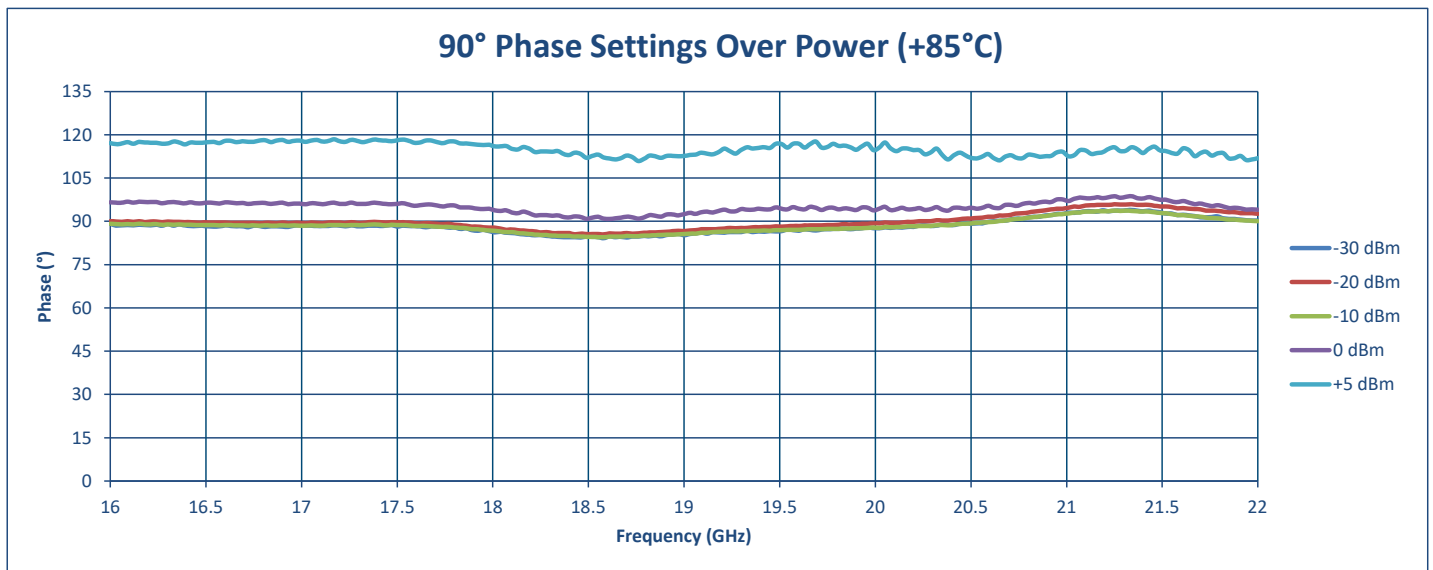
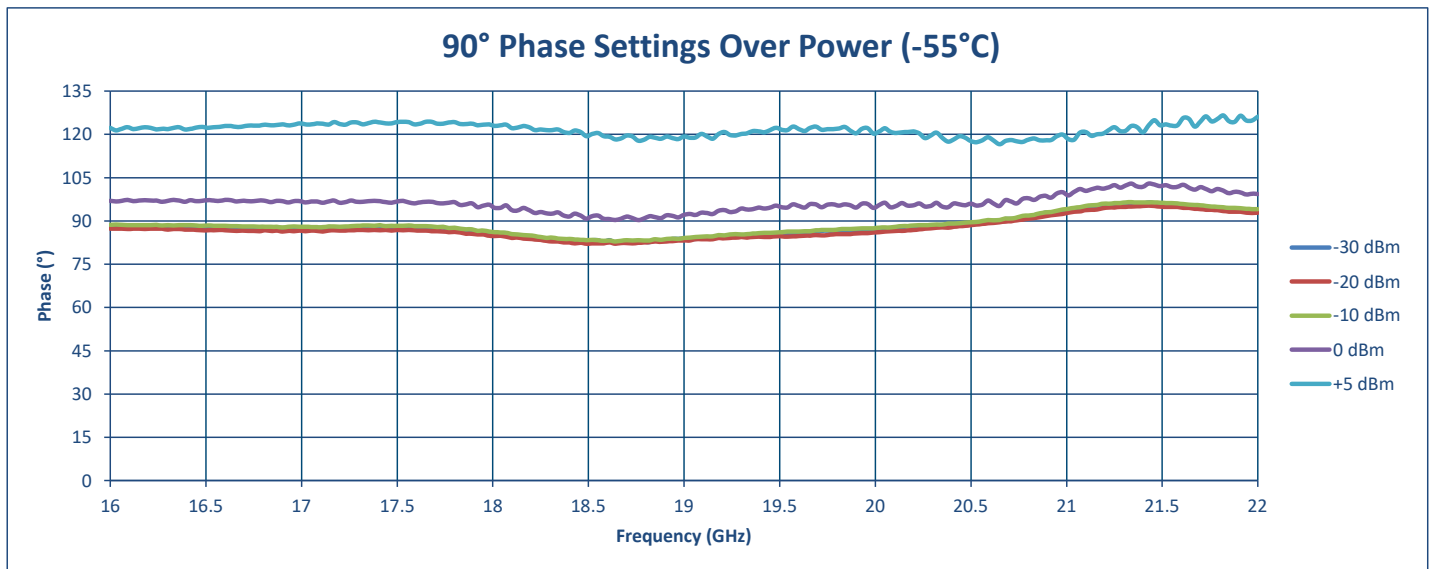
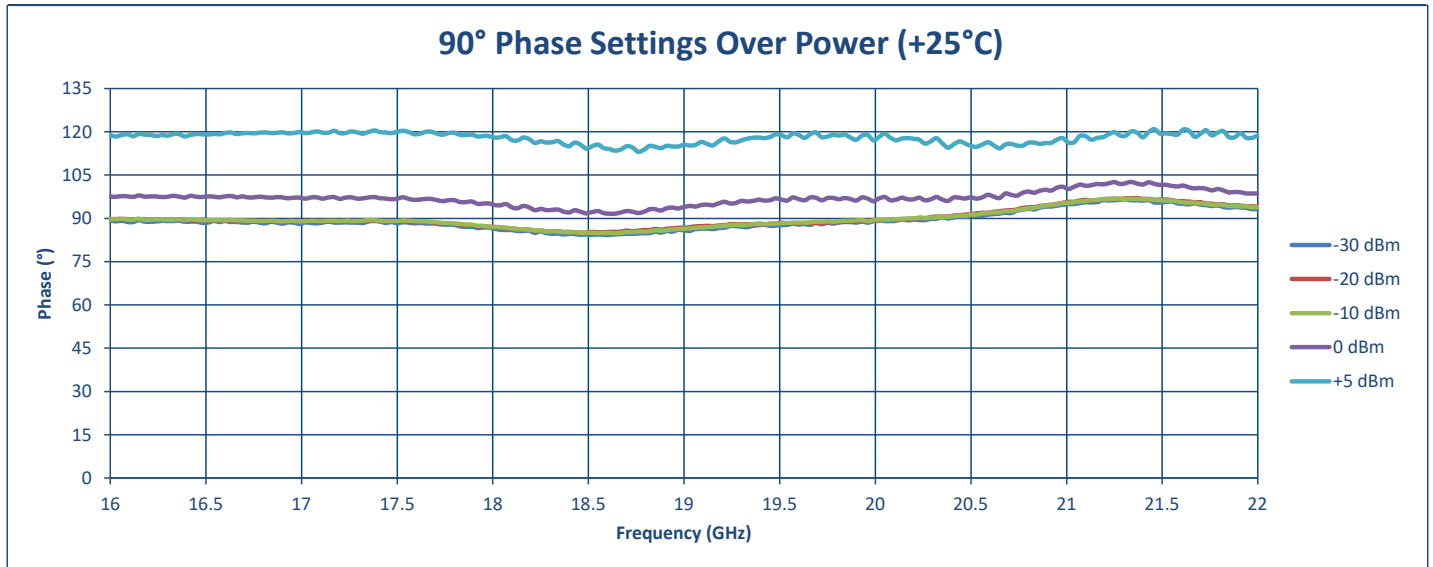




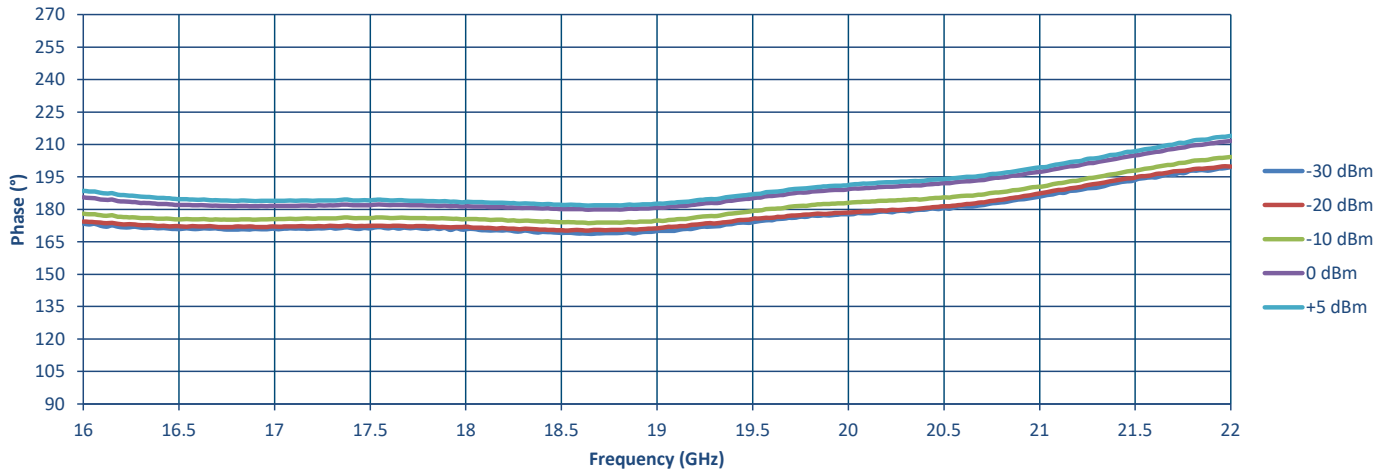




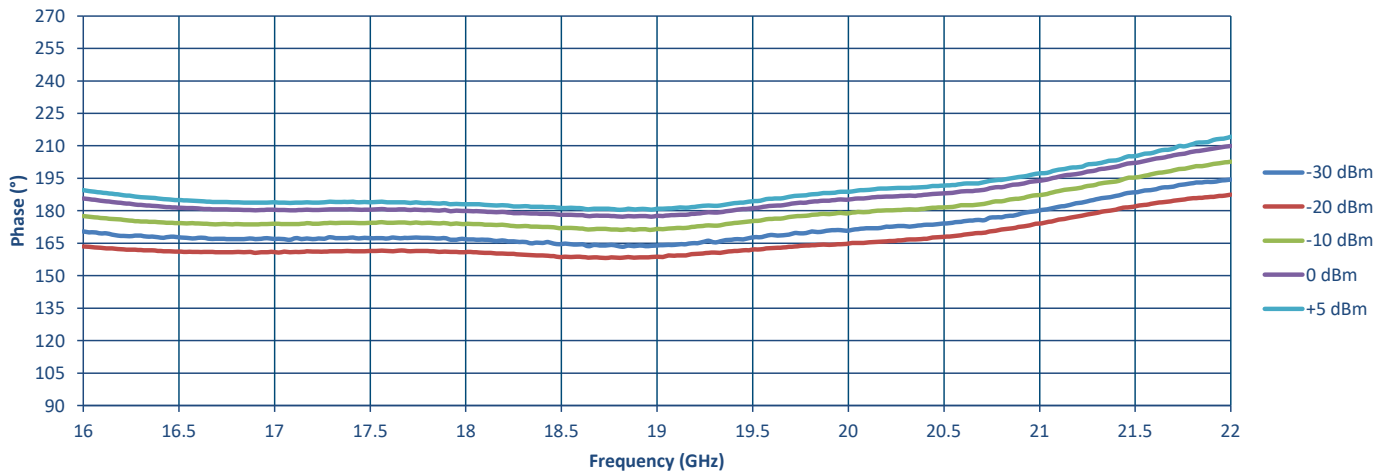




180° (MSB) Phase Settings Over Power (+25°C)



180° (MSB) Phase Settings Over Power (-55°C)



180° (MSB) Phase Settings Over Power (+85°C)

