Typical Characteristics On SBA-218-63DB-6B-SFF

PMI MODEL SBA-218-63DB-6B-SFF IS A SWITCHED BIT ATTENUATOR OPERATING FROM 2 TO 18 GHz. DESIGNED TO BE SWITCHED BETWEEN A LOW LOSS STATE AND 6 SET ATTENUATION STATES. THE SETTINGS ARE SELECTED BY 6 INDEPENDENT BIT CONTROLS.

October 5, 2021

Designed By:

Engineering PMI

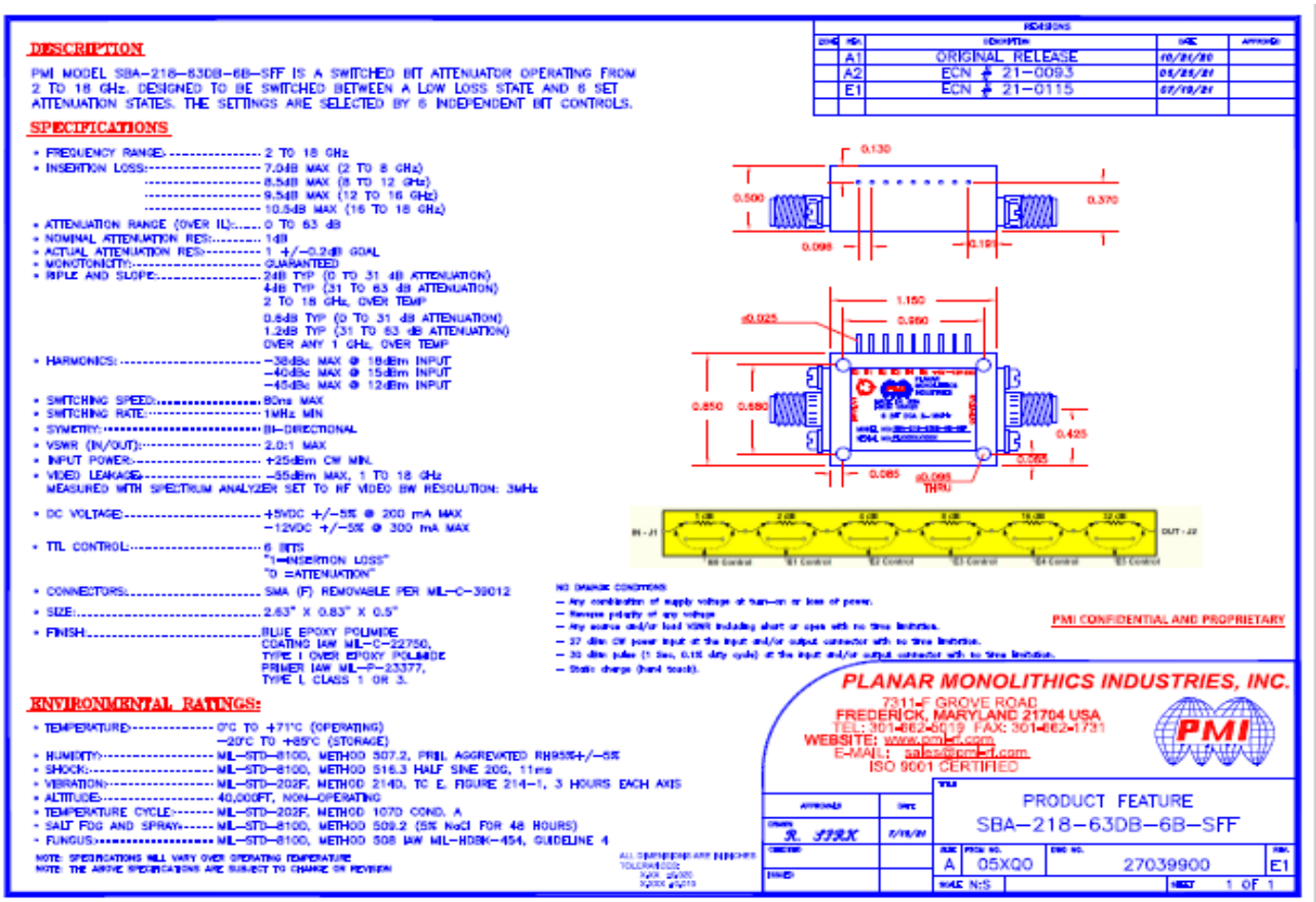
Tested and Reported By:

Alfredo Lopez

7311-F Grove Road Frederick, MD 21704 USA Phone: (301)662-5019 Fax: (301)662-1731
Email: sales@pmi-rf.com

Typical Characteristics On SBA-218-63DB-6B-SFF

Outline Drawing



DESCRIPTION

PMI MODEL SBA-218-63DB-6B-SFF IS A SWITCHED BIT ATTENUATOR OPERATING FROM 2 TO 18 GHz. DESIGNED TO BE SWITCHED BETWEEN A LOW LOSS STATE AND 6 SET ATTENUATION STATES. THE SETTINGS ARE SELECTED BY 6 INDEPENDENT BIT CONTROLS.

REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A1	ORIGINAL RELEASE	10/31/20	
	A2	ECN # 21-0093	05/25/21	
	E1	ECN # 21-0115	07/19/21	

SPECIFICATIONS

- FREQUENCY RANGE: ---------- 2 TO 18 GHz
- INSERTION LOSS: ---------- 7.0dB MAX (2 TO 8 GHz)
  ---------- 8.5dB MAX (8 TO 12 GHz)
  ---------- 9.5dB MAX (12 TO 16 GHz)
  ---------- 10.5dB MAX (16 TO 18 GHz)
- ATTENUATION RANGE (OVER IL): ..... 0 TO 63 dB
- NOMINAL ATTENUATION RES: 1dB
- ACTUAL ATTENUATION RES: ---------- 1 +/-0.2dB GOAL
- MONOTONICITY: ---------- GUARANTEED
- RIPPLE AND SLOPE: ---------- 2dB TYP (0 TO 31 dB ATTENUATION)
  4dB TYP (31 TO 63 dB ATTENUATION)
  2 TO 18 GHz, OVER TEMP
  0.6dB TYP (0 TO 31 dB ATTENUATION)
  1.2dB TYP (31 TO 63 dB ATTENUATION)
  OVER ANY 1 GHz, OVER TEMP
- HARMONICS: ---------- -36dBc MAX @ 18dBm INPUT
  -40dBc MAX @ 15dBm INPUT
  -45dBc MAX @ 12dBm INPUT
- SWITCHING SPEED: ---------- 80ns MAX
- SWITCHING RATE: ---------- 1MHz MIN
- SYMETRY: ---------- BI-DIRECTIONAL
- VSWR (IN/OUT): ---------- 2.0:1 MAX
- INPUT POWER: ---------- +25dBm CW MIN.
- VIDEO LEAKAGE: ---------- -55dBm MAX, 1 TO 18 GHz
  MEASURED WITH SPECTRUM ANALYZER SET TO RF VIDEO BW RESOLUTION: 3MHz
- DC VOLTAGE: ---------- +5VDC +/-5% @ 200 mA MAX
  -12VDC +/-5% @ 300 mA MAX
- TTL CONTROL: ---------- 6 BITS
  "1"=INSERTION LOSS"
  "0 =ATTENUATION"
- CONNECTORS: ---------- SMA (F) REMOVABLE PER MIL-C-39012
- SIZE: ---------- 2.63" X 0.83" X 0.5"
- FINISH: ---------- BLUE EPOXY POLIMIDE COATING IAW MIL-C-22750, TYPE I OVER EPOXY POLIMIDE PRIMER IAW MIL-P-23377, TYPE I, CLASS 1 OR 3.

ENVIRONMENTAL RATINGS:

- TEMPERATURE: ---------- 0°C TO +71°C (OPERATING)
  -20°C TO +85°C (STORAGE)
- HUMIDITY: ---------- MIL-STD-810D, METHOD 507.2, PROL AGGREVATED RH95%+/-5%
- SHOCK: ---------- MIL-STD-810D, METHOD 516.3 HALF SINE 20G, 11ms
- VIBRATION: ---------- MIL-STD-202F, METHOD 214D, TC E, FIGURE 214-1, 3 HOURS EACH AXIS
- ALTITUDE: ---------- 40,000FT, NON-OPERATING
- TEMPERATURE CYCLE: ---------- MIL-STD-202F, METHOD 107D COND. A
- SALT FOG AND SPRAY: ---------- MIL-STD-810D, METHOD 509.2 (5% NaCl FOR 48 HOURS)
- FUNGUS: ---------- MIL-STD-810D, METHOD 508 IAW MIL-HDBK-454, GUIDELINE 4

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

NO DAMAGE CONDITIONS
- Any combination of supply voltage at turn-on or loss of power.
- Reverse polarity of any voltage.
- Any source and/or load VSWR including short or open with no time limitation.
- 27 dBm CW power input at the input and/or output connector with no time limitation.
- 33 dBm pulse (1 Sec, 0.1% duty cycle) at the input and/or output connector with no time limitation.
- Static charge (hand touch).

PMI CONFIDENTIAL AND PROPRIETARY

PLANAR MONOLITHICS INDUSTRIES, INC.
7311-F GROVE ROAD
FREDERICK, MARYLAND 21704 USA
TEL: 301-662-5019 FAX: 301-662-1731
WEBSITE: www.pmi-rf.com
E-MAIL: sales@pmi-rf.com
ISO 9001 CERTIFIED

APPROVALS	DATE
DRAWN R. STRX	7/19/21
CHECKED	
ISSUED	

TITLE: PRODUCT FEATURE
SBA-218-63DB-6B-SFF

SIZE	FSCM NO.	DWG NO.	REV.
A	05XQ0	27039900	E1

SCALE N/S SHEET 1 OF 1

Typical Characteristics On SBA-218-63DB-6B-SFF

Technical Specifications

TEST ITEM NO.	PARAMETERS	SPECIFIED VALUE	Test Results			QA QC
			+25°C	0°C	+71°C	
1	Frequency Range:	2 to 18 GHz	**2 to 18 GHz**	**2 to 18 GHz**	**2 to 18 GHz**	
2	Insertion Loss:	7 dB Max.(2 To 8 GHz) 8.5 dB Max.(8 To 12 GHz) 9.5 dB Max.(12 To 16 GHz) 10.5dB Max.(16 To 18 GHz)	**6.65 dB**	**6.65 dB**	**6.64 dB**	
			7.51 dB	**7.51 dB**	**7.48 dB**	
			8.6 dB	**8.59 dB**	**8.62 dB**	
			9.09 dB	**9.06 dB**	**9.12 dB**	
			See Graphs	**See Graphs**	**See Graphs**	
3	Attenuation Range (Over IL):	0 To 63 dB	**Pass** **See Graphs**	**Pass** **See Graphs**	**Pass** **See Graphs**	
4	Nominal Attenuation Res:	1 dB	**Pass**	**Pass**	**Pass**	
5	Actual Attenuation Res:	1 +/-0.2dB Goal	**Pass**	**Pass**	**Pass**	
6	Monotonicity:	Guaranteed	**Pass**	**Pass**	**Pass**	
7	Riple And Slope	2dB Typ (0 to 31 dB Atte)	**0.18 dB Max/-0.21 dB Min**	**0.18 dB Max/-0.21 dB Min**	**0.17 dB Max/-0.21 dB Min**	
		4dB Typ. (31 To 63 dB Atte)	**1.92 dB Max/-1.23 dB Min**	**2.03 dB Max/-1.28 dB Min**	**1.88 dB Max/-1.06 dB Min**	
		2 To 18 GHz, Over Temp	**See Graphs**	**See Graphs**	**See Graphs**	
		0.6dB Typ (0 To 31 dB Atte)	**0.06 dB Max/-0.21 dB Min**	**0.06 dB Max/-0.21 dB Min**	**0.05 dB Max/-0.21 dB Min**	
		1.2 dB Typ (31 To 63 dB Atte)	**1.33 dB Max/-0.99 dB Min**	**1.06 dB Max/-1.08 dB Min**	**1.26 dB Max/-0.82 dB Min**	
		Over Any 1 GHz, Over Temp	**See Graphs**	**See Graphs**	**See Graphs**	
8	Harmonics:	-38dBc Max @ 18dBm Input	**-60.07 dBc**	**-60.07 dBc**	**-60.07 dBc**	
		-40dBc Max @ 15dBm Input	**-62.93 dBc**	**-62.93 dBc**	**-62.93 dBc**	
		-45dBc Max @ 12 dBm Input	**-64.93 dBc**	**-64.93 dBc**	**-64.93 dBc**	
			See Plots	**See Plots**	**See Plots**	
9	Switching Speed:	80ns Max	**Rise Time - 24.10 ns**	**Rise Time - 24.10 ns**	**Rise Time - 24.10 ns**	
			Fall Time - 3.90 ns	**Fall Time - 3.90 ns**	**Fall Time - 3.90 ns**	
			Speed ON - 78.00 ns	**Speed ON - 78.00 ns**	**Speed ON - 78.00 ns**	
			Speed OFF - 12.40 ns	**Speed OFF - 12.40 ns**	**Speed OFF - 12.40 ns**	
			See Plots	**See Plots**	**See Plots**	
10	Switching Rate:	1 MHz Min	**Pass**			
11	VSWR (In/Out)	1.9:1 Max	**1.7 :1** **All The Attenuation steps**	**1.74 :1** **All The Attenuation steps**	**1.7 :1** **All The Attenuation steps**	
12	Input Power:	+25dBm CW Max.	**Pass** **See Graph**	**Pass** **See Graph**	**Pass** **See Graph**	
13	Video Leakage:	-55dBm Max, 1 To 18 GHz (Measured with Spectrum Analyzer set to RF Video BW Resolution: 3MHz)	**> to -55 dBm** **See Plots**	**> to -55 dBm** **See Plots**	**> to -55 dBm** **See Plots**	
14	DC Voltage:	+5VDC +/-5% @ 200 mA Max -12VDC +/-5% @ 300mA Max	**+5VDC @ 20 mA** **-12VDC @ 20 mA**	**+5VDC @ 20 mA** **-12VDC @ 20 mA**	**+5VDC @ 20 mA** **-12VDC @ 20 mA**	
15	TTL Control:	6 Bits "'1 = Insertion Loss" "0 = Attenuation"	**Pass**	**Pass**	**Pass**	

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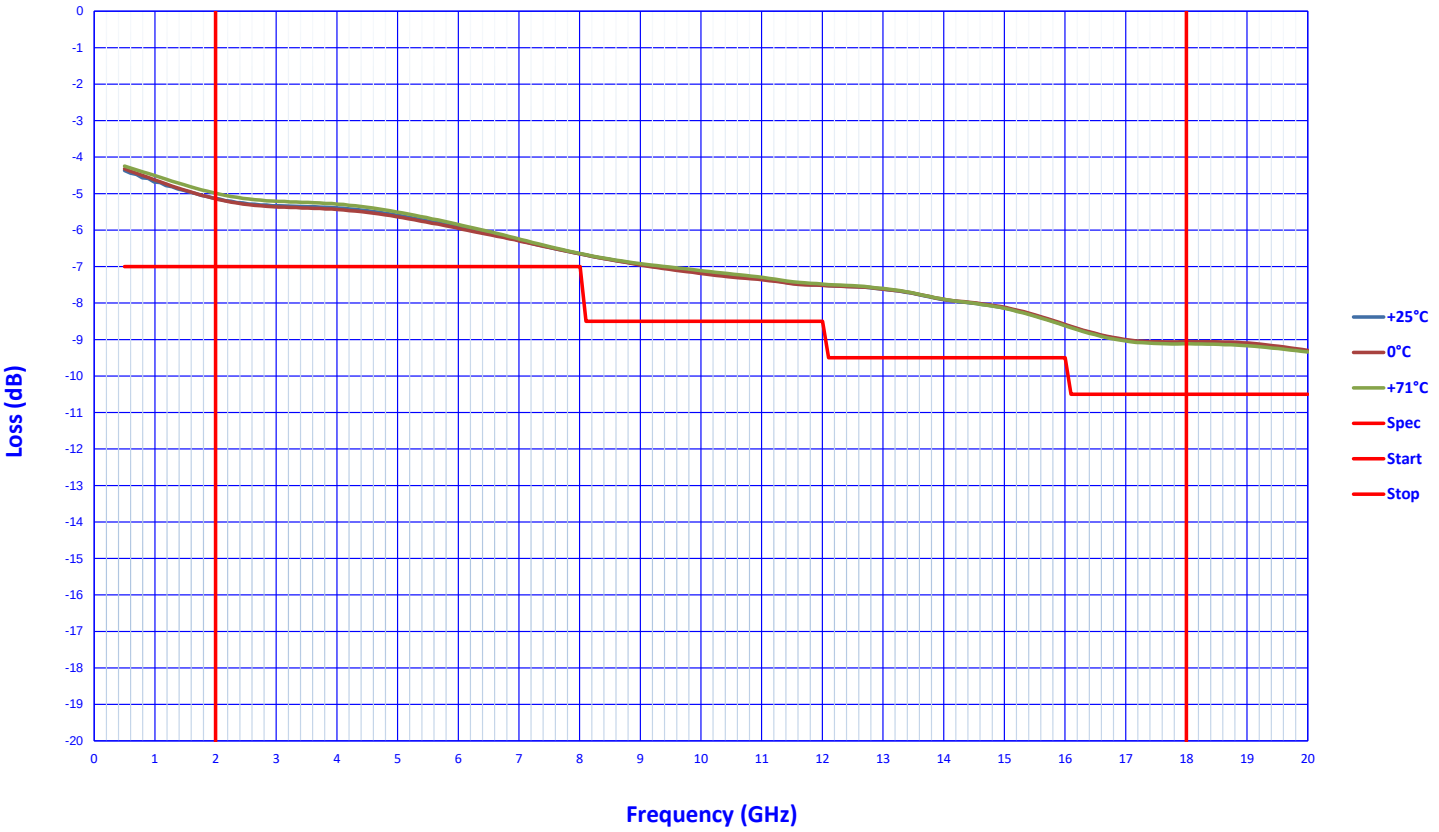
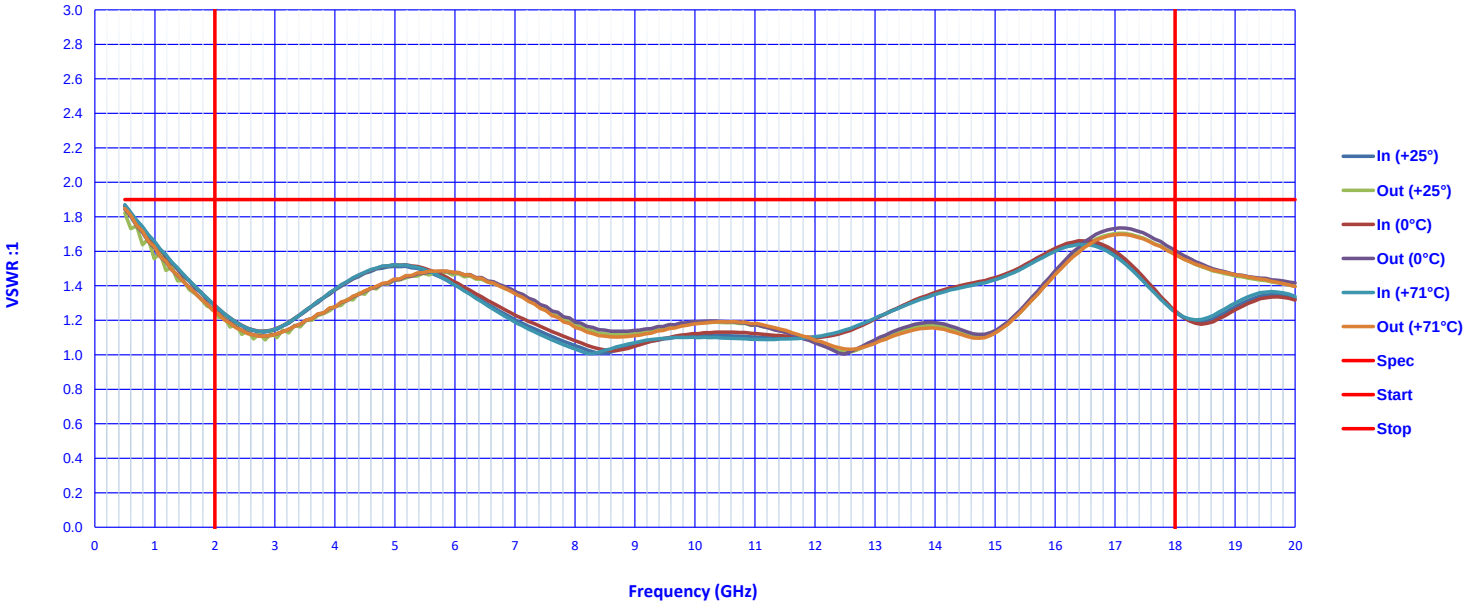
Insertion Loss



VSWR In/Out



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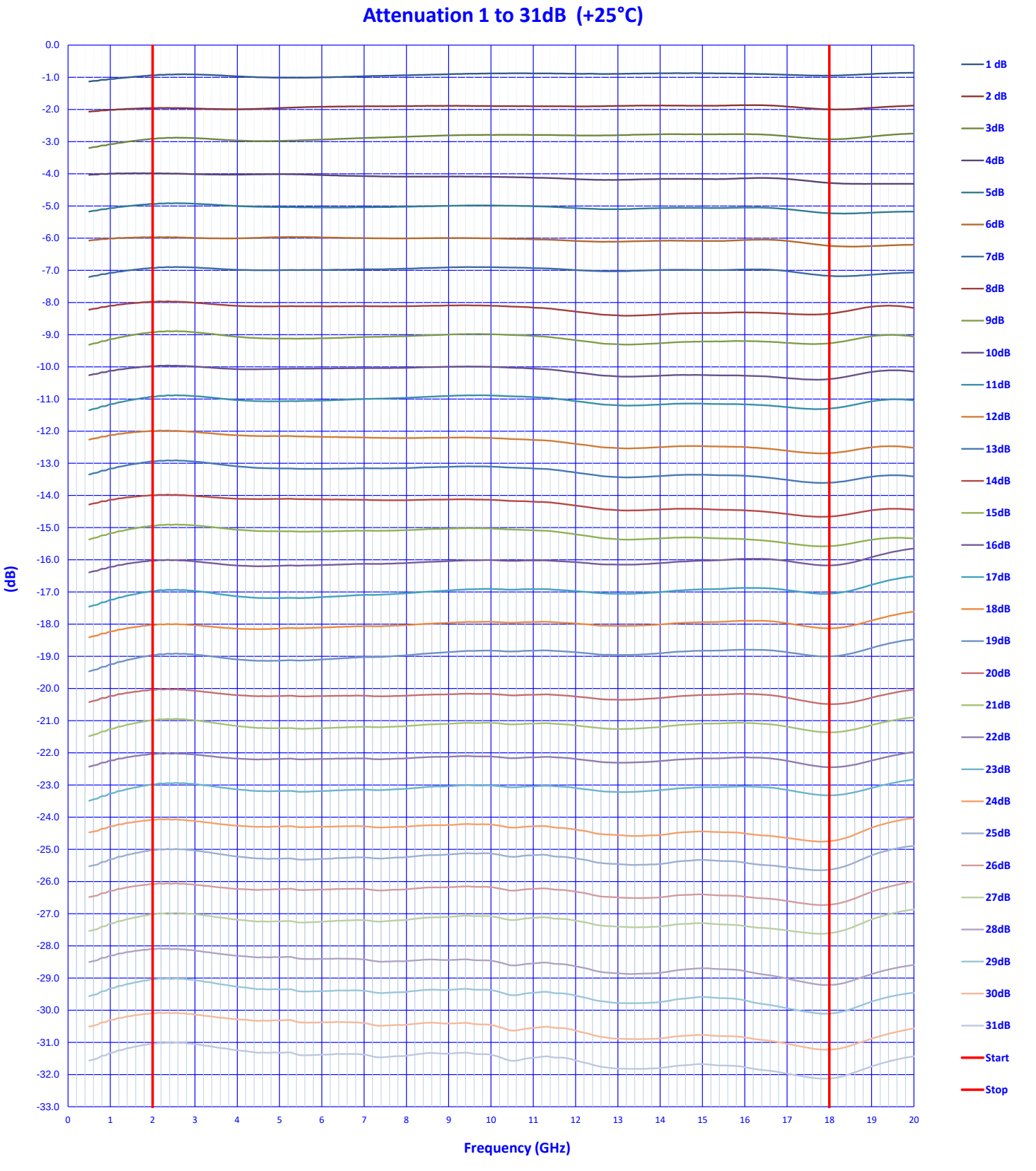

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Typical Characteristics
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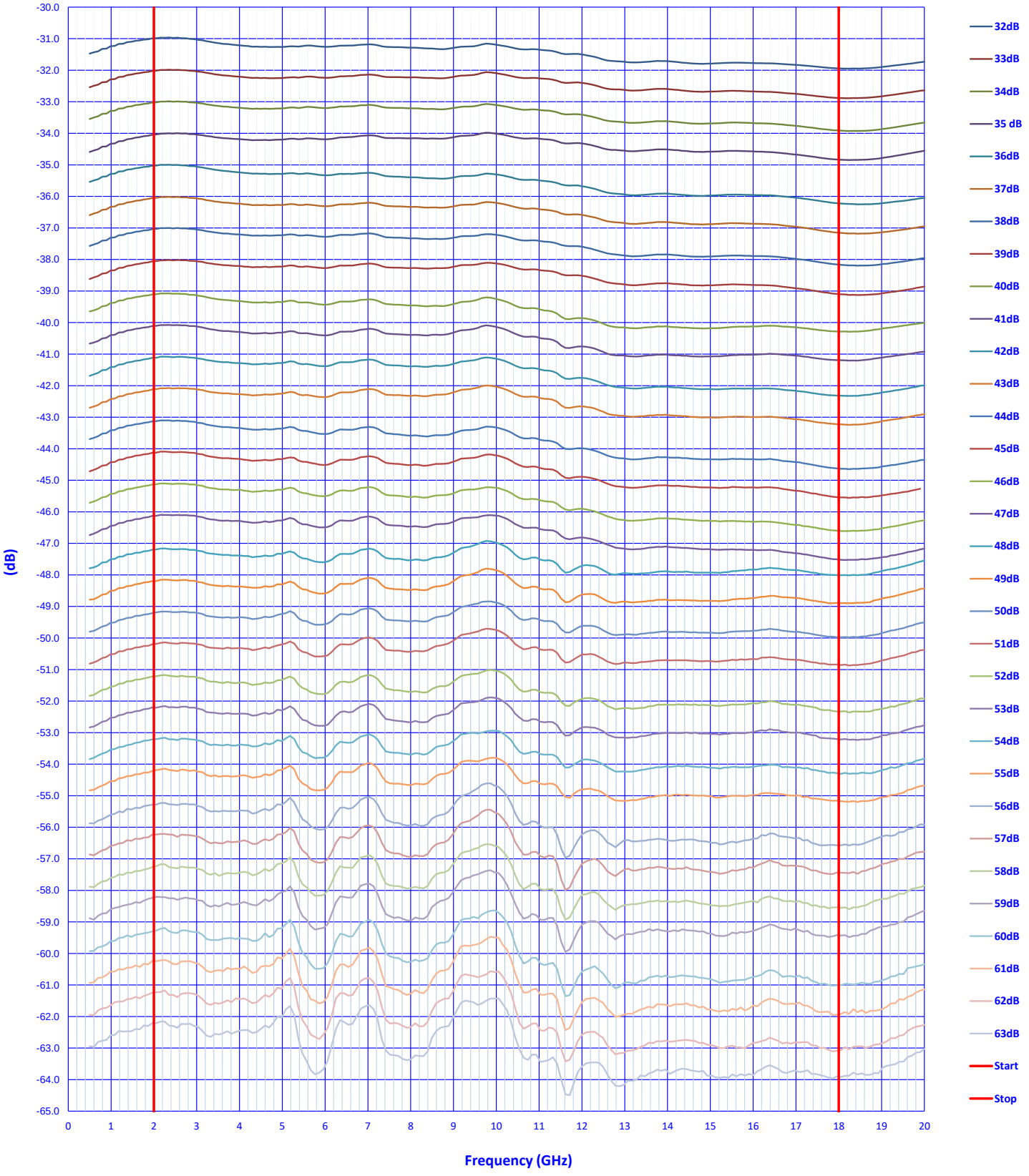
Attenuation 32 to 63 dB (+25°C)



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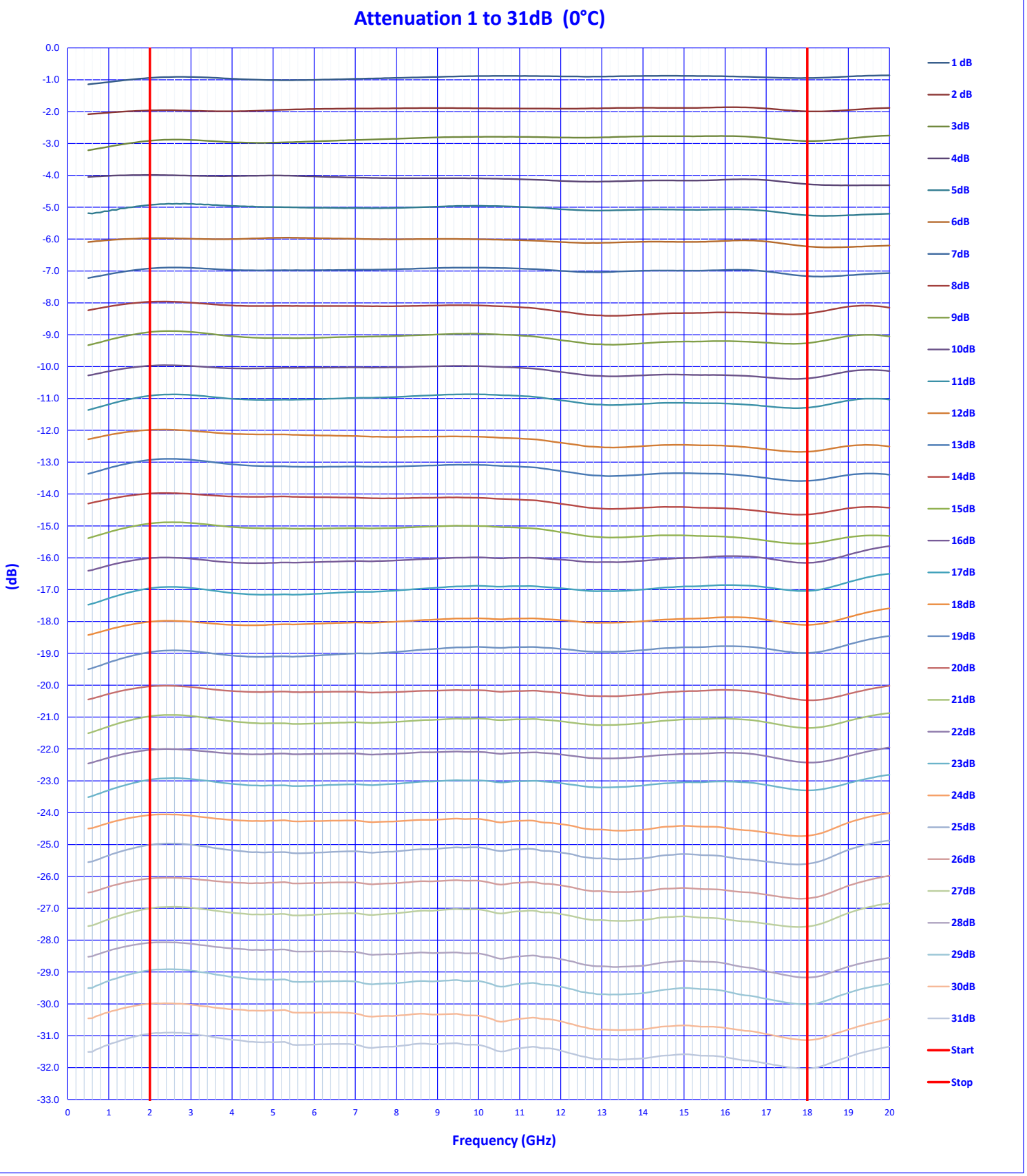

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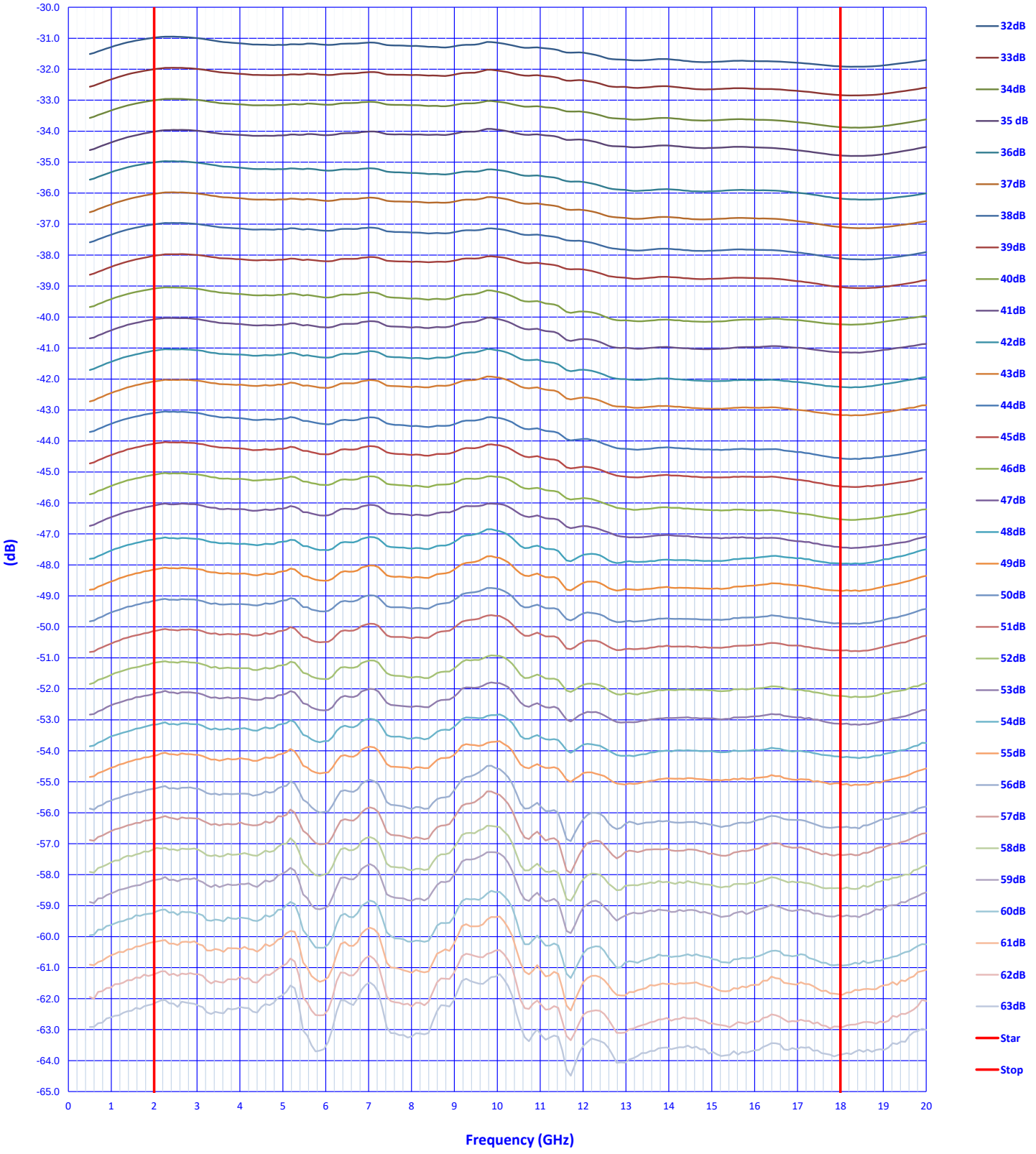

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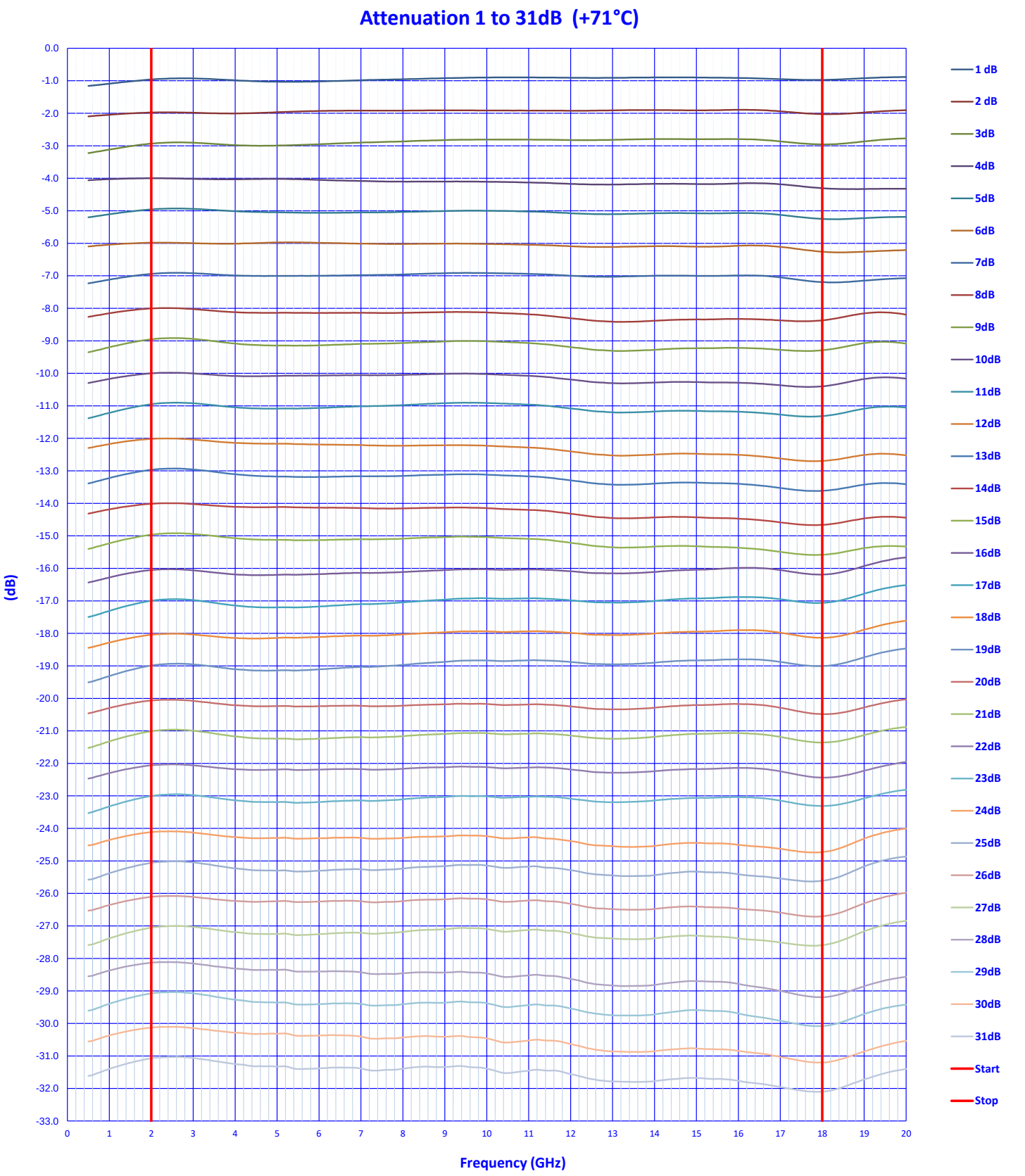

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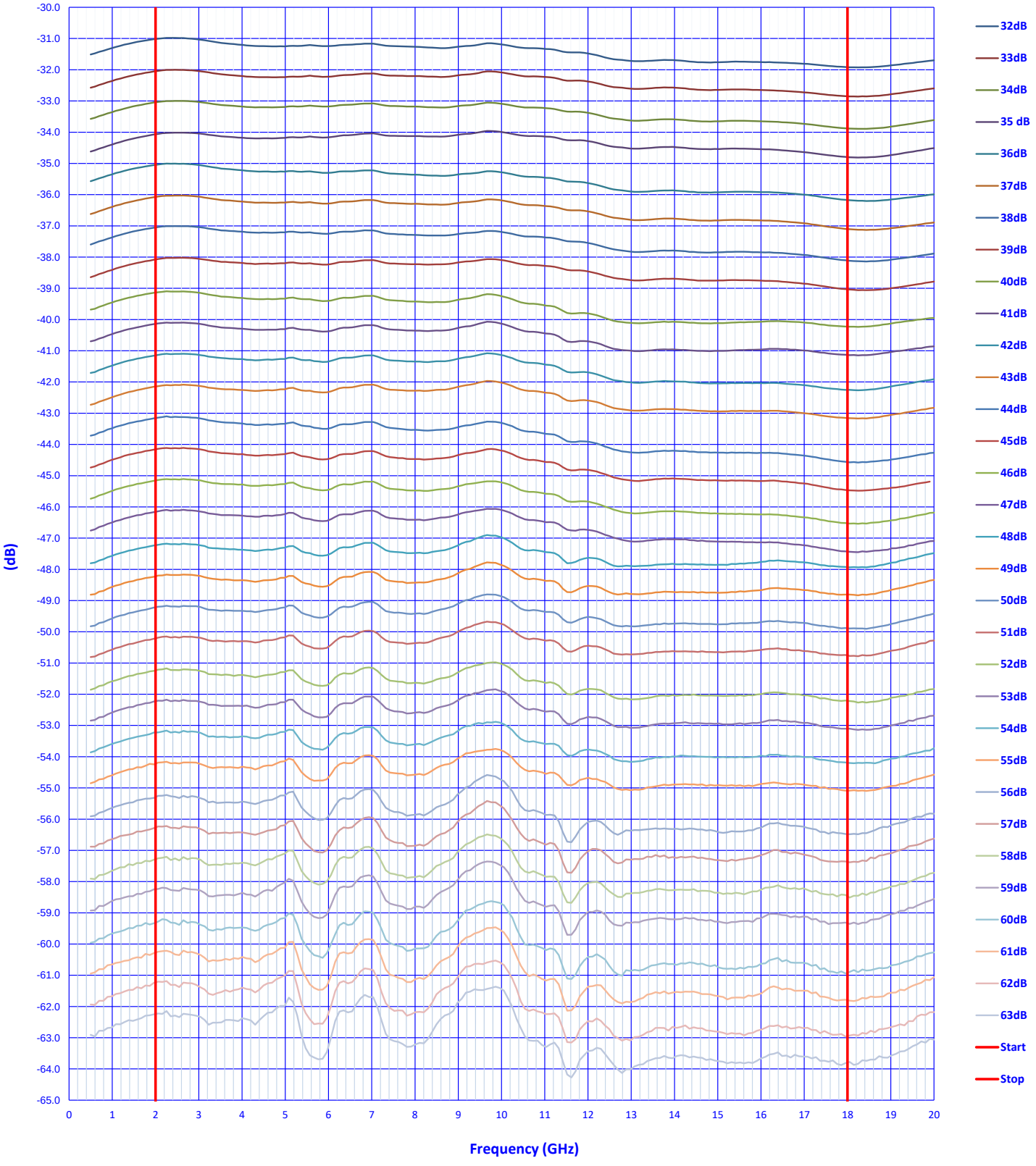

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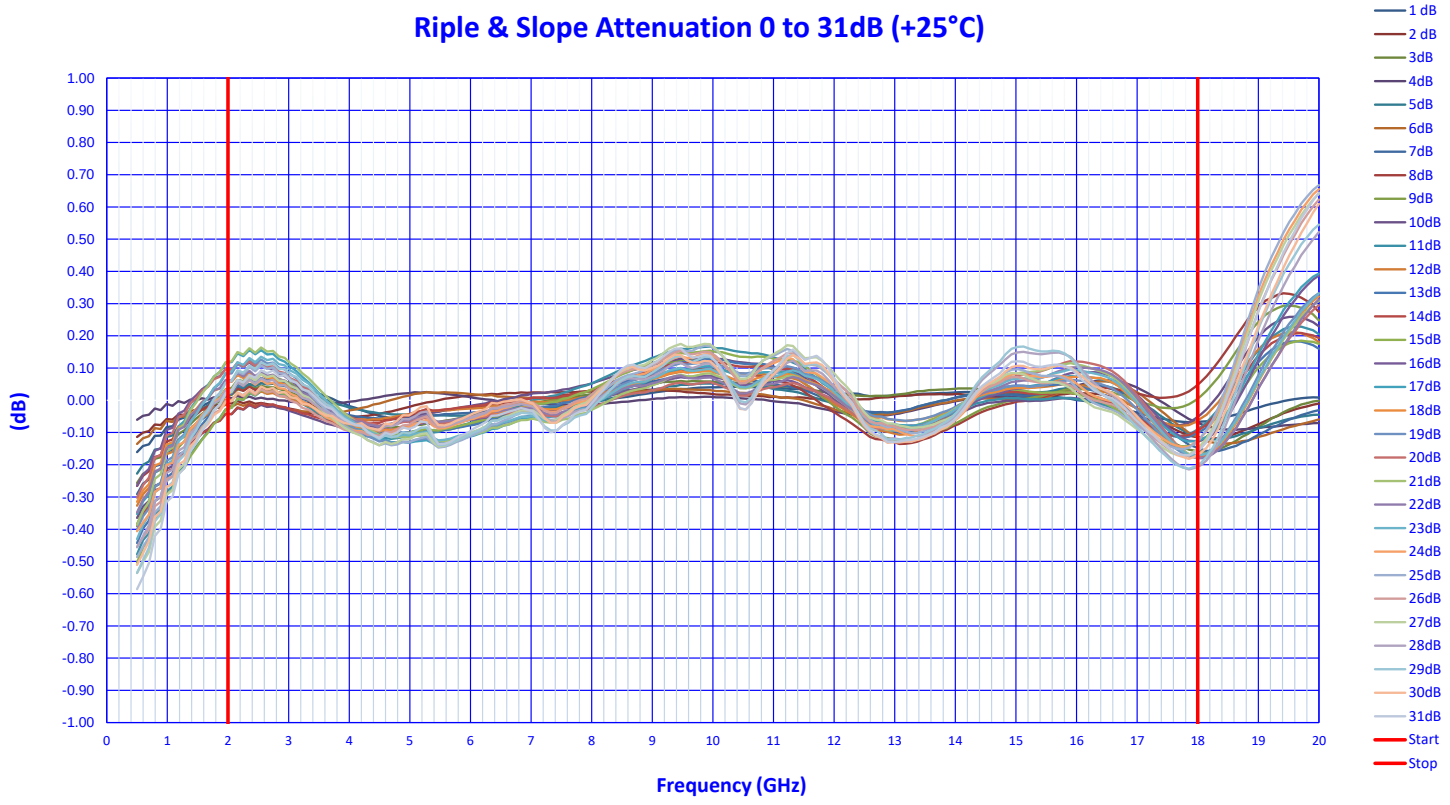

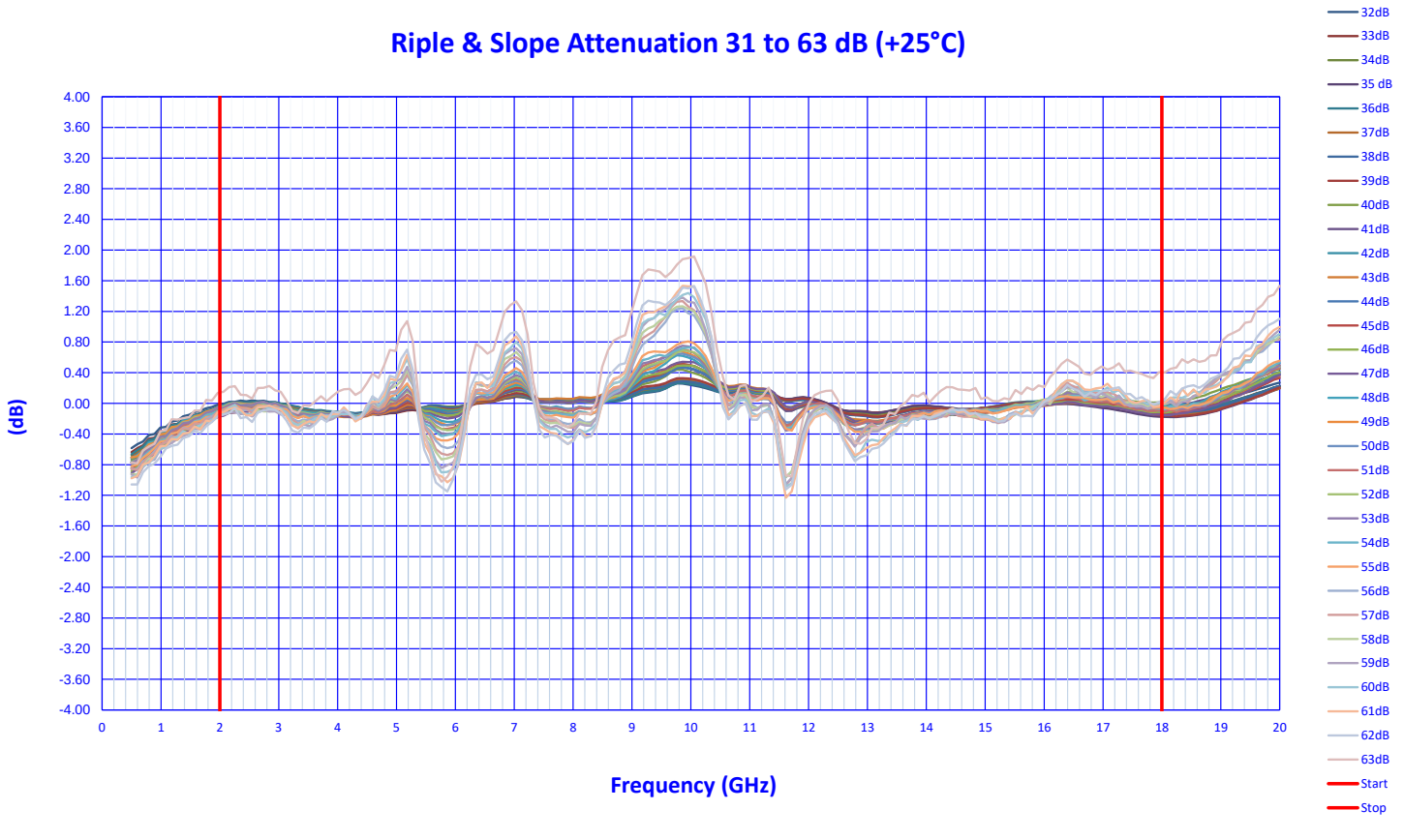

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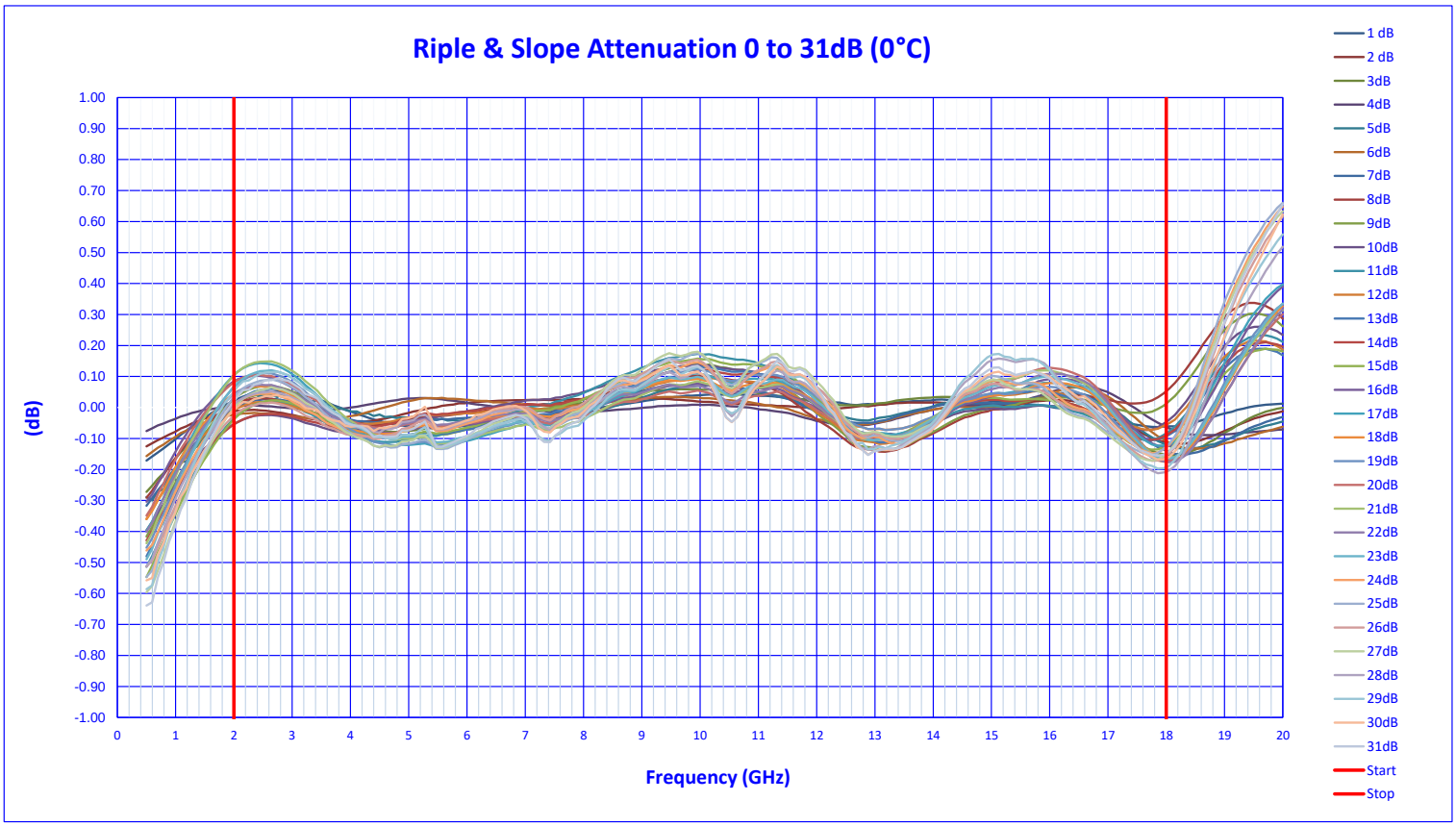

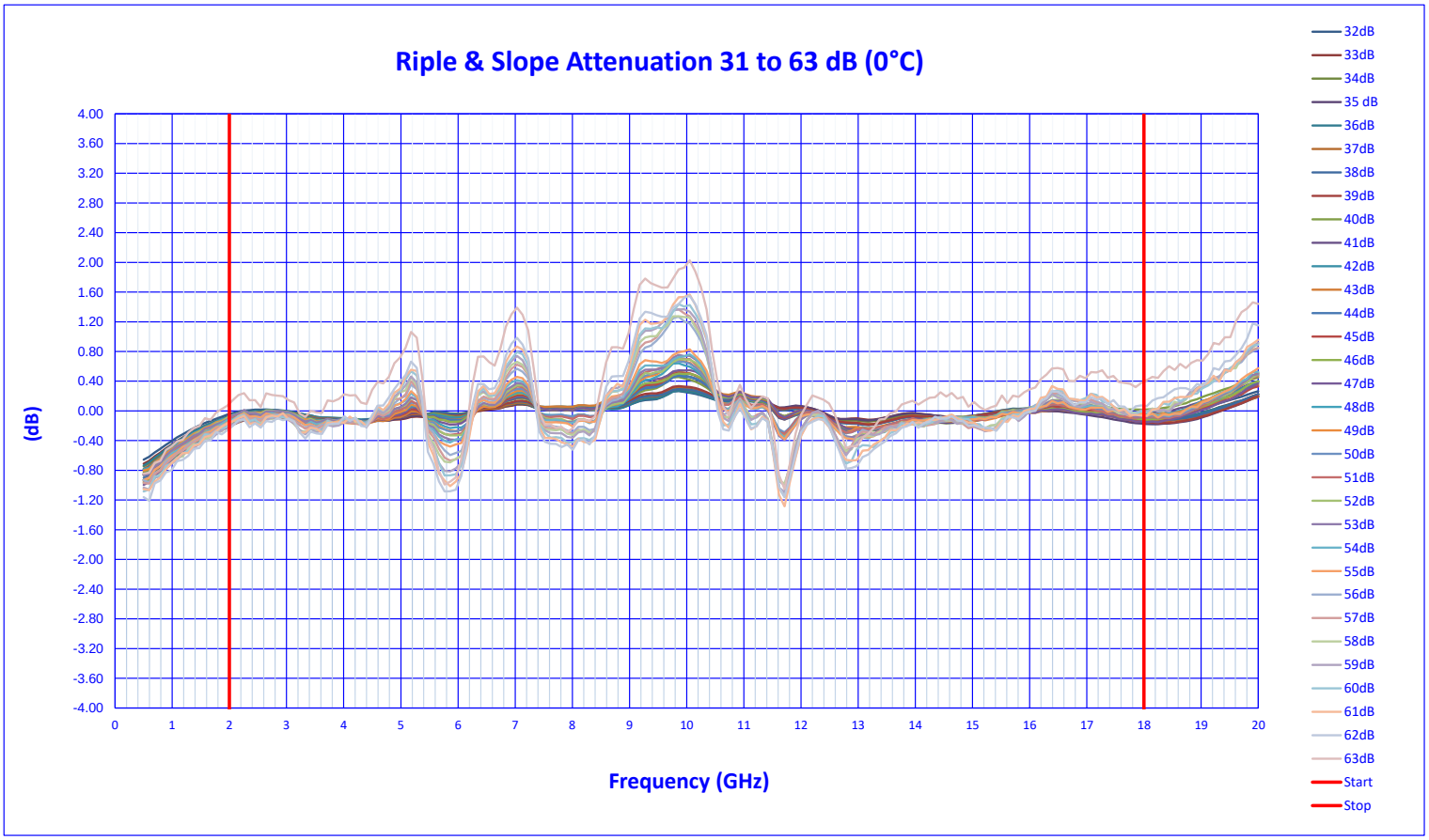

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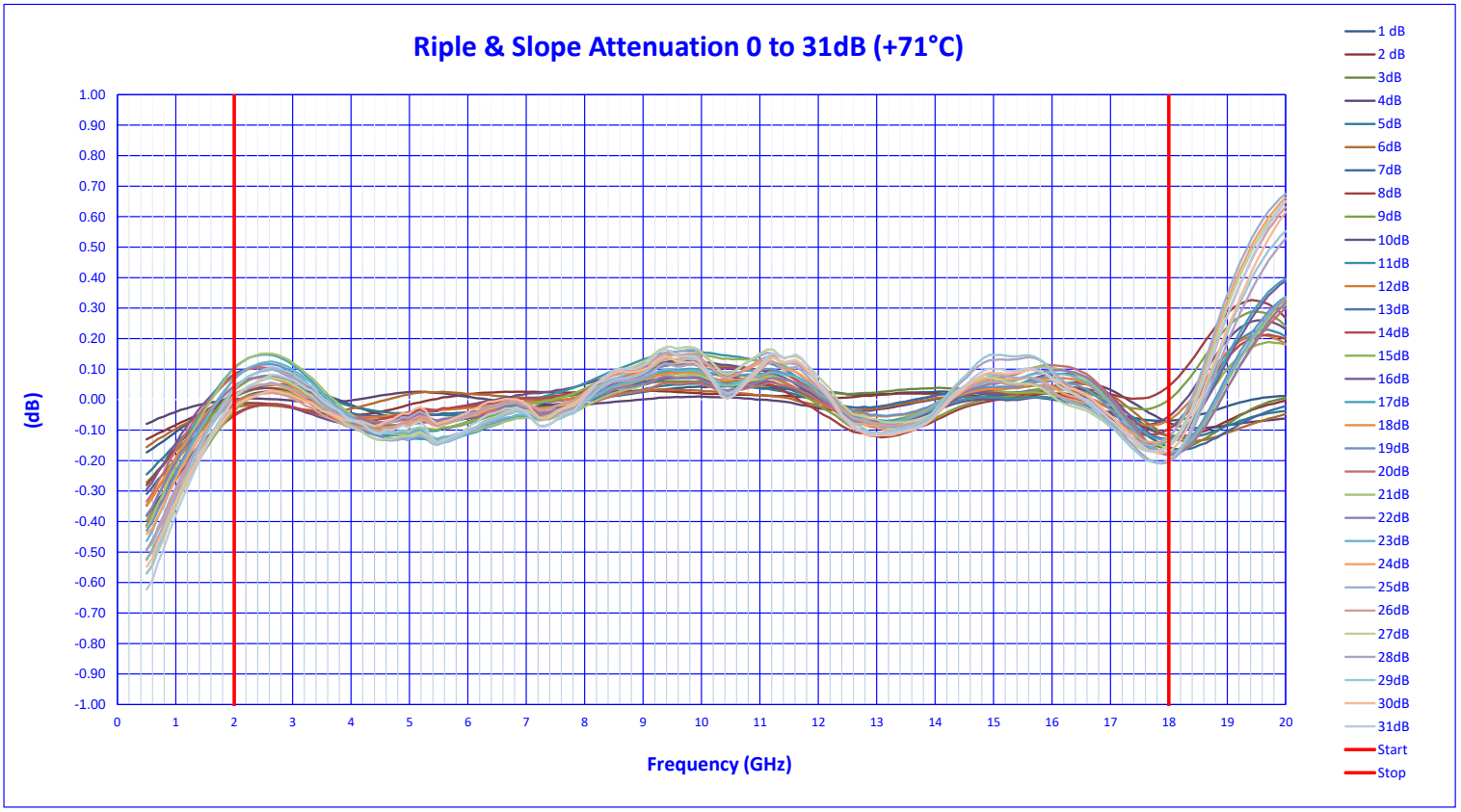

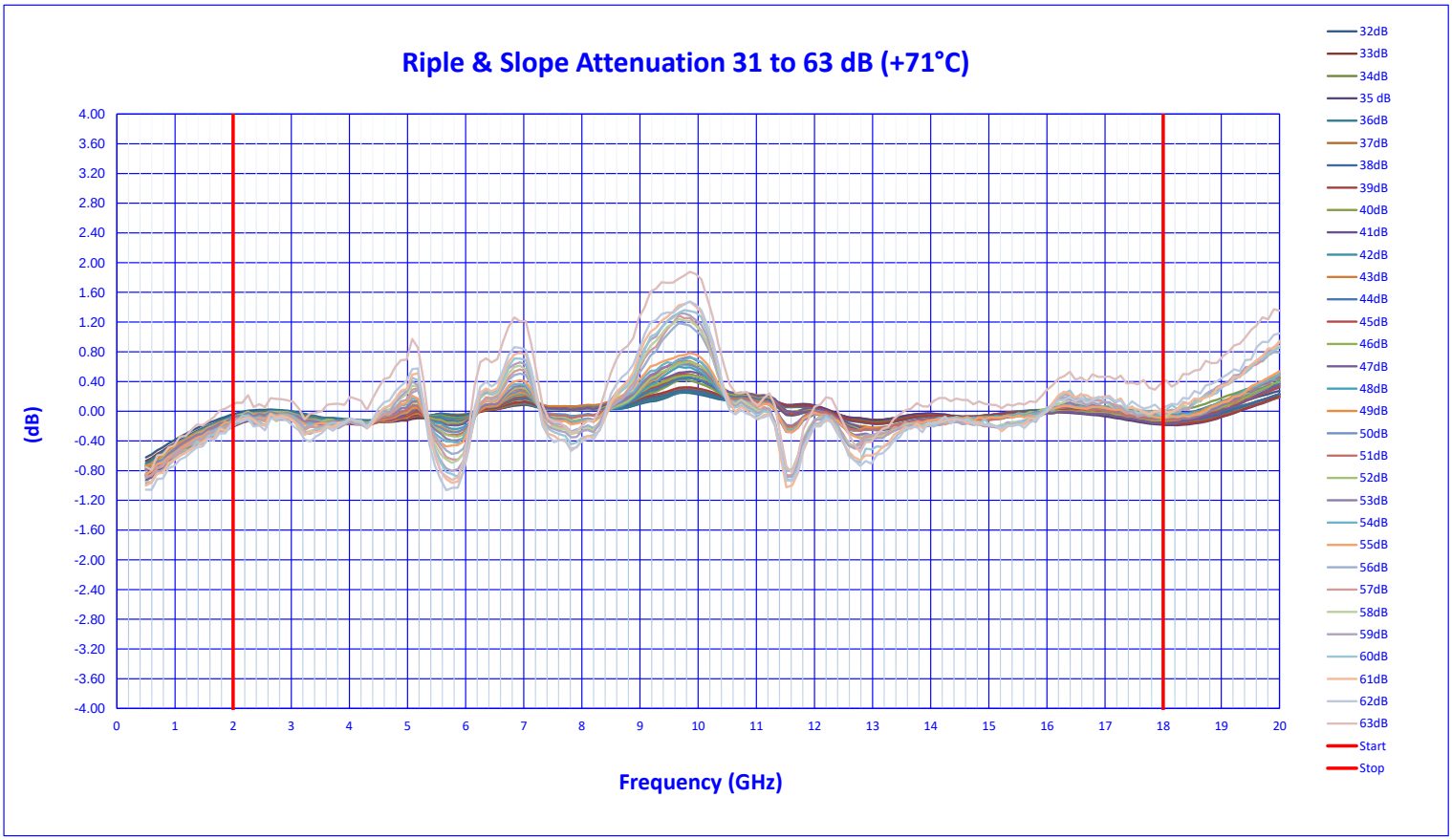

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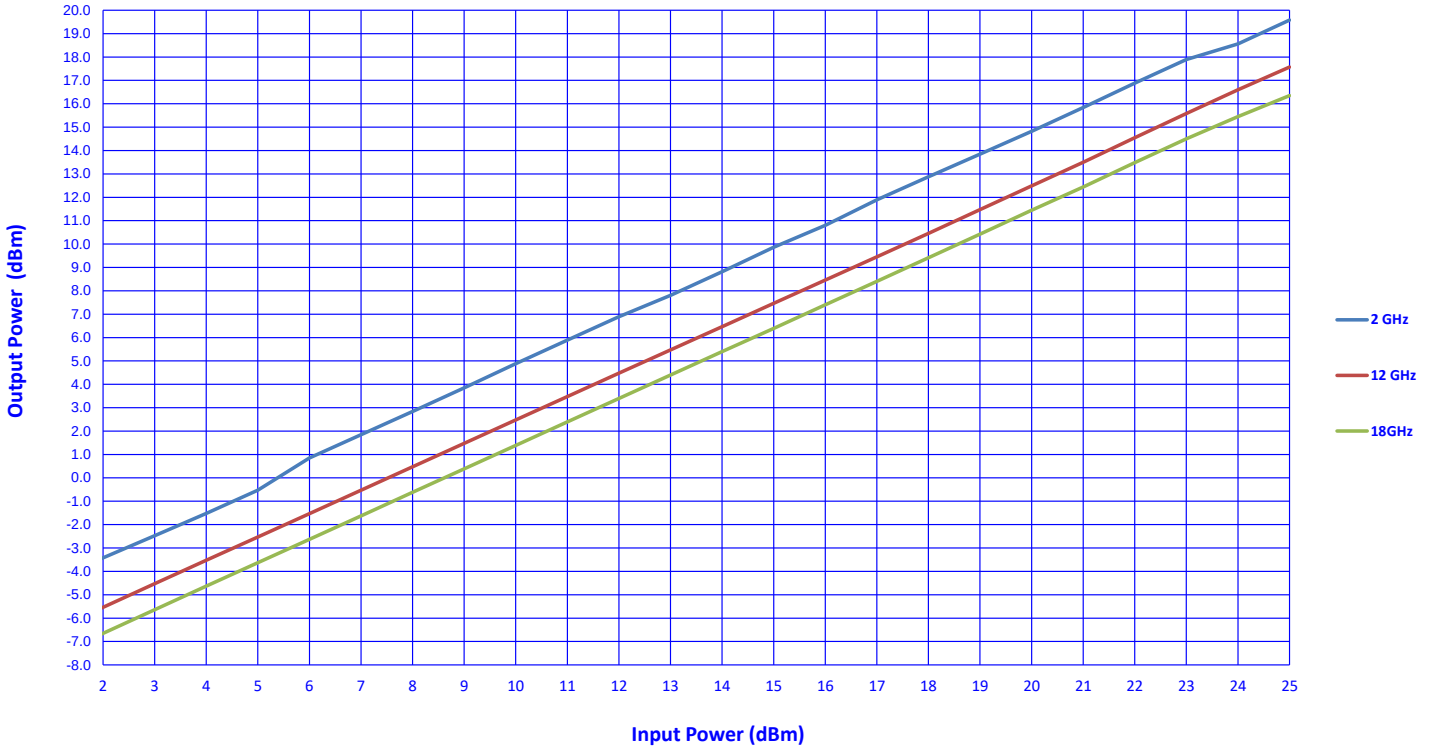

High Power Test Data 2 to 18 GHz (CW)											
2 GHz				12 GHz				18GHz			
Pin (dBm)	Pout (dBm)	Loss	Compression (dBm)	Pin (dBm)	Pout (dBm)	Loss	Compression (dBm)	Pin (dBm)	Pout (dBm)	Loss	Compression (dBm)
0	-5.431	5.431	0.000	0	-7.535	7.535	0.000	0	-8.661	8.661	0.000
1	-4.427	5.427	0.004	1	-6.535	7.535	0.000	1	-7.647	8.647	0.014
2	-3.419	5.419	0.012	2	-5.533	7.533	0.002	2	-6.653	8.653	0.008
3	-2.475	5.475	0.044	3	-4.523	7.523	0.012	3	-5.637	8.637	0.024
4	-1.525	5.525	0.094	4	-3.527	7.527	0.008	4	-4.632	8.632	0.029
5	-0.530	5.530	0.099	5	-2.527	7.527	0.008	5	-3.629	8.629	0.032
6	0.855	5.145	0.286	6	-1.527	7.527	0.008	6	-2.627	8.627	0.034
7	1.846	5.154	0.277	7	-0.528	7.528	0.007	7	-1.623	8.623	0.038
8	2.842	5.158	0.273	8	0.473	7.527	0.008	8	-0.621	8.621	0.040
9	3.846	5.154	0.277	9	1.476	7.524	0.011	9	0.382	8.618	0.043
10	4.880	5.120	0.311	10	2.478	7.522	0.013	10	1.389	8.611	0.050
11	5.891	5.109	0.322	11	3.477	7.523	0.012	11	2.393	8.607	0.054
12	6.895	5.105	0.326	12	4.474	7.526	0.009	12	3.397	8.603	0.058
13	7.806	5.194	0.237	13	5.471	7.530	0.006	13	4.395	8.605	0.056
14	8.815	5.185	0.246	14	6.465	7.535	0.000	14	5.396	8.604	0.057
15	9.861	5.140	0.292	15	7.467	7.534	0.002	15	6.395	8.605	0.056
16	10.802	5.198	0.233	16	8.457	7.543	0.008	16	7.401	8.599	0.062
17	11.892	5.108	0.323	17	9.451	7.549	0.014	17	8.401	8.599	0.062
18	12.875	5.125	0.306	18	10.457	7.543	0.008	18	9.411	8.589	0.072
19	13.849	5.151	0.280	19	11.469	7.531	0.004	19	10.423	8.577	0.084
20	14.821	5.179	0.252	20	12.485	7.515	0.020	20	11.450	8.550	0.111
21	15.840	5.160	0.271	21	13.500	7.500	0.035	21	12.440	8.560	0.101
22	16.880	5.120	0.311	22	14.550	7.450	0.085	22	13.480	8.520	0.141
23	17.890	5.110	0.321	23	15.580	7.420	0.115	23	14.500	8.500	0.161
24	18.560	5.440	0.009	24	16.600	7.400	0.135	24	15.450	8.550	0.111
25	**19.580**	**5.420**	0.011	**25**	**17.570**	**7.430**	0.105	**25**	**16.350**	**8.650**	0.011

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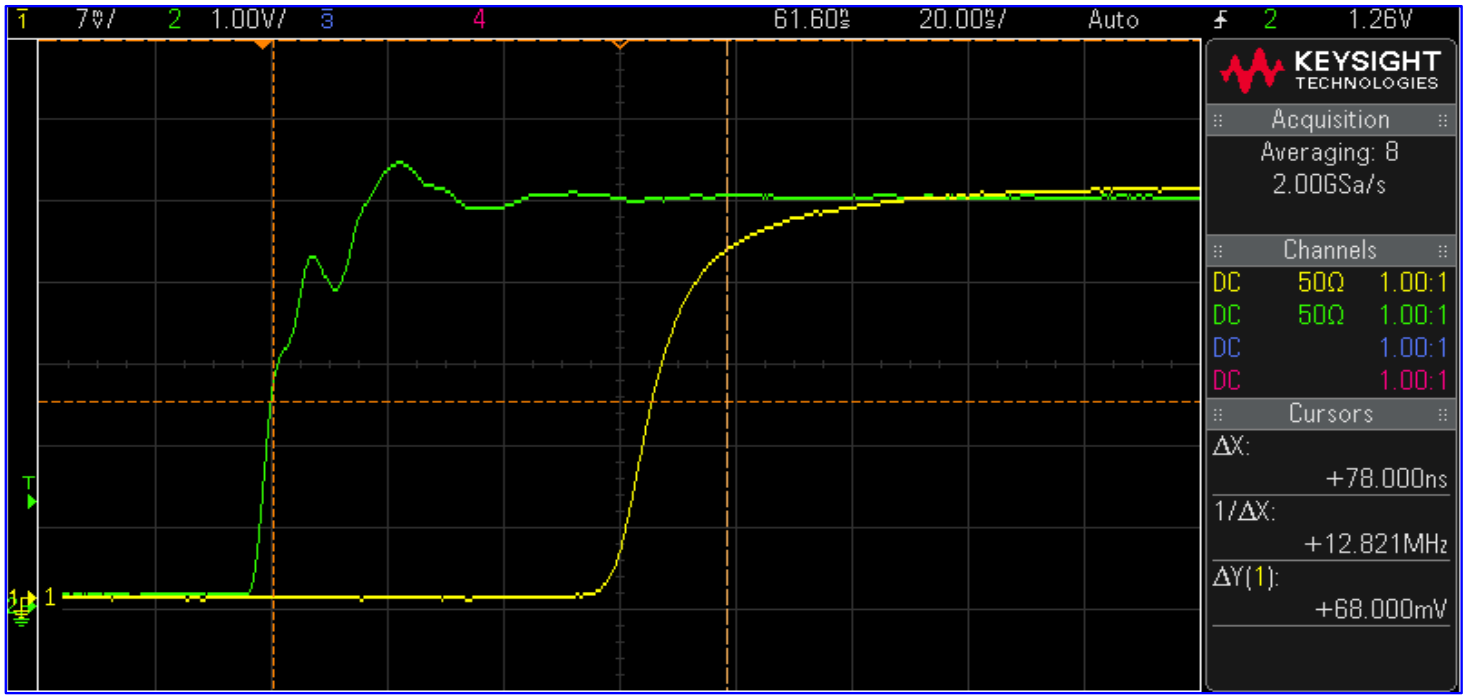
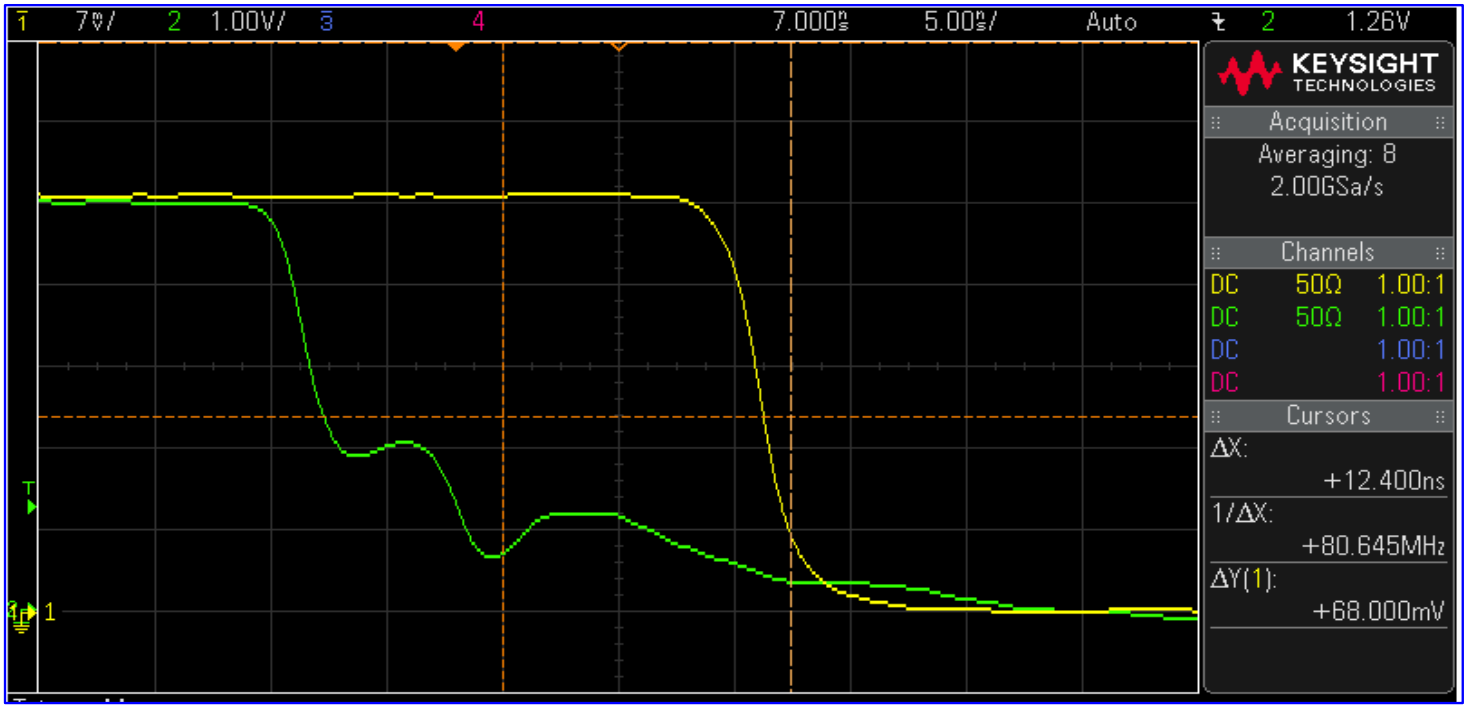
Switching Speed ON
20 ns Per Div.
Measured Value (78.0 ns)



Switching Speed OFF
5 ns Per Div.
Measured Value (12.40 ns)



Green Trace = TTL Signal
Yellow Trace = RF Signal

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Typical Characteristics
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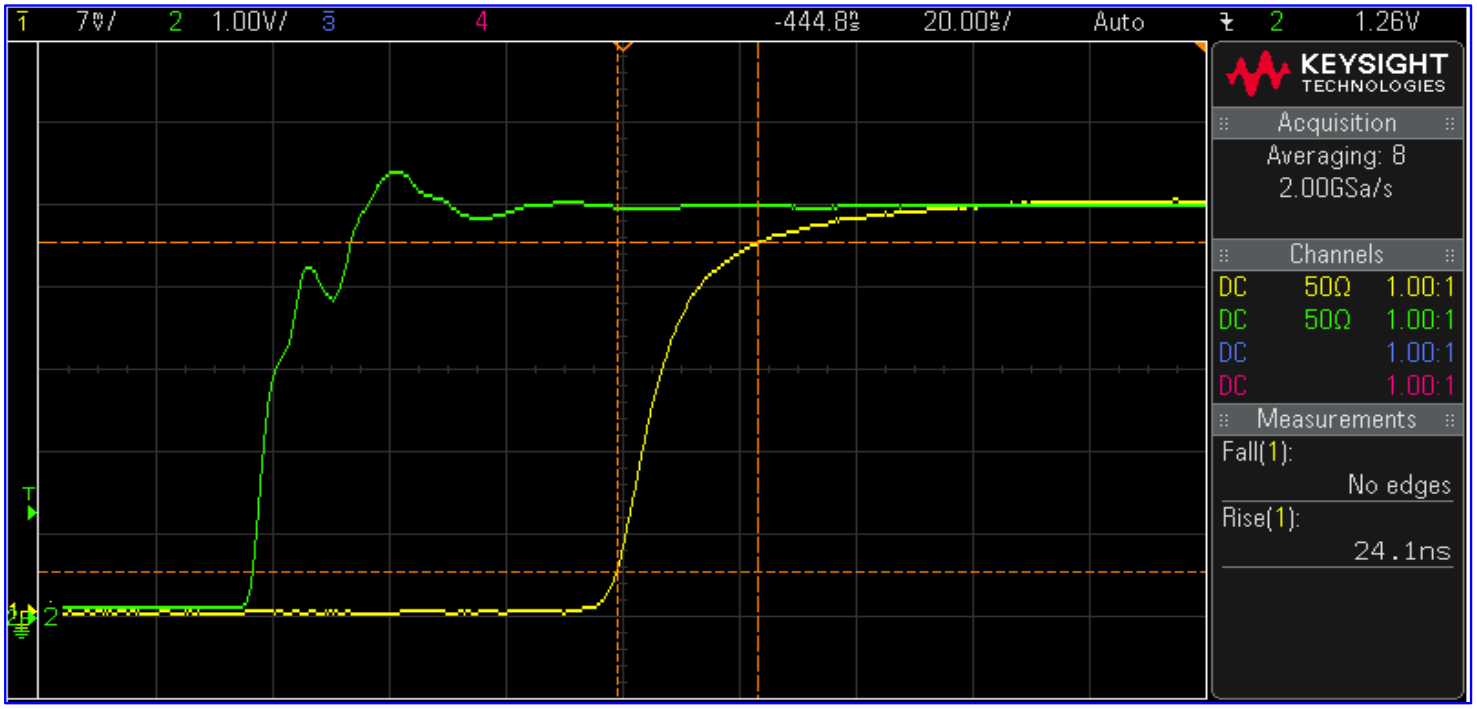
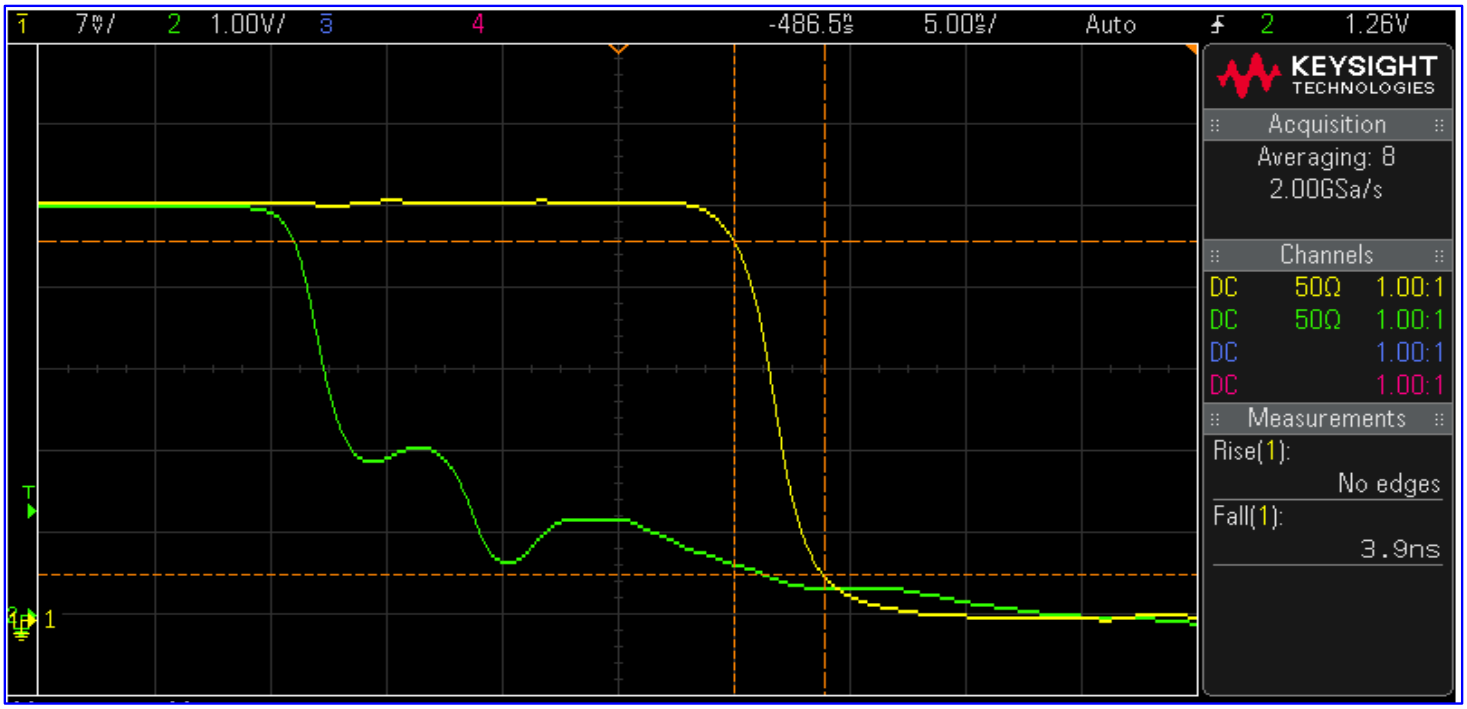
Rise Time
20 ns Per Div.
Measured Value (24.0 ns)



Fall Time
5 ns Per Div.
Measured Value (3.90 ns)



Green Trace = TTL Signal
Yellow Trace = RF Signal

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Typical Characteristics
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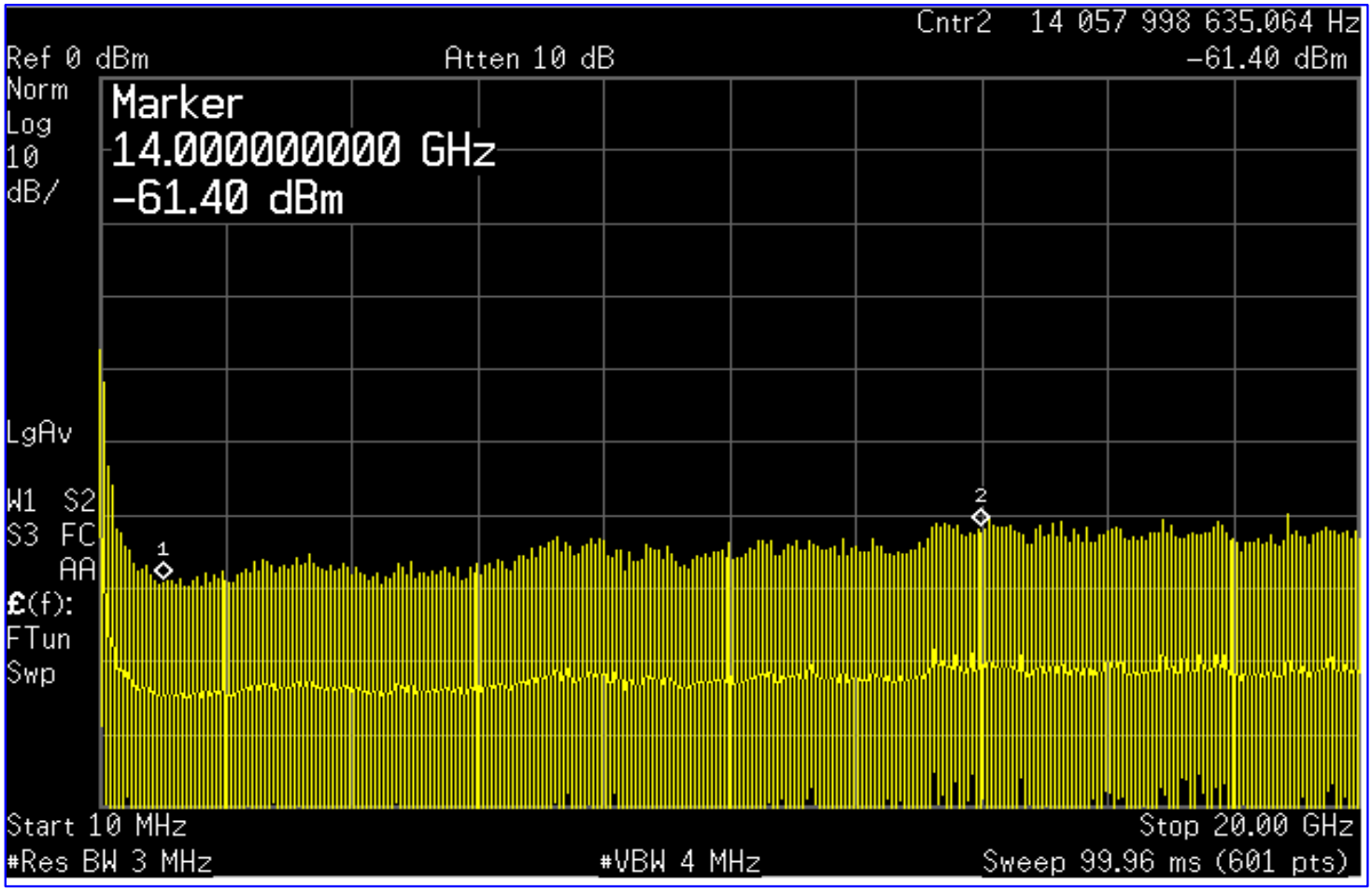
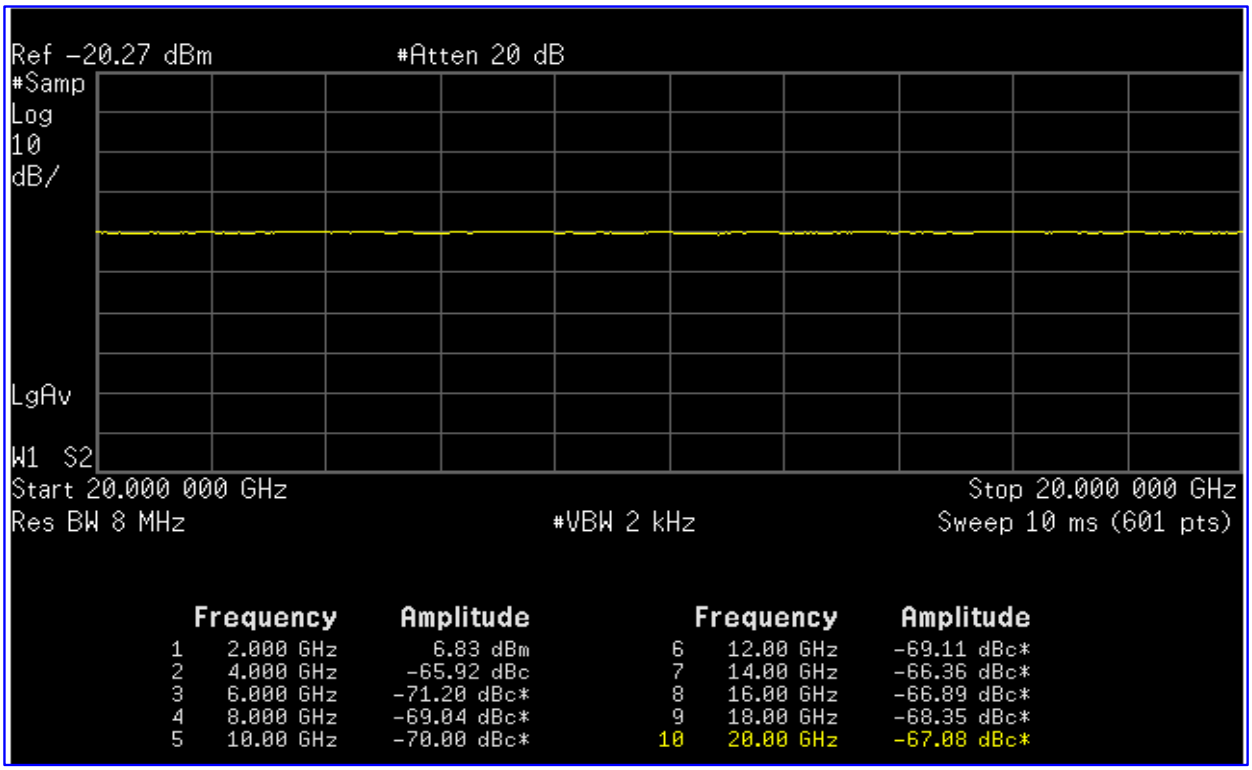
Video Leakage
(Set to RF Video BW Resolution 3MHz)



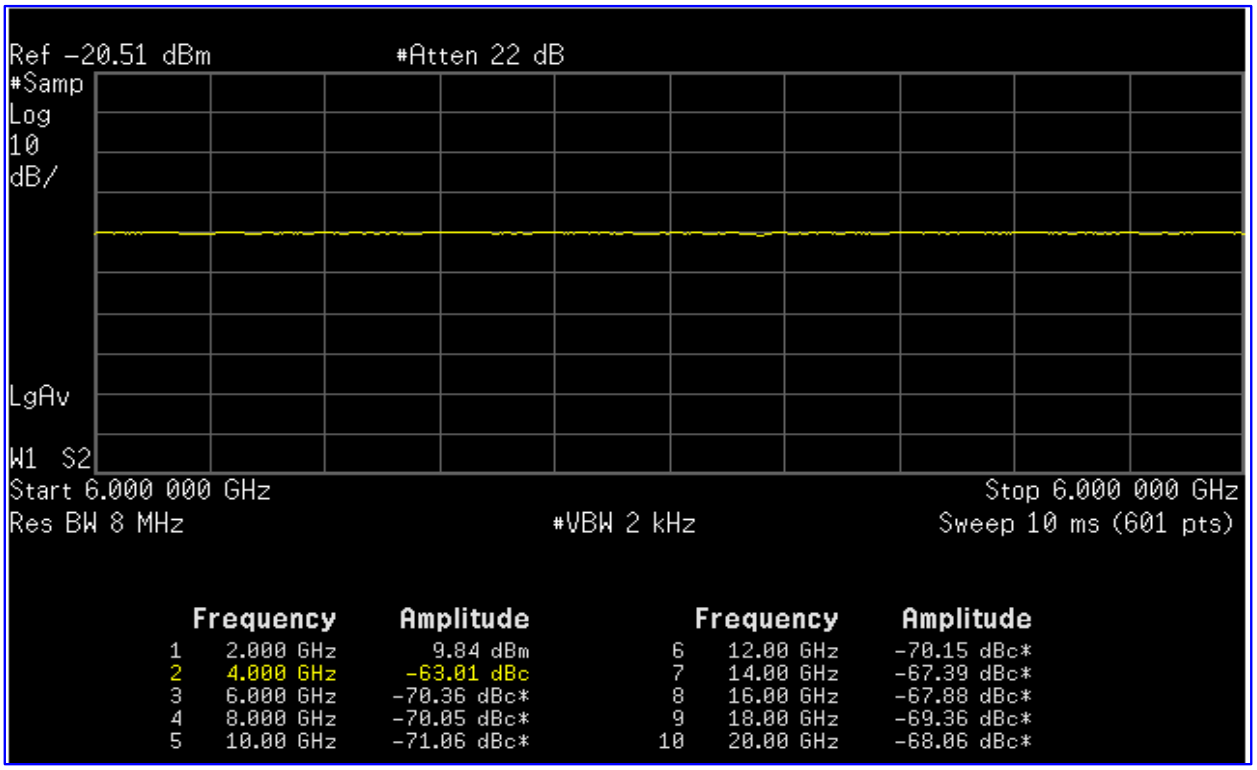
Typical Characteristics
On
SBA-218-63DB-6B-SFF

Harmonics 2 to 20 GHz (Fundamental 2GHz)
Input Power +12 dBm



	Frequency	Amplitude		Frequency	Amplitude
1	2.000 GHz	6.83 dBm	6	12.00 GHz	-69.11 dBc*
2	4.000 GHz	-65.92 dBc	7	14.00 GHz	-66.36 dBc*
3	6.000 GHz	-71.20 dBc*	8	16.00 GHz	-66.89 dBc*
4	8.000 GHz	-69.04 dBc*	9	18.00 GHz	-68.35 dBc*
5	10.00 GHz	-70.00 dBc*	10	20.00 GHz	-67.08 dBc*

Harmonics 2 to 20 GHz (Fundamental 2GHz)
Input Power +15 dBm



	Frequency	Amplitude		Frequency	Amplitude
1	2.000 GHz	9.84 dBm	6	12.00 GHz	-70.15 dBc*
2	4.000 GHz	-63.01 dBc	7	14.00 GHz	-67.39 dBc*
3	6.000 GHz	-70.36 dBc*	8	16.00 GHz	-67.88 dBc*
4	8.000 GHz	-70.05 dBc*	9	18.00 GHz	-69.36 dBc*
5	10.00 GHz	-71.06 dBc*	10	20.00 GHz	-68.06 dBc*

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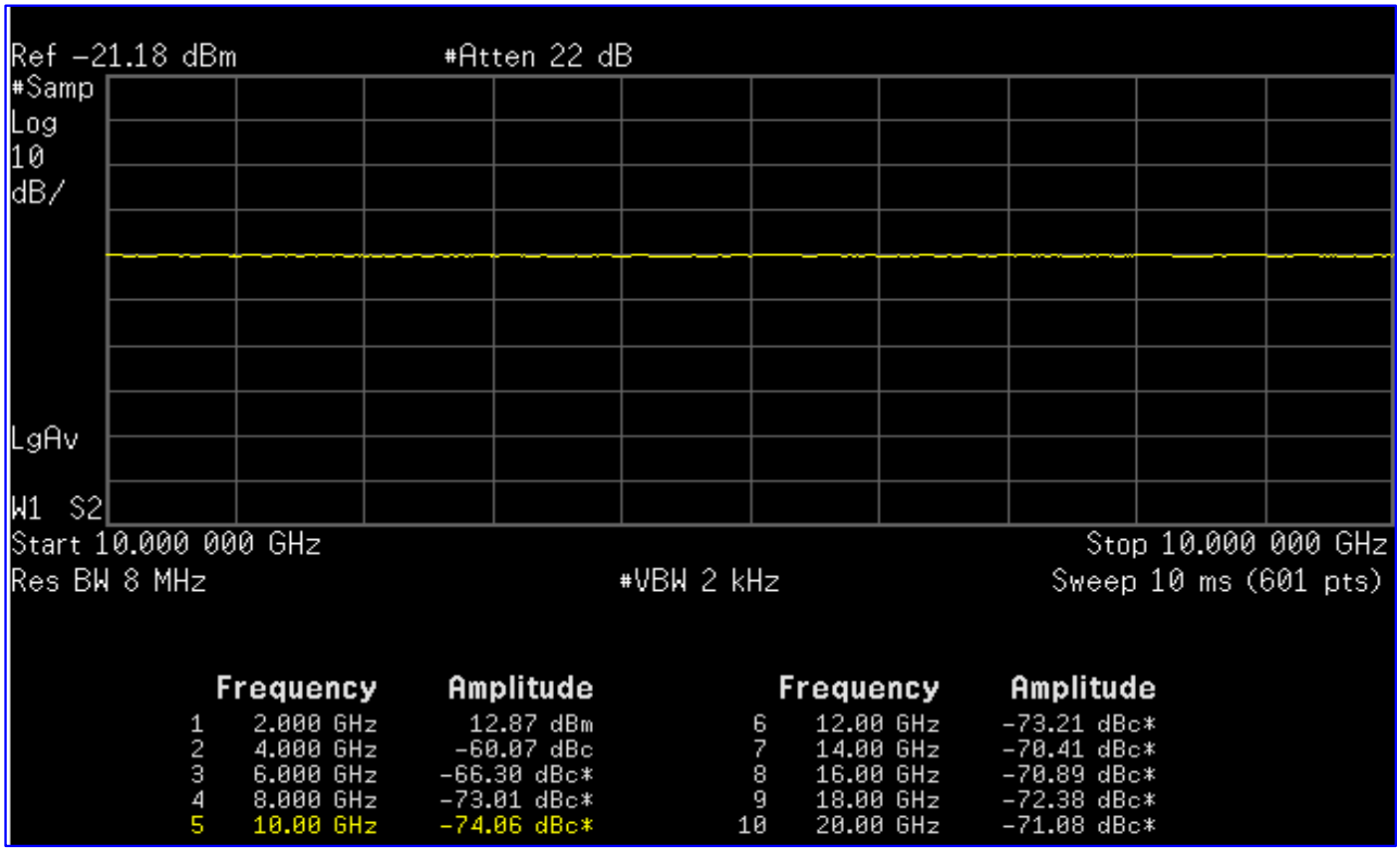
Typical Characteristics
On
SBA-218-63DB-6B-SFF

Harmonics 2 to 20 GHz (Fundamental 2GHz)
Input Power +18 dBm



	Frequency	Amplitude		Frequency	Amplitude
1	2.000 GHz	12.87 dBm	6	12.00 GHz	-73.21 dBc*
2	4.000 GHz	-60.07 dBc	7	14.00 GHz	-70.41 dBc*
3	6.000 GHz	-66.30 dBc*	8	16.00 GHz	-70.89 dBc*
4	8.000 GHz	-73.01 dBc*	9	18.00 GHz	-72.38 dBc*
5	10.00 GHz	-74.06 dBc*	10	20.00 GHz	-71.08 dBc*

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Typical Characteristics
On
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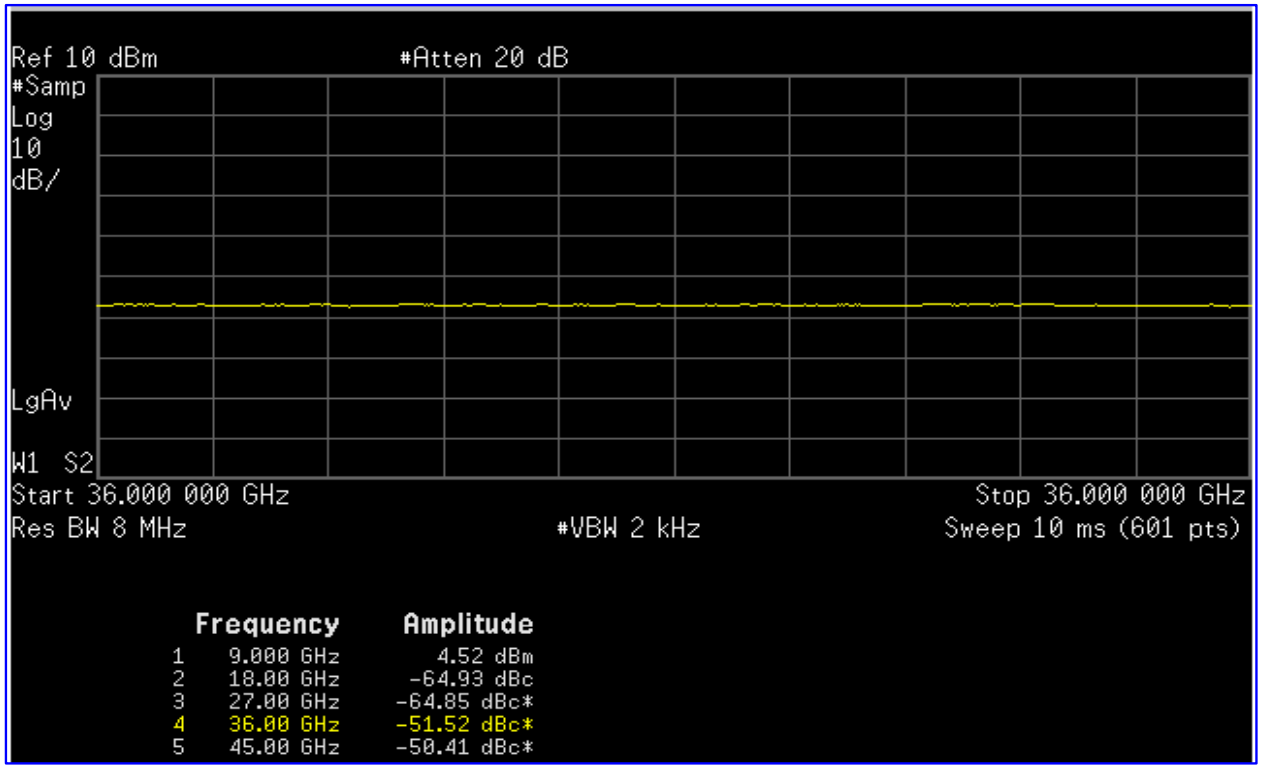
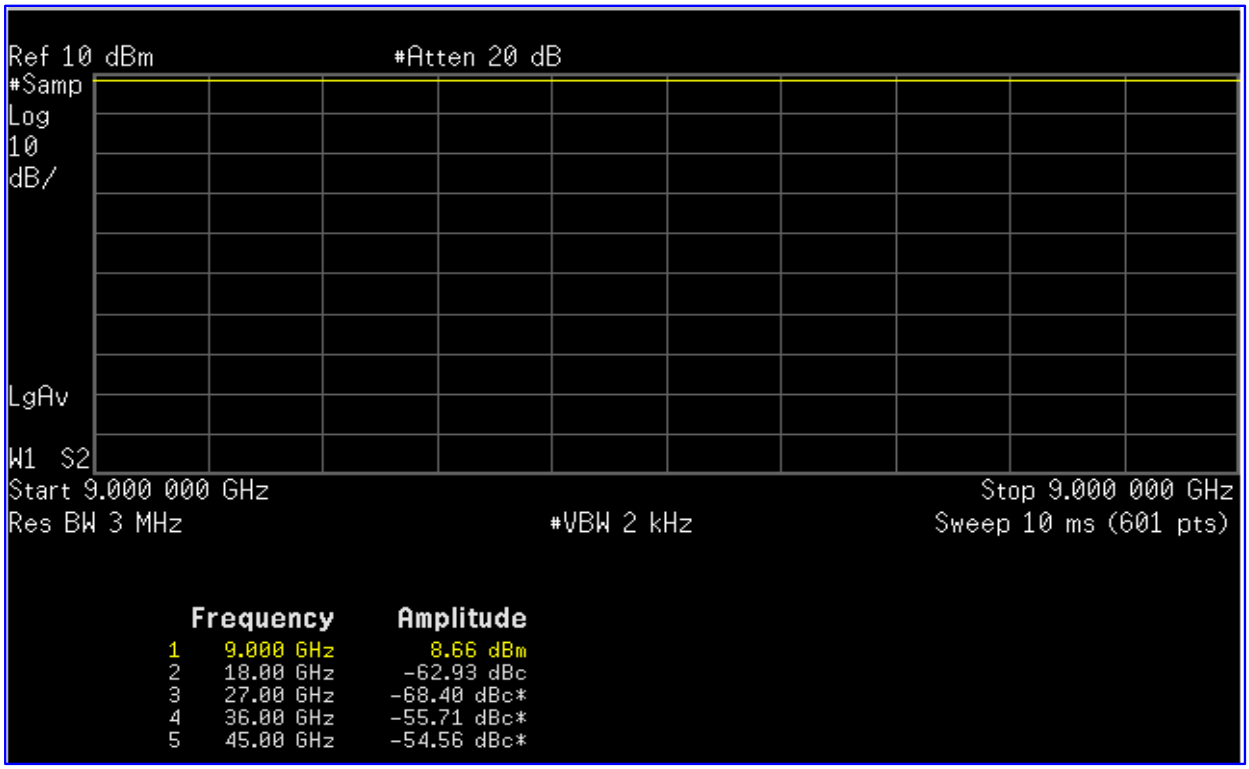
Harmonics 9 to 40 GHz (Fundamental 9GHz)
Input Power +12 dBm



Harmonics 9 to 40 GHz (Fundamental 9GHz)
Input Power +15 dBm



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Typical Characteristics
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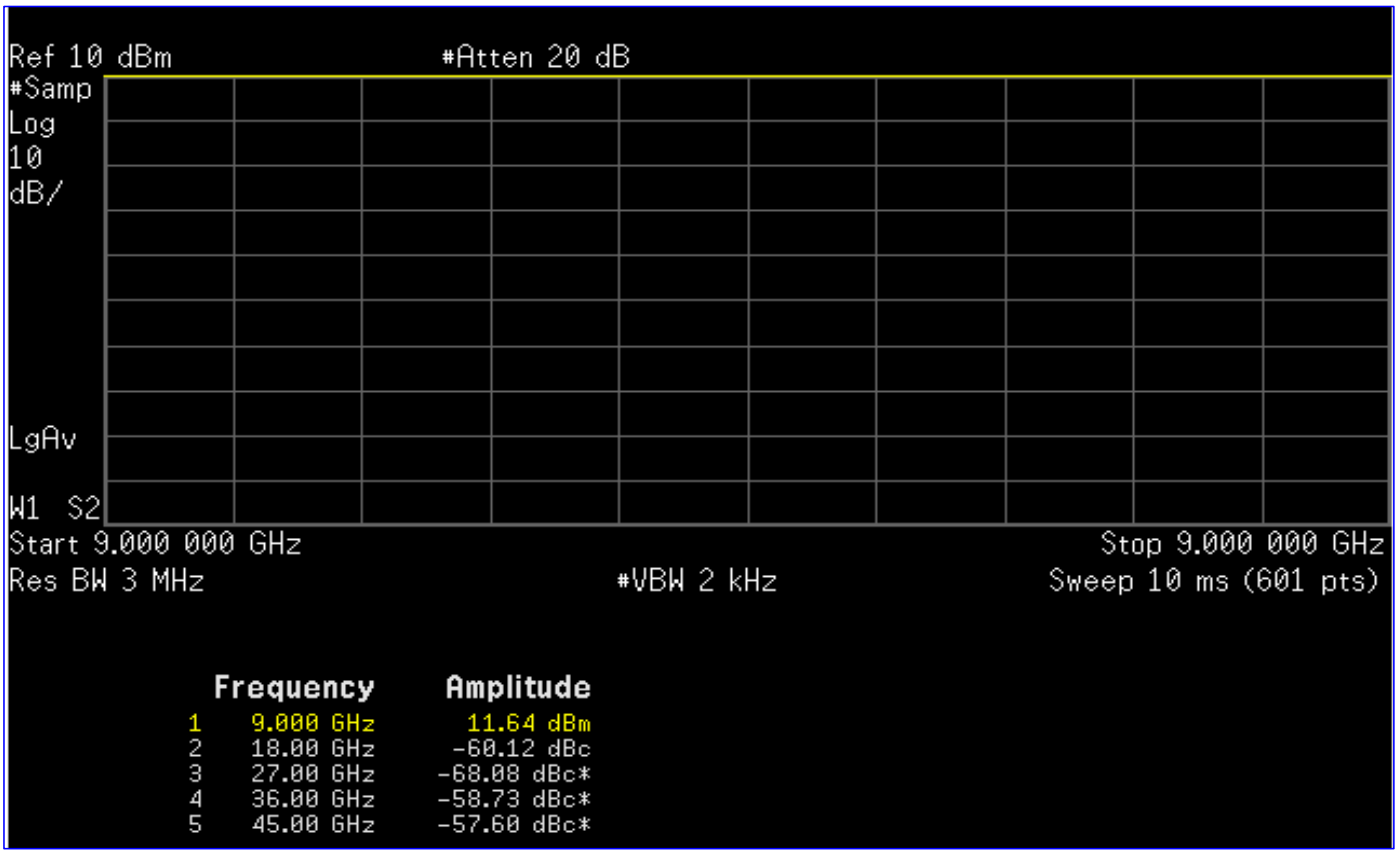
Harmonics 9 to 40 GHz (Fundamental 9GHz)
Input Power +18 dBm



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