

### 5.1.1 Antenna Port Conducted Emissions – RF Output Power

<b>Operator</b>	Anthony Smith	<b>QA</b>	Adam Alger
<b>Temperature</b>	20.7°C	<b>R.H. %</b>	29.4%
<b>Test Date</b>	3/9/2023	<b>Location</b>	Conducted RF Bench
<b>Requirement</b>	FCC 15.247 RSS-247	<b>Method</b>	ANSI C63.10

Limits: <30dBm

#### Test Parameters

<b>Frequency</b>	2400-2483.5 MHz	<b>Setup</b>	Conducted
<b>RBW</b>	3 MHz	<b>VBW</b>	50 MHz
<b>Detector(s)</b>	Peak	<b>Settings</b>	Trace Max Hold

#### Instrumentation

Asset #	Description	Manufacturer	Model #	Serial #	Date	Due Date	Status
AA 960173	Cable	A.H. Systems, Inc.	SAC-26G-1	388	6/13/2023	6/12/2024	Active Verification
EE 960087	Analyzer - Spectrum	Agilent	N9010A	MY53400296	4/11/2023	4/11/2024	Active Calibration

#### EUT Parameters

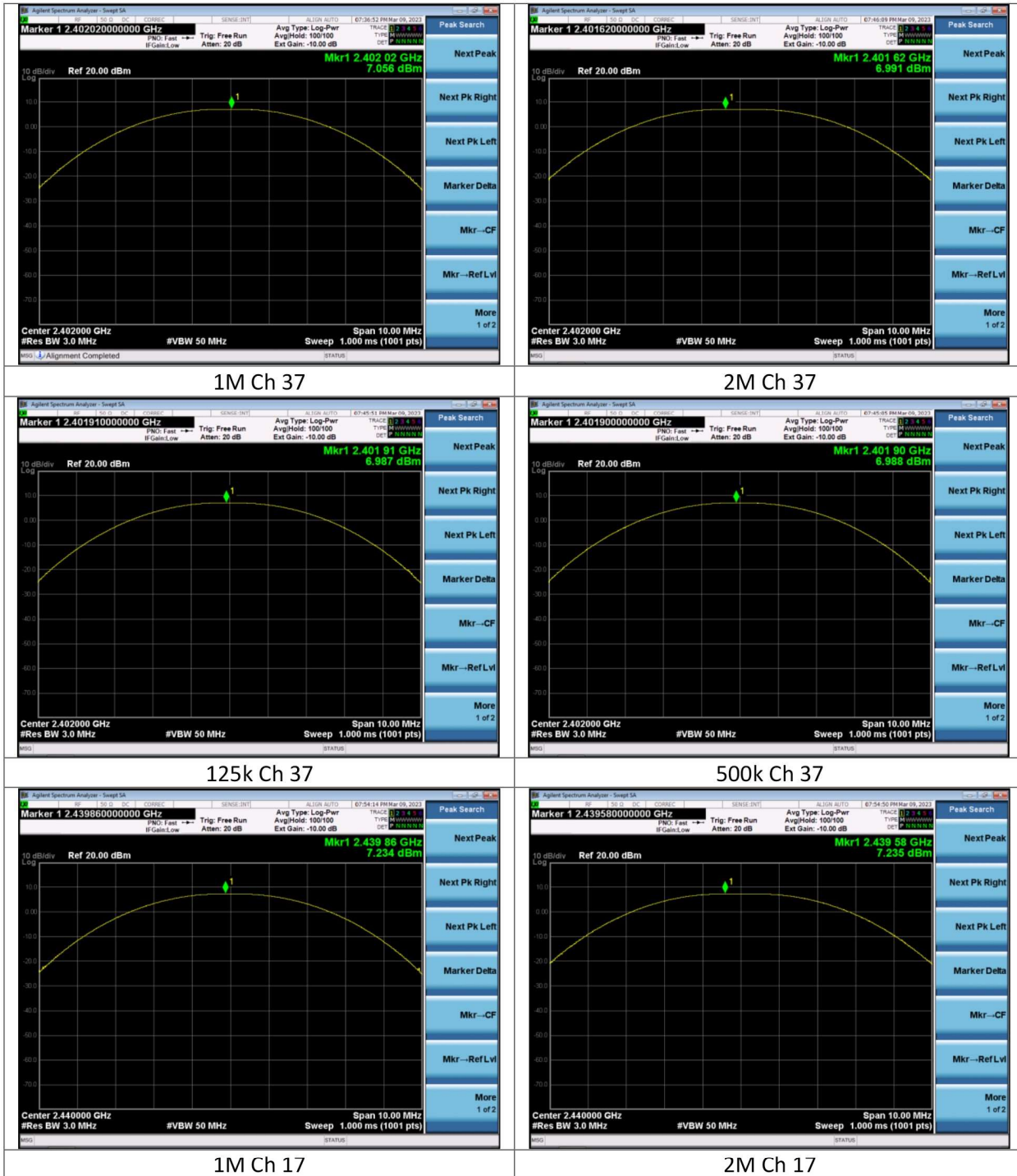
<b>Input Power</b>	12VDC	<b>Mode</b>	BLE – 125k, 500k, 1M, 2M
<b>Frequency (MHz)</b>	2402, 2440, 2480	<b>Channel</b>	37, 17, 39
<b>Transmit Power Setting</b>	7		

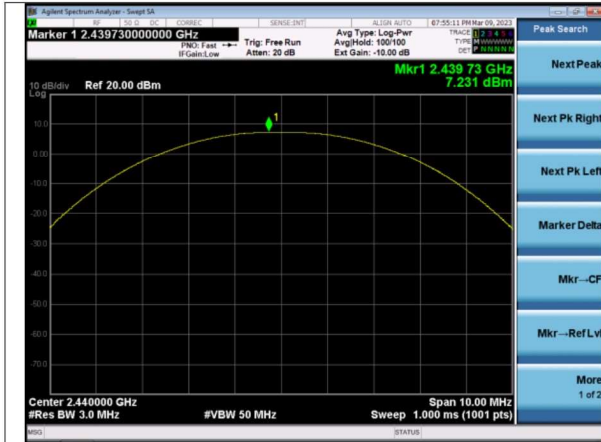
Data

Table

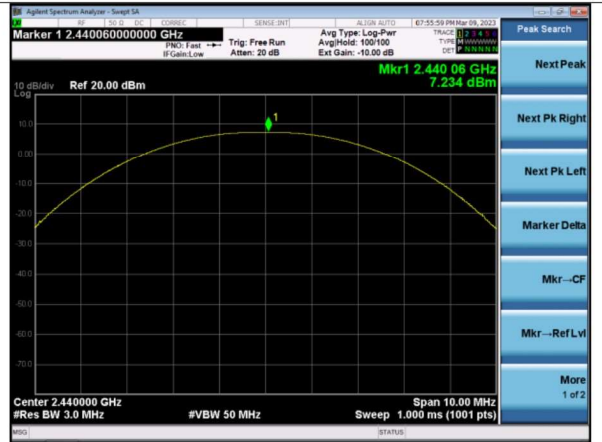
Channel	Mode	Peak Conducted Power (dBm)	Limit (dBm)	Margin (dB)
37	1M	7.1	30.0	22.9
17	1M	7.2	30.0	22.8
39	1M	7.4	30.0	22.6
37	2M	7.0	30.0	23.0
17	2M	7.2	30.0	22.8
39	2M	7.4	30.0	22.6
37	125k	7.0	30.0	23.0
17	125k	7.2	30.0	22.8
39	125k	7.4	30.0	22.6
37	500k	7.0	30.0	23.0
17	500k	7.2	30.0	22.8
39	500k	7.4	30.0	22.6

Plots

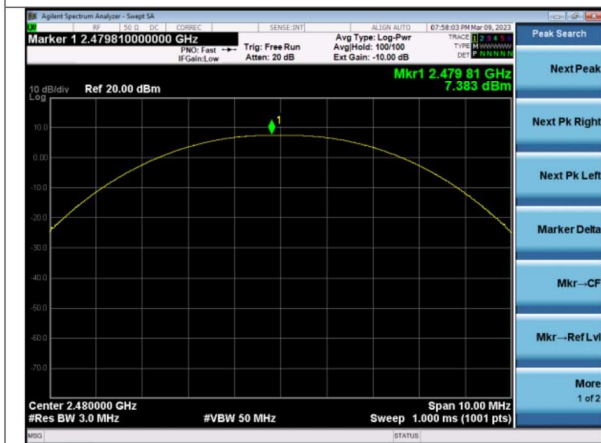




125k Ch 17



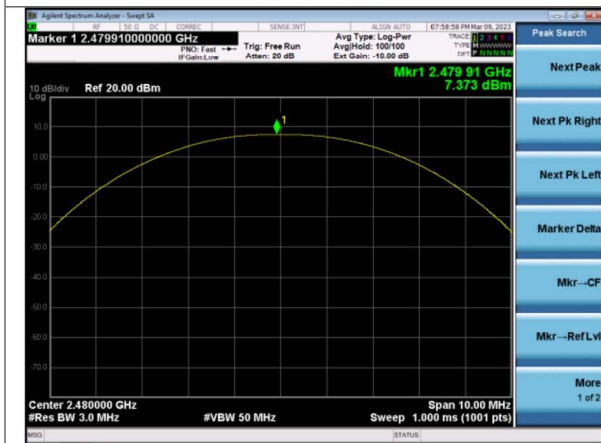
500k Ch 17



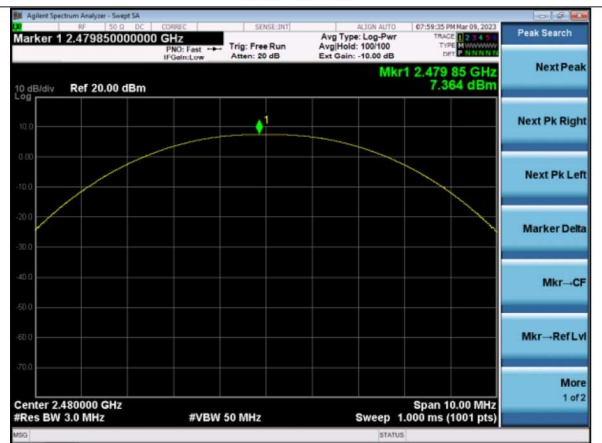
1M Ch 39



500k Ch 39



125k Ch 39



500k Ch 39

Company: Laird Connectivity

Report: TR3664A BL654

Quote: NBO-12-2022-005678

Name: BL654

Model: BL654

Serial: Engineering Sample

### 5.1.2 Antenna Port Conducted Emissions – Emissions in Restricted Frequency Bands

<b>Operator</b>	Anthony Smith	<b>QA</b>	Adam Alger
<b>Temperature</b>	22.2°C	<b>R.H. %</b>	21.2%
<b>Test Date</b>	3/20/2023	<b>Location</b>	Bench
<b>Requirement</b>	FCC 15.247 RSS-247	<b>Method</b>	ANSI C63.10 § 11.12.2 Cabinet Radiation method

#### Limits:

Frequency (MHz)	Quasi Peak Limit (dBµV/m)	Average Limit (dBµV/m)	Peak Limit (dBµV/m)
30-88	40.0	-	-
88-216	43.5	-	-
216-960	46.0	-	-
960-1000	54.0	-	-
1000-25000	-	54.0	74.0

#### Test Parameters

<b>Frequency</b>	1-25 GHz	<b>Setup</b>	Conducted
<b>RBW</b>	1 MHz	<b>VBW</b>	3 MHz
<b>Detector(s)</b>	Peak, Average	<b>Settings</b>	Peak – Max Hold Average – Trace Average

#### Instrumentation

Asset #	Description	Manufacturer	Model #	Serial #	Date	Due Date	Status
AA 960172	Cable	A.H. Systems, Inc.	SAC-26G-1	387	6/13/2023	6/12/2024	Active Verification
EE 960087	Analyzer - Spectrum	Agilent	N9010A	MY53400296	4/11/2023	4/11/2024	Active Calibration

#### EUT Parameters

<b>Input Power</b>	12VDC	<b>Mode</b>	BLE – Packet Length 255
<b>Frequency (MHz)</b>	2402, 2440, 2480	<b>Channel</b>	37, 17, 39
<b>Data Rate</b>	1M, 2M (Worst Case Rates)		

**Data**

**Table**

Mode	On Time (ms)	Period (ms)	Duty Cycle (%)	Avg VBW (Hz)	DC Correction (dB)
1M	2.137	2.5	85.5	468	0.7
2M	1.078	1.875	57.5	928	2.4

**Band Edge**

**Peak**

Mode/Channel	Freq (MHz)	Meas. (dBm)	Ant. Gain (dBi)	Corrected Meas. (dBm)	Limit (dBm)	Margin (dB)
1M/Low	2378.04	-52.1	3.1	-49.0	-21.2	27.8
2M/Low	2388.9	-49.8	3.1	-46.7	-21.2	25.5
1M/High	2483.5	-37.9	3.1	-34.8	-21.2	13.6
2M/High	2483.5	-36.4	3.1	-33.3	-21.2	12.1

Mode/Channel	Freq (MHz)	Meas. (dBm)	Ant. Gain (dBi)	Duty Cycle Correction	Corrected Meas. (dBm)	Limit (dBm)	Margin (dB)
1M/Low	2346.1	-59.5	3.1	0.7	-55.7	-41.2	14.5
1M/Mid	2383.9	-58.7	3.1	0.7	-54.9	-41.2	13.7
1M/High	2352.1	-58.9	3.1	0.7	-55.1	-41.2	13.9
2M/Low	2389.9	-61.6	3.1	2.4	-56.1	-41.2	14.9
2M/Mid	2384.2	-60.2	3.1	2.4	-54.7	-41.2	13.5
2M/High	2351.8	-61.4	3.1	2.4	-55.9	-41.2	14.7
1M/Low	2497.9	-58.9	3.1	0.7	-55.1	-41.2	13.9
1M/Mid	2496.2	-58.3	3.1	0.7	-54.5	-41.2	13.3
1M/High	2483.5	-50.9	3.1	0.7	-47.1	-41.2	5.9
2M/Low	2497.8	-61.2	3.1	2.4	-55.7	-41.2	14.5
2M/Mid	2495.9	-60.1	3.1	2.4	-54.6	-41.2	13.4
2M/High	2483.5	-48.2	3.1	2.4	-42.7	-41.2	1.5

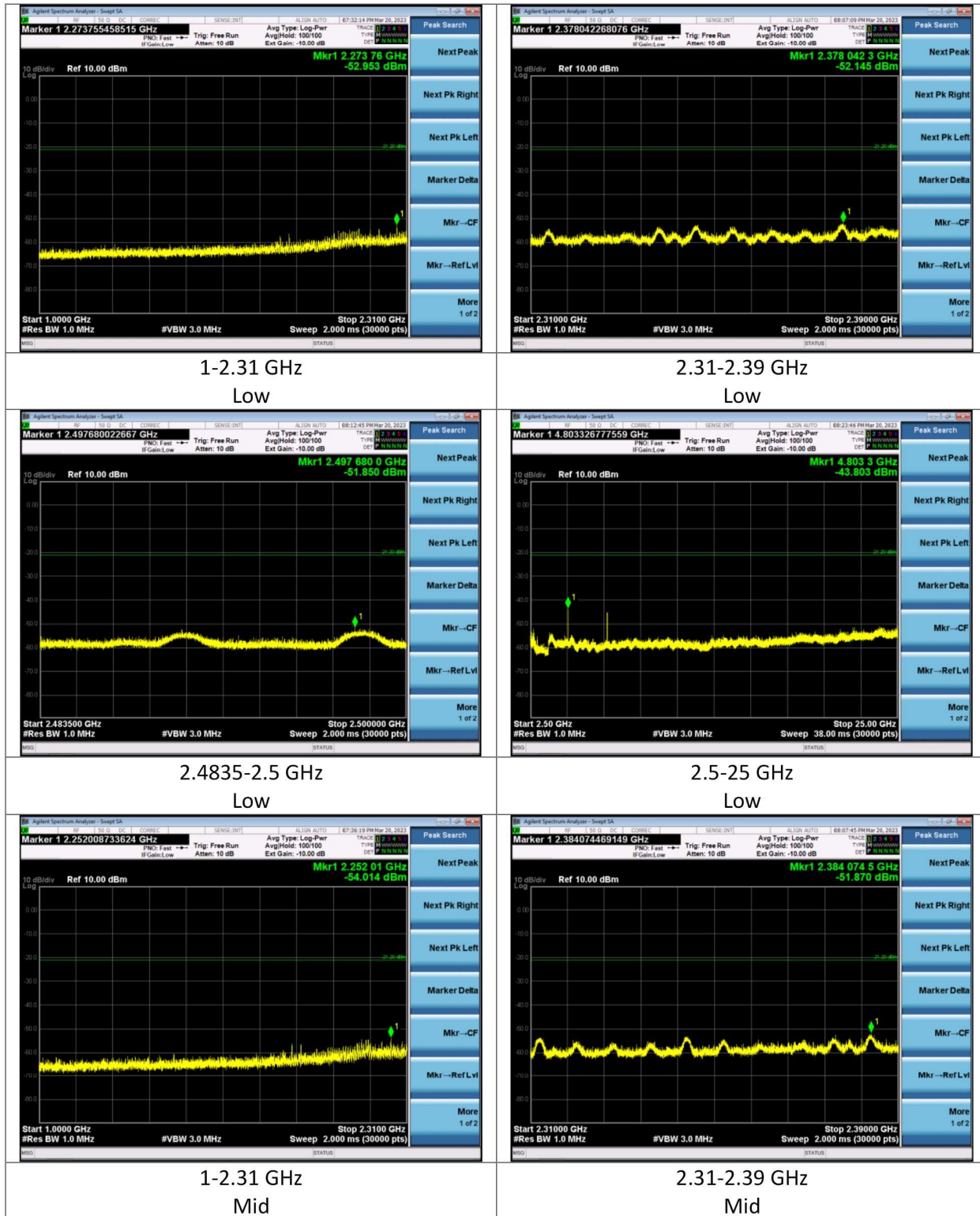
**Spurious  
Peak**

Mode/Channel	Freq (MHz)	Meas. (dBm)	Ant. Gain (dBi)	Corrected Meas. (dBm)	Limit (dBm)	Margin (dB)
1M/Low	4803.3	-43.8	3.1	-40.7	-21.2	19.5
1M/Mid	7320.4	-45.9	3.1	-42.8	-21.2	21.6
1M/High	7441.2	-46.6	3.1	-43.5	-21.2	22.3
2M/Low	4804.8	-43.8	3.1	-40.7	-21.2	19.5
2M/Mid	7318.9	-46.0	3.1	-42.9	-21.2	21.7
2M/High	7441.9	-46.9	3.1	-43.8	-21.2	22.6

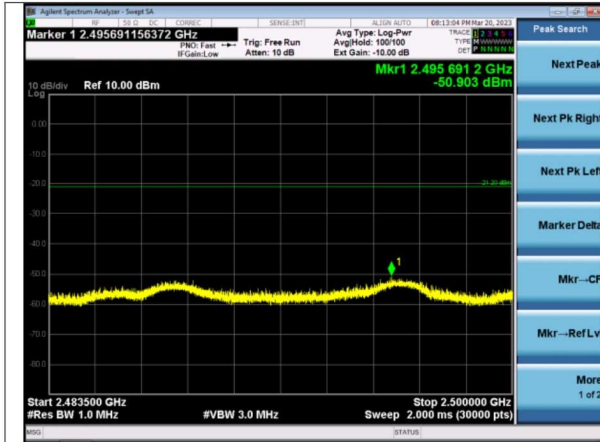
Mode/Channel	Freq (MHz)	Meas. (dBm)	Ant. Gain (dBi)	Duty Cycle Correction	Corrected Meas. (dBm)	Limit (dBm)	Margin (dB)
1M/Low	4804.3	-47.5	3.1	0.7	-43.7	-41.2	2.5
1M/Mid	7319.4	-50.9	3.1	0.7	-47.1	-41.2	5.9
1M/High	7440.9	-51.6	3.1	0.7	-47.8	-41.2	6.6
2M/Low	4803.9	-51.1	3.1	2.4	-45.6	-41.2	4.4
2M/Mid	7319.0	-53.9	3.1	2.4	-48.4	-41.2	7.2
2M/High	7441.7	-54.1	3.1	2.4	-48.6	-41.2	7.4

Plots

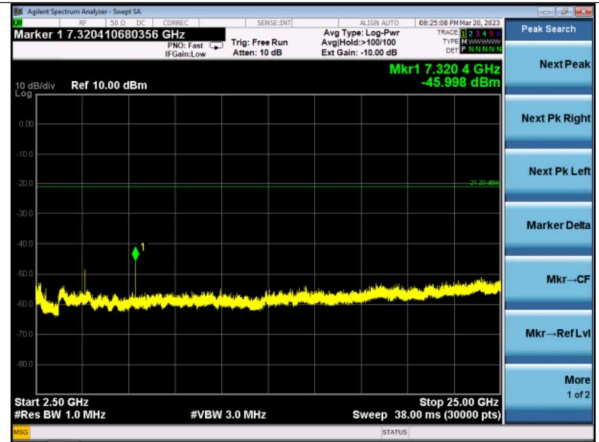
1M Peak – Worst Case 1-25 GHz, no change in 30-1000 MHz



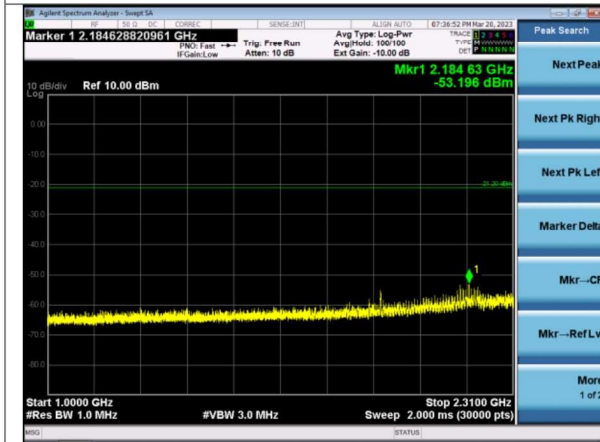




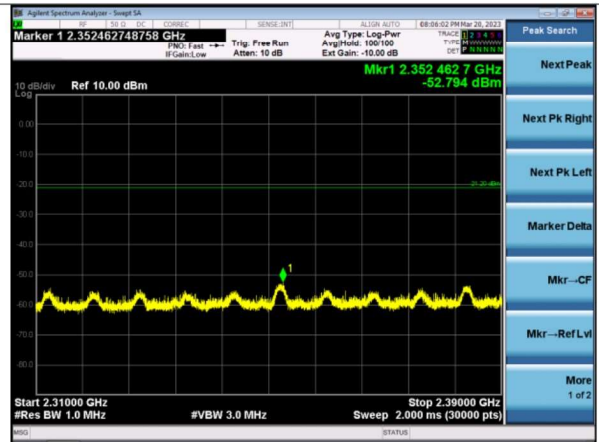
2.4835-2.5 GHz  
Mid



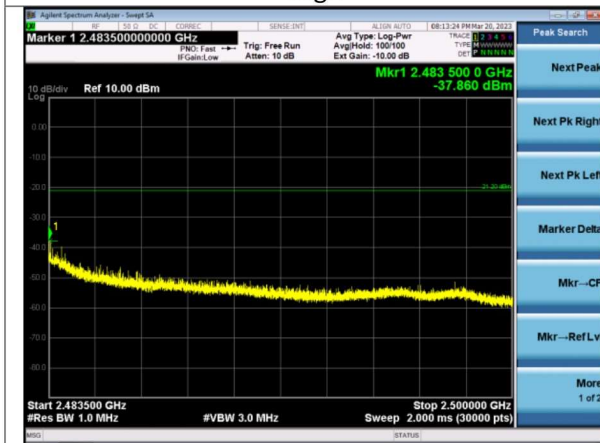
2.5-25 GHz  
Mid



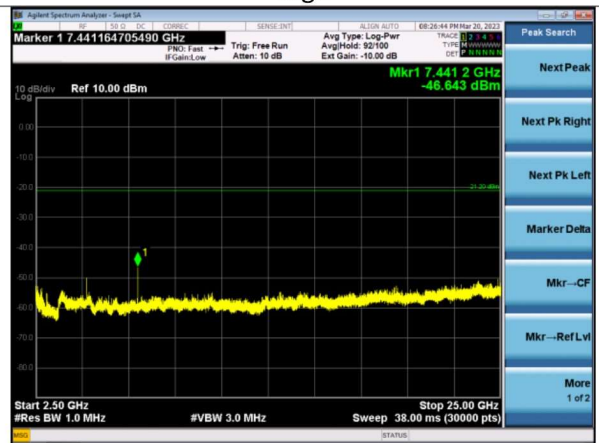
1-2.31 GHz  
High



2.31-2.39 GHz  
High

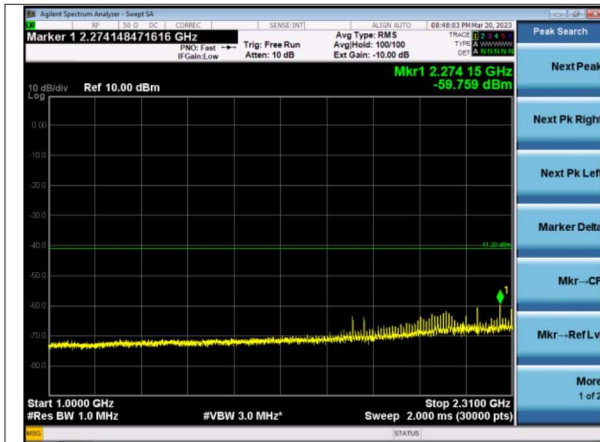


2.4835-2.5 GHz  
High

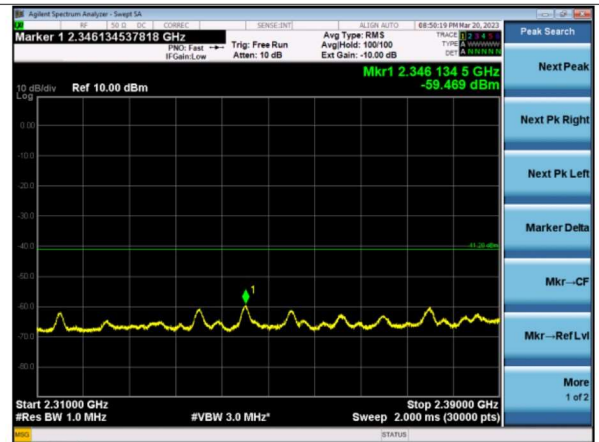


2.5-25 GHz  
High

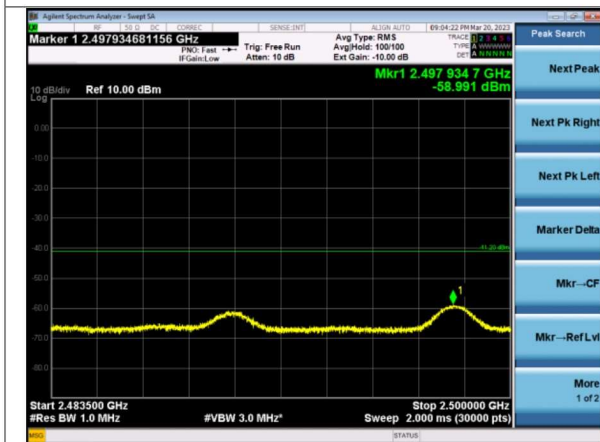
1M Average - Worst Case 1-25 GHz, no change in 30-100 MHz



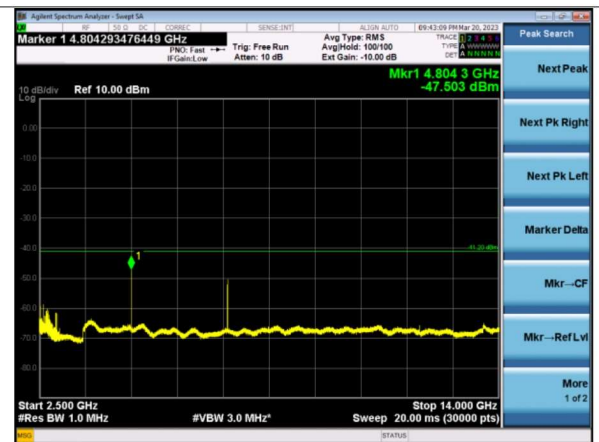
1-2.31 GHz  
Low



2.31-2.39 GHz  
Low



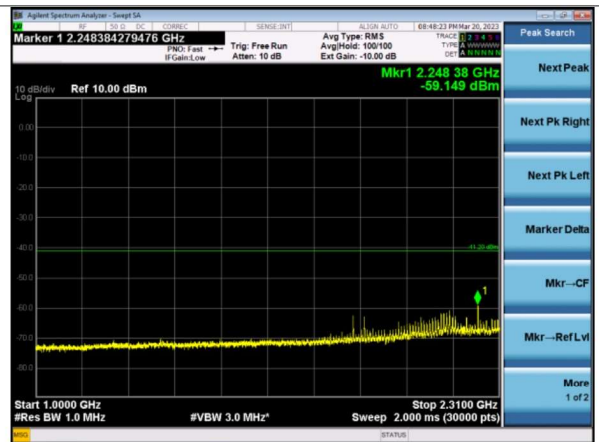
2.4835-2.5 GHz  
Low



2.5-14 GHz  
Low



14-25 GHz  
Low



1-2.31 GHz  
Mid