

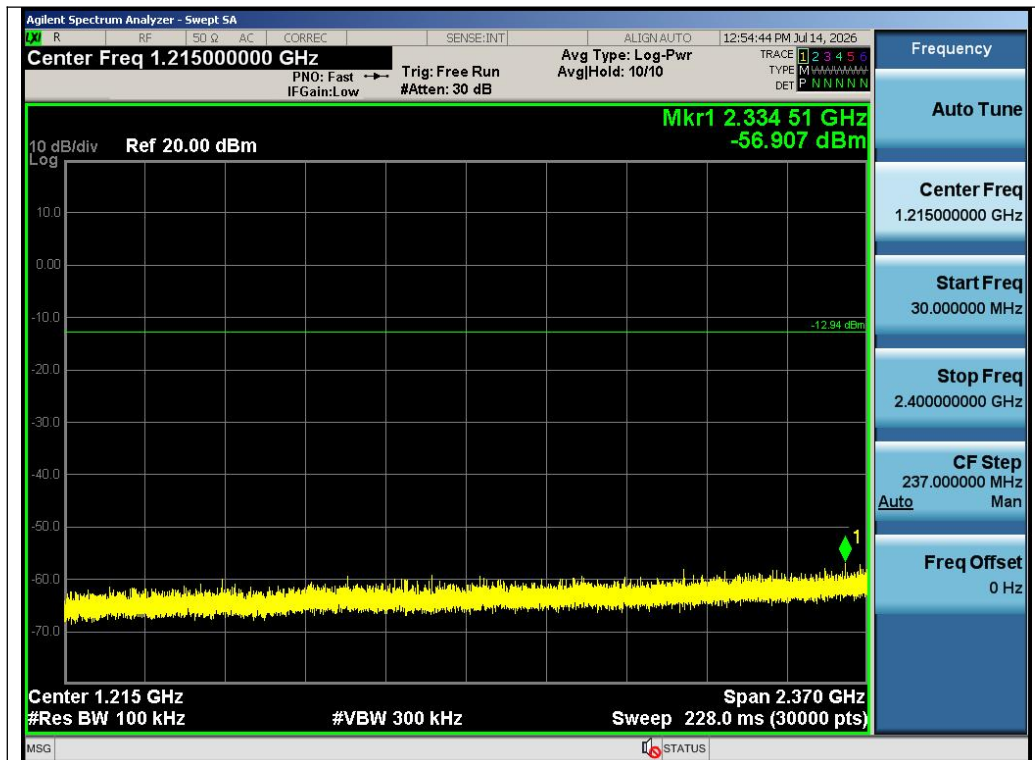


Test_Graph_EDR_ANT1_2402_3Mbps_Higher Band Emissions

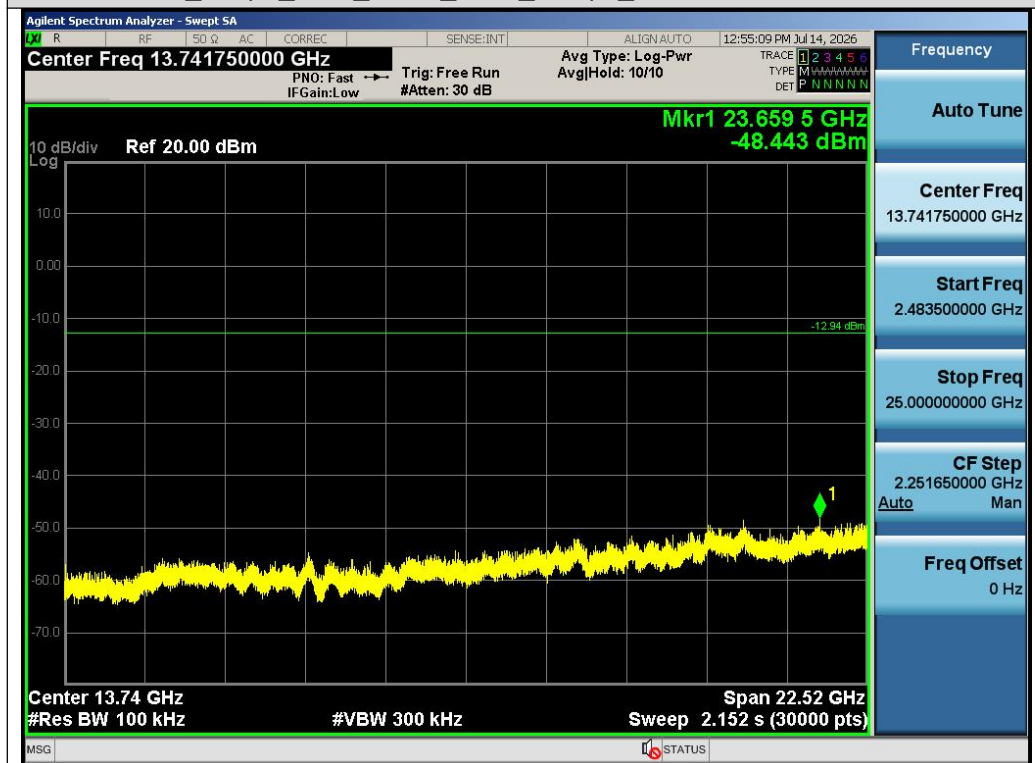


Test_Graph_EDR_ANT1_2441_3Mbps_Reference Level

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Test_Graph_EDR_ANT1_2441_3Mbps_Lower Band Emissions



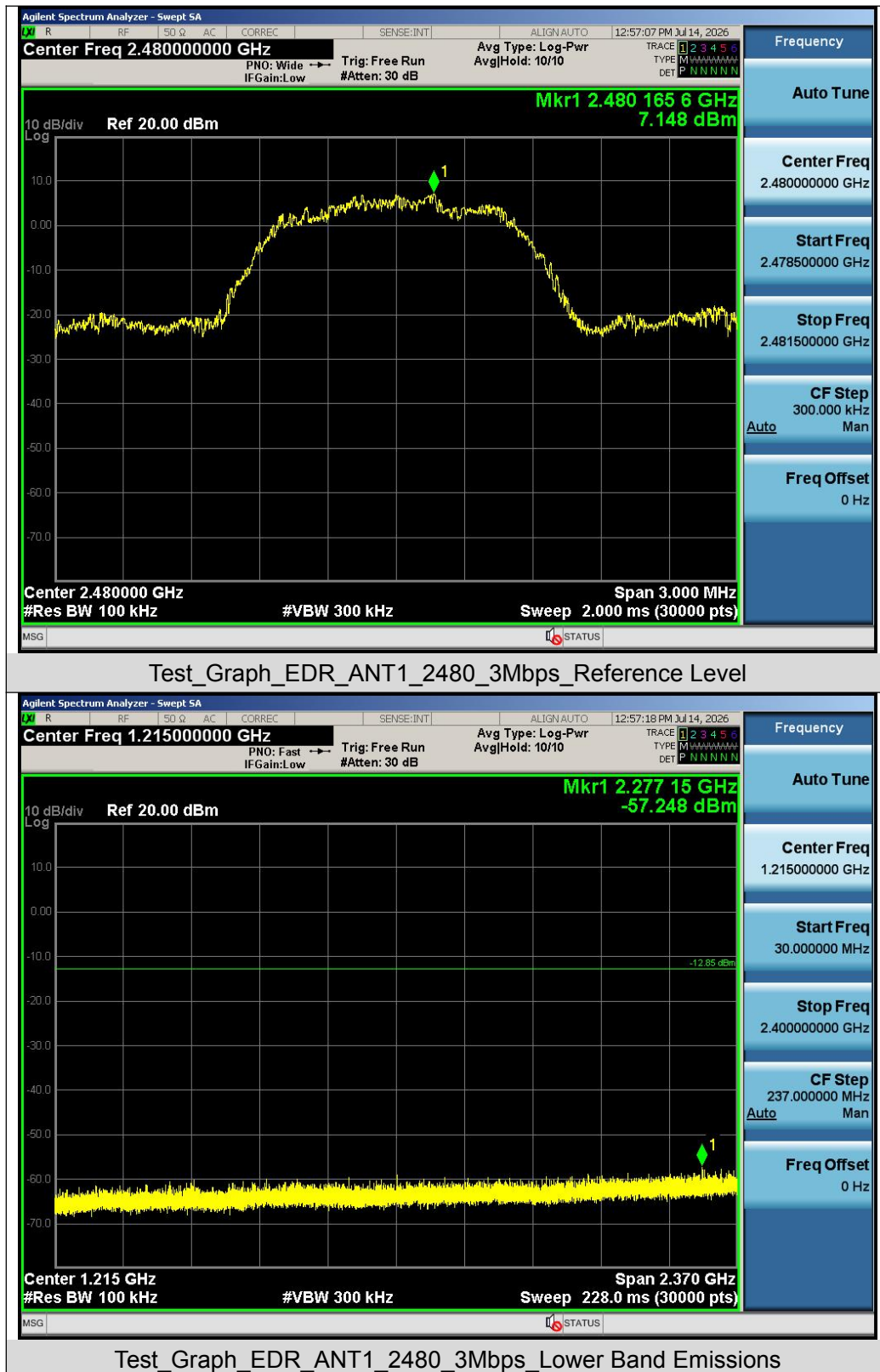
Test_Graph_EDR_ANT1_2441_3Mbps_Higher Band Emissions

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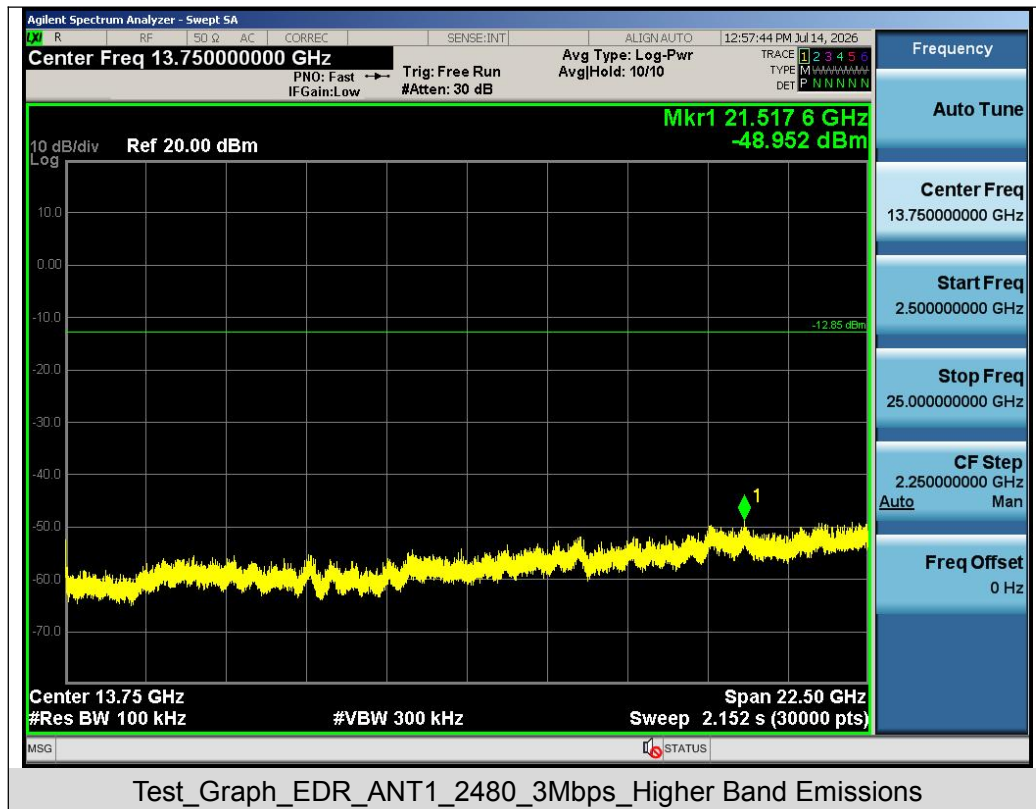


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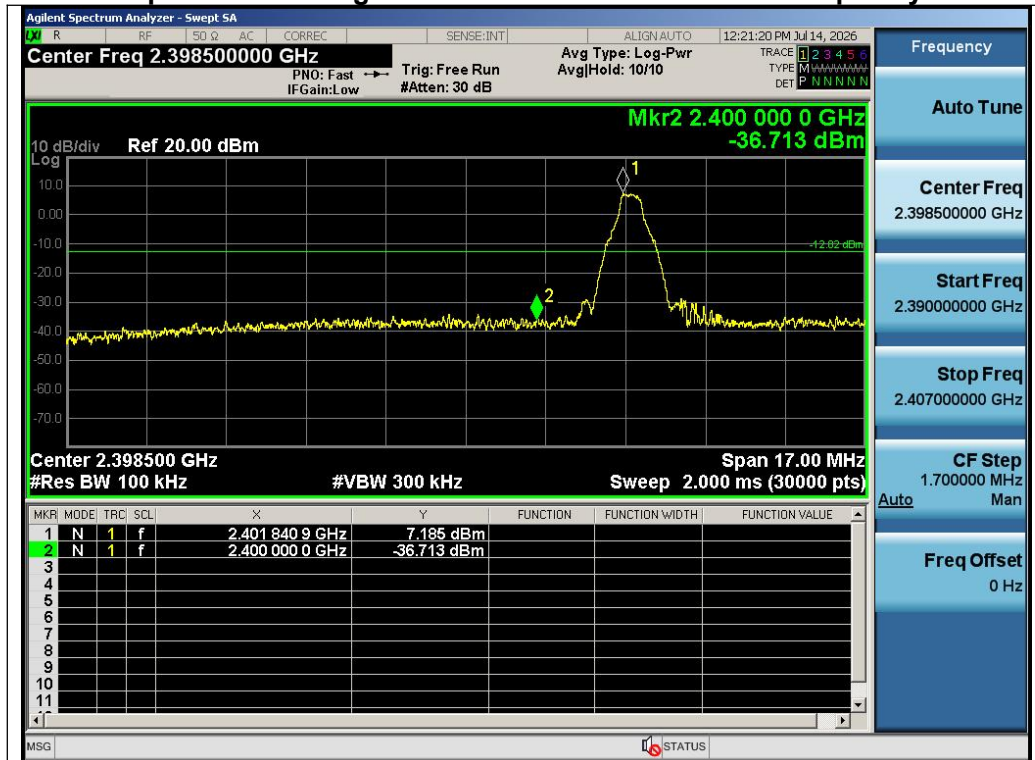
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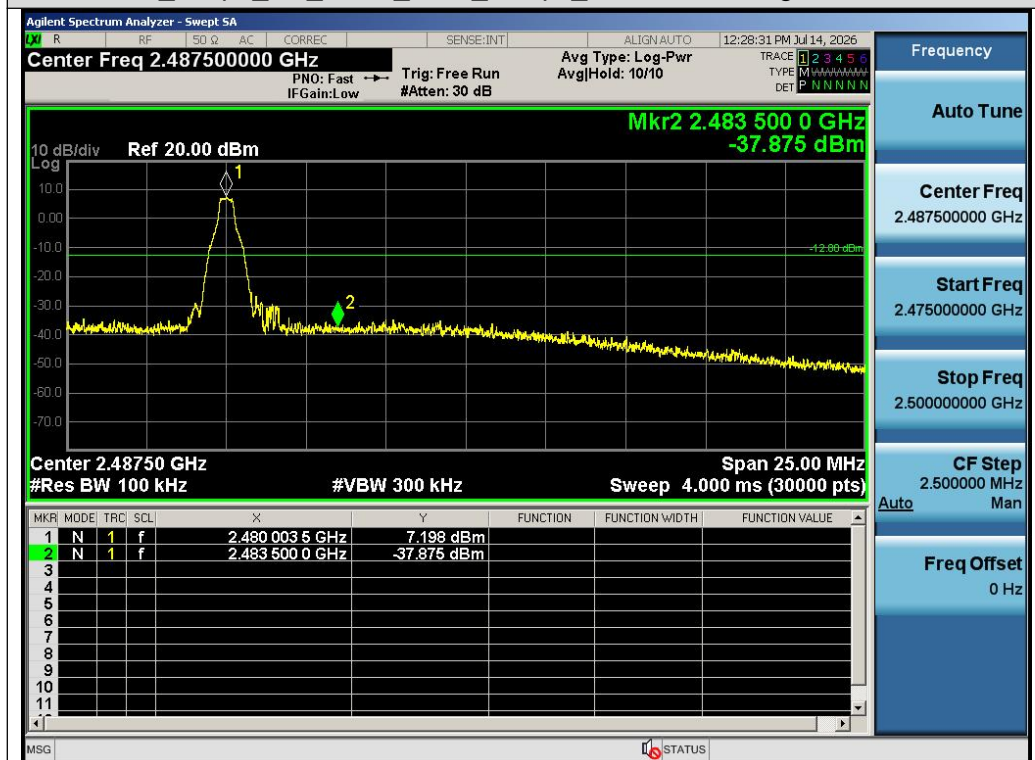
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Test Graphs of Band Edge Emissions in Non-Restricted Frequency Bands

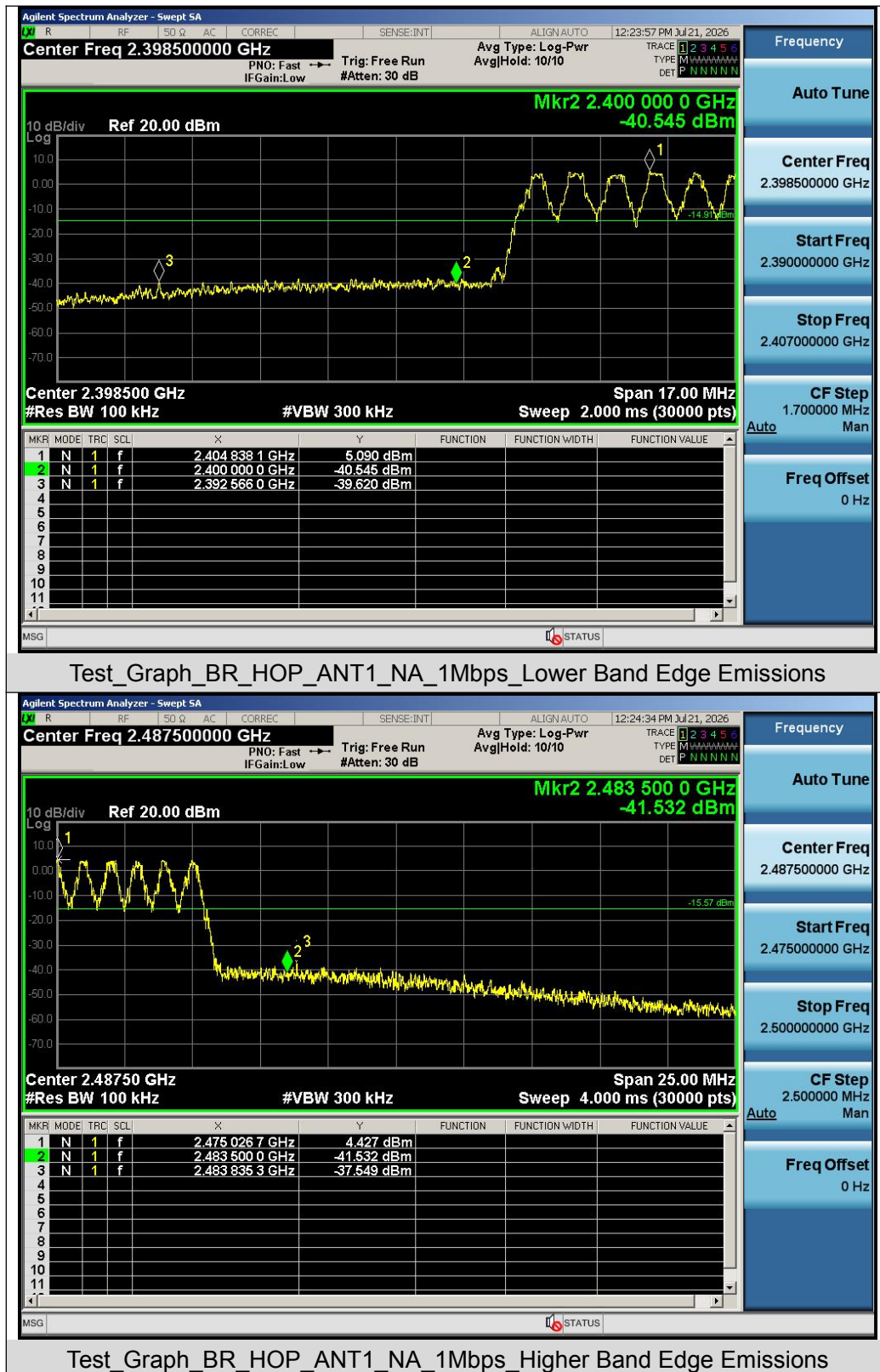


Test_Graph_BR_ANT1_2402_1Mbps_Lower Band Edge Emissions

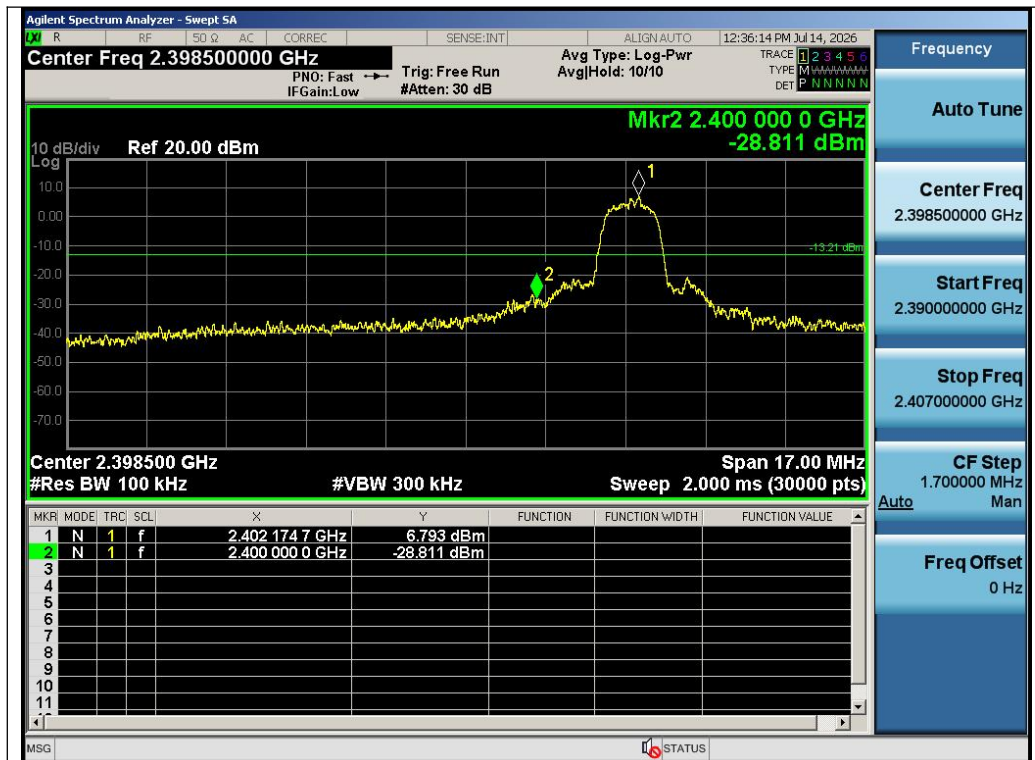


Test_Graph_BR_ANT1_2480_1Mbps_Higher Band Edge Emissions

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Test_Graph_EDR_ANT1_2402_2Mbps_Lower Band Edge Emissions



Test_Graph_EDR_ANT1_2480_2Mbps_Higher Band Edge Emissions

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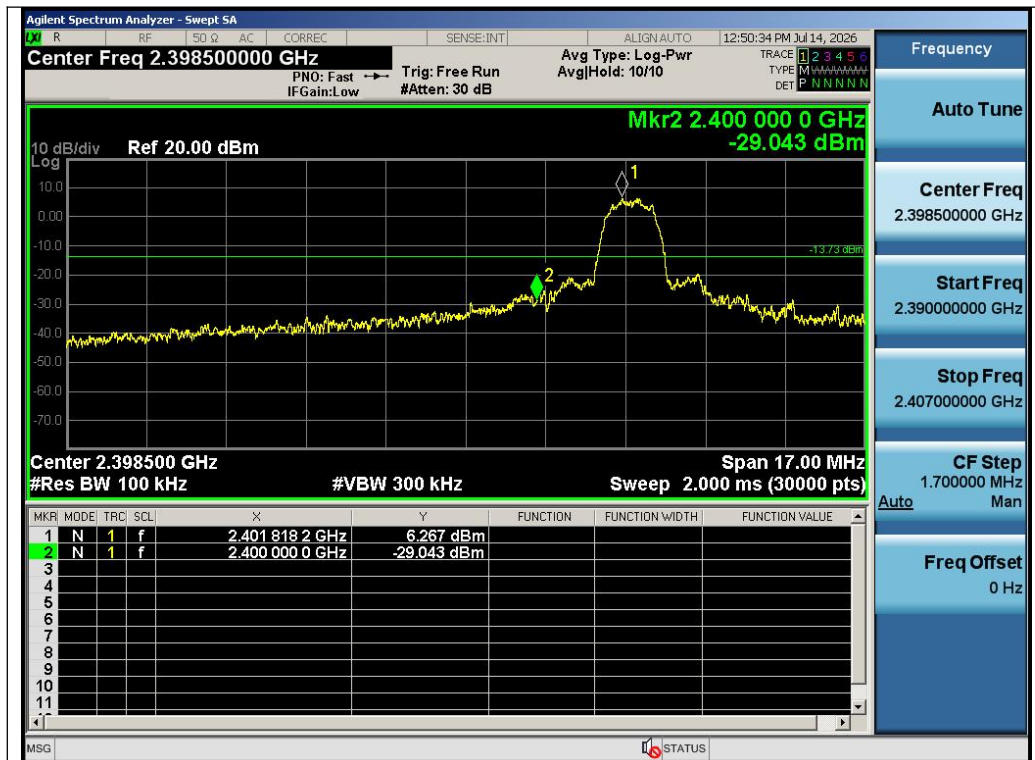


Test_Graph_EDR_HOP_ANT1_NA_2Mbps_Lower Band Edge Emissions



Test_Graph_EDR_HOP_ANT1_NA_2Mbps_Higher Band Edge Emissions

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Test_Graph_EDR_ANT1_2402_3Mbps_Lower Band Edge Emissions



Test_Graph_EDR_ANT1_2480_3Mbps_Higher Band Edge Emissions

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Test_Graph_EDR_HOP_ANT1_NA_3Mbps_Lower Band Edge Emissions



Test_Graph_EDR_HOP_ANT1_NA_3Mbps_Higher Band Edge Emissions

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9. Radiated Spurious Emission

9.1 Measurement Limit

- 15.209 Limit in the below table has to be followed

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Note: All modes were tested for restricted band radiated emission, the test records reported below are the worst result compared to other modes.

9.2 Measurement Procedure

- The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
- Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
- For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
- Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
- For emissions above 1GHz, insert the 2.4G filter between the receiving antenna and the Pre-amplifier(only for Radiated Spurious Emission). Use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average

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absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.

8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/3MHz for Peak, 1MHz/3MHz for Average

Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

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- **Quasi-Peak Measurements below 1GHz**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = as shown in the table above
4. Detector = CISPR quasi-peak
5. Sweep time = auto couple
6. Trace was allowed to stabilize

- **Peak Measurements above 1GHz**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

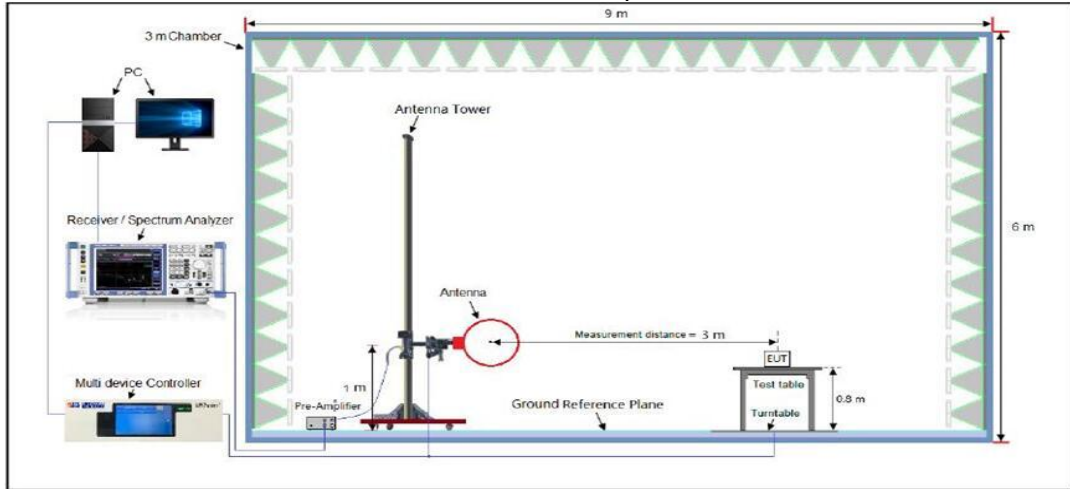
- **Average Measurements above 1GHz**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = Power averaging (rms)
5. Averaging type = power (i.e., rms)
6. Sweep time = auto
7. Perform a trace average of at least 100 traces.

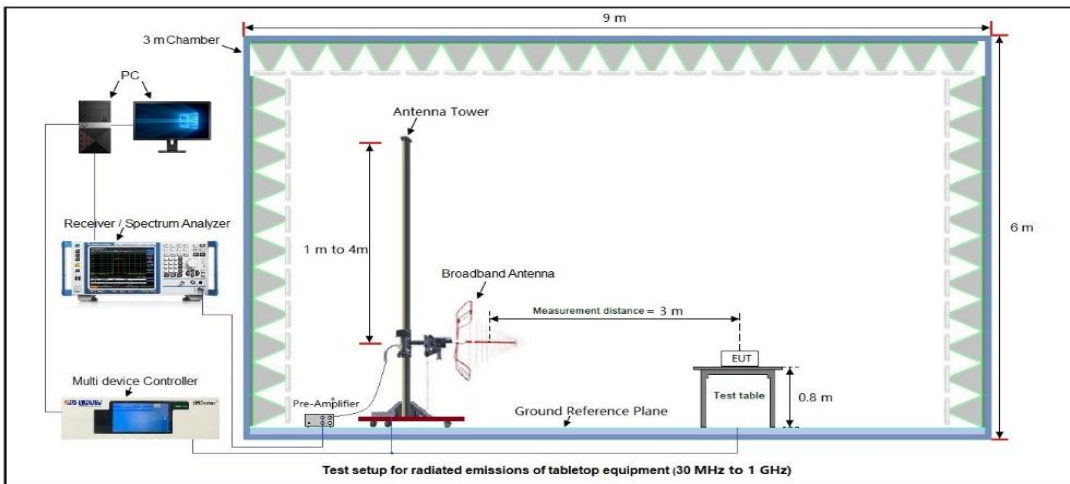
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9.3 Measurement Setup (Block Diagram of Configuration)

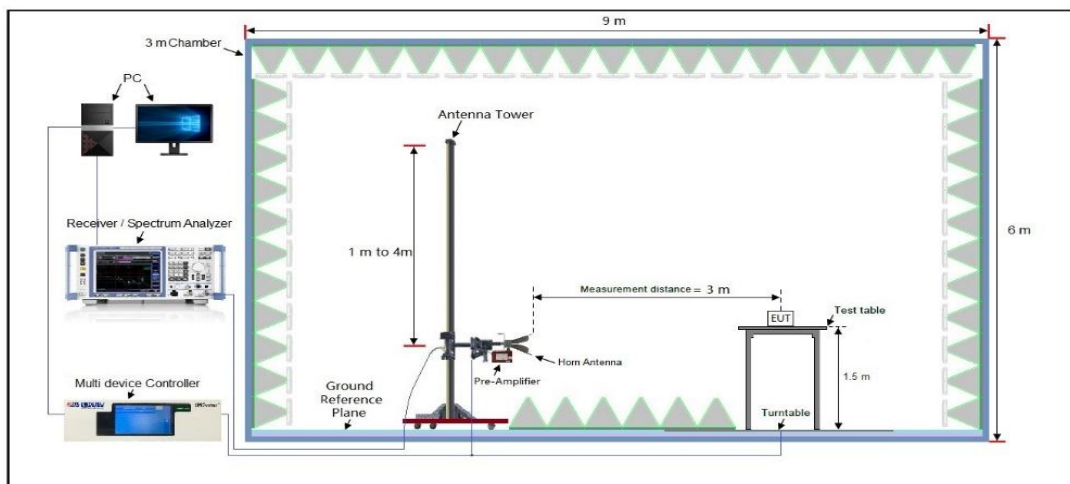
Radiated Emission Test Setup 9KHz-30MHz



Radiated Emission Test Setup 30MHz-1000MHz



Radiated Emission Test Setup Above 1000MHz



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9.4 Measurement Result

Radiated Emission Below 30MHz

The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported.

Radiated Emission Test Results at 30MHz-1GHz

EUT Name	Trihear SmartMic	Model Name	TH-N18M
Temperature	21.3℃	Relative Humidity	52.5%
Pressure	960hPa	Test Voltage	DC 3.7V
Test Mode	Mode 3	Antenna Polarity	Horizontal

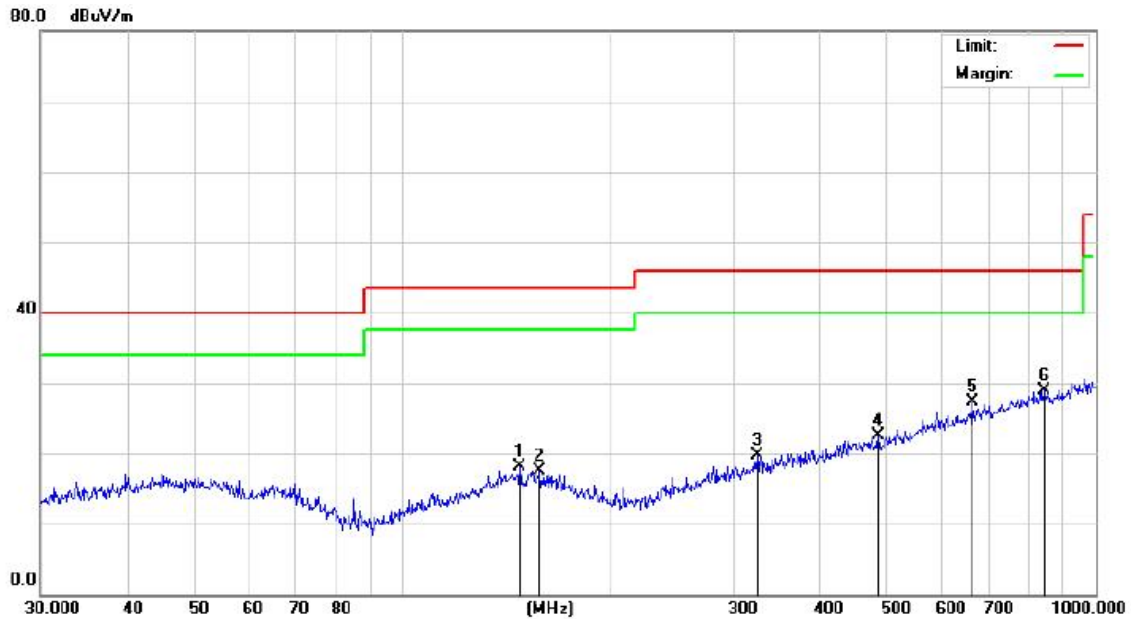


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		134.0882	36.91	-22.87	14.04	43.50	-29.46	peak
2		155.3644	38.22	-21.93	16.29	43.50	-27.21	peak
3		299.3158	38.67	-21.26	17.41	46.00	-28.59	peak
4		397.6334	39.15	-19.59	19.56	46.00	-26.44	peak
5		642.8613	39.86	-15.63	24.23	46.00	-21.77	peak
6	*	815.9678	38.65	-12.47	26.18	46.00	-19.82	peak

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Radiated Emission Test Results at 30MHz-1GHz

EUT Name	Trihear SmartMic	Model Name	TH-N18M
Temperature	21.3℃	Relative Humidity	52.5%
Pressure	960hPa	Test Voltage	DC 3.7V
Test Mode	Mode 3	Antenna Polarity	Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		147.4036	39.07	-20.94	18.13	43.50	-25.37	peak
2		157.5588	38.39	-20.91	17.48	43.50	-26.02	peak
3		324.4561	39.40	-19.76	19.64	46.00	-26.36	peak
4		485.6093	39.15	-16.67	22.48	46.00	-23.52	peak
5		663.4729	40.36	-13.02	27.34	46.00	-18.66	peak
6	*	842.1296	39.08	-10.24	28.84	46.00	-17.16	peak

RESULT: Pass

Note:

- Factor=Antenna Factor + Cable loss - Pre-amplifier, Margin=Limit-Measurement.
- All test modes had been pre-tested. The mode 3 is the worst case and recorded in the report.

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Radiated Emissions Test Results Above 1GHz

EUT Name	Trihear SmartMic	Model Name	TH-N18M
Temperature	21.3℃	Relative Humidity	52.5%
Pressure	960hPa	Test Voltage	DC 3.7V
Test Mode	Mode 1	Antenna Polarity	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4804.000	47.56	0.08	47.64	74	-26.36	peak
4804.000	38.52	0.08	38.6	54	-15.4	AVG
7206.000	42.61	2.21	44.82	74	-29.18	peak
7206.000	31.54	2.21	33.75	54	-20.25	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

EUT Name	Trihear SmartMic	Model Name	TH-N18M
Temperature	21.3℃	Relative Humidity	52.5%
Pressure	960hPa	Test Voltage	DC 3.7V
Test Mode	Mode 1	Antenna Polarity	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4804.000	49.65	0.08	49.73	74	-24.27	peak
4804.000	37.54	0.08	37.62	54	-16.38	AVG
7206.000	42.51	2.21	44.72	74	-29.28	peak
7206.000	30.22	2.21	32.43	54	-21.57	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

RESULT: PASS

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Radiated Emissions Test Results for Above 1GHz

EUT Name	Trihear SmartMic	Model Name	TH-N18M
Temperature	21.3℃	Relative Humidity	52.5%
Pressure	960hPa	Test Voltage	DC 3.7V
Test Mode	Mode 2	Antenna Polarity	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4882.000	47.54	0.14	47.68	74	-26.32	peak
4882.000	37.52	0.14	37.66	54	-16.34	AVG
7323.000	42.61	2.36	44.97	74	-29.03	peak
7323.000	31.48	2.36	33.84	54	-20.16	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

EUT Name	Trihear SmartMic	Model Name	TH-N18M
Temperature	21.3℃	Relative Humidity	52.5%
Pressure	960hPa	Test Voltage	DC 3.7V
Test Mode	Mode 2	Antenna Polarity	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4882.000	47.91	0.14	48.05	74	-25.95	peak
4882.000	37.23	0.14	37.37	54	-16.63	AVG
7323.000	41.52	2.36	43.88	74	-30.12	peak
7323.000	31.53	2.36	33.89	54	-20.11	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

RESULT: PASS

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Radiated Emissions Test Results for Above 1GHz

EUT Name	Trihear SmartMic	Model Name	TH-N18M
Temperature	21.3℃	Relative Humidity	52.5%
Pressure	960hPa	Test Voltage	DC 3.7V
Test Mode	Mode 3	Antenna Polarity	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4960.000	48.63	0.22	48.85	74	-25.15	peak
4960.000	38.91	0.22	39.13	54	-14.87	AVG
7440.000	42.55	2.64	45.19	74	-28.81	peak
7440.000	31.62	2.64	34.26	54	-19.74	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

EUT Name	Trihear SmartMic	Model Name	TH-N18M
Temperature	21.3℃	Relative Humidity	52.5%
Pressure	960hPa	Test Voltage	DC 3.7V
Test Mode	Mode 3	Antenna Polarity	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4960.000	47.58	0.22	47.8	74	-26.2	peak
4960.000	37.52	0.22	37.74	54	-16.26	AVG
7440.000	41.38	2.64	44.02	74	-29.98	peak
7440.000	32.33	2.64	34.97	54	-19.03	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

RESULT: PASS

Note:

- The amplitude of other spurious emissions from 1G to 25 GHz which are attenuated more than 20 dB below the permissible value need not be reported.
- Factor = Antenna Factor + Cable loss – Pre-amplifier gain, Margin = Emission Level - Limit.
- The "Factor" value can be calculated automatically by software of measurement system.
- All test modes had been pre-tested. The mode GFSK is the worst case and recorded in the report.

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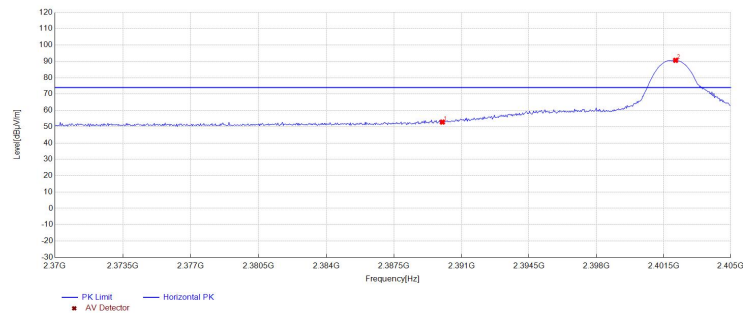
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Band Edge Emission Test Results for Restricted Bands

EUT Name	Trihear SmartMic	Model Name	TH-N18M
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna Polarity	Horizontal

Test Graph for Peak Measurement

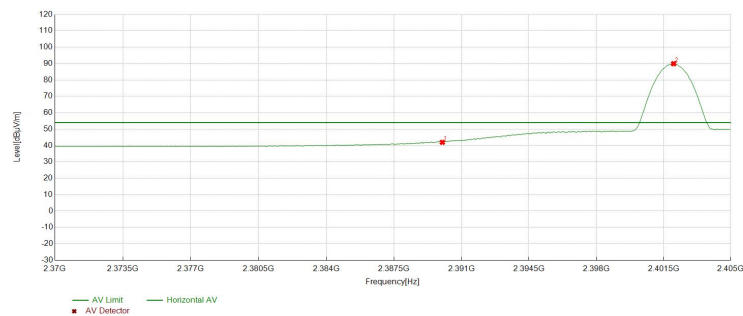


PK Data List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2390.005	52.84	35.75	74.00	21.16	150	273	Horizontal
2	2402.127	90.66	35.79	N/A	N/A	150	37	Horizontal

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Test Graph for Average Measurement



PK Data List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2390.005	41.95	35.75	54.00	12.05	150	281	Horizontal
2	2402.022	89.93	35.79	N/A	N/A	150	12	Horizontal

Remark:

- Marker 2 is the fundamental frequency and is exempt from the band edge emission limits for restricted bands.

RESULT: PASS

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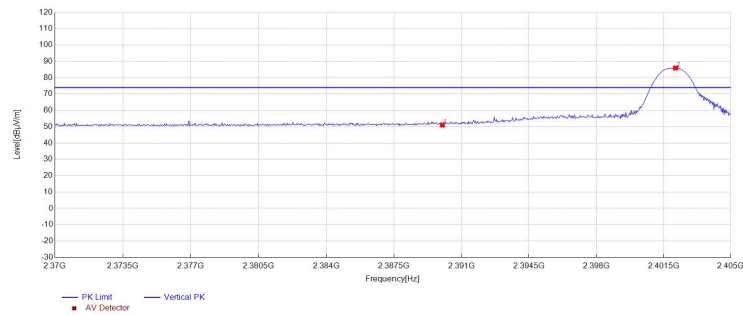
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Band Edge Emission Test Results for Restricted Bands

EUT Name	Trihear SmartMic	Model Name	TH-N18M
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna Polarity	Vertical

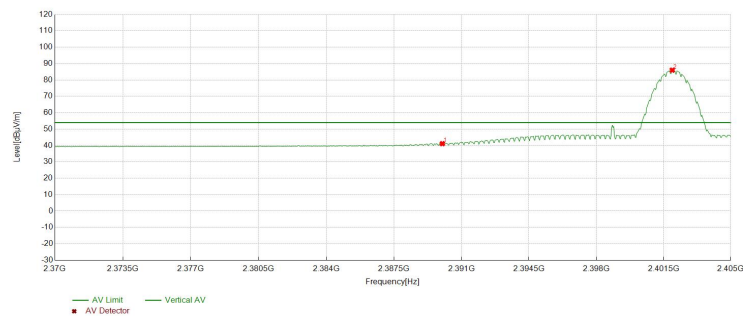
Test Graph for Peak Measurement



PK Data List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2390.005	51.05	35.75	74.00	22.95	150	189	Vertical
2	2402.127	85.97	35.79	N/A	N/A	150	232	Vertical

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Test Graph for Average Measurement



PK Data List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2390.005	41.12	35.75	54.00	12.88	150	227	Vertical
2	2401.951	85.98	35.79	N/A	N/A	150	227	Vertical

Remark:

- Marker 2 is the fundamental frequency and is exempt from the band edge emission limits for restricted bands.

RESULT: PASS

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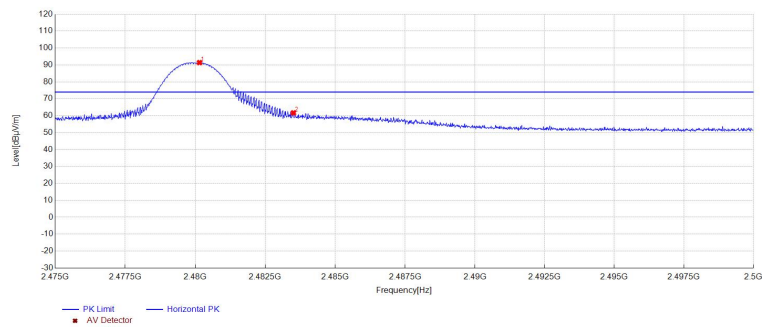
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Band Edge Emission Test Results for Restricted Bands

EUT Name	Trihear SmartMic	Model Name	TH-N18M
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna Polarity	Horizontal

Test Graph for Peak Measurement

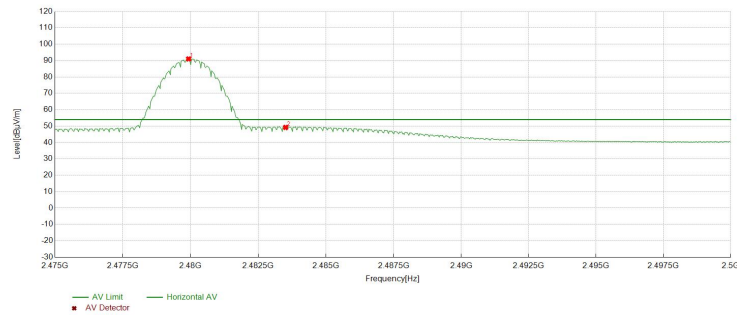


PK Data List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2480.152	91.39	36.04	N/A	N/A	150	274	Horizontal
2	2483.504	61.67	36.05	74.00	12.33	150	274	Horizontal

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Test Graph for Average Measurement



PK Data List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2479.929	91.03	36.04	N/A	N/A	150	269	Horizontal
2	2483.508	49.21	36.05	54.00	4.79	150	269	Horizontal

Remark:

- Marker 1 is the fundamental frequency and is exempt from the band edge emission limits for restricted bands.

RESULT: PASS

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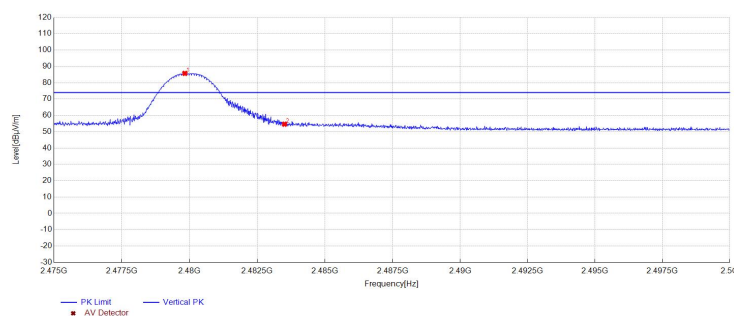
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Band Edge Emission Test Results for Restricted Bands

EUT Name	Trihear SmartMic	Model Name	TH-N18M
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna Polarity	Vertical

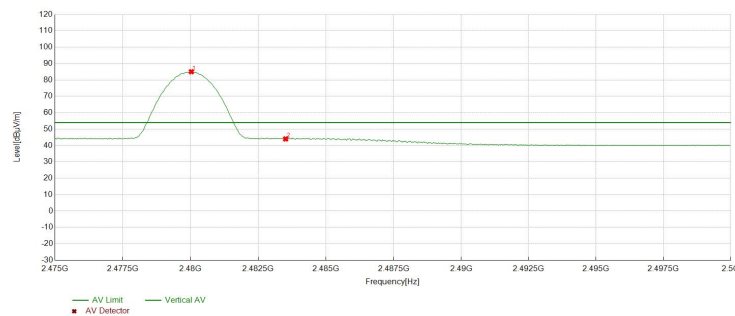
Test Graph for Peak Measurement



PK Data List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2479.827	85.72	36.04	N/A	N/A	150	204	Vertical
2	2483.504	54.61	36.05	74.00	19.39	150	231	Vertical

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Test Graph for Average Measurement



PK Data List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2480.030	85.05	36.04	N/A	N/A	150	205	Vertical
2	2483.508	44.00	36.05	54.00	10.00	150	320	Vertical

Remark:

1. Marker 1 is the fundamental frequency and is exempt from the band edge emission limits for restricted bands.

RESULT: PASS

Note:

1. The factor had been edited in the "Input Correction" of the Spectrum Analyzer.
2. Margin = Limit - Level.
3. All test modes had been pre-tested. The mode GFSK is the worst case and recorded in the report.

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10. Number of Hopping Frequency Measurement

10.1 Provisions Applicable

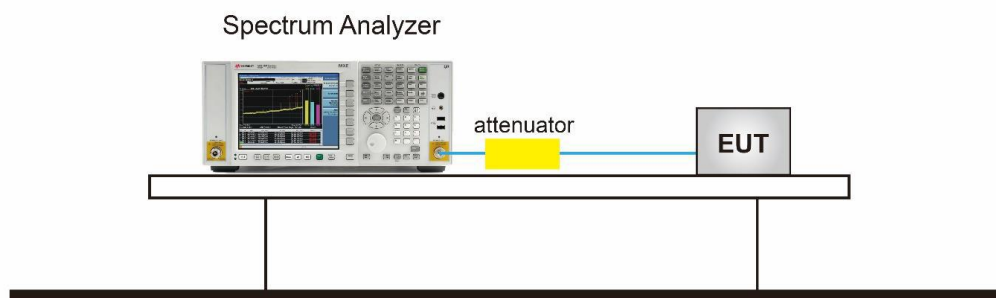
This frequency hopping system must employ a minimum of 15 hopping channels.

10.2 Measurement Procedure

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

1. Span = The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
2. RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
3. VBW $\geq$ RBW
4. Sweep time = Auto couple
5. Detector = Peak
6. Trace mode = Max hold
7. Allow the trace to stabilize

10.3 Measurement Setup (Block Diagram of Configuration)



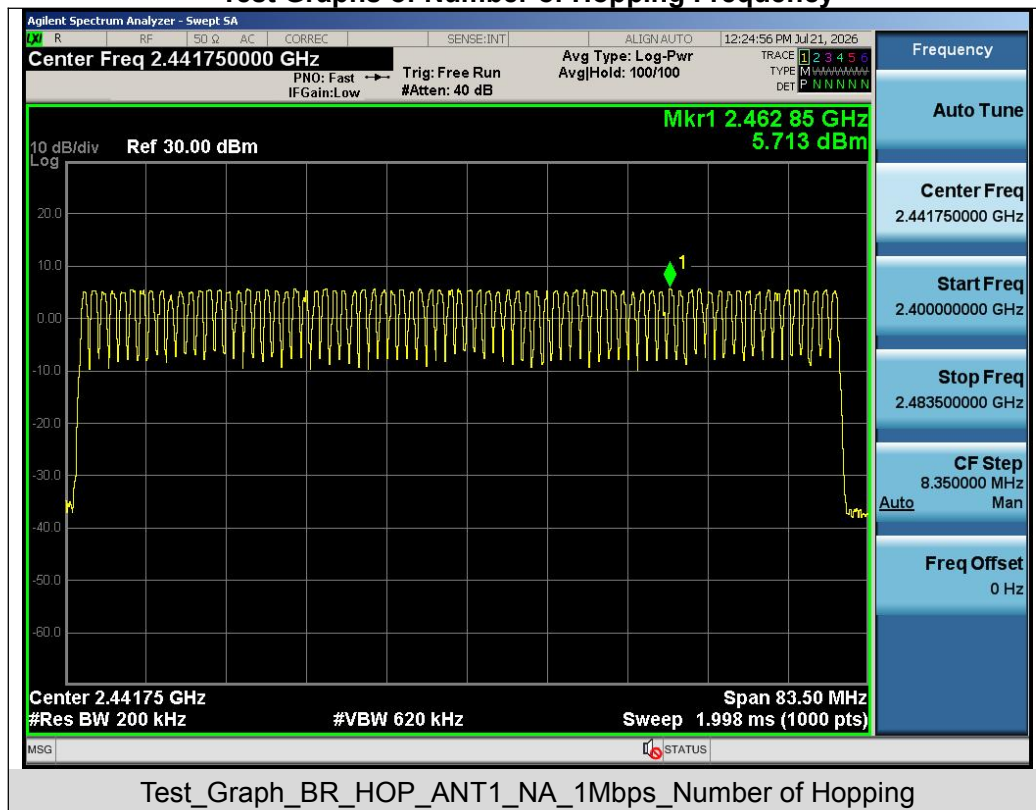
10.4 Measurement Result

Test Data of Number of Hopping Frequency			
Test Mode	Number of Hopping Frequency	Limits	Pass or Fail
GFSK Hopping	79	≥ 15	Pass

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Test Graphs of Number of Hopping Frequency



Note: All mode rates are tested and evaluated, GFSK modulated DH5 mode is the worst case and documented in the report.

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11. Time of Occupancy (Dwell Time) Measurement

11.1 Provisions Applicable

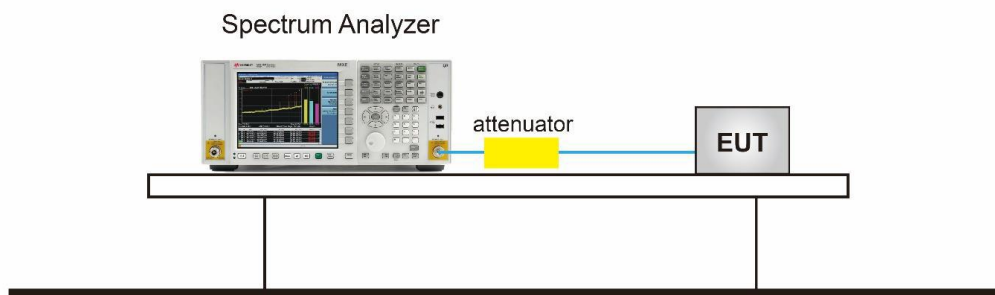
The maximum permissible time of occupancy is 400ms within a period of 400ms multiplied by the number of hopping channels employed.

11.2 Measurement Procedure

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

1. Span = Zero span, centered on a hopping channel.
2. RBW shall be $\leq$ channel spacing and where possible RBW should be set $\gg 1 / T$, where T is the expected dwell time per channel.
3. VBW $\geq$ RBW
4. Sweep time = As necessary to capture the entire dwell time per hopping channel
5. Detector = Peak
6. Trace mode = Free Run
7. Use the marker-delta function to determine the transmit time per hop. If this value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in transmit time. An oscilloscope may be used instead of a spectrum analyzer. The EUT shall show compliance with the appropriate regulatory limit for the number of hopping channels. A plot of the data shall be included in the test report.

11.3 Measurement Setup (Block Diagram of Configuration)

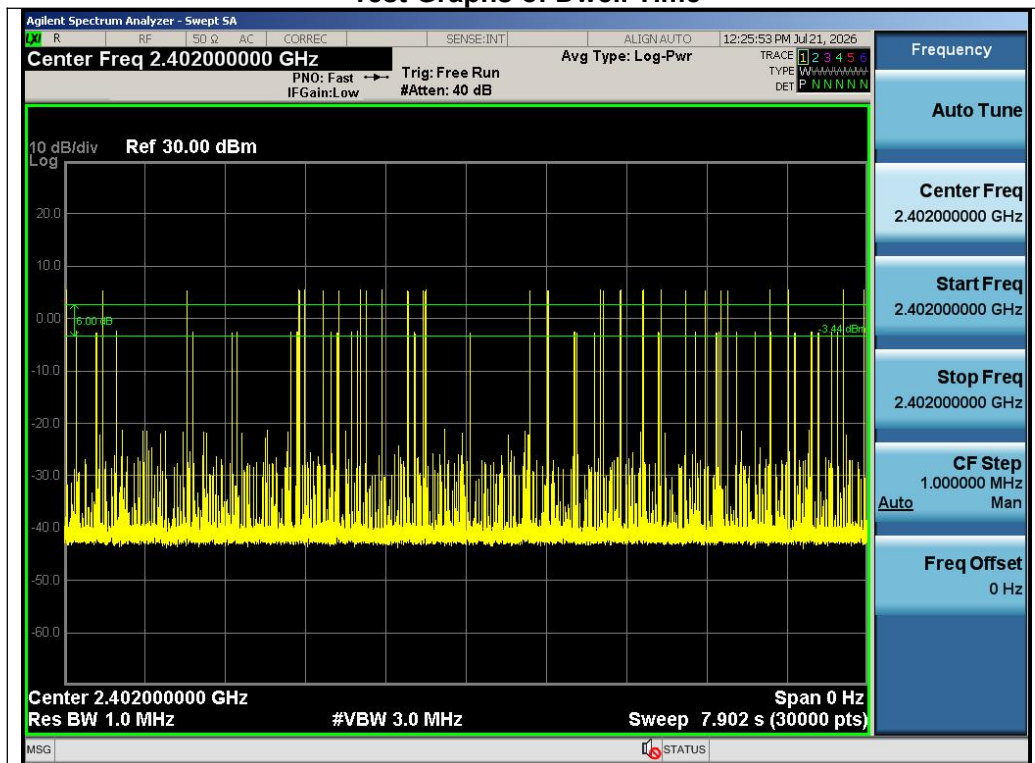


11.4 Measurement Result

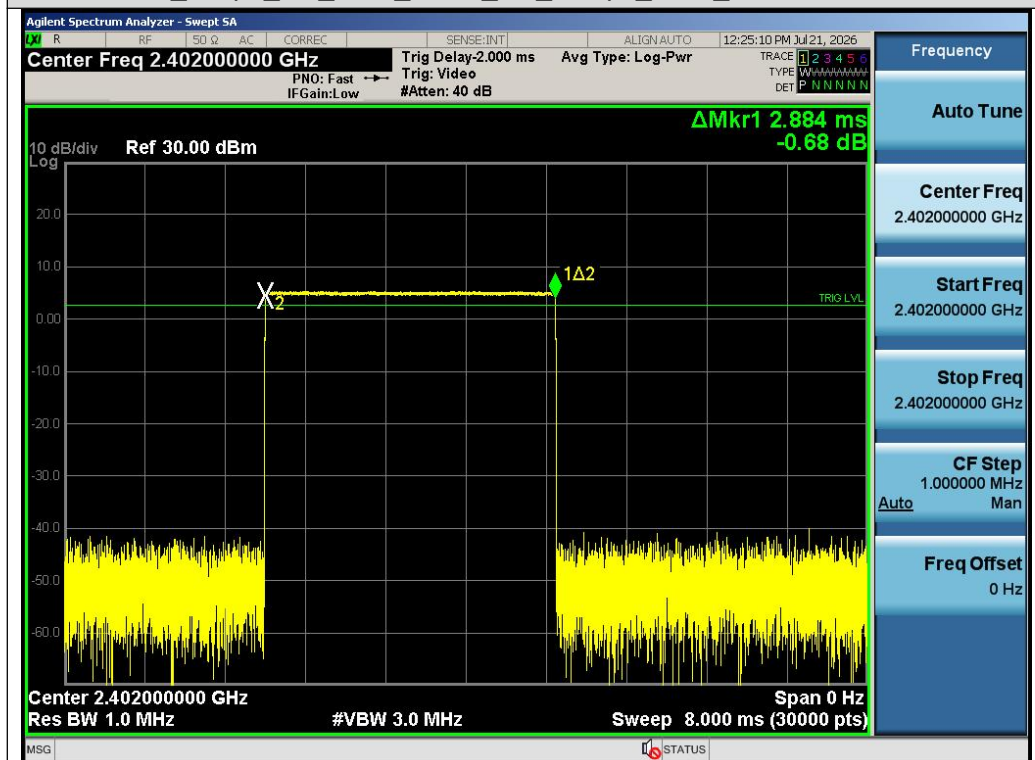
Test Data of Dwell Time					
Channel	Time of Pulse for DH5 (ms)	Number of hops in the period specified in the requirements	Dwell Time (ms)	Limit (ms)	Pass or Fail
2402	2.884	28.0*4	323.008	400	Pass
2441	2.884	26.0*4	299.936	400	Pass
2480	2.884	24.0*4	276.864	400	Pass

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Test Graphs of Dwell Time

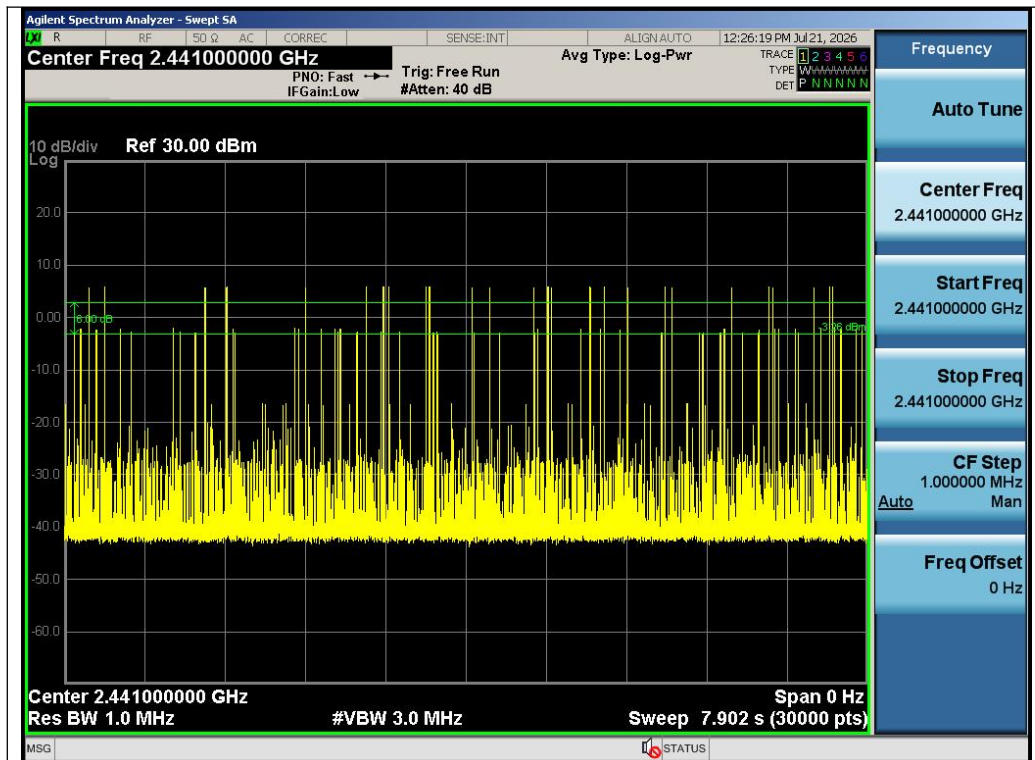


Test_Graph_BR_HOP_ANT1_NA_1Mbps_2402_Number of Burst

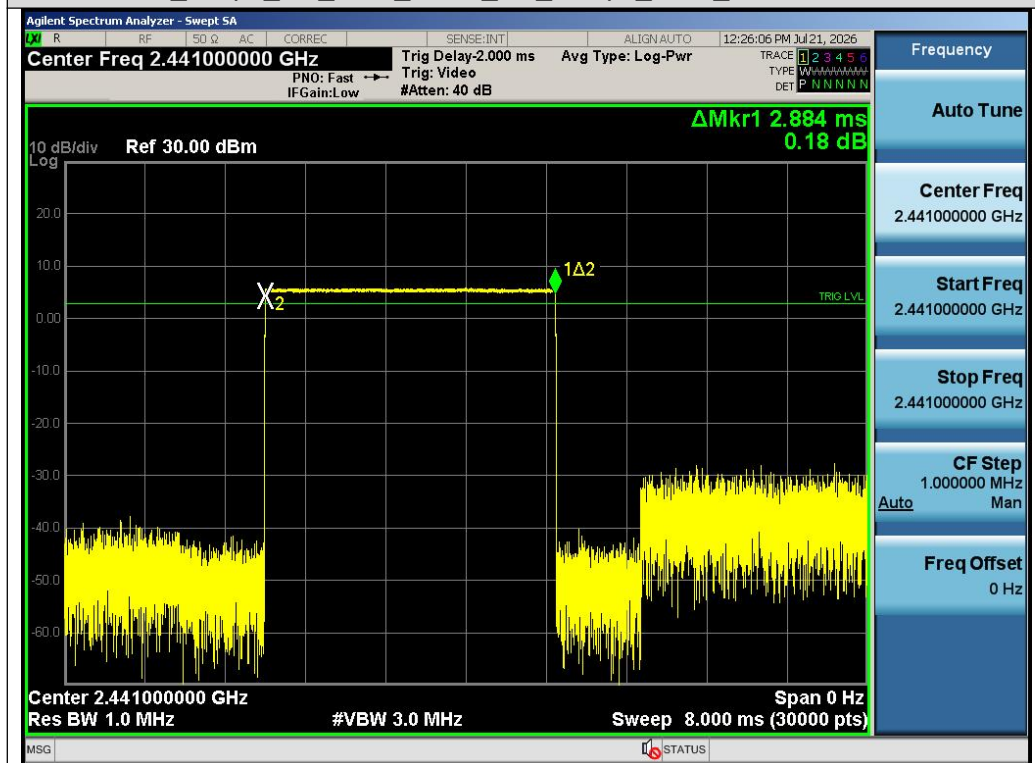


Test_Graph_BR_HOP_ANT1_NA_1Mbps_2402_Time per Burst

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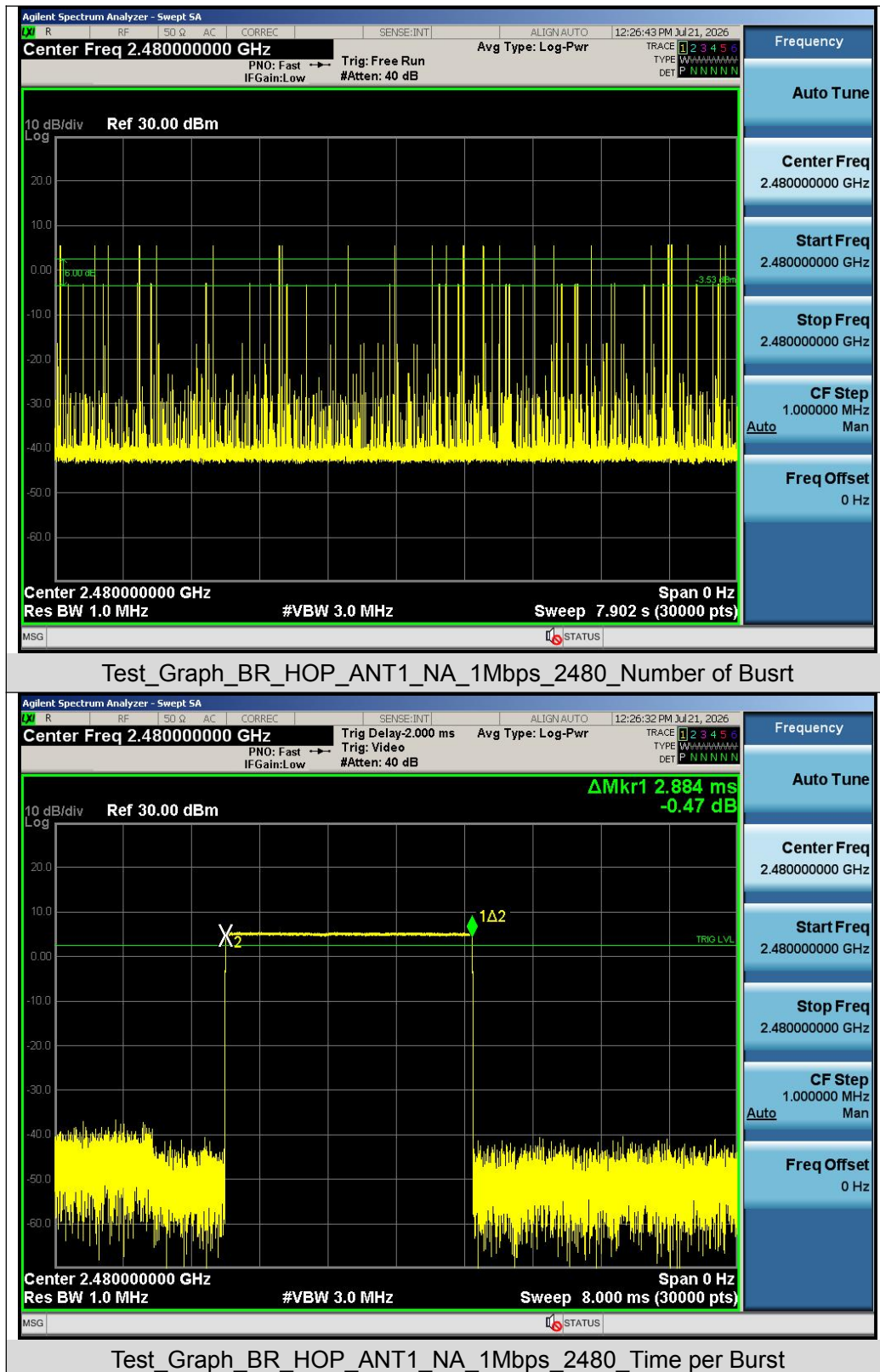
Test_Graph_BR_HOP_ANT1_NA_1Mbps_2441_Number of Burst



Test_Graph_BR_HOP_ANT1_NA_1Mbps_2441_Time per Burst

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Note: All mode rates are tested and evaluated, GFSK modulated DH5 mode is the worst case and documented in the report.

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