MOTOROLA SOLUTIONS

CERTIFICATE 2518.08

SAMM 825

MOTOROLA PENANG ADV. COMM. LABORATORY

Motorola Solutions Malaysia Sdn. Bhd.
Plot 2A Medan Bayan Lepas,
Mukim 12, S.W.D. 11900 Bayan Lepas,
Penang, Malaysia.

FCC / ISED TEST REPORT

Report Revision : Rev.A

Date/s Tested	:	18-July-2024 - 05-September-2024
Report Issue Date	:	20-September-2024
Manufacturer/Location	:	Motorola Solutions Malaysia Sdn Bhd Plot 2A, Medan Bayan Lepas, Mukim 12 SWD, 11900 Bayan Lepas, Penang, Malaysia
Requestor	:	R THAYAPARAN DANESHKUMAR AL
Product Type	:	Portable
Product Marketing Name (PMN)	:	R5
Hardware Version Identification Number (HVIN)	:	AAH07JDH9SA1AN
Frequency Band	:	2.402 - 2.480 GHz
Max RF Output Power	:	10 mWatts
Applicant Name	:	Motorola Solutions Inc
Applicant Address	:	Plot 2A, Medan Bayan Lepas, Mukim 12 SWD, 11900 Bayan Lepas, Penang, Malaysia
FCC Registrations	:	461337
ISED Registrations	:	MY0001
Firmware Version Identification Number (FVIN)	:	B02.25.01.0019

The equipment was tested accordance to the requirement listed below:

(2.4GHz BT LE) **47 CFR Part 15C** **ISED RSS 247 Issue 3** **February 2017**	**PASS**

Prepared By:

NUR ALIEYA BINTI MAT YUSOFF
Test Personnel

Approved Signatory:

MAHESHVARAN A/L RAJAGOPAL
Responsible Engineer

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REVISION HISTORY

Revision History	Description	Date	Originator
Rev. A	Initial Report	**13-September-2024**	**Alieya**

1.0 General Information

EUT Description:

Technologies	2.4GHz BT LE
TX Frequency range	2402MHz – 2480MHz
Modulation Type	GFSK
Connector type	PROGRAMMING, TEST & ALIGNMENT CABLE
Antenna type	PIFA

The EUT contains following accessory devices and data cable:

Item	Brand	Model or P/N
BATT IMPRES LIION TIA4950 IP68 3200T	MOTOROLA	PMNN4890A
VHF WHIP ANT, 136-174MHz	MOTOROLA	PMAD4147A
BATT IMPRES LIION IP68 3200T HICAP	MOTOROLA	PMNN4889A
CHARGER DEKSTOP MULTI UNIT IMPRES 2 1 Display External Power Supply 100–240 VAC– US/NA	MOTOROLA	PMPN4284B

Channel number and frequency information:

40 channels are provided to this EUT:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, the EUT is to comply with the requirements of the following standards:

FCC 47 CFR Part 15 Subpart C
KDB 558074 D01 15.247 Meas Guidance v05
ANSI C63.10-2013

Deviation from standard

Not applicable as no deviation from standard test method

Modifications to EUT

For RF conducted measurements a pigtail was soldered out of the board while for radiated measurements there were no modifications to the device

2.0 Summary of Test Results

FCC Clause	ISED Clause	Test Item	Result	Remark	Serial number tested	Tested by
15.247 (a)(2)	RSS 247 5.2 (a)	DTS & 99% Channel Bandwidth	Pass	Highest 99% OCB: BT 4.0 - 1.05 MHz (1M05F1D) BT 5.0 – 2.07 MHz (2M07F1D)	651EAK0146	Alieya
15.247 (b)(3)	RSS 247 5.4 (d)	Conducted RF Output Power (Peak)	Pass	Highest output power: BT 4.0 – 9.135 dBm (8.194 mW) BT 5.0 – 8.832 dBm (7.64 mW)	651EAK0146	Alieya
15.247(e)	RSS 247 5.2 (b)	Maximum Peak Power Spectral Density	Pass	Meet the limit requirement.	651EAK0146	Alieya
15.247 (d)	RSS-247 5.5	Band-Edge Conducted Spurious Emission	Pass	Worst case emission: -49.06 dBm	651EAK0146	Alieya
15.247 (b)	RSS-247 5.5	Conducted Spurious Emission	Pass	Worst case emission: -39.45 dBm	651EAK0146	Alieya
15.205, 15.209, 15.247 (d)	RSS247 5.5	Radiated Emission within Restricted Bands	Pass	Worst case emission: RBE: 46.9795 dBuV/m (margin: 7.0205 dBuV/m) RSE: 32.8680 dBuV/m (margin: 10.6320 dBuV/m)	651EAK0033, 651EAK0054, 651EAK0048	Nazrin, Rezza, Fuad
15.207	RSS-Gen 8.8	AC Power Line Conducted Spurious Emission	NA	Meet the limit requirement.	651EAK0033, 651EAK0054, 651EAK0048	Shidee
15.203	-	Antenna Requirement	NA	Internal antenna is not accessible to the end-user	NA	NA

3.0. Measurement Uncertainty

Measurement	Frequency	Expended Uncertainty (k=1.96) (±dB)
AC Power Line Conducted Spurious Emission	150KHz ~ 30MHz	3.48
Radiated Emissions up to 1 GHz	30MHz ~ 1000MHz	5.88
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	5.84
	18GHz ~ 40GHz	6.02
Conducted Spurious Emissions	9kHz ~ 12.75GHz	2.82

4.0 Equipment List

Bluetooth ATE # 1 (SW Version: Ate Main_3.1.12_R1)

Description	Model	Serial Number	Calibration Date	Calibration Due Date
CHAMBER	SH-641	92003820	04-Jul-24	04-Jul-25
PULSE SENSOR	MA2411B	1726287	22-Aug-23	22-Aug-24
PULSE POWER METER	ML2495A	1845014	16-Aug-23	16-Aug-24
SPECTRUM ANALYZER	E4440A	MY48250517	08-Nov-23	08-Nov-24
POWER SUPPLY	6652A	3640A02967	15-Oct-23	15-Oct-24

Radiated Emission Station (SW Version: EMC FCC RE v1.6.5)

Description	Model	Serial Number	Calibration Date	Calibration Due Date
DRG HORN FREQ.	SAS-571	1143	08-Mar-23	08-Mar-25
DRG HORN FREQ.	SAS-571	720	18-Apr-23	18-Apr-25
DC Power Supply	6623A	3302A02585	30-Jul-24	30-Jul-25
SIGNAL GENERATOR	SMB 100A	182511	04-Sep-21	04-Dec-24
EMI TEST RECEIVER	ESW44	101750	08-Aug-24	07-Aug-25
BILOG ANTENNA	CBL6112B	2950	14-Dec-23	14-Dec-24
BILOG ANTENNA	CBL6112B	2964	25-Sep-23	25-Sep-24
DATA LOGGER THERMOHYGROMETER	SDL500	A.016800	26-Jun-24	26-Jun-25
BROAD-BAND HORN ANTENNA	BBHA9170	BBHA9170255	13-Mar-24	13-Mar-25
PREAMPLIFIER	PAM-0118P	574	19-Mar-24	19-Mar-25
LOOP ANTENNA	6502	00203479	06-Mar-24	06-Mar-25
5m SEMI-ANECHOIC CHAMBER	S800-HX	J2308	Not Required	Not Required
SYSTEM CONTROLLER	SC104V	050806-1	Not Required	Not Required
TURNTABLE FLUSH MOUNT 2M	FM2011	NA	Not Required	Not Required
ANTENNA POSITIONING TOWER	TLT2	NA	Not Required	Not Required
PREAMPLIFIER 18-40GHz	Miteq Hi Gain Sucoflex	002	Not Required	Not Required

AC Powerline Station (SW Version: EMC32 Ver.10.60.10)

Description	Model	Serial Number	Calibration Date	Calibration Due Date
DATA LOGGER	DSB	16344143	05-Jul-24	05-Jul-25
V-NETWORK 2-LINE	ENV216V	101039	13-Dec-23	13-Dec-24
EMI TEST RECEIVER	ESCI	100225	08-May-24	08-May-25
PROGRAMMABLE AC SOURCE	61604	616040003502	15-Dec-23	15-Dec-24

5.0 Test Mode Applicability and Test Channel Detail

Radiated Emission Test (Above 1GHz)

☒Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type	Environmental Conditions
Test Mode	0 to 39	0,19,39	GFSK	23.8°C, 67.9%RH

Radiated Emission Test (Below 1GHz)

☒Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type	Environmental Conditions
Test Mode	0 to 39	0,19,39	GFSK	23.8°C, 67.9%RH

Power Line Conducted Emission Test

☐Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☐Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type	Environmental Conditions
Application Mode	0 to 39	AUTO	AUTO	NA

Antenna Port Conducted Measurement:

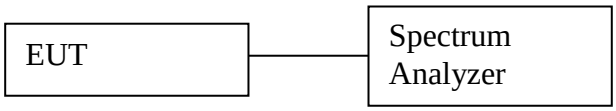
☒This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
☒Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type	Environmental Conditions
Test Mode	0 to 39	0,19,39	GFSK	25°C, 54.8%RH

6.0 Transmitter Test Parameters

6.1 6dB Channel Bandwidth

6.1.1 Test Setup



1) Check and ensure the spectrum analyzer well calibrate.
2) Turn on the DUT and set DUT to transmit maximum power.
3) Connect DUT's antenna terminal to spectrum analyzer with a low loss cable.
4) Setting of Spectrum analyzer :
    a. RBW = 100 kHz
    b. VBW = 300 kHz
    c. Detector mode = Peak
    d. Trace = Max hold
    e. Sweep = auto
5) Measure the freq different of two frequencies that were attenuated 6dB from peak of the emission & record the frequency difference as the emission bandwidth.

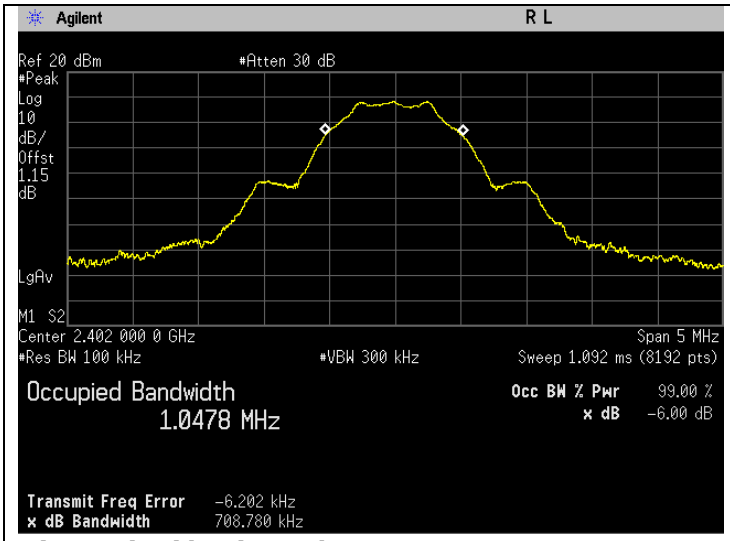
6.1.2 Test Limits:

Normal Condition (25 ° C)
≥500 kHz

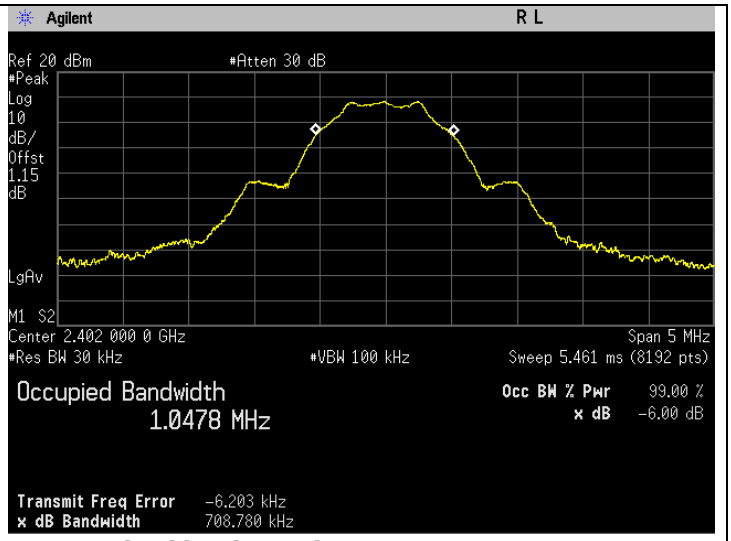
6.1.3 Test Data:

BTLE 1M

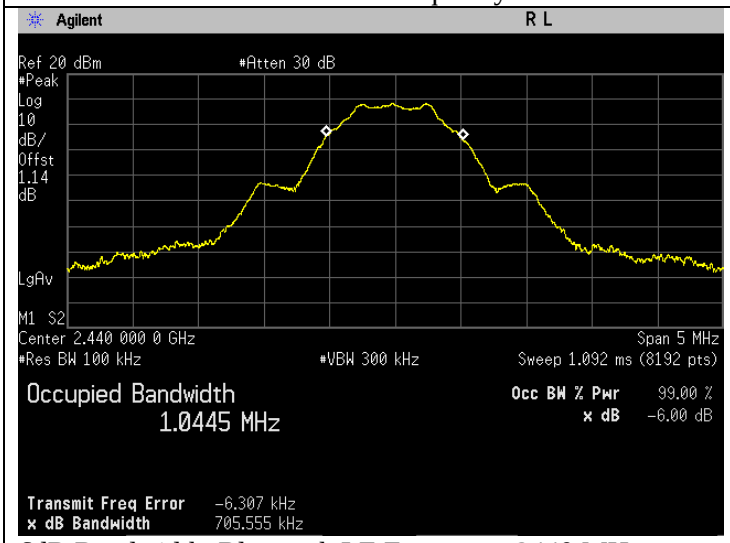
Test Conditions		Test Frequency	Results		
Standard	Modulation Type	Tx (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Status
Bluetooth L.E	GFSK	2402	0.71	1.05	Pass
Bluetooth L.E	GFSK	2440	0.71	1.04	Pass
Bluetooth L.E	GFSK	2480	0.71	1.05	Pass



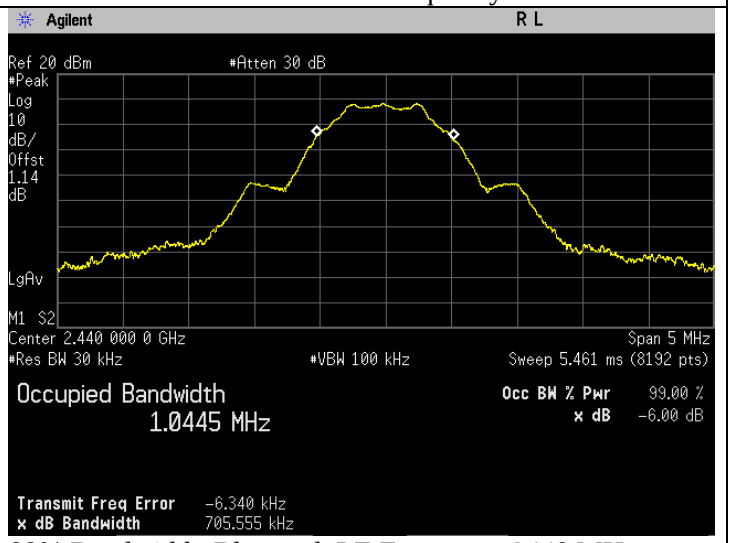
6dB Bandwidth. Bluetooth LE Frequency 2402 MHz



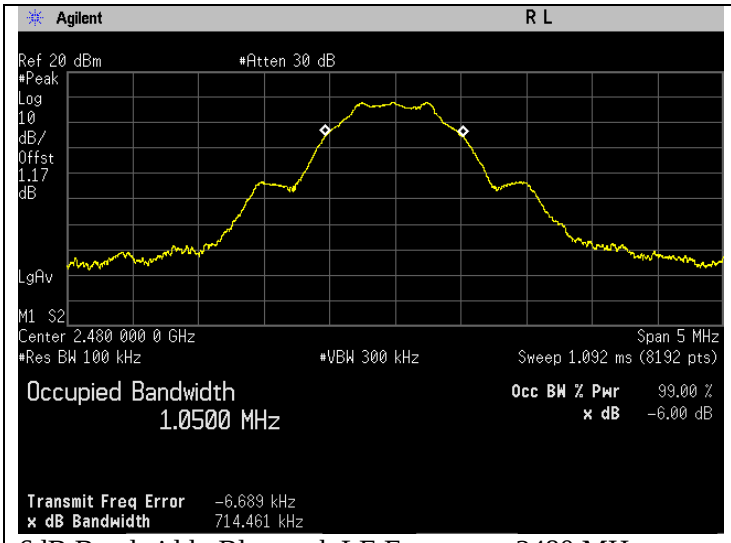
99% Bandwidth. Bluetooth LE Frequency 2402 MHz



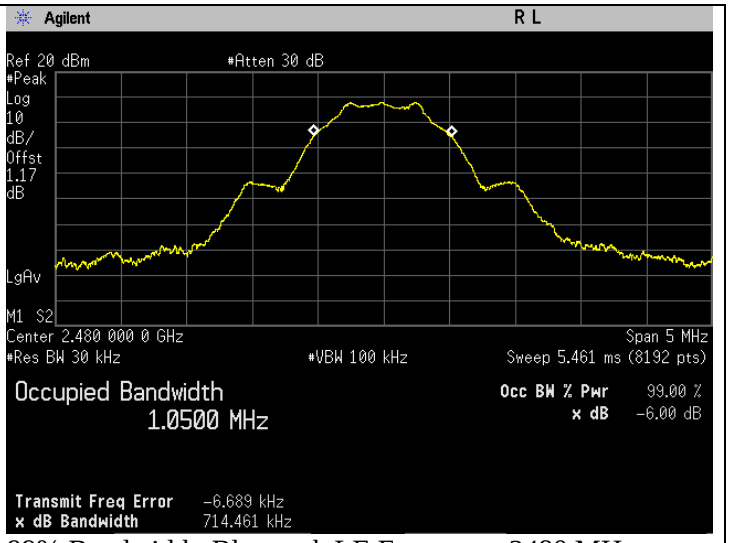
6dB Bandwidth. Bluetooth LE Frequency 2440 MHz



99% Bandwidth. Bluetooth LE Frequency 2440 MHz



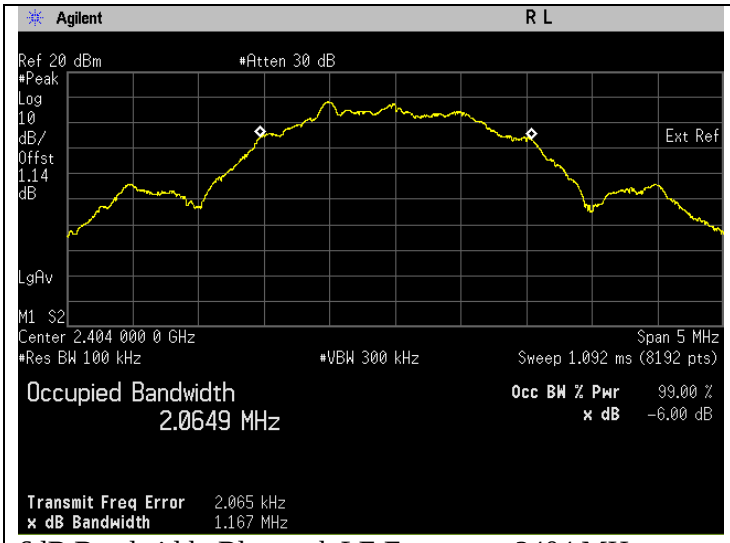
6dB Bandwidth. Bluetooth LE Frequency 2480 MHz



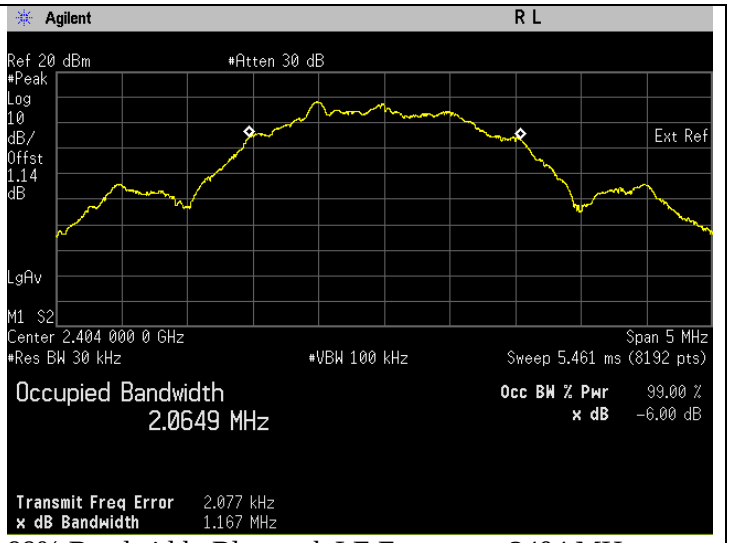
99% Bandwidth. Bluetooth LE Frequency 2480 MHz

BTLE 2M

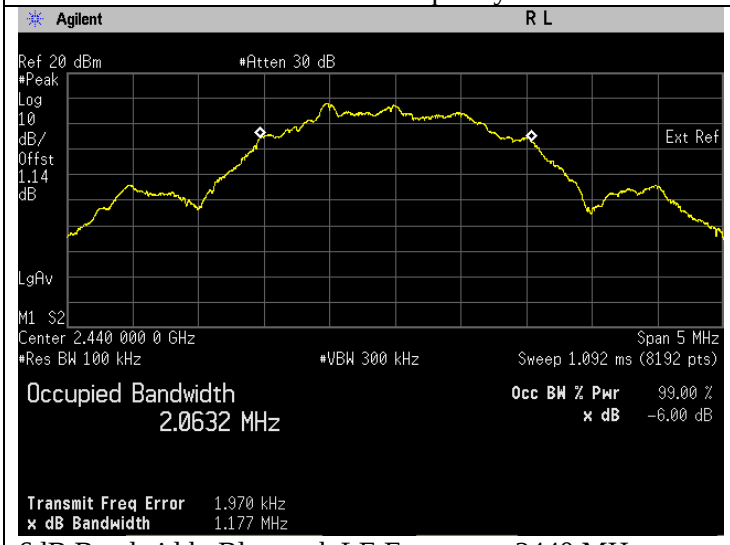
Test Conditions		Test Frequency	Results		
Standard	Modulation Type	Tx (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Status
Bluetooth L.E	GFSK	2404	1.17	2.06	Pass
Bluetooth L.E	GFSK	2440	1.18	2.06	Pass
Bluetooth L.E	GFSK	2478	1.17	2.07	Pass



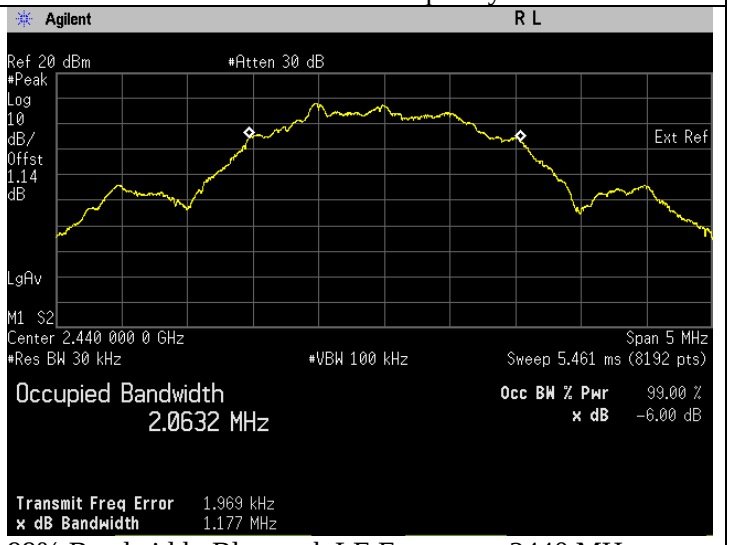
6dB Bandwidth. Bluetooth LE Frequency 2404 MHz



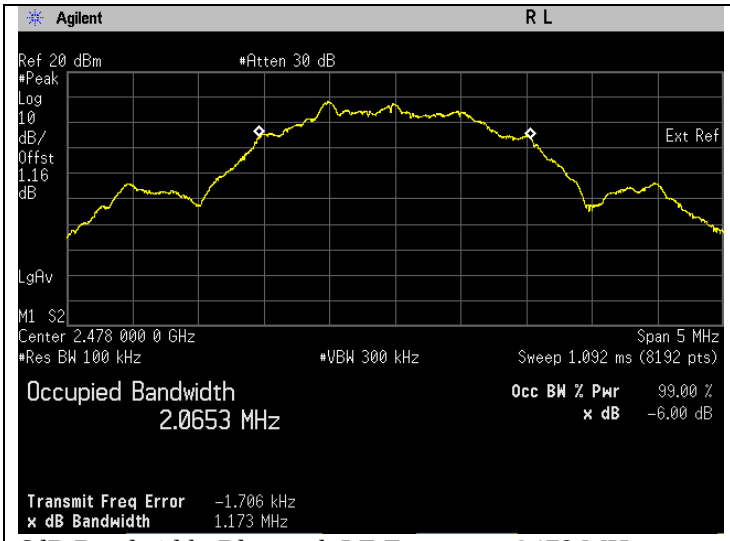
99% Bandwidth. Bluetooth LE Frequency 2404 MHz



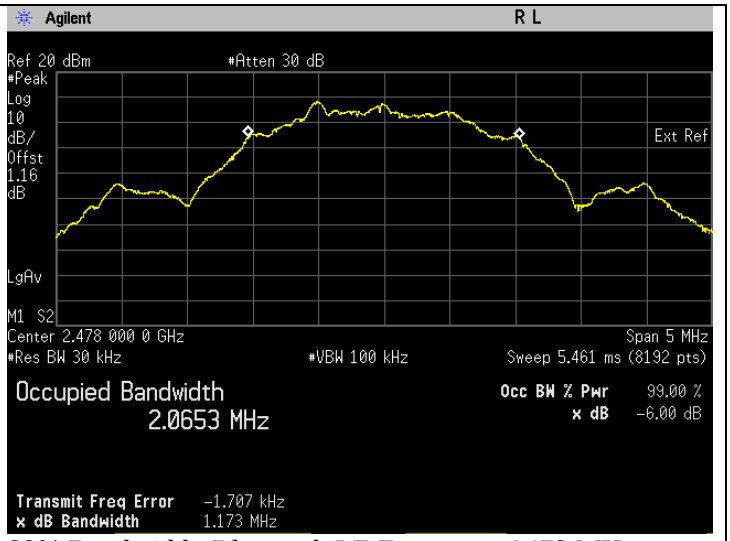
6dB Bandwidth. Bluetooth LE Frequency 2440 MHz



99% Bandwidth. Bluetooth LE Frequency 2440 MHz



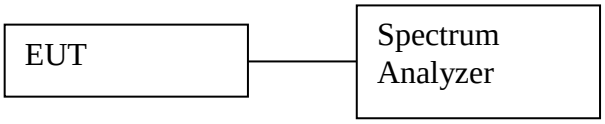
6dB Bandwidth. Bluetooth LE Frequency 2478 MHz



99% Bandwidth. Bluetooth LE Frequency 2478 MHz

6.2 Conducted RF Output Power

6.2.1 Test Setup



Peak

1) Check and ensure the spectrum analyzer well calibrate.
2) Turn on the DUT and set DUT to transmit maximum power.
3) Measure the duty cycle of transmitter output signal.
4) Setting of Spectrum analyzer :
    a. Set the RBW = 3 MHz.
    b. Set the VBW = 50 MHz.
    c. Set the span ≥ [1.5 × OBW bandwidth].
    d. Detector = Peak
    e. Sweep time = auto couple.
    f. Trace mode = max hold.
    g. Allow trace to fully stabilize.

6.2.2 Test Limits:

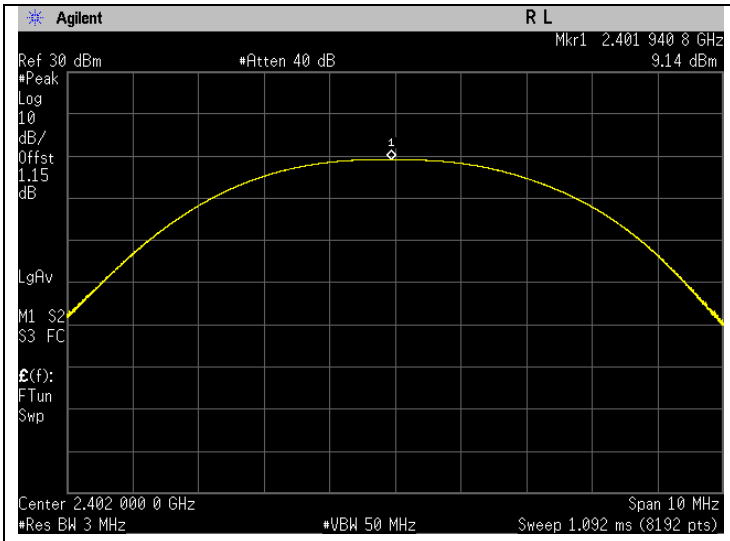
Normal Condition (25 ° C)
≤1 Watt(30 dBm)

6.2.3 Test Data:

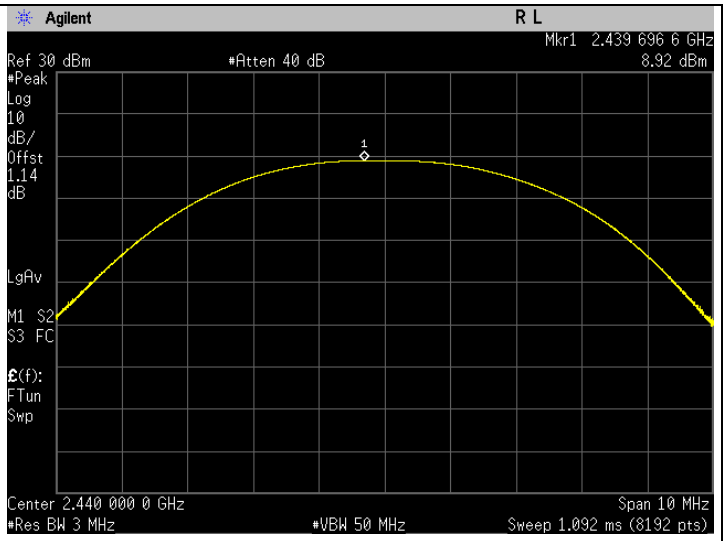
Test was conducted with peak power.

BTLE 1M

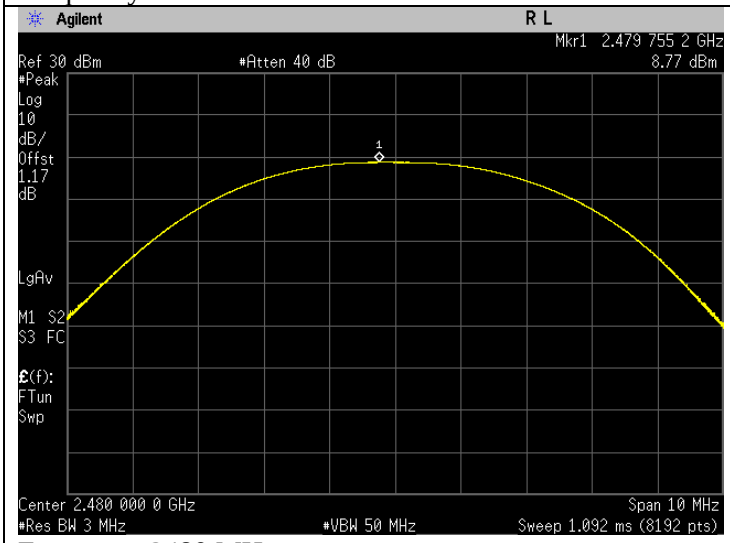
Test Conditions			Test Frequency	Results
Standard	Modulation Type	Tx (MHz)	Output Power (dBm)	Status
Bluetooth L.E	GFSK	2402	9.135	Pass
Bluetooth L.E	GFSK	2440	8.919	Pass
Bluetooth L.E	GFSK	2480	8.765	Pass



Frequency 2402 MHz



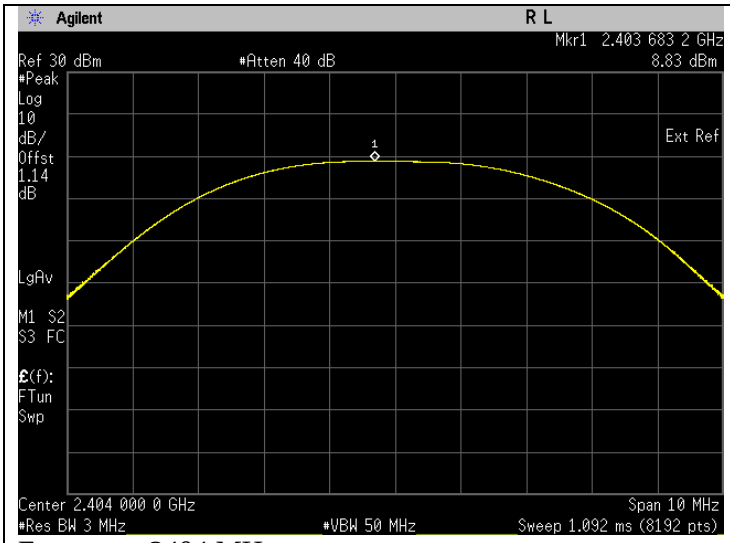
Frequency 2440 MHz



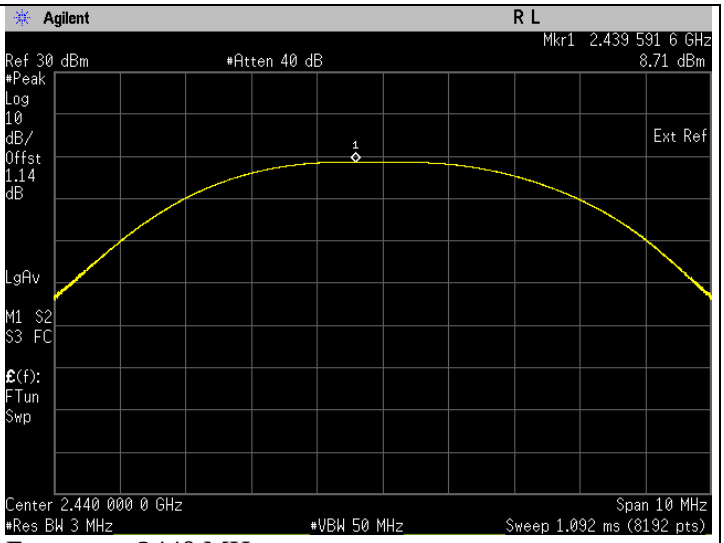
Frequency 2480 MHz

BTLE 2M

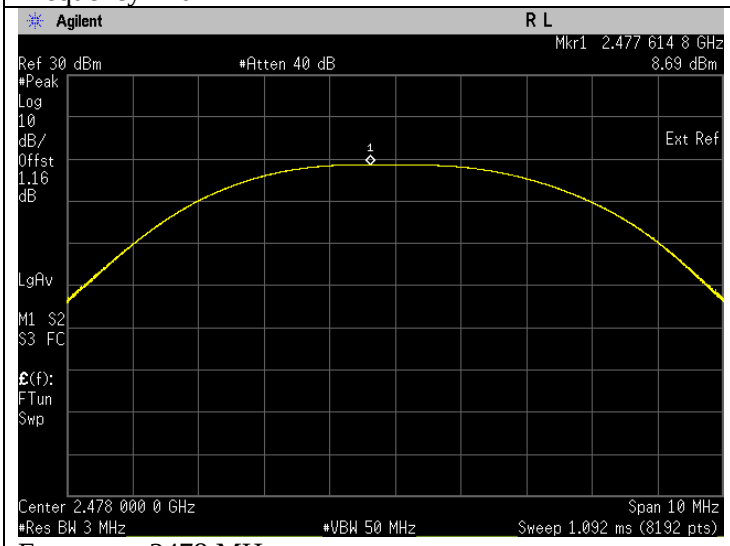
Test Conditions			Test Frequency	Results
Standard	Modulation Type	Tx (MHz)	Output Power (dBm)	Status
Bluetooth L.E	GFSK	2404	8.832	Pass
Bluetooth L.E	GFSK	2440	8.711	Pass
Bluetooth L.E	GFSK	2478	8.691	Pass



Frequency 2404 MHz



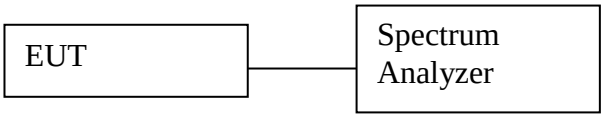
Frequency 2440 MHz



Frequency 2478 MHz

6.3 Maximum Peak Power Spectral Density

6.3.1 Test Setup



Maximum Peak

1) Check and ensure the spectrum analyzer well calibrate.
2) Turn on the DUT and set DUT to transmit maximum power.
3) Connect DUT's antenna terminal to spectrum analyzer with a low loss cable.
4) Setting of Spectrum analyzer :
   a. Set analyzer center frequency to DTS channel center frequency.
   b. Set the span to 1.5 times the DTS bandwidth.
   c. Set the RBW to 3 kHz.
   d. Set the VBW ≥ [3 × RBW].
   e. Detector = peak.
   f. Sweep time = auto couple.
   g. Trace mode = max hold.
   h. Allow trace to fully stabilize.
   i. Use the peak marker function to determine the maximum amplitude level within the RBW.
   j. If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.

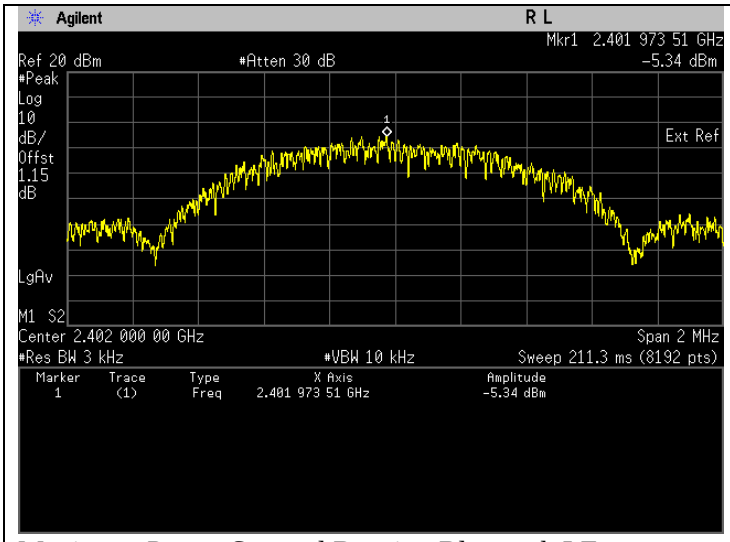
6.3.2 Test Limits:

Normal Condition (25 º C)
≤ 8 dBm/3kHz

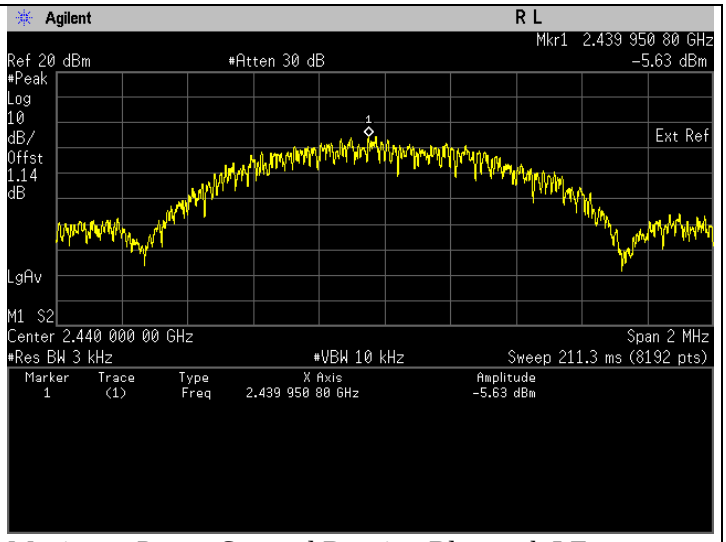
6.3.3 Test Result

BTLE 1M

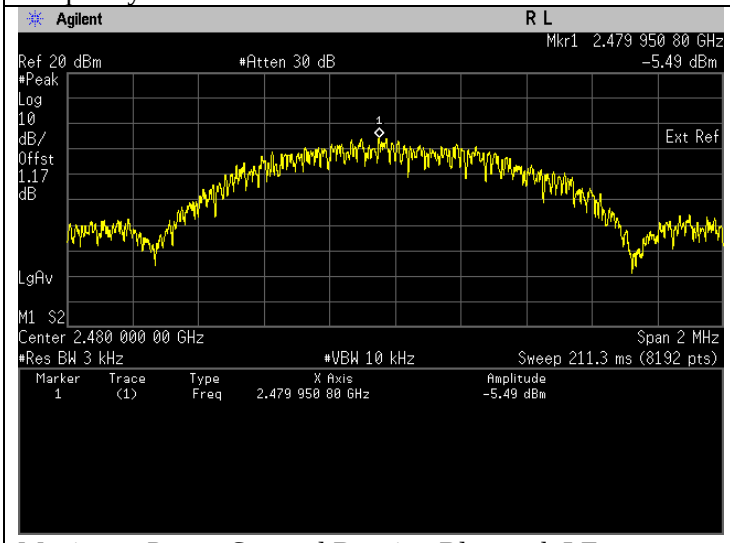
Test Conditions		Test Frequency	Results	
Standard	Modulation Type	Tx (MHz)	Power (dBm/3kHz)	Status
Bluetooth L.E.	GFSK	2402	-5.34	Pass
Bluetooth L.E.	GFSK	2440	-5.63	Pass
Bluetooth L.E.	GFSK	2480	-5.49	Pass



Maximum Power Spectral Density. Bluetooth LE Frequency 2402 MHz



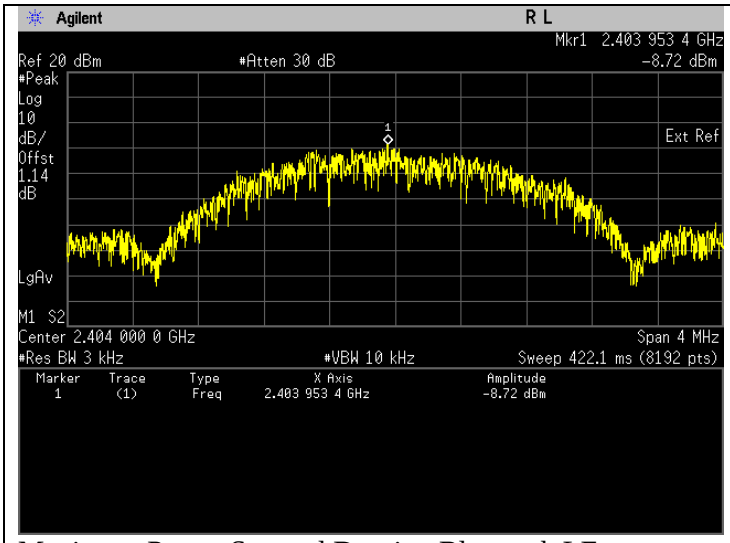
Maximum Power Spectral Density. Bluetooth LE Frequency 2440 MHz



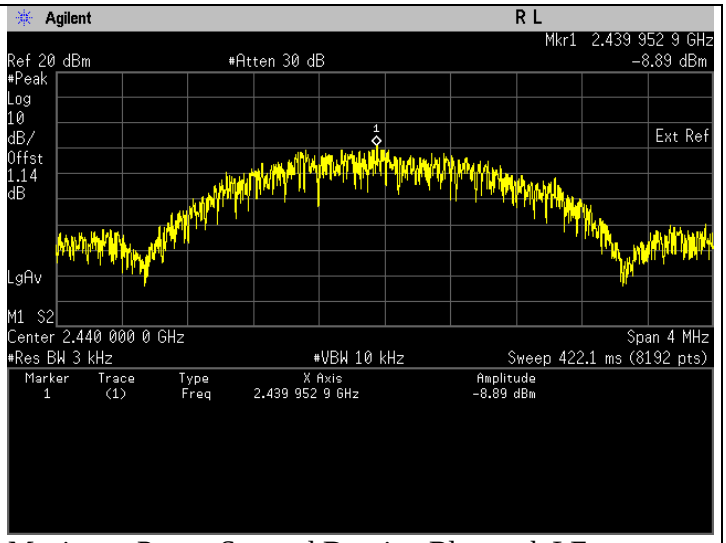
Maximum Power Spectral Density. Bluetooth LE Frequency 2480 MHz

BTLE 2M

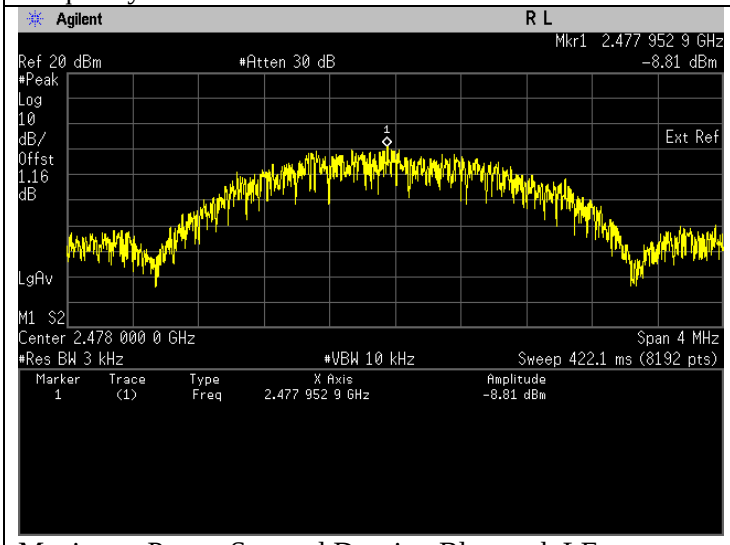
Test Conditions		Test Frequency	Results	
Standard	Modulation Type	Tx (MHz)	Power (dBm/3kHz)	Status
Bluetooth L.E.	GFSK	2404	-8.72	Pass
Bluetooth L.E.	GFSK	2440	-8.89	Pass
Bluetooth L.E.	GFSK	2478	-8.81	Pass



Maximum Power Spectral Density. Bluetooth LE Frequency 2404 MHz



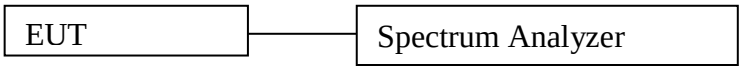
Maximum Power Spectral Density. Bluetooth LE Frequency 2440 MHz



Maximum Power Spectral Density. Bluetooth LE Frequency 2478 MHz

6.4 Conducted Spurious Emission

6.4.1 Test Setup



1) Check and ensure the spectrum analyzer well calibrate.
2) Turn on the DUT and set DUT to transmit maximum power.
3) Connect DUT's antenna terminal to spectrum analyzer with a low loss cable.
4) Setting of Spectrum analyzer :
   a. RBW = 100 kHz
   b. VBW = 300 kHz
   c. Detector mode = Peak
   d. Trace = Max Hold
   e. Sweep = auto
5) Use the peak marker function to measure highest emission and scan up to 10th harmonic.

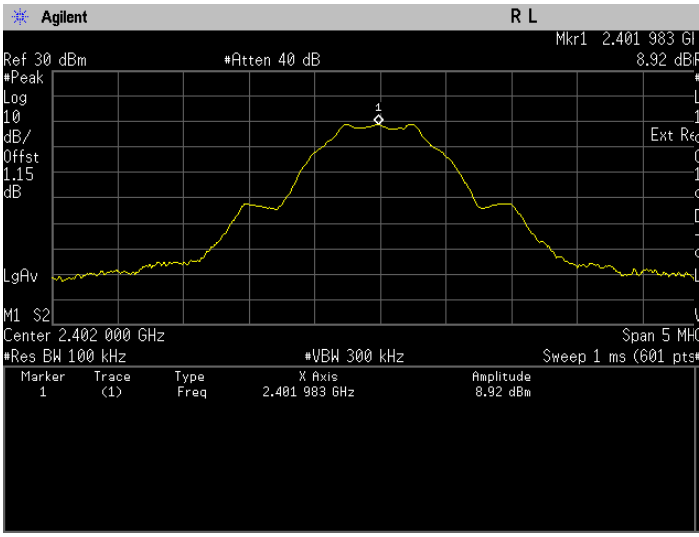
6.4.2 Test Limits:

Normal Condition (25 º C)
Shall be at least 20 dB below max power. (Peak detector)

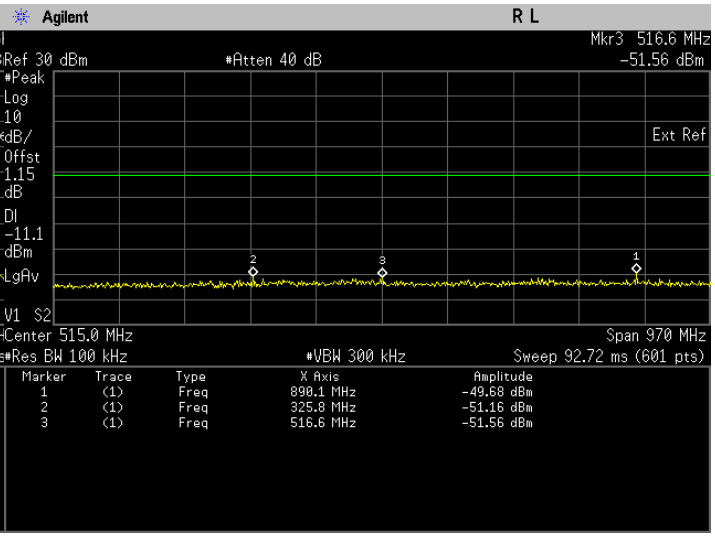
6.4.3 Test Result

BTLE 1M

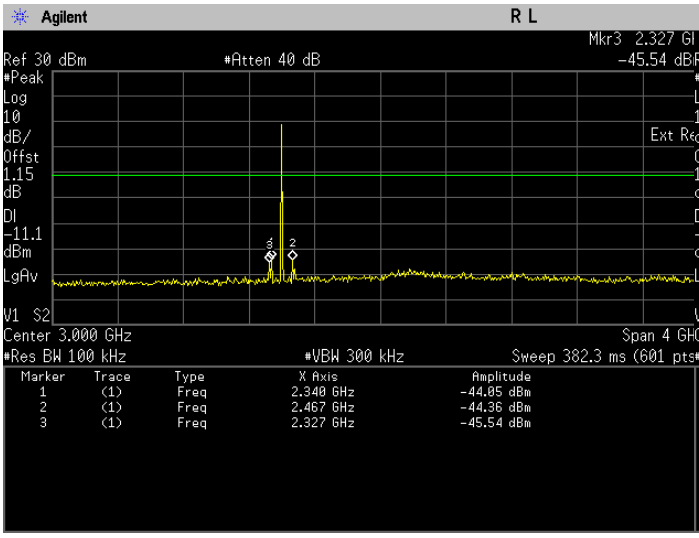
Test Conditions			Test Frequency	Results	
Standard	Modulation Type	Tx (MHz)	Spurs (MHz)	Level (dBm)	Status
Bluetooth L.E.	GFSK	2402	24692.00	-40.04	Pass
			24942.00	-40.08	Pass
			24558.00	-40.55	Pass
Bluetooth L.E.	GFSK	2440	24567.00	-39.53	Pass
			24833.00	-40.38	Pass
			24508.00	-40.42	Pass
Bluetooth L.E.	GFSK	2480	24733.00	-40.57	Pass
			24625.00	-40.59	Pass
			24858.00	-40.61	Pass



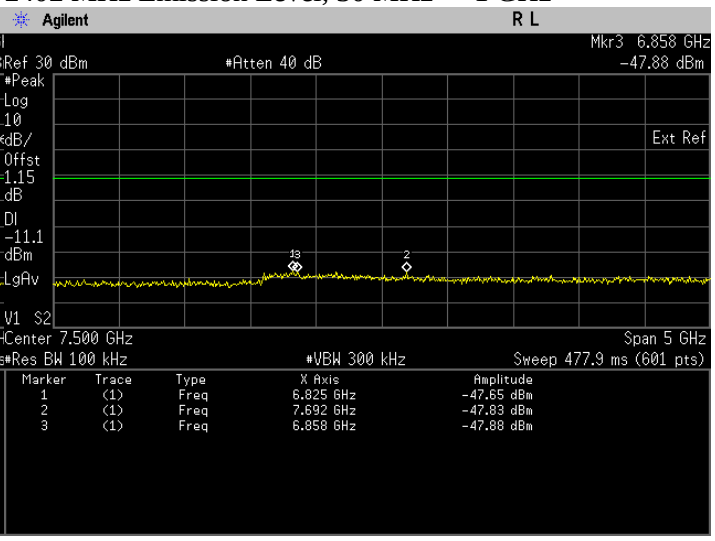
Conducted Emissions(Peak). Bluetooth LE, Frequency 2402 MHz Reference Level



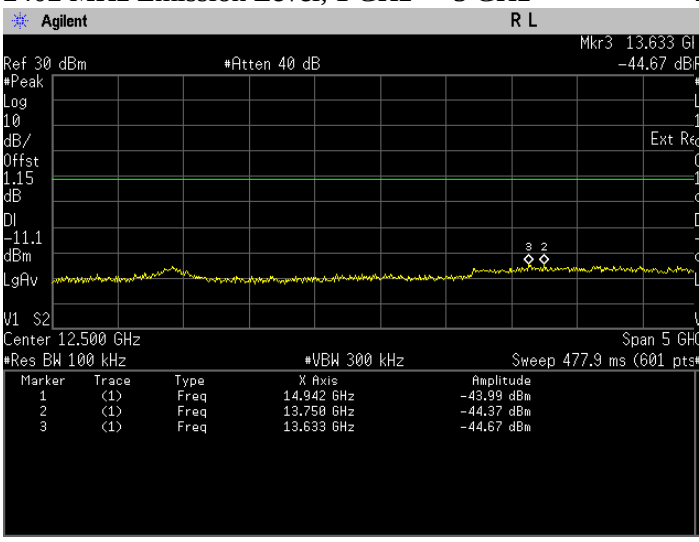
Conducted Emissions(Peak). Bluetooth LE, Frequency 2402 MHz Emission Level, 30 MHz -> 1 GHz



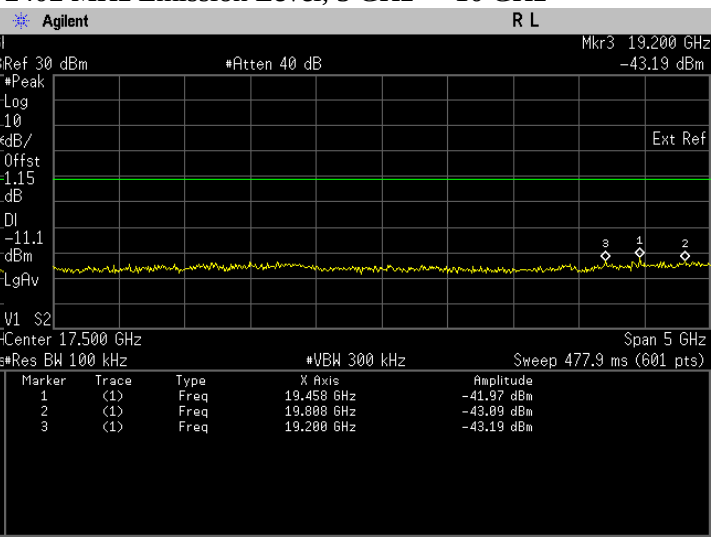
Conducted Emissions(Peak). Bluetooth LE, Frequency 2402 MHz Emission Level, 1 GHz -> 5 GHz



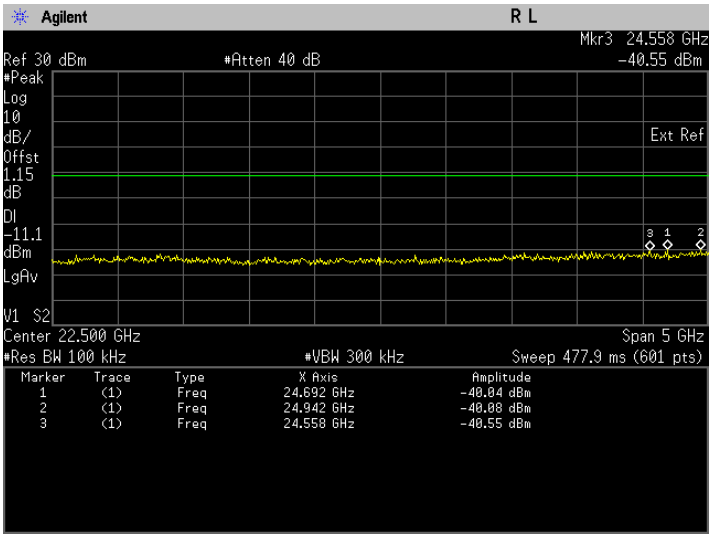
Conducted Emissions(Peak). Bluetooth LE, Frequency 2402 MHz Emission Level, 5 GHz -> 10 GHz



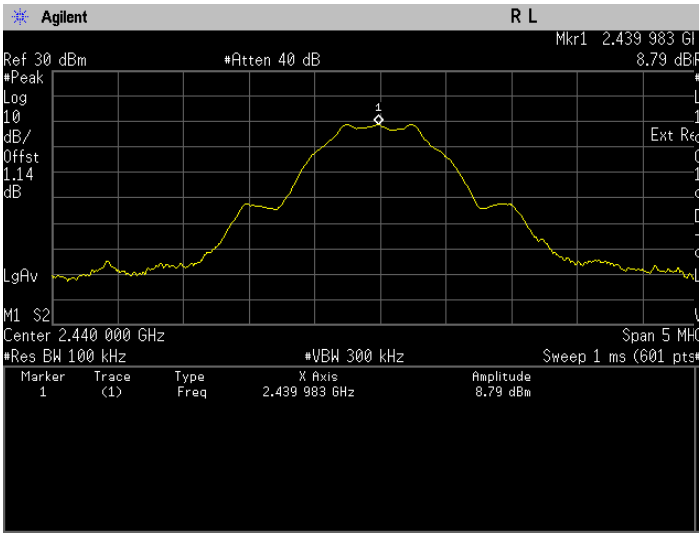
Conducted Emissions(Peak). Bluetooth LE, Frequency 2402 Emission Level, 10 GHz -> 15 GHz



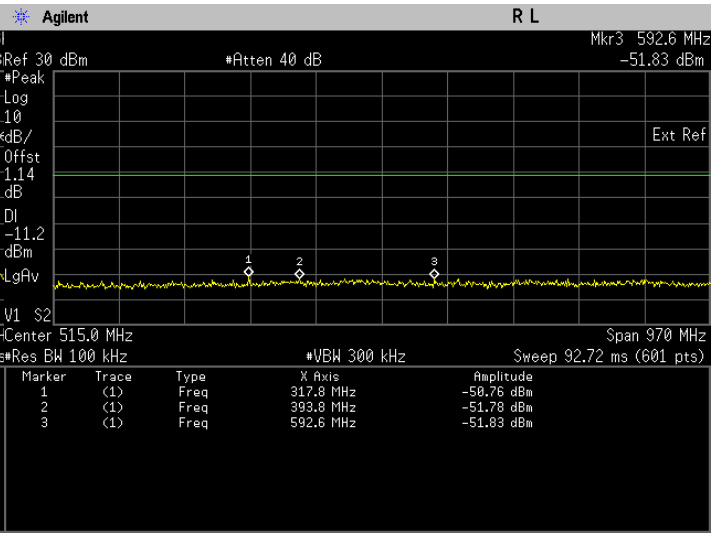
Conducted Emissions(Peak). Bluetooth LE, Frequency 2402 MHz Emission Level, 15 GHz -> 20 GHz



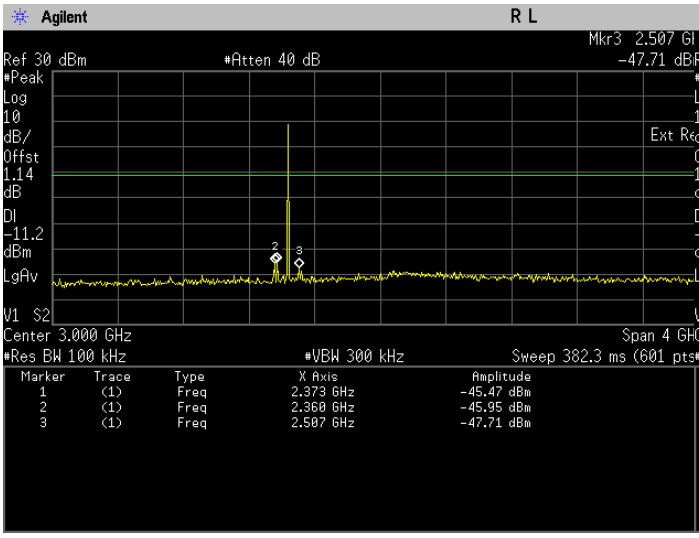
Conducted Emissions(Peak). Bluetooth LE, Frequency 2402 MHz Emission Level, 20 GHz -> 25 GHz



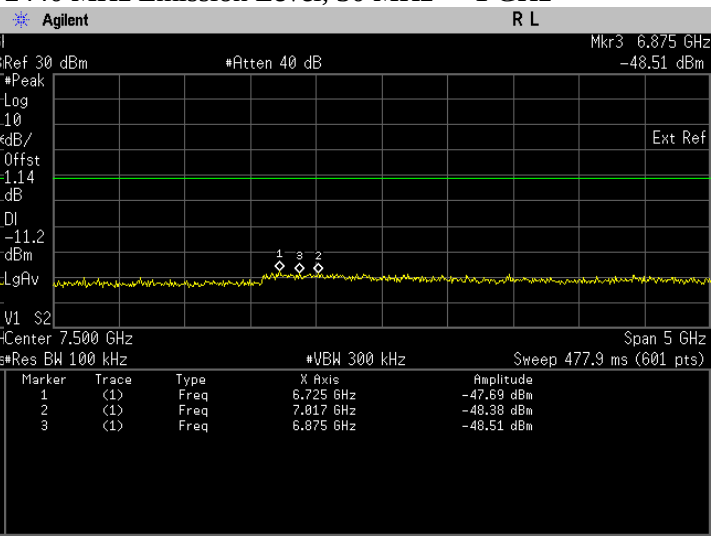
Conducted Emissions(Peak). Bluetooth LE, Frequency 2440 MHz Reference Level



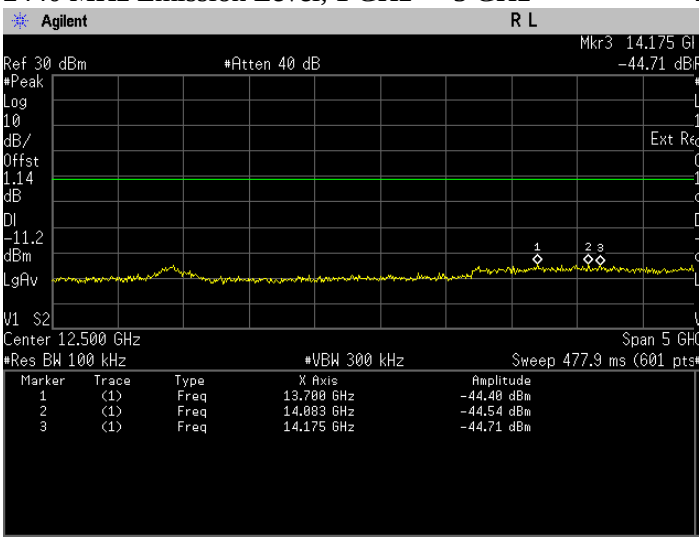
Conducted Emissions(Peak). Bluetooth LE, Frequency 2440 MHz Emission Level, 30 MHz -> 1 GHz



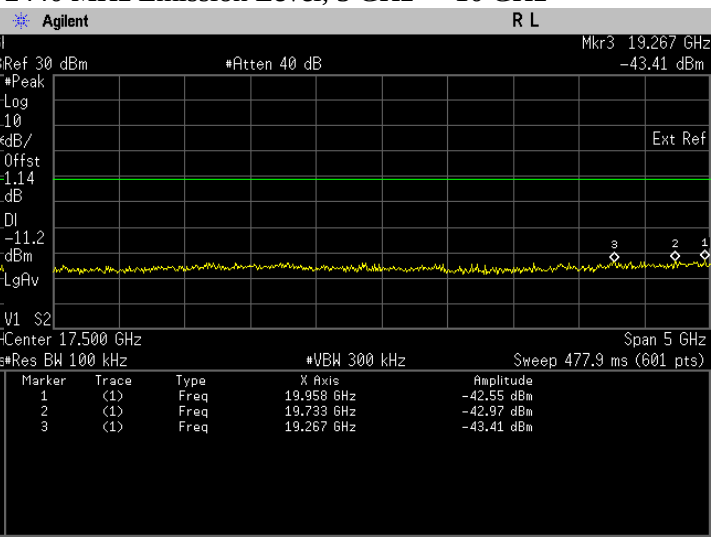
Conducted Emissions(Peak). Bluetooth LE, Frequency 2440 MHz Emission Level, 1 GHz -> 5 GHz



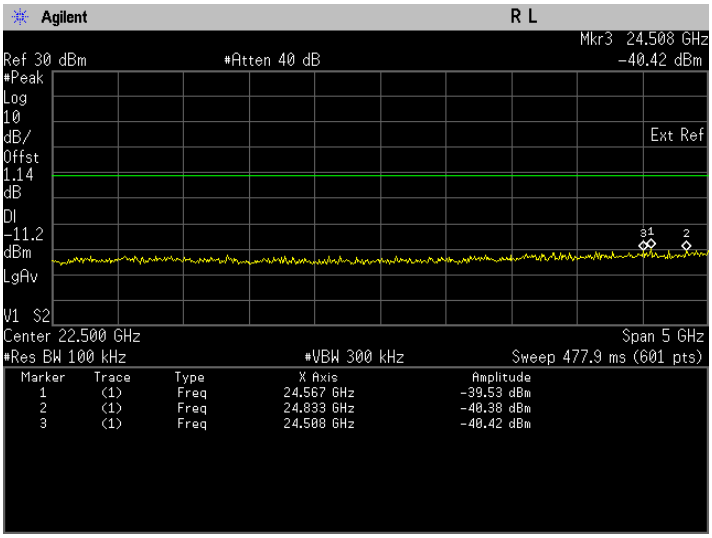
Conducted Emissions(Peak). Bluetooth LE, Frequency 2440 MHz Emission Level, 5 GHz -> 10 GHz



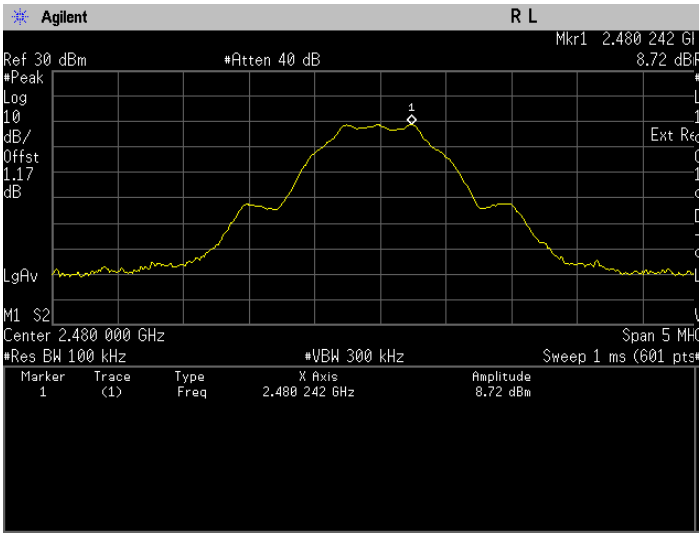
Conducted Emissions(Peak). Bluetooth LE, Frequency 2440 Emission Level, 10 GHz -> 15 GHz



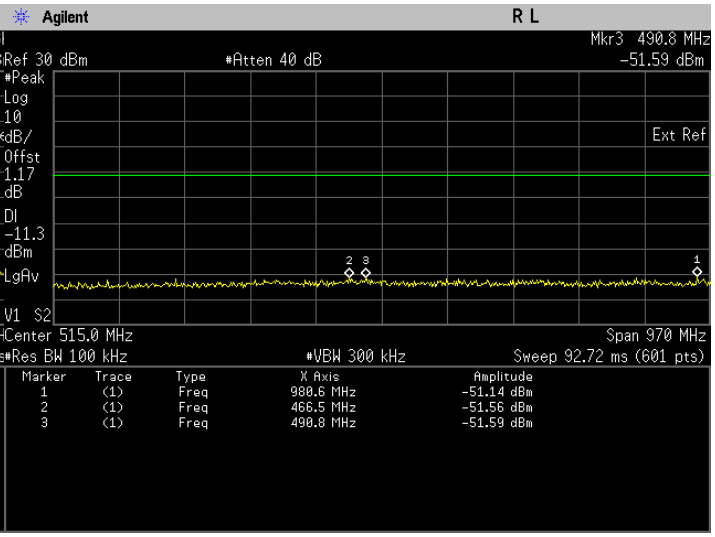
Conducted Emissions(Peak). Bluetooth LE, Frequency 2440 MHz Emission Level, 15 GHz -> 20 GHz



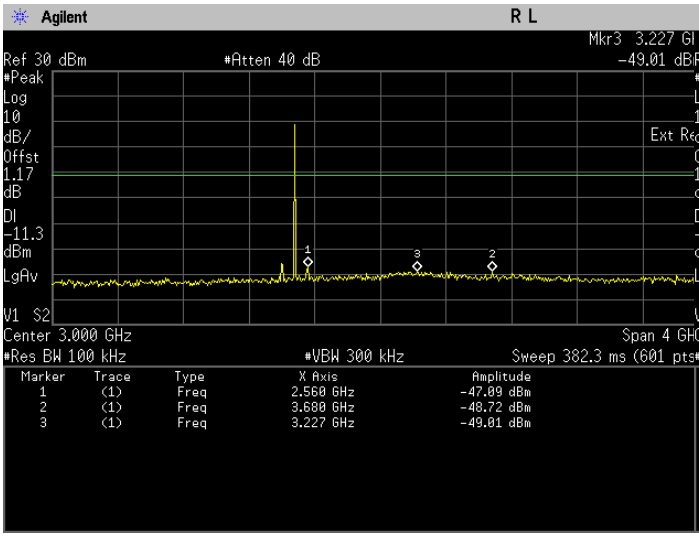
Conducted Emissions(Peak). Bluetooth LE, Frequency 2440 MHz Emission Level, 20 GHz -> 25 GHz



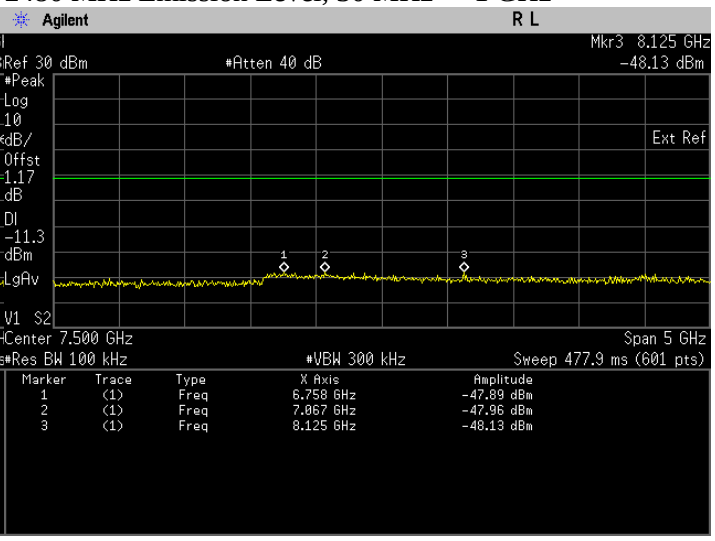
Conducted Emissions(Peak). Bluetooth LE, Frequency 2480 MHz Reference Level



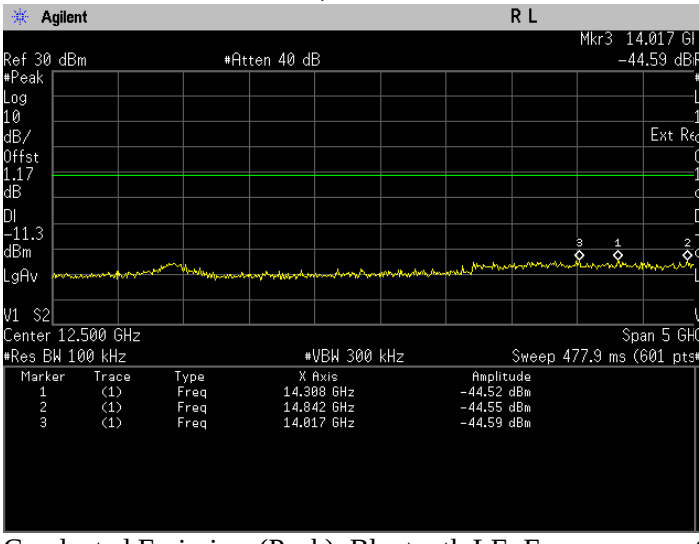
Conducted Emissions(Peak). Bluetooth LE, Frequency 2480 MHz Emission Level, 30 MHz -> 1 GHz



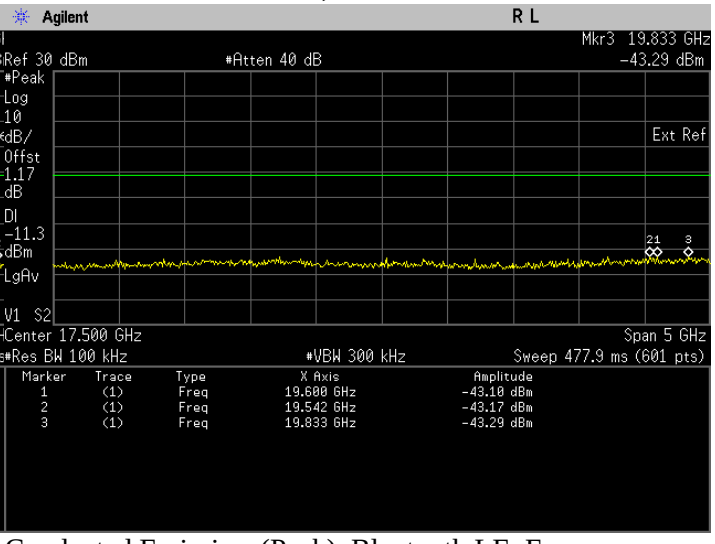
Conducted Emissions(Peak). Bluetooth LE, Frequency 2480 MHz Emission Level, 1 GHz -> 5 GHz



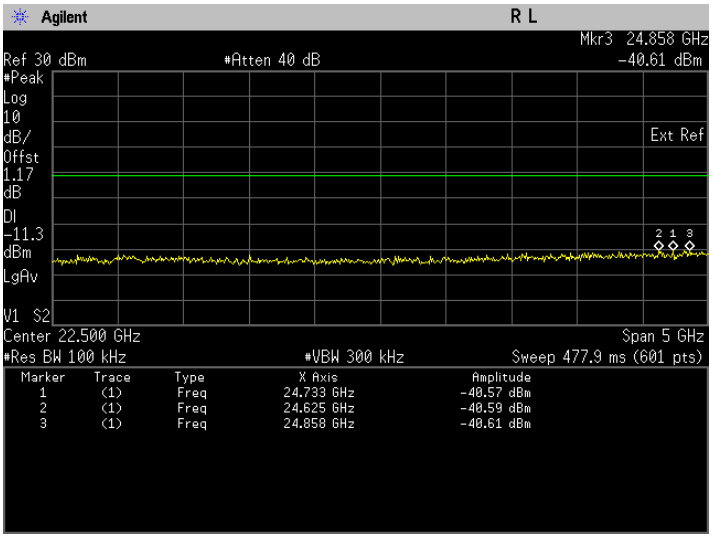
Conducted Emissions(Peak). Bluetooth LE, Frequency 2480 MHz Emission Level, 5 GHz -> 10 GHz



Conducted Emissions(Peak). Bluetooth LE, Frequency 2480 Emission Level, 10 GHz -> 15 GHz



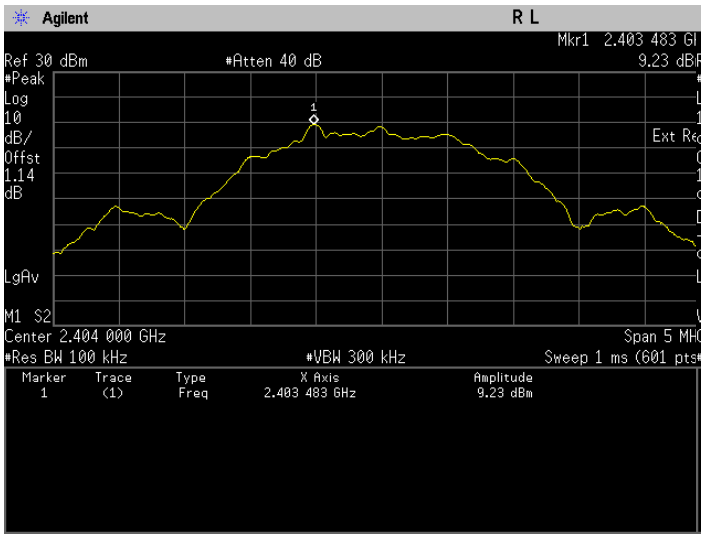
Conducted Emissions(Peak). Bluetooth LE, Frequency 2480 MHz Emission Level, 15 GHz -> 20 GHz



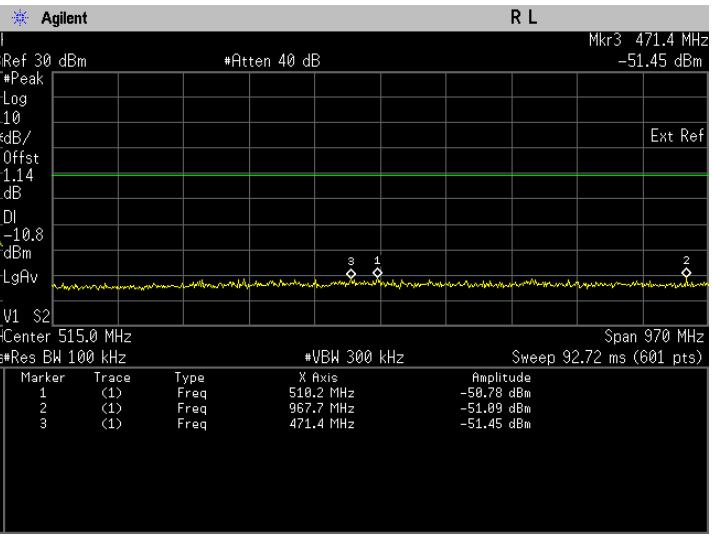
Conducted Emissions(Peak). Bluetooth LE, Frequency 2480 MHz Emission Level, 20 GHz -> 25 GHz

BTLE 2M

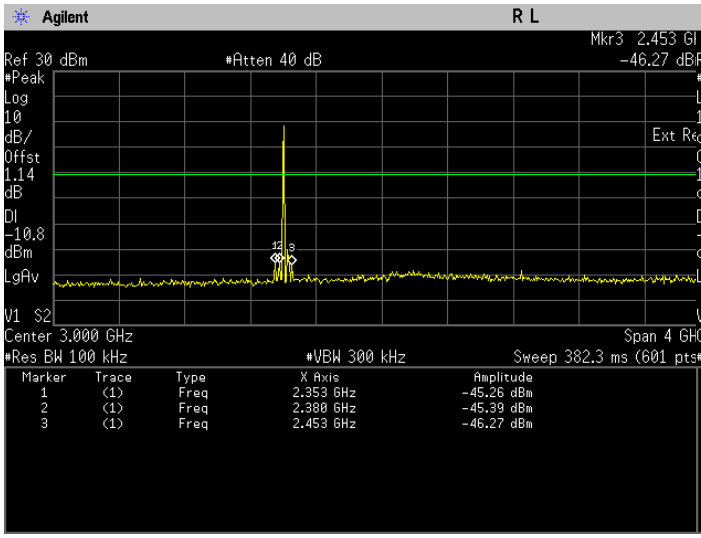
Test Conditions			Test Frequency	Results	
Standard	Modulation Type	Tx (MHz)	Spurs (MHz)	Level (dBm)	Status
Bluetooth L.E.	GFSK	2404	24908.00	-40.41	Pass
			24850.00	-40.81	Pass
			24350.00	-41.39	Pass
Bluetooth L.E.	GFSK	2440	24425.00	-40.46	Pass
			24442.00	-40.65	Pass
			24983.00	-40.78	Pass
Bluetooth L.E.	GFSK	2478	24917.00	-39.45	Pass
			24892.00	-39.46	Pass
			24667.00	-39.94	Pass



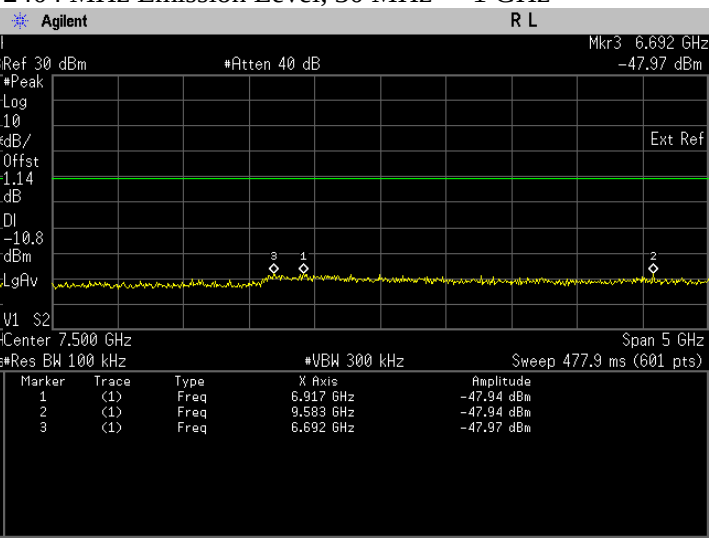
Conducted Emissions(Peak). Bluetooth LE, Frequency 2404 MHz Reference Level



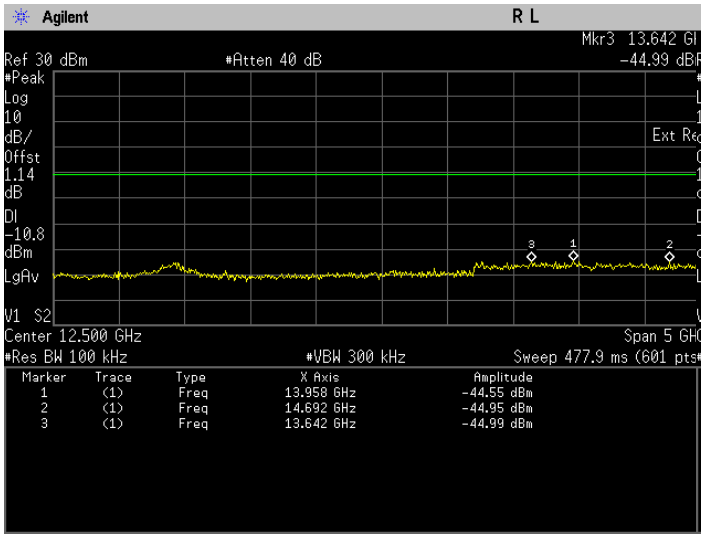
Conducted Emissions(Peak). Bluetooth LE, Frequency 2404 MHz Emission Level, 30 MHz -> 1 GHz



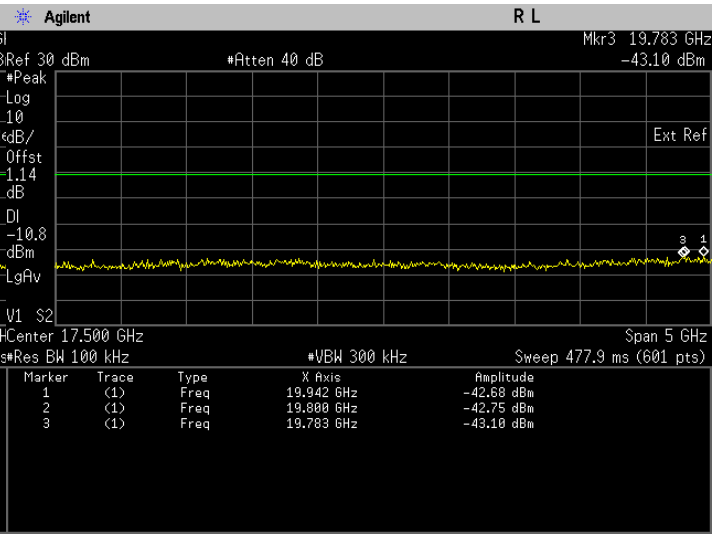
Conducted Emissions(Peak). Bluetooth LE, Frequency 2404 MHz Emission Level, 1 GHz -> 5 GHz



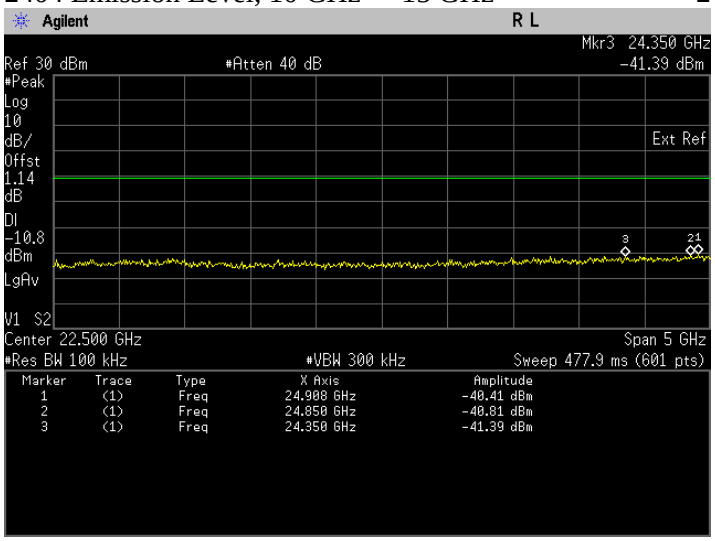
Conducted Emissions(Peak). Bluetooth LE, Frequency 2404 MHz Emission Level, 5 GHz -> 10 GHz



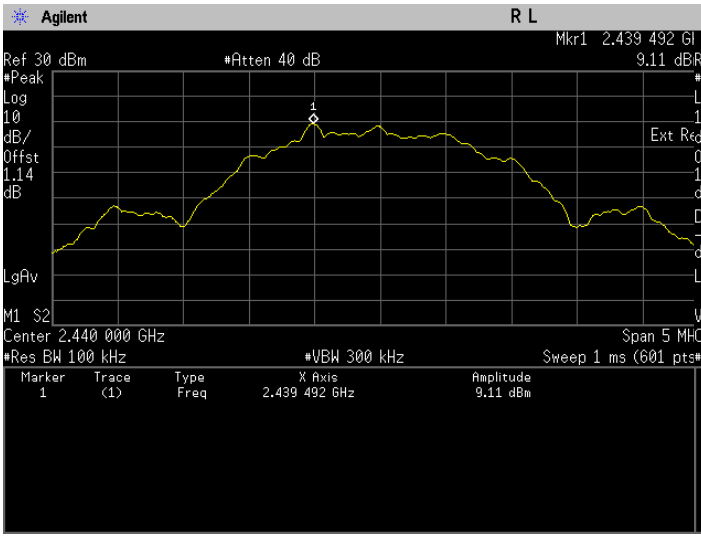
Conducted Emissions(Peak). Bluetooth LE, Frequency 2404 Emission Level, 10 GHz -> 15 GHz



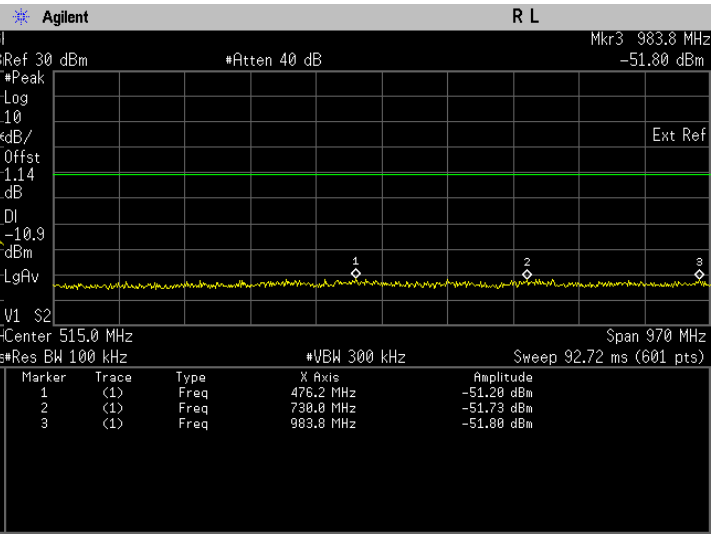
Conducted Emissions(Peak). Bluetooth LE, Frequency 2404 MHz Emission Level, 15 GHz -> 20 GHz



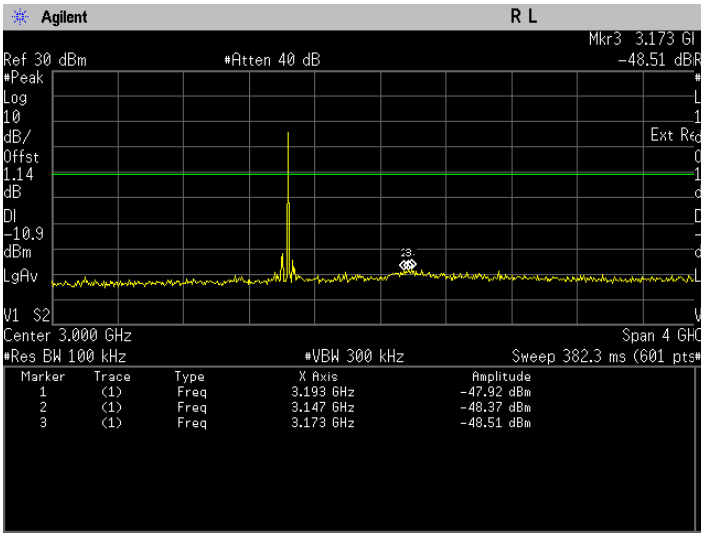
Conducted Emissions(Peak). Bluetooth LE, Frequency 2404 MHz Emission Level, 20 GHz -> 25 GHz



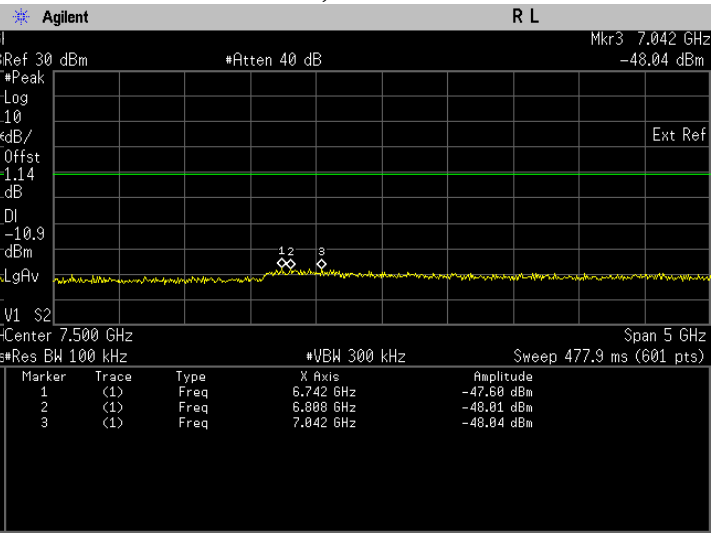
Conducted Emissions(Peak). Bluetooth LE, Frequency 2440 MHz Reference Level



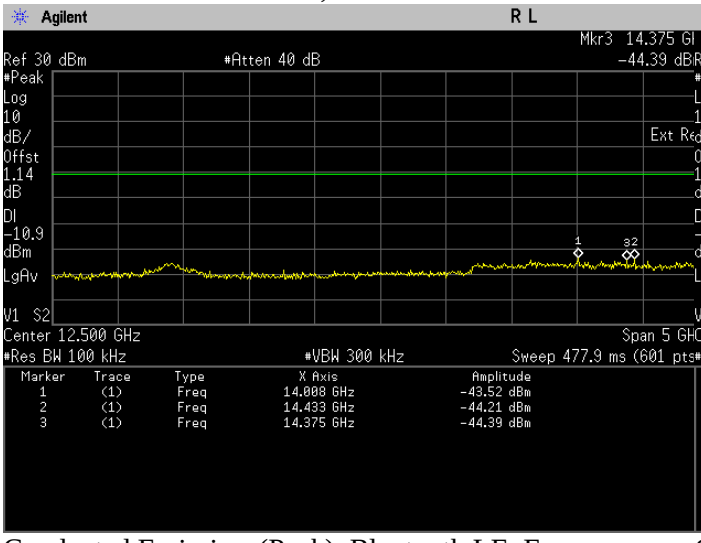
Conducted Emissions(Peak). Bluetooth LE, Frequency 2440 MHz Emission Level, 30 MHz -> 1 GHz



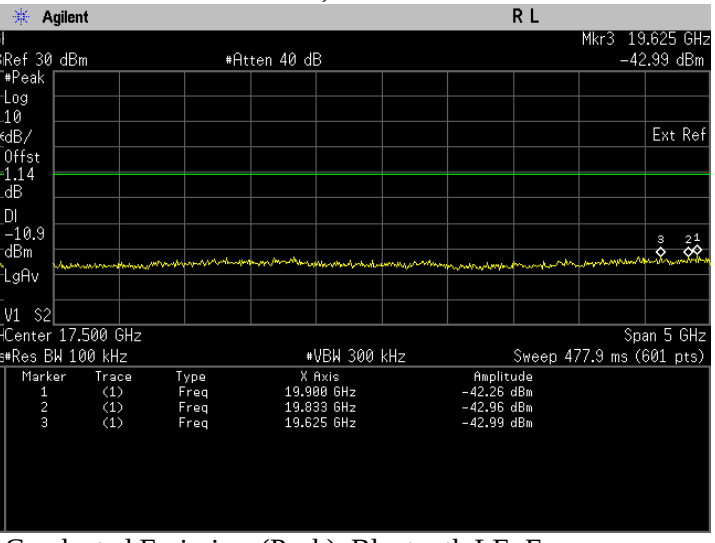
Conducted Emissions(Peak). Bluetooth LE, Frequency 2440 MHz Emission Level, 1 GHz -> 5 GHz



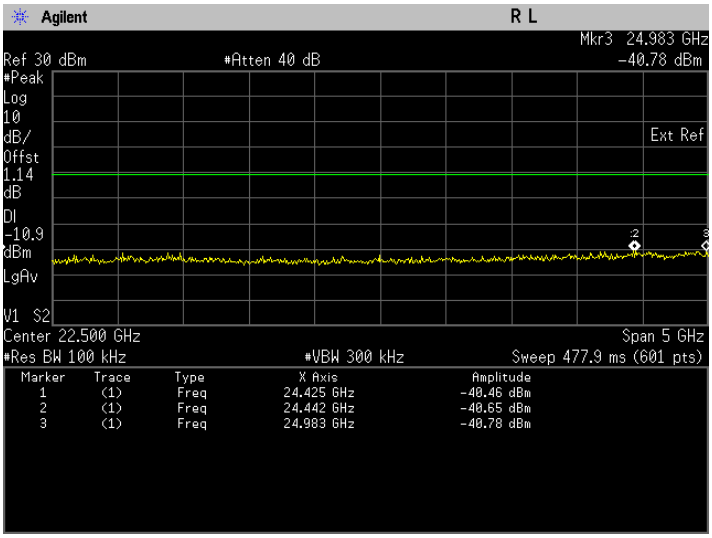
Conducted Emissions(Peak). Bluetooth LE, Frequency 2440 MHz Emission Level, 5 GHz -> 10 GHz



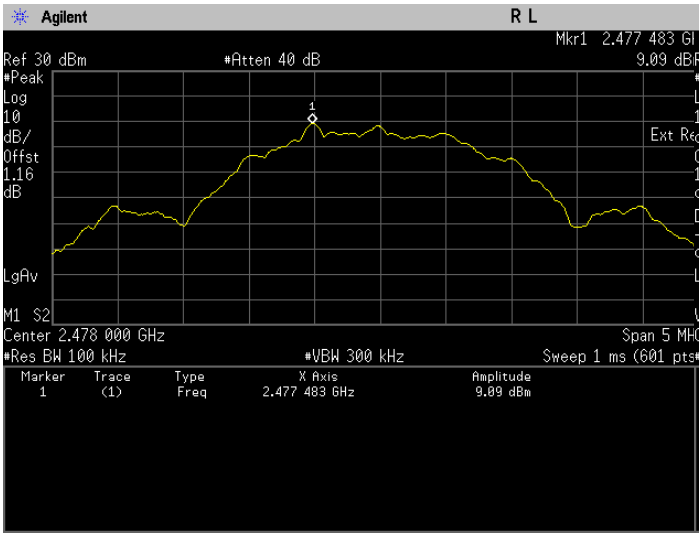
Conducted Emissions(Peak). Bluetooth LE, Frequency 2440 Emission Level, 10 GHz -> 15 GHz



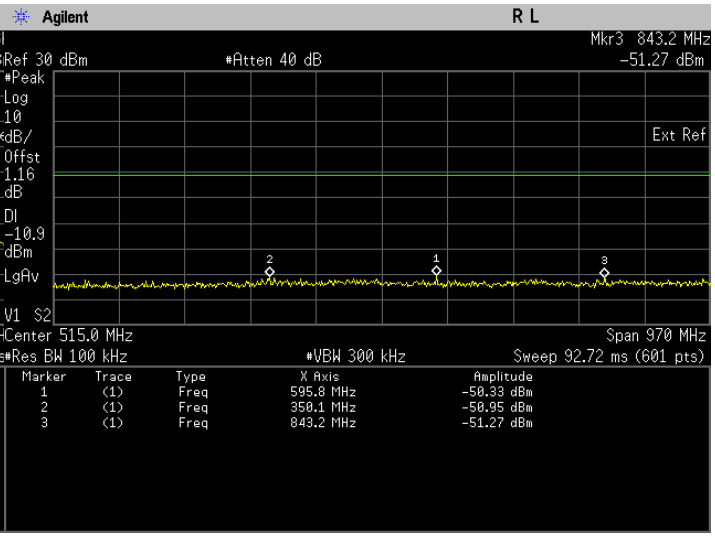
Conducted Emissions(Peak). Bluetooth LE, Frequency 2440 MHz Emission Level, 15 GHz -> 20 GHz



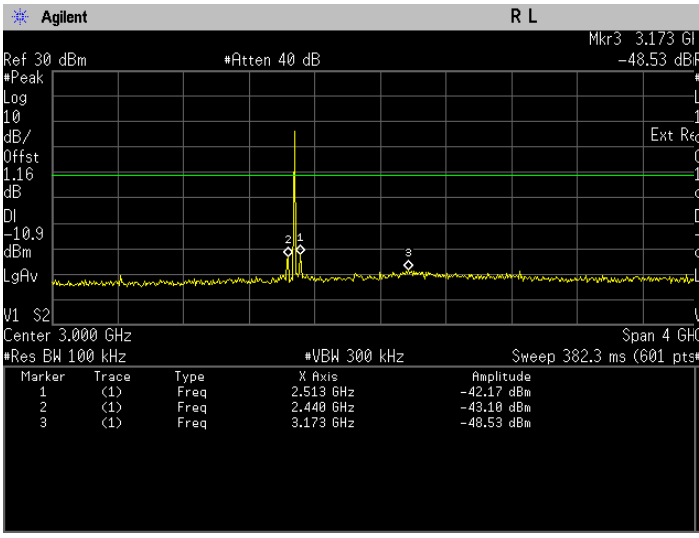
Conducted Emissions(Peak). Bluetooth LE, Frequency 2440 MHz Emission Level, 20 GHz -> 25 GHz



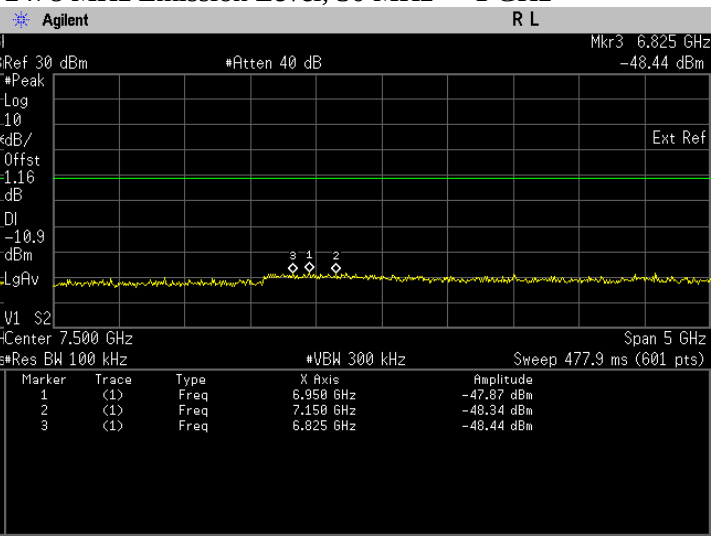
Conducted Emissions(Peak). Bluetooth LE, Frequency 2478 MHz Reference Level



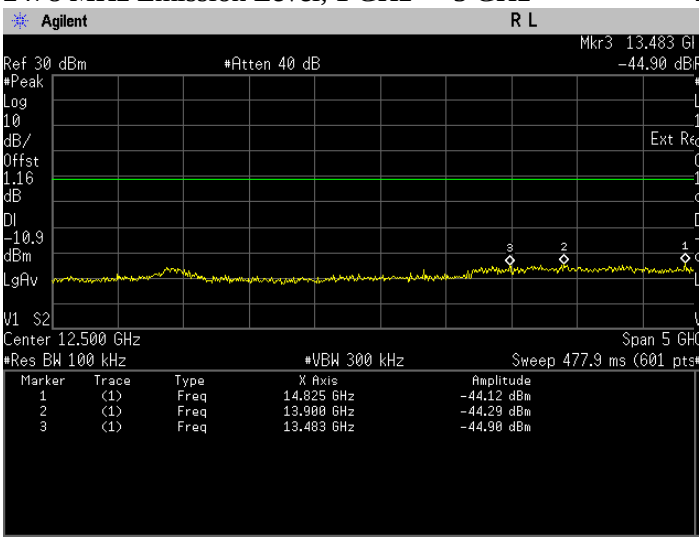
Conducted Emissions(Peak). Bluetooth LE, Frequency 2478 MHz Emission Level, 30 MHz -> 1 GHz



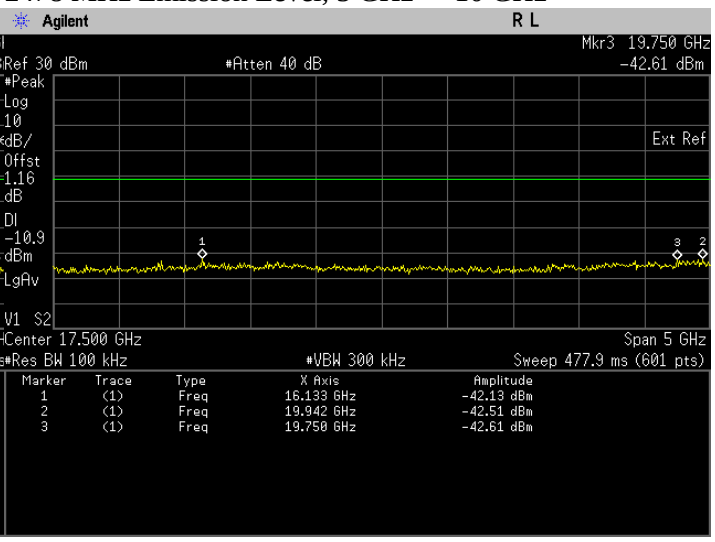
Conducted Emissions(Peak). Bluetooth LE, Frequency 2478 MHz Emission Level, 1 GHz -> 5 GHz



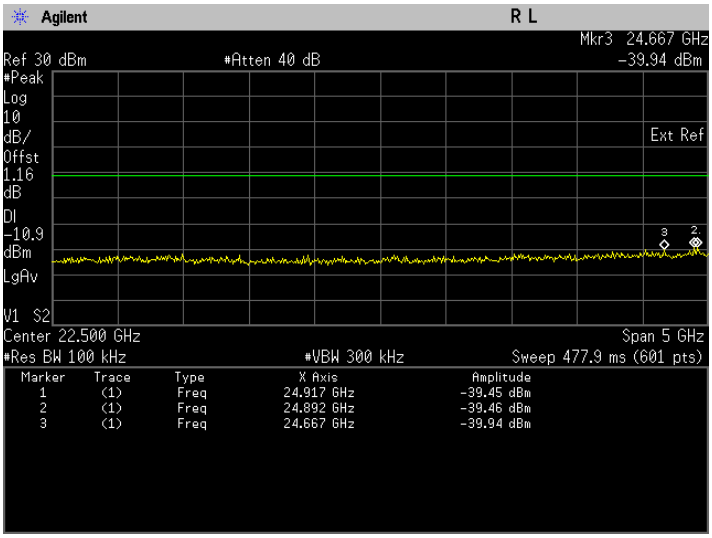
Conducted Emissions(Peak). Bluetooth LE, Frequency 2478 MHz Emission Level, 5 GHz -> 10 GHz



Conducted Emissions(Peak). Bluetooth LE, Frequency 2478 Emission Level, 10 GHz -> 15 GHz



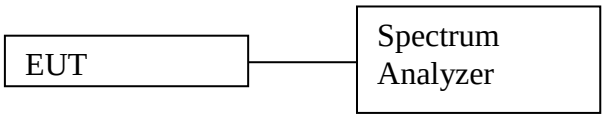
Conducted Emissions(Peak). Bluetooth LE, Frequency 2478 MHz Emission Level, 15 GHz -> 20 GHz



Conducted Emissions(Peak). Bluetooth LE, Frequency 2478 MHz Emission Level, 20 GHz -> 25 GHz

6.5 Band edge Conducted Spurious Emission

6.5.1 Test Setup



a) Check and ensure the spectrum analyzer well calibrate.
b) Turn on the DUT and set DUT to transmit maximum power.
c) Connect DUT's antenna terminal to spectrum analyzer with a low loss cable.
d) Setting of Spectrum analyzer :
    a. RBW = 100 kHz
    b. VBW = 300 kHz
    c. Detector mode = Peak
    d. Trace = Max Hold
    e. Sweep = auto
e) Use the peak marker function to measure highest emission.

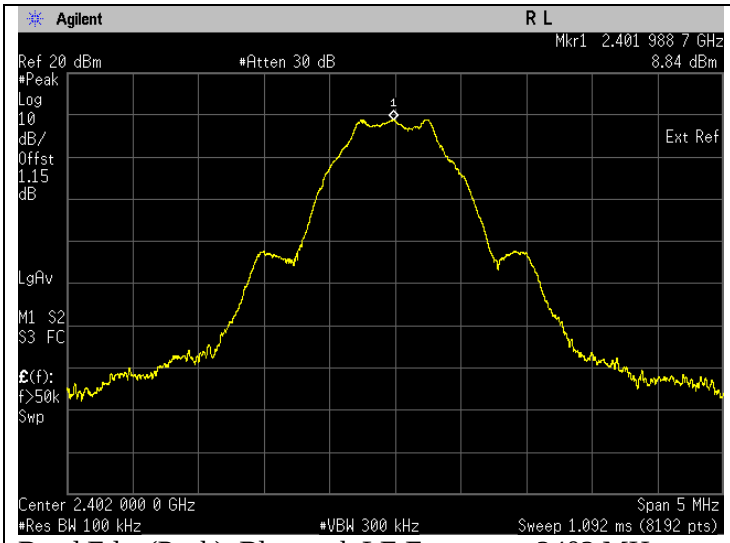
6.5.2 Test Limits:

Normal Condition (25 º C)
Shall be at least 20 dB below max power. (Peak detector)

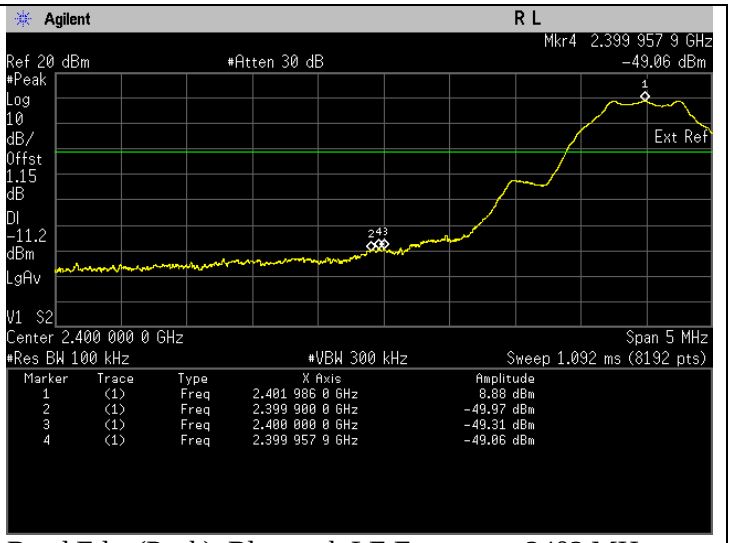
6.5.3 Test Result

BTLE 1M

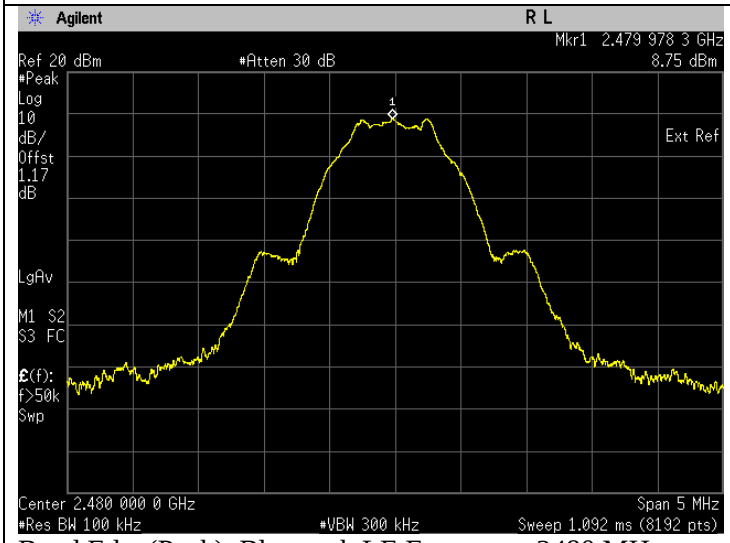
Test Conditions		Test Frequency	Results		
Standard	Modulation Type	Tx (MHz)	Frequencies (MHz)	Power (dBm)	Status
Bluetooth L.E	GFSK	2402	2399.96	-49.06	Pass
Bluetooth L.E	GFSK	2480	2483.60	-55.33	Pass



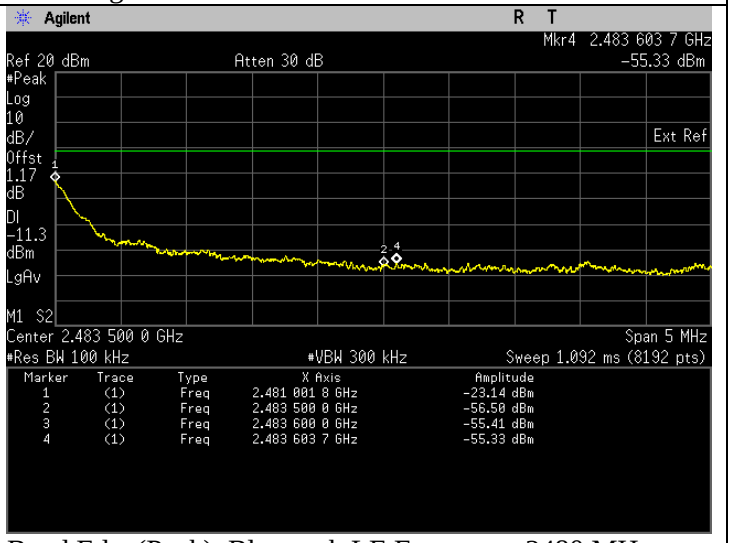
Band Edge(Peak). Bluetooth LE Frequency 2402 MHz Reference Level



Band Edge(Peak). Bluetooth LE Frequency 2402 MHz Band Edge



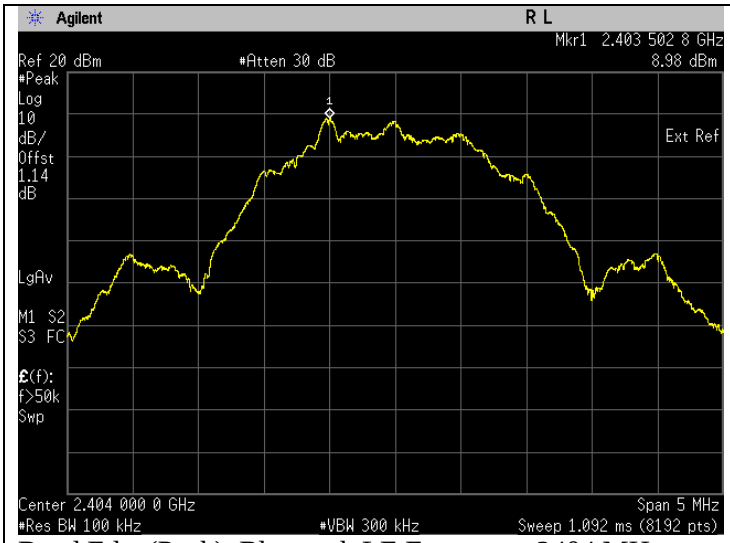
Band Edge(Peak). Bluetooth LE Frequency 2480 MHz Reference Level



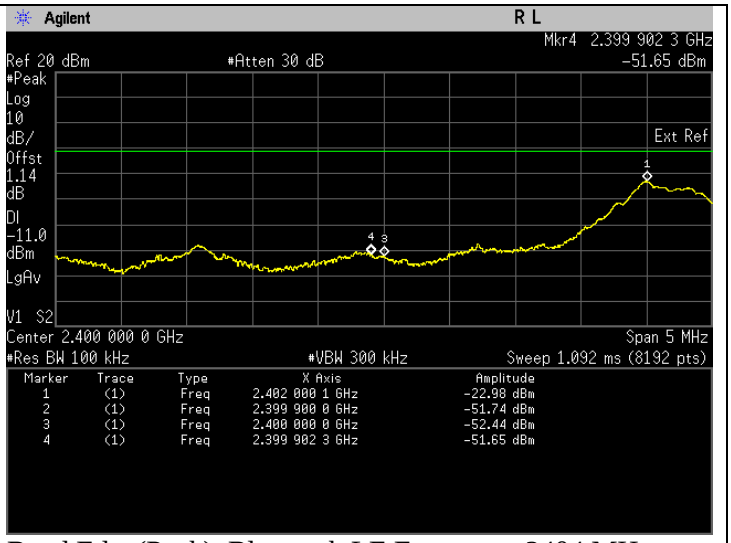
Band Edge(Peak). Bluetooth LE Frequency 2480 MHz Band Edge

BTLE 2M

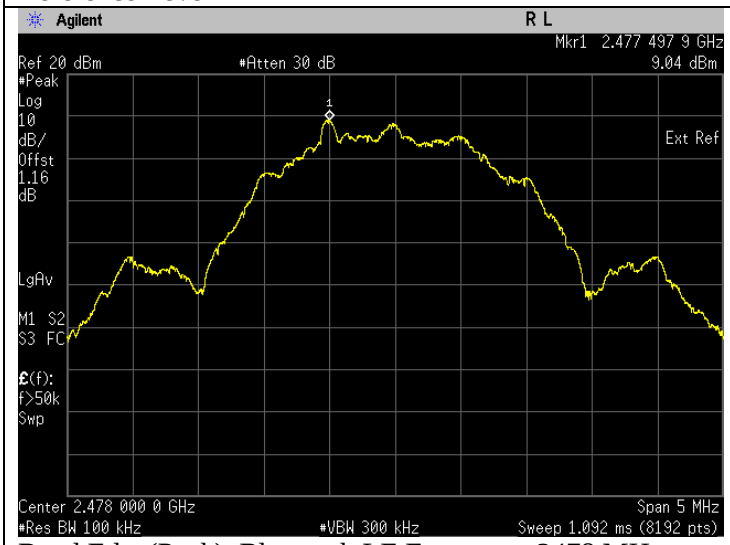
Test Conditions		Test Frequency	Results		
Standard	Modulation Type	Tx (MHz)	Frequencies (MHz)	Power (dBm)	Status
Bluetooth L.E	GFSK	2404	2399.90	-51.65	Pass
Bluetooth L.E	GFSK	2478	2483.52	-50.49	Pass



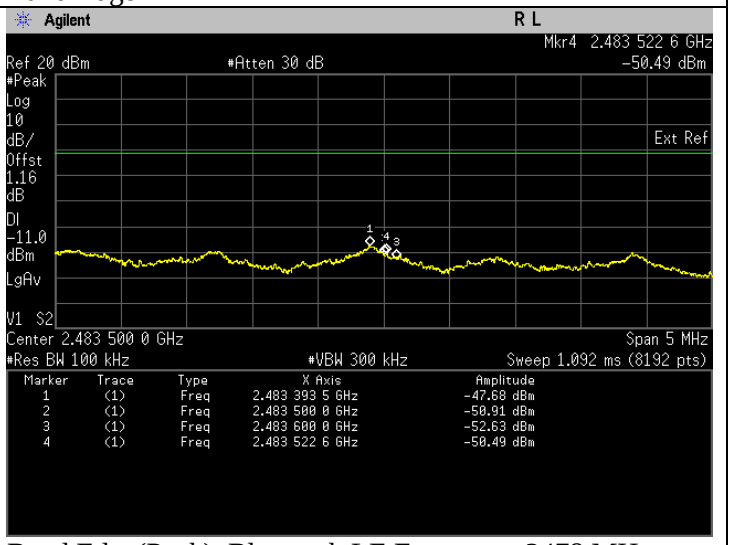
Band Edge(Peak). Bluetooth LE Frequency 2404 MHz Reference Level



Band Edge(Peak). Bluetooth LE Frequency 2404 MHz Band Edge



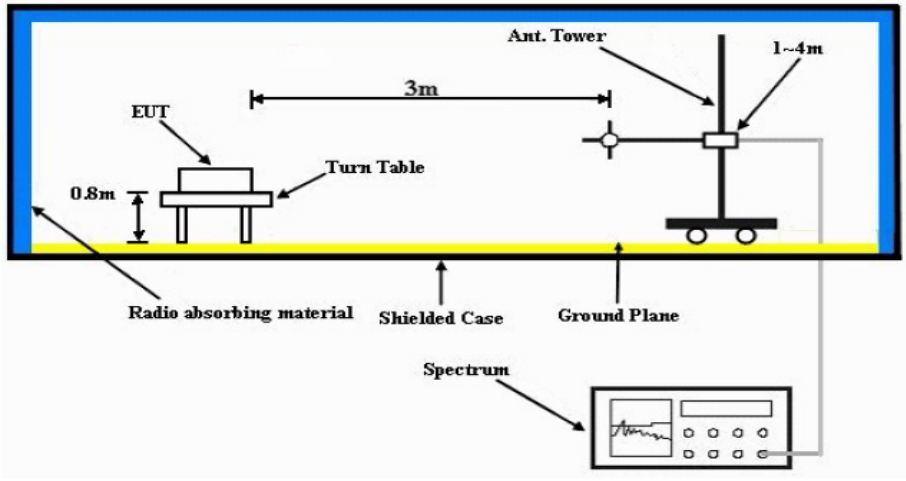
Band Edge(Peak). Bluetooth LE Frequency 2478 MHz Reference Level



Band Edge(Peak). Bluetooth LE Frequency 2478 MHz Band Edge

6.6 Radiated Emission within Restricted Bands

6.6.1 Test Setup



a. The EUT is placed on the top of a rotating table 0.8m (<1GHz) or 1.5m (>1GHz) above the ground at a 3m semi-anechoic chamber. The table is rotated 360 degrees to determine the position of the highest radiation.
b. The EUT is set 3m away from the interference-receiving antenna, which is mounted on the top of a variable-height antenna tower.
c. The antenna is Bilog/Horn antenna depend on which frequency range uses, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT is arranged to its worst case and then the antenna is tuned to heights from 1m to 4m and the rotatable table is turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system is set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode is fall within the range of 10dB from the limit specified, the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. Otherwise, the testing could be stopped and the peak values of the EUT would be reported.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3 MHz for Peak detection at frequency above 1 GHz.

3. All modes of operation were investigated and the worst-case emissions are reported.

6.6.2 Test Limits:

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power.

Frequency (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:

1) The lower limit shall apply at the transition frequencies.
2) Emission level (dBuV/m) = 20 log Emission level (uV/m).
3) For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

6.6.3 Test Results:

Test: Bluetooth SAC Restricted Band Edge
Model Number: AAH07JDH9SA1AN S/N: 651EAK0033 EMC SR ID#: 0680N01-EMC-00009
Battery: PMNN4890A Softpot power (9dBm) Accessory: PMAD4147A
Test Channel: Low Test Frequency: 2402.0000 MHz Test Standard: ANSI C63.10-2013
Worst Case Plane: Z-Plane (BTLE 1M)

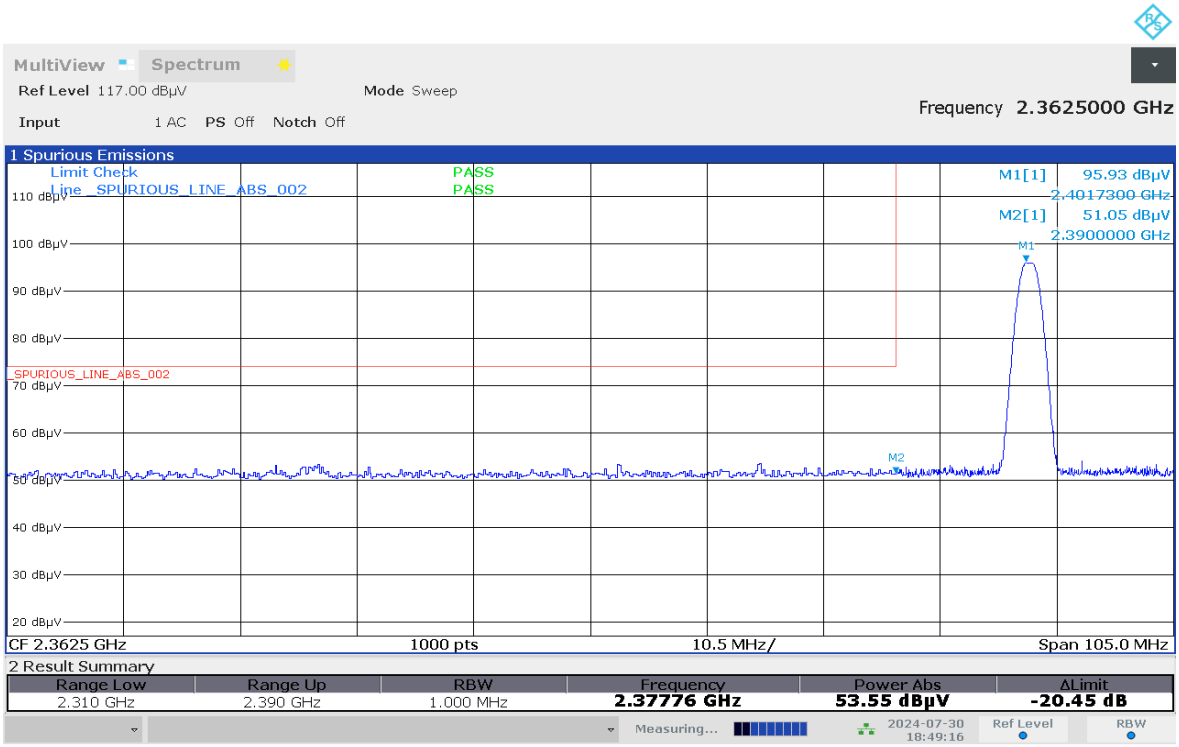
Restricted Band Edge (Low Channel) tabular data

Vertical Radiated Emission Result										
Spur Freq (MHz)	Spur level QPK (dBµV/m)	Spur level PK (dBµV/m)	Spur level AV (dBµV/m)	Limit QPK (dBµV/m)	Limit PK (dBµV/m)	Limit AV (dBµV/m)	Margin QPK (dBµV/m)	Margin PK (dBµV/m)	Margin AV (dBµV/m)	Carrier PK Power (dBµV/m)
2390.0000	-	50.6426	41.0048	-	74.0000	54.0000	-	23.3574	12.9952	-
Horizontal Radiated Emission Result										
2390.0000	-	50.9299	41.2018	-	74.0000	54.0000	-	23.0701	12.7982	-

Remarks: Pass Result	Marginal Result	Fail Result

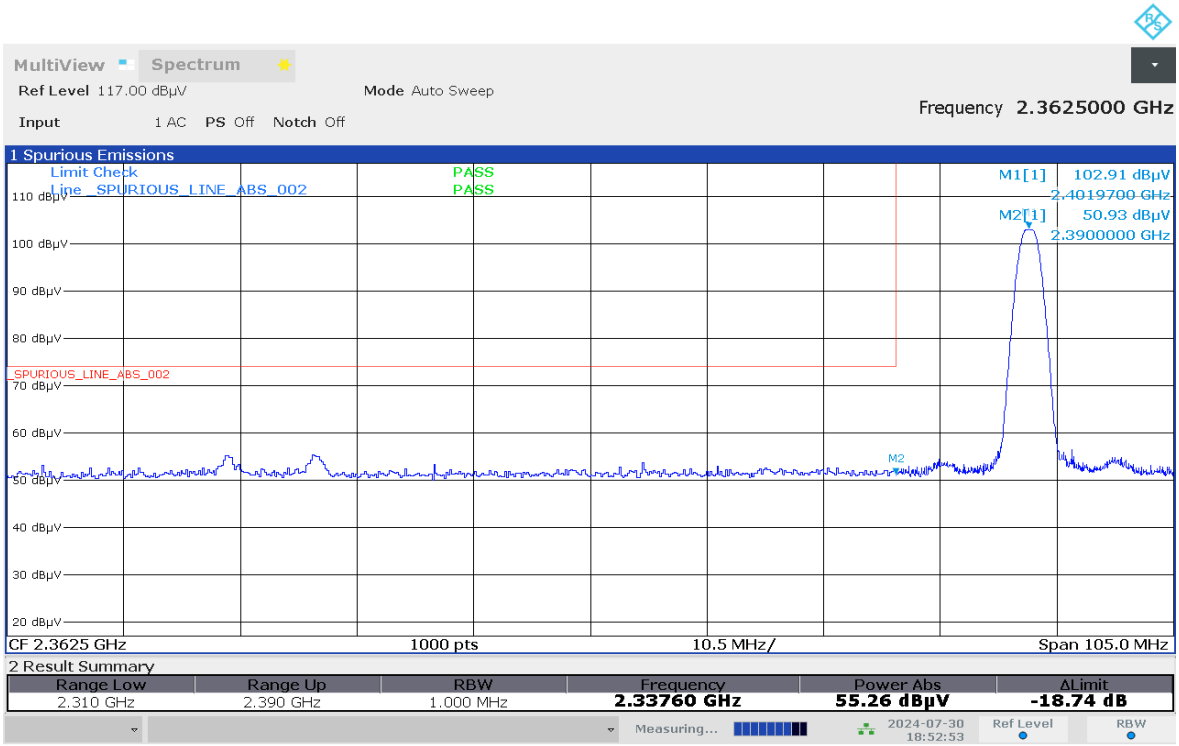
Temperature (degC): 23.8 **Humidity (%): 67.9**
Test Performed by: Nazrin & Rezza **Test Date: Wed, 31 Jul, 2024**
System MU: 5.84dB

Restricted Band Edge (Low Channel, Vertical, Peak) graphical screen shot



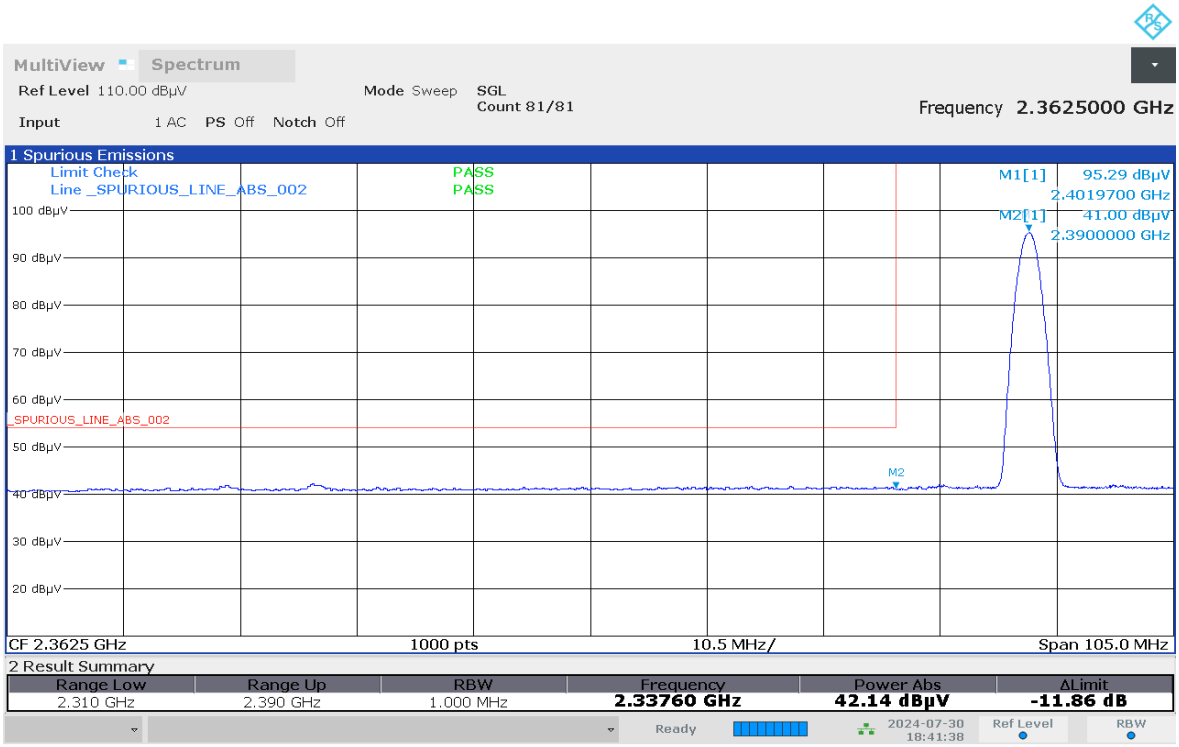
06:49:16 PM 07/30/2024

Restricted Band Edge (Low Channel, Horizontal, Peak) graphical screen shot



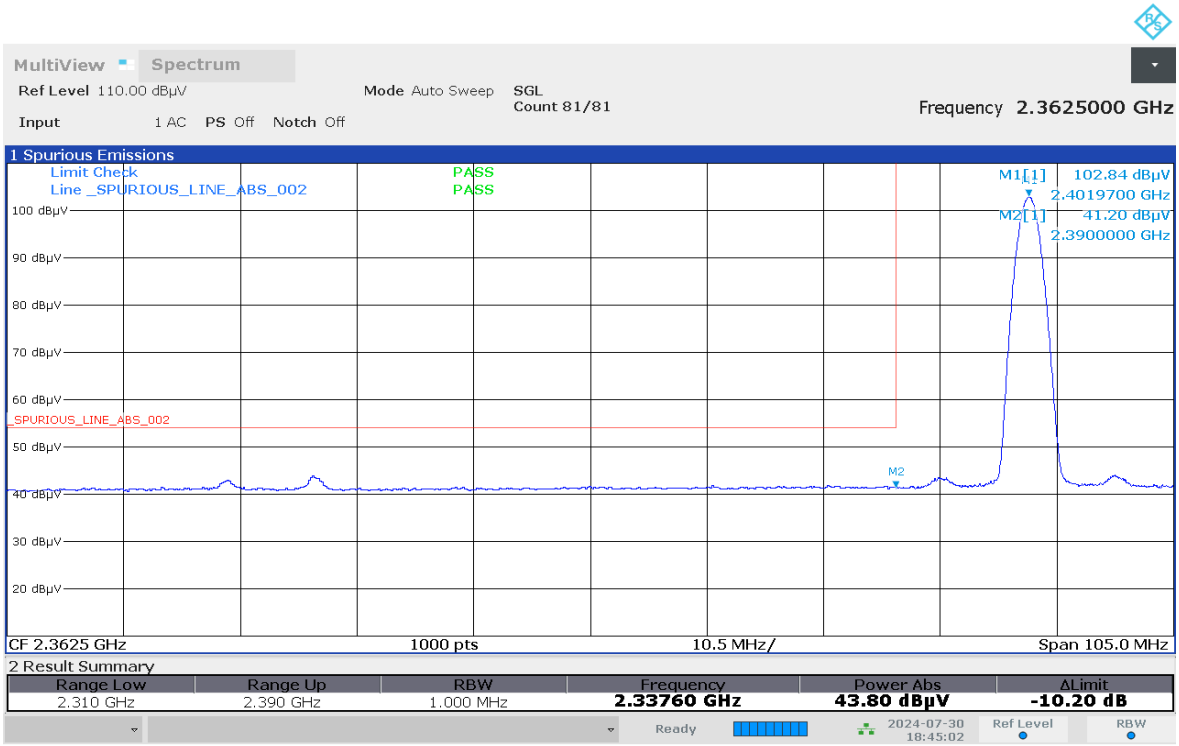
06:52:53 PM 07/30/2024

Restricted Band Edge (Low Channel, Vertical, Average) graphical screen shot



06:41:38 PM 07/30/2024

Restricted Band Edge (Low Channel, Horizontal, Average) graphical screen shot



06:45:03 PM 07/30/2024

Test: Bluetooth SAC Restricted Band Edge
Model Number: AAH07JDH9SA1AN S/N: 651EAK0033 EMC SR ID#: 0680N01-EMC-00009
Battery: PMNN4890A Softpot power (9dBm) Accessory: PMAD4147A
Test Channel: High Test Frequency: 2480.0000 MHz Test Standard: ANSI C63.10-2013
Worst Case Plane: Z-Plane (BTLE 1M)

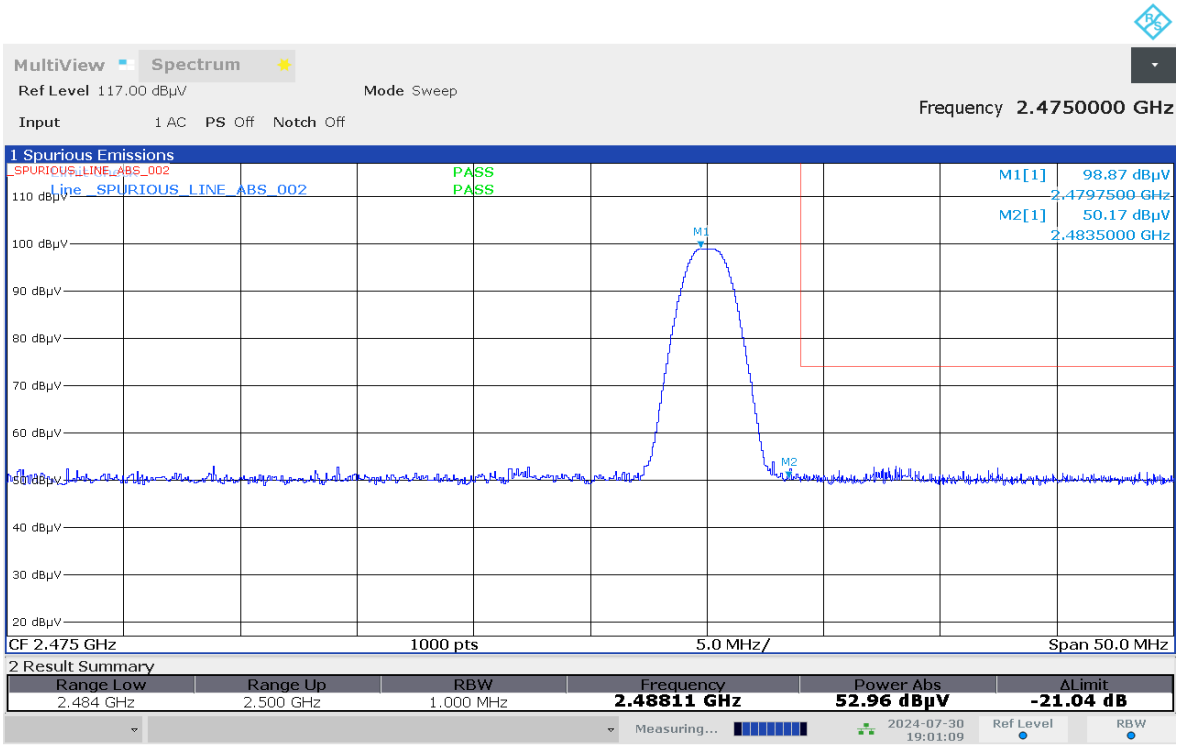
Restricted Band Edge (High Channel) tabular data

Vertical Radiated Emission Result										
Spur Freq (MHz)	Spur level QPK (dBµV/m)	Spur level PK (dBµV/m)	Spur level AV (dBµV/m)	Limit QPK (dBµV/m)	Limit PK (dBµV/m)	Limit AV (dBµV/m)	Margin QPK (dBµV/m)	Margin PK (dBµV/m)	Margin AV (dBµV/m)	Carrier PK Power (dBµV/m)
2483.5000	-	50.0793	41.6591	-	74.0000	54.0000	-	23.9207	12.3409	-
Horizontal Radiated Emission Result										
2483.5000	-	52.2038	43.2785	-	74.0000	54.0000	-	21.7962	10.7215	-

Remarks: Pass Result	Marginal Result	Fail Result

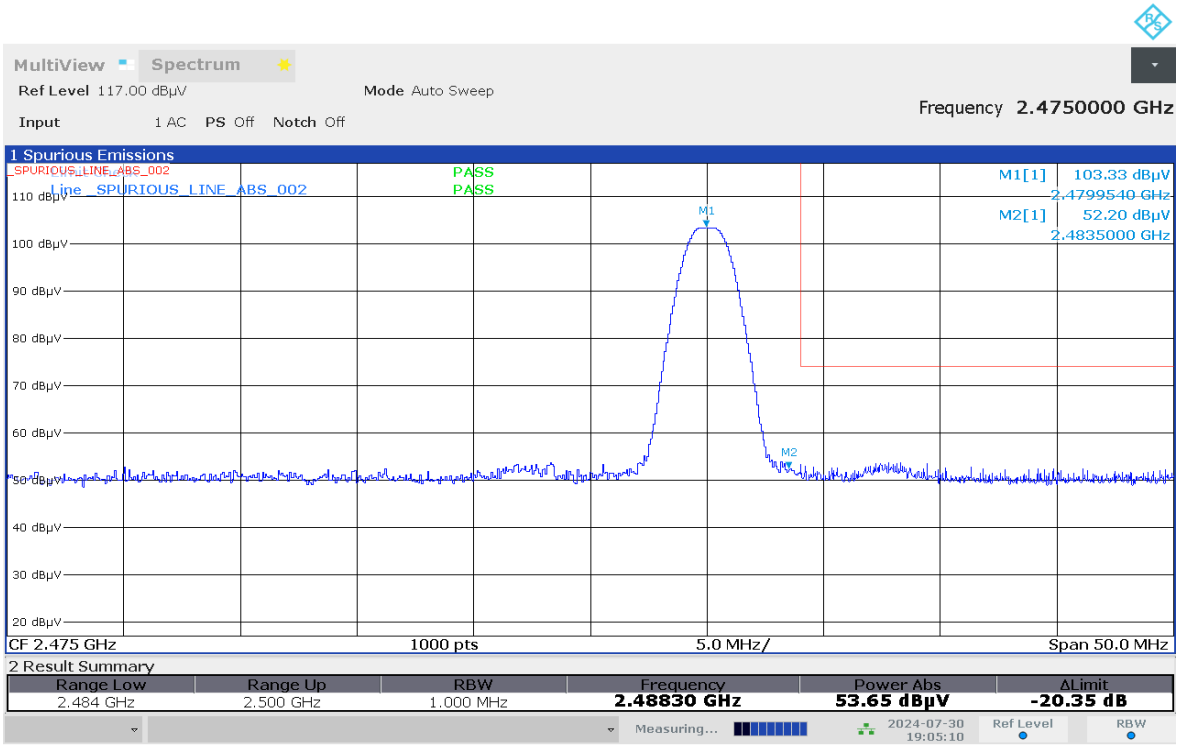
Temperature (degC): 23.8 **Humidity (%): 67.9**
Test Performed by: Nazrin & Rezza **Test Date: Wed, 31 Jul, 2024**
System MU: 5.84dB

Restricted Band Edge (High Channel, Vertical, Peak) graphical screen shot



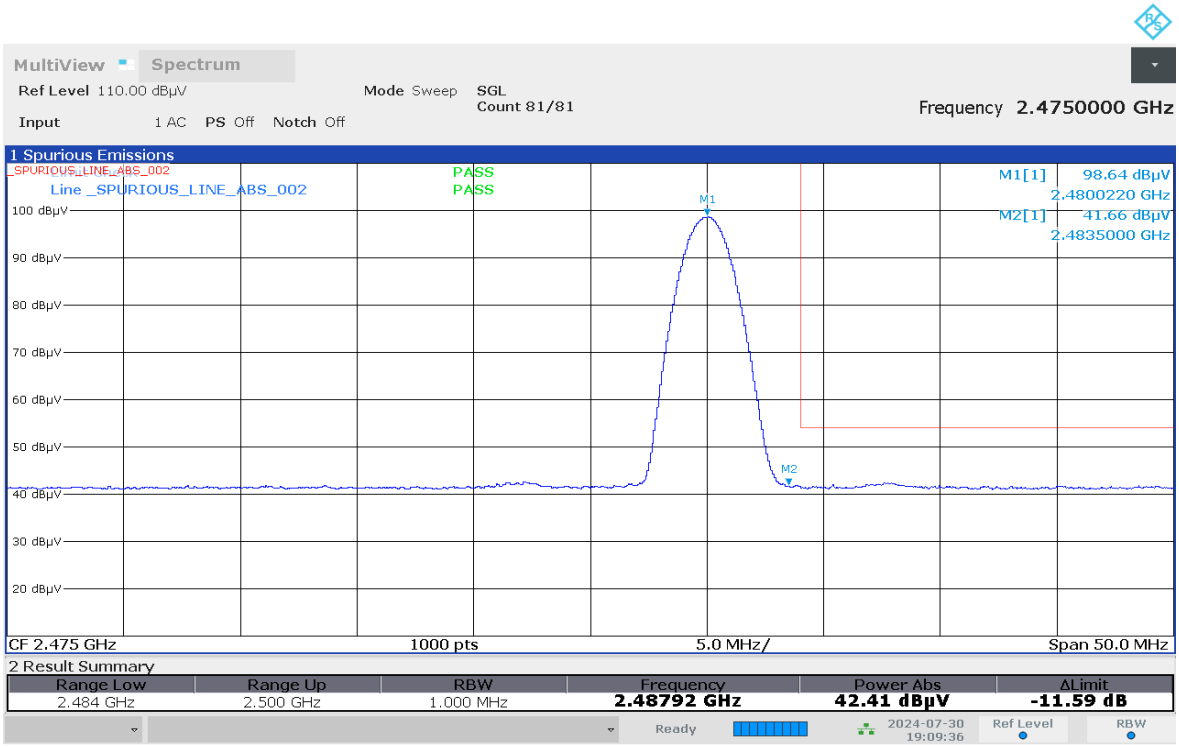
07:01:10 PM 07/30/2024

Restricted Band Edge (High Channel, Horizontal, Peak) graphical screen shot



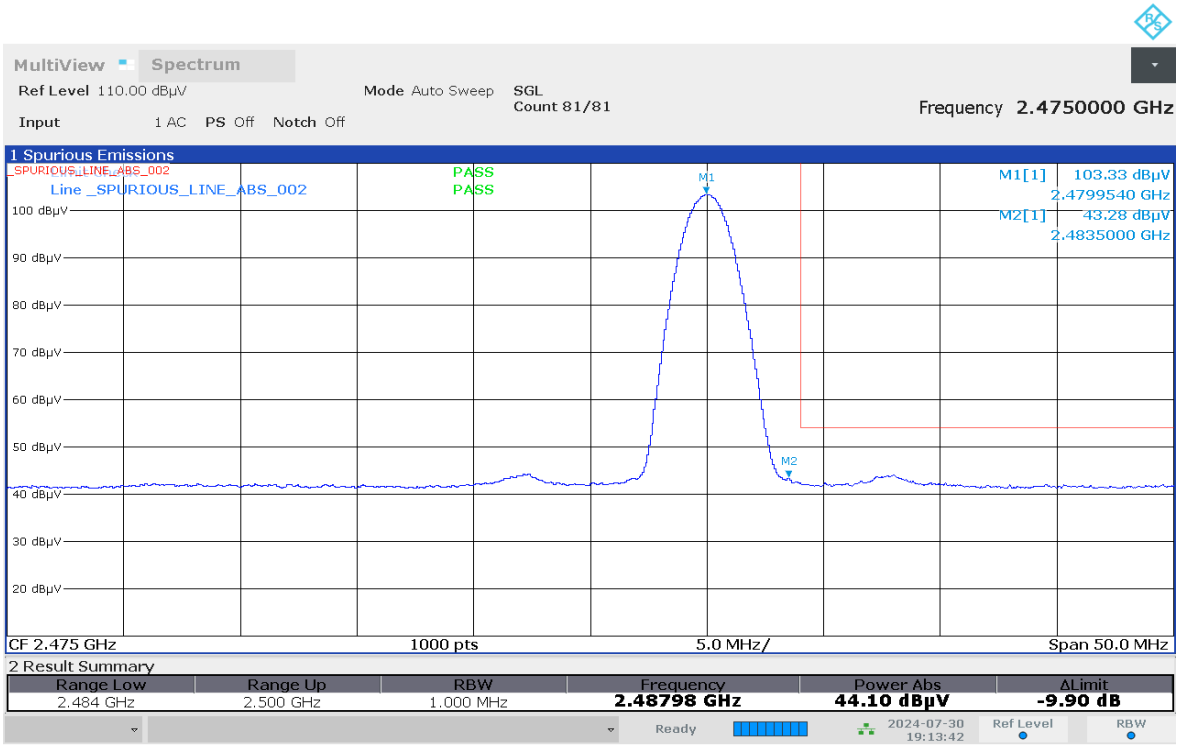
07:05:11 PM 07/30/2024

Restricted Band Edge (High Channel, Vertical, Average) graphical screen shot



07:09:37 PM 07/30/2024

Restricted Band Edge (High Channel, Horizontal, Average) graphical screen shot



07:13:42 PM 07/30/2024

Test: Bluetooth SAC Restricted Band Edge
Model Number: AAH07JDH9SA1AN S/N: 651EAK0033 EMC SR ID#: 0680N01-EMC-00009
Battery: PMNN4890A Softpot power (8dBm) Accessory: PMAD4147A
Test Channel: Low Test Frequency: 2404.0000 MHz Test Standard: ANSI C63.10-2013
Worst Case Plane: Z-Plane (BTLE 2M)

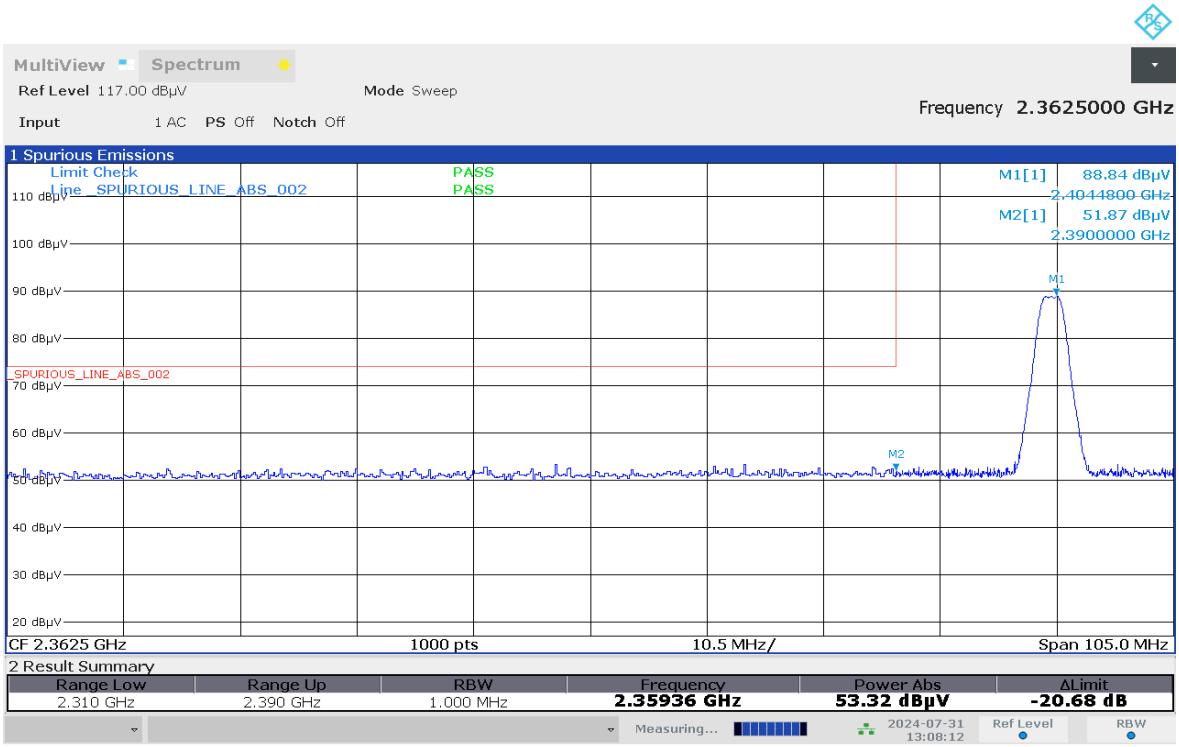
Restricted Band Edge (Low Channel) tabular data

Vertical Radiated Emission Result										
Spur Freq (MHz)	Spur level QPK (dBµV/m)	Spur level PK (dBµV/m)	Spur level AV (dBµV/m)	Limit QPK (dBµV/m)	Limit PK (dBµV/m)	Limit AV (dBµV/m)	Margin QPK (dBµV/m)	Margin PK (dBµV/m)	Margin AV (dBµV/m)	Carrier PK Power (dBµV/m)
2379.5200	-	-	43.1122	-	-	54.0000	-	-	10.8878	-
2390.0000	-	51.8732	41.4324	-	74.0000	54.0000	-	22.1268	12.5676	-
Horizontal Radiated Emission Result										
2379.3600	-	-	46.9795	-	-	54.0000	-	-	7.0205	-
2390.0000	-	51.3640	41.5079	-	74.0000	54.0000	-	22.6360	12.4921	-

Remarks: Pass Result	Marginal Result	Fail Result

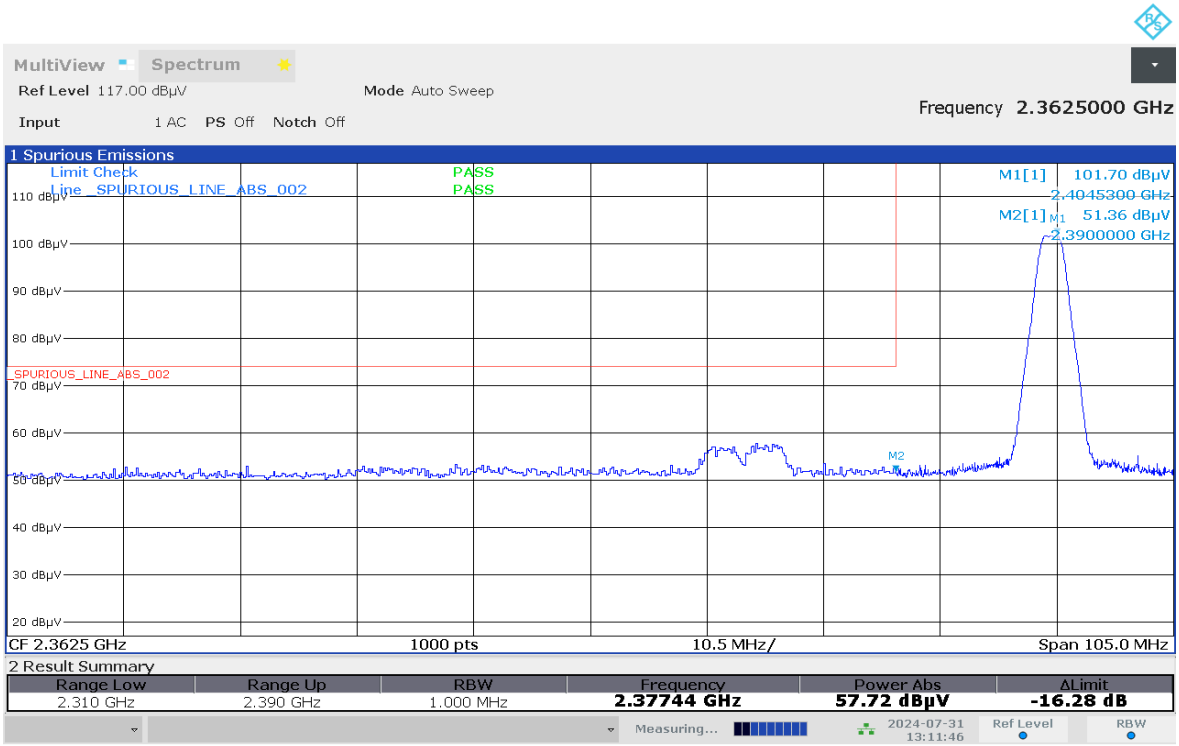
Temperature (degC): 23.8 **Humidity (%): 67.9**
Test Performed by: Nazrin & Rezza **Test Date: Wed, 31 Jul, 2024**
System MU: 5.84dB

Restricted Band Edge (Low Channel, Vertical, Peak) graphical screen shot



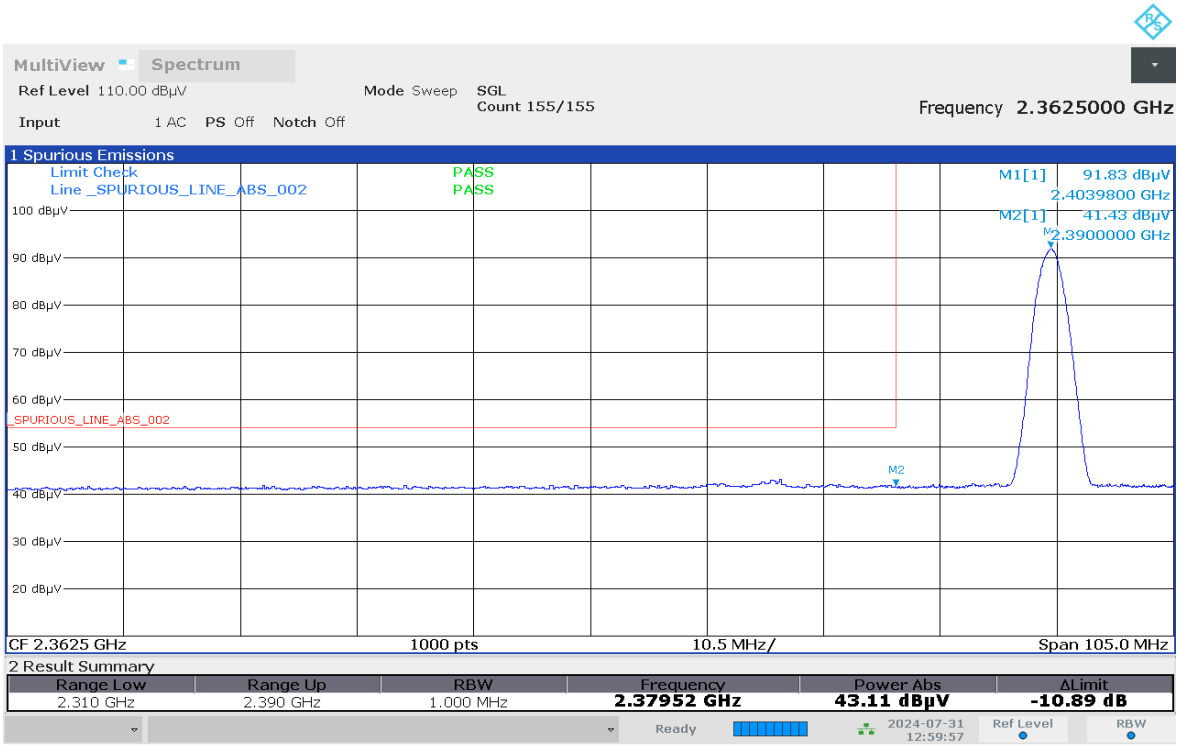
01:08:12 PM 07/31/2024

Restricted Band Edge (Low Channel, Horizontal, Peak) graphical screen shot



01:11:46 PM 07/31/2024

Restricted Band Edge (Low Channel, Vertical, Average) graphical screen shot



12:59:58 PM 07/31/2024

Restricted Band Edge (Low Channel, Horizontal, Average) graphical screen shot

01:04:01 PM 07/31/2024

Test: Bluetooth SAC Restricted Band Edge
Model Number: AAH07JDH9SA1AN S/N: 651EAK0033 EMC SR ID#: 0680N01-EMC-00009
Battery: PMNN4890A Softpot power (9dBm) Accessory: PMAD4147A
Test Channel: High Test Frequency: 2478.0000 MHz Test Standard: ANSI C63.10-2013
Worst Case Plane: Z-Plane (BTLE 2M)

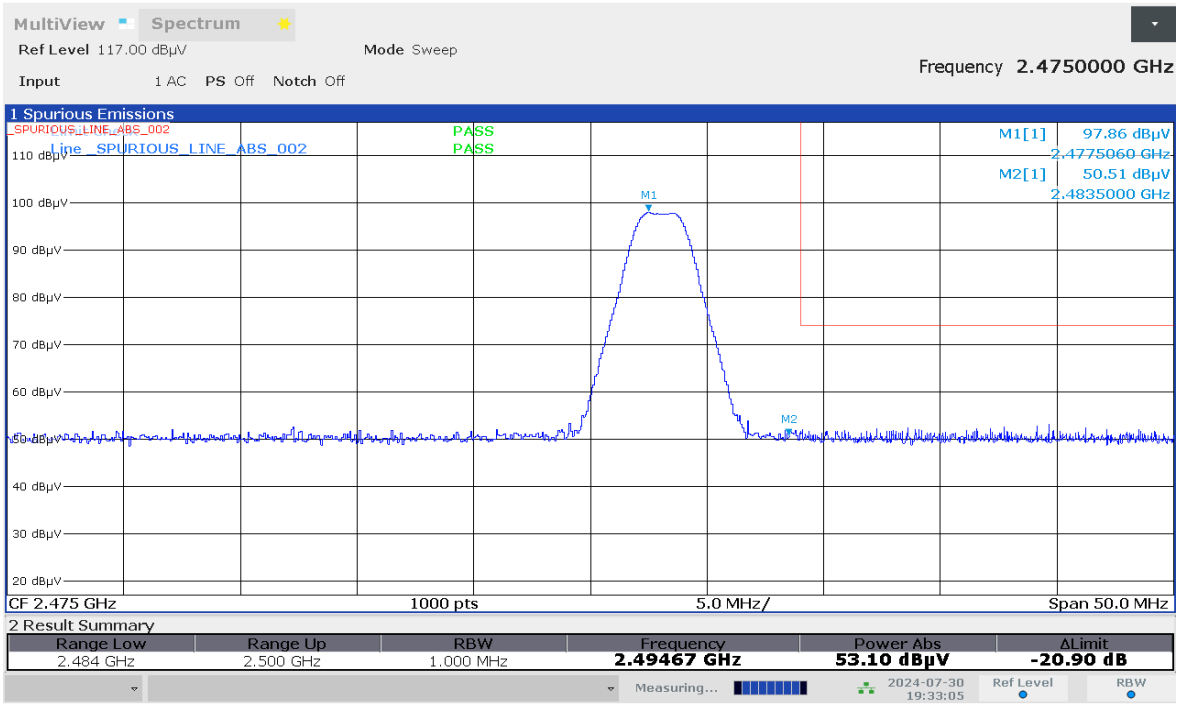
Restricted Band Edge (High Channel) tabular data

Vertical Radiated Emission Result										
Spur Freq (MHz)	Spur level QPK (dBµV/m)	Spur level PK (dBµV/m)	Spur level AV (dBµV/m)	Limit QPK (dBµV/m)	Limit PK (dBµV/m)	Limit AV (dBµV/m)	Margin QPK (dBµV/m)	Margin PK (dBµV/m)	Margin AV (dBµV/m)	Carrier PK Power (dBµV/m)
2483.5000	-	50.5090	42.0199	-	74.0000	54.0000	-	23.4910	11.9801	-
Horizontal Radiated Emission Result										
2483.5000	-	52.1800	44.5773	-	74.0000	54.0000	-	21.8200	9.4227	-

Remarks: Pass Result	Marginal Result	Fail Result

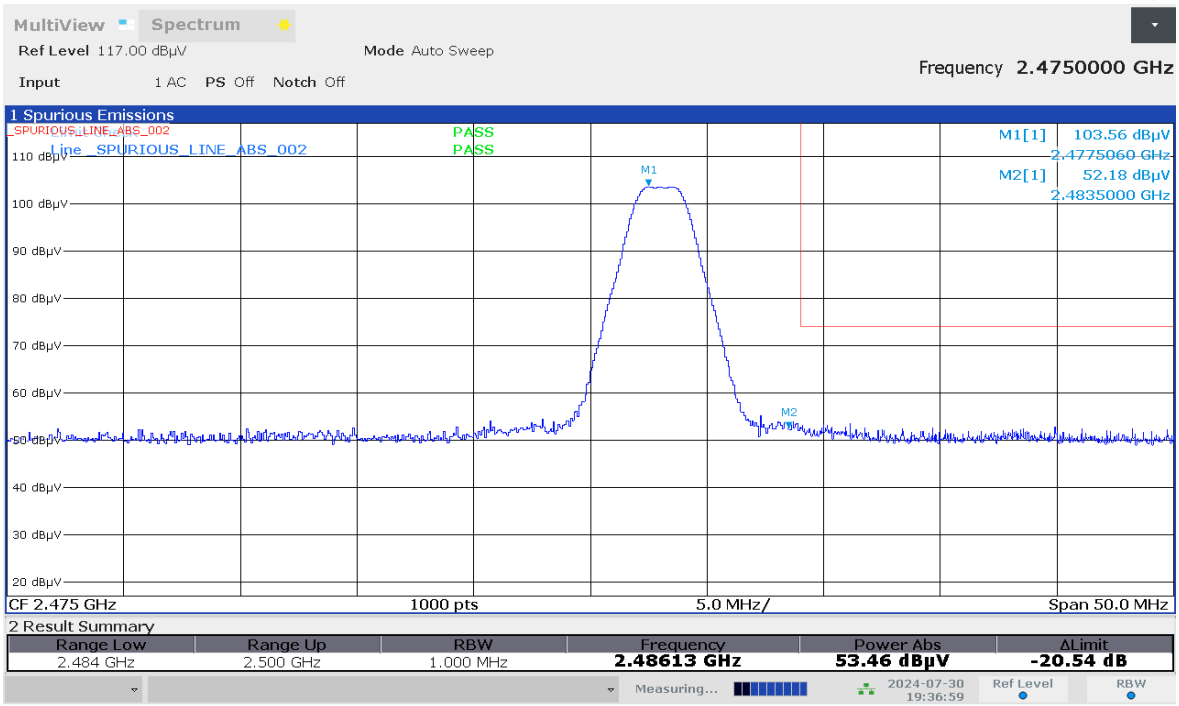
Temperature (degC): 23.8 **Humidity (%): 67.9**
Test Performed by: Nazrin & Rezza **Test Date: Wed, 31 Jul, 2024**
System MU: 5.84dB

Restricted Band Edge (High Channel, Vertical, Peak) graphical screen shot



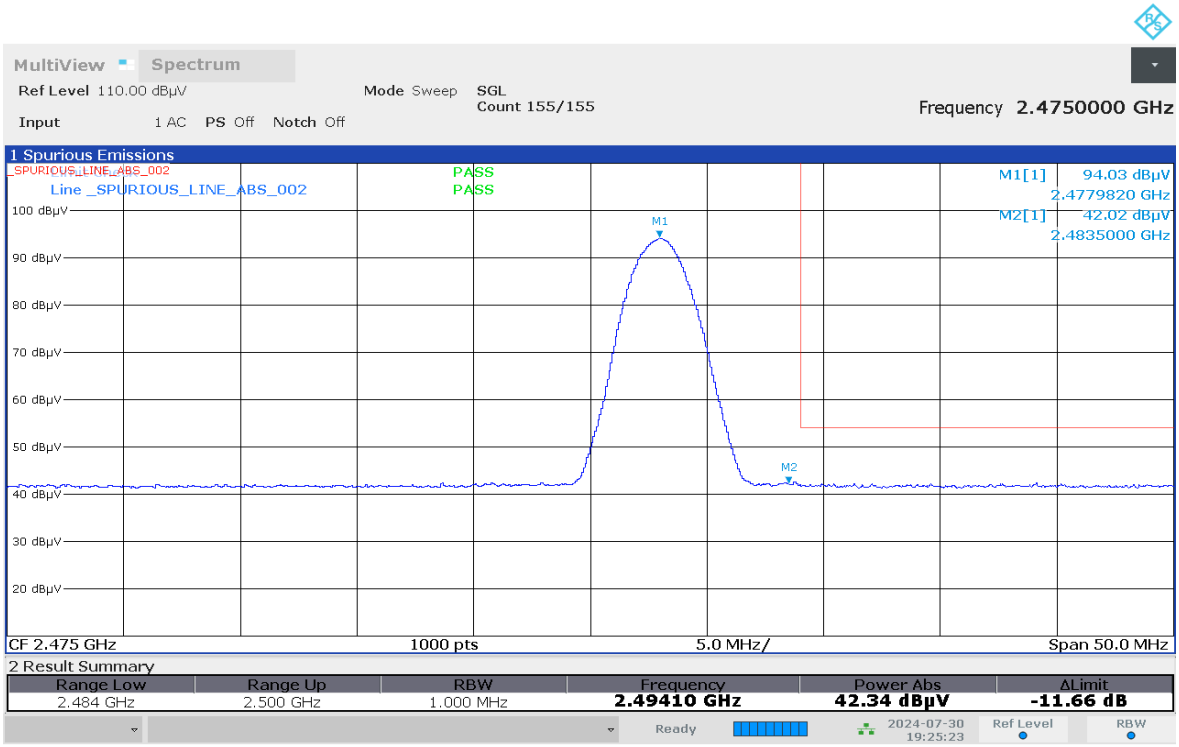
07:33:05 PM 07/30/2024

Restricted Band Edge (High Channel, Horizontal, Peak) graphical screen shot



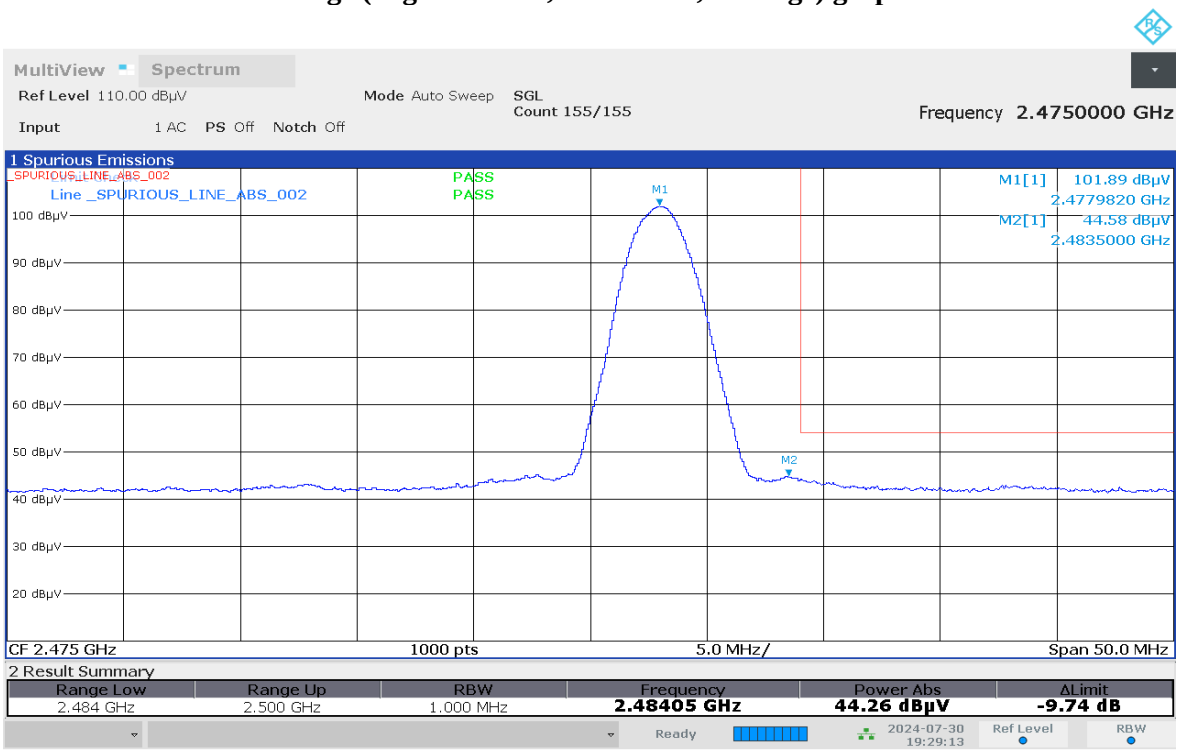
07:36:59 PM 07/30/2024

Restricted Band Edge (High Channel, Vertical, Average) graphical screen shot



07:25:24 PM 07/30/2024

Restricted Band Edge (High Channel, Horizontal, Average) graphical screen shot



07:29:13 PM 07/30/2024

Test: Bluetooth SAC Transmitter Radiated Emission
Model#: AAH07JDH9SA1AN S/N: 651EAK0033 EMC SR ID#: 0680N01-EMC-00009
Battery: PMNN4890A Softpot power (9dBm) Accessory: PMAD4147A
Test Channel: Low Test Frequency: 2402.0000 MHz Test Standard: ANSI C63.10-2013
Worst Case Plane: Z-Plane (BTLE 1M)

Radiated Emission (Low Channel) tabular data

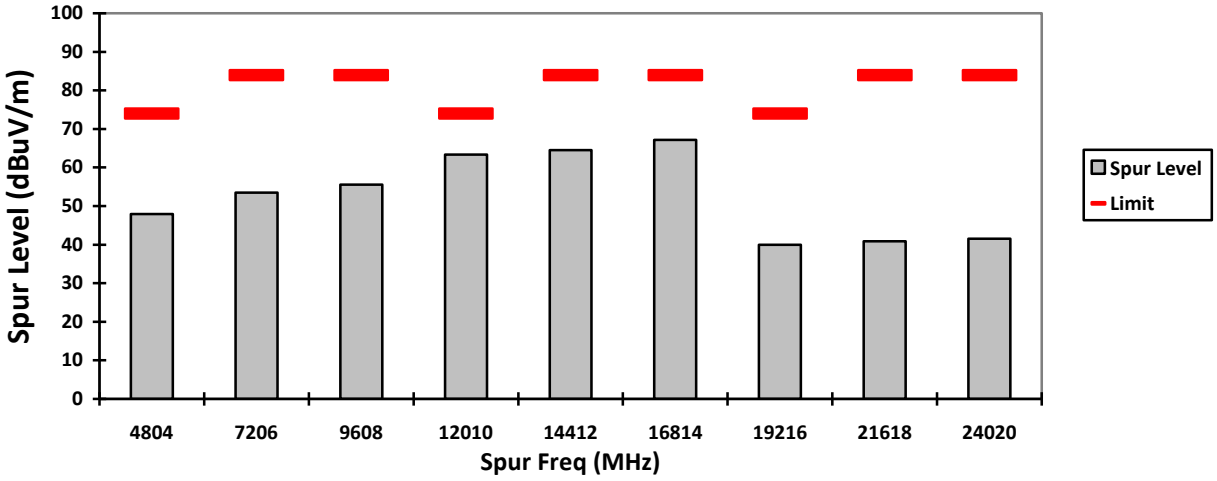
Vertical Radiated Emission Result										
Spur Freq (MHz)	Spur level QPK (dBµV/m)	Spur level PK (dBµV/m)	Spur level AV (dBµV/m)	Limit QPK (dBµV/m)	Limit PK (dBµV/m)	Limit AV (dBµV/m)	Margin QPK (dBµV/m)	Margin PK (dBµV/m)	Margin AV (dBµV/m)	Carrier PK Power (dBµV/m)
4804	-	47.9278**	-	-	74.0000	-	-	26.0722	-	-
7206	-	53.4992**	-	-	83.9173	-	-	30.4181	-	103.9173
9608	-	55.5879**	-	-	83.9173	-	-	28.3294	-	103.9173
12010	-	63.3782**	50.5287**	-	74.0000	54.0000	-	10.6218	3.4713	-
14412	-	64.4948**	-	-	83.9173	-	-	19.4225	-	103.9173
16814	-	67.1823**	-	-	83.9173	-	-	16.7350	-	103.9173
19216	-	39.9791**	-	-	74.0000	-	-	34.0209	-	-
21618	-	40.8470**	-	-	83.9173	-	-	43.0703	-	103.9173
24020	-	41.5339**	-	-	83.9173	-	-	42.3834	-	103.9173
Horizontal Radiated Emission Result										
4804	-	46.7500**	-	-	74.0000	-	-	27.2500	-	-
7206	-	52.5426**	-	-	83.9173	-	-	31.3747	-	103.9173
9608	-	55.2409**	-	-	83.9173	-	-	28.6764	-	103.9173
12010	-	63.8864**	50.6731**	-	74.0000	54.0000	-	10.1136	3.3269	-
14412	-	63.2228**	-	-	83.9173	-	-	20.6945	-	103.9173
16814	-	67.4955**	-	-	83.9173	-	-	16.4218	-	103.9173
19216	-	39.2227**	-	-	74.0000	-	-	34.7773	-	-
21618	-	39.8380**	-	-	83.9173	-	-	44.0793	-	103.9173
24020	-	41.0993**	-	-	83.9173	-	-	42.8180	-	103.9173

Remarks: Pass Result	Marginal Result	Fail Result

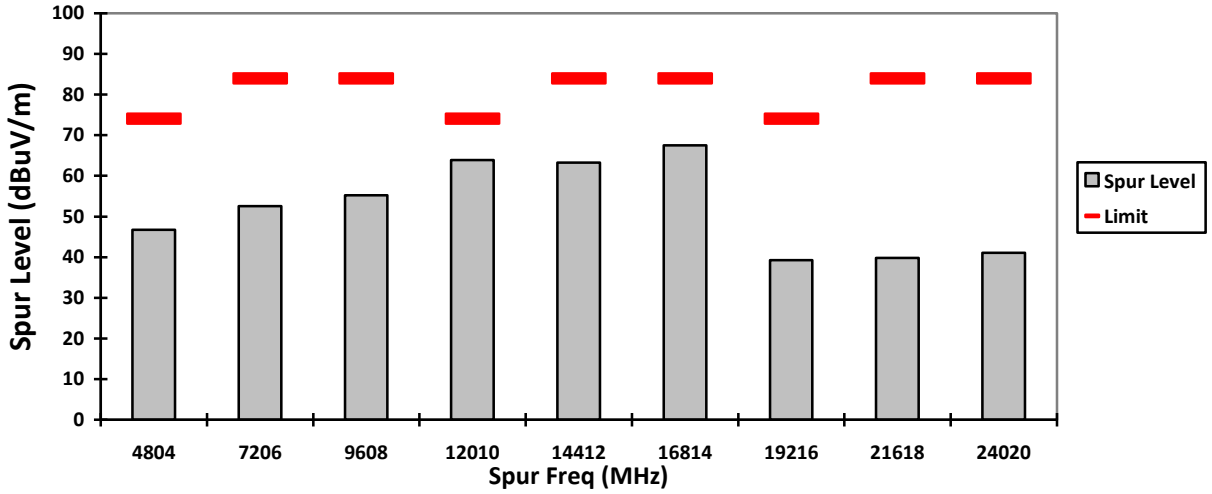
Temperature (degC): 23.8 Humidity (%): 67.9
Test Performed by: Nazrin & Rezza Test Date: Sat, 3 Aug, 2024
System MU: 5.88 dB (30-1000MHz), 5.84 dB (1000-18000MHz), 6.02 dB (18000MHz-40000MHz)

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.
***Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported.**

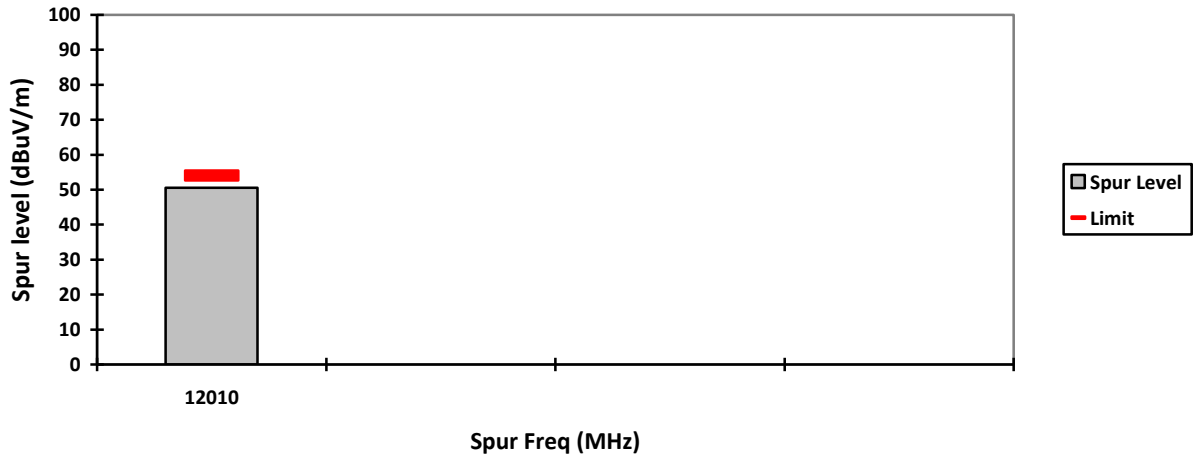
VERTICAL, PK



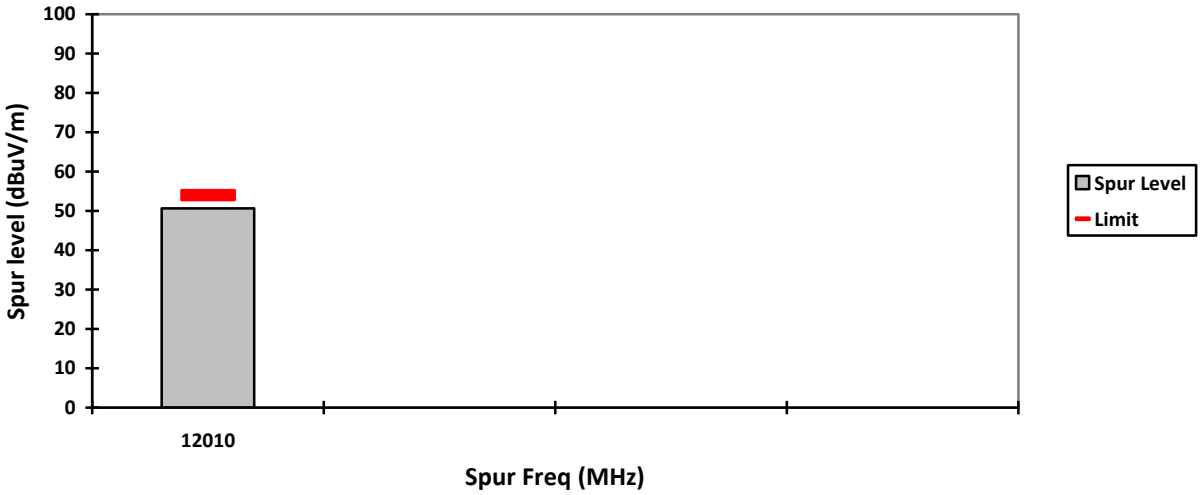
HORIZONTAL, PK



VERTICAL, AV



HORIZONTAL, AV



Test: Bluetooth SAC Transmitter Radiated Emission
Model#: AAH07JDH9SA1AN S/N: 651EAK0033 EMC SR ID#: 0680N01-EMC-00009
Battery: PMNN4890A Softpot power (9dBm) Accessory: PMAD4147A
Test Channel: Mid Test Frequency: 2440.0000 MHz Test Standard: ANSI C63.10-2013
Worst Case Plane: Z-Plane (BTLE 1M)

Radiated Emission (Mid Channel) tabular data

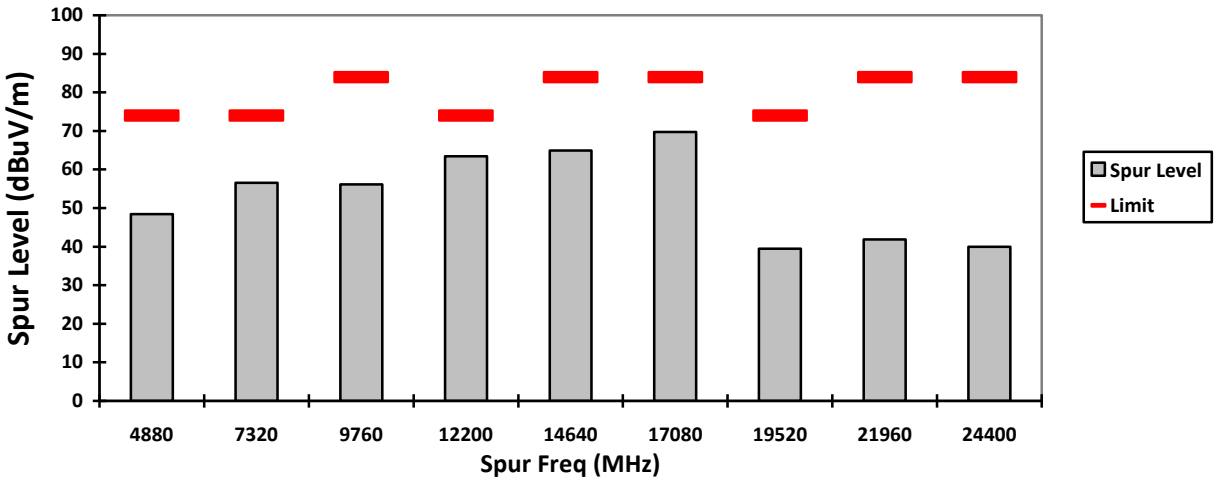
Vertical Radiated Emission Result										
Spur Freq (MHz)	Spur level QPK (dBµV/m)	Spur level PK (dBµV/m)	Spur level AV (dBµV/m)	Limit QPK (dBµV/m)	Limit PK (dBµV/m)	Limit AV (dBµV/m)	Margin QPK (dBµV/m)	Margin PK (dBµV/m)	Margin AV (dBµV/m)	Carrier PK Power (dBµV/m)
4880	-	48.4399**	-	-	74.0000	-	-	25.5601	-	-
7320	-	56.5113**	44.1790**	-	74.0000	54.0000	-	17.4887	9.8210	-
9760	-	56.1454**	-	-	83.9173	-	-	27.7719	-	103.9173
12200	-	63.4519**	50.6865**	-	74.0000	54.0000	-	10.5481	3.3135	-
14640	-	64.9168**	-	-	83.9173	-	-	19.0005	-	103.9173
17080	-	69.7305**	-	-	83.9173	-	-	14.1868	-	103.9173
19520	-	39.4571**	-	-	74.0000	-	-	34.5429	-	-
21960	-	41.8379**	-	-	83.9173	-	-	42.0794	-	103.9173
24400	-	39.9364**	-	-	83.9173	-	-	43.9809	-	103.9173
Horizontal Radiated Emission Result										
4880	-	47.8413**	-	-	74.0000	-	-	26.1587	-	-
7320	-	56.6487**	44.0931**	-	74.0000	54.0000	-	17.3513	9.9069	-
9760	-	56.5758**	-	-	83.9173	-	-	27.3415	-	103.9173
12200	-	63.4733**	50.9876**	-	74.0000	54.0000	-	10.5267	3.0124	-
14640	-	64.1061**	-	-	83.9173	-	-	19.8112	-	103.9173
17080	-	69.0050**	-	-	83.9173	-	-	14.9123	-	103.9173
19520	-	39.1694**	-	-	74.0000	-	-	34.8306	-	-
21960	-	40.6554**	-	-	83.9173	-	-	43.2619	-	103.9173
24400	-	40.6927**	-	-	83.9173	-	-	43.2246	-	103.9173

Remarks: Pass Result	Marginal Result	Fail Result

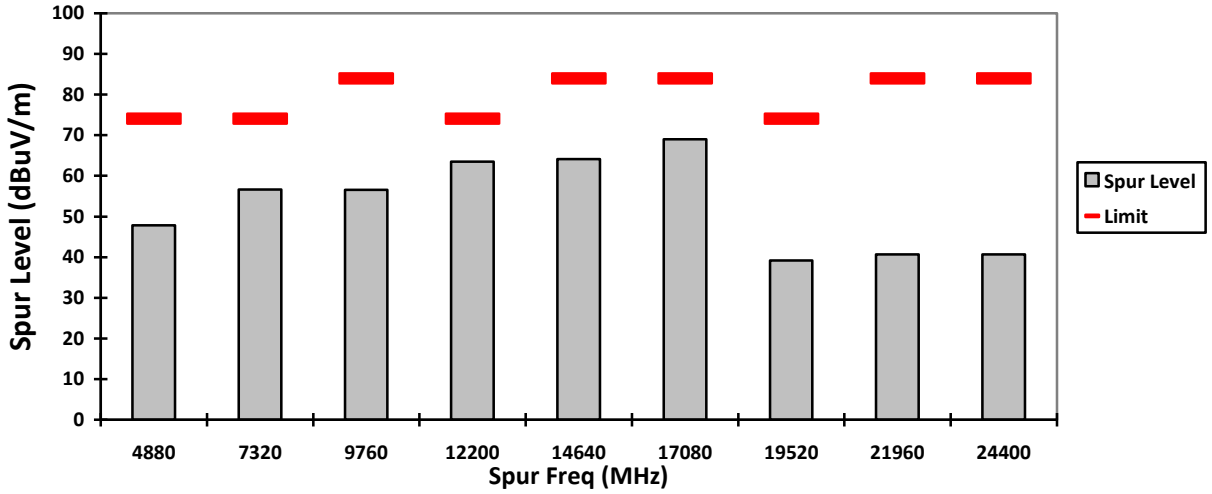
Temperature (degC): 23.8 Humidity (%): 67.9
Test Performed by: Nazrin & Rezza Test Date: Sat, 3 Aug, 2024
System MU: 5.88 dB (30-1000MHz), 5.84 dB (1000-18000MHz), 6.02 dB (18000MHz-40000MHz)

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.
***Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported.**

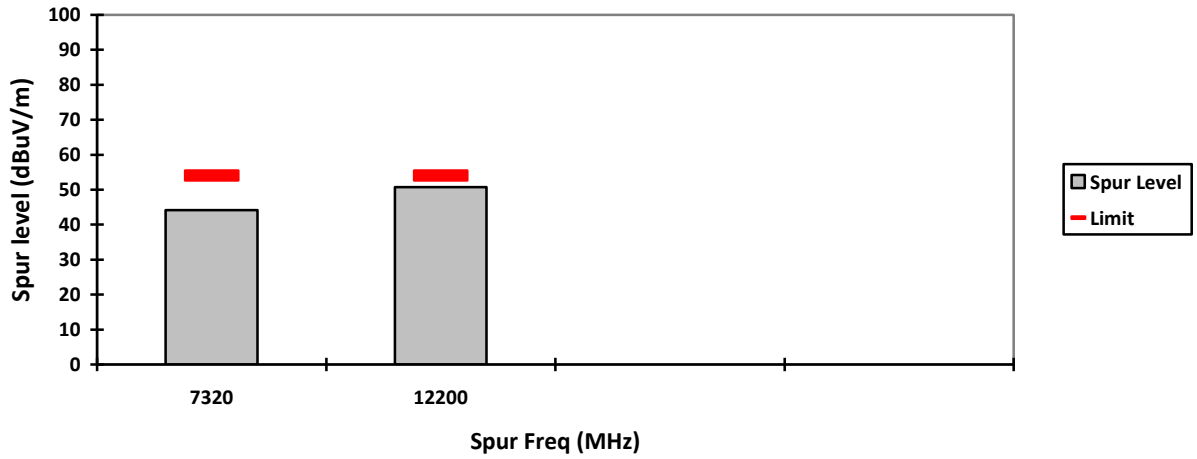
VERTICAL, PK



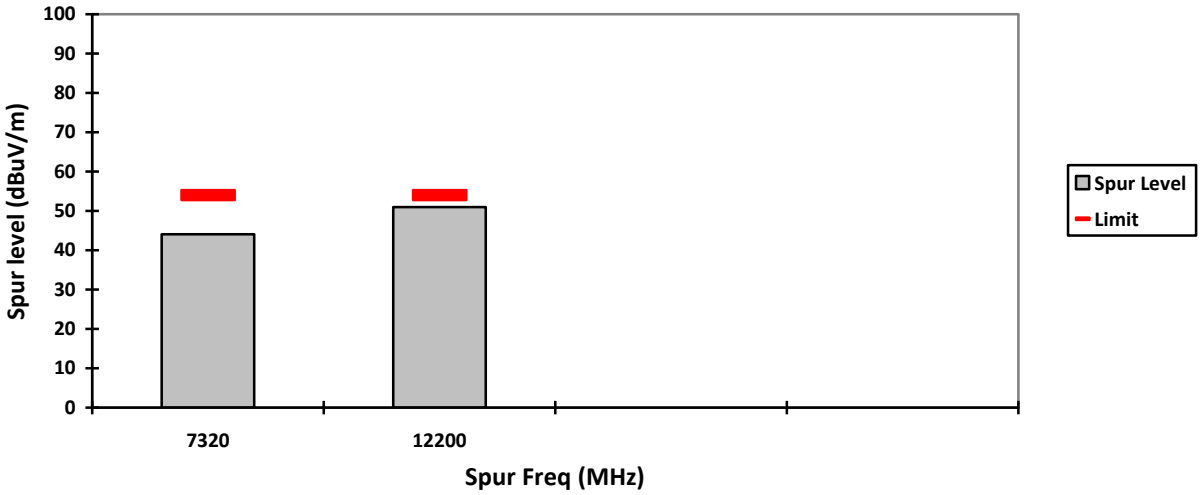
HORIZONTAL, PK



VERTICAL, AV



HORIZONTAL, AV



Test: Bluetooth SAC Transmitter Radiated Emission
Model#: AAH07JDH9SA1AN S/N: 651EAK0033 EMC SR ID#: 0680N01-EMC-00009
Battery: PMNN4890A Softpot power (9dBm) Accessory: PMAD4147A
Test Channel: High Test Frequency: 2480.0000 MHz Test Standard: ANSI C63.10-2013
Worst Case Plane: Z-Plane (BTLE 1M)

Radiated Emission (High Channel) tabular data

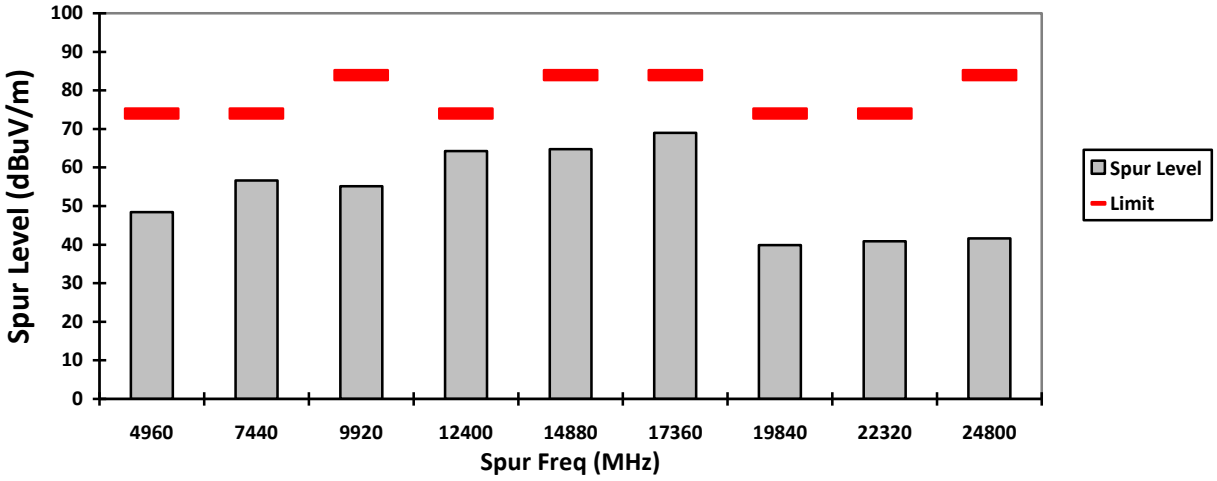
Vertical Radiated Emission Result										
Spur Freq (MHz)	Spur level QPK (dBµV/m)	Spur level PK (dBµV/m)	Spur level AV (dBµV/m)	Limit QPK (dBµV/m)	Limit PK (dBµV/m)	Limit AV (dBµV/m)	Margin QPK (dBµV/m)	Margin PK (dBµV/m)	Margin AV (dBµV/m)	Carrier PK Power (dBµV/m)
4960	-	48.4042**	-	-	74.0000	-	-	25.5958	-	-
7440	-	56.6187**	44.1634**	-	74.0000	54.0000	-	17.3813	9.8366	-
9920	-	55.1727**	-	-	83.9173	-	-	28.7446	-	103.9173
12400	-	64.2990**	51.8041**	-	74.0000	54.0000	-	9.7010	2.1959	-
14880	-	64.7620**	-	-	83.9173	-	-	19.1553	-	103.9173
17360	-	69.0041**	-	-	83.9173	-	-	14.9132	-	103.9173
19840	-	39.9247**	-	-	74.0000	-	-	34.0753	-	-
22320	-	40.8997**	-	-	74.0000	-	-	33.1003	-	-
24800	-	41.6182**	-	-	83.9173	-	-	42.2991	-	103.9173
Horizontal Radiated Emission Result										
4960	-	47.8060**	-	-	74.0000	-	-	26.1940	-	-
7440	-	56.4877**	44.1692**	-	74.0000	54.0000	-	17.5123	9.8308	-
9920	-	54.7265**	-	-	83.9173	-	-	29.1908	-	103.9173
12400	-	64.2662**	51.8048**	-	74.0000	54.0000	-	9.7338	2.1952	-
14880	-	64.2996**	-	-	83.9173	-	-	19.6177	-	103.9173
17360	-	69.6254**	-	-	83.9173	-	-	14.2919	-	103.9173
19840	-	38.8900**	-	-	74.0000	-	-	35.1100	-	-
22320	-	42.6323**	-	-	74.0000	-	-	31.3677	-	-
24800	-	41.3722**	-	-	83.9173	-	-	42.5451	-	103.9173

Remarks: Pass Result	Marginal Result	Fail Result

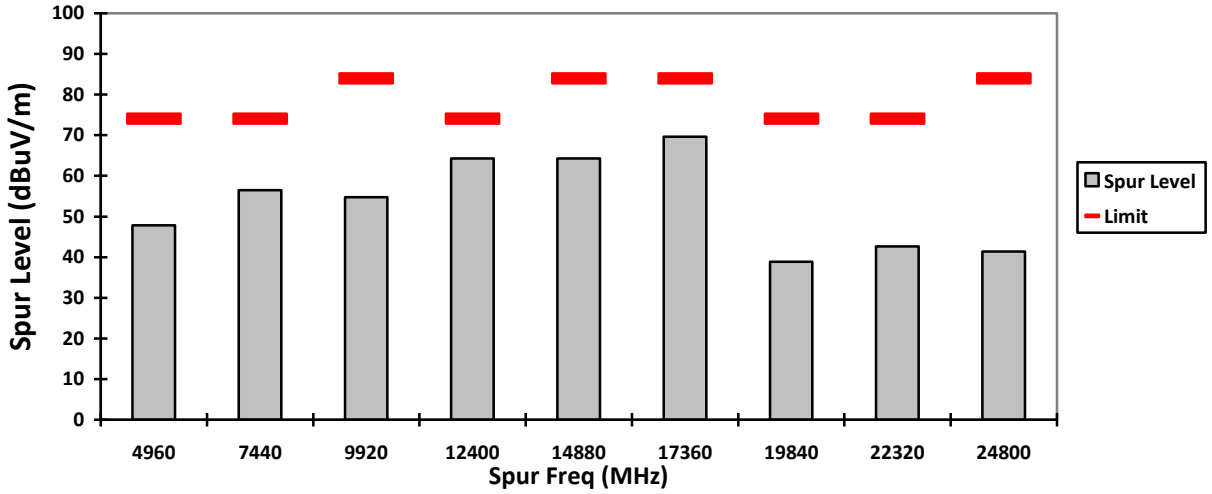
Temperature (degC): 23.8 Humidity (%): 67.9
Test Performed by: Nazrin & Rezza Test Date: Sat, 3 Aug, 2024
System MU: 5.88 dB (30-1000MHz), 5.84 dB (1000-18000MHz), 6.02 dB (18000MHz-40000MHz)

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.
***Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported.**

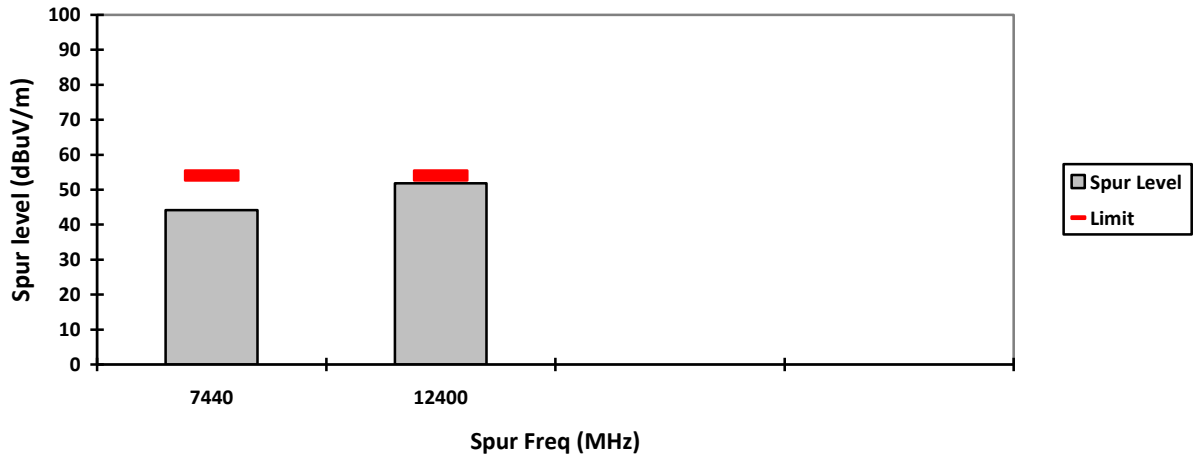
VERTICAL, PK



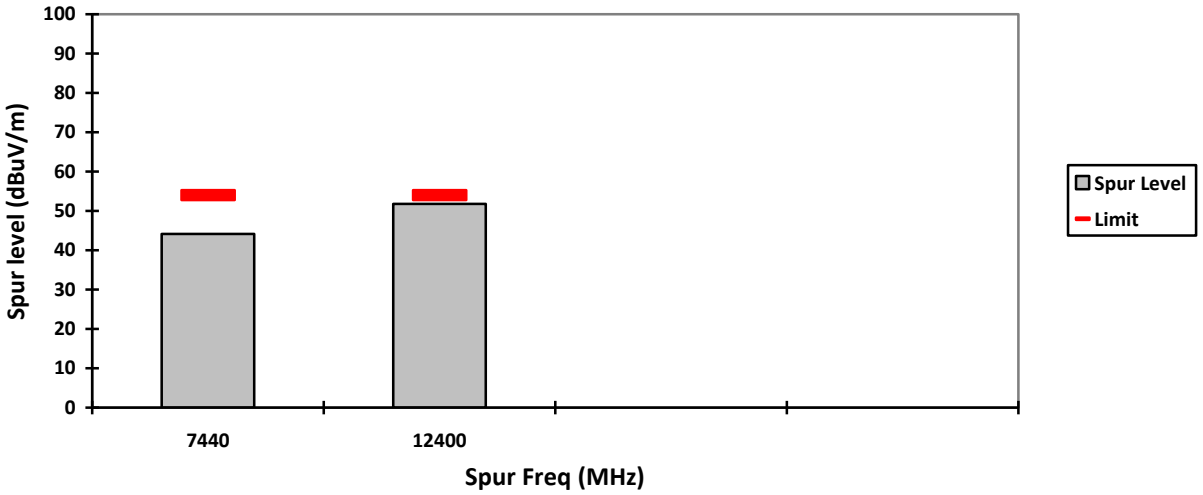
HORIZONTAL, PK



VERTICAL, AV



HORIZONTAL, AV



Test: Bluetooth SAC Transmitter Radiated Emission
Model#: AAH07JDH9SA1AN S/N: 651EAK0033 EMC SR ID#: 0680N01-EMC-00009
Battery: PMNN4890A Softpot power (9dBm) Accessory: PMAD4147A
Test Channel: Low Test Frequency: 2404.0000 MHz Test Standard: ANSI C63.10-2013
Worst Case Plane: Z-Plane (BTLE 2M)

Radiated Emission (Low Channel) tabular data

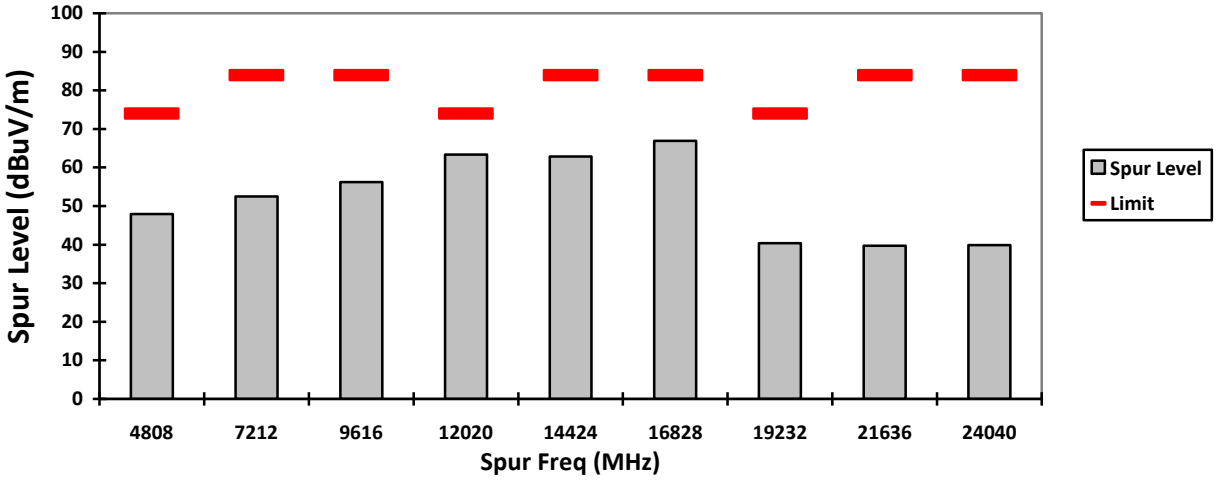
Vertical Radiated Emission Result										
Spur Freq (MHz)	Spur level QPK (dBµV/m)	Spur level PK (dBµV/m)	Spur level AV (dBµV/m)	Limit QPK (dBµV/m)	Limit PK (dBµV/m)	Limit AV (dBµV/m)	Margin QPK (dBµV/m)	Margin PK (dBµV/m)	Margin AV (dBµV/m)	Carrier PK Power (dBµV/m)
4808	-	47.9026**	-	-	74.0000	-	-	26.0974	-	-
7212	-	52.4684**	-	-	83.9173	-	-	31.4489	-	103.9173
9616	-	56.2503**	-	-	83.9173	-	-	27.6670	-	103.9173
12020	-	63.3364**	51.2036**	-	74.0000	54.0000	-	10.6636	2.7964	-
14424	-	62.8645**	-	-	83.9173	-	-	21.0528	-	103.9173
16828	-	66.9368**	-	-	83.9173	-	-	16.9805	-	103.9173
19232	-	40.3660**	-	-	74.0000	-	-	33.6340	-	-
21636	-	39.7422**	-	-	83.9173	-	-	44.1751	-	103.9173
24040	-	39.8550**	-	-	83.9173	-	-	44.0623	-	103.9173
Horizontal Radiated Emission Result										
4808	-	47.4216**	-	-	74.0000	-	-	26.5784	-	-
7212	-	53.3365**	-	-	83.9173	-	-	30.5808	-	103.9173
9616	-	54.4271**	-	-	83.9173	-	-	29.4902	-	103.9173
12020	-	63.2451**	51.0655**	-	74.0000	54.0000	-	10.7549	2.9345	-
14424	-	63.5534**	-	-	83.9173	-	-	20.3639	-	103.9173
16828	-	67.4231**	-	-	83.9173	-	-	16.4942	-	103.9173
19232	-	41.2194**	-	-	74.0000	-	-	32.7806	-	-
21636	-	41.7061**	-	-	83.9173	-	-	42.2112	-	103.9173
24040	-	42.2958**	-	-	83.9173	-	-	41.6215	-	103.9173

Remarks: Pass Result	Marginal Result	Fail Result

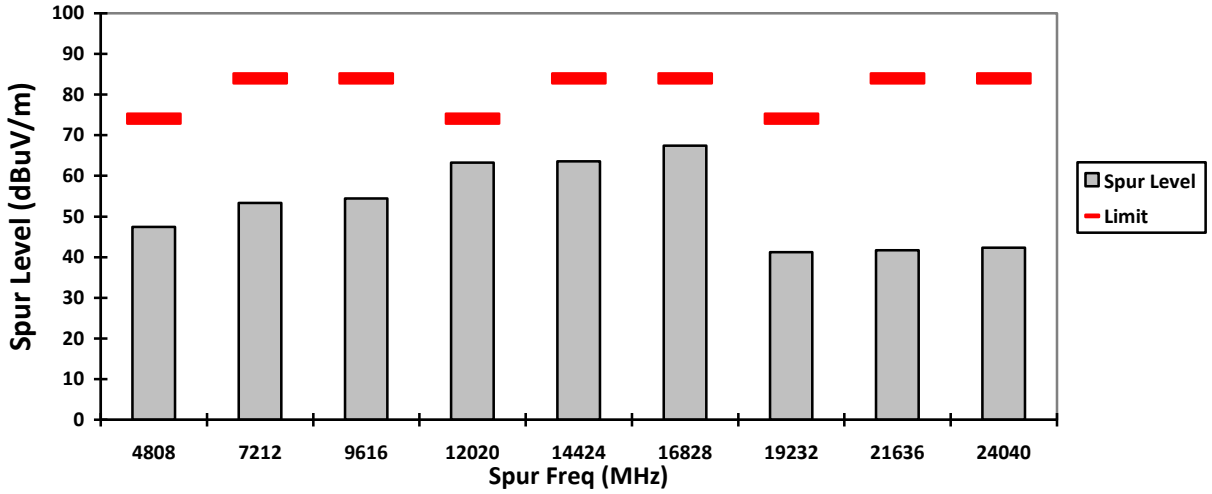
Temperature (degC): 23.8 Humidity (%): 67.9
Test Performed by: Nazrin & Rezza Test Date: Sat, 3 Aug, 2024
System MU: 5.88 dB (30-1000MHz), 5.84 dB (1000-18000MHz), 6.02 dB (18000MHz-40000MHz)

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.
***Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported.**

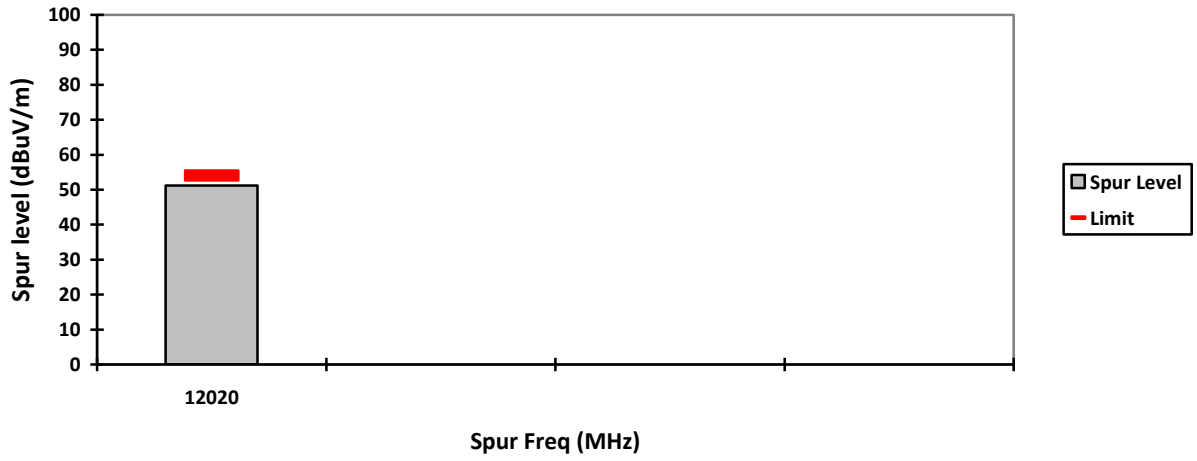
VERTICAL, PK



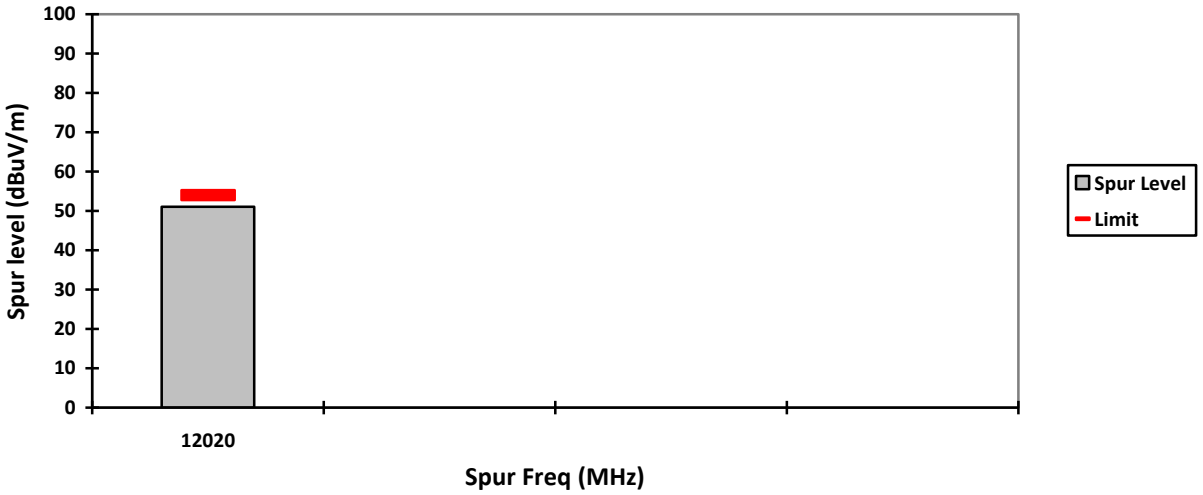
HORIZONTAL, PK



VERTICAL, AV



HORIZONTAL, AV



Test: Bluetooth SAC Transmitter Radiated Emission
Model#: AAH07JDH9SA1AN S/N: 651EAK0033 EMC SR ID#: 0680N01-EMC-00009
Battery: PMNN4890A Softpot power (9dBm) Accessory: PMAD4147A
Test Channel: Mid Test Frequency: 2440.0000 MHz Test Standard: ANSI C63.10-2013
Worst Case Plane: Z-Plane (BTLE 2M)

Radiated Emission (Mid Channel) tabular data

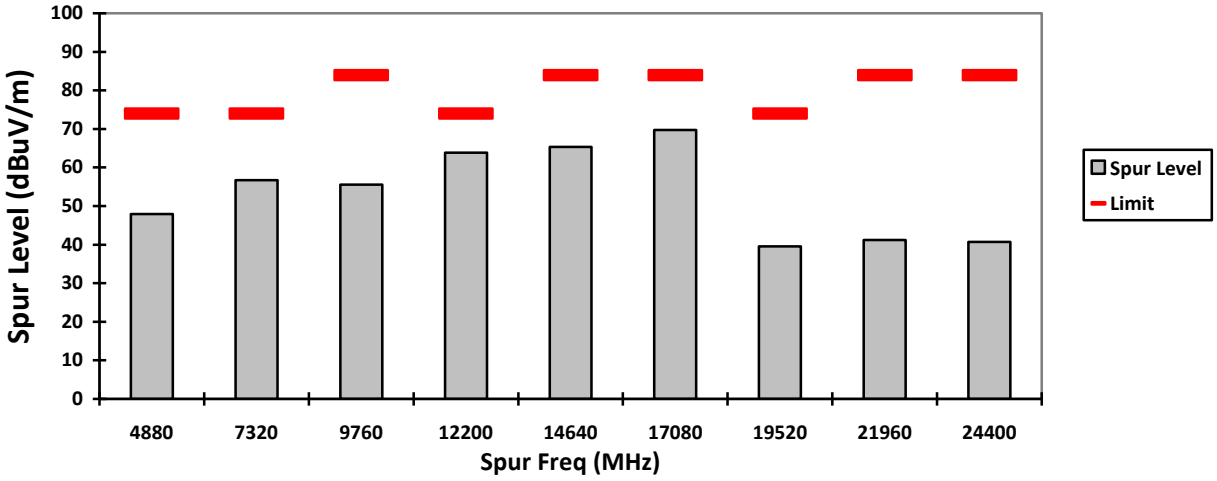
Vertical Radiated Emission Result										
Spur Freq (MHz)	Spur level QPK (dBµV/m)	Spur level PK (dBµV/m)	Spur level AV (dBµV/m)	Limit QPK (dBµV/m)	Limit PK (dBµV/m)	Limit AV (dBµV/m)	Margin QPK (dBµV/m)	Margin PK (dBµV/m)	Margin AV (dBµV/m)	Carrier PK Power (dBµV/m)
qq4880	-	47.9199**	-	-	74.0000	-	-	26.0801	-	-
7320	-	56.6948**	44.5947**	-	74.0000	54.0000	-	17.3052	9.4053	-
9760	-	55.5702**	-	-	83.9173	-	-	28.3471	-	103.9173
12200	-	63.8559**	51.1385**	-	74.0000	54.0000	-	10.1441	2.8615	-
14640	-	65.3130**	-	-	83.9173	-	-	18.6043	-	103.9173
17080	-	69.7430**	-	-	83.9173	-	-	14.1743	-	103.9173
19520	-	39.5406**	-	-	74.0000	-	-	34.4594	-	-
21960	-	41.1914**	-	-	83.9173	-	-	42.7259	-	103.9173
24400	-	40.7045**	-	-	83.9173	-	-	43.2128	-	103.9173
Horizontal Radiated Emission Result										
4880	-	48.2903**	-	-	74.0000	-	-	25.7097	-	-
7320	-	56.3885**	44.7190**	-	74.0000	54.0000	-	17.6115	9.2810	-
9760	-	56.6892**	-	-	83.9173	-	-	27.2281	-	103.9173
12200	-	63.2452**	51.4332**	-	74.0000	54.0000	-	10.7548	2.5668	-
14640	-	64.1611**	-	-	83.9173	-	-	19.7562	-	103.9173
17080	-	69.6467**	-	-	83.9173	-	-	14.2706	-	103.9173
19520	-	40.7855**	-	-	74.0000	-	-	33.2145	-	-
21960	-	41.8509**	-	-	83.9173	-	-	42.0664	-	103.9173
24400	-	42.5255**	-	-	83.9173	-	-	41.3918	-	103.9173

Remarks: Pass Result	Marginal Result	Fail Result

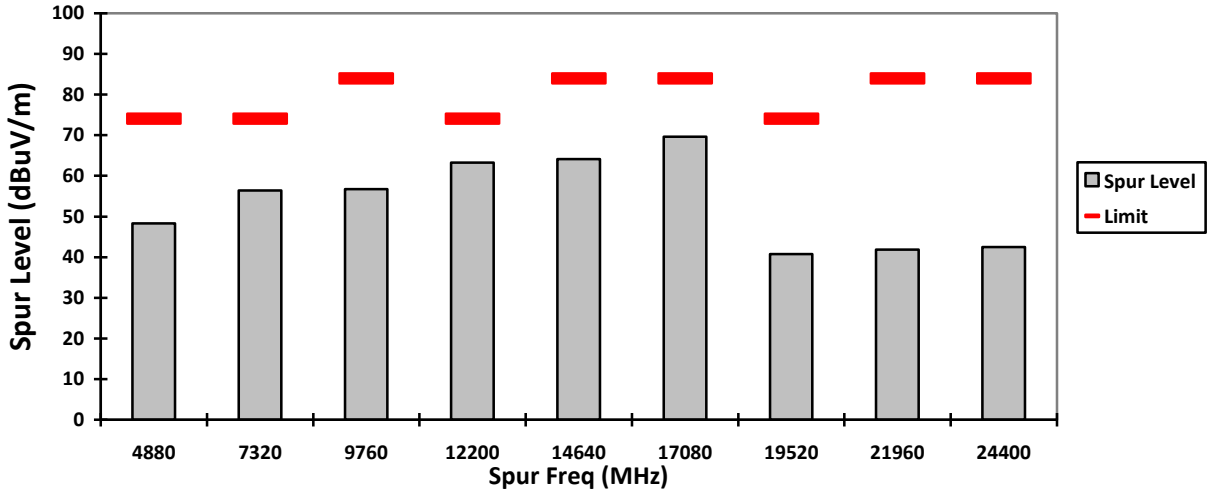
Temperature (degC): 23.8 Humidity (%): 67.9
Test Performed by: Nazrin & Rezza Test Date: Sat, 3 Aug, 2024
System MU: 5.88 dB (30-1000MHz), 5.84 dB (1000-18000MHz), 6.02 dB (18000MHz-40000MHz)

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.
***Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported.**

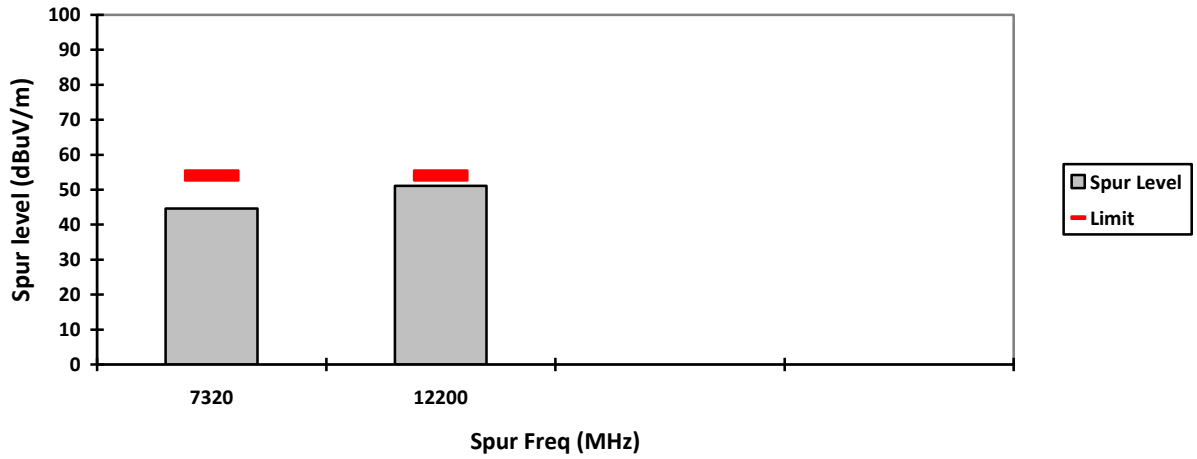
VERTICAL, PK



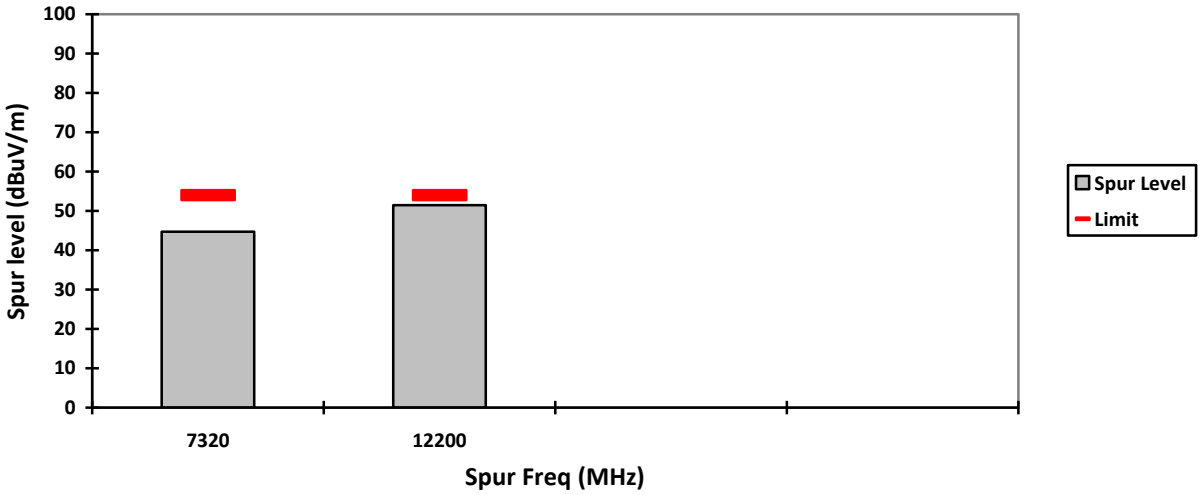
HORIZONTAL, PK



VERTICAL, AV



HORIZONTAL, AV



Test: Bluetooth SAC Transmitter Radiated Emission
Model#: AAH07JDH9SA1AN S/N: 651EAK0033 EMC SR ID#: 0680N01-EMC-00009
Battery: PMNN4890A Softpot power (9dBm) Accessory: PMAD4147A
Test Channel: High Test Frequency: 2478.0000 MHz Test Standard: ANSI C63.10-2013
Worst Case Plane: Z-Plane (BTLE 2M)

Radiated Emission (High Channel) tabular data

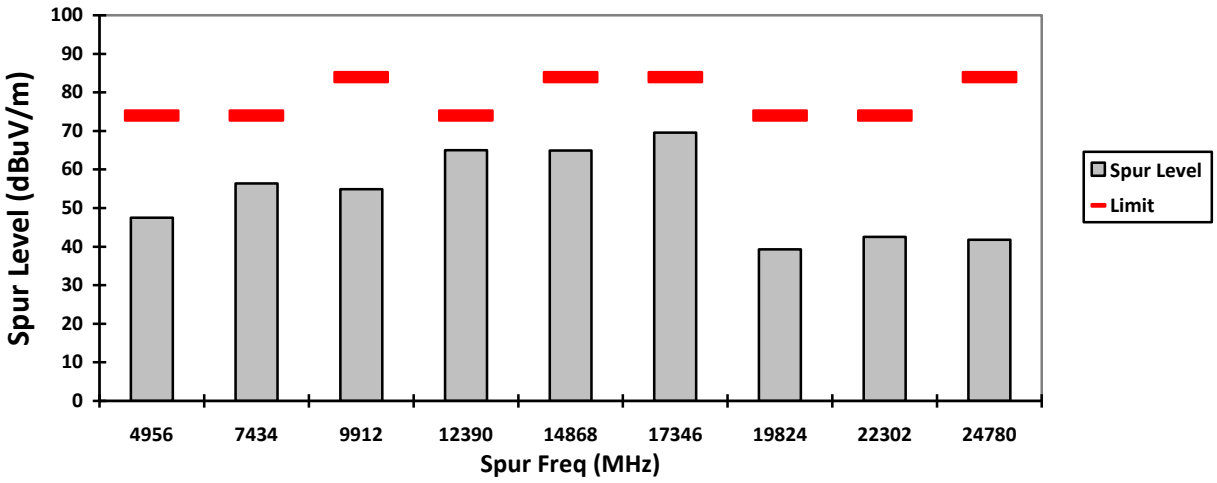
Vertical Radiated Emission Result										
Spur Freq (MHz)	Spur level QPK (dBµV/m)	Spur level PK (dBµV/m)	Spur level AV (dBµV/m)	Limit QPK (dBµV/m)	Limit PK (dBµV/m)	Limit AV (dBµV/m)	Margin QPK (dBµV/m)	Margin PK (dBµV/m)	Margin AV (dBµV/m)	Carrier PK Power (dBµV/m)
4956	-	47.5370**	-	-	74.0000	-	-	26.4630	-	-
7434	-	56.3988**	44.4376**	-	74.0000	54.0000	-	17.6012	9.5624	-
9912	-	54.9324**	-	-	83.9173	-	-	28.9849	-	103.9173
12390	-	65.0330**	52.4246**	-	74.0000	54.0000	-	8.9670	1.5754	-
14868	-	64.9456**	-	-	83.9173	-	-	18.9717	-	103.9173
17346	-	69.6087**	-	-	83.9173	-	-	14.3086	-	103.9173
19824	-	39.3027**	-	-	74.0000	-	-	34.6973	-	-
22302	-	42.5009**	-	-	74.0000	-	-	31.4991	-	-
24780	-	41.8053**	-	-	83.9173	-	-	42.1120	-	103.9173
Horizontal Radiated Emission Result										
4956	-	47.9538**	-	-	74.0000	-	-	26.0462	-	-
7434	-	56.6757**	44.5629**	-	74.0000	54.0000	-	17.3243	9.4371	-
9912	-	54.5199**	-	-	83.9173	-	-	29.3974	-	103.9173
12390	-	65.0385**	52.2796**	-	74.0000	54.0000	-	8.9615	1.7204	-
14868	-	64.3597**	-	-	83.9173	-	-	19.5576	-	103.9173
17346	-	69.9514**	-	-	83.9173	-	-	13.9659	-	103.9173
19824	-	39.6413**	-	-	74.0000	-	-	34.3587	-	-
22302	-	41.5901**	-	-	74.0000	-	-	32.4099	-	-
24780	-	42.4764**	-	-	83.9173	-	-	41.4409	-	103.9173

Remarks: Pass Result	Marginal Result	Fail Result

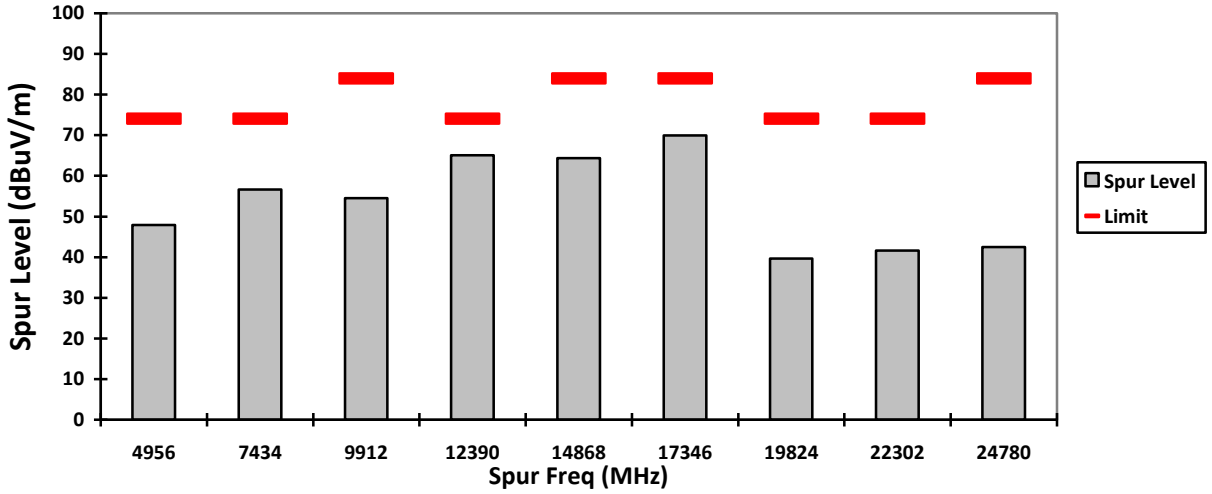
Temperature (degC): 23.8 Humidity (%): 67.9
Test Performed by: Nazrin & Rezza Test Date: Sat, 3 Aug, 2024
System MU: 5.88 dB (30-1000MHz), 5.84 dB (1000-18000MHz), 6.02 dB (18000MHz-40000MHz)

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.
***Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported.**

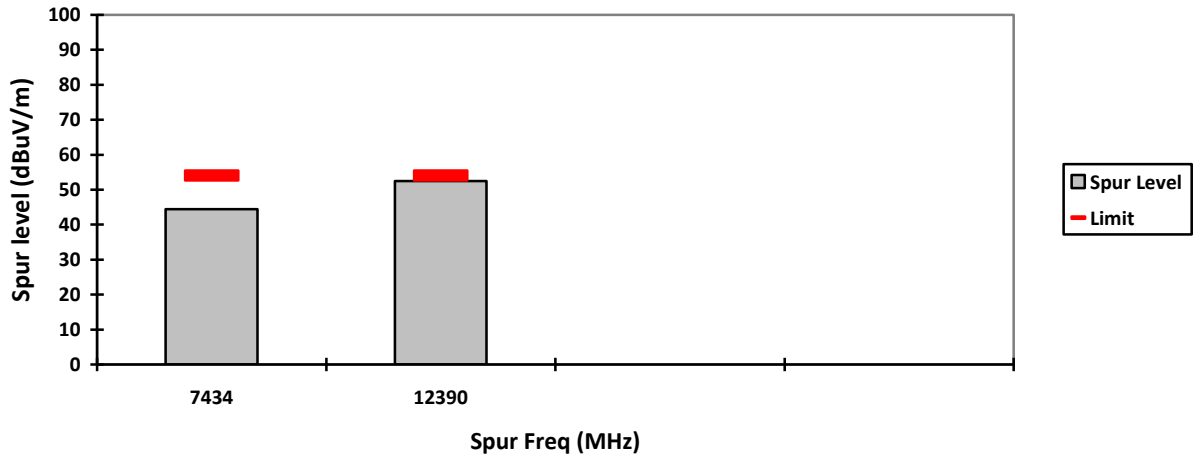
VERTICAL, PK



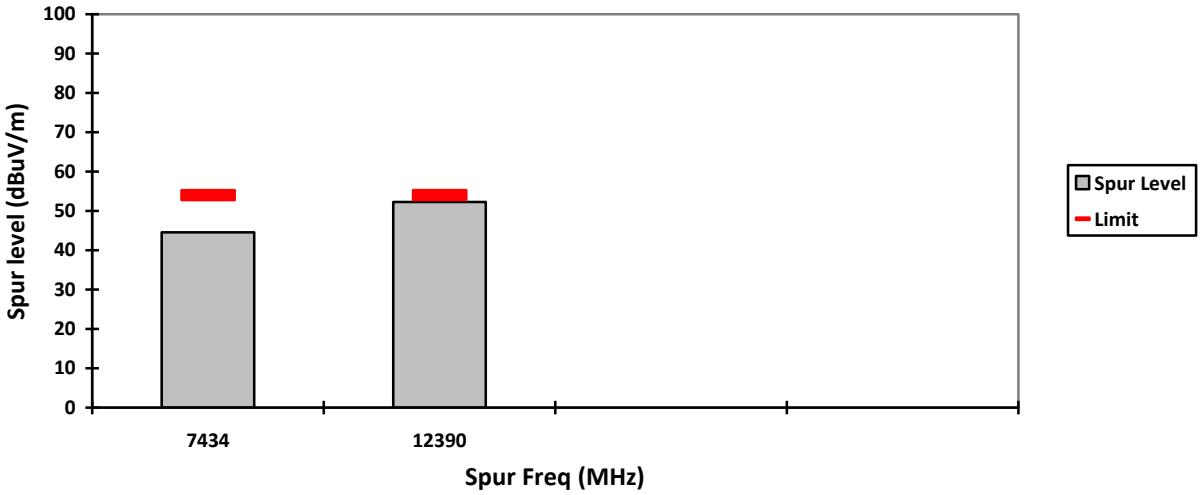
HORIZONTAL, PK



VERTICAL, AV



HORIZONTAL, AV



Test: Bluetooth SAC Transmitter Radiated Emission
Model#: AAH07JDH9SA1AN S/N: 651EAK0033, 651EAK0054, 651EAK0048
EMC SR ID#: 0680N01-EMC-00024
Battery: PMNN4889A Accessory: PMAD4147A, PMPN4283B-C10, PS000242A01, 3087791G01
Test Channel: High Test Frequency: 2478.0000 MHz Test Standard: ANSI C63.10-2013
Worst Case Plane: Y-Plane (BTLE 2M)

Radiated Emission (High Channel) tabular data

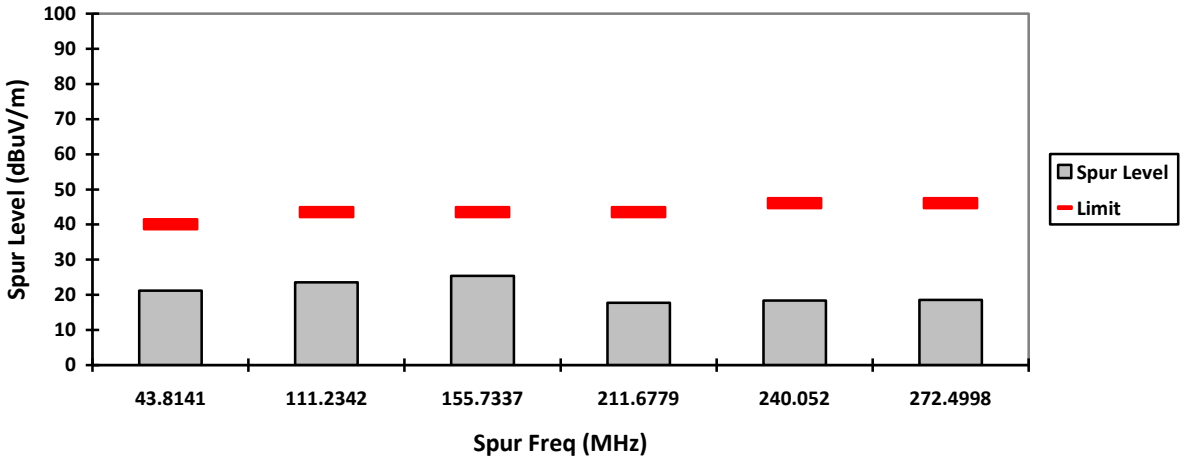
Vertical Radiated Emission Result										
Spur Freq (MHz)	Spur level QPK (dBµV/m)	Spur level PK (dBµV/m)	Spur level AV (dBµV/m)	Limit QPK (dBµV/m)	Limit PK (dBµV/m)	Limit AV (dBµV/m)	Margin QPK (dBµV/m)	Margin PK (dBµV/m)	Margin AV (dBµV/m)	Carrier PK Power (dBµV/m)
43.8141	21.2185	-	-	40.0000	-	-	18.7815	-	-	-
111.2342	23.5308	-	-	43.5000	-	-	19.9692	-	-	-
155.7337	25.4061	-	-	43.5000	-	-	18.0939	-	-	-
211.6779	17.7432 *	-	-	43.5000	-	-	25.7568	-	-	-
240.0520	18.3937 *	-	-	46.0000	-	-	27.6063	-	-	-
272.4998	18.5809 *	-	-	46.0000	-	-	27.4191	-	-	-
Horizontal Radiated Emission Result										
43.5664	14.8835 *	-	-	40.0000	-	-	25.1165	-	-	-
111.8396	16.7712 *	-	-	43.5000	-	-	26.7288	-	-	-
155.3451	32.8680	-	-	43.5000	-	-	10.6320	-	-	-
211.0685	26.6032	-	-	43.5000	-	-	16.8968	-	-	-
240.0460	28.6357	-	-	46.0000	-	-	17.3643	-	-	-
272.5727	27.6961	-	-	46.0000	-	-	18.3039	-	-	-

Remarks: Pass Result	Marginal Result	Fail Result

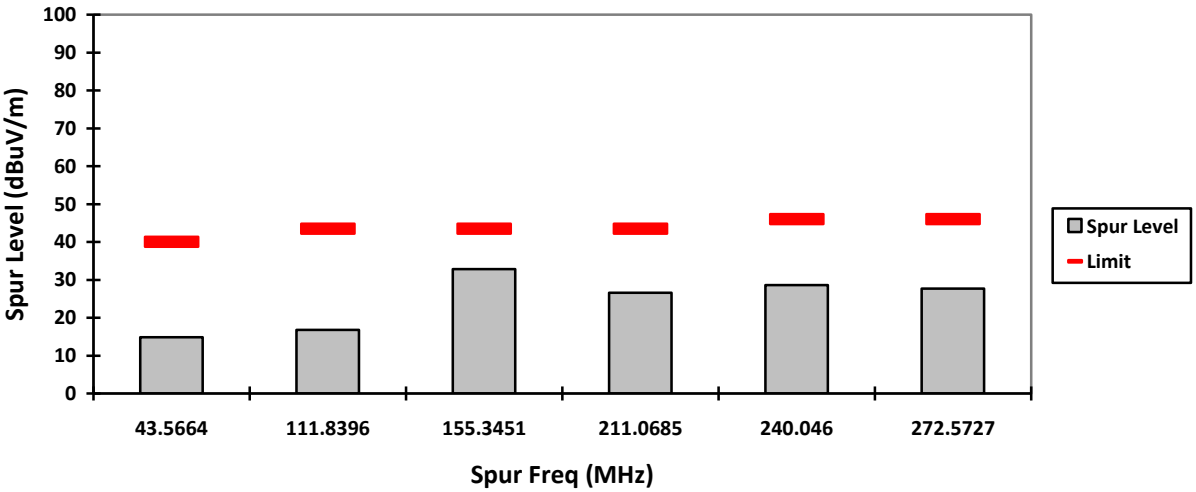
Temperature (degC): 22.6 **Humidity (%): 68.2**
Test Performed by: Nazrin & Fuad **Test Date: Sun, 1 Sep, 2024**
System MU: 5.88 dB (30-1000MHz), 5.84 dB (1000-18000MHz), 6.02 dB (18000MHz-40000MHz)

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.
***Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported.**

VERTICAL, QPK

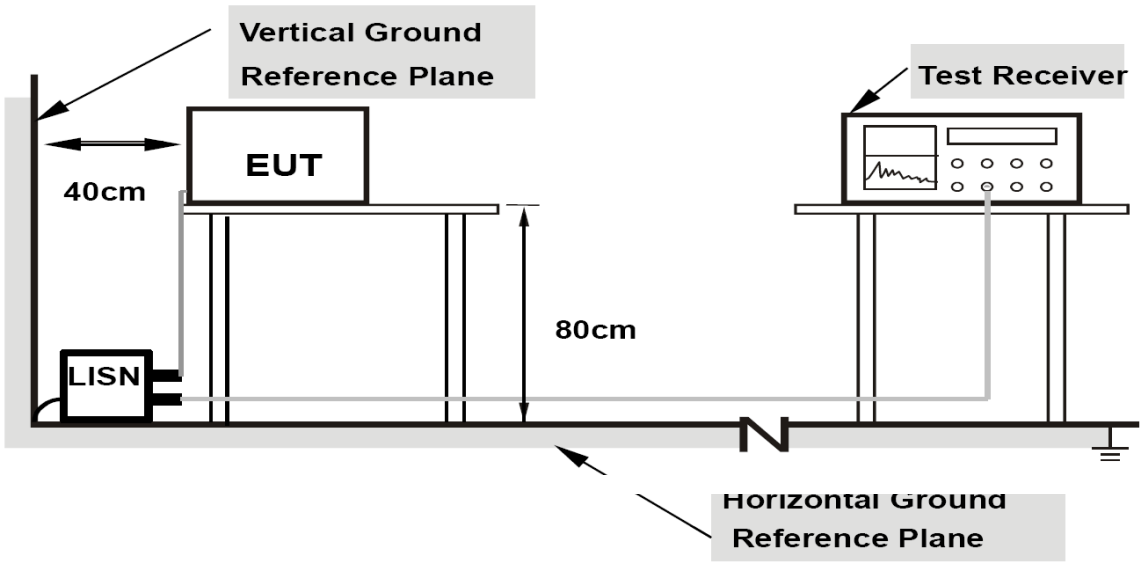


HORIZONTAL, QPK



6.7 AC Powerline Conducted Emission

6.7.1 Test Setup



1) Tests were conducted for both Receive and Transmit Mode of the EUT.
2) The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50uH of coupling impedance for the measuring instrument.
3) Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
4) The frequency range from 150 kHz to 30MHz was measured.

6.7.2 Test Limits:

For AC Power Line Conducted Test Limit can be Class A or B depends on product classification.

Limits for conducted disturbance at the mains ports of class A ITE

Frequency range MHz	Limits dB(µV)	
	Quasi-peak	Average
0,15 to 0,50	79	66
0,50 to 30	73	60
NOTE The lower limit shall apply at the transition frequency.		

Table 1: Limits for Conducted Disturbance at the Mains Ports of Class A ITE.

Limits for conducted disturbance at the mains ports of class B ITE

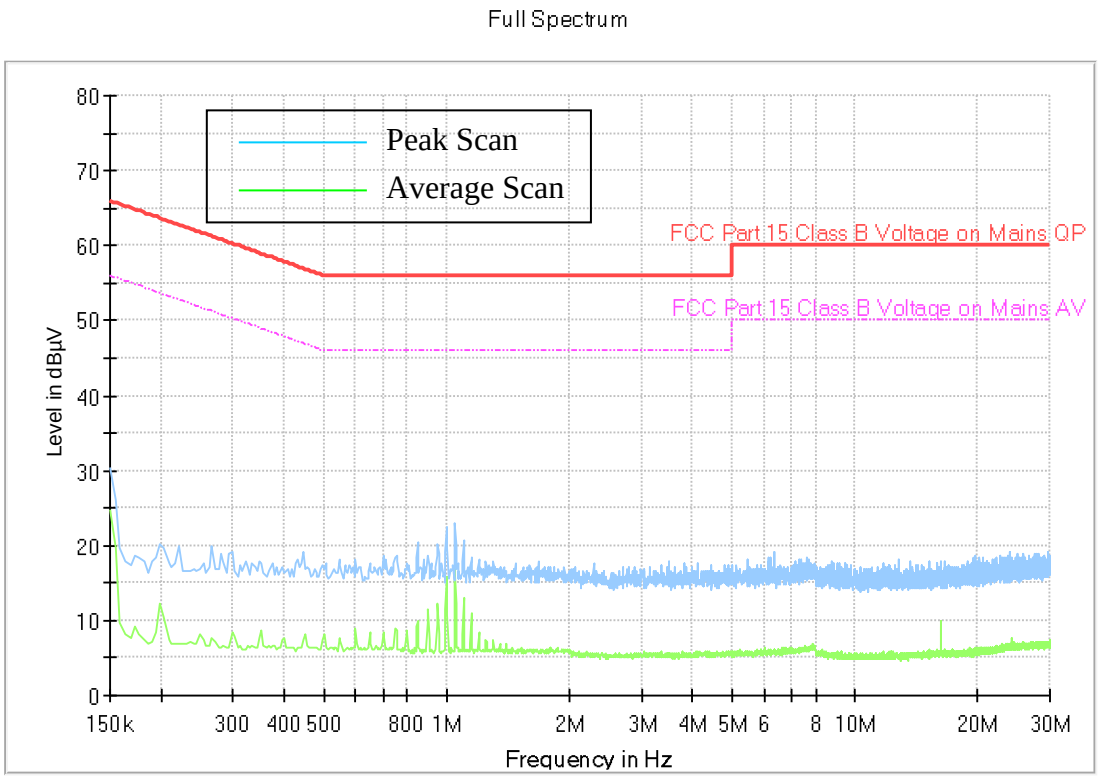
Frequency range MHz	Limits dB(µV)	
	Quasi-peak	Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50
NOTE 1 The lower limit shall apply at the transition frequencies. NOTE 2 The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz.		

Table 2: Limits for Conducted Disturbance at the Mains Ports of Class B ITE

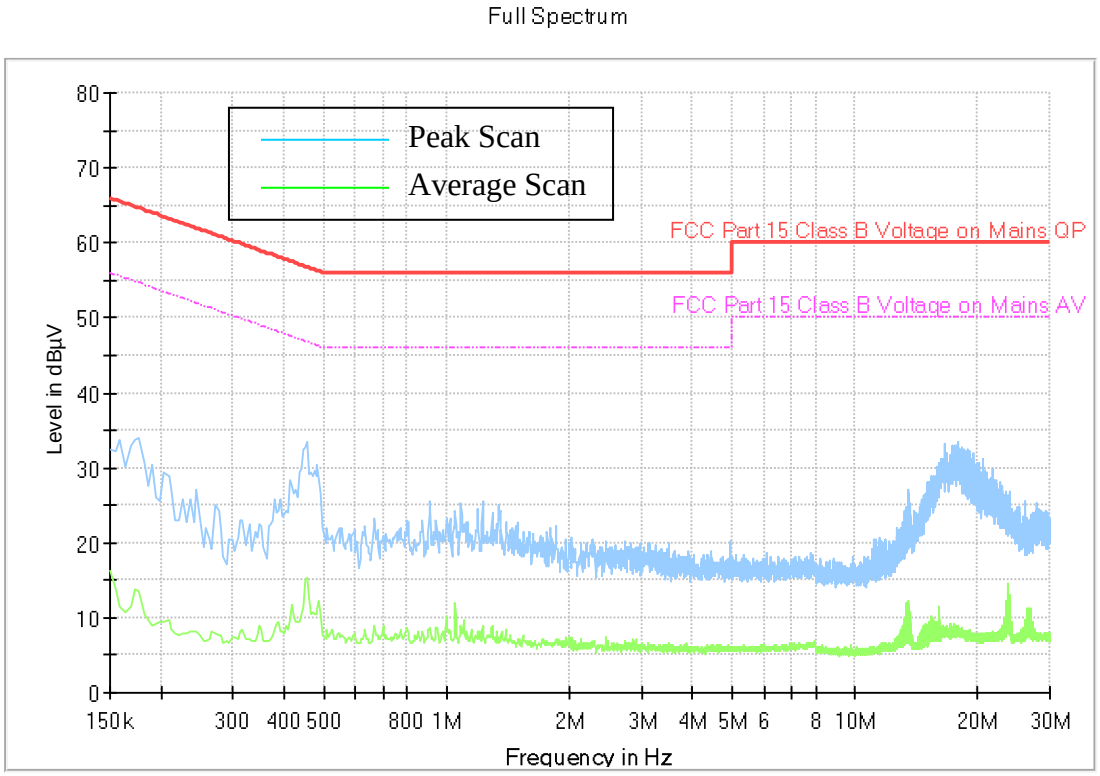
6.7.3 Test Result

120 VAC, 60Hz

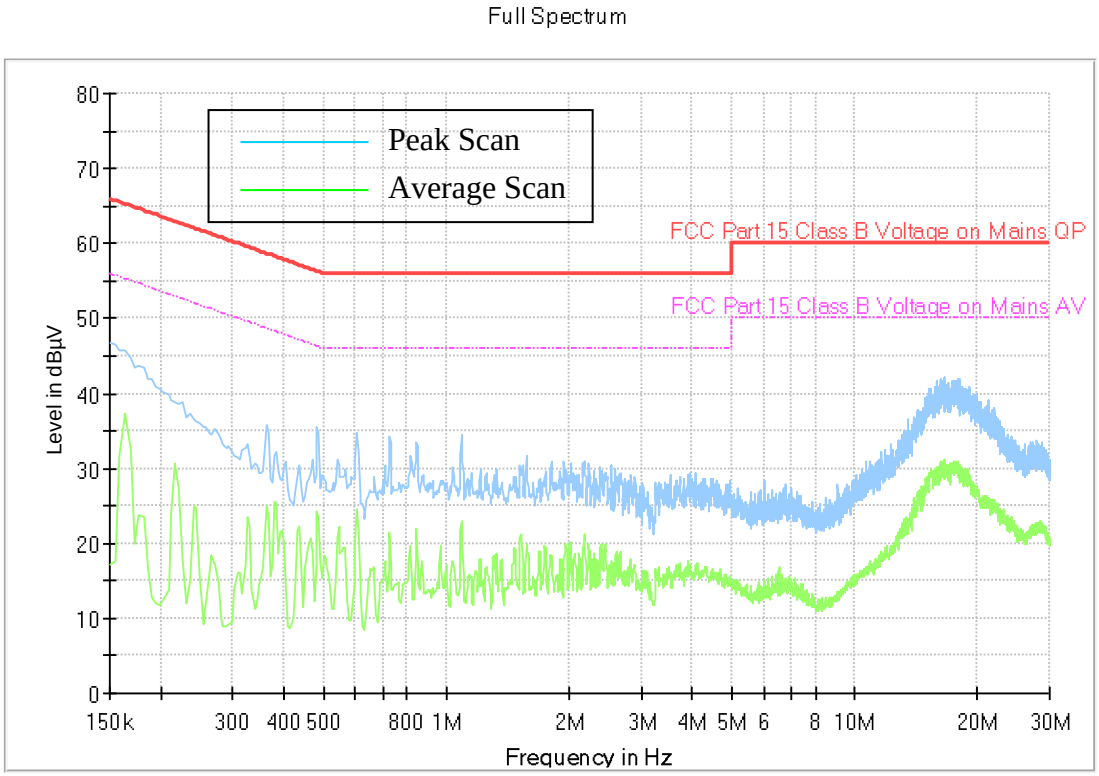
1) Ambient



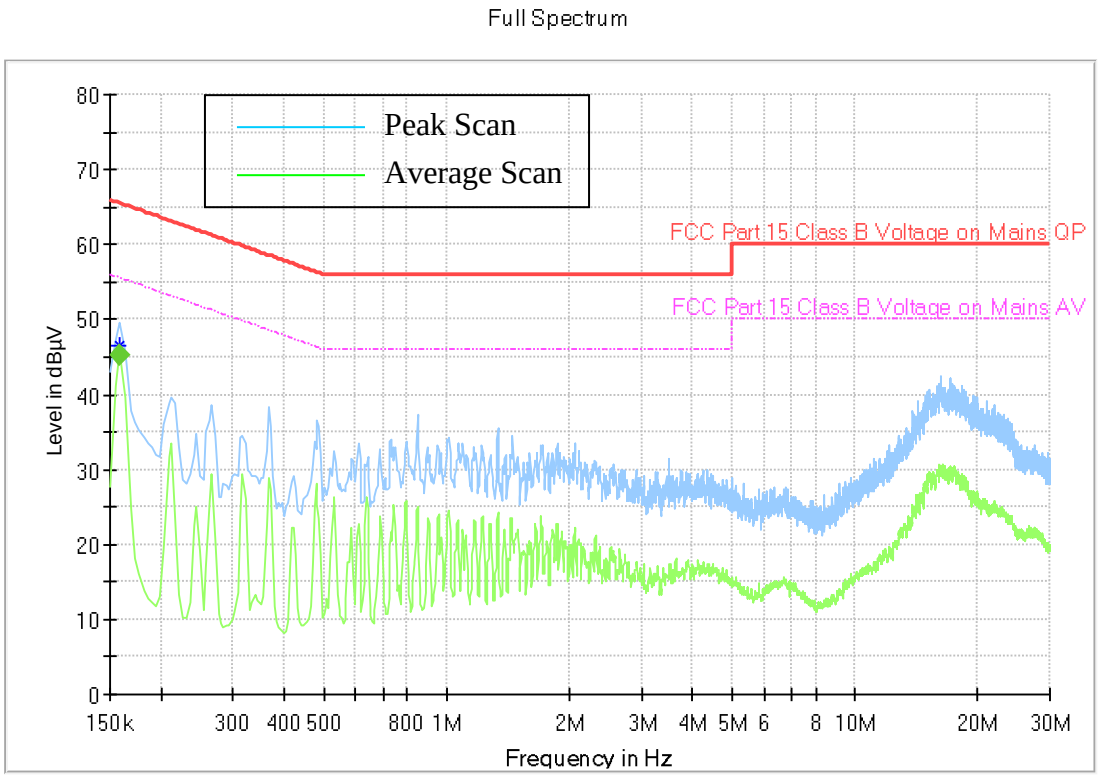
2) Charger Alone



3) Charger + Radio Off



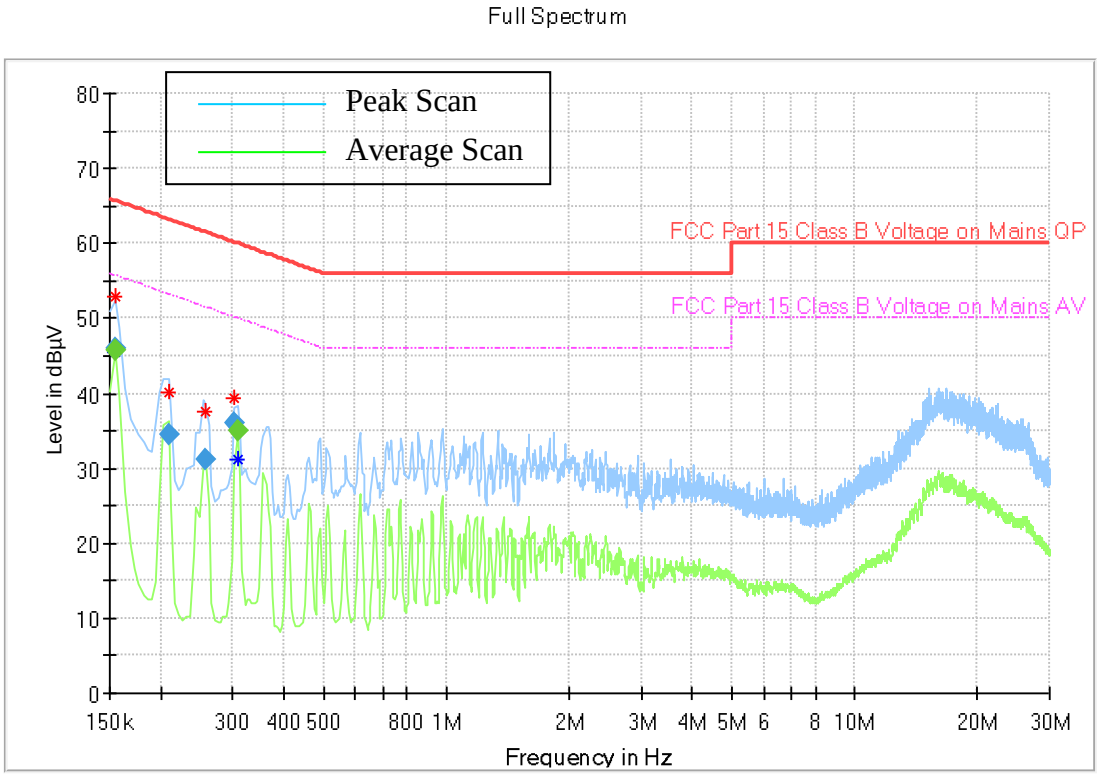
4) Charger + Radio Standby



Quasipeak and Average Measurement

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.159000	---	45.15	55.52	10.37	L1	ON	10.6

5) Charger + Radio TX BTLE 2M



Quasipeak and Average Measurement

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.154500	45.95	---	65.75	19.80	L1	ON	10.5
0.154500	---	45.63	55.75	10.12	L1	ON	10.5
0.208500	34.42	---	63.27	28.84	L1	ON	10.5
0.258000	31.23	---	61.50	30.26	N	ON	10.4
0.303000	36.00	---	60.16	24.16	L1	ON	10.5
0.307500	---	34.99	50.04	15.05	L1	ON	10.5

END OF TEST REPORT