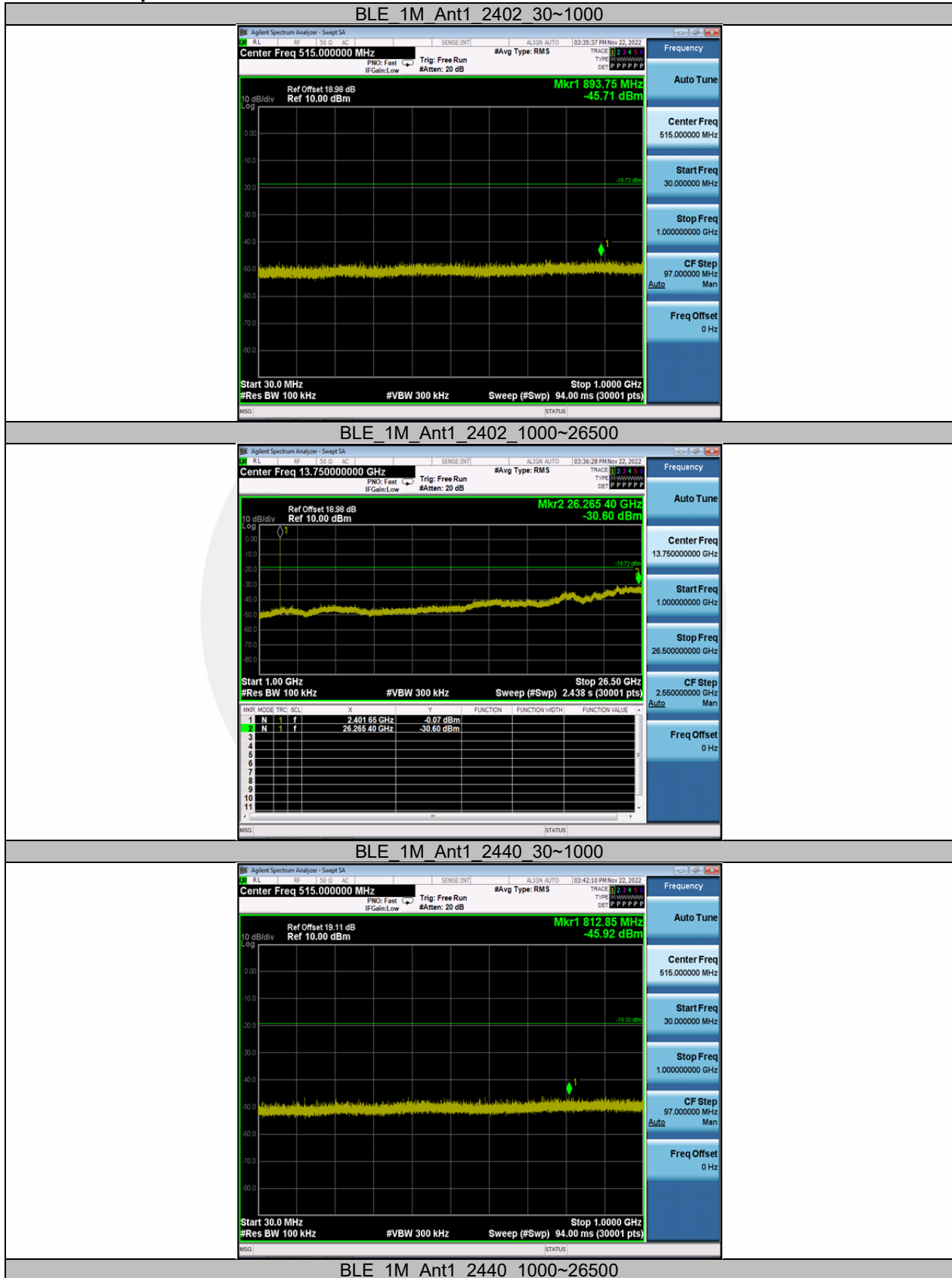
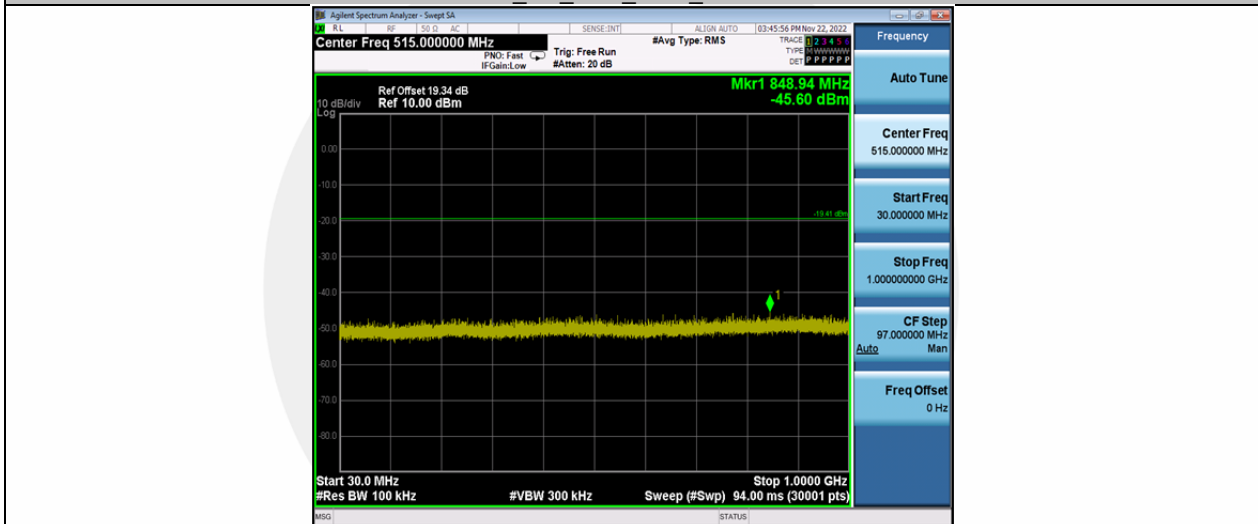


Conducted Spurious Emission





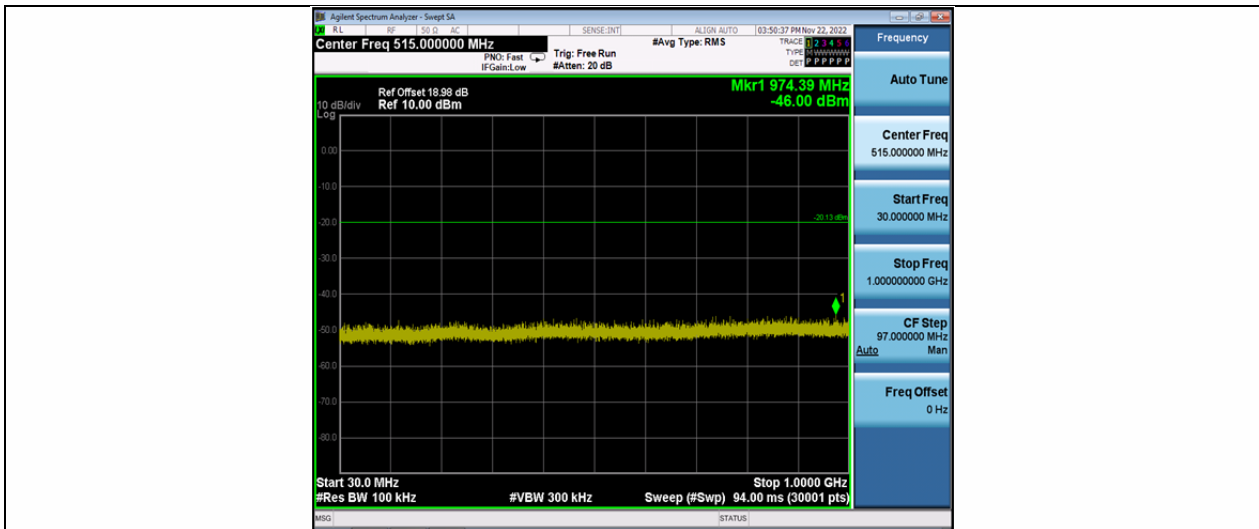
BLE_1M_Ant1_2480_30~1000



BLE_1M_Ant1_2480_1000~26500



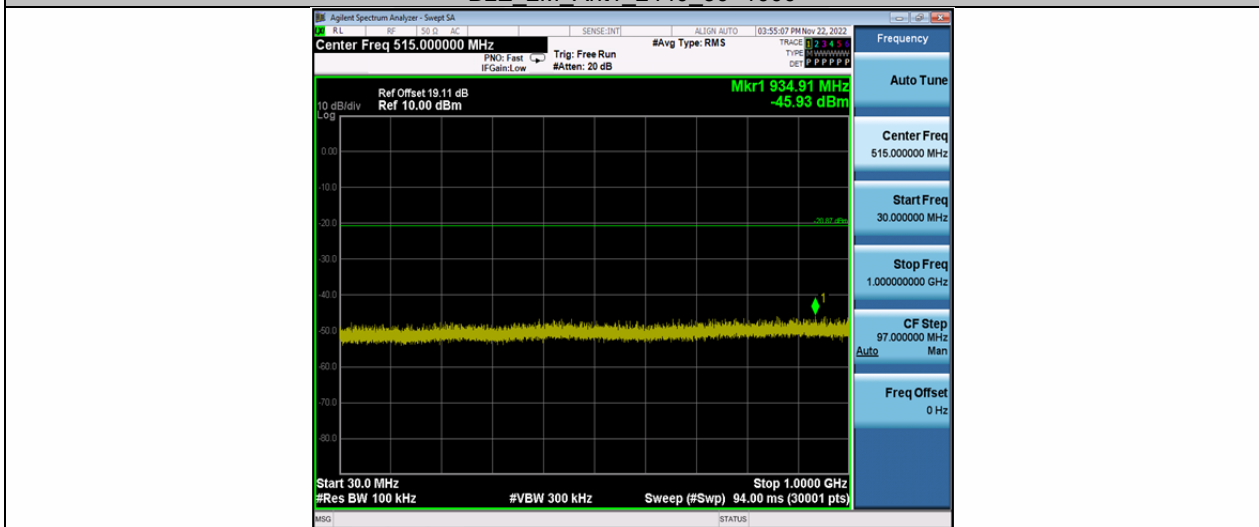
BLE_2M_Ant1_2402_30~1000



BLE_2M_Ant1_2402_1000~26500



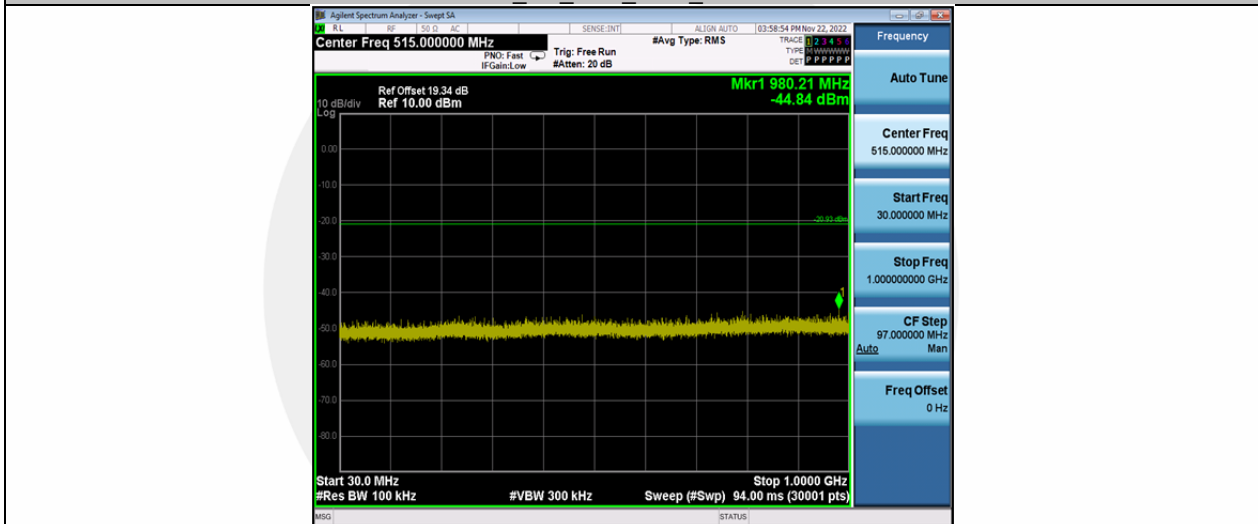
BLE_2M_Ant1_2440_30~1000



BLE_2M_Ant1_2440_1000~26500



BLE_2M_Ant1_2480_30~1000



BLE_2M_Ant1_2480_1000~26500



8.7 RADIATED SPURIOUS EMISSION

8.7.1 Applicable Standard

According to FCC Part 15.247(d), 15.205, 15.209

According to RSS-Gen and RSS-247

According to 558074 D01 15.247 Meas Guidance v05r02 Section 8.6

According to ANSI C63.10 Section 11.12

8.7.2 Conformance Limit

According to FCC Part 15.247(d): radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

According to FCC Part 15.205, Restricted bands

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

According to FCC Part 15.205, the level of any transmitter spurious emission in Restricted bands shall not exceed the level of the emission specified in the following table

Restricted Frequency(MHz)	Field Strength ($\mu\text{V/m}$)	Field Strength ($\text{dB}\mu\text{V/m}$)	Measurement Distance
0.009-0.490	2400/F(KHz)	20 log ($\mu\text{V/m}$)	300
0.490-1.705	24000/F(KHz)	20 log ($\mu\text{V/m}$)	30
1.705-30	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

8.7.3 Test Configuration

Test according to clause 7.2 radio frequency test setup 2

8.7.4 Test Procedure

This test is required for any spurious emission that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:

For Above 1GHz:

The EUT was placed on a turn table which is 1.5m above ground plane.

Maximum procedure was performed on the highest emissions to ensure EUT compliance.

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz

VBW ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

For average measurements the resolution bandwidth of spectrum analyzer is 1 MHz with the video bandwidth is ≥ 1/T with peak detector.

For Below 1GHz:

The EUT was placed on a turn table which is 0.8m above ground plane.

Maximum procedure was performed on the highest emissions to ensure EUT compliance.

Span = wide enough to fully capture the emission being measured

RBW = 100 kHz for

VBW ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

For Below 30MHz:

The EUT was placed on a turn table which is 0.8m above ground plane.

Maximum procedure was performed on the highest emissions to ensure EUT compliance.

Span = wide enough to fully capture the emission being measured

RBW = 9kHz

VBW ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

For Below 150KHz:

The EUT was placed on a turn table which is 0.8m above ground plane.

Maximum procedure was performed on the highest emissions to ensure EUT compliance.

Span = wide enough to fully capture the emission being measured

RBW = 200Hz

VBW ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Follow the guidelines in ANSI C63.10 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc. A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit. Submit this data.

8.7.5 Test Results

Temperature:	25 °C
Relative Humidity:	54%
ATM Pressure:	1011 mbar
Test Engineer:	XXH

■ Spurious Emission below 30MHz (9KHz to 30MHz)

For Spurious Emission below 30MHz (9KHz to 30MHz), was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

■ Spurious Emission Above 1GHz (1GHz to 25GHz)

Bluetooth (BLE_1M, BLE_2M) mode have been tested, and the worst result was report as below:

Test mode: BLE_1M Frequency: Channel 0: 2402MHz

Freq.(MHz)	Ant.Pol.	Corrected Reading(dBuV/m)	Limit 3m(dBuV/m)	Margin(dB)	Remark
4801.875	V	50.82	74.00	23.18	Peak
14568.75	V	64.81	74.00	9.19	Peak
17647.5	V	70.10	74.00	3.90	Peak
4801.875	V	30.81	54.00	23.19	Avg
14568.75	V	44.48	54.00	9.52	Avg
17647.5	V	45.90	54.00	8.10	Avg
4801.875	H	52.23	74.00	21.77	Peak
14707.5	H	64.50	74.00	9.50	Peak
17602.5	H	69.83	74.00	4.17	Peak
4801.875	H	32.59	54.00	21.41	Avg
14707.5	H	43.29	54.00	10.71	Avg
17602.5	H	46.34	54.00	7.66	Avg

Test mode: BLE_1M Frequency: Channel 19: 2440MHz

Freq.(MHz)	Ant.Pol.	Corrected Reading(dBuV/m)	Limit 3m(dBuV/m)	Margin(dB)	Remark
1993.4967	V	48.62	74.00	25.38	Peak
4878.75	V	49.37	74.00	24.63	Peak
17966.25	V	70.09	74.00	3.91	Peak
1993.4967	V	28.78	54.00	25.22	Avg
4878.75	V	29.36	54.00	24.64	Avg
17966.25	V	45.61	54.00	8.39	Avg
1665.3327	H	46.04	74.00	27.96	Peak
4878.75	H	52.08	74.00	21.92	Peak
17625	H	69.77	74.00	4.23	Peak
1665.3327	H	26.13	54.00	27.87	Avg
4878.75	H	31.76	54.00	22.24	Avg
17625	H	47.10	54.00	6.90	Avg

Test mode: BLE_1M Frequency: Channel 39: 2480MHz

Freq.(MHz)	Ant.Pol.	Corrected Reading(dBuV/m)	Limit 3m(dBuV/m)	Margin(dB)	Remark
1991.4957	V	49.13	74.00	24.87	Peak
4959.375	V	50.47	74.00	23.53	Peak
17598.75	V	69.74	74.00	4.26	Peak
1991.4957	V	30.85	54.00	23.15	Avg
4959.375	V	32.19	54.00	21.81	Avg
17598.75	V	46.36	54.00	7.64	Avg
4959.375	H	54.54	74.00	19.46	Peak
14666.25	H	64.90	74.00	9.10	Peak
17600.625	H	70.06	74.00	3.94	Peak
4959.375	H	36.11	54.00	17.89	Avg
14666.25	H	45.08	54.00	8.92	Avg
17600.625	H	47.10	54.00	6.90	Avg

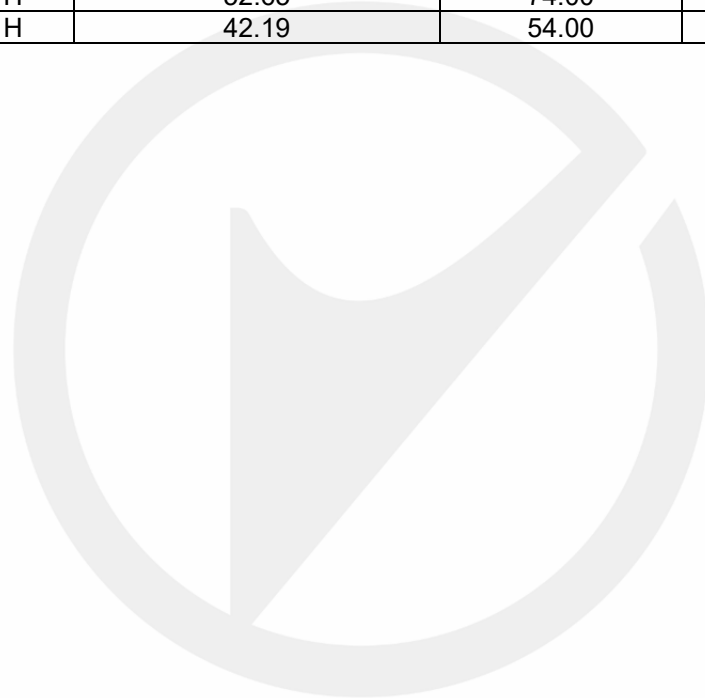
■ Spurious Emission in Restricted Band 2310-2390MHz and 2483.5-2500MHz
Bluetooth (BLE_1M, BLE_2M) mode have been tested, and the worst result was report as below:

Test mode: BLE_1M Frequency: Channel 0: 2402MHz

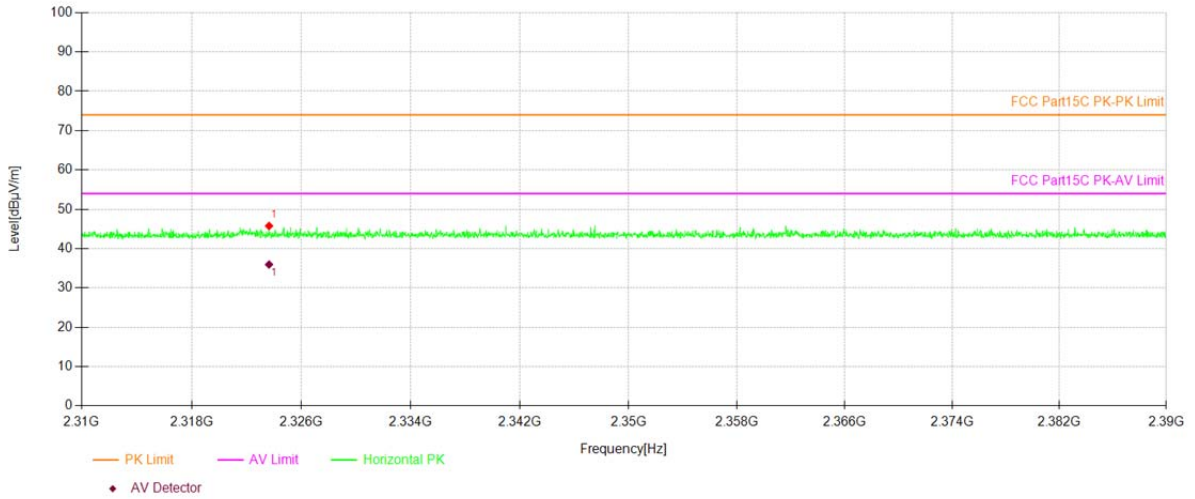
Freq.(MHz)	Ant.Pol.	Corrected Reading(dBuV/m)	Limit 3m(dBuV/m)	Margin(dB)	Remark
2346.865	V	48.15	74.00	25.85	Peak
2346.865	V	38.10	54.00	15.90	Avg
2323.631	H	45.77	74.00	28.23	Peak
2323.631	H	35.96	54.00	18.04	Avg

Test mode: BLE_1M Frequency: Channel 39: 2480MHz

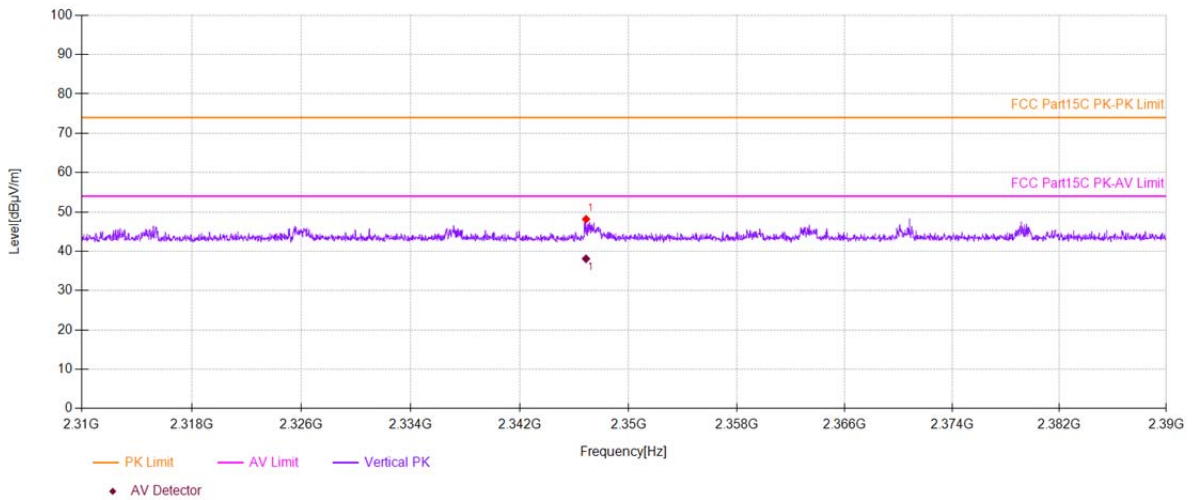
Freq.(MHz)	Ant.Pol.	Corrected Reading(dBuV/m)	Limit 3m(dBuV/m)	Margin(dB)	Remark
2483.665	V	48.23	74.00	25.77	Peak
2483.665	V	38.19	54.00	15.81	Avg
2483.747	H	52.65	74.00	21.35	Peak
2483.747	H	42.19	54.00	11.81	Avg



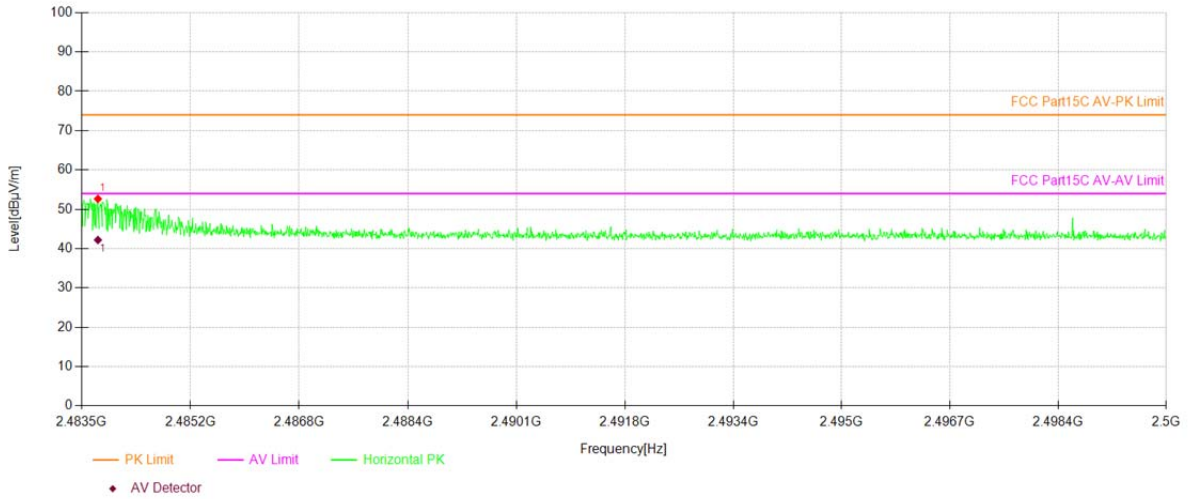
Test Model Spurious Emission in Restricted Band 2310-2390MHz
Channel 0: 2402MHz BLE_1M H



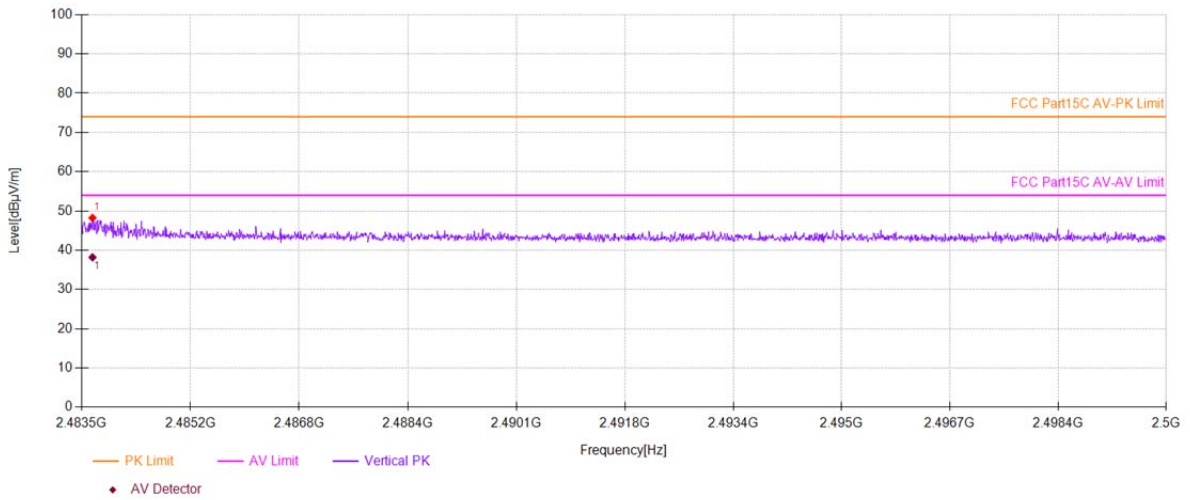
Test Model Spurious Emission in Restricted Band 2310-2390MHz
Channel 0: 2402MHz BLE_1M V



Test Model **Spurious Emission in Restricted Band 2483.5-2500MHz**
Channel 39: 2480MHz **BLE_1M** **H**



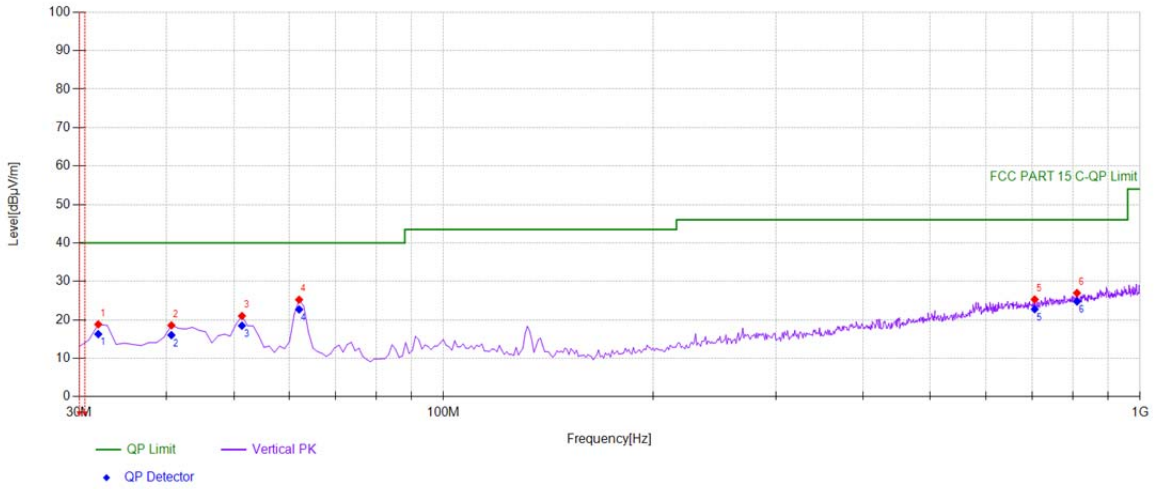
Test Model **Spurious Emission in Restricted Band 2483.5-2500MHz**
Channel 39: 2480MHz **BLE_1M** **V**



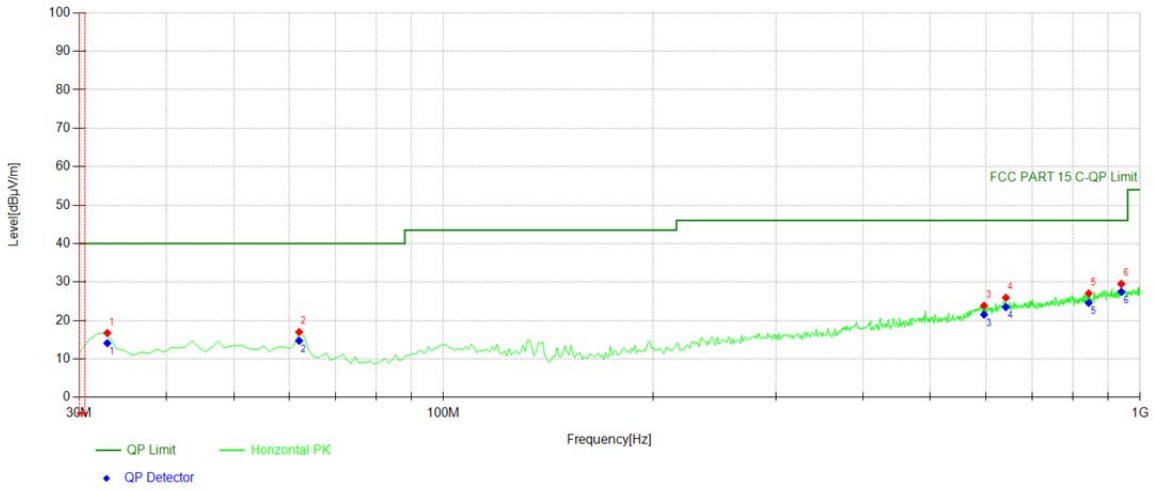
■ Spurious Emission below 1GHz (30MHz to 1GHz)

Bluetooth (BLE_1M, BLE_2M) mode have been tested, and the worst result was report as below:

2402

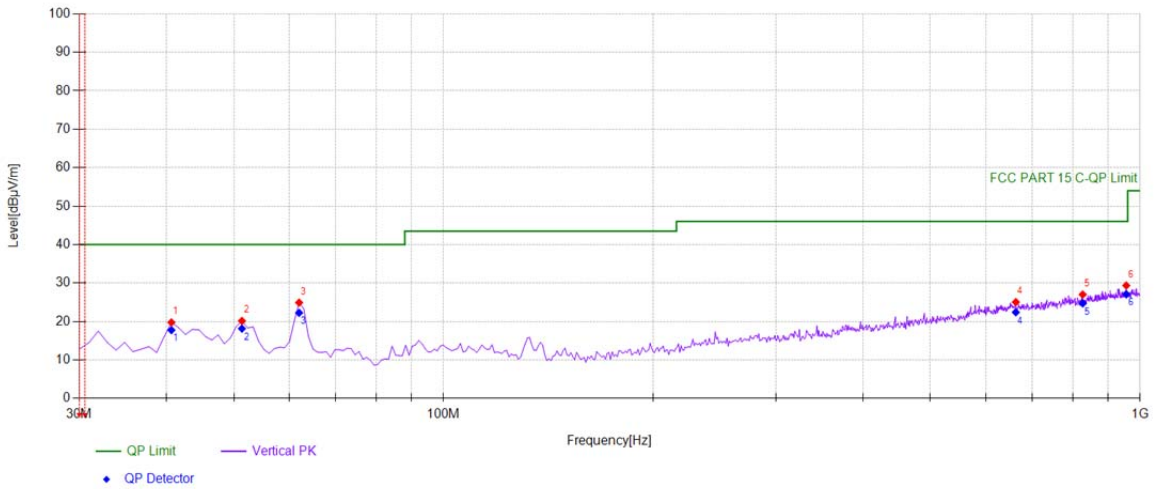


Suspected Data List							
NO.	Freq. [MHz]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	31.9419	18.83	40.00	21.17	100	169	Vertical
2	40.6807	18.57	40.00	21.43	100	303	Vertical
3	51.3614	21.02	40.00	18.98	100	114	Vertical
4	62.042	25.24	40.00	14.76	100	45	Vertical
5	705.7958	25.31	46.00	20.69	100	119	Vertical
6	811.6316	26.97	46.00	19.03	100	197	Vertical



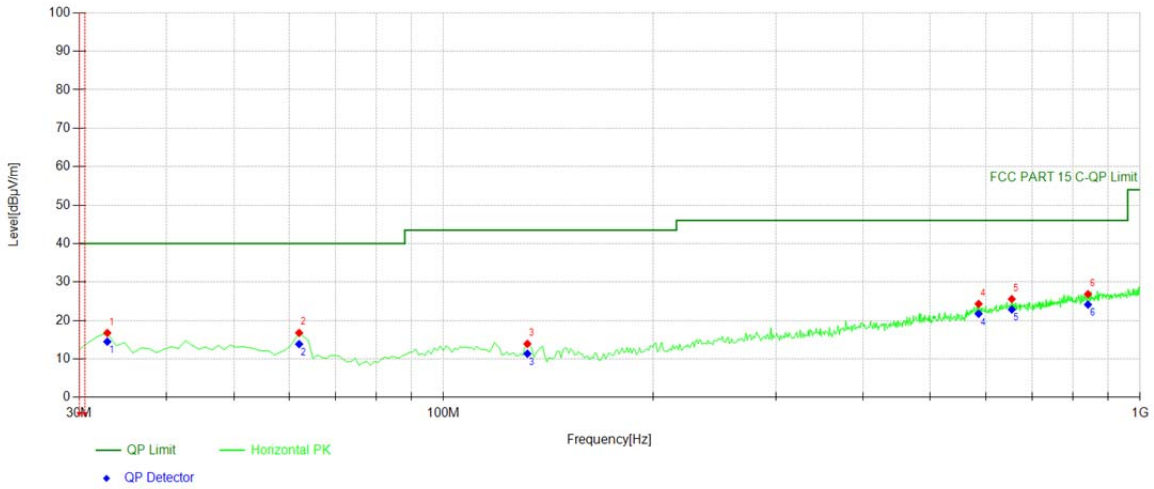
Suspected Data List							
NO.	Freq. [MHz]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	32.9129	16.75	40.00	23.25	100	168	Horizontal
2	62.042	17.01	40.00	22.99	100	247	Horizontal
3	597.047	23.82	46.00	22.18	100	329	Horizontal
4	641.7117	25.93	46.00	20.07	100	104	Horizontal
5	843.6737	27.05	46.00	18.95	100	81	Horizontal
6	939.7998	29.53	46.00	16.47	100	279	Horizontal

2440



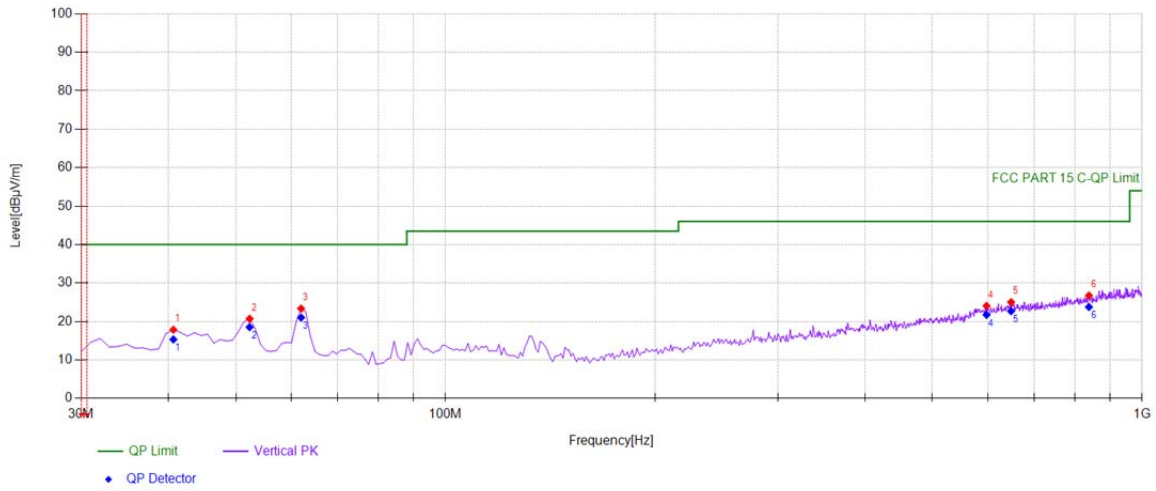
Suspected Data List

NO.	Freq. [MHz]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	40.6807	19.77	40.00	20.23	100	229	Vertical
2	51.3614	20.16	40.00	19.84	100	173	Vertical
3	62.042	24.91	40.00	15.09	100	146	Vertical
4	663.0731	25.05	46.00	20.95	100	63	Vertical
5	827.1672	27.01	46.00	18.99	100	196	Vertical
6	955.3353	29.36	46.00	16.64	100	72	Vertical



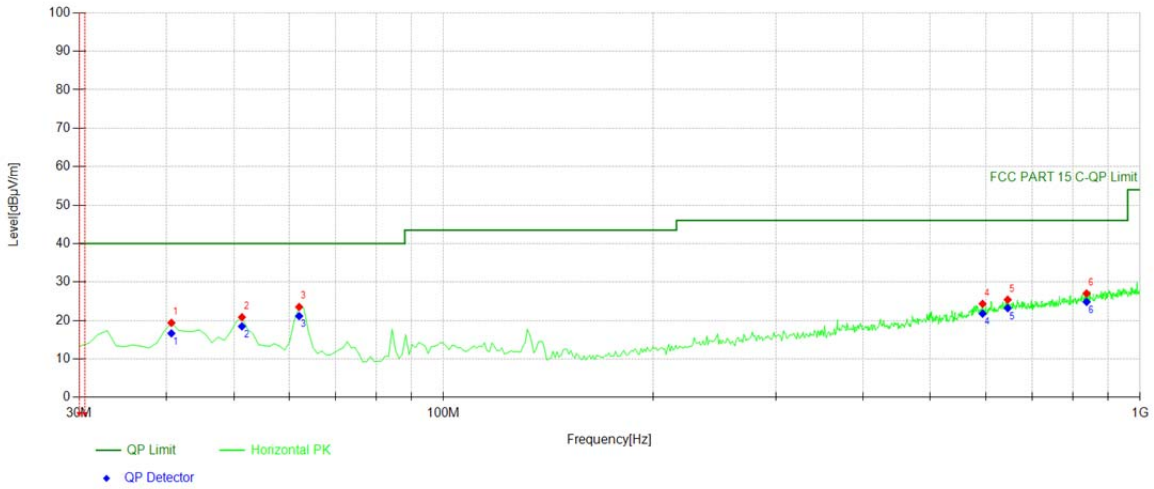
Suspected Data List							
NO.	Freq. [MHz]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	32.9129	16.76	40.00	23.24	100	260	Horizontal
2	62.042	16.78	40.00	23.22	100	247	Horizontal
3	131.952	13.92	43.50	29.58	100	288	Horizontal
4	586.3664	24.31	46.00	21.69	100	311	Horizontal
5	654.3343	25.58	46.00	20.42	100	178	Horizontal
6	841.7317	26.85	46.00	19.15	100	21	Horizontal

2480



Suspected Data List

NO.	Freq. [MHz]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	40.6807	17.87	40.00	22.13	100	63	Vertical
2	52.3323	20.71	40.00	19.29	100	30	Vertical
3	62.042	23.35	40.00	16.65	100	30	Vertical
4	598.018	24.07	46.00	21.93	100	105	Vertical
5	648.5085	25.03	46.00	20.97	100	91	Vertical
6	838.8188	26.75	46.00	19.25	100	188	Vertical



Suspected Data List

NO.	Freq. [MHz]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	40.6807	19.39	40.00	20.61	100	219	Horizontal
2	51.3614	20.86	40.00	19.14	100	122	Horizontal
3	62.042	23.53	40.00	16.47	100	159	Horizontal
4	594.1341	24.33	46.00	21.67	100	154	Horizontal
5	645.5956	25.41	46.00	20.59	100	53	Horizontal
6	837.8478	27.04	46.00	18.96	100	330	Horizontal

8.8 CONDUCTED EMISSIONS TEST

8.8.1 Applicable Standard

According to FCC Part 15.207(a)
According to IC RSS-Gen 8.8

8.8.2 Conformance Limit

Frequency(MHz)	Conducted Emission Limit	
	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

8.8.3 Test Configuration

Test according to clause 7.3 conducted emission test setup

8.8.4 Test Procedure

The EUT was placed on a table which is 0.8m above ground plane.
Maximum procedure was performed on the highest emissions to ensure EUT compliance.
Repeat above procedures until all frequency measured were complete.

8.8.5 Test Results

N/A

8.9 ANTENNA APPLICATION

8.9.1 Antenna Requirement

Standard	Requirement
FCC CRF Part 15.203	An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.
FCC 47 CFR Part 15.247 (b)	If transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.
RSS-Gen Section 6.8	The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.
RSS-247 Section 5.4	If the transmitter employs an antenna system that emits multiple directional beams, but does not emit multiple directional beams simultaneously, the total output power conducted to the array or arrays that comprise the device (i.e. the sum of the power supplied to all antennas, antenna elements, staves, etc., and summed across all carriers or frequency channels) shall not exceed the applicable output power limit. However, the total conducted output power shall be reduced by 1 dB below the specified limits for each 3 dB that the directional gain of the antenna/antenna array exceeds 6 dBi. The directional antenna gain shall be computed as the sum of 10 log (number of array elements or staves) plus the directional gain of the element or stave having the highest gain.

8.9.2 Result

PASS.

- Note:
- Antenna use a permanently attached antenna which is not replaceable.
 - Not using a standard antenna jack or electrical connector for antenna replacement
 - The antenna has to be professionally installed (please provide method of installation)

Please refer to the attached document Internal Photos to show the antenna connector.

----- END OF REPORT -----