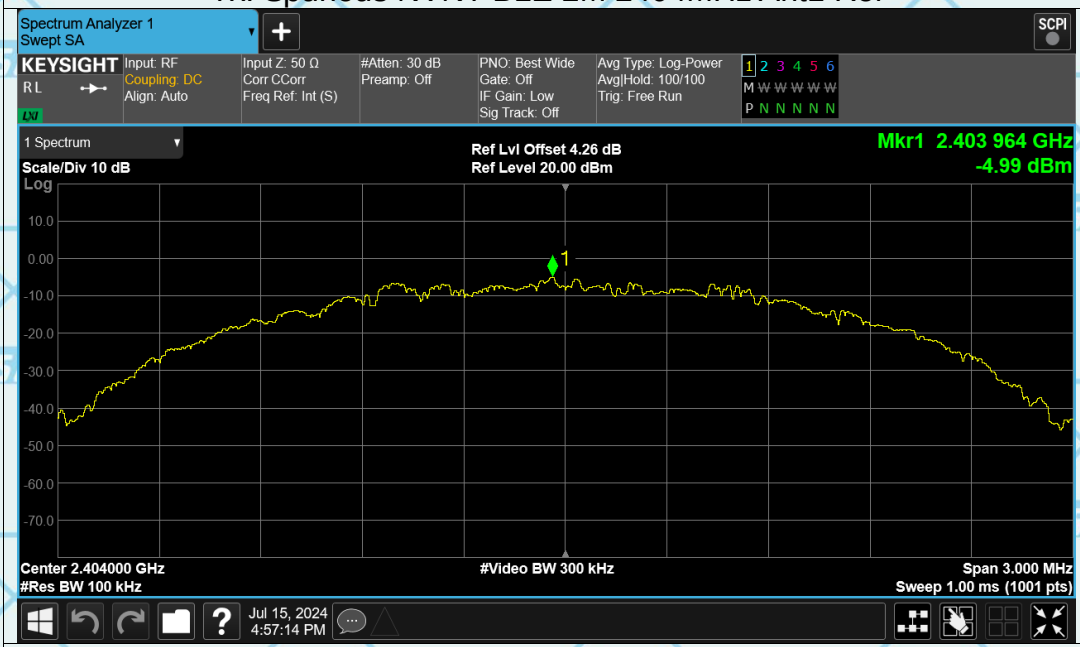
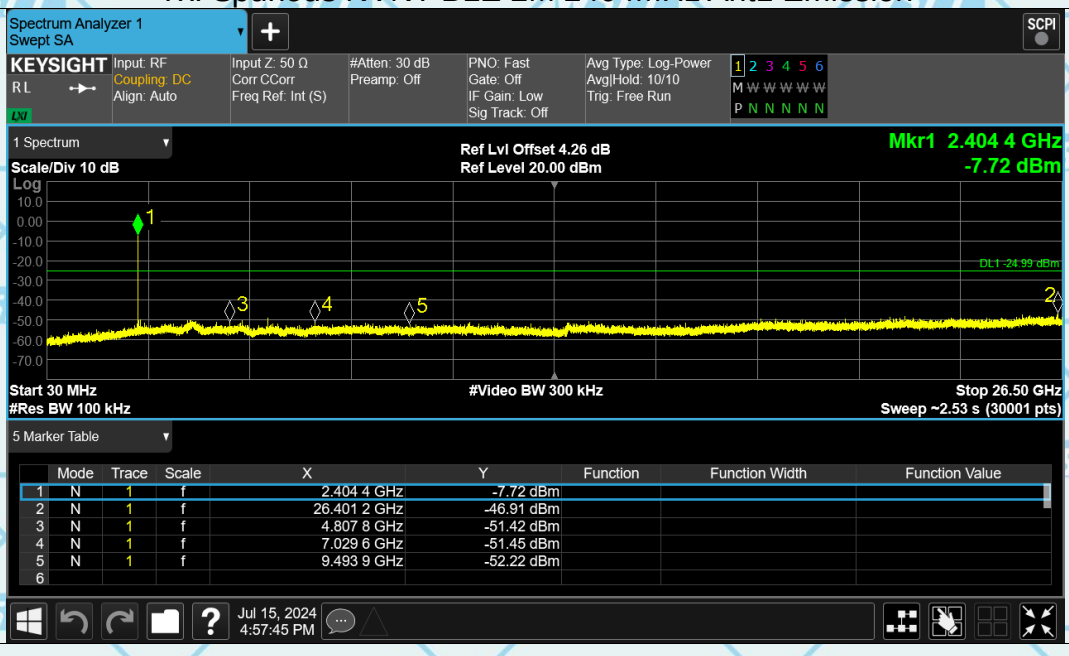
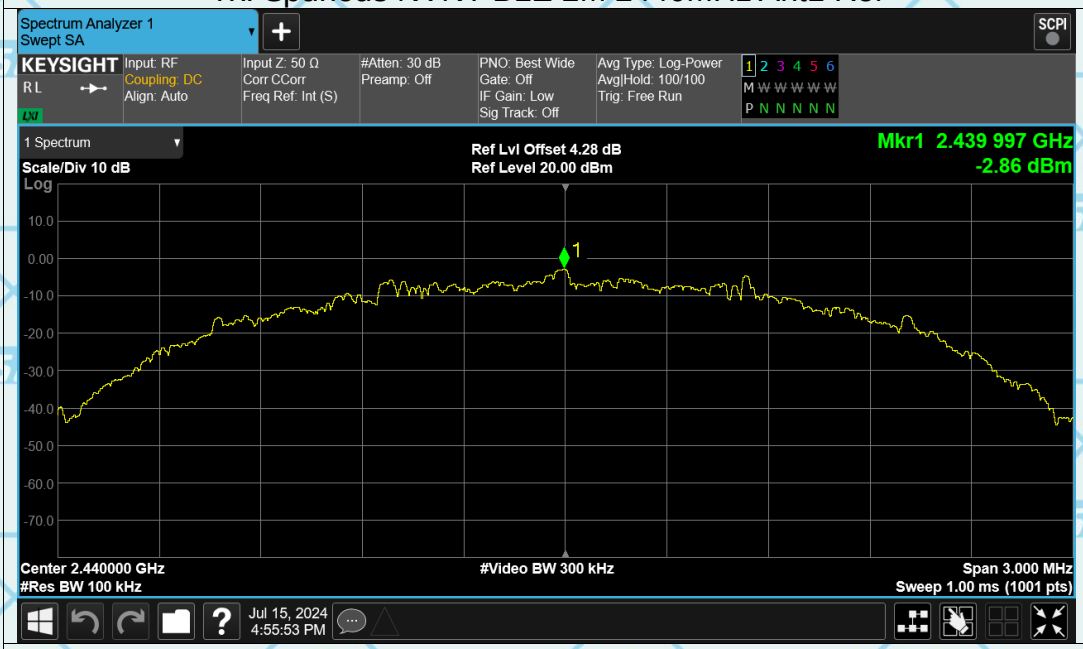
Tx. Spurious NVNT BLE 2M 2404MHz Ant1 Ref



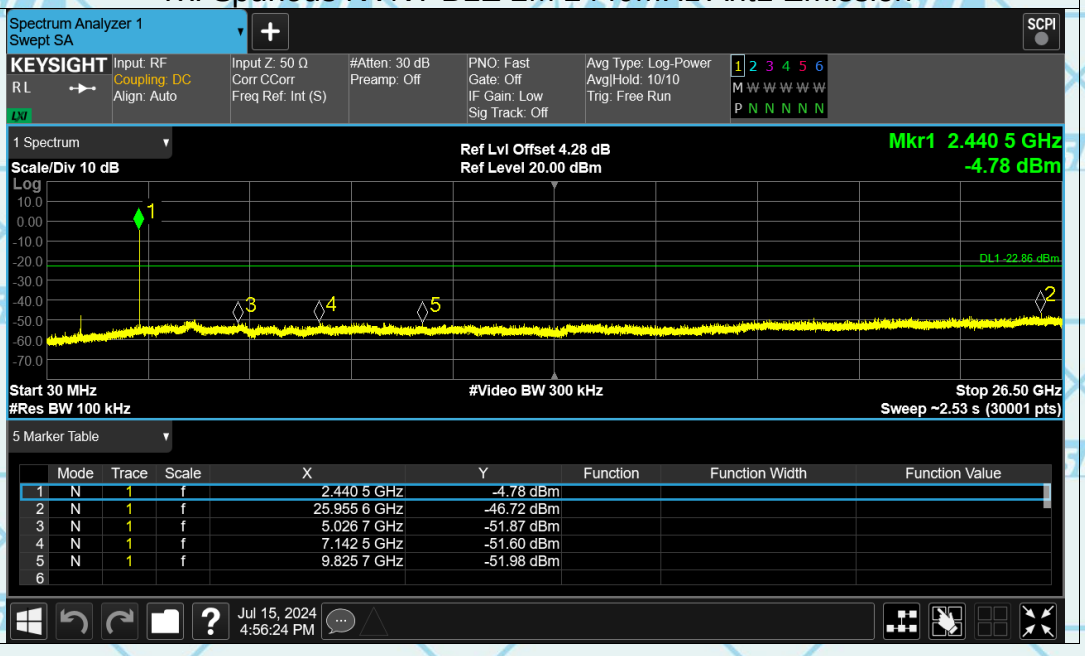
Tx. Spurious NVNT BLE 2M 2404MHz Ant1 Emission



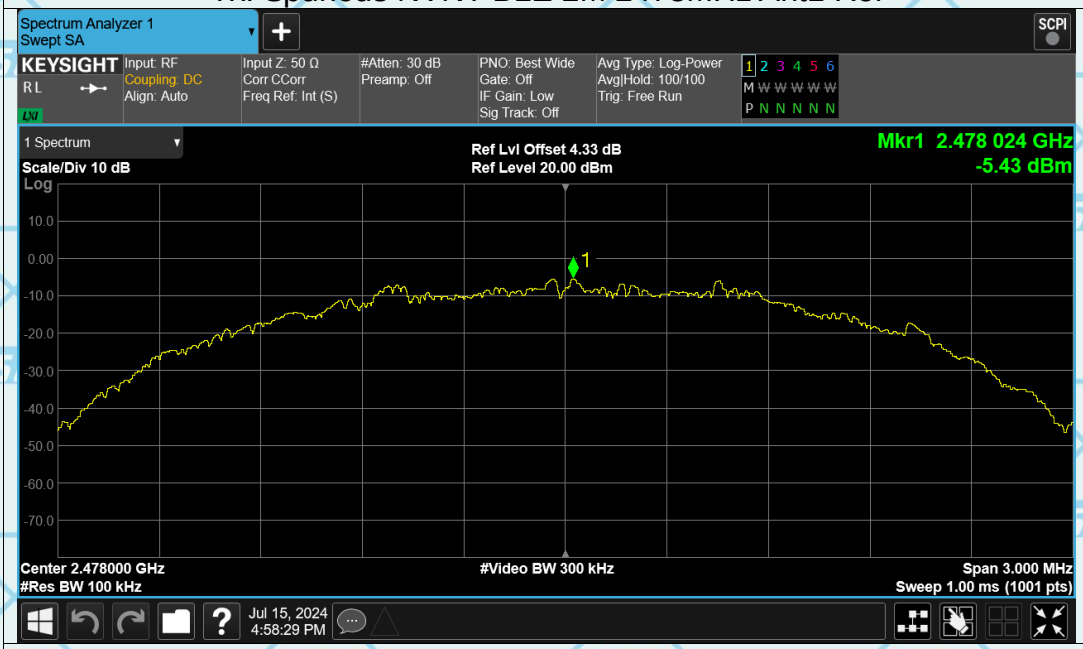
Tx. Spurious NVNT BLE 2M 2440MHz Ant1 Ref



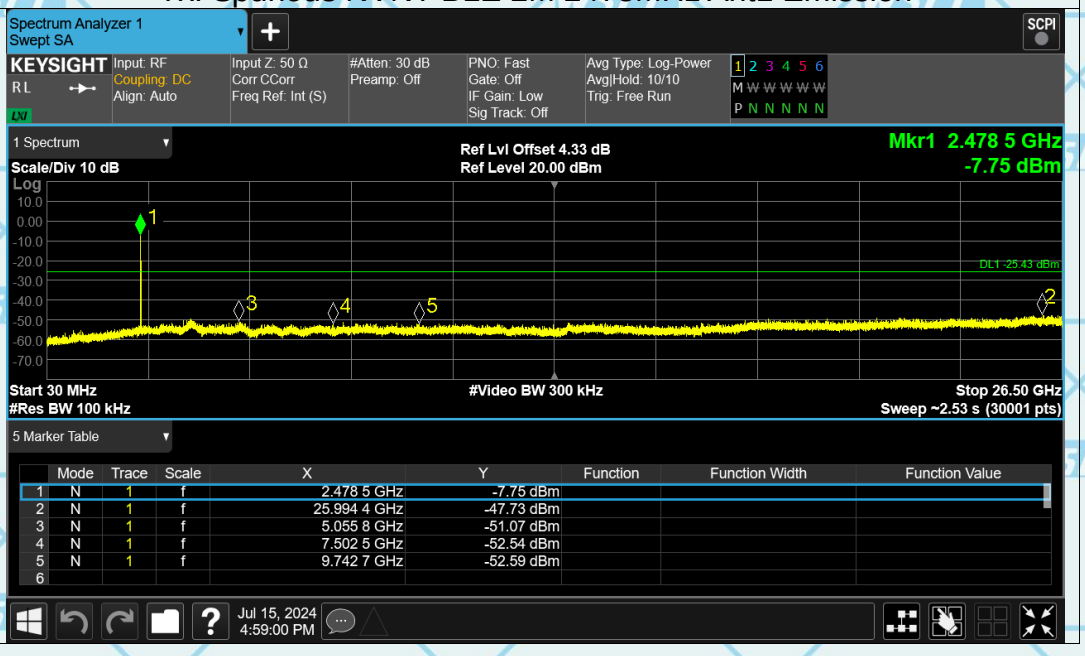
Tx. Spurious NVNT BLE 2M 2440MHz Ant1 Emission



Tx. Spurious NVNT BLE 2M 2478MHz Ant1 Ref



Tx. Spurious NVNT BLE 2M 2478MHz Ant1 Emission



	Mode	Trace	Scale	X	Y	Function	Function Width	Function Value
1	N	1	f	2.478 5 GHz	-7.75 dBm			
2	N	1	f	25.994 4 GHz	-47.73 dBm			
3	N	1	f	5.055 8 GHz	-51.07 dBm			
4	N	1	f	7.502 5 GHz	-52.54 dBm			
5	N	1	f	9.742 7 GHz	-52.59 dBm			
6								

6.7. Radiated Spurious Emission Measurement

6.7.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.209
Test Method:	ANSI C63.10:2014
Frequency Range:	9 kHz to 25 GHz
Measurement Distance:	3 m
Antenna Polarization:	Horizontal & Vertical
Operation mode:	Refer to item 4.1

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
9kHz- 150kHz	Quasi-peak	200Hz	1kHz	Quasi-peak Value
150kHz-30MHz	Quasi-peak	9kHz	30kHz	Quasi-peak Value
30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak Value
Above 1GHz	Peak	1MHz	3MHz	Peak Value
	Peak	1MHz	10Hz	Average Value

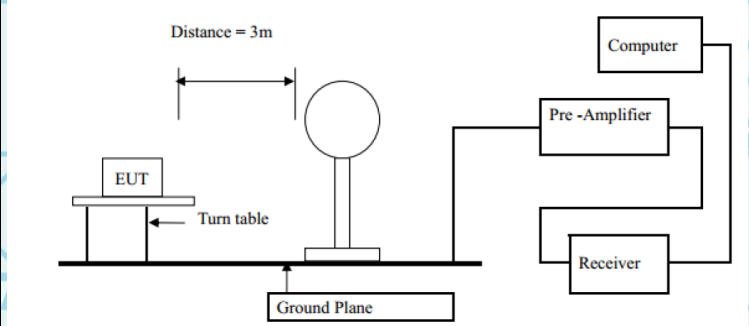
Limit:

Frequency	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	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

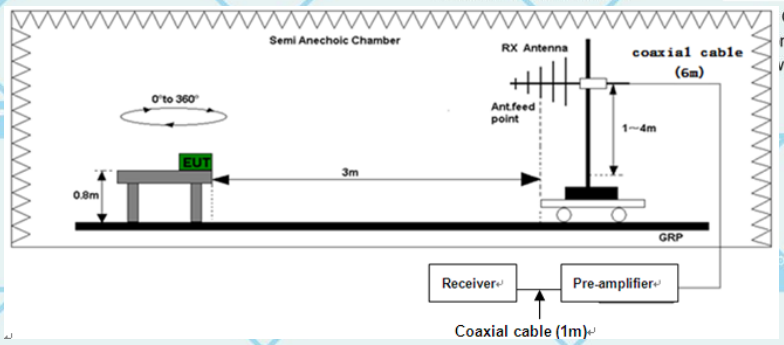
Frequency	Field Strength (microvolts/meter)	Measurement Distance (meters)	Detector
Above 1GHz	500	3	Average
	5000	3	Peak

Test setup:

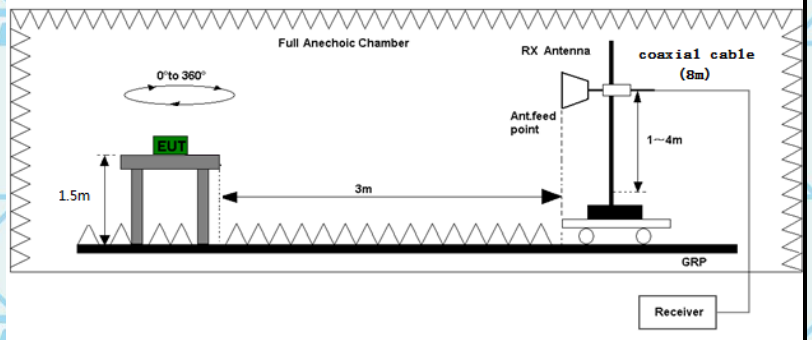
For radiated emissions below 30MHz



30MHz to 1GHz



Above 1GHz



Test Procedure:

1. For the radiated emission test below 1GHz:
The EUT was placed on a turntable with 0.1 meter above ground. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high PASS filter are used for the test in order to get better signal level.
For the radiated emission test above 1GHz:
Place the measurement antenna on a turntable with 1.5 meter above ground, which is away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
2. Corrected Reading: Antenna Factor + Cable Loss +

	Read Level - Preamp Factor = Level 3. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported. 4. Use the following spectrum analyzer settings: (1) Span shall wide enough to fully capture the emission being measured; (2) Set RBW=100 kHz for f < 1 GHz; VBW ≥RBW; Sweep = auto; Detector function = peak; Trace = max hold; (3) Set RBW = 1 MHz, VBW= 3MHz for f 1 GHz for peak measurement. For average measurement: VBW = 10 Hz, when duty cycle is no less than 98 percent. VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
Test mode:	Refer to section 4.1 for details
Test results:	PASS

Note 1: The symbol of "--" in the table which means not application.

Note 2: For the test data above 1 GHz，According the ANSI C63.10-2013, where limits are specified for both average and peak (or quasi-peak) detector functions, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.

Note 3: The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

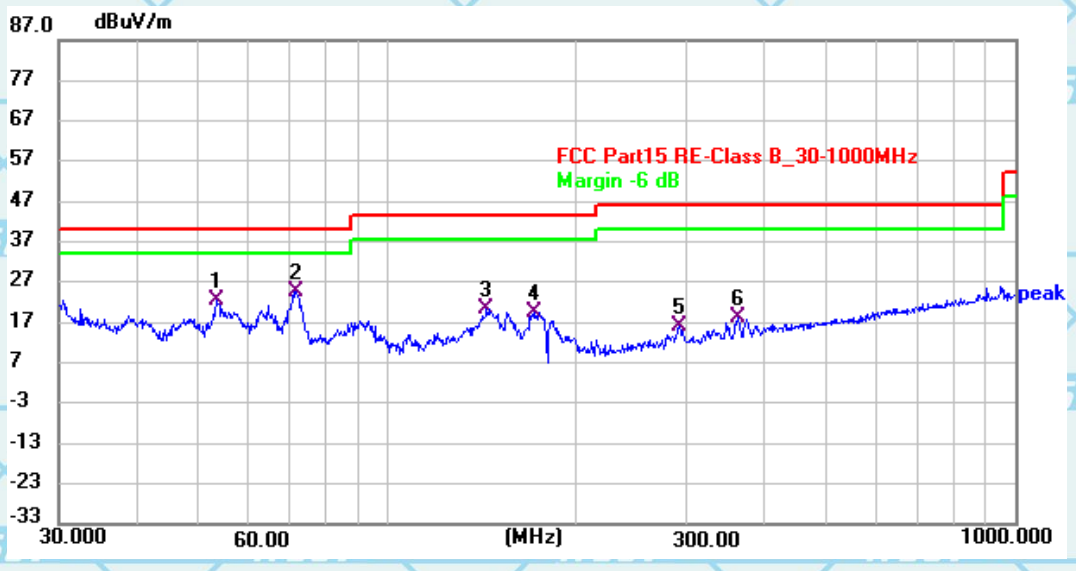
Note 4: The EUT is working in the Normal link mode below 1 GHz. All modes have been tested and normal link mode is worst.

6.7.2. Test Data

Please refer to following diagram for individual

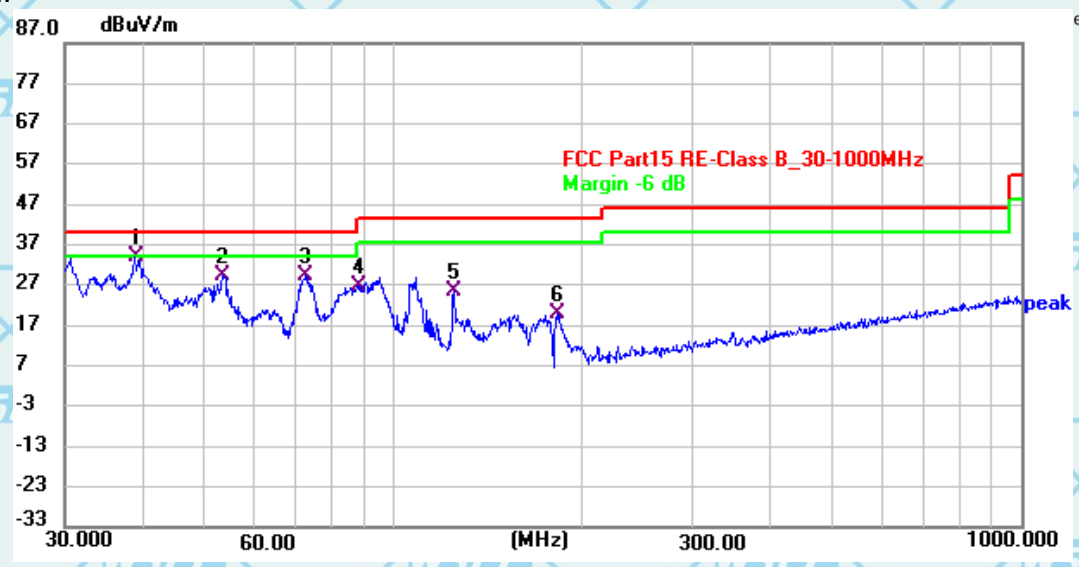
Below 1GHz

Horizontal:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	53.8581	41.72	-19.19	22.53	40.00	-17.47	QP
2 *	71.6747	47.26	-22.51	24.75	40.00	-15.25	QP
3	144.0187	40.24	-19.89	20.35	43.50	-23.15	QP
4	172.1454	40.57	-20.89	19.68	43.50	-23.82	QP
5	292.3144	36.44	-20.52	15.92	46.00	-30.08	QP
6	362.5074	37.23	-18.95	18.28	46.00	-27.72	QP

Vertical:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	38.9560	53.21	-19.15	34.06	40.00	-5.94	QP
2	53.5287	48.67	-19.10	29.57	40.00	-10.43	QP
3	72.7828	52.01	-22.82	29.19	40.00	-10.81	QP
4	88.0329	50.65	-24.04	26.61	43.50	-16.89	QP
5	125.0066	46.66	-20.98	25.68	43.50	-17.82	QP
6	183.2005	42.36	-22.42	19.94	43.50	-23.56	QP

Note1:
Freq. = Emission frequency in MHz
Reading level (dBμV) = Receiver reading
Corr. Factor (dB) = Antenna factor + Cable loss - Amplifier factor.
Measurement (dBμV) = Reading level (dBμV) + Corr. Factor (dB)
Limit (dBμV) = Limit stated in standard
Margin (dB) = Measurement (dBμV) – Limits (dBμV)

Above 1GHz

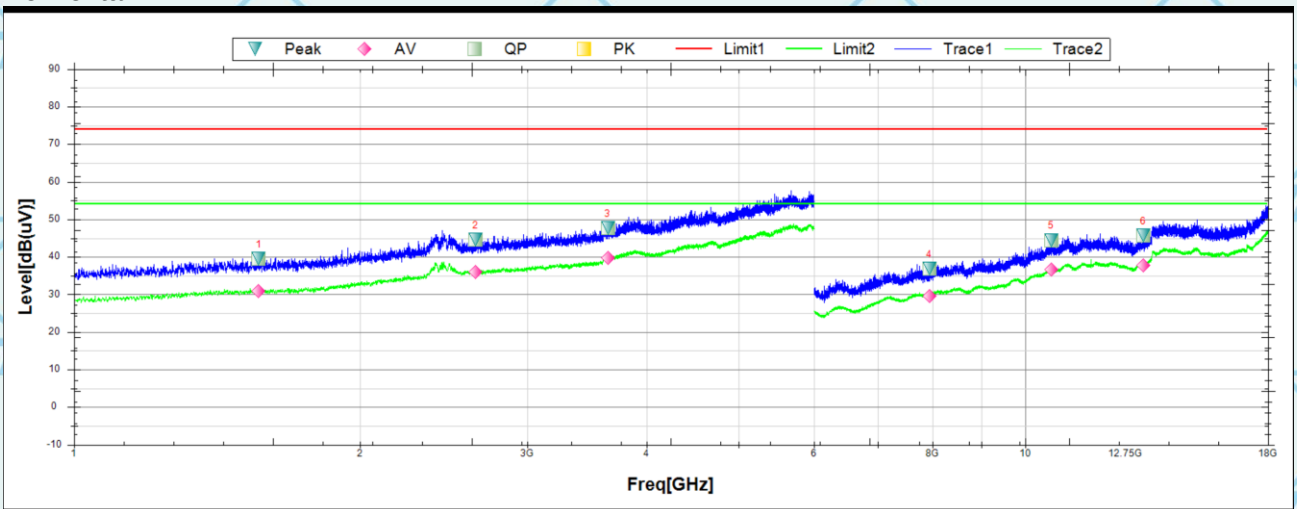
Note 1: The marked spikes near 2400 MHz with circle should be ignored because they are Fundamental signal.

Note 2: The spurious above 18G is noise only, do not show on the report.

Note 3 BLE 1M and 2M both tested the report and only recorded the worst-case scenario 1M:

Low channel: 2402MHz

Horizontal:



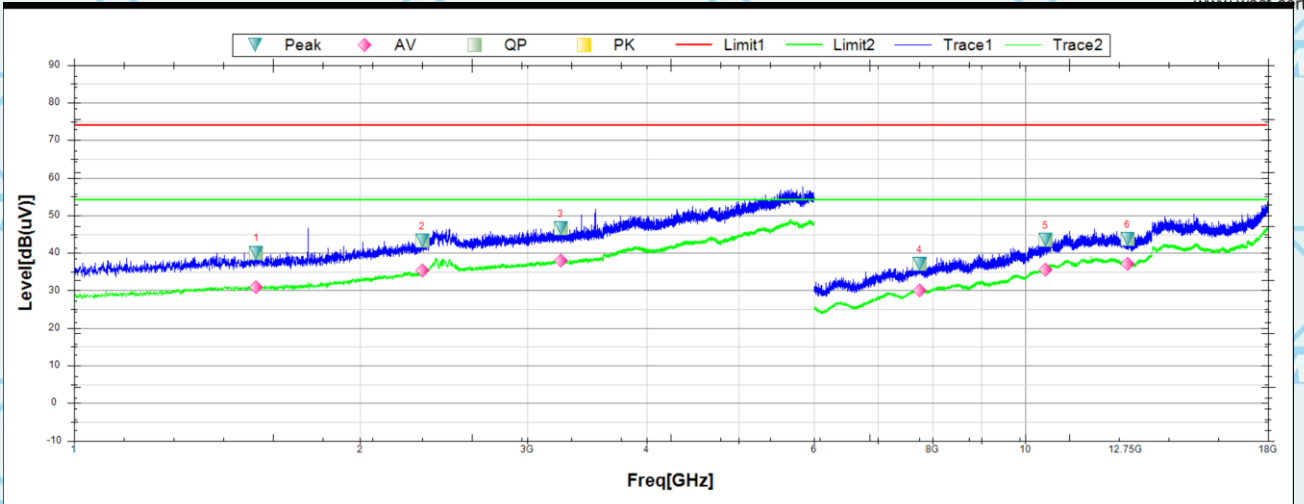
Susputed Data List

NO.	Freq. [MHz]	Reading [dB(uV)]	Factor [dB]	Level [dB(uV)]	Limit [dB]	Margin [dB]	Deg [°]	Polarity	Trace	Verdict
1	1565.0000	39.41	0.08	39.33	74	-34.59	39.4	Horizontal	PK	Pass
2	2645.0000	44.66	6.28	38.38	74	-29.34	357.7	Horizontal	PK	Pass
3	3641.2500	47.65	10.21	37.44	74	-26.35	145.8	Horizontal	PK	Pass
4	7929.0000	36.75	36.89	-0.14	74	-37.25	163.1	Horizontal	PK	Pass
5	10651.5000	44.46	39.01	5.45	74	-29.54	29.2	Horizontal	PK	Pass
6	13312.5000	45.59	39.71	5.88	74	-28.41	172.6	Horizontal	PK	Pass

Final Data List

NO.	Freq. [MHz]	Reading [dB(uV)]	Factor [dB]	Level [dB (uV)]	Limit [dB]	Margin [dB]	Deg [°]	Polarity	Trace	Verdict
1	1565.0000	30.82	0.08	30.74	54	-23.18	39.4	Horizontal	AV	Pass
2	2645.0000	35.95	6.28	29.67	54	-18.05	357.7	Horizontal	AV	Pass
3	3641.2500	39.68	10.21	29.47	54	-14.32	145.8	Horizontal	AV	Pass
4	7929.0000	29.51	36.89	-7.38	54	-24.49	163.1	Horizontal	AV	Pass
5	10651.5000	36.71	39.01	-2.3	54	-17.29	29.2	Horizontal	AV	Pass
6	13312.5000	37.76	39.71	-1.95	54	-16.24	172.6	Horizontal	AV	Pass

Vertical:



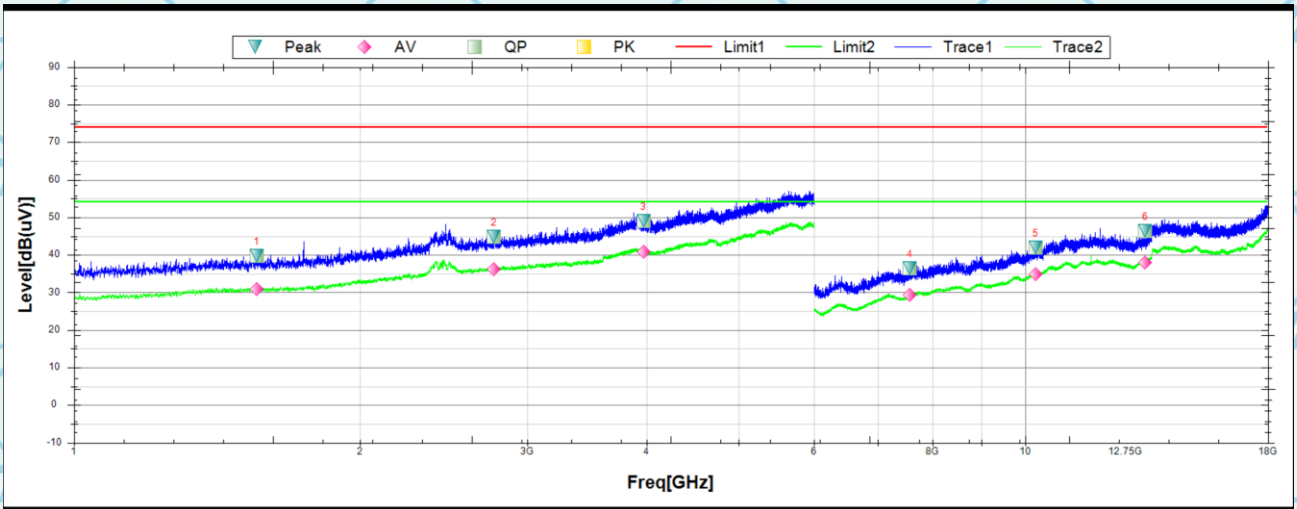
Susputed Data List

NO.	Freq. [MHz]	Reading [dB(uV)]	Factor [dB]	Level [dB(uV)]	Limit [dB]	Margin [dB]	Deg [°]	Polarity	Trace	Verdict
1	1555.6250	40.03	0.02	40.01	74	-33.97	357.6	Vertical	PK	Pass
2	2324.3750	43.28	4.92	38.36	74	-30.72	359.4	Vertical	PK	Pass
3	3249.3750	46.6	8.8	37.8	74	-27.4	230.4	Vertical	PK	Pass
4	7746.0000	36.99	36.62	0.37	74	-37.01	0.4	Vertical	PK	Pass
5	10507.5000	43.38	38.81	4.57	74	-30.62	42.3	Vertical	PK	Pass
6	12808.5000	43.67	38.84	4.83	74	-30.33	51.8	Vertical	PK	Pass

Final Data List

NO.	Freq. [MHz]	Reading [dB(uV)]	Factor [dB]	Level [dB (uV)]	Limit [dB]	Margin [dB]	Deg [°]	Polarity	Trace	Verdict
1	1555.6250	30.88	0.02	30.86	54	-23.12	357.6	Vertical	AV	Pass
2	2324.3750	35.19	4.92	30.27	54	-18.81	359.4	Vertical	AV	Pass
3	3249.3750	37.97	8.8	29.17	54	-16.03	230.4	Vertical	AV	Pass
4	7746.0000	29.95	36.62	-6.67	54	-24.05	0.4	Vertical	AV	Pass
5	10507.5000	35.56	38.81	-3.25	54	-18.44	42.3	Vertical	AV	Pass
6	12808.5000	37.04	38.84	-1.8	54	-16.96	51.8	Vertical	AV	Pass

Middle channel: 2440MHz
Horizontal:



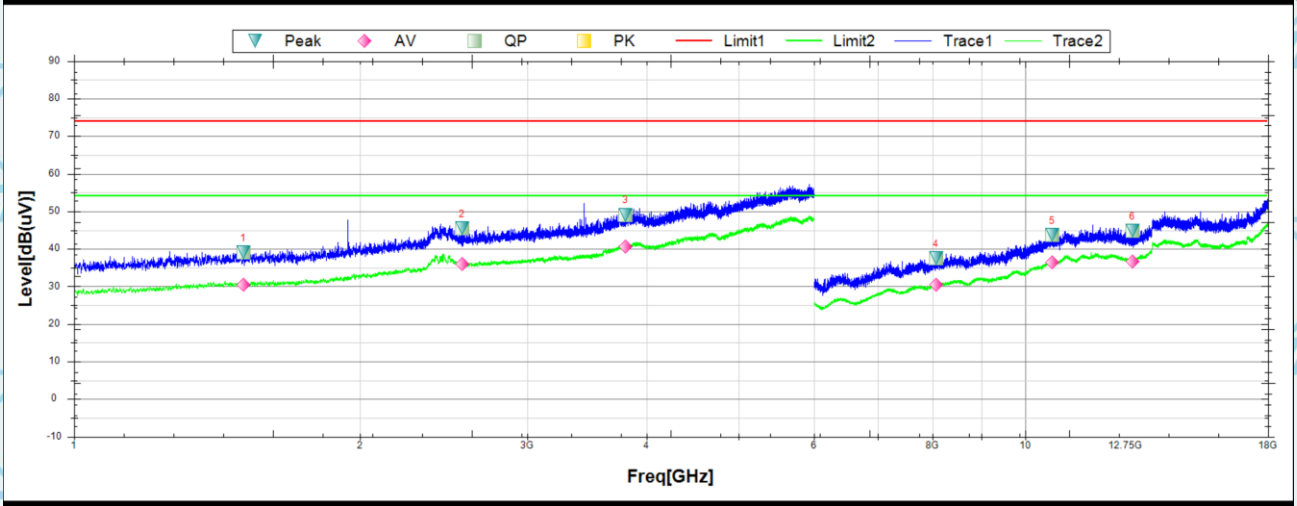
Susputed Data List

NO.	Freq. [MHz]	Reading [dB(uV)]	Factor [dB]	Level [dB(uV)]	Limit [dB]	Margin [dB]	Deg [°]	Polarity	Trace	Verdict
1	1556.8750	39.69	0.03	39.66	74	-34.31	309.6	Horizontal	PK	Pass
2	2766.2500	44.77	6.91	37.86	74	-29.23	357.7	Horizontal	PK	Pass
3	3971.2500	48.89	11.93	36.96	74	-25.11	304.8	Horizontal	PK	Pass
4	7569.0000	36.31	36.35	-0.04	74	-37.69	243.2	Horizontal	PK	Pass
5	10258.5000	41.86	38.46	3.4	74	-32.14	153.5	Horizontal	PK	Pass
6	13378.5000	46.35	39.88	6.47	74	-27.65	286.2	Horizontal	PK	Pass

Final Data List

NO.	Freq. [MHz]	Reading [dB(uV)]	Factor [dB]	Level [dB (uV)]	Limit [dB]	Margin [dB]	Deg [°]	Polarity	Trace	Verdict
1	1556.8750	30.96	0.03	30.93	54	-23.04	309.6	Horizontal	AV	Pass
2	2766.2500	36.24	6.91	29.33	54	-17.76	357.7	Horizontal	AV	Pass
3	3971.2500	40.91	11.93	28.98	54	-13.09	304.8	Horizontal	AV	Pass
4	7569.0000	29.27	36.35	-7.08	54	-24.73	243.2	Horizontal	AV	Pass
5	10258.5000	34.83	38.46	-3.63	54	-19.17	153.5	Horizontal	AV	Pass
6	13378.5000	37.94	39.88	-1.94	54	-16.06	286.2	Horizontal	AV	Pass

Vertical:



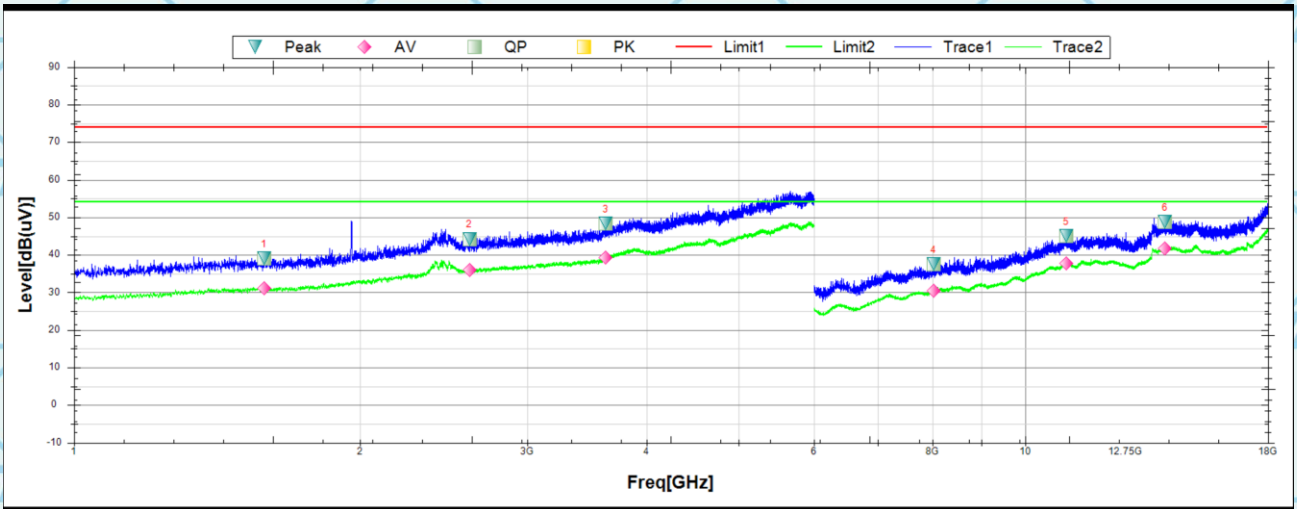
Susputed Data List

NO.	Freq. [MHz]	Reading [dB(uV)]	Factor [dB]	Level [dB(uV)]	Limit [dB]	Margin [dB]	Deg [°]	Polarity	Trace	Verdict
1	1506.8750	39.08	-0.26	39.34	74	-34.92	291.4	Vertical	PK	Pass
2	2560.0000	45.4	6.11	39.29	74	-28.6	185	Vertical	PK	Pass
3	3803.1250	49.1	11.02	38.08	74	-24.9	359.5	Vertical	PK	Pass
4	8059.5000	37.56	37.02	0.54	74	-36.44	214.4	Vertical	PK	Pass
5	10678.5000	43.76	39.05	4.71	74	-30.24	360	Vertical	PK	Pass
6	12966.0000	44.78	38.89	5.89	74	-29.22	358.1	Vertical	PK	Pass

Final Data List

NO.	Freq. [MHz]	Reading [dB(uV)]	Factor [dB]	Level [dB (uV)]	Limit [dB]	Margin [dB]	Deg [°]	Polarity	Trace	Verdict
1	1506.8750	30.47	-0.26	30.73	54	-23.53	291.4	Vertical	AV	Pass
2	2560.0000	35.94	6.11	29.83	54	-18.06	185	Vertical	AV	Pass
3	3803.1250	40.7	11.02	29.68	54	-13.3	359.5	Vertical	AV	Pass
4	8059.5000	30.5	37.02	-6.52	54	-23.5	214.4	Vertical	AV	Pass
5	10678.5000	36.48	39.05	-2.57	54	-17.52	360	Vertical	AV	Pass
6	12966.0000	36.53	38.89	-2.36	54	-17.47	358.1	Vertical	AV	Pass

High channel: 2480MHz
Horizontal:



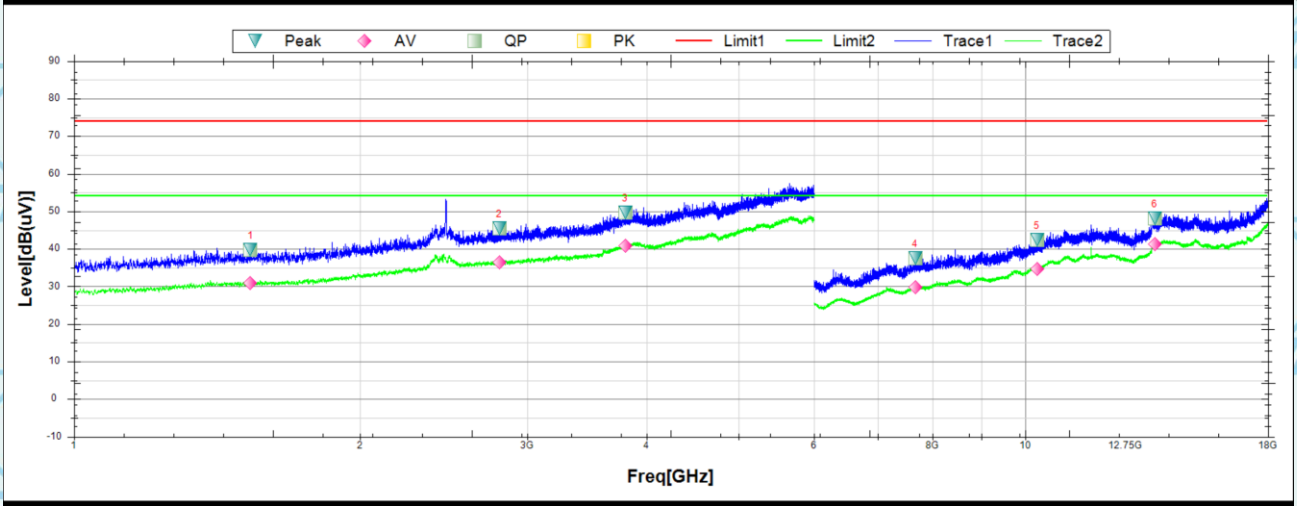
Susputed Data List

NO.	Freq. [MHz]	Reading [dB(uV)]	Factor [dB]	Level [dB(uV)]	Limit [dB]	Margin [dB]	Deg [°]	Polarity	Trace	Verdict
1	1584.3750	39.06	0.14	38.92	74	-34.94	86.1	Horizontal	PK	Pass
2	2605.0000	44.24	6.27	37.97	74	-29.76	203.2	Horizontal	PK	Pass
3	3625.0000	48.32	10.14	38.18	74	-25.68	310.9	Horizontal	PK	Pass
4	8013.0000	37.48	37.01	0.47	74	-36.52	81.8	Horizontal	PK	Pass
5	11050.5000	44.91	39.45	5.46	74	-29.09	0.4	Horizontal	PK	Pass
6	14034.0000	48.75	41.46	7.29	74	-25.25	30.4	Horizontal	PK	Pass

Final Data List

NO.	Freq. [MHz]	Reading [dB(uV)]	Factor [dB]	Level [dB (uV)]	Limit [dB]	Margin [dB]	Deg [°]	Polarity	Trace	Verdict
1	1584.3750	31.05	0.14	30.91	54	-22.95	86.1	Horizontal	AV	Pass
2	2605.0000	35.86	6.27	29.59	54	-18.14	203.2	Horizontal	AV	Pass
3	3625.0000	39.33	10.14	29.19	54	-14.67	310.9	Horizontal	AV	Pass
4	8013.0000	30.36	37.01	-6.65	54	-23.64	81.8	Horizontal	AV	Pass
5	11050.5000	37.73	39.45	-1.72	54	-16.27	0.4	Horizontal	AV	Pass
6	14034.0000	41.73	41.46	0.27	54	-12.27	30.4	Horizontal	AV	Pass

Vertical:



Susputed Data List

NO.	Freq. [MHz]	Reading [dB(uV)]	Factor [dB]	Level [dB(uV)]	Limit [dB]	Margin [dB]	Deg [°]	Polarity	Trace	Verdict
1	1533.7500	39.72	-0.12	39.84	74	-34.28	201.7	Vertical	PK	Pass
2	2800.6250	45.47	7.27	38.2	74	-28.53	112.1	Vertical	PK	Pass
3	3800.0000	49.6	11	38.6	74	-24.4	0	Vertical	PK	Pass
4	7663.5000	37.42	36.5	0.92	74	-36.58	75	Vertical	PK	Pass
5	10291.5000	42.28	38.51	3.77	74	-31.72	232.9	Vertical	PK	Pass
6	13683.0000	48.01	40.68	7.33	74	-25.99	155.1	Vertical	PK	Pass

Final Data List

NO.	Freq. [MHz]	Reading [dB(uV)]	Factor [dB]	Level [dB (uV)]	Limit [dB]	Margin [dB]	Deg [°]	Polarity	Trace	Verdict
1	1533.7500	30.8	-0.12	30.92	54	-23.2	201.7	Vertical	AV	Pass
2	2800.6250	36.48	7.27	29.21	54	-17.52	112.1	Vertical	AV	Pass
3	3800.0000	40.79	11	29.79	54	-13.21	0	Vertical	AV	Pass
4	7663.5000	29.72	36.5	-6.78	54	-24.28	75	Vertical	AV	Pass
5	10291.5000	34.61	38.51	-3.9	54	-19.39	232.9	Vertical	AV	Pass
6	13683.0000	41.3	40.68	0.62	54	-12.7	155.1	Vertical	AV	Pass

Note:

1. *All emissions not reported were more than 20dB below the specified limit or in the noise floor.*
2. *Emission Level= Reading Level+Probe Factor +Cable Loss.*
3. *Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
4. *EUT has been tested in unfolded states, and the report only reflects data in the unfolded state (worst-case scenario)*

7. Test Setup Photographs

Please refer to Annex "Set Up Photos-15C" for test setup photos

*******END OF REPORT*******