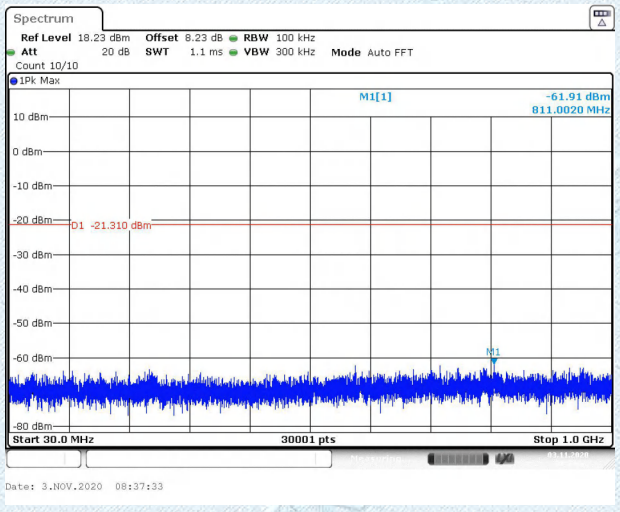
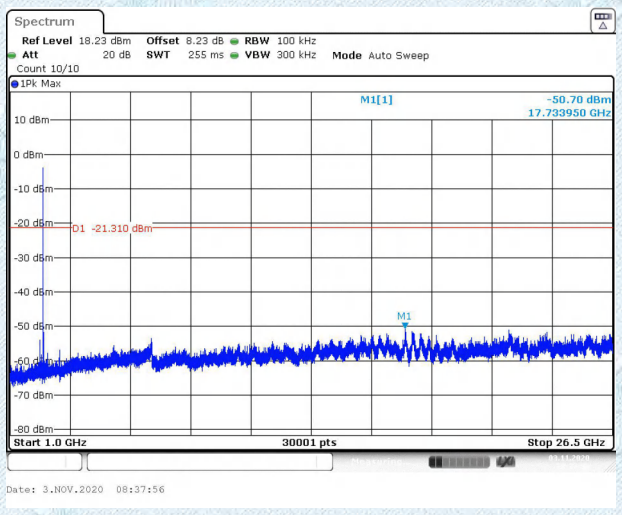
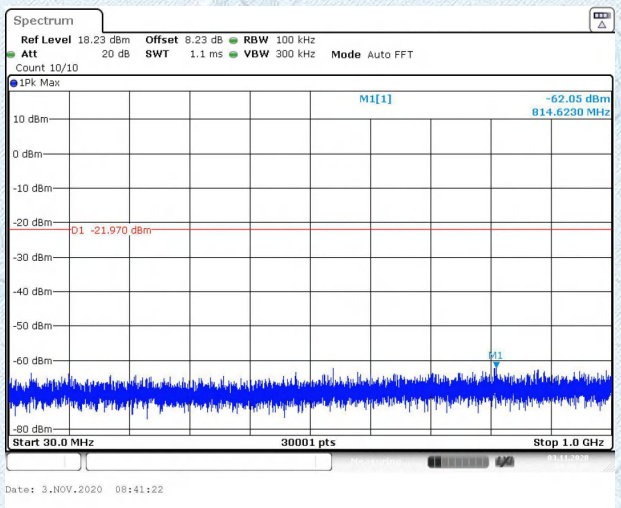
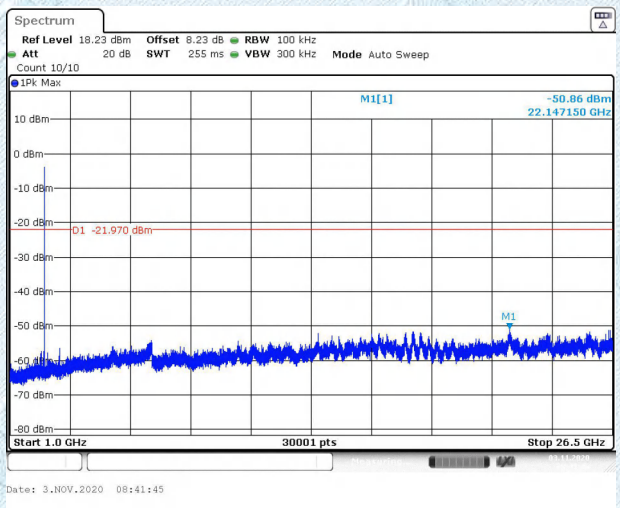
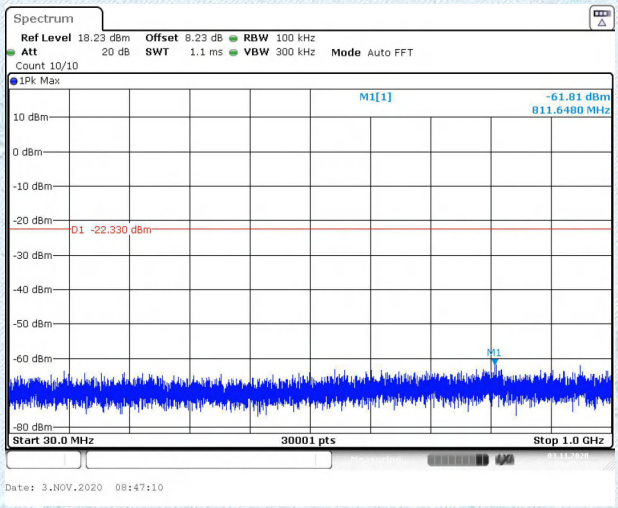
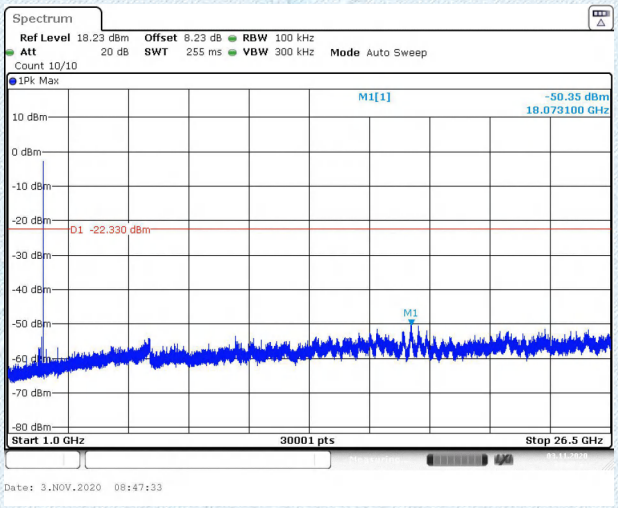
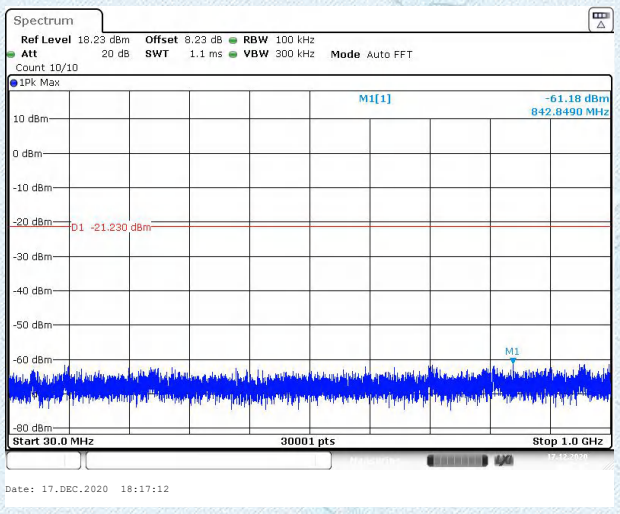
BLE_1M

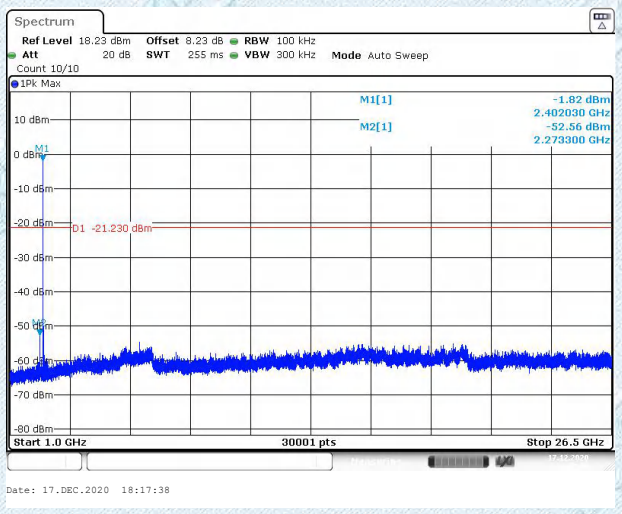
GFSK_1M	
CH00-SE	
	
CH19-SE	
	
CH39-SE	
	

BLE_2M

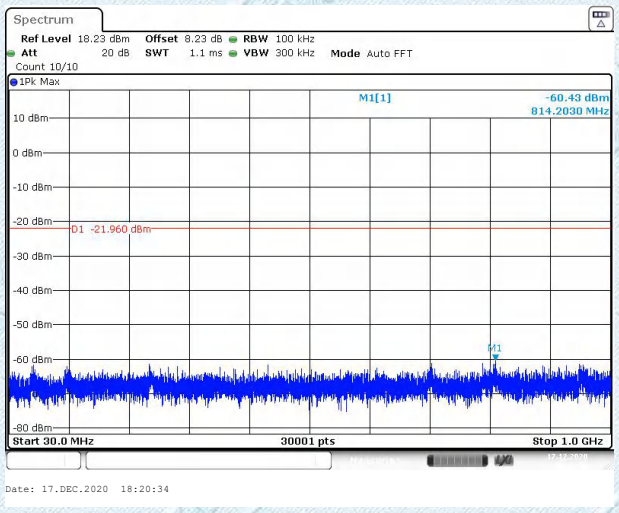
GFSK_2M

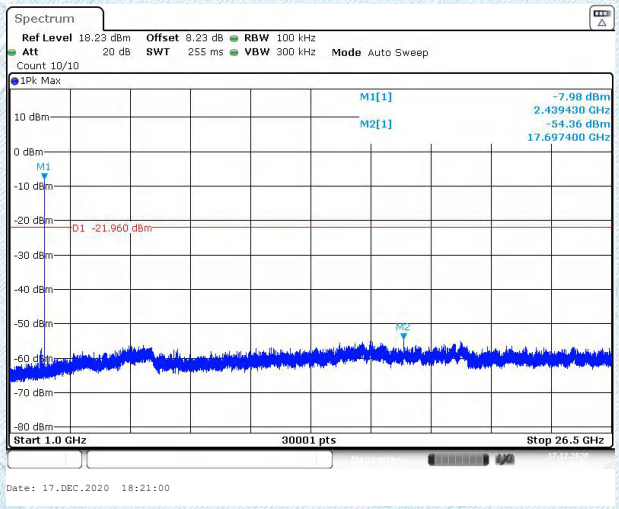
CH00-SE



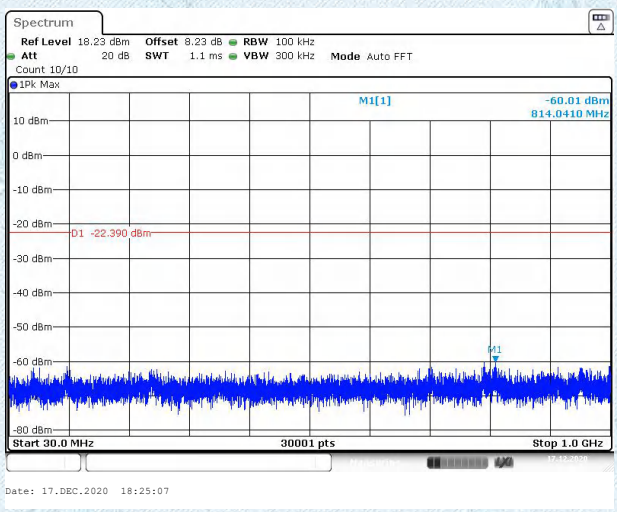


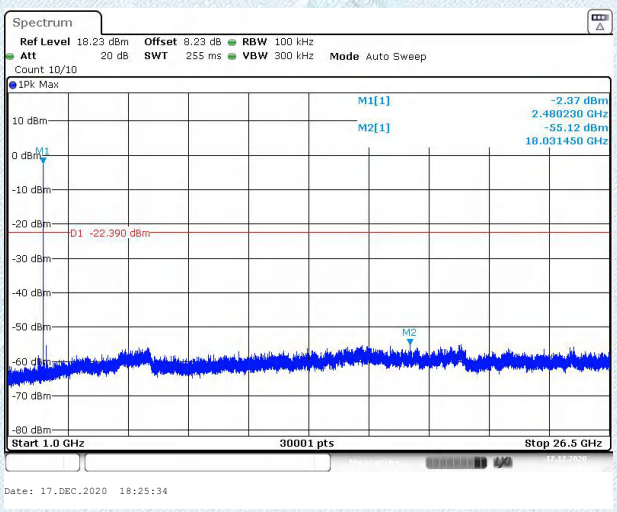
CH19-SE





CH39-SE



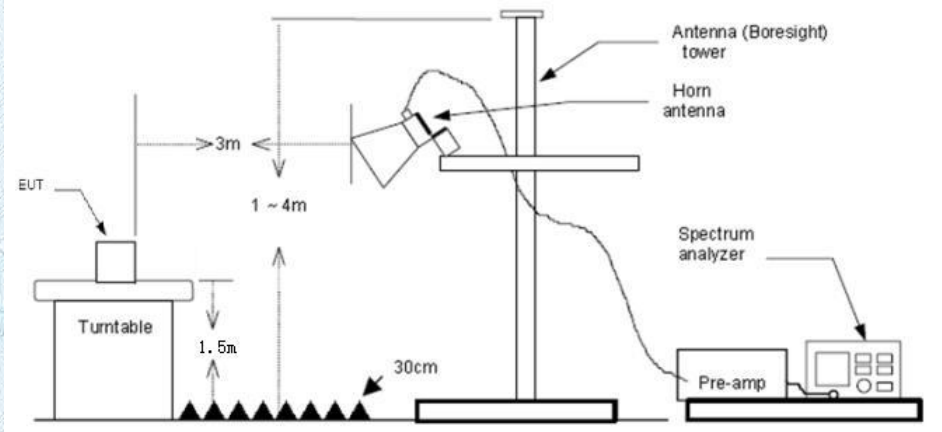


3.7. Band Edge Emissions(Radiated)

Limit

Restricted Frequency Band (MHz)	(dBuV/m)(at 3m)	
	Peak	Average
2310 ~2390	74	54
2483.5 ~2500	74	54
Note: All restriction bands have been tested, only the worst case is reported.		

Test Configuration



Test Procedure

1. The EUT was setup and tested according to ANSI C63.10:2013 requirements.
2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.
5. The receiver set as follow:
   RBW=1MHz, VBW=3MHz PEAK detector for Peak value.
   RBW=1MHz, VBW=10Hz with PEAK Detector for Average Value.

Test Mode

Please refer to the clause 2.2.

Test Results

Note:

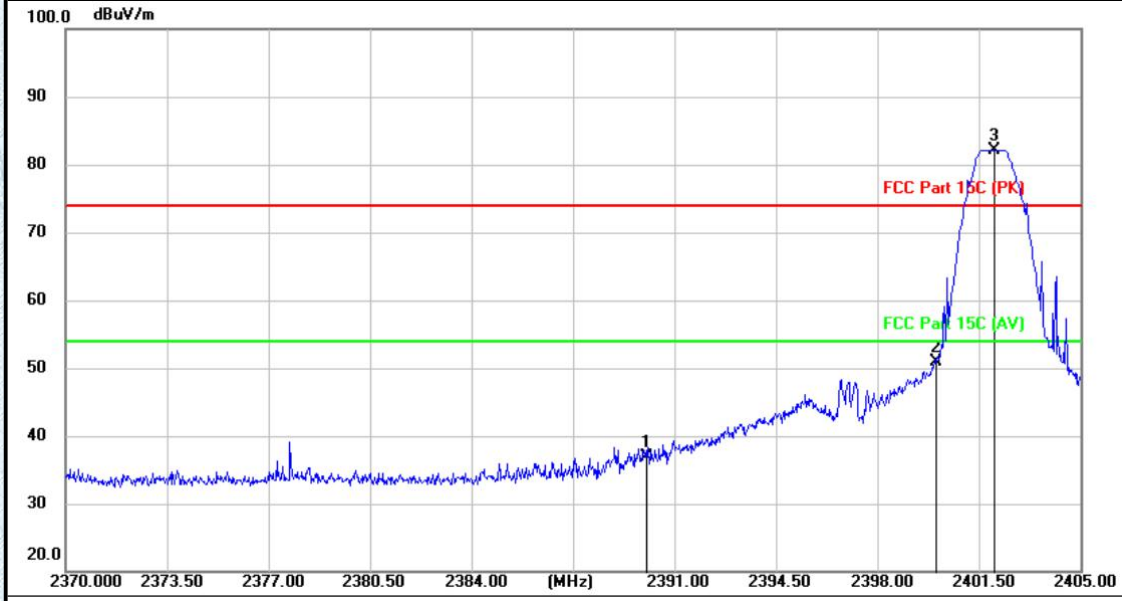
(1)Measurement = Reading level + Correct Factor

(2)Correct Factor=Antenna Factor + Cable Loss -Preamplifier Factor

(3)All modulation modes were tested, and only the worst data of GFSK_1M was recorded in the report.

Test model : MK06A

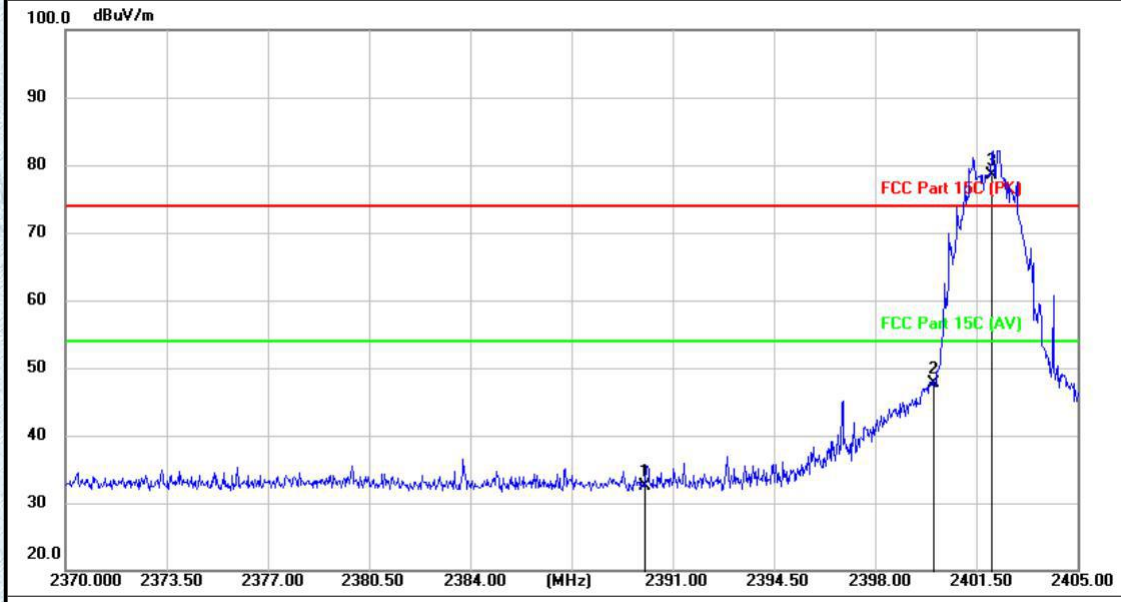
Test Voltage:	DC 3.3V
Ant. Pol.:	Horizontal
Test Mode:	TX BLE Mode 2402MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		2390.000	47.86	-10.92	36.94	74.00	-37.06	peak
2		2400.000	61.82	-10.92	50.90	74.00	-23.10	peak
3	*	2402.000	93.05	-10.91	82.14	74.00	8.14	peak

Emission Level= Read Level+ Correct Factor

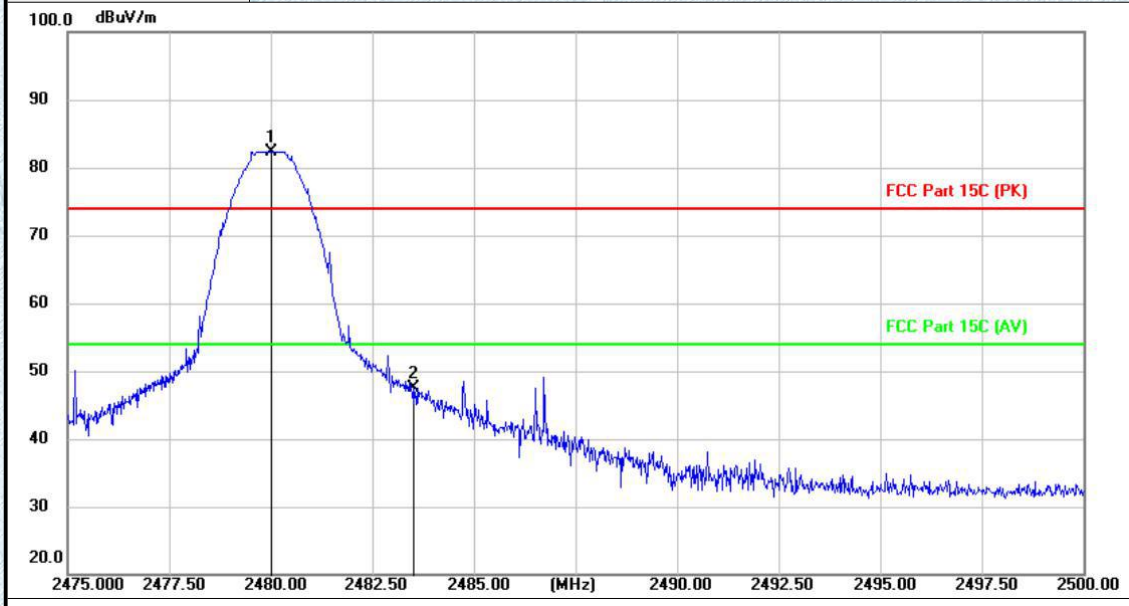
Test Voltage:	DC 3.3V
Ant. Pol.	Vertical
Test Mode:	TX BLE Mode 2402MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		2390.000	43.45	-10.92	32.53	74.00	-41.47	peak
2		2400.000	58.57	-10.92	47.65	74.00	-26.35	peak
3	*	2402.000	89.47	-10.91	78.56	74.00	4.56	peak

Emission Level= Read Level+ Correct Factor

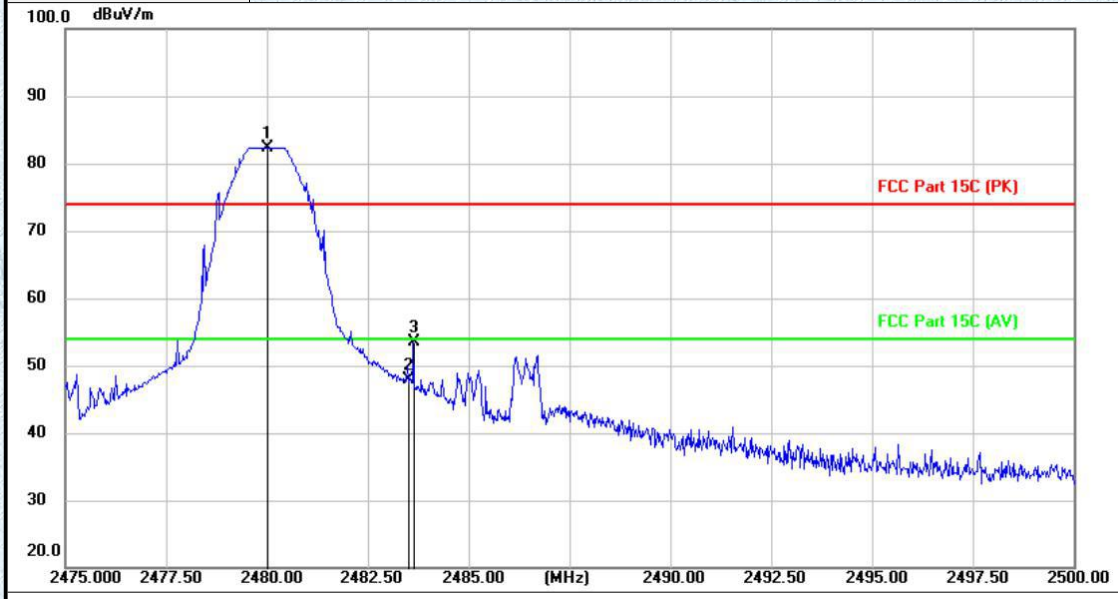
Test Voltage:	DC 3.3V
Ant. Pol.	Horizontal
Test Mode:	TX BLE Mode 2480 MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1	*	2480.000	93.28	-10.89	82.39	74.00	8.39	peak
2		2483.500	58.41	-10.88	47.53	74.00	-26.47	peak

Emission Level= Read Level+ Correct Factor

Test Voltage:	DC 3.3V
Ant. Pol.	Vertical
Test Mode:	TX BLE Mode 2480 MHz

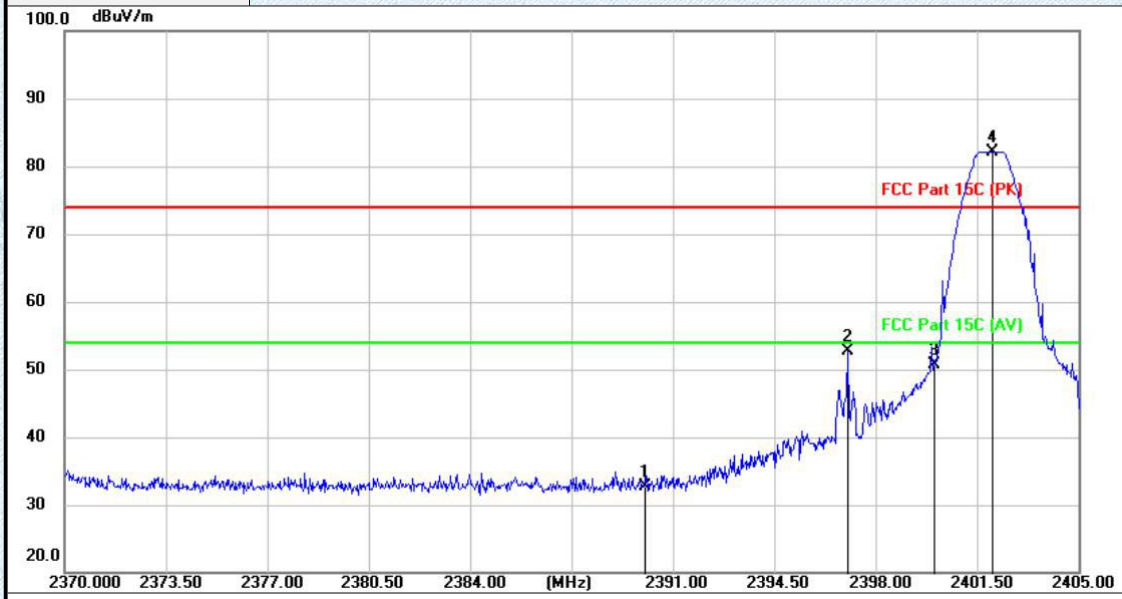


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1	*	2480.000	93.28	-10.89	82.39	74.00	8.39	peak
2		2483.500	58.70	-10.88	47.82	74.00	-26.18	peak
3		2483.630	64.34	-10.88	53.46	74.00	-20.54	peak

Emission Level= Read Level+ Correct Factor

Test model : MK06B

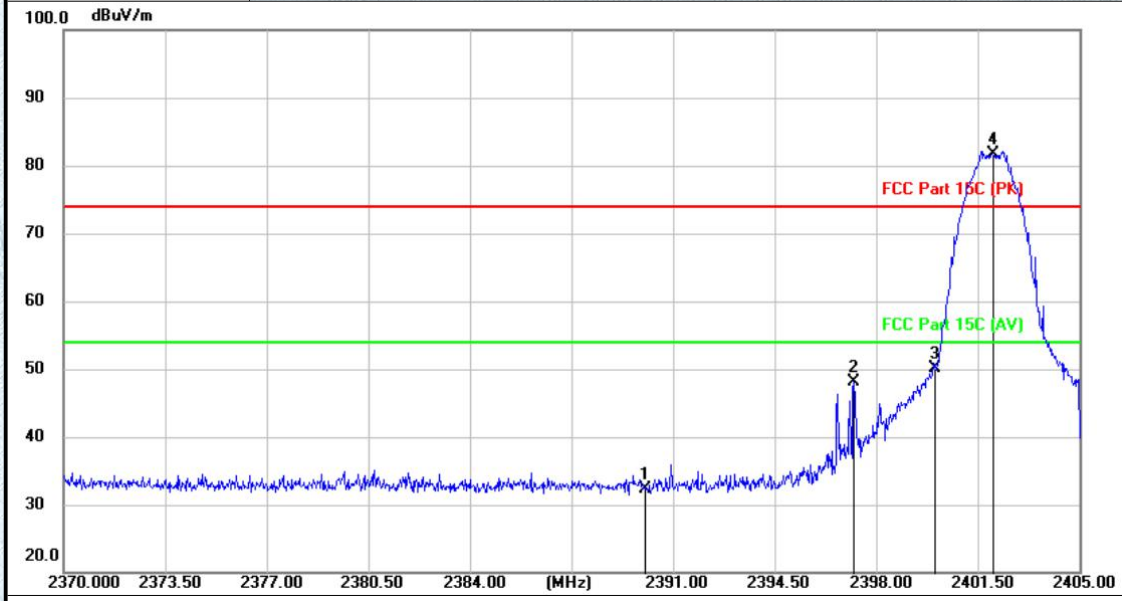
Test Voltage:	DC 3.3V
Ant. Pol.	Horizontal
Test Mode:	TX BLE Mode 2402 MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		2390.000	43.70	-10.92	32.78	74.00	-41.22	peak
2		2397.044	63.59	-10.92	52.67	74.00	-21.33	peak
3		2400.000	61.69	-10.92	50.77	74.00	-23.23	peak
4	*	2402.000	93.05	-10.91	82.14	74.00	8.14	peak

Emission Level= Read Level+ Correct Factor

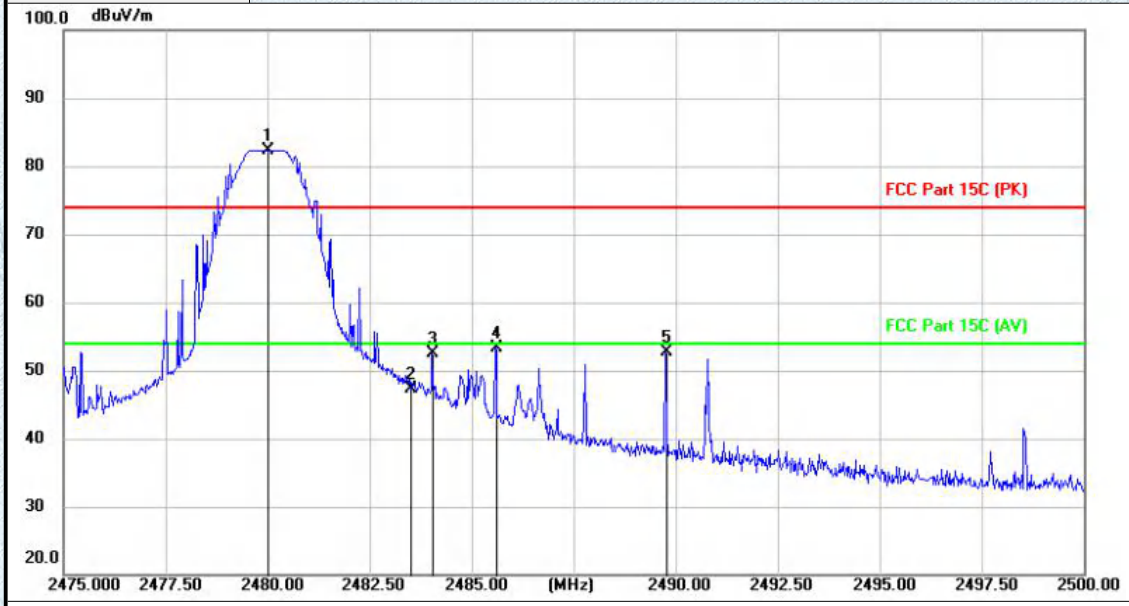
Test Voltage:	DC 3.3V
Ant. Pol.	Vertical
Test Mode:	TX BLE Mode 2402 MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		2390.000	43.27	-10.92	32.35	74.00	-41.65	peak
2		2397.230	59.06	-10.92	48.14	74.00	-25.86	peak
3		2400.000	61.09	-10.92	50.17	74.00	-23.83	peak
4	*	2402.000	92.56	-10.91	81.65	74.00	7.65	peak

Emission Level= Read Level+ Correct Factor

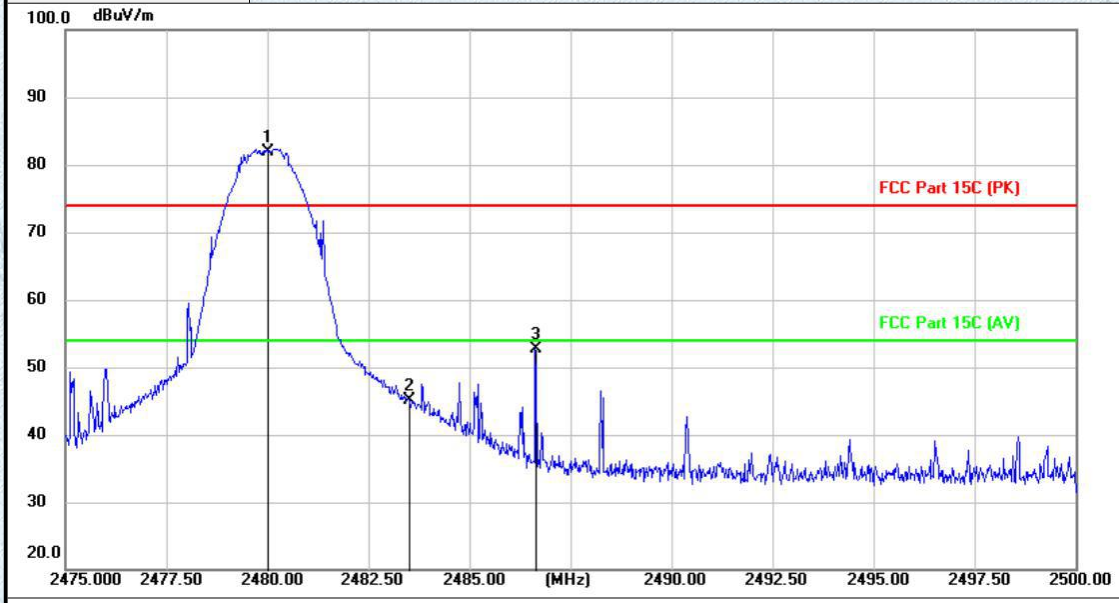
Test Voltage:	DC 3.3V
Ant. Pol.	Horizontal
Test Mode:	TX BLE Mode 2480 MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1	*	2480.000	93.28	-10.89	82.39	74.00	8.39	peak
2		2483.500	58.17	-10.88	47.29	74.00	-26.71	peak
3		2484.040	63.29	-10.88	52.41	74.00	-21.59	peak
4		2485.597	64.20	-10.88	53.32	74.00	-20.68	peak
5		2489.767	63.66	-10.89	52.77	74.00	-21.23	peak

Emission Level= Read Level+ Correct Factor

Test Voltage:	DC 3.3V
Ant. Pol.	Vertical
Test Mode:	TX BLE Mode 2480 MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1	*	2480.000	92.73	-10.89	81.84	74.00	7.84	peak
2		2483.500	56.03	-10.88	45.15	74.00	-28.85	peak
3		2486.642	63.63	-10.88	52.75	74.00	-21.25	peak

Emission Level= Read Level+ Correct Factor

3.8. Spurious Emission (Radiated)

Limit

Radiated Emission Limits (9 kHz~1000 MHz)

Frequency (MHz)	Field Strength (microvolt/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

Radiated Emission Limit (Above 1000MHz)

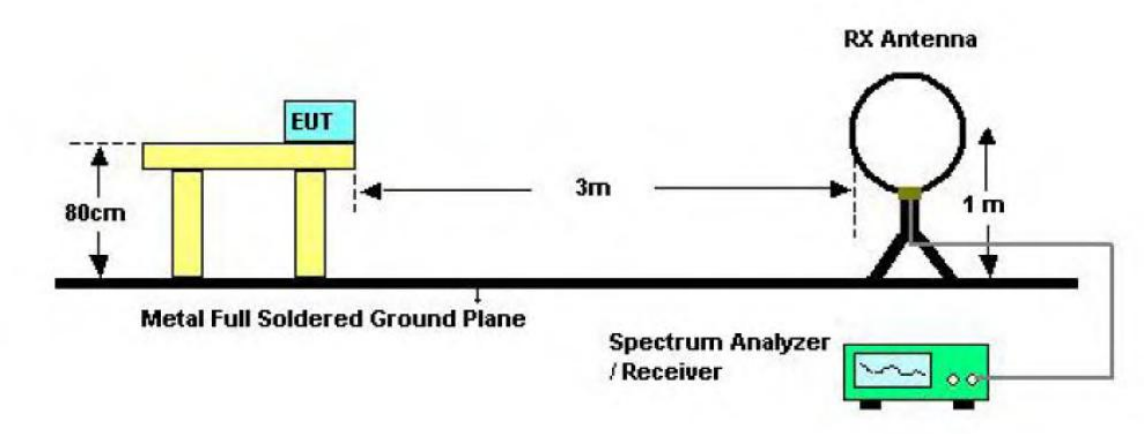
Frequency (MHz)	Distance Meters(at 3m)	
	Peak	Average
Above 1000	74	54

Note:

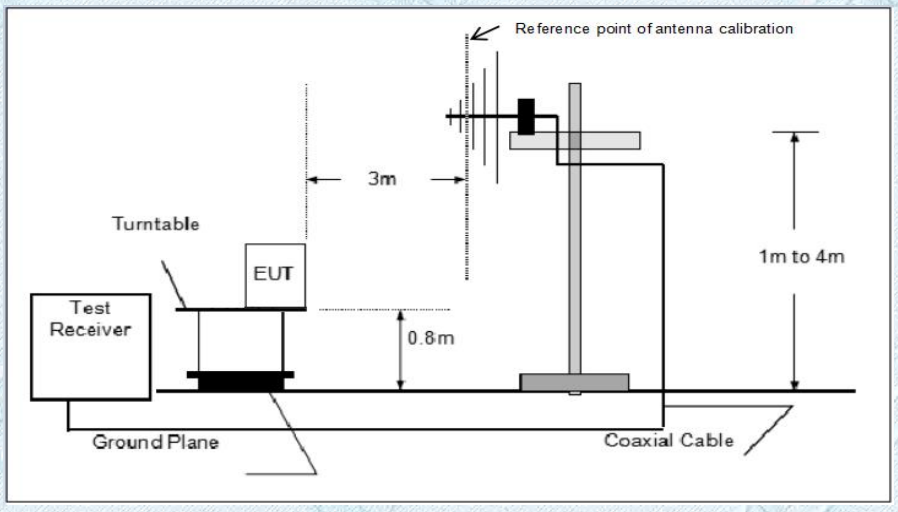
(1) The tighter limit applies at the band edges.

(2) Emission Level (dBuV/m)=20log Emission Level (uV/m).

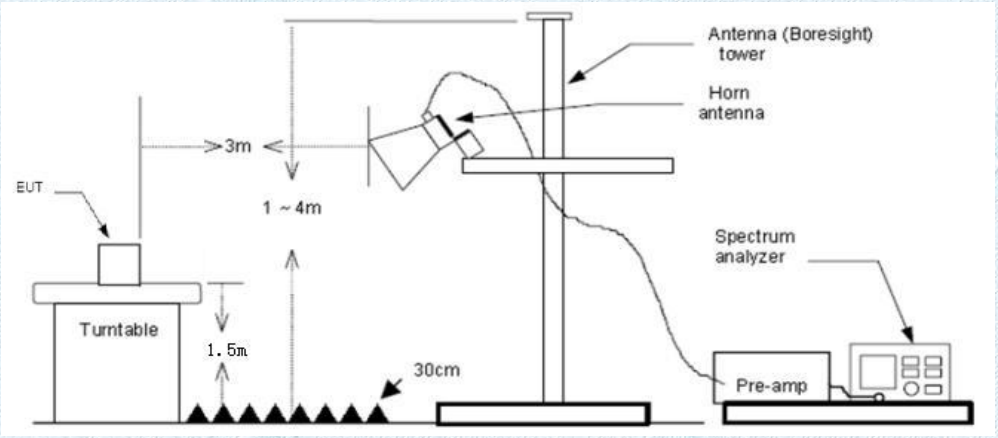
Test Configuration



Below 30MHz Test Setup



Below 1000MHz Test Setup



Above 1GHz Test Setup

Test Procedure

1. The EUT was setup and tested according to ANSI C63.10:2013
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, 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 to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings

   (1) Span shall wide enough to fully capture the emission being measured;

   (2) Below 1 GHz:

   RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;

   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.

   (3) From 1 GHz to 10th harmonic:

   RBW=1MHz, VBW=3MHz Peak detector for Peak value.

   RBW=1MHz, VBW=10Hz Peak detector for Average value.

Test Mode

Please refer to the clause 2.3.

Test Result

9 KHz~30 MHz and 18GHz~25GHz

From 9 KHz~30 MHz and 18GHz~25GHz: Conclusion: PASS

Note:

1) Measurement = Reading level + Correct Factor
   Correct Factor=Antenna Factor + Cable Loss -Preamplifier Factor
2) The peak level is lower than average limit(54 dBuV/m), this data is the too weak instrument of signal is unable to test.
3) The emission levels of other frequencies are very lower than the limit and not show in test report.
4) The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
5) Pre-scan CH00, CH19 and CH39 modulation, and found the GFSK_1M_CH00 which it is worse case for 30MHz-1GHz , so only show the test data for worse case.

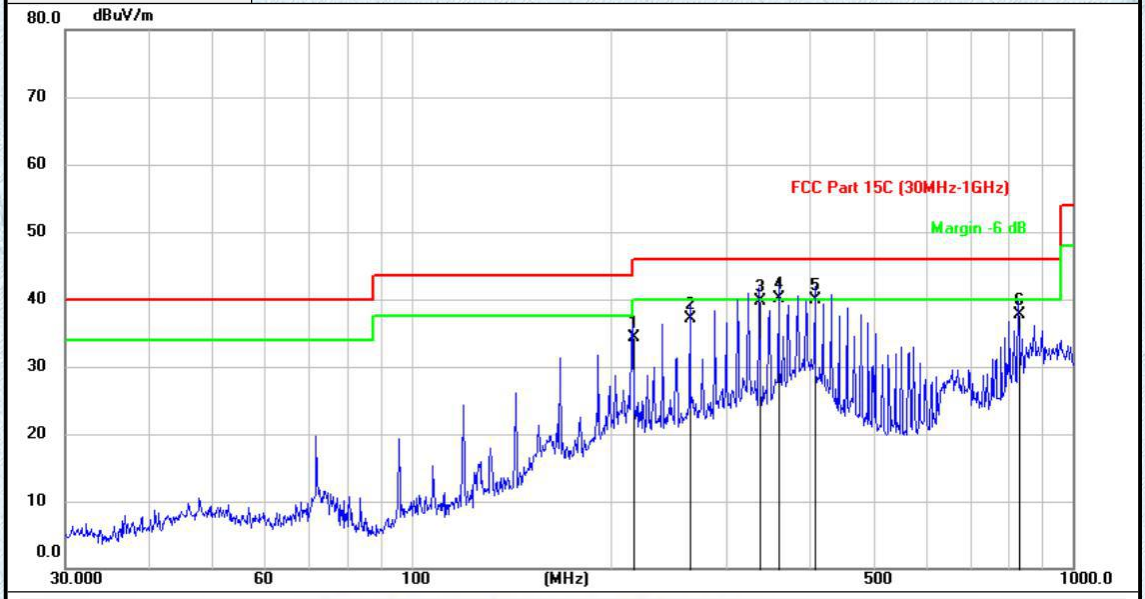
BELOW 30MHZ

No emission found between lowest internal used/generated frequencies to 30MHz.

Test model : MK06A

30MHz-1GHz

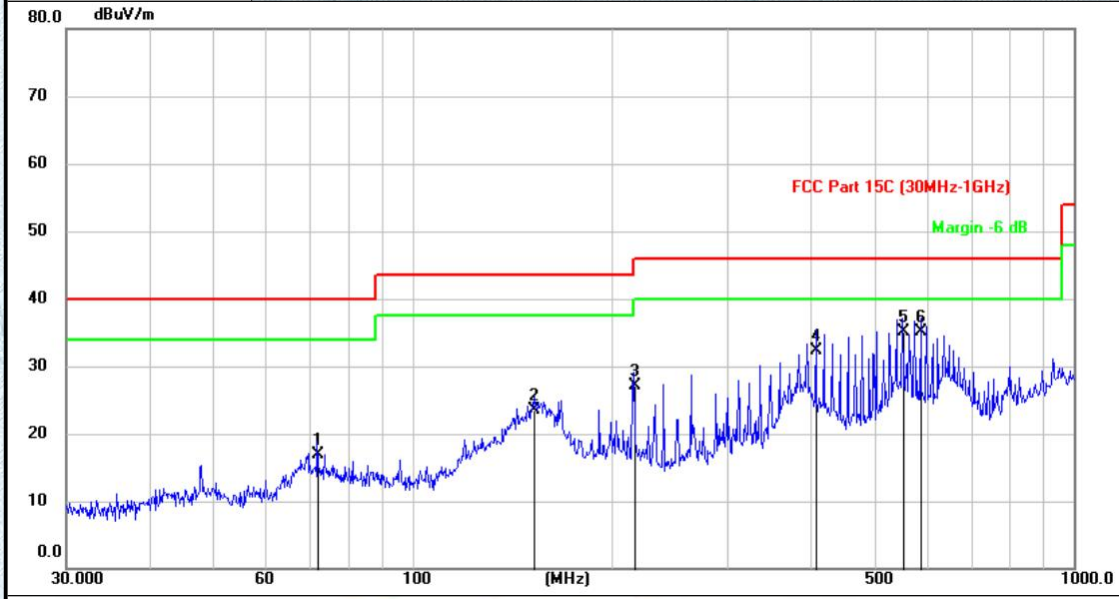
Test Voltage:	DC 3.3V
Ant. Pol.	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		216.0240	51.65	-17.29	34.36	46.00	-11.64	QP
2		264.0041	52.63	-15.48	37.15	46.00	-8.85	QP
3		336.0352	52.80	-13.13	39.67	46.00	-6.33	QP
4	*	360.0687	52.25	-12.21	40.04	46.00	-5.96	QP
5		408.0865	50.66	-10.82	39.84	46.00	-6.16	QP
6		828.0740	43.43	-5.66	37.77	46.00	-8.23	QP

Emission Level= Read Level+ Correct Factor

Test Voltage:	DC 3.3V
Ant. Pol.	Vertical

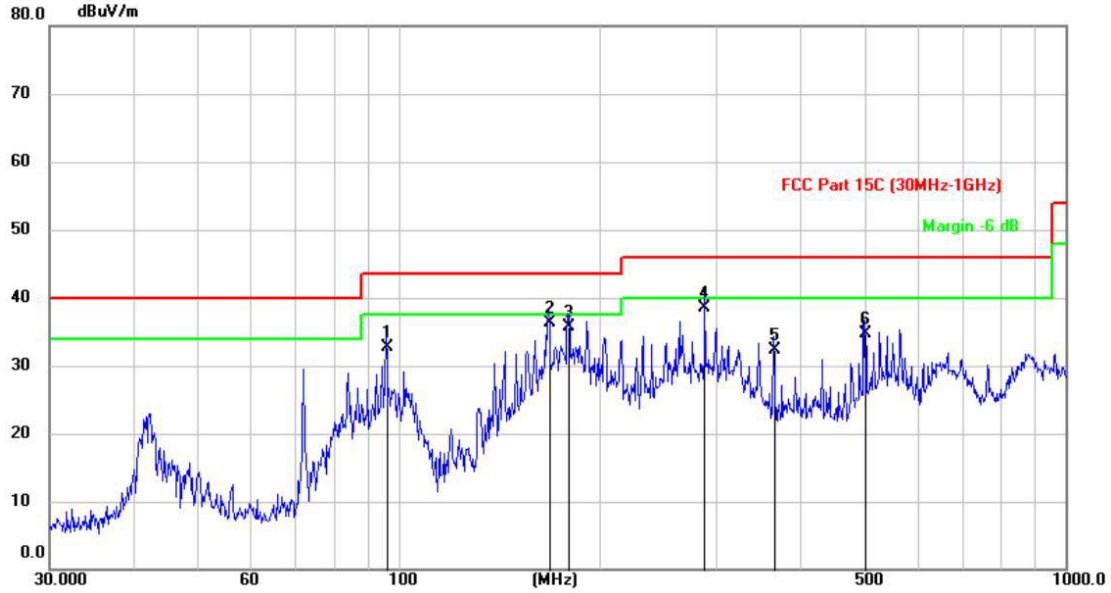


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		71.9833	36.77	-19.91	16.86	40.00	-23.14	QP
2		152.7712	44.88	-21.32	23.56	43.50	-19.94	QP
3		216.0240	44.33	-17.29	27.04	46.00	-18.96	QP
4		408.0865	43.08	-10.82	32.26	46.00	-13.74	QP
5		552.1084	43.98	-8.84	35.14	46.00	-10.86	QP
6	*	588.0797	43.14	-7.96	35.18	46.00	-10.82	QP

Emission Level= Read Level+ Correct Factor

Test model : MK06B

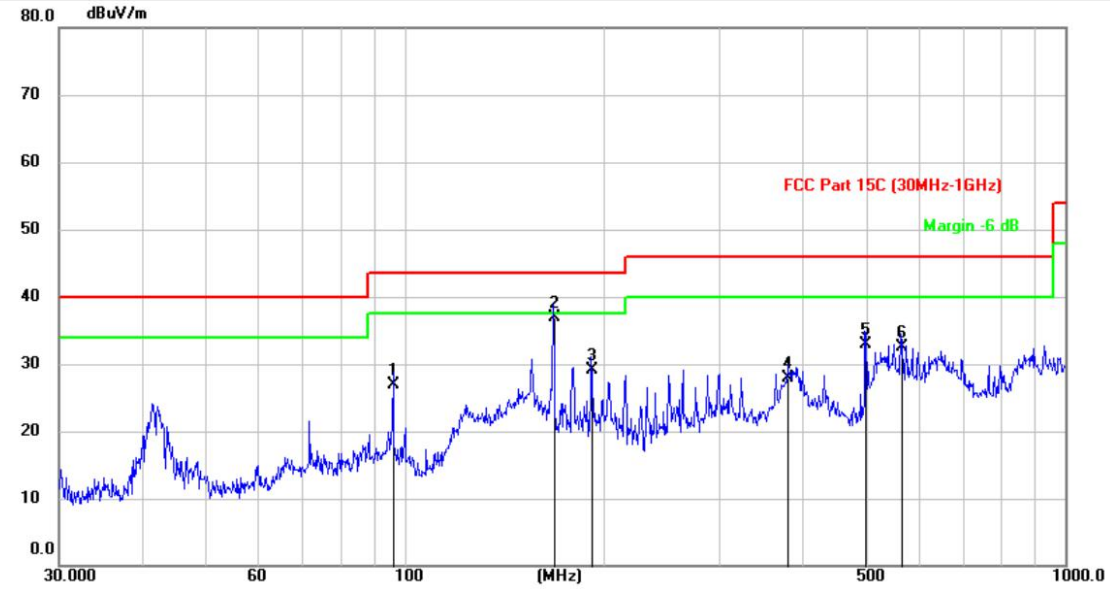
Test Voltage:	DC 3.3V
Ant. Pol.	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		95.8966	50.95	-18.31	32.64	43.50	-10.86	QP
2	*	168.0009	57.05	-20.71	36.34	43.50	-7.16	QP
3		179.8272	54.81	-19.08	35.73	43.50	-7.77	QP
4		287.9904	53.39	-14.96	38.43	46.00	-7.57	QP
5		366.5658	44.33	-12.00	32.33	46.00	-13.67	QP
6		499.9503	44.56	-9.93	34.63	46.00	-11.37	QP

Emission Level= Read Level+ Correct Factor

Test Voltage:	DC 3.3V
Ant. Pol.	Vertical



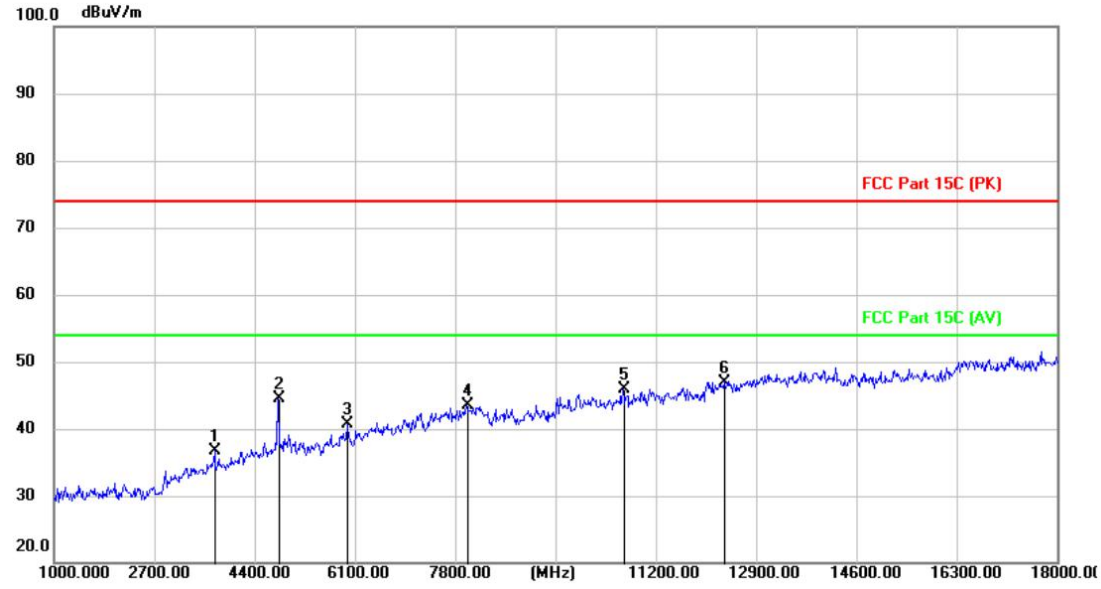
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		96.1323	45.11	-18.27	26.84	43.50	-16.66	QP
2	*	168.3547	57.56	-20.67	36.89	43.50	-6.61	QP
3		191.9468	47.40	-18.34	29.06	43.50	-14.44	QP
4		380.5808	39.40	-11.54	27.86	46.00	-18.14	QP
5		498.3750	42.81	-9.95	32.86	46.00	-13.14	QP
6		564.8369	41.07	-8.53	32.54	46.00	-13.46	QP

Emission Level= Read Level+ Correct Factor

Test model : MK06A

Adobe 1GHz

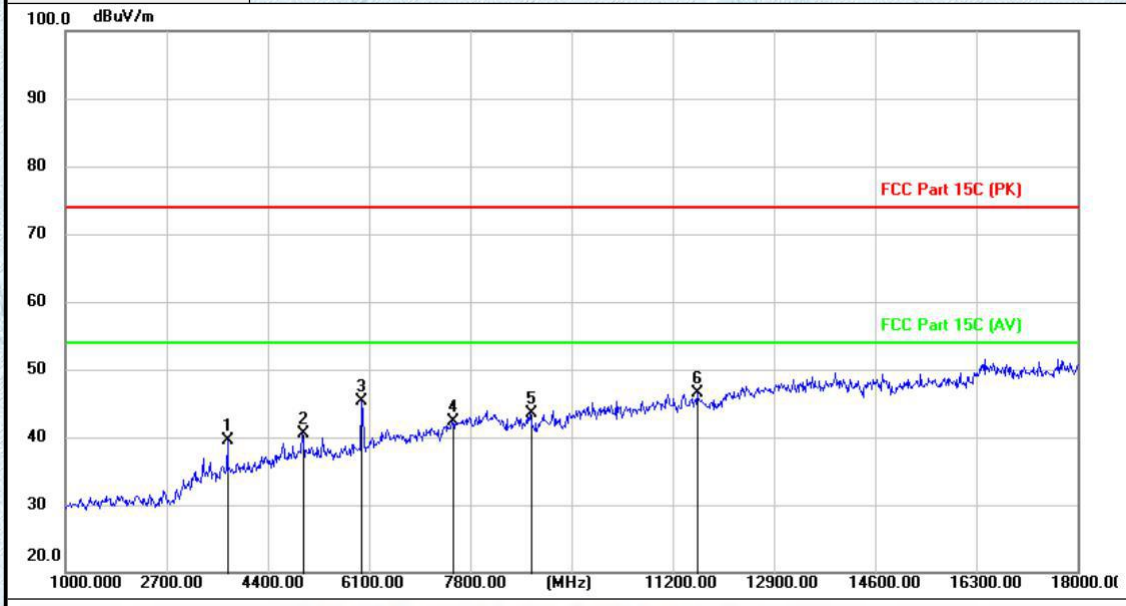
Test Voltage:	DC 3.3V
Ant. Pol.	Horizontal
Test Mode:	TX BLE Mode 2402MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		3728.500	45.91	-9.12	36.79	74.00	-37.21	peak
2		4802.900	50.43	-5.92	44.51	74.00	-29.49	peak
3		5977.600	44.65	-3.85	40.80	74.00	-33.20	peak
4		7995.500	41.52	2.06	43.58	74.00	-30.42	peak
5		10647.500	40.74	5.15	45.89	74.00	-28.11	peak
6	*	12364.500	38.32	8.68	47.00	74.00	-27.00	peak

Emission Level= Read Level+ Correct Factor

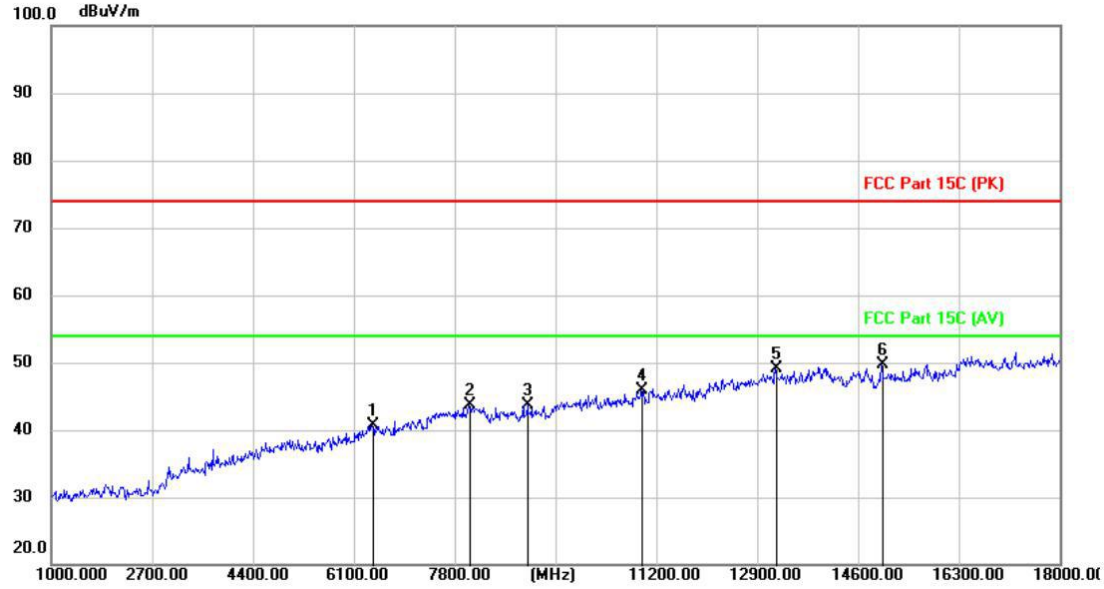
Test Voltage:	DC 3.3V
Ant. Pol.	Vertical
Test Mode:	TX BLE Mode 2402MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		3723.400	48.54	-9.12	39.42	74.00	-34.58	peak
2		4989.900	45.90	-5.42	40.48	74.00	-33.52	peak
3		5979.300	49.24	-3.84	45.40	74.00	-28.60	peak
4		7509.300	41.48	0.85	42.33	74.00	-31.67	peak
5		8808.100	41.67	1.86	43.53	74.00	-30.47	peak
6	*	11619.900	39.44	7.11	46.55	74.00	-27.45	peak

Emission Level= Read Level+ Correct Factor

Test Voltage:	DC 3.3V
Ant. Pol.	Horizontal
Test Mode:	TX BLE Mode 2440MHz

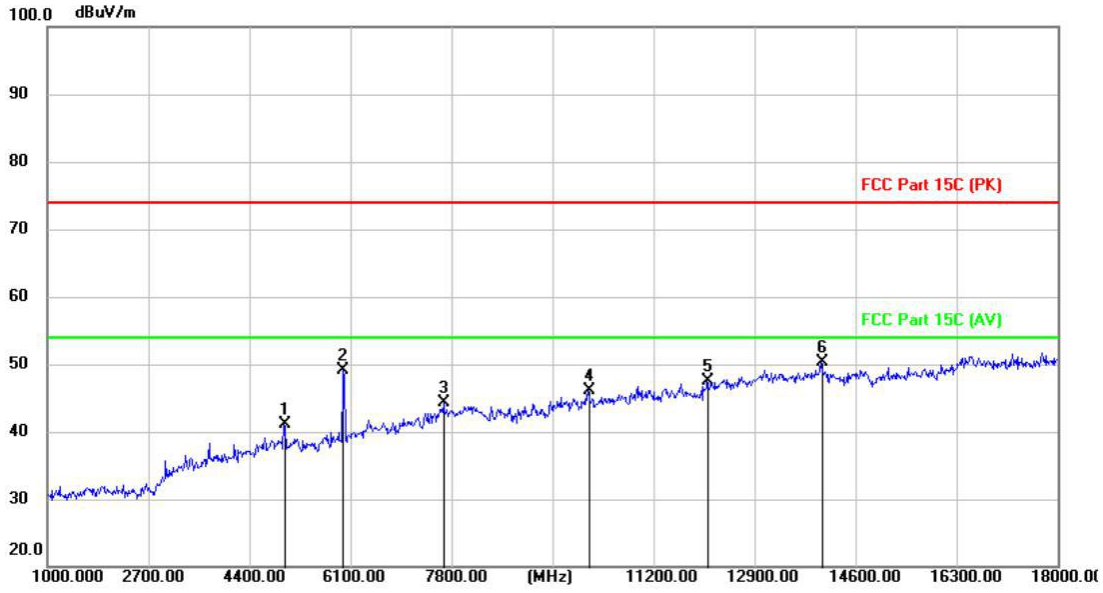


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		6411.100	43.09	-2.41	40.68	74.00	-33.32	peak
2		8044.800	41.72	2.06	43.78	74.00	-30.22	peak
3		9039.300	41.88	1.91	43.79	74.00	-30.21	peak
4		10946.700	40.28	5.62	45.90	74.00	-28.10	peak
5		13221.300	38.85	10.23	49.08	74.00	-24.92	peak
6	*	15001.200	38.17	11.55	49.72	74.00	-24.28	peak

Emission Level= Read Level+ Correct Factor

Test Voltage:	DC 3.3V

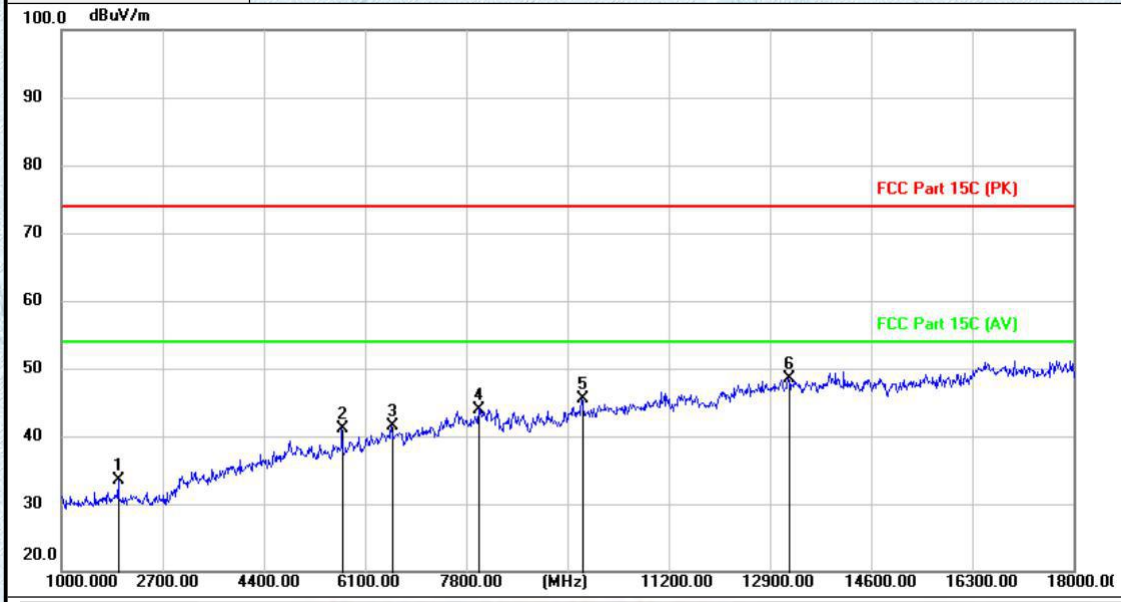
Ant. Pol.	Vertical
Test Mode:	TX BLE Mode 2440MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		4988.200	46.59	-5.43	41.16	74.00	-32.84	peak
2		5981.000	52.85	-3.84	49.01	74.00	-24.99	peak
3		7664.000	43.02	1.24	44.26	74.00	-29.74	peak
4		10103.500	41.89	4.24	46.13	74.00	-27.87	peak
5		12116.300	39.28	8.13	47.41	74.00	-26.59	peak
6	*	14033.900	39.10	11.18	50.28	74.00	-23.72	peak

Emission Level= Read Level+ Correct Factor

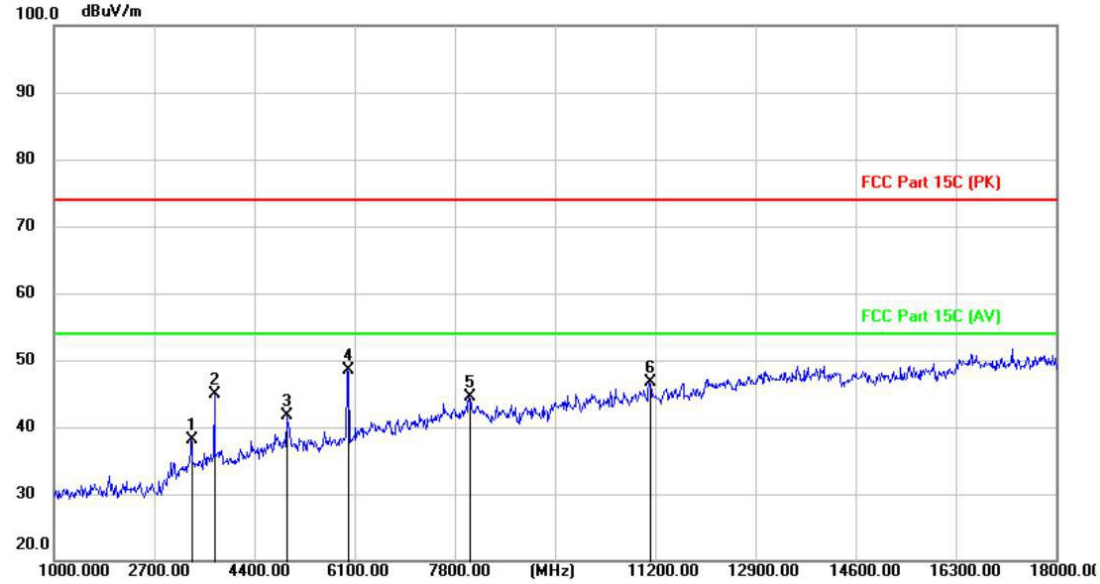
Test Voltage:	DC 3.3V
Ant. Pol.	Horizontal
Test Mode:	TX BLE Mode 2480MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		1960.500	44.69	-11.10	33.59	74.00	-40.41	peak
2		5717.500	45.52	-4.43	41.09	74.00	-32.91	peak
3		6545.400	43.57	-1.99	41.58	74.00	-32.42	peak
4		8015.900	41.93	2.07	44.00	74.00	-30.00	peak
5		9743.100	41.90	3.51	45.41	74.00	-28.59	peak
6	*	13214.500	38.25	10.22	48.47	74.00	-25.53	peak

Emission Level= Read Level+ Correct Factor

Test Voltage:	DC 3.3V
Ant. Pol.	Vertical
Test Mode:	TX BLE Mode 2480MHz

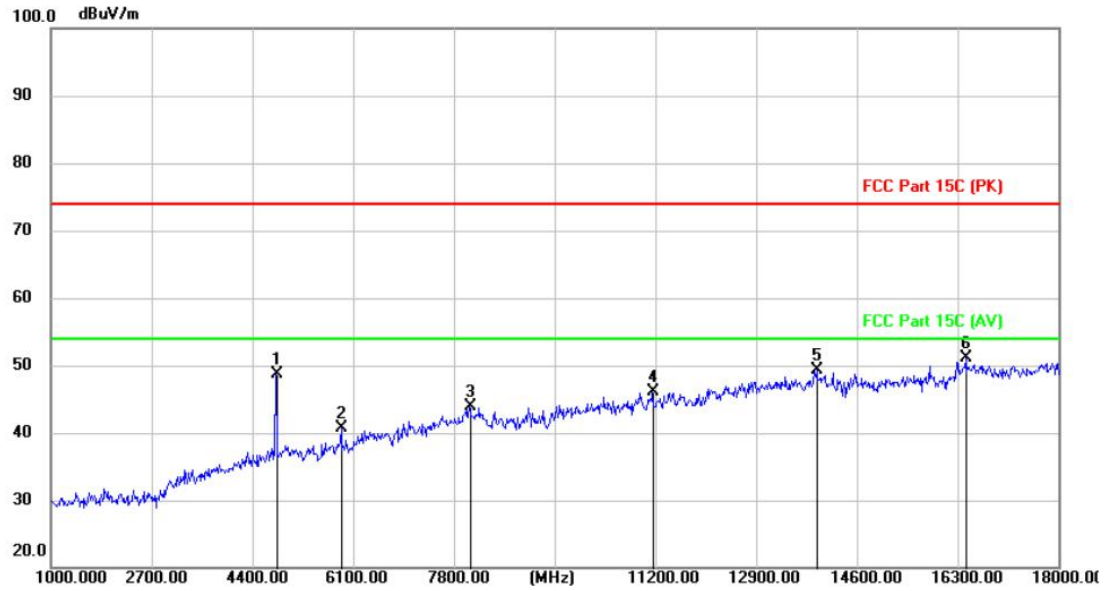


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		3332.400	48.14	-9.98	38.16	74.00	-35.84	peak
2		3728.500	53.95	-9.12	44.83	74.00	-29.17	peak
3		4959.300	47.20	-5.51	41.69	74.00	-32.31	peak
4	*	5994.600	52.24	-3.81	48.43	74.00	-25.57	peak
5		8044.800	42.35	2.06	44.41	74.00	-29.59	peak
6		11113.300	40.71	5.96	46.67	74.00	-27.33	peak

Emission Level= Read Level+ Correct Factor

Test model : MK06B

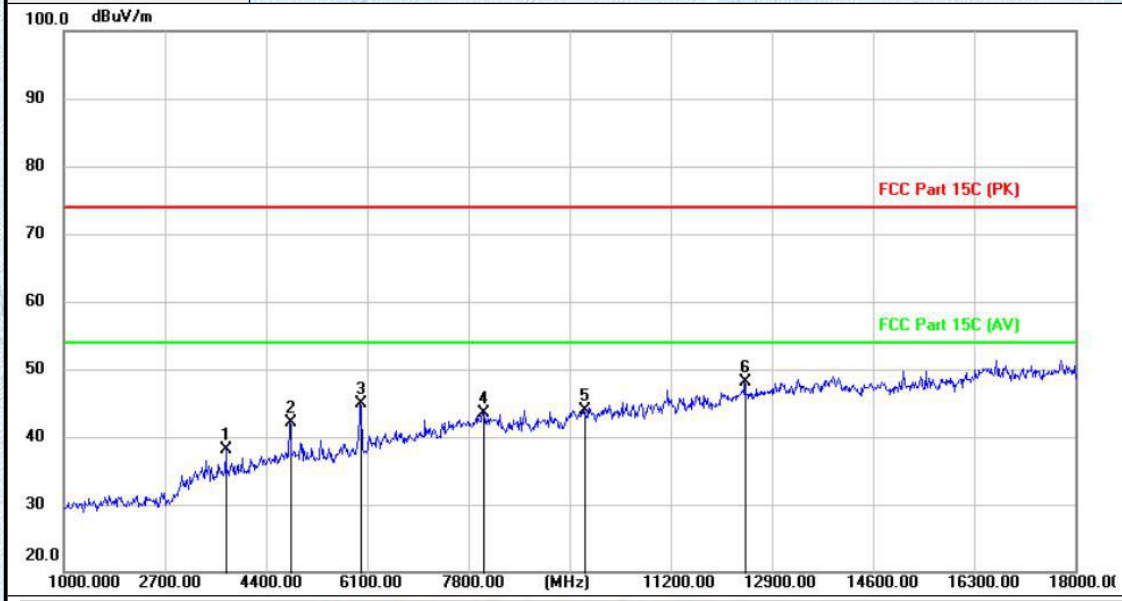
Test Voltage:	DC 3.3V
Ant. Pol.	Horizontal
Test Mode:	TX BLE Mode 2402MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		4804.600	54.66	-5.92	48.74	74.00	-25.26	peak
2		5899.400	44.71	-4.03	40.68	74.00	-33.32	peak
3		8070.300	41.86	2.05	43.91	74.00	-30.09	peak
4		11154.100	39.99	6.05	46.04	74.00	-27.96	peak
5		13930.200	38.15	11.14	49.29	74.00	-24.71	peak
6	*	16439.400	37.45	13.66	51.11	74.00	-22.89	peak

Emission Level= Read Level+ Correct Factor

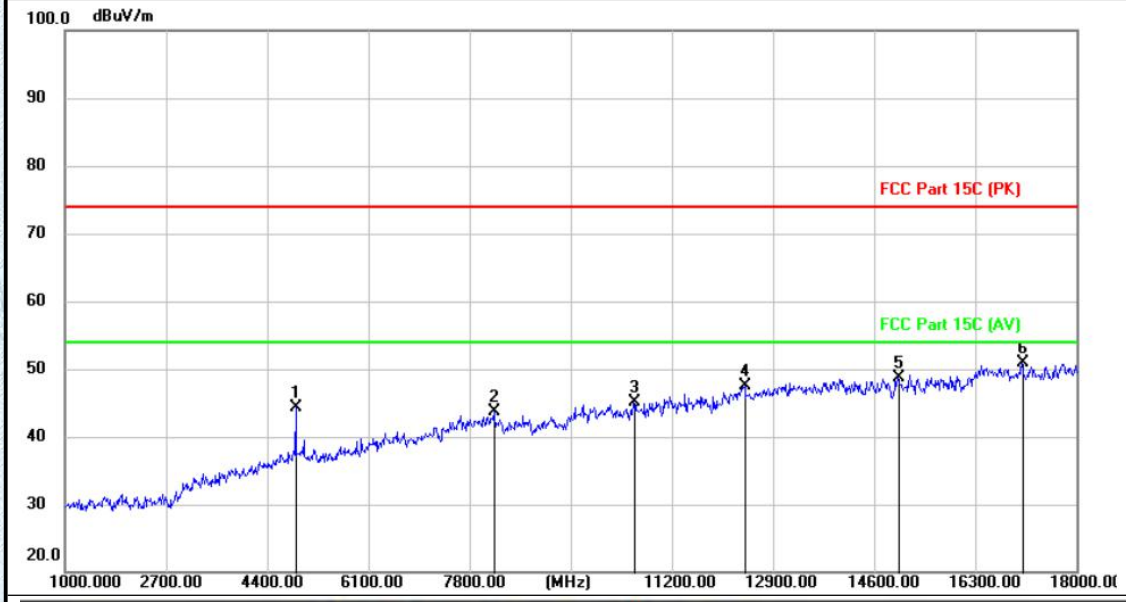
Test Voltage:	DC 3.3V
Ant. Pol.	Vertical
Test Mode:	TX BLE Mode 2402MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		3725.100	47.21	-9.12	38.09	74.00	-35.91	peak
2		4804.600	48.08	-5.92	42.16	74.00	-31.84	peak
3		5989.500	48.65	-3.82	44.83	74.00	-29.17	peak
4		8048.200	41.51	2.06	43.57	74.00	-30.43	peak
5		9743.100	40.47	3.51	43.98	74.00	-30.02	peak
6	*	12446.100	39.17	8.85	48.02	74.00	-25.98	peak

Emission Level= Read Level+ Correct Factor

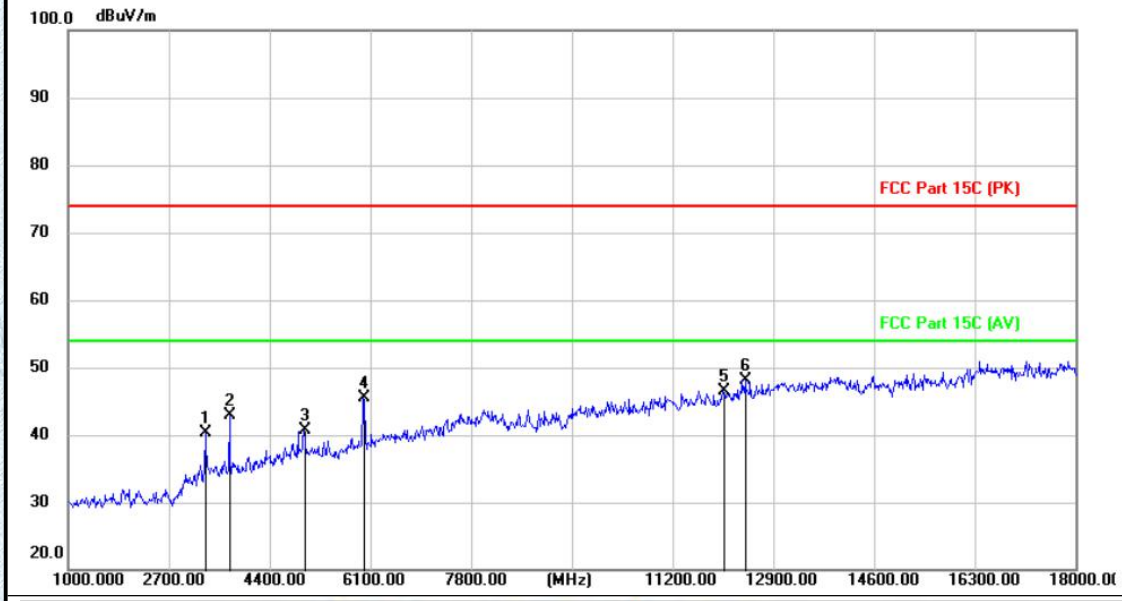
Test Voltage:	DC 3.3V
Ant. Pol.	Horizontal
Test Mode:	TX BLE Mode 2440MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		4879.400	50.08	-5.72	44.36	74.00	-29.64	peak
2		8219.900	41.64	2.01	43.65	74.00	-30.35	peak
3		10562.500	40.13	5.02	45.15	74.00	-28.85	peak
4		12429.100	38.71	8.81	47.52	74.00	-26.48	peak
5		15004.600	37.22	11.55	48.77	74.00	-25.23	peak
6	*	17087.100	37.91	13.09	51.00	74.00	-23.00	peak

Emission Level= Read Level+ Correct Factor

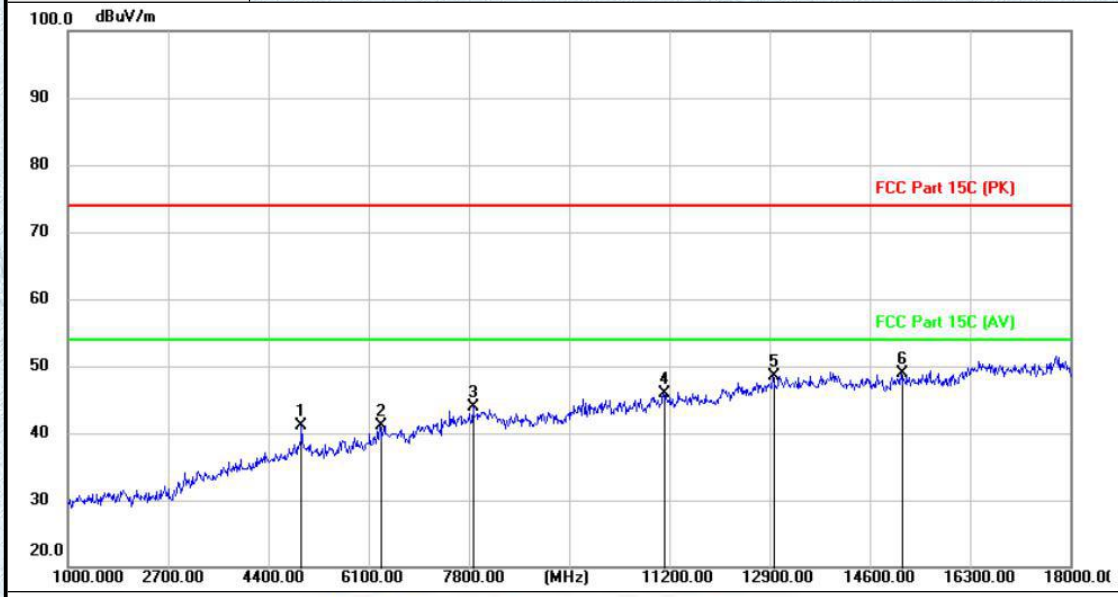
Test Voltage:	DC 3.3V
Ant. Pol.	Vertical
Test Mode:	TX BLE Mode 2440MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		3322.200	50.23	-10.01	40.22	74.00	-33.78	peak
2		3721.700	52.10	-9.12	42.98	74.00	-31.02	peak
3		4986.500	46.07	-5.43	40.64	74.00	-33.36	peak
4		5987.800	49.24	-3.83	45.41	74.00	-28.59	peak
5		12060.200	38.53	8.01	46.54	74.00	-27.46	peak
6	*	12435.900	39.23	8.84	48.07	74.00	-25.93	peak

Emission Level= Read Level+ Correct Factor

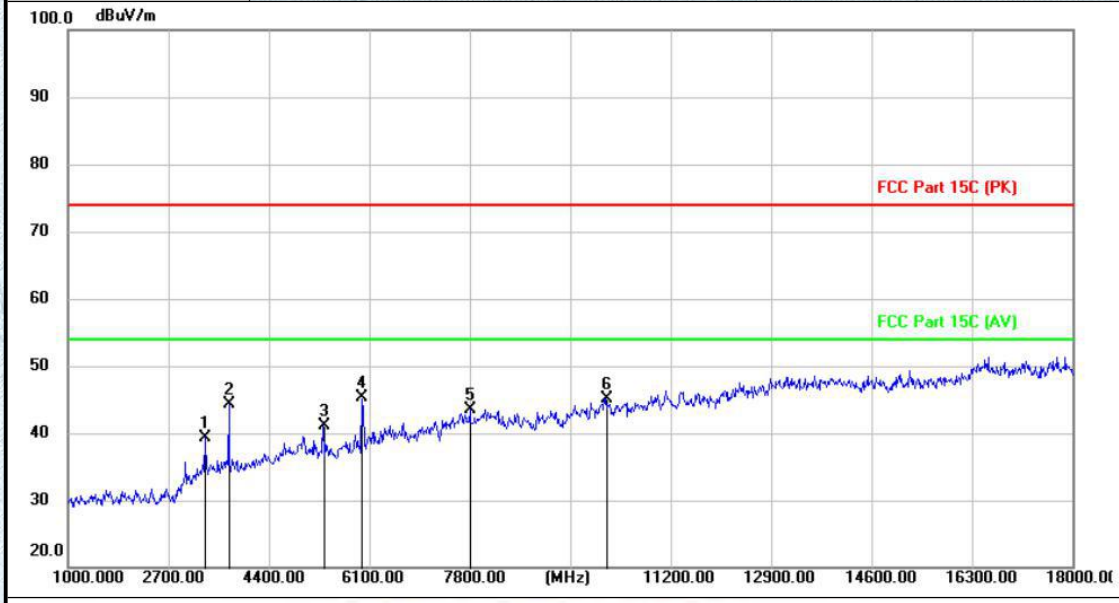
Test Voltage:	DC 3.3V
Ant. Pol.	Horizontal
Test Mode:	TX BLE Mode 2480MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		4961.000	46.53	-5.50	41.03	74.00	-32.97	peak
2		6298.900	43.92	-2.79	41.13	74.00	-32.87	peak
3		7883.300	42.04	1.78	43.82	74.00	-30.18	peak
4		11099.700	39.92	5.93	45.85	74.00	-28.15	peak
5		12966.300	38.69	9.87	48.56	74.00	-25.44	peak
6	*	15130.400	37.27	11.68	48.95	74.00	-25.05	peak

Emission Level= Read Level+ Correct Factor

Test Voltage:	DC 3.3V
Ant. Pol.	Vertical
Test Mode:	TX BLE Mode 2480MHz



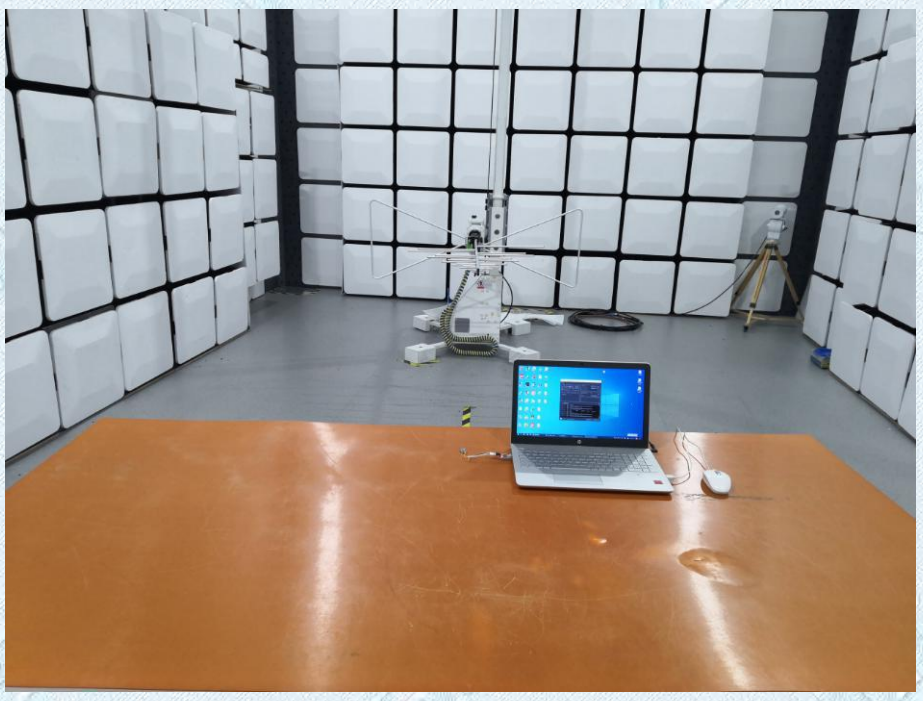
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		3325.600	49.20	-10.00	39.20	74.00	-34.80	peak
2		3721.700	53.42	-9.12	44.30	74.00	-29.70	peak
3		5329.900	46.14	-5.08	41.06	74.00	-32.94	peak
4	*	5977.600	49.05	-3.85	45.20	74.00	-28.80	peak
5		7815.300	41.95	1.61	43.56	74.00	-30.44	peak
6		10096.700	40.87	4.24	45.11	74.00	-28.89	peak

Emission Level= Read Level+ Correct Factor

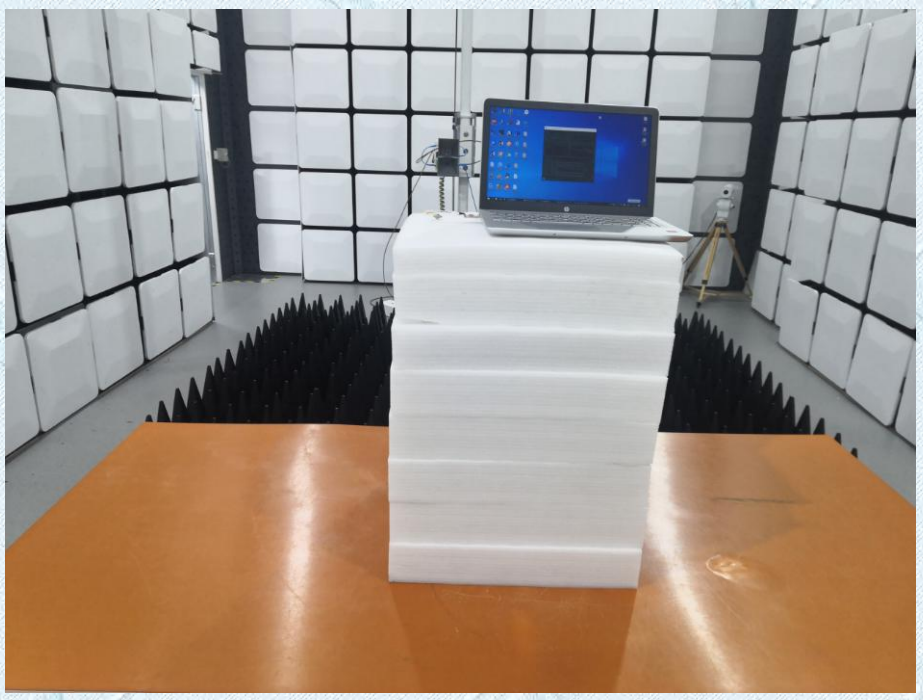
Note:All modulation modes were tested, and only the worst data of GFSK_1M was recorded in the report.

4.EUT TEST PHOTOS

Radiated Measurement (Below 1GHz)

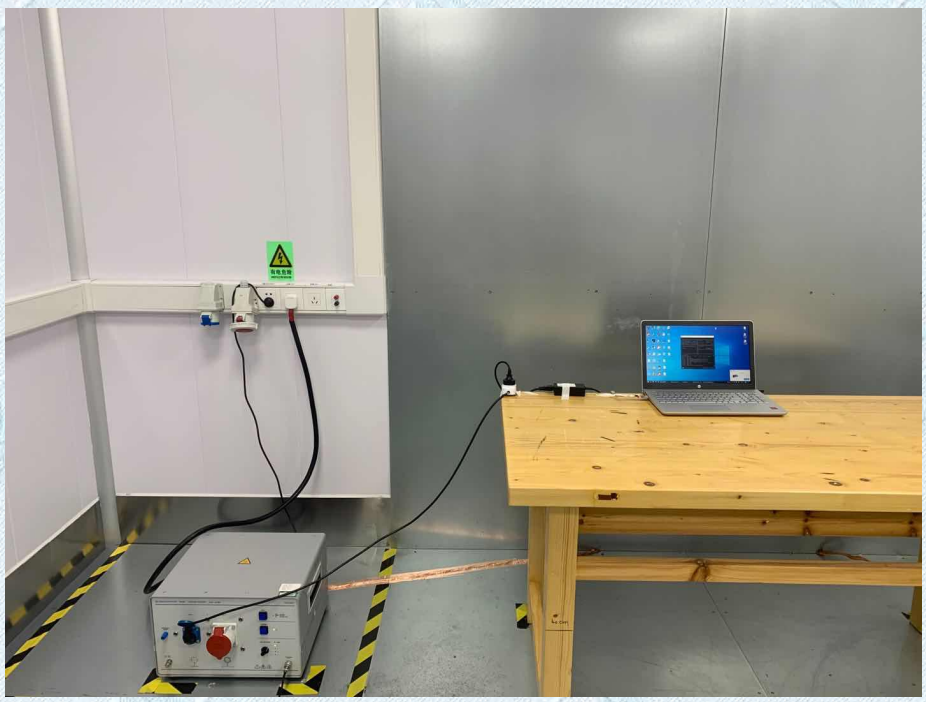


Radiated Measurement (Above 1GHz)



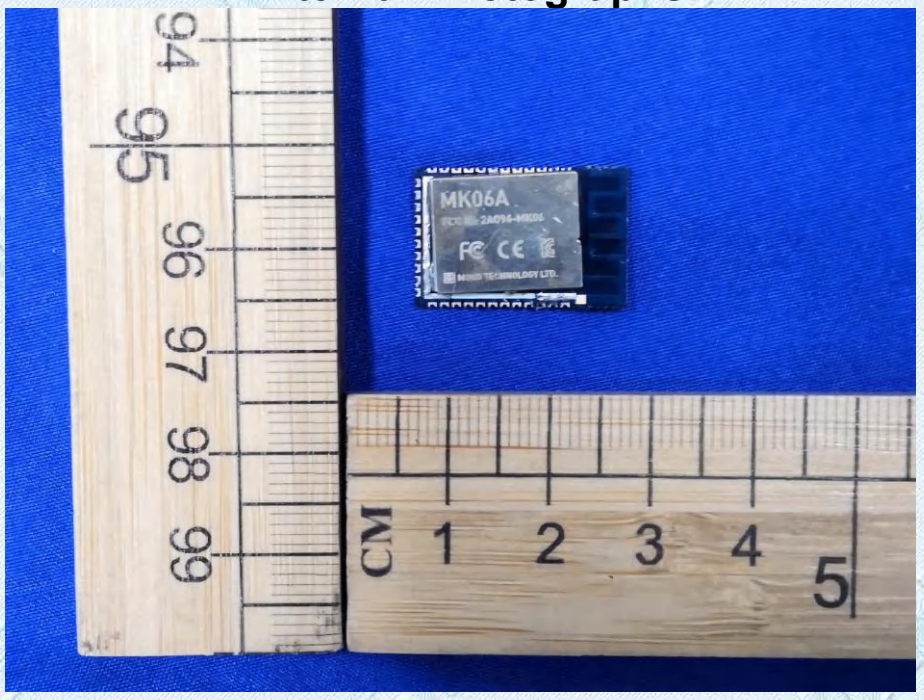
RF Conducted

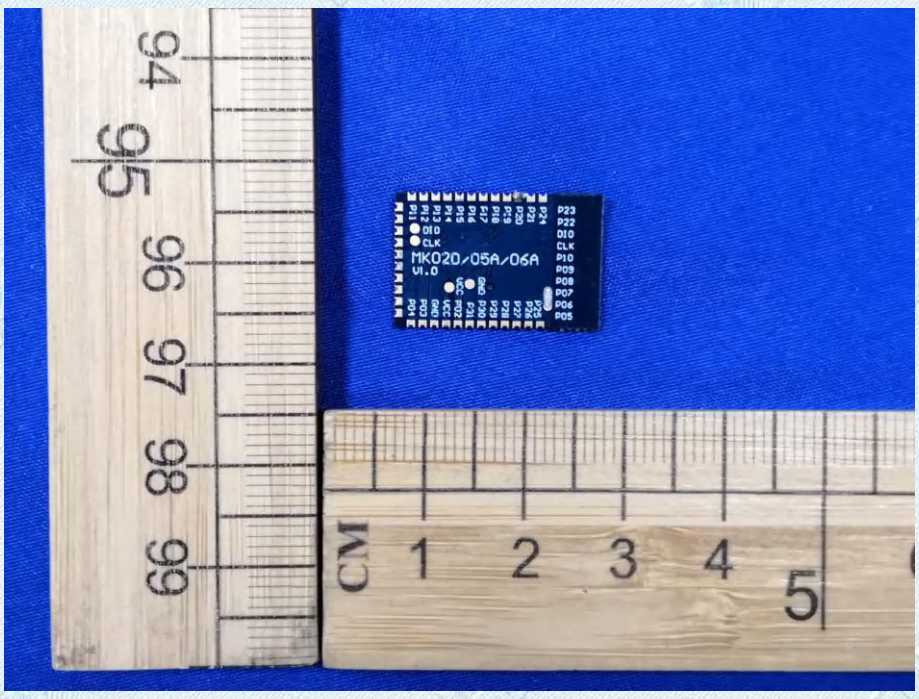
CONDUCTED EMISSION TEST SETUP

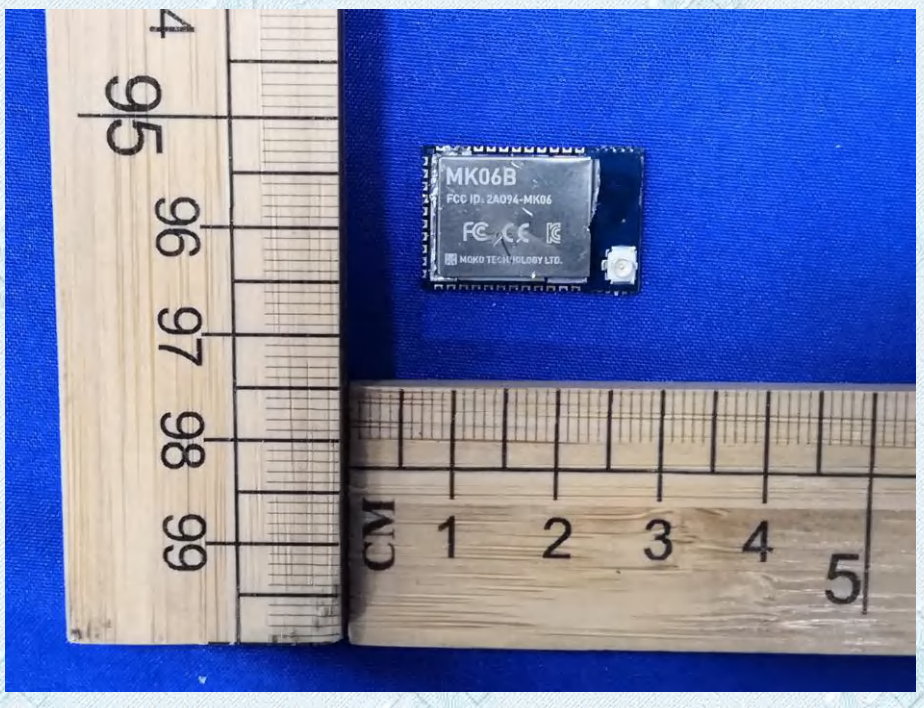


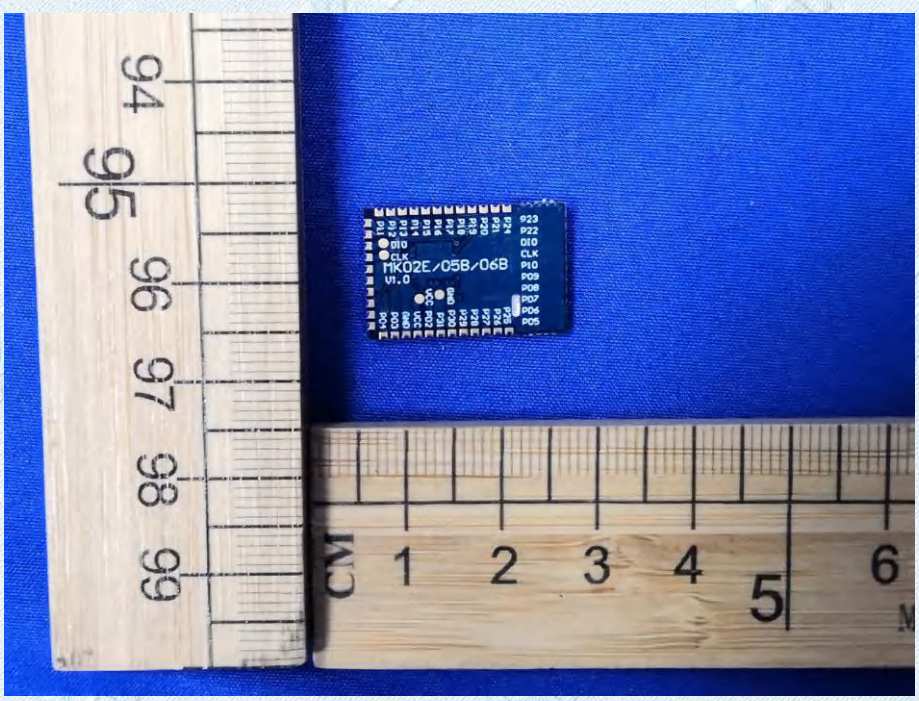
5.PHOTOGRAPHS OF EUT CONSTRUCTIONAL

External Photographs

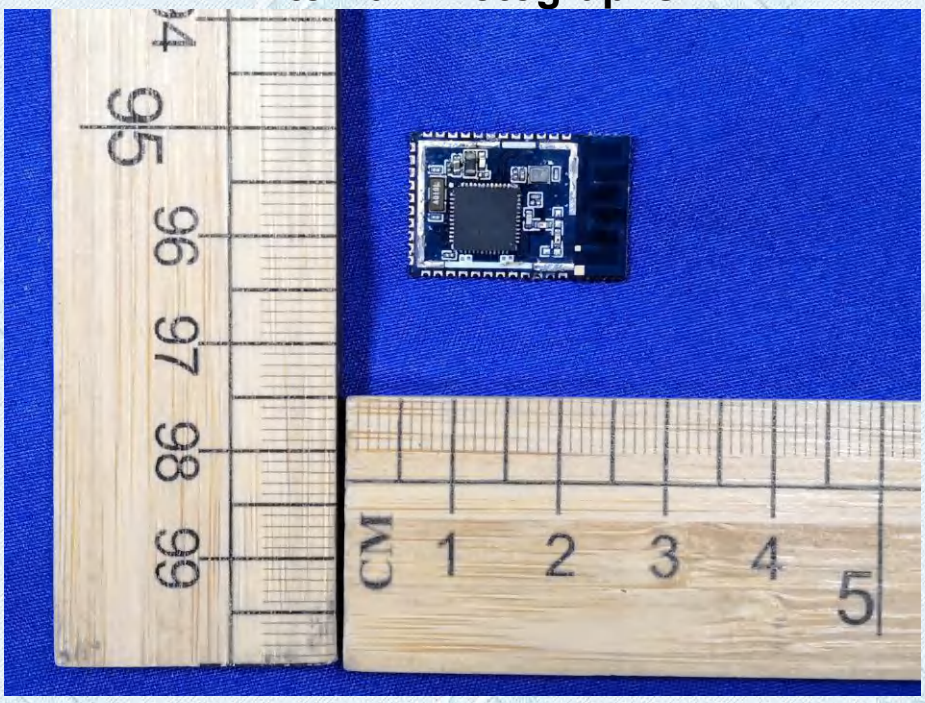


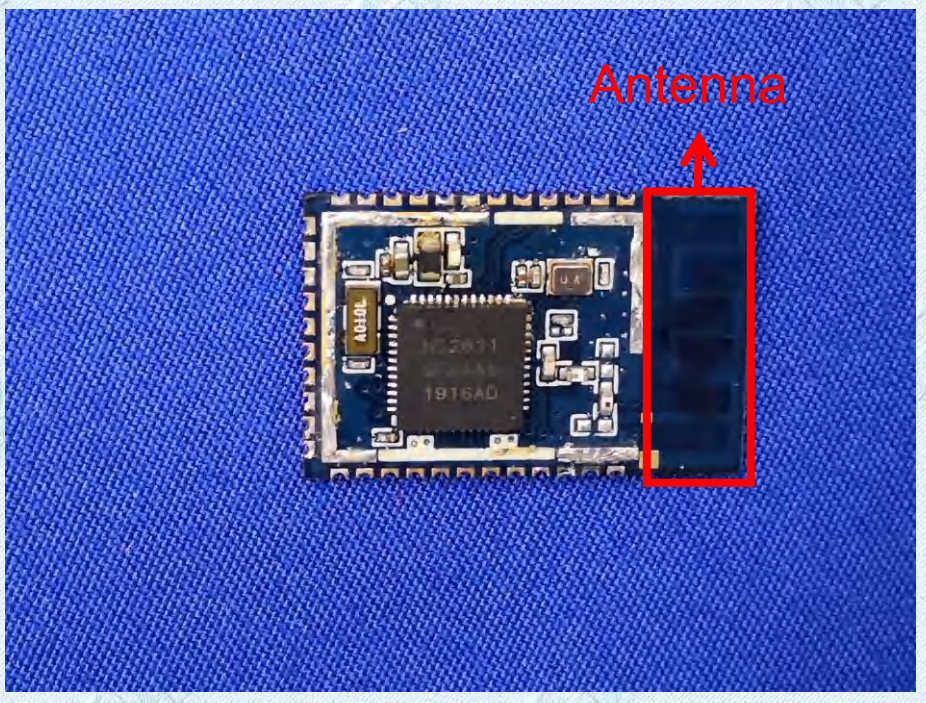


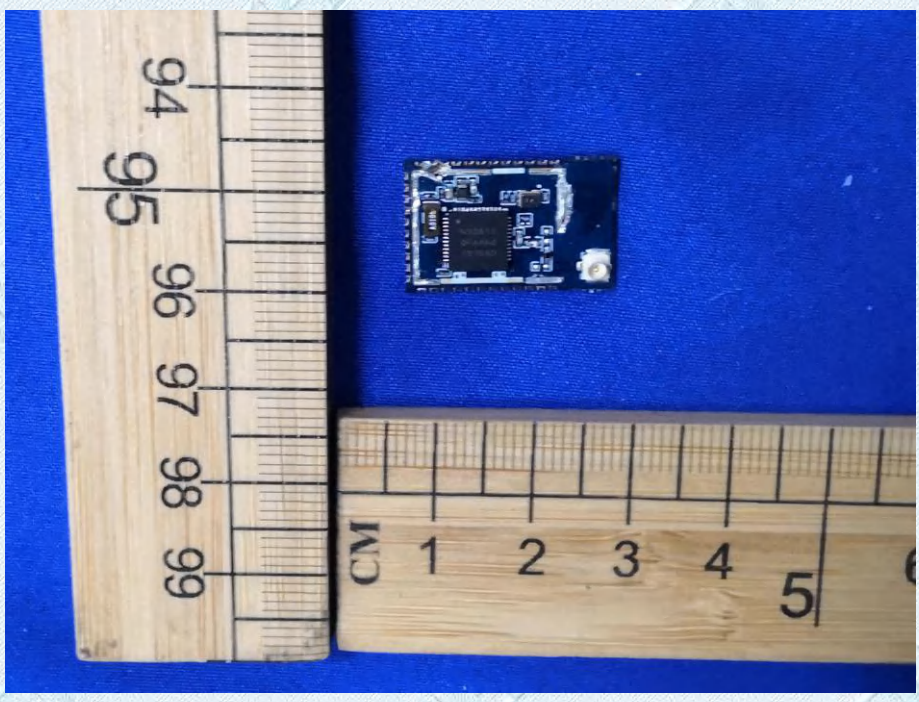

MK06B
FCC ID: 2A094-MK06
MOKO TECHNOLOGY LTD.
CM
1
2
3
4
5

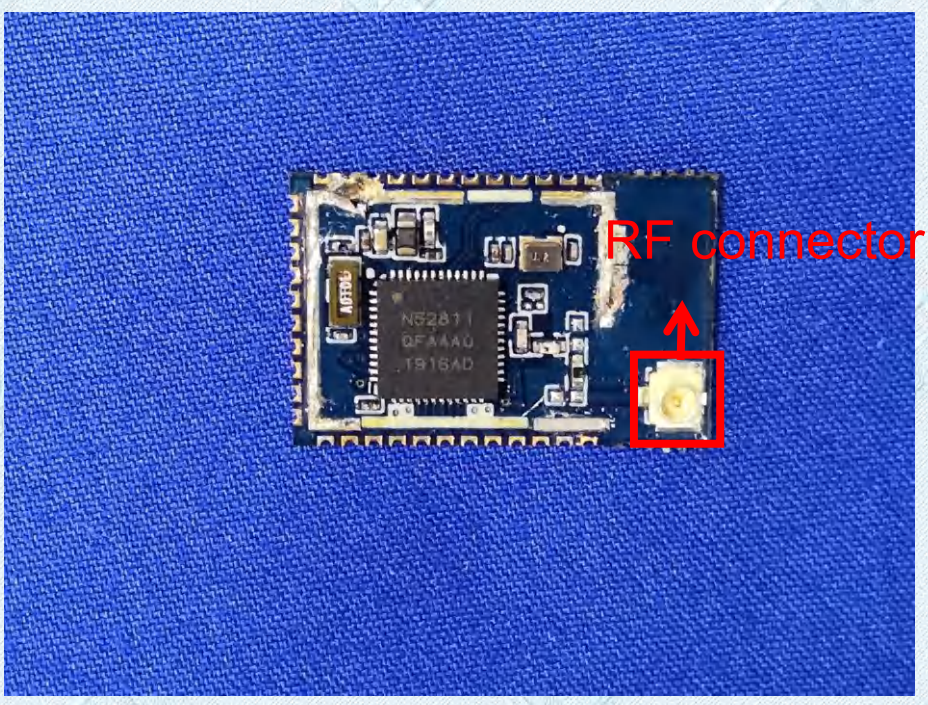

MK02E/05B/06B
V1.0
CM
1
2
3
4
5
6

Internal Photographs









******THE END*****