

TEST REPORT

Application No.:	KSCR2412002452AT
FCC ID:	M82-UTK3000
IC:	9404A-UTK3000
Applicant:	Advantech Co., Ltd.
Address of Applicant:	No.1, Alley 20, Lane 26, Rueiguang Road, Neihu District, Taipei 114, Taiwan
Manufacturer:	Advantech Co., Ltd.
Address of Manufacturer:	No.1, Alley 20, Lane 26, Rueiguang Road, Neihu District, Taipei 114, Taiwan
Equipment Under Test (EUT):	
EUT Name:	Self-service terminal
Model No.:	UTK-3000, UTK-3XXXXXXXXXXXXXXX, UTK3XXXXXXXX XXXXXXXXX(X=0-9, a-z, "-" or black, indicating different sales regions, the change of X not affect the safety performance and EMC performance of the product) *
For IC Model No.:	UTK-3000
*	Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.
Standard(s) :	47 CFR Part 15, Subpart C 15.247 RSS-247 Issue 3, August 2023 RSS-Gen Issue 5 Amendment 2 (February 2021)
Date of Receipt:	2024-12-02
Date of Test:	2024-12-06 to 2025-01-04
Date of Issue:	2025-01-07

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Revision Record			
Version	Description	Date	Remark
00	Original	2025-01-07	/

Authorized for issue by:			
Tested By		<i>Maker Qi</i>	
		Maker Qi /Project Engineer	
Approved By		<i>Terry Hou</i>	
		Terry Hou /Reviewer	

2 Test Summary

Radio Spectrum Technical Requirement				
Item	FCC Requirement	IC Requirement	Method	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.203 & 15.247(c)	RSS-Gen Clause 6.8	N/A	Customer Declaration

N/A: Not applicable

Radio Spectrum Matter Part				
Item	FCC Requirement	IC Requirement	Method	Result
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.207	RSS-Gen Clause 8.8	ANSI C63.10 (2013) Section 6.2	Pass
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	Section 3.3 & RSS-Gen Section 8.9	ANSI C63.10 (2013) Section 6.10.5	Pass
Radiated Spurious Emissions	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	Section 3.3 & RSS-Gen Section 8.9	ANSI C63.10 (2013) Section 6.4,6.5,6.6	Pass

Note1: There are series models mentioned in this report, and they are identical in electrical and electronic characters. Only the model UTK-3000 was tested since their differences were the model number and appearance.

Note2: The RF module RTL8822CE has been certified, Issued by Bureau Veritas Consumer Products Services (H.K.) Ltd. Taoyuan Branch, FCC Report No. RF180816E04-3, IC Report No. IC180816E04-3. So, we only evaluate Conducted Emissions at AC Power Line (150kHz-30MHz), Radiated Emissions which fall in the restricted bands and Receiver spurious emissions test of this sample, other test data please refer to module test report.

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4 General Information

4.1 Details of E.U.T.

Power supply:	Host Adapter: FSP120-AHAN3 Input: 100-240V~ 50/60Hz 2.0A Output: 12.0V 10.0A 120.0W Printer Adapter1: GM60-240250-F Input: 100-240V~ 50/60Hz 2.0A Output: 24.0V 2.5A 60.0W Printer Adapter2: AP152G-240200 Input: 100-240V~ 50/60Hz 2.0A Max Output: 24.0V 2.0A 48.0W Printer Adapter3: GM53-240200-F Input: 100-240V~ 50/60Hz 2.0A Output: 24.0V 2.0A 48.0W
S/N:	KSA7062996
Firmware Version:	RTLWlanE_WindowsDriver_2024.0.10.130_Drv_3.00.0036_Win10.L
Test Voltage:	AC 120V/60Hz (Pre-test AC 230V/50Hz&AC 110V/60Hz then choose the AC 120V/60Hz as worst case)
Operation Frequency:	BLE 1M: 2402MHz to 2480MHz; BLE 2M: 2404MHz to 2478MHz
Modulation Type:	GFSK
Number of Channels:	40
Channel Spacing:	2MHz
Antenna Type:	Dipole Antenna
Antenna Gain:	2.28dBi (Provided by the manufacturer)

Note1: EUT has three different types of adapters: Adapter 1 (GM60-240250-F), Adapter 2 (AP152G-240200), and Adapter 3 (GM53-240200-F), all of which are pre-tested. Adapter1 is identified as the worst-case scenario, and only the worst-case results are reflected in the report.

Note2: The EUT comes with three different display sizes: Display 1 (UTK-3241KP), Display 2 (UTK-3321KP), and Display 3 (GUTK-3271KP), all of which are pre-tested. The display1 is identified as worst-case and only worst-case results are reflected in the report.

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
The EUT has been tested as an independent unit.			

4.3 Power level setting using in test

Channel	BLE 1M	Channel	BLE 2M
	Ant 1		Ant 1
00	default	01	default
19	default	19	default
39	default	38	default

4.4 Channels list

Channel	BLE 1M	BLE 2M	Channel	BLE 1M	BLE 2M
	Ant 1	Ant 1		Ant 1	Ant 1
00	✓	-	20	✓	✓
01	✓	✓	21	✓	✓
02	✓	✓	22	✓	✓
03	✓	✓	23	✓	✓
04	✓	✓	24	✓	✓
05	✓	✓	25	✓	✓
06	✓	✓	26	✓	✓
07	✓	✓	27	✓	✓
08	✓	✓	28	✓	✓
09	✓	✓	29	✓	✓
10	✓	✓	30	✓	✓
11	✓	✓	31	✓	✓
12	✓	✓	32	✓	✓
13	✓	✓	33	✓	✓
14	✓	✓	34	✓	✓
15	✓	✓	35	✓	✓
16	✓	✓	36	✓	✓
17	✓	✓	37	✓	✓
18	✓	✓	38	✓	✓
19	✓	✓	39	✓	-

4.5 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	8.4×10^{-8}
2	Timeout	2s
3	Duty Cycle	0.37%
4	Occupied Bandwidth	3%
5	RF Conducted Power	0.6dB
6	RF Power Density	2.9dB
7	Conducted Spurious Emissions	0.75dB
8	RF Radiated Power	5.2dB (Below 1GHz) 5.9dB (Above 1GHz)
9	Radiated Spurious Emission Test	4.2dB (Below 30MHz) 4.5dB (30MHz-1GHz) 5.1dB (1GHz-18GHz) 5.4dB (Above 18GHz)
10	Temperature Test	1°C
11	Humidity Test	3%
12	Supply Voltages	1.5%
13	Time	3%

Note: The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

4.6 Test Location

SGS-CSTC Standards Technical Services (Suzhou) Co., Ltd.

South of No. 6 Plant, No. 1, Runsheng Road, Suzhou Industrial Park, Suzhou Area, China (Jiangsu)

Pilot Free Trade Zone

Note:

1. SGS is not responsible for wrong test results due to incorrect information (e.g., max. internal working frequency, antenna gain, cable loss, etc) is provided by the applicant. (If applicable).
2. SGS is not responsible for the authenticity, integrity and the validity of the conclusion based on results of the data provided by applicant. (If applicable).
3. Sample source: sent by customer.

4.7 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **A2LA (Certificate No. 6336.01)**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 6336.01.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0120.

IC#: 27594.

- **FCC –Designation Number: CN1312**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized as an accredited testing laboratory.

Designation Number: CN1312.

Test Firm Registration Number: 717327

4.8 Deviation from Standards

None

4.9 Abnormalities from Standard Conditions

None

5 Equipment List

9*6*6 Test Equipment					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Semi-Anechoic Chamber	Brilliant-emc	N/A	SUWI-04-02-02	25/11/2024	24/11/2027
Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-13	2/8/2024	2/7/2025
Signal Analyzer	ROHDE&SCHWARZ	FSW43	SUWI-01-02-04	5/8/2024	5/7/2025
Signal Analyzer	KEYSIGHT	N9020A	SUWI-01-02-06	11/21/2024	11/20/2025
Test receiver	ROHDE&SCHWARZ	ESR7	SUWI-01-10-01	2/1/2024	1/31/2025
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	VULB 9168	SUWI-01-11-04	11/24/2024	11/23/2025
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	BBHA 9120D	SUWI-01-11-05	11/24/2024	11/23/2025
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	BBHA 9170	SUWI-01-11-03	5/12/2023	5/11/2025
Active Loop Antenna	SCHWRZBECK MESS-ELEKTRONIK	FMZB 1519B	SUWI-01-21-01	5/13/2023	5/12/2025
Amplifier	Tonscend	TAP9K3G32	SUWI-01-14-06	11/19/2024	11/24/2025
Amplifier	Tonscend	TAP01018050	SUWI-01-14-04	11/19/2024	11/24/2025
Amplifier	Tonscend	TAP30M7G30	SUWI-01-14-05	11/19/2024	11/24/2025
Measurement Software	Tonscend	JS32-RE	SUWI-02-09-04	NCR	NCR
Measurement Software		V4.0.0.0			
Measurement Software	Tonscend	JS32-RSE	SUWI-02-09-06	NCR	NCR
Measurement Software		4.0.0.1			

Conduction Test Equipment					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Test receiver	ROHDE&SCHWARZ	ESR7	SUWI-01-10-01	2/1/2024	1/31/2025
Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-06	2/8/2024	2/7/2025
Artificial network	ROHDE&SCHWARZ	ENV216	SUWI-01-19-03	2/4/2024	2/3/2025
Artificial network	ROHDE&SCHWARZ	ENV216	SUWI-01-19-04	2/4/2024	2/3/2025
Measurement Software	Tonscend	JS32-CE	SUWI-02-09-05	NCR	NCR

6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)

6.1.2 Conclusion

Standard Requirement:

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, 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.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

The antenna is Dipole Antenna and no consideration of replacement. The best case gain of the antenna is 2.28dBi.

Antenna location: Refer to External photo.

7 Radio Spectrum Matter Test Results

7.1 Conducted Emissions at AC Power Line (150kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.207

Test Method: ANSI C63.10 (2013) Section 6.2

Limit:

Frequency of emission(MHz)	Conducted limit(dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

Detector: Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz

7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 22.3 °C

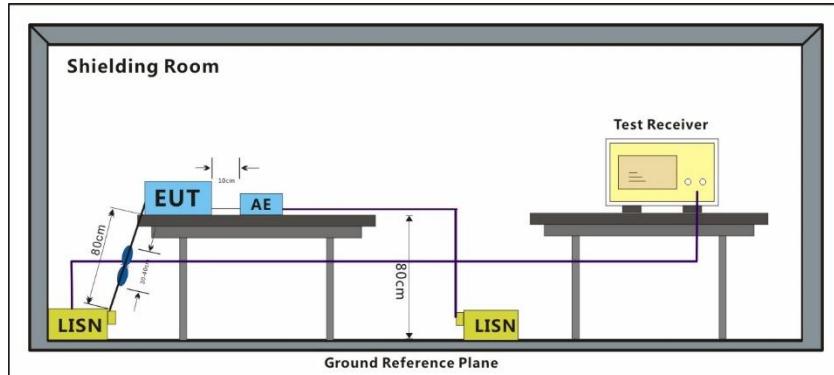
Humidity: 46.8 % RH

Atmospheric Pressure: 1010 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	06	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	07	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

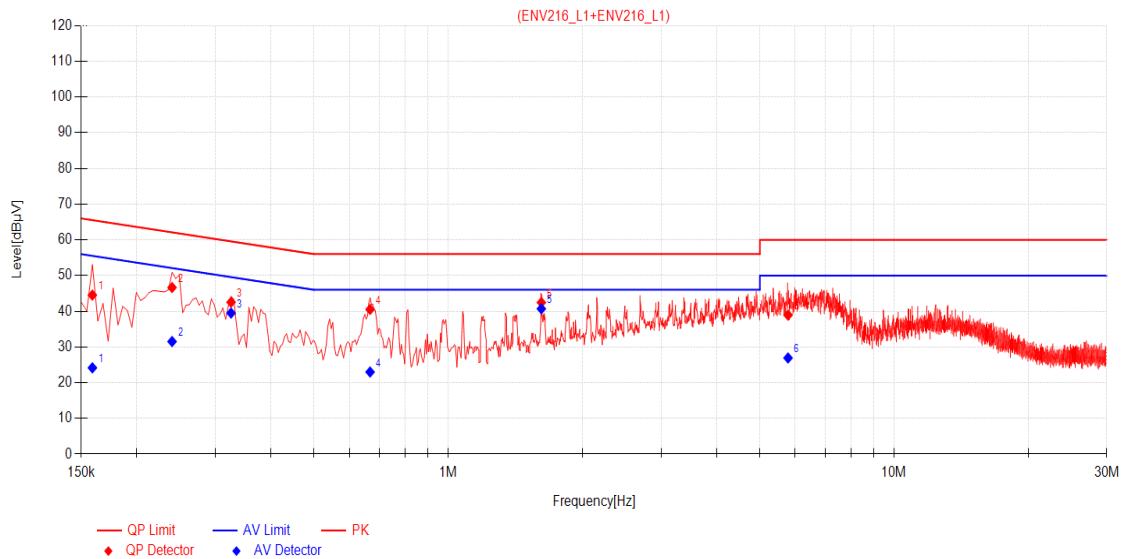
7.1.3 Test Setup Diagram



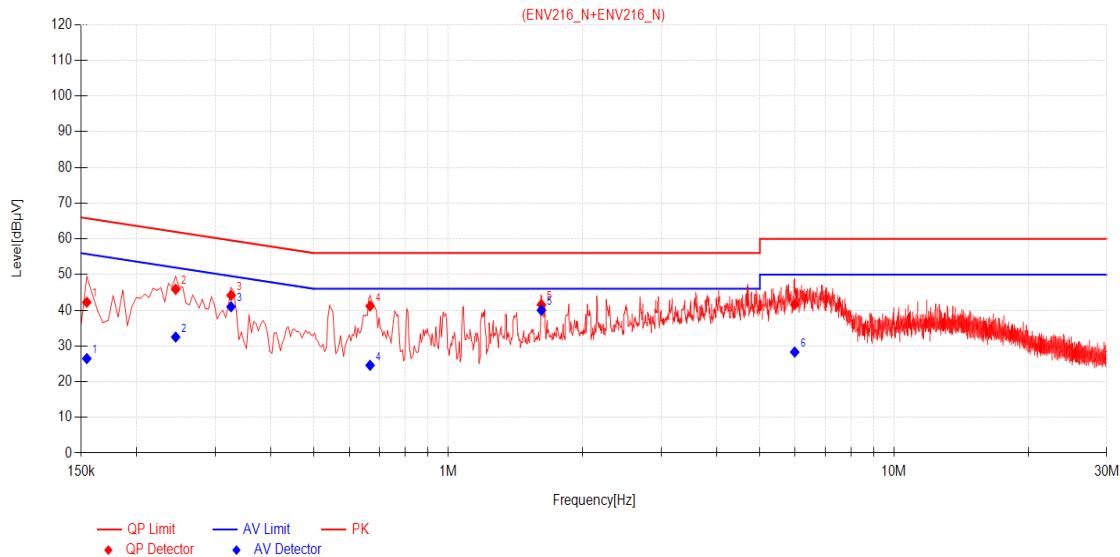
7.1.4 Measurement Procedure and Data

- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50 μ H + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane.
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
- 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

Remark: Level=Read Level+ Cable Loss+ LISN Factor



Final Data List											
NO	Frequency [MHz]	Factor [dB]	QP Reading	QP Value [dBuV]	QP Limit [dBuV]	QP Margin [dB]	AV Reading	AV Value [dBuV]	AV Limit [dBuV]	AV Margin [dB]	Verdict
1	0.1590	10.20	34.33	44.53	65.52	20.99	13.96	24.16	55.52	31.36	PASS
2	0.2400	10.16	36.48	46.64	62.10	15.46	21.36	31.52	52.10	20.58	PASS
3	0.3255	10.16	32.38	42.54	59.57	17.03	29.33	39.49	49.57	10.08	PASS
4	0.6675	10.21	30.31	40.52	56.00	15.48	12.78	22.99	46.00	23.01	PASS
5	1.6170	10.08	32.37	42.45	56.00	13.55	30.62	40.70	46.00	5.30	PASS
6	5.7840	10.09	28.84	38.93	60.00	21.07	16.83	26.92	50.00	23.08	PASS



Final Data List											
NO	Frequency [MHz]	Factor [dB]	QP Reading	QP Value [dBuV]	QP Limit [dBuV]	QP Margin [dB]	AV Reading	AV Value [dBuV]	AV Limit [dBuV]	AV Margin [dB]	Verdict
1	0.1545	10.20	32.04	42.24	65.75	23.51	16.27	26.47	55.75	29.28	PASS
2	0.2445	10.16	35.70	45.86	61.94	16.08	22.33	32.49	51.94	19.45	PASS
3	0.3255	10.16	34.02	44.18	59.57	15.39	30.83	40.99	49.57	8.58	PASS
4	0.6675	10.22	30.95	41.17	56.00	14.83	14.36	24.58	46.00	21.42	PASS
5	1.6170	10.13	31.45	41.58	56.00	14.42	29.86	39.99	46.00	6.01	PASS
6	5.9865	10.10	31.50	41.60	60.00	18.40	18.19	28.29	50.00	21.71	PASS

7.2 Radiated Emissions which fall in the restricted bands

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

Test Method: ANSI C63.10 (2013) Section 6.10.5

Measurement Distance: 3M

Limit:

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

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

7.2.1 E.U.T. Operation

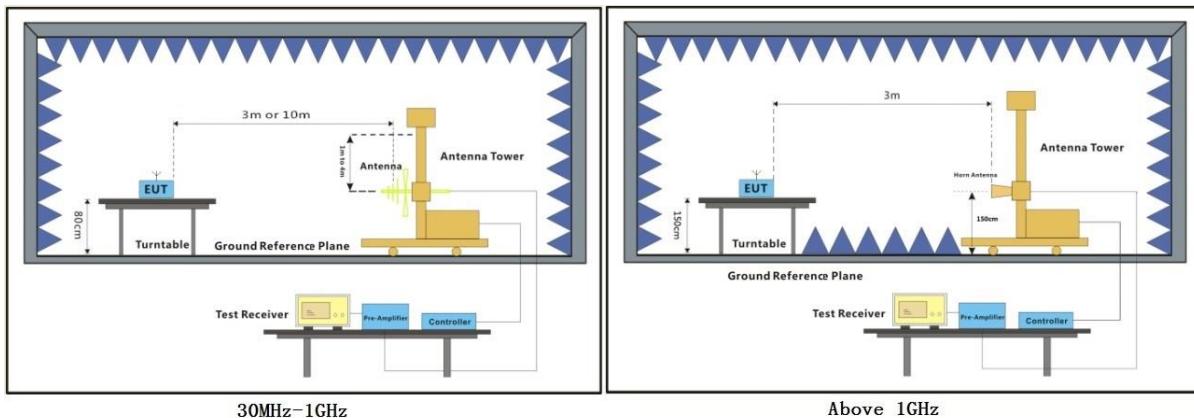
Operating Environment:

Temperature: 22.5 °C Humidity: 47.6 % RH Atmospheric Pressure: 1010 mbar

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	06	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	07	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.2.3 Test Setup Diagram



7.2.4 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna 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.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

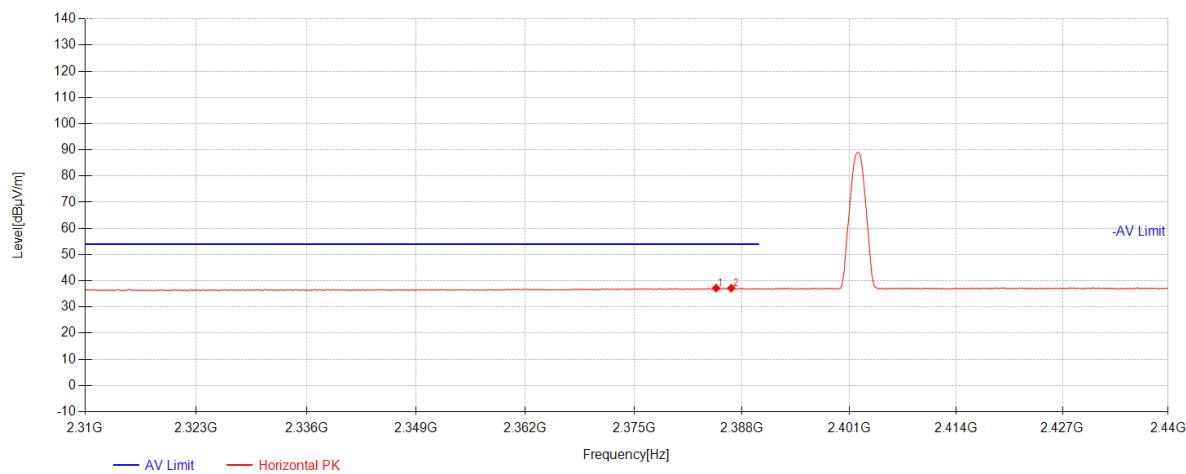
Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

Remark 3: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for Peak detection (PK) and Average detection (AV) at frequency above 1GHz.

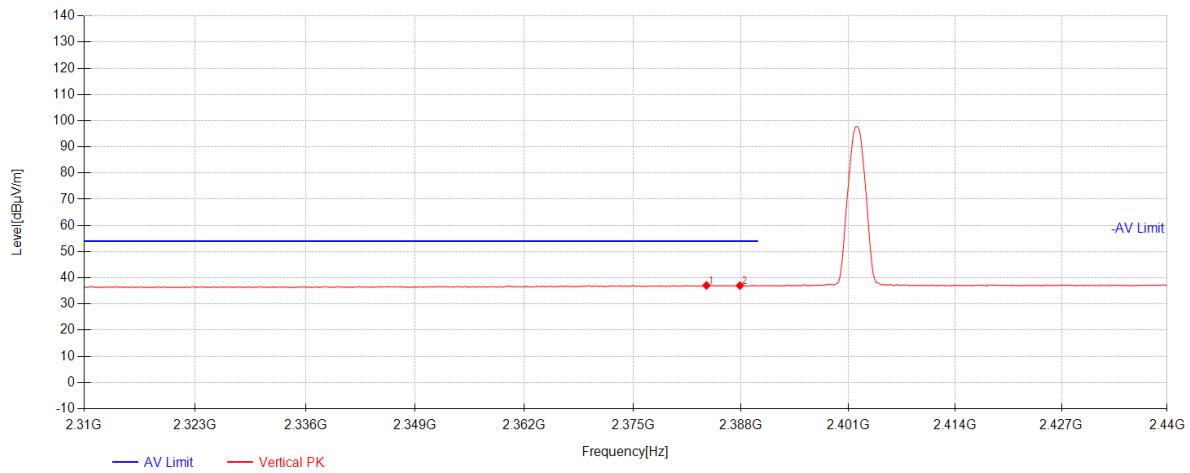
Remark 4: For fundamental and harmonic signal measurement, the resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle $< 98\%$) or 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.

BLE 1M_Channel 00



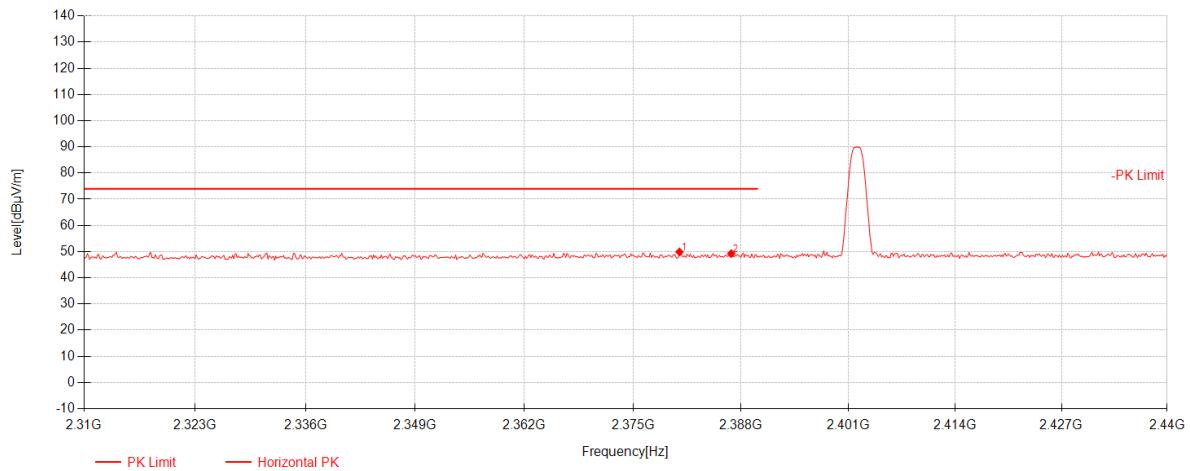
Data List								
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	2384.88	33.80	26.97	-23.57	37.20	54.00	16.80	Horizontal
2	2386.7	33.78	26.97	-23.57	37.18	54.00	16.82	Horizontal

BLE 1M_Channel 00



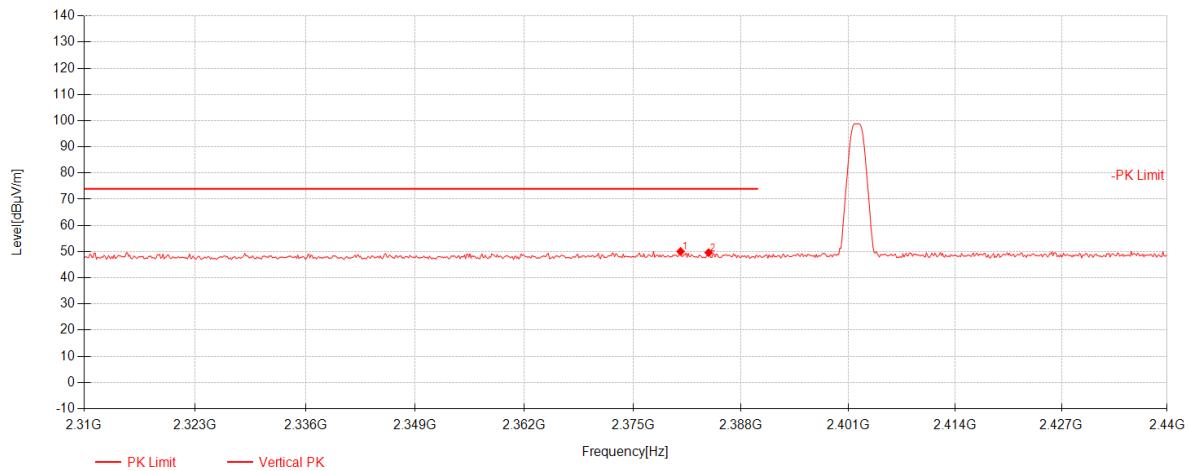
Data List								
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	2383.84	33.67	26.97	-23.57	37.07	54.00	16.93	Vertical
2	2387.87	33.60	26.98	-23.57	37.00	54.00	17.00	Vertical

BLE 1M_Channel 00



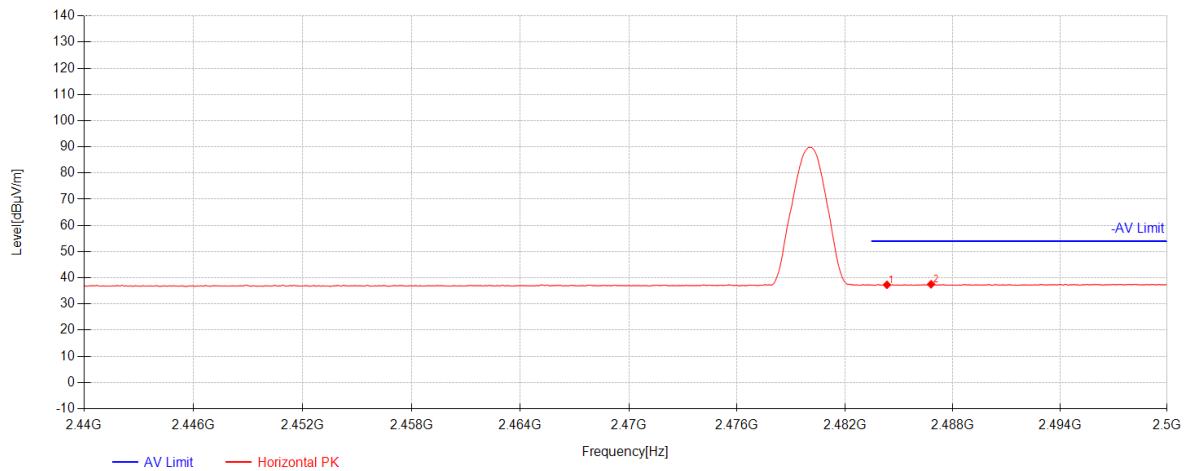
Data List								
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	2380.59	46.48	26.96	-23.57	49.87	74.00	24.13	Horizontal
2	2386.83	45.85	26.97	-23.57	49.25	74.00	24.75	Horizontal

BLE 1M_Channel 00



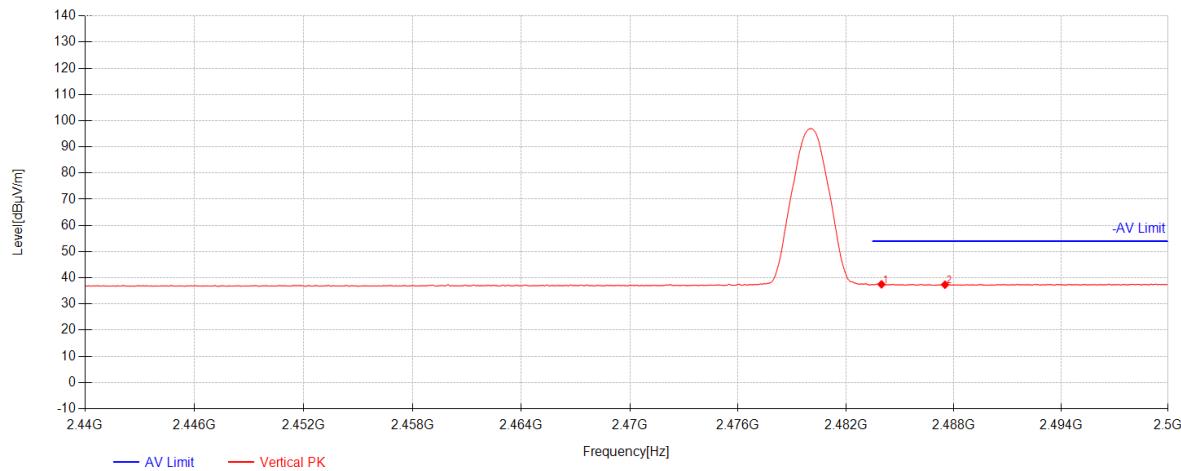
Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2380.72	46.67	26.96	-23.57	50.06	74.00	23.94	Vertical
2	2384.1	46.20	26.97	-23.57	49.60	74.00	24.40	Vertical

BLE 1M_Channel 39



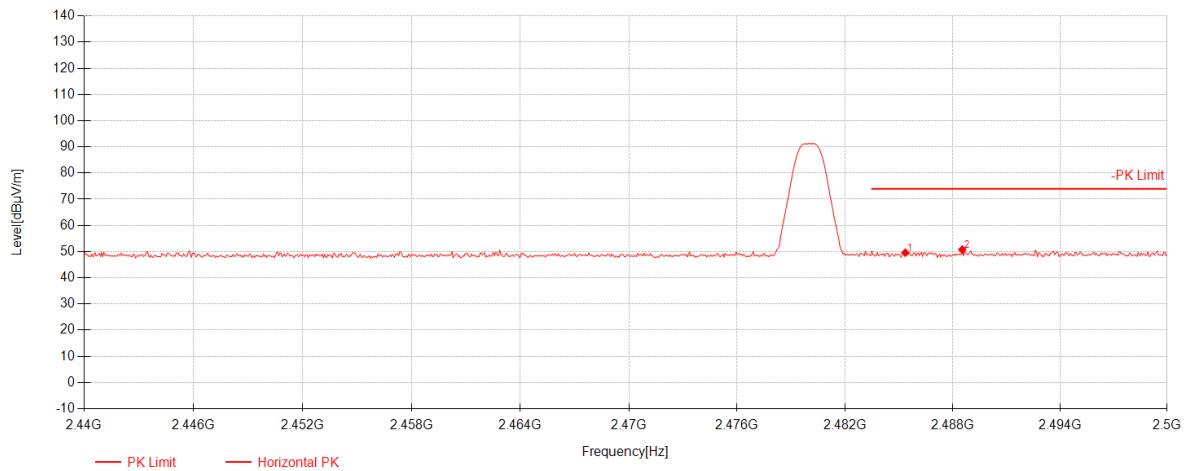
Data List								
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	2484.34	33.70	27.17	-23.54	37.32	54.00	16.68	Horizontal
2	2486.8	33.89	27.17	-23.54	37.52	54.00	16.48	Horizontal

BLE 1M_Channel 39



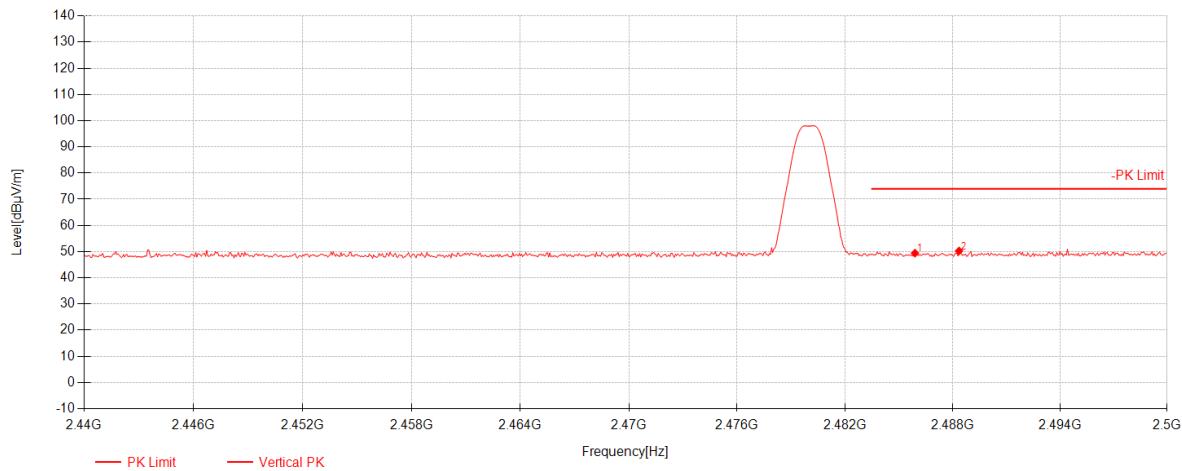
Data List								
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	2483.98	33.87	27.17	-23.54	37.49	54.00	16.51	Vertical
2	2487.52	33.72	27.18	-23.54	37.35	54.00	16.65	Vertical

BLE 1M_Channel 39



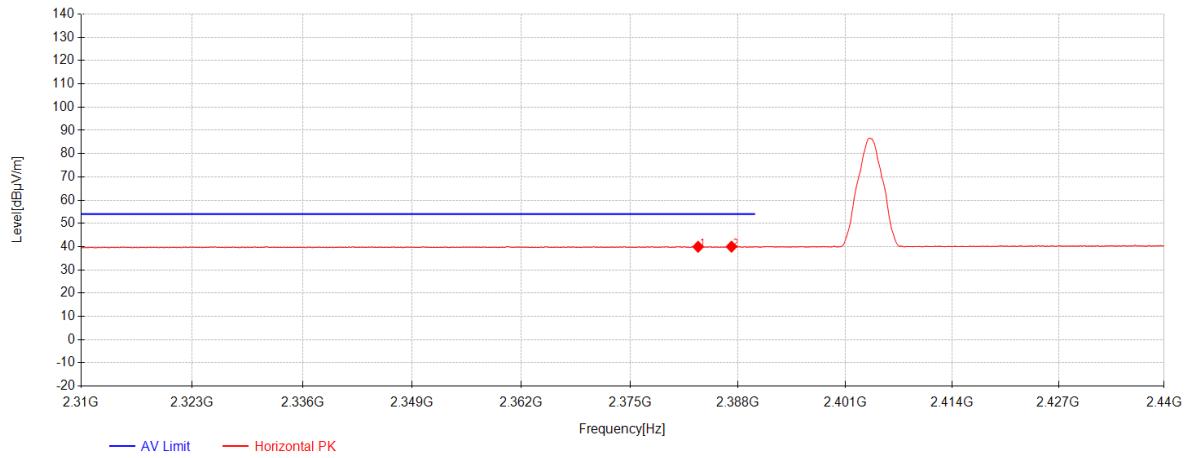
Data List								
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	2485.36	45.96	27.17	-23.54	49.59	74.00	24.41	Horizontal
2	2488.54	47.16	27.18	-23.54	50.79	74.00	23.21	Horizontal

BLE 1M_Channel 39



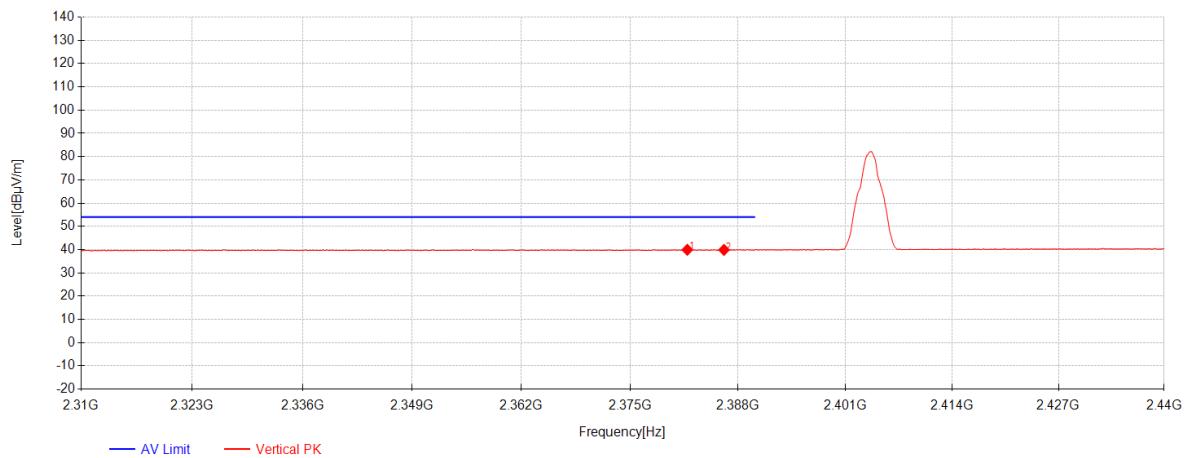
Data List								
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	2485.9	45.78	27.17	-23.54	49.41	74.00	24.59	Vertical
2	2488.36	46.62	27.18	-23.54	50.25	74.00	23.75	Vertical

BLE 2M_Channel 01



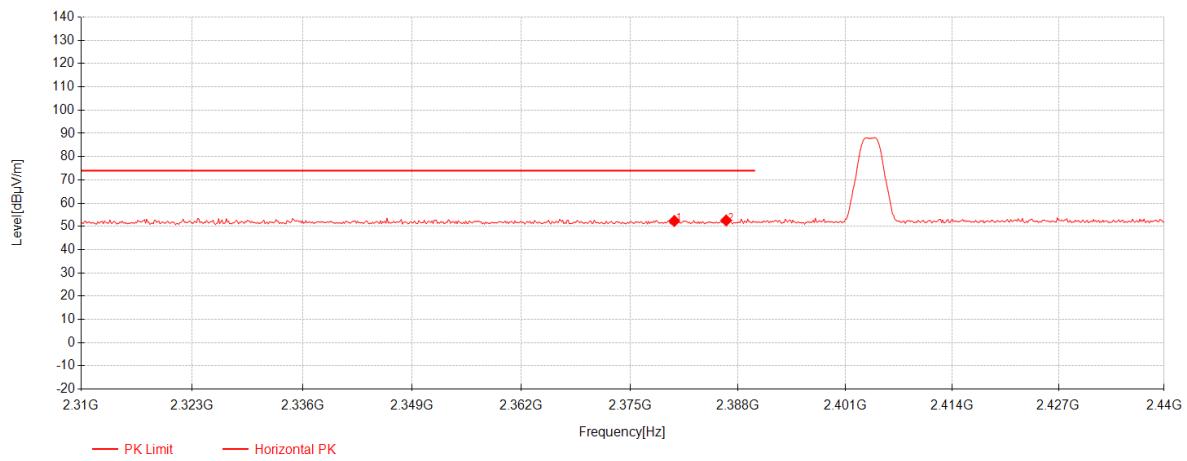
Data List								
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	2383.19	36.12	27.14	-23.31	39.95	54.00	14.05	Horizontal
2	2387.22	36.15	27.15	-23.31	39.99	54.00	14.01	Horizontal

BLE 2M_Channel 01



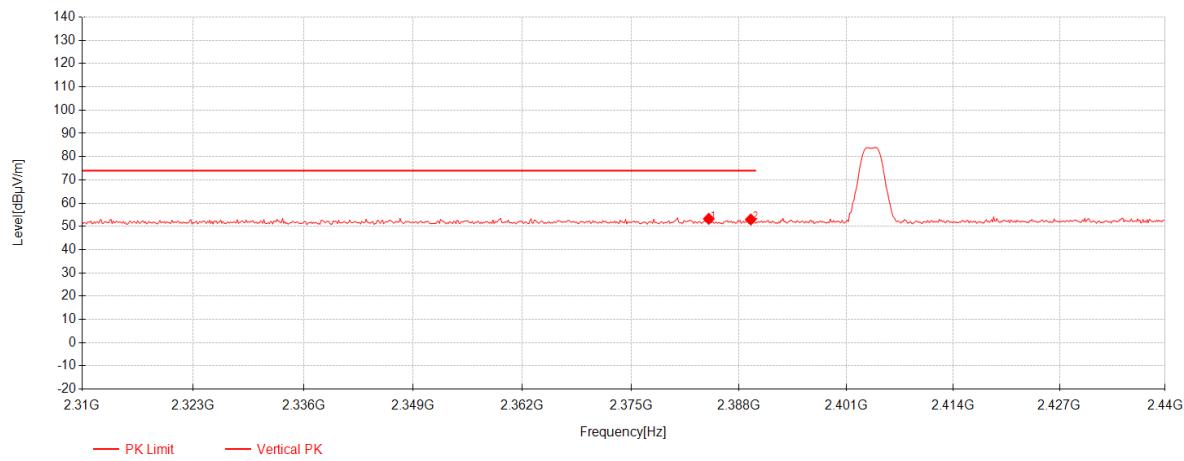
Data List								
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	2381.89	36.12	27.14	-23.31	39.95	54.00	14.05	Vertical
2	2386.31	36.06	27.15	-23.31	39.90	54.00	14.10	Vertical

BLE 2M_Channel 01



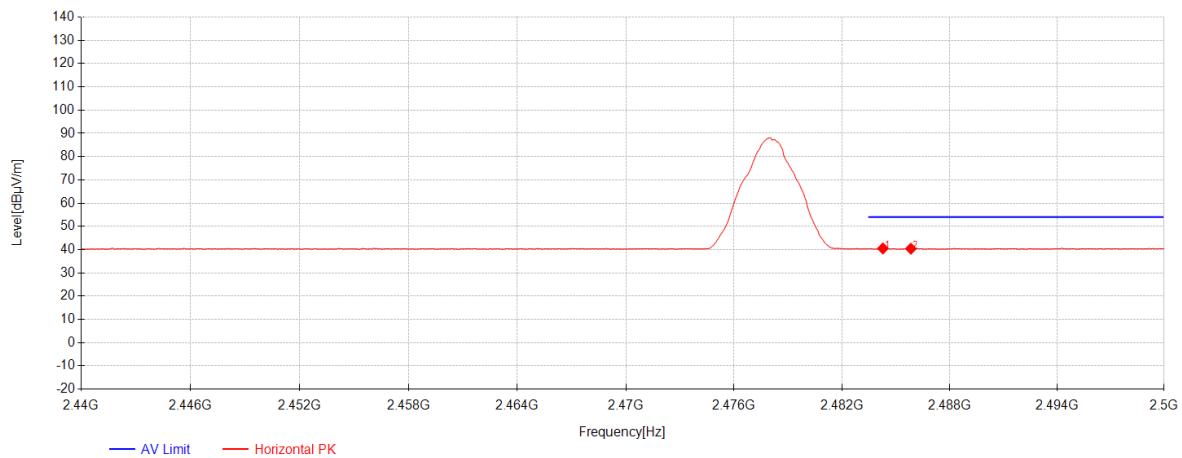
Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2380.33	48.50	27.14	-23.31	52.33	74.00	21.67	Horizontal
2	2386.57	48.72	27.15	-23.31	52.56	74.00	21.44	Horizontal

BLE 2M_Channel 01



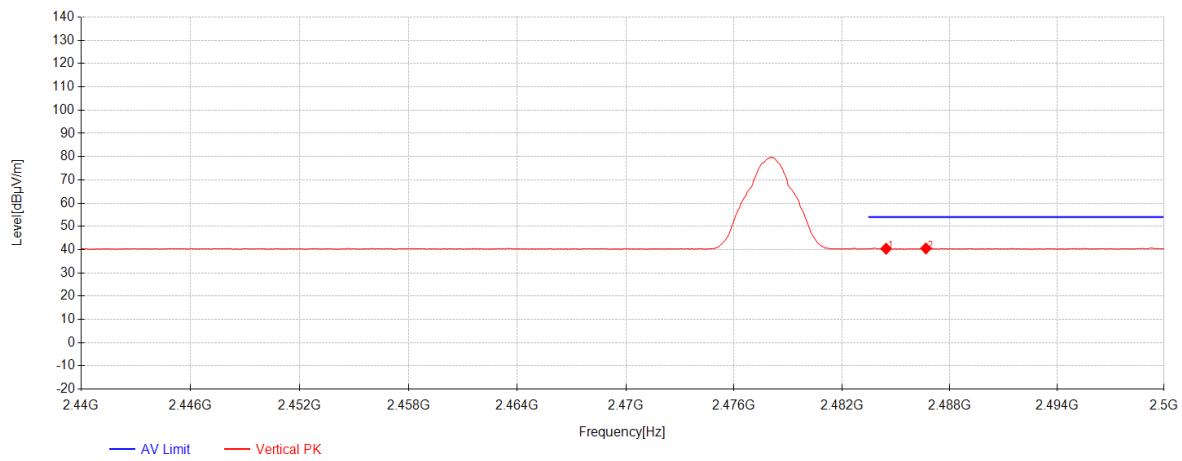
Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2384.36	49.42	27.15	-23.31	53.26	74.00	20.74	Vertical
2	2389.43	49.13	27.16	-23.31	52.97	74.00	21.03	Vertical

BLE 2M_Channel 38



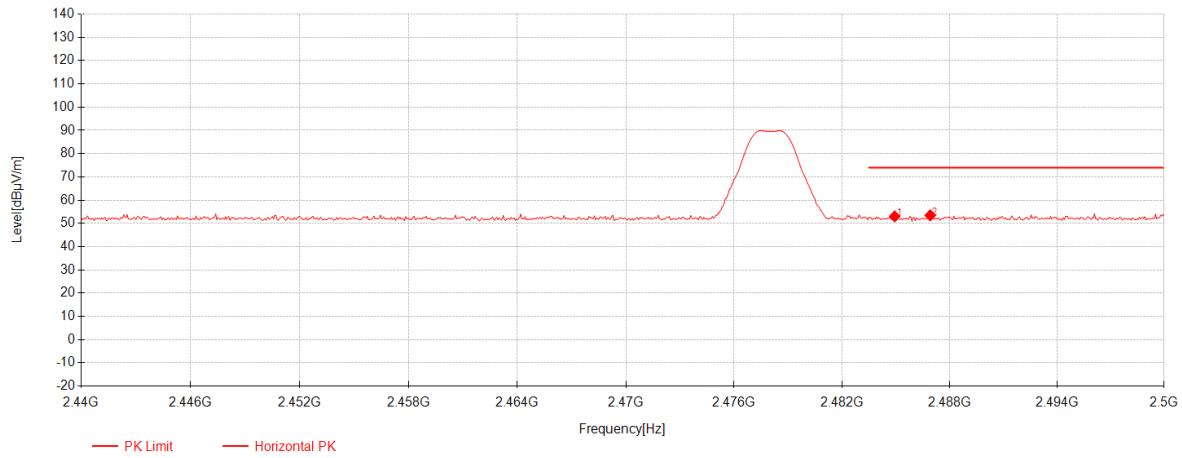
Data List								
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	2484.28	36.41	27.37	-23.27	40.51	54.00	13.49	Horizontal
2	2485.84	36.30	27.37	-23.27	40.40	54.00	13.60	Horizontal

BLE 2M_Channel 38



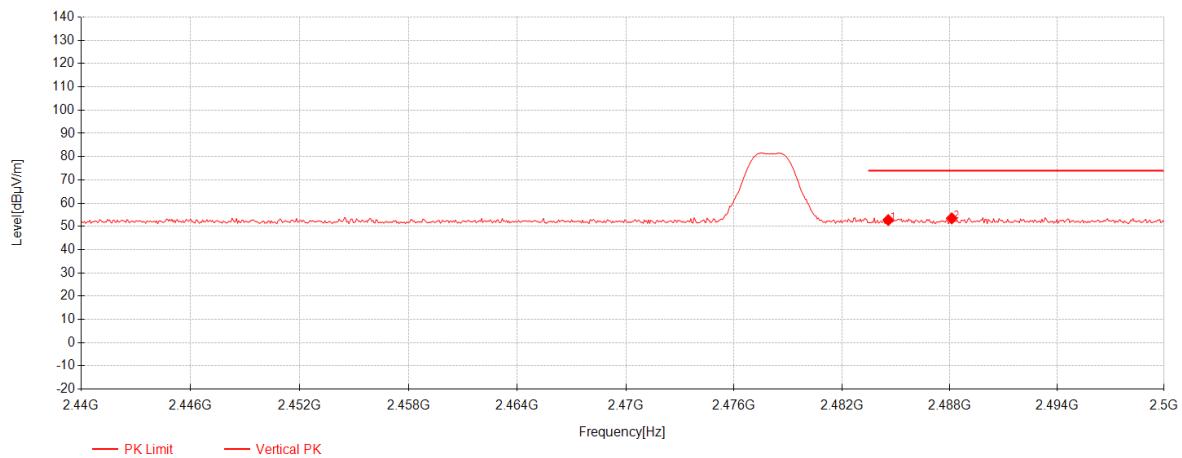
Data List								
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	2484.46	36.30	27.37	-23.27	40.40	54.00	13.60	Vertical
2	2486.68	36.41	27.37	-23.27	40.51	54.00	13.49	Vertical

BLE 2M_Channel 39



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2484.94	48.92	27.37	-23.27	53.02	74.00	20.98	Horizontal
2	2486.92	49.35	27.37	-23.27	53.45	74.00	20.55	Horizontal

BLE 2M_Channel 39



Data List								
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	2484.58	48.62	27.37	-23.27	52.72	74.00	21.28	Vertical
2	2488.12	49.34	27.37	-23.27	53.45	74.00	20.55	Vertical

7.3 Radiated Spurious Emissions Below 1GHz

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

Test Method: ANSI C63.10 (2013) Section 6.4,6.5

Measurement Distance: 3M

Limit:

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
960-1000	500	3

7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 22.2 °C

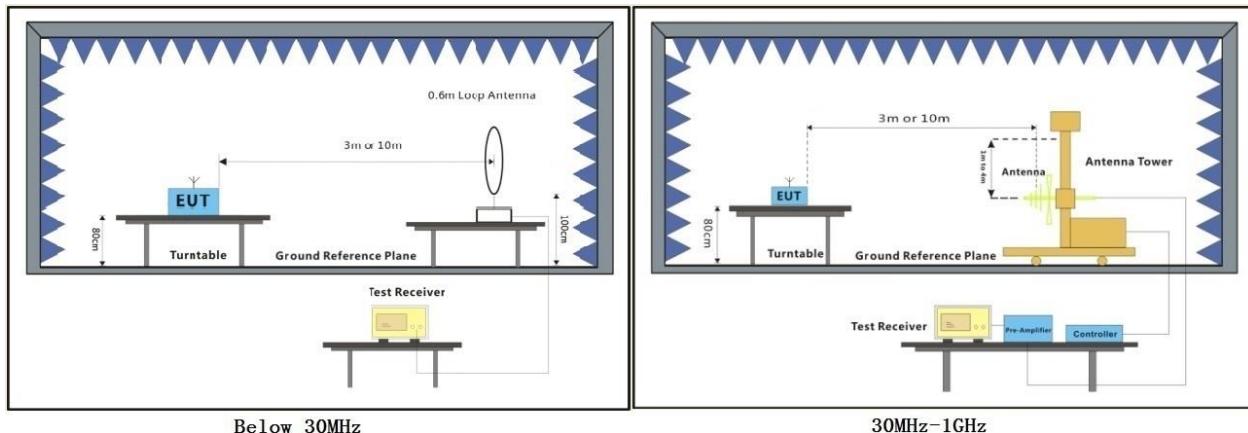
Humidity: 48.1 % RH

Atmospheric Pressure: 1010 mbar

7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	06	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.3.3 Test Setup Diagram



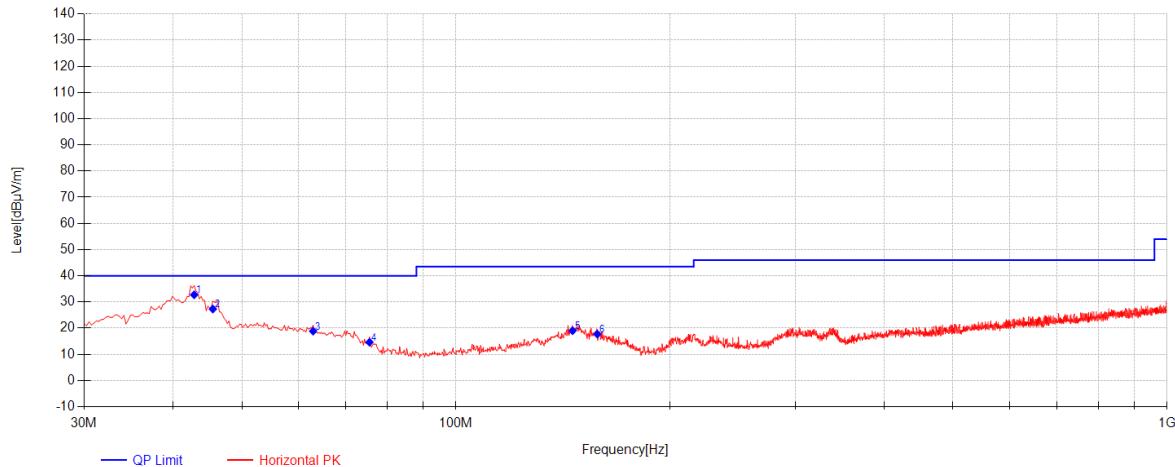
7.3.4 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna 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 was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using quasi-peak method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- i. Repeat above procedures until all frequencies measured was complete.

Remark:

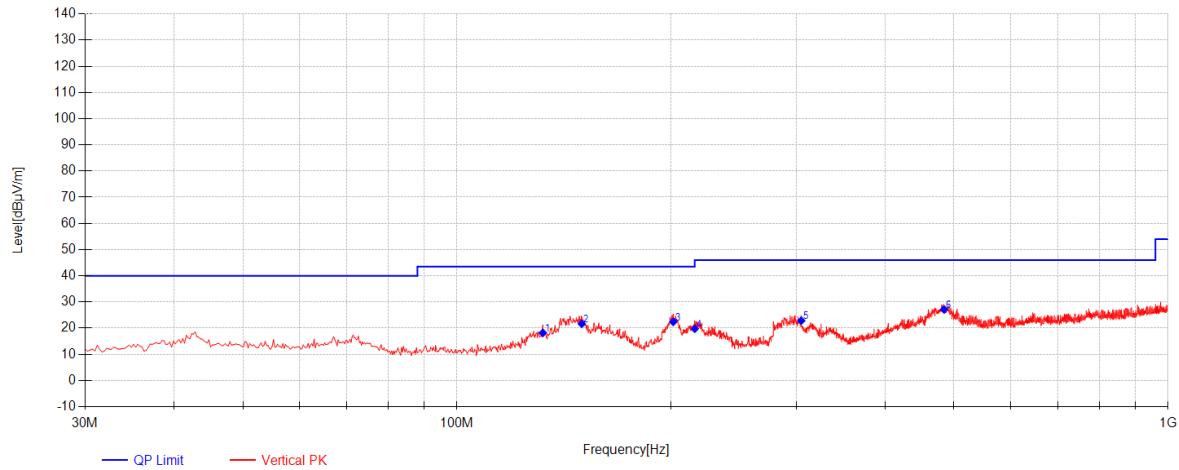
1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
2. Scan from 9kHz to 30MHz, the disturbance below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

BLE 1M_Channel 19 WORSE



Final Data List								
NO.	Frequency [MHz]	Reading [dBμV]	Factor [dB]	AF [dB/m]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Polarity
1	42.8525	56.14	-42.21	18.79	32.72	40.00	7.28	Horizontal
2	45.52	50.47	-42.19	19.00	27.29	40.00	12.71	Horizontal
3	62.98	43.20	-41.94	17.60	18.85	40.00	21.15	Horizontal
4	75.59	41.01	-41.72	15.32	14.61	40.00	25.39	Horizontal
5	145.915	40.80	-40.84	19.05	19.01	43.50	24.49	Horizontal
6	158.04	39.32	-40.70	19.09	17.71	43.50	25.79	Horizontal

BLE 1M_Channel 19 WORSE



Final Data List								
NO.	Frequency [MHz]	Reading [dB μ V]	Factor [dB]	AF [dB/m]	QP Value [dB μ V/m]	QP Limit [dB μ V/m]	QP Margin [dB]	Polarity
1	132.0925	41.32	-41.24	18.11	18.19	43.50	25.31	Vertical
2	149.795	43.30	-40.73	19.06	21.63	43.50	21.87	Vertical
3	201.4475	47.60	-40.63	15.41	22.39	43.50	21.11	Vertical
4	215.9975	44.73	-40.61	15.64	19.76	43.50	23.74	Vertical
5	304.995	44.11	-39.85	18.60	22.86	46.00	23.14	Vertical
6	484.2025	43.79	-38.46	21.82	27.15	46.00	18.85	Vertical

7.4 Radiated Spurious Emissions Above 1GHz

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

Test Method: ANSI C63.10 (2013) Section 6.6

Measurement Distance: 3M

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
Above 1000	500	3

7.4.1 E.U.T. Operation

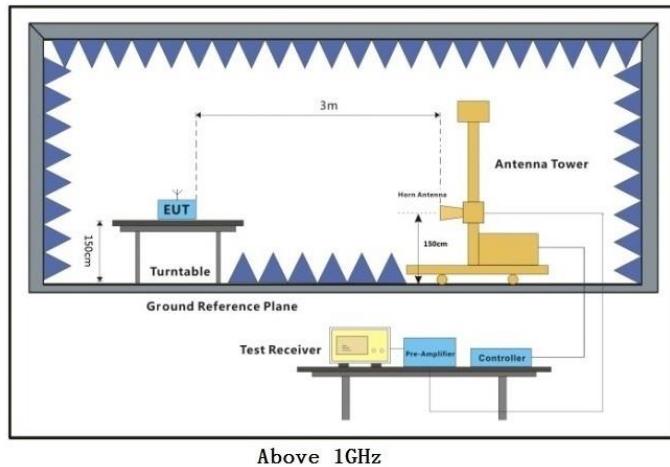
Operating Environment:

Temperature: 22.2 °C Humidity: 48.1 % RH Atmospheric Pressure: 1010 mbar

7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	06	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.4.3 Test Setup Diagram



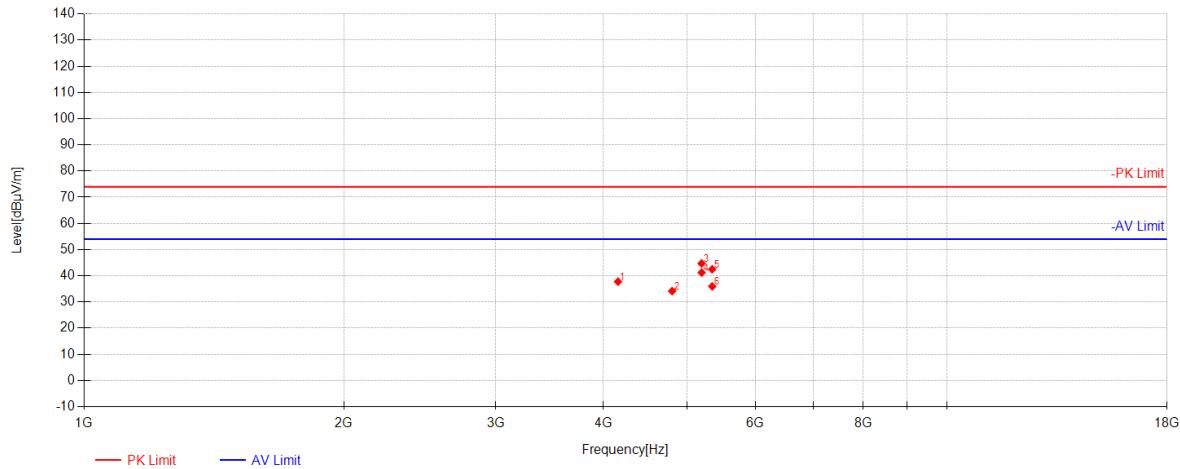
7.4.4 Measurement Procedure and Data

- a. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna 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 was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak or average method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- i. Repeat above procedures until all frequencies measured was complete.

Remark:

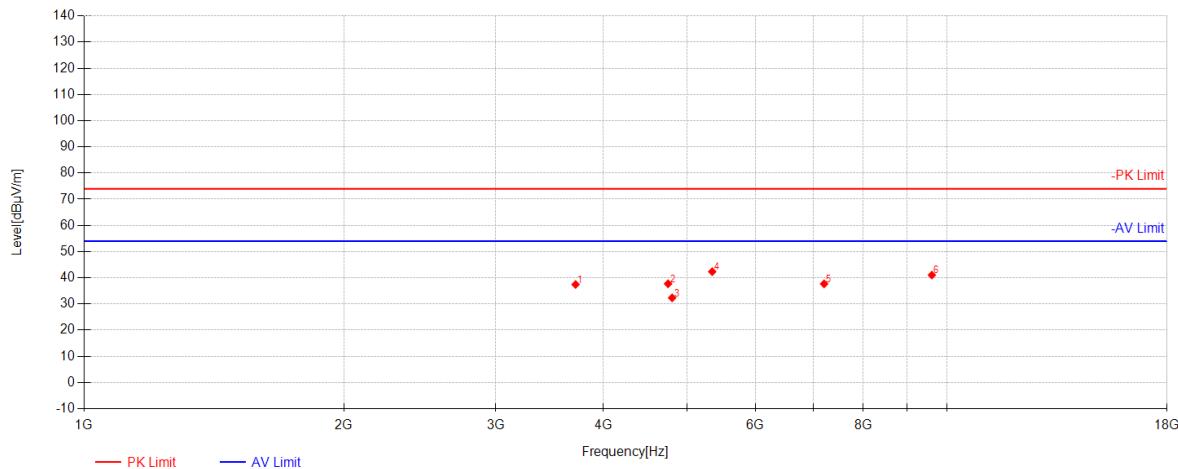
1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
2. Scan from 1GHz to 25GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.
- 4: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for Peak detection (PK) and Average detection (AV) at frequency above 1GHz.
- 5:For fundamental and harmonic signal measurement, the resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle $< 98\%$) or 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.

BLE 1M_Channel 00



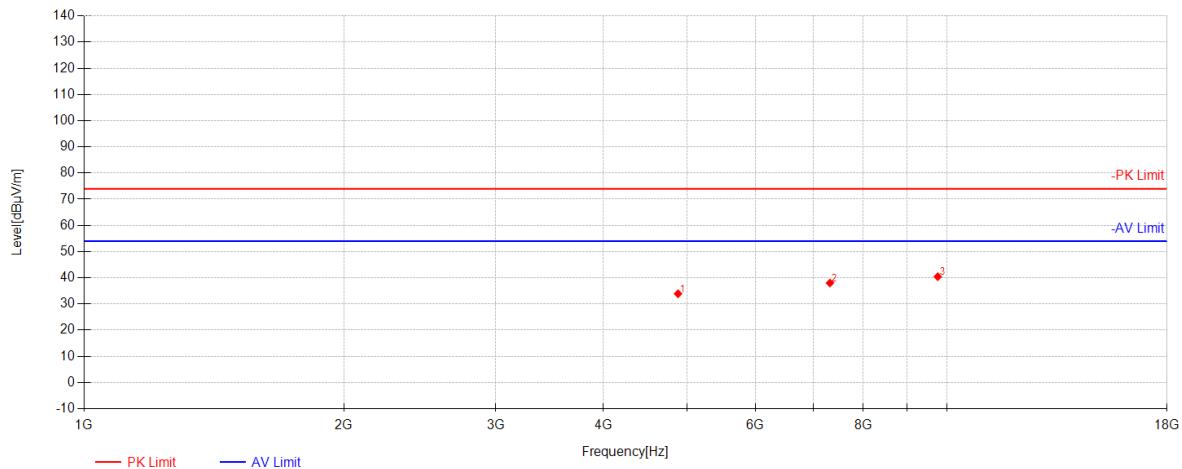
Data List									
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity	
1	4158	53.76	29.78	-45.77	37.77	74.00	36.23	Horizontal	
2	4804.0000	48.59	31.09	-45.54	34.14	74.00	39.86	Horizontal	
3	5197.5	58.24	31.76	-45.28	44.71	74.00	29.29	Horizontal	
4	5197.875	54.76	31.76	-45.28	41.23	54.00	12.77	Horizontal	
5	5346	55.64	32.02	-45.19	42.48	74.00	31.52	Horizontal	
6	5346.375	49.10	32.02	-45.19	35.94	54.00	18.06	Horizontal	

BLE 1M_Channel 00



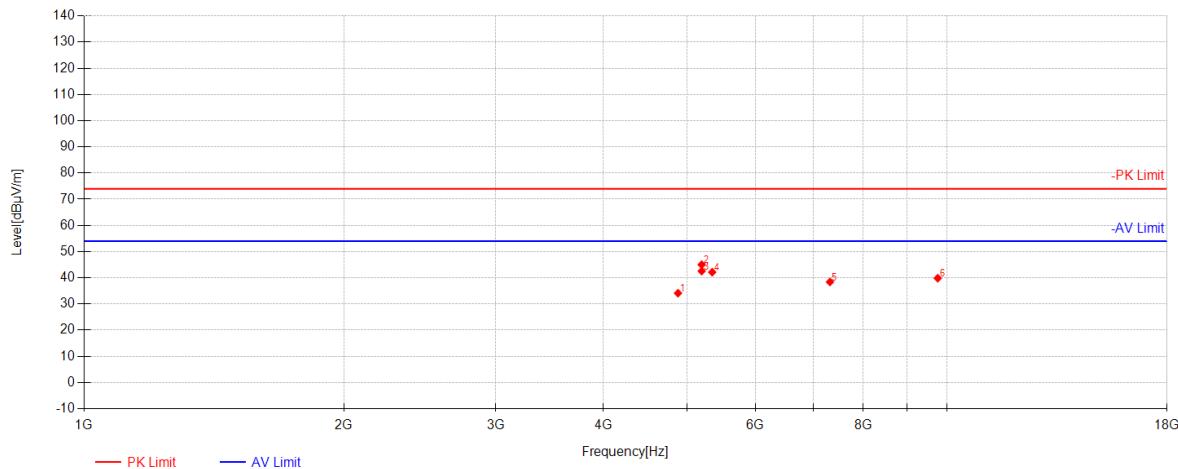
Data List									
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity	
1	3712.5	54.06	28.94	-45.55	37.45	74.00	36.55	Vertical	
2	4752	52.28	31.00	-45.57	37.71	74.00	36.29	Vertical	
3	4804.0000	46.80	31.09	-45.54	32.35	74.00	41.65	Vertical	
4	5346	55.50	32.02	-45.19	42.34	74.00	31.66	Vertical	
5	7206.0000	45.54	35.58	-43.44	37.68	74.00	36.32	Vertical	
6	9608.0000	42.97	37.72	-39.65	41.04	74.00	32.96	Vertical	

BLE 1M_Channel 19



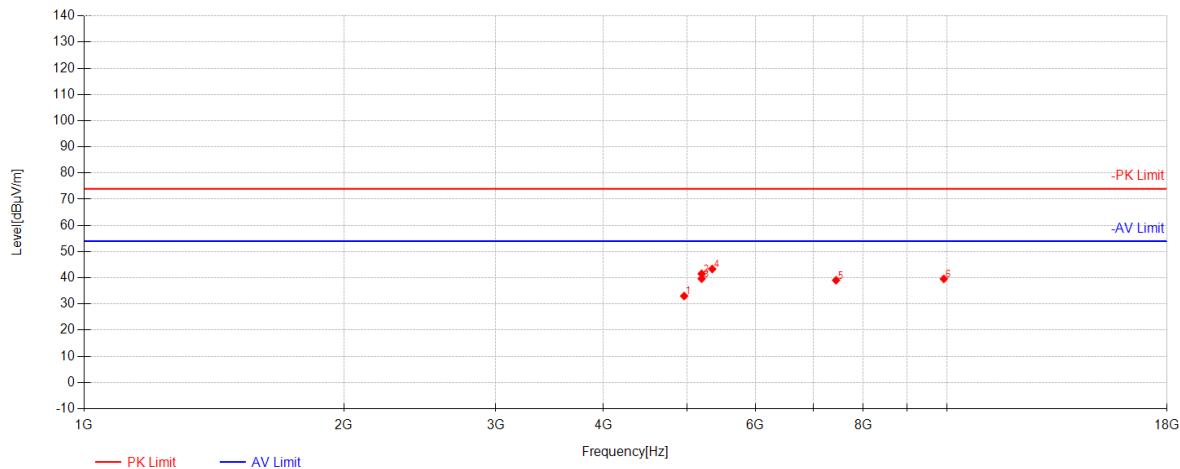
Data List									
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity	
1	4880.0000	48.23	31.21	-45.53	33.91	74.00	40.09	Horizontal	
2	7320.0000	45.80	35.90	-43.68	38.01	74.00	35.99	Horizontal	
3	9760.0000	41.86	38.02	-39.46	40.42	74.00	33.58	Horizontal	

BLE 1M_Channel 19



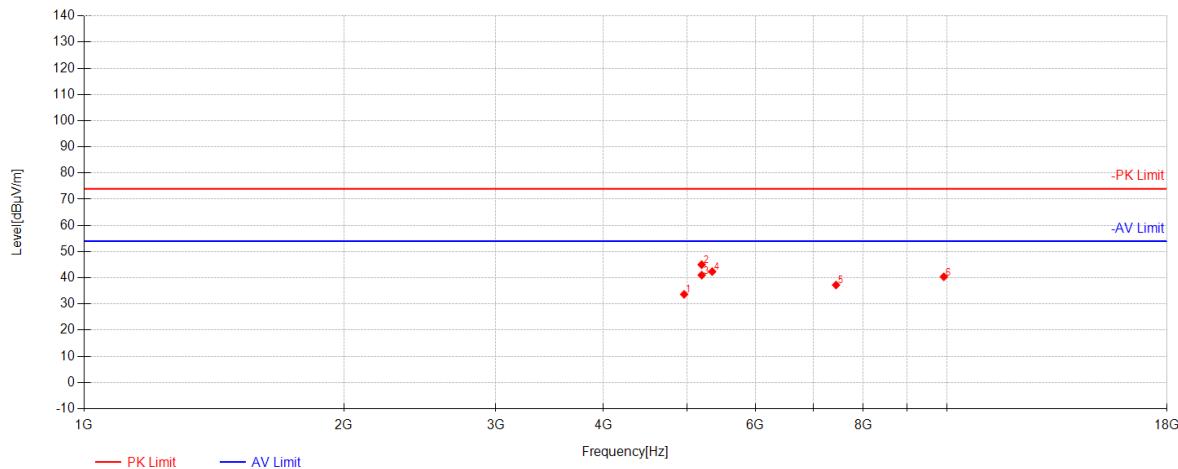
Data List									
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity	
1	4880.0000	48.44	31.21	-45.53	34.12	74.00	39.88	Vertical	
2	5197.5	58.54	31.76	-45.28	45.01	74.00	28.99	Vertical	
3	5197.875	56.08	31.76	-45.28	42.55	54.00	11.45	Vertical	
4	5346	55.31	32.02	-45.19	42.15	74.00	31.85	Vertical	
5	7320.0000	46.19	35.90	-43.68	38.40	74.00	35.60	Vertical	
6	9760.0000	41.28	38.02	-39.46	39.84	74.00	34.16	Vertical	

BLE 1M_Channel 39



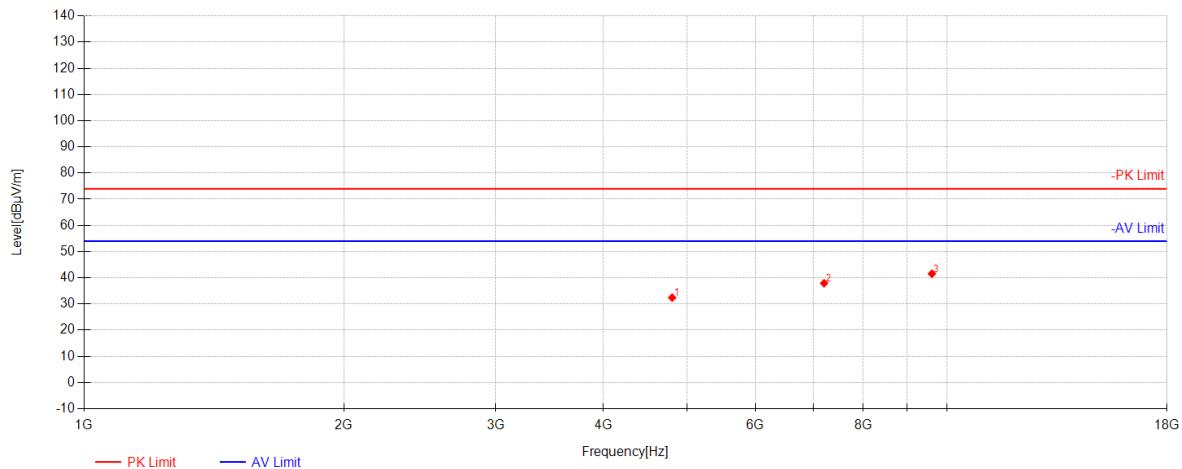
Data List									
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity	
1	4960.0000	47.30	31.34	-45.60	33.04	74.00	40.96	Horizontal	
2	5197.5	55.04	31.76	-45.28	41.51	74.00	32.49	Horizontal	
3	5197.875	53.19	31.76	-45.28	39.66	54.00	14.34	Horizontal	
4	5346.375	56.51	32.02	-45.19	43.35	74.00	30.65	Horizontal	
5	7440.0000	46.10	36.23	-43.30	39.03	74.00	34.97	Horizontal	
6	9920.0000	40.55	38.34	-39.31	39.58	74.00	34.42	Horizontal	

BLE 1M_Channel 39



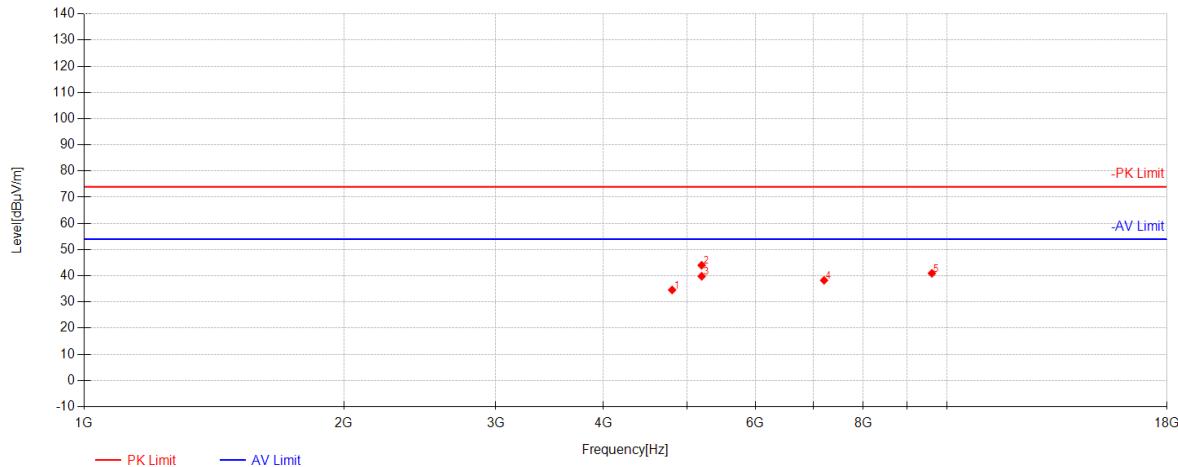
Data List									
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity	
1	4960.0000	47.93	31.34	-45.60	33.67	74.00	40.33	Vertical	
2	5197.875	58.54	31.76	-45.28	45.01	74.00	28.99	Vertical	
3	5198.25	54.53	31.76	-45.28	41.01	54.00	12.99	Vertical	
4	5346	55.52	32.02	-45.19	42.36	74.00	31.64	Vertical	
5	7440.0000	44.30	36.23	-43.30	37.23	74.00	36.77	Vertical	
6	9920.0000	41.34	38.34	-39.31	40.37	74.00	33.63	Vertical	

BLE 2M_Channel 01



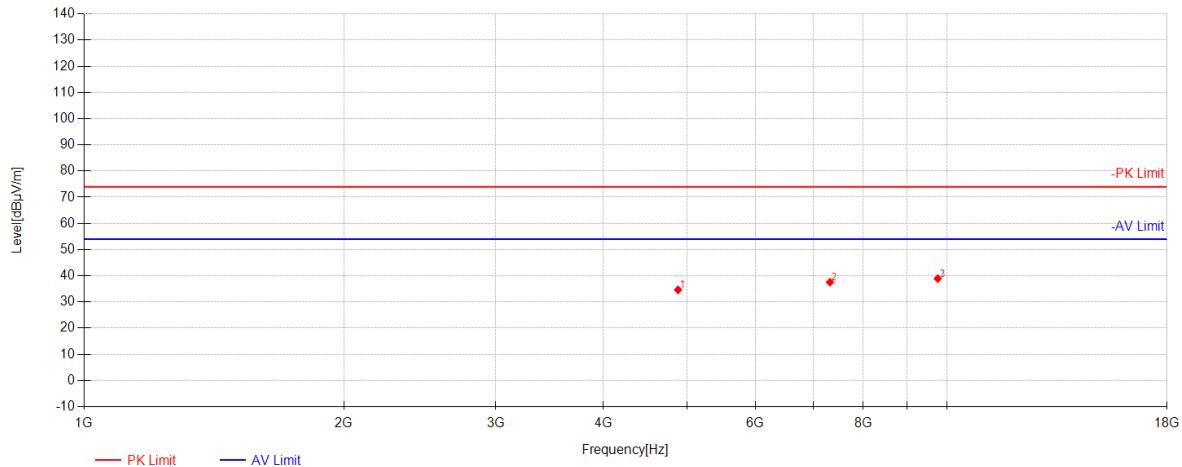
Data List									
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity	
1	4804.0000	46.87	31.09	-45.54	32.42	74.00	41.58	Horizontal	
2	7206.0000	45.75	35.58	-43.44	37.89	74.00	36.11	Horizontal	
3	9608.0000	43.47	37.72	-39.65	41.54	74.00	32.46	Horizontal	

BLE 2M_Channel 01



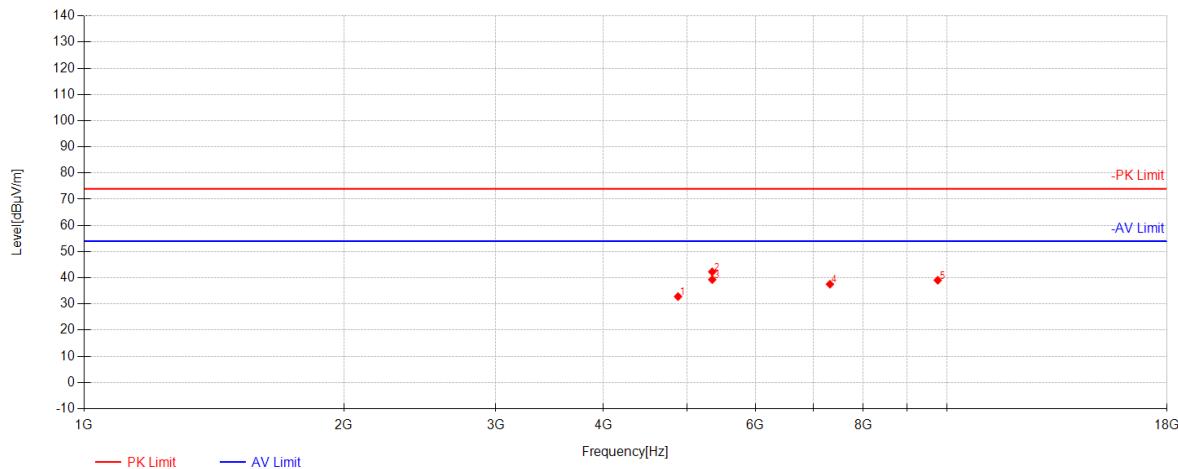
Data List									
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity	
1	4804.0000	49.04	31.09	-45.54	34.59	74.00	39.41	Vertical	
2	5197.5	57.55	31.76	-45.28	44.02	74.00	29.98	Vertical	
3	5198.25	53.34	31.76	-45.28	39.82	54.00	14.18	Vertical	
4	7206.0000	46.12	35.58	-43.44	38.26	74.00	35.74	Vertical	
5	9608.0000	42.87	37.72	-39.65	40.94	74.00	33.06	Vertical	

BLE 2M_Channel 19



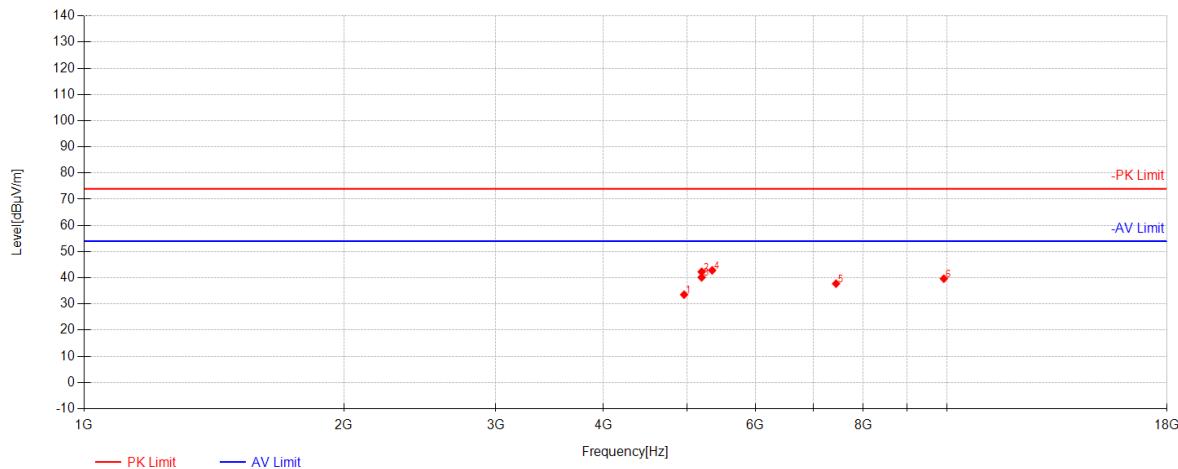
Data List									
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity	
1	4880.0000	48.94	31.21	-45.53	34.62	74.00	39.38	Horizontal	
2	7320.0000	45.33	35.90	-43.68	37.54	74.00	36.46	Horizontal	
3	9760.0000	40.36	38.02	-39.46	38.92	74.00	35.08	Horizontal	

BLE 2M_Channel 19



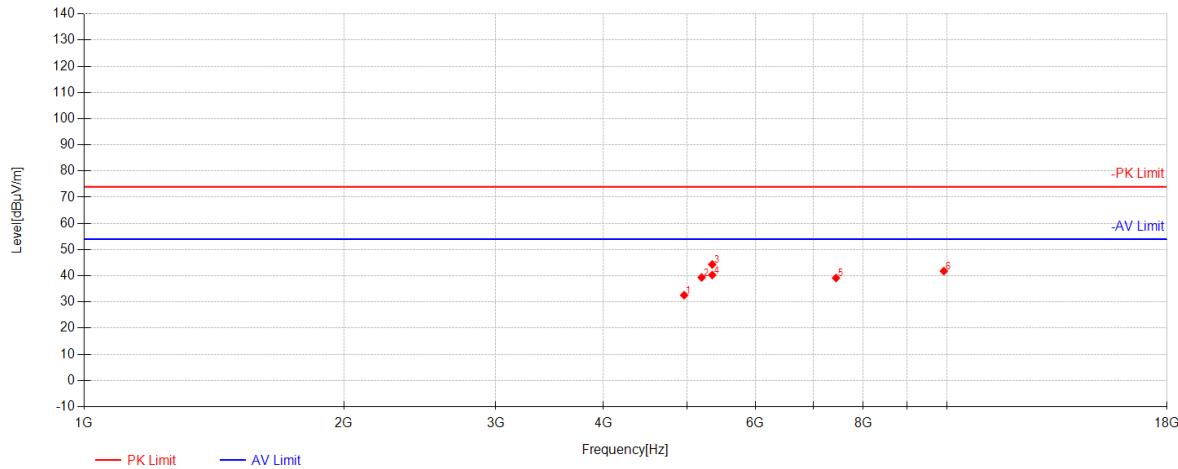
Data List									
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity	
1	4880.0000	47.14	31.21	-45.53	32.82	74.00	41.18	Vertical	
2	5346.375	55.43	32.02	-45.19	42.27	74.00	31.73	Vertical	
3	5346.375	52.46	32.02	-45.19	39.30	54.00	14.70	Vertical	
4	7320.0000	45.33	35.90	-43.68	37.54	74.00	36.46	Vertical	
5	9760.0000	40.49	38.02	-39.46	39.05	74.00	34.95	Vertical	

BLE 2M_Channel 38



Data List									
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity	
1	4960.0000	47.81	31.34	-45.60	33.55	74.00	40.45	Horizontal	
2	5197.5	55.82	31.76	-45.28	42.29	74.00	31.71	Horizontal	
3	5197.875	53.69	31.76	-45.28	40.16	54.00	13.84	Horizontal	
4	5346	56.00	32.02	-45.19	42.84	74.00	31.16	Horizontal	
5	7440.0000	44.82	36.23	-43.30	37.75	74.00	36.25	Horizontal	
6	9920.0000	40.63	38.34	-39.31	39.66	74.00	34.34	Horizontal	

BLE 2M_Channel 38



Data List									
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity	
1	4960.0000	46.84	31.34	-45.60	32.58	74.00	41.42	Vertical	
2	5197.5	52.90	31.76	-45.28	39.37	74.00	34.63	Vertical	
3	5346	57.46	32.02	-45.19	44.30	74.00	29.70	Vertical	
4	5346.375	53.45	32.02	-45.19	40.29	54.00	13.71	Vertical	
5	7440.0000	46.22	36.23	-43.30	39.15	74.00	34.85	Vertical	
6	9920.0000	42.75	38.34	-39.31	41.78	74.00	32.22	Vertical	

8 Test Setup Photo

Refer to Appendix - Test Setup Photo for KSCR2412002452AT

9 EUT Constructional Details (EUT Photos)

Refer to Appendix_Photos of EUT Constructional Details for KSCR2412002452AT

- End of the Report -