TEST REPORT

Reference No.	:	WTS17S0682346-1E V1
FCC ID	:	2AMNV-MP-LED01
Applicant	:	Shenzhen tongshengwei electronics Co.,Ltd
Address	:	415, Block A, Baoan Zhigu technical Park, YinTian Road, Baoan, Shenzhen, China
Manufacturer	:	The same as above
Address	:	The same as above
Product Name	:	smart magic light
Model No.	:	MP-LED01
Brand	:	POWERADD
Standards	:	FCC CFR47 Part 15.247:2016
Date of Receipt sample	:	Jun. 19, 2017
Date of Test	:	Jun. 20 ~ Jul. 11, 2017
Date of Issue	:	Jul. 18, 2017
Test Result	:	**Pass**

Remarks:
The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

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2 Laboratories Introduction

Waltek Services Test Group Ltd is a professional third-party testing and certification organization with multi-year product testing and certification experience, established strictly in accordance with ISO/IEC 17025 requirements, and accredited by CNAS (China National Accreditation Service for Conformity Assessment) AQSIQ, CMA and IECEE for CBTL. Meanwhile, Waltek has got recognition as registration and accreditation laboratory from EMSD (Electrical and Mechanical Services Department), and American Energy star, FCC(The Federal Communications Commission), CPSC(Consumer Product Safety Commission), CEC(California energy efficiency), IC(Industry Canada) and ELI(Efficient Lighting Initiative). It's the strategic partner and data recognition laboratory of international authoritative organizations, such as UL, Intertek(ETL-SEMKO), CSA, TÜV Rheinland, TÜV SÜD, etc.

Waltek Services Test Group Ltd. is one of the largest and the most comprehensive third party testing organizations in China, our headquarter located in Shenzhen and have branches in Foshan, Dongguan, Zhongshan, Suzhou,Ningbo and Hong Kong, Our test capability covered four large fields: safety test. ElectroMagnetic Compatibility(EMC), reliablity and energy performance, Chemical test. As a professional, comprehensive, justice international test organization, we still keep the scientific and rigorous work attitude to help each client satisfy the international standards and assist their product enter into globe market smoothly.

3 Contents

Page

1 COVER PAGE 1
2 LABORATORIES INTRODUCTION 2
3 CONTENTS 3
4 REVISION HISTORY 5
5 GENERAL INFORMATION 6
5.1 GENERAL DESCRIPTION OF E.U.T. 6
5.2 DETAILS OF E.U.T. 6
5.3 CHANNEL LIST 7
5.4 TEST MODE 8
5.5 TEST FACILITY 9
6 TEST SUMMARY 10
7 EQUIPMENT USED DURING TEST 11
7.1 EQUIPMENTS LIST 11
7.2 DESCRIPTION OF SUPPORT UNITS 12
7.3 MEASUREMENT UNCERTAINTY 12
7.4 TEST EQUIPMENT CALIBRATION 12
8 RADIATED EMISSIONS 13
8.1 EUT OPERATION 13
8.2 TEST SETUP 14
8.3 SPECTRUM ANALYZER SETUP 15
8.4 TEST PROCEDURE 16
8.5 CORRECTED AMPLITUDE & MARGIN CALCULATION 16
8.6 SUMMARY OF TEST RESULTS 17
9 CONDUCTED SPURIOUS EMISSIONS 20
9.1 TEST PROCEDURE 20
9.2 TEST RESULT 21
10 BAND EDGE MEASUREMENT 25
10.1 TEST PRODUCE 25
10.2 TEST RESULT 26
11 6 DB BANDWIDTH MEASUREMENT 27
11.1 TEST PROCEDURE: 27
11.2 TEST RESULT: 27
12 MAXIMUM PEAK OUTPUT POWER 30
12.1 TEST PROCEDURE: 30
12.2 TEST RESULT: 31
13 POWER SPECTRAL DENSITY 34
13.1 TEST PROCEDURE: 34
13.2 TEST RESULT: 34
14 ANTENNA REQUIREMENT 37
15 RF EXPOSURE 38
15.1 REQUIREMENTS 38
15.2 THE PROCEDURES / LIMIT 38
15.3 MPE CALCULATION METHOD 39
16 PHOTOGRAPHS OF TEST SETUP AND EUT. 40

16.1 PHOTOGRAPH - SPURIOUS EMISSIONS RADIATED TEST SETUP 40
16.2 EUT – EXTERNAL VIEW MODEL MP-LED01 FCC ID: 2AMNV-MP-LED01 42
16.3 EUT – INTERNAL VIEW MODEL MP-LED01 FCC ID: 2AMNV-MP-LED01 45

4 Revision History

Test report No.	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTS17S0682346-1E	Jun. 19, 2017	Jun. 20 ~ Jul. 11, 2017	Jul. 12, 2017	original	-	Replaced
WTS17S0682346-1E V1	Jun. 19, 2017	Jun. 20 ~ Jul. 11, 2017	Jul. 18, 2017	Version 1	Updated	Valid

5 General Information

5.1 General Description of E.U.T.

Product Name:	smart magic light
Model No.:	MP-LED01
Model Description:	N/A
Bluetooth Version:	V4.1(BLE Only)
Hardware Version:	BT-LED-V4.0
Software Version:	BIKE-LIGHT-V1.2.BIN
Highest frequency (Exclude Radio):	312MHz
Storage Location:	Internal Storage
Note:	N/A

5.2 Details of E.U.T.

Operation Frequency:	Bluetooth: 2402~2480MHz
Max. RF output power:	Bluetooth: -0.37dBm
Type of Modulation:	Bluetooth: GFSK
Antenna installation:	Bluetooth: internal permanent antenna
Antenna Gain:	Bluetooth: 0dBi
Technical Data: Power Bank(Auxiliary)	Input: DC 4.3V 5.4A By Power Bank Manufacture: shenzhen tongshengwei electronics Co.,Ltd. Model No.: MP-LED01

5.3 Channel List

BT BLE

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
0	2402	1	2404	2	2406	3	2408
4	2410	5	2412	6	2414	7	2416
8	2418	9	2420	10	2422	11	2424
12	2426	13	2428	14	2430	15	2432
16	2434	17	2436	18	2438	19	2440
20	2442	21	2444	22	2446	23	2448
24	2450	25	2452	26	2454	27	2456
28	2458	29	2460	30	2462	31	2464
32	2466	33	2468	34	2470	35	2472
36	2474	37	2476	38	2478	39	2480

5.4 Test Mode

Table 2 Tests Carried Out Under FCC part 15.247

Test Items	Mode	Data Rate	Channel	TX/RX
Maximum Peak Output Power	BT BLE	1 Mbps	0/19/39	TX
Power Spectral Density	BT BLE	1 Mbps	0/19/39	TX
6dB Bandwidth	BT BLE	1 Mbps	0/19/39	TX
Band Edge	BT BLE	1 Mbps	0/19/39	TX
Transmitter Spurious Emissions	BT BLE	1 Mbps	0/19/39	TX

Note :Parameters set by test software during channel & power tests, the software provided by the customer was used to set the operating channels as well as the output power level. The RF output power set is the power expected by the manufacturer and is going to be fixed on the firmware of the final product .

5.5 Test Facility

The test facility has a test site registered with the following organizations:

- **IC – Registration No.: 7760A-1**

Waltek Services (Shenzhen) Co., Ltd. has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration 7760A-1, October 15, 2015.

- **FCC Test Site – Registration No.: 328995**

Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory `has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 328995, December 3, 2014.

6 Test Summary

Test Items	Test Requirement	Result
Radiated Spurious Emissions	15.247(d) 15.205(a) 15.209(a)	PASS
Conducted Spurious Emissions	15.247(d)	PASS
Conducted Emissions	15.207(a)	N/A
6dB Bandwidth	15.247(a)(2)	PASS
Maximum Peak Output Power	15.247(b)(3),(4)	PASS
Power Spectral Density	15.247(e)	PASS
Band Edge	15.247(d)	PASS
Antenna Requirement	15.203	PASS
Maximum Permissible Exposure (Exposure of Humans to RF Fields)	1.1307(b)(1)	PASS

7 Equipment Used during Test

7.1 Equipments List

Conducted Emissions Test Site 1#						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1.	EMI Test Receiver	R&S	ESCI	100947	Sep.12,2016	Sep.11,2017
2.	LISN	R&S	ENV216	101215	Sep.12,2016	Sep.11,2017
3.	Cable	Top	TYPE16(3.5M)	-	Sep.12,2016	Sep.11,2017
Conducted Emissions Test Site 2#						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1.	EMI Test Receiver	R&S	ESCI	101155	Sep.12,2016	Sep.11,2017
2.	LISN	SCHWARZBECK	NSLK 8128	8128-289	Sep.12,2016	Sep.11,2017
3.	Limiter	York	MTS-IMP-136	261115-001-0024	Sep.12,2016	Sep.11,2017
4.	Cable	LARGE	RF300	-	Sep.12,2016	Sep.11,2017
3m Semi-anechoic Chamber for Radiation Emissions Test site 1#						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1	Spectrum Analyzer	R&S	FSP	100091	Apr.29, 2017	Apr.28, 2018
2	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	Apr.09,2017	Apr.08,2018
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	Apr.09,2017	Apr.08,2018
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	Sep.12,2016	Sep.11,2017
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	Apr.09,2017	Apr.08,2018
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	Apr.09,2017	Apr.08,2018
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	Apr.13,2017	Apr.12,2018
8	Coaxial Cable (above 1GHz)	Top	1GHz-25GHz	EW02014-7	Apr.13,2017	Apr.12,2018
3m Semi-anechoic Chamber for Radiation Emissions Test site 2#						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No**	**Last Calibration Date**	**Calibration Due Date**
1	Test Receiver	R&S	ESCI	101296	Apr.13,2017	Apr.12,2018
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	Apr.09,2017	Apr.08,2018
3	Amplifier	Compliance pirection systems inc	PAP-0203	22024	Apr.13,2017	Apr.12,2018
4	Cable	HUBER+SUHNER	CBL2	525178	Apr.13,2017	Apr.12,2018

RF Conducted Testing						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1.	EMC Analyzer (9k~26.5GHz)	Agilent	E7405A	MY45114943	Sep.12,2016	Sep.11,2017
2.	Spectrum Analyzer (9k-6GHz)	R&S	FSL6	100959	Sep.12,2016	Sep.11,2017
3.	Signal Analyzer (9k~26.5GHz)	Agilent	N9010A	MY50520207	Sep.12,2016	Sep.11,2017

7.2 Description of Support Units

Equipment	Manufacturer	Model No.	Series No.
/	/	/	/

7.3 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	± 1 x 10^{-6}
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
Radiated Spurious Emissions test	± 5.03 dB (Bilog antenna 30M~1000MHz)
	± 5.47 dB (Horn antenna 1000M~25000MHz)
Conducted Emissions test	± 3.64 dB (AC mains 150KHz~30MHz)
Conducted Spurious Emissions test	± 3.12 dB (9kHz~30MHz)
	± 4.21 dB (30M~1000MHz)
	± 5.14 dB (1000M~26500MHz)
Confidence interval：95%. Confidence factor:k=2	

7.4 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

8 Radiated Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.247

Test Method: ANSI C63.10:2013

Test Result: PASS

Measurement Distance: 3m

Limit:

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
1.705 ~ 30	30	30	100 * 30	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

8.1 EUT Operation

Operating Environment **:**

Temperature: 23.5 °C

Humidity: 52.1 % RH

Atmospheric Pressure: 101.2kPa

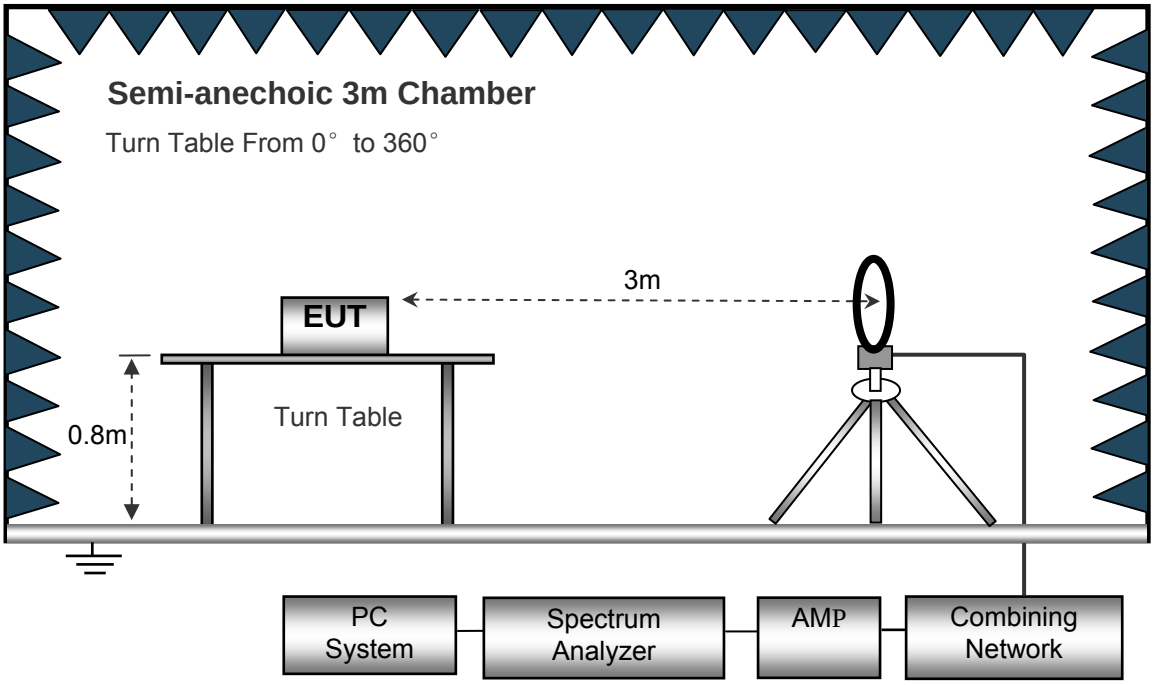
EUT Operation **:**

The test was performed in TX transmitting mode, the test data were shown in the report.

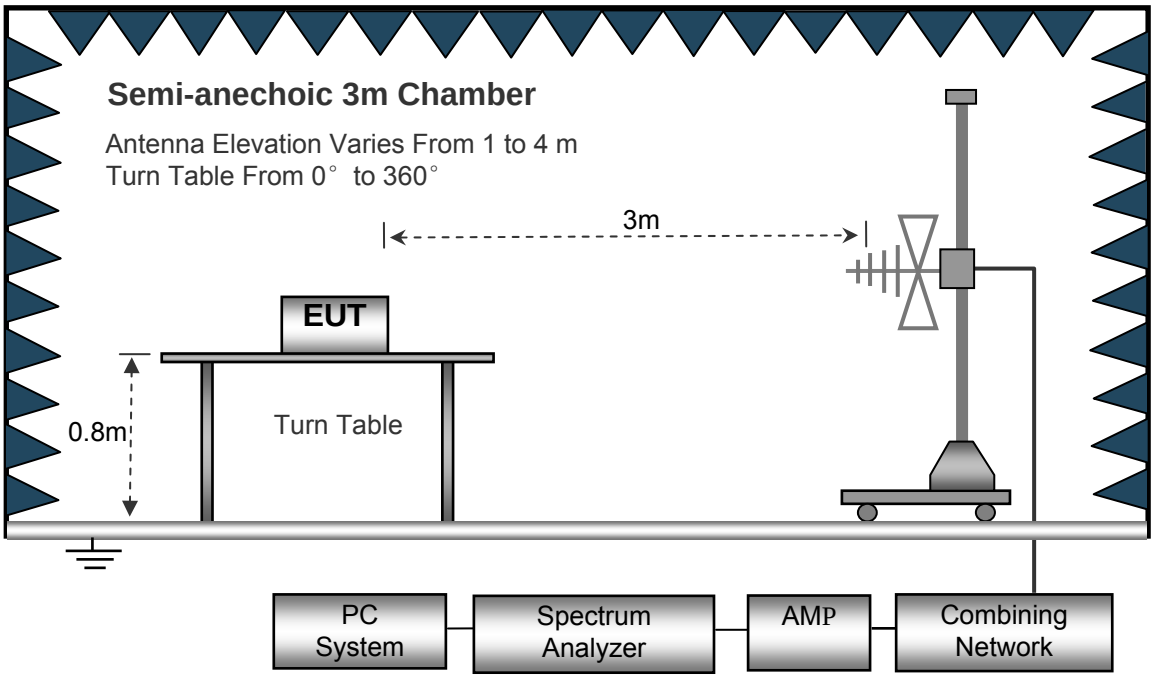
8.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10.

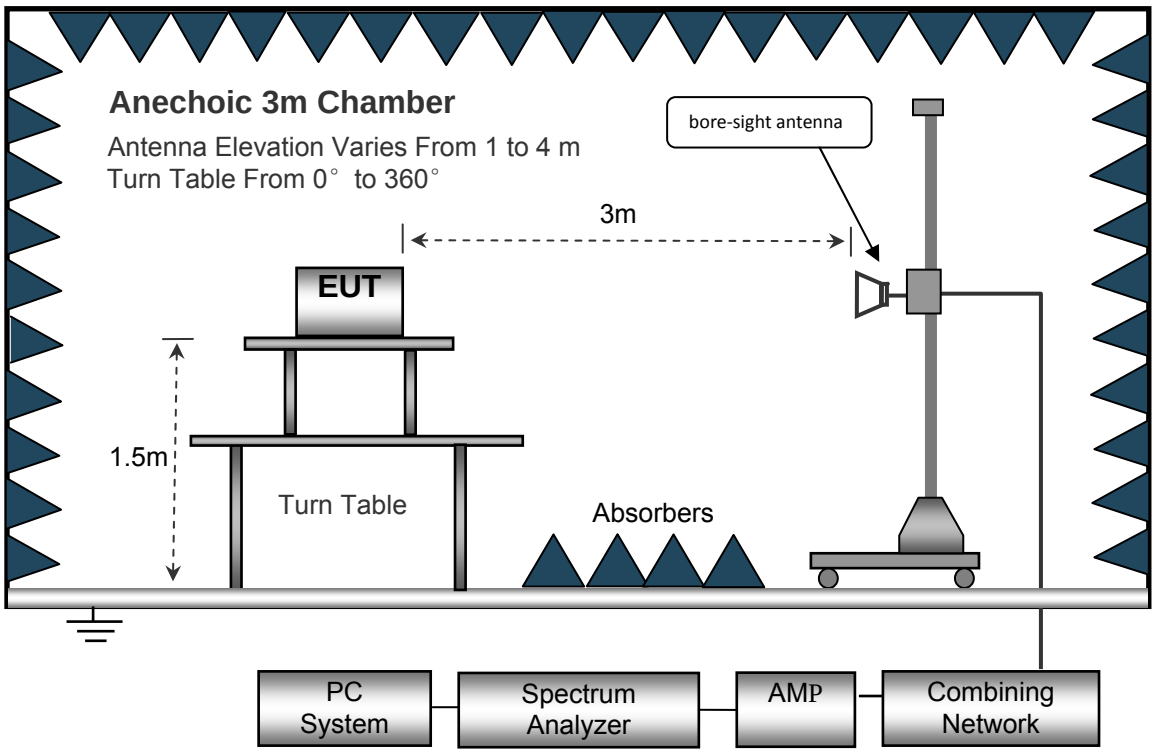
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



8.3 Spectrum Analyzer Setup

Below 30MHz

Sweep Speed ..... Auto
IF Bandwidth..... 10kHz
Video Bandwidth..... 10kHz
Resolution Bandwidth..... 10kHz

30MHz ~ 1GHz

Sweep Speed ..... Auto
Detector ..... PK
Resolution Bandwidth..... 100kHz
Video Bandwidth..... 300kHz

Above 1GHz

Sweep Speed ..... Auto
Detector ..... PK
Resolution Bandwidth..... 1MHz
Video Bandwidth..... 3MHz
Detector ..... Ave.
Resolution Bandwidth..... 1MHz
Video Bandwidth..... 10Hz

8.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane for below 1GHz and 1.5m for above 1GHz.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are performed in X,Y and Z axis positioning(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand),the worst condition was tested putting the eut in Z axis,so the worst data were shown as follow.
8. A 2.4GHz high –pass filter is used druing radiated emissions above 1GHz measurement.

8.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – Limit

8.6 Summary of Test Results

BT BLE:

Test Frequency: 9KHz~26MHz(Only the worst mode low channel was show)

Frequency	Measurement results dBμV @3m	Detector PK/QP	Correct factor dB/m	Extrapolation factor dB	Measurement results (calculated) dBμV/m @30m	Limits dBμV/m @30m	Margin dB
(MHz)	Measurement results	Detector	Correct factor	Extrapolation factor	Measurement results (calculated)	Limits	Margin
6.031	25.36	QP	21.84	40.00	7.20	29.54	-22.34
8.306	26.17	QP	21.02	40.00	7.19	29.54	-22.35
26.132	24.06	QP	20.55	40.00	4.61	29.54	-24.93

Test Frequency : 26MHz ~ 30MHz

The measurements were more than 20 dB below the limit and not reported.

Test Frequency : 30MHz ~ 18GHz

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
GFSK Low Channel 2402MHz									
268.32	37.01	QP	311	1.9	H	-13.35	23.66	46.00	-22.34
268.32	42.07	QP	126	1.0	V	-13.35	28.72	46.00	-17.28
4804.00	45.58	PK	66	1.4	V	-1.06	44.52	74.00	-29.48
4804.00	42.76	Ave	66	1.4	V	-1.06	41.70	54.00	-12.30
7206.00	40.12	PK	283	1.7	H	1.33	41.45	74.00	-32.55
7206.00	36.34	Ave	283	1.7	H	1.33	37.67	54.00	-16.33
2326.93	45.31	PK	165	1.1	V	-13.19	32.12	74.00	-41.88
2326.93	37.76	Ave	165	1.1	V	-13.19	24.57	54.00	-29.43
2352.08	44.72	PK	159	1.8	H	-13.14	31.58	74.00	-42.42
2352.08	37.68	Ave	159	1.8	H	-13.14	24.54	54.00	-29.46
2498.94	43.25	PK	339	1.5	V	-13.08	30.17	74.00	-43.83
2498.94	36.67	Ave	339	1.5	V	-13.08	23.59	54.00	-30.41

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
GFSK Middle Channel 2440MHz									
268.32	37.06	QP	11	1.6	H	-13.35	23.71	46.00	-22.29
268.32	43.34	QP	18	2.0	V	-13.35	29.99	46.00	-16.01
4880.00	46.30	PK	206	1.4	V	-0.62	45.68	74.00	-28.32
4880.00	42.30	Ave	206	1.4	V	-0.62	41.68	54.00	-12.32
7320.00	41.24	PK	219	1.1	H	2.21	43.45	74.00	-30.55
7320.00	36.27	Ave	219	1.1	H	2.21	38.48	54.00	-15.52
2310.27	45.70	PK	174	1.1	V	-13.19	32.51	74.00	-41.49
2310.27	38.33	Ave	174	1.1	V	-13.19	25.14	54.00	-28.86
2375.17	43.68	PK	279	1.7	H	-13.14	30.54	74.00	-43.46
2375.17	37.17	Ave	279	1.7	H	-13.14	24.03	54.00	-29.97
2487.10	43.36	PK	306	1.9	V	-13.08	30.28	74.00	-43.72
2487.10	38.01	Ave	306	1.9	V	-13.08	24.93	54.00	-29.07

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
GFSK High Channel 2480MHz									
268.32	38.17	QP	109	1.9	H	-13.35	24.82	46.00	-21.18
268.32	42.89	QP	51	1.9	V	-13.35	29.54	46.00	-16.46
4960.00	45.73	PK	119	1.7	V	-0.24	45.49	74.00	-28.51
4960.00	43.44	Ave	119	1.7	V	-0.24	43.20	54.00	-10.80
7440.00	42.58	PK	91	1.7	H	2.84	45.42	74.00	-28.58
7440.00	35.58	Ave	91	1.7	H	2.84	38.42	54.00	-15.58
2313.03	46.19	PK	12	1.2	V	-13.19	33.00	74.00	-41.00
2313.03	37.57	Ave	12	1.2	V	-13.19	24.38	54.00	-29.62
2382.56	42.66	PK	337	1.4	H	-13.14	29.52	74.00	-44.48
2382.56	38.48	Ave	337	1.4	H	-13.14	25.34	54.00	-28.66
2484.46	44.35	PK	63	1.7	V	-13.08	31.27	74.00	-42.73
2484.46	38.15	Ave	63	1.7	V	-13.08	25.07	54.00	-28.93

Test Frequency: 18GHz~25GHz

The measurements were more than 20 dB below the limit and not reported.

9 Conducted Spurious Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 DTS Meas Guidance v03r05 April 8, 2016

Test Result: PASS

Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

9.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer:

Blow 1GHz:

RBW = 100kHz, VBW = 300kHz, Sweep = auto

Detector function = peak, Trace = max hold

Above 1GHz:

For BLE mode

RBW = 100kHz, VBW = 300kHz, Sweep = auto

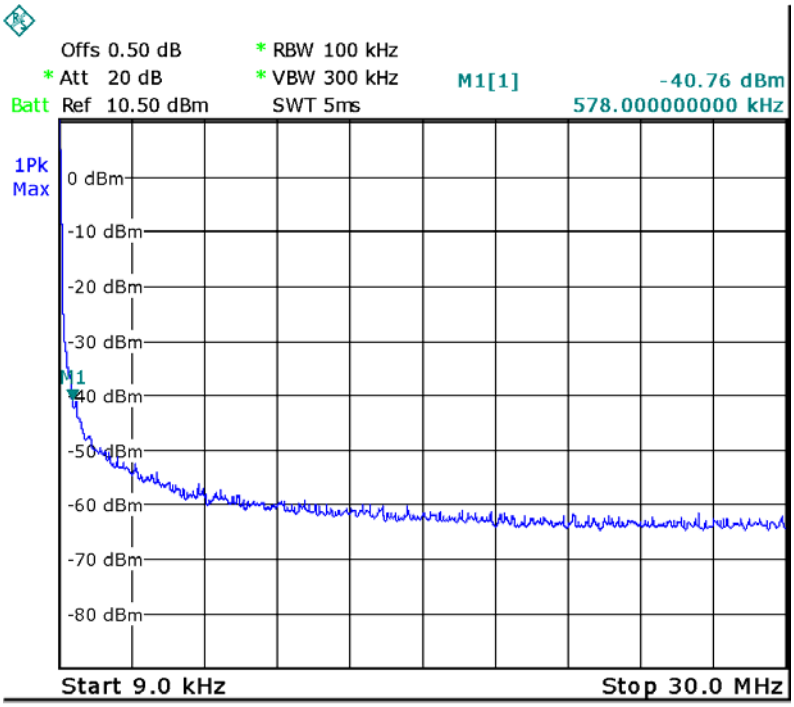
Detector function = peak, Trace = max hold

9.2 Test Result

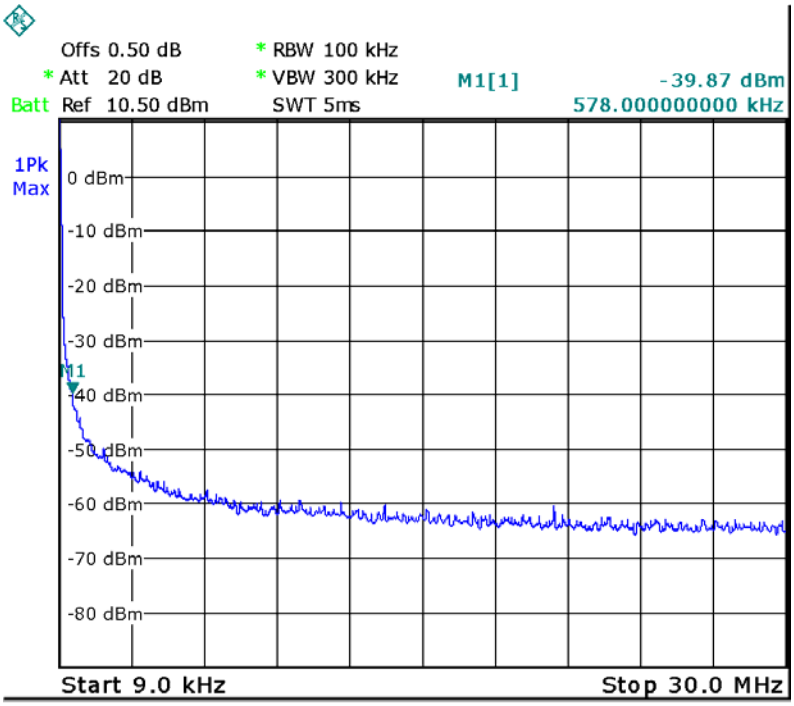
9KHz – 30MHz

BLE

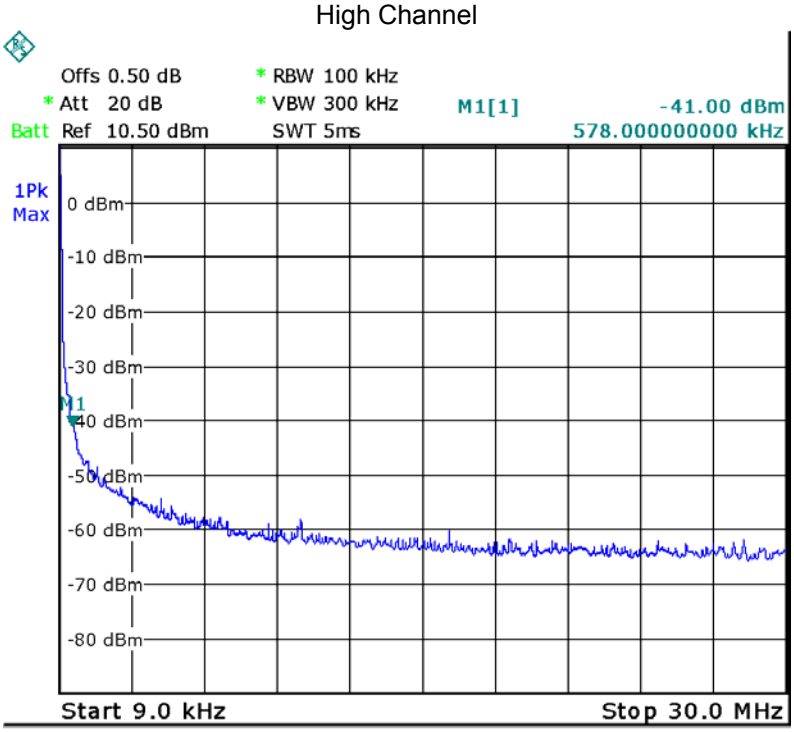
Low Channel



Middle Channel



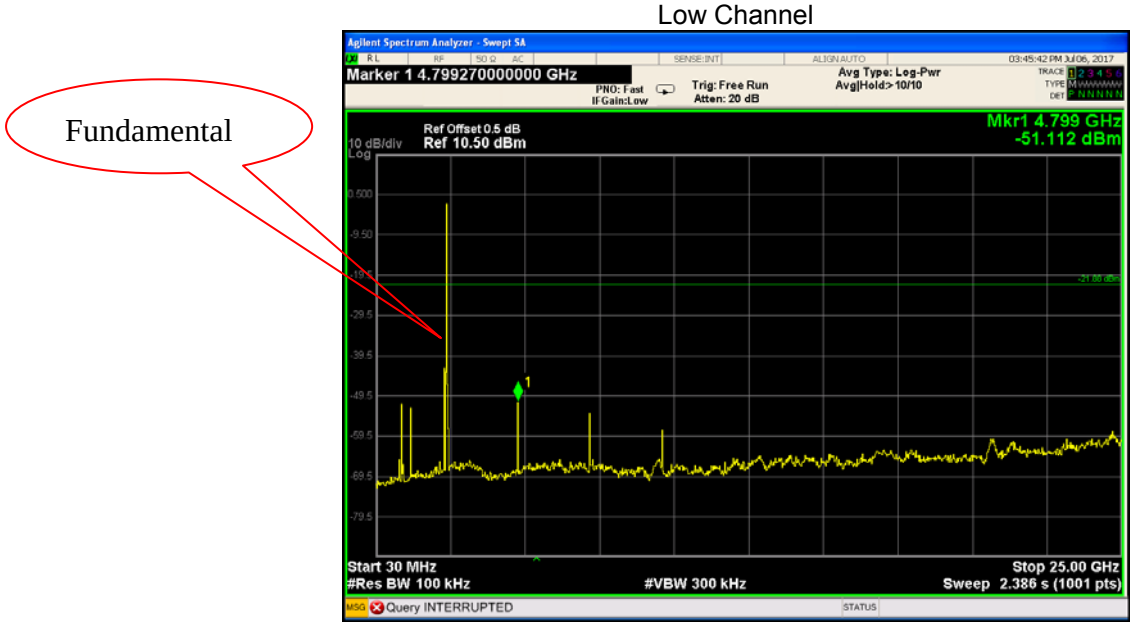
High Channel



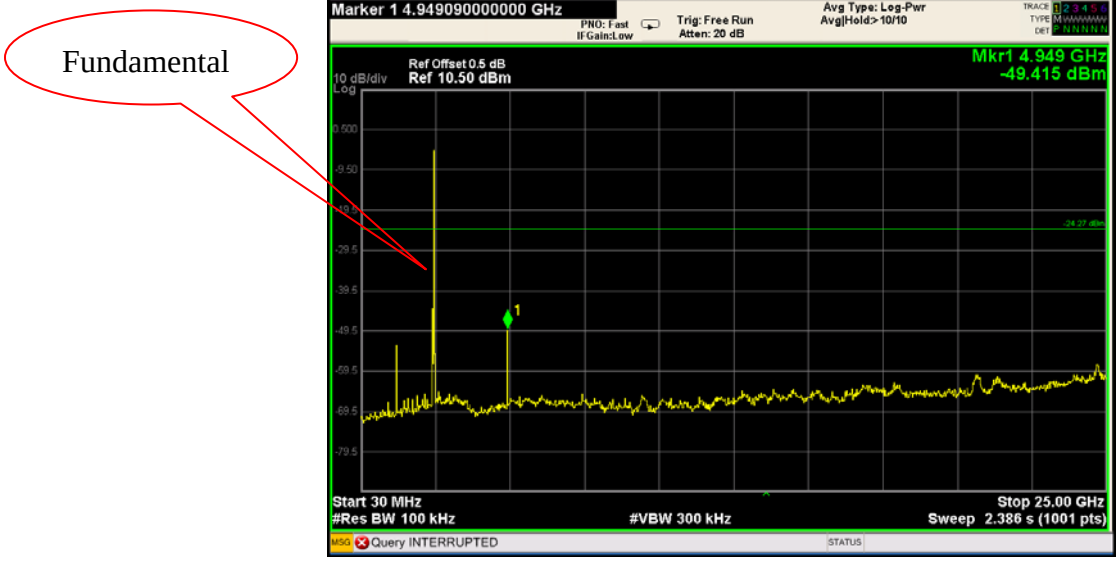
Above 30MHz

BLE

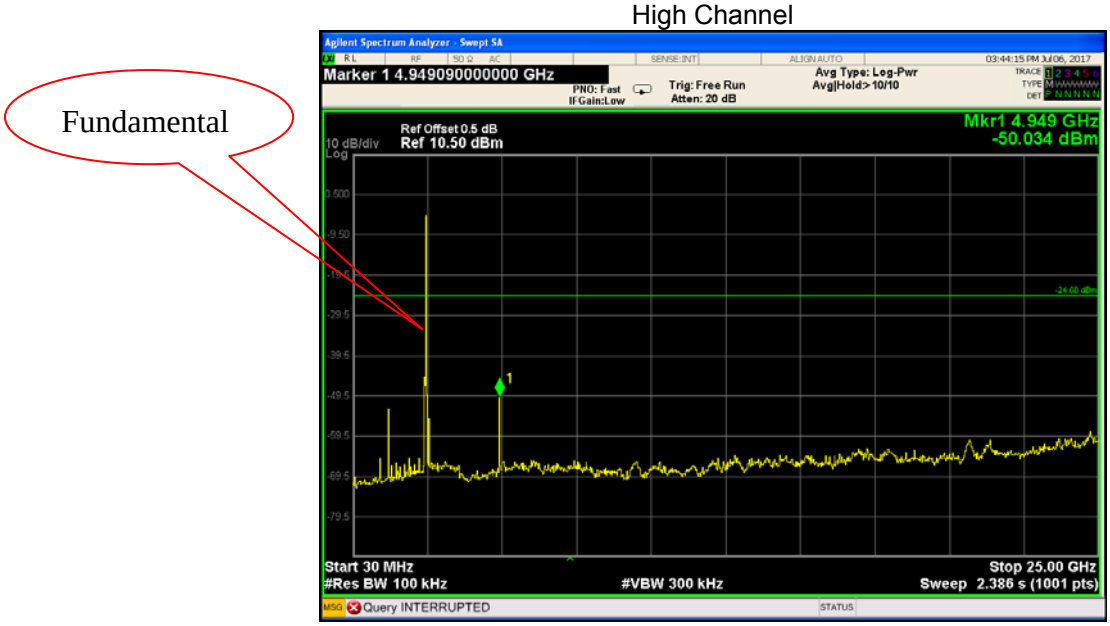
Low Channel



Middle Channel



High Channel



10 Band Edge Measurement

Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	KDB 558074 D01 DTS Meas Guidance v03r05 April 8, 2016
Test Limit:	Regulation 15.247 (d),In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, 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)).
Test Mode:	Transmitting

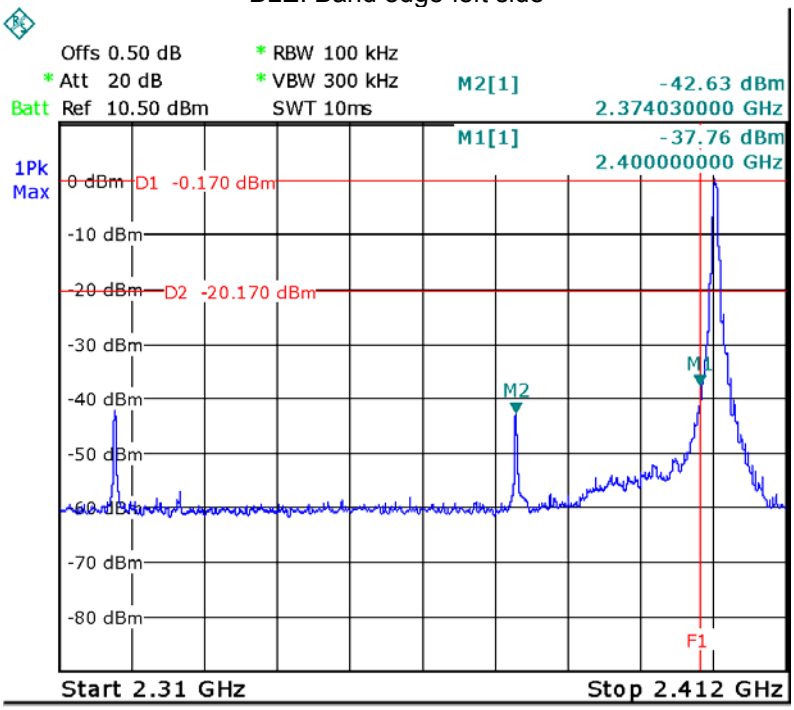
10.1 Test Produce

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

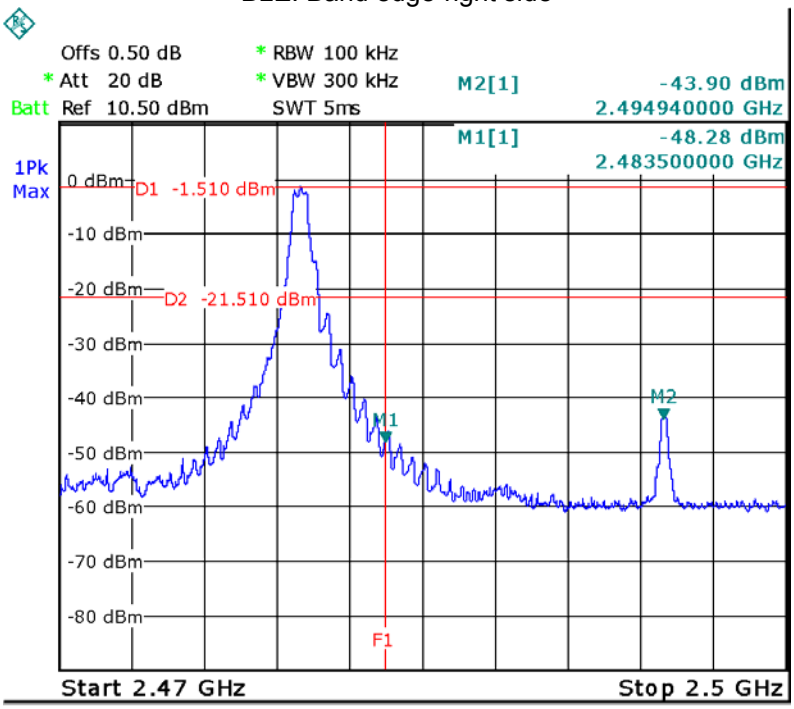
10.2 Test Result

Test result plots shown as follows:

BLE: Band edge-left side



BLE: Band edge-right side



11 6 dB Bandwidth Measurement

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 DTS Meas Guidance v03r05 April 8, 2016

11.1 Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;

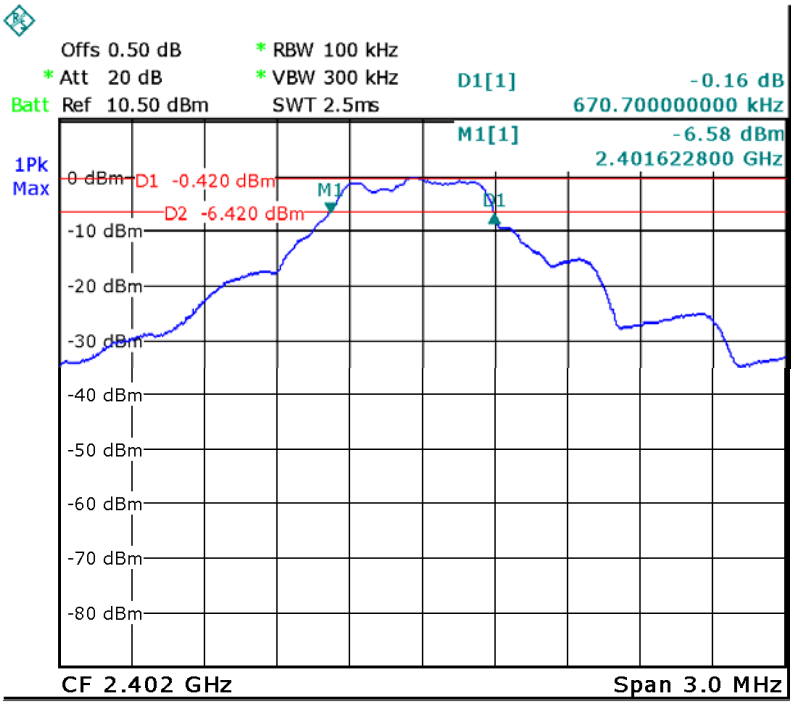
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

11.2 Test Result:

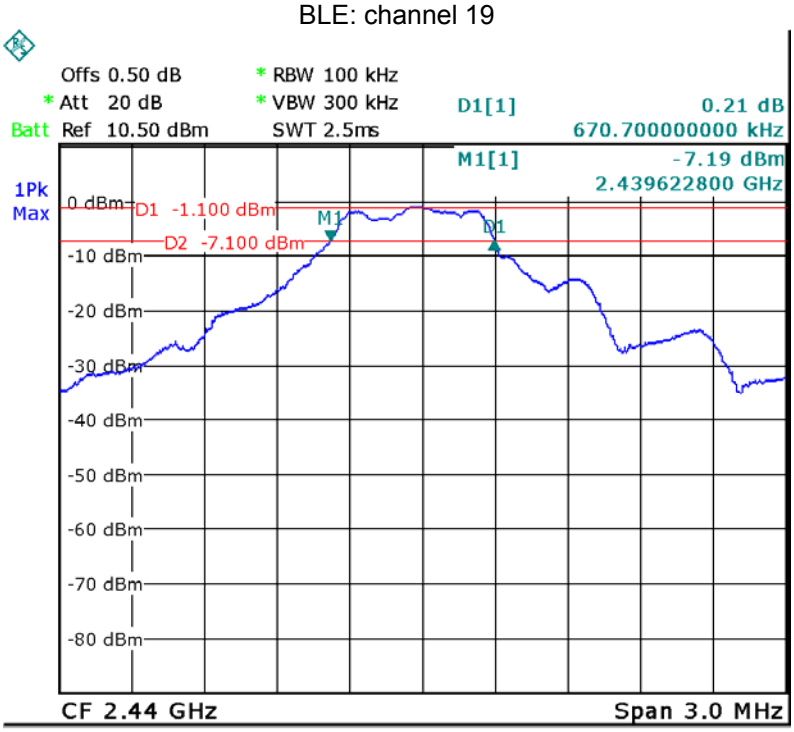
Operation mode	Test Channel	Bandwidth (MHz)	Limit (kHz)
BLE	Channel 0	0.671	500
	Channel 19	0.671	500
	Channel 39	0.671	500

Test result plot:

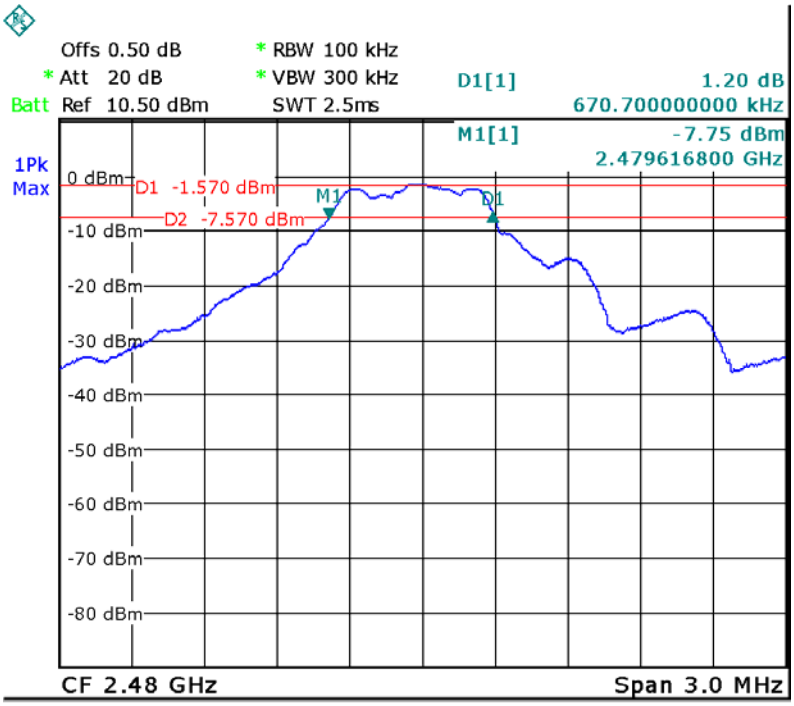
BLE: channel 0



BLE: channel 19



BLE: channel 39



12 Maximum Peak Output Power

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 DTS Meas Guidance v03r05 April 8, 2016

12.1 Test Procedure:

KDB 558074 D01 DTS Meas Guidance v03r05 April 8, 2016

section 9.1.1 (For BLE)

This procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the DTS bandwidth.

a)Set the RBW ≥ DTS bandwidth.

b)Set VBW ≥ 3 RBW.

c)Set span ≥ 3 x RBW

d)Sweep time = auto couple.

e)Detector = peak.

f)Trace mode = max hold.

g)Allow trace to fully stabilize.

h)Use peak marker function to determine the peak amplitude level.

section 9.1.2 (For WIFI)

This procedure may be used when the maximum available RBW of the measurement instrument is less than the DTS bandwidth.

a)Set the RBW = 1 MHz.

b)Set the VBW ≥ 3 RBW

c)Set the span ≥ 1.5 x DTS bandwidth.

d)Detector = peak.

e)Sweep time = auto couple.

f)Trace mode = max hold.

g)Allow trace to fully stabilize.

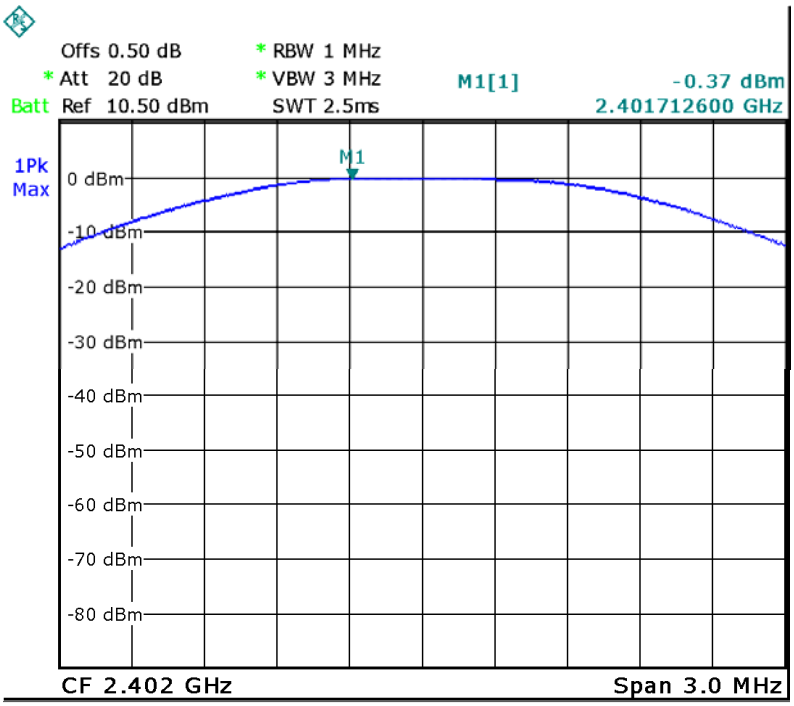
h)Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select peak detector). If the instrument does not have a band power function, sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS bandwidth.

12.2 Test Result:

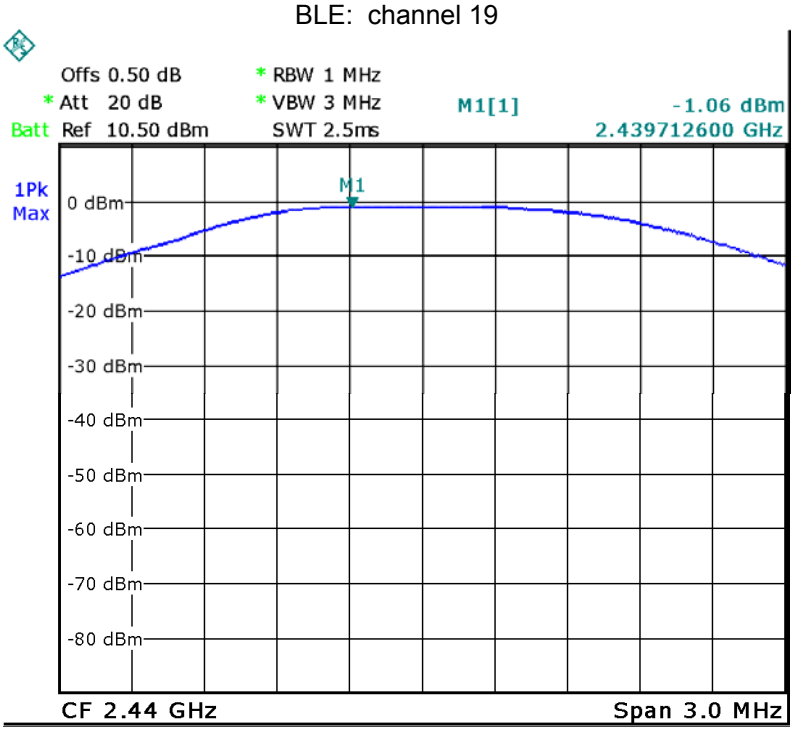
Operation mode	Channel Frequency (MHz)	Maximum Peak Output Power (dBm)	Limit
BLE	Low-2402	-0.37	1W/30dBm
	Middle-2440	-1.06	1W/30dBm
	High-2480	-1.51	1W/30dBm

Test Plot

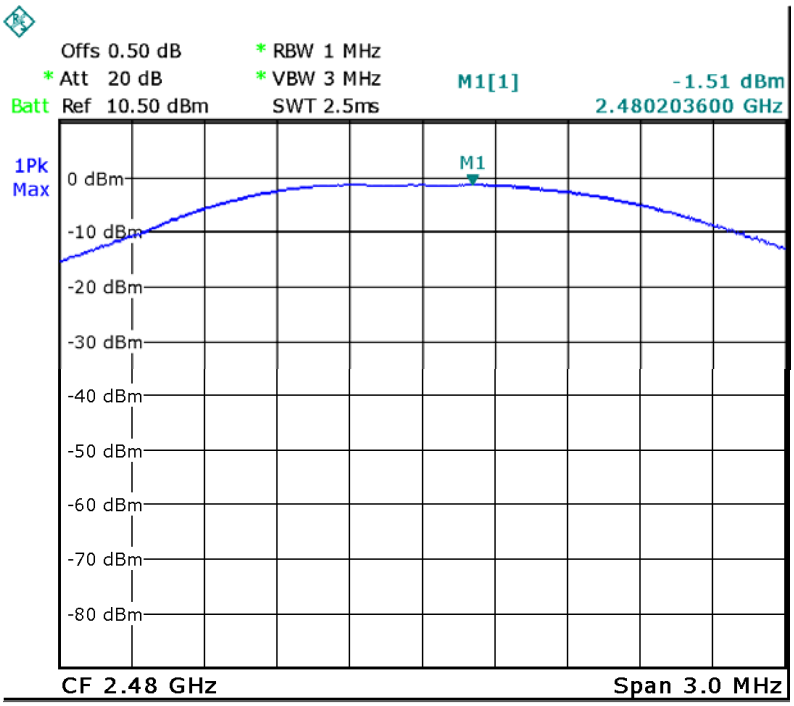
BLE: channel 0



BLE: channel 19



BLE: channel 39



13 Power Spectral density

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 DTS Meas Guidance v03r05 April 8, 2016

13.1 Test Procedure:

KDB 558074 D01 DTS Meas Guidance v03r05 April 8, 2016 section 10.2

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

2. Set the spectrum analyzer: RBW = 3kHz. VBW = 10kHz , Span = 1.5 times the DTS channel bandwidth(6 dB bandwidth). Sweep = auto; Detector Function = Peak. Trace = Max hold.

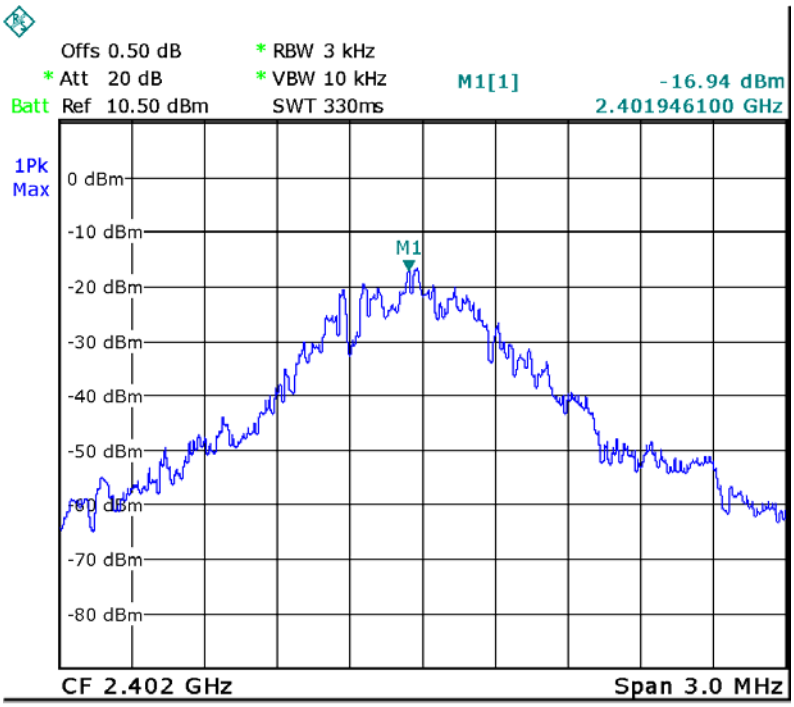
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

13.2 Test Result:

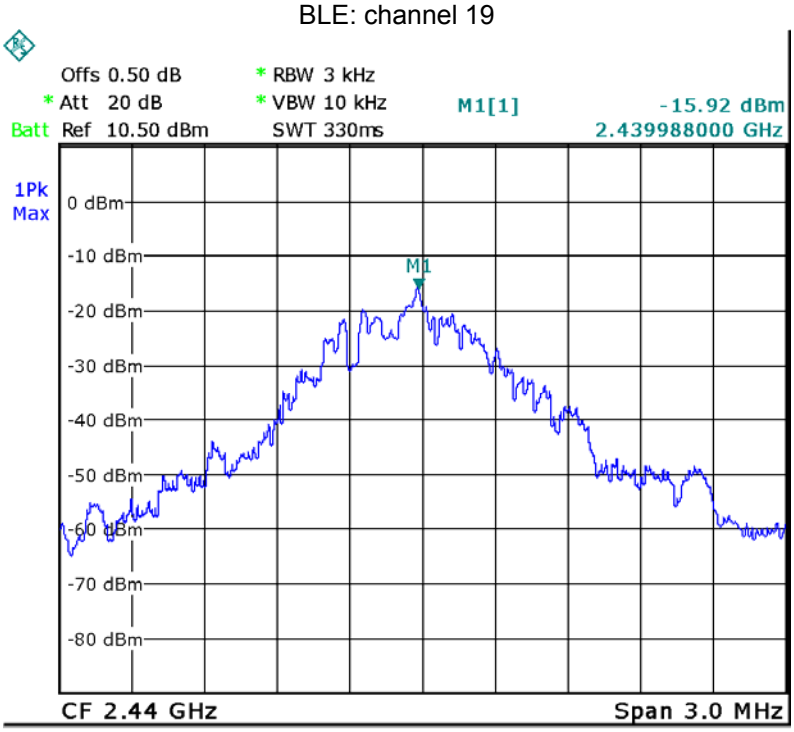
Operation mode	Channel Frequency (MHz)	Power Spectral (dBm per 3kHz)	Limit
BLE	Low-2402	-16.94	8dBm per 3kHz
	Middle-2440	-15.92	8dBm per 3kHz
	High-2480	-16.53	8dBm per 3kHz

Test Plot

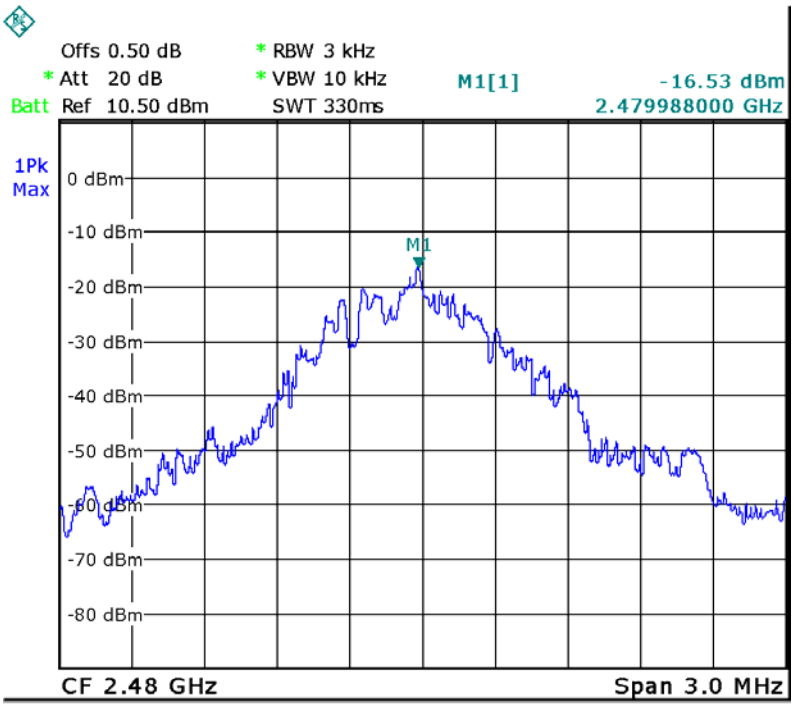
BLE: channel 0



BLE: channel 19



BLE: channel 39



14 Antenna Requirement

According to the FCC Part 15 Paragraph 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. This product has an integrated antenna fulfill the requirement of this section.

15 RF Exposure

Test Requirement: FCC Part 1.1307

Test Mode: The EUT work in test mode(Tx).

15.1 Requirements

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2 m normally can be maintained between the user and the device.

15.2 The procedures / limit

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm^2)	Averaging Time $\|E\|^2$,$\|H\|^2$or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm^2)	Averaging Time $\|E\|^2$,$\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz ; *Plane-wave equivalent power density

15.3 MPE Calculation Method

$$\text{E (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \qquad \text{Power Density: } Pd \text{ (W/m²)} = \frac{E^2}{377}$$

E = Electric field (V/m)
P = Peak RF output power (W)
G = EUT Antenna numeric gain (numeric)
d = Separation distance between radiator and human body (m)
The formula can be changed to

$$\boldsymbol{Pd} = \frac{30 \times P \times G}{377 \times d^2}$$

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained

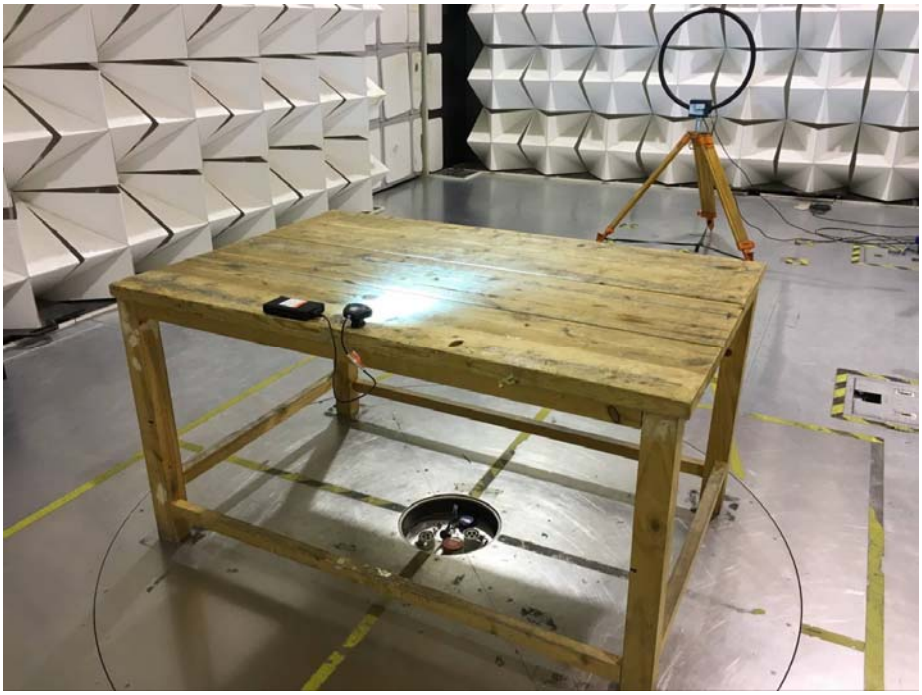
Antenna Gain (dBi)	Antenna Gain (numeric)	Max.Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (mW/cm2)	Limit of Power Density (mW/cm2)
0.00	1.000	-0.37	0.92	0.000183	1.0

16 Photographs of test setup and EUT.

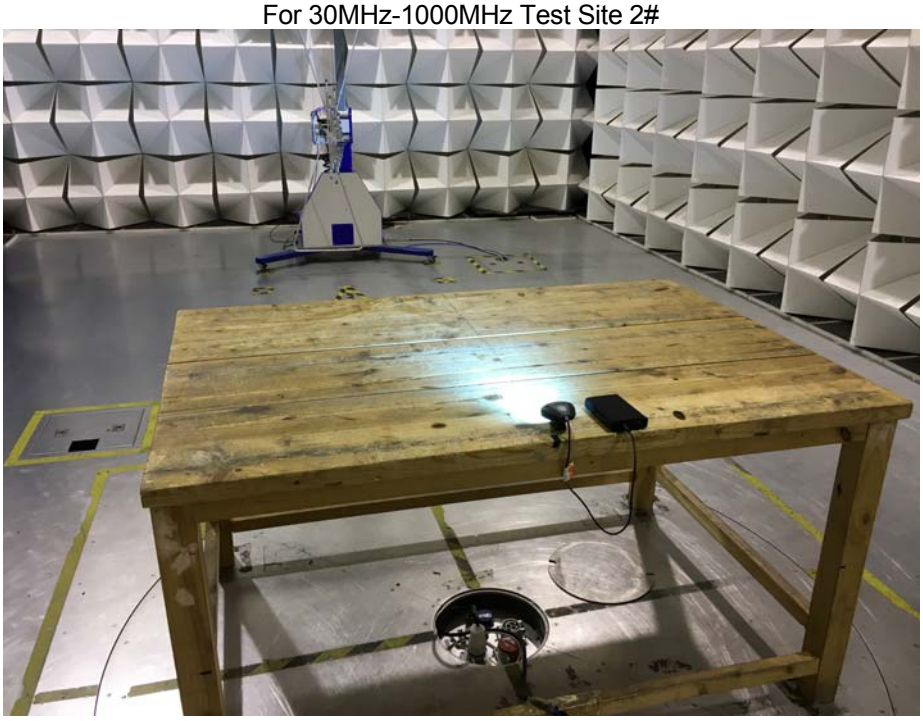
Model MP-LED01 FCC ID: 2AMNV-MP-LED01

16.1 Photograph - Spurious Emissions Radiated Test Setup

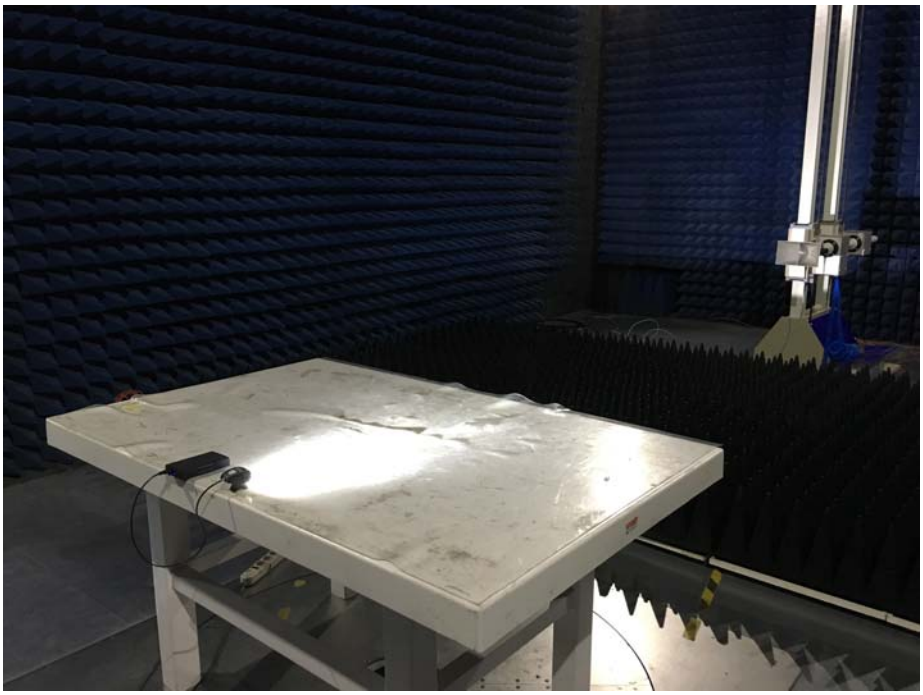
Below 30MHz Test Site 2#



For 30MHz-1000MHz Test Site 2#

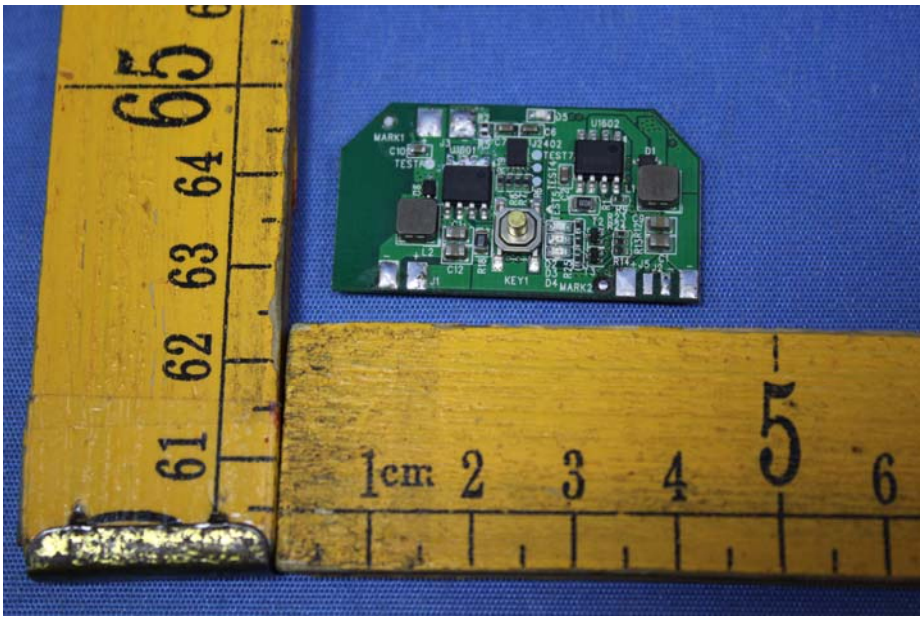


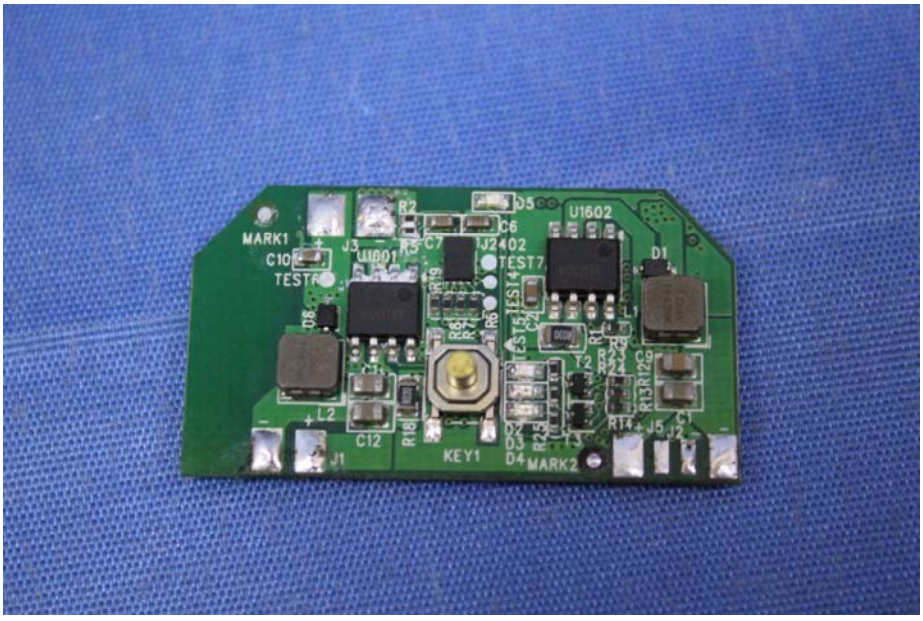
For Above 1GHz Test Site 1#

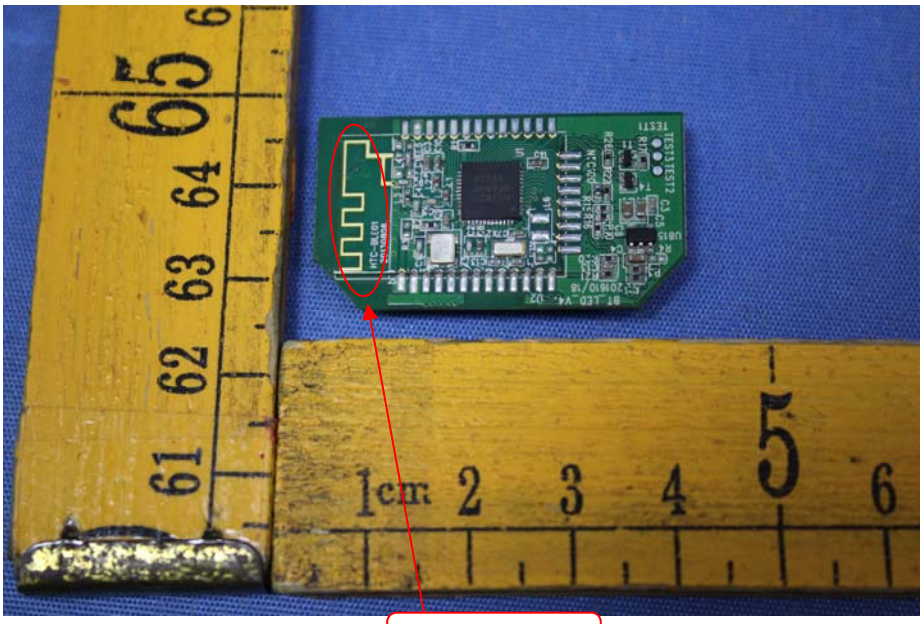


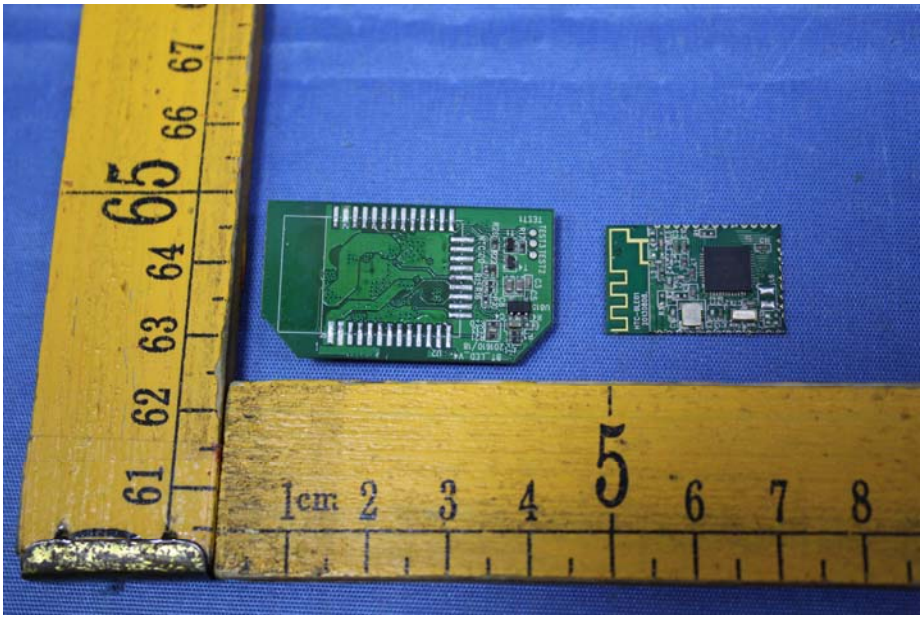
16.2 EUT – External View Model MP-LED01 FCC ID: 2AMNV-MP-LED01

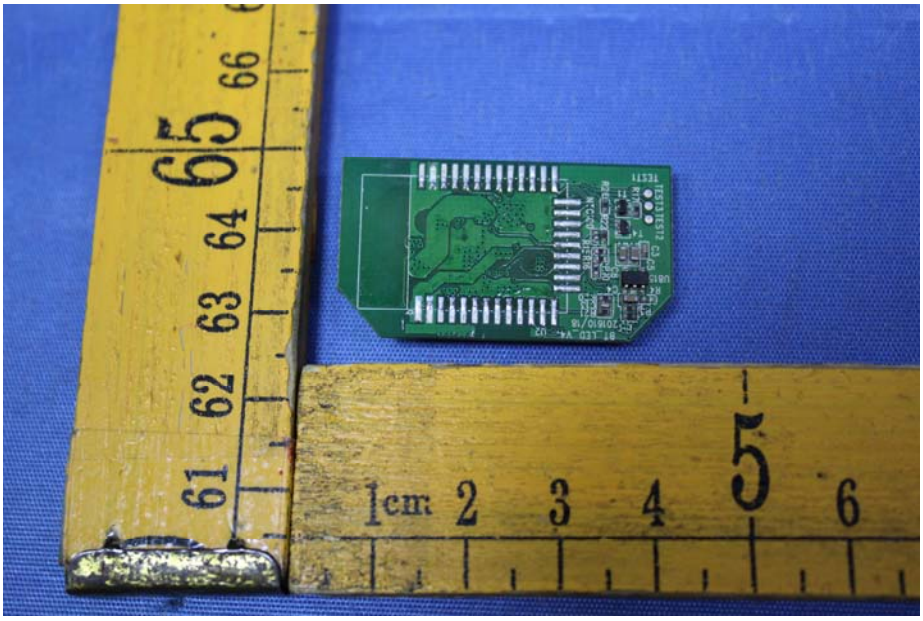
16.3 EUT – Internal View Model MP-LED01 FCC ID: 2AMNV-MP-LED01


65
64
63
62
61
1cm 2 3 4 5 6
MARK1
U1602
KEY1
MARK2


MARK1
C10
TEST6
U1601
J2402
TEST7
U1602
D1
C12
KEY1
MARK2


BLE ANT.




66
65
64
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62
61
1cm
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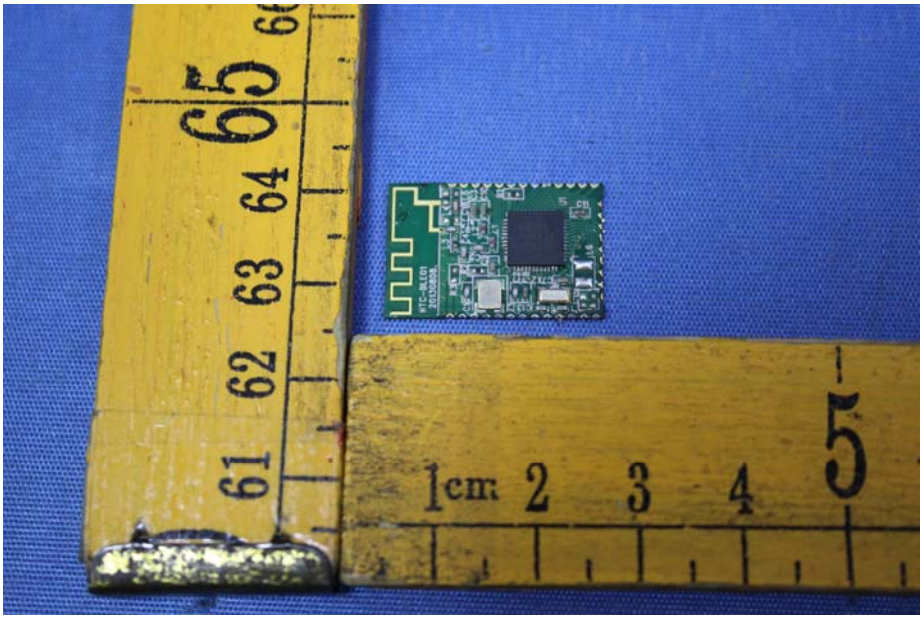
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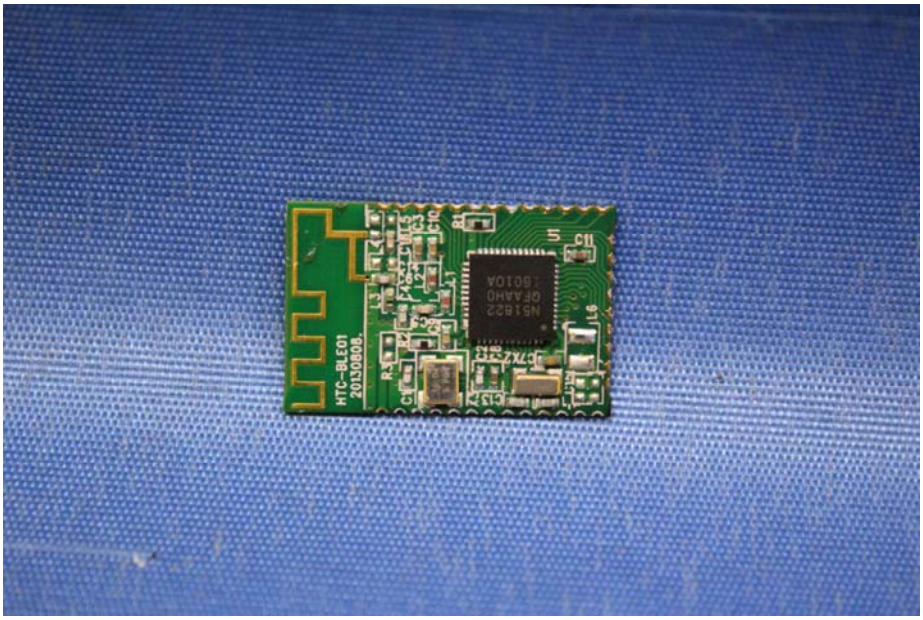
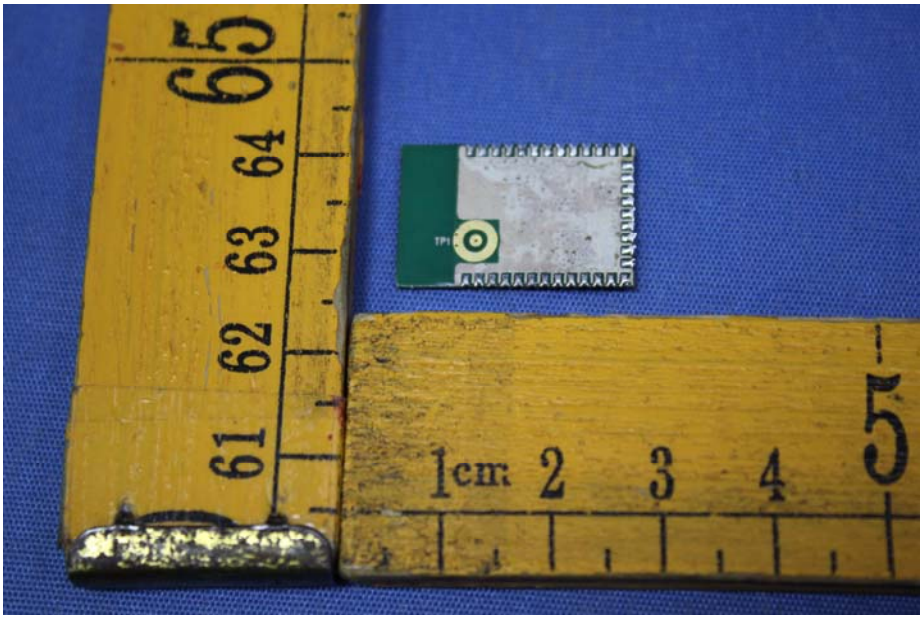
64
63
62
61
1cm
2
3
4
5





======End of Report======