

**ESTECH CO., Ltd.**

347-69, Jungbu-daero 147beon-gil, Majang-myeon,  
Icheon-si, Gyeonggi-do 467-811, R. O. Korea  
Tel : +82-31-631-8037 Fax : +82-31-631-8039

## Test Report for FCC

FCC ID:2AFNU-ULBM-01

Report Number		ESTF151512-003		
Applicant	Company name	Utileighting Co.,Ltd.		
	Address	#102, 1F, 22, Samyang-ro, Seongbuk-go, Seoul, 136-717, Korea		
	Telephone	82-70-4713-6561		
	Contact person	Wonhee Han		
Product	Product name	BT Module		
	Model No.	ULBM	Manufacturer	Utileighting Co.,Ltd.
	Serial No.	NONE	Country of origin	KOREA
Test date	2015-12-21 ~ 2015-12-22		Date of issue	22-Dec-15
Testing location	347-69, Jungbu-daero 147beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do 467-811, R. O. Korea			
Standard	FCC PART 15 Subpart C (15.247); ANSI C 63.10(2009) , KDB 558074 D01(2015)			
Measurement facility registration number		659627		
Tested by	Manager J.H.Kim		(Signature)	
Reviewed by	Engineering Manager J.M.Yang		(Signature)	
Abbreviation	OK, Pass = Passed, Fail = Failed, N/A = not applicable			
<p>* Note</p> <ul style="list-style-type: none"><li>- This test report is not permitted to copy partly without our permission</li><li>- This test result is dependent on only equipment to be used</li><li>- This test result based on a single evaluation of one sample of the above mentioned</li></ul>				



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Appendix 1. Special diagram

Appendix 2. Antenna Requirement



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## 1. Laboratory Information

### 1.1 General

This EUT (Equipment Under Test) has been shown to be capable of compliance with the applicable technical standards and is tested in accordance with the measurement procedures as indicated in this report.

ESTECH Lab attests to accuracy of test data. All measurement reported herein were performed by ESTECH Co., Ltd.

ESTECH Lab assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

### 1.2 Test Lab.

Corporation Name : ESTECH Co., Ltd.

Head Office : Suite 1015 World Meridian II, 123 Gasan Digital 2-ro, Geumcheon-gu, Seoul 153-759, R. O. Korea

EMC/Telecom/Safety Test Lab : 347-69, Jungbu-daero 147beon-gil, Majang-myeon, Icheon-si,  
Gyeonggi-do 467-811, R. O. Korea

### 1.3 Official Qualification(s)

MSIP : Granted Accreditation from Ministry of Information & Communication for EMC, Safety and Telecommunication

KOLAS : Accredited Lab By Korea Laboratory Accreditation Schema base on CENELEC requirements

FCC : Conformity Assessment Body(CAB) with registration number 659627 under APEC TEL MRA between the RRA and the FCC

VCCI : Granted Accreditation from Voluntary Control Council for Interference from ITE

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## 2. Description of EUT

### 2.1 Summary of Equipment Under Test (Bluetooth)

Modulation Type	: Bluetooth (DSSS)
Transfer Rate	: 1 Mbps
Number of Channel	: 40 ch
PEAK Output Power	: DSSS : 0.087 mW
Rating	: INPUT : AC (100 ~ 240) V, (50 ~ 60) Hz, 0.35 A : OUTPUT : DC 12 V, 1.5 A
Receipt Date	: 20-Jul-15
X-tal list(s) or Frequencies generated	: The highest operating frequency is 2 480 MHz (Bluetooth) XTAL : 16 MHz ,32.768 KHz, Bluetooth : 2.4 GHz

### 2.2 General descriptions of EUT

- Bluetooth v4.1 specification compliant ; Bluetooth Smart ; Bluetooth Low Energy ; BLE
- Small: 17mm x 25mm
- Integrated chip antenna
- RSSI monitoring for proximity applications
- <900nA current consumption in dormant mode
- <20mA peak current consumption in RX active
- Programmable general purpose PIO controller
- 10-bit ADC
- 12 digital PIOs
- 3 analog AIOs
- 1 UART
- shared 1 I2C(only master) or 1 SPI(master/slave)
- 4 PWM modules
- Wake-up interrupt and watchdog timer
- 5 operating modes : Running, Idle, Deep sleep, Hibernate, Dormant
- Over-the-Air Configuration or Firmware Update service (by Smart-phone)

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### 3. Test Standards

**Test Standard : FCC PART 15 Subpart C (15.247)**

This Standard sets out the regulations under which an intentional, unintentional, or incidental radiator may be operated without an individual license. It also contains the technical specifications, administrative requirements and other conditions relating to the marketing of Part 15 devices.

**Test Method : ANSI C 63.10 (2009) & KDB558074 D01(2015)**

This standard sets forth uniform methods of measurement of radio-frequency (RF) signals and noise emitted from both unintentional and intentional emitters of RF energy in the frequency range 9 kHz to 40 GHz. Methods for the measurement of radiated and AC power-line conducted radio noise are covered and may be applied to any such equipment unless otherwise specified by individual equipment requirements. These methods cover measurement of certain devices that deliberately radiate energy, such as intentional emitters, but does not cover licensed transmitters. This standard is not intended for certification/approval of avionic equipment or for industrial, scientific, and medical (ISM) equipment. These methods apply to the measurement of individual units or systems comprised of multiple units.

**Summary of Test Results**

Applied Standard : 47 CFR Part 15 Subpart C				remark
Standard	Test Type	Result	Remark	Limit
15.207	AC Power Conducted Emission	Pass	Meet the requirement	
15.205 & 15.209	Restricted band / Intentional Radiated Emission	Pass	Meet the requirement	
15.247(a)(2)	6 dB Bandwidth	Pass	See Note 1	Min. 500 kHz
	Occupied Bandwidth			
15.247(b)(3)	Maximum Peak/average output power	Pass	See Note 1	Max. 30 dBm
15.247(c)	Transmitter Radiated Emission	Pass	Meet the requirement	Table 15.209
15.247(e)	Power Spectral Density	Pass	See Note 1	Max. 8 dBm
15.247(d)	Band Edge Measurement	Pass	See Note 1	20 dB less

\* Note 1 : Please refer to test report ESTF151508-002 for FCC ID : 2AFNU-ULBM-01

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## 4. Measurement Condition

### 4.1 EUT Operation

#### a. Channel

Ch.	Frequency	Ch.	Frequency
0	2402 MHz	21	2444 MHz
1	2404 MHz	22	2446 MHz
2	2406 MHz	23	2448 MHz
3	2408 MHz	24	2450 MHz
4	2410 MHz	25	2452 MHz
5	2412 MHz	26	2454 MHz
6	2414 MHz	...	...
...	...	39	2480 MHz
20	2442 MHz		

b. Measurement Channel : Bluetooth : Low(2402 MHz), Middle(2442 MHz),High(2480 MHz)

c. Test Mode : Continuous Output, DSSS

d. Test rate : 1 Mbps



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### 4.2 EUT Operation.

- \* The EUT was in the following operation mode during all testing
- \* Execute a RF test program to enable EUT under transmission/receiving condition continuously at specific channel frequency.
- \* Transmit mode were measured each channels(Low,Middle,High).
- \* Check RF output power by spectrum analyzer.
- \* The EUT was measured up to tenth harmonic or 40 GHz of the highest operating frequencies.

Before

Limited Modular Approval for portable platform. Host:

LED lighting system/JPKKOREA Co., Ltd. (Model No. JUIDPL-S40)

After

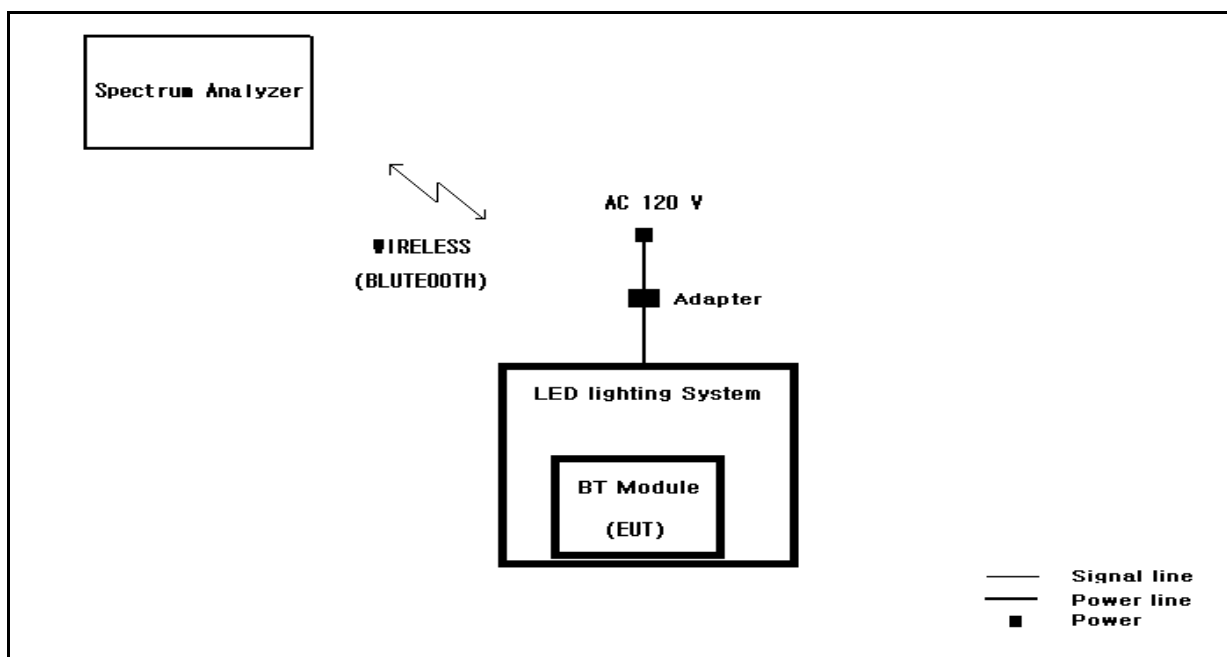
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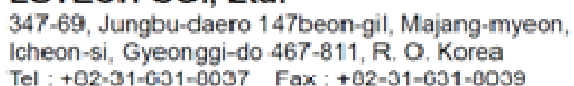
LED lighting system/JPKKOREA Co., Ltd. (Model No. JUIDPL-S40)

LED lighting system/ POWER PLUS .CO.,LTD (Model No. JLPS-2612LH)

LED lighting system/ POWER PLUS .CO.,LTD (Model No. JLPS-2612LHW)

### 4.3 Configuration and Peripherals





#### 4.4 EUT and Support equipment

Equipment Name	Model Name	S/N	Manufacturer	Remark (FCC ID)
BT Module	ULBM	NONE	Utileighting Co.,Ltd.	EUT
Adapter	SH-1215N	NONE	Advanced Power Supply	
LED lighting System	JLPS-2612LH ' JLPS-2612LHW	NONE	POWER PLUS .CO.,LTD	
Spectrum Analyzer	R3273	110600592	ADVANTEST	

## 4.5 Cable Connecting

[illegible]



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## 5. Emissions in non-restricted frequency bands

### 5.1 Test procedure

KDB 558074 D01 DTS Meas Guidance V03r03 11.0 Emissions in non-restricted

### 5.2 Test instruments and measurement setup

The spectrum analyzer is set to as following

- a) Set instrument center frequency to DTS channel center frequency.
- b) Set the span to  $\geq 1.5$  times the DTS bandwidth.
- c) Set the RBW = 100 kHz.
- d) Set the VBW  $\geq 3 \times$  RBW.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum PSD level.

Limits FCC § 15.247

#### Band Edge&Out of Emission Test Instruments

Description	Model	Serial Number	Cal. Due Date
Spectrum Analyzer	FSV40	100939	2016-1-19
RF Cable	Length: 6cm		—
—Spectrum Analyzer $\Leftrightarrow$ EUT	Loss: 1.0dB		—

### 5.3 Measurement results of band-edge & out of emission

EUT	BT Module	MODEL	ULBM
MODE	DSSS	ENVIRONMENTAL CONDITION	23.0 °C, 43.0 % R.H
INPUT POWER	5 Vd.c.		

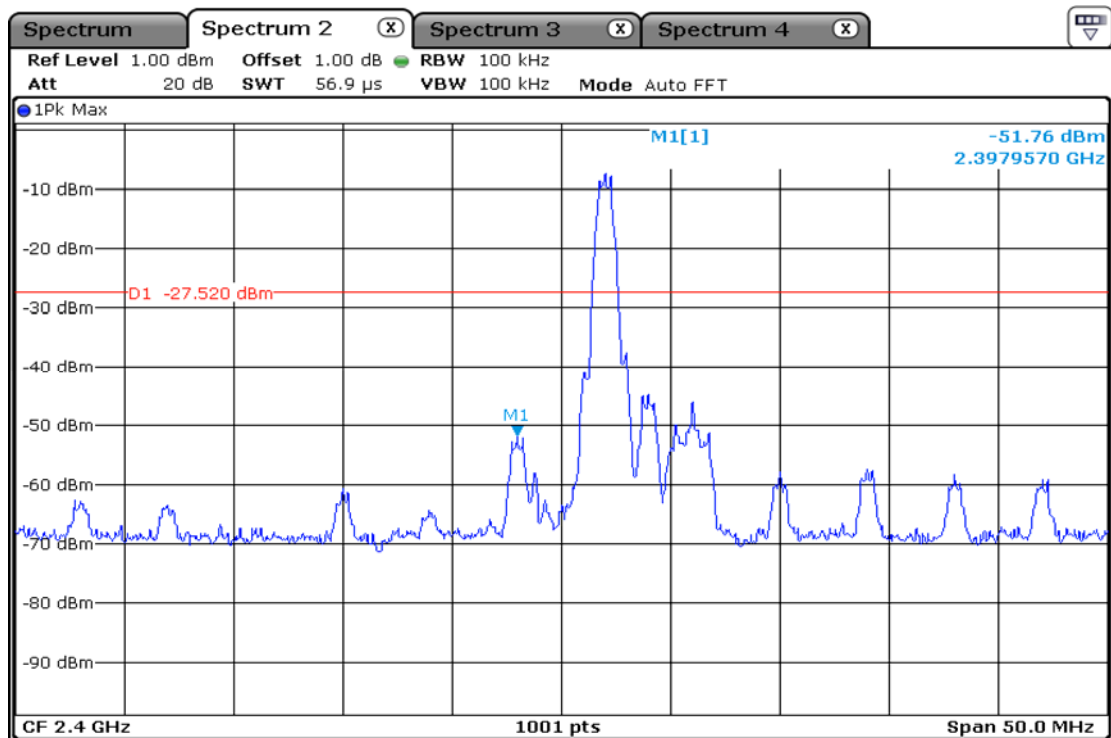
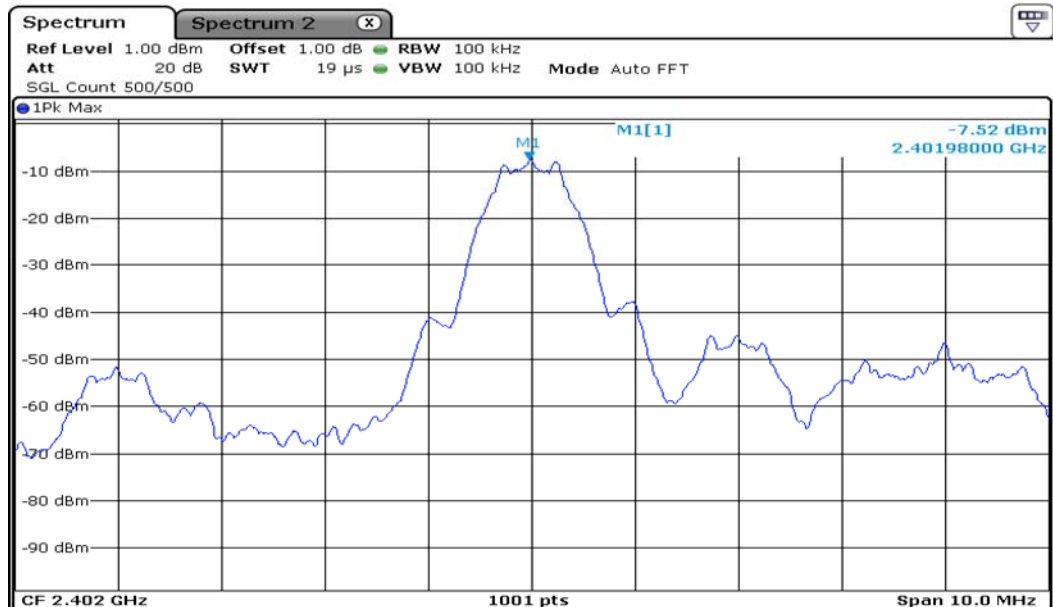
CHANNEL	Channel Frequency (MHz)	limit	PASS/FAIL
0	2 402	20dBc	PASS
39	2480	20dBc	PASS



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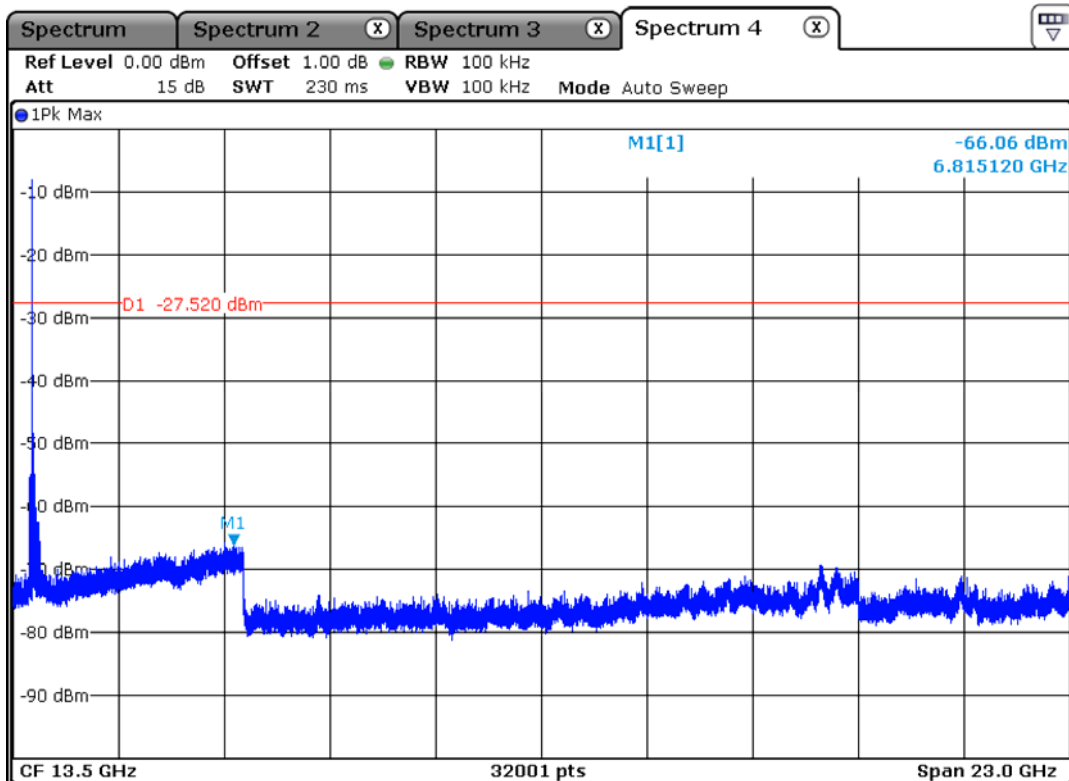
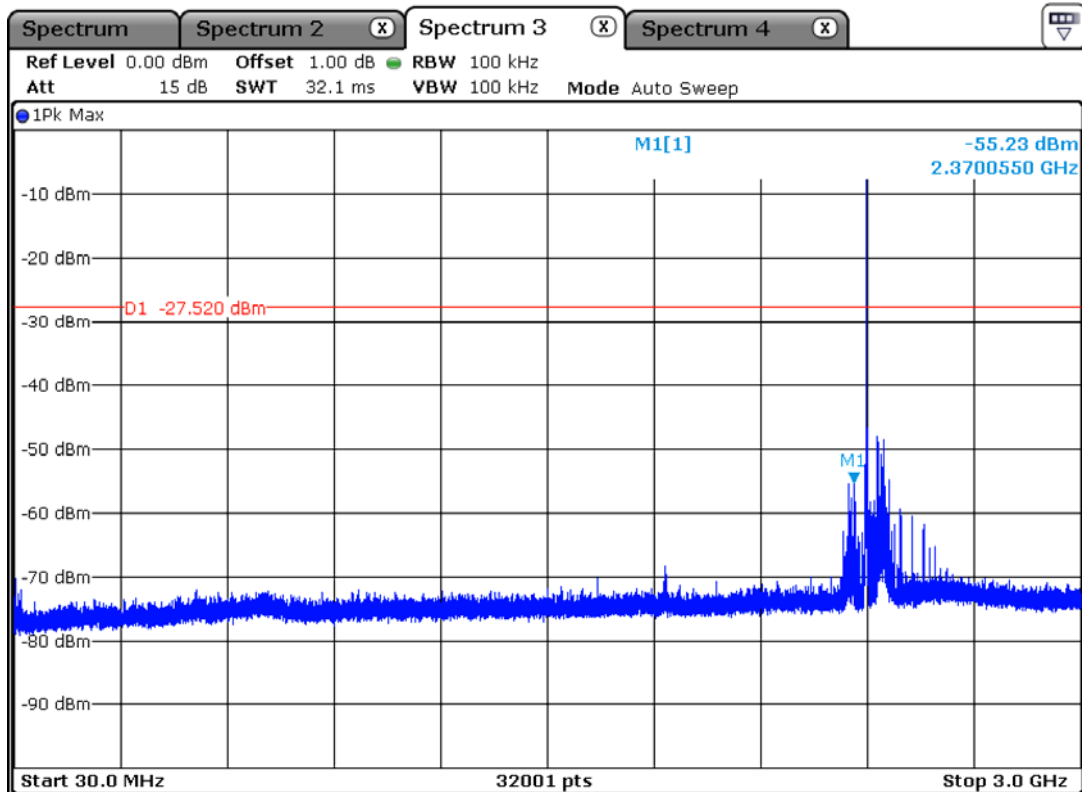
### 5.4 Trace data of band-edge & Out of Emission (ch\_0)





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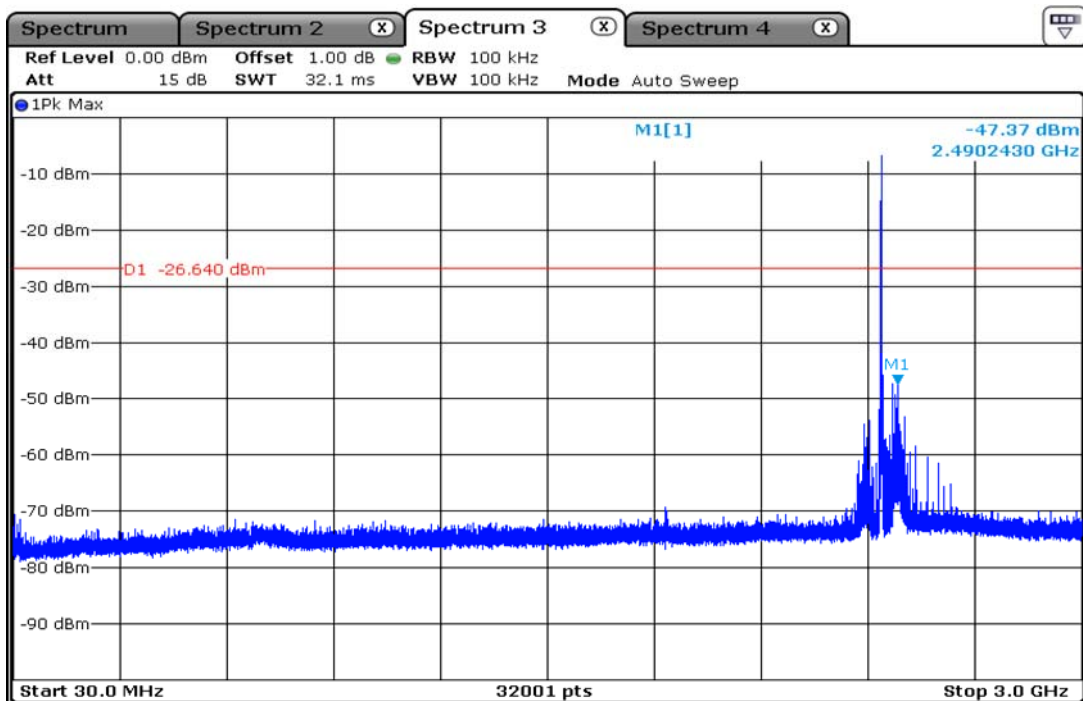
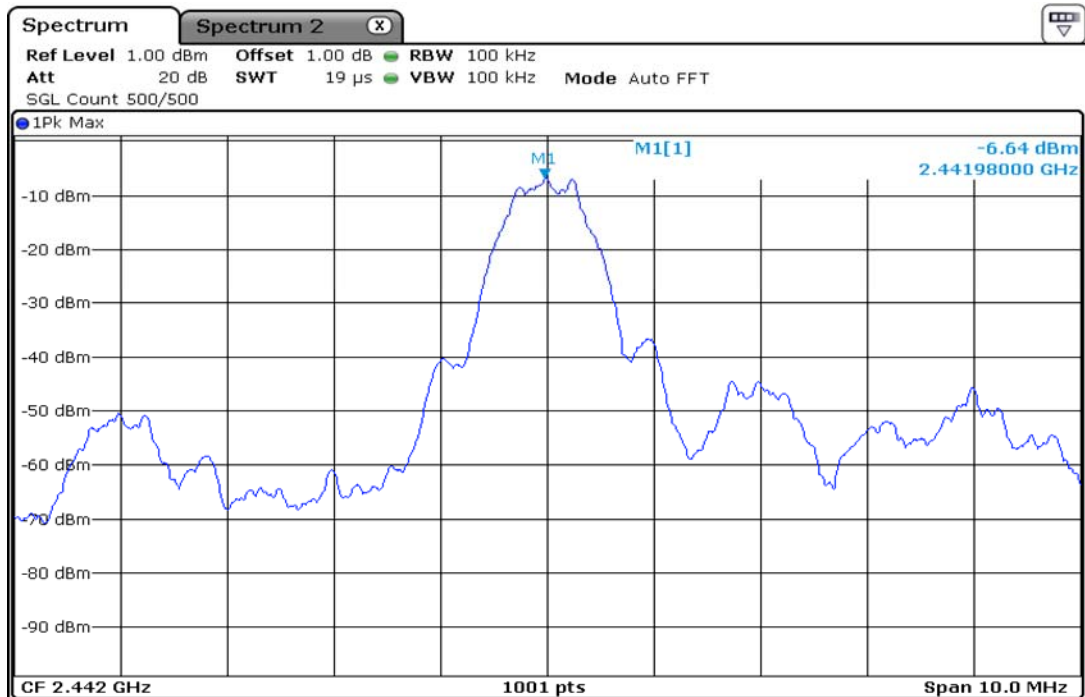
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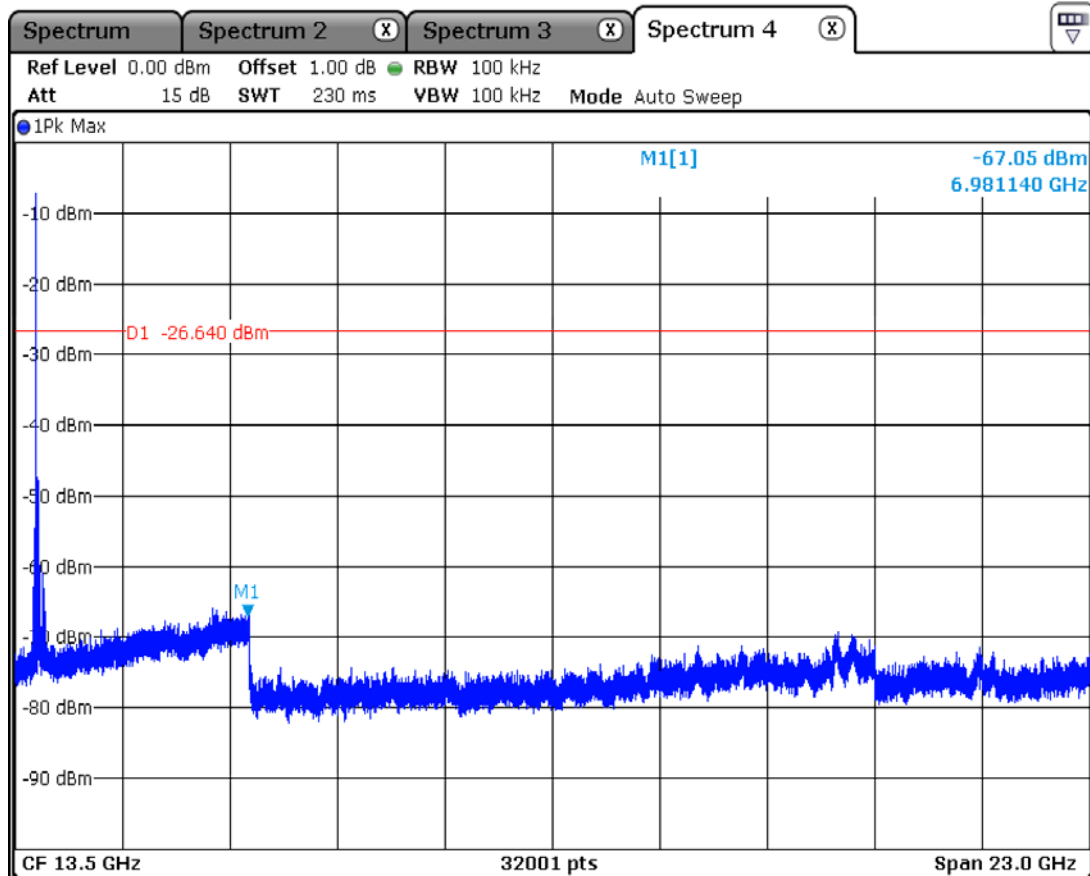
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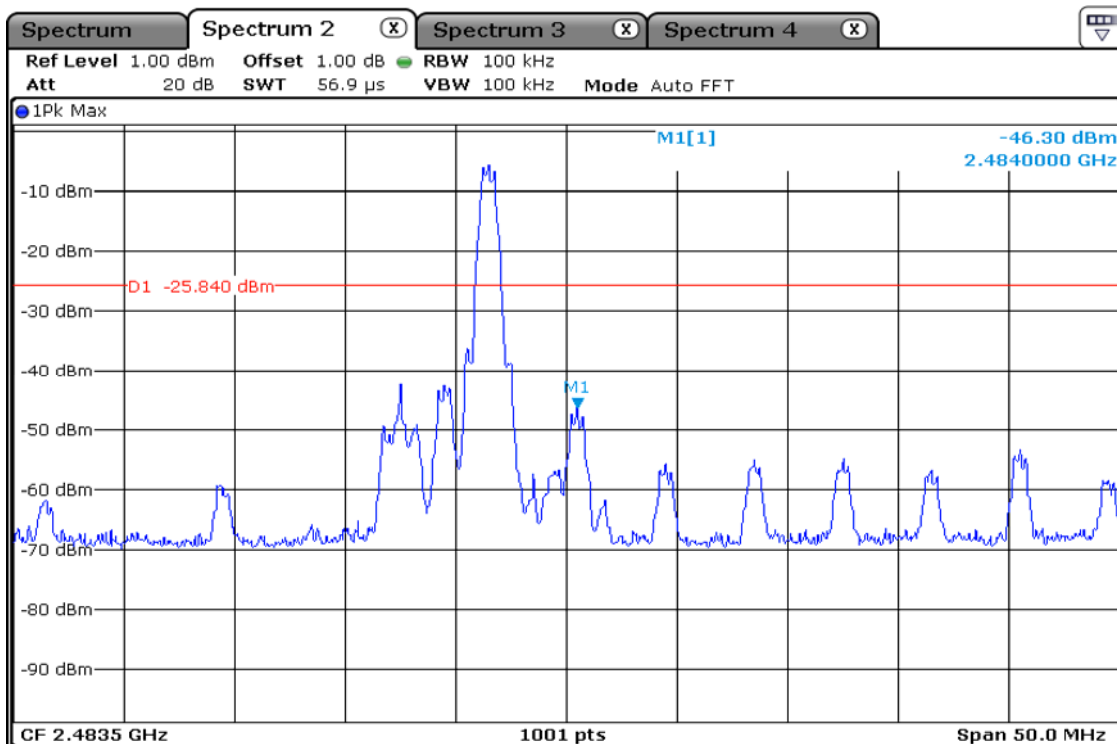
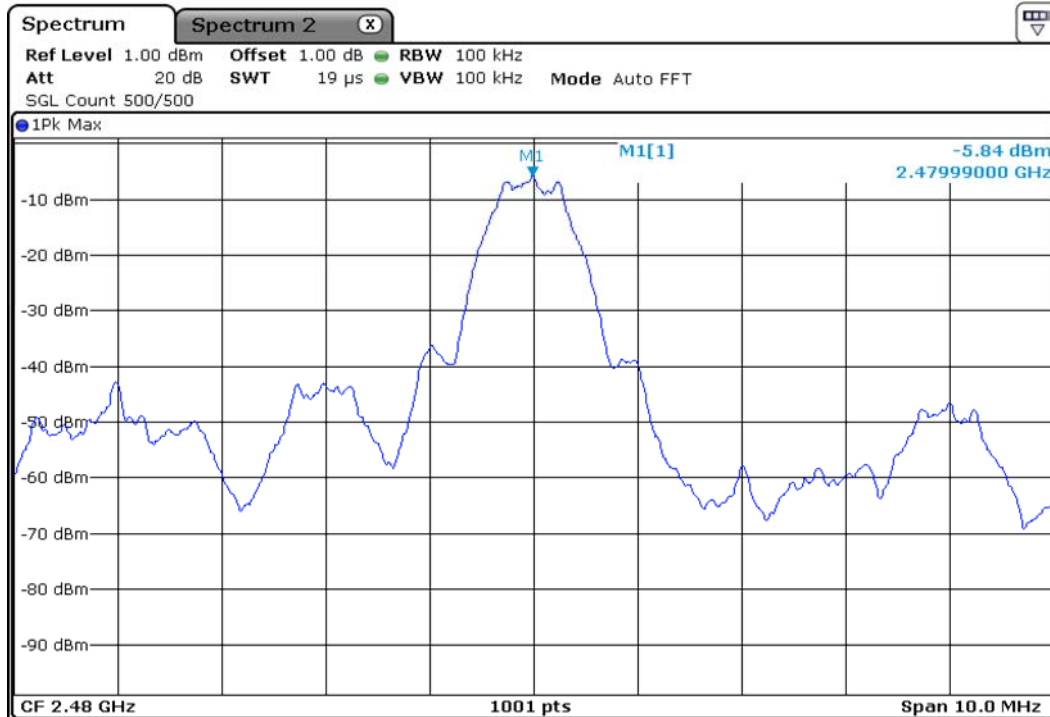




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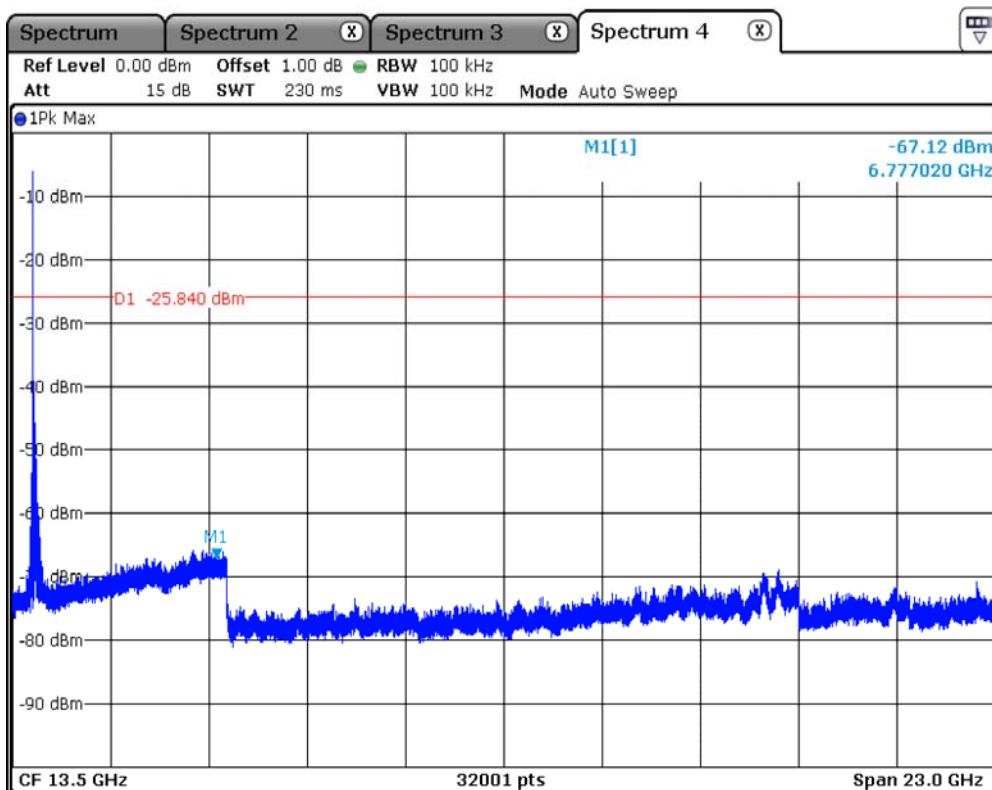
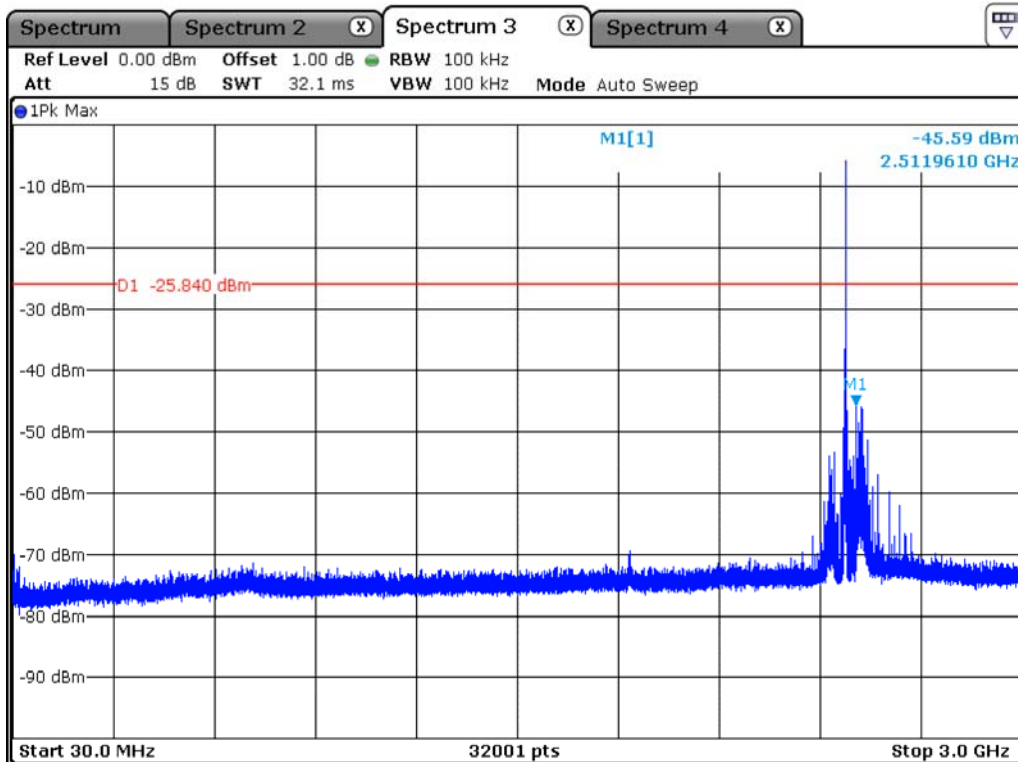
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## 6. Measurement of radiated disturbance

Above 30 MHz Electric Field strength was measured in accordance with FCC PART 15.205, 15.209 . The test setup was made according to ANSI C 63.10 (2009) & KDB 558074 D01 Semi-anechoic chamber, which allows a 3 m distance measurement. The EUT was placed in the center of styrofoam. turntable. The height of this table was 0.8 m. The measurement was conducted with both horizontal and vertical antenna polarization. The turntable has fully rotated. For further description of the configuration refer to the picture of the test setup.

### 6.1 Measurement equipments

Equipment Name	Type	Manufacturer	Serial No.	Next Calibration date
TEST Receiver	ESCI7	ROHDE & SCHWARZ	100916	13-Jan-16
Logbicon Antenna	VULB 9168	SCHWARZBECK	237	13-Jan-16
Turn Table	DT3000-2t	Innco System GmbH	N/A	-
Antenna Mast	MA4000-EP	Innco System GmbH	N/A	-
PREAMPLIFIER	8449B	AGILENT	3008A00595	13-Jan-16
Horn Antenna	BBHA9120D	SCHWARZBECK	469	16-Oct-16
Test Receiver	ESPI7	ROHDE & SCHWARZ	100185	13-Jan-16
Spectrum Analyzer	R3273	ADVANTEST	110600592	13-Jan-16
Turn Table	DT1500-S	Innco System GmbH	N/A	-
Antenna Mast	MA4000-EP	Innco System GmbH	N/A	-
Pyramidal Horn Antenna	3160-09-01	EST-LINDGREN	102642	14-Nov-16
Antenna Master & Turn table controller	CO2000-P	Innco System GmbH	CO2000/642 /28051111/L	-

## 10.2 Environmental Condition

Below 1 GHz -Test Place : 10 m Semi-anechoic chamber

### Bluetooth LE Mode

Temperature (°C) : 22.7 °C

Humidity (% R.H.) : 54.2 % R.H.

Above 1 GHz-Test Place : 3 m Semi-anechoic chamber

### Bluetooth LE Mode

Temperature (°C) : 21.4 °C

Humidity (% R.H.) : 58.4 % R.H.



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## 6.3 Measurement Instrument setting for Radiated Emission

### 6.3.1 Frequency range below 1 GHz

Detector : Quasi-Peak

### 6.3.2 Frequency range above 1 GHz

#### Peak Power Measurement Procedure (KDB 558074 section 12.2.4)

- a. RBW : 1 MHz , VBW : 3 MHz
- b. Trace mode = max hold
- c. Detector : Peak
- d. Sweep time = auto

#### Average Power Measurement Procedures (KDB 558074 section 12.2.5.3)

- a. Set analyzer center frequency to the frequency associated with the emission
- b. RBW : 1 MHz , VBW : 1 kHz
- c. Detector : Peak
- d. Sweep time = auto

Note

Band	Duty cycle(%)	Ton (ms)	Ton + Toff (ms)	DCF=10*log(1/Duty) (dB)
Bluetooth	66.0	0.413	0.627	1.80

\*This was applied of duty cycle factor for average value because of measured with the EUT transmitting continuously less than 98% duty cycle at its maximum power control level.

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## 6.4 Test Data for Bluetooth (BLE)

Test Date : 21-Dec-15

Measurement Distance : 3 m

Frequency (MHz)	Reading (dB $\mu$ V)	Position (V/H)	Height (m)	Correction Factor		Result Value		
				Ant Factor (dB)	Cable (dB)	Limit (dB $\mu$ V/m)	Result (dB $\mu$ V/m)	Margin (dB)
47.10	16.91	V	1.0	13.59	1.21	40.00	31.70	8.30
71.10	21.72	V	1.0	11.52	1.46	40.00	34.70	5.30
107.20	18.23	V	1.0	9.59	1.78	43.50	29.60	13.90
129.00	14.78	H	2.4	11.78	1.95	43.50	28.50	15.00
157.60	18.21	V	1.0	13.24	2.15	43.50	33.60	9.90
484.00	9.37	V	1.0	17.49	3.74	46.00	30.60	15.40
Remark	<p>H : Horizontal, V : Vertical TEST MODE : Bluetooth - LE (CH : 20 - 2 442 MHz)</p> <p>*Checked in all 3 axis and the maximum measured data were reported.( Worst data is Z axis of position) *CL = Cable Loss(In case of below 1 000 MHz) *Result Value = Reading + Ant Factor + Cable loss *The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection at frequency below 1 GHz.</p>							

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**6.4-1 Test Data for Bluetooth (LE)**

Test Date : 21-Dec-15

Measurement Distance : 3 m

Frequency (MHz)	Reading (dB $\mu$ /m)	Position (V/H)	Height (m)	Correction Factor		Duty Cycle Correction(dB)	Result Value		
				Ant Factor (dB)	Cable (dB)		Limit (dB $\mu$ /m)	Result (dB $\mu$ /m)	Margin (dB)
PEAK(RBW: 1 MHz    VBW: 3 MHz)									
2316.20	26.06	H	1.0	26.47	5.62	0.00	74.00	58.15	15.85
2316.20	24.51	V	1.0	26.47	5.62	0.00	74.00	56.60	17.40
2390.00	25.93	H	1.0	26.59	5.62	0.00	74.00	58.14	15.86
2390.00	24.48	V	1.0	26.59	5.62	0.00	74.00	56.69	17.31
4804.00	46.38	H	1.0	30.72	-24.20	0.00	74.00	52.90	21.10
4804.00	46.31	V	1.0	30.72	-24.20	0.00	74.00	52.83	21.17
AV(RBW: 1 MHz    VBW: 1 kHz)									
2316.20	13.05	H	1.0	26.47	5.62	1.80	54.00	46.94	7.06
2316.20	13.03	V	1.0	26.47	5.62	1.80	54.00	46.92	7.08
2390.00	13.08	H	1.0	26.59	5.62	1.80	54.00	47.09	6.91
2390.00	12.99	V	1.0	26.59	5.62	1.80	54.00	47.00	7.00
4804.00	33.42	H	1.0	30.72	-24.20	1.80	54.00	41.74	12.26
4804.00	33.45	V	1.0	30.72	-24.20	1.80	54.00	41.77	12.23
Remark	H : Horizontal,    V : Vertical    TEST MODE : Bluetooth – LE (CH : 0 – 2 402 MHz)								
	*The TX signal wasn't detected from 3th harmonics.								
	*Checked in all 3 axis and the maximum measured data were reported.( Worst data is Z axis of position)								
	*Total = Reading Value + Antenna Factor + Cable Loss – Amp Gain + Duty Cycle Correction								
	FYI a. Ton Time : 0.413 ms b. duty cycle : 66 % c. DCF : 1.80 dB								

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**6.4-2 Test Data for Bluetooth (BLE)**

Test Date : 21-Dec-15

Measurement Distance : 3 m

Frequency (MHz)	Reading (dB $\mu$ V)	Position (V/H)	Height (m)	Correction Factor		Duty Cycle Correction(dB)	Result Value		
				Ant Factor (dB)	Cable (dB)		Limit (dB $\mu$ V/m)	Result (dB $\mu$ V/m)	Margin (dB)
PEAK(RBW: 1 MHz    VBW: 3 MHz)									
4884.00	46.36	H	1.0	30.86	-23.96	0.00	74.00	53.25	20.75
4884.00	46.28	V	1.0	30.86	-23.96	0.00	74.00	53.17	20.83
AV(RBW: 1 MHz    VBW: 1 kHz)									
4884.00	33.26	H	1.0	30.86	-23.96	1.71	54.00	41.86	12.14
4884.00	33.16	V	1.0	30.86	-23.96	1.71	54.00	41.76	12.24
Remark	H : Horizontal,    V : Vertical    TEST MODE : Bluetooth – LE (CH : 20 – 2 442 MHz)								
	*The TX signal wasn't detected from 3th harmonics.								
	*Checked in all 3 axis and the maximum measured data were reported.( Worst data is Z axis of position)								
	*Total = Reading Value + Antenna Factor + Cable Loss – Amp Gain + Duty Cycle Correction								
	FYI								
	a. Ton Time : 0.413 ms								
	b. duty cycle : 66 %								
	c. DCF : 1.80 dB								

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**6.4-3 Test Data for Bluetooth (BLE)**

Test Date : 21-Dec-15

Measurement Distance : 3 m

Frequency (MHz)	Reading (dB $\mu$ V)	Position (V/H)	Height (m)	Correction Factor		Duty Cycle Correction(dB)	Result Value		
				Ant Factor (dB)	Cable (dB)		Limit (dB $\mu$ V/m)	Result (dB $\mu$ V/m)	Margin (dB)
PEAK(RBW: 1 MHz    VBW: 3 MHz)									
2483.50	27.13	H	1.0	26.74	5.80	0.00	74.00	59.67	14.33
2483.50	25.59	V	1.0	26.74	5.80	0.00	74.00	58.13	15.87
2492.10	24.24	H	1.0	26.76	5.80	0.00	74.00	56.80	17.20
2492.10	24.10	V	1.0	26.76	5.80	0.00	74.00	56.66	17.34
4960.00	46.34	H	1.0	30.98	-23.87	0.00	74.00	53.45	20.55
4960.00	47.11	V	1.0	30.98	-23.87	0.00	74.00	54.22	19.78
AV(RBW: 1 MHz    VBW: 1 kHz)									
2483.50	15.69	H	1.0	26.74	5.80	1.80	54.00	50.03	3.97
2483.50	13.84	V	1.0	26.74	5.80	1.80	54.00	48.18	5.82
2492.10	15.53	H	1.0	26.76	5.80	1.80	54.00	49.89	4.11
2492.10	12.95	V	1.0	26.76	5.80	1.80	54.00	47.31	6.69
4960.00	34.14	H	1.0	30.98	-23.87	1.80	54.00	43.05	10.95
4960.00	34.04	V	1.0	30.98	-23.87	1.80	54.00	42.95	11.05
Remark	H : Horizontal,    V : Vertical    TEST MODE : Bluetooth – LE (CH : 39 – 2 480 MHz)								
	*The TX signal wasn't detected from 3th harmonics. *Checked in all 3 axis and the maximum measured data were reported.( Worst data is Z axis of position) *Total = Reading Value + Antenna Factor + Cable Loss – Amp Gain + Duty Cycle Correction  FYI a. Ton Time : 0.413 ms b. duty cycle : 66 % c. DCF : 1.80 dB								



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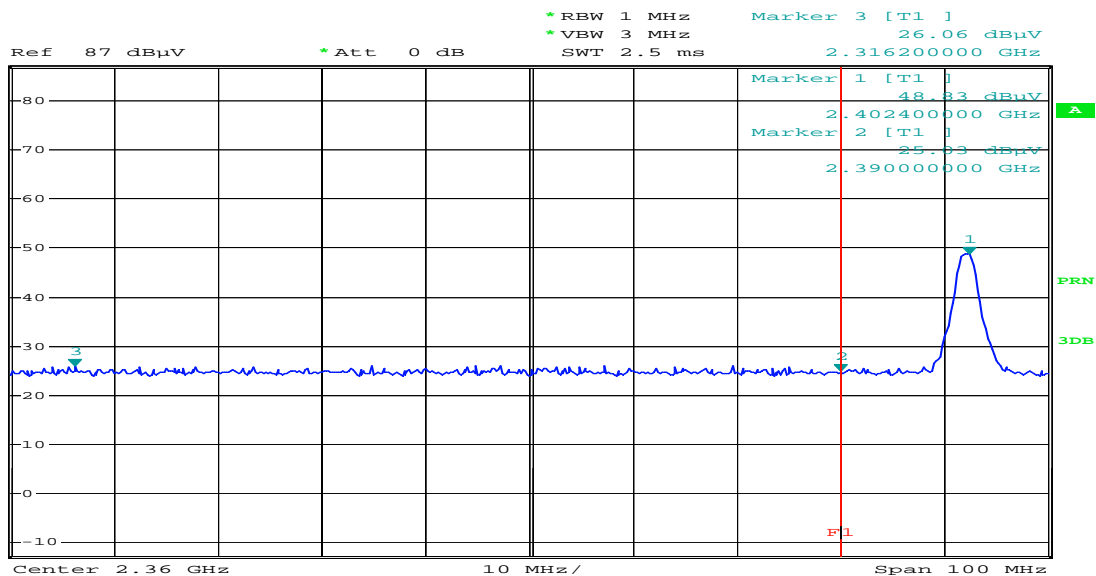
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## 6.4-4 Restricted Band Edges for Bluetooth (LE)

Band Edges(CH Low)

Detector mode:Peak

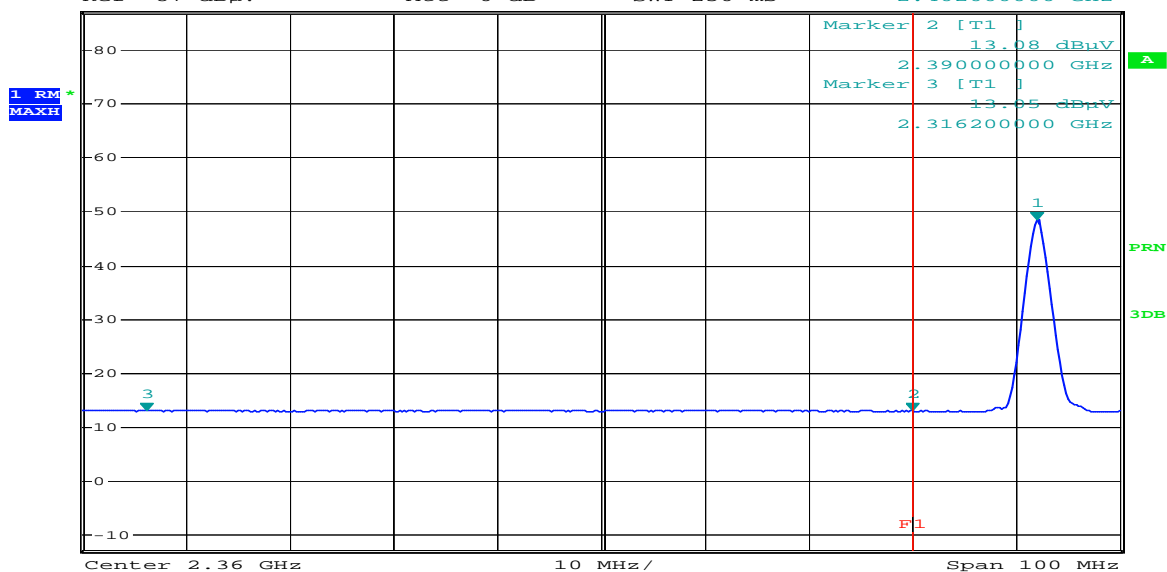
Polarity:Horizontal



Comment : ESTC-15-01463 2402 MHz PK HOR

Detector mode:Average

Polarity:Horizontal



Comment : ESTC-15-01463 2402 MHz AV HOR



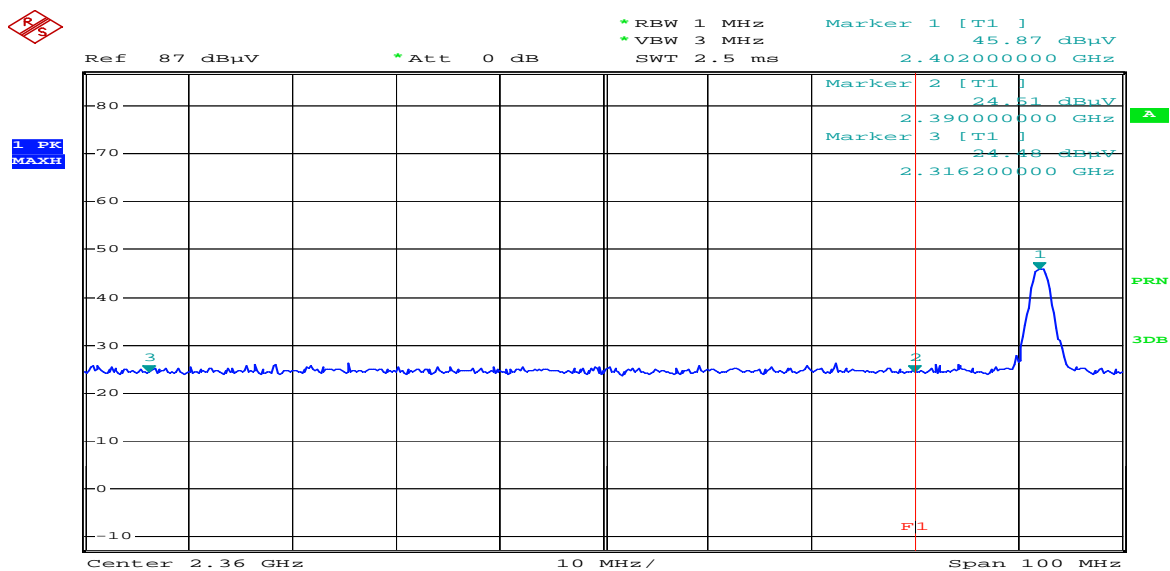
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Band Edges(CH Low)

Detector mode:Peak

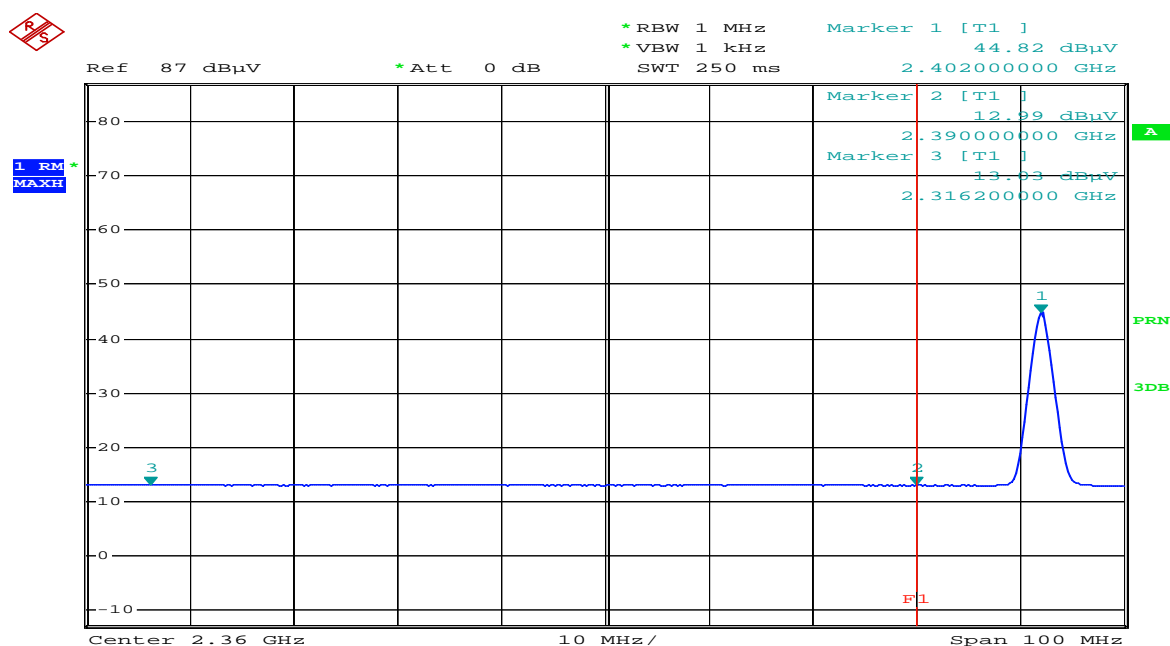
Polarity:Vertical



Comment : ESTC-15-01463 2402 MHz PK VER

Detector mode:Average

Polarity:Vertical



Comment : ESTC-15-01463 2402 MHz AV VER



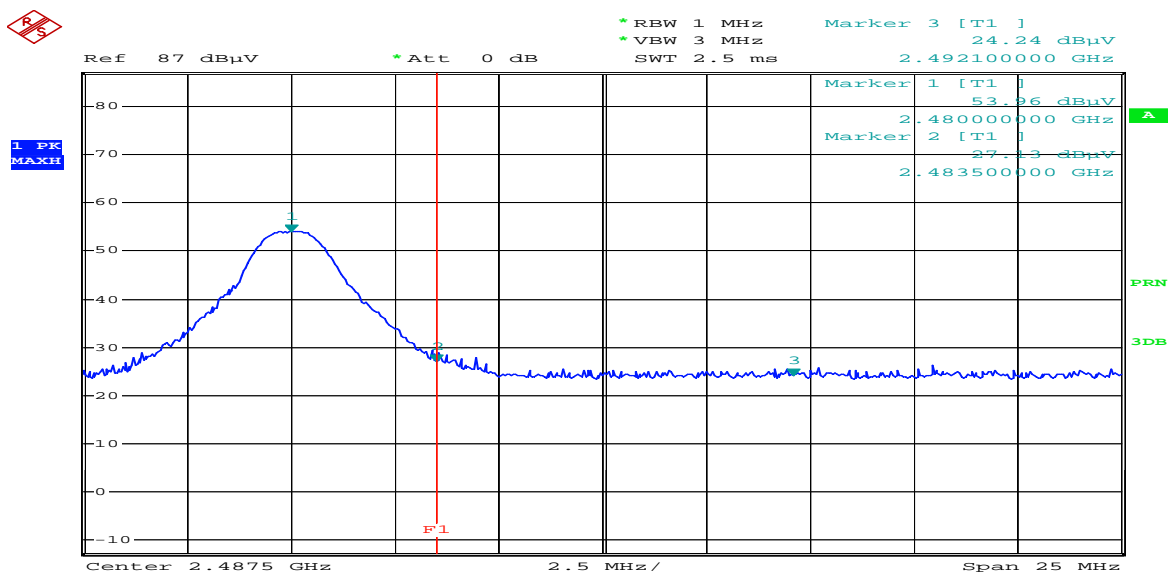
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Band Edges(CH High)

Detector mode:Peak

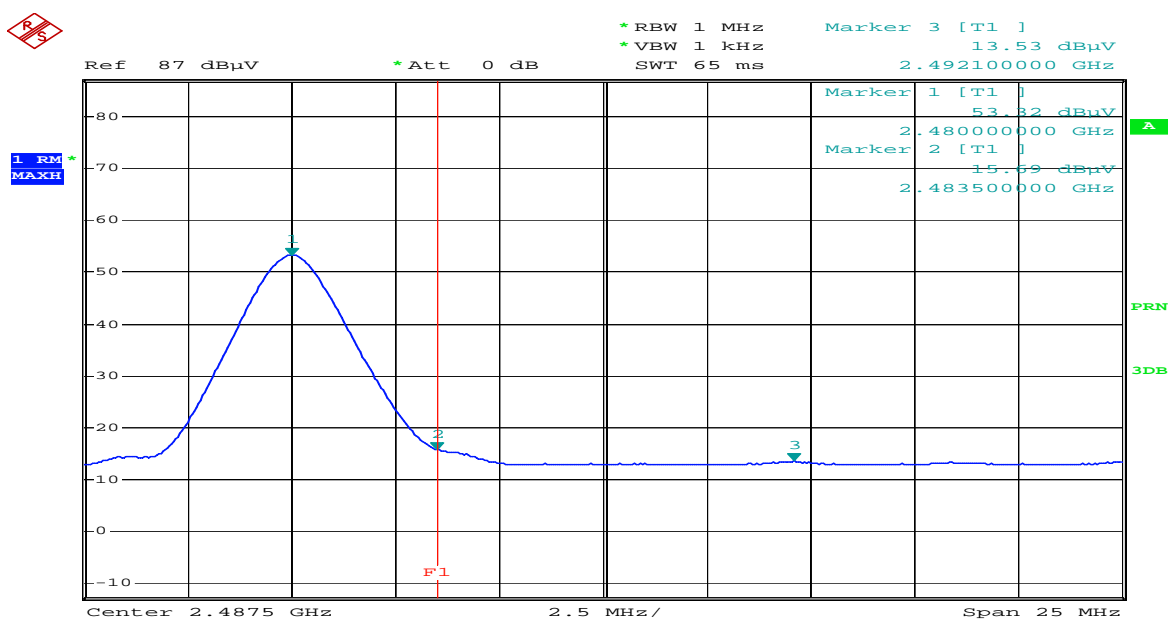
Polarity:Horizontal



Comment: ESTC-15-01463 2480 MHz PK HOR

Detector mode:Average

Polarity:Horizontal



Comment: ESTC-15-01463 2480 MHz AV HOR





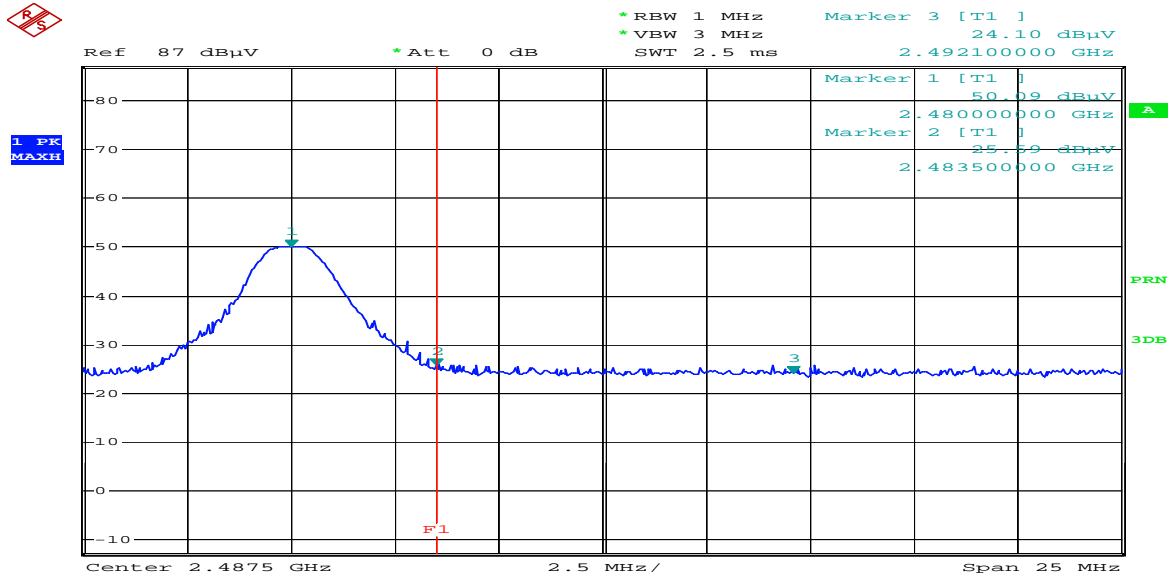
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Band Edges(CH High)

Detector mode:Peak

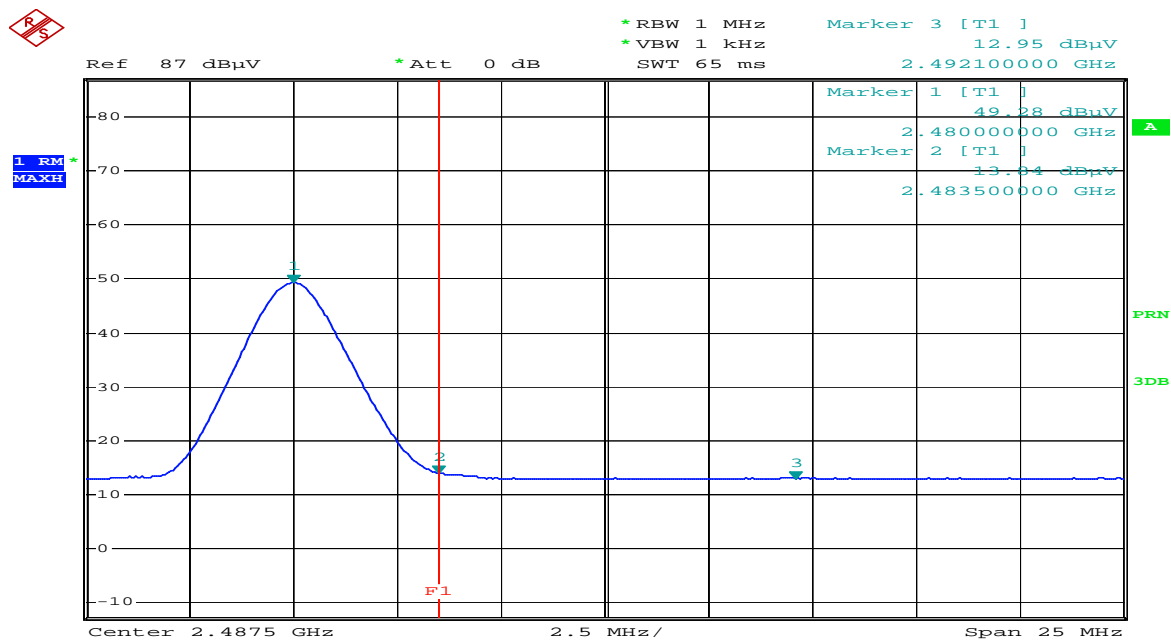
Polarity:Vertical



Comment: ESTC-15-01463 2480 MHz PK VER

Detector mode:Average

Polarity:Vertical



Comment: ESTC-15-01463 2480 MHz AV VER

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## 7. Measurement of conducted disturbance

The continuous disturbance voltage of AC Mains in the frequency from 0.15 MHz to 30 MHz was measured in accordance to FCC PART 15.207. The test setup was made according to ANSI C 63.10 (2009) in a shielded room. The EUT was placed on a non-conductive table at least 0.8 m above the ground plan. A grounded vertical reference plane was positioned in a distance of 0.4 m from the EUT. The distance from the EUT to other metal surfaces was at least 0.8 m. The EUT was only earthen by its power cord through the line impedance stabilizing network. The power cord has been bundled to a length of 1.0 m. The test receiver with Quasi Peak detector complies with CISPR 16.

### 7.1 Measurement equipments

Equipment Name	Type	Manufacturer	Serial No.	Next Calibration date
TEST RECEIVER	ESPI	Rohde & Schwarz	100005	13-Jan-16
LISN	ESH3-Z5	Rohde & Schwarz	836679/025	13-Jan-16
Pulse Limiter	ESH3Z2	Rohde & Schwarz	NONE	13-Jan-16

### 7.2 Environmental Condition

Test Place : Shielded Room

Temperature (°C) : 22.7 °C

Humidity (% R.H.) : 55.8 % R.H.

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## 7.3 Test Data for Bluetooth (BLE)

Test Date : 21-Dec-15

Frequency (MHz)	Correction Factor		Line (H/N)	Quasi-peak Value			Average Value		
	Lisn (dB)	Cable (dB)		Limit (dB $\mu$ W)	Reading (dB $\mu$ W)	Result (dB $\mu$ W)	Limit (dB $\mu$ W)	Reading (dB $\mu$ W)	Result (dB)
0.17	0.12	0.12	H	64.91	39.11	39.35	54.91	21.97	22.21
0.21	0.11	0.14	N	63.32	39.77	40.02	53.32	22.88	23.13
0.24	0.10	0.12	H	62.10	33.41	33.63	52.10	19.28	19.50
0.28	0.12	0.14	N	60.85	35.69	35.95	50.85	20.92	21.18
0.57	0.14	0.16	N	56.00	33.92	34.22	46.00	20.86	21.16
0.58	0.12	0.14	H	56.00	28.10	28.36	46.00	17.43	17.69
0.98	0.10	0.14	H	56.00	23.48	23.72	46.00	16.67	16.91
1.01	0.11	0.15	N	56.00	23.21	23.47	46.00	16.30	16.56
12.81	0.11	0.14	N	60.00	19.95	20.20	50.00	9.47	9.72
13.01	0.11	0.14	H	60.00	20.02	20.27	50.00	9.58	9.83
25.21	0.12	0.14	H	60.00	19.91	20.17	50.00	9.64	9.90
25.73	0.16	0.21	N	60.00	20.54	20.91	50.00	9.94	10.31
Remark	H : Hot Line, N : Neutral Line *Correction Factor = Lisn + Cable *Result = Correction Factor + Reading								



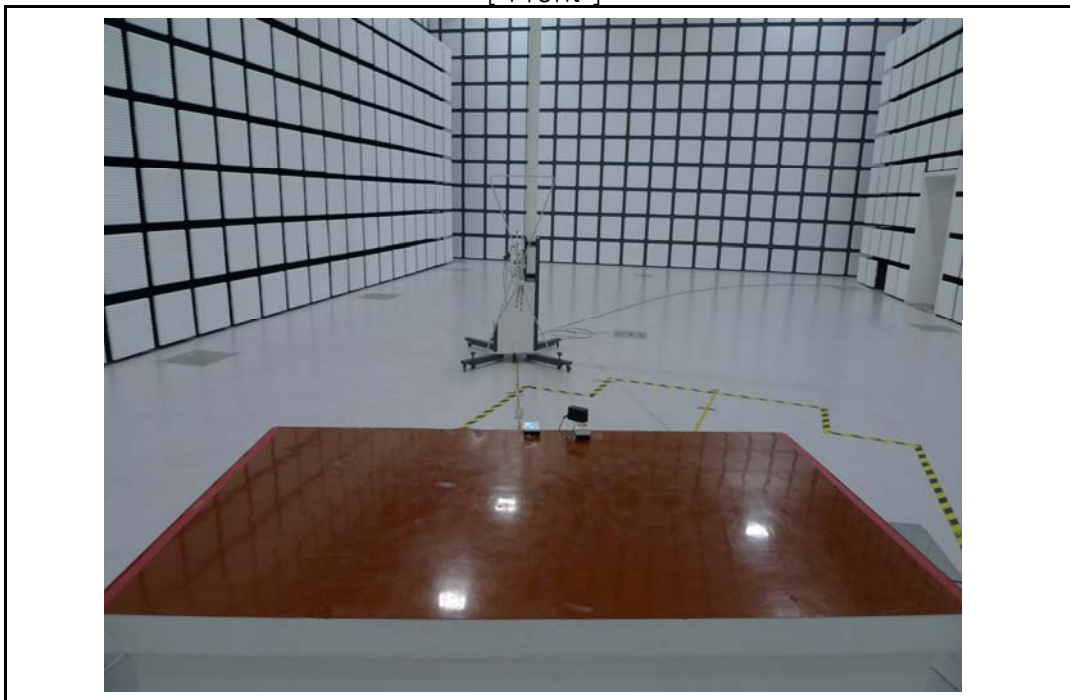
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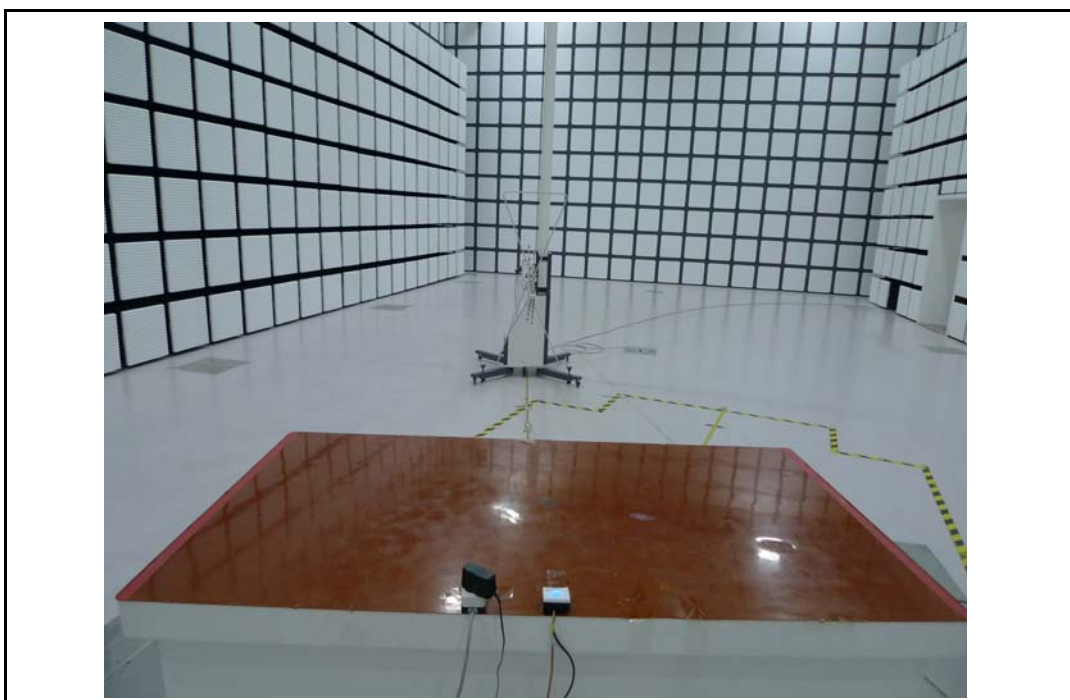
## 8. Photographs of test setup

### 8.1. Setup for Radiated Test : (30 ~ 1 000) MHz

[ Front ]



[ Rear ]





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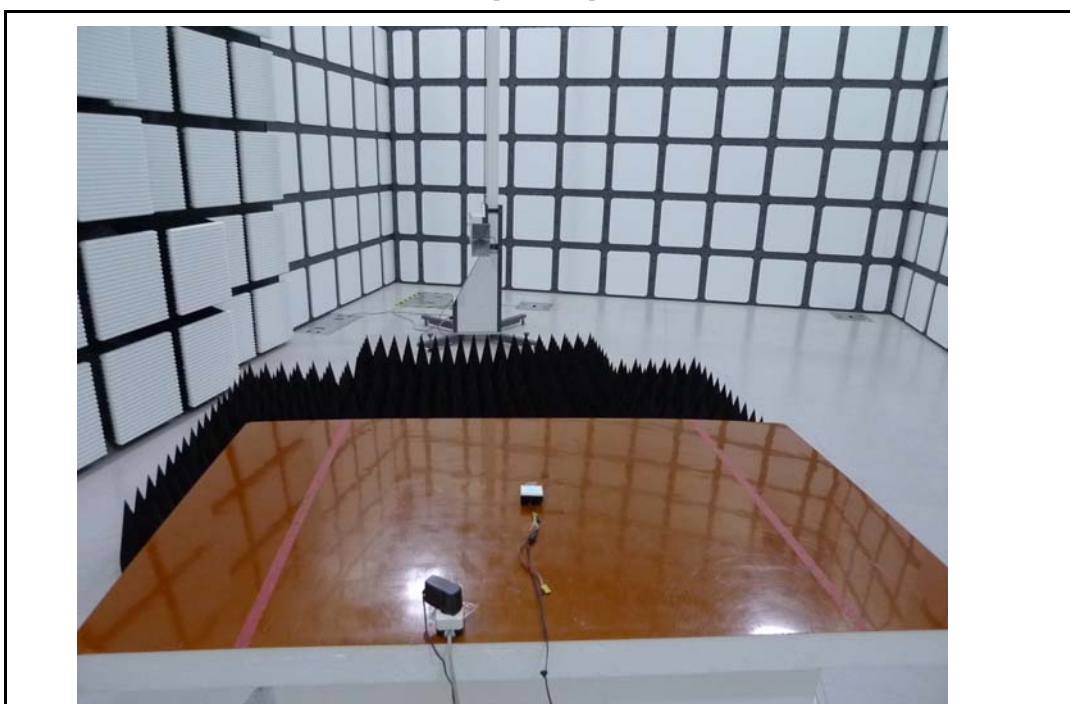
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## 8.2.Setup for Radiated Test : Above 1 GHz

[ Front ]



[ Rear ]





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### 8.3. Setup for Conducted Test : (0.15 ~ 30) MHz

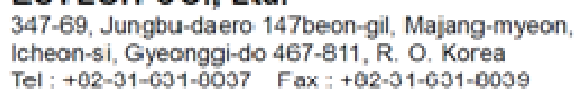
[ Front ]



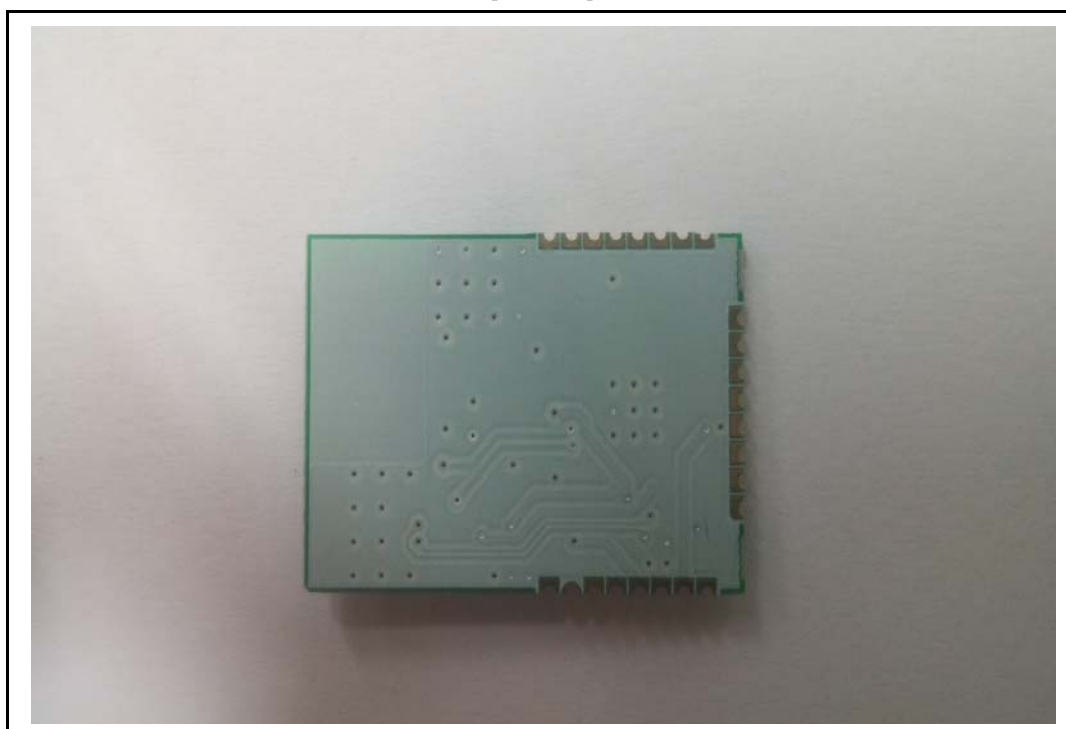
[ Rear ]





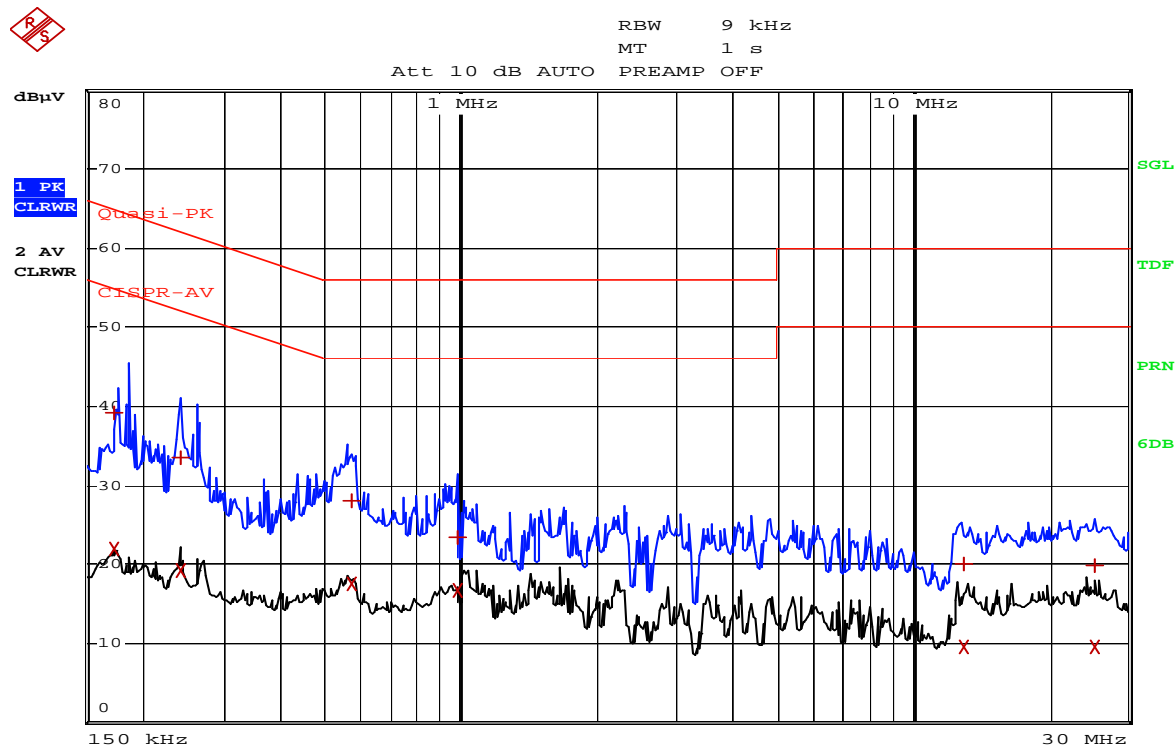


[ Front ]



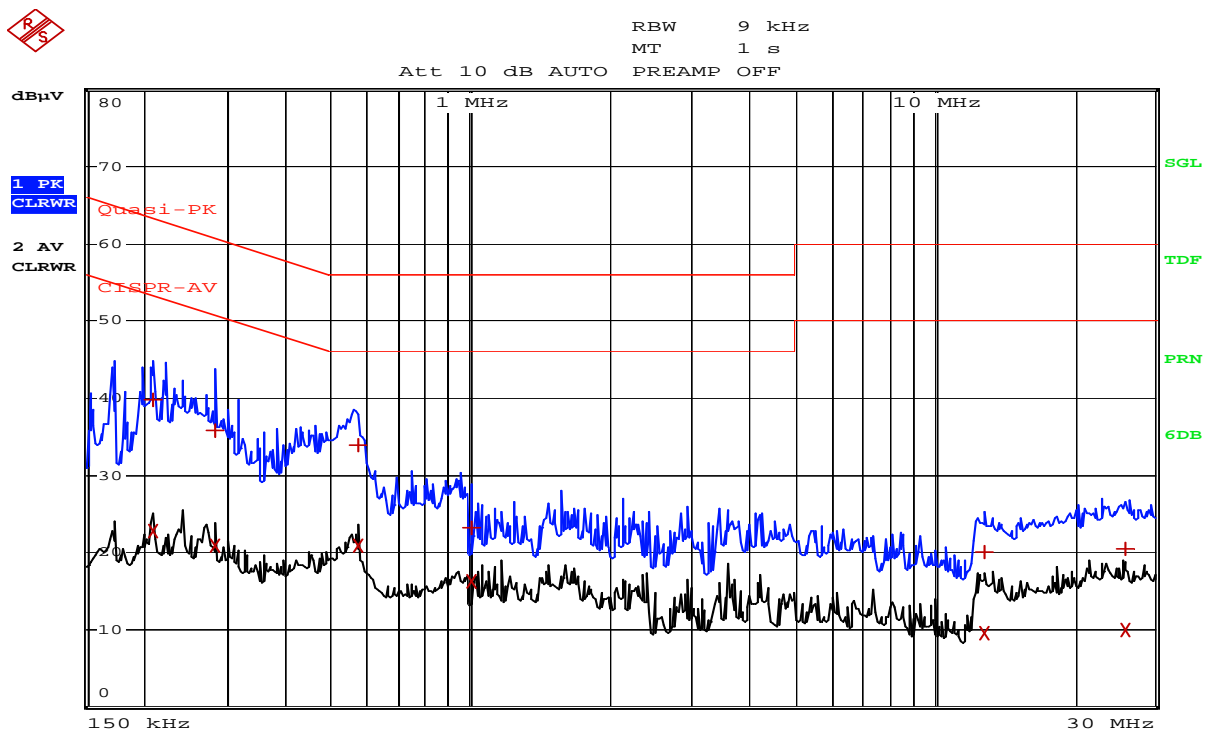
# Appendix 1. Special diagram for Bluetooth (LE)

\* HOT LINE



Comment: ESTC-15-02570 HOT  
Date: 21.DEC.2015 14:50:09

## \* NEUTRAL LINE



Comment: ESTC-15-02570 NEUTRAL  
Date: 21.DEC.2015 14:53:59



## Appendix 2. Antenna Requirement

### 1. Antenna Requirement

#### 1.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 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.

And according to FCC 47 CFR Section 15.204

#### 1.2 Antenna Connected Construction

The antenna types used in this product are Intergrated Chip Antenna . The maximum Gain of this antenna is 3.5 dBi.