

# FCC Test Report

Report No.: AGC00111180201FE03

**FCC ID** : ZYMFW-1601-1

**APPLICATION PURPOSE** : Original Equipment

**PRODUCT DESIGNATION** : Bluetooth Tower Speaker

**BRAND NAME** : Fullwing, GOgroove

**MODEL NAME** : FW-1601-1, BlueSYNC STW

**CLIENT** : Zhuhai Fullwing Electronic Co., Ltd

**DATE OF ISSUE** : Mar. 12, 2018

**STANDARD(S)**  
**TEST PROCEDURE(S)** : FCC Part 15 Subpart C Section 15.249

**REPORT VERSION** : V1.0



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### Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Mar. 12, 2018	Valid	Initial release



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## 1. VERIFICATION OF CONFORMITY

<b>Applicant</b>	Zhuhai Fullwing Electronic Co., Ltd
<b>Address</b>	4/F & 5/F, Industrial Building, No 28, Zuo Wu Road, Wan Zai, Zhu Hai, China
<b>Manufacturer</b>	Zhuhai Fullwing Electronic Co.,Ltd Zhongshan Branch
<b>Address</b>	4/F & 5/F, No 10, Xingye Road, Xinxu, San Xiang, Zhongshan, Guangdong, China
<b>Product Designation</b>	Bluetooth Tower Speaker
<b>Brand Name</b>	Fullwing, GOgroove
<b>Test Model</b>	FW-1601-1
<b>Series Model</b>	BlueSYNC STW
<b>Difference Description</b>	All the same except for the model name
<b>Date of test</b>	Mar. 05, 2018 to Mar. 09, 2018
<b>Deviation</b>	None
<b>Condition of Test Sample</b>	Normal
<b>Report Template</b>	AGCRT-US-BR/RF

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, the energy emitted by the sample tested as described in this report is in compliance with the requirements of FCC Rules Part 15.249. The test results of this report relate only to the tested sample identified in this report.

Tested By



Berg Lu(Lu Bing)

Mar. 09, 2018

Reviewed By



Forrest Lei(Lei Yonggang)

Mar. 12, 2018

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## 2. GENERAL INFORMATION

### 2.1. PRODUCT DESCRIPTION

A major technical description of EUT is described as following

<b>Operation Frequency</b>	2.402 GHz to 2.480GHz
<b>RF Output Power</b>	-5.03dBm(Max EIRP Power=Max radiation field-95.2)
<b>Bluetooth Version</b>	V3.0
<b>Modulation</b>	BR <input checked="" type="checkbox"/> GFSK, EDR <input checked="" type="checkbox"/> π/4-DQPSK, <input checked="" type="checkbox"/> 8DPSK BLE <input type="checkbox"/> GFSK
<b>Number of channels</b>	79 for BR/EDR
<b>Hardware Version</b>	V1.3
<b>Software Version</b>	V3.0
<b>Antenna Designation</b>	PCB Antenna
<b>Antenna Gain</b>	0dBi
<b>Power Supply (by adapter)</b>	INPUT: 100-240V 50/60Hz 1.2A OUTPUT: 15.0V---3.0A

### 2.2. TABLE OF CARRIER FREQUENCIES

BR/EDR channel List

Frequency Band	Channel Number	Frequency
2400~2483.5MHz	0	2402MHz
	1	2403MHz
	:	:
	38	2440 MHz
	39	2441 MHz
	40	2442 MHz
	:	:
	77	2479 MHz
	78	2480 MHz

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### 3. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement  $y \pm U$ , where expended uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95%.

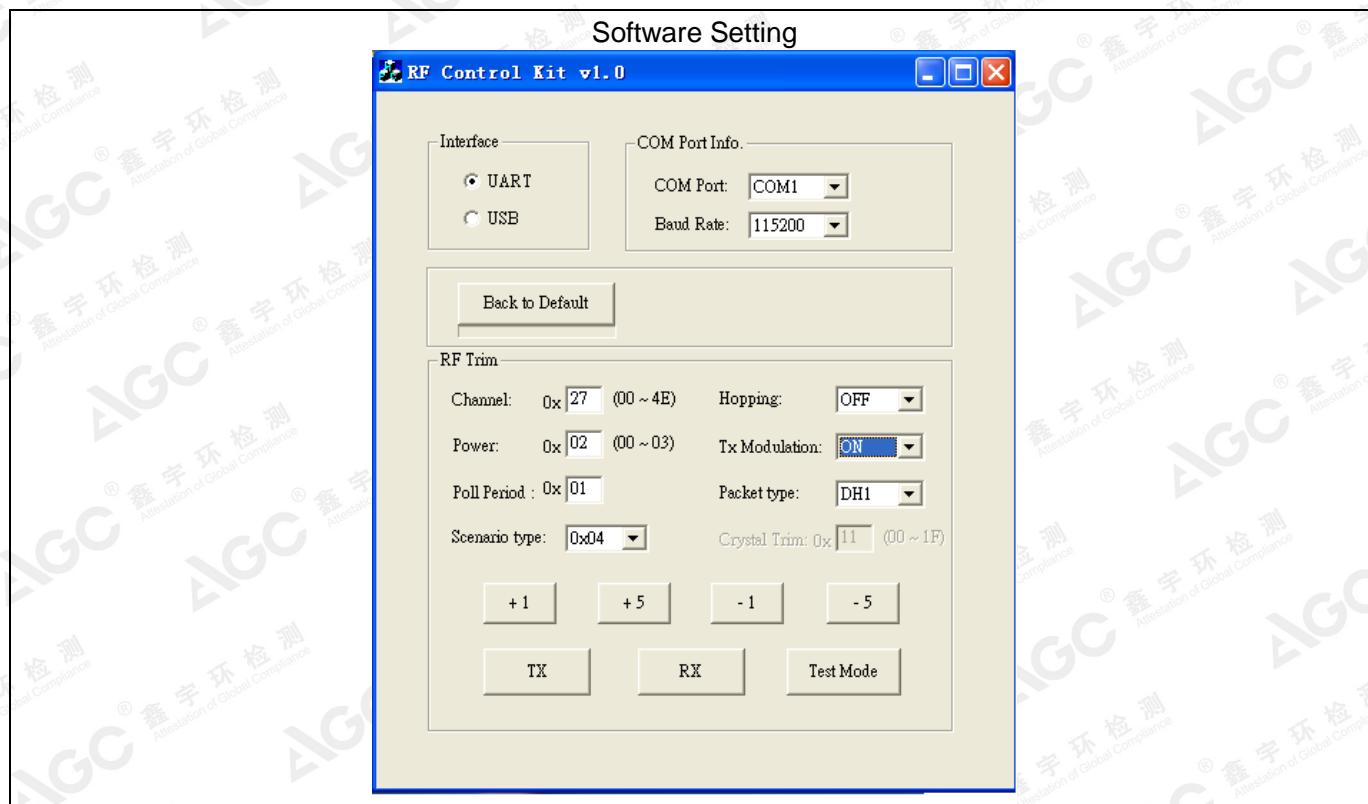
- Uncertainty of Conducted Emission,  $U_c = \pm 3.2 \text{ dB}$
- Uncertainty of Radiated Emission below 1GHz,  $U_c = \pm 3.9 \text{ dB}$
- Uncertainty of Radiated Emission above 1GHz,  $U_c = \pm 4.8 \text{ dB}$

### 4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Low channel GFSK
2	Middle channel GFSK
3	High channel GFSK
4	Low channel $\pi/4$ -DQPSK
5	Middle channel $\pi/4$ -DQPSK
6	High channel $\pi/4$ -DQPSK
7	Low channel 8DPSK
8	Middle channel 8DPSK
9	High channel 8DPSK
10	BT Link

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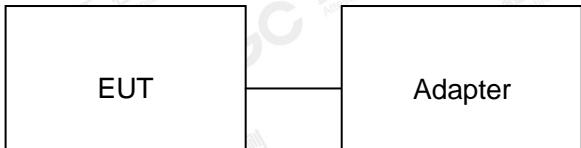
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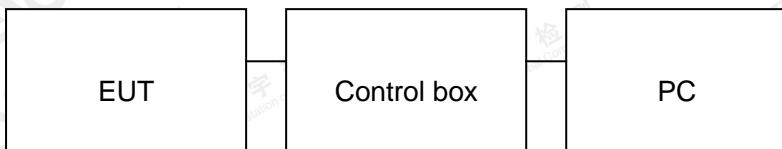
## 5. SYSTEM TEST CONFIGURATION

### 5.1. CONFIGURATION OF EUT SYSTEM

Configure 1: (Normal hopping)



Configure 2: (Control continuous TX)



### 5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Mfr/Brand	Model/Type No.	Remark
1	Bluetooth Tower Speaker	Fullwing	FW-1601-1	EUT
2	PC	APPLE	A1465	A.E
3	Control box	ISSC	N/A	A.E
4	Adapter	KPTEC	K48V150300U	Accessory
5	AUX Cable 1	N/A	0.6m unshielded	Accessory
6	AUX Cable 2	N/A	0.8m unshielded	A.E
7	IPOD	APPLE	A1367	A.E
8	Load	HPX	RX24	A.E
9	U-Disk	Kingston	DT 101G2/16GB	A.E

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### 5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.249(a) §15.209	Radiated Emission	Compliant
§15.249(d)	Band Edges	Compliant
§15.207	Conduction Emission	Compliant
§15.215	Bandwidth	Compliant

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## 6. TEST FACILITY

<b>Test Site</b>	Attestation of Global Compliance (Shenzhen) Co., Ltd
<b>Location</b>	1-2F., Bldg.2, No.1-4, Chaxi Sanwei Technical Industrial Park, Gushu, Xixiang, Bao'an District B112-B113, Bldg.12, Baoan Bldg Materials Center, No.1 of Xixiang Inner Ring Road, Baoan District, Shenzhen 518012
<b>NVLAP Lab Code</b>	600153-0
<b>Designation Number</b>	CN5028
<b>Test Firm Registration Number</b>	682566
<b>Description</b>	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by National Voluntary Laboratory Accreditation program, NVLAP Code 600153-0

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## 7. TEST METHOD

All measurements contained in this report were conducted with ANSI C63.10-2013

## 8. TEST EQUIPMENT LIST

### TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESPI	101206	Jun.20, 2017	Jun.19, 2018
LISN	R&S	ESH2-Z5	100086	Aug.21, 2017	Aug.20, 2018

### TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	Jun.20, 2017	Jun.19, 2018
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec.08, 2017	Dec.07, 2018
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep.20, 2017	Sep.19, 2018
preamplifier	ChengYi	EMC184045SE	980508	Sep.15, 2017	Sep.14, 2018
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May 18, 2017	May 17, 2019
Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-205	Jun.20, 2017	Jun.19, 2018
ANTENNA	SCHWARZBECK	VULB9168	D69250	Sep.28, 2017	Sep.27, 2018
Loop Antenna	A.H.Systems,Inc	SAS-562B	--	Mar. 01, 2018	Feb. 28, 2020

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## 9. RADIATED EMISSION

### 9.1 TEST LIMIT

#### Standard FCC15.249

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
900-928MHz	50	500
2400-2483.5MHz	50	500
5725-5875MHz	50	500
24.0-24.25GHz	250	2500

#### Standard FCC 15.209

Frequency (MHz)	Distance Meters	Field Strengths Limit	
		$\mu$ V/m	dB( $\mu$ V)/m
0.009 ~ 0.490	300	2400/F(kHz)	---
0.490 ~ 1.705	30	24000/F(kHz)	---
1.705 ~ 30	30	30	---
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	Other: 74.0 dB( $\mu$ V)/m (Peak) 54.0 dB( $\mu$ V)/m (Average)	

Remark:

- (1) Emission level  $dB\mu$  V =  $20 \log$  Emission level  $\mu$  V/m
- (2) The smaller limit shall apply at the cross point between two frequency bands.
- (3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

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## 9.2. MEASUREMENT PROCEDURE

1. The measuring distance of 3m shall be used for measurements. The EUT was placed on the top of a rotating table 12mm above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation(Below 1GHz)
2. The measuring distance of 3m shall be used for measurements. The EUT was placed on the top of a rotating table 12mm above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation(Above 1GHz)
3. The height of the test antenna shall vary between 1m to 4m. Both horizontal and vertical polarization of the antenna are set to make the measurement.
4. The initial step in collecting radiated emission data is a receive peak detector mode. Pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
5. All readings are peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP limits and then QP Mode measurement didn't perform(Below 1GHz)
6. All readings are Peak mode value unless otherwise stated AVG in column of Note. If the Peak mode measured value compliance with the Peak limits and lower than AVG Limits, the EUT shall be deemed to meet Peak & AVG limits and then only Peak mode was measured, but AVG mode didn't perform.(Above 1GHz)

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The following table is the setting of spectrum analyzer and receiver.

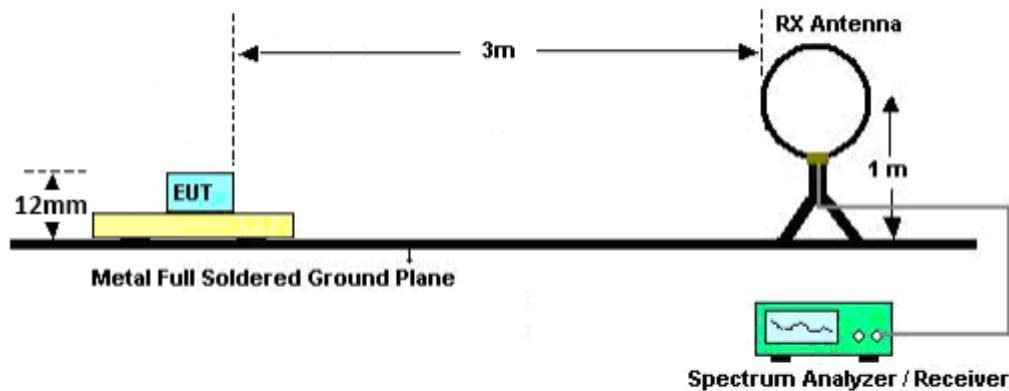
Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	Fundamental: 2.4~2.483GHz RBW 2MHz/ VBW 6MHz for Peak, RBW 2MHz/ VBW 10Hz for Average Harmonics: 1GHz~25GHz RBW 1MHz/ VBW 3MHz for Peak, RBW 1MHz/ VBW 10Hz for Average
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

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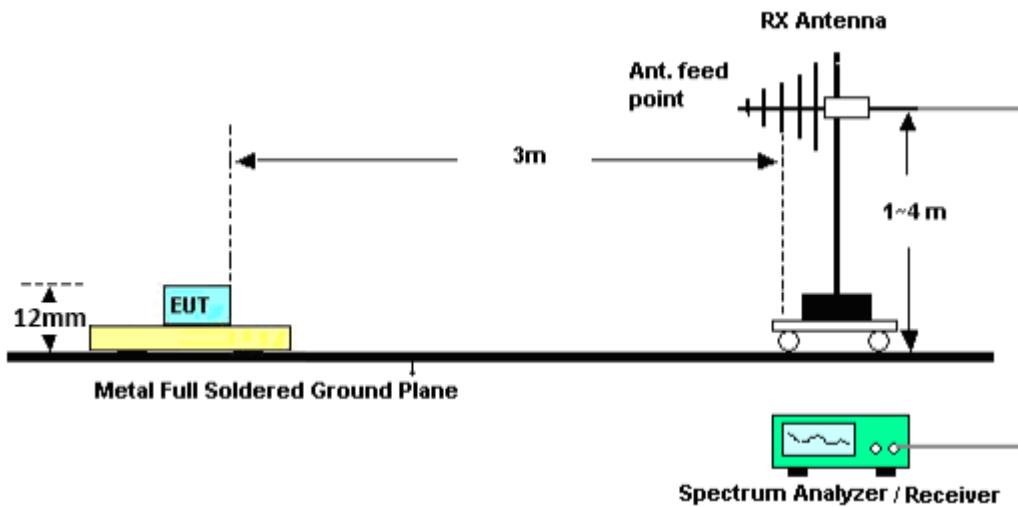


### 9.3. TEST SETUP

#### RADIATED EMISSION TEST-SETUP FREQUENCY BELOW 30MHz



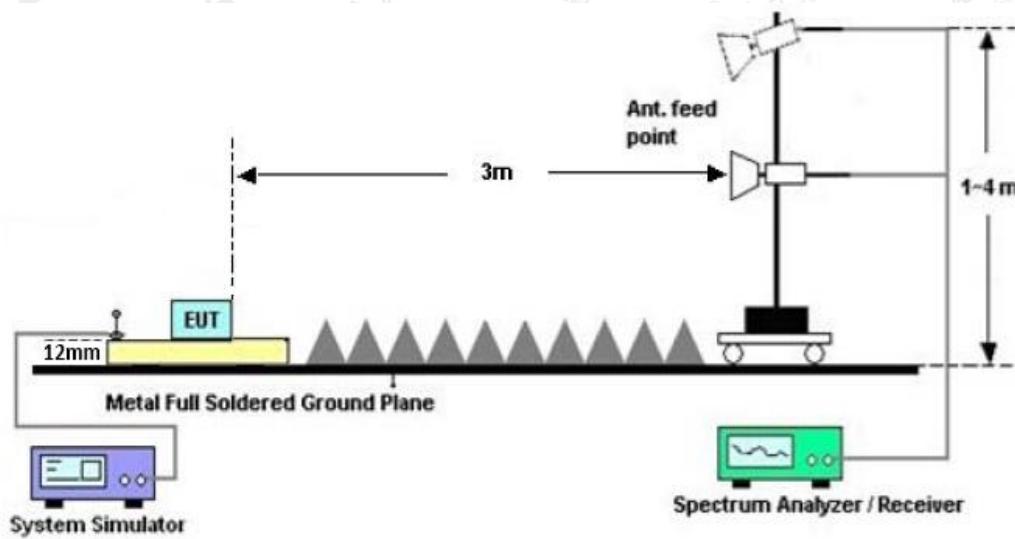
#### RADIATED EMISSION TEST SETUP 30MHz-1000MHz



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### RADIATED EMISSION TEST SETUP ABOVE 1000MHz



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## 9.4. TEST RESULT

(Worst modulation: GFSK)

FOR BR/EDR

### RADIATED EMISSION BELOW 30MHz

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

### RADIATED EMISSION BELOW 1GHz

#### RADIATED EMISSION TEST- (30MHz-1GHz)-LOW CHANNEL-HORIZONTAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		57.4833	28.77	3.20	31.97	40.00	-8.03	peak			
2	*	115.6833	33.34	6.86	40.20	43.50	-3.30	peak			
3		335.5500	18.23	17.78	36.01	46.00	-9.99	peak			
4		492.3667	16.51	21.05	37.56	46.00	-8.44	peak			
5		817.3167	2.89	27.32	30.21	46.00	-15.79	peak			
6		945.0333	2.21	29.86	32.07	46.00	-13.93	peak			

**RESULT: PASS**

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RADIATED EMISSION TEST- (30MHz-1GHz)-LOW CHANNEL -VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dB <sub>UV</sub>	dB/m	dB <sub>UV</sub> /m	dB <sub>UV</sub> /m	dB		cm	degree	
1	*	41.3167	28.07	8.81	36.88	40.00	-3.12	peak			
2	!	131.8500	28.41	11.80	40.21	43.50	-3.29	peak			
3		293.5167	17.66	15.21	32.87	46.00	-13.13	peak			
4		364.6500	19.13	18.84	37.97	46.00	-8.03	peak			
5		532.7833	12.32	22.02	34.34	46.00	-11.66	peak			
6		930.4833	2.69	29.46	32.15	46.00	-13.85	peak			

**RESULT: PASS**

**Note:** 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The "Factor" value can be calculated automatically by software of measurement system.

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RADIATED EMISSION TEST- (30MHz-1GHz)-MIDDLE CHANNEL-HORIZONTAL



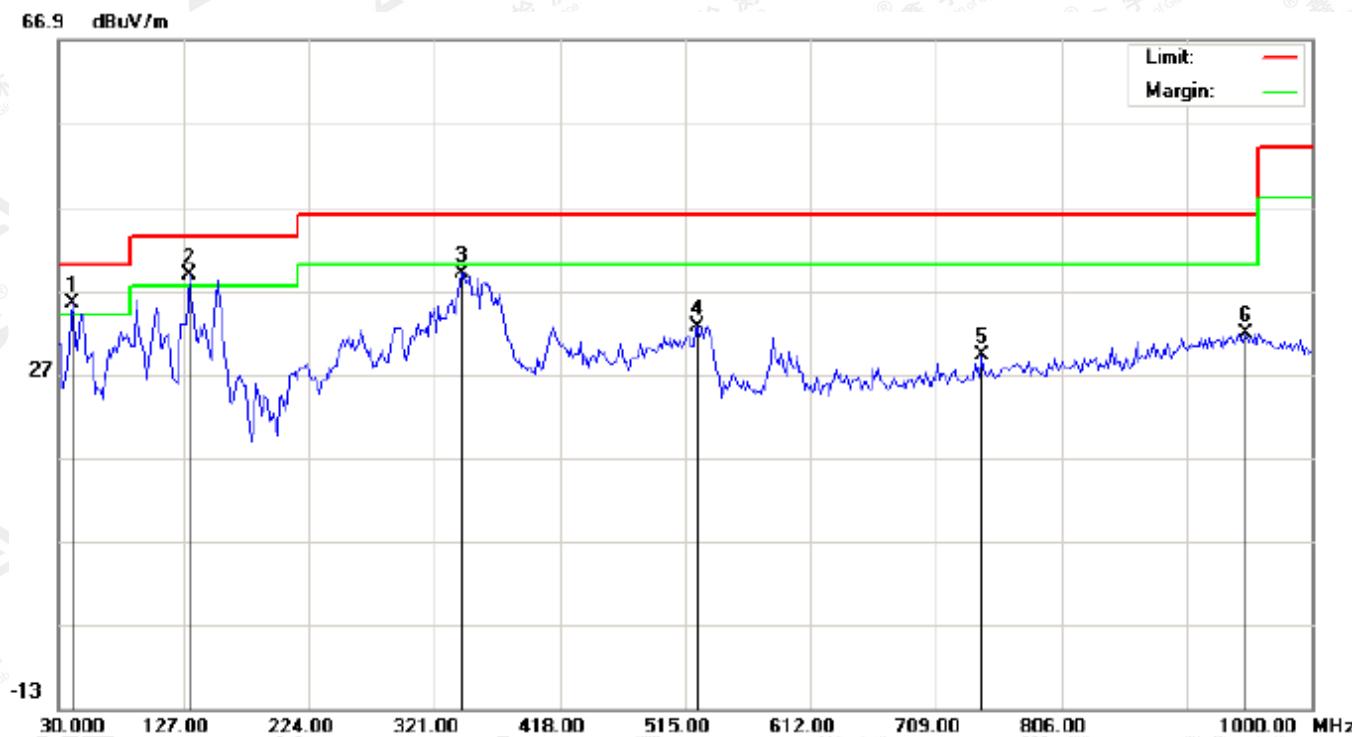
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		70.4167	21.37	9.85	31.22	40.00	-8.78	peak			
2	*	115.6833	31.73	6.86	38.59	43.50	-4.91	peak			
3		293.5167	19.70	14.31	34.01	46.00	-11.99	peak			
4		485.9000	15.52	20.98	36.50	46.00	-9.50	peak			
5		584.5167	6.33	23.34	29.67	46.00	-16.33	peak			
6		880.3667	1.66	28.10	29.76	46.00	-16.24	peak			

**RESULT: PASS**

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RADIATED EMISSION TEST- (30MHz-1GHz)-MIDDLE CHANNEL -VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna	Table	Comment
									Height	Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	41.3167	26.69	8.81	35.50	40.00	-4.50	peak			
2	!	131.8500	27.03	11.80	38.83	43.50	-4.67	peak			
3		342.0167	20.75	18.21	38.96	46.00	-7.04	peak			
4		524.7000	10.88	21.80	32.68	46.00	-13.32	peak			
5		744.5667	2.73	26.47	29.20	46.00	-16.80	peak			
6		948.2667	1.88	29.95	31.83	46.00	-14.17	peak			

**RESULT: PASS**

**Note:** 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The "Factor" value can be calculated automatically by software of measurement system.

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RADIATED EMISSION TEST- (30MHz-1GHz)-HIGH CHANNEL-HORIZONTAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	115.6833	31.75	6.86	38.61	43.50	-4.89	peak			
2		287.0500	22.56	13.21	35.77	46.00	-10.23	peak			
3		332.3167	18.54	17.56	36.10	46.00	-9.90	peak			
4		429.3167	15.30	19.96	35.26	46.00	-10.74	peak			
5		594.2166	5.13	23.59	28.72	46.00	-17.28	peak			
6		799.5333	3.49	27.31	30.80	46.00	-15.20	peak			

**RESULT: PASS**

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RADIATED EMISSION TEST- (30MHz-1GHz)-HIGH CHANNEL -VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	41.3167	27.85	8.81	36.66	40.00	-3.34	peak			
2	!	131.8500	26.97	11.80	38.77	43.50	-4.73	peak			
3		251.4833	20.92	13.94	34.86	46.00	-11.14	peak			
4		361.4167	18.45	18.82	37.27	46.00	-8.73	peak			
5		531.1667	11.21	21.97	33.18	46.00	-12.82	peak			
6		943.4167	2.02	29.82	31.84	46.00	-14.16	peak			

**RESULT: PASS**

**Note:** 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The "Factor" value can be calculated automatically by software of measurement system.

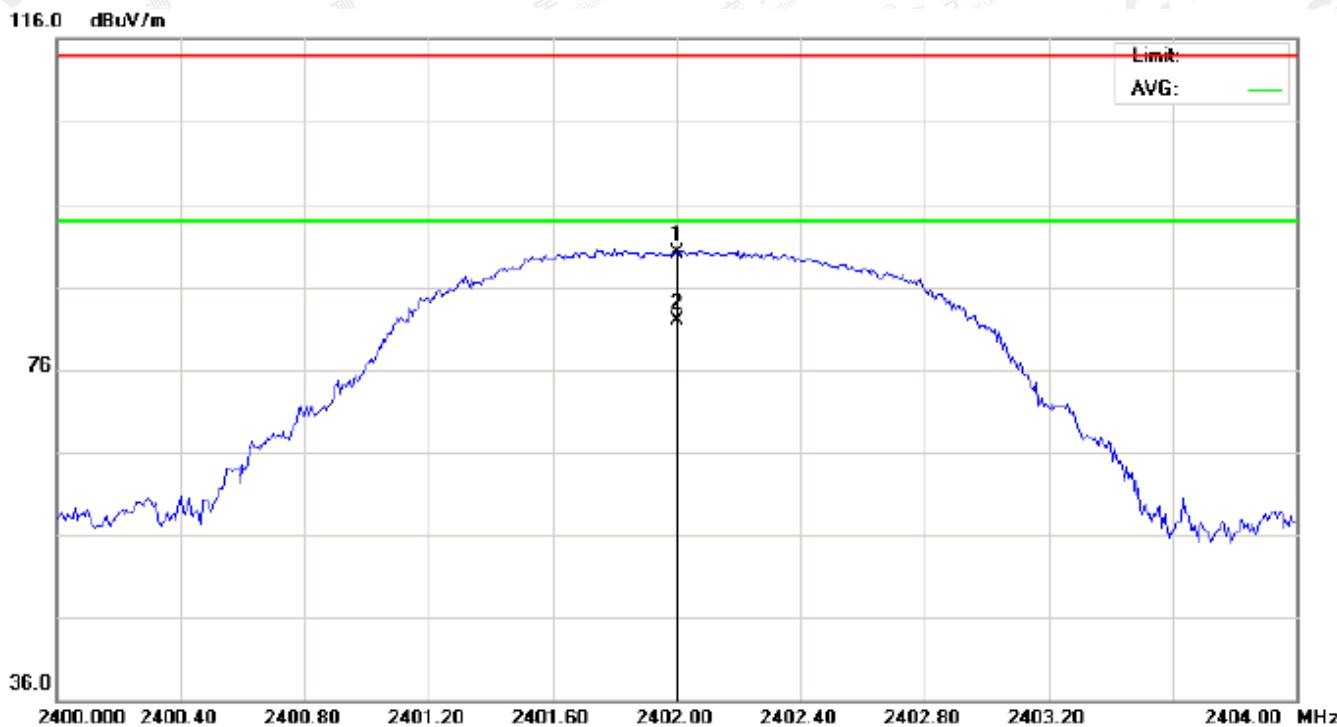
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**RADIATED EMISSION ABOVE 1GHz**  
**(Worst modulation: GFSK)**  
**FOR BR/EDR**

**For Fundamental**

**RADIATED EMISSION TEST- (ABOVE 1GHz)-LOW CHANNEL-HORIZONTAL**



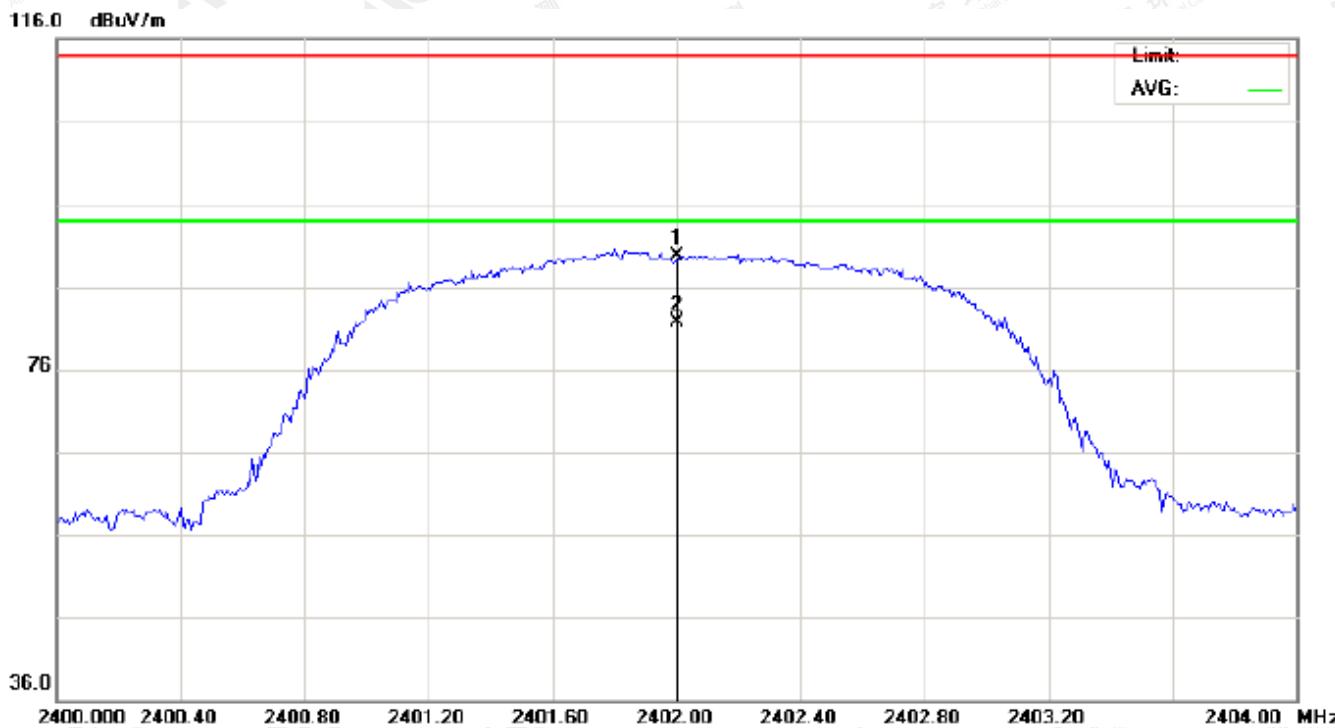
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2402.000	79.85	10.32	90.17	114.00	-23.83	peak			
2	*	2402.000	71.55	10.32	81.87	94.00	-12.13	AVG	100	321	

**RESULT: PASS**

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RADIATED EMISSION TEST- (ABOVE 1GHz)-LOW CHANNEL- VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2402.000	79.43	10.32	89.75	114.00	-24.25	peak			
2	*	2402.000	71.43	10.32	81.75	94.00	-12.25	AVG	100	134	

**RESULT: PASS**

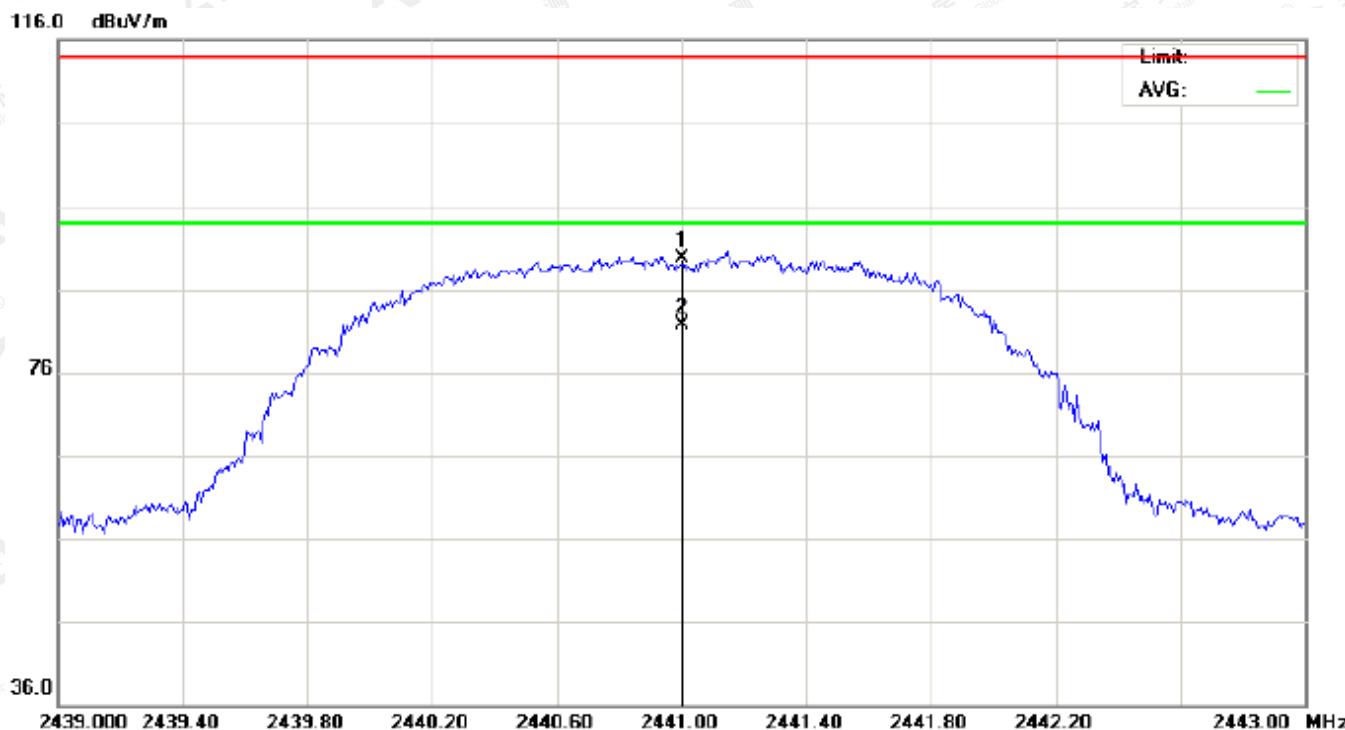
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RADIATED EMISSION TEST- (ABOVE 1GHz)-MIDDLE CHANNEL-HORIZONTAL



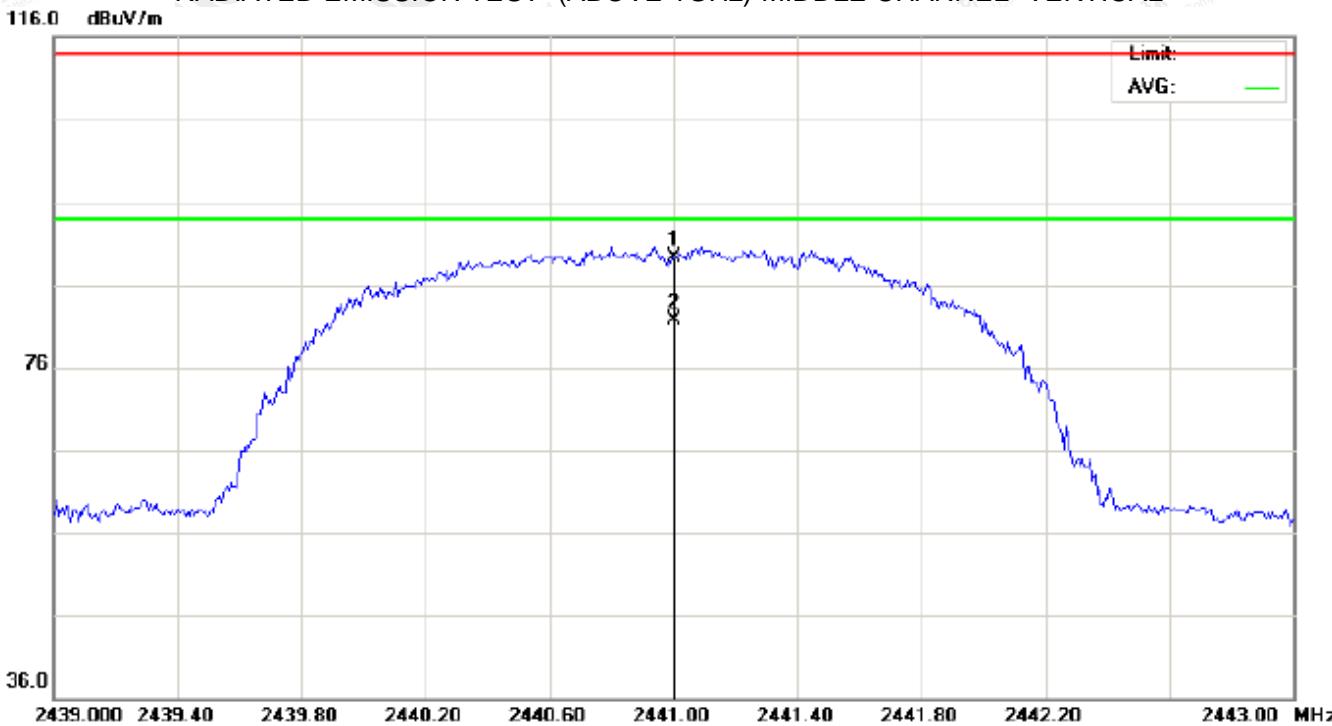
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2441.000	79.20	10.36	89.56	114.00	-24.44	peak			
2	*	2441.000	71.30	10.36	81.66	94.00	-12.34	AVG	100	324	

**RESULT: PASS**

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RADIATED EMISSION TEST- (ABOVE 1GHz)-MIDDLE CHANNEL- VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2441.000	79.02	10.36	89.38	114.00	-24.62	peak			
2	*	2441.000	71.19	10.36	81.55	94.00	-12.45	AVG	100	138	

RESULT: PASS

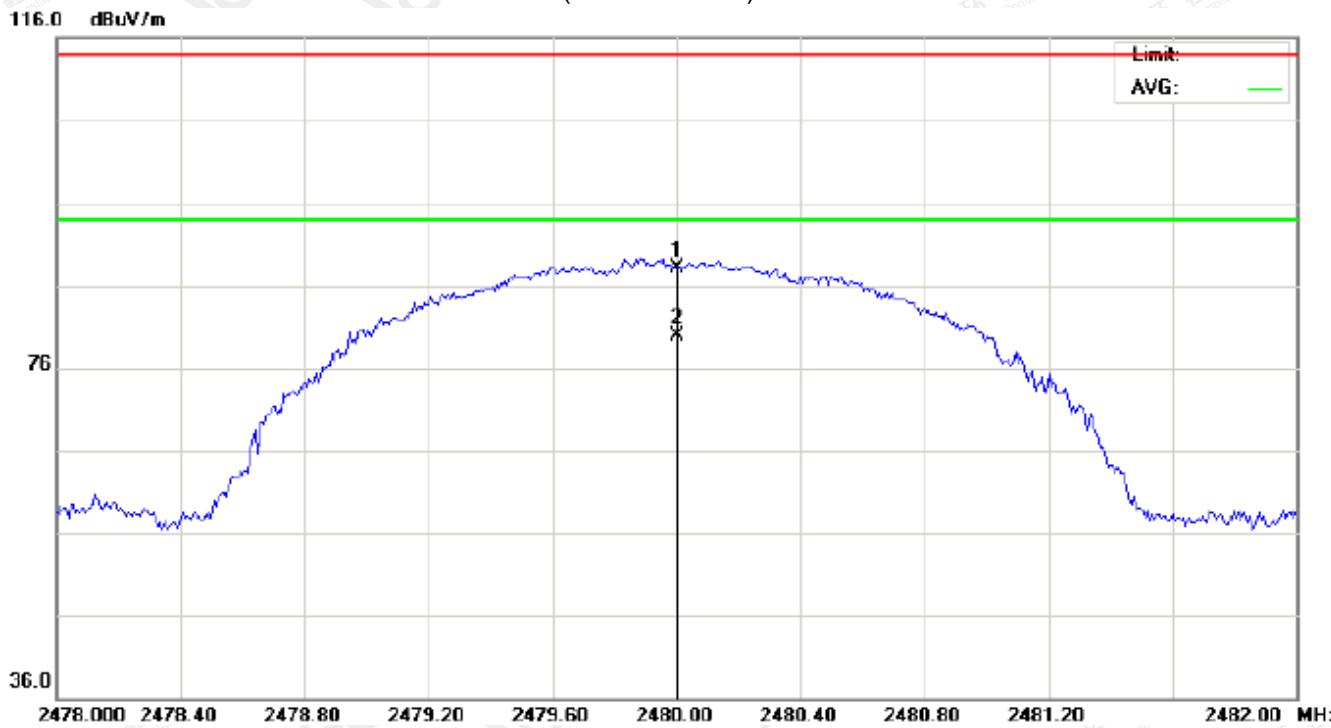
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RADIATED EMISSION TEST- (ABOVE 1GHZ)-HIGH CHANNEL-HORIZONTAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2480.000	77.75	10.41	88.16	114.00	-25.84	peak			
2	*	2480.000	69.45	10.41	79.86	94.00	-14.14	AVG	100	314	

**RESULT: PASS**

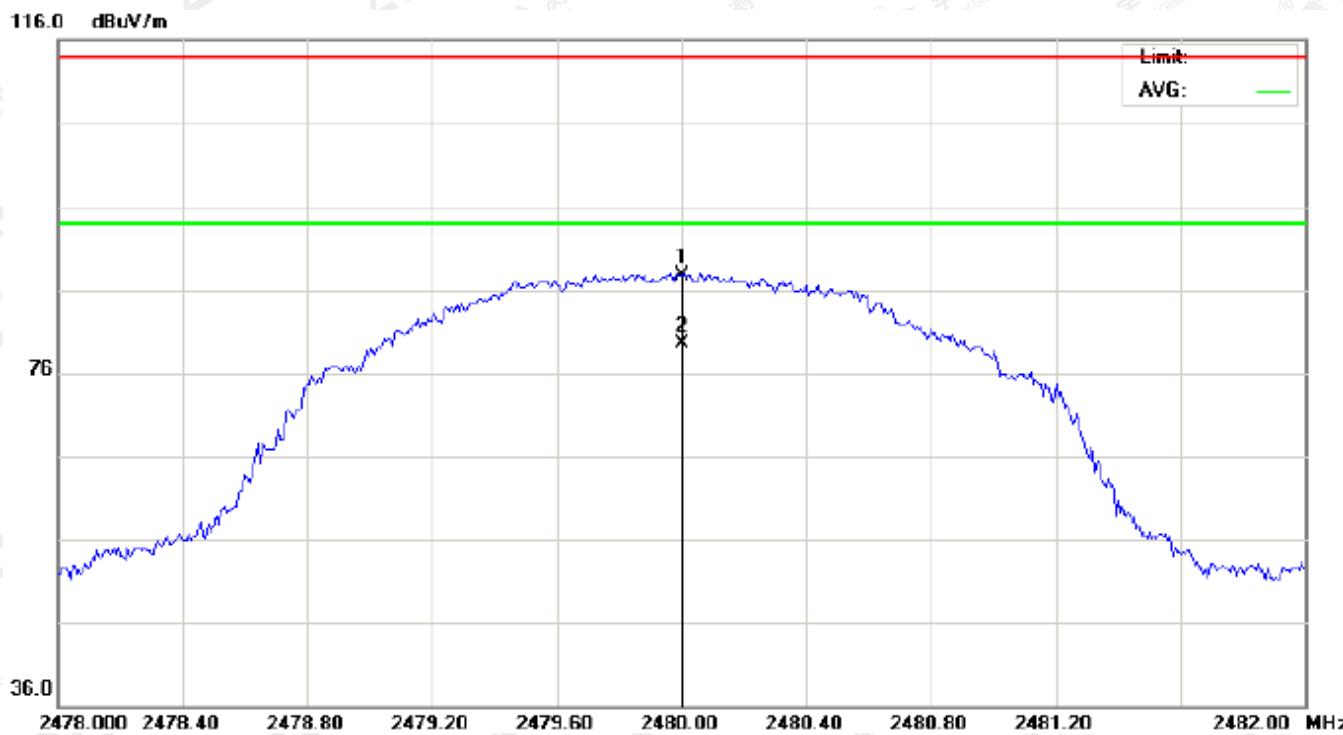
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RADIATED EMISSION TEST- (ABOVE 1GHz)-HIGH CHANNEL- VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2480.000	77.24	10.41	87.65	114.00	-26.35	peak			
2	*	2480.000	69.12	10.41	79.53	94.00	-14.47	AVG	100	147	

**RESULT: PASS**

**Note:** Factor=Antenna Factor + Cable loss - Amplifier gain, Margin=Measurement-Limit.

The "Factor" value can be calculated automatically by software of measurement system.

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**Field strength of the fundamental signal**
**1Mbps Result:**
**Peak value**

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	79.85	10.32	90.17	114	-23.83	Horizontal
2402	79.43	10.32	89.75	114	-24.25	Vertical
2441	79.20	10.36	89.56	114	-24.44	Horizontal
2441	79.02	10.36	89.38	114	-24.62	Vertical
2480	77.75	10.41	88.16	114	-25.84	Horizontal
2480	77.24	10.41	87.65	114	-26.35	Vertical

**Average value**

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	71.55	10.32	81.87	94	-12.13	Horizontal
2402	71.43	10.32	81.75	94	-12.25	Vertical
2441	71.30	10.36	81.66	94	-12.34	Horizontal
2441	71.19	10.36	81.55	94	-12.45	Vertical
2480	69.45	10.41	79.86	94	-14.14	Horizontal
2480	69.12	10.41	79.53	94	-14.47	Vertical

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**2Mbps Result:**
**Peak value**

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	79.52	10.32	89.84	114	-24.16	Horizontal
2402	78.96	10.32	89.28	114	-24.72	Vertical
2441	78.84	10.36	89.20	114	-24.80	Horizontal
2441	78.65	10.36	89.01	114	-24.99	Vertical
2480	77.31	10.41	87.72	114	-26.28	Horizontal
2480	76.84	10.41	87.25	114	-26.75	Vertical

**Average value**

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	71.12	10.32	81.44	94	-12.56	Horizontal
2402	71.05	10.32	81.37	94	-12.63	Vertical
2441	70.82	10.36	81.18	94	-12.82	Horizontal
2441	70.71	10.36	81.07	94	-12.93	Vertical
2480	69.04	10.41	79.45	94	-14.55	Horizontal
2480	68.78	10.41	79.19	94	-14.81	Vertical

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**3Mbps Result:**
**Peak value**

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	79.03	10.32	89.35	114	-24.65	Horizontal
2402	78.57	10.32	88.89	114	-25.11	Vertical
2441	78.36	10.36	88.72	114	-25.28	Horizontal
2441	78.29	10.36	88.65	114	-25.35	Vertical
2480	76.87	10.41	87.28	114	-26.72	Horizontal
2480	76.39	10.41	86.80	114	-27.20	Vertical

**Average value**

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	70.68	10.32	81.00	94	-13.00	Horizontal
2402	70.67	10.32	80.99	94	-13.01	Vertical
2441	70.33	10.36	80.69	94	-13.31	Horizontal
2441	70.40	10.36	80.76	94	-13.24	Vertical
2480	68.56	10.41	78.97	94	-15.03	Horizontal
2480	68.42	10.41	78.83	94	-15.17	Vertical

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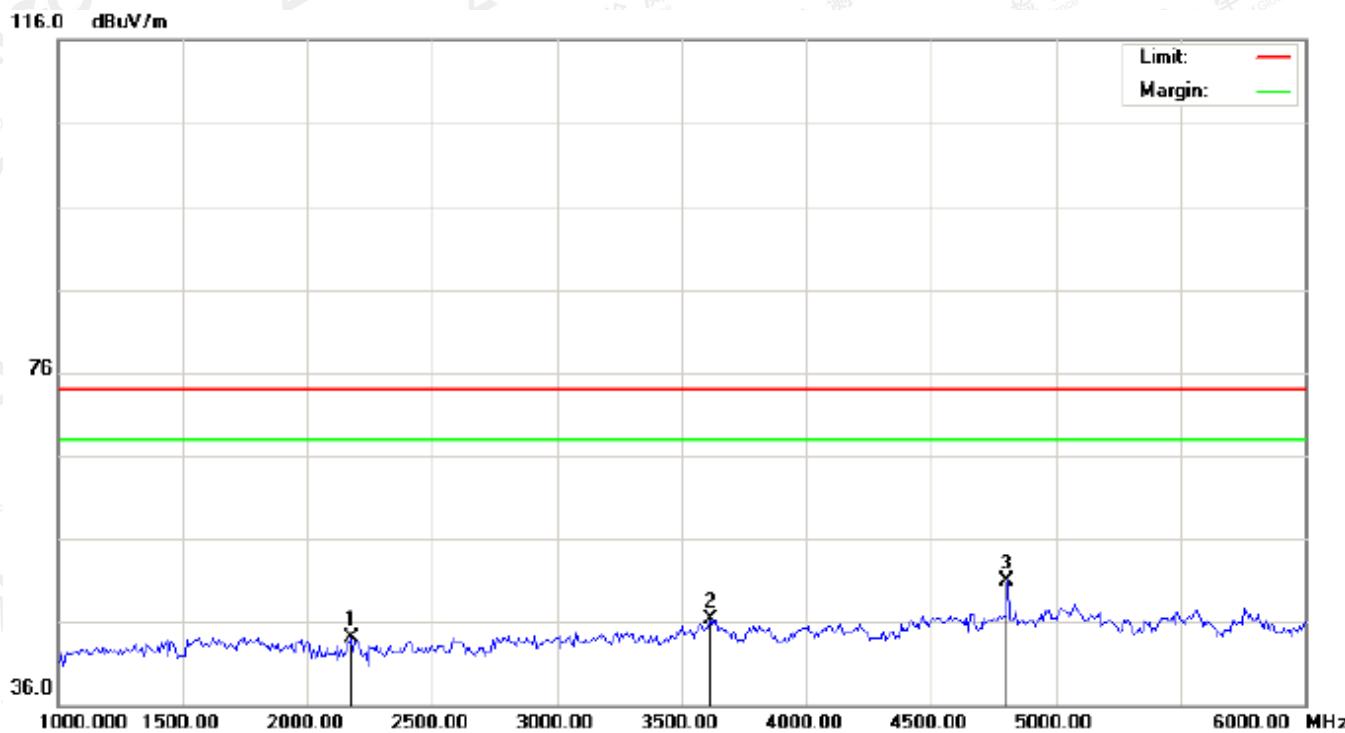


**(Worst modulation: GFSK)**

**FOR BR/EDR**

**For Harmonics**

**RADIATED EMISSION TEST- (ABOVE 1GHz)-LOW CHANNEL-HORIZONTAL**



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB				
1		2175.000	34.00	10.07	44.07	74.00	-29.93	peak			
2		3616.667	33.55	12.83	46.38	74.00	-27.62	peak			
3	*	4804.000	43.21	7.69	50.90	74.00	-23.10	peak			

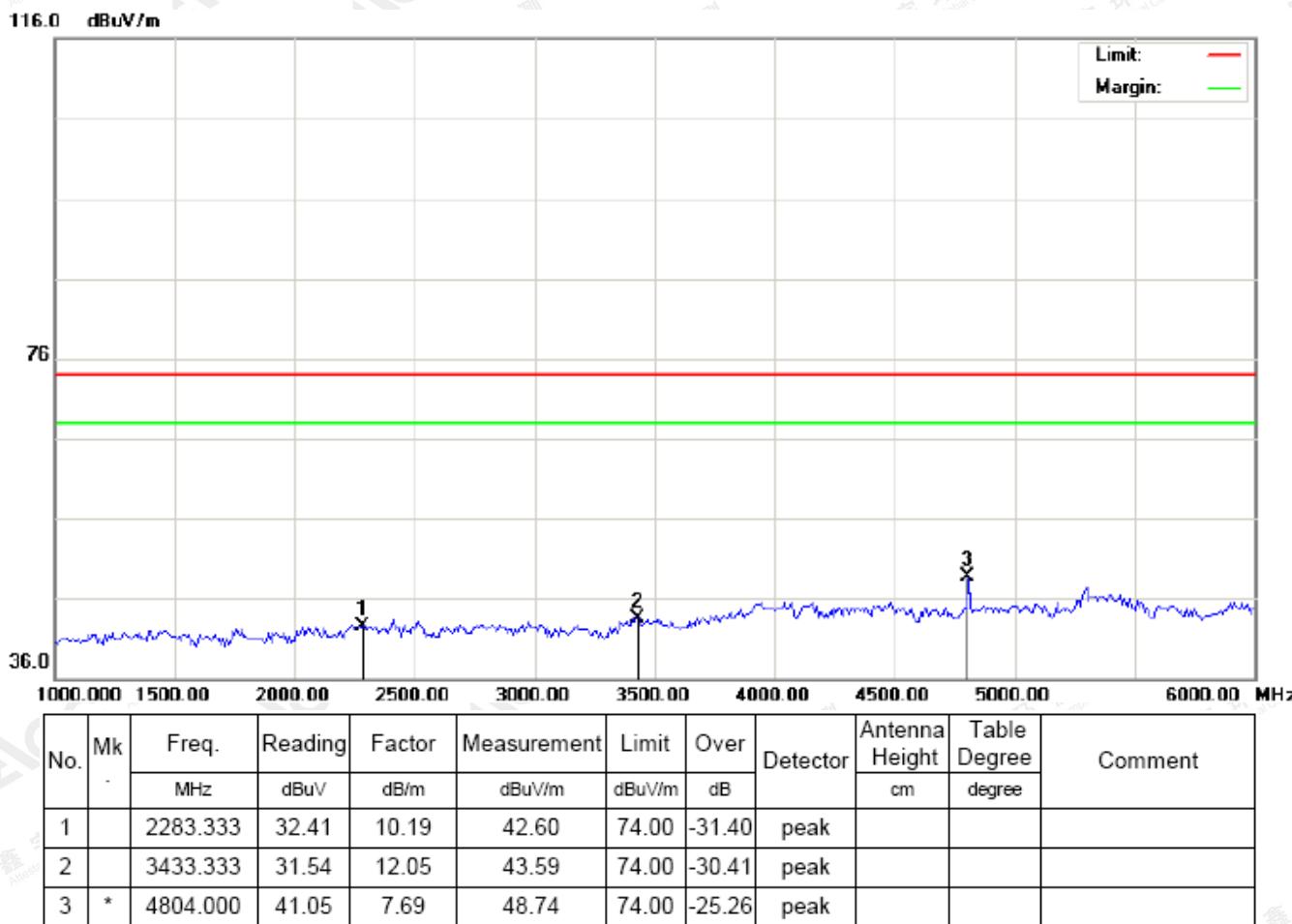
**RESULT: PASS**

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RADIATED EMISSION TEST- (ABOVE 1GHz)-LOW CHANNEL- VERTICAL



**RESULT: PASS**

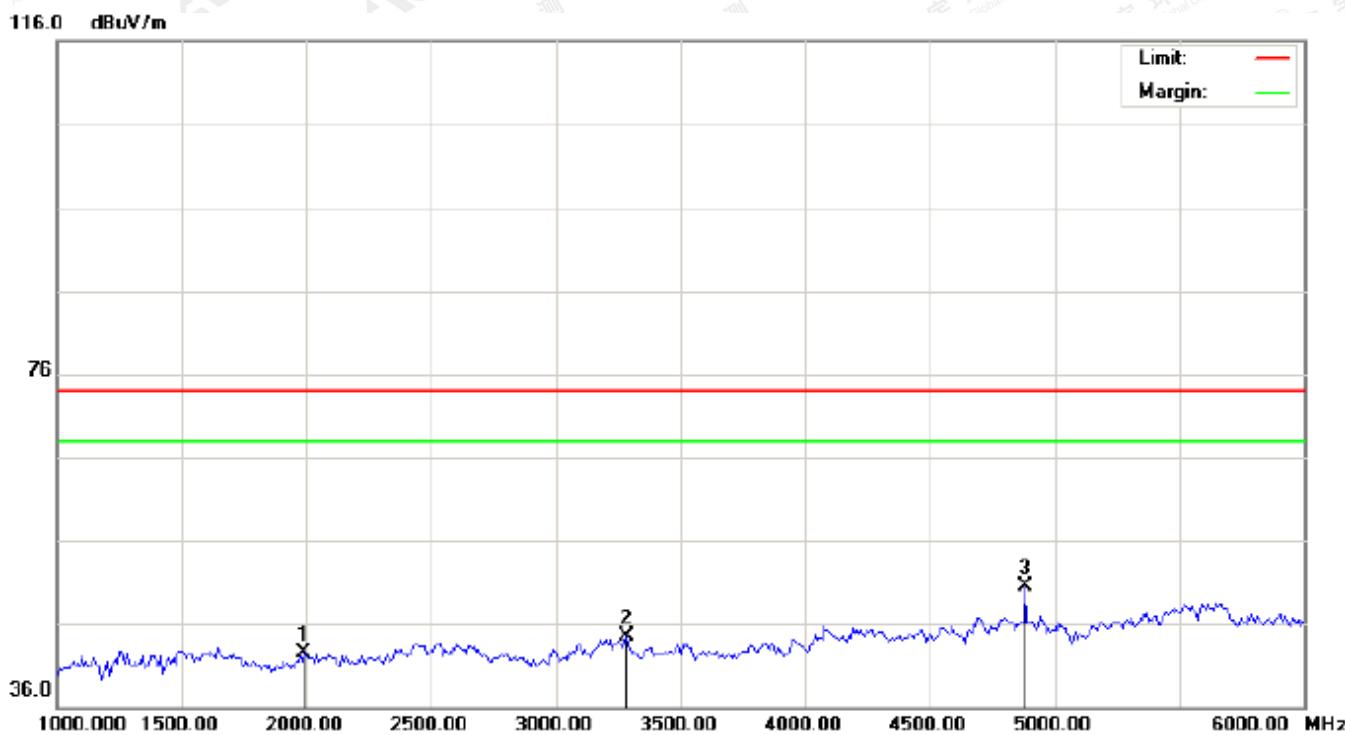
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RADIATED EMISSION TEST- (ABOVE 1GHz)-MIDDLE CHANNEL-HORIZONTAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB				
1		1991.667	32.70	9.79	42.49	74.00	-31.51	peak			
2		3283.333	32.67	11.91	44.58	74.00	-29.42	peak			
3	*	4882.000	42.66	7.89	50.55	74.00	-23.45	peak			

**RESULT: PASS**

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RADIATED EMISSION TEST- (ABOVE 1GHz)-MIDDLE CHANNEL- VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dB <sub>uV</sub>	dB/m	dB <sub>uV/m</sub>	dB <sub>uV/m</sub>	dB				
1		2433.333	34.05	10.36	44.41	74.00	-29.59	peak			
2		3491.667	33.15	12.10	45.25	74.00	-28.75	peak			
3	*	4882.000	42.39	7.89	50.28	74.00	-23.72	peak			

**RESULT: PASS**

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RADIATED EMISSION TEST- (ABOVE 1GHz)-HIGH CHANNEL-HORIZONTAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna	Table	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		Height	Degree	
1		2475.000	32.73	10.40	43.13	74.00	-30.87	peak			
2		3525.000	32.29	12.26	44.55	74.00	-29.45	peak			
3	*	4960.000	42.60	8.09	50.69	74.00	-23.31	peak			

**RESULT: PASS**

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RADIATED EMISSION TEST- (ABOVE 1GHz)-HIGH CHANNEL- VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2475.000	33.61	10.40	44.01	74.00	-29.99	peak			
2		3925.000	30.33	14.73	45.06	74.00	-28.94	peak			
3	*	4960.000	41.91	8.09	50.00	74.00	-24.00	peak			

**RESULT: PASS**

**Note:** 6~25GHz at least have 20dB margin. No recording in the test report.

Factor=Antenna Factor + Cable loss - Amplifier gain, Margin=Measurement-Limit.

The "Factor" value can be calculated automatically by software of measurement system.

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## 10. BAND EDGE EMISSION

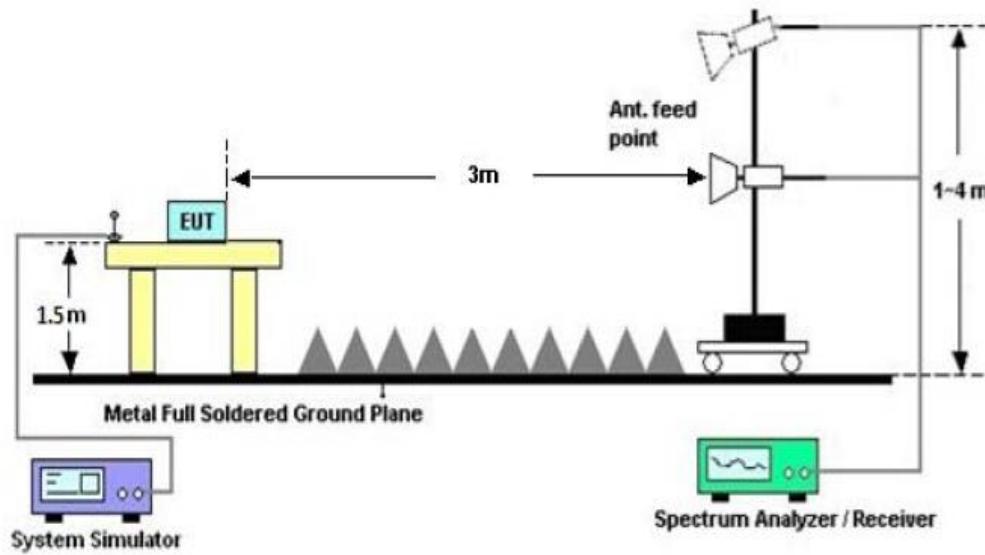
### 10.1. MEASUREMENT PROCEDURE

1. The EUT operates at hopping-off test mode. The lowest or highest channels are tested to verify the largest transmission and spurious emissions power at the continuous transmission mode.
2. Max hold the trace of the setup 1, and the EUT operates at hopping-on test mode to verify the largest spurious emissions power.
3. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission.

Start frequency(MHz)	Stop frequency(MHz)
2200	2405
2478	2500

### 10.2 TEST SETUP

#### RADIATED EMISSION TEST SETUP



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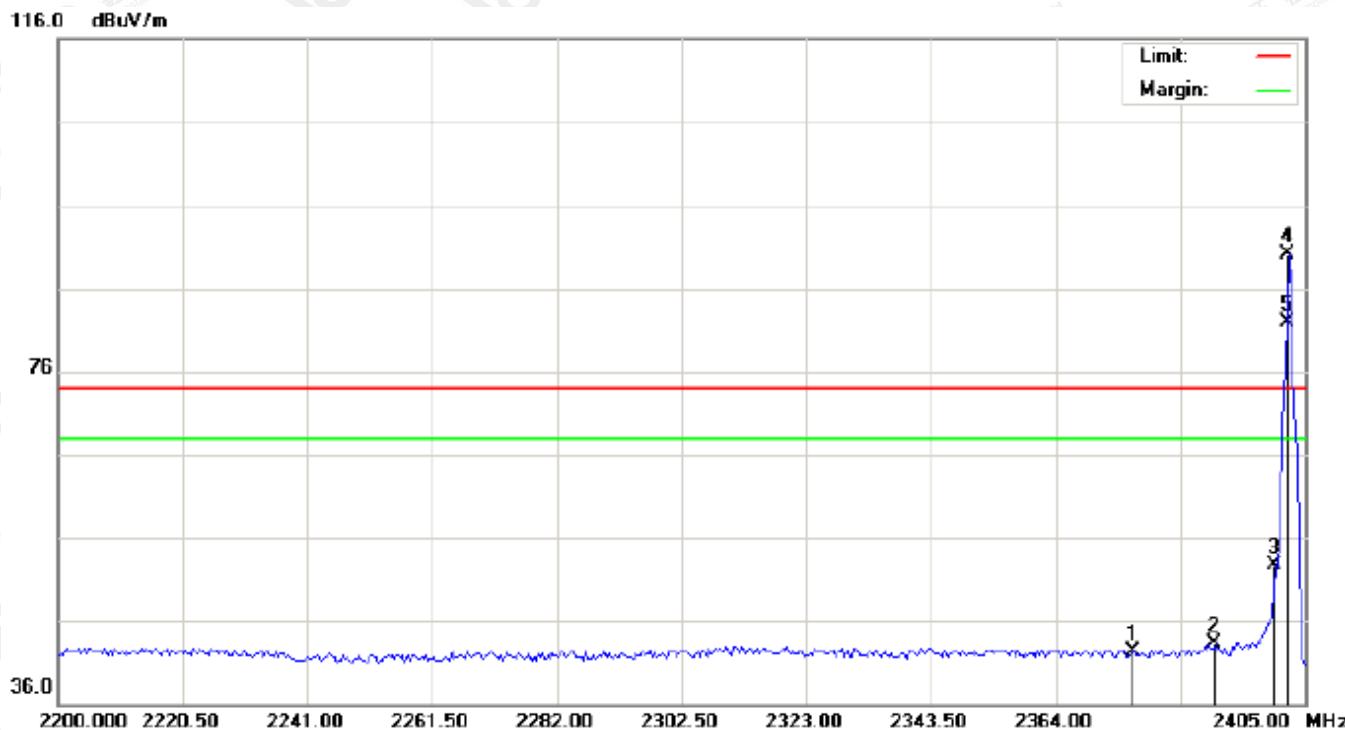


### 10.3 RADIATED TEST RESULT

(Worst modulation: GFSK)

FOR BR/EDR

#### TEST PLOT OF BAND EDGE FOR LOW CHANNEL-Horizontal



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2376.642	32.04	10.29	42.33	74.00	-31.67	peak			
2		2390.000	33.00	10.31	43.31	74.00	-30.69	peak			
3		2400.000	42.47	10.32	52.79	74.00	-21.21	peak			
4	*	2402.000	79.84	10.32	90.16	74.00	16.16	peak			
5	X	2402.000	71.53	10.32	81.85	74.00	7.85	AVG	100	305	

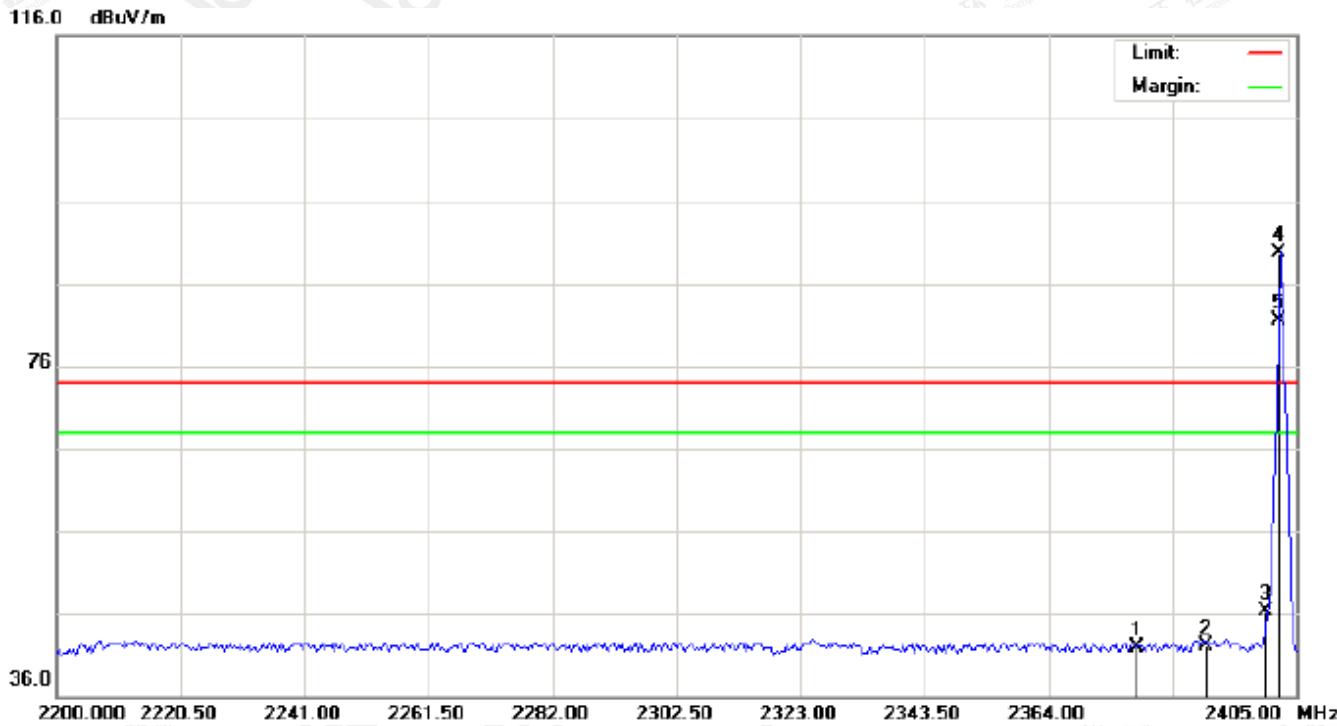
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TEST PLOT OF BAND EDGE FOR LOW CHANNEL -Vertical



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2378.692	31.54	10.30	41.84	74.00	-32.16	peak			
2		2390.000	31.71	10.31	42.02	74.00	-31.98	peak			
3		2400.000	36.06	10.32	46.38	74.00	-27.62	peak			
4	*	2402.000	79.31	10.32	89.63	74.00	15.63	peak			
5	X	2402.000	71.20	10.32	81.52	74.00	7.52	AVG	100	154	

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TEST PLOT OF BAND EDGE FOR HIGH CHANNEL -Horizontal

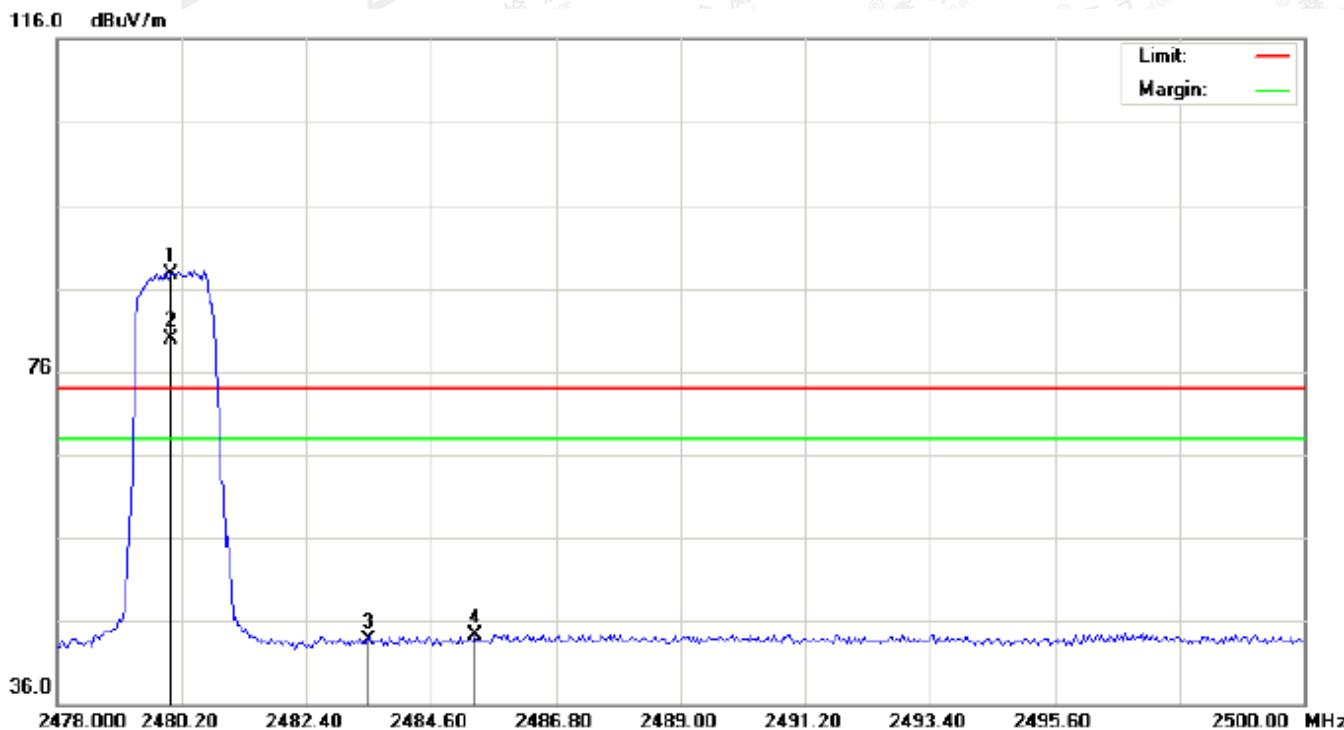


No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	2480.000	77.72	10.41	88.13	74.00	14.13	peak			
2	X	2480.000	69.43	10.41	79.84	74.00	5.84	AVG	100	301	
3		2483.500	33.69	10.41	44.10	74.00	-29.90	peak			
4		2485.077	33.05	10.41	43.46	74.00	-30.54	peak			

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TEST PLOT OF BAND EDGE FOR HIGH CHANNEL-Vertical



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna	Table	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		Height	Degree	
1	*	2480.000	77.20	10.41	87.61	74.00	13.61	peak			
2	X	2480.000	69.44	10.41	79.85	74.00	5.85	AVG	100	134	
3		2483.500	33.26	10.41	43.67	74.00	-30.33	peak			
4		2485.370	33.89	10.41	44.30	74.00	-29.70	peak			

**RESULT: PASS**

**Note:** Factor=Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

The “Factor” value can be calculated automatically by software of measurement system.

Hopping on mode and Hopping off mode have been tested, but only worst case reported.

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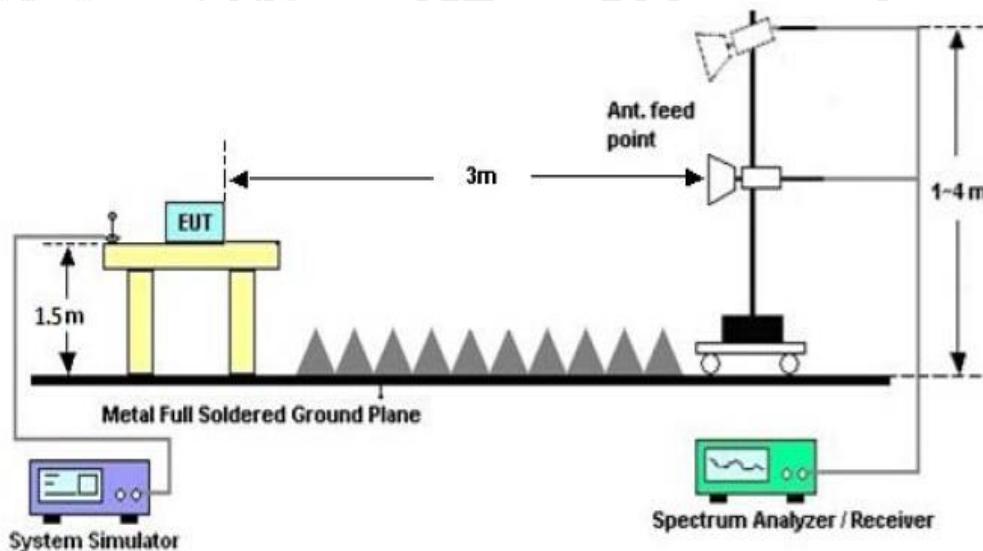


## 11. 20DB BANDWIDTH

### 11.1. MEASUREMENT PROCEDURE

1. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
2. Set Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hoping channel  
 $RBW \geq 1\%$  of the 20 dB bandwidth,  $VBW \geq 3RBW$ ; Sweep = auto; Detector function = peak
3. Set SPA Trace 1 Max hold, then View.

### 11.2. TEST SET-UP



### 11.3. LIMITS AND MEASUREMENT RESULTS

#### FOR BR/EDR

BLUETOOTH 1MBPS LIMITS AND MEASUREMENT RESULT					
Applicable Limits	Measurement Result			Result	
	Test Data (MHz)		-20dB BW(MHz)		
		99%OBW (MHz)			
N/A	Low Channel	0.967	1.105	PASS	
	Middle Channel	0.946	1.083	PASS	
	High Channel	0.953	1.095	PASS	

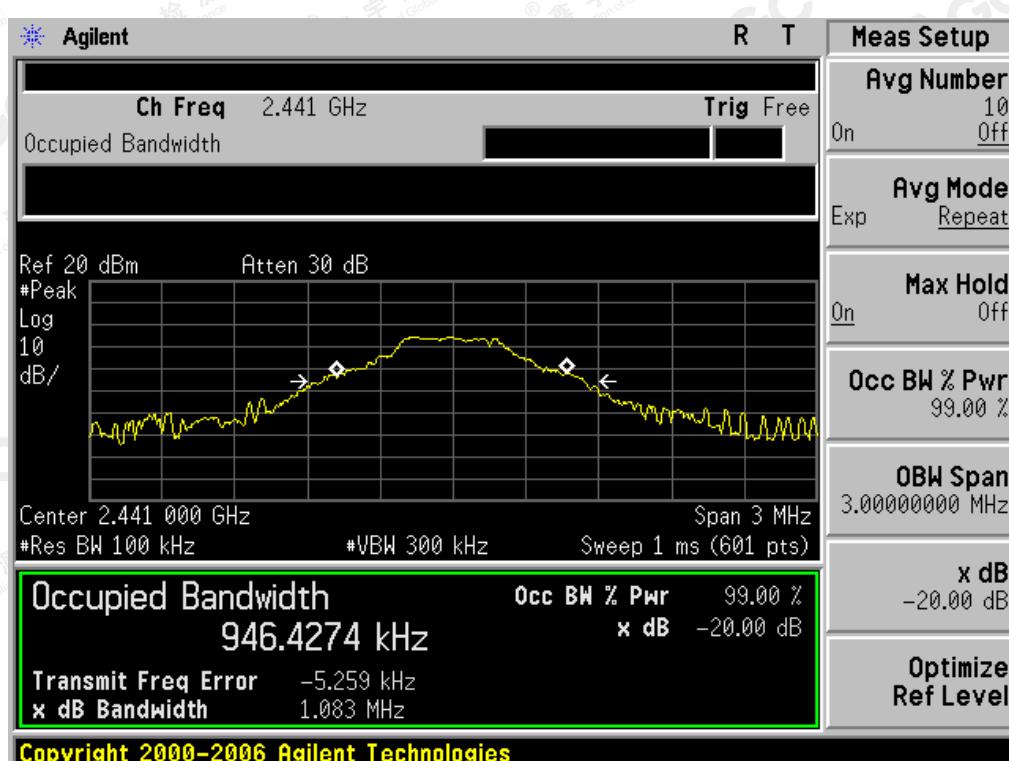
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## TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



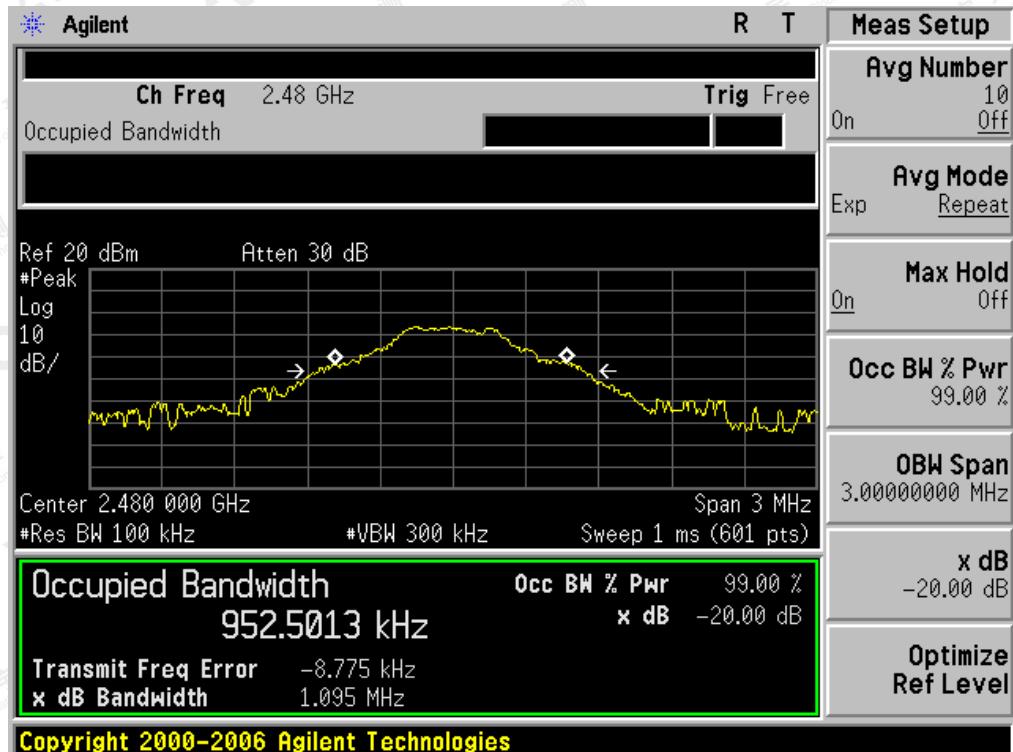
## TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



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TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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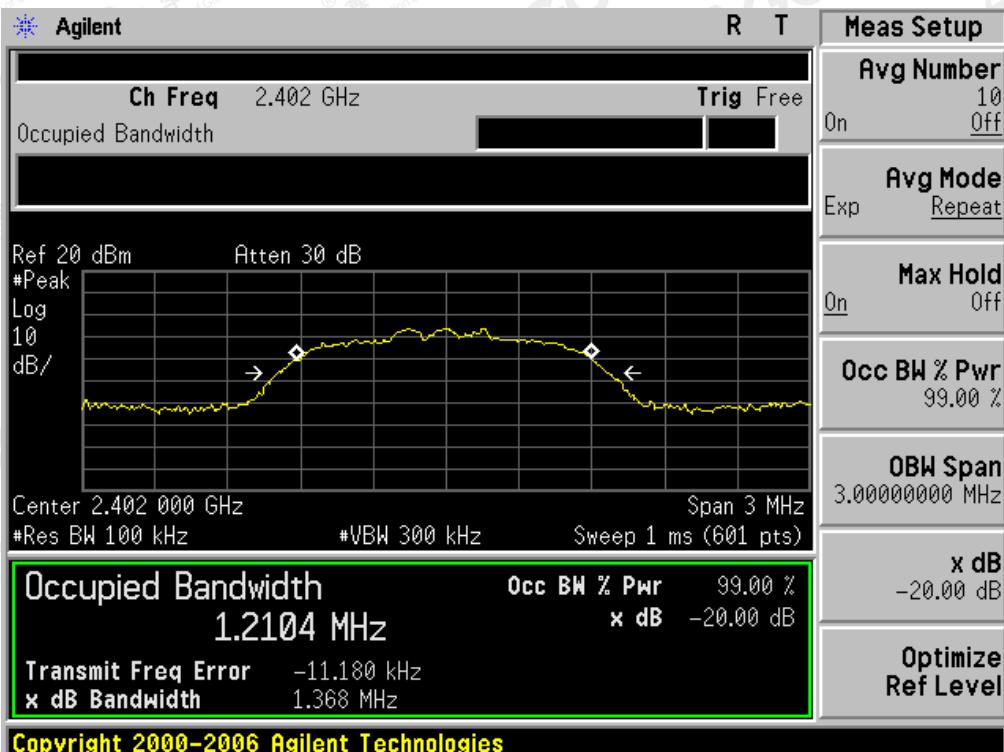


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BLUETOOTH 2MBPS LIMITS AND MEASUREMENT RESULT				
Applicable Limits	Measurement Result			
	Test Data (MHz)			Result
		99%OBW (MHz)	-20dB BW(MHz)	
N/A	Low Channel	1.210	1.368	PASS
	Middle Channel	1.218	1.362	PASS
	High Channel	1.212	1.355	PASS

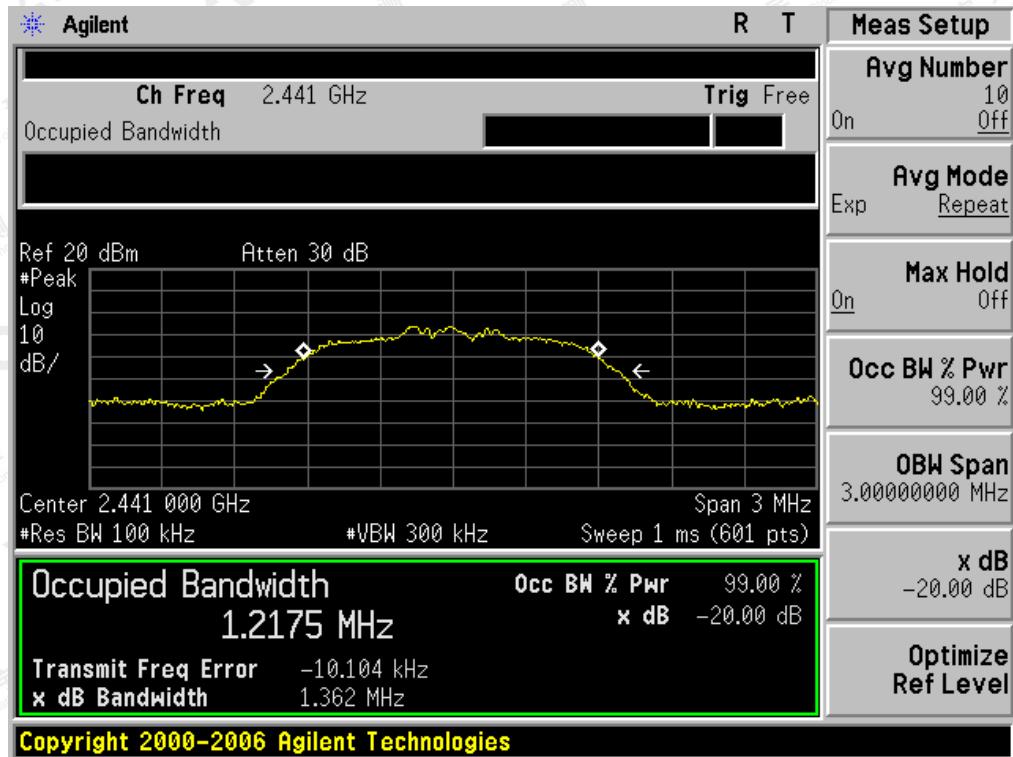
## TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



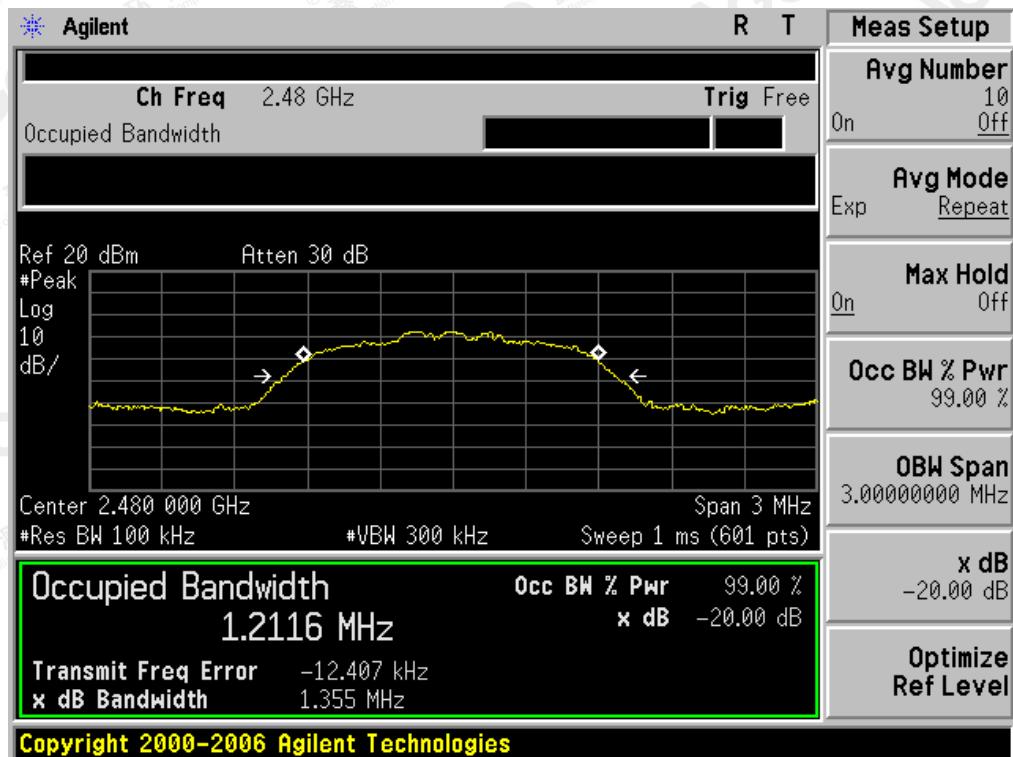
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## TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



## TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

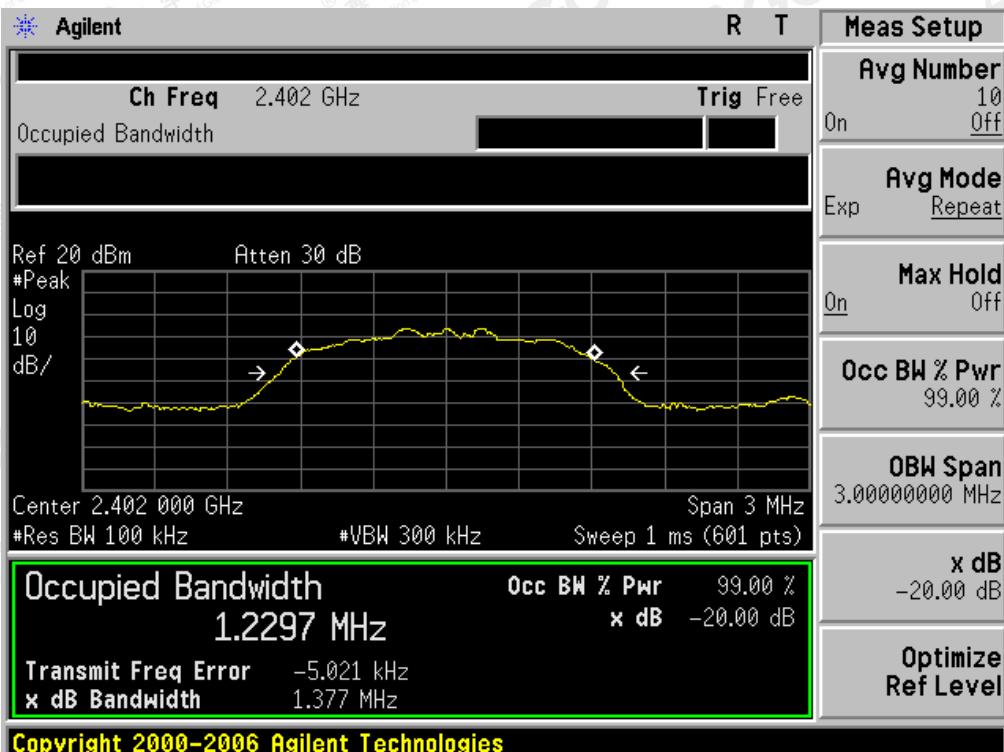


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BLUETOOTH 3MBPS LIMITS AND MEASUREMENT RESULT				
Applicable Limits	Measurement Result			
	Test Data (MHz)			Result
		99%OBW (MHz)	-20dB BW(MHz)	
N/A	Low Channel	1.230	1.377	PASS
	Middle Channel	1.229	1.382	PASS
	High Channel	1.231	1.379	PASS

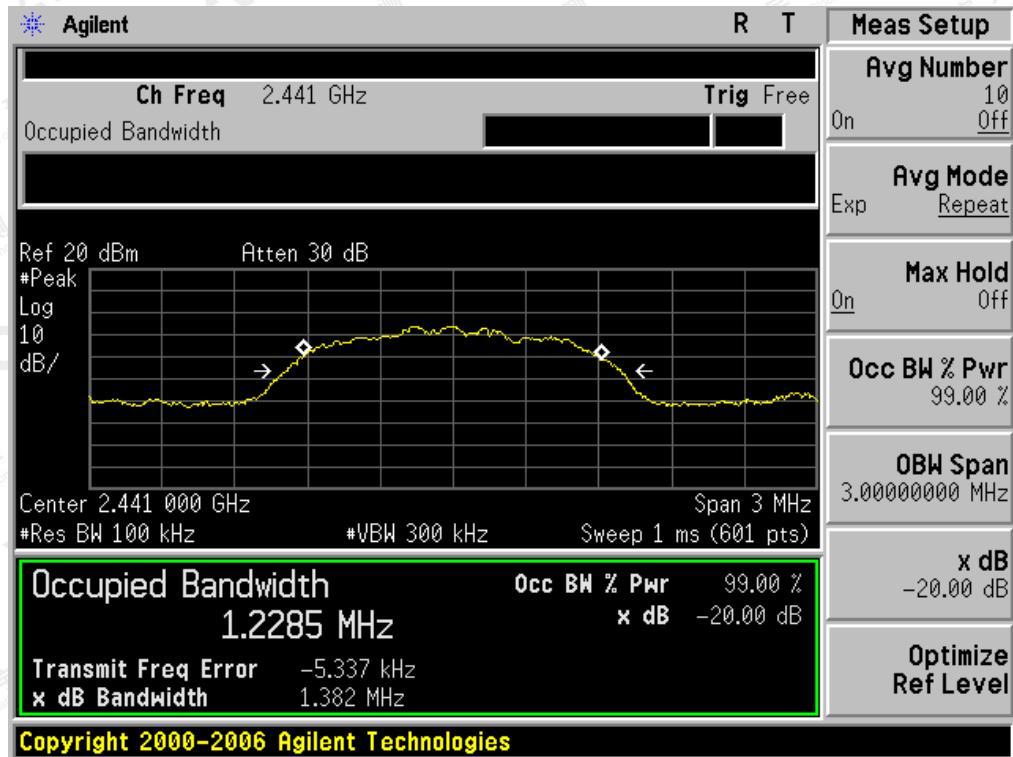
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



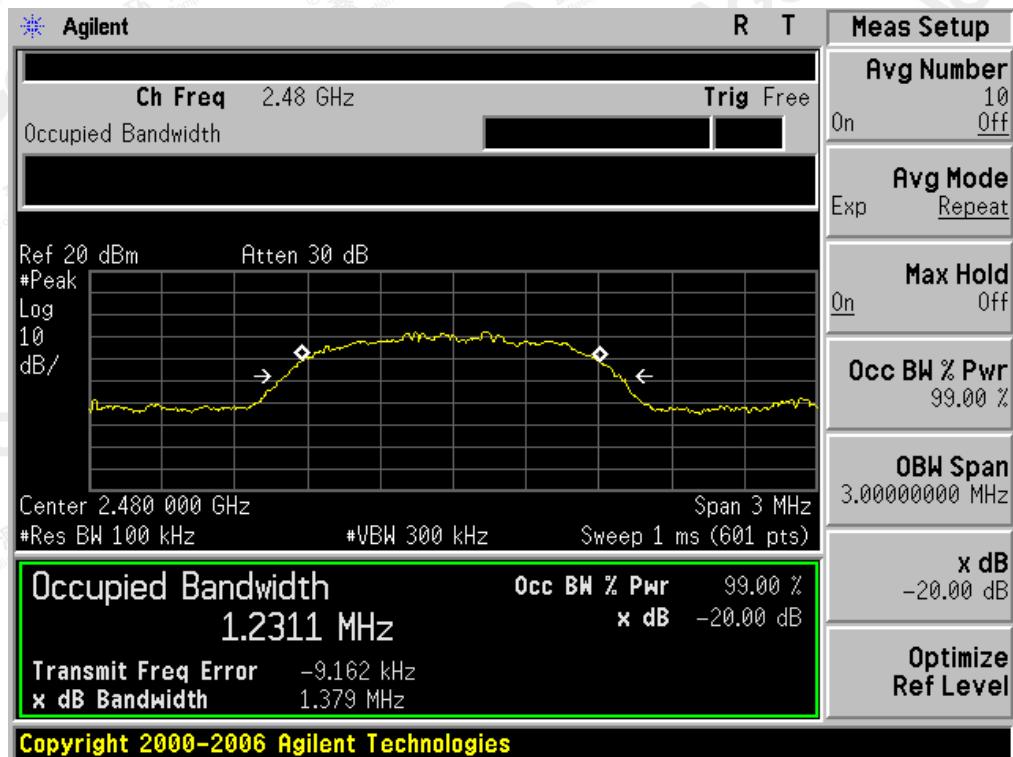
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## TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



## TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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## 12. FCC LINE CONDUCTED EMISSION TEST

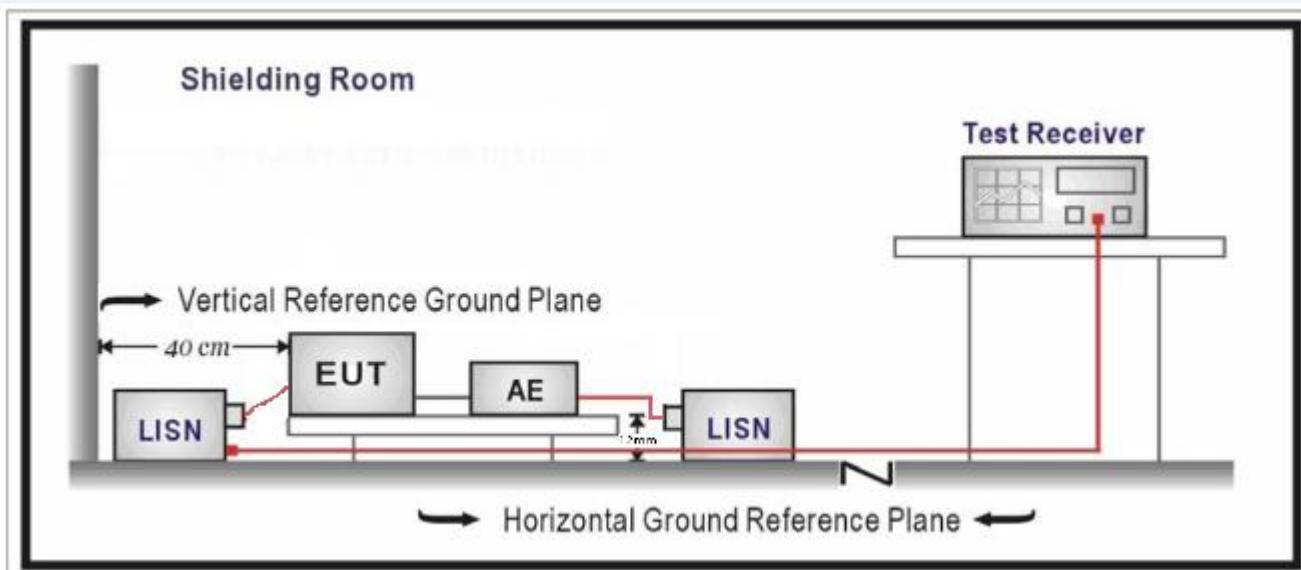
### 12.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P. (dBuV)	Average( dBuV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Note:

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

### 12.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



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### 12.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 12mm is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipments received AC120V/60Hz power from a LISN, if any.
5. The EUT received DC voltage by adapter which received 120V/60Hz power by a LISN.
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

### 12.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less -2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

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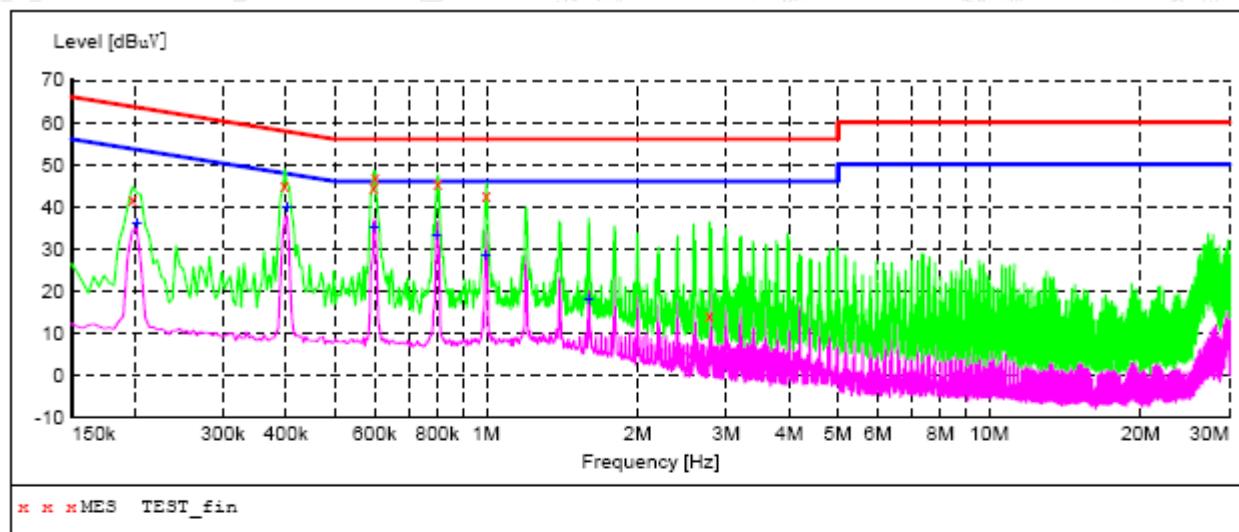


## 12.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

By adapter(worst case)

FOR BR/EDR

Line Conducted Emission Test Line 1-L



### MEASUREMENT RESULT: "TEST\_fin"

2018/3/5 9:55

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.198000	41.90	11.4	64	21.8	QP	L1	FLO
0.398000	45.10	11.4	58	12.8	QP	L1	FLO
0.598000	44.70	11.4	56	11.3	QP	L1	FLO
0.602000	47.10	11.4	56	8.9	QP	L1	FLO
0.802000	45.70	11.4	56	10.3	QP	L1	FLO
1.002000	42.60	11.3	56	13.4	QP	L1	FLO
2.778000	14.10	11.4	56	41.9	QP	L1	FLO

### MEASUREMENT RESULT: "TEST\_fin2"

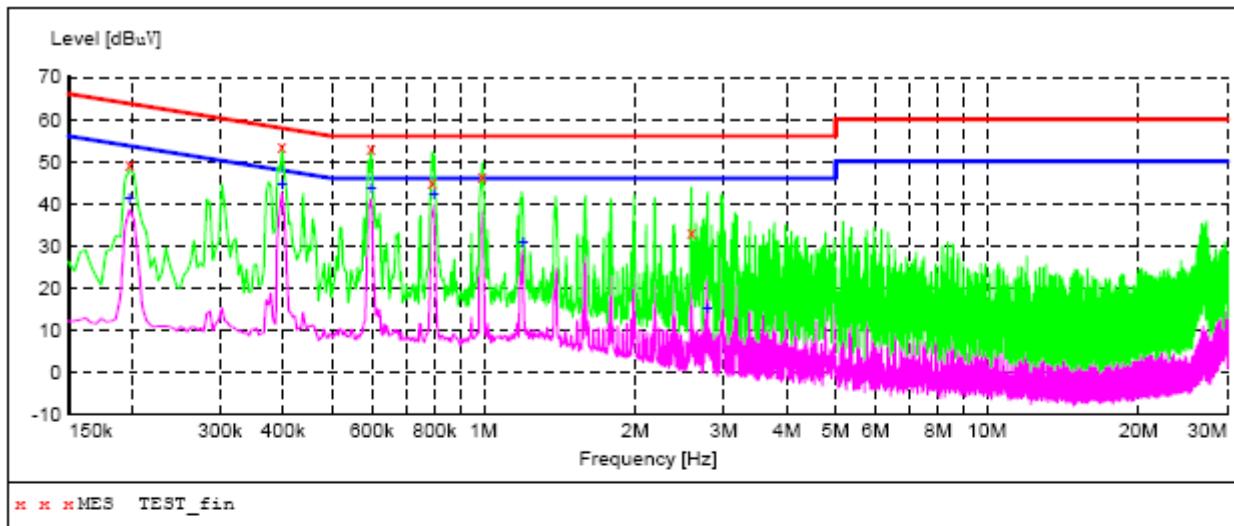
2018/3/5 9:55

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.202000	36.20	11.4	54	17.3	AV	L1	FLO
0.402000	39.60	11.4	48	8.2	AV	L1	FLO
0.598000	35.00	11.4	46	11.0	AV	L1	FLO
0.798000	33.00	11.4	46	13.0	AV	L1	FLO
0.998000	28.60	11.3	46	17.4	AV	L1	FLO
1.598000	18.00	11.3	46	28.0	AV	L1	FLO

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Line Conducted Emission Test Line 2-N



**MEASUREMENT RESULT: "TEST\_fin"**

2018/3/5 9:49

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.198000	49.50	11.4	64	14.2	QP	N	FLO
0.398000	53.40	11.4	58	4.5	QP	N	FLO
0.598000	53.30	11.4	56	3.7	QP	N	FLO
0.790000	45.20	11.4	56	10.8	QP	N	FLO
0.994000	46.40	11.3	56	9.6	QP	N	FLO
2.586000	33.30	11.4	56	22.7	QP	N	FLO

**MEASUREMENT RESULT: "TEST\_fin2"**

2018/3/5 9:49

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.198000	41.40	11.4	54	12.3	AV	N	FLO
0.398000	44.50	11.4	48	3.4	AV	N	FLO
0.598000	43.80	11.4	46	3.2	AV	N	FLO
0.798000	42.30	11.4	46	3.7	AV	N	FLO
1.198000	31.00	11.3	46	15.0	AV	N	FLO
2.782000	14.90	11.4	46	31.1	AV	N	FLO

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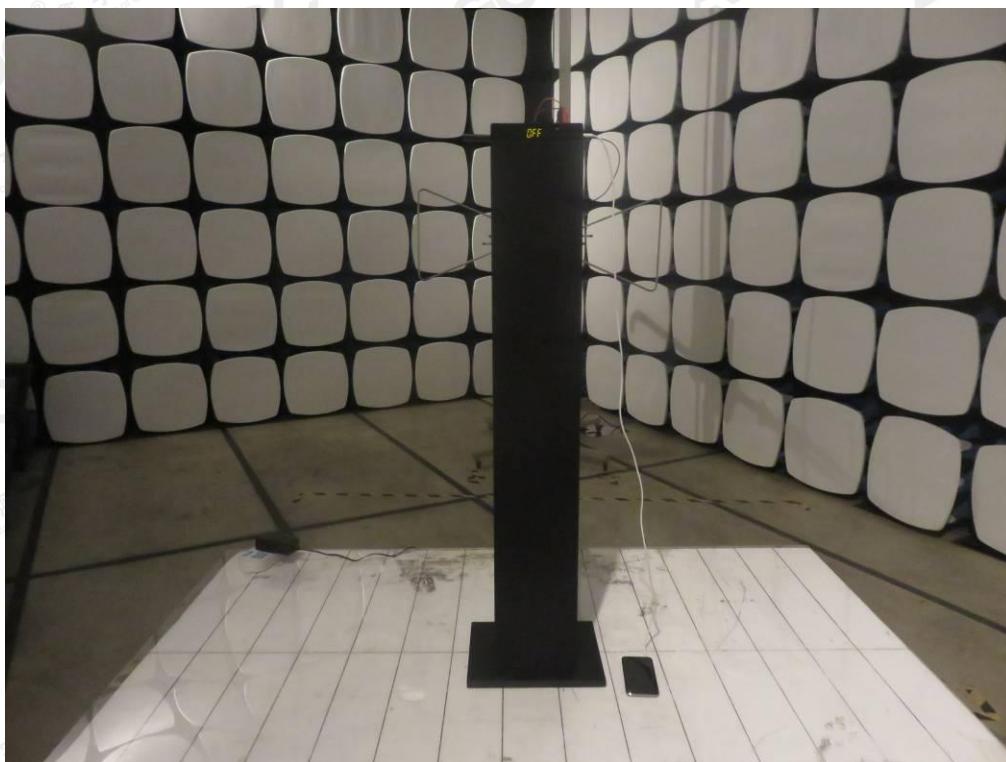


## APPENDIX A: PHOTOGRAPHS OF TEST SETUP

### FCC LINE CONDUCTED EMISSION TEST SETUP



### FCC RADIATED EMISSION TEST SETUP

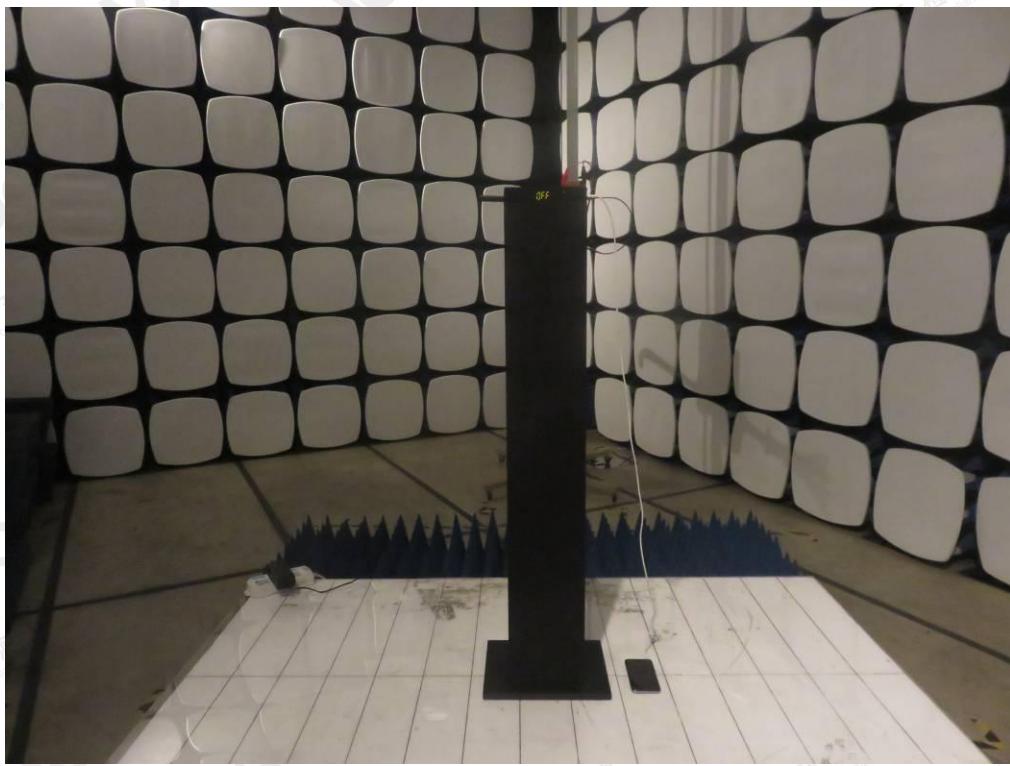
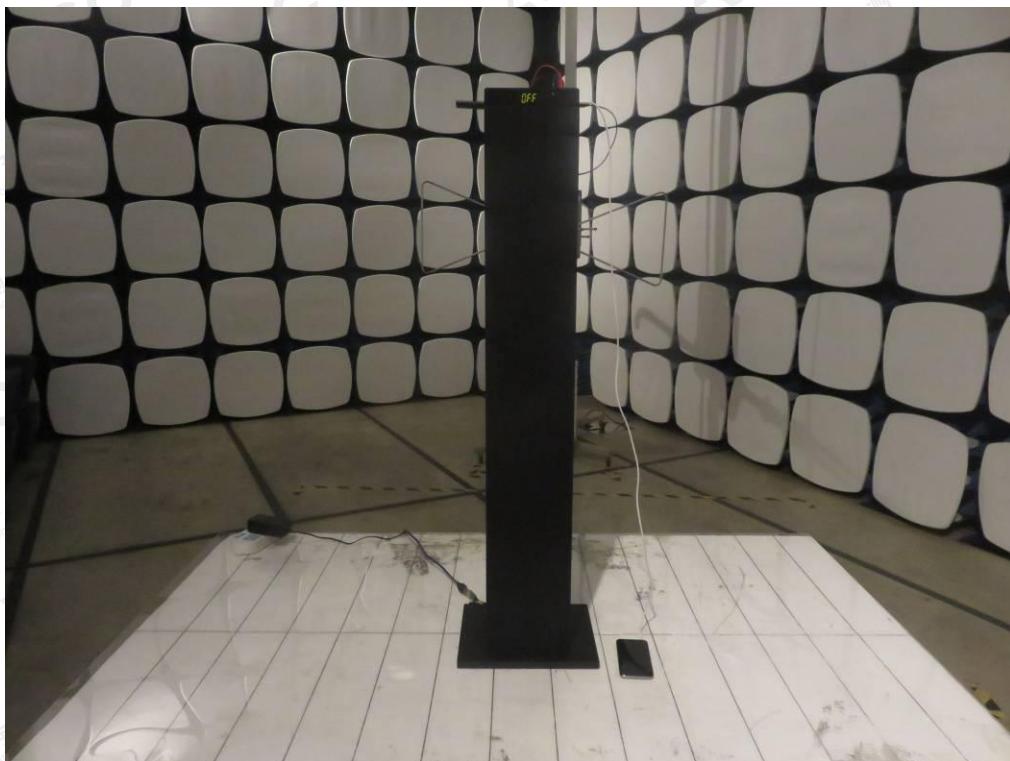


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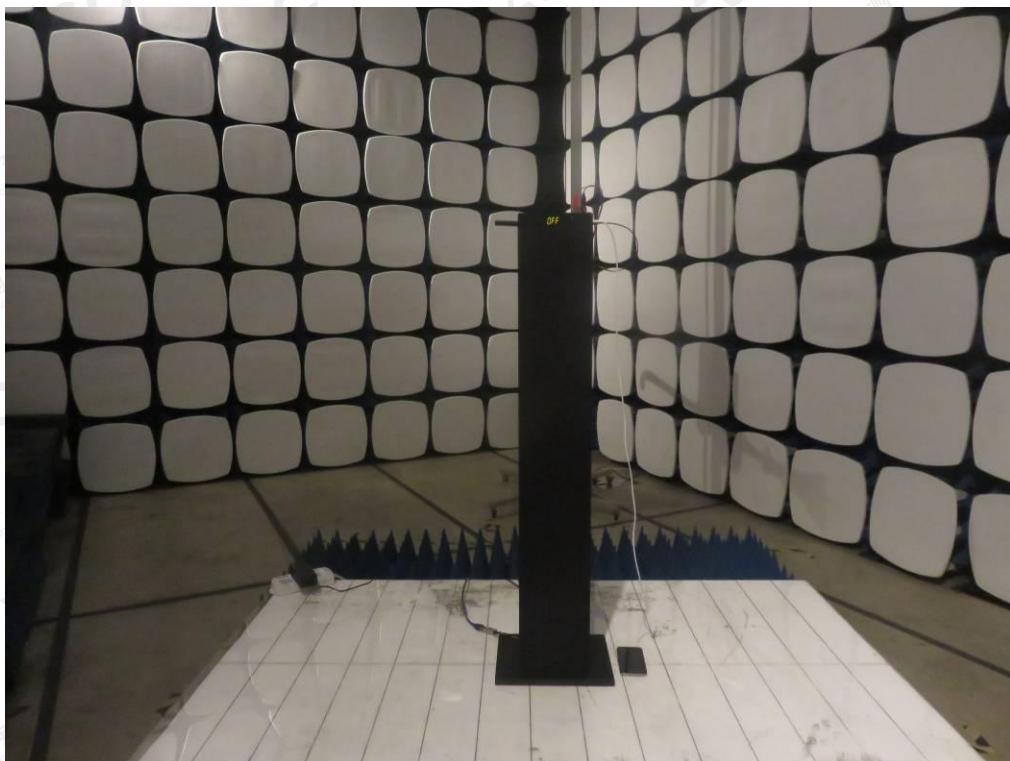


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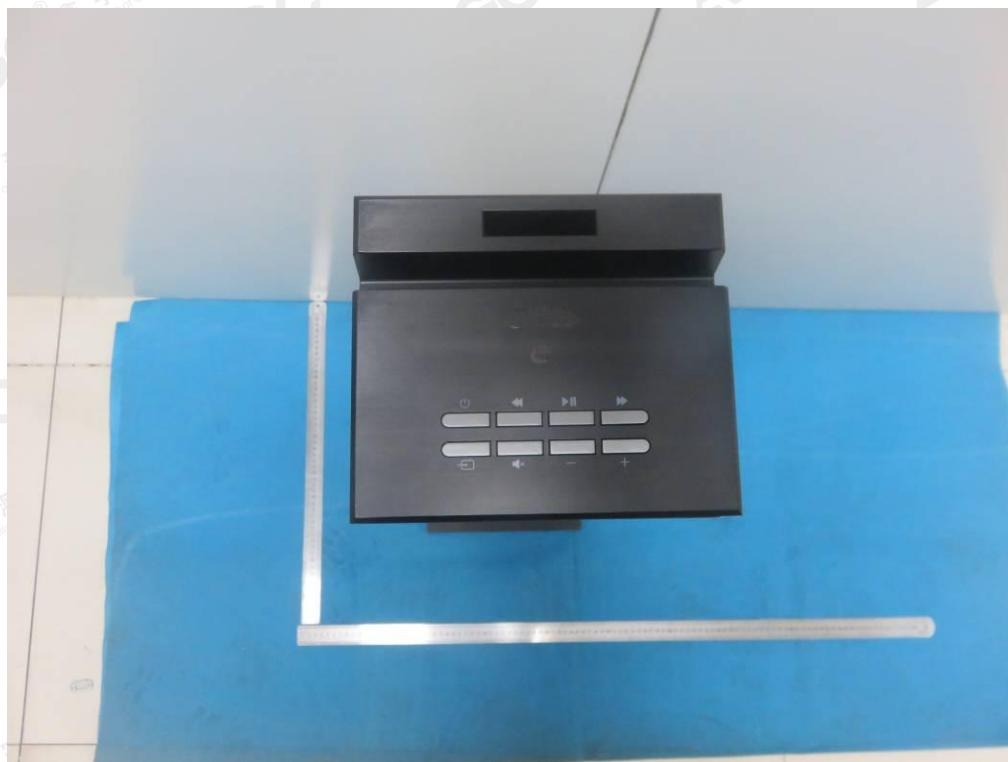
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## APPENDIX B: PHOTOGRAPHS OF EUT

### TOTAL VIEW OF EUT



TOP VIEW OF EUT



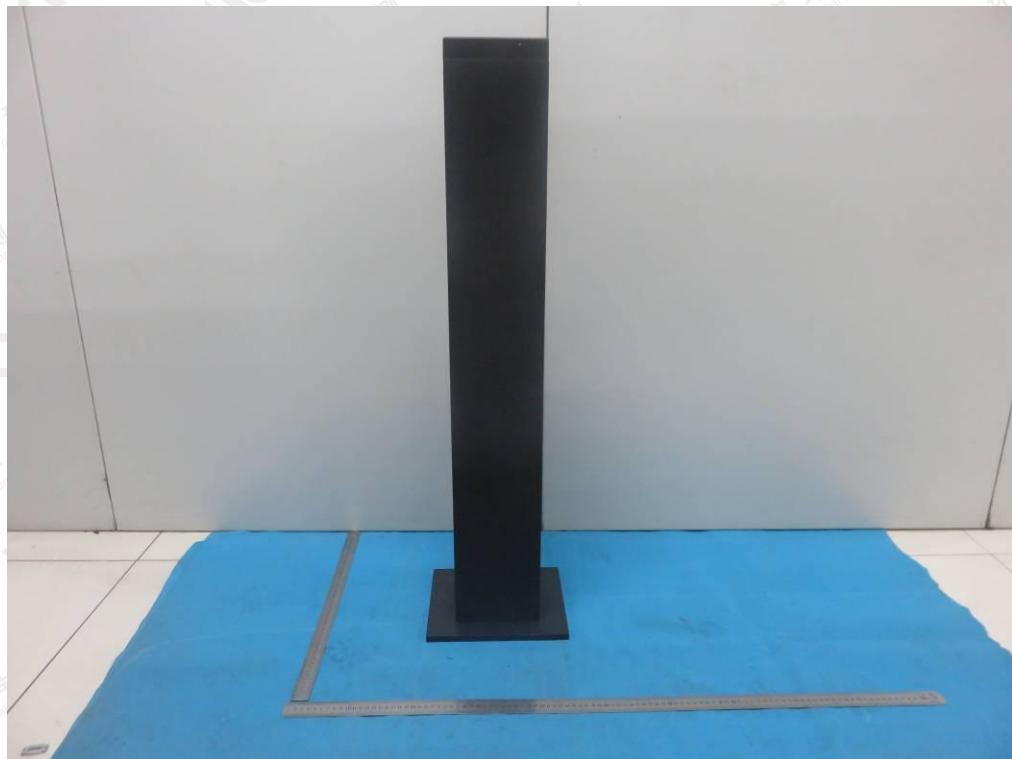
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FRONT VIEW OF EUT



BACK VIEW OF EUT



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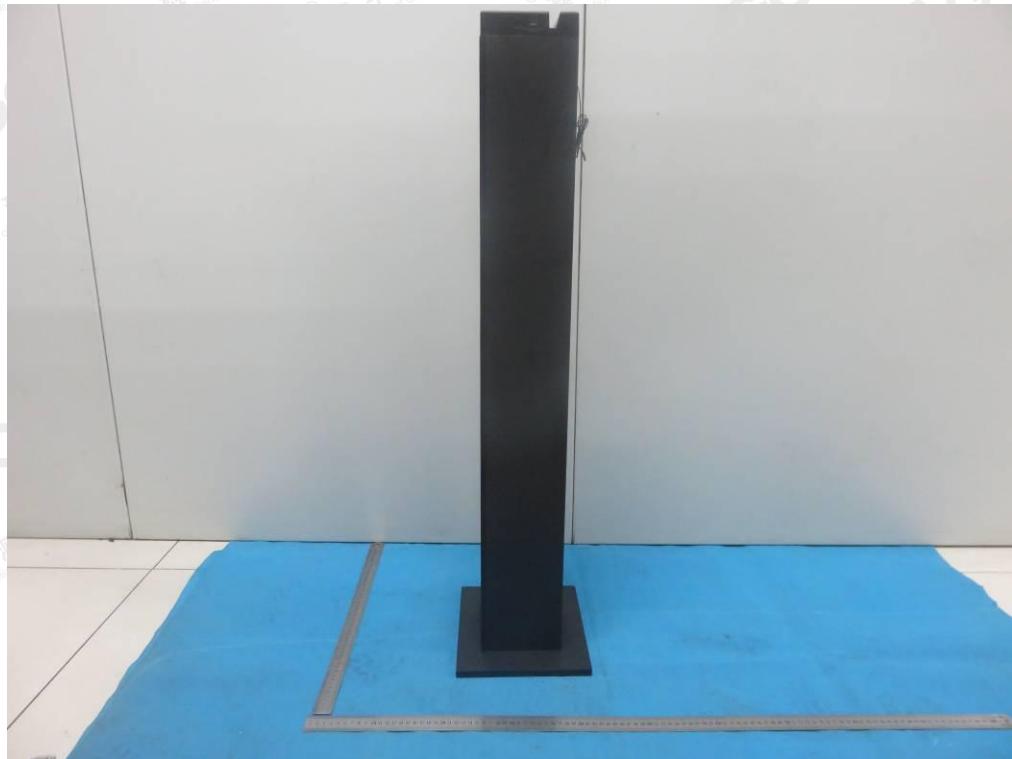
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LEFT VIEW OF EUT



RIGHT VIEW OF EUT



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VIEW OF EUT (PORT)-1



VIEW OF EUT (PORT)-2



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VIEW OF EUT (PORT)-3



OPEN VIEW OF EUT



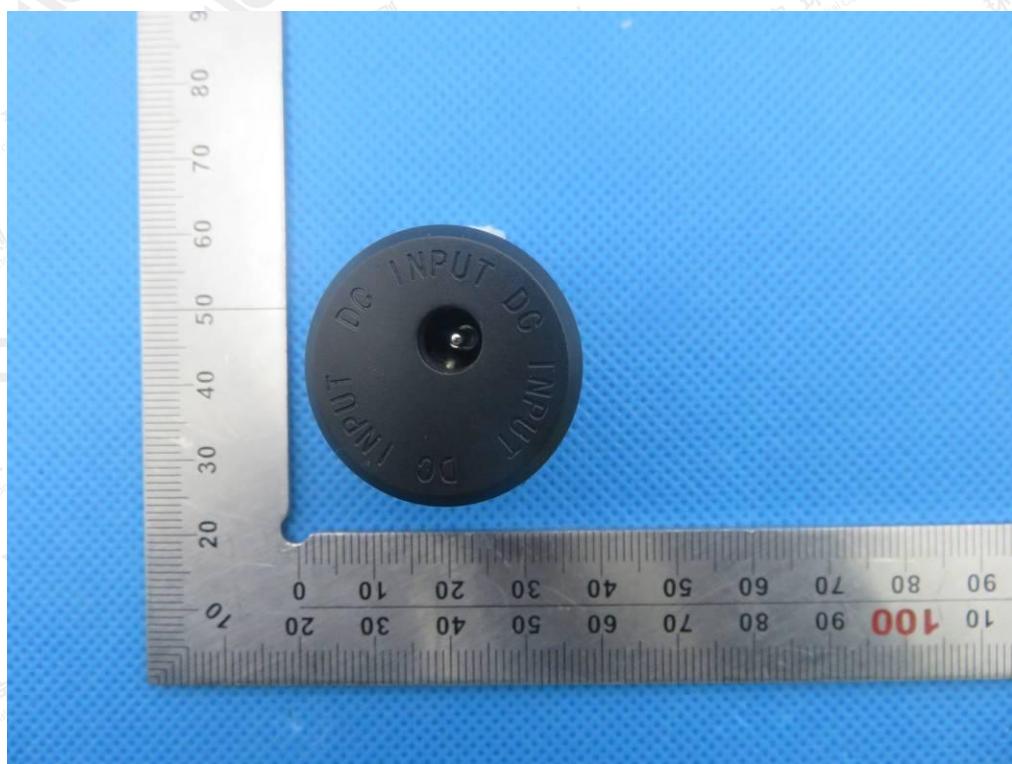
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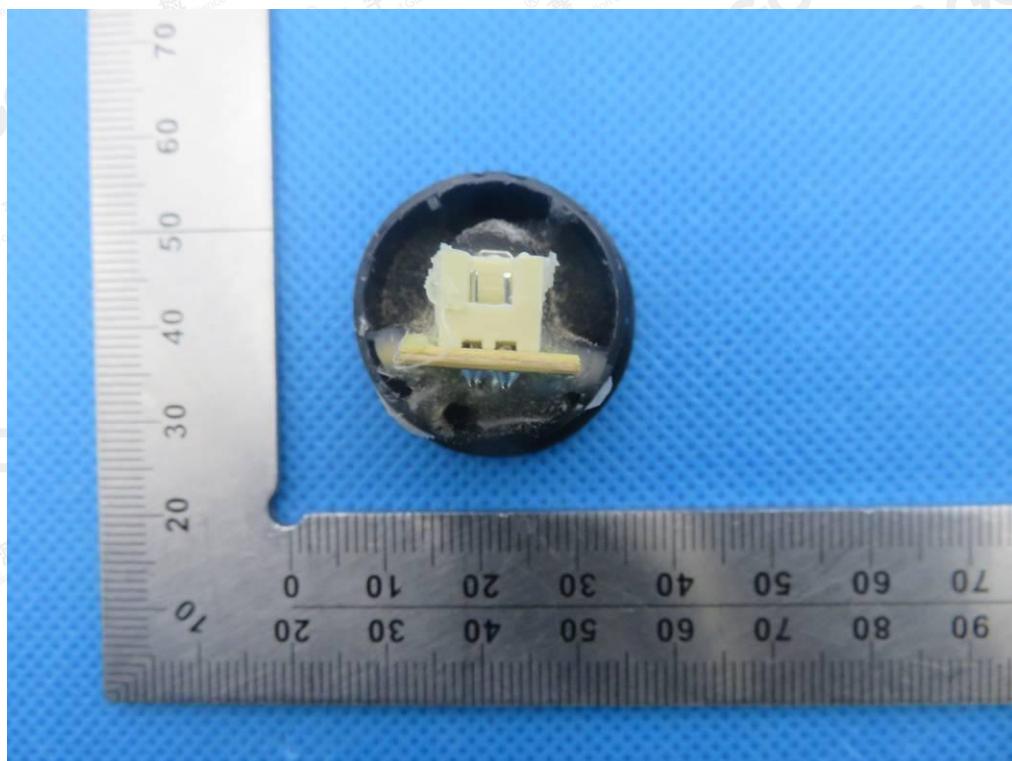
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## INTERNAL VIEW OF EUT-1



## INTERNAL VIEW OF EUT-2



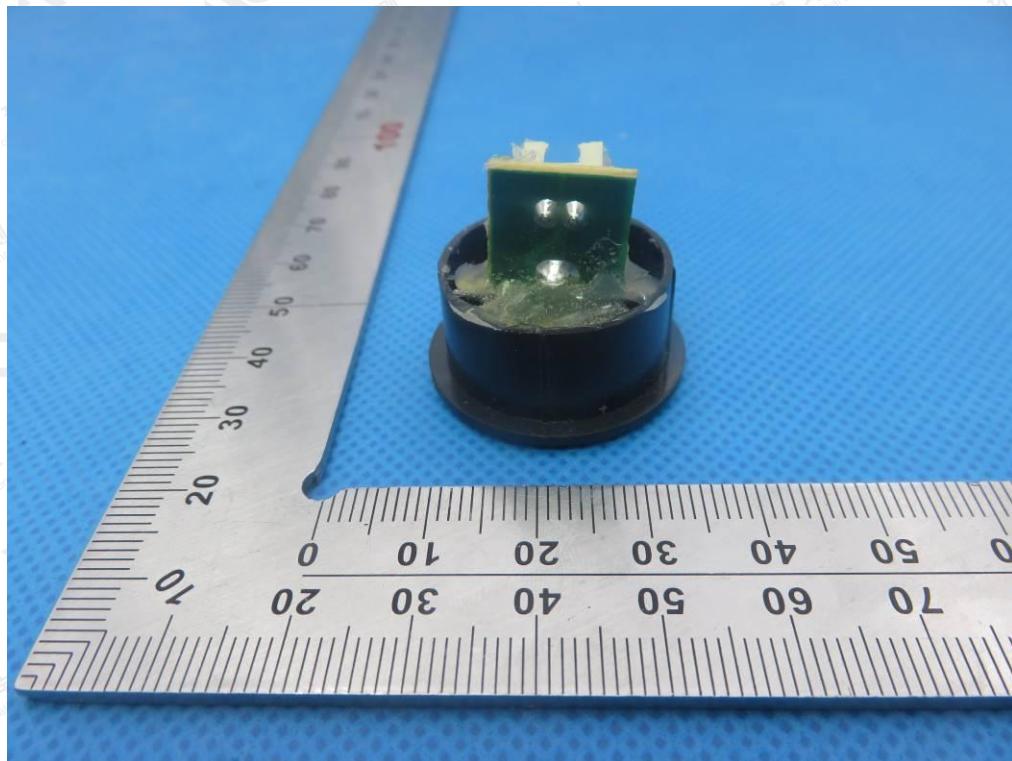
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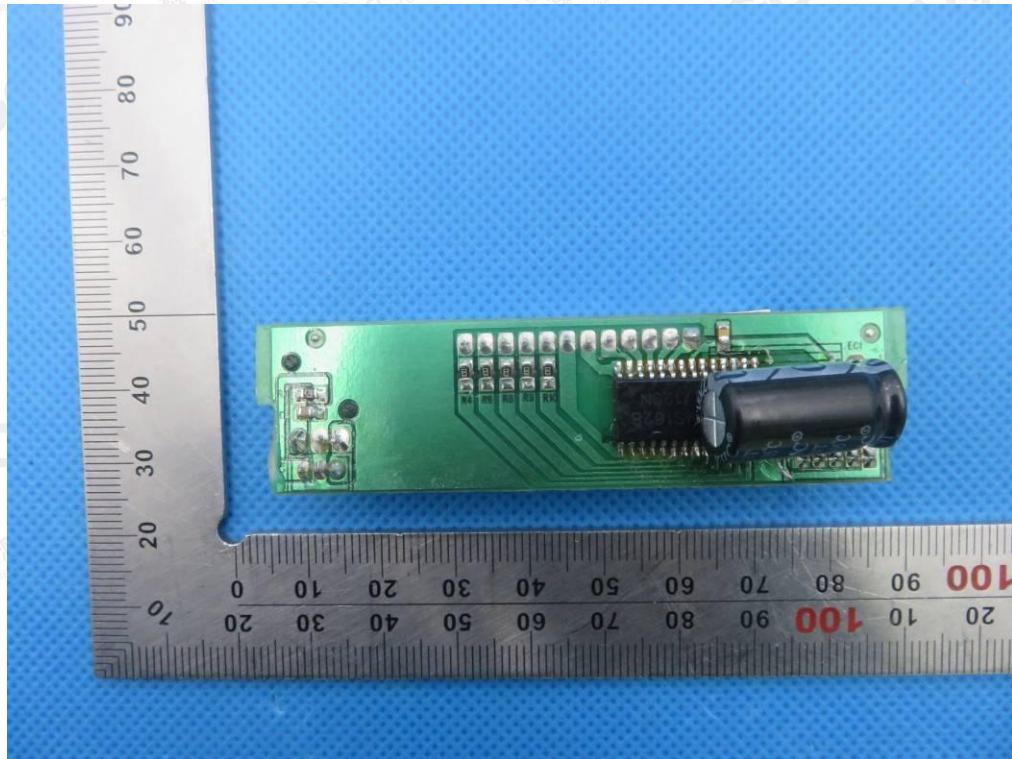
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## INTERNAL VIEW OF EUT-3



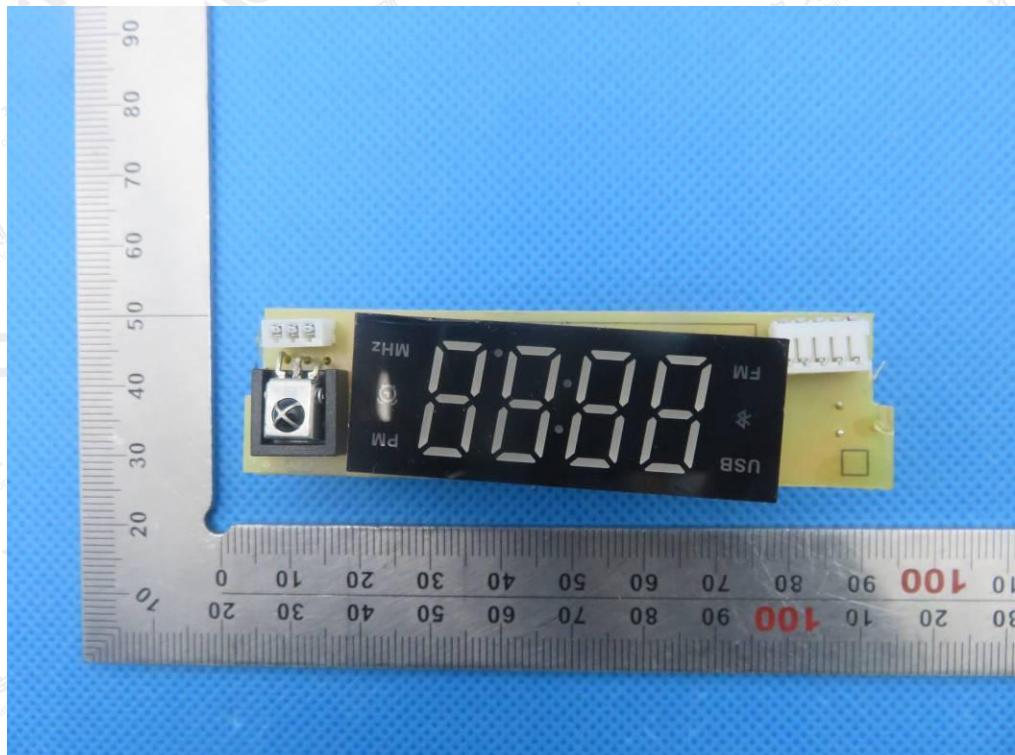
## INTERNAL VIEW OF EUT-4



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## INTERNAL VIEW OF EUT-5



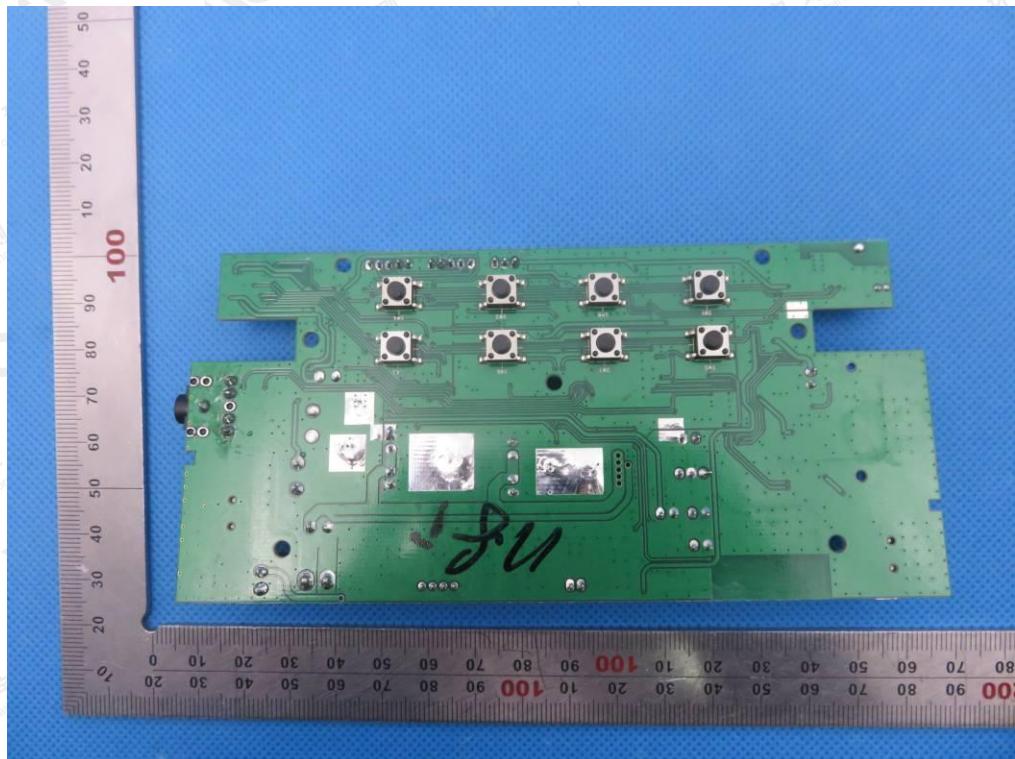
## INTERNAL VIEW OF EUT-6



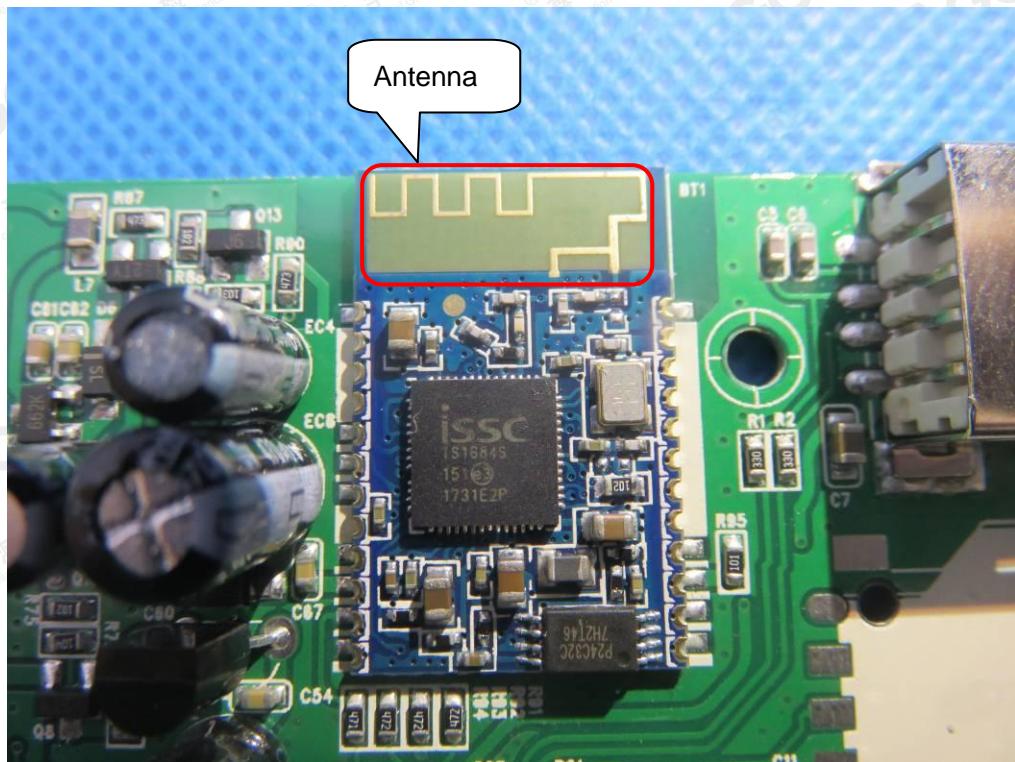
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## INTERNAL VIEW OF EUT-7



## INTERNAL VIEW OF EUT-8



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VIEW OF ADAPTER



---END OF REPORT---

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