

FCC Test Report

Report No.: AGC04138180601FE03

FCC ID : 2AAXO-SDL-2093
APPLICATION PURPOSE : Original Equipment
PRODUCT DESIGNATION : STUDIO-Bluetooth® PORTABLE HIGH DEFINITION
KARAOKE SYSTEM
BRAND NAME : Singing Machine
MODEL NAME : See page 4
CLIENT : The Singing Machine Company, Inc.
DATE OF ISSUE : July 05, 2018
STANDARD(S) : FCC Part 15 Subpart C Section 15.249
TEST PROCEDURE(S)
REPORT VERSION : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd

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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	July 05, 2018	Valid	Initial release

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1. VERIFICATION OF CONFORMITY

Applicant	The Singing Machine Company, Inc.
Address	6301 NW 5th Way, Suite 2900, Fort Lauderdale, FL 33309, USA
Manufacturer	Zhuhai Fullwing Electronic Co., Ltd Zhongshan Branch
Address	4/F & 5/F, No 10, Xing Ye Road, Xin Xu, San Xiang, Zhongshan, China
Product Designation	STUDIO-Bluetooth® PORTABLE HIGH DEFINITION KARAOKE SYSTEM
Brand Name	Singing Machine
Test Model	SDL2093
Series Model	SDL2093, SDL2093SC, SDL2093XX (X is reserved for future color change. It can be 0-9, A-Z or N/A)
Difference description	All the same except for the model name and appearance color
Date of test	June 07, 2018 to June 18, 2018
Deviation	None
Condition of Test Sample	Normal
Report Template	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



Jonhen Wang(Wang Yonghuan) June 18, 2018

Reviewed By



Cool Cheng(Cheng Mengguo) July 05, 2018

Approved By



Forrest Lei(Lei Yonggang)
 Authorized Officer July 05, 2018

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

A major technical description of EUT is described as following

Operation Frequency	2.402 GHz to 2.480GHz
Bluetooth Version	V2.1+EDR
Modulation	BR <input checked="" type="checkbox"/> GFSK, EDR <input checked="" type="checkbox"/> π /4-DQPSK, <input type="checkbox"/> 8DPSK BLE <input type="checkbox"/> GFSK
Number of channels	79
Hardware Version	V1.0
Software Version	V1.0
Antenna Designation	PCB Antenna
Antenna Gain	-0.58dBi
Power Supply	DC 12V by battery
Charging Voltage(By adapter)	Model name: K48V180266U INPUT: 100-240~ 50-60Hz 1.2A OUTPUT: 18.0V \pm 2.66A
Note: The standard USB port can be used to read data from U-disk but can't be used to transfer data with PC.	

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 expanded 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, $U_c = \pm 3.2$ dB
- Uncertainty of Radiated Emission below 1GHz, $U_c = \pm 3.9$ dB
- Uncertainty of Radiated Emission above 1GHz, $U_c = \pm 4.8$ 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	BT Link with charging
8	BT Link(Hopping mode)

Note:

1. All the test modes can be supply by battery, only the result of the worst case was recorded in the report, if no other cases.
2. The EUT used fully-charged battery when tested.

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Software Setting

FCCAssist 1.5

Parameter

MODE	TX				
Channel	78	Packet type	2-DH3	Data Types	Pn9
Transmit Power	10	Hopping	OFF	Serial Port	COM3

open COM3 succeed
Channel: 78 Data Types: Pn9
Transmit Power : 10 Packet type: 2-DH3
Send configuration information successfully

Send configuration

Description:

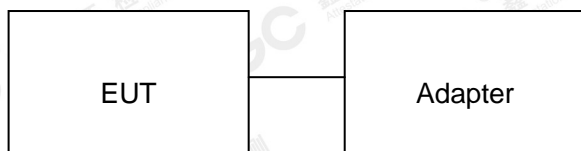
1. Channel: range 0-78, corresponding frequency 2.402GHz-2.480GHZ
2. Transmit Power range 0-10, 0 is the minimum, maximum 10

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5. SYSTEM TEST CONFIGURATION

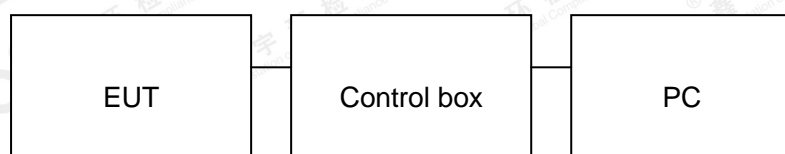
5.1. CONFIGURATION OF EUT SYSTEM

Configure 1: (Normal hopping)



Note: Owing to the EUT has own battery, and testing may be performed while adapter removed.

Configure 2: (Control continuous TX)



5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Mfr/Brand	Model/Type No.	Remark
1	STUDIO-Bluetooth® PORTABLE HIGH DEFINITION KARAOKE SYSTEM	Singing Machine	SDL2093	EUT
2	Battery	CONSENT	GS12V7AH	Accessory
3	Control box	GZUT	N/A	A.E
4	Adapter	KPTEC	K48V180266U	Accessory
5	MIC	Singing Machine	3m unshielded	Accessory
6	USB Cable	N/A	1m unshielded	A.E
7	AUX IN Cable	N/A	1m unshielded	A.E
8	Mobile phone	Huawei	V9	A.E
9	U-Disk	Kingston	DT 101G2/16GB	A.E
10	Earphone	OPPO	MH133	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

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	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
NVLAP Lab Code	600153-0
Designation Number	CN5028
Test Firm Registration Number	682566
Description	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
Radiation Cable 1	MXT	RS1	R005	N/A	N/A
Radiation Cable 2	MXT	RS1	R006	N/A	N/A
Loop Antenna	A.H.Systems,Inc	SAS-562B	--	Mar. 01, 2018	Feb. 28, 2019
Filter (2.4-2.483GHz)	Micro-tronics	087	--	Jun.20, 2017	Jun.19, 2018

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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	
		μ V/m	dB(μ 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(μ V)/m (Peak) 54.0 dB(μ V)/m (Average)	

Remark:

- (1) Emission level $\text{dB}\mu$ V = 20 log Emission level μ 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 0.8 meter 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 used for measurements. The EUT was placed on the top of a rotating table 1.5 meter 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 denoted 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

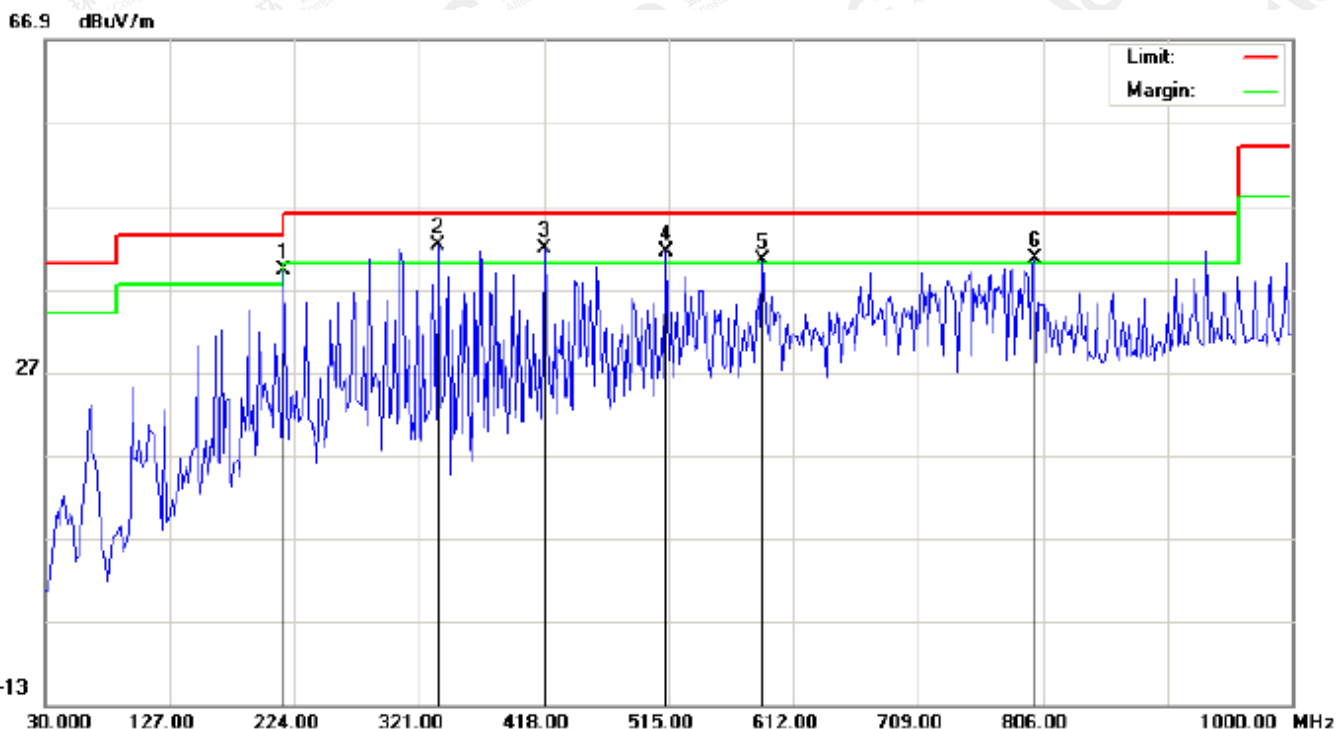
(Worst modulation: GFSK)

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

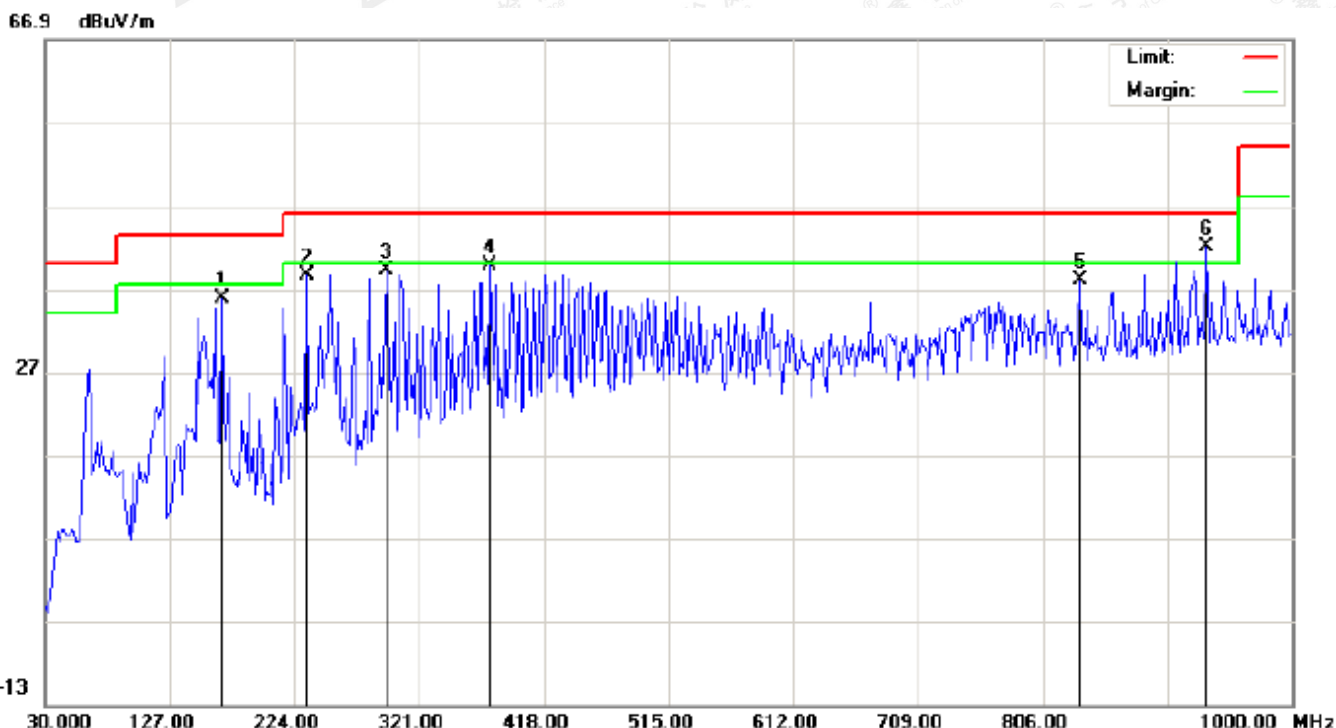


No.	Mk	Freq. MHz	Reading dBuV	Factor dB/m	Measurement dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree degree	Comment
1	!	215.9165	28.84	10.38	39.22	43.50	-4.28	peak			
2	*	335.5500	24.34	17.78	42.12	46.00	-3.88	peak			
3	!	418.0000	22.13	19.62	41.75	46.00	-4.25	peak			
4	!	513.3831	19.92	21.49	41.41	46.00	-4.59	peak			
5	!	587.7500	17.03	23.42	40.45	46.00	-5.55	peak			
6	!	799.5333	13.28	27.31	40.59	46.00	-5.41	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	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		167.4165	20.87	14.86	35.73	43.50	-7.77	peak			
2		233.6999	26.27	12.30	38.57	46.00	-7.43	peak			
3		295.1333	23.93	15.26	39.19	46.00	-6.81	peak			
4		375.9667	20.81	18.91	39.72	46.00	-6.28	peak			
5		835.1000	10.61	27.31	37.92	46.00	-8.08	peak			
6	*	933.7164	12.47	29.55	42.02	46.00	-3.98	peak			

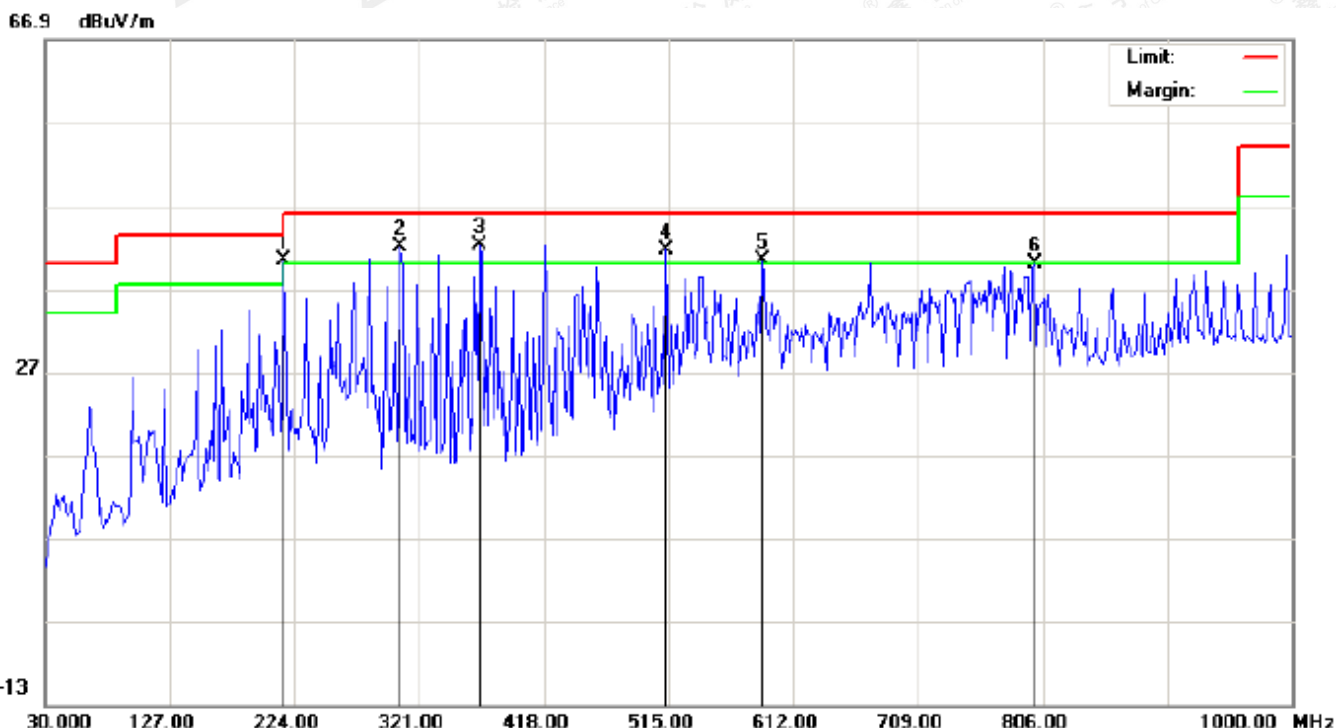
RESULT: PASS

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

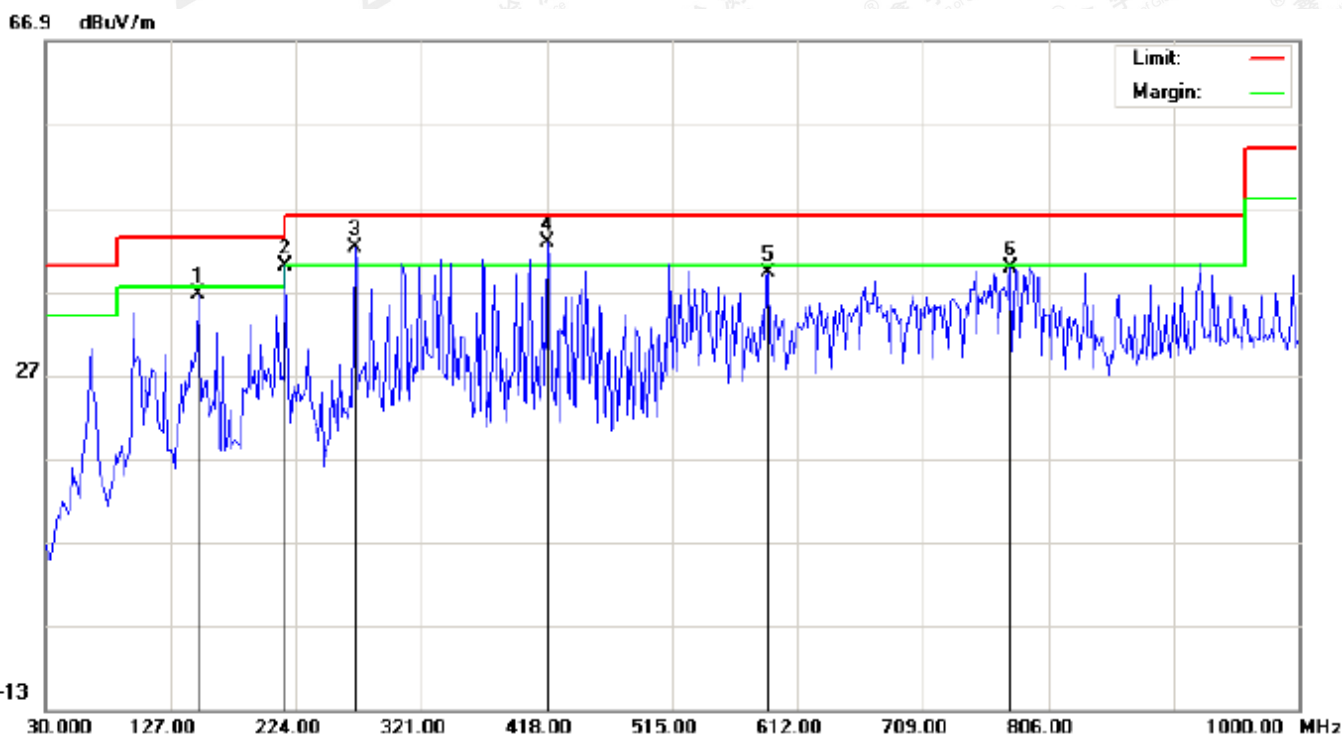


No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	215.9165	30.11	10.38	40.49	43.50	-3.01	peak			
2	!	306.4499	26.13	15.84	41.97	46.00	-4.03	peak			
3	!	367.8833	23.37	18.86	42.23	46.00	-3.77	peak			
4	!	513.3831	20.21	21.49	41.70	46.00	-4.30	peak			
5	!	587.7500	17.06	23.42	40.48	46.00	-5.52	peak			
6	!	799.5333	12.70	27.31	40.01	46.00	-5.99	peak			

RESULT: PASS

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



No.	Mk	Freq. MHz	Reading dBuV	Factor dB/m	Measurement dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree degree	Comment
1		148.0166	23.43	13.25	36.68	43.50	-6.82	peak			
2	!	215.9165	29.58	10.38	39.96	43.50	-3.54	peak			
3	!	269.2667	32.11	10.18	42.29	46.00	-3.71	peak			
4	*	418.0000	23.25	19.62	42.87	46.00	-3.13	peak			
5		589.3667	15.66	23.46	39.12	46.00	-6.88	peak			
6		776.8999	12.85	27.00	39.85	46.00	-6.15	peak			

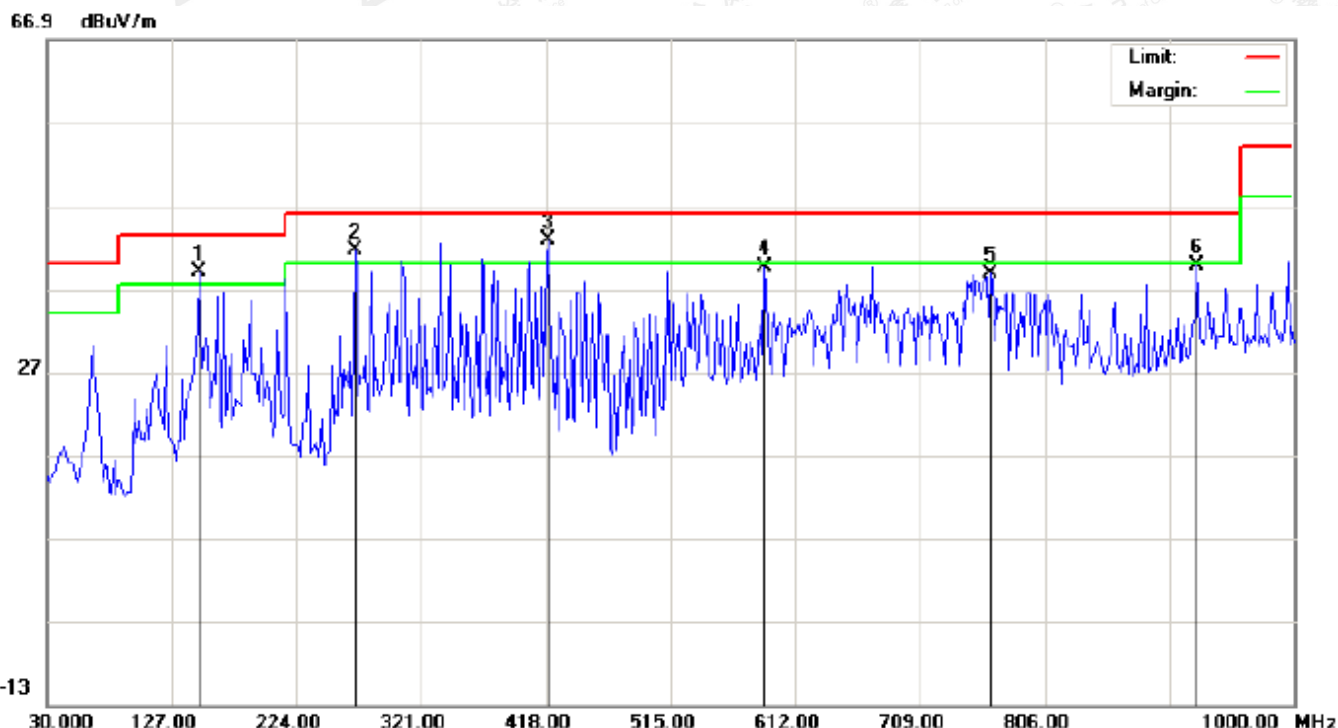
RESULT: PASS

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

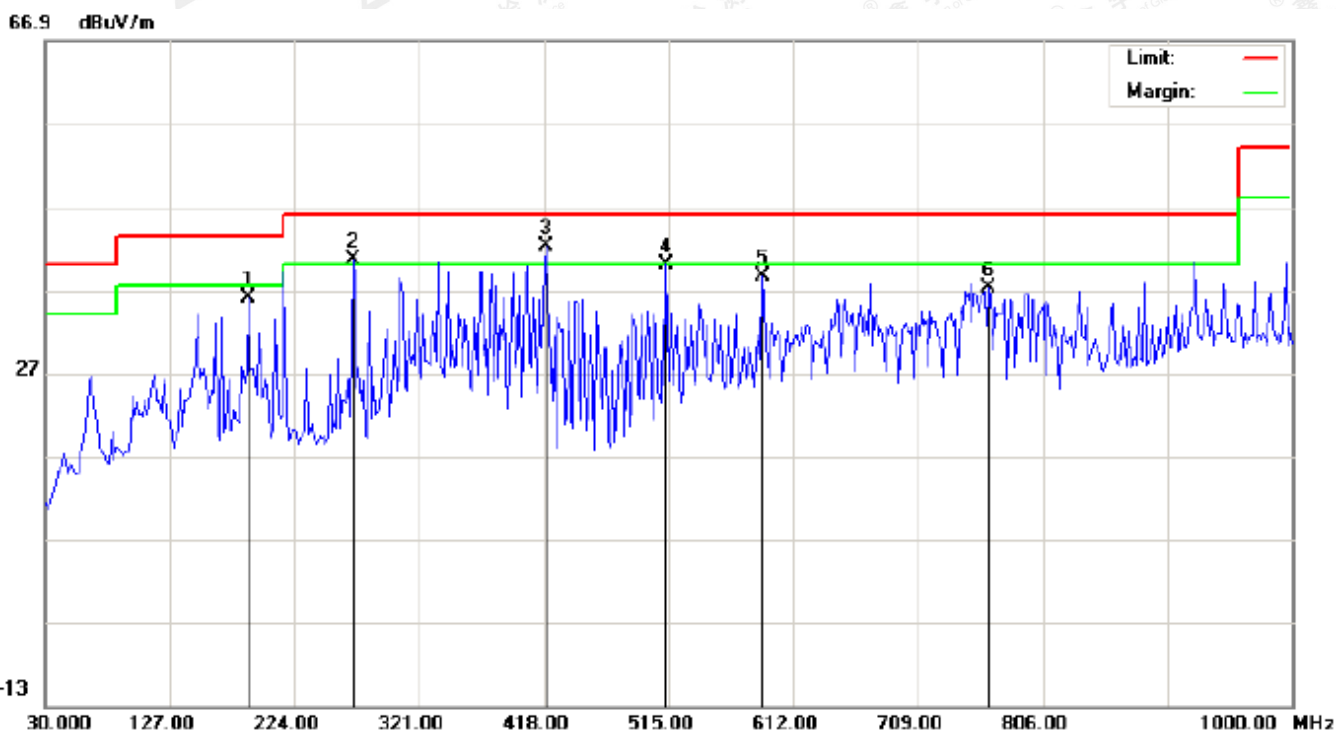


No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	!	148.0166	25.81	13.25	39.06	43.50	-4.44	peak			
2	!	269.2667	31.34	10.18	41.52	46.00	-4.48	peak			
3	*	419.6166	23.05	19.67	42.72	46.00	-3.28	peak			
4		587.7500	16.24	23.42	39.66	46.00	-6.34	peak			
5		763.9664	11.98	26.82	38.80	46.00	-7.20	peak			
6		924.0167	10.55	29.28	39.83	46.00	-6.17	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		188.4333	24.59	11.46	36.05	43.50	-7.45	peak			
2	!	269.2667	30.34	10.18	40.52	46.00	-5.48	peak			
3	*	419.6166	22.55	19.67	42.22	46.00	-3.78	peak			
4		513.3831	18.50	21.49	39.99	46.00	-6.01	peak			
5		587.7500	15.24	23.42	38.66	46.00	-7.34	peak			
6		763.9664	10.48	26.82	37.30	46.00	-8.70	peak			

RESULT: PASS

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

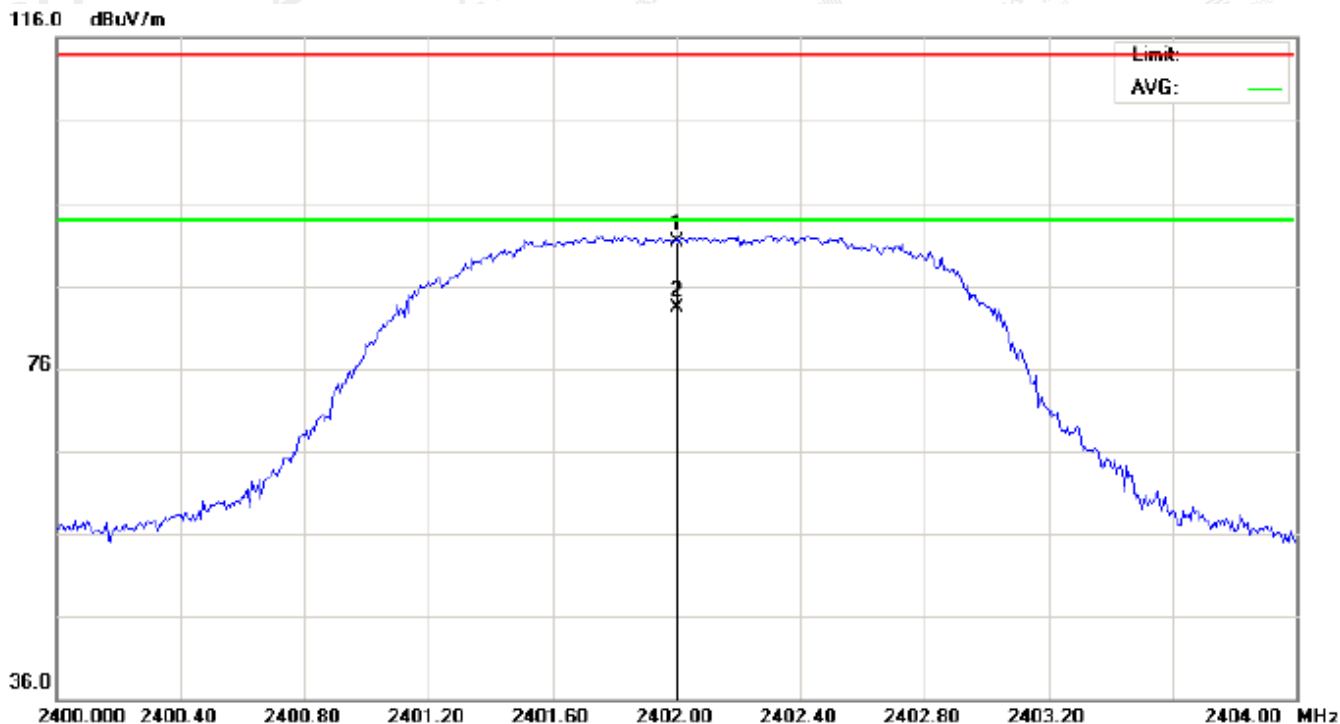
2. The "Factor" value can be calculated automatically by software of measurement system.

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RADIATED EMISSION ABOVE 1GHz
(Worst modulation: GFSK)

For Fundamental

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

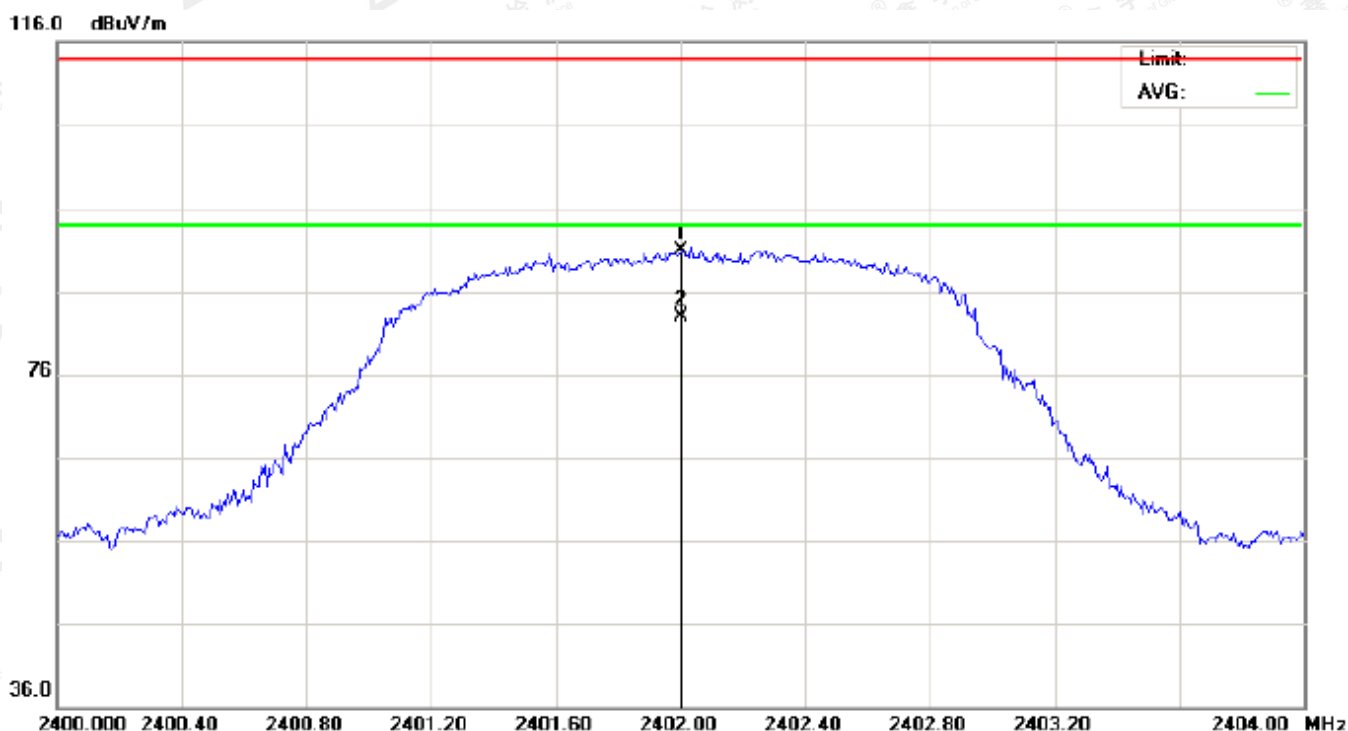


No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2402.000	81.00	10.32	91.32	114.00	-22.68	peak			
2	*	2402.000	73.05	10.32	83.37	94.00	-10.63	AVG	100	291	

RESULT: PASS

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

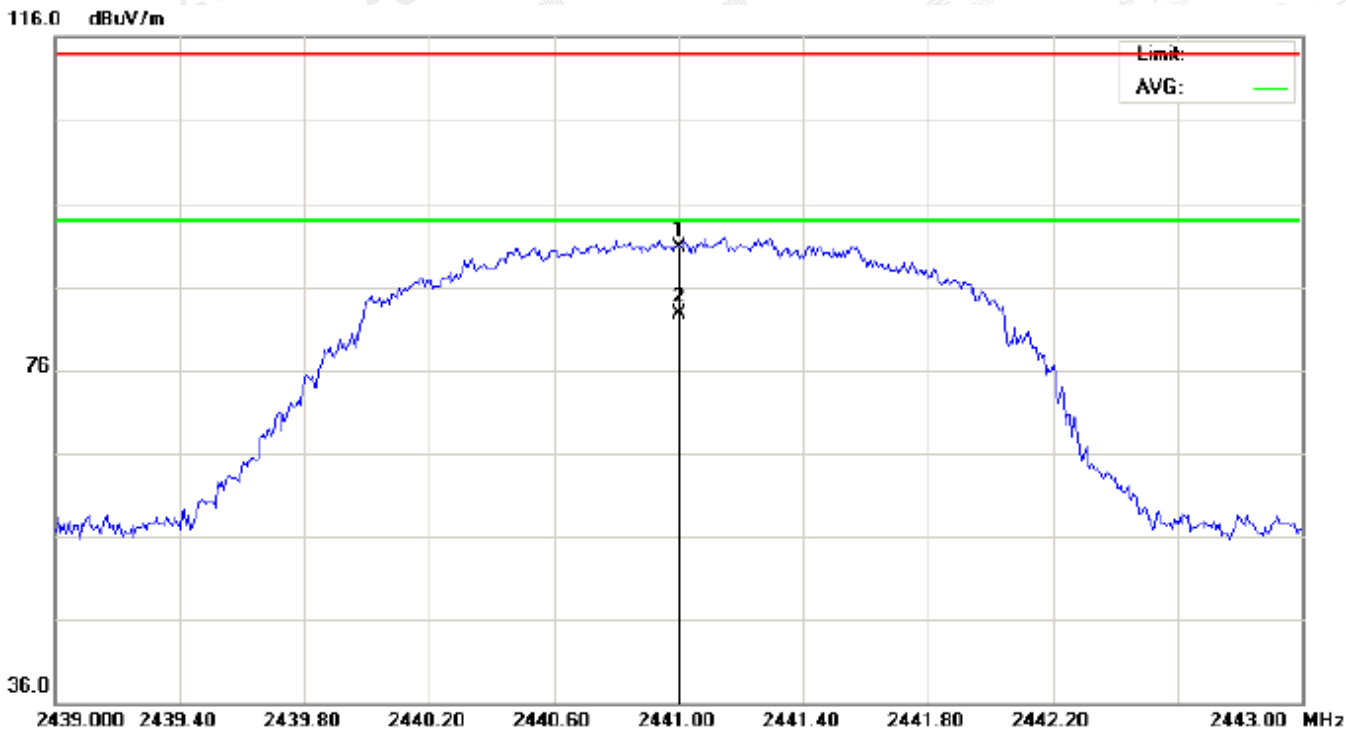


No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2402.000	80.53	10.32	90.85	114.00	-23.15	peak			
2	*	2402.000	72.56	10.32	82.88	94.00	-11.12	AVG	100	11	

RESULT: PASS

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

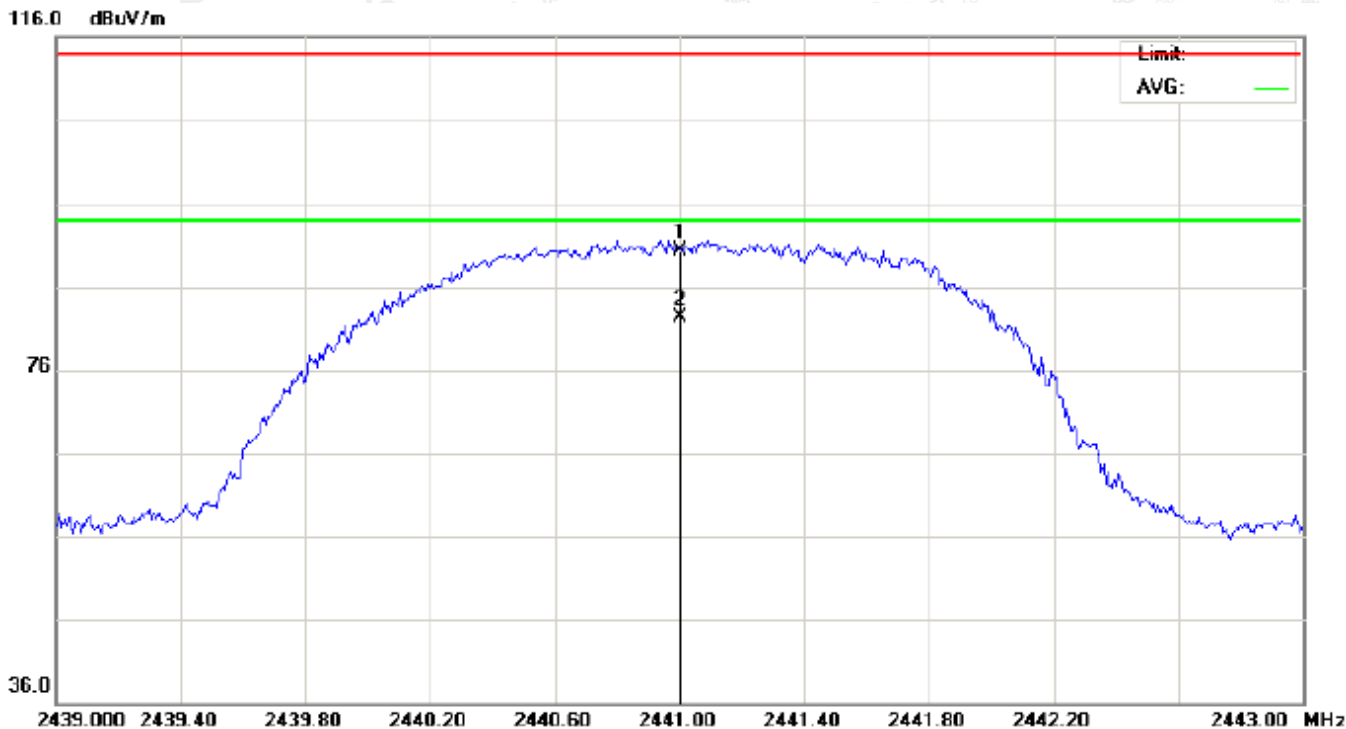


No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2441.000	80.35	10.36	90.71	114.00	-23.29	peak			
2	*	2441.000	72.39	10.36	82.75	94.00	-11.25	AVG	100	289	

RESULT: PASS

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

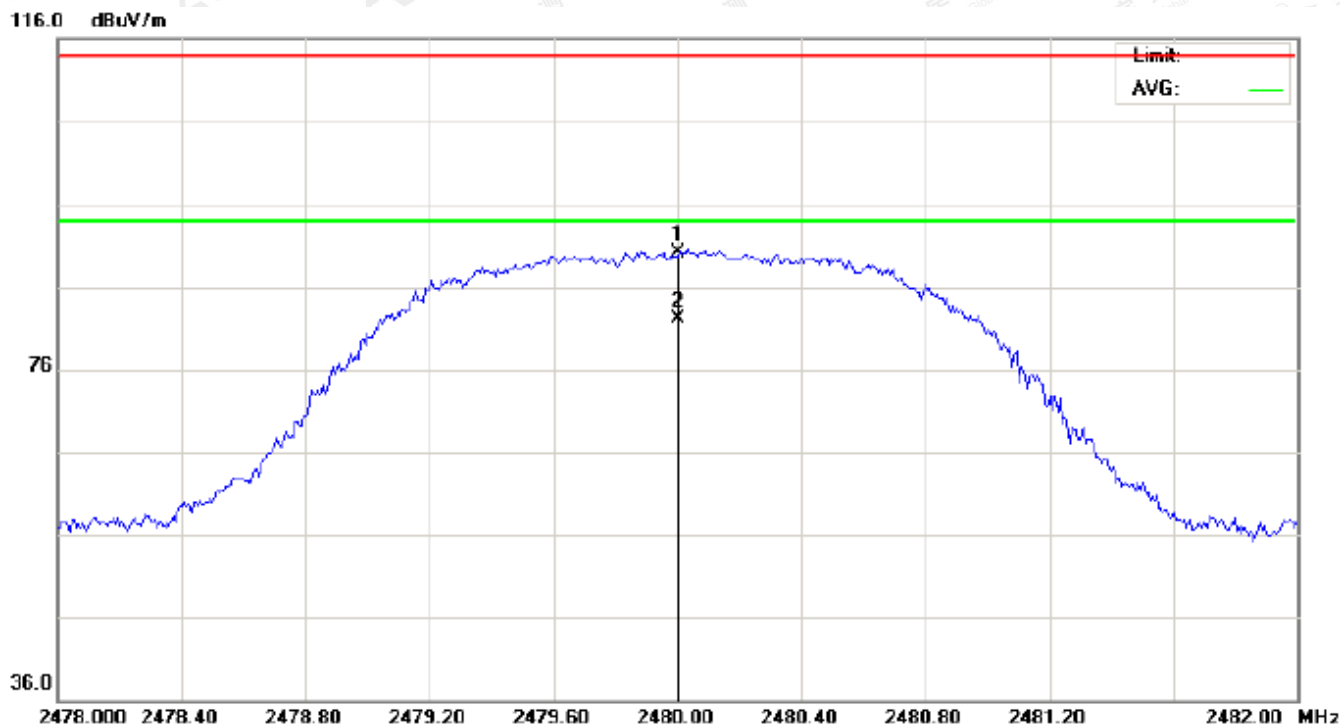


No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2441.000	79.85	10.36	90.21	114.00	-23.79	peak			
2	*	2441.000	71.93	10.36	82.29	94.00	-11.71	AVG	100	15	

RESULT: PASS

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

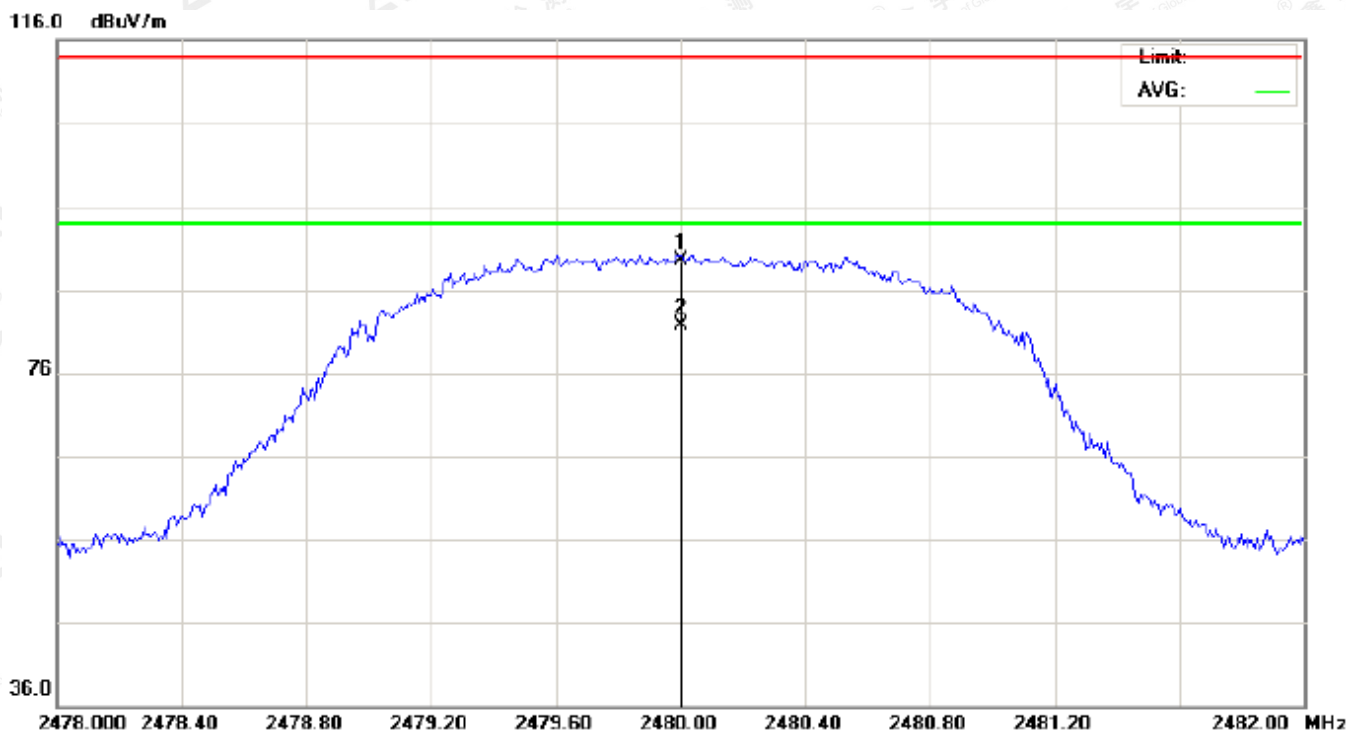


No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2480.000	79.62	10.41	90.03	114.00	-23.97	peak			
2	*	2480.000	71.65	10.41	82.06	94.00	-11.94	AVG	100	288	

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	79.14	10.41	89.55	114.00	-24.45	peak			
2	*	2480.000	71.21	10.41	81.62	94.00	-12.38	AVG	100	29	

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	81.00	10.32	91.32	114	-22.68	Horizontal
2402	80.53	10.32	90.85	114	-23.15	Vertical
2441	80.35	10.36	90.71	114	-23.29	Horizontal
2441	79.85	10.36	90.21	114	-23.79	Vertical
2480	79.62	10.41	90.03	114	-23.97	Horizontal
2480	79.14	10.41	89.55	114	-24.45	Vertical

Average value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	73.05	10.32	83.37	94	-10.63	Horizontal
2402	72.56	10.32	82.88	94	-11.12	Vertical
2441	72.39	10.36	82.75	94	-11.25	Horizontal
2441	71.93	10.36	82.29	94	-11.71	Vertical
2480	71.65	10.41	82.06	94	-11.94	Horizontal
2480	71.21	10.41	81.62	94	-12.38	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	80.57	10.32	90.89	114	-23.11	Horizontal
2402	80.15	10.32	90.47	114	-23.53	Vertical
2441	79.96	10.36	90.32	114	-23.68	Horizontal
2441	79.51	10.36	89.87	114	-24.13	Vertical
2480	79.22	10.41	89.63	114	-24.37	Horizontal
2480	78.73	10.41	89.14	114	-24.86	Vertical

Average value

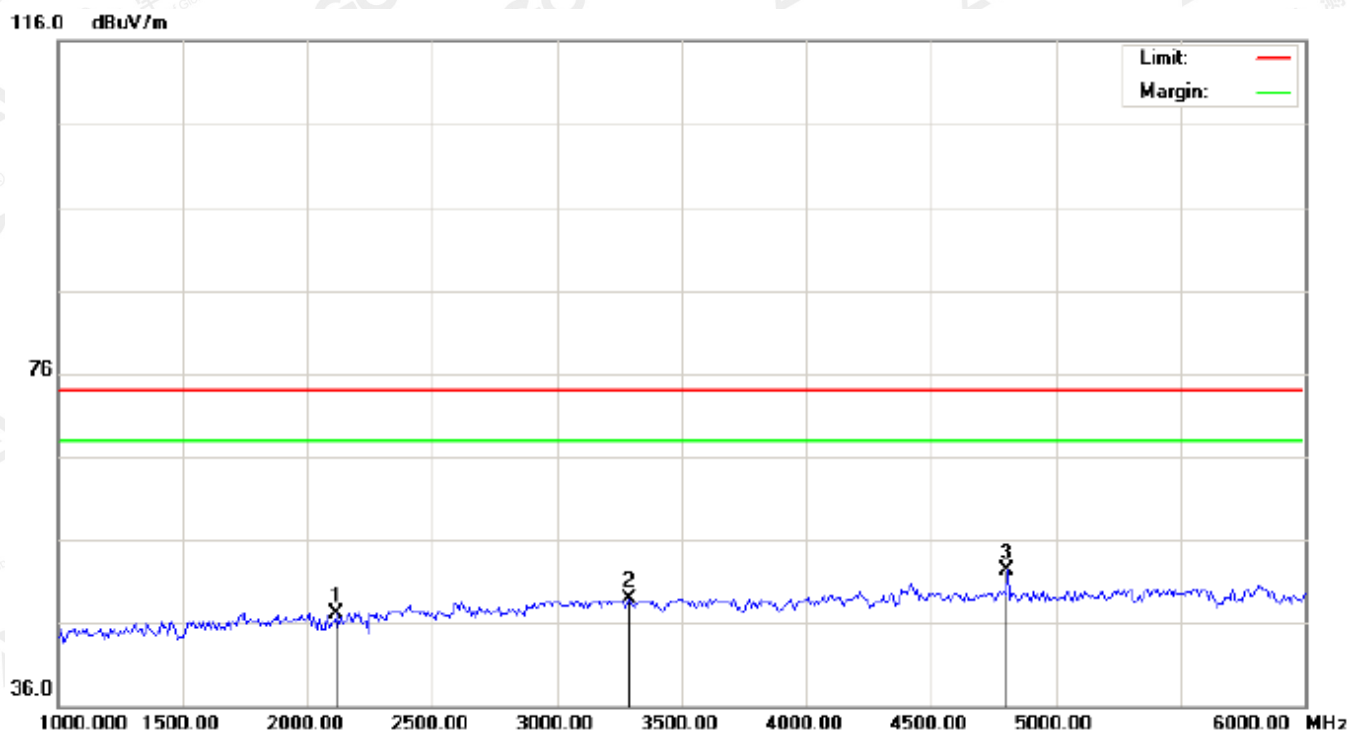
Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	72.68	10.32	83.00	94	-11.00	Horizontal
2402	72.18	10.32	82.50	94	-11.50	Vertical
2441	71.87	10.36	82.23	94	-11.77	Horizontal
2441	71.45	10.36	81.81	94	-12.19	Vertical
2480	71.28	10.41	81.69	94	-12.31	Horizontal
2480	70.88	10.41	81.29	94	-12.71	Vertical

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(Worst modulation: GFSK)

For Harmonics

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

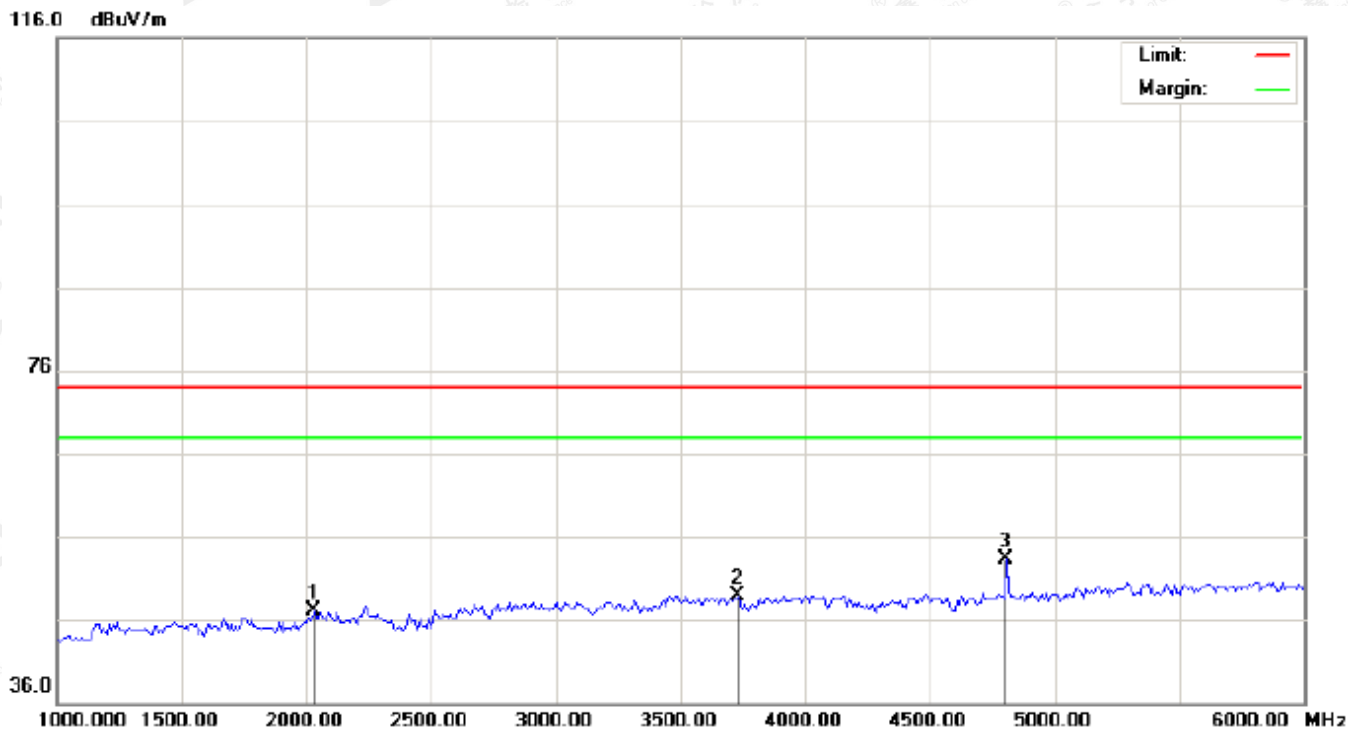


No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2116.667	37.02	10.01	47.03	74.00	-26.97	peak			
2		3291.667	36.91	11.91	48.82	74.00	-25.18	peak			
3	*	4804.000	44.71	7.69	52.40	74.00	-21.60	peak			

RESULT: PASS

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

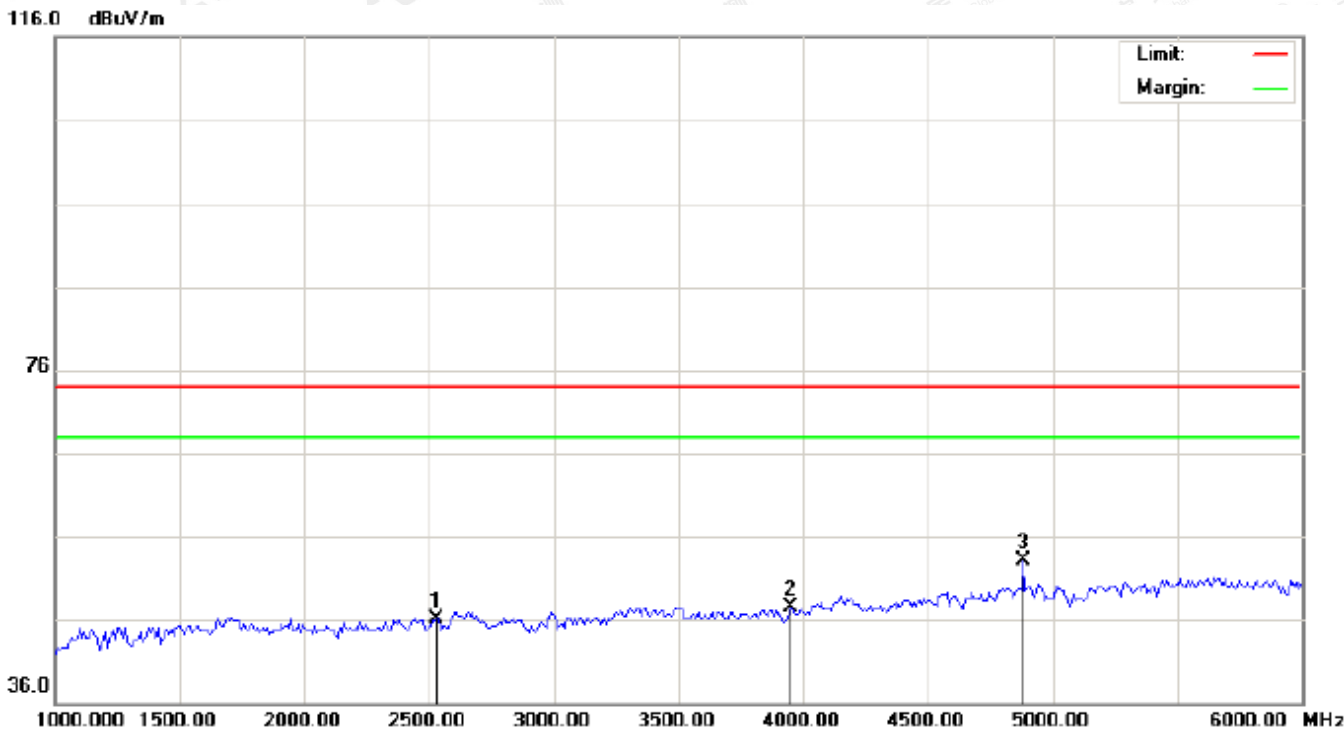


No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2033.333	37.09	9.92	47.01	74.00	-26.99	peak			
2		3733.333	35.34	13.55	48.89	74.00	-25.11	peak			
3	*	4804.000	45.55	7.69	53.24	74.00	-20.76	peak			

RESULT: PASS

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

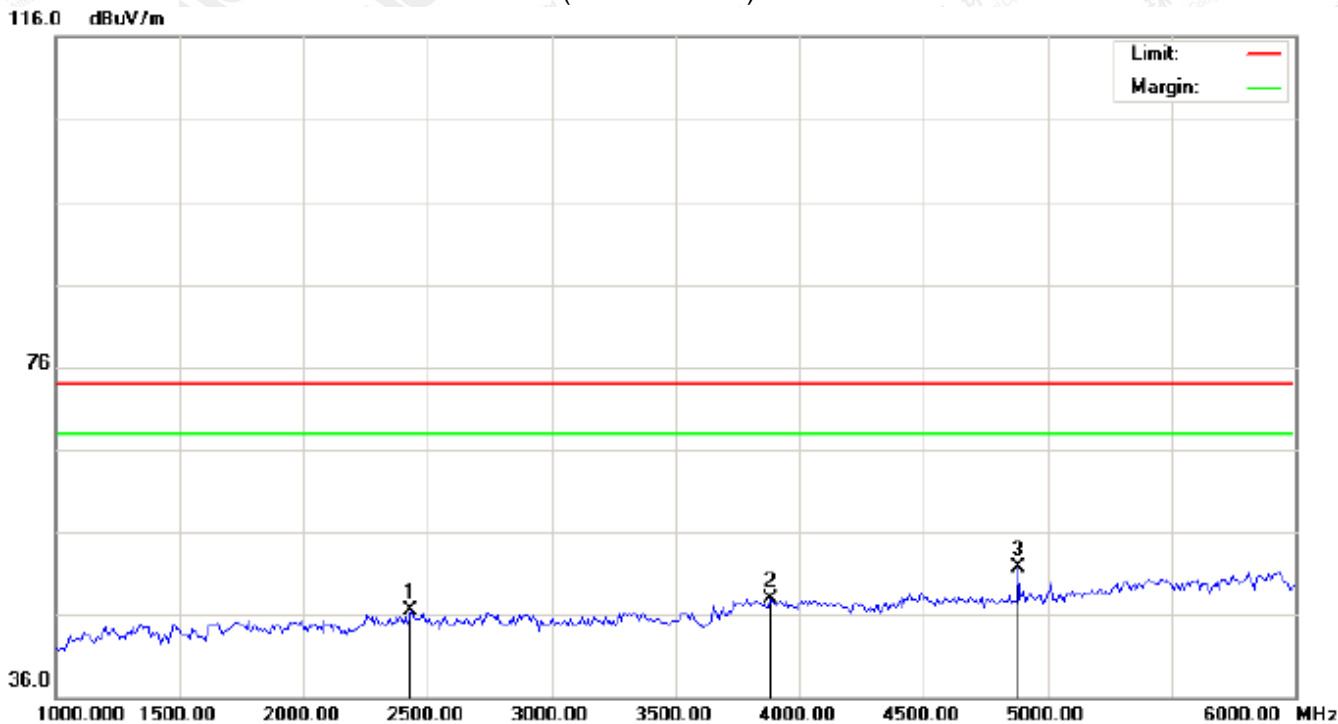


No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2533.333	35.68	10.51	46.19	74.00	-27.81	peak			
2		3950.000	32.68	14.88	47.56	74.00	-26.44	peak			
3	*	4882.000	45.16	7.89	53.05	74.00	-20.95	peak			

RESULT: PASS

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

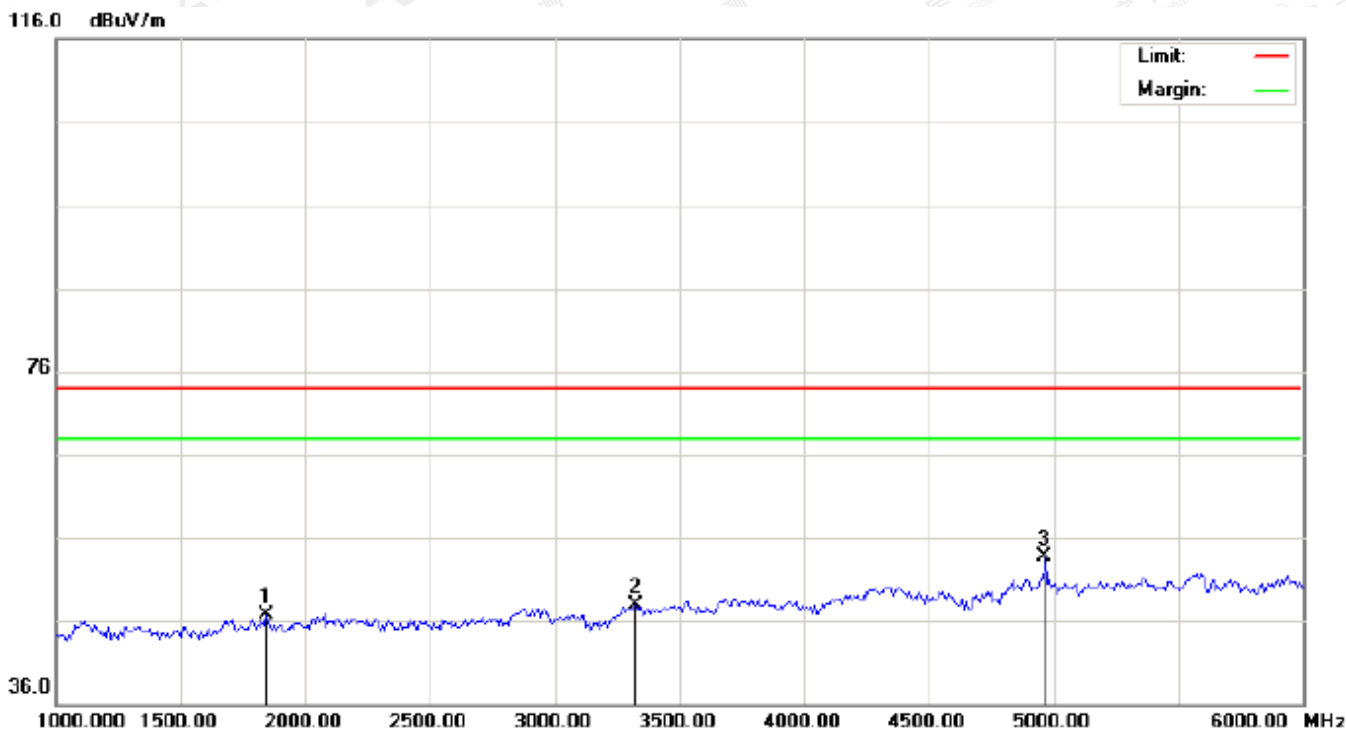


No.	Mk	Freq. MHz	Reading dBuV	Factor dB/m	Measurement dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree degree	Comment
1		2433.333	36.05	10.36	46.41	74.00	-27.59	peak			
2		3883.333	33.43	14.47	47.90	74.00	-26.10	peak			
3	*	4882.000	43.89	7.89	51.78	74.00	-22.22	peak			

RESULT: PASS

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

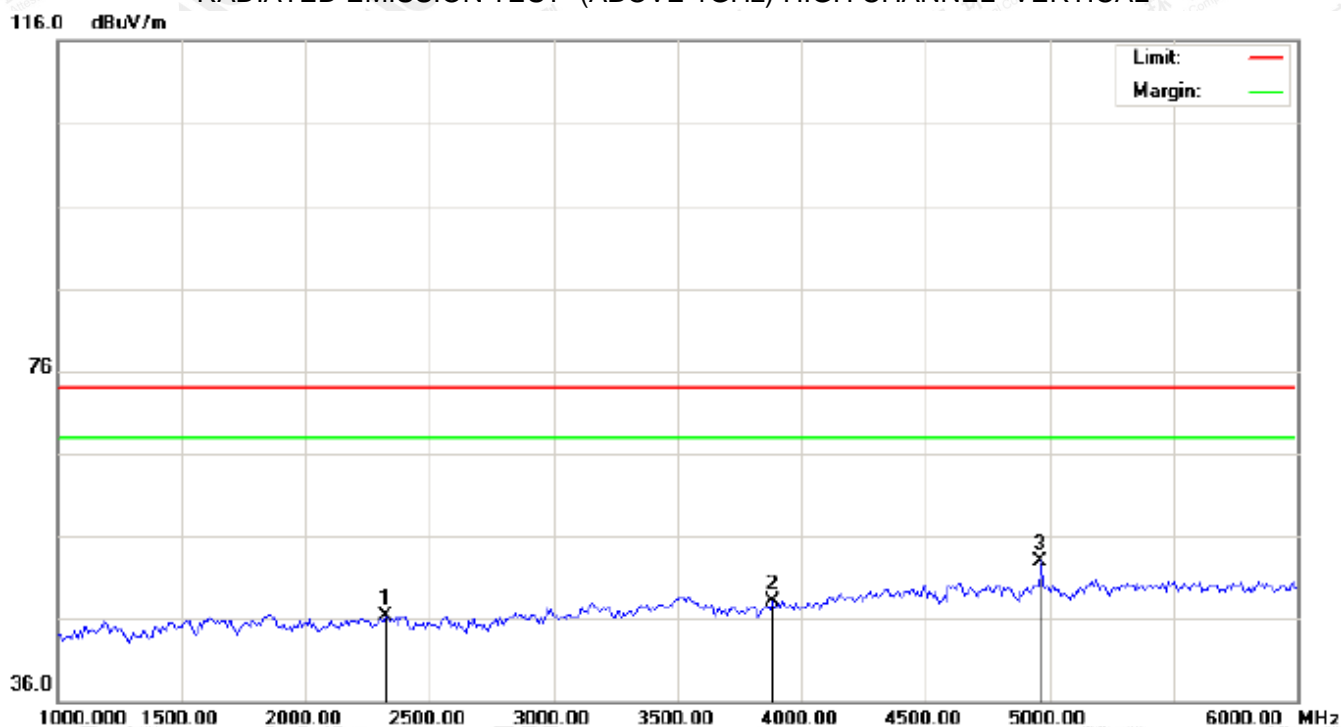


No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		1841.667	38.57	8.21	46.78	74.00	-27.22	peak			
2		3325.000	36.02	11.95	47.97	74.00	-26.03	peak			
3	*	4960.000	45.60	8.09	53.69	74.00	-20.31	peak			

RESULT: PASS

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



No.	Mk	Freq. MHz	Reading dBuV	Factor dB/m	Measurement dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree degree	Comment
1		2325.000	36.14	10.24	46.38	74.00	-27.62	peak			
2		3883.333	33.56	14.47	48.03	74.00	-25.97	peak			
3	*	4960.000	44.91	8.09	53.00	74.00	-21.00	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

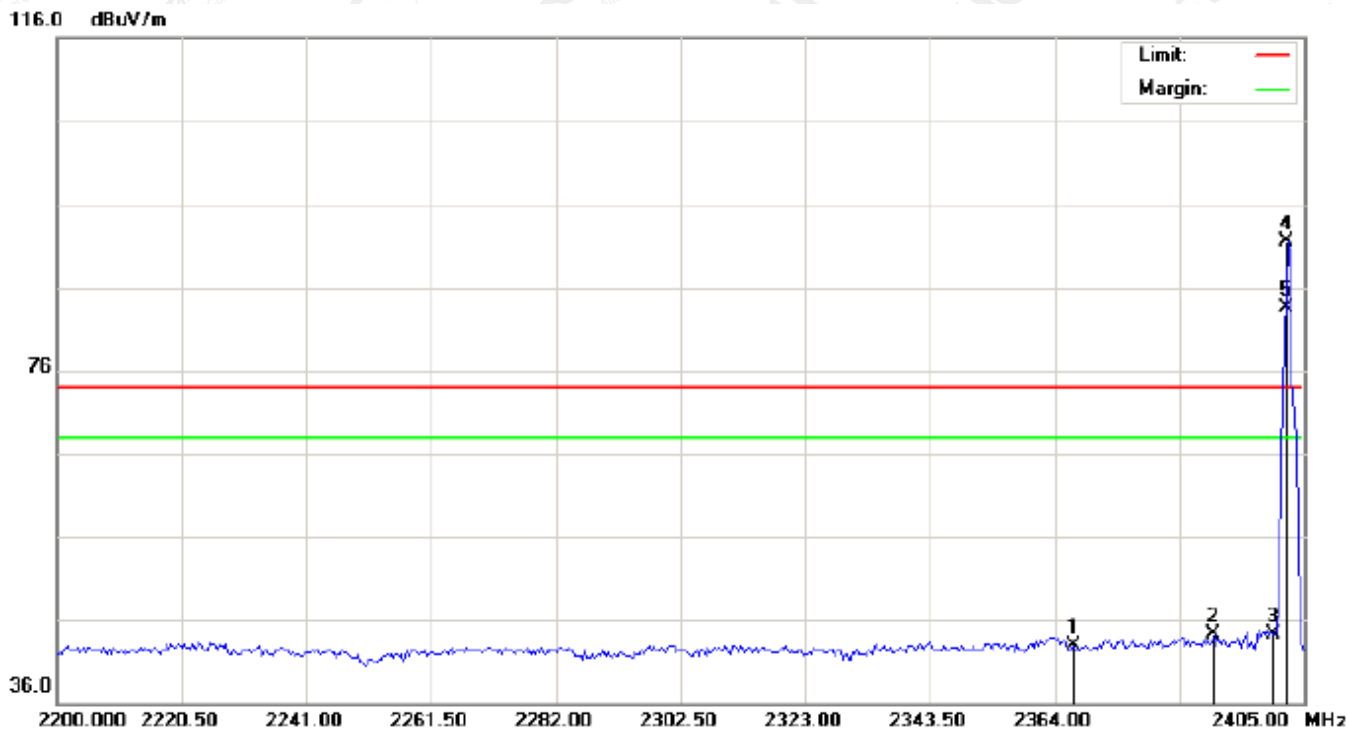


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10.3 RADIATED TEST RESULT

(Worst modulation: GFSK)

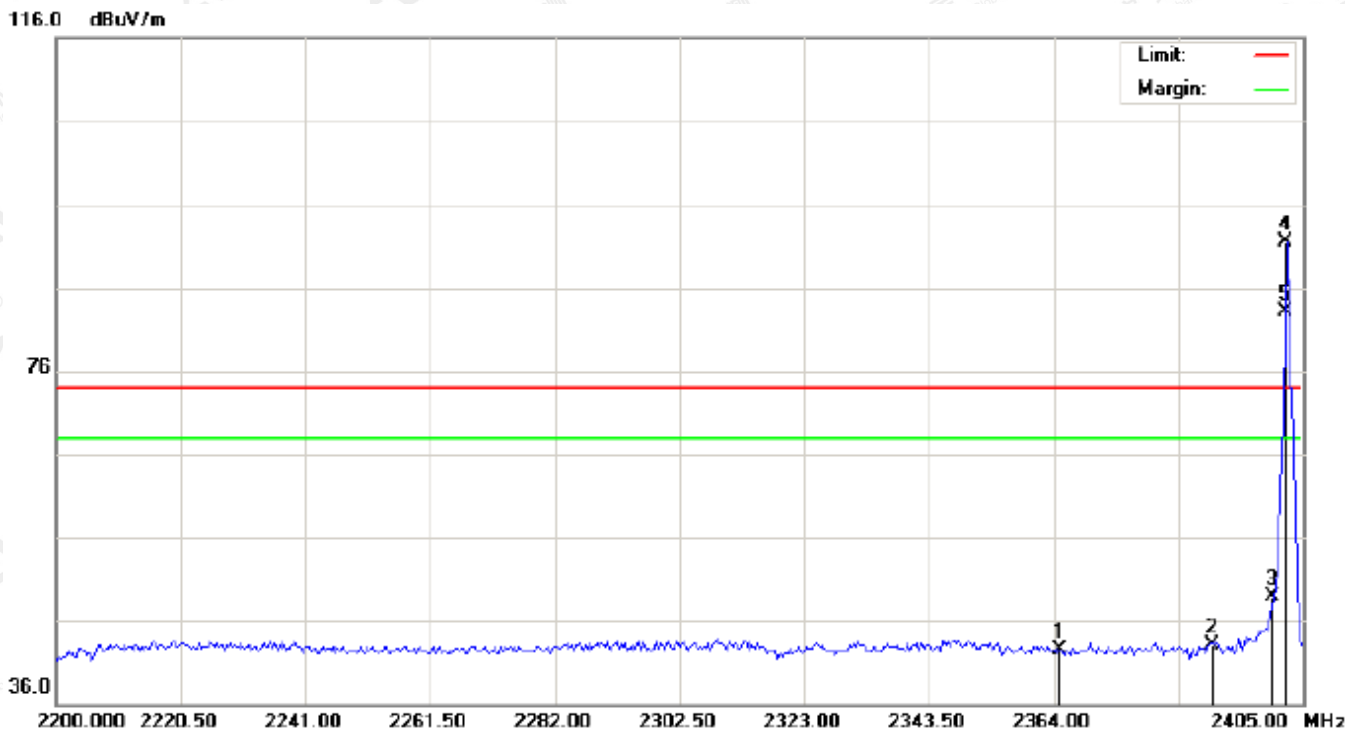
TEST PLOT OF BAND EDGE FOR LOW CHANNEL-Horizontal



No.	Mk	Freq. MHz	Reading dBuV	Factor dB/m	Measurement dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree degree	Comment
1		2367.075	32.61	10.28	42.89	74.00	-31.11	peak			
2		2390.000	34.00	10.31	44.31	74.00	-29.69	peak			
3		2400.000	33.97	10.32	44.29	74.00	-29.71	peak			
4	*	2402.000	81.22	10.32	91.54	74.00	17.54	peak			
5	X	2402.000	73.26	10.32	83.58	74.00	9.58	AVG	100	285	

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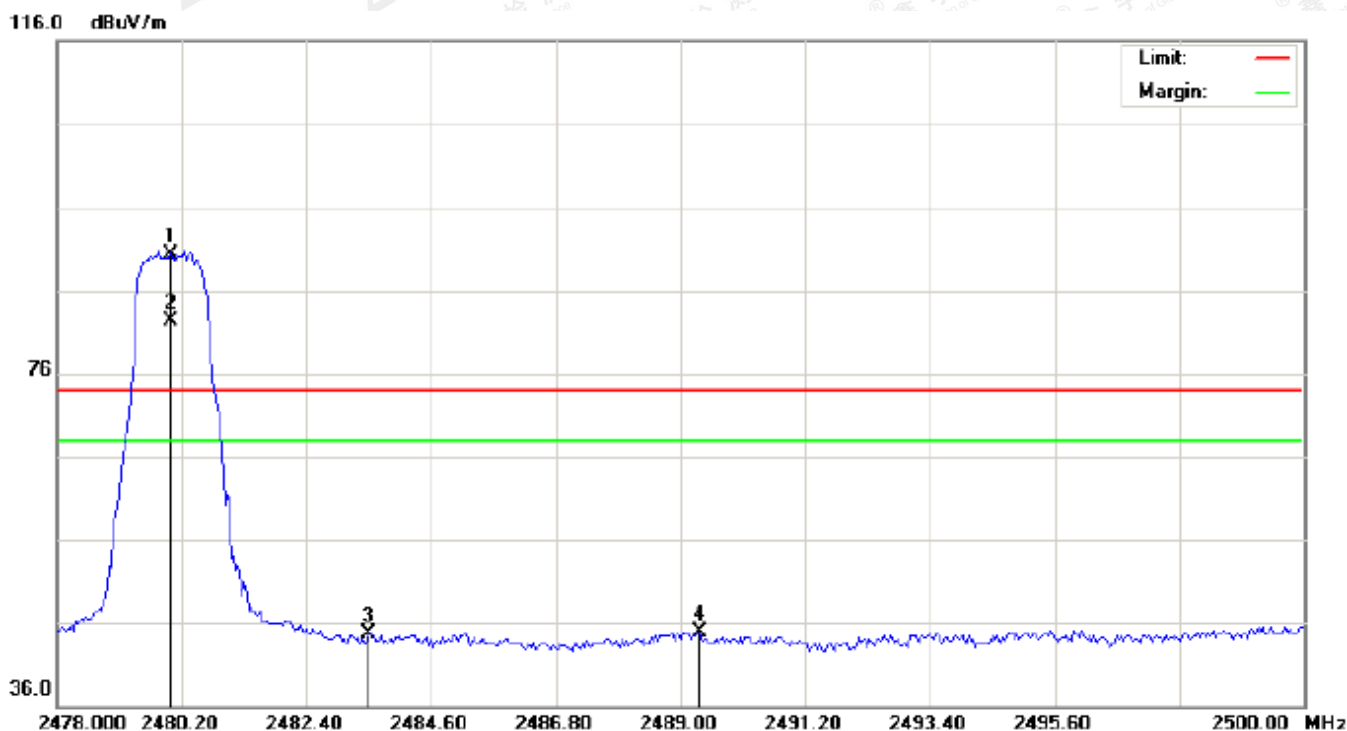
TEST PLOT OF BAND EDGE FOR LOW CHANNEL -Vertical



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		2365.025	32.22	10.28	42.50	74.00	-31.50	peak			
2		2390.000	32.71	10.31	43.02	74.00	-30.98	peak			
3		2400.000	38.56	10.32	48.88	74.00	-25.12	peak			
4	*	2402.000	81.09	10.32	91.41	74.00	17.41	peak			
5	X	2402.000	72.80	10.32	83.12	74.00	9.12	AVG	100	23	

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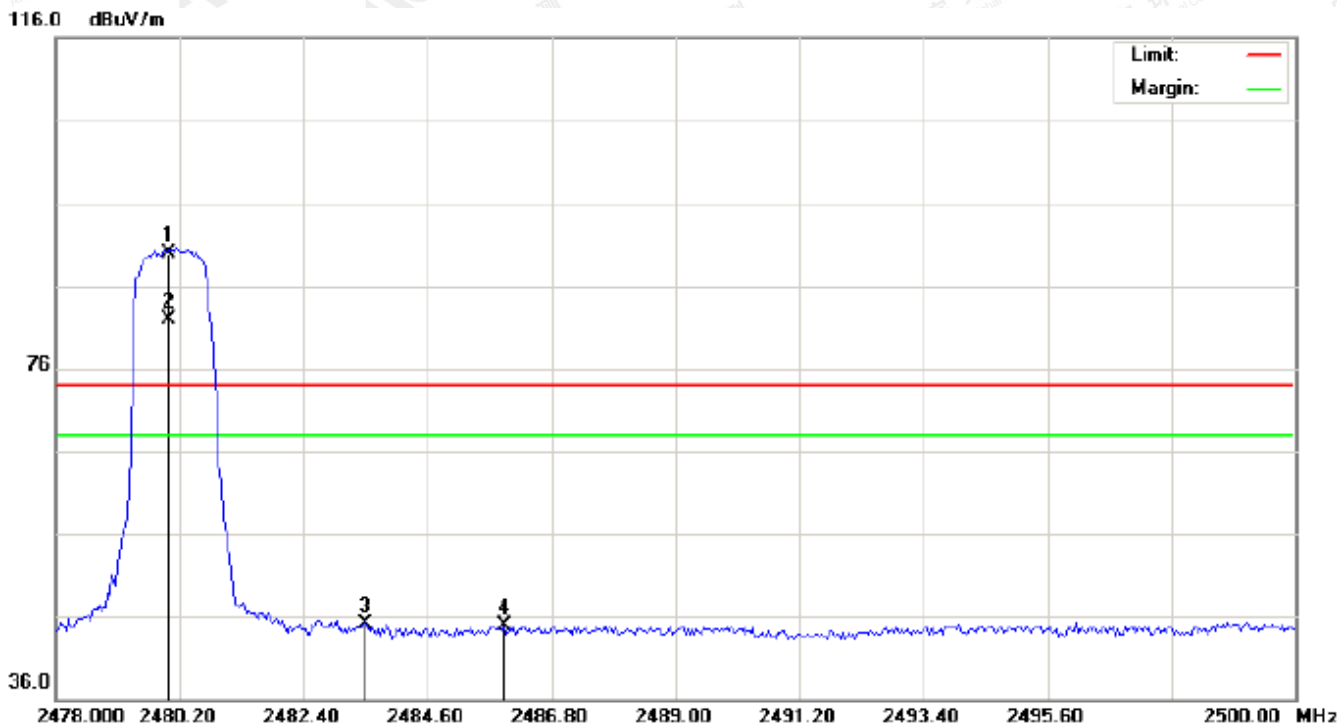
TEST PLOT OF BAND EDGE FOR HIGH CHANNEL -Horizontal



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	79.87	10.41	90.28	74.00	16.28	peak			
2	X	2480.000	71.90	10.41	82.31	74.00	8.31	AVG	100	283	
3		2483.500	34.19	10.41	44.60	74.00	-29.40	peak			
4		2489.330	34.46	10.42	44.88	74.00	-29.12	peak			

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TEST PLOT OF BAND EDGE FOR 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	79.43	10.41	89.84	74.00	15.84	peak			
2	X	2480.000	71.52	10.41	81.93	74.00	7.93	AVG	100	19	
3		2483.500	34.76	10.41	45.17	74.00	-28.83	peak			
4		2485.957	34.48	10.41	44.89	74.00	-29.11	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.

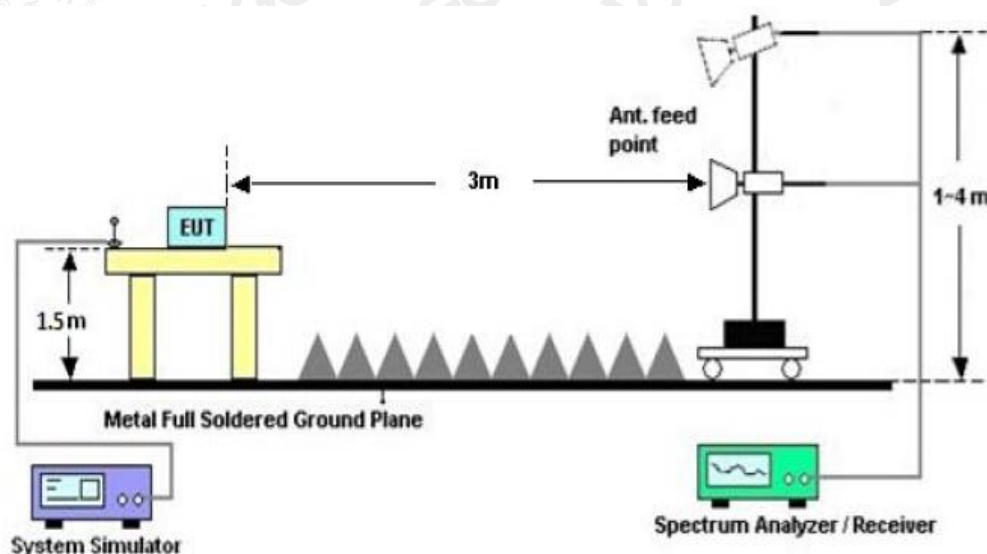
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11. 20DB BANDWIDTH

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 hopping 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

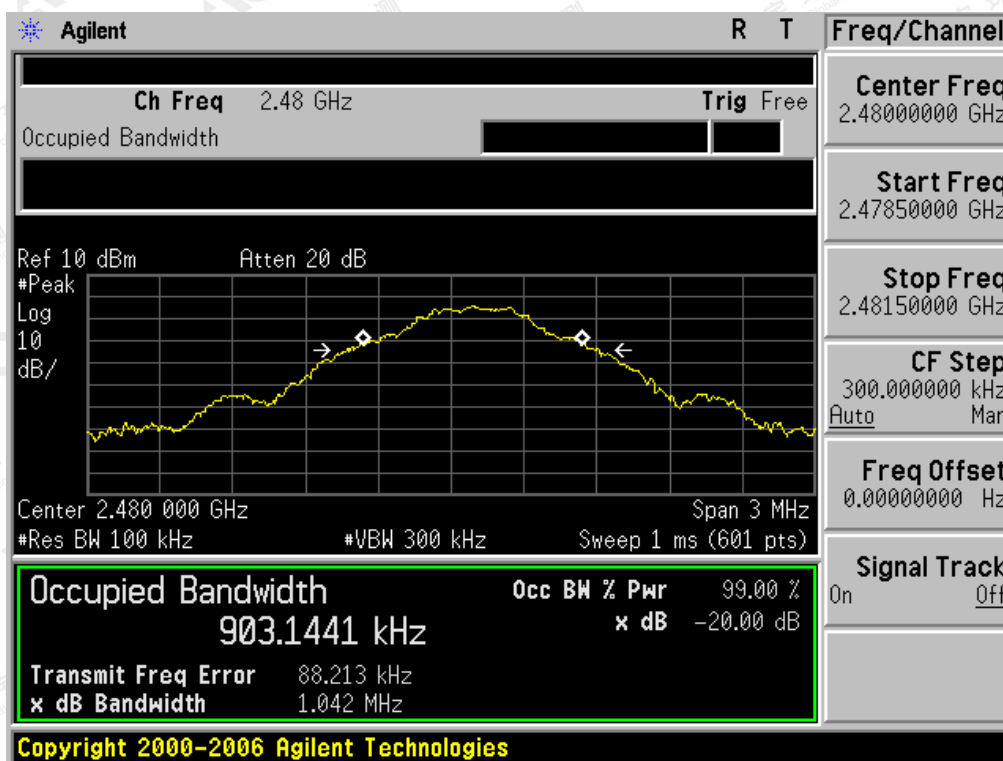


11.3. LIMITS AND MEASUREMENT RESULTS

BLUETOOTH 1MBPS LIMITS AND MEASUREMENT RESULT				
Applicable Limits	Measurement Result			
	Test Data (MHz)			Result
		99%OBW (MHz)	-20dB BW(MHz)	
N/A	Low Channel	0.908	1.070	PASS
	Middle Channel	0.911	1.023	PASS
	High Channel	0.903	1.042	PASS

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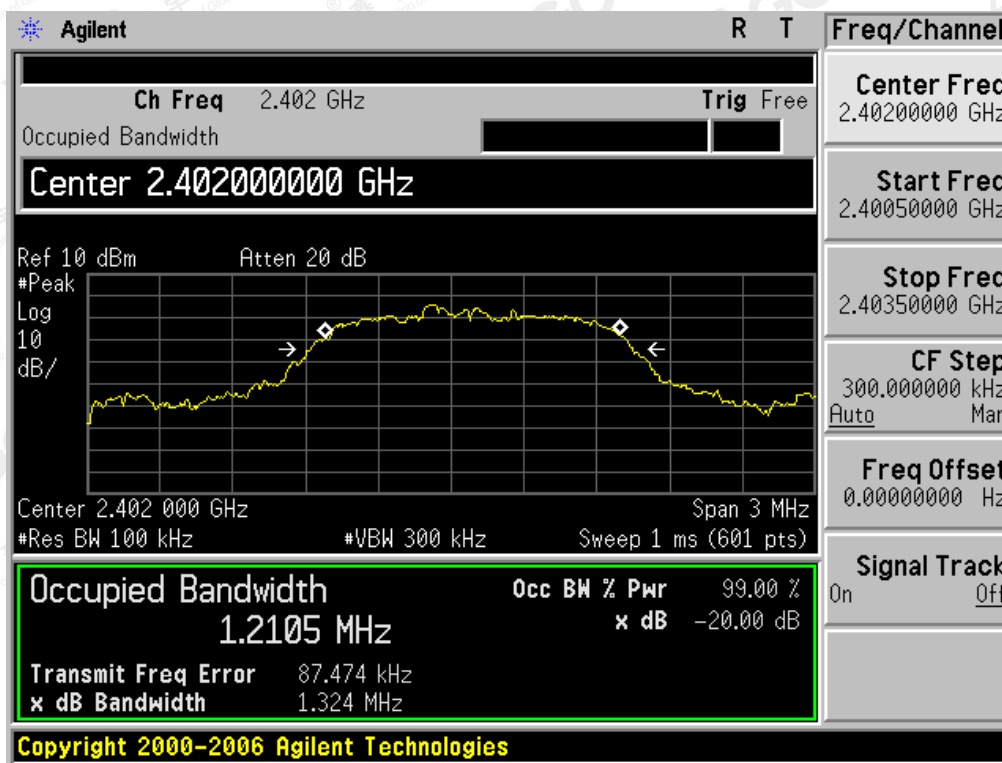
TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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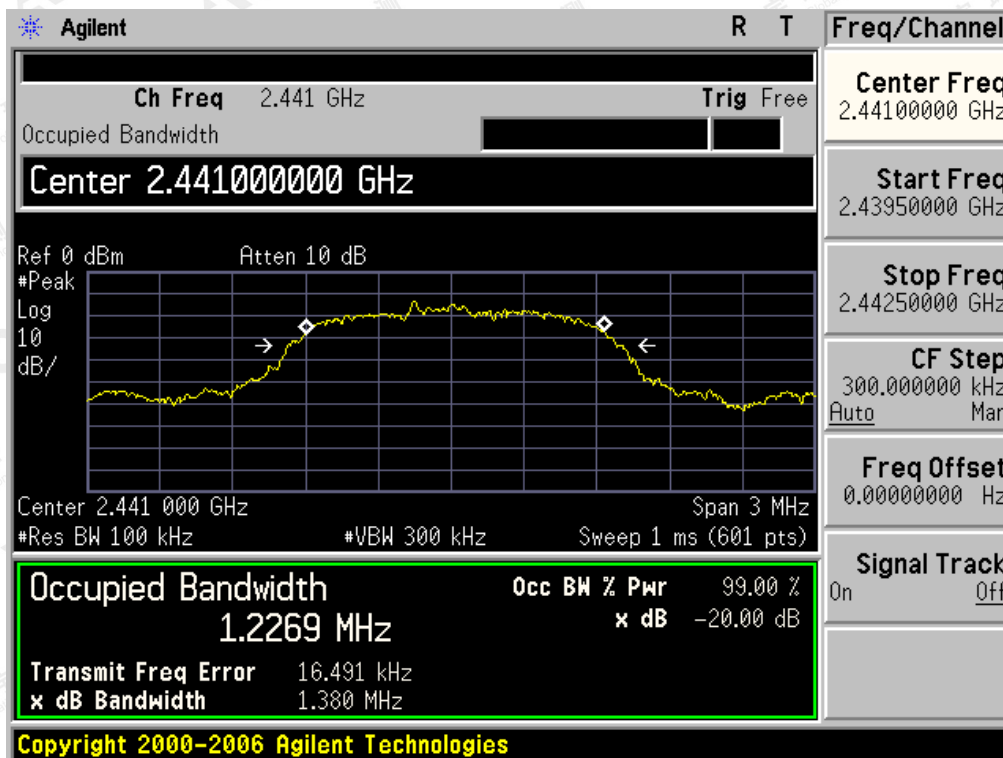
BLUETOOTH 2MBPS LIMITS AND MEASUREMENT RESULT				
Applicable Limits	Measurement Result			
	Test Data (MHz)			Result
		99%OBW (MHz)	-20dB BW(MHz)	
N/A	Low Channel	1.211	1.324	PASS
	Middle Channel	1.227	1.380	PASS
	High Channel	1.220	1.364	PASS

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

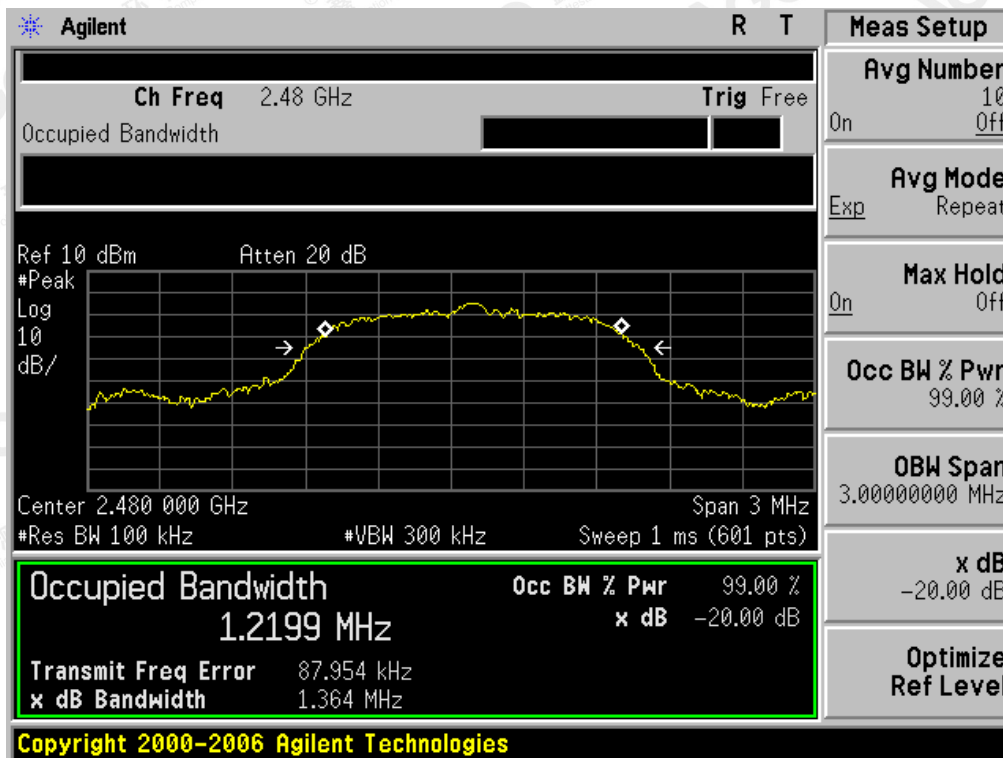


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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



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 0.8 meters 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 charging 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

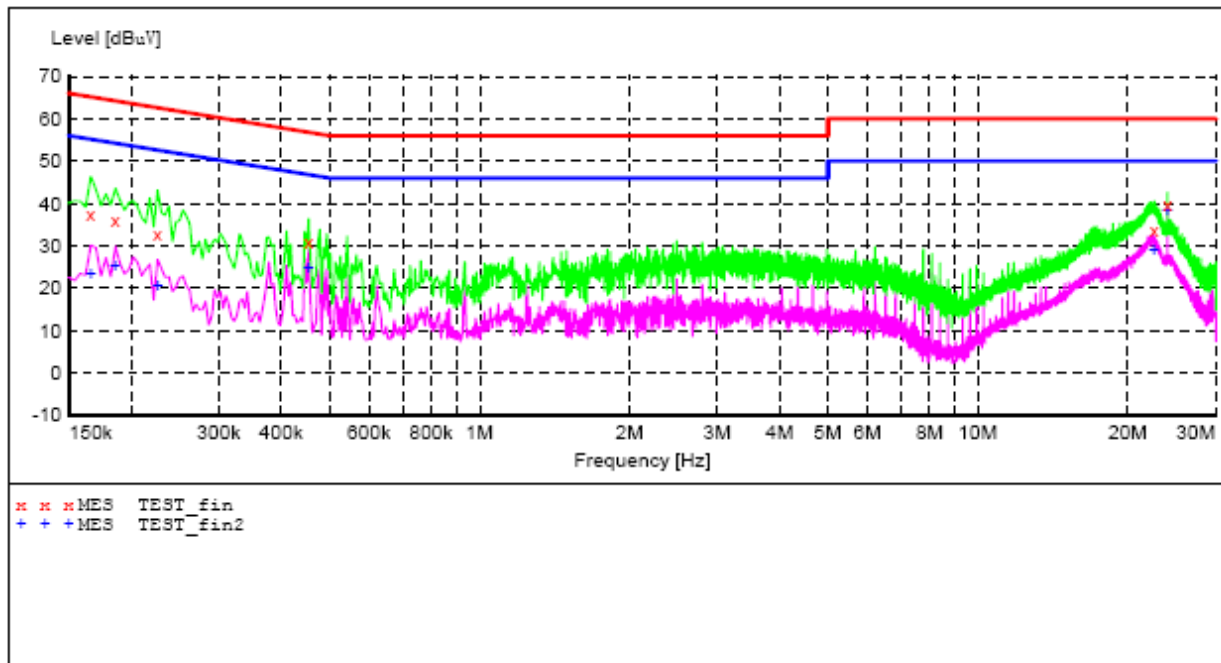
1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used 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)

Line Conducted Emission Test Line 1-L



MEASUREMENT RESULT:

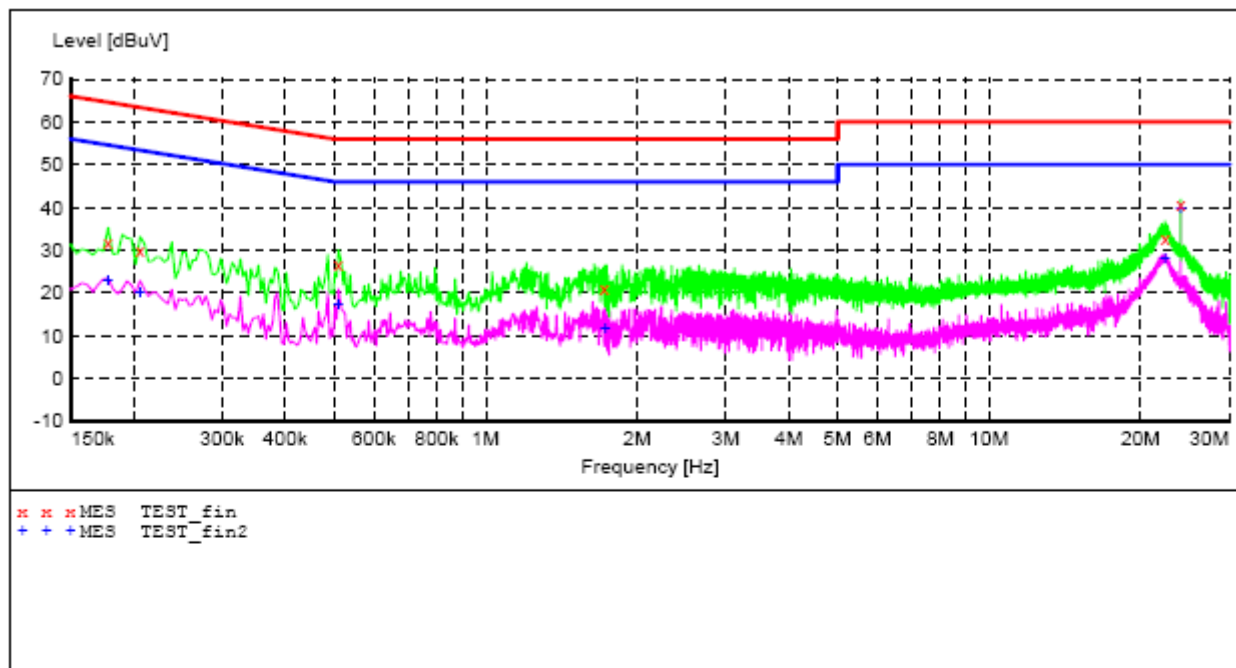
Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.166000	37.40	10.0	65	27.8	QP	L1	FLO
0.186000	36.20	10.1	64	28.0	QP	L1	FLO
0.226000	33.00	10.1	63	29.6	QP	L1	FLO
0.454000	30.80	10.1	57	26.0	QP	L1	FLO
22.582000	33.80	11.1	60	26.2	QP	L1	FLO
24.002000	39.60	11.1	60	20.4	QP	L1	FLO

MEASUREMENT RESULT:

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.166000	23.60	10.0	55	31.6	AV	L1	FLO
0.186000	25.40	10.1	54	28.8	AV	L1	FLO
0.226000	20.60	10.1	53	32.0	AV	L1	FLO
0.454000	24.60	10.1	47	22.2	AV	L1	FLO
22.578000	28.80	11.1	50	21.2	AV	L1	FLO
24.002000	38.60	11.1	50	11.4	AV	L1	FLO

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Line Conducted Emission Test Line 2-N



MEASUREMENT RESULT:

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.178000	31.70	10.0	65	32.9	QP	N	FLO
0.206000	29.90	10.1	63	33.5	QP	N	FLO
0.510000	26.60	10.1	56	29.4	QP	N	FLO
1.722000	21.30	10.2	56	34.7	QP	N	FLO
22.330000	32.70	11.1	60	27.3	QP	N	FLO
24.002000	40.60	11.1	60	19.4	QP	N	FLO

MEASUREMENT RESULT:

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.178000	22.80	10.0	55	31.8	AV	N	FLO
0.206000	20.30	10.1	53	33.1	AV	N	FLO
0.510000	17.50	10.1	46	28.5	AV	N	FLO
1.726000	11.50	10.2	46	34.5	AV	N	FLO
22.334000	28.20	11.1	50	21.8	AV	N	FLO
24.002000	39.70	11.1	50	10.3	AV	N	FLO

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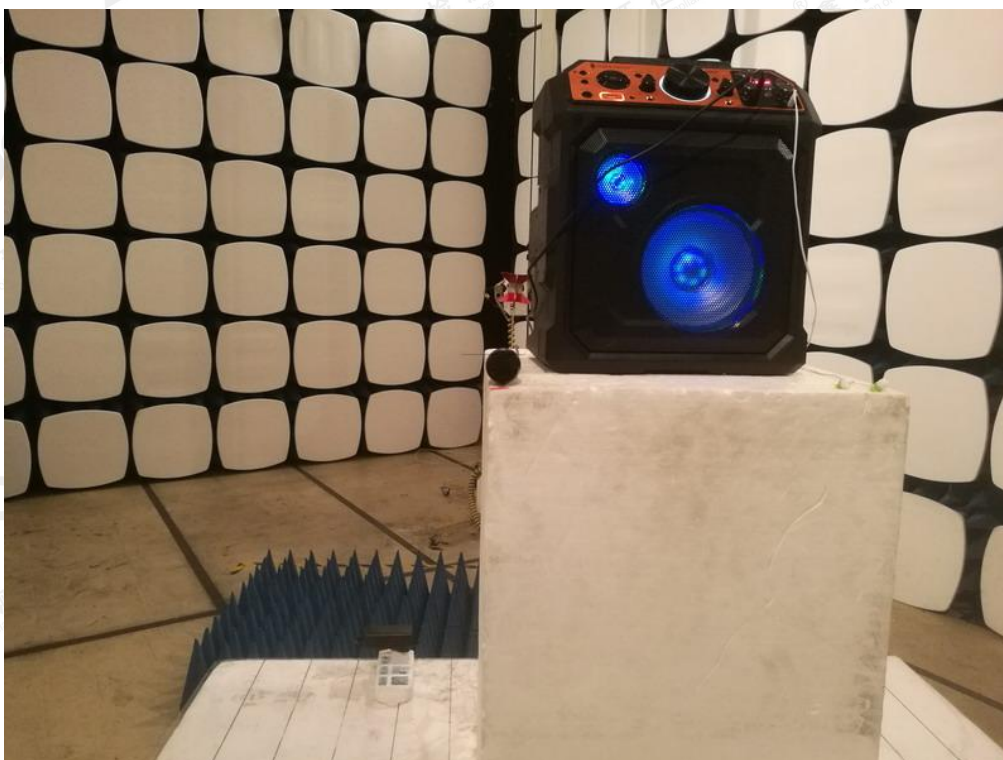
APPENDIX A: PHOTOGRAPHS OF TEST SETUP
FCC LINE CONDUCTED EMISSION TEST SETUP



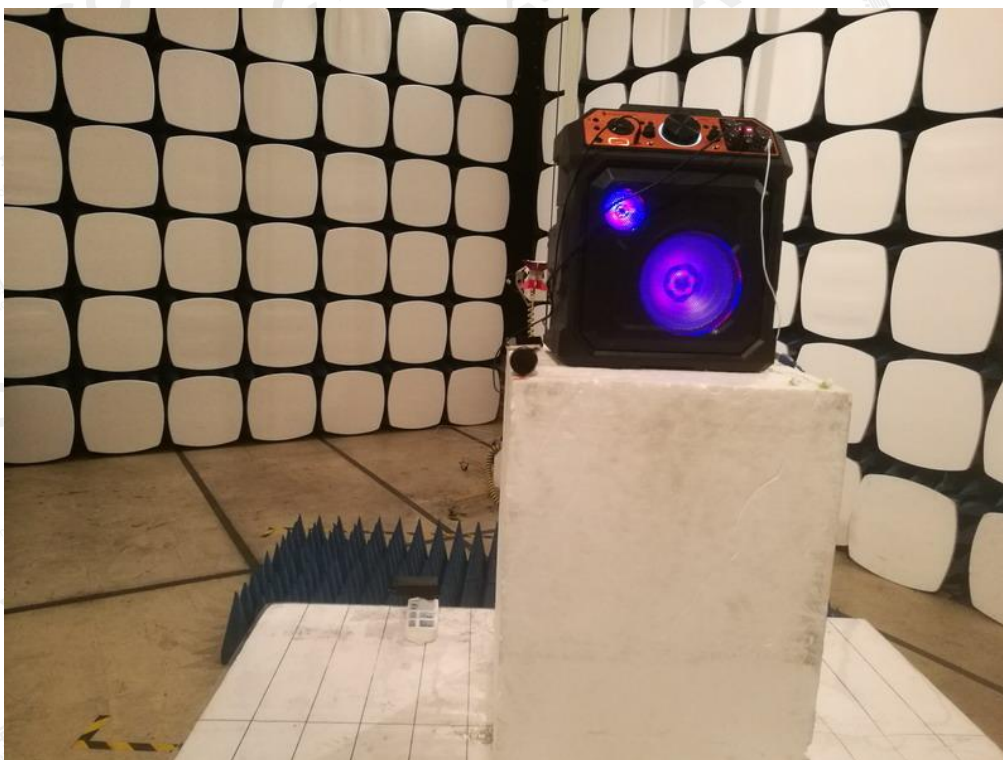
FCC RADIATED EMISSION TEST SETUP



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APPENDIX B: PHOTOGRAPHS OF EUT
TOTAL VIEW OF EUT



TOP VIEW OF EUT



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BOTTOM VIEW OF EUT



FRONT VIEW OF EUT



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BACK VIEW OF EUT



LEFT VIEW OF EUT



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RIGHT VIEW OF EUT



VIEW OF EUT (PORT)-1



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VIEW OF EUT (PORT)-2

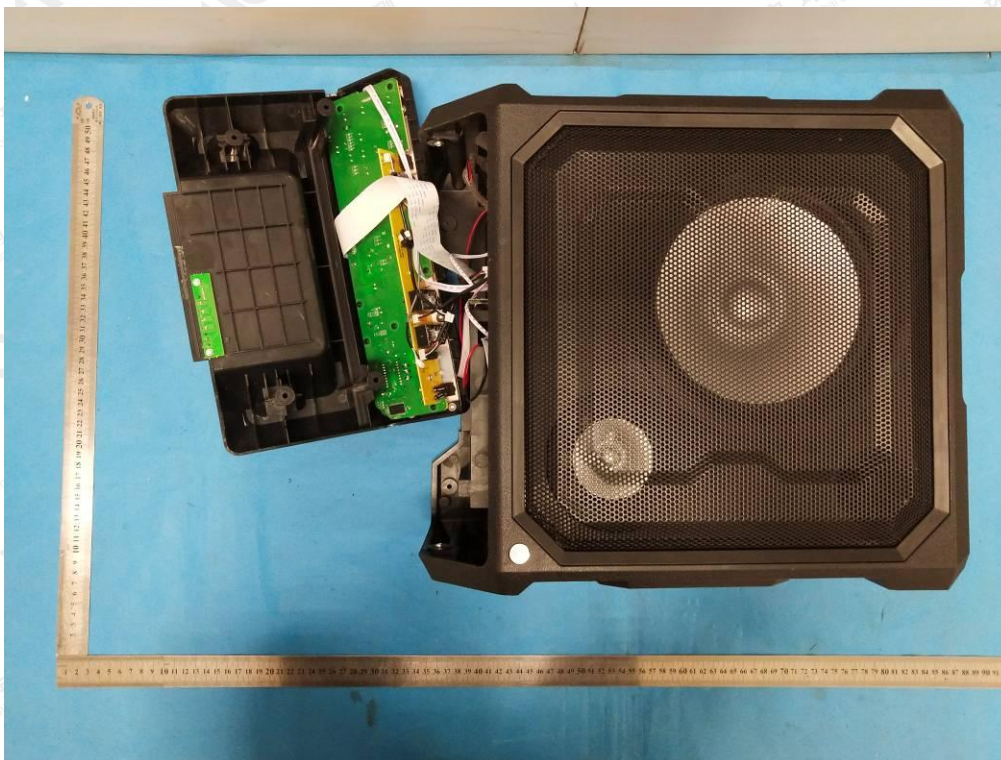


VIEW OF EUT (PORT)-3

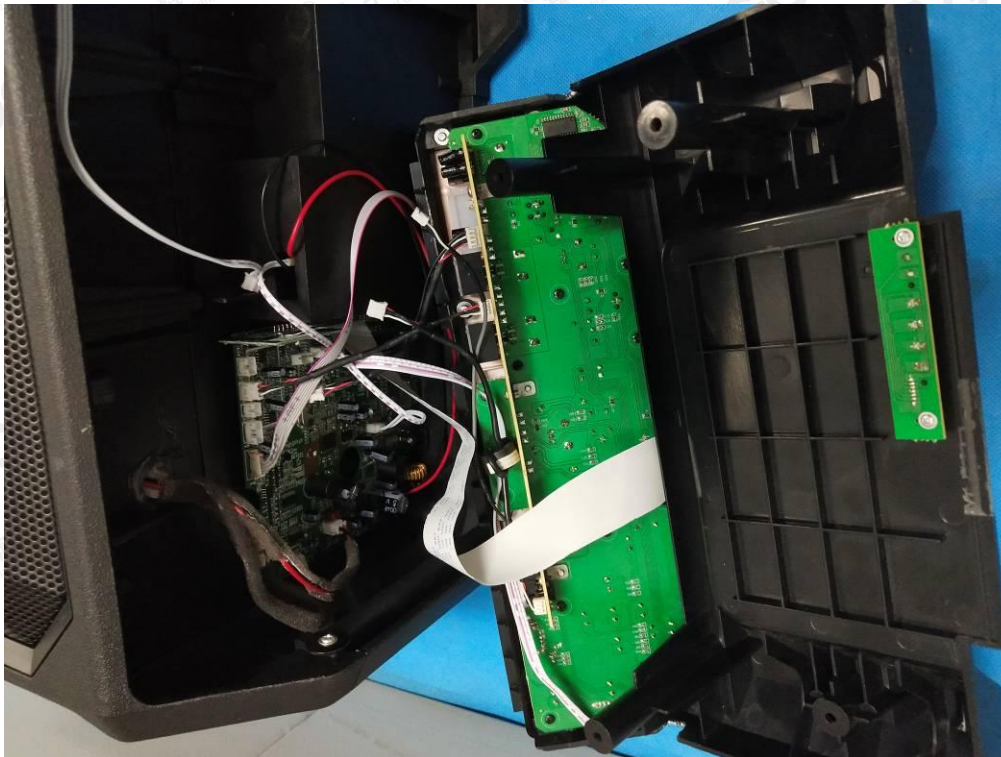


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OPEN VIEW OF EUT-1

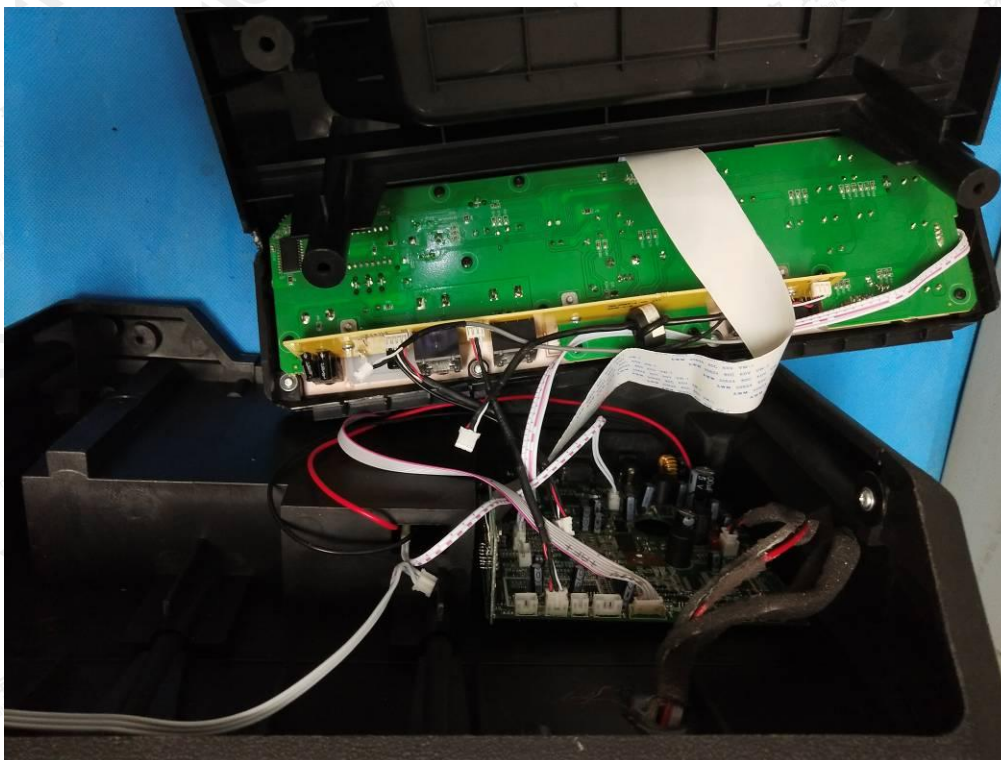


OPEN VIEW OF EUT-2

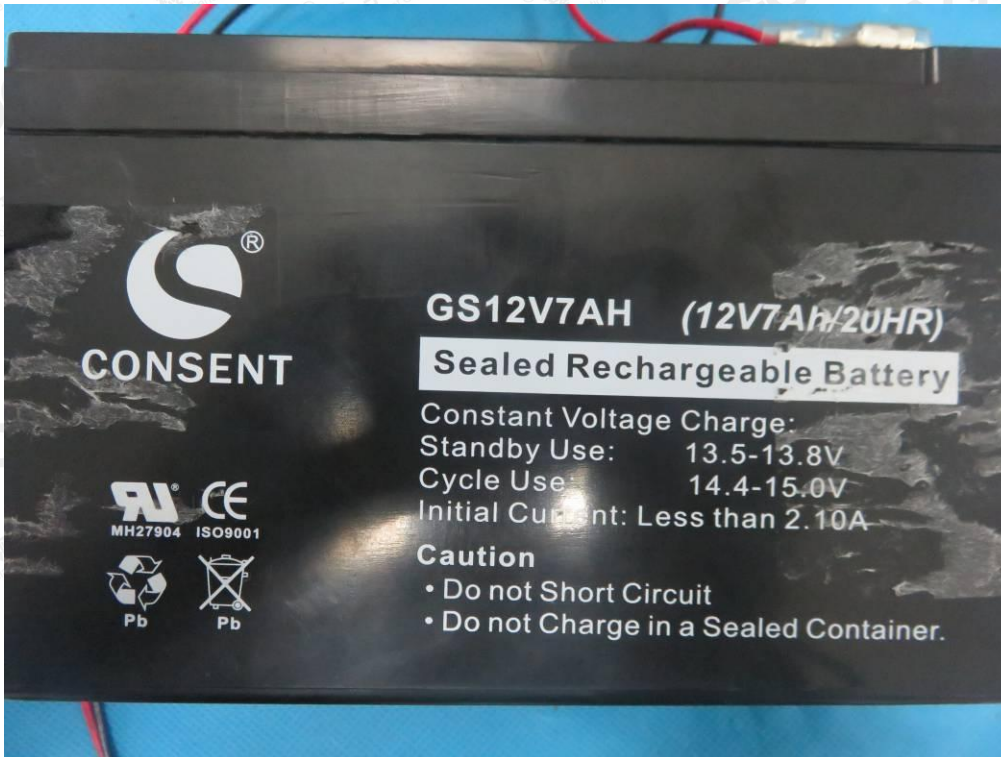


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OPEN VIEW OF EUT-3

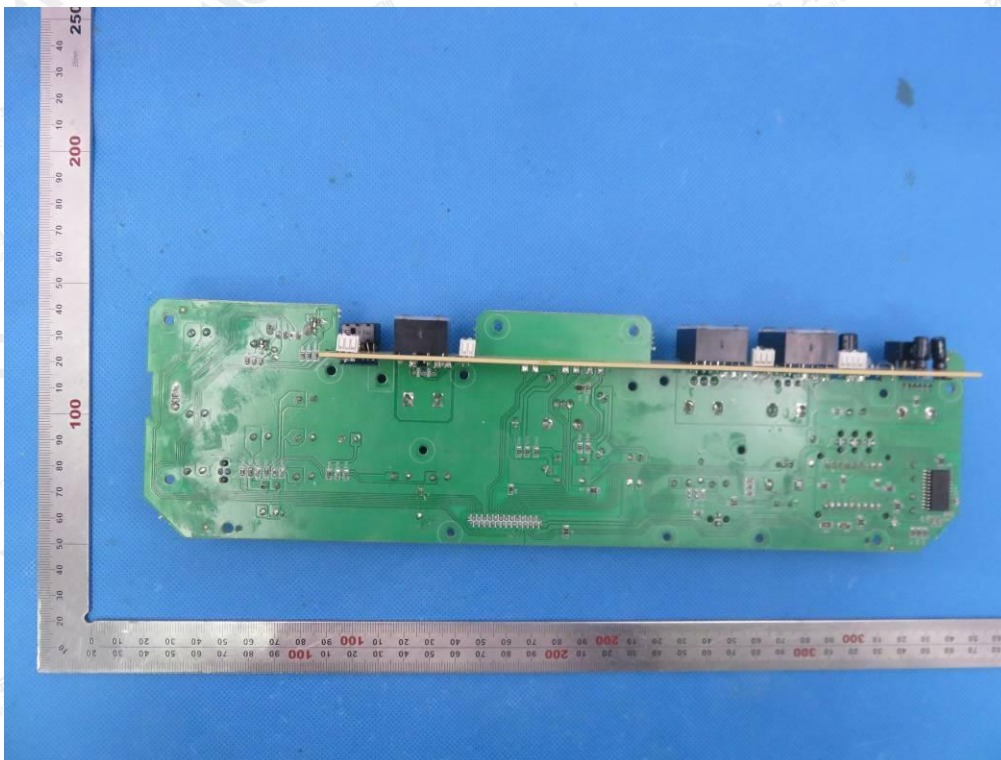


VIEW OF BATTERY

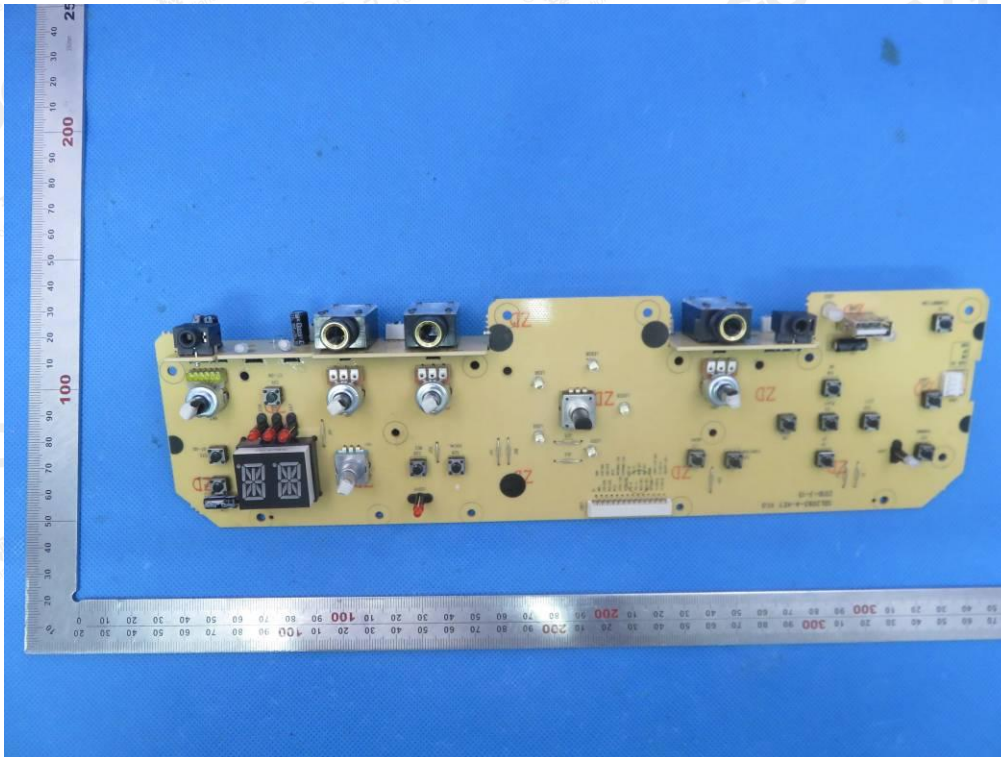


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INTERNAL VIEW OF EUT-1

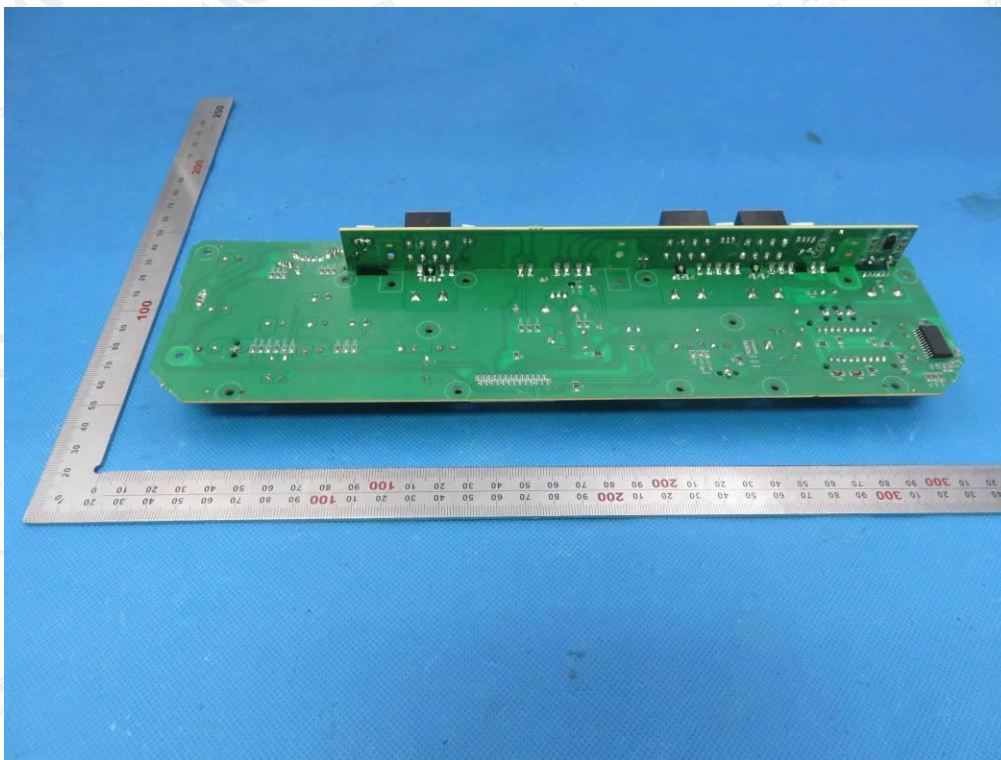


INTERNAL VIEW OF EUT-2

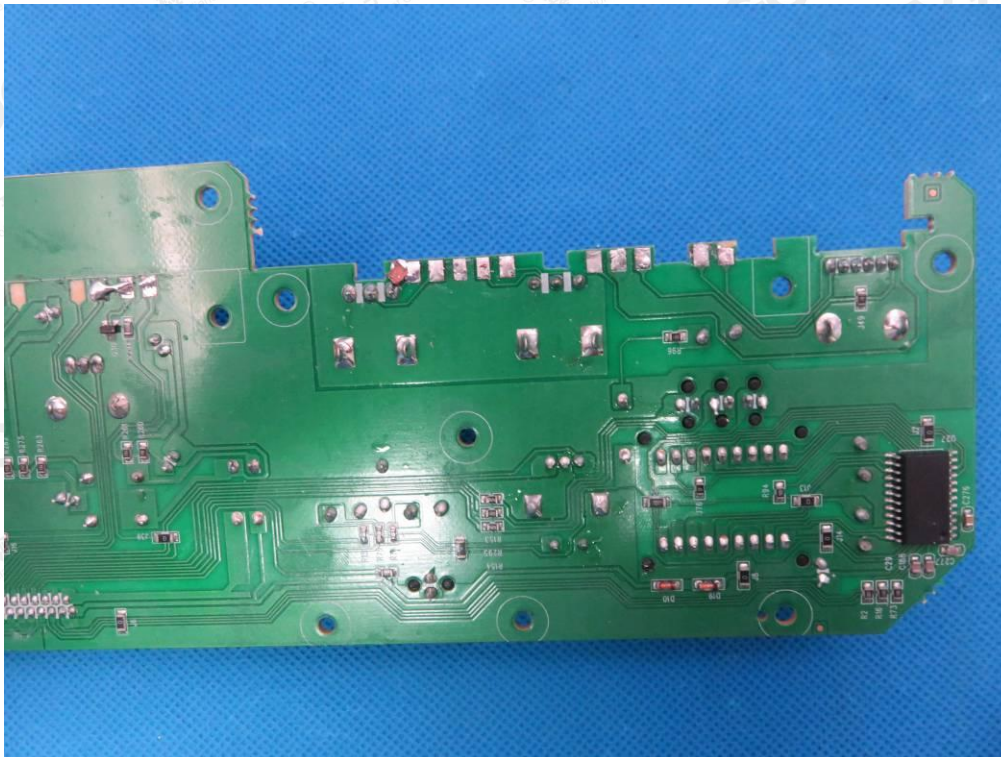


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INTERNAL VIEW OF EUT-3

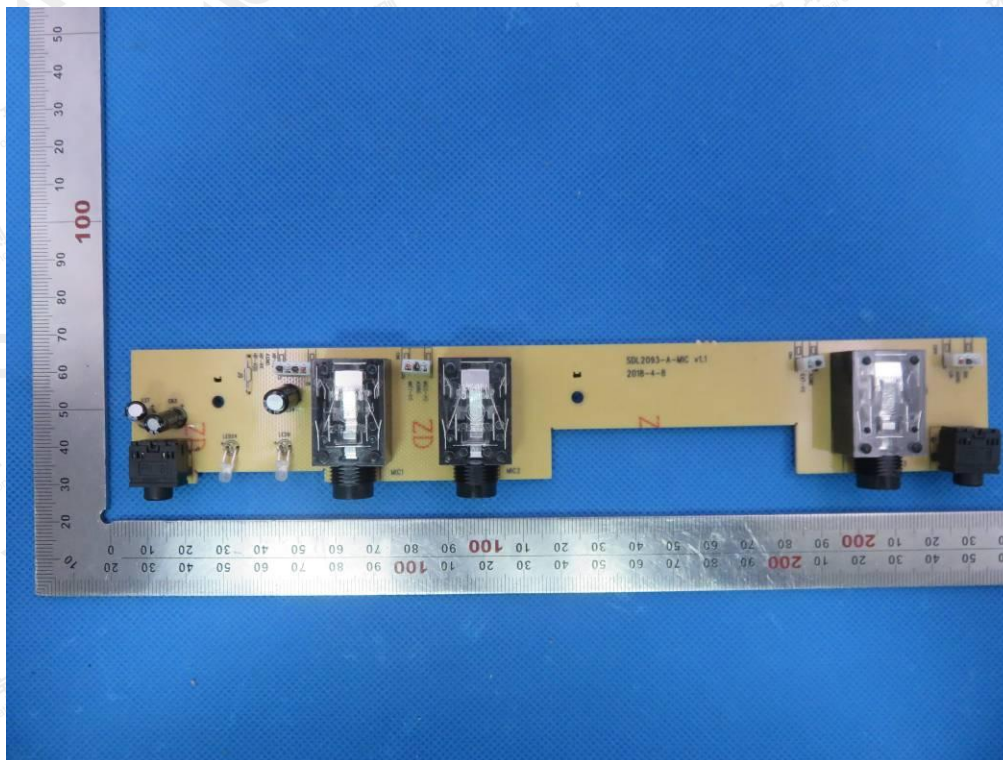


INTERNAL VIEW OF EUT-4

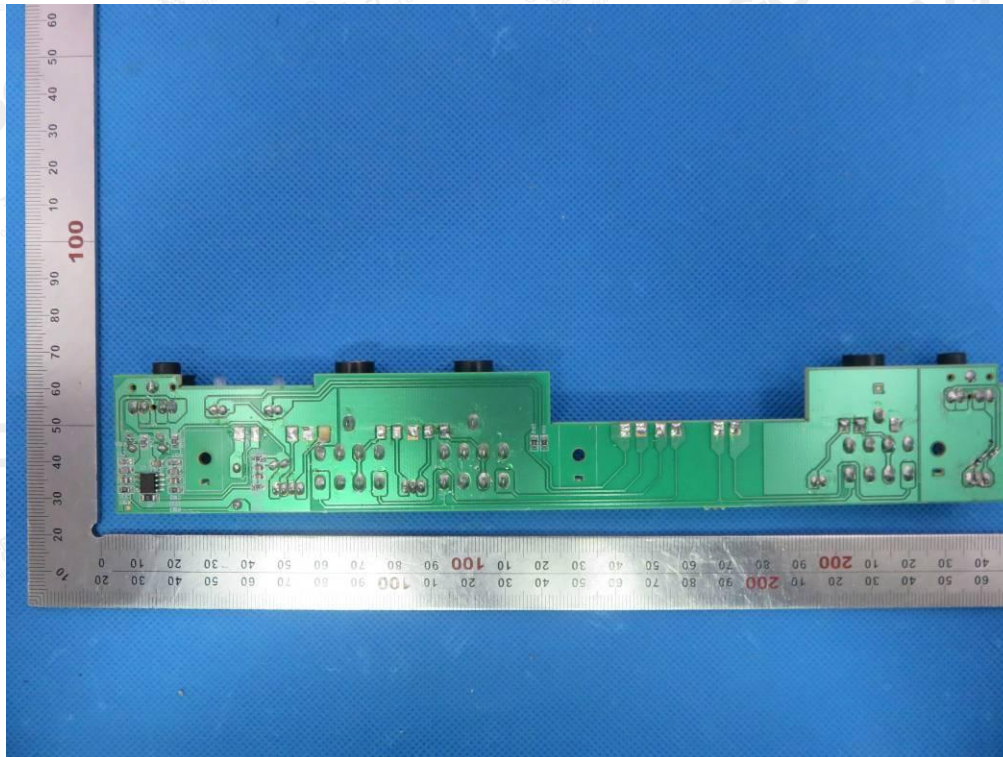


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INTERNAL VIEW OF EUT-5

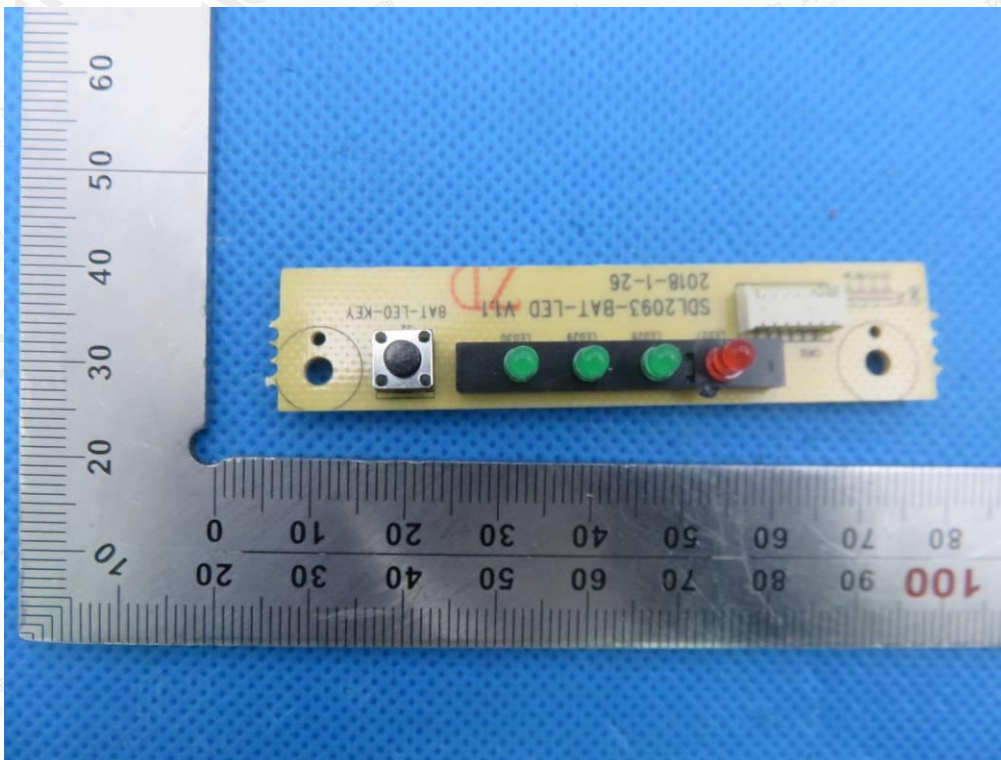


INTERNAL VIEW OF EUT-6

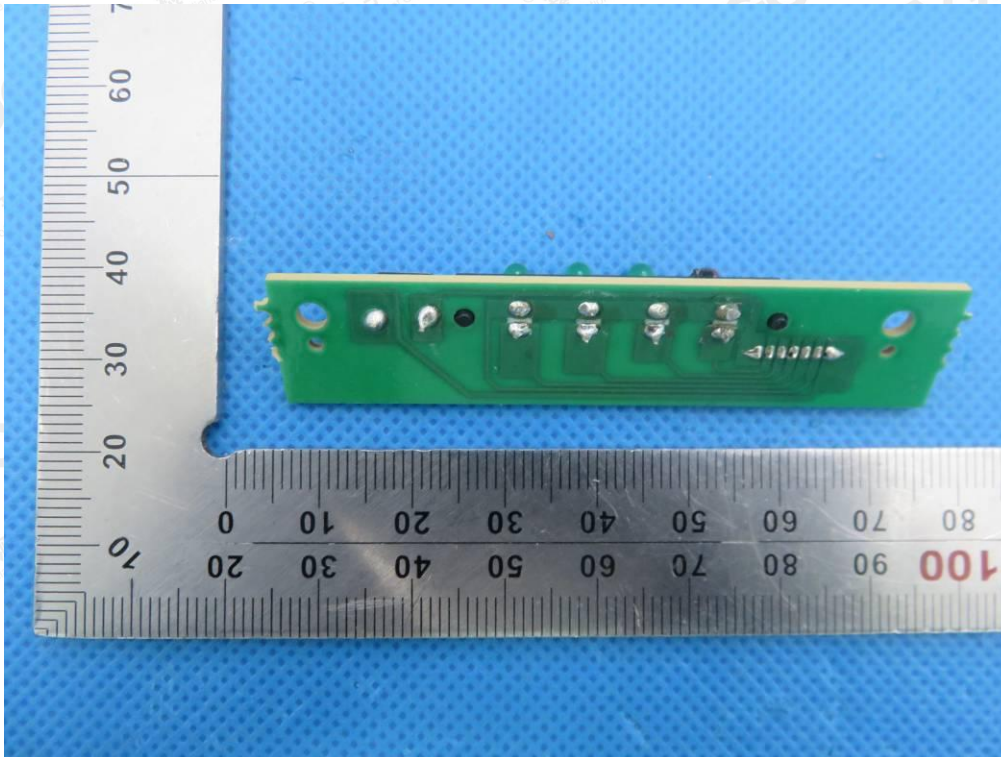


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INTERNAL VIEW OF EUT-7

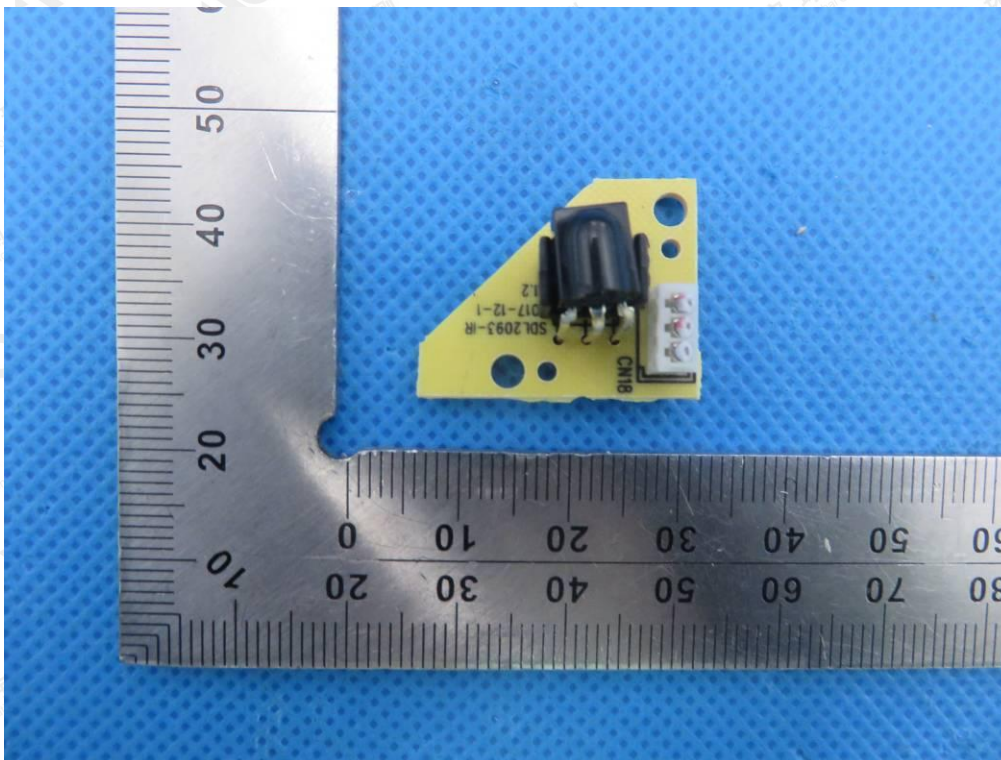


INTERNAL VIEW OF EUT-8

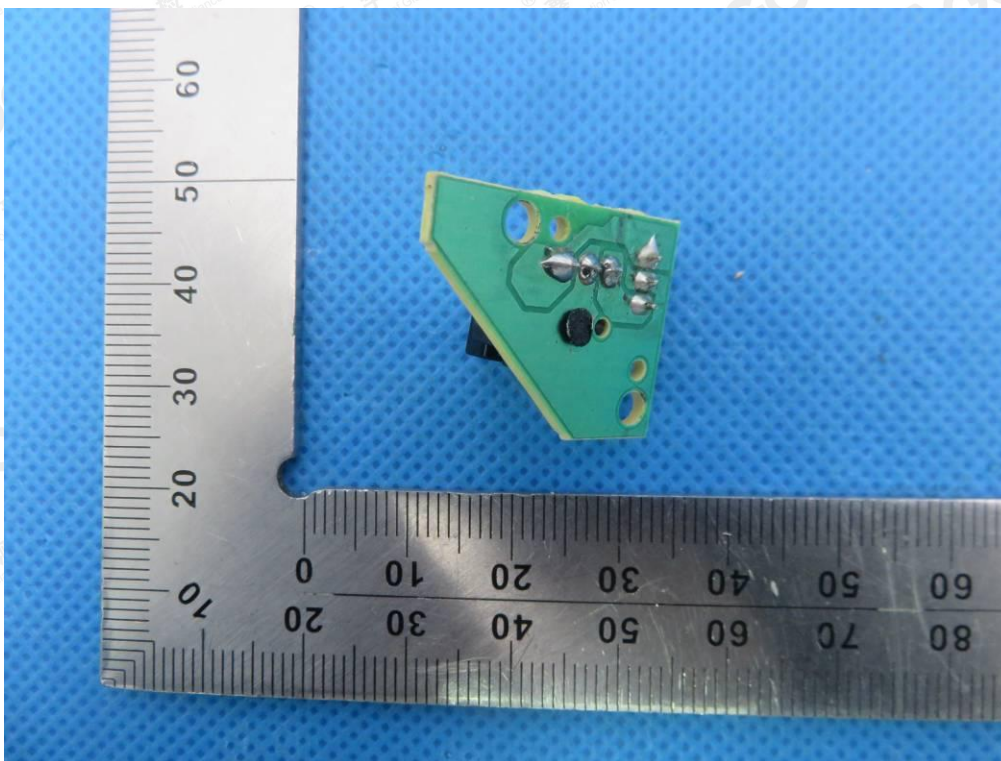


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INTERNAL VIEW OF EUT-11

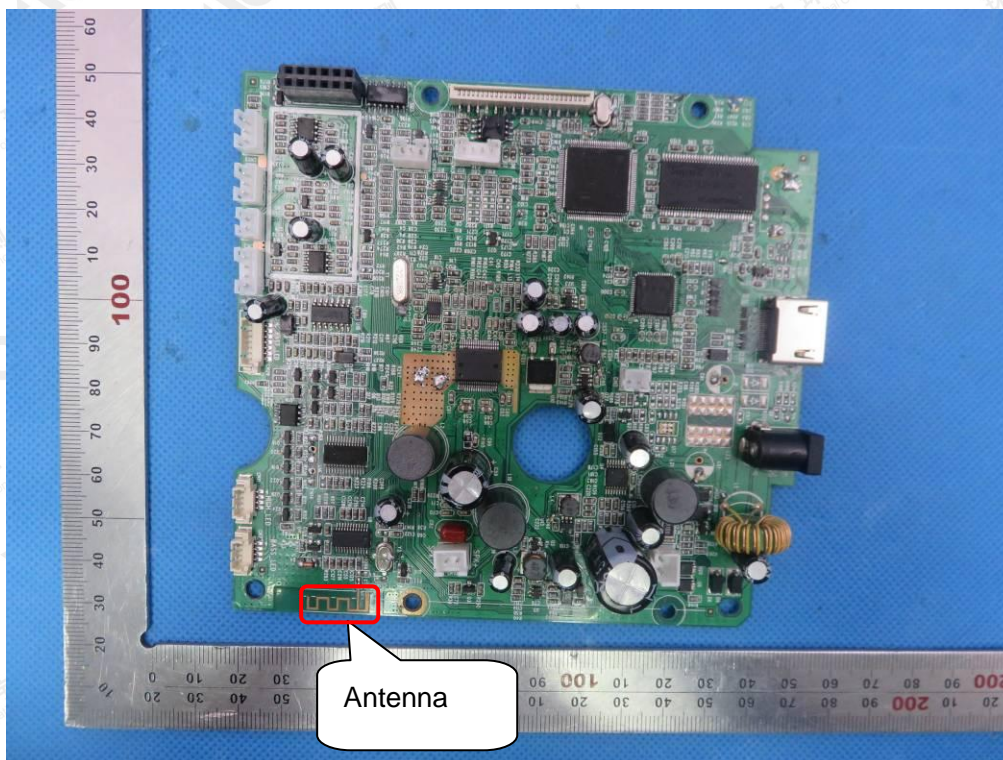


INTERNAL VIEW OF EUT-12

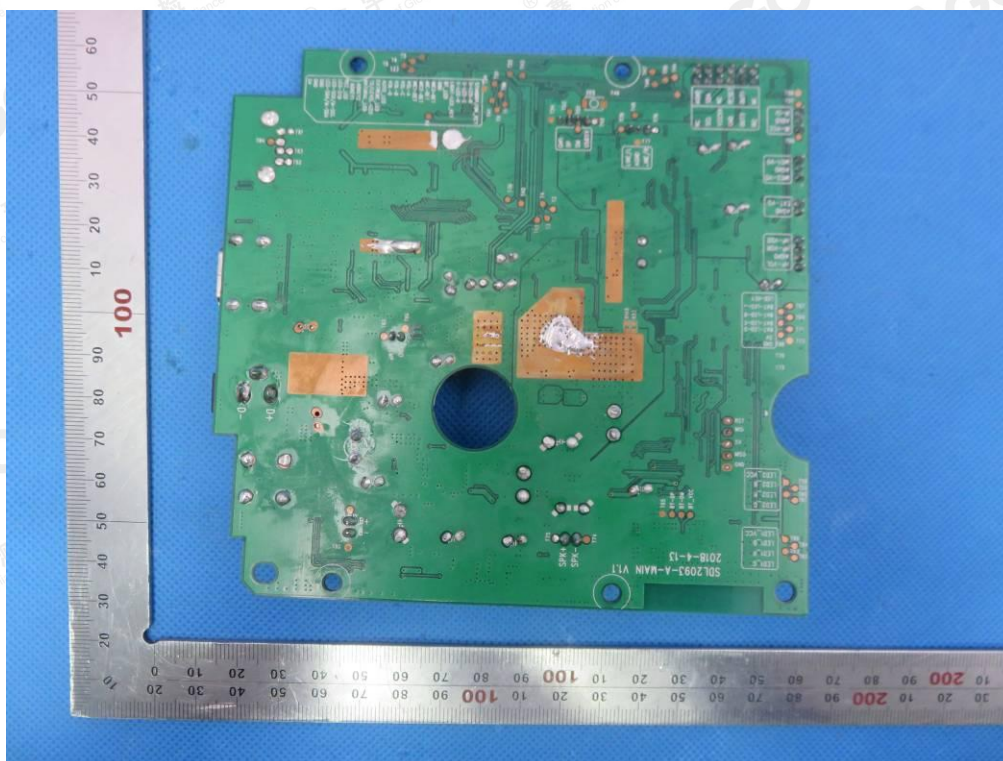


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INTERNAL VIEW OF EUT-13

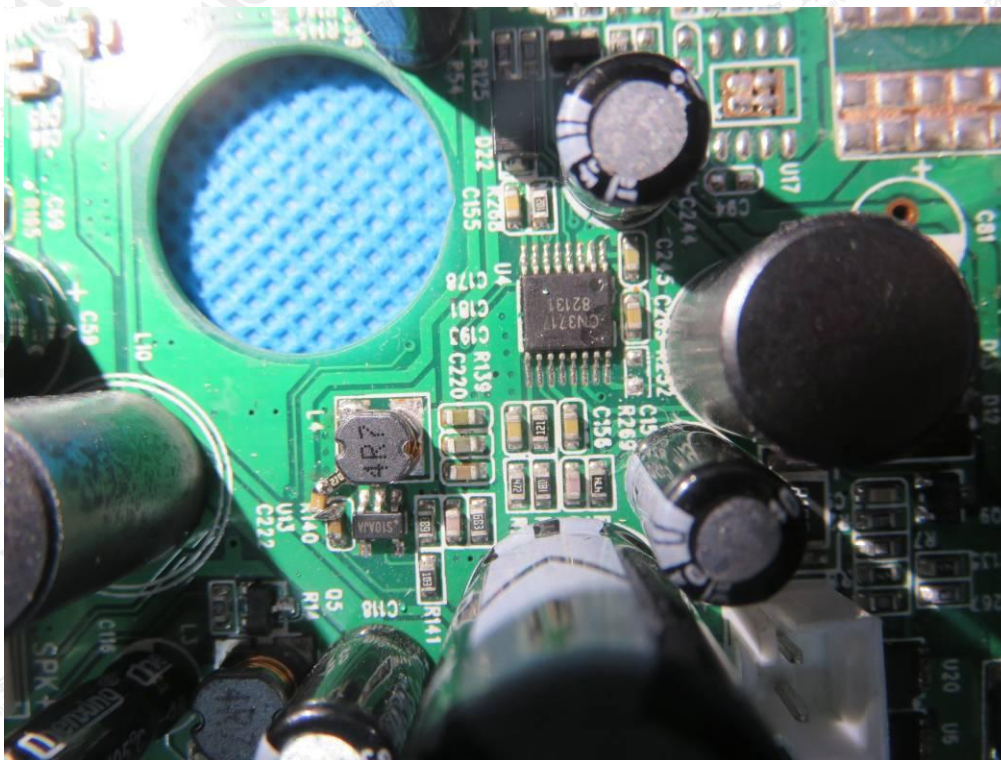


INTERNAL VIEW OF EUT-14

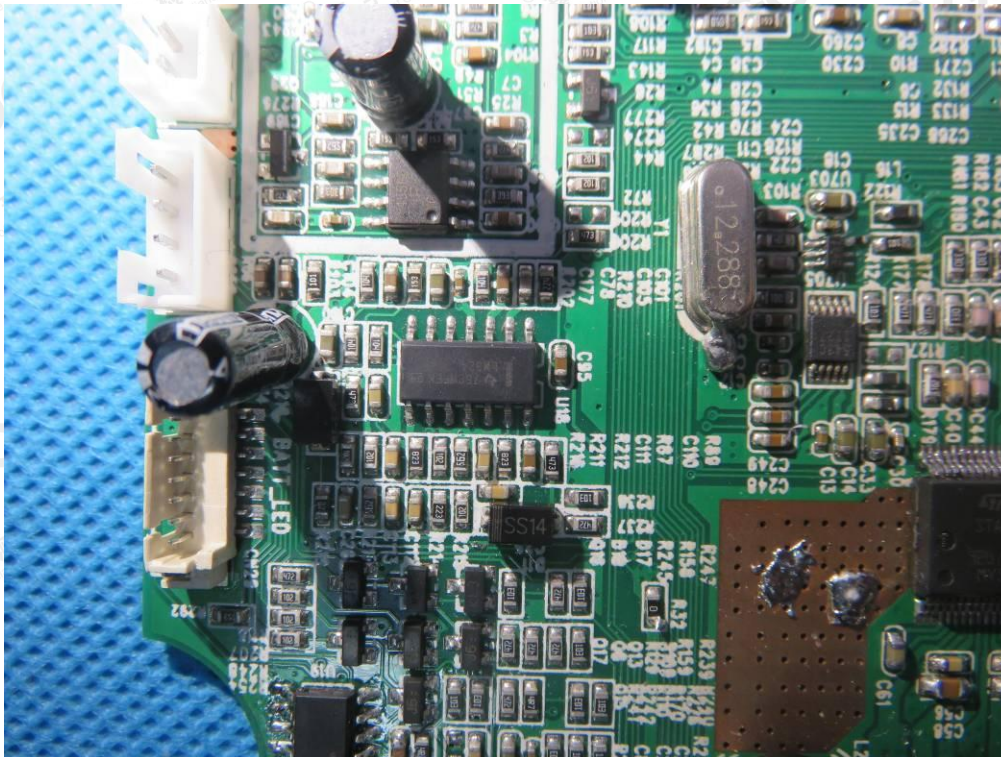


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INTERNAL VIEW OF EUT-19



INTERNAL VIEW OF EUT-20



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VIEW OF ADAPTER



----END OF REPORT----

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