RF TEST REPORT

No. 160802628SHA-001

Applicant	:	ISKN
		52 cours Jean Jaurès. 38000 Grenoble. FRANCE
Manufacturer	:	ISKN
		52 cours Jean Jaurès. 38000 Grenoble. FRANCE
Product Name	:	the Slate
Type/Model	:	TS2E1
TEST RESULT	**:**	**PASS**

SUMMARY

The equipment complies with the requirements according to the following standard(s):

47CFR Part 15 (2016): Radio Frequency Devices

ANSI C63.10 (2013): American National Standard for Testing Unlicensed Wireless Devices

RSS-210 Issue 9 (August 2016): Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

RSS-Gen Issue 4 (November 2014): General Requirements for Compliance of Radio Apparatus

Date of issue: November 11, 2016

Prepared by:

Wade Zhang (*Project Engineer*)

Reviewed by:

Daniel Zhao (*Reviewer*)

Description of Test Facility

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IC Assigned Code: 2042B-1

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Content

1. General Information

1.1 Applicant Information

Applicant	:	ISKN 52 cours Jean Jaurès. 38000 Grenoble. FRANCE
Name of contact	:	Tristan Hautson
Tel	:	+33 6 68 67 29 12
Fax	:	/
Manufacturer	:	ISKN 52 cours Jean Jaurès. 38000 Grenoble. FRANCE
Factory	:	Technochina Industries(ShangHai) Co., Ltd 152/1421 Zhuan Xin Dong Lu, Minhang Industrial Park 201108 Shanghai, China

1.2 Identification of the EUT

Product description	:	the Slate
Type/model	:	TS2E1
Operation Frequency Band	:	2400-2483.5MHz
EUT Modes of Modulation	:	Bluetooth 4.0 Low Energy
Type of Modulation	:	GFSK
Channel Description	:	40 channels (0-39)
Antenna Type	:	0dBi Internal PCB antenna
Port identification	:	Mini USB * 1
Rating	:	DC5V
Category of EUT	:	Class B
EUT type	:	☒ Table top☐ Floor standing
Sample received date	:	2016.08.30
Sample Identification No	:	*0160830-21-001*
Date of test	:	2016.08.30 ~ 2016.11.11

1.3 Mode of operation during the test / Test peripherals used

Within this test report, EUT was tested with modulation and tested under its rating voltage and frequency.

The EUT was set to work normal and as receiving and transmitting mode during test. No standby function.

The EUT is a handheld device, so three axes (X, Y, Z) were observed while the test receiver worked as “max hold” continuously and the highest reading among the whole test procedure was recorded.

Test Peripherals: NA

2. Test Specification

2.1 Instrument list

Selected	Equipment	Type	Manu.	Internal no.	Cal. Date	Due date
☒	PXA Analyzer	N9030A	Agilent	EC5338	2016/3/4	2017/3/3
☒	Vector SG	N5182B	Agilent	EC5175	2016/3/4	2017/3/3
☒	Power sensor	U2021XA	Agilent	EC5338-1	2016/3/4	2017/3/3
☒	MXG Analog SG	N5181A	Agilent	EC5338-2	2016/3/4	2017/3/3
☒	Power meter	N1911A/N1921A	Agilent	EC4318	2016/4/10	2017/4/9
☒	EMI chamber	3m	Albatross	EC 3048	2016/5/5	2017/5/4
☒	Test Receiver	ESIB 26	R&S	EC 3045	2016/10/19	2017/10/18
☒	Test Receiver	ESCI 7	R&S	EC4501	2016/2/24	2017/2/23
☒	Bilog Antenna	CBL 6112D	TESEQ	EC 4206	2016/5/30	2017/5/29
☒	Horn antenna	HF 906	R&S	EC 3049	2016/9/11	2017/9/10
☒	Horn antenna	HAP18-26W	TOYO	EC 4792-3	2014/6/12	2017/6/11
☒	Pre-amplifier	Pre-amp 18	R&S	EC 5262	2016/5/24	2017/5/23
☒	Pre-amplifier	Tpa0118-40	R&S	EC 4792-2	2016/4/11	2017/4/10

2.2 Test Standard

47CFR Part 15 (2016)
ANSI C63.10 (2013)
RSS-210 Issue 9 (August 2016)
RSS-Gen Issue 4 (November 2014)

2.3 Test Summary

This report applies to tested sample only. This report shall not be reproduced in part without written approval of Intertek Testing Service Shanghai Limited.

TEST ITEM	FCC REFERANCE	IC Reference	RESULT
Radiated emission	15.249 & 15.209	RSS 210 Issue 9	Pass
Assigned bandwidth (20dB bandwidth)	15.215(c)	-	Pass
Power line conducted emission	15.207	RSS-Gen Issue 4 Clause 8.8	Pass

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3. Radiated emission & Band Edge

Test result: Pass

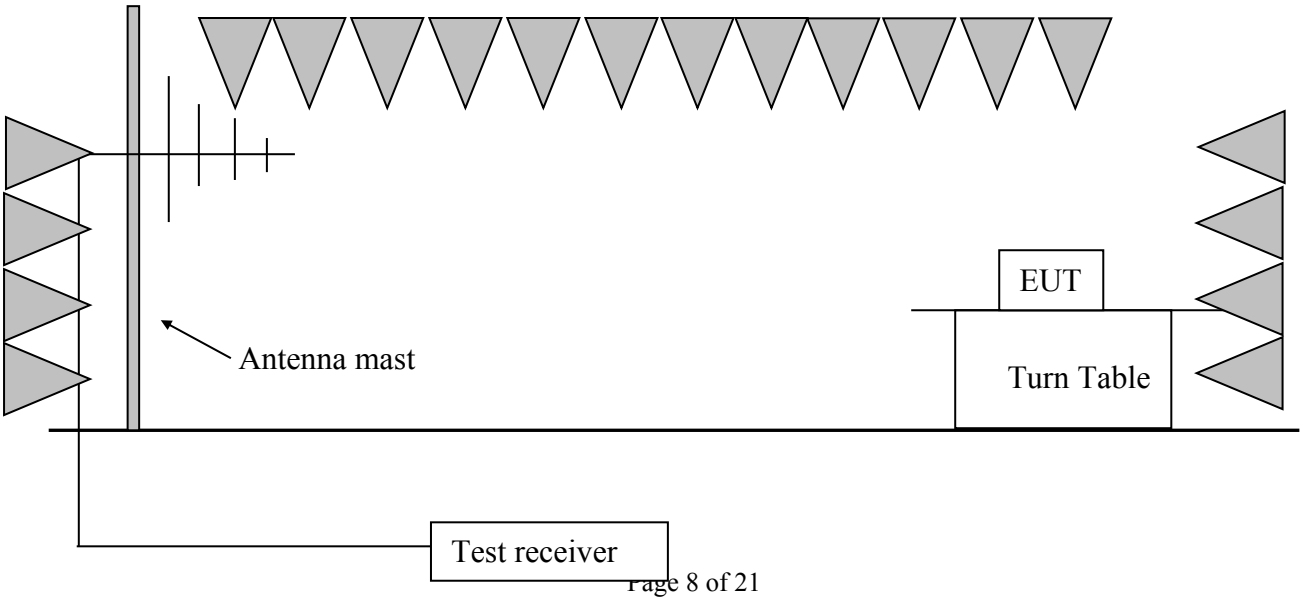
3.1 Test limit

Fundamental Frequency (MHz)	Fundamental limit (dBuV/m)	Harmonic limit (dBuV/m)
☐902 - 928	94	54
☒2400 - 2483.5	94	54
☐5725 - 5875	94	54
☐24000 - 24250	108	68

The radiated emissions which fall outside allocated band, must also comply with the radiated emission limits specified in § 15.209(a) and Band edge emissions radiated outside of the specified frequency bands shall be attenuated by at least 50 dB below the level of the fundamental or comply with the radiated emissions limits specified in section 15.209(a) limit in the table below has to be followed.

Frequency (MHz)	Field Strength (dBuV/m)	Measurement Distance (m)
30 - 88	40.0	3
88 - 216	43.5	3
216 - 960	46.0	3
Above 960	54.0	3

3.2 Test Configuration



3.3 Test procedure and test setup

The measurement was applied in a semi-anechoic chamber. While testing for spurious emission higher than 1GHz, if applied, the pre-amplifier would be equipped just at the output terminal of the antenna.

Tabletop devices shall be placed on a non-conducting platform with nominal top surface dimensions 1 m by 1.5 m. For emissions testing at or below 1 GHz, the table height shall be 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m.

The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mast. The antenna moved up and down between from 1meter to 4 meters to find out the maximum emission level.

The radiated emission was measured using the Spectrum Analyzer with the resolutions bandwidth set as:

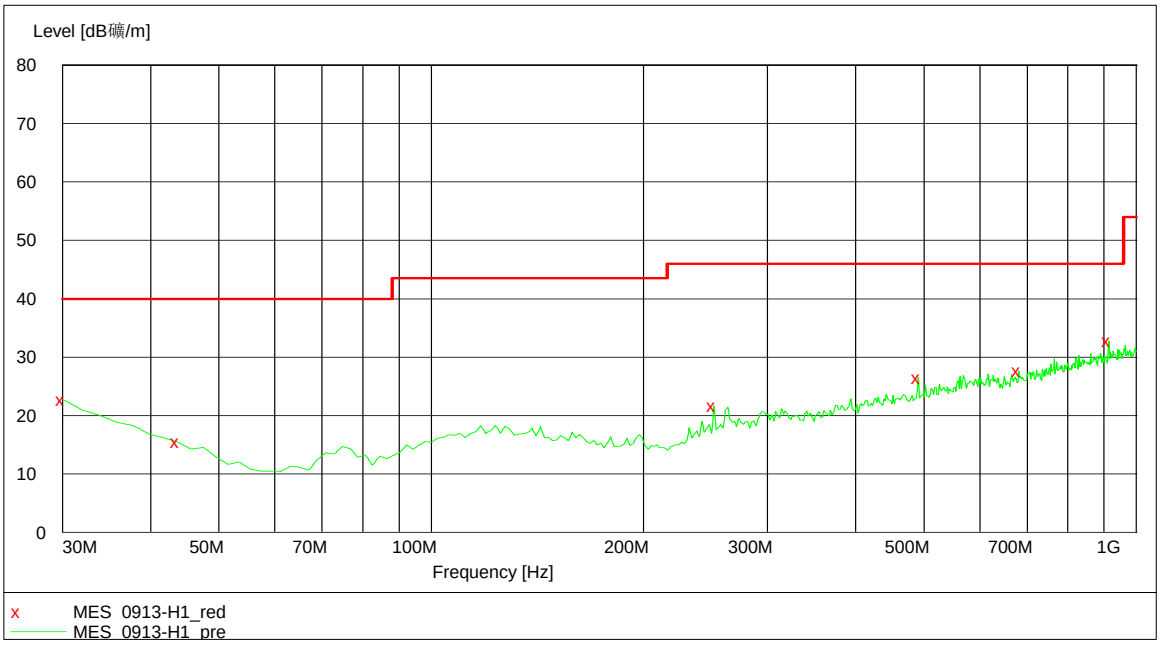
RBW = 300 Hz, VBW = 1 kHz (9 kHz~150 kHz);
RBW = 10 kHz, VBW = 30 kHz (150 kHz~30MHz);
RBW = 100 kHz, VBW = 300 kHz (30MHz~1GHz for PK)
RBW = 1MHz, VBW = 3MHz (>1GHz for PK);

3.4 Test protocol

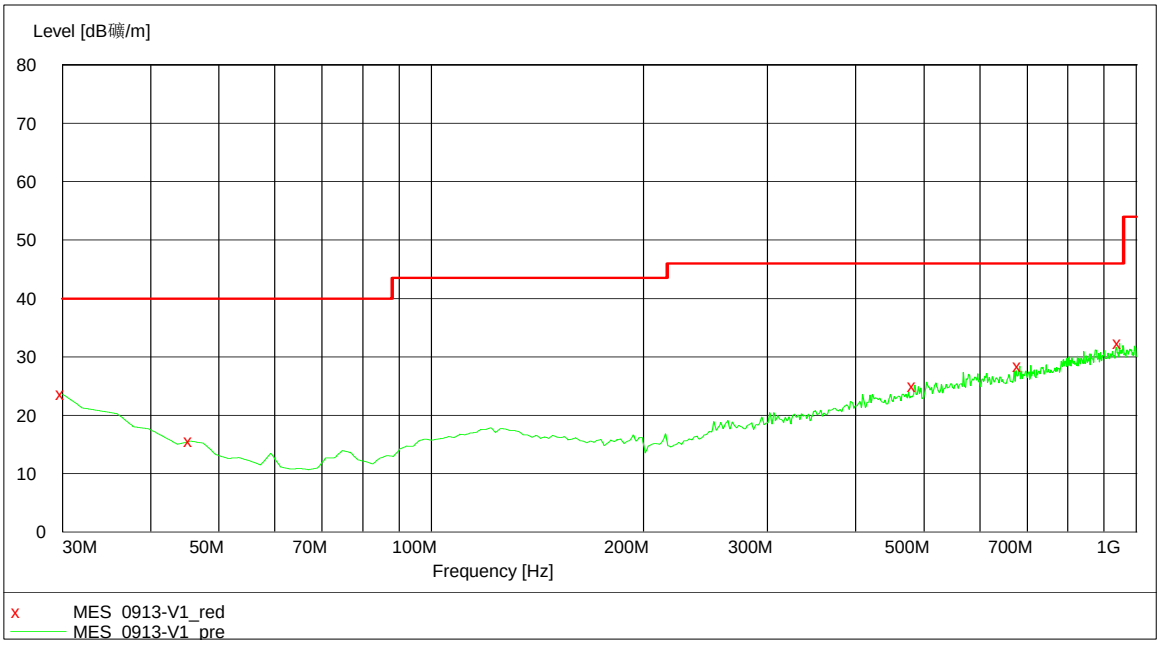
Temperature	:	25 °C
Relative Humidity	:	55 %

The worst waveform from 30MHz to 1000MHz is listed as below:

Horizontal



Vertical



Test result below 1GHz:

Polarization	Frequency (MHz)	Measured level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
H	30.00	22.7	40.0	17.3	PK
	43.61	15.5	40.0	24.5	PK
	251.60	21.6	46.0	24.4	PK
	490.70	26.5	46.0	19.5	PK
	681.20	27.7	46.0	18.3	PK
	914.47	32.7	46.0	13.3	PK
V	30.00	23.6	40.0	16.4	PK
	45.55	15.6	40.0	24.4	PK
	484.87	25.1	46.0	20.9	PK
	683.15	28.4	46.0	17.6	PK
	947.52	32.4	46.0	13.6	PK

Note: The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

Test result above 1GHz:

CH	Antenna	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H	2402.00	34.34	97.54	114.00	16.46	PK
	V	2402.00	34.34	86.33	114.00	27.67	PK
	H	2400.00	34.29	49.89	74.00	24.11	PK
	V	2400.00	34.29	45.56	74.00	28.44	PK
	H	4804.00	6.50	45.46	74.00	28.54	PK
	V	4804.00	6.50	42.33	74.00	31.67	PK
	H	7206.00	9.30	48.72	74.00	25.28	PK
	V	7206.00	9.30	44.26	74.00	29.74	PK
M	H	2440.00	34.36	97.62	114.00	16.38	PK
	V	2440.00	34.36	85.77	114.00	28.23	PK
	H	4880.00	6.50	49.86	74.00	24.14	PK
	V	4880.00	6.50	45.34	74.00	28.66	PK
	H	7320.00	9.30	48.75	74.00	25.25	PK
	V	7320.00	9.30	43.25	74.00	30.75	PK
H	H	2480.00	34.38	99.55	114.00	14.45	PK
	V	2480.00	34.38	86.33	114.00	27.67	PK
	H	2483.50	34.63	48.66	74.00	25.34	PK
	V	2483.50	34.63	44.68	74.00	29.32	PK
	H	4960.00	6.70	47.36	74.00	26.64	PK
	V	4960.00	6.70	44.86	74.00	29.14	PK
	H	7440.00	9.30	47.43	74.00	26.57	PK
	V	7440.00	9.30	43.76	74.00	30.24	PK

Remark:

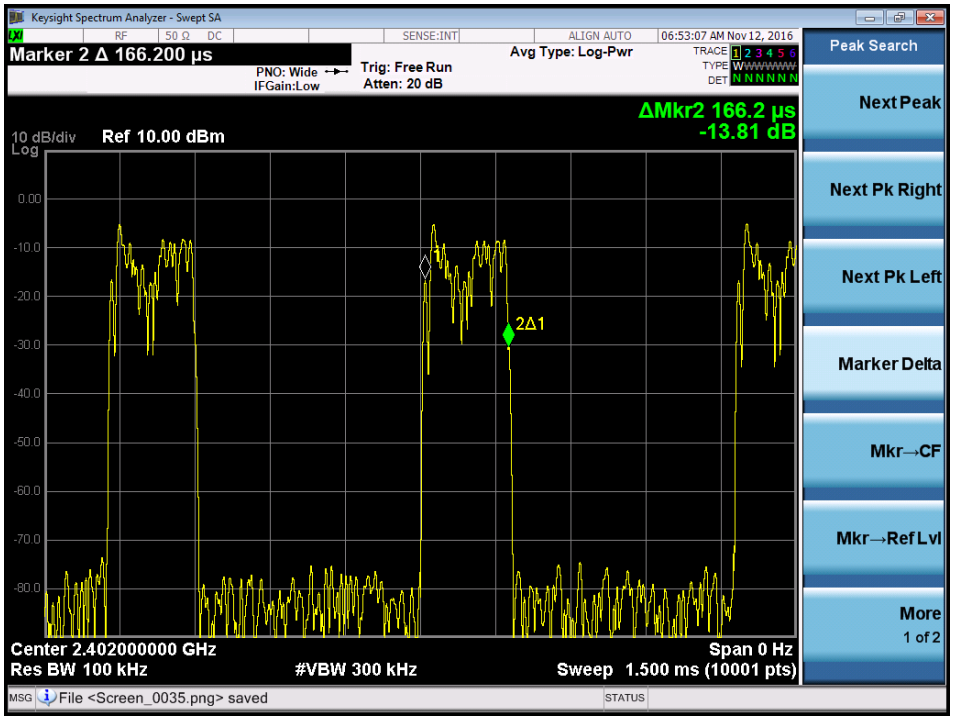
1. For fundamental emission test, no pre-amplifier is employed;
2. Correct Factor = Antenna Factor + Cable Loss (-Amplifier, is employed);
3. Corrected Reading = Original Receiver Reading + Correct Factor;
4. Margin = limit – Corrected Reading;
5. If the PK reading is lower than AV limit, the AV test can be elided;
6. The shaded data is the fundamental emission;
7. Both emissions on “horizontal” and “vertical” axes were assessed and the worse test data was listed in this report;

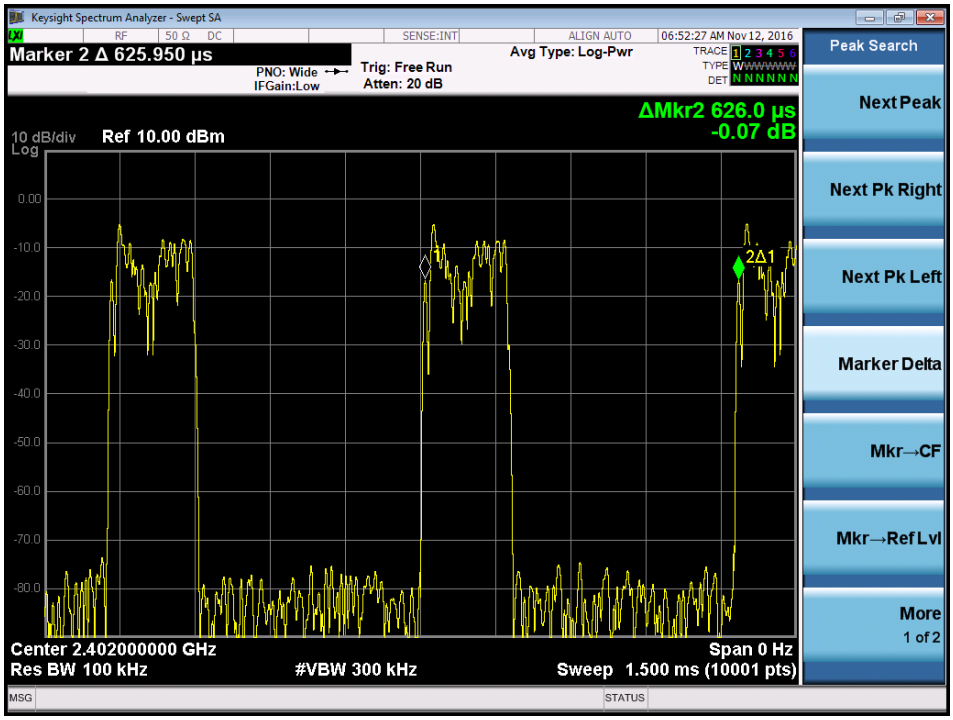
Example:

Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10dBuV,
Then Correct Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m,
Corrected Reading = 10dBuV + 0.20dB/m = 10.20dBuV/m,
Assuming limit = 54dBuV/m, Corrected Reading = 10.20dBuV/m,
Then Margin = 54 -10.20 = 43.80dBuV/m.

Duty Cycle

The test data with maximum duty cycle was listed below.
The worst Duty cycle= 166.2 / 626.0 = 0.2655





Calculating the AV value according to the duty cycle

Antenna	Frequency (MHz)	PK Reading (dBuV/m)	Correct Factor (dB)	AV Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)
H	2402.00	97.54	-11.52	86.02	94.00	7.98
V	2402.00	86.33		74.81	94.00	19.19
H	2440.00	97.62		86.10	94.00	7.90
V	2440.00	85.77		74.25	94.00	19.75
H	2480.00	99.55		88.03	94.00	5.97
V	2480.00	86.33		74.81	94.00	19.19

Remark: 1.Correct Factor = 20lg (duty cycle) = 20lg (166.2 / 626.0) = -11.52
2. AV Reading = PK Reading + Correct Factor
3. Margin = limit - AV Reading

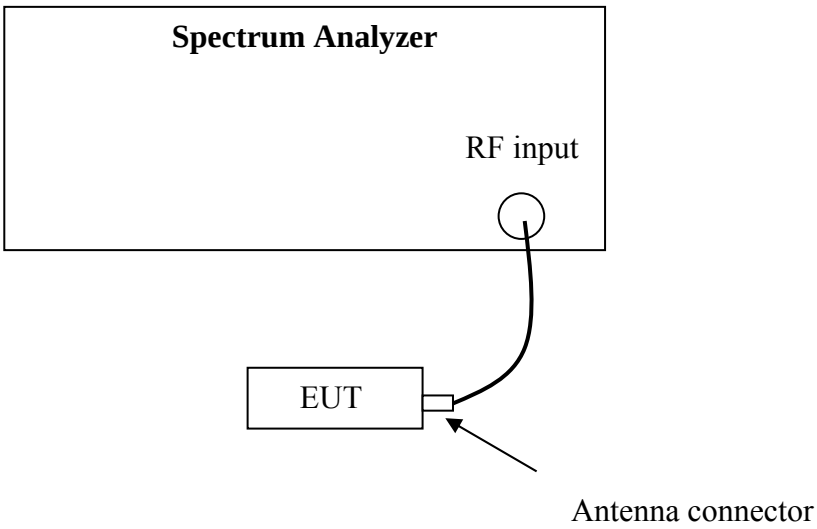
4. Assigned bandwidth (20dB bandwidth)

Test result: **Pass**

4.1 Limit

Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emission is contained within the allocated frequency band as clause 3.1 shows.

4.2 Test Configuration



4.3 Test procedure and test setup

The 20dB Bandwidth per FCC § 15.215(c) is measured using the Spectrum Analyzer.
Set Span = 2 to 3 times the 20 dB bandwidth, RBW≥1% of the 20 dB bandwidth, VBW≥RBW, Sweep = auto, Detector = peak, Trace = max hold.
The test was performed at 3 channels (lowest, middle and highest channel).

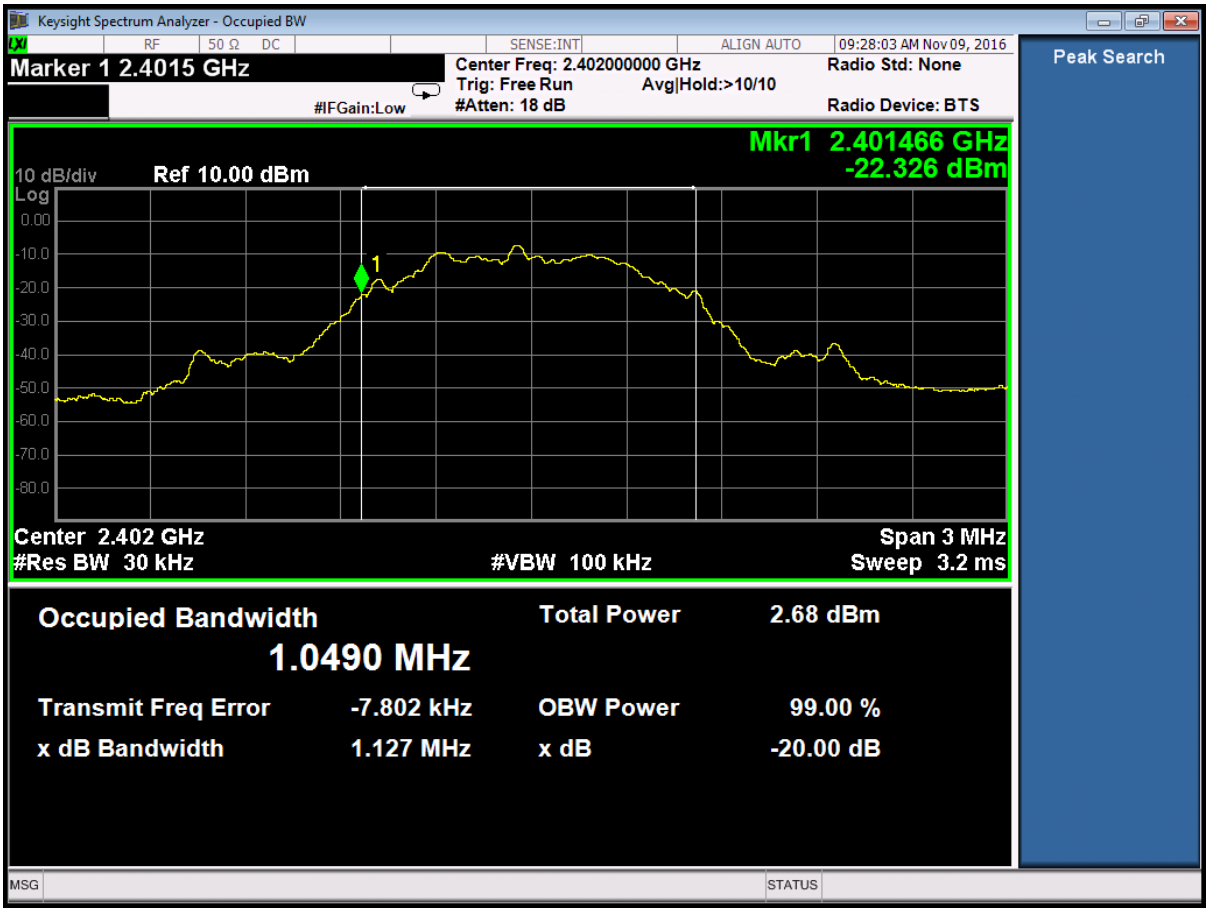
4.4 Test protocol

Temperature : 25°C
Relative Humidity : 55 %

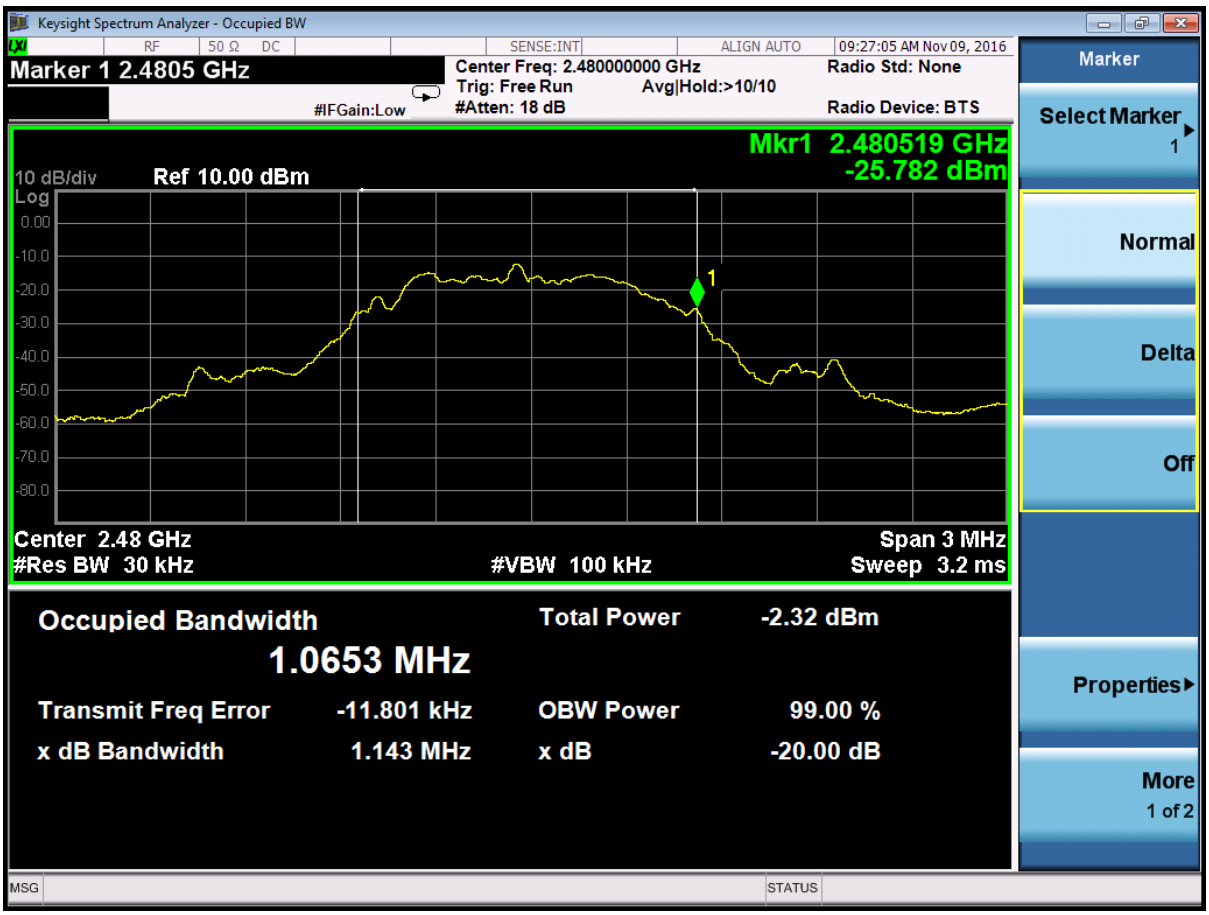
Mode	20dB Bandwidth		Permitted Bandwidth (MHz)	Result
	F_L (MHz)	F_H (MHz)		
BLE	2401.466	2480.519	2400-2483.5	Pass

Mode	99% Bandwidth	
	Channel L	Channel H
BLE	1.0490 MHz	1.0653 MHz

Channel L



Channel H



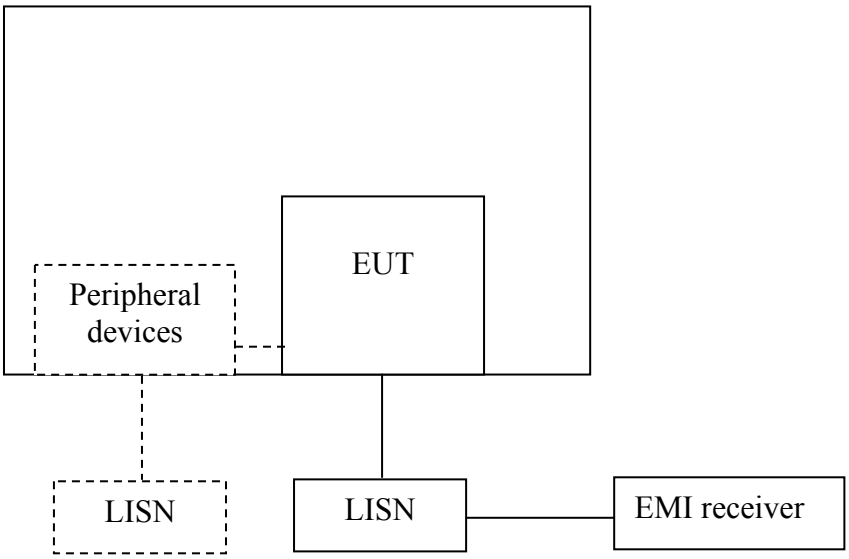
5. Power line conducted emission

Test result: **Pass**

5.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	QP	AV
0.15-0.5	66 to 56*	56 to 46 *
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

5.2 Test configuration



☒ For table top equipment, wooden support is 0.8m height table

☐ For floor standing equipment, wooden support is 0.1m height rack.

5.3 Test procedure and test set up

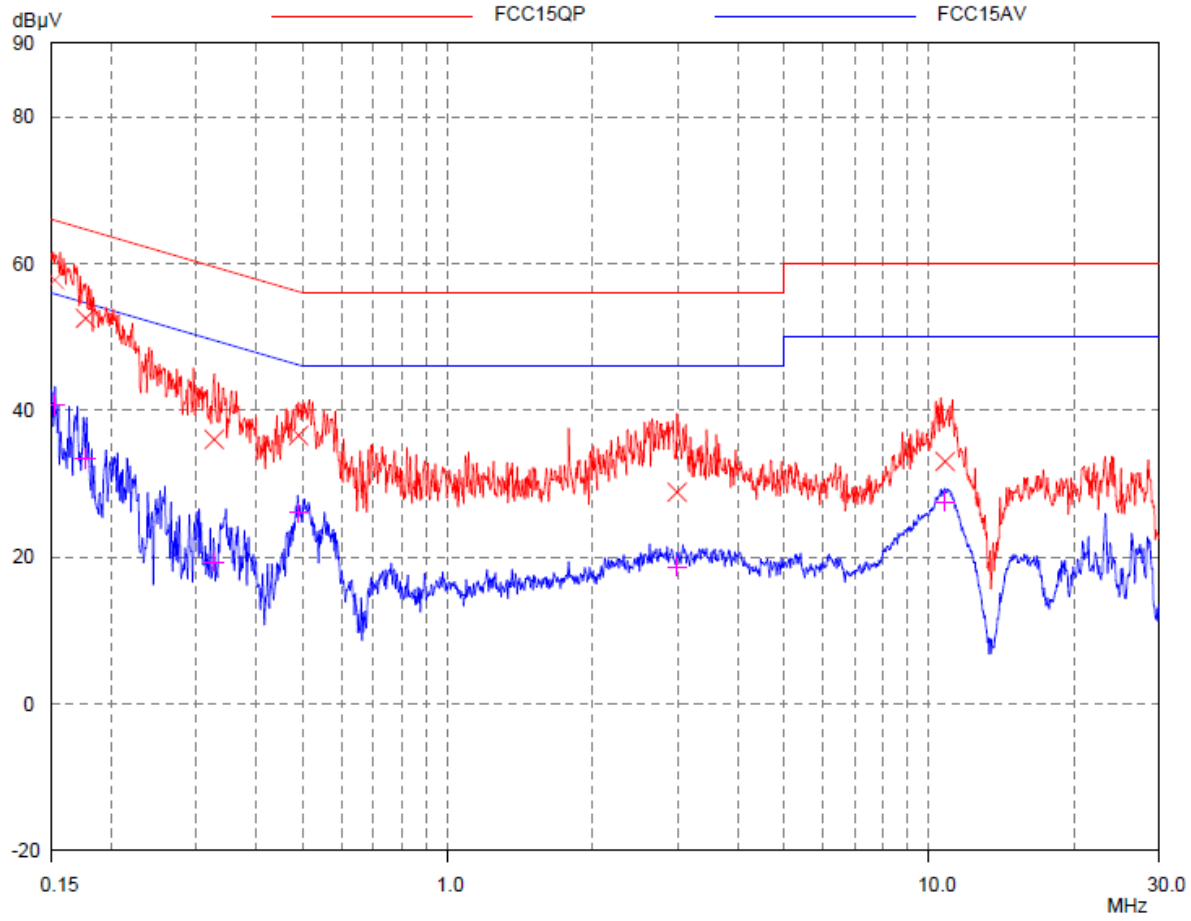
The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50Ω/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50Ω/50uH coupling impedance with 50Ω termination.

Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4 on conducted measurement. The bandwidth of the test receiver is set at 9 kHz.

5.4 Test protocol

Temperature : 25°C
Relative Humidity : 55 %

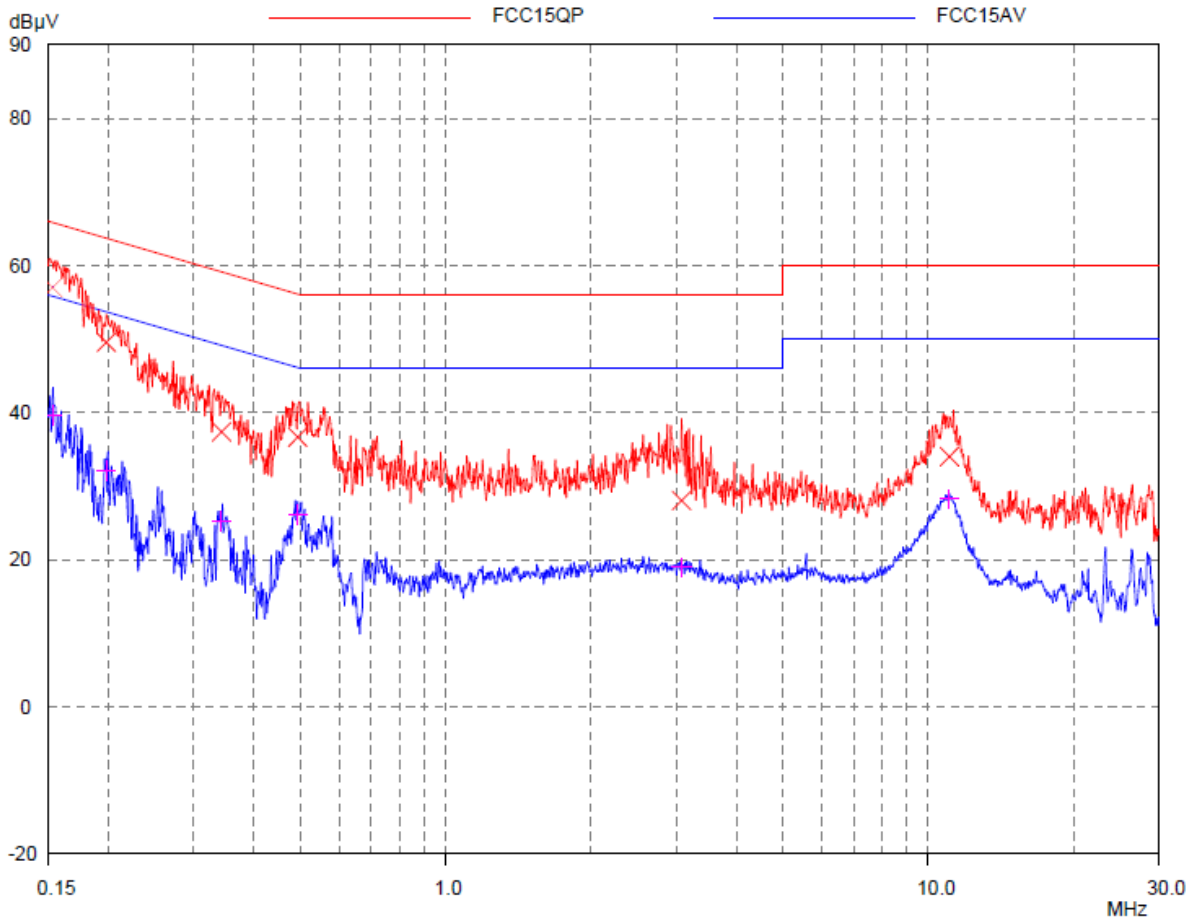
L line



Test Data:

Frequency (MHz)	Quasi-peak			Average		
	level dB(µV)	Limit dB(µV)	Margin (dB)	level dB(µV)	limit dB(µV)	Margin (dB)
0.152	57.78	65.87	8.09	40.71	55.87	15.16
0.177	52.54	64.64	12.10	33.40	54.64	21.24
0.327	36.05	59.53	23.48	19.38	49.53	30.15
0.489	36.58	56.19	19.61	26.03	46.19	20.16
2.995	28.85	56.00	27.15	18.67	46.00	27.33
10.787	33.04	60.00	26.96	27.53	50.00	22.47

N line



Test Data:

Frequency (MHz)	Quasi-peak			Average		
	level dB(µV)	Limit dB(µV)	Margin (dB)	level dB(µV)	limit dB(µV)	Margin (dB)
0.153	57.02	65.83	8.81	39.62	55.83	16.21
0.198	49.54	63.71	14.17	32.08	53.71	21.63
0.343	37.40	59.14	21.74	25.31	49.14	23.83
0.493	36.67	56.12	19.45	26.19	46.12	19.93
3.080	28.05	56.00	27.95	18.96	46.00	27.04
11.048	34.01	60.00	25.99	28.24	50.00	21.76