

ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LOW-POWER, NON-LICENSED TRANSMITTER

Test Report No. : OT-188-RWD-022
AGR No. : A187A-274
Applicant : AISOLUTION Co., LTD.
Address : 01194 28-4, Samyang-ro 29-gil, Gangbuk-gu, Seoul, 01194, South Korea
Manufacturer : AISOLUTION Co., LTD.
Address : 01194 28-4, Samyang-ro 29-gil, Gangbuk-gu, Seoul, 01194, South Korea
Type of Equipment : KDC BLE USB Dongle
FCC ID. : VH9KBLED41
Model Name : KBLED41
Multiple Model Name : N/A
Serial number : N/A
Total page of Report : 33 pages (including this page)
Date of Incoming : July 19, 2018
Date of issue : August 16, 2018

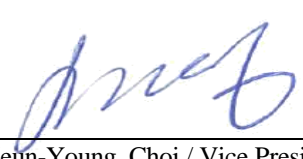
SUMMARY

The equipment complies with the regulation; *FCC PART 15 SUBPART C Section 15.247*

This test report only contains the result of a single test of the sample supplied for the examination.

It is not a generally valid assessment of the features of the respective products of the mass-production.

Reviewed by: 
 Jae-Ho Lee / Chief Engineer
 ONETECH Corp.

Approved by: 
 Keun-Young, Choi / Vice President
 ONETECH Corp.

CONTENTS

PAGE

1. VERIFICATION OF COMPLIANCE	5
2. TEST SUMMARY	6
2.1 TEST ITEMS AND RESULTS	6
2.2 ADDITIONS, DEVIATIONS, EXCLUSIONS FROM STANDARDS	6
2.3 RELATED SUBMITTAL(S) / GRANT(S)	6
2.4 PURPOSE OF THE TEST	6
2.5 TEST METHODOLOGY	6
2.6 TEST FACILITY	6
3. GENERAL INFORMATION	7
3.1 PRODUCT DESCRIPTION	7
3.2 ALTERNATIVE TYPE(S)/MODEL(S); ALSO COVERED BY THIS TEST REPORT	7
4. EUT MODIFICATIONS	7
5. SYSTEM TEST CONFIGURATION	8
5.1 JUSTIFICATION	8
5.2 PERIPHERAL EQUIPMENT	8
5.3 MODE OF OPERATION DURING THE TEST	8
5.4 CONFIGURATION OF TEST SYSTEM	9
5.5 ANTENNA REQUIREMENT	9
6. PRELIMINARY TEST	9
6.1 AC POWER LINE CONDUCTED EMISSIONS TESTS	9
6.2 GENERAL RADIATED EMISSIONS TESTS	9
7. MINIMUM 6 DB BANDWIDTH	10
7.1 OPERATING ENVIRONMENT	10
7.2 TEST SET-UP	10
7.3 TEST EQUIPMENT USED	10
7.4 TEST DATA	11
8. MAXIMUM PEAK OUTPUT POWER	13
8.1 OPERATING ENVIRONMENT	13
8.2 TEST SET-UP	13
8.3 TEST EQUIPMENT USED	13
8.4 TEST DATA	14
9. 100 KHZ BANDWIDTH OUTSIDE THE FREQUENCY BAND	16

9.1 OPERATING ENVIRONMENT	16
9.2 TEST SET-UP FOR CONDUCTED MEASUREMENT	16
9.3 TEST SET-UP FOR RADIATED MEASUREMENT.....	16
9.4 TEST EQUIPMENT USED	16
9.5 TEST DATA FOR CONDUCTED EMISSION	17
9.6 TEST DATA FOR RADIATED EMISSION	22
<i>9.6.1 Radiated Emission which fall in the Restricted Band.....</i>	<i>22</i>
<i>9.6.2 Spurious & Harmonic Radiated Emission.....</i>	<i>23</i>
10. PEAK POWER SPECTRAL DENSITY	24
10.1 OPERATING ENVIRONMENT	24
10.2 TEST SET-UP	24
10.3 TEST EQUIPMENT USED	24
10.4 TEST DATA	25
11. RADIATED EMISSION TEST	27
11.1 OPERATING ENVIRONMENT	27
11.2 TEST SET-UP	27
11.3 TEST EQUIPMENT USED	27
11.4 TEST DATA FOR TRANSMITTING MODE	28
<i>11.4.1 Test data for 30 MHz ~ 1 GHz</i>	<i>28</i>
<i>11.4.2 Test data for Below 30 MHz</i>	<i>29</i>
<i>11.4.3 Test data for above 1 GHz</i>	<i>29</i>
12. CONDUCTED EMISSION TEST	30
12.1 OPERATING ENVIRONMENT	30
12.2 TEST SET-UP	30
12.3 TEST EQUIPMENT USED	30
14.4 TEST DATA FOR TRANSMITTING MODE	31

Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-188-RWD-022	August 16, 2018	Initial Issue	All

1. VERIFICATION OF COMPLIANCE

Applicant : AISOLUTION Co., LTD.
Address : 01194 28-4, Samyang-ro 29-gil, Gangbuk-gu, Seoul, 01194, South Korea
Contact Person : Hyun Su Cho/Assistant Manager
Telephone No. : +82-2-2201-3731
FCC ID : VH9KBLED41
Model Name : KBLED41
Serial Number : N/A
Date : August 16, 2018

EQUIPMENT CLASS	DTS – DIGITAL TRNSMISSION SYSTEM
KIND OF EQUIPMENT	KDC BLE USB Dongle
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2013
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SUBPART C Section 15.247
Modifications on the Equipment to Achieve Compliance	None
Final Test was Conducted On	3 m, Semi Anechoic Chamber

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

2. TEST SUMMARY

2.1 Test items and results

SECTION	TEST ITEMS	RESULTS
15.247 (a) (2)	Minimum 6 dB Bandwidth	Met the Limit / PASS
15.247 (b) (3)	Maximum Peak Conducted Output Power	Met the Limit / PASS
15.247 (d)	100 kHz Bandwidth Outside the Frequency Band	Met the Limit / PASS
15.247 (d)	Radiated Emission which fall in the Restricted Band	Met the Limit / PASS
15.247 (e)	Peak Power Spectral Density	Met the Limit / PASS
15.209	Radiated Emission Limits	Met the Limit / PASS
15.207	Conducted Limits	Met the Limit / PASS
15.203	Antenna Requirement	Met requirement / PASS

2.2 Additions, deviations, exclusions from standards

No additions, deviations or exclusions have been made from standard.

2.3 Related Submittal(s) / Grant(s)

Original submittal only

2.4 Purpose of the test

To determine whether the equipment under test fulfills the requirements of the regulation stated in FCC PART 15 SUBPART C Section 15.247.

2.5 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10: 2013. Radiated testing was performed at a distance of 3 m from EUT to the antenna.

2.6 Test Facility

The Onetech Corp. has been designated to perform equipment testing in compliance with ISO/IEC 17025.

The Electromagnetic compatibility measurement facilities are located at 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea

-. Site Filing:

VCCI (Voluntary Control Council for Interference) – Registration No. R-4112/ C-14617/ G-10666 / T-1842

IC (Industry Canada) – Registration No. Site# 3736A-3

-. Site Accreditation:

KOLAS (Korea Laboratory Accreditation Scheme) - Accreditation NO. KT085

FCC (Federal Communications Commission) - Accreditation No. KR0013

RRA (Radio Research Agency) – Designation No. KR0013

3. GENERAL INFORMATION

3.1 Product Description

The AISOLUTION Co., LTD., Model KBLED41 (referred to as the EUT in this report) is a KDC BLE USB Dongle. The product specification described herein was obtained from product data sheet or user's manual.

Device Type	KDC BLE USB Dongle
Operating Frequency	2 402 MHz ~ 2 480 MHz
RF Output Power	-1.88 dBm
Number of Channel	40 Channels
Modulation Type	GFSK(Bluetooth LE)
Antenna Type	Chip Antenna
Antenna Gain	4.08 dBi
List of each Osc. or crystal Freq.(Freq. >= 1 MHz)	16 MHz
Rated Supply Voltage	DC 3.3 V

3.2 Alternative type(s)/model(s); also covered by this test report.

-. None

4. EUT MODIFICATIONS

-. None

5. SYSTEM TEST CONFIGURATION

5.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
Main Board	N/A	N/A	-

5.2 Peripheral equipment

Model	Manufacturer	Description	Connected to
EUT	AISOLUTION Co., LTD.	EUT	Notebook PC
G6-1121TV	HP	Notebook PC	EUT, AC/DC Adapter
PPP009C	HP	AC/DC Adapter	Notebook PC

5.3 Mode of operation during the test

For the testing, software used to control the EUT for staying in continuous transmitting is programmed.

For final testing, the EUT was set at 2 402 MHz, 2 440 MHz, and 2 480 MHz to get a maximum emission levels from the EUT. The EUT was moved throughout the XY, XZ, and YZ planes and the worst case is “XY” axis, but the worst data was recorded in this report.

5.4 Configuration of Test System

Radiated Emission Test: Preliminary radiated emissions test were conducted using the procedure in ANSI C63.10: 2013 to determine the worse operating conditions. Final radiated emission tests were conducted at 3 meter Semi Anechoic Chamber.

The turntable was rotated through 360 degrees and the EUT was tested by positioned three orthogonal planes to obtain the highest reading on the field strength meter. Once maximum reading was determined, the search antenna was raised and lowered in both vertical and horizontal polarization.

Line Conducted Test: The EUT was tested in a charging mode and transmitting mode. The EUT was connected to a laptop. All supporting equipments were connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.10: 2013 to determine the worse operating conditions

5.5 Antenna Requirement

For intentional device, according to section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna Construction:

The antenna of the EUT is a Chip Antenna on the main board in the EUT, so no consideration of replacement by the user.

6. PRELIMINARY TEST

6.1 AC Power line Conducted Emissions Tests

During Preliminary Tests, the following operating modes were investigated

Operation Mode	The Worse operating condition (Please check one only)
Transmitting Mode	X

6.2 General Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated

Operation Mode	The Worse operating condition (Please check one only)
Transmitting Mode	X

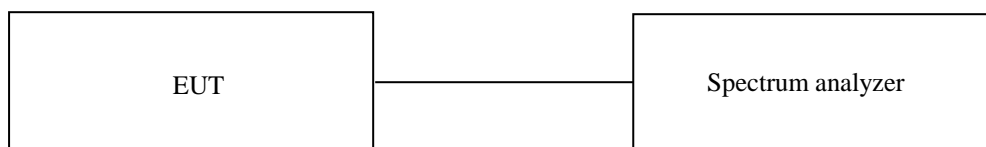
7. MINIMUM 6 dB BANDWIDTH

7.1 Operating environment

Temperature : 24 °C
Relative humidity : 44 % R.H.

7.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz, and peak detection was used. The 6 dB bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 6 dB.



7.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	FSV30	Rohde & Schwarz	Signal Analyzer	101199	Mar.14, 2018 (1Y)

All test equipment used is calibrated on a regular basis.

7.4 Test data

-. Test Date : July 23, 2018

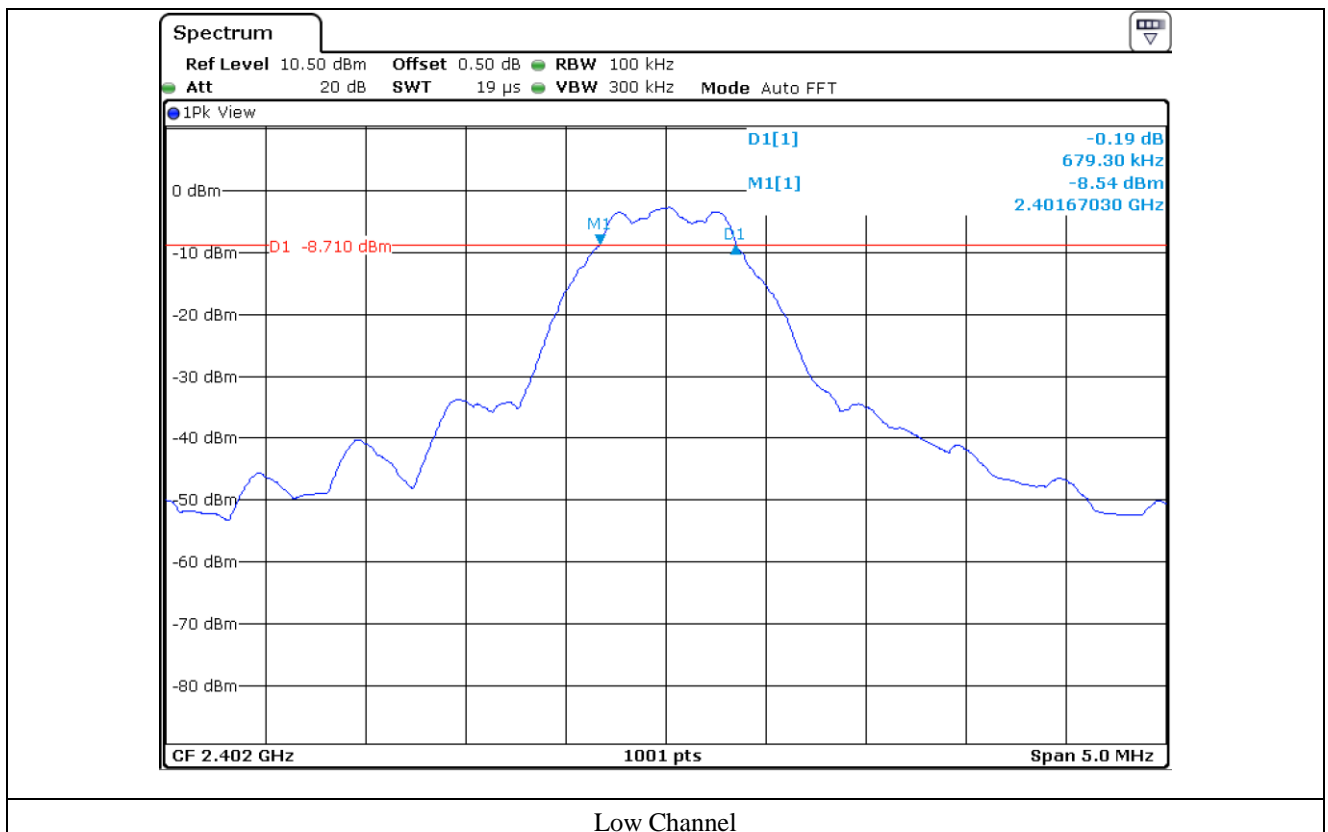
-. Test Result : Pass

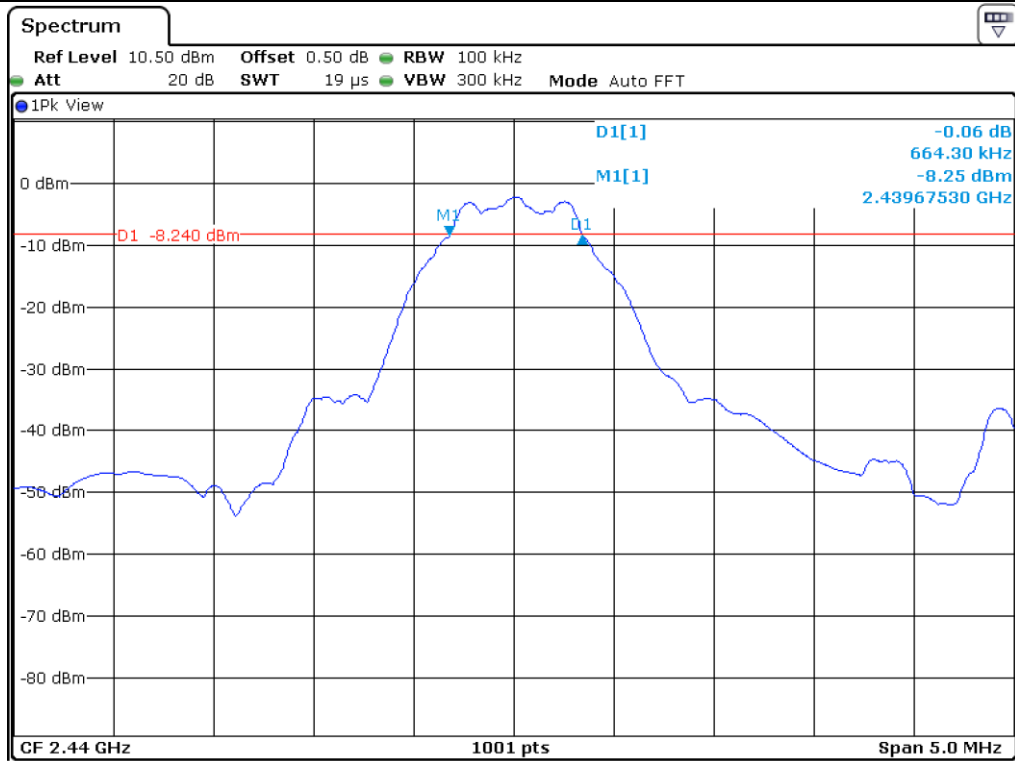
CHANNEL	FREQUENCY(MHz)	MEASURED VALUE (kHz)	LIMIT (kHz)	MARGIN (kHz)
Low	2 402.00	679.30	500	179.30
Middle	2 440.00	664.30	500	164.30
High	2 480.00	684.30	500	184.30

Remark. Margin = Measured Value - Limit

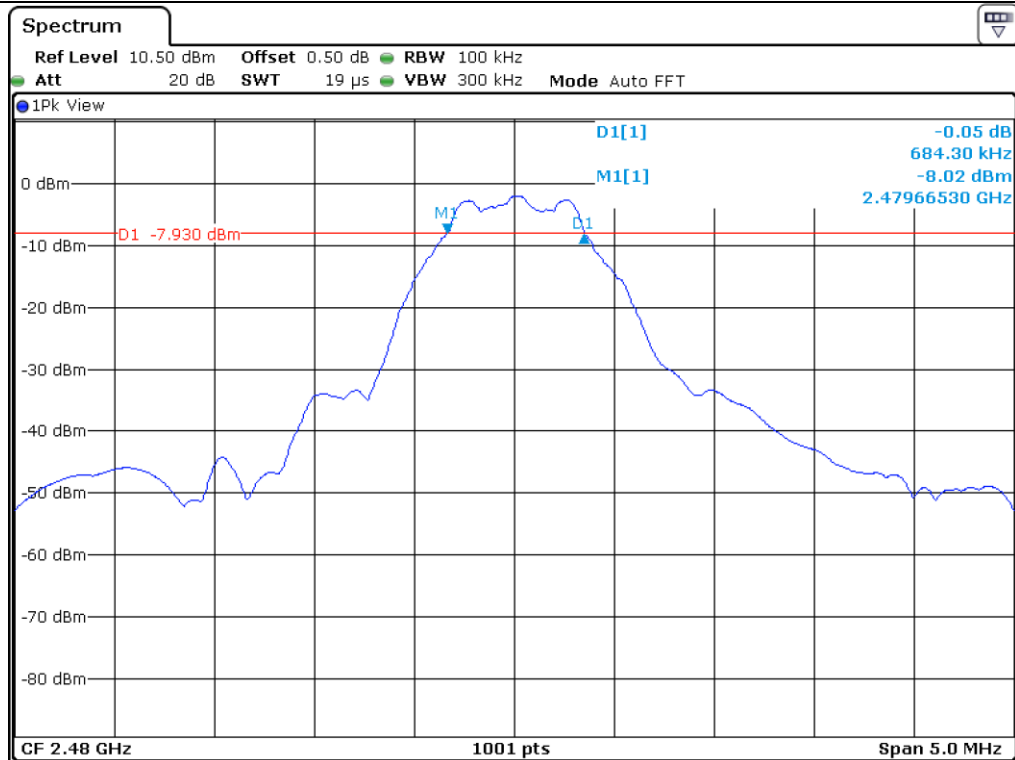


Tested by: Min-Gu Ji / Assistant Manager





Middle Channel



High Channel

8. MAXIMUM PEAK OUTPUT POWER

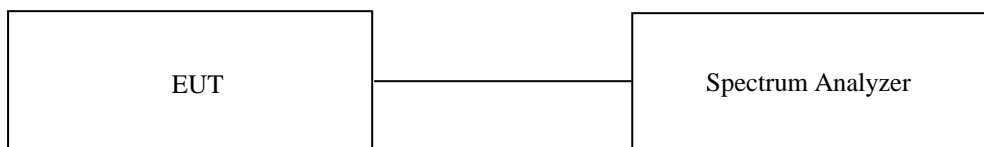
8.1 Operating environment

Temperature : 24 °C
Relative humidity : 44 % R.H.

8.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer.

The resolution bandwidth is set to \geq DTS Bandwidth, the video bandwidth is set to 3 times the resolution bandwidth.



8.3 Test equipment used

Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ - FSV30	Rohde & Schwarz	Signal Analyzer	101199	Mar.14, 2018 (1Y)

All test equipment used is calibrated on a regular basis.

8.4 Test data

-. Test Date : July 25, 2018

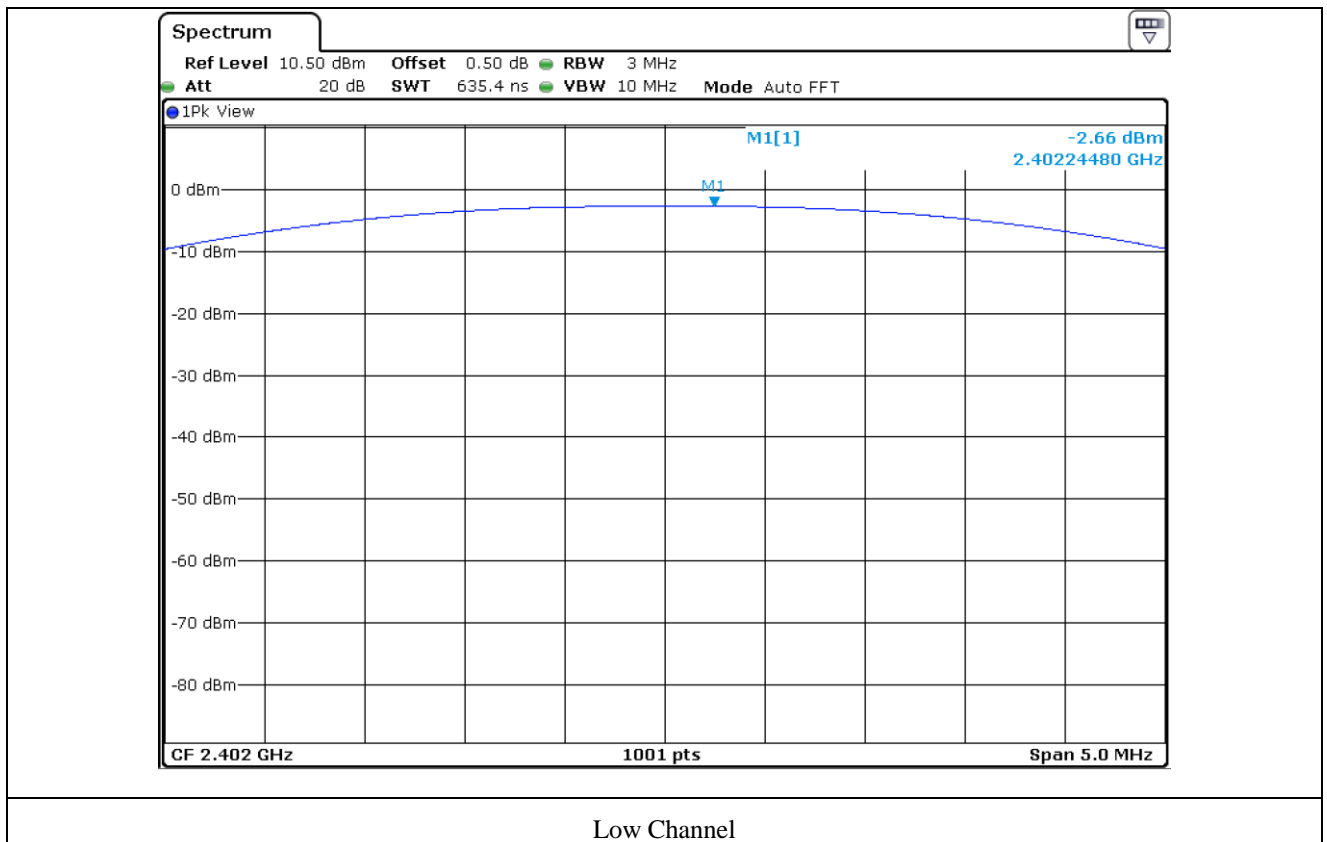
-. Test Result : Pass

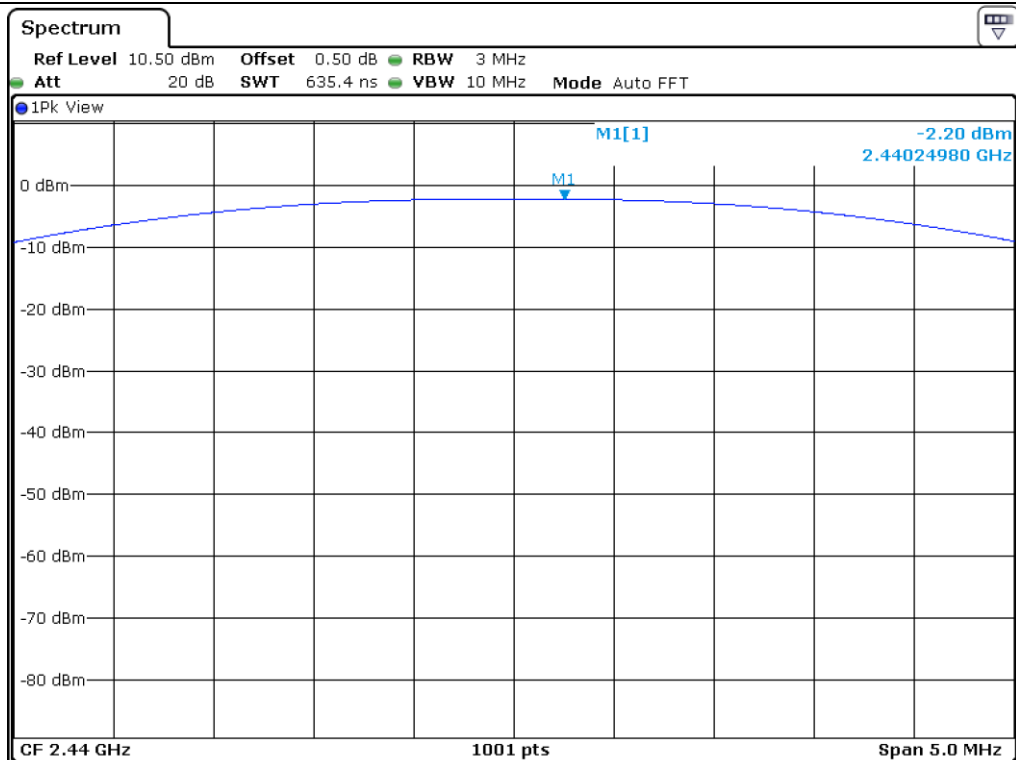
CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 402.00	-2.66	30.00	32.66
MIDDLE	2 440.00	-2.20	30.00	32.20
HIGH	2 480.00	-1.88	30.00	31.88

Remark. Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)

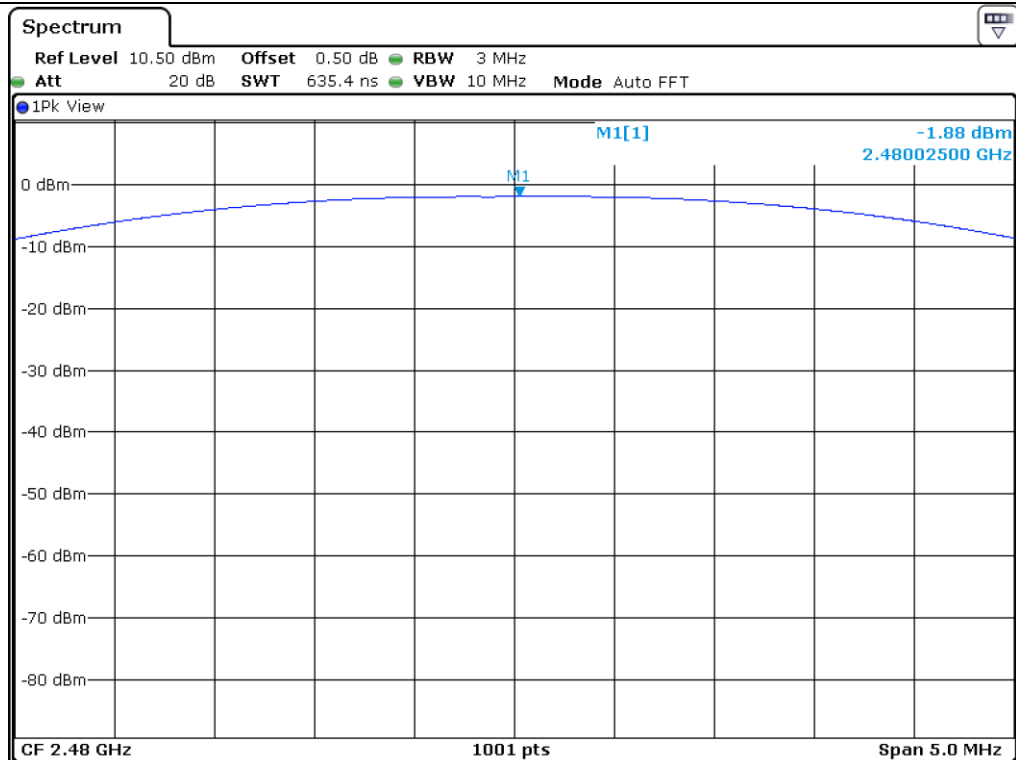


Tested by: Min-Gu Ji / Assistant Manager





Middle Channel



High Channel

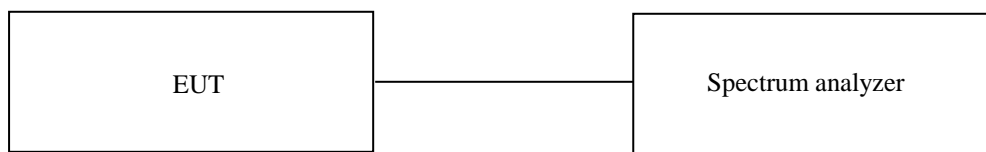
9. 100 kHz BANDWIDTH OUTSIDE THE FREQUENCY BAND

9.1 Operating environment

Temperature : 24 °C
Relative humidity : 44 % R.H.

9.2 Test set-up for conducted measurement

The antenna output of the EUT was connected to the spectrum analyzer. The resolution and video bandwidth is set to 100 kHz, and peak detection was used.



9.3 Test set-up for radiated measurement

The radiated emissions measurements were performed on the 3 m semi anechoic chamber. The EUT was placed on turntable approximately 1.5 m above the ground plane.

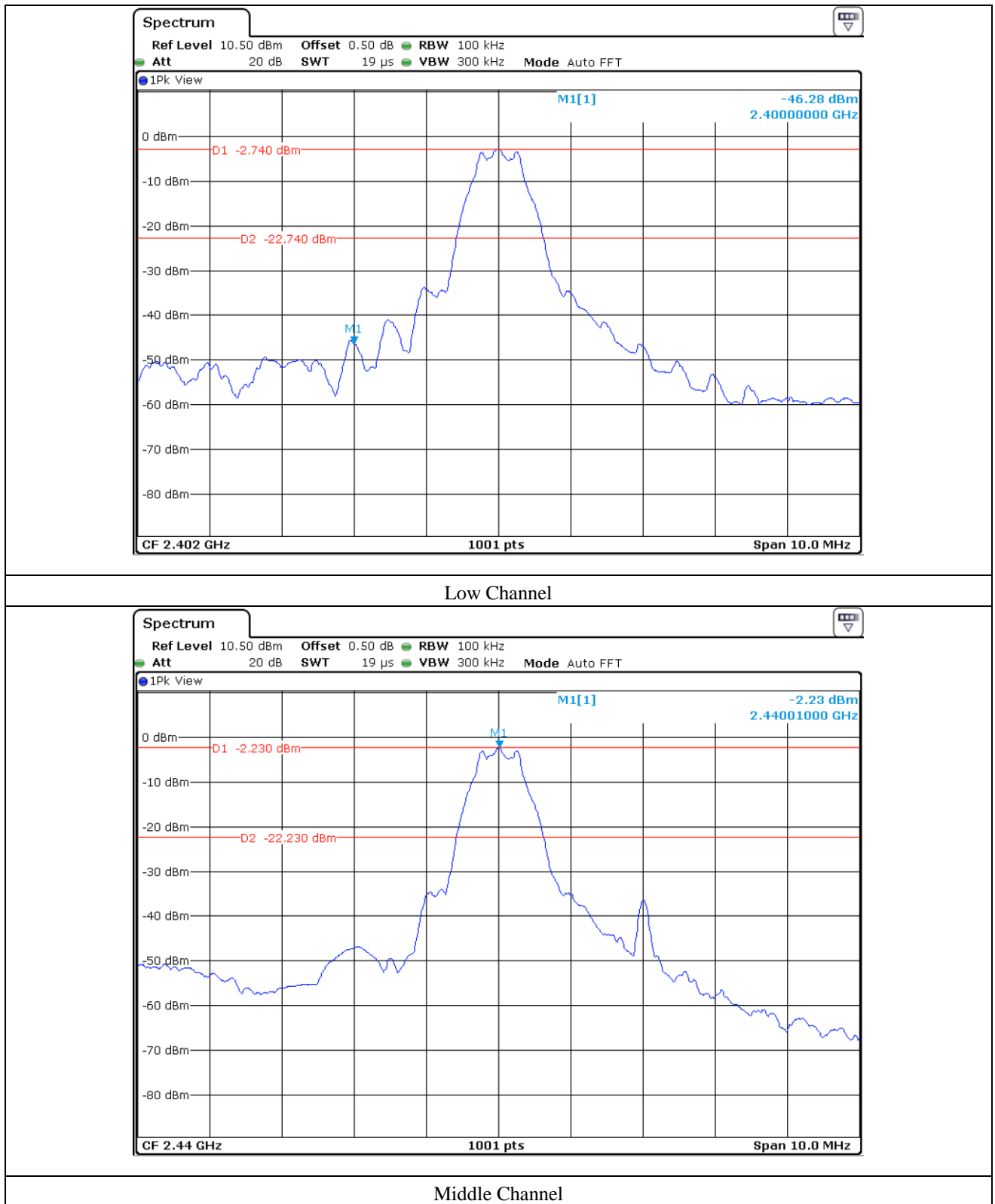
The frequency spectrum from 30 MHz to 26.5 GHz was scanned and maximum emission levels at each frequency recorded. The system was rotated 360°, and the antenna was varied in the height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for horizontal and vertical polarization of the receiving antenna.

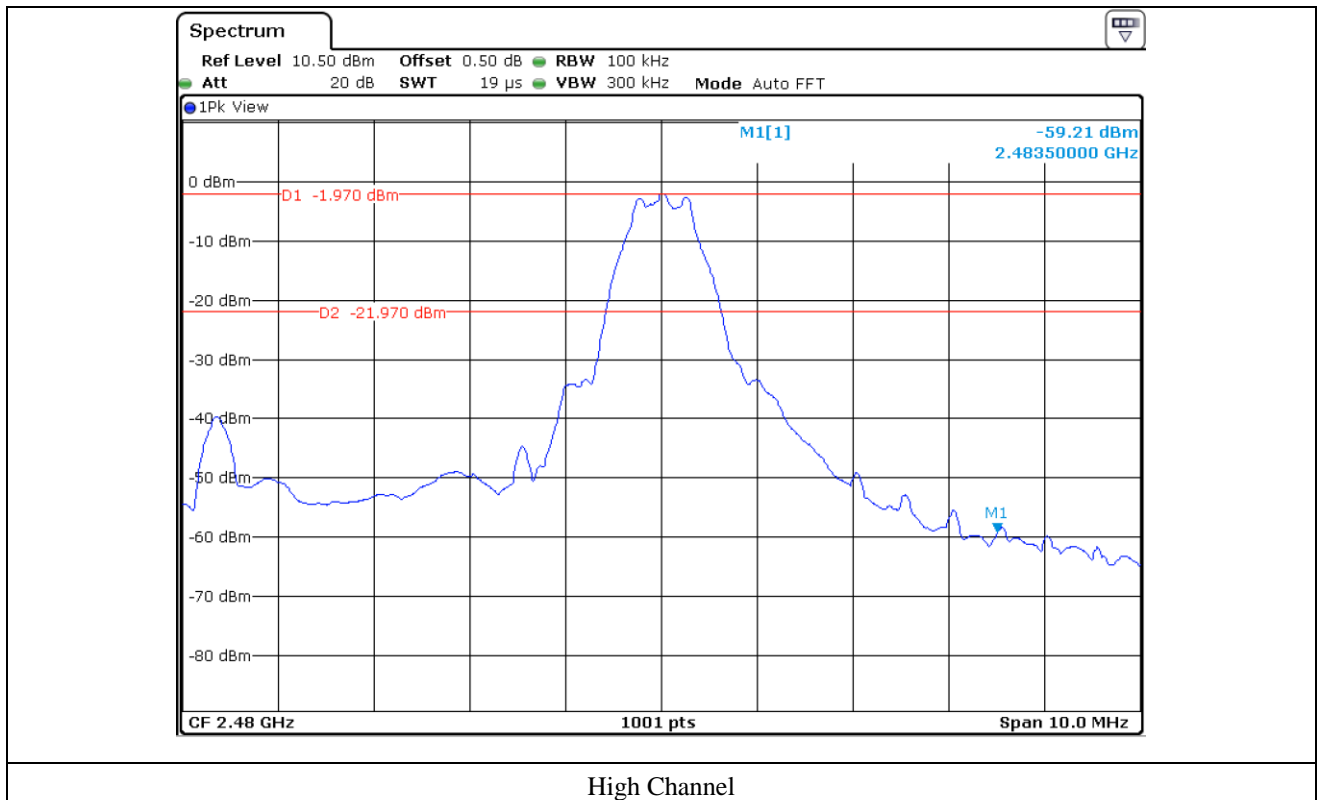
9.4 Test equipment used

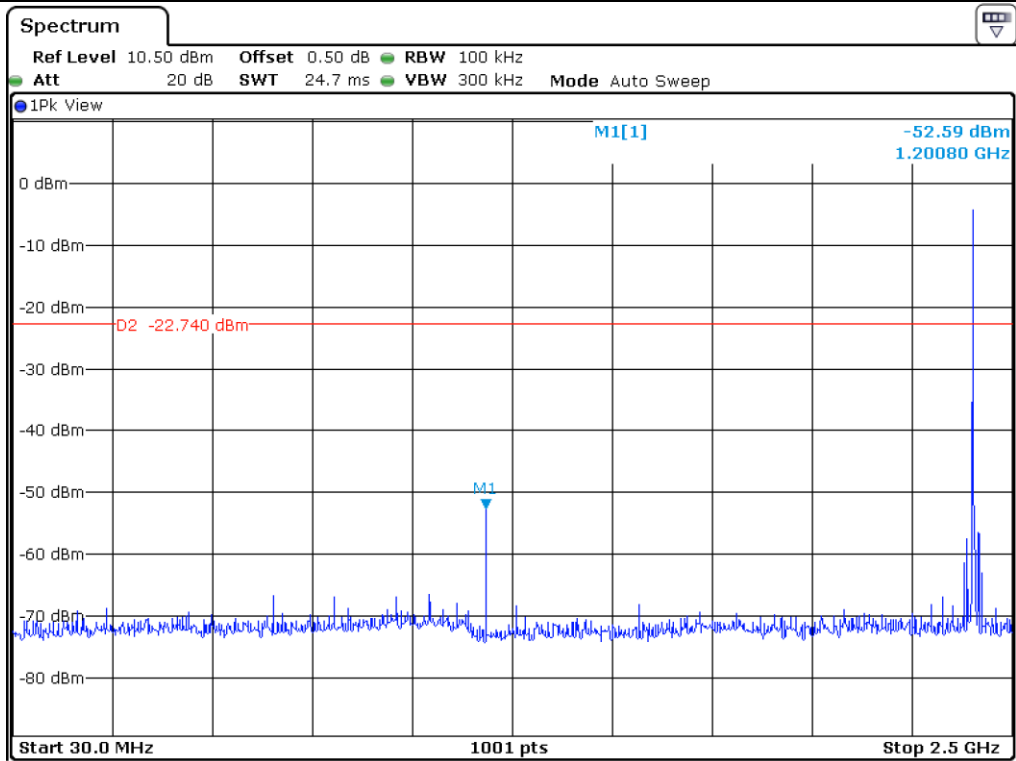
	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ -	ESR	Rohde & Schwarz	EMI Test Receiver	101470	Oct. 27, 2017 (1Y)
■ -	310N	Sonoma Instrument	AMPLIFIER	312544	Mar. 28, 2018 (1Y)
■ -	FSV30	Rohde & Schwarz	Signal Analyzer	101199	Mar. 14, 2018 (1Y)
■ -	BBV 9718 B	Schwarzbeck	Broadband Preamplifier	009	Mar. 16, 2018 (1Y)
■ -	MA-4000XPET	Innco Systems GmbH	Antenna Master	MA4000/509	N/A
□ -	HD100	HD GmbH	Position Controller	N/A	N/A
■ -	DT3000-3t	Innco Systems GmbH	Turn Table	N/A	N/A
■ -	VULB9163	Schwarzbeck	TRILOG Broadband Antenna	9163-255	Jun. 05, 2018 (2Y)
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D295	Aug. 16, 2017 (2Y)
■ -	BBHA9170	Schwarzbeck	Horn Antenna	BBHA91700179	Jul. 28, 2017 (2Y)
■ -	BBV 9718 B	Schwarzbeck	Broadband Preamplifier	009	Mar. 16, 2018 (1Y)

All test equipment used is calibrated on a regular basis.

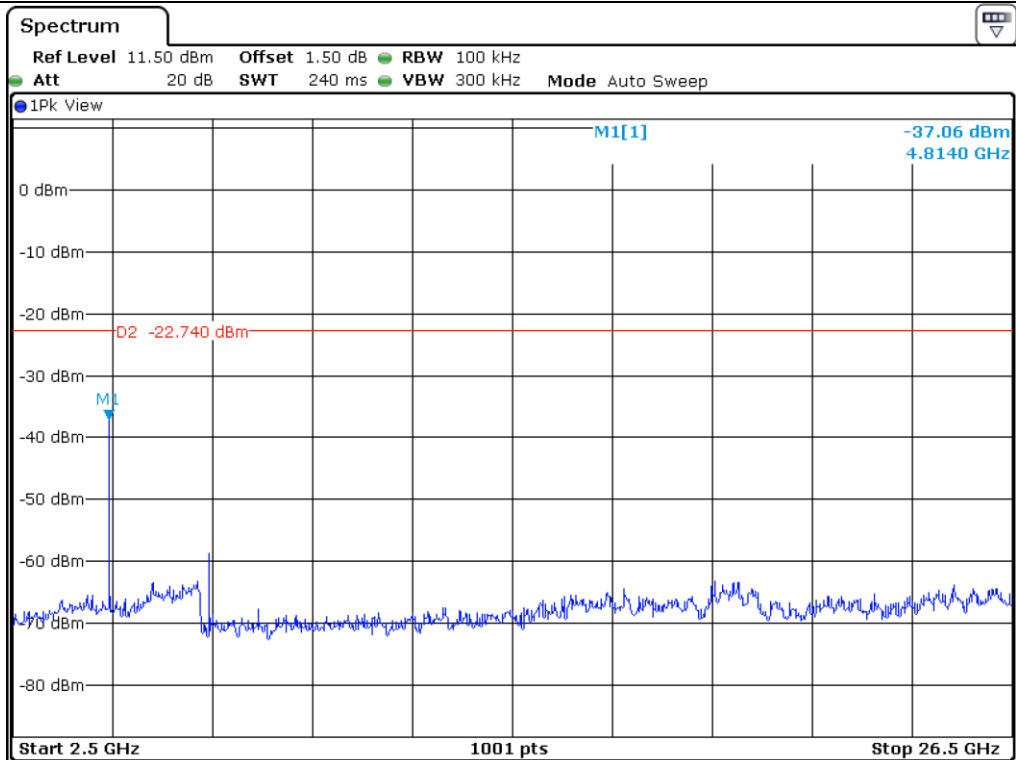
9.5 Test data for conducted emission



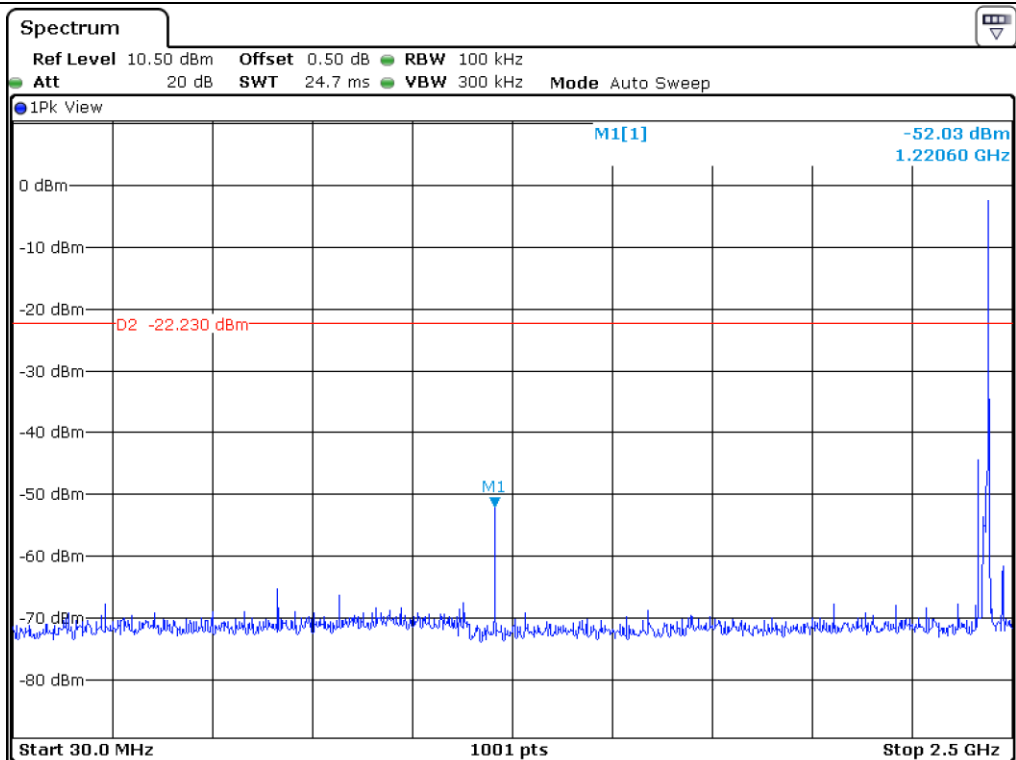




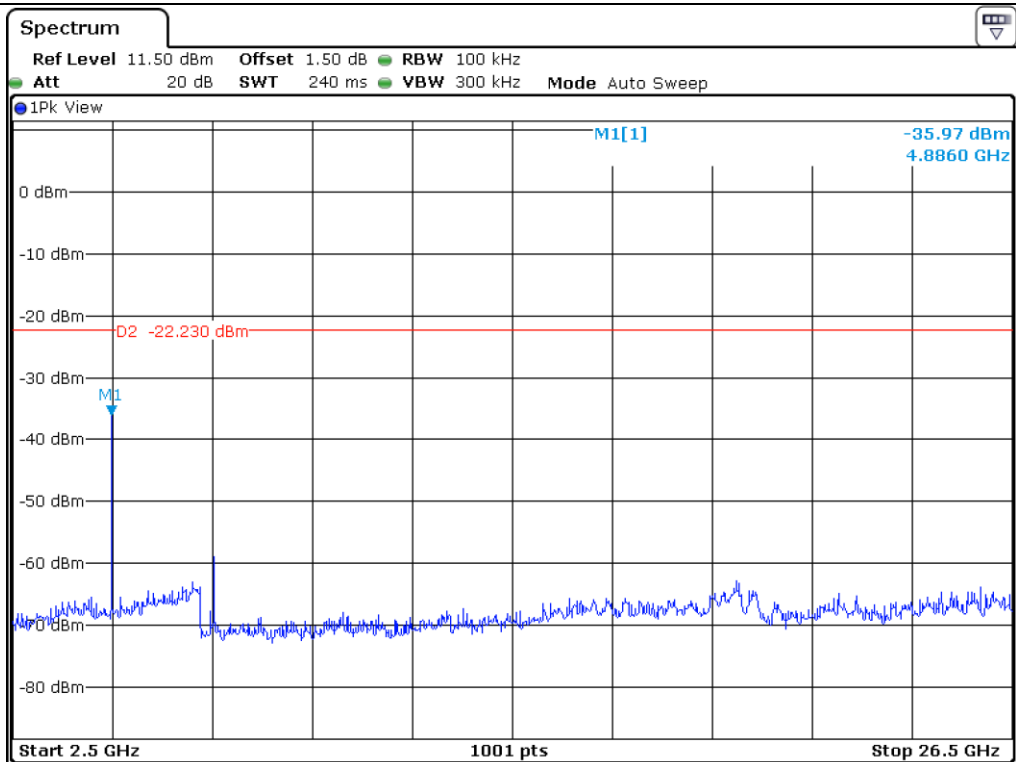
Low Channel



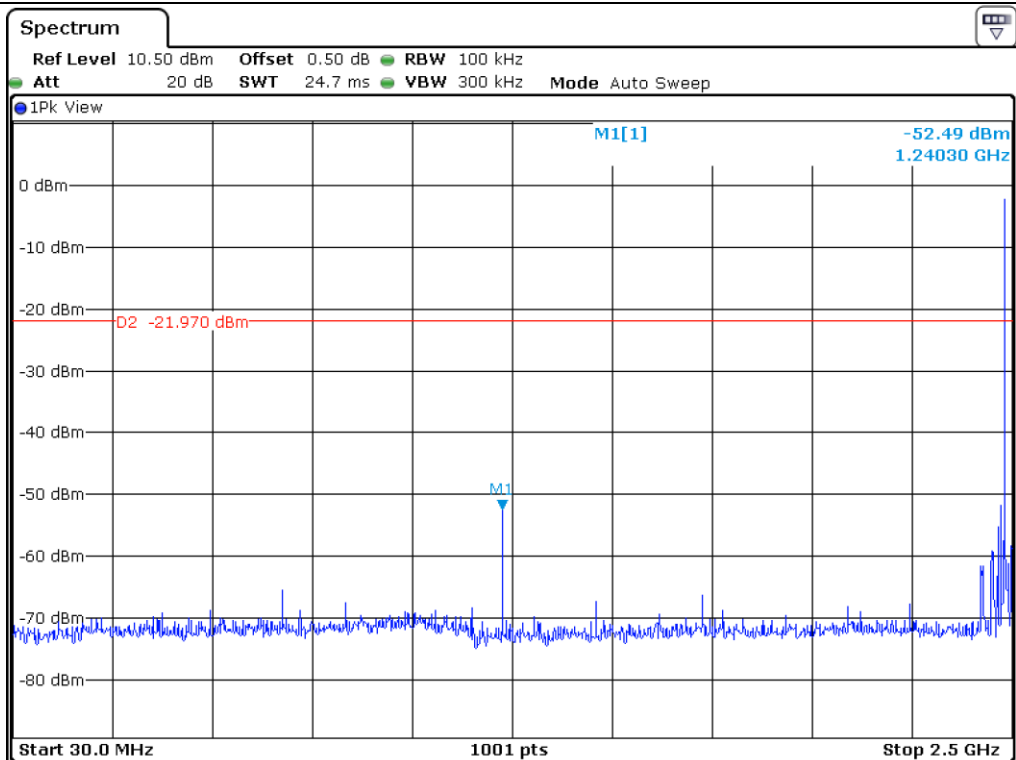
Low Channel



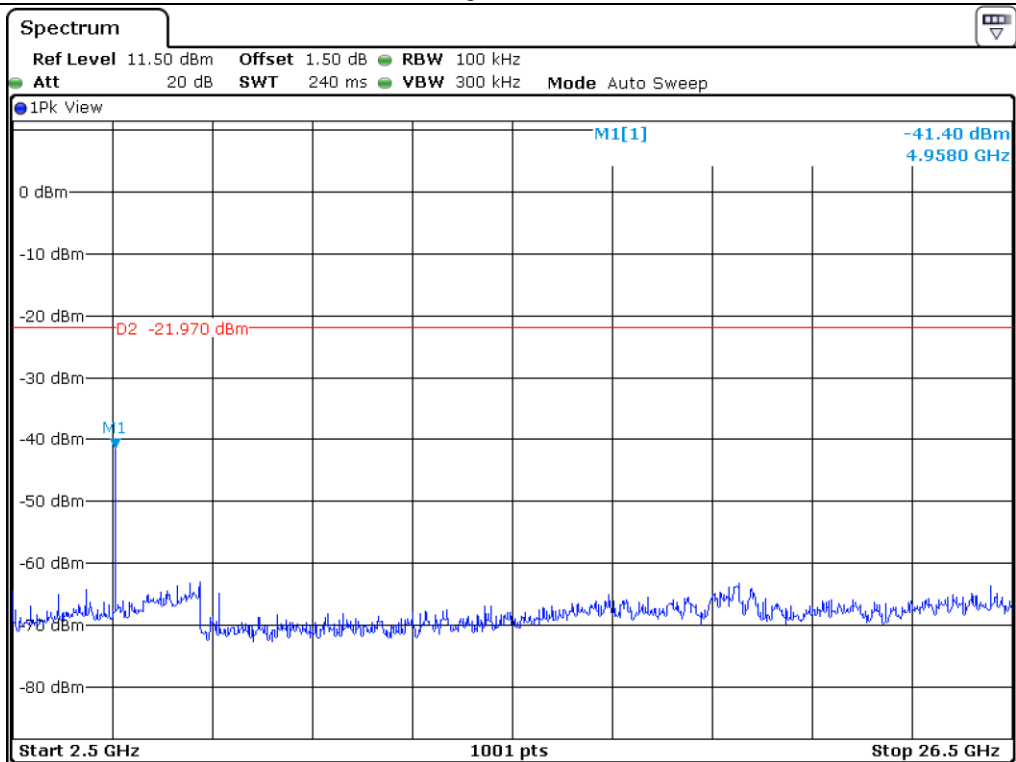
Middle Channel



Middle Channel



High Channel



High Channel

9.6 Test data for radiated emission

9.6.1 Radiated Emission which fall in the Restricted Band

- . Test Date : July 23, 2018
- . Resolution bandwidth : 1 MHz for Peak and Average Mode
- . Video bandwidth : 3 MHz for Peak and Average Mode
- . Detector : Peak Mode(Peak), Average Mode(RMS)
- . Measurement distance : 3 m
- . Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
2368.06	40.34	Peak	H	27.60	11.40	33.52	45.82	74.00	28.18
2366.86	21.30	Average	H				26.78	54.00	27.22
2312.27	42.16	Peak	V				47.64	74.00	26.36
2370.93	21.51	Average	V				26.99	54.00	27.01
Test Data for High Channel									
2488.98	55.49	Peak	H	27.80	11.40	33.63	61.06	74.00	12.94
2483.62	22.32	Average	H				27.89	54.00	26.11
2489.11	48.44	Peak	V				54.01	74.00	19.99
2488.51	21.19	Average	V				26.76	54.00	27.24

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



Tested by: Min-Gu Ji / Assistant Manager

9.6.2 Spurious & Harmonic Radiated Emission

- Test Date : July 23, 2018
- Resolution bandwidth : 1 MHz for Peak and Average Mode
- Video bandwidth : 3 MHz for Peak and Average Mode
- Detector : Peak Mode(Peak), Average Mode(RMS)
- Frequency range : 1 GHz ~ 26.5 GHz
- Measurement distance : 3 m
- Result : PASSED

Frequency (GHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
4 804.00	41.16	Peak	H	31.00	16.10	32.90	55.36	74.00	18.64
	30.26	Average	H				44.46	54.00	9.54
	34.50	Peak	V				48.70	74.00	25.30
	23.28	Average	V				37.48	54.00	16.52
Test Data for Middle Channel									
4 880.00	40.26	Peak	H	31.10	16.10	33.00	54.46	74.00	19.54
	28.71	Average	H				42.91	54.00	11.09
	37.17	Peak	V				51.37	74.00	22.63
	25.06	Average	V				39.26	54.00	14.74
Test Data for High Channel									
4 960.00	38.48	Peak	H	31.20	16.10	33.10	52.68	74.00	21.32
	29.65	Average	H				43.85	54.00	10.15
	31.49	Peak	V				45.69	74.00	28.31
	18.95	Average	V				33.15	54.00	20.85

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical

Margin (dB) = Limits (dBμV/m) - Total Level (dBμV/m)

Total Level = Reading + Antenna Factor + Cable Loss – Pre-Amplifier Gain



Tested by: Min-Gu Ji / Assistant Manager

10. PEAK POWER SPECTRAL DENSITY

10.1 Operating environment

Temperature : 24 °C
Relative humidity : 44 % R.H.

10.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer.

The resolution bandwidth is set to $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$, the video bandwidth is set to 3 times the resolution bandwidth.



10.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	FSV30	Rohde & Schwarz	Signal Analyzer	101199	Mar.14, 2018 (1Y)

All test equipment used is calibrated on a regular basis.

10.4 Test data

-. Test Date : July 23, 2018

-. Test Result : Pass

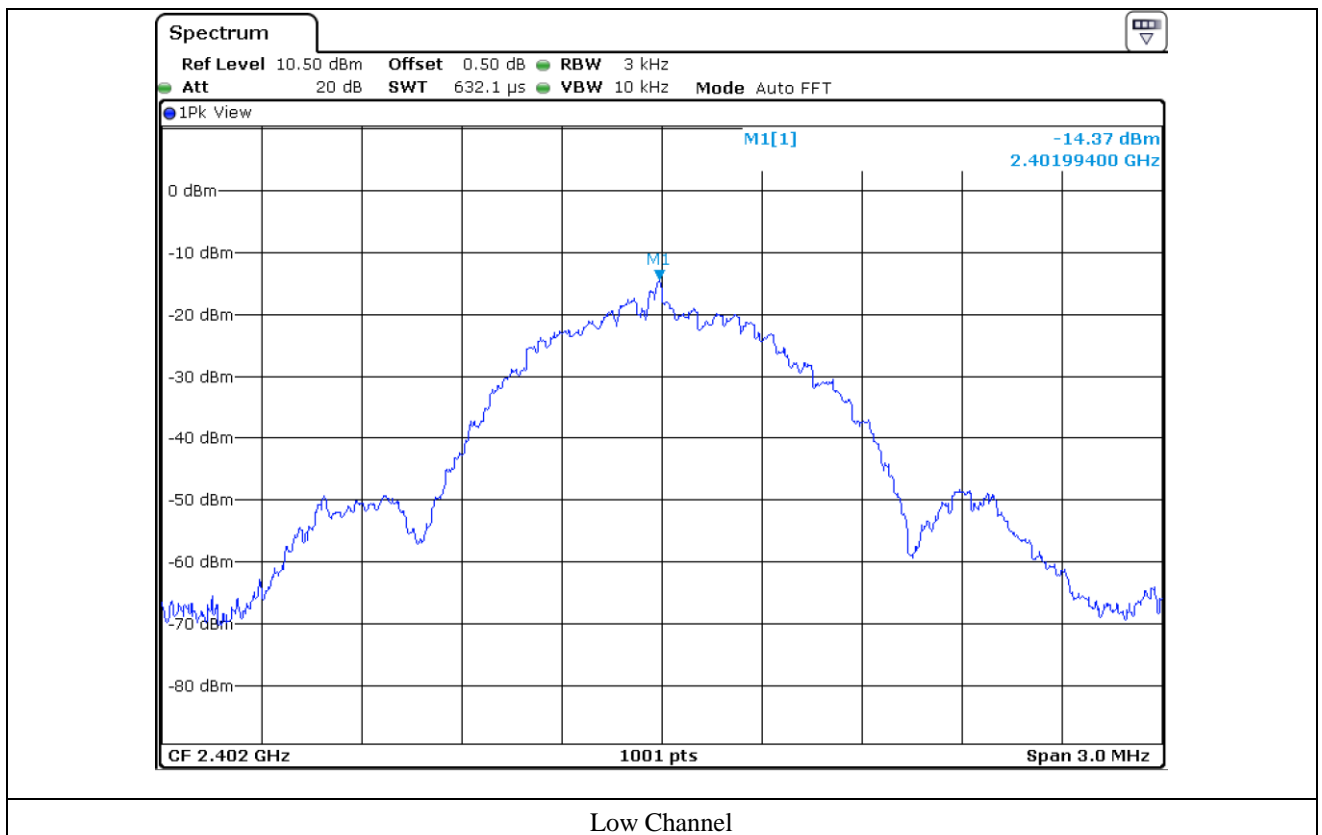
-. Operating Condition : Continuous transmitting mode

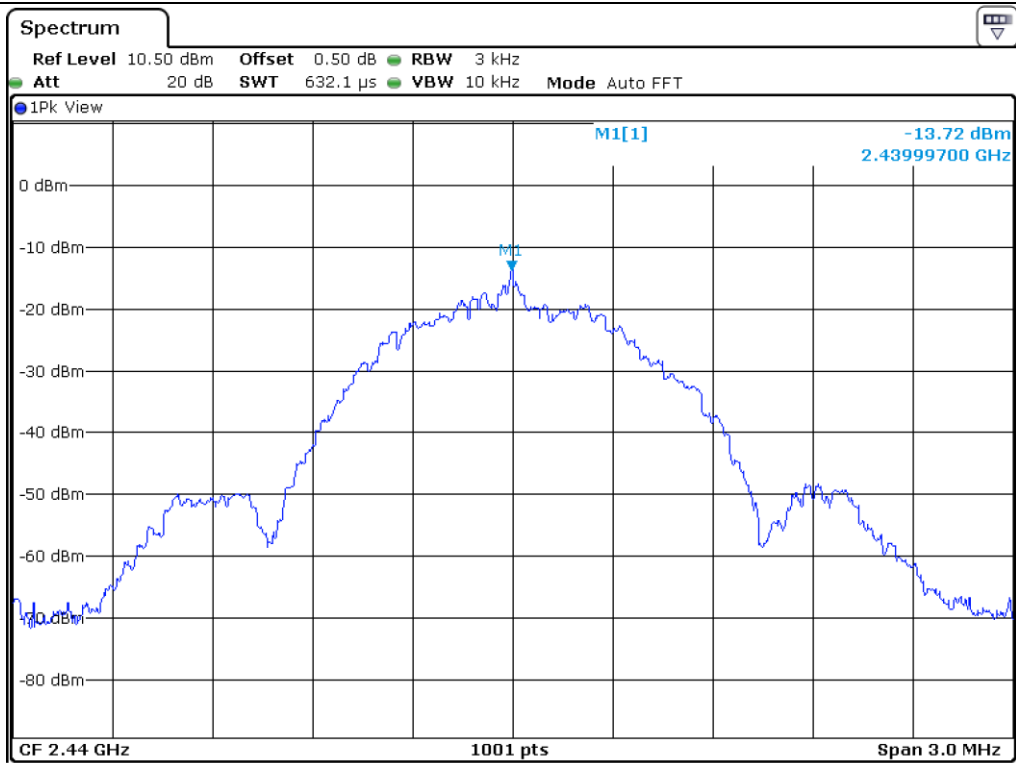
CHANNEL	FREQUENCY(MHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 402.00	-14.37	8.00	22.37
Middle	2 440.00	-13.72	8.00	21.72
High	2 480.00	-14.36	8.00	22.36

Remark. Margin = Limit – Measured value

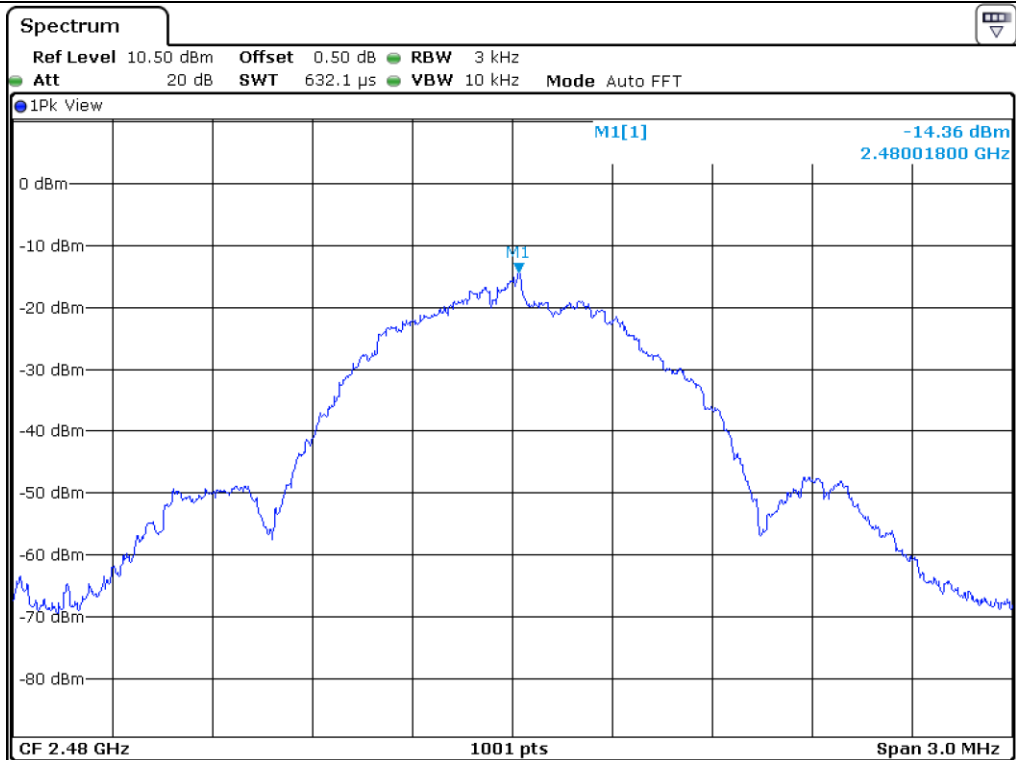


Tested by: Min-Gu Ji / Assistant Manager





Middle Channel



High Channel

11. RADIATED EMISSION TEST

11.1 Operating environment

Temperature : 24 °C
Relative humidity : 44 % R.H.

11.2 Test set-up

The radiated emissions measurements were on the 3 m semi anechoic chamber. The EUT and other support equipment were placed on a non-conductive turntable above the ground plane. The interconnecting cables from outside test site were inserted into ferrite clamps at the point where the cables reach the turntable.

The frequency spectrum from 30 MHz to 26.5 GHz was scanned and emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

11.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ -	ESR	Rohde & Schwarz	EMI Test Receiver	101470	Oct. 27, 2017 (1Y)
■ -	310N	Sonoma Instrument	AMPLIFIER	312544	Mar. 28, 2018 (1Y)
■ -	FSV30	Rohde & Schwarz	Signal Analyzer	101199	Mar. 14, 2018 (1Y)
■ -	BBV 9718 B	Schwarzbeck	Broadband Preamplifier	009	Mar. 16, 2018 (1Y)
■ -	MA-4000XPET	Innco Systems GmbH	Antenna Master	MA4000/509	N/A
□ -	HD100	HD GmbH	Position Controller	N/A	N/A
■ -	DT3000-3t	Innco Systems GmbH	Turn Table	N/A	N/A
■ -	VULB9163	Schwarzbeck	TRILOG Broadband Antenna	9163-255	Jun. 05, 2018 (2Y)
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D295	Aug. 16, 2017 (2Y)
■ -	BBHA9170	Schwarzbeck	Horn Antenna	BBHA91700179	Jul. 28, 2017 (2Y)

All test equipment used is calibrated on a regular basis.

11.4 Test data for Transmitting Mode

11.4.1 Test data for 30 MHz ~ 1 GHz

Humidity Level : 44 % R.H.

Temperature: 24 °C

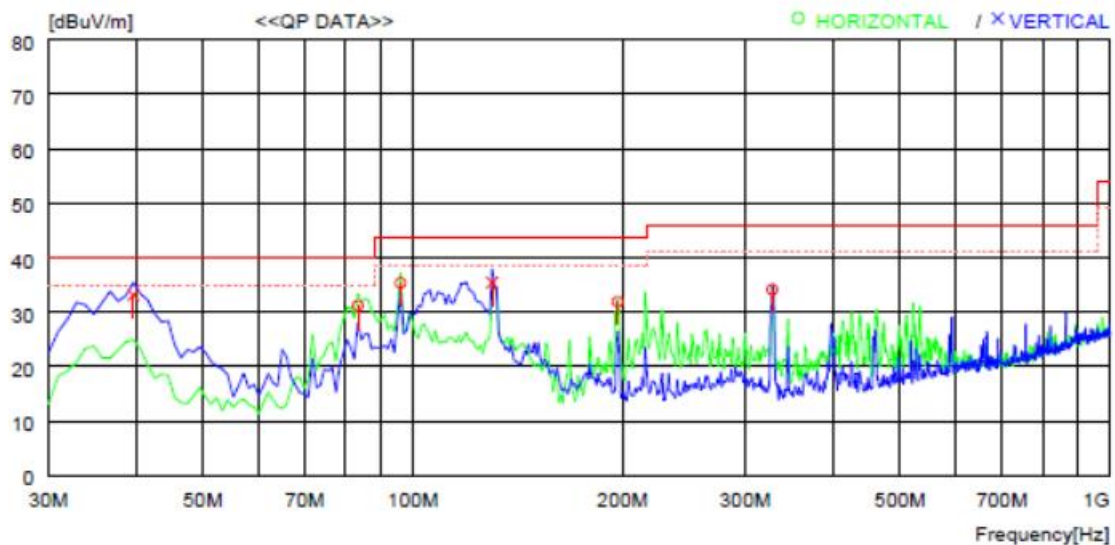
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.247

Result : PASSED

EUT : KDC BLE USB Dongle

Date: July 23, 2018

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)



No.	FREQ	READING	ANT	LOSS	GAIN	RESULT	LIMIT	MARGIN	ANTENNA	TABLE
	[MHz]	QP	FACTOR							
	[MHz]	[dBuV]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[cm]	[DEG]
---- Horizontal ----										
1	83.350	53.2	8.8	2.1	33.0	31.1	40.0	8.9	200	0
2	95.980	54.1	12.0	2.2	33.0	35.3	43.5	8.2	300	170
3	196.840	50.8	10.8	3.3	33.0	31.9	43.5	11.6	200	0
4	327.790	48.7	14.2	4.2	33.0	34.1	46.0	11.9	100	359
---- Vertical ----										
5	39.700	50.6	14.1	1.5	33.1	33.1	40.0	6.9	100	250
6	129.910	56.7	9.1	2.6	33.0	35.4	43.5	8.1	100	0



Tested by: Min-Gu Ji / Assistant Manager

11.4.2 Test data for Below 30 MHz

- Test Date : July 23, 2018
- Resolution bandwidth : 200 Hz (from 9 kHz to 0.15 MHz), 9 kHz (from 0.15 MHz to 30 MHz)
- Frequency range : 9 kHz ~ 30 MHz
- Measurement distance : 3 m
- Operating mode : Transmitting mode

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
Any emissions less than 20 dB below the limit were not observed.									

11.4.3 Test data for above 1 GHz

- Test Date : July 23, 2018
- Resolution bandwidth : 1 MHz for Peak and Average Mode
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 1 GHz ~ 26.5 GHz
- Measurement distance : 3 m
- Operating mode : Transmitting mode

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
Any emissions less than 20 dB below the limit were not observed.									



Tested by: Min-Gu Ji / Assistant Manager

12. CONDUCTED EMISSION TEST

12.1 Operating environment

Temperature : 23 °C
Relative humidity : 45 % R.H

12.2 Test set-up

The EUT was placed on a wooden table, 0.8 m height above the floor. Power was fed to the EUT through a 50 Ω / 50 μ H + 5 Ω Artificial Mains Network (AMN). The ground plane was electrically bonded to the reference ground system and all power lines were filtered from ambient.

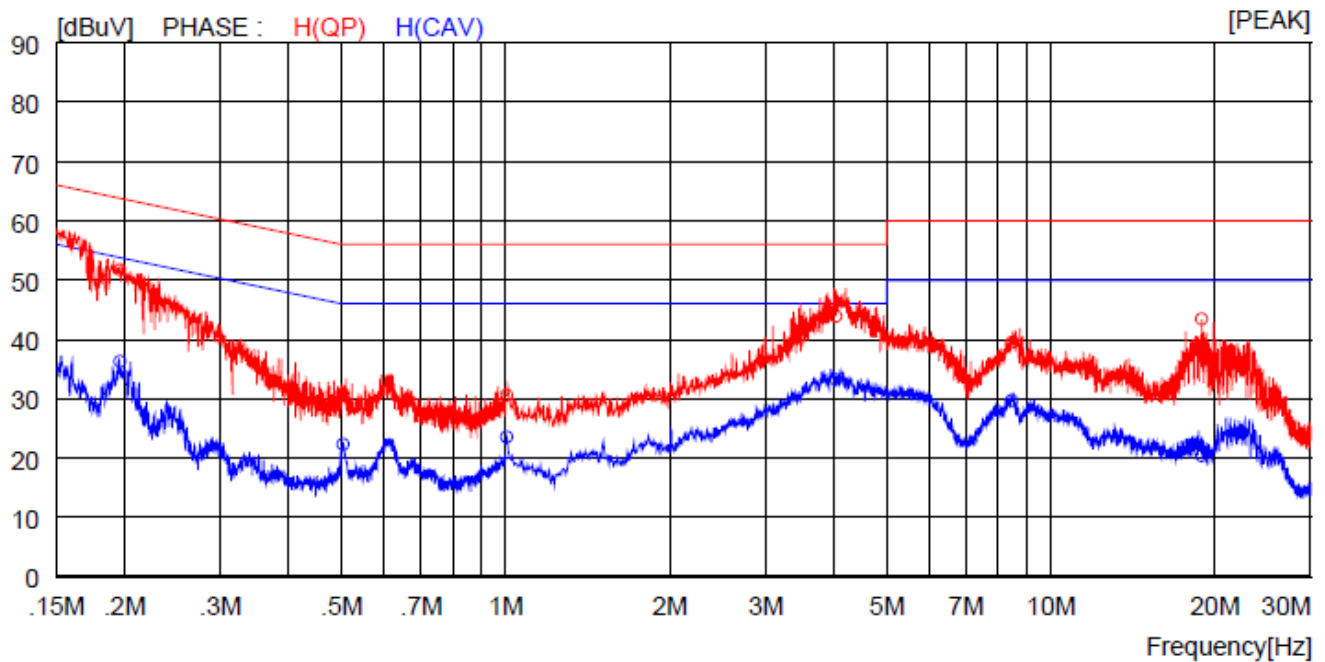
12.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ -	ESCI	Rohde & Schwarz	EMI Test Receiver	101012	Oct. 27, 2017 (1Y)
■ -	NSLK8128	Schwarzbeck	AMN	8128-216	Mar. 28, 2018 (1Y)
□ -	3825/2	EMCO	AMN	9109-1869	Apr. 11, 2018 (1Y)

All test equipment used is calibrated on a regular basis.

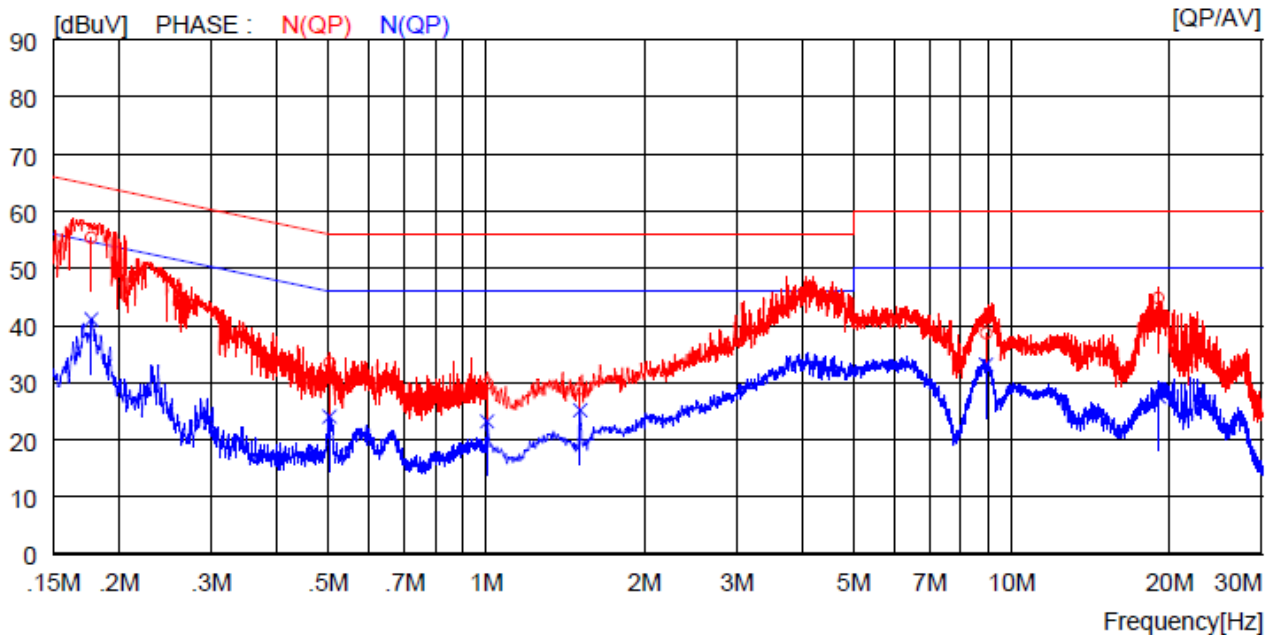
14.4 Test data for Transmitting Mode

-. Test Date : July 27, 2018
 -. Resolution bandwidth : 9 kHz
 -. Frequency range : 0.15 MHz ~ 30 MHz
 -. Tested Line : HOT LINE



NO	FREQ [MHz]	READING (PK) [dBuV]	C.F [dB]	RESULT [dBuV]	LIMIT		MARGIN		PHASE	COMMENT
					QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
1	0.19600	41.8	9.9	51.7	63.8	53.8	12.1	2.1	H (QP)	
2	0.50400	20.8	10.0	30.8	56.0	46.0	25.2	15.2	H (QP)	
3	1.00400	20.6	10.0	30.6	56.0	46.0	25.4	15.4	H (QP)	
4	4.03600	33.7	10.2	43.9	56.0	46.0	12.1	2.1	H (QP)	
5	8.49500	29.2	10.2	39.4	60.0	50.0	20.6	10.6	H (QP)	
6	18.95000	33.0	10.4	43.4	60.0	50.0	16.6	6.6	H (QP)	
7	0.19600	26.3	10.0	36.3	63.8	53.8	27.5	17.5	H (CAV)	
8	0.50400	12.3	10.0	22.3	56.0	46.0	33.7	23.7	H (CAV)	
9	1.00400	13.5	10.0	23.5	56.0	46.0	32.5	22.5	H (CAV)	
10	4.03600	23.1	10.1	33.2	56.0	46.0	22.8	12.8	H (CAV)	
11	8.49500	19.5	10.2	29.7	60.0	50.0	30.3	20.3	H (CAV)	
12	18.95000	9.9	10.4	20.3	60.0	50.0	39.7	29.7	H (CAV)	

-. Tested Line : NEUTRAL LINE



NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.17700	45.5	----	9.9	55.4	----	64.6	----	9.2	----	N(QP)
2	0.50300	23.4	----	10.0	33.4	----	56.0	----	22.6	----	N(QP)
3	1.00400	19.8	----	10.0	29.8	----	56.0	----	26.2	----	N(QP)
4	1.50800	18.9	----	10.0	28.9	----	56.0	----	27.1	----	N(QP)
5	8.96000	28.5	----	10.2	38.7	----	60.0	----	21.3	----	N(QP)
6	19.06000	34.4	----	10.4	44.8	----	60.0	----	15.2	----	N(QP)
7	0.17700	----	31.2	9.9	----	41.1	----	54.6	----	13.5	N(CAV)
8	0.50300	----	14.0	10.0	----	24.0	----	46.0	----	22.0	N(CAV)
9	1.00400	----	13.2	10.0	----	23.2	----	46.0	----	22.8	N(CAV)
10	1.50800	----	15.2	10.0	----	25.2	----	46.0	----	20.8	N(CAV)
11	8.96000	----	22.9	10.2	----	33.1	----	50.0	----	16.9	N(CAV)
12	19.06000	----	17.2	10.4	----	27.6	----	50.0	----	22.4	N(CAV)

Remark: Margin (dB) = Limit – Level (Result)

The emission level in above table is included the transducer factor that means insertion loss (LISN), cable loss and attenuator.

Handwritten signature

Tested by: Min-Gu Ji / Assistant Manager

