

## FCC Test Report (BT-LE)

**Report No.:** RF170419E08D-1

**FCC ID:** QXP-A7310

**Test Model:** mevo

**Received Date:** Apr. 19, 2017

**Test Date:** Apr. 21 to June 06, 2017

**Issued Date:** Feb. 08, 2018

**Applicant:** FlightScope (Pty) Ltd

**Address:** 10 Elektron Road, Technopark, Stellenbosch, 7500 South Africa

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
Hsin Chu Laboratory

**Lab Address:** E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,  
Taiwan R.O.C.

**Test Location :** E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,  
Taiwan R.O.C.

**FCC Registration /  
Designation Number:** 723255 / TW2022



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## Table of Contents

<b>Release Control Record .....</b>	<b>3</b>
<b>1 Certificate of Conformity.....</b>	<b>4</b>
<b>2 Summary of Test Results .....</b>	<b>5</b>
2.1 Measurement Uncertainty .....	5
2.2 Modification Record .....	5
<b>3 General Information.....</b>	<b>6</b>
3.1 General Description of EUT .....	6
3.2 Description of Test Modes .....	7
3.2.1 Test Mode Applicability and Tested Channel Detail .....	8
3.3 Description of Support Units .....	10
3.3.1 Configuration of System under Test .....	11
3.4 General Description of Applied Standards .....	12
<b>4 Test Types and Results .....</b>	<b>13</b>
4.1 Radiated Emission and Bandedge Measurement.....	13
4.1.1 Limits of Radiated Emission and Bandedge Measurement .....	13
4.1.2 Test Instruments .....	14
4.1.3 Test Procedures.....	15
4.1.4 Deviation from Test Standard .....	15
4.1.5 Test Setup.....	16
4.1.6 EUT Operating Conditions.....	17
4.1.7 Test Results .....	18
4.2 Conducted Emission Measurement .....	22
4.2.1 Limits of Conducted Emission Measurement .....	22
4.2.2 Test Instruments .....	22
4.2.3 Test Procedures.....	23
4.2.4 Deviation from Test Standard .....	23
4.2.5 Test Setup.....	23
4.2.6 EUT Operating Conditions.....	23
4.2.7 Test Results (Mode 1).....	24
4.2.8 Test Results (Mode 2).....	26
4.3 20dB bandwidth Measurement .....	28
4.3.1 Limits of 20dB bandwidth Measurement .....	28
4.3.2 Test Instruments .....	28
4.3.3 Test Procedure .....	28
4.3.4 Test Setup.....	28
4.3.5 Deviation from Test Standard .....	28
4.3.6 EUT Operating Condition .....	28
4.3.7 Test Results .....	29
<b>5 Pictures of Test Arrangements.....</b>	<b>30</b>
<b>Appendix – Information on the Testing Laboratories .....</b>	<b>31</b>

### Release Control Record

Issue No.	Description	Date Issued
RF170419E08D-1	Original release.	Feb. 08, 2018

## 1 Certificate of Conformity

**Product:** FlightScope mevo

**Brand:** FlightScope

**Test Model:** mevo

**Sample Status:** ENGINEERING SAMPLE

**Applicant:** FlightScope (Pty) Ltd

**Test Date:** Apr. 21 to June 06, 2017

**Standards:** 47 CFR FCC Part 15, Subpart C (Section 15.249)  
ANSI C63.10: 2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**Prepared by :** Wendy Wu , **Date:** Feb. 08, 2018  
Wendy Wu / Specialist

**Approved by :** May Chen , **Date:** Feb. 08, 2018  
May Chen / Manager

## 2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (SECTION 15.249)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -13.42dB at 0.16562MHz.
15.209 15.249 15.249 (d)	Radiated Emission Test Band Edge Measurement Limit: 50dB less than the peak value of fundamental frequency or meet radiated emission limit in section 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -1.9dB at 4956.00MHz.
15.215 (c)	20dB Bandwidth	PASS	Meet the requirement of limit
15.203	Antenna Requirement	PASS	No antenna connector is used.

### 2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.84 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.32 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.14 dB
	6GHz ~ 18GHz	5.04 dB
	18GHz ~ 40GHz	5.25 dB

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

Product	FlightScope mevo
Brand	FlightScope
Test Model	mevo
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	5 Vdc from USB interface 3.2~3.4 Vdc from battery
Modulation Type	GFSK
Modulation Technology	DTS
Transfer Rate	Up to 1Mbps
Operating Frequency	2404MHz ~ 2478MHz
Number of Channel	38
Output Power	0.15382mW
Antenna Type	Microstrip antenna with 2.5 dBi gain
Antenna Connector	NA
Accessory Device	NA
Data Cable Supplied	USB Cable x 1(unshielded, 0.1m )

Note:

1. There are 24GHz radar technology and BT-LE technology used for the EUT.
2. This device will disable CH0:2402MHz & CH39:2480MHz by software.
3. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

### 3.2 Description of Test Modes

38 channels are provided to this EUT:

CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)
		10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460		

### 3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO			DESCRIPTION
	RE $\geq$ 1G	RE<1G	PLC	
1	√	√	√	Power from adapter
2	-	-	√	Power from host equipment

Where **RE $\geq$ 1G:** Radiated Emission above 1GHz & Bandedge Measurement  
**RE<1G:** Radiated Emission below 1GHz  
**PLC:** Power Line Conducted Emission  
**APCM:** Antenna Port Conducted Measurement

**NOTE:** The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-plane**.

#### **Radiated Emission Test (Above 1GHz):**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE (Mbps)
1 to 38	1, 19, 38	GFSK	1

#### **Radiated Emission Test (Below 1GHz):**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE (Mbps)
1 to 38	38	GFSK	1

#### **Power Line Conducted Emission Test:**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE (Mbps)
1 to 38	38	GFSK	1



**Test Condition:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	24deg. C, 61%RH	DC 5V	Jyunchun Lin
RE<1G	24deg. C, 64%RH	DC 5V	Rey Chen
PLC	25deg. C, 75%RH	120Vac, 60Hz (system)	Andy Ho

### 3.3 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Main Switch	NA	NA	NA	NA	Supplied by client(for RF Setup)
B	24GHz RF Switch	NA	NA	NA	NA	Supplied by client(for RF Setup)
C	Bluetooth Switch	NA	NA	NA	NA	Supplied by client(for RF Setup)
D	USB Adapter	ASUS	EXA1205UA	NA	NA	Provided by Lab
E	Laptop	DELL	E6440	F9LYQ32	FCC DoC	Provided by Lab

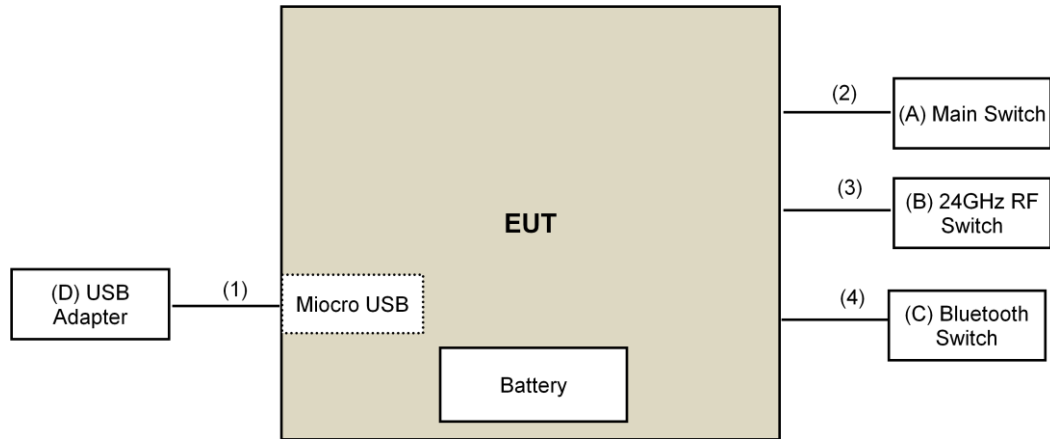
Note:

1. All power cords of the above support units are non-shielded (1.8m).

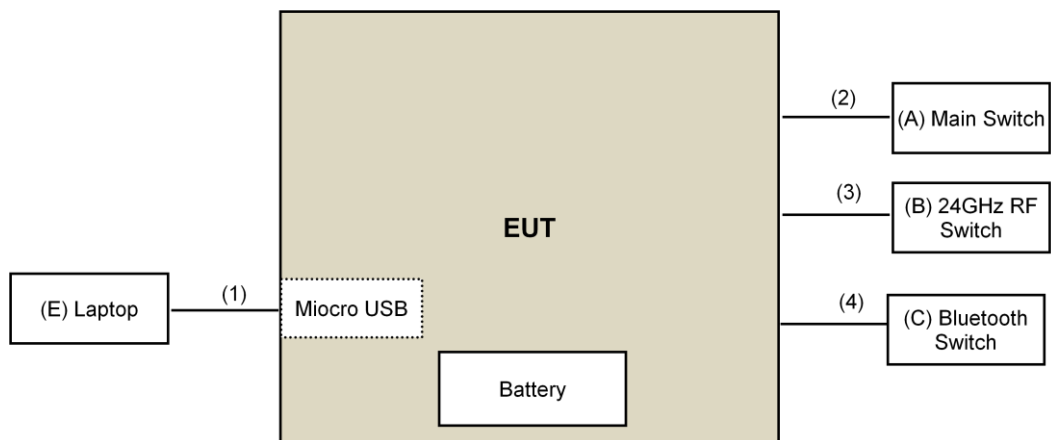
ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	USB Cable	1	0.1	No	0	Supplied by client
2	Console Cable	1	0.05	No	0	Supplied by client(for RF Setup)
3	Console Cable	1	0.05	No	0	Supplied by client(for RF Setup)
4	Console Cable	1	0.05	No	0	Supplied by client(for RF Setup)

### 3.3.1 Configuration of System under Test

#### For Mode 1



#### For Mode 2



### 3.4 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart C (15.249)**

ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

## 4 Test Types and Results

### 4.1 Radiated Emission and Bandedge Measurement

#### 4.1.1 Limits of Radiated Emission and Bandedge Measurement

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902 ~ 928 MHz	50	500
2400 ~ 2483.5 MHz	50	500
5725 ~ 5875 MHz	50	500
24 ~ 24.25 GHz	250	2500

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits as below table, whichever is the lesser attenuation

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

#### NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

## 4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010156	Aug. 18, 2016	Aug. 17, 2017
Pre-Amplifier <sup>(*)</sup> EMCI	EMC001340	980142	Jan. 20, 2016	Jan. 19, 2018
Loop Antenna <sup>(*)</sup> Electro-Metrics	EM-6879	264	Dec. 16, 2016	Dec. 15, 2018
RF Cable	NA	LOOPCAB-001 LOOPCAB-002	Jan. 17, 2017	Jan. 16, 2018
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-05	May 07, 2016	May 06, 2017
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Dec. 29, 2016	Dec. 28, 2017
RF Cable	8D	966-3-1 966-3-2 966-3-3	Apr. 01, 2017	Mar. 31, 2018
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	Oct. 05, 2016	Oct. 04, 2017
Horn_Antenna SCHWARZBECK	BBHA9120-D	9120D-406	Dec. 28, 2016	Dec. 27, 2017
Pre-Amplifier EMCI	EMC12630SE	980384	Feb. 02, 2017	Feb. 01, 2018
RF Cable	EMC104-SM-SM-1200 EMC104-SM-SM-2000 EMC104-SM-SM-5000	160922 150317 150322	Feb. 02, 2017 Mar. 29, 2017 Mar. 29, 2017	Feb. 01, 2018 Mar. 28, 2018 Mar. 28, 2018
Spectrum Analyzer Keysight	N9030A	MY54490520	July 29, 2016	July 28, 2017
Pre-Amplifier EMCI	EMC184045SE	980386	Feb. 02, 2017	Feb. 01, 2018
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Dec. 15, 2016	Dec. 14, 2017
RF Cable	SUCOFLEX 102	36432/2 36433/2	Jan. 15, 2017	Jan. 14, 2018
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA

**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. \*The calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Loop antenna was used for all emissions below 30 MHz.
4. The test was performed in 966 Chamber No. 3.
5. The CANADA Site Registration No. is 20331-1
6. Tested Date: Apr. 21, 2017

#### 4.1.3 Test Procedures

##### **For Radiated emission below 30MHz**

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Both X and Y axes of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

##### **NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

##### **For Radiated emission above 30MHz**

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

##### **Note:**

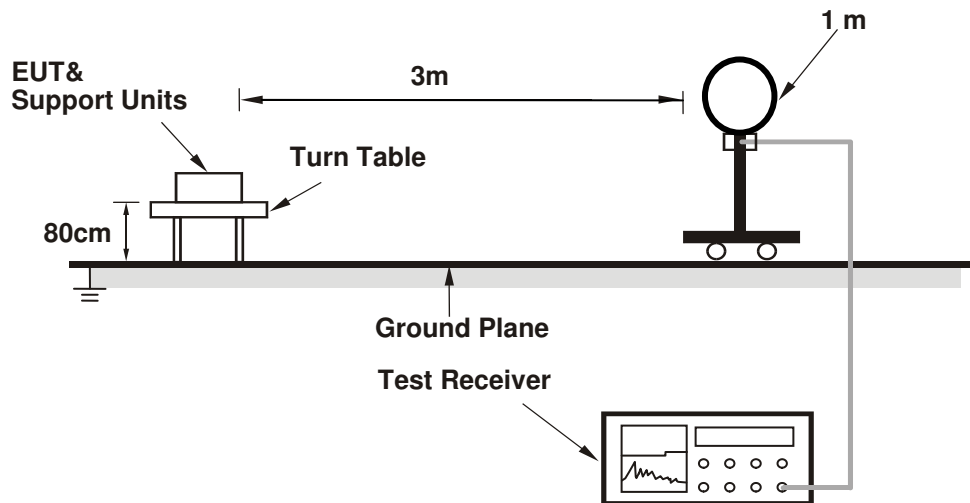
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 Deviation from Test Standard

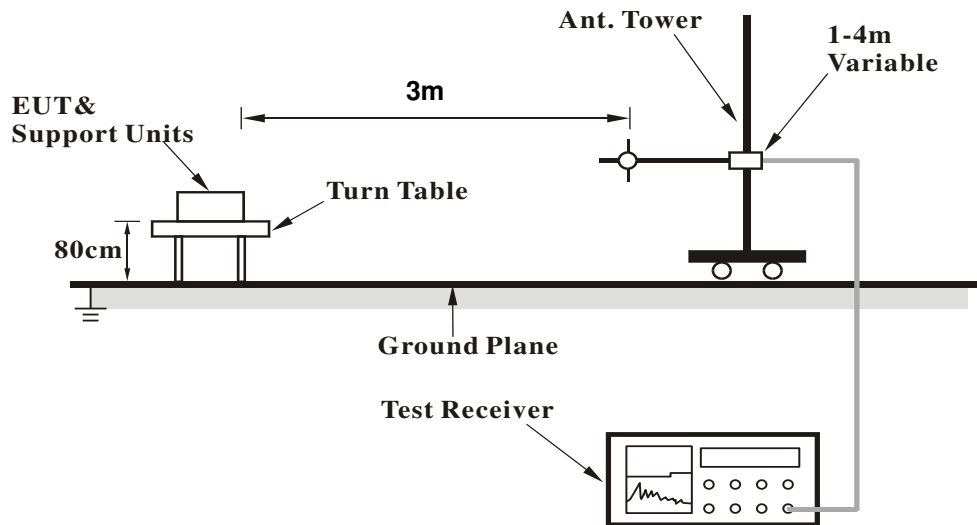
No deviation.

#### 4.1.5 Test Setup

##### For Radiated emission below 30MHz

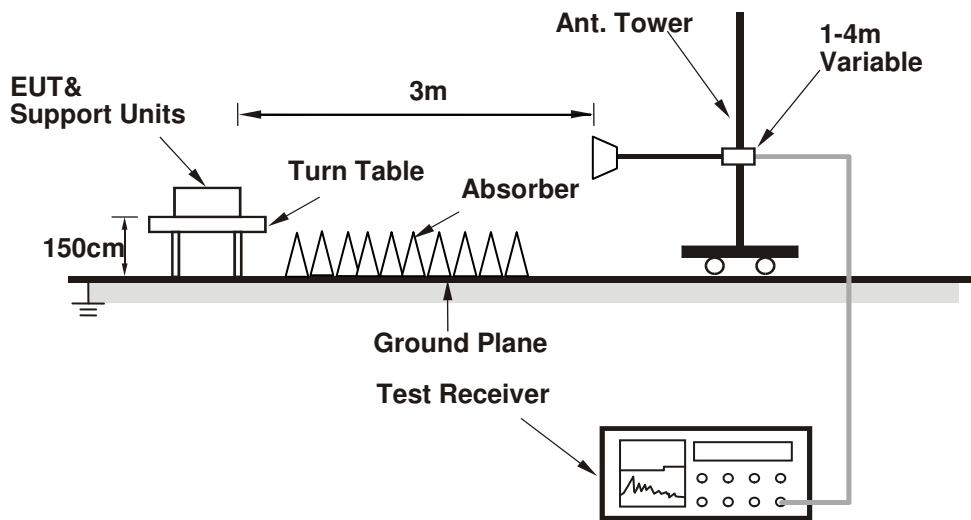


##### For Radiated emission 30MHz to 1GHz





### For Radiated emission above 1GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 4.1.6 EUT Operating Conditions

Set the EUT under transmission condition continuously at specific channel frequency.

#### 4.1.7 Test Results

##### Above 1GHz Data :

<b>CHANNEL</b>	TX Channel 1	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

#### ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2400.00	50.8 PK	74.0	-23.2	1.94 H	204	52.3	-1.5
2	2400.00	34.2 AV	54.0	-19.8	1.94 H	204	35.7	-1.5
3	*2404.00	83.1 PK	114.0	-30.9	1.94 H	204	84.6	-1.5
4	*2404.00	81.7 AV	94.0	-12.3	1.94 H	204	83.2	-1.5
5	4808.00	57.7 PK	74.0	-16.3	1.21 H	298	54.7	3.0
6	4808.00	51.9 AV	54.0	-2.1	1.21 H	298	48.9	3.0

#### ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2400.00	51.0 PK	74.0	-23.0	1.14 V	8	52.5	-1.5
2	2400.00	34.4 AV	54.0	-19.6	1.14 V	8	35.9	-1.5
3	*2404.00	83.4 PK	114.0	-30.6	1.14 V	8	84.9	-1.5
4	*2404.00	82.1 AV	94.0	-11.9	1.14 V	8	83.6	-1.5
5	4808.00	54.2 PK	74.0	-19.8	1.25 V	87	51.2	3.0
6	4808.00	48.4 AV	54.0	-5.6	1.25 V	87	45.4	3.0

#### REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.

<b>CHANNEL</b>	TX Channel 19	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2440.00	86.4 PK	114.0	-27.6	2.09 H	209	87.9	-1.5
2	*2440.00	85.1 AV	94.0	-8.9	2.09 H	209	86.6	-1.5
3	4880.00	57.6 PK	74.0	-16.4	1.17 H	287	54.4	3.2
4	4880.00	51.7 AV	54.0	-2.3	1.17 H	287	48.5	3.2
5	7320.00	49.6 PK	74.0	-24.4	1.54 H	173	40.7	8.9
6	7320.00	38.9 AV	54.0	-15.1	1.54 H	173	30.0	8.9

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2440.00	86.9 PK	114.0	-27.1	1.00 V	24	88.4	-1.5
2	*2440.00	85.6 AV	94.0	-8.4	1.00 V	24	87.1	-1.5
3	4880.00	54.7 PK	74.0	-19.3	1.28 V	99	51.5	3.2
4	4880.00	48.8 AV	54.0	-5.2	1.28 V	99	45.6	3.2
5	7320.00	54.0 PK	74.0	-20.0	2.44 V	16	45.1	8.9
6	7320.00	42.4 AV	54.0	-11.6	2.44 V	16	33.5	8.9

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.

<b>CHANNEL</b>	TX Channel 38	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2478.00	86.7 PK	114.0	-27.3	2.11 H	200	88.1	-1.4
2	*2478.00	85.4 AV	94.0	-8.6	2.11 H	200	86.8	-1.4
3	2483.50	48.0 PK	74.0	-26.0	2.11 H	200	49.4	-1.4
4	2483.50	34.7 AV	54.0	-19.3	2.11 H	200	36.1	-1.4
5	4956.00	57.9 PK	74.0	-16.1	1.20 H	279	54.7	3.2
<b>6</b>	<b>4956.00</b>	<b>52.1 AV</b>	<b>54.0</b>	<b>-1.9</b>	<b>1.20 H</b>	<b>279</b>	<b>48.9</b>	<b>3.2</b>
7	7434.00	49.9 PK	74.0	-24.1	1.50 H	166	40.7	9.2
8	7434.00	39.1 AV	54.0	-14.9	1.50 H	166	29.9	9.2

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2478.00	87.1 PK	114.0	-26.9	1.00 V	14	88.5	-1.4
2	*2478.00	85.9 AV	94.0	-8.1	1.00 V	14	87.3	-1.4
3	2483.50	48.3 PK	74.0	-25.7	1.00 V	14	49.7	-1.4
4	2483.50	34.9 AV	54.0	-19.1	1.00 V	14	36.3	-1.4
5	4956.00	54.9 PK	74.0	-19.1	1.26 V	98	51.7	3.2
6	4956.00	49.0 AV	54.0	-5.0	1.26 V	98	45.8	3.2
7	7434.00	54.0 PK	74.0	-20.0	2.48 V	0	44.8	9.2
8	7434.00	42.7 AV	54.0	-11.3	2.48 V	0	33.5	9.2

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.

**Below 1GHz Data:**

<b>CHANNEL</b>	TX Channel 1	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	9kHz ~ 1GHz		

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	36.81	26.5 QP	40.0	-13.5	3.00 H	124	35.8	-9.3
2	58.25	20.7 QP	40.0	-19.3	3.00 H	31	29.4	-8.7
3	175.99	21.6 QP	43.5	-21.9	2.00 H	106	30.9	-9.3
4	193.78	22.5 QP	43.5	-21.0	4.00 H	253	33.6	-11.1
5	579.67	27.2 QP	46.0	-18.8	1.00 H	275	28.1	-0.9
6	651.67	28.4 QP	46.0	-17.6	2.00 H	201	27.9	0.5

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	30.15	24.3 QP	40.0	-15.7	1.00 V	360	33.9	-9.6
2	96.42	23.8 QP	43.5	-19.7	1.00 V	0	37.1	-13.3
3	196.11	24.9 QP	43.5	-18.6	4.00 V	74	36.1	-11.2
4	229.17	23.4 QP	46.0	-22.6	4.00 V	146	34.0	-10.6
5	558.43	28.4 QP	46.0	-17.6	2.00 V	360	29.9	-1.5
6	644.35	30.4 QP	46.0	-15.6	3.00 V	80	30.0	0.4

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

## 4.2 Conducted Emission Measurement

### 4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

### 4.2.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	847124/029	Oct. 24, 2016	Oct. 23, 2017
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 26, 2016	Oct. 25, 2017
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100072	June 13, 2016	June 12, 2017
50 ohms Terminator	N/A	EMC-02	Sep. 29, 2016	Sep. 28, 2017
RF Cable	5D-FB	COCCAB-001	Sep. 30, 2016	Sep. 29, 2017
10 dB PAD Mini-Circuits	HAT-10+	CONATT-004	June 20, 2016	June 19, 2017
Software BVADT	BVADT_Cond_ V7.3.7.4	NA	NA	NA

#### Note:

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. 1.
3. Tested Date: Apr. 25, 2017

#### 4.2.3 Test Procedures

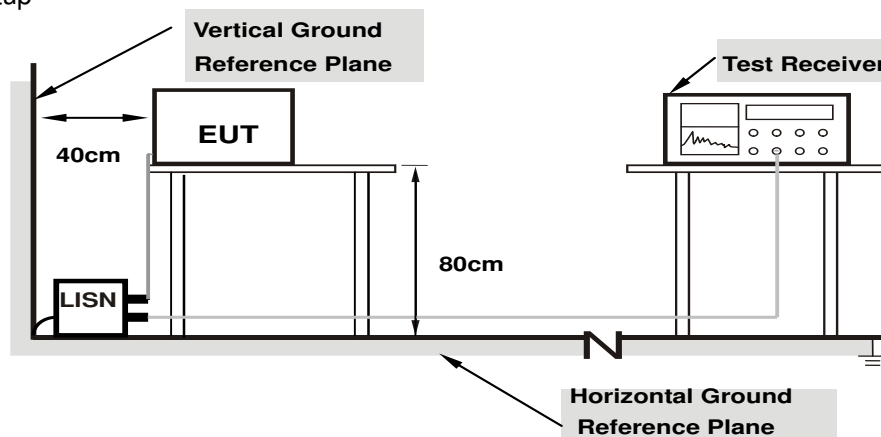
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

**NOTE:** The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

#### 4.2.4 Deviation from Test Standard

No deviation.

#### 4.2.5 Test Setup



**Note:** 1.Support units were connected to second LISN.

For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 4.2.6 EUT Operating Conditions

Same as 4.1.6.

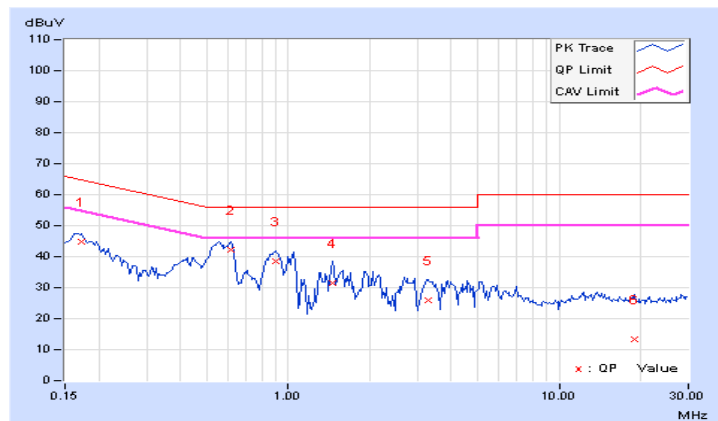
#### 4.2.7 Test Results (Mode 1)

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor (dB)	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17344	10.20	34.46	22.68	44.66	32.88	64.79	54.79	-20.13	-21.91
2	0.61094	10.26	32.04	22.29	42.30	32.55	56.00	46.00	-13.70	-13.45
3	0.90000	10.29	28.30	19.25	38.59	29.54	56.00	46.00	-17.41	-16.46
4	1.45313	10.30	21.05	8.95	31.35	19.25	56.00	46.00	-24.65	-26.75
5	3.30469	10.30	15.59	4.33	25.89	14.63	56.00	46.00	-30.11	-31.37
6	19.03516	11.62	1.85	-4.14	13.47	7.48	60.00	50.00	-46.53	-42.52

#### REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.



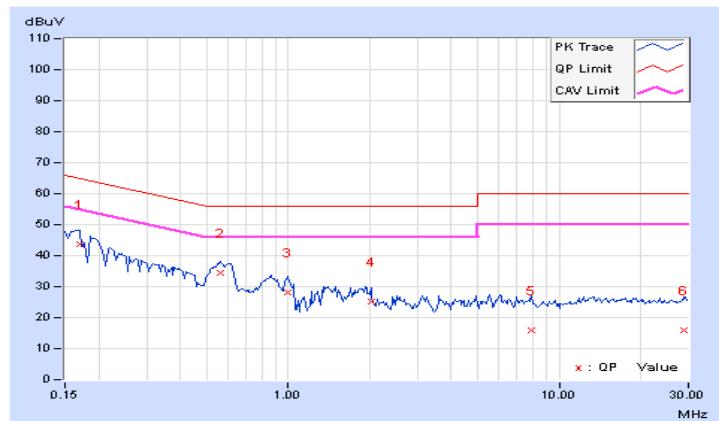


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16953	10.18	33.55	16.98	43.73	27.16	64.98	54.98	-21.25	-27.82
2	0.56016	10.25	24.03	14.38	34.28	24.63	56.00	46.00	-21.72	-21.37
3	0.99375	10.26	18.04	7.22	28.30	17.48	56.00	46.00	-27.70	-28.52
4	2.02344	10.31	14.97	4.71	25.28	15.02	56.00	46.00	-30.72	-30.98
5	7.94922	10.49	5.48	-0.93	15.97	9.56	60.00	50.00	-44.03	-40.44
6	28.69922	11.40	4.60	-0.63	16.00	10.77	60.00	50.00	-44.00	-39.23

**REMARKS:**

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.



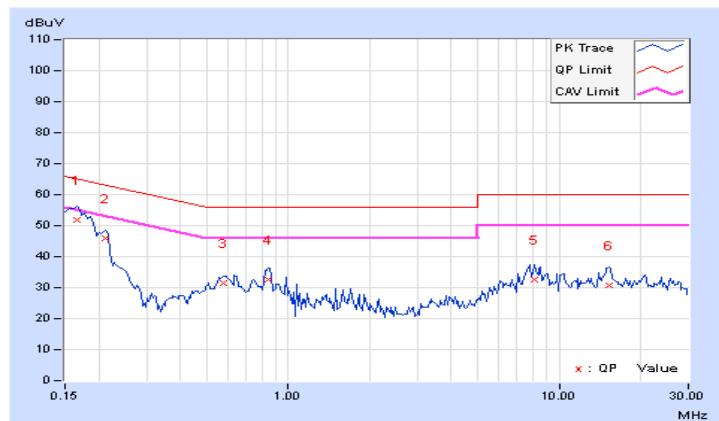
#### 4.2.8 Test Results (Mode 2)

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
	<b>1</b>	<b>0.16562</b>	<b>10.19</b>	<b>41.57</b>	<b>23.04</b>	<b>51.76</b>	<b>33.23</b>	<b>65.18</b>	<b>55.18</b>	<b>-13.42</b>
2	0.21250	10.19	35.89	24.40	46.08	34.59	63.11	53.11	-17.03	-18.52
3	0.57969	10.23	21.18	13.29	31.41	23.52	56.00	46.00	-24.59	-22.48
4	0.84531	10.25	22.44	10.91	32.69	21.16	56.00	46.00	-23.31	-24.84
5	8.09766	10.45	22.13	13.56	32.58	24.01	60.00	50.00	-27.42	-25.99
6	15.27344	11.07	19.84	13.19	30.91	24.26	60.00	50.00	-29.09	-25.74

#### REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

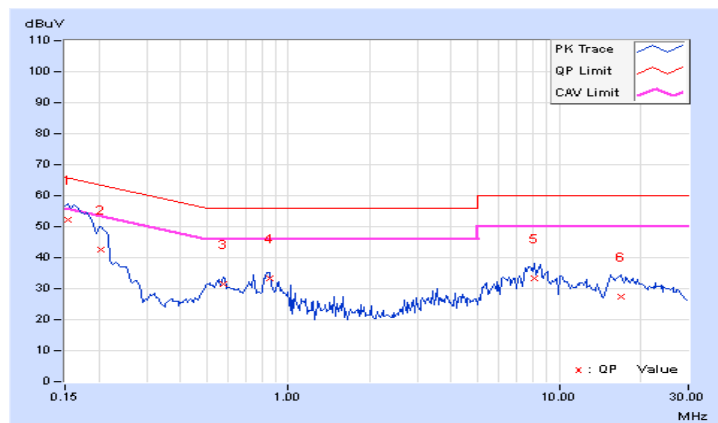


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	10.18	42.08	24.72	52.26	34.90	65.79	55.79	-13.53	-20.89
2	0.20469	10.16	32.30	17.16	42.46	27.32	63.42	53.42	-20.96	-26.10
3	0.57578	10.22	21.08	13.90	31.30	24.12	56.00	46.00	-24.70	-21.88
4	0.85313	10.23	23.00	11.70	33.23	21.93	56.00	46.00	-22.77	-24.07
5	8.10156	10.39	22.96	13.30	33.35	23.69	60.00	50.00	-26.65	-26.31
6	16.88672	10.96	16.51	10.52	27.47	21.48	60.00	50.00	-32.53	-28.52

#### REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.



### 4.3 20dB bandwidth Measurement

#### 4.3.1 Limits of 20dB bandwidth Measurement

For frequency hopping system operating in the 2404-2478MHz, If the 20dB bandwidth of hopping channel is greater than 25kHz, two-thirds 20dB bandwidth of hopping channel shall be a minimum limit for the hopping channel separation.

#### 4.3.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSV40	100964	June 28, 2016	June 27, 2017

**Note:**

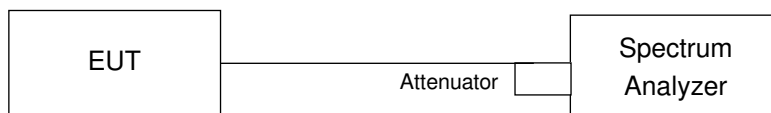
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : May 05, 2017

#### 4.3.3 Test Procedure

The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 kHz RBW and 300kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

Set both RBW and VBW of spectrum analyzer to 100 kHz and 300kHz with suitable frequency span from band edge. The bandedge was measured and recorded.

#### 4.3.4 Test Setup



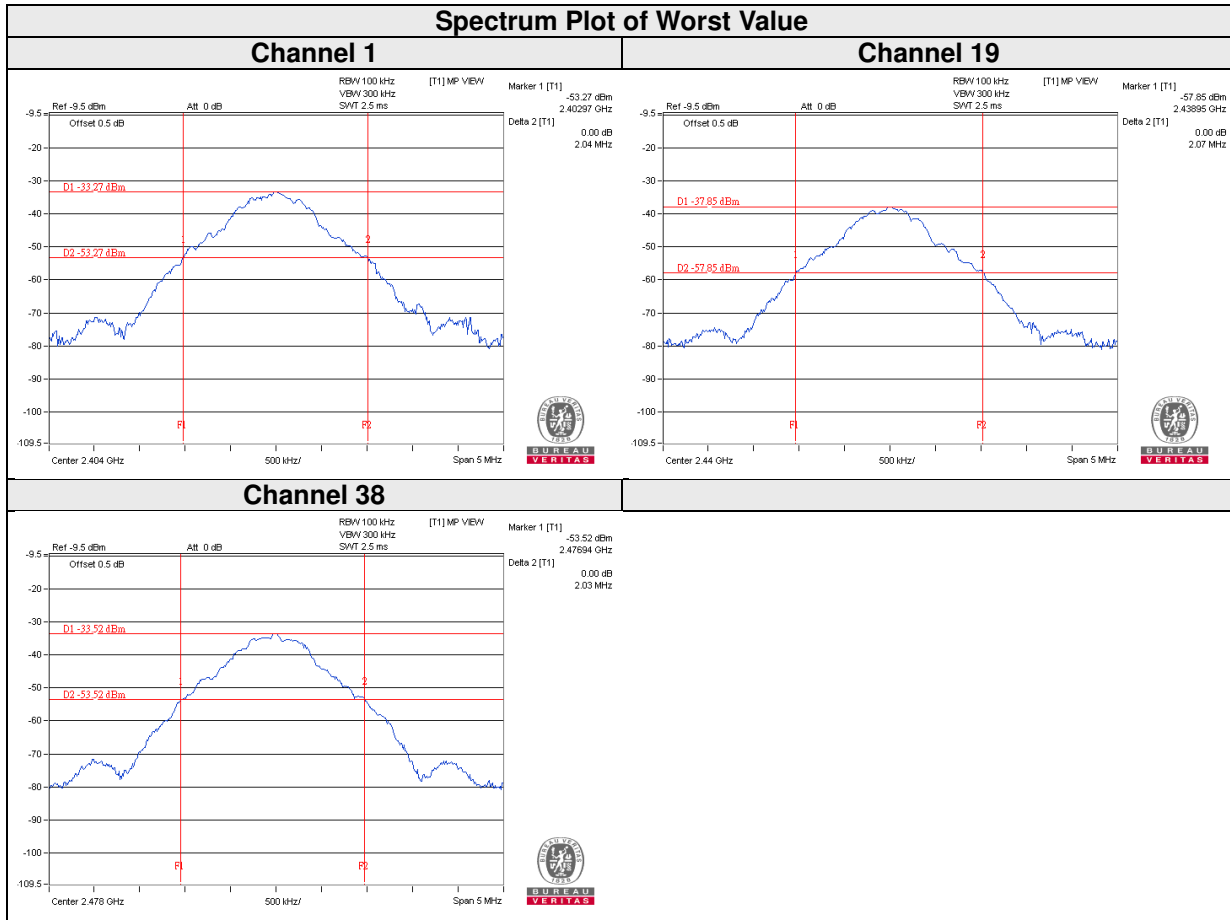
#### 4.3.5 Deviation from Test Standard

No deviation.

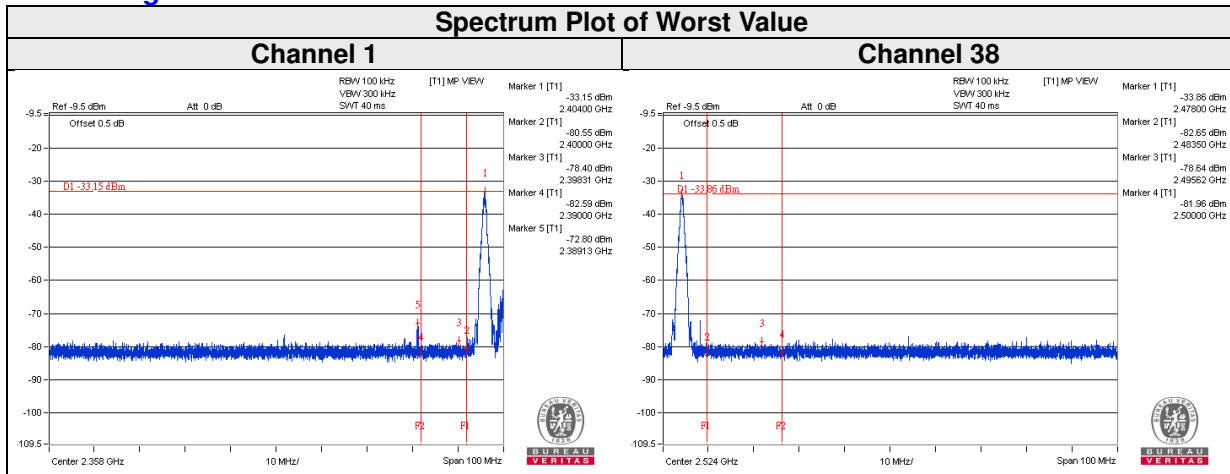
#### 4.3.6 EUT Operating Condition

Set the EUT under transmission / receiver condition continuously.

### 4.3.7 Test Results For 20dB Bandwidth



### For Bandedge



## 5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

## Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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The address and road map of all our labs can be found in our web site also.

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