

# FCC Test Report

## (Bluetooth LE\_Hopping)

**Report No.:** RF190408C21

**FCC ID:** QOQGM210P

**Test Model:** MGM210P32A, MGM210P22A

**Series Model:** BGM210P32A, BGM210P22A (refer to item 3.1 for more details)

**Received Date:** Apr. 08, 2019

**Test Date:** Apr. 13 ~ Jun. 17, 2019

**Issued Date:** Jun. 21, 2019

**Applicant:** Silicon Laboratories Finland Oy

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Lin Kou Laboratories

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33383, TAIWAN

**FCC Registration /  
Designation Number:** 788550 / TW0003



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## Table of Contents

<b>Release Control Record</b> .....	<b>4</b>
<b>1 Certificate of Conformity</b> .....	<b>5</b>
<b>2 Summary of Test Results</b> .....	<b>6</b>
2.1 Measurement Uncertainty .....	6
2.2 Modification Record .....	6
<b>3 General Information</b> .....	<b>7</b>
3.1 General Description of EUT .....	7
3.2 Description of Test Modes .....	9
3.2.1 Test Mode Applicability and Tested Channel Detail .....	10
3.1 Duty Cycle of Test Signal .....	11
3.2 Description of Support Units .....	12
3.2.1 Configuration of System under Test .....	12
3.3 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 .....	40
4.2.1 Limits of Conducted Emission Measurement .....	40
4.2.2 Test Instruments .....	40
4.2.3 Test Procedures.....	41
4.2.4 Deviation from Test Standard .....	41
4.2.5 Test Setup.....	41
4.2.6 EUT Operating Conditions.....	41
4.2.7 Test Results .....	42
4.3 Number of Hopping Frequency Used .....	50
4.3.1 Limits of Hopping Frequency Used Measurement .....	50
4.3.2 Test Setup.....	50
4.3.3 Test Instruments .....	50
4.3.4 Test Procedure .....	50
4.3.5 Deviation from Test Standard .....	50
4.3.6 Test Results .....	50
4.4 Dwell Time on Each Channel.....	53
4.4.1 Limits of Dwell Time on Each Channel Measurement.....	53
4.4.2 Test Setup.....	53
4.4.3 Test Instruments .....	53
4.4.4 Test Procedures.....	53
4.4.5 Deviation from Test Standard .....	53
4.4.6 Test Results .....	54
4.5 Channel Bandwidth .....	56
4.5.1 Limits of Channel Bandwidth Measurement.....	56
4.5.2 Test Setup.....	56
4.5.3 Test Instruments .....	56
4.5.4 Test Procedure .....	56
4.5.5 Deviation from Test Standard .....	56
4.5.6 EUT Operating Condition .....	56
4.5.7 Test Results .....	57

4.6	Hopping Channel Separation .....	59
4.6.1	Limits of Hopping Channel Separation Measurement.....	59
4.6.2	Test Setup.....	59
4.6.3	Test Instruments .....	59
4.6.4	Test Procedure .....	59
4.6.5	Deviation from Test Standard .....	59
4.6.6	Test Results .....	60
4.7	Maximum Output Power.....	62
4.7.1	Limits of Maximum Output Power Measurement .....	62
4.7.2	Test Setup.....	62
4.7.3	Test Instruments .....	62
4.7.4	Test Procedure .....	62
4.7.5	Deviation from Test Standard .....	62
4.7.6	EUT Operating Condition .....	62
4.7.7	Test Results .....	63
4.8	Conducted Out of Band Emission Measurement.....	65
4.8.1	Limits Of Conducted Out Of Band Emission Measurement.....	65
4.8.2	Test Instruments .....	65
4.8.3	Test Procedure .....	65
4.8.4	Deviation from Test Standard .....	65
4.8.5	EUT Operating Condition .....	65
4.8.6	Test Results .....	65
<b>5</b>	<b>Pictures of Test Arrangements.....</b>	<b>72</b>
	<b>Appendix – Information of the Testing Laboratories .....</b>	<b>73</b>

### Release Control Record

Issue No.	Description	Date Issued
RF190408C21	Original release.	Jun. 21, 2019

## 1 Certificate of Conformity

**Product:** Bluetooth Low Energy and ZigBee wireless radio modules

**Brand:** Silicon Labs

**Test Model:** MGM210P32A, MGM210P22A

**Series Model:** BGM210P32A, BGM210P22A (refer to item 3.1 for more details)

**Sample Status:** Engineering sample

**Applicant:** Silicon Laboratories Finland Oy

**Test Date:** Apr. 13 ~ Jun. 17, 2019

**Standards:** 47 CFR FCC Part 15, Subpart C (Section 15.247)  
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 RF characteristics under the conditions specified in this report.

**Prepared by :**  , **Date:** Jun. 21, 2019  
Polly Chien / Specialist

**Approved by :**  , **Date:** Jun. 21, 2019  
Bruce Chen / Project Engineer

## 2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (SECTION 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -13.57dB at 0.43800MHz.
15.247(a)(1)(iii)	Number of Hopping Frequency Used	Pass	Meet the requirement of limit.
15.247(a)(1)(iii)	Dwell Time on Each Channel	Pass	Meet the requirement of limit.
15.247(a)(1)	1. Hopping Channel Separation 2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	Pass	Meet the requirement of limit.
15.247(b)	Maximum Peak Output Power	Pass	Meet the requirement of limit.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -0.1dB at 2483.50MHz.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna 1: No antenna connector is used. Antenna 2: Antenna connector is SMA not a standard connector.

Note:

1. If the Frequency Hopping System operating in 2400-2483.5MHz band and the output power less than 125mW. The hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of hopping channel whichever is greater.
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

### 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	2.94 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.04 dB
	30MHz ~ 200MHz	3.59 dB
	200MHz ~ 1000MHz	3.60 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

Product	Bluetooth Low Energy and ZigBee wireless radio modules
Brand	Silicon Labs
Test Model	MGM210P32A, MGM210P22A
Series Model	BGM210P32A, BGM210P22A
Model Difference	Refer to note
Sample Status	Engineering sample
Power Supply Rating	3.3Vdc from host equipment
Modulation Type	GFSK
Modulation Technology	Hopping
Transfer Rate	1Mbps, 2Mbps
Operating Frequency	2402~2480MHz
Number of Channel	40
Output Power	<b>EUT / Dipole antenna</b> Mode A1 (MGM210P32A / High power 1M): 90.365mW Mode A2 (MGM210P22A / Low power 1M): 12.023mW Mode A3 (MGM210P32A / High power 2M): 87.297mW Mode A4 (MGM210P22A / Low power 2M): 12.106mW
	<b>EUT / Chip antenna</b> Mode B1 (MGM210P32A / High power 1M): 94.842mW Mode B2 (MGM210P22A / Low power 1M): 12.050mW Mode B3 (MGM210P32A / High power 2M): 99.083mW Mode B4 (MGM210P22A / Low power 2M): 12.050mW
Antenna Type	Refer to Note
Antenna Connector	Chip antenna: NA Dipole antenna: 50-ohm pin
Accessory Device	NA
Cable Supplied	NA

Note:

1. All models are listed as below. Model MGM210P22A and MGM210P32A are the representative for final test.

Model	MGM210P22A	MGM210P32A	BGM210P22A	BGM210P32A
Spec.	Low-Power/ Zigbee and/or BLE	High-Power/ Zigbee and/or BLE	Low-Power/ BLE	high-Power/ BLE
Antenna Type	1. On board ceramic chip antenna with 1.86dBi of gain 2. Dipole antenna with the theoretical gain of 2.14dBi			
Hardware	The wireless chipset is the same in all these modules, and it integrates a PA subsystem and a RF switch to route the RF signal to two separate RF ports, one for the integral onboard ceramic chip antenna and one for an optional external antenna			
RF max TX power	10dBm	20dBm	10dBm	20dBm

The MGM210Px modules are for Zigbee + BLE, while the BGM210Px modules are for BLE only. The 22 and 32 in the model names indicate the power variant, that is, the xGM210P22A is the low-power variant which is allowed to transmit at up to 10dBm, whereas the xGM210P32A is the high-power variant for up to 20dBm. Hardware-wise, the two power variants only differ in their 50Ω matching network which is optimized for the related max allowed output power.

2. The following samples are provided by client and used for testing.

Sample	Model
A	MGM210P32A
B	MGM210P22A

3. The EUT has DTS and Hopping functions.

4. The power setting is list as below.

Test Mode	A1: MGM210P32A / High power 1M / Dipole ant.	Test Mode	A2: MGM210P22A / Low power 1M / Dipole ant.
CH 0	195	CH 0	100
CH 19	195	CH 19	100
CH 38	195	CH 38	100
CH 39	195	CH 39	100
Test Mode	A3: MGM210P32A / High power 2M / Dipole ant.	Test Mode	A4: MGM210P22A / Low power 2M / Dipole ant.
CH 1	195	CH 1	100
CH 19	195	CH 19	100
CH 38	175	CH 38	100

Test Mode	B1: MGM210P32A / High power 1M / Chip ant.	Test Mode	B2: MGM210P22A / Low power 1M / Chip ant.
CH 0	192	CH 0	100
CH 19	192	CH 19	100
CH 38	192	CH 38	100
CH 39	192	CH 39	100
Test Mode	B3: MGM210P32A / High power 2M / Chip ant.	Test Mode	B4: MGM210P22A / Low power 2M / Chip ant.
CH 1	192	CH 1	100
CH 19	192	CH 19	100
CH 38	170	CH 38	100



### 3.2 Description of Test Modes

40 channels are provided to this EUT:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	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	39	2480

\* That the channels 2402MHz, 2426MHz, and 2480MHz are used for primary advertising only, and these advertisement packets are never being sent over the 2M PHY, meaning that when testing band edges the 2M PHY should not be taken into account with the upper and lower channels.

### 3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable to				Description
	RE $\geq$ 1G	RE<1G	PLC	APCM	
A1	√	√	√	√	Sample A / High power 1M / Dipole ant.
A2	-	-	-	√	Sample B / Low power 1M / Dipole ant.
A3	√	√	√	√	Sample A / High power 2M / Dipole ant.
A4	-	-	-	√	Sample B / Low power 2M / Dipole ant.
B1	√	√	√	√	Sample A / High power 1M / Chip ant.
B2	-	-	-	√	Sample B / Low power 1M / Chip ant.
B3	√	√	√	√	Sample A / High power 2M / Chip ant.
B4	-	-	-	√	Sample B / Low power 2M / Chip ant.

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.
- "-": Means no effect.

#### 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.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)
A1, B1	0 to 39	0, 19, 38, 39	GFSK	1.0
A3, B3	0 to 39	1, 19, 38	GFSK	2.0

#### 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.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)
A1, B1	0 to 39	0	GFSK	1.0
A3, B3	0 to 39	1	GFSK	2.0

#### 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.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)
A1, B1	0 to 39	0	GFSK	1.0
A3, B3	0 to 39	1	GFSK	2.0

**Antenna Port Conducted Measurement:**

- This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- 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.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)
Conducted output power				
A1, A2, B1, B2	0 to 39	0, 19, 38, 39	GFSK	1.0/2.0
A3, A4, B3, B4	0 to 39	1, 19, 38	GFSK	1.0/2.0
For other tests except conducted output power				
A1, B	0 to 39	0, 19, 38, 39	GFSK	1.0/2.0
A3, B3	0 to 39	1, 19, 38	GFSK	1.0/2.0

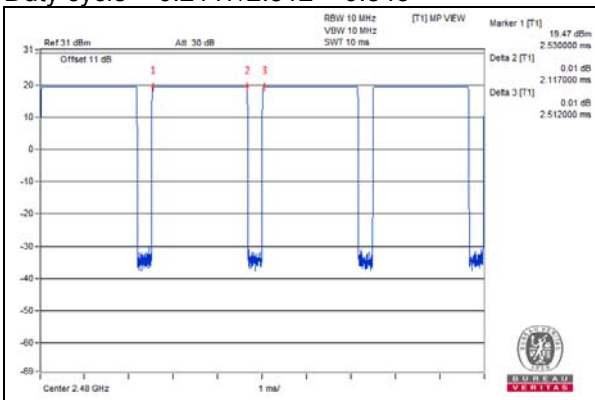
**Test Condition:**

Applicable to	Environmental Conditions	Input Power (System)	Tested by
RE $\geq$ 1G	22 deg. C, 68% RH	120Vac, 60Hz	Greg Lin
RE<1G	22 deg. C, 68% RH	120Vac, 60Hz	Han Wu
PLC	25 deg. C, 75% RH	120Vac, 60Hz	Jones Chang
APCM	25 deg. C, 60% RH	120Vac, 60Hz	Alan Wu

**3.1 Duty Cycle of Test Signal**

Duty cycle of test signal is < 98 %, duty factor shall be considered.

Duty cycle =  $0.2117/2.512 = 0.843$



### 3.2 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.

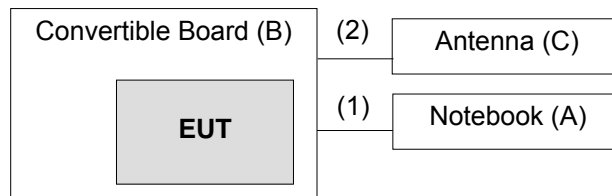
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	Lenovo	81A4	YD02TWF5	FCC DoC Approved	-
B.	Convertible Board	NA	NA	NA	NA	Provided by client
C.	Antenna	NA	NA	NA	NA	Provided by client

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Items A acted as a communication partner to transfer data.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB cable	1	1	Y	0	-
2.	RF cable	1	0.15	-	0	Provided by client

#### 3.2.1 Configuration of System under Test



### 3.3 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 (15.247)**  
**KDB 558074 D01 15.247 Meas Guidance v05r02**  
 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

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

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.	Cal. Date	Cal. Due
Test Receiver KEYSIGHT	N9038A	MY51210203	Mar. 18, 2019	Mar. 17, 2020
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Sep. 25, 2018	Sep. 24, 2019
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Nov. 21, 2018	Nov. 20, 2019
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Nov. 25, 2018	Nov. 24, 2019
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 25, 2018	Nov. 24, 2019
Loop Antenna EMCI	EM-6879	269	Sep. 07, 2018	Sep. 06, 2019
Preamplifier Agilent (Below 1GHz)	8447D	2944A10638	Aug. 08, 2018	Aug. 07, 2019
Preamplifier Agilent (Above 1GHz)	8449B	3008A02367	Feb. 19, 2019	Feb. 18, 2020
RF signal cable HUBER+SUHNER&EMCI	SUCOFLEX 104 & EMC104-SM-SM80 00	CABLE-CH9-02 (248780+171006)	Jan. 19, 2019	Jan. 18, 2020
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(250795/4)	Aug. 08, 2018	Aug. 07, 2019
RF signal cable Woken	8D-FB	Cable-CH9-01	Jul. 31, 2018	Jul. 30, 2019
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower & Turn BV ADT	AT100	AT93021705	NA	NA
Turn Table BV ADT	TT100	TT93021705	NA	NA
Turn Table Controller BV ADT	SC100	SC93021705	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
USB Wideband Power Sensor KEYSIGHT	U2021XA	MY55050005/MY55190 004/MY55190007/MY55 210005	Jul. 17, 2018	Jul. 16, 2019

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 test was performed in HwaYa Chamber 9.

### 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. Parallel, perpendicular, and ground-parallel orientations 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:

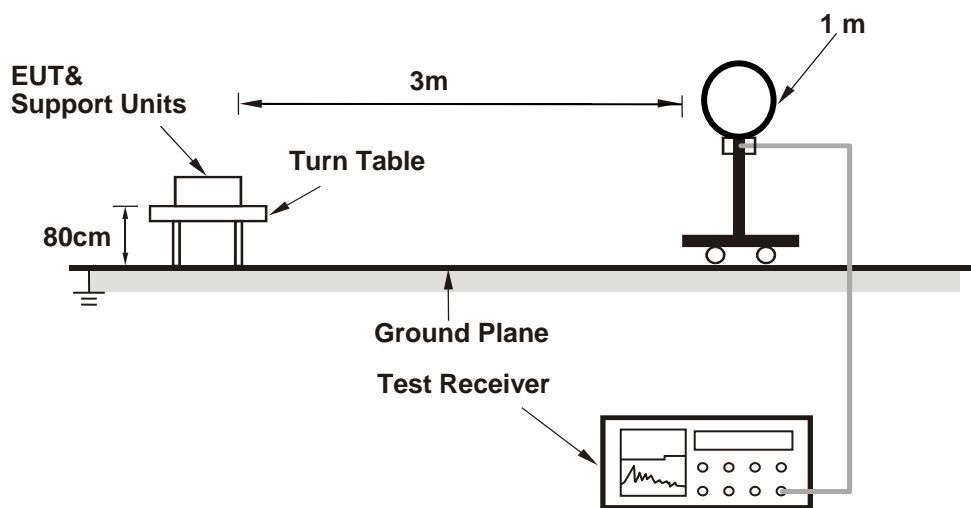
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle < 98%) or 3 x RBW (Duty cycle  $\geq 98\%$ ) 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

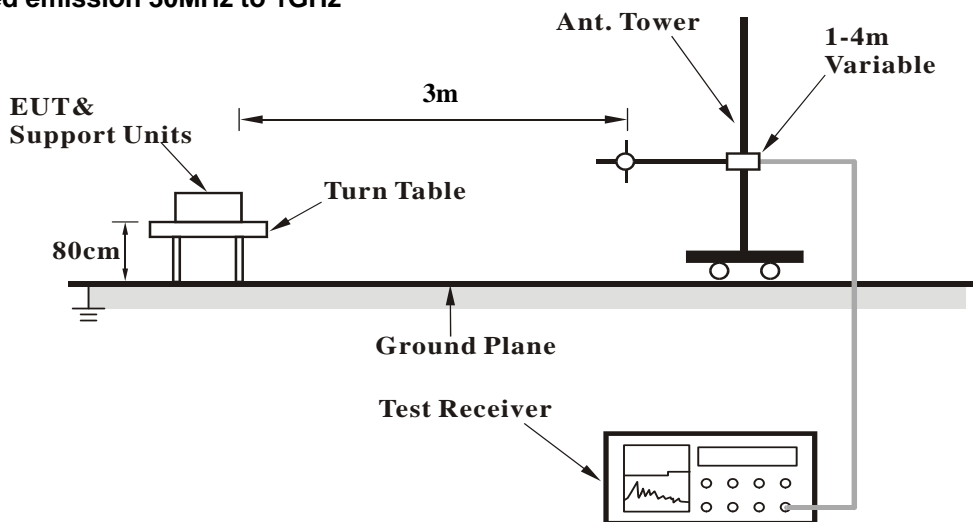
No deviation.

#### 4.1.5 Test Setup

##### For Radiated emission below 30MHz

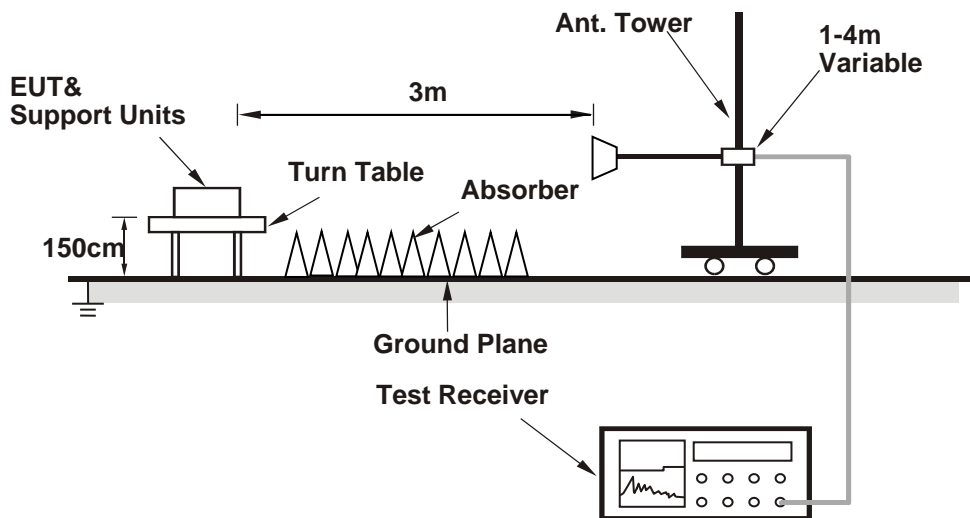


##### For Radiated emission 30MHz to 1GHz





**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**

- a. Placed the EUT on the testing table.
- b. Prepared a notebook to act as a communication partner and placed it outside of testing area.
- c. The communication partner connected with EUT via a USB cable and ran a test program (BGTOOL) to enable EUT under transmission condition continuously at specific channel frequency.
- d. The necessary accessories enable the system in full functions.

#### 4.1.7 Test Results

Above 1GHz Data:

Mode A1

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	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	2363.60	56.7 PK	74.0	-17.3	1.37 H	143	24.8	31.9
2	2363.60	46.1 AV	54.0	-7.9	1.37 H	143	14.2	31.9
3	*2402.00	108.0 PK			1.44 H	138	76.2	31.8
4	*2402.00	103.6 AV			1.44 H	138	71.8	31.8
5	4804.00	46.9 PK	74.0	-27.1	1.13 H	334	43.2	3.7
6	4804.00	35.2 AV	54.0	-18.8	1.13 H	334	31.5	3.7
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	2363.60	58.8 PK	74.0	-15.2	1.42 V	231	26.9	31.9
2	2363.60	53.5 AV	54.0	-0.5	1.42 V	231	21.6	31.9
3	*2402.00	117.1 PK			1.50 V	242	85.3	31.8
4	*2402.00	112.5 AV			1.50 V	242	80.7	31.8
5	4804.00	48.2 PK	74.0	-25.8	1.09 V	184	44.5	3.7
6	4804.00	36.3 AV	54.0	-17.7	1.09 V	184	32.6	3.7

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.

CHANNEL	TX Channel 19	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	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	107.8 PK			1.34 H	142	76.0	31.8
2	*2440.00	103.3 AV			1.34 H	142	71.5	31.8
3	4880.00	46.3 PK	74.0	-27.7	1.06 H	327	42.8	3.5
4	4880.00	34.7 AV	54.0	-19.3	1.06 H	327	31.2	3.5

**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	*2440.00	116.8 PK			1.29 V	247	85.0	31.8
2	*2440.00	112.3 AV			1.29 V	247	80.5	31.8
3	4880.00	47.8 PK	74.0	-26.2	1.03 V	169	44.3	3.5
4	4880.00	35.9 AV	54.0	-18.1	1.03 V	169	32.4	3.5

**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.

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

## ANTENNA POLARITY &amp; 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	107.6 PK			1.40 H	139	75.8	31.8
2	*2478.00	106.4 AV			1.40 H	139	74.6	31.8
3	2483.50	58.7 PK	74.0	-15.3	1.43 H	136	26.9	31.8
4	2483.50	47.6 AV	54.0	-6.4	1.43 H	136	15.8	31.8
5	4956.00	46.9 PK	74.0	-27.1	1.22 H	329	43.1	3.8
6	4956.00	34.8 AV	54.0	-19.2	1.22 H	329	31.0	3.8

## ANTENNA POLARITY &amp; 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	115.8 PK			1.42 V	244	84.0	31.8
2	*2478.00	114.5 AV			1.42 V	244	82.7	31.8
3	2483.50	66.0 PK	74.0	-8.0	1.43 V	242	34.2	31.8
4	<b>2483.50</b>	<b>53.9 AV</b>	<b>54.0</b>	<b>-0.1</b>	<b>1.43 V</b>	<b>242</b>	<b>22.1</b>	<b>31.8</b>
5	4956.00	48.2 PK	74.0	-25.8	1.10 V	190	44.4	3.8
6	4956.00	36.6 AV	54.0	-17.4	1.10 V	190	32.8	3.8

## 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.

CHANNEL	TX Channel 39	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	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	*2480.00	104.9 PK			1.51 H	135	73.1	31.8
2	*2480.00	95.3 AV			1.51 H	135	63.5	31.8
3	2483.50	57.6 PK	74.0	-16.4	1.46 H	133	25.8	31.8
4	2483.50	44.7 AV	54.0	-9.3	1.46 H	133	12.9	31.8
5	4960.00	43.2 PK	74.0	-30.8	1.11 H	324	39.4	3.8
6	4960.00	32.5 AV	54.0	-21.5	1.11 H	324	28.7	3.8

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	*2480.00	113.3 PK			1.49 V	225	81.5	31.8
2	*2480.00	103.7 AV			1.49 V	225	71.9	31.8
3	2483.50	60.2 PK	74.0	-13.8	1.43 V	221	28.4	31.8
4	2483.50	50.2 AV	54.0	-3.8	1.43 V	221	18.4	31.8
5	4960.00	45.4 PK	74.0	-28.6	1.18 V	172	41.6	3.8
6	4960.00	34.7 AV	54.0	-19.3	1.18 V	172	30.9	3.8

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.

## Mode A3

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	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	2365.70	57.5 PK	74.0	-16.5	1.26 H	150	25.6	31.9
2	2365.70	45.4 AV	54.0	-8.6	1.26 H	150	13.5	31.9
3	2390.00	55.8 PK	74.0	-18.2	1.29 H	144	24.0	31.8
4	2390.00	44.4 AV	54.0	-9.6	1.29 H	144	12.6	31.8
5	*2404.00	108.3 PK			1.24 H	143	76.5	31.8
6	*2404.00	105.8 AV			1.24 H	143	74.0	31.8
7	4808.00	45.1 PK	74.0	-28.9	1.21 H	320	41.4	3.7
8	4808.00	33.1 AV	54.0	-20.9	1.21 H	320	29.4	3.7

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	2365.70	58.8 PK	74.0	-15.2	1.08 V	18	26.9	31.9
2	2365.70	51.9 AV	54.0	-2.1	1.08 V	18	20.0	31.9
3	2390.00	58.1 PK	74.0	-15.9	1.05 V	11	26.3	31.8
4	2390.00	46.6 AV	54.0	-7.4	1.05 V	11	14.8	31.8
5	*2404.00	116.6 PK			1.05 V	18	84.8	31.8
6	*2404.00	113.4 AV			1.05 V	18	81.6	31.8
7	4808.00	45.8 PK	74.0	-28.2	1.00 V	269	42.7	3.1
8	4808.00	35.9 AV	54.0	-18.1	1.00 V	269	32.8	3.1

## 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.

CHANNEL	TX Channel 19	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	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	108.3 PK			1.22 H	149	76.5	31.8
2	*2440.00	105.7 AV			1.22 H	149	73.9	31.8
3	4880.00	44.8 PK	74.0	-29.2	1.17 H	325	41.3	3.5
4	4880.00	33.3 AV	54.0	-20.7	1.17 H	325	29.8	3.5

**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	*2440.00	116.7 PK			1.00 V	85	84.9	31.8
2	*2440.00	114.1 AV			1.00 V	85	82.3	31.8
3	4880.00	46.1 PK	74.0	-27.9	1.00 V	269	42.6	3.5
4	4880.00	33.0 AV	54.0	-21.0	1.00 V	269	29.5	3.5

**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.

CHANNEL	TX Channel 38	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	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	105.7 PK			1.23 H	151	73.9	31.8
2	*2478.00	102.8 AV			1.23 H	151	71.0	31.8
3	2483.50	58.0 PK	74.0	-16.0	1.22 H	155	26.2	31.8
4	2483.50	47.3 AV	54.0	-6.7	1.22 H	155	15.5	31.8
5	4976.00	45.5 PK	74.0	-28.5	1.11 H	328	41.7	3.8
6	4976.00	33.4 AV	54.0	-20.6	1.11 H	328	29.6	3.8

**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	114.3 PK			1.07 V	78	82.5	31.8
2	*2478.00	111.4 AV			1.07 V	78	79.6	31.8
3	2483.50	64.0 PK	74.0	-10.0	1.07 V	78	32.2	31.8
4	2483.50	53.4 AV	54.0	-0.6	1.07 V	78	21.6	31.8
5	4976.00	46.6 PK	74.0	-27.4	1.06 V	277	42.8	3.8
6	4976.00	33.4 AV	54.0	-20.6	1.06 V	277	29.6	3.8

**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.



## Mode B1

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

## ANTENNA POLARITY &amp; 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	2390.00	58.1 PK	74.0	-15.9	1.62 H	349	26.3	31.8
2	2390.00	45.8 AV	54.0	-8.2	1.62 H	349	14.0	31.8
3	*2402.00	116.8 PK			1.62 H	344	85.0	31.8
4	*2402.00	115.5 AV			1.62 H	344	83.7	31.8
5	4804.00	48.2 PK	74.0	-25.8	1.87 H	342	44.5	3.7
6	4804.00	38.2 AV	54.0	-15.8	1.87 H	342	34.5	3.7

## ANTENNA POLARITY &amp; 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	2390.00	56.8 PK	74.0	-17.2	1.16 V	268	25.0	31.8
2	2390.00	44.8 AV	54.0	-9.2	1.16 V	268	13.0	31.8
3	*2402.00	108.3 PK			1.18 V	269	76.5	31.8
4	*2402.00	107.0 AV			1.18 V	269	75.2	31.8
5	4804.00	44.7 PK	74.0	-29.3	3.21 V	162	41.0	3.7
6	4804.00	31.0 AV	54.0	-23.0	3.21 V	162	27.3	3.7

## 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.

CHANNEL	TX Channel 19	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	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	117.6 PK			1.81 H	346	85.8	31.8
2	*2440.00	116.4 AV			1.81 H	346	84.6	31.8
3	4880.00	47.7 PK	74.0	-26.3	1.90 H	344	44.2	3.5
4	4880.00	38.3 AV	54.0	-15.7	1.90 H	344	34.8	3.5

**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	*2440.00	109.5 PK			1.11 V	265	77.7	31.8
2	*2440.00	108.2 AV			1.11 V	265	76.4	31.8
3	4880.00	44.1 PK	74.0	-29.9	3.18 V	165	40.6	3.5
4	4880.00	30.8 AV	54.0	-23.2	3.18 V	165	27.3	3.5

**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.

CHANNEL	TX Channel 38	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	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	115.2 PK			1.39 H	354	83.4	31.8
2	*2478.00	113.9 AV			1.39 H	354	82.1	31.8
3	2483.50	64.3 PK	74.0	-9.7	1.39 H	354	32.5	31.8
4	2483.50	53.7 AV	54.0	-0.3	1.39 H	354	21.9	31.8
5	4956.00	49.0 PK	74.0	-25.0	1.88 H	355	45.2	3.8
6	4956.00	38.2 AV	54.0	-15.8	1.88 H	355	34.4	3.8

**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	106.7 PK			1.66 V	342	74.9	31.8
2	*2478.00	105.4 AV			1.66 V	342	73.6	31.8
3	2483.50	56.1 PK	74.0	-17.9	1.62 V	344	24.3	31.8
4	2483.50	44.7 AV	54.0	-9.3	1.62 V	344	12.9	31.8
5	4956.00	44.9 PK	74.0	-29.1	3.28 V	165	41.1	3.8
6	4956.00	31.4 AV	54.0	-22.6	3.28 V	165	27.6	3.8

**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.

CHANNEL	TX Channel 39	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	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	*2480.00	117.0 PK			1.72 H	342	85.2	31.8
2	*2480.00	107.3 AV			1.72 H	342	75.5	31.8
3	2483.50	61.8 PK	74.0	-12.2	1.72 H	342	30.0	31.8
4	2483.50	50.1 AV	54.0	-3.9	1.72 H	342	18.3	31.8
5	4960.00	42.2 PK	74.0	-31.8	1.84 H	340	38.4	3.8
6	4960.00	28.5 AV	54.0	-25.5	1.84 H	340	24.7	3.8

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	*2480.00	107.6 PK			1.16 V	269	75.8	31.8
2	*2480.00	97.8 AV			1.16 V	269	66.0	31.8
3	2483.50	53.8 PK	74.0	-20.2	1.07 V	268	22.0	31.8
4	2483.50	44.0 AV	54.0	-10.0	1.07 V	268	12.2	31.8
5	4960.00	44.0 PK	74.0	-30.0	3.17 V	167	40.2	3.8
6	4960.00	30.6 AV	54.0	-23.4	3.17 V	167	26.8	3.8

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.

Mode B3

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	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	2390.00	57.0 PK	74.0	-17.0	1.41 H	354	25.2	31.8
2	2390.00	45.2 AV	54.0	-8.8	1.41 H	354	13.4	31.8
3	*2404.00	116.0 PK			1.43 H	353	84.2	31.8
4	*2404.00	112.4 AV			1.43 H	353	80.6	31.8
5	4808.00	45.3 PK	74.0	-28.7	1.88 H	321	41.6	3.7
6	4808.00	35.2 AV	54.0	-18.8	1.88 H	321	31.5	3.7

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	2390.00	56.6 PK	74.0	-17.4	1.15 V	261	24.8	31.8
2	2390.00	44.4 AV	54.0	-9.6	1.15 V	261	12.6	31.8
3	*2404.00	108.0 PK			1.18 V	262	76.2	31.8
4	*2404.00	105.4 AV			1.18 V	262	73.6	31.8
5	4808.00	44.9 PK	74.0	-29.1	3.11 V	165	41.2	3.7
6	4808.00	30.8 AV	54.0	-23.2	3.11 V	165	27.1	3.7

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.

CHANNEL	TX Channel 19	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	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	117.5 PK			1.79 H	351	85.7	31.8
2	*2440.00	114.1 AV			1.79 H	351	82.3	31.8
3	4880.00	45.3 PK	74.0	-28.7	1.91 H	339	41.8	3.5
4	4880.00	35.2 AV	54.0	-18.8	1.91 H	339	31.7	3.5

**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	*2440.00	109.1 PK			1.19 V	264	77.3	31.8
2	*2440.00	105.8 AV			1.19 V	264	74.0	31.8
3	4880.00	43.7 PK	74.0	-30.3	3.12 V	165	40.2	3.5
4	4880.00	30.2 AV	54.0	-23.8	3.12 V	165	26.7	3.5

**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.

CHANNEL	TX Channel 38	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	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	115.1 PK			1.79 H	355	83.3	31.8
2	*2478.00	111.7 AV			1.79 H	355	79.9	31.8
3	2483.50	64.0 PK	74.0	-10.0	1.77 H	342	32.2	31.8
4	2483.50	53.1 AV	54.0	-0.9	1.77 H	342	21.3	31.8
5	4976.00	46.7 PK	74.0	-27.3	1.93 H	331	42.9	3.8
6	4976.00	32.6 AV	54.0	-21.4	1.93 H	331	28.8	3.8

**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	107.9 PK			1.77 V	358	76.1	31.8
2	*2478.00	103.5 AV			1.77 V	358	71.7	31.8
3	2483.50	56.2 PK	74.0	-17.8	1.19 V	4	24.4	31.8
4	2483.50	44.4 AV	54.0	-9.6	1.19 V	4	12.6	31.8
5	4976.00	45.5 PK	74.0	-28.5	3.22 V	168	41.7	3.8
6	4976.00	32.0 AV	54.0	-22.0	3.22 V	168	28.2	3.8

**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.

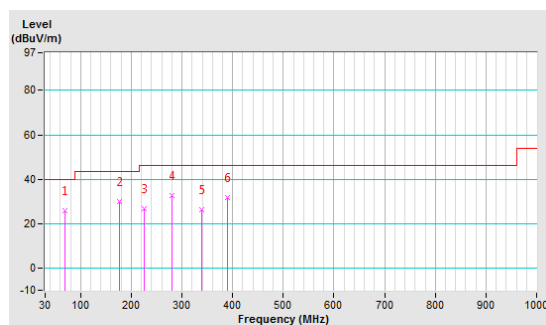
Below 1GHz worst-case data:

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	A1

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	68.80	26.0 QP	40.0	-14.0	1.00 H	184	37.6	-11.6
2	177.44	30.0 QP	43.5	-13.5	1.00 H	160	40.2	-10.2
3	224.97	26.5 QP	46.0	-19.5	1.00 H	142	37.6	-11.1
4	281.23	32.8 QP	46.0	-13.2	1.00 H	147	41.1	-8.3
5	338.46	26.4 QP	46.0	-19.6	1.00 H	207	33.7	-7.3
6	389.87	31.9 QP	46.0	-14.1	1.00 H	56	38.3	-6.4

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



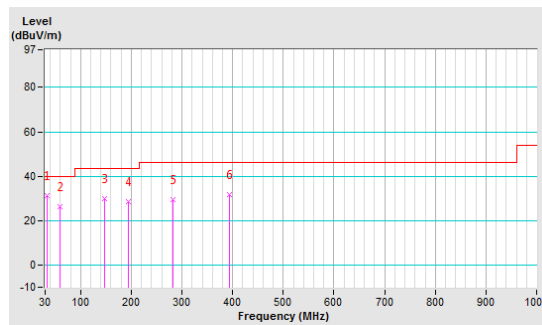


CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	A1

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	34.85	31.1 QP	40.0	-8.9	1.00 V	204	41.9	-10.8
2	60.07	26.2 QP	40.0	-13.8	1.00 V	288	36.5	-10.3
3	146.40	29.8 QP	43.5	-13.7	1.00 V	339	39.2	-9.4
4	193.93	28.4 QP	43.5	-15.1	1.00 V	204	39.9	-11.5
5	283.17	29.3 QP	46.0	-16.7	1.00 V	177	37.6	-8.3
6	393.75	31.6 QP	46.0	-14.4	1.00 V	161	38.0	-6.4

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

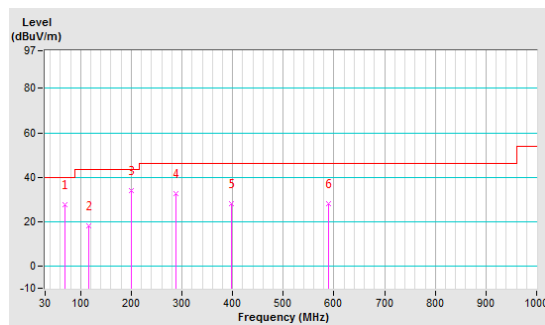


CHANNEL	TX Channel 1	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	A3

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	68.80	27.5 QP	40.0	-12.5	1.00 H	212	39.1	-11.6
2	116.33	18.2 QP	43.5	-25.3	1.00 H	356	30.1	-11.9
3	199.75	34.1 QP	43.5	-9.4	1.00 H	154	45.6	-11.5
4	288.99	32.6 QP	46.0	-13.4	1.00 H	217	40.8	-8.2
5	398.60	28.2 QP	46.0	-17.8	1.00 H	50	34.4	-6.2
6	588.72	27.9 QP	46.0	-18.1	1.00 H	128	30.6	-2.7

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

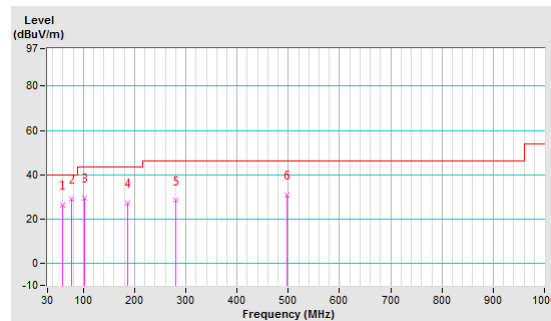


CHANNEL	TX Channel 1	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	A3

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	59.10	26.2 QP	40.0	-13.8	1.00 V	318	36.5	-10.3
2	77.53	28.9 QP	40.0	-11.1	1.00 V	226	42.4	-13.5
3	101.78	29.6 QP	43.5	-13.9	1.00 V	223	43.0	-13.4
4	186.17	27.4 QP	43.5	-16.1	1.00 V	207	38.6	-11.2
5	281.23	28.3 QP	46.0	-17.7	1.00 V	176	36.6	-8.3
6	496.57	30.6 QP	46.0	-15.4	1.00 V	114	35.2	-4.6

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

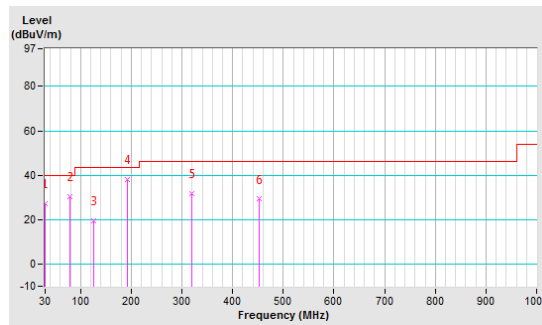


CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	B1

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	30.97	27.3 QP	40.0	-12.7	1.00 H	60	38.7	-11.4
2	78.50	30.2 QP	40.0	-9.8	1.00 H	229	43.9	-13.7
3	125.06	19.3 QP	43.5	-24.2	1.00 H	256	30.5	-11.2
4	192.96	38.2 QP	43.5	-5.3	1.00 H	147	49.7	-11.5
5	320.03	31.8 QP	46.0	-14.2	1.00 H	168	39.2	-7.4
6	452.92	29.2 QP	46.0	-16.8	1.00 H	314	34.3	-5.1

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

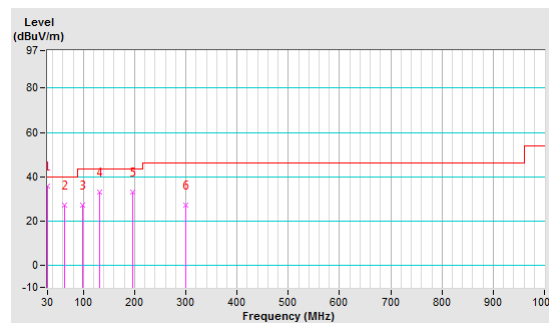


CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	B1

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	30.97	35.6 QP	40.0	-4.4	1.00 V	207	47.0	-11.4
2	62.98	27.2 QP	40.0	-12.8	1.00 V	123	37.7	-10.5
3	98.87	27.4 QP	43.5	-16.1	1.00 V	228	41.3	-13.9
4	131.85	32.9 QP	43.5	-10.6	1.00 V	123	43.5	-10.6
5	196.84	33.1 QP	43.5	-10.4	1.00 V	194	44.7	-11.6
6	299.66	27.3 QP	46.0	-18.7	1.00 V	199	35.2	-7.9

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

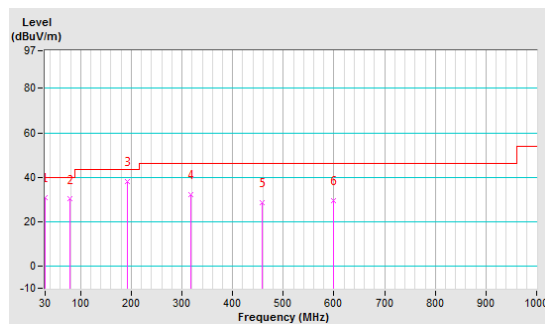


CHANNEL	TX Channel 1	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	B3

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	30.00	30.9 QP	40.0	-9.1	1.00 H	218	42.1	-11.2
2	78.50	30.1 QP	40.0	-9.9	1.00 H	218	43.8	-13.7
3	192.96	38.0 QP	43.5	-5.5	1.00 H	154	49.5	-11.5
4	317.12	32.0 QP	46.0	-14.0	1.00 H	171	39.4	-7.4
5	457.77	28.7 QP	46.0	-17.3	1.00 H	300	33.9	-5.2
6	598.42	29.3 QP	46.0	-16.7	1.00 H	147	31.7	-2.4

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

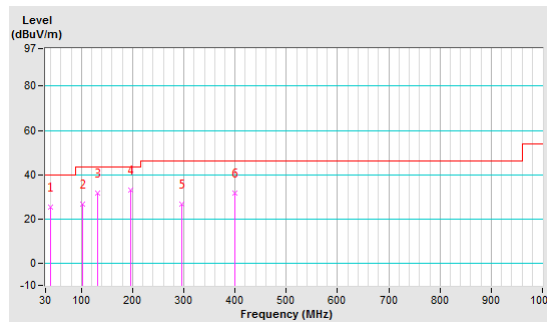


CHANNEL	TX Channel 1	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	B3

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	40.67	25.3 QP	40.0	-14.7	1.00 V	94	35.5	-10.2
2	101.78	26.8 QP	43.5	-16.7	1.00 V	69	40.2	-13.4
3	130.88	31.7 QP	43.5	-11.8	1.00 V	109	42.4	-10.7
4	195.87	33.0 QP	43.5	-10.5	1.00 V	236	44.6	-11.6
5	295.78	26.9 QP	46.0	-19.1	1.00 V	199	34.9	-8.0
6	400.54	31.6 QP	46.0	-14.4	1.00 V	225	37.9	-6.3

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



## 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.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESR3	102412	Feb. 14, 2019	Feb. 13, 2020
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond2-01	Sep. 05, 2018	Sep. 04, 2019
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Jan. 30, 2019	Jan. 29, 2020
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Aug. 13, 2018	Aug. 12, 2019
Software ADT	BV ADT_Cond_ V7.3.7.4	NA	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 test was performed in HwaYa Shielded Room 2.

3. The VCCI Site Registration No. is C-12047.

4. Test date: Apr. 17, 2019



#### 4.2.3 Test Procedures

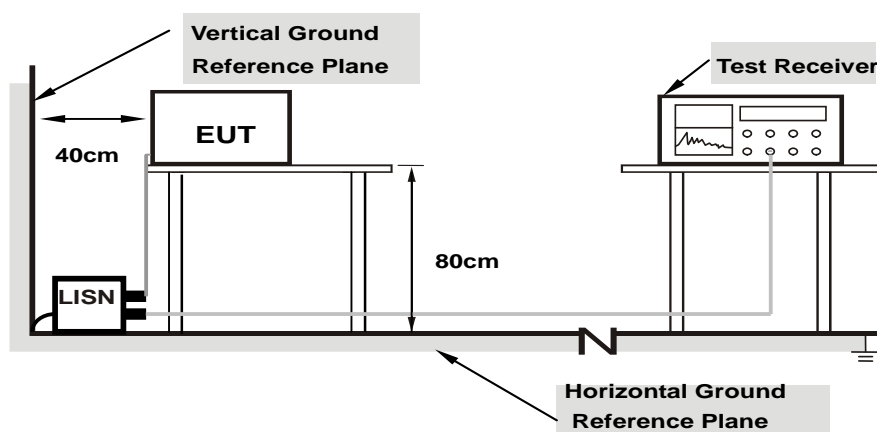
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance 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 item 4.1.6.

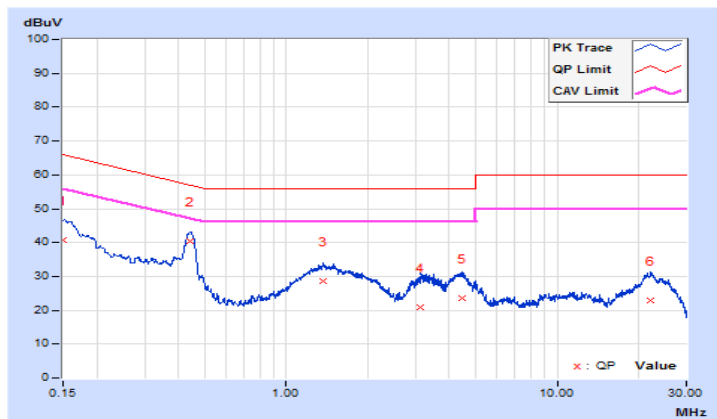
#### 4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A1		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
			1	0.15000	10.19	30.63	15.16	40.82	25.35	66.00
2	0.43891	10.28	29.98	22.57	40.26	32.85	57.08	47.08	-16.82	-14.23
3	1.37400	10.32	18.14	11.10	28.46	21.42	56.00	46.00	-27.54	-24.58
4	3.14475	10.38	10.39	4.09	20.77	14.47	56.00	46.00	-35.23	-31.53
5	4.46100	10.42	13.29	5.23	23.71	15.65	56.00	46.00	-32.29	-30.35
6	22.15275	10.78	12.08	7.41	22.86	18.19	60.00	50.00	-37.14	-31.81

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.

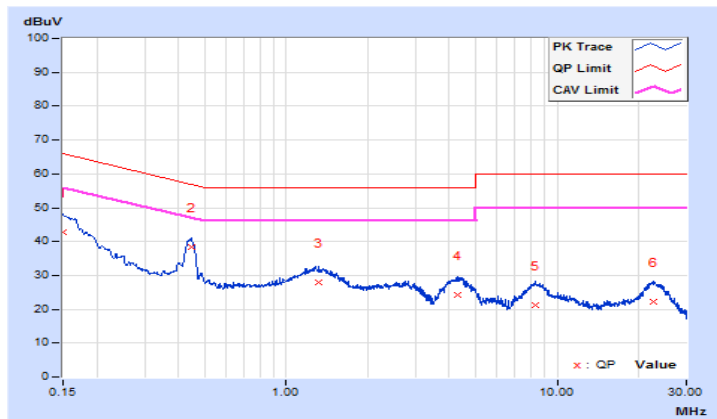


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A1		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
			1	0.15000	10.19	32.67	17.67	42.86	27.86	66.00
2	0.44474	10.25	28.02	21.23	38.27	31.48	56.97	46.97	-18.70	-15.49
3	1.32225	10.30	17.54	10.67	27.84	20.97	56.00	46.00	-28.16	-25.03
4	4.28775	10.42	13.92	5.52	24.34	15.94	56.00	46.00	-31.66	-30.06
5	8.29275	10.56	10.70	4.77	21.26	15.33	60.00	50.00	-38.74	-34.67
6	22.58475	10.87	11.30	6.96	22.17	17.83	60.00	50.00	-37.83	-32.17

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.

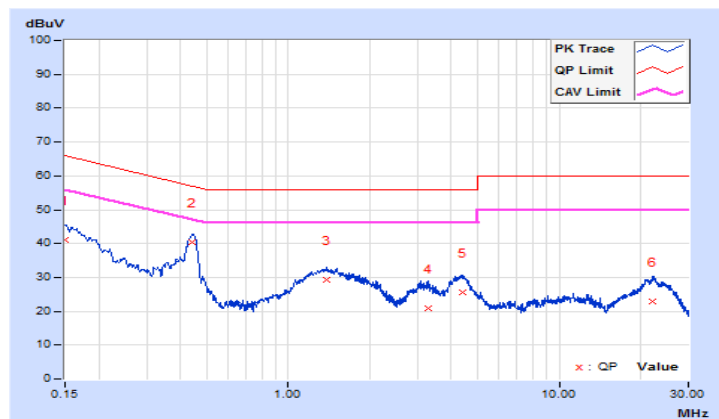


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A3		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
			1	0.15000	10.19	30.92	15.18	41.11	25.37	66.00
2	0.44007	10.28	30.09	22.79	40.37	33.07	57.06	47.06	-16.69	-13.99
3	1.38975	10.32	18.87	12.63	29.19	22.95	56.00	46.00	-26.81	-23.05
4	3.30450	10.38	10.48	4.03	20.86	14.41	56.00	46.00	-35.14	-31.59
5	4.38900	10.42	15.21	6.33	25.63	16.75	56.00	46.00	-30.37	-29.25
6	22.24950	10.78	12.17	7.45	22.95	18.23	60.00	50.00	-37.05	-31.77

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.

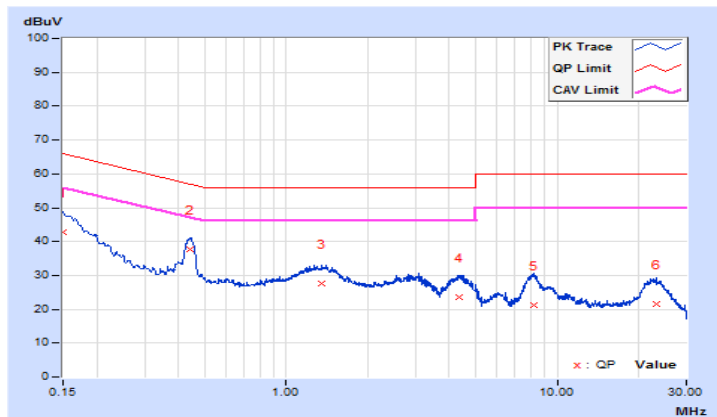


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A3		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
			1	0.15000	10.19	32.64	17.69	42.83	27.88	66.00
2	0.44007	10.25	27.54	20.07	37.79	30.32	57.06	47.06	-19.27	-16.74
3	1.35825	10.30	17.28	10.89	27.58	21.19	56.00	46.00	-28.42	-24.81
4	4.36875	10.42	13.30	5.73	23.72	16.15	56.00	46.00	-32.28	-29.85
5	8.23200	10.56	10.61	4.52	21.17	15.08	60.00	50.00	-38.83	-34.92
6	23.14275	10.85	10.64	6.23	21.49	17.08	60.00	50.00	-38.51	-32.92

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.

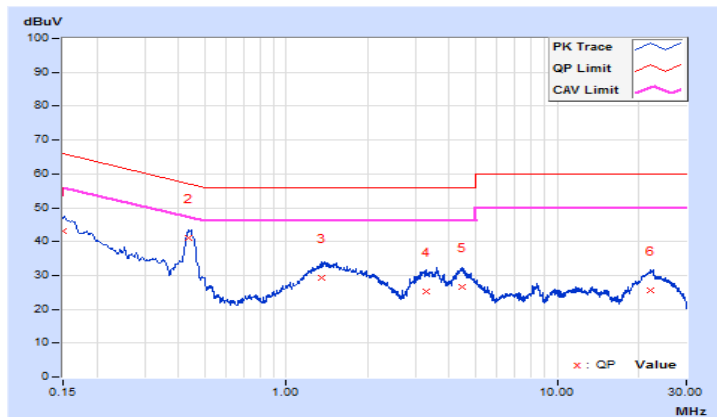


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B1		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
			1	0.15000	10.19	32.93	14.55	43.12	24.74	66.00
<b>2</b>	<b>0.43800</b>	<b>10.28</b>	<b>30.86</b>	<b>23.25</b>	<b>41.14</b>	<b>33.53</b>	<b>57.10</b>	<b>47.10</b>	<b>-15.96</b>	<b>-13.57</b>
3	1.34700	10.32	18.85	11.44	29.17	21.76	56.00	46.00	-26.83	-24.24
4	3.28200	10.38	14.94	8.93	25.32	19.31	56.00	46.00	-30.68	-26.69
5	4.45875	10.42	16.22	7.02	26.64	17.44	56.00	46.00	-29.36	-28.56
6	22.03800	10.79	14.90	10.75	25.69	21.54	60.00	50.00	-34.31	-28.46

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.

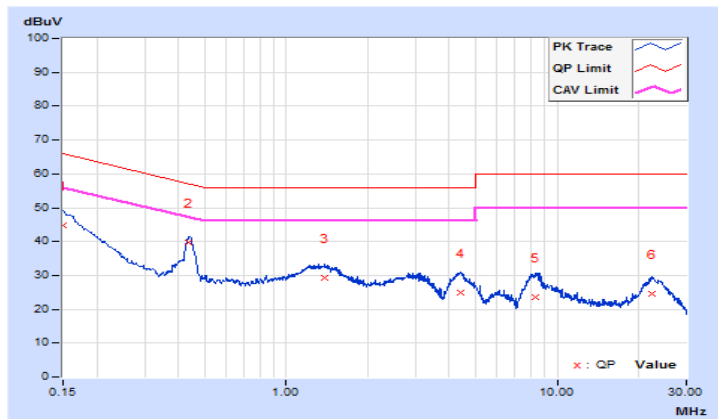


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B1		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
			1	0.15000	10.19	34.66	18.03	44.85	28.22	66.00
2	0.43775	10.25	29.37	21.29	39.62	31.54	57.10	47.10	-17.48	-15.56
3	1.37850	10.30	19.03	11.77	29.33	22.07	56.00	46.00	-26.67	-23.93
4	4.37775	10.42	14.66	6.02	25.08	16.44	56.00	46.00	-30.92	-29.56
5	8.33325	10.56	13.03	6.44	23.59	17.00	60.00	50.00	-36.41	-33.00
6	22.47675	10.87	13.59	9.54	24.46	20.41	60.00	50.00	-35.54	-29.59

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.

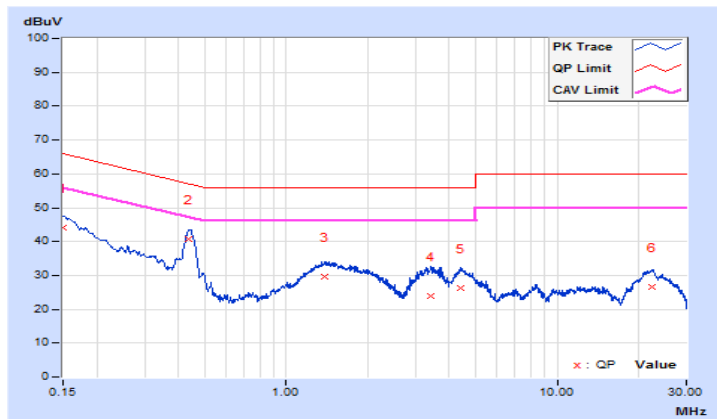


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B3		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
			1	0.15000	10.19	33.84	14.95	44.03	25.14	66.00
2	0.43545	10.28	30.50	22.98	40.78	33.26	57.15	47.15	-16.37	-13.89
3	1.38975	10.32	19.34	13.57	29.66	23.89	56.00	46.00	-26.34	-22.11
4	3.43500	10.39	13.66	6.16	24.05	16.55	56.00	46.00	-31.95	-29.45
5	4.40700	10.42	15.95	5.58	26.37	16.00	56.00	46.00	-29.63	-30.00
6	22.31025	10.78	15.75	11.62	26.53	22.40	60.00	50.00	-33.47	-27.60

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.



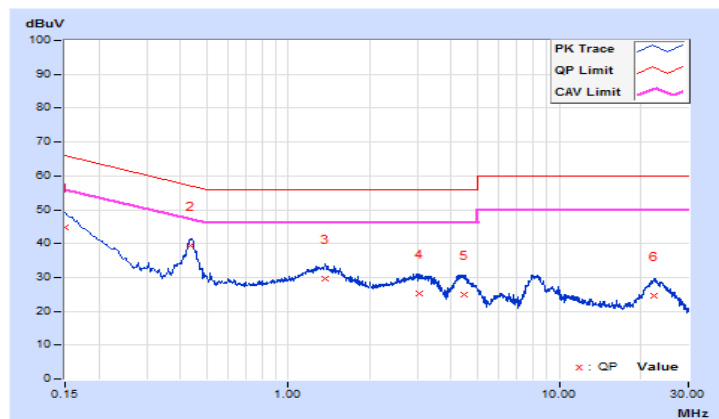


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B3		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
			1	0.15000	10.19	34.64	17.90	44.83	28.09	66.00
2	0.43775	10.25	29.26	21.19	39.51	31.44	57.10	47.10	-17.59	-15.66
3	1.37175	10.30	19.31	12.24	29.61	22.54	56.00	46.00	-26.39	-23.46
4	3.03450	10.37	14.81	7.72	25.18	18.09	56.00	46.00	-30.82	-27.91
5	4.46325	10.43	14.65	7.44	25.08	17.87	56.00	46.00	-30.92	-28.13
6	22.38900	10.87	13.55	9.60	24.42	20.47	60.00	50.00	-35.58	-29.53

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 Number of Hopping Frequency Used

#### 4.3.1 Limits of Hopping Frequency Used Measurement

At least 15 channels frequencies, and should be equally spaced.

#### 4.3.2 Test Setup



#### 4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

#### 4.3.4 Test Procedure

- a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- c. Set the SA on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
- d. Set the SA on View mode and then plot the result on SA screen.
- e. Repeat above procedures until all frequencies measured were complete.

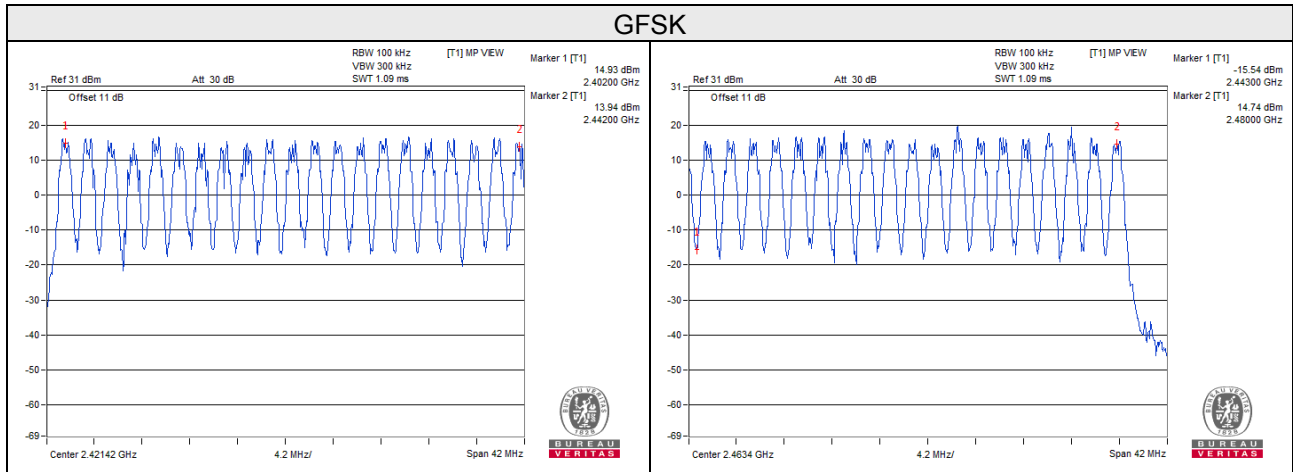
#### 4.3.5 Deviation from Test Standard

No deviation.

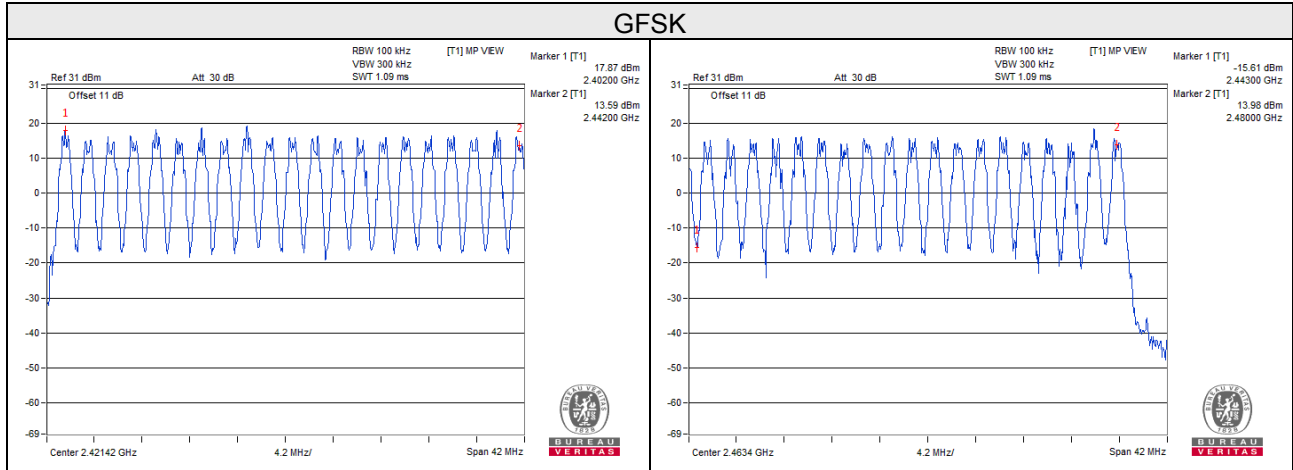
#### 4.3.6 Test Results

There are 38 hopping frequencies in the hopping mode. Please refer to next page for the test result. On the plots, it shows that the hopping frequencies are equally spaced.

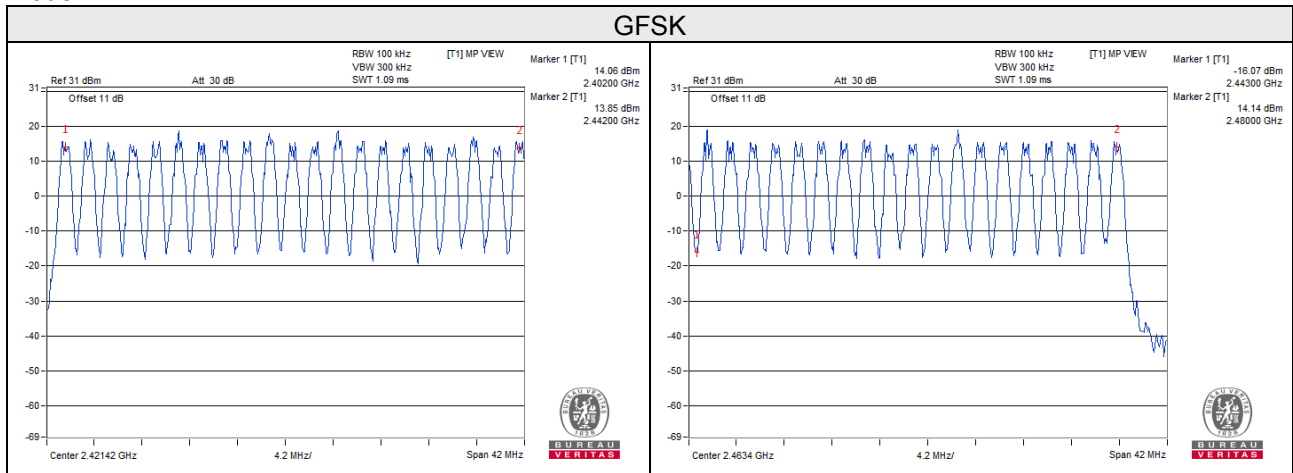
### Mode A1



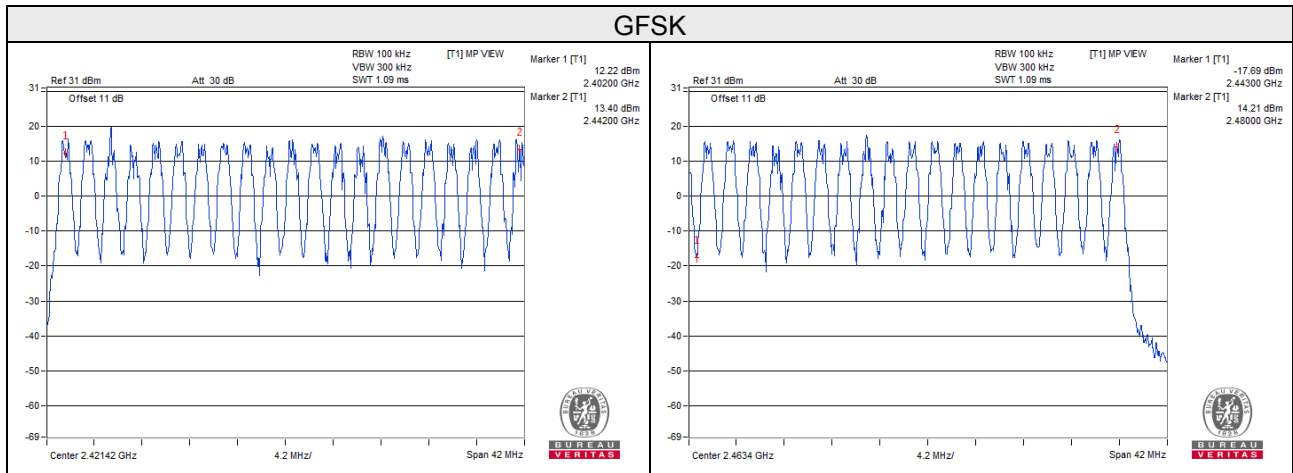
### Mode A3



### Mode B1



### Mode B3



#### 4.4 Dwell Time on Each Channel

##### 4.4.1 Limits of Dwell Time on Each Channel Measurement

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

##### 4.4.2 Test Setup



##### 4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

##### 4.4.4 Test Procedures

- a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- c. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
- d. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
- e. Repeat above procedures until all different time-slot modes have been completed.

##### 4.4.5 Deviation from Test Standard

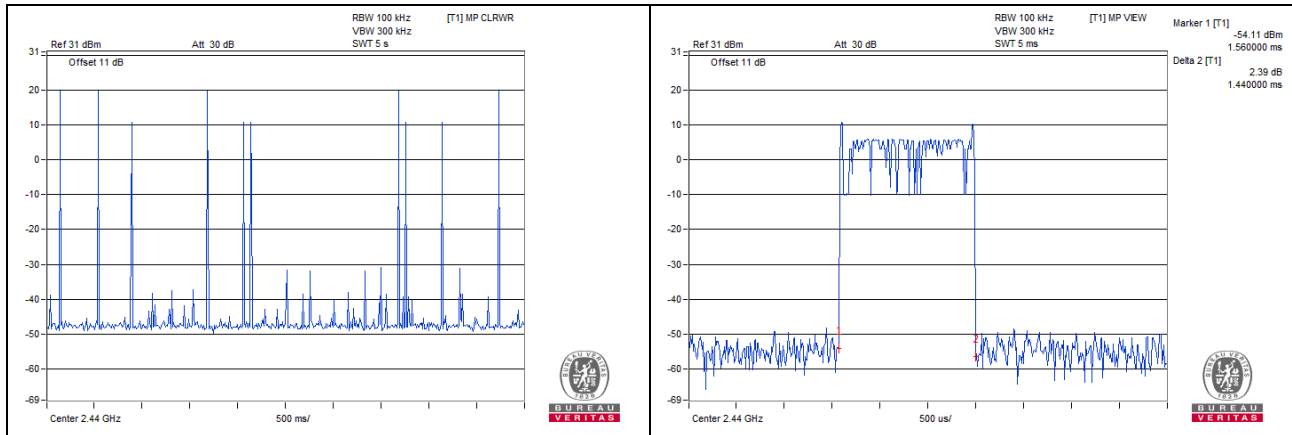
No deviation.

### 4.4.6 Test Results

#### Mode A1

Mode	Number of transmission in a 14.8 (37Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
Hopping	10 (times / 5 sec) * 2.96 = 29.6 times	1.440	42.624	400

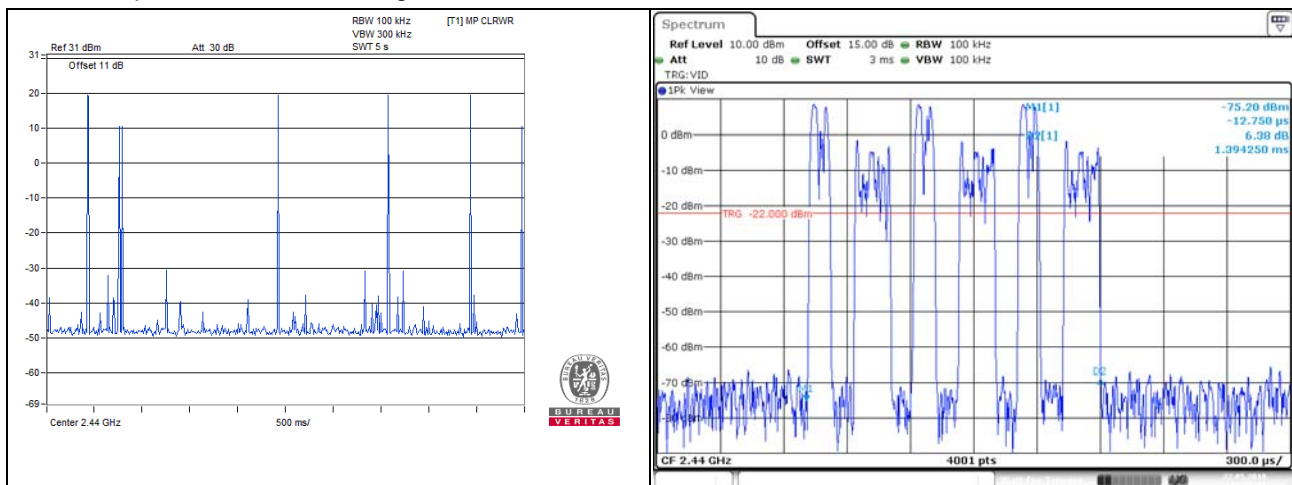
Note: Test plots of the transmitting time slot are shown as below.



#### Mode A3

Mode	Number of transmission in a 14.8 (37Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
Hopping	7 (times / 5 sec) * 2.96 = 20.72 times	1.390	28.801	400

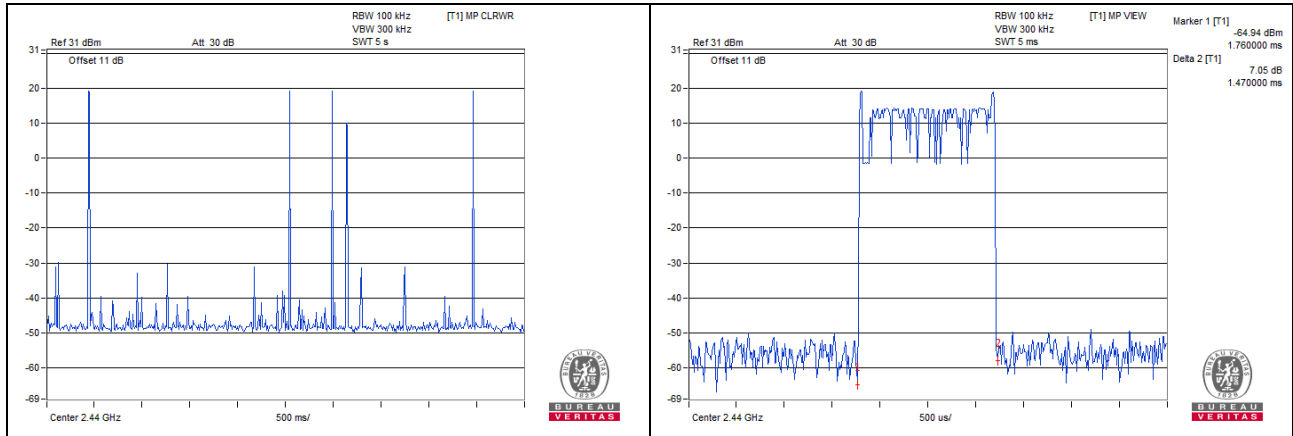
Note: Test plots of the transmitting time slot are shown as below.



### Mode B1

Mode	Number of transmission in a 14.8 (37Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
Hopping	5 (times / 5 sec) * 2.96 = 14.8 times	1.470	21.756	400

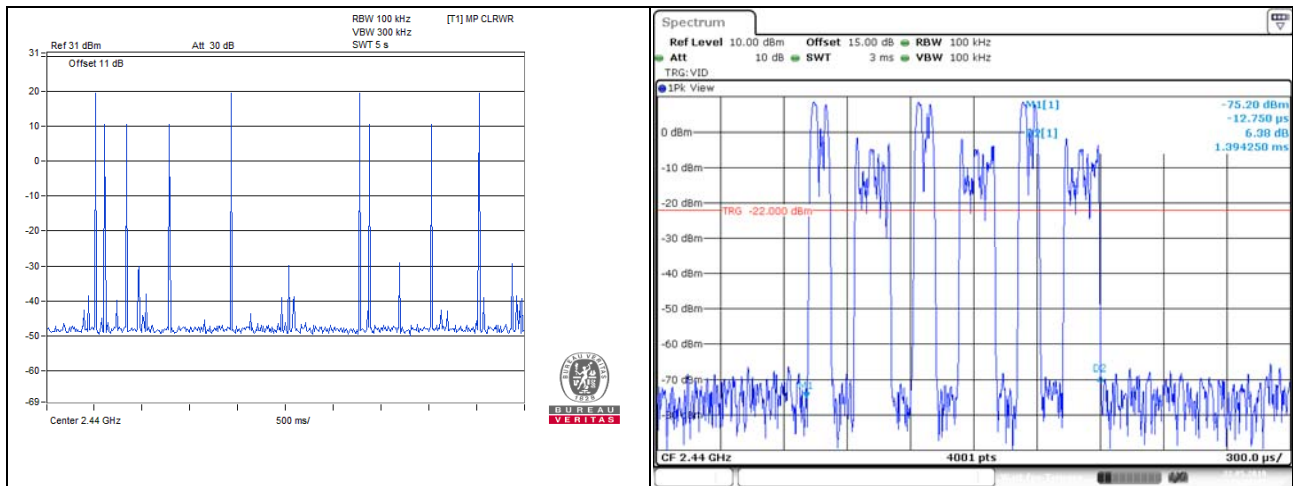
Note: Test plots of the transmitting time slot are shown as below.



### Mode B3

Mode	Number of transmission in a 14.8 (37Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
Hopping	9 (times / 5 sec) * 2.96 = 26.64 times	1.390	37.030	400

Note: Test plots of the transmitting time slot are shown as below.

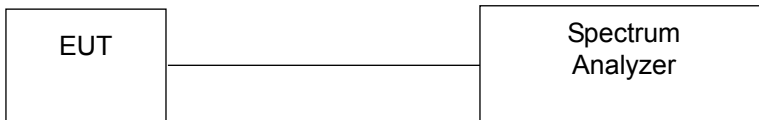


## 4.5 Channel Bandwidth

### 4.5.1 Limits of Channel Bandwidth Measurement

For frequency hopping system operating in the 2400-2483.5MHz, 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.

### 4.5.2 Test Setup



### 4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.5.4 Test Procedure

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
- Repeat above procedures until all frequencies measured were complete.

### 4.5.5 Deviation from Test Standard

No deviation.

### 4.5.6 EUT Operating Condition

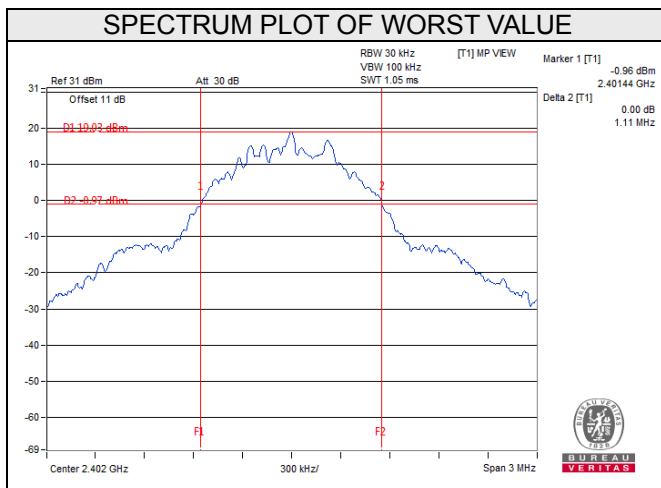
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.



### 4.5.7 Test Results

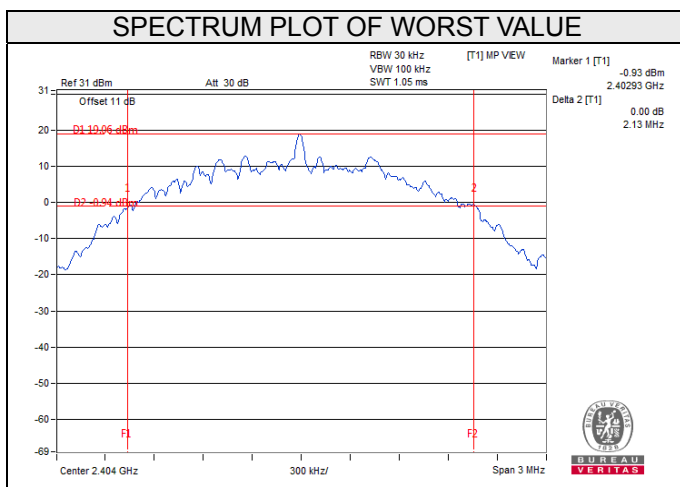
#### Mode A1

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
0	2402	1.11
19	2440	1.11
38	2478	1.11
39	2480	1.11



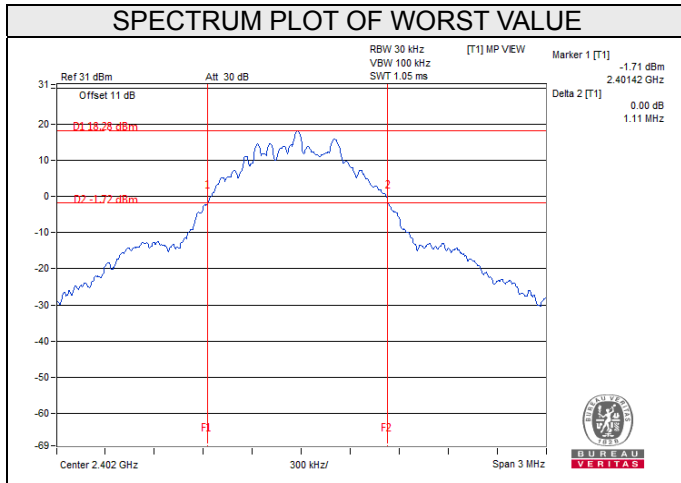
#### Mode A3

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
1	2404	2.13
19	2440	2.13
38	2478	2.07



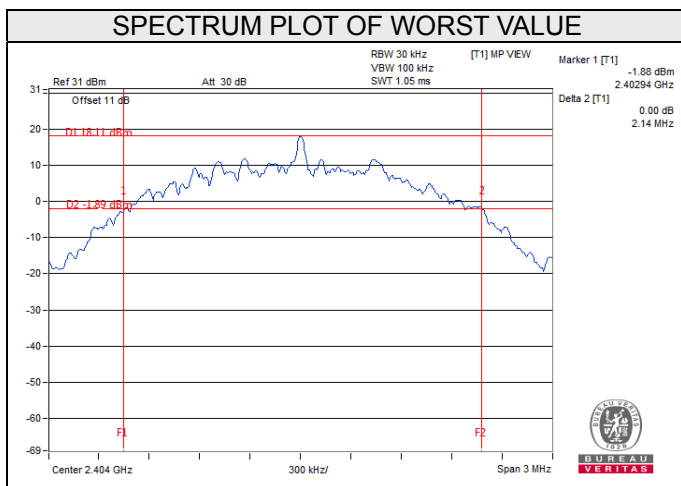
Mode B1

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
0	2402	1.11
19	2440	1.11
38	2478	1.11
39	2480	1.11



Mode B3

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
1	2404	2.14
19	2440	2.14
38	2478	2.14

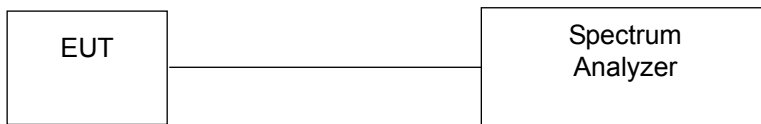


## 4.6 Hopping Channel Separation

### 4.6.1 Limits of Hopping Channel Separation Measurement

At least 25kHz or two-third of 20dB hopping channel bandwidth (whichever is greater).

### 4.6.2 Test Setup



### 4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.6.4 Test Procedure

Measurement Procedure REF

- a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
- c. By using the MaxHold function record the separation of two adjacent channels.
- d. Measure the frequency difference of these two adjacent channels by SA MARK function. And then plot the result on SA screen.
- e. Repeat above procedures until all frequencies measured were complete.

### 4.6.5 Deviation from Test Standard

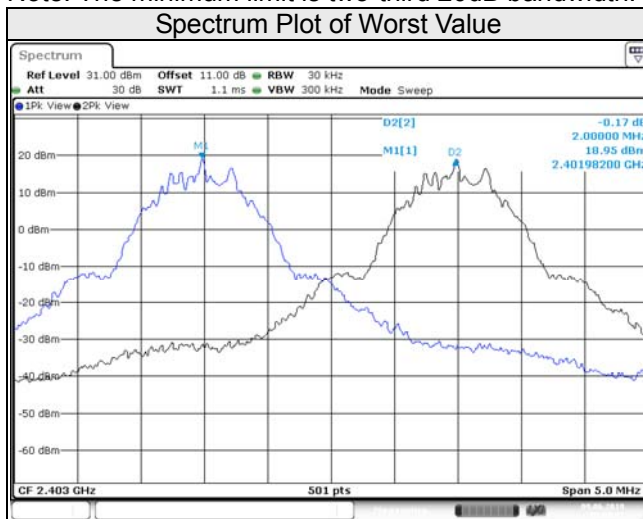
No deviation.

### 4.6.6 Test Results

#### Mode A1

Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)	20dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	2.00	1.11	0.74	Pass
19	2440	2.00	1.11	0.74	Pass
38	2478	2.00	1.11	0.74	Pass
39	2480	2.00	1.11	0.74	Pass

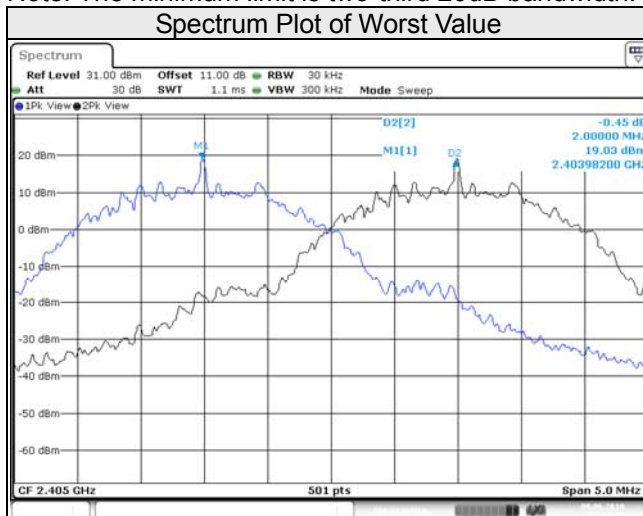
Note: The minimum limit is two-third 20dB bandwidth.



#### Mode A3

Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)	20dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2404	2.00	2.13	1.42	Pass
19	2440	2.00	2.13	1.42	Pass
38	2478	2.00	2.07	1.38	Pass

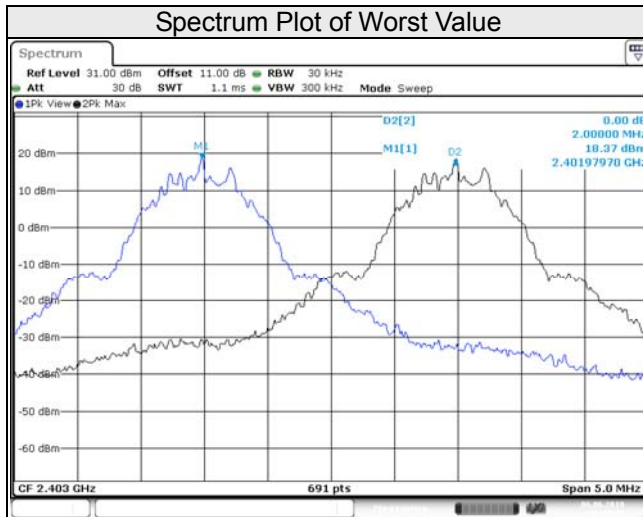
Note: The minimum limit is two-third 20dB bandwidth.



Mode B1

Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)	20dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	2.00	1.11	0.74	Pass
19	2440	2.00	1.11	0.74	Pass
38	2478	2.00	1.11	0.74	Pass
39	2480	2.00	1.11	0.74	Pass

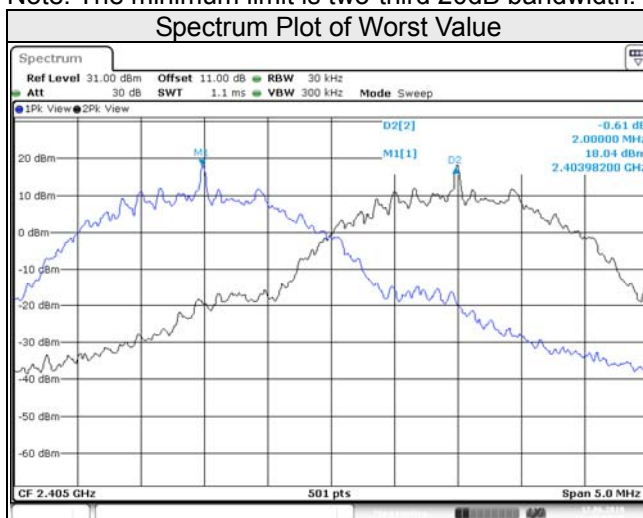
Note: The minimum limit is two-third 20dB bandwidth.



Mode B3

Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)	20dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2404	2.00	2.14	1.43	Pass
19	2440	2.00	2.14	1.43	Pass
38	2478	2.00	2.14	1.43	Pass

Note: The minimum limit is two-third 20dB bandwidth.

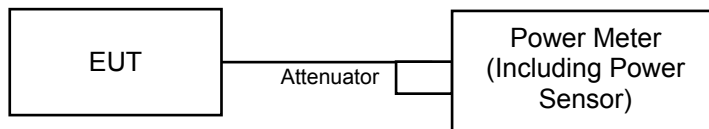


## 4.7 Maximum Output Power

### 4.7.1 Limits of Maximum Output Power Measurement

The Maximum Output Power Measurement is 125mW.

### 4.7.2 Test Setup



### 4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.7.4 Test Procedure

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

### 4.7.5 Deviation from Test Standard

No deviation.

### 4.7.6 EUT Operating Condition

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

#### 4.7.7 Test Results

##### Mode A1

Channel	Frequency (MHz)	Output Power (mW)	Output Power (dBm)	Power Limit (mW)	Pass / Fail
0	2402	86.896	19.39	125	Pass
19	2440	<b>90.365</b>	19.56	125	Pass
38	2478	86.099	19.35	125	Pass
39	2480	80.910	19.08	125	Pass

##### Mode A2

Channel	Frequency (MHz)	Output Power (mW)	Output Power (dBm)	Power Limit (mW)	Pass / Fail
0	2402	11.830	10.73	125	Pass
19	2440	11.995	10.79	125	Pass
38	2478	<b>12.023</b>	10.80	125	Pass
39	2480	<b>12.023</b>	10.80	125	Pass

##### Mode A3

Channel	Frequency (MHz)	Output Power (mW)	Output Power (dBm)	Power Limit (mW)	Pass / Fail
1	2404	<b>87.297</b>	19.41	125	Pass
19	2440	84.918	19.29	125	Pass
38	2478	49.431	16.94	125	Pass

##### Mode A4

Channel	Frequency (MHz)	Output Power (mW)	Output Power (dBm)	Power Limit (mW)	Pass / Fail
1	2404	11.995	10.79	125	Pass
19	2440	<b>12.106</b>	10.83	125	Pass
38	2478	10.257	10.11	125	Pass

## Mode B1

Channel	Frequency (MHz)	Output Power (mW)	Output Power (dBm)	Power Limit (mW)	Pass / Fail
0	2402	<b>94.842</b>	19.77	125	Pass
19	2440	92.045	19.64	125	Pass
38	2478	90.782	19.58	125	Pass
39	2480	81.283	19.10	125	Pass

## Mode B2

Channel	Frequency (MHz)	Output Power (mW)	Output Power (dBm)	Power Limit (mW)	Pass / Fail
0	2402	11.803	10.72	125	Pass
19	2440	11.995	10.79	125	Pass
38	2478	12.023	10.80	125	Pass
39	2480	<b>12.050</b>	10.81	125	Pass

## Mode B3

Channel	Frequency (MHz)	Output Power (mW)	Output Power (dBm)	Power Limit (mW)	Pass / Fail
1	2404	<b>99.083</b>	19.96	125	Pass
19	2440	95.499	19.80	125	Pass
38	2478	48.529	16.86	125	Pass

## Mode B4

Channel	Frequency (MHz)	Output Power (mW)	Output Power (dBm)	Power Limit (mW)	Pass / Fail
1	2404	11.885	10.75	125	Pass
19	2440	<b>12.050</b>	10.81	125	Pass
38	2478	10.304	10.13	125	Pass



## **4.8 Conducted Out of Band Emission Measurement**

### **4.8.1 Limits Of Conducted Out Of Band Emission Measurement**

Below  $-20\text{dB}$  of the highest emission level of operating band (in  $100\text{kHz}$  RBW).

### **4.8.2 Test Instruments**

Refer to section 4.1.2 to get information of above instrument.

### **4.8.3 Test Procedure**

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set both RBW and VBW of spectrum analyzer to  $100\text{ kHz}$  and  $300\text{ kHz}$  with suitable frequency span including  $100\text{ MHz}$  bandwidth from band edge. The band edges was measured and recorded.

### **4.8.4 Deviation from Test Standard**

No deviation.

### **4.8.5 EUT Operating Condition**

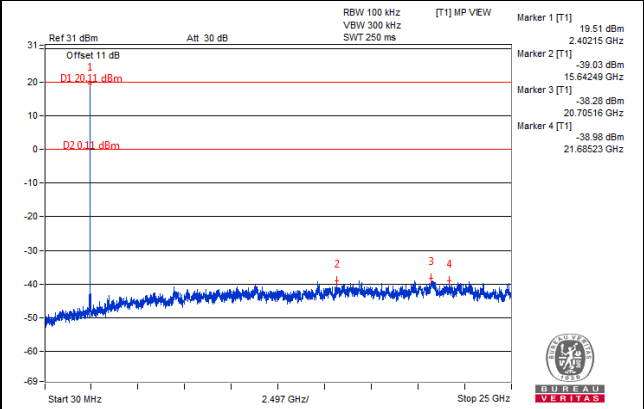
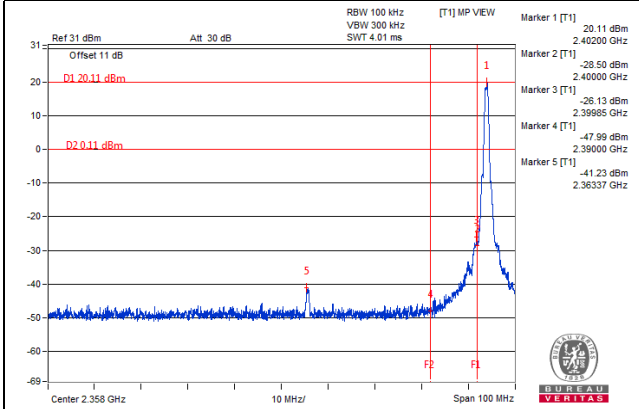
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

### **4.8.6 Test Results**

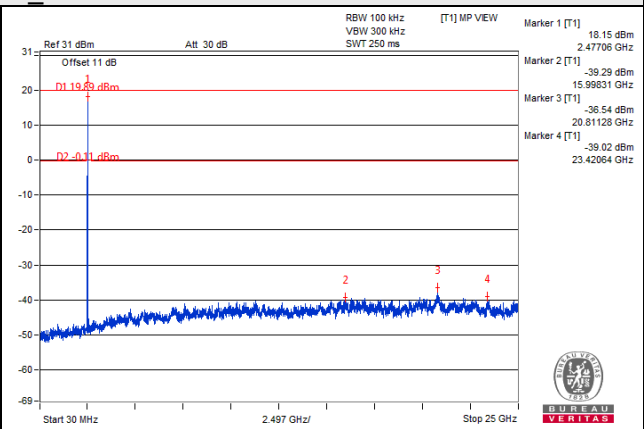
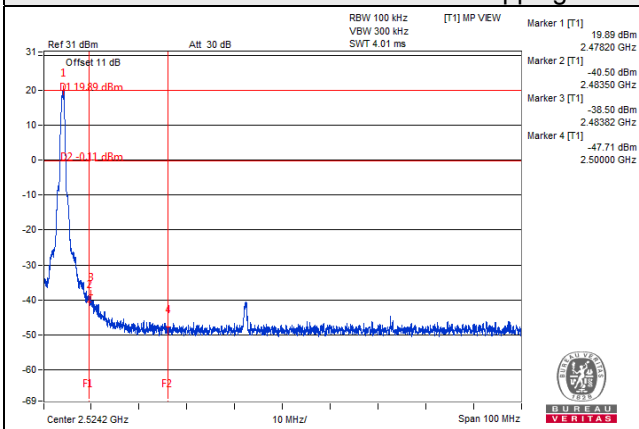
The spectrum plots are attached on the following images. D1 line indicates the highest level, D2 line indicates the  $20\text{dB}$  offset below D1. It shows compliance with the requirement.

Mode A1

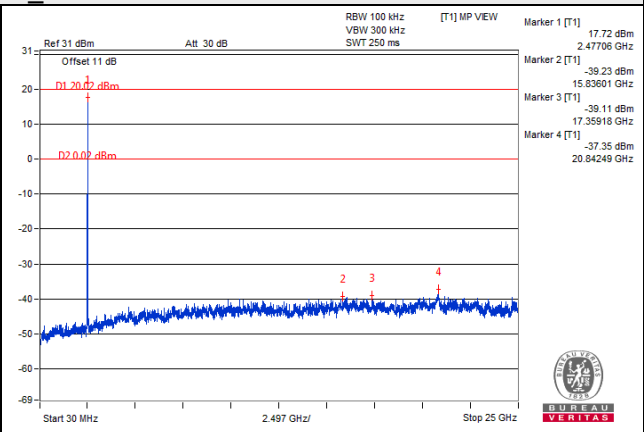
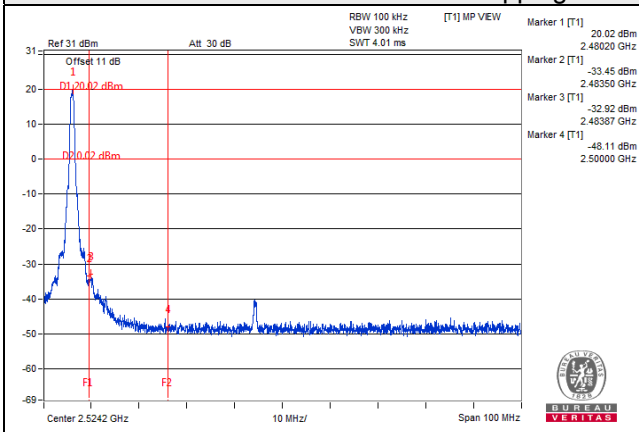
Hopping disabled Channel 0



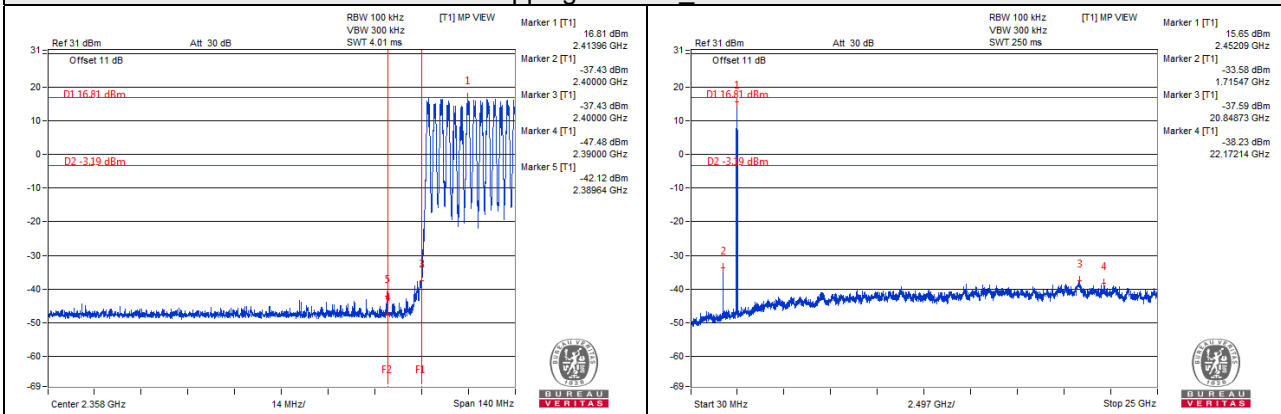
Hopping disabled Channel 38



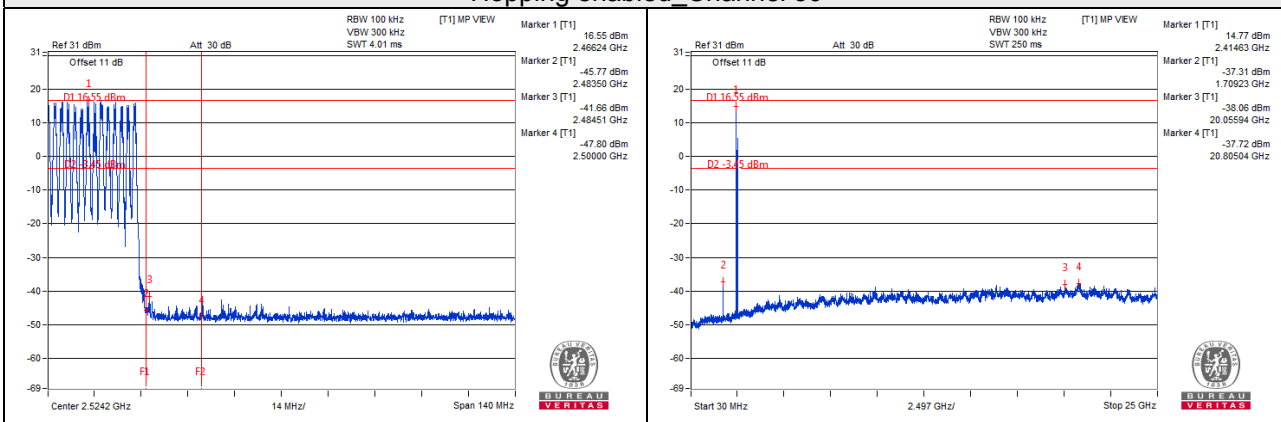
Hopping disabled Channel 39



### Hopping enabled Channel 0

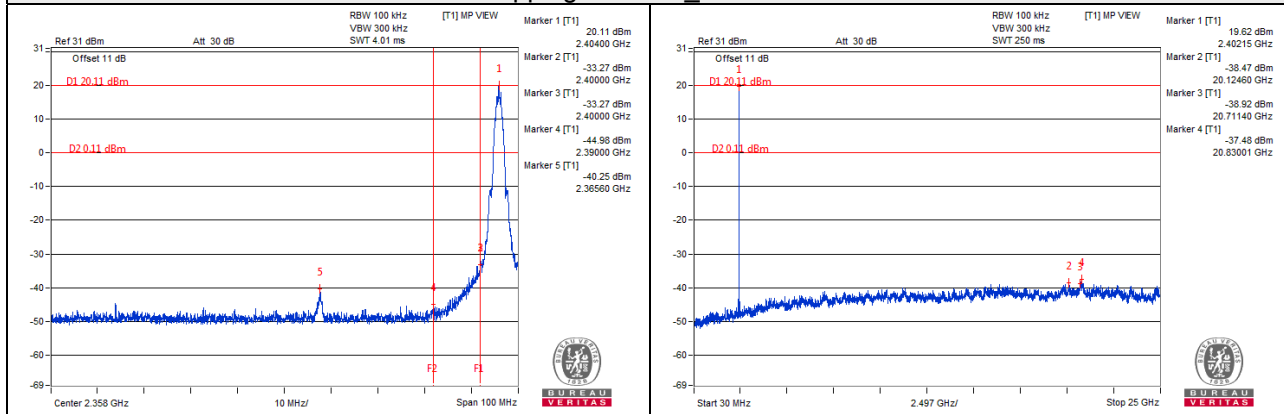


### Hopping enabled Channel 39

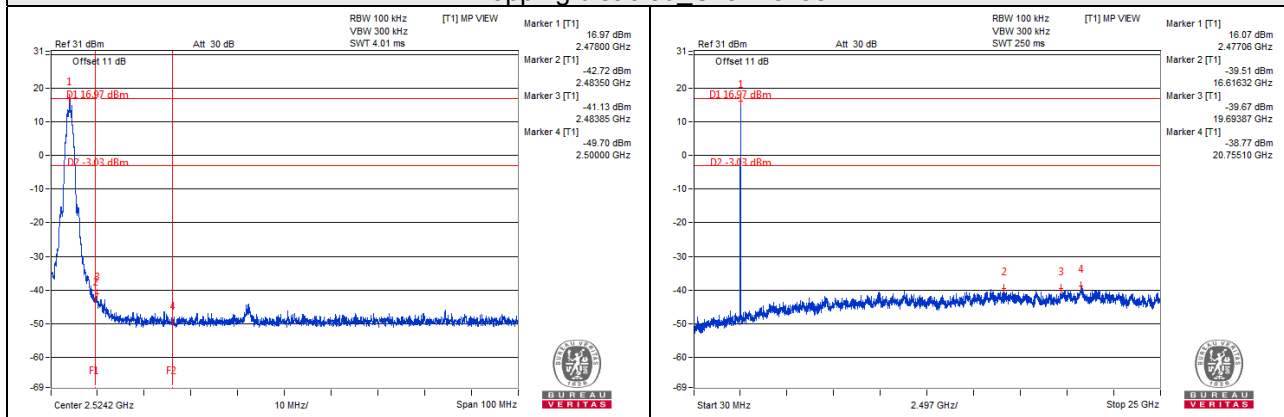


Mode A3

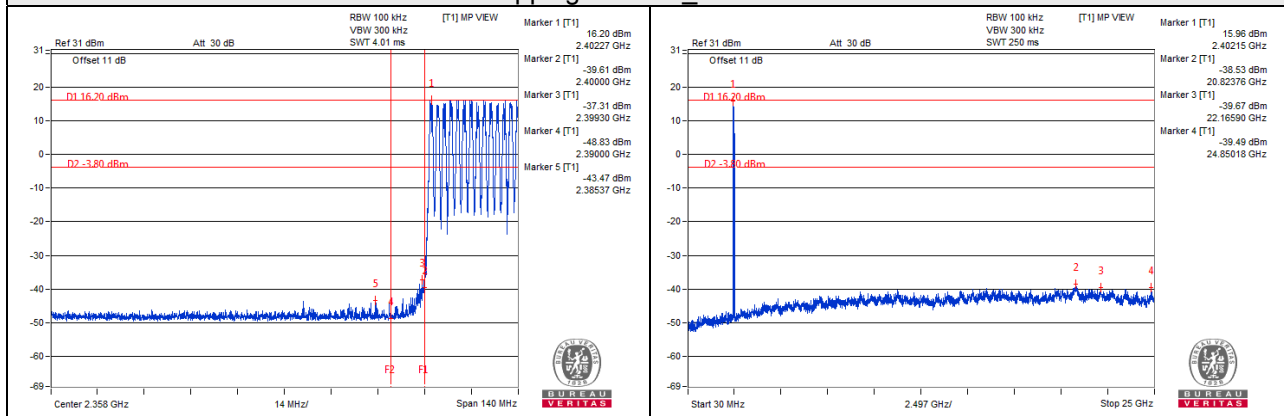
Hopping disabled\_Channel 1



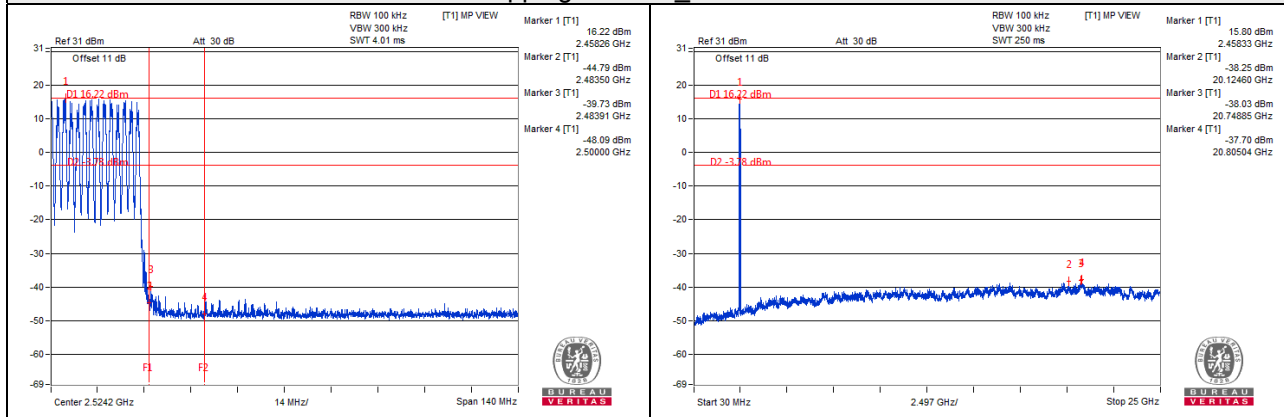
Hopping disabled\_Channel 38



Hopping enabled\_Channel 1

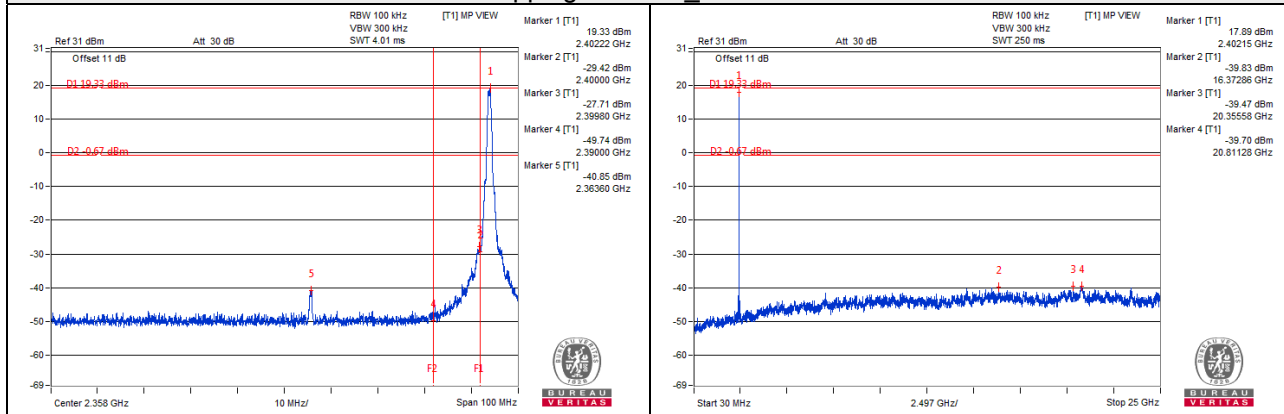


Hopping enabled\_Channel 38

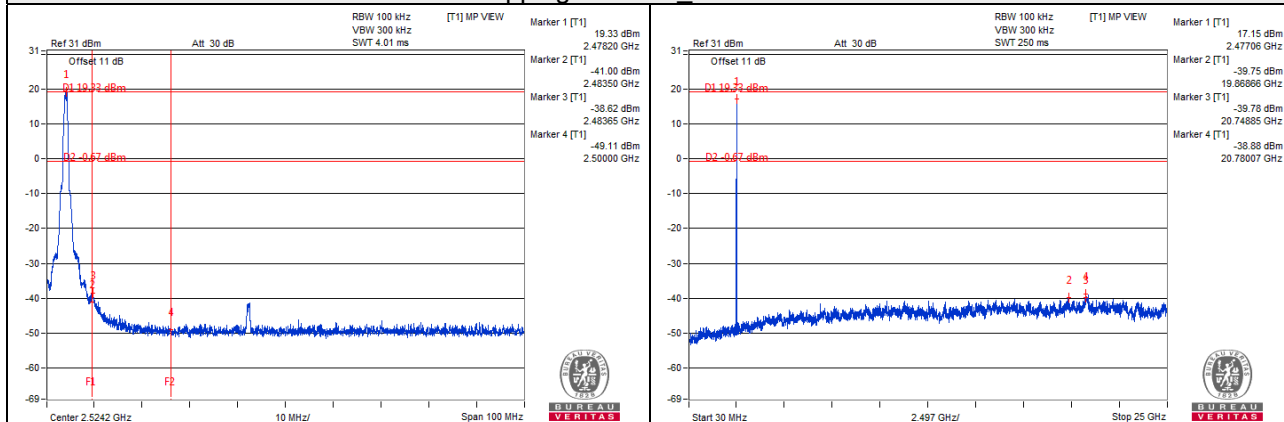


Mode B1

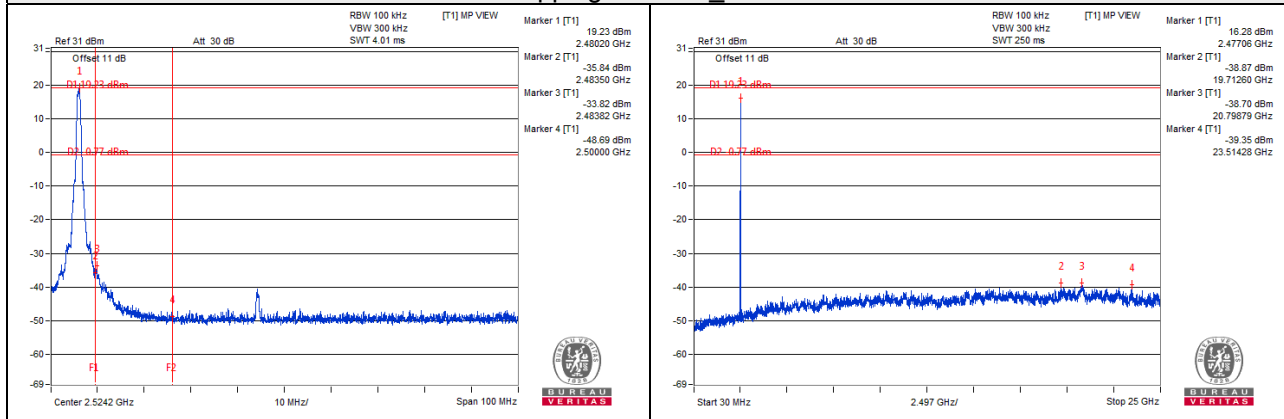
Hopping disabled\_Channel 0



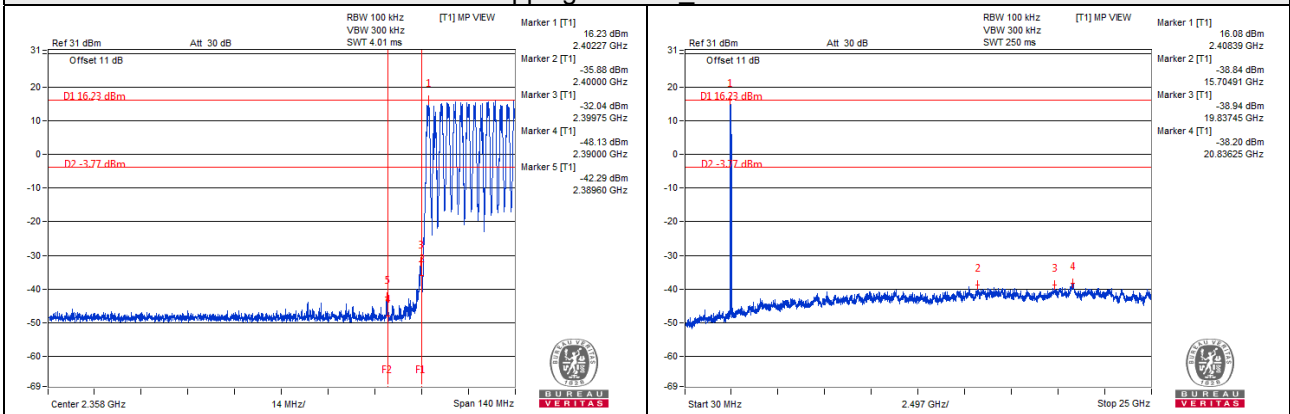
Hopping disabled\_Channel 38



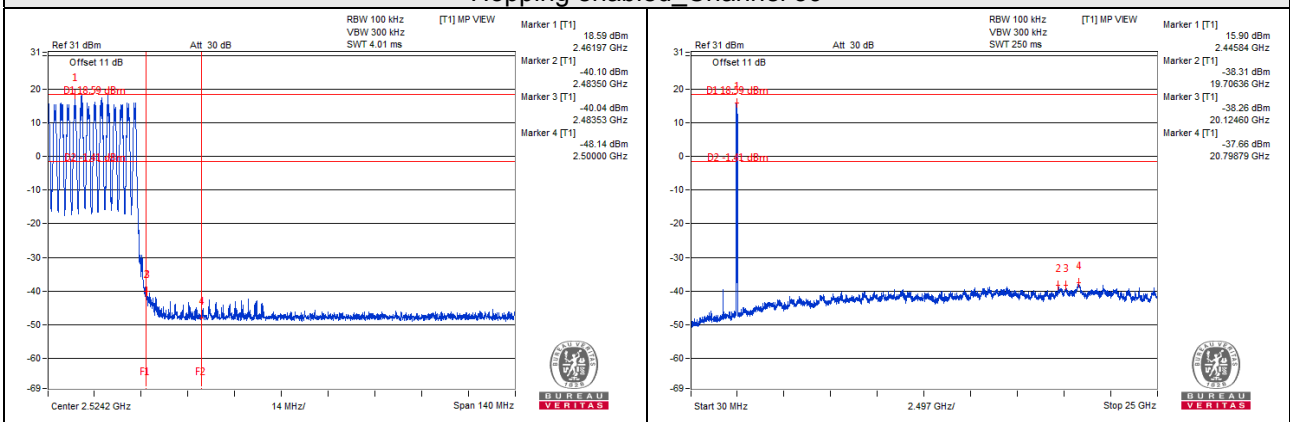
Hopping disabled\_Channel 39



### Hopping enabled Channel 0

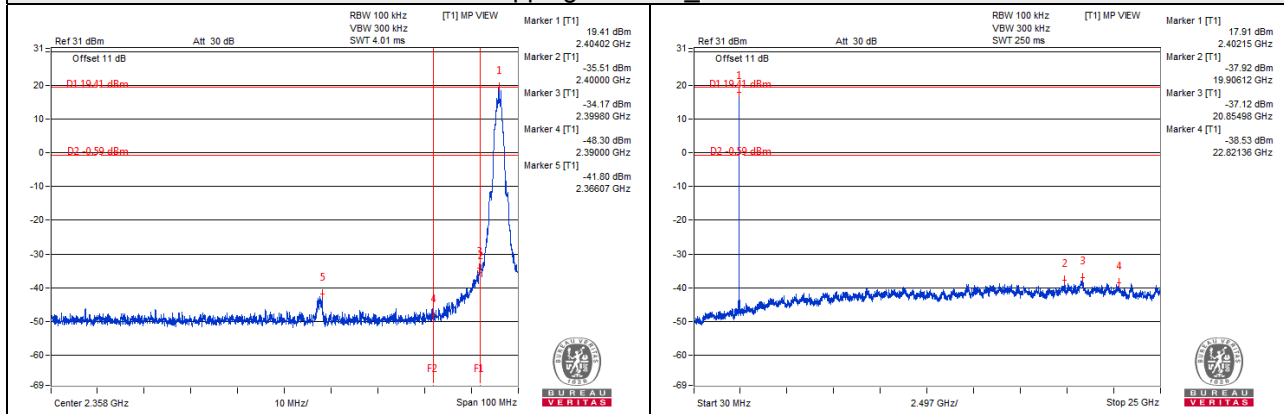


### Hopping enabled Channel 39

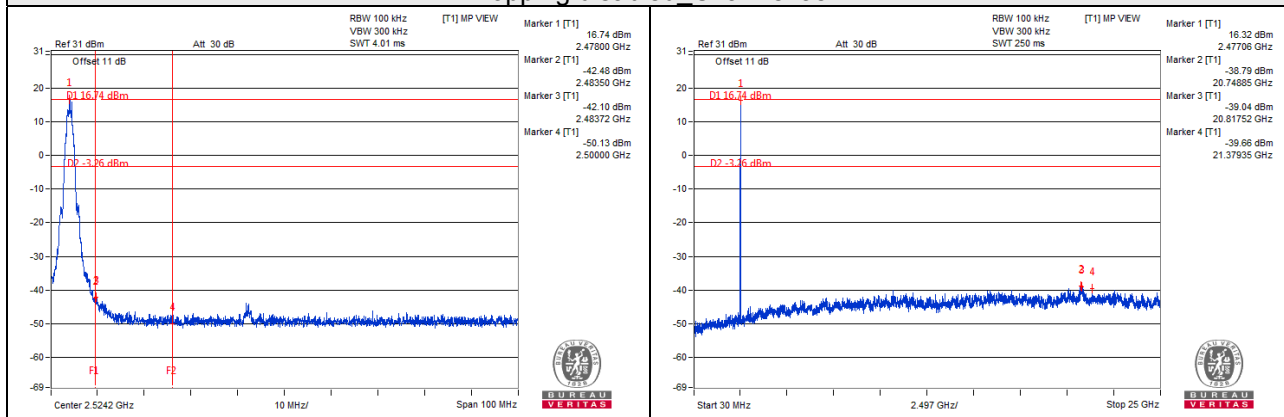


Mode B3

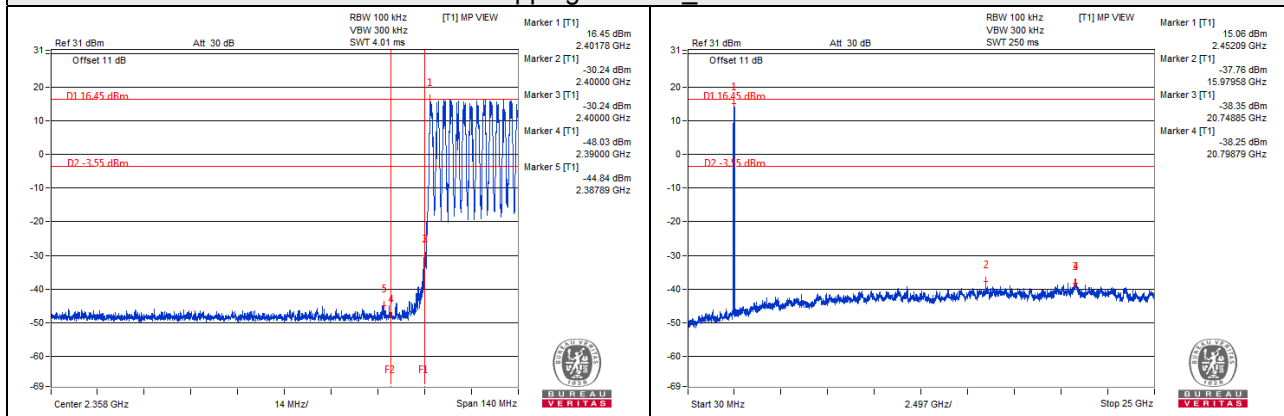
Hopping disabled\_Channel 1



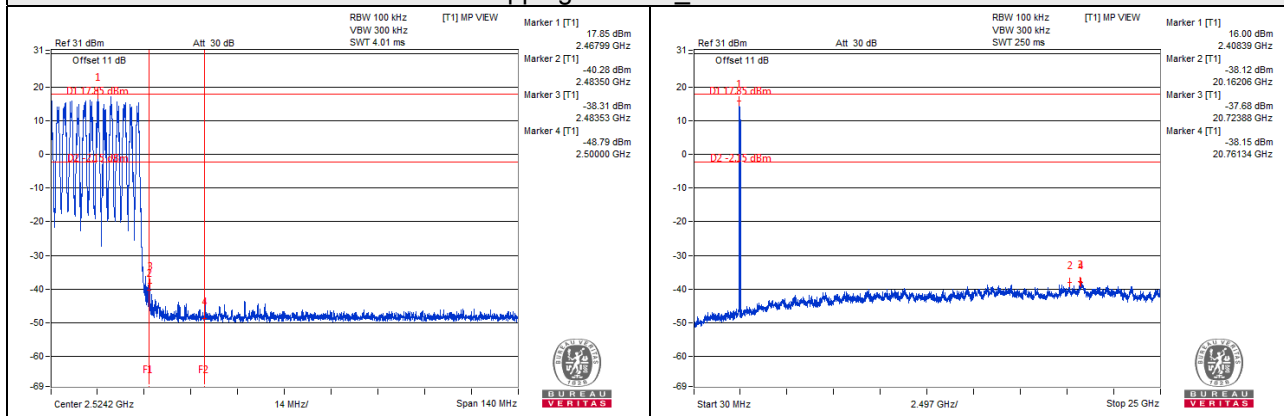
Hopping disabled\_Channel 38



Hopping enabled\_Channel 1



Hopping enabled\_Channel 38



## 5 Pictures of Test Arrangements

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



## Appendix – Information of 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 and approved according to ISO/IEC 17025.

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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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