



**FCC 47 CFR PART 15 SUBPART C  
INDUSTRY CANADA RSS-247 ISSUE 1**

**CERTIFICATION TEST REPORT**

**FOR**

**802.11b/g/n 1X1 WLAN + Bluetooth Atlas**

**MODEL NUMBER: Atlas001**

**FCC ID: ZVAOH00003  
IC: 9976A-OH00003**

**REPORT NUMBER: 4787541345-2**

**ISSUE DATE: Sep 8, 2016**

Prepared for

**TCL Technoly Electronics(Huizhou) Co.,Ltd  
Section 37, Zhongkai High-tech Development Zone, Huizhou City, Guang Dong  
Province, China, 516006**

Prepared by

**UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch  
Room 101, Building 10, Innovation Technology Park,  
Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China  
Tel: +86 769 33817100  
Fax: +86 769 33244054  
Website: www.ul.com**

Summary of Test Results			
Clause	Test Items	FCC/IC Rules	Test Results
1	6db DTS Bandwidth	FCC 15.247 (a) (2) IC RSS-247 Clause 5.1 (1)	Complied
2	Peak Conducted Power	FCC 15.247 (b) (3) IC RSS-247 Clause 5.4 (4)	Complied
3	Power Spectral Density	FCC 15.247 (3) IC RSS-247 Clause 5.2 (2)	Complied
4	Conducted Band edge And Spurious emission	FCC 15.247 (d) IC RSS-247 Clause 5.5	Complied
5	Radiated Band edges and Spurious emission	FCC 15.247 (d) FCC 15.209 FCC 15.205 IC RSS-247 Clause 5.5 IC RSS-GEN Clause 8.9	Complied
6	Conducted Emission Test For AC Power Port	FCC 15.207 RSS-GEN Clause 8.8	Complied
7	Antenna Requirement	FCC 15.203 RSS-GEN Clause 8.3	Complied

## TABLE OF CONTENTS

<b>1. ATTESTATION OF TEST RESULTS .....</b>	<b>5</b>
<b>2. TEST METHODOLOGY .....</b>	<b>6</b>
<b>3. FACILITIES AND ACCREDITATION .....</b>	<b>6</b>
<b>4. CALIBRATION AND UNCERTAINTY .....</b>	<b>7</b>
4.1. MEASURING INSTRUMENT CALIBRATION .....	7
4.2. MEASUREMENT UNCERTAINTY .....	7
<b>5. EQUIPMENT UNDER TEST .....</b>	<b>8</b>
5.1. DESCRIPTION OF EUT .....	8
5.2. MAXIMUM OUTPUT POWER.....	8
5.3. CHANNEL LIST .....	8
5.4. TEST CHANNEL CONFIGURATION.....	8
5.5. THE WORSE CASE POWER SETTING PARAMETER.....	9
5.6. DESCRIPTION OF AVAILABLE ANTENNAS .....	9
5.7. WORST-CASE CONFIGURATIONS.....	9
5.8. DESCRIPTION OF TEST SETUP.....	10
5.9. MEASURING INSTRUMENT AND SOFTWARE USED.....	11
<b>6. MEASUREMENT METHODS .....</b>	<b>12</b>
<b>7. ANTENNA PORT TEST RESULTS .....</b>	<b>13</b>
7.1. 6 dB DTS BANDWIDTH.....	13
7.2. PEAK CONDUCTED OUTPUT POWER.....	16
7.3. POWER SPECTRAL DENSITY .....	19
7.4. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS.....	22
<b>8. RADIATED TEST RESULTS.....</b>	<b>29</b>
8.1. LIMITS AND PROCEDURE .....	29
8.2. RESTRICTED BANDEDGE .....	33
8.3. SPURIOUS EMISSIONS (1~25GHz) .....	36
8.4. SPURIOUS EMISSIONS BELOW 1 GHz.....	39
<b>9. AC POWER LINE CONDUCTED EMISSIONS.....</b>	<b>41</b>
<b>10. ANTENNA REQUIREMENTS .....</b>	<b>44</b>
<b>11. SETUP PHOTOS .....</b>	<b>45</b>
11.1. ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP .....	45

---

11.1.	RADIATED RF MEASUREMENT SETUP (BELOW 30MHz) .....	45
11.2.	RADIATED RF MEASUREMENT SETUP (BELOW 1GHz) .....	46
11.3.	RADIATED RF MEASUREMENT SETUP (ABOVE 1GHz).....	46
11.4.	POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP .....	47

# 1. ATTESTATION OF TEST RESULTS

## Applicant Information

Company Name: TCL Technoly Electronics(Huizhou) Co.,Ltd

Address: Section 37, Zhongkai High-tech Development Zone, Huizhou City, Guang Dong Province, China, 516006.

## Manufacturer Information

Company Name: Same as applicant

Address: Same as applicant

## EUT Description

Product Name Atlas

Brand Name TrackR

Model Name Atlas001

Serial Number N/A

Model Difference N/A

Date Tested July 25, 2016 ~ August 5, 2016

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-247 Issue 1	Pass
INDUSTRY CANADA RSS-GEN Issue 4	Pass

Tested By : *Miller Ma*

Check By: *Shawn Wen*

Gary Zhang  
Engineer Project Associate

Shawn Wen  
Laboratory Leader

Approved By: *Shawn Wen*

Shawn Wen  
Laboratory Leader

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013, RSS-GEN Issue 4, and RSS-247 Issue 1.

## 3. FACILITIES AND ACCREDITATION

Test Location	Shenzhen Huatongwei International Inspection Co., Ltd.
Address	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China Phone: 86-755-26748019 Fax: 86-755-26748089
Accreditation Certificate	Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing. Valid time is until December 31, 2016. Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 317478, Renewal date Jul. 18, 2014, valid time is until Jul. 18, 2017. The 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377A on Dec. 31, 2013, valid time is until Dec. 31, 2016. Two 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377B on Dec.03, 2014, valid time is until Dec.03, 2017.
Description	All measurement facilities use to collect the measurement data are located at 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

### 4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	$\pm 3.39$ dB
Radiated Disturbance, 9k to 30 MHz	$\pm 2.20$ dB
Radiated Disturbance, 30 to 1000 MHz	$\pm 4.24$ dB
Radiated Disturbance, 1 to 18 GHz	$\pm 5.16$ dB
Radiated Disturbance, 18 to 40 GHz	$\pm 5.54$ dB

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

The EUT is an 802.11b/g/n 1X1 WLAN + Bluetooth Atlas.

### 5.2. MAXIMUM OUTPUT POWER

Frequency Range (MHz)	Number of Transmit Chains (NTX)	Bluetooth Mode	Frequency (MHz)	Channel Number	Max Output Power (dBm)
2400-2483.5	1	BLE	2402-2480	0-39[40]	-3.14

### 5.3. CHANNEL LIST

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	11	2424	22	2442	33	2466
1	2404	12	2426	23	2446	34	2468
2	2406	13	2428	24	2448	35	2470
3	2408	14	2430	25	2450	36	2472
4	2410	15	2432	26	2452	37	2474
5	2412	16	2434	27	2454	38	2476
6	2414	17	2436	28	2456	39	2478
7	2416	18	2438	29	2458	40	2480
8	2418	19	2440	30	2460		
9	2420	20	2442	31	2462		
10	2422	21	2444	32	2464		

### 5.4. TEST CHANNEL CONFIGURATION

Test Mode	Test Channel	Frequency
GFSK	CH 00, CH 19, CH 40	2402MHz, 2440MHz, 2480MHz



## 5.5. THE WORSE CASE POWER SETTING PARAMETER

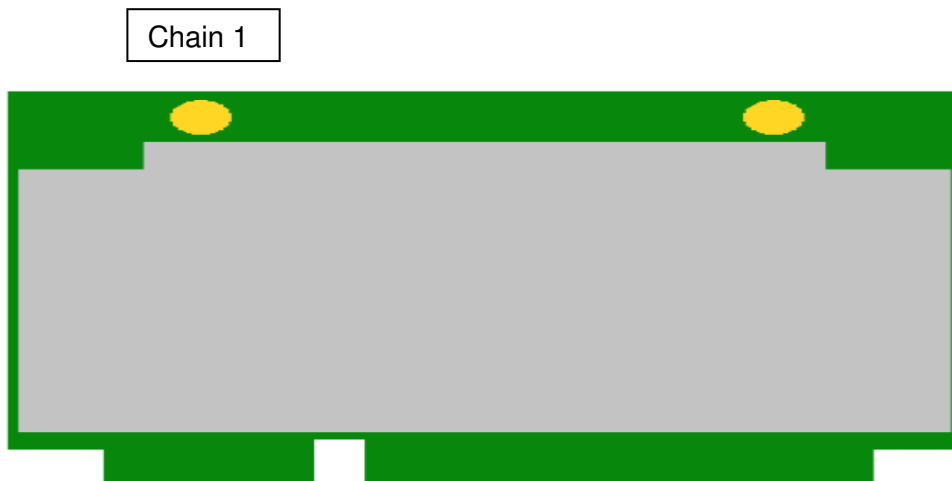
The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band				
Test Software Version		BTool		
Modulation Type	Transmit Antenna Number	Test Channel		
		CH 00	CH 19	CH 40
GFSK	1	N/A	N/A	N/A

Note: "N/A" denotes Power setting is not applicable to be changed.

## 5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
1 (BLE)	2402-2480	PCB Antenna	0.0

Test Mode	Transmit and Receive Mode	Description
GFSK	<input checked="" type="checkbox"/> 1TX, 1RX	Chain 1 can be used as transmitting/receiving antenna.
4-DQPSK	<input type="checkbox"/> 1TX, 1RX	Chain 1 can be used as transmitting/receiving antenna.
8-DPSK	<input type="checkbox"/> 1TX, 1RX	Chain 1 can be used as transmitting/receiving antenna.



## 5.7. WORST-CASE CONFIGURATIONS

Bluetooth Mode	Modulation Technology	Modulation Type	Data Rate (Mbps)
BLE	DTS	GFSK	1Mbit/s

## 5.8. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	FCC ID
1	N/A	N/A	N/A	N/A

### I/O CABLES

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	N/A	N/A	N/A	N/A	N/A

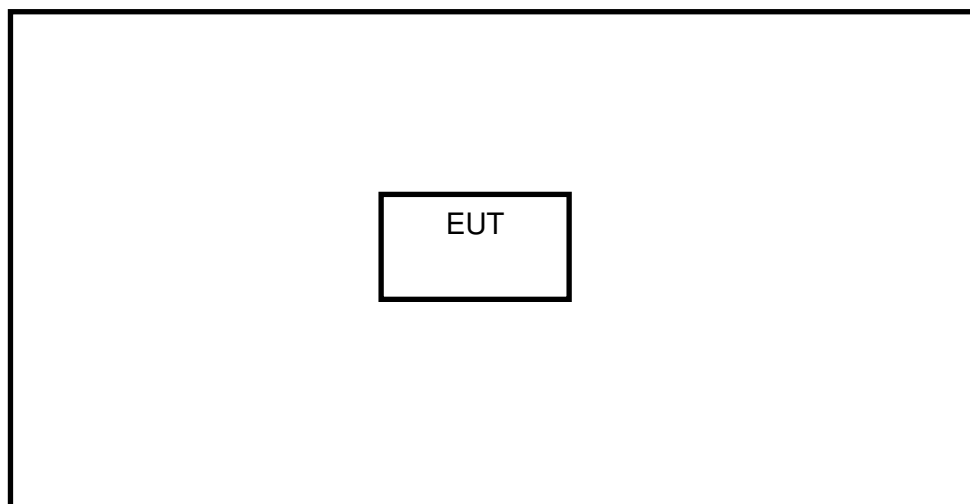
### ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	N/A	N/A	N/A	N/A:

### TEST SETUP

The EUT have the engineer mode inside.

### SETUP DIAGRAM FOR TEST



## 5.9. MEASURING INSTRUMENT AND SOFTWARE USED

Instrument(Conducted for RF Port)						
Use d	Equipment	Manufactur er	Model No.	Serial No.	Last Cal.	Expired date
<input checked="" type="checkbox"/>	Spectrum Analyzer	R&S	FSV40	100048	Nov.3,2015	Nov.3,2016
Instrument (Line Conducted Emission (AC Main))						
Use d	Equipment	Manufactur er	Model No.	Serial No.	Last Cal.	Expired date
<input checked="" type="checkbox"/>	EMI Test Receiver	R&S	ESCI	101247	Nov.3,2015	Nov.3,2016
<input checked="" type="checkbox"/>	Artificial Mains	SCHWARZ BECK	NNLK 8121	573	Nov.3,2015	Nov.3,2016
<input checked="" type="checkbox"/>	Pulse Limiter	R&S	ESH3-Z2	101488	Nov.3,2015	Nov.3,2016
<input checked="" type="checkbox"/>	Test Software	R&S	ES-K1	N/A	N/A	N/A
<input checked="" type="checkbox"/>	Adapter (see note )	HUNTKEY	HW-050100C2W	HWHKAPE5 1309936	-	-
Instrument (Radiated Tests)						
Use d	Equipment	Manufactur er	Model No.	Serial No.	Last Cal.	Expired date
<input checked="" type="checkbox"/>	EMI Test Receiver	Rohde&Sch warz	ESI 26	100009	Nov.2,2015	Nov.2,2016
<input checked="" type="checkbox"/>	RF Test Panel	Rohde&Sch warz	TS / RSP	335015/0017	N/A	N/A
<input checked="" type="checkbox"/>	EMI Test Software	Rohde&Sch warz	ESK1	N/A	N/A	N/A
<input checked="" type="checkbox"/>	Ultra-Broadband Antenna	ShwarzBec k	VULB9163	538	Nov.8,2015	Nov.8,2016
<input checked="" type="checkbox"/>	Horn Antenna	ShwarzBec k	9120D	1011	Nov.8,2015	Nov.8,2016
<input checked="" type="checkbox"/>	Loop Antenna	Rohde&Sch warz	HZ-9	838622\013	Nov.8,2015	Nov.8,2016
<input checked="" type="checkbox"/>	Broadband Horn Antenna	ShwarzBec k	BBHA9170	BBHA91704 72	Nov.8,2015	Nov.8,2016
<input checked="" type="checkbox"/>	Broadband Preamplifier	SCHWARZ BECK	BBV 9718	9718-247	Nov.2,2015	Nov.2,2016
<input checked="" type="checkbox"/>	Broadband Preamplifier	SCHWARZ BECK	BBV 9721	9721-102	Nov.2,2015	Nov.2,2016
<input checked="" type="checkbox"/>	Turn Table	MATURO	TT2.0	----	N/A	N/A
<input checked="" type="checkbox"/>	Antenna Mast	MATURO	TAM-4.0-P	----	N/A	N/A
<input checked="" type="checkbox"/>	EMI Test Software	Audix	E3	N/A	N/A	N/A

<input checked="" type="checkbox"/>	Test cable	Siva Cables Italy	RG 58A/U	W14.02	Nov.5,2015	Nov.5,2016
-------------------------------------	------------	----------------------	----------	--------	------------	------------

## 6. MEASUREMENT METHODS

No.	Test Item	KDB Name	Section
1	6 dB Bandwidth	KDB 558074 D01 v03r05	8.2
2	Peak Output Power	KDB 558074 D01 v03r05	9.1.1
3	Power Spectral Density	KDB 558074 D01 v03r05	10.2
4	Out-of-band emissions in non-restricted bands	KDB 558074 D01 v03r05	11.0
5	Out-of-band emissions in restricted bands	KDB 558074 D01 v03r05	12.1
6	Band-edge	KDB 558074 D01 v03r05	13.3.2
7	Conducted Emission Test For AC Power Port	ANSI C63.4-2014	7.3

## 7. ANTENNA PORT TEST RESULTS

### 7.1. 6 dB DTS BANDWIDTH

#### LIMITS

FCC Part15 (15.247) , Subpart C IC RSS-247 ISSUE 1			
Section	Test Item	Limit	Frequency Range (MHz)
FCC 15.247(a)(2) IC RSS-247 5.1 (1)	Bandwidth	$\geq 500\text{KHz}$	2400-2483.5

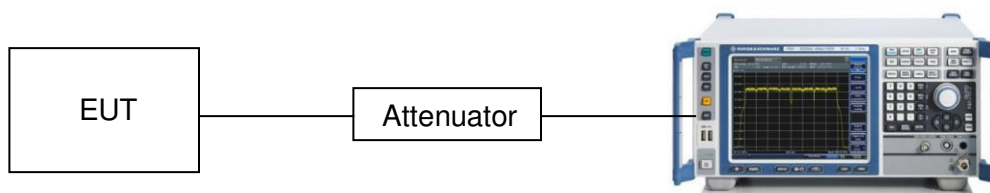
#### TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	100K
VBW	$\geq 3 \times \text{RBW}$
Trace	Max hold
Sweep	Auto couple

Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

#### TEST SETUP



#### TEST CONDITIONS

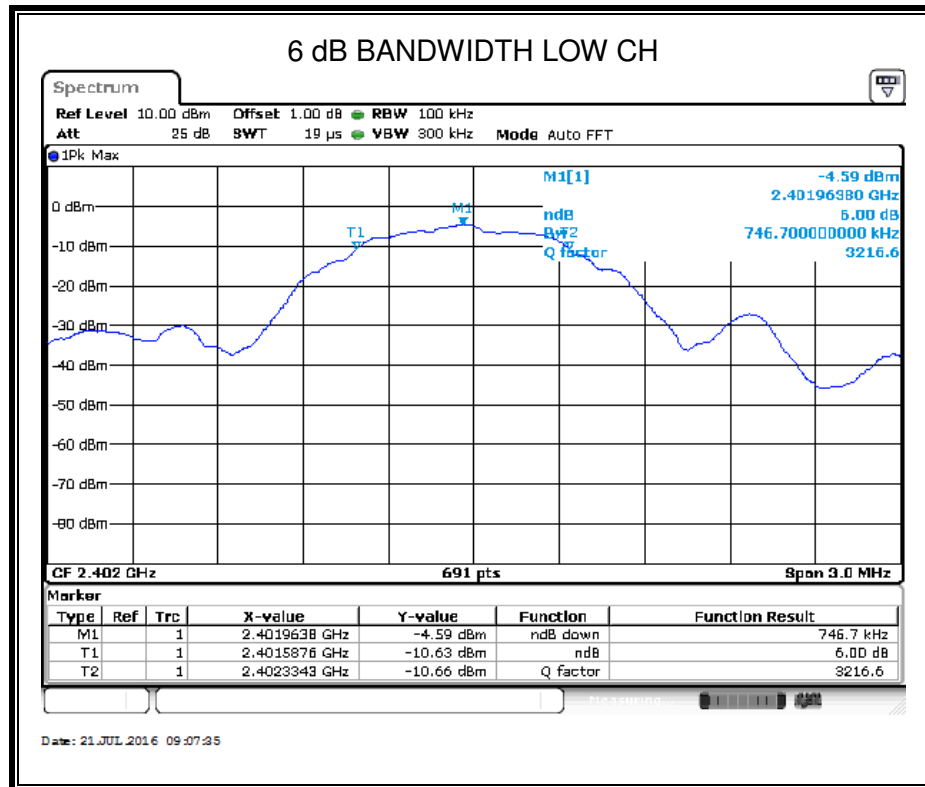
Temperature: 28°C

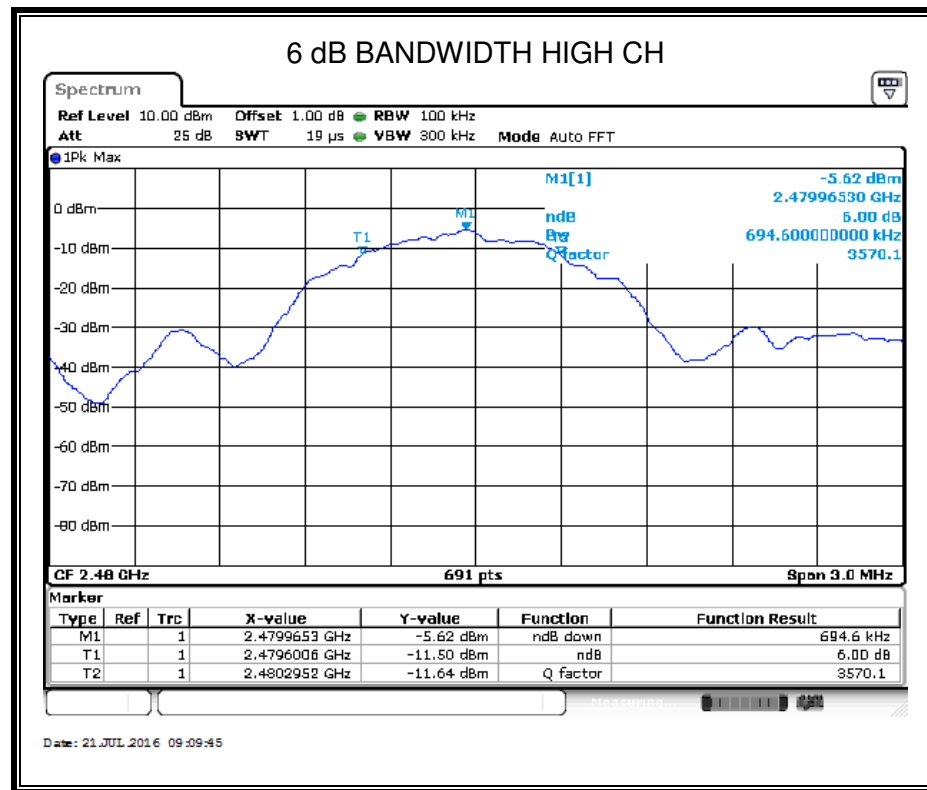
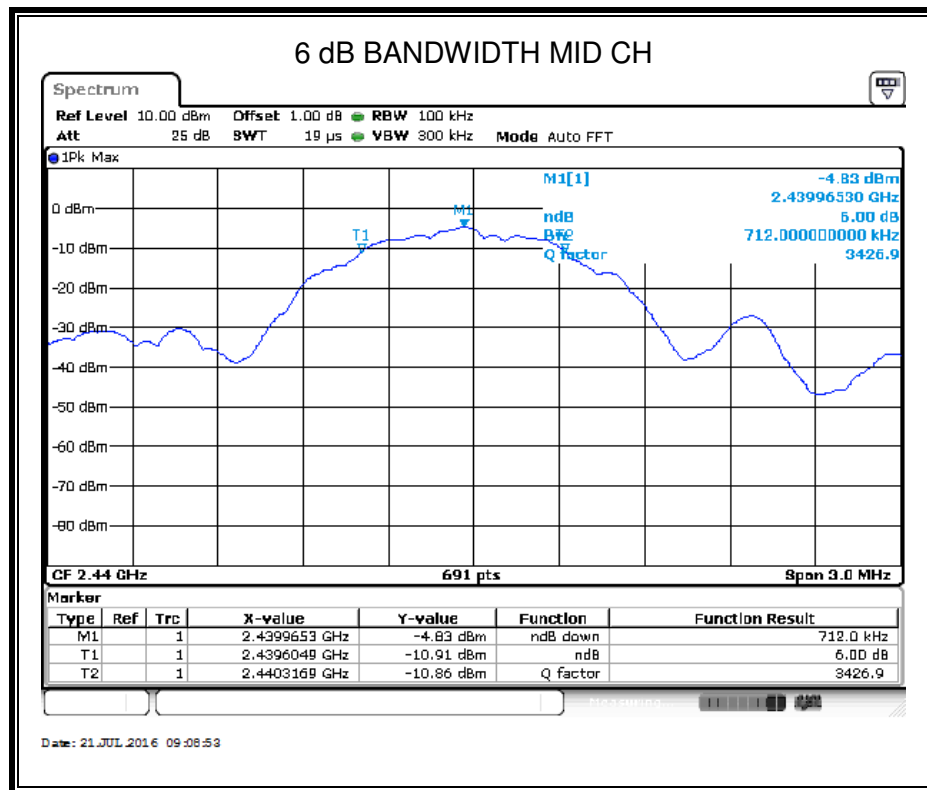
Relative Humidity: 60%

Test Voltage: AC 120V/60Hz

**RESULTS**

Channel	Frequency (MHz)	6dB bandwidth (kHz)	Limit (kHz)	Result
Low	2402	746.70	500	Pass
Middle	2440	712.00	500	Pass
High	2480	694.60	500	Pass





## 7.2. PEAK CONDUCTED OUTPUT POWER

### LIMITS

FCC Part15 (15.247) , Subpart C IC RSS-247 ISSUE 1			
Section	Test Item	Limit	Frequency Range (MHz)
FCC 15.247(b)(3) IC RSS-247 5.4 (4)	Peak Output Power	1 watt or 30dBm	2400-2483.5

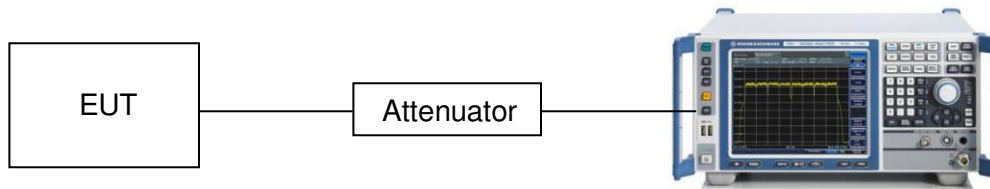
### TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	$\geq$ DTS bandwidth(e.g. 1 MHz for BLE)
VBW	$\geq 3 \times$ RBW
Span	$3 \times$ RBW
Trace	Max hold
Sweep time	Auto couple.

Allow trace to fully stabilize and use peak marker function to determine the peak amplitude level.

### TEST SETUP



### TEST CONDITIONS

Temperature: 28°C

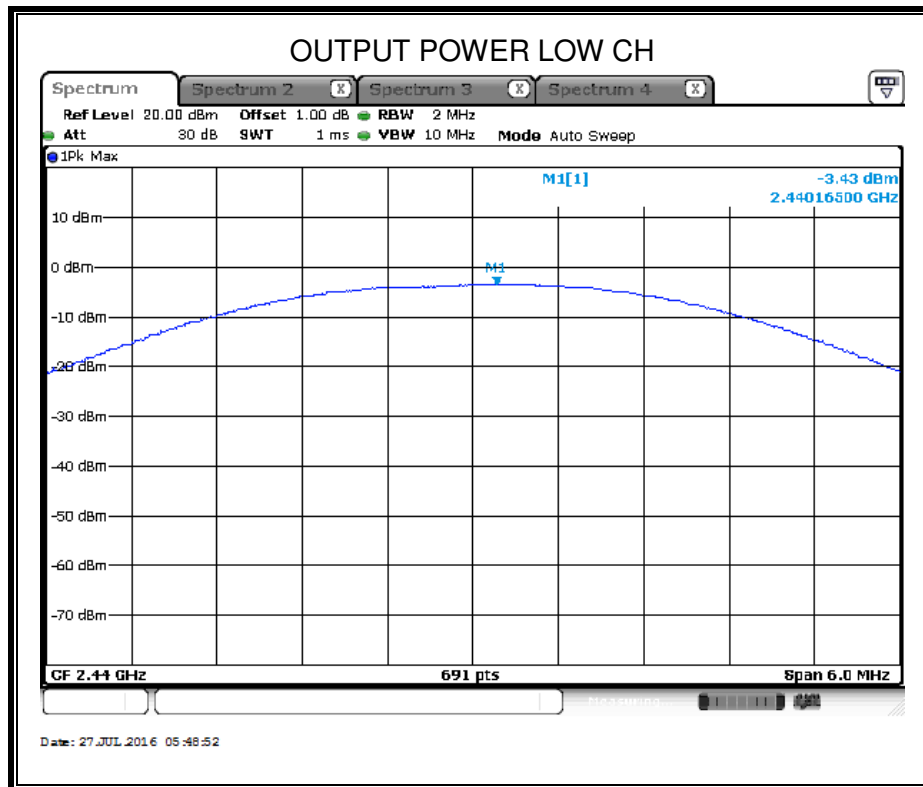
Relative Humidity: 60%

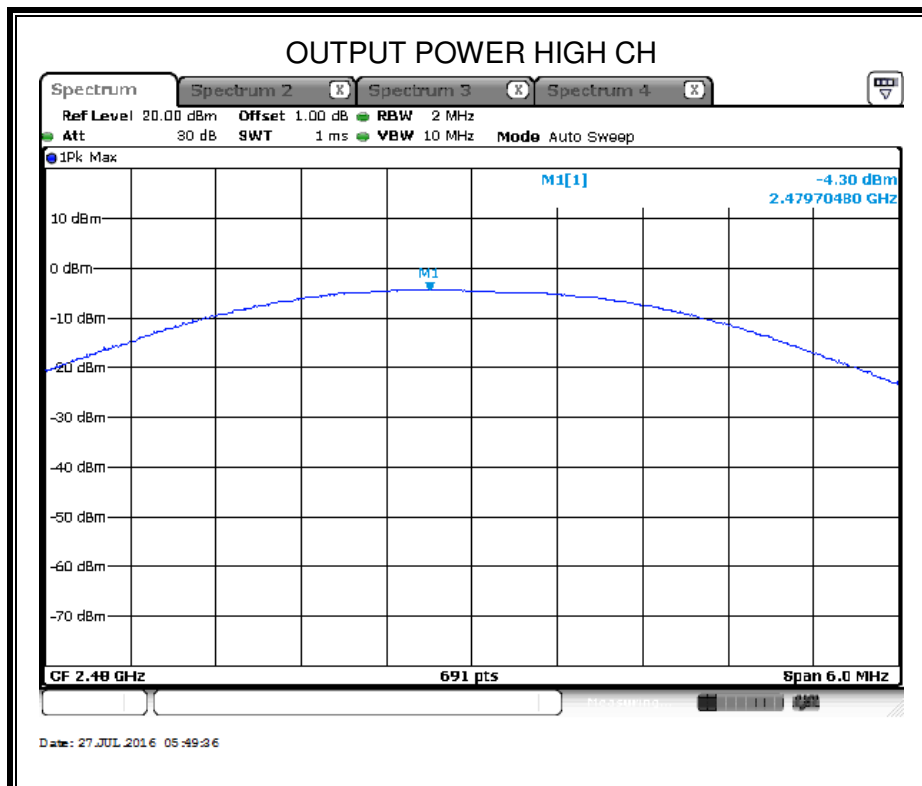
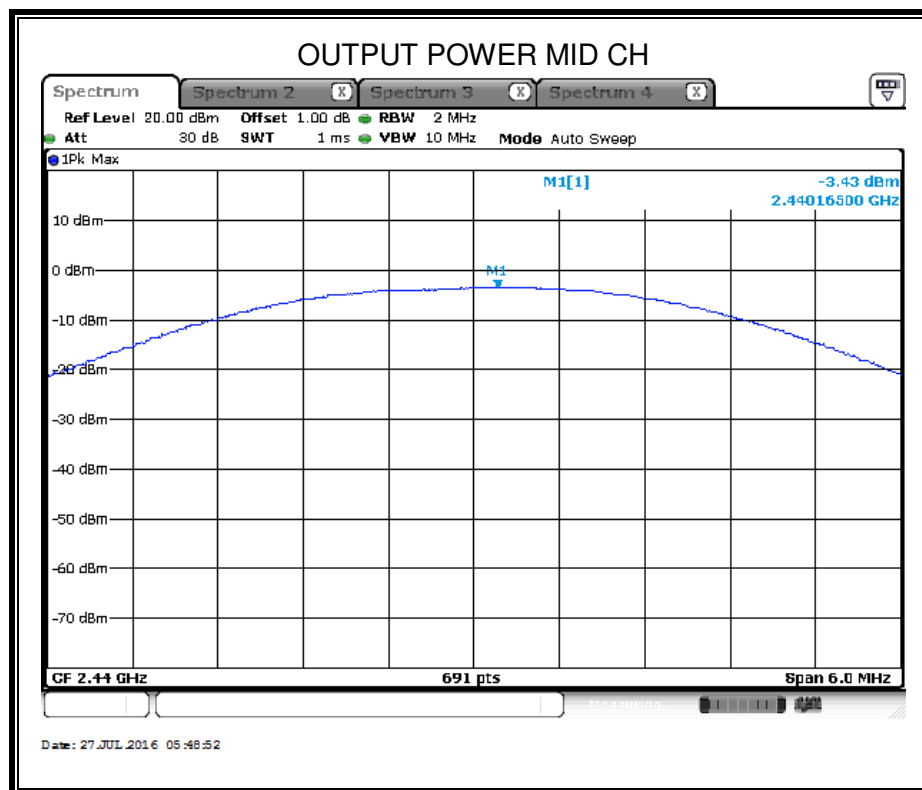
Test Voltage: AC 120V/60Hz



**RESULTS**

Test Channel	Frequency	Maximum Conducted Output Power(PK)	LIMIT
	(MHz)	(dBm)	dBm
CH00	2402	-3.14	30
CH19	2440	-3.43	30
CH39	2480	-4.30	30





### 7.3. POWER SPECTRAL DENSITY

#### LIMITS

FCC Part15 (15.247) , Subpart C IC RSS-247 ISSUE 1			
Section	Test Item	Limit	Frequency Range (MHz)
FCC §15.247 (e) IC RSS-247 5.2 (2)	Power Spectral Density	8 dBm in any 3 kHz band	2400-2483.5

#### TEST PROCEDURE

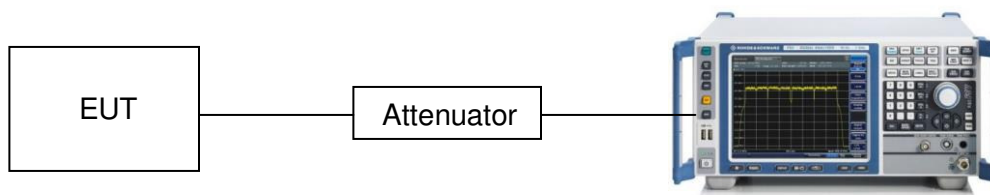
Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	$3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$
VBW	$\geq 3 \times \text{RBW}$
Span	$1.5 \times \text{DTS bandwidth}$
Trace	Max hold
Sweep time	Auto couple.

Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.

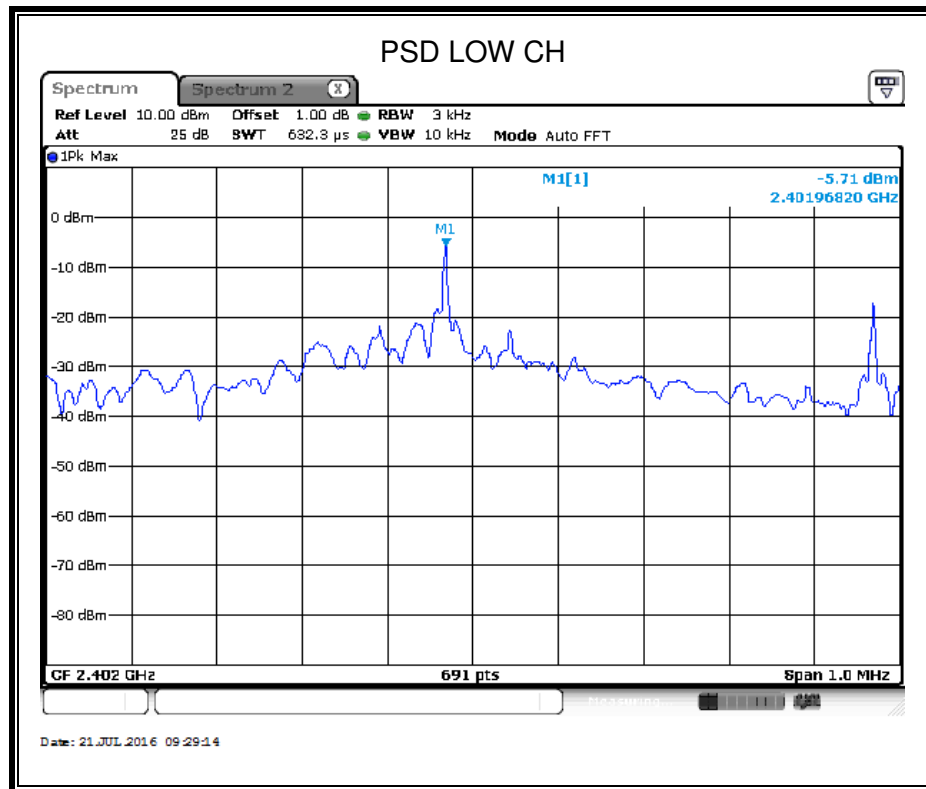
If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

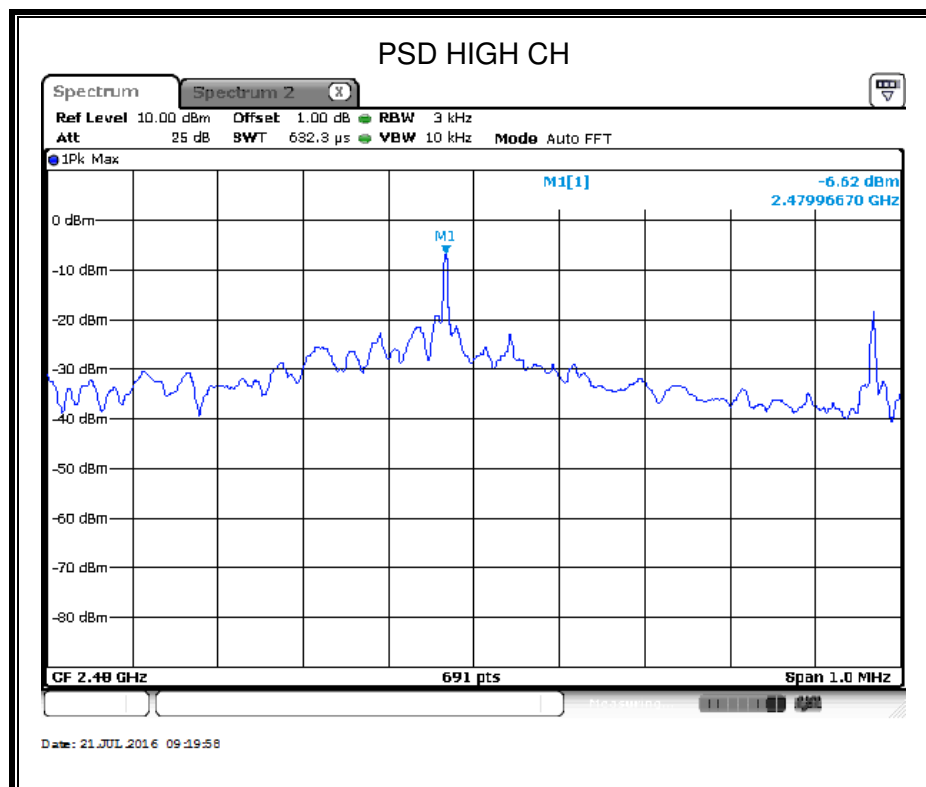
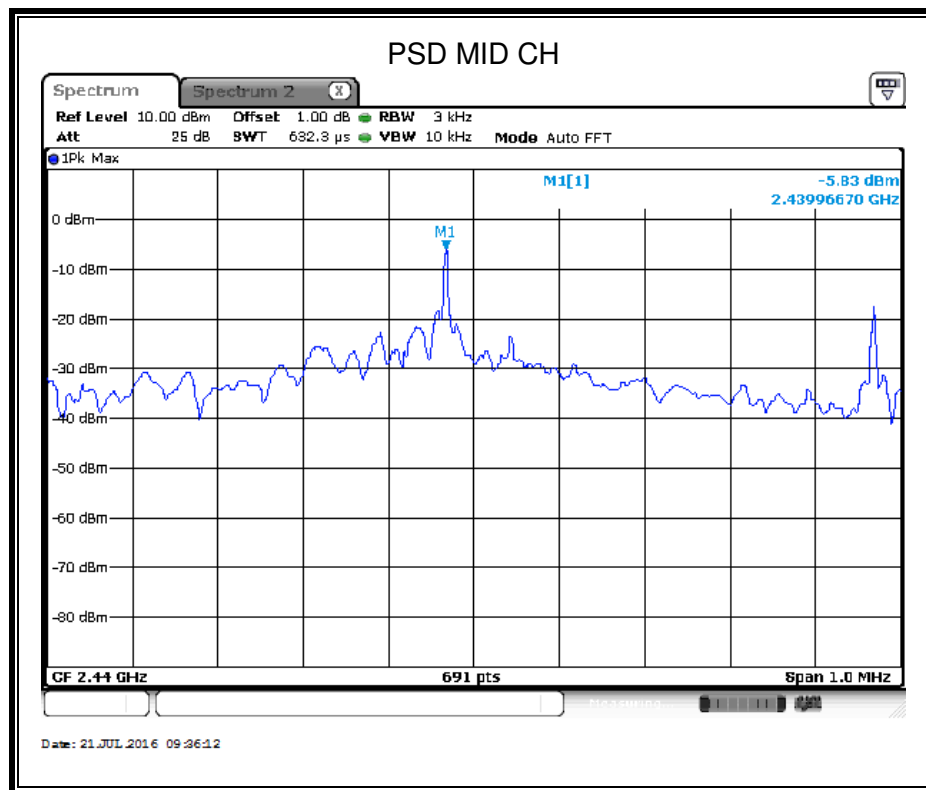
#### TEST SETUP



**RESULTS**

Frequency	Power Spectral Density (dBm)	Limit (dBm)	Result
2402 MHz	-5.71	8	PASS
2440 MHz	-5.83	8	PASS
2480 MHz	-6.62	8	PASS





## 7.4. CONDUCTED BANDEGE AND SPURIOUS EMISSIONS

### LIMITS

FCC Part15 (15.247) , Subpart C IC RSS-247 ISSUE 1		
Section	Test Item	Limit
FCC §15.247 (d) IC RSS-247 5.5	Conducted Bandedge and Spurious Emissions	at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

### TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

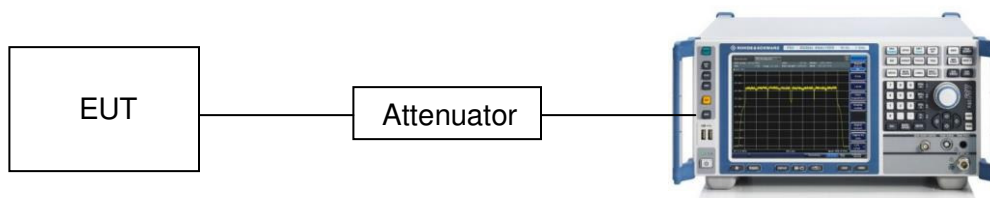
Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	100K
VBW	$\geq 3 \times \text{RBW}$
Span	$1.5 \times \text{DTS bandwidth}$
Trace	Max hold
Sweep time	Auto couple.

Use the peak marker function to determine the maximum PSD level.

Span	Set the center frequency and span to encompass frequency range to be measured
Detector	Peak
RBW	100K
VBW	$\geq 3 \times \text{RBW}$
measurement points	$\geq \text{span}/\text{RBW}$
Trace	Max hold
Sweep time	Auto couple.

Use the peak marker function to determine the maximum amplitude level.

### TEST SETUP

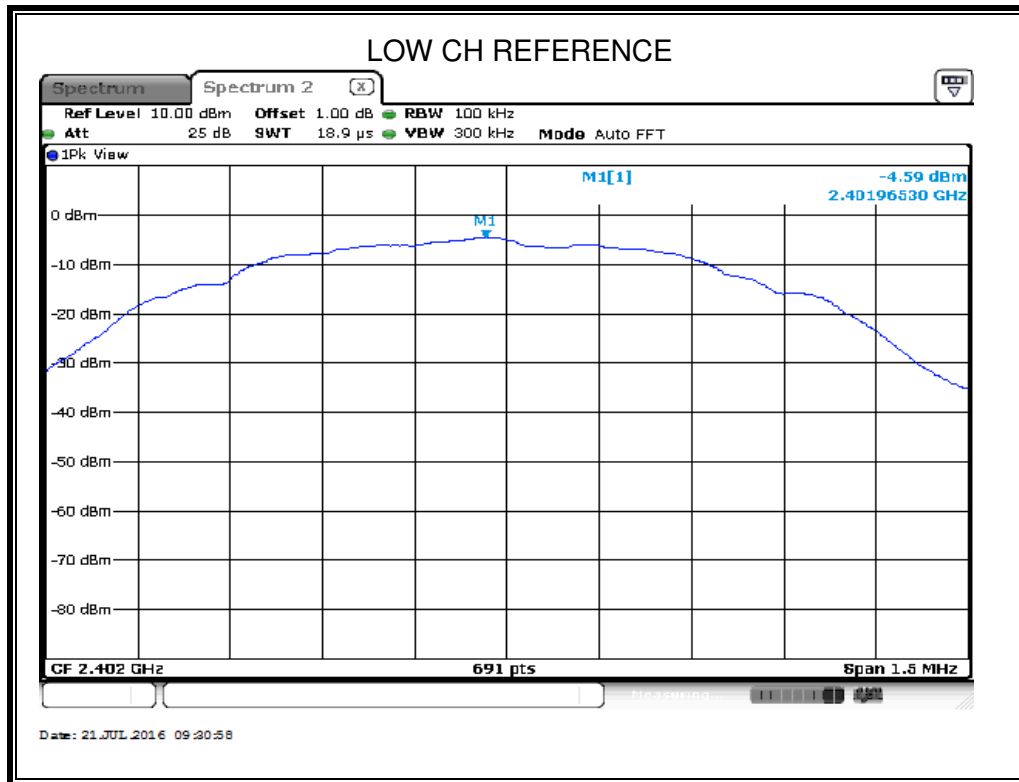


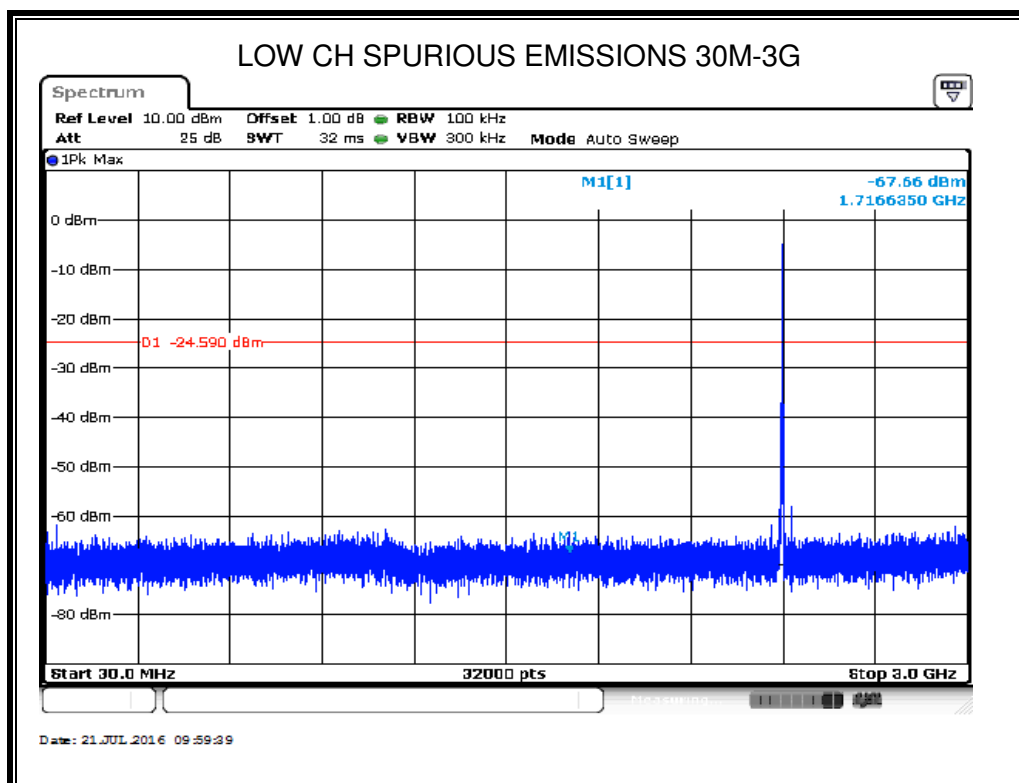
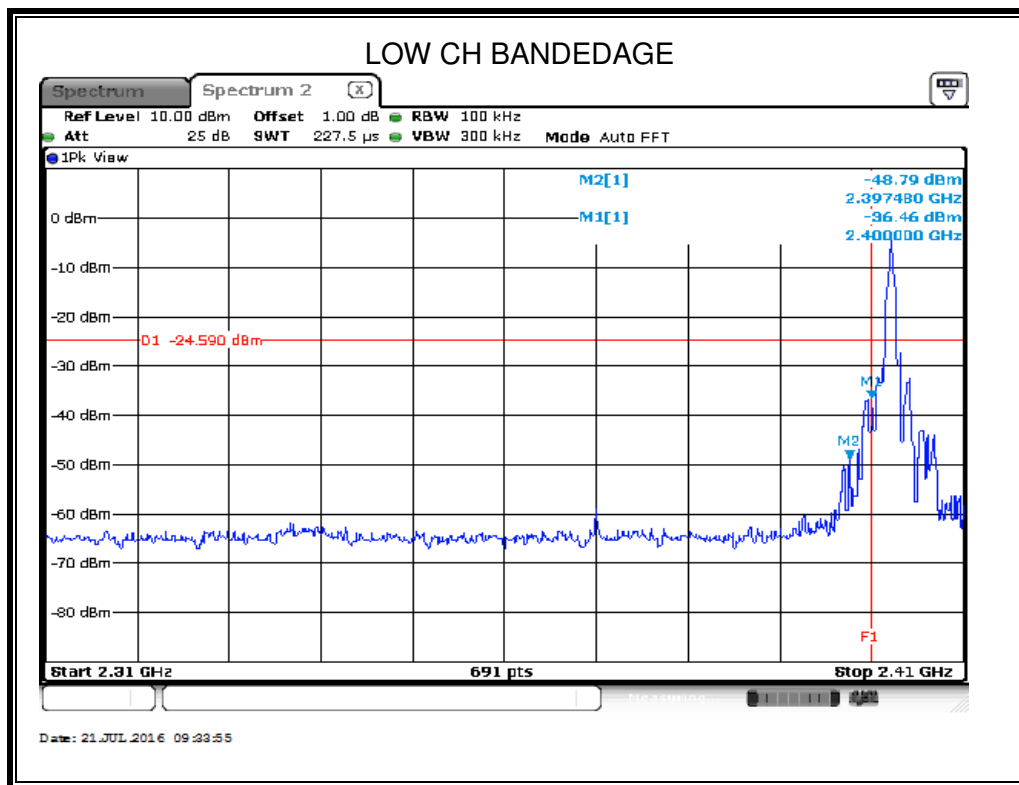
**TEST CONDITIONS**

Temperature: 28°C

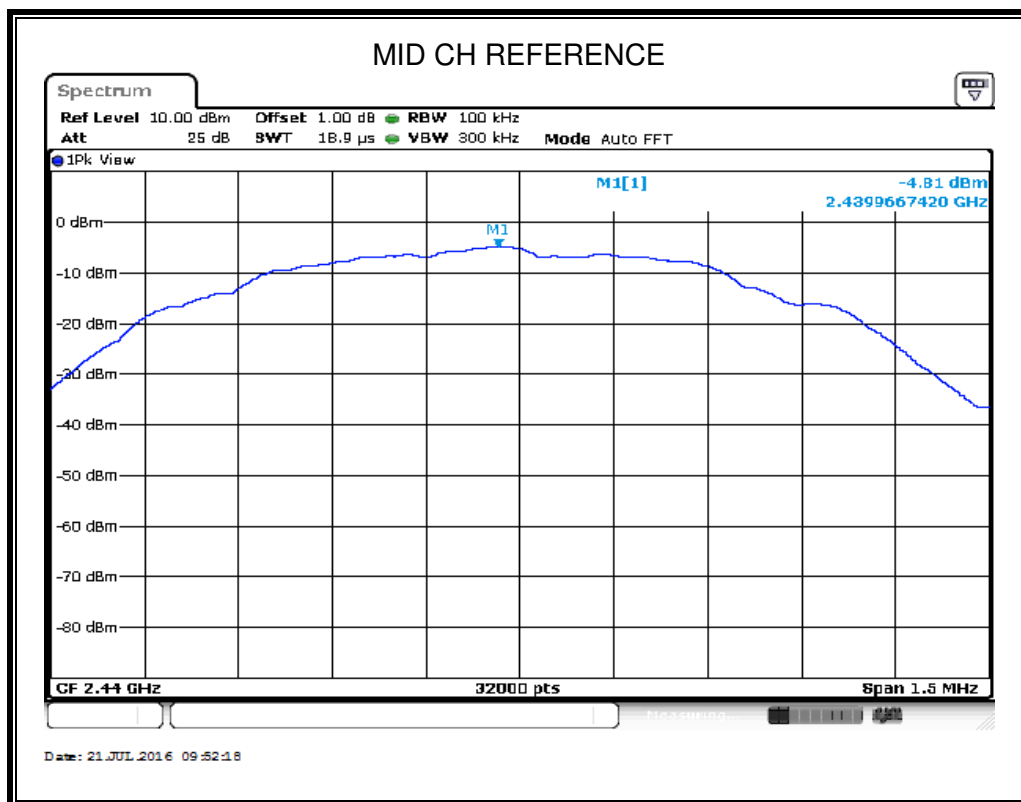
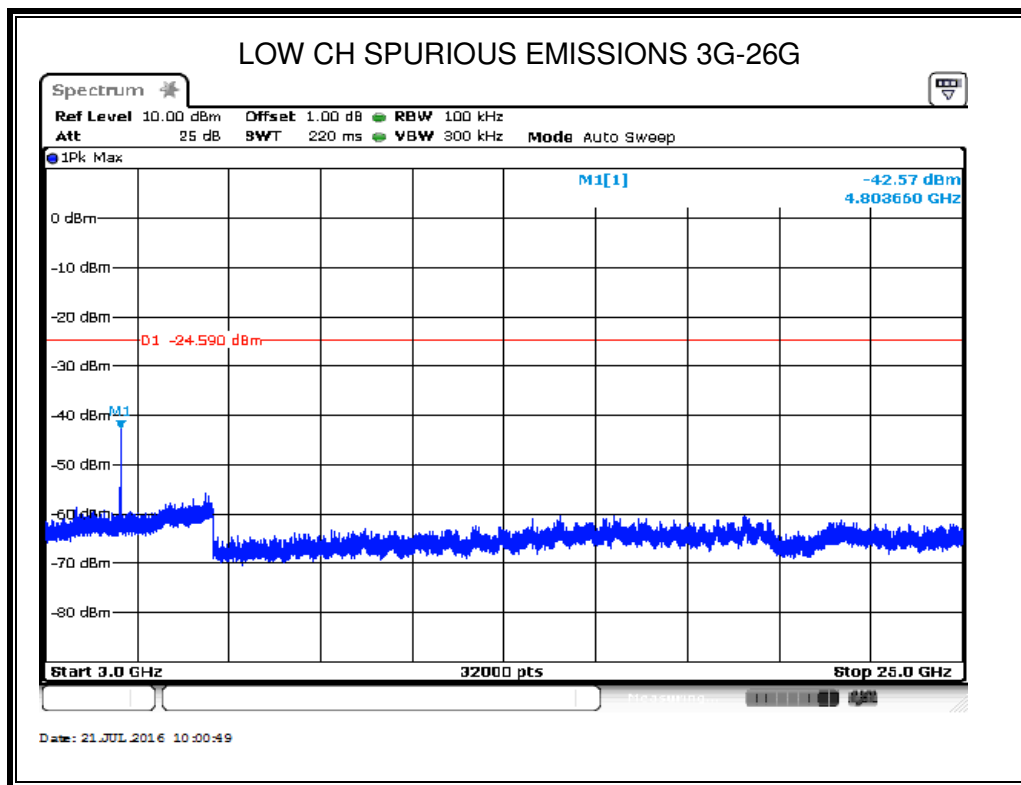
Relative Humidity: 60%

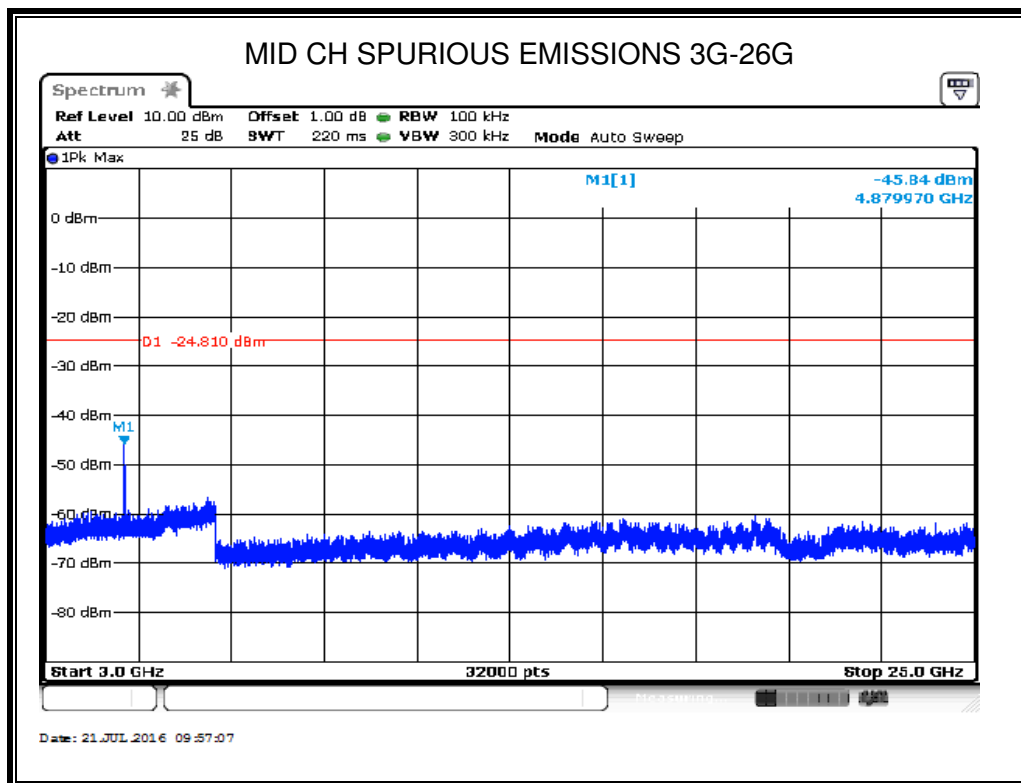
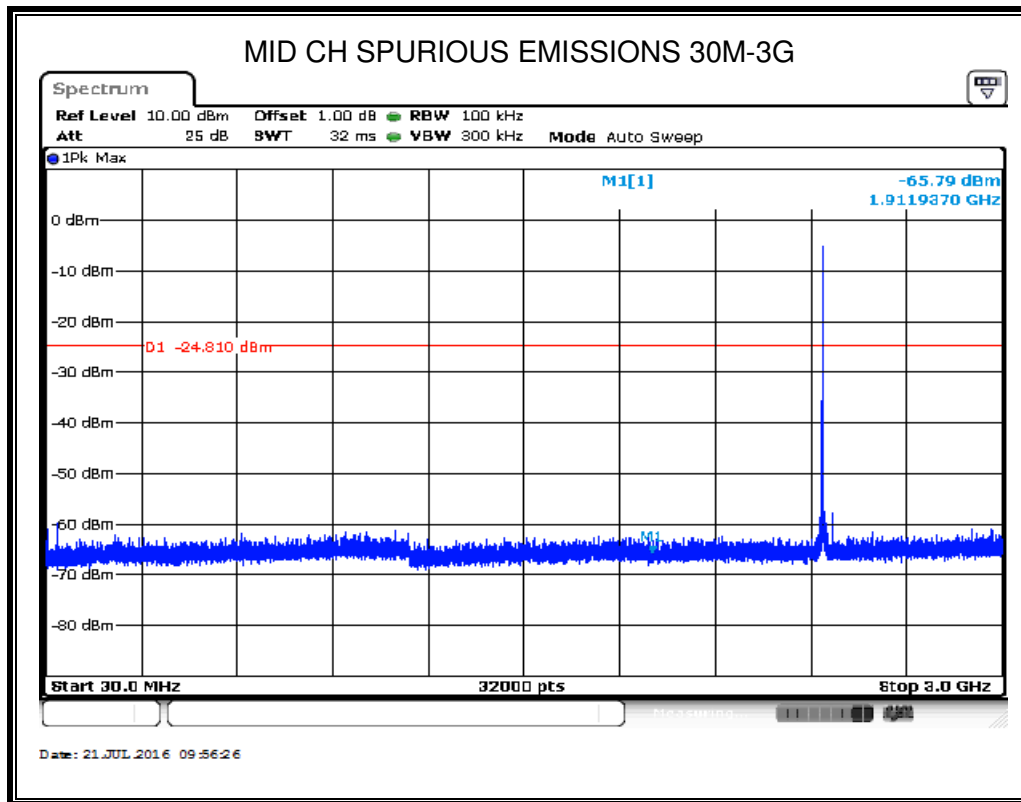
Test Voltage: AC 120V/60Hz

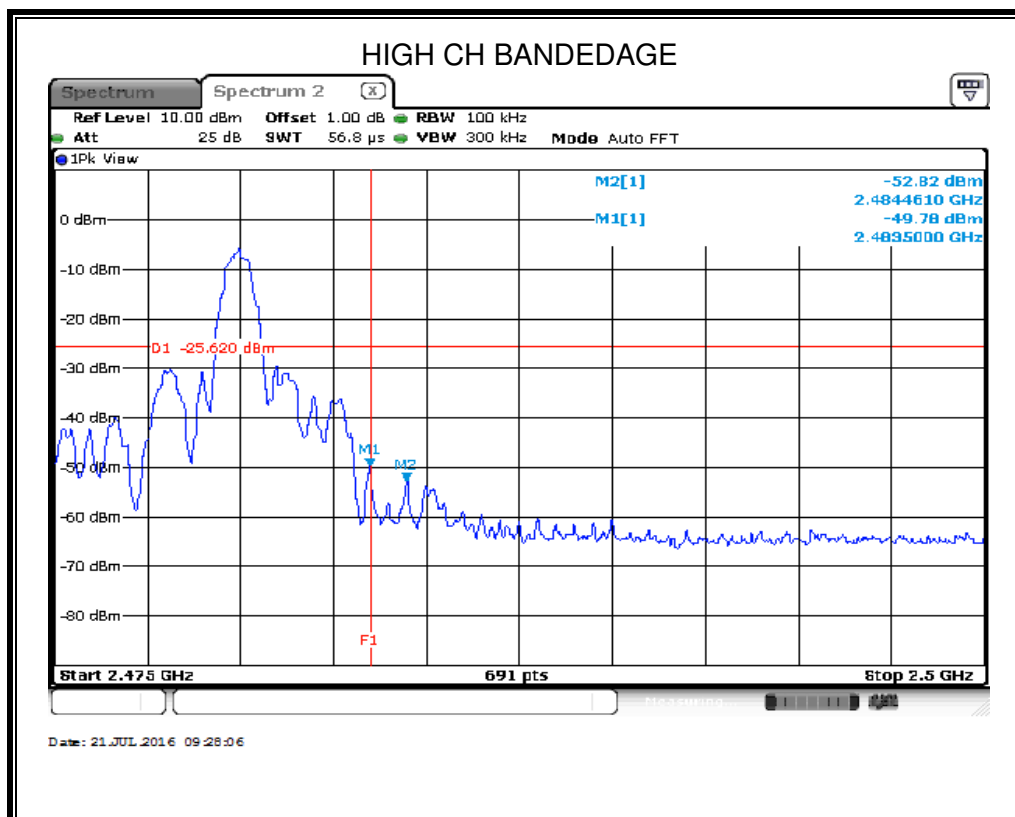
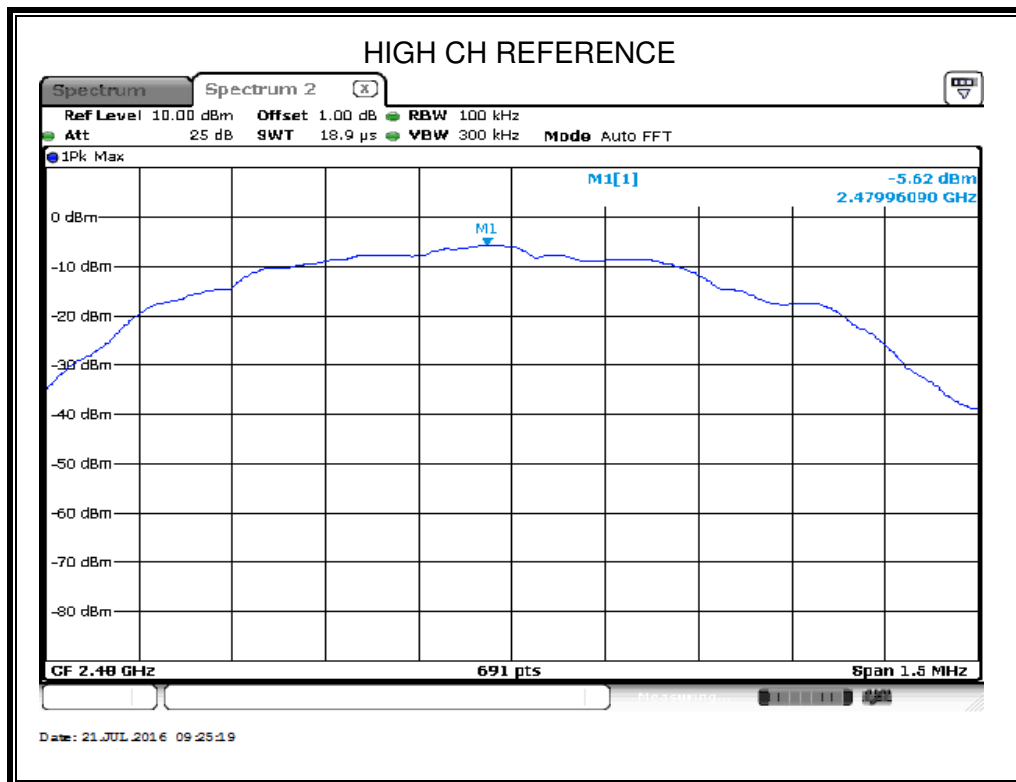
**RESULTS**

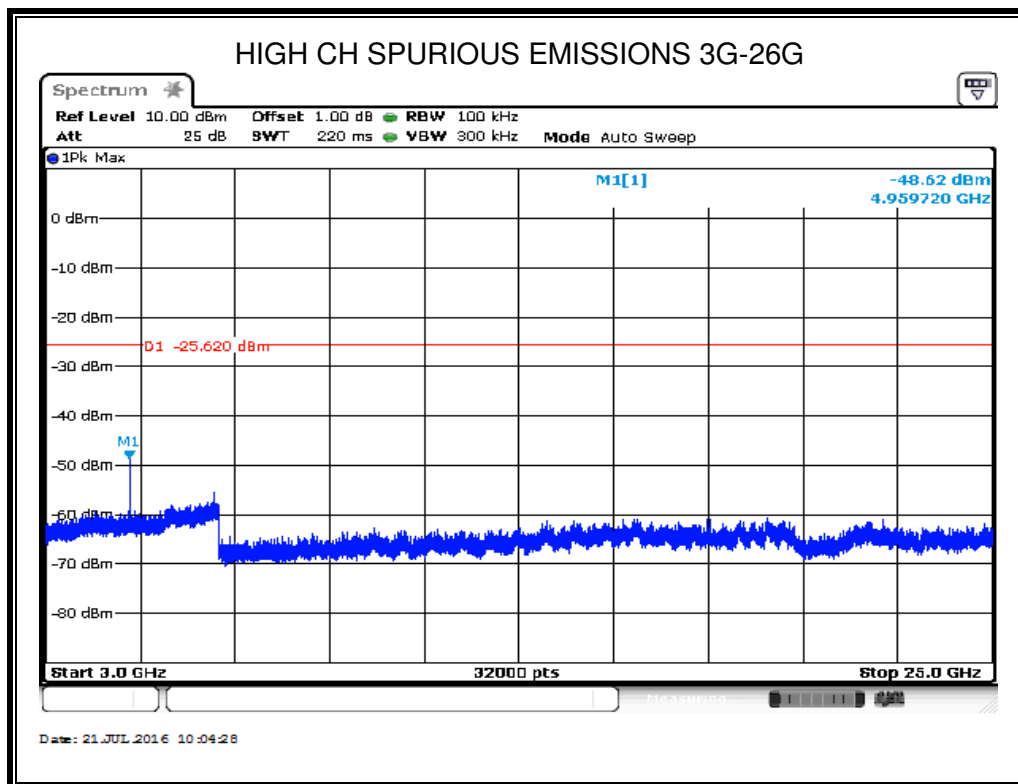
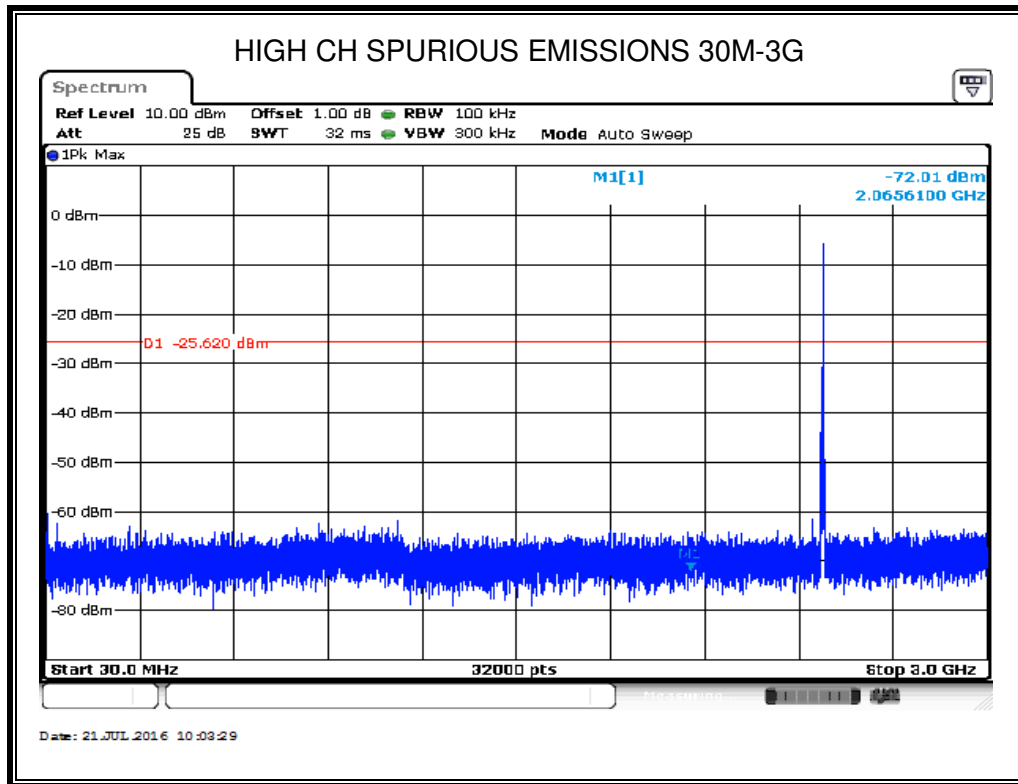












## 8. RADIATED TEST RESULTS

### 8.1. LIMITS AND PROCEDURE

#### LIMITS

Please refer to FCC §15.205 and §15.209

Please refer to IC RSS-GEN Clause 8.9 (Transmitter)

Radiation Disturbance Test Limit for FCC (Class B)(9KHz-1GHz)

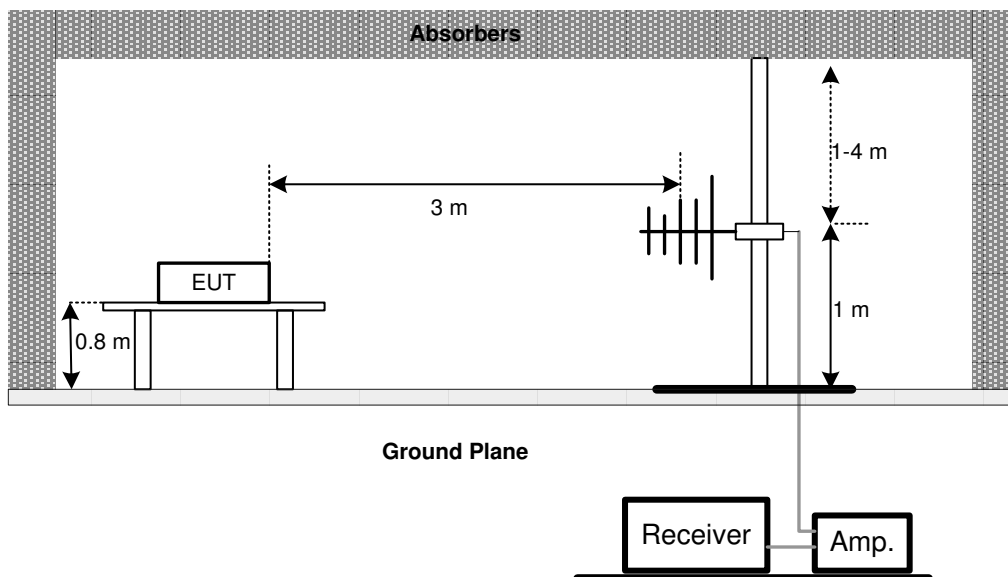
Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

Radiation Disturbance Test Limit for FCC (Above 1G)

Frequency (MHz)	dB(uV/m) (at 3 meters)	
	Peak	Average
Above 1000	74	54

#### TEST SETUP AND PROCEDURE

Below 1G

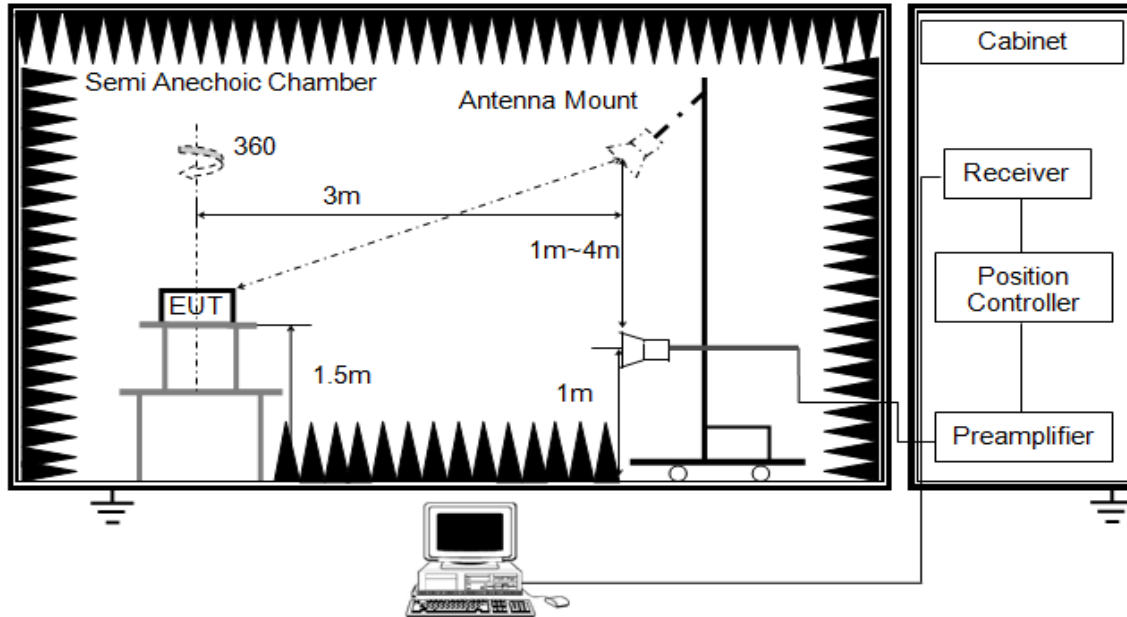


## The setting of the spectrum analyser

RBW	120KHz
VBW	300KHz
Sweep	Auto
Detector	Peak/QP
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 0.8 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamplifier Factor = Level
6. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration)

## ABOVE 1G

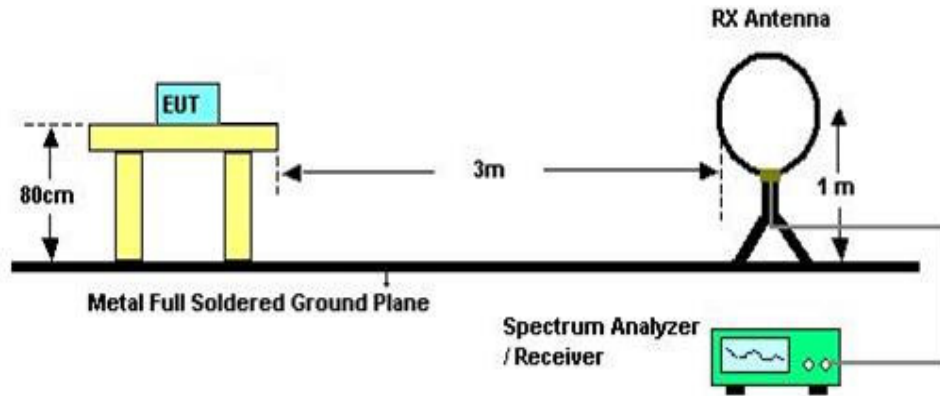


The setting of the spectrum analyser

RBW	1M MHz
VBW	3MHz
Sweep	Auto
Detector	Peak and AVG
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.
2. The EUT was arranged to its worst case and then tune the antenna tower (1.5 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 1.5 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading:  $\text{Antenna Factor} + \text{Cable Loss} + \text{Read Level} - \text{Preamp Factor} = \text{Level}$
6. For measurement above 1GHz, the emission measurement will be measured by the peak detector and the AV detector.
7. If the peak-detected amplitude can be shown to comply with the average limit, then it is not necessary to perform a separate average measurement.

Below 30MHz



The setting of the spectrum analyser

RBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
VBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
Sweep	Auto
Detector	Peak/QP/ Average
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013
2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 0.8 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)

#### **TEST CONDITIONS**

Temperature: 22.2°C

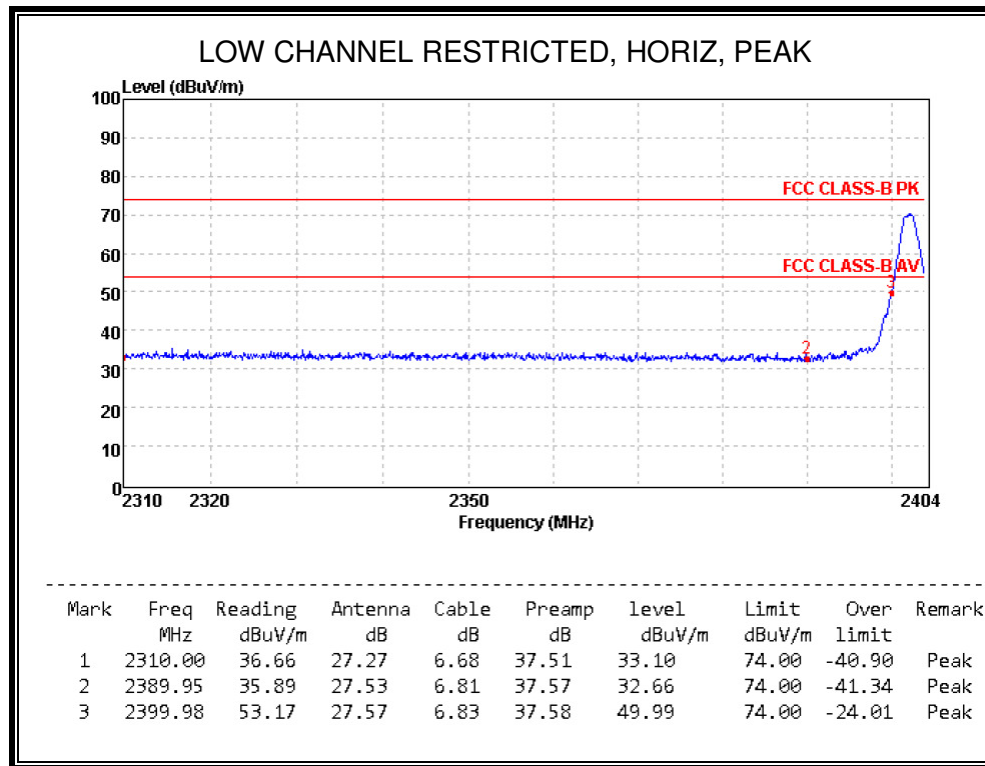
Relative Humidity: 61%

Test Voltage: AC 120V/60Hz

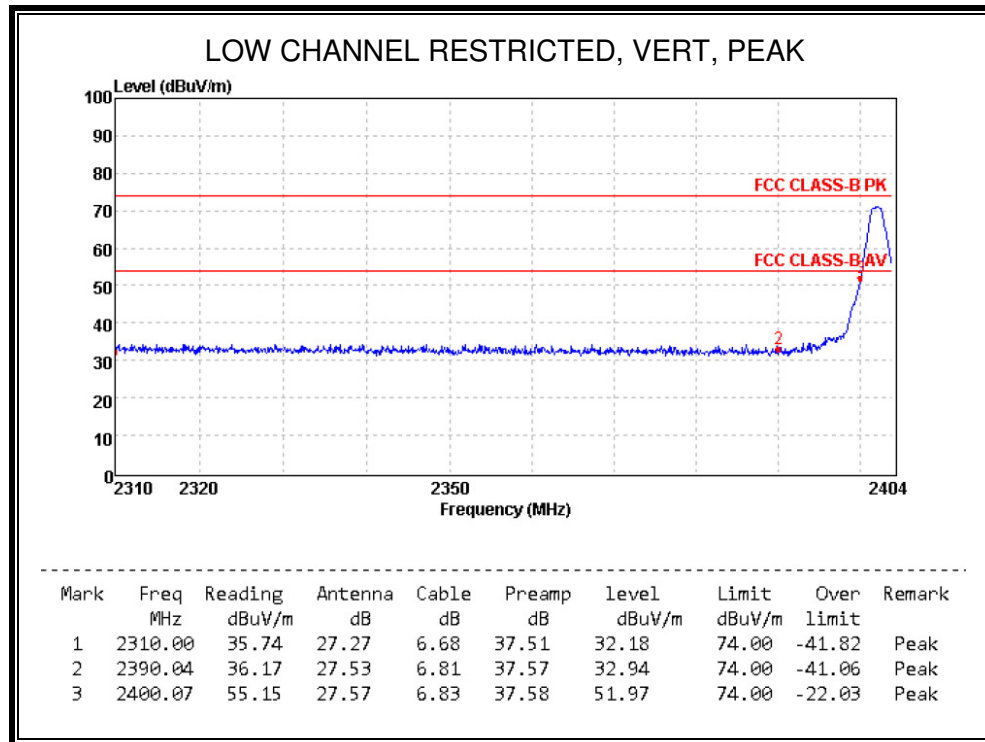


## 8.2. RESTRICTED BANDEDGE

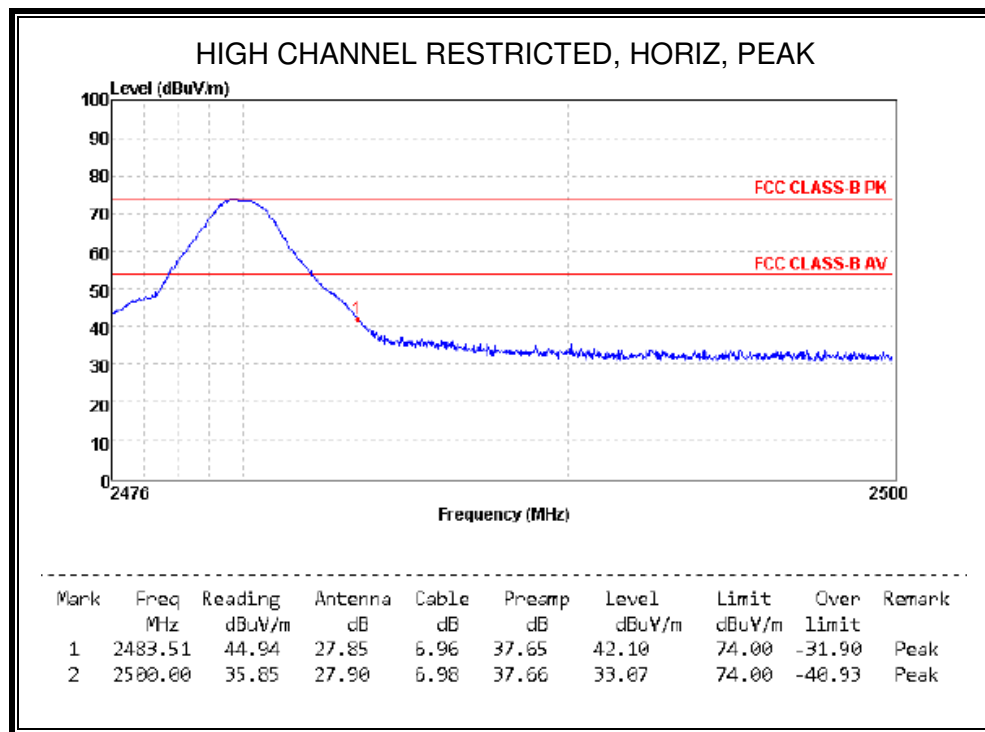
### RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



\* - indicates frequency in CFR15.205/IC8.10 Restricted Band

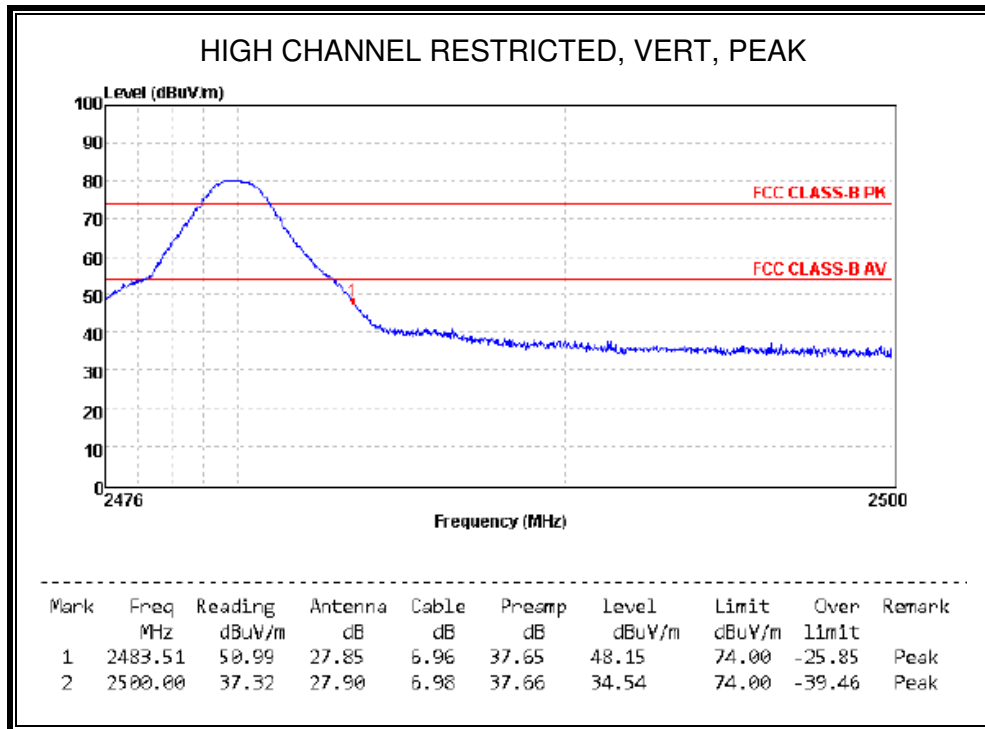
**RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**

\* - indicates frequency in CFR15.205/IC8.10 Restricted Band

**RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**

\* - indicates frequency in CFR15.205/IC8.10 Restricted Band

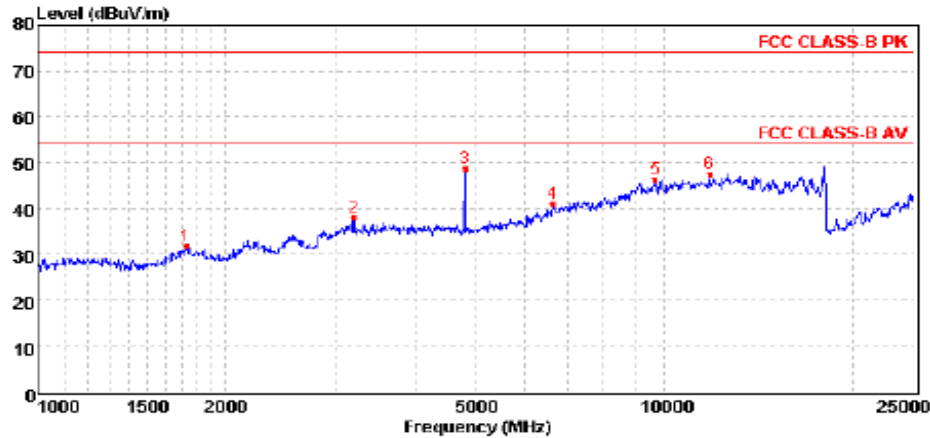
### **RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)**



\* - indicates frequency in CFR15.205/IC8.10 Restricted Band

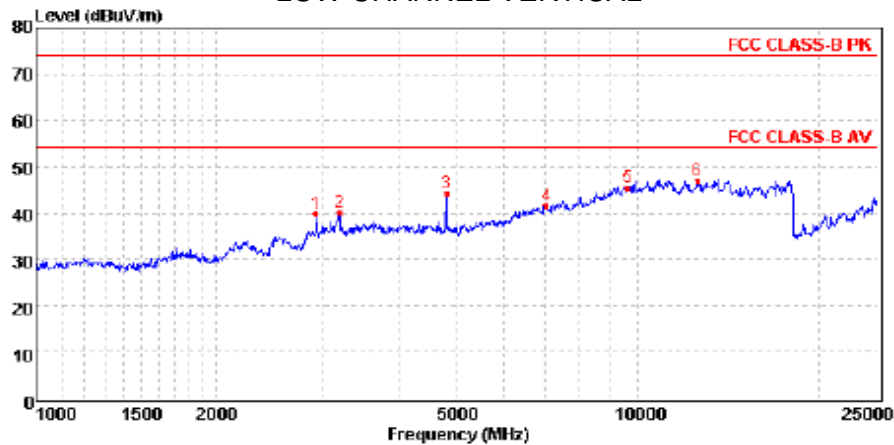
### 8.3. SPURIOUS EMISSIONS (1~25GHz)

#### LOW CHANNEL HORIZONTAL



Mark	Freq MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1726.82	37.86	25.39	5.66	37.04	31.87	74.00	-42.13	Peak
2	3196.09	39.18	28.58	8.43	37.99	38.20	74.00	-35.80	Peak
3	4804.11	47.15	31.09	9.21	38.53	48.92	74.00	-25.08	Peak
4	6640.54	33.32	35.30	10.46	38.01	41.07	74.00	-32.93	Peak
5	9669.16	34.11	38.20	12.17	38.08	46.40	74.00	-27.60	Peak
6	11803.28	32.68	39.18	13.64	37.72	47.70	74.00	-26.30	Peak

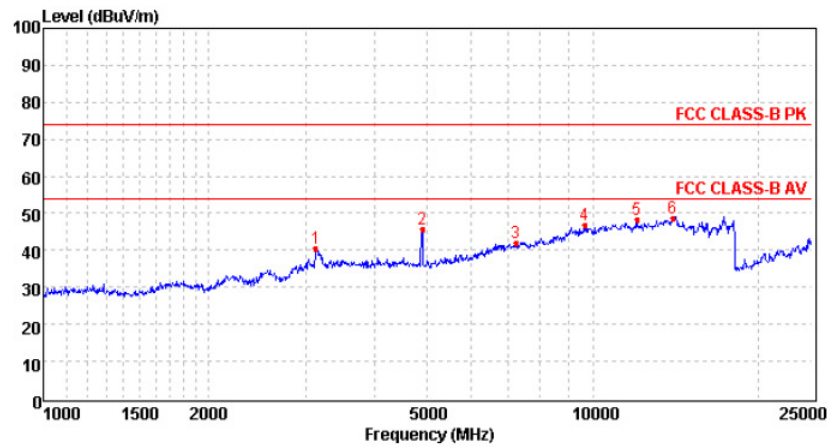
#### LOW CHANNEL VERTICAL



Mark	Freq MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2922.17	41.36	28.41	8.00	37.94	39.83	74.00	-34.17	Peak
2	3196.09	41.15	28.58	8.43	37.99	40.17	74.00	-33.83	Peak
3	4804.11	42.47	31.09	9.21	38.53	44.24	74.00	-29.76	Peak
4	7056.09	33.11	35.85	10.79	38.07	41.68	74.00	-32.32	Peak
5	9613.43	33.29	38.17	12.11	38.07	45.50	74.00	-28.50	Peak
6	12578.21	31.92	39.23	13.93	37.95	47.13	74.00	-26.87	Peak

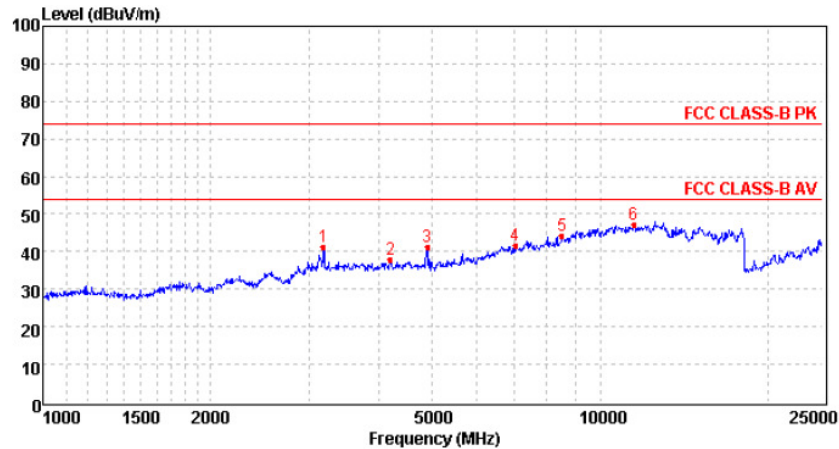
**Note:** Signals in non-restricted bands are covered by -20 dBc antenna port spurious testing.

## MID CHANNEL HORIZONTAL



Mark	Freq MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	level dBuV/m	Limit dBuV/m	Over limit	Remark
1	3132.08	41.70	28.56	8.35	37.99	40.62	74.00	-33.38	Peak
2	4888.15	44.09	31.14	9.26	38.58	45.91	74.00	-28.09	Peak
3	7242.05	33.23	36.00	10.87	38.11	41.99	74.00	-32.01	Peak
4	9641.26	34.77	38.18	12.14	38.07	47.02	74.00	-26.98	Peak
5	12009.76	33.26	39.10	13.73	37.61	48.48	74.00	-25.52	Peak
6	13957.53	31.65	40.76	14.10	37.86	48.65	74.00	-25.35	Peak

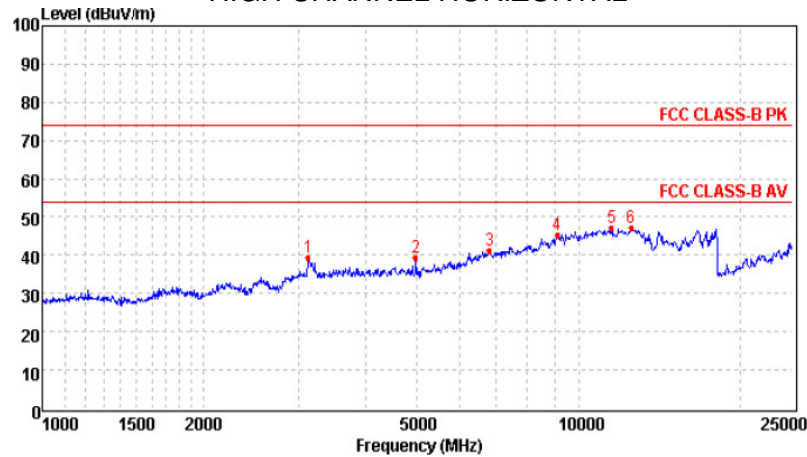
## MID CHANNEL VERTICAL



Mark	Freq MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	level dBuV/m	Limit dBuV/m	Over limit	Remark
1	3186.87	42.43	28.58	8.42	37.99	41.44	74.00	-32.56	Peak
2	4206.01	37.16	30.09	8.76	38.14	37.87	74.00	-36.13	Peak
3	4888.15	39.52	31.14	9.26	38.58	41.34	74.00	-32.66	Peak
4	7035.73	33.05	35.83	10.78	38.07	41.59	74.00	-32.41	Peak
5	8539.10	33.75	37.27	11.27	38.08	44.21	74.00	-29.79	Peak
6	11467.00	32.34	39.11	13.48	37.89	47.04	74.00	-26.96	Peak

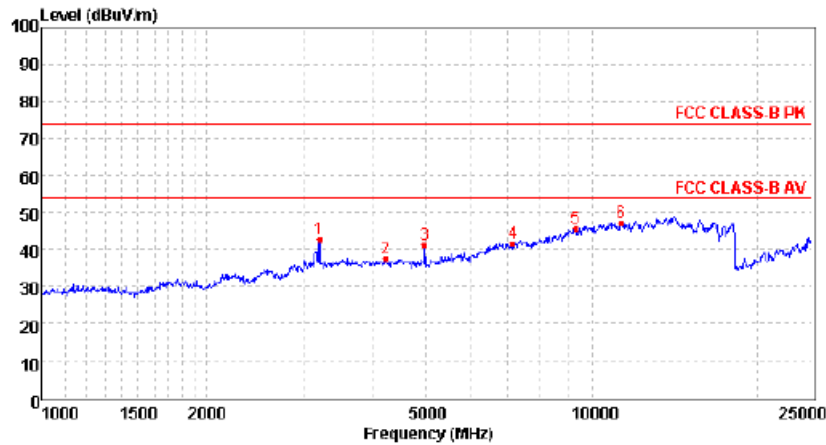
**Note:** Signals in non-restricted bands are covered by -20 dBc antenna port spurious testing.

## HIGH CHANNEL HORIZONTAL



Mark	Freq MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	level dBuV/m	Limit dBuV/m	Over limit	Remark
1	3132.08	40.42	28.56	8.35	37.99	39.34	74.00	-34.66	Peak
2	4959.31	37.52	31.18	9.31	38.62	39.39	74.00	-34.61	Peak
3	6815.55	33.22	35.55	10.61	38.03	41.35	74.00	-32.65	Peak
4	9126.06	33.56	37.95	11.76	37.98	45.29	74.00	-28.71	Peak
5	11500.20	32.45	39.10	13.49	37.88	47.16	74.00	-26.84	Peak
6	12505.71	32.10	39.20	13.91	37.91	47.30	74.00	-26.70	Peak

## HIGH CHANNEL VERTICAL



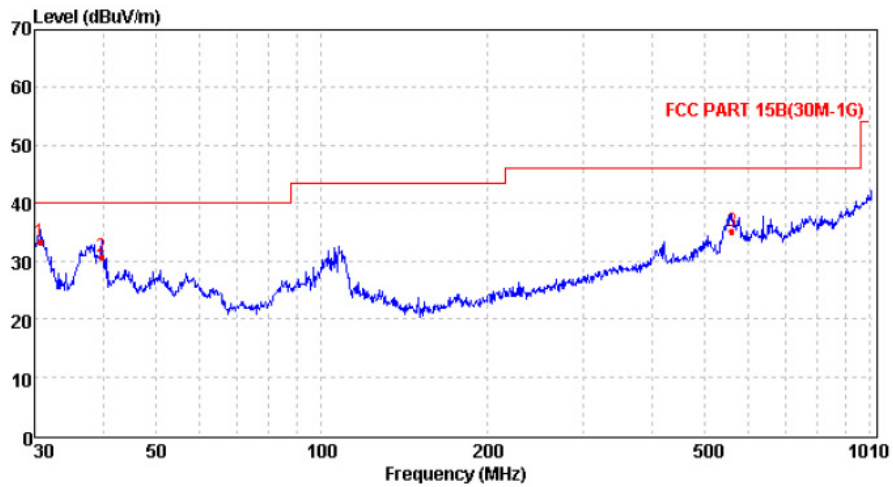
Mark	Freq MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	level dBuV/m	Limit dBuV/m	Over limit	Remark
1	3196.09	43.63	28.58	8.43	37.99	42.65	74.00	-31.35	Peak
2	4218.19	36.92	30.13	8.77	38.14	37.68	74.00	-36.32	Peak
3	4959.31	39.28	31.18	9.31	38.62	41.15	74.00	-32.85	Peak
4	7179.53	33.13	35.95	10.84	38.10	41.82	74.00	-32.18	Peak
5	9312.59	33.97	38.03	11.88	38.01	45.87	74.00	-28.13	Peak
6	11269.86	32.87	39.15	13.37	38.00	47.39	74.00	-26.61	Peak

**Note:** Signals in non-restricted bands are covered by -20 dBc antenna port spurious testing.

## 8.4. SPURIOUS EMISSIONS BELOW 1 GHz

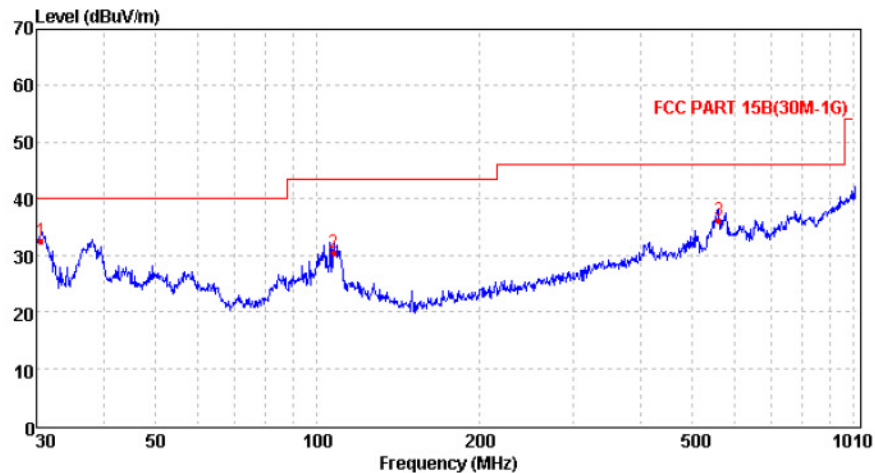
### SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)

#### LOW CHANNEL HORIZONTAL



Mark	Freq MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	level dBuV/m	Limit dBuV/m	Over limit	Remark
1	30.75	35.24	25.34	0.51	27.69	33.40	40.00	-6.60	QP
2	39.75	31.58	26.47	0.60	28.07	30.58	40.00	-9.42	QP
3	559.44	30.32	30.90	2.72	28.82	35.12	46.00	-10.88	QP

#### LOW CHANNEL VERTICAL



Mark	Freq MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	level dBuV/m	Limit dBuV/m	Over limit	Remark
1	30.64	34.46	25.34	0.51	27.69	32.62	40.00	-7.38	QP
2	107.52	32.68	25.21	1.04	28.50	30.43	43.50	-13.07	QP
3	559.44	31.32	30.90	2.72	28.82	36.12	46.00	-9.88	QP

**SPURIOUS EMISSIONS 9KHz TO 30 MHz (WORST-CASE CONFIGURATION)**

The emissions don't show in following result tables are more than 20dB below the limits.  
The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.



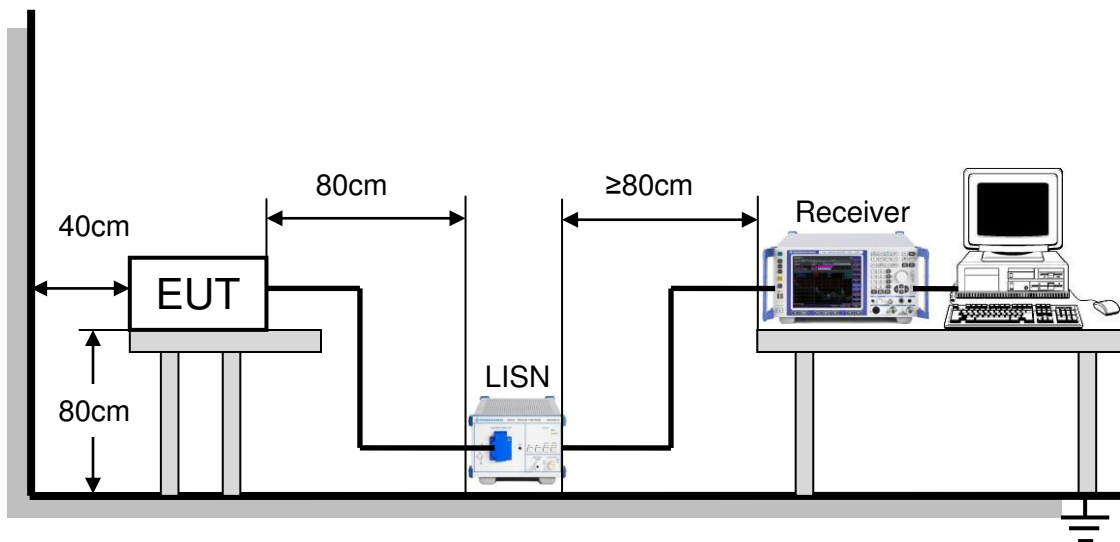
## 9. AC POWER LINE CONDUCTED EMISSIONS

### LIMITS

Please refer to FCC §15.207 (a) and RSS-Gen Clause 8.8

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *
0.50 -5.0	73.00	60.00	56.00	46.00
5.0 -30.0	73.00	60.00	60.00	50.00

### TEST SETUP AND PROCEDURE



The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI Measurement Receiver (R&S Test Receiver ESR3) is used to test the emissions from both sides of AC line. According to the requirements in Section 7 and 13 of ANSI C63.4-2003. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver is set at 9kHz.

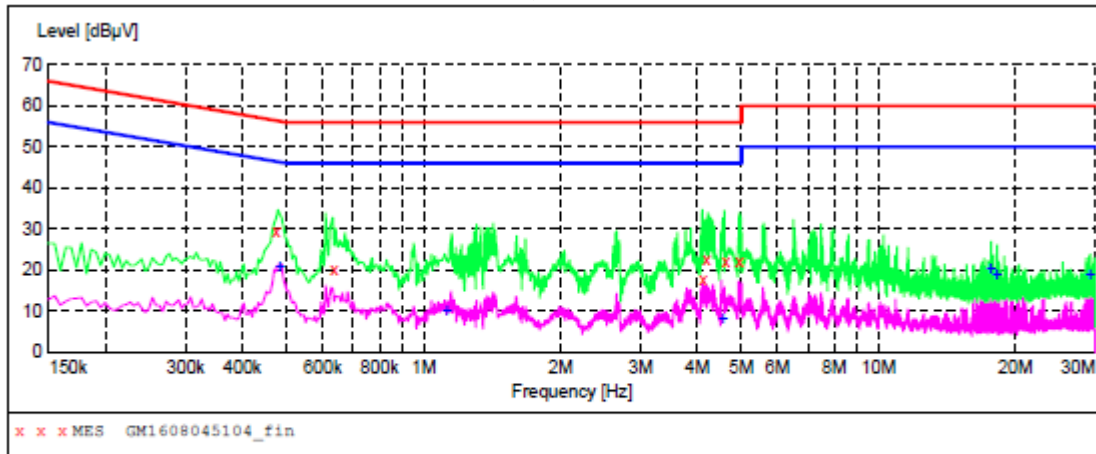
The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application.

### TEST CONDITIONS

Temperature: 23.8°C

Relative Humidity: 58%

Test Voltage: AC 120V/60Hz

**TEST RESULTS****Mode:TX ; Phase: LINE****MEASUREMENT RESULT: "GM1608045104\_fin"**

8/4/2016 9:18PM

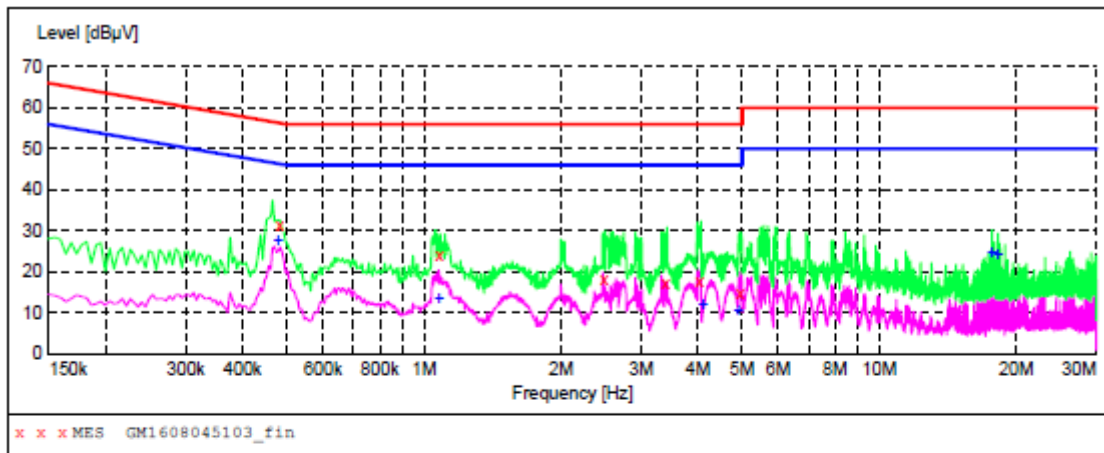
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.474000	29.60	10.2	56	26.8	QP	L1	GND
0.636000	20.30	10.2	56	35.7	QP	L1	GND
4.119000	17.60	10.4	56	38.4	QP	L1	GND
4.200000	22.80	10.4	56	33.2	QP	L1	GND
4.623000	22.30	10.4	56	33.7	QP	L1	GND
4.947000	21.90	10.5	56	34.1	QP	L1	GND

**MEASUREMENT RESULT: "GM1608045104\_fin2"**

8/4/2016 9:18PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.483000	21.40	10.2	46	24.9	AV	L1	GND
1.122000	10.50	10.3	46	35.5	AV	L1	GND
4.555500	8.70	10.4	46	37.3	AV	L1	GND
17.691000	20.80	10.7	50	29.2	AV	L1	GND
18.244500	19.30	10.7	50	30.7	AV	L1	GND
29.233500	19.30	10.9	50	30.7	AV	L1	GND

## Mode:TX Phase: Neutral



## MEASUREMENT RESULT: "GM1608045103\_fin"

8/4/2016 9:15PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.483000	31.60	10.2	56	24.7	QP	N	GND
1.081500	23.90	10.3	56	32.1	QP	N	GND
2.490000	18.00	10.3	56	38.0	QP	N	GND
3.403500	17.40	10.4	56	38.6	QP	N	GND
4.042500	17.70	10.4	56	38.3	QP	N	GND
4.965000	14.80	10.5	56	41.2	QP	N	GND

## MEASUREMENT RESULT: "GM1608045103\_fin2"

8/4/2016 9:15PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.478500	27.80	10.2	46	18.6	AV	N	GND
1.077000	13.60	10.3	46	32.4	AV	N	GND
4.096500	12.40	10.4	46	33.6	AV	N	GND
4.897500	11.10	10.5	46	34.9	AV	N	GND
17.695500	25.20	10.7	50	24.8	AV	N	GND
18.244500	24.80	10.7	50	25.2	AV	N	GND

## **10. ANTENNA REQUIREMENTS**

### **Applicable requirements**

Please refer to FCC §15.203

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

### **Antenna Connector**

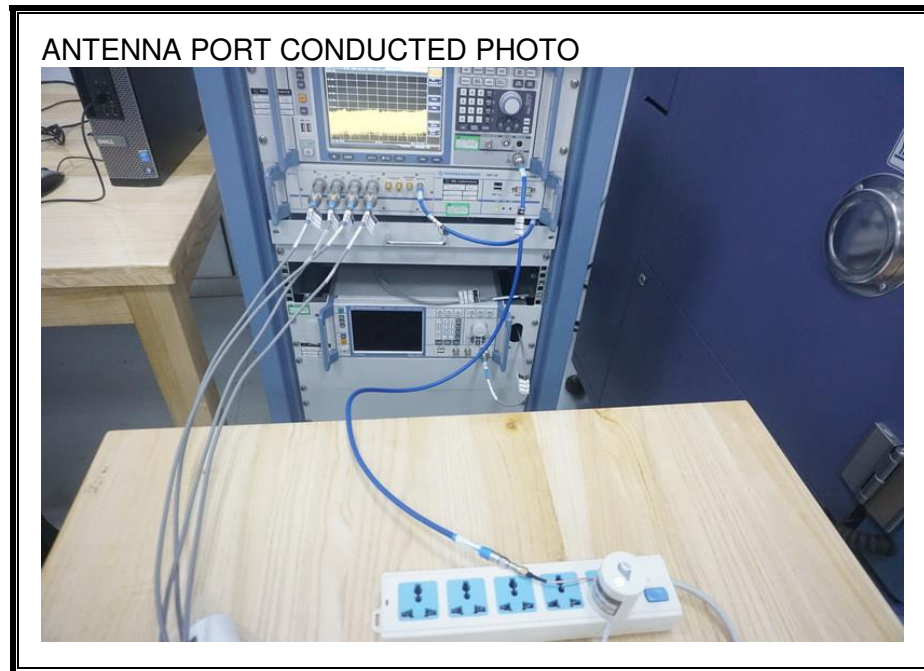
Antenna Connector is on the PCB within enclosure and not accessible to user.

### **Antenna Gain**

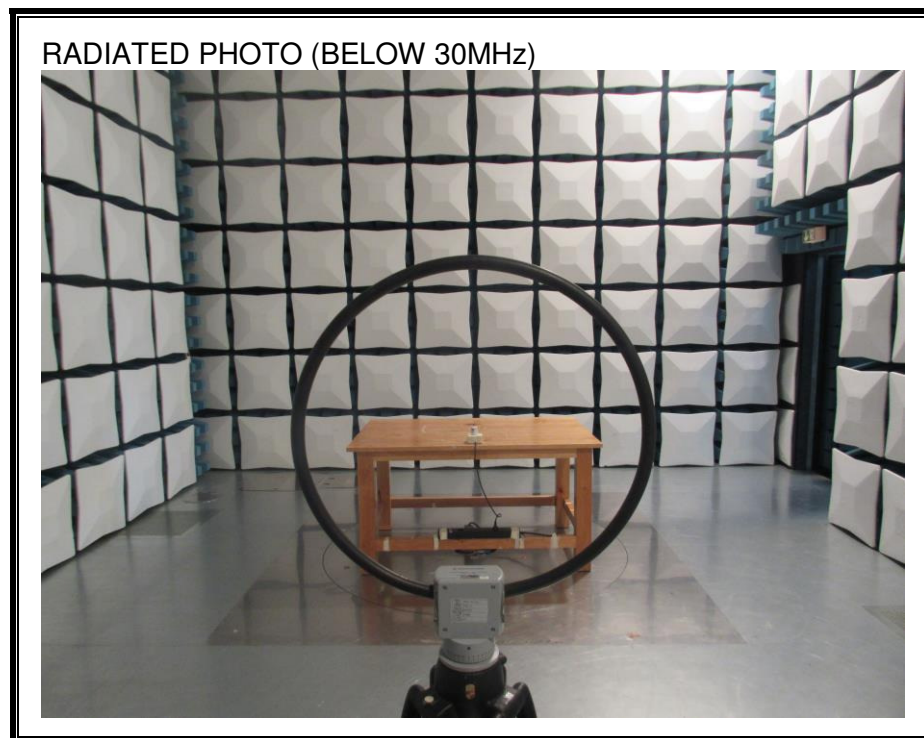
The antenna gain of EUT is less than 6 dBi.

## 11. SETUP PHOTOS

### 11.1. ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP



### 11.1. RADIATED RF MEASUREMENT SETUP (BELOW 30MHz)

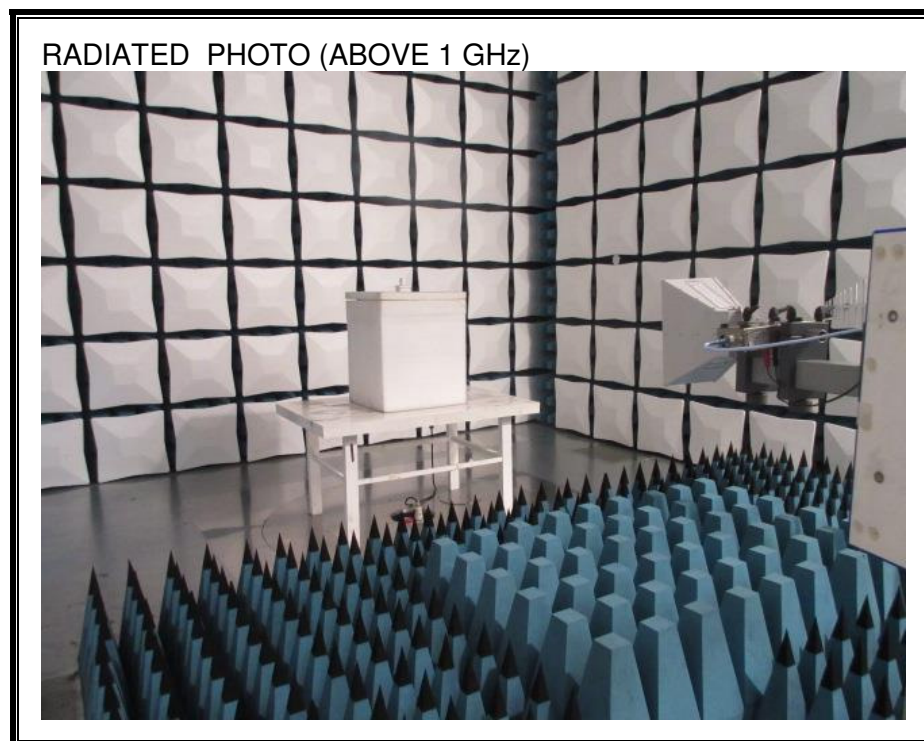


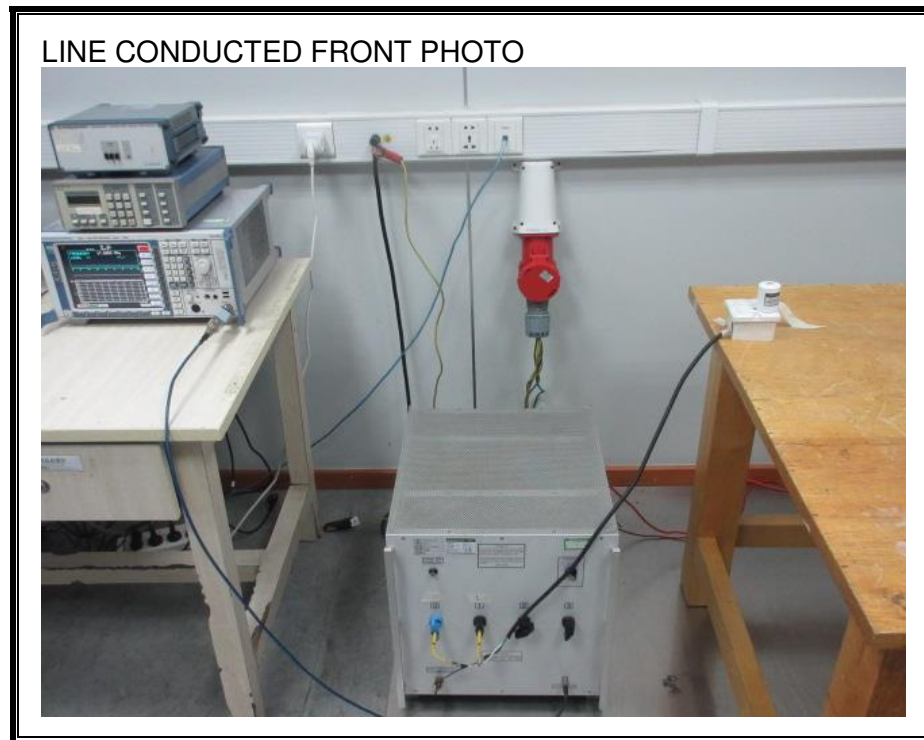


## 11.2. RADIATED RF MEASUREMENT SETUP (BELOW 1GHz)



## 11.3. RADIATED RF MEASUREMENT SETUP (ABOVE 1GHz)



**11.4. POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP****END OF REPORT**