

# FCC Radio Test Report

For

**Product Name: Aircraft Simulator**

**Brand Name: YUNEEC**

**FCC Model.: Simu-connector**

**FCC ID: 2ACS5-SC**

**Test Report Number:**

**C150827R01-RPW**

Issued for

**Yuneecc Technology Co., Limited**

**2/F Man Shung Industrial Building, 7 Lai Yip Street, Kwun Tong**

Issued by

**Compliance Certification Services Inc.**

**Kun shan Laboratory**

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TESTING CERT #2541.01

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### Revision History

Rev.	Issue Date	Report NO.	Effect Page	Contents
00	September 17, 2015	C150827R01-RPW	ALL	N/A

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## 1. TEST RESULT CERTIFICATION

<b>Product Name:</b>	Aircraft Simulator
<b>Trade Name:</b>	YUNEEC
<b>FCC Model:</b>	Simu-connector
<b>Applicant Discrepancy:</b>	Initial
<b>Device Category:</b>	Mobile unit
<b>Date of Test:</b>	September 11, 2015- September 18, 2015
<b>Applicant:</b>	<b>Yuneeec Technology Co., Limited</b> 2/F Man Shung Industrial Building, 7 Lai Yip Street, Kwun Tong
<b>Manufacturer:</b>	<b>Yuneeec International (China) Co., Ltd.</b> No.388 East Zhengwei Road, Jinxi Town, Kunshan, Jiangsu 215324, China
<b>Application Type:</b>	Certification

### APPLICABLE STANDARDS

STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart C	No non-compliance noted

### We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10: 2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.247.

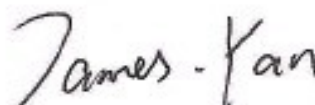
The test results of this report relate only to the tested sample EUT identified in this report.

**Approved by:**



Jeff.Fang  
RF Manager  
Compliance Certification Service Inc.

**Tested by:**



James.Yan  
Test Engineer  
Compliance Certification Service Inc.

## 2. EUT DESCRIPTION

<b>Product Name:</b>	Aircraft Simulator
<b>Brand Name:</b>	YUNEEC
<b>FCC Model:</b>	Simu-connector
<b>Model Discrepancy:</b>	N/A
<b>Power Adapter Power Rating :</b>	DC 5V
<b>Frequency Range:</b>	2405 ~ 2480MHz
<b>Transmit Power:</b>	Channel 2405: 0.01 dBm
<b>Modulation Technique:</b>	O-QPSK
<b>Number of Channels:</b>	16 Channels
<b>Antenna Specification:</b>	PCB Antenna for 2.4GHz Gain 0 dBi

**Remark:**

- 1.The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.
- 2.This submittal(s) (test report) is intended for **FCC ID: 2ACS5-SC** filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.

### 3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10 2013 and FCC CFR 47 15.207, 15.209 and 15.247.

#### 3.1.EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

#### 3.2.EUT EXERCISE

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

#### 3.3.GENERAL TEST PROCEDURES

##### Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.10 2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

##### Radiated Emissions

Under 1GHz

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.10:2013.

Above 1GHz

The EUT is placed on a turn table, which is 1.5 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.10:2013.

### 3.4.FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41			

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> Above 38.6

Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

### 3.5. DESCRIPTION OF TEST MODES

Software used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

The worst-case data are determined to be as follows for each mode based on investigation by measuring the average power, peak power and PPSD across all channel, bandwidths, and modulations.

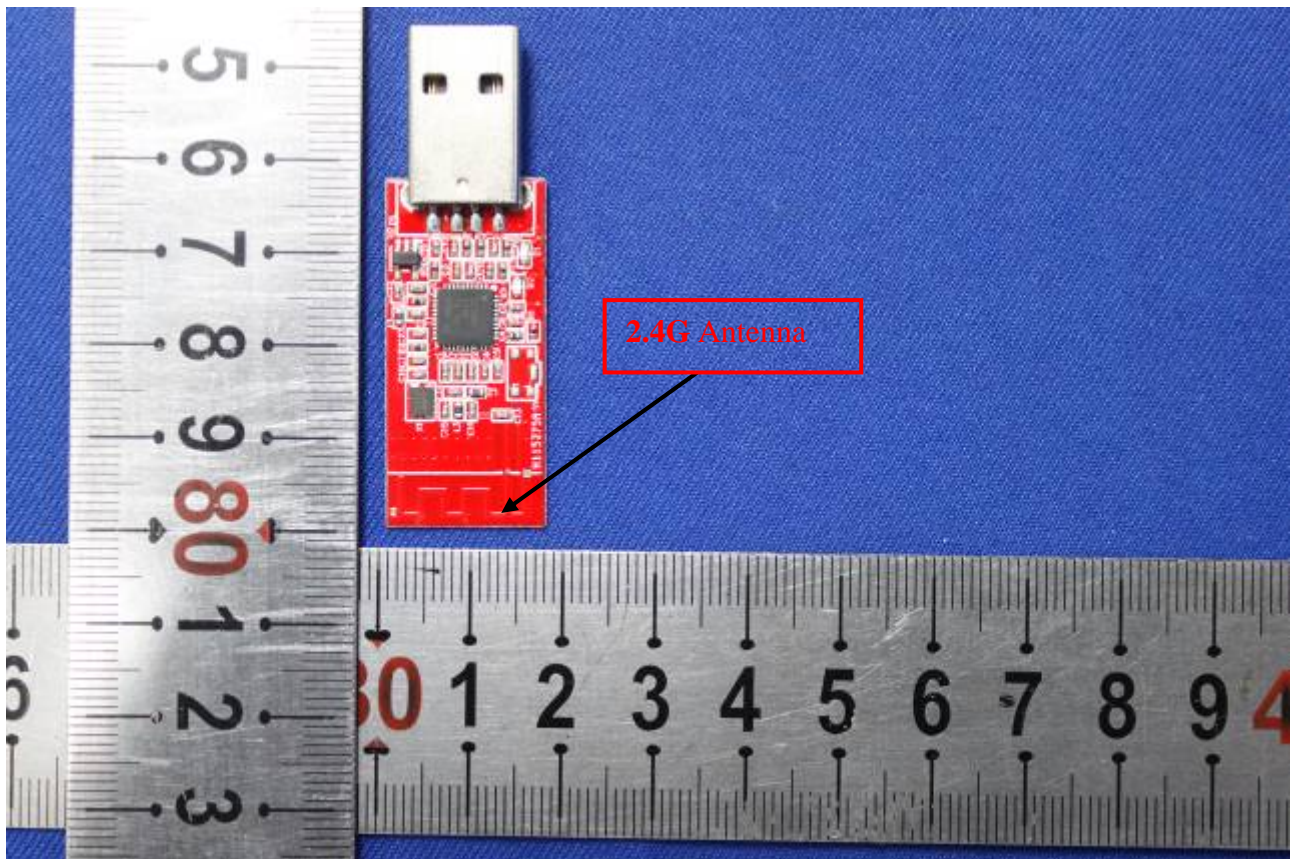
### 3.6. ANTENNA DESCRIPTION

#### According to FCC 47 CFR 15.203

“an intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached or an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section”

\* the antenna of this EUT is a unique(PCB Antenna).

\* the EUT complies with the requirement of 15.203.



## 4. INSTRUMENT CALIBRATION

### 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.



### Equipment Used for Emissions Measurement

Conducted Emissions Test Site					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	2015-4-9	2016-4-8
DETECTOR NEGATIVE	Agilent	8473B	MY42240176	2015-5-11	2016-5-10
OSCILLOSCOPE	Agilent	DSO6104A	MY44002585	2015-3-16	2016-3-15
Power Sensor	Anritsu	MA2411A	0917072	2015-4-24	2016-4-23
Power SPLITTER	Mini-Circuits	ZN2PD-9G	SF078500430	N.C.R	N.C.R
DC Power Supply	AGILENT	E3632A	MY50340053	N.C.R	N.C.R
Temp. / Humidity Chamber	TERCHY	MHK-120AK	X30109	2015-1-22	2016-1-21
Test Software	EZ-EMC				

977 Chamber					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	2015-4-9	2016-4-8
EMI Test Receiver	R&S	ESCI	101378	2015-1-22	2016-1-21
Pre-Amplifier	MINI	ZFL-1000VH2	d041703	2015-1-22	2016-1-21
Pre-Amplifier	Miteq	JS41-00101800-32-10P	1675713	2015-1-22	2016-1-21
Bilog Antenna	Sunol	JB1	A062604	2015-3-6	2016-3-5
Horn-antenna	SCHWARZBECK	BBHA9120D	D:266	2015-3-7	2016-3-6
Turn Table	CT	CT123	4165	N.C.R	N.C.R
Antenna Tower	CT	CTERG23	3256	N.C.R	N.C.R
Controller	CT	CT100	95637	N.C.R	N.C.R
Test Software	EZ-EMC				

Conducted Emission					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
EMI TEST RECEIVER	R&S	ESCI	100781	2015-3-16	2016-3-15
V (V-LISN)	SCHWARZBECK	NNLK 8129	8129-143	N.C.R	N.C.R
LISN (EUT)	FCC	FCC-LISN-50/250-50-2-02	05012	2015-3-16	2016-3-15
Pulse LIMITER	R&S	ESH3-Z2	100524	2015-9-24	2016-9-23
Test Software	EZ-EMC				

**Remark:** The measurement uncertainty is less than +/- 2.81dB, which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.

Expanded Uncertainty (95% CONFIDENCE INTERVAL): K=2

## **5. FACILITIES AND ACCREDITATIONS**

### **5.1.FACILITIES**

All measurement facilities used to collect the measurement data are located at CCS China Kunshan Lab at 10#Weiyue Rd, Innovation Park Eco. & Tec. Development Zone

Kunshan city JiangSu, (215300), CHINA.

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 2013 and CISPR Publication 22.

### **5.2.EQUIPMENT**

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.



Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

### **5.3.LABORATORY ACCREDITATIONS AND LISTING**

The test facilities used to perform radiated and conducted emissions tests are accredited by American Association for Laboratory Accreditation Program for the specific scope accreditation under Lab Code: 200581-0 to perform Electromagnetic Interference tests according to FCC Part 15 and CISPR 22 requirements. In addition, the test facilities are listed with Industry Canada, Certification and Engineering Bureau, IC5743 for 10m chamber 10m, IC5743 for 10m chamber 3m.

**5.4.TABLE OF ACCREDITATIONS AND LISTINGS**

Country	Agency	Scope of Accreditation	Logo
USA	A2LA	47 CFR FCC Part 15/18 (using ANSI C63.10 :2013); VCCI V3; CNS 13438; CNS 13439; CNS 13803; CISPR 11; EN 55011; CISPR 13; EN 55013; CISPR 22:2005; CISPR 22:1997 +A1 :2000+A2 :2002; EN 55022:2006; EN55022 :1998 +A1 :2001+A2 :2003; EN 61000-6-3 (excluding discontinuous interference); EN 61000-6-4; AS/NZS CISPR 22; CAN/CSA-CEI/IEC CISPR 22; EN 61000-3-2; EN 61000-3-3; EN550024; EN 61000-4-2; EN 61000-4-3; EN61000-4-4; EN 61000-4-5; EN 61000-4-6; IEC 61000-4-8; EN 61000-4-11; IEC61000-3-2; IEC61000-3-3; IEC 61000-4-2; IEC 61000-4-3; IEC 61000-4-4; IEC 61000-4-5; IEC 61000-4-6; IEC 61000-4-8; IEC 61000-4-11; EN 300 220-3; EN 300 328; EN 300 330-2; EN 300 440-1; EN 300-440-2; EN 300 893; EN 301 489-01; EN 301 489-3; EN 301 489-07; EN 301 489-17; 47 CFR FCC Part 15, 22, 24	
USA	FCC	3/10 meter Sites to perform FCC Part 15/18 measurements	 93105, 90471
Japan	VCCI	3/10 meter Sites and conducted test sites to perform radiated/conducted measurements	<b>VCCI</b> R-1600 C-1707 G-216

*\* No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.*

## 6. SETUP OF EQUIPMENT UNDER TEST

### 6.1.SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

### 6.2.SUPPORT EQUIPMENT

No.	Device Type	Brand	Model	Series No.	FCC DOC
1.	Notebook	DELL	E5430	CN8YYW1	N/A

**Remark:**

1. *All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.*
2. *Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*

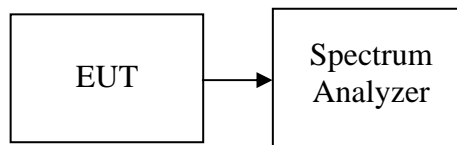
## 7. FCC PART 15.247 REQUIREMENTS

### 7.1. 6DB BANDWIDTH MEASUREMENT

#### LIMIT

According to §15.247(a)(2), systems using digital modulation techniques may operate in the 902 - 928 MHz, and 2400 - 2483.5 MHz bands, and 5725 - 5850 MHz bands. The minimum 6dB bandwidth shall be at least 500kHz.

#### Test Configuration



#### TEST PROCEDURE

1. The transmitter output is connected to the spectrum analyzer. Set RBW = 100 kHz. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW, Sweep = auto couple.

#### TEST RESULTS

*No non-compliance noted*

#### Test Data

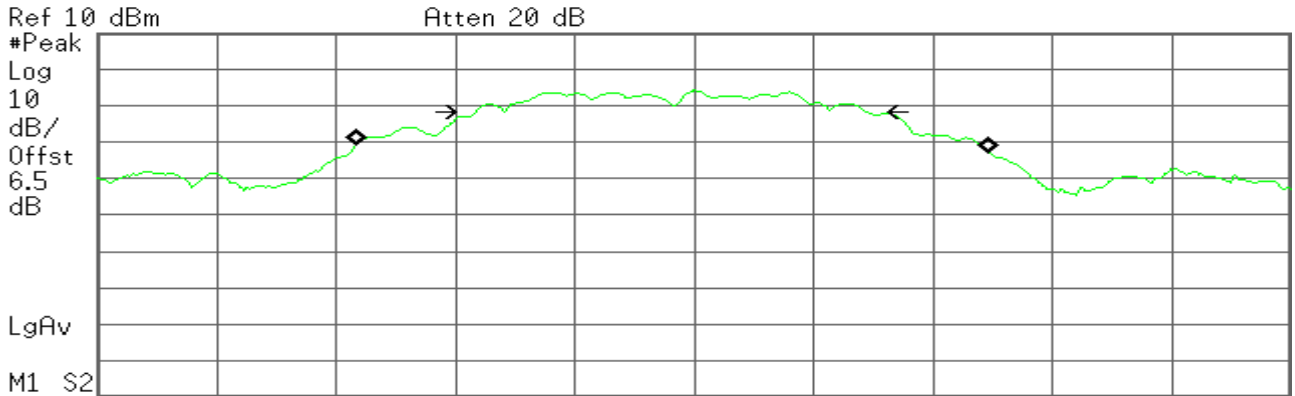
Channel	Frequency (MHz)	Bandwidth(B) (MHz)	6dB Bandwidth Min. Limit(MHz)
Low	2405	1.641	0.5
Mid	2440	1.648	0.5
High	2480	1.644	0.5

**Test Plot**

**6dB Bandwidth (CH Low)**

Agilent

R T



Center 2.405 000 GHz Span 5 MHz  
 #Res BW 100 kHz #VBW 300 kHz Sweep 1 ms (601 pts)

**Occupied Bandwidth**  
 2.6553 MHz

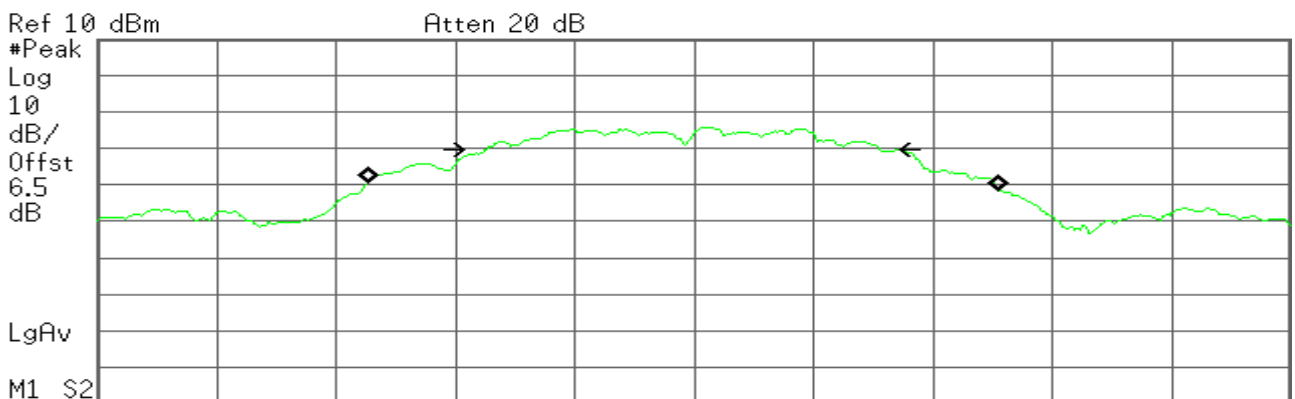
**Occ BW % Pwr** 99.00 %  
**x dB** -6.00 dB

**Transmit Freq Error** -91.708 kHz  
**x dB Bandwidth** 1.641 MHz

**6dB Bandwidth (CH Mid)**

Agilent

R T



Center 2.440 000 GHz Span 5 MHz  
 #Res BW 100 kHz #VBW 300 kHz Sweep 1 ms (601 pts)

**Occupied Bandwidth**  
 2.6483 MHz

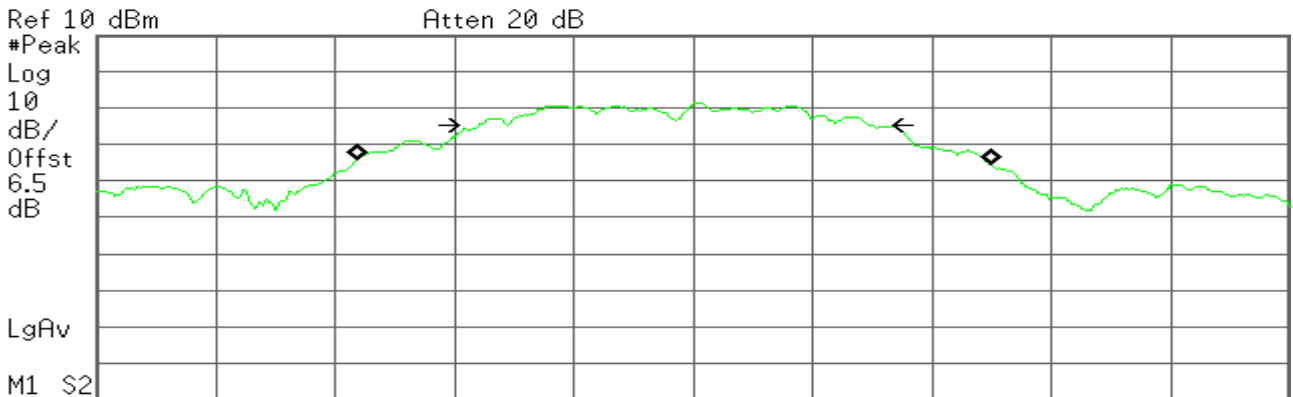
**Occ BW % Pwr** 99.00 %  
**x dB** -6.00 dB

**Transmit Freq Error** -45.536 kHz  
**x dB Bandwidth** 1.648 MHz

**6dB Bandwidth (CH High)**

Agilent

R T



Ref 10 dBm      Atten 20 dB  
 #Peak  
 Log  
 10  
 dB/  
 Offst  
 6.5  
 dB  
 LgAv  
 M1 S2  
 Center 2.480 000 0 GHz      Span 5 MHz  
 #Res BW 100 kHz      #VBW 300 kHz      Sweep 1 ms (601 pts)

**Occupied Bandwidth**  
 2.6616 MHz

**Occ BW % Pwr**      99.00 %  
**x dB**                -6.00 dB

**Transmit Freq Error**      -79.521 kHz  
**x dB Bandwidth**            1.644 MHz

## 7.2. PEAK POWER

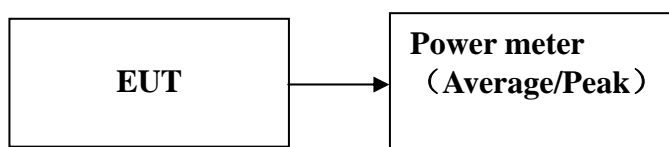
### LIMIT

The maximum peak output power of the intentional radiator shall not exceed the following:

1. According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, and 2400-2483.5 MHz: 1 Watt.

2. According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### Test Configuration



### TEST PROCEDURE

1. The EUT transmitter output is connected to the Power meter. The Power meter is set to the peak power detection.
2. The testing follows the Measurement Procedure FCC KDB No. 558074 D01 DTS Meas. Guidance v03r02. 9.1.2 PKPM1 Peak power meter method.

### TEST RESULTS

*No non-compliance noted*

### Test Data

Channel	Frequency (MHz)	Conducted Output Power (dBm)	Limit (dBm)
Low	2405	0.01	30
Mid	2440	-2.39	30
High	2480	-3.32	30



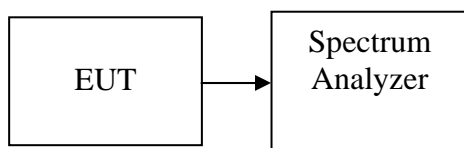
### 7.3. PEAK POWER SPECTRAL DENSITY

#### LIMIT

1. According to §15.247(e), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

2. According to §15.247(f), the digital modulation operation of the hybrid system, with the frequency hopping turned off, shall comply with the power density requirements of paragraph (d) of this section.

#### Test Configuration



#### TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set the spectrum analyzer as RBW = 3 kHz, VBW = 10 kHz, Span = 1.5 times the DTS bandwidth, Sweep = auto
3. Record the max reading.
4. Repeat the above procedure until the measurements for all frequencies are completed.

#### TEST RESULTS

*No non-compliance noted*

#### Test Data

Test mode:

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2405	-15.70	8.00	PASS
Mid	2440	-17.80	8.00	PASS
High	2480	-16.98	8.00	PASS

**Test Plot**

**PPSD (CH Low)**

 **Agilent**

**R T**

Mkr1 2.405 029 52 GHz  
-15.70 dBm

Ref 10 dBm

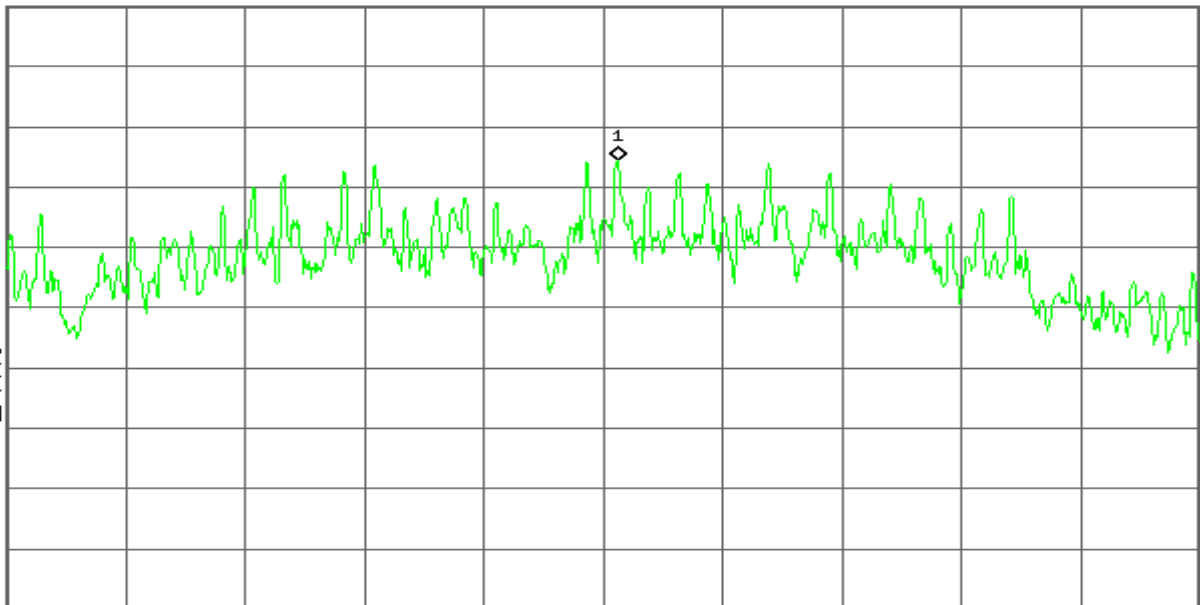
Atten 20 dB

Peak  
Log  
10  
dB/  
Offst  
6.5  
dB

LgAv

M1 S2  
S3 FC  
AA

£(f):  
f>50k  
Swp



Center 2.405 000 00 GHz

Span 2.46 MHz

#Res BW 3 kHz

#VBW 10 kHz

Sweep 259.4 ms (1001 pts)

**PPSD (CH Mid)**

 **Agilent**

**R T**

Mkr1 2.440 071 6 GHz  
-17.80 dBm

Ref 10 dBm

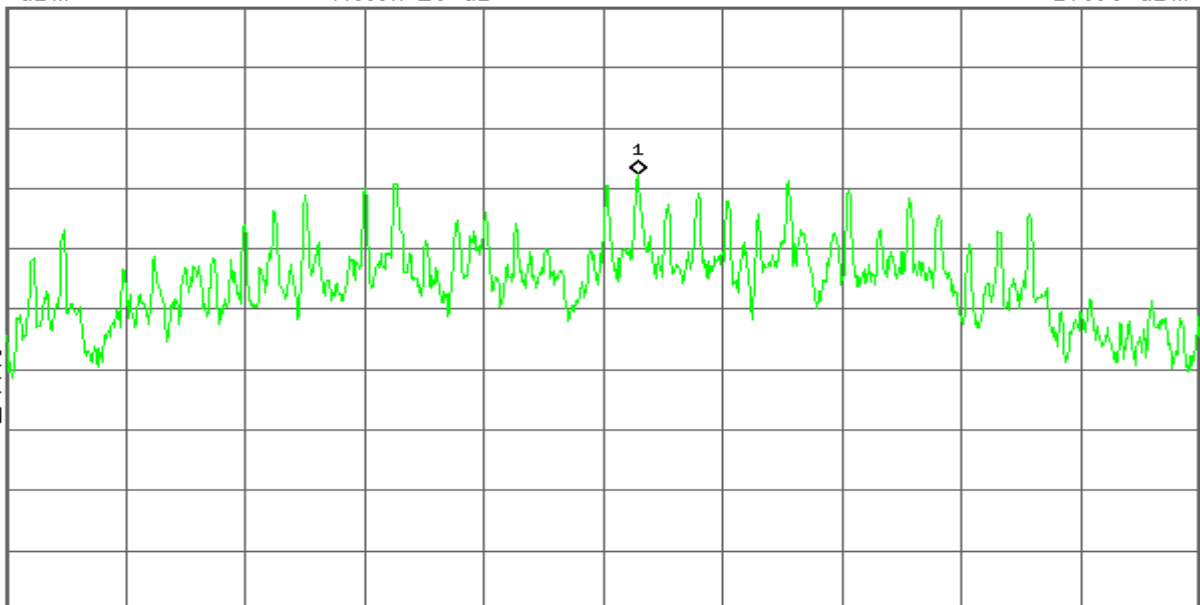
Atten 20 dB

Peak  
Log  
10  
dB/  
Offst  
6.5  
dB

LgAv

M1 S2  
S3 FC  
AA

£(f):  
f>50k  
Swp



Center 2.440 000 0 GHz

Span 2.47 MHz

#Res BW 3 kHz

#VBW 10 kHz

Sweep 260.5 ms (1001 pts)

PPSD (CH High)

Agilent

R T

Mkr1 2.480 044 5 GHz  
-16.98 dBm

Ref 10 dBm

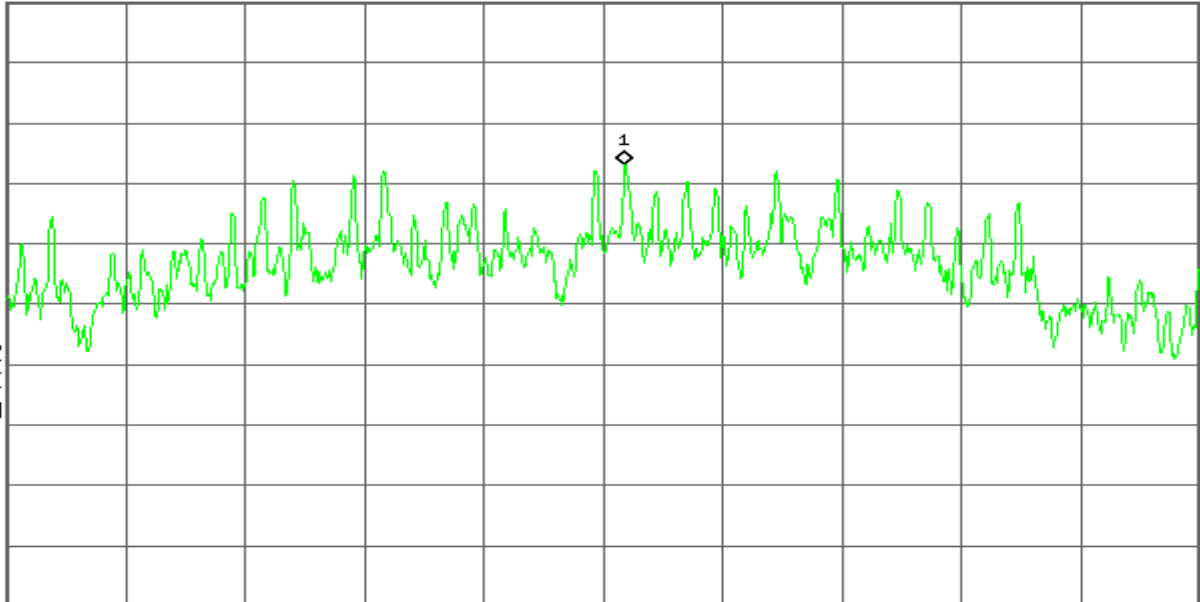
Atten 20 dB

Peak  
Log  
10  
dB/  
Offst  
6.5  
dB

LgAv

M1 S2  
S3 FC  
AA

$\mathcal{E}(f)$ :  
f>50k  
Swp



Center 2.480 000 GHz

Span 2.47 MHz

#Res BW 3 kHz

#VBW 10 kHz

Sweep 260.5 ms (1001 pts)

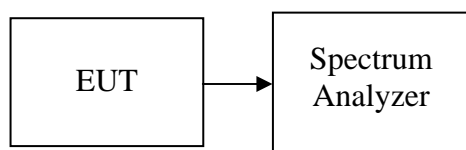
## 7.4.SPURIOUS EMISSIONS

### Conducted Measurement

#### LIMIT

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

#### Test Configuration



#### TEST PROCEDURE

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

Measurements are made over the 30MHz to 40GHz range with the transmitter set to the lowest, middle, and highest channels.

#### TEST RESULTS

*No non-compliance noted*

**Test Plot**

**OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT**

**CH Low**

Agilent

R T

Mkr1 2.405 008 GHz  
-5.84 dBm

Ref 10 dBm

Atten 20 dB

Peak

Log

10

dB/

Offst

6.5

dB

DI

-25.8

dBm

LgAv

M1 S2

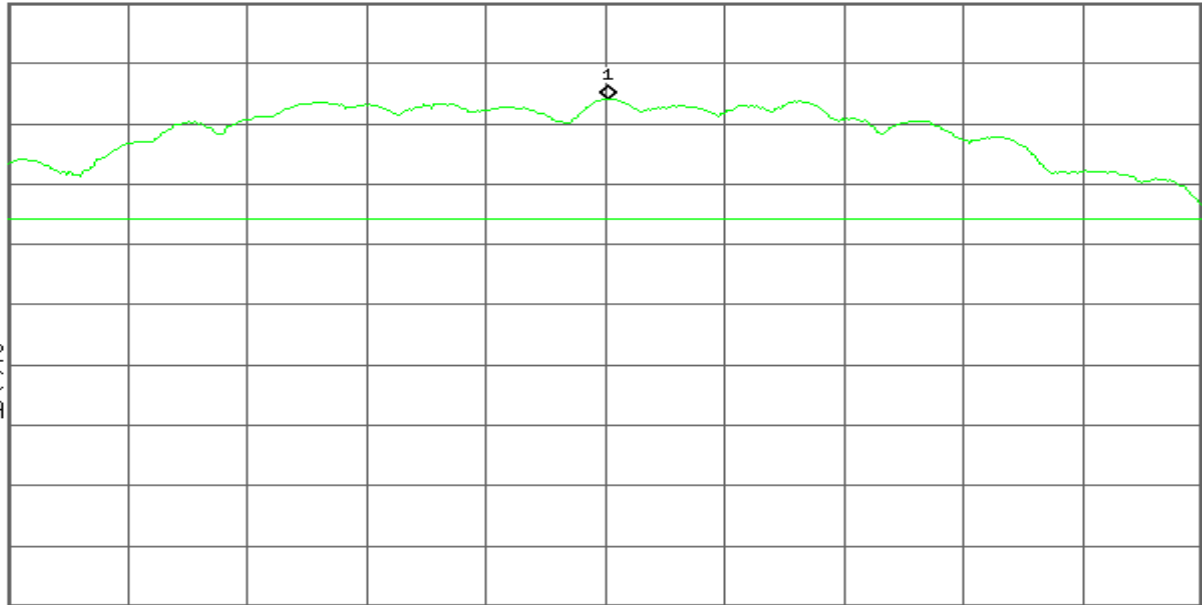
S3 FC

AA

$E(f)$ :

f>50k

Swp



Center 2.405 000 00 GHz

Span 2.46 MHz

\*Res BW 100 kHz

\*VBW 300 kHz

Sweep 1 ms (601 pts)

Agilent

R T

Mkr1 2.400 0 GHz  
-45.90 dBm

Ref 10 dBm

Atten 20 dB

Peak

Log

10

dB/

Offst

6.5

dB

DI

-25.8

dBm

LgAv

M1 S2

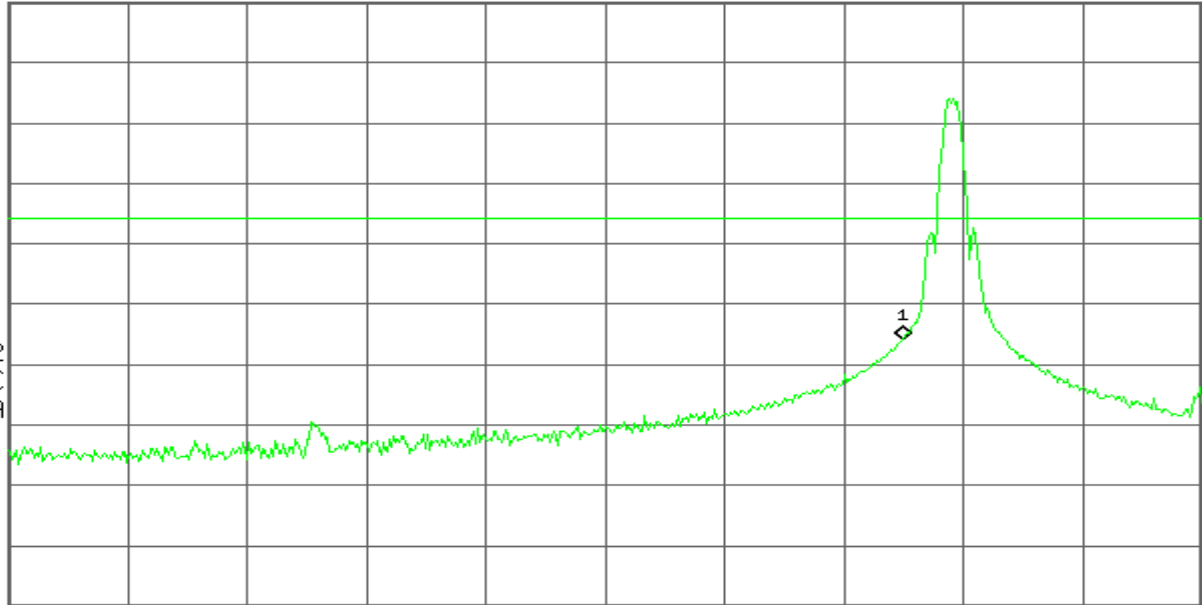
S3 FC

AA

$E(f)$ :

FTun

Swp



Start 2.310 0 GHz

Stop 2.430 0 GHz

\*Res BW 100 kHz

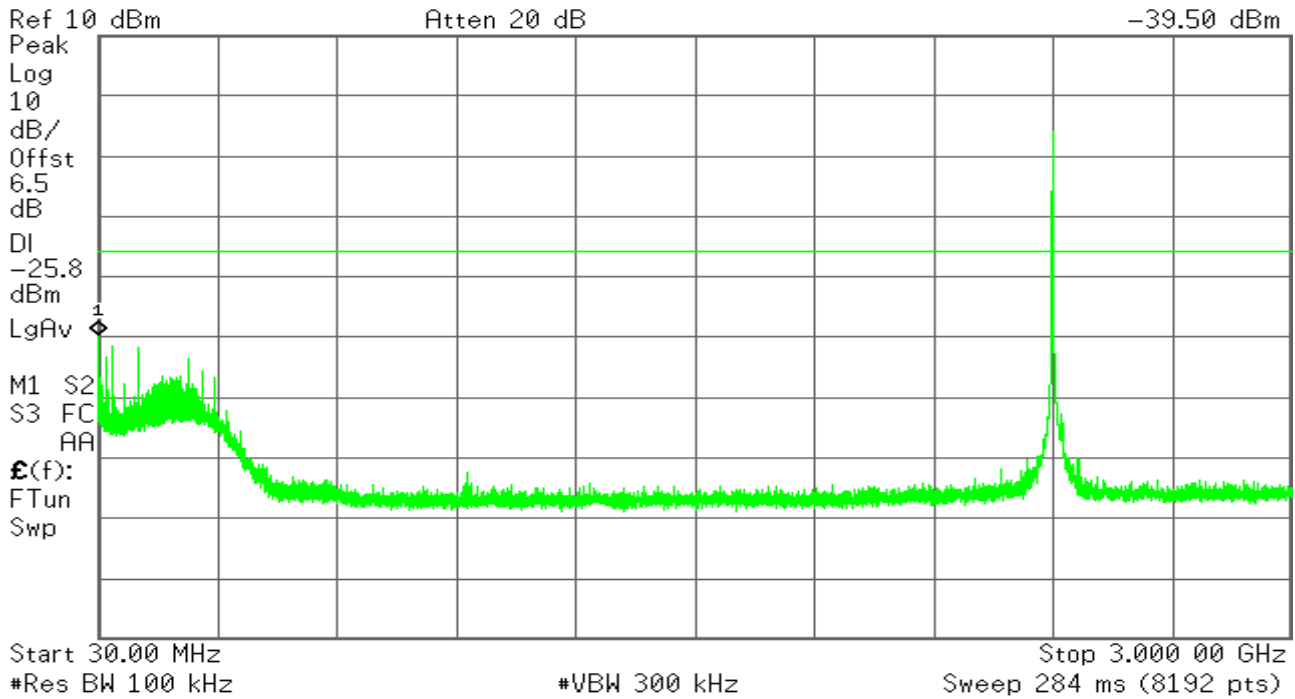
\*VBW 300 kHz

Sweep 11.48 ms (601 pts)

Agilent

R T

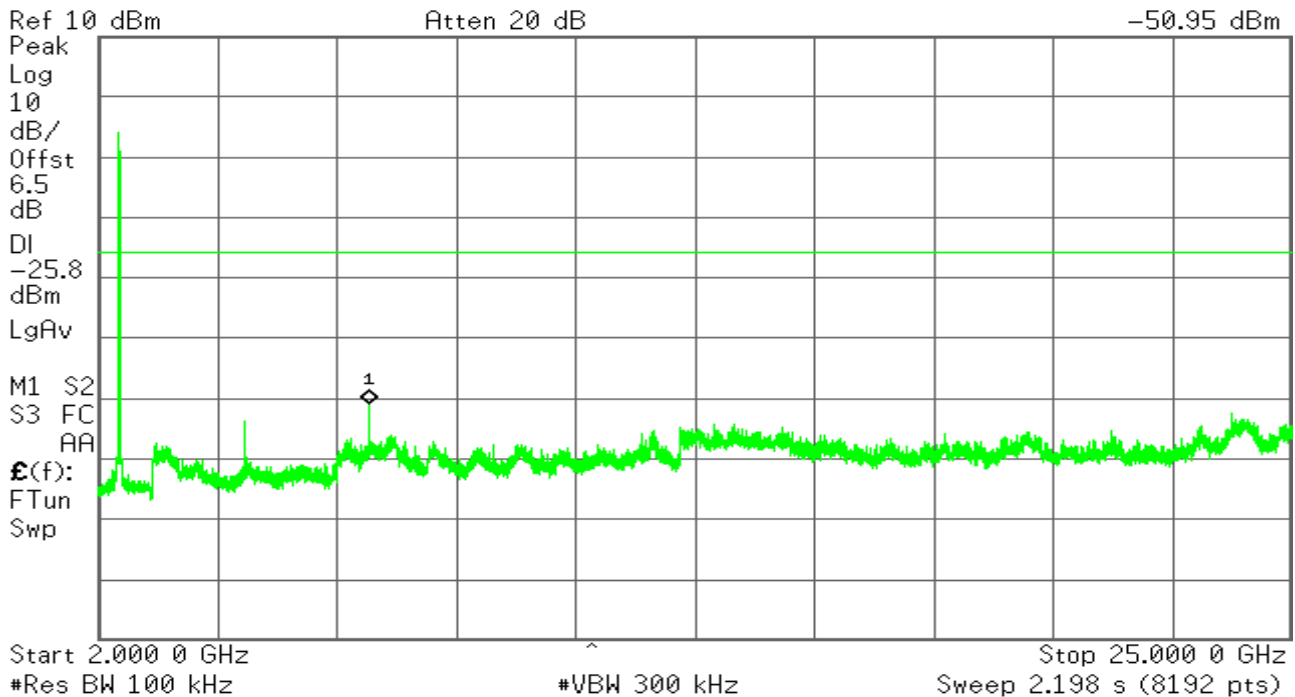
Mkr1 31.8 MHz  
-39.50 dBm



Agilent

R T

Mkr1 7.217 2 GHz  
-50.95 dBm



**CH Mid**

Agilent

R T

Mkr1 2.440 054 GHz  
-8.85 dBm

Ref 10 dBm

Atten 20 dB

Peak

Log

10

dB/

Offst

6.5

dB

DI

-28.9

dBm

LgAv

M1 S2

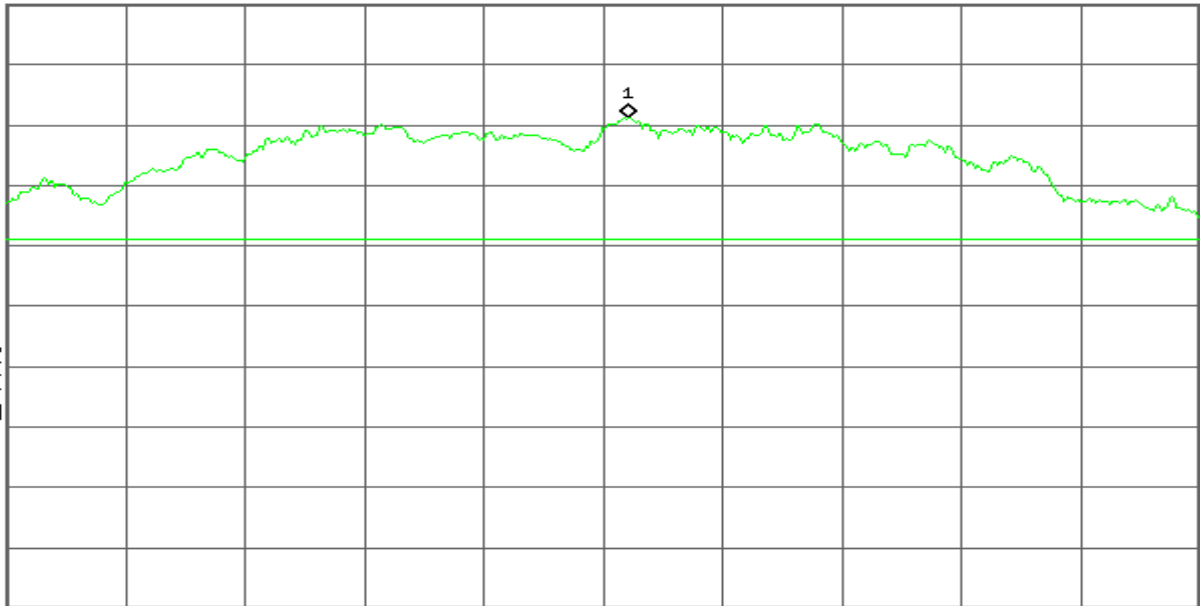
S3 FC

AA

$\mathcal{E}(f)$ :

f>50k

Swp



Center 2.440 000 0 GHz

#Res BW 100 kHz

#VBW 300 kHz

Span 2.47 MHz

Sweep 1 ms (601 pts)

Agilent

R T

Mkr1 2.609 8 GHz  
-52.59 dBm

Ref 10 dBm

Atten 20 dB

Peak

Log

10

dB/

Offst

6.5

dB

DI

-28.9

dBm

LgAv

M1 S2

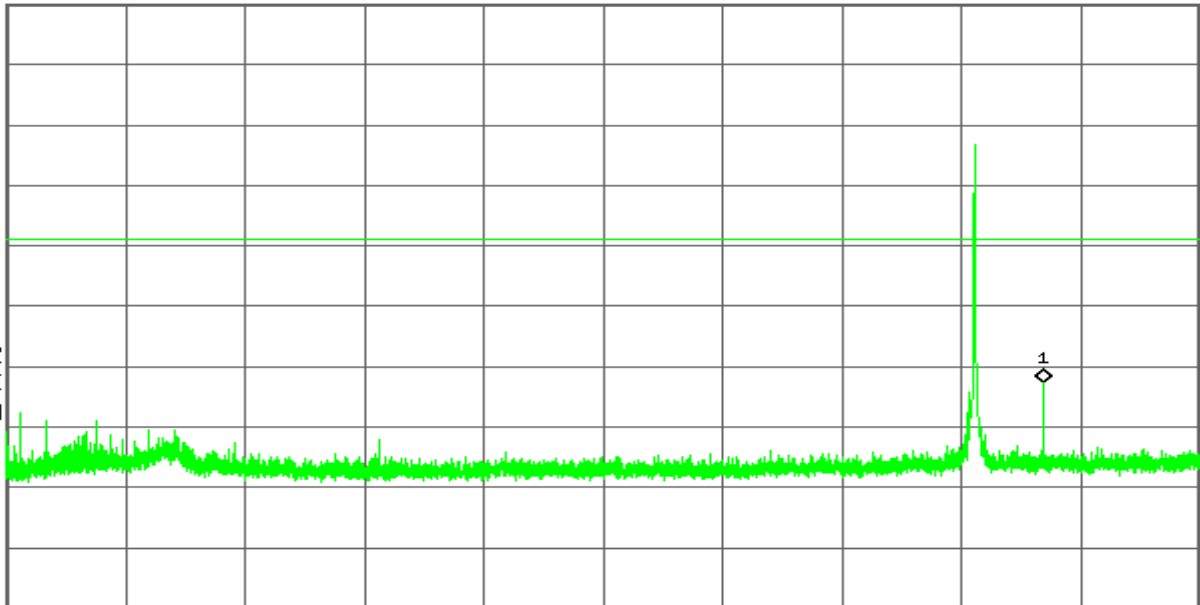
S3 FC

AA

$\mathcal{E}(f)$ :

FTun

Swp



Start 30.00 MHz

#Res BW 100 kHz

#VBW 300 kHz

Stop 3.000 00 GHz

Sweep 284 ms (8192 pts)

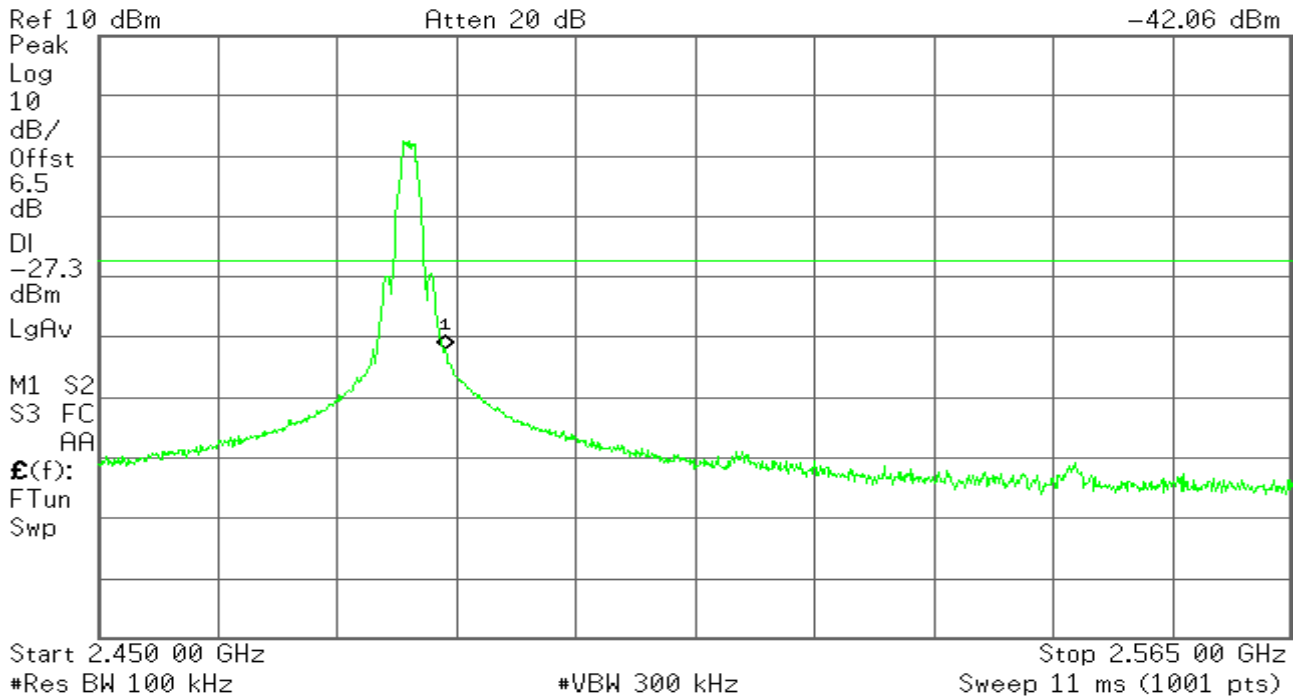




Agilent

R T

Mkr1 2.483 50 GHz  
-42.06 dBm



Agilent

R T

Mkr1 32.2 MHz  
-39.28 dBm





## 7.5.RADIATED EMISSIONS

### LIMIT

Radiated emissions from 9 kHz to 25 GHz were measured according to the methods defines in ANSI C63.10-2013. The EUT was placed above the ground plane, 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions

1. According to §15.209(a), except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

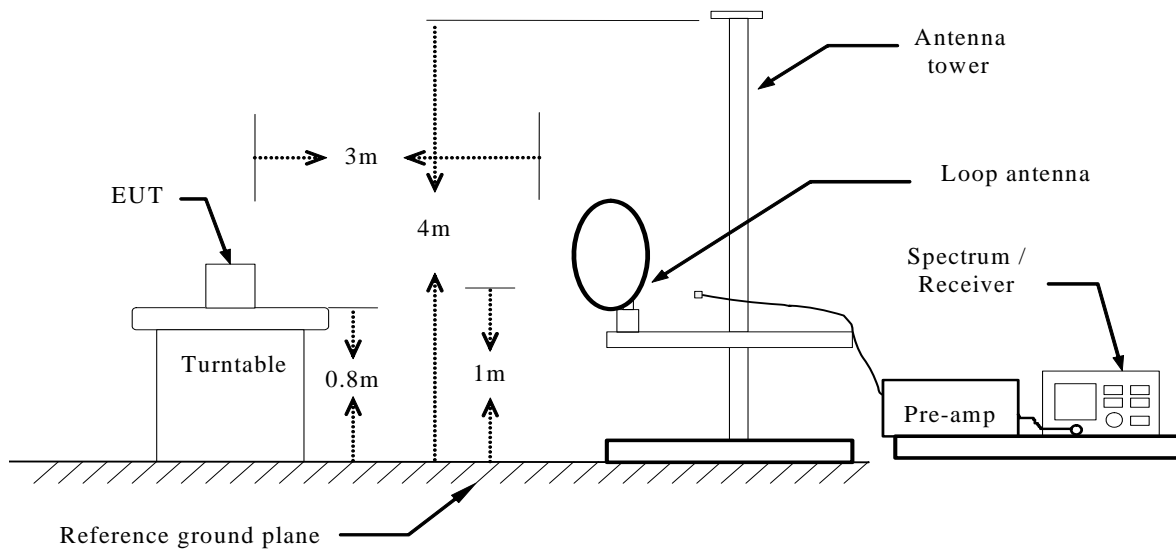
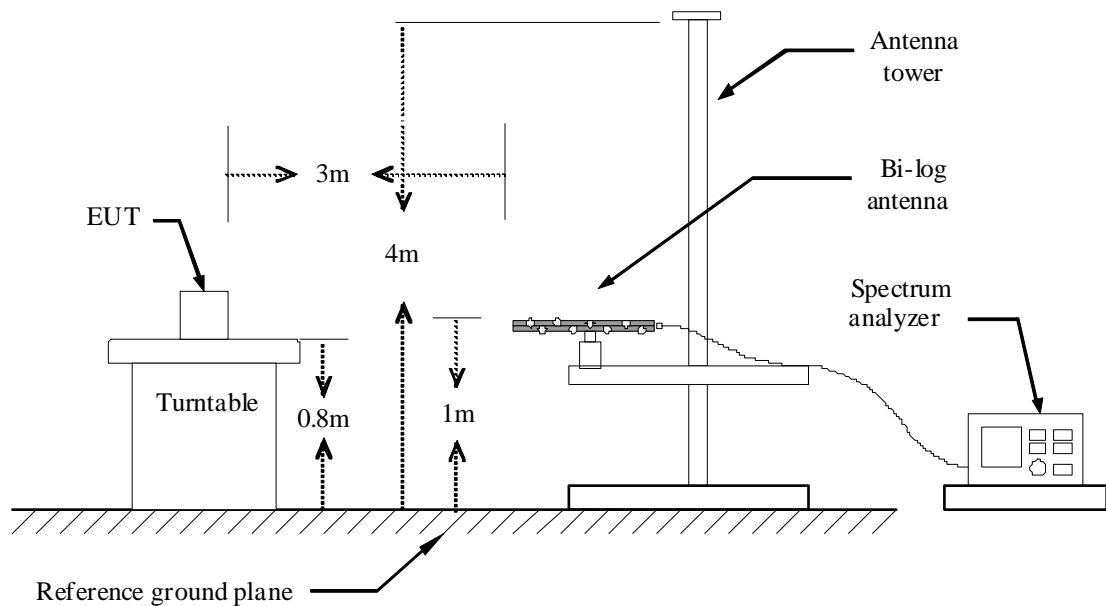
FREQUENCIES(MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE(meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

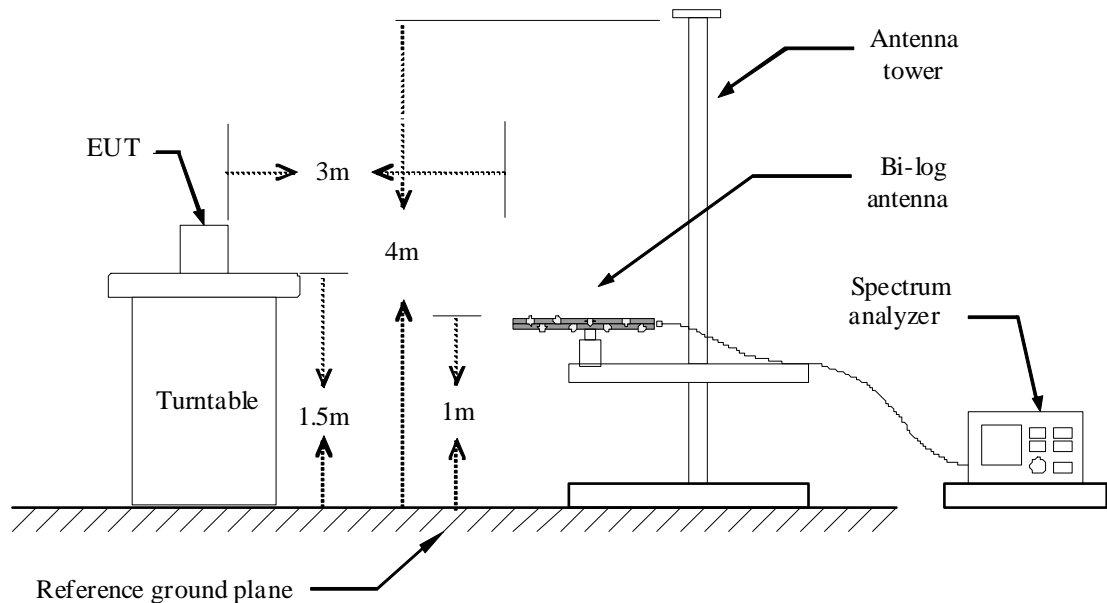
**Remark:** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

2.In the emission table above, the tighter limit applies at the band edges.

Frequency (MHz)	Field Strength ( $\mu$ V/m at 3-meter)	Field Strength (dB $\mu$ V/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

### Test Configuration

**Below 30MHz****Below 1 GHz**

**Above 1 GHz****TEST PROCEDURE**

1. The EUT is placed on a turntable above ground plane, which is 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:

Below 1GHz:

RBW=100kHz / VBW=300kHz / Sweep=AUTO

Above 1GHz:

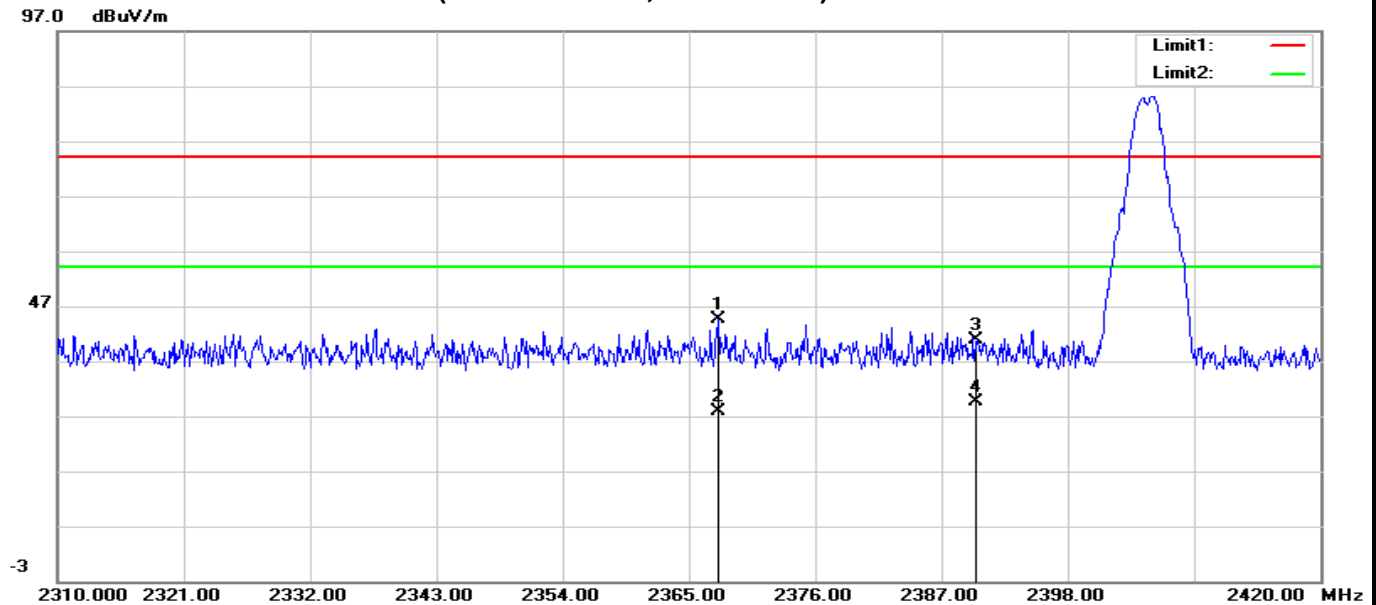
PEAK: RBW=VBW=1MHz / Sweep=AUTO, PEAK DETECTOR

AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO, PEAK DETECTOR

7. Repeat above procedures until the measurements for all frequencies are complete.

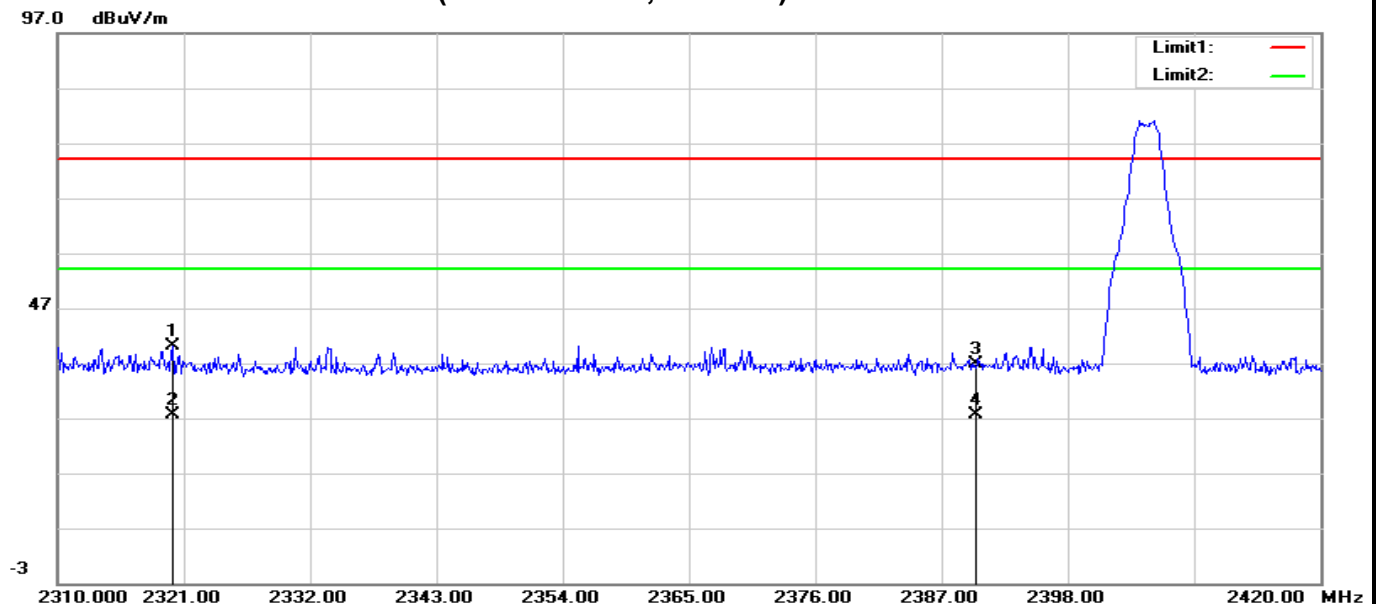
**TEST RESULTS**

**RESTRICTED BANDEDGE (Low Channel, Horizontal)**



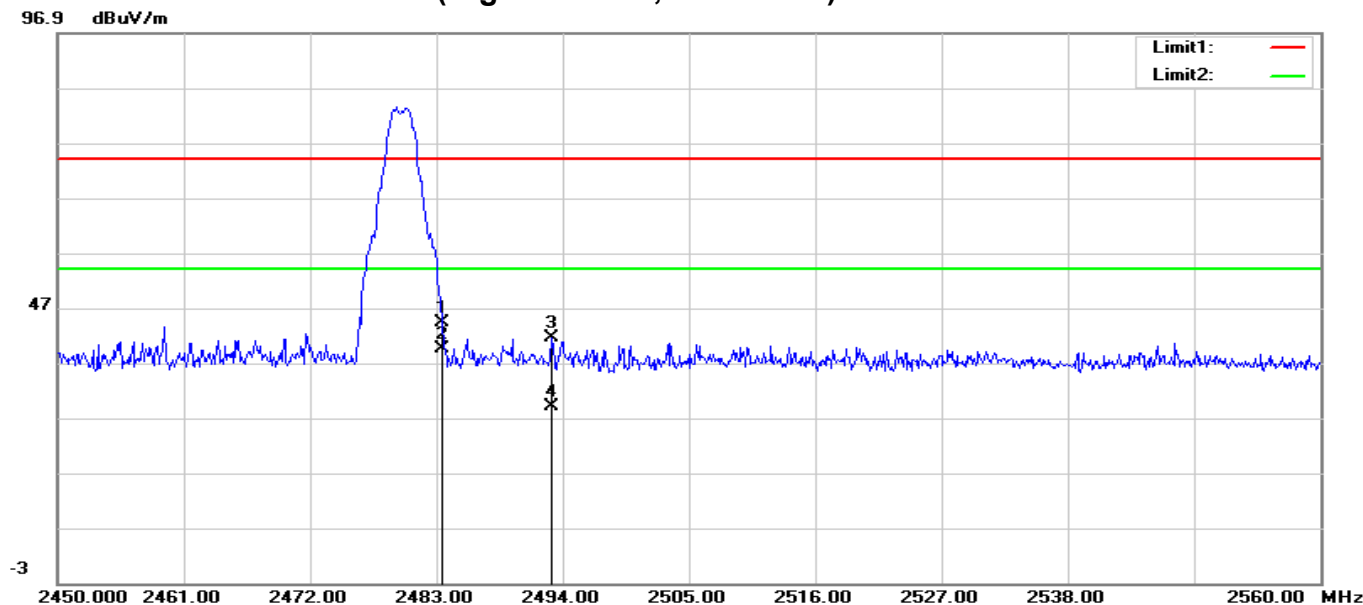
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2367.530	50.69	-6.13	44.56	74.00	-29.44	100	359	peak
2	2367.530	33.88	-6.13	27.75	54.00	-26.25	100	359	AVG
3	2390.000	46.89	-6.04	40.85	74.00	-33.15	100	28	peak
4	2390.000	35.78	-6.04	29.74	54.00	-24.26	100	28	AVG

**RESTRICTED BANDEDGE (Low Channel, Vertical)**



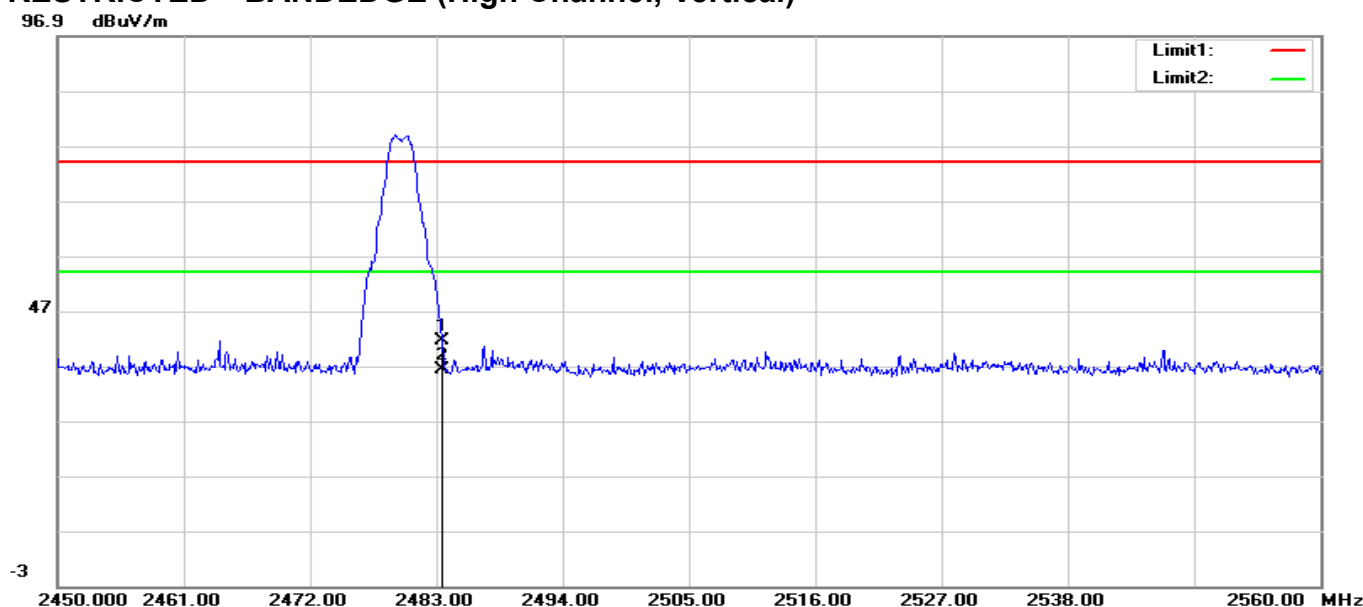
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2320.010	46.48	-6.34	40.14	74.00	-33.86	100	278	peak
2	2320.010	34.02	-6.34	27.68	54.00	-26.32	100	278	AVG
3	2390.000	42.92	-6.04	36.88	74.00	-37.12	100	10	peak
4	2390.000	33.73	-6.04	27.69	54.00	-26.31	100	10	AVG

**RESTRICTED BANDEDGE (High Channel, Horizontal)**



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2483.500	49.79	-5.63	44.16	74.00	-29.84	100	335	peak
2	2483.500	45.11	-5.63	39.48	54.00	-14.52	100	335	AVG
3	2493.010	47.20	-5.59	41.61	74.00	-32.39	100	286	peak
4	2493.010	34.53	-5.59	28.94	54.00	-25.06	100	286	AVG

**RESTRICTED BANDEDGE (High Channel, Vertical)**



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2483.500	47.21	-5.63	41.58	74.00	-32.42	100	359	peak
2	2483.500	41.79	-5.63	36.16	54.00	-17.84	100	359	AVG

## Below 1GHz

**Operation Mode:** Keeping TX

**Test Date:** 2015-9-14

**Temperature:** 24°C

**Tested by:** James.Yan

**Humidity:** 48% RH

**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
144.4600	V	10.63	14.71	25.34	43.50	-18.16	Peak
165.8000	V	15.08	14.73	29.81	43.50	-13.69	Peak
232.7300	V	20.87	13.24	34.11	46.00	-11.89	Peak
298.6900	V	16.81	15.36	32.17	46.00	-13.83	Peak
498.5100	V	11.22	19.94	31.16	46.00	-14.84	Peak
665.3500	V	18.80	22.36	41.16	46.00	-4.84	Peak
165.8000	H	18.42	14.73	33.15	43.50	-10.35	Peak
232.7300	H	29.31	13.24	42.55	46.00	-3.45	Peak
299.6600	H	20.28	15.40	35.68	46.00	-10.32	Peak
431.5800	H	13.53	19.68	33.21	46.00	-12.79	Peak
631.4000	H	13.02	21.49	34.51	46.00	-11.49	Peak
665.3500	H	14.84	22.36	37.20	46.00	-8.80	Peak

**Remark:**

3. *Measuring frequencies from 30 MHz to the 1GHz (No emission found between lowest internal used/generated frequency to 30 MH).*
4. *Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Result (dBuV/m) – Limit (dBuV/m).*



## Above 1 GHz

**Operation Mode:** TX / CH Low

**Test Date:** 2015-9-14

**Temperature:** 24°C

**Tested by:** James.Yan

**Humidity:** 48 % RH

**Polarity:** Ver. / Hor.

### Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4808.000	43.58	0.97	44.55	74.00	-29.45	100	103	peak
2	7171.000	42.05	6.20	48.25	74.00	-25.75	100	177	peak
N/A									

### Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4927.000	40.85	1.62	42.47	74.00	-31.53	100	126	peak
2	7205.000	40.81	6.36	47.17	74.00	-26.83	100	146	peak
N/A									

**Operation Mode:** TX /CH Mid

**Test Date:** 2015-9-14

**Temperature:** 24°C

**Tested by:** James.Yan

**Humidity:** 48 % RH

**Polarity:** Ver. / Hor.

### Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4876.000	44.68	1.34	46.02	74.00	-27.98	100	209	peak
2	7443.000	41.36	7.43	48.79	74.00	-25.21	100	233	peak
N/A									

### Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4961.000	41.74	1.81	43.55	74.00	-30.45	100	44	peak
2	7086.000	41.79	5.82	47.61	74.00	-26.39	100	186	peak
N/A									



# Compliance Certification Services Inc.

Date of Issue :September 17, 2015

Report No: C150827R01-RPW

FCC ID: 2ACS5-SC

Operation Mode: TX /CH High

Test Date: 2015-9-14

Temperature: 24°C

Tested by:James.Yan

Humidity: 48 % RH

Polarity: Ver. / Hor.

### Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4961.000	45.32	1.81	47.13	74.00	-26.87	100	225	peak
2	7188.000	42.75	6.28	49.03	74.00	-24.97	100	197	peak
N/A									

### Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4842.000	40.26	1.16	41.42	74.00	-32.58	100	227	peak
2	7375.000	40.36	7.13	47.49	74.00	-26.51	100	194	peak
N/A									

## 7.6.POWERLINE CONDUCTED EMISSIONS

### LIMIT

According to §15.207(a), except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Limits (dB $\mu$ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

\* Decreases with the logarithm of the frequency.

### Test Configuration

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

### TEST PROCEDURE

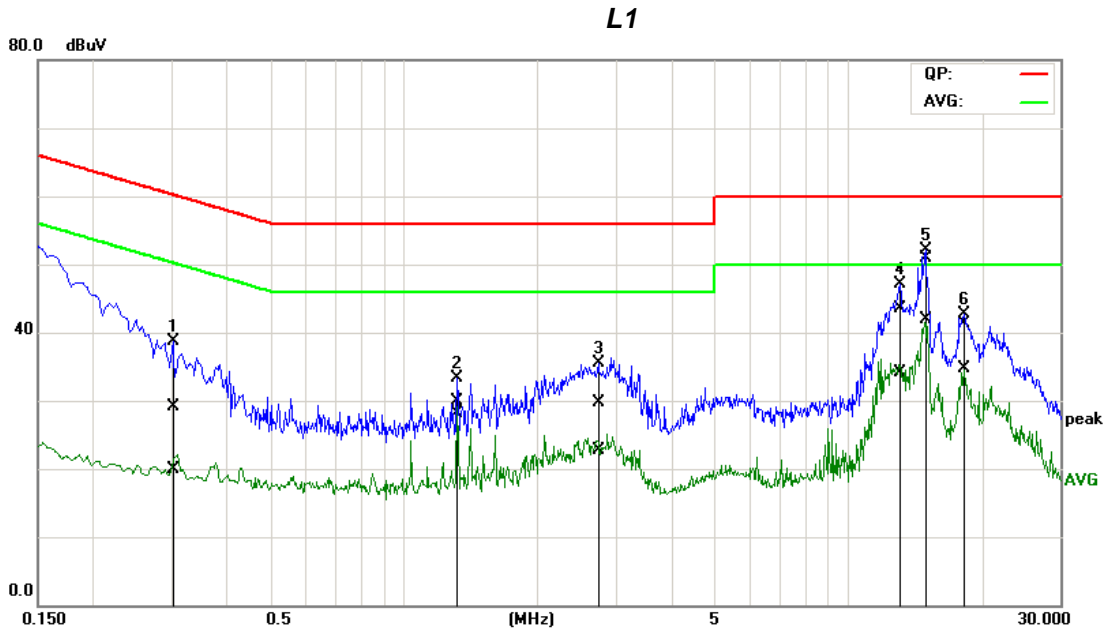
- 1.The EUT was placed on a table, which is 0.8m above ground plane.
- 2.Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 3.Repeat above procedures until all frequency measured were complete.

### TEST RESULTS

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

### Test Data

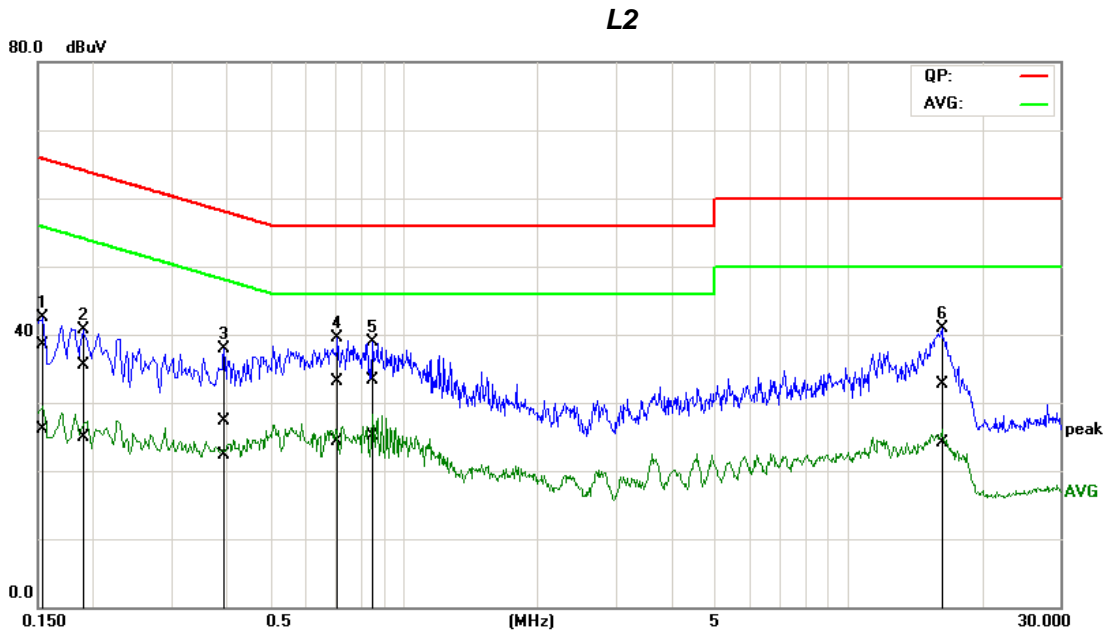
Job No.:	C150827R01-RPW	Date:	2015-9-18
Model:	Simu-connector	Time:	10:21:31
Standard:	FCC Class B	Temp.(C)/Hum.(%):	22(C)/48%
Test item:	Conduction test	Test By:	James.Yan
Line:	L1	Test Voltage:	AC 120V/60Hz
Model:		Description:	



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1	0.3011	9.40	0.32	19.68	29.08	20.00	60.21	50.21	-31.13	-30.21	Pass
2	1.3230	10.10	8.31	19.87	29.97	28.18	56.00	46.00	-26.03	-17.82	Pass
3	2.7273	9.71	2.71	20.02	29.73	22.73	56.00	46.00	-26.27	-23.27	Pass
4	13.0955	22.60	13.23	20.81	43.41	34.04	60.00	50.00	-16.59	-15.96	Pass
5*	14.9077	30.08	21.09	20.84	50.92	41.93	60.00	50.00	-9.08	-8.07	Pass
6	18.3055	20.28	13.71	21.03	41.31	34.74	60.00	50.00	-18.69	-15.26	Pass

**Note:** 1. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).

Job No.:	C150827R01-RPW	Date:	2015-9-18
Model:	Simu-connector	Time:	10:27:38
Standard:	FCC Class B	Temp.(C)/Hum.(%):	22(C)/48%
Test item:	Conduction test	Test By:	James.Yan
Line:	L2	Test Voltage:	AC 120V/60Hz
Model:		Description:	



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1	0.1524	18.84	6.33	19.73	38.57	26.06	65.87	55.87	-27.30	-29.81	Pass
2	0.1865	15.92	5.17	19.66	35.58	24.83	64.19	54.19	-28.61	-29.36	Pass
3	0.3946	7.62	2.57	19.78	27.40	22.35	57.97	47.97	-30.57	-25.62	Pass
4	0.7028	13.23	4.39	19.84	33.07	24.23	56.00	46.00	-22.93	-21.77	Pass
5*	0.8354	13.57	5.19	19.83	33.40	25.02	56.00	46.00	-22.60	-20.98	Pass
6	16.2493	11.94	3.28	20.78	32.72	24.06	60.00	50.00	-27.28	-25.94	Pass

**Note:** 1. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).