

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

## INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

**Product Name:** EXATI Auto DPI Mouse-Wireless

**Brand Name:** Speedlink

**Model No.:** SL-630008-BKRD, SL-630008-XXXX ("XXXX" is product color)

**Model Difference:** Product color

**FCC ID:** 2AEDNA24

**Report No.:** ER/2016/60109

**Issue Date:** Jun. 29, 2016

**FCC Rule Part:** §15.249

**Prepared for:** Winspeed Co., Ltd.  
14 F-1, No.2, Jian-Ba Rd., Chung-Ho District,  
New Taipei City, Taiwan

**Prepared by:** SGS Taiwan Ltd.  
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24803



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## VERIFICATION OF COMPLIANCE

**Applicant:** Winspeed Co., Ltd.  
14 F-1, No.2, Jian-Ba Rd., Chung-Ho District, New Taipei City,  
Taiwan

**Product Name:** EXATI Auto DPI Mouse-Wireless

**Brand Name:** Speedlink

**Model No.:** SL-630008-BKRD, SL-630008-XXXX ("XXXX" IS PRODUCT  
COLOR)

**Model Difference:** Product color

**FCC ID:** 2AEDNA24

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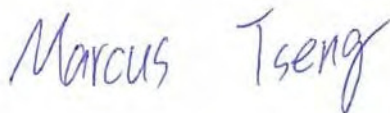
**Date of test:** Jun. 03 2016 ~ Jun. 07, 2016

**Date of EUT Received:** Jun. 03 2016

**We hereby certify that:**

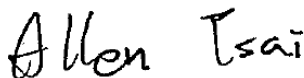
The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10:2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits.

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

**Test By:****Date**

Jun. 29, 2016

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**Marcus Tseng / Sr.Engineer****Prepared By:****Date**

Jun. 29, 2016

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**Allen Tsai / Engineer****Approved By:****Date**

Jun. 29, 2016

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**Jim Chang / Asst. Manager**

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## Revision History

Report Number	Revision	Description	Issue Date
ER/2016/60109	Rev.00	Initial creation of document	Jun. 29, 2016

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# 1 GENERAL INFORMATION

## 1.1 Product Description

General:

Product Name:	EXATI Auto DPI Mouse-Wireless
Brand Name:	Speedlink
Model No.:	SL-630008-BKRD, SL-630008-XXXX ("XXXX" IS PRODUCT COLOR)
Model Difference:	Product color
Product SW/HW version:	0/0
Radio SW/HW version:	N/A / N/A
Test SW Version:	N/A
RF power setting in TEST SW:	N/A
Power Supply:	3Vdc from 1.5Vdc AA Battery*2
Antenna Designation:	PCB Antenna Gain: 0.01 dBi

## 2.4GHz

Transmit Power	88.23dBuV/m (Peak)
Operation Frequency:	2405 ~ 2477MHz
Channel number:	16 channels
Channel space:	1MHz
Modulation Type:	GFSK

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## 1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.249

ANSI C63.10:2013

Note:

1. All test items have been performed and record as per the above standards.
2. The composite system is compliance with FCC Subpart B is authorized under the certification procedure.

## 1.3 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan. (TAF code 0513)

FCC Registration Numbers are: 509634

Canada Registration Number: 4260A-5.

## 1.4 Special Accessories

There are no special accessories used while test was conducted.

## 1.5 Equipment Modifications

There was no modification incorporated into the EUT.

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## 2 SYSTEM TEST CONFIGURATION

### 2.1 EUT Configuration

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

### 2.2 EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

### 2.3 Test Procedure

#### 2.3.1 Conducted Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz. The CISPR Quasi-Peak and Average detector mode is employed according to §15.207. 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.

#### 2.3.2 Radiated Emissions

The EUT is placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table 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 max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

### 2.4 Measurement Results Explanation Example

#### For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

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## 2.5 Limitation

### (1) Conducted Emission

Conducted Emission Limits is as following.

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 – 0.5	66 - 56	56 - 46
0.5 – 5	56	46
5 - 30	60	50

### (2) Radiated Emission

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

Frequency (MHz)	Field strength of Fundamental	Field strength of Harmonics	Distance (m)
902 – 928	50 mV/m (94dBuV/m)	500 uV/m (54dBuV/m)	3
2400 – 2483.5	50 mV/m (94dBuV/m)	500 uV/m (54dBuV/m)	3
5725 – 5875	50 mV/m (94dBuV/m)	500 uV/m (54dBuV/m)	3
24.0 – 24.25 GHz	250 mV/m (107.95dBuV/m)	2500 uV/m (67.95dBuV/m)	3

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### (3) Radiated Emission

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

Frequency (MHz)	Field strength $\mu\text{V/m}$	Distance (m)	Field strength at 3m dB $\mu\text{V/m}$
1.705-30	30	30	69.54
30-88	100	3	40
88-216	150	3	43.5
216-960	200	3	46
Above 960	500	3	54

### (4) Radiated Emission

For frequencies above 1000MHz, the above field strength limits are based on average limits. 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.

- Re- mark:
1. Emission level in dB $\mu\text{V/m}$ =20 log ( $\mu\text{V/m}$ )
  2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
  3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of  $\xi$  15.205 and RSS-Gen  $\xi$  8.10
  4. Emission spurious frequency which appearing within the Restricted Bands specified in provision of  $\xi$  15.205 and RSS-Gen  $\xi$  8.10, then the general radiated emission limits in  $\xi$  15.209 and RSS-Gen  $\xi$  8.9 apply.

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## 2.6 Configuration of Tested System

Fig. 2-1 Radiated Emission & Conducted (Antenna Port) Configuration



Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	2.4GHz Wireless Test Software	N/A	N/A	N/A	N/A	N/A

## 3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207(a)	AC Power Line Conducted Emission	Compliant
§15.249(a)(d)(e)	Radiated Emission	Compliant
§15.215(c)	20dB bandwidth Measurement	Compliant

## 4 DESCRIPTION OF TEST MODES

### 4.1 Operated in 2405 ~ 2477MHz Band

16 channels are provided.

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2405MHz	5	2421MHz	9	2440MHz	13	2455MHz
2	2407MHz	6	2428MHz	10	2441MHz	14	2467MHz
3	2410MHz	7	2435MHz	11	2442MHz	15	2468MHz
4	2414MHz	8	2437MHz	12	2449MHz	16	2477MHz

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## 4.2 The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

### RADIATED EMISSION TEST:

RADIATED EMISSION TEST (BELOW 1 GHz)					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
2.4G	1 to 16	2,11,16	FSK	2	MAIN
RADIATED EMISSION TEST (ABOVE 1 GHz)					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
2.4G	1 to 16	2,11,16	FSK	2	MAIN

#### Note:

The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for Bluetooth LE Transmitter for channel Low, Mid and High, the worst case H position was reported.

### ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
2.4G	1 to 16	2,11,16	FSK	2	MAIN

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## 5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
20dB & 99% Bandwidth	+/- 51.33 Hz
100 kHz Bandwidth Of Frequency Band Edges	+/- 0.84 dB
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC= +/- 0.2%

Radiated Spurious Emission:

Measurement uncertainty (Polarization : <b>Vertical</b> )	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB

Measurement uncertainty (Polarization : <b>Horizontal</b> )	30MHz - 167MHz: +/- 4.22dB
	167MHz -500MHz: +/- 3.44dB
	0.5GHz-1GHz: +/- 3.39dB
	1GHz - 18GHz: +/- 4.08dB
	18GHz - 40GHz: +/- 4.08dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

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## 6 CONDUCTED EMISSION TEST

### 6.1 Standard Applicable:

Frequency range within 150kHz to 30MHz shall not exceed the Limit table as below.

Frequency range MHz	Limits dB(μV)	
	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
Note 1.The lower limit shall apply at the transition frequencies 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

### 6.2 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESC17	100760	05/10/2016	05/09/2017
LISN	SCHWARZBECK	NSLK 8127	8127-649	05/16/2016	05/15/2017
LISN	MESS TEC	FCC-LISN-50/2 50-25-2-01	4034	05/16/2016	05/15/2017
Coaxial Cables	N/A	WK CE Cable	N/A	11/26/2015	11/25/2016

### 6.3 EUT Setup:

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

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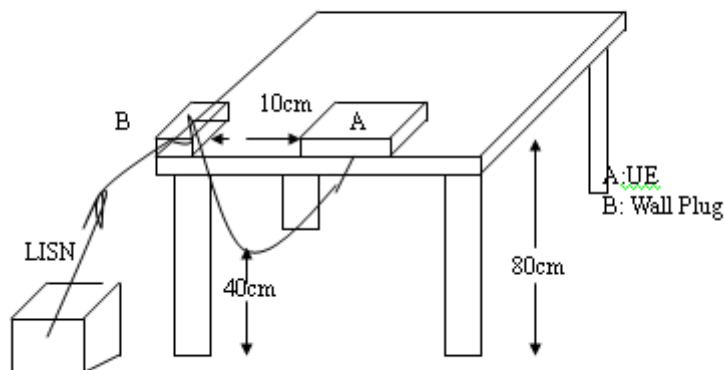
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## 6.4 Test SET-UP (Block Diagram of Configuration)



## 6.5 Measurement 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 phases of power being supplied by given UE are completed

## 6.6 Measurement Result:

N/A, This device is powered by battery.

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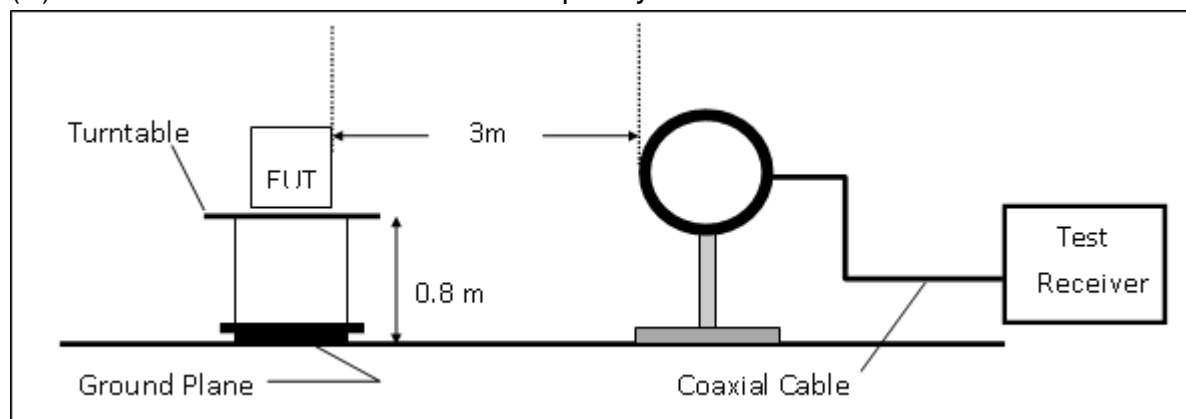
## 7 Radiated Emission Test

### 7.1. Measurement Procedure

1. The EUT was placed on a turn table with 0.8m for frequency < 1GHz and 1.5m for frequency > 1GHz above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured were complete.

### 7.2. Test SET-UP (Block Diagram of Configuration)

(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



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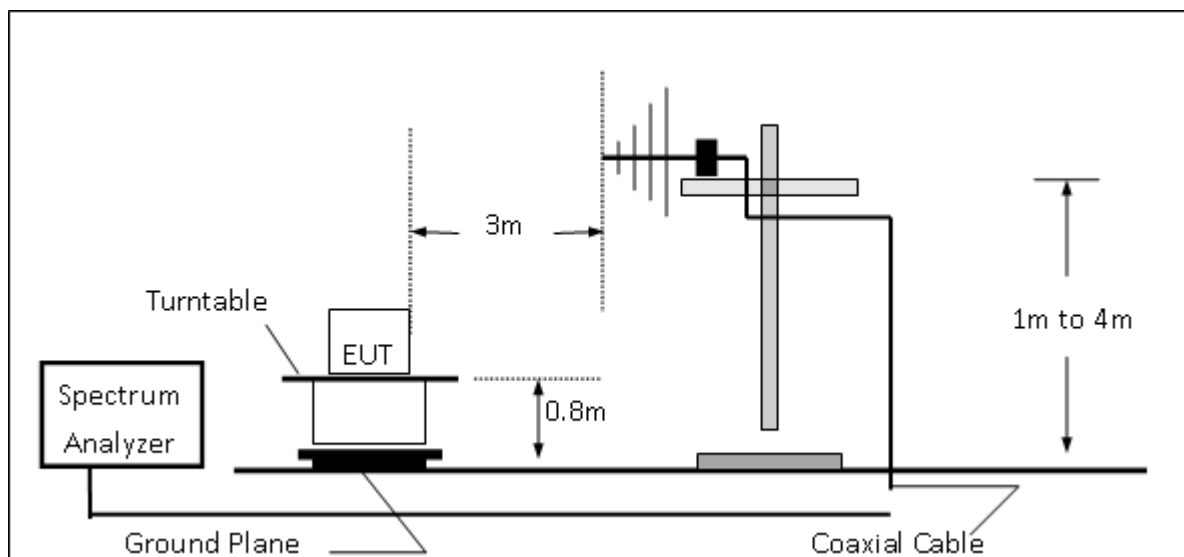
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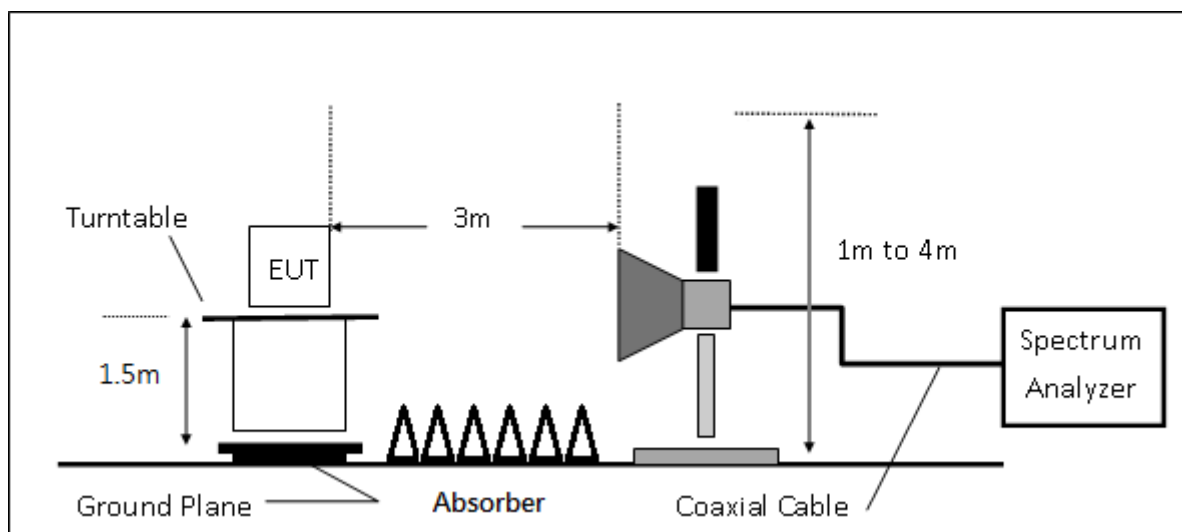
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### (B) Radiated Emission Test Set-Up, Frequency form 30MHz to 1000MHz



### (C) Radiated Emission Test Set-UP Frequency Over 1 GHz



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### 7.3. Measurement Equipment Used:

966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI7	100760	05/10/2016	05/09/2017
Spectrum Analyzer	Agilent	E4446A	MY51100003	01/29/2016	01/28/2017
Loop Antenna	ETS.LINDGREN	6502	148045	09/07/2015	09/06/2016
Bilog Antenna	SCHWAZBECK	VULB9168	378	12/14/2015	12/13/2016
Horn Antenna	Schwarzbeck	BBHA9120D	1441	08/10/2015	08/09/2016
Pre-Amplifier	Agilent	8447D	2944A07676	01/02/2016	01/01/2017
Pre-Amplifier	EMC Instruments Corp.	EMC0126530	980038	01/02/2016	01/01/2017
Turn Table	HD	DT420	N/A	N.C.R	N.C.R
Antenna Tower	ChamPro	AM-BS-4500-B	060776-ABS	N.C.R	N.C.R
Controller	ChamPro	EM1000	60776	N.C.R	N.C.R
Low Loss Cable	Huber Suhner	966_RX	9	01/02/2016	01/01/2017
3m Site NSA	SGS	966 chamber	N/A	07/02/2015	07/01/2016
Low Loss Cable	Huber Suhner	966 TX	1	01/02/2016	01/01/2017
Horn Antenna	Schwarzbeck	BBHA9170	184	12/12/2015	12/11/2016
Pre-Amplifier	EMC Instruments Corp.	EMC184045	980135	01/02/2016	01/01/2017

Note: N.C.R refers to Not Calibrated Required

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## 7.4. Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

**Note :** “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

## 7.5. Measurement Result

### Radiated Spurious Emission Measurement Result (MAIN)

Operation Mode : 2.4G Test Date : 06/06/2016  
Fundamental Frequency : 2405 MHz Temp. / Humi. : 22 deg\_C / 61 RH  
Operation Band : MAIN LOW Test Engineer : Tin  
EUT Pol. : E2 Plane Measurement Antenna Pol. : VERTICAL

Freq.	Note	Decetor Mode	Actual Reading Level	Spectrum FS	Factor	Limit @3m	Margin
MHz	F/H/E/S	QP/AV/PK	dBμV/m	dBμV/m	dB	dBμV/m	dB
2404.63	F	Average	51.11	52.87	-1.76	94.00	-42.89
2404.63	F	Peak	80.13	81.90	-1.76	114.00	-33.87

Operation Mode : 2.4G Test Date : 06/06/2016  
Fundamental Frequency : 2405 MHz Temp. / Humi. : 22 deg\_C / 61 RH  
Operation Band : MAIN LOW Test Engineer : Tin  
EUT Pol. : E2 Plane Measurement Antenna Pol. : HORIZONTAL

Freq.	Note	Decetor Mode	Actual Reading Level	Spectrum FS	Factor	Limit @3m	Margin
MHz	F/H/E/S	QP/AV/PK	dBμV/m	dBμV/m	dB	dBμV/m	dB
2404.65	F	Average	54.27	56.03	-1.76	94.00	-39.73
2404.65	F	Peak	88.23	89.99	-1.76	114.00	-25.77

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Operation Mode : 2.4G      Test Date : 06/06/2016  
 Fundamental Frequency : 2442 MHz      Temp. / Humi. : 22 deg\_C / 61 RH  
 Operation Band : MAIN MID      Test Engineer : Tin  
 EUT Pol. : E2 Plane      Measurement Antenna Pol. : VERTICAL

Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBμV/m	dBμV/m	dB	dBuV/m	dB
2441.58	F	Average	53.88	55.55	-1.67	94.00	-40.12
2441.58	F	Peak	72.37	74.04	-1.67	114.00	-41.63

Operation Mode : 2.4G      Test Date : 06/06/2016  
 Fundamental Frequency : 2442 MHz      Temp. / Humi. : 22 deg\_C / 61 RH  
 Operation Band : MAIN MID      Test Engineer : Tin  
 EUT Pol. : E2 Plane      Measurement Antenna Pol. : HORIZONTAL

Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBμV/m	dBμV/m	dB	dBuV/m	dB
2442.01	F	Average	53.46	55.13	-1.67	94.00	-40.54
2442.01	F	Peak	87.32	88.99	-1.67	114.00	-26.68

Operation Mode : 2.4G      Test Date : 06/06/2016  
 Fundamental Frequency : 2477 MHz      Temp. / Humi. : 22 deg\_C / 61 RH  
 Operation Band : MAIN HIGH      Test Engineer : Tin  
 EUT Pol. : E2 Plane      Measurement Antenna Pol. : VERTICAL

Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBμV/m	dBμV/m	dB	dBuV/m	dB
2477.47	F	Average	52.98	54.60	-1.62	94.00	-41.02
2477.47	F	Peak	75.62	77.24	-1.62	114.00	-38.38

Operation Mode : 2.4G      Test Date : 06/06/2016  
 Fundamental Frequency : 2477 MHz      Temp. / Humi. : 22 deg\_C / 61 RH  
 Operation Band : MAIN HIGH      Test Engineer : Tin  
 EUT Pol. : E2 Plane      Measurement Antenna Pol. : HORIZONTAL

Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBμV/m	dBμV/m	dB	dBuV/m	dB
2476.58	F	Average	57.59	59.21	-1.62	94.00	-36.41
2476.58	F	Peak	87.41	89.03	-1.62	114.00	-26.59

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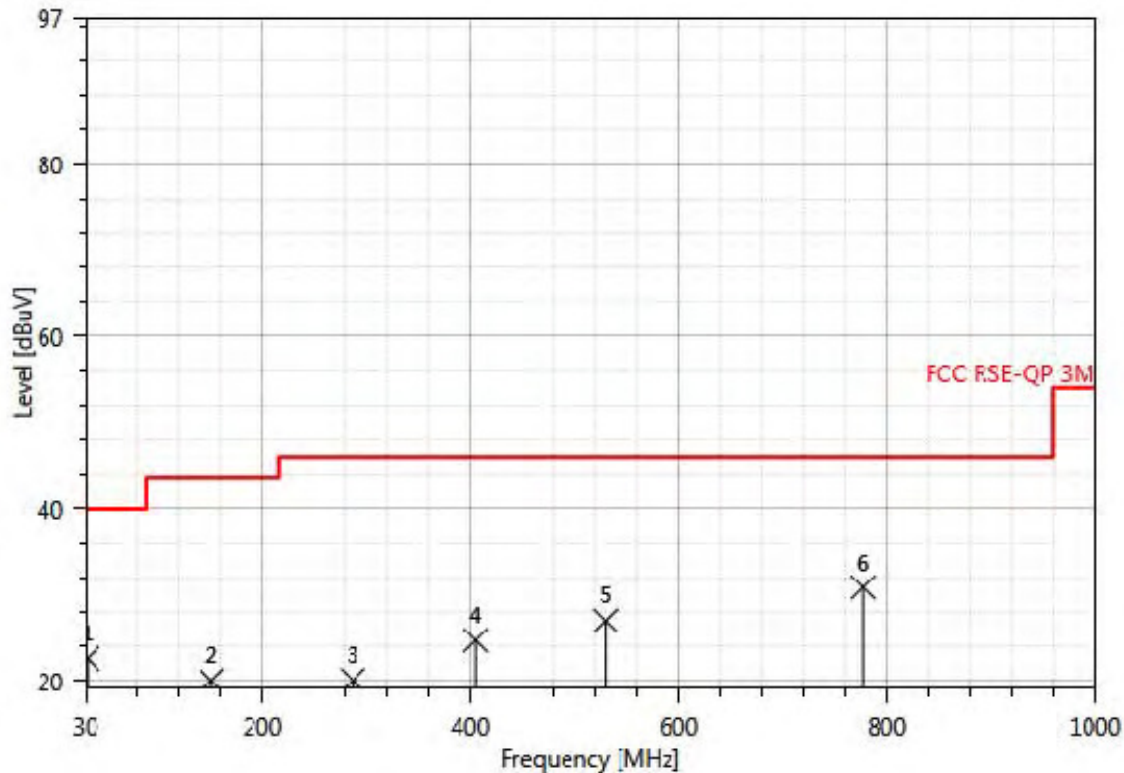
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## Radiated Spurious Emission Measurement Result

Operation Mode :	2.4G	Test Date :	06/06/2016
Fundamental Frequency :	2405 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Tx CH LOW	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	VERTICAL



Freq. MHz	Note F/H/E/S	Decetor Mode QP/AV/PK	Actual Reading Level dBuV/m	Spectrum FS dBuV/m	Factor dB	Limit @3m dBuV/m	Margin dB
31.94	S	Peak	22.60	31.71	-9.11	40.00	-17.40
151.25	S	Peak	20.04	27.73	-7.70	43.50	-23.46
287.05	S	Peak	20.08	26.27	-6.19	46.00	-25.92
405.39	S	Peak	24.70	28.40	-3.70	46.00	-21.30
529.55	S	Peak	26.99	28.24	-1.25	46.00	-19.01
776.90	S	Peak	30.87	28.32	2.54	46.00	-15.13

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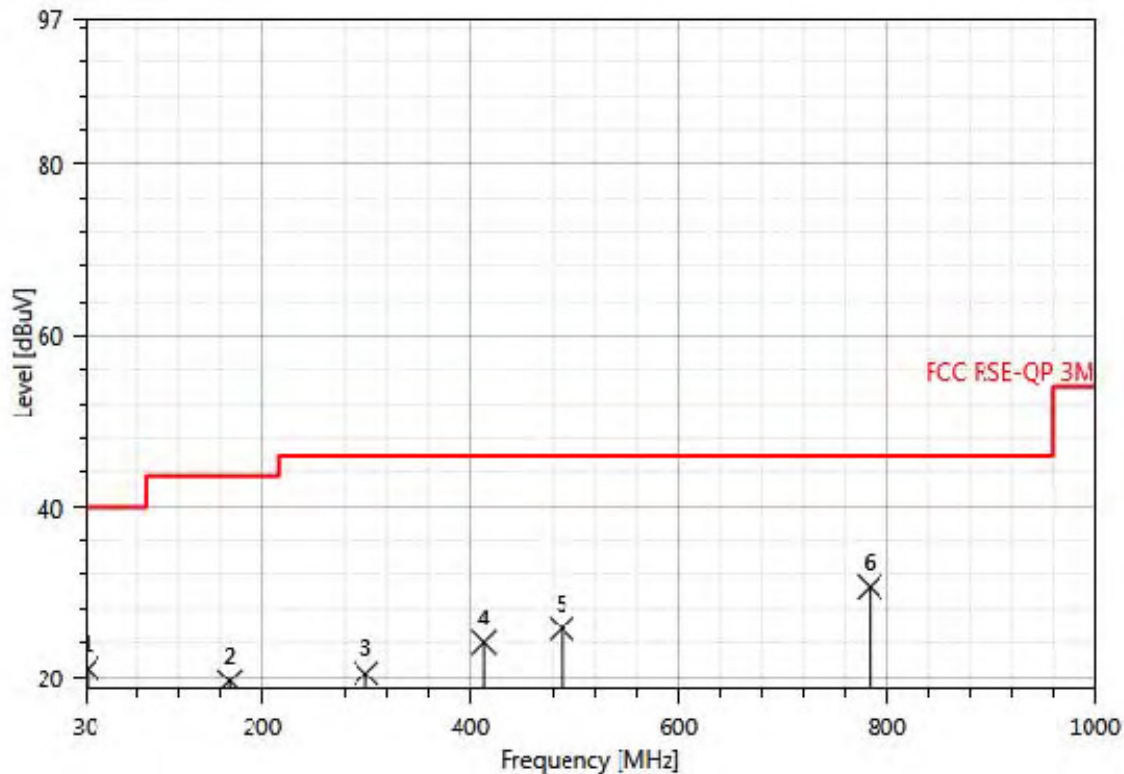
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Operation Mode :	2.4G	Test Date :	06/06/2016
Fundamental Frequency :	2405 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Tx CH LOW	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	HORIZONTAL



Freq. MHz	Note F/H/E/S	Decetor Mode QP/AV/PK	Actual Reading Level dBμV/m	Spectrum FS dBμV/m	Factor dB	Limit @3m dBuV/m	Margin dB
31.94	S	Peak	21.10	30.21	-9.11	40.00	-18.90
168.71	S	Peak	19.62	27.15	-7.53	43.50	-23.88
299.66	S	Peak	20.53	26.46	-5.93	46.00	-25.47
413.15	S	Peak	24.12	27.51	-3.39	46.00	-21.88
487.84	S	Peak	25.77	28.11	-2.34	46.00	-20.23
783.69	S	Peak	30.58	27.83	2.75	46.00	-15.42

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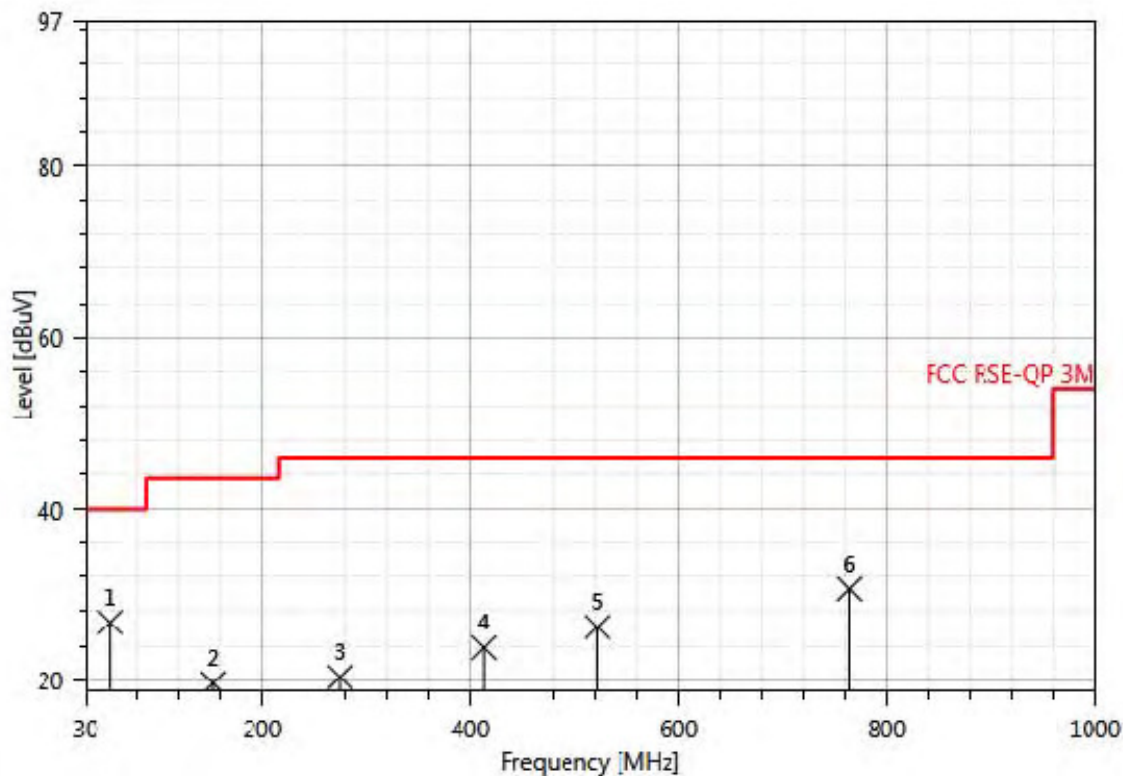
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Operation Mode :	2.4G	Test Date :	06/06/2016
Fundamental Frequency :	2442 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Tx CH MID	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	VERTICAL



Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level	FS		@3m	
		QP/AV/PK	dBμV/m	dBμV/m	dB	dBuV/m	dB
54.25	S	Peak	26.74	34.56	-7.82	40.00	-13.26
153.19	S	Peak	19.63	27.34	-7.70	43.50	-23.87
274.44	S	Peak	20.36	27.04	-6.67	46.00	-25.64
413.15	S	Peak	23.78	27.17	-3.39	46.00	-22.22
521.79	S	Peak	26.21	27.81	-1.60	46.00	-19.79
764.29	S	Peak	30.60	27.63	2.97	46.00	-15.40

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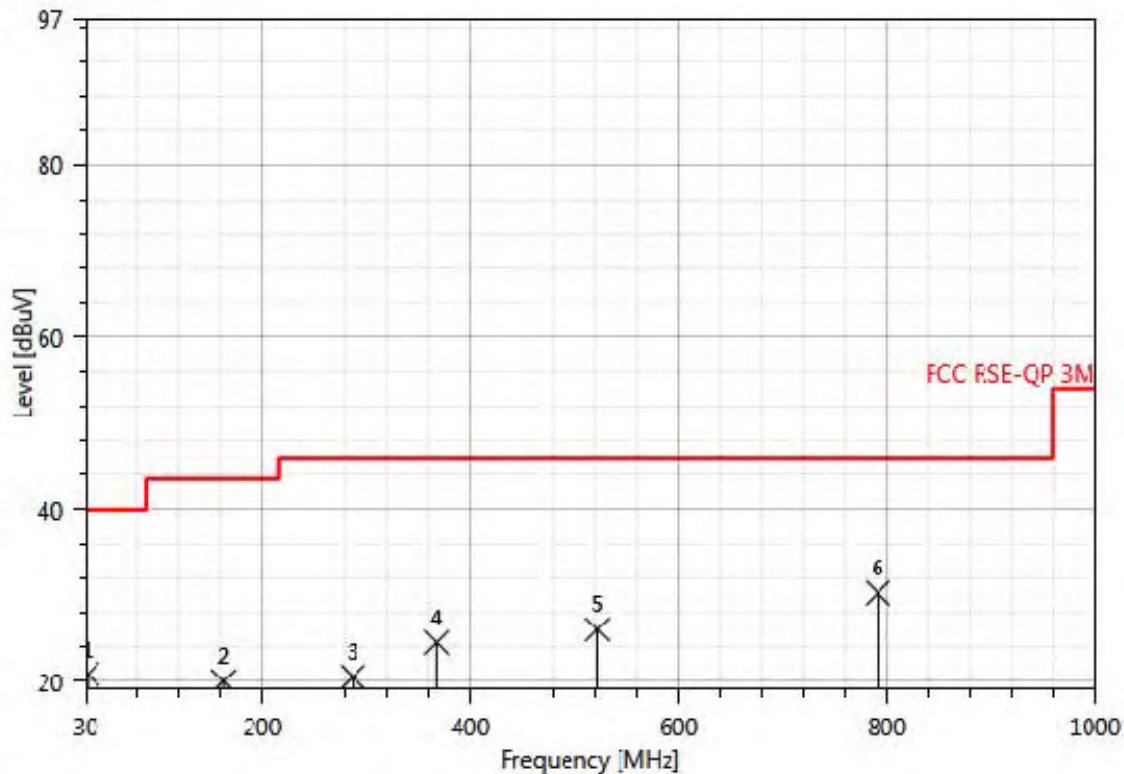
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Operation Mode :	2.4G	Test Date :	06/06/2016
Fundamental Frequency :	2442 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Tx CH MID	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	HORIZONTAL



Freq. MHz	Note F/H/E/S	Decetor Mode QP/AV/PK	Actual Reading Level dBμV/m	Spectrum FS dBμV/m	Factor dB	Limit @3m dBuV/m	Margin dB
31.94	S	Peak	20.84	29.95	-9.11	40.00	-19.16
162.89	S	Peak	20.02	27.50	-7.48	43.50	-23.48
287.05	S	Peak	20.53	26.72	-6.19	46.00	-25.47
367.56	S	Peak	24.51	29.23	-4.73	46.00	-21.49
521.79	S	Peak	26.03	27.64	-1.60	46.00	-19.97
791.45	S	Peak	30.26	27.36	2.89	46.00	-15.74

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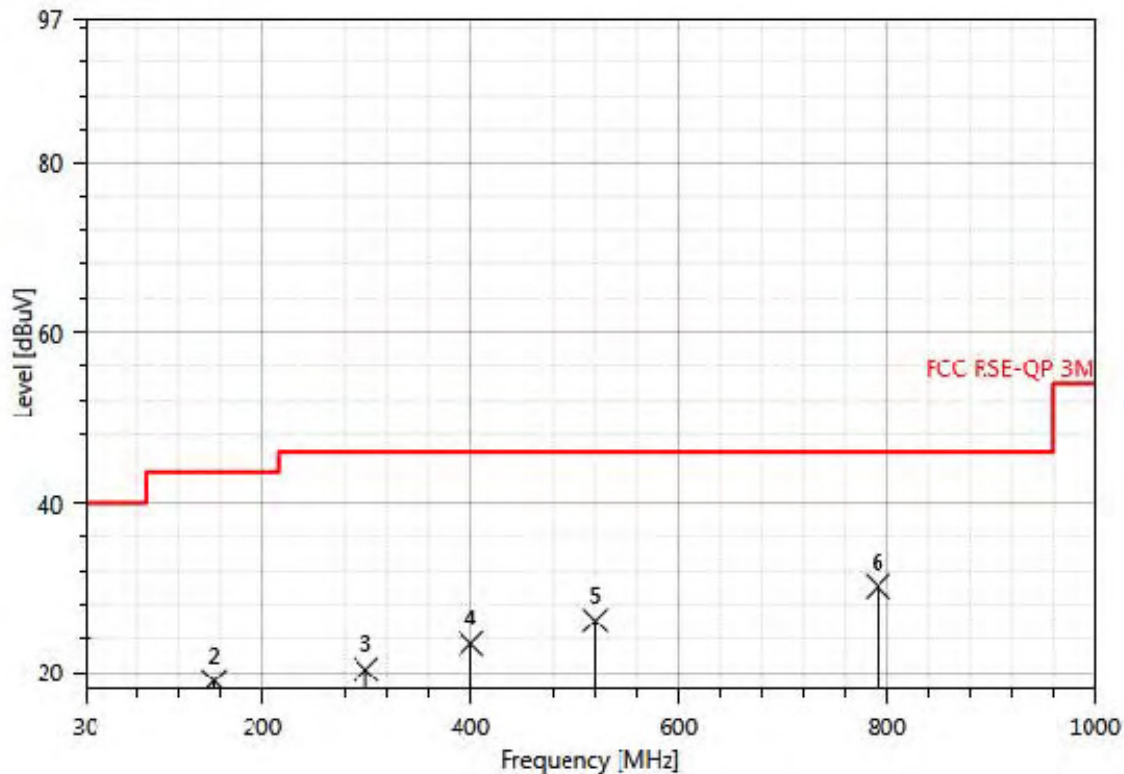
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Operation Mode :	2.4G	Test Date :	06/06/2016
Fundamental Frequency :	2447 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Tx CH HIGH	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	VERTICAL



Freq. MHz	Note F/H/E/S	Decetor Mode QP/AV/PK	Actual Reading Level dBμV/m	Spectrum FS dBμV/m	Factor dB	Limit @3m dBuV/m	Margin dB
30.00	S	Peak	21.76	30.95	-9.19	40.00	-18.24
154.16	S	Peak	18.96	26.66	-7.70	43.50	-24.54
299.66	S	Peak	20.34	26.27	-5.93	46.00	-25.66
400.54	S	Peak	23.38	27.32	-3.94	46.00	-22.62
519.85	S	Peak	26.11	27.73	-1.62	46.00	-19.89
791.45	S	Peak	30.08	27.18	2.89	46.00	-15.92

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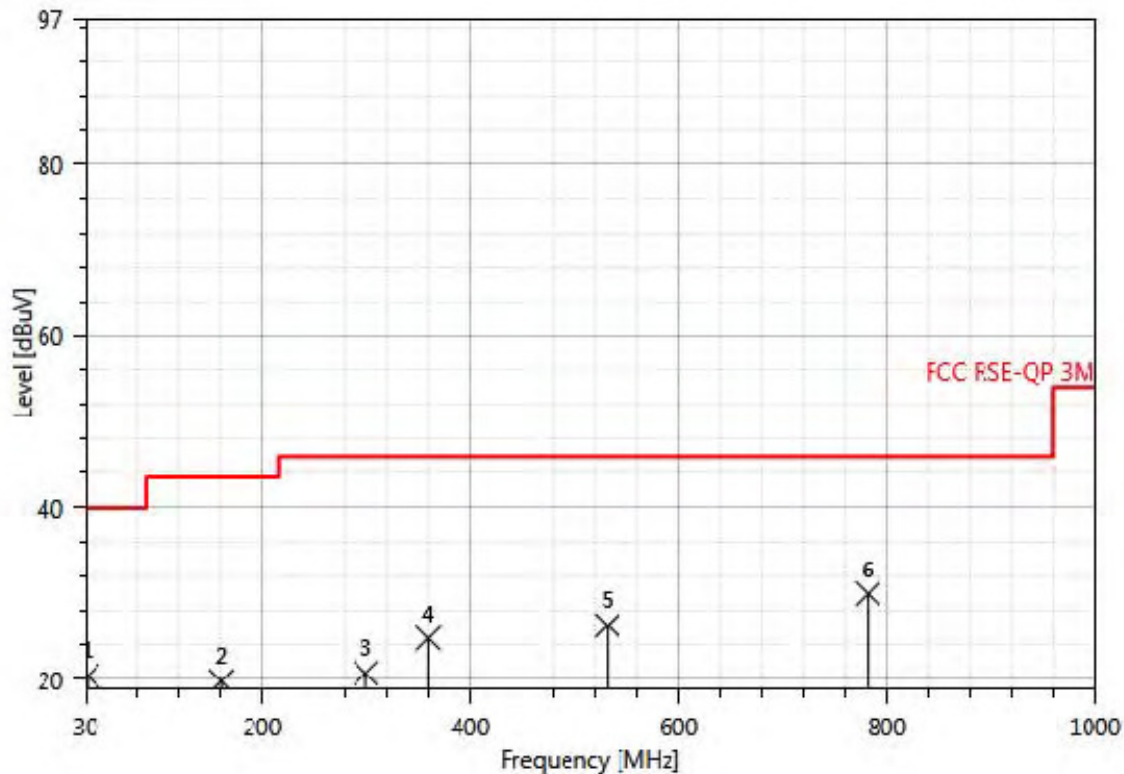
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Operation Mode :	2.4G	Test Date :	06/06/2016
Fundamental Frequency :	2447 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Tx CH HIGH	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	HORIZONTAL



Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level	FS		@3m	
		QP/AV/PK	dBμV/m	dBμV/m	dB	dBuV/m	dB
31.94	S	Peak	20.37	29.48	-9.11	40.00	-19.63
160.95	S	Peak	19.74	27.18	-7.44	43.50	-23.76
299.66	S	Peak	20.69	26.62	-5.93	46.00	-25.31
359.80	S	Peak	24.74	29.54	-4.80	46.00	-21.26
531.49	S	Peak	26.26	27.82	-1.57	46.00	-19.74
781.75	S	Peak	29.94	27.18	2.76	46.00	-16.06

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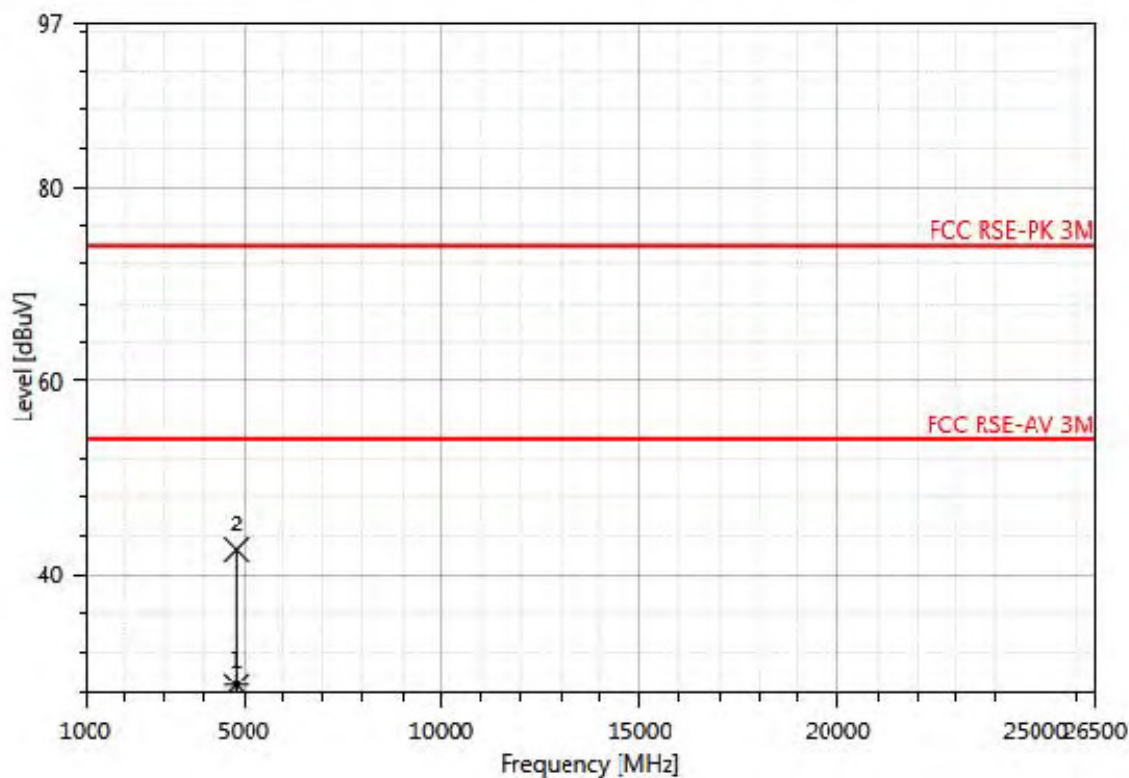
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Operation Mode :	2.4G	Test Date :	06/06/2016
Fundamental Frequency :	2405 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Tx CH LOW	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	VERTICAL



Freq. MHz	Note F/H/E/S	Decetor Mode QP/AV/PK	Actual Reading Level dBμV/m	Spectrum FS dBμV/m	Factor dB	Limit @3m dBuV/m	Margin dB
4810.00	H	Average	28.59	23.66	4.93	54.00	-25.41
4810.00	H	Peak	42.59	37.66	4.93	74.00	-31.41

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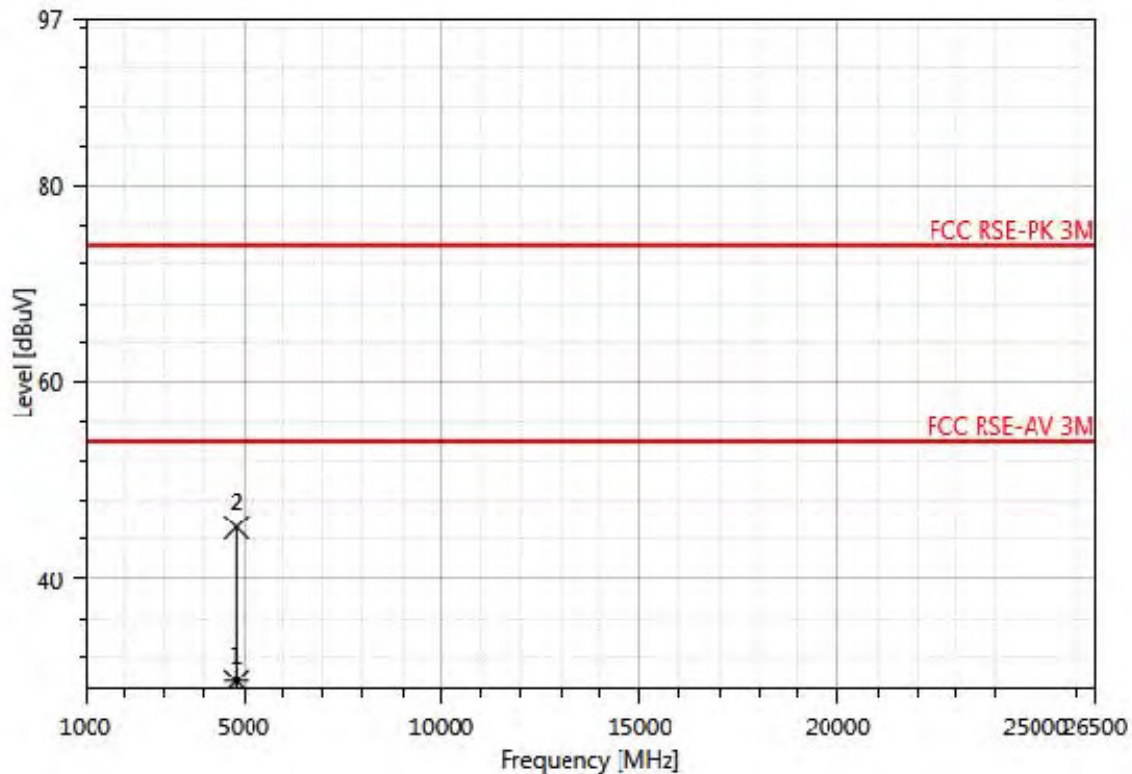
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Operation Mode :	2.4G	Test Date :	06/06/2016
Fundamental Frequency :	2405 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Tx CH LOW	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	HORIZONTAL



Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level	FS	dB	@3m	dB
		QP/AV/PK	dBμV/m	dBμV/m		dBuV/m	
4810.00	H	Average	29.58	24.65	4.93	54.00	-24.42
4810.00	H	Peak	45.23	40.30	4.93	74.00	-28.77

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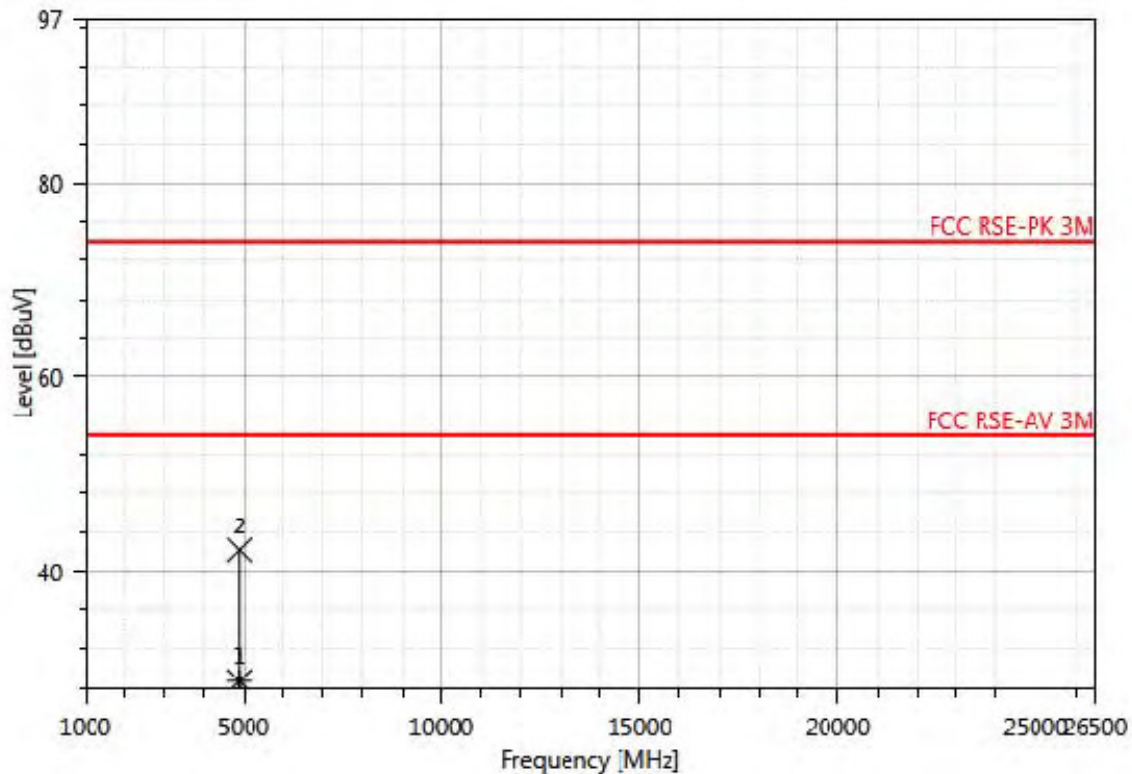
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Operation Mode :	2.4G	Test Date :	06/06/2016
Fundamental Frequency :	2442 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Tx CH MID	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	VERTICAL



Freq. MHz	Note F/H/E/S	Decetor Mode QP/AV/PK	Actual Reading Level dBμV/m	Spectrum FS dBμV/m	Factor dB	Limit @3m dBuV/m	Margin dB
4884.00	H	Average	28.60	23.41	5.19	54.00	-25.40
4884.00	H	Peak	42.17	36.97	5.19	74.00	-31.83

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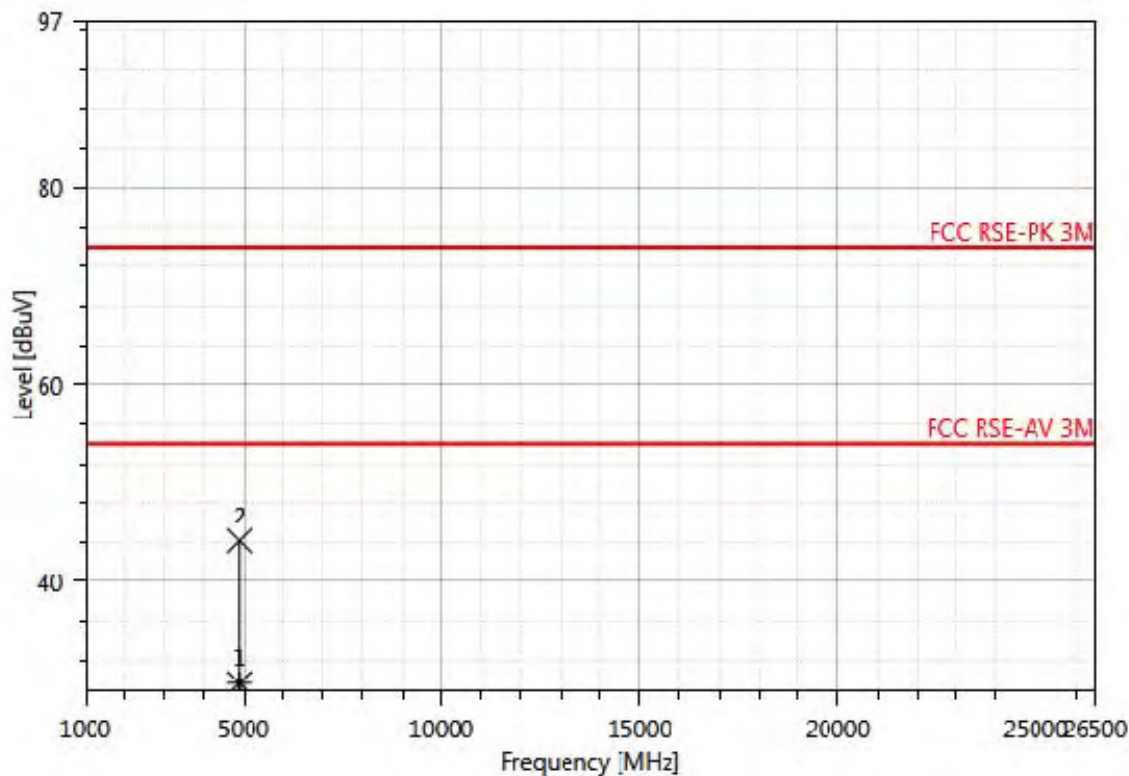
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Operation Mode :	2.4G	Test Date :	06/06/2016
Fundamental Frequency :	2442 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Tx CH MID	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	HORIZONTAL



Freq. MHz	Note F/H/E/S	Decetor Mode QP/AV/PK	Actual Reading Level dBuV/m	Spectrum FS dBuV/m	Factor dB	Limit @3m dBuV/m	Margin dB
4884.00	H	Average	29.66	24.47	5.19	54.00	-24.34
4884.00	H	Peak	44.14	38.95	5.19	74.00	-29.86

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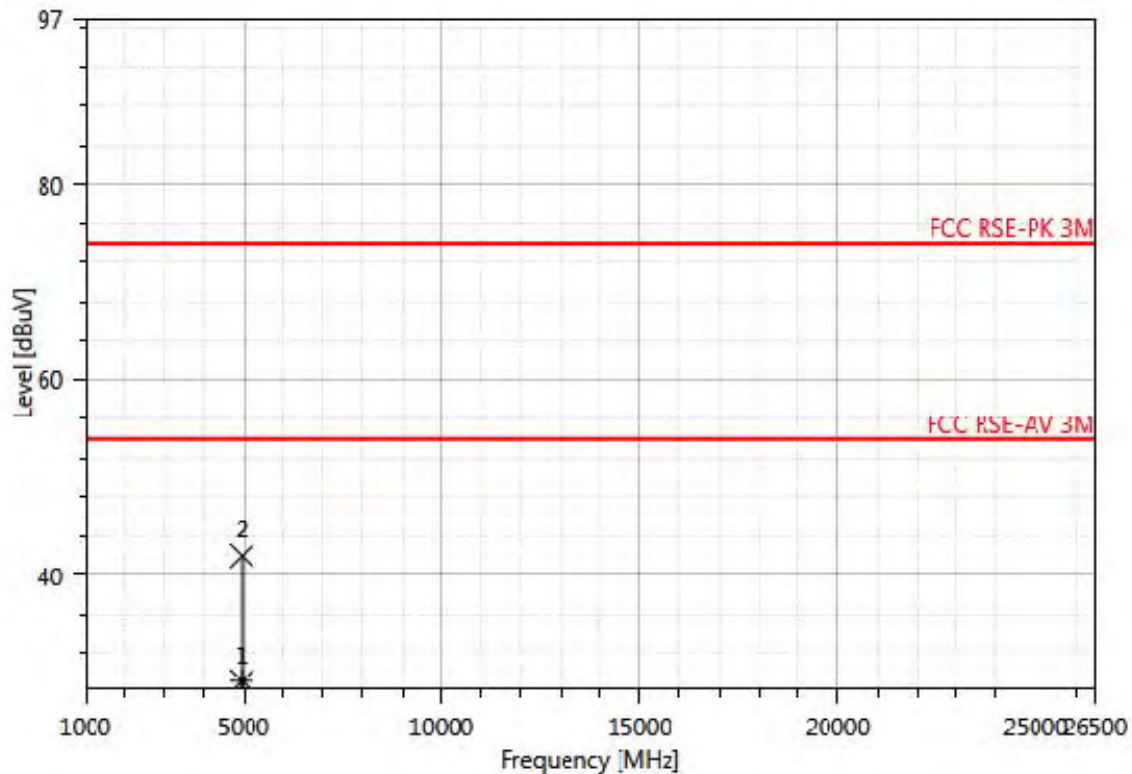
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Operation Mode :	2.4G	Test Date :	06/06/2016
Fundamental Frequency :	2477 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Tx CH HIGH	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	VERTICAL



Freq. MHz	Note F/H/E/S	Decetor Mode QP/AV/PK	Actual Reading Level dBμV/m	Spectrum FS dBμV/m	Factor dB	Limit @3m dBuV/m	Margin dB
4954.00	H	Average	29.18	23.89	5.29	54.00	-24.82
4954.00	H	Peak	42.03	36.74	5.29	74.00	-31.97

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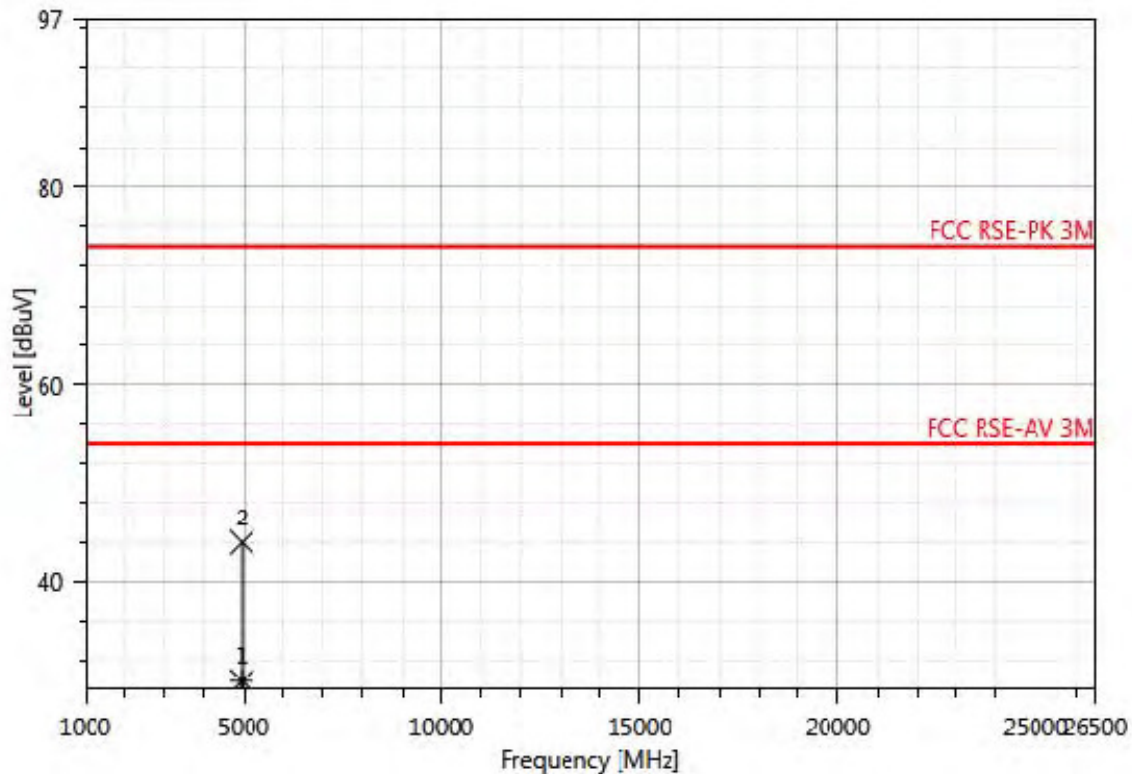
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Operation Mode :	2.4G	Test Date :	06/06/2016
Fundamental Frequency :	2477 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Tx CH HIGH	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	HORIZONTAL



Freq. MHz	Note F/H/E/S	Decetor Mode QP/AV/PK	Actual Reading Level dBμV/m	Spectrum FS dBμV/m	Factor dB	Limit @3m dBuV/m	Margin dB
4954.00	H	Average	29.97	24.68	5.29	54.00	-24.03
4954.00	H	Peak	44.02	38.74	5.29	74.00	-29.98

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## 8 20 dB Bandwidth Measurement

### 8.1 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set ETU normal operating mode.
3. Set SPA Center Frequency = fundamental frequency, RBW = 100kHz, VBW = 300kHz, Span = 5MHz.
4. Set SPA Max hold. Mark peak, -20dB.

### 8.2 Test SET-UP (Block Diagram of Configuration)

Refer to section 7.2 for the plot.

### 8.3 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	Anritsu	ML2495A	1005007	12/20/2014	12/19/2015
Power Sensor	Anritsu	MA2411B	917032	12/20/2014	12/19/2015
Spectrum Analyzer	Agilent	E4446A	MY51100003	01/29/2015	01/28/2016
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/02/2015	01/01/2016
Spectrum Analyzer	Agilent	E4440A	MY45304525	05/05/2015	05/04/2016
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2015	01/01/2016
Attenuator	Mini-Circuit	BW-S10W2+	002	01/02/2015	01/01/2016
Splitter	Agilent	11636B	N/A	01/02/2015	01/01/2016

### 8.4 Measurement Results:

Frequency (MHz)	20dB Bandwidth (kHz)
2405	2117
2475	2127
2480	2136

Refer to attached data chart.

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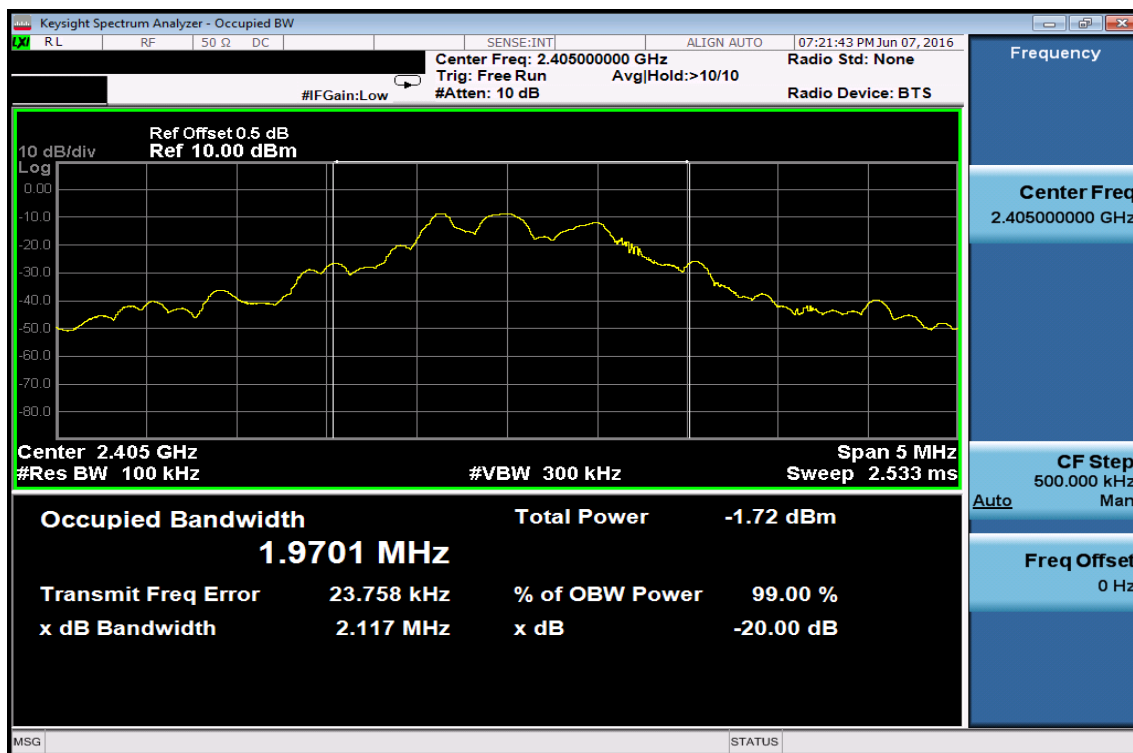
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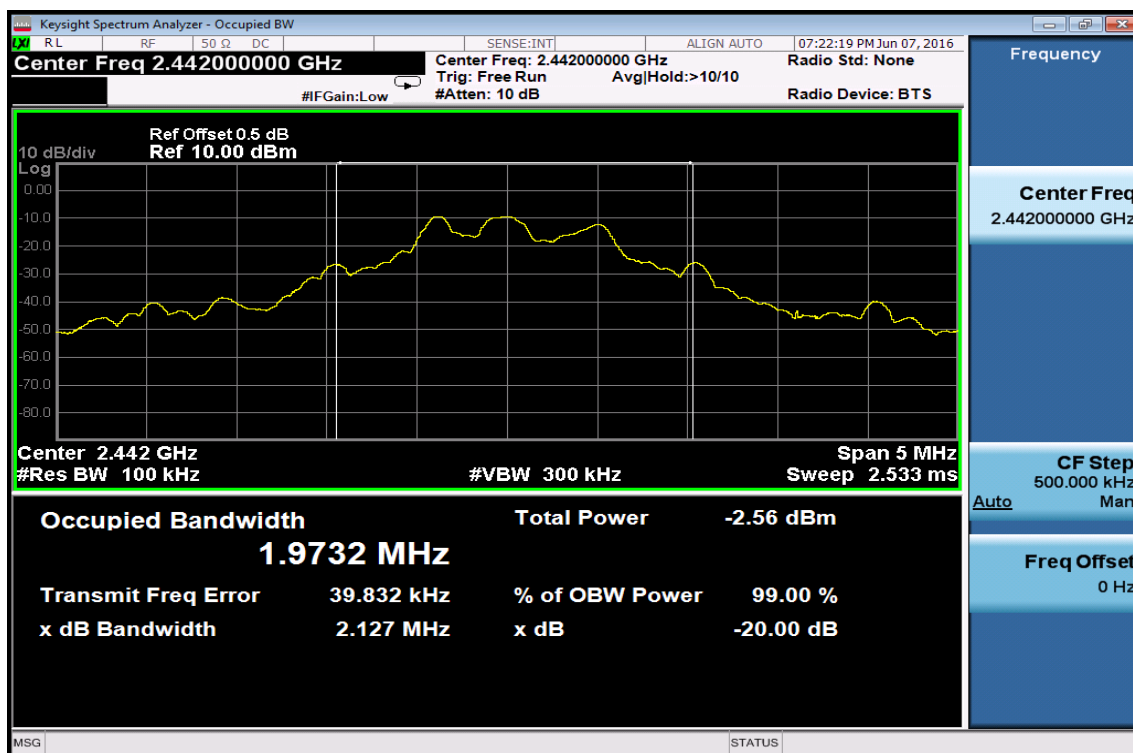
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## 2405MHz



## 2442MHz



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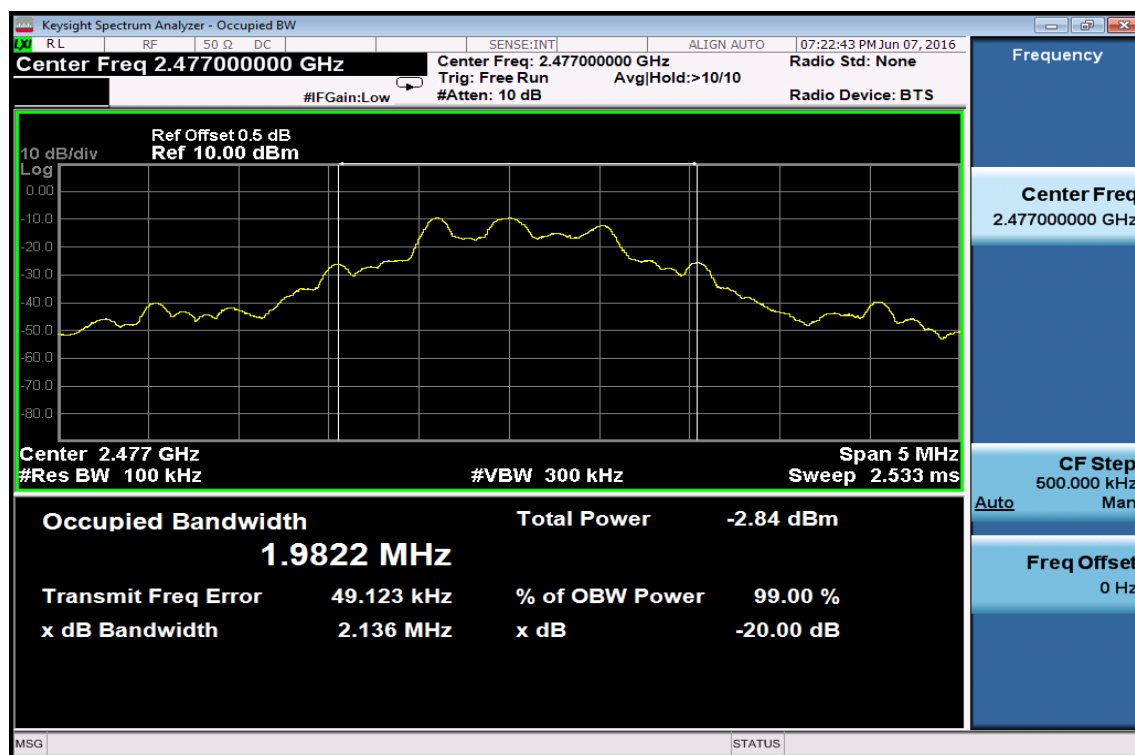
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## 2477MHz



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## 9 Antenna Requirement

### 9.1 Standard Applicable:

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

If the transmitting antenna is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi.

In case of point-to-point operation, the power shall be reduced by the one dB for every 3 dB that the directional gain of antenna exceeds 6dBi.

### 9.2 Antenna Connected Construction:

embedded-in antenna design is used.

The antenna is designed as permanently attached and no consideration of replacement. Please see EUT photo and antenna spec. for details.

The antenna gain is less than 6dBi. Therefore, it is not necessary to reduce maximum output power limit.

~ *End of Report* ~

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