

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

## INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C AND CANADA RSS-210 REQUIREMENT

OF

**Product Name:** 2.4GHz Wireless Mouse

**Brand Name:** N/A

**Model No.:** B219M 5+1B / B219M 3+1B / 26503 / 26504  
(B219M 5+1B with side button; B219M 3+1B / 26503 / 26504 without side button)

**Model Difference:** Side button and color difference

**FCC ID:** P5A-CB0018

**IC:** 9468A-0B219M

**Report No.:** E2/2014/30049

**Issue Date:** May 05, 2014

**FCC Rule Part:** §15.249

**IC Rule Part:** RSS-210 issue 8: 2010, Annex 2.9

**Prepared for:** ARESON Technology Corp.  
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**Prepared by:** SGS Taiwan Ltd.  
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## VERIFICATION OF COMPLIANCE

ARESON Technology Corp.

**Applicant:** 11F, No.646, Sec.5, Chongxin Rd., SanChong Dist., New Taipei City  
241, Taiwan (R.O.C.)

**Product Description:** 2.4GHz Wireless Mouse

**FCC ID:** P5A-CB0018  
**IC:** 9468A-0B219M

**Brand Name:** N/A

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**Model Difference:** Side button and color difference

**File Number:** E2/2014/30049

**Date of test:** Mar. 27, 2014 ~ May 05, 2014

**Date of EUT Received:** Mar. 27, 2014

### 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 C63.4:2009 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.249 and RSS-210 issue 8: 2010 Annex 2.9.

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

**Test By:**

*Jazz Huang*

**Date:**

May 05, 2014

*Jazz Huang / Sr. Engineer*

**Prepared By:**

*Judy Hsu*

**Date:**

May 05, 2014

*Judy Hsu / Clerk*

**Approved By:**

*Jim Chang*

**Date:**

May 05, 2014

*Jim Chang / Supervisor*

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## Version

Version No.	Date	Description
00	May 05, 2014	Initial creation of document

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## 1. GENERAL INFORMATION

### 1.1. Product Description

Product Name:	2.4GHz Wireless Mouse
Brand Name:	N/A
Model No.:	B219M 5+1B / B219M 3+1B / 26503 / 26504 (B219M 5+1B with side button; B219M 3+1B / 26503 / 26504 without side button)
Model Difference:	Side button and color difference
Hardware Version	01
Software Version	MA380E
Operation Frequency:	2408~2474MHz
Channel number:	34 channels
Channel Spacing:	2MHz
Modulation Type:	GFSK
Power Supply	DC 3V form AAA Batteries*2
Antenna Designation:	Printed Antenna

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## 1.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: P5A-CB0018** filing to comply with Section 15.249 of the FCC Part 15, Subpart C Rules and **IC: 9468A-0B219M** filing to comply with Industry Canada RSS-210 issue 8: 2010 Annex 2.9.

## 1.3. Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4:2009 and RSS-Gen: 2010. Radiated testing was performed at an antenna to EUT distance 3 meters.

## 1.4. Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1st Rd., Guishan Township, Taoyuan Coun, Taoyuan County, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2009. FCC Registration Number: 628985, Canada Registration Number: 4620A-5.

The 10 m Open Area Test Sites located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1st Rd., Guishan Township, Taoyuan Coun, Taoyuan County, Taiwan which is constructed and calibrated to meet the CISPR 22/EN 55022 requirements. FCC Registration Number: 455997. IC Registration Number: 4620A-6.

## 1.5. Special Accessories

Not available for this EUT intended for grant.

## 1.6. Equipment Modifications

Not available for this EUT intended for grant.

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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

The Transmitter was operated in the engineering operating mode. the Tx frequency was fixed at 2408, 2440 and 2474 MHz which were for the purpose of the measurements.

### 2.3. Test Procedure

#### 2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 7.3.1 of ANSI C63.4-2009 and RSS-Gen: 2007. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and Average detector mode.

#### 2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. 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 according to the requirements in Section 8 and 13 of ANSI C63.4:2009 and RSS-Gen:2010.

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## 2.4. Limitation

### (1) Conducted Emission

According to section 15.207(a) and RSS-Gen §7.2.2 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 15.249(a) and RSS-210 issue 8, §A2.9(a)

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

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**(3) Radiated Emission 15.249 (d) and RSS-210 issue 8, §A2.9(b)**

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 in Section 15.209 and RSS-210 issue 8, §A2.9(a) as below, whichever is the lesser attenuation.

Frequency (MHz)	Field strength $\mu\text{V/m}$	Distance (m)	Field strength at 3m $\text{dB}\mu\text{V/m}$
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 15.249(e) and RSS-210 issue 8**

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.

- Remark:
1. Emission level in  $\text{dB}\mu\text{V/m} = 20 \log (\mu\text{V/m})$
  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 § 15.205
  4. Emission spurious frequency which appearing within the Restricted Bands specified in provision of § 15.205, then the general radiated emission limits in § 15.209 apply.

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## 2.5. Configuration of Tested System

Fig. 2-1 Configuration

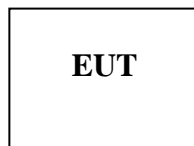


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	Test software	N/A	N/A	N/A	N/A	N/A

**Note:** All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.

**Grounding:** Grounding was in accordance with the manufacturer's requirements and conditions for the intended use.

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### 3. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207/ RSS-Gen §7.2.2	Conducted Emission	N/A
§15.249(a)(d)(e) RSS-210 issue 8, §A2.9(a)(b)	Field Strength Measurement (TX and RX)	Compliant
§15.215(c)	20dB band width Measurement	Compliant
RSS-Gen §4.6.1	99% Power Bandwidth	Compliant

### 4. DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

Test program used to control the EUT for staying in continuous transmitting and receive mode is programmed.

Channel low (2408MHz)、mid (2440MHz) and high (2474MHz) with highest data rate are chosen for full testing.

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## 5. MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
20dB Bandwidth	+/- 123.36 Hz
100 KHz Bandwidth Of Frequency Band Edges	+/- 1.55 dB
Temperature	+/- 0.8 °C
Humidity	+/- 4.7 %
DC / AC Power Source	DC= +/- 1%, 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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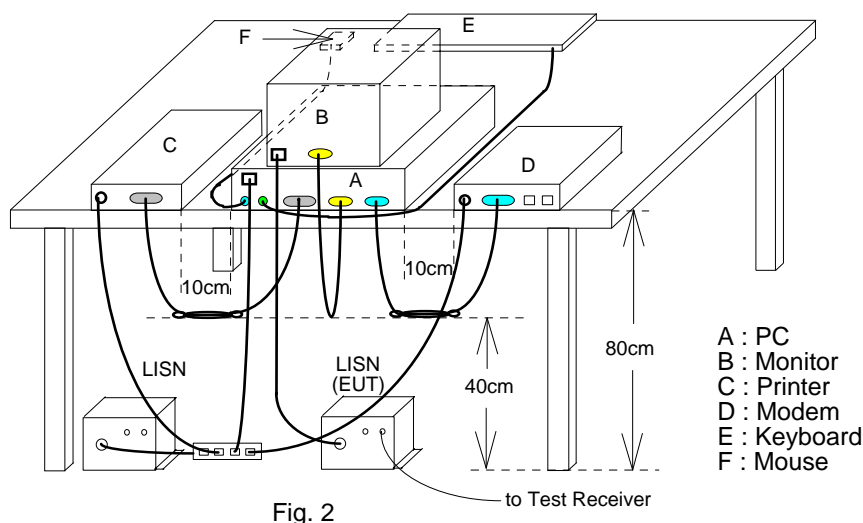
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## 6. CONDUCTED EMISSIONS TEST

### 6.1 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 frequency measured were complete.

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



### 6.3 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI 3	101311	2013/06/27	06/26/2014
Coaxial Cables	N/A	N30N30-1042-150 cm	N/A	2014/02/07	02/06/2015
LISN	Schwarzbeck	NSLK 8127	8127-648	2013/06/17	06/16/2014
LISN	Rolf-Heine	NNB-2/16Z	99012	2014/03/26	03/25/2015
Test Software	Farad	EZ-EMC	Ver. SGS-03A2	N.C.R.	N.C.R.

### 6.4 Measurement Result:

N/A, This device is powered by battery.

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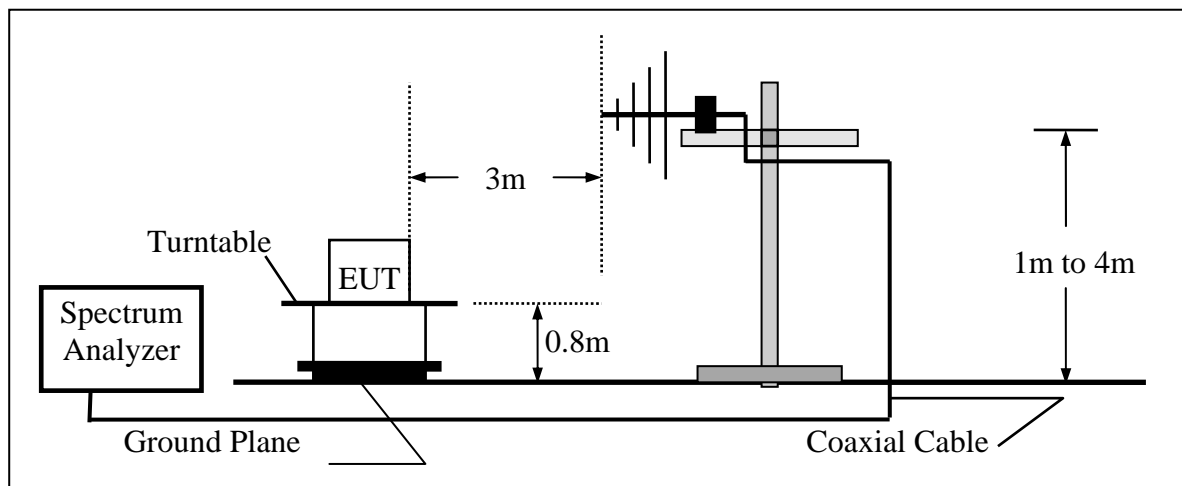
## 7. RADIATED EMISSION TEST

### 7.1 Measurement Procedure

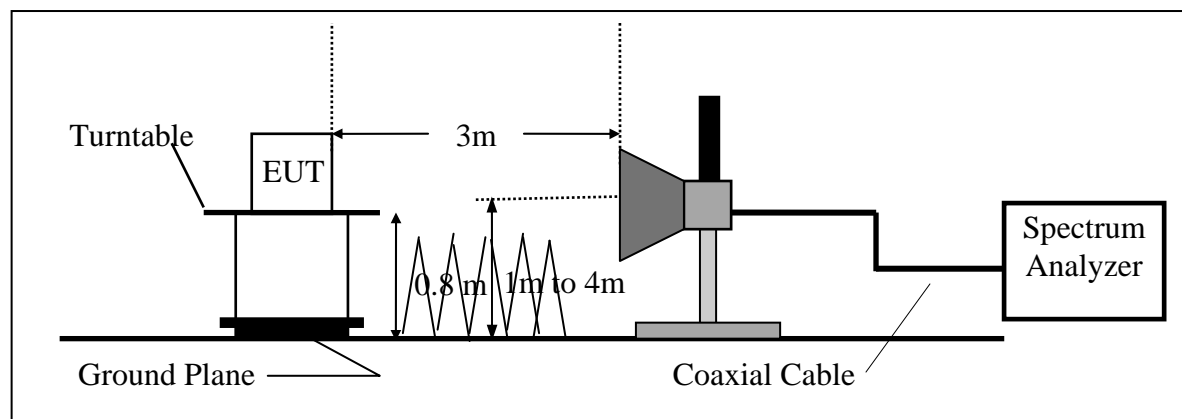
1. The EUT was placed on a turntable that is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above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

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

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-Up Frequency Over 1 GHz



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### 7.3 Measurement Equipment Used:

SGS SAC Chamber No.C (FCC)					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
EMI Test Receiver	R&S	ESU 40	100363	04/12/2014	04/11/2015
Loop Antenna	ETS-Lindgren	6502	00143303	01/16/2014	01/15/2015
Broadband Antenna	TESEQ	CBL 6112D	35240	01/17/2014	01/16/2015
Horn Antenna	ETS-Lindgren	3117	00143272	01/27/2014	01/26/2015
Horn Antenna	Schwarzbeck	BBHA9170	BBHA9170-184	01/23/2014	01/22/2015
Horn Antenna	ETS-Lindgren	3160-09	00117911	01/22/2014	01/21/2015
Horn Antenna	ETS-Lindgren	3160-10	00117783	01/22/2014	01/21/2015
Pre Amplifier	R&S	SCU-18	10204	03/26/2014	03/25/2015
Pre Amplifier	R&S	SCU-26	100780	03/26/2014	03/25/2015
Pre Amplifier	R&S	SCU-40	100356	03/26/2014	03/25/2015
Pre Amplifier	EMC Instruments	EMC330	980096	03/26/2014	03/25/2015
Pre Amplifier	EMC Instruments	EMC184045	980135	01/24/2014	01/23/2015
Coaxial Cable	Huber+Suhner	RG 214/U	W21.03	03/26/2014	03/25/2015
Coaxial Cable	Huber+Suhner	RG 214/U	W22.03	03/26/2014	03/25/2015
Coaxial Cable	Huber+Suhner	SUCCOFLEX 104	MY17413/4	03/26/2014	03/25/2015
Coaxial Cable	Huber+Suhner	SUCCOFLEX 104	MY17404/4	03/26/2014	03/25/2015
Coaxial Cable	Huber+Suhner	SUCCOFLEX 104	MY17394/4	03/26/2014	03/25/2015
Coaxial Cable	Huber+Suhner	SUCCOFLEX 104	MY17386/4	03/26/2014	03/25/2015
Coaxial Cable	Huber+Suhner	SUCCOFLEX 104	MY17388/4	03/26/2014	03/25/2015
Attenuator	WOKEN	218FS-10	HY-151	01/06/2014	01/05/2015
Communication Tester	R&S	CMW500	131121	01/16/2014	01/15/2015
Communication Tester	Anritsu	MT8820C	6201107337	04/23/2014	04/22/2015
Controller	MF	MF-7802	N/A	N.C.R.	N.C.R.
Antenna Master	MF	N/A	N/A	N.C.R.	N.C.R.
Turn Table	MF	N/A	N/A	N.C.R.	N.C.R.
Site NSA	SGS	966 Chamber C	SAC-C	03/05/2014	03/04/2015
Site VSWR	SGS	966 Chamber C	SAC-C	04/10/2014	04/09/2015
Test Software	World-Pallas	Dr. E	V 3.0 Lite	N.C.R.	N.C.R.

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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	

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## 7.5 Measurement Result

## Radiated Spurious Emission Measurement Result

Operation Band	:2.4G	Test Date	:2014-04-30
Fundamental Frequency	:2408 MHz	Temp./Humi.	:27.4 deg_C / 47 RH
Operation Mode	:TX LOW MAIN	Engineer	:Aken
EUT Pol.	:E2	Measurement Antenna Pol.	:VERTICAL

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.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2407.88	F	Peak	84.51	3.19	87.70	114.00	-26.30
2407.88	F	Average	80.65	3.19	60.98	94.00	-33.02

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Operation Band	:2.4G	Test Date	:2014-04-30
Fundamental Frequency	:2408 MHz	Temp./Humi.	:27.4 deg_C / 47 RH
Operation Mode	:TX LOW MAIN	Engineer	: Aken
EUT Pol.	:E2	Measurement Antenna Pol.	:HORIZONTAL

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.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2407.90	F	Peak	92.41	3.19	95.59	114.00	-18.41
2407.90	F	Average	88.56	3.19	91.75	94.00	-2.25

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Operation Band	:2.4G	Test Date	:2014-04-30
Fundamental Frequency	:2440 MHz	Temp./Humi.	:27.4 deg_C / 47 RH
Operation Mode	:TX MID MAIN	Engineer	: Aken
EUT Pol.	:E2	Measurement Antenna Pol.	:VERTICAL

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.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2438.84	F	Peak	82.87	3.26	86.12	114.00	-27.88
2438.84	F	Average	78.98	3.26	82.24	94.00	-11.76

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Operation Band	:2.4G	Test Date	:2014-04-30
Fundamental Frequency	:2440 MHz	Temp./Humi.	:27.4 deg_C / 47 RH
Operation Mode	:TX MID MAIN	Engineer	: Aken
EUT Pol.	:E2	Measurement Antenna Pol.	:HORIZONTAL

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.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2439.54	F	Peak	91.18	3.26	94.44	114.00	-19.56
2439.54	F	Average	87.15	3.26	90.41	94.00	-3.59

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Operation Band	:2.4G	Test Date	:2014-04-30
Fundamental Frequency	:2474 MHz	Temp./Humi.	:27.4 deg_C / 47 RH
Operation Mode	:TX HIGH MAIN	Engineer	: Aken
EUT Pol.	:E2	Measurement Antenna Pol.	:VERTICAL

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.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2472.79	F	Peak	81.65	3.33	84.98	114.00	-29.02
2472.79	F	Average	77.75	3.33	81.08	94.00	-12.92

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Operation Band	:2.4G	Test Date	:2014-04-30
Fundamental Frequency	:2474 MHz	Temp./Humi.	:27.4 deg_C / 47 RH
Operation Mode	:TX HIGH MAIN	Engineer	: Aken
EUT Pol.	:E2	Measurement Antenna Pol.	:HORIZONTAL

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.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2473.33	F	Peak	89.62	3.33	92.95	114.00	-21.05
2473.33	F	Average	85.75	3.33	89.08	94.00	-4.92

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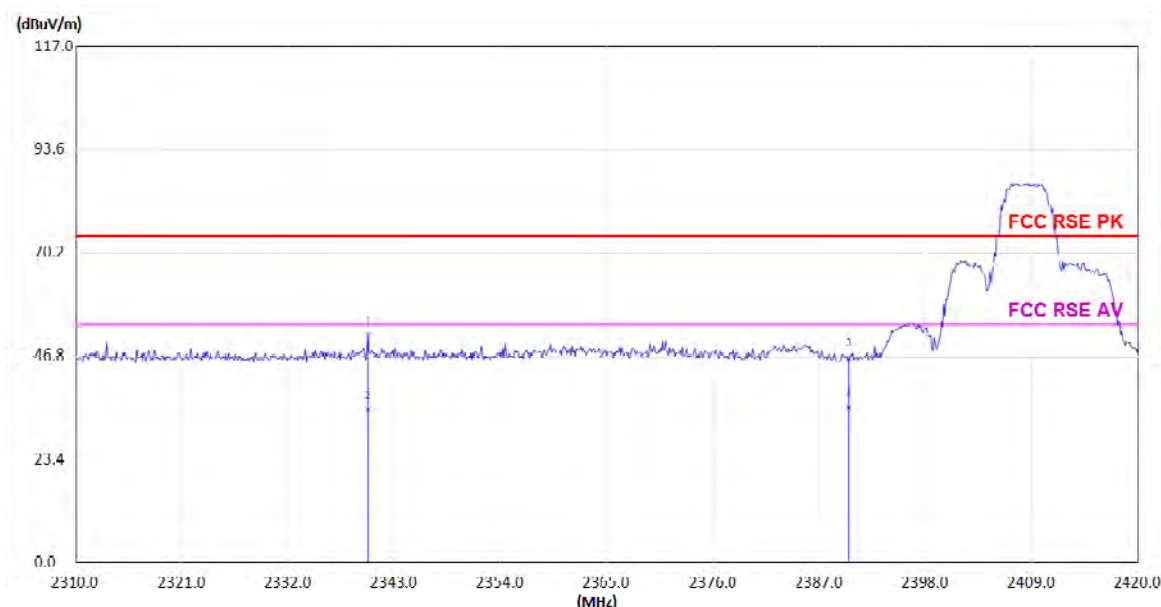
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## Radiated Spurious Emission Measurement Result

Operation Band	:2.4G	Test Date	:2014-04-30
Fundamental Frequency	:2408 MHz	Temp./Humi.	:27.4 deg_C / 47 RH
Operation Mode	:BANDEDGE LOW	Engineer	: Aken
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL



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.

“---” : denotes Noise Floor.

The trace on RE (radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV/m	dB	dBμV/m	dBμV/m	dB
2390.00	E	Peak	43.34	3.14	46.48	74.00	-27.52
2390.00	E	Average	32.25	3.14	35.39	54.00	-18.61

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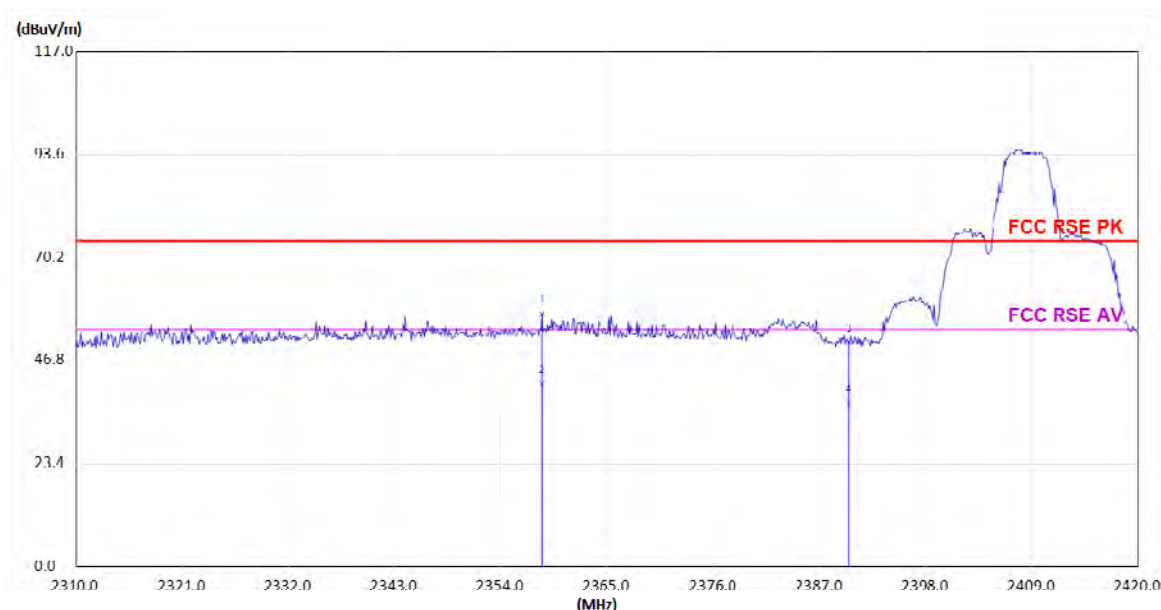
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Operation Band	:2.4G	Test Date	:2014-04-30
Fundamental Frequency	:2408 MHz	Temp./Humi.	:27.4 deg_C / 47 RH
Operation Mode	:BANDEDGE LOW	Engineer	: Aken
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL



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.

“---“ : denotes Noise Floor.

The trace on RE (radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV/m	dB	dBμV/m	dBμV/m	dB
2390.00	E	Peak	47.72	3.14	50.86	74.00	-23.14
2390.00	E	Average	34.14	3.14	37.28	54.00	-16.72

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Operation Band	:2.4G	Test Date	:2014-04-30
Fundamental Frequency	:2474 MHz	Temp./Humi.	:27.4 deg_C / 47 RH
Operation Mode	:BANDEDGE HIGH	Engineer	: Aken
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL



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.

“---” : denotes Noise Floor.

The trace on RE (radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV/m	dB	dBμV/m	dBμV/m	dB
2483.50	E	Peak	50.58	3.35	53.93	74.00	-20.07
2483.50	E	Average	33.08	3.35	36.43	54.00	-17.57

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Operation Band	:2.4G	Test Date	:2014-04-30
Fundamental Frequency	:2474 MHz	Temp./Humi.	:27.4 deg_C / 47 RH
Operation Mode	:BANDEDGE HIGH	Engineer	: Aken
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL



Actual FS(dB $\mu$ V/m) = SPA. Reading level(dB $\mu$ V) + Factor(dB)

Factor(dB) = Antenna Factor(dB $\mu$ V/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.

“---” : denotes Noise Floor.

The trace on RE (radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dB $\mu$ V/m	dB	dB $\mu$ V/m	dB $\mu$ V/m	dB
2483.50	E	Peak	55.00	3.35	58.35	74.00	-15.65
2483.50	E	Average	35.66	3.35	39.01	54.00	-14.99

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Operation Band	:2.4G	Test Date	:2014-04-30
Fundamental Frequency	:2408 MHz	Temp./Humi.	:27.4 deg_C / 47 RH
Operation Mode	:TX LOW	Engineer	: Aken
EUT Pol.	:E2	Measurement Antenna Pol.	:VERTICAL

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.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
101.78	S	Peak	53.77	-22.93	30.84	43.50	-12.66
141.55	S	Peak	45.52	-22.24	23.27	43.50	-20.23
156.10	S	Peak	44.90	-23.01	21.89	43.50	-21.61
369.50	S	Peak	40.81	-16.84	23.97	46.00	-22.03
551.86	S	Peak	38.75	-12.45	26.30	46.00	-19.70
600.36	S	Peak	40.94	-12.32	28.62	46.00	-17.38
2372.00	S	Peak	44.91	3.08	47.99	74.00	-26.01
2372.00	S	Average	27.22	3.08	30.30	54.00	-23.70
4816.00	H	Peak	59.69	0.38	60.07	74.00	-13.93
4816.00	H	Average	52.59	0.38	52.97	54.00	-1.03
7224.00	H	Peak	50.06	4.71	54.77	74.00	-19.23
7224.00	H	Average	40.35	4.71	45.06	54.00	-8.95
9632.00	H	Peak	--	--	--	--	--
12040.00	H	Peak	--	--	--	--	--
14448.00	H	Peak	--	--	--	--	--
16856.00	H	Peak	--	--	--	--	--
19264.00	H	Peak	--	--	--	--	--
21672.00	H	Peak	--	--	--	--	--
24080.00	H	Peak	--	--	--	--	--

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Operation Band	:2.4G	Test Date	:2014-04-30
Fundamental Frequency	:2408 MHz	Temp./Humi.	:27.4 deg_C / 47 RH
Operation Mode	:TX LOW	Engineer	: Aken
EUT Pol.	:E2	Measurement Antenna Pol.	:HORIZONTAL

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.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@3m	dB
		PK/QP/AV	dBμV		dBμV/m	dBμV/m	
101.78	S	Peak	41.85	-22.93	18.92	43.50	-24.58
299.66	S	Peak	45.68	-19.05	26.63	46.00	-19.37
370.47	S	Peak	51.45	-16.83	34.62	46.00	-11.38
743.92	S	Peak	32.46	-10.59	21.86	46.00	-24.14
888.45	S	Peak	34.04	-9.12	24.93	46.00	-21.07
960.23	S	Peak	36.27	-8.94	27.33	54.00	-26.67
2362.00	S	Peak	50.79	3.05	53.83	74.00	-20.17
2362.00	S	Average	36.30	3.05	39.35	54.00	-14.65
4816.00	H	Peak	56.88	0.38	57.26	74.00	-16.74
4816.00	H	Average	49.29	0.38	49.67	54.00	-4.33
7224.00	H	Peak	54.25	4.71	58.95	74.00	-15.05
7224.00	H	Average	44.51	4.71	49.22	54.00	-4.79
9632.00	H	Peak	--	--	--	--	--
12040.00	H	Peak	--	--	--	--	--
14448.00	H	Peak	--	--	--	--	--
16856.00	H	Peak	--	--	--	--	--
19264.00	H	Peak	--	--	--	--	--
21672.00	H	Peak	--	--	--	--	--
24080.00	H	Peak	--	--	--	--	--

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Operation Band	:2.4G	Test Date	:2014-04-30
Fundamental Frequency	:2440 MHz	Temp./Humi.	:27.4 deg_C / 47 RH
Operation Mode	:TX MID	Engineer	: Aken
EUT Pol.	:E2	Measurement Antenna Pol.	:VERTICAL

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.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@3m	dB
		PK/QP/AV	dBμV		dBμV/m	dBμV/m	
34.85	S	Peak	40.43	-18.42	22.01	40.00	-17.99
101.78	S	Peak	53.53	-22.93	30.60	43.50	-12.90
371.44	S	Peak	41.83	-16.80	25.03	46.00	-20.97
528.58	S	Peak	36.53	-13.56	22.97	46.00	-23.03
576.11	S	Peak	38.61	-12.29	26.32	46.00	-19.68
608.12	S	Peak	40.25	-12.04	28.21	46.00	-17.79
2370.00	S	Peak	42.92	3.07	46.00	74.00	-28.00
2370.00	S	Average	27.03	3.07	30.10	54.00	-23.90
4880.00	H	Peak	62.12	0.41	62.53	74.00	-11.47
4880.00	H	Average	52.56	0.41	52.97	54.00	-1.03
7320.00	H	Peak	48.92	4.85	53.77	74.00	-20.23
7320.00	H	Average	39.58	4.85	44.43	54.00	-9.57
9760.00	H	Peak	--	--	--	--	--
12200.00	H	Peak	--	--	--	--	--
14640.00	H	Peak	--	--	--	--	--
17080.00	H	Peak	--	--	--	--	--
19520.00	H	Peak	--	--	--	--	--
21960.00	H	Peak	--	--	--	--	--
24400.00	H	Peak	--	--	--	--	--

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Operation Band	:2.4G	Test Date	:2014-04-30
Fundamental Frequency	:2440 MHz	Temp./Humi.	:27.4 deg_C / 47 RH
Operation Mode	:TX MID	Engineer	: Aken
EUT Pol.	:E2	Measurement Antenna Pol.	:HORIZONTAL

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.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@3m	dB
		PK/QP/AV	dBμV		dBμV/m	dBμV/m	
101.78	S	Peak	41.30	-22.93	18.37	43.50	-25.13
149.31	S	Peak	38.23	-22.75	15.48	43.50	-28.02
299.66	S	Peak	45.60	-19.05	26.55	46.00	-19.45
371.44	S	Peak	54.24	-16.80	37.44	46.00	-8.56
936.95	S	Peak	37.25	-9.12	28.13	46.00	-17.87
960.23	S	Peak	35.53	-8.94	26.60	54.00	-27.40
2346.00	S	Peak	50.26	3.00	53.26	74.00	-20.74
2346.00	S	Average	32.75	3.00	35.75	54.00	-18.25
4880.00	H	Peak	57.09	0.41	57.50	74.00	-16.50
4880.00	H	Average	47.41	0.41	47.82	54.00	-6.18
7320.00	H	Peak	50.92	4.85	55.77	74.00	-18.23
7320.00	H	Average	42.93	4.85	47.78	54.00	-6.22
9760.00	H	Peak	--	--	--	--	--
12200.00	H	Peak	--	--	--	--	--
14640.00	H	Peak	--	--	--	--	--
17080.00	H	Peak	--	--	--	--	--
19520.00	H	Peak	--	--	--	--	--
21960.00	H	Peak	--	--	--	--	--
24400.00	H	Peak	--	--	--	--	--

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Operation Band	:2.4G	Test Date	:2014-04-30
Fundamental Frequency	:2474 MHz	Temp./Humi.	:27.4 deg_C / 47 RH
Operation Mode	:TX HIGH	Engineer	: Aken
EUT Pol.	:E2	Measurement Antenna Pol.	:VERTICAL

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.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@3m	dB
		PK/QP/AV	dBμV		dBμV/m	dBμV/m	
101.78	S	Peak	54.00	-22.93	31.07	43.50	-12.43
191.02	S	Peak	52.14	-24.12	28.02	43.50	-15.48
366.59	S	Peak	43.03	-16.85	26.18	46.00	-19.82
551.86	S	Peak	38.41	-12.45	25.96	46.00	-20.04
600.36	S	Peak	39.86	-12.32	27.54	46.00	-18.46
615.88	S	Peak	39.86	-12.39	27.47	46.00	-18.53
2370.00	S	Peak	43.09	3.07	46.16	74.00	-27.84
2370.00	S	Average	27.98	3.07	31.05	54.00	-22.95
4948.00	H	Peak	60.45	0.58	61.03	74.00	-12.97
4948.00	H	Average	51.61	0.58	52.19	54.00	-1.81
7422.00	H	Peak	49.61	5.02	54.63	74.00	-19.37
7422.00	H	Average	39.30	5.02	44.32	54.00	-9.68
9896.00	H	Peak	--	--	--	--	--
12370.00	H	Peak	--	--	--	--	--
14844.00	H	Peak	--	--	--	--	--
17318.00	H	Peak	--	--	--	--	--
19792.00	H	Peak	--	--	--	--	--
22266.00	H	Peak	--	--	--	--	--
24740.00	H	Peak	--	--	--	--	--

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Operation Band	:2.4G	Test Date	:2014-04-30
Fundamental Frequency	:2474 MHz	Temp./Humi.	:27.4 deg_C / 47 RH
Operation Mode	:TX HIGH	Engineer	: Aken
EUT Pol.	:E2	Measurement Antenna Pol.	:HORIZONTAL

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.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@3m	dB
		PK/QP/AV	dBμV		dBμV/m	dBμV/m	
101.78	S	Peak	42.30	-22.93	19.37	43.50	-24.13
149.31	S	Peak	38.58	-22.75	15.83	43.50	-27.67
299.66	S	Peak	46.25	-19.05	27.20	46.00	-18.80
371.44	S	Peak	53.60	-16.80	36.80	46.00	-9.20
792.42	S	Peak	33.54	-9.99	23.55	46.00	-22.45
936.95	S	Peak	37.66	-9.12	28.54	46.00	-17.46
2342.00	S	Peak	47.37	2.98	50.35	74.00	-23.65
2342.00	S	Average	30.18	2.98	33.16	54.00	-20.84
4948.00	H	Peak	58.30	0.58	58.88	74.00	-15.12
4948.00	H	Average	50.05	0.58	50.63	54.00	-3.37
7422.00	H	Peak	51.01	5.02	56.03	74.00	-17.97
7422.00	H	Average	40.68	5.02	45.70	54.00	-8.30
9896.00	H	Peak	--	--	--	--	--
12370.00	H	Peak	--	--	--	--	--
14844.00	H	Peak	--	--	--	--	--
17318.00	H	Peak	--	--	--	--	--
19792.00	H	Peak	--	--	--	--	--
22266.00	H	Peak	--	--	--	--	--
24740.00	H	Peak	--	--	--	--	--

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## 8. 20 dB BAND WIDTH 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)

Same as 7.2 Radiated Emission Measurement.

### 8.3 Measurement Equipment Used:

Same as 7.3 Radiated Emission Measurement.

### 8.4 Measurement Results:

2408 Channel = 4.381MHz

2440 Channel = 4.311MHz

2474 Channel = 4.354MHz

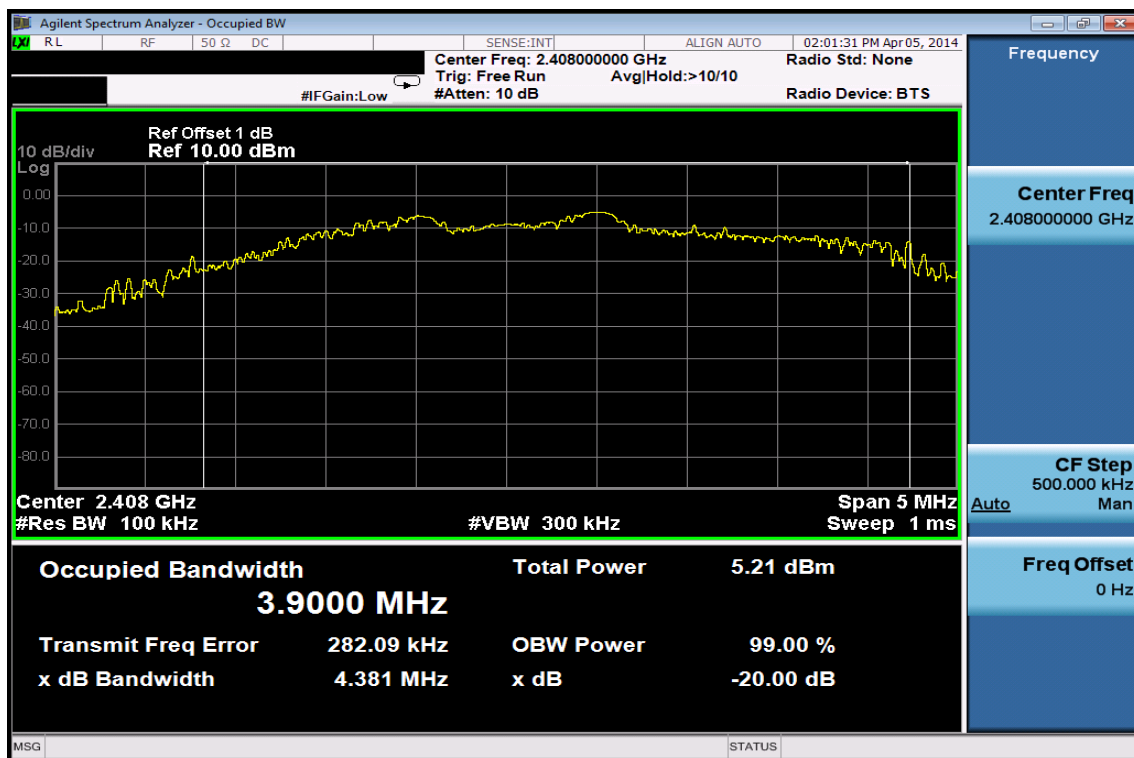
Refer to attached data chart.

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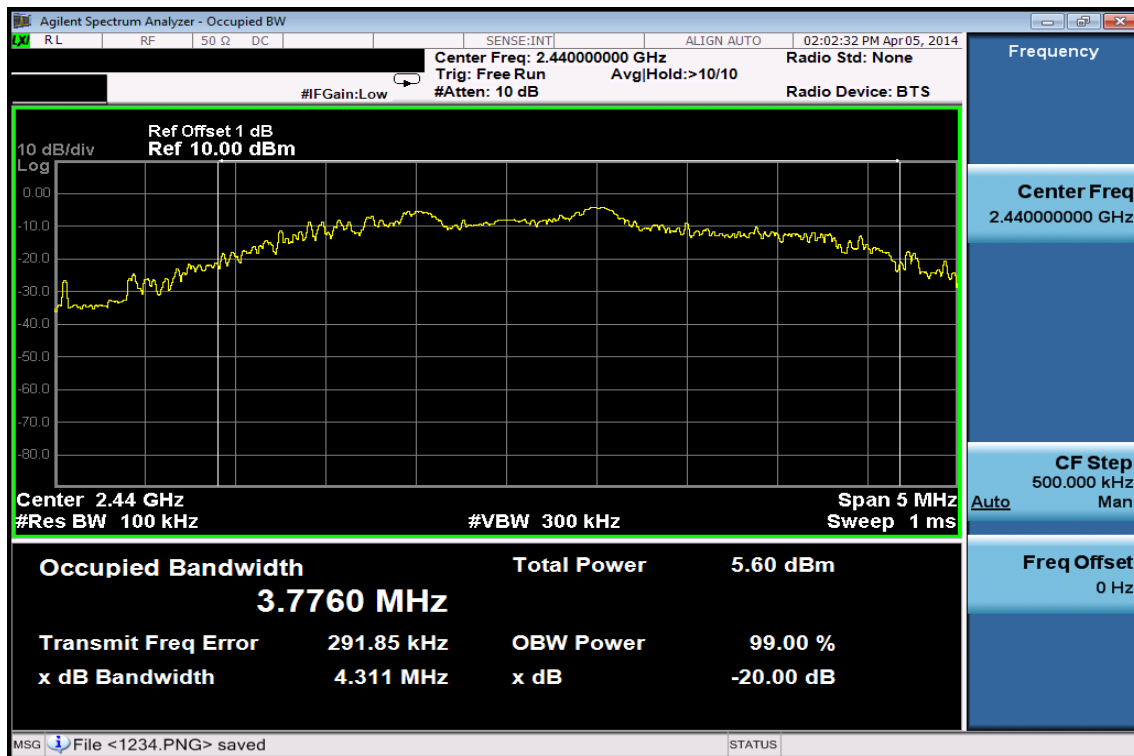
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## 20dB Bandwidth Test Data CH-Low



## 20dB Bandwidth Test Data CH-Mid



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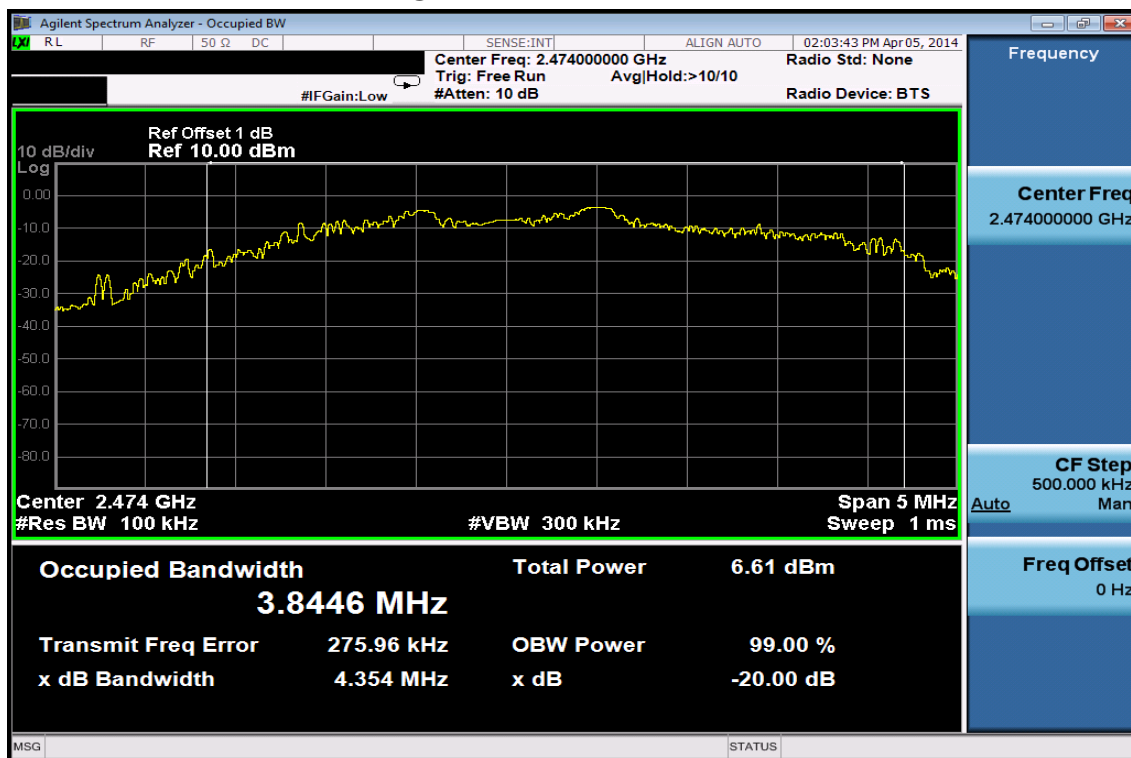
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## 20dB Bandwidth Test Data CH-High



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## 9. 99% BAND WIDTH MEASUREMENT

### 9.1 Measurement Procedure

- 1 Place the EUT on the table and set it in transmitting mode.
- 2 Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3 Set the spectrum analyzer as RBW=1% of the approximate emission bandwidth, VBW = 3 times RBW, Span= approximately 20dB below the peak level. Sweep=auto
- 4 Turn on the 99% bandwidth function, max reading..
- 5 Repeat above procedures until all frequency measured were complete.

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

Same as 7.2 Radiated Emission Measurement.

### 9.3 Measurement Equipment Used:

Same as 7.3 Radiated Emission Measurement.

### 9.4 Measurement Results:

2408 Channel = 3.4648MHz

2440 Channel = 3.4688MHz

2474 Channel = 3.4501MHz

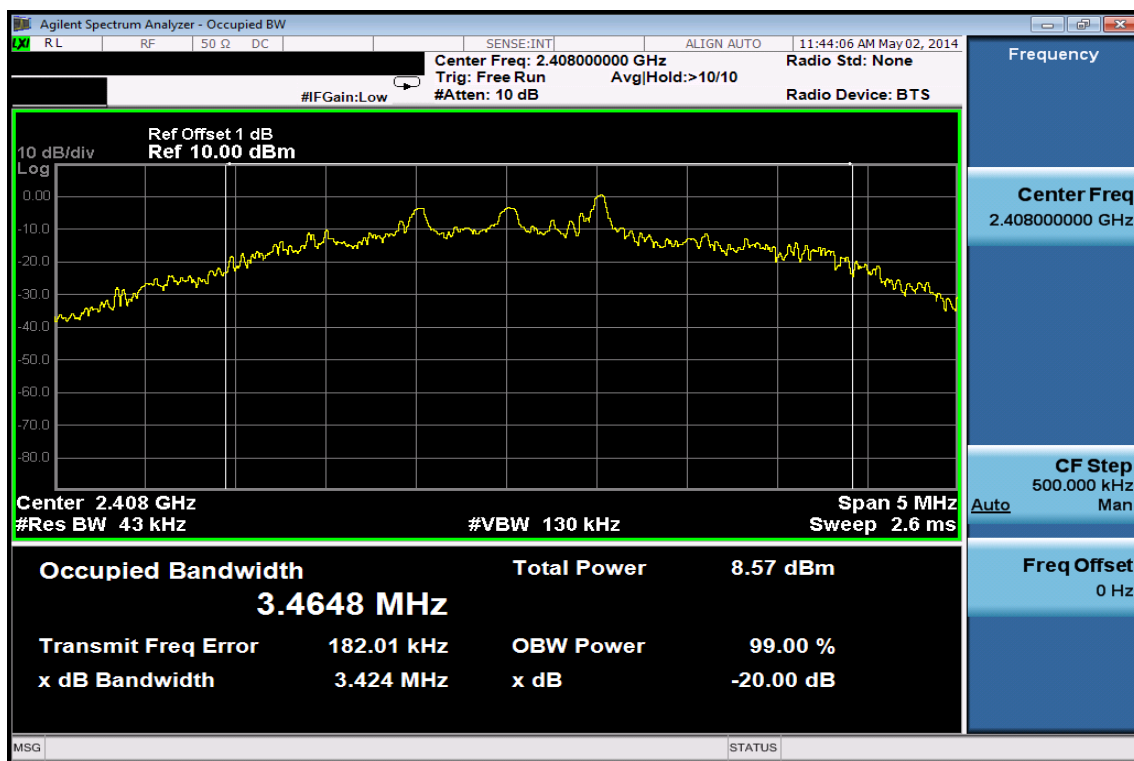
Refer to attached data chart.

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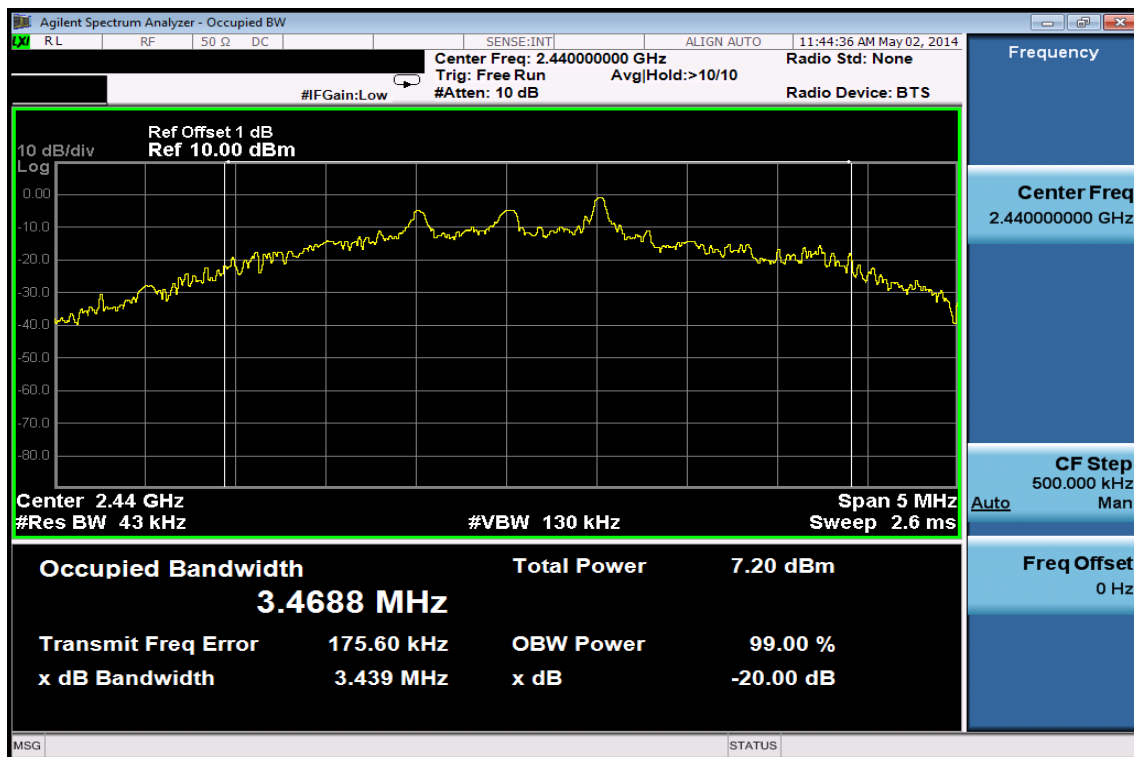
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## 99% Bandwidth Test Data CH-Low



## 99% Bandwidth Test Data CH-Mid



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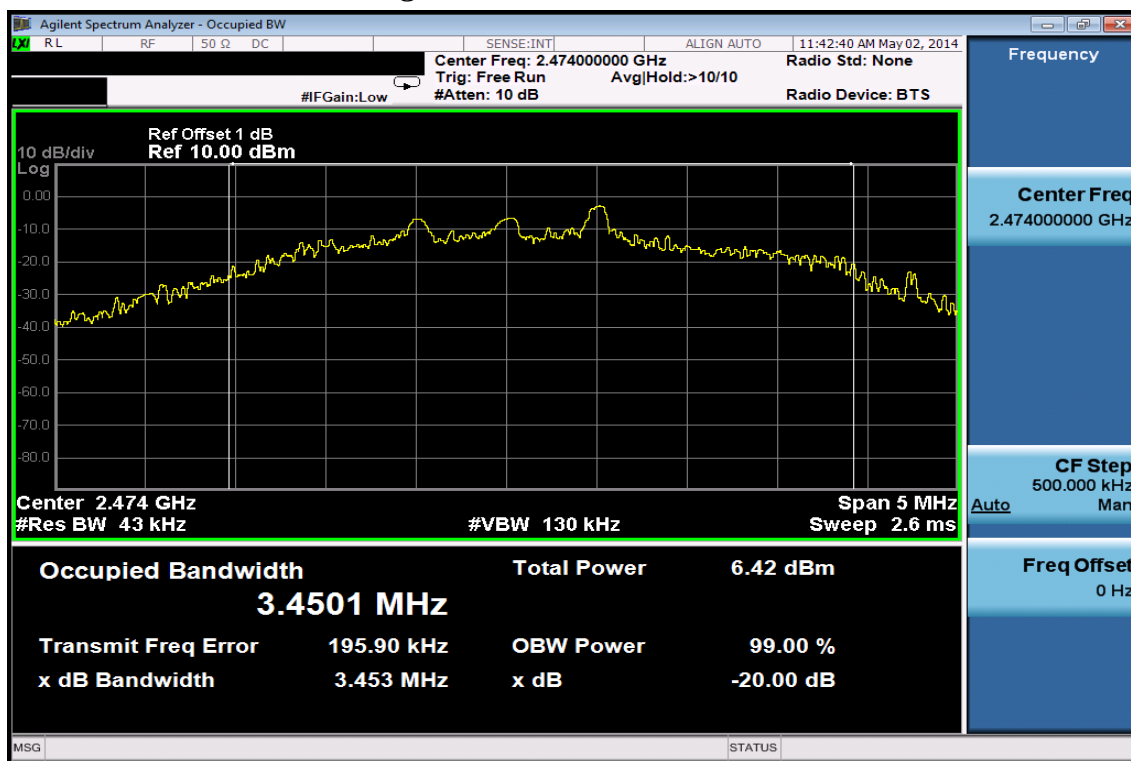
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## 99% Bandwidth Test Data CH-High



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