

# RF TEST REPORT

Test item : BLE Lighting Module  
Model No. : 9CM237CVD1  
Order No. : DEMC1305-01702  
Date of receipt : 2013-05-24  
Test duration : 2013-05-28 ~ 2013-06-04  
Date of issue : 2013-06-24  
Use of report : FCC Original Grant

Applicant : LG Electronics USA  
1000 Sylvan Avenue Englewood Cliffs, New Jersey, United States

Test laboratory : Digital EMC Co., Ltd.  
683-3, Yubang-Dong, Cheoin-Gu, Yongin-Si, Gyeonggi-Do, 449-080, Korea

Test specification : FCC Part 15 Subpart C 247  
Test environment : See appended test report  
Test result :  Pass  Fail

The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose. This test report shall not be reproduced except in full, without the written approval of DIGITAL EMC CO., LTD.

Tested by:



Engineer  
JaeJin Lee

Witnessed by:

N/A

Reviewed by:



Technical Director  
Harvey Sung

## Test Report Version

Test Report No.	Date	Description
DRTFCC1306-0596	Jun. 13, 2013	Initial issue
DRTFCC1306-0596(1)	Jun. 24, 2013	Changed model name

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## 1. GENERAL INFORMATION

**Applicant** : LG Electronics USA  
**Address** : 1000 Sylvan Avenue Englewood Cliffs, New Jersey, United States  
**FCC ID** : BEJ9CM237CVD1  
**EUT** : BLE Lighting Module  
**Model** : 9CM237CVD1  
**Additional Model(s)** : N/A  
**Data of Test** : 2013. 05. 28 ~ 2013. 06. 04  
**Contact person** : Seong Hun Ahn

## 2. EUT DESCRIPTION

<b>Product</b>	BLE Lighting Module
<b>Model Name</b>	9CM237CVD1
<b>Power Supply</b>	DC 3.3 V (Power Supply of Lighting Product)
<b>Frequency Range</b>	2402 ~ 2480MHz(40 channels)
<b>Max. RF Output Power</b>	3.10 dBm
<b>Modulation Type</b>	GFSK
<b>Antenna Specification</b>	Antenna Type: Internal Antenna Gain: 1.47 dBi (PK)

### 3. SUMMARY OF TESTS

FCC Part Section(s)	Parameter	Limit	Test Condition	Status Note 1
<b>I. Transmitter Mode (TX)</b>				
15.247(a)	6 dB Bandwidth	> 500 kHz	Conducted	<b>C</b>
15.247(b)	Transmitter Output Power	< 1Watt		<b>C</b>
15.247(d)	Out of Band Emissions / Band Edge	20dBc in any 100kHz BW		<b>C</b>
15.247(e)	Transmitter Power Spectral Density	< 8dBm / 3kHz		<b>C</b>
15.205 15.209	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	<FCC 15.209 limits	Radiated	<b>C</b> <sup>Note2</sup>
15.207	AC Conducted Emissions	< FCC 15.207 limits	AC Line Conducted	<b>C</b>
15.203	Antenna Requirements	FCC 15.203	-	<b>C</b>

Note 1: **C**=Comply    **NC**=Not Comply    **NT**=Not Tested    **NA**=Not Applicable

Note 2: This test item was performed in each axis and the worst case data was reported.

## 4. TEST METHODOLOGY

The measurement procedure described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2009) and KDB558074

### 4.1 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.

### 4.2 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.

### 4.3 GENERAL TEST PROCEDURES

#### Conducted Emissions

According to the requirements in Section 6.2 of ANSI C63.10, the EUT is placed on the turntable, which is 0.8 m above ground plane and the conducted emissions from the EUT are measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and Average detector.

#### Radiated Emissions

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 3 m away from the receiving antenna, which varied from 1 m to 4 m 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 6.3 of ANSI C63.10

### 4.4 DESCRIPTION OF TEST MODES

The EUT has been tested with the operating condition for maximizing the emission characteristics. A test program is used to control the EUT for staying in continuous transmitting. The Bluetooth low energy mode and below low, middle and high channels were tested and reported.

Test Mode	Channel	Frequency [MHz]
BT LE	0	2402
	19	2440
	39	2480

## 5. 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 equipments, which is traceable to recognized national standards.

## 6. FACILITIES AND ACCREDITATIONS

### 6.1 FACILITIES

The open area test site(OATS) or semi anechoic chamber and conducted measurement facility used to collect the radiated and conducted test data are located at the 683-3, Yubang-Dong, Yongin-Si, Gyunggi-Do, 449-080, South Korea. The site is constructed in conformance with the requirements.

- Semi anechoic chamber registration Number : 678747

### 6.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and peak, 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."

## 7. ANTENNA REQUIREMENTS

### 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 antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

\* The internal antenna of this E.U.T is permanently attached using the soldering.

\* Therefore this E.U.T Complies with the requirement of §15.203

## 8. TEST RESULT

### 8.1 6dB Bandwidth Measurement

#### Test Requirements and limit, §15.247(d)

The bandwidth at 6dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the receive antenna while the EUT is operating in transmission mode at the appropriate frequencies.

**The minimum permissible 6dB bandwidth is 500 kHz.**

#### ■ TEST CONFIGURATION

Refer to the APPENDIX I.

#### ■ TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer and used following test procedure of KDB558074.

1. Set resolution bandwidth (RBW) = 100 KHz
2. Set the video bandwidth (VBW) ≥ 3 x RBW.  
**(RBW:100KHz/VBW:300KHz)**
3. Detector = **Peak**.
4. Trace mode = **max hold**.
5. Sweep = **auto couple**.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

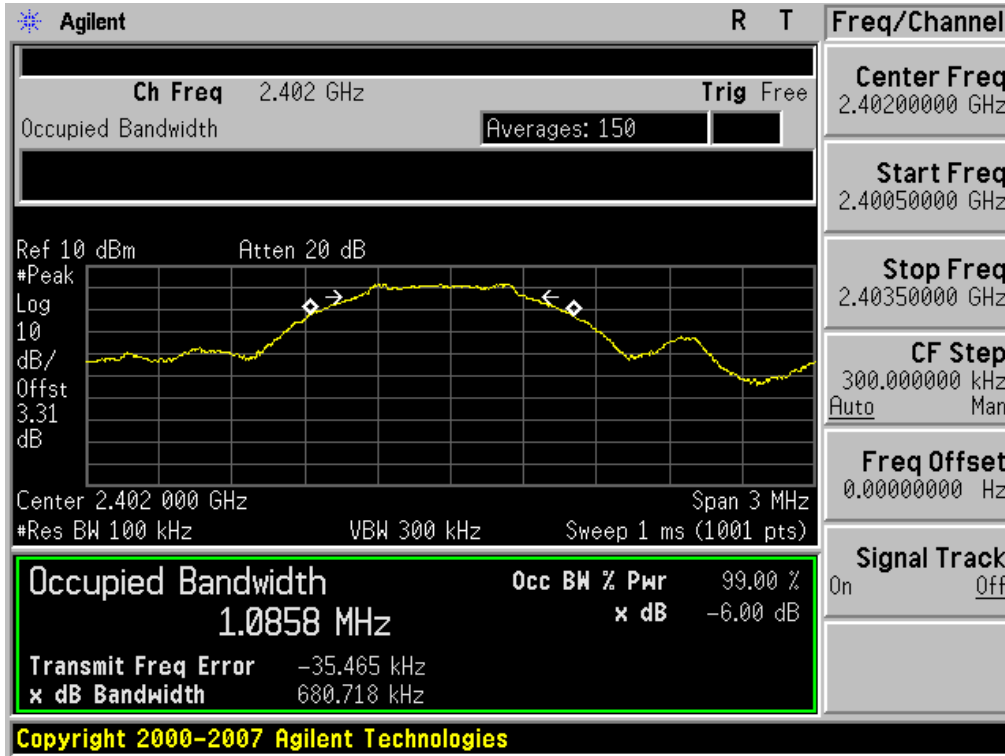
#### ■ TEST RESULTS: **Comply**

Test Mode	Frequency [MHz]	Test Results [KHz]
LE	2402	681
	2440	715
	2480	710

■ **RESULT PLOTS**

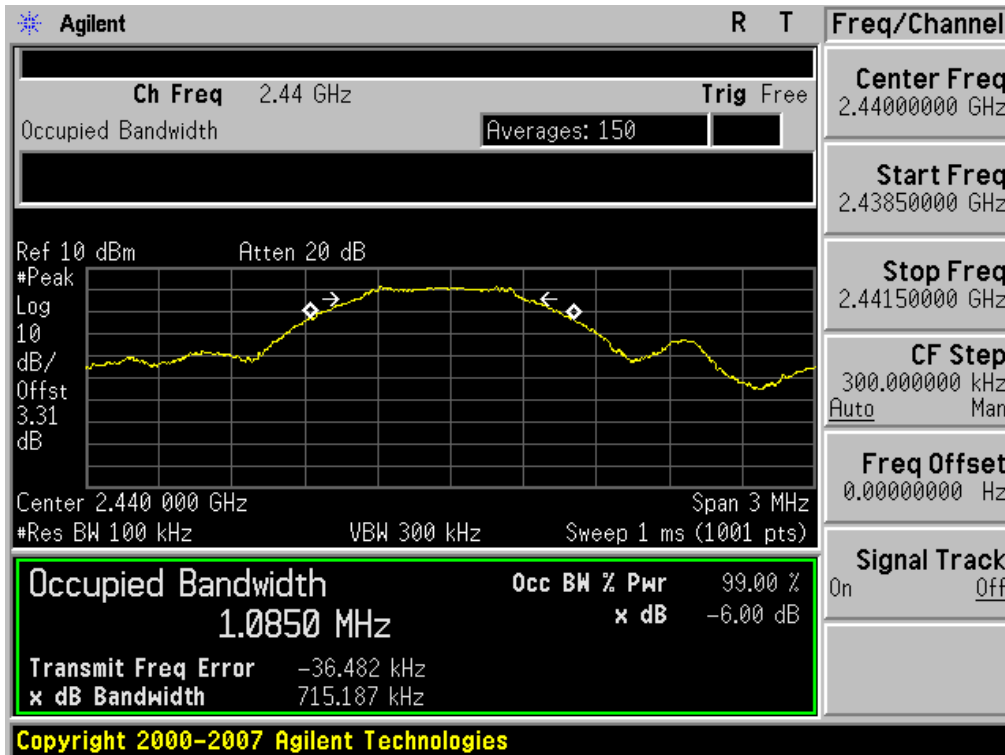
**6 dB Bandwidth**

Test Mode: LE & 1Mbps & 2402MHz



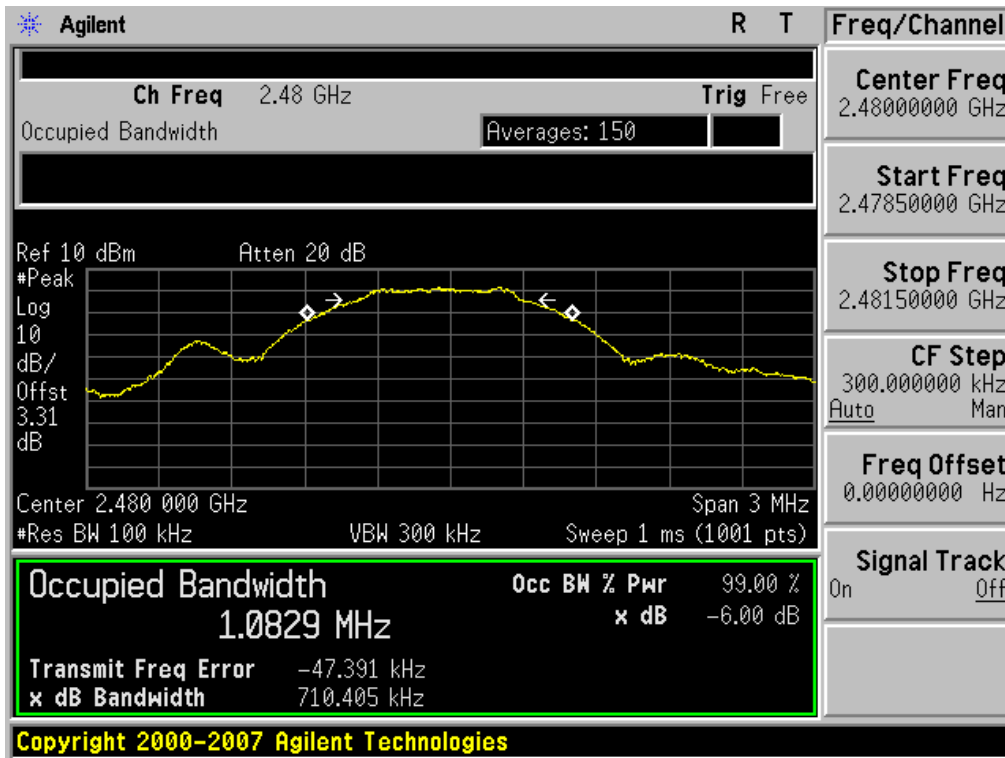
**6 dB Bandwidth**

Test Mode: LE & 1Mbps & 2440MHz



**6 dB Bandwidth**

Test Mode: LE & 1Mbps & 2480MHz



### 8.2 Maximum Peak Conducted Output Power

#### Test Requirements and limit, §15.247(b)

A transmitter antenna terminal of EUT is connected to the input of a spectrum analyzer.

Measurement is made while the EUT is operating in transmission mode at the appropriate frequencies.

**The maximum permissible conducted output power is 1 Watt.**

#### ■ TEST CONFIGURATION

Refer to the APPENDIX I.

#### ■ TEST CONFIGURATION:

Maximum Peak Conducted Output Power is measured using Measurement Procedure Option1 of KDB558074.

1. Set the RBW  $\geq$  DTS bandwidth. **Actual RBW = 2 MHz**
2. Set VBW  $\geq 3 \times$  RBW. **Actual VBW = 6 MHz**
3. Set span  $\geq 3 \times$  RBW.
4. Sweep time = **auto couple**
5. Detector = **peak**
6. Trace mode = **max hold**
7. Allow trace to fully stabilize
8. Use peak marker function to determine the peak amplitude level.

#### ■ TEST RESULTS: **Comply**

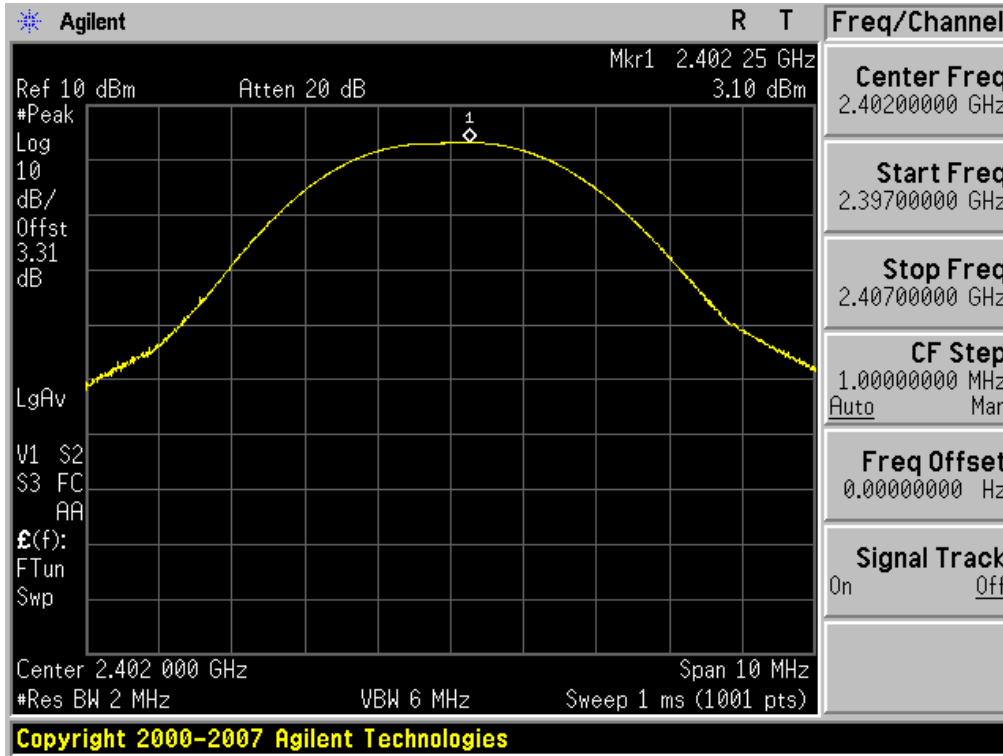
Test Mode	Test Results[dBm]		
	2402MHz	2440MHz	2480MHz
<b>LE</b>	<b>3.10</b>	2.89	2.61

Note : The path loss was corrected using the offset value of the spectrum analyzer.

▣ **RESULT PLOTS**

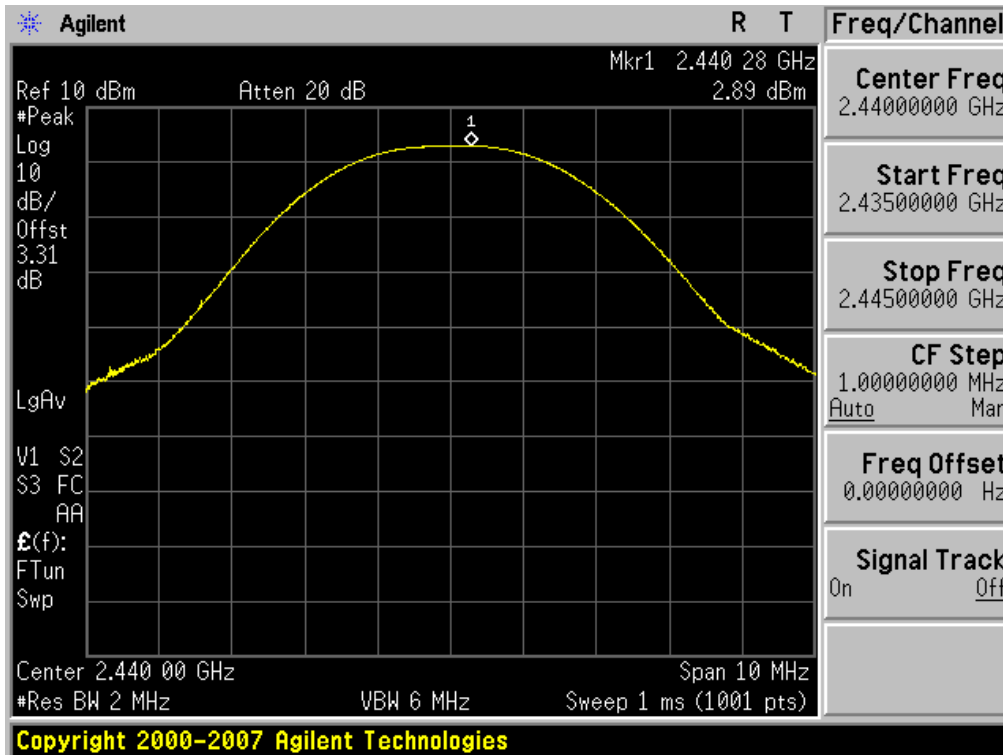
**Peak Output Power**

Test Mode: LE & 2402MHz



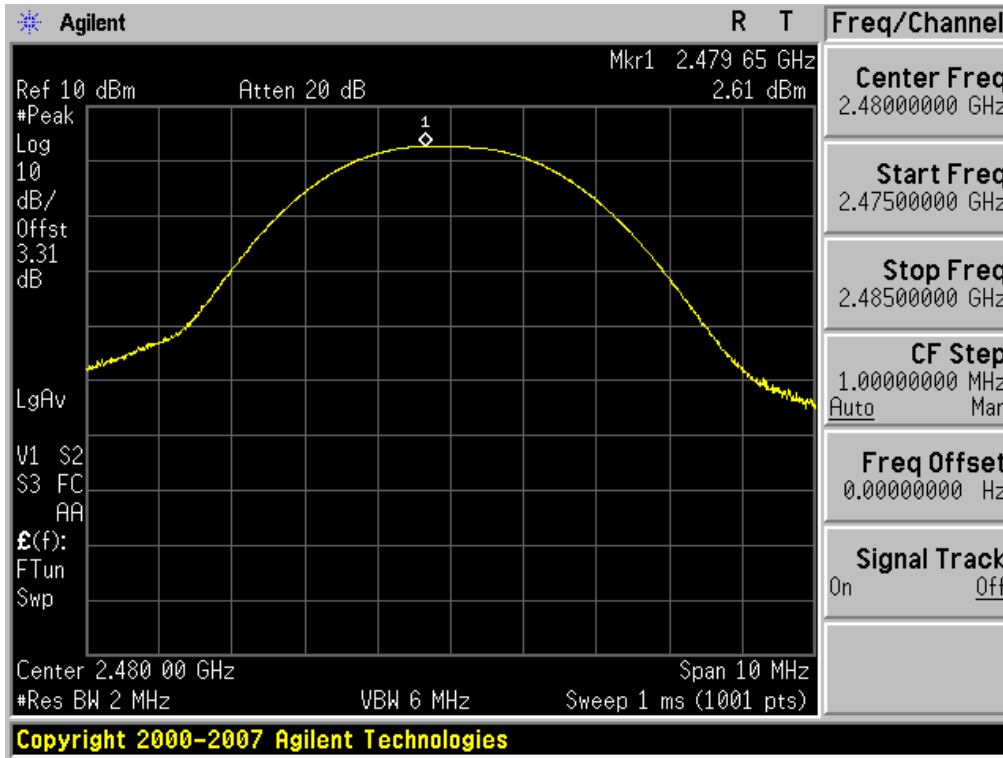
**Peak Output Power**

Test Mode: LE & 2440MHz



**Peak Output Power**

Test Mode: LE & 2480MHz



### 8.3 Maximum Power Spectral Density.

#### Test requirements and limit, §15.247(e)

The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

**Minimum Standard –specifies a conducted power spectral density (PSD) limit of 8 dBm in any 3 kHz band segment within the fundamental EBW during any time interval of continuous transmission.**

#### ■ TEST CONFIGURATION

Refer to the APPENDIX I.

#### ■ TEST PROCEDURE:

The Measurement Procedure **Method PKPSD of KDB558074** is used.

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to **1.5 times** the DTS bandwidth.
3. Set the RBW to: **3 kHz ≤ RBW ≤ 100 kHz**.
4. Set the VBW ≥ **3 x RBW**.
5. Detector = **peak**.
6. Sweep time = **auto couple**.
7. Trace mode = **max hold**.
8. Allow trace to fully stabilize.
9. Use the **peak marker function** to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

#### ■ TEST RESULTS: **Comply**

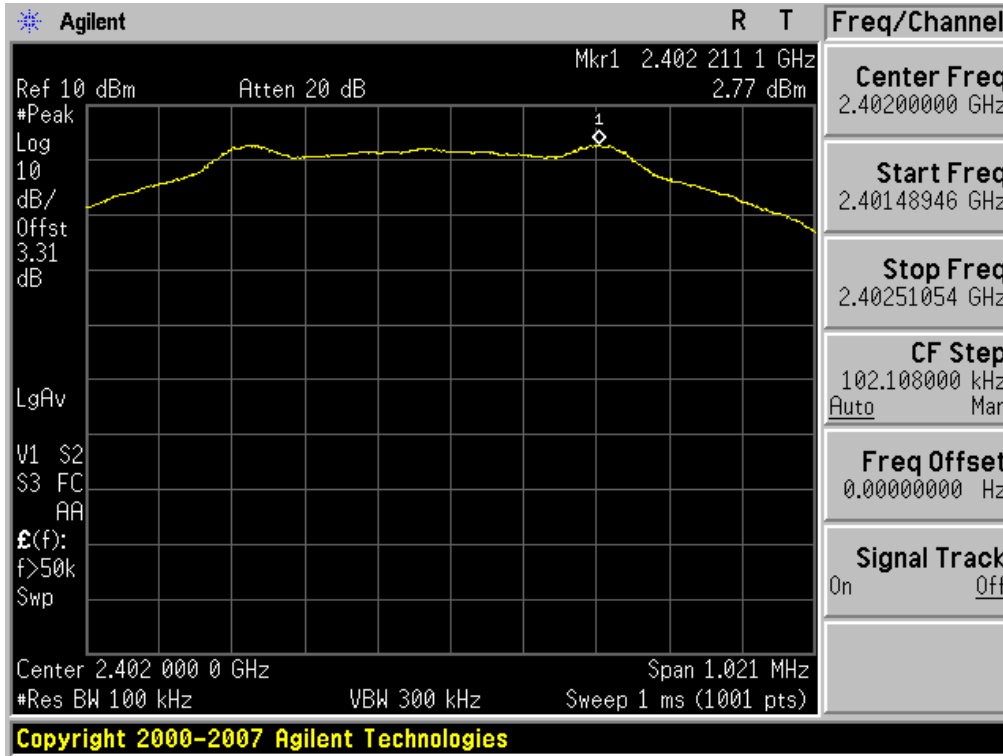
Test Mode	Data Rate	Frequency [MHz]	PKPSD [dBm]
LE	1Mbps	2402	2.770
		2440	2.340
		2480	2.190

Note : The path loss was corrected using the offset value of the spectrum analyzer.

■ **RESULT PLOTS**

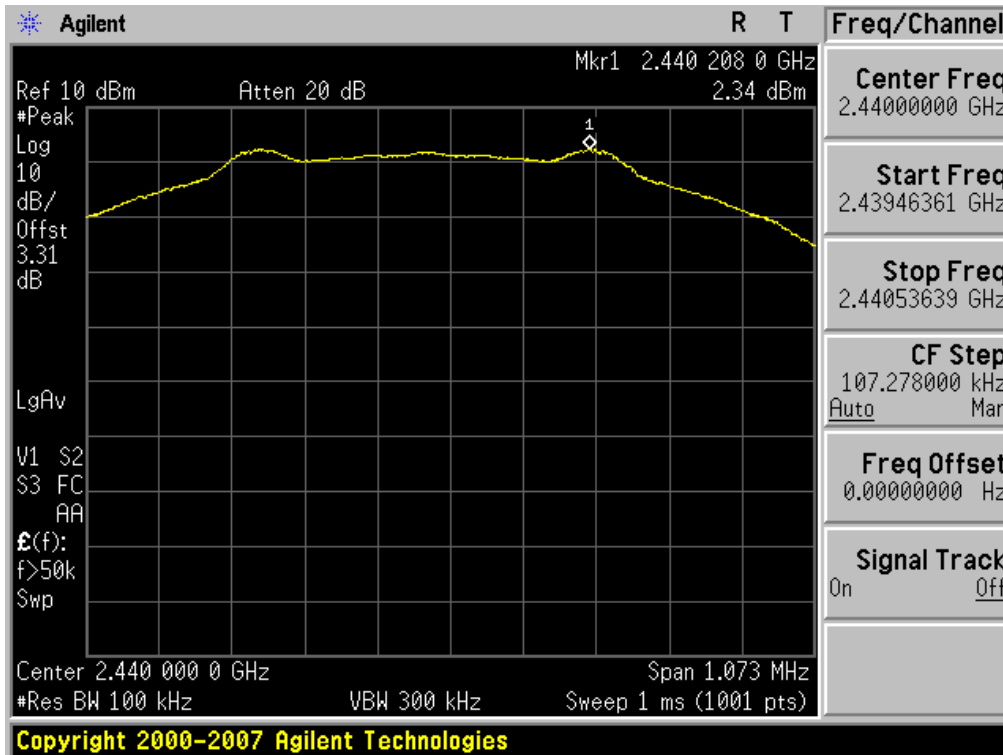
**Maximum PKPSD**

Test Mode: LE & 2402MHz



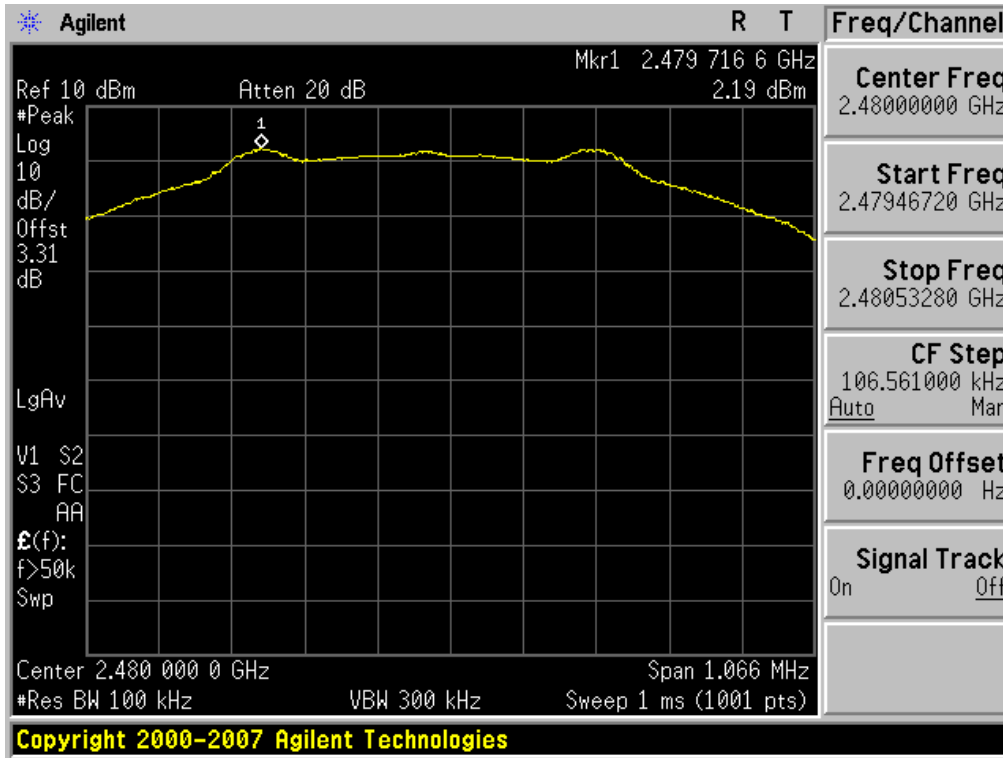
**Maximum PKPSD**

Test Mode: LE & 2440MHz



**Maximum PKPSD**

Test Mode: LE & 2480MHz



## 8.4 Out of Band Emissions at the Band Edge/ Conducted Spurious Emissions

### Test requirements and limit, §15.247(d)

§15.247(d) specifies that in any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions:

If **the peak output power procedure** is used to measure the fundamental emission power to demonstrate compliance to **15.247(b)(3)** requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated **by at least 20 dB** relative to the maximum measured in-band peak PSD level.

If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to **15.247(b)(3)** requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured inband average PSD level.

In either case, attenuation to levels below the general emission limits specified in **§15.209(a)** is not required.

### ■ TEST CONFIGURATION

Refer to the APPENDIX I.

### ■ TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer.

#### - Measurement Procedure 1 – Reference Level

1. Set instrument center frequency to DTS channel center frequency.
2. Set the span to  $\geq 1.5$  times the DTS bandwidth.
3. Set the RBW = 100 kHz.
4. Set the VBW  $\geq 3 \times$  RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum PSD level

#### - Measurement Procedure 2 - Unwanted Emissions

1. Set the center frequency and span to encompass frequency range to be measured.
2. Set the RBW = **100 kHz. ( Actual 1 MHz , See below note)**
3. Set the VBW  $\geq 3 \times$  RBW. **(Actual 3 MHz, See below note)**
4. Detector = **peak**.
5. Ensure that the number of measurement points  $\geq$  span/RBW
6. Sweep time = **auto couple**.
7. Trace mode = **max hold**.
8. **Allow the trace to stabilize** (this may take some time, depending on the extent of the span).
9. Use the peak marker function to determine the maximum amplitude level.

Note :The conducted spurious emission was tested each ranges were set as below.

**Frequency range** :9KHz ~ 30MHz

**RBW= 100kHz, VBW= 300kHz, SWEEP TIME = AUTO, DETECTOR = PEAK, TRACE = MAX HOLD, Sweep point : 40001**

**Frequency range** :30MHz~10GHz, 10GHz~26GHz

**RBW= 1MHz, VBW= 3MHz, SWEEP TIME = AUTO, DETECTOR = PEAK, TRACE = MAX HOLD, Sweep point : 40001**

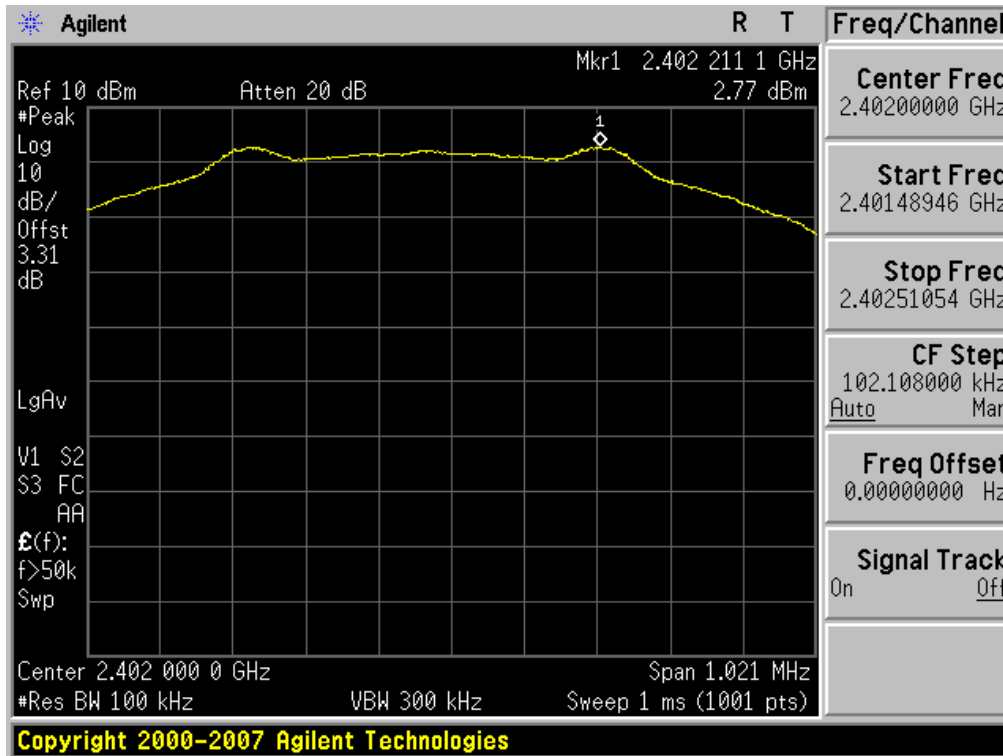
If the emission level with above setting was close to the limit (ie, less than 3 dB margin) then zoom scan is required using RBW = 100 KHz, VBW = 300 KHz, SAPN = 100 MHz and BINS = 1001 to get accurate emission level within 100 KHz BW.

■ **TEST RESULTS: Comply**

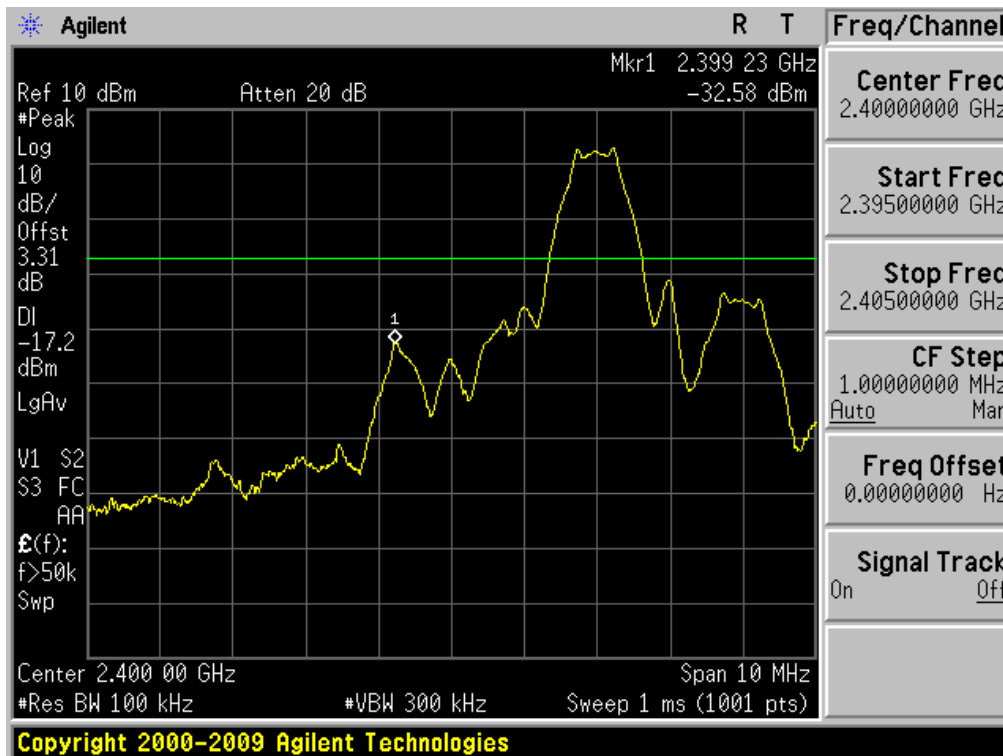
■ **RESULT PLOTS**

LE & 2402MHz

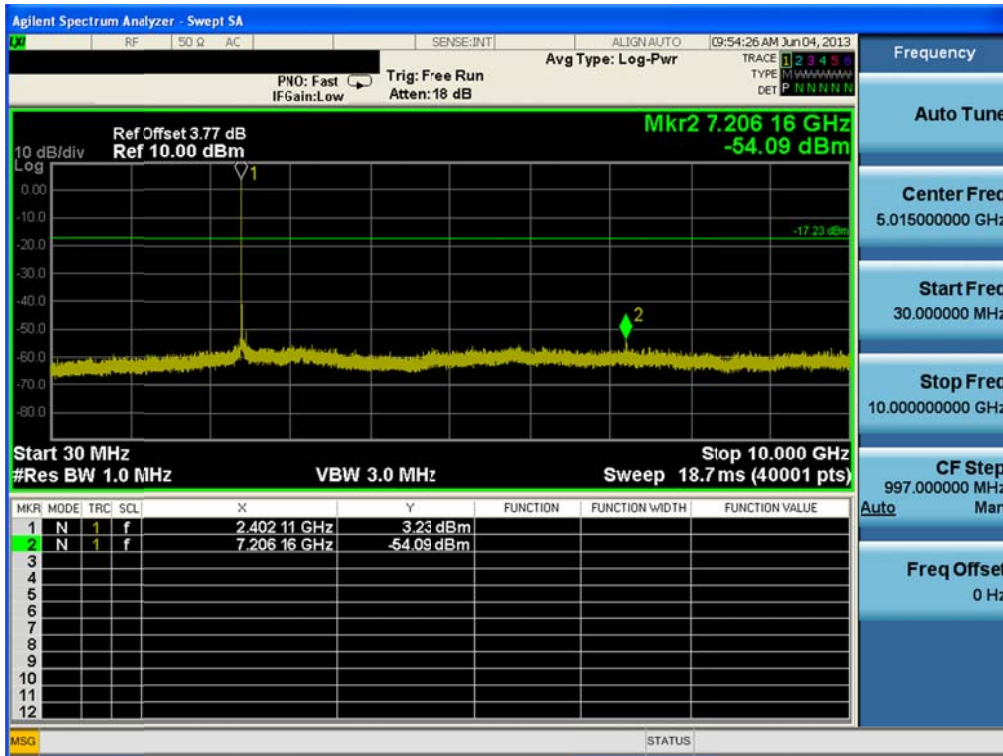
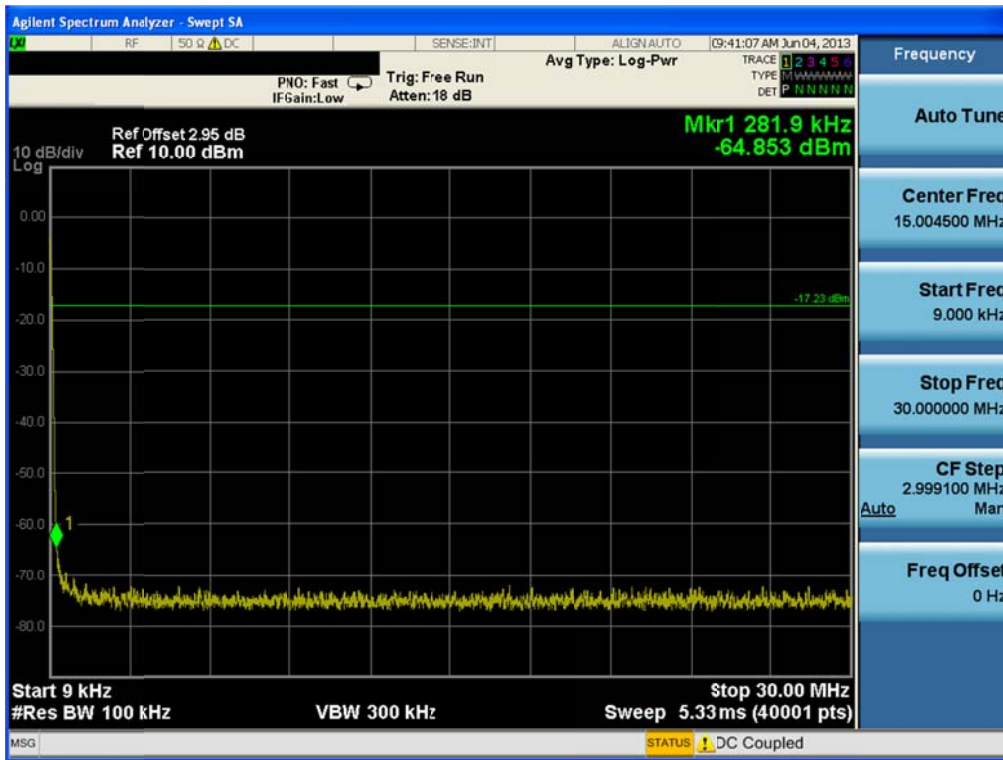
**Reference**

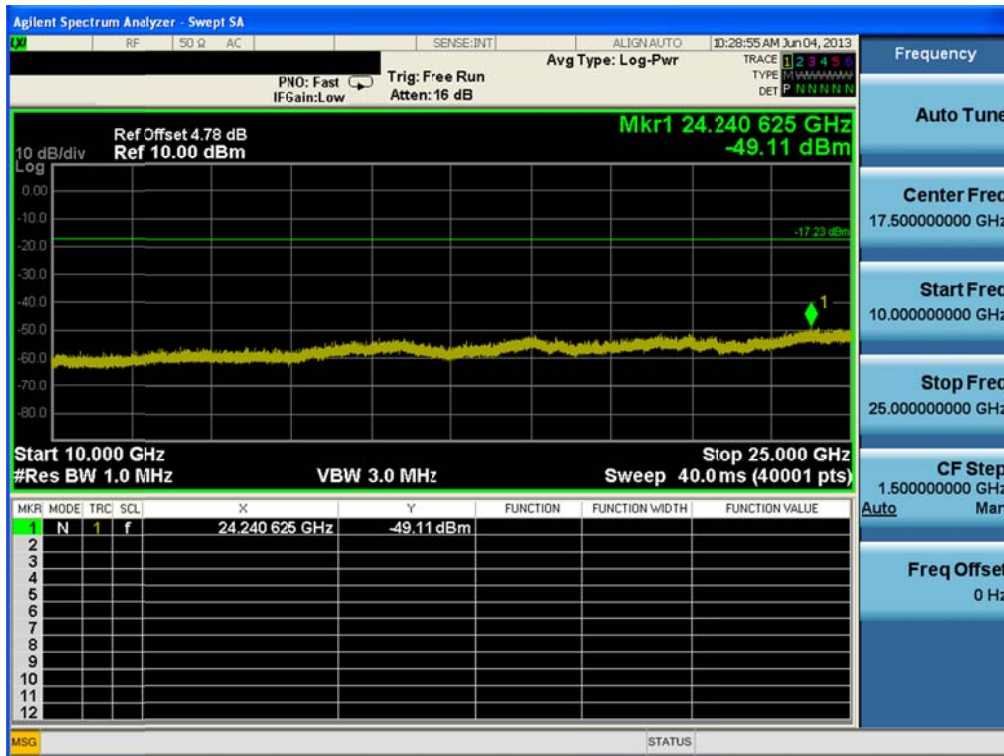


**Low Band-edge**



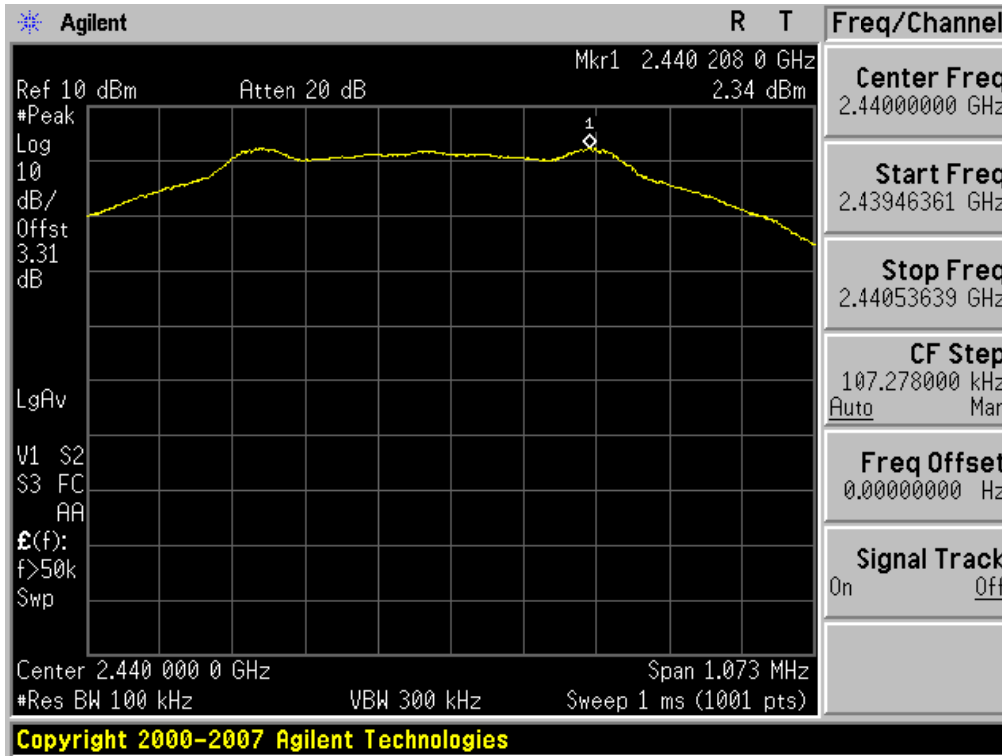
### Conducted Spurious Emissions



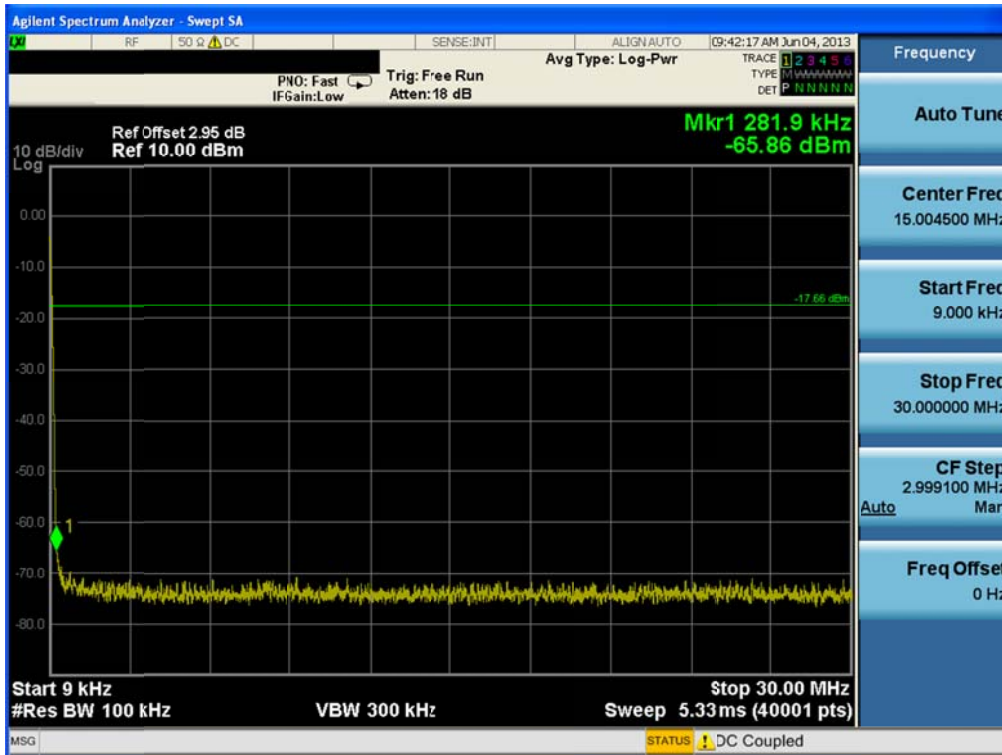


LE & 2440MHz

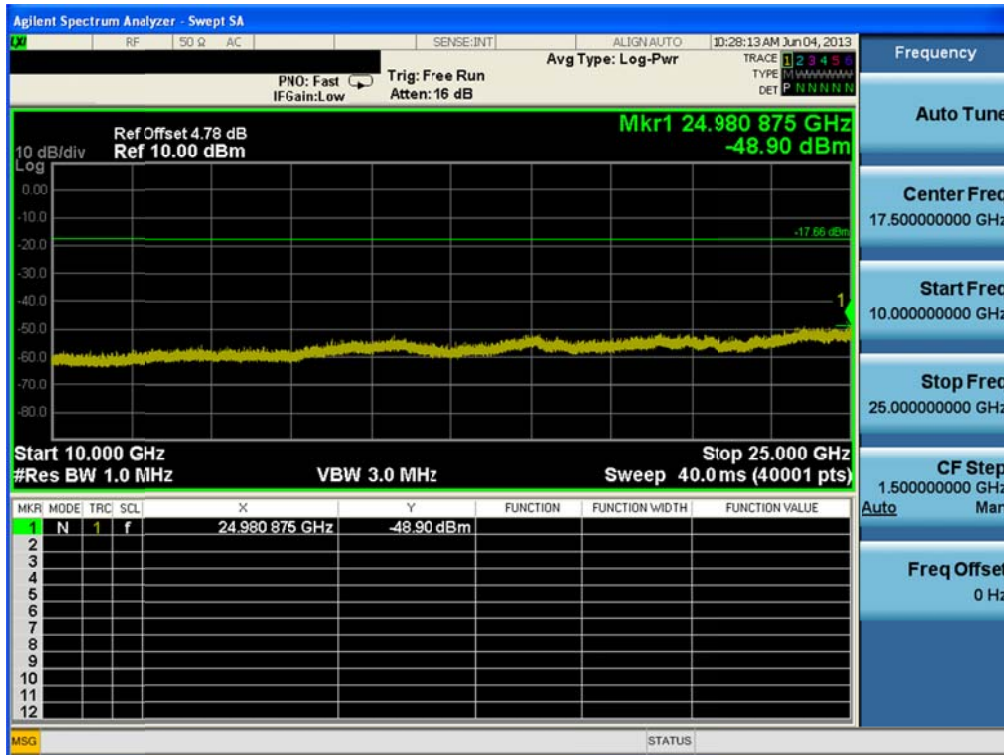
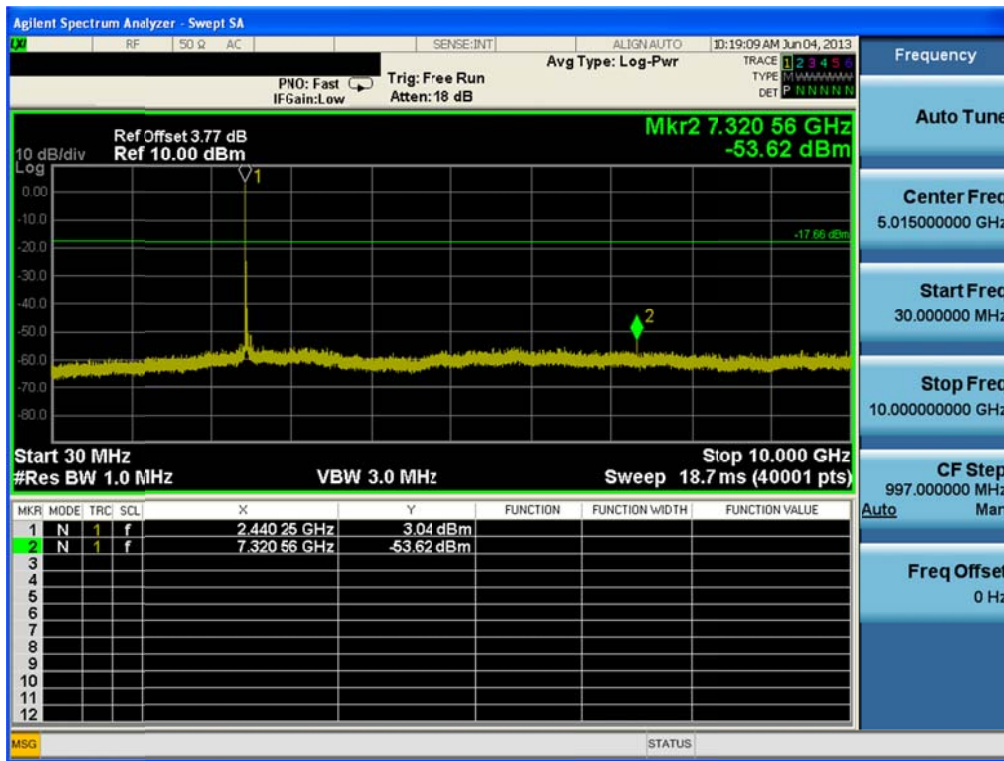
### Reference



### Conducted Spurious Emissions

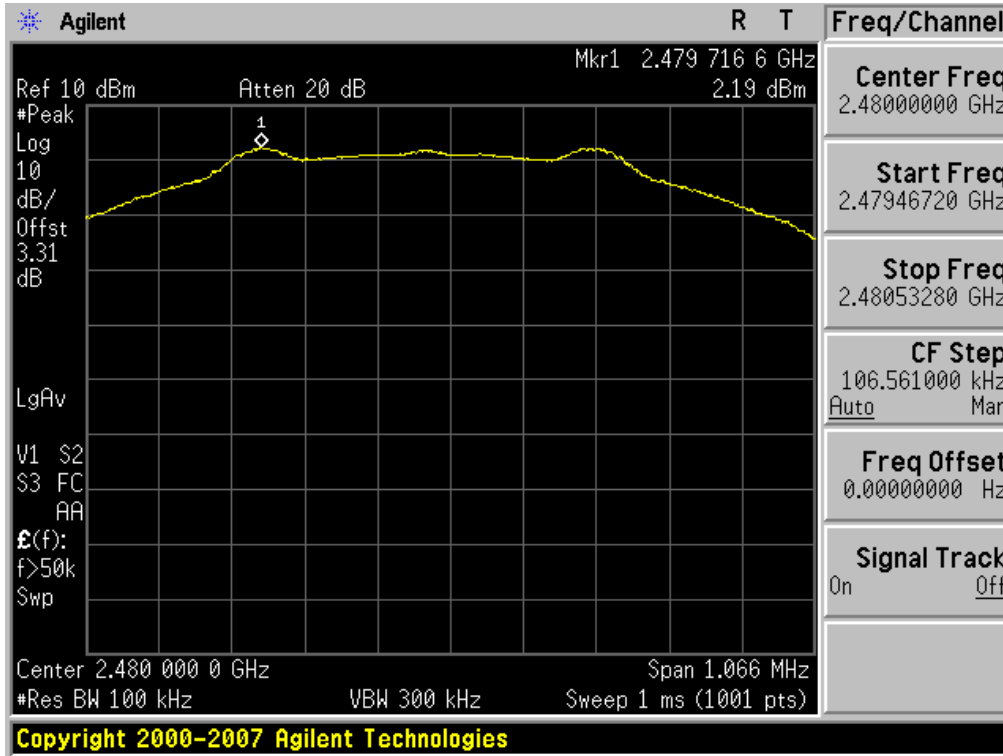


### Conducted Spurious Emissions

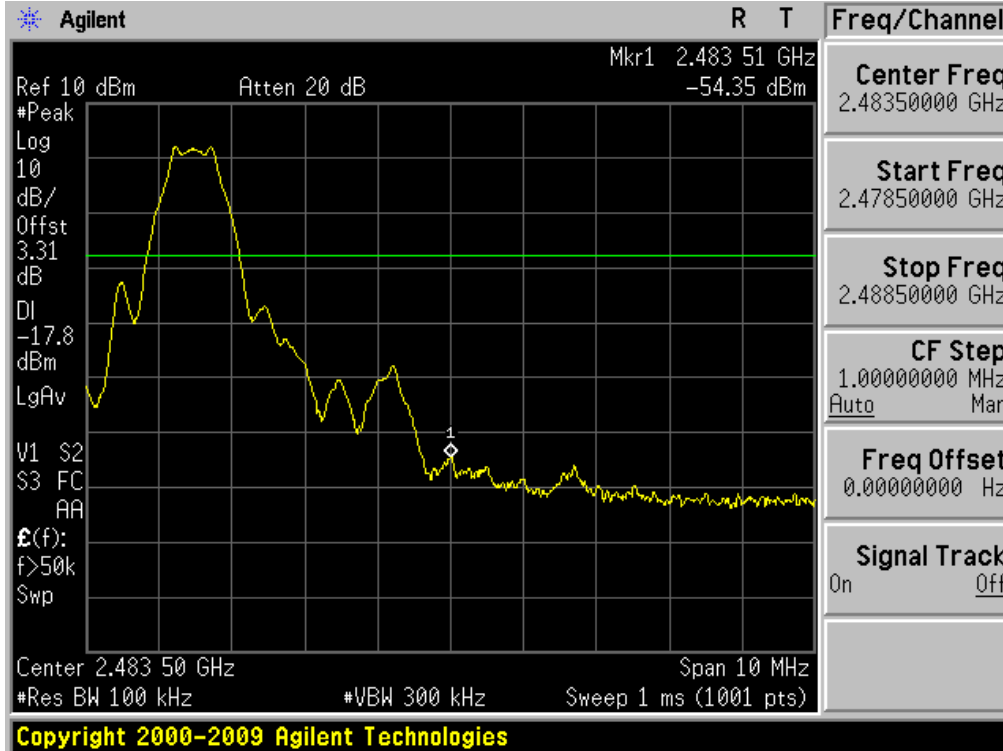


LE & 2480MHz

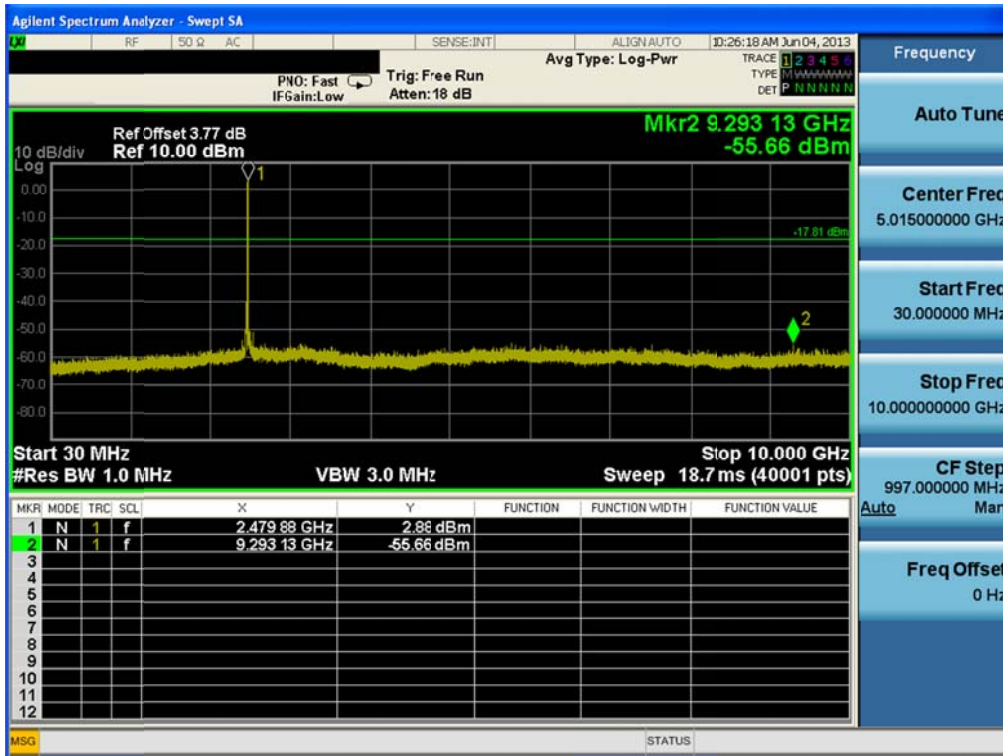
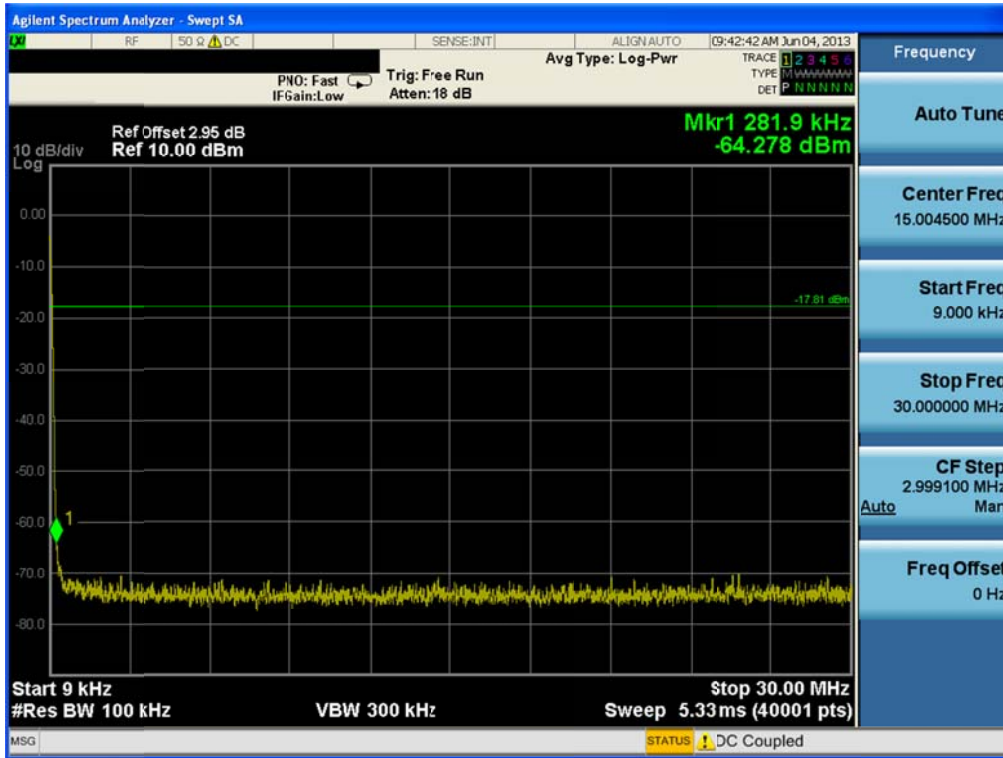
**Reference**



**High Band-edge**



### Conducted Spurious Emissions





**8.5 Radiated Measurement.**

**8.5.1 Radiated Spurious Emissions.**

**Test Requirements and limit, §15.247(d)**

In any 100kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a) and (b), then the 15.209(a) limit in the table below has to be followed

**▪ FCC Part 15.209(a) and (b)**

Frequency (MHz)	Limit (uV/m)	Measurement Distance (meter)
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

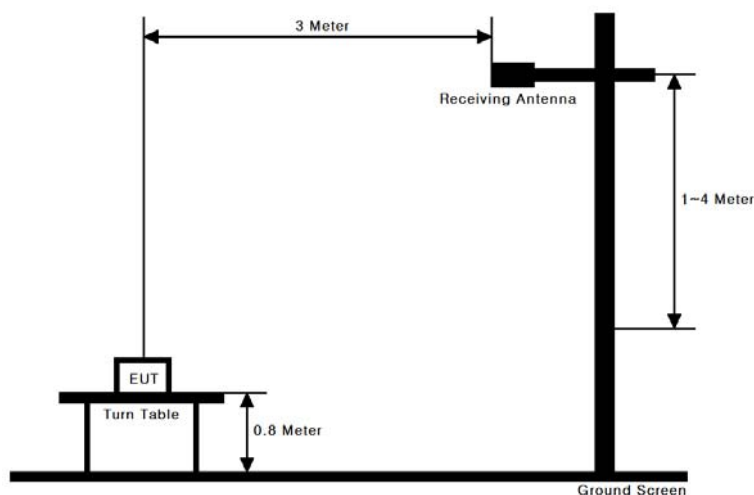
\*\* Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

**▪ FCC Part 15.205 (a): Only spurious emissions are permitted in any of the frequency bands listed below:**

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	3600 ~ 4400	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	4.5 ~ 5.15	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~	149.9 ~ 150.05	1645.5 ~ 1646.5	5.35 ~ 5.46	17.7 ~ 21.4
4.125 ~ 4.128	12.52025	156.52475 ~	1660 ~ 1710	7.25 ~ 7.75	22.01 ~ 23.12
4.17725 ~ 4.17775	12.57675 ~	156.52525	1718.8 ~ 1722.2	8.025 ~ 8.5	23.6 ~ 24.0
4.20725 ~ 4.20775	12.57725	156.7 ~ 156.9	2200 ~ 2300	9.0 ~ 9.2	31.2 ~ 31.8
6.215 ~ 6.218	13.36 ~ 13.41	162.0125 ~ 167.17	2310 ~ 2390	9.3 ~ 9.5	36.43 ~ 36.5
6.26775 ~ 6.26825	16.42 ~ 16.423	167.72 ~ 173.2	2483.5 ~ 2500	10.6 ~ 12.7	Above 38.6
6.31175 ~ 6.31225	16.69475 ~	240 ~ 285	2655 ~ 2900	13.25 ~ 13.4	
8.291 ~ 8.294	16.69525	322 ~ 335.4	3260 ~ 3267		
8.362 ~ 8.366	16.80425 ~	399.90 ~ 410	3332 ~ 3339		
8.37625 ~ 8.38675	16.80475	608 ~ 614	3345.8 ~ 3358		
	25.5 ~ 25.67	960 ~ 1240			
	37.5 ~ 38.25				
	73 ~ 74.6				
	74.8 ~ 75.2				

**▪ FCC Part 15.205(b):** The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

## Test Configuration



## TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8 m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3 m 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. Repeat above procedures until the measurements for all frequencies are complete.

### Note : Measurement Instrument Setting for Radiated Emission Measurements.

#### 1. Frequency Range Below 1 GHz

RBW = 100 or 120 KHz, VBW = 3 x RBW , Detector = Peak or Quasi Peak

#### 2. Frequency Range > 1 GHz

##### Peak Measurement > 1 GHz

RBW = 1 MHz , VBW = 3 MHz, Detector = Peak, Sweep time = Auto, Trace mode = Max Hold until the trace stabilizes

##### Average Measurement > 1GHz

- 1) RBW = 1 MHz (unless otherwise specified).
- 2) VBW  $\geq 3 \times$  RBW.
- 3) Detector = RMS, if  $\text{span}/(\# \text{ of points in sweep}) \leq (\text{RBW}/2)$ . Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.
- 4) Averaging type = power (i.e., RMS).
  - (1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
  - (2) Some instruments require linear display mode in order to use linear voltage averaging. Log or dB averaging shall not be used.
- 5) Sweep time = auto.
- 6) Perform a trace average of at least 100 traces.

**Note : This device was configured to transmit continuously so duty cycle correction is not required for AVG measurement.**

**9 KHz ~ 25GHz Data(LE)**

▪ **Lowest Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBm)	T.F (dB/m)	Result (dB/m)	Limit (dBm)	Margin (dB)
2338.16	V	Y	PK	48.71	-3.38	45.33	74.00	28.67
2338.00	V	Y	AV	38.10	-3.38	34.72	54.00	19.28
4806.14	H	Y	PK	48.69	5.43	54.12	74.00	19.88
4805.98	H	Y	AV	40.08	5.43	45.51	54.00	8.49
-	-	-	-	-	-	-	-	-

▪ **Middle Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4882.14	H	Y	PK	48.11	5.64	53.75	74.00	20.25
4881.98	H	Y	AV	40.69	5.64	46.33	54.00	7.67
-	-	-	-	-	-	-	-	-

▪ **Highest Channel**

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2483.52	V	Y	PK	54.57	-2.79	51.78	74.00	22.22
2483.50	V	Y	AV	44.76	-2.79	41.97	54.00	12.03
4957.95	H	Y	PK	47.90	5.99	53.89	74.00	20.11
4957.95	H	Y	AV	38.85	5.99	44.84	54.00	9.16
-	-	-	-	-	-	-	-	-

**Note.**

1. No other spurious and harmonic emissions were reported greater than listed emissions above table.
2. Above listed point data is the worst case data.
3. Sample Calculation.

$$\text{Margin} = \text{Limit} - \text{Result} \quad / \quad \text{Result} = \text{Reading} + \text{T.F} \quad / \quad \text{T.F} = \text{AF} + \text{CL} - \text{AG}$$

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

## 8.6 POWERLINE CONDUCTED EMISSIONS

### Test Requirements and limit, §15.207

For an intentional radiator which 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 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

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

\* Decreases with the logarithm of the frequency

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

### Test Configuration

See test photographs for the actual connections between EUT and support equipment.

### TEST PROCEDURE

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.

■ **RESULT PLOTS**

**AC Line Conducted Emissions (Graph)**

Test Mode: LE & 2440MHz



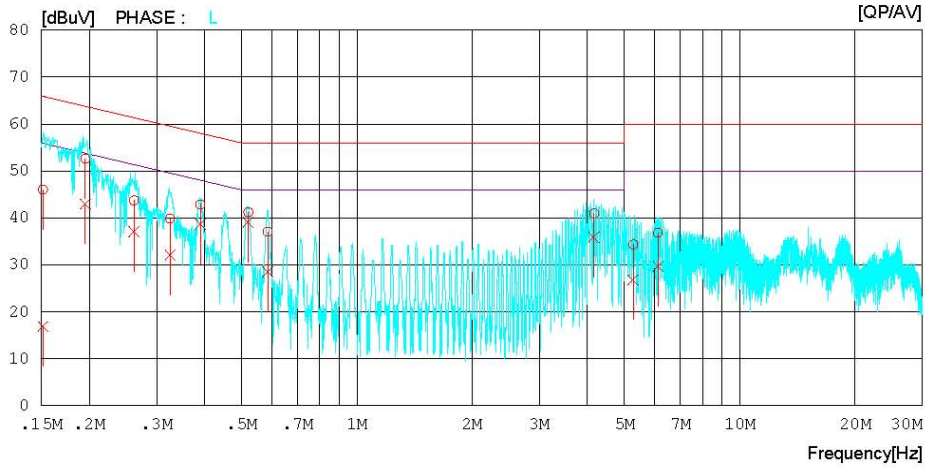
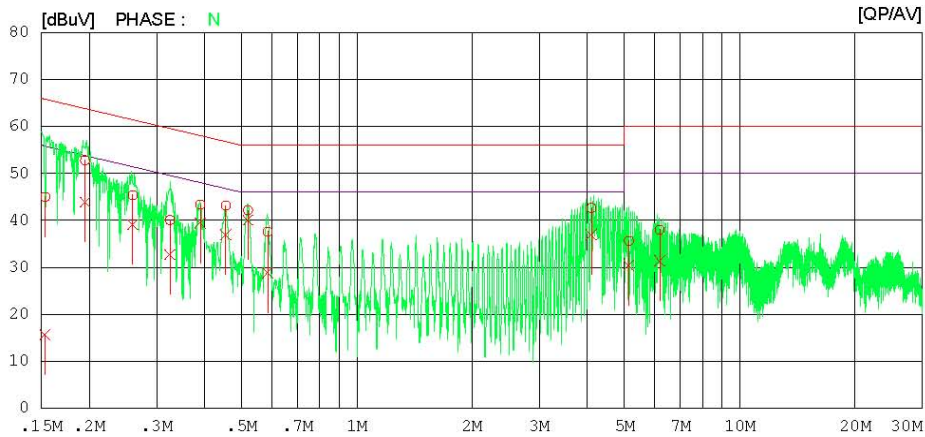
Results of Conducted Emission

Digital EMC  
Date : 2013-06-03

Model No. : 9CM237CVD1.AWBZ0U  
Type :  
Serial No. : Identical prototype  
Test Condition : LE

Reference No. :  
Power Supply : 120 V 60 Hz  
Temp/Humi. : 23 °C 43 % R.H.  
Operator : J.J.LEE

Memo :  
LIMIT : FCC P15.207 QP  
FCC P15.207 AV



**AC Line Conducted Emissions (List)**

Test Mode: LE & 2440MHz

**Results of Conducted Emission**

Digital EMC  
Date : 2013-06-03

Model No.	: 9CM237CVD1.AWBZ0U	Reference No.	:
Type	:	Power Supply	: 120 V 60 Hz
Serial No.	: Identical prototype	Temp/Humi.	: 23 °C 43 % R.H.
Test Condition	: LE	Operator	: J.J.LEE

Memo :  
  
LIMIT : FCC P15.207 QP  
FCC P15.207 AV

NO	FREQ [MHz]	READING		C. FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.15349	44.8	15.5	0.2	45.0	15.7	65.8	55.8	20.8	40.1	N
2	0.19514	52.5	43.6	0.2	52.7	43.8	63.8	53.8	11.1	10.0	N
3	0.25998	45.2	38.9	0.2	45.4	39.1	61.4	51.4	16.0	12.3	N
4	0.32519	39.9	32.5	0.2	40.1	32.7	59.6	49.6	19.5	16.9	N
5	0.39005	43.1	39.2	0.2	43.3	39.4	58.1	48.1	14.8	8.7	N
6	0.45488	42.9	36.8	0.2	43.1	37.0	56.8	46.8	13.7	9.8	N
7	0.51993	41.9	39.9	0.2	42.1	40.1	56.0	46.0	13.9	5.9	N
8	0.58515	37.4	28.6	0.2	37.6	28.8	56.0	46.0	18.4	17.2	N
9	4.09600	42.3	36.7	0.3	42.6	37.0	56.0	46.0	13.4	9.0	N
10	5.13500	35.2	30.0	0.4	35.6	30.4	60.0	50.0	24.4	19.6	N
11	6.18050	37.5	30.9	0.5	38.0	31.4	60.0	50.0	22.0	18.6	N
12	0.15149	45.8	16.7	0.2	46.0	16.9	65.9	55.9	19.9	39.0	L
13	0.19533	52.4	42.8	0.2	52.6	43.0	63.8	53.8	11.2	10.8	L
14	0.26179	43.5	36.8	0.2	43.7	37.0	61.4	51.4	17.7	14.4	L
15	0.32556	39.7	32.0	0.2	39.9	32.2	59.6	49.6	19.7	17.4	L
16	0.39039	42.7	38.5	0.2	42.9	38.7	58.1	48.1	15.2	9.4	L
17	0.52058	41.0	38.8	0.2	41.2	39.0	56.0	46.0	14.8	7.0	L
18	0.58529	36.9	28.3	0.2	37.1	28.5	56.0	46.0	18.9	17.5	L
19	4.16400	40.7	35.6	0.3	41.0	35.9	56.0	46.0	15.0	10.1	L
20	5.27150	34.0	26.4	0.4	34.4	26.8	60.0	50.0	25.6	23.2	L
21	6.11800	36.3	29.2	0.5	36.8	29.7	60.0	50.0	23.2	20.3	L

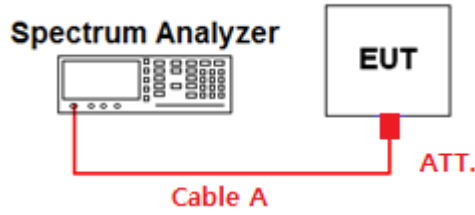
## 9. LIST OF TEST EQUIPMENT

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Multimeter	HP	34401A	13/02/27	14/02/27	3146A13475
DC Power Supply	HP	6622A	13/02/27	14/02/27	3448A03760
Horn Antenna	ETS	3115	12/02/20	14/02/20	6419
Horn Antenna	A.H.Systems Inc.	SAS-574	13/03/20	15/03/20	154
Spectrum Analyzer	Agilent Technologies	E4440A	12/09/18	13/09/18	MY45304199
PreAmplifier	Agilent	8449B	13/02/27	14/02/27	3008A00370
Signal Generator	Rohde Schwarz	SMR20	13/02/27	14/02/27	101251
Vector Signal Generator	Rohde Schwarz	SMJ100A	13/01/08	14/01/08	100148
3dB Attenuator	Aeroflex/Weinschel	56-3	12/09/17	13/09/17	Y2342
Spectrum Analyzer	Agilent Technologies	E4440A	12/10/22	13/10/22	US45303051
Thermohygrometer	BODYCOM	BJ5478	12/06/20	13/06/20	120612-2
Loop Antenna	Schwarzbeck	FMZB1513	12/09/24	13/09/24	1513-128
High-pass filter	Wainwright Instruments	WHKX3.0	13/01/08	14/01/08	12
BILOG ANTENNA	SCHAFFNER	CBL6112B	12/11/06	14/11/06	2737
Amplifier	H/P	8447E	13/01/08	14/01/08	2945A02865
EMI TEST RECEIVER	R&S	ESU	13/01/08	14/01/08	100014
EMI TEST RECEIVER	R&S	ESCI	13/02/27	14/02/27	100364
CVCF	KIKUSUI	PCR1000L	12/09/15	13/09/15	14110610
LISN	R&S	ESH2-Z5	12/09/18	13/09/18	828739/006

## APPENDIX I

### Conducted Test set up Diagram & Path loss Information

▪ **Conducted Measurement**



**Offset value information**

Frequency (GHz)	Path Loss (dB)	Frequency (GHz)	Path Loss (dB)
2402 & 2440 & 2480	3.31		

Note. 1: The path loss (= S/A's offset value) from EUT to Spectrum analyzer was measured and used for test.

## APPENDIX II

### Duty Cycle Plot & Calculation

The screenshot shows the Agilent Spectrum Analyzer interface. The main display is a grid with a horizontal yellow line. The interface includes various control panels and parameter readouts.

Agilent		R	T	Freq/Channel
Ref 10 dBm	Atten 20 dB			<b>Center Freq</b> 2.44000000 GHz
#Peak				<b>Start Freq</b> 2.44000000 GHz
Log				<b>Stop Freq</b> 2.44000000 GHz
10				<b>CF Step</b> 8.00000000 MHz Auto Man
dB/				<b>Freq Offset</b> 0.00000000 Hz
Offst				<b>Signal Track</b> On Off
3.31				
dB				
LgAv				
W1 S2				
S3 FS				
AA				
£(f):				
FTun				
Center 2.440 000 GHz			Span 0 Hz	
Res BW 8 MHz	VBW 8 MHz		Sweep 50 ms (1001 pts)	
<b>Copyright 2000-2007 Agilent Technologies</b>				
<b>Duty Cycle = 100 %</b>				