

TEST REPORT

of

FCC Part 15 Subpart C

☒ New Application; ☐ Class I PC; ☐ Class II PC

Product : RIVA Turbo X
Brand: RIVA
Model: RTX01B
Series Model: RTX01S
Model Difference: Color Difference
FCC ID: PU5TX8670
FCC Rule Part: §15.247, Cat: DSS
Applicant: Wistron Corporation
Address: 21F., No. 88, Sec. 1, HsinTai 5th Rd., Hsichih
Dist, New Taipei City 221, Taiwan

Test Performed by:
International Standards Laboratory

<Lung-Tan LAB>

*Site Registration No.

BSMI: SL2-IN-E-0013; MRA TW1036; TAF: 0997; IC: IC4067B-3;

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Report No.: **ISL-14LR155FCDSS**

Issue Date : **2014/06/23**

Test results given in this report apply only to the specific sample(s) tested and are traceable to national or international standard through calibration of the equipment and evaluating measurement uncertainty herein.

This report **MUST** not be used to claim product endorsement by TAF, NVLAP or any agency of the Government.

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VERIFICATION OF COMPLIANCE

Applicant: Wistron Corporation
Product Description: RIVA Turbo X
Brand Name: RIVA
Model No.: RTX01B
Series Model Number: RTX01S
Model Difference: Color Difference
FCC ID: PU5TX8670
Date of test: 2014/06/16 ~ 2014/06/20
Date of EUT Received: 2014/06/16

We hereby certify that:

All the tests in this report have been performed and recorded in accordance with the standards described above and performed by an independent electromagnetic compatibility consultant, International Standards Laboratory.

The test results contained in this report accurately represent the measurements of the characteristics and the energy generated by sample equipment under test at the time of the test. The sample equipment tested as described in this report is in compliance with the limits of above standards.

Test By:**Date:**

2014/06/23

*Dion Chang / Engineer***Prepared By:****Date:**

2014/06/23

*Gigi Yeh / Specialist***Approved By:****Date:**

2014/06/23

Vincent Su / Technical Manager

Version

| Version No. | Date | Description |
|-------------|------------|------------------------------|
| 00 | 2014/06/23 | Initial creation of document |
| | | |
| | | |

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1. GENERAL INFORMATION

1.1. Product Description

General:

| | | |
|--------------------|--|---------------------------------------|
| Product Name | RIVA Turbo X | |
| Brand Name | RIVA | |
| Model Name | RTX01B | |
| Series Model Name: | RTX01S | |
| Model Difference | Color Difference | |
| Power Supply | 100~240VAC form AC/DC Adapter or 15V re-chargeable battery | |
| | Adaptor: | 1. Model: DA-65A19, Supplier: APD |
| | Battery: | 1. Model: 4ICR18/65, Supplier: SIMPLO |

Bluetooth:

| | | |
|----------------------|-----------------------------------|------------------------|
| Frequency Range: | 2402 – 2480MHz | |
| Bluetooth Version: | V2.1 + EDR | V4.0 |
| Channel number: | 79 channels | 40 channels, 2MHz step |
| Modulation type | Frequency Hopping Spread Spectrum | Digital Modulation |
| Modulation type: | GFSK + $\pi/4$ DQPSK + 8DPSK | GFSK |
| Transmit Power: | 8.36 dBm (Peak) | 7.81 dBm Peak |
| Dwell Time: | $\leq 0.4s$ | N/A |
| Antenna Designation: | PIFA Antenna -0.62dBi | |

The EUT is compliance with Bluetooth EDR V2.1 + 4.0 Standard.

The report applies for BT 2.1 mode.

Remark: The above DUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

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

This submittal(s) (test report) is intended for **FCC ID: PU5TX8670** filing to comply with Section 15.247 of the FCC Part 15C, Subpart C Rules.

1.3. Test Methodology

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

Tested in accordance with FCC Public Notice DA 00-705

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 **International Standards Laboratory** <Lung-Tan LAB> No. 120, Lane 180, San Ho Tsuen, Hsin Ho Rd., Lung-Tan Hsiang, Tao Yuan County 325, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2009. FCC Registration Number is: TW1036, Canada Registration Number: 4067B-3.

1.5. Special Accessories

Not available for this EUT intended for grant.

1.6. Equipment Modifications

Not available for this EUT intended for grant.

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 EUT (Transmitter) was tested with a test program to fix the Tx/RX frequency that was for the purpose of the measurements. For more information please see test data and APPENDIX 1 for set-up photographs.

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. According to the requirements in Section 7, 13 of ANSI C63.4-2009. 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 placed on a 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 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. according to the requirements in Section 8 and 13 of ANSI C63.4-2009 and DA 00-705.

2.4. Configuration of Tested System

Fig. 2-1 Configuration of Tested System (Fixed channel)

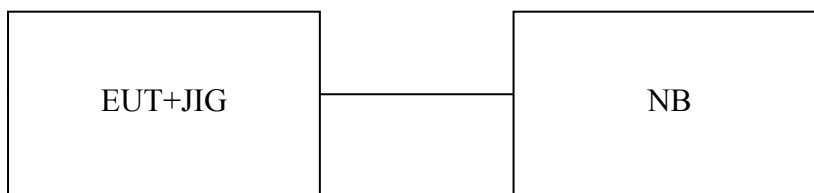


Table 1 Equipment Used in Tested System

| Item | Equipment | Mfr/Brand | Model/ Type No. | Series No. | Data Cable | Power Cord |
|------|-----------|-----------|--------------------|------------|------------|---------------|
| 1 | NB | Dell | P19G | 6LCQCT1 | Non-Shield | No- Shielding |
| | | | | | | |

3. SUMMARY OF TEST RESULTS

| FCC Rules | Description Of Test | Result |
|---------------------|---|-----------|
| §15.207(a) | AC Power line Conducted Emission | Compliant |
| §15.247(b)(1) | Peak Output Power | Compliant |
| §15.247(d) | 100 KHz Bandwidth Of Frequency Band Edges | Compliant |
| §15.247(c) | Spurious Emission | Compliant |
| §15.247(a)(1) | Frequency Separation | Compliant |
| §15.247(a)(1)(iii) | Number of hopping frequency | Compliant |
| §15.247(a)(1)(ii) | Time of Occupancy | Compliant |
| §15.247 | Peak Power Density | Compliant |
| §15.247(a)(1) | 20dB Bandwidth | Compliant |
| §15.203, §15.247(c) | Antenna Requirement | Compliant |
| §2.1093 | RF EXPOSURE | Compliant |

4. DESCRIPTION OF TEST MODES

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

Channel low (2402MHz)、 mid (2441MHz) and high (2480MHz) with each modulation were chosen for full testing.

The worst case BDR mode was reported for Radiated Emission.

5. AC POWER LINE CONDUCTED EMISSION TEST

5.1. Standard Applicable:

According to §15.207, frequency range within 150KHz to 30MHz shall not exceed the Limit table as below.

| Frequency range MHz | Limits dB(uV) | |
|--|------------------|----------|
| | 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. | | |

5.2. Measurement Equipment Used:

| Conducted Emission Test Site | | | | | |
|------------------------------|-----------------|--------------|-----------------|------------|------------|
| EQUIPMENT TYPE | MFR | MODEL NUMBER | SERIAL NUMBER | LAST CAL. | CAL DUE. |
| Conduction 04-1 Cable | WOKEN | CFD 300-NL | Conduction 04-1 | 09/24/2013 | 09/23/2014 |
| EMI Receiver 16 | Rohde & Schwarz | ESCI | 101221 | 06/13/2014 | 06/12/2015 |
| LISN 18 | ROHDE & SCHWARZ | ENV216 | 101424 | 03/13/2014 | 03/12/2015 |
| LISN 19 | ROHDE & SCHWARZ | ENV216 | 101425 | 03/13/2014 | 03/12/2015 |

5.3. EUT Setup:

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4-2009.
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.

5.4. Measurement Procedure:

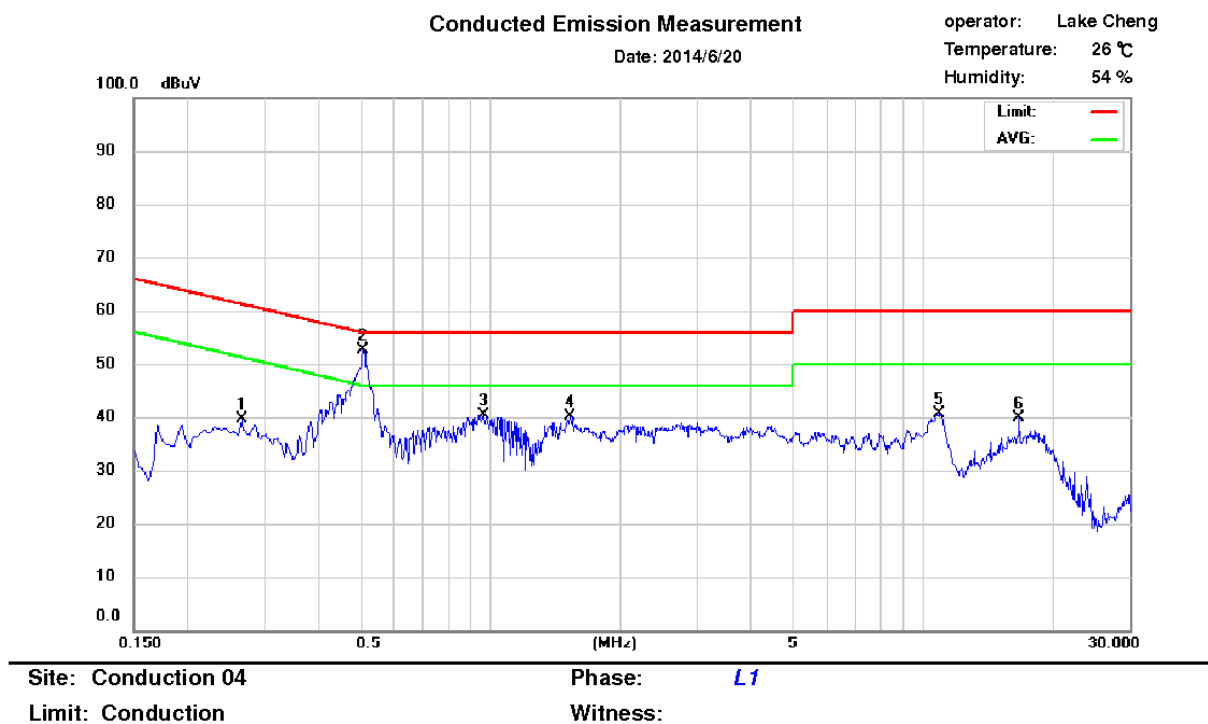
1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

5.5. Measurement Result:

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

AC POWER LINE CONDUCTED EMISSION TEST DATA

| | | | |
|-----------------|----------------|------------|------------|
| Operation Mode: | Operation Mode | Test Date: | 2014/06/20 |
| Test By: | Dino | | |



| No. | Frequency (MHz) | Correct Factor (dB) | QP Emission (dBuV) | QP Limit (dBuV) | QP Margin (dB) | AVG Emission (dBuV) | AVG Limit (dBuV) | AVG Margin (dB) | Note |
|-----|--------------------|------------------------|--------------------------|-----------------------|----------------------|---------------------------|------------------------|-----------------------|------|
| 1 | 0.266 | 9.58 | 37.08 | 61.24 | -24.16 | 29.79 | 51.24 | -21.45 | |
| 2 | 0.510 | 9.59 | 50.70 | 56.00 | -5.30 | 43.96 | 46.00 | -2.04 | |
| 3 | 0.966 | 9.60 | 38.76 | 56.00 | -17.24 | 31.73 | 46.00 | -14.27 | |
| 4 | 1.530 | 9.61 | 36.59 | 56.00 | -19.41 | 28.68 | 46.00 | -17.32 | |
| 5 | 10.934 | 9.77 | 38.75 | 60.00 | -21.25 | 31.94 | 50.00 | -18.06 | |
| 6 | 16.714 | 9.90 | 33.10 | 60.00 | -26.90 | 26.15 | 50.00 | -23.85 | |

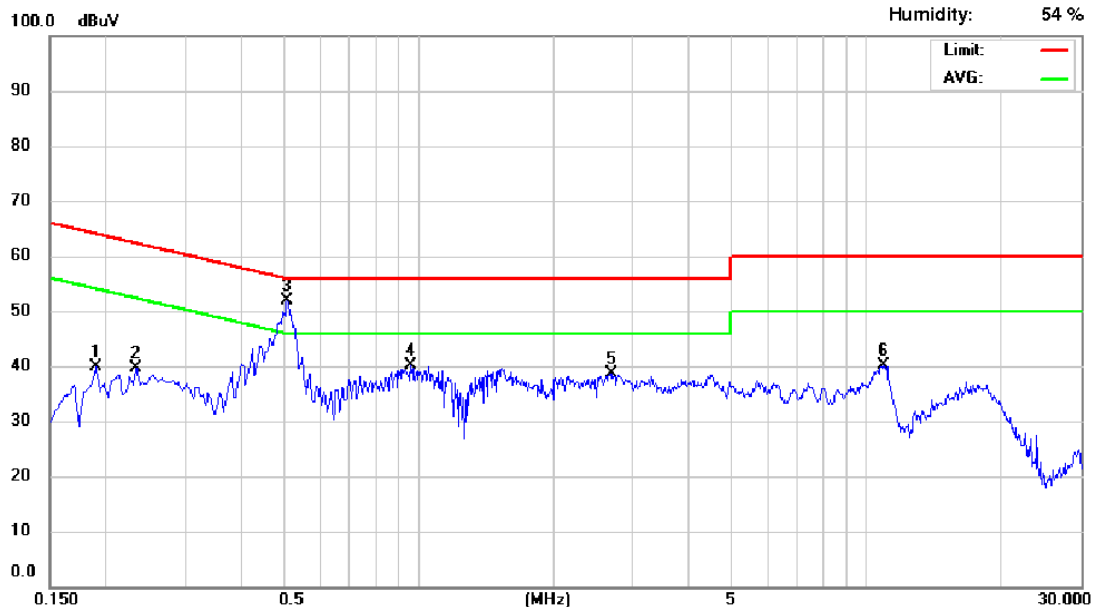
Conducted Emission Measurement

Date: 2014/6/20

operator: Lake Cheng

Temperature: 26 °C

Humidity: 54 %



Site: Conduction 04

Phase: N

Limit: Conduction

Witness:

| No. | Frequency (MHz) | Correct Factor (dB) | QP Emission (dBuV) | QP Limit (dBuV) | QP Margin (dB) | AVG Emission (dBuV) | AVG Limit (dBuV) | AVG Margin (dB) | Note |
|-----|-----------------|---------------------|--------------------|-----------------|----------------|---------------------|------------------|-----------------|------|
| 1 | 0.190 | 9.60 | 36.78 | 64.04 | -27.26 | 30.30 | 54.04 | -23.74 | |
| 2 | 0.234 | 9.60 | 36.51 | 62.31 | -25.80 | 29.41 | 52.31 | -22.90 | |
| 3 | 0.510 | 9.60 | 50.67 | 56.00 | -5.33 | 43.67 | 46.00 | -2.33 | |
| 4 | 0.962 | 9.61 | 38.35 | 56.00 | -17.65 | 29.42 | 46.00 | -16.58 | |
| 5 | 2.702 | 9.64 | 36.20 | 56.00 | -19.80 | 27.03 | 46.00 | -18.97 | |
| 6 | 10.862 | 9.79 | 38.15 | 60.00 | -21.85 | 31.17 | 50.00 | -18.83 | |

6. PEAK OUTPUT POWER MEASUREMENT

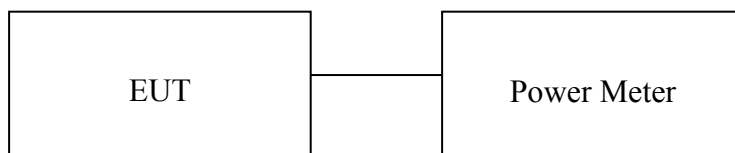
6.1. Standard Applicable:

According to §15.247(b)(1), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850MHz band: 1Watt. For all other frequency hopping systems in the 2400 – 2483.5MHz band: 0.125 Watts.

6.2. Measurement Equipment Used:

| Conducted Emission Test Site | | | | | |
|------------------------------|---------|--------------|-------------------|------------|------------|
| EQUIPMENT TYPE | MFR | MODEL NUMBER | SERIAL NUMBER | LAST CAL. | CAL DUE. |
| Power Meter 05 | Anritsu | ML2495A | 1116010 | 04/19/2014 | 04/18/2015 |
| Power Sensor 07 | DARE | RPR3006W | 13I00030SN O34 | 10/18/2013 | 10/17/2014 |
| Temperature Chamber | KSON | THS-B4H100 | 2287 | 03/17/2014 | 03/16/2015 |
| DC Power supply | ABM | 51850 | N/A | 08/16/2013 | 08/15/2014 |
| AC Power supply | EXTECH | CFC105W | NA | 12/19/2013 | 12/18/2014 |
| Attenuator | Woken | Watt-65m3502 | 11051601 | NA | NA |
| Splitter | MCLI | PS4-199 | 12465 | 12/27/2013 | 12/26/2014 |
| Spectrum analyzer | Agilent | N9030A | MY51360021 | 05/02/2014 | 05/01/2015 |

6.3. Test Set-up:



6.4. 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 power meter or spectrum. (Channel power function, RBW, VBW = 1MHz)
3. Record the max. reading.
4. Repeat above procedures until all frequency measured were complete.

6.5. Measurement Result:

BDR Mode

| Frequency (MHz) | Peak Reading Power (dBm) | Cable Loss | Output Power (dBm) | Output Power (W) | Limit (W) |
|-----------------|--------------------------|------------|--------------------|------------------|-----------|
| 2402.00 | 8.13 | 0.00 | 8.13 | 0.00650 | 1 |
| 2441.00 | 8.13 | 0.00 | 8.13 | 0.00650 | 1 |
| 2480.00 | 8.36 | 0.00 | 8.36 | 0.00685 | 1 |

EDR 2M Mode

| Frequency (MHz) | Peak Reading Power (dBm) | Cable Loss | Output Power (dBm) | Output Power (W) | Limit (W) |
|-----------------|--------------------------|------------|--------------------|------------------|-----------|
| 2402.00 | 7.61 | 0.00 | 7.61 | 0.00577 | 1 |
| 2441.00 | 7.70 | 0.00 | 7.70 | 0.00589 | 1 |
| 2480.00 | 8.01 | 0.00 | 8.01 | 0.00632 | 1 |

EDR 3M Mode

| Frequency (MHz) | Peak Reading Power (dBm) | Cable Loss | Output Power (dBm) | Output Power (W) | Limit (W) |
|-----------------|--------------------------|------------|--------------------|------------------|-----------|
| 2402.00 | 7.75 | 0.00 | 7.75 | 0.00596 | 1 |
| 2441.00 | 7.82 | 0.00 | 7.82 | 0.00605 | 1 |
| 2480.00 | 8.09 | 0.00 | 8.09 | 0.00644 | 1 |

Offset: 0.5dB

7. 100KHz BANDWIDTH OF BAND EDGES MEASUREMENT

7.1. Standard Applicable:

According to §15.247(d), in any 100 KHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100KHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

7.2. Measurement Equipment Used:

7.2.1. Conducted Emission at antenna port:

Refer to section 6.2 for details.

7.2.2. Radiated emission:

| Chamber 14(966) | | | | | |
|----------------------------------|---------------|--------------------------|-----------------|------------|------------|
| EQUIPMENT TYPE | MFR | MODEL NUMBER | SERIAL NUMBER | LAST CAL. | CAL DUE. |
| Spectrum Analyzer 21(26.5GHz) | Agilent | N9010A | MY49060537 | 07/18/2013 | 07/17/2014 |
| Spectrum Analyzer 20(6.5GHz) | Agilent | E4443A | MY48250315 | 05/26/2014 | 05/25/2015 |
| Spectrum Analyzer 22(43GHz) | R&S | FSU43 | 100143 | 05/03/2014 | 05/02/2015 |
| Dipole antenna | SCHWARZBECK | VHAP,30-300 | 919 | 12/03/2013 | 12/02/2015 |
| Dipole antenna | SCHWARZBECK | UHAP,300-1000 | 1195 | 12/03/2013 | 12/02/2015 |
| Loop Antenna9K-30M | A.H.SYSTEM | SAS-564 | 294 | 03/07/2013 | 03/06/2015 |
| Bilog Antenna30-1G | Schaffner | CBL 6112B | 2756 | 01/08/2014 | 01/07/2015 |
| Horn antenna1-18G(06) | EMCO | 3117 | 0006665 | 11/04/2013 | 11/03/2014 |
| Horn antenna18-26G(04) | Com-power | AH-826 | 081001 | 05/15/2013 | 05/14/2015 |
| Preamplifier9-1000M | HP | 8447D | NA | 02/20/2014 | 02/19/2015 |
| Preamplifier1-18G | MITEQ | AFS44-00101800-25-10P-44 | 1329256 | 07/18/2013 | 07/17/2014 |
| Preamplifier1-26G | EM | EM01M26G | NA | 02/20/2014 | 02/19/2015 |
| Cable1-18G | HUBER SUHNER | Sucoflex 106 | NA | 02/17/2014 | 02/16/2015 |
| Cable UP to 1G | HUBER SUHNER | RG 214/U | NA | 10/14/2013 | 10/13/2014 |
| SUCOFLEX 1GHz~40GHz cable | HUBER SUHNER | Sucoflex 102 | 27963/2&37421/2 | 10/03/2013 | 10/02/2015 |
| Signal Generator | R&S | SMU200A | 102330 | 02/19/2014 | 02/18/2015 |
| Signal Generator | Anritsu | MG3692A | 20311 | 10/30/2013 | 10/29/2014 |
| 2.4G Filter | Micro-Tronics | Brm50702 | 76 | 12/27/2013 | 12/26/2014 |

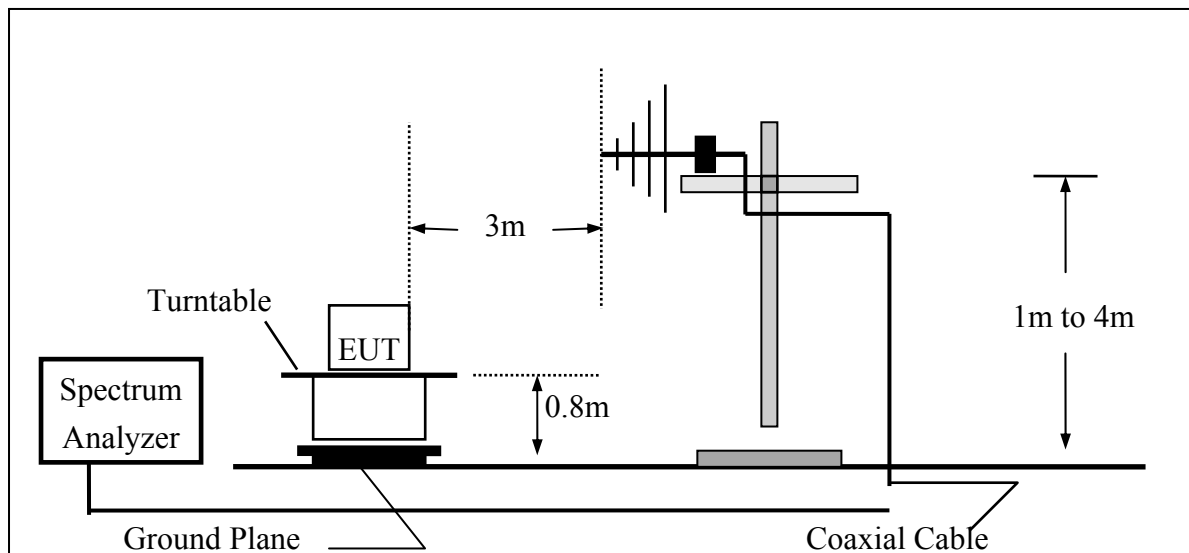
7.3. Test SET-UP:

7.3.1. Conducted Emission at antenna port:

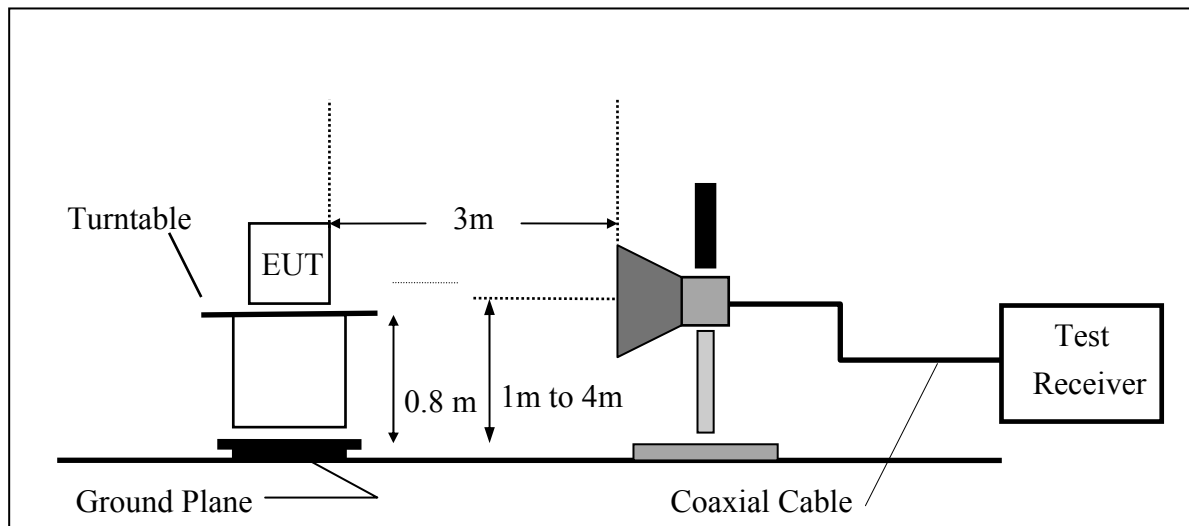
Refer to section 6.3 for details.

7.3.2. Radiated emission:

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



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



7.4. 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 center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW, VBW=100KHz, Span=25MHz, Sweep = auto
5. Mark Peak, 2.390GHz and 2.4835GHz and record the max. level.
6. Repeat above procedures until all frequency measured were complete.

7.5. 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:

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

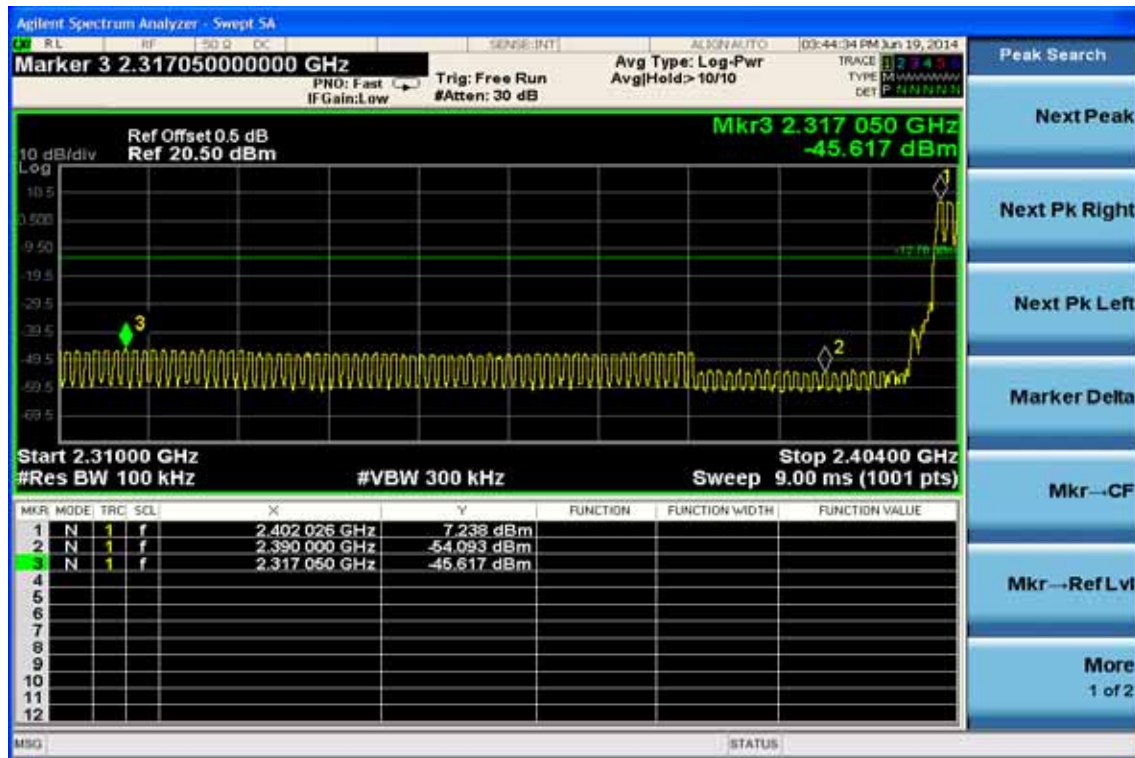
| | | |
|-------|------------------------|--|
| Where | FS = Field Strength | CL = Cable Attenuation Factor (Cable Loss) |
| | RA = Reading Amplitude | AG = Amplifier Gain |
| | AF = Antenna Factor | |

7.6. Measurement Result:

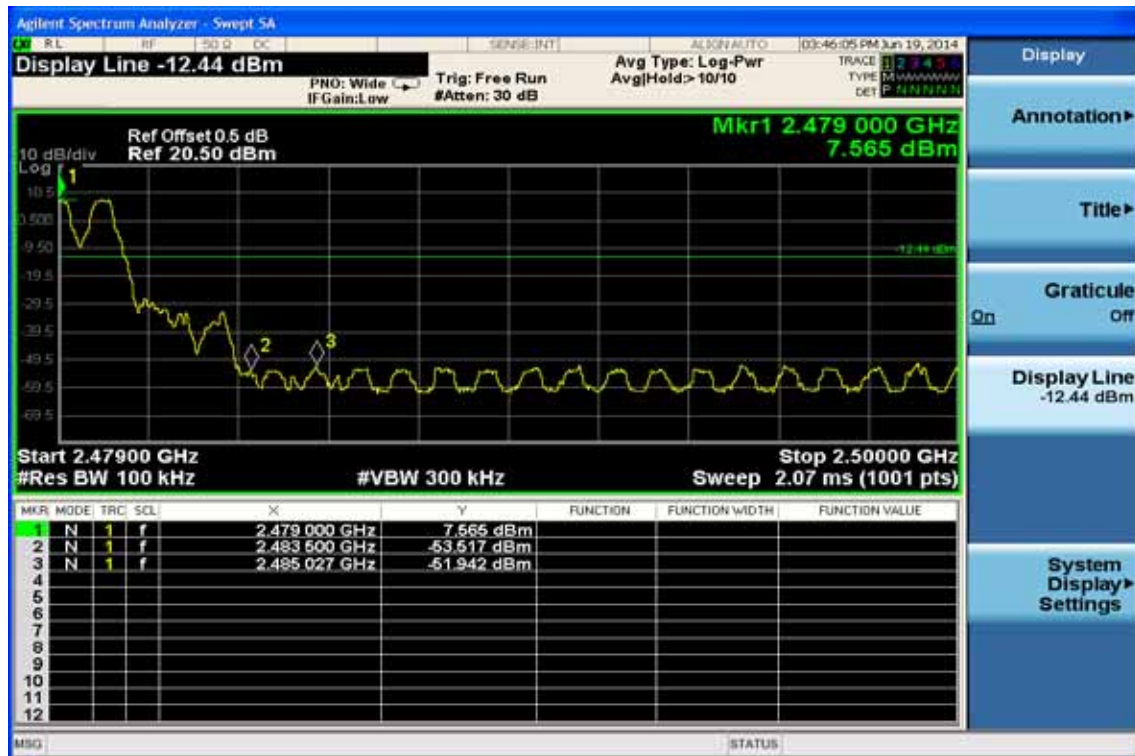
Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

BDR Mode

Band Edges Test Data CH-Low



Band Edges Test Data CH-High



Radiated Emission: (BDR mode)

Operation Mode TX CH Low
Fundamental Frequency 2402 MHz
Temperature 25

Test Date 2014/06/17
Test By Dino
Humidity 60 %

| No | Freq MHz | Reading dBuV | Factor dB | Level dBuV/m | Limit dBuV/m | Over Limit dB | Remark | Pol V/H |
|----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|---------|------------|
| 1 | 2390.00 | 15.57 | 31.40 | 46.97 | 54.00 | -7.03 | Average | VERTICAL |
| 2 | 2390.00 | 27.21 | 31.40 | 58.61 | 74.00 | -15.39 | Peak | VERTICAL |
| | | | | | | | | |
| 1 | 2389.40 | 15.56 | 31.39 | 46.95 | 54.00 | -7.05 | Average | HORIZONTAL |
| 2 | 2389.40 | 29.57 | 31.39 | 60.96 | 74.00 | -13.04 | Peak | HORIZONTAL |
| 3 | 2390.00 | 15.57 | 31.40 | 46.97 | 54.00 | -7.03 | Average | HORIZONTAL |
| 4 | 2390.00 | 28.02 | 31.40 | 59.42 | 74.00 | -14.58 | Peak | HORIZONTAL |

Operation Mode TX CH High
Fundamental Frequency 2480 MHz
Temperature 25

Test Date 2014/06/17
Test By Dino
Humidity 60 %

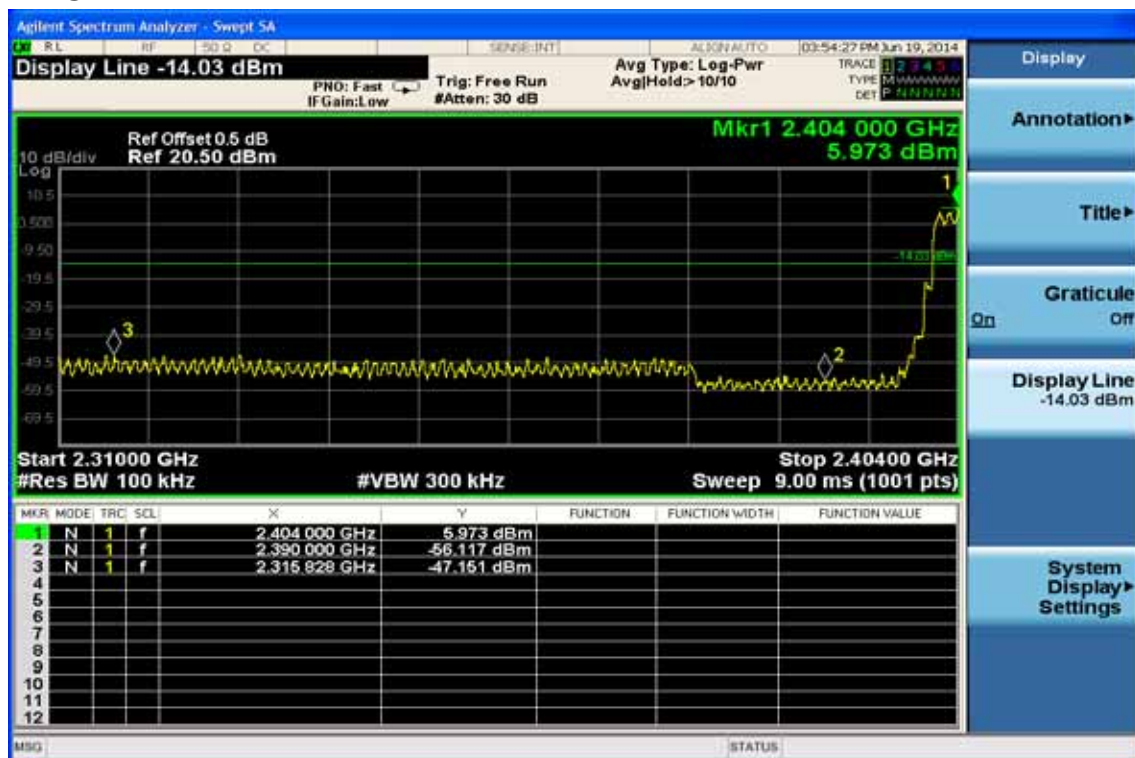
| No | Freq MHz | Reading dBuV | Factor dB | Level dBuV/m | Limit dBuV/m | Over Limit dB | Remark | Pol V/H |
|----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|---------|------------|
| 1 | 2483.50 | 16.10 | 31.56 | 47.66 | 54.00 | -6.34 | Average | VERTICAL |
| 2 | 2483.50 | 28.17 | 31.56 | 59.73 | 74.00 | -14.27 | Peak | VERTICAL |
| 3 | 2486.54 | 15.94 | 31.56 | 47.50 | 54.00 | -6.50 | Average | VERTICAL |
| 4 | 2486.54 | 29.02 | 31.56 | 60.58 | 74.00 | -13.42 | Peak | VERTICAL |
| | | | | | | | | |
| 1 | 2483.50 | 16.08 | 31.56 | 47.64 | 54.00 | -6.36 | Average | HORIZONTAL |
| 2 | 2483.50 | 27.97 | 31.56 | 59.53 | 74.00 | -14.47 | Peak | HORIZONTAL |

Remark:

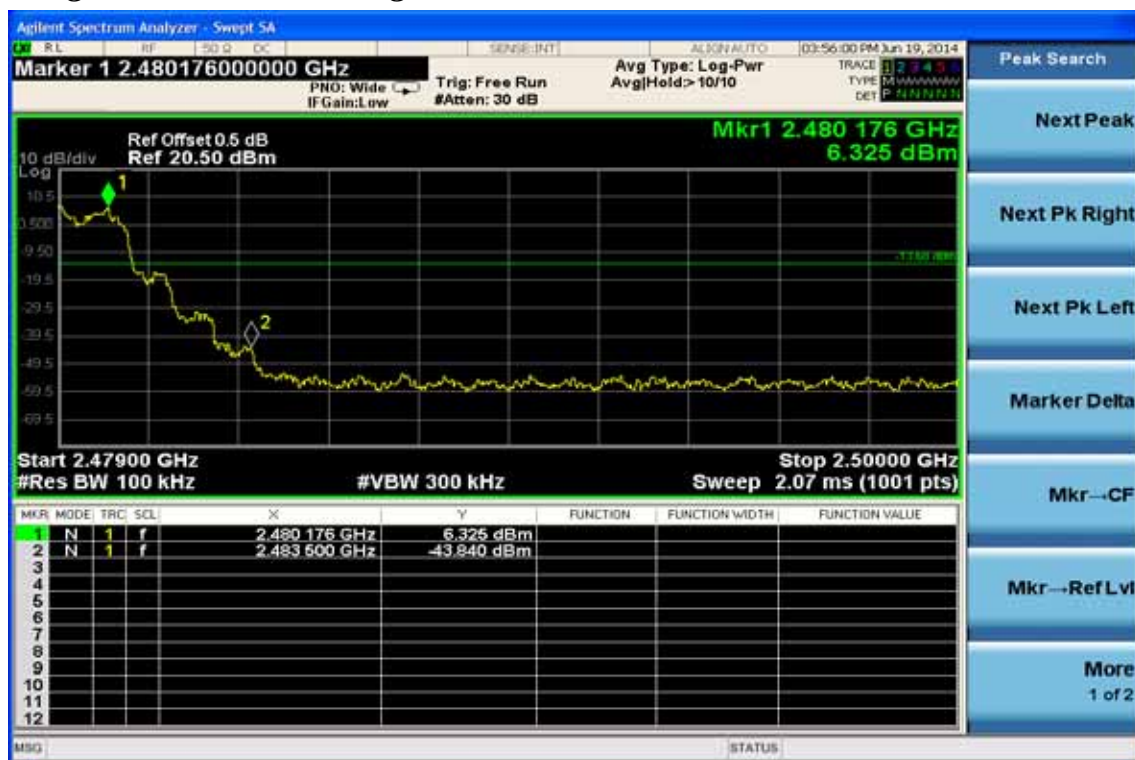
- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 "F" denotes fundamental frequency; "H" denotes harmonics frequency. "S" denotes spurious frequency.
- 4 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

EDR 2M Mode

Band Edges Test Data CH-Low



Band Edges Test Data CH-High



Radiated Emission (EDR 2M mode):

Operation Mode TX CH Low

Fundamental Frequency 2402 MHz

Temperature 25

Test Date 2014/06/17

Test By Dino

Humidity 60 %

| No. | Freq MHz | Reading dBuV | Factor dB | Level dBuV/m | Limit dBuV/m | Over Limit dB | Remark | Pol V/H |
|-----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|---------|------------|
| 1 | 2385.72 | 15.61 | 31.39 | 47.00 | 54.00 | -7.00 | Average | VERTICAL |
| 2 | 2385.72 | 29.17 | 31.39 | 60.56 | 74.00 | -13.44 | Peak | VERTICAL |
| 3 | 2390.00 | 15.94 | 31.40 | 47.34 | 54.00 | -6.66 | Average | VERTICAL |
| 4 | 2390.00 | 27.79 | 31.40 | 59.19 | 74.00 | -14.81 | Peak | VERTICAL |
| | | | | | | | | |
| 1 | 2364.10 | 15.94 | 31.35 | 47.29 | 54.00 | -6.71 | Average | HORIZONTAL |
| 2 | 2364.10 | 29.99 | 31.35 | 61.34 | 74.00 | -12.66 | Peak | HORIZONTAL |
| 3 | 2390.00 | 16.13 | 31.40 | 47.53 | 54.00 | -6.47 | Average | HORIZONTAL |
| 4 | 2390.00 | 27.18 | 31.40 | 58.58 | 74.00 | -15.42 | Peak | HORIZONTAL |

Operation Mode TX CH High

Fundamental Frequency 2480 MHz

Temperature 25

Test Date 2014/06/17

Test By Dino

Humidity 60 %

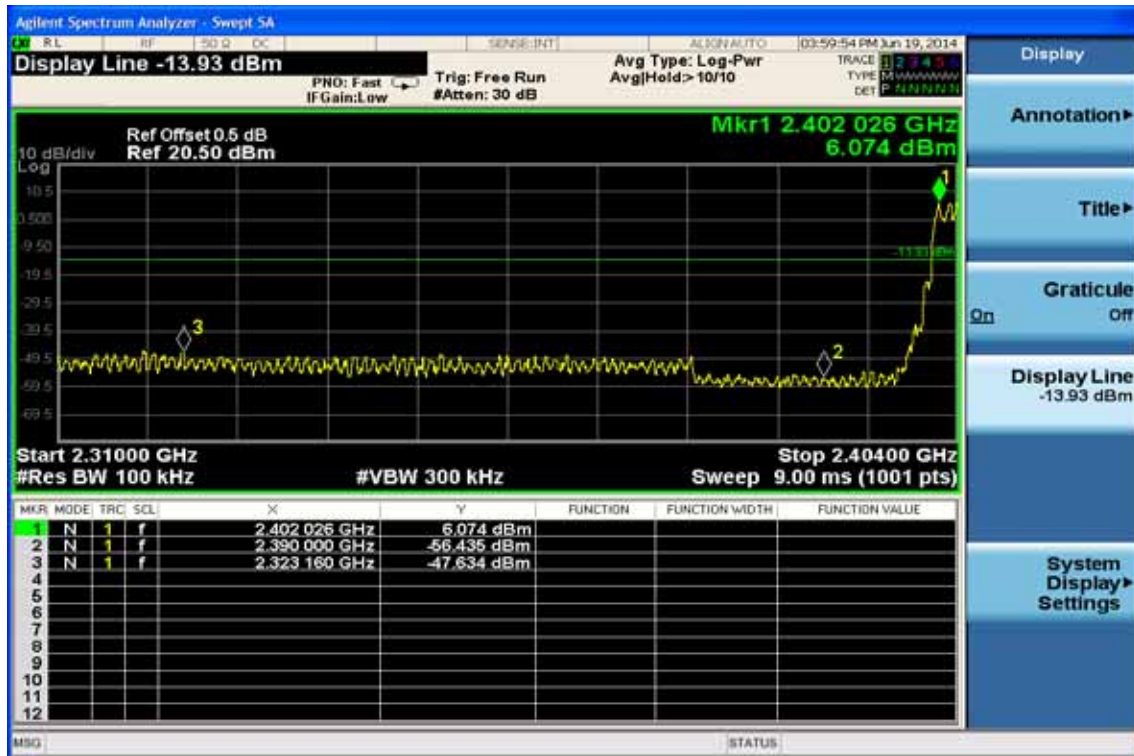
| No. | Freq MHz | Reading dBuV | Factor dB | Level dBuV/m | Limit dBuV/m | Over Limit dB | Remark | Pol V/H |
|-----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|---------|------------|
| 1 | 2483.50 | 16.15 | 31.56 | 47.71 | 54.00 | -6.29 | Average | VERTICAL |
| 2 | 2483.50 | 27.26 | 31.56 | 58.82 | 74.00 | -15.18 | Peak | VERTICAL |
| 3 | 2484.46 | 16.26 | 31.56 | 47.82 | 54.00 | -6.18 | Average | VERTICAL |
| 4 | 2484.46 | 28.93 | 31.56 | 60.49 | 74.00 | -13.51 | Peak | VERTICAL |
| | | | | | | | | |
| 1 | 2483.50 | 16.56 | 31.56 | 48.12 | 54.00 | -5.88 | Average | HORIZONTAL |
| 2 | 2483.50 | 26.83 | 31.56 | 58.39 | 74.00 | -15.61 | Peak | HORIZONTAL |
| 3 | 2494.04 | 15.93 | 31.57 | 47.50 | 54.00 | -6.50 | Average | HORIZONTAL |
| 4 | 2494.04 | 30.04 | 31.57 | 61.61 | 74.00 | -12.39 | Peak | HORIZONTAL |

Remark:

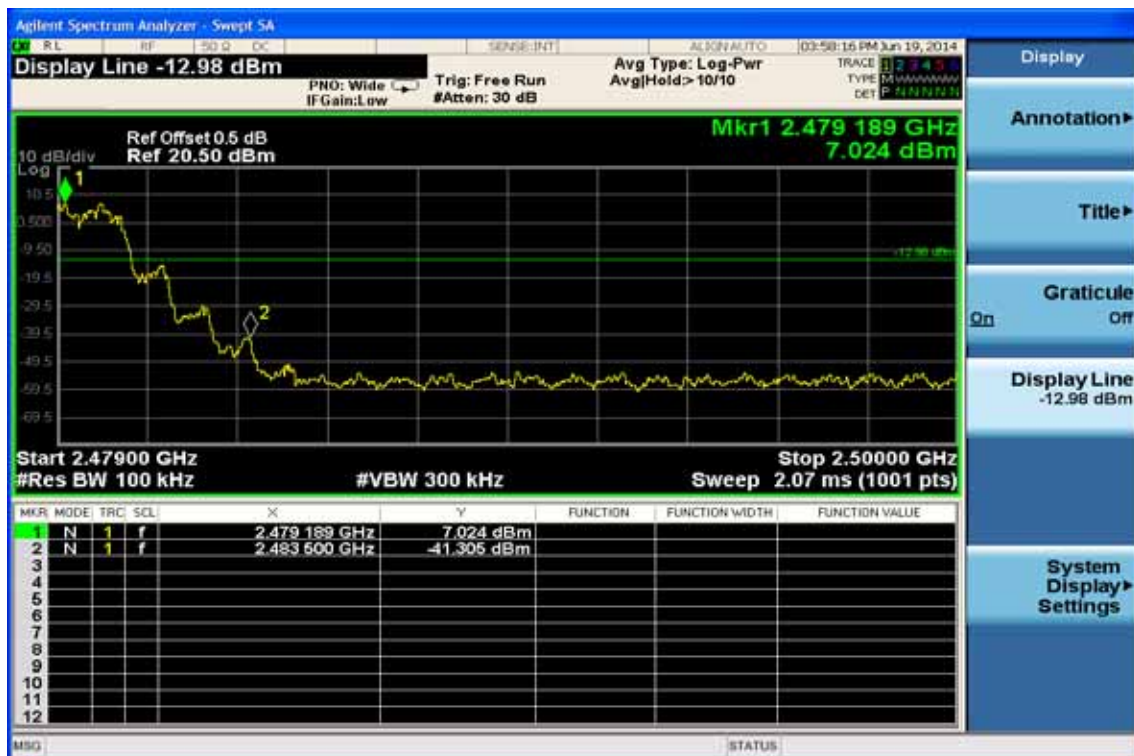
- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 "F" denotes fundamental frequency; "H" denotes harmonics frequency. "S" denotes spurious frequency.
- 4 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

EDR 3M Mode

Band Edges Test Data CH-Low



Band Edges Test Data CH-High



Radiated Emission (EDR 3M mode):

Operation Mode TX CH Low

Fundamental Frequency 2402 MHz

Temperature 25

Test Date 2014/06/17

Test By Dino

Humidity 60 %

| No. | Freq MHz | Reading dBuV | Factor dB | Level dBuV/m | Limit dBuV/m | Over Limit dB | Remark | Pol V/H |
|-----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|---------|------------|
| 1 | 2389.67 | 16.57 | 31.39 | 47.96 | 54.00 | -6.04 | Average | VERTICAL |
| 2 | 2389.67 | 29.20 | 31.39 | 60.59 | 74.00 | -13.41 | Peak | VERTICAL |
| 3 | 2390.00 | 16.14 | 31.40 | 47.54 | 54.00 | -6.46 | Average | VERTICAL |
| 4 | 2390.00 | 27.52 | 31.40 | 58.92 | 74.00 | -15.08 | Peak | VERTICAL |
| | | | | | | | | |
| 1 | 2346.98 | 16.02 | 31.33 | 47.35 | 54.00 | -6.65 | Average | HORIZONTAL |
| 2 | 2346.98 | 29.23 | 31.33 | 60.56 | 74.00 | -13.44 | Peak | HORIZONTAL |
| 3 | 2390.00 | 16.24 | 31.40 | 47.64 | 54.00 | -6.36 | Average | HORIZONTAL |
| 4 | 2390.00 | 27.90 | 31.40 | 59.30 | 74.00 | -14.70 | Peak | HORIZONTAL |

Operation Mode TX CH High

Fundamental Frequency 2480 MHz

Temperature 25

Test Date 2014/06/17

Test By Dino

Humidity 60 %

| No. | Freq MHz | Reading dBuV | Factor dB | Level dBuV/m | Limit dBuV/m | Over Limit dB | Remark | Pol V/H |
|-----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|---------|------------|
| 1 | 2483.50 | 16.10 | 31.56 | 47.66 | 54.00 | -6.34 | Average | VERTICAL |
| 2 | 2483.50 | 27.50 | 31.56 | 59.06 | 74.00 | -14.94 | Peak | VERTICAL |
| 3 | 2498.98 | 16.05 | 31.58 | 47.63 | 54.00 | -6.37 | Average | VERTICAL |
| 4 | 2498.98 | 29.44 | 31.58 | 61.02 | 74.00 | -12.98 | Peak | VERTICAL |
| | | | | | | | | |
| 1 | 2483.50 | 16.23 | 31.56 | 47.79 | 54.00 | -6.21 | Average | HORIZONTAL |
| 2 | 2483.50 | 27.21 | 31.56 | 58.77 | 74.00 | -15.23 | Peak | HORIZONTAL |
| 3 | 2486.08 | 16.31 | 31.56 | 47.87 | 54.00 | -6.13 | Average | HORIZONTAL |
| 4 | 2486.08 | 29.00 | 31.56 | 60.56 | 74.00 | -13.44 | Peak | HORIZONTAL |

Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 "F" denotes fundamental frequency; "H" denotes harmonics frequency. "S" denotes spurious frequency.
- 4 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

8. SPURIOUS EMISSION TEST

8.1. Standard Applicable:

According to §15.247(d), all other emissions outside these bands shall not exceed the general radiated emission limits specified in §15.209(a). And according to §15.33(a)(1), for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

8.2. Measurement Equipment Used:

8.2.1. Conducted Emission at antenna port:

Refer to section 6.2 for details.

8.2.2. Radiated emission:

Refer to section 7.2 for details.

8.3. Test SET-UP:

8.3.1. Conducted Emission at antenna port:

Refer to section 6.3 for details.

8.3.2. Radiated emission:

Refer to section 7.3 for details.

8.4. Measurement Procedure:

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
4. When 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.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. Repeat above procedures until all frequency measured were complete.

8.5. 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:

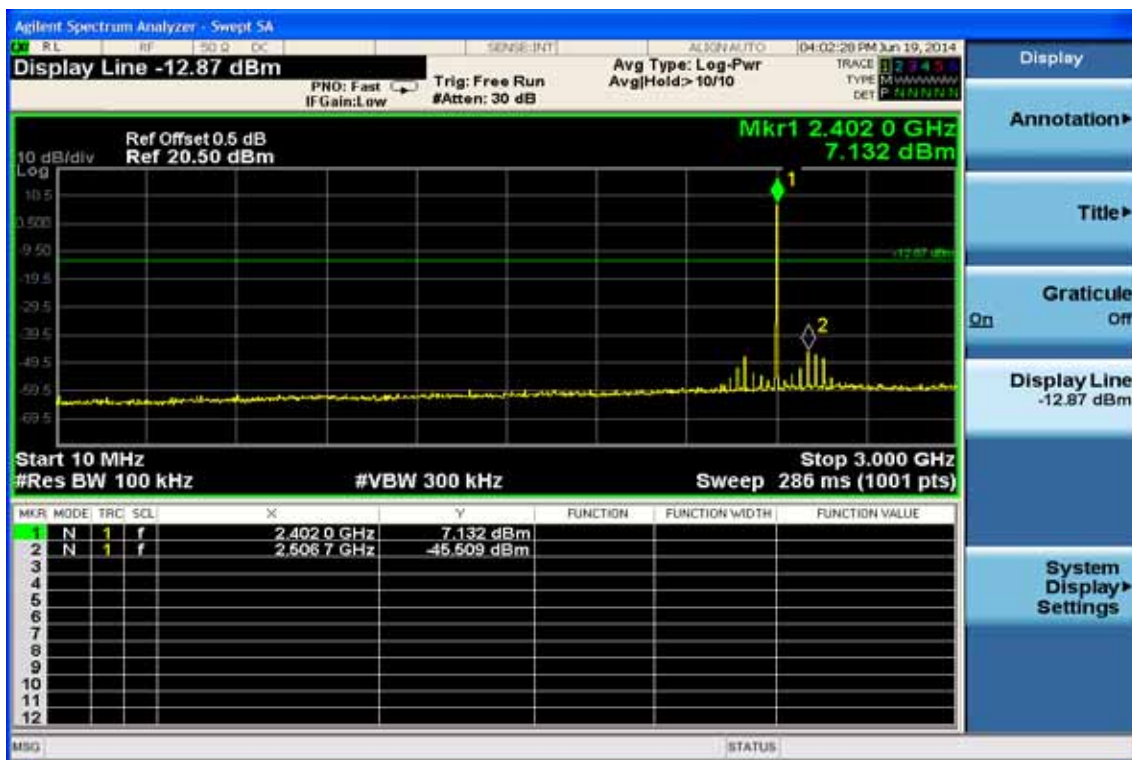
$$FS = RA + AF + CL - AG$$

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

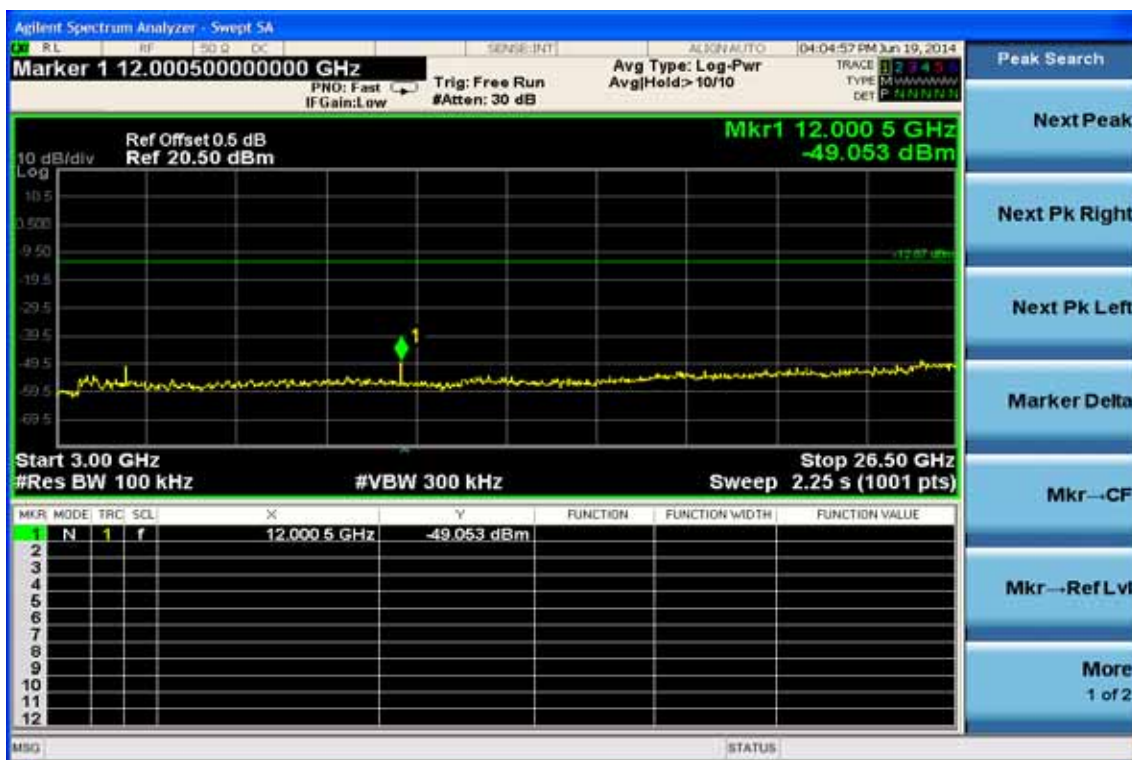
8.6. Measurement Result:

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

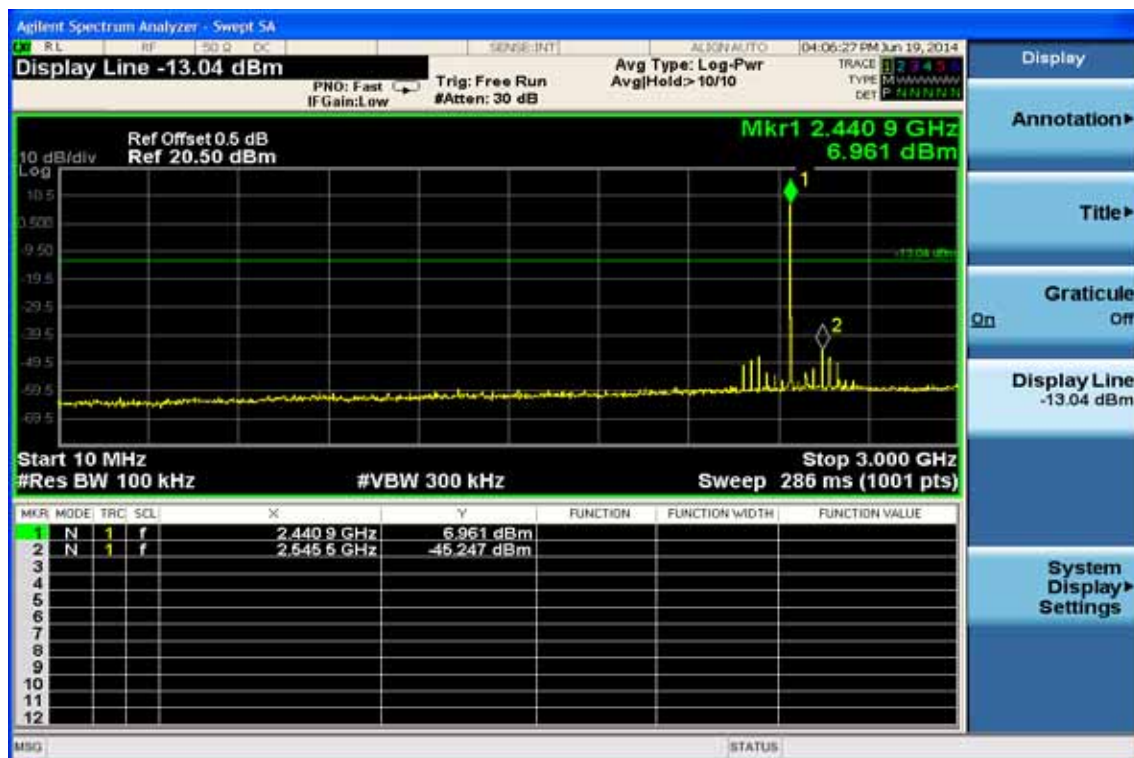
Conducted Spurious Emission Measurement Result (Worst case: BDR Mode) Ch Low 30MHz – 3GHz



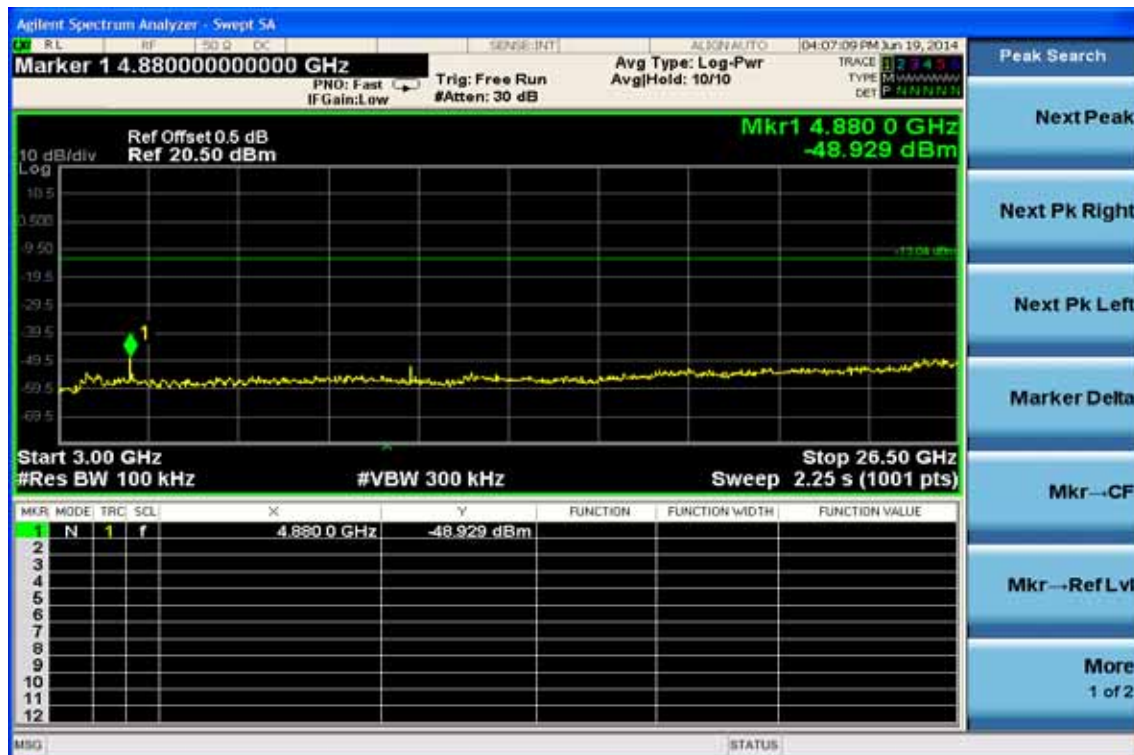
Ch Low 3GHz – 26.5GHz



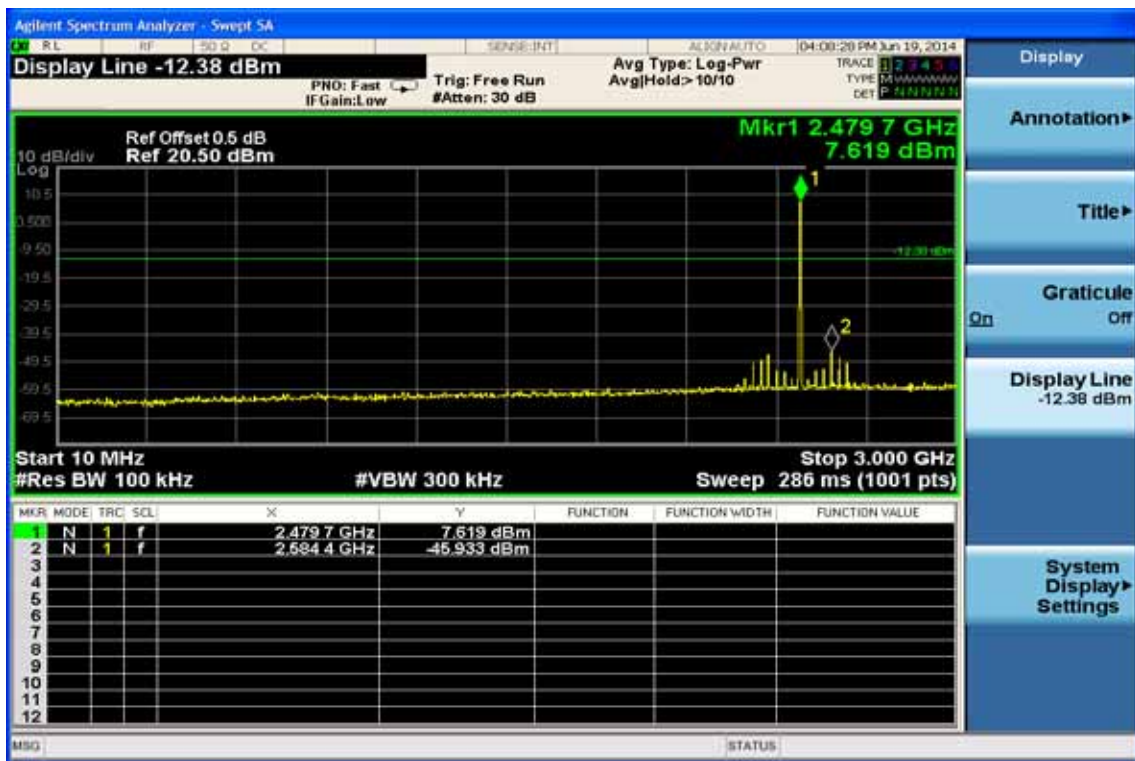
Ch Mid 30MHz – 3GHz



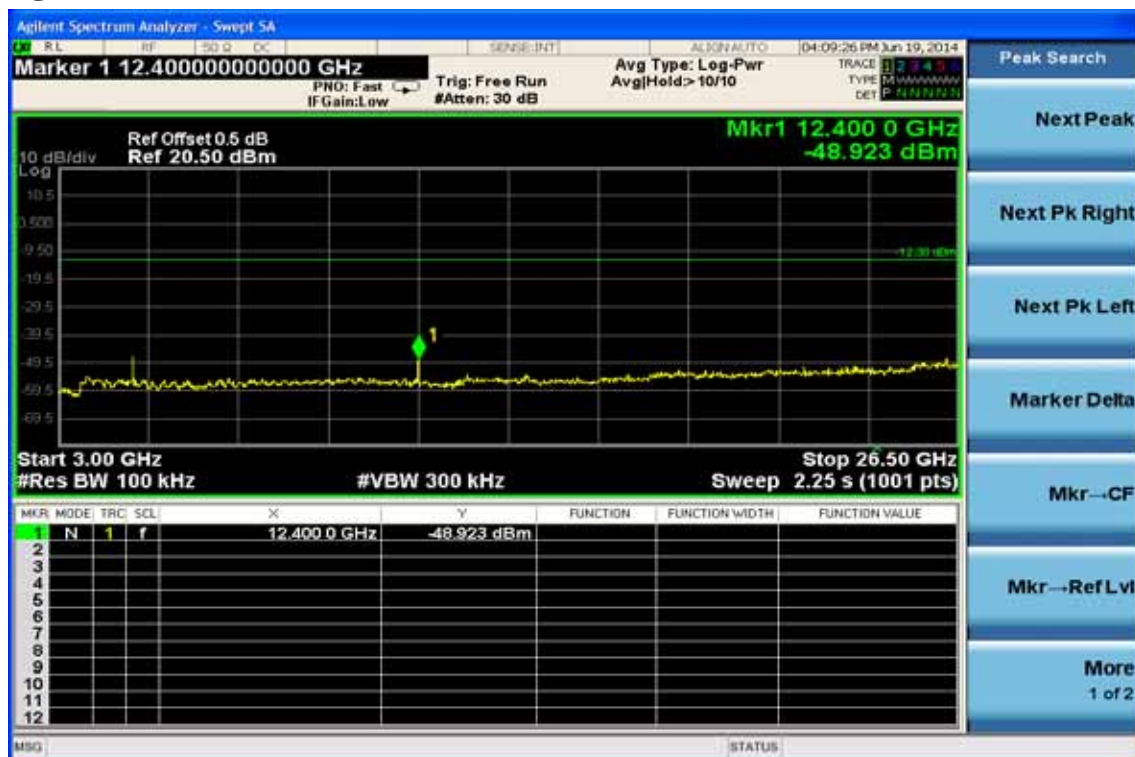
Ch Mid 3GHz – 26.5GHz



Ch High 30MHz – 3GHz



Ch High 3GHz – 26.5GHz



Radiated Spurious Emission Measurement Result: (below 1GHz) (Worst case: BDR Mode)

Operation Mode TX CH Low
Fundamental Frequency 2402MHz
Temperature 25

Test Date 2014/06/17
Test By Dino
Humidity 60 %

| No | Freq MHz | Reading dBuV | Factor dB | Level dBuV/m | Limit dBuV/m | Over Limit dB | Remark | Pol V/H |
|----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|--------|------------|
| 1 | 48.43 | 46.69 | -12.19 | 34.50 | 40.00 | -5.50 | Peak | VERTICAL |
| 2 | 157.07 | 47.47 | -12.01 | 35.46 | 43.50 | -8.04 | Peak | VERTICAL |
| 3 | 182.29 | 47.24 | -13.90 | 33.34 | 43.50 | -10.16 | Peak | VERTICAL |
| 4 | 292.87 | 50.76 | -11.33 | 39.43 | 46.00 | -6.57 | Peak | VERTICAL |
| 5 | 444.19 | 42.67 | -8.34 | 34.33 | 46.00 | -11.67 | Peak | VERTICAL |
| 6 | 870.99 | 26.67 | -1.39 | 25.28 | 46.00 | -20.72 | Peak | VERTICAL |
| | | | | | | | | |
| 1 | 48.43 | 47.68 | -12.19 | 35.49 | 40.00 | -4.51 | Peak | HORIZONTAL |
| 2 | 140.58 | 42.69 | -12.44 | 30.25 | 43.50 | -13.25 | Peak | HORIZONTAL |
| 3 | 187.14 | 49.55 | -14.30 | 35.25 | 43.50 | -8.25 | Peak | HORIZONTAL |
| 4 | 322.94 | 49.70 | -10.70 | 39.00 | 46.00 | -7.00 | Peak | HORIZONTAL |
| 5 | 444.19 | 41.30 | -8.34 | 32.96 | 46.00 | -13.04 | Peak | HORIZONTAL |
| 6 | 886.51 | 25.86 | -1.09 | 24.77 | 46.00 | -21.23 | Peak | HORIZONTAL |

Remark:

- 1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
- 2 Measuring frequencies from the lowest internal frequency to the 1GHz.
- 3 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak / QP detector mode.
- 4 Measurement result within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz, VBW=300KHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode TX CH Mid
Fundamental Frequency 2441MHz
Temperature 25

Test Date 2014/06/17
Test By Dino
Humidity 60 %

| No | Freq MHz | Reading dBuV | Factor dB | Level dBuV/m | Limit dBuV/m | Over Limit dB | Remark | Pol V/H |
|----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|--------|------------|
| 1 | 141.55 | 39.48 | -12.38 | 27.10 | 43.50 | -16.40 | Peak | VERTICAL |
| 2 | 176.47 | 41.20 | -13.30 | 27.90 | 43.50 | -15.60 | Peak | VERTICAL |
| 3 | 239.52 | 40.31 | -13.24 | 27.07 | 46.00 | -18.93 | Peak | VERTICAL |
| 4 | 352.04 | 39.21 | -10.19 | 29.02 | 46.00 | -16.98 | Peak | VERTICAL |
| 5 | 422.85 | 39.48 | -8.78 | 30.70 | 46.00 | -15.30 | Peak | VERTICAL |
| 6 | 749.74 | 27.70 | -2.95 | 24.75 | 46.00 | -21.25 | Peak | VERTICAL |
| | | | | | | | | |
| 1 | 48.43 | 49.46 | -12.19 | 37.27 | 40.00 | -2.73 | Peak | HORIZONTAL |
| 2 | 84.32 | 54.23 | -17.70 | 36.53 | 40.00 | -3.47 | Peak | HORIZONTAL |
| 3 | 121.18 | 54.15 | -14.42 | 39.73 | 43.50 | -3.77 | Peak | HORIZONTAL |
| 4 | 143.49 | 53.98 | -12.30 | 41.68 | 43.50 | -1.82 | Peak | HORIZONTAL |
| 5 | 168.71 | 51.54 | -12.49 | 39.05 | 43.50 | -4.45 | Peak | HORIZONTAL |
| 6 | 803.09 | 30.79 | -2.48 | 28.31 | 46.00 | -17.69 | Peak | HORIZONTAL |

Remark:

- 1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
- 2 Measuring frequencies from the lowest internal frequency to the 1GHz.
- 3 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak / QP detector mode.
- 4 Measurement result within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz, VBW=300KHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode TX CH High
Fundamental Frequency 2480MHz
Temperature 25

Test Date 2014/06/17
Test By Dino
Humidity 60 %

| No | Freq MHz | Reading dBuV | Factor dB | Level dBuV/m | Limit dBuV/m | Over Limit dB | Remark | Pol V/H |
|----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|--------|------------|
| 1 | 31.94 | 39.32 | -13.15 | 26.17 | 40.00 | -13.83 | Peak | VERTICAL |
| 2 | 141.55 | 40.58 | -12.38 | 28.20 | 43.50 | -15.30 | Peak | VERTICAL |
| 3 | 240.49 | 39.33 | -13.20 | 26.13 | 46.00 | -19.87 | Peak | VERTICAL |
| 4 | 352.04 | 38.69 | -10.19 | 28.50 | 46.00 | -17.50 | Peak | VERTICAL |
| 5 | 422.85 | 39.82 | -8.78 | 31.04 | 46.00 | -14.96 | Peak | VERTICAL |
| 6 | 792.42 | 29.24 | -2.59 | 26.65 | 46.00 | -19.35 | Peak | VERTICAL |
| | | | | | | | | |
| 1 | 48.43 | 42.51 | -12.19 | 30.32 | 40.00 | -9.68 | Peak | HORIZONTAL |
| 2 | 147.37 | 51.98 | -12.12 | 39.86 | 43.50 | -3.64 | Peak | HORIZONTAL |
| 3 | 283.17 | 39.48 | -11.54 | 27.94 | 46.00 | -18.06 | Peak | HORIZONTAL |
| 4 | 359.80 | 43.22 | -10.04 | 33.18 | 46.00 | -12.82 | Peak | HORIZONTAL |
| 5 | 444.19 | 37.90 | -8.34 | 29.56 | 46.00 | -16.44 | Peak | HORIZONTAL |
| 6 | 817.64 | 27.05 | -2.26 | 24.79 | 46.00 | -21.21 | Peak | HORIZONTAL |

Remark:

- 1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
- 2 Measuring frequencies from the lowest internal frequency to the 1GHz.
- 3 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak / QP detector mode.
- 4 Measurement result within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz, VBW=300KHz.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode TX CH Low
Fundamental Frequency 2402 MHz
Temperature 25

Test Date 2014/06/17
Test By Dino
Humidity 60 %

| No | Freq MHz | Reading dBuV | Factor dB | Level dBuV/m | Limit dBuV/m | Over Limit dB | Remark | Pol V/H |
|----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|--------|------------|
| 1 | 1679.00 | 61.07 | -14.12 | 46.95 | 74.00 | -27.05 | Peak | VERTICAL |
| 2 | 4804.00 | 51.57 | -1.90 | 49.67 | 74.00 | -24.33 | Peak | VERTICAL |
| | | | | | | | | |
| 1 | 1994.00 | 52.76 | -12.09 | 40.67 | 74.00 | -33.33 | Peak | HORIZONTAL |
| 2 | 4804.00 | 49.51 | -1.90 | 47.61 | 74.00 | -26.39 | Peak | HORIZONTAL |

Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 "F" denotes fundamental frequency; "H" denotes harmonics frequency. "S" denotes spurious frequency.
- 4 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

| | | | |
|-----------------------|-----------|-----------|------------|
| Operation Mode | TX CH Mid | Test Date | 2014/06/17 |
| Fundamental Frequency | 2441 MHz | Test By | Dino |
| Temperature | 25 | Humidity | 60 % |

| No | Freq MHz | Reading dBuV | Factor dB | Level dBuV/m | Limit dBuV/m | Over Limit dB | Remark | Pol V/H |
|----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|--------|------------|
| 1 | 1994.00 | 60.32 | -12.09 | 48.23 | 74.00 | -25.77 | Peak | VERTICAL |
| 2 | 4882.00 | 53.27 | -1.61 | 51.66 | 74.00 | -22.34 | Peak | VERTICAL |
| | | | | | | | | |
| 1 | 1798.00 | 52.67 | -13.34 | 39.33 | 74.00 | -34.67 | Peak | HORIZONTAL |
| 2 | 4882.00 | 51.28 | -1.61 | 49.67 | 74.00 | -24.33 | Peak | HORIZONTAL |

Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 "F" denotes fundamental frequency; "H" denotes harmonics frequency. "S" denotes spurious frequency.
- 4 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode TX CH High
Fundamental Frequency 2480 MHz
Temperature 25

Test Date 2014/06/17
Test By Dino
Humidity 60 %

| No | Freq MHz | Reading dBuV | Factor dB | Level dBuV/m | Limit dBuV/m | Over Limit dB | Remark | Pol V/H |
|----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|--------|------------|
| 1 | 4960.00 | 49.58 | -1.30 | 48.28 | 74.00 | -25.72 | Peak | VERTICAL |
| 2 | 7440.00 | 45.60 | 5.38 | 50.98 | 74.00 | -23.02 | Peak | VERTICAL |
| | | | | | | | | |
| 1 | 4960.00 | 51.80 | -1.30 | 50.50 | 74.00 | -23.50 | Peak | HORIZONTAL |
| 2 | 7440.00 | 44.96 | 5.38 | 50.34 | 74.00 | -23.66 | Peak | HORIZONTAL |

Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 "F" denotes fundamental frequency; "H" denotes harmonics frequency. "S" denotes spurious frequency.
- 4 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

9. FREQUENCY SEPARATION

9.1. Standard Applicable:

According to §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25KHz or the 20dB bandwidth of the hopping channel, whichever is greater.

9.2. Measurement Equipment Used:

Refer to section 6.2 for details.

9.3. Test Set-up:

Refer to section 6.3 for details.

9.4. 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 center frequency of spectrum analyzer = middle of hopping channel .
4. Set the spectrum analyzer as RBW,VBW=100KHz, Adjust Span to 3.0 MHz, Sweep = auto.
5. Max hold. Mark 3 Peaks of hopping channel and record the 3 peaks frequency.

9.5. Measurement Result:

| Channel separation (MHz) | Limit | Result |
|-----------------------------|--|--------|
| 1 | $\geq 25\text{KHz}$ or 2/3 times 20dB bandwidth | PASS |

Note: Refer to next page for plots.

Frequency Separation Test Data

Low



Mid



High



10. NUMBER OF HOPPING FREQUENCY

10.1. Standard Applicable:

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands shall use at least 15 hopping frequencies.

10.2. Measurement Equipment Used:

Refer to section 6.2 for details.

10.3. Test Set-up:

Refer to section 6.3 for details.

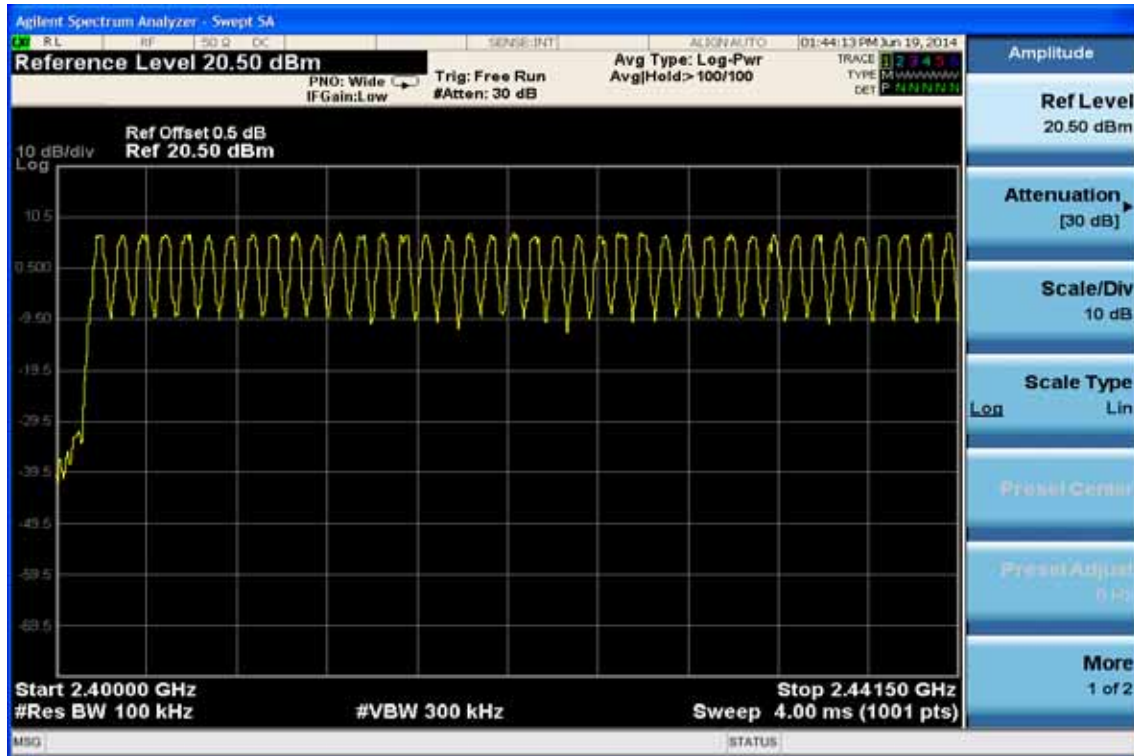
10.4. Measurement Procedure:

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 spectrum analyzer Start=2400MHz, Stop = 2441MHz and Start=2441MHz, Stop = 2483.5MHz, Sweep = auto.
4. Set the spectrum analyzer as RBW=300KHz, VBW=1MHz
5. Max hold, view and count how many channel in the band.

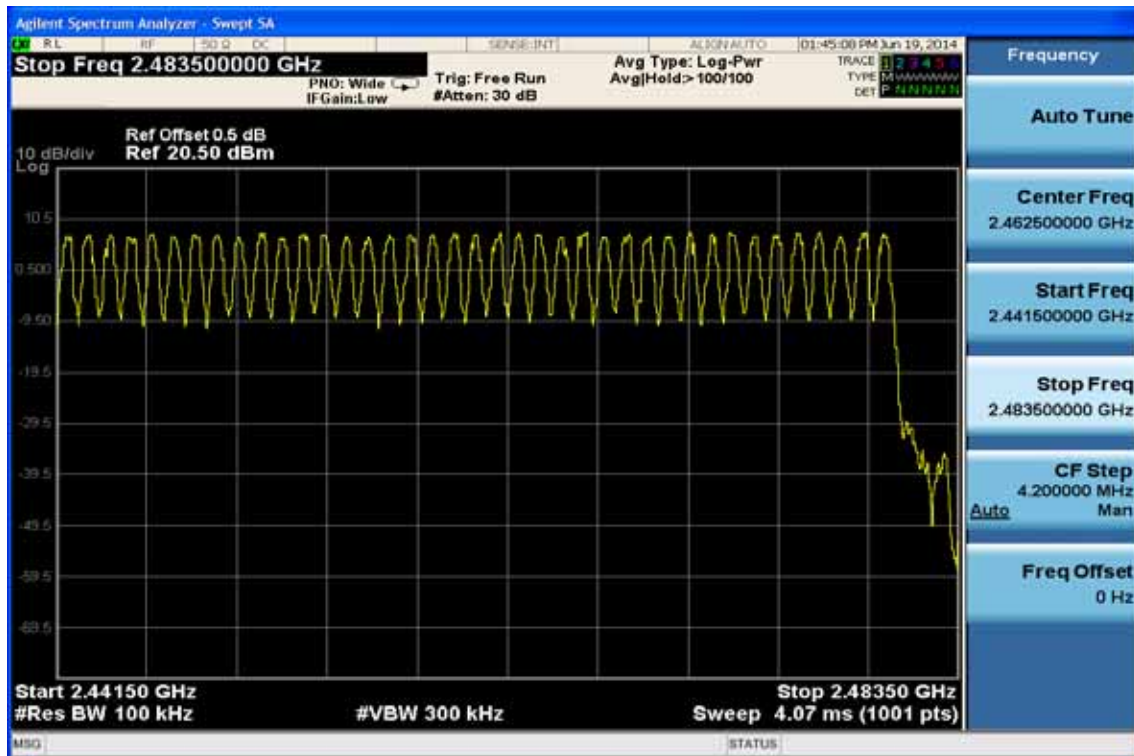
10.5. Measurement Result:

Note: Refer to next page for plots.

Channel Number 2.4 GHz – 2.441GHz



2.441 GHz – 2.4835GHz



11. TIME OF OCCUPANCY (DWELL TIME)

11.1. Standard Applicable:

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz. The average time of occupancy on any frequency shall not greater than 0.4 s within period of 0.4 seconds multiplied by the number of hopping channel employed.

11.2. Measurement Equipment Used:

Refer to section 6.2 for details.

11.3. Test Set-up:

Refer to section 6.3 for details.

11.4. 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 center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW / VBW = 1MHz, Span = 0Hz , Adjust Sweep = 2.5ms.
5. Repeat above procedures until all frequency measured were complete.

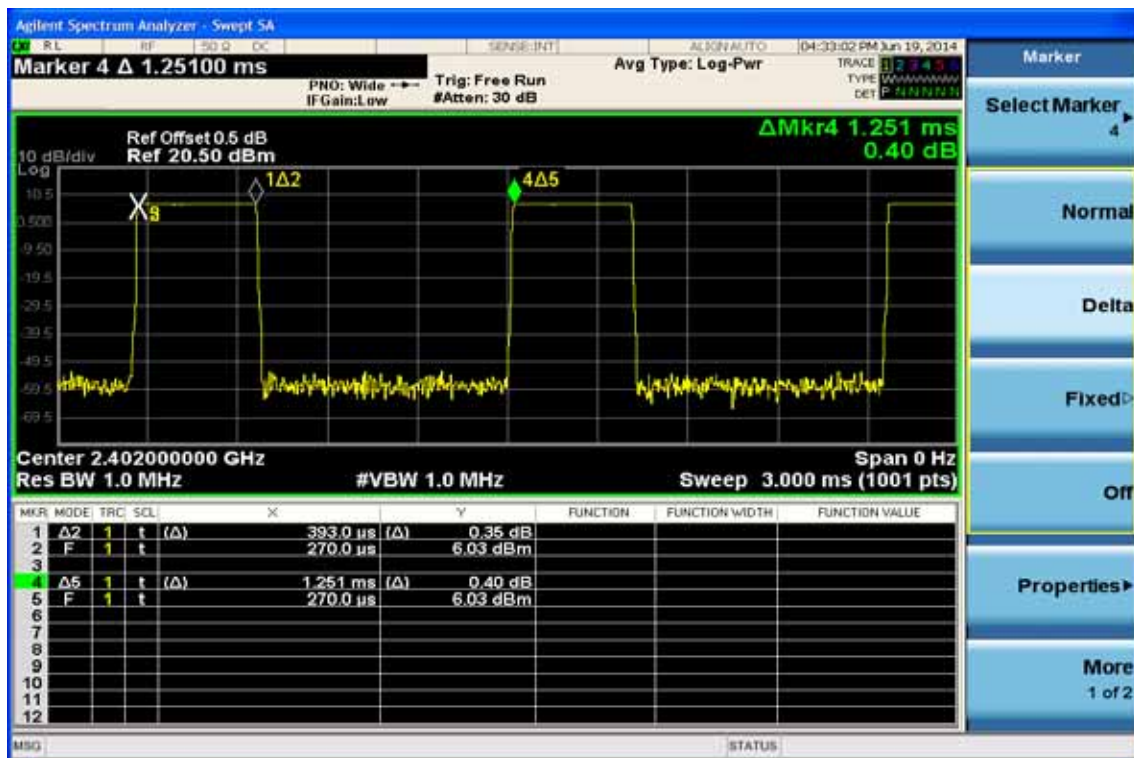
11.5. Measurement Result:

A period time = 0.4 (s) * 79 = 31.6 (s)

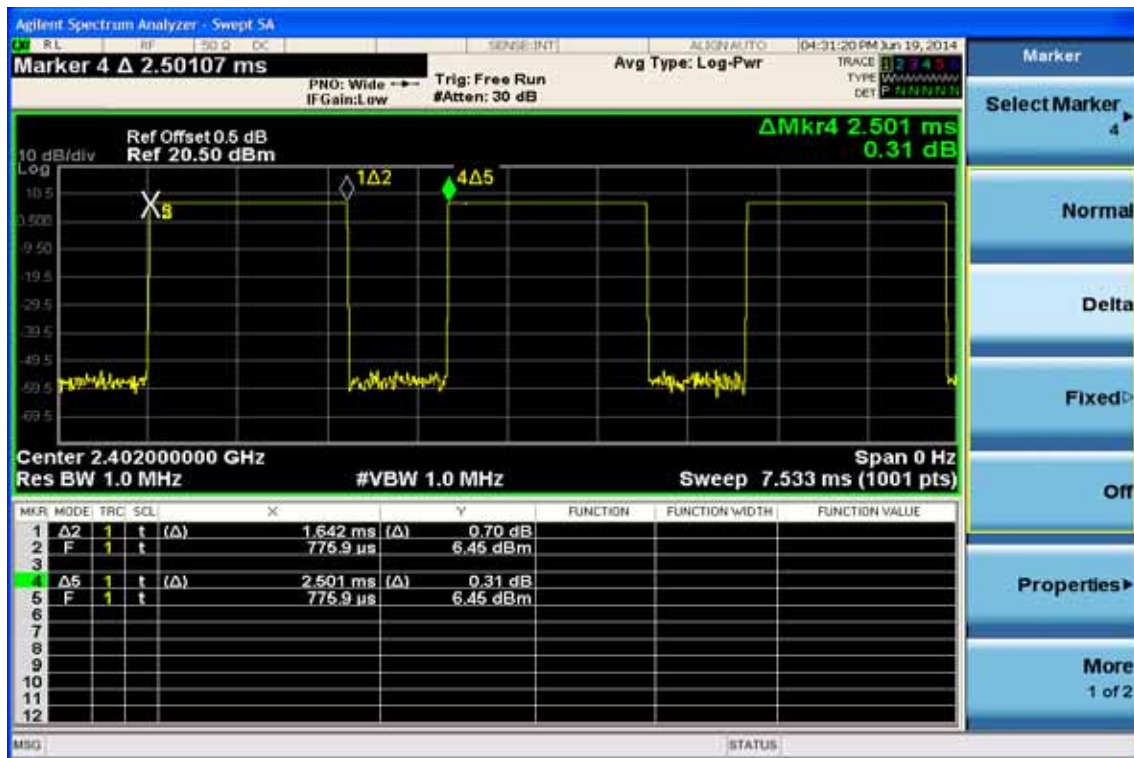
| | | | | | | | | | |
|---------|---------------|---|------------|---|-------------|---|--------|--------|------|
| CH Low | DH1 time slot | = | 0.393 (ms) | * | (1600/2/79) | * | 31.6 = | 125.76 | (ms) |
| | DH3 time slot | = | 1.642 (ms) | * | (1600/4/79) | * | 31.6 = | 262.72 | (ms) |
| | DH5 time slot | = | 2.890 (ms) | * | (1600/6/79) | * | 31.6 = | 308.27 | (ms) |
| CH Mid | DH1 time slot | = | 0.396 (ms) | * | (1600/2/79) | * | 31.6 = | 126.72 | (ms) |
| | DH3 time slot | = | 1.650 (ms) | * | (1600/4/79) | * | 31.6 = | 264.00 | (ms) |
| | DH5 time slot | = | 2.890 (ms) | * | (1600/6/79) | * | 31.6 = | 308.27 | (ms) |
| CH High | DH1 time slot | = | 0.396 (ms) | * | (1600/2/79) | * | 31.6 = | 126.72 | (ms) |
| | DH3 time slot | = | 1.657 (ms) | * | (1600/4/79) | * | 31.6 = | 265.12 | (ms) |
| | DH5 time slot | = | 2.890 (ms) | * | (1600/6/79) | * | 31.6 = | 308.27 | (ms) |

Note: Refer to next page for plots.

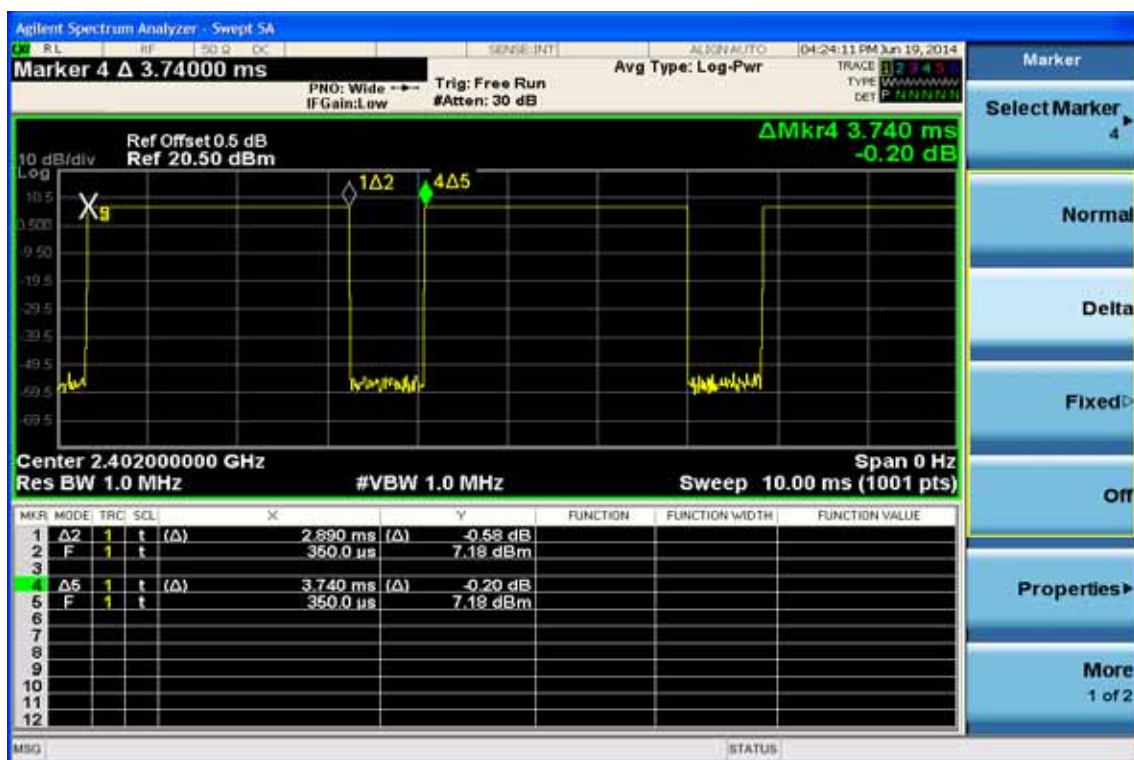
Low Channel DH1



DH3

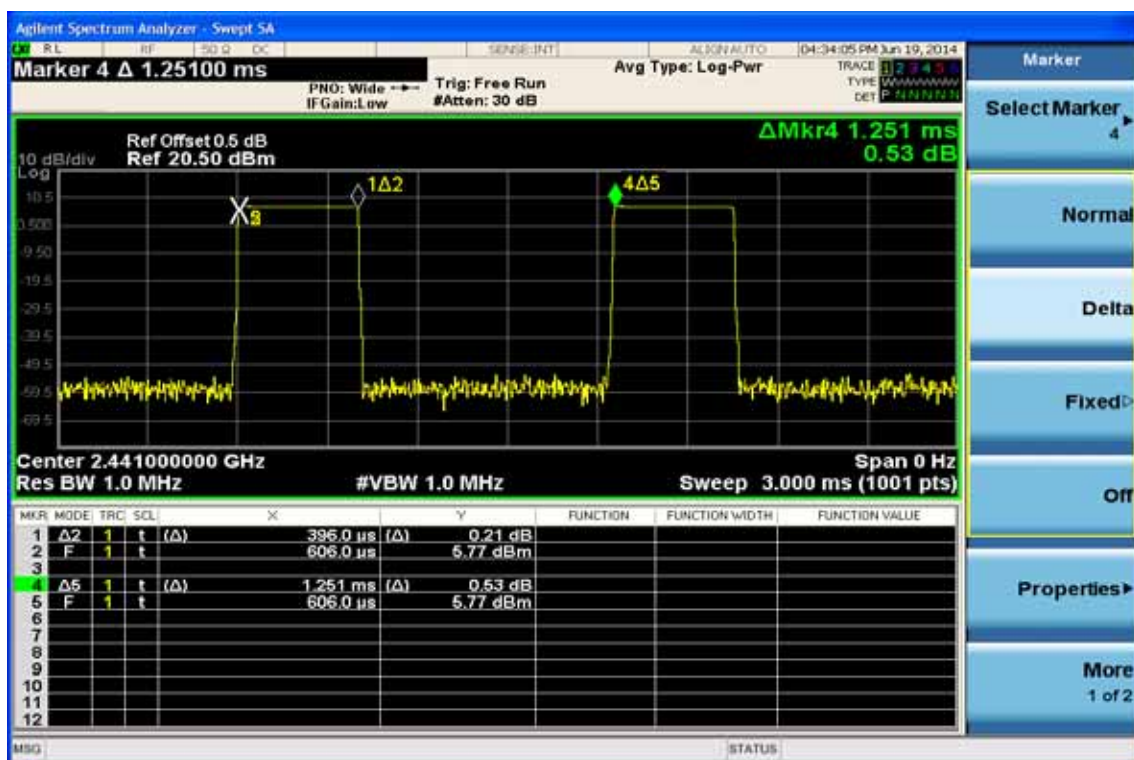


DH5

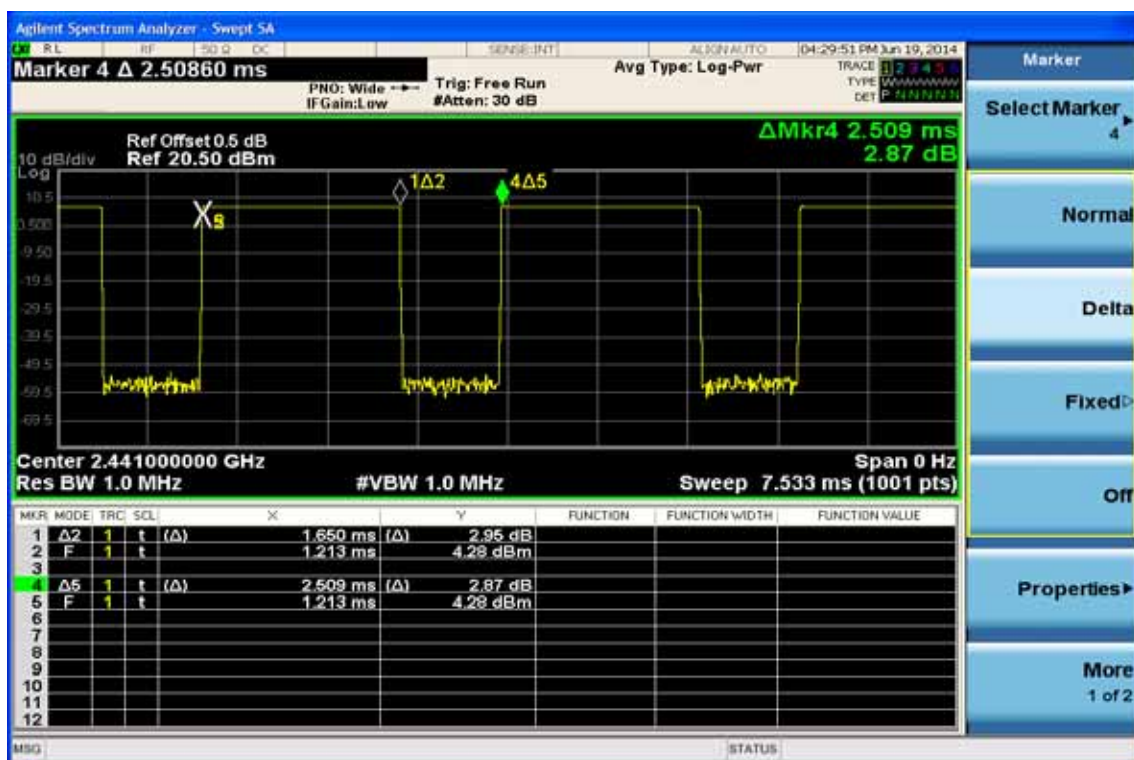


Mid Channel

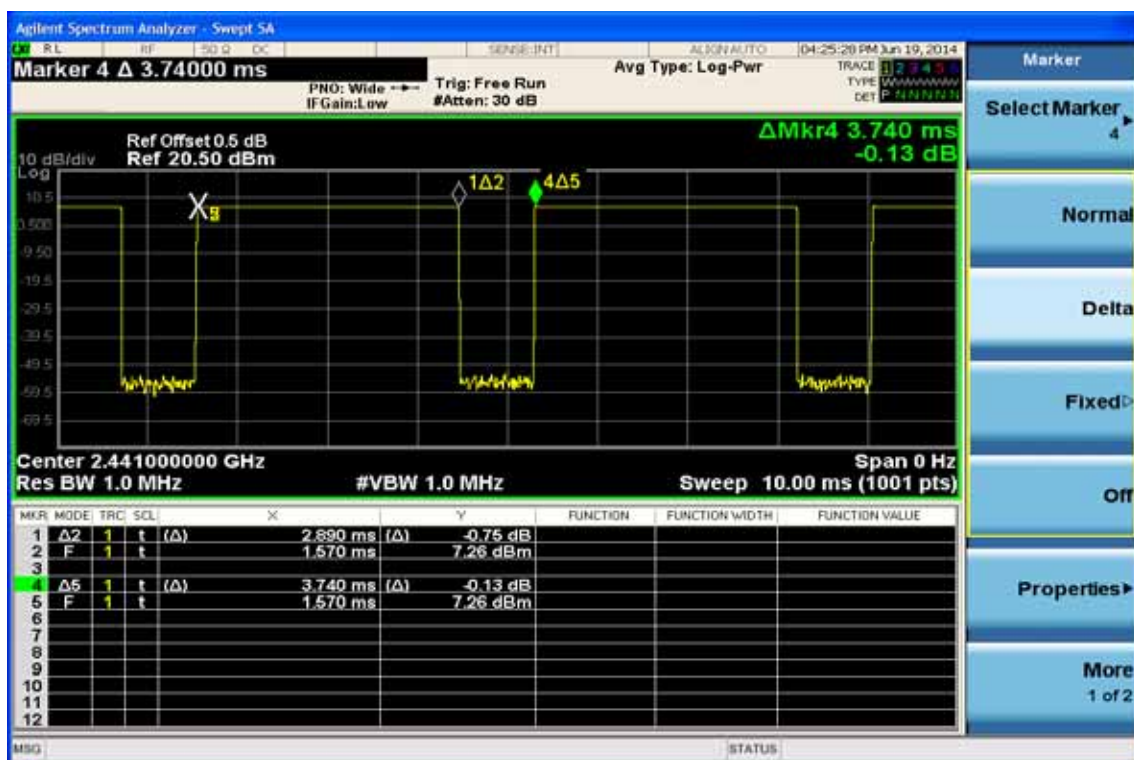
DH1



DH3

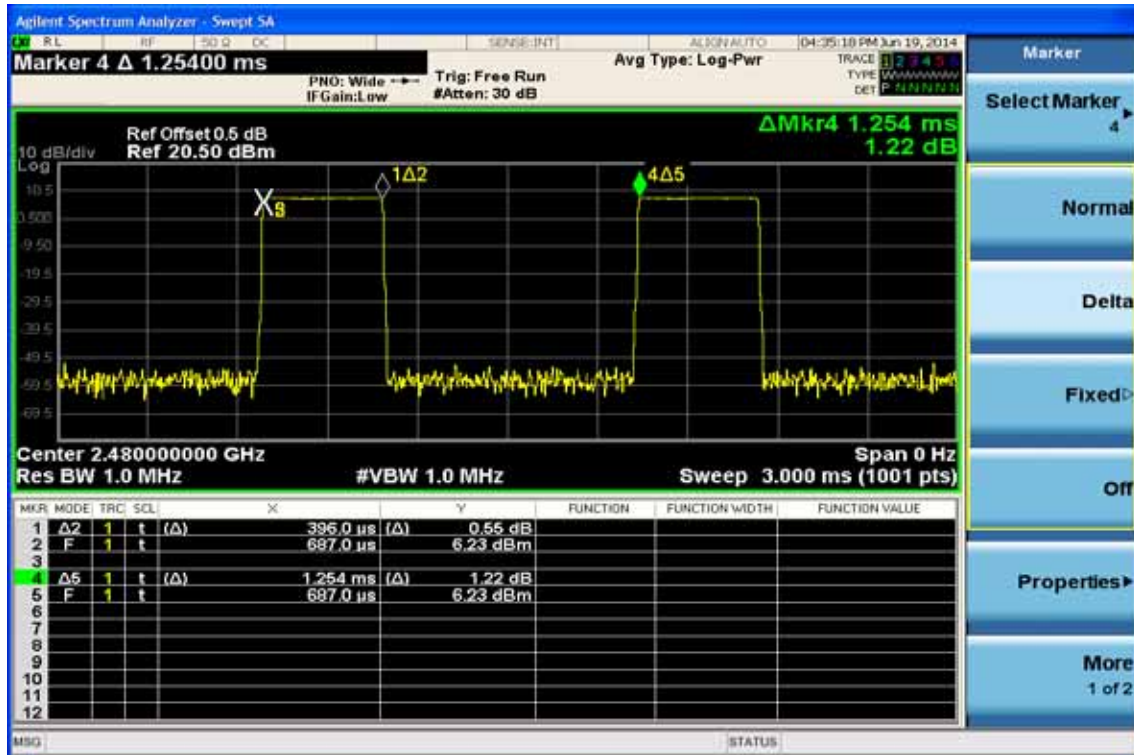


DH5

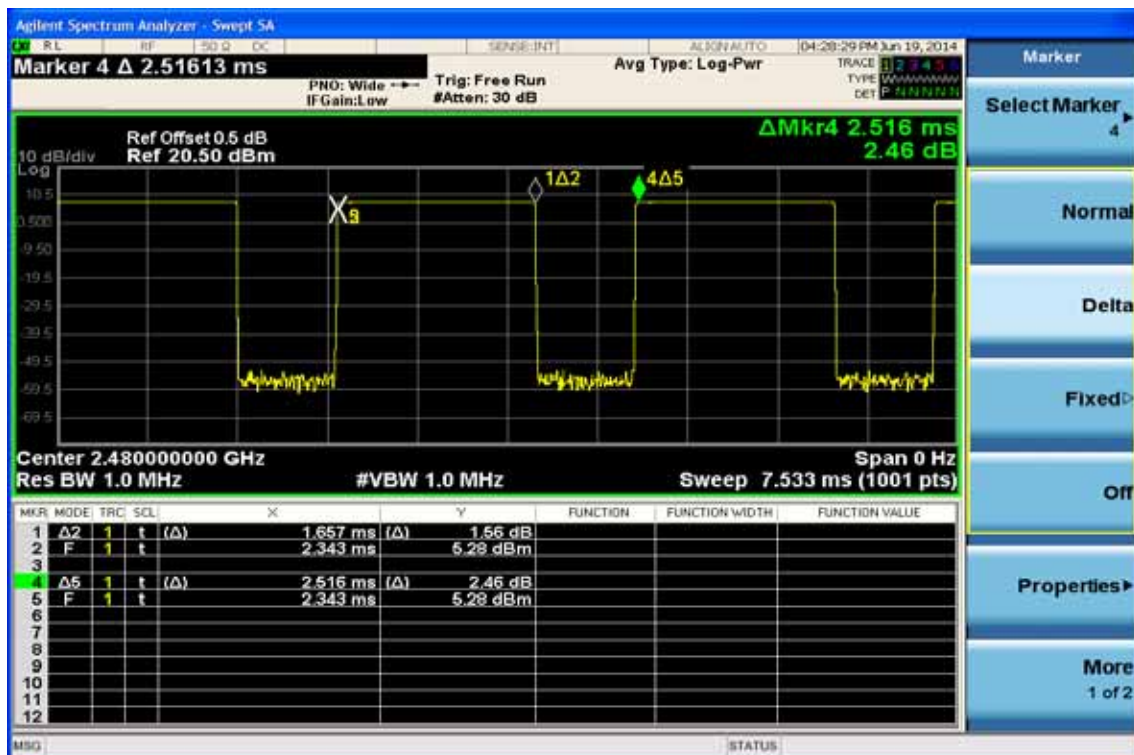


High Channel

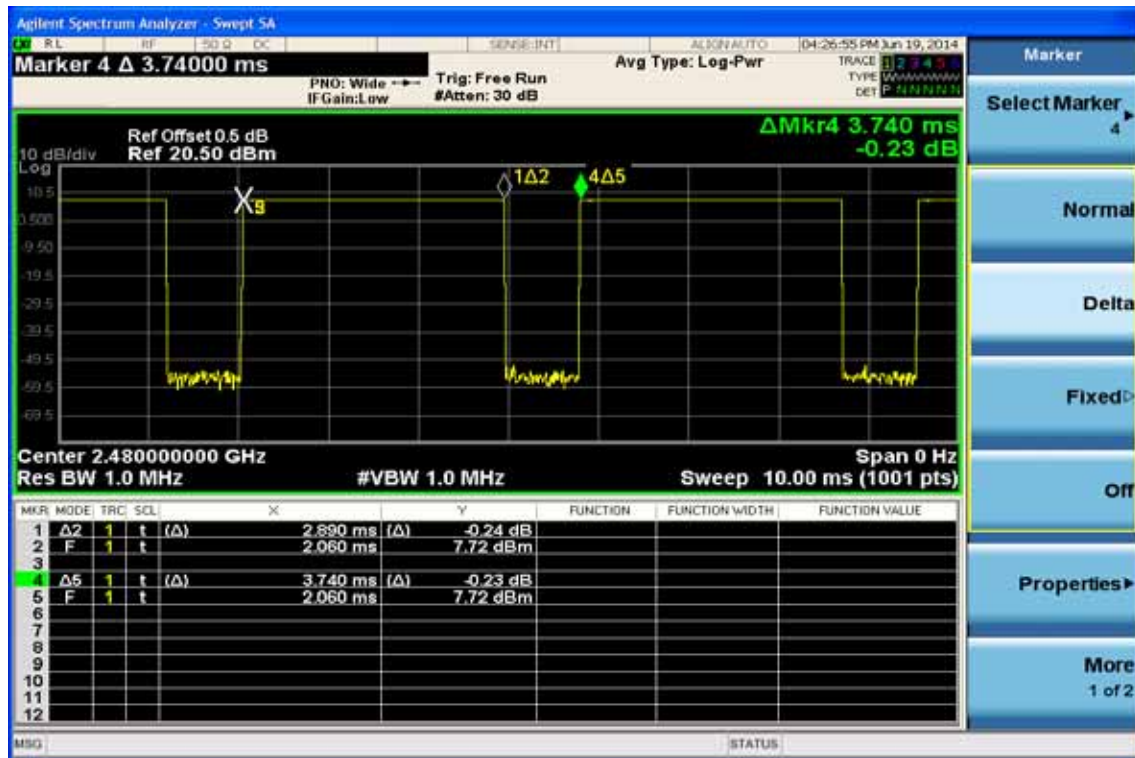
DH1



DH3



DH5



12. 20dB Bandwidth

12.1. Standard Applicable:

According to §15.247(a)(1) for frequency hopping systems operating in the 2400MHz-2483.5 MHz no limit for 20dB bandwidth.

12.2. Measurement Equipment Used:

Refer to section 6.2 for details.

12.3. Test Set-up:

Refer to section 6.3 for details.

12.4. 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=10KHz (1 % of Bandwidth.), Span= 3MHz, Sweep=auto
4. Mark the peak frequency and -20dB (upper and lower) frequency.
5. Repeat above procedures until all frequency measured were complete.

12.5. Measurement Result:

BDR Mode

| CH | 20dB Bandwidth (MHz) |
|--------|-------------------------|
| Lower | 0.9244 |
| Mid | 0.9250 |
| Higher | 0.9251 |

EDR 2M Mode

| CH | 20dB Bandwidth (MHz) | 2/3* 20dB Bandwidth (MHz) |
|--------|-------------------------|---------------------------------|
| Lower | 1.244 | 0.829 |
| Mid | 1.248 | 0.832 |
| Higher | 1.275 | 0.850 |

EDR 3M Mode

| CH | 20dB Bandwidth (MHz) | 2/3* 20dB Bandwidth (MHz) |
|--------|-------------------------|---------------------------------|
| Lower | 1.268 | 0.845 |
| Mid | 1.285 | 0.857 |
| Higher | 1.297 | 0.865 |

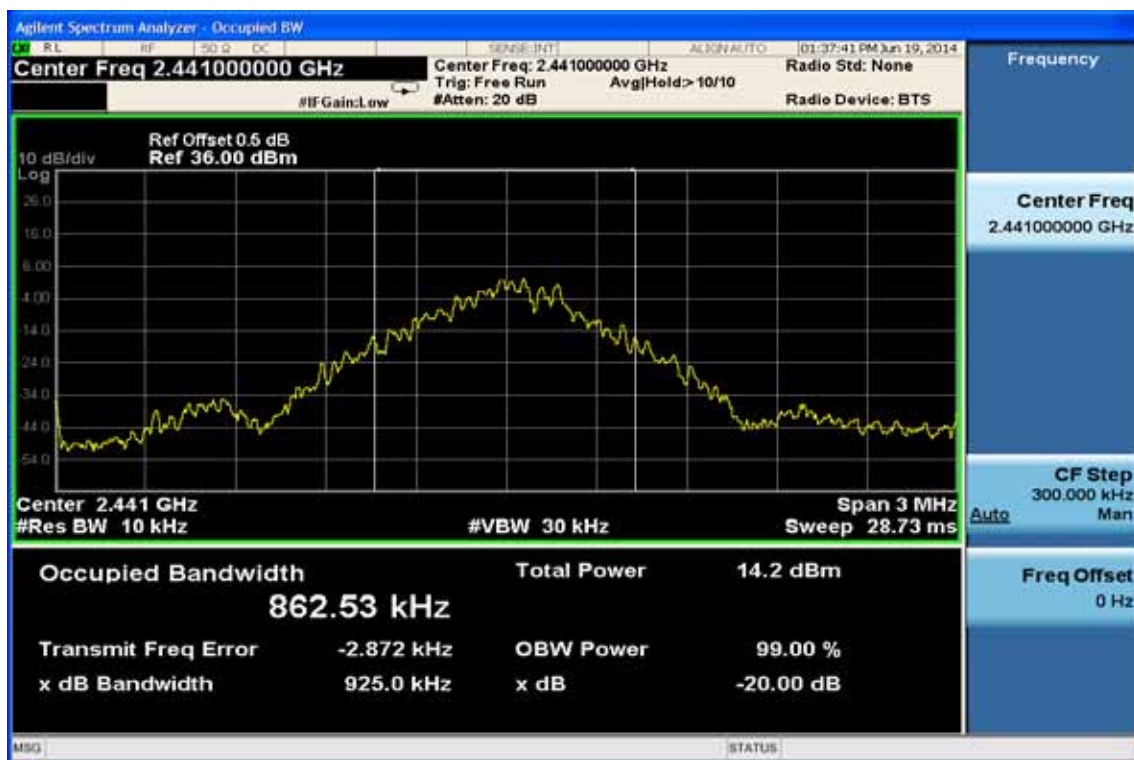
Note: Refer to next page for plots.

BDR Mode

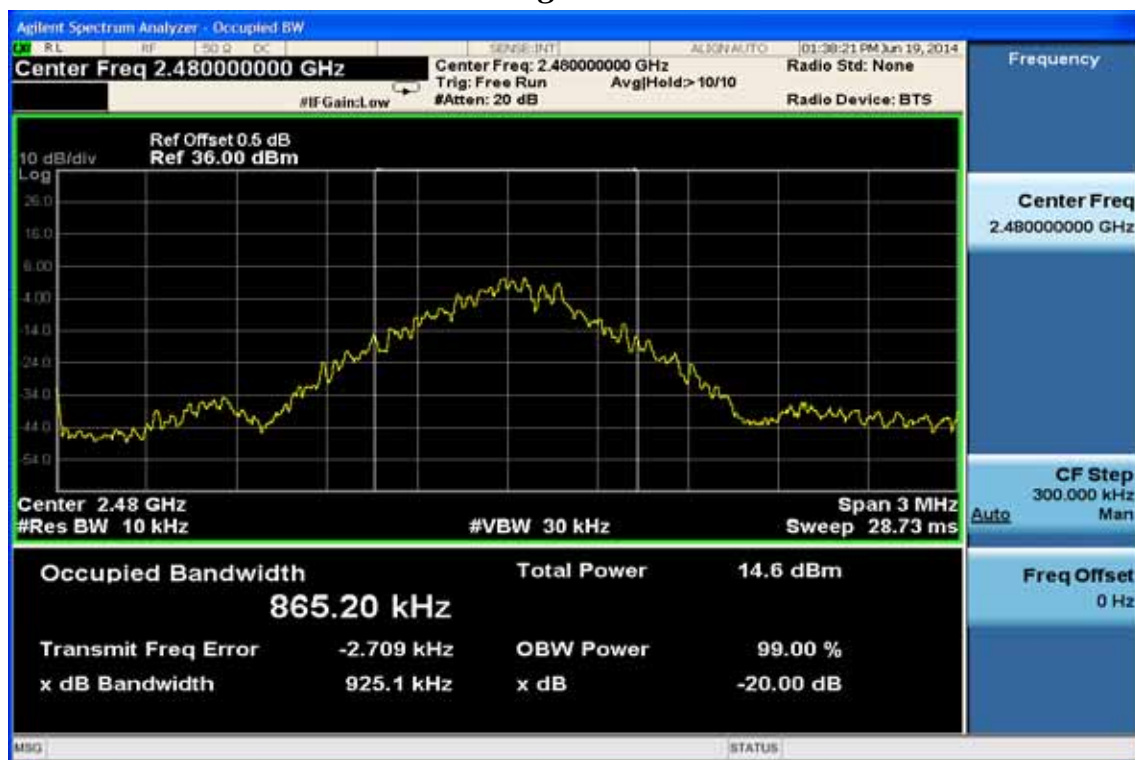
20dB Bandwidth Test Data CH-Low



20dB Bandwidth Test Data CH-Mid

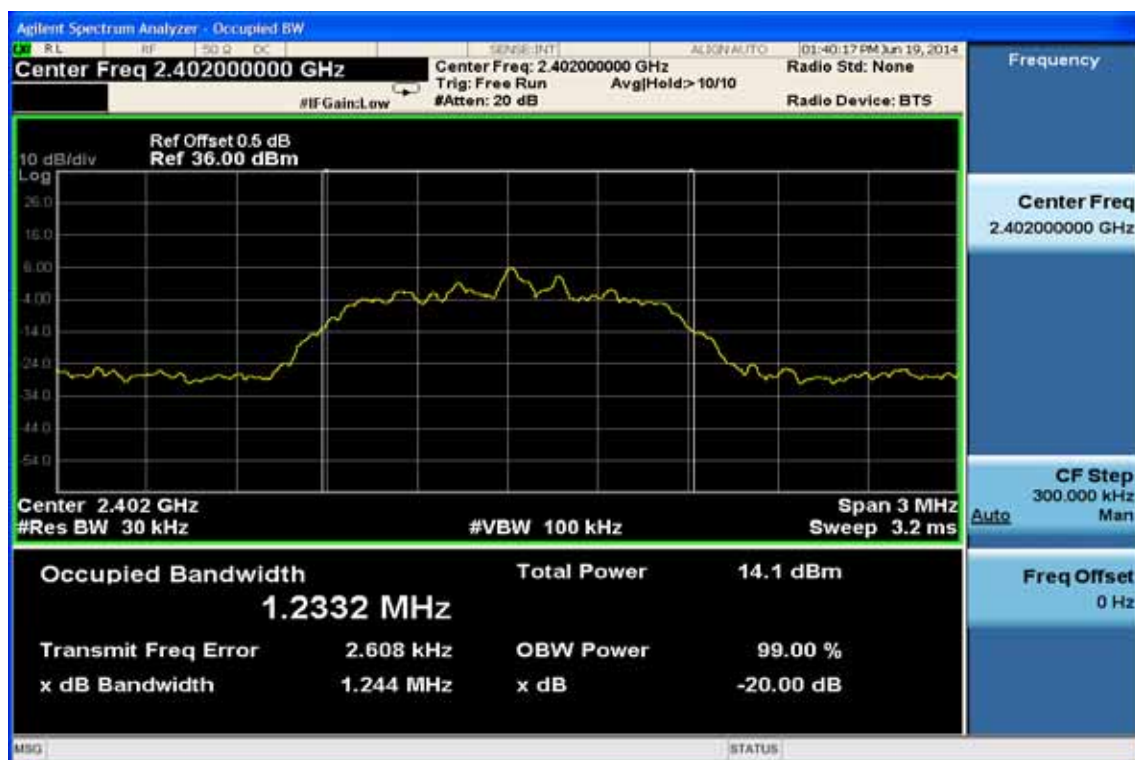


20dB Bandwidth Test Data CH-High



EDR 2M Mode

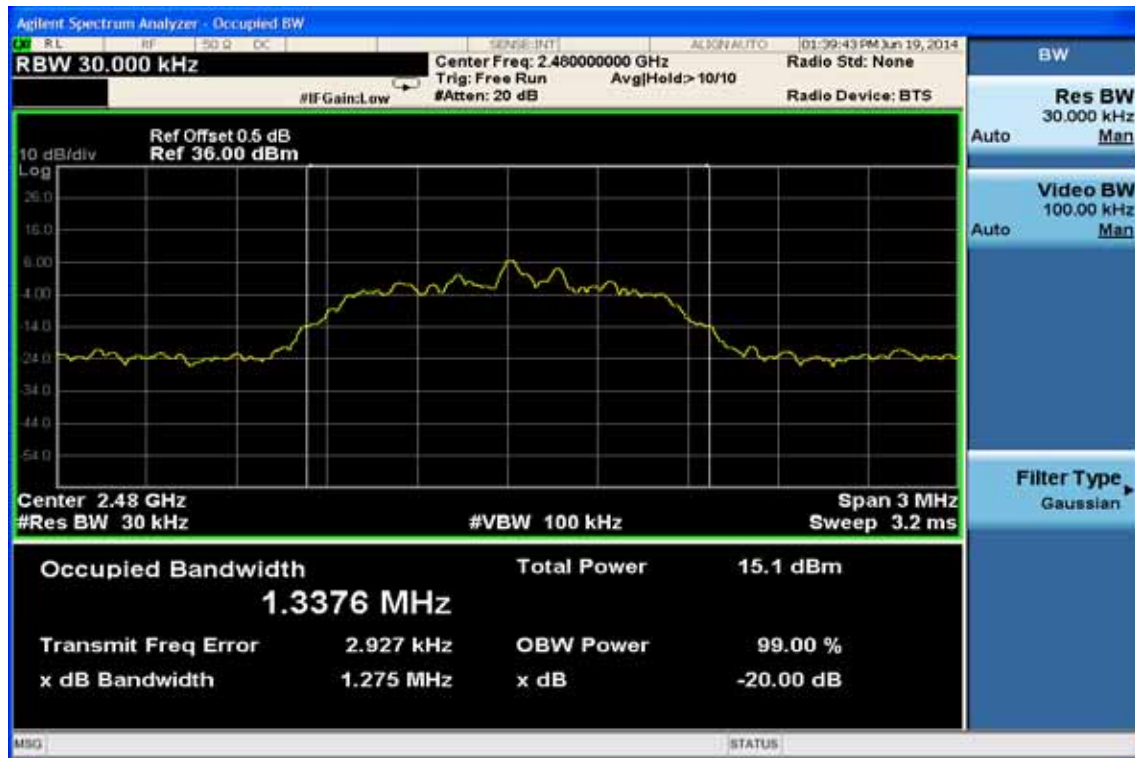
20dB Bandwidth Test Data CH-Low



20dB Bandwidth Test Data CH-Mid

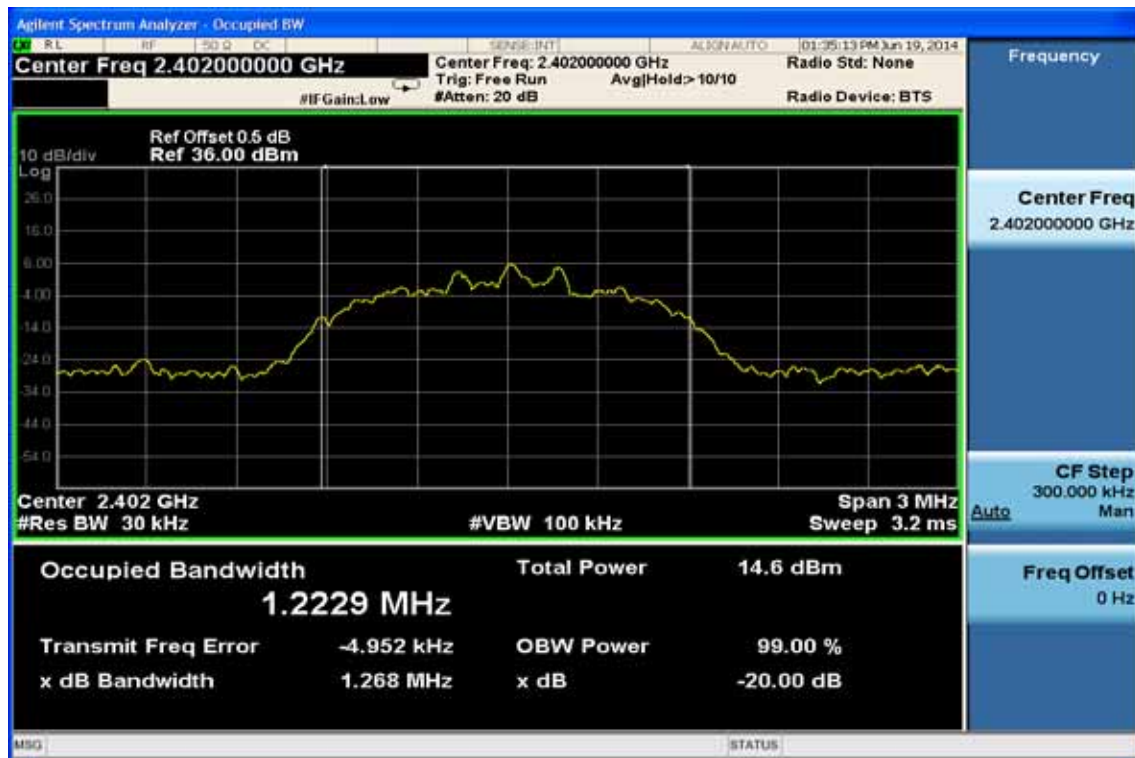


20dB Bandwidth Test Data CH-High

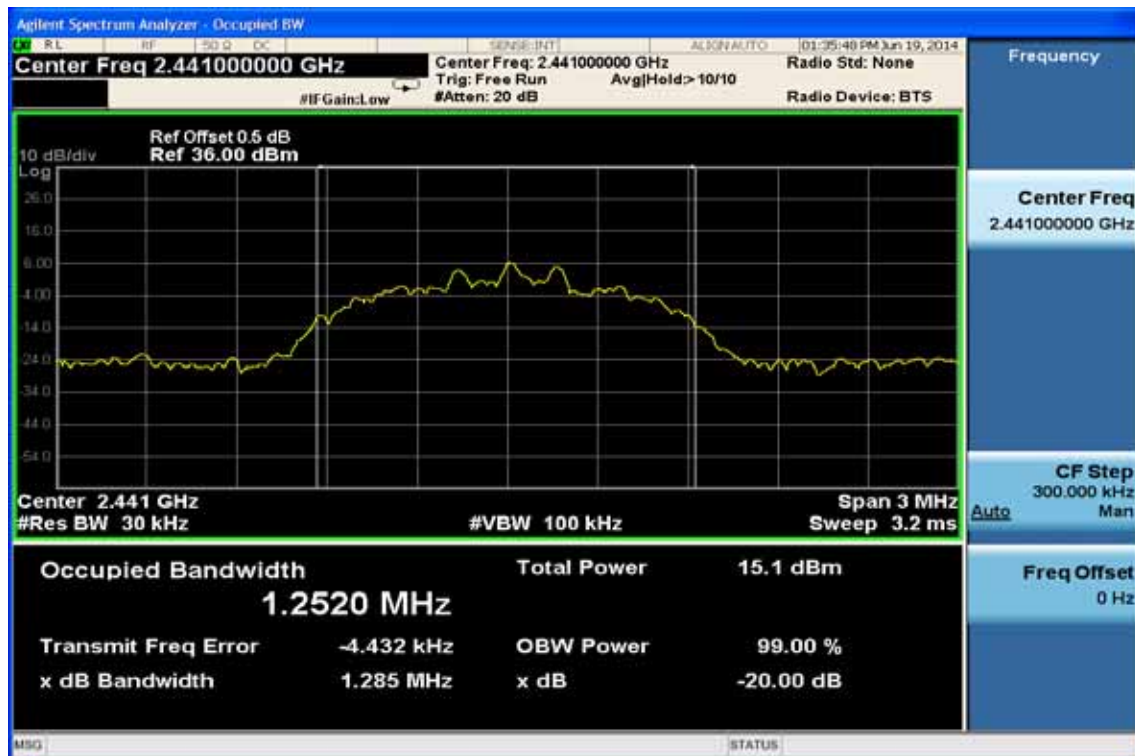


EDR 3M Mode

20dB Bandwidth Test Data CH-Low



20dB Bandwidth Test Data CH-Mid



20dB Bandwidth Test Data CH-High



13. ANTENNA REQUIREMENT

13.1. Standard Applicable:

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.

And according to §15.247(c), if transmitting antennas of directional gain greater than 6dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

13.2. Antenna Connected Construction:

The directional gains of antenna used for transmitting is -0.62dBi, and the antenna type is printed antenna which is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

14. RF EXPOSURE

14.1. Standard Applicable

According to §2.1093 this is a Portable device.

According to KDB 447498 D01 V5, Appendix A SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and ≤ 50 mm, the power level 10mW at 5 mm.

This is a Portable device.

14.2. Measurement Result:

This is a portable device and the Max. peak output power is 8.36dBm (6.85 mW) lower than low threshold 10 mW (24.48mW), d at 5mm in general population category.

The SAR measurement is not necessary.