ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

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

OF

Product Name:	**Tablet Computer**
Brand Name:	acer
Marketing Name:	**A3-A30**
Model No.:	**A5003**
Model Difference:	**N/A**
FCC ID:	**HLZA5003**
IC:	**1754F-A5003**
Report No.:	**E2/2015/20016**
Issue Date:	**Apr. 08, 2015**
FCC Rule Part:	**§15.247, Cat: DSS**
IC Rule Part:	**RSS-210 issue 8 :2010, Annex 8**
Prepared for:	**Acer Incorporated** **8F., No.88, Sec. 1, Hsintai 5th Rd., Hsichih, New Taipei City 22181, Taiwan (R.O.C.)**
Prepared by:	**SGS Taiwan Ltd.** **Electronics & Communication Laboratory** **No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333**

ilac-MRA TAF Testing Laboratory 0513

VERIFICATION OF COMPLIANCE

Applicant:	Acer Incorporated 8F., No.88, Sec. 1, Hsintai 5th Rd., Hsichih, New Taipei City 22181, Taiwan (R.O.C.)
Product Name:	Tablet Computer
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Marketing Name:	A3-A30
Model No.:	A5003
Model Difference:	N/A
FCC ID:	HLZA5003
IC:	1754F-A5003
File Number:	E2/2015/20016
Date of test:	Feb. 25, 2015 ~ Apr. 08, 2015
Date of EUT Received:	Feb. 25, 2015

We hereby certify that:

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

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

Test By:	Marcus Tseng	***Date:***	Apr. 08, 2015
	Marcus Tseng / Engineer		
Prepared By:	Allen Tsai	***Date:***	Apr. 08, 2015
	Allen Tsai / Engineer		
Approved By:	Jim Chang	***Date:***	Apr. 08, 2015
	Jim Chang / Asst. Manager		

Revision History

Report Number	Revision	Description	Issue Date
E2/2015/20016	Rev.00	Initial creation of document	Apr. 08, 2015

Table of Contents

1. GENERAL INFORMATION

1.1. Product description

General:

Product Name:	Tablet Computer	
Brand Name:	acer	
Marketing Name:	A3-A30	
Model No.:	A5003	
Model Difference:	N/A	
Product SW/HW version:	Acer_AV0L0_A3-A30_RV01RZ01_WW_CUS1 / E0	
Radio SW/HW version:	1.5.1.2 / WCN3620	
Test SW Version:	1.5.1.2	
USB Cable	Model No.: 3080199058, Supplier: 坤記	
Power Supply:	3.8Vdc from Rechargeable Li-polymer Battery or 5.35V from AC/DC Adapter	
	Battery:	Model No.:AP14A4M, Supplier: SONY
	Adapter :	1. Model No.: PA-1100-25, Supplier: LITEON. 2. Model No.: ADP-10HW A, Supplier: DELTA.

Bluetooth_BR+EDR:

Bluetooth Version:	V4.0 dual mode
Channel number:	79 channels
Modulation type:	GFSK + π/4DQPSK + 8DPSK
Transmit Power:	7.97dBm
Frequency Range:	2.402GHz – 2.480GHz
Emission Designation:	1M21F1D
Antenna Designation:	PCB Wire Antenna, Gain: 1.9dBi Model No.: QTNKFWIPB01+A, Supplier: Wgt

1.2 Product Feature of Equipment Under Test

The equipment under Test (Hereafter Called: EUT) is mobile phone supporting, ,Wi-Fi 802.11abgn & ac, Bluetooth with NFC features, and below is details of information.

Product Feature	
Product Name:	Tablet Computer
Brand Name:	acer
Type No.:	A3-A30
Model Difference:	A5003
FCC ID	HLZA5003
IC ID	1754F-A5003
Wi-Fi Specification	802.11a/b/g/n/ac
Bluetooth Version	V4.0 dual mode + HS
NFC Specification	NFC

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

1.3. Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247

FCC KDB 558074 D01 DTS Meas. Guidance V03r02

ANSI C63.10:2013

IC RSS 210 issue 8:2010 Annex 8

RSS-Gen. issue 4

Note:

1. All test items have been performed and record as per the above standards.
2. The composite system is compliance with FCC Subpart B is authorized under the certification procedure.
3. The EUT was placed 1.5m height for frequency above 1GHz in accordance with ANSI C63. 10 :2013

1.4. Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan. (TAF code 0513)

FCC Registration Numbers are: 628985

Canada Registration Number: 4620A

1.5. Special Accessories

There is no special accessory used while test was conducted.

1.6. Equipment Modifications

There was no modification incorporated into the EUT.

2. SYSTEM TEST CONFIGURATION

2.1. EUT Configuration

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

2.2. EUT Exercise

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

2.3. Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz,. The CISPR Quasi-Peak and Average detector mode is employed according to §15.107. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

2.3.2 Radiated Emissions

The EUT is 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 and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.

2.4. Measurement Results Explanation Example

For all conducted test items:

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

Note:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Following shows an offset computation example with cable loss 4.8 dB.

2.5. Configuration of Tested System

Fig. 2-1 Conducted (Antenna Port) Configuration

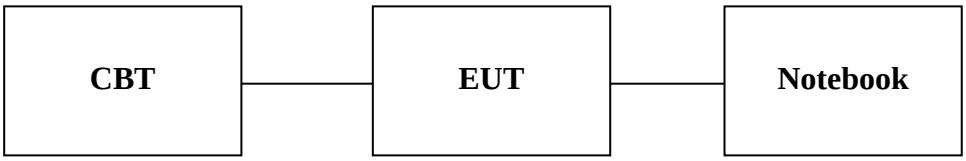
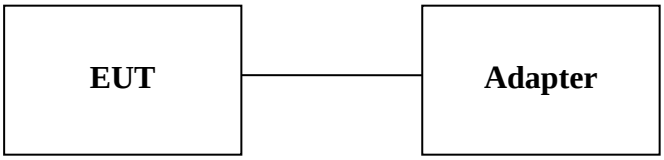


Fig. 2-2 Radiated Emission Configuration



Remote Side

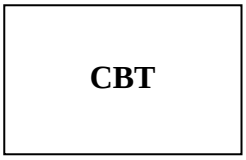


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	Bluetooth Test Software	N/A	N/A	N/A	N/A	N/A
2.	Bluetooth Test Set	R&S	CBT	101140	Shielded	Unshielded
3.	Notebook	Lenovo	L430	R9-YYG88	Shield	Un-shield

Fig. 2-3 AC Power Line Conducted Emission

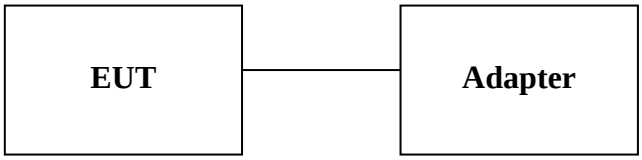


Table 2-2 Equipment Used in Tested System

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

3. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207(a) RSS-Gen §8.8	AC Power Line Conducted Emission	Compliant
§15.247(b) (3) RSS-210 issue 8,§A8.4(2)	Peak Output Power	Compliant
§15.247(a)(2) RSS210 issue ,§A8.1(a) RSS-Gen §6.6	20dB Bandwidth & 99% Power Bandwidth	Compliant
§15.247(d) RSS-210 issue 8,§A8.5	Conducted Band Edge and Spurious Emission	Compliant
§15.247(d) RSS-Gen §8.9 RSS-210 issue 8,§A8.5	Radiated Band Edge and Spurious Emission	Compliant
§15.247(a)(1) RSS-210 issue 8,§A8.1(b)	Frequency Separation	Compliant
§15.247(a)(1)(iii) RSS-210 issue 8,§A8.1(d)	Number of hopping frequency	Compliant
§15.247(a)(1)(iii) RSS-210 issue 8,§A8.1(d)	Time of Occupancy	Compliant
§15.203 §15.247(b) RSS- Gen 4 §6.7 RSS- Gen 4 §8.3	Antenna Requirement	Compliant

4. DESCRIPTION OF TEST MODES

3.1. Operated in 2400 ~ 2483.5MHz Band

79 channels are provided for Bluetooth

CH	FREQUENCY	CH	FREQUENCY	CH	FREQUENCY	CH	FREQUENCY
0	2402 MHz	20	2422 MHz	40	2442 MHz	70	2462 MHz
1	2403 MHz	21	2423 MHz	41	2443 MHz	71	2463 MHz
2	2404 MHz	22	2424 MHz	42	2444 MHz	72	2464 MHz
3	2405 MHz	23	2425 MHz	43	2445 MHz	73	2465 MHz
4	2406 MHz	24	2426 MHz	44	2446 MHz	74	2466 MHz
5	2407 MHz	25	2427 MHz	45	2447 MHz	75	2467 MHz
6	2408 MHz	26	2428 MHz	46	2448 MHz	76	2468 MHz
7	2409 MHz	27	2429 MHz	47	2449 MHz	77	2469 MHz
8	2410 MHz	28	2430 MHz	48	2450 MHz	78	2470 MHz
9	2411 MHz	29	2431 MHz	49	2451 MHz	79	2471 MHz
10	2412 MHz	30	2432 MHz	50	2452 MHz	70	2472 MHz
11	2413 MHz	31	2433 MHz	51	2453 MHz	71	2473 MHz
12	2414 MHz	32	2434 MHz	52	2454 MHz	72	2474 MHz
13	2415 MHz	33	2435 MHz	53	2455 MHz	73	2475 MHz
14	2416 MHz	34	2436 MHz	54	2456 MHz	74	2476 MHz
15	2417 MHz	35	2437 MHz	55	2457 MHz	75	2477 MHz
16	2418 MHz	36	2438 MHz	56	2458 MHz	76	2478 MHz
17	2419 MHz	37	2439 MHz	57	2459 MHz	77	2479 MHz
18	2420 MHz	38	2440 MHz	58	2460 MHz	78	2480 MHz
19	2421 MHz	39	2441 MHz	59	2461 MHz		

3.2. The Worst Test Modes and Channel Details

1 The EUT has been tested under operating condition.
2 Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.
3 Investigation has been done on all the possible configurations for searching the worst case.

RADIATED EMISSION TEST:

RADIATED EMISSION TEST (BELOW 1 GHz)					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	PACKET TYPE	ANTENNA PORT
Bluetooth	0 to 78	0,39,78	GFSK	DH5	MAIN
RADIATED EMISSION TEST (ABOVE 1 GHz)					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	PACKET TYPE	ANTENNA PORT
Bluetooth	0 to 78	0,39,78	GFSK	DH5	MAIN

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

ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST					
Peak Output Power, 20dB Band Width					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	PACKET TYPE	ANTENNA PORT
Bluetooth	0 to 78	0,39,78	GFSK	DH5	MAIN
	0 to 78	0,39,78	π/4-DQPSK	DH5	MAIN
	0 to 78	0,39,78	8-DPSK	DH5	MAIN
Band Edge					
Bluetooth	0 to 78	0,78	GFSK	DH5	MAIN
Frequency Separation					
Bluetooth	0 to 78	0,1,2	GFSK	DH5	MAIN
Number of hopping frequency					
Bluetooth	0 to 78	0 to 78	GFSK	DH5	MAIN
Time of Occupancy (Dwell time)					
Bluetooth	0 to 78	0,39,78	GFSK	DH1/DH3/DH5	MAIN
Bluetooth	0 to 78	39	π/4-DQPSK	DH1/DH3/DH5	MAIN
Bluetooth	0 to 78	39	8-DPSK	DH1/DH3/DH5	MAIN

5. MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
Peak Output Power	+/- 0.84 dB
20dB/ 99% Bandwidth	+/- 51.33 Hz
100 KHz Bandwidth Of Frequency Band Edges	+/- 1.55 dB
Frequency Separation	+/- 51.33 Hz
Number of hopping frequency	+/- 51.33 Hz
Time of Occupancy	+/- 51.33 Hz
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC= +/- 0.2%

Radiated Spurious Emission:

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

Measurement uncertainty (Polarization : **Horizontal**)	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.

6. CONDUCTED EMISSION TEST

6.1. Standard Applicable

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

Frequency range	Limits dB(uV)	
MHz	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note 1.The lower limit shall apply at the transition frequencies 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

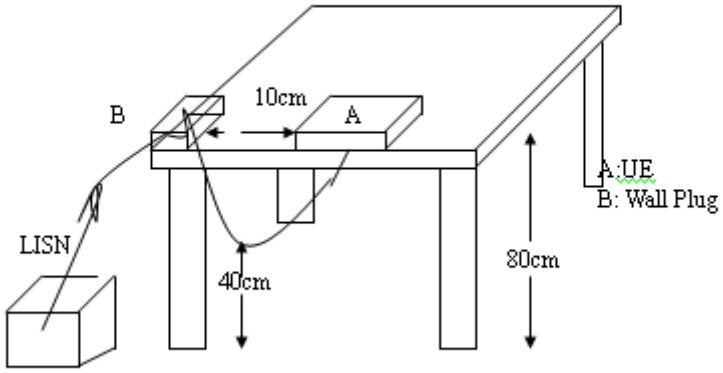
6.2. Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
EMI Test Receiver	R&S	ESCI 3	101311	06/20/2014	06/19/2015
LISN	Schwarzbeck	NSLK 8127	8127-648	06/10/2014	06/09/2015
LISN	Rolf-Heine	NNB-2/16Z	99012	03/04/2015	03/03/2016
Coaxial Cables	N/A	N30N30-1042-150cm	N/A	01/06/2015	01/07/2016

6.3. EUT Setup

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI 63.10:2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

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



6.5. Measurement Procedure

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

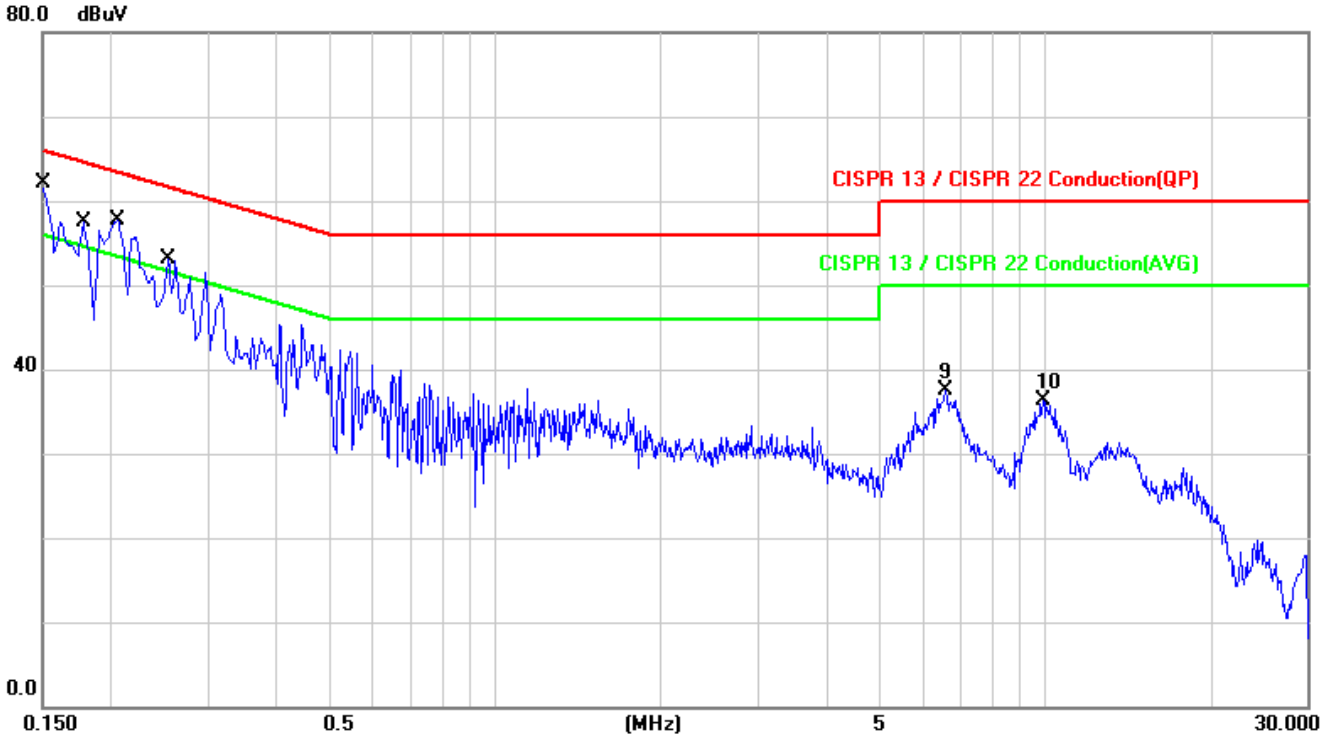
6.6. Measurement Result

Note: Refer to next page for measurement data and plots.

Note2: The * reveals the worst-case results that closet to the limit

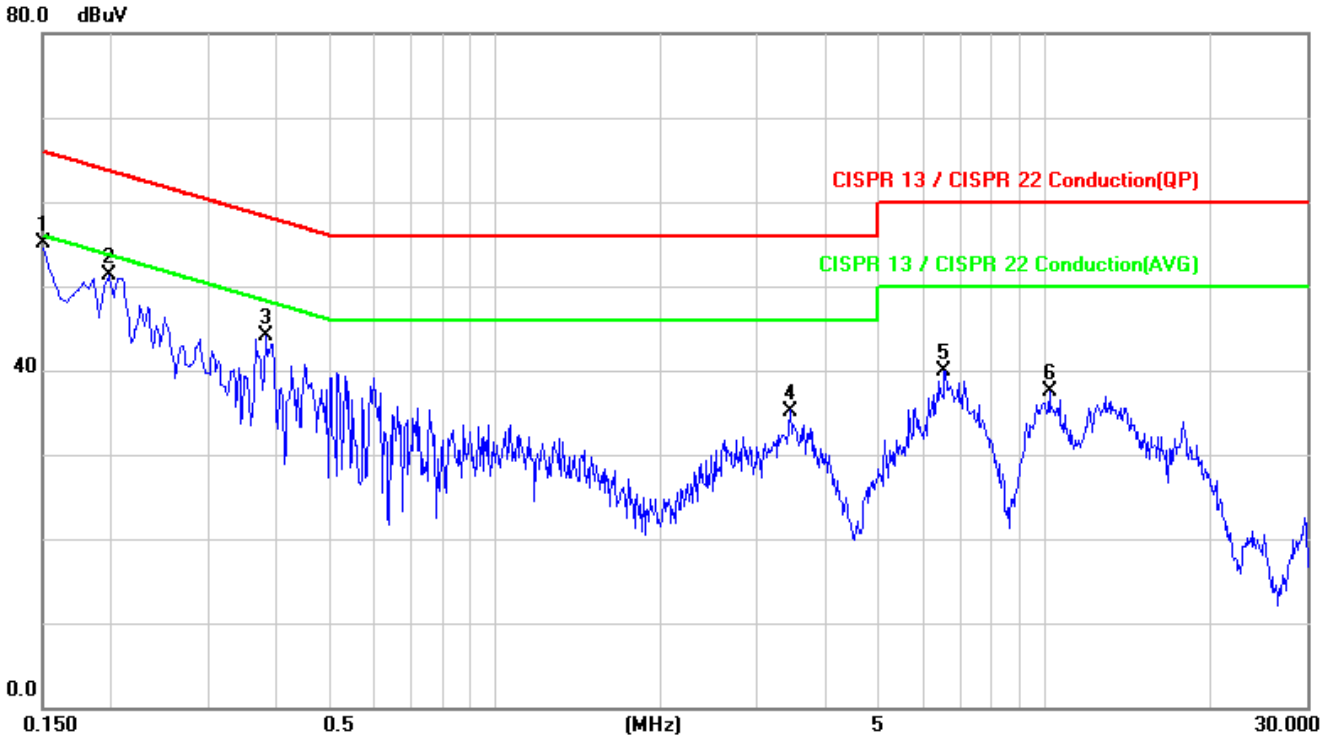
AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation mode			Test Date:	Mar. 26, 2015
Temperature:	21 ℃	Humidity:	70 %	Test By:	Vito
Model No.:	PA-1100-25				
Phase:	L1				



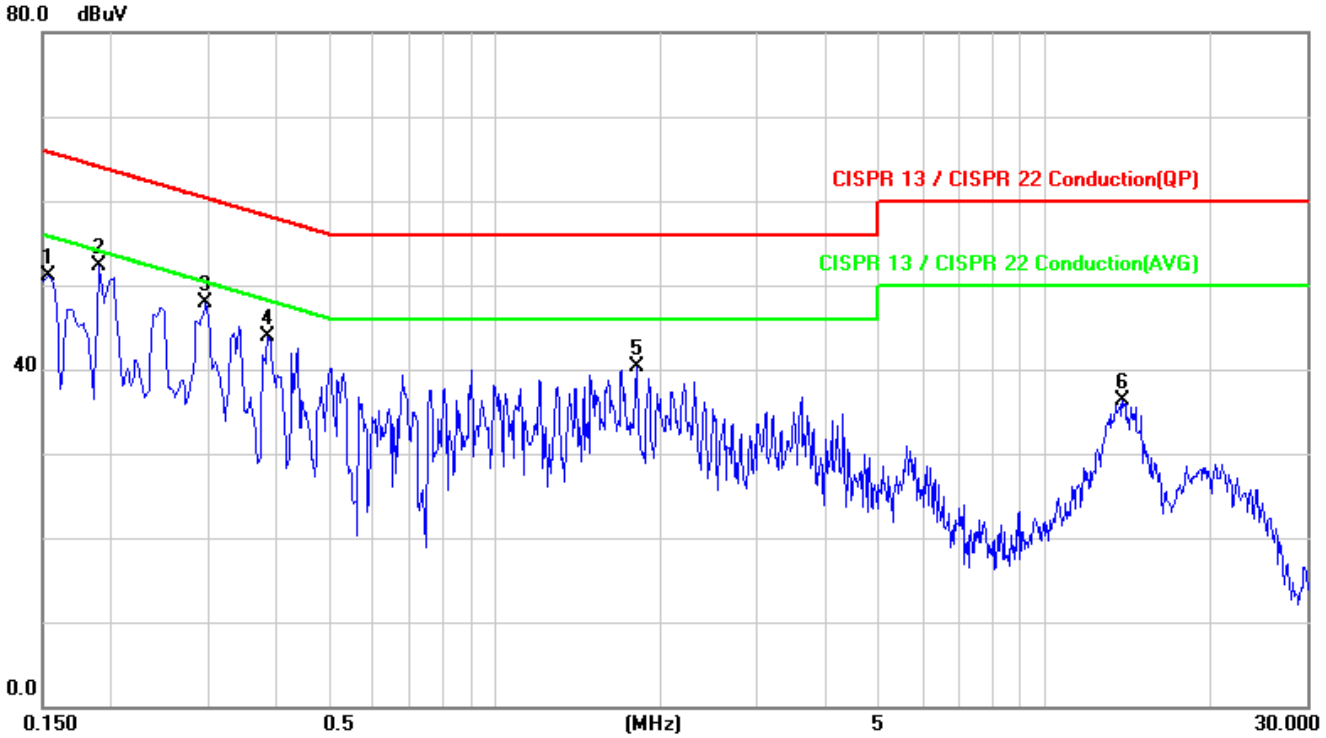
No.	Mk.	Freq. (MHz)	Reading dBuV	Factor (dB)	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector	Comment
1	*	0.1516	54.40	0.12	54.52	65.91	-11.39	QP	
2		0.1516	38.70	0.12	38.82	55.91	-17.09	AVG	
3		0.1780	49.90	0.12	50.02	64.58	-14.56	QP	
4		0.1780	35.40	0.12	35.52	54.58	-19.06	AVG	
5		0.2060	50.80	0.12	50.92	63.37	-12.45	QP	
6		0.2060	37.30	0.12	37.42	53.37	-15.95	AVG	
7		0.2540	45.20	0.12	45.32	61.63	-16.31	QP	
8		0.2540	30.40	0.12	30.52	51.63	-21.11	AVG	
9		6.6020	37.11	0.32	37.43	60.00	-22.57	peak	
10		9.9580	35.91	0.40	36.31	60.00	-23.69	peak	

Operation Mode:	Operation mode			Test Date:	Mar. 26, 2015
Temperature:	21 ℃	Humidity:	70 %	Test By:	Vito
Model No.:	PA-1100-25				
Phase:	N				



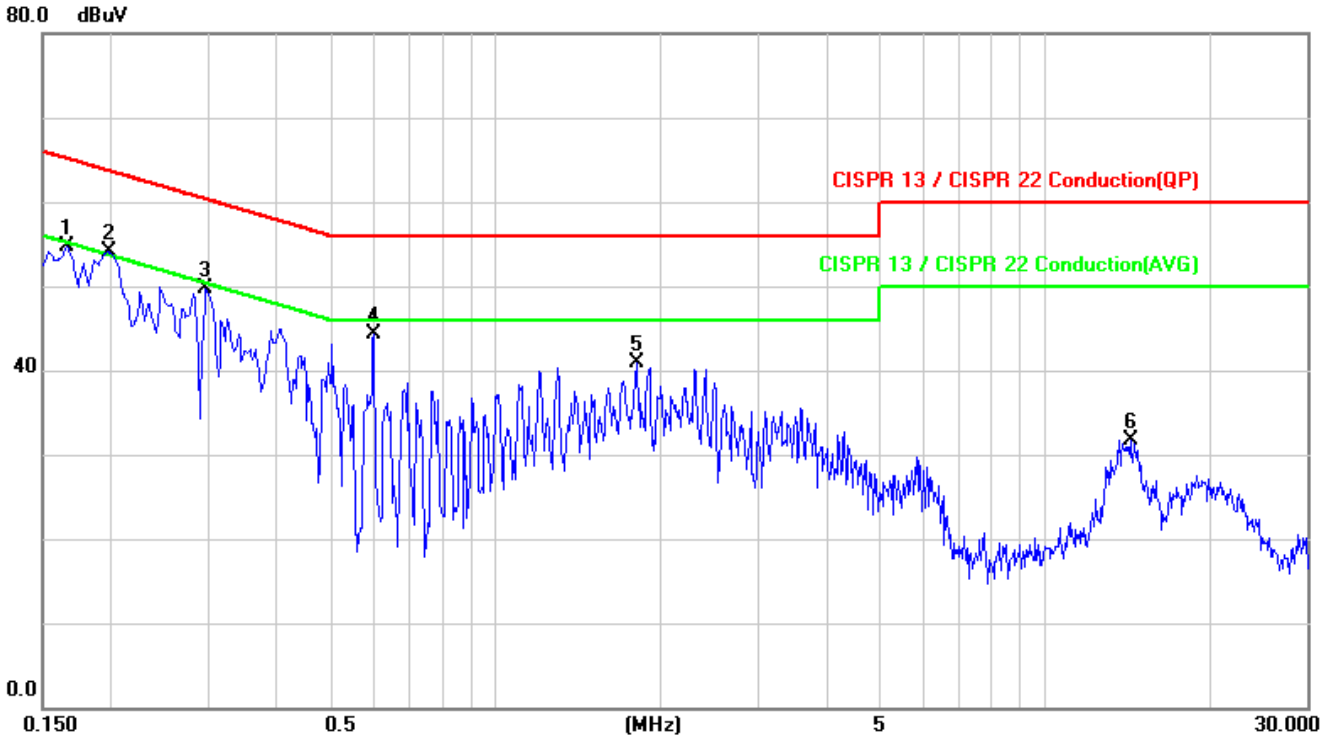
No.	Mk.	Freq. (MHz)	Reading dBuV	Factor (dB)	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector	Comment
1	*	0.1500	54.98	0.12	55.10	66.00	-10.90	peak	
2		0.1980	51.17	0.12	51.29	63.69	-12.40	peak	
3		0.3820	44.01	0.12	44.13	58.24	-14.11	peak	
4		3.4420	34.97	0.23	35.20	56.00	-20.80	peak	
5		6.5700	39.54	0.32	39.86	60.00	-20.14	peak	
6		10.2220	37.06	0.40	37.46	60.00	-22.54	peak	

Operation Mode:	Operation mode			Test Date:	Mar. 26, 2015
Temperature:	21 ℃	Humidity:	70 %	Test By:	Vito
Model No.:	ADP-10HW				
Phase:	L1				



No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Comment
		(MHz)	dBuV	(dB)	(dBuV)	(dBuV)	(dB)		
1		0.1540	51.09	0.05	51.14	65.78	-14.64	peak	
2	*	0.1900	52.36	0.04	52.40	64.04	-11.64	peak	
3		0.2980	47.91	0.08	47.99	60.30	-12.31	peak	
4		0.3860	43.70	0.12	43.82	58.15	-14.33	peak	
5		1.8100	39.79	0.49	40.28	56.00	-15.72	peak	
6		13.8420	35.89	0.37	36.26	60.00	-23.74	peak	

Operation Mode:	Operation mode			Test Date:	Mar. 26, 2015
Temperature:	21 ℃	Humidity:	70 %	Test By:	Vito
Model No.:	ADP-10HW				
Phase:	N				



No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Comment
		(MHz)	dBuV	(dB)	(dBuV)	(dBuV)	(dB)		
1		0.1660	54.71	0.05	54.76	65.16	-10.40	peak	
2	*	0.1980	54.01	0.04	54.05	63.69	-9.64	peak	
3		0.2980	49.53	0.08	49.61	60.30	-10.69	peak	
4		0.6020	44.17	0.21	44.38	56.00	-11.62	peak	
5		1.8100	40.47	0.49	40.96	56.00	-15.04	peak	
6		14.3260	31.45	0.35	31.80	60.00	-28.20	peak	

7. PEAK OUTPUT POWER MEASUREMENT

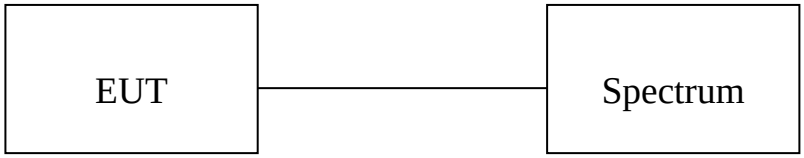
7.1. Standard Applicable

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, The Limit: 1Watt. For all other frequency hopping systems in the 2400 – 2483.5MHz band: The Limit: 0.125 Watts. The power limit for 1Mbps is 1watt, and 2Mbps, 3Mbps and AFH mode are 0.125 watts.

7.2. Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Spectrum Analyzer	Agilent	N9010A	MY53400256	10/15/2014	10/14/2015
DC Block	PASTERNACK	PE8210	RF29	12/19/2014	12/18/2015
Attenuator	WOKEN	218FS-10	RF23	12/19/2014	12/18/2015
Splitter	RF-LAMBAD	RFLT2W1G18G	RF35	12/19/2014	12/18/2015

7.3. Test Set-up:



7.4. Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter or spectrum. (Max Hold, Detector = Peak, RBW >=20dB bandwidth)
4. Record the max. reading.
5. Repeat above procedures until all default test channel is completed.

7.5. Measurement Result

	GFSK (1 Mbps)			
Channel	**Frequency (MHz)**	**Output Power (dBm)**	**Output Power (mW)**	**Limit (mW)**
0	2402.00	7.35	5.43000	1000
39	2441.00	**7.97**	6.26470	1000
78	2480.00	7.72	5.91970	1000
	π/4-DQPSK (2 Mbps)			
Channel	**Frequency (MHz)**	**Output Power (dBm)**	**Output Power (mW)**	**Limit (mW)**
0	2402.00	5.98	3.95913	125
39	2441.00	6.43	4.39744	125
78	2480.00	6.83	4.82059	125
	8-DPSK (3 Mbps)			
Channel	**Frequency (MHz)**	**Output Power (dBm)**	**Output Power (mW)**	**Limit (mW)**
0	2402.00	6.47	4.43200	125
39	2441.00	6.93	4.92720	125
78	2480.00	7.32	5.39635	125

NOTE: cable loss as 4.8dB that offsets in the spectrum

Peak Power Output Data Plot (CH Low) (GFSK mode)

Peak Power Output Data Plot (CH Mid) (GFSK mode)

Peak Power Output Data Plot (CH High) (GFSK mode)

Peak Power Output Data Plot (CH Low) (π/4-DQPSK mode)

Peak Power Output Data Plot (CH Mid) (π/4-DQPSK mode)

Peak Power Output Data Plot (CH High) (π/4-DQPSK mode)

Peak Power Output Data Plot (CH Low) (8-DPSK mode)

Peak Power Output Data Plot (CH Mid) (8-DPSK mode)

Peak Power Output Data Plot (CH High) (8-DPSK mode)

8. 20dB BANDWIDTH MEASUREMENT & 99% POWER BANDWIDTH

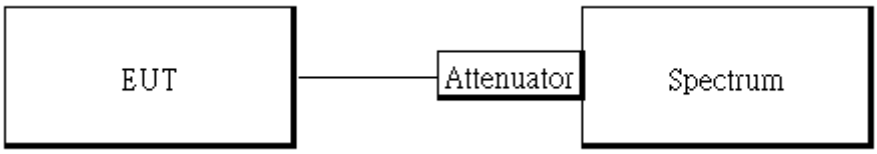
8.1. Standard Applicable

For frequency hopping systems operating in the 2400MHz-2483.5 MHz no limit for 20dB bandwidth.

8.2. Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Spectrum Analyzer	Agilent	N9010A	MY53400256	10/15/2014	10/14/2015
DC Block	PASTERNACK	PE8210	RF29	12/19/2014	12/18/2015
Splitter	RF-LAMBAD	RFLT2W1G18G	RF35	12/19/2014	12/18/2015
Attenuator	WOKEN	218FS-10	RF23	12/19/2014	12/18/2015

8.3. Test Set-up



8.4. Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
4. Set the spectrum analyzer as RBW=10 kHz (1 % of 20 dB Bandwidth.), VBW = 30 kHz, Span= 3MHz, Sweep=auto, Detector = Peak, and Max hold for 20dB Bandwidth test.
5. Mark the peak frequency and –20dB (upper and lower) frequency
6. Repeat above procedures until all test default channel is completed

NOTE:

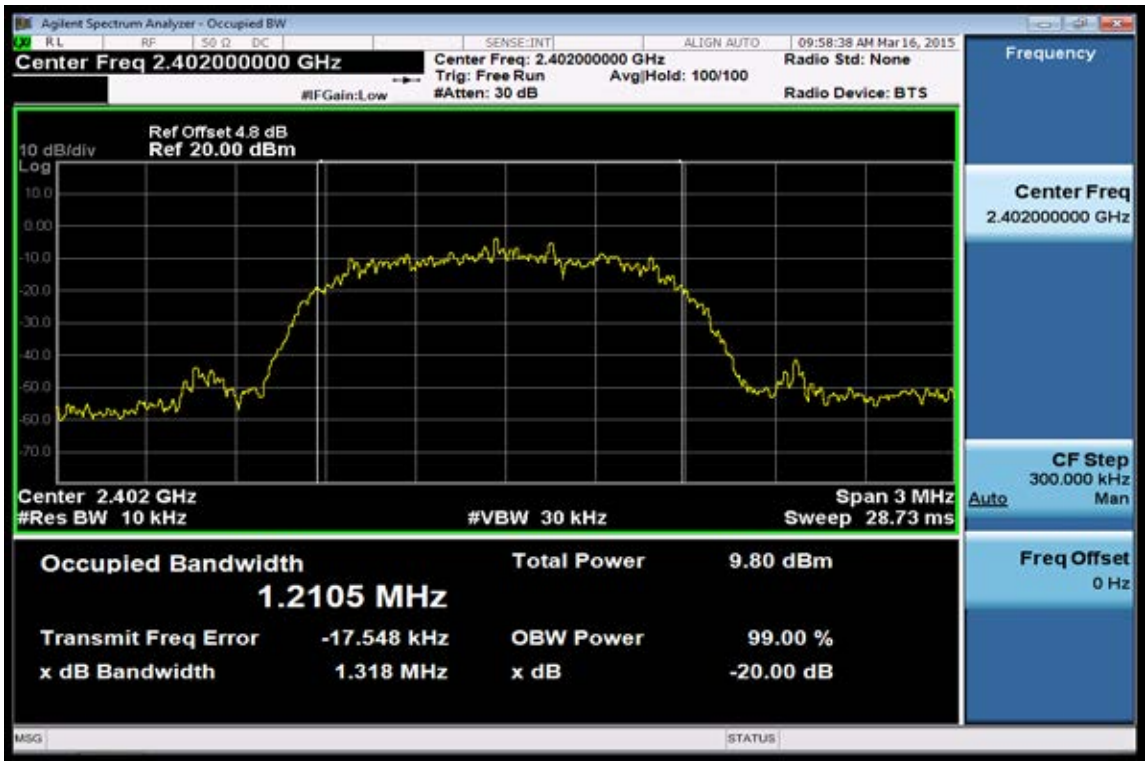
1. cable loss as 4.8dB that offsets in the spectrum
2. For the plot of bandwidth measurement, the marker of the 20dB BW is arrow-mark

8.5. Measurement Result

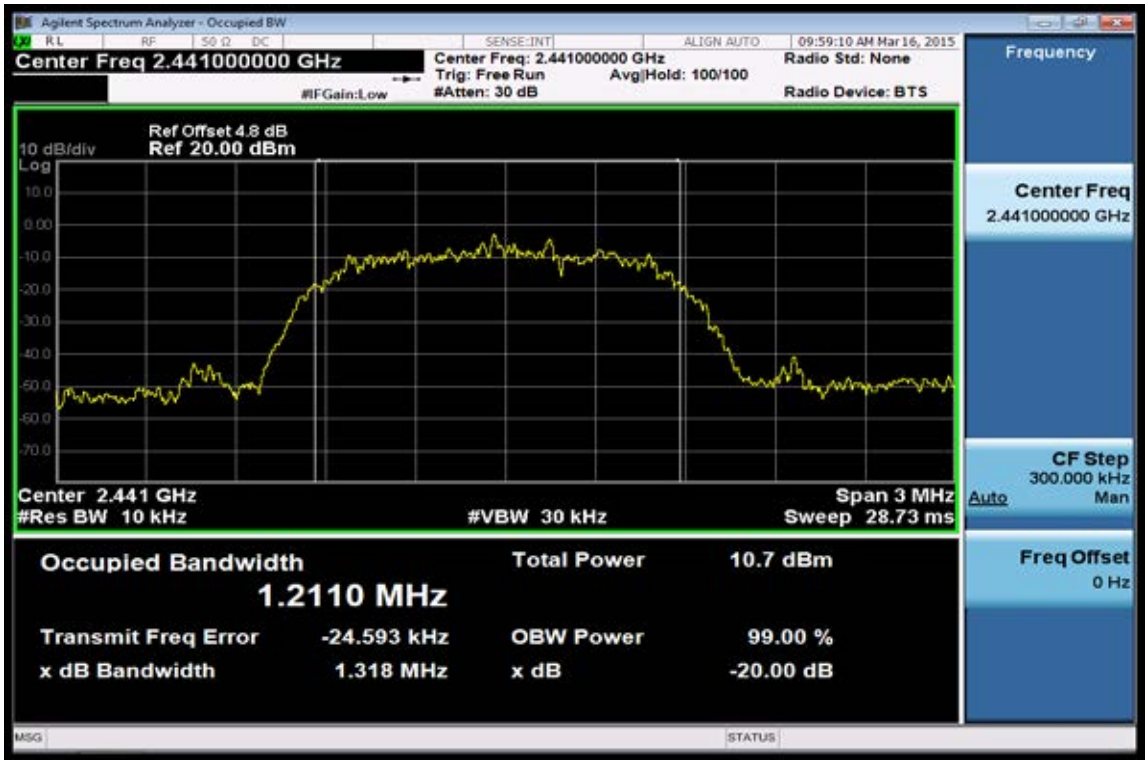
GFSK			
Channel	**Frequency (MHz)**	**20 dB Bandwidth (MHz)**	**2/3 Bandwidth (MHz)**
0	2402	1.32	-
39	2441	1.32	-
78	2480	1.32	-
π/4-DQPSK			
Channel	**Frequency (MHz)**	**20 dB Bandwidth (MHz)**	**2/3 Bandwidth (MHz)**
0	2402	1.32	0.88
39	2441	1.33	0.89
78	2480	1.34	0.89
8-DPSK			
Channel	**Frequency (MHz)**	**20 dB Bandwidth (MHz)**	**2/3 Bandwidth (MHz)**
0	2402	1.31	0.87
39	2441	1.34	0.89
78	2480	1.34	0.89

GFSK		
Channel	**Frequency (MHz)**	**99% Power Bandwidth (MHz)**
0	2402	0.87
39	2441	0.89
78	2480	0.89
π/4-DQPSK		
Channel	**Frequency (MHz)**	**99% Power Bandwidth (MHz)**
0	2402	1.20
39	2441	1.20
78	2480	1.20
8-DPSK		
Channel	**Frequency (MHz)**	**99% Power Bandwidth (MHz)**
0	2402	1.20
39	2441	1.21
78	2480	1.21

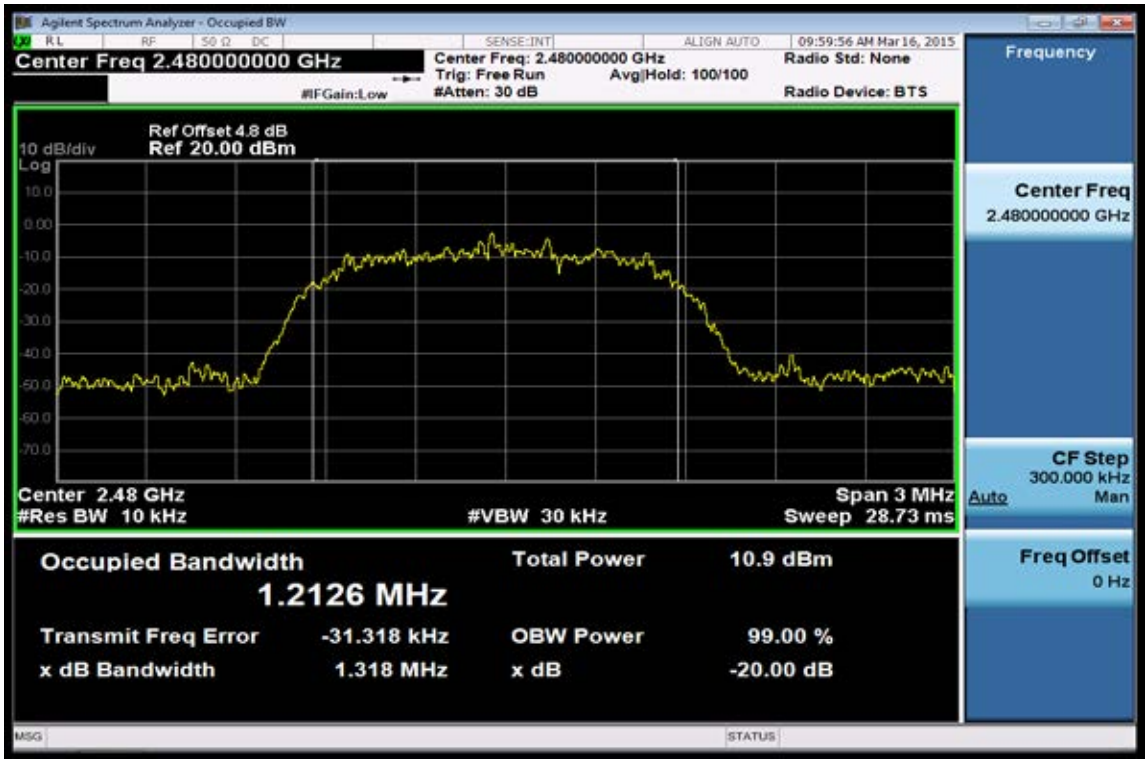
20dB Band Width Test Data CH-Low (GFSK mode)



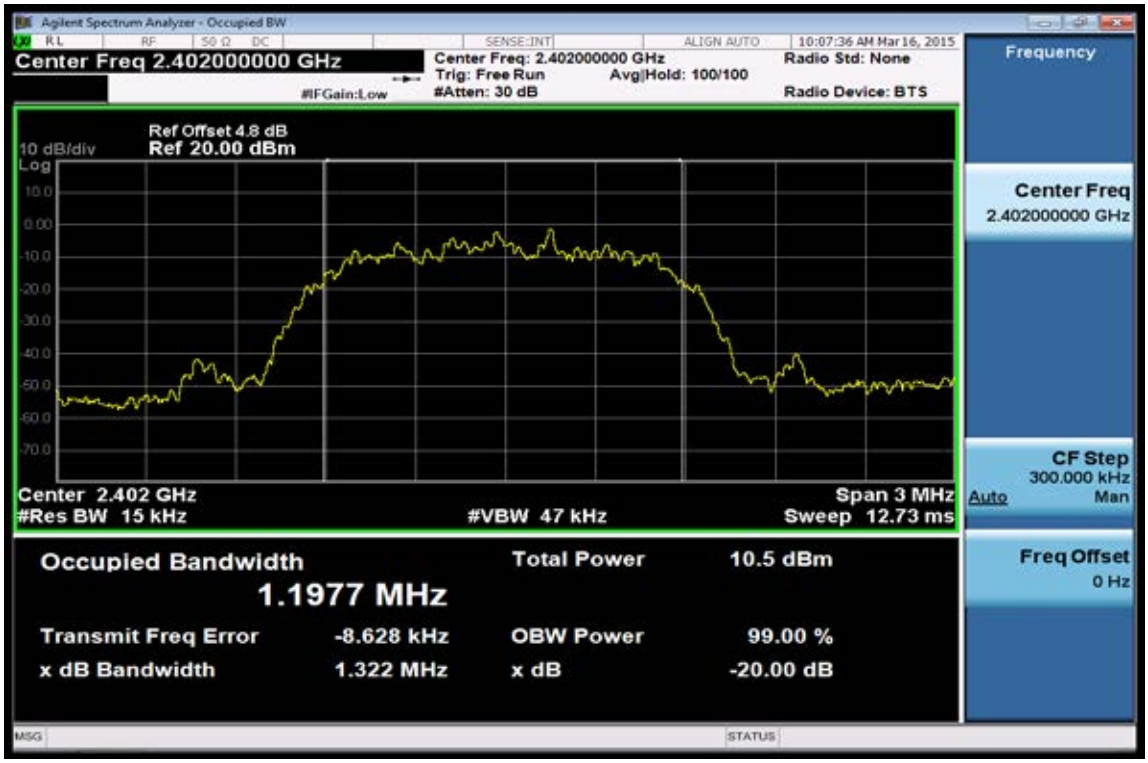
20dB Band Width Test Data CH-Mid (GFSK mode)



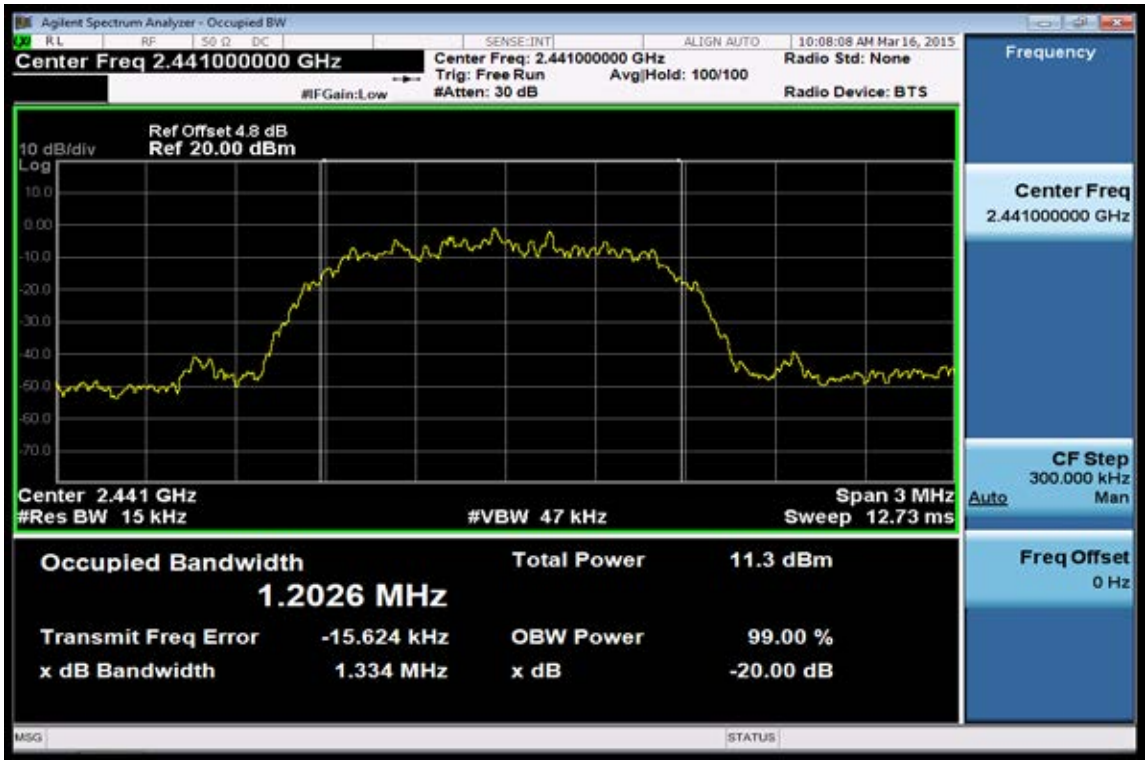
20dB Band Width Test Data CH-High (GFSK mode)



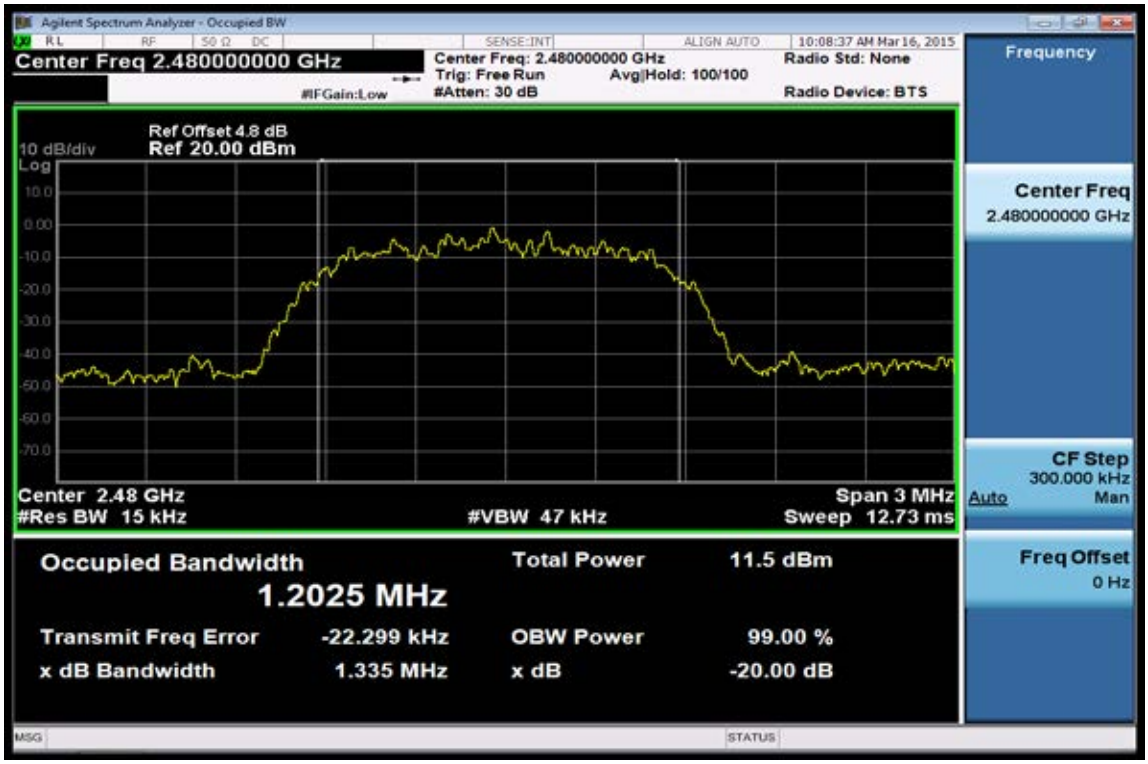
20dB Band Width Test Data CH-Low (π/4-DQPSK mode)



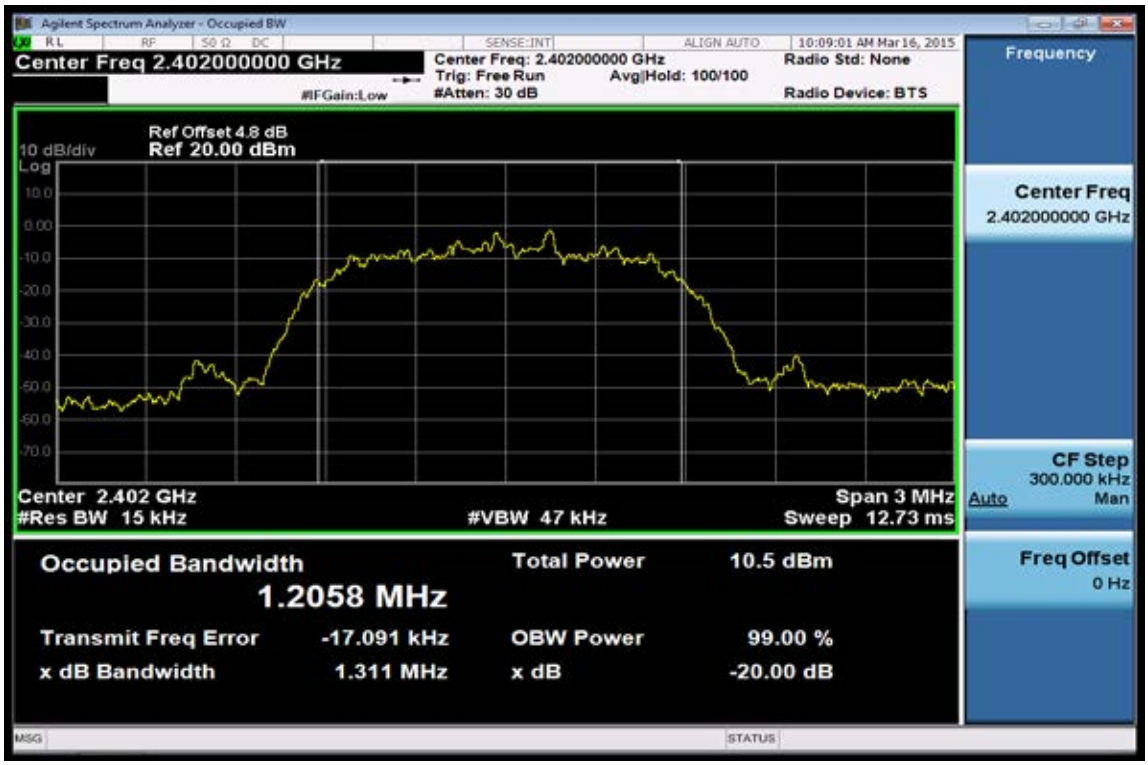
20dB Band Width Test Data CH-Mid (π/4-DQPSK mode)



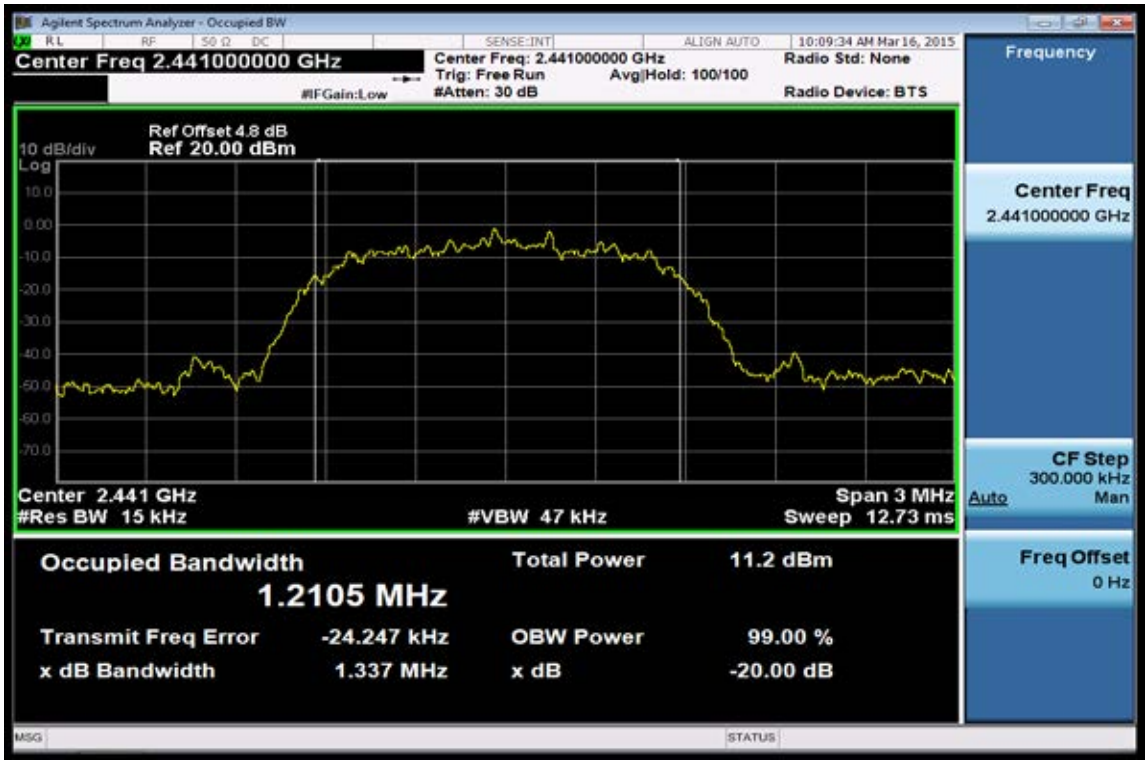
20dB Band Width Test Data CH-High (π/4-DQPSK mode)



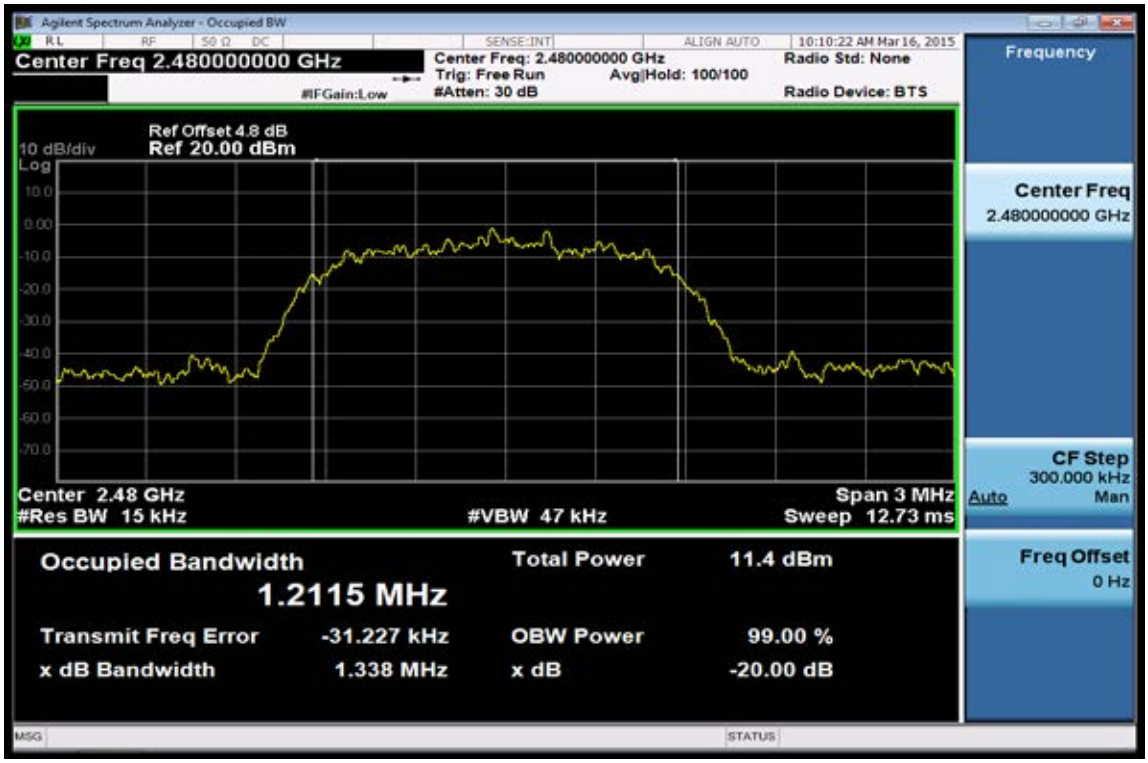
20dB Band Width Test Data CH-Low (8-DPSK mode)



20dB Band Width Test Data CH-Mid (8-DPSK mode)



20dB Width Test Data CH-High (8-DPSK mode)

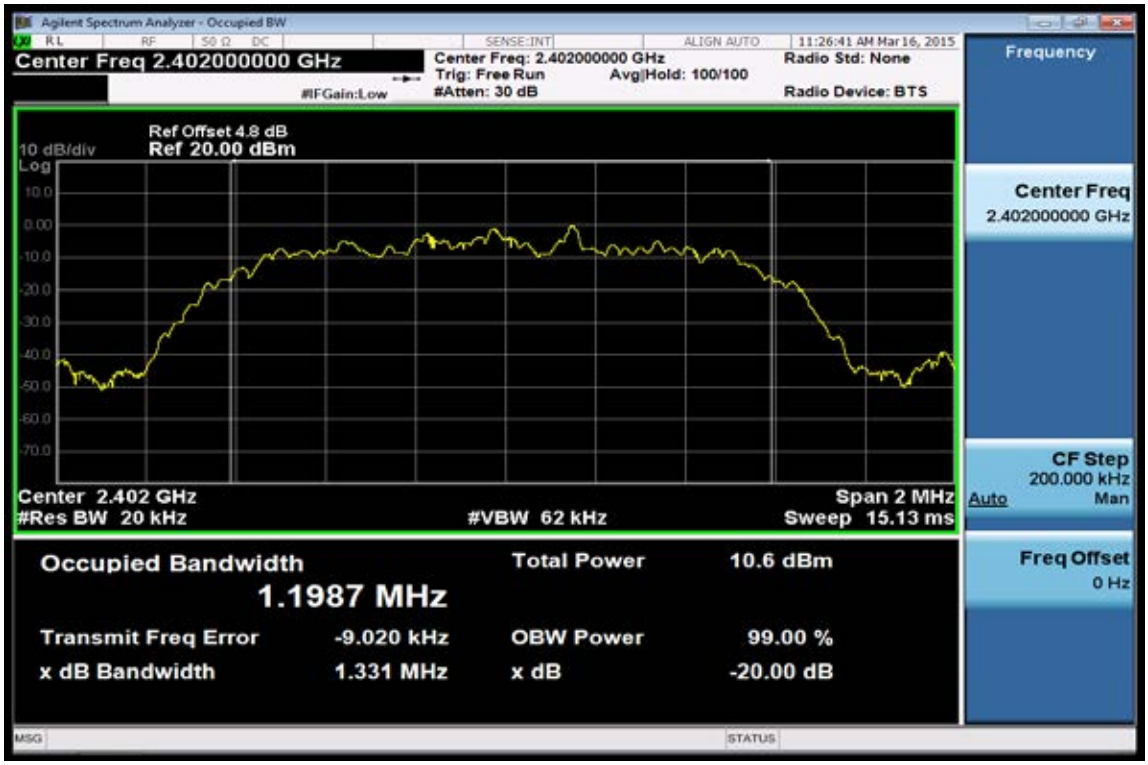


99% Band Width Test Data CH-Low (GFSK mode)

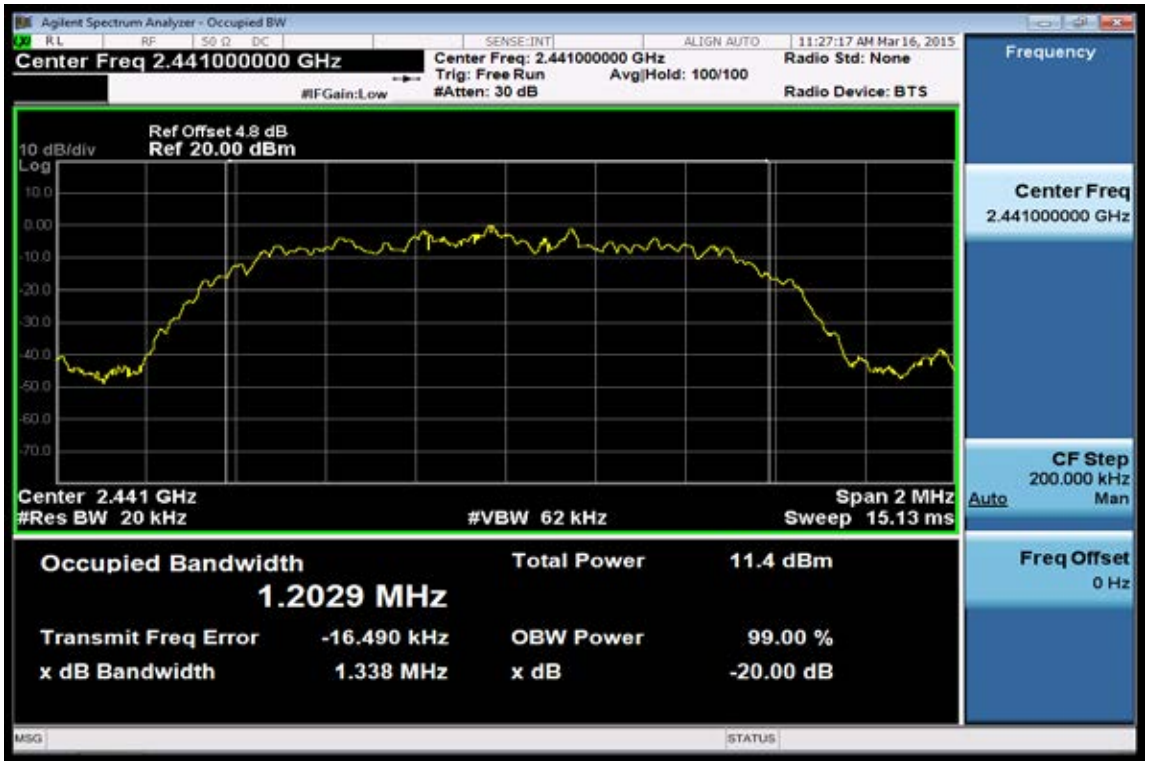
99% Band Width Test Data CH-Mid (GFSK mode)

99% Band Width Test Data CH-High (GFSK mode)

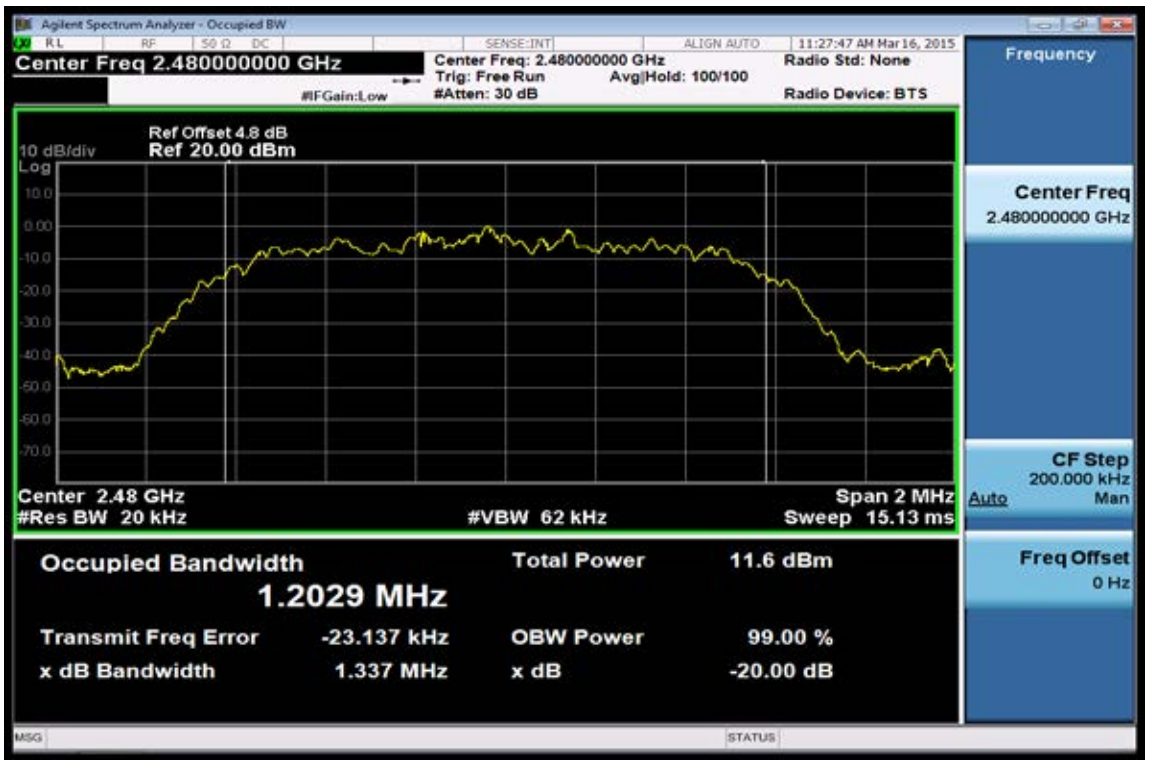
99% Band Width Test Data CH-Low (π/4-DQPSK mode)



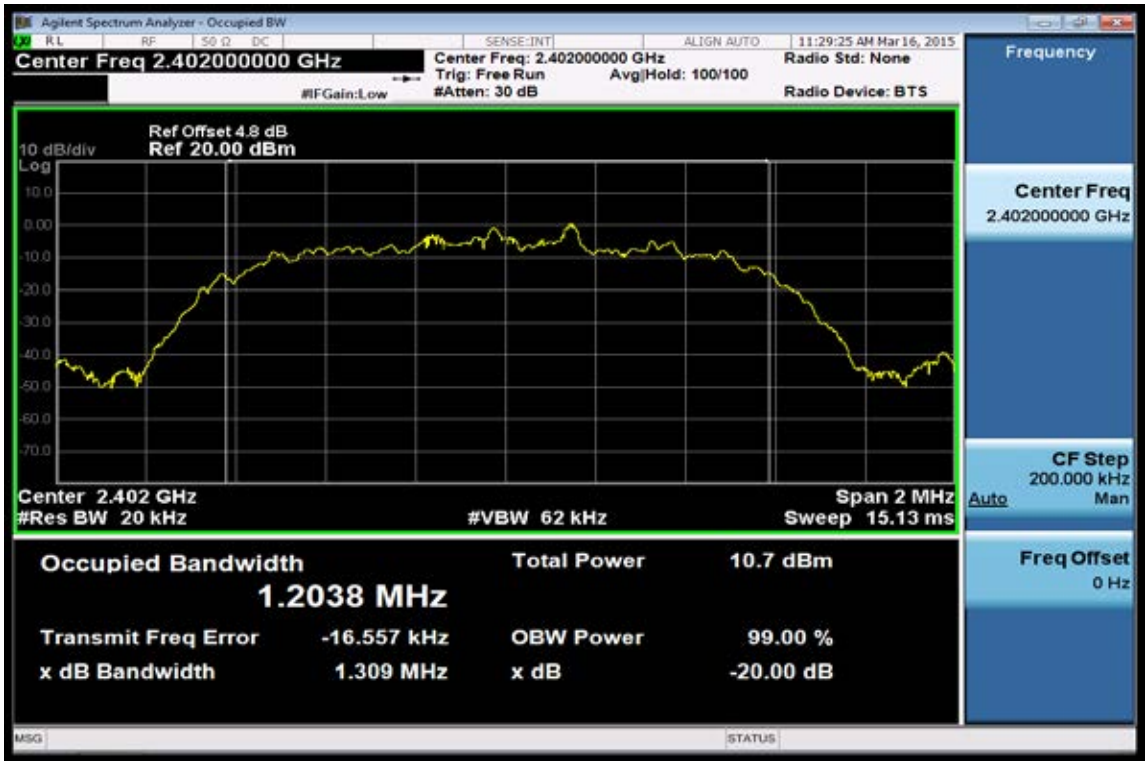
99% Band Width Test Data CH-Mid (π/4-DQPSK mode)



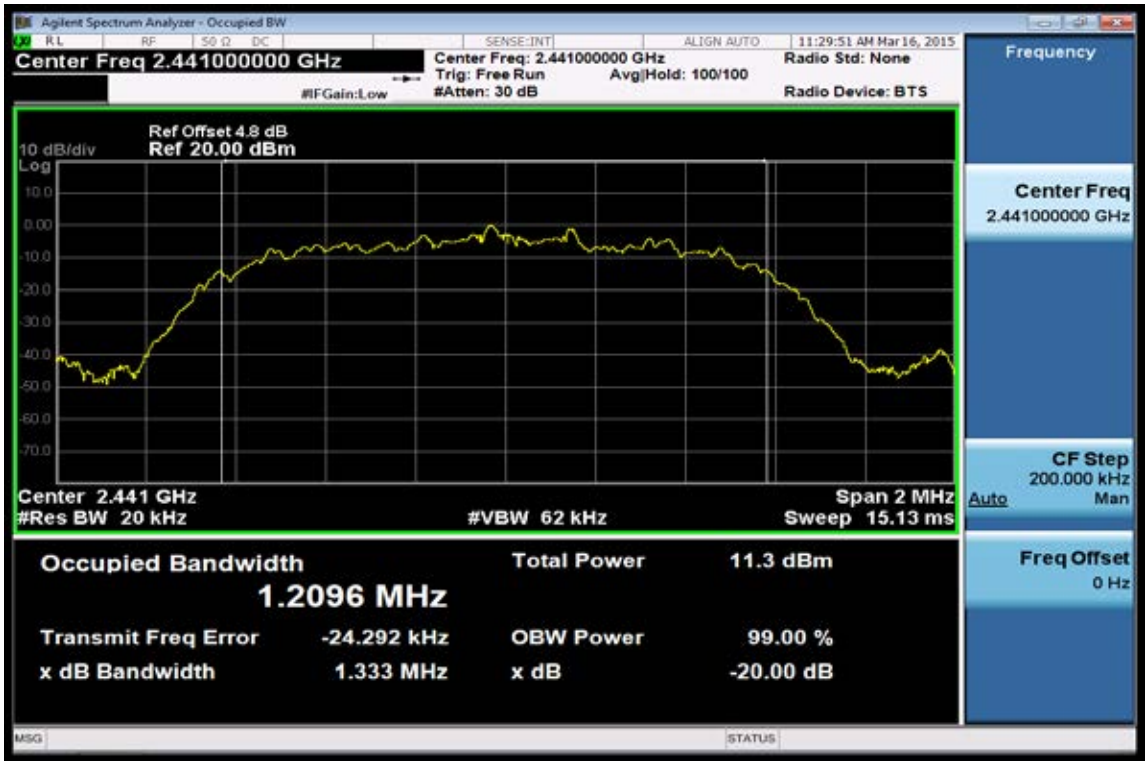
99% Band Width Test Data CH-High (π/4-DQPSK mode)



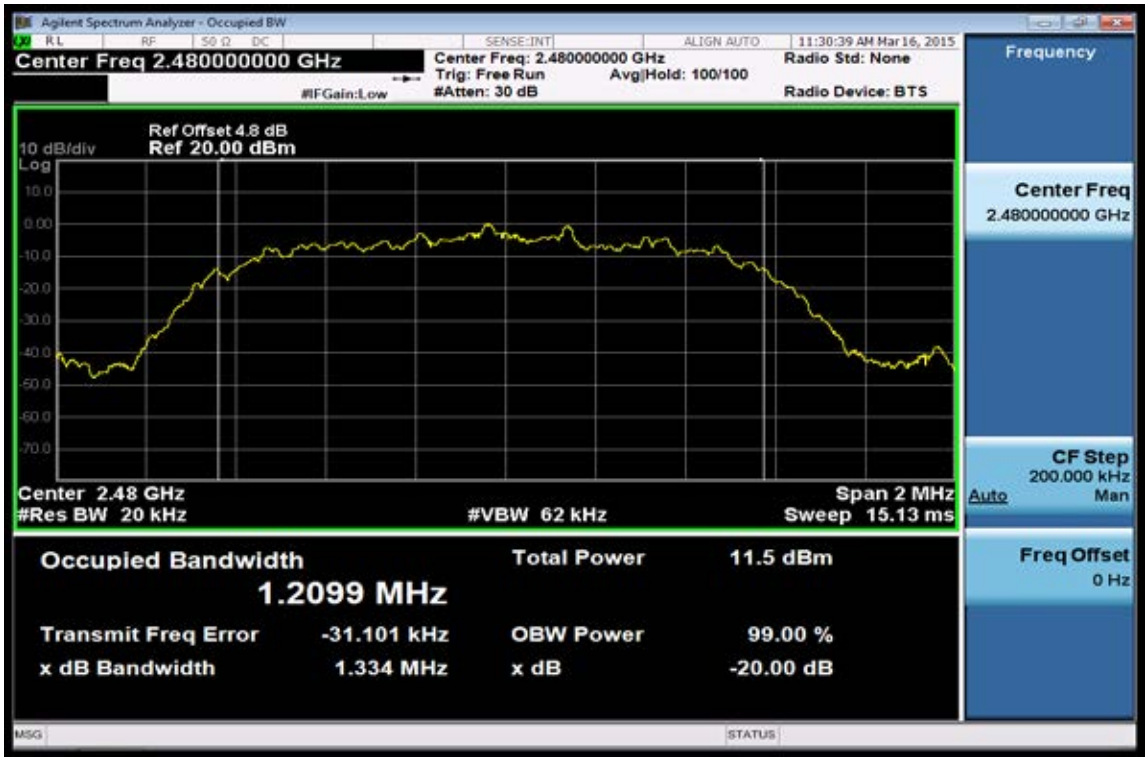
99% Band Width Test Data CH-Low (8-DPSK mode)



99% Band Width Test Data CH-Mid (8-DPSK mode)



99% Band Width Test Data CH-High (8-DPSK mode)



9. CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT

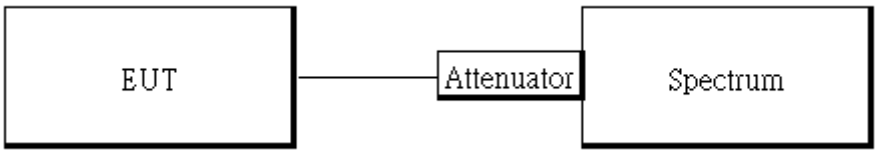
9.1. Standard Applicable

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

10.1. Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Spectrum Analyzer	Agilent	N9010A	MY53400256	10/15/2014	10/14/2015
DC Block	PASTERNACK	PE8210	RF29	12/19/2014	12/18/2015
Splitter	RF-LAMBAD	RFLT2W1G18G	RF35	12/19/2014	12/18/2015
Attenuator	WOKEN	218FS-10	RF23	12/19/2014	12/18/2015

10.2. Test SET-UP



10.3. Measurement Procedure

Conducted Band Edge:

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
4. Set center frequency of spectrum analyzer = operating frequency.
5. Set the spectrum analyzer as RBW = 100K, VBW=300 kHz, Sweep = auto
6. Mark Peak, 2.390GHz and 2.4835GHz and record the max. level.
7. Repeat above procedures until all frequency measured were complete.

Conducted Spurious Emission:

1. To connect Antenna Port of EUT to Spectrum.
2. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
3. Set RBW = 100K & VBW = 300K, Detector =Peak, Sweep = Auto
4. Allow trace to fully stabilize.
5. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
6. Repeat above procedures until all default test channel measured were complete.

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	

10.4. Measurement Result

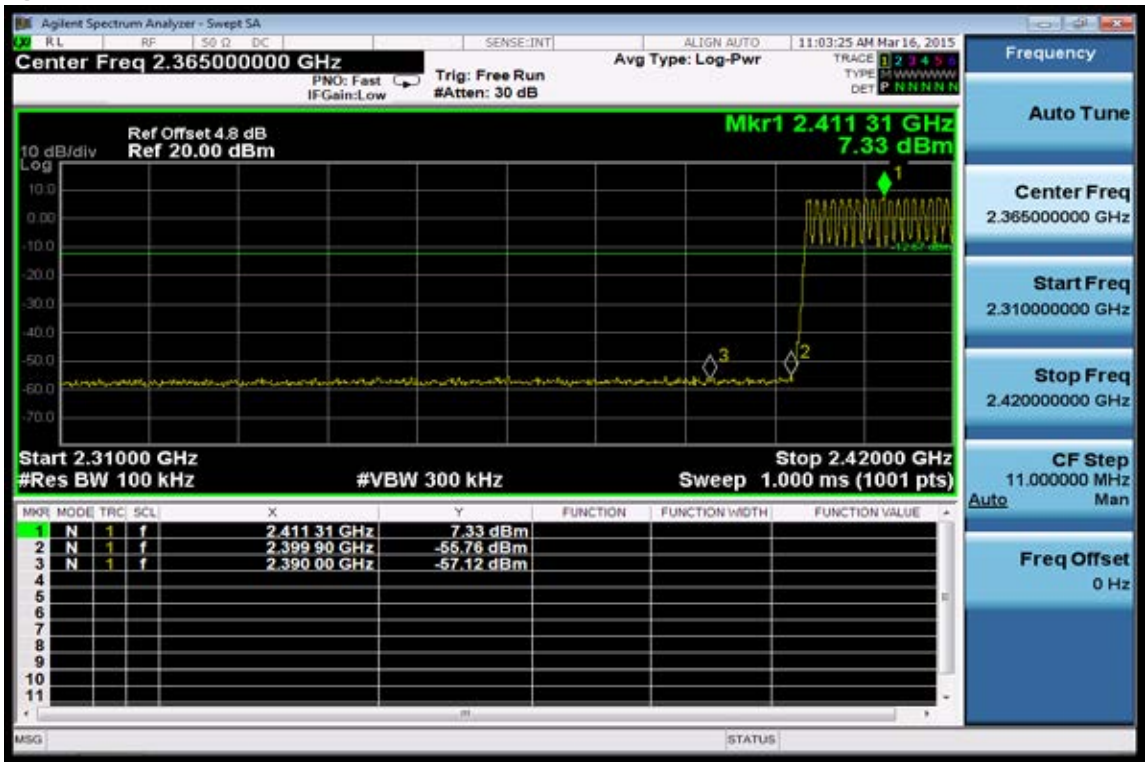
Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

NOTE:

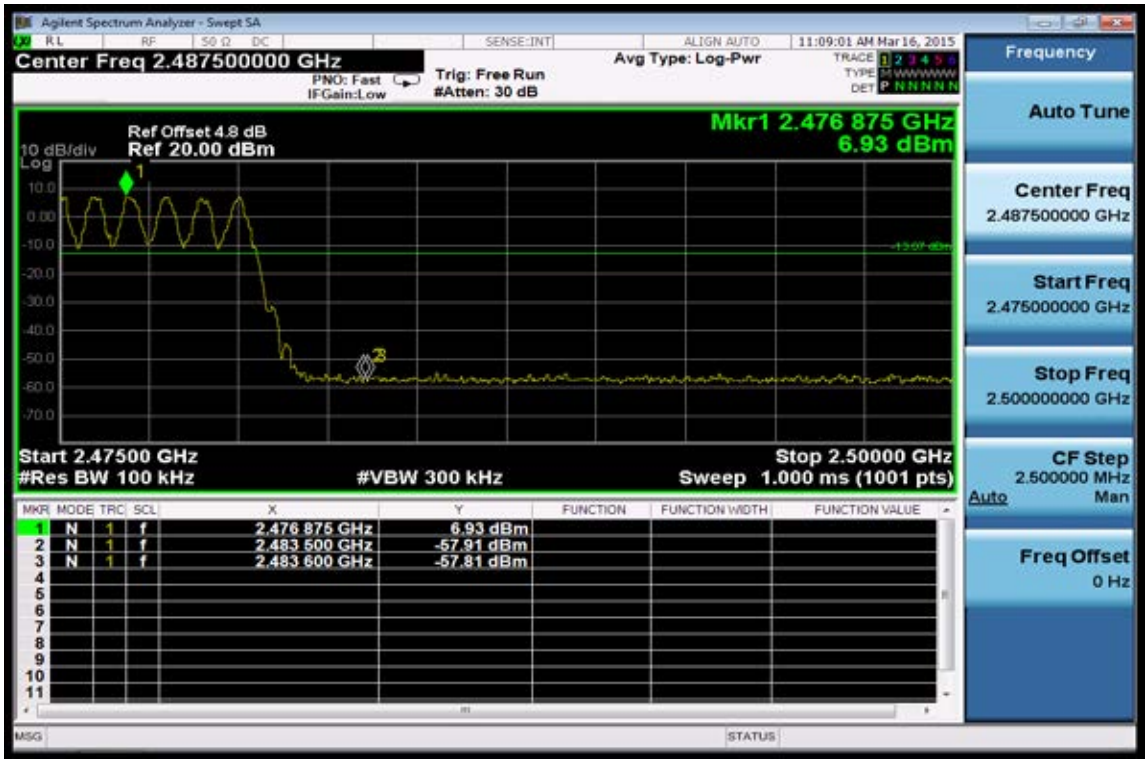
1. Cable loss as 4.8dB that offsets in the spectrum
2. The occurrence of the spike on the conducted emission is the signal of the fundamental emission.

BR Mode The Worst Case(Hopping mode)

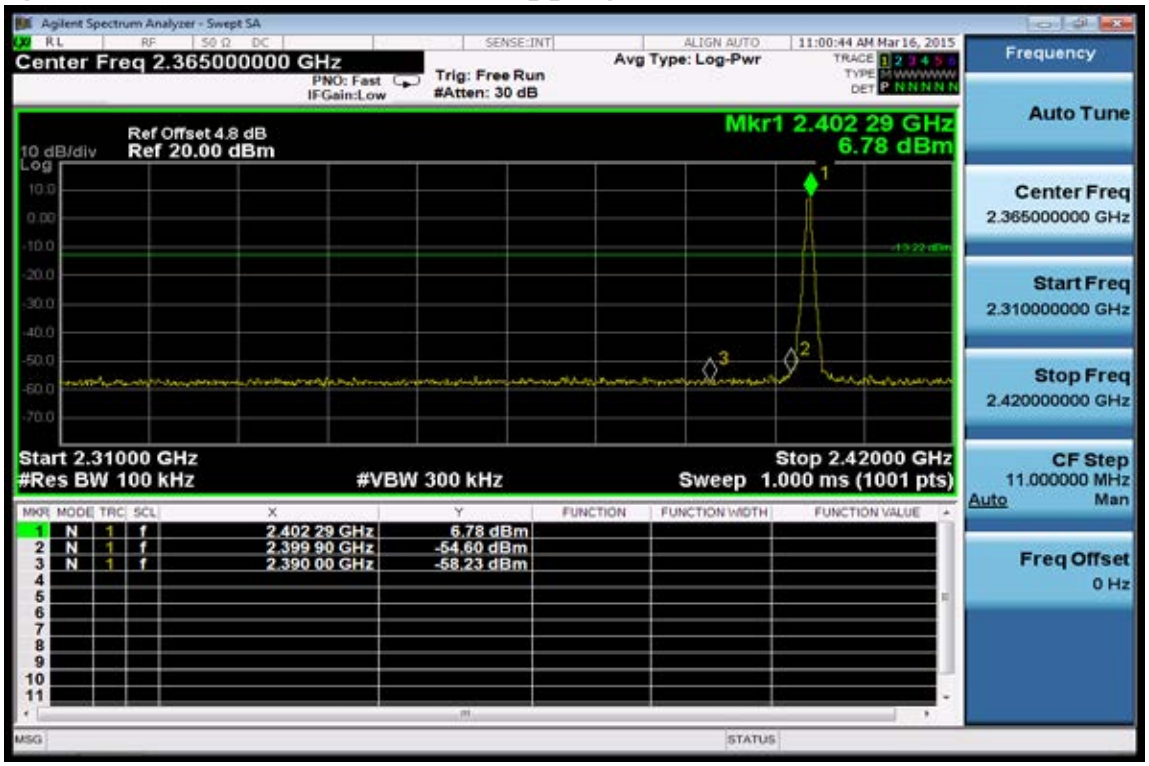
Band Edges Test Data CH-Low



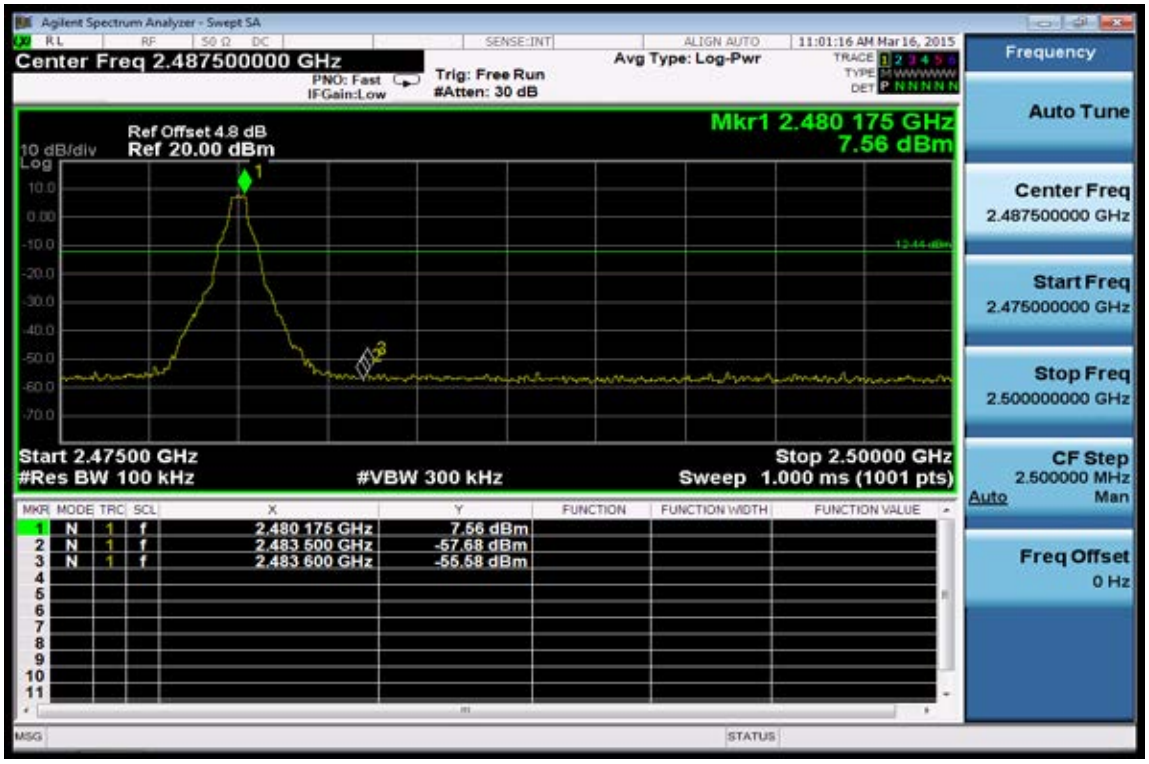
Band Edges Test Data CH-High



Band Edges Test Data CH-Low (Non-Hopping mode)

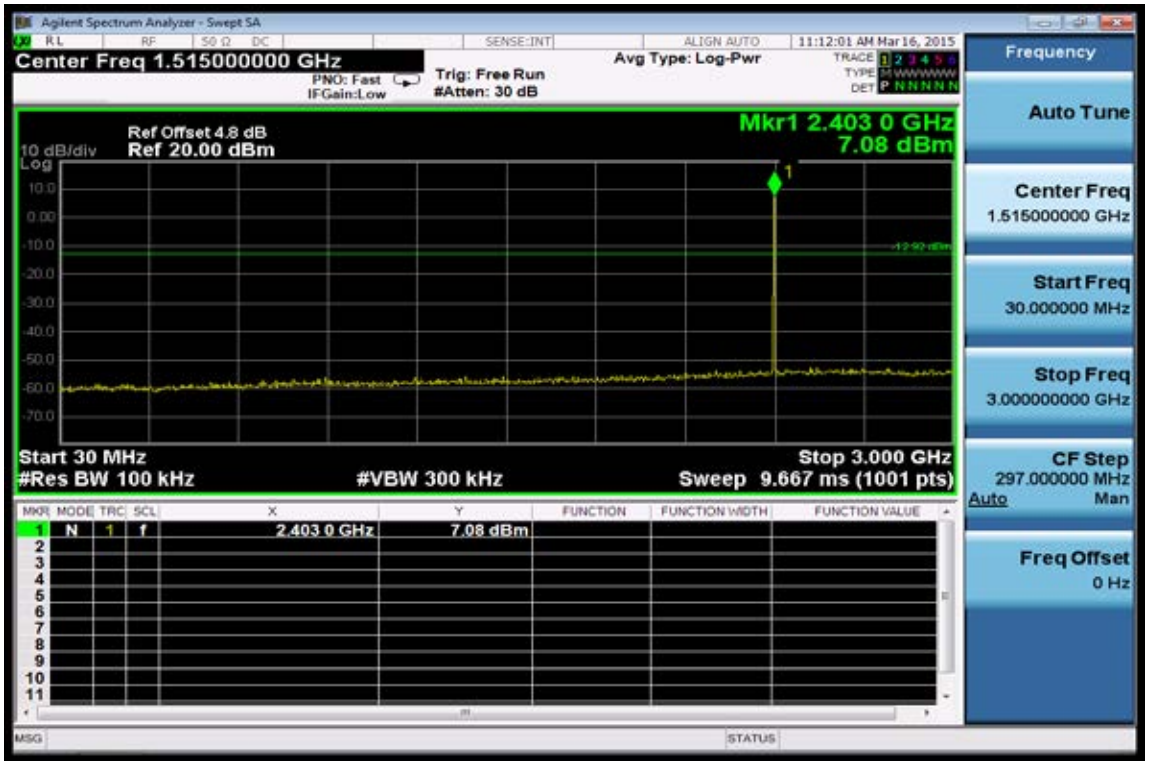


Band Edges Test Data CH-High

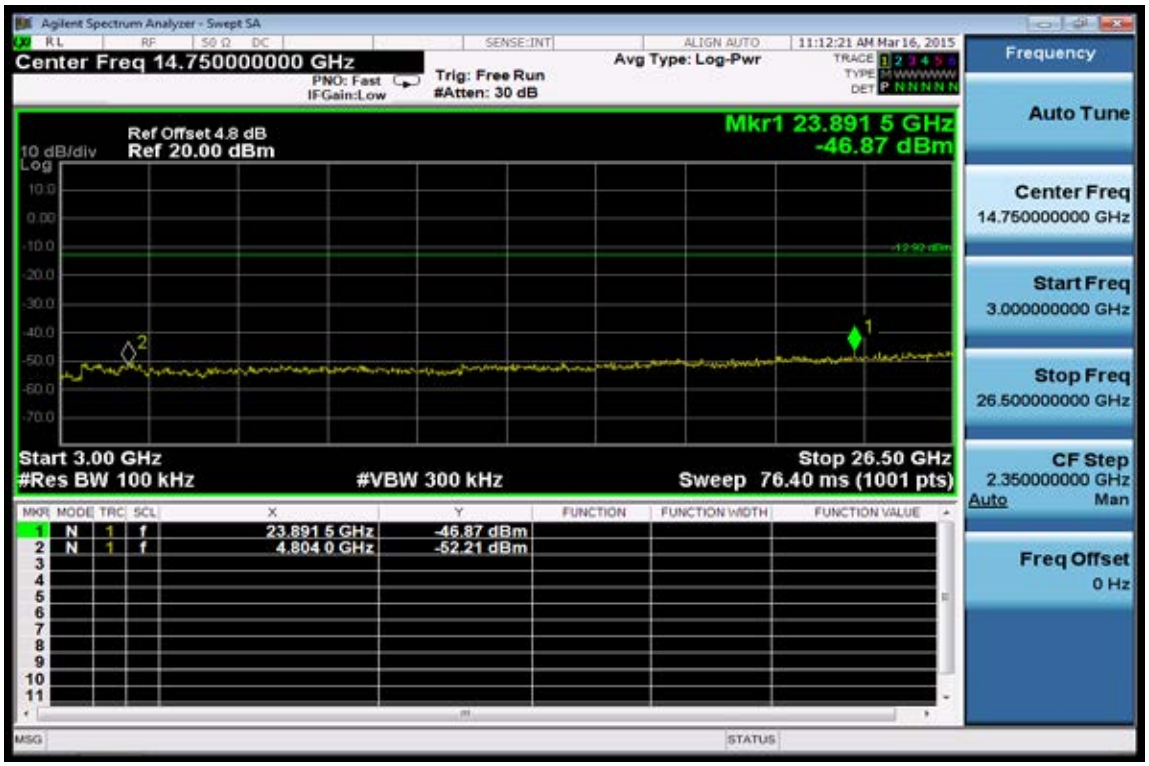


Conducted Spurious Emission Measurement Result

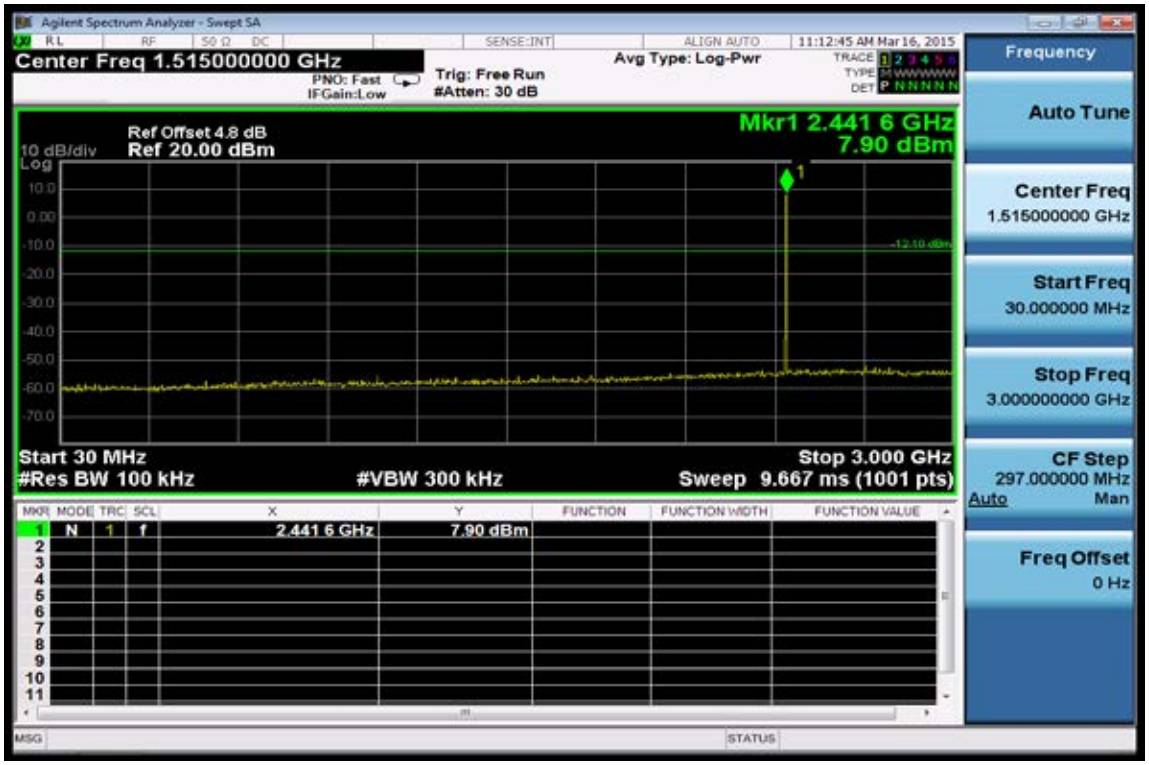
Ch Low 30MHz – 3GHz



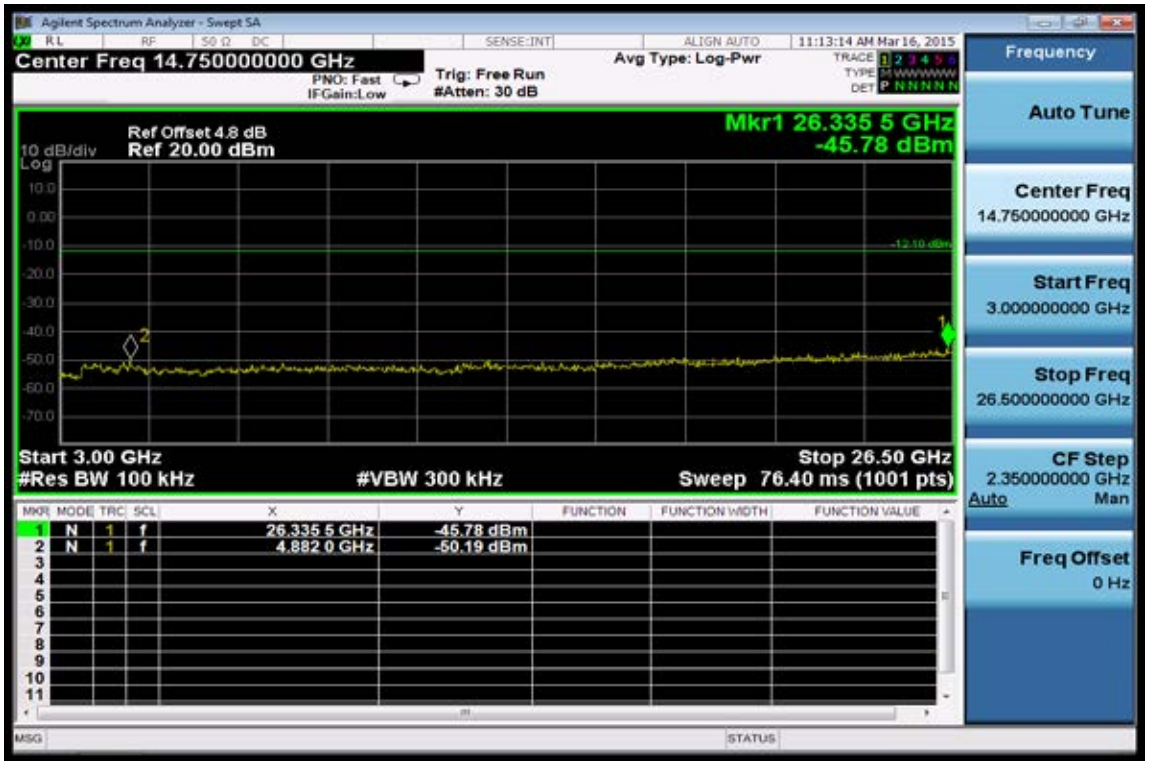
Ch Low 3GHz – 26.5GHz



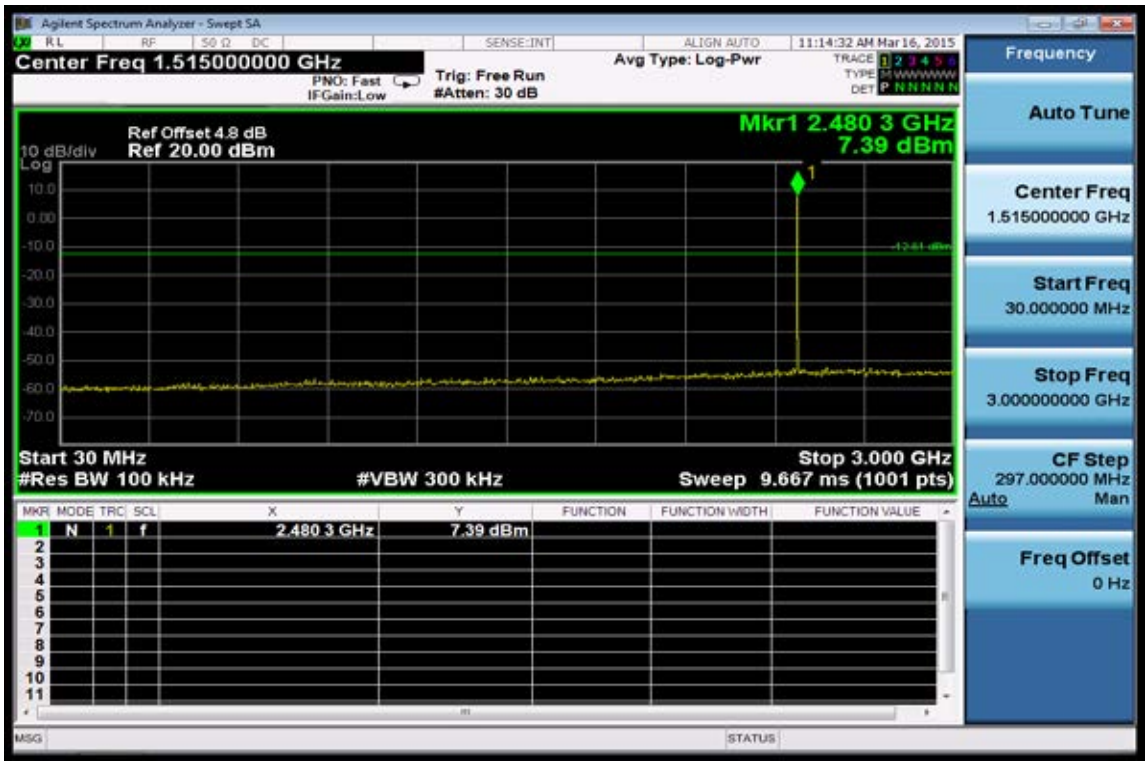
Ch Mid 30MHz – 3GHz



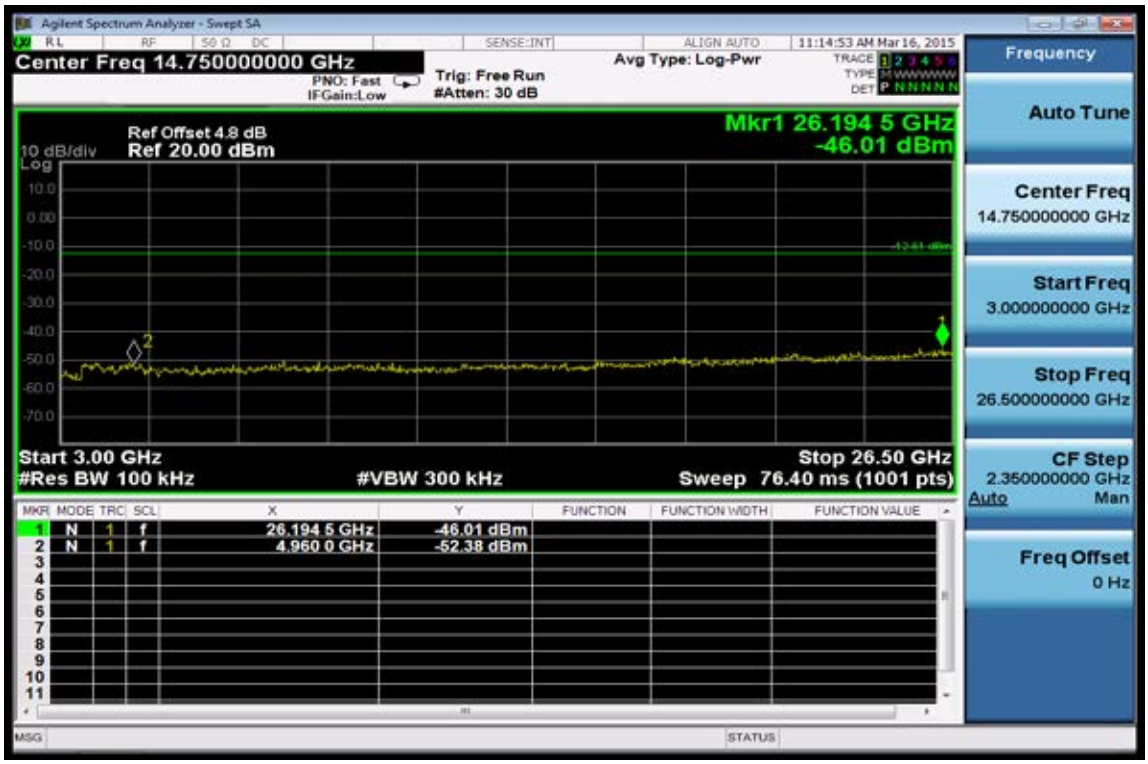
Ch Mid 3GHz – 26.5GHz



Ch High 30MHz – 3GHz



Ch High 3GHz – 26.5GHz



11. RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT

11.1. Standard Applicable

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

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.

Frequency (MHz)	Field strength (microvolts/meter)	Distance (meters)
0.009-0.490	2400/F(KHz)	300
0.490-1.705	24000/F(KHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBμV/m) = 20 log Emission level (dBμV/m)

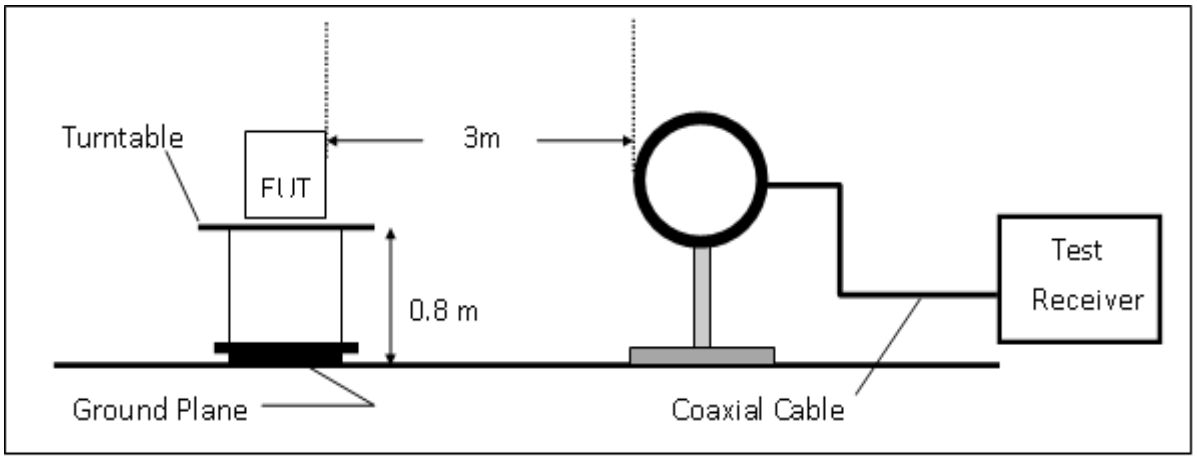
11.2. Measurement Equipment Used

966 Chamber					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
EMI Test Receiver	R&S	ESU 40	100363	04/12/2014	04/11/2015
Loop Antenna	ETS-Lindgren	6502	00143303	12/09/2014	12/08/2015
Broadband Antenna	TESEQ	CBL 6112D	35240	12/05/2014	12/04/2015
Horn Antenna	ETS-Lindgren	3117	00143272	12/08/2014	12/07/2015
Horn Antenna	ETS-Lindgren	3160-09	00117911	11/13/2014	11/12/2015
Horn Antenna	ETS-Lindgren	3160-10	00117783	11/13/2014	11/12/2015
Pre Amplifier	EMC Instruments	EMC330	980096	12/19/2014	12/18/2015
Pre Amplifier	EMC Instruments	EMC0011830	980199	12/19/2014	12/18/2015
Pre Amplifier	R&S	SCU-18	10204	12/19/2014	12/18/2015
Pre Amplifier	R&S	SCU-26	100780	12/19/2014	12/18/2015
Attenuator	WOKEN	218FS-10	RF27	12/19/2014	12/18/2015
Turn Table	MF	N/A	N/A	N.C.R.	N.C.R.
Antenna Master	MF	N/A	N/A	N.C.R.	N.C.R.
Controller	MF	MF-7802	N/A	N.C.R.	N.C.R.
Coaxial Cable	Huber+Suhner	RG 214/U	966Rx 9K-30M	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	RG 214/U SUCOFLEX 104	966Rx 30M-3G	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Rx 1G-18G	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	mini 141-12 SUCOFLEX 104	966Rx 18G-40G	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Tx 30M-18G	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	966Tx 18G-40G	12/19/2014	12/18/2015

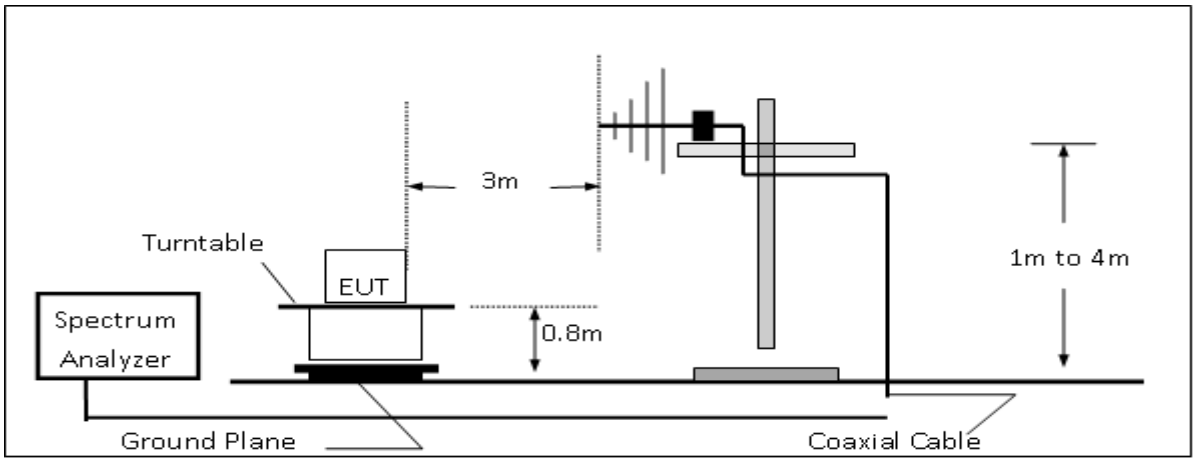
NOTE: N.C.R refers to Not Calibrated Required.

11.3. Test SET-UP

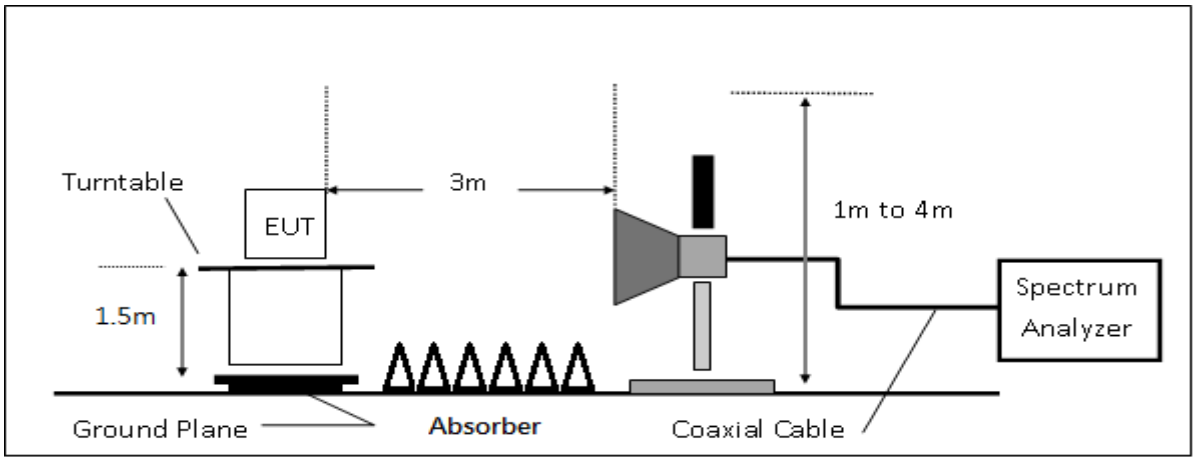
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



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



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



11.4. Measurement Procedure

Radiated Emission

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The EUT was placed on a turn table with 0.8m for frequency< 1GHz and 1.5m for frequency> 1GHz above ground plane.
3. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
4. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
5. Use the follow spectrum analyzer setting:
   (1) Span = wide enough to fully capture the emission being measured
   (2) RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz, VBW ≥ RBW, Sweep = auto,
   Detector function = peak, Trace = max hold
   (3) For average measurement: use duty cycle correction factor method per 15.35(c)
   Duty Cycle = On time/100 milliseconds
   On time = N1*L1=N2*L2+…+N(n-1)*LN(n-1)+N(n)*L(n)
   Where N1 is number of type 1 pulses, L1 is length of type 1 pulses, etc.
   Average Emission Level = Peak Emission Level + 20*log (duty Cycle)
6. 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.
7. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
8. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
9. Repeat above procedures until all frequency of the interest measured were complete.

11.5. 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	

The limit of the emission level is expressed in dBuV/m, which converts 20*log(uV/m)

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.

11.6. Test Results of Radiated Spurious Emissions form 9 KHz to 30 MHz

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit per 15.31(o) was not reported.

11.7. Measurement Result

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

Radiated Band Edge Measurement Result: (Hopping Mode)

Operation Band	:BR+Hopping	Test Date	:2015-03-27
Fundamental Frequency	:2402 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Band Edge LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
2390.00	Peak	E	36.46	6.62	43.08	74.00	-30.92
2390.00	Average	E	23.06	6.62	29.68	54.00	-24.32

Operation Band	:BR+Hopping	Test Date	:2015-03-27
Fundamental Frequency	:2402 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Band Edge LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
2390.00	Peak	E	37.21	6.62	43.83	74.00	-30.17
2390.00	Average	E	23.10	6.62	29.72	54.00	-24.28

Operation Band	:BR+Hopping	Test Date	:2015-03-27
Fundamental Frequency	:2480 MHz	Temp./Humi.	:19.5 deg_C / 72 RH
Operation Mode	:Band Edge HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
2483.50	Peak	E	47.28	6.96	54.25	74.00	-19.75
2483.50	Average	E	28.75	6.96	35.71	54.00	-18.29

Operation Band	:BR+Hopping	Test Date	:2015-03-27
Fundamental Frequency	:2480 MHz	Temp./Humi.	:19.5 deg_C / 72 RH
Operation Mode	:Band Edge HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
2483.50	Peak	E	53.12	6.96	60.08	74.00	-13.92
2483.50	Average	E	30.41	6.96	37.37	54.00	-16.63

10.6.2 Radiated Emission – Band Edge (Non-Hopping Mode):

Operation Band	:BR	Test Date	:2015-03-27
Fundamental Frequency	:2402 MHz	Temp./Humi.	:19.5 deg_C / 72 RH
Operation Mode	:Band Edge LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
2390.00	Peak	E	36.94	6.62	43.55	74.00	-30.45
2390.00	Average	E	23.13	6.62	29.75	54.00	-24.25

Operation Band	:BR	Test Date	:2015-03-27
Fundamental Frequency	:2402 MHz	Temp./Humi.	:19.5 deg_C / 72 RH
Operation Mode	:Band Edge LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
2390.00	Peak	E	37.02	6.62	43.64	74.00	-30.36
2390.00	Average	E	23.43	6.62	30.05	54.00	-23.95

Operation Band	:BR	Test Date	:2015-03-27
Fundamental Frequency	:2480 MHz	Temp./Humi.	:19.5 deg_C / 72 RH
Operation Mode	:Band Edge HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
2483.50	Peak	E	47.77	6.96	54.74	74.00	-19.26
2483.50	Average	E	40.23	6.96	47.19	54.00	-6.81

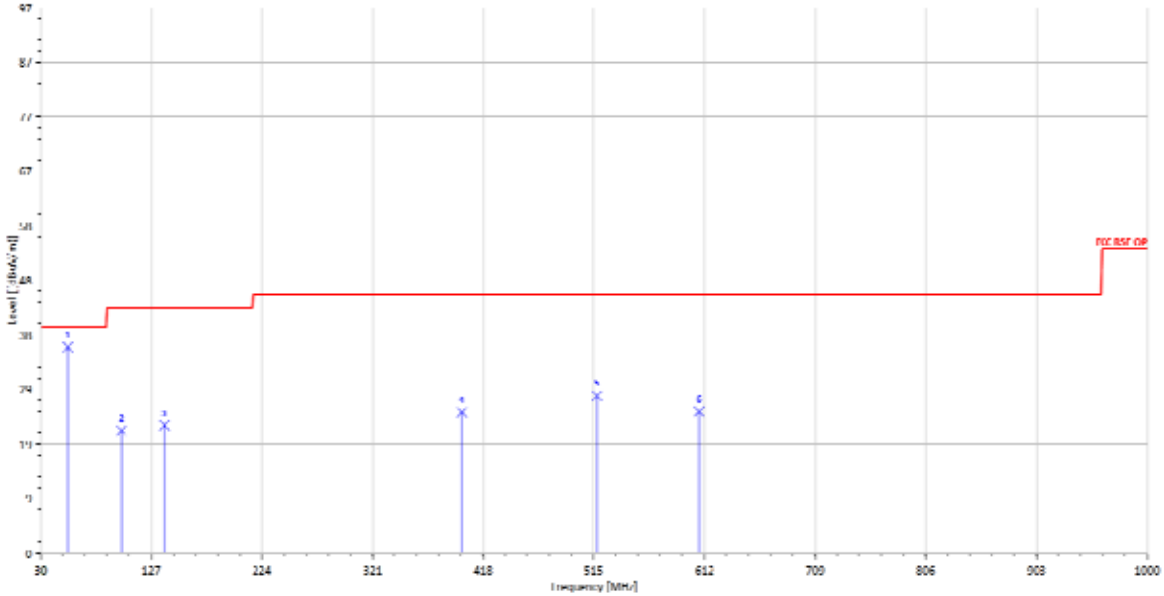
Operation Band	:BR	Test Date	:2015-03-27
Fundamental Frequency	:2480 MHz	Temp./Humi.	:19.5 deg_C / 72 RH
Operation Mode	:Band Edge HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
2483.50	Peak	E	53.83	6.96	60.80	74.00	-13.20
2483.50	Average	E	45.23	6.96	52.19	54.00	-1.81

Radiated Spurious Emission Measurement Result:

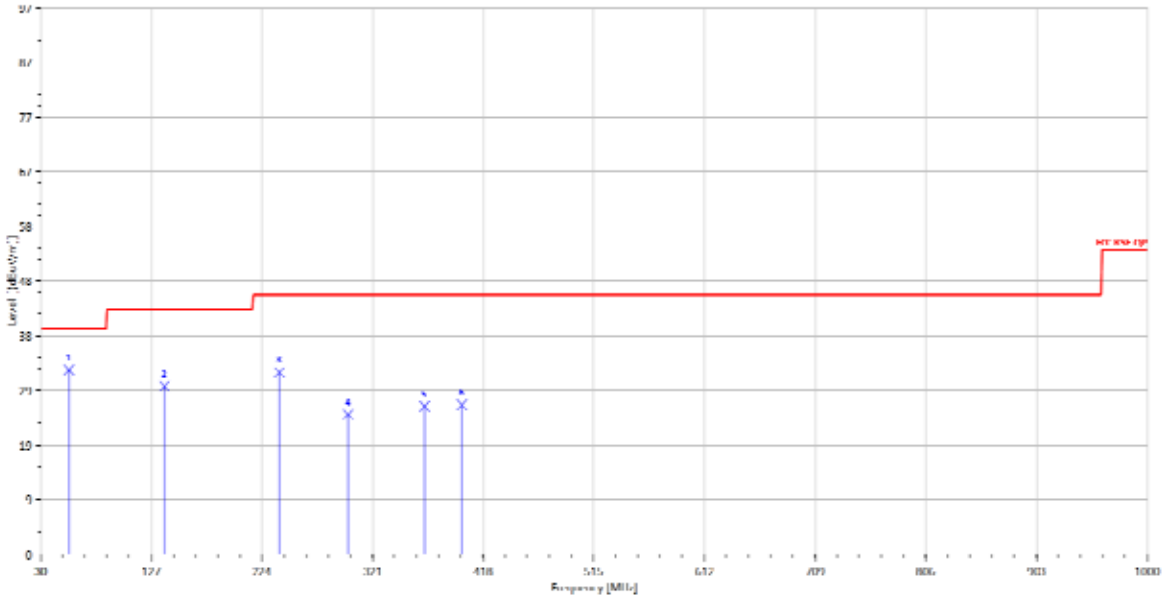
For Frequency form 30MHz to 1000MHz

Operation Band	:BR	Test Date	:2015-03-27
Fundamental Frequency	:2402 MHz	Temp./Humi.	:19.5 deg_C / 72 RH
Operation Mode	:TX LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



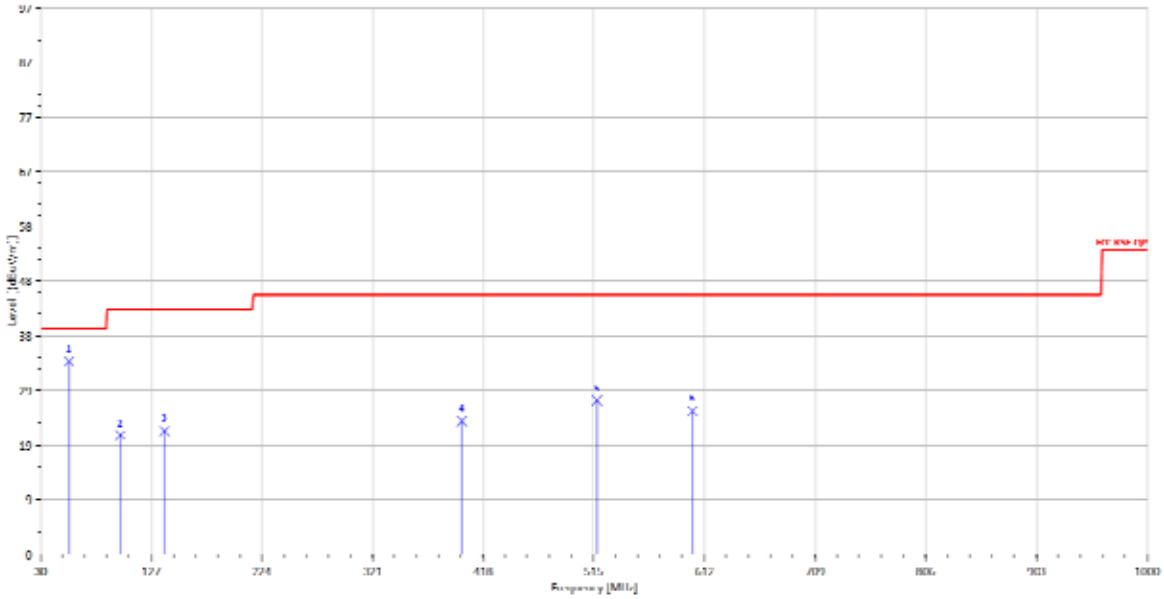
Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
54.25	Peak	S	63.41	-26.79	36.61	40.00	-3.39
100.81	Peak	S	45.46	-23.69	21.77	43.50	-21.73
138.64	Peak	S	44.33	-21.60	22.72	43.50	-20.78
399.57	Peak	S	40.97	-15.88	25.09	46.00	-20.91
517.91	Peak	S	41.56	-13.60	27.96	46.00	-18.04
607.15	Peak	S	37.68	-12.50	25.18	46.00	-20.82

Operation Band	:BR	Test Date	:2015-03-27
Fundamental Frequency	:2402 MHz	Temp./Humi.	:19.5 deg_C / 72 RH
Operation Mode	:TX LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



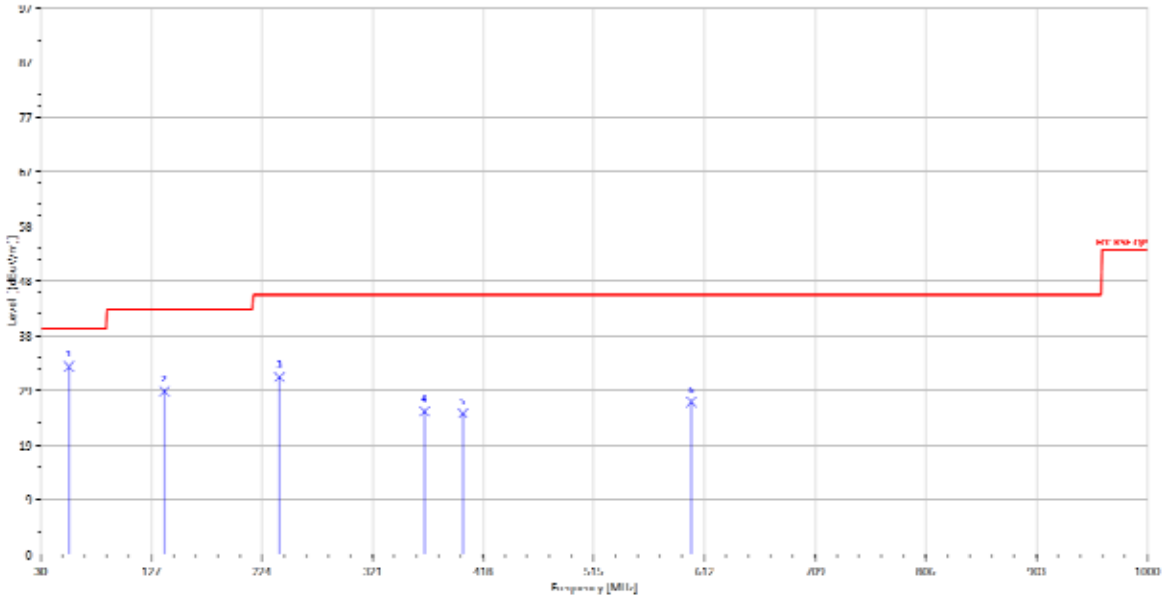
Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
55.22	Peak	S	59.77	-27.06	32.71	40.00	-7.29
138.64	Peak	S	51.39	-21.60	29.79	43.50	-13.71
239.52	Peak	S	53.42	-21.14	32.28	46.00	-13.72
299.66	Peak	S	44.08	-19.28	24.80	46.00	-21.20
366.59	Peak	S	43.15	-16.91	26.24	46.00	-19.76
399.57	Peak	S	42.37	-15.88	26.50	46.00	-19.50

Operation Band	:BR	Test Date	:2015-03-27
Fundamental Frequency	:2441 MHz	Temp./Humi.	:19.5 deg_C / 72 RH
Operation Mode	:TX MID	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



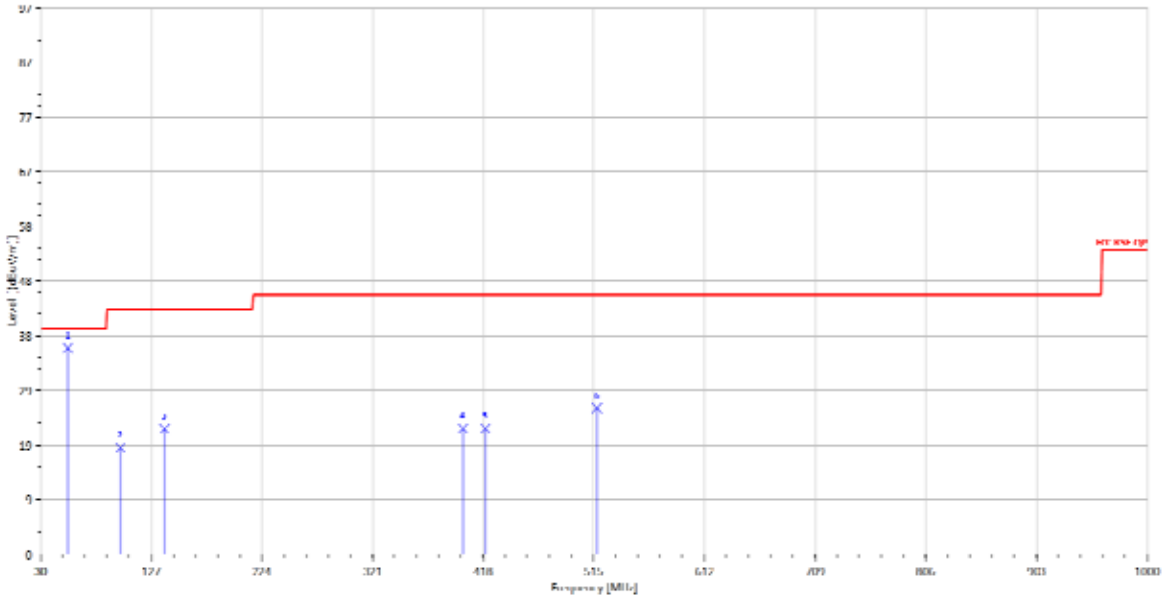
Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
55.22	Peak	S	61.27	-27.06	34.21	40.00	-5.79
99.84	Peak	S	44.94	-23.84	21.10	43.50	-22.40
138.64	Peak	S	43.45	-21.60	21.85	43.50	-21.65
399.57	Peak	S	39.51	-15.88	23.63	46.00	-22.37
517.91	Peak	S	40.86	-13.60	27.25	46.00	-18.75
601.33	Peak	S	37.95	-12.52	25.43	46.00	-20.57

Operation Band	:BR	Test Date	:2015-03-27
Fundamental Frequency	:2441 MHz	Temp./Humi.	:19.5 deg_C / 72 RH
Operation Mode	:TX MID	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



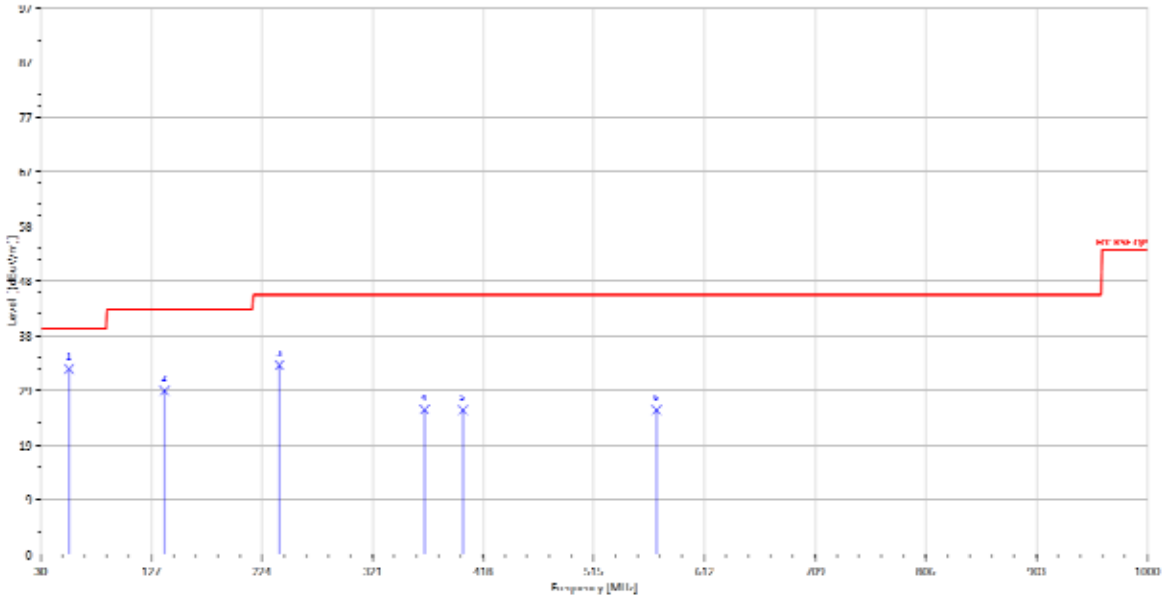
Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
55.22	Peak	S	60.32	-27.06	33.27	40.00	-6.73
138.64	Peak	S	50.54	-21.60	28.93	43.50	-14.57
239.52	Peak	S	52.54	-21.14	31.39	46.00	-14.61
366.59	Peak	S	42.24	-16.91	25.33	46.00	-20.67
400.54	Peak	S	40.77	-15.84	24.93	46.00	-21.07
600.36	Peak	S	39.47	-12.45	27.02	46.00	-18.98

Operation Band	:BR	Test Date	:2015-03-27
Fundamental Frequency	:2480 MHz	Temp./Humi.	:19.5 deg_C / 72 RH
Operation Mode	:TX HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
54.25	Peak	S	63.37	-26.79	36.58	40.00	-3.42
99.84	Peak	S	42.75	-23.84	18.91	43.50	-24.59
138.64	Peak	S	43.86	-21.60	22.25	43.50	-21.25
400.54	Peak	S	38.17	-15.84	22.32	46.00	-23.68
419.94	Peak	S	37.74	-15.40	22.34	46.00	-23.66
517.91	Peak	S	39.57	-13.60	25.96	46.00	-20.04

Operation Band	:BR	Test Date	:2015-03-27
Fundamental Frequency	:2480 MHz	Temp./Humi.	:19.5 deg_C / 72 RH
Operation Mode	:TX HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL

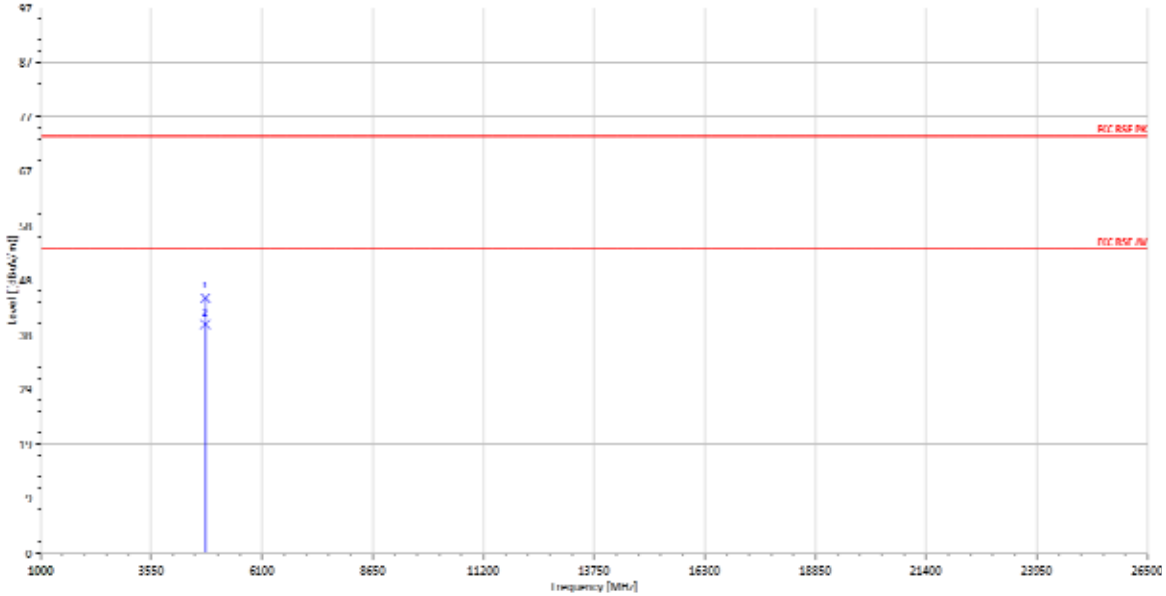


Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
55.22	Peak	S	59.94	-27.06	32.88	40.00	-7.12
138.64	Peak	S	50.61	-21.60	29.01	43.50	-14.49
239.52	Peak	S	54.66	-21.14	33.51	46.00	-12.49
366.59	Peak	S	42.57	-16.91	25.67	46.00	-20.33
400.54	Peak	S	41.42	-15.84	25.58	46.00	-20.42
570.29	Peak	S	38.05	-12.46	25.59	46.00	-20.41

Radiated Spurious Emission Measurement Result:

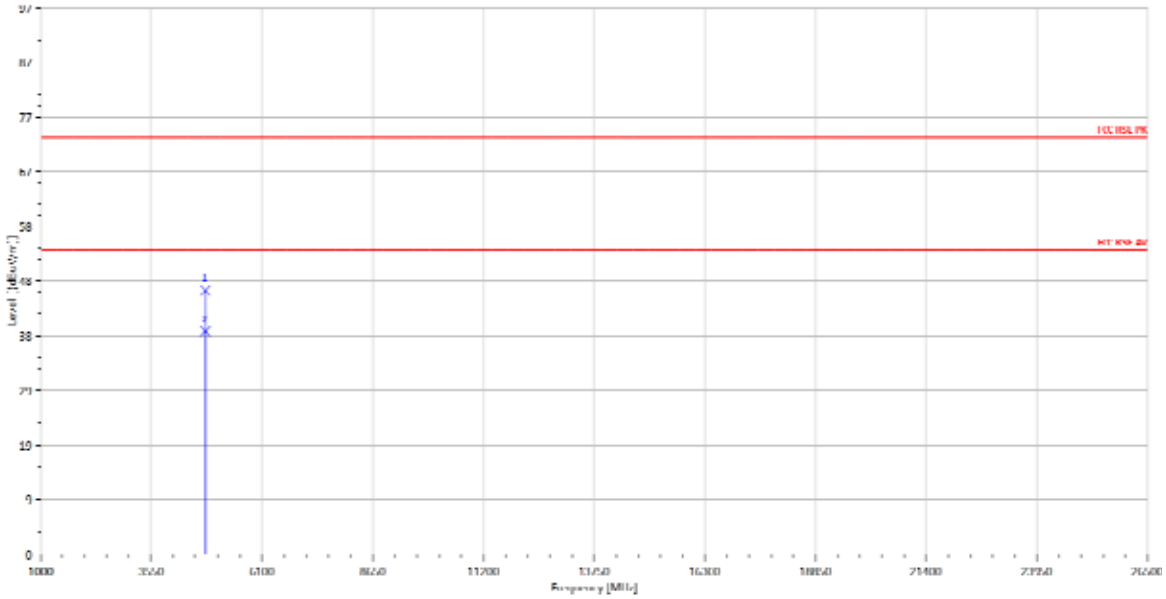
For Frequency over 1GHz

Operation Band	:BR	Test Date	:2015-03-27
Fundamental Frequency	:2402 MHz	Temp./Humi.	:19.5 deg_C / 72 RH
Operation Mode	:TX LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



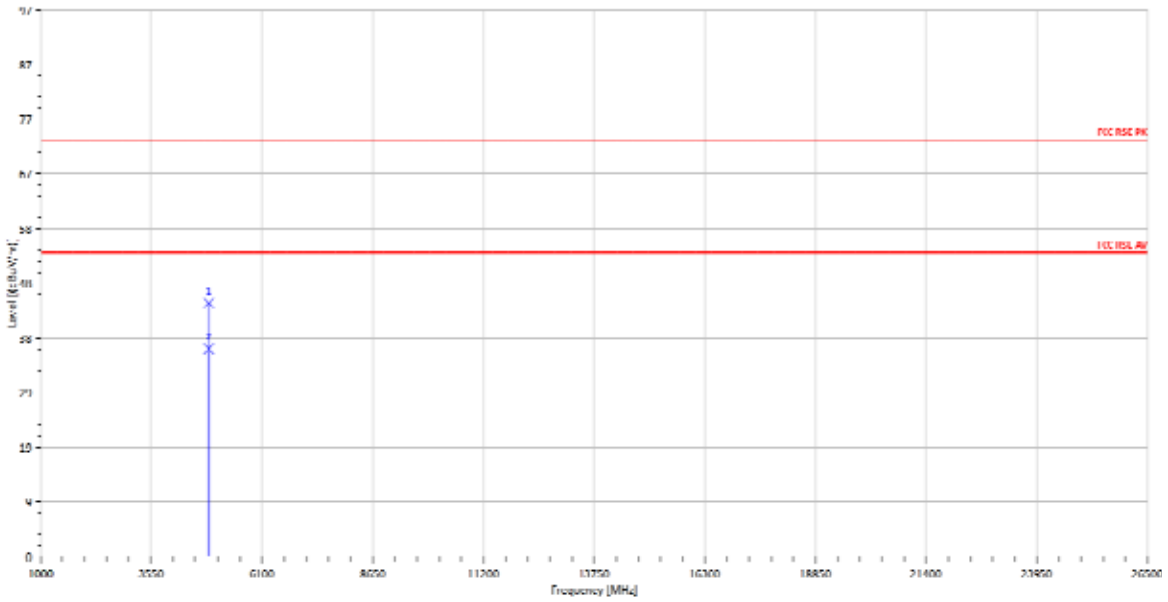
Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
4804.00	Peak	H	34.39	10.98	45.37	74.00	-28.63
4804.00	Average	H	29.66	10.98	40.64	54.00	-13.36

Operation Band	:BR	Test Date	:2015-03-27
Fundamental Frequency	:2402 MHz	Temp./Humi.	:19.5 deg_C / 72 RH
Operation Mode	:TX LOW	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



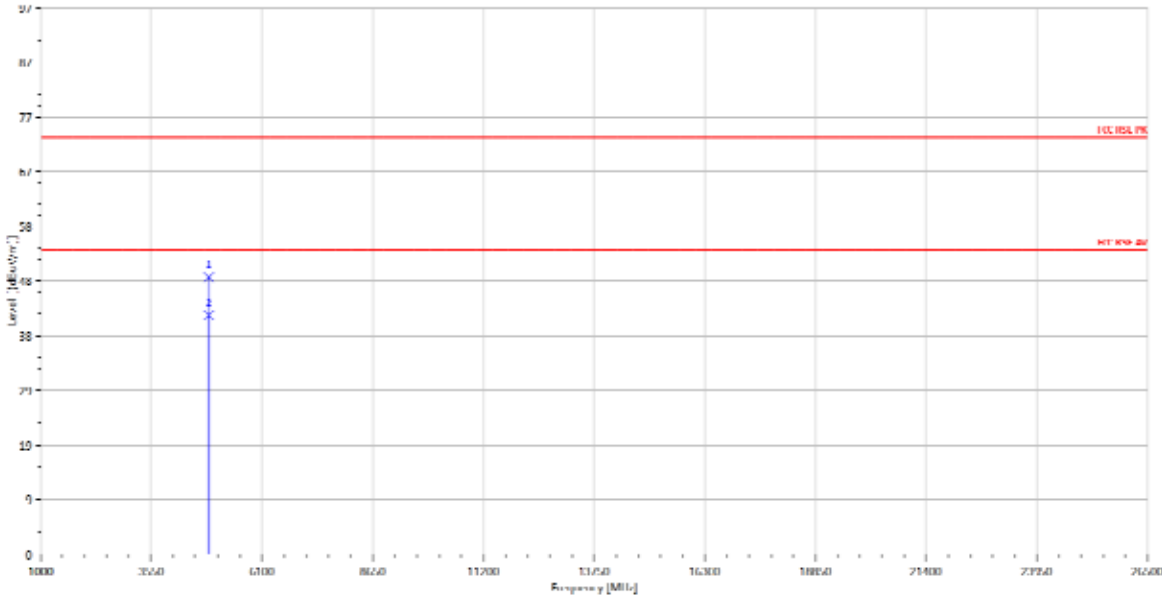
Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
4804.00	Peak	H	35.80	10.99	46.79	74.00	-27.21
4804.00	Average	H	28.61	10.99	39.60	54.00	-14.40

Operation Band	:BR	Test Date	:2015-03-27
Fundamental Frequency	:2441 MHz	Temp./Humi.	:19.5 deg_C / 72 RH
Operation Mode	:TX MID	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



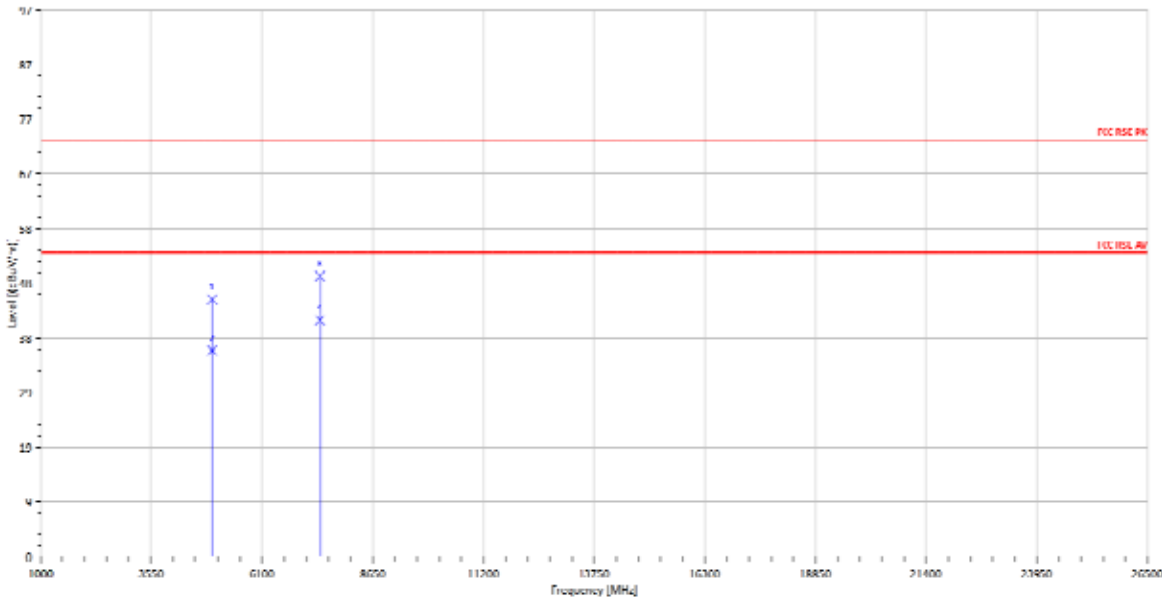
Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
4882.00	Peak	H	34.01	10.93	44.94	74.00	-29.06
4882.00	Average	H	25.93	10.93	36.86	54.00	-17.14

Operation Band	:BR	Test Date	:2015-03-27
Fundamental Frequency	:2441 MHz	Temp./Humi.	:19.5 deg_C / 72 RH
Operation Mode	:TX MID	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



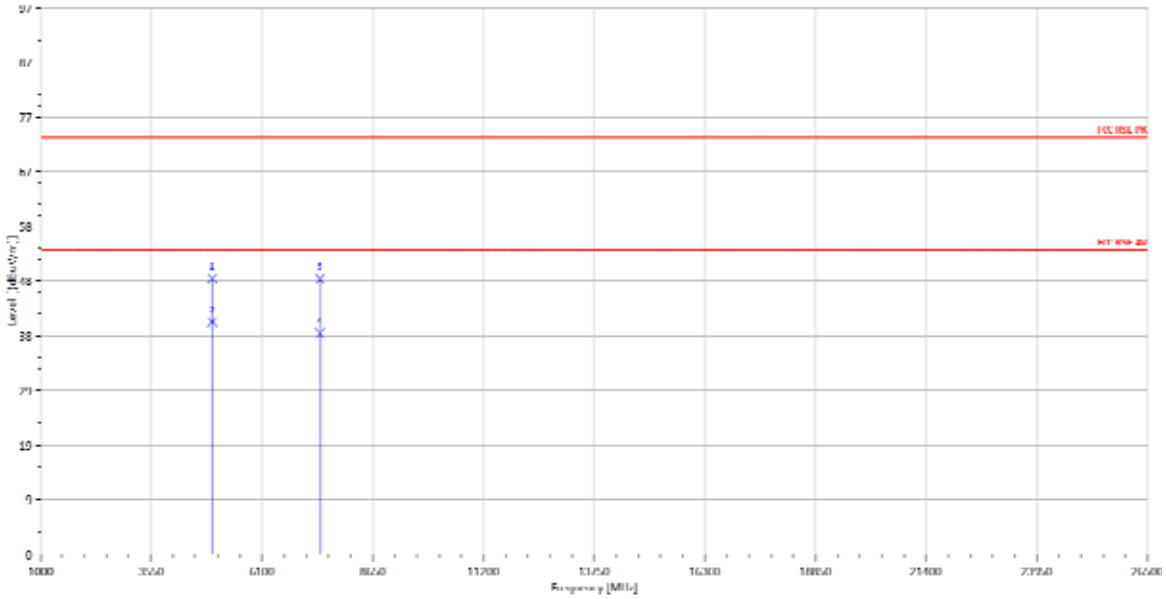
Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
4882.00	Peak	H	38.23	10.93	49.16	74.00	-24.84
4882.00	Average	H	31.49	10.93	42.42	54.00	-11.58

Operation Band	:BR	Test Date	:2015-03-27
Fundamental Frequency	:2480 MHz	Temp./Humi.	:19.5 deg_C / 72 RH
Operation Mode	:TX HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
4960.00	Peak	H	34.63	10.99	45.62	74.00	-28.38
4960.00	Average	H	25.56	10.99	36.55	54.00	-17.45
7440.00	Peak	H	34.09	15.67	49.76	74.00	-24.24
7440.00	Average	H	26.29	15.65	41.94	54.00	-12.06

Operation Band	:BR	Test Date	:2015-03-27
Fundamental Frequency	:2480 MHz	Temp./Humi.	:19.5 deg_C / 72 RH
Operation Mode	:TX HIGH	Engineer	:Ashton
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dBµV	dB	dBµV / m	dBµV / m	dB
4960.00	Peak	H	37.94	10.99	48.93	74.00	-25.07
4960.00	Average	H	30.22	10.99	41.21	54.00	-12.79
7440.00	Peak	H	33.17	15.65	48.82	74.00	-25.18
7440.00	Average	H	23.58	15.65	39.23	54.00	-14.77

12. FREQUENCY SEPARATION

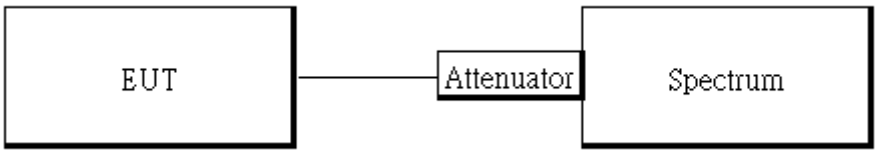
12.1. Standard Applicable

Frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25 kHz or the 2/3*20dB bandwidth of the hopping channel, whichever is greater.

12.2. Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY53400256	10/15/2014	10/14/2015
DC Block	PASTERNACK	PE8210	RF29	12/19/2014	12/18/2015
Splitter	RF-LAMBAD	RFLT2W1G18G	RF35	12/19/2014	12/18/2015
Attenuator	WOKEN	218FS-10	RF23	12/19/2014	12/18/2015

12.3. Test Set-up



12.4. Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
4. Set center frequency of spectrum analyzer = middle of hopping channel.
5. Set the spectrum analyzer as RBW, VBW=100 kHz, Adjust Span to 5MHz, Sweep = auto.
6. Max hold. Mark 3 Peaks of hopping channel and record the 3 peaks frequency.

12.5. Measurement Result

Channel separation (MHz)	Limit	Result
1	>=25 kHz or 2/3 times 20dB bandwidth	PASS

Frequency Separation Test Data

13. NUMBER OF HOPPING FREQUENCY

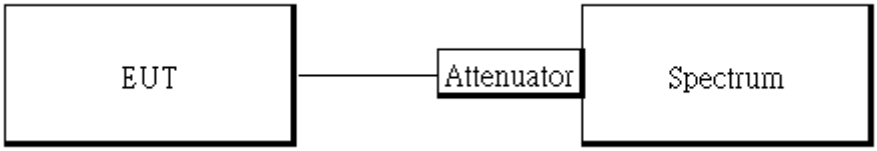
13.1. Standard Applicable

Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands shall use at least 15 hopping frequencies.

13.2. Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Spectrum Analyzer	Agilent	N9010A	MY53400256	10/15/2014	10/14/2015
DC Block	PASTERNACK	PE8210	RF29	12/19/2014	12/18/2015
Splitter	RF-LAMBAD	RFLT2W1G18G	RF35	12/19/2014	12/18/2015
Attenuator	WOKEN	218FS-10	RF23	12/19/2014	12/18/2015

13.3. Test Set-up



13.4. Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
4. Set spectrum analyzer Start=2400MHz, Stop = 2483.5MHz, Sweep = auto.
5. Set the spectrum analyzer as RBW=430 kHz, VBW=1.5MHz., Detector = Peak
6. Max hold, view and count how many channel in the band.

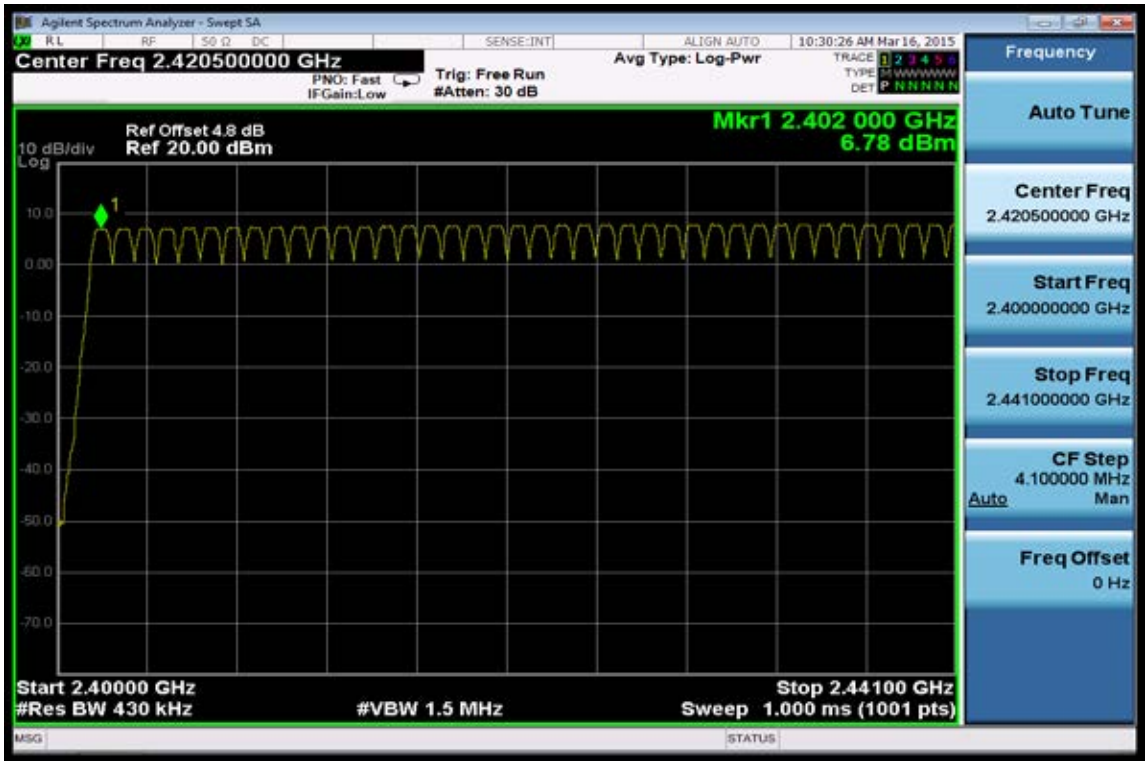
13.5. Measurement Result

Tabular Data of Total Channel Number

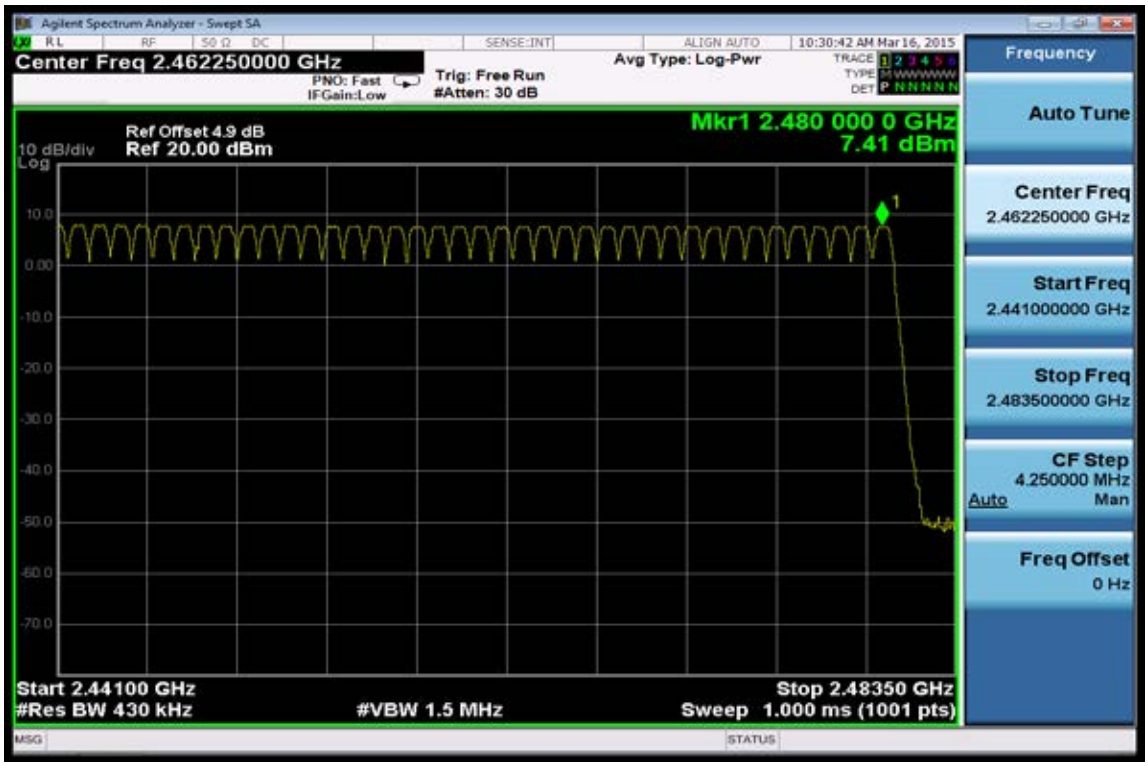
	Channel Number	**Limit**
2.4 GHz – 2.441GHz	**40**	**>15**
2.441 GHz – 2.4835GHz	**39**	
2.4GHz ~2.4835GHz	**(40+39) = 79**	

Channel Number

2.4 GHz – 2.441GHz



2.441 GHz – 2.4835GHz



14. TIME OF OCCUPANCY (DWELL TIME)

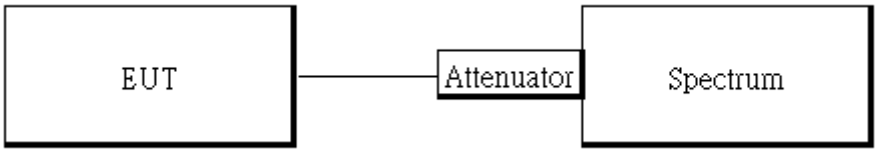
14.1. Standard Applicable

Frequency hopping systems operating in the 2400MHz-2483.5MHz. 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.

14.2. Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Spectrum Analyzer	Agilent	N9010A	MY53400256	10/15/2014	10/14/2015
DC Block	PASTERNACK	PE8210	RF29	12/19/2014	12/18/2015
Splitter	RF-LAMBAD	RFLT2W1G18G	RF35	12/19/2014	12/18/2015
Attenuator	WOKEN	218FS-10	RF23	12/19/2014	12/18/2015

14.3. Test Set-up



14.4. Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
4. Set center frequency of spectrum analyzer = operating frequency.
5. Set the spectrum analyzer as RBW, VBW=1MHz, 3MHz, Span = 0Hz , Detector = Peak,
   Adjust Sweep = 2~8ms.
6. Repeat above procedures until all frequency of the interest measured were complete.

Formula Deduced: time occupancy of one time slot X Hopping rate / total slot in one channel / total channel that hops X period of working channels.

Where, standard hopping rate is 1600 hops/s, slot in one channel for DH1, DH3, and DH5 is 2, 4, and 6, respectively.

DH1 consists of single time slot of the uplink, and one slot of the downlink Total Slot: 2

DH3 consists of three time slot of the uplink, and one slot of the downlink. Total Slot: 4

DH5 consists of five time slot of the uplink, and one slot of the downlink. Total Slot: 6

Note: the result of the complete test default channel at 1Mbps is recorded on the test report, 2Mbps, and 3Mbps only records the measurement result at middle channel that reveals no much deviation.

14.5. Tabular Result of the Measurement

GFSK (1Mbps)			
Channel	**PACKET TYPE**	**Measurement Result (ms)**	**Limit (ms)**
0	DH1	123.52	400ms
	DH3	261.92	400ms
	DH5	308.38	400ms
39	DH1	122.88	400ms
	DH3	262.08	400ms
	DH5	307.73	400ms
78	DH1	123.52	400ms
	DH3	262.72	400ms
	DH5	307.73	400ms
π/4 DQPSK (2Mbps)			
Channel	**PACKET TYPE**	**Measurement Result (ms)**	**Limit (ms)**
39	DH1	124.80	400ms
	DH3	263.52	400ms
	DH5	306.45	400ms
8-DPSK (3Mbps)			
Channel	**PACKET TYPE**	**Measurement Result (ms)**	**Limit (ms)**
39	DH1	124.80	400ms
	DH3	262.72	400ms
	DH5	307.84	400ms

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

GFSK (1Mbps):

CH Low	DH1 time slot	=	0.386 (ms) * (1600/2/79)	* 31.6 =	123.52	(ms)
	DH3 time slot	=	1.637 (ms) * (1600/4/79)	* 31.6 =	261.92	(ms)
	DH5 time slot	=	2.891 (ms) * (1600/6/79)	* 31.6 =	308.38	(ms)
CH Mid	DH1 time slot	=	0.384 (ms) * (1600/2/79)	* 31.6 =	122.88	(ms)
	DH3 time slot	=	1.638 (ms) * (1600/4/79)	* 31.6 =	262.08	(ms)
	DH5 time slot	=	2.885 (ms) * (1600/6/79)	* 31.6 =	307.73	(ms)
CH High	DH1 time slot	=	0.386 (ms) * (1600/2/79)	* 31.6 =	123.52	(ms)
	DH3 time slot	=	1.642 (ms) * (1600/4/79)	* 31.6 =	262.72	(ms)
	DH5 time slot	=	2.885 (ms) * (1600/6/79)	* 31.6 =	307.73	(ms)

π/4 -DQPSK (2Mbps):

CH Mid	2DH1 time slot =	0.390 (ms) * (1600/2/79)	* 31.6 =	124.80	(ms)
	2DH3 time slot =	1.631 (ms) * (1600/4/79)	* 31.6 =	263.52	(ms)
	2DH5 time slot =	2.870 (ms) * (1600/6/79)	* 31.6 =	306.45	(ms)

8-DPSK (3Mbps):

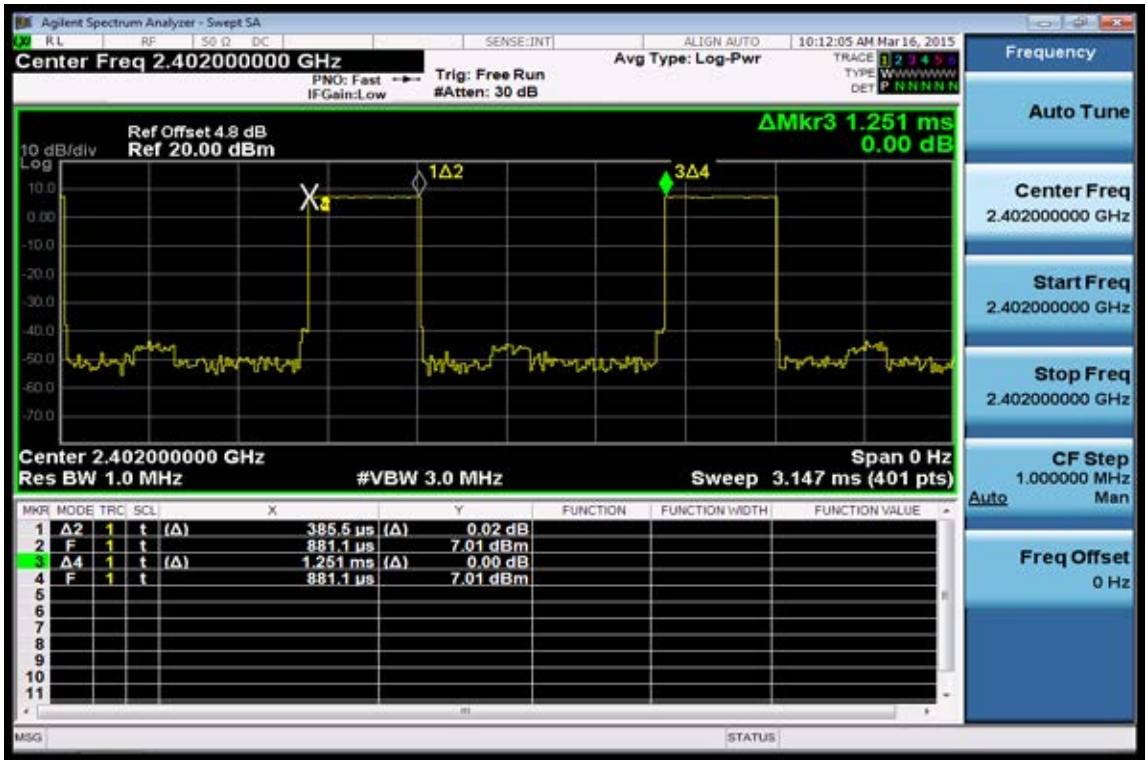
CH Mid	3DH1 time slot =	0.390 (ms) * (1600/2/79)	* 31.6 =	124.80	(ms)
	3DH3 time slot =	1.642 (ms) * (1600/4/79)	* 31.6 =	262.72	(ms)
	3DH5 time slot =	2.886 (ms) * (1600/6/79)	* 31.6 =	307.84	(ms)

14.6. Measurement Result

Note: Refer to next page for plots.

CH-Low

DH1

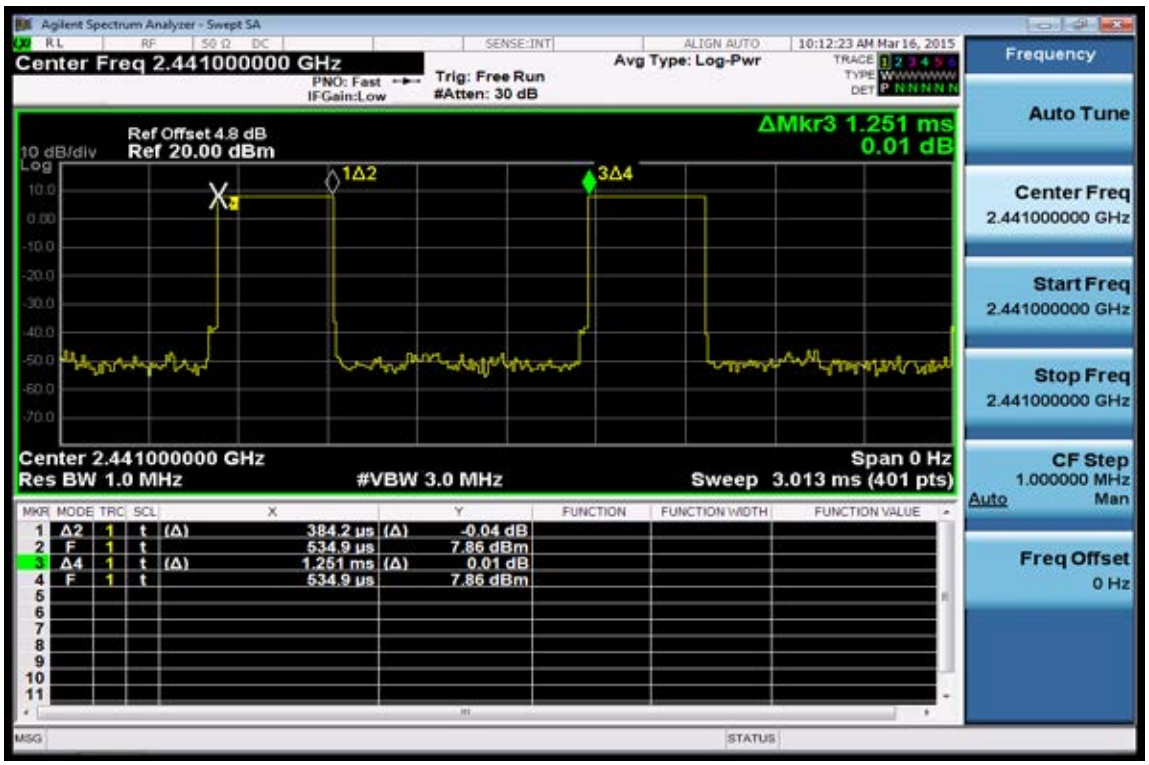


DH3

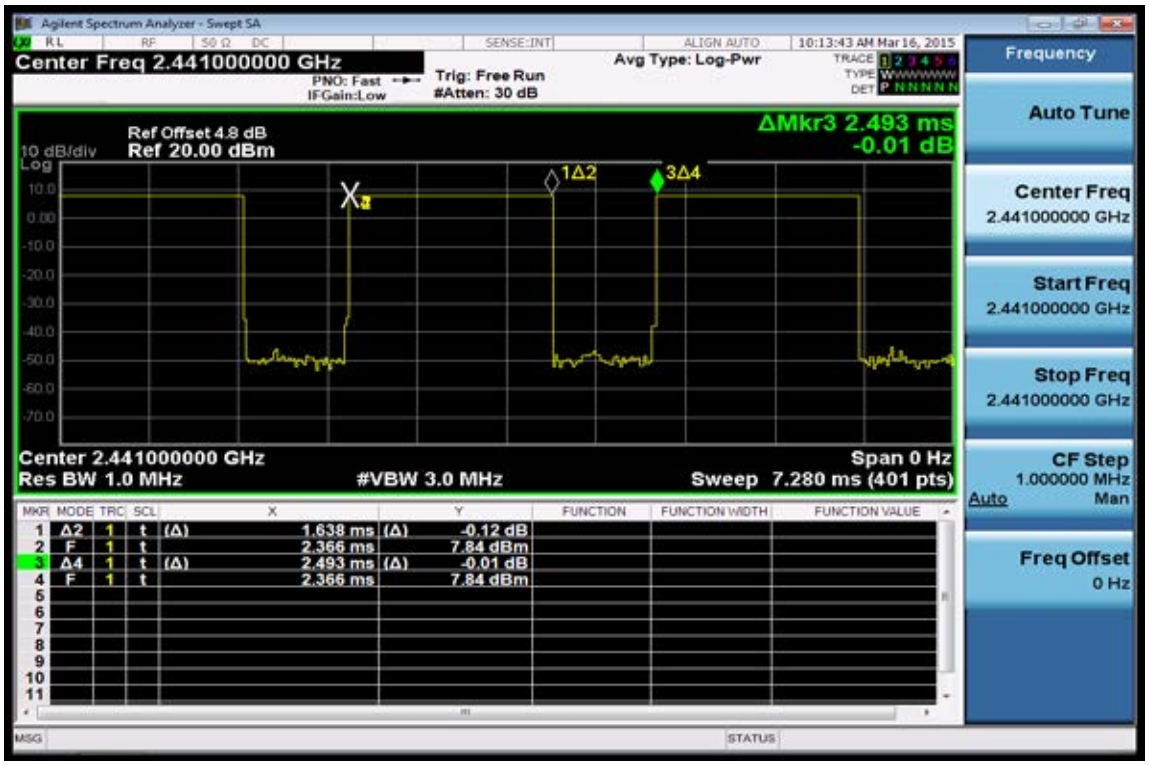
DH5

CH-Mid

DH1



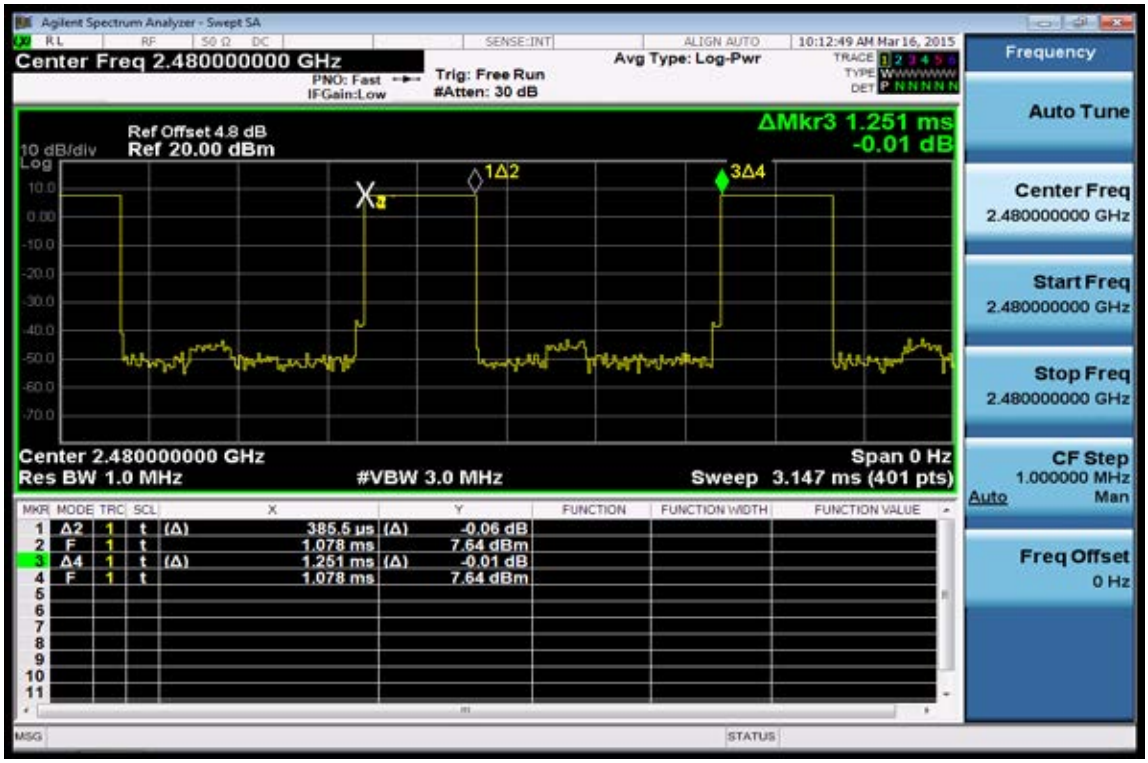
DH3



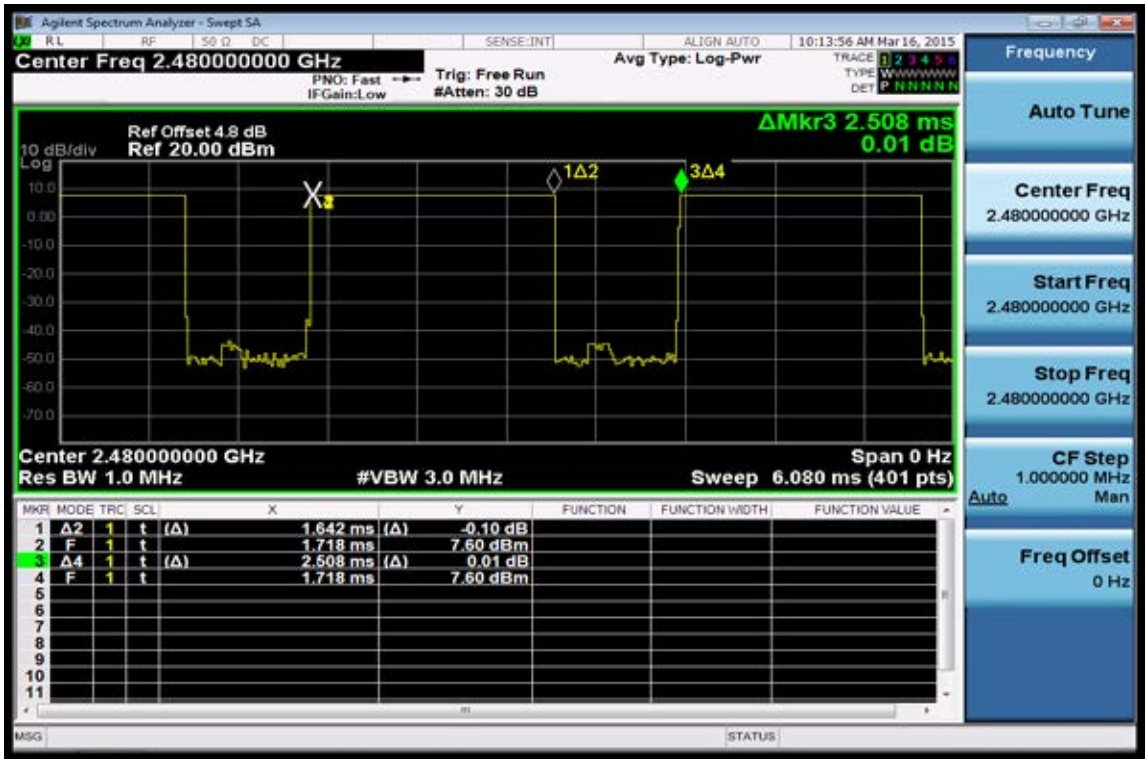
DH5

CH-High

DH1



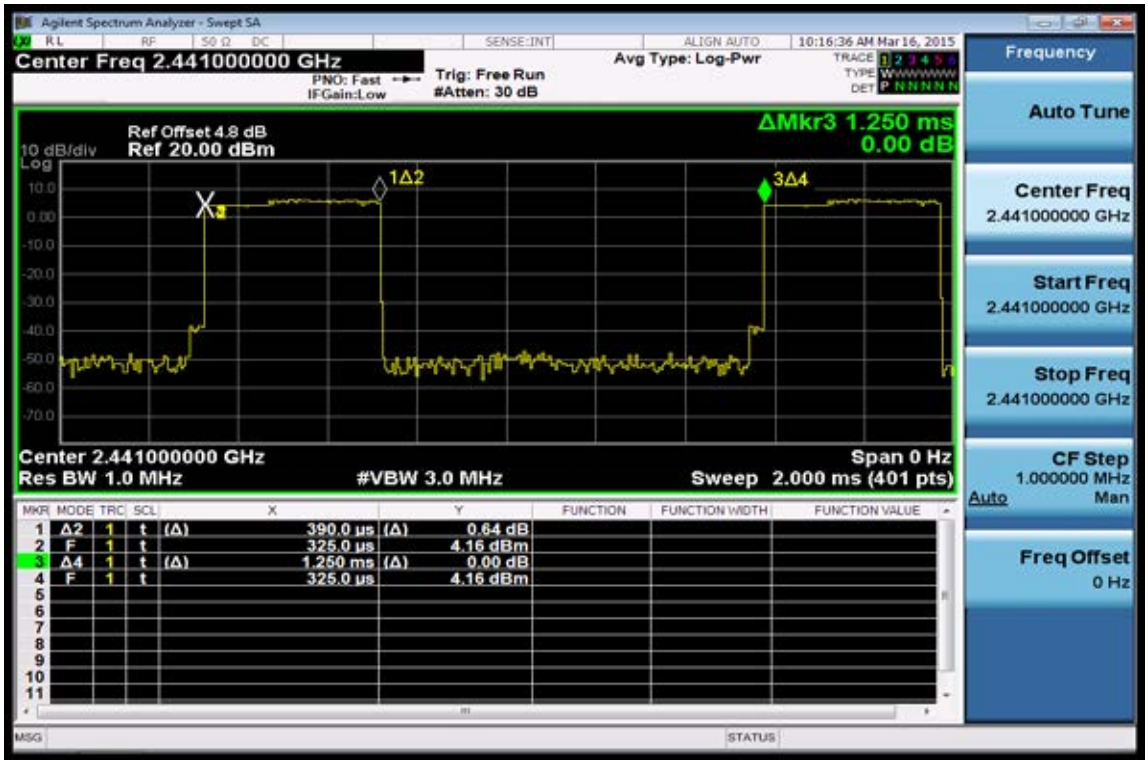
DH3



DH5

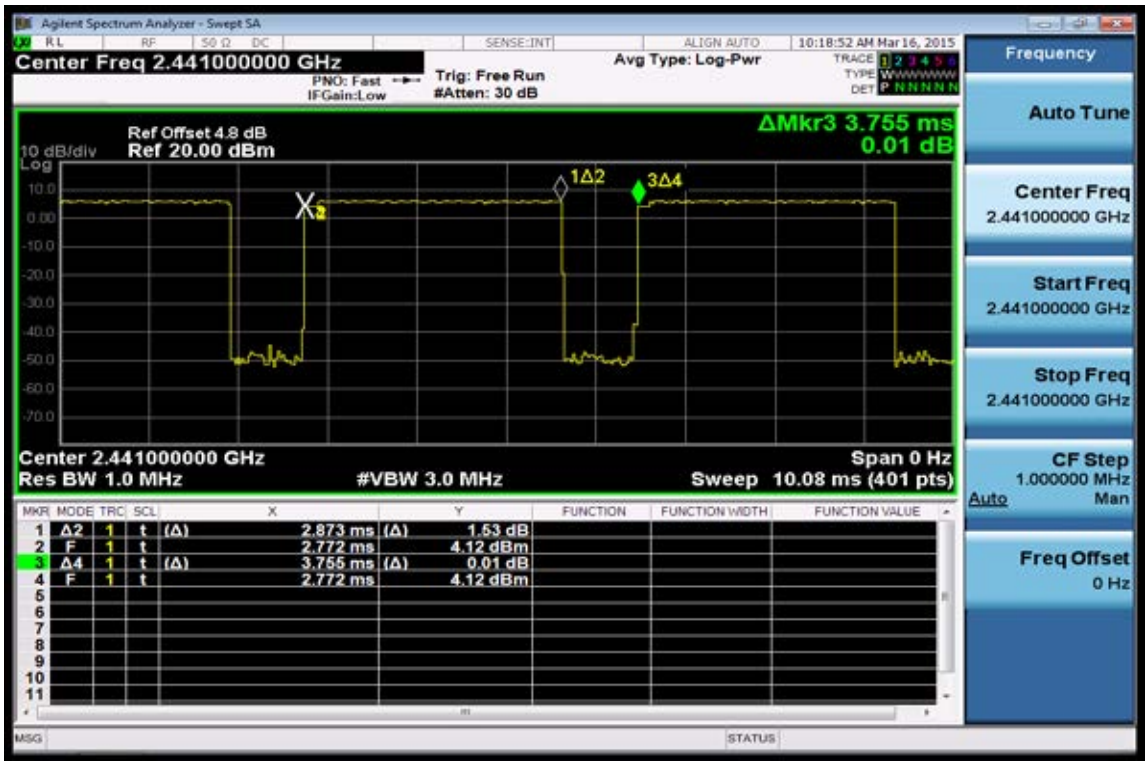
CH-Mid

2DH1



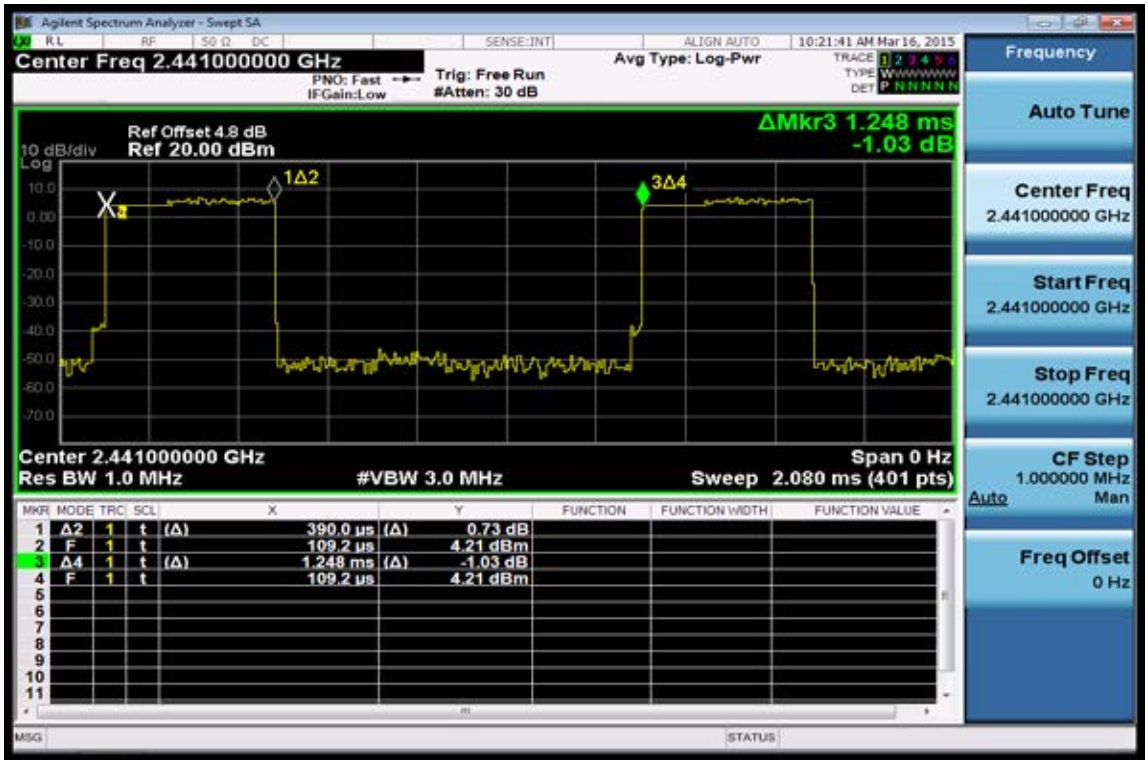
2DH3

2DH5



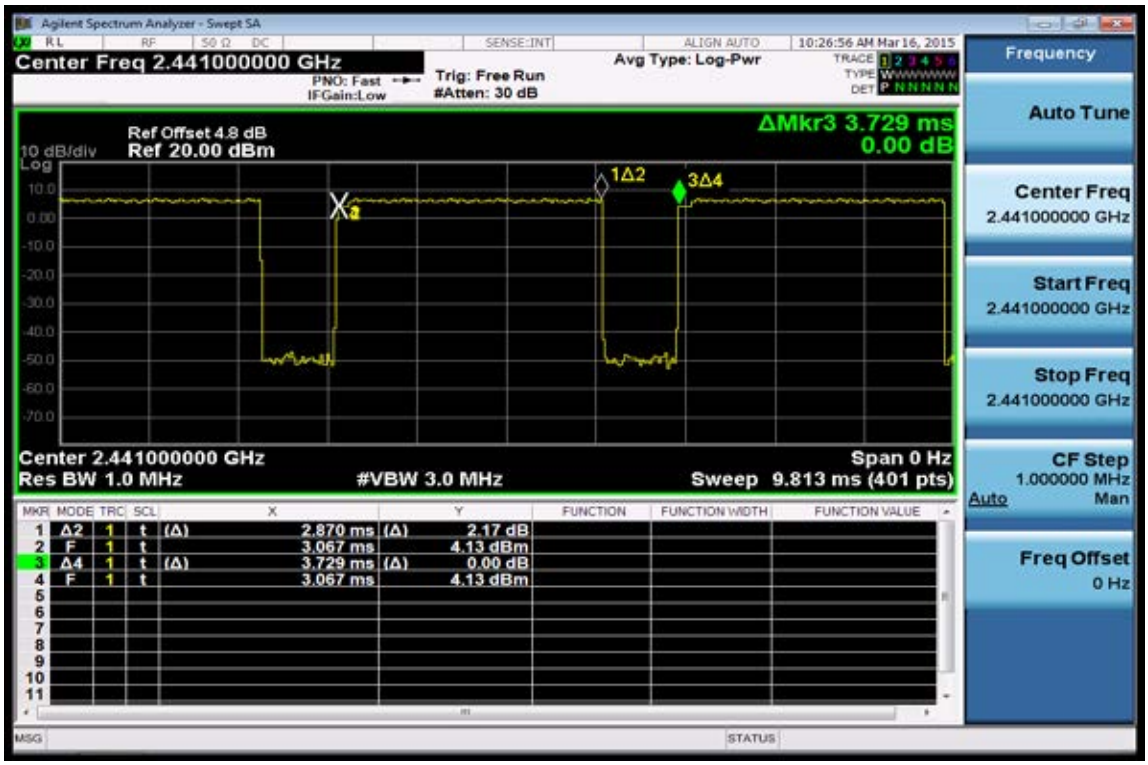
CH-Mid

3DH1



3DH3

3DH5



15. ANTENNA REQUIREMENT

15.1. Standard Applicable

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

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

According to RSS-GEN 6.7
As per RSP-100, each applicant for equipment certification must provide a list of all antenna types that may be used with the transmitter, indicating the maximum permissible antenna gain (in dBi).
When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer. The test report shall state the RF power, output power setting and spurious emission measurements, including the antenna type used.
In addition, applicants shall perform RF power and spurious emission measurements with each antenna type supplied or specified by the manufacturer for use with the transmitter.

According to RSS-GEN 8.3
The applicant for equipment certification, as per RSP-100, must provide a list of all antenna types that may be used with the licence-exempt transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna.
Licence-exempt transmitters that have received equipment certification may operate with different types of antennas. However, it is not permissible to exceed the maximum equivalent isotropically radiated power (e.i.r.p.) limits specified in the applicable standard (RSS) for the licence-exempt apparatus.

Testing shall be performed using the highest gain antenna of each combination of licence-exempt transmitter and antenna type, with the transmitter output power set at the maximum level.9 When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer.

15.2. Antenna Connected Construction

An embedded-in antenna design is used.

The antenna connector is designed with unique type RF connector and no consideration of replacement.

Please see EUT photo and antenna spec. for details.

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

~ End of Report ~