

Application for FCC Certification
On behalf of

Jiaxing Shufude Electric Bed Co. Ltd.

Product Name: Bluetooth

Model No.: BT-Adjustable Bed

FCC ID: WKZSFD-BT

Prepared For: Jiaxing Shufude Electric Bed Co. Ltd.
East No.07 Provincial Road, Tengyun Village
Wangjiangjing Development Zone,
Jiaxing, Zhejiang, China

Prepared By: Audix Technology (Shanghai) Co., Ltd.
3F and 4F, 34Bldg 680 Guiping Rd.,
Caohejing Hi-Tech Park,
Shanghai 200233, China

Tel: +86-21-64955500
Fax: +86-21-64955491

Report No. : ACI-F14194
Date of Test : Nov 13 – 16, 2014
Date of Report : Nov 26, 2014

TABLE OF CONTENTS

Page

1 SUMMARY OF STANDARDS AND RESULTS.....	5
1.1 Description of Standards and Results.....	5
2 GENERAL INFORMATION.....	6
2.1 Description of Equipment Under Test.....	6
2.2 Description of Test Facility	7
2.3 Measurement Uncertainty	7
3 RADIATED EMISSION TEST.....	8
3.1 Test Equipment.....	8
3.2 Block Diagram of Test Setup	9
3.3 Radiated Emission Limit [FCC Part 15 Subpart C 15.209]	10
3.4 Test Configuration.....	10
3.5 Operating Condition of EUT	10
3.6 Test Procedures	10
3.7 Test Results	11
4 6 dB BANDWIDTH MEASUREMENT.....	19
4.1 Test Equipment.....	19
4.2 Block Diagram of Test Setup	19
4.3 Specification Limits (§15.247(a)(2)).....	19
4.4 Operating Condition of EUT	19
4.5 Test Procedure.....	19
4.6 Test Results	20
5 MAXIMUM PEAK OUTPUT POWER MEASUREMENT.....	23
5.1 Test Equipment.....	23
5.2 Block Diagram of Test Setup	23
5.3 Specification Limits ((§15.247(b)(3))	23
5.4 Operating Condition of EUT	23
5.5 Test Procedure.....	23
5.6 Test Results	24
6 EMISSION LIMITATIONS MEASUREMENT.....	25
6.1 Test Equipment.....	25
6.2 Block Diagram of Test Setup	25
6.3 Specification Limits (§15.247(d))	25
6.4 Operating Condition of EUT	25
6.5 Test Procedure.....	25
6.6 Test Results	26
7 BAND EDGES MEASUREMENT	36
7.1 Test Equipment.....	36
7.2 Block Diagram of Test Setup	36
7.3 Specification Limits (§15.247(d))	36
7.4 Operating Condition of EUT	36
7.5 Test Procedure.....	36
7.6 Test Results	37
8 POWER SPECTRAL DENSITY MEASUREMENT.....	39
8.1 Test Equipment.....	39

8.2 Block Diagram of Test Setup 39

8.3 Specification Limits (§15.247(e)) 39

8.4 Operating Condition of EUT 39

8.5 Test Procedure..... 39

8.6 Test Results 40

9 DEVIATION TO TEST SPECIFICATIONS..... 43

TEST REPORT FOR FCC CERTIFICATE

Applicant : Jiaxing Shufude Electric Bed Co. Ltd.
Manufacturer : Shenzhen Silicontra Technology Co., Ltd.
EUT Description : Bluetooth
(A) Model No. : BT-Adjustable Bed
(B) Power Supply : DC 5V (USB Power)

Test Procedure Used:

*FCC RULES AND REGULATIONS PART 15 SUBPART C OCTOBER 2013
AND ANSI C63.4-2003*

The device described above is tested by Audix Technology (Shanghai) Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits.

The test results are contained in this test report and Audix Technology (Shanghai) Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. This report also shows that the EUT (M/N: Refer to Sec2.1), which was tested on Nov 13 – 16, 2014 is technically compliance with the FCC limits.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Audix Technology (Shanghai) Co., Ltd.

This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

Date of Test : Nov 13 – 16, 2014 Date of Report : Nov 26, 2014

Producer : Alan He
ALAN HE / Assistant

Review : Sammy Chen
SAMMY CHEN/ Deputy Manager

 For and on behalf of
Audix Technology (Shanghai) Co., Ltd.

Signatory : Byron Kwo
Authorized Signature EMC BYRON KWO/Assistant General Manager

1 SUMMARY OF STANDARDS AND RESULTS

1.1 Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below:

Description / Test Item	Test Standard	Results	Meets Limit
EMISSION			
Conducted Emission	FCC RULES AND REGULATIONS PART 15 SUBPART C October 2013 AND ANSI C63.4:2003 AND KDB558074 D01 v03r02	N/A	15.207
Radiated Emission	FCC RULES AND REGULATIONS PART 15 SUBPART C October 2013 AND ANSI C63.4:2003 AND KDB558074 D01 v03r02	Pass	15.209(a) 15.205(a)(c)
6 dB Bandwidth Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C October 2013 AND ANSI C63.4:2003 AND KDB558074 D01 v03r02	Pass	15.247(a)(2)
Maximum Peak Output Power Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C October 2013 AND ANSI C63.4:2003 AND KDB558074 D01 v03r02	Pass	15.247(b)(3)
Emission Limitations Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C October 2013 AND ANSI C63.4:2003 AND KDB558074 D01 v03r02	Pass	15.247(d)
Band Edge Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C October 2013 AND ANSI C63.4:2003 AND KDB558074 D01 v03r02	Pass	15.247(d)
Power Spectral Density Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C October 2013 AND ANSI C63.4:2003 AND KDB558074 D01 v03r02	Pass	15.247(e)
N/A is an abbreviation for Not Applicable.			

2 GENERAL INFORMATION

2.1 Description of Equipment Under Test

Description	:	Bluetooth
Type of EUT	:	☒ Production ☐ Pre-product ☐ Pro-type
Model Number	:	BT-Adjustable Bed
Radio Tech	:	Bluetooth v4.0 (v2.0, v3.0 is not supported)
Freq. Band	:	2402 MHz ~ 2480 MHz Total 40 Channels
Tested Freq.	:	2402 MHz (Channel 00) 2442 MHz (Channel 20) 2480 MHz (Channel 39)
Modulation	:	GFSK
Transmit data rate	:	1Mbps
Antenna Type	:	PCB Antenna
Antenna Gain	:	1.5 dBi
Test Mode	:	The EUT was set at continuous TX with duty cycle 100% during all the test in the report
Applicant	:	Jiaxing Shufude Electric Bed Co. Ltd. East No.07 Provincial Road, Tengyun Village, Wangjiangjing Development Zone, Jiaxing, Zhejiang, China
Manufacturer	:	Shenzhen Silicon Technology Co., Ltd. B 1120-1122 Yousong Technology Building, Longhuadonghuan Road, Baoan District, Shenzhen

2.2 Description of Test Facility

Site Description (Semi-Anechoic Chamber)	: Sept. 17, 1998 file on Mar 16, 2012 Renewed Federal Communications Commission FCC Engineering Laboratory 7435 Oakland Mills Road Columbia, MD 21046, USA
Name of Firm	: Audix Technology (Shanghai) Co., Ltd.
Site Location	: 3F 34 Bldg 680 Guiping Rd., Caohejing Hi-Tech Park, Shanghai 200233, China
FCC registration Number	: 91789
Accredited by NVLAP, Lab Code	: 200371-0

2.3 Measurement Uncertainty

Radiated Emission Expanded Uncertainty (30-200MHz):	U = 4.40dB (Horizontal) U = 4.40dB (Vertical)
Radiated Emission Expanded Uncertainty (200M-1GHz):	U = 4.40dB (Horizontal) U = 5.40dB (Vertical)
Radiated Emission Expanded Uncertainty (Above 1GHz):	U= 4.68 dB (Horizontal) U= 4.87 dB (Vertical)
6 dB Bandwidth Expanded Uncertainty	: U = $\pm 1 \times 10^{-8}$ MHz
Maximum Peak Output Power Expanded Uncertainty:	U = ± 1.56 dB
Emission Limitations Expanded Uncertainty	: U = ± 1.20 dB
Band Edge Expanded Uncertainty	: U = ± 1.20 dB
Power Spectral Density Expanded Uncertainty	: U = ± 1.20 dB

3 RADIATED EMISSION TEST

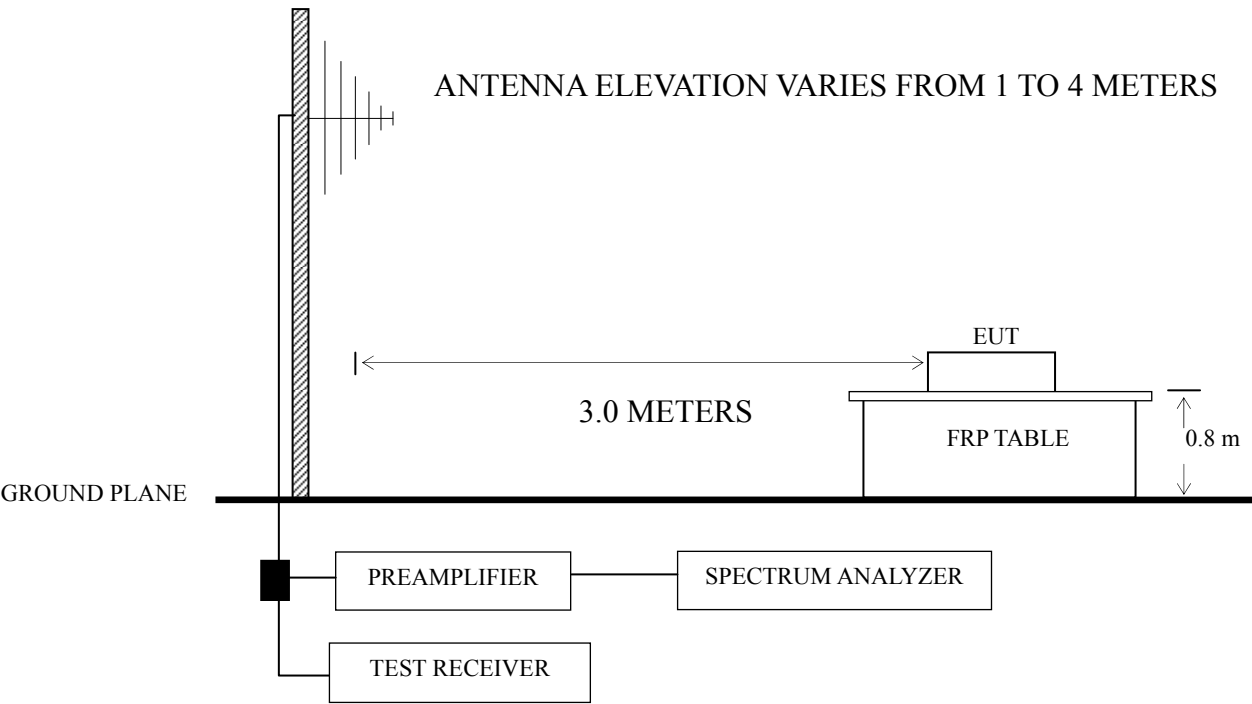
3.1 Test Equipment

The following test equipment are used during the radiated emission test in a semi-anechoic chamber:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Pre-Amplifier	Agilent	8447D	2944A10548	Sep 18, 2014	Mar 17, 2015
2.	Pre-Amplifier	Agilent	8449B	3008A00864	Mar 20, 2014	Mar 19, 2015
3.	Spectrum Analyzer	Agilent	N9010A	MY52221182	Jun 14, 2014	Jun 13, 2015
4.	Test Receiver	R&S	ESCI	101302	Sep 03, 2014	Sep 02, 2015
5.	Bi-log Antenna	TESEQ	CBL6112D	23193	May 03, 2014	May 02, 2015
6.	Horn Antenna	EMCO	3115	9607-4878	Jun 16, 2014	Jun 15, 2015
7.	Horn Antenna	EMCO	3116	00062643	Jul 21, 2014	Jul 21, 2015
8.	50 Ω Coaxial Switch	Anritsu	MP59B	6200426390	Sep 18, 2014	Mar 17, 2015
9.	50 Ω Terminator	Audix	BNC	001	Mar 20, 2014	Mar 19, 2015
10.	Software	Audix	E3	SET00200 9912M295-2	--	--

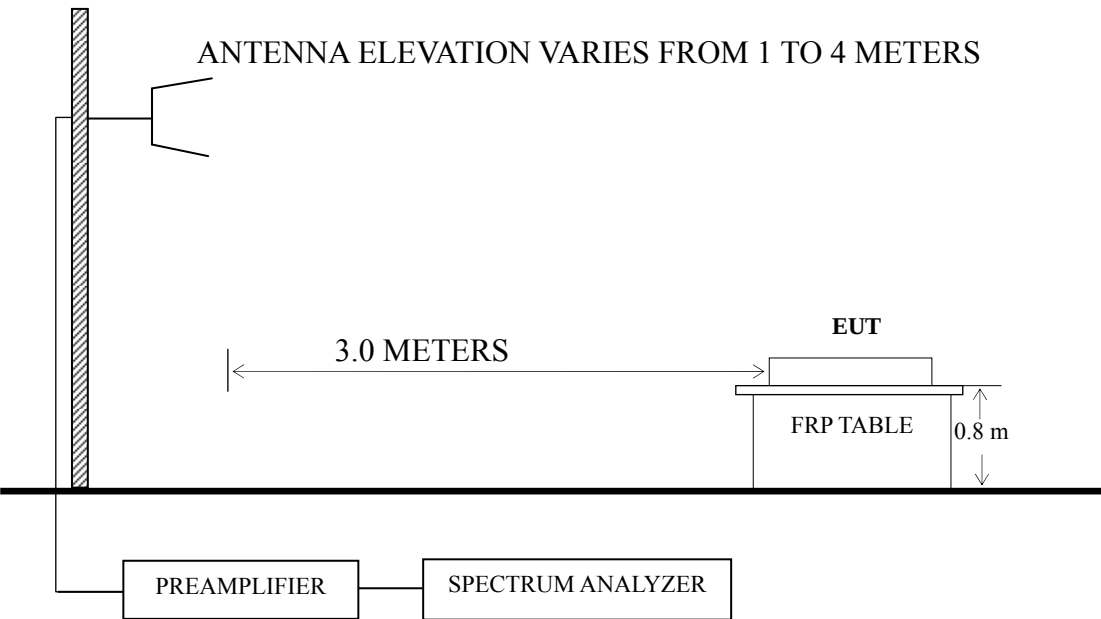
3.2 Block Diagram of Test Setup

3.2.1 Below 1GHz



■ : 50 ohm Coaxial Switch

3.2.2 Above 1GHz



3.3 Radiated Emission Limit [FCC Part 15 Subpart C 15.209]

Frequency (MHz)	Distance (m)	Field strength limits ($\mu\text{V/m}$)	
		($\mu\text{V/m}$)	dB($\mu\text{V/m}$)
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
Above 960	3	500	54.0
NOTE 1 - Emission Level dB ($\mu\text{V/m}$) = 20 log Emission Level ($\mu\text{V/m}$) NOTE 2 - The tighter limit applies at the band edges. NOTE 3 - Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system. NOTE 4 - The limits shown are based on Quasi-peak value detector below or equal to 1GHz and Average value detector above 1GHz. NOTE 5 - Above 1 GHz, the limit on peak emission is 20 dB above the maximum permitted average emission limit applicable to the EUT			

3.4 Test Configuration

The EUT (listed in Sec.2.1) and the simulators (listed in Sec.2.2) were installed as shown on Sec.3.2 to meet FCC requirements and operating in a manner that tends to maximize its emission level in a normal application.

3.5 Operating Condition of EUT

3.5.1 Setup the EUT as shown in Sec. 3.2.

3.5.2 Turn on the power of all equipment.

3.5.3 Turn the EUT on the test mode, and then test.

3.6 Test Procedures

Radiated emission test applies to harmonics/spurs that fall in the restricted bands listed in Section 15.205. The maximum permitted average field strength is listed in Section 15.209. A pre-amp is necessary for this measurement. For measurement above 1 GHz, set RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation.

The EUT was placed on a turntable that is 0.8 meter above ground. The turntable rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna, which was mounted on an antenna tower. The antenna moved up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (Calibrated Bilog Antenna) or Horn antenna was used as receiving antenna. Both horizontal and vertical polarizations of the antenna were set on measurement. In order to find the maximum emission, all of the interference cables were manipulated according to ANSI C63.4:2003 requirements during radiated emission test.

The bandwidth of Test Receiver R&S ESCI was set at 120 kHz from 30MHz to 1000MHz.

The bandwidth of the VBW was set at 1MHz and RBW was set at 1MHz for peak emission measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emission above 1GHz for Spectrum Agilent E7405A.

The frequency range from 30 MHz to 25 GHz (Up to 10th harmonics from fundamental frequency) was checked.

The EUT was tested under the following test modes:

Mode	Operation	Channel
1.	Transmitting	00
2.		20
3.		39
4.	Receiving	--
5.	Transmitting	00
6.	Band-Edge	39

All the test results are listed in Sec.3.7.

3.7 Test Results

<PASS>

The frequency and amplitude of the highest radiated emission relative the limit is reported. All the emissions not reported below are too low against the FCC limit.

No.	Operation	Modulation	Channel	Frequency	Data Page	
1.	Transmitting	Worst case emission < 1GHz			P12	
2.		--	00	2402 MHz	P13	
3.			20	2442 MHz		
4.			39	2480 MHz		
5.	Receiving	--	--		P14	
6.	Transmitting	--	00	2402 MHz	Restricted	P15-16
7.			39	2480 MHz	BandEdge	P17-18

NOTE 1 – Level = Read Level + Antenna Factor + Cable Loss (<1GHz)

NOTE 2 – Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor (>1GHz)

NOTE 3 – All reading are Quasi-Peak values below or equal to 1GHz, Peak and Average values above 1GHz.

For above 1GHz test, if the peak measured value complies with the average limit, it is unnecessary to perform an average measurement.

Worst case emission < 1GHz

EUT : Bluetooth Temperature : 25°C

Model No. : BT-Adjustable Bed Humidity : 45%RH

Test Mode : Transmitting Date of Test : Nov. 16, 2014

Polarization	Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
Horizontal	99.88	8.11	11.51	0.99	20.61	43.50	22.89	QP
	260.14	8.69	12.30	1.65	22.64	46.00	23.36	
	324.46	6.51	14.74	1.86	23.11	46.00	22.89	
	355.43	5.57	14.79	1.94	22.30	46.00	23.70	
	612.06	5.38	18.95	2.53	26.86	46.00	19.14	
	830.40	3.03	21.40	2.93	27.36	46.00	18.64	
Vertical	60.07	11.12	5.30	0.76	17.18	40.00	22.82	QP
	147.92	7.55	10.59	1.23	19.37	43.50	24.13	
	287.99	6.91	12.60	1.75	21.26	46.00	24.74	
	366.82	8.00	14.97	1.98	24.95	46.00	21.05	
	511.84	8.45	17.40	2.30	28.15	46.00	17.85	
	903.31	4.90	19.60	3.05	27.55	46.00	18.45	

TEST ENGINEER: BILL WU

Radiated Emission > 1GHz

EUT : Bluetooth Temperature : 25°C

Model No. : BT-Adjustable Bed Humidity : 45%RH

Test Mode : Transmitting Date of Test : Nov. 16, 2014

Ch00

Polarization	Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
Horizontal	1855.00	47.13	27.00	4.38	35.41	43.10	74.00	30.90	Peak
	4804.00	43.90	33.48	7.75	34.87	50.26	74.00	23.74	Peak
	7206.00	46.70	36.83	9.14	35.14	57.53	74.00	16.47	Peak
	7206.00	32.58	36.83	9.14	35.14	43.41	54.00	10.59	Average
Vertical	1360.00	52.35	25.17	3.78	36.11	45.19	74.00	28.81	Peak
	4804.00	43.75	33.48	7.75	34.87	50.11	74.00	23.89	Peak
	7206.00	45.99	36.83	9.14	35.14	56.82	74.00	17.18	Peak
	7206.00	32.69	36.83	9.14	35.14	43.52	54.00	10.48	Average

Ch20

Polarization	Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
Horizontal	2674.00	45.79	29.29	5.36	35.37	45.07	74.00	28.93	Peak
	4884.00	43.83	33.58	7.82	34.88	50.35	74.00	23.65	Peak
	7326.00	45.62	37.04	9.30	35.17	56.79	74.00	17.21	Peak
	7326.00	32.92	37.04	9.30	35.17	44.09	54.00	9.91	Average
Vertical	1468.00	50.01	25.60	3.92	35.90	43.63	74.00	30.37	Peak
	4884.00	43.27	33.58	7.82	34.88	49.79	74.00	24.21	Peak
	7326.00	46.32	37.04	9.30	35.17	57.49	74.00	16.51	Peak
	7326.00	32.11	37.04	9.30	35.17	43.28	54.00	10.72	Average

Ch39

Polarization	Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
Horizontal	3439.00	47.41	31.80	6.26	35.07	50.40	74.00	23.60	Peak
	4960.00	43.14	33.66	7.88	34.89	49.79	74.00	24.21	Peak
	7440.00	45.29	37.20	9.46	35.19	56.76	74.00	17.24	Peak
	7440.00	31.54	37.20	9.46	35.19	43.01	54.00	10.99	Average
Vertical	2125.00	46.91	27.66	4.71	35.31	43.97	74.00	30.03	Peak
	4960.00	44.02	33.66	7.88	34.89	50.67	74.00	23.33	Peak
	7440.00	44.91	37.20	9.46	35.19	56.38	74.00	17.62	Peak
	7440.00	31.59	37.20	9.46	35.19	43.06	54.00	10.94	Average

TEST ENGINEER: BILL WU

EUT : Bluetooth Temperature : 25°C

Model No. : BT-Adjustable Bed Humidity : 45%RH

Test Mode : Receiving Date of Test : Nov. 16, 2014

Polarization	Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
Horizontal	1503.14	44.96	25.71	3.98	35.84	38.81	74.00	35.19	Peak
	3228.49	45.39	31.38	6.01	35.23	47.55	74.00	26.45	Peak
	4549.88	44.03	33.16	7.49	34.82	49.86	74.00	24.14	Peak
Vertical	1169.50	45.27	24.10	3.49	36.44	36.42	74.00	37.58	Peak
	2648.50	44.56	29.17	5.32	35.37	43.68	74.00	30.32	Peak
	4159.11	43.50	32.83	7.09	34.73	48.69	74.00	25.31	Peak

TEST ENGINEER: BILL WU

Emissions in restricted frequency bands

Using Antenna-port conducted measurements:

According to the KDB 558074 D01 DTS Meas Guidance v03r02 12.2, antenna-port conducted measurements is also be permitted as an alternative to radiated measurements in the restricted frequency bands.

The transmitter output was connected to the Test Receiver. The EUT was set to transmit continuously ($\geq 98\%$ duty cycle).

The test procedure is defined in KDB558074 v03r02:2014
(12.2.4 Peak power measurement procedure & the 12.2.5 Average power measurement procedures (12.2.5.1 Trace averaging with continuous EUT transmission at full power)):

Note1 – The additional radiated test was performed to prove that the cabinet emissions (transmit antenna be replaced with a termination matching the impedance of the antenna) also comply with the applicable limits.

Cabinet Emission (Radiated with antenna terminated):

Polarization	Frequency (MHz)	Meter Reading dB (μ V)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μ V/m)	Limits dB (μ V/m)	Margin (dB)	Remark
Horizontal	2390.00	44.45	28.21	5.04	35.34	42.36	74.00	31.64	Peak
	2390.00	32.96	28.21	5.04	35.34	30.87	54.00	23.13	Average
	2483.50	44.24	28.38	5.12	35.35	42.39	74.00	31.61	Peak
	2483.50	33.28	28.38	5.12	35.35	31.43	54.00	22.57	Average
Vertical	2390.00	44.05	28.21	5.04	35.34	41.96	74.00	32.04	Peak
	2390.00	33.51	28.21	5.04	35.34	31.42	54.00	22.58	Average
	2483.50	43.58	28.38	5.12	35.35	41.73	74.00	32.27	Peak
	2483.50	33.11	28.38	5.12	35.35	31.26	54.00	22.74	Average

The frequency range 2310-2390MHz & 2483.5-2500MHz were tested, and the maximum emission frequency was recorded above.

Note2 – The antenna gain (1.5dBi, as 2 dBi) and cable loss (2dB) were set as offset (4dB) in the spectrum.

(According to KDB558074 v03r02:2014 Sec. 12.2.6, when determining the EIRP from the measured conducted power, the upper bound on antenna gain for a device with a signal RF output shall be selected as the maximum in-band gain of the antenna across all operating bands, or 2 dBi, whichever is greater.)

Note3 – $EIRP = E + 20\log D - 104.8$

Where: EIRP = equivalent isotropic radiated power in dBm,

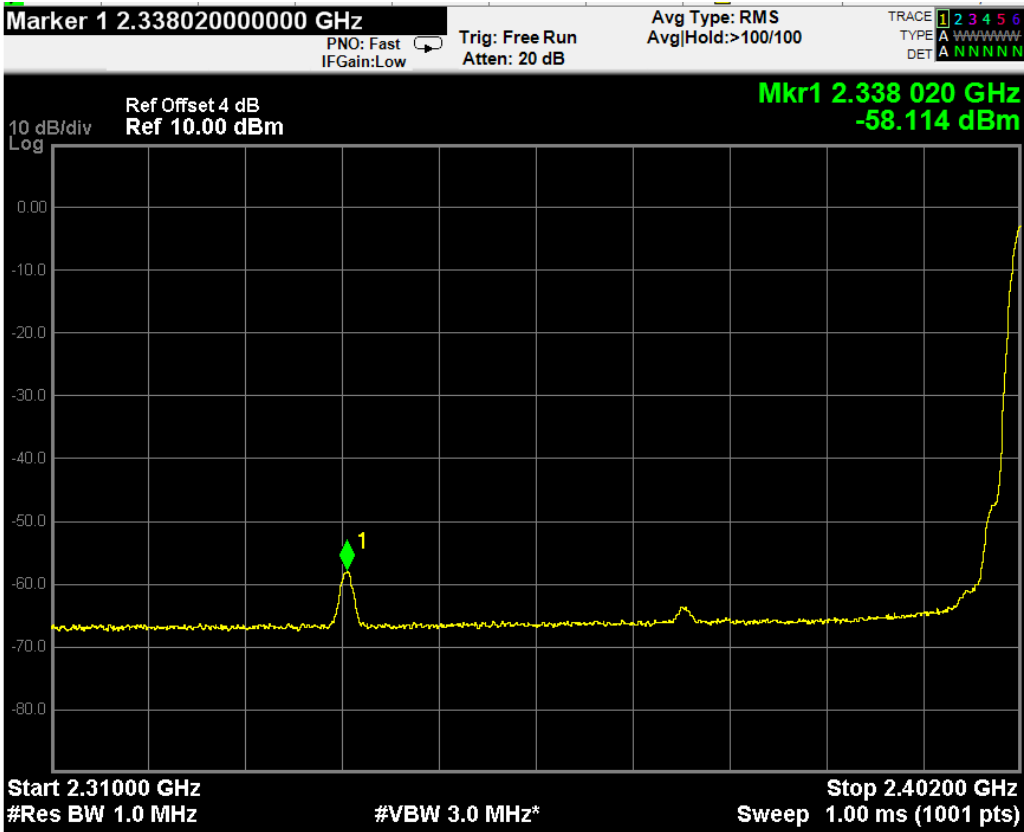
E = electric field strength in dB μ V/m,

D = specified measurement distance in meters.

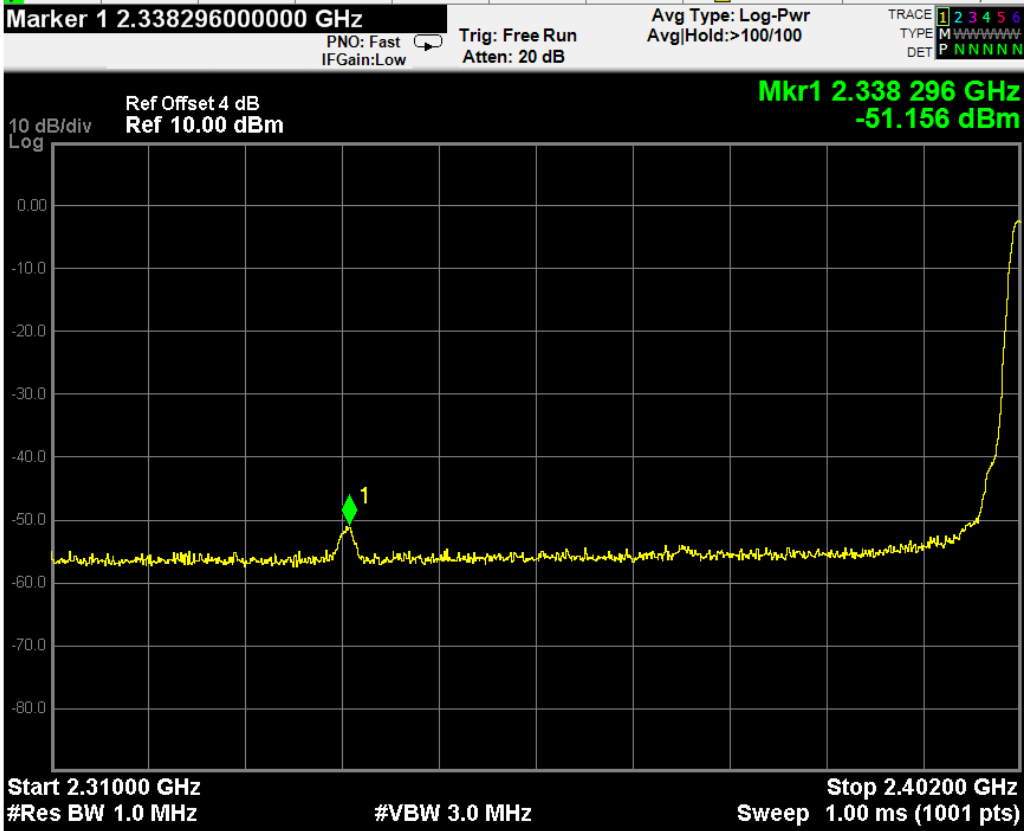
The Average Power limit = -41.2 dBm

The Peak Power limit = -21.2 dBm

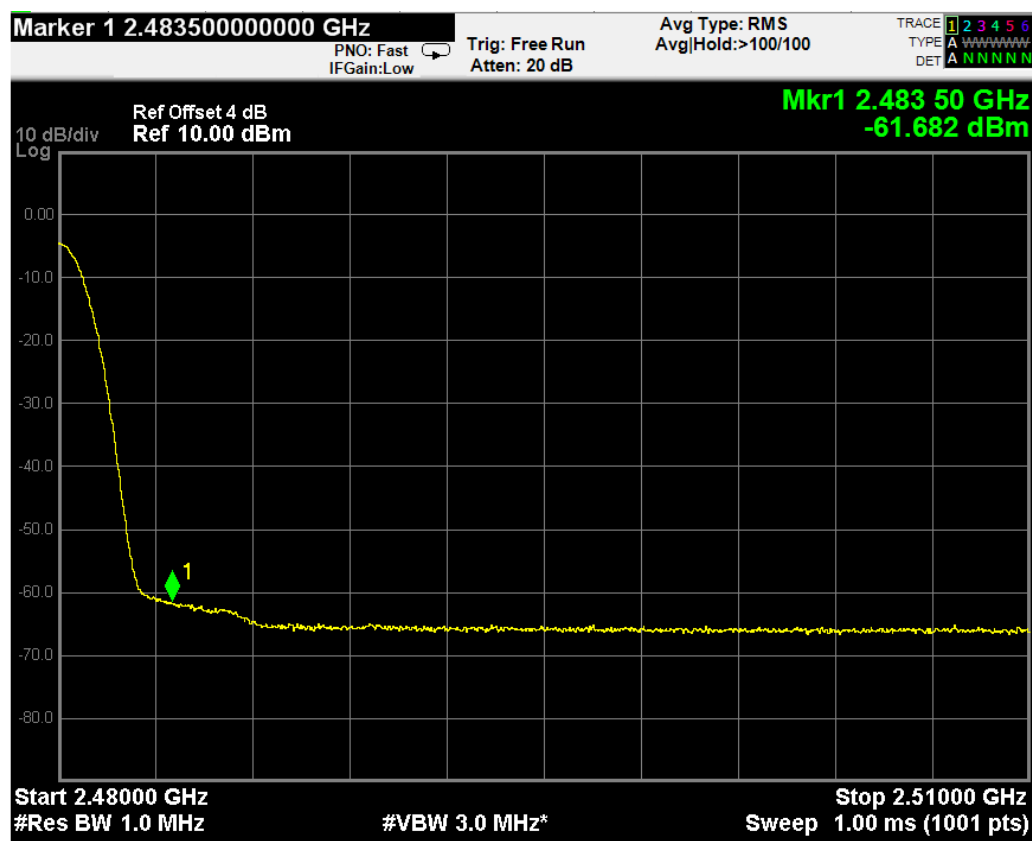
AV Result on Ch 00



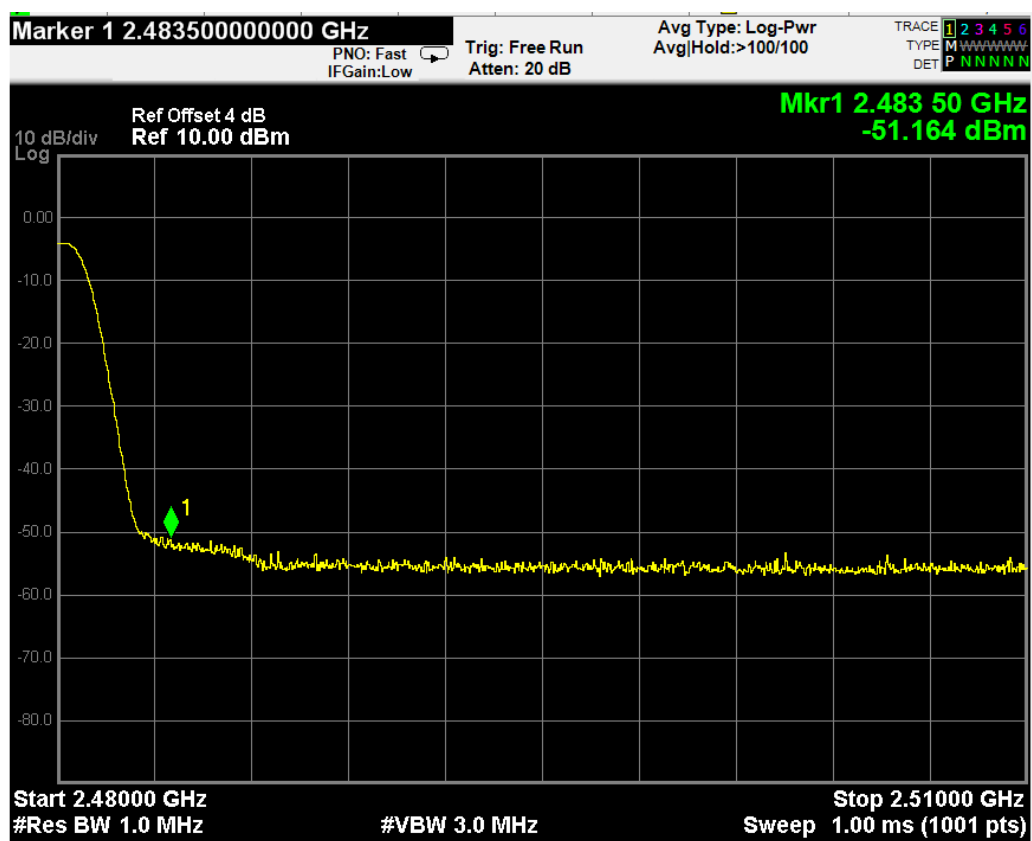
PK Result on Ch 00



AV Result on Ch 39



PK Result on Ch 39



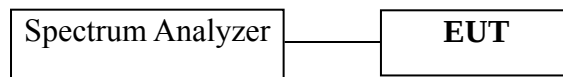
4 6 dB BANDWIDTH MEASUREMENT

4.1 Test Equipment

The following test equipment was used during the Emission Bandwidth measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	Jun 14, 2014	Jun 13, 2015

4.2 Block Diagram of Test Setup



4.3 Specification Limits (§15.247(a)(2))

The minimum 6 dB bandwidth shall be at least 500 kHz.

4.4 Operating Condition of EUT

The test program “ComAssistant” was used to enable the EUT to transmit data at different channel frequency individually.

4.5 Test Procedure

The transmitter output was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measure by spectrum analyzer with 100 kHz RBW / 300 kHz VBW.

The 6 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6 dB.

The test procedure is defined in KDB558074 D01 v03r02 (the 8.1 Measurement Procedure “Option 1” was used).

4.6 Test Results

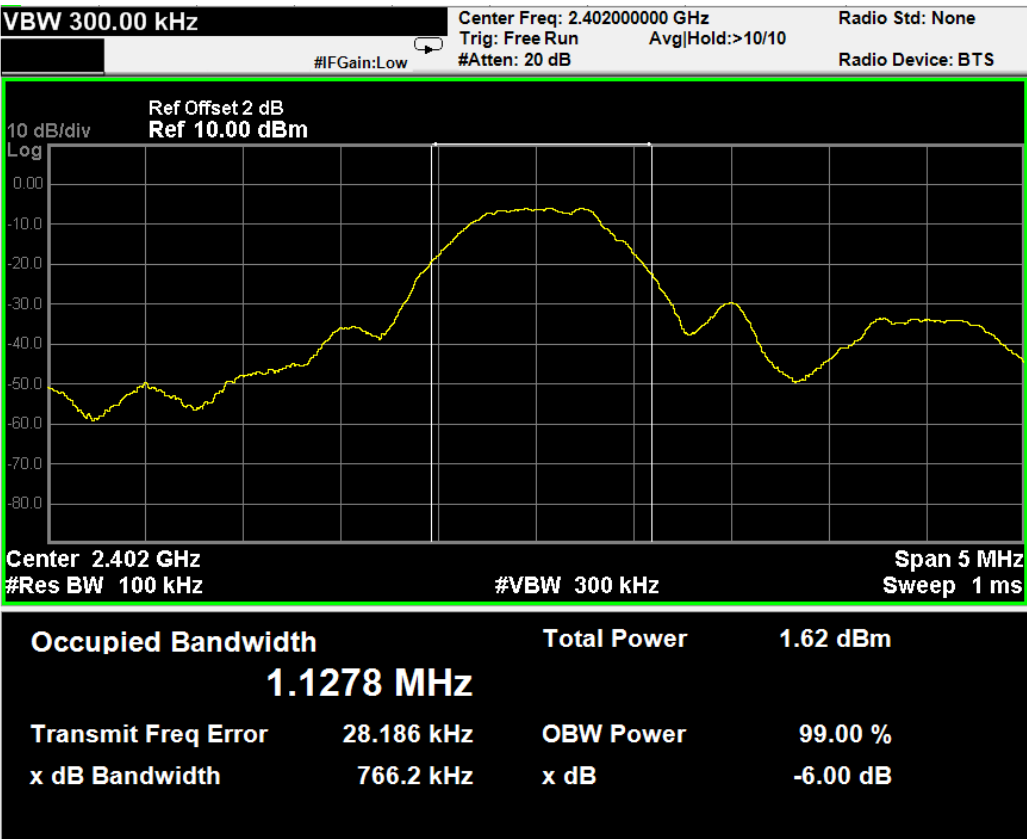
PASSED.

All the test results are attached in next pages.

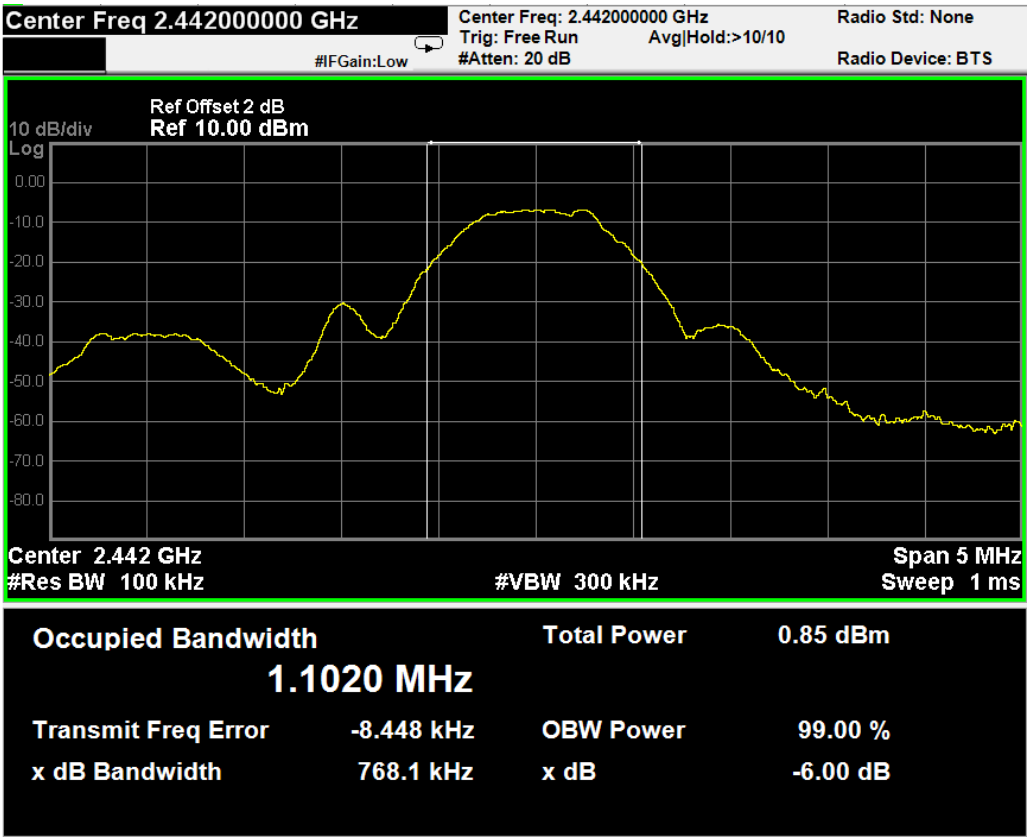
(Test Date: Nov 13, 2014 Temperature: 22°C Humidity: 44 %)

Channel	Frequency	6dB Bandwidth
00	2402 MHz	766.2 kHz
20	2442 MHz	768.1 kHz
39	2480 MHz	769.8 kHz

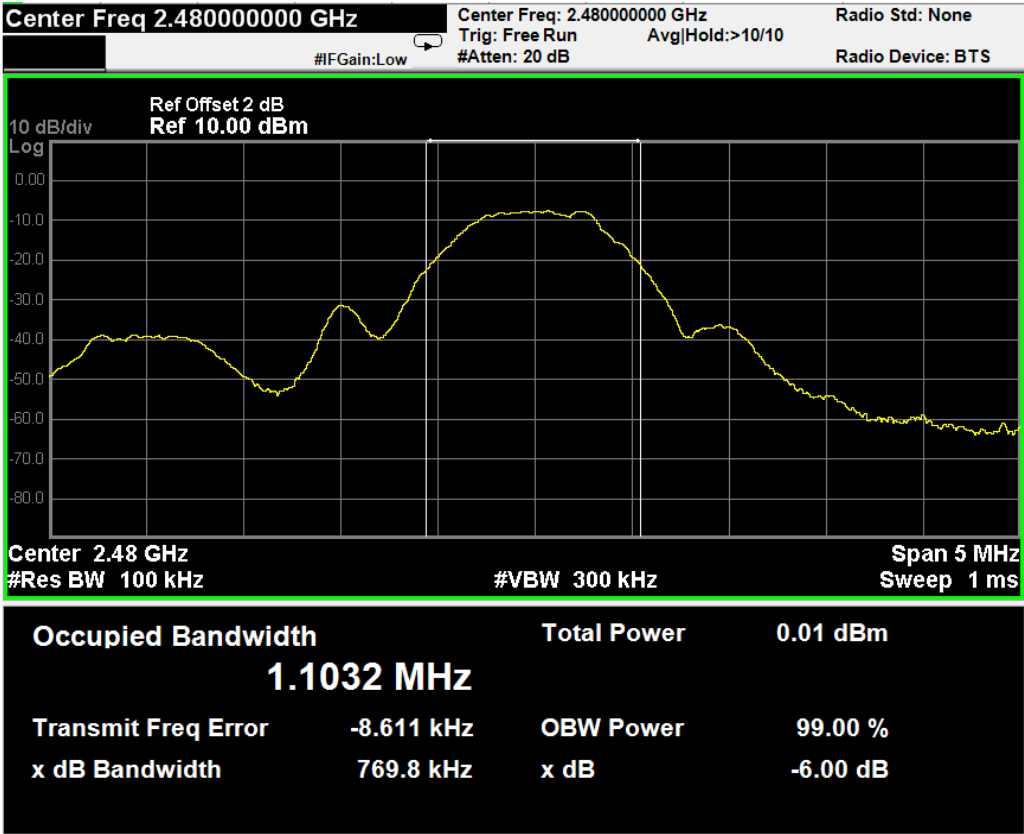
Ch 00 (2402 MHz)



Ch 20 (2442 MHz)



Ch 39 (2480 MHz)



5 MAXIMUM PEAK OUTPUT POWER MEASUREMENT

5.1 Test Equipment

The following test equipment was used during the maximum peak output power measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Power Meter	Anritsu	ML2487A	6K00003245	Mar 20, 2014	Mar 19, 2015
2.	Power Sensor	Anritsu	MA2491A	32489	Mar 20, 2014	Mar 19, 2015

5.2 Block Diagram of Test Setup



5.3 Specification Limits ((§15.247(b)(3))

The Limits of maximum Peak Output Power for digital modulation in 2400-2483.5 MHz is: 1 Watt. (30 dBm)

5.4 Operating Condition of EUT

The test program “ComAssistant” was used to enable the EUT to transmit data at different channel frequency individually.

5.5 Test Procedure

This is an RF conducted test.

Use a direct connection between the antenna port of the transmitter and the power meter, through suitable attenuation. We use PKPM1 Peak power meter method to measure the power output. The transmitter output was connected to the power meter that was designed to detect peak value automatically.

Note: The bandwidth of the power meter is 20MHz.

The test procedure is defined in KDB558074 D01 v03r02 (the 9.1.2 Measurement Procedure “Integration band power method”) was used).

5.6 Test Results

PASSED. All the test results are listed below.

(Test Date: Nov 14, 2014 Temperature: 22°C Humidity: 45 %)

Channel	Frequency	Peak Output Power	Limit
00	2402 MHz	-1.85 dBm	30 dBm
20	2442 MHz	-2.67 dBm	30 dBm
39	2480 MHz	-3.06 dBm	30 dBm

6 EMISSION LIMITATIONS MEASUREMENT

6.1 Test Equipment

The following test equipment was used during the emission limitations test :

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	Jun 14, 2014	Jun 13, 2015

6.2 Block Diagram of Test Setup

The same as Section. 4.2.

6.3 Specification Limits (§15.247(d))

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. Attenuation below the general limits specified in Section 15.209(a) is not required.

In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (See Section 15.205(c)).(※This test result attaching to Section. 4.7)

6.4 Operating Condition of EUT

The test program “ComAssistant” was used to enable the EUT to transmit data at different channel frequency individually.

6.5 Test Procedure

The transmitter output was connected to the Test Receiver. Set RBW = 100 kHz, VBW $\geq$ 300 kHz, scan up through 10th harmonic. All harmonics/spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

The test procedure is defined in KDB558074 D01 v03r02 (the 11.3 Emission Level Measurement was used).

6.6 Test Results

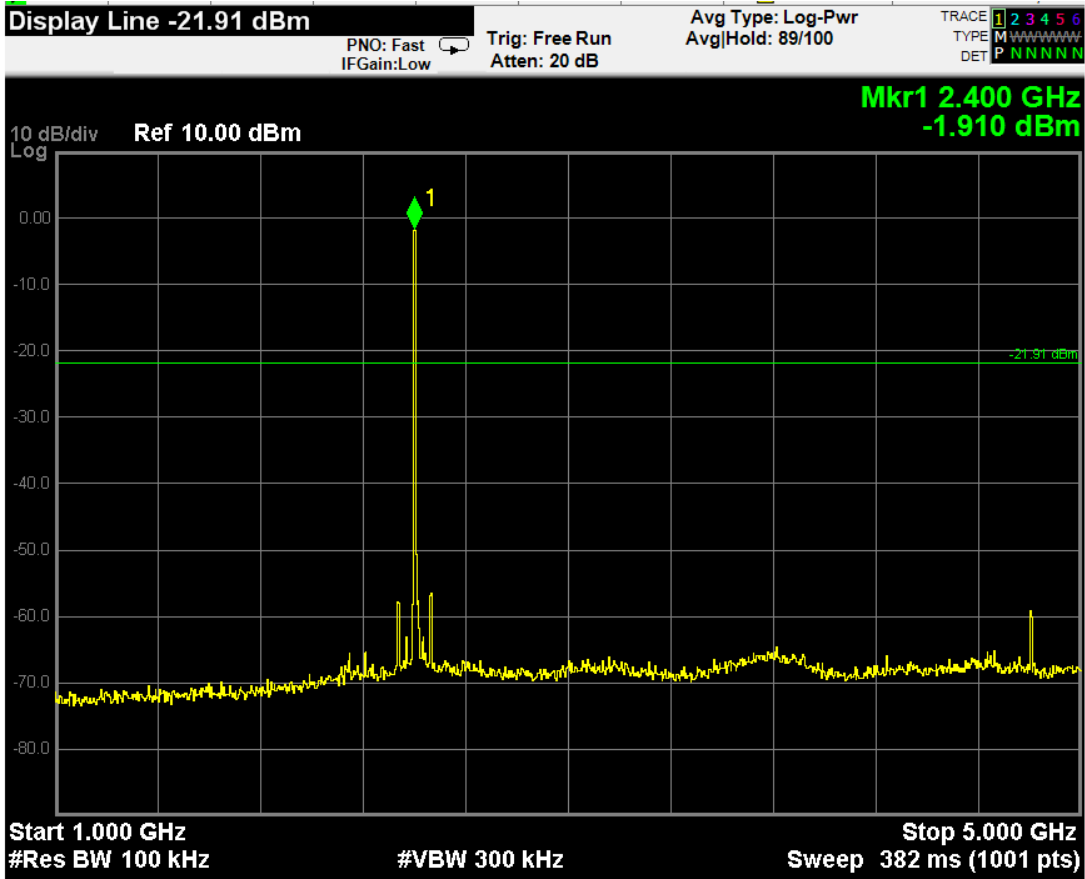
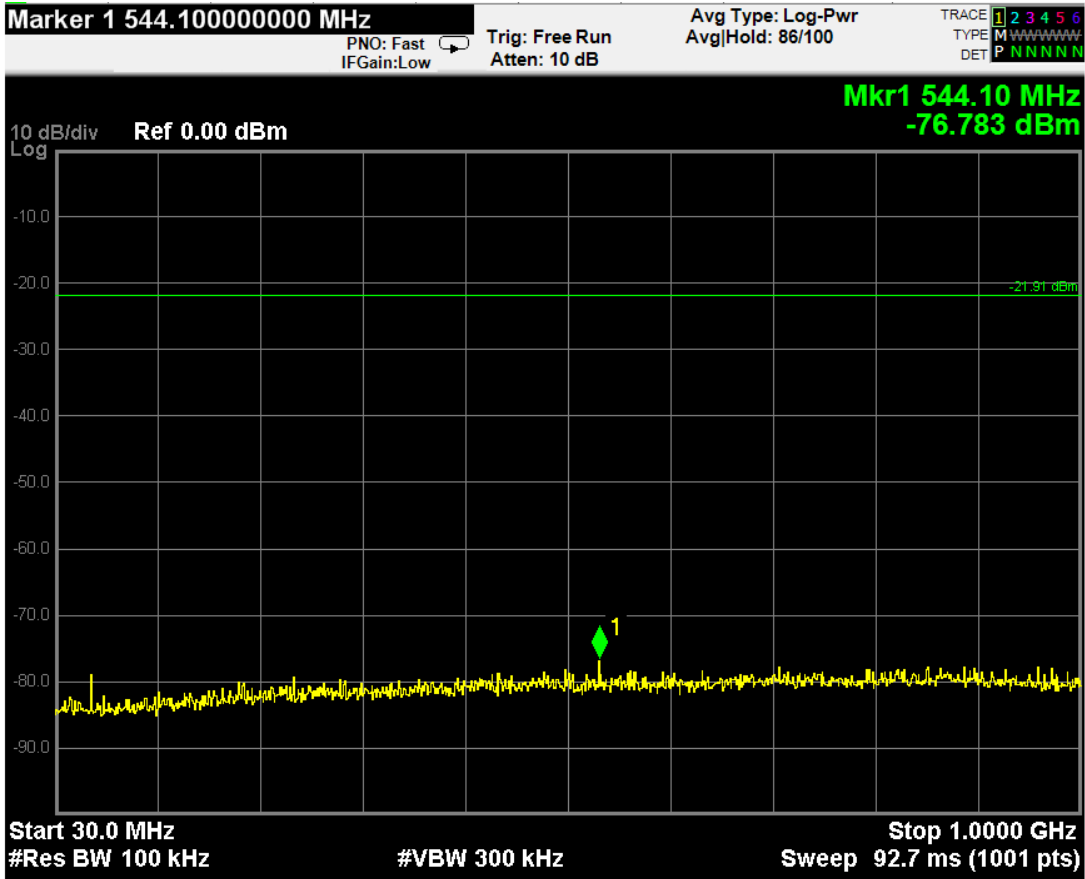
PASSED.

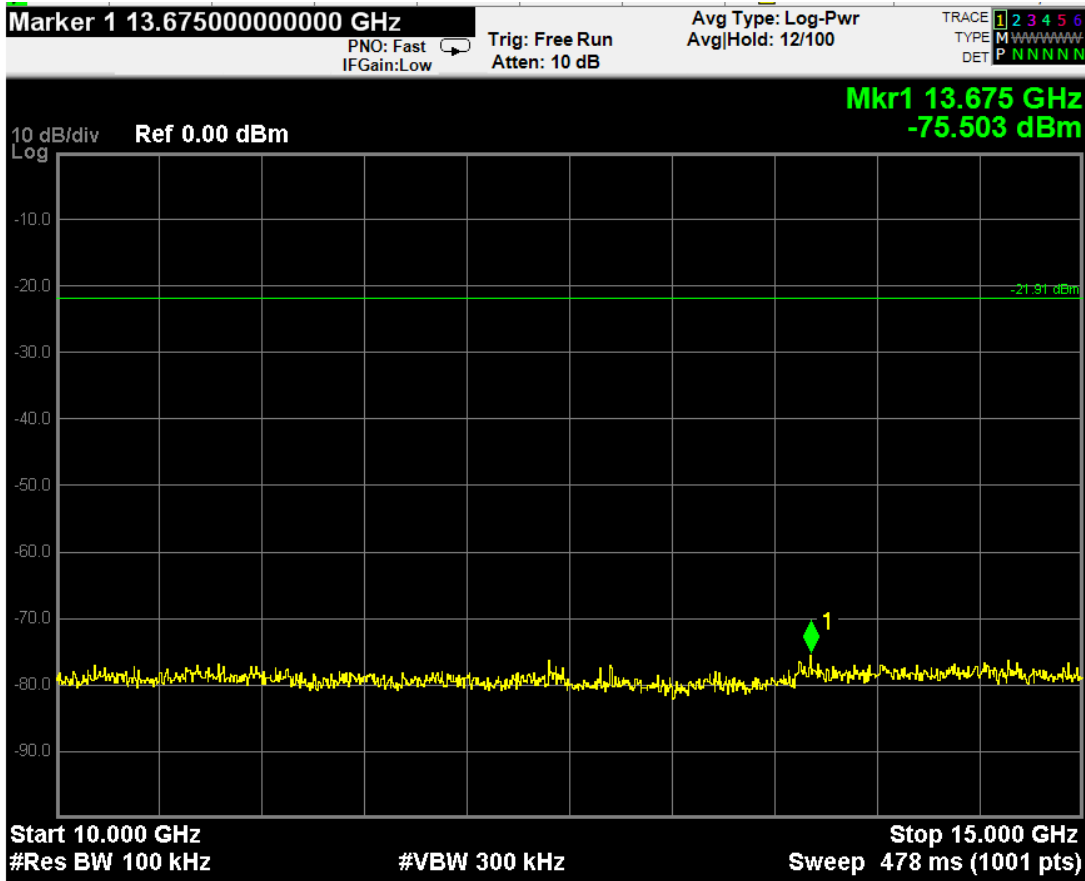
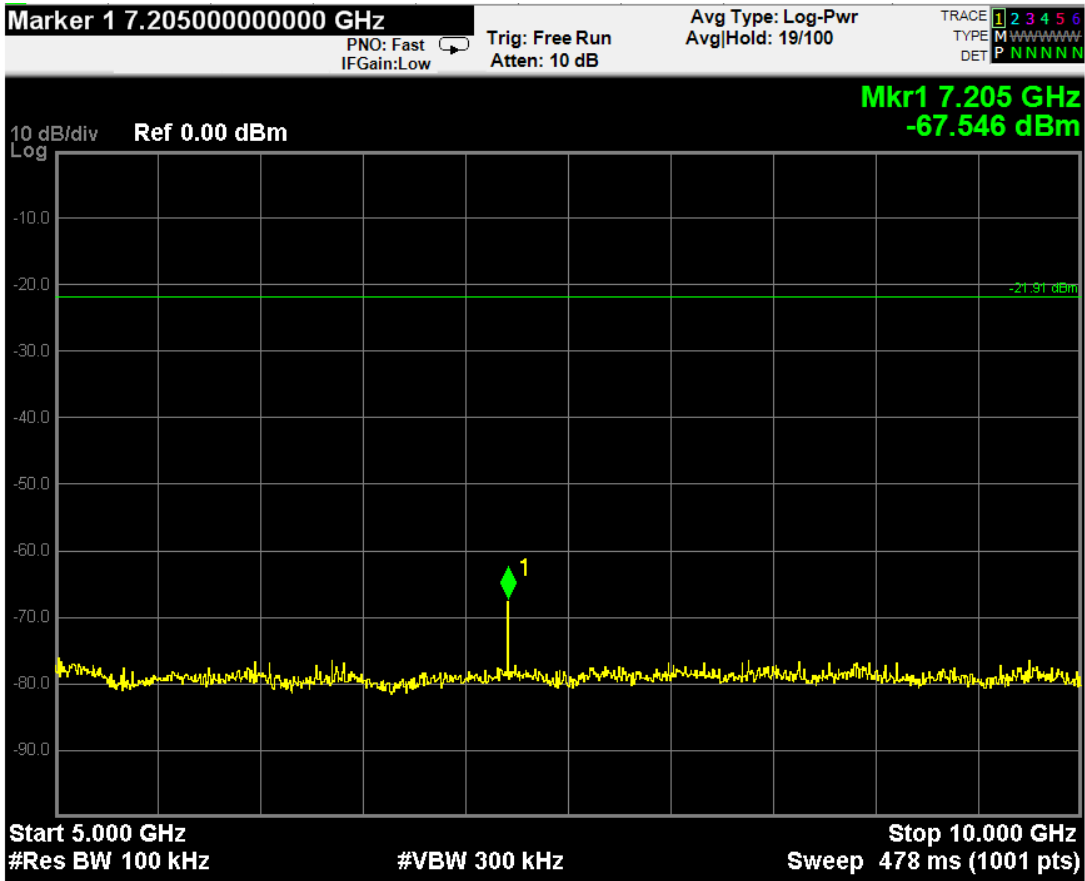
The test data was attached in the next pages.

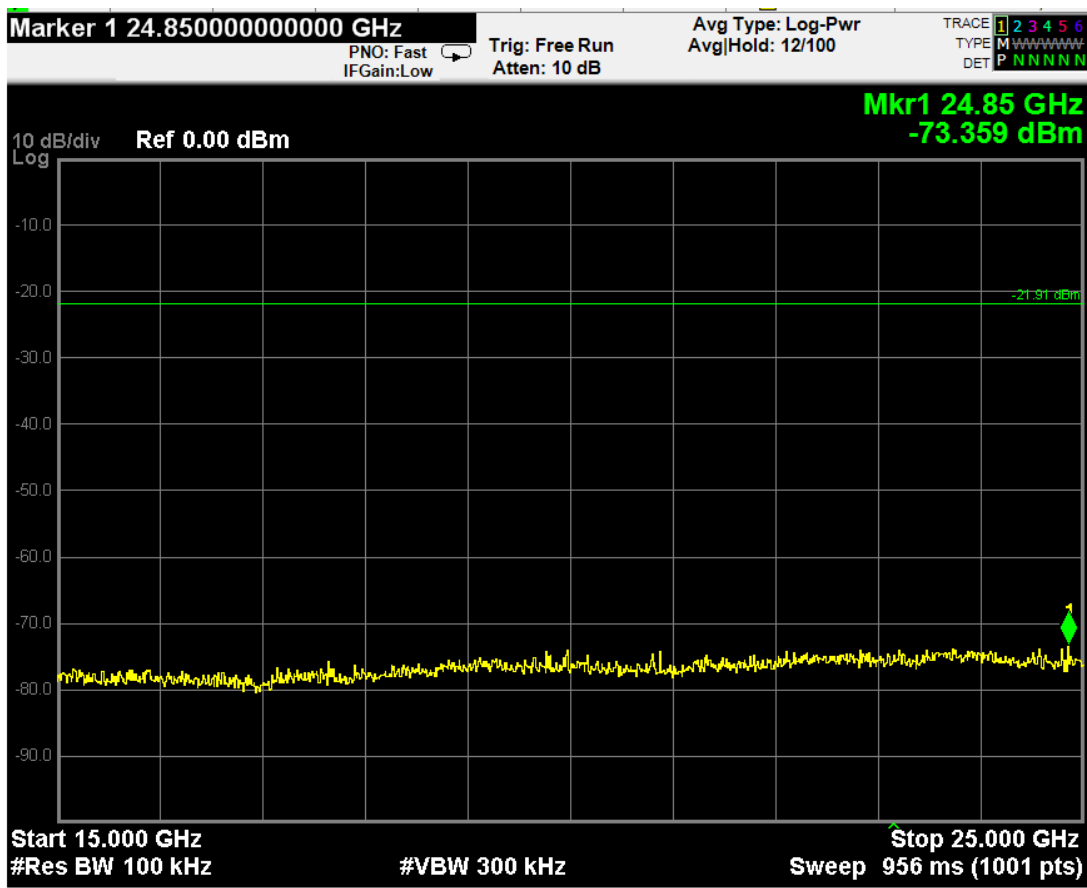
(Test Date: Nov. 14, 2014 Temperature: 22°C Humidity: 45 %)

Channel	Data Page
00	P27-29
20	P30-32
39	P33-35

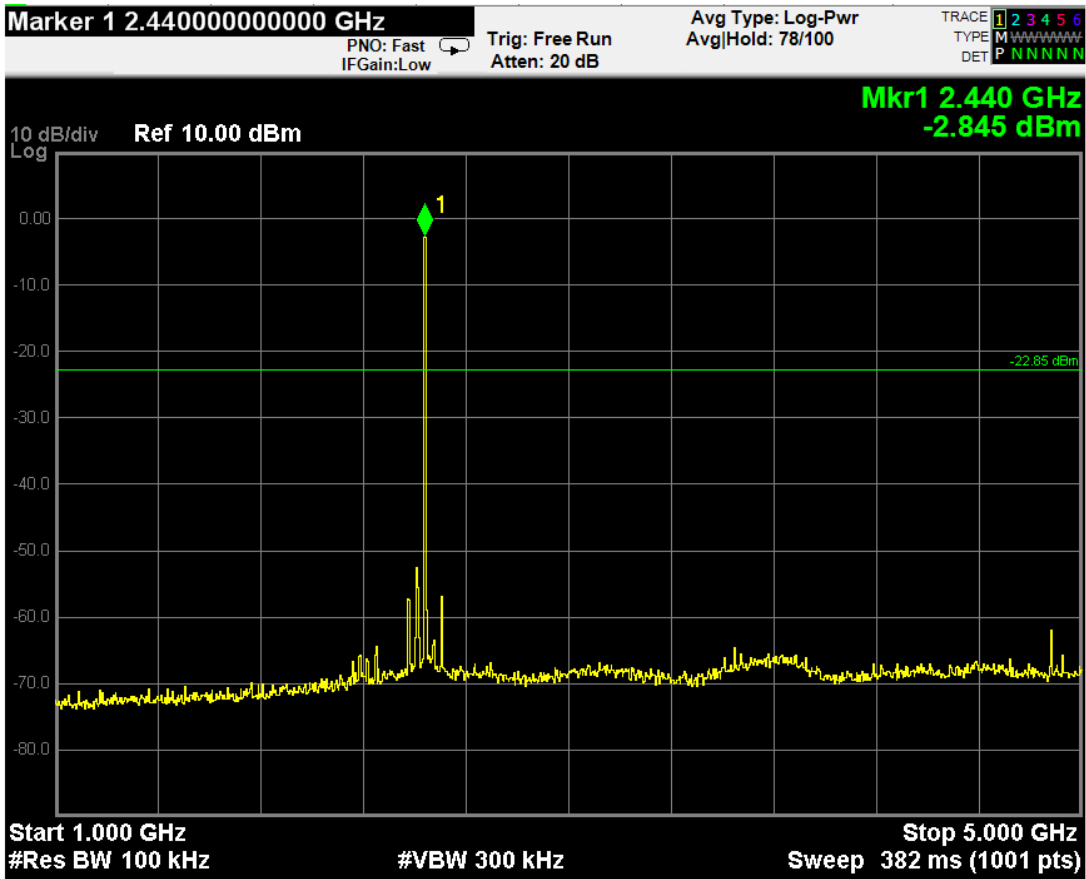
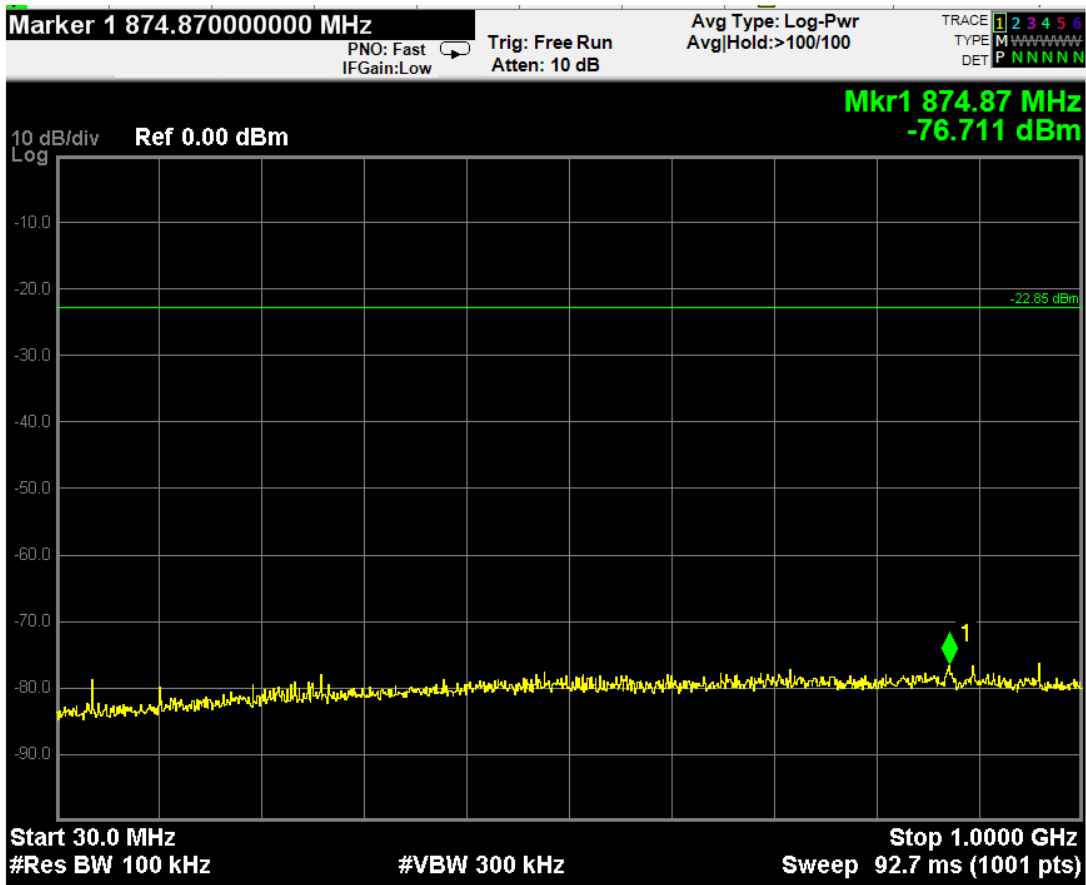
Ch 00 (2402 MHz)

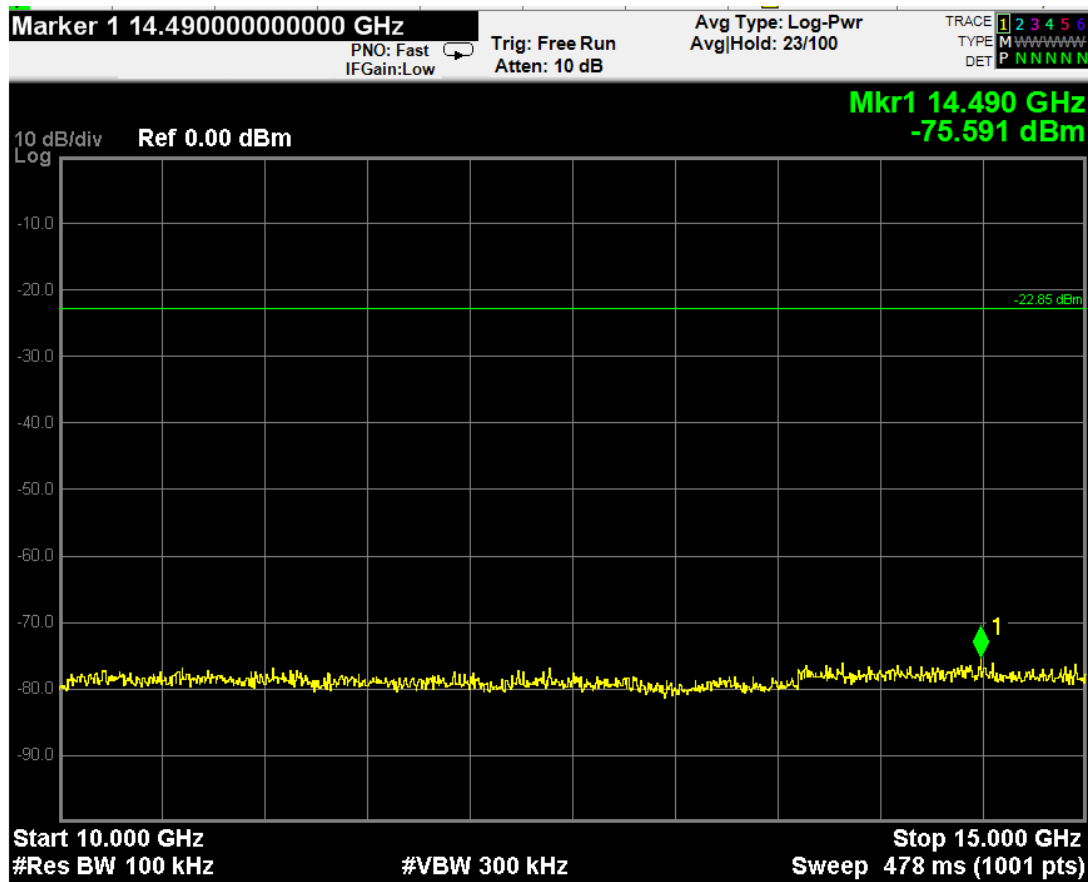
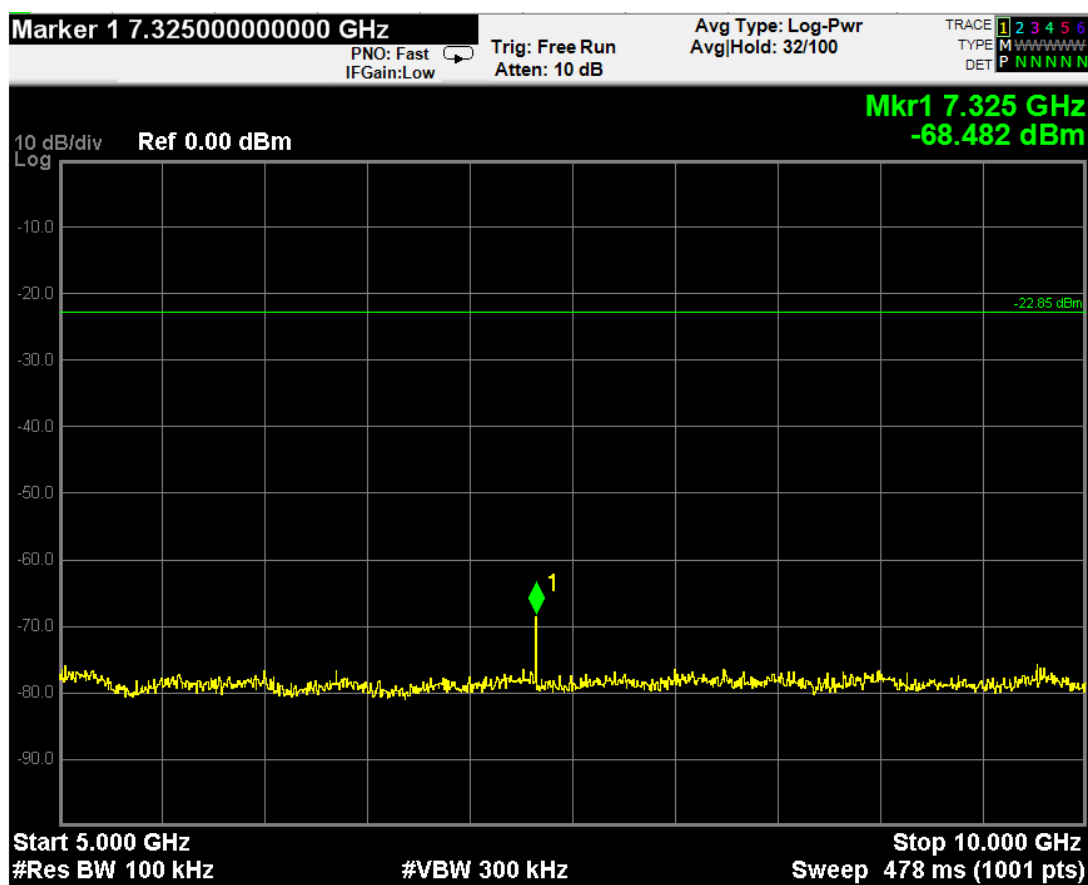


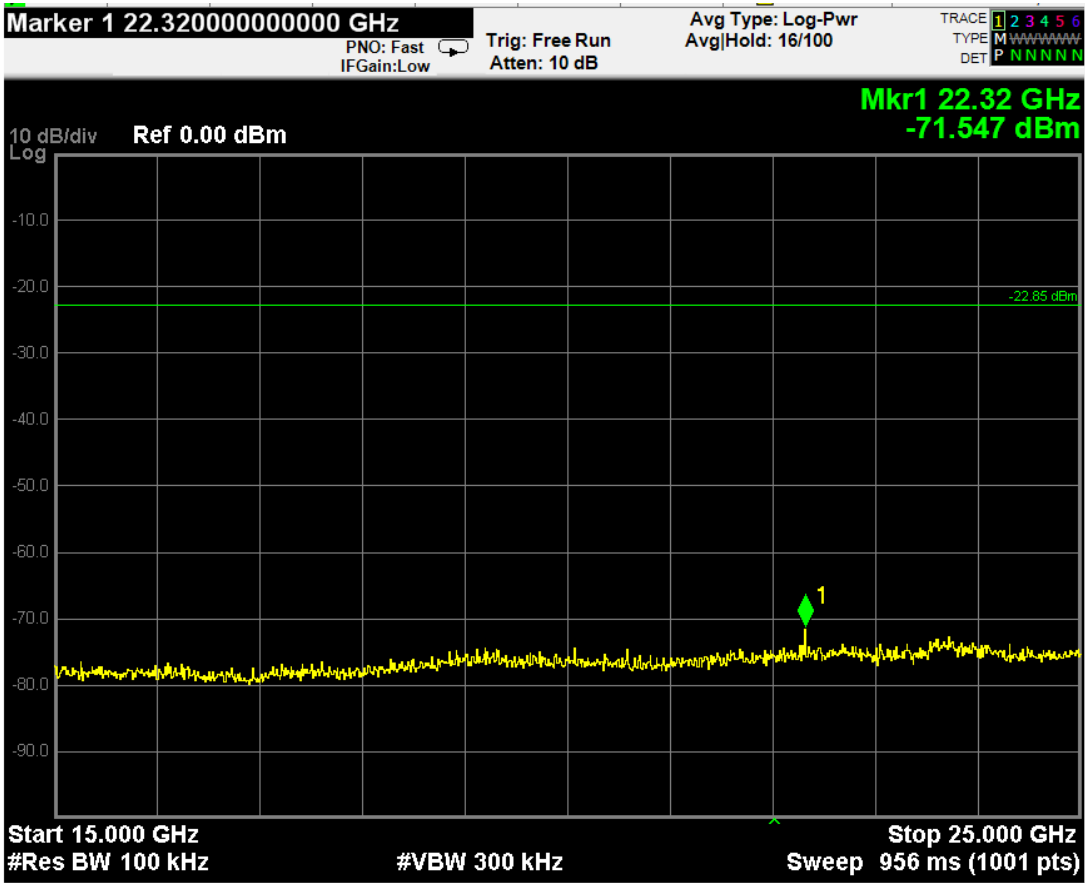




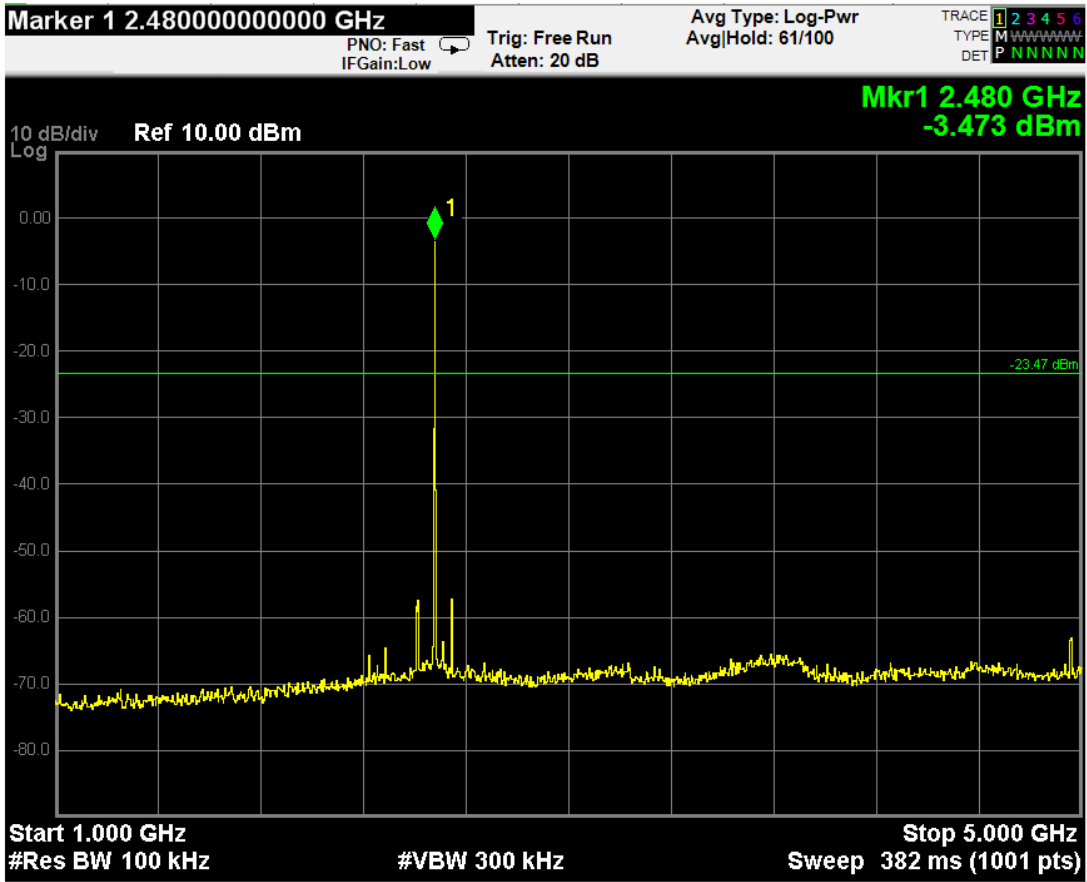
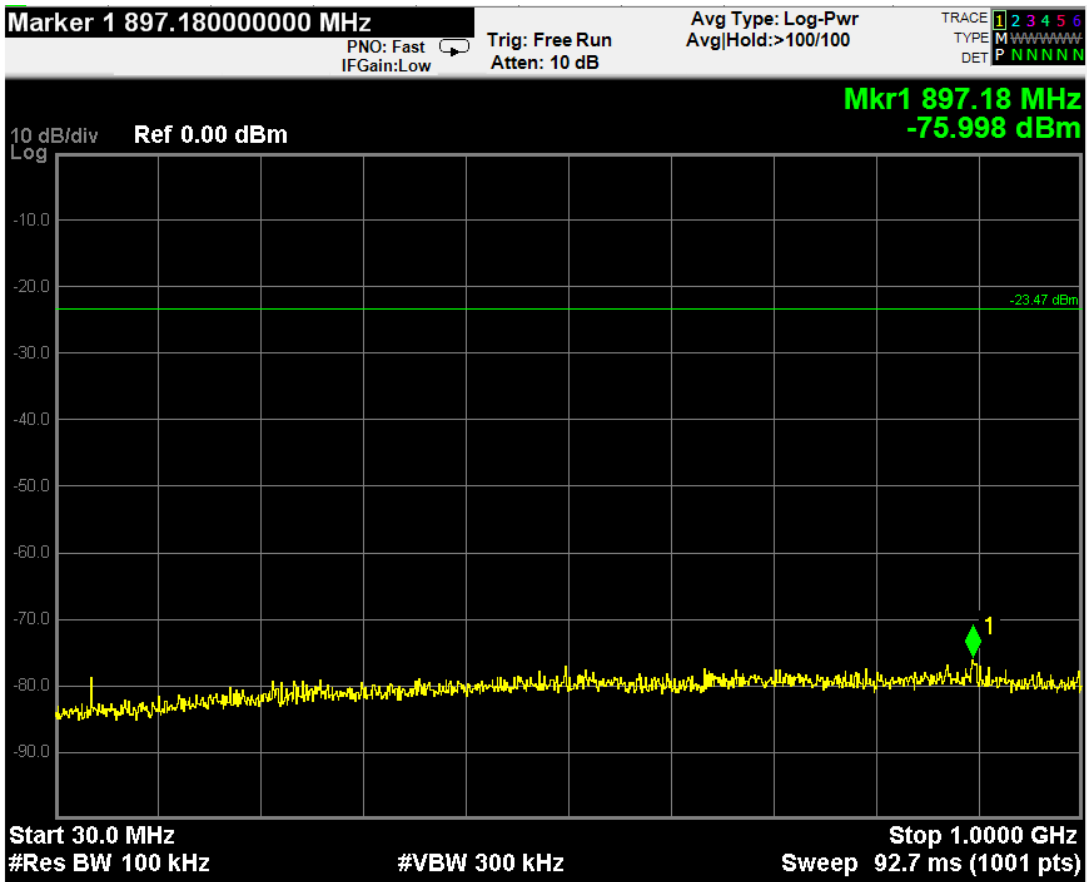
Ch 20 (2442 MHz)

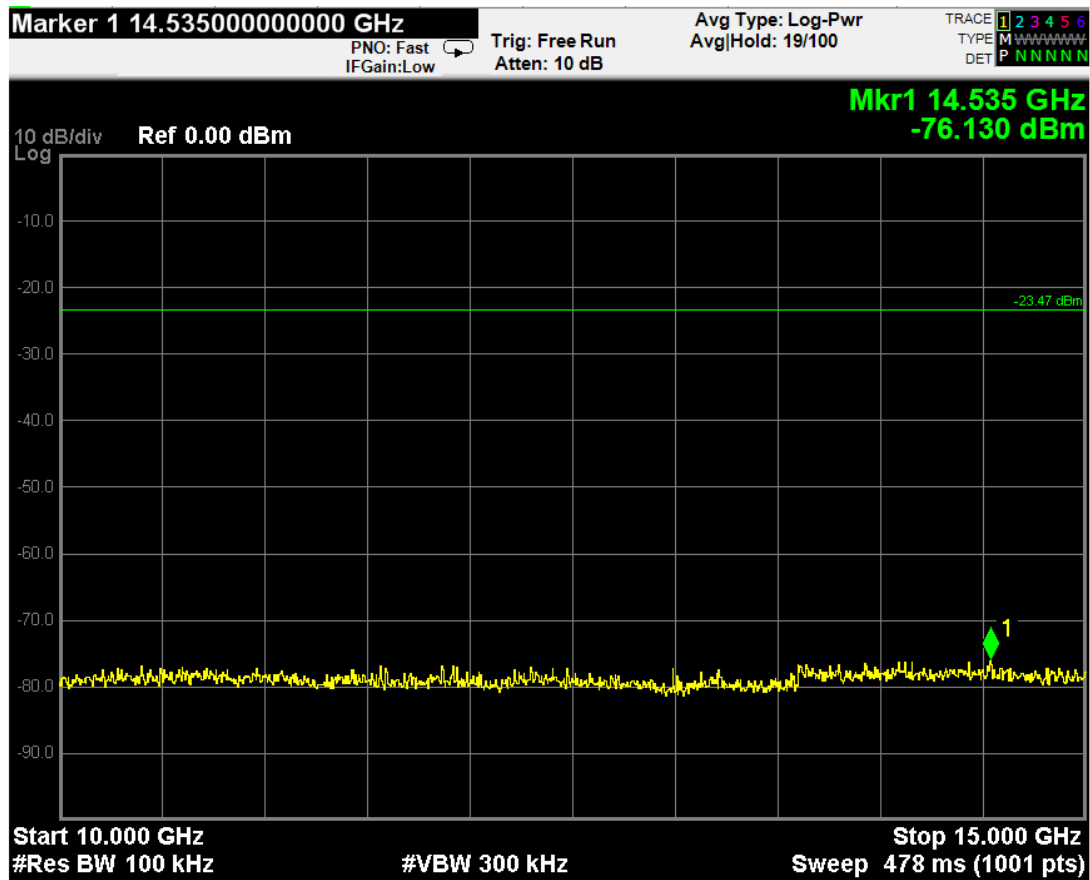
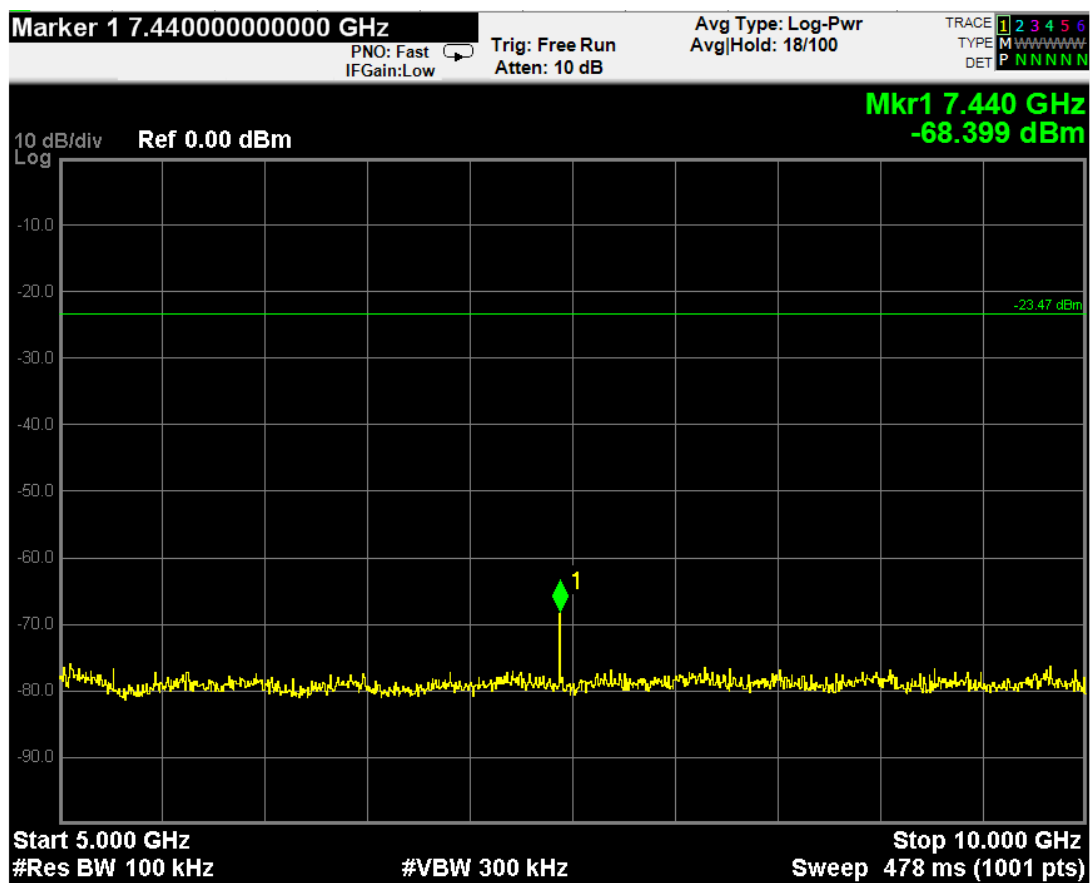


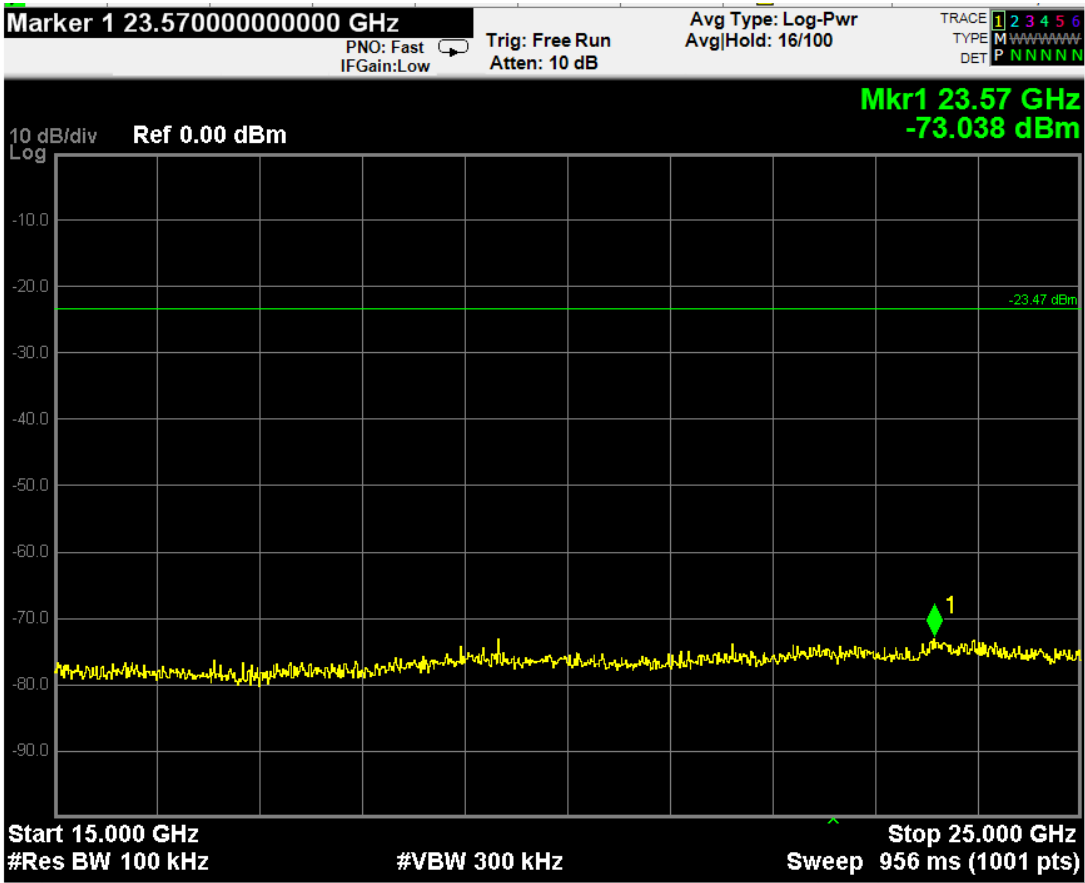




Ch 39 (2480 MHz)







7 BAND EDGES MEASUREMENT

7.1 Test Equipment

The following test equipment was used during the band edges measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	Jun 14, 2014	Jun 13, 2015

7.2 Block Diagram of Test Setup

The same as section.4.2.

7.3 Specification Limits (§15.247(d))

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.

7.4 Operating Condition of EUT

The test program “ComAssistant” was used to enable the EUT to transmit and receive data at different channel frequency individually.

7.5 Test Procedure

The transmitter output was connected to the Test Receiver. Set RBW of Test Receiver to 100kHz and VBW to 300kHz with suitable frequency span including 100kHz bandwidth from band edge.

The test procedure is defined in KDB558074 D01 v03r02 (the 11.3 Emission Level Measurement was used).

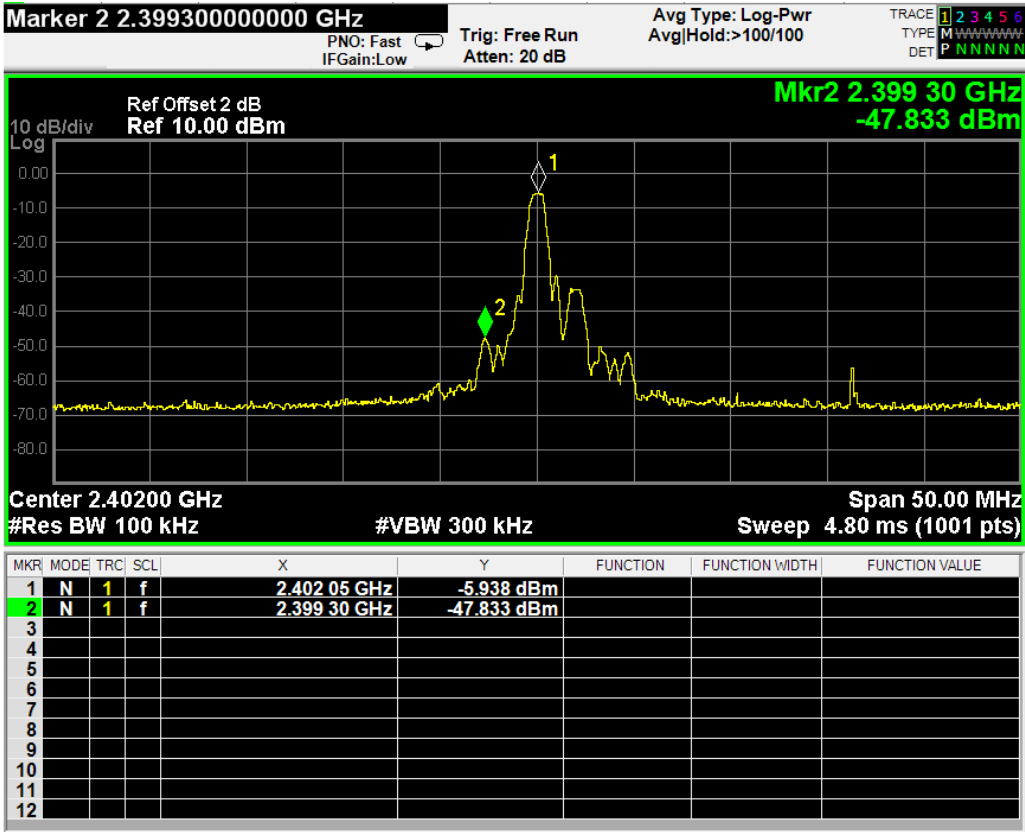
7.6 Test Results

PASSED. All the test results are attached in next pages.

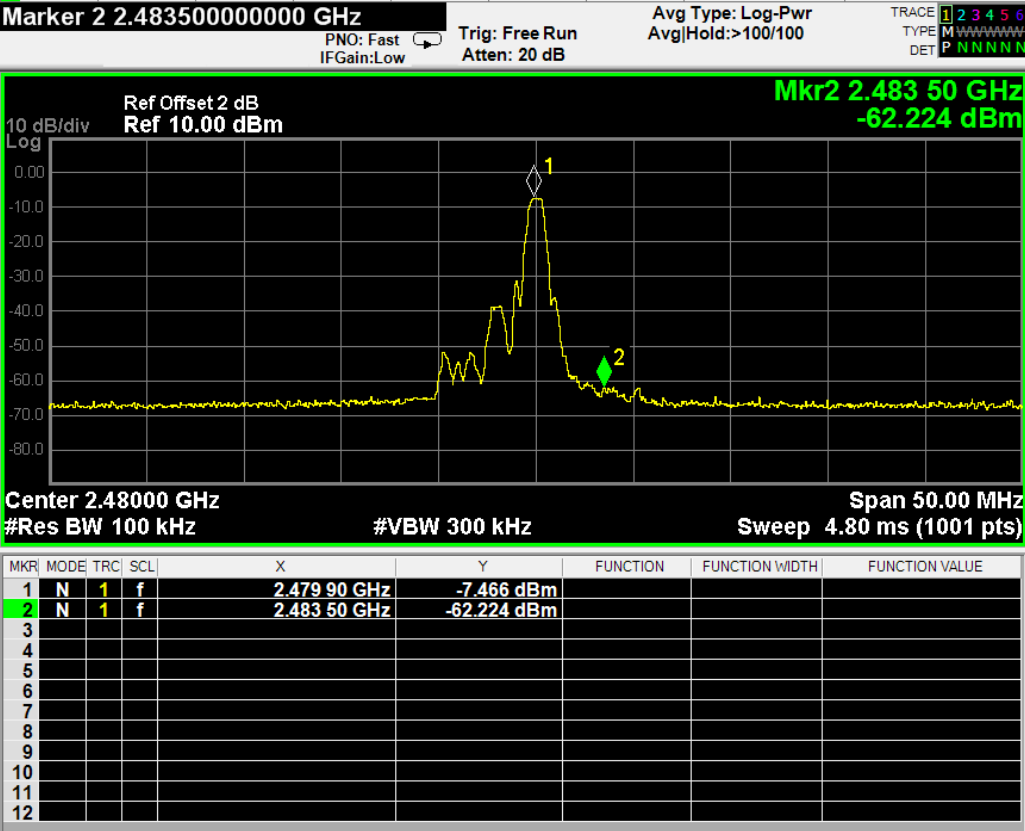
(Test Date: Nov 14, 2014 Temperature: 22°C Humidity: 45 %)

Location	Channel	Frequency	Delta Marker	Result
Below Band Edge	00	2402 MHz	41.895 dB	More than 20 dB below the highest level of the desired power
Upper Band Edge	39	2480 MHz	54.758 dB	

Ch00 2402MHz (Below Edge 2400 MHz)



Ch39 2480MHz (Upper Edge 2483.5 MHz)



8 POWER SPECTRAL DENSITY MEASUREMENT

8.1 Test Equipment

The following test equipment was used during the power spectral density measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	Jun 14, 2014	Jun 13, 2015

8.2 Block Diagram of Test Setup

The same as section.4.2.

8.3 Specification Limits (§15.247(e))

The peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band.

8.4 Operating Condition of EUT

The test program “ComAssistant” was used to enable the EUT to transmit data at different channel frequency individually.

8.5 Test Procedure

The transmitter output was connected to the Test Receiver. The Test Receiver was set as $3\text{kHz} \leq \text{RBW} \leq 100\text{kHz}$, $\text{VBW} \geq 3 \times \text{RBW}$, span = 1.5 times the DTS channel bandwidth.

The test procedure is defined in KDB558074 D01 v03r02 (the 10.2 Measurement Procedure “Method PKPSD (peak PSD)” was used).

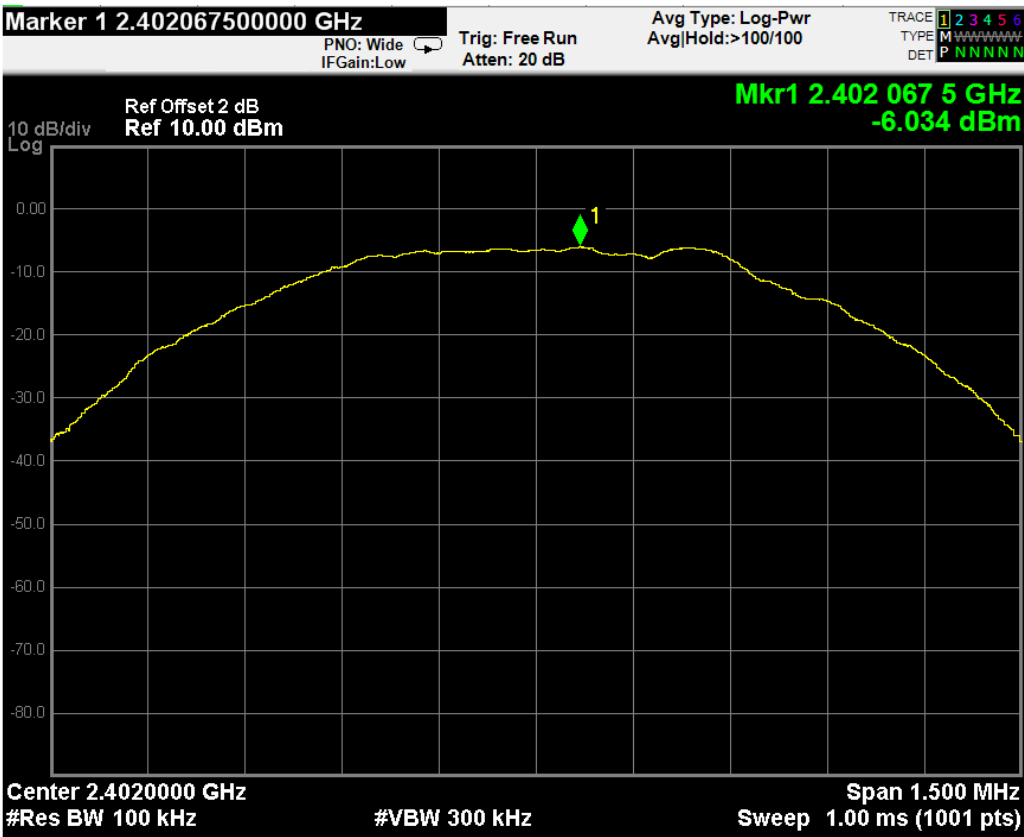
8.6 Test Results

PASSED. All the test results are attached in next pages.

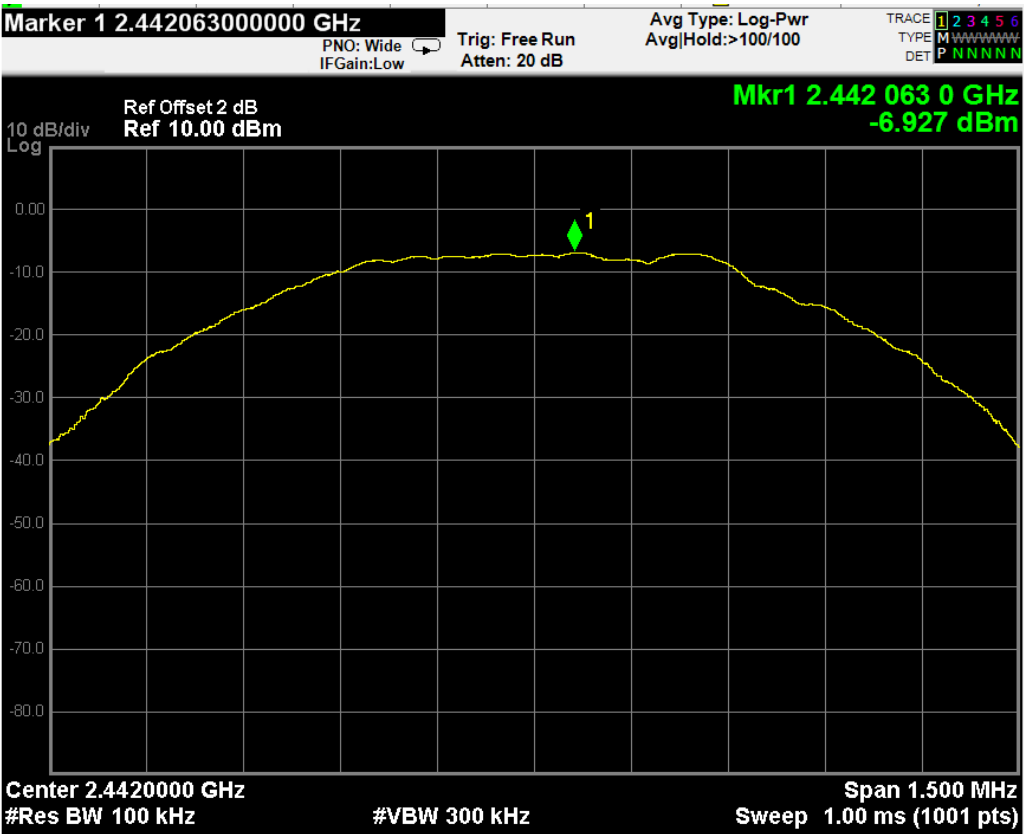
(Test Date: Nov 14, 2014 Temperature: 22°C Humidity: 45 %)

Channel	Frequency	Power Spectral Density	Limit
00	2402 MHz	-6.034 dBm	8dBm
20	2442 MHz	-6.927dBm	8dBm
39	2480 MHz	-7.702 dBm	8dBm

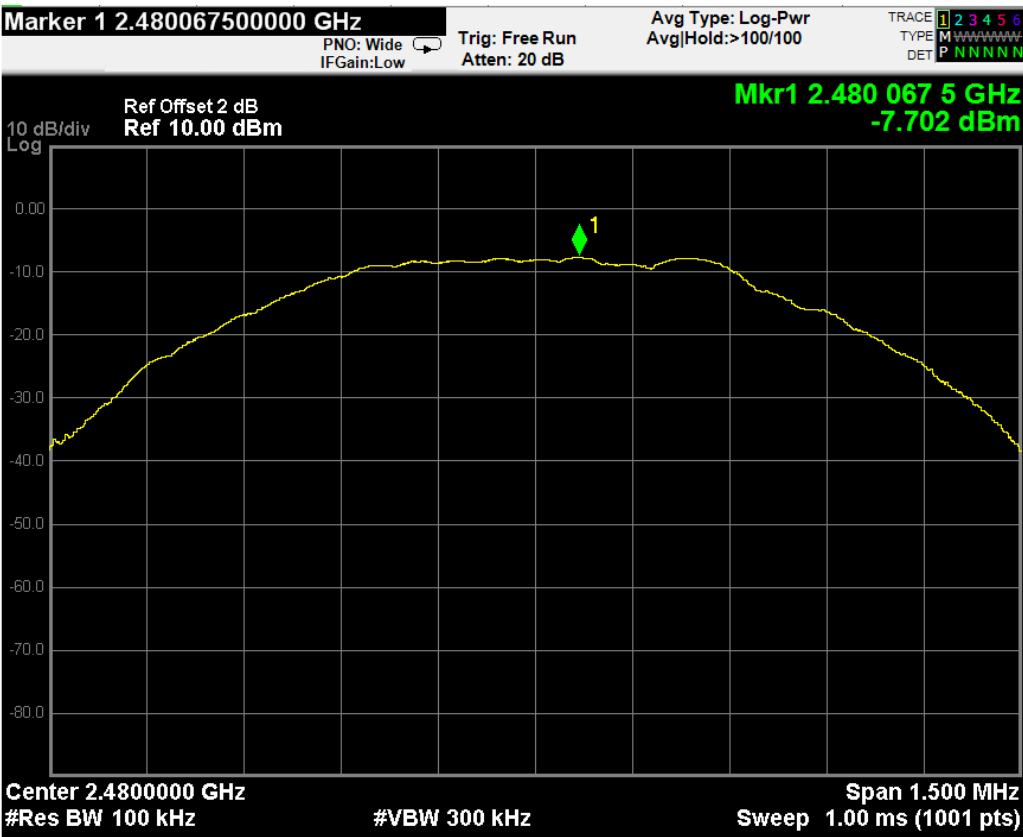
Ch01 2402 MHz



Ch20 2442 MHz



Ch39 2480MHz



9 DEVIATION TO TEST SPECIFICATIONS

None.