Application for FCC Certification
On behalf of

Shanghai Streamind Tech Inc.

Product Name: RoboMing

Model No.: RoboMing-*

FCC ID: 2AF3BROBO001

Prepared For: Shanghai Streamind Tech Inc.
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Yangpu District, Shanghai. China

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Report No. : ACI-F15193
Date of Test : Sep. 19 – 26, 2015
Date of Report : Sep. 26, 2015

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TEST REPORT FOR FCC CERTIFICATE

Applicant	:	Shanghai Streamind Tech Inc.
Manufacturer	:	Shanghai Streamind Tech Inc.
EUT Description	:	RoboMing
		(A) Model No. : RoboMing-*
		(B) Power Supply : AC 120V/60Hz

Test Procedure Used:

FCC RULES AND REGULATIONS PART 15 SUBPART C OCTOBER 2014 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 Sep. 19 – 26, 2015 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 contains data that are not covered by the NVLAP accreditation.

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 : Sep. 19 – 26, 2015 Date of Report : Sep 26, 2015

Producer : Alan He
ALAN HE / Assistant

Review : Sammy Chen
SAMMY CHEN/ Manager

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

Signatory :
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 C63.4:2009 AND KDB558074 D01 v03r03	Pass	15.207(a)
Radiated Emission	FCC RULES AND REGULATIONS PART 15 SUBPART C October 2013 AND ANSI C63.4:2009 AND KDB558074 D01 v03r03	Pass	15.209(a) 15.205(a)(c)
6 dB Bandwidth Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C October 2013 AND ANSI C63.4:2009 AND KDB558074 D01 v03r03	Pass	15.247(a)(2)
Maximum Peak Output Power Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C October 2013 AND ANSI C63.4:2009 AND KDB558074 D01 v03r03	Pass	15.247(b)(3)
Emission Limitations Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C October 2013 AND ANSI C63.4:2009 AND KDB558074 D01 v03r03	Pass	15.247(d)
Band Edge Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C October 2013 AND ANSI C63.4:2009 AND KDB558074 D01 v03r03	Pass	15.247(d)
Power Spectral Density Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C October 2013 AND ANSI C63.4:2009 AND KDB558074 D01 v03r03	Pass	15.247(e)
N/A is an abbreviation for Not Applicable.			

2 GENERAL INFORMATION

2.1 Description of Equipment Under Test

Description	:	RoboMing
Type of EUT		☑ Production ☐ Pre-product ☐ Pro-type
Model Number	:	RoboMing-*
Note	:	The symbol "*" in the model name can be "I~IX", which stand for different appearance color.
Test Model	:	RoboMing-I
Radio Tech	:	Bluetooth 4.0 LE
Freq. Band	:	2402MHz ~ 2480MHz (Ch1-Ch40)
Tested Freq.	:	2402MHz (Ch1), 2440MHz (Ch20), 2480MHz (Ch40)
Modulation	:	GFSK
Antenna Gain	:	0 dBi
Test Mode	:	The EUT was set at continuous TX with duty cycle 100% during all the test in the report
Charger	:	Manufacturer : Shenzhen XINGUANYUDA Power of Science and Technology Co., Ltd M/N : XVE-2520200 Input : 100~240V~50/60Hz Output : 25.2V 2A
Applicant	:	Shanghai Streamind Tech Inc. South 5th Floor Bosideng Build, No.18, Zhengfu Road, Yangpu District, Shanghai. China
Manufacturer	:	Same as Applicant
Factory	:	Shanghai Yantai Tech Inc. 3rd Floor, Building B, No. 1051, Shengke Road, Jiading, District, Shanghai.

2.2 Description of Test Facility

Site Description (Semi-Anechoic Chamber) : Sept. 17, 1998 file on
Jan 15, 2015 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

Conducted Disturbance Test Uncertainty	: U = 3.4dB
Radiated Disturbance Test Uncertainty (30-200MHz)	: U = 4.6 dB (Horizontal) U = 4.3dB (Vertical)
Radiated Disturbance Test Uncertainty (200M-1GHz)	: U = 4.5dB (Horizontal) U = 5.4dB (Vertical)
Radiated Emission Uncertainty (Above 1GHz)	: U = 5.1 dB
6 dB Bandwidth Expanded Uncertainty	: U = $1x10^{-8}$ 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 CONDUCTED EMISSION TEST

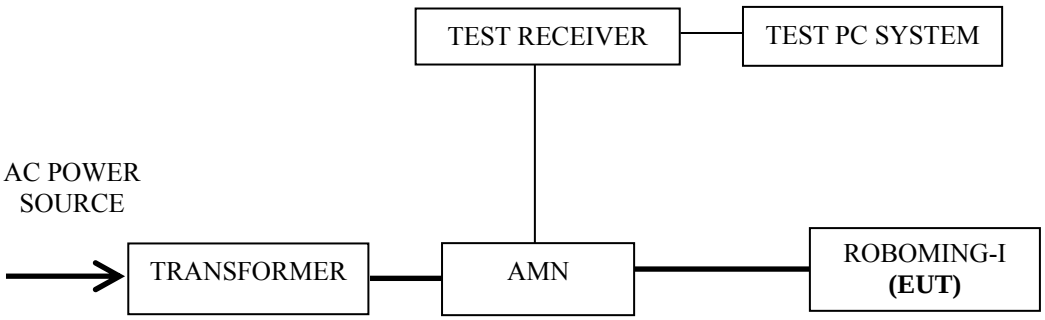
3.1 Test Equipment

The following test equipments are used during the conducted emission test in a shielded room:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Test Receiver	R&S	ESCI	101302	Apr 27, 2015	Apr 26, 2016
2.	Artificial Mains Network (AMN)	R&S	ENV4200	100125	Jun 27, 2015	Jun 26, 2016
3.	50Ω Coaxial Switch	Anritsu	MP59B	6200426389	Sep 18, 2015	Mar 17, 2016
4.	50Ω Terminator	Anritsu	BNC	001	Mar 20, 2015	Mar 19, 2016
5.	Software	Audix	E3	6.111206	--	--

3.2 Block Diagram of Test Setup

3.2.1 Conducted Disturbance Test Setup



—— : Signal Line
▬ : Power Line

3.3 Conducted Emission Limit [FCC Part 15 Subpart B 15.207]

Frequency Range (MHz)	Limits dB (μV)	
	Quasi-peak	Average
0.15 ~ 0.5	66~56	56~46
0.5 ~ 5	56	46
5 ~ 30	60	50

NOTE 1 – The lower limit shall apply at the transition frequencies.
NOTE 2 – The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz~0.50 MHz

3.4 Test Configuration

The EUT (listed in Sec.2.1) and the peripherals (listed in Sec 2.2) were installed as shown on Sec.3.2 to meet FCC requirement 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 equipments and the EUT.

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

3.6 Test Procedures

The EUT were connected to the power mains through an Artificial Mains Network (AMN). This provided a 50 ohm coupling impedance for the measuring equipment.

Both sides of AC line (Line & Neutral) were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables were changed or manipulated according to ANSI C63.4:2009 during conducted emission test.

The bandwidth of R&S Test Receiver ESCI was set at 9 kHz.

The frequency range from 150 kHz to 30 MHz was checked.

The test modes were done on conducted disturbance test and all the test results are listed in Sec. 3.7.

3.7 Test Results

< PASS >

The frequency and amplitude of the highest conducted emission relative to the limit is reported. All emissions not reported below are too low against the prescribed limits.

Test Mode	Data Page
Ch 01	P15
Ch 20	P16
Ch 40	P17

NOTE 1 – Factor = Cable Loss + AMN Factor.
NOTE 2 – Emission Level = Meter Reading + Factor.
NOTE 3 – "QP" means "Quasi-Peak" values, "AV" means "Average" values.
NOTE 4 – The worst case is for Ch20 test mode. The worst emission is detected at 0.187 MHz (Average Value) with corrected signal level of 57.34dB (μV) (limit is 64.18 dB (μV)), when the Line of the EUT is connected to AMN.

EUT	:	RoboMing	Temperature :	22℃	
Model No.	:	RoboMing-I	Humidity	:	48%RH
Test Mode	:	Ch 01	Date of Test	:	Sep 20, 2015

Test Line	Frequency (MHz)	Meter Reading dB(μV)	Factor (dB)	Emission Level dB(μV)	Limits dB(μV)	Margin (dB)	Remark
Line	**0.187**	**46.76**	**10.54**	**57.30**	**64.24**	**6.94**	QP
	0.430	30.14	10.41	40.55	57.27	16.72	
	0.618	31.48	10.38	41.86	56	14.14	
	1.281	27.76	10.39	38.15	56	17.85	
	2.771	25.45	10.44	35.89	56	20.11	
	5.925	33.49	10.47	43.96	60	16.04	
	0.188	**33.89**	**10.54**	**44.43**	**54.24**	**9.81**	AV
	0.430	18.75	10.41	29.16	47.27	18.11	
	0.619	20.09	10.38	30.47	46	15.53	
	1.271	15.51	10.39	25.90	46	20.10	
	2.776	14.98	10.44	25.42	46	20.58	
	5.925	27.23	10.47	37.70	50	12.30	
Neutral	**0.188**	**46.10**	**10.52**	**56.62**	**64.18**	**7.56**	QP
	0.430	28.76	10.39	39.15	57.24	18.09	
	0.605	31.94	10.36	42.30	56	13.70	
	1.021	27.91	10.37	38.28	56	17.72	
	1.908	28.81	10.41	39.22	56	16.78	
	5.919	33.13	10.49	43.62	60	16.38	
	0.184	**34.24**	**10.52**	**44.76**	**54.18**	**9.42**	AV
	0.432	17.37	10.39	27.76	47.24	19.48	
	0.607	18.67	10.36	29.03	46	16.97	
	1.024	17.47	10.37	27.84	46	18.16	
	1.907	18.08	10.41	28.49	46	17.51	
	5.917	21.57	10.49	32.06	50	17.94	

TEST ENGINEER: WENCY YANG

EUT	:	RoboMing	Temperature :	22℃	
Model No.	:	RoboMing-I	Humidity	:	48%RH
Test Mode	:	Ch 20	Date of Test	:	Sep. 20, 2015

Test Line	Frequency (MHz)	Meter Reading dB(μV)	Factor (dB)	Emission Level dB(μV)	Limits dB(μV)	Margin (dB)	Remark
Line	**0.189**	**46.77**	**10.54**	**57.31**	**64.24**	**6.93**	QP
	0.431	30.53	10.41	40.94	57.27	16.33	
	0.583	30.87	10.38	41.25	56	14.75	
	1.283	28.29	10.39	38.68	56	17.32	
	2.718	27.80	10.44	38.24	56	17.76	
	5.937	33.66	10.47	44.13	60	15.87	
	0.185	**34.28**	**10.54**	**44.82**	**54.24**	**9.42**	AV
	0.435	17.62	10.41	28.03	47.27	19.24	
	0.580	18.77	10.38	29.15	46	16.85	
	1.282	16.67	10.39	27.06	46	18.94	
	2.719	16.93	10.44	27.37	46	18.63	
	5.938	26.34	10.47	36.81	50	13.19	
Neutral	**0.191**	**46.14**	**10.52**	**56.66**	**64.18**	**7.52**	QP
	0.411	28.91	10.39	39.30	57.24	17.94	
	0.611	31.70	10.36	42.06	56	13.94	
	1.058	28.09	10.37	38.46	56	17.54	
	4.330	25.24	10.41	35.65	56	20.35	
	5.912	32.80	10.49	43.29	60	16.71	
	0.187	**33.99**	**10.52**	**44.51**	**54.18**	**9.67**	AV
	0.418	18.58	10.39	28.97	47.24	18.27	
	0.616	20.95	10.36	31.31	46	14.69	
	1.053	16.58	10.37	26.95	46	19.05	
	4.324	15.64	10.41	26.05	46	19.95	
	5.912	25.62	10.49	36.11	50	13.89	

TEST ENGINEER: WENCY YANG

EUT	:	RoboMing	Temperature :	22℃	
Model No.	:	RoboMing-I	Humidity	:	48%RH
Test Mode	:	Ch 40	Date of Test	:	Sep. 20, 2015

Test Line	Frequency (MHz)	Meter Reading dB(μV)	Factor (dB)	Emission Level dB(μV)	Limits dB(μV)	Margin (dB)	Remark
Line	**0.181**	**46.35**	**10.54**	**56.89**	**64.24**	**7.35**	QP
	0.432	30.83	10.41	41.24	57.27	16.03	
	0.614	31.43	10.38	41.81	56	14.19	
	1.127	28.24	10.39	38.63	56	17.37	
	2.790	27.78	10.44	38.22	56	17.78	
	5.929	34.90	10.47	45.37	60	14.63	
	0.184	**34.32**	**10.54**	**44.86**	**54.24**	**9.38**	AV
	0.434	18.30	10.41	28.71	47.27	18.56	
	0.610	19.68	10.38	30.06	46	15.94	
	1.126	15.60	10.39	25.99	46	20.01	
	2.791	16.57	10.44	27.01	46	18.99	
	5.935	26.01	10.47	36.48	50	13.52	
Neutral	**0.181**	**46.08**	**10.52**	**56.60**	**64.18**	**7.58**	QP
	0.425	29.72	10.39	40.11	57.24	17.13	
	0.573	31.36	10.36	41.72	56	14.28	
	1.287	29.63	10.37	40.00	56	16.00	
	2.585	28.21	10.41	38.62	56	17.38	
	6.061	31.81	10.49	42.30	60	17.70	
	0.183	**33.96**	**10.52**	**44.48**	**54.18**	**9.70**	AV
	0.428	18.56	10.39	28.95	47.24	18.29	
	0.576	19.04	10.36	29.40	46	16.60	
	1.286	18.11	10.37	28.48	46	17.52	
	2.586	19.00	10.41	29.41	46	16.59	
	6.059	24.91	10.49	35.40	50	14.60	

TEST ENGINEER: WENCY YANG

4 RADIATED EMISSION TEST

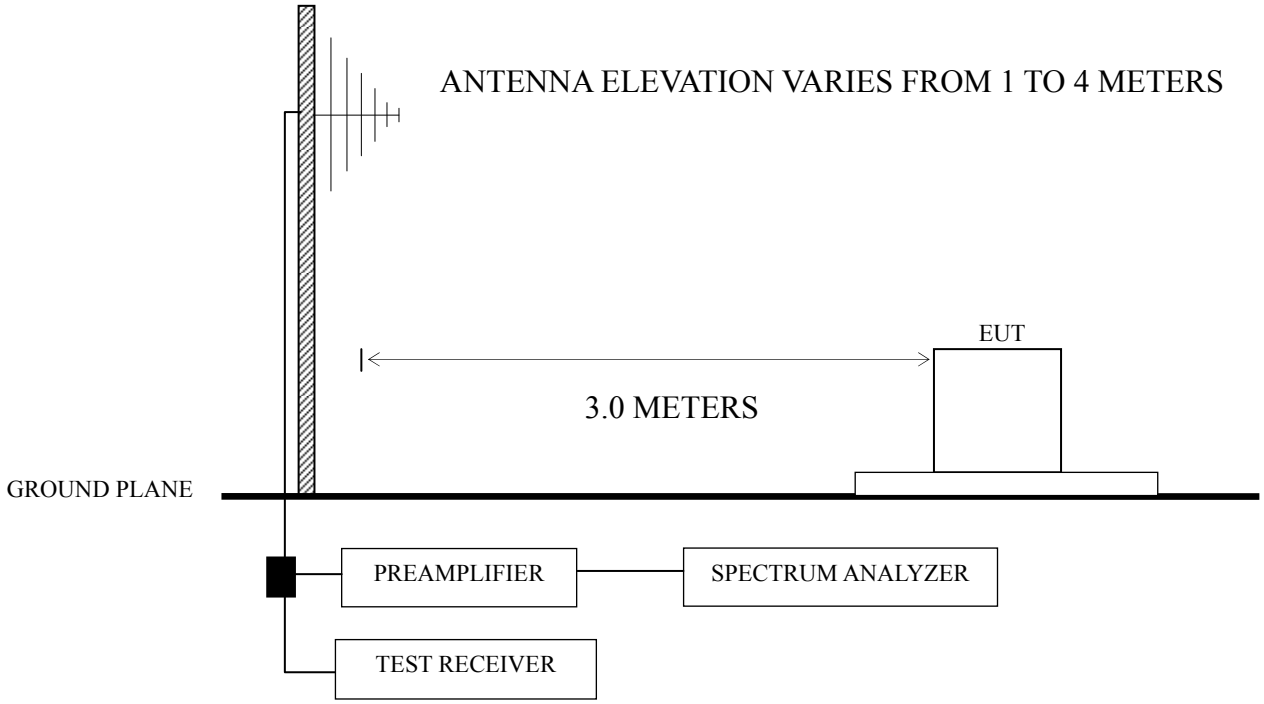
4.1 Test Equipment

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, 2015	Mar 17, 2016
2.	Pre-Amplifier	Agilent	8449B	3008A00864	Mar 20, 2015	Mar 19, 2016
3.	Spectrum Analyzer	Agilent	N9010A	MY52221182	Jun 14, 2015	Jun 13, 2016
4.	Test Receiver	R&S	ESCI	101302	Sep 03, 2015	Sep 02, 2016
5.	Bi-log Antenna	TESEQ	CBL6112D	23193	May 03, 2015	May 02, 2016
6.	Horn Antenna	EMCO	3115	9607-4878	Jun 16, 2015	Jun 15, 2016
7.	Horn Antenna	EMCO	3116	00062643	Jul 21, 2015	Jul 21, 2016
8.	50Ω Coaxial Switch	Anritsu	MP59B	6200426390	Sep 18, 2015	Mar 17, 2016
9.	50Ω Terminator	Audix	BNC	001	Mar 20, 2015	Mar 19, 2016
10.	Software	Audix	E3	SET00200 9912M295-2	--	--

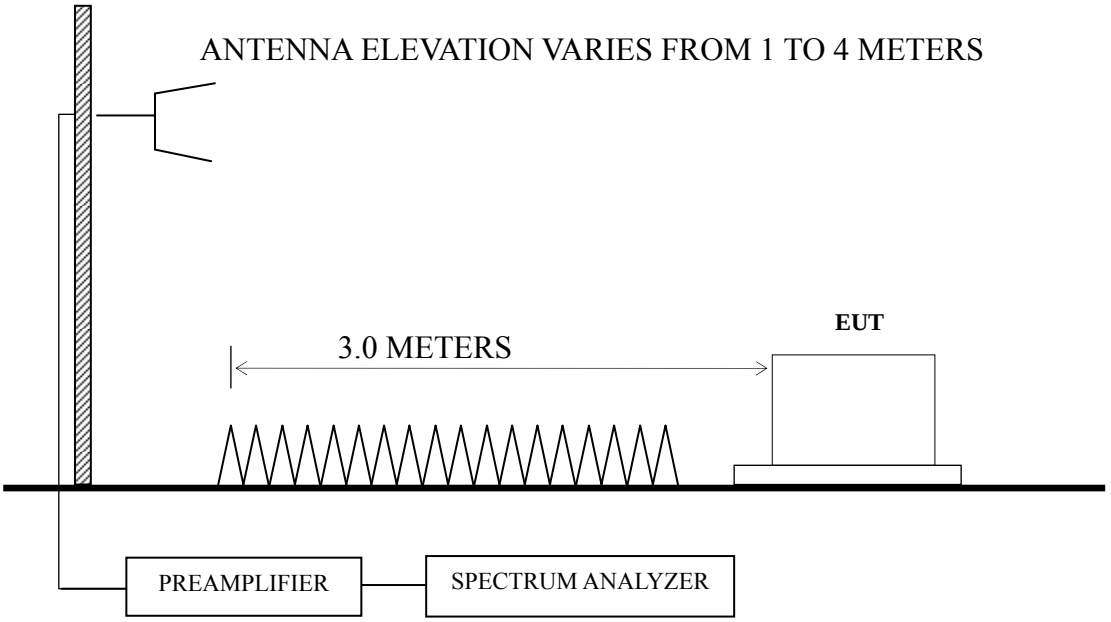
4.2 Block Diagram of Test Setup

4.2.1 Below 1GHz



■ : 50 ohm Coaxial Switch

4.2.2 Above 1GHz



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

Frequency (MHz)	Distance (m)	Field strength limits (μV/m)	
		(μV/m)	dB(μV/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 (μV/m) = 20 log Emission Level (μV/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

4.4 Test Configuration

The EUT (listed in Sec.2.1) and the simulators (listed in Sec.2.2) were installed as shown on Sec.4.2 to meet FCC requirements and operating in a manner that tends to maximize its emission level in a normal application.

4.5 Operating Condition of EUT

4.5.1 Setup the EUT as shown in Sec. 4.2.

4.5.2 Turn on the power of all equipment.

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

4.6 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 floor-standing equipment. Insulating material (10 mm thick) was placed under the EUT. 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 C63.4:2009 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 10^{th} harmonics from fundamental frequency) was checked.

All the test results are listed in Sec.4.7.

4.7 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	Channel	Frequency	Data Page
1.	Transmitting	Worst case emission < 1GHz		P17
2.		01	2402 MHz	P18-19
3.		20	2440 MHz	
4.		40	2480 MHz	
5.	Receiving	--		P20

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	:	RoboMing	Temperature :	25℃
Model No.	:	RoboMing-I	Humidity :	45%RH
Test Mode	:	Transmitting	Date of Test :	Sep. 20, 2015

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	52.03	8.63	6.6	0.7	15.93	40	24.07	QP
	166.65	9.38	8.96	1.3	19.64	43.5	23.86	
	300.37	13.42	12.47	1.79	27.68	46	18.32	
	332.52	8.92	14.71	1.88	25.51	46	20.49	
	497.68	**10.67**	**16.98**	**2.26**	**29.91**	**46**	**16.09**	
	566.62	3.50	19.88	2.43	25.81	46	20.19	
Vertical	73.88	11.68	7.08	0.85	19.61	40	20.39	QP
	151.07	13.71	10.3	1.24	25.25	43.5	18.25	
	300.37	11.04	12.47	1.79	25.30	46	20.70	
	387.99	7.51	14.95	2.03	24.49	46	21.51	
	533.83	**10.14**	**18.3**	**2.36**	**30.80**	**46**	**15.20**	
	663.47	7.31	19.55	2.64	29.50	46	16.50	

TEST ENGINEER: BILL WU

Radiated Emission > 1GHz

EUT	:	RoboMing	Temperature :	25℃
Model No.	:	RoboMing-I	Humidity :	45%RH
Test Mode	:	Transmitting	Date of Test :	Sep. 20, 2015

Ch01

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	1361.50	50.07	25.19	3.78	36.11	42.93	74	31.07	Peak
	4804.00	53.51	33.5	7.75	34.87	59.89	74	14.11	Peak
	4804.00	42.80	33.52	7.75	34.87	49.20	54	4.80	Average
	7206.00	46.74	36.9	9.14	35.15	57.63	74	16.37	Peak
	7206.00	31.95	36.9	9.14	35.15	42.84	54	11.16	Average
Vertical	1352.10	51.24	25.14	3.78	36.13	44.03	74	29.97	Peak
	4804.00	54.29	33.5	7.75	34.87	60.67	74	13.33	Peak
	4804.00	44.66	33.52	7.75	34.87	51.06	54	2.94	Average
	7206.00	46.17	36.9	9.14	35.15	57.06	74	16.94	Peak
	7206.00	31.56	36.9	9.14	35.15	42.45	54	11.55	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	1361.41	49.98	25.19	3.78	36.11	42.84	74	31.16	Peak
	4880.00	50.13	33.58	7.82	34.88	56.65	74	17.35	Peak
	4880.00	40.29	33.58	7.82	34.88	46.81	54	7.19	Average
	7320.00	46.49	37.00	9.30	35.16	57.63	74	16.37	Peak
	7320.00	33.57	37.00	9.30	35.16	44.71	54	9.29	Average
Vertical	1361.45	51.29	25.19	3.78	36.11	44.15	74	29.85	Peak
	4880.00	51.92	33.58	7.82	34.88	58.44	74	15.56	Peak
	4880.00	42.31	33.58	7.82	34.88	48.83	54	5.17	Average
	7320.00	46.87	37	9.3	35.16	58.01	74	15.99	Peak
	7320.00	32.85	37	9.3	35.16	43.99	54	10.01	Average

Ch40

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	1733.80	51.29	26.55	4.26	35.53	46.57	74	27.43	Peak
	4960.00	52.37	33.61	7.88	34.89	58.97	74	15.03	Peak
	4960.00	43.36	33.61	7.88	34.89	49.96	54	4.04	Average
	7440.00	45.96	37.14	9.46	35.18	57.38	74	16.62	Peak
	7440.00	33.06	37.14	9.46	35.18	44.48	54	9.52	Average
Vertical	1361.48	53.36	25.19	3.78	36.11	46.22	74	27.78	Peak
	4960.00	50.46	33.61	7.88	34.89	57.06	74	16.94	Peak
	4960.00	40.90	33.61	7.88	34.89	47.50	54	6.50	Average
	7440.00	45.80	37.14	9.46	35.18	57.22	74	16.78	Peak
	7440.00	32.95	37.14	9.46	35.18	44.37	54	9.63	Average

TEST ENGINEER: BILL WU

EUT	:	RoboMing	Temperature :	25℃	
Model No.	:	RoboMing-I	Humidity	:	45%RH
Test Mode	:	Receiving	Date of Test	:	Sep. 20, 2015

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	97.12	0.57	6.6	0.7	--	7.87	43.5	35.63	QP
	173.21	3.92	8.96	1.3	--	14.18	43.5	29.32	
	278.07	6.20	12.47	1.79	--	20.46	46	25.54	
	344.39	1.02	14.71	1.88	--	17.61	46	28.39	
	580.70	-0.65	16.98	2.26	--	18.59	46	27.41	
	839.18	0.64	19.88	2.43	--	22.95	46	23.05	
	1574.01	47.02	25.95	4.06	35.73	41.30	74	32.70	PK
	2426.61	46.70	28.29	5.08	35.35	44.72	74	29.28	
	4345.10	44.28	32.98	7.29	34.77	49.78	54	4.22	
Vertical	38.89	9.94	6.6	0.7	--	17.24	40	22.76	QP
	126.33	4.11	8.96	1.3	--	14.37	43.5	29.13	
	193.77	6.39	12.47	1.79	--	20.65	43.5	22.85	
	422.06	5.32	14.71	1.88	--	21.91	46	24.09	
	550.95	1.03	16.98	2.26	--	20.27	46	25.73	
	804.60	0.80	19.88	2.43	--	23.11	46	22.89	
	1258.90	48.23	24.67	3.64	36.3	40.24	74	33.76	PK
	2904.02	45.99	30.51	5.57	35.39	46.68	74	27.32	
	3971.92	45.11	32.65	6.89	34.71	49.94	54	4.06	

TEST ENGINEER: BILL WU

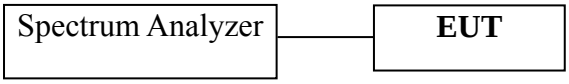
5 6 dB BANDWIDTH MEASUREMENT

5.1 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 12, 2015	Jun 11, 2016

5.2 Block Diagram of Test Setup



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

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

5.4 Operating Condition of EUT

The test program "SecureCRT" was used to enable the EUT to transmit data at different channel frequency individually.

5.5 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 8.2 Measurement Procedure "Option 2" was used).

5.6 Test Results

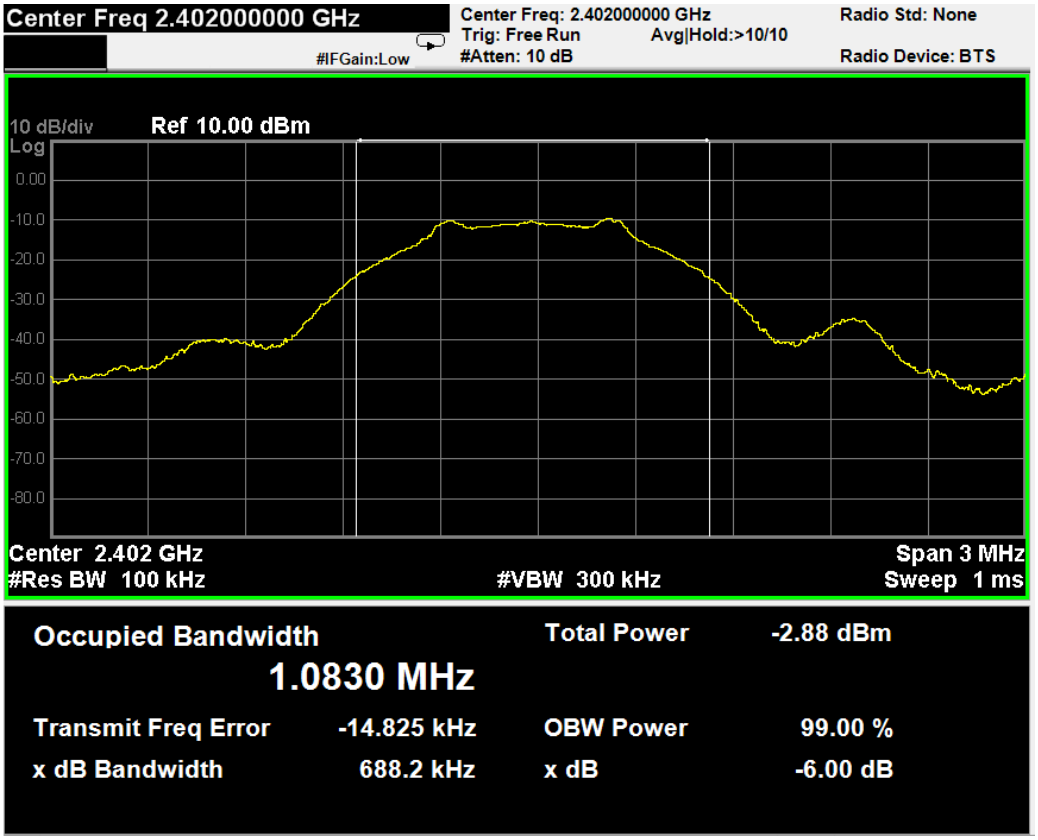
PASSED.

All the test results are attached in next pages.

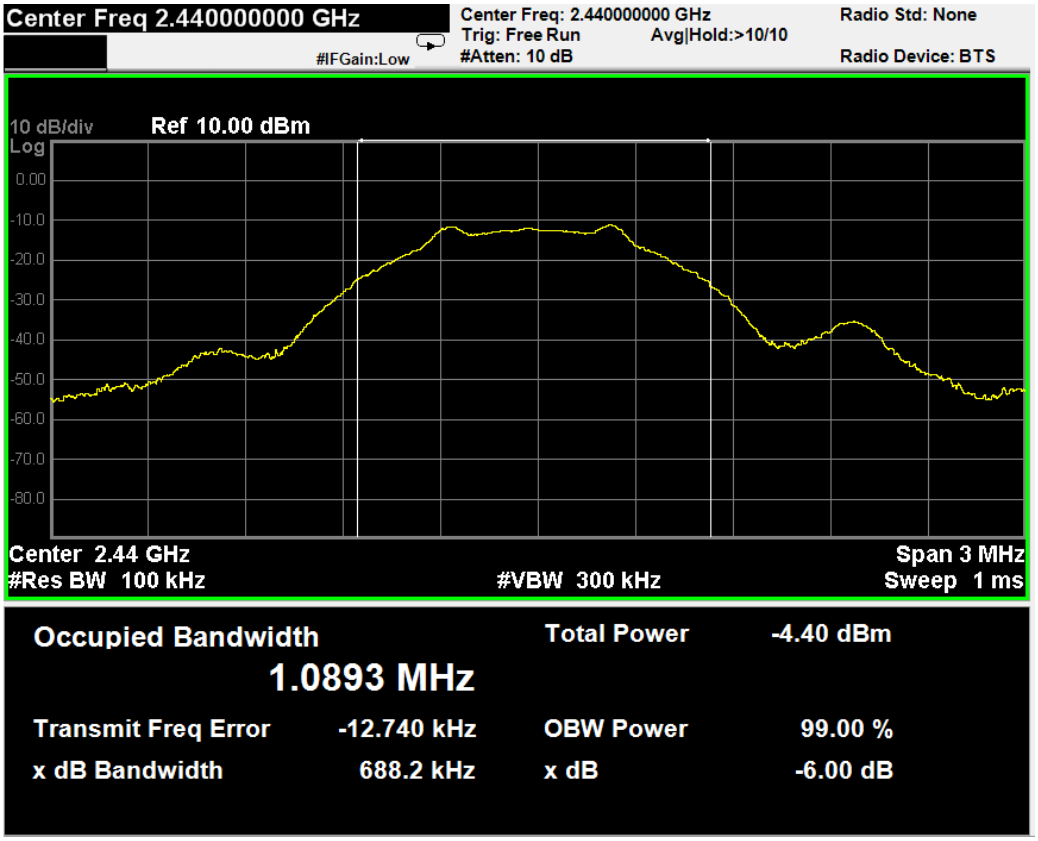
(Test Date: Sep. 19, 2015 Temperature: 20℃ Humidity: 44 %)

Channel	Frequency	**6dB Bandwidth**
01	2402 MHz	**688.2 kHz**
20	2440 MHz	**688.2 kHz**
40	2480 MHz	**693.8 kHz**

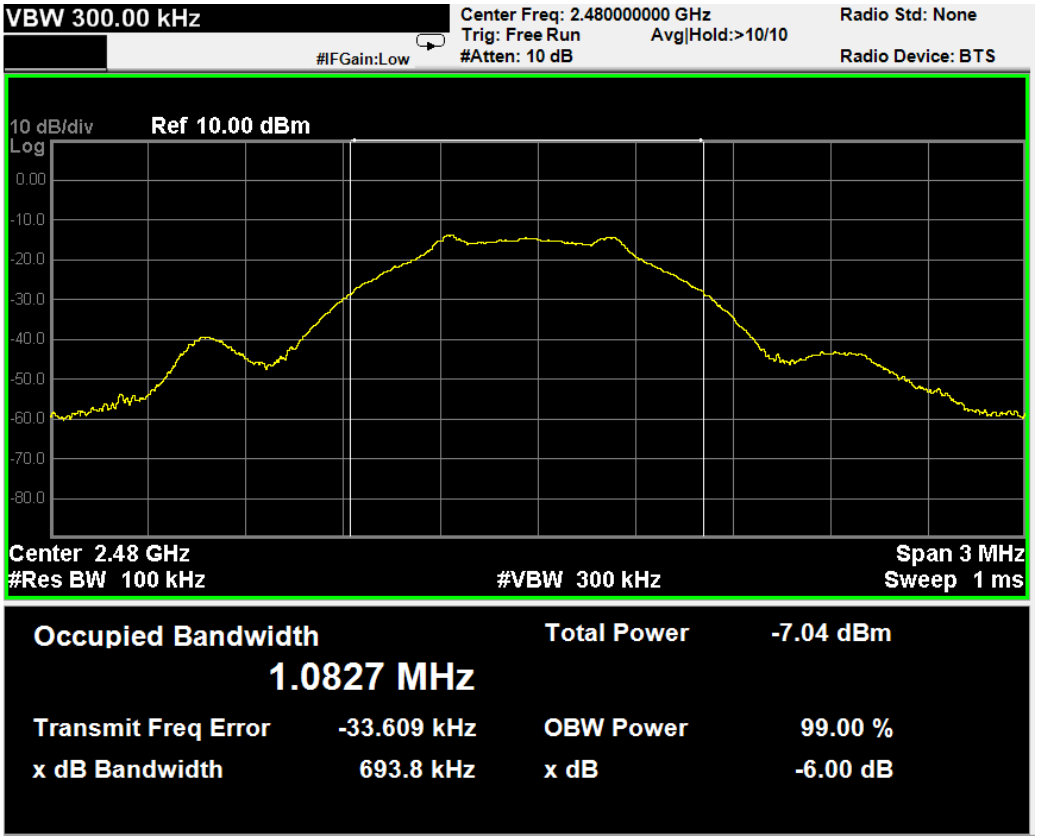
Ch 01 (2402 MHz)



Ch 20 (2440 MHz)



Ch 40 (2480 MHz)



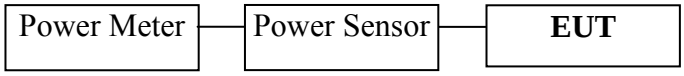
6 MAXIMUM PEAK OUTPUT POWER MEASUREMENT

6.1 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, 2015	Mar 19, 2016
2.	Power Sensor	Anritsu	MA2491A	32489	Mar 20, 2015	Mar 19, 2016

6.2 Block Diagram of Test Setup



6.3 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)

6.4 Operating Condition of EUT

The test program "SecureCRT" was used to enable the EUT to transmit data at different channel frequency individually.

6.5 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 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 v03r03 (the 9.1.2 Measurement Procedure "Integration band power method)" was used).

6.6 Test Results

PASSED. All the test results are listed below.

(Test Date: Sep. 19, 2015 Temperature: 20℃ Humidity: 45 %)

Channel	Frequency	**Peak Output Power**	Limit
01	2402 MHz	**-8.24dBm**	30 dBm
20	2440 MHz	**-6.10dBm**	30 dBm
40	2480 MHz	**-4.68dBm**	30 dBm

7 EMISSION LIMITATIONS MEASUREMENT

7.1 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 12, 2015	Jun 11, 2016

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. 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)

7.4 Operating Condition of EUT

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

7.5 Test Procedure

The transmitter output was connected to the Test Receiver. Set RBW = 100 kHz, VBW ≥ 300 kHz, scan up through 10^{th} 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).

7.6 Test Results

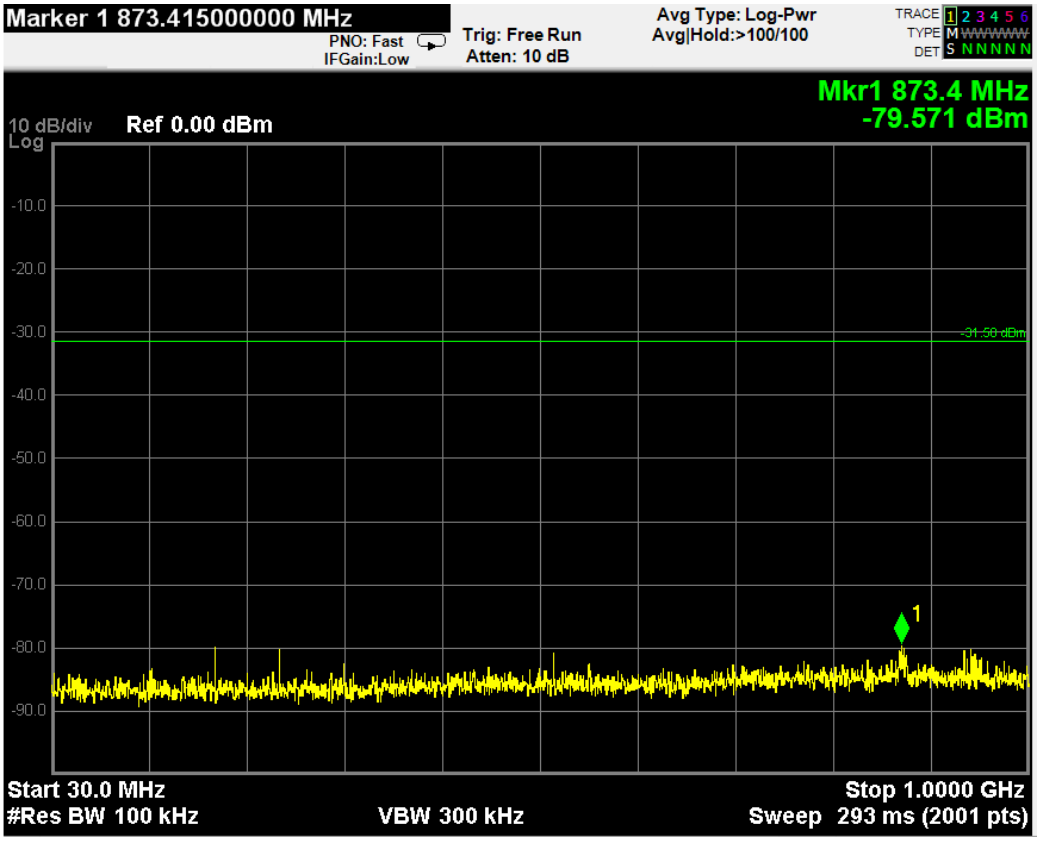
PASSED.

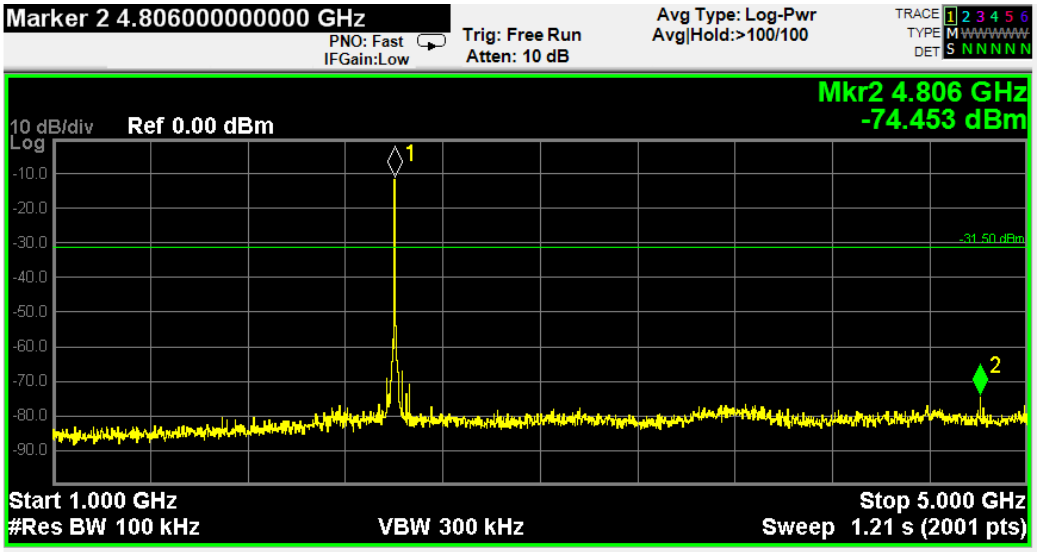
The test data was attached in the next pages.

(Test Date: Sep. 26, 2015 Temperature: 20℃ Humidity: 44 %)

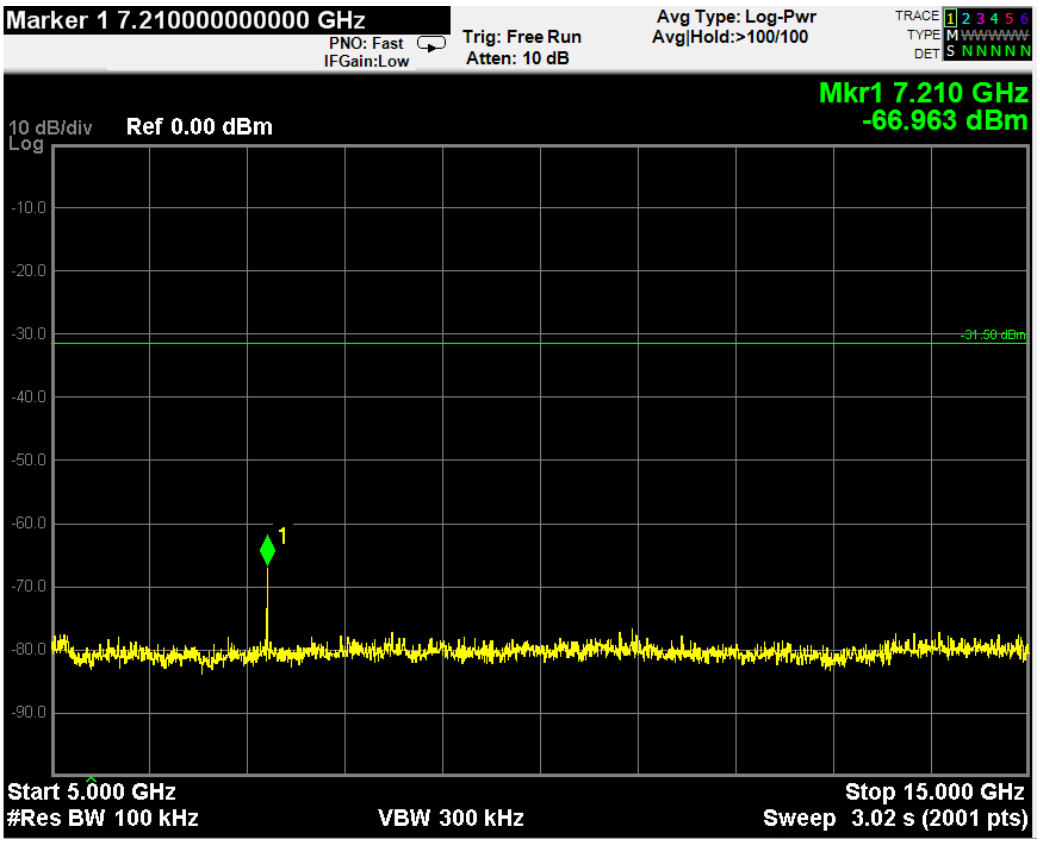
Channel	Data Page
01	P30-31
20	P32-33
40	P34-35

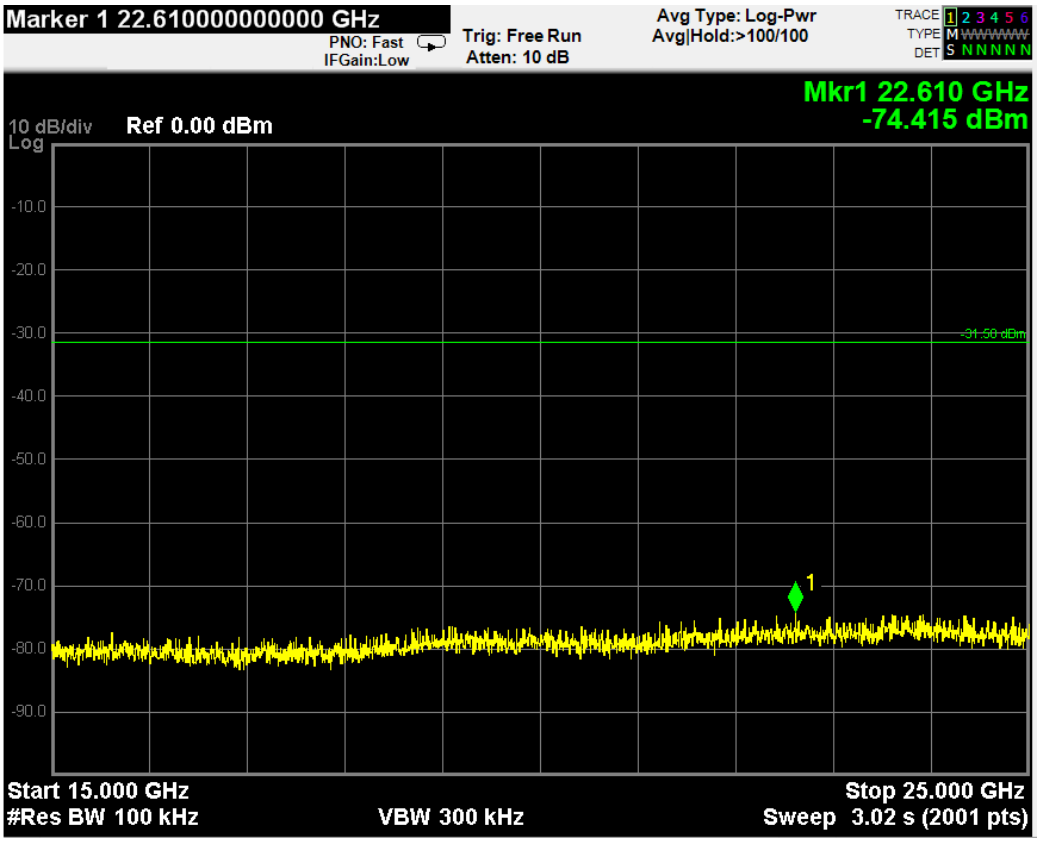
Ch 01 (2402 MHz)



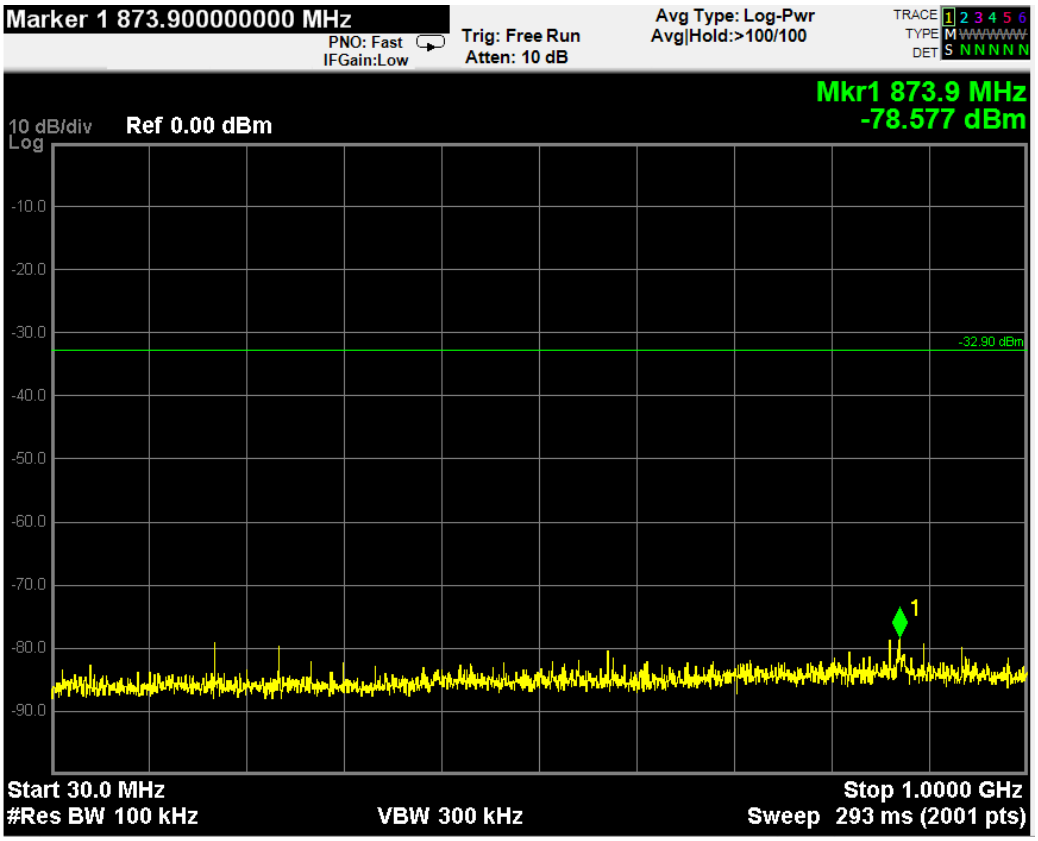


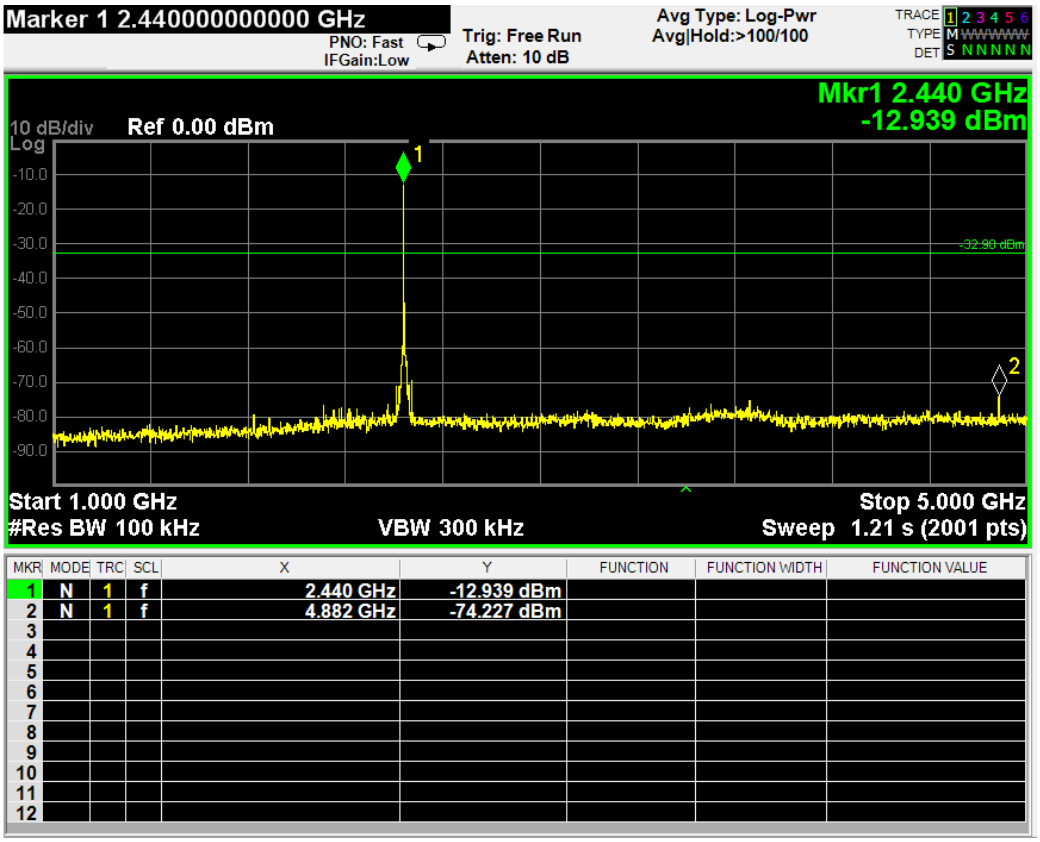
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.402 GHz	-11.548 dBm			
2	N	1	f	4.806 GHz	-74.453 dBm			
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								


Marker 1 7.210000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE M WWWWW
DET S N N N N N
Mkr1 7.210 GHz
-66.963 dBm
10 dB/div
Log
Ref 0.00 dBm
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-31.50 dBm
1
Start 5.000 GHz
#Res BW 100 kHz
VBW 300 kHz
Stop 15.000 GHz
Sweep 3.02 s (2001 pts)

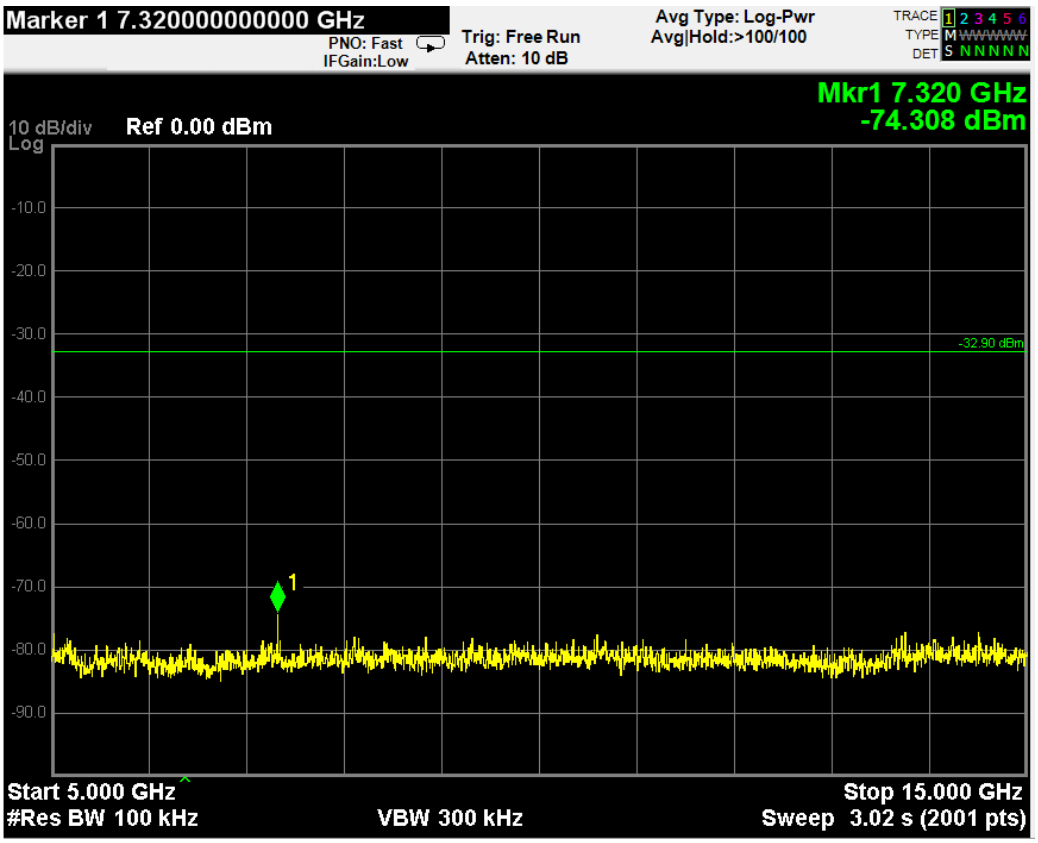

Marker 1 22.610000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE M WWWWW
DET S N N N N N
Mkr1 22.610 GHz
-74.415 dBm
10 dB/div
Log
Ref 0.00 dBm
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-31.50 dBm
1
Start 15.000 GHz
#Res BW 100 kHz
VBW 300 kHz
Stop 25.000 GHz
Sweep 3.02 s (2001 pts)

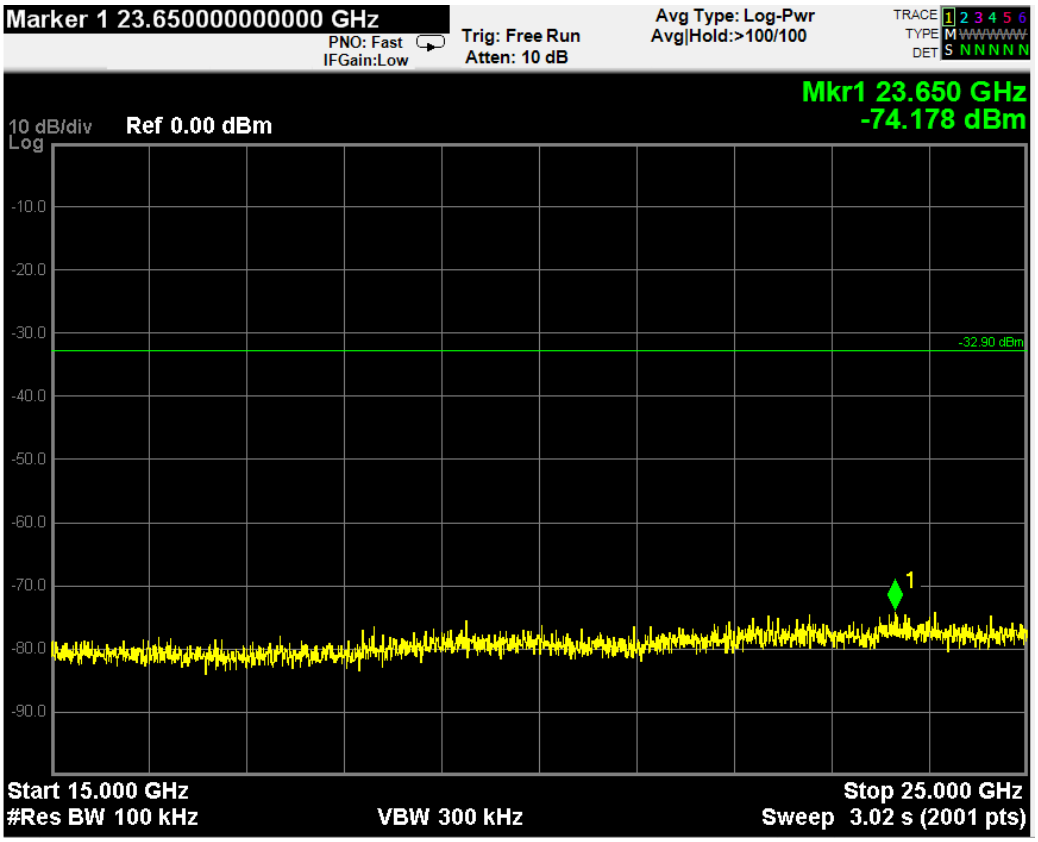
Ch 20 (2440 MHz)



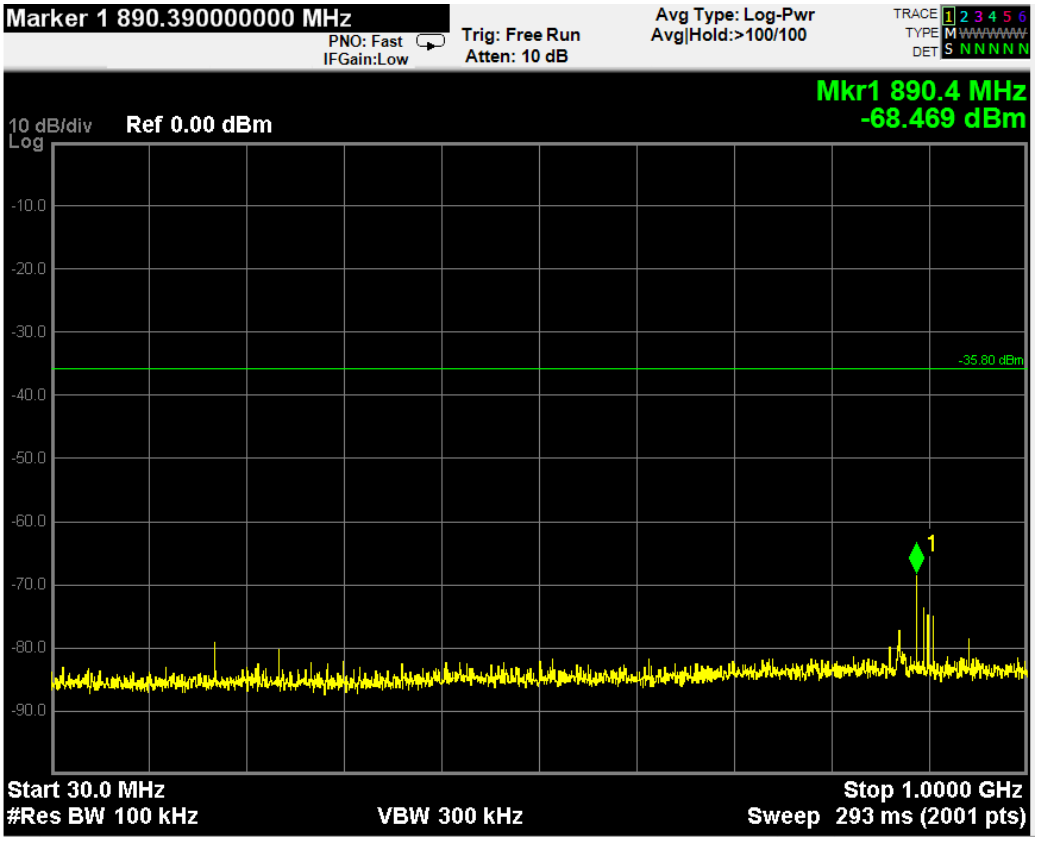


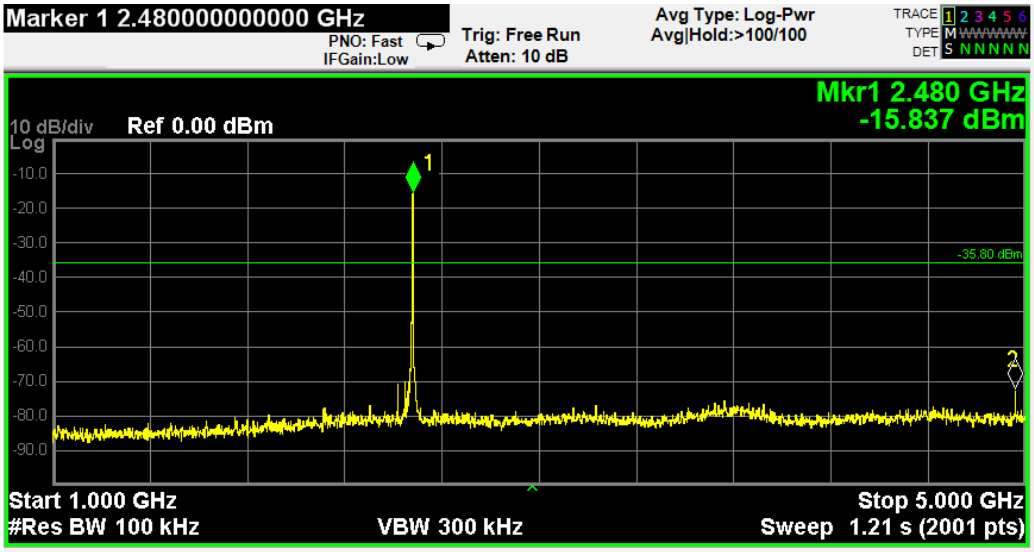
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.440 GHz	-12.939 dBm			
2	N	1	f	4.882 GHz	-74.227 dBm			
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								


Marker 1 7.320000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE M WWWWW
DET S N N N N N
Mkr1 7.320 GHz
-74.308 dBm
10 dB/div
Log
Ref 0.00 dBm
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-32.90 dBm
1
Start 5.000 GHz
#Res BW 100 kHz
VBW 300 kHz
Stop 15.000 GHz
Sweep 3.02 s (2001 pts)

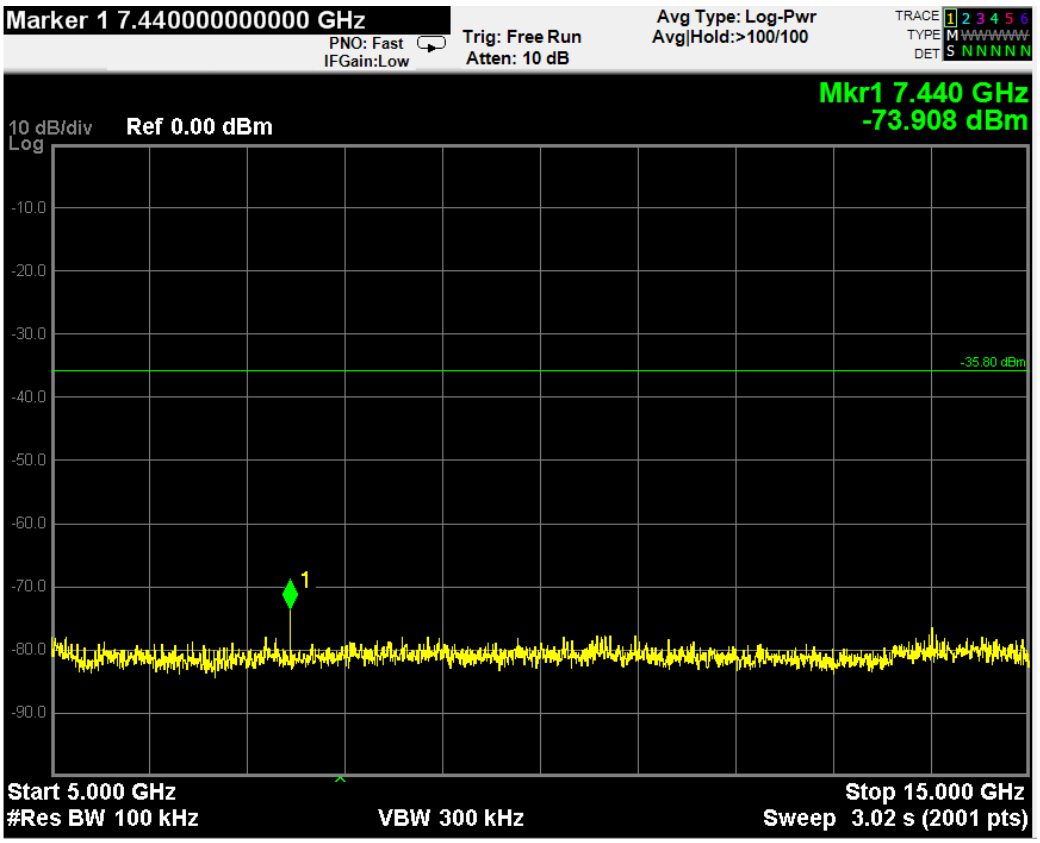

Marker 1 23.650000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE M WWWWW
DET S N N N N N
Mkr1 23.650 GHz
-74.178 dBm
10 dB/div
Log
Ref 0.00 dBm
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-32.90 dBm
1
Start 15.000 GHz
#Res BW 100 kHz
VBW 300 kHz
Stop 25.000 GHz
Sweep 3.02 s (2001 pts)

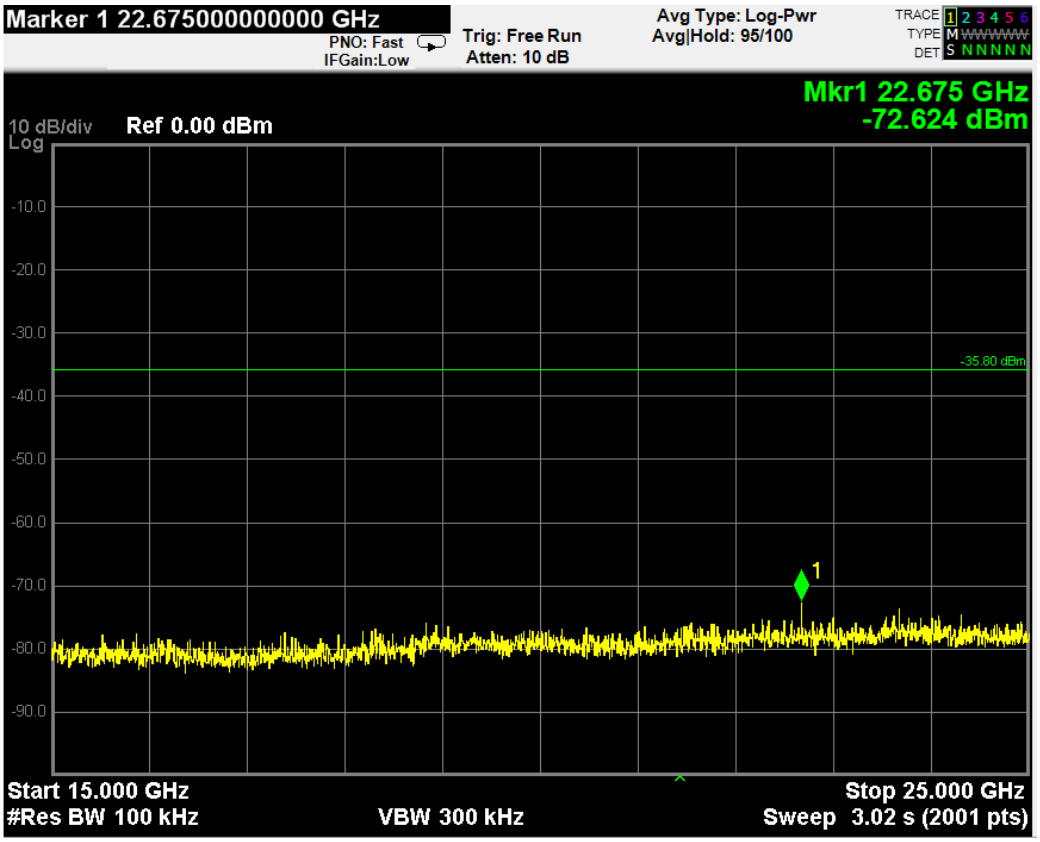
Ch 40 (2480 MHz)





MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.480 GHz	-15.837 dBm			
2	N	1	f	4.958 GHz	-72.682 dBm			
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								


Marker 1 7.440000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE M WWWWW
DET S N N N N N
Mkr1 7.440 GHz
-73.908 dBm
10 dB/div
Log
Ref 0.00 dBm
-10.0
-20.0
-30.0
-35.80 dBm
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
Start 5.000 GHz
#Res BW 100 kHz
VBW 300 kHz
Stop 15.000 GHz
Sweep 3.02 s (2001 pts)


Marker 1 22.675000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold: 95/100
TRACE 1 2 3 4 5 6
TYPE M WWWWW
DET S N N N N N
Mkr1 22.675 GHz
-72.624 dBm
10 dB/div
Log
Ref 0.00 dBm
-10.0
-20.0
-30.0
-35.80 dBm
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
Start 15.000 GHz
#Res BW 100 kHz
VBW 300 kHz
Stop 25.000 GHz
Sweep 3.02 s (2001 pts)

8 BAND EDGES MEASUREMENT

8.1 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 12, 2015	Jun 11, 2016

8.2 Block Diagram of Test Setup

The same as section.4.2.

8.3 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.

8.4 Operating Condition of EUT

The test program "SecureCRT" was used to enable the EUT to transmit and receive data at different channel frequency individually.

8.5 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).

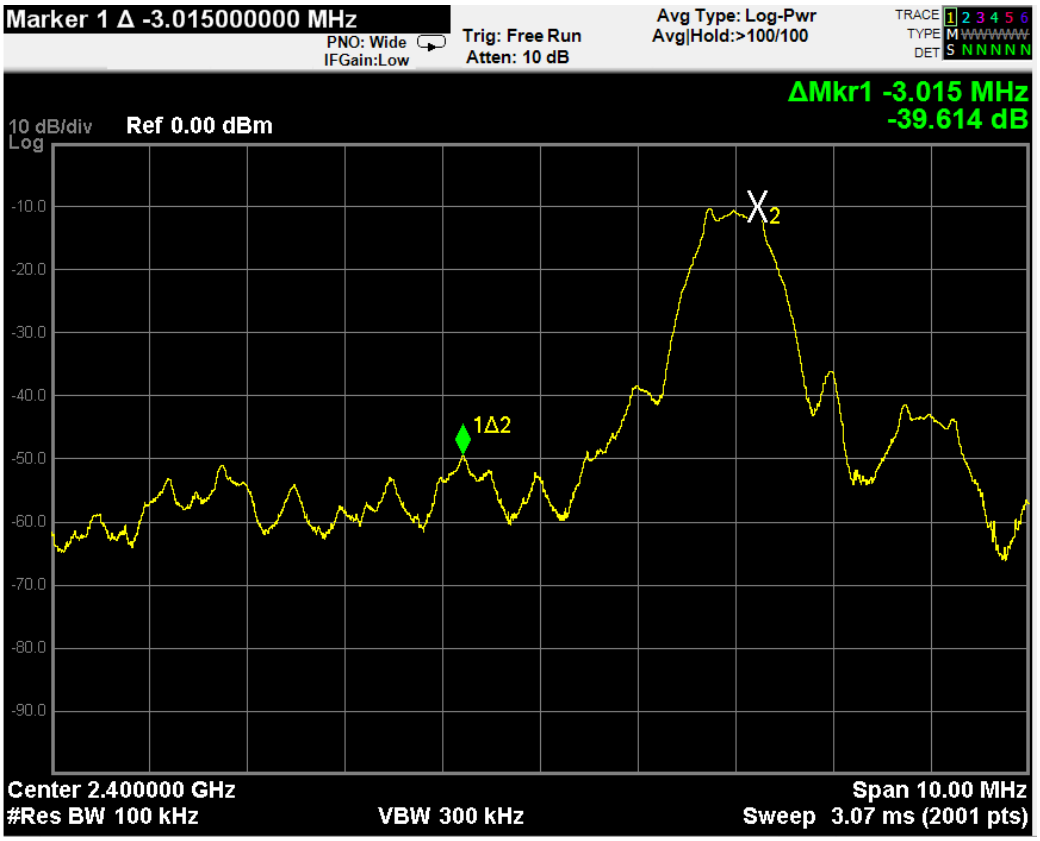
8.6 Test Results

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

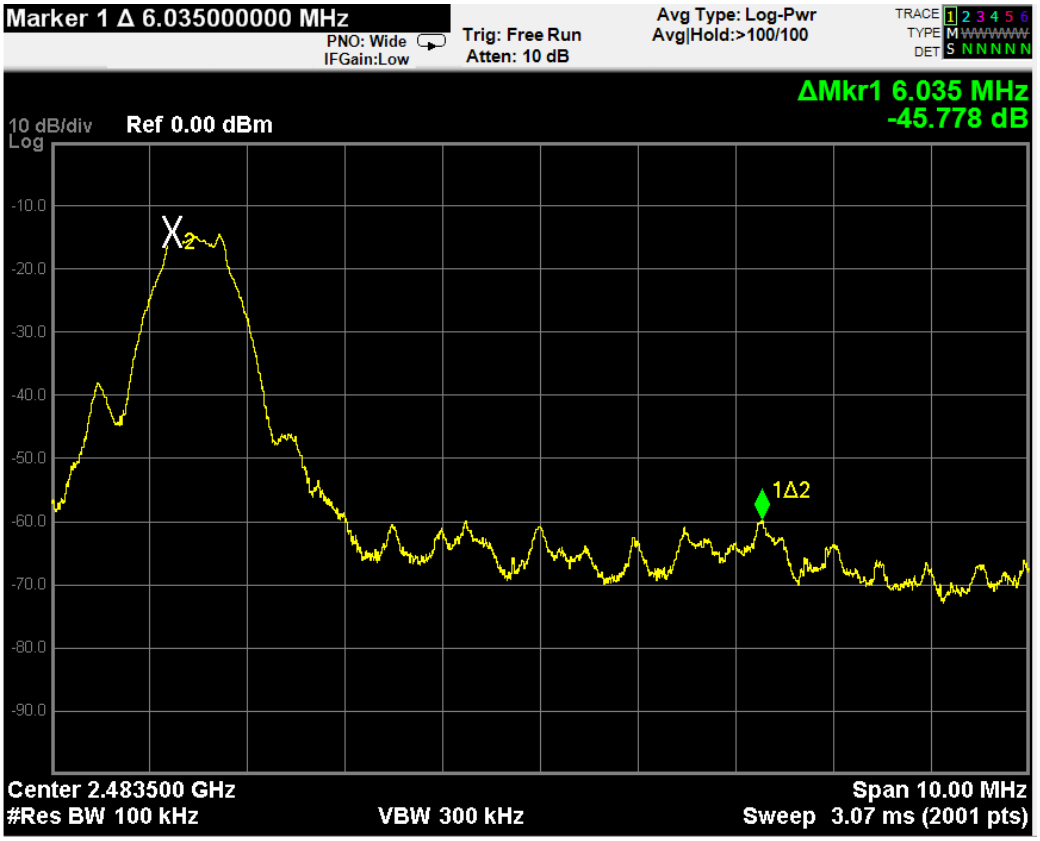
(Test Date: Sep. 19, 2015 Temperature: 20℃ Humidity: 44 %)

Location	Channel	Frequency	**Delta Marker**	Result
Below Band Edge	01	2402 MHz	**39.614 dB**	More than **20 dB** below the highest level of the desired power
Upper Band Edge	40	2480 MHz	**45.778 dB**	

Ch01 2402MHz (Below Edge 2400 MHz)



Ch40 2480MHz (Upper Edge 2483.5 MHz)



9 POWER SPECTRAL DENSITY MEASUREMENT

9.1 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

9.2 Block Diagram of Test Setup

The same as section.4.2.

9.3 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.

9.4 Operating Condition of EUT

The test program "SecureCRT" was used to enable the EUT to transmit data at different channel frequency individually.

9.5 Test Procedure

The transmitter output was connected to the Test Receiver. The Test Receiver was set as 3kHz ≤ RBW ≤ 100kHz, VBW ≥ 3 x RBW, span = 1.5 times the DTS channel bandwidth.
The test procedure is defined in KDB558074 D01 v03r03 (the 10.2 Measurement Procedure "Method PKPSD (peak PSD)" was used).

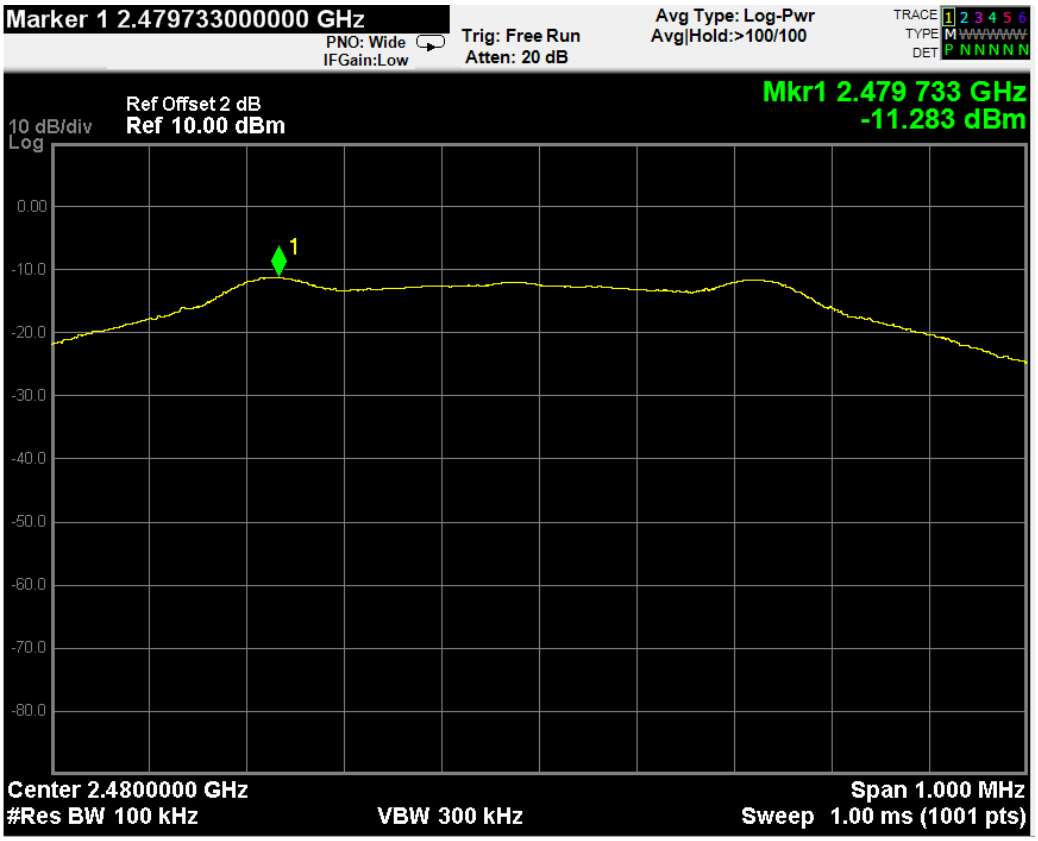
9.6 Test Results

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

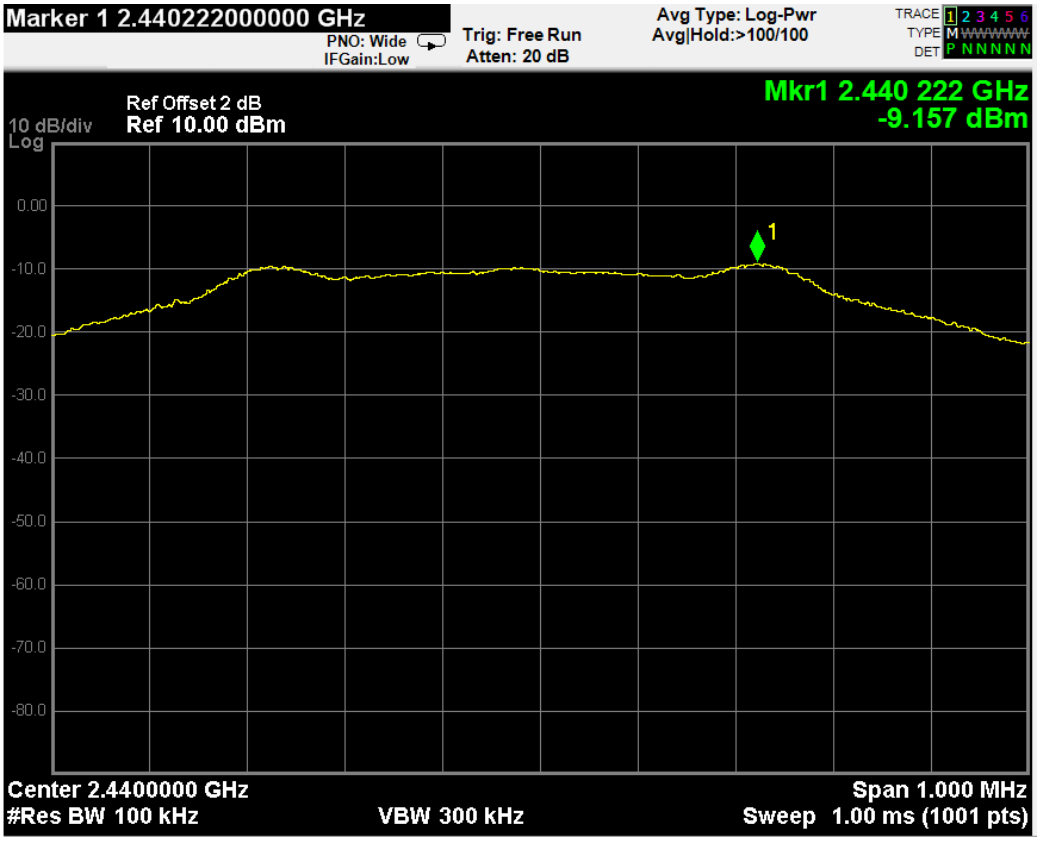
(Test Date: Sep. 19, 2015 Temperature: 20℃ Humidity: 44 %)

Channel	Frequency	Power Spectral Density	Limit
01	2402 MHz	-11.283 dBm	8dBm
20	2440 MHz	-9.157 dBm	8dBm
40	2480 MHz	-7.901 dBm	8dBm

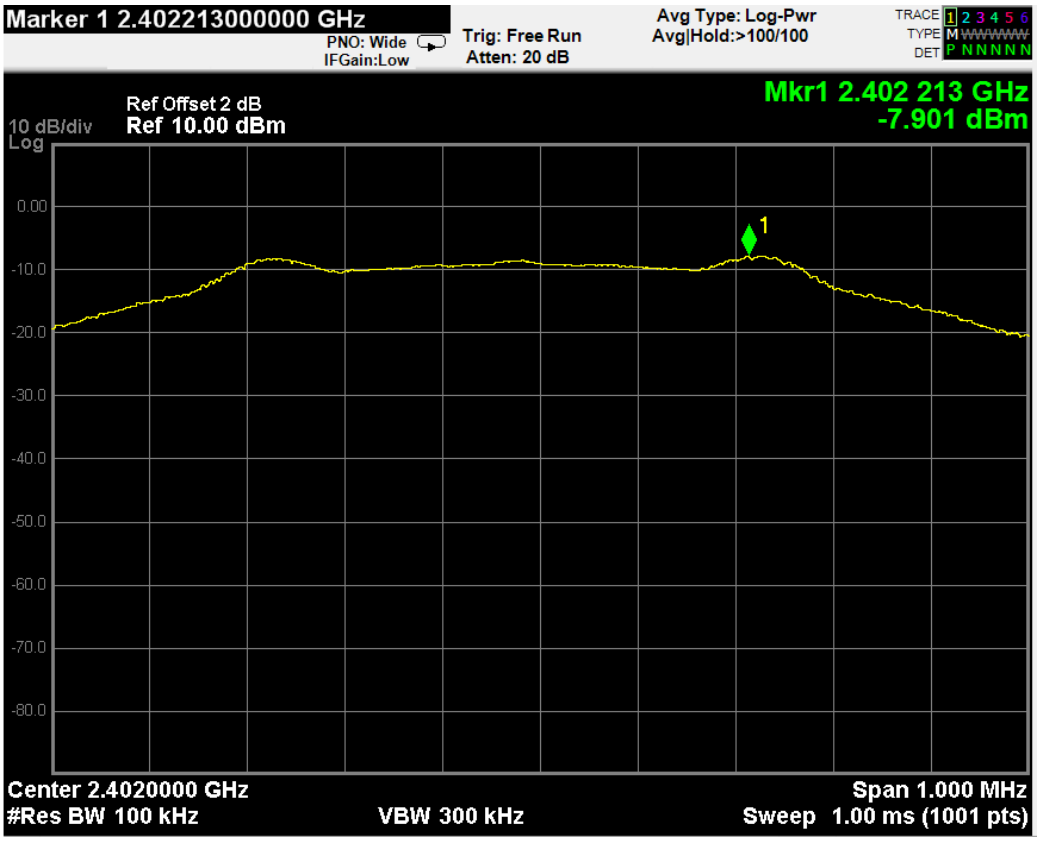
Ch01 2402 MHz



Ch06 2440 MHz



Ch40 2480 MHz



10 DEVIATION TO TEST SPECIFICATIONS

None.