

Application for FCC Certification  
On behalf of

Philips (China) Investment Co., Ltd.

Product Name: LED LAMPS

Model No.: 9290002265

Serial No.: E1206790-06/06

FCC ID: O3M9290002265X

Prepared For : Philips (China) Investment Co., Ltd.  
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Report No. : ACI-F12124  
Date of Test : Jul. 05 - 16, 2012  
Date of Report : Jul. 19, 2012

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## TEST REPORT FOR FCC CERTIFICATE

Applicant : Philips (China) Investment Co., Ltd.  
 Manufacturer : Philips (China) Investment Co., Ltd.  
 Factory #1 : CHANGAN WIN CHANNEL ELECTRONICS COMPANY LIMITED  
 Factory #2 : Arts Electronics Co., Ltd.  
 EUT Description : LED LAMPS  
 (A) Model No. : 9290002265  
 (B) Serial No. : E1206790-06/06  
 (C) Test Voltage : AC 120V/60Hz

Test Procedure Used:

*FCC RULES AND REGULATIONS PART 15 SUBPART C OCTOBER 2011  
 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: 9290002265, S/N: E1206790-06/06), which was tested on Jul. 05 - 16, 2012 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 : Jul. 05 - 16, 2012 Date of Report : Jul. 19, 2012

Producer : Kathy Wang  
 KATHY WANG / Assistant

Review : Dio Yang  
 DIO YANG / Assistant Manager

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

Signatory : Sammy Chen  
 Authorized Signature EMC SAMMY CHEN / Deputy 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
<b>EMISSION</b>			
Conducted Emission	FCC RULES AND REGULATIONS PART 15 SUBPART C October 2011 AND ANSI C63.4:2003 AND KDB558074 v01:2012	Pass	15.207
Radiated Emission	FCC RULES AND REGULATIONS PART 15 SUBPART C October 2011 AND ANSI C63.4:2003 AND KDB558074 v01:2012	Pass	15.209(a) 15.205(a)(c)
6 dB Bandwidth Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C October 2011 AND ANSI C63.4:2003 AND KDB558074 v01:2012	Pass	15.247(a)(2)
Maximum Peak Output Power Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C October 2011 AND ANSI C63.4:2003 AND KDB558074 v01:2012	Pass	15.247(b)(3)
Emission Limitations Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C October 2011 AND ANSI C63.4:2003 AND KDB558074 v01:2012	Pass	15.247(d)
Band Edge Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C October 2011 AND ANSI C63.4:2003 AND KDB558074 v01:2012	Pass	15.247(d)
Power Spectral Density Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C October 2011 AND ANSI C63.4:2003 AND KDB558074 v01:2012	Pass	15.247(e)

## 2 GENERAL INFORMATION

### 2.1 Description of Equipment Under Test

Description : LED LAMPS

Type of EUT  Production  Pre-product  Pro-type

Model Number : 9290002265

Serial Number : E1206790-06/06

Radio Tech : IEEE 802.15.4 (ZigBee®)

Freq. Band : 2405 MHz ~ 2480 MHz  
Total 5 Channels:  
2405 MHz, 2425 MHz, 2450 MHz,  
2475 MHz, 2480 MHz

Tested Freq. : 2405 MHz (Channel 01)  
2450 MHz (Channel 03)  
2480 MHz (Channel 05)

Antenna Gain : -10.0 dBi

Antenna Type : PCB antenna

Applicant : Philips (China) Investment Co., Ltd.  
No.9, Lane 888, Tian Lin Road, 200233, Shanghai,  
China

Manufacturer : Philips (China) Investment Co., Ltd.  
No.9, Lane 888, Tian Lin Road, 200233, Shanghai,  
China

Factory #1 : CHANGAN WIN CHANNEL ELECTRONICS  
COMPANY LIMITED  
No.85, TONG GU XIA LU, SHANGJIAO  
COMMUNITY, CHANGAN TOWN, DONGGUAN  
CITY, GUANGDONG PROVINCE, CHINA

Factory #2 : Arts Electronics Co., Ltd.  
No.1 Shang Xing Lu, Shang Jiao Community,  
Chang An Town, Dongguan City,  
Guangdong Province 523000, China.

## 2.2 Description of Test Facility

Site Description (Semi-Anechoic Chamber)	: Sept. 17, 1998 file on Apr 29, 2009 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	: 3 F 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 Emission Expanded Uncertainty	: U = 3.43 dB
Radiated Emission Expanded Uncertainty (30-200MHz):	U = 4.67dB (Horizontal) U = 4.72dB (Vertical)
Radiated Emission Expanded Uncertainty (200M-1GHz):	U = 4.81dB (Horizontal) U = 4.69dB (Vertical)
Radiated Emission Expanded Uncertainty (Above 1GHz):	U= 4.50 dB (Horizontal) U= 4.16 dB (Vertical)
6 dB Bandwidth Expanded Uncertainty	: U = 0.05 kHz
Maximum Peak Output Power Expanded Uncertainty:	U = 0.30 dB
Emission Limitations Expanded Uncertainty	: U = 0.15 dB
Band Edge Expanded Uncertainty	: U = 0.15 dB
Power Spectral Density Expanded Uncertainty	: U = 0.15 dB

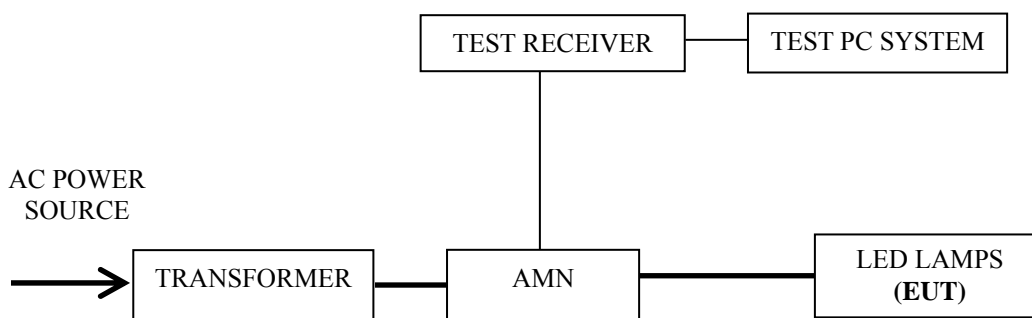
### 3 CONDUCTED EMISSION TEST

#### 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	100841	Mar 22, 2012	Mar 22, 2013
2.	Artificial Mains Network (AMN)	R&S	ESH2-Z5	843890/011	Feb 13, 2012	Feb 13, 2013
3.	50 Ω Coaxial Switch	Anritsu	MP59B	6200426389	Mar 18, 2012	Sep 18, 2012
4.	Software	Audix	E3	SET00200 9804M592	--	--

#### 3.2 Block Diagram of 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) was 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 Set the EUT on the test mode (Transmitting), and then test.

### 3.6 Test Procedures

The EUT was 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 C63.4:2003 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.

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 emission is detected at 0.681 MHz (Quasi-Peak Value) with corrected signal level of 41.78 dB (μV) (limit is 56.00 dB (μV)), when the Neutral of the EUT is connected to AMN.

EUT : LED LAMPS Temperature : 22°C

Model No. : 9290002265 Humidity : 48%RH

Serial No. : E1206790-06/06 Date of Test : Jul 16, 2012

Test Mode : Transmitting

Test Line	Frequency (MHz)	Meter Reading dB(μV)	Factor (dB)	Emission Level dB(μV)	Limits dB(μV)	Margin (dB)	Remark
Line	0.204	37.82	0.25	38.07	63.46	25.39	QP
	0.250	35.45	0.25	35.70	61.76	26.06	
	0.678	41.01	0.20	41.21	56.00	14.79	
	0.862	35.99	0.29	36.28	56.00	19.72	
	4.407	35.68	0.49	36.17	56.00	19.83	
	6.186	35.37	0.59	35.96	60.00	24.04	
	AV	0.204	24.20	0.25	24.45	53.46	29.01
		0.250	24.10	0.25	24.35	51.76	27.41
		0.678	28.50	0.20	28.70	46.00	17.30
		0.862	23.41	0.29	23.70	46.00	22.30
		4.407	22.64	0.49	23.13	46.00	22.87
		6.186	22.30	0.59	22.89	50.00	27.11
Neutral	0.189	41.22	0.12	41.34	64.10	22.76	QP
	0.264	35.98	0.12	36.10	61.30	25.20	
	<b>0.681</b>	<b>41.58</b>	<b>0.20</b>	<b>41.78</b>	<b>56.00</b>	<b>14.22</b>	
	1.197	34.45	0.21	34.66	56.00	21.34	
	3.943	35.13	0.39	35.52	56.00	20.48	
	6.352	35.78	0.54	36.32	60.00	23.68	
	AV	0.189	29.80	0.12	29.92	54.10	24.18
		0.264	23.20	0.12	23.32	51.30	27.98
		0.681	29.00	0.20	29.20	46.00	16.80
		1.197	22.17	0.21	22.38	46.00	23.62
		3.943	22.53	0.39	22.92	46.00	23.08
		6.352	21.94	0.54	22.48	50.00	27.52

TEST ENGINEER: SAWEN LI

## 4 RADIATED EMISSION TEST

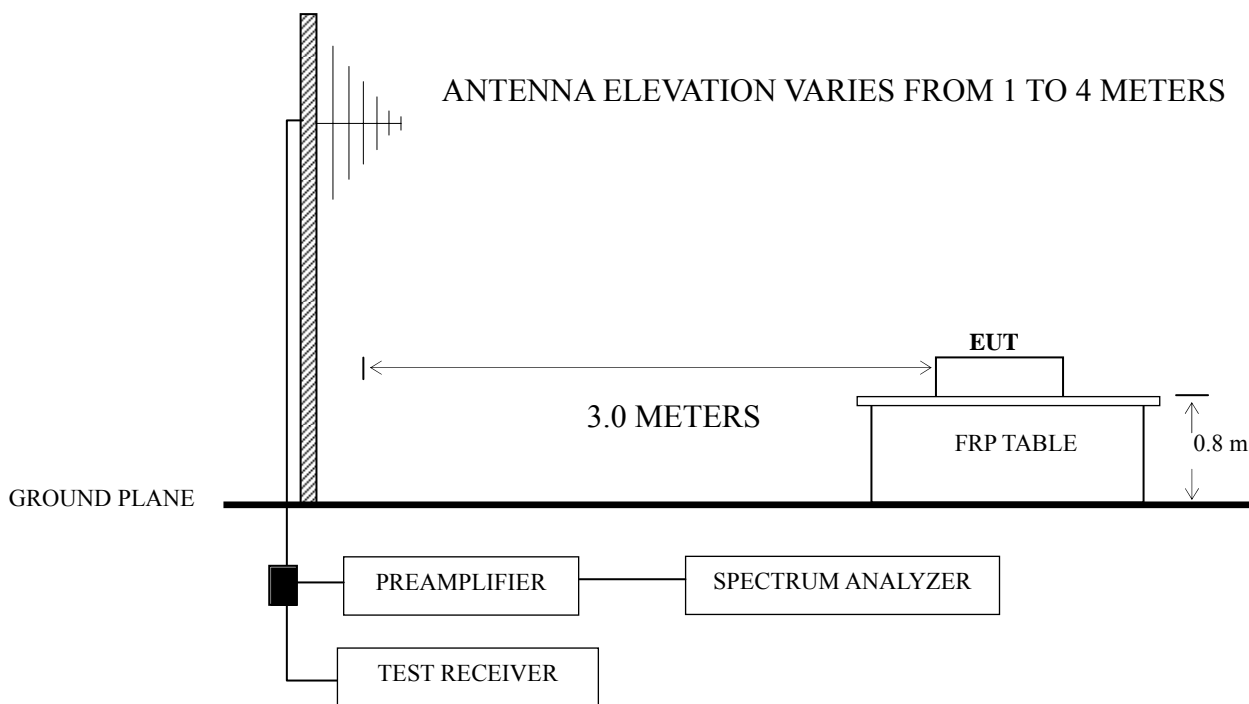
### 4.1 Test Equipment

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.	Preamplifier	Agilent	8447D	2944A10548	Mar 18, 2012	Sep 18, 2012
2.	Preamplifier	HP	8449B	3008A00864	Mar 22, 2012	Mar 22, 2013
3.	Spectrum Analyzer	Agilent	E7405A	MY45106600	Mar 22, 2012	Mar 22, 2013
4.	Test Receiver	R&S	ESVS10	844594/001	Mar 22, 2012	Mar 22, 2013
5.	Bi-log Antenna	TESEQ	CBL6112D	23192	Dec 01, 2011	Dec 01, 2012
6.	Horn Antenna	EMCO	3115	9607-4878	May 03, 2012	May 03, 2013
7.	Horn Antenna	EMCO	3116	00062643	Jul 21, 2011	Jul 21, 2012
8.	50Ω Coaxial Switch	Anritsu	MP59B	6200426390	Mar 18, 2012	Sep 18, 2012
9.	Software	Audix	E3	SET00200 9912M295-2	-	-

### 4.2 Block Diagram of Test Setup

#### 4.2.1 Test Setup



■ : 50 ohm Coaxial Switch

### 4.3 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

### 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.3.2 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. 3.2.

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 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 ESVS10 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 for Spectrum Agilent E7405A.

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

The EUT was tested under the following test modes:

Mode	Operation	Channel	Frequency
1.	Transmitting	01	2405 MHz
2.		03	2450 MHz
3.		05	2480 MHz
4.	Receiving	--	--
5.	Transmitting	01	2405 MHz
6.	Band-Edge	05	2480 MHz

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	01	2405 MHz	P15	
2.		03	2450 MHz	P16	
3.		05	2480 MHz	P17	
7.	Receiving	--	--	P18	
10.	Transmitting	01	2405 MHz	Band	P19-P20
11.		05	2480 MHz	Edge	P21-P22

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.

EUT : LED LAMPS Temperature : 25°C

Model No. : 9290002265 Humidity : 45%RH

Serial No. : E1206790-06/06 Date of Test : Jul 02, 2012

Test Mode : Transmitting 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	92.08	9.60	11.08	1.75	--	22.43	43.50	21.07	QP
	121.18	16.72	10.99	2.03	--	29.74	43.50	13.76	
	189.08	25.05	9.90	2.39	--	37.34	43.50	6.16	
	227.88	11.92	10.97	2.53	--	25.42	46.00	20.58	
	358.83	9.10	15.37	2.90	--	27.37	46.00	18.63	
	749.74	3.45	20.05	3.80	--	27.30	46.00	18.70	
	1675.00	45.23	27.14	6.03	36.62	41.78	74.00	32.22	PK
	3295.00	43.07	32.03	6.85	35.82	46.13	74.00	27.87	
	7219.00	43.76	37.72	9.83	34.73	56.58	74.00	17.42	
	9334.00	42.08	39.50	12.42	34.92	59.08	74.00	14.92	AV
	7219.00	26.54	37.72	9.83	34.73	39.36	54.00	14.64	
9334.00	25.93	39.50	12.42	34.92	42.93	54.00	11.07		
Vertical	43.58	18.91	10.86	0.89	--	30.66	40.00	9.34	QP
	92.08	18.55	11.08	1.75	--	31.38	43.50	12.12	
	121.18	22.63	10.99	2.03	--	35.65	43.50	7.85	
	191.99	15.39	9.87	2.40	--	27.66	43.50	15.84	
	281.23	11.46	13.17	2.70	--	27.33	46.00	18.67	
	410.24	6.50	16.43	3.01	--	25.94	46.00	20.06	
	1747.00	44.53	27.21	6.13	36.51	41.36	74.00	32.64	PK
	5086.00	40.54	36.67	9.30	35.15	51.36	74.00	22.64	
	7219.00	44.89	37.72	9.83	34.73	57.71	74.00	16.29	
	9100.00	40.79	39.50	12.15	34.88	57.56	74.00	16.44	AV
	7219.00	27.75	37.72	9.83	34.73	40.57	54.00	13.43	
9100.00	26.68	39.50	12.15	34.88	43.45	54.00	10.55		

TEST ENGINEER: RAVEN JIN

EUT : LED LAMPS Temperature : 25°C

Model No. : 9290002265 Humidity : 45%RH

Serial No. : E1206790-06/06 Date of Test : Jul 02, 2012

Test Mode : Transmitting Ch03

Polarization	Frequency (MHz)	Meter Reading dB ( $\mu$ V)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB ( $\mu$ V/m)	Limits dB ( $\mu$ V/m)	Margin (dB)	Remark
Horizontal	86.26	7.97	10.83	1.68	--	20.48	40.00	19.52	QP
	119.24	16.67	11.02	2.01	--	29.70	43.50	13.80	
	160.95	11.83	10.24	2.28	--	24.35	43.50	19.15	
	193.93	26.16	9.86	2.41	--	38.43	43.50	5.07	
	367.56	9.97	15.61	2.92	--	28.50	46.00	17.50	
	797.27	2.06	20.57	3.88	--	26.51	46.00	19.49	
	1657.00	45.21	27.13	6.03	36.65	41.72	74.00	32.28	PK
	2971.00	44.11	31.80	6.49	35.90	46.50	74.00	27.50	
	7354.00	46.44	38.19	9.91	34.73	59.81	74.00	14.19	
	9361.00	41.82	39.50	12.42	34.92	58.82	74.00	15.18	
	7354.00	31.43	38.19	9.91	34.73	44.80	54.00	9.20	AV
9361.00	23.43	39.50	12.42	34.92	40.43	54.00	13.57		
Vertical	43.58	19.51	10.86	0.89	--	31.26	40.00	8.74	QP
	87.23	19.85	10.88	1.70	--	32.43	40.00	7.57	
	104.69	16.24	11.27	1.89	--	29.40	43.50	14.10	
	119.24	21.11	11.02	2.01	--	34.14	43.50	9.36	
	187.14	20.95	9.92	2.38	--	33.25	43.50	10.25	
	361.74	8.88	15.45	2.91	--	27.24	46.00	18.76	
	1711.00	45.06	27.18	6.10	36.56	41.78	74.00	32.22	PK
	2908.00	43.80	31.54	6.56	35.92	45.98	74.00	28.02	
	7345.00	47.09	38.19	9.91	34.73	60.46	74.00	13.54	
	9127.00	41.18	39.50	12.15	34.88	57.95	74.00	16.05	
	7345.00	30.28	38.19	9.91	34.73	43.65	54.00	10.35	AV
9127.00	25.77	39.50	12.15	34.88	42.54	54.00	11.46		

TEST ENGINEER: RAVEN JIN



EUT : LED LAMPS Temperature : 25°C

Model No. : 9290002265 Humidity : 45%RH

Serial No. : E1206790-06/06 Date of Test : Jul 02, 2012

Test Mode : Transmitting Ch05

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	41.64	7.59	11.78	0.88	--	20.25	40.00	19.75	QP
	85.29	10.72	10.80	1.66	--	23.18	40.00	16.82	
	117.30	16.71	11.05	2.00	--	29.76	43.50	13.74	
	188.11	23.84	9.91	2.39	--	36.14	43.50	7.36	
	318.09	10.95	14.19	2.80	--	27.94	46.00	18.06	
	415.09	4.46	16.50	3.02	--	23.98	46.00	22.02	
	2107.00	44.35	27.88	6.56	36.17	42.62	74.00	31.38	PK
	2908.00	44.65	31.54	6.56	35.92	46.83	74.00	27.17	
	7435.00	42.83	38.48	10.02	34.72	56.61	74.00	17.39	
	9307.00	40.65	39.50	12.42	34.91	57.66	74.00	16.34	AV
	7435.00	26.34	38.48	10.02	34.72	40.12	54.00	13.88	
9307.00	24.76	39.50	12.42	34.91	41.77	54.00	12.23		
Vertical	42.20	22.70	11.52	0.88	--	35.10	40.00	4.90	QP
	58.13	20.37	9.02	1.14	--	30.53	40.00	9.47	
	101.78	22.40	11.32	1.86	--	35.58	43.50	7.92	
	118.27	25.14	11.03	2.01	--	38.18	43.50	5.32	
	192.96	22.23	9.87	2.40	--	34.50	43.50	9.00	
	317.12	14.92	14.15	2.80	--	31.87	46.00	14.13	
	1954.00	44.57	27.37	6.38	36.25	42.07	74.00	31.93	PK
	5275.00	41.24	36.59	9.40	35.06	52.17	74.00	21.83	
	7228.00	42.39	37.72	9.83	34.73	55.21	74.00	18.79	
	9334.00	40.98	39.50	12.42	34.92	57.98	74.00	16.02	AV
	7228.00	25.55	37.72	9.83	34.73	38.37	54.00	15.63	
9334.00	24.86	39.50	12.42	34.92	41.86	54.00	12.14		

TEST ENGINEER: RAVEN JIN

EUT : LED LAMPS Temperature : 25°C

Model No. : 9290002265 Humidity : 45%RH

Serial No. : E1206790-06/06 Date of Test : Jul 02, 2012

Test Mode : Receiving

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	92.08	7.91	11.08	1.75	--	20.74	43.50	22.76	QP
	121.18	15.19	10.99	2.03	--	28.21	43.50	15.29	
	191.99	25.23	9.87	2.40	--	37.50	43.50	6.00	
	310.33	10.49	13.97	2.78	--	27.24	46.00	18.76	
	450.98	5.62	16.98	3.13	--	25.73	46.00	20.27	
	785.63	2.76	20.47	3.86	--	27.09	46.00	18.91	PK
	1630.00	44.37	27.11	5.96	36.70	40.74	74.00	33.26	
	2971.00	43.46	31.80	6.49	35.90	45.85	74.00	28.15	
	5257.00	41.12	36.60	9.40	35.07	52.05	74.00	21.95	
	7372.00	41.97	38.26	9.91	34.73	55.41	74.00	18.59	
	7372.00	26.82	38.26	9.91	34.73	40.26	54.00	13.74	AV
Vertical	43.58	19.20	10.86	0.89	--	30.95	40.00	9.05	QP
	90.14	17.58	11.00	1.73	--	30.31	43.50	13.19	
	121.18	23.79	10.99	2.03	--	36.81	43.50	6.69	
	196.84	15.76	9.83	2.42	--	28.01	43.50	15.49	
	281.23	16.44	13.17	2.70	--	32.31	46.00	13.69	
	415.09	6.60	16.50	3.02	--	26.12	46.00	19.88	PK
	1747.00	44.09	27.21	6.13	36.51	40.92	74.00	33.08	
	2809.00	44.13	31.11	6.64	35.96	45.92	74.00	28.08	
	5059.00	40.04	36.68	9.30	35.16	50.86	74.00	23.14	
	7507.00	40.77	38.70	10.14	34.72	54.89	74.00	19.11	
	7507.00	26.23	38.70	10.14	34.72	40.35	54.00	13.65	AV

TEST ENGINEER: RAVEN JIN

## Band edge using conducted measurement:

According to the KDB 558074 D01 DTS Meas Guidance v01 5.4.2.1, 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 spectrum analyzer. The EUT was set to transmit continuously ( $\geq 98\%$  duty cycle).

The test procedure is defined in KDB558074 v01:2012 (the 5.4.2.2.1 Measurement Procedure RBAVG1 (Power Averaging) was used for average measurement & the 5.4.2.2.3 was used for peak measurement).

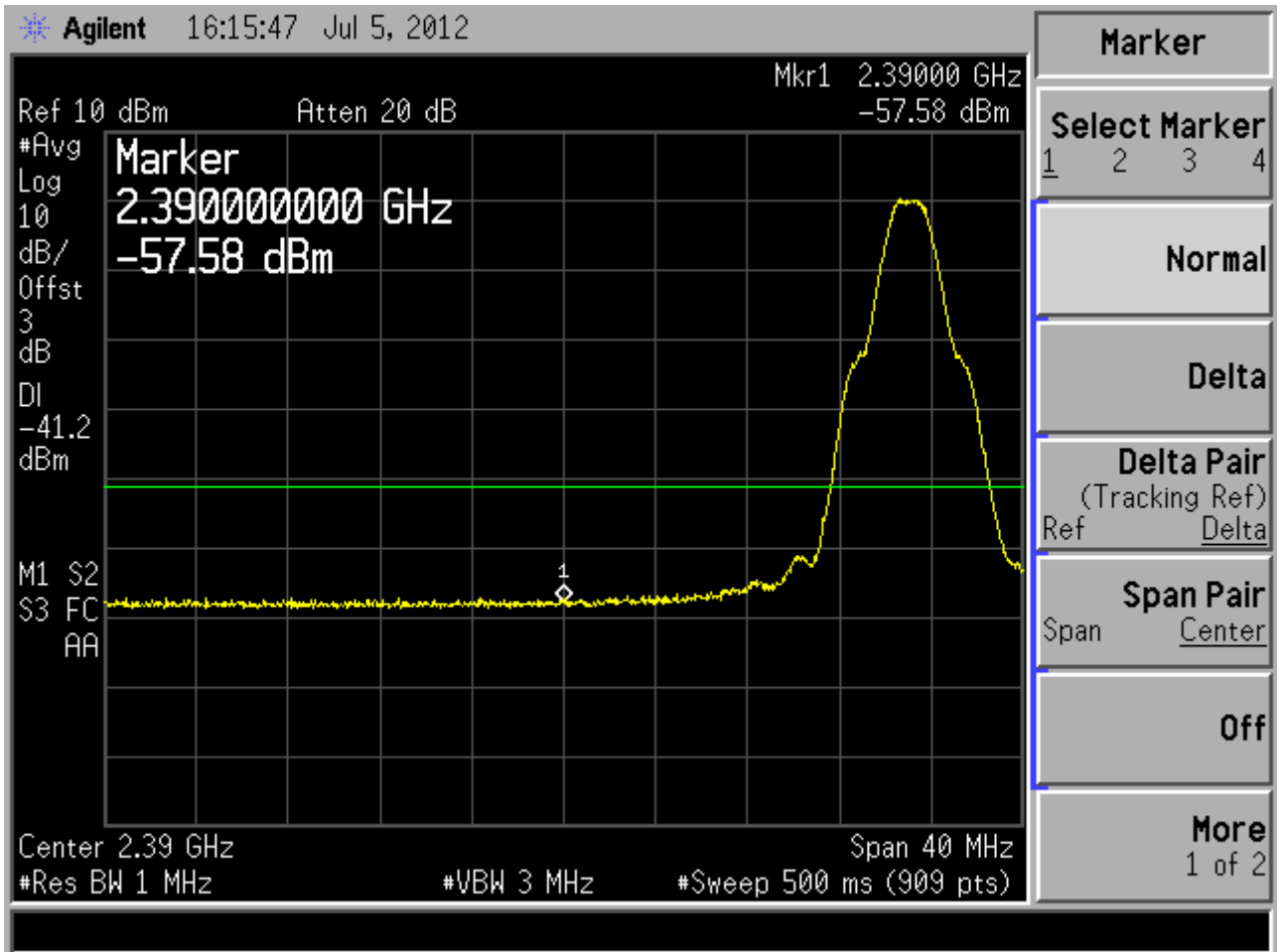
Note1 – The additional radiated test was performed to prove that the cabinet emissions (transmit antenna be replaced with a termination) also meets the requirement.

### Cabinet Emission:

Polarization	Frequency (MHz)	Meter Reading dB ( $\mu$ V)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB ( $\mu$ V/m)	Limits dB ( $\mu$ V/m)	Margin (dB)	Remark
Horizontal	2390.00	47.08	29.19	6.89	36.09	50.07	74.00	26.93	PK
	2483.50	46.33	29.55	6.96	36.07	49.77	74.00	27.23	
	2390.00	37.90	29.19	6.89	36.09	40.89	54.00	16.11	AV
	2483.50	36.69	29.55	6.96	36.07	40.13	54.00	16.87	
Vertical	2390.00	46.57	29.19	6.89	36.09	50.56	74.00	27.44	PK
	2483.50	51.89	29.55	6.96	36.07	54.33	74.00	21.67	
	2390.00	37.98	29.19	6.89	36.09	41.97	54.00	16.03	AV
	2483.50	37.74	29.55	6.96	36.07	44.18	54.00	15.82	

Note2 – The antenna gain (2dBi) and cable loss (1dB) were set as offset (3dB) in the spectrum. (According to KDB558074 v01:2012 Sec. 5.4.2.1, 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. )

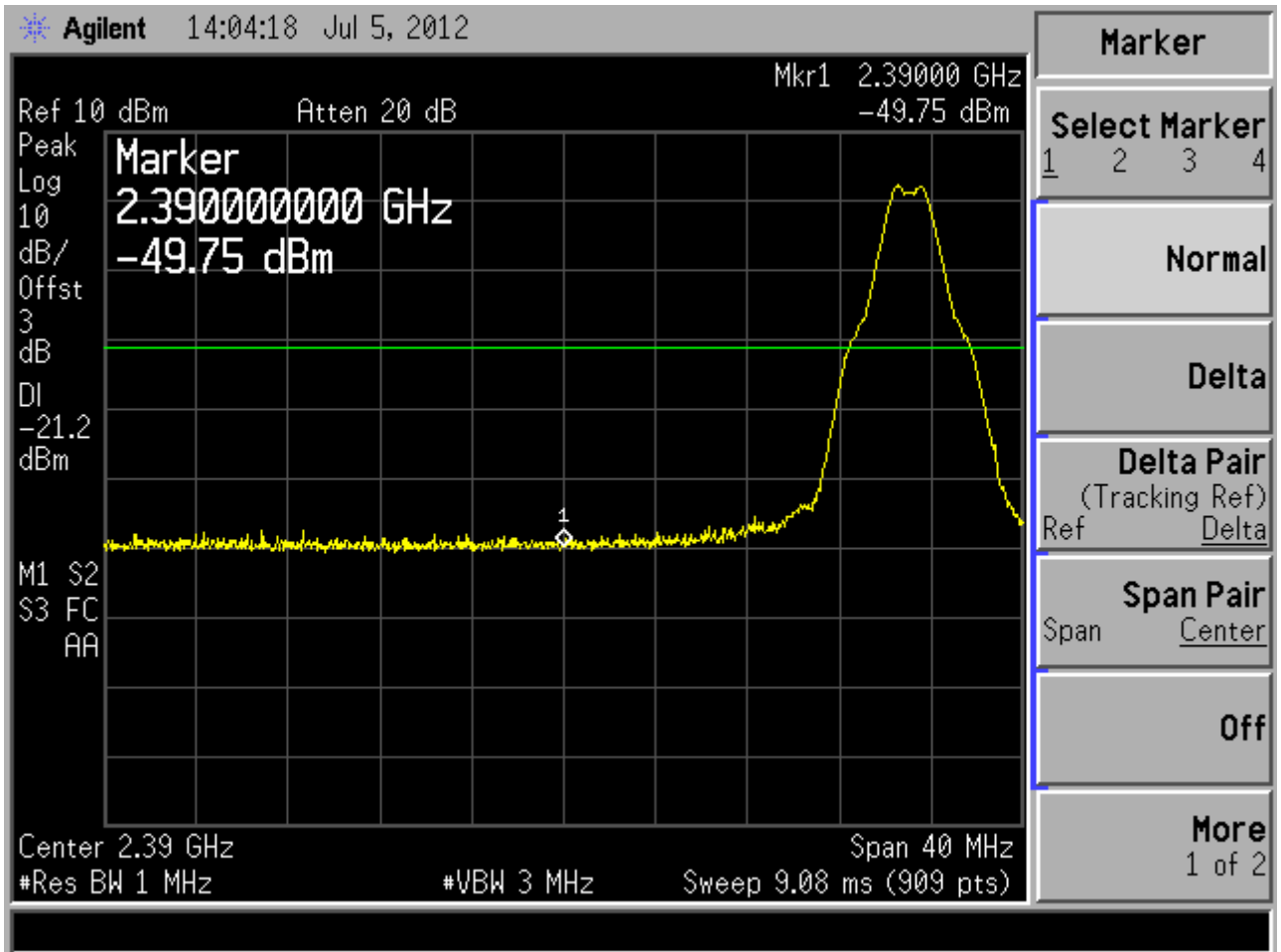
### AV Result on CH 01



AV Result = -57.58 dBm  
Limit = -41.2 dBm

Result is **PASS**

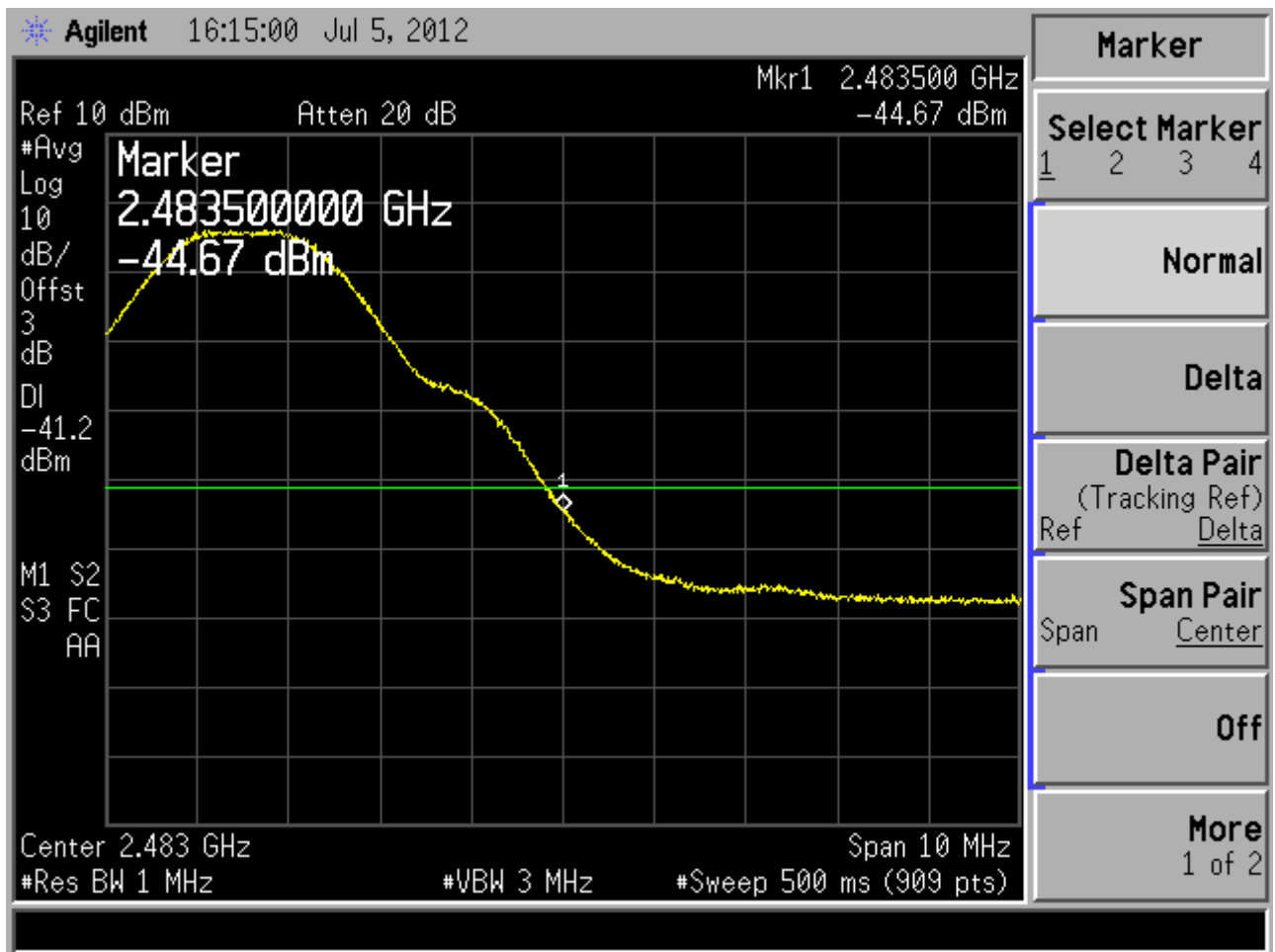
**PK Result on CH 01**



PK Result = -49.75 dBm  
 Limit = -21.2 dBm

Result is **PASS**

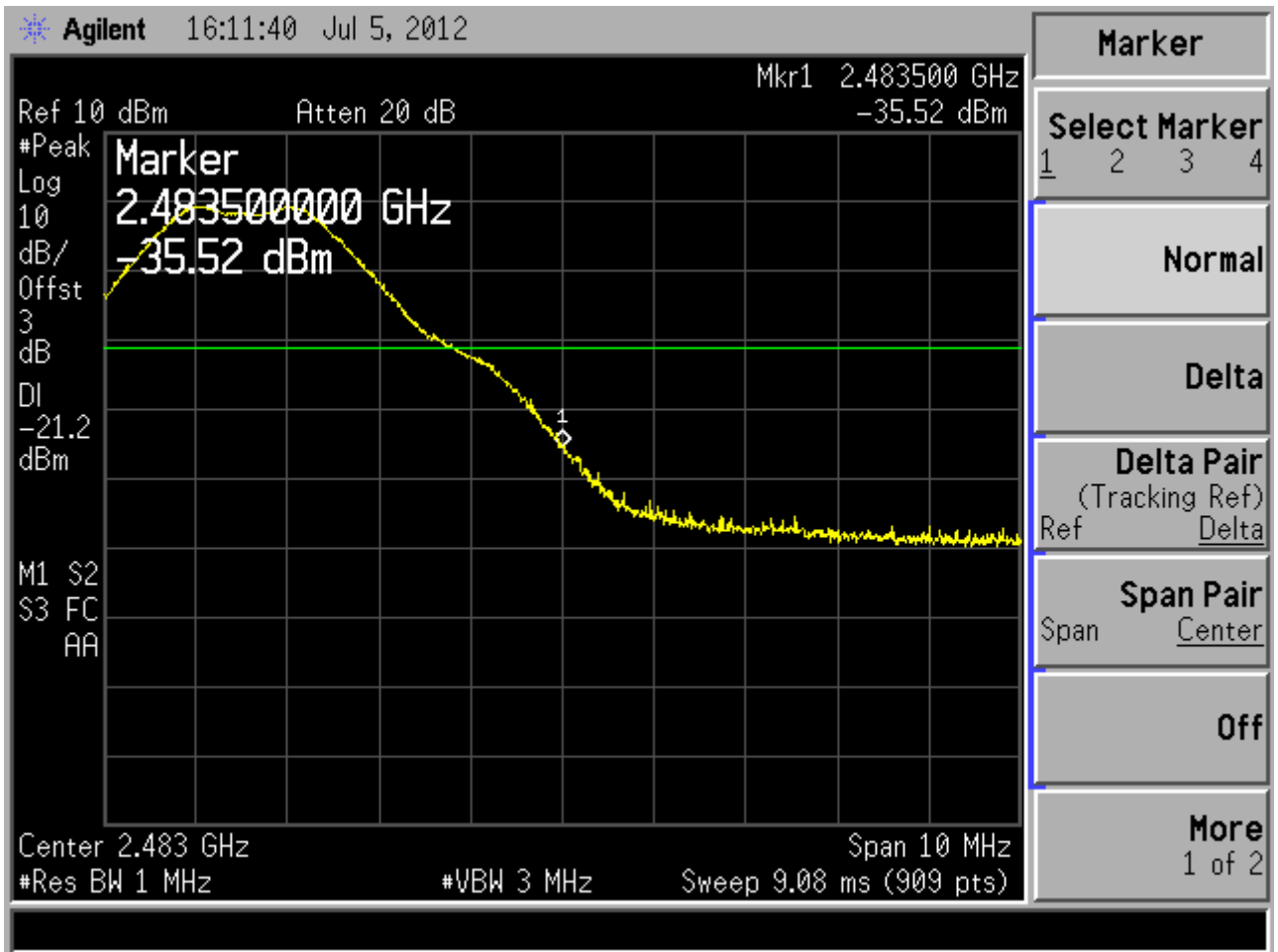
## AV Result on CH 05



AV Result = -44.67 dBm  
Limit = -41.2 dBm

Result is **PASS**

**PK Result on CH 05**



PK Result = -35.52 dBm  
 Limit = -21.2 dBm

Result is **PASS**

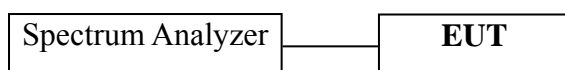
## 5 6 dB BANDWIDTH MEASUREMENT

### 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	E7405A	MY45106600	Mar 22, 2012	Mar 22, 2013

### 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

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.

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 v01:2012 (the 5.1.1 EBW Measurement Procedure was used). The RBW/EBW ratio should be 1-5%.

### 5.6 Test Results

**PASSED.**

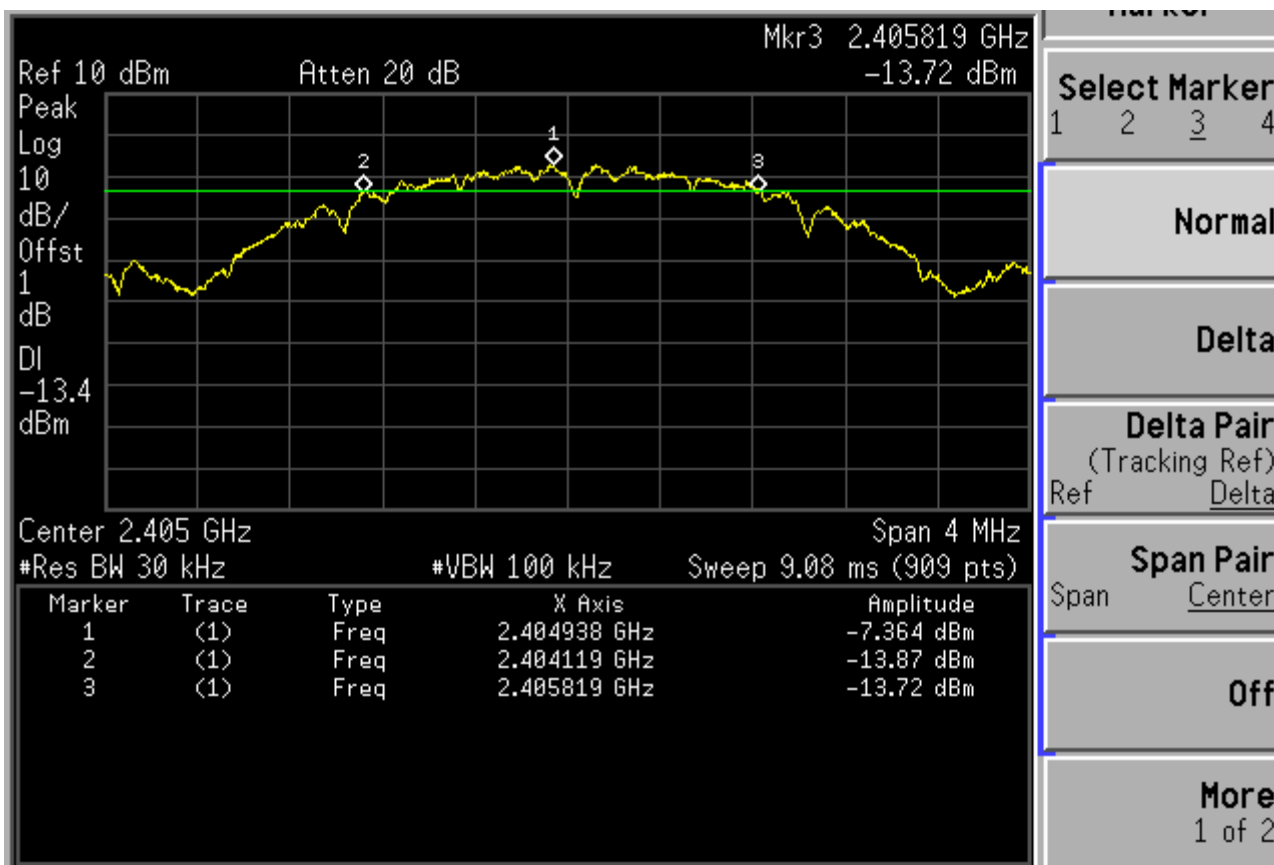
All the test results are attached in next pages.

(Test Date: Jul. 05, 2012 Temperature: 25°C Humidity: 48 %)

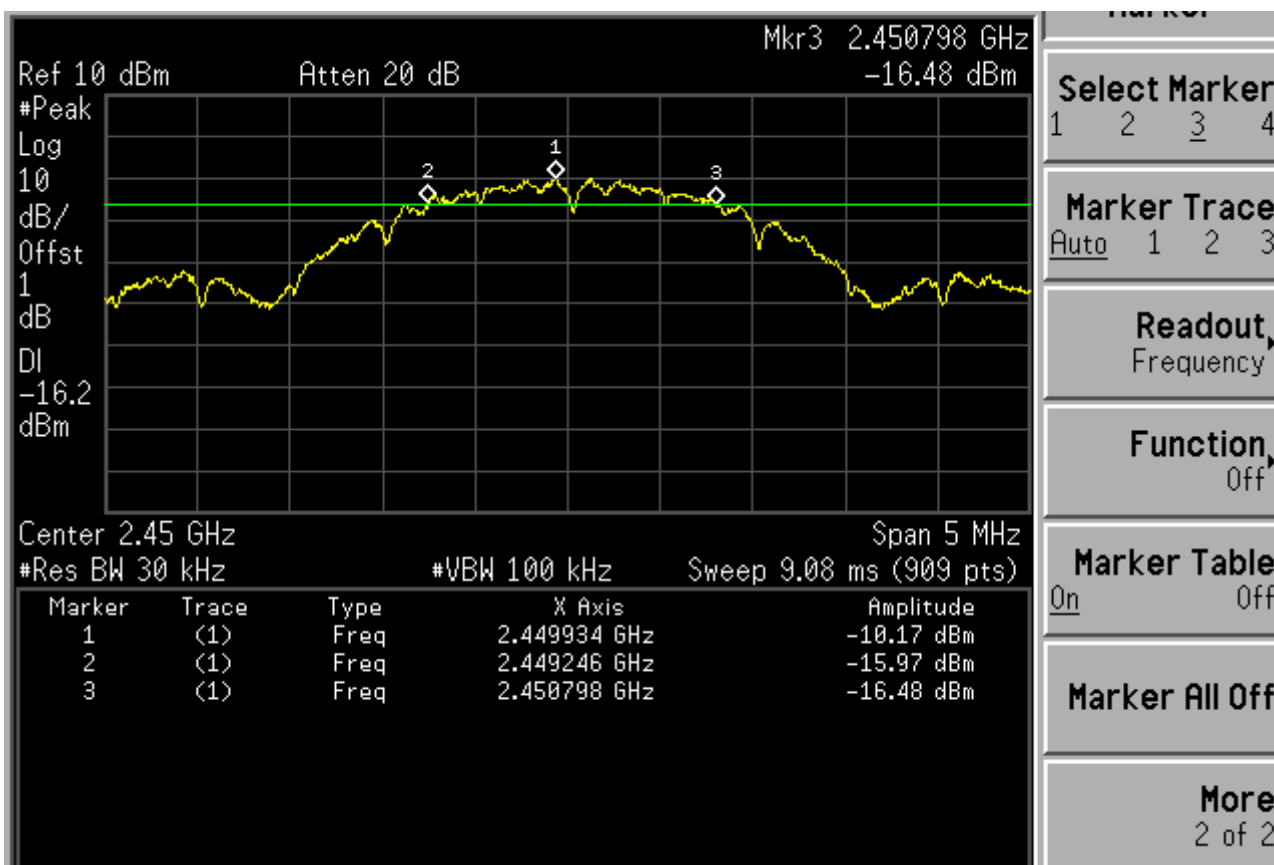
Channel	Frequency	6dB Bandwidth (EBW)
01	2405 MHz	<b>1.700 MHz</b>
03	2450 MHz	<b>1.552 MHz</b>
05	2480 MHz	<b>1.586 MHz</b>



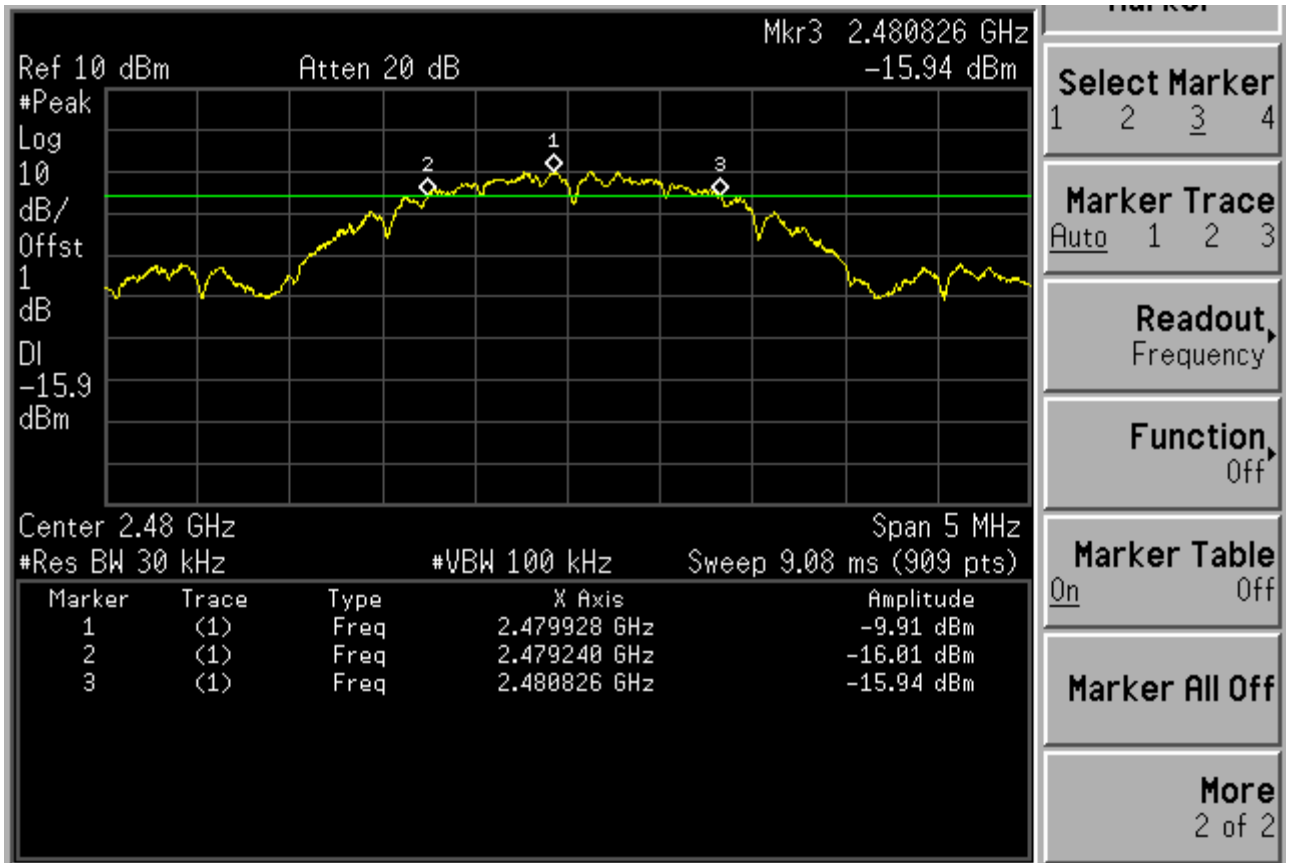
**Ch 01 (2405 MHz)**



**Ch 03 (2450 MHz)**



**Ch 05 (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 28, 2012	Mar 28, 2013
2.	Power Sensor	Anritsu	MA2491A	32489	Mar 28, 2012	Mar 28, 2013

### 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

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. 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.

### 6.6 Test Results

**PASSED.**

(Test Date: Jul. 05, 2012 Temperature: 25°C Humidity: 48 %)

Channel	Frequency	Peak Output Power	Limit
01	2405 MHz	<b>1.46 dBm</b>	30 dBm
03	2450 MHz	<b>-0.59 dBm</b>	30 dBm
05	2480 MHz	<b>-1.45 dBm</b>	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	E7405A	MY45106600	Mar 22, 2012	Mar 22, 2013

### 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

Enable the EUT to transmit data at different channel frequency individually.

### 7.5 Test Procedure

The transmitter output was connected to the spectrum analyzer. Set RBW = 100 kHz, VBW = 300 kHz, scan up through 10<sup>th</sup> 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 v01:2012 (the 5.4.1.1 Measurement Procedure – Reference Level & 5.4.1.2 Measurement Procedure – Unwanted Emission was used).

### 7.6 Test Results

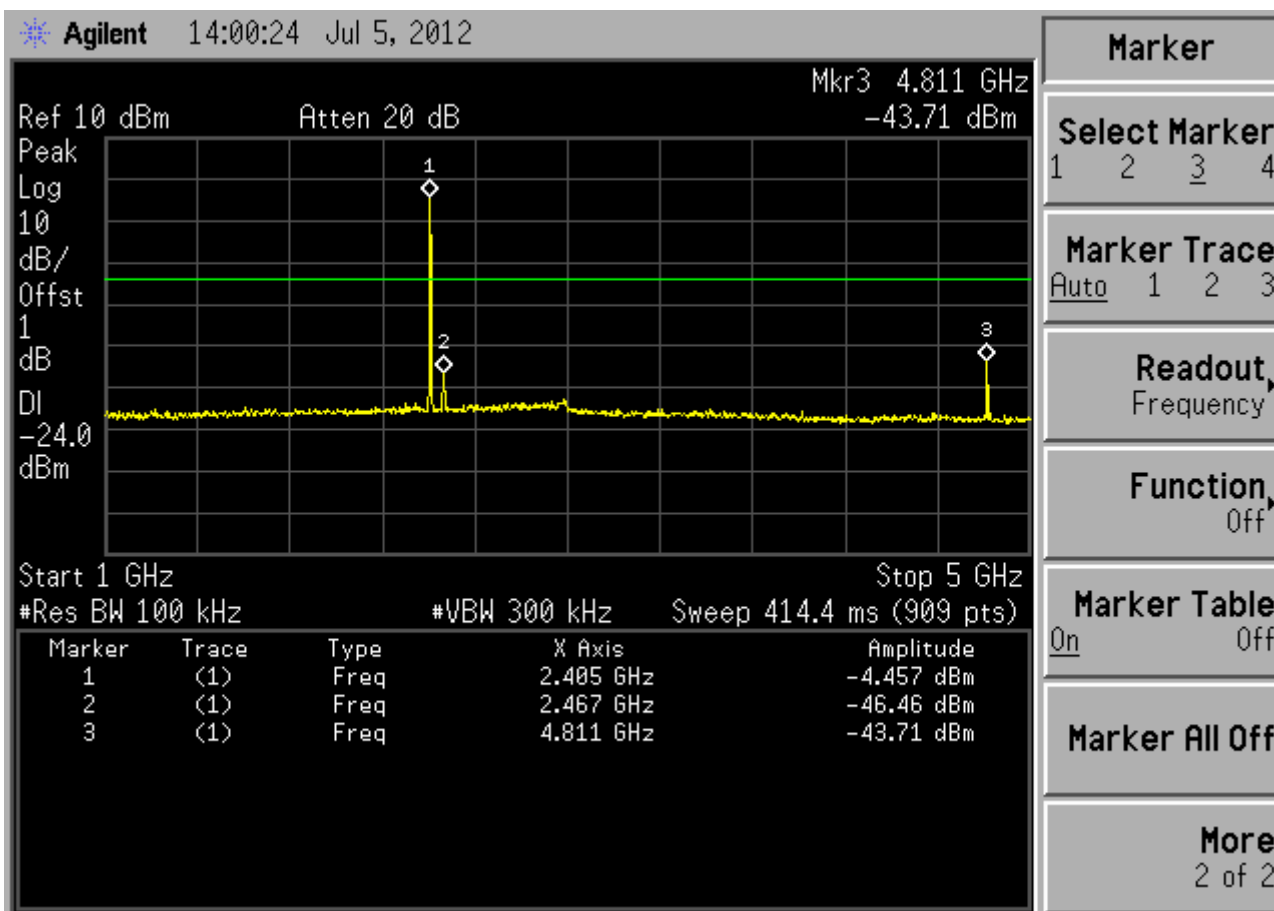
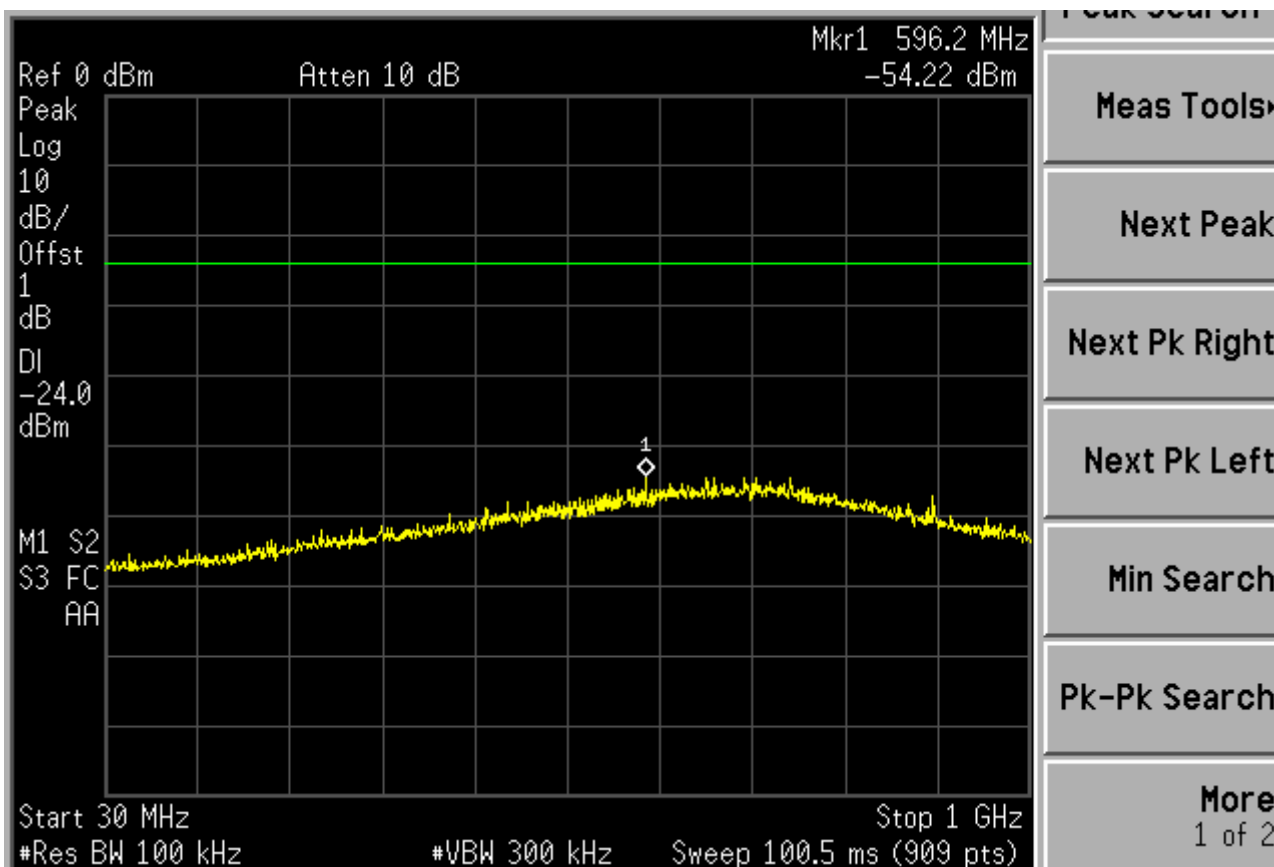
**PASSED.**

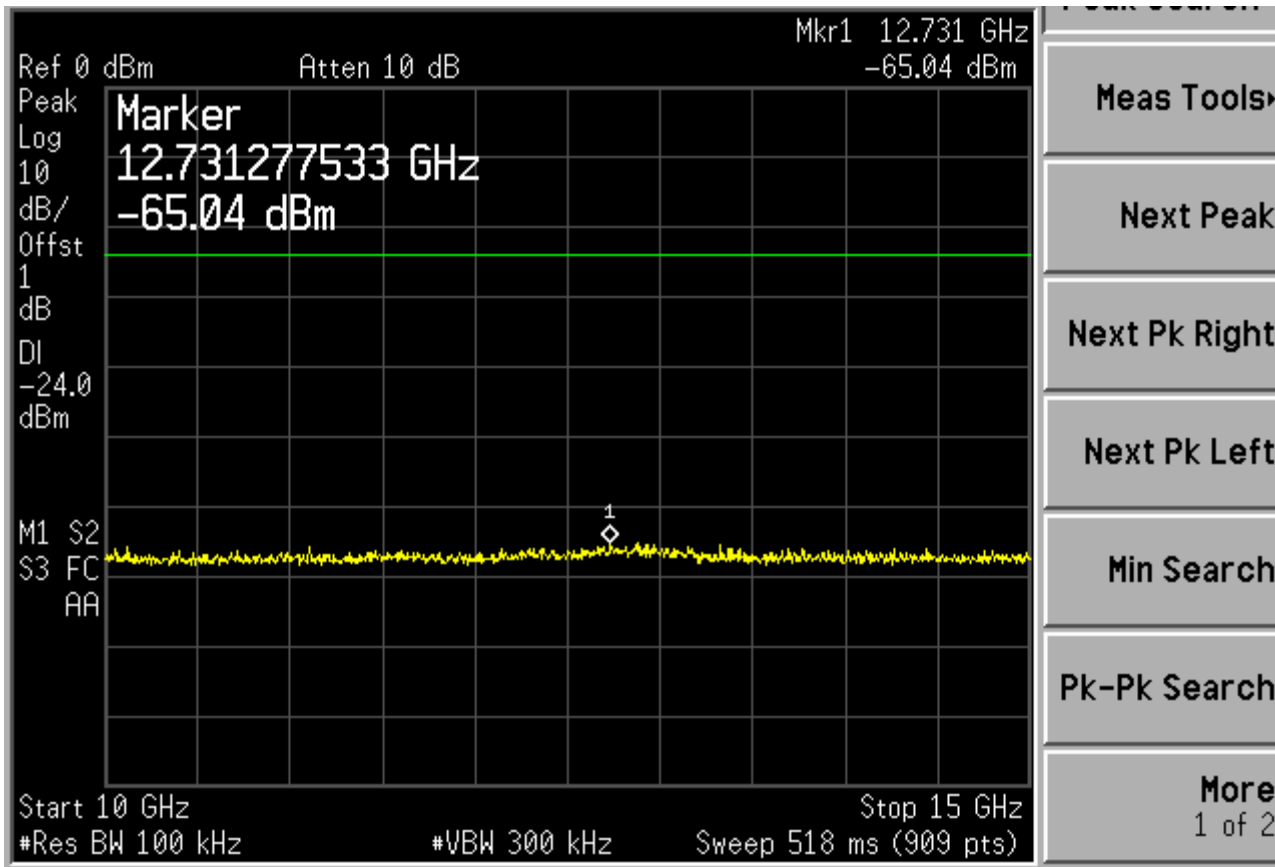
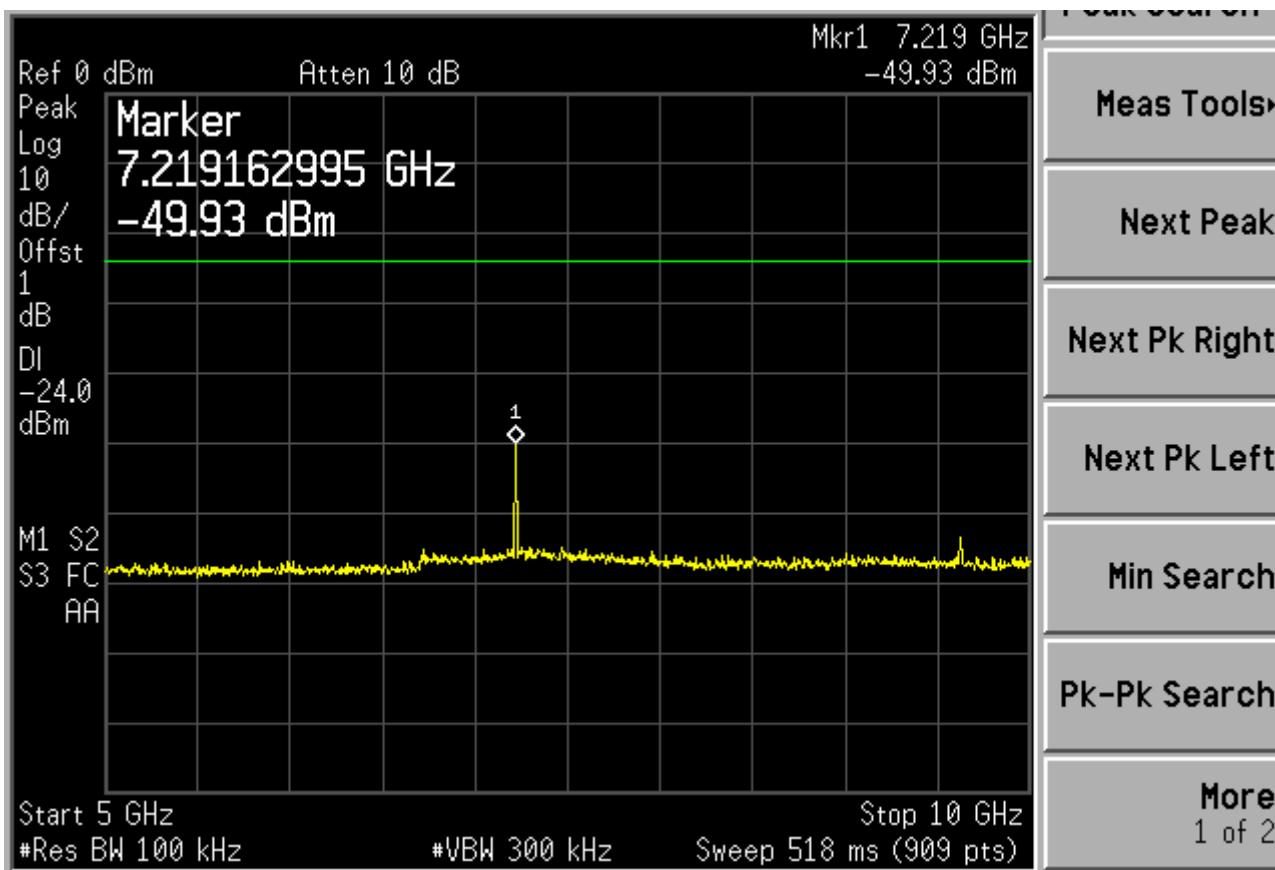
The test data was attached in the next pages.

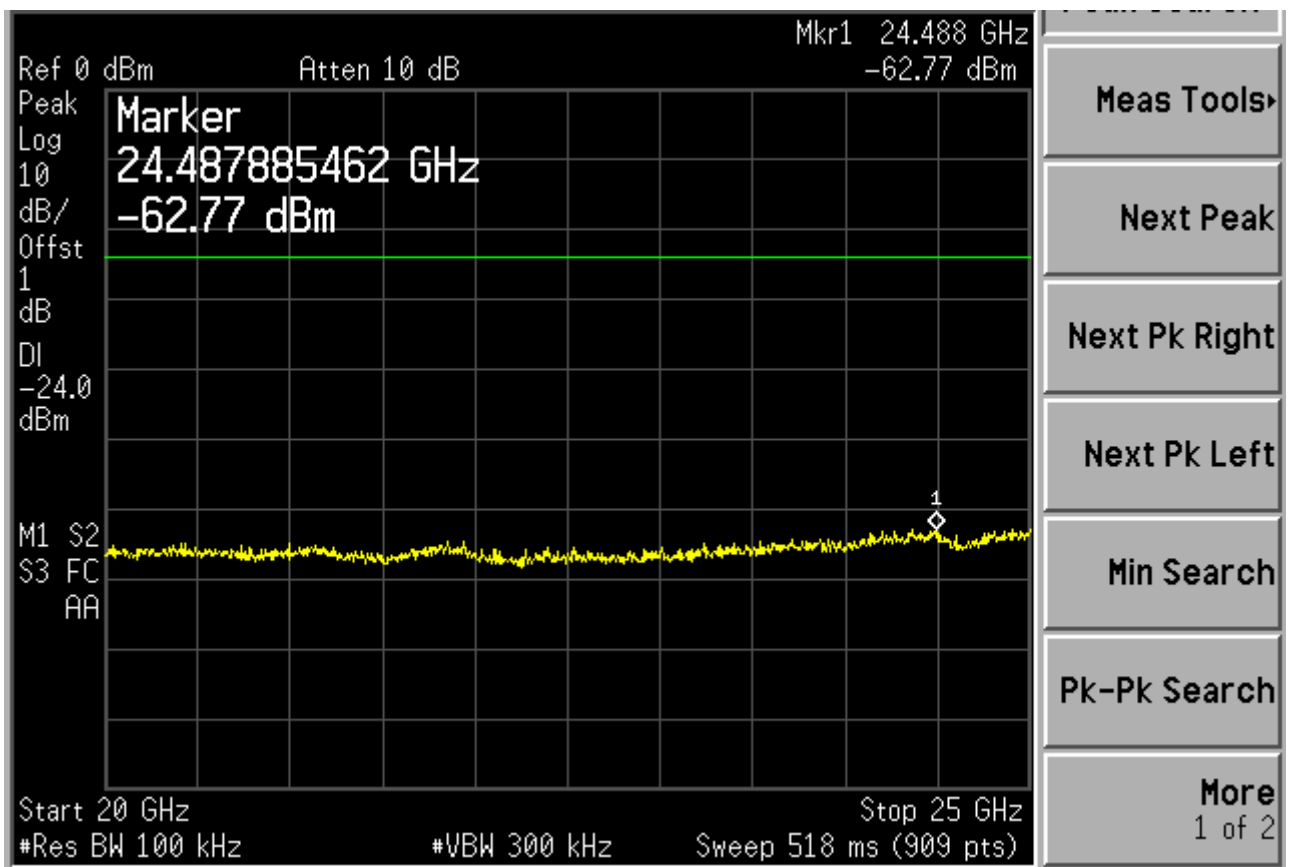
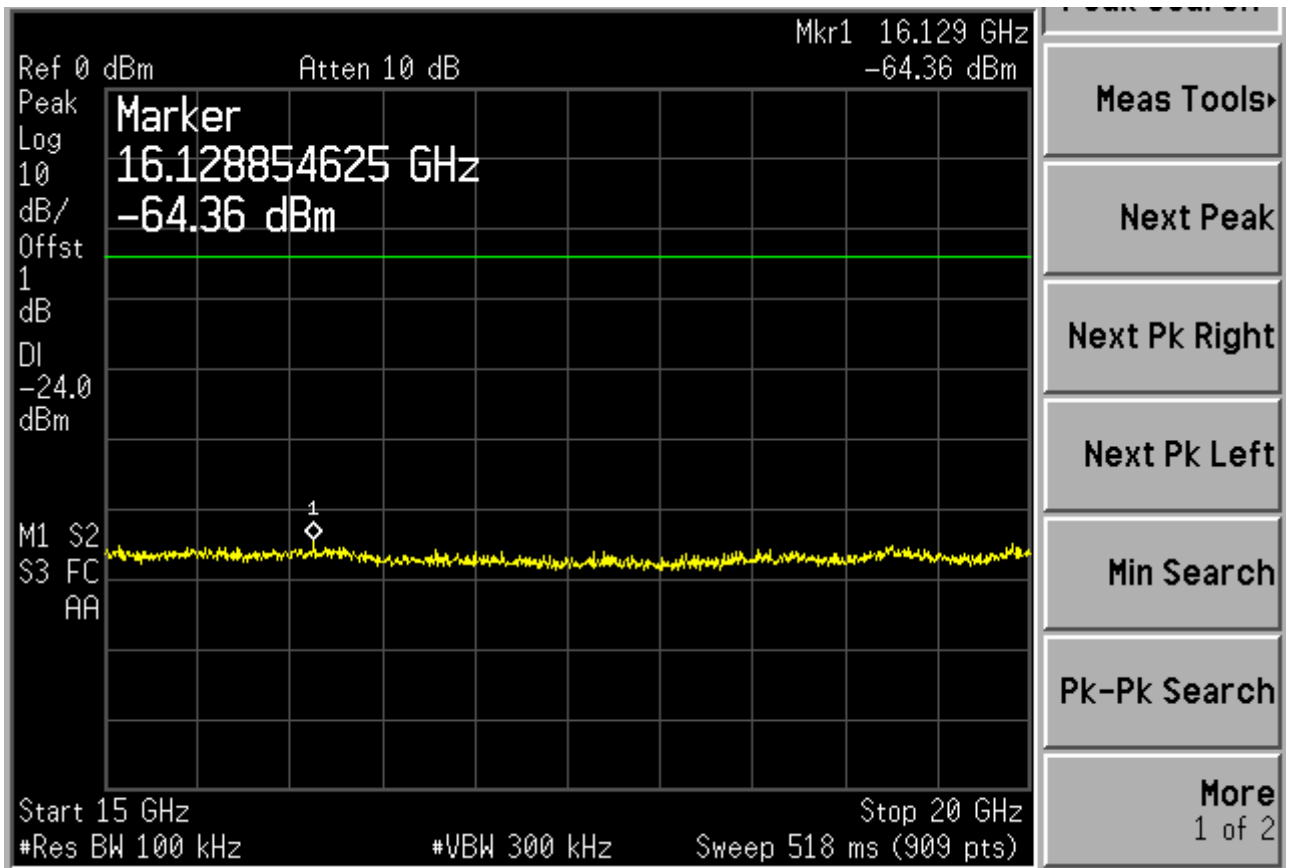
Note – The Reference Level refer to Sec. 8.6 PSD (in 100kHz) which tested according to “5.4.1.1 Measurement Procedure – Reference Level” of KDB558074 v01:2012

(Test Date: Jul. 05, 2012 Temperature: 25°C Humidity: 48 %)

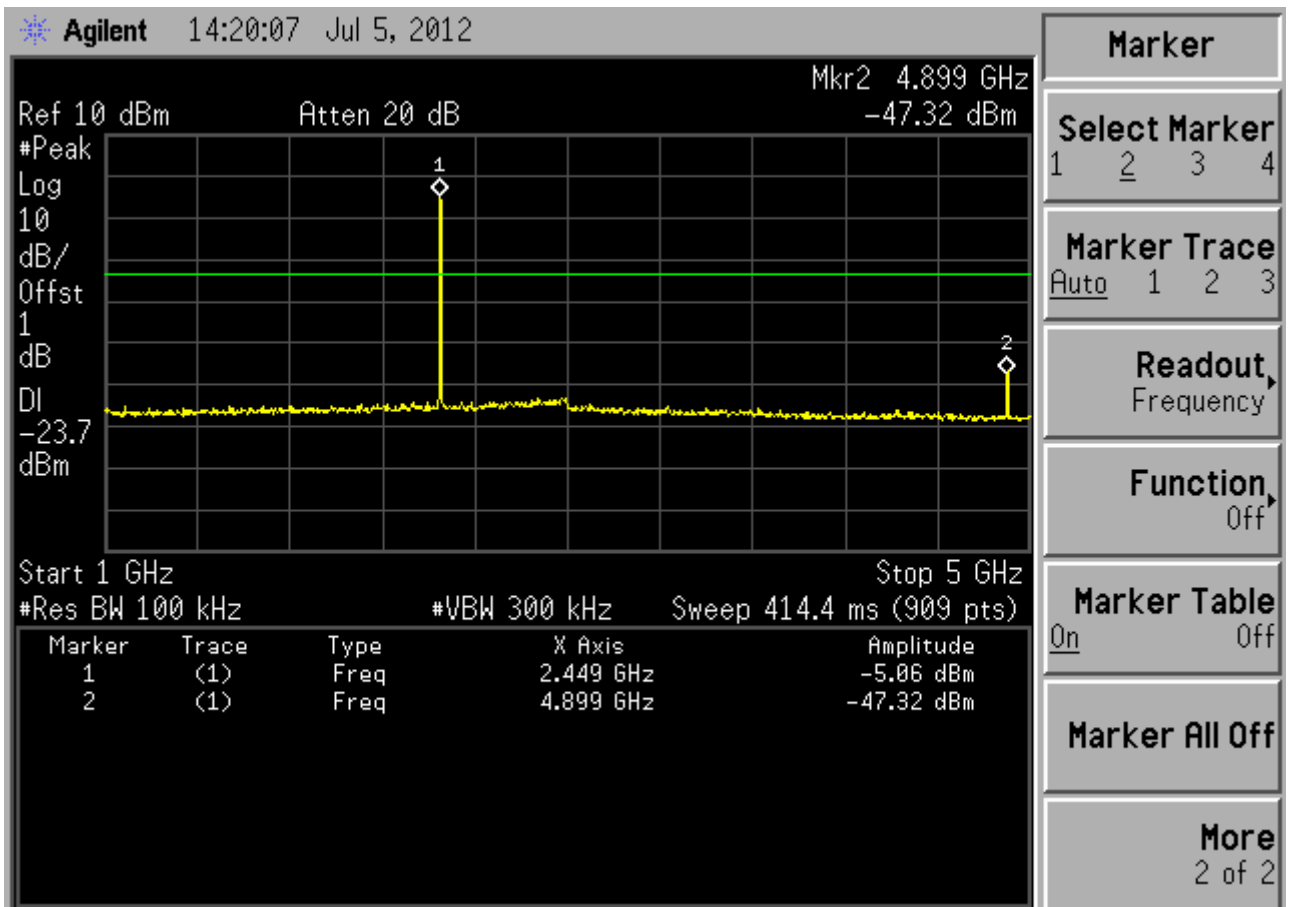
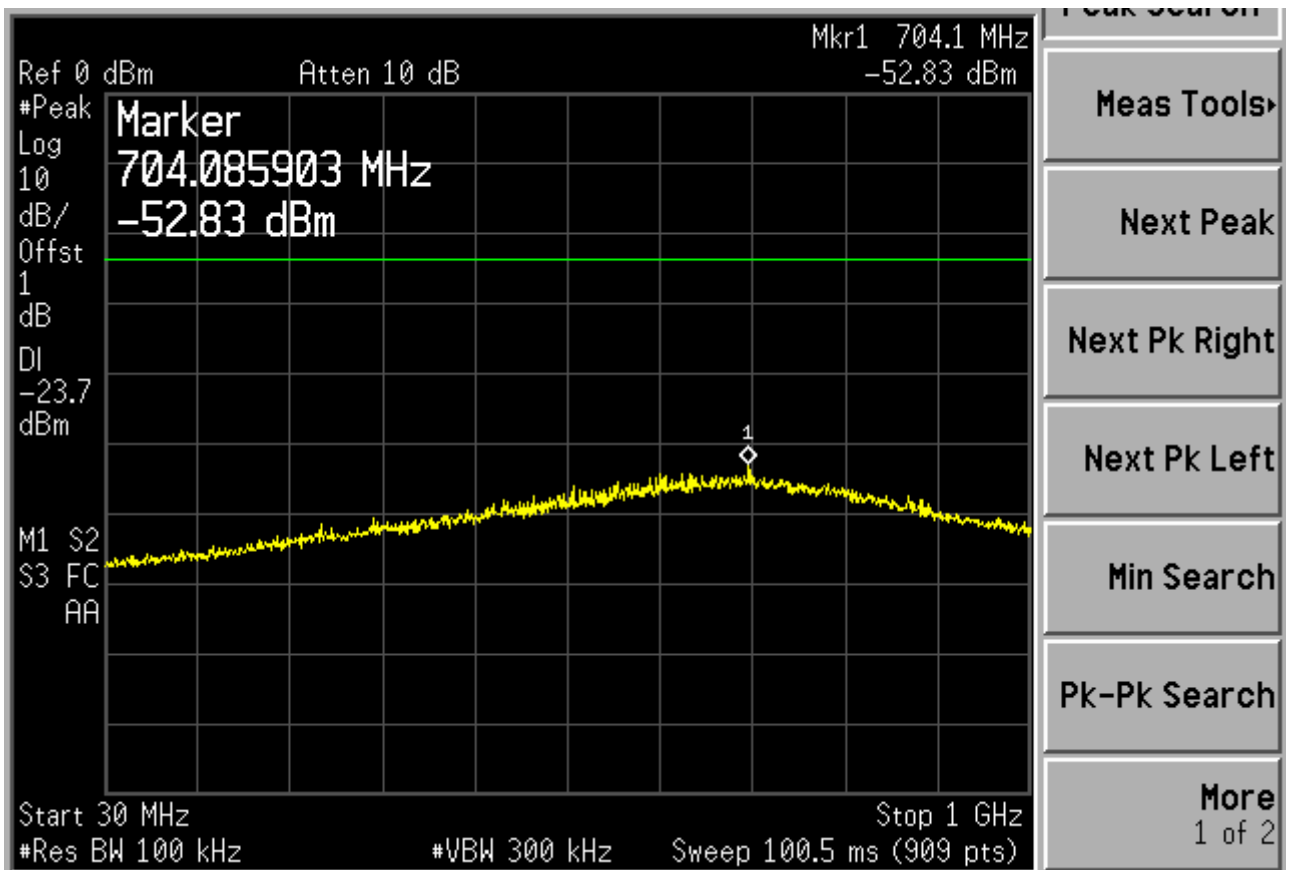
Ch 01 (2405 MHz)



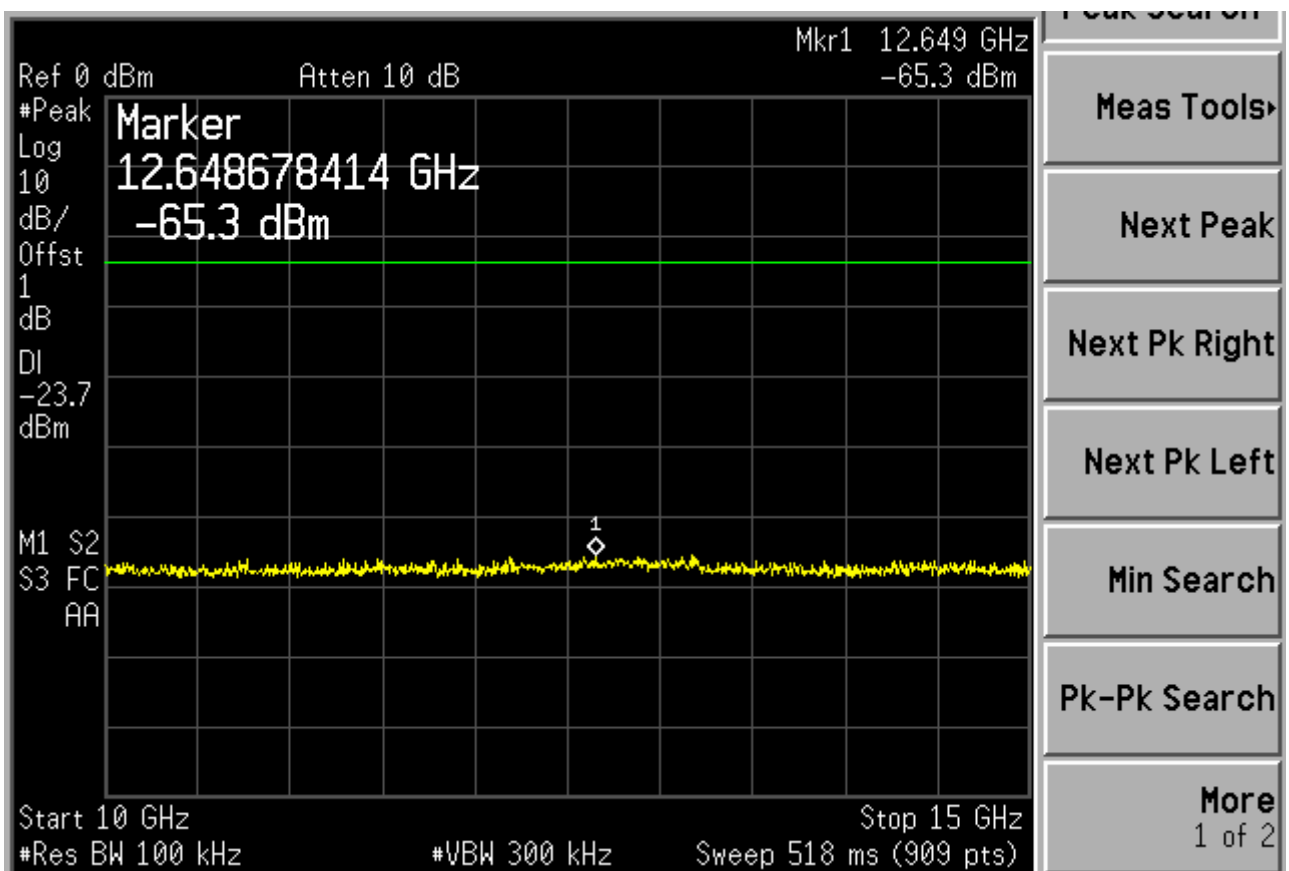
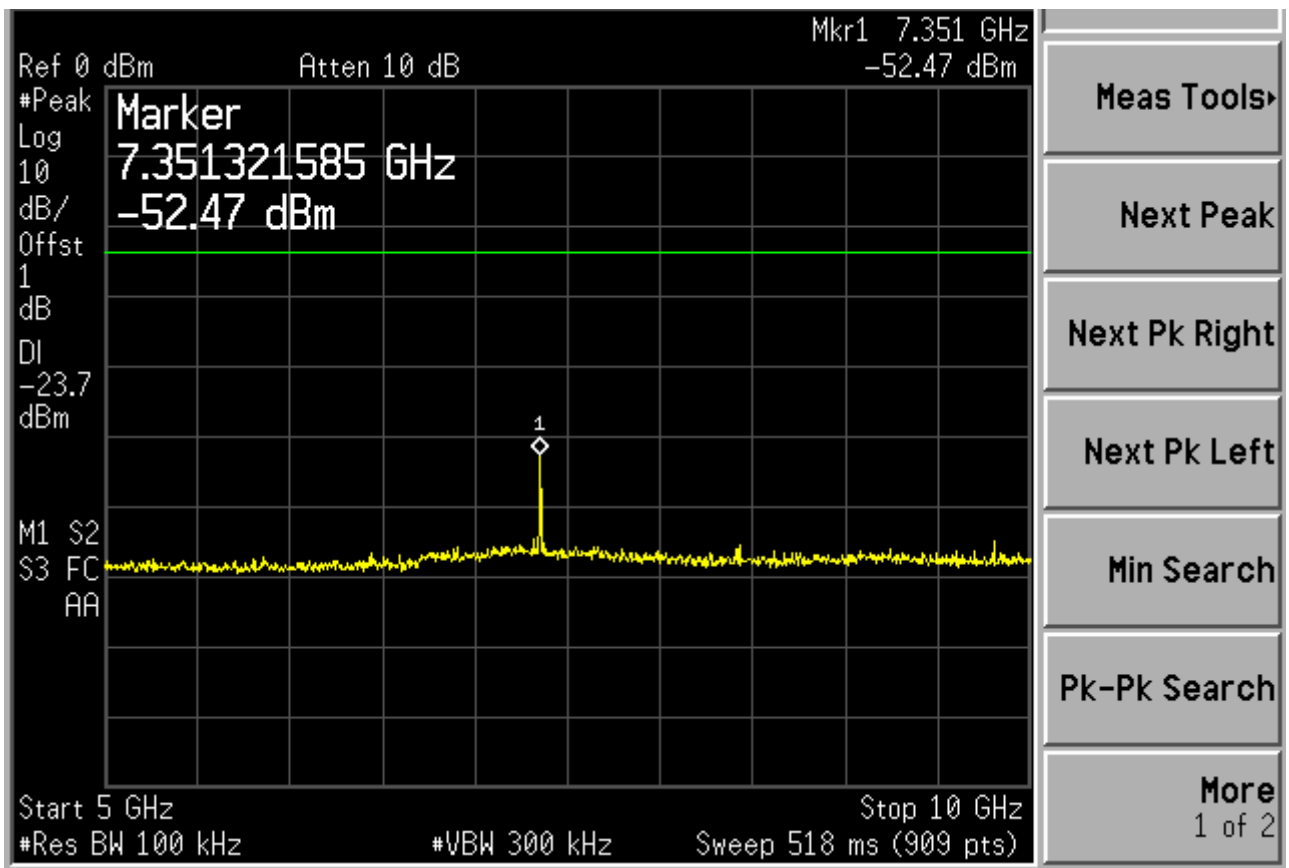




Ch 03 (2450 MHz)

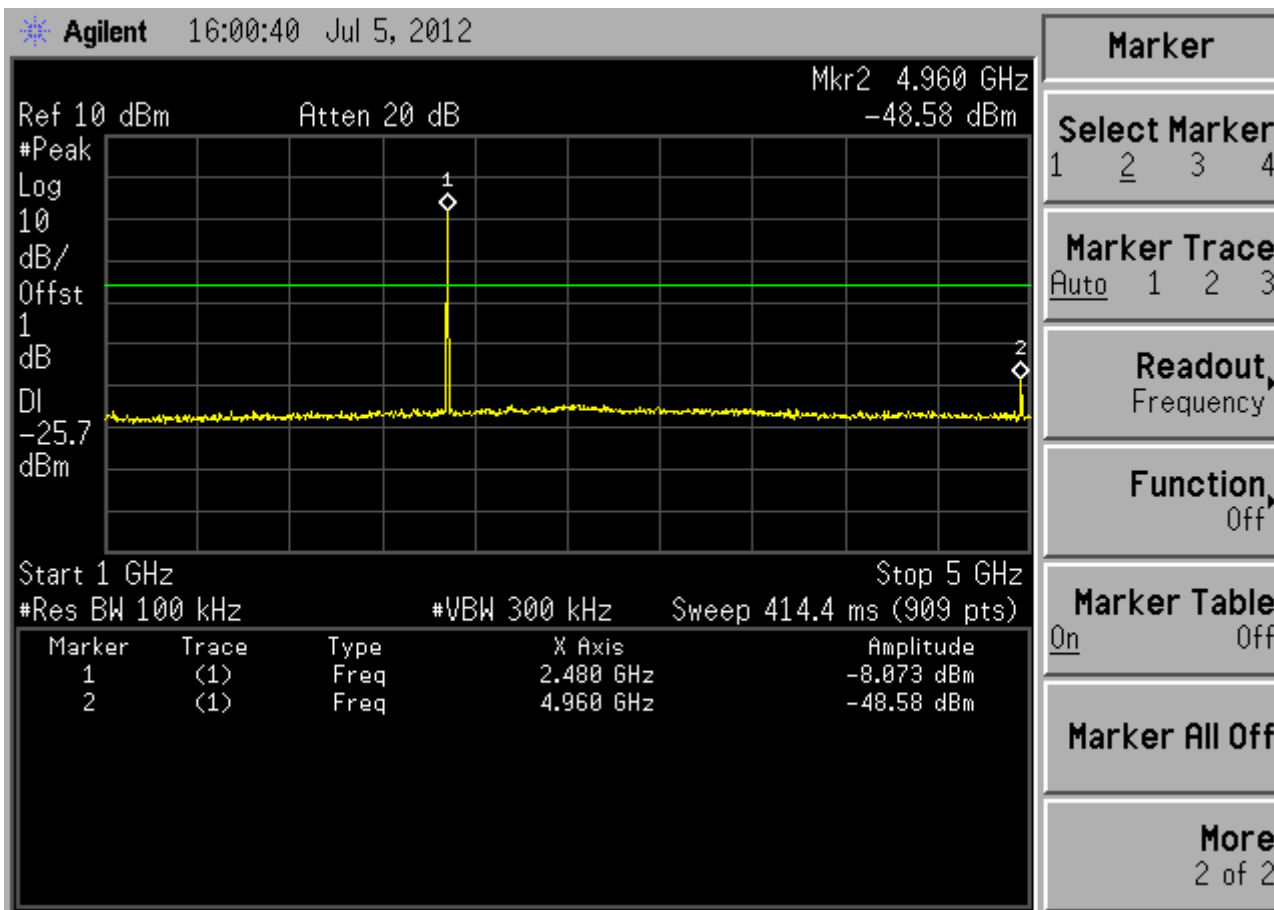
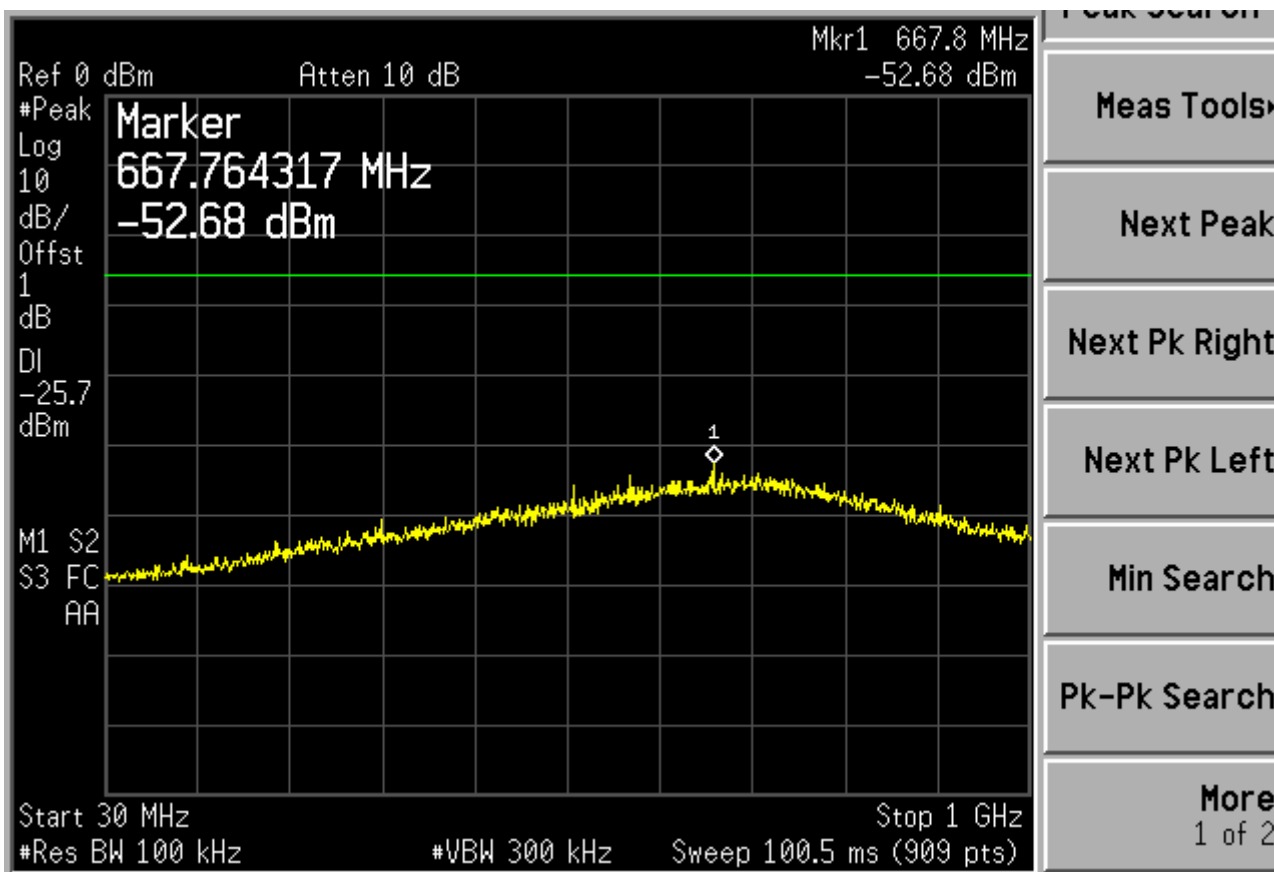








Ch 05 (2480 MHz)







## 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	E7405A	MY45106600	Mar 22, 2012	Mar 22, 2013

### 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

Enable the EUT to transmit and receive data at different channel frequency individually.

### 8.5 Test Procedure

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

### 8.6 Test Results

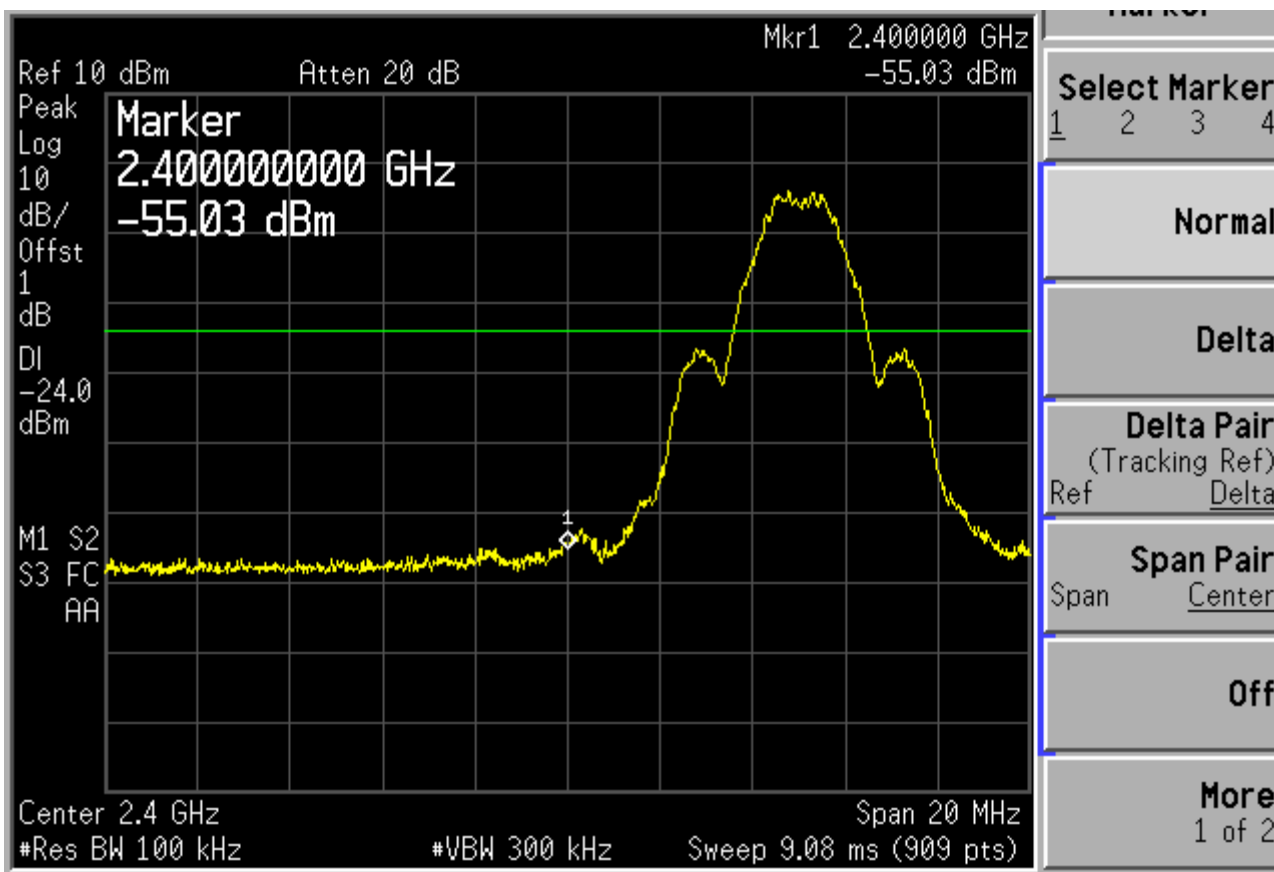
**PASSED.** All the test results are attached in next pages.

Note – The Reference Level refer to Sec. 8.6 PSD (in 100kHz) which tested according to “5.4.1.1 Measurement Procedure – Reference Level” of KDB558074 v01: 2012

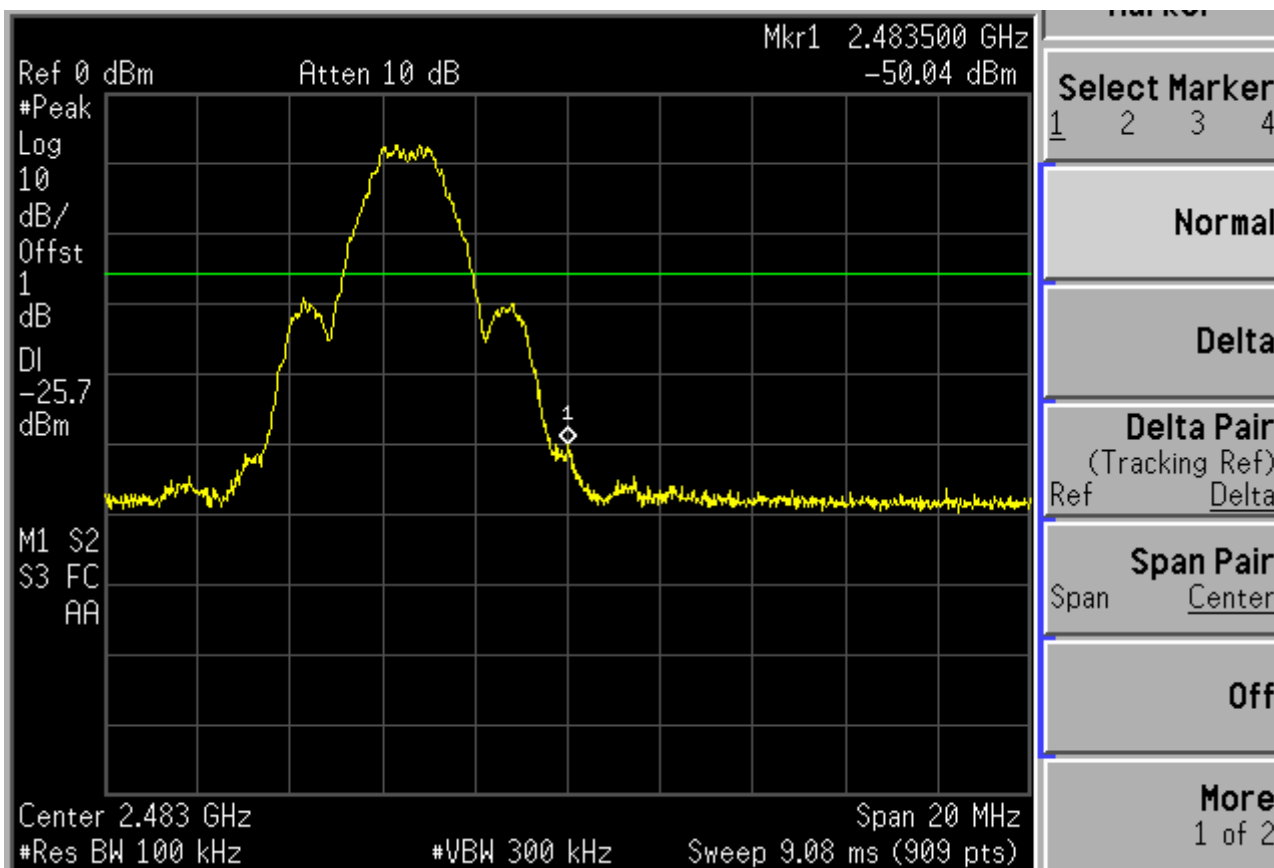
(Test Date: Jul. 05, 2012 Temperature: 25°C Humidity: 48 %%)

Location	Channel	Frequency	Delta Marker	Result
Below Band Edge	01	2405 MHz	<b>52.632 dB</b>	More than <b>20 dB</b> below the highest level of the desired power
Upper Band Edge	05	2480 MHz	<b>44.292 dB</b>	

### Ch01 2405MHz (Below Edge 2400 MHz)



### Ch05 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	E7405A	MY45106600	Mar 22, 2012	Mar 22, 2013

### 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

Enable the EUT to transmit data at different channel frequency individually.

### 9.5 Test Procedure

The transmitter output was connected to the spectrum analyzer. The spectrum analyzer was set as RBW = 100kHz, VBW = 300kHz, span = 800kHz (5 – 30% greater than the EBW).

The test procedure is defined in KDB558074 v01:2012 (the 5.3.1 Measurement Procedure PKPSD was used).

### 9.6 Test Results

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

(Test Date: Jul. 05, 2012 Temperature: 25°C Humidity: 48 %)

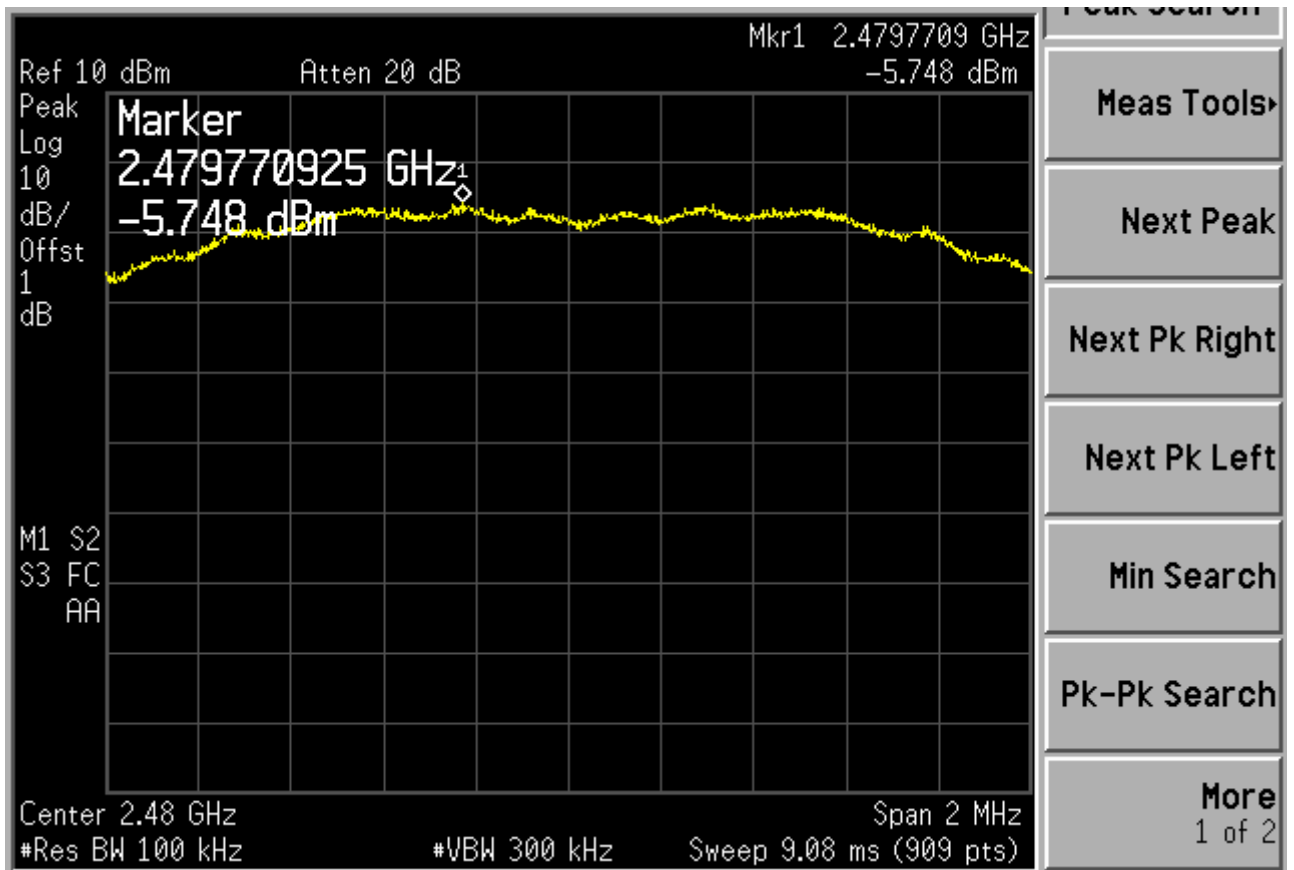
Channel	Frequency	Power Spectral Density reading value (in 100kHz)	Power Spectral Density reading value (in 3kHz)	Limit
01	2405 MHz	-2.398 dBm	-17.598 dBm	8dBm
03	2450 MHz	-3.693 dBm	-18.893 dBm	8dBm
05	2480 MHz	-5.748 dBm	-20.948 dBm	8dBm

Note – The PSD (in 3kHz) = PSD (in 100kHz) + BWCF  
Where BWCF =  $10\log(3\text{kHz}/100\text{kHz}) = -15.2\text{dB}$





### Ch05 2480 MHz



## **10 DEVIATION TO TEST SPECIFICATIONS**

None.