

FCC TEST REPORT

For

In-wall switch

Model Number: ZB4001(45856)

FCC ID: U2ZZB4001

Report Number : WT138003203

Test Laboratory : Shenzhen Academy of Metrology and Quality Inspection

National Digital Electronic Product Testing Center

Site Location : No.4 TongFa Road, Xili Town, Nanshan District,
Shenzhen, China

Tel : 0086-755-86009898

Fax : 0086-755-86009898-31396

Web : www.smq.com.cn

Test report declaration

Applicant : SHEENWAY ASIA LTD.
Address : Room1313, 13/F., AustinTower, 22-26AustinAvenu, TsimSha Tsui, Kowloon. Hong Kong. China
Manufacturer : KONIG ELECTRONIC (HUIZHOU) LTD.
Address : 2-Plant, East Lake Side, QingTang, Lian He Village, Shui Kou, Hui Cheng District, Huizhou, Guangdong, China.
Factory : KONIG ELECTRONIC (HUIZHOU) LTD.
Address : 2-Plant, East Lake Side, QingTang, Lian He Village, Shui Kou, Hui Cheng District, Huizhou, Guangdong, China.
EUT Description : In-wall switch
Model No : ZB4001(45856)
FCC ID : U2ZZB4001

Test Standards:

FCC Part 15 15.207, 15.209, 15.247 (2012)

ANSI C63.4: 2009

The EUT described above is tested by Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory to determine the maximum emissions from the EUT. Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory is assumed full responsibility for the accuracy of the test results. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2009) and the energy emitted by the sample EUT tested as described in this report is in compliance with FCC Rules Part 15.207, 15.209 and 15.247.

The test report is valid for above tested sample only and shall not be reproduced in part without written approval of the laboratory.

Project Engineer:  Date: Nov.18,2013
(Chen Qichun)
Checked by:  Date: Nov.18,2013
(Yang Dongping)
Approved by:  Date: Nov.18,2013
(Lin Bin)

TABLE OF CONTENTS

TEST REPORT DECLARATION	2
1. TEST RESULTS SUMMARY	5
2. GENERAL INFORMATION	6
2.1. Report information.....	6
2.2. Laboratory Accreditation and Relationship to Customer	6
2.3. Measurement Uncertainty.....	7
3. PRODUCT DESCRIPTION	8
3.1. EUT Description.....	8
3.2. Related Submittal(s) / Grant (s)	8
3.3. Block Diagram of EUT Configuration	9
3.4. Operating Condition of EUT.....	9
3.5. Support Equipment List	10
3.6. Test Conditions.....	10
3.7. Special Accessories	10
3.8. Equipment Modifications	10
4. TEST EQUIPMENT USED	11
5. 6DB BANDWIDTH MEASUREMENT	12
5.1. Limits of 6dB Bandwidth Measurement	12
5.2. Test Procedure	12
5.3. Test Setup	12
5.4. Test Data	13
6. MAXIMUM PEAK CONDUCTED OUTPUT POWER MEASUREMENT	15
6.1. Limits of Maximum Peak Conducted Output Power Measurement	15
6.2. Test Procedure	15
6.3. Test Data	15
7. MAXIMUM POWER SPECTRAL DENSITY LEVEL MEASUREMENT	17
7.1. Limits of Maximum Power Spectral Density Level Measurement	17
7.2. Test Procedure	17
7.3. Test Data	17
8. CONDUCTED BANDEDGE AND SPURIOUS MEASUREMENT	19

8.1.	Limits of Conducted Band Edge and Spurious Measurement	19
8.2.	Test Procedure	19
8.3.	Test Data	20
9.	RADIATED BAND EDGE AND SPURIOUS MEASUREMENT	24
9.1.	Limits of Radiated Band Edge And Spurious Measurement.....	24
9.2.	TEST PROCEDURE.....	24
9.3.	Test Data	24
10.	CONDUCTED EMISSION TEST FOR AC POWER PORT MEASUREMENT	31
10.1.	Test Standard and Limit	31
10.2.	Test Procedure	31
10.3.	Test Arrangement.....	31
10.4.	Test Data	32
11.	ANTENNA REQUIREMENTS	35
11.1.	Applicable requirements.....	35
11.2.	Antenna Connector	35
11.3.	Antenna Gain	35

1. TEST RESULTS SUMMARY

Table 1 Test Results Summary

Test Items	FCC Rules	Test Results
6dB DTS bandwidth measurement	15.247 (a) (2)	Pass
Maximum Peak Conducted Power	15.247 (b) (3)	Pass
Maximum Power Spectral Density Level	15.247 (3)	Pass
Conducted Band Edge and Spurious	15.247 (d)	Pass
Radiated Band Edge and Spurious	15.247 (d)	Pass
	15.209 15.205	
Conducted emission test for AC power port	15.207	Pass
Antenna Requirement	15.203	Pass

Remark: “ N/A” means “ Not applicable.”

2. GENERAL INFORMATION

2.1. Report information

2.1.1. This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that SMQ approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that SMQ in any way guarantees the later performance of the product/equipment.

2.1.2. The sample/s mentioned in this report is/are supplied by Applicant, SMQ therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture or any information supplied.

2.1.3. Additional copies of the report are available to the Applicant at an additional fee. No third part can obtain a copy of this report through SMQ, unless the applicant has authorized SMQ in writing to do so.

2.2. Laboratory Accreditation and Relationship to Customer

The testing report were performed by the Shenzhen Academy of Metrology and quality Inspection EMC Laboratory (Guangdong EMC compliance testing center), in their facilities located at No.4 TongFa Road, Xili Town, Nanshan District, Shenzhen, China. At the time of testing, Laboratory is accredited by the following organizations:

China National Accreditation Service for Conformity Assessment (CNAS) accredits the Laboratory for conformance to FCC standards, EMC international standards and EN standards. The Registration Number is CNAS L0579.

The Laboratory is listed in the United States of American Federal Communications Commission (FCC), and the registration number are 446246 806614 994606(semi anechoic chamber).

The Laboratory is registered to perform emission tests with Industry Canada (IC), and the registration number is 11177A.

TUV Rhineland accredits the Laboratory for conformance to IEC and EN standards, the registration number is E2024086Z02.

2.3. Measurement Uncertainty

Conducted Emission

9kHz~30MHz 3.5dB

Radiated Emission

30MHz~1000MHz 4.5dB

1GHz~25GHz 4.6dB

3. PRODUCT DESCRIPTION

3.1.EUT Description

Description : In-wall switch
Manufacturer : KONIG ELECTRONIC (HUIZHOU) LTD.
Model Number : ZB4001(45856)
Rated Input : AC 120V/60Hz
Power supply : AC 120V/60Hz
Operate Frequency : 2.405GHz~2.480GHz
Modulation : DSSS (O-QPSK)
Data Rate (Mbps) : 250kbps
Antenna Designation : Monopole antenna (Integrated)

Table 2 Working Frequency List

Channel	Center Frequency(MHz)	Channel	Center Frequency(MHz)
11	2405	19	2445
12	2410	20	2450
13	2415	21	2455
14	2420	22	2460
15	2425	23	2465
16	2430	24	2470
17	2435	25	2475
18	2440	26	2480

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

This submittal(s) (test report) is intended for FCC ID: U2ZZB4001, filing to comply with Section 15.207 , 15.209 , 15.247 of the FCC Part 15, Subpart C Rules.

3.3. Block Diagram of EUT Configuration

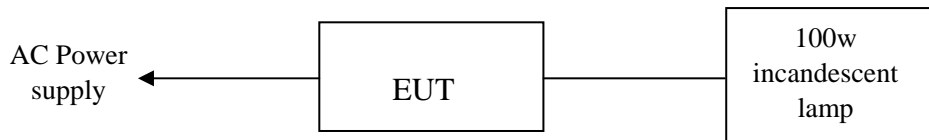


Figure 1 EUT setup

3.4. Operating Condition of EUT

Worst-case mode and channel used for power line conducted emissions was the mode and channel with the highest output power.

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Date Rate	Channel
Maximum Peak Conducted Power	TX	250 kbps	11, 18, 24, 25, 26
6dB DTS bandwidth Power Spectral Density	TX	250 kbps	11, 18, 24, 25, 26
Spurious Emission	TX	250 kbps	11, 18, 24, 25, 26
Band Edge	TX	250 kbps	11, 25, 26
Conducted emission test for AC power port	TX	250 kbps	--

3.5. Support Equipment List

Table 3 Support Equipment List

Name	Model No	S/N	Manufacturer	FCC Approval
--	--	--	--	--
--	--	--	--	--

3.6. Test Conditions

Date of test : Oct.31, 2013-Nov.07, 2013

Date of EUT Receive : Oct.22, 2013

Temperature: 21-22 °C

Relative Humidity: 53-58%

3.7. Special Accessories

Not available for this EUT intended for grant.

3.8. Equipment Modifications

Not available for this EUT intended for grant.

4. TEST EQUIPMENT USED

Table 4 Test Equipment

No.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
SB3319	EMI Test Receiver	Rohde & Schwarz	ESCS30	Jan.21,2013	1 Year
SB4357	AMN	Rohde & Schwarz	ENV216	Jan.21,2013	1 Year
SB8501/09	EMI Test Receiver	Rohde & Schwarz	ESU40	May.17, 2013	1 Year
SB9060	Spectrum analyzer	Rohde & Schwarz	FSQ40	May.17, 2013	1 Year
SB3955	Broadband antenna	SCHWARZBECK	VULB9163	Jan.21, 2013	1 Year
SB8501/01	Horn Antenna	Rohde & Schwarz	HF907	May.14, 2013	1 Year
SB8501/10	Horn Antenna	Rohde & Schwarz	3160-09	May.14, 2013	3 Years
SB8501/12	Horn Antenna	Rohde & Schwarz	3160-10	May.14, 2013	3 Years
SB8501/17	Preamplifier	Rohde & Schwarz	SCU-18	May.14, 2013	1 Year
SB8501/16	Preamplifier	Rohde & Schwarz	SCU-26	May.14, 2013	1 Year
SB9059	Preamplifier	Rohde & Schwarz	SCU-40	May.14, 2013	1 Year

5. 6DB BANDWIDTH MEASUREMENT

5.1.Limits of 6dB Bandwidth Measurement

CFR 47 (FCC) part 15.247 (a) (2) and 558074 D01 DTS Meas Guidance v03r01

5.2.Test Procedure

The transmitter output was connected to the spectrum analyzer.

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

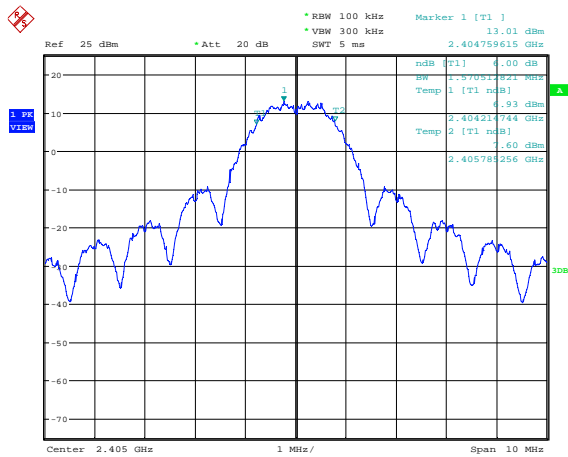
5.3.Test Setup



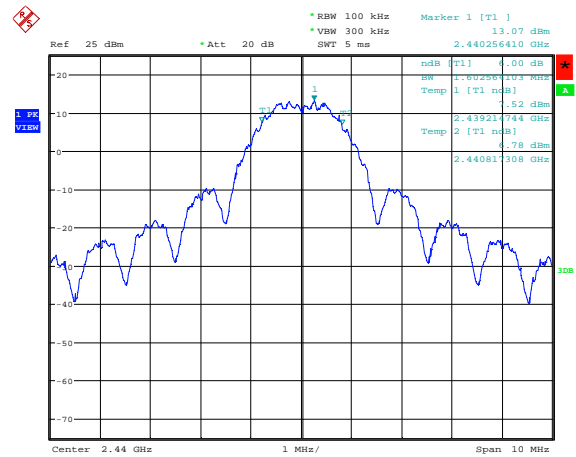
5.4. Test Data

Table 5 6dB Bandwidth Test Data

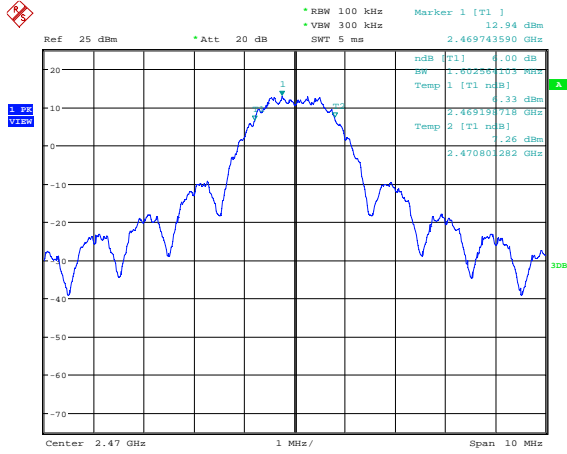
CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	results
11 (2405MHz)	1.571	Pass
18 (2440MHz)	1.603	Pass
24 (2470MHz)	1.603	Pass
25 (2475MHz)	1.603	Pass
26 (2480MHz)	1.587	Pass



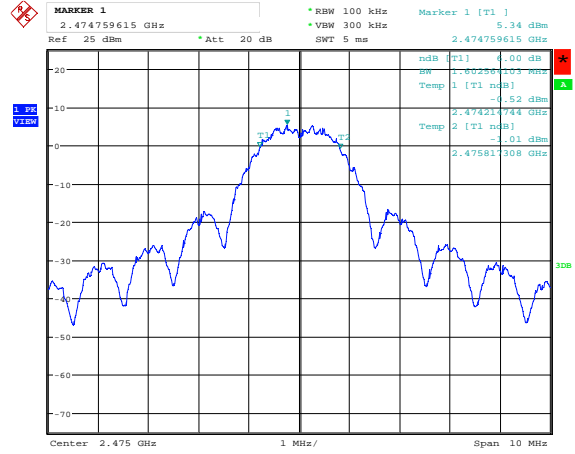
Date: 7.NOV.2013 10:52:21



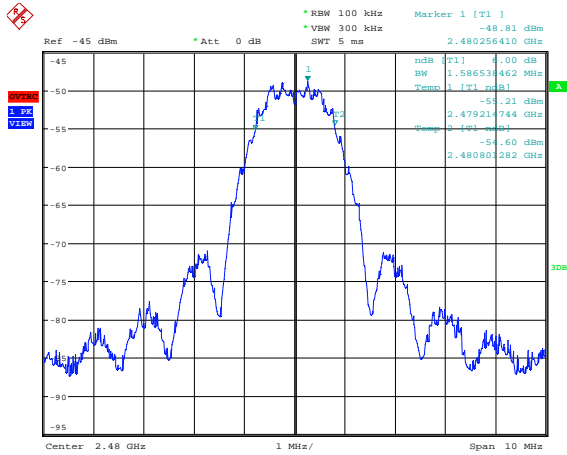
Date: 7.NOV.2013 10:54:22



Date: 7.NOV.2013 10:56:19



Date: 7.NOV.2013 10:58:10



Date: 7.NOV.2013 11:00:10

6. MAXIMUM PEAK CONDUCTED OUTPUT POWER MEASUREMENT

6.1. Limits of Maximum Peak Conducted Output Power Measurement

CFR 47 (FCC) part 15.247 (b) (3) and 558074 D01 DTS Meas Guidance v03r01

6.2. Test Procedure

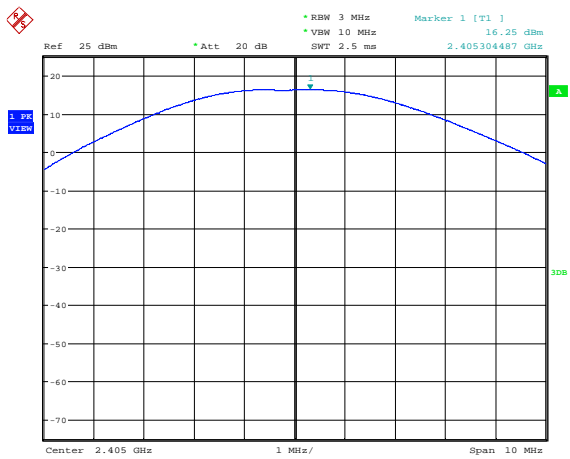
The transmitter output was connected to the spectrum analyzer.

- a) Set the RBW = 3 MHz
- b) Set the VBW \geq 3 x RBW
- c) Set the span \geq 3 x RBW
- d) Detector = peak.
- e) Sweep time = auto couple.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use peak marker function to determine the peak amplitude level.

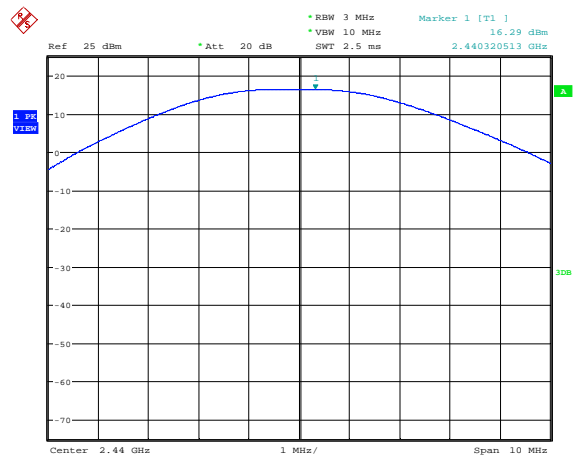
6.3. Test Data

Table 6 Maximum Peak Conducted Output Power Test Data

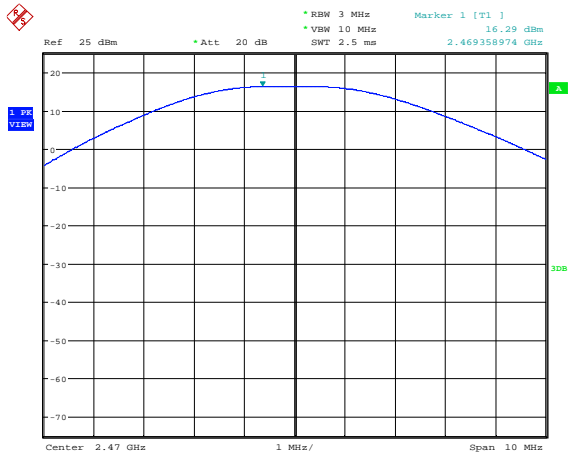
CHANNEL FREQUENCY (MHz)	Meas. Level (Cond.) [dBm]	Limit [dBm]	Result
11 (2405MHz)	16.3	< 30	Pass
18 (2440MHz)	16.3	< 30	Pass
24 (2470MHz)	16.3	< 30	Pass
25 (2475MHz)	8.8	< 30	Pass
26 (2480MHz)	-44.6	< 30	Pass



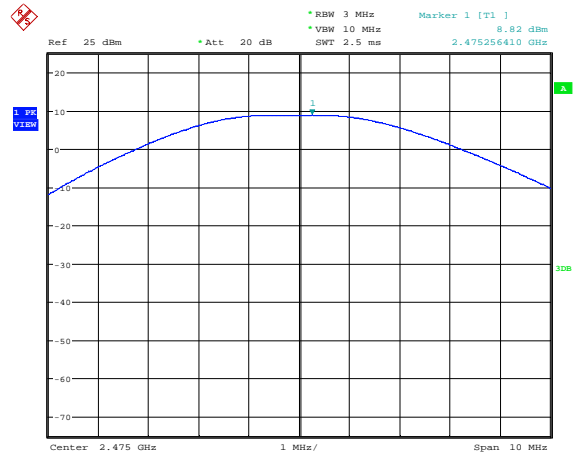
Date: 7.NOV.2013 11:05:42



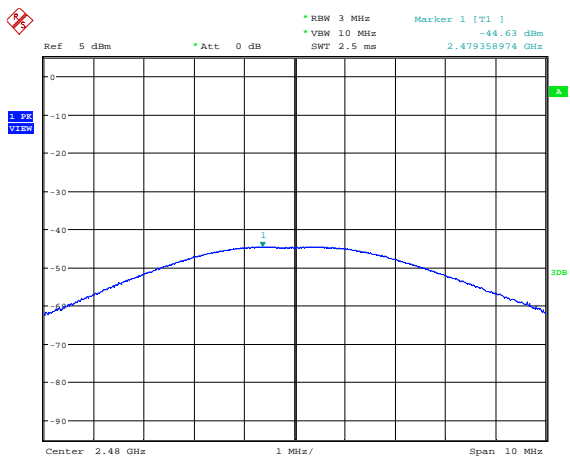
Date: 7.NOV.2013 11:04:53



Date: 7.NOV.2013 11:04:04



Date: 7.NOV.2013 11:03:12



Date: 7.NOV.2013 11:02:03

7. MAXIMUM POWER SPECTRAL DENSITY LEVEL MEASUREMENT

7.1.Limits of Maximum Power Spectral Density Level Measurement

CFR 47 (FCC) part 15.247 (e) and 558074 D01 DTS Meas Guidance v03r01

7.2.Test Procedure

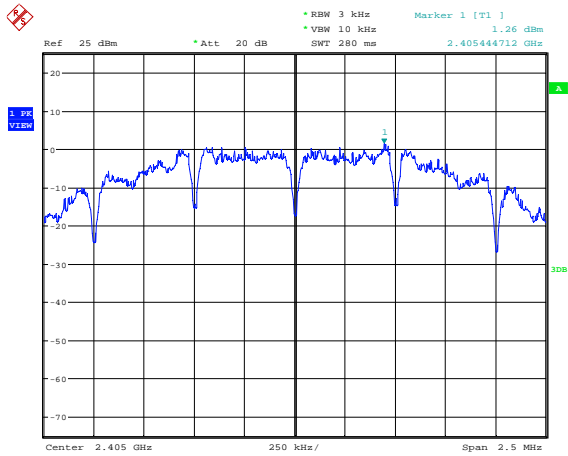
The transmitter output was connected to the spectrum analyzer.

- a) Set analyzer center frequency to DTS channel center frequency.
- b) Set the span to 1.5 times the DTS bandwidth.
- c) Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- d) Set the VBW $\geq 3\text{RBW}$.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum amplitude level within the RBW.
- j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

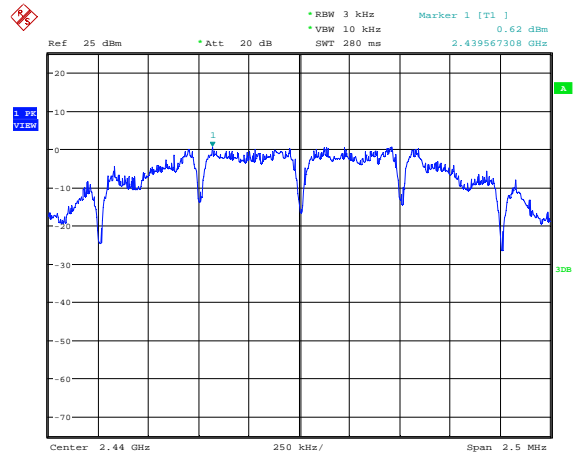
7.3.Test Data

Table 7 Maximum Power Spectral Density Level Test Data

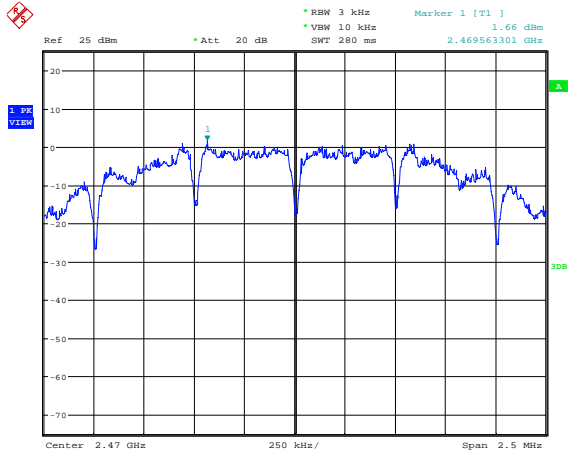
CHANNEL FREQUENCY (MHz)	PSD [dBm]	Limit [dBm]	Result
11 (2405MHz)	1.3	8	Pass
18 (2440MHz)	0.6	8	Pass
24 (2470MHz)	1.7	8	Pass
25 (2475MHz)	-6.1	8	Pass
26 (2480MHz)	-59.6	8	Pass



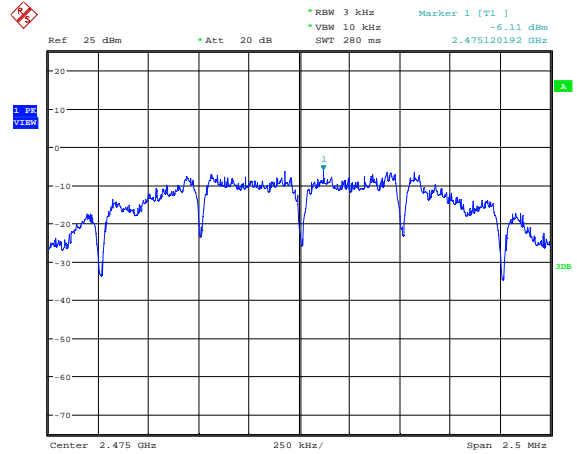
Date: 7.NOV.2013 11:07:05



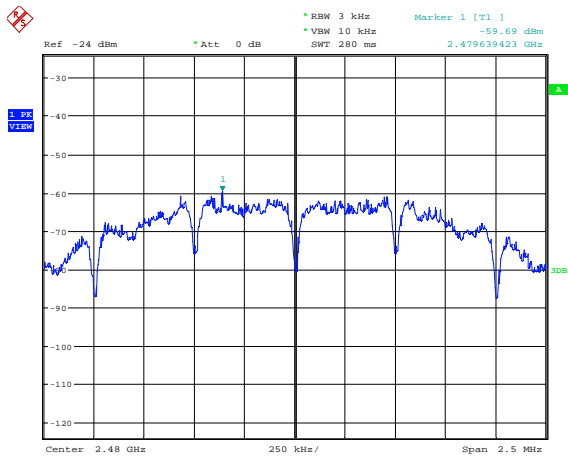
Date: 7.NOV.2013 11:08:06



Date: 7.NOV.2013 11:09:34



Date: 7.NOV.2013 11:10:31



Date: 7.NOV.2013 11:11:43

8. CONDUCTED BANDEDGE AND SPURIOUS MEASUREMENT

8.1.Limits of Conducted Band Edge and Spurious Measurement

CFR 47 (FCC) part 15.247 (d) and 558074 D01 DTS Meas Guidance v03r01

8.2.Test Procedure

The transmitter output was connected to the spectrum analyzer.

Establish a reference level by using the following procedure:

- a) Set instrument center frequency to DTS channel center frequency.
- b) Set the span to ≥ 1.5 times the DTS bandwidth.
- c) Set the RBW = 100 kHz.
- d) Set the VBW $\geq 3 \times$ RBW.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum PSD level.

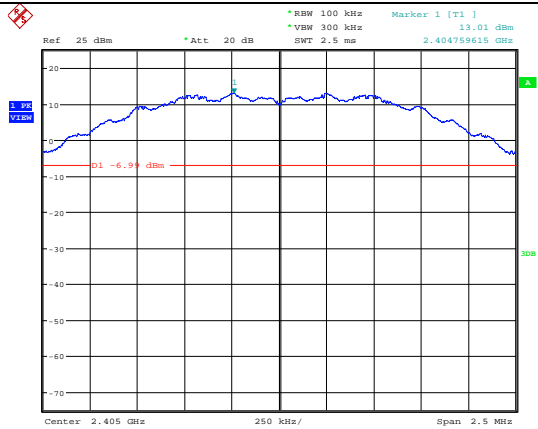
Emission level measurement

- a) Set the center frequency and span to encompass frequency range to be measured.
- b) Set the RBW = 100 kHz.
- c) Set the VBW $\geq 3 \times$ RBW.
- d) Detector = peak.
- e) Ensure that the number of measurement points \geq span/RBW
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum amplitude level.

8.3. Test Data

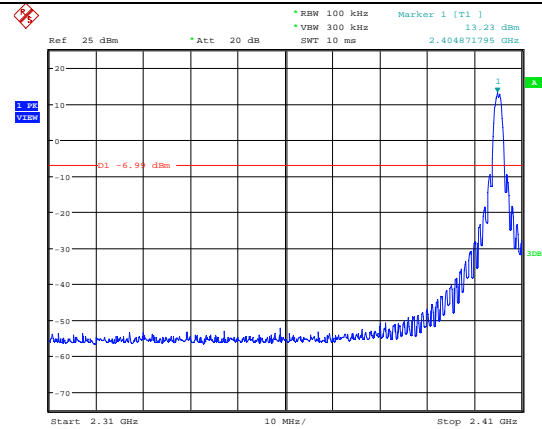
Channel 11

Pref



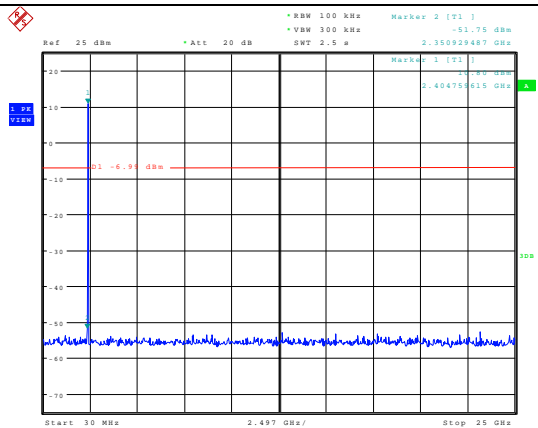
Date: 7.NOV.2013 11:25:42

Lower Edge



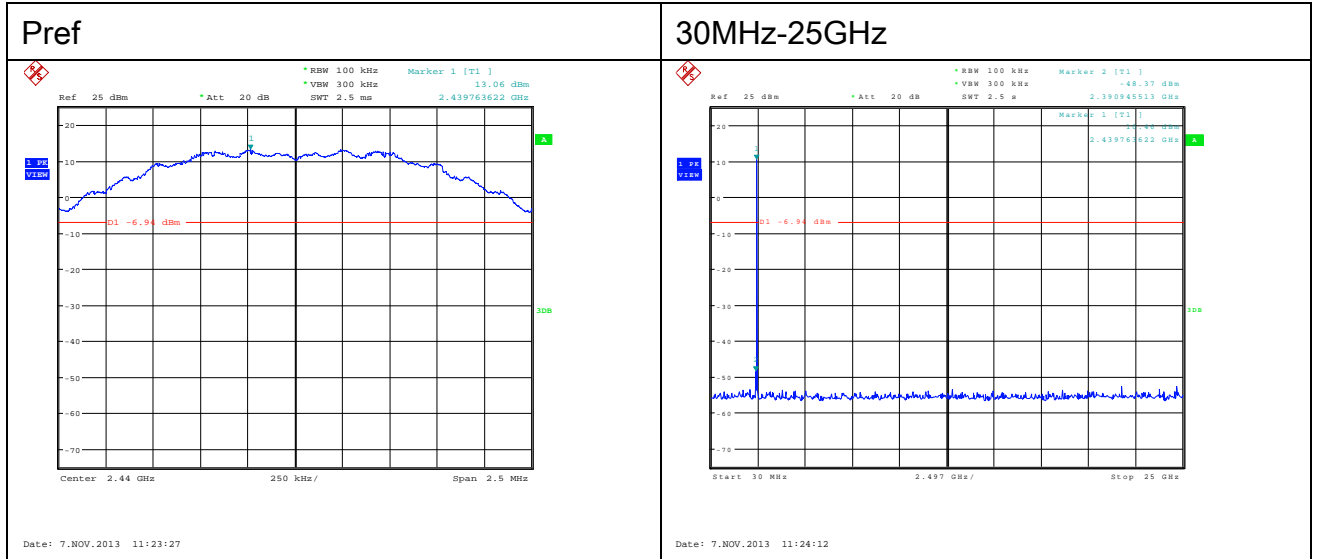
Date: 7.NOV.2013 11:27:30

30MHz-25GHz

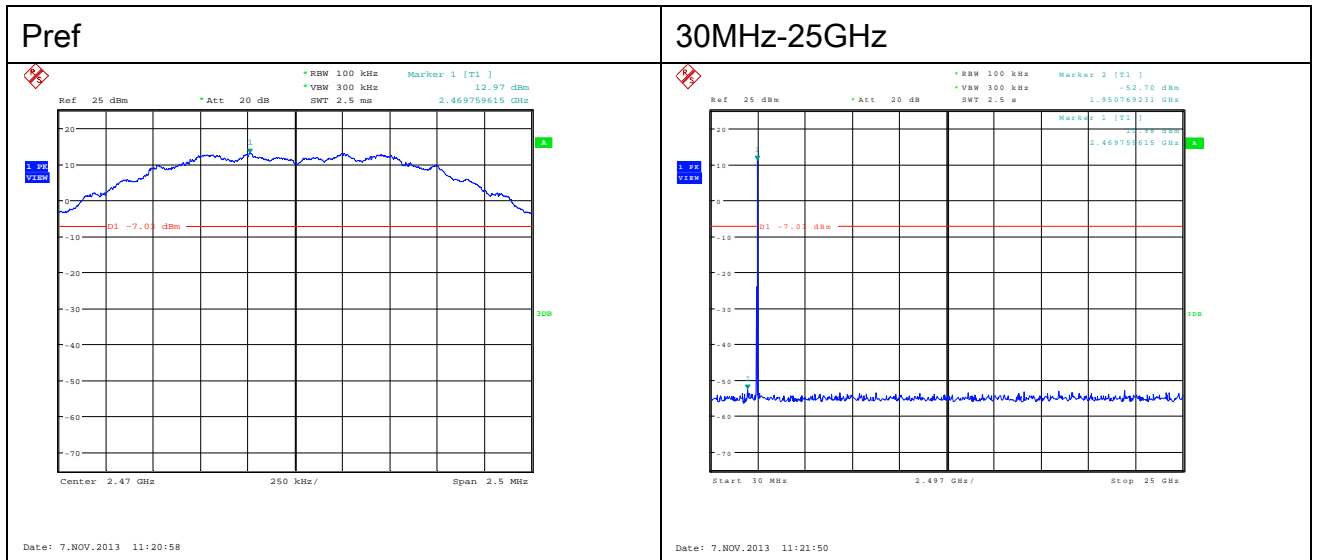


Date: 7.NOV.2013 11:26:40

Channel 18

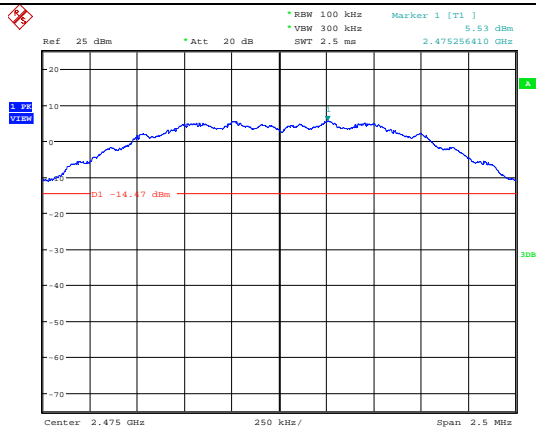


Channel 24



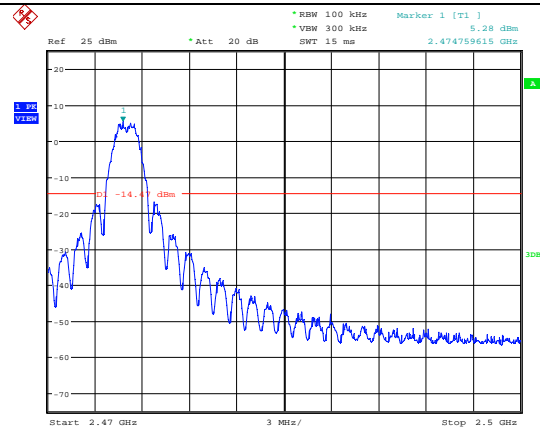
Channel 25

Pref



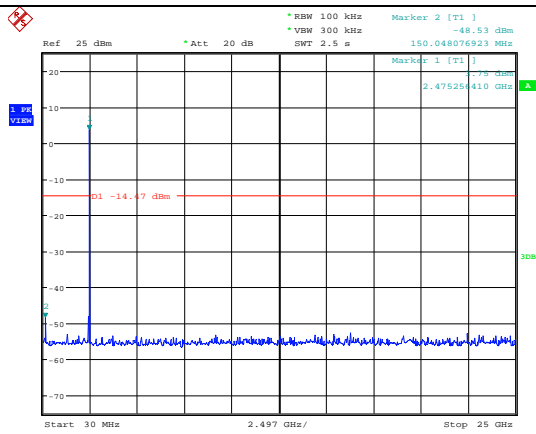
Date: 7.NOV.2013 11:17:53

Upper Edge



Date: 7.NOV.2013 11:19:24

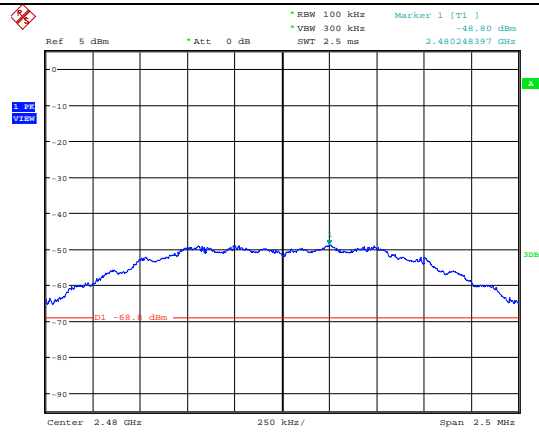
30MHz-25GHz



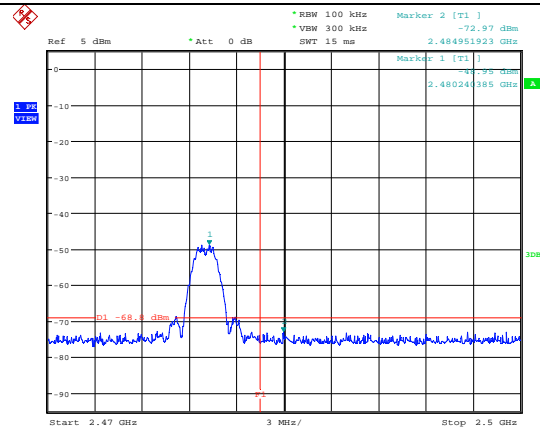
Date: 7.NOV.2013 11:18:49

Channel 26

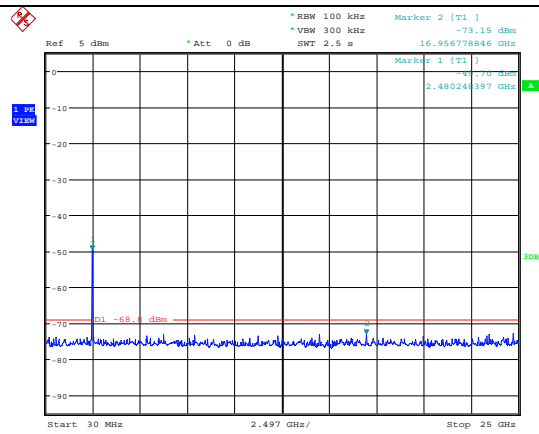
Pref



Upper Edge



30MHz-25GHz



9. RADIATED BAND EDGE AND SPURIOUS MEASUREMENT

9.1.Limits of Radiated Band Edge And Spurious Measurement

CFR 47 (FCC) part 15.247 (d) and 558074 D01 DTS Meas Guidance v03r01

9.2.TEST PROCEDURE

1. The testing follows the guidelines in ANSI C63.10-2009.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
6. Use the following spectrum analyzer settings:
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Set RBW=100 kHz for $f < 1$ GHz; VBW \geq RBW; Sweep = auto; Detector function = peak; Trace = max hold;
 - (3) Set RBW = 1 MHz, VBW= 3MHz for $f > 1$ GHz for peak measurement.
Set RBW = 1 MHz, VBW= 10Hz for $f > 1$ GHz for AV measurement.

9.3.Test Data

Table 8 Radiated Emission Test Data

Model No.: ZB4001(45856)								
Test mode: TX, Channel 11								
Frequency (MHz)	Polarization	Correction Factor (dB)	Antenna Factor (dB/m)	Reading Value (dB μ V)	Emission Level dB (μ V/m)	Limits dB (μ V/m)	EUT axes	Note
4811.002	Horizontal	-39.4	34.0	60.4	55.0	74	X	Harmonics PK
4811.002	Horizontal	-39.4	34.0	52.0	46.6	54	X	Harmonics AV
7216.568	Horizontal	-38.3	35.6	58.1	55.4	74	X	Harmonics PK
7216.568	Horizontal	-38.3	35.6	48.3	45.6	54	X	Harmonics AV
4810.953	Vertical	-39.4	34.0	60.1	54.7	74	X	Harmonics PK
4810.953	Vertical	-39.4	34.0	52.4	47.0	54	X	Harmonics AV
7216.696	Vertical	-38.3	35.6	59.5	56.8	74	X	Harmonics PK
7216.696	Vertical	-38.3	35.6	49.6	46.9	54	X	Harmonics AV

Table 9 Radiated Emission Test Data

Model No.: ZB4001(45856)								
Test mode: TX, Channel 18								
Frequency (MHz)	Polarization	Correction Factor (dB)	Antenna Factor (dB/m)	Reading Value (dB μ V)	Emission Level dB (μ V/m)	Limits dB (μ V/m)	EUT axes	Note
4880.974	Horizontal	-39.4	34.0	57.5	52.1	74	X	Harmonics PK
4880.974	Horizontal	-39.4	34.0	48.7	43.3	54	X	Harmonics AV
7321.420	Horizontal	-38.1	35.6	59.1	56.6	74	X	Harmonics PK
7321.420	Horizontal	-38.1	35.6	49.2	46.7	54	X	Harmonics AV
4880.973	Vertical	-39.4	34.0	58.5	53.1	74	X	Harmonics PK
4880.973	Vertical	-39.4	34.0	50.0	44.6	54	X	Harmonics AV
7321.713	Vertical	-38.1	35.6	60.1	57.6	74	X	Harmonics PK
7321.713	Vertical	-38.1	35.6	49.6	47.1	54	X	Harmonics AV

Table 10 Radiated Emission Test Data

Model No.: ZB4001(45856)								
Test mode: TX, Channel 24								
Frequency (MHz)	Polarization	Correction Factor (dB)	Antenna Factor (dB/m)	Reading Value (dB μ V)	Emission Level dB (μ V/m)	Limits dB (μ V/m)	EUT axes	Note
4938.962	Horizontal	-39.5	34.0	57.3	51.8	74	X	Harmonics PK
4938.962	Horizontal	-39.5	34.0	47.9	42.4	54	X	Harmonics AV
7411.372	Horizontal	-37.6	35.6	58.6	56.6	74	X	Harmonics PK
7411.372	Horizontal	-37.6	35.6	49.0	47.0	54	X	Harmonics AV
4938.987	Vertical	-39.5	34.0	57.7	52.2	74	X	Harmonics PK
4938.987	Vertical	-39.5	34.0	48.3	42.8	54	X	Harmonics AV
7411.387	Vertical	-37.6	35.6	59.2	57.2	74	X	Harmonics PK
7411.387	Vertical	-37.6	35.6	49.2	47.2	54	X	Harmonics AV

Table 11 Radiated Emission Test Data

Model No.: ZB4001(45856)								
Test mode: TX, Channel 25								
Frequency (MHz)	Polarization	Correction Factor (dB)	Antenna Factor (dB/m)	Reading Value (dB μ V)	Emission Level dB (μ V/m)	Limits dB (μ V/m)	EUT axes	Note
--	--	--	--	--	--	--	--	--

Table 12 Radiated Emission Test Data

Model No.: ZB4001(45856)								
Test mode: TX, Channel 26								
Frequency (MHz)	Polarization	Correction Factor (dB)	Antenna Factor (dB/m)	Reading Value (dB μ V)	Emission Level dB (μ V/m)	Limits dB (μ V/m)	EUT axes	Note
--	--	--	--	--	--	--	--	--

- Note: 1. Emission level(dBuV/m)=Reading Value(dBuV) + Correction Factor(dB)+Antenna Factor (dB/m)
 2. Correction Factor(dB) = Cable Factor (dB)+Amplifier Factor(dB)
 3. No other spurious and harmonic emissions were reported greater than listed emissions above table.

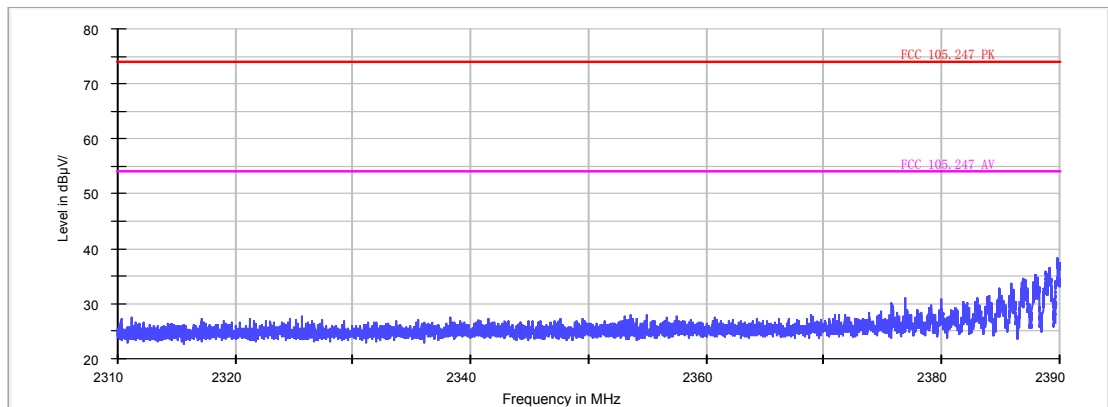
Band Edge

Radiated Emission

EUT Information

EUT Model Name: ZB4001(45856)
Operation mode: CH11 TX
Test Voltage:
Comment:

FCC Electric Field Strength 2.4GHz Bandedge-PK

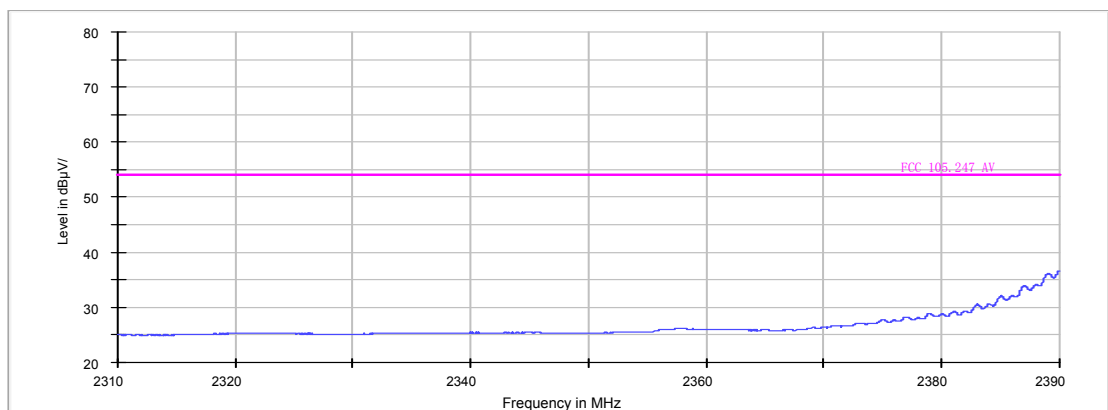


Radiated Emission

EUT Information

EUT Model Name: ZB4001(45856)
Operation mode: CH11 TX
Test Voltage:
Comment:

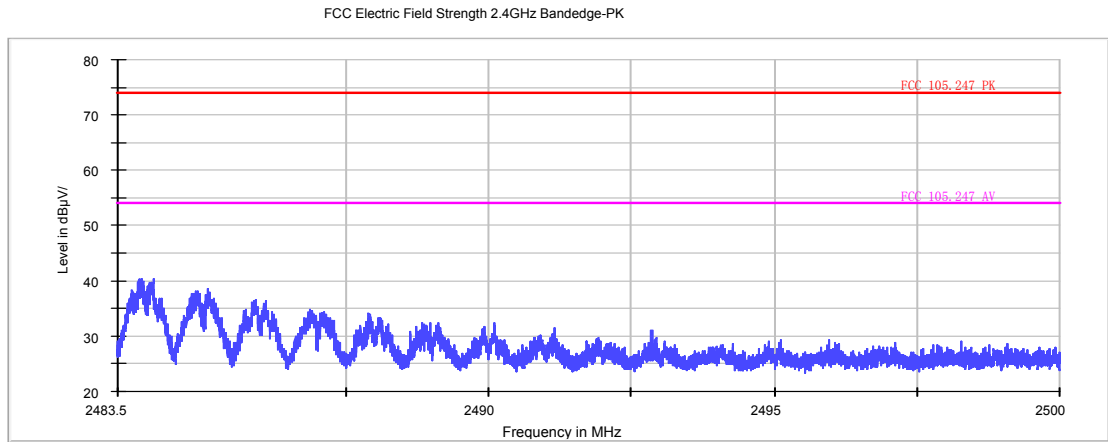
FCC Electric Field Strength 2.4GHz Bandedge-AV



Radiated Emission

EUT Information

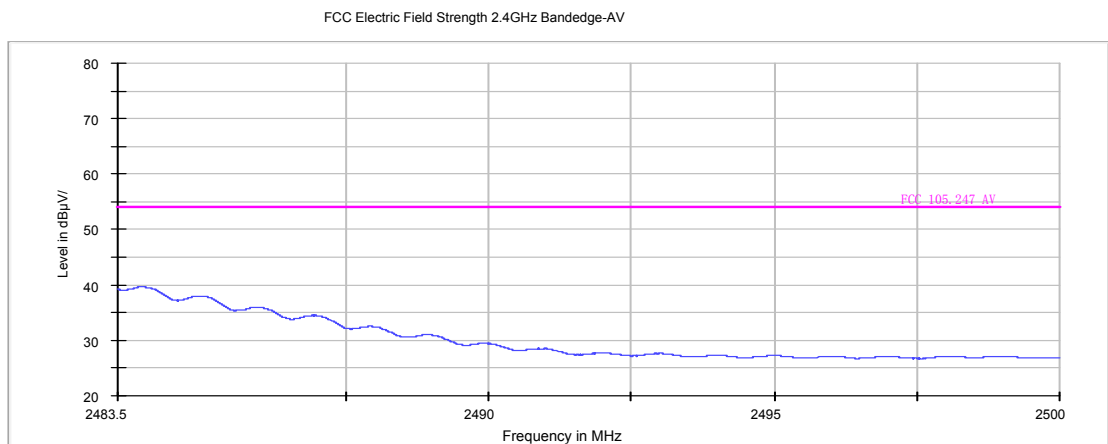
EUT Model Name: ZB4001(45856)
Operation mode: CH25 TX
Test Voltage:
Comment:



Radiated Emission

EUT Information

EUT Model Name: ZB4001(45856)
Operation mode: CH25 TX
Test Voltage:
Comment:

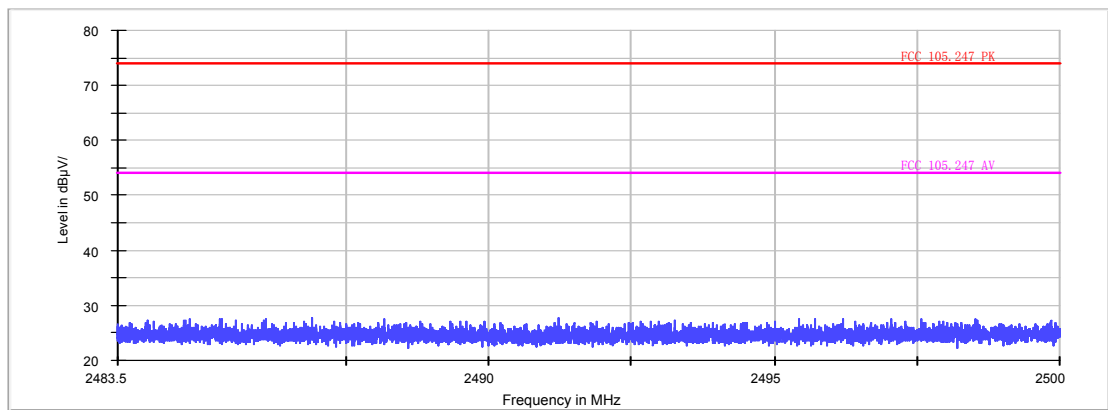


Radiated Emission

EUT Information

EUT Model Name: ZB4001(45856)
Operation mode: CH26 TX
Test Voltage:
Comment:

FCC Electric Field Strength 2.4GHz Bandedge-PK

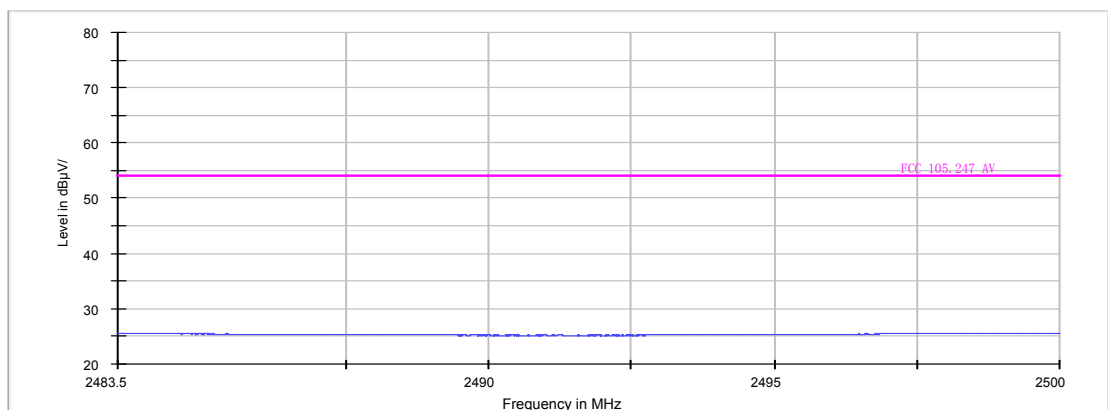


Radiated Emission

EUT Information

EUT Model Name: ZB4001(45856)
Operation mode: CH26 TX
Test Voltage:
Comment:

FCC Electric Field Strength 2.4GHz Bandedge-AV



10. CONDUCTED EMISSION TEST FOR AC POWER PORT MEASUREMENT

10.1. Test Standard and Limit

10.1.1. Test Standard

FCC Part 15 15.207

10.1.2. Test Limit

Table 13 Conducted Disturbance Test Limit

Frequency	Maximum RF Line Voltage (dB μ V)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

* Decreasing linearly with logarithm of the frequency

* The lower limit shall apply at the transition frequency.

10.2. Test Procedure

The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through an Artificial Mains Network (A.M.N.). An EMI test receiver (R&S Test Receiver ESCS30) is used to test the emissions from both sides of AC line. According to the requirements in Section 7 and 13 of ANSI C63.4-2009. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver is set at 9kHz.

10.3. Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

10.4. Test Data

The emissions don't show in below are too low against the limits. Refer to the test curves.

Table 14 Conducted Disturbance Test Data

Model No.:							
Test mode: TX, Worst-case							
Line							
Frequency MHz	QP		AV		QP	AV	Factor (dB)
	Level (dBuV)	Limit (dBuV)	Level (dBuV)	Limit (dBuV)	Reading (dBuV)	Reading (dBuV)	
0.170	57.3	65.0	49.0	55.0	47.6	39.3	9.7
0.198	57.6	63.7	47.6	53.7	47.9	37.9	9.7
0.230	56.8	62.4	45.6	52.4	47.1	35.9	9.7
0.298	54.0	60.3	41.3	50.3	44.3	31.6	9.7
0.330	51.7	59.5	37.0	49.5	42.0	27.3	9.7
0.574	43.2	56	30.8	46	33.4	21.0	9.8
0.646	43.7	56	30.5	46	33.9	20.7	9.8
0.686	43.8	56	31.1	46	34.0	21.3	9.8
Neutral							
Frequency MHz	QP		AV		QP	AV	Factor (dB)
	Level (dBuV)	Limit (dBuV)	Level (dBuV)	Limit (dBuV)	Reading (dBuV)	Reading (dBuV)	
0.162	58.1	65.4	49.5	55.4	48.4	39.8	9.7
0.206	56.8	63.4	44.5	53.4	47.1	34.8	9.7
0.230	56.5	62.4	45.9	52.4	46.8	36.2	9.7
0.262	56.4	61.4	43.0	51.4	46.7	33.3	9.7
0.294	54.5	60.4	41.6	50.4	44.8	31.9	9.7
0.330	52.5	59.5	38.0	49.5	42.8	28.3	9.7
0.362	48.9	58.7	34.8	48.7	39.2	25.1	9.7
0.394	46.8	58.0	31.8	48.0	37.1	22.1	9.7
0.494	45.6	56.1	33.3	46.1	35.9	23.6	9.7
0.582	43.3	56	31.7	46	33.5	21.9	9.8

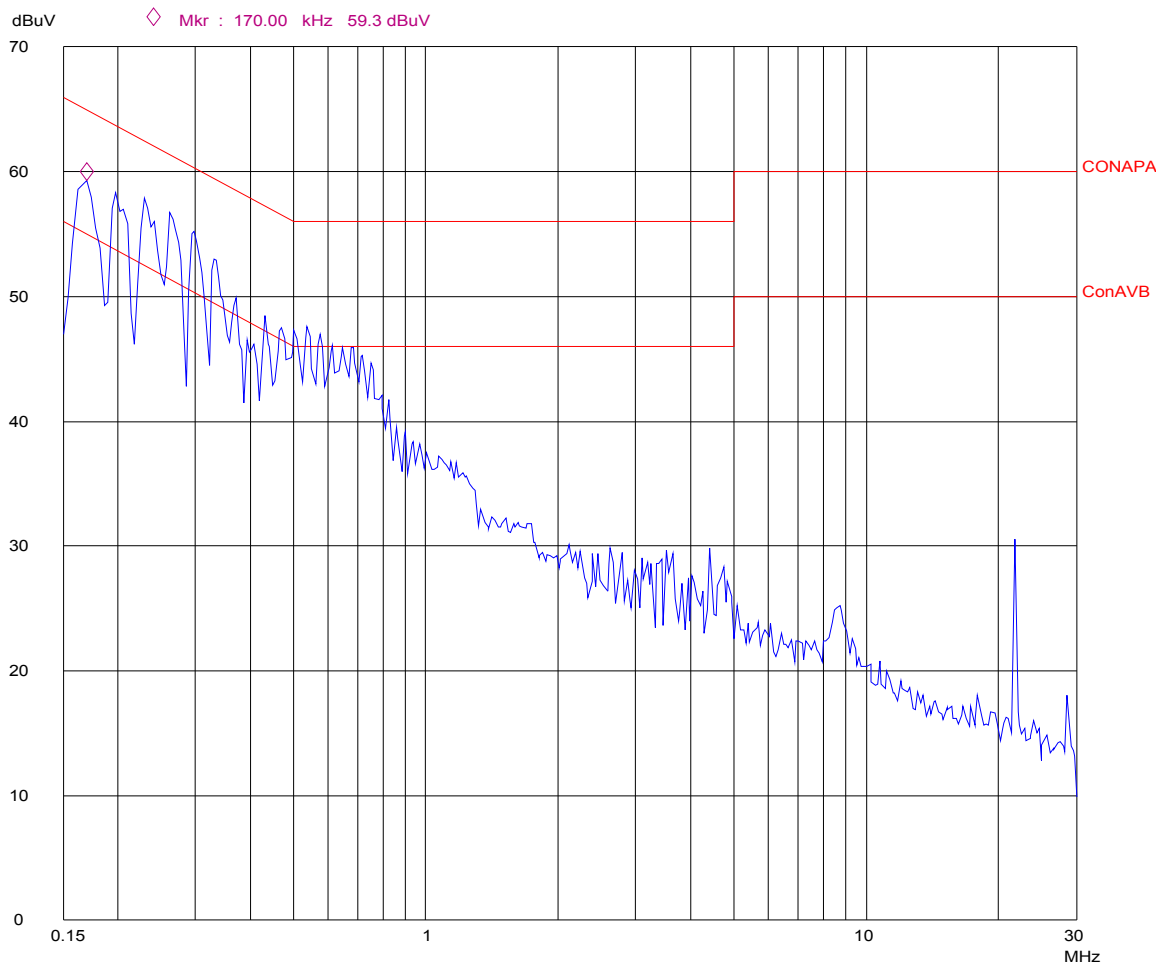
REMARKS: 1. Emission level(dBuV)=Read Value(dBuV) + Correction Factor(dB)

2. Correction Factor(dB) =LISN Factor (dB) + Cable Factor (dB)+Limiter Factor(dB)

3. The other emission levels were very low against the limit.

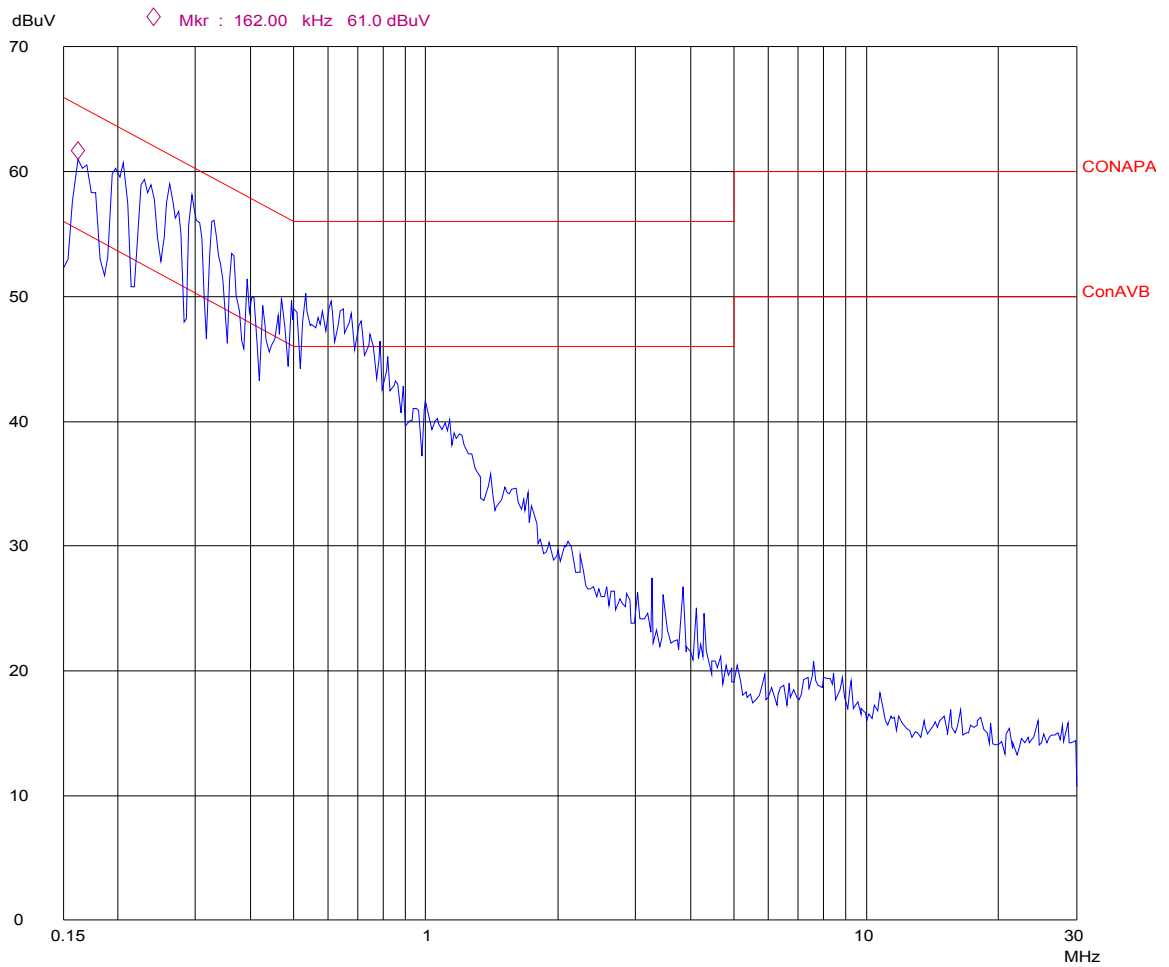
Conducted Disturbance

EUT: M/N:ZB4001(45856)
Op Cond: Tx
Test Spec: L
Comment: AC 120V/60Hz



Conducted Disturbance

EUT: M/N:ZB4001(45856)
Op Cond: Tx
Test Spec: N
Comment: AC 120V/60Hz



11. ANTENNA REQUIREMENTS

11.1. Applicable requirements

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

11.2. Antenna Connector

The EUT has not external antenna connector and built in monopole antenna which is integrated inside the enclosure.

11.3. Antenna Gain

The antenna gain of EUT is less than 6 dBi.