



FCC 47 CFR PART 15 SUBPART C TEST REPORT

For

Product Name: disco speaker

Brand Name: Soundlogic XT

Model No.: MDS-8/6094

Series Model: SY-TS01A,SY-TS01B,SYTS01C,SY-TS01D

FCC ID: 2AEAM-MDS

Test Report Number:

C150304R01-RPB

Issued for

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Issued by

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Revision History

Rev.	Issue Date	Report NO.	Effect Page	Contents
00	March 12, 2015	C150304R01-RPB	ALL	N/A



TABLE OF CONTENTS

1. TEST RESULT CERTIFICATION	5
2. EUT DESCRIPTION	6
3. TEST METHODOLOGY	7
3.1 EUT CONFIGURATION.....	7
3.2 EXERCISEEUT.....	7
3.3 GENERAL TEST PROCEDURES.....	7
3.4 TEST MODE.....	8
3.5 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS.....	9
4. INSTRUMENT CALIBRATION	10
5. FACILITIES AND ACCREDITATIONS.....	10
5.1 FACILITIES.....	10
5.2 EQUIPMENT.....	10
5.3 LABORATORY ACCREDITATIONS AND LISTING	10
5.4 TABLE OF ACCREDITATIONS	11
5.5 LIST OF MEASURING EQUIPMENT	12
5.6 SETUP CONFIGURATION	13
5.7 SUPPORT EQUIPMENT	13
6. FCC PART 15.247 REQUIREMENTS	14
6.1 PEAK POWER.....	14
6.2 20DB BANDWIDTH MEASUREMENT	16
6.3 HOPPING CHANNEL SEPARATION.....	21
6.4 NUMBER OF HOPPING FREQUENCY	24
6.5 TIME OF OCCUPANCY (DWELL TIME).....	26
6.6 CONDUCTED BAND EDGES MEASUREMENT	31
6.7 CONDUCTED SPURIOUS EMISSION MEASUREMENT	38
6.8 RADIATED BAND EDGE AND SPURIOUS EMISSION MEASUREMENT	45
6.9 POWERLINE CONDUCTED EMISSIONS	56



SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result
3.1	15.247(a)(1)	Number of Channels	≥ 15 Channels	Pass
3.2	15.247(a)(1)	Hopping Channel Separation	$\geq 2/3$ of 20dB BW	Pass
3.3	15.247(a)(1)	Dwell Time of Each Channel	≤ 0.4 sec in 31.6sec period	Pass
3.4	15.247(a)(1)	20dB Bandwidth	NA	Pass
3.5	15.247(b) (1)	Peak Output Power	≤ 125 mW	Pass
3.6	15.247(d)	Conducted Band Edges and Spurious Emission	≤ 20 dBc	Pass
3.7	15.247(d)	Radiated Band Edges and Spurious Emission	15.209(a) & 15.247(d)	Pass
3.8	15.207	AC Conducted Emission	15.207(a)	Pass
3.9	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass



1. TEST RESULT CERTIFICATION

Product Name:	disco speaker
Trade Name:	Soundlogic XT
Model Name:	MDS-8/6094
Series Model:	SY-TS01A,SY-TS01B, SYTS01C,SY-TS01D
Applicant Discrepancy:	Initial
Device Category:	Mobile unit
Date of Test:	March 9, 2015 to March 11, 2015
Applicant:	ShenZhen ShiYi Technology Co.,Ltd. Unite B,3/F.,Building 29,Yintian Industrial Zone, XiXiang, Baoan District,Shen zhen,China
Manufacturer:	ShenZhen ShiYi Technology Co.,Ltd. Unite B,3/F.,Building 29,Yintian Industrial Zone, XiXiang, Baoan District,Shen zhen,China
Application Type:	Certification

APPLICABLE STANDARDS

STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart C	No non-compliance noted

The above equipment was tested by Compliance Certification Services Inc. 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 the requirements of FCC Rules Part 15.207, 15.209, 15.247.

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

Approved by:

Tested by:

Jeff.Fang
RF Manager
Compliance Certification Services Inc.

James.yan
Test Engineer
Compliance Certification Services Inc.



2. EUT DESCRIPTION

Product Name:	disco speaker
Trade Name:	Soundlogic XT
Model Name:	MDS-8/6094
Series Model:	SY-TS01A,SY-TS01B, SYTS01C,SY-TS01D
Model Discrepancy:	Just model names are different for the marketing requirement.
Power Adapter Power Rating :	Input: DC5.0V
Frequency Range :	Bluetooth:2402 ~ 2480 MHz
Transmit Power :	2.99dBm(1.99mW)
Modulation Technique :	FHSS
Transmit Data Rate :	GFSK(1 Mbps), $\pi/4$ -DQPSK(2 Mbps),8-DPSK(3 Mbps)
Number of Channels :	79 Channels
Antenna Specification :	PCB Antenna
Antenna Specification:	0 dBi

Remark:

1. This submittal(s) (test report) is intended for **FCC ID: 2AEAM-MDS** filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.



3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 15.207, 15.209 and 15.247.

3.1 EUT CONFIGURATION

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

3.2 EXERCISE EUT

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4.



3.4 TEST Mode

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	Data Rate	Channel	Antenna
Peak Output Power	GFSK	1 Mbps	0/39/78	1
	8DPSK	3 Mbps		
Hopping Channel Bandwidth	GFSK	1 Mbps	0/39/78	1
	8DPSK	3 Mbps		
Hopping Channel Separation	GFSK	1 Mbps	38-39	1
	8DPSK	3 Mbps		
Number of Hopping Frequency	GFSK	1 Mbps	0-78	1
	8DPSK	3 Mbps		
Dwell Time	DH1/DH3/DH5	1 Mbps	39	1
	3DH1/3DH3/3DH5	3 Mbps		
Spurious Emission	GFSK	1 Mbps	0/39/78	1
	8DPSK	3 Mbps		
Band Edge Emissions	GFSK	1 Mbps	0/78	1
	8DPSK	3 Mbps		
Radiated Emissions Below 1GHz	GFSK	1 Mbps	78	1
Radiated Emissions Above 1GHz	GFSK	1 Mbps	0/39/78	1
	8DPSK	3 Mbps		
AC Power Conducted Emissions	CTX	-	-	-

Remark: For radiated test cases below 1 GHz, the worst mode data rate channel 78 of 1Mbps was reported only, because this data rate has the highest RF output power at preliminary tests.



3.5 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.0900 - 0.1100	16.420 - 16.423	399.9 - 410.0	4.50 - 5.15
0.4950 - 0.505 ⁽¹⁾	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960.0 - 1240	7.25 - 7.75
4.1250 - 4.1280	25.50 - 25.67	1300 - 1427	8.025 - 8.500
4.17725 - 4.17775	37.50 - 38.25	1435.0 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73.0 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.2150 - 6.2180	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108.00 - 121.94	1718.8 - 1722.2	13.25 - 13.40
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.50
8.2910 - 8.2940	149.90 - 150.05	2310 - 2390	15.35 - 16.20
8.3620 - 8.3660	156.52475 - 156.52525	2483.5 - 2500.0	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.1700	3260 - 3267	23.6 - 24.0
12.2900 - 12.2930	167.72 - 173.20	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345 - 3358	36.43 - 36.5 ⁽²⁾
12.57675 - 12.57725	322.0 - 335.4	3600 - 4400	
13.3600 - 13.4100			

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

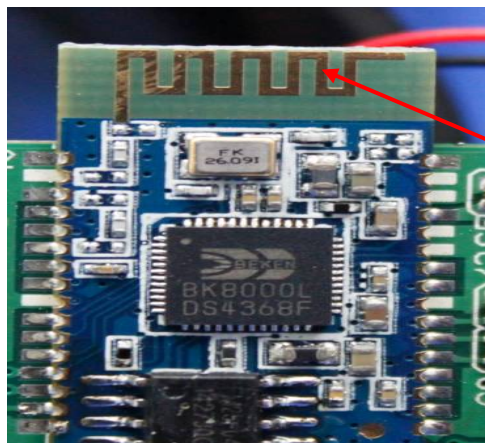
(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

3.6 Antenna Description

According to FCC 47 CFR 15.203

“an intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached or an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section”

As the photo below, the EUT use a permanently attached antenna, so the EUT complies with the requirement of 15.203.



BT Antenna



4. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards. facilities and accreditations

5. FACILITIES AND ACCREDITATIONS

5.1 FACILTIES

All measurement facilities used to collect the measurement data are located at CCS China Kunshan Lab at 10#Weiye Rd, Innovation Park Eco. & Tec. Development Zone Kunshan city JiangSu, (215300), CHINA.

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22.

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

5.3 LABORATORY ACCREDITATIONS AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by American Association for Laboratory Accreditation Program for the specific scope accreditation under Lab Code: 200581-0 to perform Electromagnetic Interference tests according to FCC Part 15 or 18 requirements. In addition, the test facilities are listed with Federal Communication Commission, Laboratory Division, 424105 for 10m chamber, 238958 for 3m chamber .



5.4 TABLE OF ACCREDITATIONS

Our laboratories are accredited and approved by the following accreditation body according to ISO/IEC 17025.

Taiwan	TAF
USA	A2LA

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada	Industry Canada
Japan	VCCI
Taiwan	BSMI
USA	FCC

Copies of granted accreditation certificates are available for downloading from our web site, <http://www.ccsrf.com>



5.5 LIST OF MEASURING EQUIPMENT

Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	RS	FSU26	200789	2015-8-11
Spectrum Analyzer	Agilent	E4446A	MY44020154	2015-4-9
DETECTOR NEGATIVE	Agilent	8473B	MY42240176	2015-5-11
OSCILLOSCOPE	Agilent	DSO6104A	MY44002585	2016-3-15
Power Sensor	Anritsu	MA2411A	0917072	2015-6-3
Power Meter	Aglient	U2021XA	MY53120005	2015-9-12
Power SPLITTER	Mini-Circuits	ZN2PD-9G	SF078500430	N.C.R
DC Power Supply	AGILENT	E3632A	MY50340053	N.C.R
Temp. / Humidity Chamber	TERCHY	MHK-120AK	X30109	2016-1-21
Test Software	EZ-EMC			

977 Chamber				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	2015-11-11
EMI Test Receiver	R&S	ESCI	101378	2016-1-21
Pre-Amplifier	MINI	ZFL-1000VH2	d041703	2016-1-21
Pre-Amplifier	Miteq	JS41-00101800-32-10P	1675713	2016-1-21
Bilog Antenna	Sunol	JB1	A062604	2016-3-5
Horn-antenna	SCHWARZBECK	BBHA9120D	D:266	2016-3-6
Turn Table	CT	CT123	4165	N.C.R
Antenna Tower	CT	CTERG23	3256	N.C.R
Controller	CT	CT100	95637	N.C.R
Test Software	EZ-EMC			

Conducted Emission				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI TEST RECEIVER	R&S	ESCI	100781	2016-3-15
V (V-LISN)	SCHWARZBECK	NNLK 8129	8129-143	N.C.R
LISN (EUT)	FCC	FCC-LISN-50/250-50-2-02	05012	2016-3-15
Pulse LIMITER	R&S	ESH3-Z2	100524	2015-9-24
Test Software	EZ-EMC			

Remark: Each piece of equipment is scheduled for calibration once a year.



5.6 SETUP CONFIGURATION

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

5.7 SUPPORT EQUIPMENT

No.	Device Type	Brand	Model	Series No.	FCC ID
1.	Notebook	DELL	E5430	CN8YYW1	N/A

Remark:

- 1.All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2.Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.



6. FCC PART 15.247 REQUIREMENTS

6.1 PEAK POWER

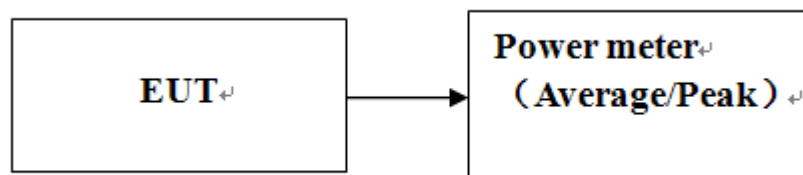
Limit

The maximum peak output power of the intentional radiator shall not exceed the following:

1. According to §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.
2. According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 Watt.
3. According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Remark: Each piece of equipment is scheduled for calibration once a year.

Test Configuration



Test Procedure

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v03r02.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

**Test Results***No non-compliance noted***Test RESULTS****1M GFSK Modulation mode**

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (mW)	Limit (mW)	Result
Low	2402	2.99	1.99	125	PASS
Mid	2441	2.34	1.71		PASS
High	2480	1.55	1.43		PASS

3M 8-DPSK Modulation mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (mW)	Limit (mW)	Result
Low	2402	2.62	1.83	125	PASS
Mid	2441	2.04	1.60		PASS
High	2480	1.25	1.33		PASS

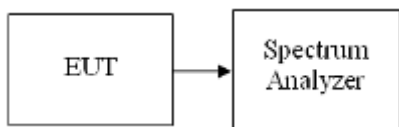


6.2 20DB BANDWIDTH MEASUREMENT

Limit

According to §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Test Configuration



Test Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 30kHz, VBW = 300kHz, Span = 2MHz, Sweep = auto.
4. Max hold, mark 2 peaks of hopping channel and record the 2 peaks frequency.



Test Results of Bandwidth

No non-compliance noted

Operation Mode:	1 Mbps	Test Date:	March 11, 2015
Temperature:	24°C	Tested by:	James.Yan

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
00	2402	1.101
39	2441	1.096
78	2480	1.096

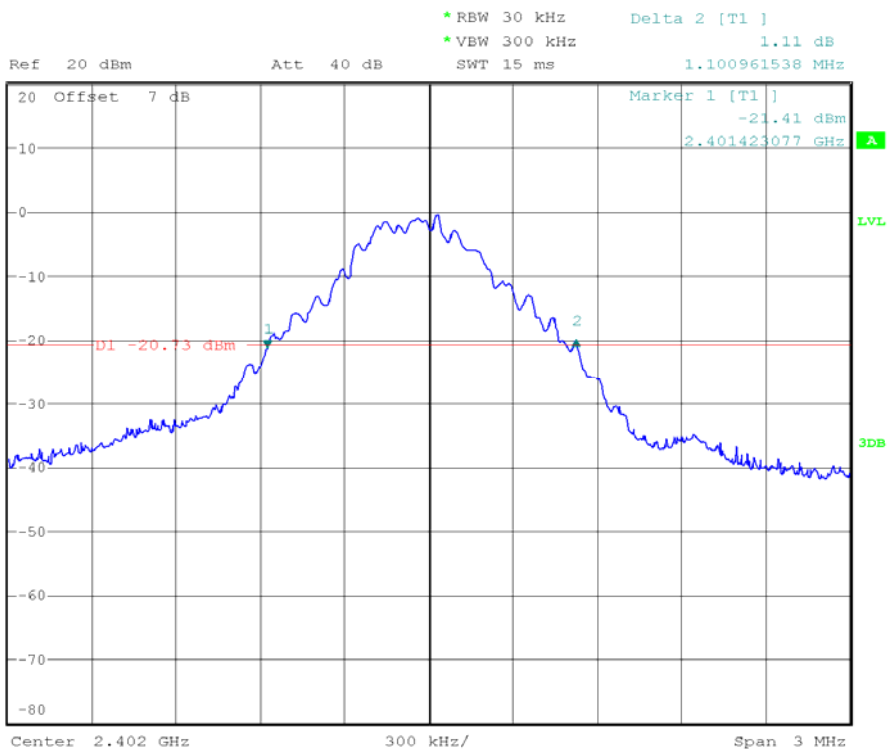
Operation Mode:	3 Mbps	Test Date:	March 11, 2015
Temperature:	24°C	Tested by:	James.Yan

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
00	2402	1.346
39	2441	1.351
78	2480	1.346

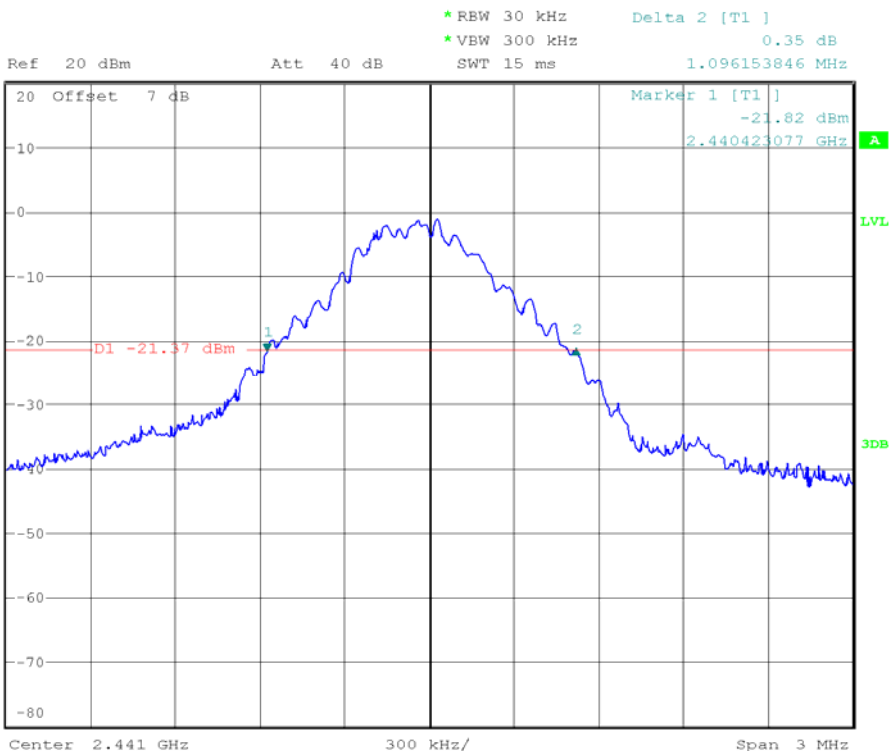


Test Plot

1M Channel 00

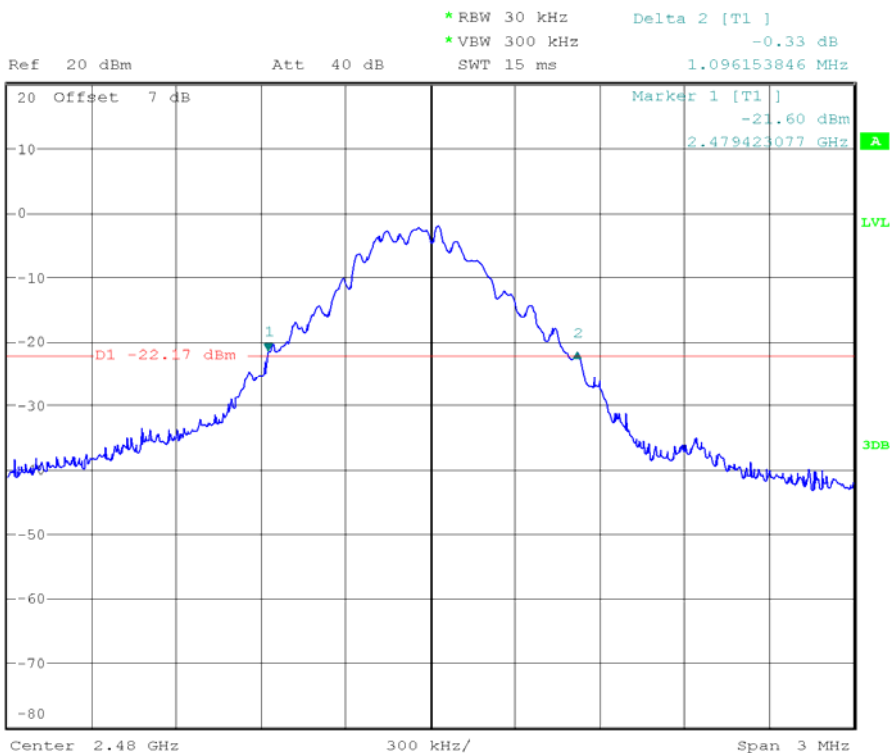


1M Channel 39

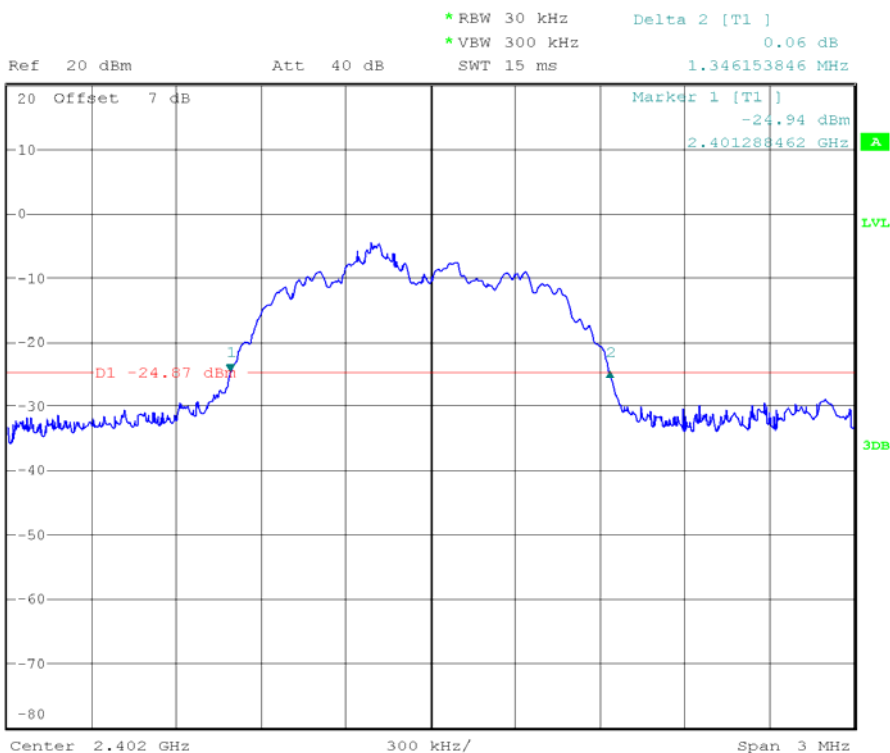




1M Channel 78

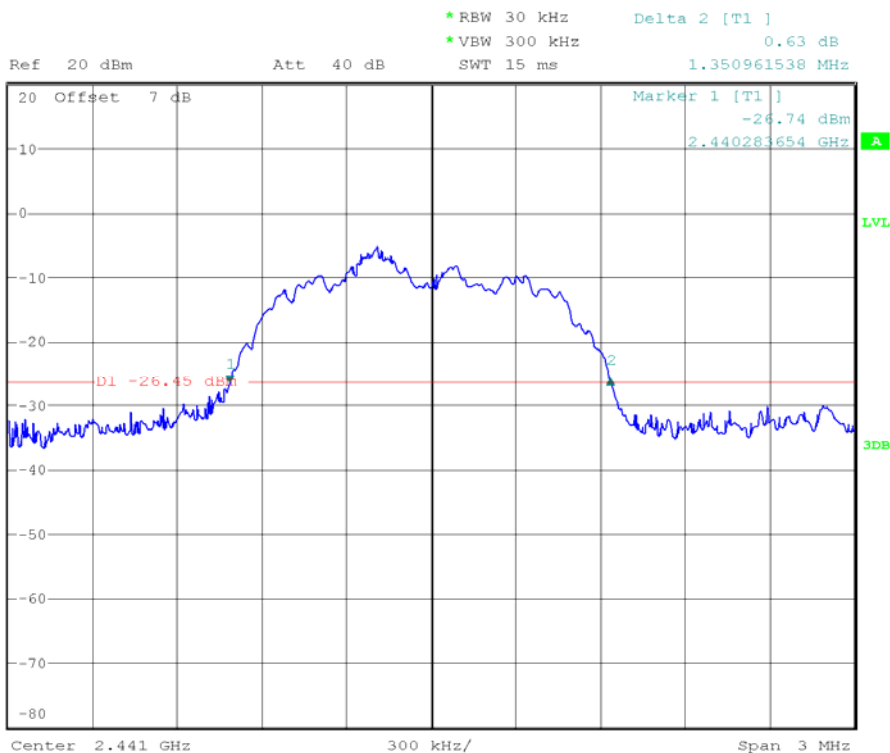


3M Channel 00

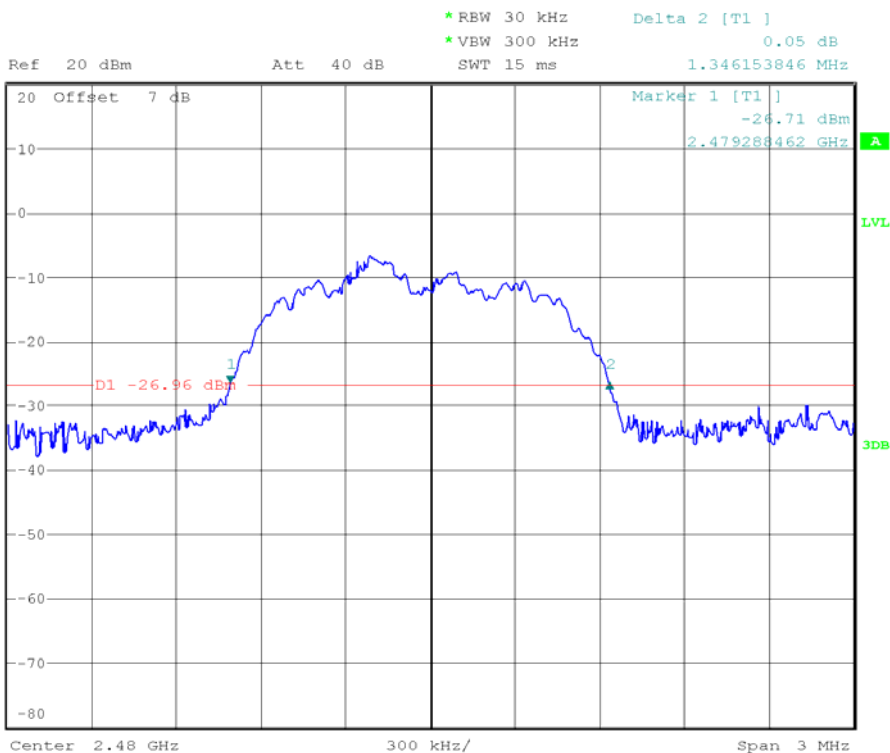




3M Channel 39



3M Channel 78



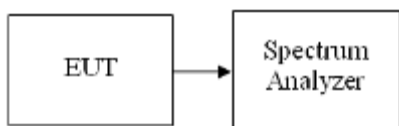


6.3 HOPPING CHANNEL SEPARATION

LIMIT

According to §15.247(a)(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = middle of hopping channel.
4. Set the spectrum analyzer as RBW = 30kHz, VBW = 100kHz, Span = 3MHz, Sweep = auto.
5. Max hold, mark 2 peaks of hopping channel and record the 2 peaks frequency.



Compliance Certification Services Inc.

Report No: C150304R01-RPB

FCC ID: 2AEAM-MDS

Date of Issue :March 12, 2015

TEST RESULTS

No non-compliance noted

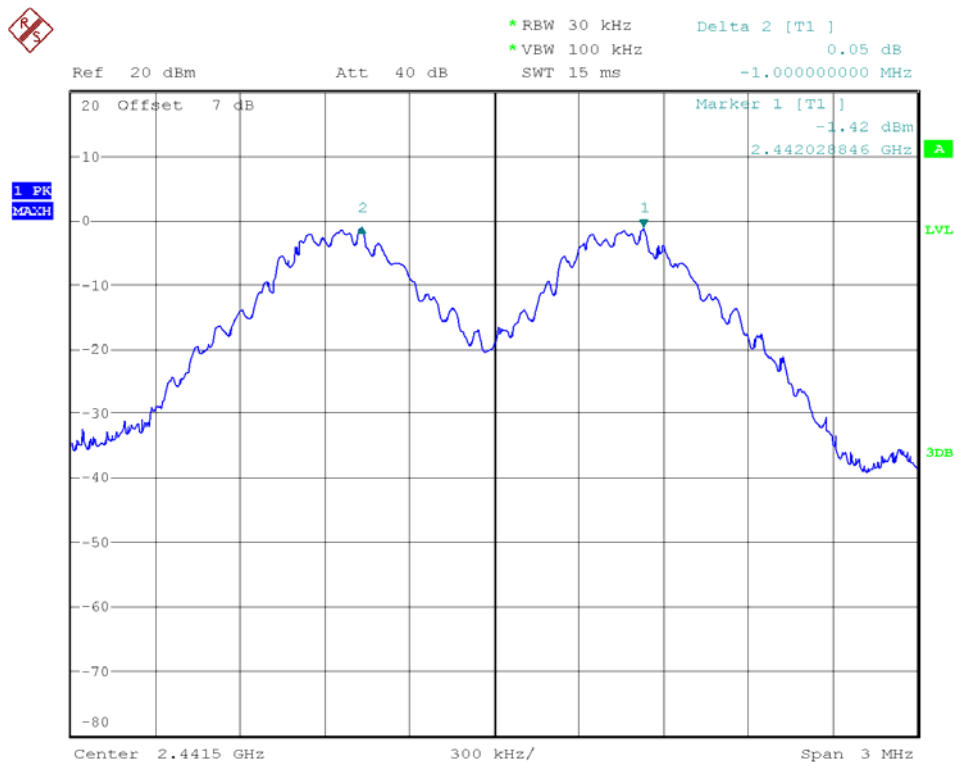
Operation Mode:	1 Mbps	Test Date:	March 11, 2015
Temperature:	24°C	Tested by:	James.Yan

Channel	Frequency	Separation	(2/3 of 20dB BW)	Result
	(MHz)	(MHz)	Limits (MHz)	
39~40	2441~2442	1.000	0.734	Pass

Operation Mode:	3 Mbps	Test Date:	March 11, 2015
Temperature:	24°C	Tested by:	James.Yan

Channel	Frequency	Separation	(2/3 of 20dB BW)	Result
	(MHz)	(MHz)	Limits (MHz)	
39~40	2441~2442	1.000	0.901	Pass

1M Channel Separation Plot on Channel 39-40





3M Channel Separation Plot on Channel 39-40



*RBW 30 kHz
*VBW 100 kHz
SWT 15 ms

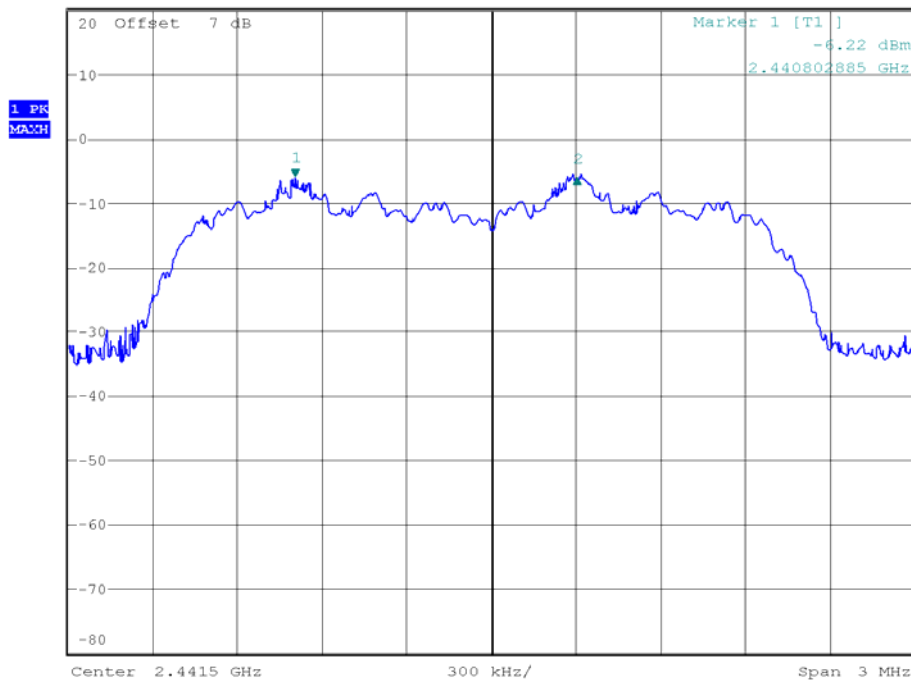
Delta 2 [T1]

-0.06 dB

999.999999999 kHz

Ref 20 dBm

Att 40 dB



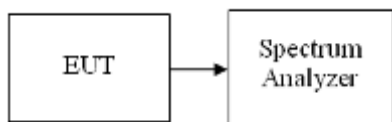


6.4 NUMBER OF HOPPING FREQUENCY

LIMIT

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands shall use at least 15 hopping frequencies.

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set spectrum analyzer Start=2400MHz, Stop = 2483.5MHz, Sweep = auto.
4. Set the spectrum analyzer as RBW, VBW=1MHz.
5. Max hold, view and count how many channel in the band.

TEST RESULTS

No non-compliance noted

Test Data

Operation Mode:	1 Mbps	Test Date:	March 11, 2015
Temperature:	24°C	Tested by:	James.Yan

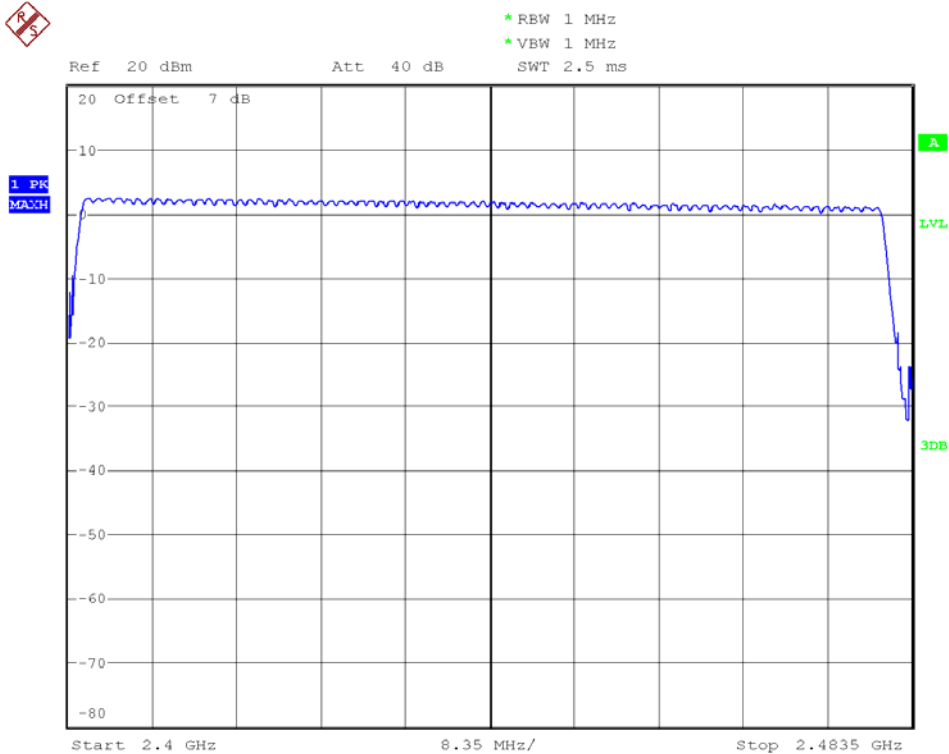
Result (No. of CH)	Limit (No. of CH)	Result
79	>15	PASS

Operation Mode:	3 Mbps	Test Date:	March 11, 2015
Temperature:	24°C	Tested by:	James.Yan

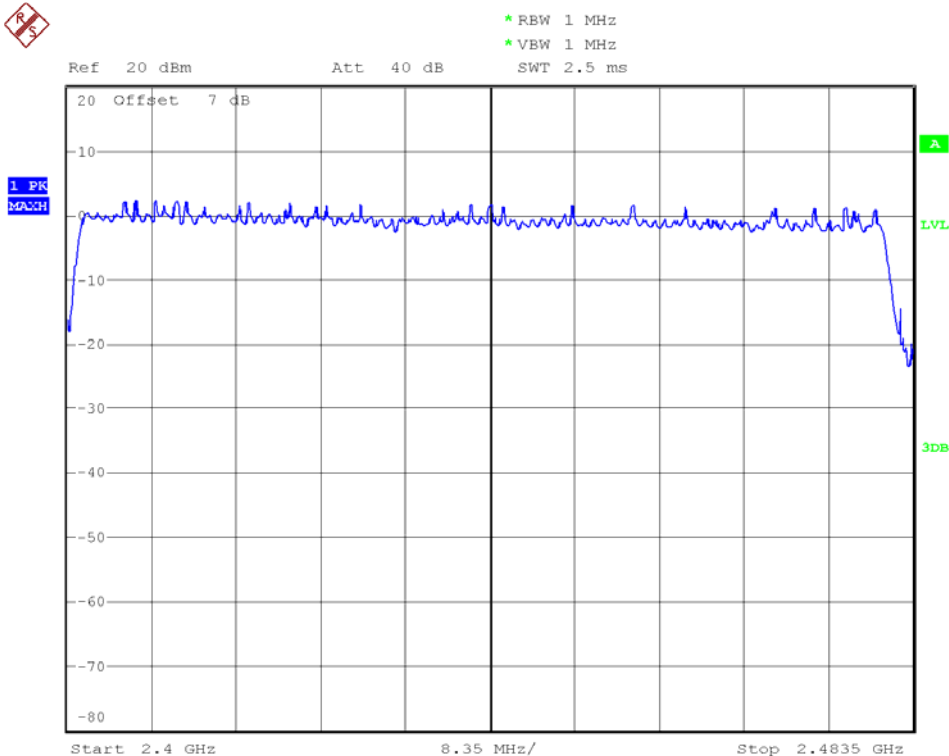
Result (No. of CH)	Limit (No. of CH)	Result
79	>15	PASS



Test Plot:1M



Test Plot:3M



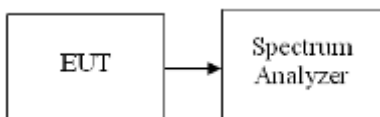


6.5 TIME OF OCCUPANCY (DWELL TIME)

LIMIT

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands. The average time of occupancy on any channels shall not greater than 0.4 s within a period 0.4 s multiplied by the number of hopping channels employed.

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW, VBW=1MHz, Span = 0Hz, Sweep = auto.
5. Repeat above procedures until all frequency measured were complete.

TEST RESULTS

No non-compliance noted

Test Data

1M

DH 1

$$0.535 * (1600/2)/79 * 31.6 = 171.20(\text{ms})$$

Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
0.535	171.20	31.60	400	PASS

DH 3

$$1.659 * (1600/4)/79 * 31.6 = 265.44 (\text{ms})$$

Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
1.659	265.44	31.60	400	PASS

DH 5

$$2.965 * (1600/6)/79 * 31.6 = 316.27 (\text{ms})$$

Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
2.965	316.27	31.60	400	PASS



Compliance Certification Services Inc.

Report No: C150304R01-RPB

FCC ID: 2AEAM-MDS

Date of Issue :March 12, 2015

3M

DH 1

$$0.394 * (1600/2)/79 * 31.6 = 126.08 \text{ (ms)}$$

Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
0.394	126.08	31.60	400	PASS

DH 3

$$1.667 * (1600/4)/79 * 31.6 = 266.72 \text{ (ms)}$$

Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
1.667	266.72	31.60	400	PASS

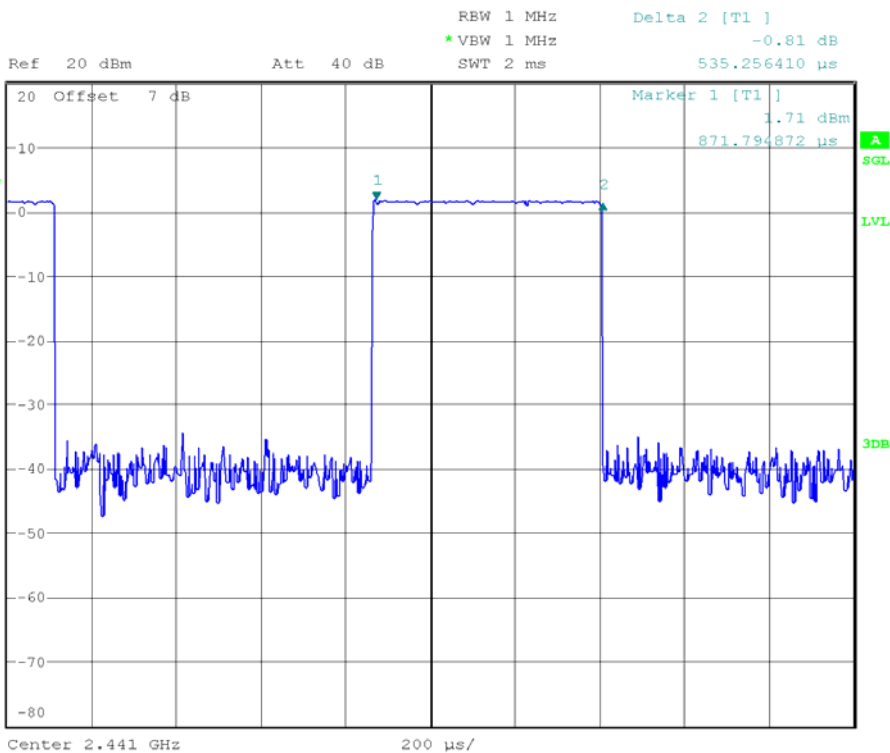
DH 5

$$2.804 * (1600/6)/79 * 31.6 = 299.09 \text{ (ms)}$$

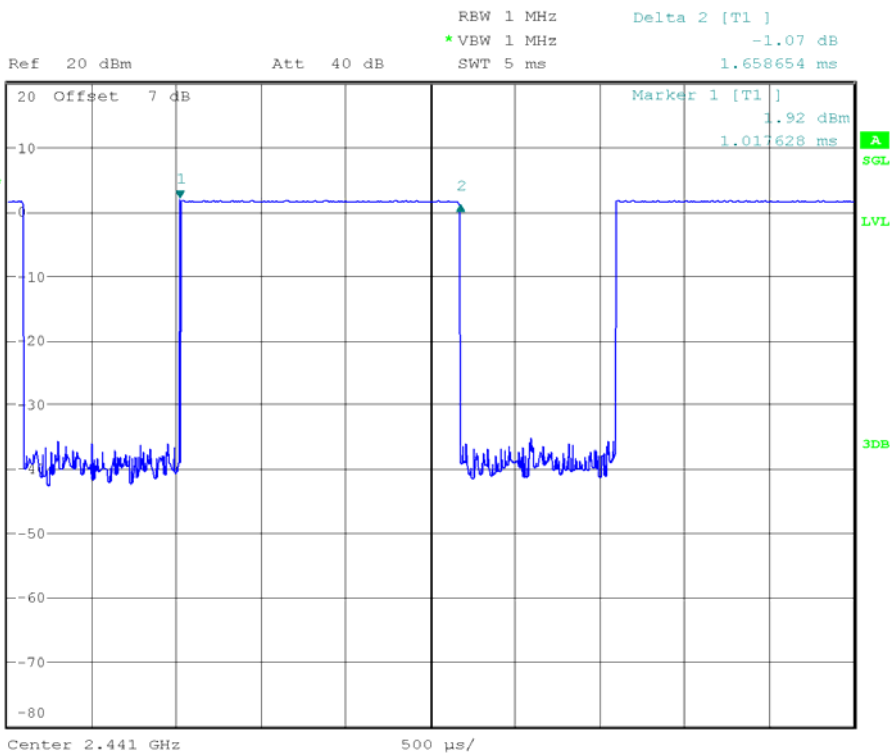
Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
2.804	299.09	31.60	400	PASS



1M-DH1

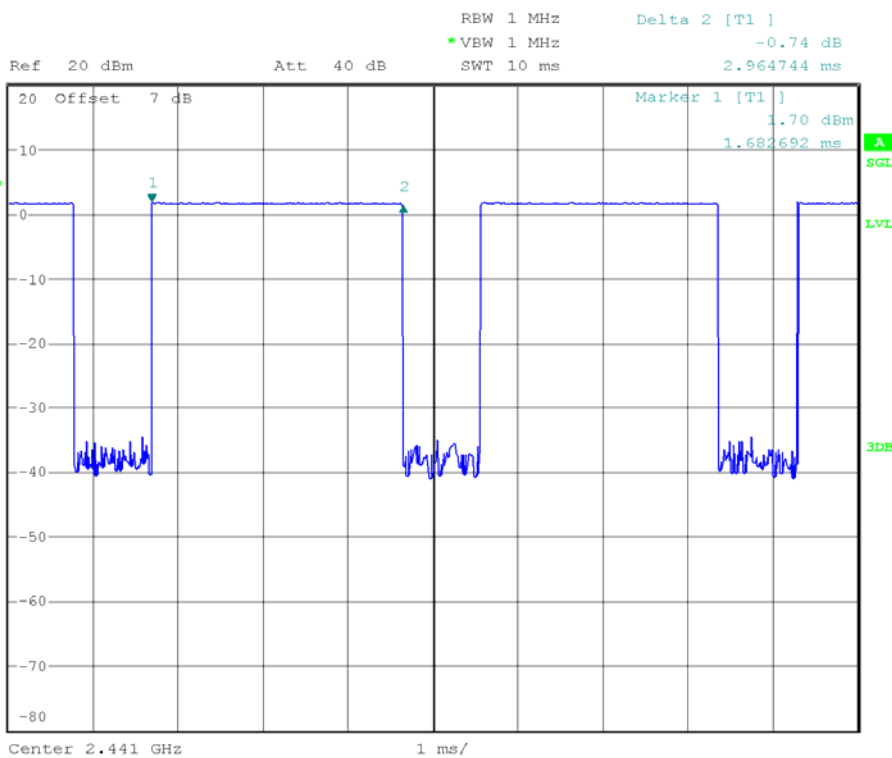


1M-DH3

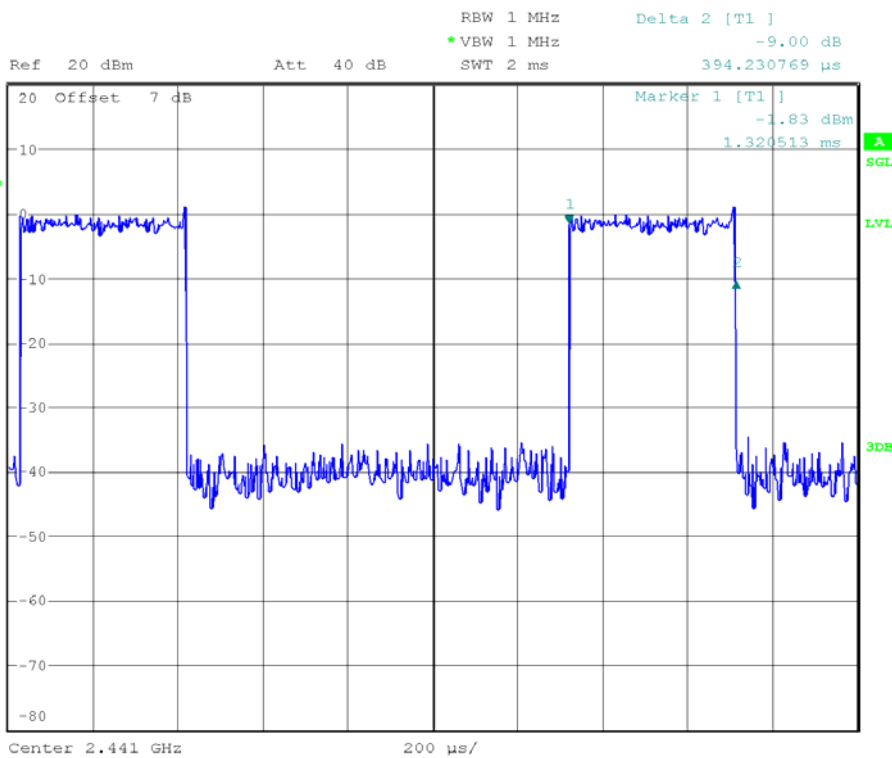




1M-DH5



3M-DH1





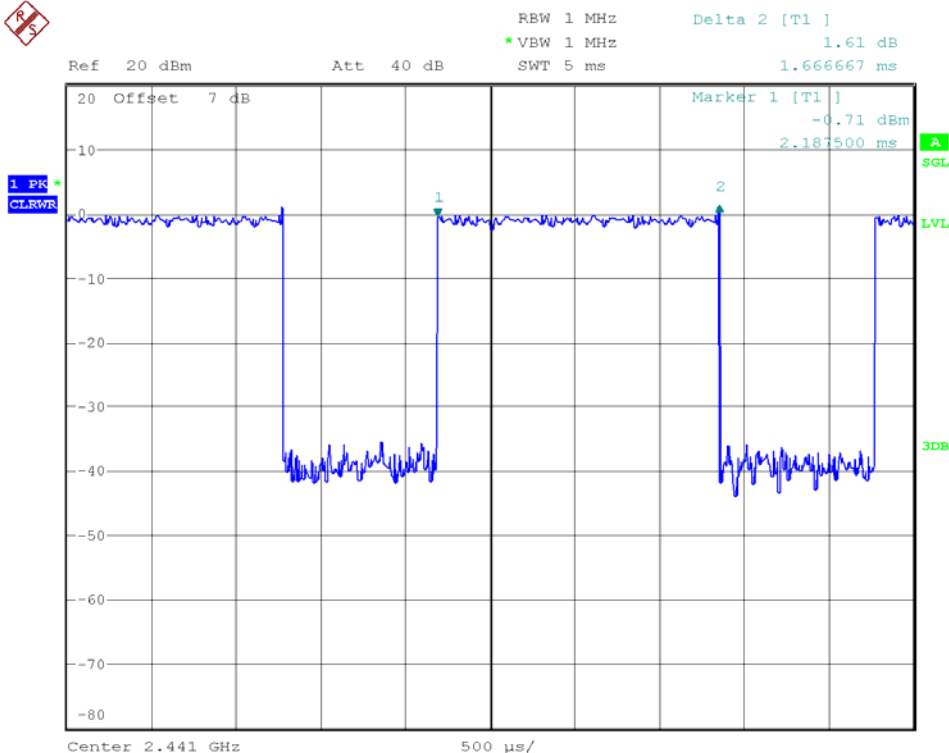
Compliance Certification Services Inc.

Report No: C150304R01-RPB

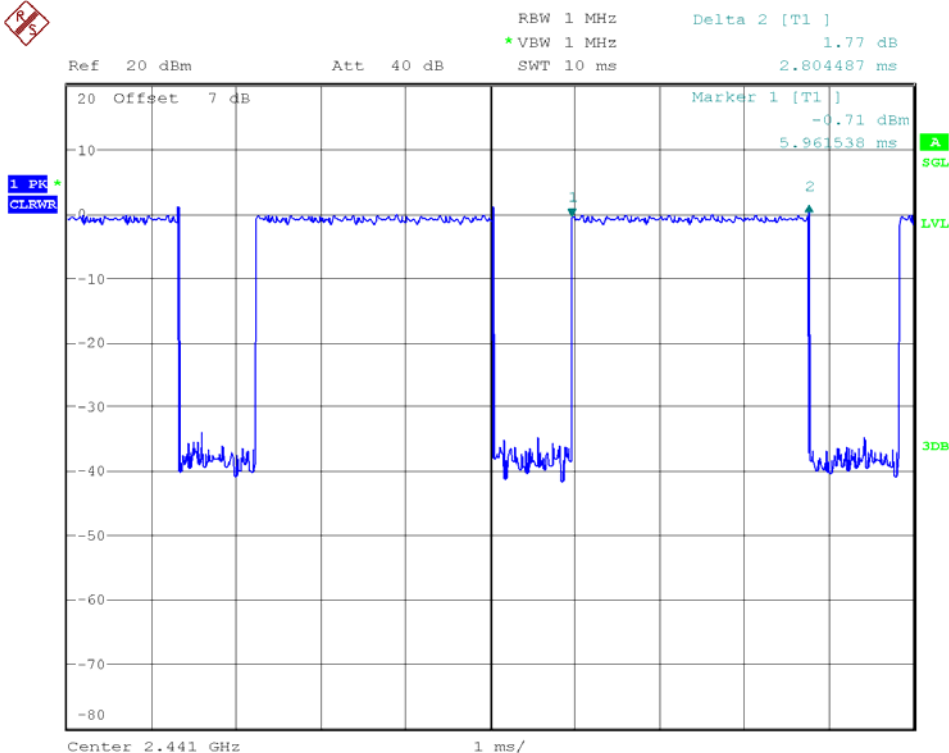
FCC ID: 2AEAM-MDS

Date of Issue :March 12, 2015

3M-DH3



3M-DH5



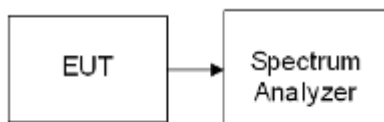


6.6 Conducted Band Edges Measurement

LIMIT

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

Test Configuration



TEST PROCEDURE

1. The testing follows the guidelines in Band-edge Compliance of RF Conducted Emissions of FCC Public Notice DA 00-705 Measurement Guidelines.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Set RBW = 100kHz ($\geq 1\%$ span=10MHz), VBW = 300kHz (≥ 3 RBW). Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100kHz RBW. The attenuation shall be 30 dB instead of 20 dB when RMS conducted output power procedure is used.
4. Enable hopping function of the EUT and then repeat step 2. and 3.
5. Measure and record the results in the test report.

TEST RESULTS

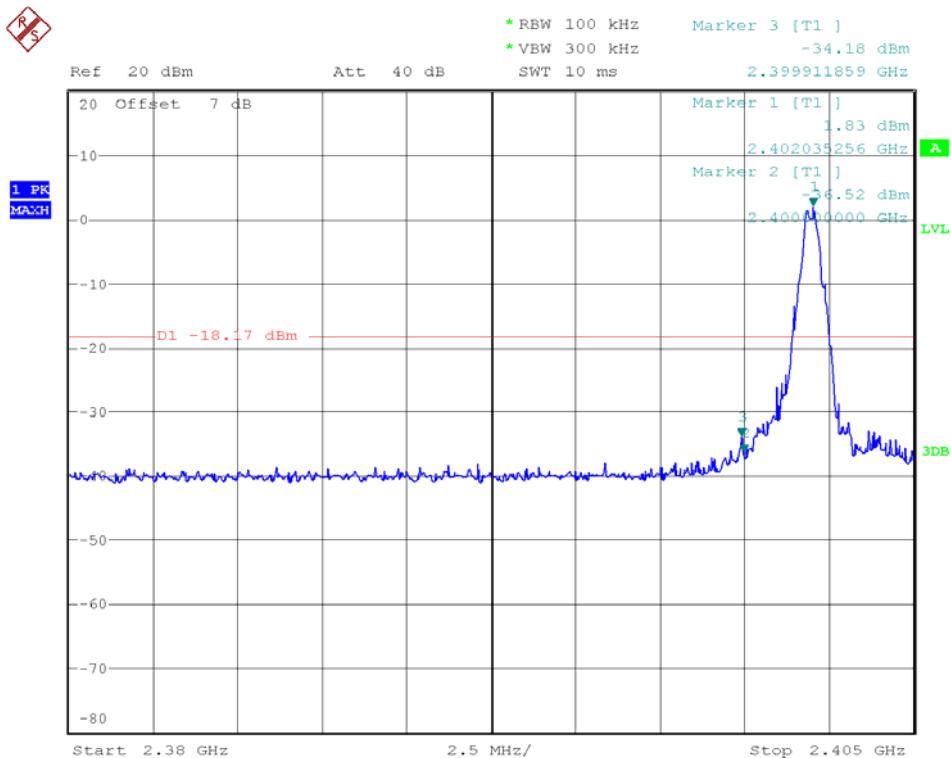
No non-compliance noted



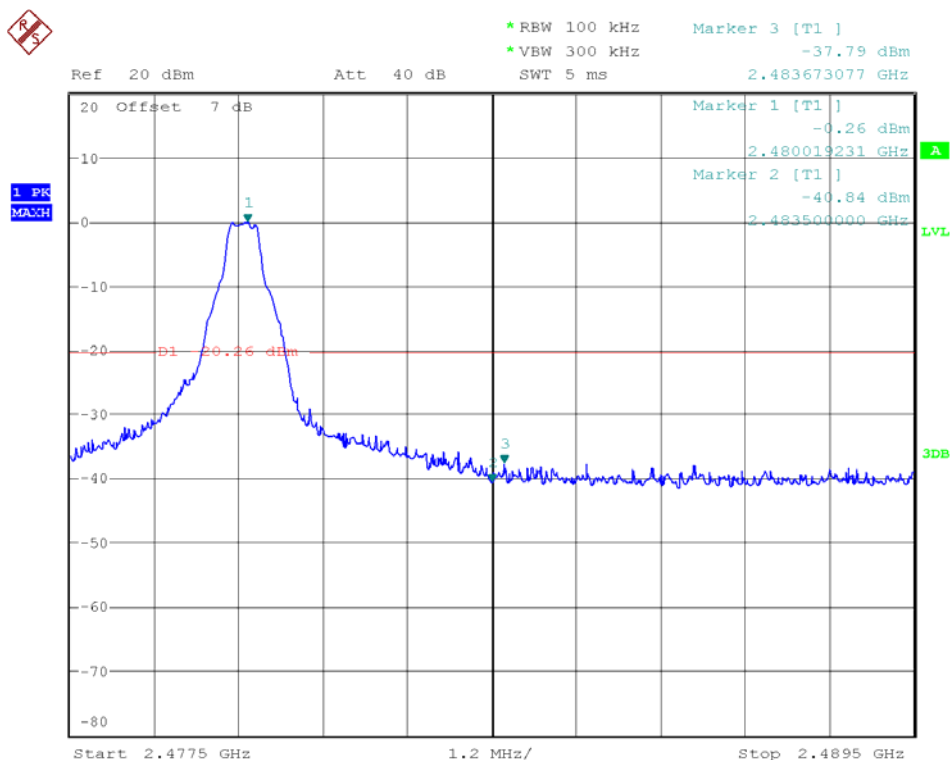
Test Result of Conducted Band Edges

Operation Mode:	1 Mbps	Test Date:	March 11, 2015
Test Channel:	00 and 78	Tested by:	James.Yan
Humidity:	52 % RH	Temperature:	24°C

Low Band Edge Plot on Channel 00



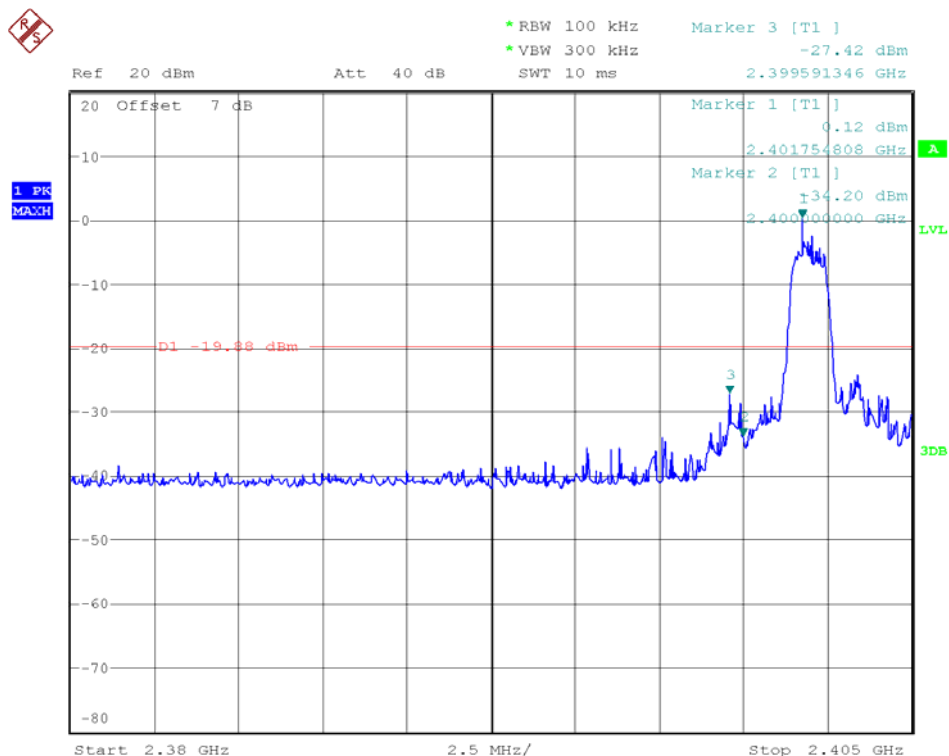
High Band Edge Plot on Channel 78



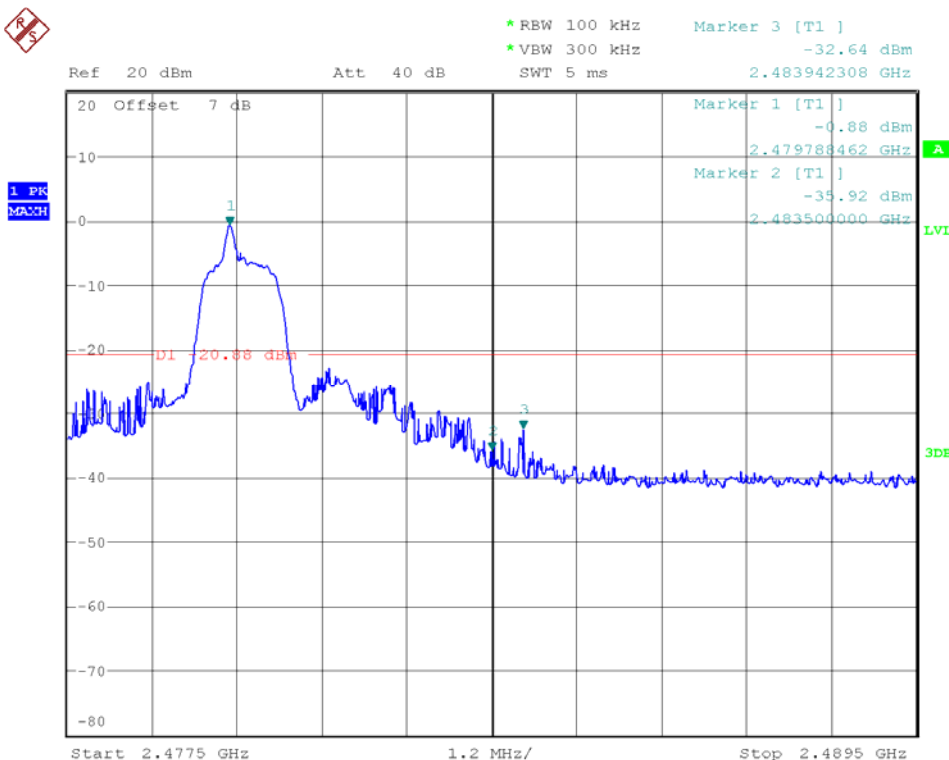


Operation Mode:	2 Mbps	Test Date:	March 11, 2015
Test Channel:	00 and 78	Tested by:	James.Yan
Humidity:	52 % RH	Temperature:	24°C

Low Band Edge Plot on Channel 00



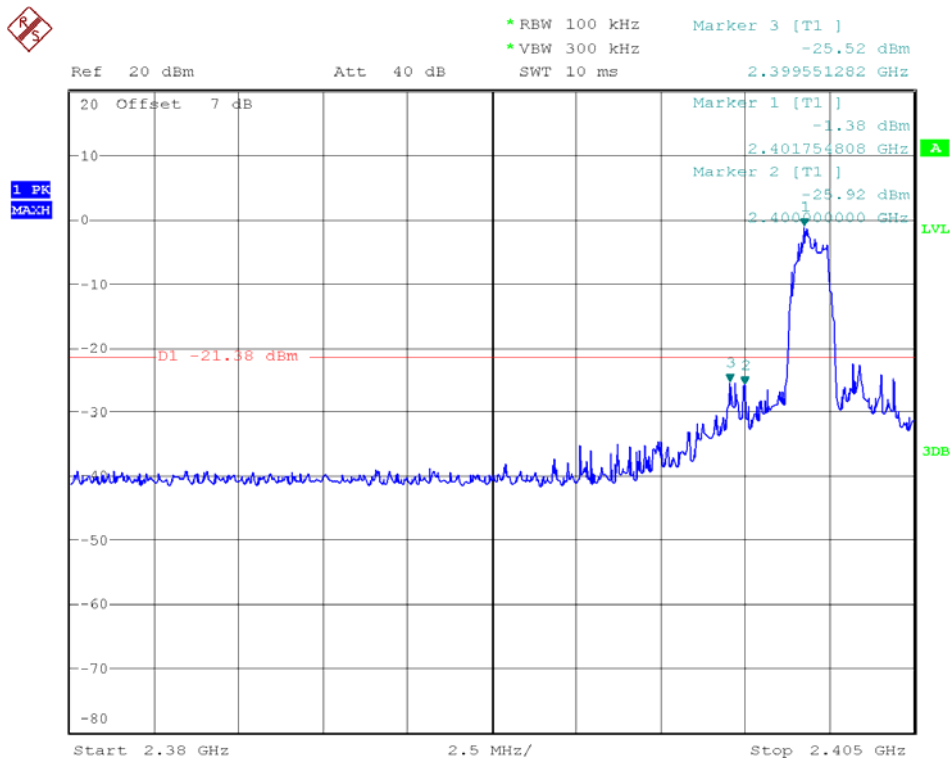
High Band Edge Plot on Channel 78



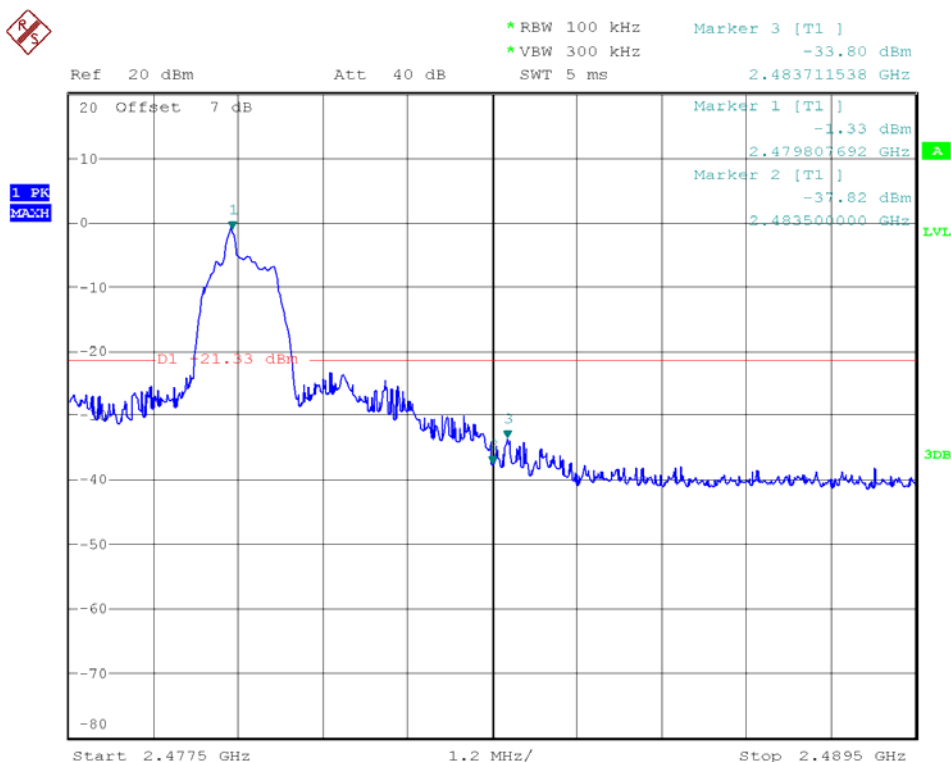


Operation Mode:	3 Mbps	Test Date:	March 11, 2015
Test Channel:	00 and 78	Tested by:	James.Yan
Humidity:	52 % RH	Temperature:	24°C

Low Band Edge Plot on Channel 00



High Band Edge Plot on Channel 78

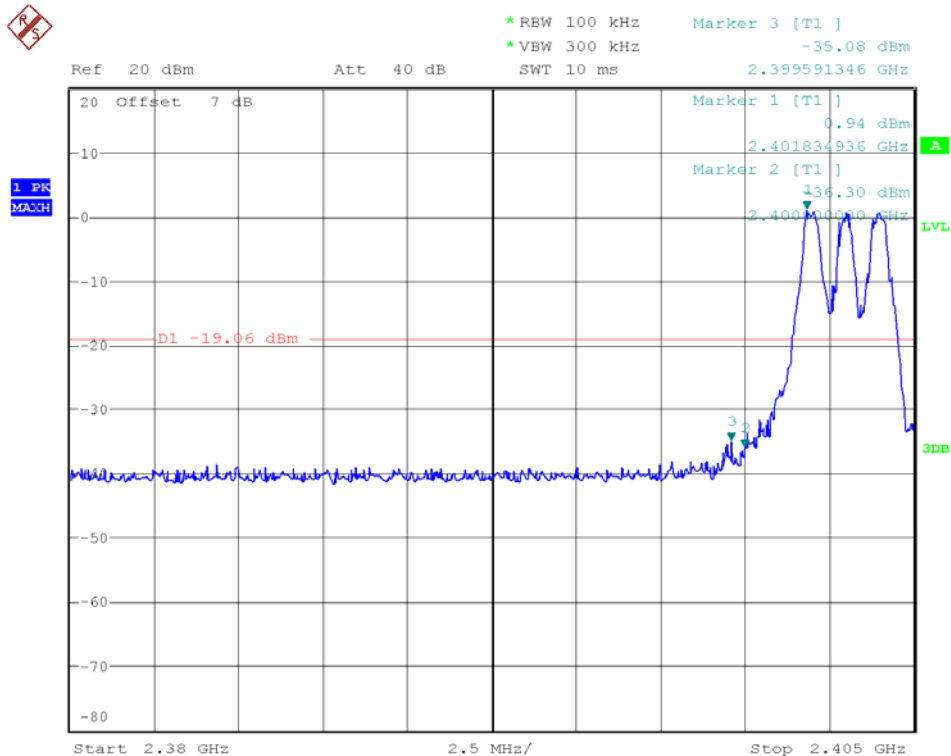




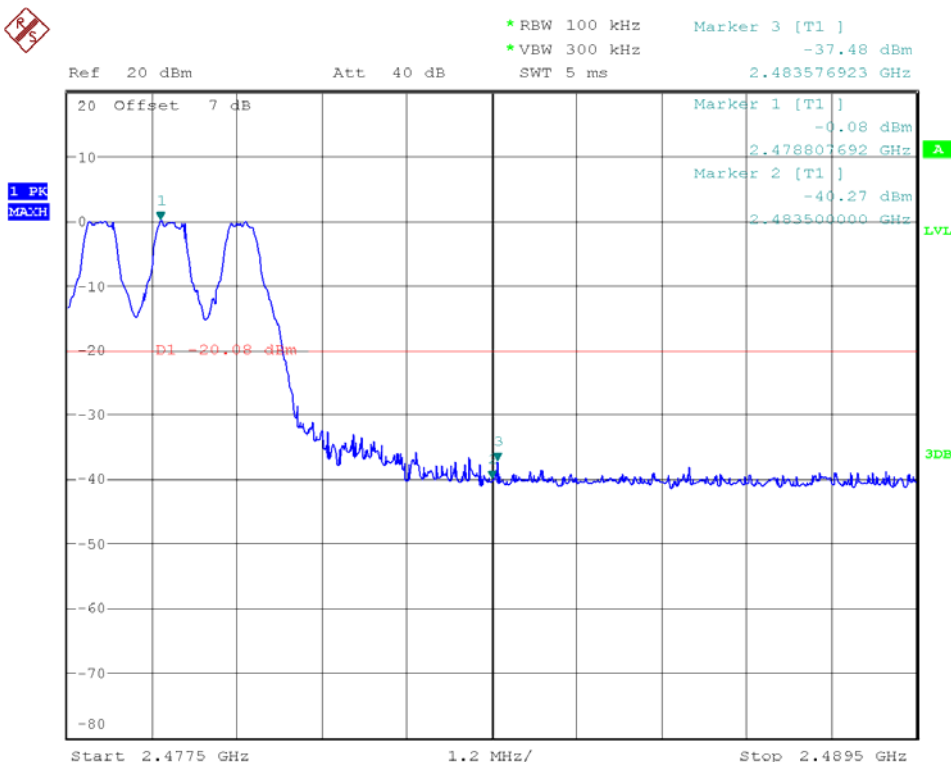
Test Result of Conducted Hopping Mode Band Edges

Operation Mode:	1 Mbps	Test Date:	March 11, 2015
Humidity:	52 % RH	Temperature:	24°C

1Mbps Hopping Mode Low Band Edge Plot



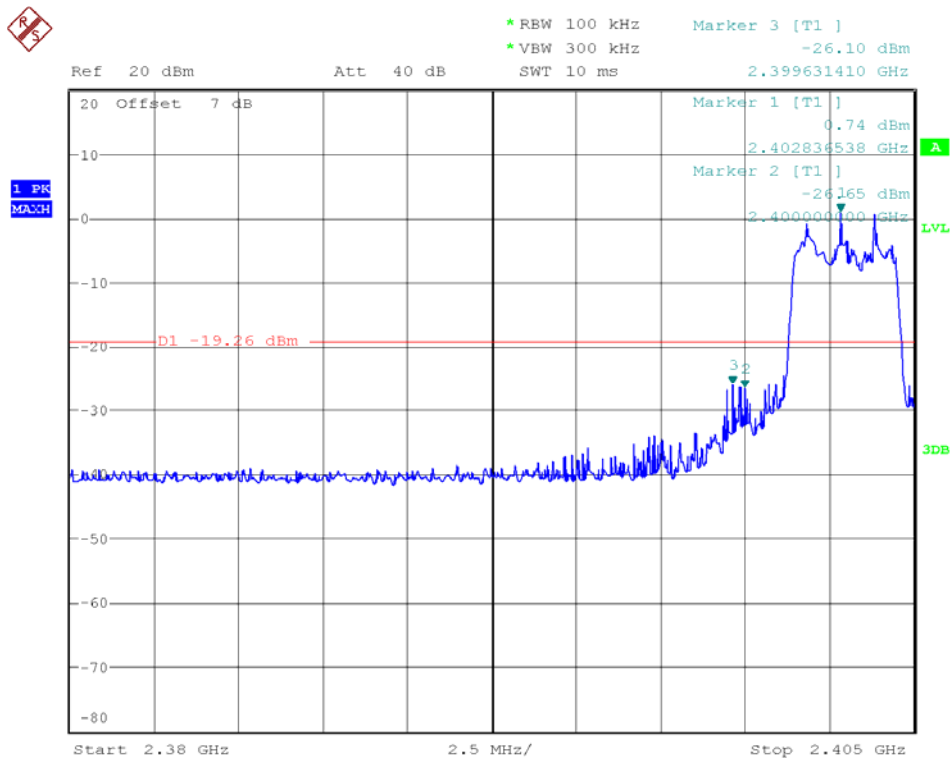
1Mbps Hopping Mode High Band Edge Plot



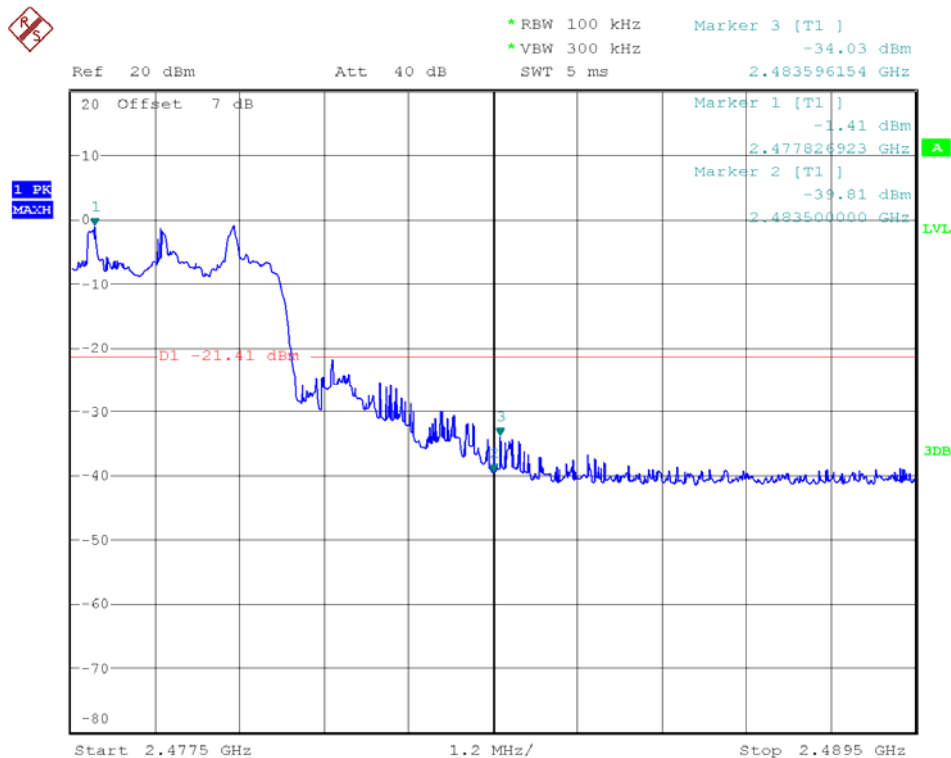


Operation Mode:	2 Mbps	Test Date:	March 11, 2015
Humidity:	52 % RH	Temperature:	24°C

2Mbps Hopping Mode Low Band Edge Plot



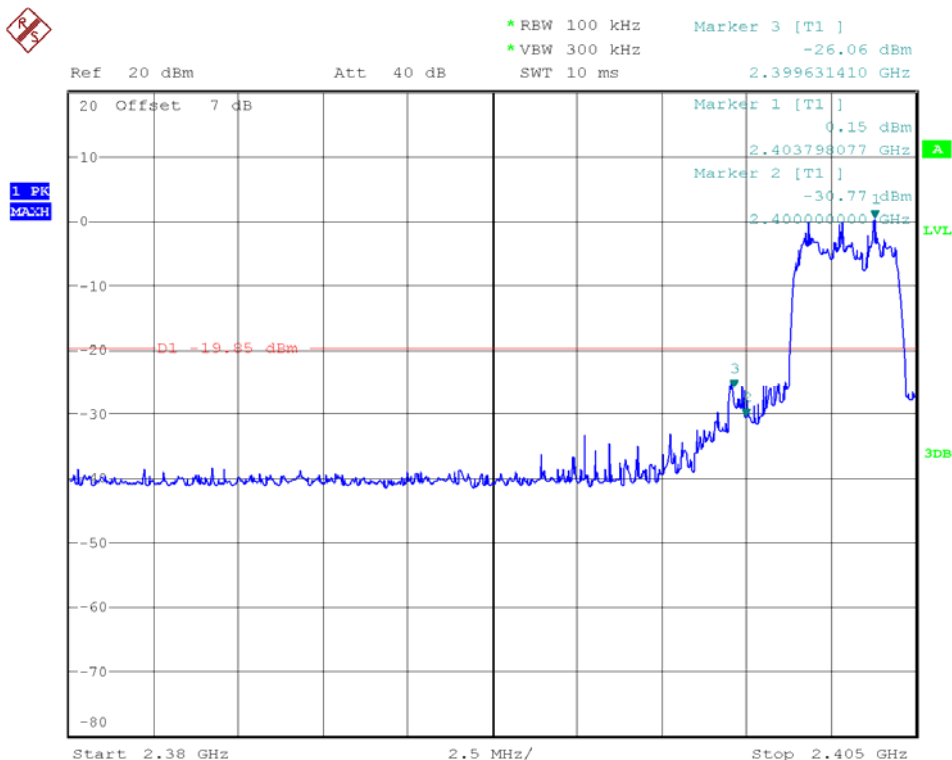
2Mbps Hopping Mode High Band Edge Plot



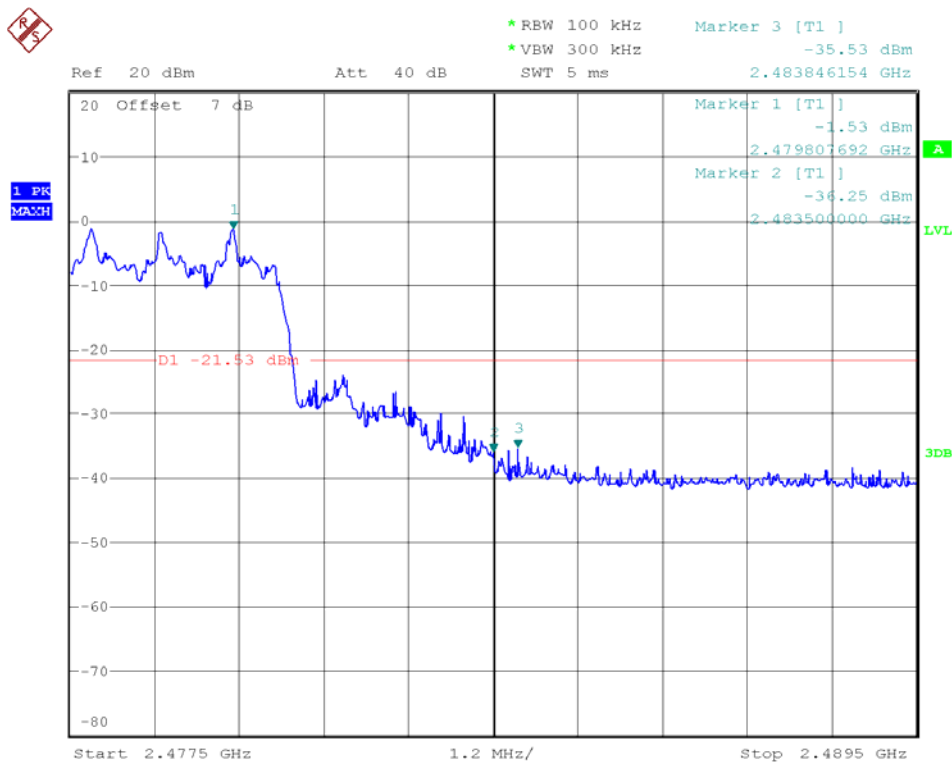


Operation Mode:	3 Mbps	Test Date:	March 11, 2015
Humidity:	52 % RH	Temperature:	24°C

3Mbps Hopping Mode Low Band Edge Plot



3Mbps Hopping Mode High Band Edge Plot



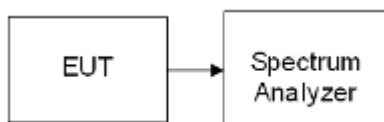


6.7 Conducted Spurious Emission Measurement

LIMIT

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 the 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)).

Test Configuration



TEST PROCEDURE

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 KHz. The video bandwidth is set to 300 KHz.

Measurements are made over the 30MHz to 25GHz range with the transmitter set to the lowest, middle, and highest channels.

TEST RESULTS

No non-compliance noted



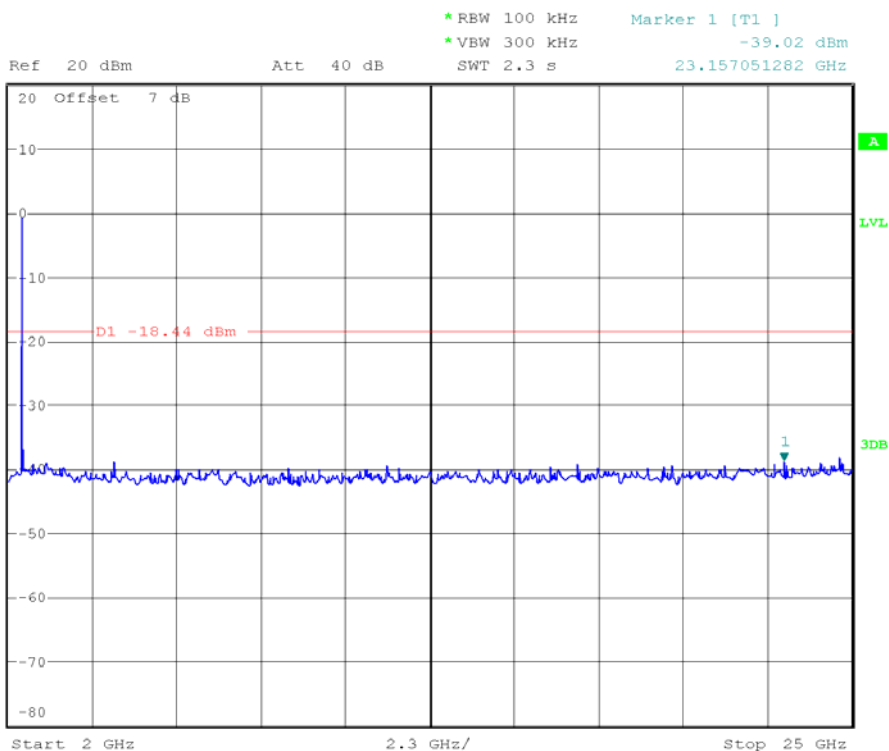
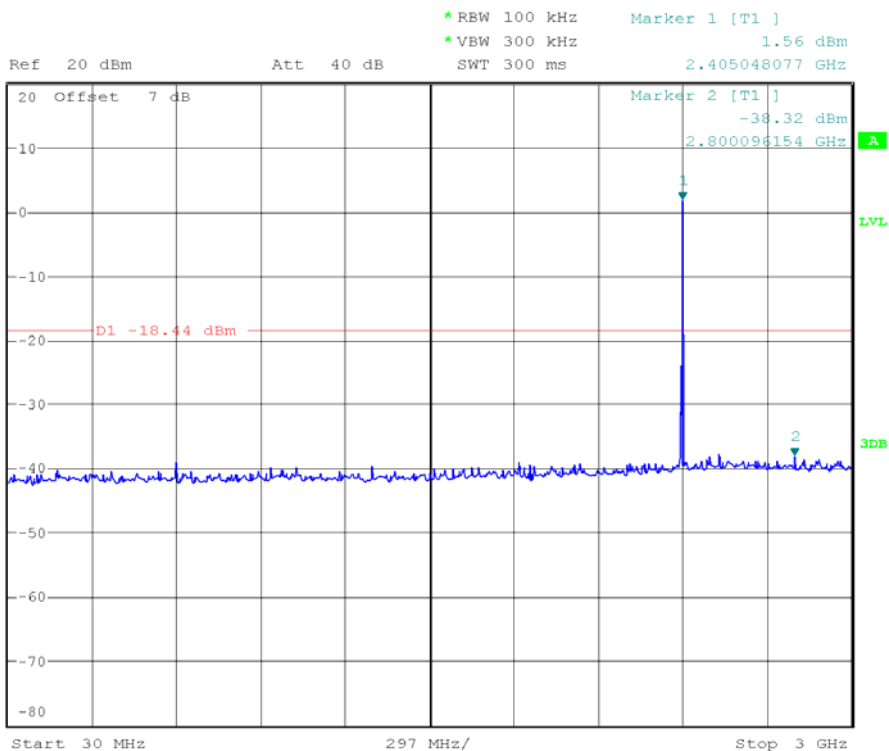
Compliance Certification Services Inc.

Report No: C150304R01-RPB

FCC ID: 2AEAM-MDS

Date of Issue :March 12, 2015

Operation Mode:	1 Mbps	Test Date:	March 11, 2015
Test Channel:	00	Tested by:	James.Yan
Humidity:	52 % RH	Temperature:	24°C





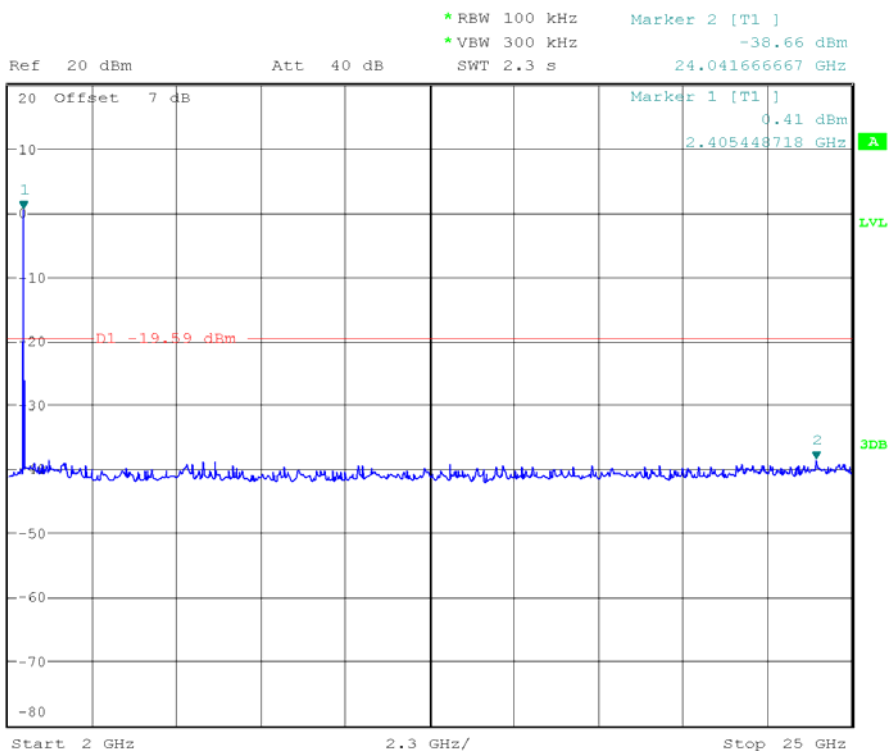
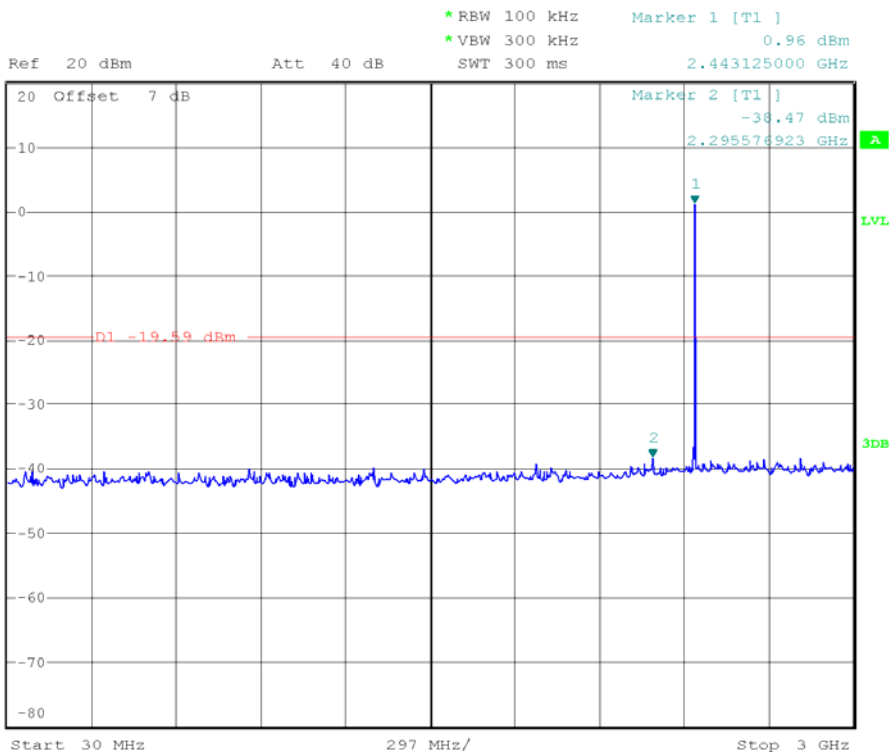
Compliance Certification Services Inc.

Report No: C150304R01-RPB

FCC ID: 2AEAM-MDS

Date of Issue :March 12, 2015

Operation Mode:	1 Mbps	Test Date:	March 11, 2015
Test Channel:	39	Tested by:	James.Yan
Humidity:	52 % RH	Temperature:	24°C





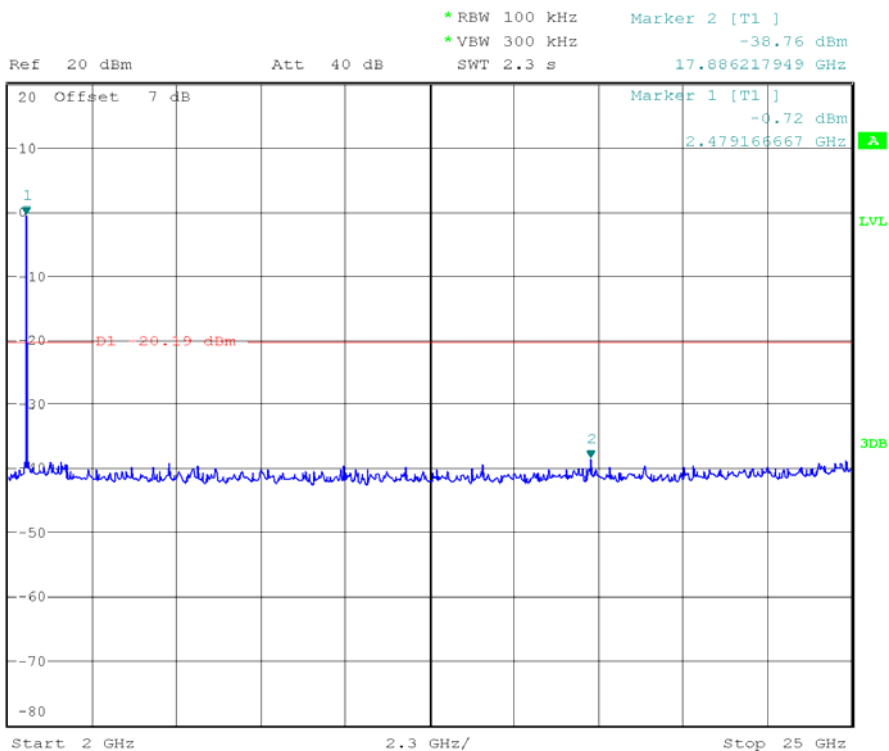
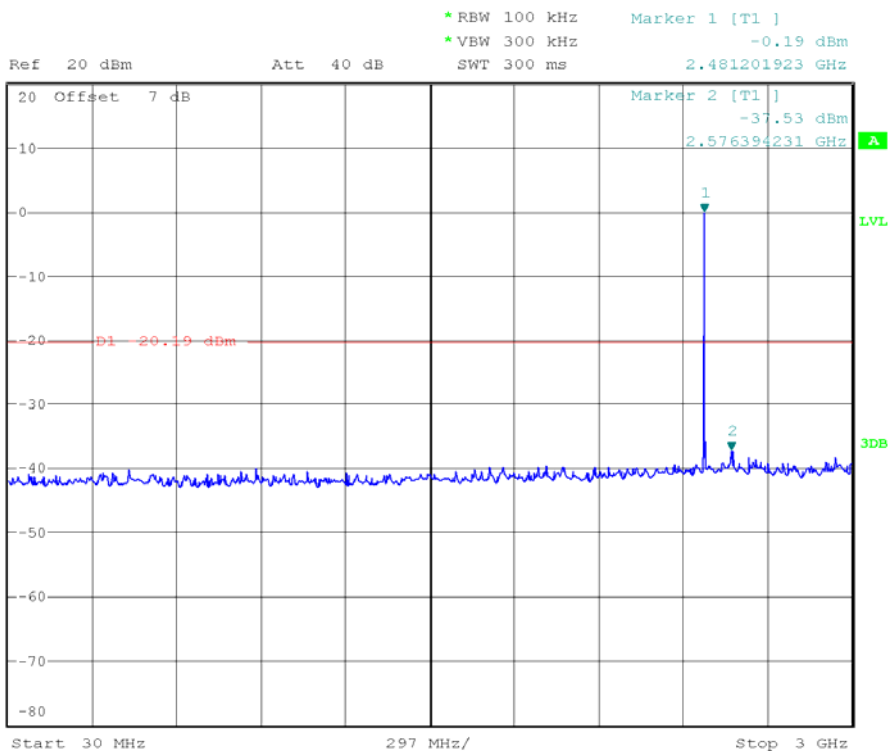
Compliance Certification Services Inc.

Report No: C150304R01-RPB

FCC ID: 2AEAM-MDS

Date of Issue :March 12, 2015

Operation Mode:	1 Mbps	Test Date:	March 11, 2015
Test Channel:	78	Tested by:	James.Yan
Humidity:	52 % RH	Temperature:	24°C





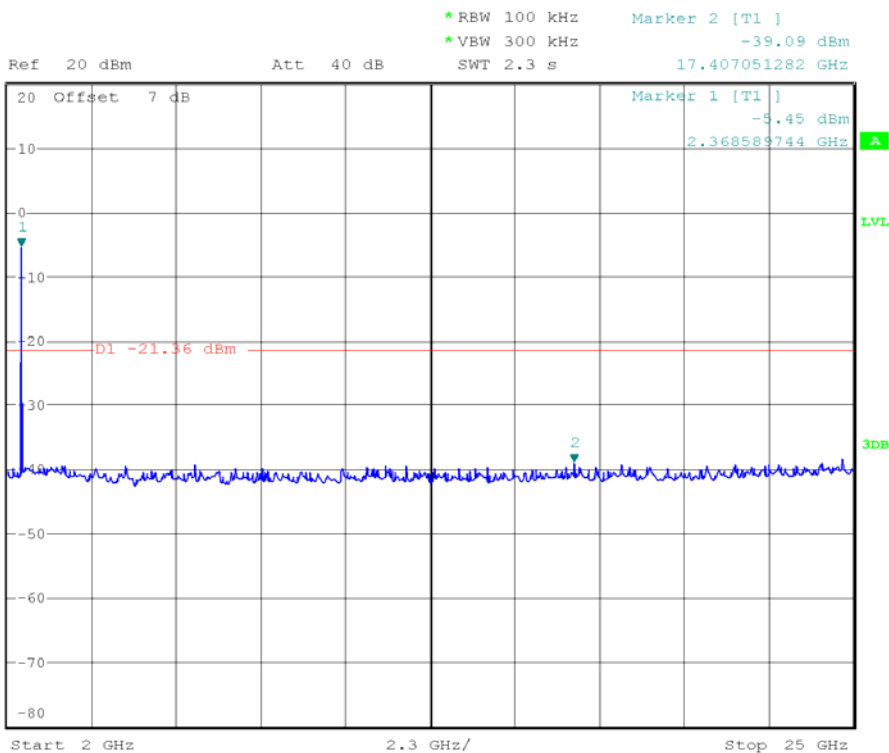
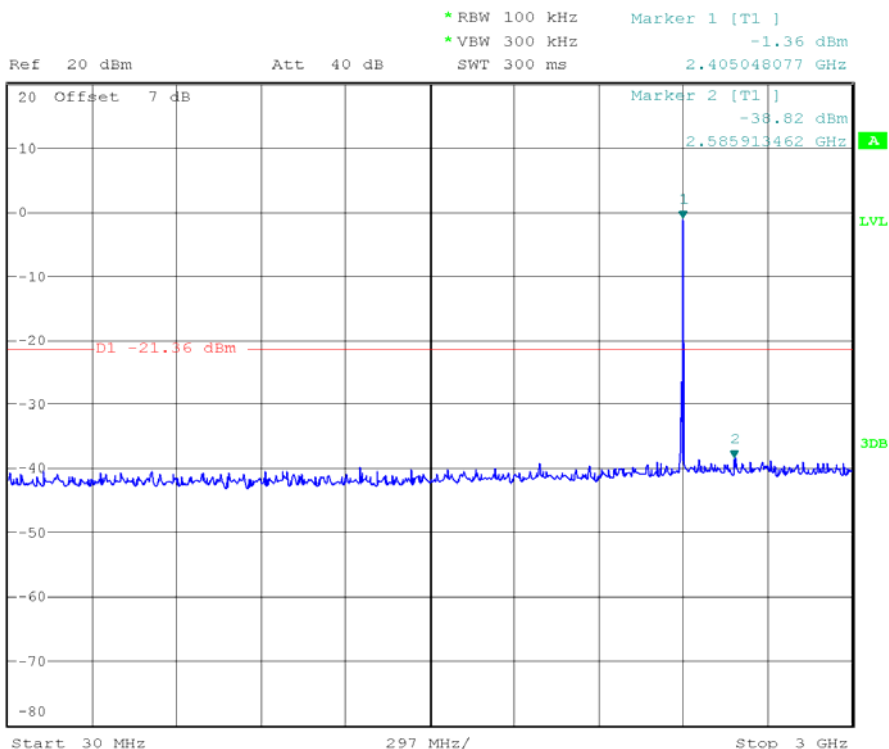
Compliance Certification Services Inc.

Report No: C150304R01-RPB

FCC ID: 2AEAM-MDS

Date of Issue :March 12, 2015

Operation Mode:	3 Mbps	Test Date:	March 11, 2015
Test Channel:	00	Tested by:	James.Yan
Humidity:	52 % RH	Temperature:	24°C





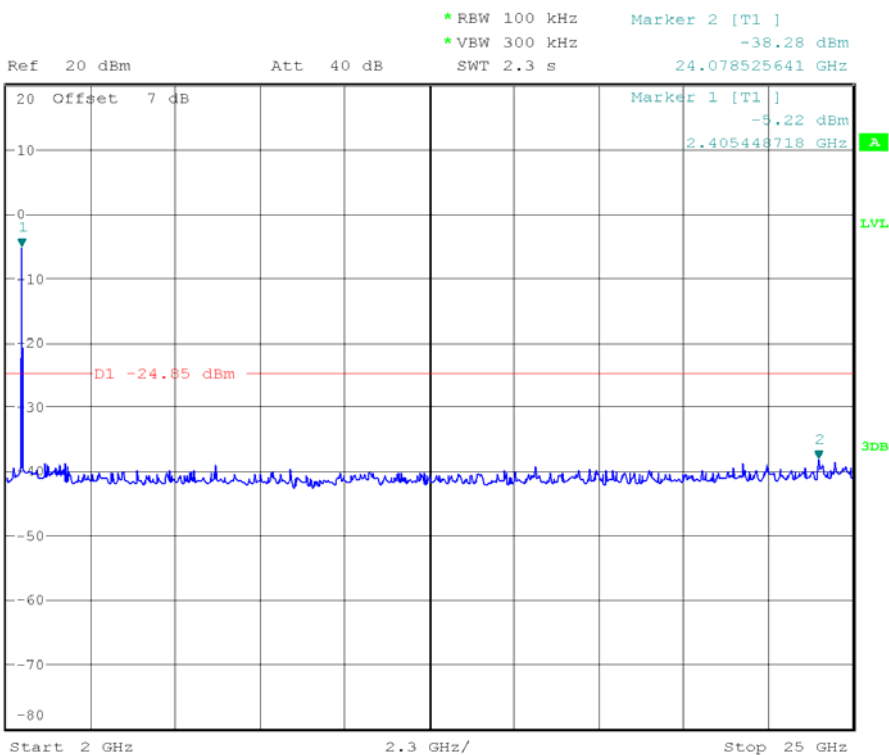
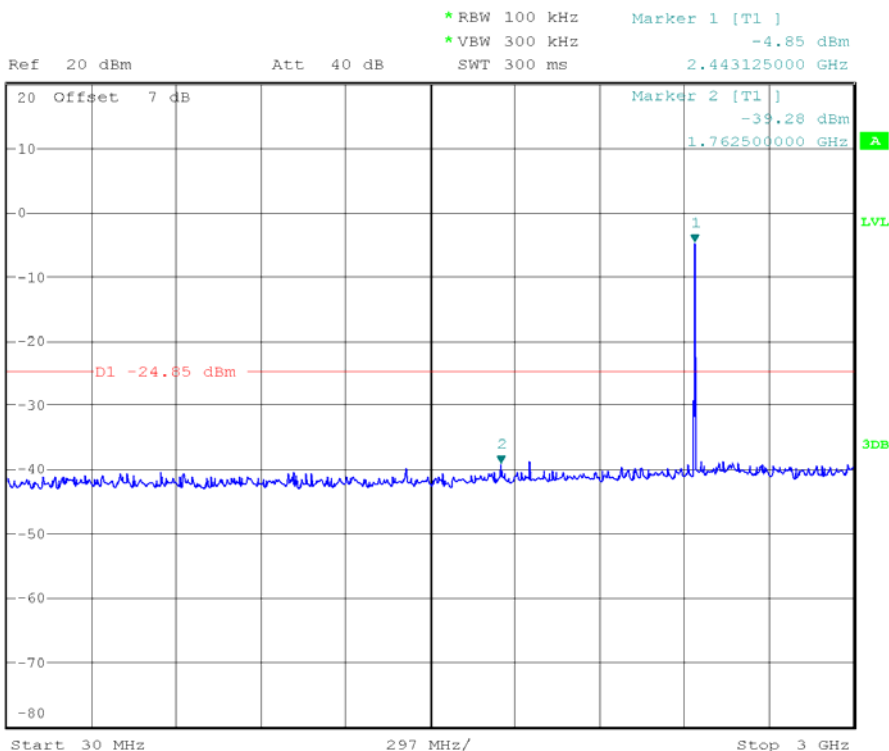
Compliance Certification Services Inc.

Report No: C150304R01-RPB

FCC ID: 2AEAM-MDS

Date of Issue :March 12, 2015

Operation Mode:	3 Mbps	Test Date:	March 11, 2015
Test Channel:	39	Tested by:	James.Yan
Humidity:	52 % RH	Temperature:	24°C





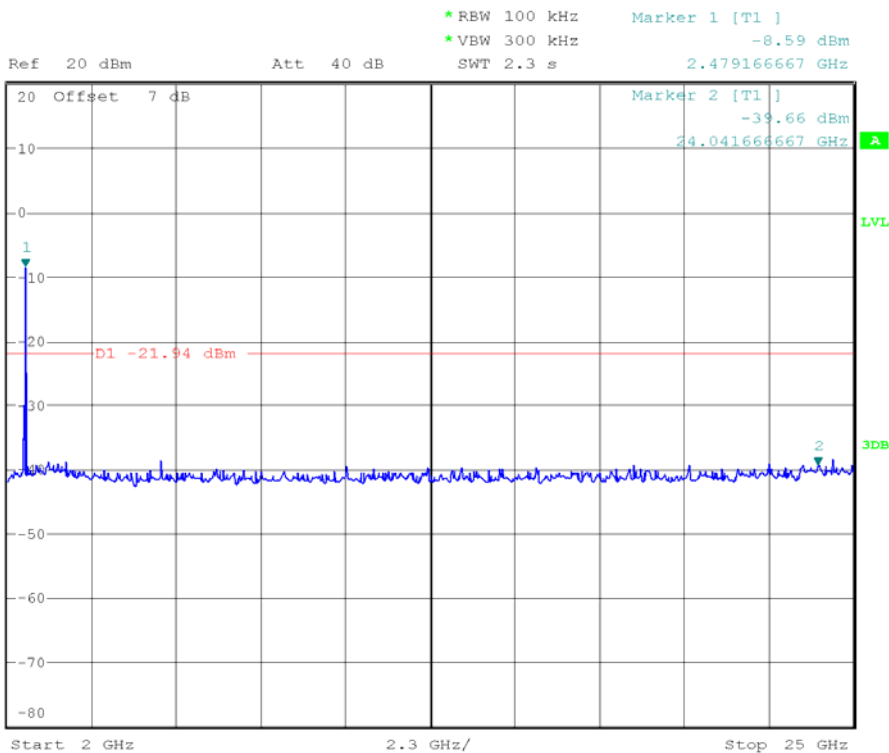
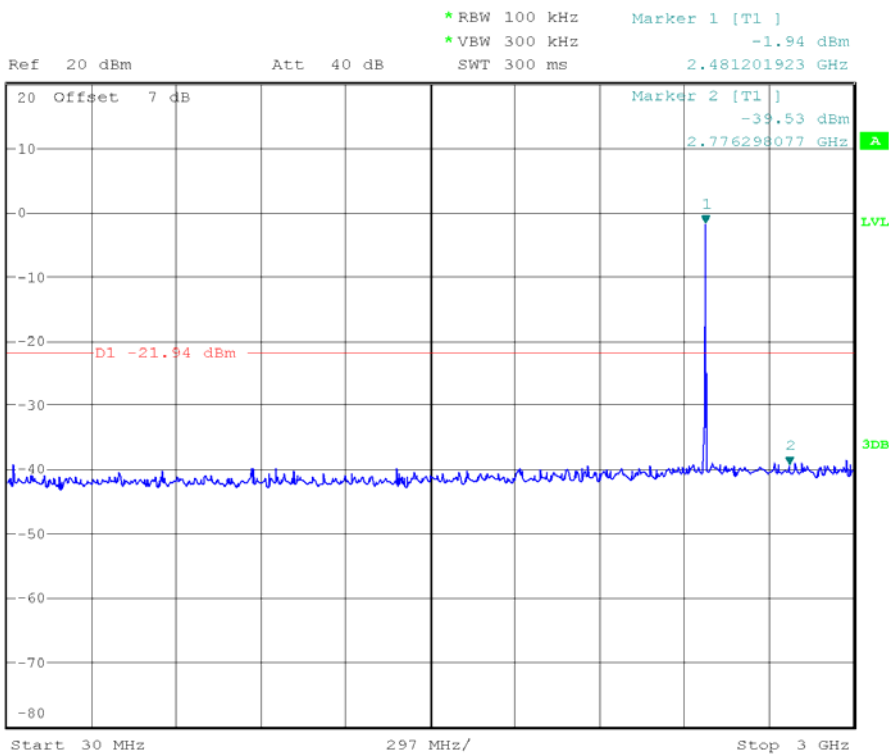
Compliance Certification Services Inc.

Report No: C150304R01-RPB

FCC ID: 2AEAM-MDS

Date of Issue :March 12, 2015

Operation Mode:	3 Mbps	Test Date:	March 11, 2015
Test Channel:	78	Tested by:	James.Yan
Humidity:	52 % RH	Temperature:	24°C





6.8 Radiated Band Edge and Spurious Emission Measurement

LIMIT

1. Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (mV/m)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

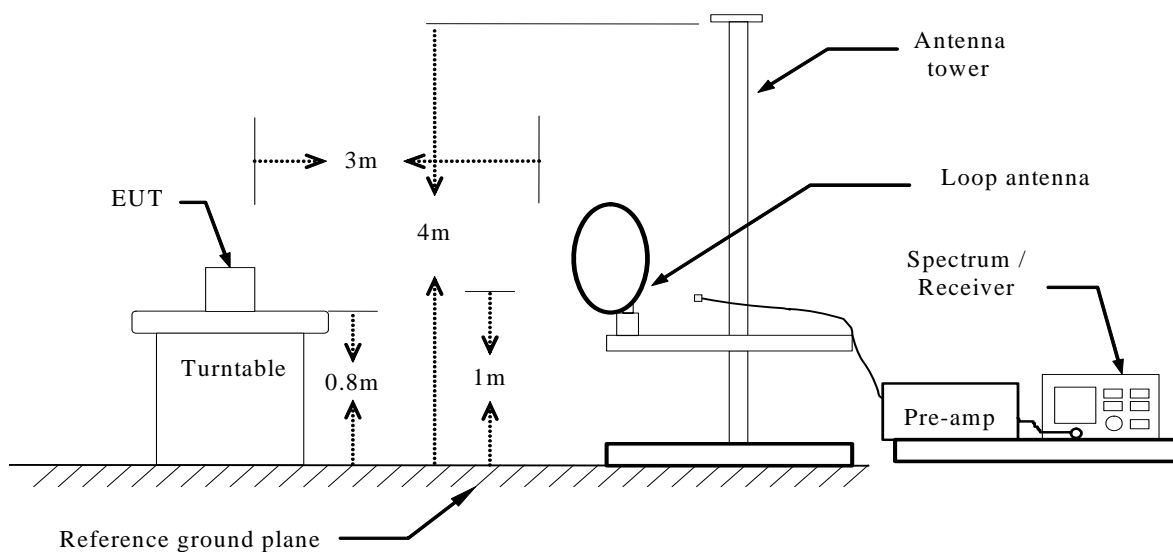
Remark: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

2. In the above emission table, the tighter limit applies at the band edges.

Frequency (Hz)	Field Strength ($\mu\text{V/m}$ at 3-meter)	Field Strength ($\text{dB}\mu\text{V/m}$ at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

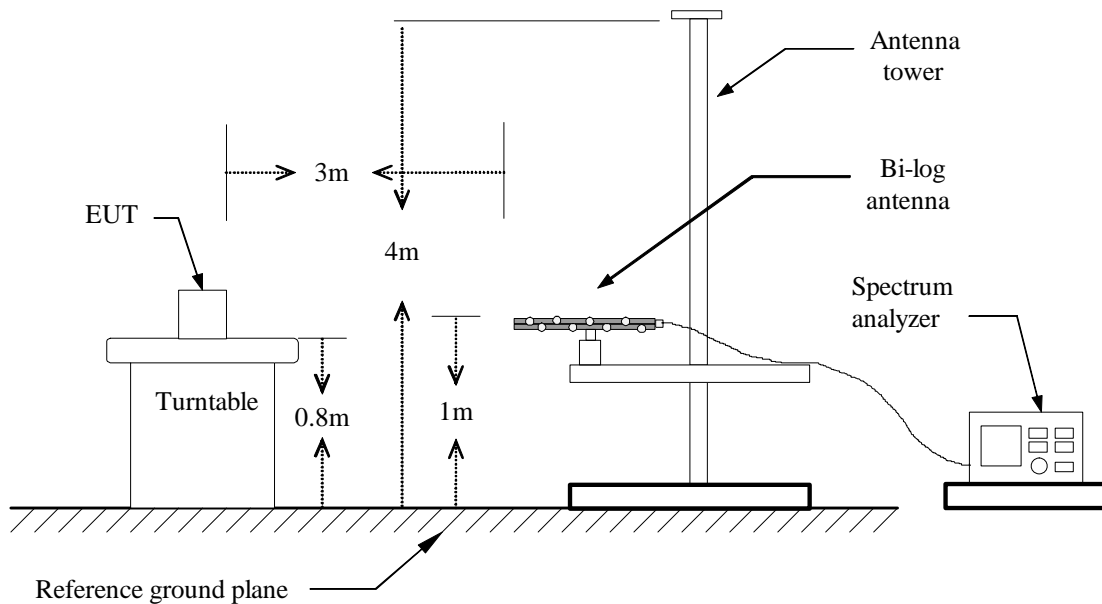
Test Configuration

Below 30MHz

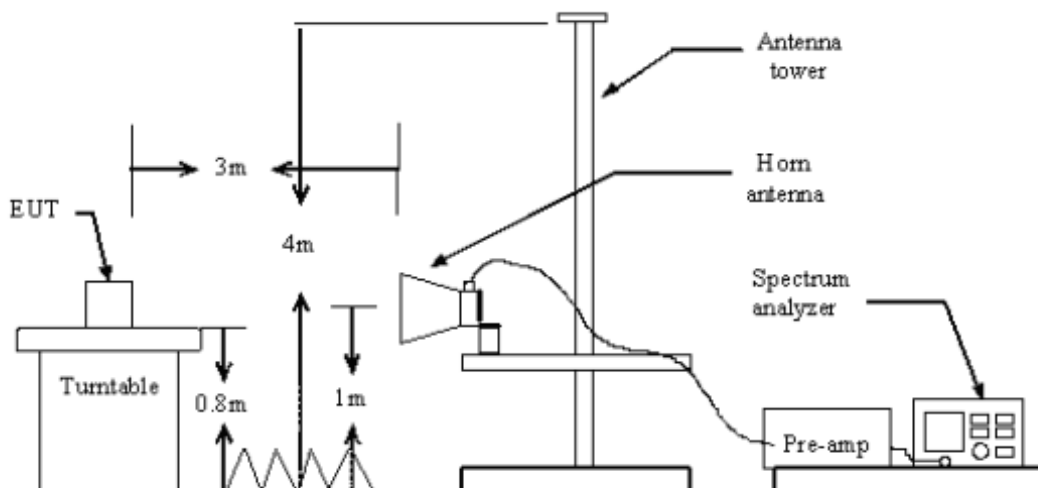




Below 1 GHz



Above 1 GHz





TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:

Below 1GHz:

RBW=100kHz / VBW=300kHz / Sweep=AUTO

Above 1GHz:

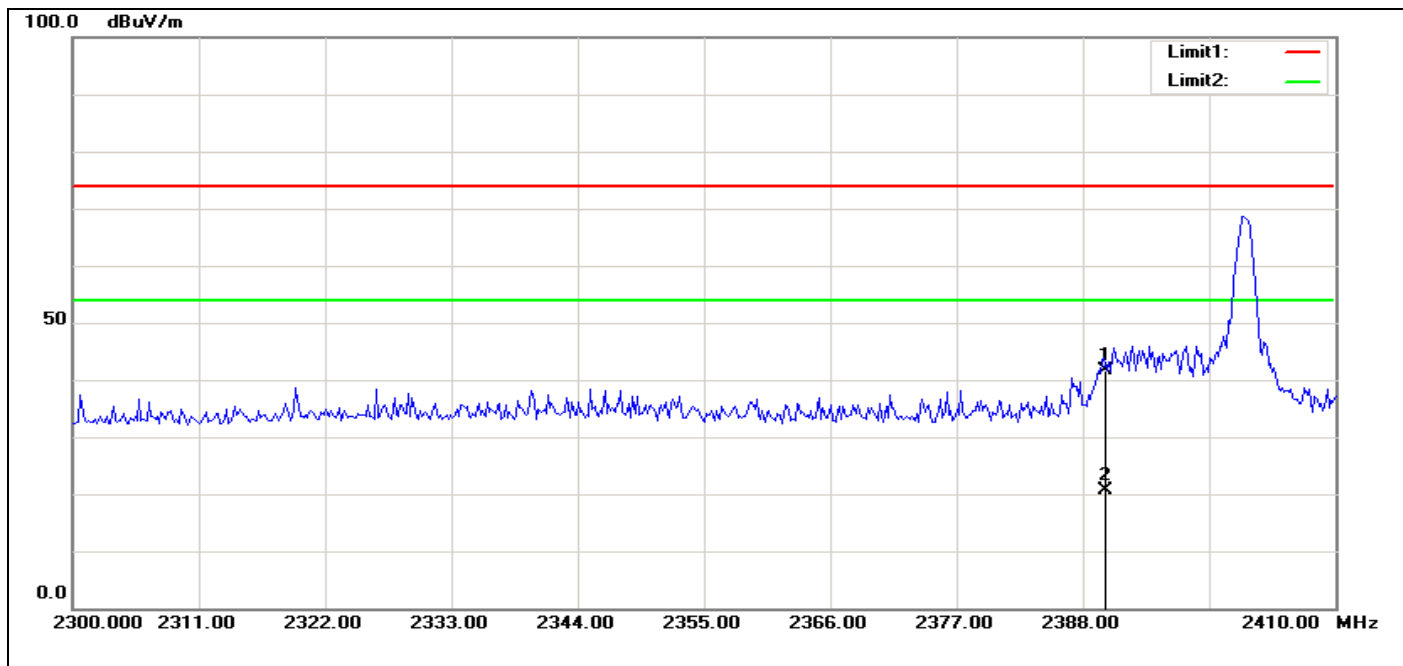
(a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO

7. Repeat above procedures until the measurements for all frequencies are complete.

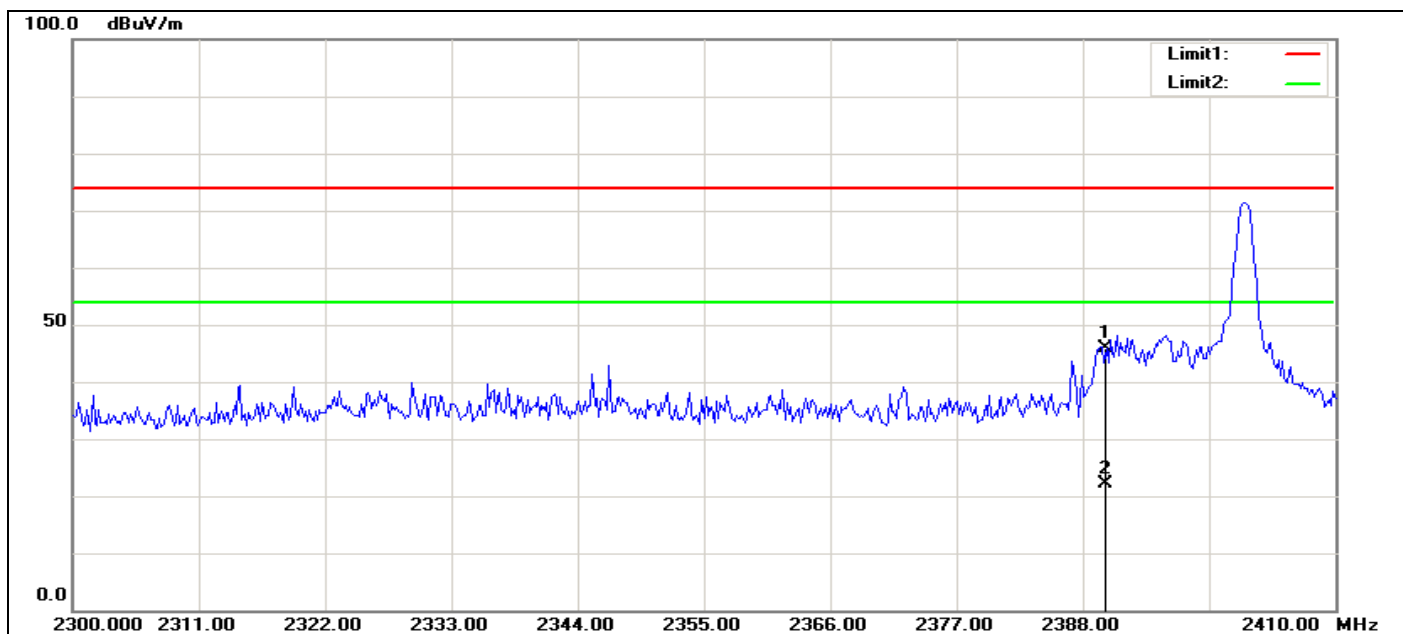


RESTRICTED BANDEDGE (1Mbps, Low Channel, Horizontal)



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2390.000	49.49	-7.87	41.62	74.00	-32.38	100	61	peak
2	2390.000	28.52	-7.87	20.65	54.00	-33.35	100	61	AVG

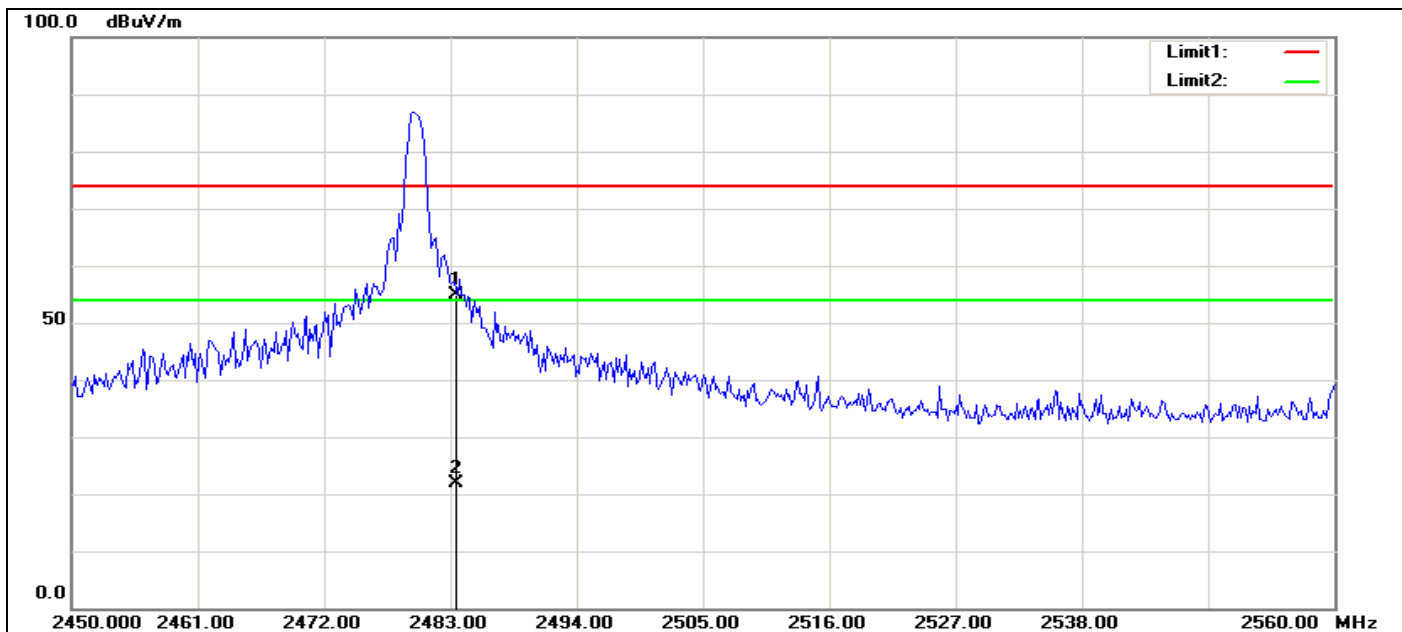
RESTRICTED BANDEDGE (1Mbps, Low Channel, Vertical)



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2390.000	53.64	-7.87	45.77	74.00	-28.23	100	133	peak
2	2390.000	30.09	-7.87	22.22	54.00	-31.78	100	133	AVG

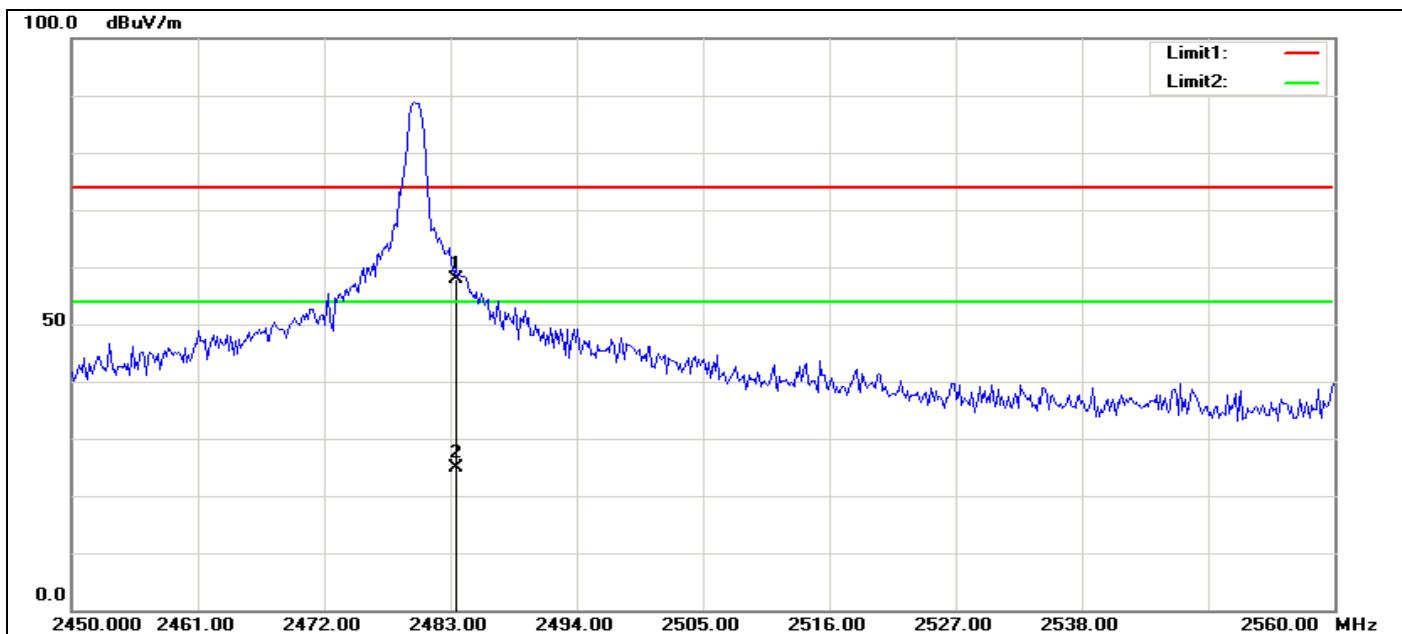


RESTRICTED BANDEDGE (1Mbps Mode, High Channel, Horizontal)



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2483.500	62.31	-7.47	54.84	74.00	-19.16	100	200	peak
2	2483.500	29.38	-7.47	21.91	54.00	-32.09	100	200	AVG

RESTRICTED BANDEDGE (1Mbps, High Channel, Vertical)



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2483.500	65.47	-7.47	58.00	74.00	-16.00	100	80	peak
2	2483.500	32.32	-7.47	24.85	54.00	-29.15	100	80	AVG



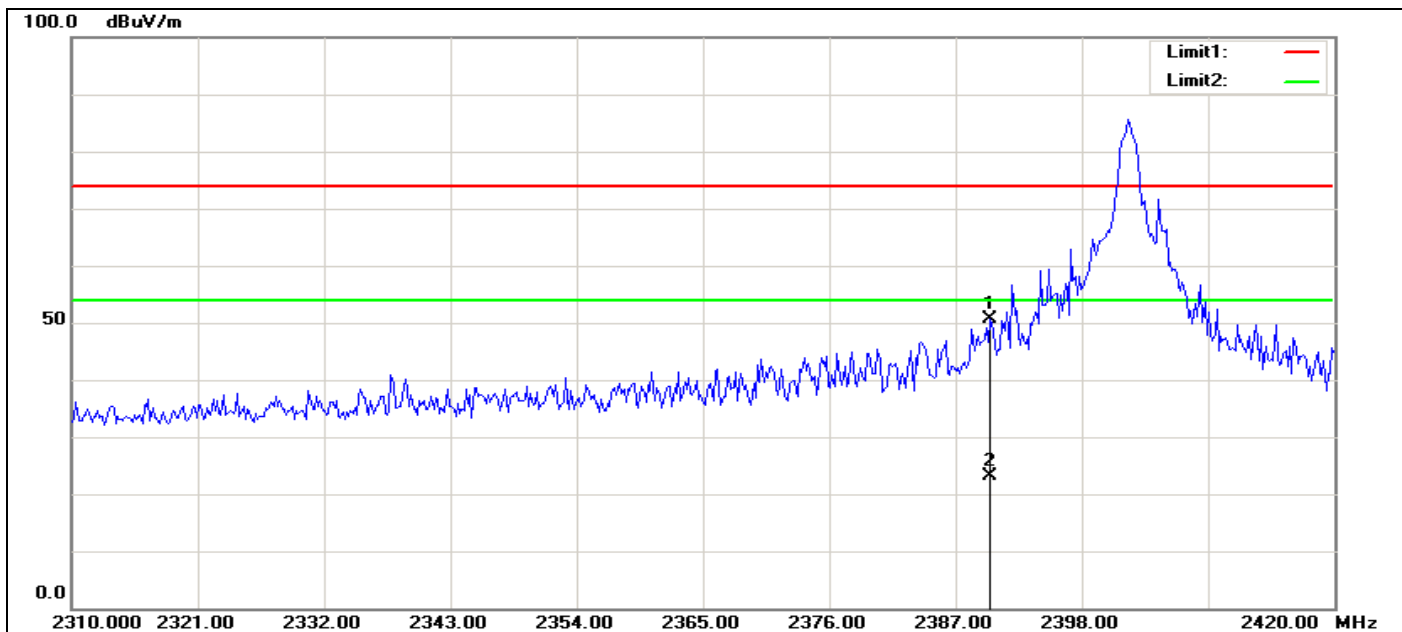
Compliance Certification Services Inc.

Report No: C150304R01-RPB

FCC ID: 2AEAM-MDS

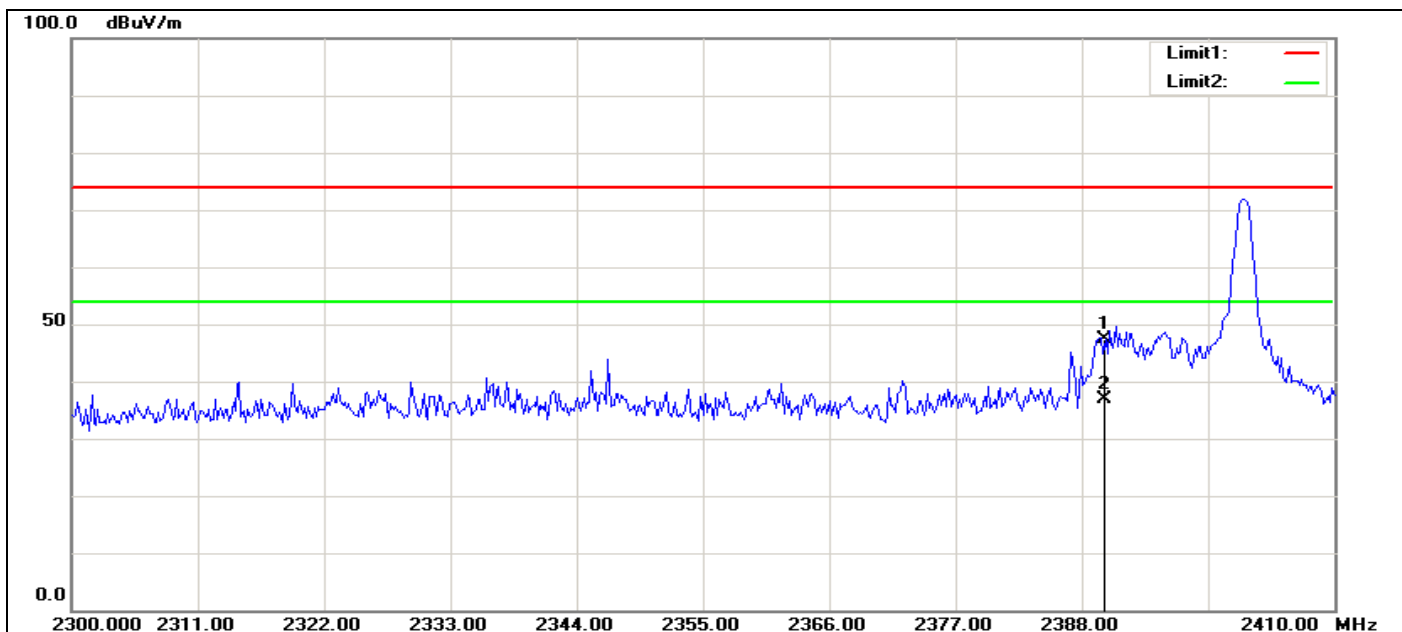
Date of Issue :March 12, 2015

RESTRICTED BANDEDGE (3Mbps, Low Channel, Horizontal)



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2390.000	58.38	-7.87	50.51	74.00	-23.49	100	57	peak
2	2390.000	31.06	-7.87	23.19	54.00	-30.81	100	57	AVG

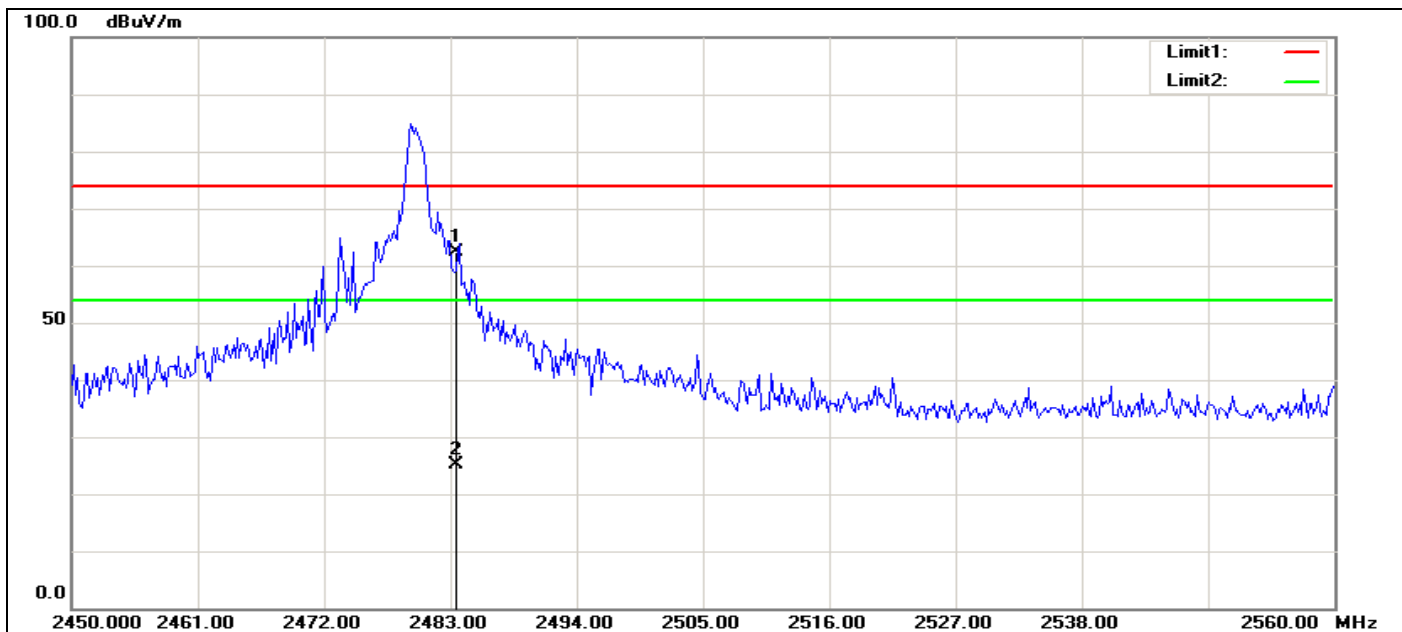
RESTRICTED BANDEDGE (3Mbps, Low Channel, Vertical)



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2390.000	55.14	-7.87	47.27	74.00	-26.73	100	303	peak
2	2390.000	44.72	-7.87	36.85	54.00	-17.15	100	303	AVG

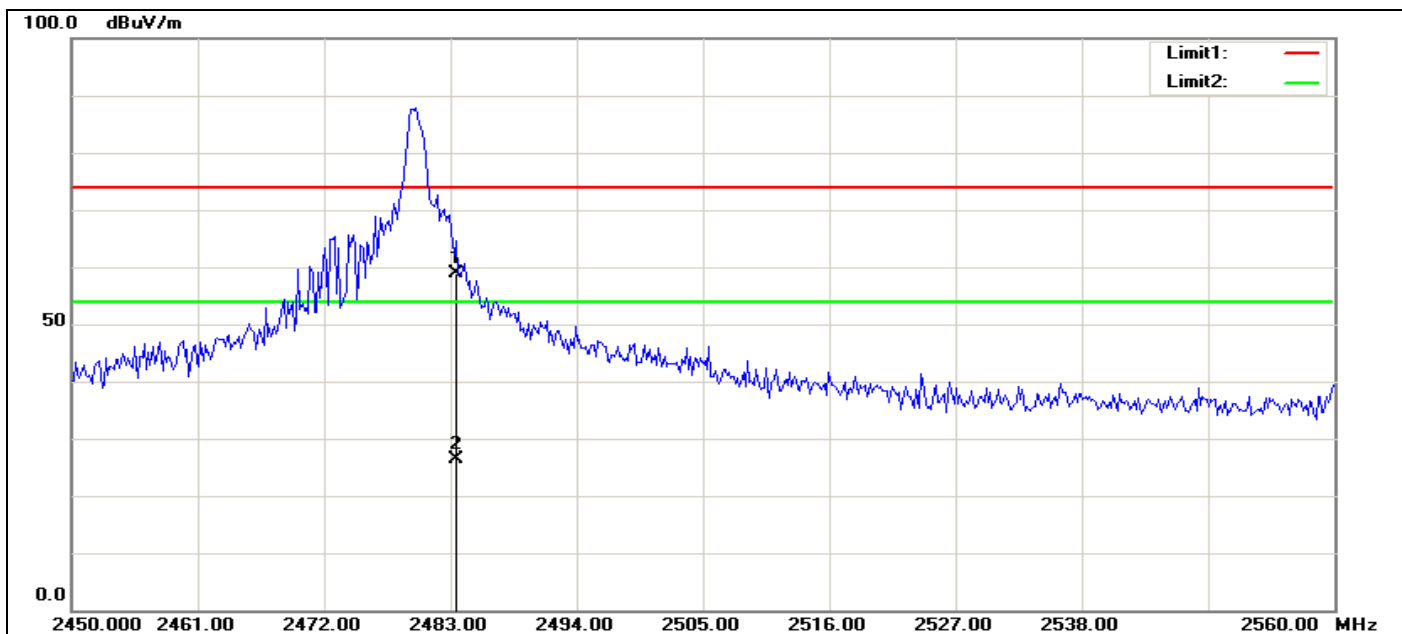


RESTRICTED BANDEDGE (3Mbps, High Channel, Horizontal)



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2483.500	69.79	-7.47	62.32	74.00	-11.68	100	115	peak
2	2483.500	32.71	-7.47	25.24	54.00	-28.76	100	115	AVG

RESTRICTED BANDEDGE (3Mbps, High Channel, Vertical)



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2483.500	66.32	-7.47	58.85	74.00	-15.15	100	142	peak
2	2483.500	33.88	-7.47	26.41	54.00	-27.59	100	142	AVG



Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
3. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.*
4. *Spectrum setting:*
 - a. *Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.*
 - b. *AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.*



6.9 POWERLINE CONDUCTED EMISSIONS

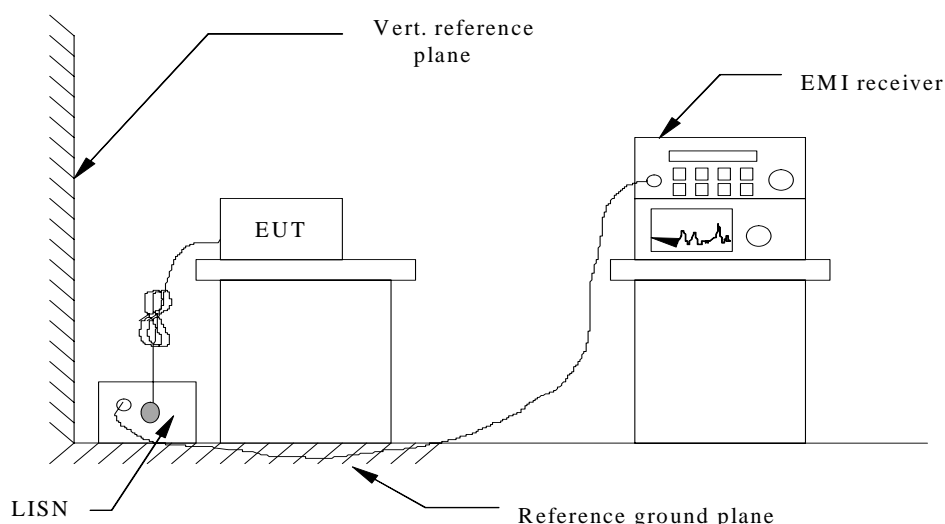
LIMIT

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration



See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

TEST PROCEDURE

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

TEST RESULTS

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.



Compliance Certification Services Inc.

Report No: C150304R01-RPB

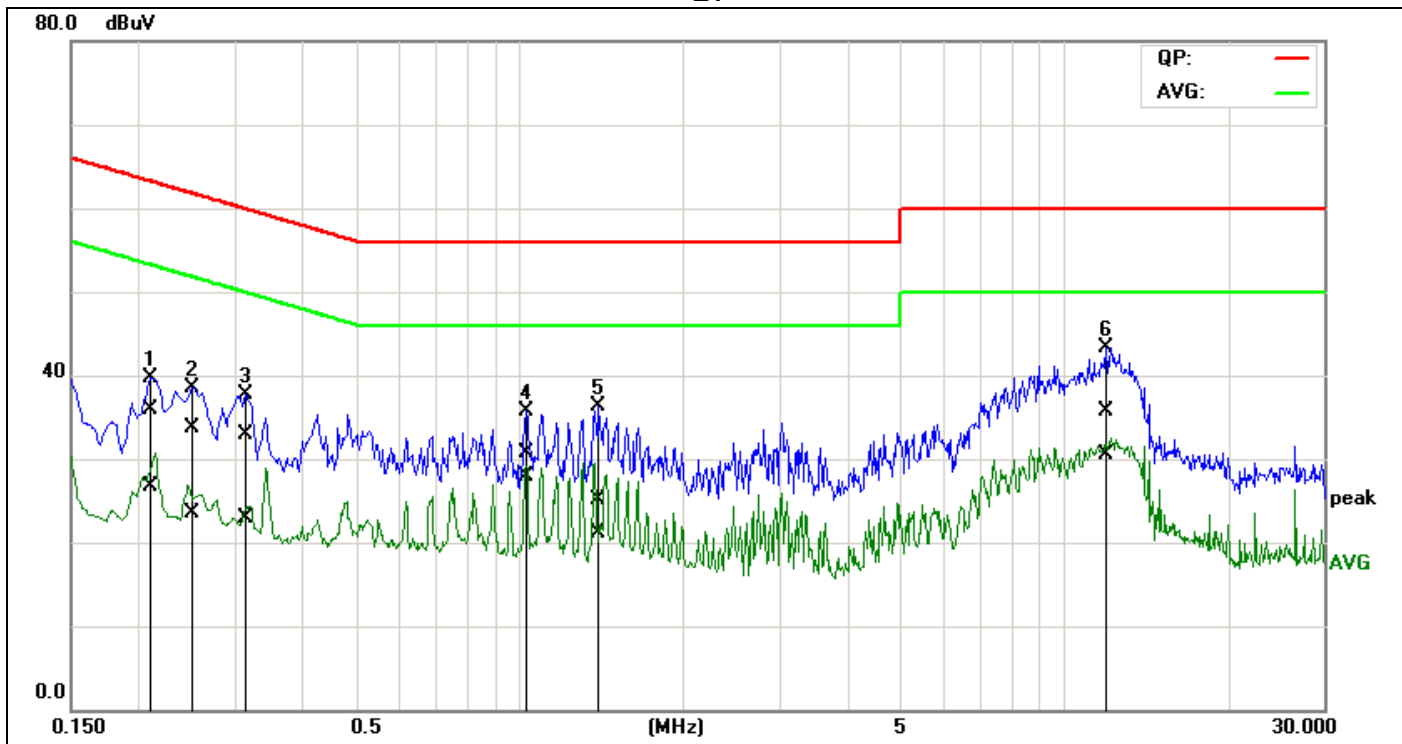
FCC ID: 2AEAM-MDS

Date of Issue :March 12, 2015

Test Data

Model: MDS-8/6094	Humidity: 51% RH
Temperature: 23°C	Test Results: Pass
Tested by: James.Yan	

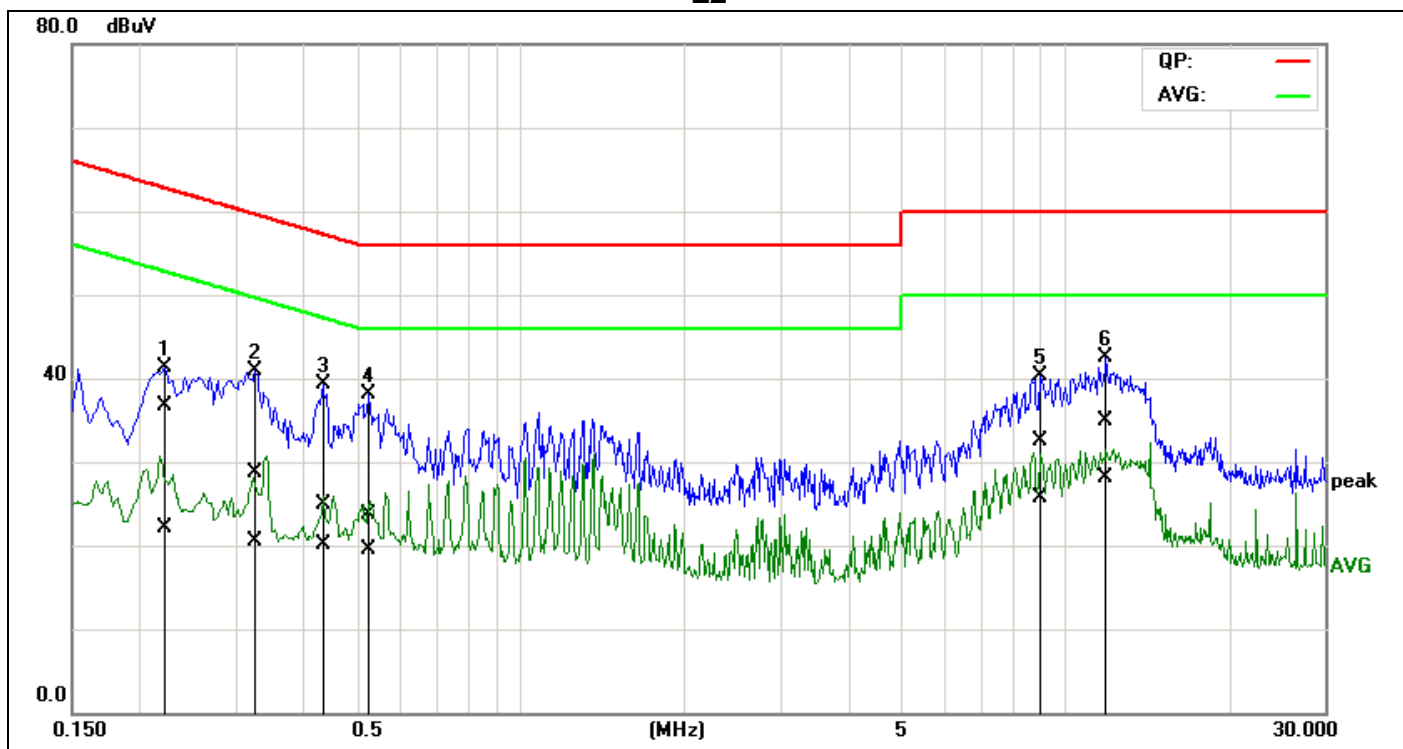
L1



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1	0.2113	16.38	7.10	19.61	35.99	26.71	63.15	53.15	-27.16	-26.44	Pass
2	0.2530	14.09	3.87	19.64	33.73	23.51	61.66	51.66	-27.93	-28.15	Pass
3	0.3127	13.16	3.16	19.69	32.85	22.85	59.90	49.90	-27.05	-27.05	Pass
4	1.0202	10.83	8.14	19.84	30.67	27.98	56.00	46.00	-25.33	-18.02	Pass
5	1.4020	5.22	1.25	19.88	25.10	21.13	56.00	46.00	-30.90	-24.87	Pass
6	12.0033	14.93	9.61	20.80	35.73	30.41	60.00	50.00	-24.27	-19.59	Pass



L2



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1	0.2205	17.03	2.48	19.65	36.68	22.13	62.80	52.80	-26.12	-30.67	Pass
2	0.3255	8.99	0.77	19.73	28.72	20.50	59.57	49.57	-30.85	-29.07	Pass
3	0.4305	5.19	0.27	19.80	24.99	20.07	57.24	47.24	-32.25	-27.17	Pass
4	0.5258	3.88	-0.28	19.85	23.73	19.57	56.00	46.00	-32.27	-26.43	Pass
5	9.0645	11.75	4.98	20.71	32.46	25.69	60.00	50.00	-27.54	-24.31	Pass
6	11.8964	14.14	7.28	20.76	34.90	28.04	60.00	50.00	-25.10	-21.96	Pass

Remark:

- 1.The measuring frequencies range between 0.15 MHz and 30 MHz.
- 2.The emissions measured in the frequency range between 0.15 MHz and 30MHz were made with an instrument using Quasi-peak detector and Average detector.
- 3.“—” denotes the emission level was or more than 2dB below the Average limit, and no re-check was made.
- 4.The IF bandwidth of SPA between 0.15MHz and 30MHz was 10KHz. The IF bandwidth of Test Receiver between 0.15MHz and 30MHz was 9kHz.

END OF REPORT