FCC RF TEST REPORT

ISSUED BY
Shenzhen BALUN Technology Co., Ltd.

FOR

HANDHELD TRANSMITTER

ISSUED TO
CAD AUDIO LLC

6573 Cochran Road, Building I, Solon, Ohio, USA 44139

Tested by: Zhengmuyi
Zheng Muyi
(Engineer)
Date Jul. 8. 2016

Approved by:
Liao Jianming
(Technical Director)
Date Jul. 8. 2016

Report No.:	BL-SZ1650378-601
EUT Type:	HANDHELD TRANSMITTER
Model Name:	TX3000R
Brand Name:	CAD AUDIO
Test Standard:	47 CFR Part 74 Subpart H
FCC ID:	OQ5-WX3000R
Test conclusion:	Pass
Test Date:	Jun. 15, 2016 ~ Jun. 28, 2016
Date of Issue:	Jul. 8, 2016

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Revision History

Version	Issue Date	Revisions Content
Rev. 01	Jul. 1, 2016	Initial Issue
Rev. 02	Jul. 4, 2016	Added test data of mask and max. deviation (Hz)
Rev. 03	Jul. 8, 2016	Updated the model name

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1 ADMINISTRATIVE DATA (GENERAL INFORMATION)

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6685 0100
Fax Number	+86 755 6182 4271

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Accreditation Certificate	The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 11524A-1. The laboratory has been listed by US Federal Communications Commission to perform electromagnetic emission measurements. The recognition numbers of test site are 832625. The laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L6791.
Description	All measurement facilities used to collect the measurement data are located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China 518055

1.3 Laboratory Condition

Ambient Temperature	20 to 25℃
Ambient Relative Humidity	45% - 55%
Ambient Pressure	100 kPa - 102 kPa

1.4 Announce

(1) The test report reference to the report template version v1.0.

(2) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.

(3) The test report is invalid if there is any evidence and/or falsification.

(4) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.

(5) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.

(6) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without

prior written approval from the laboratory.

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	CAD AUDIO LLC
Address	6573 Cochran Road, Building I, Solon, Ohio, USA 44139

2.2 Manufacturer Information

Manufacturer	CAD AUDIO LLC
Address	6573 Cochran Road, Building I, Solon, Ohio, USA 44139

2.3 Factory Information

Factory	CAD AUDIO LLC
Address	6573 Cochran Road, Building I, Solon, Ohio, USA 44139

2.4 General Description for Equipment under Test (EUT)

EUT Type	HANDHELD TRANSMITTER
Model Name	TX3000R
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	N/A
Software Version	N/A
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A
Network and Wireless connectivity	FM

2.5 Ancillary Equipment

N/A

2.6 Technical Information

The requirement for the following technical information of the EUT was tested in this report:

Modulation Technology	FM
Frequency Range	580 MHz – 600 MHz
Tested Channel	Low(580 MHz), Middle (587.4 MHz), High (599.4 MHz)
Antenna Type	Ceramic Antenna
Antenna Gain	2.5 dBi
About the Product	The equipment is HANDHELD TRANSMITTER, it contains FM module.

Channel list

No.	Frequency				
	Group 1	Group 2	Group 3	Group 4	Group 5
1	580.0	580.6	582.6	580.5	580.8
2	582.2	581.1	583.5	581.0	583.0
3	584.6	582.4	584.9	583.3	584.0
4	586.6	583.4	586.1	584.7	585.4
5	588.5	584.8	586.9	585.9	587.4
6	590.6	586.0	588.8	586.7	589.3
7	593.5	586.8	590.9	588.6	591.4
8	596.5	594.3	594.4	590.7	595.2
9	600.0	597.3	597.4	594.2	598.1
No.	Frequency				
	Group 6	Group 7	Group 8	Group 9	
1	581.3	581.9	582.1	583.1	
2	582.8	584.1	583.6	584.2	
3	584.5	586.5	584.3	584.4	
4	587.1	587.7	585.3	587.3	
5	587.9	591.0	591.2	589.5	
6	589.8	593.7	593.9	593.3	
7	592.7	595.8	596.0	597.5	
8	595.7	597.7	597.9	599.2	
9	598.2	599.3	599.5	599.4	

2.7 Additional Instructions

EUT Software Settings: TX LEVEL is built-in set parameters and cannot be changed and selected.

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 74, Subpart H	Part 74 – Experimental radio, auxiliary, special broadcast and other program distributional services. Subpart H – Low power auxiliary stations.
2	TIA-603-D 2010	Land Mobile FM or PM communications equipment measurement and performance standards.
3	ANSI C63.4-2014	American National Standard for Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

3.2 Verdict

No.	Description	FCC Part No.	Test Result	Verdict
1	Output Power	74.861(e)(1)	ANNEX A.1	Pass
2	Modulation Characteristics	74.861(e) (3)	ANNEX A.2	Pass
3	Emission Bandwidth and Emission Mask	74.861(e) (5) (6)	ANNEX A.3	Pass
4	Spurious Emissions at Antenna Terminals	74.861(e) (6)	ANNEX A.4	Pass
5	Field Strength of Spurious Radiation	74.861(e) (6)	ANNEX A.5	Pass
6	Frequency Stability	74.861(e) (4)	ANNEX A.6	Pass

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

During the measurement, the normal environmental conditions were within the listed ranges:

Relative Humidity	45% - 55%	
Atmospheric Pressure	100 kPa - 102 kPa	
Temperature	NT (Normal Temperature)	+22℃ to +25℃
	LT (Low Temperature)	-10℃
	HT (High Temperature)	+55℃
Working Voltage of the EUT	NV (Normal Voltage)	3.3 V

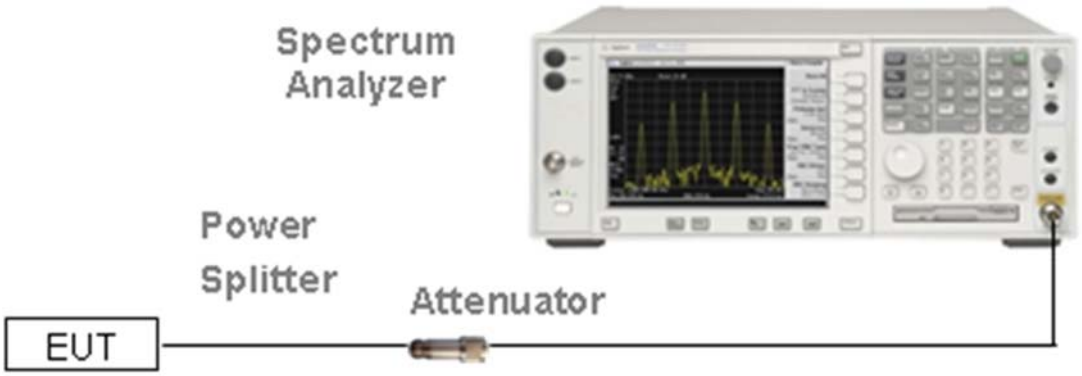
4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	ROHDE&SCHWARZ	FSV-30	103118	2015.07.16	2016.07.15
Vector Signal Generator	ROHDE&SCHWARZ	SMBV100A	177746	2015.07.16	2016.07.15
Analyzer, Modulation	HP	8901A	2026A00934	2015.07.16	2016.07.15
Signal Generator	ROHDE&SCHWARZ	SMB100A	260592	2015.07.01	2016.06.30
Switch Unit with OSP-B157	ROHDE&SCHWARZ	OSP120	101270	2015.07.16	2016.07.15
Spectrum Analyzer	AGILENT	E4440A	MY45304434	2015.10.15	2016.10.14
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2015.07.14	2016.07.13
LISN	SCHWARZBECK	NSLK 8127	8127-687	2015.07.14	2016.07.13
Bluetooth Tester	ROHDE&SCHWARZ	CBT	101005	2015.07.16	2016.07.15
Power Splitter	KMW	DCPD-LDC	1305003215	2015.07.01	2016.06.30
Power Sensor	ROHDE&SCHWARZ	NRP-Z21	103971	2015.07.21	2016.07.20
Attenuator (20 dB)	KMW	ZA-S1-201	110617091	--	--
Attenuator (6 dB)	KMW	ZA-S1-61	1305003189	--	--
DC Power Supply	ROHDE&SCHWARZ	HMP2020	018141664	2015.07.17	2016.07.16
Temperature Chamber	ANGELANTIONI SCIENCE	NTH64-40A	1310	2015.08.07	2016.08.06
Test Antenna-Loop(9 kHz-30 MHz)	SCHWARZBECK	FMZB 1519	1519-037	2015.07.22	2017.07.21
Test Antenna-Bi-Log(30 MHz-3 GHz)	SCHWARZBECK	VULB 9163	9163-624	2015.07.22	2017.07.21
Test Antenna-Horn(1-18 GHz)	SCHWARZBECK	BBHA 9120D	9120D-1148	2015.07.22	2017.07.21
Test Antenna-Horn(15-26.5 GHz)	SCHWARZBECK	BBHA 9170	9170-305	2015.07.22	2017.07.21
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2015.02.28	2017.02.27
Shielded Enclosure	ChangNing	CN-130701	130703	--	--
Audio Analyzer	Agilent	U8903B	MRTSUE06143	2015.08.12	2016.08.11

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Modulation Analyzer	HP	8901A	MRTSUE06210	2015.12.09	2016.12.08
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06180	2015.12.21	2016.12.20

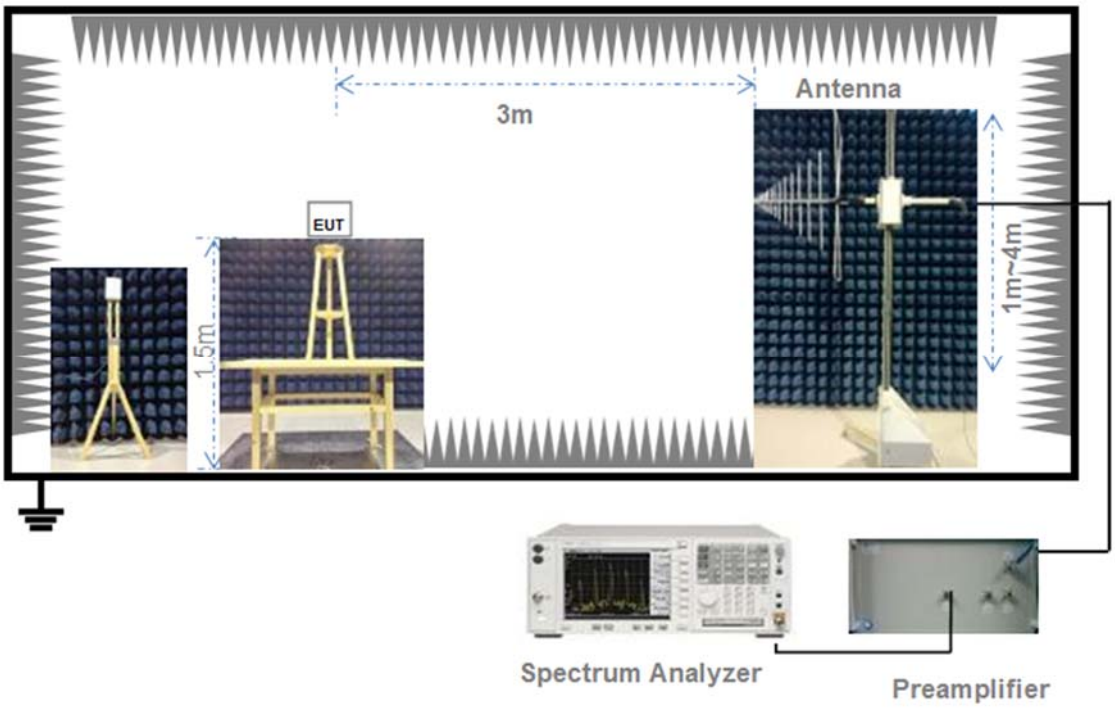
4.3 Description of Test Setup

4.3.1 For Antenna Port Test



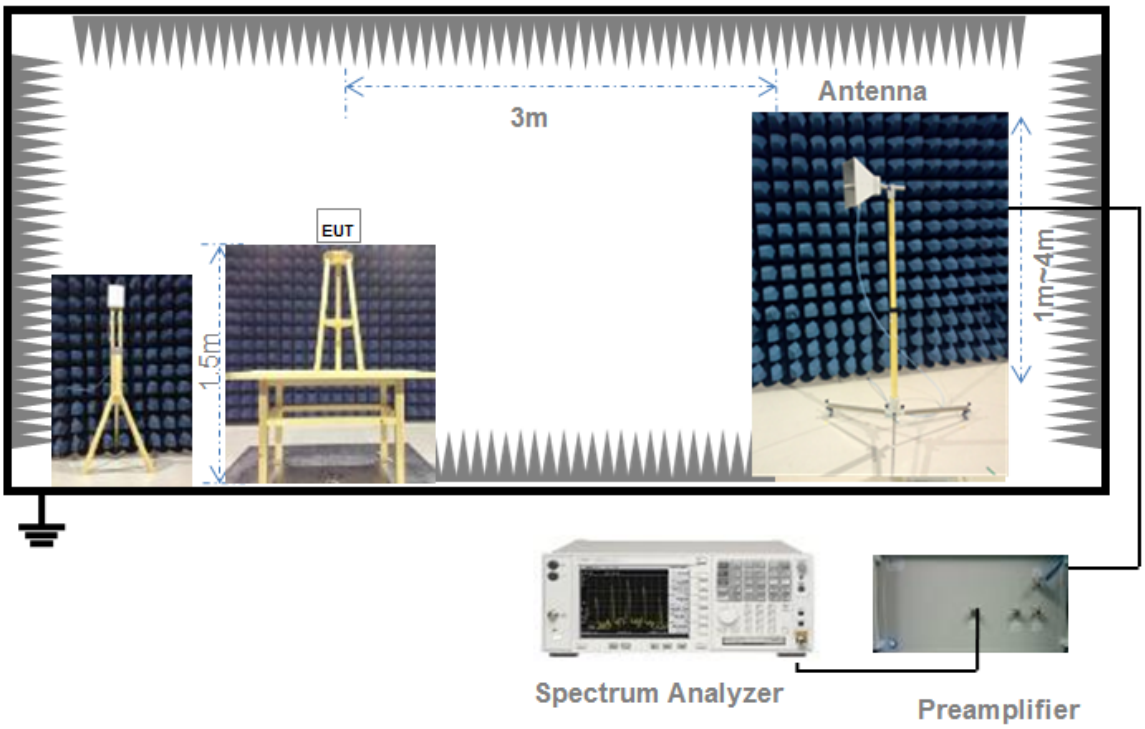
(Diagram 1)

4.3.2 For Radiated Test (30 MHz-1 GHz)



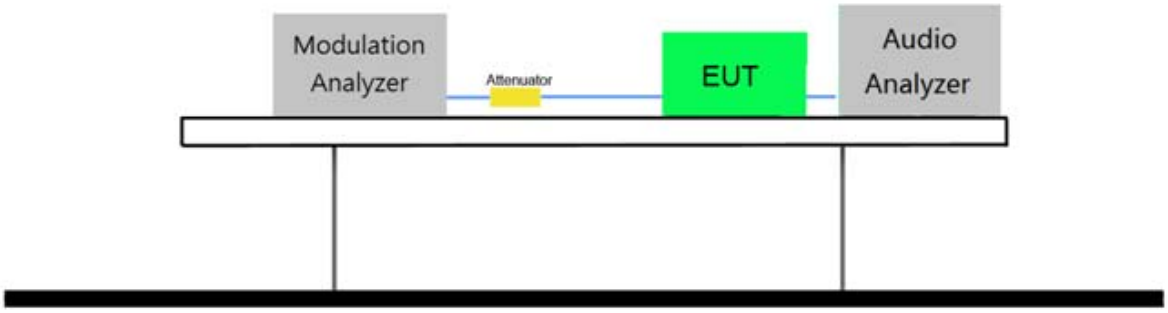
(Diagram 2)

4.3.3 For Radiated Test (Above 1 GHz)



(Diagram 3)

4.3.4 Modulation Characteristics



(Diagram 4)

5 TEST ITEMS

5.1 Output Power

5.1.1 Test Limit

FCC §74.861(e) (1)

The power of the measured unmodulated carrier power at the output of the transmitter power amplifier (antenna input power) may not exceed the following:

Frequency Band (MHz)	Limit
54-72,76-88, and 174-216 MHz	50 mW EIRP
470-608 and 614-698 MHz	250 mW conducted power
600 MHz duplex gap	20 mW EIRP

5.1.2 Test Setup

See section 4.3.1 (Diagram 1) for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.1.3 Test Procedure

Connect the EUT to spectrum analyzer and set the spectrum analyzer as following:

Center frequency: channel frequency under test;

RBW: 100 kHz;

VBW: 300 kHz;

Detector mode: peak;

Span: 1MHz

Max-hold the trace and record the peak value once the race stabilized.

In many cases, the RF output power limits for licensed digital transmission devices is specified in terms of effective radiated power (ERP) or equivalent isotropic radiated power (EIRP). Typically, ERP is specified when the operating frequency is less than or equal to 1 GHz and EIRP is specified when the operating frequency is greater than 1 GHz. Both are determined by adding the transmit antenna gain to the conducted RF output power with the primary difference between the two being that when determining the ERP, the transmit antenna gain is referenced to a dipole antenna (i.e., dBd) whereas when determining the EIRP, the transmit antenna gain is referenced to an isotropic antenna (dBi).

The relevant equation for determining the ERP or EIRP from the conducted RF output power measured using the guidance provided above is:

ERP/EIRP = PMeas + GT − LC

where:

ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm);

PMeas = measured transmitter output power or PSD, in dBm or dBW;

GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

dBd (ERP)=dBi-2.15

LC = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

5.1.4 Test Result

Please refer to ANNEX A.1.

5.2 Modulation Characteristics

5.2.1 Limit

FCC §2.1047(a) & 74.861(e) (3)

For Voice Modulation Communication Equipment, the frequency response of the audio modulation circuit over a range of 100 to 5000Hz shall be measured.
Any form of modulation may be used. A maximum deviation of ±75 kHz is permitted when frequency modulation is employed.

5.2.2 Test Setup

See section 4.3.4 (Diagram 4) for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.2.3 Test Procedure

Modulation Limit

(i) Configure the EUT as shown in next figure, adjust the audio input for 60% of rated system deviation at 1KHz using this level as a reference (0dB) and vary the input level from –20 to +20dB. Record the frequency deviation obtained as a function of the input level.

(ii) Repeat step (i) with input frequency changing to 100, 500, 2500 and 10000 Hz in sequence.

Audio Frequency Response

(i) Configure the EUT as shown in next figure.

(ii) Adjust the audio input for 20% of rated system deviation at 1 KHz using this level as a reference (0 dB).

(iii) Vary the Audio frequency from 100 Hz to 30 KHz and record the frequency deviation.

(iv) Audio Frequency Response = 20log10 (Deviation of test frequency/Deviation of 1 KHz reference).

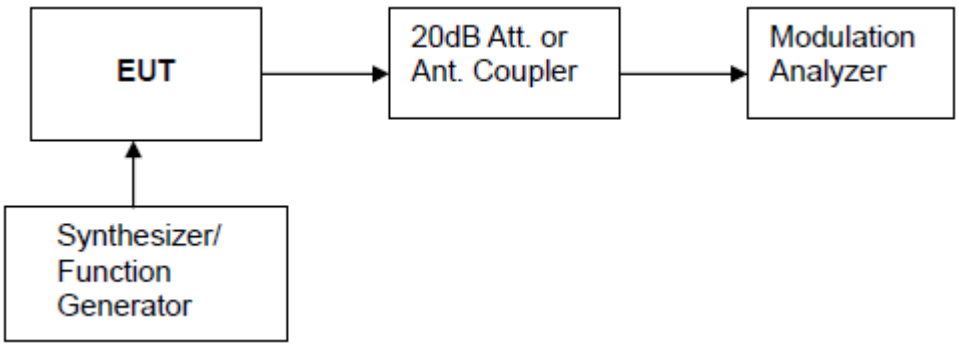


Figure: Modulation Characteristic Measurement Configuration

5.2.4 Test Result

Please refer to ANNEX A.2.

5.3 Emission Bandwidth and Emission Mask

5.3.1 Limit

FCC §74.861(e) (5) (6)

The operating bandwidth shall not exceed 200 kHz.

The mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

(i) On any frequency removed from the operating frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth : at least 25 dB;

(ii) On any frequency removed from the operating frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth : at least 35 dB;

(iii) On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth : at least 43+10log(mean output power in watts) dB;

5.3.2 Test Setup

See section 4.3.1 (Diagram 1) for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.3.3 Test Procedure

The transmitter shall be operated at its maximum carrier power measured under normal test condition. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used given that a peak or peak hold my produce a wider bandwidth than actual.

The trace data points are recovered and directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded. The span between two recorded frequencies is the occupied bandwidth.

5.3.4 Test Result

Please refer to ANNEX A.2.

5.4 Spurious Emissions at Antenna Terminals

5.4.1 Limit

FCC §74.861(e) (6) (iii)
On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least 43+10log (mean output power in watts) dB;

5.4.2 Test Setup

See section 4.3.1 (Diagram 1) for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.4.3 Test Procedure

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log(P) dB. Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

5.4.4 Test Result

Please refer to ANNEX A.5.

5.5 Field Strength of Spurious Radiation

5.5.1 Limit

FCC §2.1055(a)(1) & 2.1055(d)(2) & 74.861(e) (6) (iii)

The frequency stability shall be measured with variation of ambient temperature from －30℃ to +50℃ centigrade.

For hand carried battery powered equipment, the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point, which is specified by the manufacture.

On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least 43+10log (mean output power in watts) dB;

5.5.2 Test Setup

See section 4.3.2, 4.3.3 (Diagram 2, 3) for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.5.3 Test Procedure

1. On a test site, the EUT shall be placed at 150cm height on a turn table, and in the position close to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3 m from EUT to correspond to the fundamental frequency of the transmitter.
3. The output of the test antenna shall be connected to the measuring receiver and the peak detector is used for the measurement.
4. During the measurement of the EUT, the resolution bandwidth was to 1 MHz and the average bandwidth was set to 1 MHz.
5. The transmitter shall be switched on; the measuring receiver shall be tuned to the frequency of the transmitter under test.
6. The test antenna shall be raised and lowered through the specified range of height until the maximum signal level is detected by the measuring receiver.
7. The transmitter shall be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
8. The test antenna shall be raised and lowered again through the specified range of height until the maximum signal level is detected by the measuring receiver.
9. The maximum signal level detected by the measuring receiver shall be noted.

5.5.4 Test Result

Please refer to ANNEX A.6.

5.6 Frequency Stability

5.6.1 Limit

FCC §74.861(e) (4)

The frequency tolerance of the transmitter shall be 0.005 percent.

5.6.2 Test Setup

See section 4.3.1 (Diagram 1) for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.6.3 Test Procedure

FREQUENCY STABILITY VERSUS ENVIRONMENTAL TEMPERATURE

(i) Setup the configuration for frequencies measurement inside an environment chamber.

(ii) Turn on EUT and set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 1 KHz and Video Resolution Bandwidth to 1 KHz and Frequency Span to 50KHz. Record this frequency as reference frequency.

(iii) Set the temperature of chamber to 50℃. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the chamber, turn the EUT on and measure the EUT operating frequency.

(iv) Repeat step (ii) with a 10℃ decreased per stage until the lowest temperature -30℃ is measured, record all measured frequencies on each temperature step.

FREQUENCY STABILITY VERSUS INPUT VOLTAGE

(i) Setup the configuration for frequencies measured at temperature if it is within 15℃ to 25℃. Otherwise, an environment chamber set for a temperature of 20℃ shall be used.

(ii) Set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 1 KHz and Video Resolution Bandwidth to 1KHz. Record this frequency as reference frequency.

(iii) For battery operated only device, supply the EUT primary voltage at the operating end point which is specified by manufacturer and record the frequency.

5.6.4 Test Result

Please refer to ANNEX A.7.

ANNEX A TEST RESULT

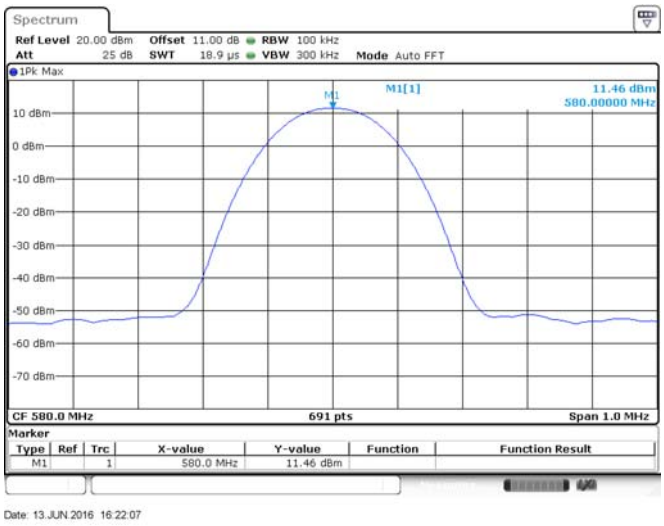
A.1 Output Power

Peak Power Test Data

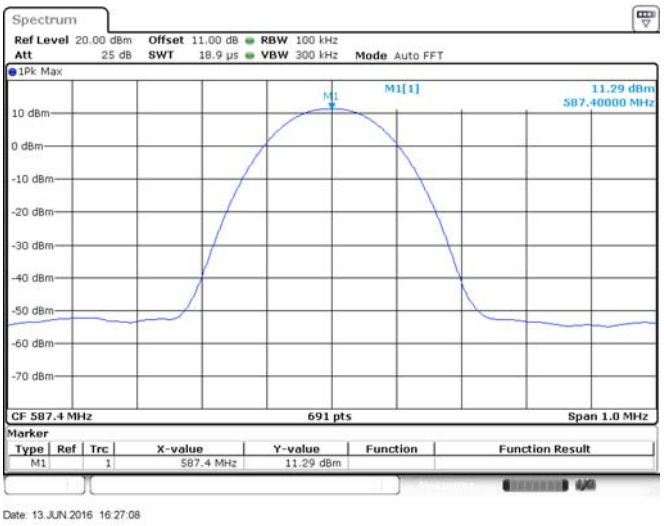
Channel	Output Peak Power dBm	Limit		Verdict
		dBm	mW	
Low	11.46	24	250	Pass
Middle	11.29			Pass
High	11.17			Pass

Test Plots

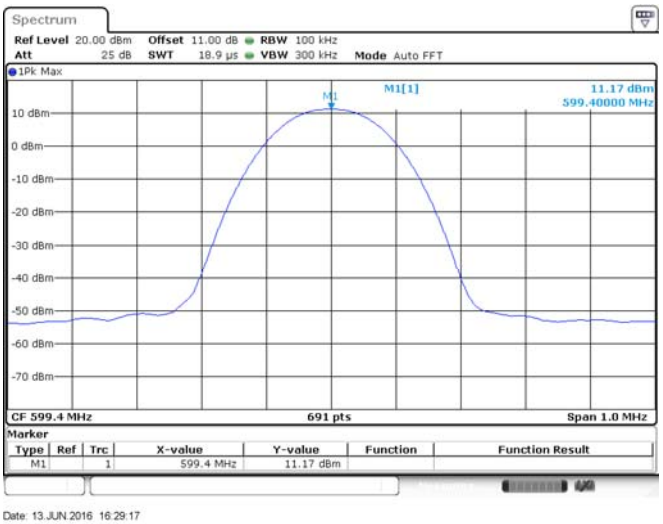
LOW CHANNEL



MIDDLE CHANNEL



HIGH CHANNEL



A.2 Modulation Characteristics

Test Data of Modulation Limit

Low Channel

Modulation Level (dB)	Peak Freq. Deviation At 100 Hz (KHz)	Peak Freq. Deviation At 500 Hz (KHz)	Peak Freq. Deviation At 2500 Hz (KHz)	Peak Freq. Deviation At 10000 Hz (KHz)	Limit (kHz)	Verdict
-20	9.18	10.40	11.90	13.50	±75	Pass
-15	9.96	11.20	13.10	15.40		
-10	11.01	11.70	14.50	17.30		
-5	12.46	13.30	16.90	20.80		
0	14.31	15.50	20.20	25.30		
+5	16.88	18.30	24.70	31.50		
+10	20.33	22.30	30.80	39.80		
+15	24.82	27.50	38.80	50.80		
+20	30.87	34.61	49.70	65.80		

Middle Channel

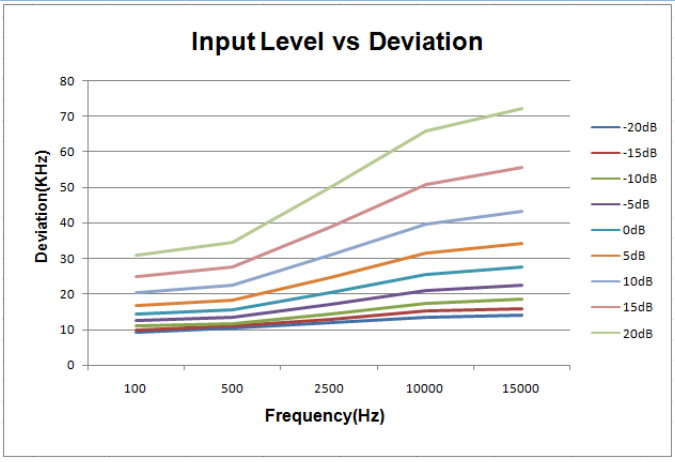
Modulation Level (dB)	Peak Freq. Deviation At 100 Hz (KHz)	Peak Freq. Deviation At 500 Hz (KHz)	Peak Freq. Deviation At 2500 Hz (KHz)	Peak Freq. Deviation At 10000 Hz (KHz)	Limit (kHz)	Verdict
-20	10.38	10.81	12.31	13.94	±75	Pass
-15	11.01	11.59	13.65	15.95		
-10	11.83	12.31	15.00	17.99		
-5	12.84	13.78	17.51	21.53		
0	14.80	16.01	20.98	26.26		
+5	17.50	19.00	25.60	32.70		
+10	21.00	23.00	31.80	41.20		
+15	25.70	28.40	40.20	52.60		
+20	32.00	35.90	51.50	68.10		

High Channel

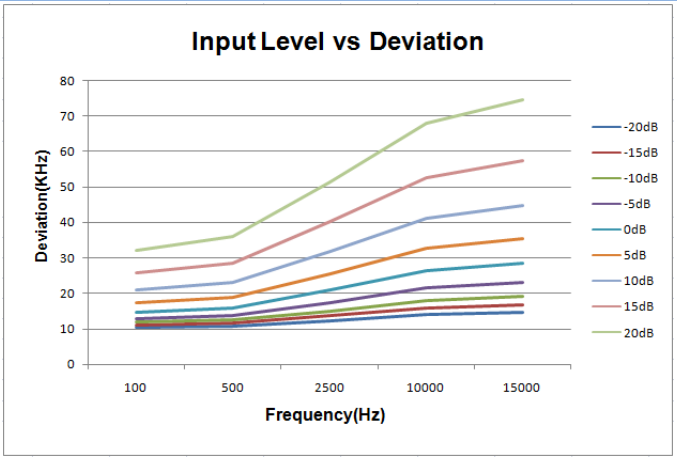
Modulation Level (dB)	Peak Freq. Deviation At 100 Hz (KHz)	Peak Freq. Deviation At 500 Hz (KHz)	Peak Freq. Deviation At 2500 Hz (KHz)	Peak Freq. Deviation At 10000 Hz (KHz)	Limit (kHz)	Verdict
-20	10.50	11.10	12.80	14.70	±75	Pass
-15	11.50	12.10	14.50	16.90		
-10	12.60	13.50	16.60	20.00		
-5	14.20	15.40	19.50	23.9		
0	16.40	17.90	23.30	29.20		
+5	19.40	21.20	28.50	36.30		
+10	23.30	25.70	35.40	45.80		
+15	28.60	31.80	44.70	58.40		
+20	35.50	39.90	57.30	74.90		

Test Plots of Modulation Limit

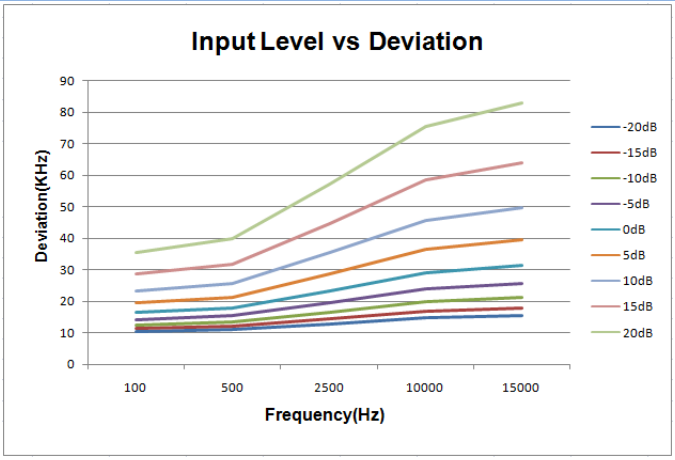
LOW CHANNEL MODULATION LIMIT



MIDDLE CHANNEL MODULATION LIMIT



HIGH CHANNEL MODULATION LIMIT



Test Data of Audio Frequency Response

Low Channel

Frequency (Hz)	Deviation (KHz)	
	+ Peak	-Peak
20	8.22	8.13
30	9.41	9.17
40	10.67	10.26
50	11.68	11.35
100	13.22	13.06
200	13.48	13.43
520	14.29	14.31
1020	15.78	15.80
1520	16.87	16.91
2020	17.72	17.73
2520	18.36	18.40
3020	18.90	18.96
3520	19.40	19.41
4020	19.78	19.80
4520	20.19	20.18
5020	20.47	20.51
5520	20.76	20.82
6020	21.03	21.06
6520	21.35	21.31
7020	21.52	21.53
7520	21.75	21.79
8020	21.95	22.01
8520	22.14	22.20
9020	22.37	22.40
9520	22.56.	22.67
10020	22.76	22.81
10520	22.94	22.98
11020	23.12	23.15
11520	23.27	23.33
12020	23.47	23.53
12520	23.69	23.65
13020	23.80	23.85
13520	24.00	24.02
14020	24.19	24.23
14520	24.35	24.36
15020	24.55	24.54
15520	24.74	24.70
16020	24.89	24.89
16520	25.06	25.10
17020	25.20	25.26

Frequency (Hz)	Deviation (KHz)	
	+ Peak	-Peak
17520	25.41	25.44
18020	22.55	25.59
18520	25.77	25.79
19020	25.91	25.93
19520	26.06	26.12
20000	26.21	26.28

Middle Channel

Frequency (Hz)	Deviation (KHz)	
	+ Peak	-Peak
20	8.52	8351
30	9.78	944
40	11.07	10.67
50	12.13	11.72
100	13.73	13.54
200	13.91	13.90
520	14.84	14.85
1020	16.31	16.36
1520	17.48	17.47
2020	18.32	18.36
2520	19.01	19.06
3020	19.57	19.61
3520	20.10	20.08
4020	20.48.	20.51
4520	20.86	20.82
5020	21.18	21.23
5520	21.48	21.53
6020	21.78	21.80
6520	22.04	22.08
7020	22.28	22.27
7520	22.51	22.56
8020	22.73	22.79
8520	22.98	23.00
9020	23.13	23.18
9520	23.36	23.42
10020	23.54	23.55
10520	23.74	23.75
11020	23.90	23.98
11520	24.10	24.11
12020	24.30	24.33
12520	24.48	24.48
13020	24.66	24.69

Frequency (Hz)	Deviation (KHz)	
	+ Peak	-Peak
13520	24.83	24.90
14020	25.04	25.05
14520	25.22	25.27
15020	25.39	25.45
15520	25.58	25.63
16020	25.76	25.78
16520	25.95	26.00
17020	26.15	26.15
17520	26.31	26.32
18020	26.49	26.54
18520	26.69	26.68
19020	26.87	26.86
19520	27.01	27.04
20000	27.17	27.21

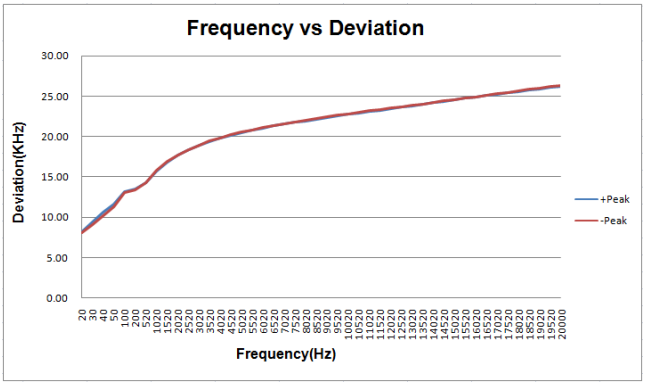
High Channel

Frequency (Hz)	Deviation (KHz)	
	+ Peak	-Peak
20	9.28	9.36
30	10.57	10.27
40	12.05	11.56
50	13.17	12.68
100	15.17	14.92
200	15.44	15.49
520	16.45	16.47
1020	18.16	18.18
1520	19.43	19.45
2020	20.36	20.41
2520	21.13	21.18
3020	21.77	21.81
3520	22.31	22.32
4020	22.78	22.82
4520	23.22	23.24
5020	23.61	23.59
5520	23.93	23.95
6020	24.22	24.23
6520	25.51	25.52
7020	24.77	24.79
7520	25.05	25.10
8020	25.25	25.31
8520	25.54	25.50
9020	25.74	25.78

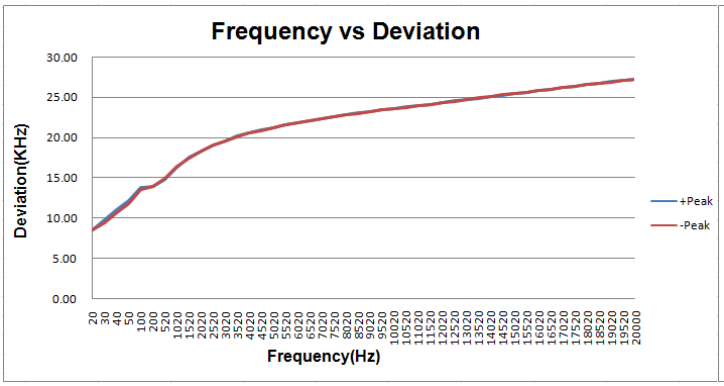
Frequency (Hz)	Deviation (KHz)	
	+ Peak	-Peak
9520	25.95	25.98
10020	26.15	26.22
10520	26.39	26.41
11020	26.59	26.61
11520	26.79	26.81
12020	27.01	27.04
12520	27.21	27.24
13020	27.45	27.44
13520	27.61	27.63
14020	27.79	27.84
14520	28.02	28.04
15020	28.20	28.22
15520	28.39	28.45
16020	28.62	28.65
16520	28.81	28.82
17020	29.01	29.02
17520	29.20	29.24
18020	29.42	29.42
18520	29.62	29.64
19020	29.82	29.85
19520	30.01	30.02
20000	30.21	30.27

Test Plots of Audio Frequency Response

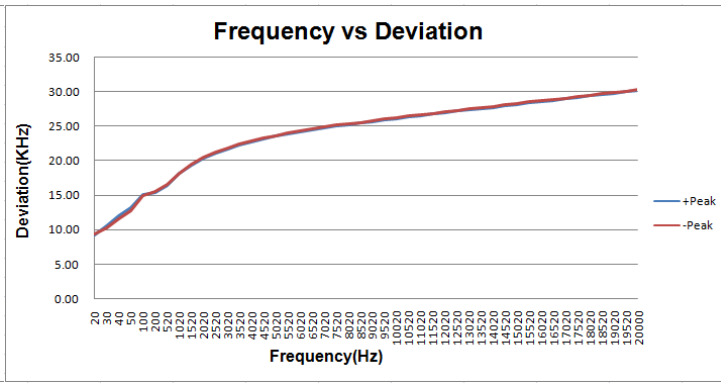
LOW CHANNEL MODULATION LIMIT



MIDDLE CHANNEL MODULATION LIMIT



HIGH CHANNEL MODULATION LIMIT



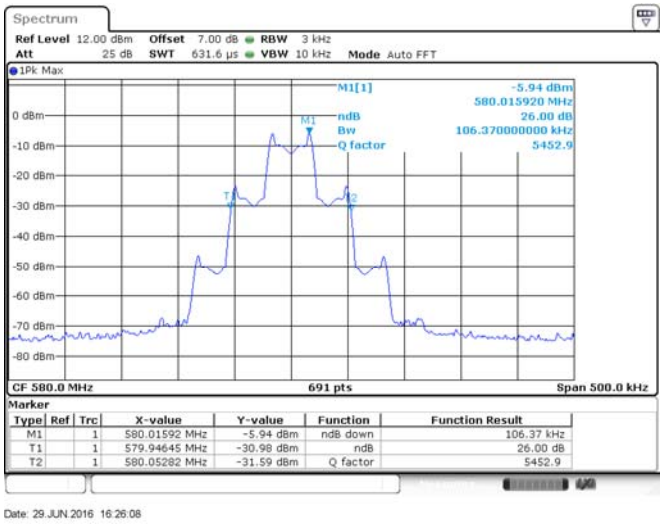
A.3 Emission Bandwidth and Emission Mask

Test Data

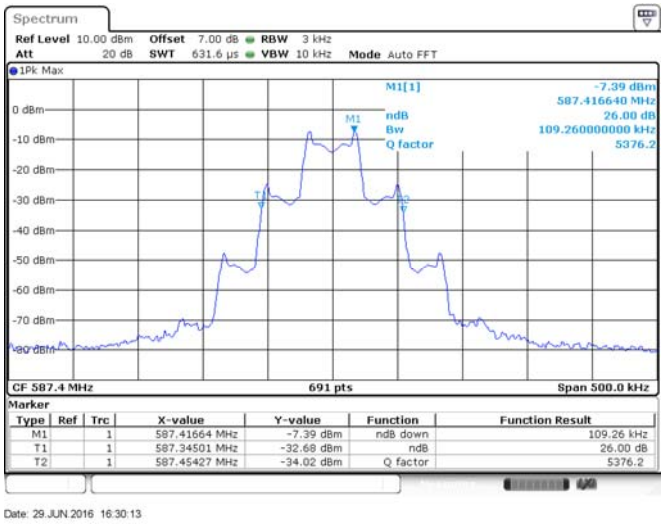
Channel	26 dB Bandwidth (kHz)	99% Bandwidth (kHz)	Limits (kHz)	Verdict
Low Channel	106.37	91.17	<200	Pass
Middle Channel	109.26	92.62	<200	Pass
High Channel	114.33	100.58	<200	Pass

Test plots (26 dB Bandwidth)

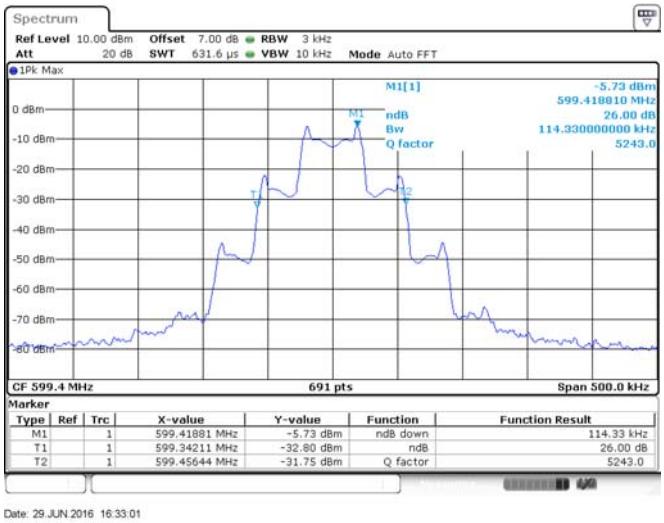
A.3.1 LOW CHANNEL



A.3.2MIDDLE CHANNEL

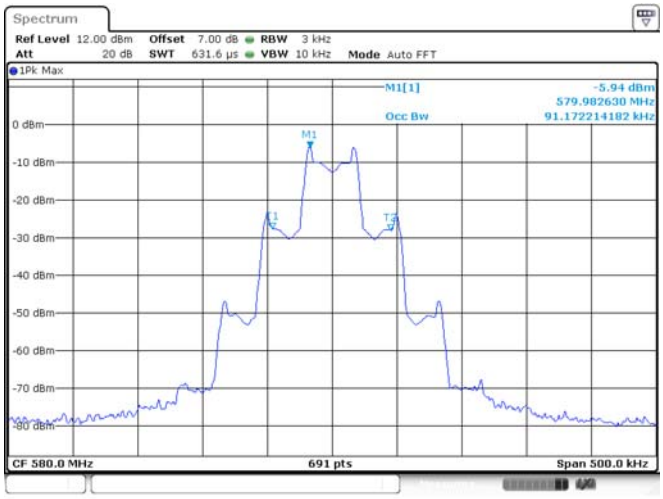


A.3.3 HIGH CHANNEL



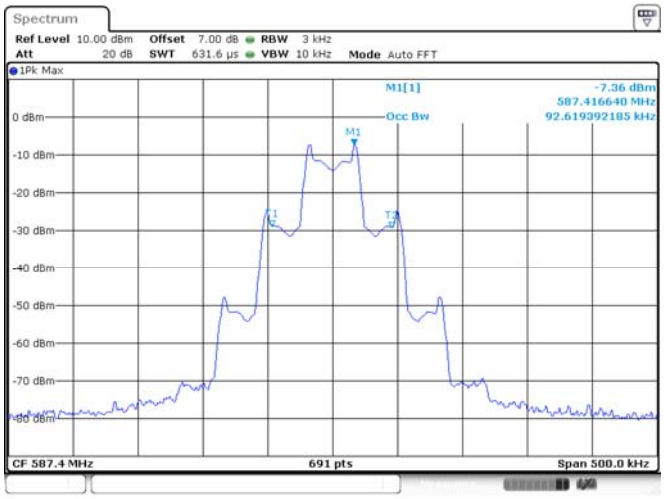
Test plots (99% Bandwidth)

A.3.4 LOW CHANNEL



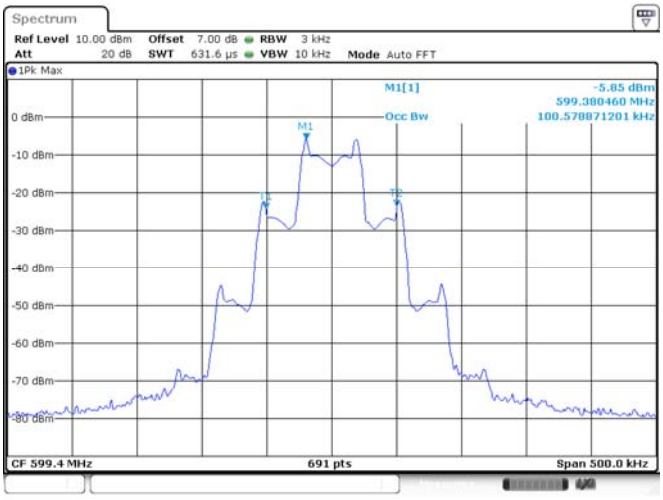
Date: 29.JUN.2016 16:27:14

A.3.5 MIDDLE CHANNEL



Date: 29.JUN.2016 16:30:49

A.3.6 HIGH CHANNEL

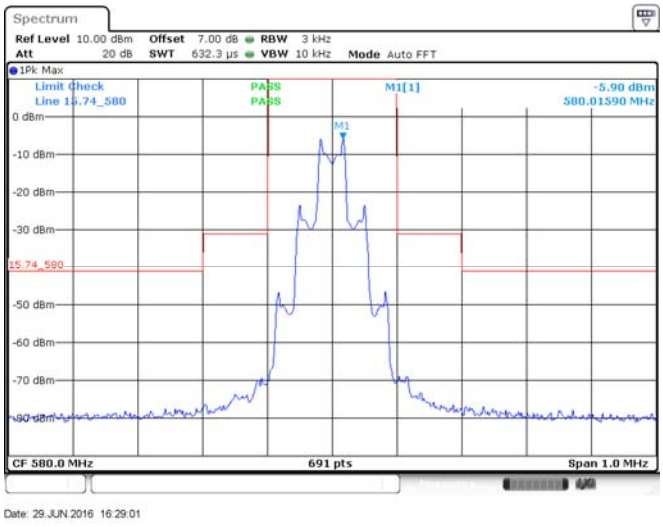


Date: 29.JUN.2016 16:33:27

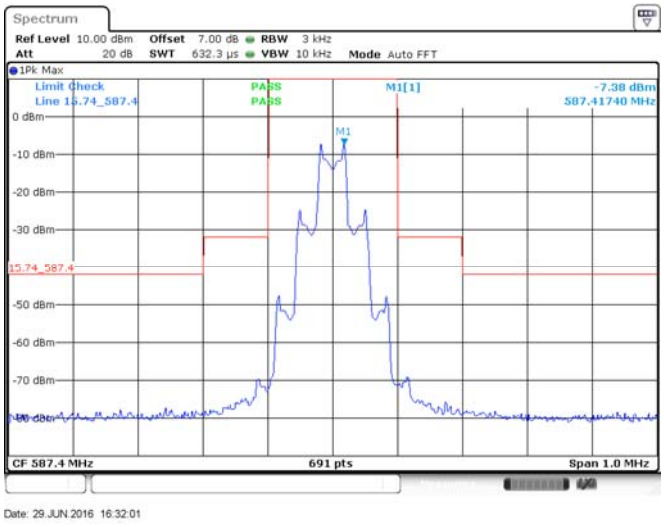
Test data of Mask

Channel	Refer to Plot	Verdict
Low Channel	A.3.7	Pass
Middle Channel	A.3.8	Pass
High Channel	A.3.9	Pass

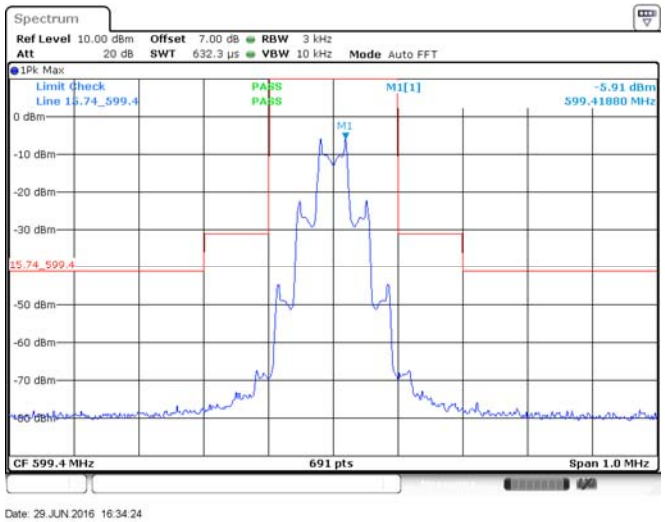
A.3.7 LOW CHANNEL



A.3.8 MIDDLE CHANNEL



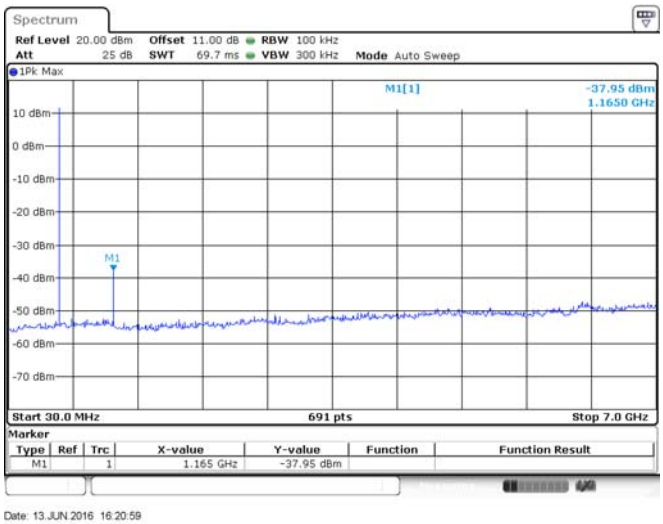
A.3.9 HIGH CHANNEL



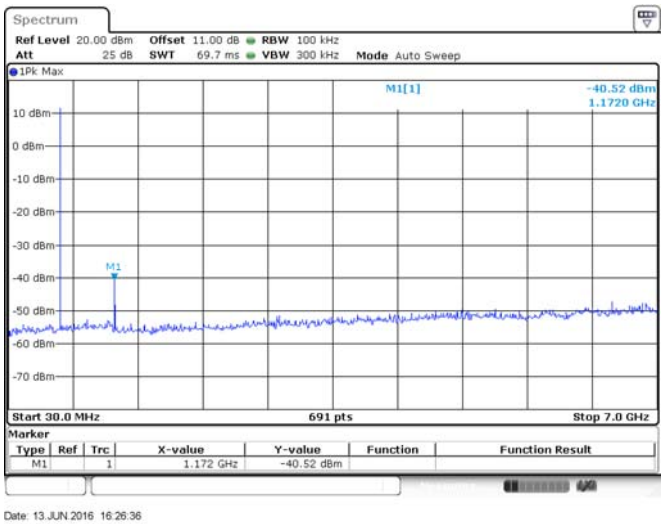
A.4 Spurious Emissions at Antenna Terminals

Test Channel	Max Spurious Emission (GHz)	Value(dBm)	Limits (dBm)	Verdict
Low Channel	1.165	-37.95	-13	Pass
Middle Channel	1.172	-40.52	-13	Pass
High Channel	1.195	-45.10	-13	Pass

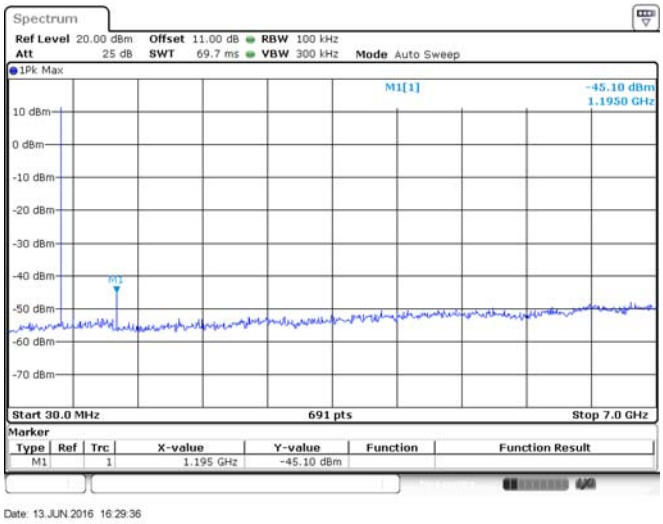
LOW CHANNEL 30 MHZ -7 GHz



MIDDLE CHANNEL 30 MHZ -7 GHz



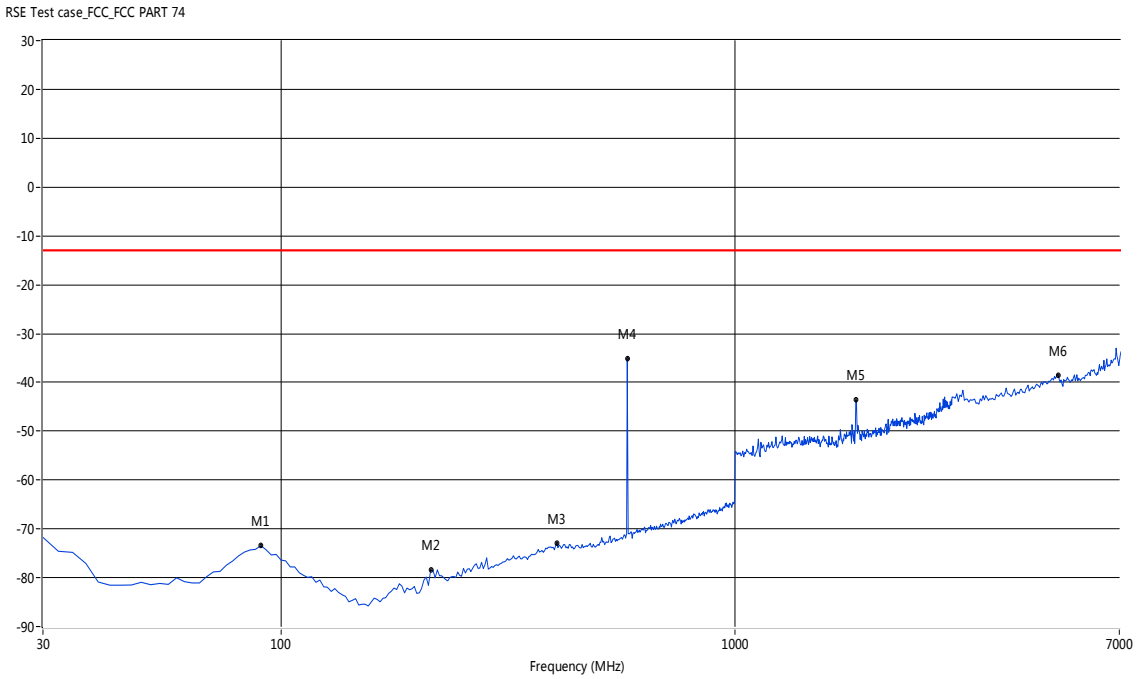
HIGH CHANNEL 30 MHZ -7 GHz



A.5 Field Strength of Spurious Radiation

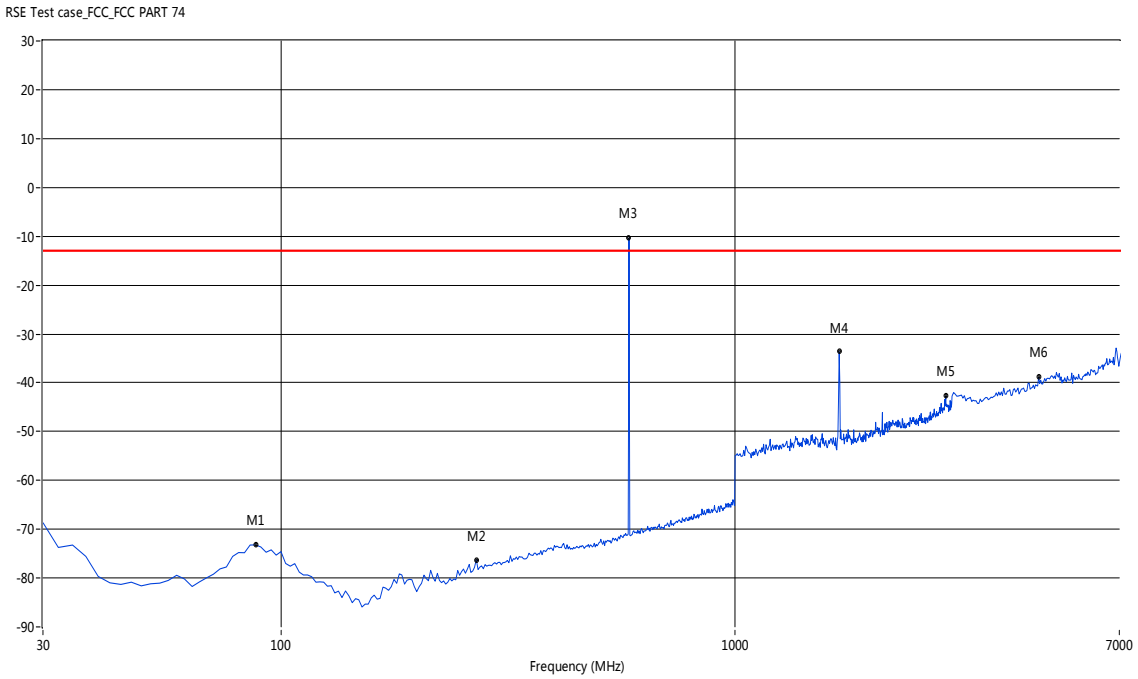
Note 1: The marked spike ”N/A” should be ignored because they are Fundamental signal.

Low Channel 30 MHz to 7 GHz, ANT V



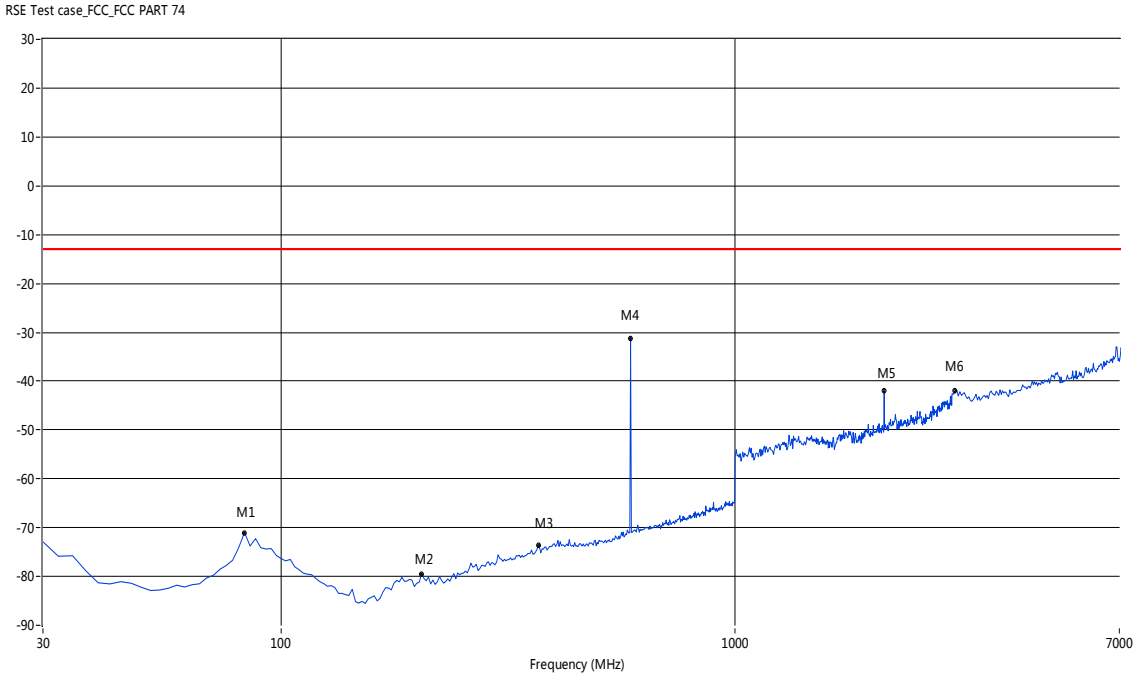
Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Margin (dB)	Table (o)	ANT	Verdict
90.47	-73.44	-2.24	-13.0	60.44	215.00	Vertical	Pass
213.84	-78.49	-11.48	-13.0	65.49	61.00	Vertical	Pass
404.94	-72.84	-2.53	-13.0	59.84	180.00	Vertical	Pass
580.10	-35.16	0.15	-13.0	22.16	225.00	Vertical	N/A
1842.89	-43.56	9.77	-13.0	30.56	195.00	Vertical	Pass
5139.65	-38.51	28.00	-13.0	25.51	171.00	Vertical	Pass

Low Channel 30 MHz to 7 GHz, ANT H



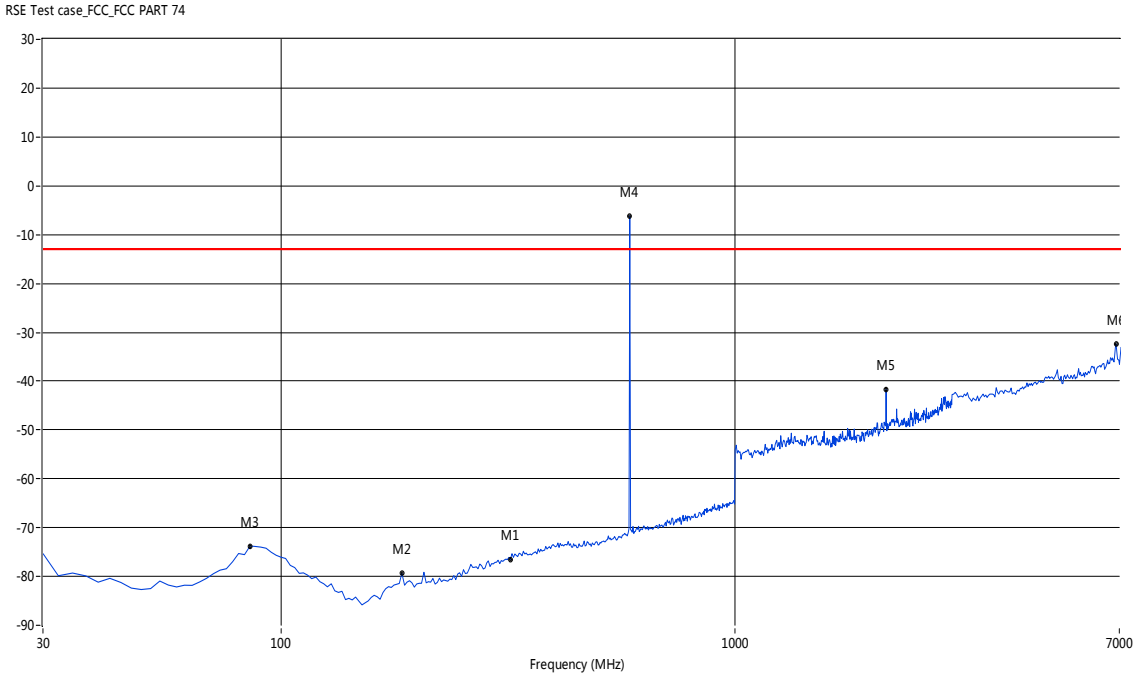
Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Margin (dB)	Table (o)	ANT	Verdict
88.06	-73.22	-2.77	-13.0	60.22	139.00	Horizontal	Pass
269.48	-76.23	-7.67	-13.0	63.23	2.00	Horizontal	Pass
580.94	-10.38	0.23	-13.0	-2.62	10.00	Horizontal	N/A
1693.27	-33.64	9.45	-13.0	20.64	143.00	Horizontal	Pass
2905.24	-42.70	15.88	-13.0	29.70	14.00	Horizontal	Pass
4653.37	-38.88	26.28	-13.0	25.88	165.00	Horizontal	Pass

Middle Channel 30 MHz to 7 GHz, ANT V



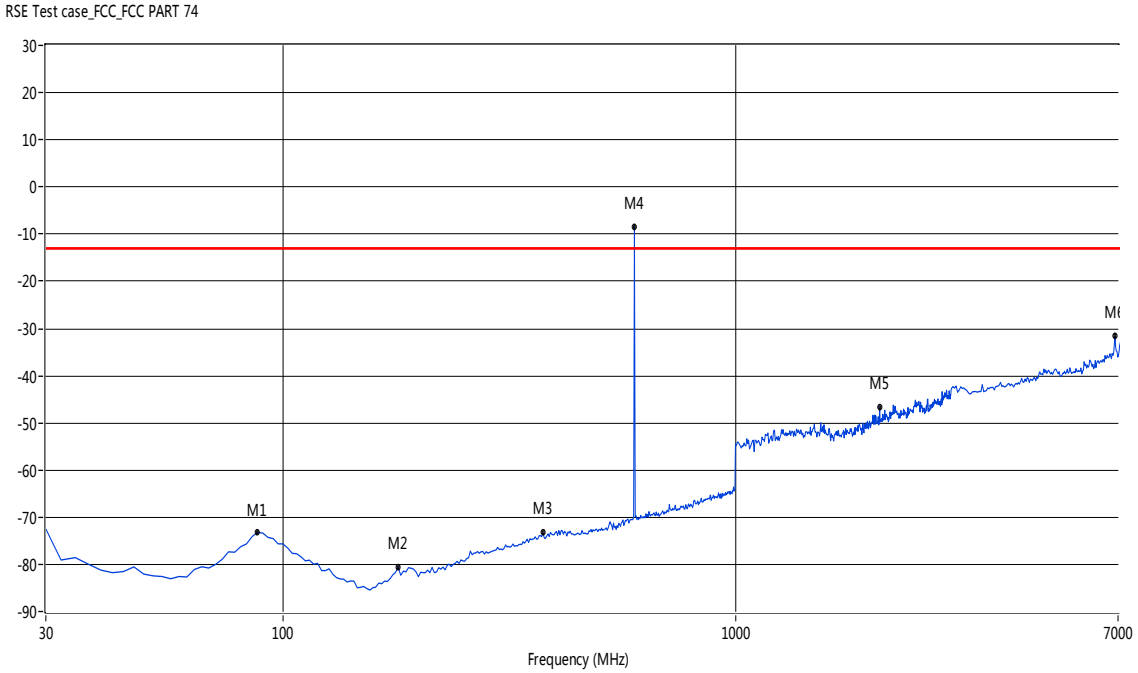
Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Margin (dB)	Table (o)	ANT	Verdict
83.22	-71.03	-4.35	-13.0	58.03	355.60	Vertical	Pass
204.16	-79.42	-11.73	-13.0	66.42	3.00	Vertical	Pass
368.65	-73.63	-3.73	-13.0	60.63	281.00	Vertical	Pass
587.78	-31.27	0.29	-13.0	18.27	130.80	Vertical	N/A
2127.18	-42.05	11.61	-13.0	29.05	286.00	Vertical	Pass
3048.63	-41.99	21.92	-13.0	28.99	28.10	Vertical	Pass

Middle Channel 30 MHz to 7 GHz, ANT H



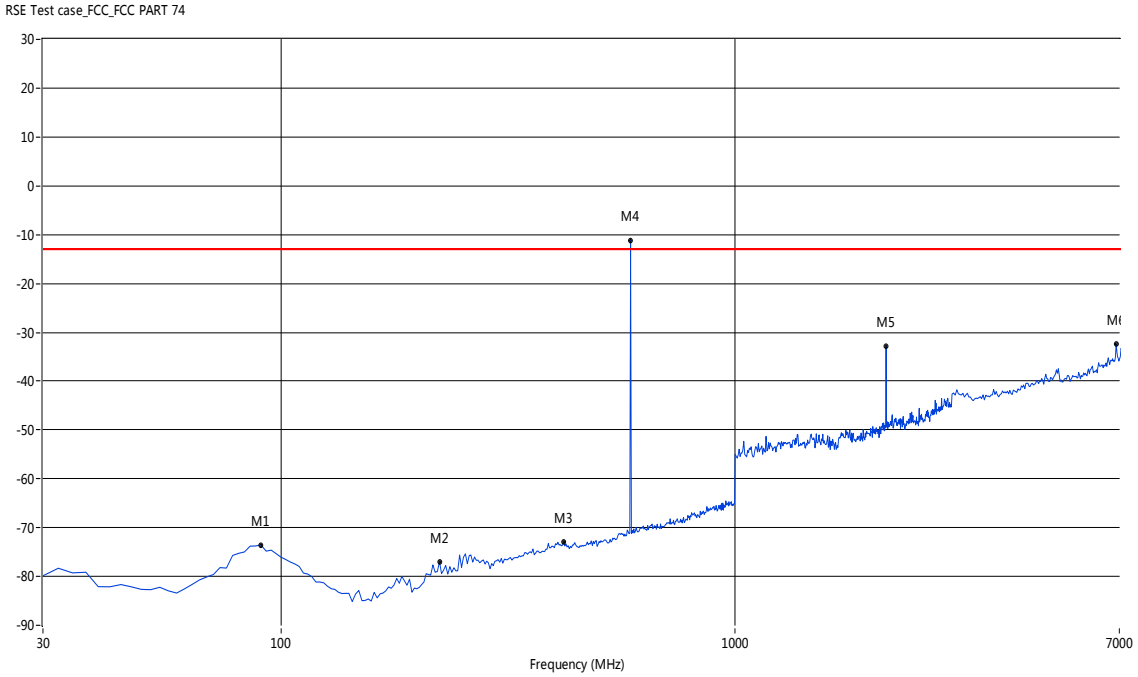
Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Margin (dB)	Table (o)	ANT	Verdict
320.27	-76.52	-5.19	-13.0	63.52	137.20	Horizontal	Pass
184.81	-79.34	-11.71	-13.0	66.34	242.00	Horizontal	Pass
85.64	-73.78	-3.64	-13.0	60.78	-0.00	Horizontal	Pass
587.36	-6.18	0.28	-13.0	-6.82	63.70	Horizontal	N/A
2147.13	-41.71	11.74	-13.0	28.71	70.00	Horizontal	Pass
6890.27	-32.46	32.92	-13.0	19.46	58.00	Horizontal	Pass

High Channel 30 MHz to 7 GHz, ANT V



Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Margin (dB)	Table (o)	ANT	Verdict
88.06	-73.22	-2.87	-13.0	60.22	17.00	Vertical	Pass
179.97	-80.59	-11.65	-13.0	67.59	133.00	Vertical	Pass
375.91	-73.26	-3.30	-13.0	60.26	119.00	Vertical	Pass
599.45	-8.37	0.78	-13.0	-4.63	245.00	Vertical	N/A
2082.29	-46.64	11.36	-13.0	33.64	90.00	Vertical	Pass
6890.27	-31.53	32.92	-13.0	18.53	347.00	Vertical	Pass

High Channel 30 MHz to 7 GHz, ANT H



Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Margin (dB)	Table (o)	ANT	Verdict
90.47	-73.53	-2.24	-13.0	60.53	246.00	Horizontal	Pass
223.52	-76.94	-10.72	-13.0	63.94	163.00	Horizontal	Pass
419.45	-72.82	-2.47	-13.0	59.82	245.00	Horizontal	Pass
599.78	-11.21	0.29	-13.0	-1.79	124.00	Horizontal	N/A
2147.13	-32.85	11.74	-13.0	19.85	76.00	Horizontal	Pass
6890.27	-32.34	32.92	-13.0	19.34	156.00	Horizontal	Pass

A.6 Frequency Stability

Voltage vs. Frequency Stability (LOW CHANNEL)

Test Conditions		Test Frequency (MHz)	Measurement Frequency (MHz)	Max. Deviation (Hz)	Max. Deviation (ppm)	Limit (ppm)
Temperature (°C)	Voltage (VDC)					
20	3.3	580	579.999459	-541	-0.93	50
	3.0	580	580.004508	4508	7.77	50
	2.0	580	580.007122	7122	12.28	50

Temperature vs. Frequency Stability (LOW CHANNEL)

Test Conditions		Test Frequency (MHz)	Measurement Frequency (MHz)	Max. Deviation (Hz)	Max. Deviation (ppm)	Limit (ppm)
Voltage (VDC)	Temperature (°C)					
3.0	-10	580	579.985679	-14321	-24.69	50
	-5	580	580.006272	6272	10.81	50
	0	580	580.009035	9035	15.58	50
	10	580	580.004971	4971	8.57	50
	20	580	579.973764	-26236	29.58	50
	30	580	580.004445	4445	7.66	50
	40	580	579.988932	-11068	-19.08	50
	50	580	580.00386	3860	6.66	50
	55	580	579.994742	-5258	-9.07	50

Voltage vs. Frequency Stability (MIDDLE CHANNEL)

Test Conditions		Test Frequency (MHz)	Measurement Frequency (MHz)	Max. Deviation (Hz)	Max. Deviation (ppm)	Limit (ppm)
Temperature (°C)	Voltage (VDC)					
20	3.3	587.4	587.378255	-21745	-37.02	50
	3.0	587.4	587.417437	17437	29.69	50
	2.0	587.4	587.40864	8640	14.71	50

Temperature vs. Frequency Stability (MIDDLE CHANNEL)

Test Conditions		Test Frequency (MHz)	Measurement Frequency (MHz)	Max. Deviation (Hz)	Max. Deviation (ppm)	Limit (ppm)
Voltage (VDC)	Temperature (°C)					
3.0	-10	587.4	587.387289	-12711	-21.64	50
	-5	587.4	587.410684	10684	18.19	50
	0	587.4	587.424869	24869	42.34	50
	10	587.4	587.417415	17415	29.65	50
	20	587.4	587.392015	-7985	-13.59	50
	30	587.4	587.421933	21933	37.34	50
	40	587.4	587.400734	734	1.25	50
	50	587.4	587.426002	26002	44.27	50
	55	587.4	587.391948	-8052	-13.71	50

Voltage vs. Frequency Stability (HIGH CHANNEL)

Test Conditions		Test Frequency (MHz)	Measurement Frequency (MHz)	Max. Deviation (Hz)	Max. Deviation (ppm)	Limit (ppm)
Temperature (°C)	Voltage (VDC)					
20	3.3	599.4	599.386207	-13793	-23.01	50
	3.0	599.4	599.423286	23286	38.85	50
	2.0	599.4	599.410272	10272	17.14	50

Temperature vs. Frequency Stability (HIGH CHANNEL)

Test Conditions		Test Frequency (MHz)	Measurement Frequency (MHz)	Max. Deviation (Hz)	Max. Deviation (ppm)	Limit (ppm)
Voltage (VDC)	Temperature (°C)					
3.0	-10	599.4	599.370406	-29594	-49.37	50
	-5	599.4	599.408139	8139	13.58	50
	0	599.4	599.402003	2003	3.34	50
	10	599.4	599.408571	8571	14.30	50
	20	599.4	599.381529	-18471	-30.82	50
	30	599.4	599.416492	16492	27.51	50
	40	599.4	599.410278	10278	17.15	50
	50	599.4	599.390254	-9746	-16.26	50
	55	599.4	599.385556	-14444	-24.10	50

ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SZ1650378-AR.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL- SZ1650378-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL- SZ1650378-AI.PDF”.

--END OF REPORT--