

FCC REPORT

Applicant: STEELMATE CO.,LTD.

Address of Applicant: Steelmate Industrial Park, Heping Street, Dongfu Road,
Dongfeng Town, Zhongshan City, Guangdong, P.R. China
528425

Equipment Under Test (EUT)

Product Name: TPMS

Model No.: BTP141

Trade mark: steelmate

FCC ID: Q6WBTP141

Applicable standards: FCC CFR Title 47 Part 15 Subpart C Section 15.231(e)

Date of sample receipt: 22 Jan., 2015

Date of Test: 22 Jan., to 28 Jan., 2015

Date of report issue: 29 Jan., 2015

Test Result: PASS*

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Bruce Zhang
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the CCIS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

2 Version

Version No.	Date	Description
00	29 Jan., 2015	Original

Prepared by:

Sera Xiang

Date:

29 Jan., 2015

Report Clerk

Reviewed by:

Wimer Zhang

Date:

29 Jan., 2015

Project Engineer

3 Contents

Page

1	COVER PAGE.....	1
2	VERSION	2
3	CONTENTS	3
4	TEST SUMMARY	4
5	GENERAL INFORMATION.....	5
5.1	CLIENT INFORMATION.....	5
5.2	GENERAL DESCRIPTION OF E.U.T.....	5
5.3	TEST MODE.....	5
5.4	DESCRIPTION OF SUPPORT UNITS.....	5
5.5	LABORATORY FACILITY.....	6
5.6	LABORATORY LOCATION	6
5.7	TEST INSTRUMENTS LIST.....	6
6	TEST RESULTS AND MEASUREMENT DATA.....	7
6.1	ANTENNA REQUIREMENT:.....	7
6.2	RADIATED EMISSION	8
6.2.1	Field Strength Of The Fundamental Signal	10
6.2.2	Spurious Emissions	11
6.3	20dB BANDWIDTH.....	13
6.4	DURATION TIME.....	15
7	TEST SETUP PHOTOS.....	17
8	EUT CONSTRUCTIONAL PHOTOS.....	19

4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	Pass
Field strength of the fundamental signal	15.231 (e)	Pass
Spurious emissions	15.231 (b)/15.209	Pass
20dB Bandwidth	15.231 (c)	Pass
Dwell time	15.231 (e)	Pass
Conducted Emission	15.107	N/A

Pass: The EUT complies with the essential requirements in the standard.

5 General Information

5.1 Client Information

Applicant:	Steelmate Co., Ltd.
Address of Applicant:	Steelmate Industrial Park, Heping Street, Dongfu Road, Dongfeng Town, Zhongshan City, Guangdong, P.R. China 528425
Manufacturer/ Factory:	Steelmate Co., Ltd.
Address of Manufacturer/ Factory:	Steelmate Industrial Park, Heping Street, Dongfu Road, Dongfeng Town, Zhongshan City, Guangdong, P.R. China 528425.

5.2 General Description of E.U.T.

Product Name:	TPMS
Model No.:	BTP141
Trade mark:	steelmate
Operation Frequency:	433.92MHz
Channel numbers:	1
Modulation type:	FSK
Antenna Type:	External antenna
Antenna gain:	0dBi
Power supply:	DC 12V

5.3 Test mode

Transmitting mode:	Keep the EUT in transmitting mode with modulation.		
Pre-Test Mode:			
CCIS has verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. which was shown in this test report and defined as follows:			
Axis	X	Y	Z
Field Strength(dBuV/m)	77.57	80.40	78.57
Final Test Mode:			
According to ANSI C63.4 standards, the test results are both the “worst case” and “worst setup”: Y axis (see the test setup photo)			

5.4 Description of Support Units

Manufacturer	Description	Model	Serial Number
GS	Battery(12V)	55D26R-MFZ	N/A

5.5 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **FCC - Registration No.: 817957**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in out files. Registration 817957, February 27, 2012.

● **IC - Registration No.: 10106A-1**

The 3m Semi-anechoic chamber of Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

● **CNAS - Registration No.: CNAS L6048**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6048.

5.6 Laboratory Location

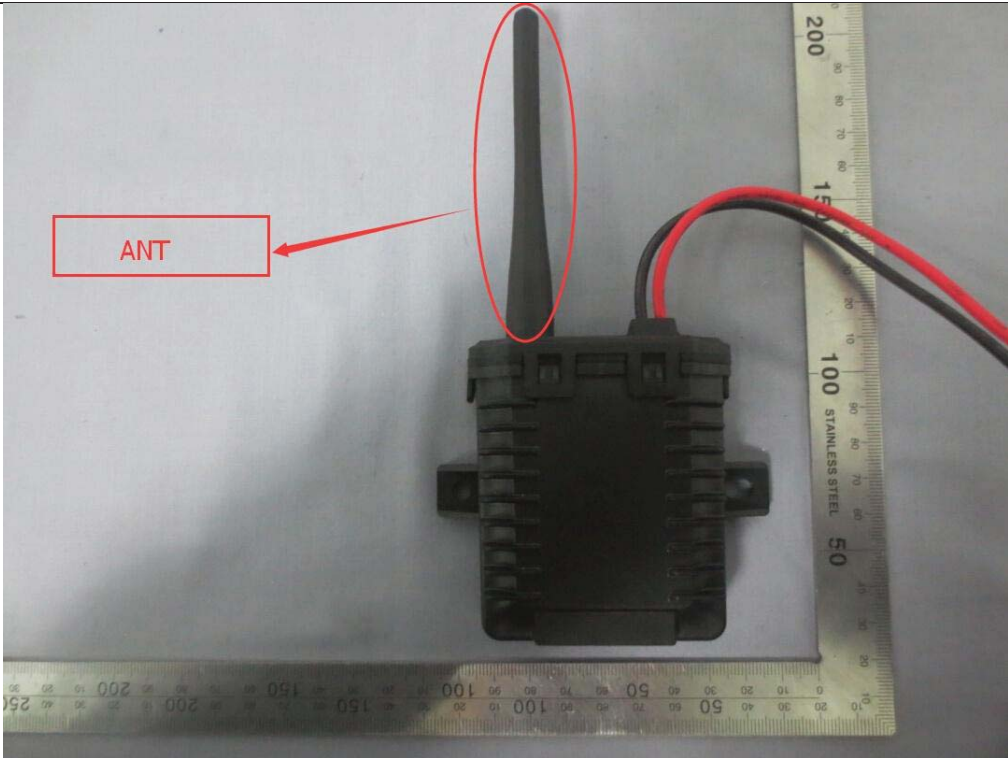
Shenzhen Zhongjian Nanfang Testing Co., Ltd.
Address: No. B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road,
Bao'an District, Shenzhen, Guangdong, China
Tel: +86-755-23118282
Fax: +86-755-23116366

5.7 Test Instruments list

Radiated Emission:					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
EMI Test Receiver	Rohde & Schwarz	ESCI	CCIS0002	04-10-2014	04-10-2015
BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	CCIS0005	04-19-2014	04-19-2015
Double-ridged waveguide horn antenna	SCHWARZBECK MESS-ELEKTRONIK	BBHA9120D	CCIS0006	04-19-2014	04-19-2015
Amplifier (10kHz-1.3GHz)	HP	8447D	CCIS0003	04-01-2014	03-31-2015
Amplifier (1GHz-18GHz)	Compliance Direction Systems Inc.	PAP-1G18	CCIS0011	06-09-2014	06-08-2015
Spectrum analyzer	Rohde & Schwarz	FSP	CCIS0023	04-19-2014	04-19-2015

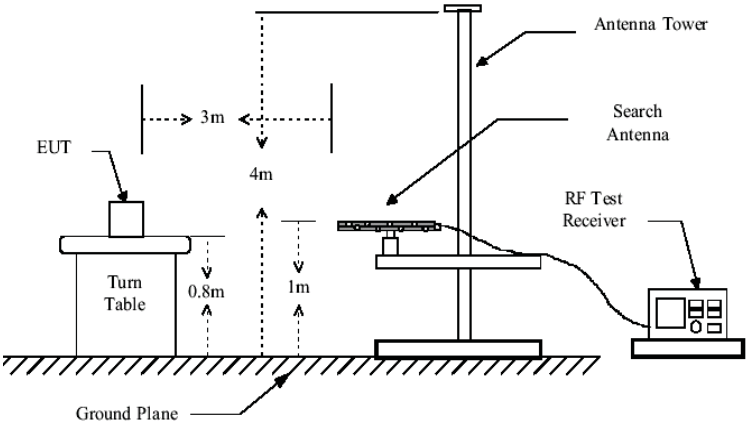
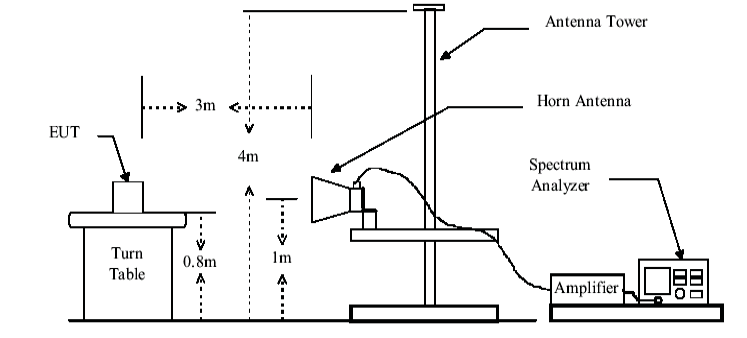
6 Test results and Measurement Data

6.1 Antenna requirement:

Standard requirement:	FCC Part15 C Section 15.203
15.203 requirement: <i>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.</i>	
E.U.T Antenna:	
The EUT make use of a Integral antenna The typical gain of the antenna is 0 dBi, The external antenna is not to be demolished.	
	

6.2 Radiated Emission

Test Requirement:	FCC Part 15 C Section 15.231(e) and 15.209				
Test Method:	ANSI C63.4:2003				
Test Frequency Range:	30MHz to 5000MHz				
Test site:	Measurement Distance: 3m (Semi-Anechoic Chamber)				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
Limit: (Field strength of the fundamental signal)	Frequency		Limit (dBuV/m @3m)		Remark
	433.92 MHz		72.8		Average Value
			92.8		Peak Value
Limit: (Spurious Emissions)	Frequency		Limit (dBuV/m @3m)		Remark
	30MHz-88MHz		40.0		Quasi-peak Value
	88MHz-216MHz		43.5		Quasi-peak Value
	216MHz-960MHz		46.0		Quasi-peak Value
	960MHz-1GHz		54.0		Quasi-peak Value
	Above 1GHz		54.0		Average Value
			74.0		Peak Value
Or The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level whichever limit permits higher field strength.					
Test Procedure:	a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.				

Test setup:	Below 1GHz  Above 1GHz 
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Measurement Record:	Uncertainty:±4.88 dB
Test results:	Pass

6.2.1 Field Strength Of The Fundamental Signal

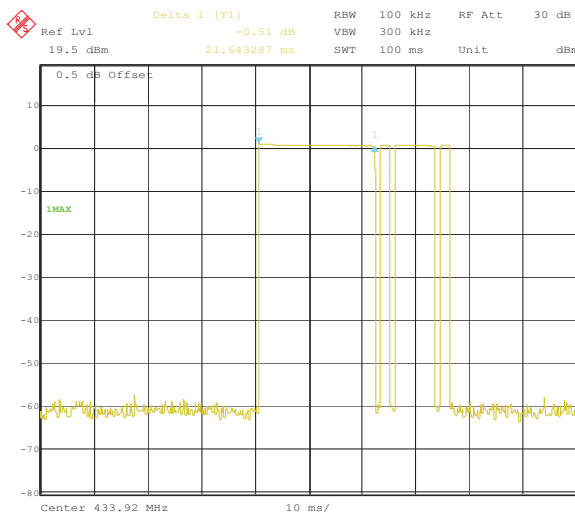
Peak value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
433.92	51.79	26.40	2.21	0.00	80.40	92.80	-12.40	Horizontal
433.92	49.96	26.40	2.21	0.00	78.57	92.80	-14.23	Vertical
Average value								
Frequency (MHz)	Level (dBuV/m)	Duty cycle factor	Average value (dBuV/m)		Limit Line (dBuV/m)	Over Limit (dB)		Polarization
433.92	80.40	-9.72	70.68		72.80	-2.12		Horizontal
433.92	78.57	-9.72	68.85		72.80	-3.95		Vertical
Calculate Formula:		Average value=Peak value + Duty Cycle Factor						
		Duty cycle = Ton time/100 milliseconds or period, whichever is less						
		Ton time = 1.80*2(ms)+7.41(ms)+21.64(ms)=32.65(ms), T period =100ms						
		So, Duty cycle = 32.65%						
		Duty Cycle Factor =20 log(Duty cycle)= -9.72						

6.2.2 Spurious Emissions

Below 1GHz (30MHz-1000MHz)									
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
40.85	41.76	13.57	0.53	29.89	25.97	40.00	-14.03	QP	Horizontal
54.45	41.87	13.07	0.65	29.80	25.79	40.00	-14.21	QP	Horizontal
97.46	42.50	13.00	0.94	29.54	26.90	43.60	-16.70	QP	Horizontal
43.97	42.28	13.56	0.55	29.87	26.52	40.00	-13.48	QP	Vertical
53.13	42.07	13.12	0.64	29.81	26.02	40.00	-13.98	QP	Vertical
102.36	42.59	12.92	0.98	29.51	26.98	43.60	-16.62	QP	Vertical

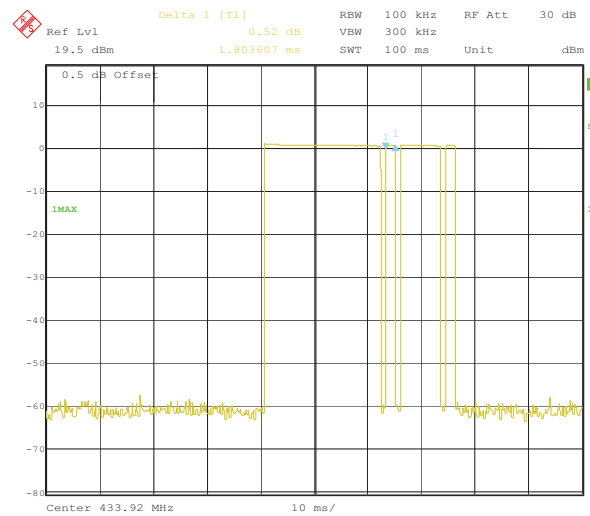
Above 1GHz:								
Peak value								
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
1302.06	57.64	25.52	3.61	40.92	45.85	72.80	-26.95	Horizontal
2168.73	59.31	27.66	5.19	40.28	51.88	72.80	-20.92	Horizontal
3040.80	63.00	28.65	6.00	40.55	57.10	72.80	-15.70	Horizontal
2605.48	53.65	27.80	6.12	40.18	47.39	72.80	-25.41	Vertical
3040.80	63.81	28.65	6.00	40.55	57.91	72.80	-14.89	Vertical
3475.38	59.62	28.76	6.30	39.46	55.22	72.80	-17.58	Vertical
Average value								
Frequency (MHz)	Level (dBuV/m)	Duty cycle factor	Average value (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization		
1301.76	45.85	-9.72	36.13	52.80	-16.67	Horizontal		
3471.36	51.88	-9.72	42.16	52.80	-10.64	Horizontal		
3905.28	57.10	-9.72	47.38	52.80	-5.42	Horizontal		
1301.76	47.39	-9.72	37.67	52.80	-15.13	Vertical		
3037.44	57.91	-9.72	48.19	52.80	-4.61	Vertical		
3471.36	55.22	-9.72	45.50	52.80	-7.30	Vertical		

T period:



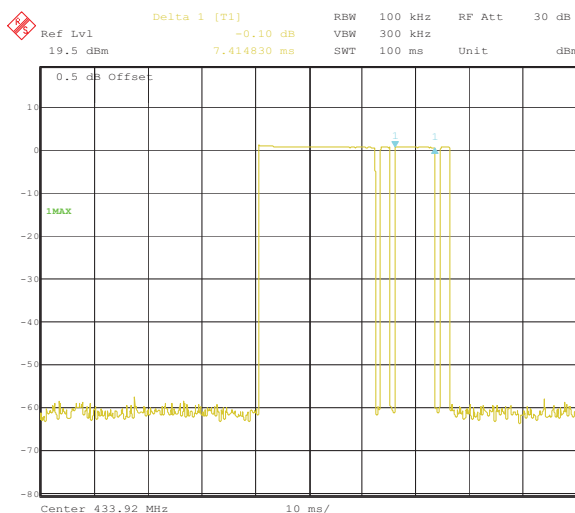
Date: 26.JAN.2015 15:24:02

T on time slot-1:



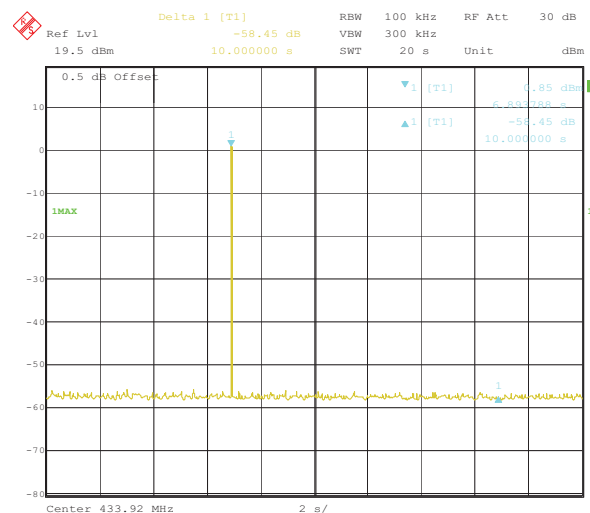
Date: 26.JAN.2015 15:25:06

T on time slot-2:



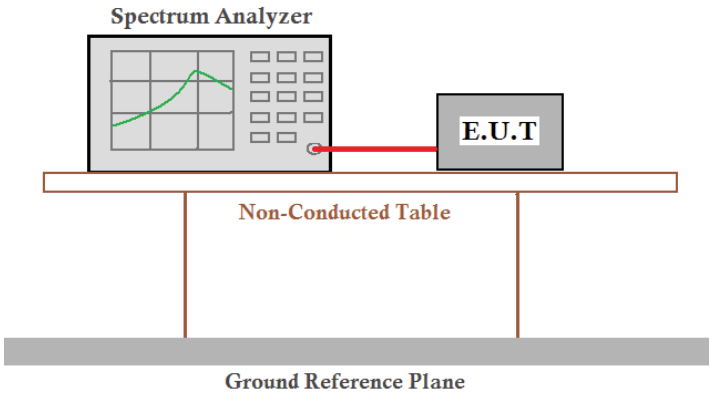
Date: 26.JAN.2015 15:25:30

T on time slot-3:



Date: 26.JAN.2015 15:21:38

6.3 20dB Bandwidth

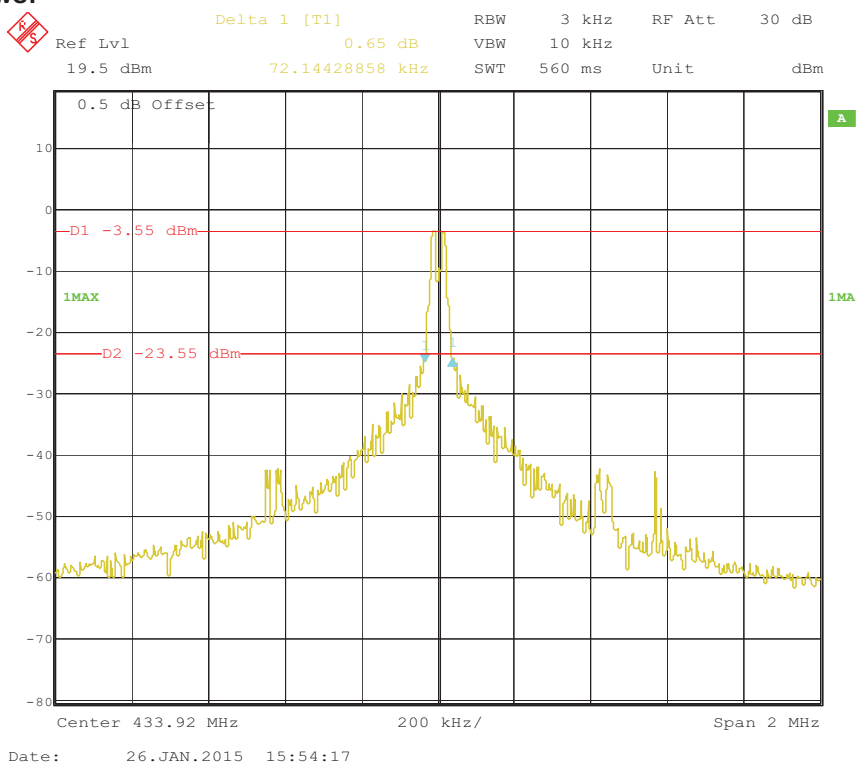
Test Requirement:	FCC Part15 C Section 15.231 (c)
Test Method:	ANSI C63.4:2003
Receiver setup:	RBW=3kHz, VBW=10kHz, detector: Peak
Limit:	The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.
Test Procedure:	1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT. 2. Set the EUT to proper test channel. 3. Max hold the radiated emissions, mark the peak power frequency point and the -20dB upper and lower frequency points. 4. Read 20dB bandwidth.
Test setup:	 The diagram illustrates the test setup. A Spectrum Analyzer is connected via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table. Below the table is a Ground Reference Plane.
Test Instruments:	Refer to section 5.6 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Data

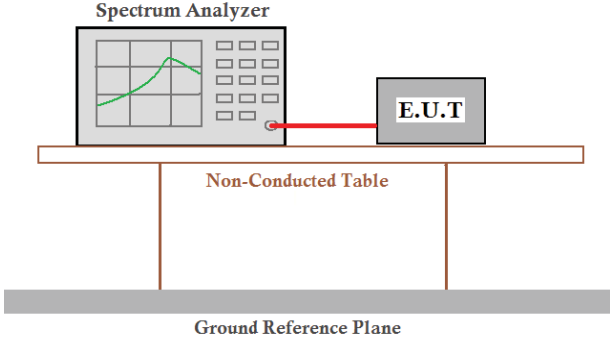
20dB bandwidth (MHz)	Limit (MHz)	Results
0.072	1.0848	Passed

Note: Limit= Fundamental frequency×0.25%=433.92×0.25%=1.0848MHz

Test plot as follows:



6.4 Duration Time

Test Requirement:	FCC Part 15 C Section 15.231 (e)
Test Method:	ANSI C63.4:2003
Receiver setup:	RBW=100kHz, VBW=300kHz, span=0Hz, detector: Peak
Test mode:	Transmitting mode
Test Procedure:	1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT. 2. Set the EUT to proper test channel. 3. Single scan the transmission, and read the transmission time.
Test setup:	 The diagram illustrates the test setup. A Spectrum Analyzer is connected via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table. Below the table is a Ground Reference Plane.
Test Instruments:	Refer to section 5.6 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Data

Items	Test Data	Limit (second)	Result
Duration time	56.112224ms	<1.0	Pass
Silent Time	241 s(see plot as below)	30* Duration time(No less than 10 s)	Pass

Test plot as follows:

