SGS-CSTC Standards Technical Services Co., Ltd.
Guangzhou Branch

198 Kezhu Road, Scientech Park, Guangzhou Economic & Technological Development District, Guangzhou, China 510663
Telephone: +86 (0) 20 82155555
Fax: +86 (0) 20 82075059
Email: ee.guangzhou@sgs.com

TEST REPORT

Application No.:	GZEM1412006925CR
Applicant:	Guangdong LFF Technology Co., Ltd
Manufacturer:	Same as the applicant.
FCC ID:	SY9TPMSX6
Product Description:	TIRE PRESSURE MONITORING SYSTEM
Model No.:	TPMS-X6, TPMS-V8♣
♣	Please refer to section 3 of this report for further details.
Trade Mark:	SPY
Standards:	CFR 47 FCC PART 15 SUBPART B:2014
Date of Receipt:	2015-01-05
Date of Test:	2015-02-28 to 2015-04-21
Date of Issue:	2015-08-11
Test Result :	**Pass***

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

Authorized Signature:

Jerry Chan
Manager

2 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
00		2015-08-11		Original

Authorized for issue by:				
Tested By		Terry Lai **(Terry Lai) /Project Engineer**		2015-02-28 to 2015-03-06 **Date**
Prepared By		June Chen **(June Chen) /Clerk**		2015-04-27 **Date**
Checked By		Kobe Jian **(Kobe Jian) /Reviewer**		2015-04-27 **Date**

3 Test Summary

Electromagnetic Interference (EMI)				
Test	**Test Requirement**	**Test Method**	**Class / Severity**	**Result**
Radiated Emission (30 MHz to 1 GHz)	FCC PART 15 SUBPART B:2014	ANSI C63.4:2009	Class B	PASS
Radiated Emission above 1 GHz	FCC PART 15 SUBPART B:2014	ANSI C63.4:2009	Class B	PASS
Remark : **EUT:** In this whole report EUT means Equipment Under Test.				
♣ **Model No.:** TPMS-X6, TPMS-V8 According to the declaration from the applicant, the electrical circuit design, layout, components used and internal wiring were identical for all models, with only difference being the model name. Therefore only one model TPMS-X6 was tested in this report.				

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5 General Information

5.1 Client Information

Applicant:	Guangdong LFF Technology Co., Ltd
Address of Applicant:	NO.9. YONGCHENG NORTH ROAD, XIAOLAN INDUSTRIAL AREA, XIAOLAN TWON, ZHONGSHAN CITY, GUANGDONG PROVINCE, P.R. CHING 528416
Manufacturer:	Same as the applicant.
Address of Manufacturer:	Same as the applicant.

5.2 General Description of E.U.T.

Product Description:	TIRE PRESSURE MONITORING SYSTEM
Model No.:	TPMS-X6

5.3 Details of E.U.T.

Power Supply:	Vehicle charger: Input: DC 9-24V Output: DC 5.2V Or DC 3.7 V internal rechargeable battery
Power Port:	1.5m unscreened USB DC output cable
Internal operation frequency:	433MHz superheterodyne receiver

5.4 Description of Support Units

The EUT has been tested with DC 12V battery and sensor (Model: WST002) as whole monitoring system.

5.5 Deviation from Standards

None.

5.6 Abnormalities from Standard Conditions

None.

5.7 General Test Climate During Testing

Temperature: 15-30 °C Humidity: 30~70 %RH Atmospheric Pressure: 860~1060 mbar

5.8 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,
198 Kezhu Road, Scientech Park, Guangzhou Economic & Technology Development District,
Guangzhou, China 510663
Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.

5.9 Test Facility

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

- **NVLAP (Lab Code: 200611-0)**

  SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

  The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

- **ACMA**

  SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our NVLAP accreditation.

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

  Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **CNAS (Lab Code: L0167)**

  SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

- **FCC (Registration No.: 282399)**

  SGS-CSTC Standards Technical Services 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 our files. Registration 282399, May 31, 2002.

- **Industry Canada (Registration No.: 4620B-1)**

  The 3m/10m Alternate Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Certification and Engineering of Industry Canada for radio equipment testing with Registration No. 4620B-1.

- **VCCI (Registration No.: R-2460, C-2584, G-449 and T-1179)**

  The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co. Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2460, C-2584，G-449 and T-1179 respectively.

- **CBTL (Lab Code: TL129)**

  SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2005, the Basic Rules, IECEE 01:2006-10 and Rules of procedure IECEE 02:2006-10, and the relevant IECEE CB-Scheme Operational documents.

6 Equipment Used during Test

RE in Chamber						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. date (YYYY-MM-DD)	Cal.Due date (YYYY-MM-DD)
EMC0525	Compact Semi-Anechoic Chamber	ChangZhou ZhongYu	N/A	N/A	2014-12-5	2015-12-5
EMC0522	EMI Test Receiver	Rohde & Schwarz	ESIB26	100283	2015-03-02	2016-03-02
EMC0056	EMI Test Receiver	Rohde & Schwarz	ESCI	100236	2015-04-07	2016-04-07
EMC0528	RI High frequency Cable	SGS	20 m	N/A	2014-04-19	2016-04-19
EMC2025	Trilog Broadband Antenna 30-1000MHz	SCHWARZBECK MESS-ELEKTRONIK	VULB 9160	9160-3372	2014-07-14	2017-07-14
EMC0524	Bi-log Type Antenna	Schaffner -Chase	CBL6112B	2966	2013-08-31	2016-08-31
EMC0519	Bilog Type Antenna	Schaffner -Chase	CBL6143	5070	2014-05-04	2017-05-04
EMC2026	Horn Antenna 1-18GHz	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	9120D-841	2013-08-31	2016-08-31
EMC0518	Horn Antenna	Rohde & Schwarz	HF906	100096	2012-07-01	2015-07-01
EMC0521	1-26.5 GHz Pre-Amplifier	Agilent	8449B	3008A01649	2015-03-02	2016-03-02
EMC2065	Amplifier	HP	8447F	N/A	2014-08-25	2015-08-25
EMC0075	310N Amplifier	Sonama	310N	272683	2015-03-02	2016-03-02
EMC0523	Active Loop Antenna	EMCO	6502	42963	2014-03-03	2016-03-03
EMC2041	Broad-Band Horn Antenna (14)15-26.5(40)GHz	SCHWARZBECK MESS-ELEKTRONI	BBHA 9170	9170-375	2014-05-26	2017-05-26
EMC2079	High Pass Filter(915MHz)	FSY MICROWAVE	HM1465-9SS	009	2015-03-02	2016-03-02
EMC2069	2.4GHz filter	Micro-Tronics	BRM 50702	149	2015-03-02	2016-03-02
EMC0530	10m Semi-Anechoic Chamber	ETS	N/A	N/A	2014-05-03	2016-05-03

General used equipment						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. date (YYYY-MM-DD)	Cal.Due date (YYYY-MM-DD)
EMC0006	DMM	Fluke	73	70681569	2014-09-15	2015-09-15
EMC0007	DMM	Fluke	73	70671122	2014-09-15	2015-09-15

7 Emission Test Results

7.1 Radiated Emissions, 30MHz to 1GHz

Test Requirement:	FCC Part15 B
Test Method:	ANSI C63.4
Test Voltage:	DC 12V
Test Date:	2015-02-28 (initial test date) 2015-04-21 (final test date)
Frequency Range:	30MHz to 1GHz
Measurement Distance:	3 m
Detector:	Peak for pre-scan Quasi-Peak if maximised peak within 20dB of limit (120 kHz resolution bandwidth)
Class / Limit:	Class B

Frequency range MHz	**Quasi-peak limits** dB (μV/m)
30 to 88	40
88 to 216	43.5
216 to 960	46
Above 960	54
At transitional frequencies the lower limit applies.	

7.1.1 E.U.T. Operation

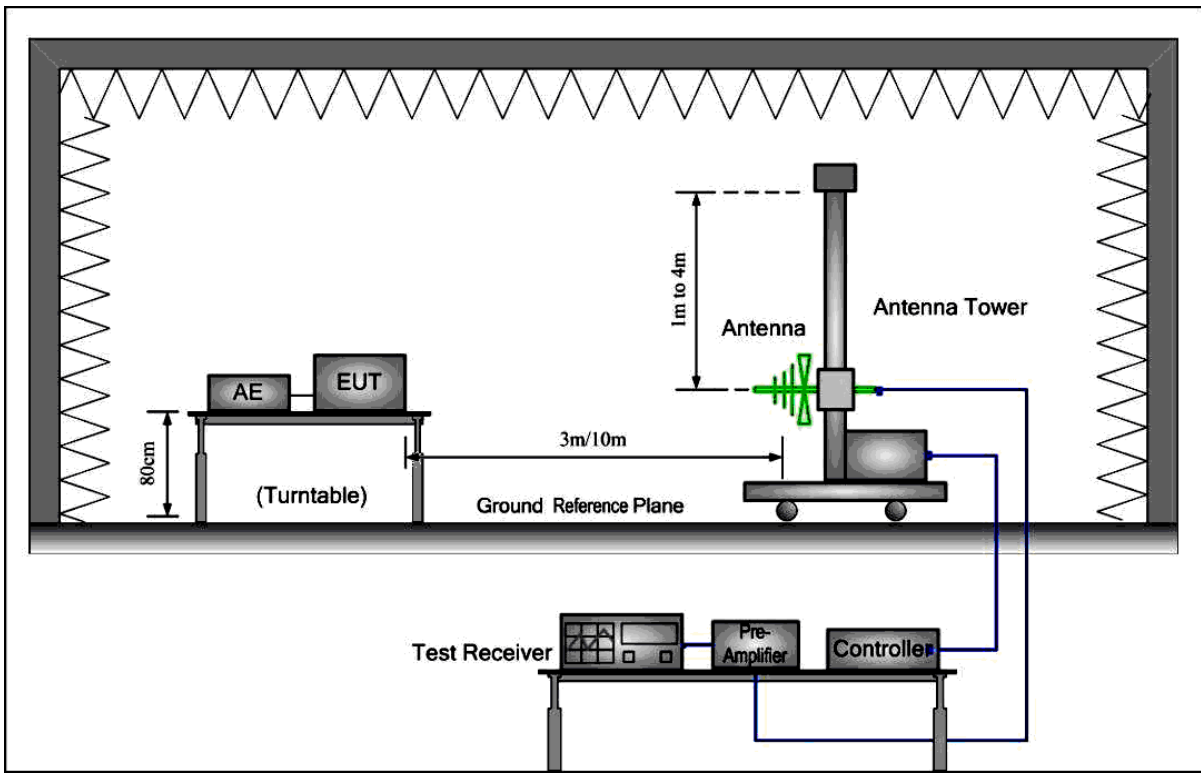
Pre-test with Peak detector with the following mode(s):

1: Receiving mode

Final test with Quasi-Peak with the following mode(s):

1: Receiving mode.

7.1.2 Test Setup and Procedure



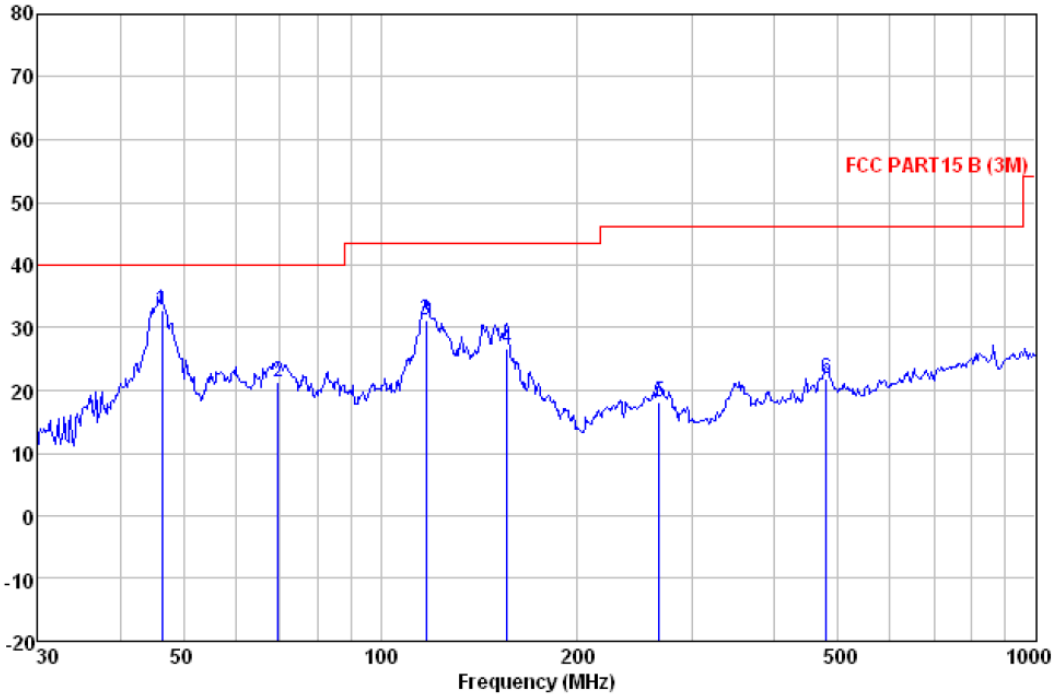
1. The radiated emissions test was conducted in a semi-anechoic chamber.
2. Biconical and log periodic antenna was used for the frequency range from 30MHz to 1GHz
3. The EUT was connected to nominal power supply through a mains power outlet which was bonded to the ground reference plane; The mains cables were draped to the ground reference plane. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
4. Before final measurements of radiated emissions, a pre-scan was performed in the spectrum mode with the peak detector to find out the maximum emissions spectrum plots of the EUT.
5. The frequencies of maximum emission were determined in the final radiated emissions measurement. At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the maximum disturbance. Measurements were performed for both horizontal and vertical antenna polarization.

7.1.3 Measurement Data

Vertical:

Peak scan

Level (dBμV/m)



Quasi-peak measurement

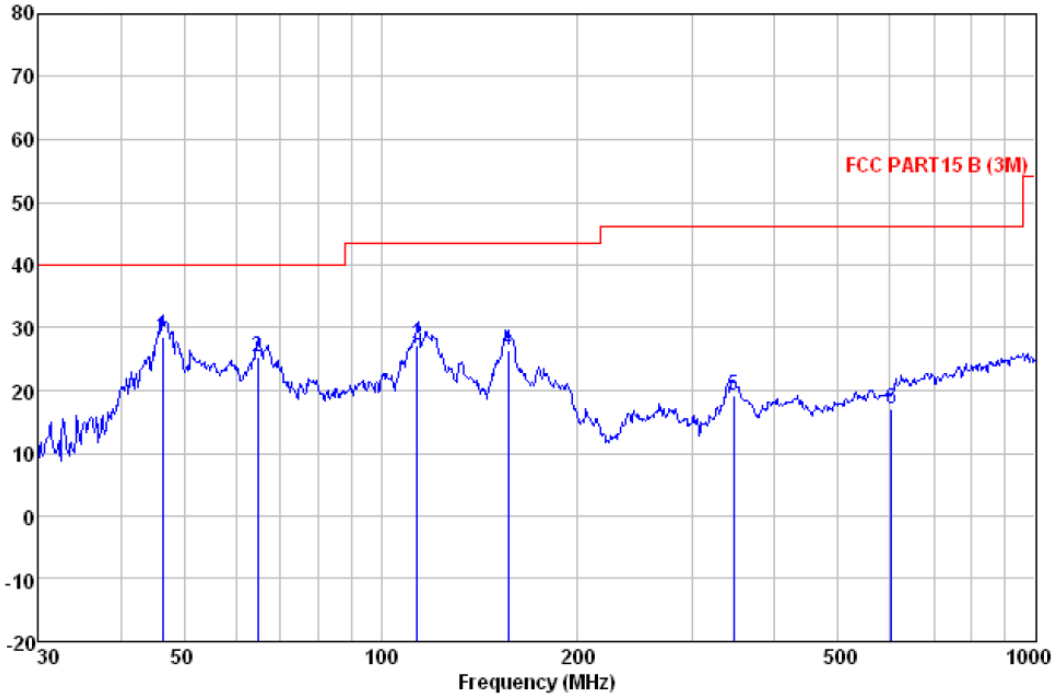
Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
46.340	50.06	12.71	1.06	31.00	32.83	40.00	-7.17	QP
69.845	40.13	11.05	1.20	31.00	21.38	40.00	-18.62	QP
117.360	49.00	11.83	1.45	31.02	31.26	43.50	-12.24	QP
155.910	42.17	13.89	1.71	31.07	26.70	43.50	-16.80	QP
266.609	34.51	12.36	2.29	31.02	18.14	46.00	-27.86	QP
478.846	32.80	16.89	3.06	30.99	21.76	46.00	-24.24	QP

Level = Read Level + Antenna Factor + Cable Loss – Preamp Factor.

Horizontal:

Peak scan

Level (dBμV/m)



Quasi-peak measurement

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
46.340	45.74	12.71	1.06	31.00	28.51	40.00	-11.49	QP
64.887	42.73	12.34	1.15	31.00	25.22	40.00	-14.78	QP
113.714	45.44	11.42	1.44	31.01	27.29	43.50	-16.21	QP
156.458	41.99	13.89	1.71	31.07	26.52	43.50	-16.98	QP
345.595	33.44	14.16	2.56	30.94	19.22	46.00	-26.78	QP
603.539	25.60	19.17	3.20	30.90	17.07	46.00	-28.93	QP

Level = Read Level + Antenna Factor + Cable Loss – Preamp Factor.

7.2 Radiated Emissions above 1 GHz

Test Requirement: FCC Part15 B
Test Method: ANSI C63.4
Test Voltage: DC 12V
Test Date: 2015-03-06
Frequency Range: 1 GHz to 6 GHz
Measurement Distance: 3 m
Detector: Peak for pre-scan
Peak and Average if maximised peak within 20dB of limit
(1 MHz resolution bandwidth)
Class / Limit: Class B

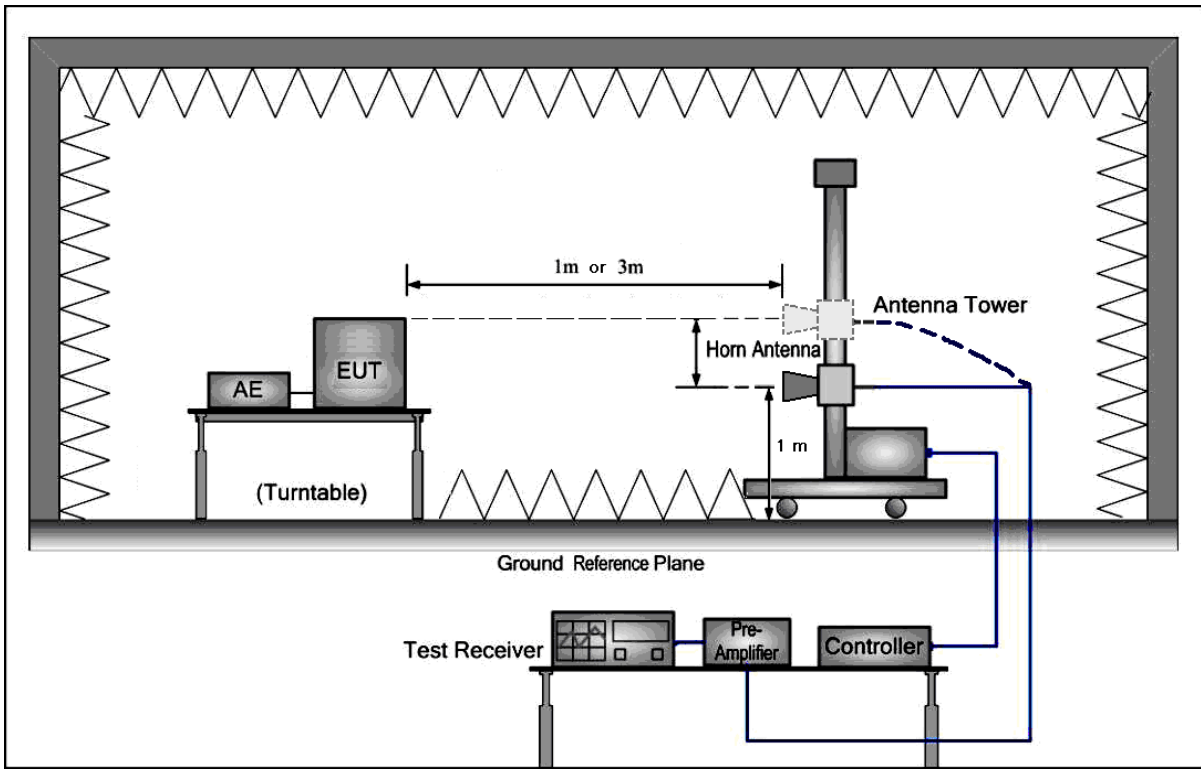
Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement Range (MHz)
Below 1.705	30
1.705 to 108	1000
108 to 500	2000
500 to 1000	5000
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower
Average limits dB(μV/m)	**Peak limits dB(μV/m)**
54	74

7.2.1 E.U.T. Operation

Pre-test with Peak detector with the following mode(s):
1: Receiving mode

Final test with Quasi-Peak with the following mode(s):
1: Receiving mode.

7.2.2 Test Setup and Procedure



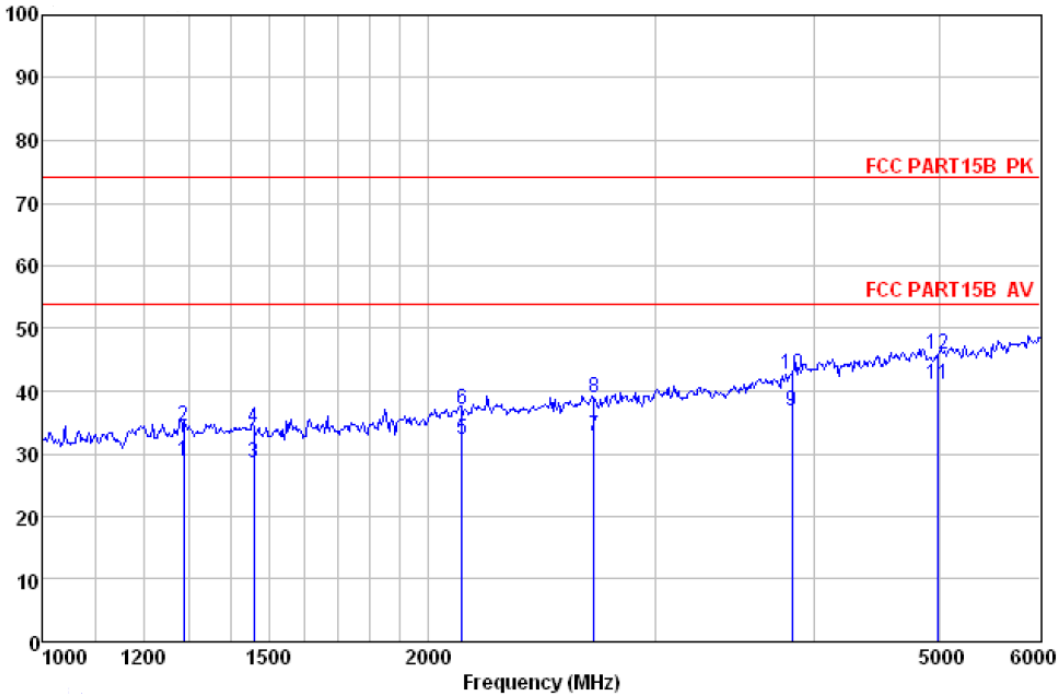
1. The radiated emissions test was conducted in a fully-anechoic chamber.
2. Horn antenna was used for the frequency above 1GHz
3. The EUT was connected to nominal power supply through a mains power outlet which was bonded to the ground reference plane; The mains cables were draped to the ground reference plane. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
4. Before final measurements of radiated emissions, a pre-scan was performed in the spectrum mode with the peak detector to find out the maximum emission spectrum plots of the EUT.
5. The frequencies of maximum emission were determined in the final radiated emissions measurement. At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the maximum disturbance. Measurements were performed for both horizontal and vertical antenna polarization.

7.2.3 Measurement Data

Vertical:

Peak scan

Level (dBμV/m)



Peak and Average measurement:

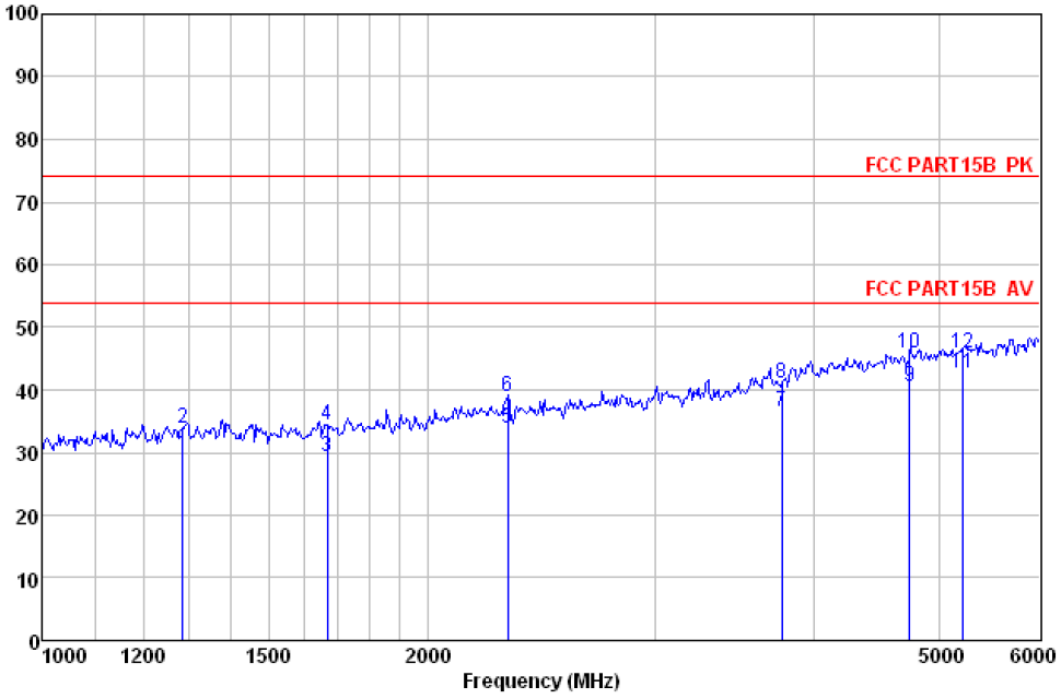
Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1287.417	48.35	25.46	4.95	49.84	28.92	54.00	-25.08	Average
1287.417	53.85	25.46	4.95	49.84	34.42	74.00	-39.58	Peak
1459.452	47.70	25.27	5.34	49.76	28.55	54.00	-25.45	Average
1459.452	53.26	25.27	5.34	49.76	34.11	74.00	-39.89	Peak
2122.382	48.22	27.16	6.42	49.52	32.28	54.00	-21.72	Average
2122.382	52.97	27.16	6.42	49.52	37.03	74.00	-36.97	Peak
2688.682	46.57	28.10	7.38	49.37	32.68	54.00	-21.32	Average
2688.682	52.86	28.10	7.38	49.37	38.97	74.00	-35.03	Peak
3840.534	46.10	29.62	10.43	49.30	36.85	54.00	-17.15	Average
3840.534	51.97	29.62	10.43	49.30	42.72	74.00	-31.28	Peak
4988.864	47.12	31.76	11.44	49.30	41.02	54.00	-12.98	Average
4988.864	51.89	31.76	11.44	49.30	45.79	74.00	-28.21	Peak

Level = Read Level + Antenna Factor + Cable Loss – Preamp Factor.

Horizontal:

Peak scan

Level (dBμV/m)



Peak and Average measurement:

Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1285.113	49.03	25.46	4.95	49.84	29.60	54.00	-24.40	Average
1285.113	53.33	25.46	4.95	49.84	33.90	74.00	-40.10	Peak
1666.376	48.26	24.98	5.75	49.67	29.32	54.00	-24.68	Average
1666.376	53.29	24.98	5.75	49.67	34.35	74.00	-39.65	Peak
2304.722	48.80	27.95	6.51	49.47	33.79	54.00	-20.21	Average
2304.722	53.89	27.95	6.51	49.47	38.88	74.00	-35.12	Peak
3772.333	46.39	29.43	10.11	49.30	36.63	54.00	-17.37	Average
3772.333	50.70	29.43	10.11	49.30	40.94	74.00	-33.06	Peak
4744.751	47.23	31.42	11.11	49.30	40.46	54.00	-13.54	Average
4744.751	52.75	31.42	11.11	49.30	45.98	74.00	-28.02	Peak
5217.416	48.47	31.84	11.65	49.35	42.61	54.00	-11.39	Average
5217.416	51.80	31.84	11.65	49.35	45.94	74.00	-28.06	Peak

Level = Read Level + Antenna Factor + Cable Loss – Preamp Factor.

--End of Report--