



STC Test Report

Date: 2016-05-16

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No.: DM121460

Applicant: Winspeed Co., Ltd.
14F-1, No.2, Jian-ba Rd., Chung-ho District, New Taipei
City, Taiwan

Manufacturer: Shenzhenshi LXD Science Co., Ltd.
No. 619-621, 6th Floor, H Building, Huachuangda Central
Building Xinan Street, Baoan District, Shenzhen City, China

Description of Sample(s): Submitted sample(s) said to be
Product: Fortus Gaming Mouse-Wireless
Brand Name: SPEEDLINK
Model Number: SL-680100-BK-01
FCC ID: 2AEDNA26

Date Sample(s) Received: 2015-10-26

Date Tested: 2015-10-31 to 2016-05-16

Investigation Requested: Perform ElectroMagnetic Interference measurement in
accordance with FCC 47CFR [Codes of Federal Regulations]
Part 15: 2015 and ANSI C63.10: 2013 for FCC Certification.

Conclusion(s): The submitted product COMPLIED with the requirements of
Federal Communications Commission [FCC] Rules and
Regulations Part 15. The tests were performed in accordance
with the standards described above and on Section 2.2 in this
Test Report.

Remark(s): ---


LONG Yun Jian, Along
Authorized Signatory
ElectroMagnetic Compatibility Department
For and on behalf of
STC (Dongguan) Company Limited



STC (Dongguan) Company Limited

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1.0 General Details

1.1 Equipment Under Test [EUT] Description of Sample(s)

Product:	Fortus Gaming Mouse-Wireless
Manufacturer:	Shenzhenshi LXD Science Co., Ltd. No. 619-621, 6th Floor, H Building, Huachuangda Central Building Xinan Street, Baoan District, Shenzhen City, China
Brand Name:	SPEEDLINK
Model Number:	SL-680100-BK-01
Rating:	3.0Vd.c. (AAA*2 battery)

1.2 Description of EUT Operation

The Equipment Under Test (EUT) is a Fortus Gaming Mouse-Wireless of Winspeed Co., Ltd.. The transceiver operating in the 2.4GHz ISM frequency band. The RF signal is modulated by IC, the type of modulation used is FSK.

1.3 Date of Order

2015-10-26

1.4 Submitted Sample(s):

1 Sample

1.5 Test Duration

2015-10-31 to 2016-05-16

1.6 Country of Origin

China

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2.0 Technical Details

2.1 Investigations Requested

Perform Electromagnetic Interference measurements in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2015 Regulations and ANSI C63.10: 2013 for FCC Certification.

The device was realized by test software.

2.2 Test Standards and Results Summary Tables

EMISSION Results Summary						
Test Condition	Test Requirement	Test Method	Class / Severity	Test Result		
				Pass	Fail	N/A
Field Strength of Fundamental & Harmonics Emissions	FCC 47CFR 15.249	ANSI C63.10: 2013	N/A	☒	☐	☐
Radiated Emissions	FCC 47CFR 15.209	ANSI C63.10: 2013	N/A	☒	☐	☐

Note: N/A - Not Applicable

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3.0 Test Results

3.1 Emission

3.1.1 Radiated Emissions

Test Requirement:	FCC 47CFR 15.249 & FCC 47CFR 15.209
Test Method:	ANSI C63.10: 2013
Test Date:	2016-05-13
Mode of Operation:	TX mode

Test Method:

For emission measurements at or below 1 GHz, the sample was placed 0.8m above the ground plane of semi-anechoic Chamber*. For emission measurements above 1 GHz, the sample was placed 1.5m above the ground plane of semi-anechoic Chamber*. For emission measurements above 1 GHz, each emission was maximized by: having the EUT continuously working, investigated all operating modes, considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

*: Semi-anechoic chamber located on the STC (Dongguan) Company Ltd. 68 Fumin Nan Road, Dalang, Dongguan, Guangdong, PRC with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 629686.

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Spectrum Analyzer Setting:

9KHz – 30MHz (Pk & Av)

RBW: 10kHz
VBW: 30kHz
Sweep: Auto
Span: Fully capture the emissions being measured
Trace: Max. hold

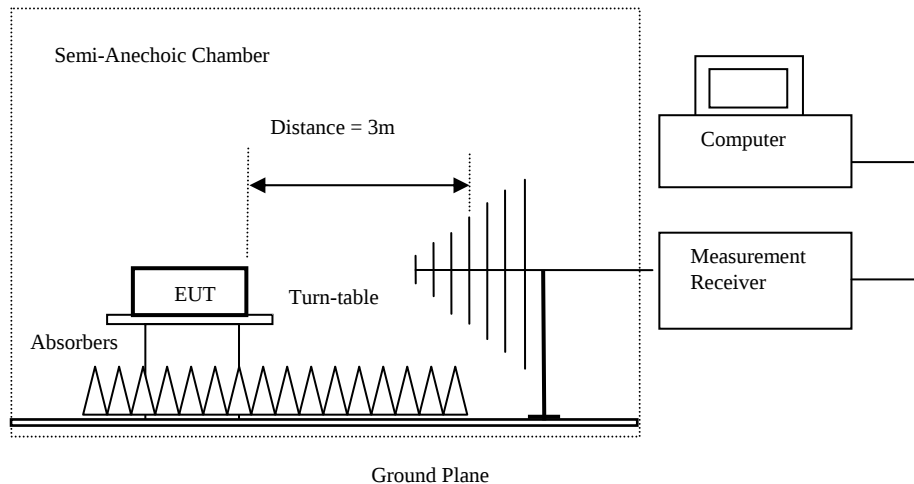
30MHz – 1GHz (QP)

RBW: 120kHz
VBW: 120kHz
Sweep: Auto
Span: Fully capture the emissions being measured
Trace: Max. hold

Above 1GHz (Pk & Av)

RBW: 1MHz
VBW: 1MHz
Sweep: Auto
Span: Fully capture the emissions being measured
Trace: Max. hold

Test Setup:



- Absorbers placed on top of the ground plane are for measurements above 1000MHz only.
- Measurements between 30MHz to 1000MHz made with Bi-log antennas, above 1000MHz horn antennas are used, 9kHz to 30MHz loop antennas are used.

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Limits for Field Strength of Fundamental & Harmonics Emissions [FCC 47CFR 15.249]:

Frequency Range of Fundamental [MHz]	Field Strength of Fundamental Emission [microvolts/meter]	Field Strength of Harmonics Emission [microvolts/meter]
902-928	50,000 [Quasi-Peak]	500 [Average]
2400-2483.5	50,000 [Average]	500 [Average]

Results of Tx mode (Lowest Frequency Channel-2402 MHz): Pass

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
2402.00	46.3	36.8	83.1	14,288.9	500,000	Vertical
2402.00	46.9	36.4	83.3	14,621.8	500,000	Horizontal

Field Strength of Fundamental Emissions Average Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
2402.00	41.9	36.8	78.7	8,609.9	50,000	Vertical
2402.00	43.0	36.4	79.4	9,332.5	50,000	Horizontal

Field Strength of Harmonics Emission Peak Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
4804.0	3.9	41.5	45.4	186.2	5,000	Vertical
4804.0	3.4	42.4	45.8	195.0	5,000	Horizontal
7206.0	3.3	45.1	48.4	263.0	5,000	Vertical
7206.0	1.9	46.2	48.1	254.1	5,000	Horizontal
9608.0	3.4	48.0	51.4	371.5	5,000	Vertical
9608.0	2.9	48.8	51.7	384.6	5,000	Horizontal

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Field Strength of Harmonics Emission						
Average Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
4804.0	-7.9	41.5	33.6	47.9	500	Vertical
4804.0	-9.7	42.4	32.7	43.2	500	Horizontal
7206.0	-10.8	45.1	34.3	51.9	500	Vertical
7206.0	-9.9	46.2	36.3	65.3	500	Horizontal
9608.0	-9.4	48.0	38.6	85.1	500	Vertical
9608.0	-10.9	48.8	37.9	78.5	500	Horizontal

Results of Tx mode (Middle Frequency Channel- 2441MHz): Pass

Field Strength of Fundamental Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
2441.00	46.1	36.8	82.9	13,963.7	500,000	Vertical
2441.00	47.0	36.4	83.4	14,791.1	500,000	Horizontal

Field Strength of Fundamental Emissions						
Average Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
2441.00	41.8	36.8	78.6	8,511.4	50,000	Vertical
2441.00	43.3	36.4	79.7	9,660.5	50,000	Horizontal

Field Strength of Harmonics Emission						
Peak Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
4882.0	3.3	41.6	44.9	175.8	5,000	Vertical
4882.0	2.9	42.5	45.4	186.2	5,000	Horizontal
7323.0	2.5	45.2	47.7	242.7	5,000	Vertical
7323.0	1.6	46.3	47.9	248.3	5,000	Horizontal
9764.0	3.6	48.1	51.7	384.6	5,000	Vertical
9764.0	0.7	48.9	49.6	302.0	5,000	Horizontal

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Field Strength of Harmonics Emission						
Average Value						
Frequency MHz	Measured Level @3m dB μ V/m	Correction Factor dB μ V/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit @3m μ V/m	E-Field Polarity
4882.0	-7.9	41.6	33.7	48.4	500	Vertical
4882.0	-9.7	42.5	32.8	43.7	500	Horizontal
7323.0	-10.7	45.2	34.5	53.1	500	Vertical
7323.0	-11.7	46.3	34.6	53.7	500	Horizontal
9764.0	-10.3	48.1	37.8	77.6	500	Vertical
9764.0	-12.4	48.9	36.5	66.8	500	Horizontal

Results of Tx mode (Highest Frequency Channel – 2480MHz): Pass

Field Strength of Fundamental Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dB μ V/m	Correction Factor dB μ V/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit @3m μ V/m	E-Field Polarity
2480.00	46.1	36.8	82.9	13,963.7	500,000	Vertical
2480.00	46.9	36.4	83.3	14,621.8	500,000	Horizontal

Field Strength of Fundamental Emissions						
Average Value						
Frequency MHz	Measured Level @3m dB μ V/m	Correction Factor dB μ V/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit @3m μ V/m	E-Field Polarity
2480.00	41.7	36.8	78.5	8,414.0	50,000	Vertical
2480.00	42.6	36.4	79.0	8,912.5	50,000	Horizontal

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Field Strength of Harmonics Emission						
Peak Value						
Frequency MHz	Measured Level @3m dB μ V/m	Correction Factor dB μ V/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit @3m μ V/m	E-Field Polarity
4960.0	4.4	41.4	45.8	195.0	5,000	Vertical
4960.0	2.2	42.7	44.9	175.8	5,000	Horizontal
7440.0	1.7	45.6	47.3	231.7	5,000	Vertical
7440.0	1.3	46.5	47.8	245.5	5,000	Horizontal
9920.0	2.8	48.6	51.4	371.5	5,000	Vertical
9920.0	1.6	49.7	51.3	367.3	5,000	Horizontal

Field Strength of Harmonics Emission						
Average Value						
Frequency MHz	Measured Level @3m dB μ V/m	Correction Factor dB μ V/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit @3m μ V/m	E-Field Polarity
4960.0	-8.5	41.4	32.9	44.2	500	Vertical
4960.0	-10.1	42.7	32.6	42.7	500	Horizontal
7440.0	-10.7	45.6	34.9	55.6	500	Vertical
7440.0	-10.8	46.5	35.7	61.0	500	Horizontal
9920.0	-10.9	48.6	37.7	76.7	500	Vertical
9920.0	-12.6	49.7	37.1	71.6	500	Horizontal

Remarks:

No additional spurious emissions found between lowest internal used/generated frequency and 30 MHz

Calculated measurement uncertainty (9kHz - 30MHz): 3.3dB
 (30MHz – 1GHz): 4.6dB
 (1GHz - 26GHz): 4.4dB

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

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Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

Frequency Range [MHz]	Quasi-Peak Limits [$\mu\text{V/m}$]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

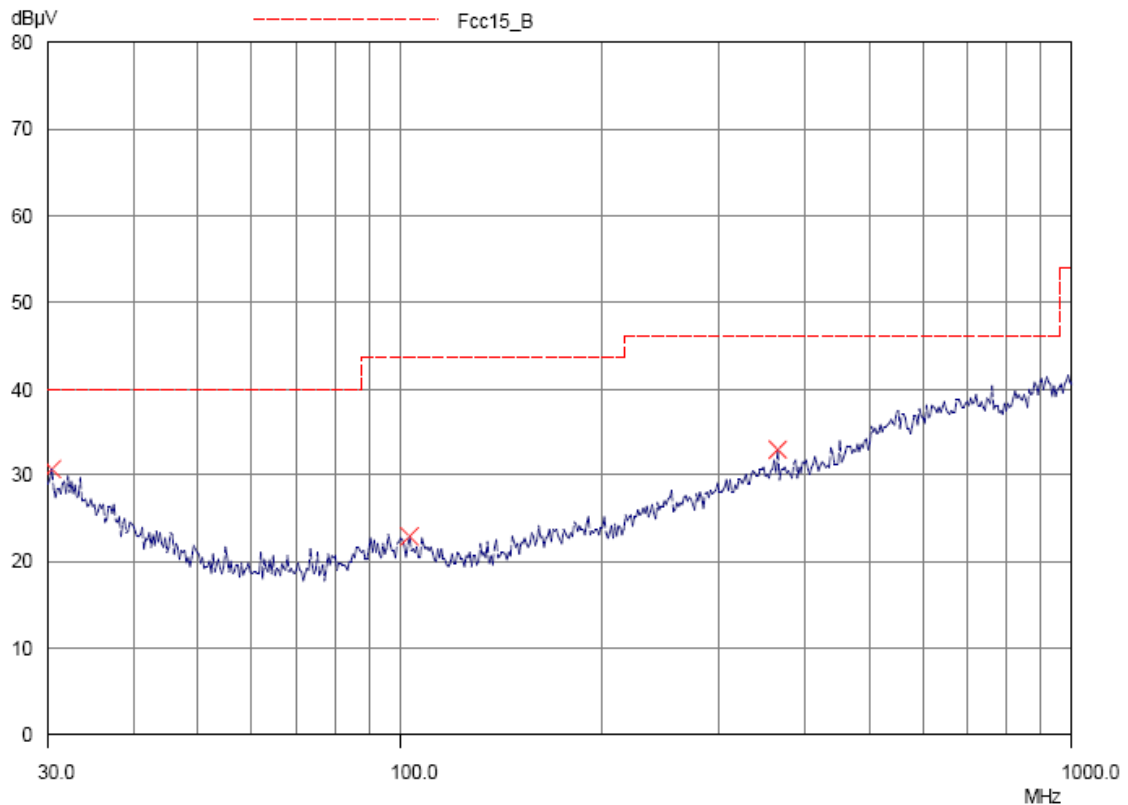
The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Results of TX mode (9kHz – 30MHz): PASS

Emissions detected are more than 20 dB below the FCC Limits

Results of TX mode (30MHz – 1GHz): PASS

Horizontal



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Results of TX mode (30MHz – 1GHz): PASS

Radiated Emissions					
Quasi-Peak					
Emission Frequency MHz	E-Field Polarity	Level @3m dB μ V/m	Limit @3m dB μ V/m	Level @3m μ V/m	Limit @3m μ V/m
30.2	Horizontal	30.7	40.0	34.3	100
103.5	Horizontal	22.9	43.5	14.0	150
363.4	Horizontal	32.9	46.0	44.2	200

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Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

Frequency Range [MHz]	Quasi-Peak Limits [$\mu\text{V/m}$]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

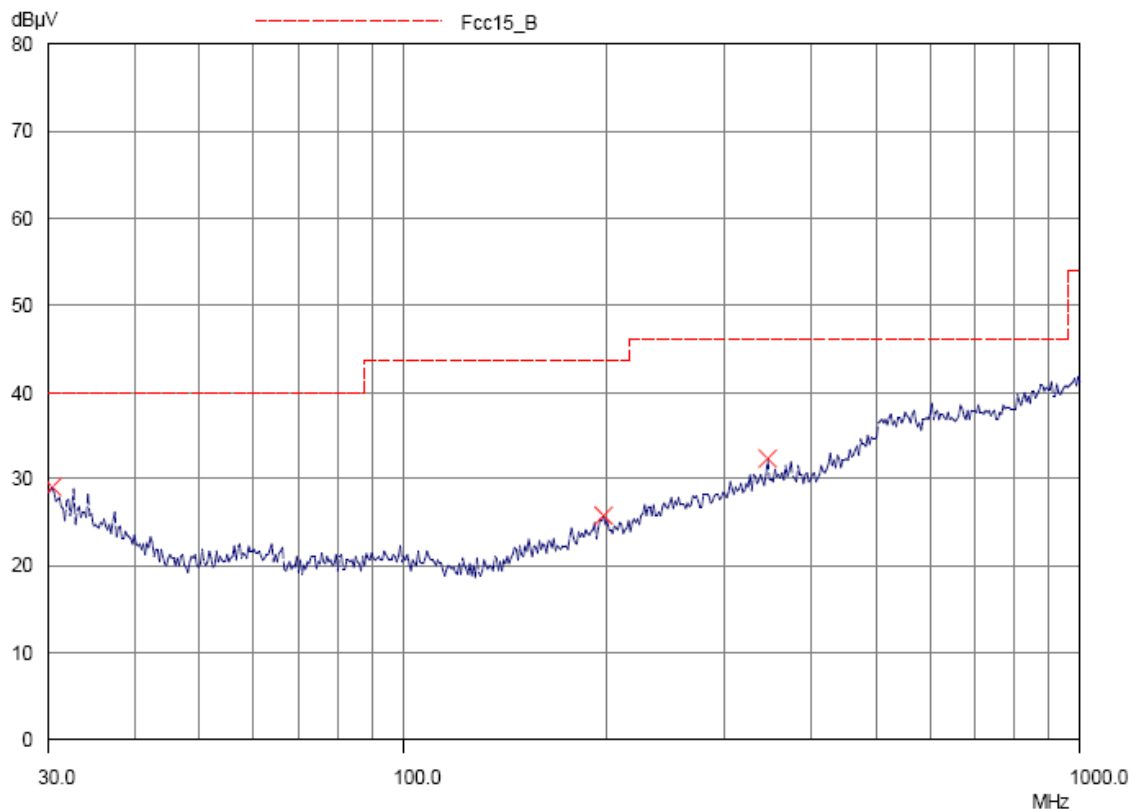
The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Results of TX mode (9kHz – 30MHz): PASS

Emissions detected are more than 20 dB below the FCC Limits

Results of TX mode (30MHz – 1GHz): PASS

Vertical



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Results of TX mode (30MHz – 1GHz): PASS

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

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RF Radiated Emissions Measurement:

Limit :

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.

Result: RF Radiated Emissions(1GHz-26GHz)(worse data) (Lowest)

Field Strength of Band-edge Compliance						
Peak Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dBμV/m	E-Field Polarity
2390.0	5.9	36.8	42.7	74.0	31.3	Vertical
2400.0	4.3	36.8	41.1	74.0	32.9	Vertical

Field Strength of Band-edge Compliance						
Average Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dBμV/m	E-Field Polarity
2390.0	-4.7	36.8	32.1	54.0	21.9	Vertical
2400.0	-7.0	36.8	29.8	54.0	24.2	Vertical

Result: RF Radiated Emissions(1GHz-26GHz)(worse data) (Highest)

Field Strength of Band-edge Compliance						
Peak Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dBμV/m	E-Field Polarity
2483.5	5.5	36.4	41.9	74.0	32.1	Horizontal

Field Strength of Band-edge Compliance						
Average Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dBμV/m	E-Field Polarity
2483.5	-5.7	36.4	30.7	54.0	23.3	Horizontal

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3.1.2 Antenna Requirement

Test Requirements: § 15.203

Test Specification:

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 shall be considered sufficient to comply with the provisions of this section. 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.

Test Results:

This is Meander line antenna. There is no external antenna, the antenna gain = -1.6dBi. User is unable to remove or changed the Antenna.

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3.2 20dB Bandwidth of Fundamental Emission

Test Requirement:	FCC 47 CFR 15.249
Test Method:	ANSI C63.10: 2013
Test Date:	2016-05-16
Mode of Operation:	Tx mode

Test Method:

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

Test Setup:

As Test Setup of clause 3.1.1 in this test report.

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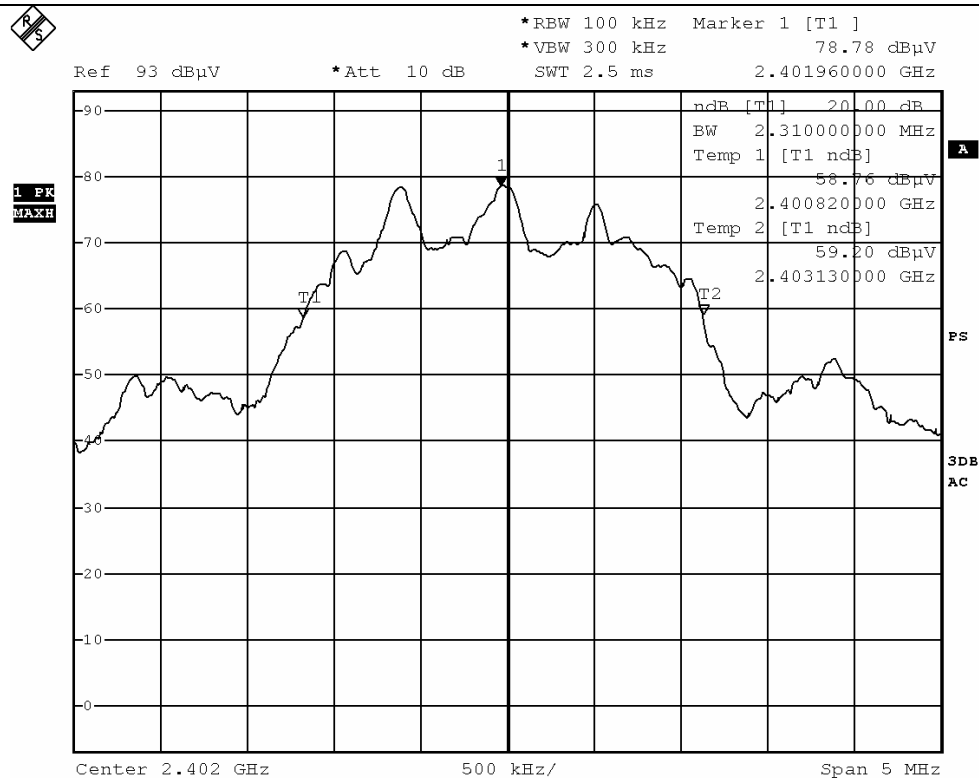
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Limits for 20dB Bandwidth of Fundamental Emission (Low Frequency Channel):

Frequency Range [MHz]	20dB Bandwidth [MHz]
2402	2.31

20dB Bandwidth of Fundamental Emission



BMP

Date: 16.MAY.2016 10:45:11

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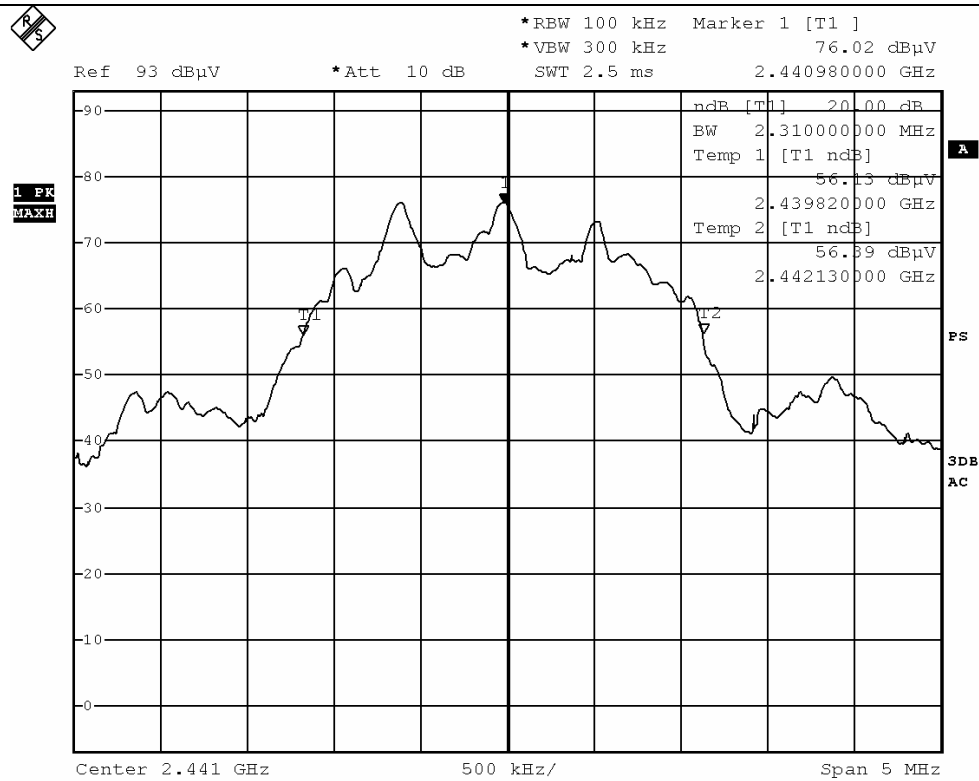
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Limits for 20dB Bandwidth of Fundamental Emission (Middle Frequency Channel):

Frequency Range [MHz]	20dB Bandwidth [MHz]
2441	2.31

20dB Bandwidth of Fundamental Emission



BMP

Date: 16.MAY.2016 10:26:01

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Date: 2016-05-16

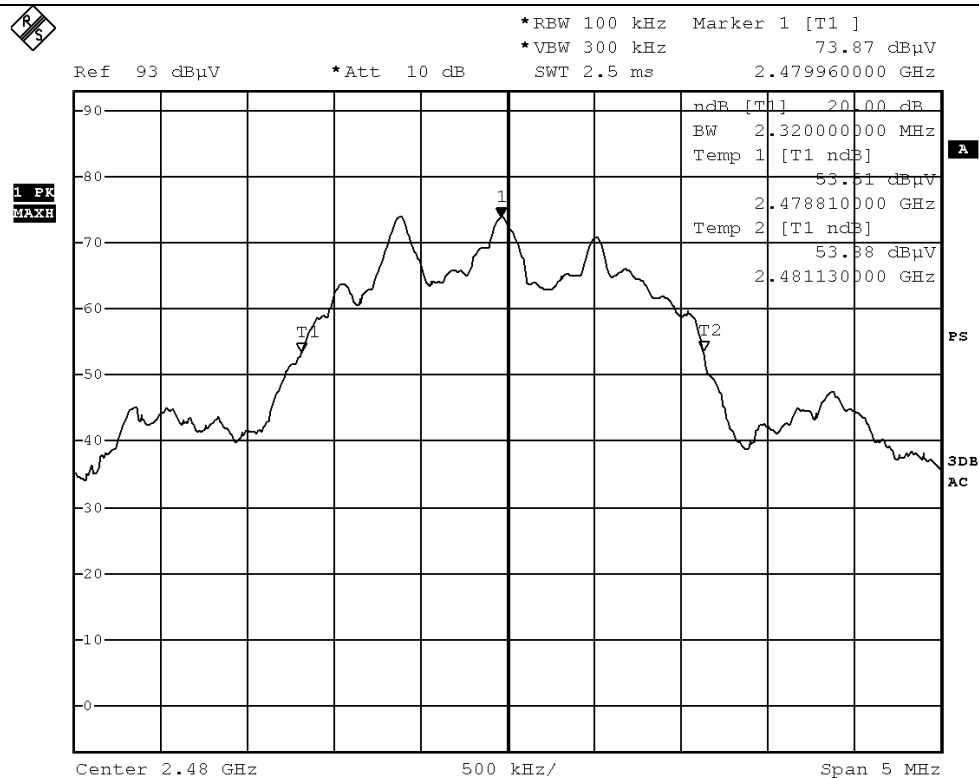
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Limits for 20dB Bandwidth of Fundamental Emission (High Frequency Channel):

Frequency Range [MHz]	20dB Bandwidth [MHz]
2480	2.32

20dB Bandwidth of Fundamental Emission



BMP

Date: 16.MAY.2016 10:33:50

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Appendix A

List of Measurement Equipment

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EMD004	LISN	ROHDE & SCHWARZ	ESH3-Z5	100102	2016.3.29	2017.3.29
EMD022	EMI Test Receiver	ROHDE & SCHWARZ	ESCS30	100314	2016.3.29	2017.3.29
EMD035	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	100441	2016.3.29	2017.3.29
EMD036	EMI Test Receiver	ROHDE & SCHWARZ	ESIB 26	100388	2016.3.29	2017.3.29
EMD041	TWO-LINE V-NETWORK	ROHDE & SCHWARZ	ENV216	100261	2016.3.29	2017.3.29
EMD061	Biconilog Antenna	ETS.LINDGREN	3142C	00060439	2014.11.29	2016.11.29
EMD062	Double-Ridged Waveguide (1GHz – 18GHz)	ETS.LINDGREN	3117	00075933	2014.11.15	2016.11.15
EMD084	MULTI-DVICE CONTROLLER	ETS.LINDGREN	2090	00060107	N/A	N/A
EMD088	Video Contol Unit	ETS.LINDGREN	Y21953A	2601073	N/A	N/A
EMD093	Monitor	ViewSonic	VA9036	Q8X064201876	N/A	N/A
EMD102	Intelligent Frequency	Ainuo Instrument Co., Ltd	AN97005SS	79707454	N/A	N/A
EMD103	Intelligent Frequency	Ainuo Instrument Co., Ltd	AN97005SS	79707455	N/A	N/A
EMD105	FACT-3 EMC Chamber	ETS.LINDGREN	FACT-3	3803	N/A	N/A
EMD106	Shielding Room #1	ETS.LINDGREN	RFD-100	3802	N/A	N/A
EMD111	Power meter	ROHDE & SCHWARZ	NRVD	102051	2016.3.29	2017.3.29
	100V Insertion Unit	ROHDE & SCHWARZ	URV5-Z4	100464	2016.3.29	2017.3.29
EMD113	Pre-Amplifier	ROHDE & SCHWARZ	N/A	1129588	2016.3.29	2017.3.29
EMD124	Loop Antenna	ETS-Lindgren	6502	00104905	2015.04.28	2017.04.28
EMD131	Standard Gain Horn Antenna (18GHz – 26.5GHz)	Chengdu AINFO Inc.	JXTXLB-42-15-C-KF	J2021100721001	2015.04.09	2017.04.09
RE01	RF cable	N/A	N/A	N/A	2014-9-28	2016-9-27
RE02	RF cable	N/A	N/A	N/A	2014-9-28	2016-9-27

Remarks:-

N/A Not Applicable or Not Available

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Appendix B

Photographs of EUT

Front View of the product



Rear View of the product



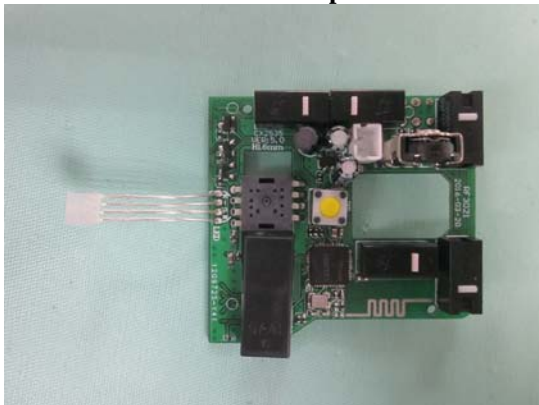
Inside View of the product



Inside View of the product



Inner Circuit Top View



Inner Circuit Bottom View



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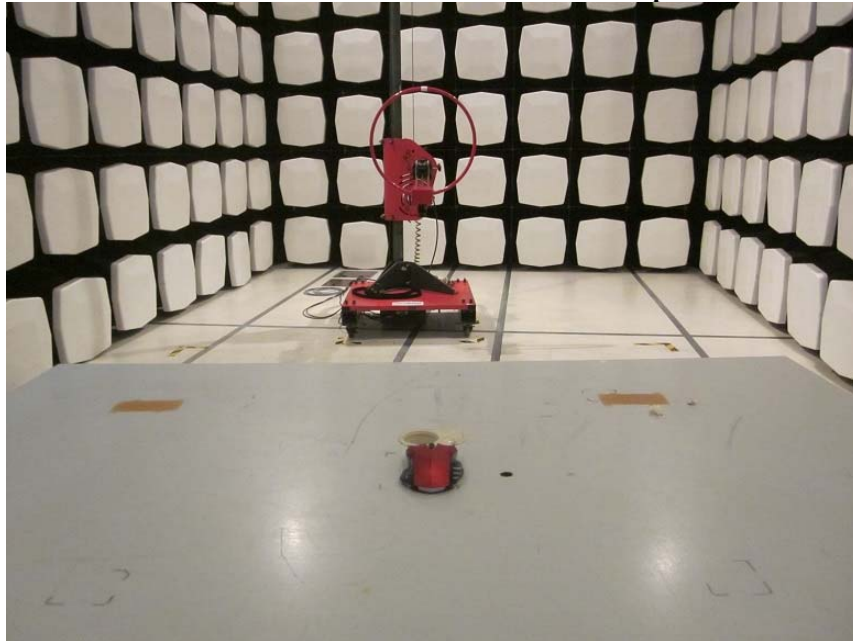
Date: 2016-05-16

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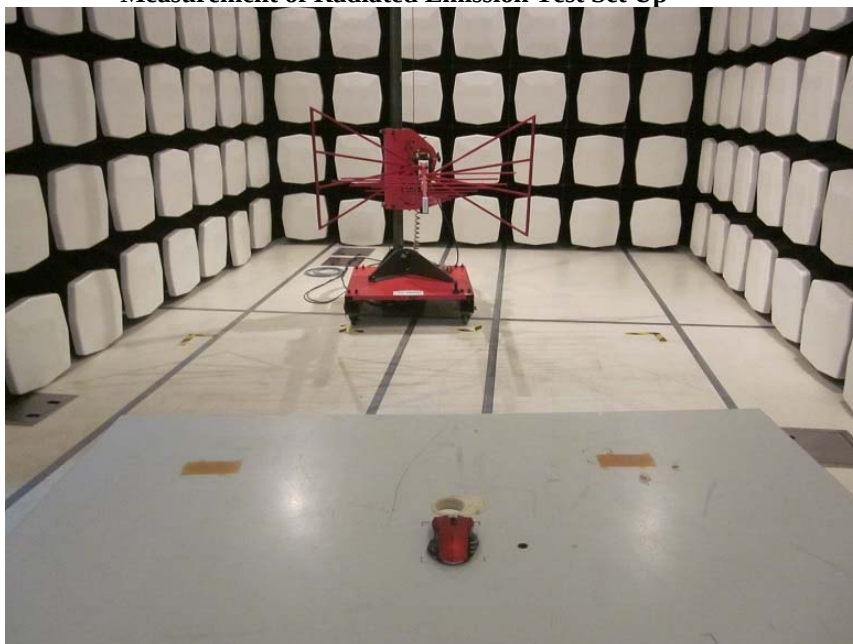
No.: DM121460

Photographs of EUT

Measurement of Radiated Emission Test Set Up



Measurement of Radiated Emission Test Set Up



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Photographs of EUT

Measurement of Radiated Emission Test Set Up



******* End of Test Report *******

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