



STC Test Report

Date: 2016-01-14

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No.: MH192272

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

Manufacturer: Winspeed Co., Ltd.
14F-1, No.2, Jian-Ba Rd., Chung-Ho District, New Taipei
City, Taiwan

Description of Sample(s): Submitted sample(s) said to be
Product: MANEJO Ergonomic Vertical Mouse,
wireless
Brand Name: SPEEDLINK
Model Number: SL-630005-BK
FCC ID: 2AEDNA13

Date Sample(s) Received: 2015-12-07

Date Tested: 2015-12-14 to 2016-01-13

Investigation Requested: Perform ElectroMagnetic Interference measurement in
accordance with FCC 47CFR [Codes of Federal Regulations]
Part 15: 2014 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): For additional model(s) details, see page 3.



Dr. LEE Kam Chuen
Authorized Signatory
ElectroMagnetic Compatibility Department
For and on behalf of
The Hong Kong Standards and Testing Centre Ltd.

The Hong Kong Standards and Testing Centre Ltd.

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1.0 General Details

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

Product:	MANEJO Ergonomic Vertical Mouse, wireless
Manufacturer:	Winspeed Co., Ltd. 14F-1, No.2, Jian-Ba Rd., Chung-Ho District, New Taipei City, Taiwan
Brand Name:	SPEEDLINK
Model Number:	SL-630005-BK
Additional Model Number:	SL-630005-xx("xx" is different product color)
Rating:	3Vd.c. ("AAA" battery * 2)

1.2 Description of EUT Operation

The Equipment Under Test (EUT) is a MANEJO Ergonomic Vertical 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

2015-12-07

1.4 Submitted Sample(s):

1 Sample

1.5 Test Duration

2015-12-14 to 2016-01-13

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: 2014 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:	2015-12-23 to 2016-01-13
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*. Measurements in both horizontal and vertical polarities were performed. During the test, 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

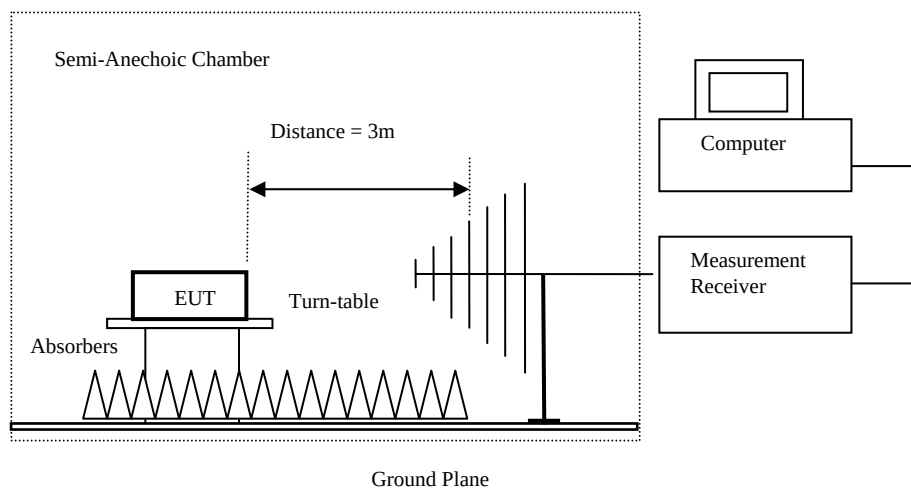
30MHz – 1GHz (QP)

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-2408 MHz) (Above 1GHz): 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
2408.00	45.7	36.4	82.1	12,735.0	500,000	Horizontal
2408.00	46.6	36.8	83.4	14,791.1	500,000	Vertical

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
2408.00	41.3	36.4	77.7	7,673.6	50,000	Horizontal
2408.00	41.4	36.8	78.2	8,128.3	50,000	Vertical

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
4816.0	13.3	42.4	55.7	609.5	5,000	Horizontal
4816.0	14.0	41.5	55.5	595.7	5,000	Vertical
7224.0	8.3	46.2	54.5	530.9	5,000	Horizontal
7224.0	9.8	45.1	54.9	555.9	5,000	Vertical
9632.0	6.2	48.8	55.0	562.3	5,000	Horizontal
9632.0	6.7	48.0	54.7	543.3	5,000	Vertical
12040.0	3.2	52.4	55.6	602.6	5,000	Horizontal
12040.0	4.4	51.5	55.9	623.7	5,000	Vertical

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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
4816.0	2.6	42.4	45.0	177.8	500	Horizontal
4816.0	2.7	41.5	44.2	162.2	500	Vertical
7224.0	-2.6	46.2	43.6	151.4	500	Horizontal
7224.0	-2.0	45.1	43.1	142.9	500	Vertical
9632.0	-6.0	48.8	42.8	138.0	500	Horizontal
9632.0	-7.1	48.0	40.9	110.9	500	Vertical
12040.0	-10.6	52.4	41.8	123.0	500	Horizontal
12040.0	-9.3	51.5	42.2	128.8	500	Vertical

Results of Tx mode (Middle Frequency Channel- 2440MHz) (Above 1GHz): 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
2440.00	45.3	36.4	81.7	12,161.9	500,000	Horizontal
2440.00	46.0	36.8	82.8	13,803.8	500,000	Vertical

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
2440.00	40.4	36.4	76.8	6,918.3	50,000	Horizontal
2440.00	40.8	36.8	77.6	7,585.8	50,000	Vertical

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
4880.0	12.5	42.5	55.0	562.3	5,000	Horizontal
4880.0	13.6	41.6	55.2	575.4	5,000	Vertical
7320.0	8.2	46.3	54.5	530.9	5,000	Horizontal
7320.0	9.6	45.2	54.8	549.5	5,000	Vertical
9760.0	6.2	48.9	55.1	568.9	5,000	Horizontal
9760.0	6.4	48.1	54.5	530.9	5,000	Vertical
12200.0	3.7	52.5	56.2	645.7	5,000	Horizontal
12200.0	4.4	51.6	56.0	631.0	5,000	Vertical

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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
4880.0	3.6	42.5	46.1	201.8	500	Horizontal
4880.0	4.3	41.6	45.9	197.2	500	Vertical
7320.0	-2.3	46.3	44.0	158.5	500	Horizontal
7320.0	-0.9	45.2	44.3	164.1	500	Vertical
9760.0	-6.4	48.9	42.5	133.4	500	Horizontal
9760.0	-6.2	48.1	41.9	124.5	500	Vertical
12200.0	-10.1	52.5	42.4	131.8	500	Horizontal
12200.0	-9.1	51.6	42.5	133.4	500	Vertical

Results of Tx mode (Highest Frequency Channel – 2474MHz) (Above 1GHz): 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
2474.00	45.7	36.4	82.1	12,735.0	500,000	Horizontal
2474.00	46.5	36.8	83.3	14,621.8	500,000	Vertical

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
2474.00	41.4	36.4	77.8	7,762.5	50,000	Horizontal
2474.00	41.6	36.8	78.4	8,317.6	50,000	Vertical

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
4948.0	12.6	42.7	55.3	582.1	5,000	Horizontal
4948.0	14.5	41.4	55.9	623.7	5,000	Vertical
7422.0	8.1	46.5	54.6	537.0	5,000	Horizontal
7422.0	8.6	45.6	54.2	512.9	5,000	Vertical
9896.0	5.5	49.7	55.2	575.4	5,000	Horizontal
9896.0	6.3	48.6	54.9	555.9	5,000	Vertical
12370.0	3.2	52.7	55.9	623.7	5,000	Horizontal
12370.0	4.4	51.7	56.1	638.3	5,000	Vertical

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Field Strength of Harmonics Emission							
Average Value							
Frequency	Measured	Correction	Field	Field	Limit @ 3m	E-Field	
	Level @ 3m	Factor	Strength	Strength		Polarity	
MHz	dBμV/m	dBμV/m	dBμV/m	μV/m	μV/m		
4948.0	2.3	42.7	45.0	177.8	500	Horizontal	
4948.0	3.3	41.4	44.7	171.8	500	Vertical	
7422.0	-3.0	46.5	43.5	149.6	500	Horizontal	
7422.0	-2.5	45.6	43.1	142.9	500	Vertical	
9896.0	-6.5	49.7	43.2	144.5	500	Horizontal	
9896.0	-6.6	48.6	42.0	125.9	500	Vertical	
12370.0	-9.9	52.7	42.8	138.0	500	Horizontal	
12370.0	-9.2	51.7	42.5	133.4	500	Vertical	

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

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

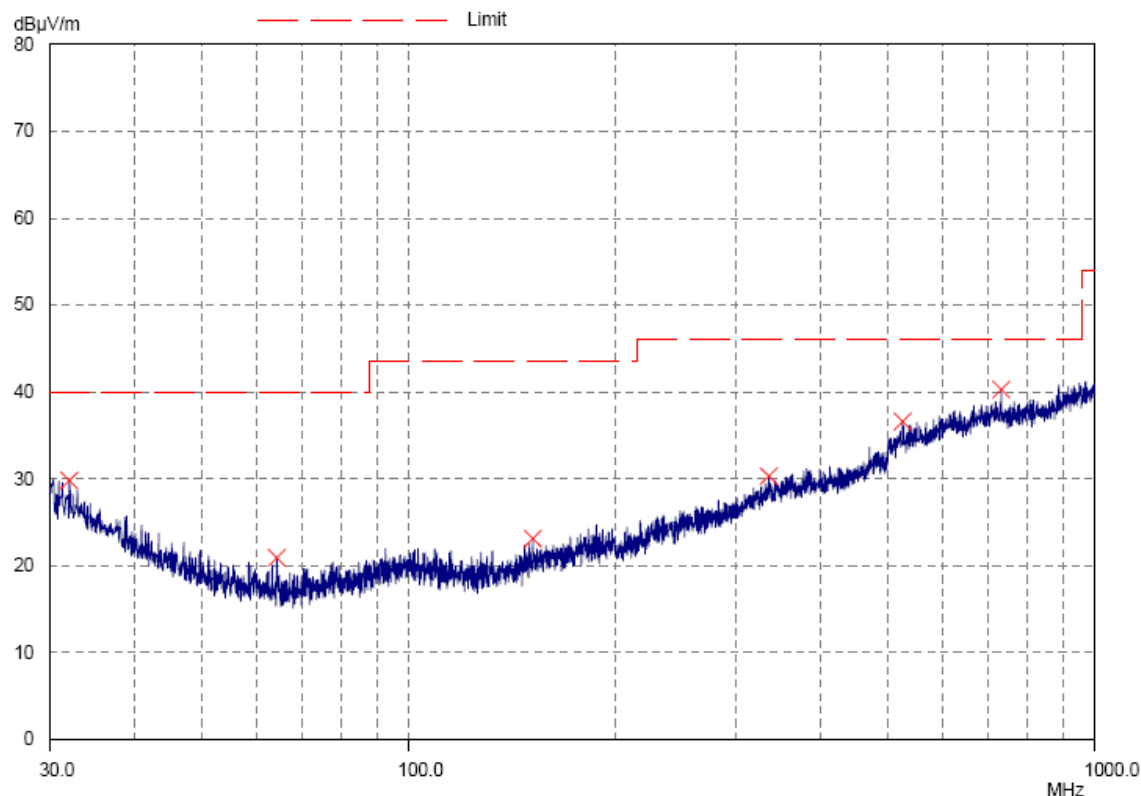
The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

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
32.1	Horizontal	29.8	40.0	30.9	100
64.4	Horizontal	20.9	40.0	11.1	100
151.9	Horizontal	23.1	43.5	14.3	150
335.3	Horizontal	30.3	46.0	32.7	200
525.4	Horizontal	36.6	46.0	67.6	200
731.7	Horizontal	40.3	46.0	103.5	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

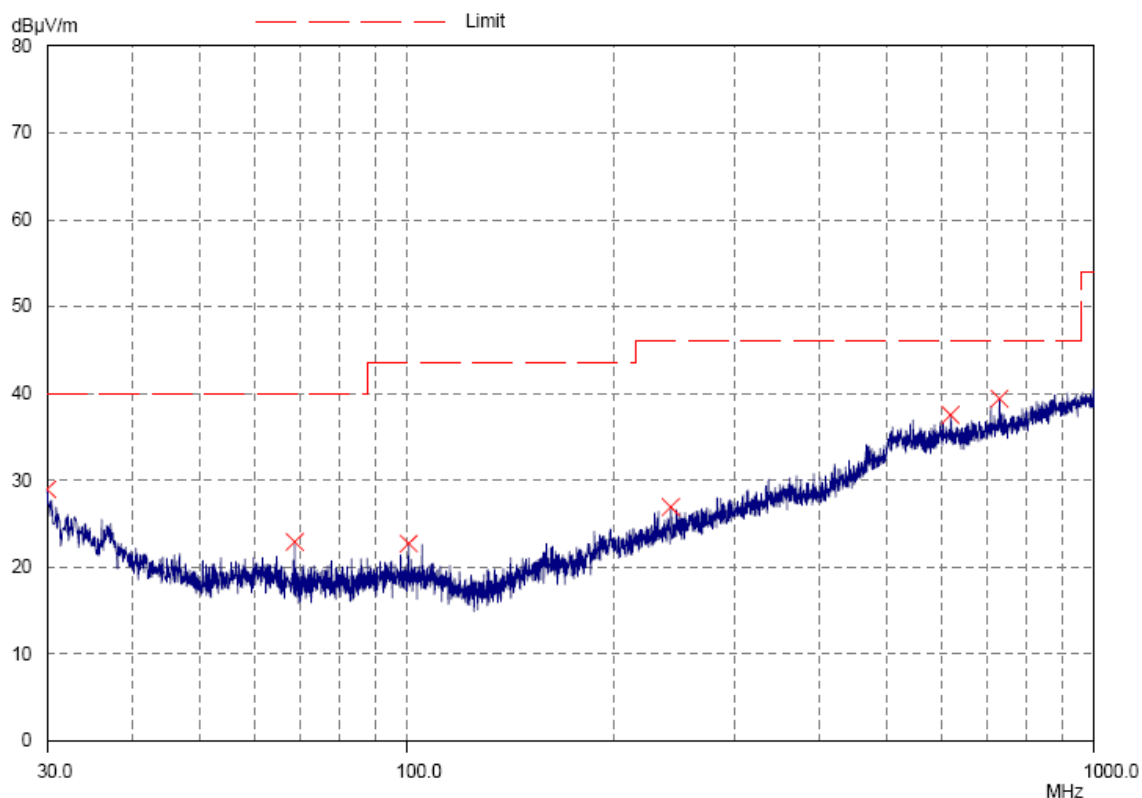
The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

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

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
30.0	Vertical	29.0	40.0	28.2	100
68.8	Vertical	22.9	40.0	14.0	100
100.8	Vertical	22.7	43.5	13.6	150
242.4	Horizontal	26.9	46.0	22.1	200
619.6	Horizontal	37.5	46.0	75.0	200
730.0	Horizontal	39.4	46.0	93.3	200

Remarks:

Calculated measurement uncertainty (9kHz - 30MHz): 2.0dB
(30MHz – 1GHz): 4.9dB
(1GHz - 26GHz): 4.0dB

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
2396.0	18.4	36.8	55.2	74.0	18.8	Vertical
2400.0	15.2	36.7	51.9	74.0	22.1	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
2396.0	13.9	36.8	50.7	54.0	3.3	Vertical
2400.0	10.4	36.7	47.1	54.0	7.0	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
2487.6	17.8	36.4	54.2	74.0	19.8	Horizontal
2483.5	14.8	36.9	51.7	74.0	22.3	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
2487.6	12.5	36.4	48.9	54.0	5.1	Horizontal
2483.5	10.1	36.9	47.0	54.0	7.0	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:	2015-12-14
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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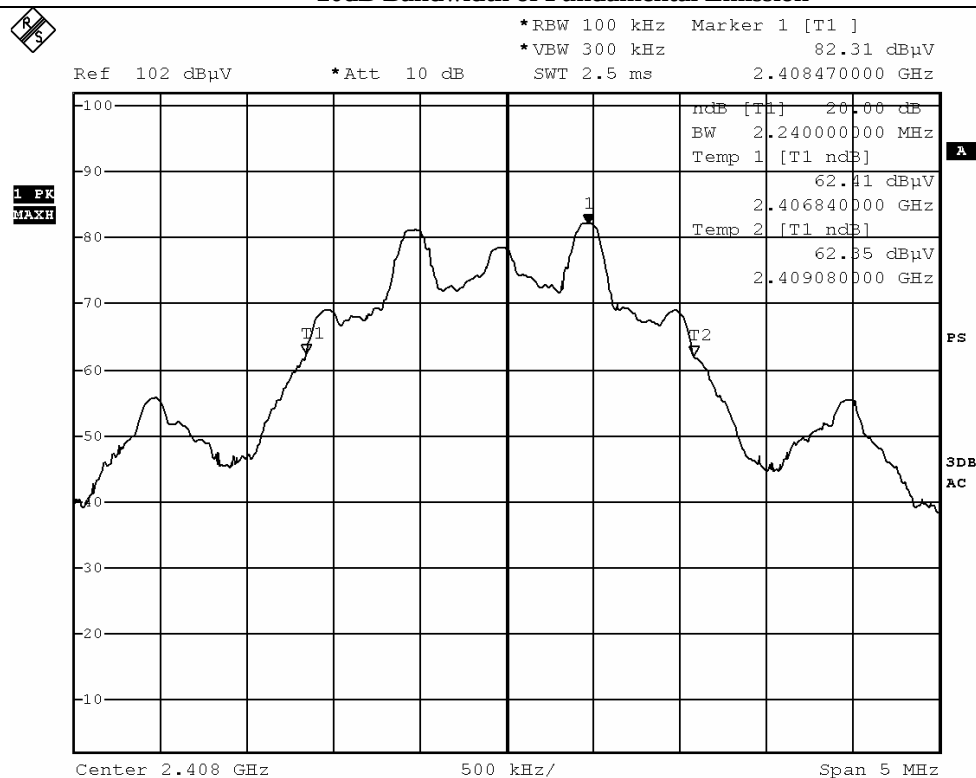
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Limits for 20dB Bandwidth of Fundamental Emission (Low Frequency Channel):

Frequency Range [MHz]	20dB Bandwidth [MHz]
2408	2.24

20dB Bandwidth of Fundamental Emission



BMP

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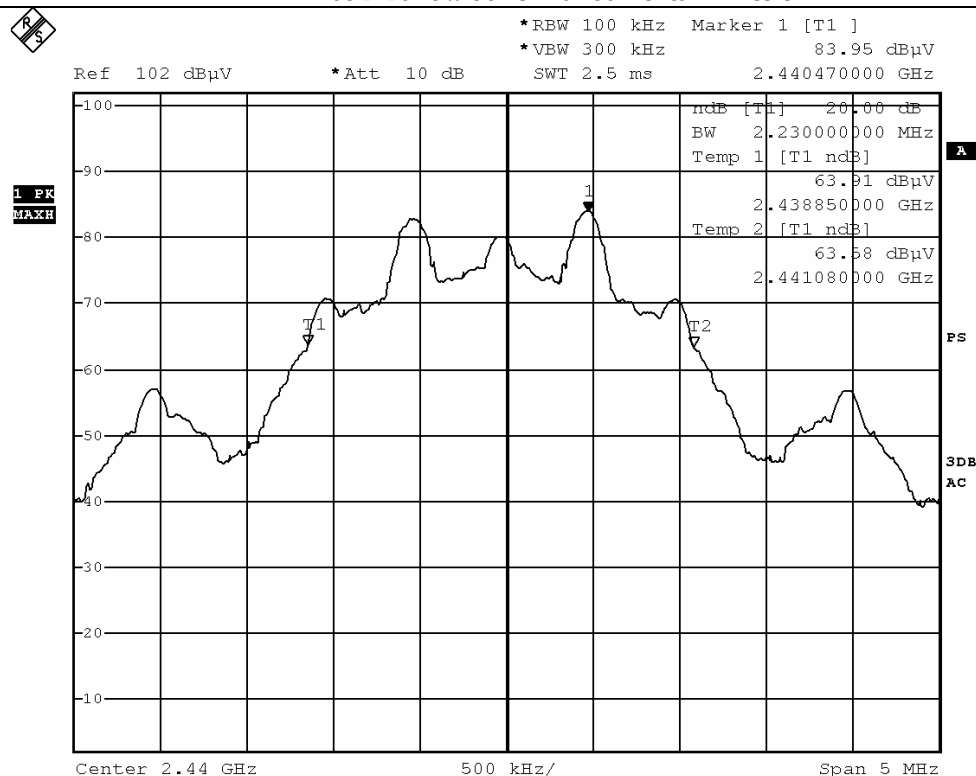
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Limits for 20dB Bandwidth of Fundamental Emission (Middle Frequency Channel):

Frequency Range [MHz]	20dB Bandwidth [MHz]
2440	2.23

20dB Bandwidth of Fundamental Emission



BMP

Date: 14.DEC.2015 15:43:01

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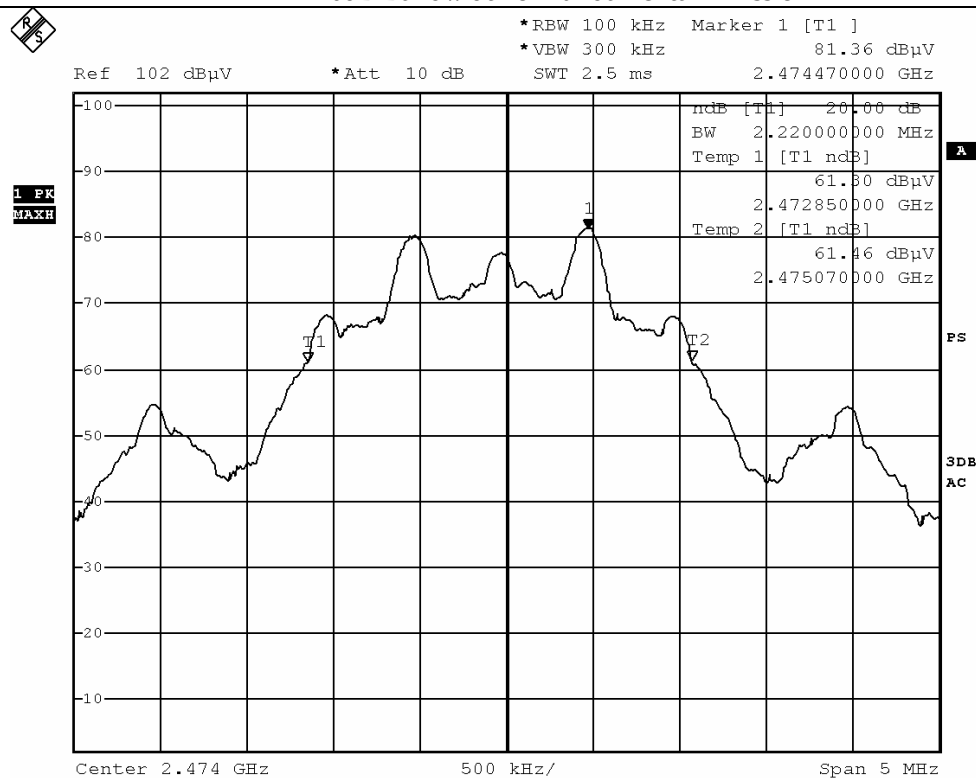
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Limits for 20dB Bandwidth of Fundamental Emission (High Frequency Channel):

Frequency Range [MHz]	20dB Bandwidth [MHz]
2474	2.22

20dB Bandwidth of Fundamental Emission



BMP

Date: 14.DEC.2015 15:44:07

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Appendix A

List of Measurement Equipment

Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM299	DOUBLE-RIDGED WAVEGUIDE HORN ANTENNA	ETS-LINDGREN	3115	00114120	2014/01/15	2016/01/25
EM300	PYRAMIDAL STANDARD GAIN HORN ANTENNA	ETS-LINDGREN	3160-09	00130130	2014/01/23	2016/01/23
EM215	MULTIDEVICE CONTROLLER	EMCO	2090	00024676	N/A	N/A
EM216	MINI MAST SYSTEM	EMCO	2075	00026842	N/A	N/A
EM217	ELECTRIC POWERED TURNABLE	EMCO	2088	00029144	N/A	N/A
EM218	ANECHOIC CHAMBER	ETS-LINDGREN	FACT-3	--	2014/09/29	2016/09/29
EM320	BICONILOG ANTENNA	ETS-LINDGREN	3142D	00094856	2014/08/06	2016/08/06
EM022	LOOP ANTENNA	EMCO	6502	1189-2424	2014/01/15	2016/01/15
EM229	EMI TEST RECEIVER	R&S	ESIB40	100248	2015/06/01	2016/06/01
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



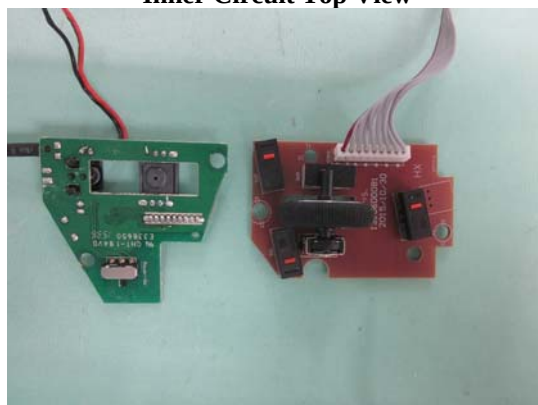
Rear View of the product



Inside View of the product



Inner Circuit Top View



Inner Circuit Bottom View



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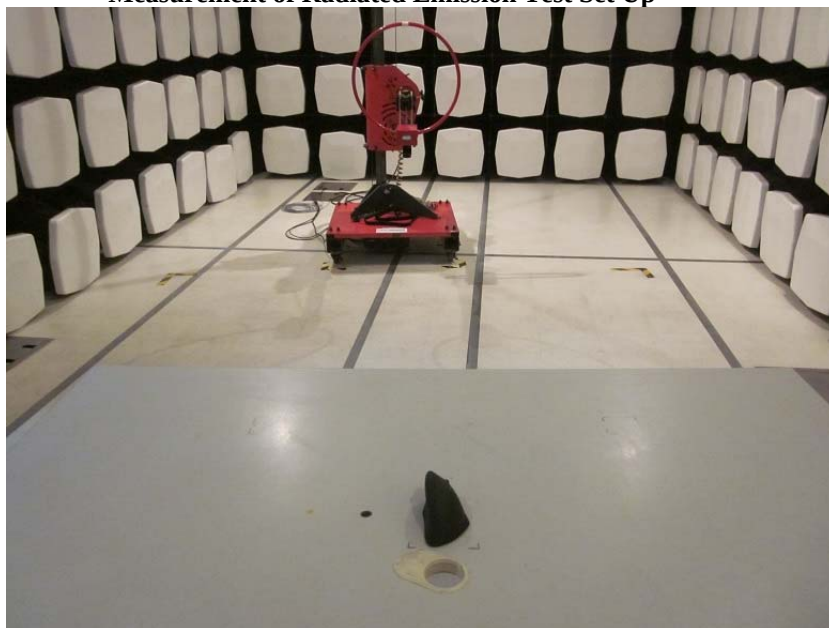
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Photographs of EUT

Measurement of Radiated Emission Test Set Up



Measurement of Radiated Emission Test Set Up



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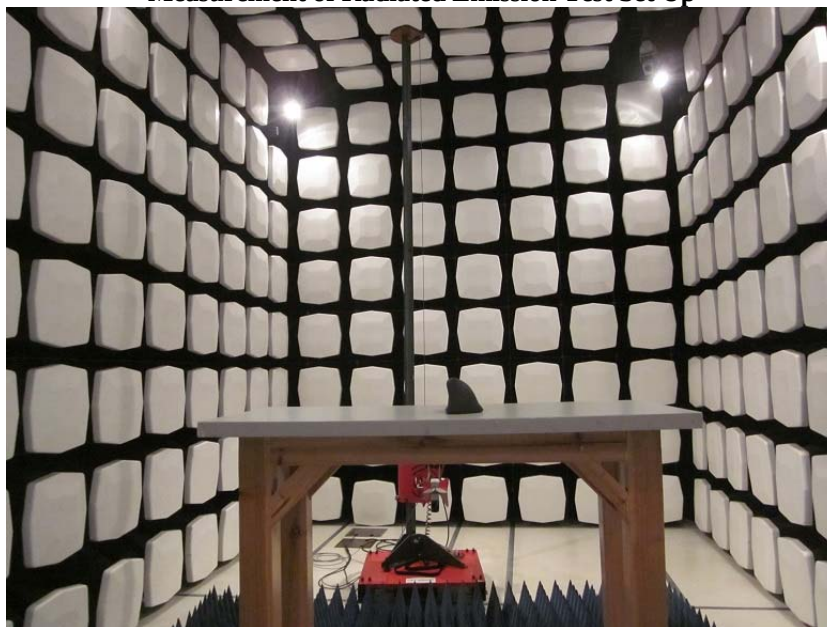
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Photographs of EUT

Measurement of Radiated Emission Test Set Up



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