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

No. 1 Workshop, M-10, Middle section, Science & Technology Park,

Nanshan District, Shenzhen, Guangdong, China 518057

Telephone: +86 (0) 755 2601 2053
Fax: +86 (0) 755 2671 0594
Email: ee.shenzhen@sgs.com

TEST REPORT

Application No. :	SZEM1605003307CR
Applicant:	Winspeed Co., Ltd
Manufacturer:	Winspeed Co., Ltd
Product Name:	NIALA Deskset - Wireless
Model No.(EUT):	SL-640304-BK-US
Add Model No.:	SL-640304-XX-YY("XX" could be from "A-Z", what stands for the different product color; "YY" could be from "A-Z", what stands for the different printing version of keyboard)
Trade Mark:	SPEEDLINK
FCC ID:	2AEDNA33
Standards:	47 CFR Part 15, Subpart C (2015)
Date of Receipt:	2016-05-16
Date of Test:	2016-05-18 to 2016-05-24
Date of Issue:	2016-05-27
Test Result:	**PASS ***

* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Authorized Signature:

Jack Zhang
EMC Laboratory Manager

2 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
00		2016-05-27		Original

Authorized for issue by:				
Tested By		Gebin Sun **(Gebin Sun) /Project Engineer**		2016-05-24 **Date**
Prepared By		Joyce Shi **(Joyce Shi) /Clerk**		2016-05-27 **Date**
Checked By		Eric Fu **(Eric Fu) /Reviewer**		2016-05-27 **Date**

3 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203	ANSI C63.10 (2013)	PASS
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10 (2013)	PASS
Field Strength of the Fundamental Signal	47 CFR Part 15, Subpart C Section 15.249 (a)	ANSI C63.10 (2013)	PASS
Spurious Emissions	47 CFR Part 15, Subpart C Section 15.249 (a)/15.209	ANSI C63.10 (2013)	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15, Subpart C Section 15.249(a)/15.205	ANSI C63.10 (2013)	PASS
20dB Occupied Bandwidth	47 CFR Part 15, Subpart C Section 15.215 (c)	ANSI C63.10 (2013)	PASS

4 Contents

5 General Information

5.1 Client Information

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

5.2 General Description of EUT

Name:	NIALA Deskset - Wireless
Model No.:	SL-640304-BK-US
Trade Mark :	SPEEDLINK
RF Function (Frequency):	2.4GHz(2408 MHz-2474 MHz)
Modulation Type:	GFSK
Sample Type:	Portable production
Antenna Type:	Integral
Antenna Gain:	0dBi
EUT power supply:	Supplied by PC

Remark:

Model No.: SL-640304-XX-YY("XX" could be from "A-Z", what stands for the different product color; "YY" could be from "A-Z", what stands for the different printing version of keyboard)

Only the model SL-640304-BK-US was tested, since the electrical circuit design, layout, components used and internal wiring were identical for the above models, only different on product color and printing version of keyboard.

Operation Frequency each of channel					
Channel	Frequency	Channel	Frequency	Channel	Frequency
1CH	2408 MHz	12CH	2430 MHz	23CH	2454 MHz
2CH	2410 MHz	13CH	2432 MHz	24CH	2456 MHz
3CH	2412 MHz	14CH	2434 MHz	25CH	2458 MHz
4CH	2414 MHz	15CH	2436 MHz	26CH	2460 MHz
5CH	2416 MHz	16CH	2438 MHz	27CH	2462 MHz
6CH	2418 MHz	17CH	2440 MHz	28CH	2464 MHz
7CH	2420 MHz	18CH	2444 MHz	29CH	2466 MHz
8CH	2422 MHz	19CH	2446 MHz	30CH	2468 MHz
9CH	2424 MHz	20CH	2448 MHz	31CH	2470 MHz
10CH	2426 MHz	21CH	2450 MHz	32CH	2472 MHz
11CH	2428 MHz	22CH	2452 MHz	33CH	2474 MHz

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The Lowest channel(CH1)	2408MHz
The Middle channel(CH17)	2440MHz
The Highest channel(CH33)	2474MHz

5.3 Test Environment and Mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	55 % RH
Atmospheric Pressure:	1015 mbar
Test mode:	
Transmitting mode:	Keep the EUT in transmitting mode with modulation.

5.4 Description of Support Units

The EUT has been tested independently.

5.5 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch E&E Lab,
No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.
Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

5.6 Test Facility

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

• **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• **VCCI**

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.: G-823, R-4188, T-1153 and C-2383 respectively.

• **FCC – Registration No.: 556682**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen 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 No.: 556682.

• **Industry Canada (IC)**

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

5.7 Deviation from Standards

None.

5.8 Abnormalities from Standard Conditions

None.

5.9 Other Information Requested by the Customer

None.

5.10 Equipment List

Conducted Emission						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal. date (yyyy-mm-dd)**	**Cal.Due date (yyyy-mm-dd)**
1	Shielding Room	ZhongYu Electron	GB-88	SEM001-06	2016-05-13	2017-05-13
2	LISN	Rohde & Schwarz	ENV216	SEM007-01	2015-10-09	2016-10-09
3	LISN	ETS-LINDGREN	3816/2	SEM007-02	2016-04-25	2017-04-25
4	8 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T8-02	EMC0120	2015-08-30	2016-08-30
5	4 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T4-02	EMC0121	2015-08-30	2016-08-30
6	2 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T2-02	EMC0122	2015-08-30	2016-08-30
7	EMI Test Receiver	Rohde & Schwarz	ESCI	SEM004-02	2016-04-25	2017-04-25
8	DC Power Supply	Zhao Xin	RXN-305D	SEM011-02	2015-10-09	2016-10-09

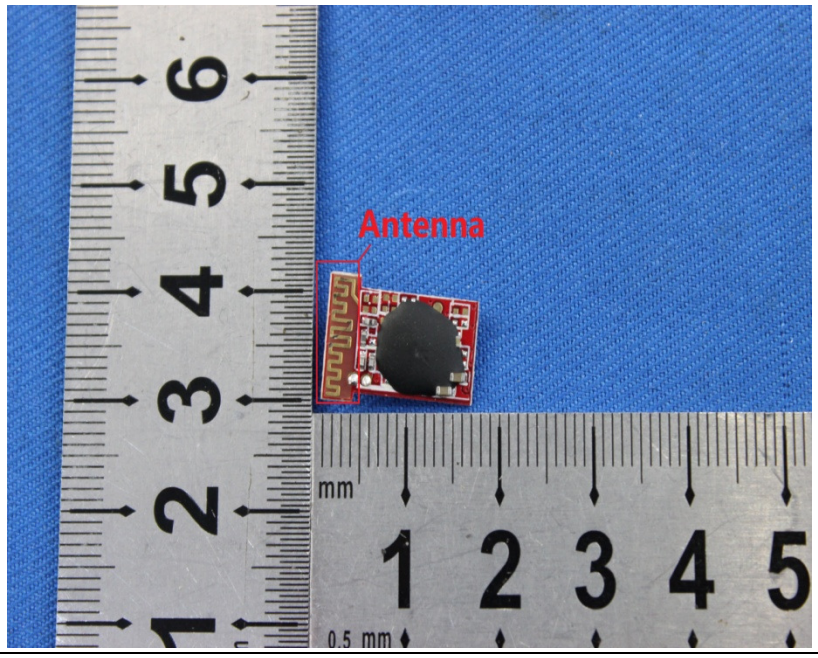
RE in Chamber						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal. date (yyyy-mm-dd)**	**Cal.Due date (yyyy-mm-dd)**
1	3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2016-05-13	2017-05-13
2	EMI Test Receiver	Agilent Technologies	N9038A	SEM004-05	2015-09-16	2016-09-16
3	BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEM003-01	2014-11-01	2017-11-01
4	Double-ridged horn (1-18GHz)	ETS-LINDGREN	3117	SEM003-11	2015-10-17	2018-10-17
5	Horn Antenna (18-26GHz)	ETS-LINDGREN	3160	SEM003-12	2014-11-24	2017-11-24
6	Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEM005-01	2016-04-25	2017-04-25
7	Band filter	Amindeon	Asi 3314	SEM023-01	N/A	N/A
8	DC Power Supply	Zhao Xin	RXN-305D	SEM011-02	2015-10-09	2016-10-09
9	Loop Antenna	Beijing Daze	ZN30401	SEM003-09	2015-05-13	2018-05-13

RE in Chamber						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal. date (yyyy-mm-dd)**	**Cal.Due date (yyyy-mm-dd)**
1	3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2016-05-13	2017-05-13
2	EMI Test Receiver	Rohde & Schwarz	ESIB26	SEM004-04	2016-04-25	2017-04-25
3	BiConiLog Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-02	2014-11-15	2017-11-15
4	Amplifier (0.1-1300MHz)	HP	8447D	SEM005-02	2015-10-09	2016-10-09
5	Horn Antenna (1-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2015-06-14	2018-06-14
6	Low Noise Amplifier	Black Diamond Series	BDLNA-0118-352810	SEM005-05	2015-10-09	2016-10-09
7	Band filter	Amindeon	Asi 3314	SEM023-01	N/A	N/A

RF connected test						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal. date (yyyy-mm-dd)**	**Cal.Due date (yyyy-mm-dd)**
1	DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2015-10-09	2016-10-09
2	Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2015-10-17	2016-10-17
3	Signal Generator	Rohde & Schwarz	SML03	SEM006-02	2016-04-25	2017-04-25
4	Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2015-10-09	2016-10-09

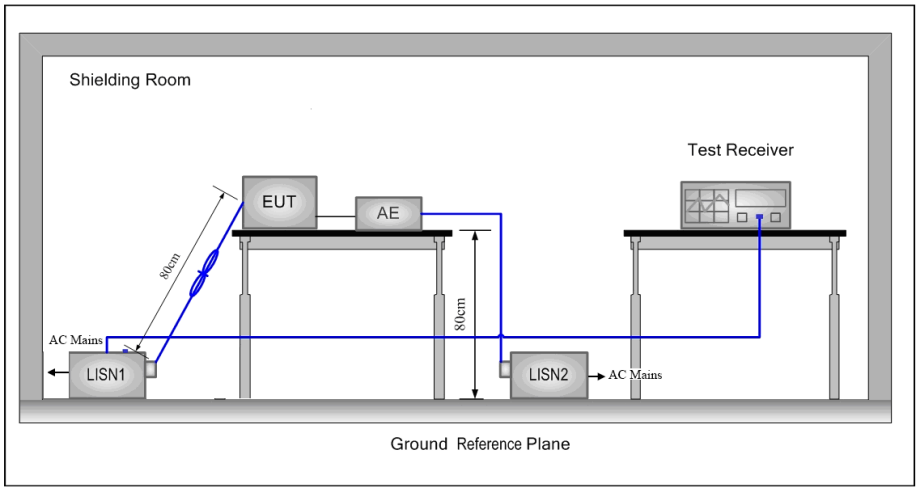
6 Test results and Measurement Data

6.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C Section 15.203
15.203 requirement: 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.	
EUT Antenna:	
The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 0dBi.	

6.2 Conducted Emissions

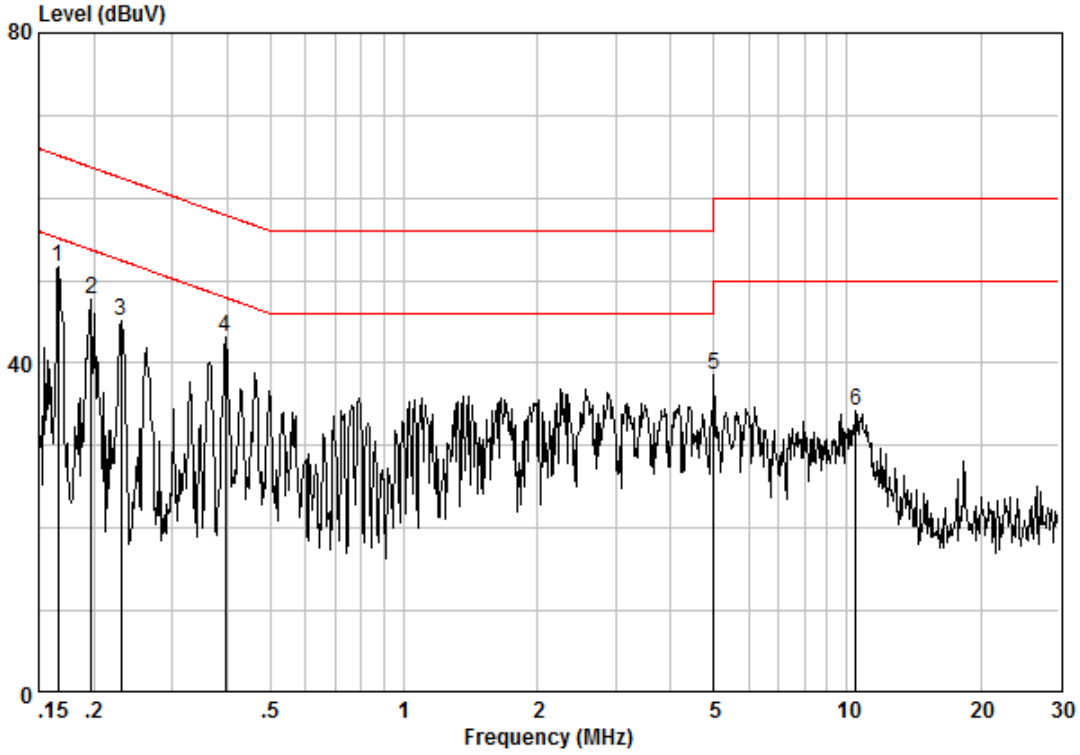
Test Requirement:	47 CFR Part 15C Section 15.207
Test Method:	ANSI C63.10: 2013
Test Frequency Range:	150KHz to 30MHz
Limit:	Frequency range (MHz) / Limit (dBuV): Quasi-peak / Average 0.15-0.5: 66 to 56* / 56 to 46* 0.5-5: 56 / 46 5-30: 60 / 50 * Decreases with the logarithm of the frequency.
Test Procedure:	1) The mains terminal disturbance voltage test was conducted in a shielded room. 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded. 3) 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, 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2. 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.

Test Setup:	
Instruments Used:	Refer to section 5.10 for details
Test Mode:	Transmitter mode
Test Results:	Pass

Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.
Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

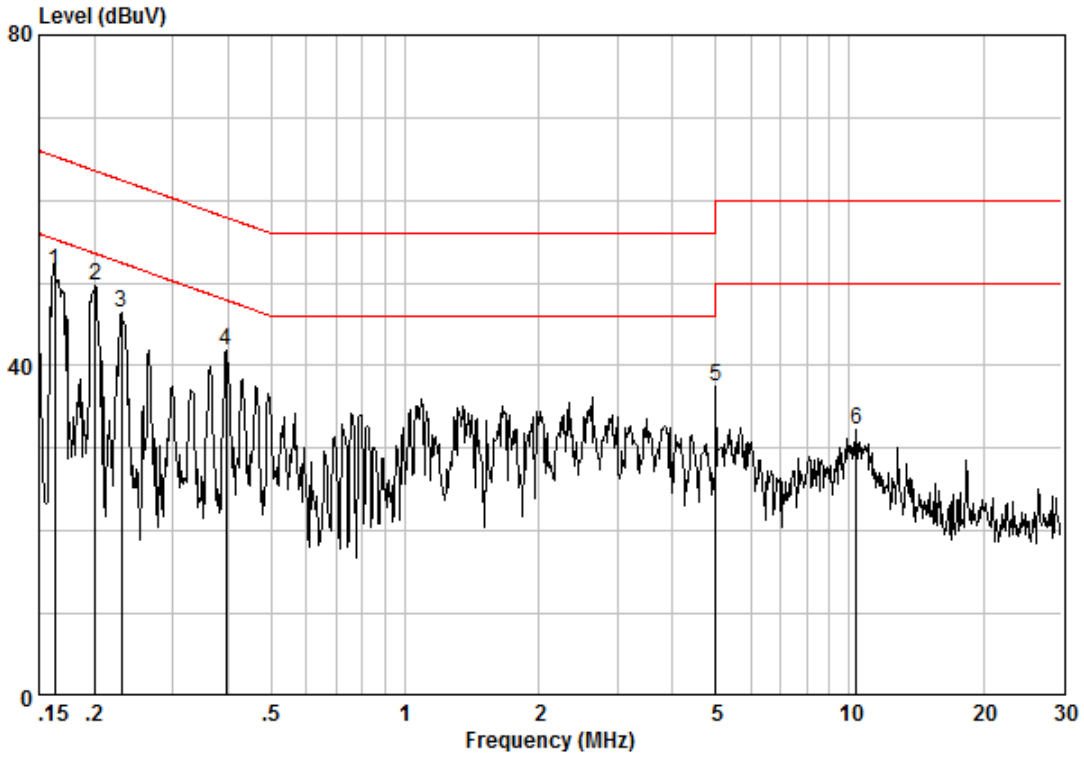
Live Line:



Site : Shielding Room
Condition : CE LINE
Job.No : 3307CR
Test Mode : TX

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1 @	0.16589	0.02	9.82	41.73	51.57	55.16	-3.59	Peak
2	0.19758	0.02	9.83	37.84	47.69	53.71	-6.02	Peak
3	0.23040	0.02	9.83	35.16	45.02	52.44	-7.42	Peak
4	0.39553	0.01	9.85	33.32	43.18	47.95	-4.77	Peak
5	5.005	0.01	10.12	28.38	38.51	50.00	-11.49	Peak
6	10.452	0.01	10.15	24.06	34.22	50.00	-15.78	Peak

Neutral Line:



Site : Shielding Room
Condition : CE NEUTRAL
Job.No : 3307CR
Test Mode : TX

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1 @	0.16241	0.02	9.80	41.65	51.47	55.34	-3.87	Peak
2 @	0.20075	0.02	9.85	39.84	49.71	53.58	-3.87	Peak
3	0.23040	0.02	9.85	36.64	46.51	52.44	-5.92	Peak
4	0.39553	0.01	9.87	31.97	41.85	47.95	-6.10	Peak
5	5.005	0.01	10.13	27.28	37.42	50.00	-12.58	Peak
6	10.342	0.01	10.14	22.05	32.20	50.00	-17.80	Peak

Notes:

1. The following Quasi-Peak and Average measurements were performed on the EUT:

2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.

6.3 Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.249 and 15.209
Test Method:	ANSI C63.10: 2013
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.090MHz	Peak	10kHz	30KHz	Peak
0.009MHz-0.090MHz	Average	10kHz	30KHz	Average
0.090MHz-0.110MHz	Quasi-peak	10kHz	30KHz	Quasi-peak
0.110MHz-0.490MHz	Peak	10kHz	30KHz	Peak
0.110MHz-0.490MHz	Average	10kHz	30KHz	Average
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
30MHz-1GHz	Quasi-peak	100 kHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Limit:
(Spurious Emissions)

Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F (kHz)	-	-	300
0.490MHz-1.705MHz	24000/F (kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1GHz	500	54.0	Average	3

Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

Limit:
(Field strength of the fundamental signal)

Frequency	Limit (dBuV/m @3m)	Remark
2400MHz-2483.5MHz	94.0	Average Value
	114.0	Peak Value

Test Setup:	

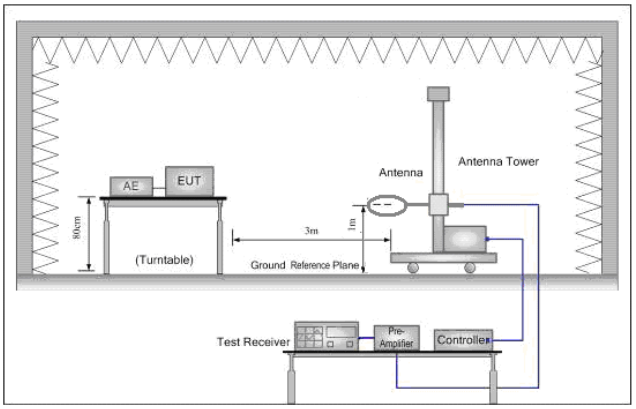


Figure 1. Below 30MHz

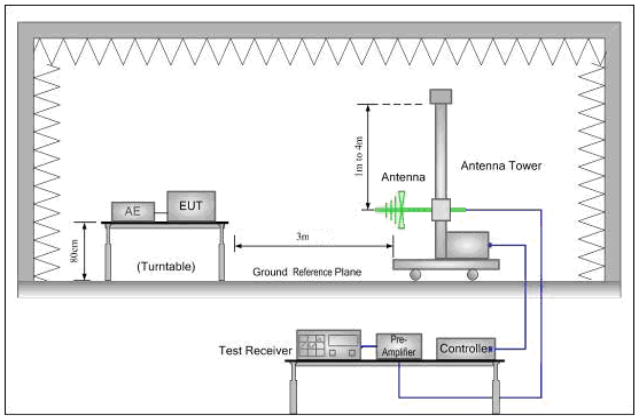


Figure 2. 30MHz to 1GHz

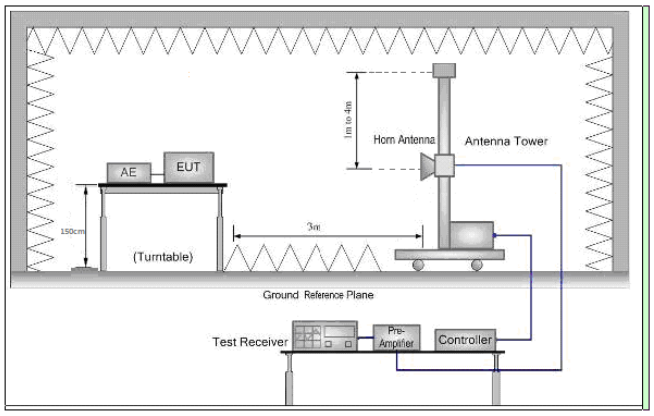


Figure 3. Above 1 GHz

Test Procedure:	a. For below 1GHz, 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. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 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 c. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. d. 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. e. 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. g. 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. h. Test the EUT in the lowest channel, the middle channel, the Highest channel i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode,And found the X axis positioning which it is worse case. j. Repeat above procedures until all frequencies measured was complete.
Instruments Used:	Refer to section 5.10 for details
Exploratory Test Mode:	Transmitting mode,
Final Test Mode:	Pretest the EUT at Transmitting mode, found the Transmitting mode which it is worse case Only the worst case is recorded in the report.
Test Results:	Pass

Measurement Data

6.3.1.1 Field Strength Of The Fundamental Signal

Peak value:

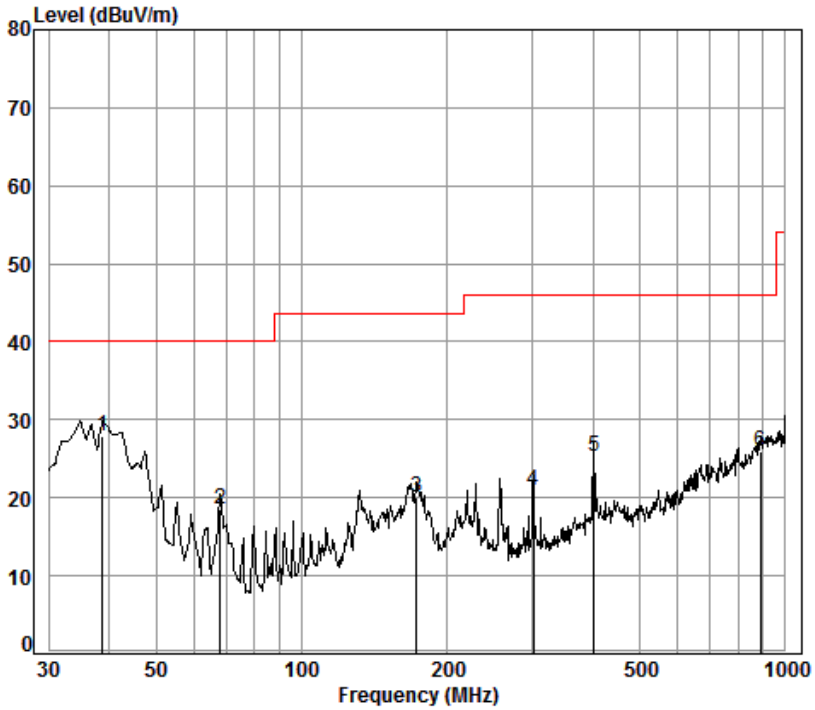
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2407.523	28.64	5.35	38.11	93.47	89.35	114	-24.65	Horizontal
2407.523	28.64	5.35	38.11	87.34	83.22	114	-30.78	Vertical
2440.518	28.79	5.38	38.11	92.95	89.01	114	-24.99	Horizontal
2440.518	28.79	5.38	38.11	86.97	83.03	114	-30.97	Vertical
2474.507	28.94	5.4	38.12	93.74	89.96	114	-24.04	Horizontal
2473.432	28.94	5.4	38.12	86	82.22	114	-31.78	Vertical

Remark:

The peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.

6.3.1.2 Spurious Emissions

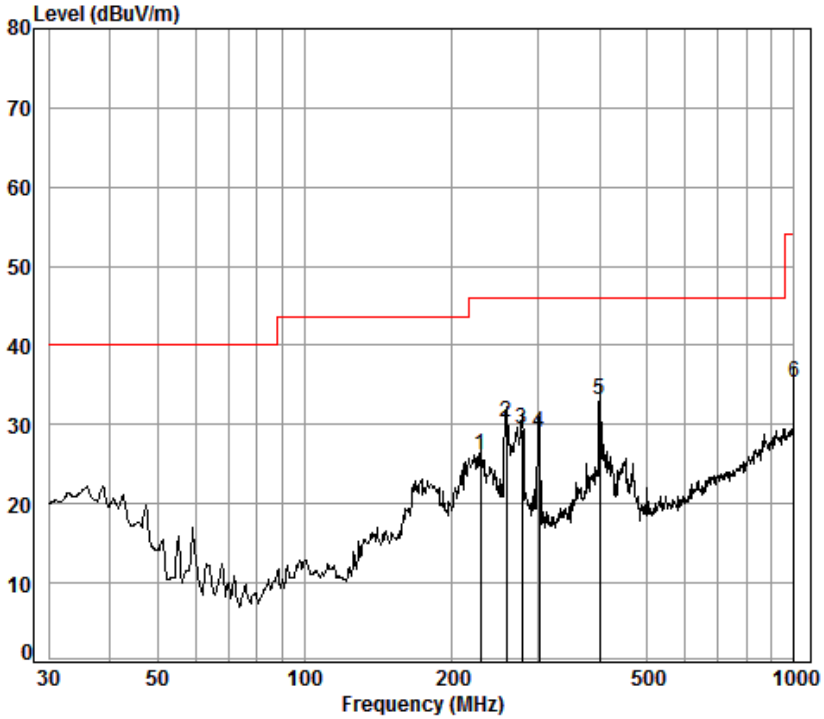
30MHz~1GHz		
Test mode:	Transmitting mode	Vertical



Condition: 3m Vertical
Job No. : 3307CR
Test mode: TX mode

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 pp	38.75	0.60	16.62	25.98	36.66	27.90	40.00	-12.10
2	67.91	0.80	5.05	25.93	38.59	18.51	40.00	-21.49
3	172.60	1.36	9.10	25.80	35.43	20.09	43.50	-23.41
4	301.42	1.90	11.27	25.70	33.44	20.91	46.00	-25.09
5	401.84	2.21	12.47	25.66	36.28	25.30	46.00	-20.70
6	887.61	3.55	21.28	25.15	26.18	25.86	46.00	-20.14

Test mode:	Transmitting mode	Horizontal



Condition: 3m Horizontal
Job No. : 3307CR
Test mode: TX mode

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	228.49	1.56	7.73	25.75	42.62	26.16	46.00	-19.84
2	258.33	1.71	9.37	25.73	45.02	30.37	46.00	-15.63
3	278.07	1.81	10.05	25.71	43.28	29.43	46.00	-16.57
4	301.42	1.90	11.27	25.70	41.54	29.01	46.00	-16.99
5 pp	400.43	2.20	12.34	25.66	44.23	33.11	46.00	-12.89
6	1000.00	3.70	22.30	24.40	33.82	35.42	54.00	-18.58

Above 1GHz					
Test mode:	Transmitting	Test channel:	Lowest	Remark:	Peak

Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
3814.467	32.91	7.75	38.49	45.58	47.75	74	-26.25	Vertical
4816.000	34.12	8.88	38.75	44.01	48.26	74	-25.74	Vertical
6639.063	35.18	10.12	38.15	44.30	51.45	74	-22.55	Vertical
7224.000	35.59	10.69	37.63	40.26	48.91	74	-25.09	Vertical
9632.000	37.10	12.51	36.31	33.81	47.11	74	-26.89	Vertical
12676.420	37.94	14.65	37.82	37.89	52.66	74	-21.34	Vertical
3792.453	32.87	7.74	38.48	45.91	48.04	74	-25.96	Horizontal
4816.000	34.12	8.88	38.75	44.91	49.16	74	-24.84	Horizontal
6157.871	34.78	10.36	38.75	45.62	52.01	74	-21.99	Horizontal
7224.000	35.59	10.69	37.63	39.60	48.25	74	-25.75	Horizontal
9632.000	37.10	12.51	36.31	33.60	46.90	74	-27.10	Horizontal
12603.270	37.90	14.44	37.75	36.96	51.55	74	-22.45	Vertical

Test mode:	Transmitting	Test channel:	Middle	Remark:	Peak

Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
3825.521	32.93	7.75	38.49	46.30	48.49	74	-25.51	Vertical
4880.000	34.18	8.97	38.76	45.97	50.36	74	-23.64	Vertical
6639.063	35.18	10.12	38.15	45.40	52.55	74	-21.45	Vertical
7320.000	35.54	10.72	37.59	41.87	50.54	74	-23.46	Vertical
9760.000	37.10	12.58	36.14	38.89	52.43	74	-21.57	Vertical
12530.530	37.83	14.24	37.68	38.11	52.50	74	-21.50	Vertical
3803.444	32.90	7.74	38.49	44.75	46.90	74	-27.10	Horizontal
4880.000	34.18	8.97	38.76	44.15	48.54	74	-25.46	Horizontal
6140.076	34.77	10.38	38.78	45.94	52.31	74	-21.69	Horizontal
7320.000	35.54	10.72	37.59	41.28	49.95	74	-24.05	Horizontal
9760.000	37.10	12.58	36.14	38.94	52.48	74	-21.52	Horizontal
12676.420	37.94	14.65	37.82	37.45	52.22	74	-21.78	Horizontal

Test mode:	Transmitting	Test channel:	Highest	Remark:	Peak

Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
3881.276	32.98	7.77	38.52	46.14	48.37	74	-25.63	Vertical
4948.000	34.25	9.07	38.78	47.39	51.93	74	-22.07	Vertical
6658.303	35.17	10.15	38.13	45.25	52.44	74	-21.56	Vertical
7424.000	35.56	10.76	37.55	39.47	48.24	74	-25.76	Vertical
9896.000	37.20	12.65	35.96	37.34	51.23	74	-22.77	Vertical
11757.650	37.50	14.30	36.94	37.50	52.36	74	-21.64	Vertical
3803.444	32.90	7.74	38.49	45.24	47.39	74	-26.61	Horizontal
4948.000	34.25	9.07	38.78	46.90	51.44	74	-22.56	Horizontal
6619.878	35.19	10.10	38.18	45.00	52.11	74	-21.89	Horizontal
7424.000	35.56	10.76	37.55	37.91	46.68	74	-27.32	Horizontal
9896.000	37.20	12.65	35.96	39.10	52.99	74	-21.01	Horizontal
12603.270	37.90	14.44	37.75	38.15	52.74	74	-21.26	Horizontal

Remark:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
   Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

2) Scan from 9kHz to 25GHz,The disturbance above 13GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported .

3) As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.

6.4 Restricted bands around fundamental frequency

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205
Test Method:	ANSI C63.10: 2013
Test site:	Measurement Distance: 3m (Semi-Anechoic Chamber)
Limit(band edge):	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 Section 15.209, whichever is the lesser attenuation.

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

Test Setup:

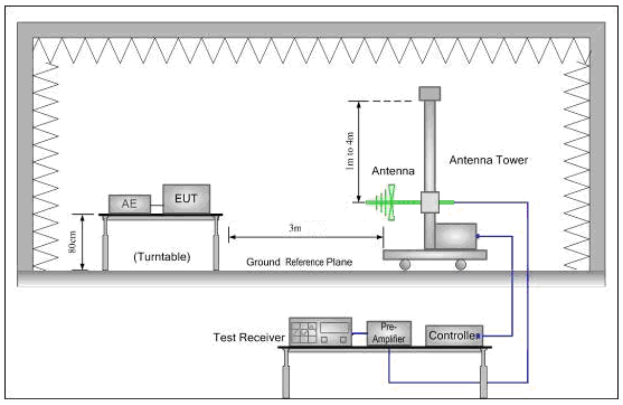


Figure 1. 30MHz to 1GHz

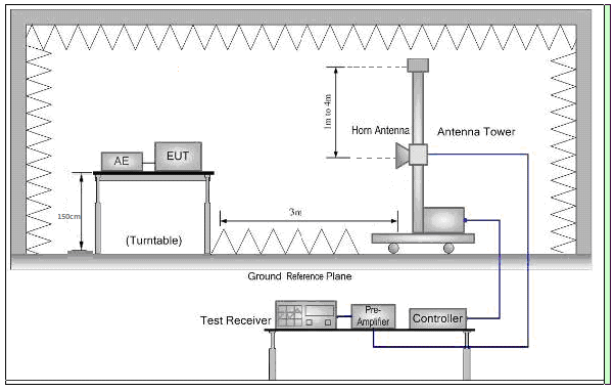
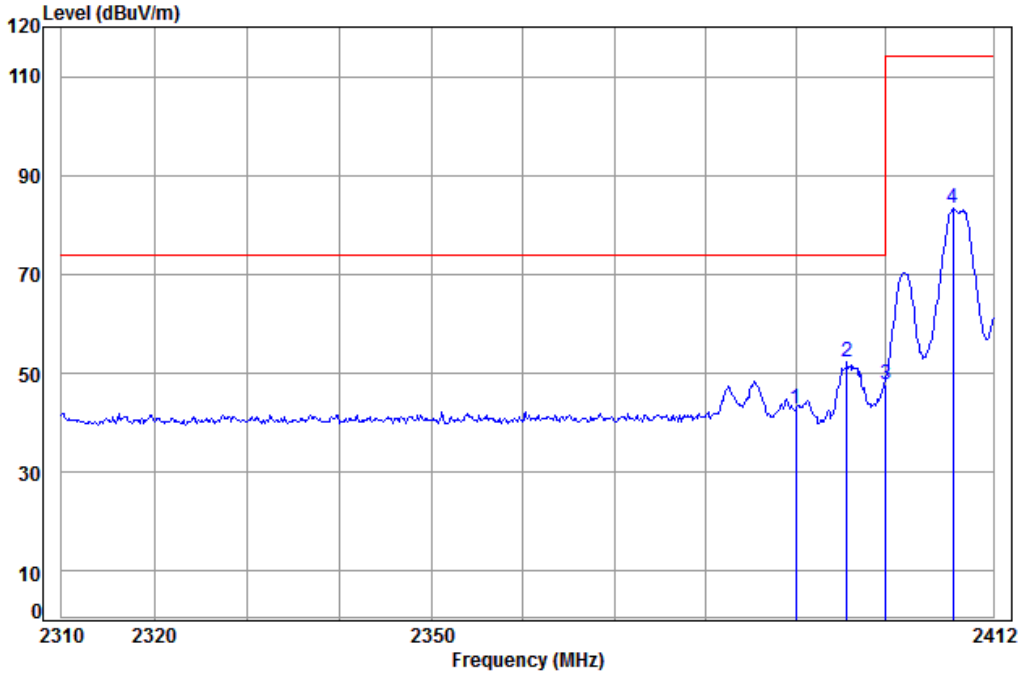


Figure 2. Above 1 GHz

Test Procedure:	a. For below 1GHz, 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. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 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. c. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. d. 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. e. 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. f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. g. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel h. Test the EUT in the lowest channel , the Highest channel i. Repeat above procedures until all frequencies measured was complete.
Instruments Used:	Refer to section 5.10 for details
Test Mode:	Transmitting with GFSK modulation. Transmitting mode
Test Results:	Pass

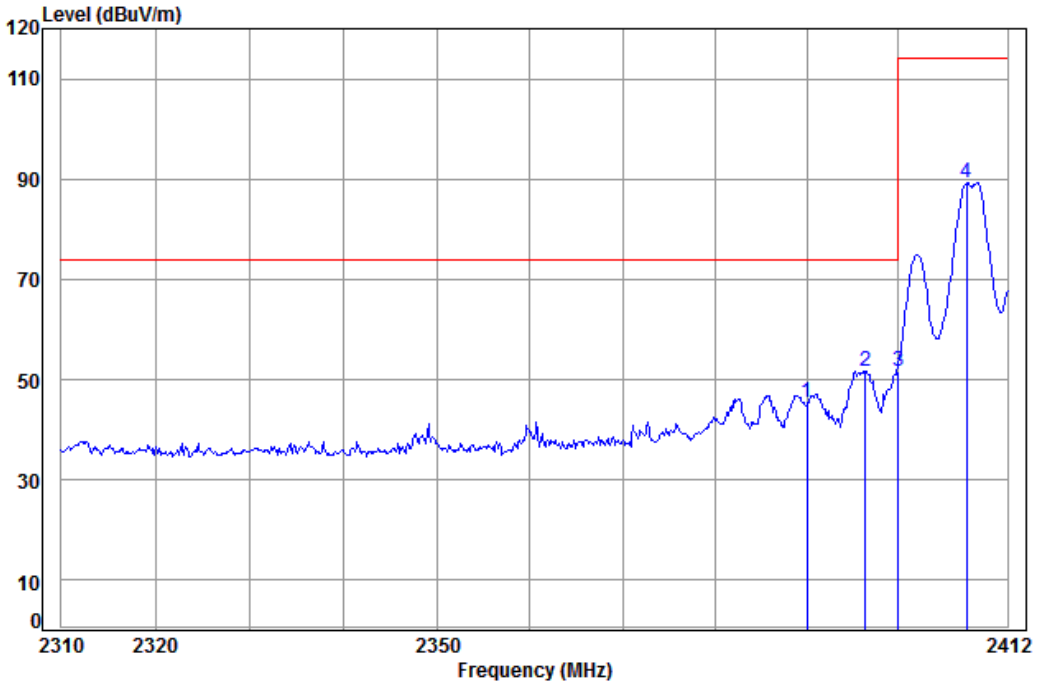
Band edge (Radiated Emission)						
Worse case mode:	Transmitting	Test channel:	Lowest	Remark:	Peak	Vertical



Condition: 3m VERTICAL
Job No: : 3307CR
Mode: : 2408 Band edge
: D

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2390.00	5.34	28.57	38.11	47.03	42.83	74.00	-31.17
2 pp	2395.69	5.34	28.59	38.11	56.42	52.24	74.00	-21.76
3	2400.00	5.34	28.60	38.11	51.96	47.79	74.00	-26.21
4	2407.52	5.35	28.64	38.11	87.34	83.22	114.00	-30.78

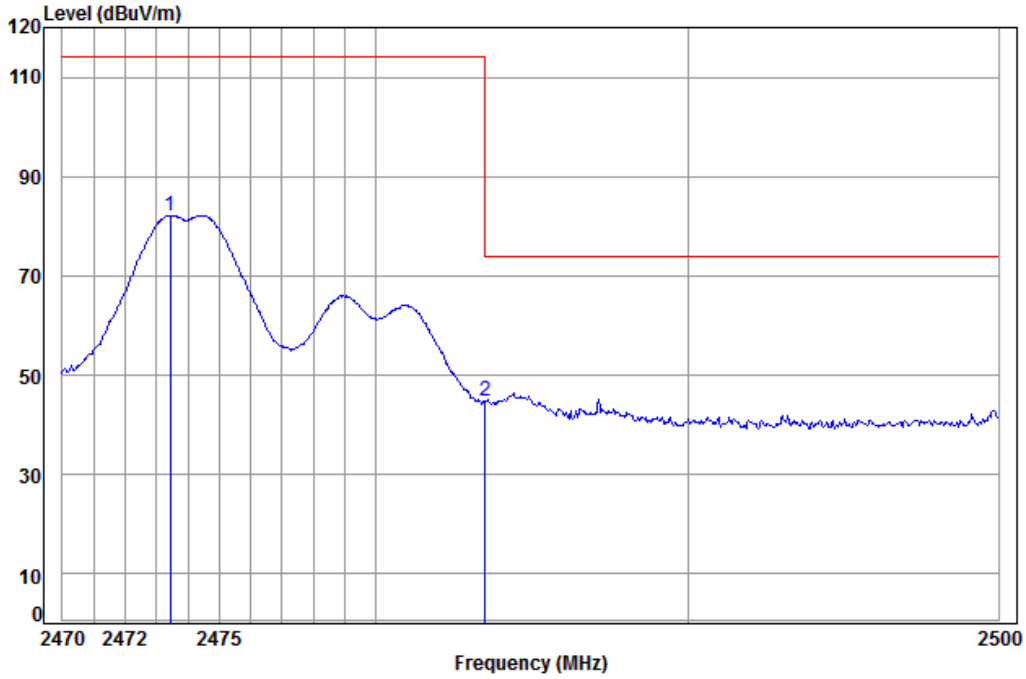
Worse case mode:	Transmitting	Test channel:	Lowest	Remark:	Peak	Horizontal



Condition: 3m Horizontal
Job No: : 3307CR
Mode: : 2408 Band edge
: D

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2390.00	5.34	28.57	38.11	49.52	45.32	74.00	-28.68
2	2396.42	5.34	28.59	38.11	55.84	51.66	74.00	-22.34
3 pp	2400.00	5.34	28.60	38.11	55.93	51.76	74.00	-22.24
4	2407.52	5.35	28.64	38.11	93.47	89.35	114.00	-24.65

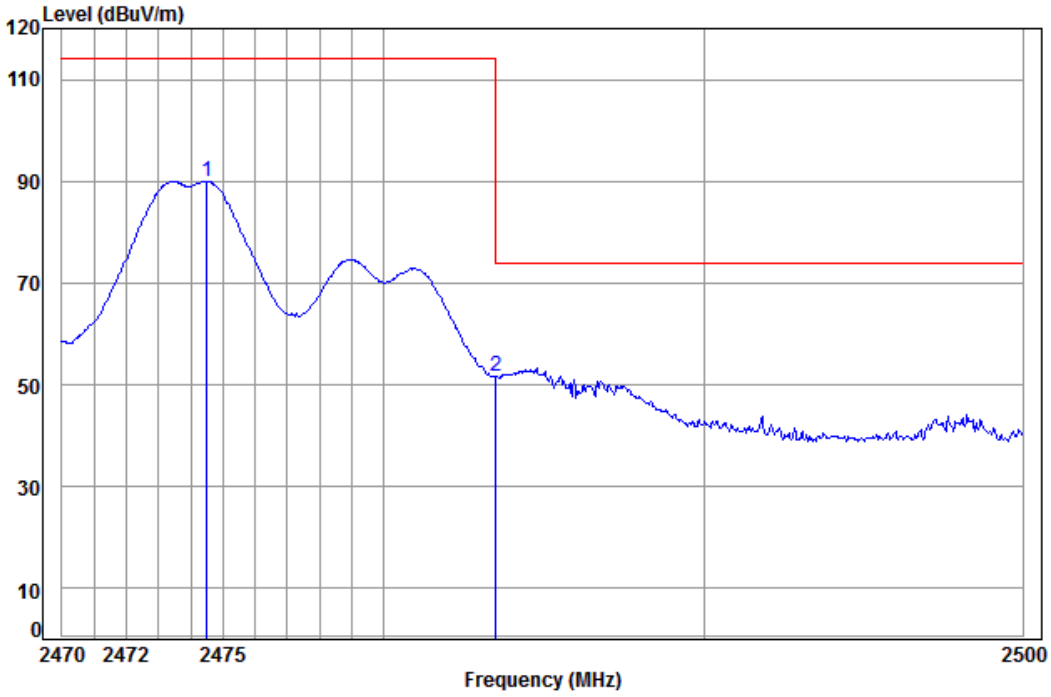
Worse case mode:	Transmitting	Test channel:	Highest	Remark:	Peak	Vertical



Condition: 3m VERTICAL
Job No: : 3307CR
Mode: : 2474 Band edge
: D

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2473.43	5.40	28.94	38.12	86.00	82.22	114.00	-31.78
2 pp	2483.50	5.41	28.98	38.12	48.44	44.71	74.00	-29.29

Worse case mode:	Transmitting	Test channel:	Highest	Remark:	Peak	Horizontal



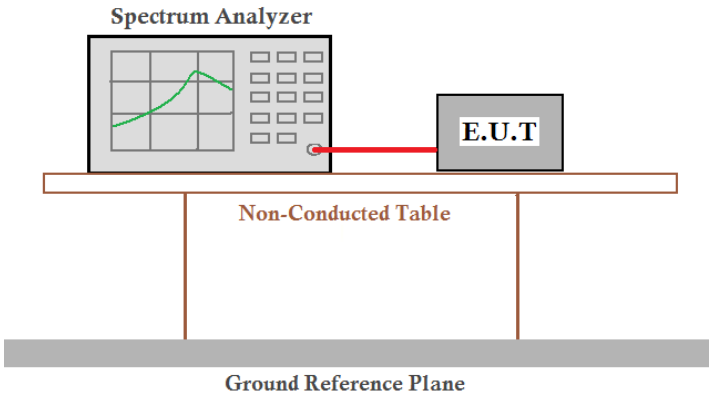
Condition: 3m HORIZONTAL
Job No: : 3307CR
Mode: : 2474 Band edge
: D

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2474.51	5.40	28.94	38.12	93.74	89.96	114.00	-24.04
2 pp	2483.50	5.41	28.98	38.12	55.34	51.61	74.00	-22.39

Note:
The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

6.5 20dB Bandwidth

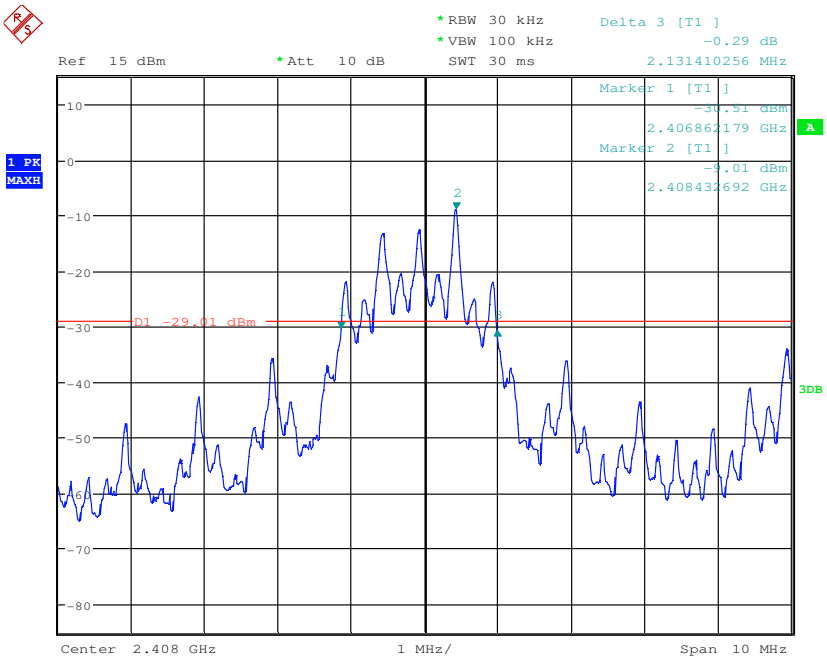
Test Requirement:	47 CFR Part 15C Section 15.215
Test Method:	ANSI C63.10:2013
Test Setup:	
Instruments Used:	Refer to section 5.10 for details
Test mode:	Transmitting mode
Limit:	N/A
Test Results:	Pass

Measurement Data

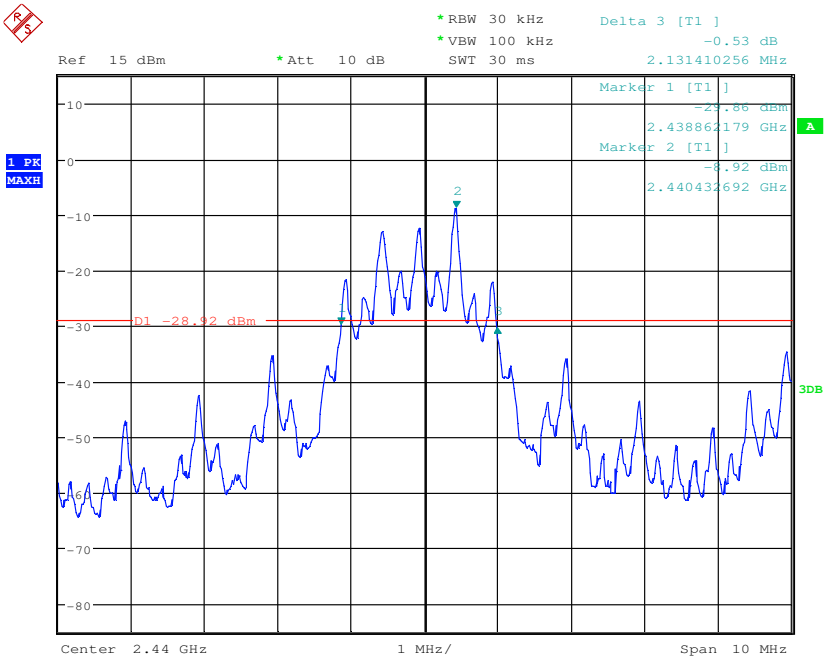
Test channel	20dB bandwidth (MHz)	Results
Lowest	2.13	Pass
Middle	2.13	Pass
Highest	2.15	Pass

Test plot as follows:

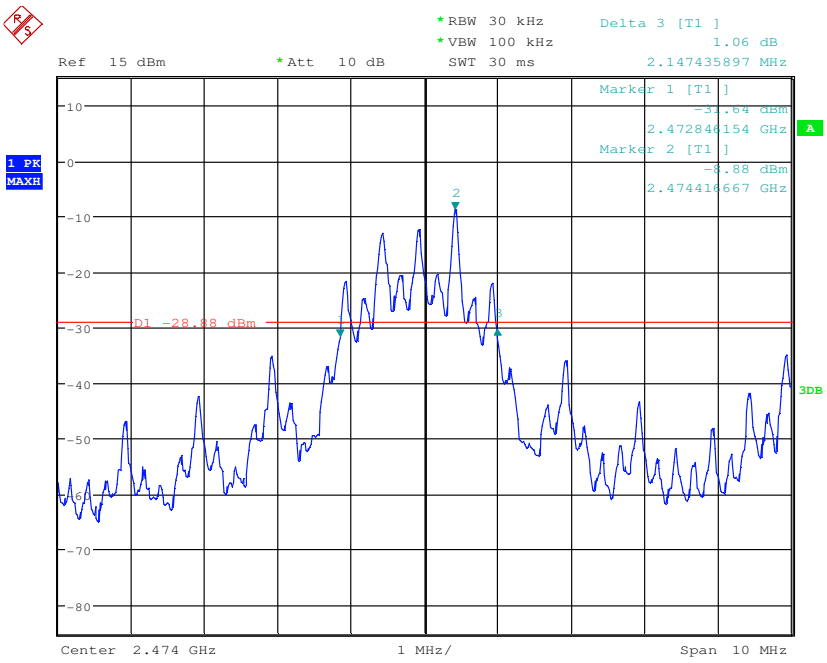
Test channel:	Lowest



Test channel:	Middle



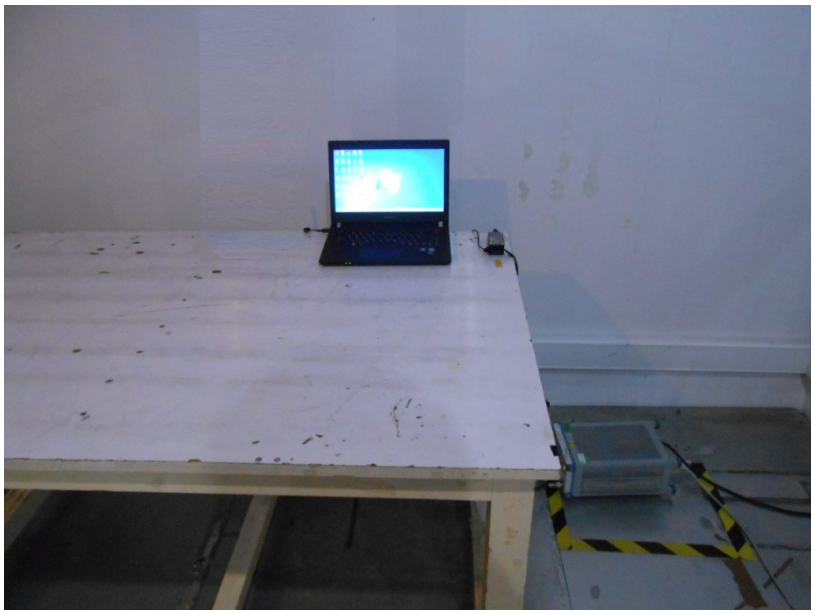
Test channel:	Highest



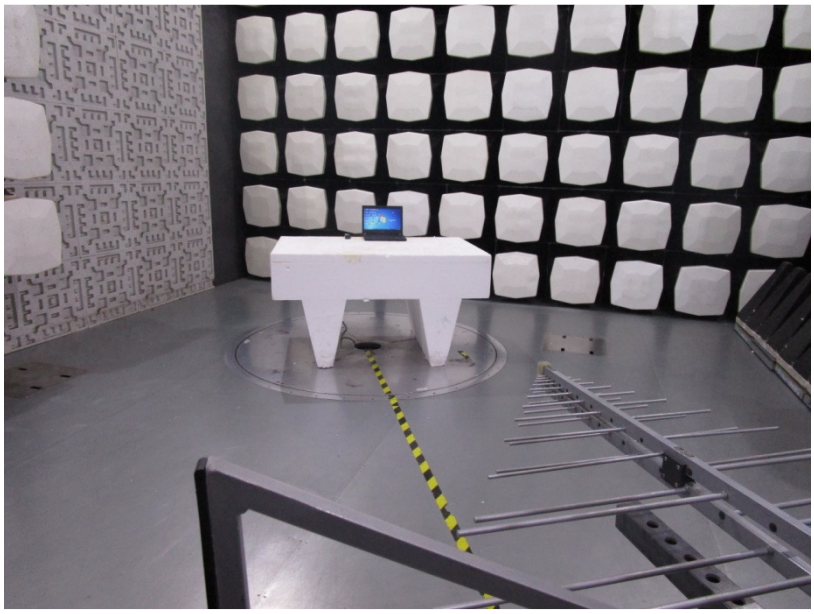
7 Photographs

Test Model No.: SL-640304-BK-US

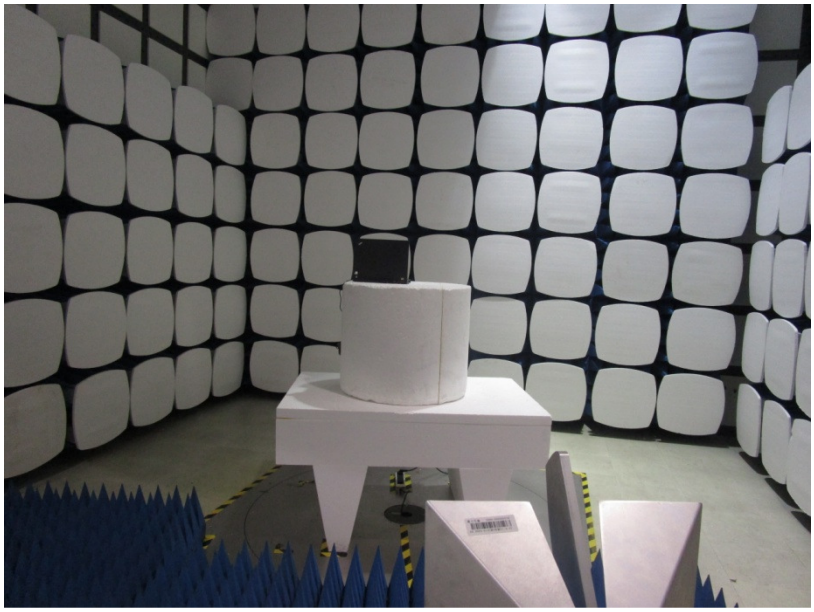
7.1 Conducted Emission Test Setup



7.2 Radiated Emission Test Setup



7.3 Radiated Spurious Emission Test Setup



7.4 EUT Constructional Details