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Report No.: SZEM180400245806

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FCC REPORT

Application No: SZEM1804002458CR
Applicant: NGSTB Company Limited
Address of Applicant: F11,BLOCK B,ZhiYuan Bldg,No. 89 Industry 8th Road Nanshan District, Shenzhen, 518067, China
Manufacturer: ABOX42 GmbH
Address of Manufacturer: 76227 Karlsruhe Germany
Factory: Aztech Communication Device (DG) Ltd
Address of Factory: Jiu Jiang Shui Village,Chang Ping Town,Dong Guan City,GUangdong Province
Product Name: Set Top Box for Smart TV/OTT/Hybrid
Model No.(EUT): M30WL.11
Trade Mark: ABOX42 GmbH
FCC ID: 2APK9-M30WL11
Standards: 47 CFR Part 15, Subpart C 15.249
Date of Receipt: 2016-12-26
Date of Test: 2016-12-26 to 2017-03-03
Date of Issue: 2018-04-08

Test Result:	PASS *
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* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Keny Xu
EMC Laboratory Manager

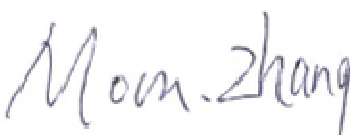
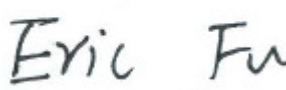
The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

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2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2018-04-08		Original

Authorized for issue by:				
				
		(Moon Zhang) /Project Engineer		
				
		(Eric Fu) /Reviewer		



3 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.249	N/A	PASS
Occupied bandwidth-20dB	47 CFR Part 15, Subpart C 15.249	ANSI C63.10 (2013) Section 6.9.2	PASS
Conducted Emission	47 CFR Part 15, Subpart C 15.249	ANSI C63.10 (2013) Section 6.2	PASS
Field Strength of the Fundamental Signal	47 CFR Part 15, Subpart C 15.249	ANSI C63.10 (2013) Section 6.5&6.6	PASS
Radiated Transmit Spurious Emissions	47 CFR Part 15, Subpart C 15.249	ANSI C63.10 (2013) Section 6.4&6.5&6.6	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15, Subpart C 15.249	ANSI C63.10 (2013) Section 6.10.5	PASS



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5 General Information

5.1 General Description of EUT

Frequency Range:	2405 MHz ~ 2480MHz
Modulation Type:	O-QPSK
Number of Channels:	16 (declared by the client)
Sample Type:	Mobile production
Antenna Type:	PCB Antenna
Antenna Gain:	0dBi
Power Supply:	AC/DC Adapter: MODEL: F18W6-050250SPAU INPUT:AC100-240V, 50/60Hz, 0.6A OUTPUT:DC 5V, 2.5A
Cable:	HDMI Cable: 150cm unsheilded LAN Cable: 200cm unsheilded

Operation Frequency each of channel					
Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2405 MHz	7	2435 MHz	13	2465 MHz
2	2410 MHz	8	2440 MHz	14	2470 MHz
3	2415 MHz	9	2445 MHz	15	2475 MHz
4	2420 MHz	10	2450 MHz	16	2480 MHz
5	2425 MHz	11	2455 MHz		
6	2430 MHz	12	2460 MHz		

Channel	Frequency
The Lowest channel(CH1)	2405MHz
The Middle channel(CH8)	2445MHz
The Highest channel(CH16)	2480MHz



5.2 Test Environment and Mode

Test Environment:	
Temperature:	25.0 °C
Humidity:	55 % RH
Atmospheric Pressure:	1010 mbar
Test Mode:	
Transmitter mode	Keep the EUT in transmitting mode with modulation.

5.3 Description of Support Units

The EUT has been tested independent unit.

5.4 Test Location

All tests were performed at:

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

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.



5.5 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 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

- **FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

- **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.

5.6 Deviation from Standards

None.

5.7 Abnormalities from Standard Conditions

None.

5.8 Other Information Requested by the Customer

None.



5.9 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	2016-10-09	2017-10-09
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	2016-09-28	2017-09-28
5	4 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T4-02	EMC0121	2016-09-28	2017-09-28
6	2 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T2-02	EMC0122	2016-09-28	2017-09-28
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	2016-10-09	2017-10-09
9	Coaxial Cable	SGS	N/A	SEM024-01	2016-07-13	2017-07-12

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	2016-10-09	2017-10-09
2	Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2016-10-09	2017-10-09
3	Signal Generator	Rohde & Schwarz	SML03	SEM006-02	2016-04-25	2017-04-25
4	Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2016-10-09	2017-10-09
5	Coaxial Cable	SGS	N/A	SEM031-02	2016-07-13	2017-07-12



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

Report No.: SZEM180400245806

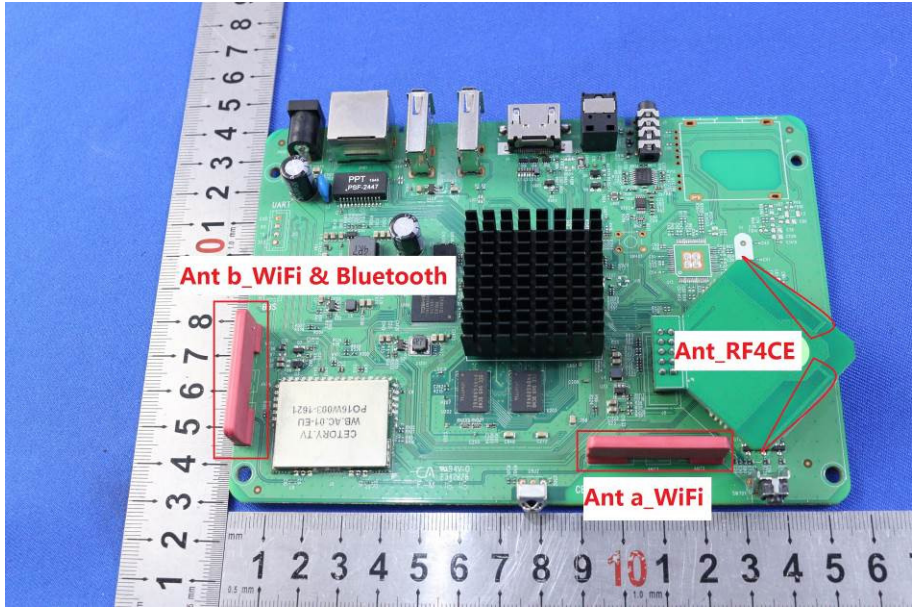
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RE in Chamber						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (yyyy-mm-dd)	Cal. Due date (yyyy-mm-dd)
1	3m Chamber	AUDIX	N/A	SEM001-02	2016-05-13	2017-05-13
2	EXA Spectrum Analyzer	Agilent Technologies Inc	N9010A	SEM004-09	2016-07-19	2017-07-19
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	2016-10-09	2017-10-09
5	Horn Antenna (1-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2015-06-14	2018-06-14
6	Horn Antenna (18-26GHz)	ETS-Lindgren	3160	SEM003-12	2014-11-24	2017-11-24
7	Horn Antenna(26GHz-40GHz)	A.H.Systems, inc.	SAS-573	SEM003-13	2015-02-12	2018-02-12
8	Low Noise Amplifier	Black Diamond Series	BDLNA-0118-352810	SEM005-05	2016-10-09	2017-10-09
9	Band filter	Amindeon	Asi 3314	SEM023-01	N/A	N/A
10	Coaxial Cable	SGS	N/A	SEM026-01	2016-07-13	2017-07-12

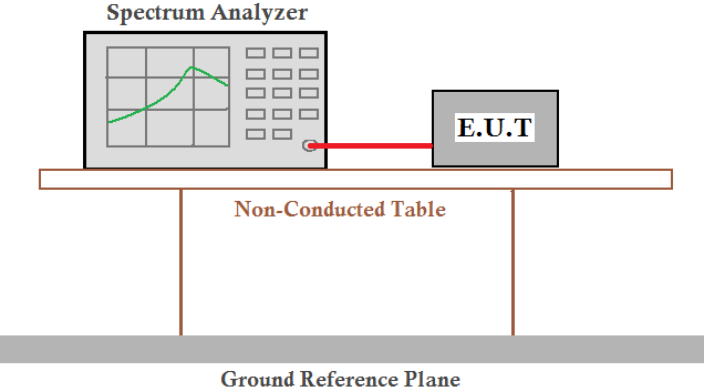
Note: The calibration interval is one year, all the instruments are valid.

6 Test Results and Measurement Data

6.1 Antenna Requirement

Standard Requirement:	47 CFR Part 15, Subpart C 15.203 & 15.249(c)
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 -20dB bandwidth

Test Requirement:	47 CFR Part 15 Subpart C 15.249
Test Method:	ANSI C63.10:2013
Test Setup:	
Instruments Used:	Refer to section 6.9.2 for details
Test Mode:	Transmitting mode
Test Results:	Pass

Measurement Data

Transmitter mode	
Test channel	Occupied bandwidth-20dB(MHz)
Lowest	2.82
Middle	2.83
Highest	2.81



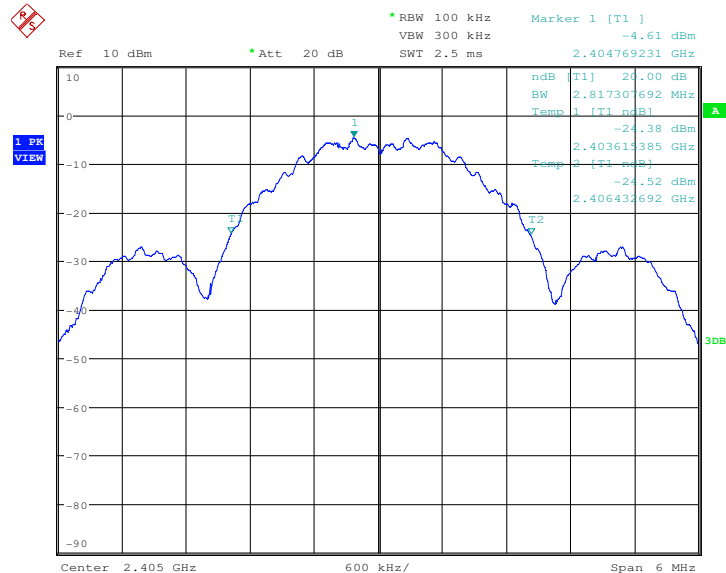
SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

Report No.: SZEM180400245806

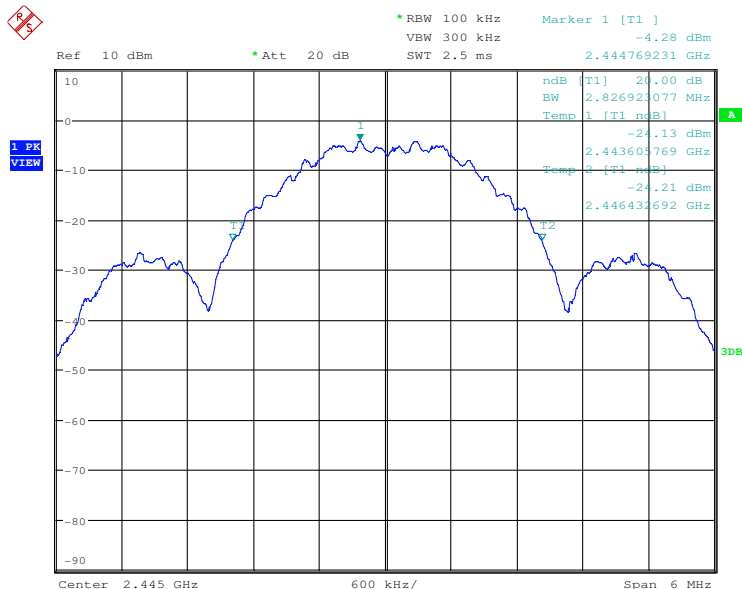
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Test plot as follows:

Test mode:	Transmitter	Test channel:	Lowest
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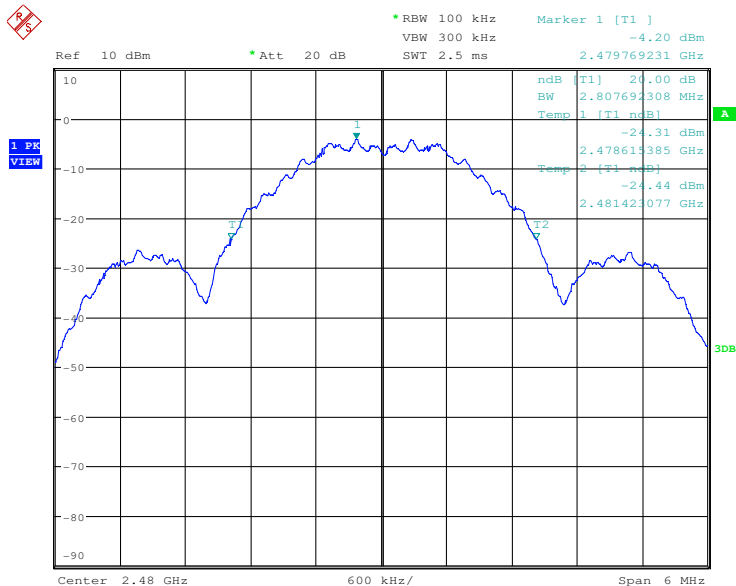


Test mode:	Transmitter	Test channel:	Middle
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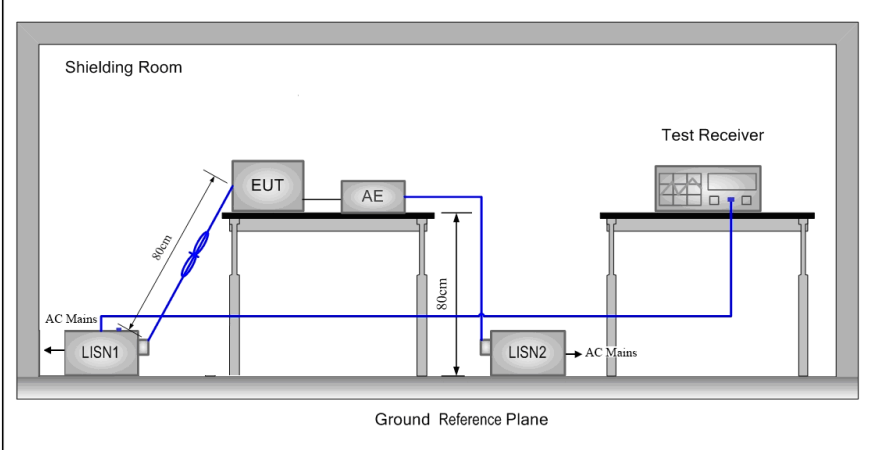
Test mode:	Transmitter	Test channel:	Highest
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6.3 Conducted Emissions

Test Requirement:	47 CFR Part 15, Subpart C 15.249		
Test Method:	ANSI C63.10 (2013) Section 6.2		
Test Frequency Range:	150KHz to 30 MHz		
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:	<ol style="list-style-type: none">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 $50\Omega/50\mu\text{H} + 5\Omega$ 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 4.10 for details
Test Mode:	Transmitter mode
Test Results:	Pass

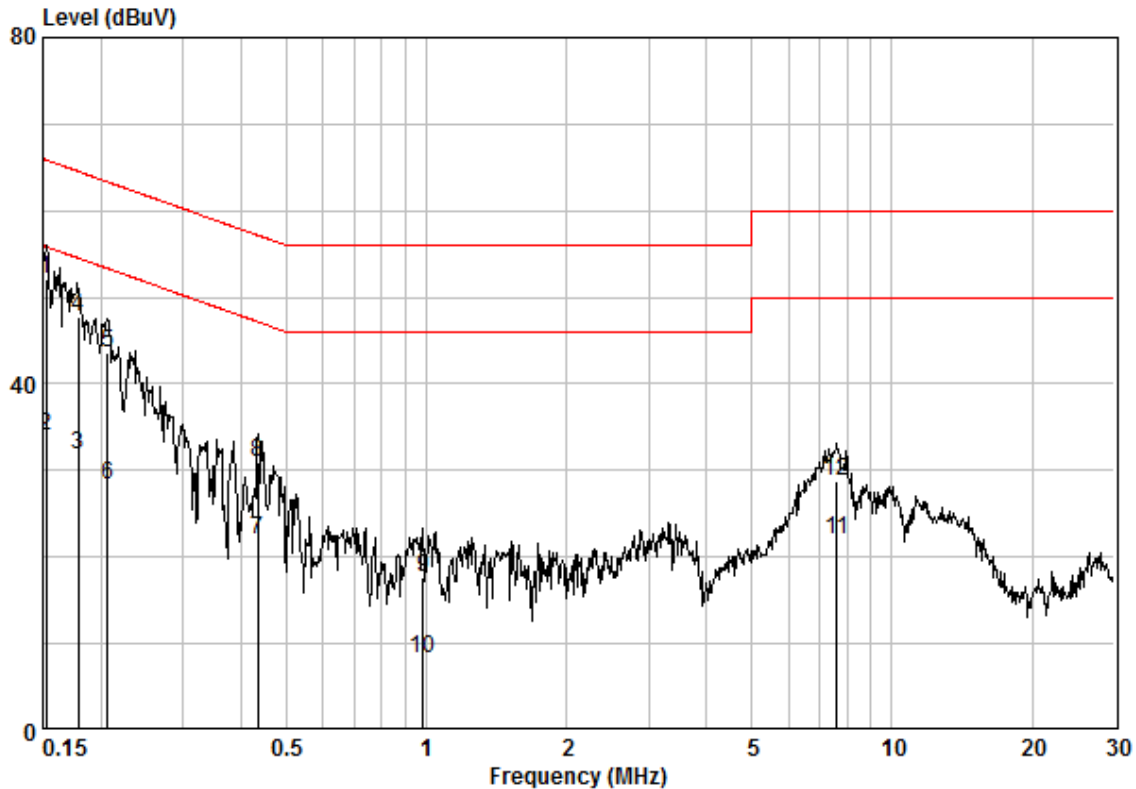
Measurement Data

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:

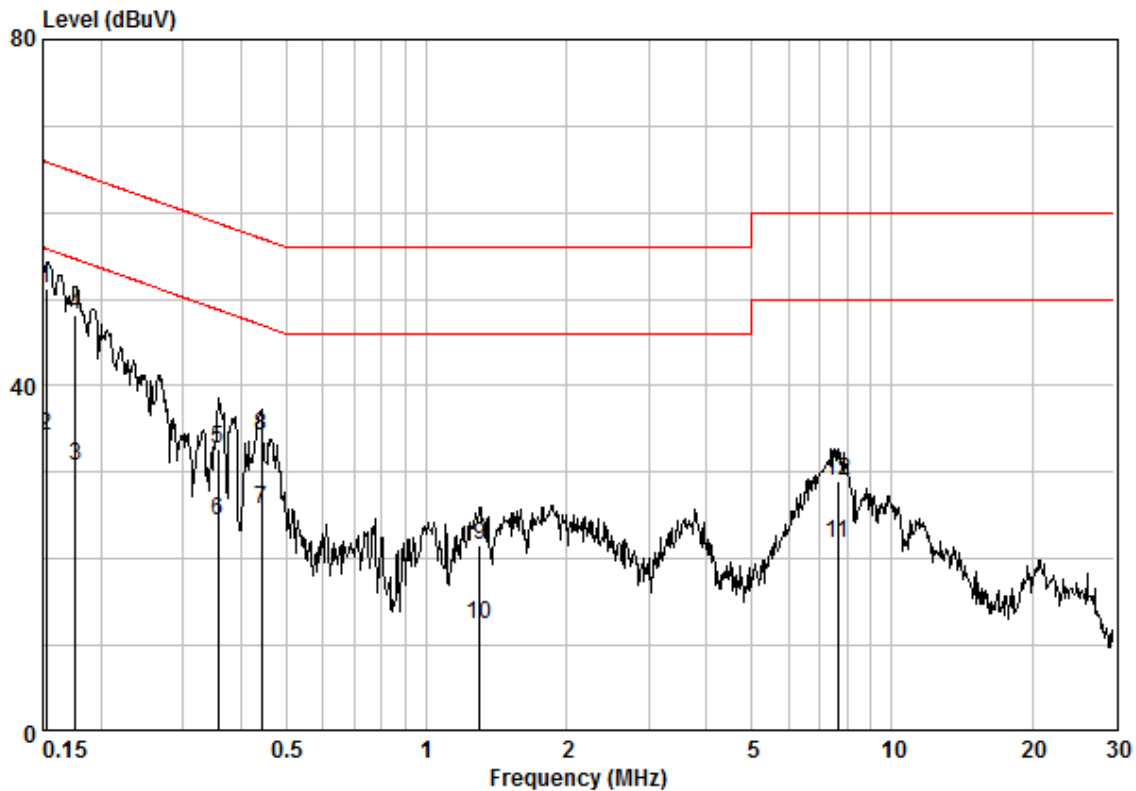


Site : Shielding Room
Condition : CE LINE
Job No. : 11090CR
Test Mode : TX mode

	Freq	Cable Loss	LISN Factor	Read Level	Limit Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.15240	0.02	9.64	42.43	52.09	65.87	-13.78	QP
2	0.15240	0.02	9.64	24.27	33.93	55.87	-21.94	AVERAGE
3	0.17866	0.02	9.64	22.17	31.83	54.55	-22.72	AVERAGE
4	0.17866	0.02	9.64	38.16	47.82	64.55	-16.73	QP
5	0.20614	0.02	9.64	33.94	43.60	63.36	-19.76	QP
6	0.20614	0.02	9.64	18.58	28.24	53.36	-25.12	AVERAGE
7	0.43511	0.02	9.64	12.28	21.94	47.15	-25.22	AVERAGE
8	0.43511	0.02	9.64	21.25	30.91	57.15	-26.24	QP
9	0.98391	0.03	9.65	8.05	17.73	56.00	-38.27	QP
10	0.98391	0.03	9.65	-1.33	8.35	46.00	-37.65	AVERAGE
11	7.606	0.09	9.80	12.05	21.94	50.00	-28.06	AVERAGE
12	7.606	0.09	9.80	18.95	28.84	60.00	-31.16	QP



Neutral Line:



Site : Shielding Room
Condition : CE NEUTRAL
Job No. : 11090CR
Test Mode : TX mode

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.15240	0.02	9.64	41.50	51.16	65.87	-14.70	QP
2	0.15240	0.02	9.64	24.55	34.21	55.87	-21.66	AVERAGE
3	0.17584	0.02	9.63	21.00	30.65	54.68	-24.03	AVERAGE
4	0.17584	0.02	9.63	38.48	48.13	64.68	-16.55	QP
5	0.35765	0.02	9.63	23.12	32.77	58.78	-26.01	QP
6	0.35765	0.02	9.63	14.84	24.49	48.78	-24.30	AVERAGE
7	0.44208	0.02	9.63	16.14	25.79	47.02	-21.23	AVERAGE
8	0.44208	0.02	9.63	24.63	34.28	57.02	-22.74	QP
9	1.303	0.03	9.64	12.01	21.68	56.00	-34.32	QP
10	1.303	0.03	9.64	2.78	12.45	46.00	-33.55	AVERAGE
11	7.646	0.09	9.79	12.01	21.88	50.00	-28.12	AVERAGE
12	7.646	0.09	9.79	19.15	29.03	60.00	-30.97	QP

Notes:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.

6.4 Radiated Spurious Emission

Test Requirement:	47 CFR Part 15, Subpart C 15.209 & 15.249 (a),(d)				
Test Method:	ANSI C63.10 (2013) Section 6.4&6.5&6.6				
Test Site:	Measurement Distance: 3m				
Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	0.009MHz-0.015MHz	Quasi-peak	200Hz	1KHz	Quasi-peak
	0.015MHz-30MHz	Quasi-peak	9kHz	30KHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	120 kHz	300KHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Peak	1MHz	10Hz	Average
Limit:	Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009MHz-0.490MHz	2400/F(kHz)	-	Quasi-peak	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	Quasi-peak	30
	1.705MHz-30MHz	30	-	Quasi-peak	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
			74.0	Peak	3
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:					

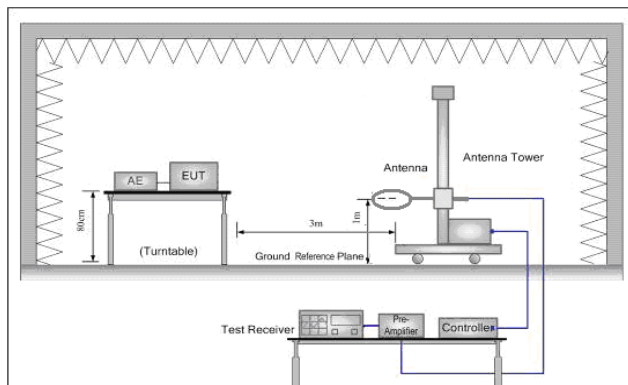


Figure 1. Below 30MHz

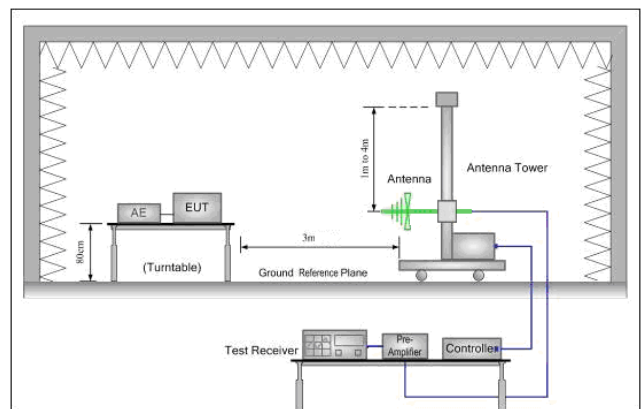


Figure 2. 30MHz to 1GHz

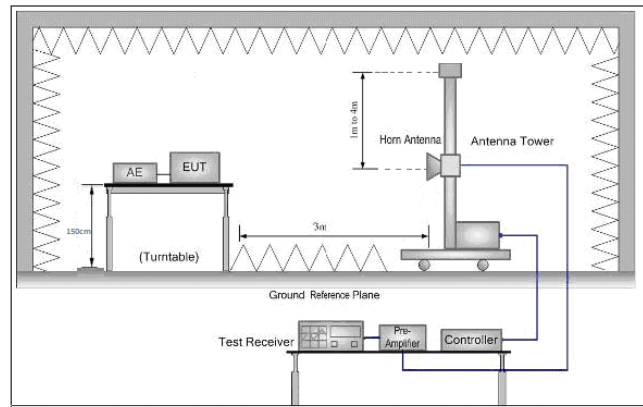


Figure 3. Above 1 GHz

Test Procedure:	<ol style="list-style-type: none"> For below 1GHz test, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. For above 1GHz test, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter full-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 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. 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. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 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 the EUT in the lowest channel, the middle channel, the Highest channel 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. Repeat above procedures until all frequencies measured was complete.
Final Test Mode:	Transmitting with modulation mode.
Instruments Used:	Refer to section 4.10 for details
Test Results:	Pass



Measurement Data

6.4.1 Field Strength Of The Fundamental Signal

Peak value:

Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2404.48	29.12	5.35	37.96	99.26	95.77	114.00	-18.23	Horizontal
2405.52	29.12	5.35	37.96	98.03	94.54	114.00	-19.46	Vertical
2445.40	29.23	5.38	37.96	99.70	96.35	114.00	-17.65	Horizontal
2445.44	29.23	5.38	37.96	96.46	93.11	114.00	-20.89	Vertical
2480.44	29.34	5.41	37.95	99.20	96.00	114.00	-18.00	Horizontal
2480.48	29.34	5.41	37.95	97.58	94.38	114.00	-19.62	Vertical

Average value:

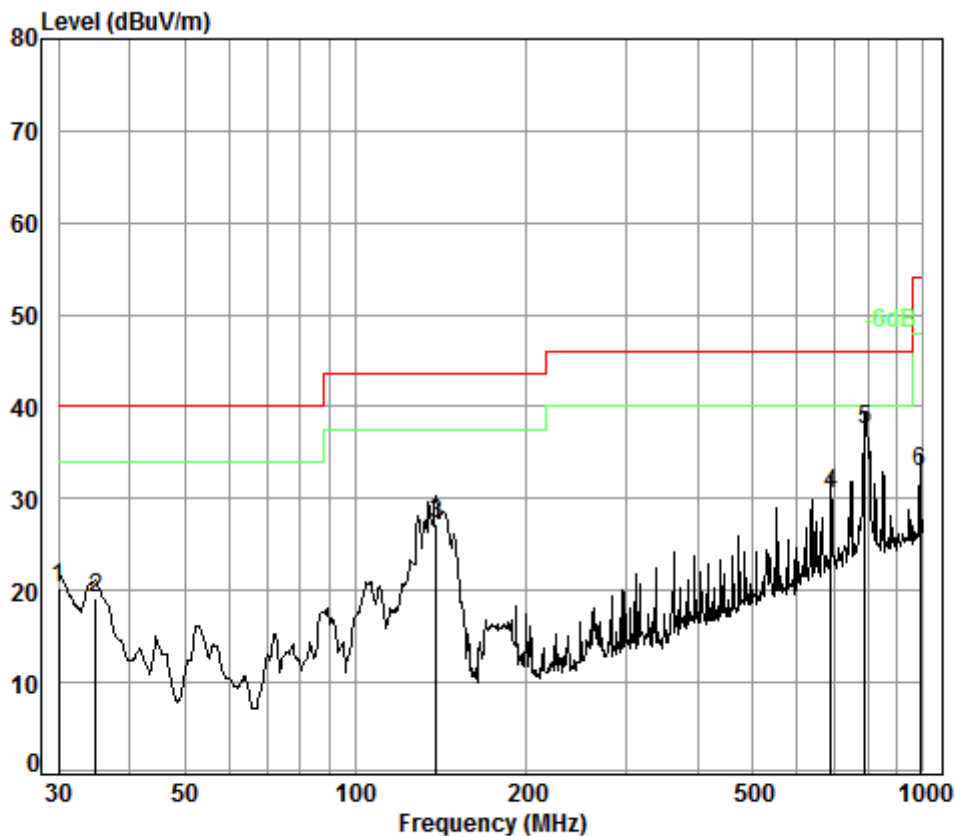
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2404.48	29.12	5.35	37.96	96.64	93.15	94.00	-0.85	Horizontal
2405.52	29.12	5.35	37.96	94.94	91.45	94.00	-2.55	Vertical
2445.40	29.23	5.38	37.96	96.83	93.48	94.00	-0.52	Horizontal
2445.44	29.23	5.38	37.96	92.85	89.50	94.00	-4.50	Vertical
2480.44	29.34	5.41	37.95	96.79	93.59	94.00	-0.41	Horizontal
2480.48	29.34	5.41	37.95	94.89	91.69	94.00	-2.31	Vertical



6.4.2 Spurious Emissions

6.4.2.1 Radiated emission below 1GHz

Test mode:	Transmitter mode	Polarization:	Vertical
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Condition: 3m VERTICAL

Job No. : 11090CR

Test mode: TX

: 2.4G

		Cable	Ant	Preamp	Read		Limit	Over
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	30.00	0.60	18.70	27.36	28.31	20.25	40.00	-19.75
2	34.88	0.60	15.97	27.34	29.87	19.10	40.00	-20.90
3	138.87	1.29	8.05	26.96	44.84	27.22	43.50	-16.28
4	687.15	2.88	21.50	27.43	33.50	30.45	46.00	-15.55
5 pp	790.62	3.18	22.06	27.31	39.61	37.54	46.00	-8.46
6	986.07	3.69	23.74	26.37	31.79	32.85	54.00	-21.15

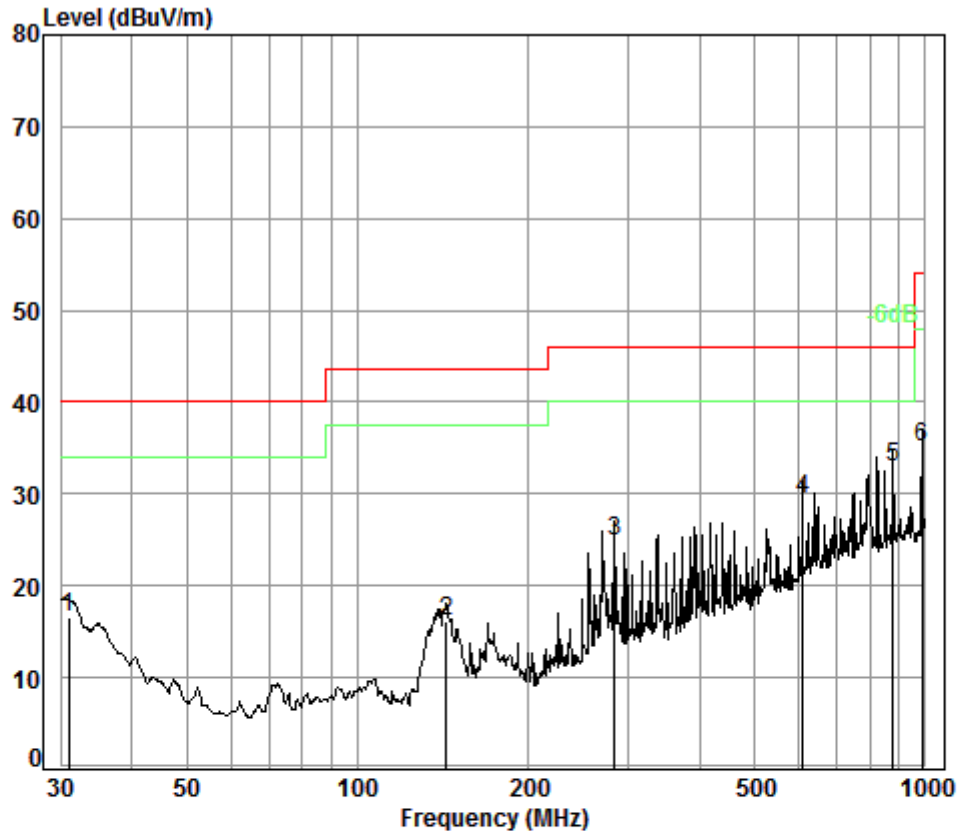


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Test mode:	Transmitter mode	Polarization:	Horizontal
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Condition: 3m HORIZONTAL

Job No. : 11090CR

Test mode: TX

: 2.4G

	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	30.96	0.60	18.16	27.35	25.18	16.59	40.00	-23.41
2	143.33	1.30	8.40	26.94	33.27	16.03	43.50	-27.47
3	283.98	1.83	13.20	26.44	36.35	24.94	46.00	-21.06
4	607.79	2.72	20.02	27.53	34.17	29.38	46.00	-16.62
5 pp	878.32	3.52	23.03	26.89	33.26	32.92	46.00	-13.08
6	986.07	3.69	23.74	26.37	33.94	35.00	54.00	-19.00



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6.4.2.2 Transmitter emission above 1GHz

Test mode:		Transmitter		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			
3765.116	32.97	7.73	37.98	45.07	47.79	74.00	-26.21	Vertical			
4810.000	34.17	8.88	38.40	42.42	47.07	74.00	-26.93	Vertical			
5803.188	34.59	10.01	38.34	44.10	50.36	74.00	-23.64	Vertical			
7215.000	36.41	10.68	37.11	42.03	52.01	74.00	-21.99	Vertical			
9620.000	37.52	12.51	35.09	38.11	53.05	74.00	-20.95	Vertical			
12015.620	38.61	14.55	35.64	36.05	53.57	74.00	-20.43	Vertical			
3497.281	32.20	7.63	37.95	44.86	46.74	74.00	-27.26	Horizontal			
4810.000	34.17	8.88	38.40	42.11	46.76	74.00	-27.24	Horizontal			
5769.698	34.57	9.91	38.35	45.00	51.13	74.00	-22.87	Horizontal			
7215.000	36.41	10.68	37.11	42.11	52.09	74.00	-21.91	Horizontal			
9620.000	37.52	12.51	35.09	38.24	53.18	74.00	-20.82	Horizontal			
12155.510	38.69	14.43	35.97	36.61	53.76	74.00	-20.24	Horizontal			

Test mode:		Transmitter		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		
3786.970	33.03	7.74	37.98	44.64	47.43	74.00	-26.57	Vertical		
4880.000	34.29	8.97	38.44	42.60	47.42	74.00	-26.58	Vertical		
5964.939	34.68	10.46	38.31	43.48	50.31	74.00	-23.69	Vertical		
7320.000	36.37	10.72	37.01	41.79	51.87	74.00	-22.13	Vertical		
9760.000	37.55	12.58	35.02	37.59	52.70	74.00	-21.30	Vertical		
11471.960	38.08	13.99	35.49	36.52	53.10	74.00	-20.90	Vertical		
3589.562	32.46	7.66	37.96	44.06	46.22	74.00	-27.78	Horizontal		
4880.000	34.29	8.97	38.44	42.66	47.48	74.00	-26.52	Horizontal		
5964.939	34.68	10.46	38.31	43.60	50.43	74.00	-23.57	Horizontal		
7320.000	36.37	10.72	37.01	41.58	51.66	74.00	-22.34	Horizontal		
9760.000	37.55	12.58	35.02	37.59	52.70	74.00	-21.30	Horizontal		
12137.940	38.68	14.45	35.93	36.21	53.41	74.00	-20.59	Horizontal		



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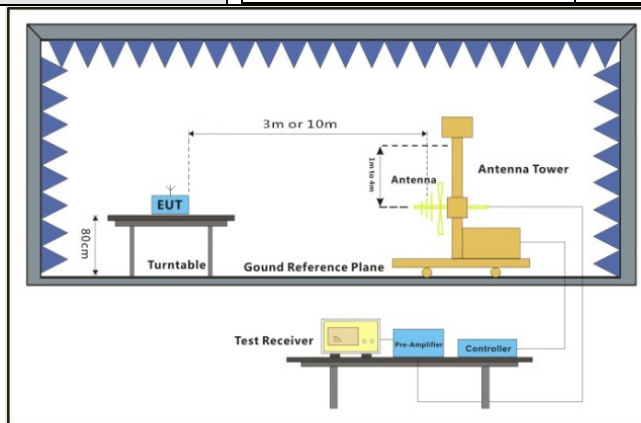
Test mode:		Transmitter		Test channel:		Highest		Remark:	Peak
Frequency (MHz)	Antenna Factor (dB/m)	Cable loss (dB)	Preamplifier Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	
3599.965	32.50	7.67	37.96	44.65	46.86	74.00	-27.14	Vertical	
4960.000	34.43	9.09	38.48	43.35	48.39	74.00	-25.61	Vertical	
5990.888	34.69	10.53	38.30	43.32	50.24	74.00	-23.76	Vertical	
7440.000	36.32	10.77	36.90	41.63	51.82	74.00	-22.18	Vertical	
9920.000	37.58	12.67	34.94	36.82	52.13	74.00	-21.87	Vertical	
12297.040	38.78	14.31	36.31	36.57	53.35	74.00	-20.65	Vertical	
3808.951	33.09	7.74	37.98	45.33	48.18	74.00	-25.82	Horizontal	
4960.000	34.43	9.09	38.48	42.52	47.56	74.00	-26.44	Horizontal	
5794.797	34.58	9.98	38.34	44.19	50.41	74.00	-23.59	Horizontal	
7440.000	36.32	10.77	36.90	41.62	51.81	74.00	-22.19	Horizontal	
9920.000	37.58	12.67	34.94	36.84	52.15	74.00	-21.85	Horizontal	
12085.370	38.65	14.49	35.80	35.76	53.10	74.00	-20.90	Horizontal	

Remark:

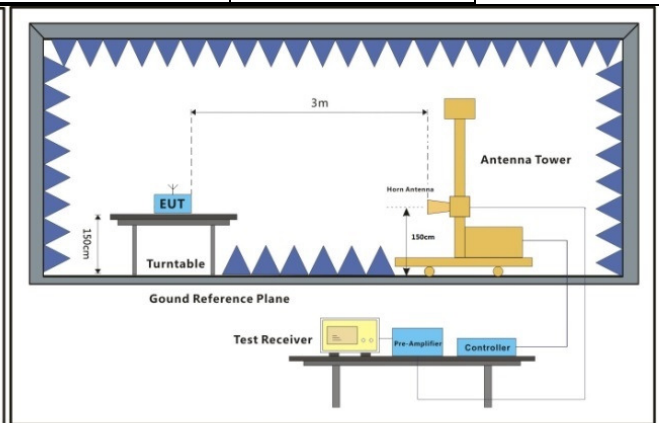
- 1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor
- 2) Scan from 9kHz to 25GHz, The disturbance above 13GHz 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.

6.5 Restricted bands around fundamental frequency

Test Requirement:	47 CFR Part 15, Subpart C 15.205 & 15.249(d) & 15.209		
Test Method:	ANSI C63.10 (2013) Section 6.10.5		
Test Site:	Measurement Distance: 3m		
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 field strength limits, whichever is less stringent.		
	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



30MHz-1GHz



Above 1GHz



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Test Procedure:	<ul style="list-style-type: none">a. The EUT was placed on the top of a rotating table 0.8/1.5 meters above the ground at a 3 meter semi-anechoic/full-anechoic chamber. 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. 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 channelg. Test the EUT in the lowest channel , the Highest channelh. 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.i. Repeat above procedures until all frequencies measured was complete.
Instruments Used:	Refer to section 4.10 for details
Final Test Mode:	Transmitting with modulation mode.
Test Results:	Pass

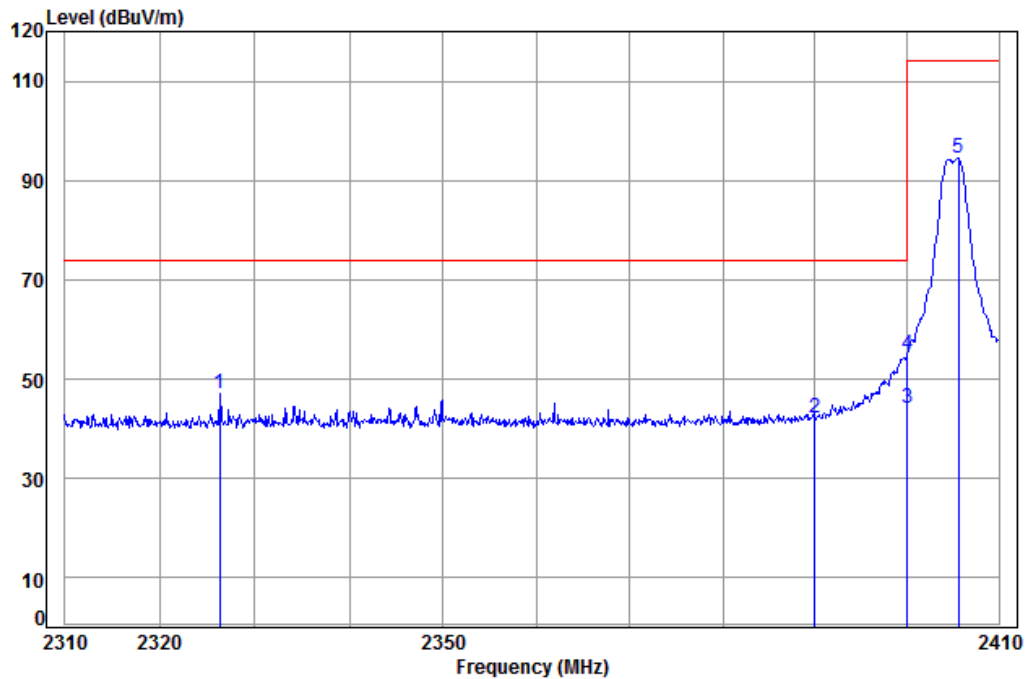


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Worse case mode:		Test channel:	Lowest	Remark:	Peak
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Condition: 3m VERTICAL

Job No: : 11090CR

Mode: : 2405 Bandedge

: Zigbee

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2326.308	5.29	28.88	37.97	50.73	46.93	74.00	-27.07
2	2390.000	5.34	29.08	37.96	45.80	42.26	74.00	-31.74
3 pp	2400.000	5.34	29.11	37.96	47.59	44.08	54.00	-9.92 Average
4 pk	2400.000	5.34	29.11	37.96	58.43	54.92	74.00	-19.08 Peak
5	2405.612	5.35	29.12	37.96	97.97	94.48	114.00	-19.52

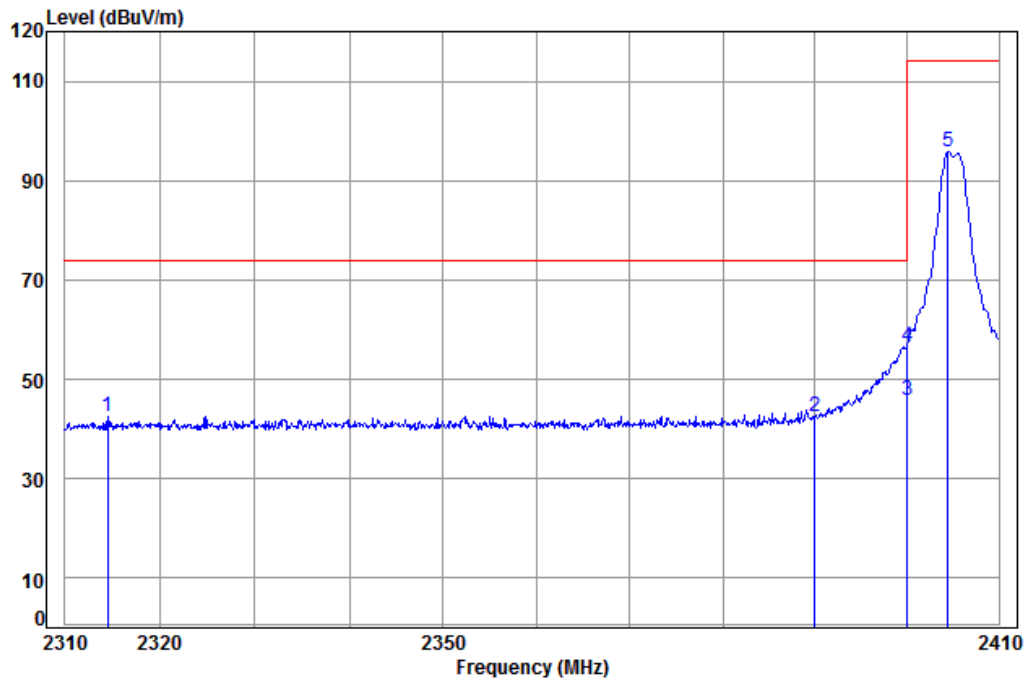


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Worse case mode:		Test channel:	Lowest	Remark:	Peak
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Condition: 3m HORIZONTAL

Job No: : 11090CR

Mode: : 2405 Bandedge

: Zigbee

	Freq	Cable Loss	Ant Factor	Preamplifier Factor	Read Level	Limit Level	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2314.508	5.28	28.85	37.97	46.38	42.54	74.00	-31.46
2	2390.000	5.34	29.08	37.96	45.92	42.38	74.00	-31.62
3 pp	2400.000	5.34	29.11	37.96	49.25	45.74	54.00	-8.26 Average
4 pk	2400.000	5.34	29.11	37.96	60.24	56.73	74.00	-17.27 Peak
5	2404.491	5.35	29.12	37.96	99.19	95.70	114.00	-18.30

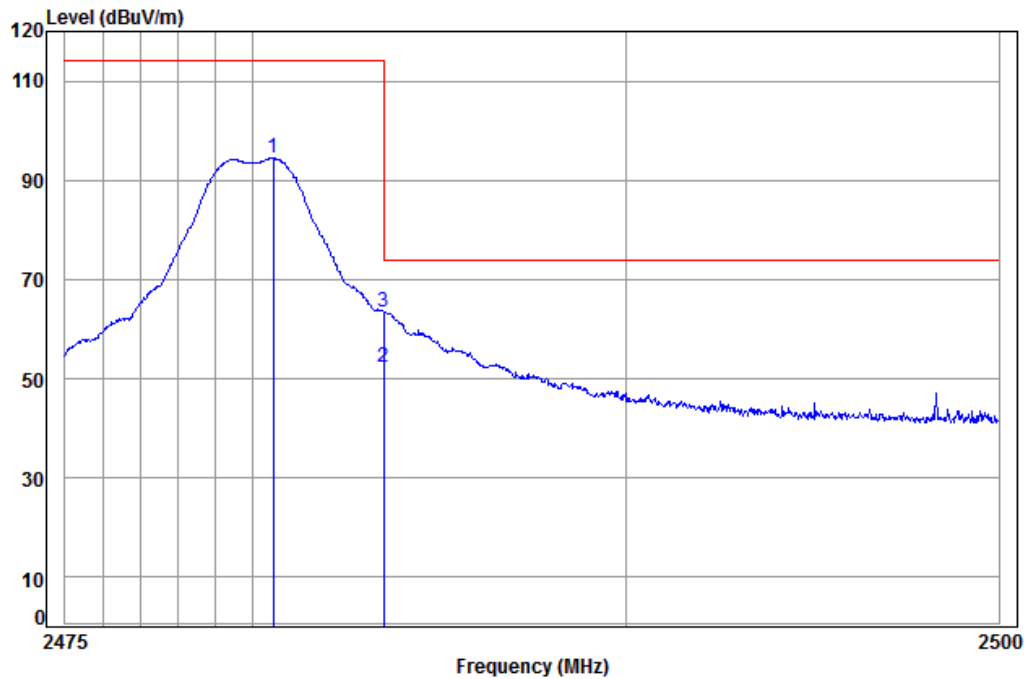


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Worse case mode:		Test channel:	Highest	Remark:	Peak
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Condition: 3m VERTICAL

Job No: : 11090CR

Mode: : 2480 Bandedge

: Zigbee

	Freq	Cable Loss	Ant Factor	Preamplifier Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2480.553	5.41	29.34	37.95	97.59	94.39	114.00	-19.61	
2 pp	2483.500	5.41	29.35	37.95	55.59	52.40	54.00	-1.60	Average
3 pk	2483.500	5.41	29.35	37.95	66.76	63.57	74.00	-10.43	Peak

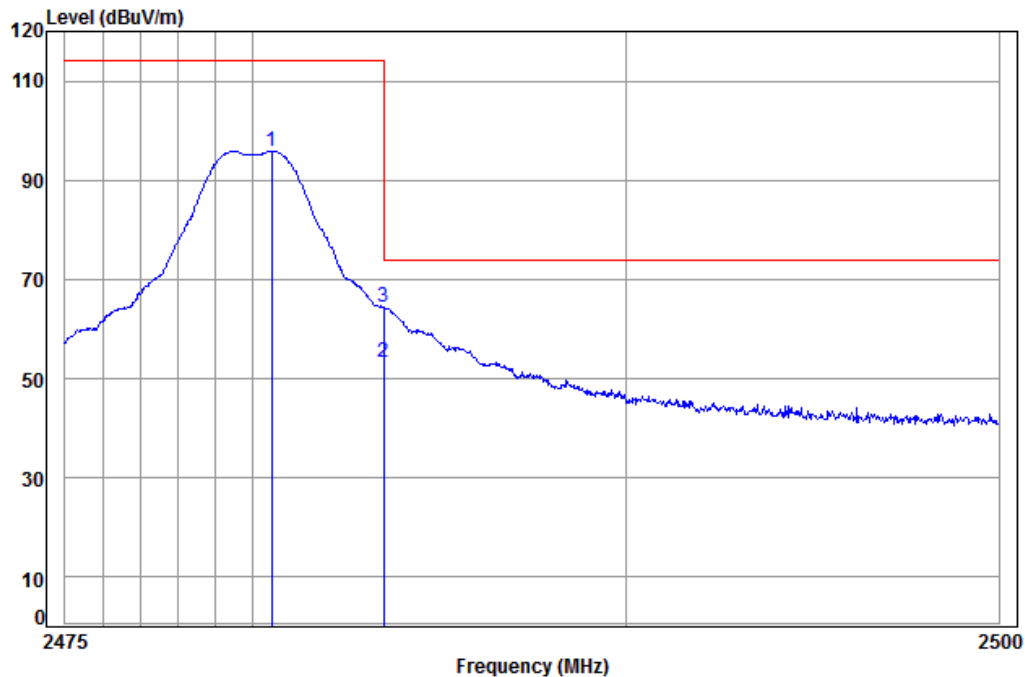


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Worse case mode:		Test channel:	Highest	Remark:	Peak
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Condition: 3m HORIZONTAL

Job No: : 11090CR

Mode: : 2480 Bandedge

: Zigbee

		Cable	Ant	Preamp	Read	Limit	Over	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2480.503	5.41	29.34	37.95	99.06	95.86	114.00	-18.14
2 pp	2483.500	5.41	29.35	37.95	56.46	53.27	54.00	-0.73 Average
3 pk	2483.500	5.41	29.35	37.95	67.70	64.51	74.00	-9.49 Peak

Note:

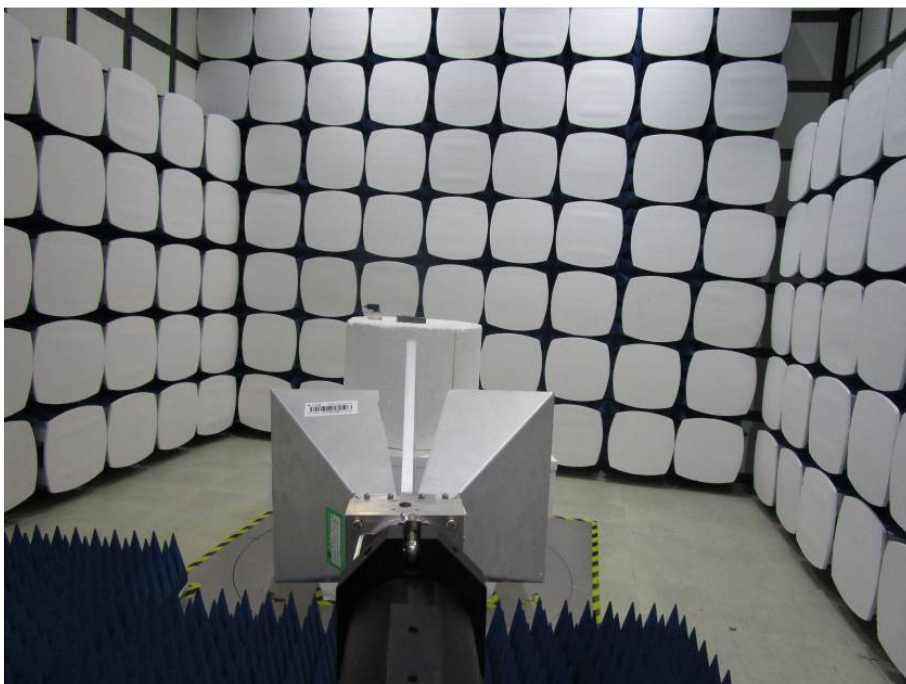
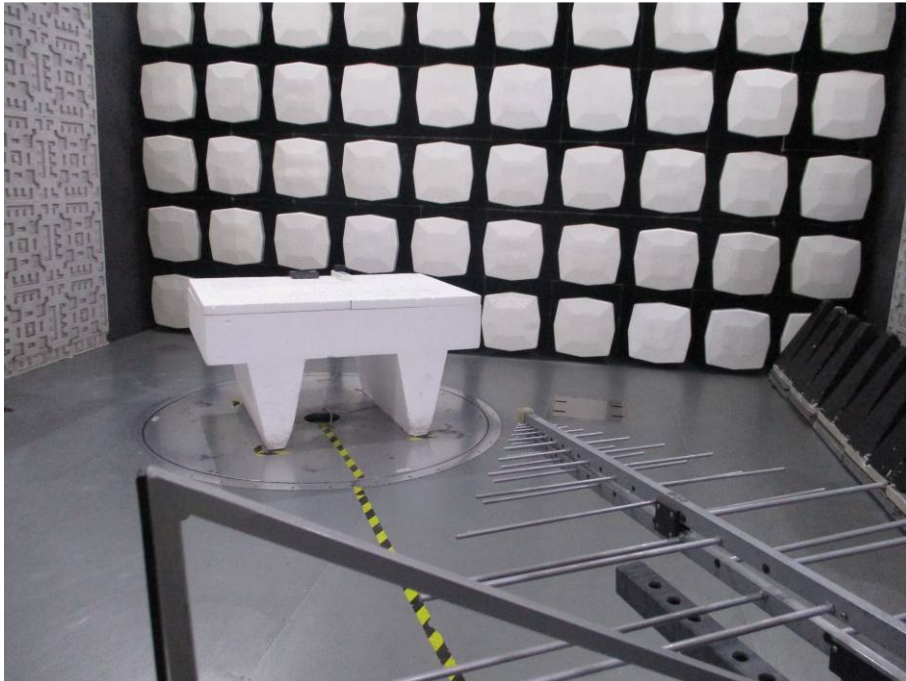
The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

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

7 Photographs

Test model No.: M30WL.11

7.1 Radiated Spurious Emission Test Setup



7.2 Conducted Emission Test Setup



7.3 EUT Constructional Details

Refer to Appendix A - Photographs of EUT Constructional Details for SZEM1804002458CR.

- End of the Report -