



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

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Report No.: SZEM180400245805

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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 15.247
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

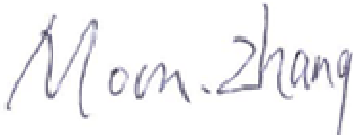
The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant 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 15.247	N/A	PASS
Conducted Emission	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.8	PASS
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.5	PASS
6dB Occupied Bandwidth	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.8.1	PASS
Power Spectral Density	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.10.2	PASS
Band-Edge for RF Transmit Conducted Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.6	PASS
Spurious RF Transmit Conducted Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.8	PASS
Radiated Transmit Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.10.4	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.10.5	PASS



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5 General Information

5.1 General Description of EUT

Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	Bluetooth 4.0 dual
	This test report is for BLE mode.
Modulation Type:	GFSK
Number of Channel:	40
Sample Type:	Mobile production
Antenna Type:	Embedded Antenna
Antenna Gain:	5dBi
Power Supply:	AC/DC Adapter: MODEL: F18W6-050250SPA INPUT:AC100-240V, 50/60Hz, 0.6A OUTPUT:DC 5V, 2.5A
Cable:	HDMI Cable: 150cm unsheilded LAN Cable: 200cm unsheilded



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Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	11	2422MHz	21	2442MHz	31	2462MHz
2	2404MHz	12	2424MHz	22	2444MHz	32	2464MHz
3	2406MHz	13	2426MHz	23	2446MHz	33	2466MHz
4	2408MHz	14	2428MHz	24	2448MHz	34	2468MHz
5	2410MHz	15	2430MHz	25	2450MHz	35	2470MHz
6	2412MHz	16	2432MHz	26	2452MHz	36	2472MHz
7	2414MHz	17	2434MHz	27	2454MHz	37	2474MHz
8	2416MHz	18	2436MHz	28	2456MHz	38	2476MHz
9	2418MHz	19	2438MHz	29	2458MHz	39	2478MHz
10	2420MHz	20	2440MHz	30	2460MHz	40	2480MHz

Channel	Frequency
The Lowest channel	2402MHz
The Middle channel	2440MHz
The Highest channel	2480MHz



5.2 Test Environment

Operating Environment:	
Temperature:	25.0 °C
Humidity:	55 % RH
Atmospheric Pressure:	1010 mbar

5.3 Description of Support Units

The EUT was 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 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Duty cycle	0.37%
2	Total RF power, conducted	0.75dB
3	RF power density, conducted	2.84dB
4	Spurious emissions, conducted	0.75dB
5	Radiated Spurious emission test	4.5dB (30MHz-1GHz)
		4.8dB (1GHz-25GHz)
6	Temperature test	1 °C
7	Humidity test	3%
8	DC and low frequency voltages	0.5%



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 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.

5.7 Deviation from Standards

None.

5.8 Abnormalities from Standard Conditions

None.

5.9 Other Information Requested by the Customer

None.



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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	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



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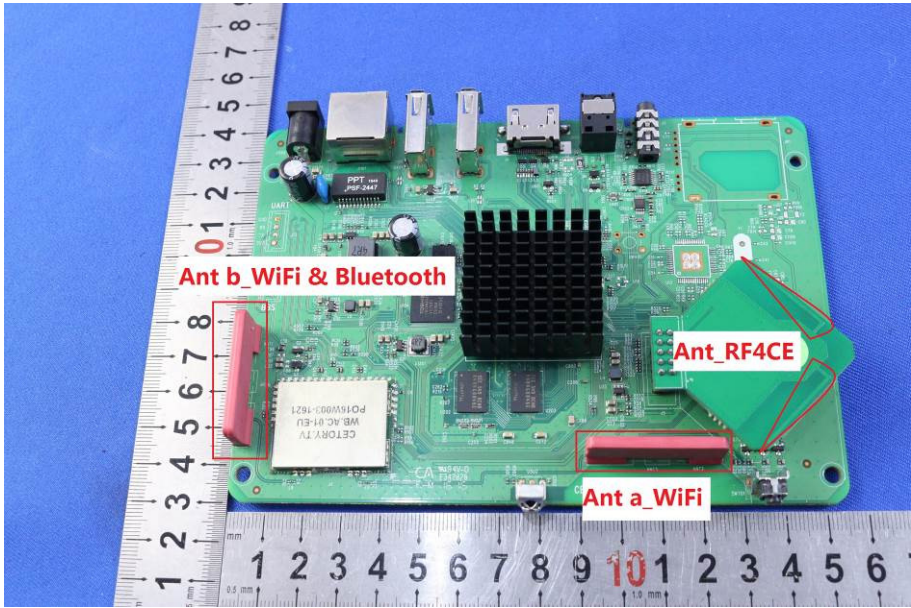
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RE in Chamber						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (yyyy-mm-dd)	Cal. Due date (yyyy-mm-dd)
1	3m Chamber	AUDIX	N/A	SEM001-02	2016-05-13	2017-05-13
2	EXA Spectrum Analyzer	Agilent Technologies Inc	N9010A	SEM004-09	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

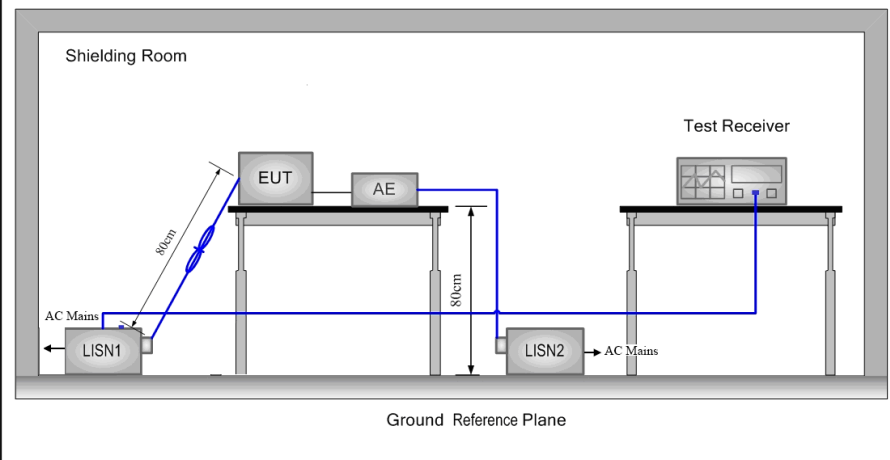
6.1 Antenna Requirement

Standard Requirement:	47 CFR Part 15, Subpart C 15.203 & 15.247(c)
EUT Antenna:	
The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 5dBi.	



6.2 Conducted Emissions

Test Requirement:	47 CFR Part 15, Subpart C 15.247(d)		
Test Method:	ANSI C63.10 (2013) Section 7.8.8		
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 $50\Omega/50\mu\text{H} + 5\Omega$ 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 5.10 for details
Test Mode:	Transmitting with GFSK modulation Transmitting 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.

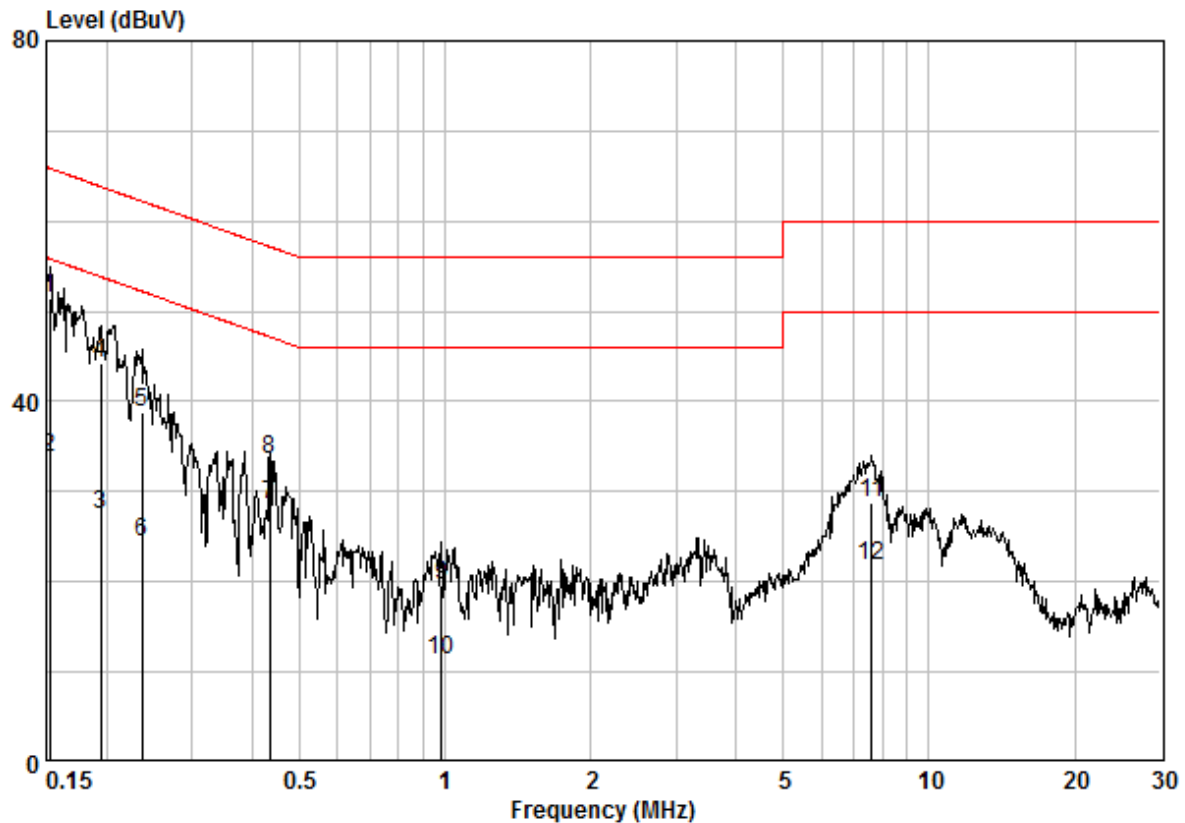


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Live Line:

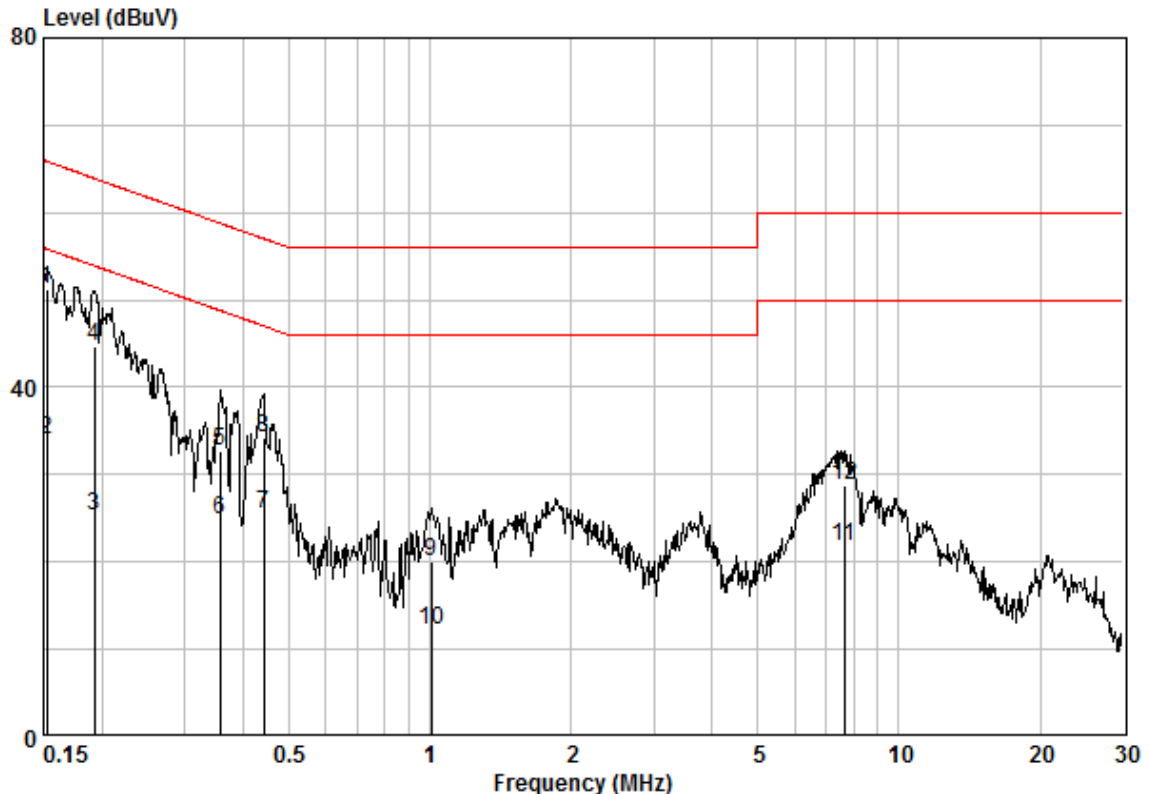


Site : Shielding Room
Condition : CE LINE
Job No. : 11090CR
Test Mode : TX mode

	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	41.80	51.46	65.87	-14.41	QP
2	0.15240	0.02	9.64	24.02	33.68	55.87	-22.19	AVERAGE
3	0.19447	0.02	9.64	17.87	27.53	53.84	-26.31	AVERAGE
4	0.19447	0.02	9.64	34.60	44.26	63.84	-19.59	QP
5	0.23658	0.02	9.64	29.20	38.86	62.22	-23.35	QP
6	0.23658	0.02	9.64	14.67	24.33	52.22	-27.89	AVERAGE
7	0.43511	0.02	9.64	18.95	28.61	47.15	-18.54	AVERAGE
8	0.43511	0.02	9.64	24.01	33.67	57.15	-23.48	QP
9	0.98391	0.03	9.65	9.99	19.67	56.00	-36.33	QP
10	0.98391	0.03	9.65	1.75	11.43	46.00	-34.57	AVERAGE
11	7.606	0.09	9.80	18.99	28.88	60.00	-31.12	QP
12	7.606	0.09	9.80	11.83	21.73	50.00	-28.27	AVERAGE



Neutral Line:



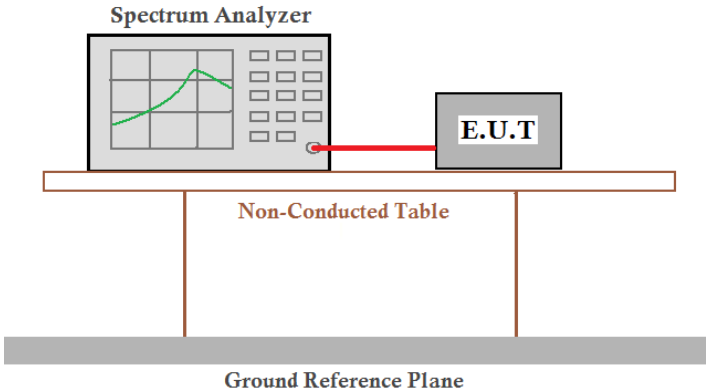
Site : Shielding Room
Condition : CE NEUTRAL
Job No. : 11090CR
Test Mode : TX mode

	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	41.67	51.33	65.87	-14.54	QP
2	0.15240	0.02	9.64	24.33	33.99	55.87	-21.88	AVERAGE
3	0.19242	0.02	9.63	15.62	25.27	53.93	-28.66	AVERAGE
4	0.19242	0.02	9.63	35.13	44.78	63.93	-19.15	QP
5	0.35765	0.02	9.63	23.06	32.71	58.78	-26.07	QP
6	0.35765	0.02	9.63	15.21	24.86	48.78	-23.92	AVERAGE
7	0.44208	0.02	9.63	15.93	25.58	47.02	-21.45	AVERAGE
8	0.44208	0.02	9.63	24.49	34.14	57.02	-22.89	QP
9	1.005	0.03	9.64	10.49	20.16	56.00	-35.84	QP
10	1.005	0.03	9.64	2.56	12.23	46.00	-33.77	AVERAGE
11	7.646	0.09	9.79	11.93	21.81	50.00	-28.19	AVERAGE
12	7.646	0.09	9.79	18.95	28.83	60.00	-31.17	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.

6.3 Conducted Peak Output Power

Test Requirement:	47 CFR Part 15, Subpart C 15.247(b)(3)
Test Method:	ANSI C63.10 (2013) Section 7.8.5
Limit:	30dBm
Test Setup:	
Instruments Used:	Refer to section 5.10 for details
Exploratory Test Mode:	Transmitting with GFSK modulation
Test Results:	Pass

Measurement Data

GFSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	5.54	30.00	Pass
Middle	5.09	30.00	Pass
Highest	4.06	30.00	Pass

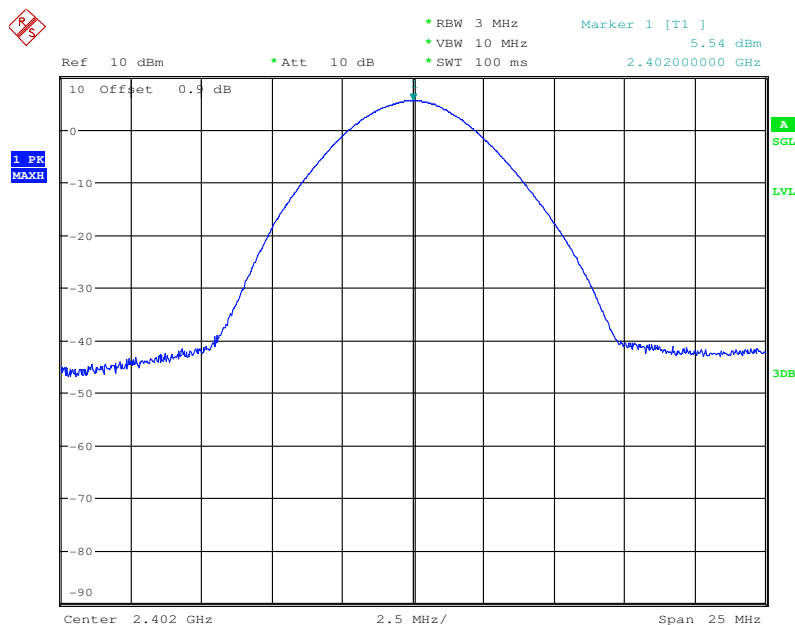


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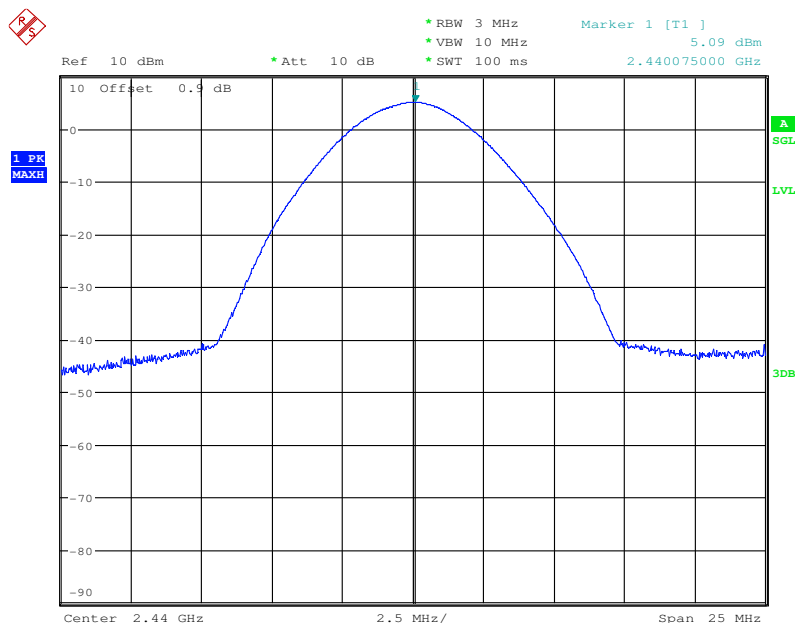
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Test plot as follows:

Test mode:	GFSK	Test channel:	Lowest
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Test mode:	GFSK	Test channel:	Middle
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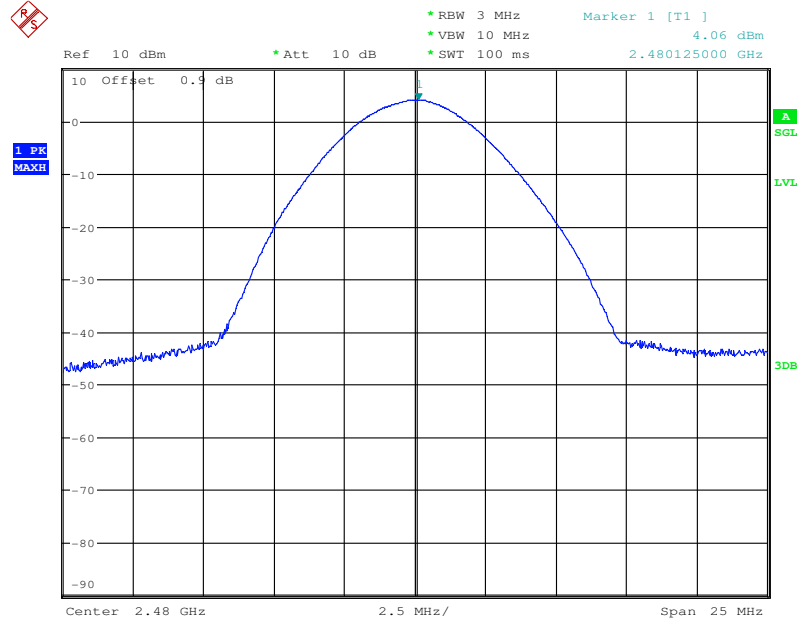


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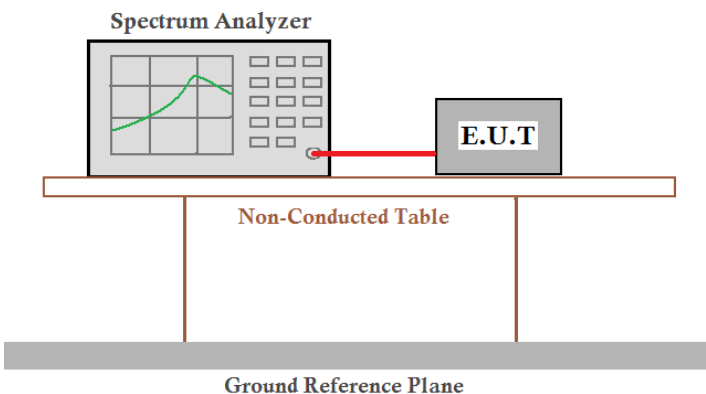
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Test mode:	GFSK	Test channel:	Highest
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6.4 6dB Occupy Bandwidth

Test Requirement:	47 CFR Part 15, Subpart C 15.247a(2)
Test Method:	ANSI C63.10 (2013) Section 11.8.1
Test Setup:	
Instruments Used:	Refer to section 5.10 for details
Limit:	≥ 500 kHz
Test Mode:	Transmitting with GFSK modulation
Test Results:	Pass

Measurement Data

GFSK mode			
Test channel	6dB Occupy Bandwidth (MHz)	Limit (kHz)	Result
Lowest	0.540	≥ 500	Pass
Middle	0.544	≥ 500	Pass
Highest	0.540	≥ 500	Pass

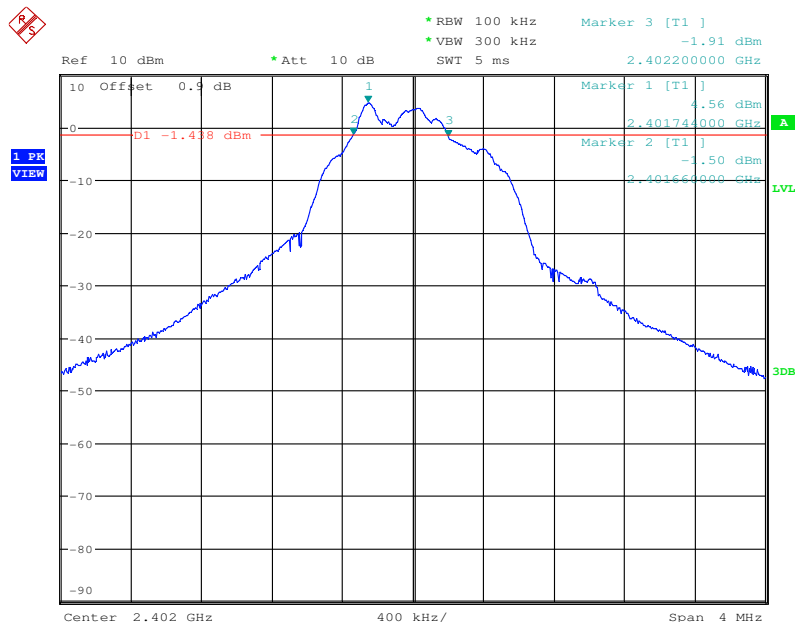


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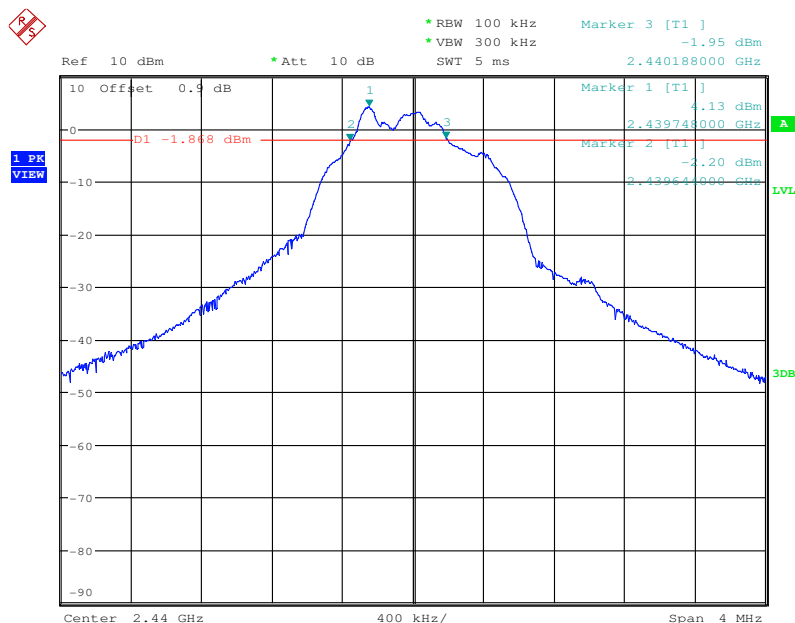
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Test plot as follows:

Test mode:	GFSK	Test channel:	Lowest
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Test mode:	GFSK	Test channel:	Middle
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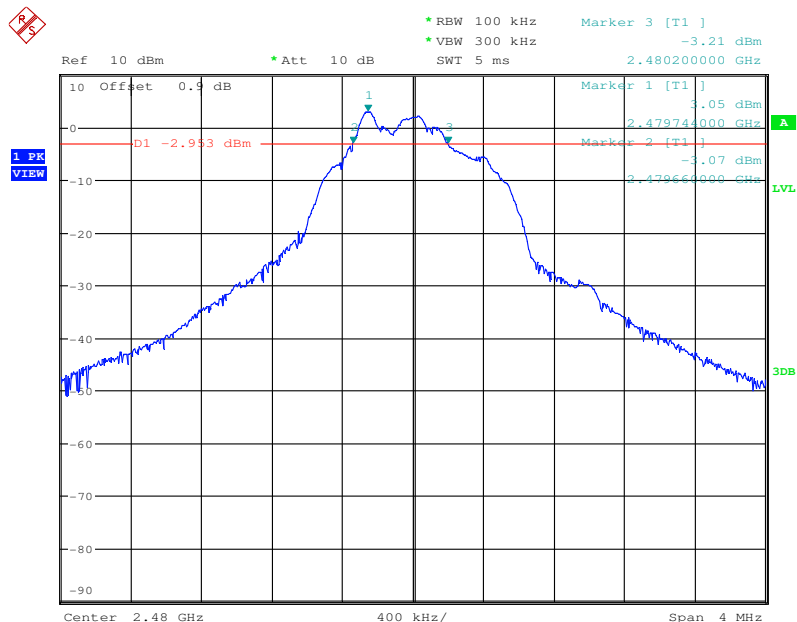




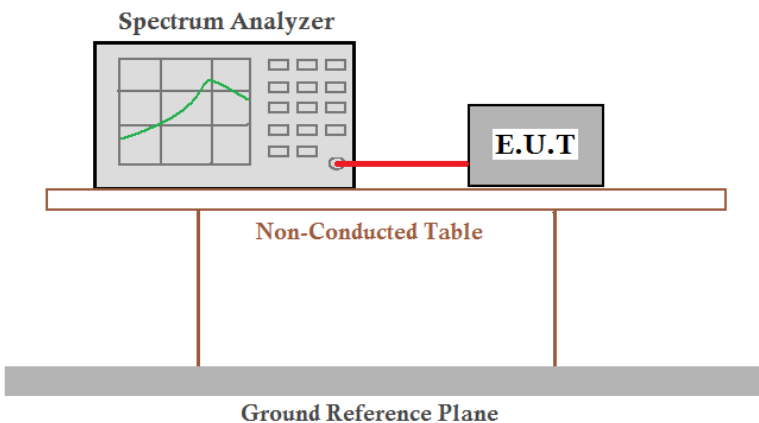
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Test mode:	GFSK	Test channel:	Highest
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6.5 Power Spectral Density

Test Requirement:	47 CFR Part 15, Subpart C 15.247(e)
Test Method:	ANSI C63.10 (2013) Section 11.10.2
Test Setup:	
Instruments Used:	Refer to section 5.10 for details
Test Mode:	Transmitting with GFSK modulation
Limit:	$\leq 8\text{dBm}/3\text{kHz}$
Test Results:	Pass

GFSK mode			
Test channel	Power Spectral Density (dBm/MHz)	Limit (dBm/3kHz)	Result
Lowest	-13.88	≤ 8.00	Pass
Middle	-14.12	≤ 8.00	Pass
Highest	-15.11	≤ 8.00	Pass

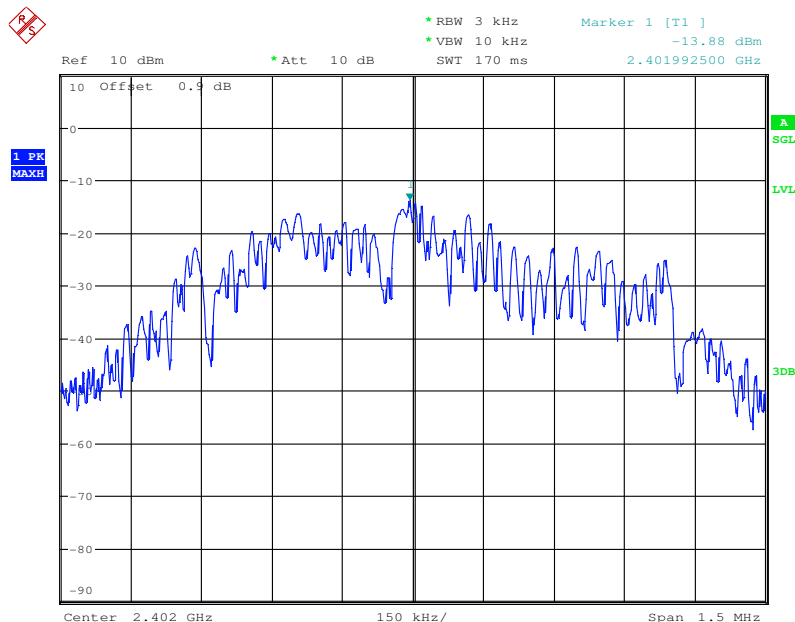


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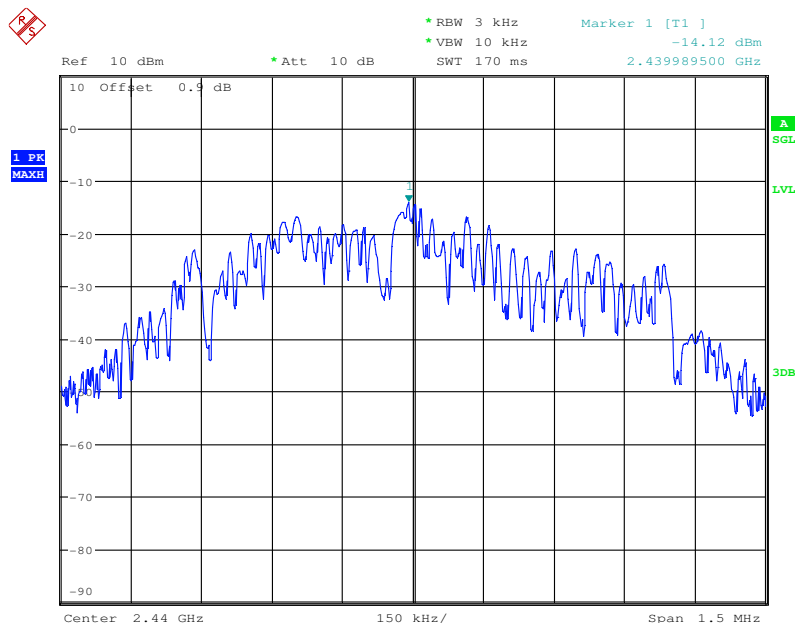
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Test plot as follows:

Test mode:	GFSK	Test channel:	Lowest
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Test mode:	GFSK	Test channel:	Middle
------------	------	---------------	--------



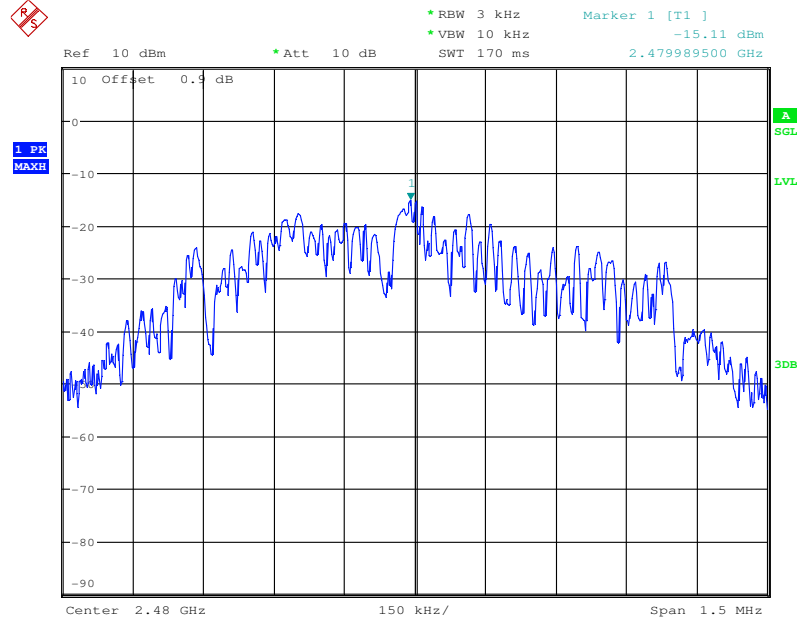


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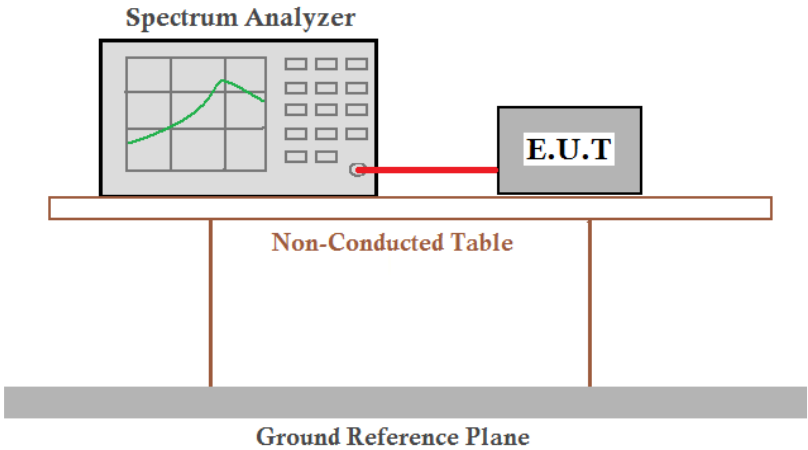
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Test mode:	GFSK	Test channel:	Highest
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6.6 Band Edge for RF Conducted Emissions

Test Requirement:	47 CFR Part 15, Subpart C 15.247(d)
Test Method:	ANSI C63.10 (2013) Section 7.8.6
Test Setup:	 The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by a Ground Reference Plane.
Instruments Used:	Refer to section 5.10 for details
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test Mode:	Transmitting with GFSK modulation
Test Results:	Pass

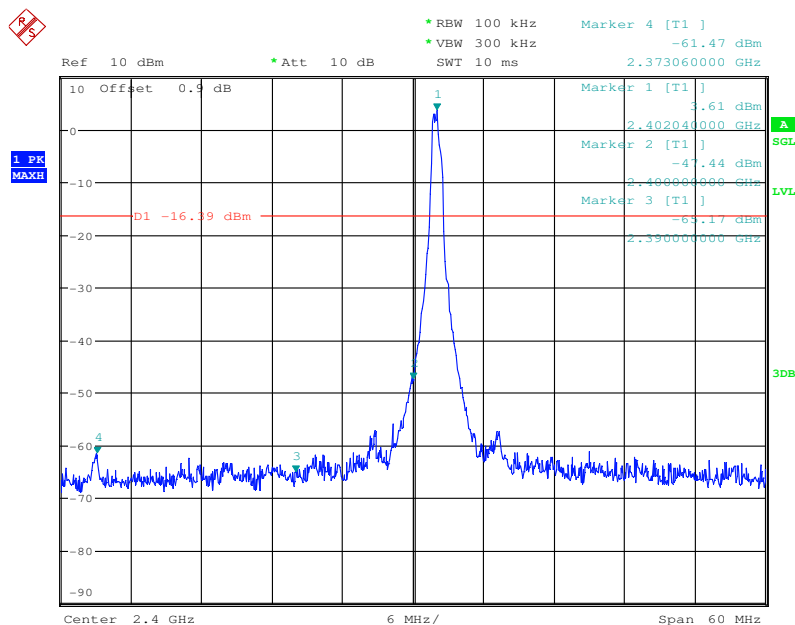


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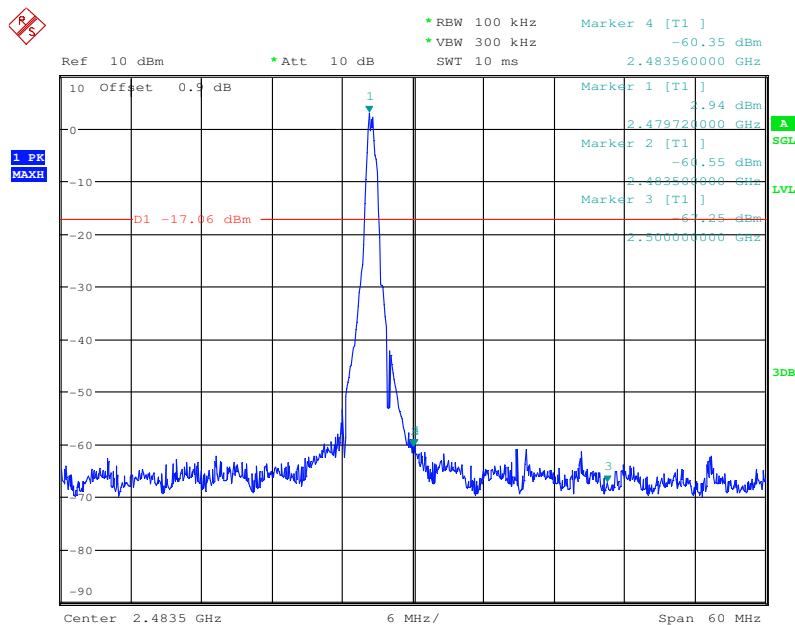
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Test plot as follows:

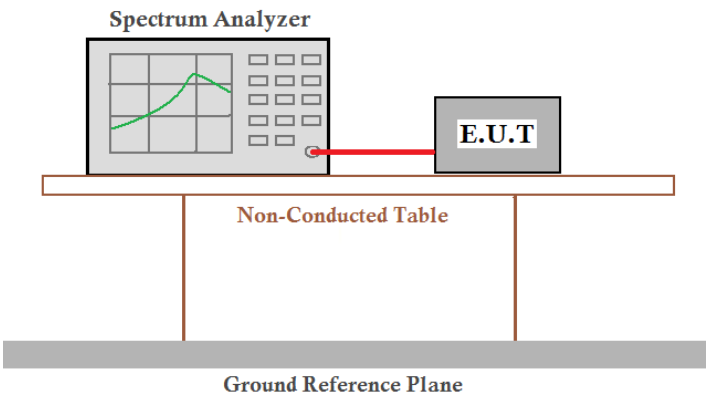
Test mode:	GFSK	Test channel:	Lowest
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Test mode:	GFSK	Test channel:	Highest
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6.7 RF Antenna Conducted Spurious Emissions

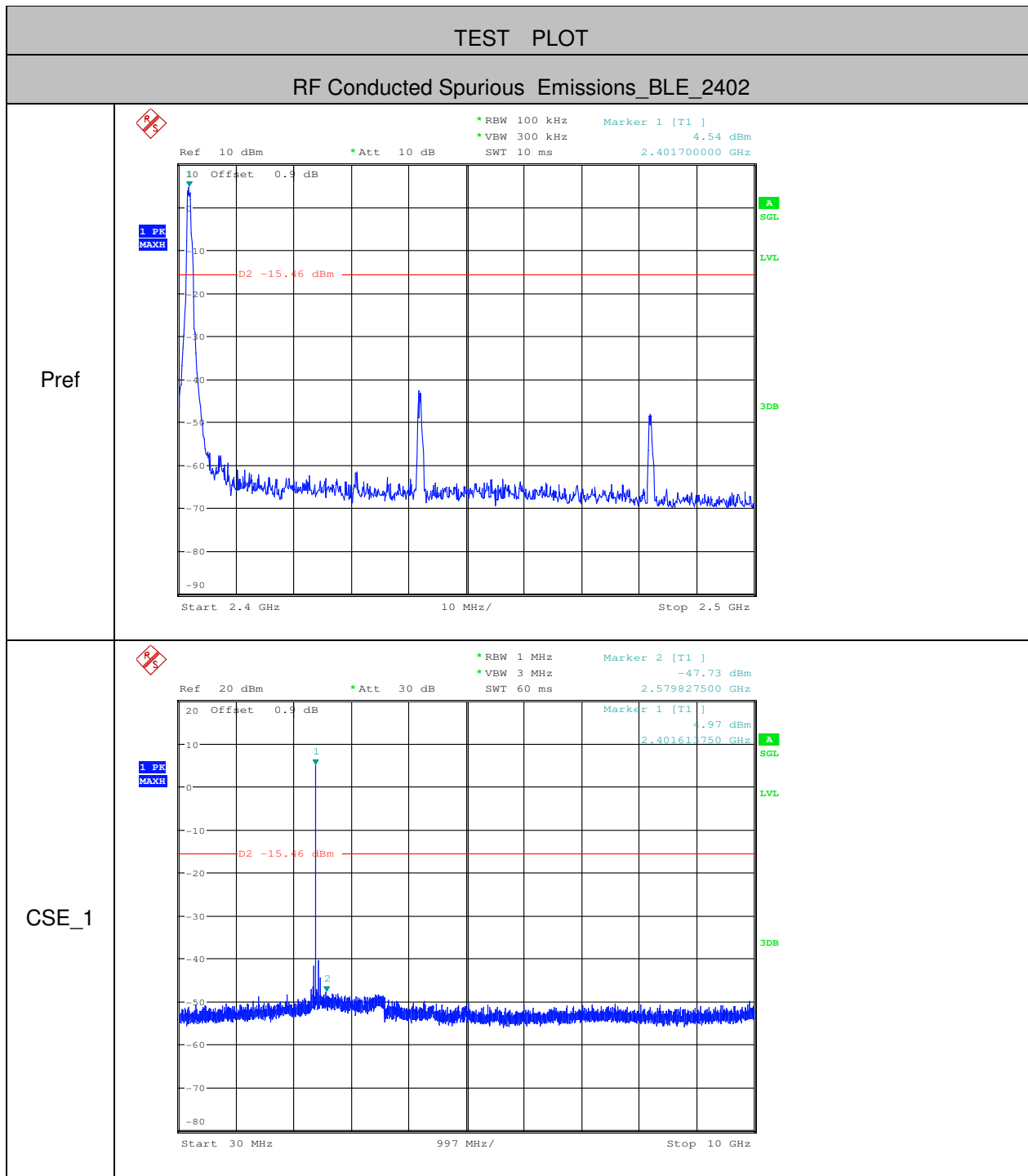
Test Requirement:	47 CFR Part 15, Subpart C 15.247(d)
Test Method:	ANSI C63.10 (2013) Section 7.8.8
Test Setup:	 <i>Remark:</i> Offset the High-Frequency cable loss 1.5dB in the spectrum analyzer.
Instruments Used:	Refer to section 5.10 for details
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test Mode:	Transmitting with GFSK modulation
Test Results:	Pass

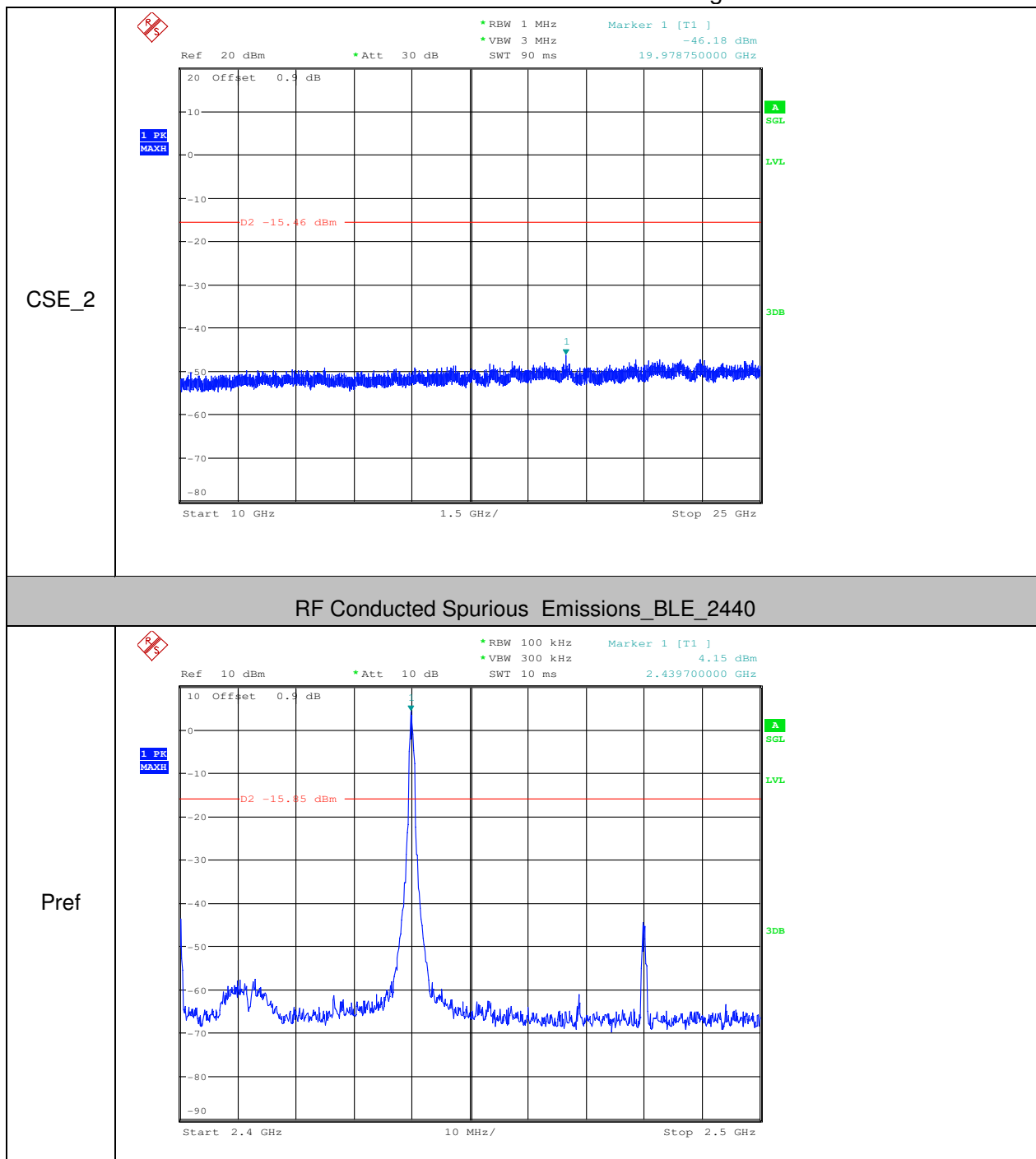


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Test plot as follows:

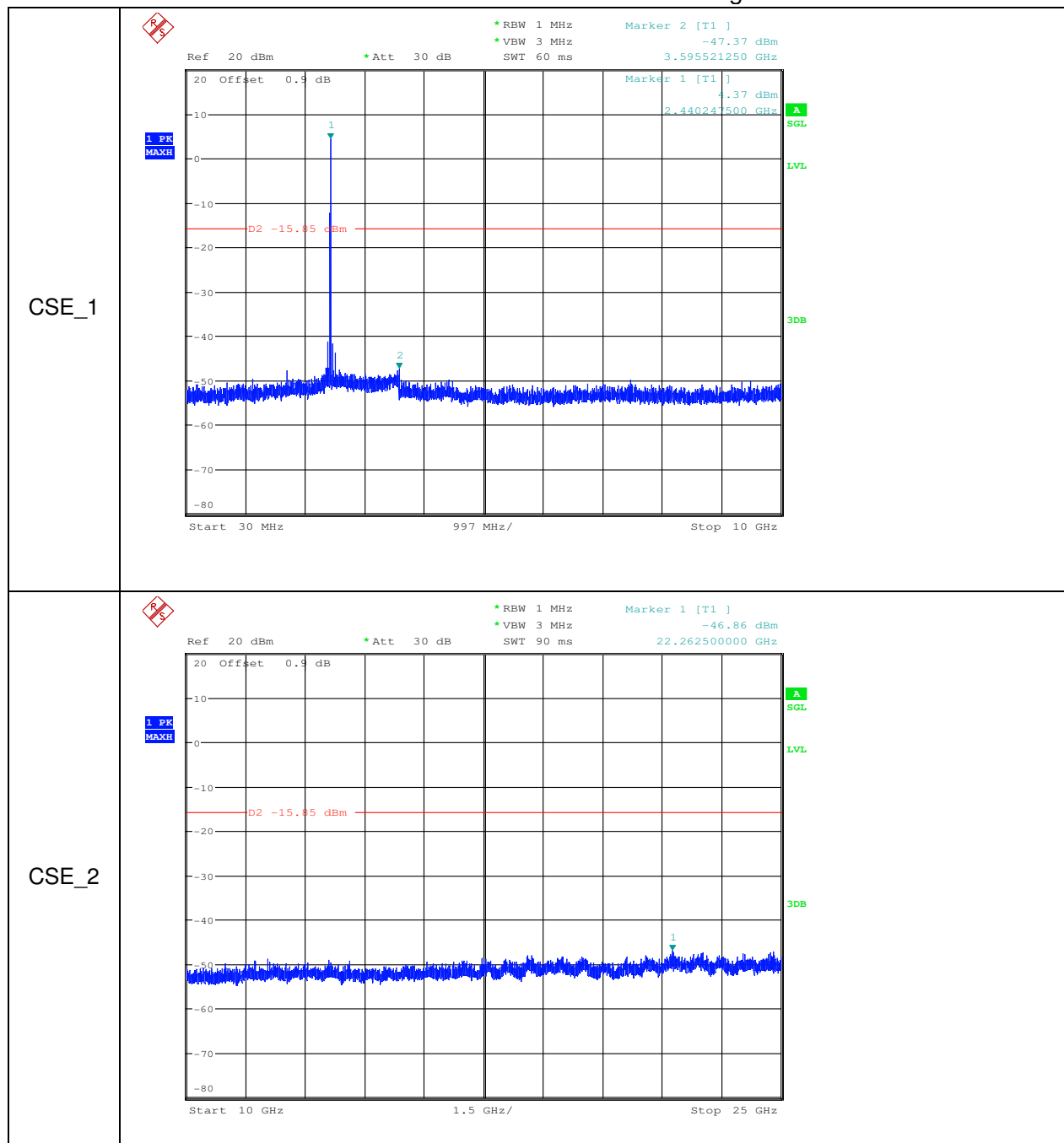


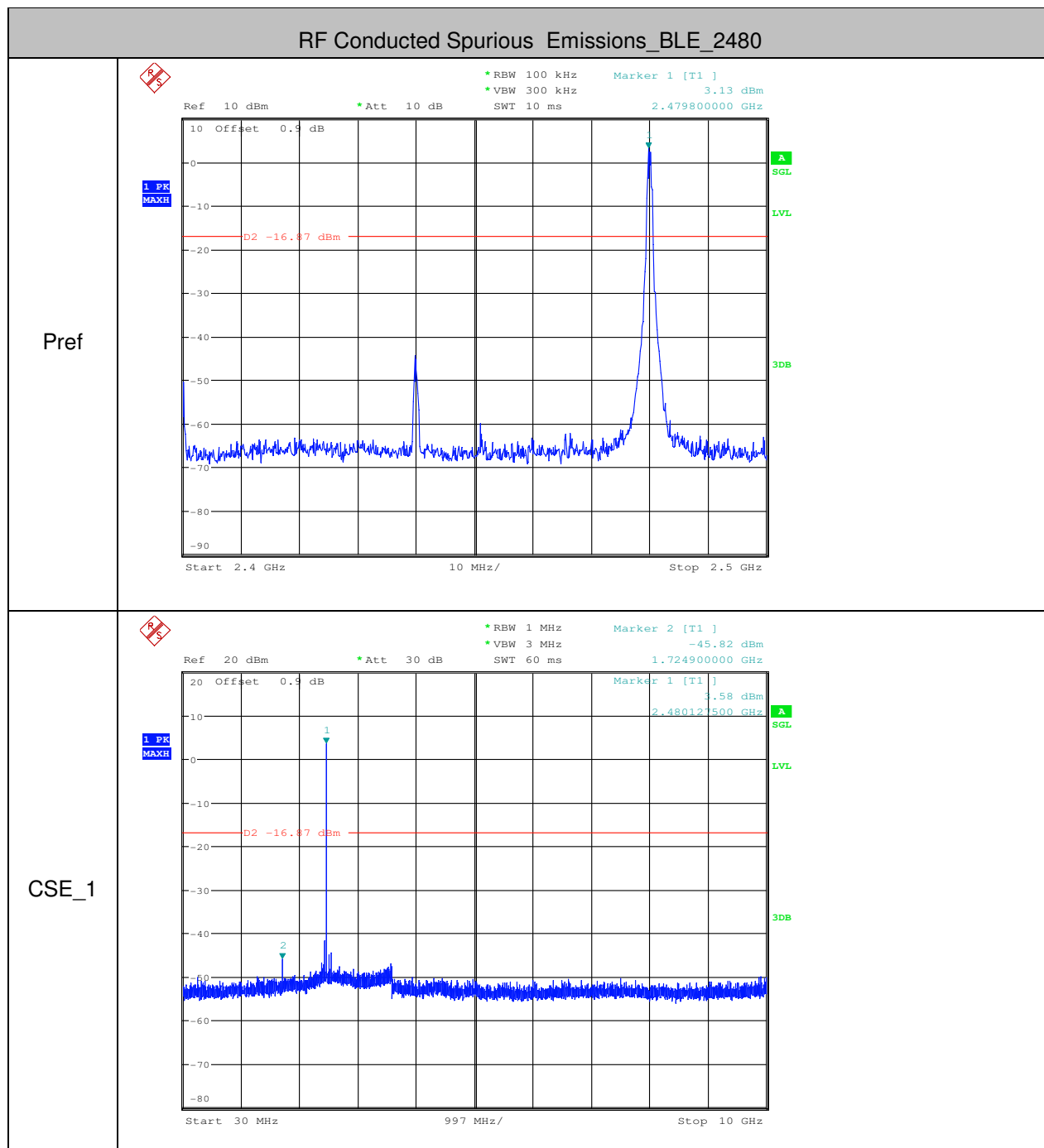




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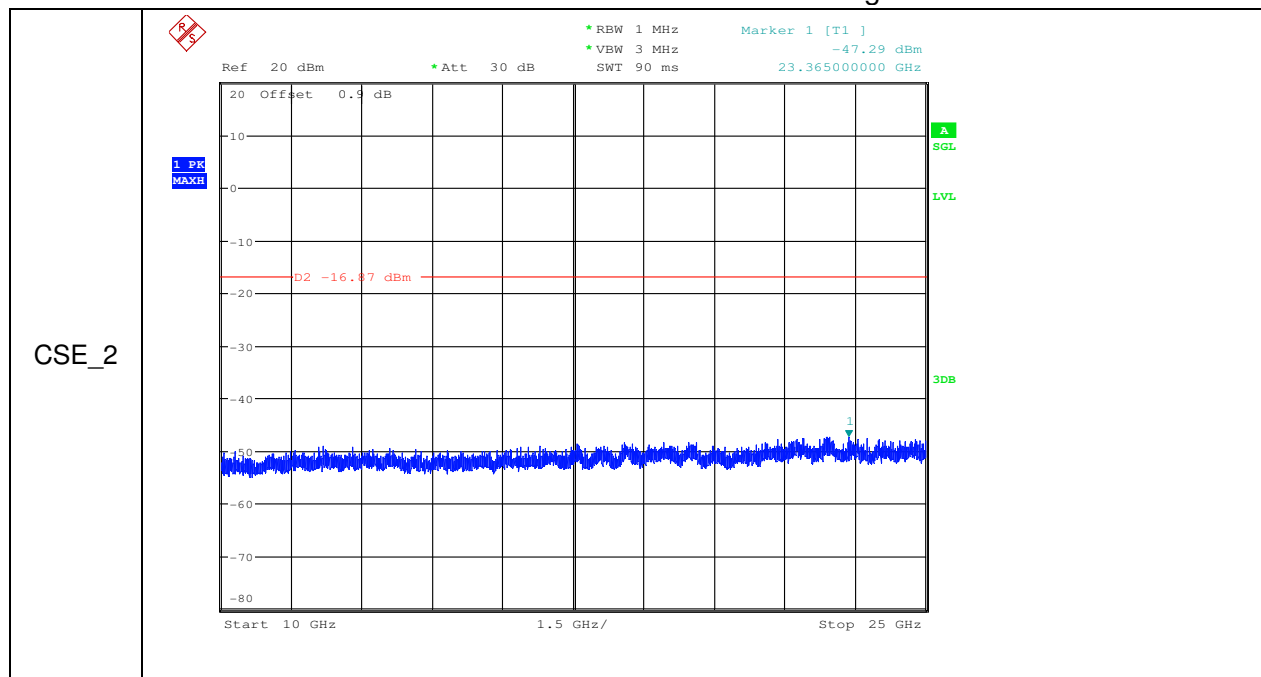






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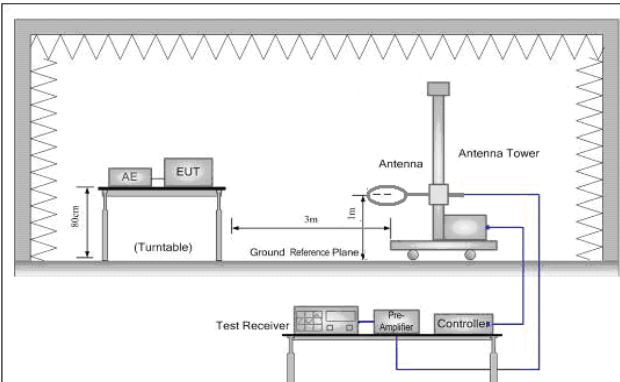


Remark:

Use 100kHz RBW to determine the relative limit in the band 2.4GHz to 2.5GHz, and Use 1MHz RBW to measure spurious emissions in the band 30MHz to 10GHz and 10GHz to 25GHz. The sweep points set to 30001.

6.8 Radiated Spurious Emission

Test Requirement:	47 CFR Part 15, Subpart C 15.205 & 15.209				
Test Method:	ANSI C63.10 (2013) Section 6.10.4				
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
Test Setup:					



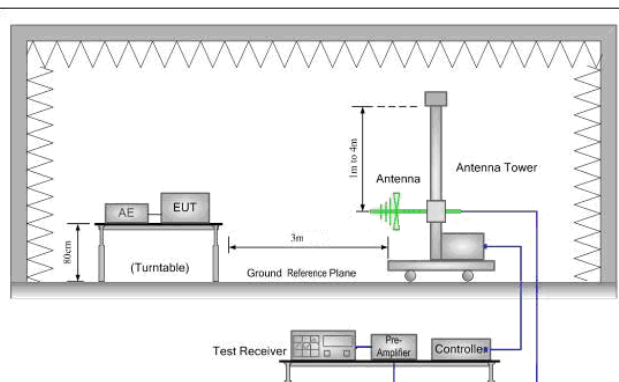


Figure 1. Below 30MHz

Figure 2. 30MHz to 1GHz

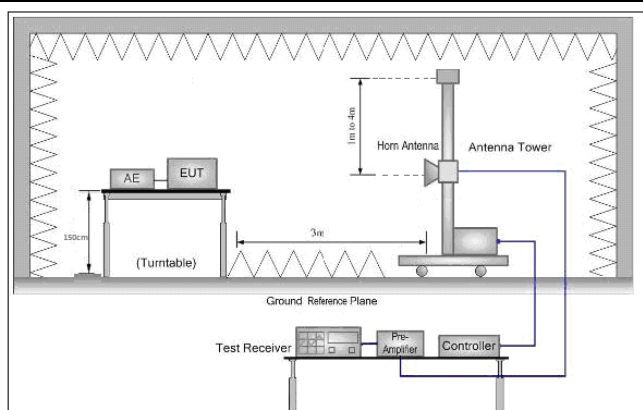


Figure 3. Above 1 GHz

Test Procedure:	- 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 height 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 (2402MHz), the middle channel (2440MHz), the Highest channel (2480MHz) - The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case. - Repeat above procedures until all frequencies measured was complete.
Instruments Used:	Refer to section 5.10 for details
Final Test Mode:	Transmitting mode with GFSK modulation For below 1GHz part, through pre-scan, the worst case is the lowest channel. Only the worst case is recorded in the report.
Test Results:	Pass



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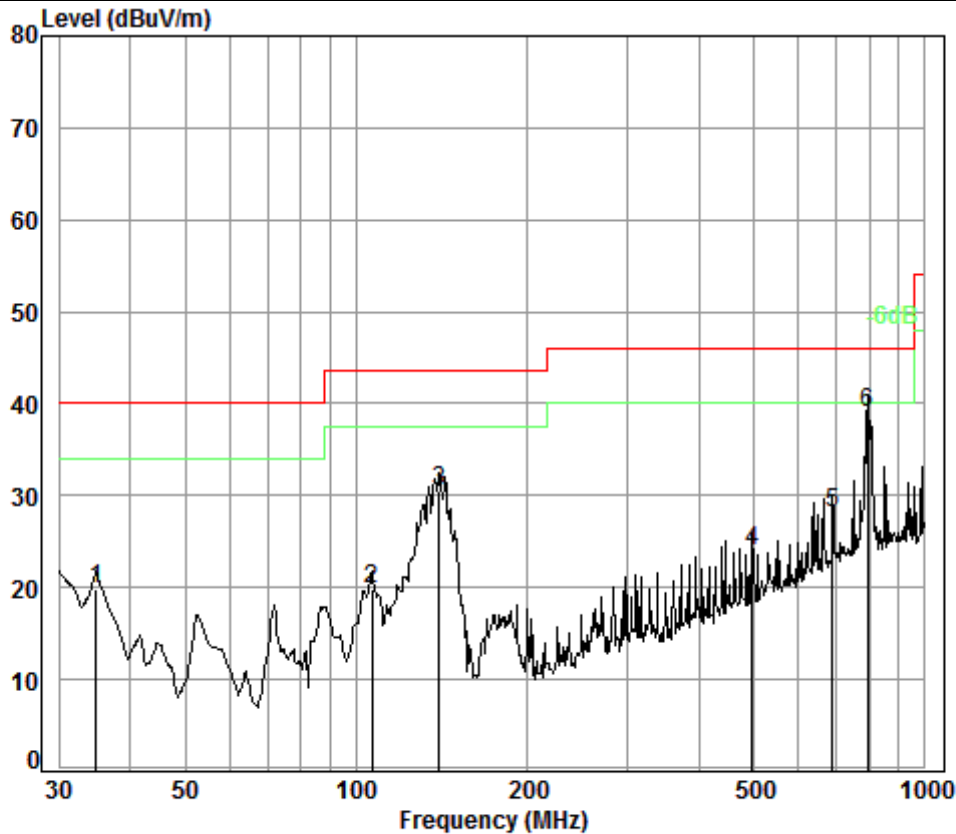
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Radiated Emission below 1GHz

30MHz~1GHz (QP)

Test mode: Transmitting Vertical



Condition: 3m VERTICAL

Job No. : 11090CR

Test mode: TX

: BT

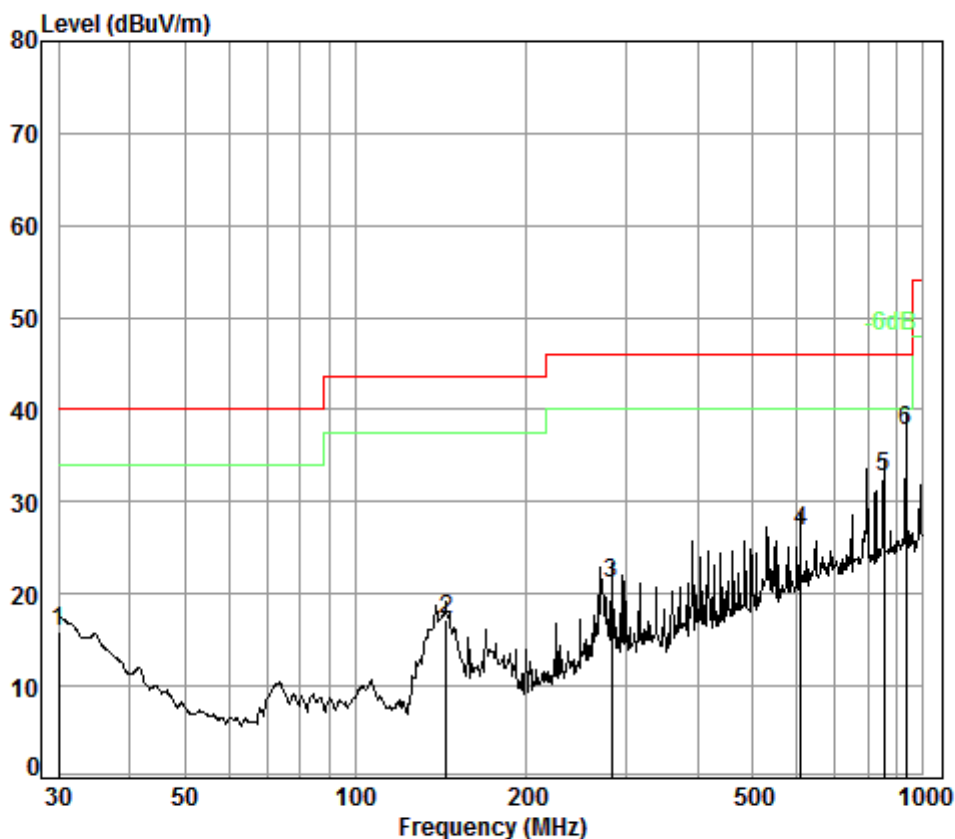
	Freq	Cable	Ant	Preamp	Read	Limit	Over
	MHz	Loss	Factor	Factor	Level	Line	Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dB
1	34.88	0.60	15.97	27.34	30.52	19.75	40.00 -20.25
2	106.76	1.22	8.76	27.15	36.92	19.75	43.50 -23.75
3	139.85	1.30	8.09	26.96	48.04	30.47	43.50 -13.03
4	497.68	2.59	17.80	27.70	31.32	24.01	46.00 -21.99
5	687.15	2.88	21.50	27.43	31.19	28.14	46.00 -17.86
6 pp	793.40	3.18	22.07	27.31	41.06	39.00	46.00 -7.00



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Test mode:	Transmitting	Horizontal
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Condition: 3m HORIZONTAL
Job No. : 11090CR
Test mode: TX
: BT

	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	30.00	0.60	18.70	27.36	23.87	15.81	40.00	-24.19
2	144.33	1.31	8.49	26.94	34.31	17.17	43.50	-26.33
3	281.99	1.82	13.11	26.45	32.75	21.23	46.00	-24.77
4	607.79	2.72	20.02	27.53	31.66	26.87	46.00	-19.13
5	851.04	3.41	22.42	27.02	33.88	32.69	46.00	-13.31
6 pp	932.27	3.63	23.30	26.61	37.41	37.73	46.00	-8.27



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Transmitter Emission above 1GHz								
Test mode:		GFSK		Test channel:		Lowest		Remark:
Frequency (MHz)	Antenna factors (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
3174.157	31.63	7.55	37.92	47.12	48.38	74.00	-25.62	Vertical
4804.000	34.16	8.87	38.40	43.53	48.16	74.00	-25.84	Vertical
5820.005	34.59	10.06	38.34	44.59	50.90	74.00	-23.10	Vertical
7206.000	36.42	10.68	37.11	41.85	51.84	74.00	-22.16	Vertical
9608.000	37.52	12.50	35.10	37.23	52.15	74.00	-21.85	Vertical
12102.870	38.66	14.47	35.85	35.93	53.21	74.00	-20.79	Vertical
3673.633	32.71	7.70	37.97	43.78	46.22	74.00	-27.78	Horizontal
4804.000	34.16	8.87	38.40	42.73	47.36	74.00	-26.64	Horizontal
5811.590	34.59	10.03	38.34	44.26	50.54	74.00	-23.46	Horizontal
7206.000	36.42	10.68	37.11	41.39	51.38	74.00	-22.62	Horizontal
9608.000	37.52	12.50	35.10	37.83	52.75	74.00	-21.25	Horizontal
12050.440	38.63	14.52	35.72	35.71	53.14	74.00	-20.86	Horizontal

Test mode:		GFSK		Test channel:		Middle		Remark:
Frequency (MHz)	Antenna factors (dB/m)	Cable Loss (dB)	Preamp factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Over limit (dB)	Polarization
3652.432	32.65	7.69	37.97	42.78	45.15	74.00	-28.85	Vertical
4880.000	34.29	8.97	38.44	41.43	46.25	74.00	-27.75	Vertical
6140.076	34.82	10.38	38.16	43.73	50.77	74.00	-23.23	Vertical
7320.000	36.37	10.72	37.01	42.18	52.26	74.00	-21.74	Vertical
9920.000	37.58	12.67	34.94	36.52	51.83	74.00	-22.17	Vertical
12350.530	38.81	14.27	36.44	36.38	53.02	74.00	-20.98	Vertical
3792.453	33.04	7.74	37.98	43.32	46.12	74.00	-27.88	Horizontal
4880.000	34.29	8.97	38.44	41.55	46.37	74.00	-27.63	Horizontal
6122.333	34.80	10.40	38.18	43.50	50.52	74.00	-23.48	Horizontal
7320.000	36.37	10.72	37.01	40.41	50.49	74.00	-23.51	Horizontal
9760.000	37.55	12.58	35.02	36.97	52.08	74.00	-21.92	Horizontal
12067.890	38.64	14.50	35.76	36.10	53.48	74.00	-20.52	Horizontal



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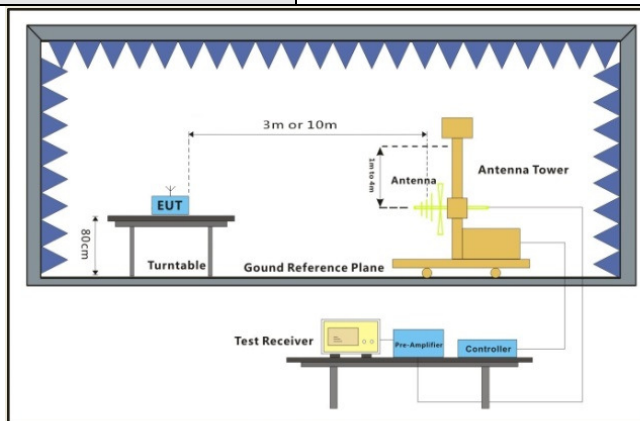
Test mode:		GFSK		Test channel:		Highest		Remark:		Peak	
Frequency (MHz)	Antenna factors (dB/m)	Cable Loss (dB)	Preamp factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Over limit (dB)	Polarization			
3721.784	32.84	7.71	37.97	44.68	47.26	74.00	-26.74	Vertical			
4960.000	34.43	9.09	38.48	42.53	47.57	74.00	-26.43	Vertical			
6025.661	34.72	10.53	38.27	44.38	51.36	74.00	-22.64	Vertical			
7440.000	36.32	10.77	36.90	40.52	50.71	74.00	-23.29	Vertical			
9920.000	37.58	12.67	34.94	36.92	52.23	74.00	-21.77	Vertical			
12085.370	38.65	14.49	35.80	35.94	53.28	74.00	-20.72	Vertical			
3803.444	33.07	7.74	37.98	44.14	46.97	74.00	-27.03	Horizontal			
4960.000	34.43	9.09	38.48	43.56	48.60	74.00	-25.40	Horizontal			
6202.582	34.87	10.30	38.10	44.34	51.41	74.00	-22.59	Horizontal			
7440.000	36.32	10.77	36.90	41.59	51.78	74.00	-22.22	Horizontal			
9920.000	37.58	12.67	34.94	37.08	52.39	74.00	-21.61	Horizontal			
12297.040	38.78	14.31	36.31	37.01	53.79	74.00	-20.21	Horizontal			

Remark:

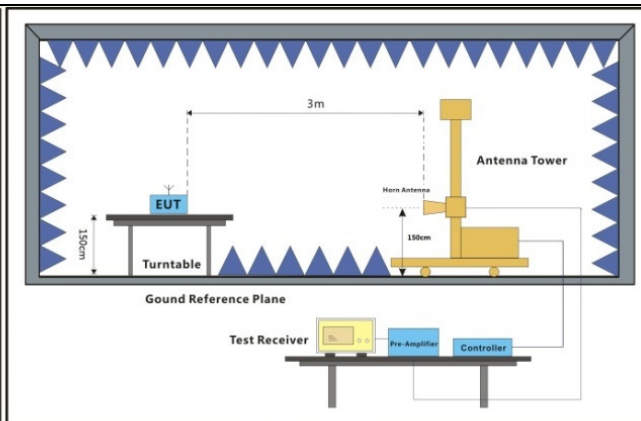
- 1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor
- 2) Scan from 9kHz to 25GHz, The disturbance above 13GHz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

6.9 Restricted bands around fundamental frequency

Test Requirement:	47 CFR Part 15, Subpart C 15.205 & 15.209		
Test Method:	ANSI C63.10 (2013) Section 6.10.5		
Test Site:	Measurement Distance: 3m		
Limit:	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:			



30MHz-1GHz



Above 1GHz



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Test Procedure:	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 channel g. Test the EUT in the lowest channel , the Highest channel h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case. i. Repeat above procedures until all frequencies measured was complete.
Instruments Used:	Refer to section 5.10 for details
Final Test Mode:	Transmitting mode with GFSK modulation.
Test Results:	Pass



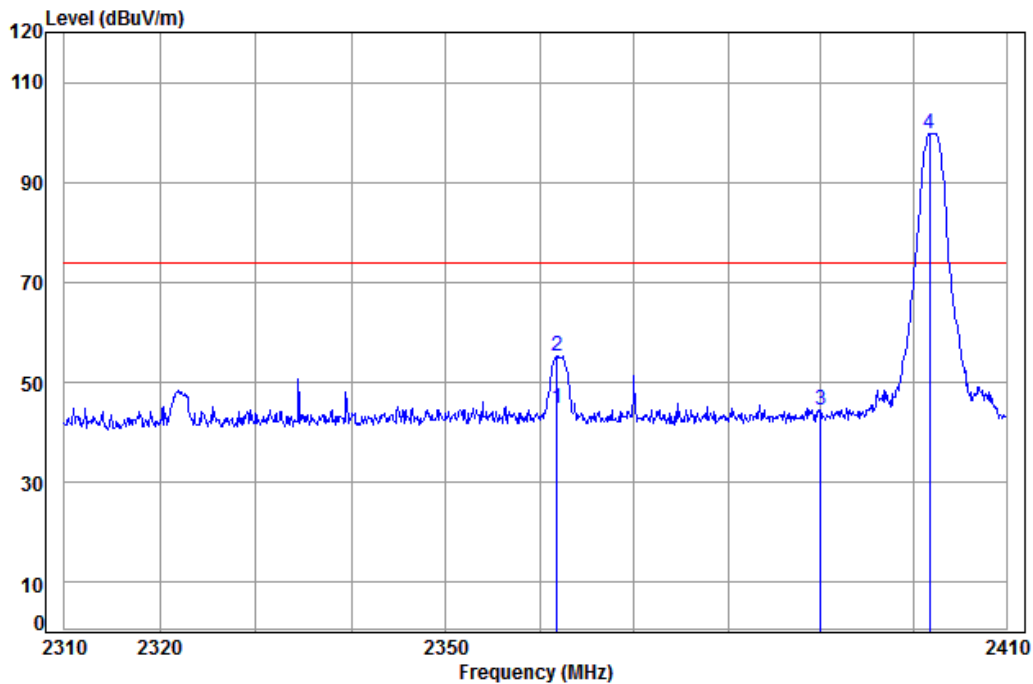
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Test plot as follows:

Test mode:	GFSK	Test channel:	Lowest	Remark:	Peak	Vertical
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Condition: 3m VERTICAL

Job No: : 11090CR

Mode: : 2402 Bandedge

: BLE

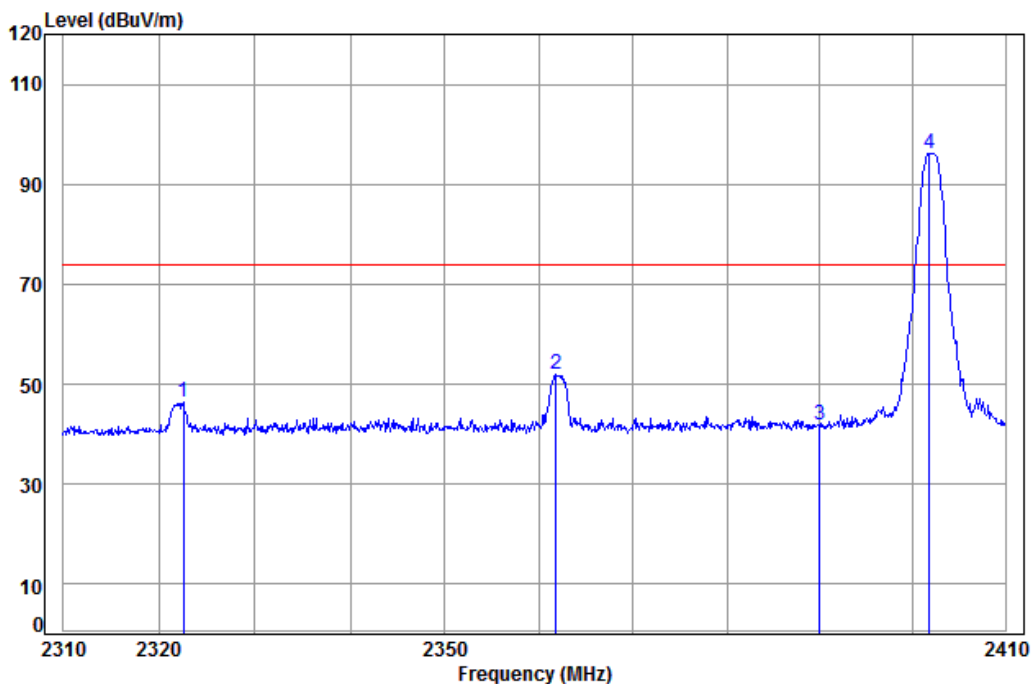
		Cable	Ant	Preamp	Read	Limit	Over	
	Freq	Loss	Factor	Factor	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 av	2361.771	5.32	28.99	37.96	48.56	44.91	54.00	-9.09 Average
2 pk	2361.771	5.32	28.99	37.96	59.06	55.41	74.00	-18.59 Peak
3	2390.000	5.34	29.08	37.96	48.04	44.50	74.00	-29.50
4 pp	2401.741	5.35	29.11	37.96	103.27	99.77	74.00	25.77



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Test mode:	GFSK	Test channel:	Lowest	Remark:	Peak	Horizontal
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Condition: 3m HORIZONTAL

Job No: : 11090CR

Mode: : 2402 Bandedge

: BLE

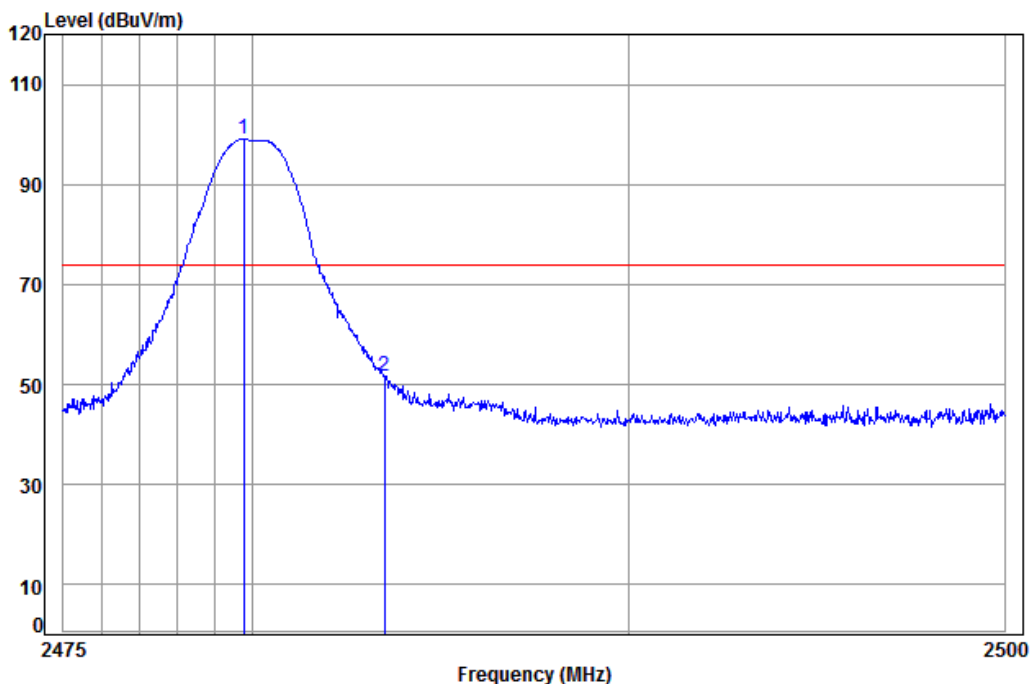
	Freq	Cable Loss	Ant Factor	Preamplifier Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2322.466	5.28	28.87	37.97	50.14	46.32	74.00	-27.68	
2	2361.771	5.32	28.99	37.96	55.56	51.91	74.00	-22.09	
3	2390.000	5.34	29.08	37.96	45.29	41.75	74.00	-32.25	
4 pp	2401.843	5.35	29.11	37.96	99.77	96.27	74.00	22.27	



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Test mode:	GFSK	Test channel:	Highest	Remark:	Peak	Vertical
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Condition: 3m VERTICAL
Job No: : 11090CR
Mode: : 2480 Bandedge
: BLE

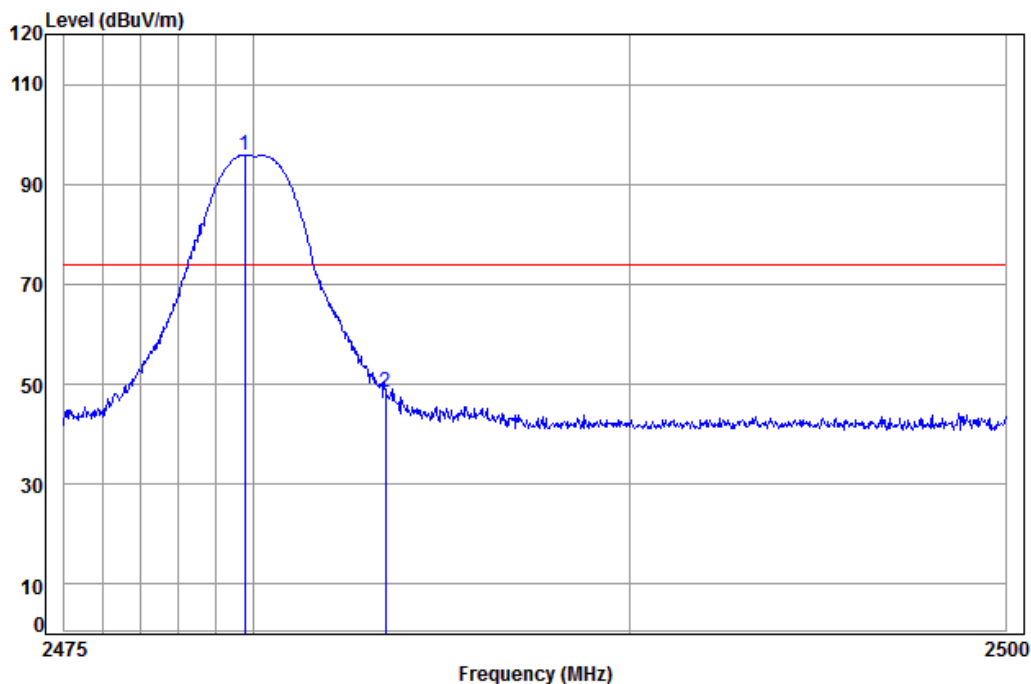
	Freq	Cable Loss	Ant Factor	Preamplifier Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 pp	2479.781	5.41	29.34	37.95	102.22	99.02	74.00	25.02	
2	2483.500	5.41	29.35	37.95	54.78	51.59	74.00	-22.41	



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Test mode:	GFSK	Test channel:	Highest	Remark:	Peak	Horizontal
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Condition: 3m HORIZONTAL

Job No: : 11090CR

Mode: : 2480 Bandedge

: BLE

		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	pp 2479.781	5.41	29.34	37.95	99.05	95.85	74.00	21.85	
2	2483.500	5.41	29.35	37.95	51.49	48.30	74.00	-25.70	

Note:

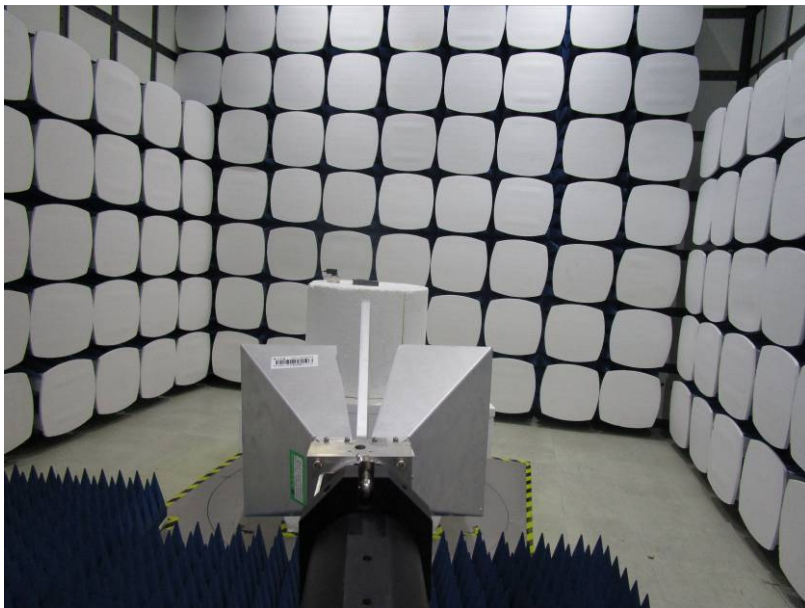
The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

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

7 Photographs - EUT Test Setup

Test model No.: M30WL.11

7.1 Radiated Spurious Emission Test Setup



7.2 Conducted Emission Test Setup



8 Photographs - EUT Constructional Details

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