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Report No.: SZEM150800484304
Page: 1 of 38

FCC REPORT

Application No: SZEM1605003176CR
Applicant: Arts Electronics Co., Ltd.
Manufacturer: Arts Electronics Co., Ltd.
Factory: Arts Electronics Co., Ltd.
Product Name: PROFESSIONAL HD KARAOKE SYSTEM WITH BLUETOOTH
Model No.(EUT): SDL9037
Add Model No.: SDL9030DB, SDL9035
Trade Mark: singing machine
FCC ID: TZISDL9030DB
Standards: 47 CFR Part 15, Subpart C (2015)(only for AC Power Line Conducted Emission, Conducted Peak Output Power, Radiated Spurious Emissions and Restricted bands around fundamental frequency (Radiated Emission))
Date of Receipt: 2016-05-18
Date of Test: 2016-06-18
Date of Issue: 2016-06-22

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

Authorized Signature:



Jack Zhang
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.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

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2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
00		2016-06-22		Original

Authorized for issue by:			
Tested By			2016-06-18
	<hr/>		<hr/>
	(Bill Chen) /Project Engineer		Date
Prepared By			2016-06-22
	<hr/>		<hr/>
	(Joyce Shi) /Clerk		Date
Checked By			2016-06-22
	<hr/>		<hr/>
	(Eric Fu) /Reviewer		Date



3 Test Summary

Test Item	Test Requirement	Test method	Result
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10 (2013)	PASS
Conducted Peak Output Power	47 CFR Part 15, Subpart C Section 15.247 (b)(1)	ANSI C63.10 (2013)	PASS
Radiated Spurious emissions	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 (2013)	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 (2013)	PASS



Remark:

Model No.: SDL9030DB, SDL9035, SDL9037

This test report (Ref. No.: SZEM150800484304) is only valid with the original test report (Ref. No.: SZEM150800484301).

Review this report and original report, this report just changing the model.

According to the declaration from the applicant, the models in this report and models in original report were identical.

The added models SDL9035 and SDL9037 are identical with original model SDL9030DB in RF circuitry, only different on output rating of adapter, audio amplifier IC and rated power of speaker listed as below table. The original model SDL9030DB is not made any changes.

The model SDL9035 is totally the same with the model SDL9037, only different on model No. and cabinet of color.

Model No.	Adapter	Audio amplifier IC	Speaker
SDL9030DB	DC 15V 3A	STA369BWS	4ohm 20W
SDL9035; SDL9037	DC 18V 3.5A	STA369BW	4ohm 30W

Considering to the difference, pre-scan were performed on the sample in this report to find the items which can be influential to the result in the original test report for fully retest.

Therefore in this report AC Power Line Conducted Emission, Conducted Peak Output Power, Radiated Spurious Emissions and Restricted bands around fundamental frequency (Radiated Emission) were fully retested on Model SDL9037, shown the data in this report, other tests please refer to original report SZEM150800484301.



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5 General Information

5.1 Client Information

Applicant:	Arts Electronics Co., Ltd.
Address of Applicant:	NO. 1, SHANGXING LU, SHANGJIAO COMMUNITY, CHANGAN TOWN, DONGGUAN CITY, GUANGDONG PROVINCE, CHINA
Manufacturer:	Arts Electronics Co., Ltd.
Address of Manufacturer:	NO. 1, SHANGXING LU, SHANGJIAO COMMUNITY, CHANGAN TOWN, DONGGUAN CITY, GUANGDONG PROVINCE, CHINA
Factory:	Arts Electronics Co., Ltd.
Address of Factory:	NO. 1, SHANGXING LU, SHANGJIAO COMMUNITY, CHANGAN TOWN, DONGGUAN CITY, GUANGDONG PROVINCE, CHINA

5.2 General Description of EUT

Product Name:	PROFESSIONAL HD KARAOKE SYSTEM WITH BLUETOOTH
Model No.:	SDL9037
Trade Mark:	singing machine
Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	BT V2.1+EDR
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, $\pi/4$ DQPSK, 8DPSK
Number of Channel:	79
Hopping Channel Type:	Adaptive Frequency Hopping systems
Sample Type:	Fixed production
Antenna Type:	Integral
Antenna Gain:	0dBi
Power Supply:	Switching power adapter Model: GME72C-180350FUL Input: AC 100-240V 50-60Hz 1.5A Output: DC 18V 3.5A



Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2402MHz	20	2422MHz	40	2442MHz	60	2462MHz
1	2403MHz	21	2423MHz	41	2443MHz	61	2463MHz
2	2404MHz	22	2424MHz	42	2444MHz	62	2464MHz
3	2405MHz	23	2425MHz	43	2445MHz	63	2465MHz
4	2406MHz	24	2426MHz	44	2446MHz	64	2466MHz
5	2407MHz	25	2427MHz	45	2447MHz	65	2467MHz
6	2408MHz	26	2428MHz	46	2448MHz	66	2468MHz
7	2409MHz	27	2429MHz	47	2449MHz	67	2469MHz
8	2410MHz	28	2430MHz	48	2450MHz	68	2470MHz
9	2411MHz	29	2431MHz	49	2451MHz	69	2471MHz
10	2412MHz	30	2432MHz	50	2452MHz	70	2472MHz
11	2413MHz	31	2433MHz	51	2453MHz	71	2473MHz
12	2414MHz	32	2434MHz	52	2454MHz	72	2474MHz
13	2415MHz	33	2435MHz	53	2455MHz	73	2475MHz
14	2416MHz	34	2436MHz	54	2456MHz	74	2476MHz
15	2417MHz	35	2437MHz	55	2457MHz	75	2477MHz
16	2418MHz	36	2438MHz	56	2458MHz	76	2478MHz
17	2419MHz	37	2439MHz	57	2459MHz	77	2479MHz
18	2420MHz	38	2440MHz	58	2460MHz	78	2480MHz
19	2421MHz	39	2441MHz	59	2461MHz		

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	2402MHz
The Middle channel	2441MHz
The Highest channel	2480MHz

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5.3 Test Environment

Operating Environment:	
Temperature:	25.0 °C
Humidity:	53 % RH
Atmospheric Pressure:	1015mbar

5.4 Description of Support Units

The EUT has been tested independent unit.

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 Communications Inc.	FCC-TLISN-T8-02	EMC0120	2015-08-30	2016-08-30
5	4 Line ISN	Fischer Communications Inc.	FCC-TLISN-T4-02	EMC0121	2015-08-30	2016-08-30
6	2 Line ISN	Fischer 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

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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

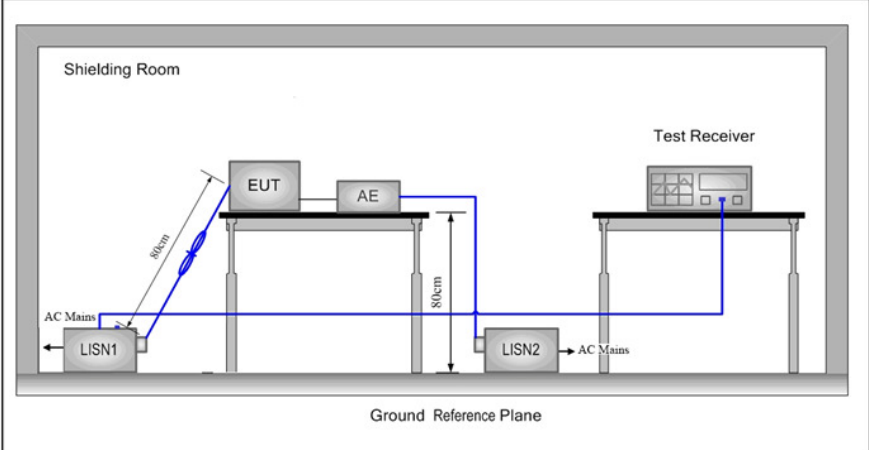


6 Test results and Measurement Data

6.1 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:	<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 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. 		

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<p>Test Setup:</p>	
<p>Exploratory Test Mode:</p>	<p>Non-hopping transmitting mode with all kind of modulation and all kind of data type at the lowest, middle, high channel. Transmitting mode.</p>
<p>Final Test Mode:</p>	<p>Through Pre-scan, find the DH1 of data type and GFSK modulation at the lowest channel is the worst case. Transmitting mode Only the worst case is recorded in the report.</p>
<p>Instruments Used:</p>	<p>Refer to section 5.10 for details</p>
<p>Test Results:</p>	<p>Pass</p>

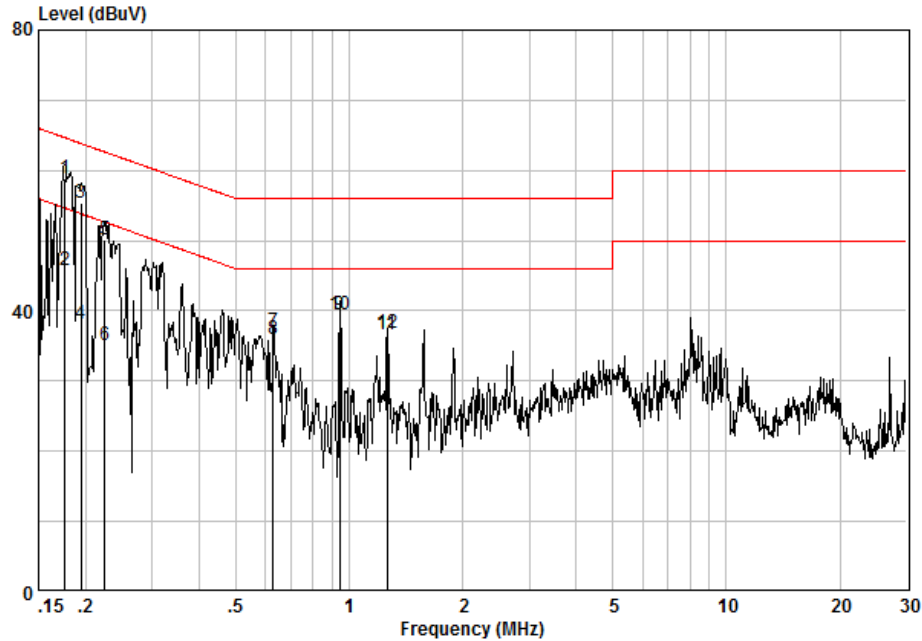


Measurement Data

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:



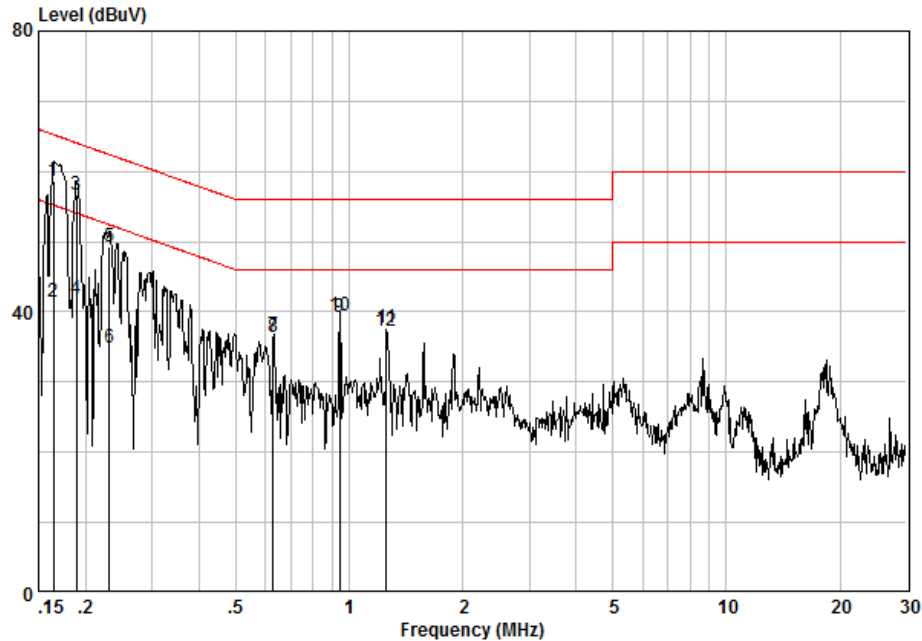
Site : Shielding Room
 Condition : CE LINE
 Model : 3176CR
 Test mode : TX

	Freq	Cable Loss	LISN Factor	Read Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dB	
1 @	0.17584	0.02	9.60	49.20	58.82	64.68	-5.86 QP
2 @	0.17584	0.02	9.60	36.20	45.82	54.68	-8.86 Average
3 @	0.19447	0.02	9.60	45.80	55.42	63.84	-8.42 QP
4 @	0.19447	0.02	9.60	28.60	38.22	53.84	-15.62 Average
5 @	0.22437	0.02	9.60	40.50	50.12	62.66	-12.54 QP
6 @	0.22437	0.02	9.60	25.50	35.12	52.66	-17.54 Average
7 @	0.62864	0.02	9.61	27.40	37.03	56.00	-18.97 QP
8 @	0.62864	0.02	9.61	26.40	36.03	46.00	-9.97 Average
9 @	0.94308	0.02	9.62	29.80	39.44	56.00	-16.56 QP
10 @	0.94308	0.02	9.62	29.90	39.54	46.00	-6.46 Average
11 @	1.257	0.02	9.60	27.10	36.72	56.00	-19.28 QP
12 @	1.257	0.02	9.60	27.30	36.92	46.00	-9.08 Average

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Neutral line:



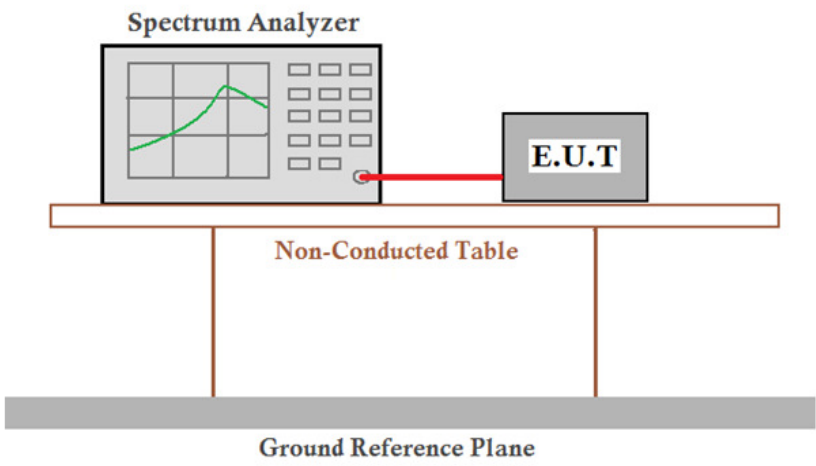
Site : Shielding Room
Condition : CE NEUTRAL
Model : 3176CR
Test mode : TX

	Freq	Cable Loss	LISN Factor	Read Level	Limit Level	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB
1 @	0.16414	0.02	9.61	49.10	58.73	65.25	-6.53 QP
2 @	0.16414	0.02	9.61	31.70	41.33	55.25	-13.93 Average
3 @	0.18938	0.02	9.61	47.00	56.63	64.06	-7.43 QP
4 @	0.18938	0.02	9.61	32.20	41.83	54.06	-12.23 Average
5 @	0.23162	0.02	9.61	39.60	49.23	62.39	-13.16 QP
6 @	0.23162	0.02	9.61	25.20	34.83	52.39	-17.56 Average
7 @	0.62849	0.02	9.63	26.90	36.55	56.00	-19.45 QP
8 @	0.62849	0.02	9.63	26.70	36.35	46.00	-9.65 Average
9 @	0.94299	0.02	9.64	29.50	39.16	56.00	-16.84 QP
10 @	0.94299	0.02	9.64	29.70	39.36	46.00	-6.64 Average
11 @	1.257	0.02	9.65	28.00	37.67	56.00	-18.33 QP
12 @	1.257	0.02	9.65	27.70	37.37	46.00	-8.63 Average

Notes:

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

6.2 Conducted Peak Output Power

Test Requirement:	47 CFR Part 15C Section 15.247 (b)(1)
Test Method:	ANSI C63.10:2013
Test Setup:	 <p><i>Remark:</i> Offset the High-Frequency cable loss 1.5dB in the spectrum analyzer.</p>
Limit:	20.97dBm
Exploratory Test Mode:	Non-hopping transmitting with all kind of modulation and all kind of data type
Final Test Mode:	Through Pre-scan, find the DH1 of data type is the worst case of GFSK modulation type, 2-DH1 of data type is the worst case of $\pi/4$ DQPSK modulation type, 3-DH1 of data type is the worst case of 8DPSK modulation type.
Instruments Used:	Refer to section 5.10 for details
Test Results:	Pass



Measurement Data

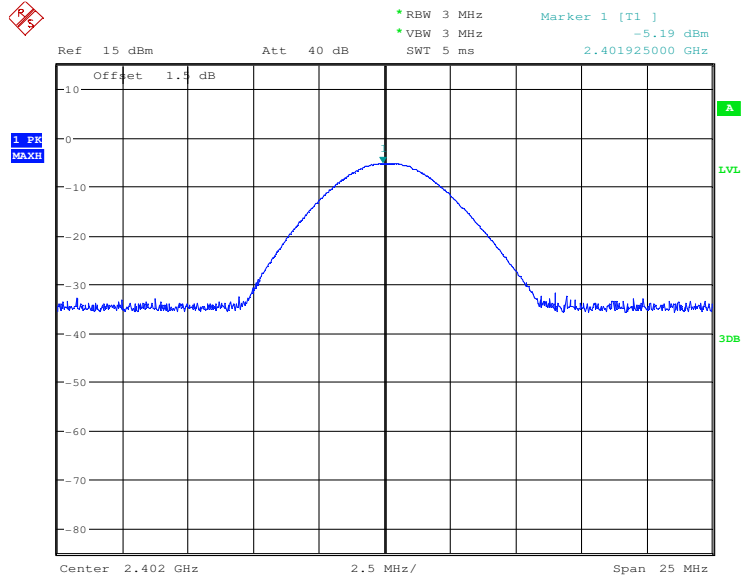
GFSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	-5.19	20.97	Pass
Middle	-4.19	20.97	Pass
Highest	-3.53	20.97	Pass
$\pi/4$ DQPSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	-7.11	20.97	Pass
Middle	-6.22	20.97	Pass
Highest	-5.49	20.97	Pass
8DPSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	-6.66	20.97	Pass
Middle	-5.70	20.97	Pass
Highest	-5.09	20.97	Pass

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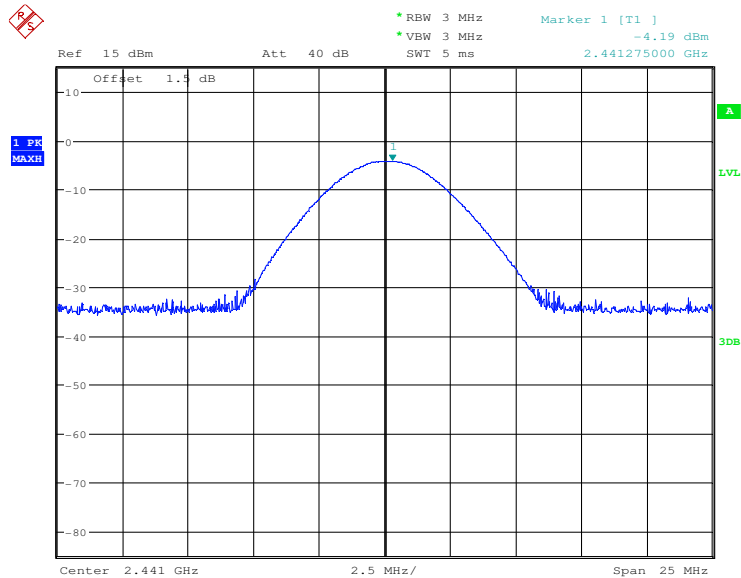


Test plot as follows:

Test mode:	GFSK	Test channel:	Lowest
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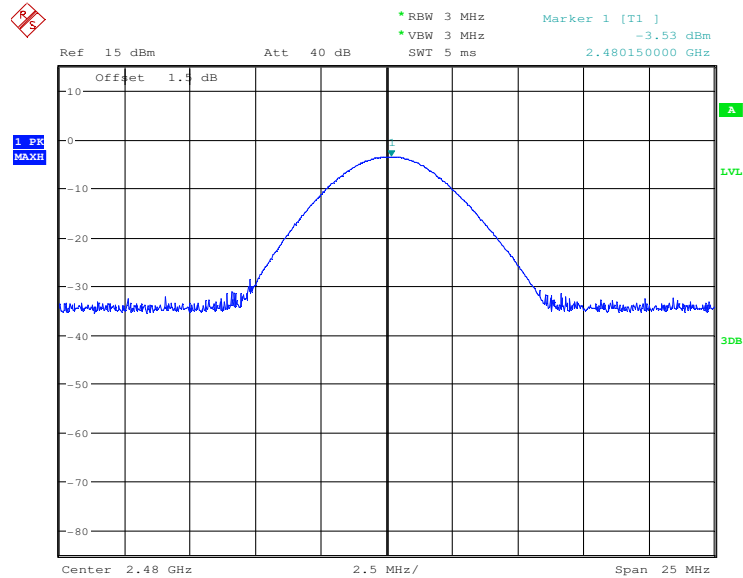
Test mode:	GFSK	Test channel:	Middle
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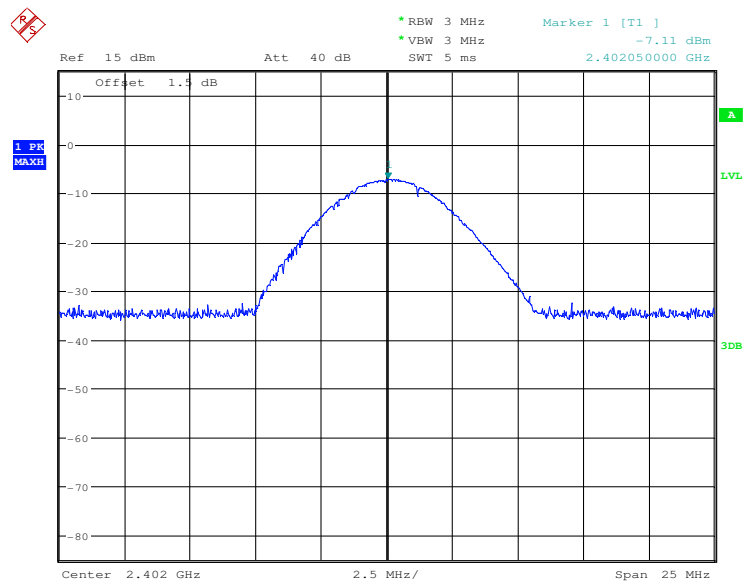
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Test mode:	GFSK	Test channel:	Highest
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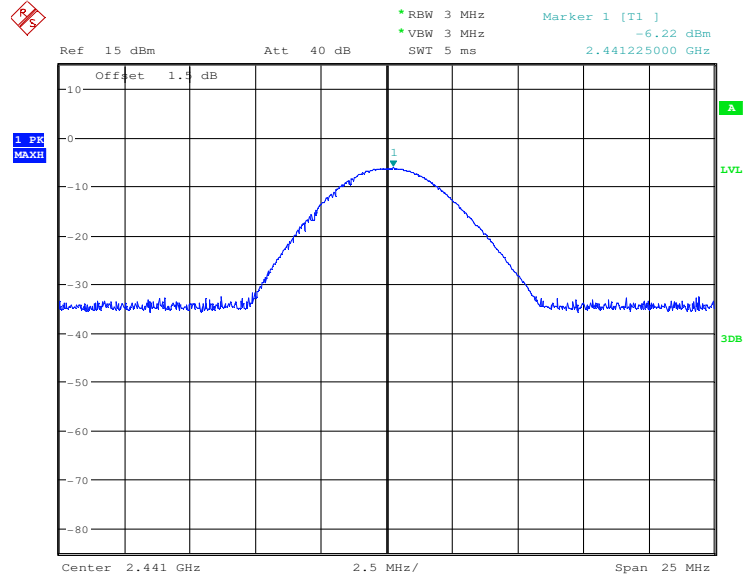
Test mode:	$\pi/4$ DQPSK	Test channel:	Lowest
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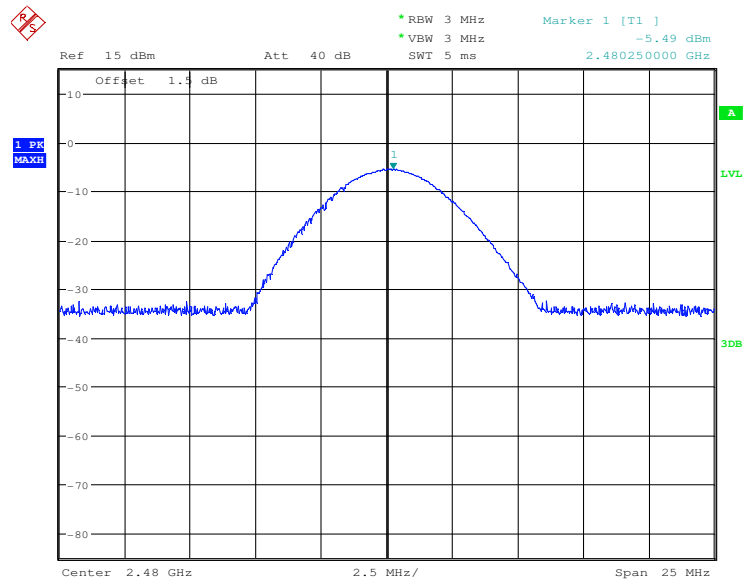
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Test mode:	$\pi/4$ DQPSK	Test channel:	Middle
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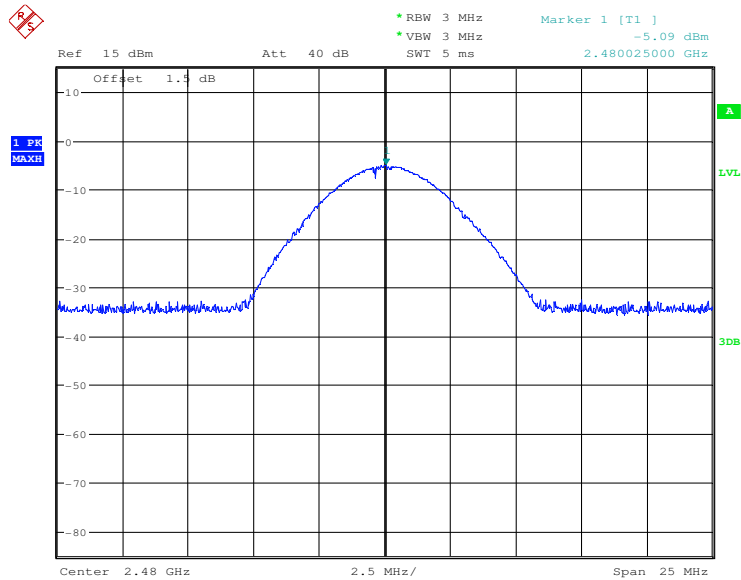
Test mode:	$\pi/4$ DQPSK	Test channel:	Highest
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Test mode:	8DPSK	Test channel:	Highest
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6.3 Radiated Spurious Emission

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205				
Test Method:	ANSI C63.10: 2013				
Test Site:	Measurement Distance: 3m				
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:	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.				

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Test Setup:

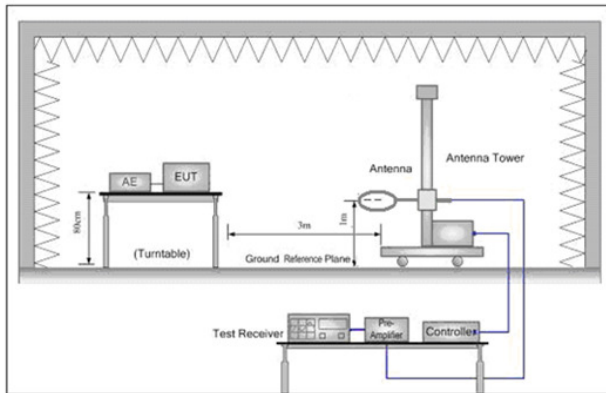


Figure 1. Below 30MHz

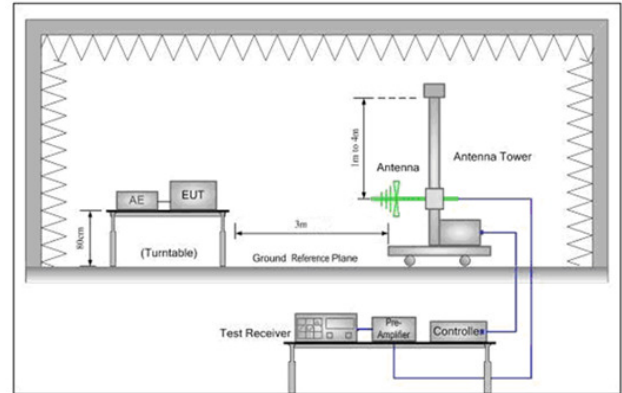


Figure 2. 30MHz to 1GHz

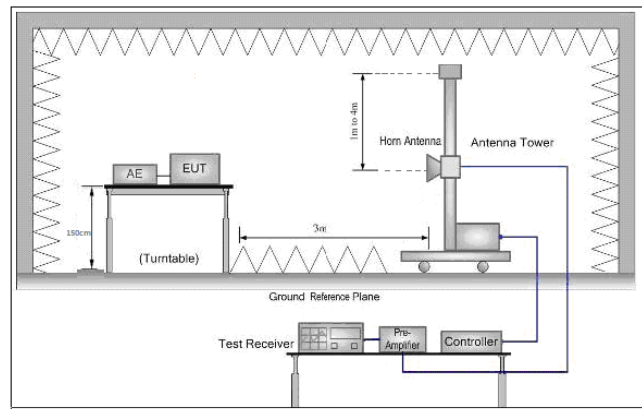


Figure 3. Above 1 GHz

Test Procedure:

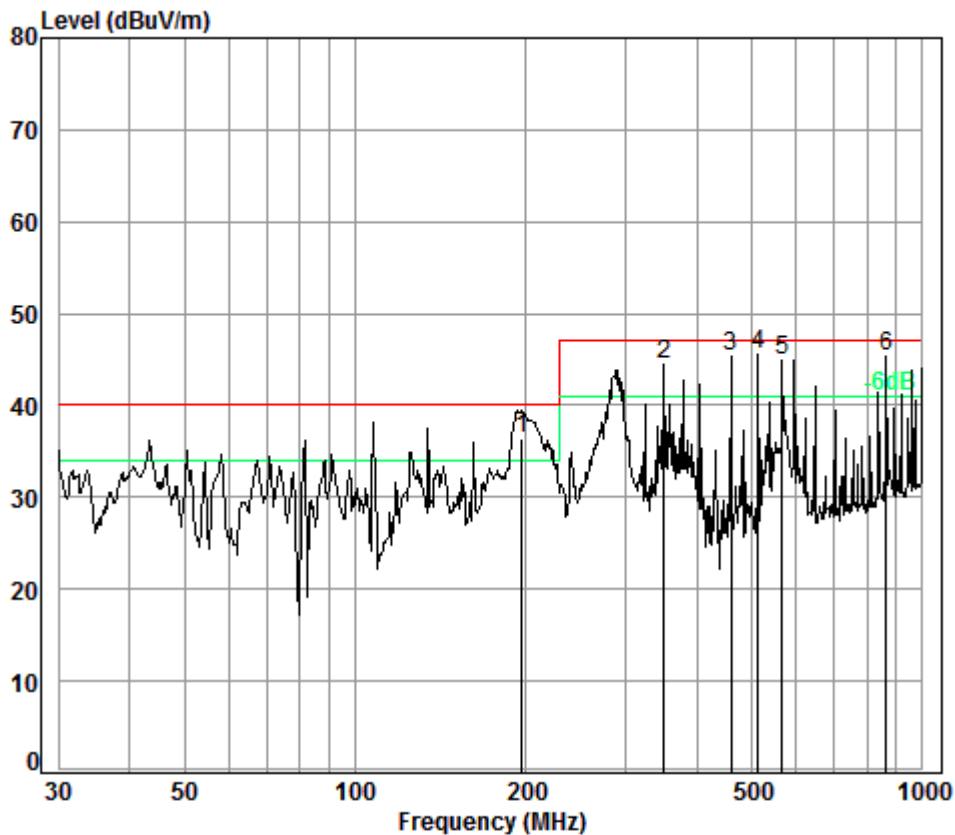
- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. 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



	<p>Bandwidth with Maximum Hold Mode.</p> <p>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.</p> <p>h. Test the EUT in the lowest channel (2402MHz),the middle channel (2441MHz),the Highest channel (2480MHz)</p> <p>i. 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.</p> <p>j. Repeat above procedures until all frequencies measured was complete.</p>
Exploratory Test Mode:	Non-hopping transmitting mode with all kind of modulation and all kind of data type Transmitting mode
Final Test Mode:	Through Pre-scan, find the DH1 of data type and GFSK modulation is the worst case. Pretest the EUT at Transmitting mode, found the Transmitting mode which it is worse case For below 1GHz part, through pre-scan, the worst case is the lowest channel. Only the worst case is recorded in the report.
Instruments Used:	Refer to section 5.10 for details
Test Results:	Pass

6.3.1 Radiated Emission below 1GHz

30MHz~1GHz (QP)		
Test mode:	Transmitting	Vertical



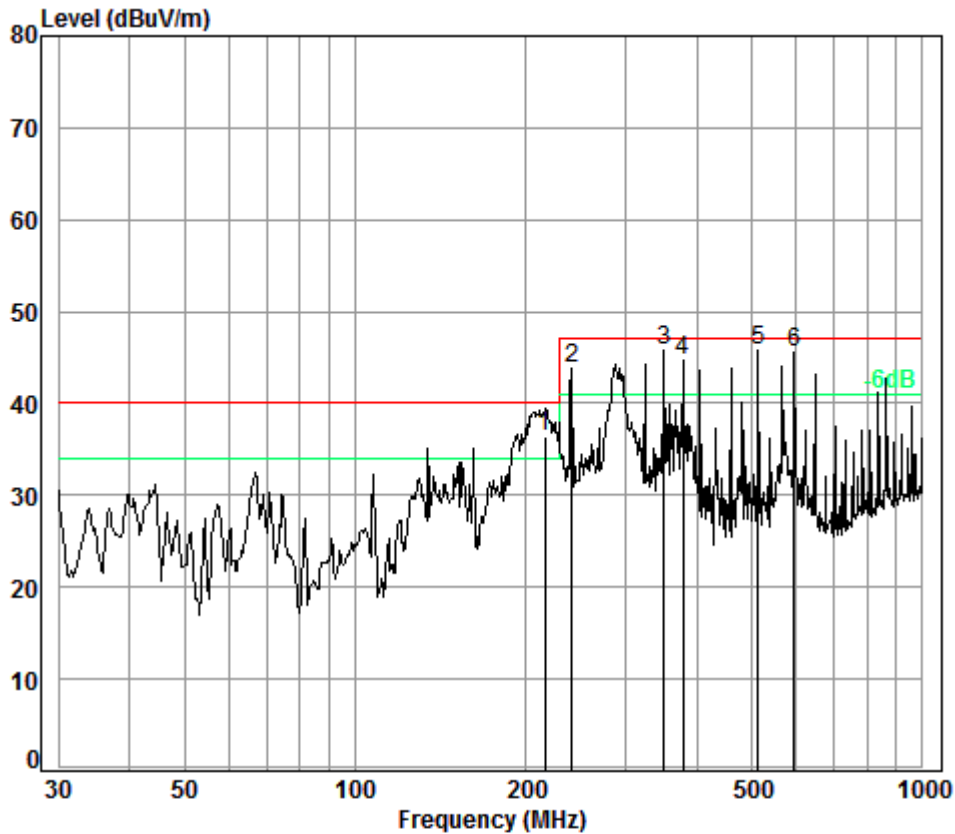
Condition: 3m VERTICAL
 Job No. : 3176CR
 Test Mode: TX mode

	Cable	Ant	Preamp	Read	Limit	Over	
Freq	Loss	Factor	Factor	Level	Level	Line	
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	
1	1.39	10.17	25.78	50.67	36.45	40.00	-3.55
2	2.06	15.51	25.68	52.60	44.49	47.00	-2.51
3	2.45	17.20	25.64	51.28	45.29	47.00	-1.71
4 pp	2.62	18.04	25.62	50.58	45.62	47.00	-1.38
5	2.67	19.00	25.61	48.93	44.99	47.00	-2.01
6	3.46	22.56	25.32	44.70	45.40	47.00	-1.60

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Test mode:	Transmitting	Horizontal
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Condition: 3m HORIZONTAL

Job No. : 3176CR

Test Mode: TX mode

	Freq	Cable Loss	Ant Factor	Preamplifier Factor	Read Level	Limit Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	216.02	1.49	10.99	25.76	49.69	36.41	40.00	-3.59
2	240.83	1.63	11.92	25.74	56.09	43.90	47.00	-3.10
3 pp	350.48	2.06	15.51	25.68	53.91	45.80	47.00	-1.20
4	378.58	2.14	15.97	25.67	52.24	44.68	47.00	-2.32
5	513.63	2.62	18.04	25.62	50.64	45.68	47.00	-1.32
6	595.13	2.70	19.57	25.60	48.96	45.63	47.00	-1.37

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6.3.2 Transmitter Emission above 1GHz

Worse case mode:		GFSK(DH1)		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	
3836.607	32.94	7.75	38.50	45.55	47.74	74	-26.26	Vertical	
4804.000	34.10	8.87	38.75	48.87	53.09	74	-20.91	Vertical	
6087.002	34.74	10.45	38.85	46.13	52.47	74	-21.53	Vertical	
7206.000	35.60	10.68	37.64	42.40	51.04	74	-22.96	Vertical	
9608.000	37.10	12.50	36.35	34.84	48.09	74	-25.91	Vertical	
12566.850	37.87	14.34	37.72	38.48	52.97	74	-21.03	Vertical	
3803.444	32.90	7.74	38.49	46.38	48.53	74	-25.47	Horizontal	
4804.000	34.10	8.87	38.75	48.43	52.65	74	-21.35	Horizontal	
5862.263	34.36	10.18	38.94	46.31	51.91	74	-22.09	Horizontal	
7206.000	35.60	10.68	37.64	42.91	51.55	74	-22.45	Horizontal	
9608.000	37.10	12.50	36.35	36.31	49.56	74	-24.44	Horizontal	
12639.790	37.92	14.55	37.79	38.92	53.60	74	-20.40	Horizontal	

Worse case mode:		GFSK(DH1)		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	
3792.453	32.87	7.74	38.48	45.74	47.87	74	-26.13	Vertical	
4882.000	34.18	8.98	38.77	49.05	53.44	74	-20.56	Vertical	
6104.642	34.75	10.42	38.82	46.49	52.84	74	-21.16	Vertical	
7323.000	35.54	10.72	37.59	41.55	50.22	74	-23.78	Vertical	
9764.000	37.10	12.58	36.14	39.20	52.74	74	-21.26	Vertical	
12639.790	37.92	14.55	37.79	38.16	52.84	74	-21.16	Vertical	
3814.467	32.91	7.75	38.49	45.62	47.79	74	-26.21	Horizontal	
4882.000	34.18	8.98	38.77	48.02	52.41	74	-21.59	Horizontal	
6140.076	34.77	10.38	38.78	45.98	52.35	74	-21.65	Horizontal	
7323.000	35.54	10.72	37.59	41.92	50.59	74	-23.41	Horizontal	
9764.000	37.10	12.58	36.14	39.64	53.18	74	-20.82	Horizontal	
12603.270	37.90	14.44	37.75	38.60	53.19	74	-20.81	Horizontal	

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Worse case mode:		GFSK(DH1)		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		
3825.521	32.93	7.75	38.49	45.94	48.13	74	-25.87	Vertical		
4960.000	34.26	9.09	38.78	48.86	53.43	74	-20.57	Vertical		
6016.949	34.71	10.54	38.94	46.25	52.56	74	-21.44	Vertical		
7440.000	35.60	10.77	37.54	39.46	48.29	74	-25.71	Vertical		
9920.000	37.22	12.67	35.93	39.53	53.49	74	-20.51	Vertical		
12603.270	37.90	14.44	37.75	38.30	52.89	74	-21.11	Vertical		
3803.444	32.90	7.74	38.49	45.49	47.64	74	-26.36	Horizontal		
4960.000	34.26	9.09	38.78	48.09	52.66	74	-21.34	Horizontal		
6034.386	34.72	10.52	38.91	46.47	52.80	74	-21.20	Horizontal		
7440.000	35.60	10.77	37.54	40.11	48.94	74	-25.06	Horizontal		
9920.000	37.22	12.67	35.93	39.51	53.47	74	-20.53	Horizontal		
12566.850	37.87	14.34	37.72	38.46	52.95	74	-21.05	Vertical		

Remark:

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

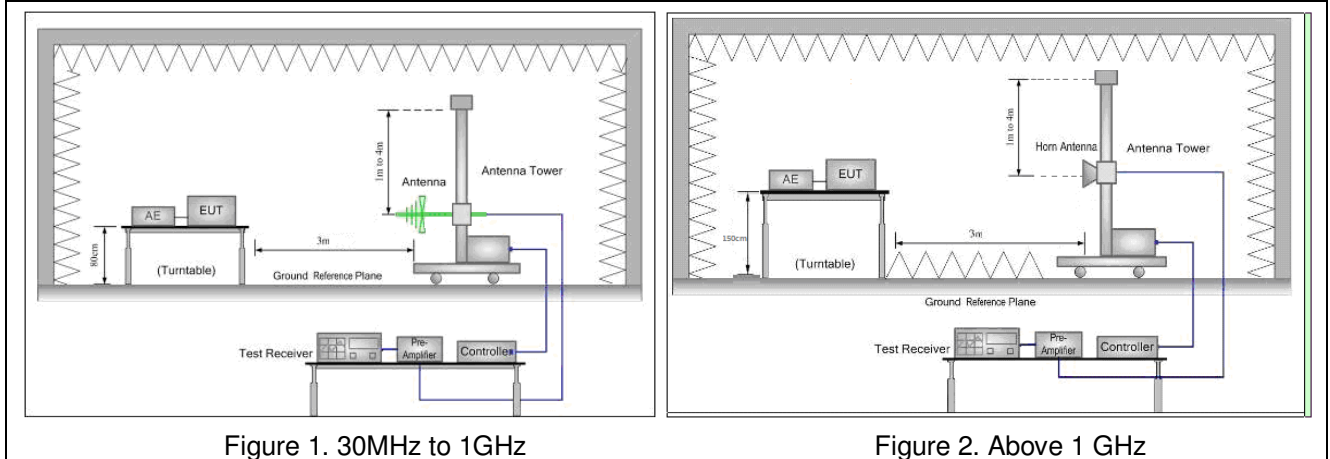


Figure 1. 30MHz to 1GHz

Figure 2. Above 1 GHz

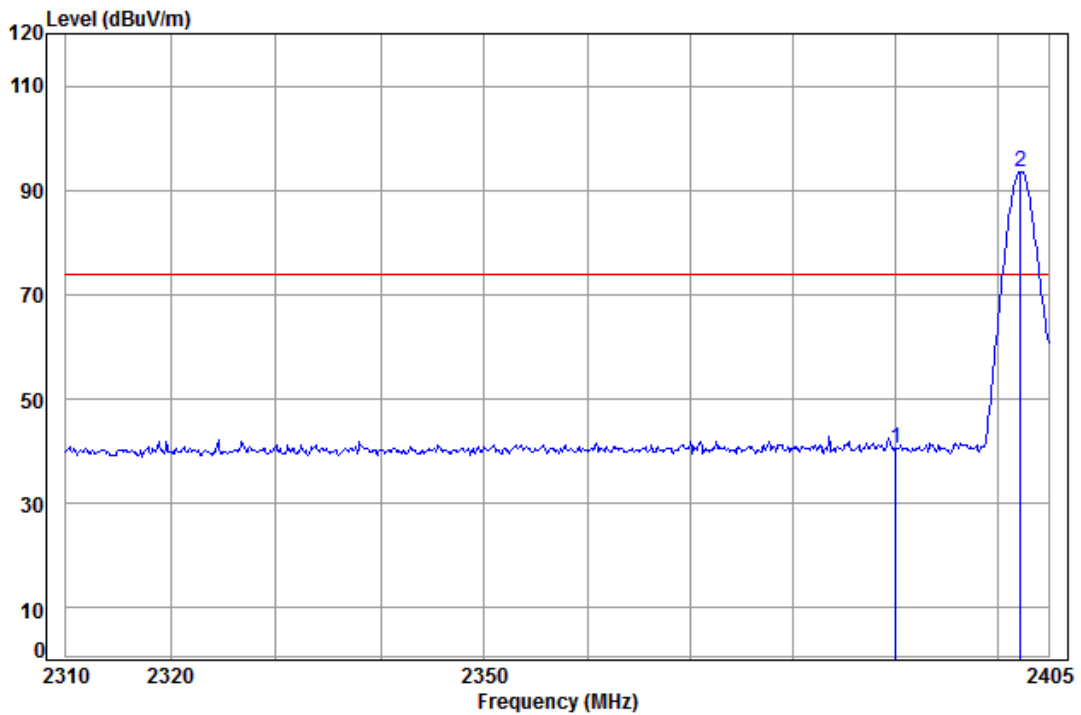


Test Procedure:	<ul style="list-style-type: none"> a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. 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. 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. j. Repeat above procedures until all frequencies measured was complete.
Exploratory Test Mode:	<p>Non-hopping transmitting mode with all kind of modulation and all kind of data type Transmitting mode</p>
Final Test Mode:	<p>Through Pre-scan, find the DH5 of data type and GFSK modulation is the worst case. Pretest the EUT at Transmitting mode, found the Transmitting mode which it is worse case Only the worst case is recorded in the report.</p>
Instruments Used:	<p>Refer to section 5.10 for details</p>
Test Results:	<p>Pass</p>



Test plot as follows:

Worse case mode:	GFSK (DH5)	Test channel:	Lowest	Remark:	Peak	Vertical
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Condition: 3m Vertical

Job No: : 3176CR

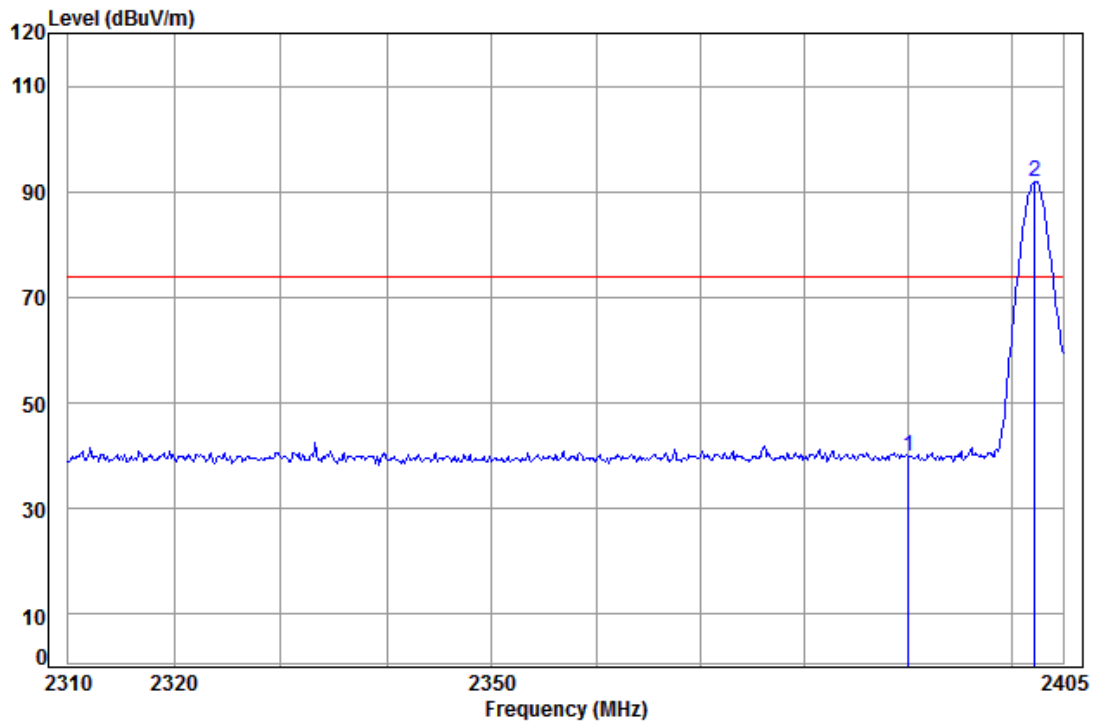
Mode: : 2402 Band edge

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dB
1	2390.00	5.34	28.57	38.11	44.81	74.00	-33.39
2 pp	2402.29	5.35	28.61	38.11	97.77	74.00	19.62

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Worse case mode:	GFSK (DH5)	Test channel:	Lowest	Remark:	Peak	Horizontal
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Condition: 3m Horizontal

Job No: : 3176CR

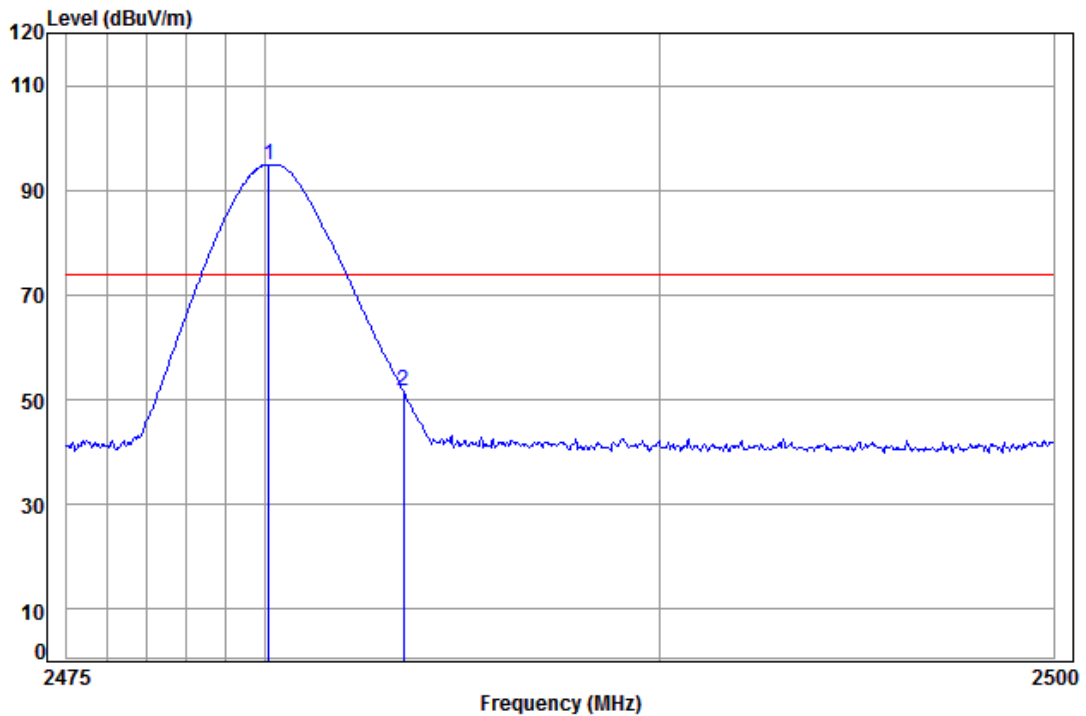
Mode: : 2402 Band edge

	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	44.06	39.86	74.00	-34.14
2 pp	2402.29	5.35	28.61	38.11	95.95	91.80	74.00	17.80

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Worse case mode:	GFSK (DH5)	Test channel:	Highest	Remark:	Peak	Vertical
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Condition: 3m Vertical

Job No: : 3176CR

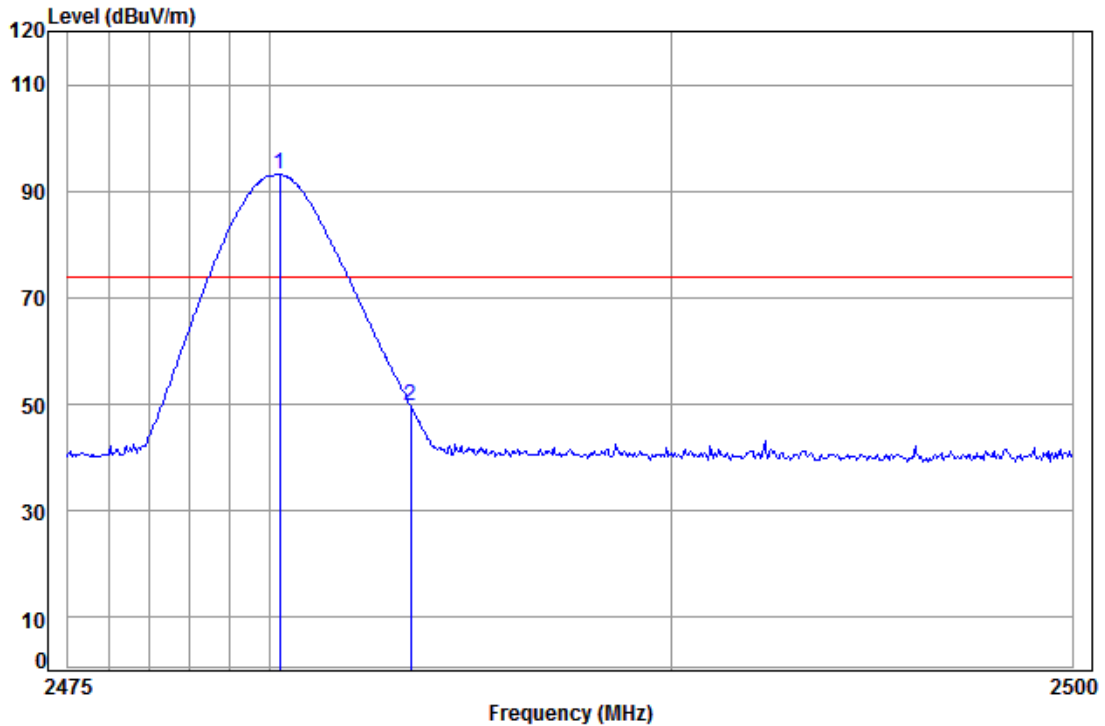
Mode: : 2480 Band edge

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 pp	2480.10	5.41	28.97	38.12	98.64	94.90	74.00	20.90
2	2483.50	5.41	28.98	38.12	55.33	51.60	74.00	-22.40

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Worse case mode:	GFSK (DH5)	Test channel:	Highest	Remark:	Peak	Horizontal
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Condition: 3m Horizontal

Job No: : 3176CR

Mode: : 2480 Band edge

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dB
1 pp	2480.25	5.41	28.97	38.12	96.80	93.06	74.00 19.06
2	2483.50	5.41	28.98	38.12	53.50	49.77	74.00 -24.23

Note:

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

$$\text{Final Test Level} = \text{Receiver Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Preamplifier Factor}$$

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7 Photographs - EUT Test Setup

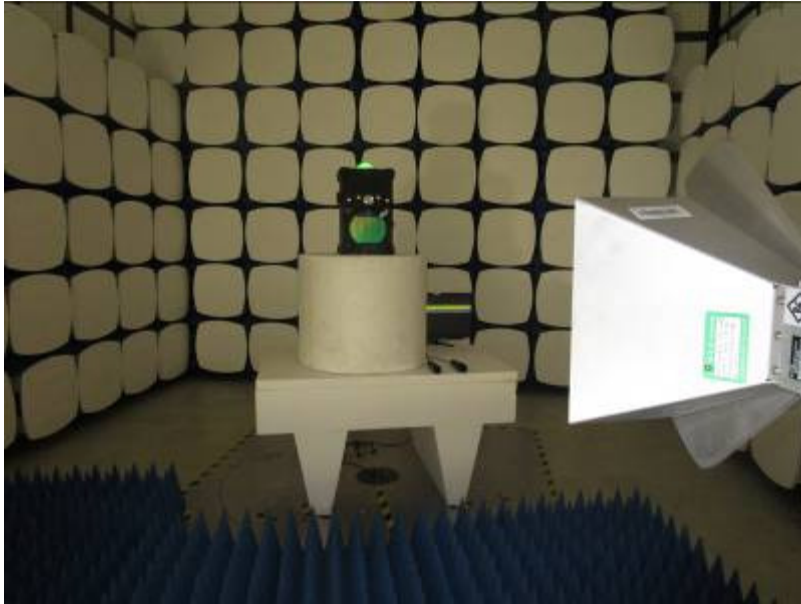
7.1 Conducted Emission



7.2 Radiated Emission



7.3 Radiated Spurious Emission



8 Photographs - EUT Constructional Details

Refer to Appendix A - Photographs of EUT Constructional Details for SZEM1605003176CR.