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TEST REPORT

Application No.:	SZEM1703002122CR(GZEM1703001380CR)
Applicant:	Gibson Innovations Limited
Address of Applicant:	5/F, Philips Electronics Building. 5 Science Park East Avenue, Hong Kong Science Park, Shatin, N.T. Hong Kong
Manufacturer:	Gibson Innovations Limited
Address of Manufacturer:	5/F, Philips Electronics Building. 5 Science Park East Avenue, Hong Kong Science Park, Shatin, N.T. Hong Kong
Factory:	Minami Acoustics Limited
Address of Factory:	NO.13, Maonan Road, Torch Development District, Zhongshan City, Guangdong Province, China.
Equipment Under Test (EUT):	
EUT Name:	Bluetooth Headphones
Model No.:	SHB5250, SHB5250/XX, SHB5250YY/XX,(YY=AA to ZZ;XX=00 to 99). SHQ6500, SHQ6500/XX, SHQ6500YY/XX,(YY=AA to ZZ;XX=00 to 99). ♣
♣	Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.
Trade mark:	Philips
FCC ID:	2AANUSHB5250
Standards:	47 CFR Part 15, Subpart C 15.247 (2016) (only for Conducted Peak Output Power, Radiated Spurious Emissions and Radiated Emissions which fall in the restricted bands)
Date of Receipt:	2017-03-20
Date of Test:	2017-03-22 to 2017-03-30
Date of Issue:	2017-04-15
Test Result :	**Pass***

* In the configuration tested, the EUT complied with the standards specified above.

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.

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Revision Record				
Version	***Chapter***	***Date***	***Modifier***	***Remark***
01		*2017-04-15*		*Original*

Authorized for issue by:				
Tested By		Benson Wang **Benson Wang /Project Engineer**		2017-03-30 **Date**
Checked By		Eric Fu **Eric Fu /Reviewer**		2017-04-15 **Date**

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2 Test Summary

Radio Spectrum Matter Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.5	47 CFR Part 15, Subpart C 15.247(b)(1)	Pass
Radiated Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.4,6.5,6.6	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass

Remark:

Model No.: SHB5250, SHB5250/XX, SHB5250YY/XX,(YY=AA to ZZ;XX=00 to 99).

SHQ6500, SHQ6500/XX, SHQ6500YY/XX,(YY=AA to ZZ;XX=00 to 99).

Only the model SHB5250 was tested, since the electrical circuit design, layout, components used, internal wiring and functions were identical for all the above models, only different on model No., outer shape, outer colour and loudspeaker.

This test report (Ref. No.: SZEM151100719403) is only valid with the original test report (Ref. No.: SZEM151100719401).

According to the declaration from the applicant, the new product added the IC protection circuit.

Additionally, updated the below standards.

Original report standard	The newest report standard
47 CFR Part 15, Subpart C (2014)	47 CFR Part 15, Subpart C 15.247 (2016)

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 Conducted Peak Output Power, Radiated Spurious Emissions and Radiated Emissions which fall in the restricted bands were fully retested on Model SHB5250 and shown the data in this report, other tests please refer to original report SZEM151100719401.

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4 General Information

4.1 Details of E.U.T.

Frequency Range:	2402MHz to 2480MHz
Bluetooth Version:	V4.1 Classic mode
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, π/4DQPSK, 8DPSK
Number of Channels:	79
Hopping Channel Type:	Adaptive Frequency Hopping systems
Sample Type:	Portable production
Antenna Type:	Integral
Antenna Gain:	0dBi
Power Supply:	Internal rechargeable battery: DC 3.7V 120mAh Battery: Charge by USB DC 5V
Cable:	USB cable: 30cm unshielded

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Adapter	Apple	A1357 W010A051	REF. No.SEA0500

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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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4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.25 x 10-8
2	Duty cycle	0.37%
3	Occupied Bandwidth	3%
4	RF conducted power	0.75dB
5	RF power density	2.84dB
6	Conducted Spurious emissions	0.75dB
7	RF Radiated power	4.5dB (below 1GHz)
		4.8dB (above 1GHz)
8	Radiated Spurious emission test	4.5dB (30MHz-1GHz)
		4.8dB (1GHz-18GHz)
9	Temperature test	1℃
10	Humidity test	3%
11	Supply voltages	1.5%
12	Time	3%

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4.4 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.

4.5 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 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.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

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5 Equipment List

RE in Chamber						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No**	**Cal. Date (yyyy-mm-dd)**	**Cal. Due date (yyyy-mm-dd)**
1	10m Semi-Anechoic Chamber	SAEMC	FSAC1018	SEM001-03	2016-05-13	2017-05-13
2	EMI Test Receiver (9k-7GHz)	Rohde & Schwarz	ESR	SEM004-03	2016-04-25	2017-04-25
3	Trilog-Broadband Antenna(30M-1GHz)	Schwarzbeck	VULB9168	SEM003-18	2016-06-29	2019-06-29
4	Pre-amplifier	Sonoma Instrument Co	310N	SEM005-03	2016-07-06	2017-07-06
5	Loop Antenna	ETS-Lindgren	6502	SEM003-08	2015-08-14	2018-08-14

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	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

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

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General used equipment						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal. Date (yyyy-mm-dd)**	**Cal. Due date (yyyy-mm-dd)**
1	Humidity/ Temperature Indicator	Anymetre	TH101B	SEM002-11	2016-07-23	2017-07-23
2	Humidity/ Temperature Indicator	Mingle	N/A	SEM002-12	2016-10-12	2017-10-12
3	Humidity/ Temperature Indicator	Mingle	N/A	SEM002-13	2016-10-12	2017-10-12
4	Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2016-05-18	2017-05-18

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6 Radio Spectrum Matter Test Results

6.1 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(1)
Test Method: ANSI C63.10 (2013) Section 7.8.5
Limit:

Frequency range(MHz)	Output power of the intentional radiator(watt)
902-928	1 for ≥50 hopping channels
	0.25 for 25≤ hopping channels <50
	1 for digital modulation
2400-2483.5	1 for ≥75 non-overlapping hopping channels
	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

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6.1.1 E.U.T. Operation

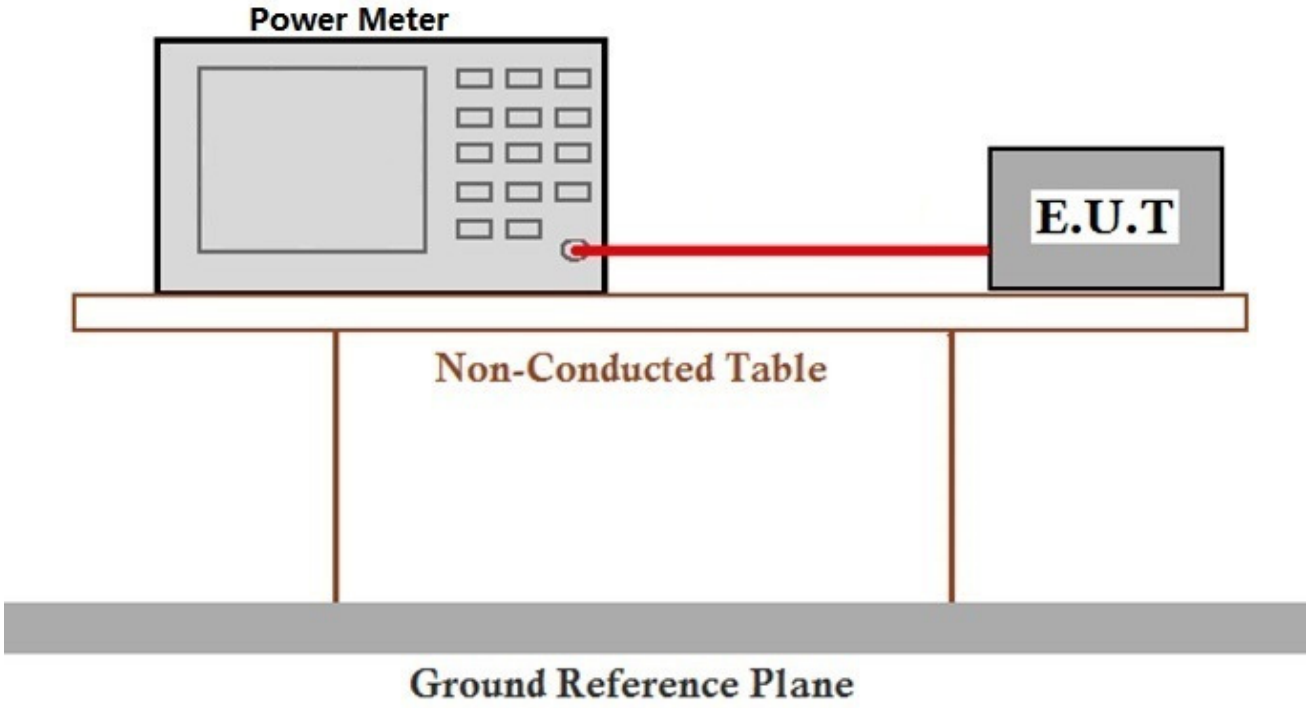
Operating Environment:

Temperature: 23.0 °C Humidity: 56 % RH Atmospheric Pressure: 1015 mbar

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 π/4DQPSK modulation type, 3-DH1 of data type is the worst case of 8DPSK modulation type.

6.1.2 Test Setup Diagram



6.1.3 Measurement Data

The detailed test data see: Appendix 15.247

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6.2 Radiated Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209
Test Method: ANSI C63.10 (2013) Section 6.4,6.5,6.6
Measurement Distance: 10m for below 1GHz; 3m for above 1GHz
Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3
Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, 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.		

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6.2.1 E.U.T. Operation

Operating Environment:

Temperature: 25.0 °C Humidity: 50 % RH Atmospheric Pressure: 1015 mbar

Exploratory Test Mode: Non-hopping transmitting mode with all kind of modulation and all kind of data type

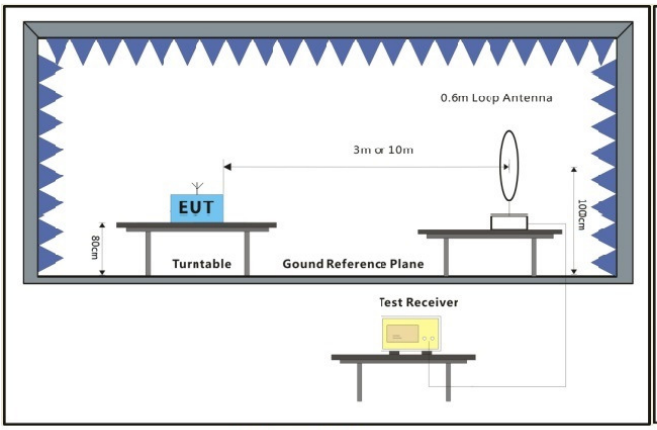
a: Transmitting mode

Final Test Mode: Through Pre-scan, find the 3-DH1 of data type and 8DPSK modulation is the worst case.

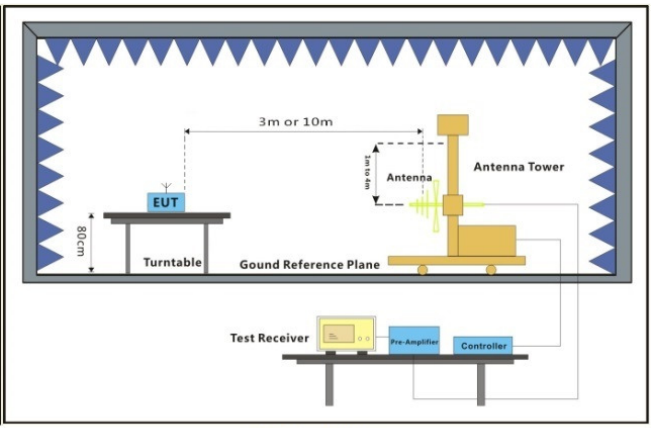
For below 1GHz part, through pre-scan, the worst case is the lowest channel.

Only the worst case is recorded in the report.

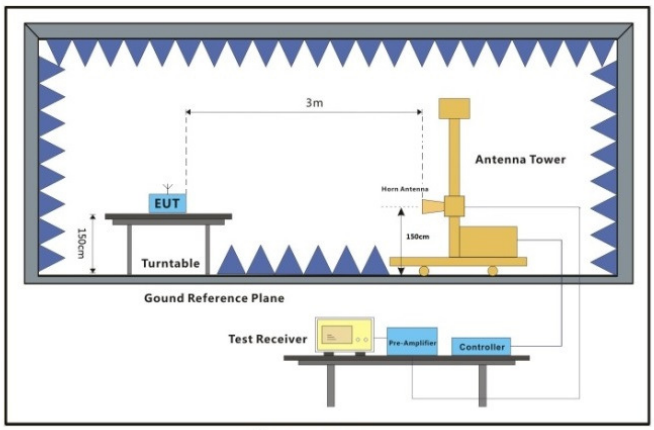
6.2.2 Test Setup Diagram



Below 30MHz



30MHz-1GHz



Above 1GHz

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6.2.3 Measurement Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 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 fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. Test the EUT in the lowest channel,the middle channel,the Highest channel.

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

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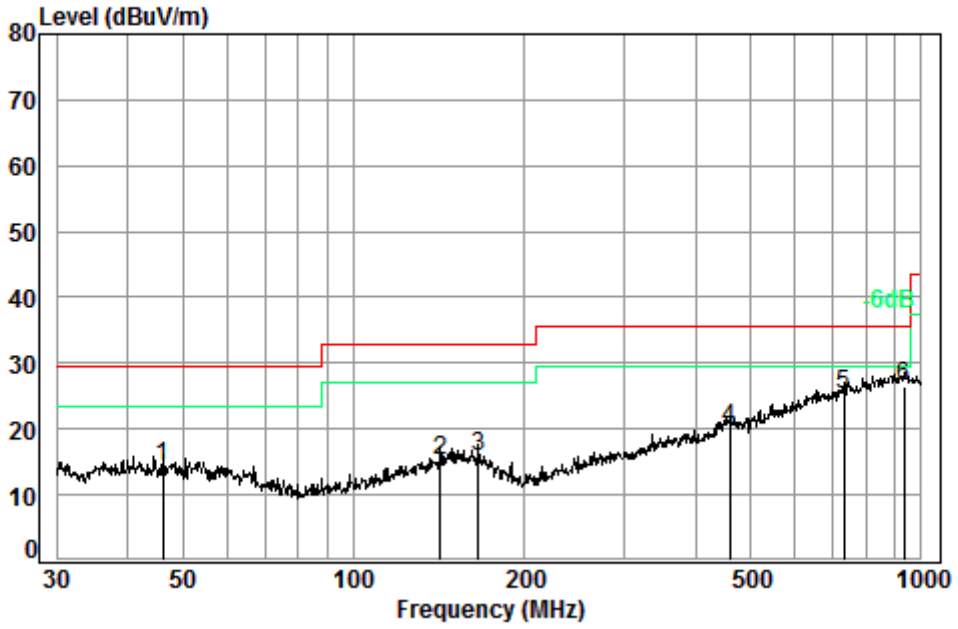
For below 1GHz:

Mode:a;Polarization:Vertical



Condition: 10m VERTICAL
Job No. : 02122CR
Test Mode: TX mode

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	46.18	6.82	12.87	33.00	27.57	14.26	29.50	-15.24
2	142.32	7.41	12.92	32.75	27.70	15.28	33.00	-17.72
3	166.07	7.50	12.79	32.73	28.20	15.76	33.00	-17.24
4	459.11	8.45	16.28	32.60	27.90	20.03	35.60	-15.57
5	731.92	9.20	20.55	32.60	28.02	25.17	35.60	-10.43
6 pp	932.27	9.53	22.61	32.50	26.94	26.58	35.60	-9.02

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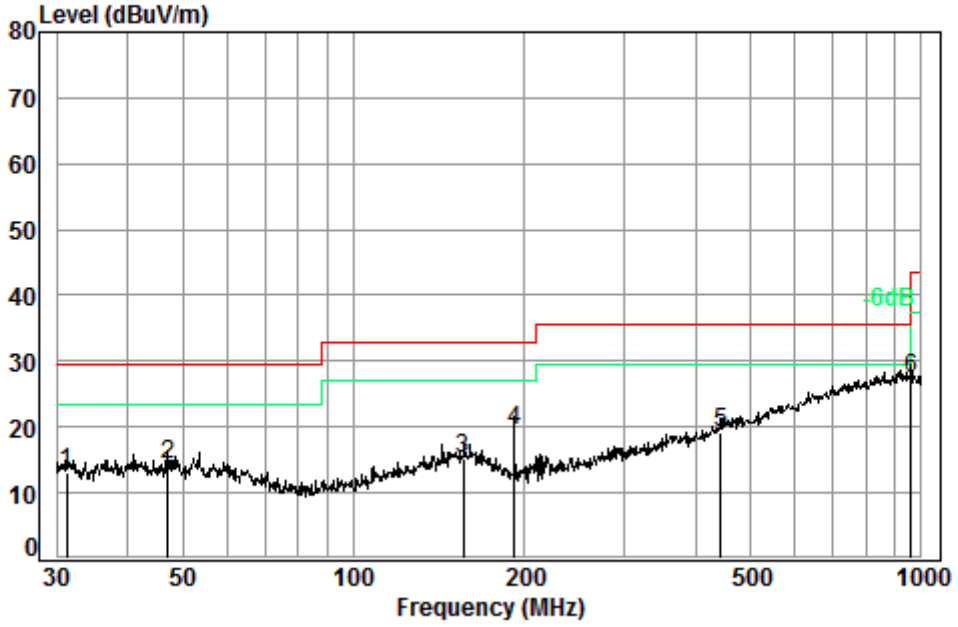
Mode:a;Polarization:Horizontal



Condition: 10m HORIZONTAL
Job No. : 02122CR
Test Mode: TX mode

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	31.29	6.70	12.52	32.97	26.77	13.02	29.50	-16.48
2	47.16	6.84	12.85	33.00	27.58	14.27	29.50	-15.23
3	156.46	7.48	13.40	32.74	27.14	15.28	33.00	-17.72
4	191.75	7.56	9.70	32.71	35.05	19.60	33.00	-13.40
5	443.29	8.41	16.01	32.60	27.39	19.21	35.60	-16.39
6 pp	958.79	9.60	22.76	32.50	27.62	27.48	35.60	-8.12

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The test was performed at a 10m test site. According to below formulate and the test data at 10m test distance,

$L_3 / L_{10} = D_{10} / D_3$

Note:

L_3: Level @ 3m distance. Unit: uV/m;

L_{10}: Level @ 10m distance. Unit: uV/m;

D_3: 3m distance. Unit: m

D_{10}: 10m distance. Unit: m

The level at 3m test distance is below:

Frequency (MHz)	Level @ 10m (dBuV/m)	Level @ 10m (uV/m)	Level @ 3m (uV/m)	Level @ 3m (dBuV/m)	Limit @ 3m (dBuV/m)	Margin (dB)	Ant. Polarization
46.18	14.26	5.16	17.21	24.72	40.00	-15.28	V
142.32	15.28	5.81	19.36	25.74	43.50	-17.76	V
166.07	15.76	6.14	20.46	26.22	43.50	-17.28	V
459.11	20.03	10.03	33.45	30.49	46.00	-15.51	V
731.92	25.17	18.13	60.45	35.63	46.00	-10.37	V
932.27	26.58	21.33	71.10	37.04	46.00	-8.96	V
31.29	13.02	4.48	14.92	23.48	40.00	-16.52	H
47.16	14.27	5.17	17.23	24.73	40.00	-15.27	H
156.46	15.28	5.81	19.36	25.74	43.50	-17.76	H
191.75	19.60	9.55	31.83	30.06	43.50	-13.44	H
443.29	19.21	9.13	30.44	29.67	46.00	-16.33	H
958.79	27.48	23.66	78.86	37.94	46.00	-8.06	H

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For Above 1GHz:

Mode: a; Polarization:Horizontal; Modulation Type:8DPSK; Channel:Low; Detector: Peak

Frequency (MHz)	Antenna factors (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading Level (dB V)	Level (dB V/m)	Limit (dB V/m)	Over limit (dB)
3856.668	33.22	6.59	37.99	45.22	47.04	74	-26.96
4804.000	34.16	7.73	38.40	46.18	49.67	74	-24.33
6001.626	34.70	8.75	38.30	45.34	50.49	74	-23.51
7206.000	36.42	9.65	37.11	43.64	52.60	74	-21.40
9608.000	37.52	11.06	35.10	40.36	53.84	74	-20.16
12255.220	38.75	12.78	36.21	38.35	53.67	74	-20.33

Mode: a; Polarization:Vertical; Modulation Type:8DPSK; Channel:Low; Detector: Peak

Frequency (MHz)	Antenna factors (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading Level (dB V)	Level (dB V/m)	Limit (dB V/m)	Over limit (dB)
3856.668	33.22	6.59	37.99	44.39	46.21	74	-27.79
4804.000	34.16	7.73	38.40	45.39	48.88	74	-25.12
6142.019	34.82	8.84	38.16	45.62	51.12	74	-22.88
7206.000	36.42	9.65	37.11	44.13	53.09	74	-20.91
9608.000	37.52	11.06	35.10	39.57	53.05	74	-20.95
12397.740	38.84	12.99	36.55	37.45	52.73	74	-21.27

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Mode: a; Polarization:Horizontal; Modulation Type:8DPSK; Channel:middle; Detector: Peak

Frequency (MHz)	Antenna factors (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading Level (dB V)	Level (dB V/m)	Limit (dB V/m)	Over limit (dB)
3845.537	33.19	6.58	37.98	44.65	46.44	74	-27.56
4882.000	34.30	7.84	38.44	45.39	49.09	74	-24.91
5830.640	34.60	8.59	38.33	44.95	49.81	74	-24.19
7323.000	36.37	9.73	37.01	43.41	52.50	74	-21.50
9764.000	37.55	11.21	35.02	39.68	53.42	74	-20.58
12219.850	38.73	12.73	36.13	37.81	53.14	74	-20.86

Mode: a; Polarization:Vertical; Modulation Type:8DPSK; Channel:middle; Detector: Peak

Frequency (MHz)	Antenna factors (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading Level (dB V)	Level (dB V/m)	Limit (dB V/m)	Over limit (dB)
3969.767	33.52	6.68	38.00	44.12	46.32	74	-27.68
4882.000	34.30	7.84	38.44	45.09	48.79	74	-25.21
6124.292	34.80	8.83	38.18	44.52	49.97	74	-24.03
7323.000	36.37	9.73	37.01	42.89	51.98	74	-22.02
9764.000	37.55	11.21	35.02	39.75	53.49	74	-20.51
12469.610	38.88	13.10	36.73	37.75	53.00	74	-21.00

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Mode: a; Polarization:Horizontal; Modulation Type:8DPSK; Channel:High; Detector: Peak

Frequency (MHz)	Antenna factors (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading Level (dB V)	Level (dB V/m)	Limit (dB V/m)	Over limit (dB)
3661.149	32.67	6.43	37.97	44.11	45.24	74	-28.76
4960.000	34.43	7.95	38.48	45.32	49.22	74	-24.78
6142.019	34.82	8.84	38.16	44.25	49.75	74	-24.25
7440.000	36.32	9.81	36.90	42.44	51.67	74	-22.33
9920.000	37.58	11.36	34.94	38.99	52.99	74	-21.01
12326.270	38.80	12.89	36.38	37.49	52.80	74	-21.20

Mode: a; Polarization:Vertical; Modulation Type:8DPSK; Channel:High; Detector: Peak

Frequency (MHz)	Antenna factors (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading Level (dB V)	Level (dB V/m)	Limit (dB V/m)	Over limit (dB)
3845.537	33.19	6.58	37.98	43.46	45.25	74	-28.75
4960.000	34.43	7.95	38.48	44.46	48.36	74	-25.64
6583.209	35.34	9.14	37.72	42.99	49.75	74	-24.25
7440.000	36.32	9.81	36.90	42.78	52.01	74	-21.99
9920.000	37.58	11.36	34.94	39.05	53.05	74	-20.95
12361.950	38.82	12.94	36.47	37.76	53.05	74	-20.95

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.

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6.3 Radiated Emissions which fall in the restricted bands

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

6.3.1 E.U.T. Operation

Operating Environment:

Temperature: 24.0 °C Humidity: 56 % RH Atmospheric Pressure: 1015 mbar

Exploratory Test Mode: Non-hopping transmitting mode with all kind of modulation and all kind of data type

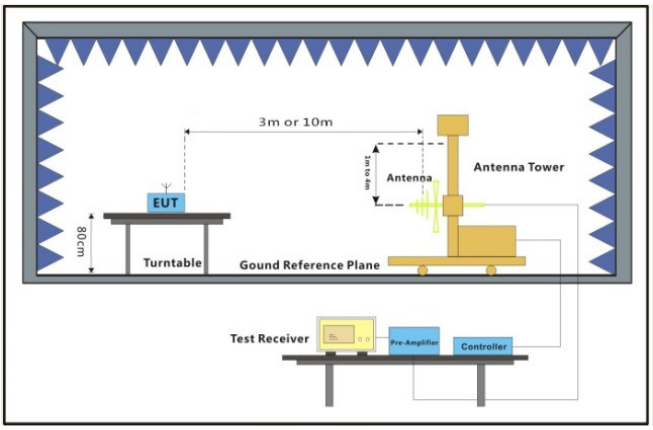
a: Transmitting mode

Final Test Mode: Through Pre-scan, find the 3-DH5 of data type and 8DPSK modulation is the worst case.

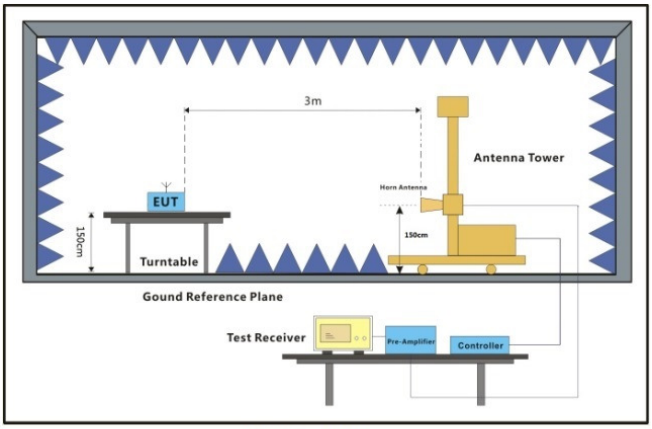
For below 1GHz part, through pre-scan, the worst case is the lowest channel.

Only the worst case is recorded in the report.

6.3.2 Test Setup Diagram



30MHz-1GHz



Above 1GHz

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6.3.3 Measurement Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 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 fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. Test the EUT in the lowest channel,the middle channel,the Highest channel.

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

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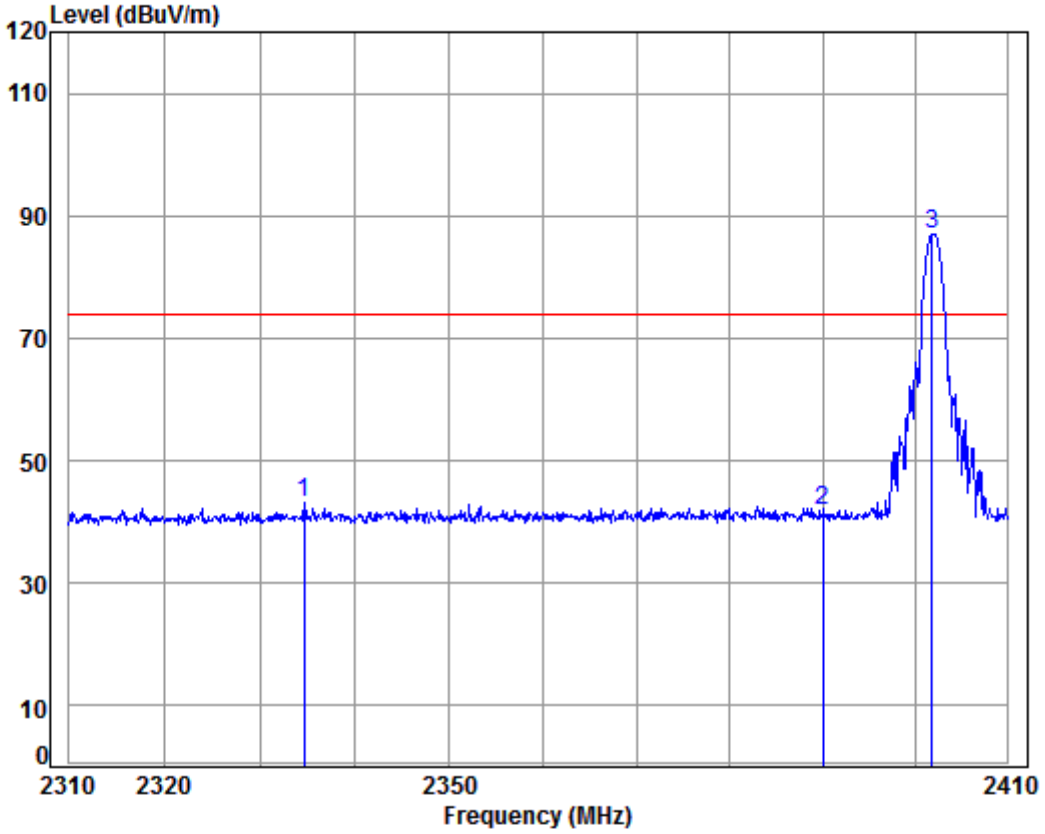
Mode:a; Polarization:Horizontal; Modulation Type:8DPSK; Channel:Low



Condition: 3m HORIZONTAL
Job No: : 02122CR
Mode: : 2402 Bandedge
: BT

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2334.703	5.29	28.91	37.97	46.81	43.04	74.00	-30.96	Peak
2	2390.000	5.34	29.08	37.96	45.25	41.71	74.00	-32.29	Peak
3 pp	2401.843	5.35	29.11	37.96	90.43	86.93	74.00	12.93	Peak

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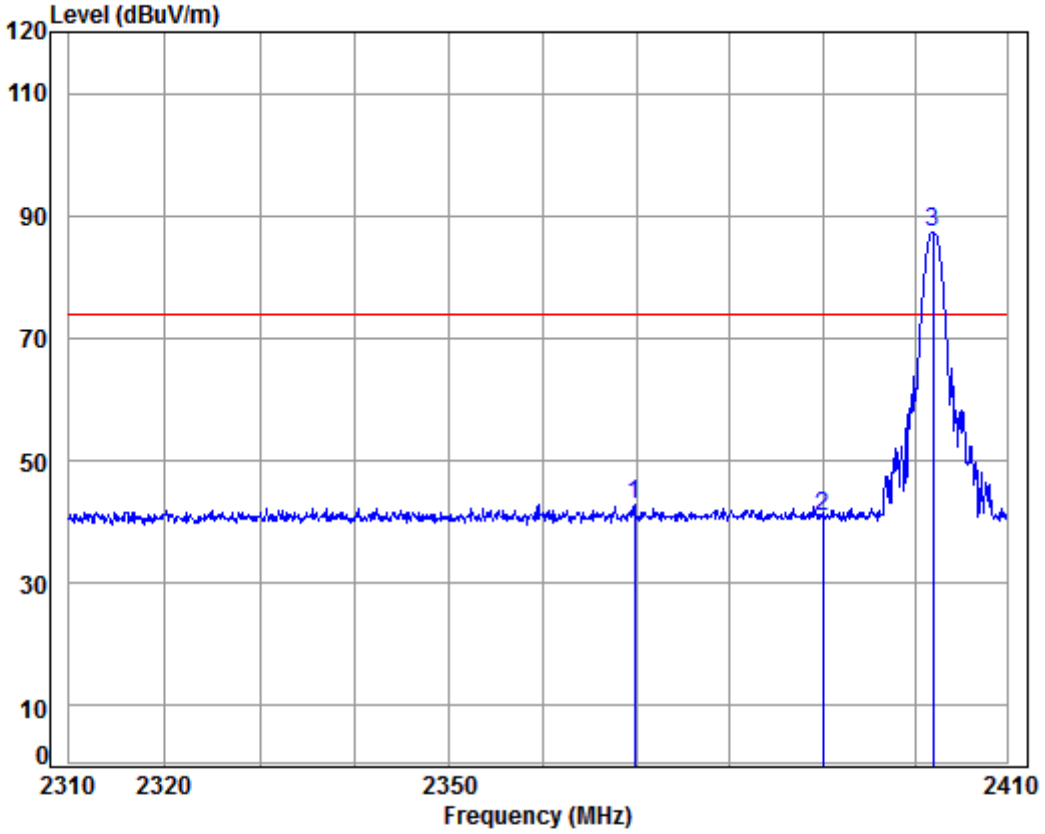
Mode:a; Polarization:Vertical; Modulation Type:8DPSK; Channel:Low



Condition: 3m VERTICAL
Job No: : 02122CR
Mode: : 2402 Bandedge
: BT

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2369.792	5.32	29.02	37.96	46.50	42.88	74.00	-31.12	Peak
2	2390.000	5.34	29.08	37.96	44.39	40.85	74.00	-33.15	Peak
3 pp	2401.945	5.35	29.11	37.96	90.74	87.24	74.00	13.24	Peak

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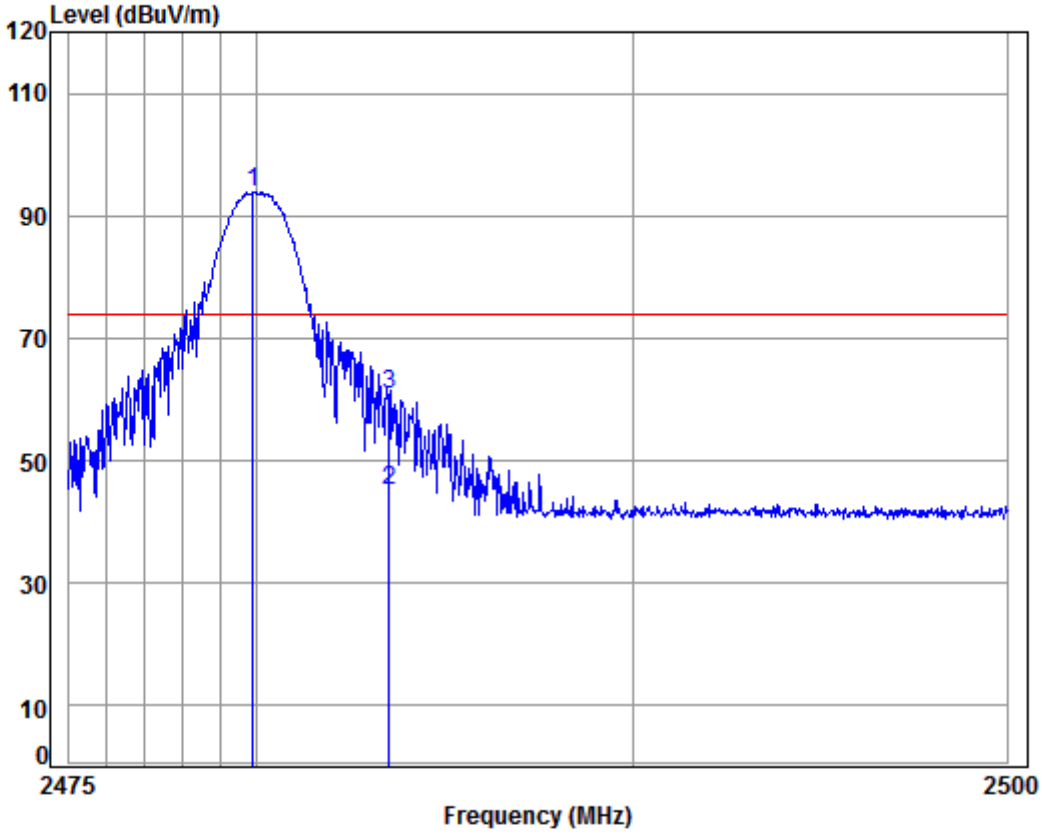
Mode:a; Polarization:Horizontal; Modulation Type:8DPSK; Channel:High



Condition: 3m HORIZONTAL
Job No: : 02122CR
Mode: : 2480 Bandedge
: BT

		Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
		MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	pp	2479.880	5.41	29.34	37.95	96.98	93.78	74.00	19.78	Peak
2	av	2483.500	5.41	29.35	37.95	48.17	44.98	54.00	-9.02	Average
3		2483.500	5.41	29.35	37.95	63.88	60.69	74.00	-13.31	Peak

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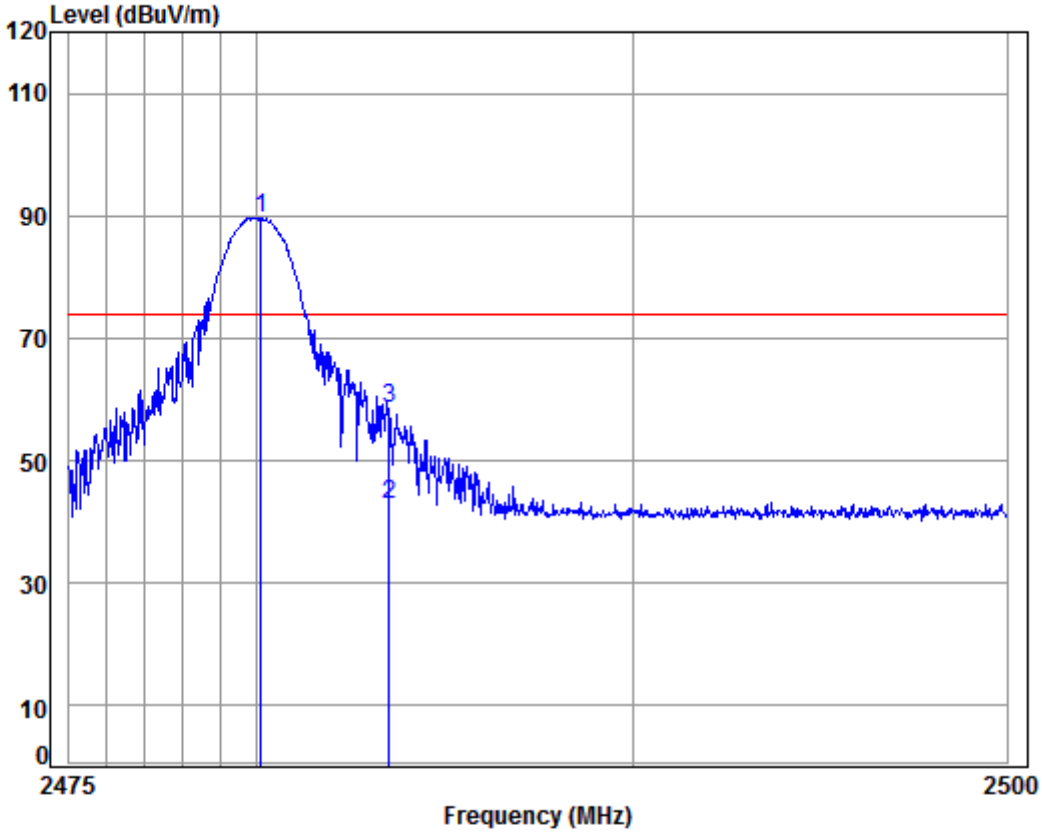
Mode:a; Polarization:Vertical; Modulation Type:8DPSK; Channel:High



Condition: 3m VERTICAL
Job No: : 02122CR
Mode: : 2480 Bandedge
: BT

		Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
		MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	pp	2480.104	5.41	29.34	37.95	92.94	89.74	74.00	15.74	Peak
2	av	2483.500	5.41	29.35	37.95	46.15	42.96	54.00	-11.04	Average
3		2483.500	5.41	29.35	37.95	61.58	58.39	74.00	-15.61	Peak

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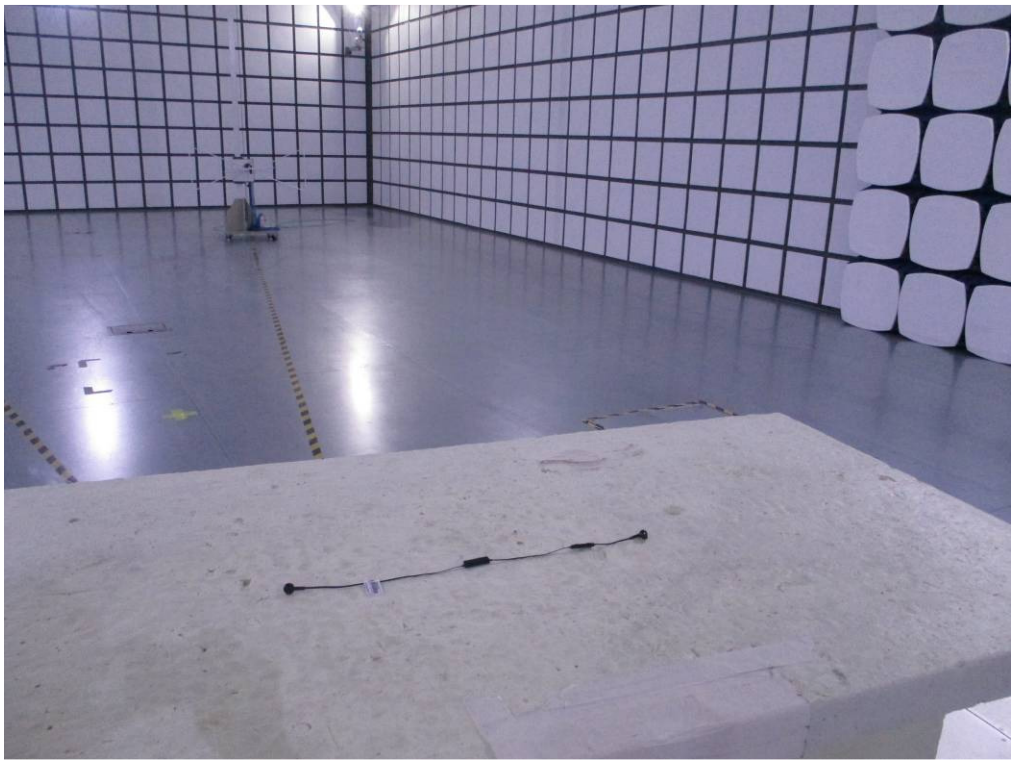
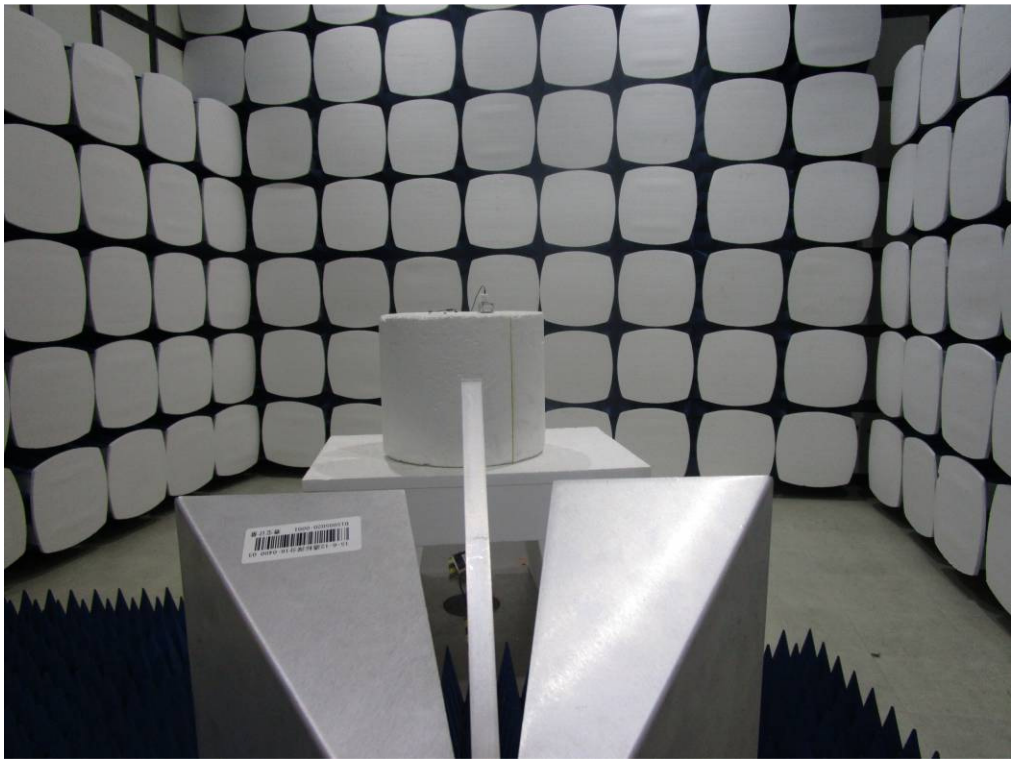
7 Photographs

7.1 Radiated Spurious Emissions Test Setup





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8 Appendix

8.1 Appendix 15.247

2.Conducted Peak Output Power

Test Mode	Test Channel	Power[dBm]	Limit[dBm]	Verdict
DH5	2402	0.71	<30	PASS
DH5	2441	1.33	<30	PASS
DH5	2480	1.7	<30	PASS
2DH5	2402	0.93	<30	PASS
2DH5	2441	1.49	<30	PASS
2DH5	2480	1.81	<30	PASS
3DH5	2402	1.16	<30	PASS
3DH5	2441	1.75	<30	PASS
3DH5	2480	2.1	<30	PASS

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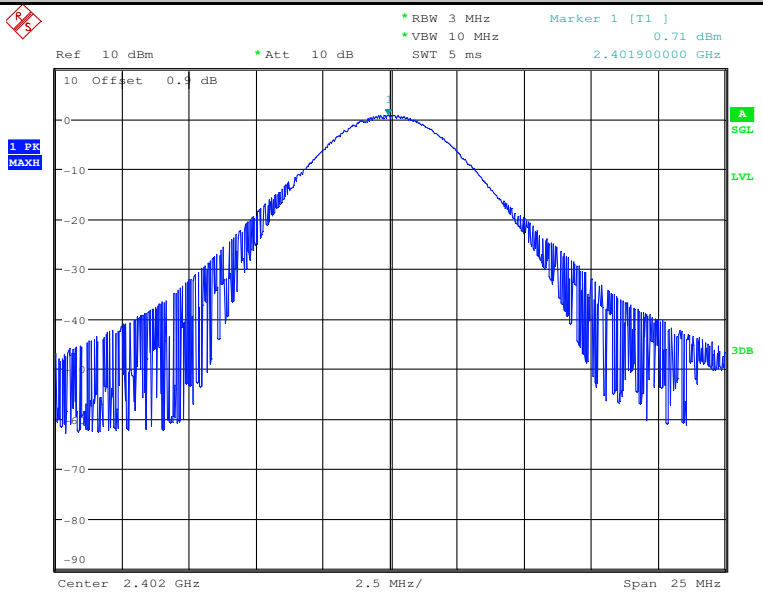
TEST PLOT

Conducted Peak Output Power_DH5_2402



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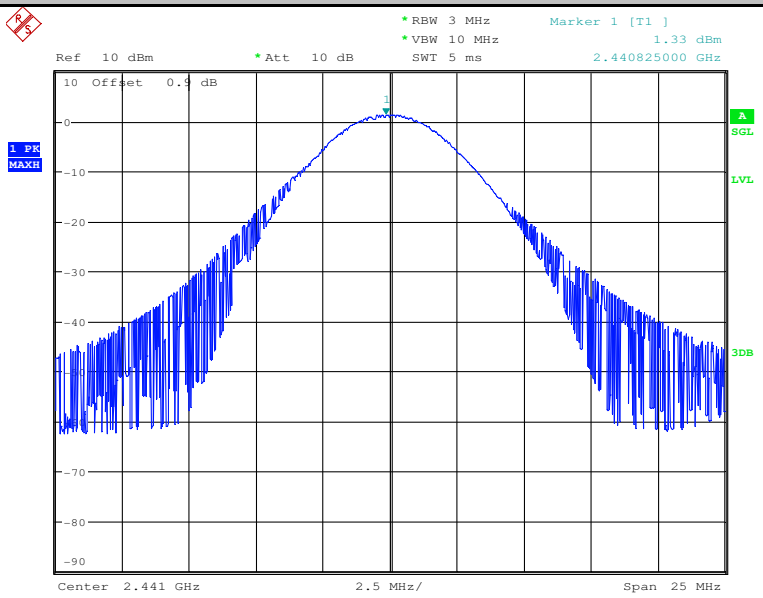
Conducted Peak Output Power_DH5_2441



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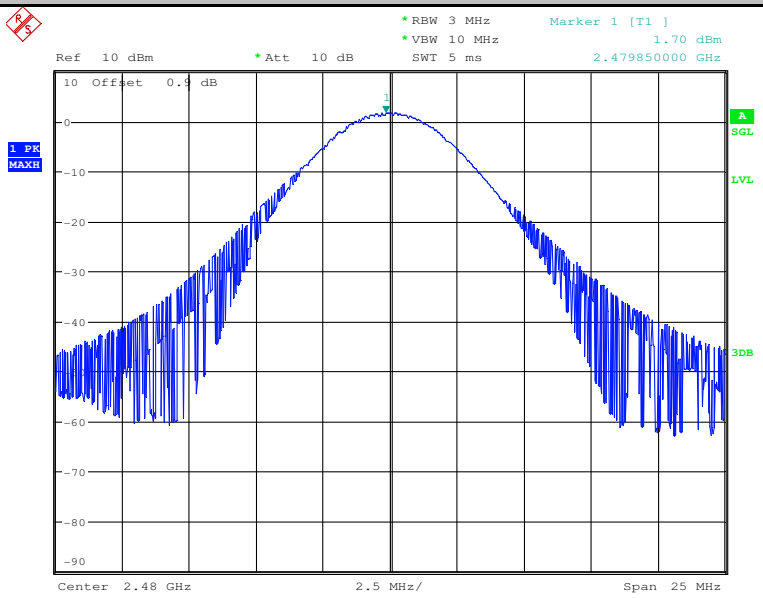
Conducted Peak Output Power_DH5_2480



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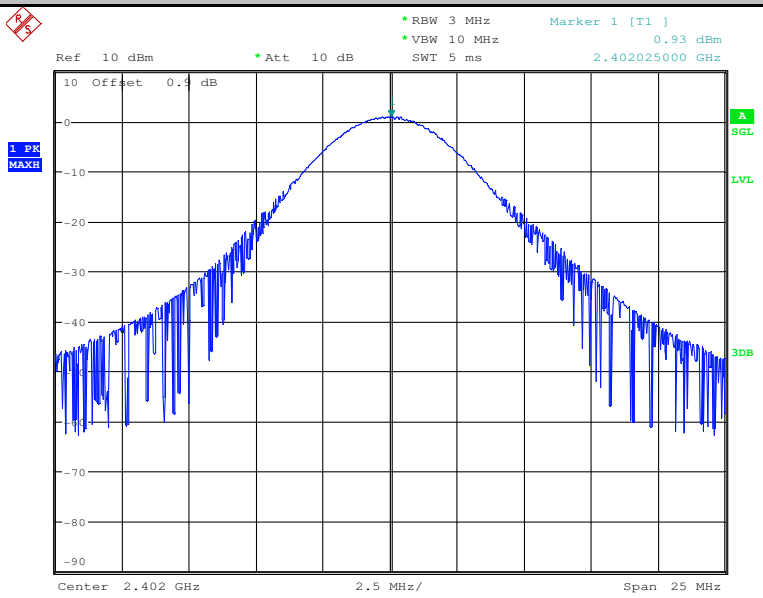
Conducted Peak Output Power_2DH5_2402



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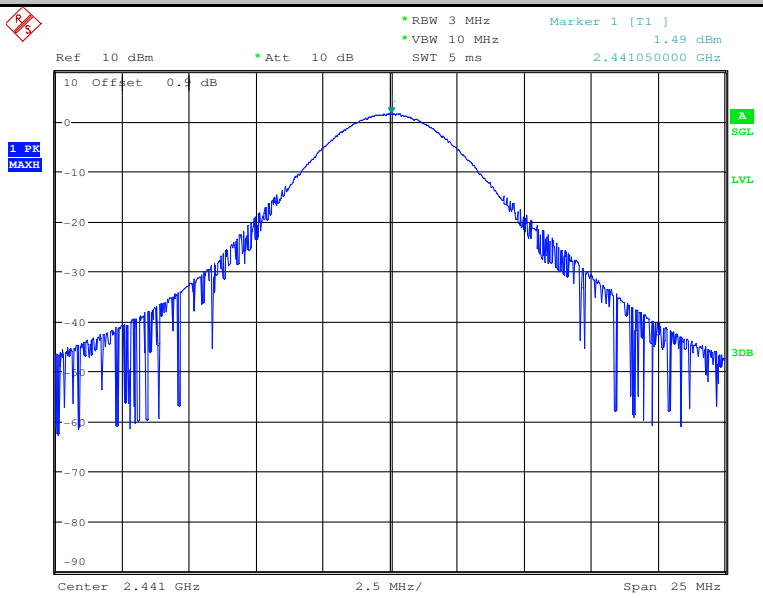
Conducted Peak Output Power_2DH5_2441



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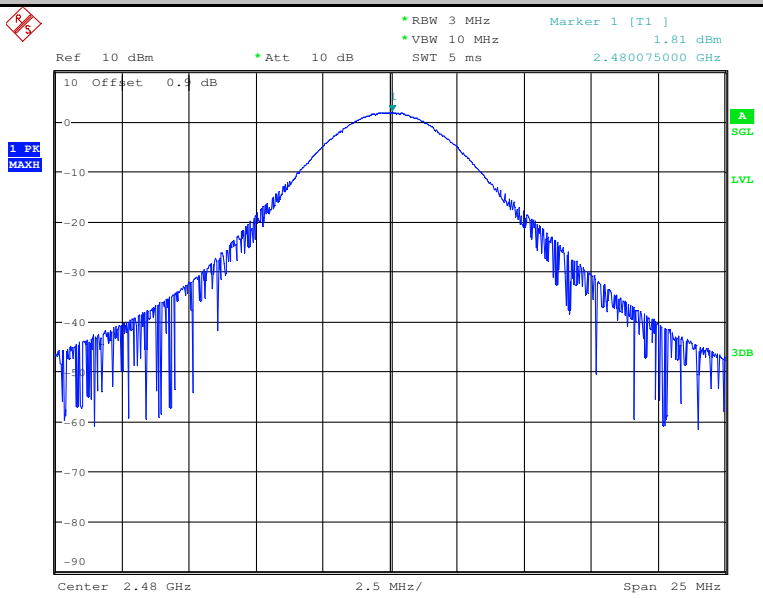
Conducted Peak Output Power_2DH5_2480



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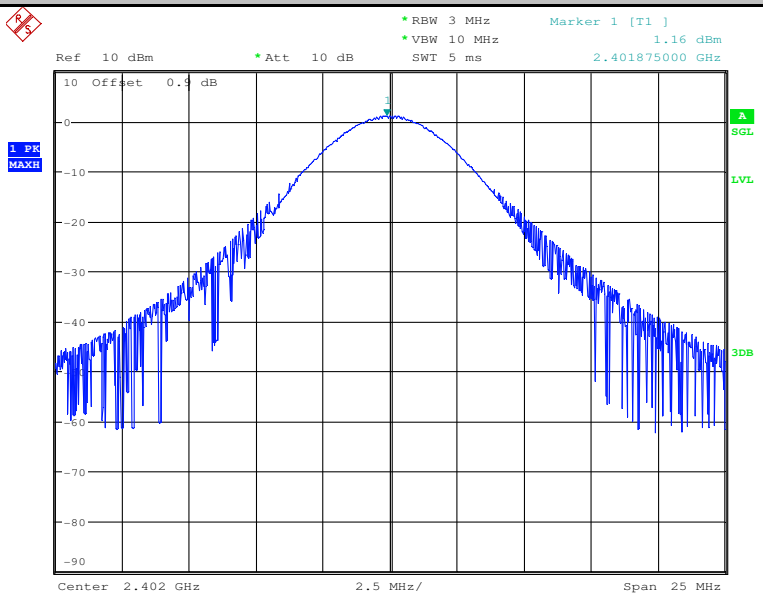
Conducted Peak Output Power_3DH5_2402



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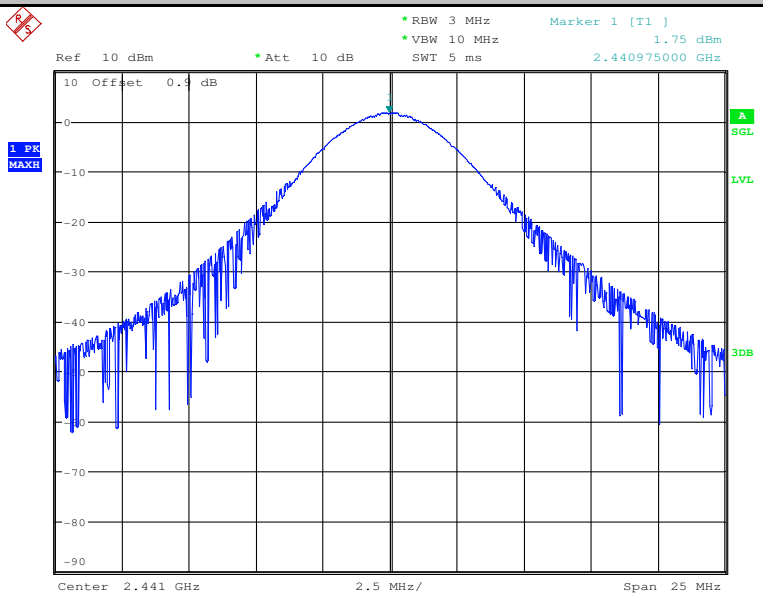
Conducted Peak Output Power_3DH5_2441



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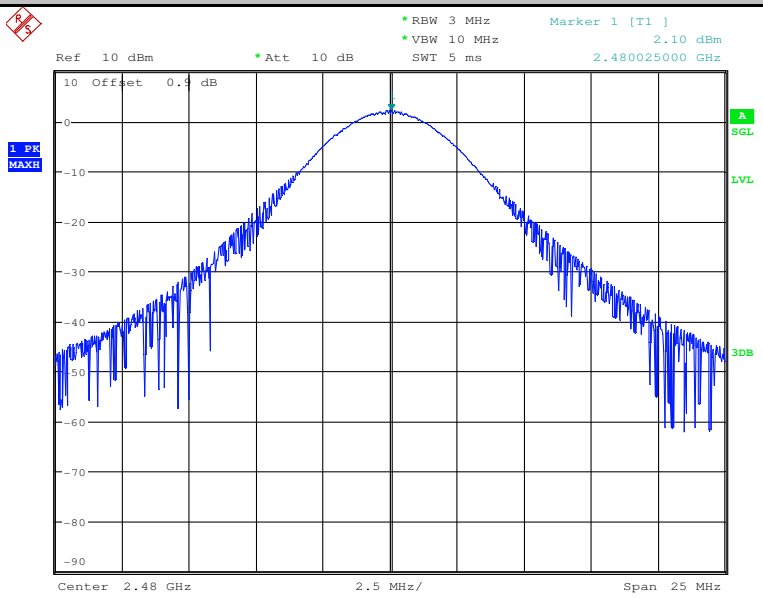
Conducted Peak Output Power_3DH5_2480



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