

TEST REPORT

Application No.: SHEM2011009384CR
FCC ID: ESVEVOLVE
Applicant: Bosch Security Systems Inc
Address of Applicant: 130 Perinton Parkway, Fairport, NY, USA
Manufacturer: Bosch Security Systems Inc
Address of Manufacturer: 130 Perinton Parkway, Fairport, NY, USA
Factory: Speaker Electronic(Jiashan) Co.,Ltd
Address of Factory: No. 8 Development Zone Road, Huimin Sub-district, Jiashan County, Zhejiang, 314112, P.R. China

Equipment Under Test (EUT):
EUT Name: EVOLVE Portable Column Loudspeaker
Model No.: EVOLVE Portable Column Loudspeaker
 EVOLVE 50M
Add Model No.: EVOLVE 50M-XX, EVOLVE 50M-XX-XX, Refer to Page 2
 Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.

Trade mark: Electro-Voice
Standard(s) : 47 CFR Part 15, Subpart C 15.247
Date of Receipt: 2020-11-06
Date of Test: 2020-11-17 to 2020-11-28
Date of Issue: 2020-11-30

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

Parlam Zhan

Parlam Zhan
E&E Section 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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SGS-CSTC Standards Technical Services Co., Ltd.
Testing Center EMC Lab (Shanghai) Co., Ltd.

NO.588 West Jindu Road, Songjiang District, Shanghai, China 201612
中国·上海·松江区金都西路588号 邮编: 201612

t(86-21) 61915666 f(86-21) 61915678 www.sgsgroup.com.cn
t(86-21) 61915666 f(86-21) 61915678 e sgs.china@sgs.com



- 1.The X range can indicate the regional variances,external colors, accessories, possibly generations, and blank (if we need to use)
- 2.Please note that X can be a blank space if we only need a single digit at the end like EVOLVE 50M-W.
- 3.The table below indicates the current model variations to be used on the certification with the notation above in item 1 and 2.

Model Name:	Sales area:	Difference:
EVOLVE 50M-SB-US	US	box volume is larger
EVOLVE 50M-SB-EU	EU AP	box volume is larger
EVOLVE 50M-SW	global	The exterior is white box volume is larger



Revision Record			
Version	Description	Date	Remark
00	original	2020-11-30	

Authorized for issue by:			
		Bill Wu	
		Bill Wu / Project Engineer	
		Parlam Zhan	
		Parlam Zhan / Reviewer	



2 Test Summary

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

Remark: This C2PC only added the RJ45 connector on the function board So we just fully retest Output Power and RSE for this product, other test data reference to original report SHEM190801642901.

Declaration of EUT Family Grouping:

Note: There are series models mentioned in this report, and they are the similar in electrical and electronic characters. Only the model EVOLVE 50M was tested since their differences were the model name.



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4 General Information

4.1 Details of E.U.T.

Power supply:	AC 100-240V~50-60Hz
Test voltage:	AC 120V/60Hz
Antenna Gain:	3.3dBi(Provided by client)
Antenna Type:	PCB Antenna
Bluetooth Version:	V5.0 Dual mode
Channel Spacing:	1MHz
Modulation Type:	GFSK, $\pi/4$ DQPSK, 8DPSK
Number of Channels:	79
Operation Frequency:	2402MHz to 2480MHz
Spectrum Spread Technology:	Frequency Hopping Spread Spectrum(FHSS)

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Blue Test3 (For CSR)	/	2.5.0	/
Laptop	Lenovo	ThinkPad X100e	/

4.3 Power level setting using in test:

Channel	power level
0	255 50
19	255 50
39	255 50

4.4 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	8.4×10^{-8}
2	Timeout	2s
3	Duty Cycle	0.37%
4	Occupied Bandwidth	3%
5	RF Conducted Power	0.6dB
6	RF Power Density	2.9dB
7	Conducted Spurious Emissions	0.75dB
8	RF Radiated Power	5.1dB (Below 1GHz)
		4.9dB (Above 1GHz)
9	Radiated Spurious Emission Test	4.2dB (Below 30MHz)
		4.5dB (30MHz-1GHz)
		5.1dB (1GHz-18GHz)
		5.4dB (Above 18GHz)
10	Temperature Test	1°C
11	Humidity Test	3%
12	Supply Voltages	1.5%
13	Time	3%

Note: The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

4.5 Test Location

All tests were performed at:

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

588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China

Tel: +86 21 6191 5666

Fax: +86 21 6191 5678

No tests were sub-contracted.

4.6 Test Facility

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

- **CNAS (No. CNAS L0599)**

CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. to ISO/IEC 17025:2017 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.

- **NVLAP (LAB CODE: 201034-0)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP).

- **FCC (Designation Number: CN5033)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been recognized as an accredited testing laboratory.

- **ISED (CAB Identifier: CN0020)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. EMC Laboratory has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory.

- **VCCI (Member No.: 3061)**

The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-13868, C-14336, T-12221, G-10830 respectively.

4.7 Deviation from Standards

None

4.8 Abnormalities from Standard Conditions

None

5 Equipment List

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
RF Conducted Test					
Spectrum Analyzer	R&S	FSP-30	SHEM002-1	2019-12-20	2020-12-19
Spectrum Analyzer	Agilent	N9020A	SHEM181-1	2020-08-13	2021-08-12
Signal Generator	R&S	SMR20	SHEM006-1	2020-08-13	2021-08-12
Signal Generator	Agilent	N5182A	SHEM182-1	2020-08-13	2021-08-12
Communication Tester	R&S	CMW270	SHEM183-1	2020-08-13	2021-08-12
Switcher	Tonscend	JS0806	SHEM184-1	2020-08-13	2021-08-12
Power Sensor	Keysight	U2021XA * 4	SHEM184-1	2020-08-13	2021-08-12
Splitter	Anritsu	MA1612A	SHEM185-1	/	/
Coupler	e-meca	803-S-1	SHEM186-1	/	/
High-low Temp Cabinet	Suzhou Zhihe	TL-40	SHEM087-1	2018-09-25	2021-09-24
AC Power Stabilizer	APC	KDF-31020T-V0-F0	SHEM216-1	2019-12-20	2020-12-19
DC Power Supply	MCH	MCH-303A	SHEM210-1	2019-12-20	2020-12-19
Conducted test Cable	/	RF01~RF04	/	2019-12-20	2020-12-19
Test software	Tonscend	JS Tonscend BT/WIFI System	Version: 2.6	/	/
RF Radiated Test					
EMI test Receiver	R&S	ESU40	SHEM051-1	2019-12-20	2020-12-19
Spectrum Analyzer	R&S	FSP-30	SHEM002-1	2019-12-20	2020-12-19
Loop Antenna (9kHz-30MHz)	Schwarzbeck	FMZB1519	SHEM135-1	2019-12-20	2020-12-19
Antenna (25MHz-2GHz)	Schwarzbeck	VULB9168	SHEM048-1	2019-10-14	2021-10-13
Antenna (25MHz-2GHz)	Schwarzbeck	VULB9168	SHEM202-1	2019-04-30	2021-04-29
Horn Antenna (1-18GHz)	Schwarzbeck	HF906	SHEM009-1	2017-10-24	2020-10-23
Horn Antenna (1-18GHz)	Schwarzbeck	BBHA9120D	SHEM050-1	2019-10-14	2021-10-13
Horn Antenna (14-40GHz)	Schwarzbeck	BBHA 9170	SHEM049-1	2017-10-31	2020-10-30
Pre-amplifier (9kHz-2GHz)	CLAVIO	BDLNA-0001	SHEM164-1	2020-08-13	2021-08-12
Pre-amplifier (1-18GHz)	CLAVIO	BDLNA-0118	SHEM050-2	2020-08-13	2021-08-12
High-amplifier (14-40GHz)	Schwarzbeck	10001	SHEM049-2	2019-12-20	2020-12-19
Signal Generator	R&S	SMR40	SHEM058-1	2020-08-13	2021-08-12
Band Filter	LORCH	9BRX-875/X150	SHEM156-1	/	/
Band Filter	LORCH	13BRX-1950/X500	SHEM083-2	/	/
Band Filter	LORCH	5BRX-2400/X200	SHEM155-1	/	/
Band Filter	LORCH	5BRX-5500/X1000	SHEM157-2	/	/
High pass Filter	Wainwright	WHK3.0/18G	SHEM157-1	/	/
High pass Filter	Wainwright	WHKS1700	SHEM157-3	/	/
Semi/Fully Anechoic	ST	11*6*6M	SHEM078-2	2020-05-25	2023-05-24
RE test Cable	/	RE01, RE02, RE06	/	2019-12-20	2020-12-19
Test software	ESE	E3	Version: 6.111221a	/	/

6 Radio Spectrum Technical Requirement

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 $25 \leq$ 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

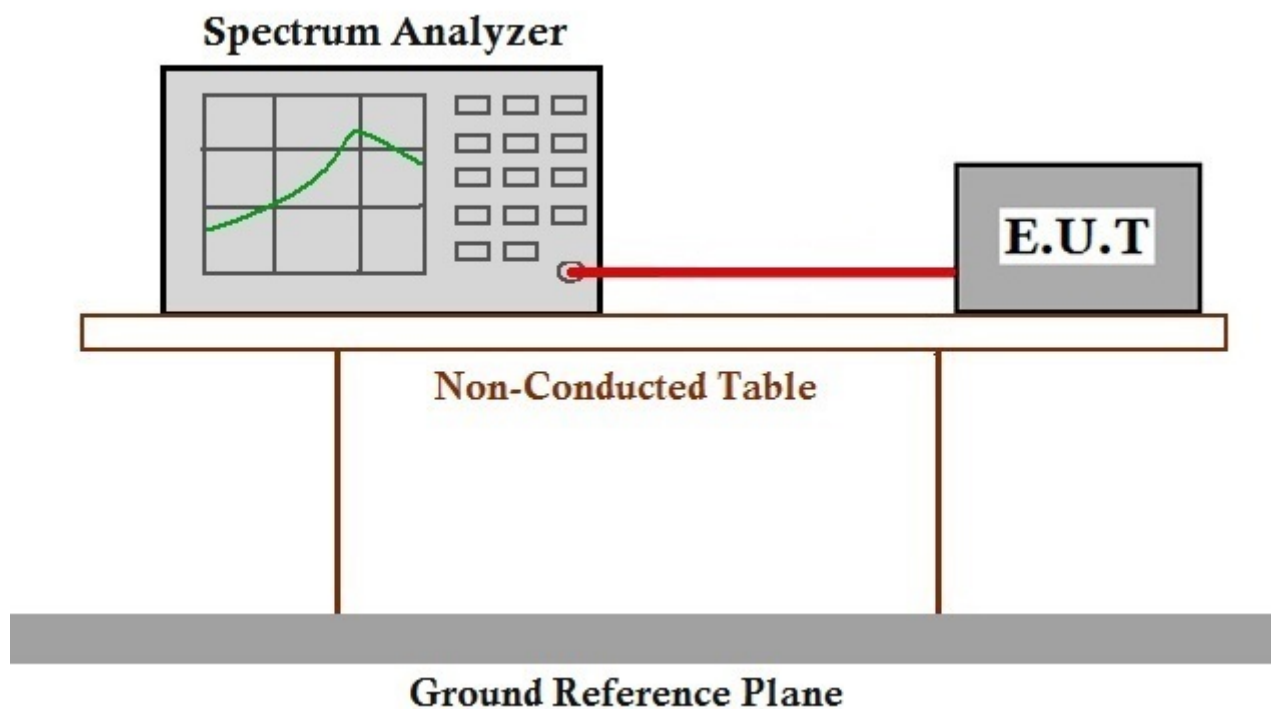
6.1.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

Test mode b:TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, $\pi/4$ DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

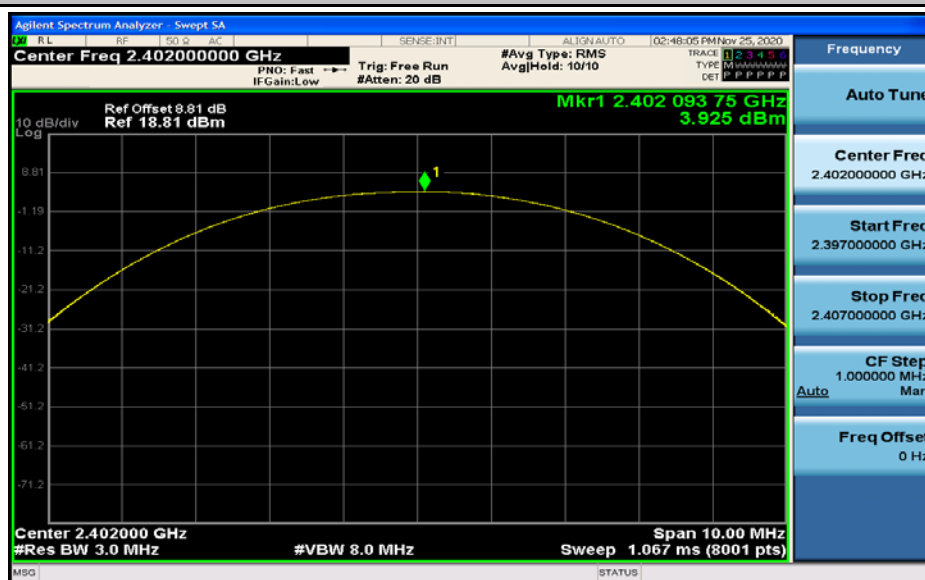
6.1.2 Test Setup Diagram



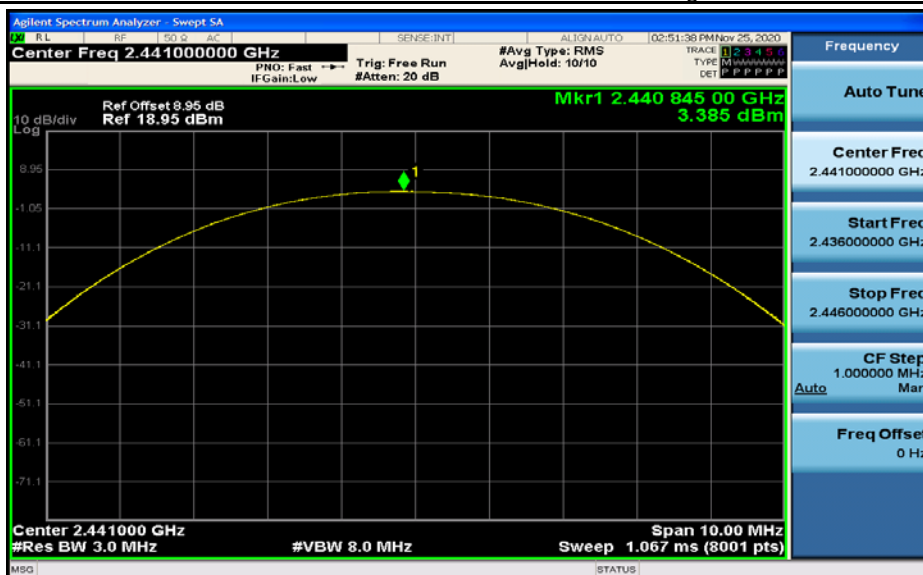
6.1.3 Measurement Procedure and Data

Test Mode	Test Channel	Power[dBm]	Limit[dBm]	Verdict
DH5	2402	3.93	30	PASS
DH5	2441	3.39	30	PASS
DH5	2480	2.14	30	PASS
2DH5	2402	1.87	30	PASS
2DH5	2441	1.41	30	PASS
2DH5	2480	0.12	30	PASS
3DH5	2402	2.32	30	PASS
3DH5	2441	1.8	30	PASS
3DH5	2480	0.55	30	PASS

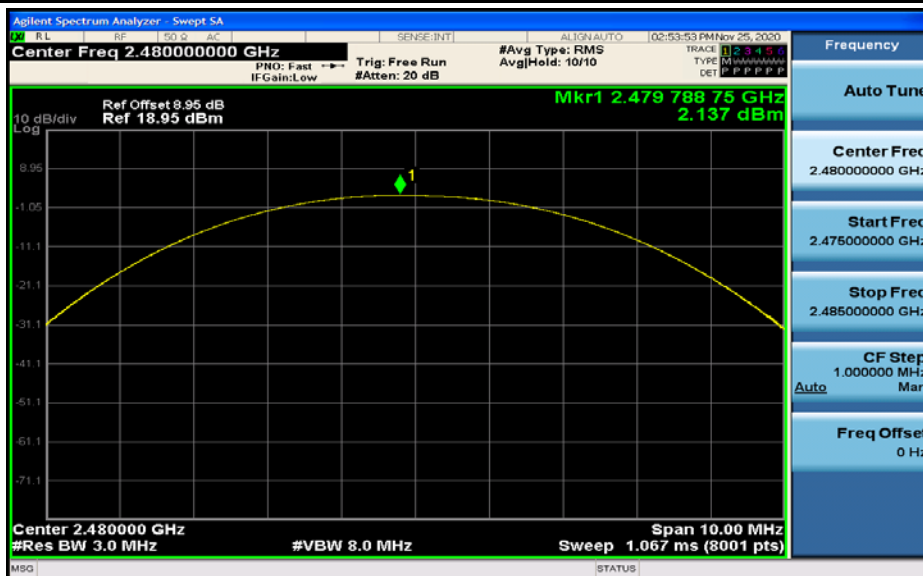
Conducted Peak Output Power_DH5_2402



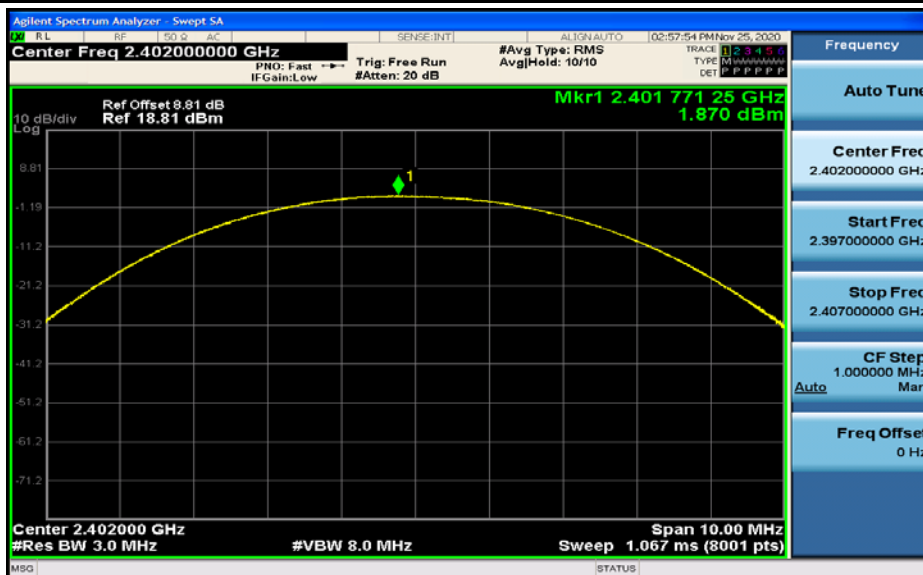
Conducted Peak Output Power_DH5_2441



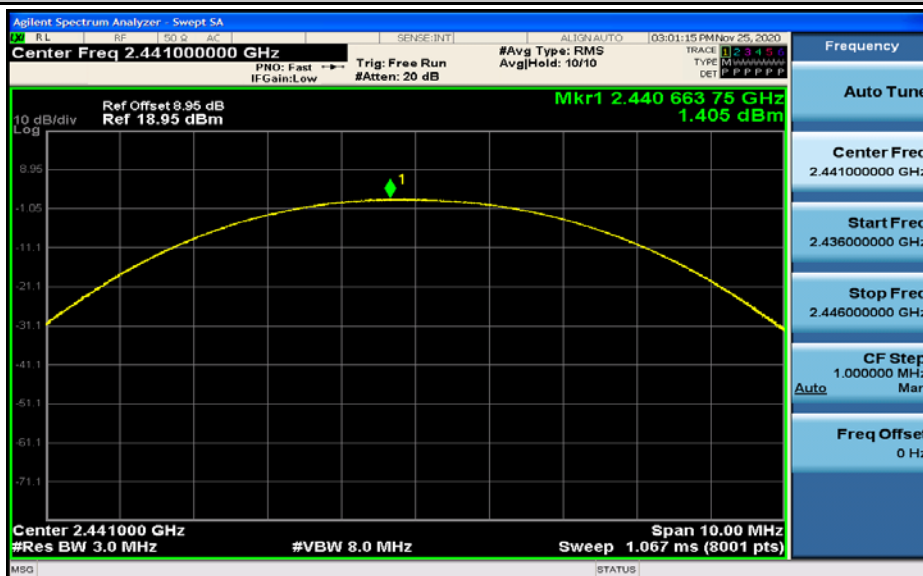
Conducted Peak Output Power_DH5_2480



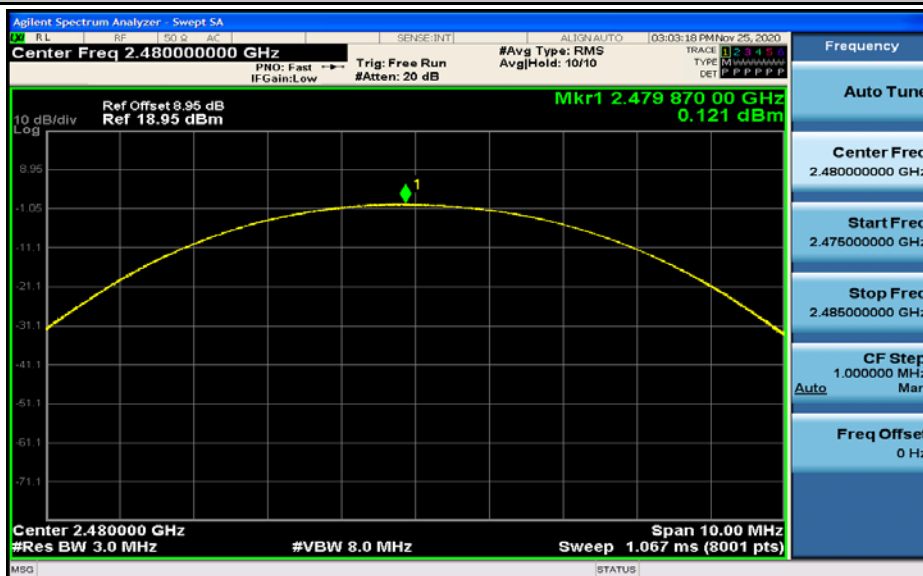
Conducted Peak Output Power_2DH5_2402



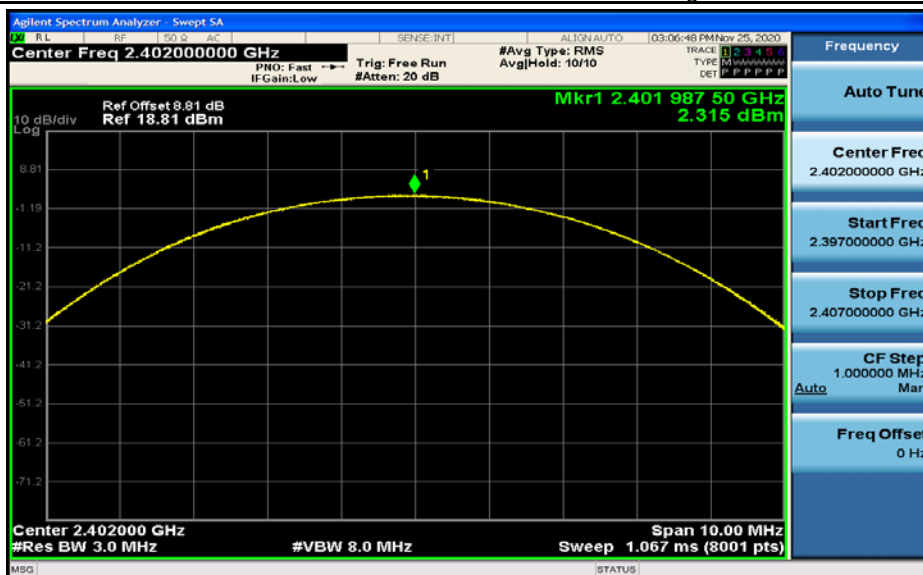
Conducted Peak Output Power_2DH5_2441



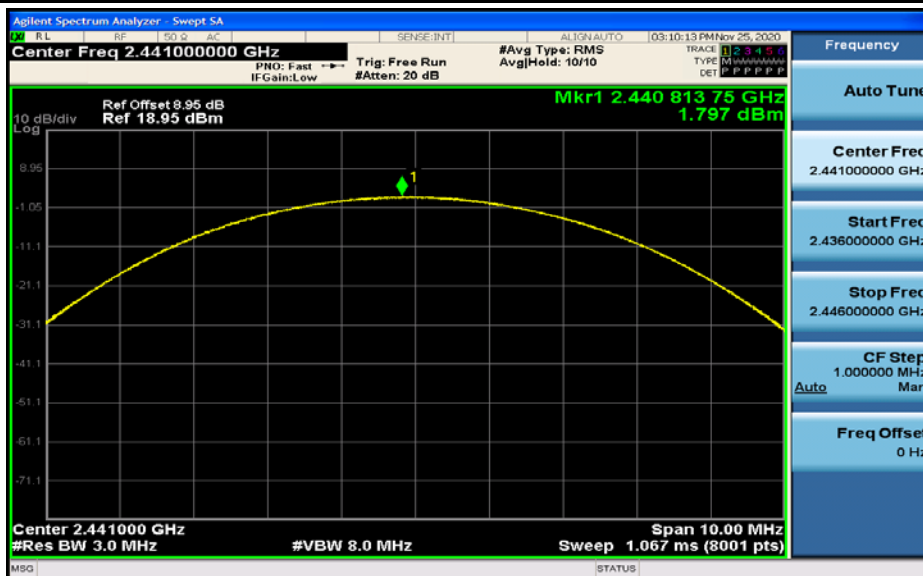
Conducted Peak Output Power_2DH5_2480



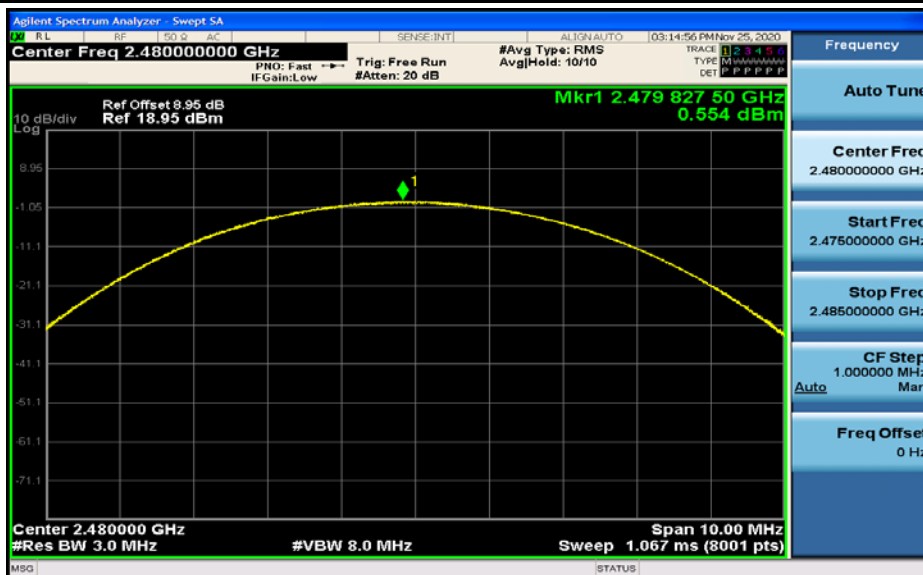
Conducted Peak Output Power_3DH5_2402



Conducted Peak Output Power_3DH5_2441



Conducted Peak Output Power_3DH5_2480





6.2 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

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.

6.2.1 E.U.T. Operation

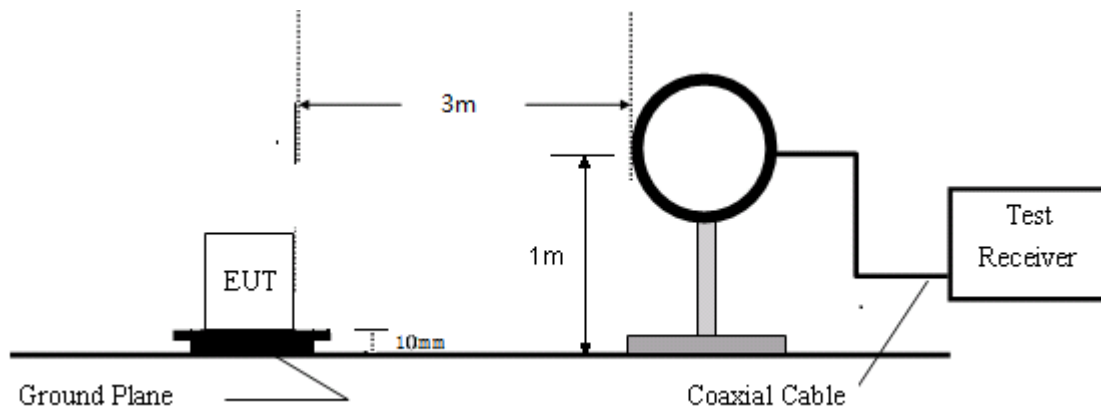
Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

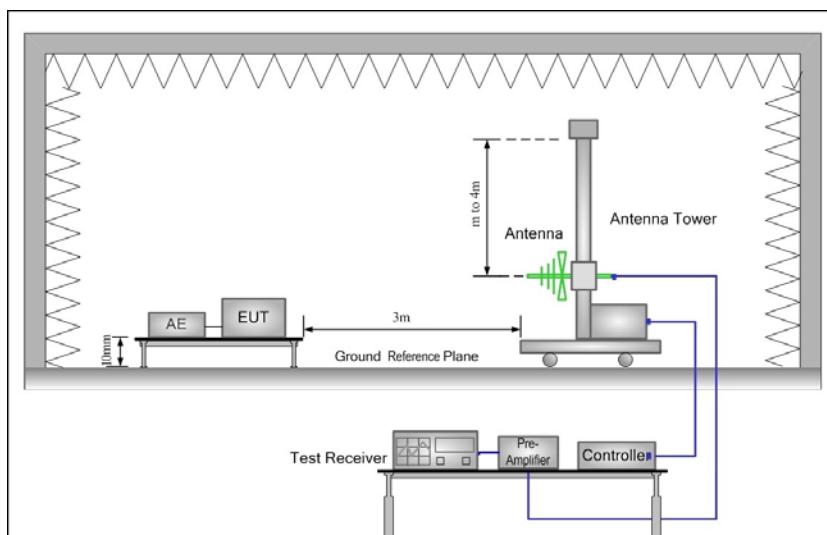
Test mode b:TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, $\pi/4$ DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

6.2.2 Test Setup Diagram

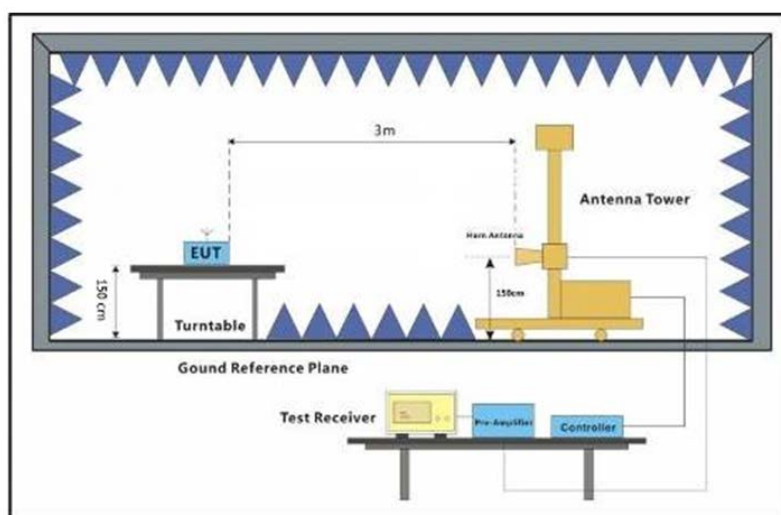
Below 30MHz



30MHz-1GHz



Above 1GHz



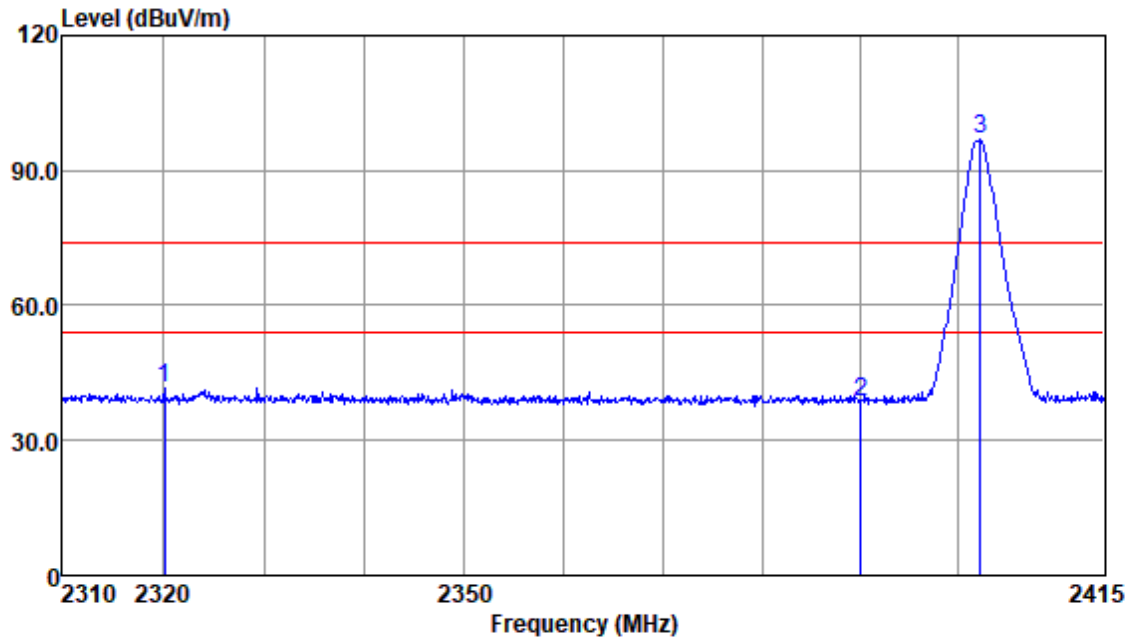
6.2.3 Measurement Procedure and Data

- 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.

Remark 1: $\text{Level} = \text{Read Level} + \text{Cable Loss} + \text{Antenna Factor} - \text{Preamp Factor}$

Remark 2: 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. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

Mode:b; Polarization:Horizontal; Modulation:GFSK; ; Channel:Low

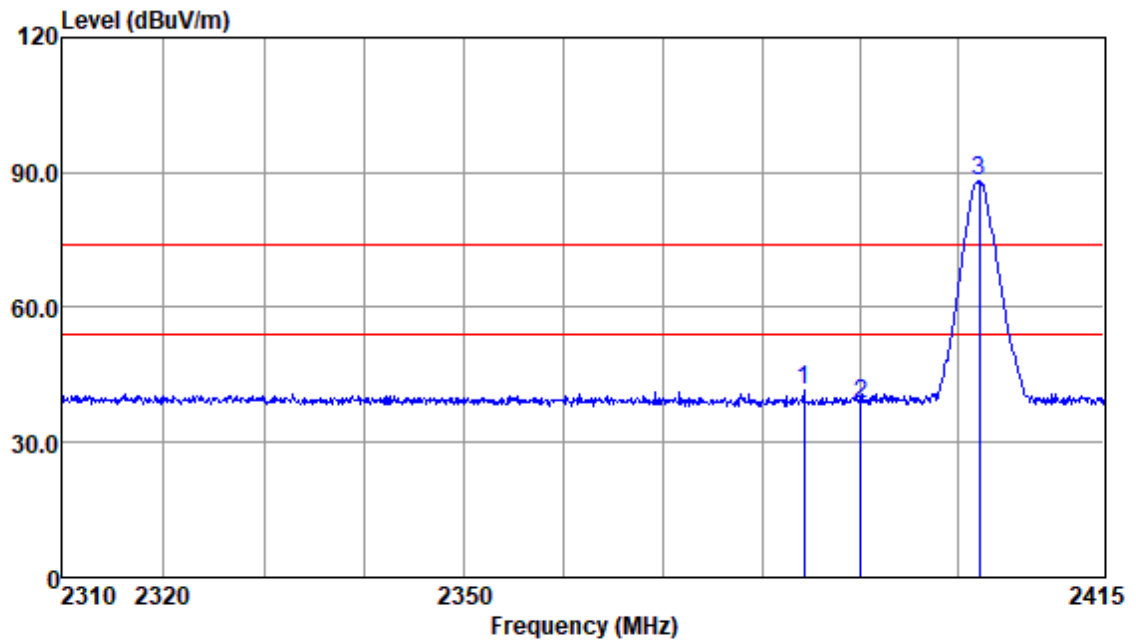


Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
2320.09	50.08	25.93	3.01	37.37	41.65	74.00	-32.35	Peak
2390.00	46.72	26.03	3.15	37.40	38.50	74.00	-35.50	Peak
2402.26	105.10	26.05	3.14	37.40	96.89	74.00	22.89	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamplifier Factor

Mode:b; Polarization:Vertical; Modulation:GFSK; ; Channel:Low

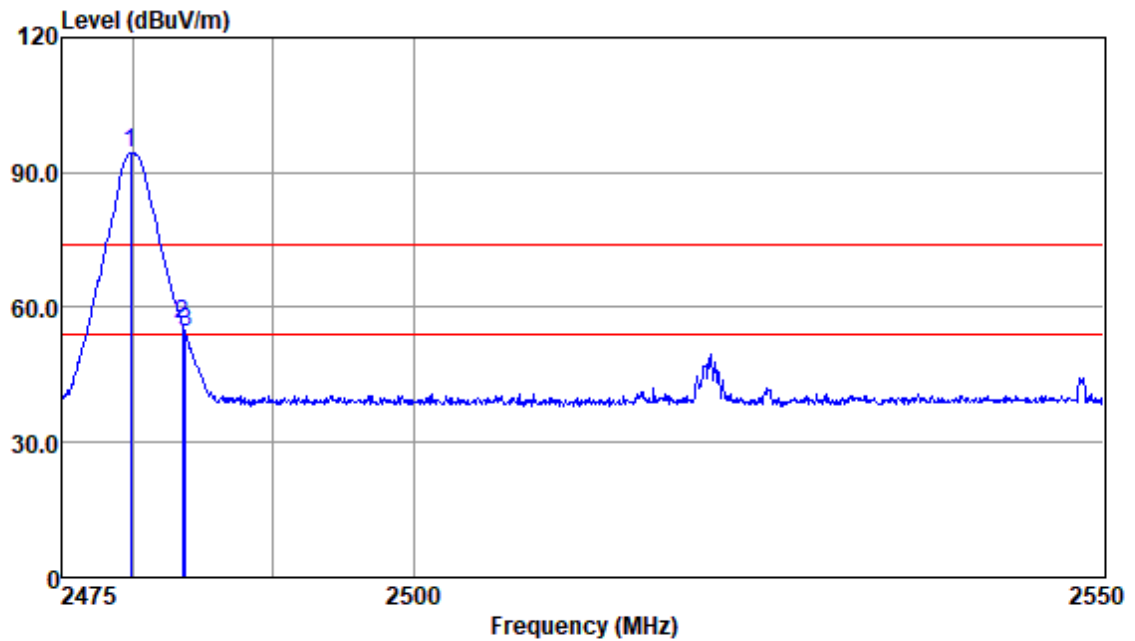


Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
2384.28	49.74	26.03	3.16	37.39	41.54	74.00	-32.46	Peak
2390.00	46.86	26.03	3.15	37.40	38.64	74.00	-35.36	Peak
2402.15	96.28	26.05	3.14	37.40	88.07	74.00	14.07	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamplifier Factor

Mode:b; Polarization:Horizontal; Modulation:GFSK; ; Channel:High

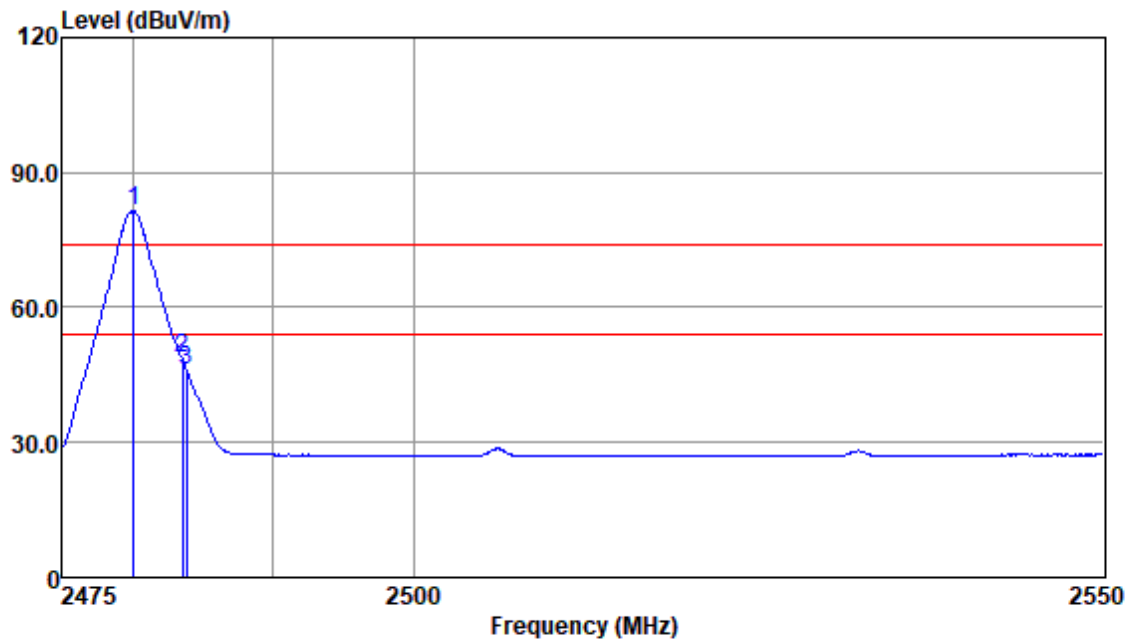


Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
2479.81	102.50	26.17	3.14	37.57	94.24	74.00	20.24	Peak
2483.50	64.62	26.18	3.14	37.57	56.37	74.00	-17.63	Peak
2483.73	62.51	26.18	3.14	37.57	54.26	74.00	-19.74	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamplifier Factor

Mode:b; Polarization:Horizontal; Modulation:GFSK; ; Channel:High

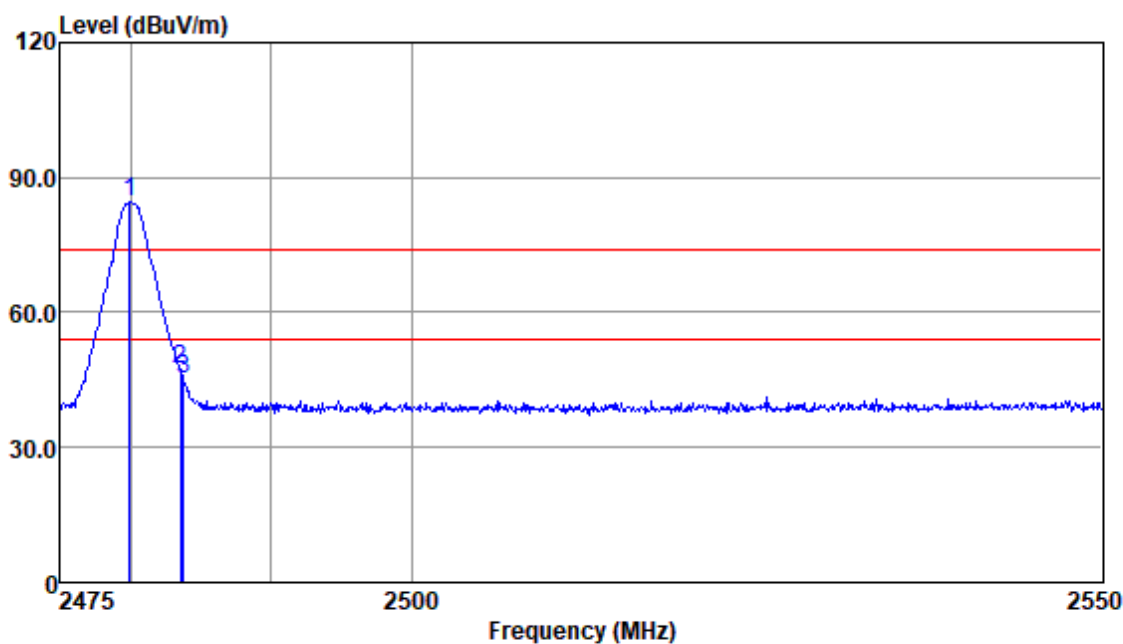


Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
2480.03	89.94	26.17	3.14	37.57	81.68	54.00	27.68	Average
2483.50	56.88	26.18	3.14	37.57	48.63	54.00	-5.37	Average
2483.81	54.27	26.18	3.14	37.57	46.02	54.00	-7.98	Average

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Vertical; Modulation:GFSK; ; Channel:High

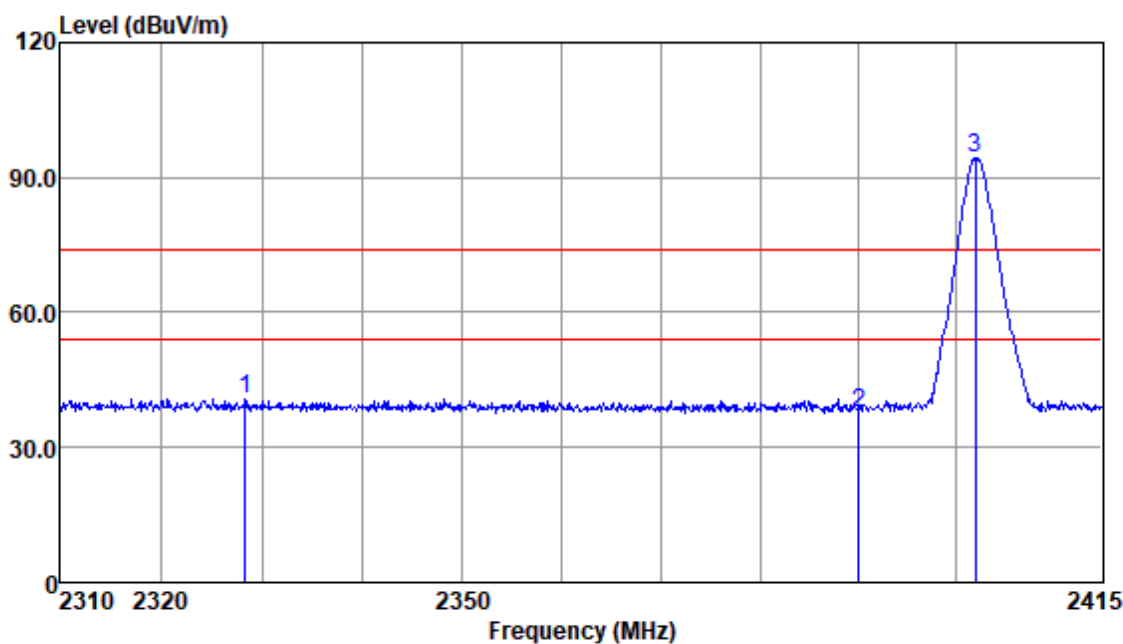


Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
2479.88	92.70	26.17	3.14	37.57	84.44	74.00	10.44	Peak
2483.50	55.57	26.18	3.14	37.57	47.32	74.00	-26.68	Peak
2483.73	53.43	26.18	3.14	37.57	45.18	74.00	-28.82	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamplifier Factor

Mode:b; Polarization:Horizontal; Modulation: $\pi/4$ DQPSK; ; Channel:Low

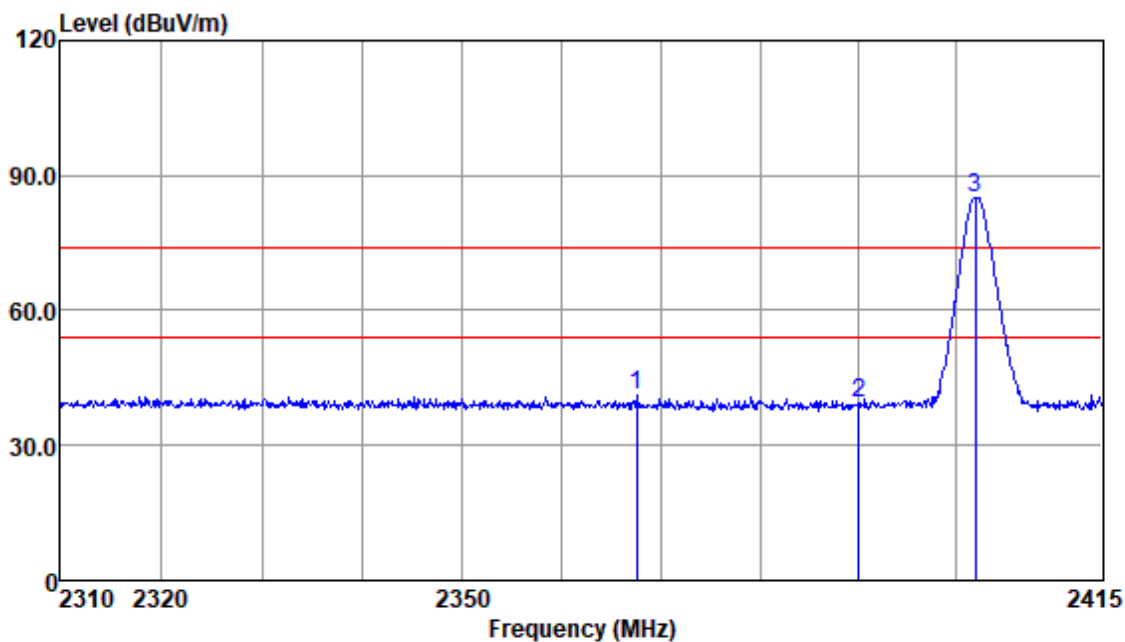


Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
2328.25	49.26	25.94	3.03	37.37	40.86	74.00	-33.14	Peak
2390.00	46.02	26.03	3.15	37.40	37.80	74.00	-36.20	Peak
2401.94	102.40	26.05	3.14	37.40	94.19	74.00	20.19	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Vertical; Modulation: $\pi/4$ DQPSK; ; Channel:Low

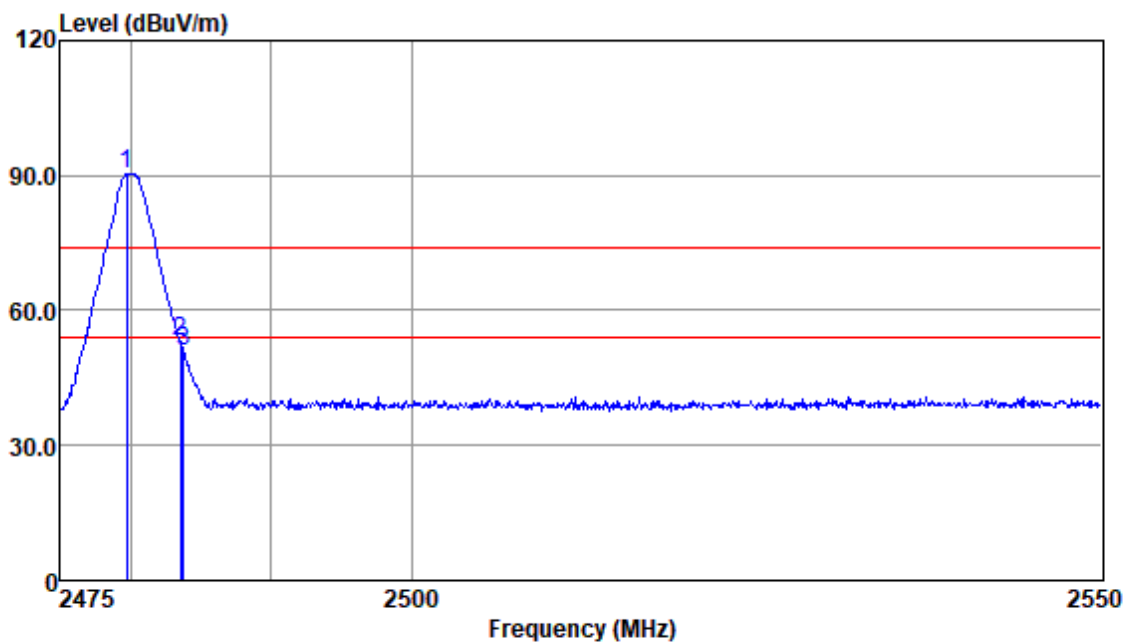


Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
2367.49	49.48	26.00	3.17	37.38	41.27	74.00	-32.73	Peak
2390.00	47.81	26.03	3.15	37.40	39.59	74.00	-34.41	Peak
2401.94	93.38	26.05	3.14	37.40	85.17	74.00	11.17	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Horizontal; Modulation: $\pi/4$ DQPSK; ; Channel:High

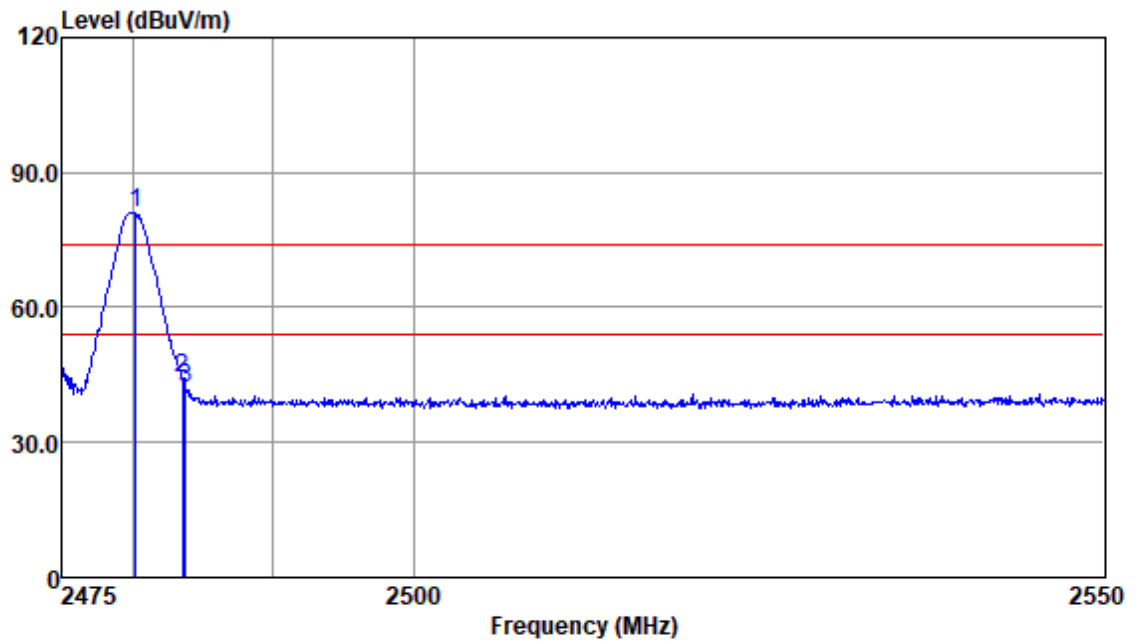


Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
2479.73	98.75	26.17	3.14	37.57	90.49	74.00	16.49	Peak
2483.50	61.45	26.18	3.14	37.57	53.20	74.00	-20.80	Peak
2483.73	59.36	26.18	3.14	37.57	51.11	74.00	-22.89	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamplifier Factor

Mode:b; Polarization:Vertical; Modulation: $\pi/4$ DQPSK; ; Channel:High

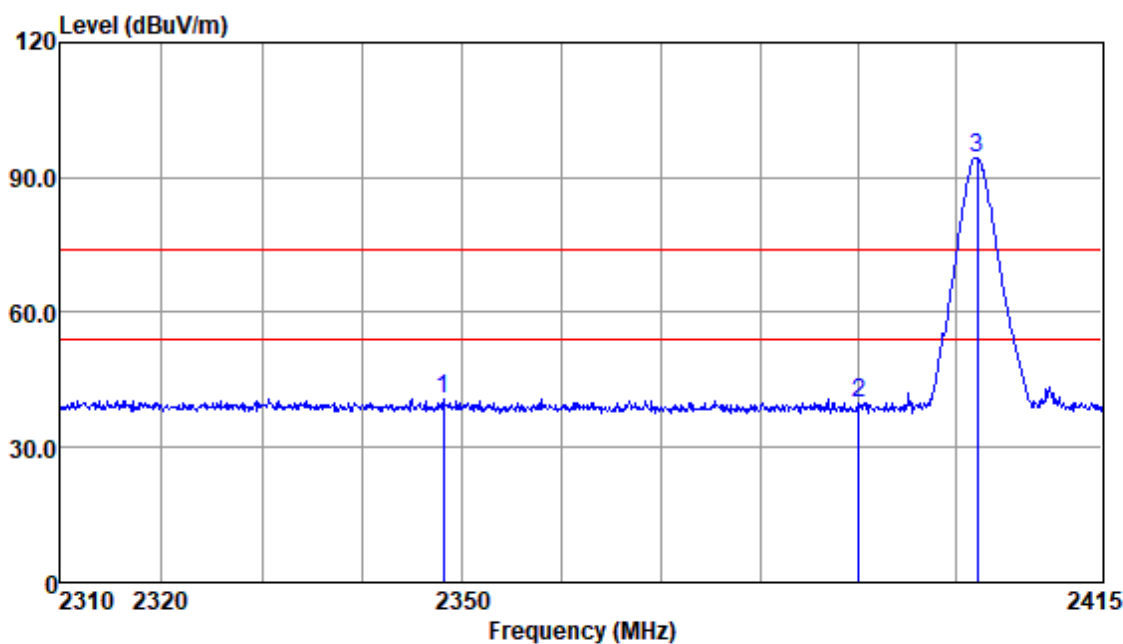


Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
2480.18	89.27	26.17	3.14	37.57	81.01	74.00	7.01	Peak
2483.50	52.55	26.18	3.14	37.57	44.30	74.00	-29.70	Peak
2483.73	50.16	26.18	3.14	37.57	41.91	74.00	-32.09	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamplifier Factor

Mode:b; Polarization:Horizontal; Modulation:8DPSK; ; Channel:Low

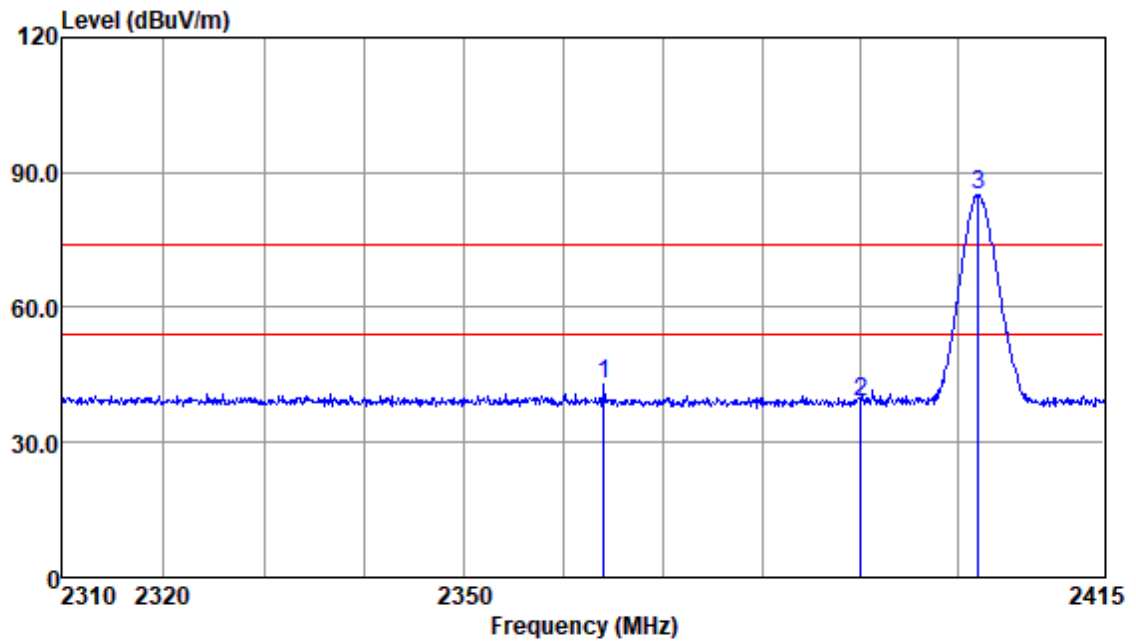


Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
2348.10	49.24	25.97	3.10	37.37	40.94	74.00	-33.06	Peak
2390.00	47.91	26.03	3.15	37.40	39.69	74.00	-34.31	Peak
2402.15	102.64	26.05	3.14	37.40	94.43	74.00	20.43	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamplifier Factor

Mode:b; Polarization:Vertical; Modulation:8DPSK; ; Channel:Low

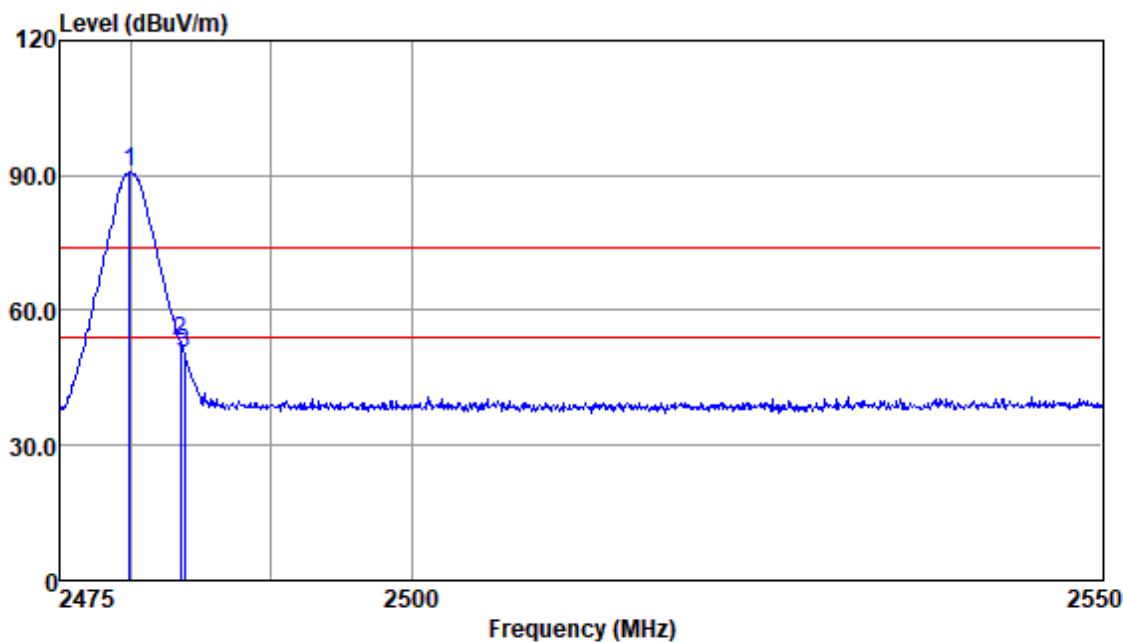


Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
2364.02	51.19	26.00	3.15	37.38	42.96	74.00	-31.04	Peak
2390.00	47.10	26.03	3.15	37.40	38.88	74.00	-35.12	Peak
2402.05	93.22	26.05	3.14	37.40	85.01	74.00	11.01	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Horizontal; Modulation:8DPSK; ; Channel:High

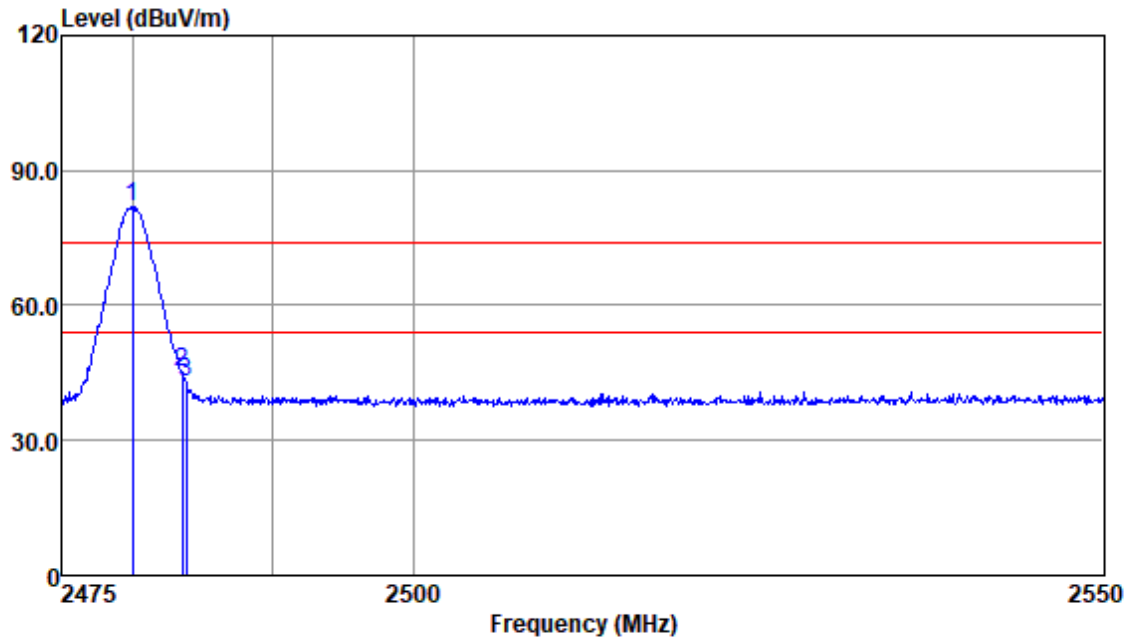


Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
2479.88	99.02	26.17	3.14	37.57	90.76	74.00	16.76	Peak
2483.50	61.61	26.18	3.14	37.57	53.36	74.00	-20.64	Peak
2483.81	58.85	26.18	3.14	37.57	50.60	74.00	-23.40	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamplifier Factor

Mode:b; Polarization:Vertical; Modulation:8DPSK; ; Channel:High



Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
2479.96	90.33	26.17	3.14	37.57	82.07	74.00	8.07	Peak
2483.50	53.48	26.18	3.14	37.57	45.23	74.00	-28.77	Peak
2483.81	51.26	26.18	3.14	37.57	43.01	74.00	-30.99	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



6.3 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

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.

6.3.1 E.U.T. Operation

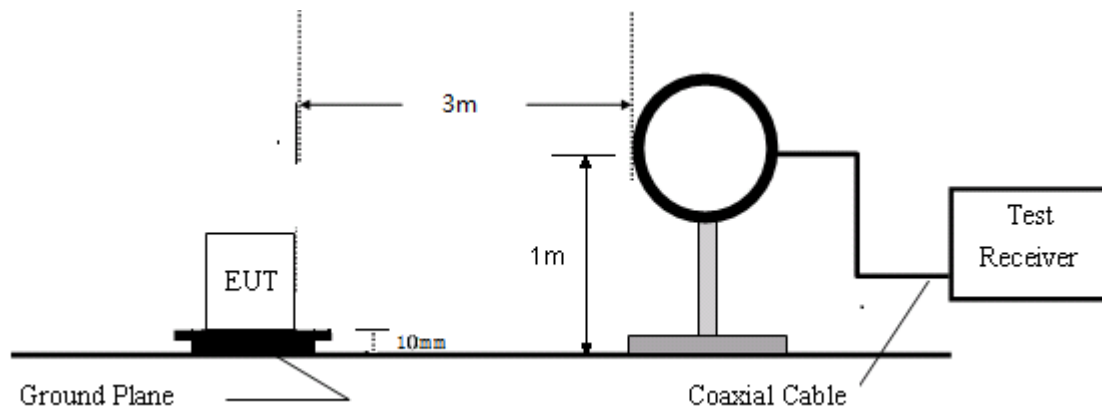
Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

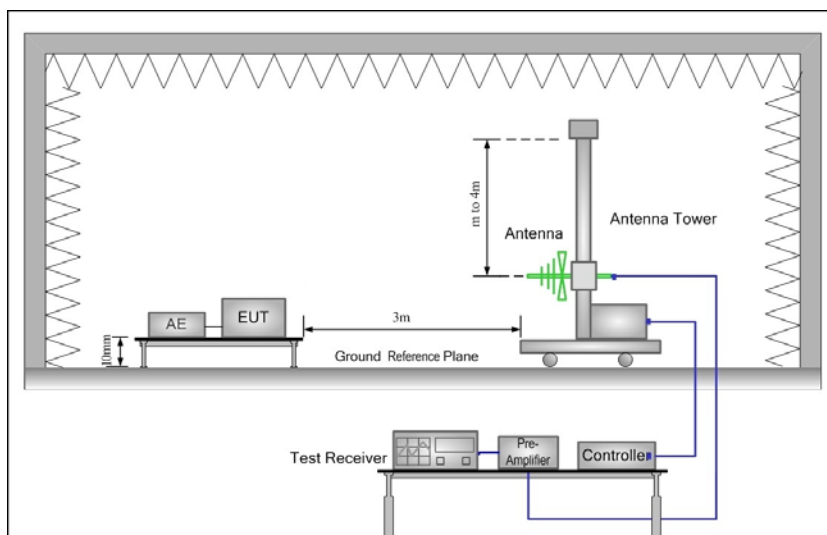
Test mode b:TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, $\pi/4$ DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

6.3.2 Test Setup Diagram

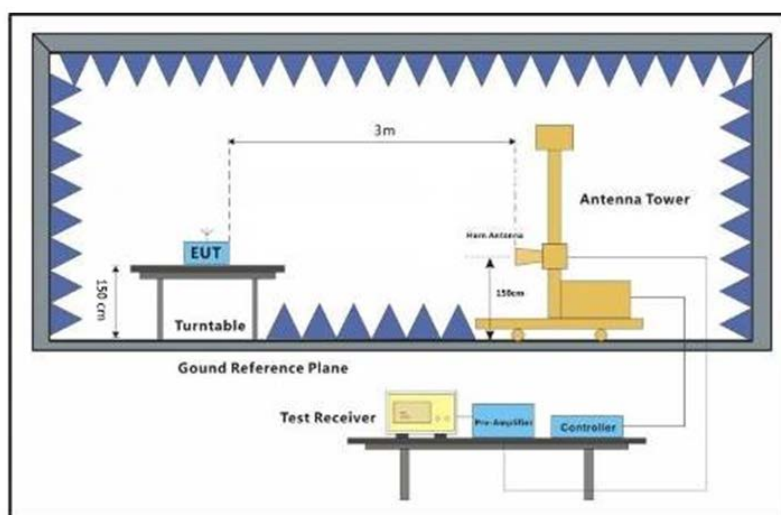
Below 30MHz



30MHz-1GHz



Above 1GHz



6.3.3 Measurement Procedure and Data

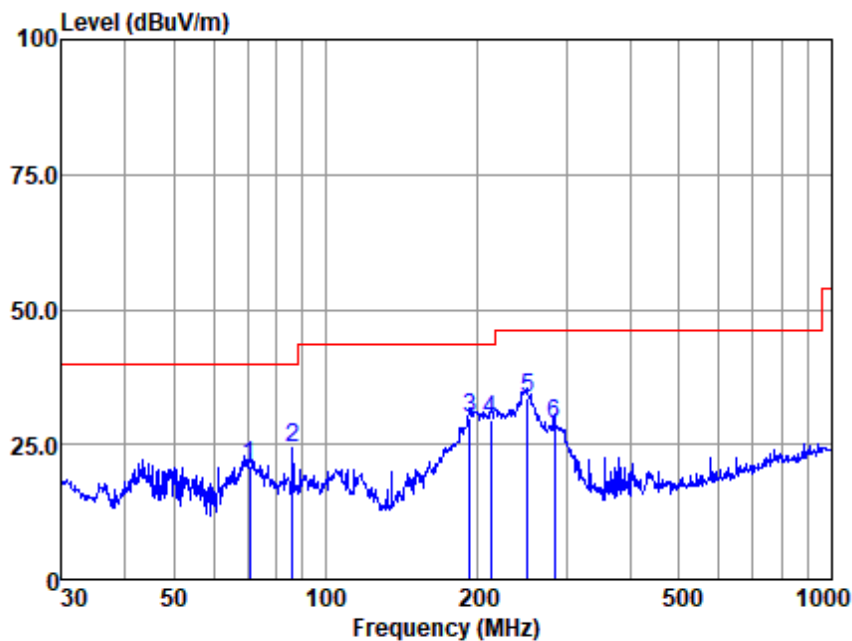
- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 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.

Remark:

- 1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.
- 2) 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
- 3) Scan from 9kHz to 25GHz, the disturbance above 18GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
- 4) 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. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown

Below 1GHz

Mode:a; Polarization:Horizontal

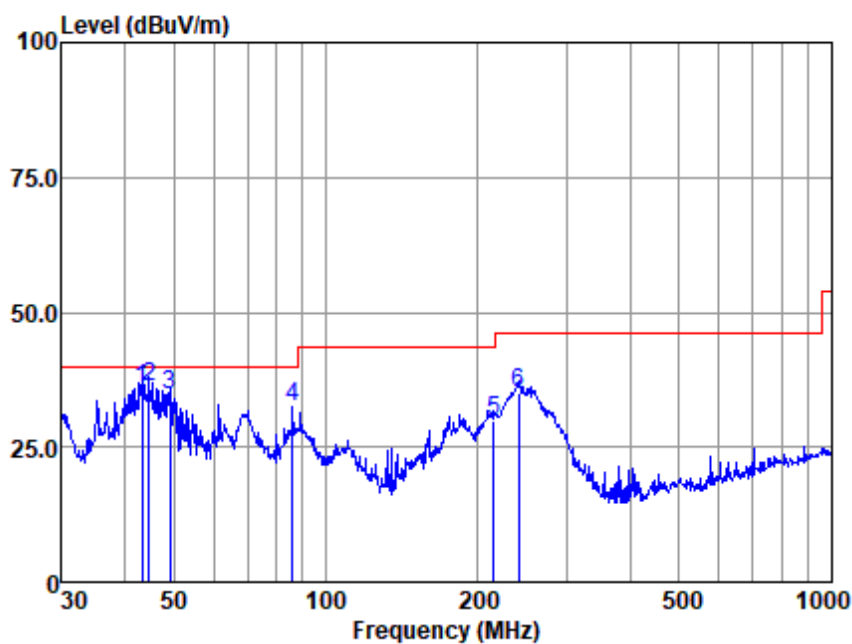


Antenna Polarity :HORIZONTAL
EUT/Project :9377CR
Test mode :a

	Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	70.584	50.72	11.57	1.17	42.30	21.16	40.00	-18.84	QP
2	85.898	57.22	8.29	1.25	42.30	24.46	40.00	-15.54	QP
3	193.095	59.74	10.30	1.96	42.20	29.80	43.50	-13.70	QP
4	212.270	60.03	9.75	2.05	42.17	29.66	43.50	-13.84	QP
5	250.301	61.74	11.70	2.21	42.10	33.55	46.00	-12.45	QP
6	282.985	55.48	12.89	2.34	42.10	28.61	46.00	-17.39	QP

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamplifier Factor

Mode:a; Polarization:Vertical



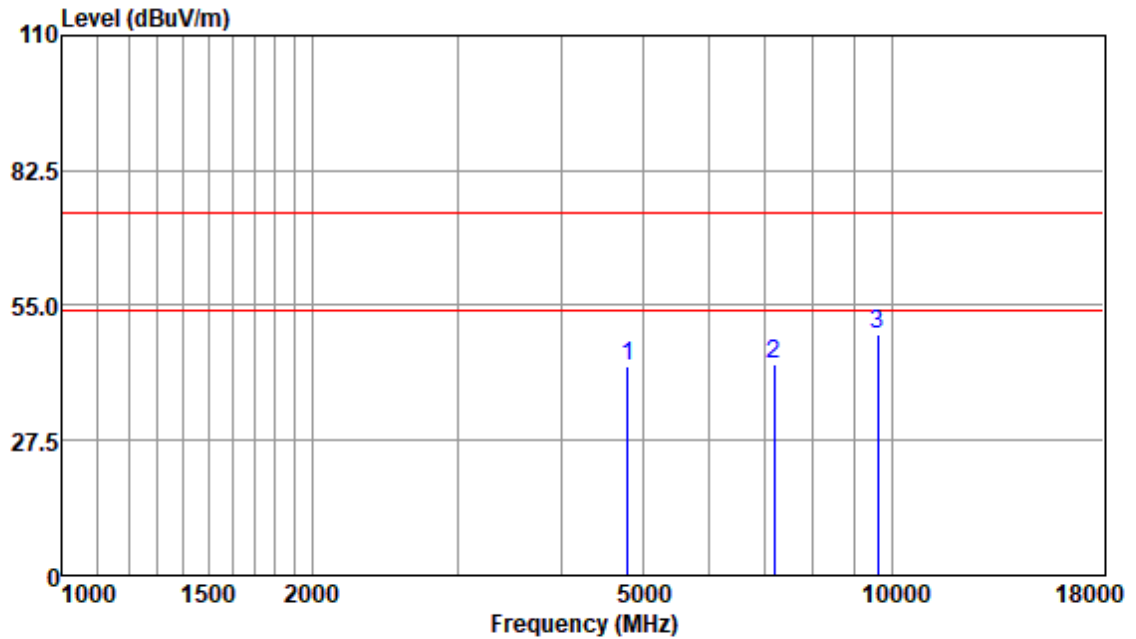
Antenna Polarity :VERTICAL
EUT/Project :9377CR
Test mode :a

	Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	43.353	63.65	13.40	0.98	42.30	35.73	40.00	-4.27	QP
2	44.743	63.81	13.48	1.00	42.30	35.99	40.00	-4.01	QP
3	49.187	62.40	13.67	1.03	42.30	34.80	40.00	-5.20	QP
4	85.898	65.18	8.29	1.25	42.30	32.42	40.00	-7.58	QP
5	214.514	60.26	9.72	2.07	42.17	29.88	43.50	-13.62	QP
6	240.830	64.22	10.93	2.19	42.12	35.22	46.00	-10.78	QP

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamplifier Factor

Above 1GHz:

Mode:b; Polarization:Horizontal; Modulation:GFSK; ; Channel:Low



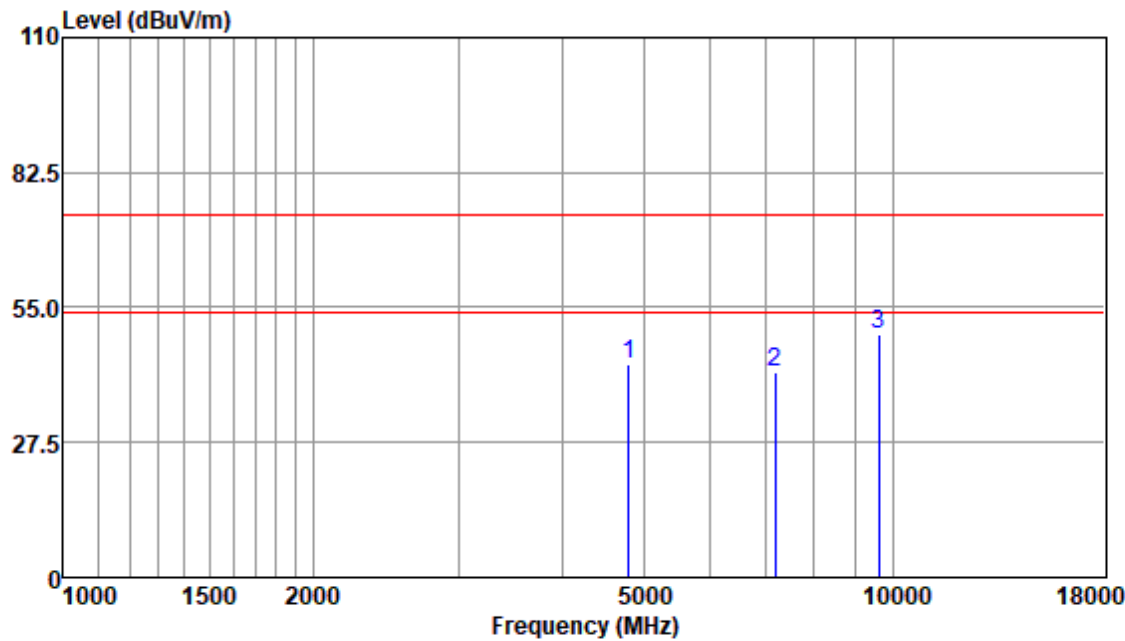
Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
-----	-----	-----	-----	-----	-----	-----	-----	-----
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
4804.00	42.50	33.72	5.09	38.71	42.60	74.00	-31.40	Peak
7206.00	38.02	36.28	5.75	37.18	42.87	74.00	-31.13	Peak
9608.00	38.95	37.70	6.78	34.18	49.25	74.00	-24.75	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



Mode:b; Polarization:Vertical; Modulation:GFSK; ; Channel:Low

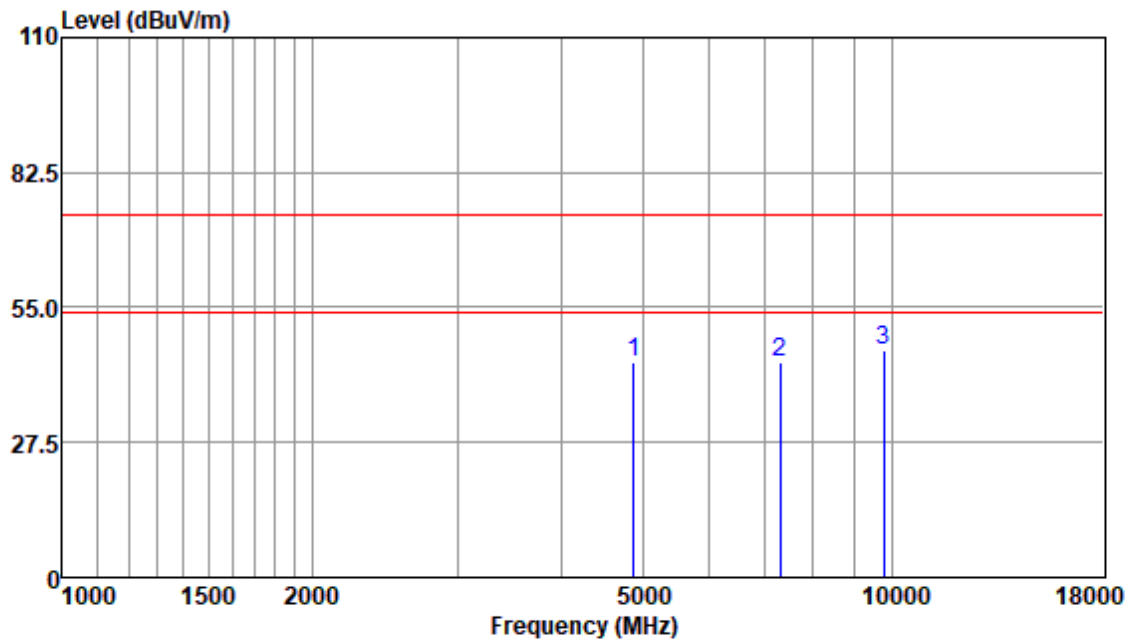


Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
4804.00	43.48	33.72	5.09	38.71	43.58	74.00	-30.42	Peak
7206.00	37.01	36.28	5.75	37.18	41.86	74.00	-32.14	Peak
9608.00	39.23	37.70	6.78	34.18	49.53	74.00	-24.47	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Horizontal; Modulation:GFSK; ; Channel:middle

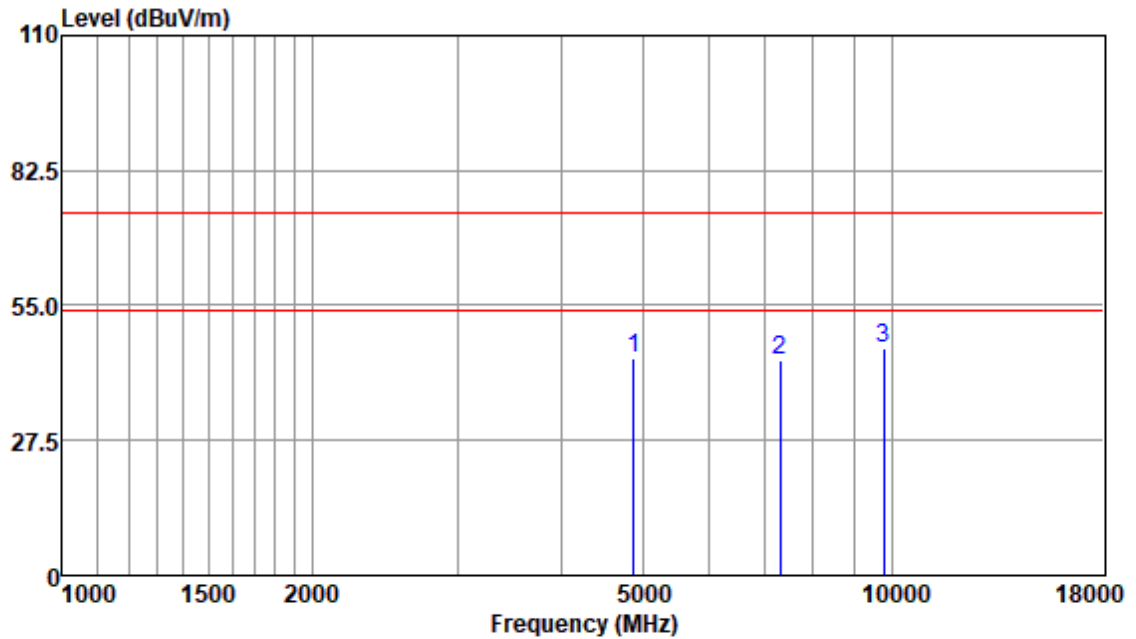


Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
4882.00	44.08	33.95	4.48	38.78	43.73	74.00	-30.27	Peak
7323.00	38.52	36.47	5.98	37.10	43.87	74.00	-30.13	Peak
9764.00	36.19	37.68	6.48	34.14	46.21	74.00	-27.79	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Vertical; Modulation:GFSK; ; Channel:middle

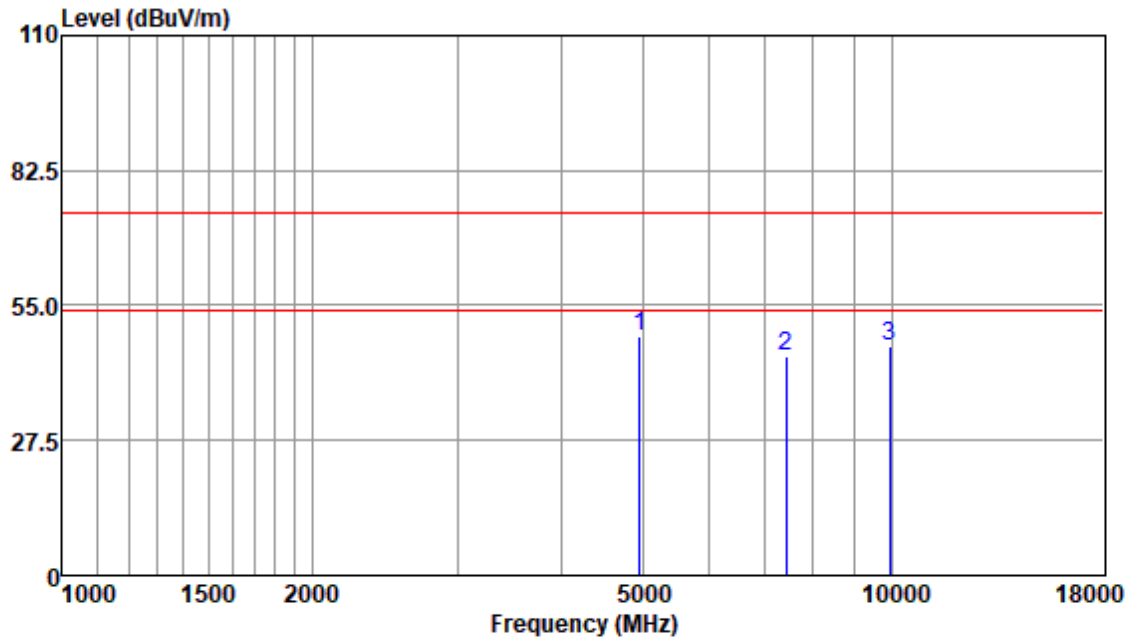


Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
4882.00	44.60	33.95	4.48	38.78	44.25	74.00	-29.75	Peak
7323.00	38.60	36.47	5.98	37.10	43.95	74.00	-30.05	Peak
9764.00	36.28	37.68	6.48	34.14	46.30	74.00	-27.70	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Horizontal; Modulation:GFSK; ; Channel:High



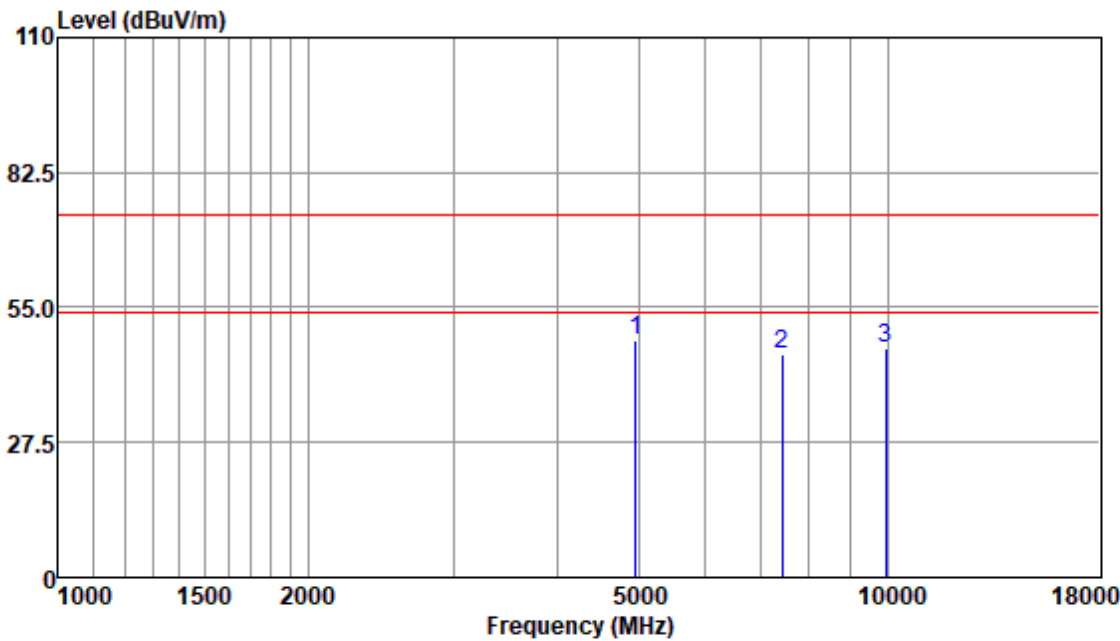
Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
4960.00	48.37	33.98	5.04	38.87	48.52	74.00	-25.48	Peak
7440.00	39.33	36.40	6.09	37.03	44.79	74.00	-29.21	Peak
9920.00	36.43	37.81	6.53	34.11	46.66	74.00	-27.34	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



Mode:b; Polarization:Vertical; Modulation:GFSK; ; Channel:High

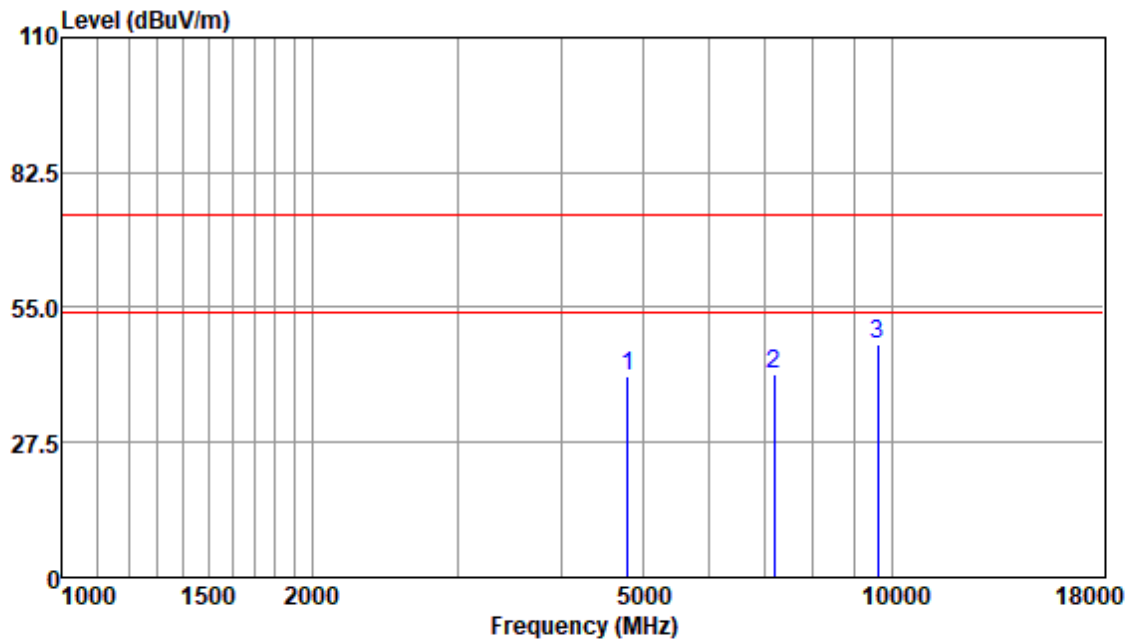


Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
4960.00	48.21	33.98	5.04	38.87	48.36	74.00	-25.64	Peak
7440.00	39.91	36.40	6.09	37.03	45.37	74.00	-28.63	Peak
9920.00	36.38	37.81	6.53	34.11	46.61	74.00	-27.39	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Horizontal; Modulation: $\pi/4$ DQPSK; ; Channel:Low

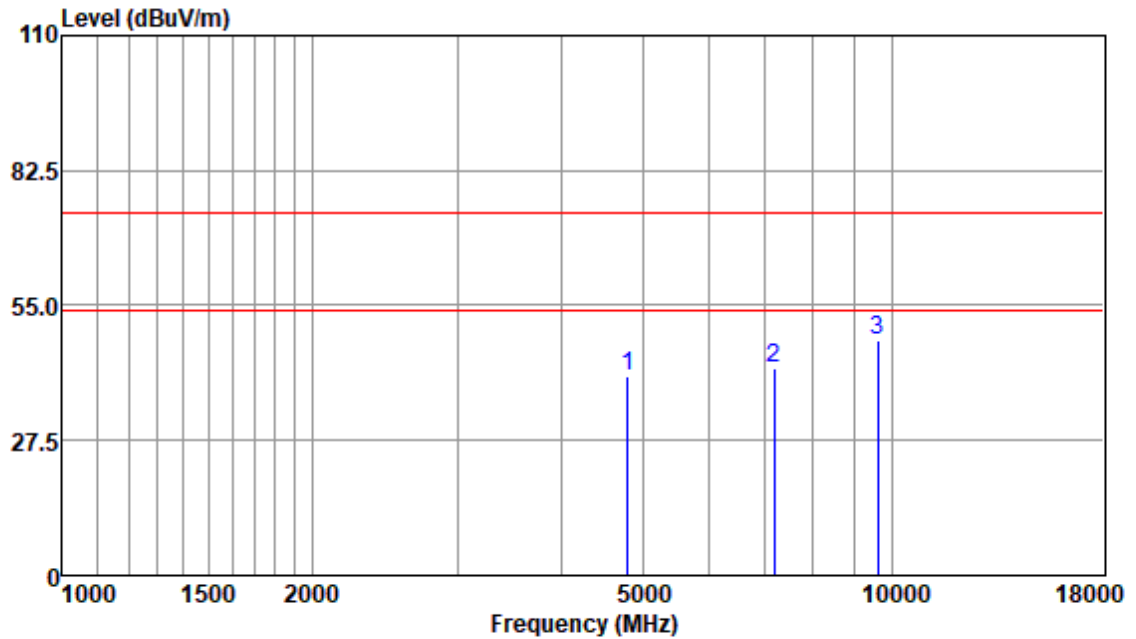


Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
4804.00	40.85	33.72	5.09	38.71	40.95	74.00	-33.05	Peak
7206.00	36.68	36.28	5.75	37.18	41.53	74.00	-32.47	Peak
9608.00	37.35	37.70	6.78	34.18	47.65	74.00	-26.35	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamplifier Factor

Mode:b; Polarization:Vertical; Modulation: $\pi/4$ DQPSK; ; Channel:Low

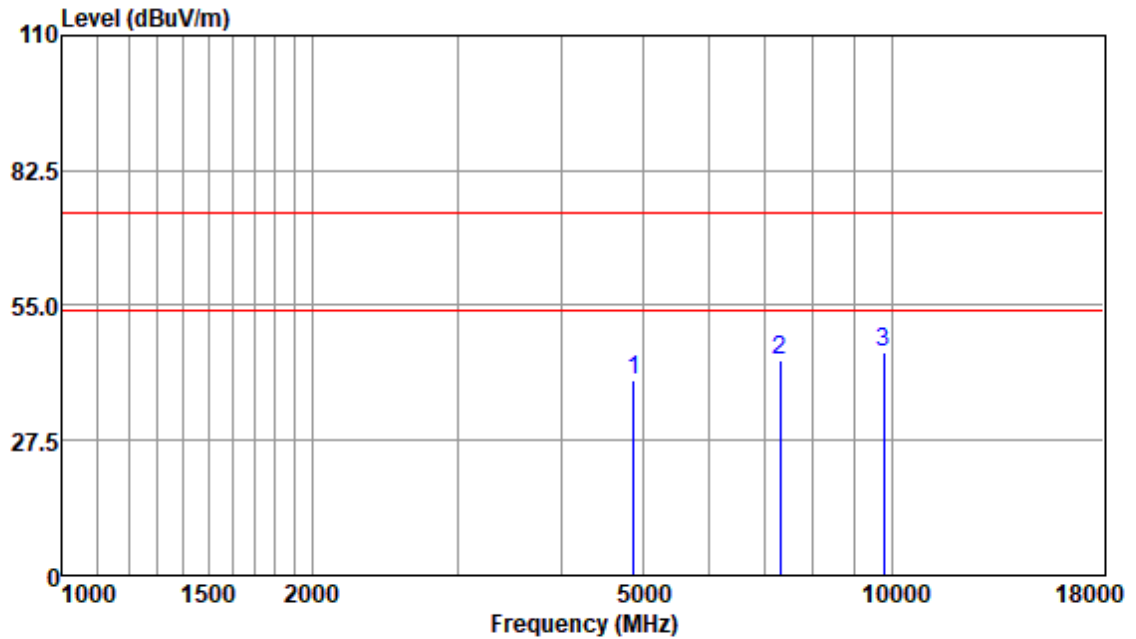


Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
4804.00	40.65	33.72	5.09	38.71	40.75	74.00	-33.25	Peak
7206.00	37.25	36.28	5.75	37.18	42.10	74.00	-31.90	Peak
9608.00	37.45	37.70	6.78	34.18	47.75	74.00	-26.25	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamplifier Factor

Mode:b; Polarization:Horizontal; Modulation: $\pi/4$ DQPSK; ; Channel:middle

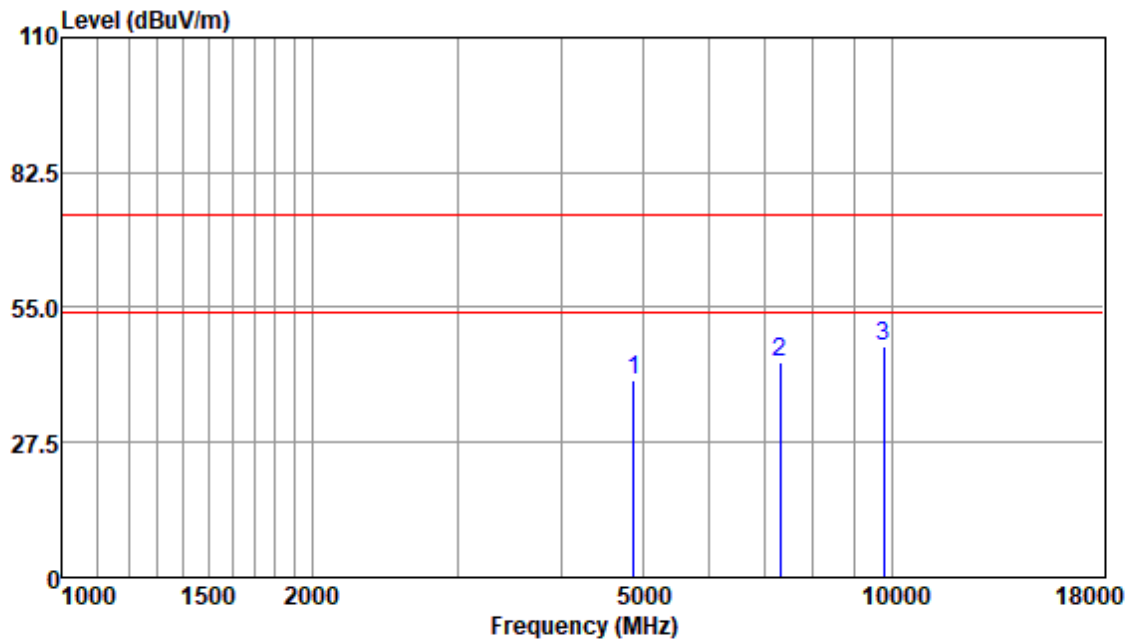


Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
4882.00	40.14	33.95	4.48	38.78	39.79	74.00	-34.21	Peak
7323.00	38.66	36.47	5.98	37.10	44.01	74.00	-29.99	Peak
9764.00	35.45	37.68	6.48	34.14	45.47	74.00	-28.53	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamplifier Factor

Mode:b; Polarization:Vertical; Modulation: $\pi/4$ DQPSK; ; Channel:middle

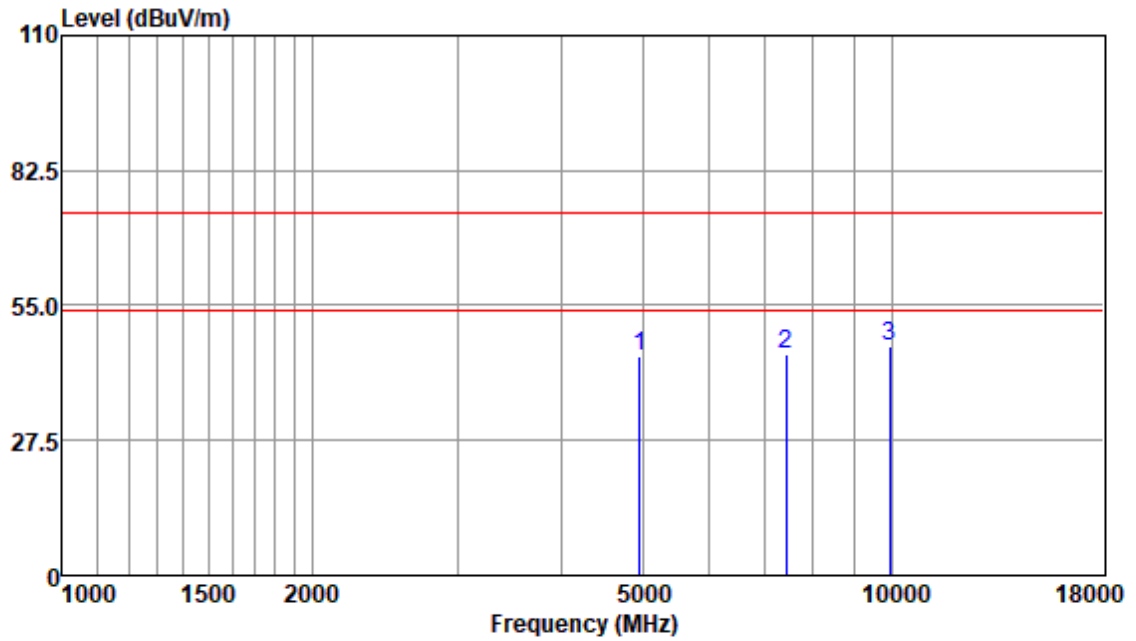


Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
4882.00	40.64	33.95	4.48	38.78	40.29	74.00	-33.71	Peak
7323.00	38.48	36.47	5.98	37.10	43.83	74.00	-30.17	Peak
9764.00	36.89	37.68	6.48	34.14	46.91	74.00	-27.09	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Horizontal; Modulation: $\pi/4$ DQPSK; ; Channel:High



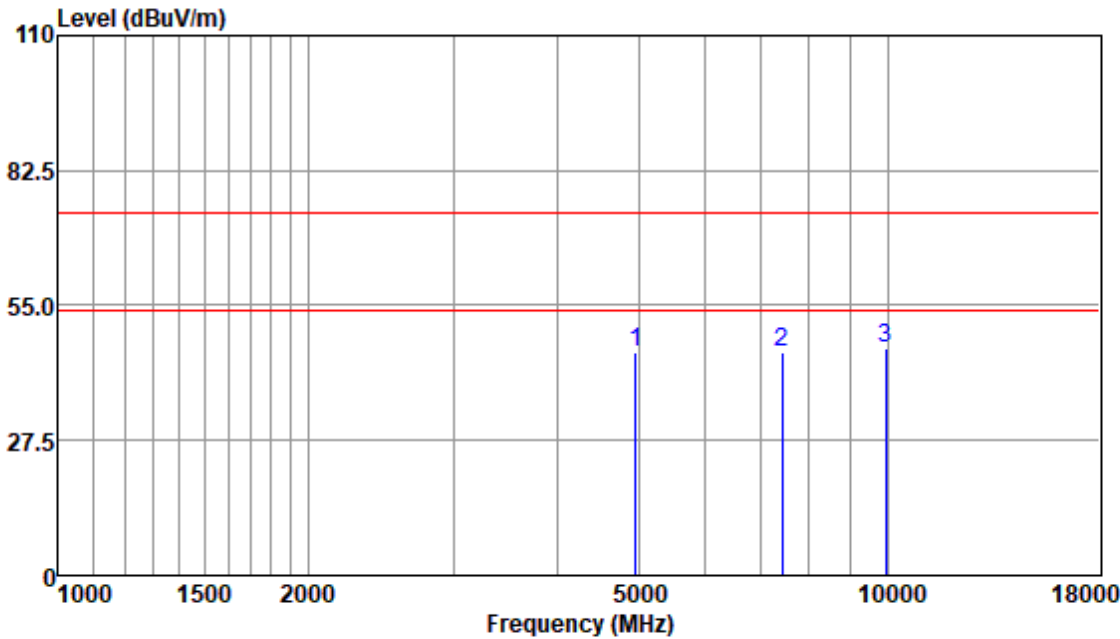
Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
4960.00	44.69	33.98	5.04	38.87	44.84	74.00	-29.16	Peak
7440.00	39.79	36.40	6.09	37.03	45.25	74.00	-28.75	Peak
9920.00	36.42	37.81	6.53	34.11	46.65	74.00	-27.35	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamplifier Factor



Mode:b; Polarization:Vertical; Modulation:π/4 DQPSK; ; Channel:High

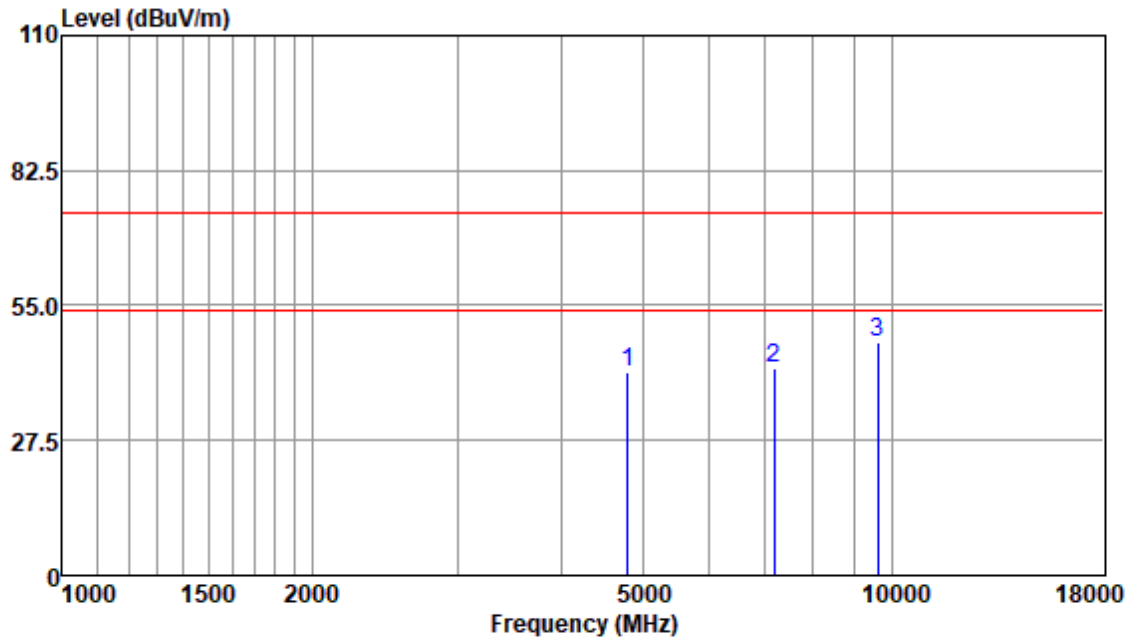


Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
4960.00	45.21	33.98	5.04	38.87	45.36	74.00	-28.64	Peak
7440.00	39.96	36.40	6.09	37.03	45.42	74.00	-28.58	Peak
9920.00	36.04	37.81	6.53	34.11	46.27	74.00	-27.73	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Horizontal; Modulation:8DPSK; ; Channel:Low

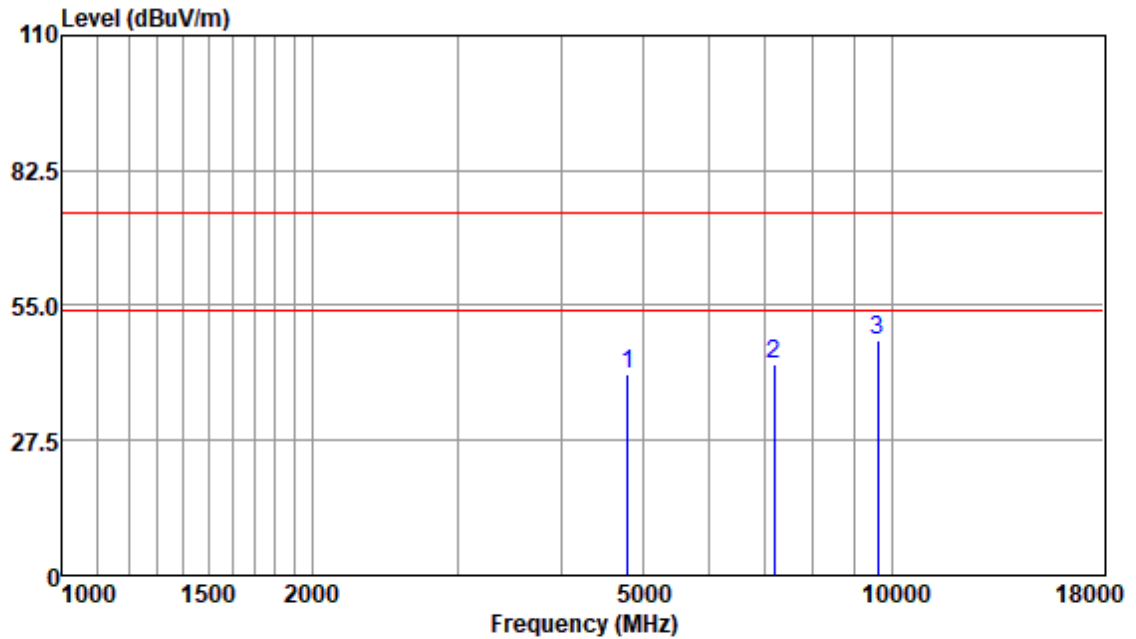


Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
4804.00	41.32	33.72	5.09	38.71	41.42	74.00	-32.58	Peak
7206.00	37.36	36.28	5.75	37.18	42.21	74.00	-31.79	Peak
9608.00	37.26	37.70	6.78	34.18	47.56	74.00	-26.44	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Vertical; Modulation:8DPSK; ; Channel:Low

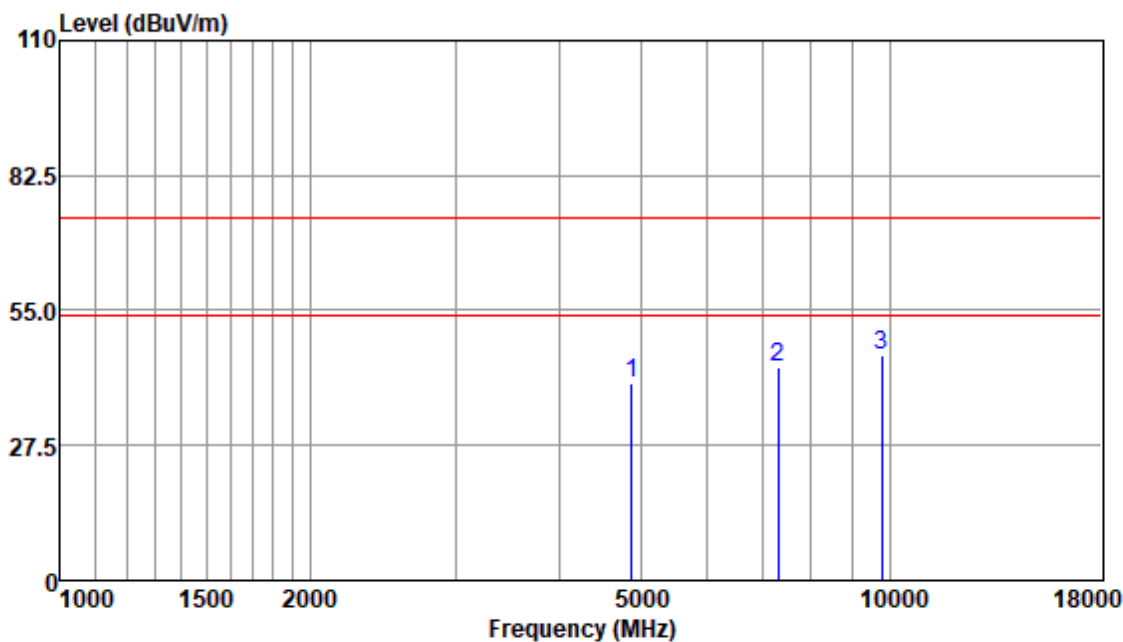


Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
4804.00	41.09	33.72	5.09	38.71	41.19	74.00	-32.81	Peak
7206.00	38.00	36.28	5.75	37.18	42.85	74.00	-31.15	Peak
9608.00	37.51	37.70	6.78	34.18	47.81	74.00	-26.19	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Horizontal; Modulation:8DPSK; ; Channel:middle

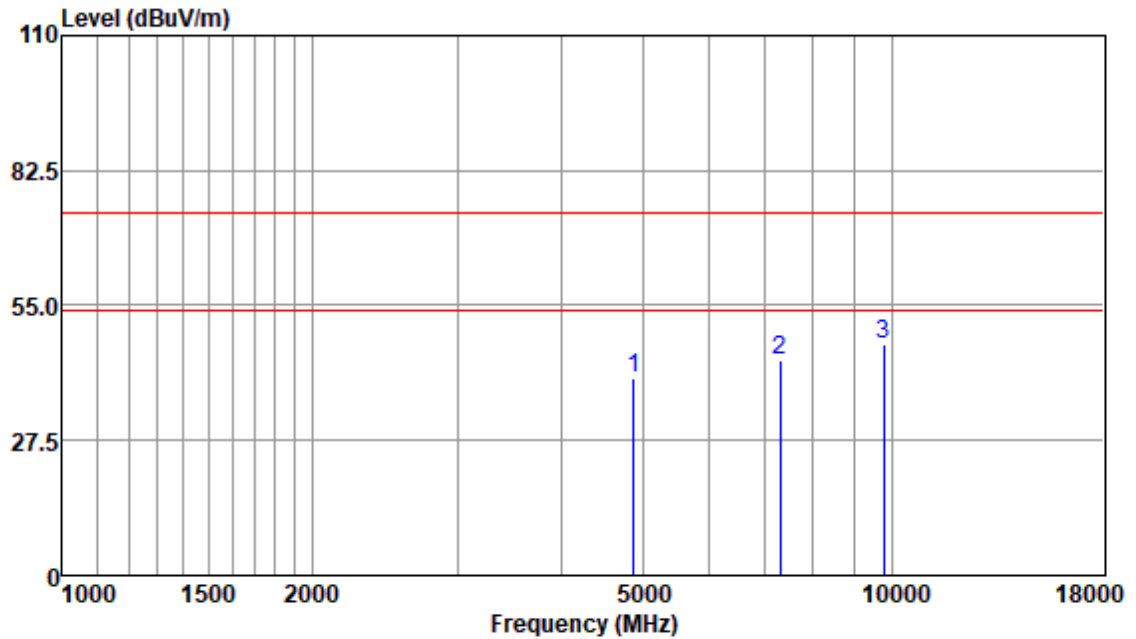


Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
4882.00	40.68	33.95	4.48	38.78	40.33	74.00	-33.67	Peak
7323.00	38.12	36.47	5.98	37.10	43.47	74.00	-30.53	Peak
9764.00	36.00	37.68	6.48	34.14	46.02	74.00	-27.98	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Vertical; Modulation:8DPSK; ; Channel:middle

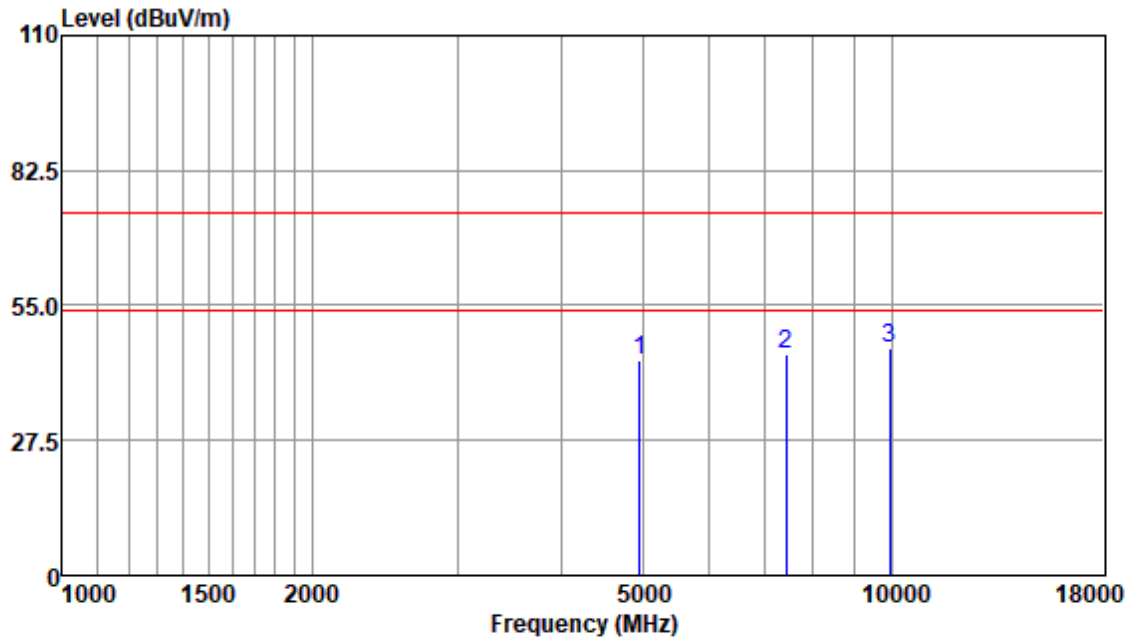


Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
4882.00	40.64	33.95	4.48	38.78	40.29	74.00	-33.71	Peak
7323.00	38.48	36.47	5.98	37.10	43.83	74.00	-30.17	Peak
9764.00	36.89	37.68	6.48	34.14	46.91	74.00	-27.09	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Horizontal; Modulation:8DPSK; ; Channel:High

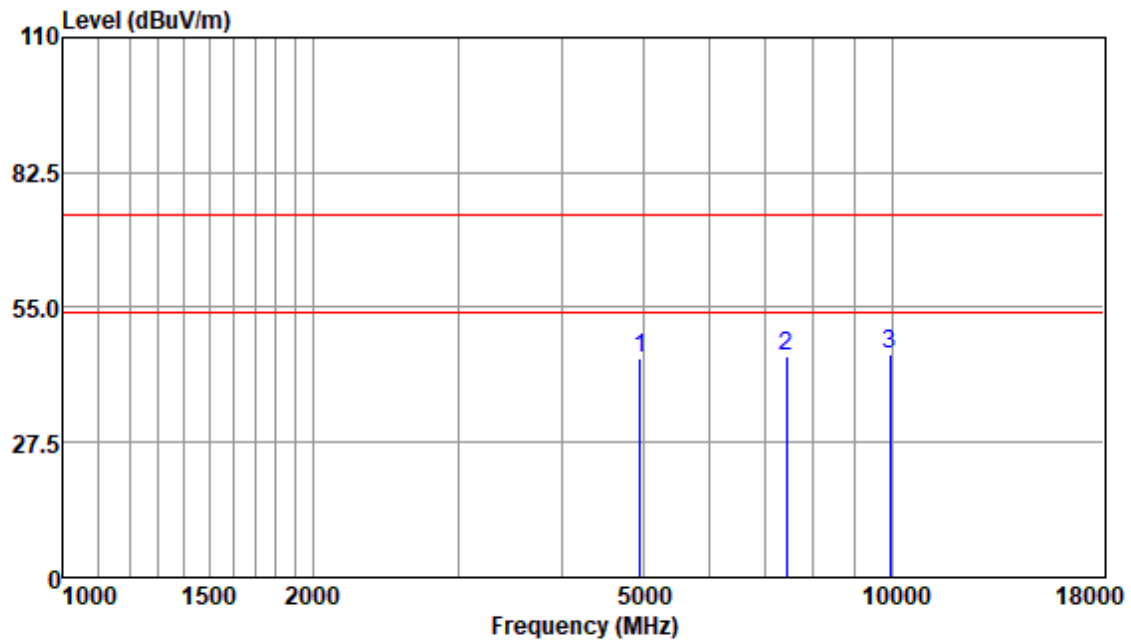


Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
4960.00	43.76	33.98	5.04	38.87	43.91	74.00	-30.09	Peak
7440.00	39.57	36.40	6.09	37.03	45.03	74.00	-28.97	Peak
9920.00	35.92	37.81	6.53	34.11	46.15	74.00	-27.85	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Vertical; Modulation:8DPSK; ; Channel:High



Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
4960.00	44.32	33.98	5.04	38.87	44.47	74.00	-29.53	Peak
7440.00	39.66	36.40	6.09	37.03	45.12	74.00	-28.88	Peak
9920.00	35.17	37.81	6.53	34.11	45.40	74.00	-28.60	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



7 Test Setup Photographs

Refer to the < Test Setup photos-FCC>.

8 EUT Constructional Details

Refer to the < External Photos > & < Internal Photos >.

- End of the Report -