RADIO TEST REPORT

FCC 47 CFR PART 15 SUBPART C

Test Standard	**FCC Part 15.247**
Product name	**SYSTEM TABLET CONTROLLER**
Brand Name	**OLYMPUS**
Model No.	**SC-1**
Test Result	**Pass**
Statements of Conformity	**Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.**

The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

The test results of this report relate only to the tested sample (EUT) identified in this report.
The test Report of full or partial shall not copy. Without written approval of Compliance Certification Services Inc.(Wugu Laboratory)

Approved by:

Kevin Tsai
Deputy Manager

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.
除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。
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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	July 14, 2020	Initial Issue	ALL	Allison Chen
01	July 27, 2020	See the following note Rev.(01)	P.A-1	Allison Chen

Rev.(01)
1. Modify test setup photo for above 1GHz.

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Table of contents

1. GENERAL INFORMATION 4
1.1 EUT INFORMATION 4
1.2 INFORMATION ABOUT THE FHSS CHARACTERISTICS 5
1.3 EUT CHANNEL INFORMATION 6
1.4 ANTENNA INFORMATION 6
1.5 MEASUREMENT UNCERTAINTY 7
1.6 FACILITIES AND TEST LOCATION 8
1.7 INSTRUMENT CALIBRATION 8
1.8 SUPPORT AND EUT ACCESSORIES EQUIPMENT 9
1.9 TEST METHODOLOGY AND APPLIED STANDARDS 9
2. TEST SUMMERY 10
3. DESCRIPTION OF TEST MODES 11
3.1 THE WORST MODE OF OPERATING CONDITION 11
3.2 THE WORST MODE OF MEASUREMENT 12
3.3 EUT DUTY CYCLE 13
4. TEST RESULT 14
4.1 AC POWER LINE CONDUCTED EMISSION 14
4.2 20DB BANDWIDTH AND OCCUPIED BANDWIDTH (99%) 17
4.3 OUTPUT POWER MEASUREMENT 22
4.4 FREQUENCY SEPARATION 24
4.5 NUMBER OF HOPPING 27
4.6 CONDUCTED BANDEDGE AND SPURIOUS EMISSION 29
4.7 TIME OF OCCUPANCY (DWELL TIME) 34
4.8 RADIATION BANDEDGE AND SPURIOUS EMISSION 36
APPENDIX 1 - PHOTOGRAPHS OF EUT

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1. GENERAL INFORMATION

1.1 EUT INFORMATION

Applicant	ADLINK TECHNOLOGY INC. 9F, No.166, Jian Yi Rd., Zhonghe Dist., New Taipei City, 235 Taiwan
Manufacturer	ADLINK TECHNOLOGY INC. 9F, No.166, Jian Yi Rd., Zhonghe Dist., New Taipei City, 235 Taiwan
Equipment	SYSTEM TABLET CONTROLLER
Model No.	SC-1
Model Discrepancy	N/A
Trade Name	OLYMPUS
Received Date	February 5, 2020
Date of Test	February 17 ~ March 25, 2020
Power Operation	1. EUT Power from Adapter. FSP GROUP INC. / FSP065M-DBA I/P: 100-240Vac, 2.0-1.0A, 50-60Hz O/P: 19.0Vdc, 3.43A Max 2. Power from Rechargeable Litthium Polymer Battery. Rating: 11.1Vdc, 2300mAh
HW Version	A2
SW Version	7.2

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1.2 INFORMATION ABOUT THE FHSS CHARACTERISTICS

1.2.1 Pseudorandom Frequency Hopping Sequence

The channel is represented by a pseudo-random hopping sequence hopping through the 79 RF channels. The hopping sequence is unique for the piconet and is determined by the Bluetooth device address of the master; the phase in the hopping sequence is determined by the Bluetooth clock of the master. The channel is divided into time slots where each slot corresponds to an RF hop frequency. Consecutive hops correspond to different RF hop frequencies. The nominal hop rate is 1 600 hops/s.

1.2.2 Equal Hopping Frequency Use

The channels of this system will be used equally over the long-term distribution of the hopsets.

1.2.3 Example of a 79 hopping sequence in data mode:

02, 05, 31, 24, 20, 10, 43, 36, 30, 23, 40, 06, 21, 50, 44, 09, 71, 78, 01, 13, 73, 07, 70, 72, 35, 62, 42, 11, 41, 08, 16, 29, 60, 15, 34, 61, 58, 04, 67, 12, 22, 53, 57, 18, 27, 76, 39, 32, 17, 77, 52, 33, 56, 46, 37, 47, 64, 49, 45, 38, 69, 14, 51, 26, 79, 19, 28, 65, 75, 54, 48, 03, 25, 66, 05, 16, 68, 74, 59, 63, 55

1.2.4 System Receiver Input Bandwidth

Each channel bandwidth is 1MHz.
The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

1.2.5 Equipment Description

RSS-247, 5.1 (a): The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

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1.3 EUT CHANNEL INFORMATION

Frequency Range	2402MHz-2480MHz
Modulation Type	1. GFSK for BDR-1Mbps 2. π/4-DQPSK for EDR-2Mbps 3. 8DPSK for EDR-3Mbps
Number of channel	79 Channels

Remark:
Refer as ANSI C63.10: 2013 clause 5.6.1 Table 4 for test channels

Number of frequencies to be tested		
Frequency range in which device operates	**Number of frequencies**	**Location in frequency range of operation**
☐ 1 MHz or less	1	Middle
☐ 1 MHz to 10 MHz	2	1 near top and 1 near bottom
☒ More than 10 MHz	3	1 near top, 1 near middle, and 1 near bottom

1.4 ANTENNA INFORMATION

Antenna Specification	PCB Antenna
Antenna Gain	1.57 dBi
Antenna connector	IPEX

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1.5 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	+/- 1.2575
Emission bandwidth, 20dB bandwidth	+/- 0.0014
RF output power, conducted	+/- 1.14
Power density, conducted	+/- 1.40
3M Semi Anechoic Chamber / 30M~200M	+/- 4.12
3M Semi Anechoic Chamber / 200M~1000M	+/- 4.68
3M Semi Anechoic Chamber / 1G~8G	+/- 5.18
3M Semi Anechoic Chamber / 8G~18G	+/- 5.47
3M Semi Anechoic Chamber / 18G~26G	+/- 3.81
3M Semi Anechoic Chamber / 26G~40G	+/- 3.87

***Remark**:*
1.This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2
2. ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report.

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1.6 FACILITIES AND TEST LOCATION

All measurement facilities used to collect the measurement data are located at *No.11, Wugong 6th Rd., Wugu Dist., New Taipei City, Taiwan. (R.O.C.)*

Test site	Test Engineer	Remark
AC Conduction Room	Dally Hong	-
Radiation	Jerry Chang	-
RF Conducted	Dally Hong	-

Remark: *The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.*

1.7 INSTRUMENT CALIBRATION

RF Conducted Test Site					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Coaxial Cable	Woken	WC12	CC001	06/28/2019	06/27/2020
Coaxial Cable	Woken	WC12	CC003	06/28/2019	06/27/2020
Signal Analyzer	R&S	FSV 40	101073	09/25/2019	09/24/2020
Power Meter	Anritsu	ML2495A	1149001	N.C.R	N.C.R
Power Seneor	Anritsu	MA2491A	030982	N.C.R	N.C.R
Software	N/A				

3M 966 Chamber Test Site					
Equipment	**Manufacturer**	**Model**	**S/N**	**Cal Date**	**Cal Due**
Band Reject Filters	MICRO TRONICS	BRM 50702	120	02/25/2020	02/24/2021
Bilog Antenna	Sunol Sciences	JB3	A030105	07/26/2019	07/25/2020
Coaxial Cable	HUBER SUHNER	SUCOFLEX 104PEA	20995	02/25/2020	02/24/2021
Coaxial Cable	EMCI	EMC105	190914+25111	09/20/2019	09/19/2020
Digital Thermo-Hygro Meter	WISEWIND	1206	D07	01/15/2020	01/14/2021
double Ridged Guide Horn Antenna	ETC	MCTD 1209	DRH13M02003	10/04/2019	10/03/2020
Pre-Amplifier	EMEC	EM330	060609	02/25/2020	02/24/2021
Pre-Amplifier	HP	8449B	3008A00965	02/25/2020	02/24/2021
PSA Series Spectrum Analyzer	Agilent	E4446A	MY46180323	05/29/2019	05/28/2020
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R
Software	e3 6.11-20180413				

Remark: *Each piece of equipment is scheduled for calibration once a year.*

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Conducted Emission Room # B					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
CABLE	EMCI	CFD300-NL	CERF	06/27/2019	06/26/2020
EMI Test Receiver	R&S	ESCI	100064	07/26/2019	07/25/2020
LISN	SCHAFFNER	NNB 41	03/10013	02/13/2020	02/12/2021
Software	EZ-EMC(CCS-3A1-CE)				

Remark: *Each piece of equipment is scheduled for calibration once a year.*

1.8 SUPPORT AND EUT ACCESSORIES EQUIPMENT

EUT Accessories Equipment					
No.	**Equipment**	**Brand**	**Model**	**Series No.**	**FCC ID**
	N/A				

Support Equipment					
No.	**Equipment**	**Brand**	**Model**	**Series No.**	**FCC ID**
	N/A				

1.9 TEST METHODOLOGY AND APPLIED STANDARDS

The test methodology, setups and results comply with all requirements in accordance with ANSI C63.10:2013, FCC Part 2, FCC Part 15.247.

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2. TEST SUMMERY

FCC Standard Section	Report Section	Test Item	Result
15.203	1.3	Antenna Requirement	Pass
15.207(a)	4.1	AC Conducted Emission	Pass
15.247(a)(1)	4.2	20 dB Bandwidth	Pass
-	4.2	Occupied Bandwidth (99%)	Pass
15.247(b)(1)	4.3	Output Power Measurement	Pass
15.247(a)(1)	4.4	Frequency Separation	Pass
15.247(a)(1)(iii)	4.5	Number of Hopping	Pass
15.247(d)	4.6	Conducted Band Edge	Pass
15.247(d)	4.6	Conducted Spurious Emission	Pass
15.247(a)(1)(iii)	4.7	Time of Occupancy	Pass
15.247(d)	4.8	Radiation Band Edge	Pass
15.247(d)	4.8	Radiation Spurious Emission	Pass

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3. DESCRIPTION OF TEST MODES

3.1 THE WORST MODE OF OPERATING CONDITION

Operation mode	GFSK for BDR-1Mbps (DH5) 8DPSK for EDR-3Mbps (3DH5)
Test Channel Frequencies	**GFSK for BDR-1Mbps:** 1.Lowest Channel: 2402MHz 2.Middle Channel: 2441MHz 3.Highest Channel: 2480MHz **8DPSK for EDR-3Mbps:** 1.Lowest Channel: 2402MHz 2.Middle Channel: 2441MHz 3.Highest Channel: 2480MHz

Remark:
1. EUT pre-scanned data rate of output power for each mode, the worst data rate were recorded in this report.

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3.2 THE WORST MODE OF MEASUREMENT

Radiated Emission Measurement Above 1G	
Test Condition	**Radiated Emission Above 1G**
Power supply Mode	**Mode 1: EUT power by Adapter**
Worst Mode	☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4
Worst Position	☐ Placed in fixed position. ☐ Placed in fixed position at X-Plane (E2-Plane) ☒ Placed in fixed position at Y-Plane (E1-Plane) ☐ Placed in fixed position at Z-Plane (H-Plane)

Radiated Emission Measurement Below 1G	
Test Condition	**Radiated Emission Below 1G**
Power supply Mode	**Mode 1: EUT power by Adapter**
Worst Mode	☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4

Remark:
1. The worst mode was record in this test report.
2. EUT pre-scanned in three axis ,X,Y, Z and two polarity, for radiated measurement. The worst case(Y-Plane) were recorded in this report

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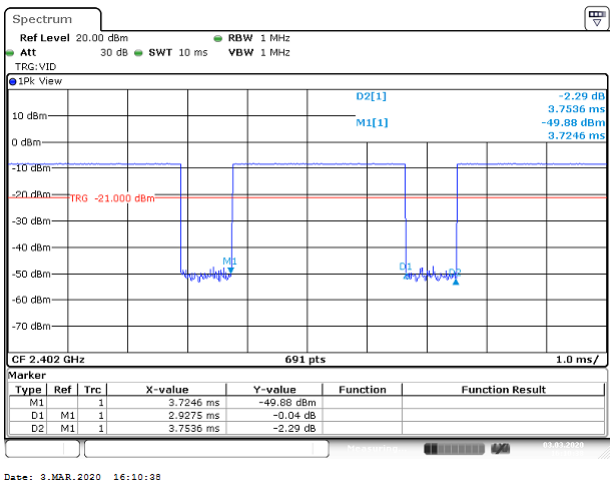
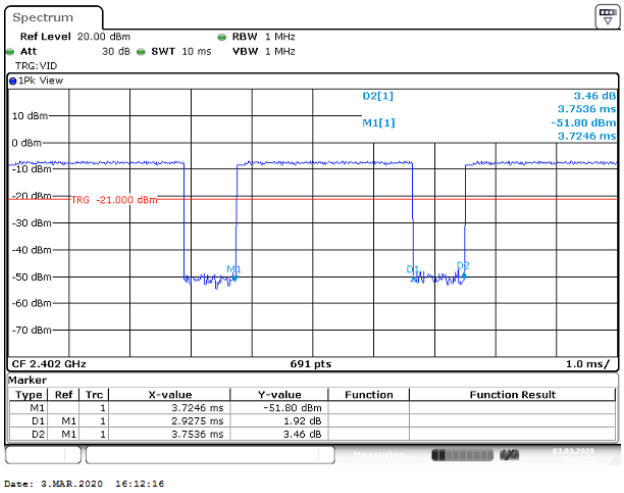
3.3 EUT DUTY CYCLE

Duty Cycle					
Configuration	TX ON (ms)	Duty Cycle (%)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
BDR-1Mbps	2.9275	77.99%	1.08	0.34	1.00
EDR-3Mbps	2.9275	77.99%	1.08	0.34	1.00

BDR-1Mbps



EDR-3Mbps



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4. TEST RESULT

4.1 AC POWER LINE CONDUCTED EMISSION

4.1.1 Test Limit

According to §15.207(a),

Frequency Range (MHz)	Limits(dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

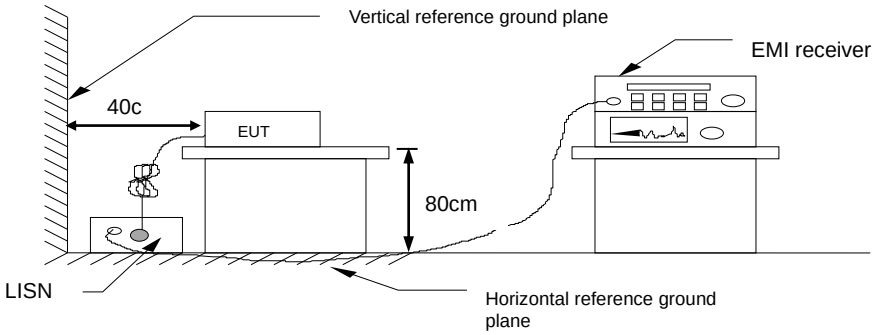
* Decreases with the logarithm of the frequency.

4.1.2 Test Procedure

Test method Refer as ANSI C63.10: 2013 clause 6.2,

1. The EUT was placed on a non-conducted table, which is 0.8m above horizontal ground plane and 0.4m above vertical ground plane.
2. EUT connected to the line impedance stabilization network (LISN)
3. Receiver set RBW of 9kHz and Detector Peak, and note as quasi-peak and average.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. Recorded Line for Neutral and Line.

4.1.3 Test Setup



4.1.4 Test Result

PASS

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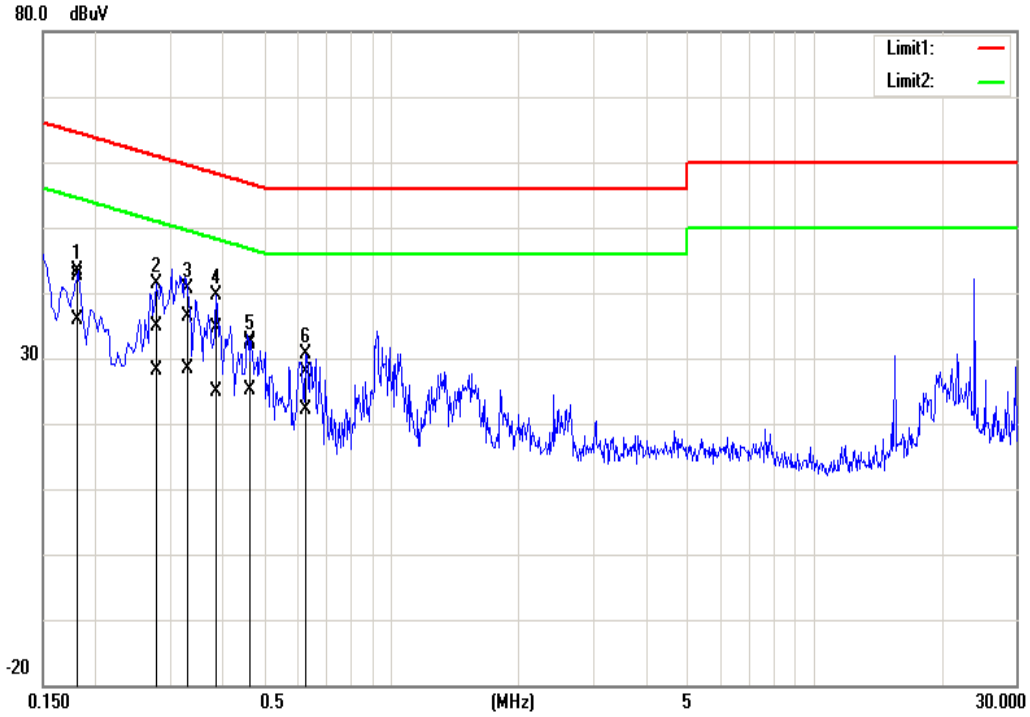
Test Data

Test Mode:	Mode 1	Temp/Hum	24(℃)/ 50%RH
Phase:	Line	Test Date	February 17, 2020
Test Voltage:	120Vac, 60Hz	Test Engineer	Dally Hong



Frequency (MHz)	Quasi Peak reading (dBuV)	Average reading (d uV)	Correction factor (dB)	Quasi Peak result (dBuV)	Average result (dBuV)	Quasi Peak limit (dBuV)	Average limit (dBuV)	Quasi Peak margin (dB)	Average margin (dB)	Remark
0.1820	32.54	25.66	10.21	42.75	35.87	64.39	54.39	-21.64	-18.52	Pass
0.2780	24.56	17.83	10.21	34.77	28.04	60.88	50.88	-26.11	-22.84	Pass
0.3303	26.20	18.04	10.22	36.42	28.26	59.44	49.44	-23.02	-21.18	Pass
0.3860	24.46	14.59	10.22	34.68	24.81	58.15	48.15	-23.47	-23.34	Pass
0.4660	21.90	14.86	10.22	32.12	25.08	56.58	46.58	-24.46	-21.50	Pass
0.6300	17.59	11.99	10.22	27.81	22.21	56.00	46.00	-28.19	-23.79	Pass

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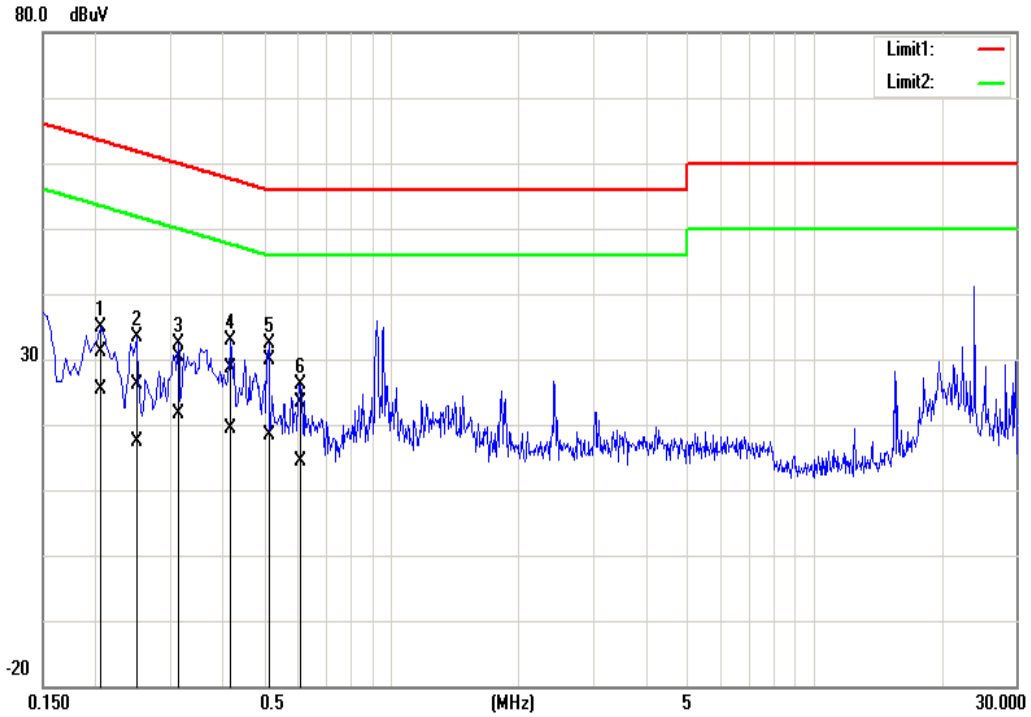
Test Mode:	Mode 1	Temp/Hum	24(℃)/ 50%RH
Phase:	Neutral	Test Date	February 17, 2020
Test Voltage:	120Vac, 60Hz	Test Engineer	Dally Hong



Frequency (MHz)	Quasi Peak reading dBuV)	Average reading (dBuV)	Correction factor (dB)	Quasi Peak result (dBuV)	Average result (dBuV)	Quasi Peak limit (dBuV)	Average limit (dBuV)	Quasi Peak margin (dB)	Average margin (dB)	Remark
0.2060	20.94	15.17	10.19	31.13	25.36	63.37	53.37	-32.24	-28.01	Pass
0.2500	15.92	7.24	10.19	26.11	17.43	61.76	51.76	-35.65	-34.33	Pass
0.3140	20.13	11.39	10.19	30.32	21.58	59.86	49.86	-29.54	-28.28	Pass
0.4180	18.37	9.12	10.19	28.56	19.31	57.49	47.49	-28.93	-28.18	Pass
0.5140	19.70	8.29	10.19	29.89	18.48	56.00	46.00	-26.11	-27.52	Pass
0.6140	13.29	4.27	10.19	23.48	14.46	56.00	46.00	-32.52	-31.54	Pass

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4.2 20dB BANDWIDTH AND OCCUPIED BANDWIDTH (99%)

4.2.1 Test Limit

According to §15.247(a) (1),

20 dB Bandwidth ：For reporting purposes only.

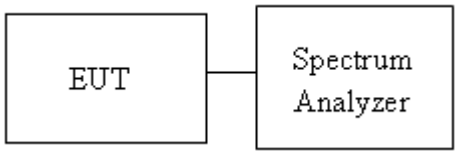
Occupied Bandwidth(99%) ：For reporting purposes only.

4.2.2 Test Procedure

Test method Refer as ANSI C63.10: 2013 clause 7.8.7,

1. The EUT RF output connected to the spectrum analyzer by RF cable.
2. Setting maximum power transmit of EUT
3. SA set RBW = 30kHz, VBW = 100kHz and Detector = Peak, to measurement 20 dB Bandwidth and 99% Bandwidth.
4. SA set RBW = 1% ~ 5% OBW, VBW = three times the RBW and Detector = Peak, to measurement 99% Bandwidth
5. Measure and record the result of 20 dB Bandwidth and 99% Bandwidth. in the test report.

4.2.3 Test Setup



4.2.4 Test Result

Test mode: GFSK_BDR-1Mbps mode / 2402-2480 MHz			
Channel	**Frequency (MHz)**	**OBW(99%) (MHz)**	**20dB BW (MHz)**
Low	2402	0.8856	0.9478
Mid	2441	0.8856	0.9478
High	2480	0.8856	0.9478

Test mode: 8DPSK_EDR-3Mbps mode / 2402-2480 MHz			
Channel	**Frequency (MHz)**	**OBW(99%) (MHz)**	**20dB BW (MHz)**
Low	2402	1.1765	1.2826
Mid	2441	1.1765	1.2826
High	2480	1.1765	1.2826

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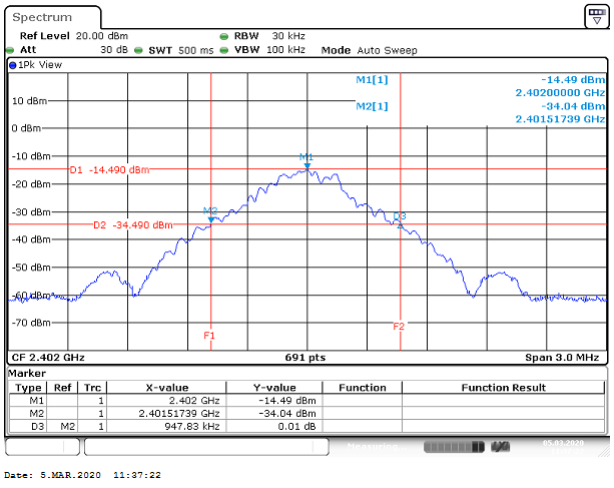
Test Data

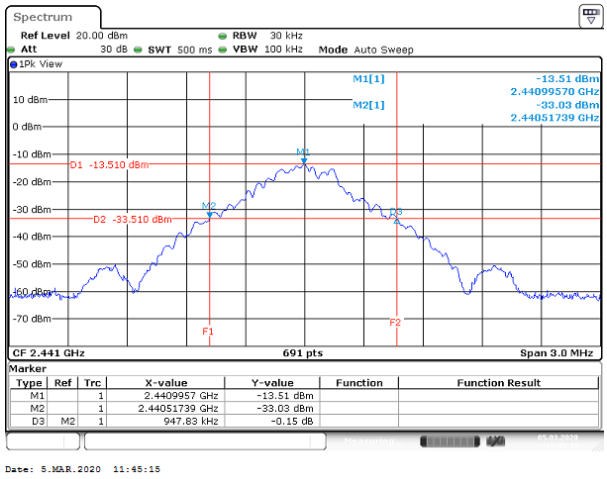
20dB BANDWIDTH

GFSK_BDR-1Mbps mode

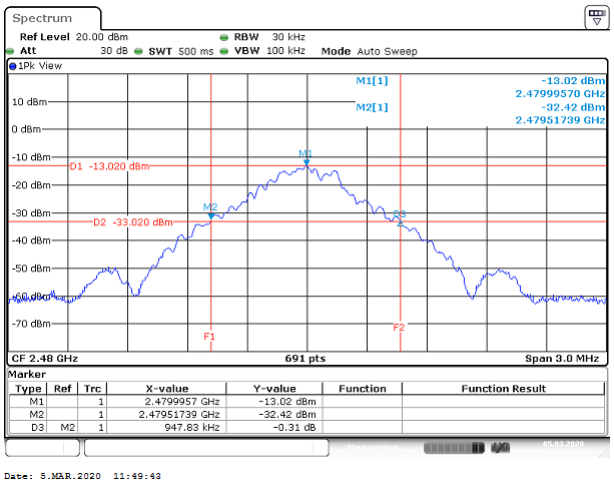
Low CH



Mid CH



High CH



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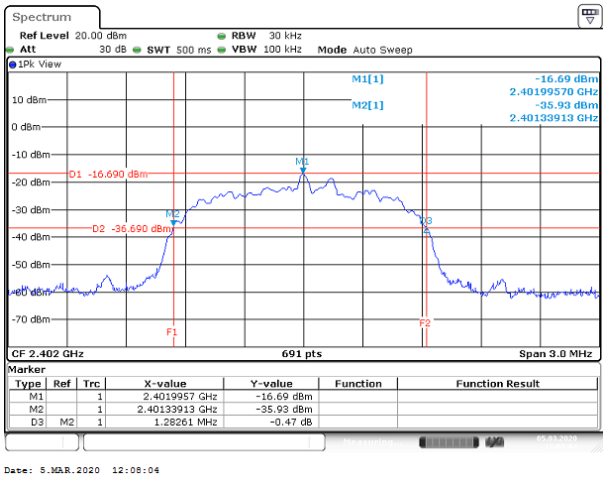
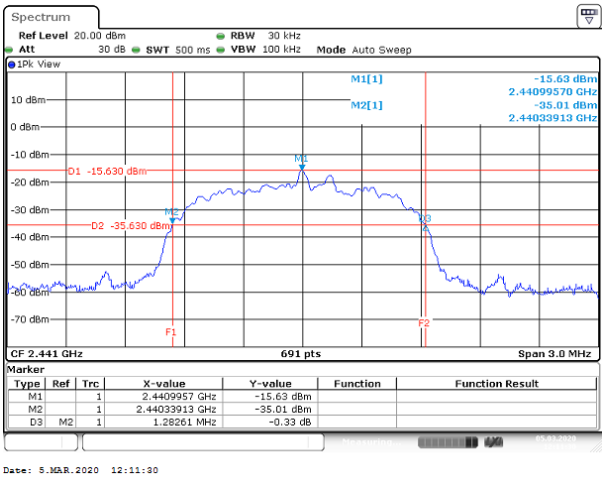
8DPSK_EDR-3Mbps mode

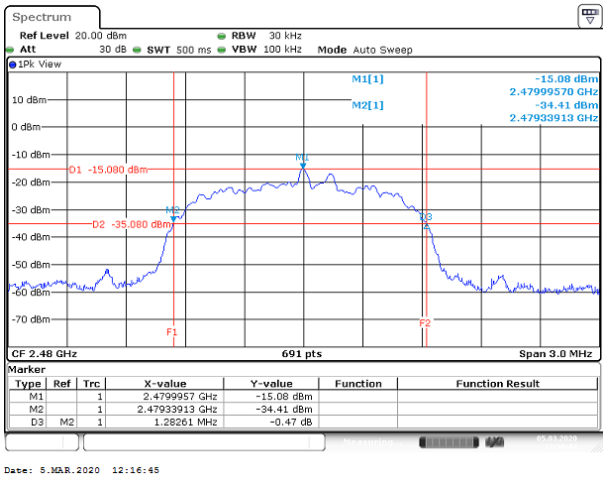
Low CH



Mid CH



High CH



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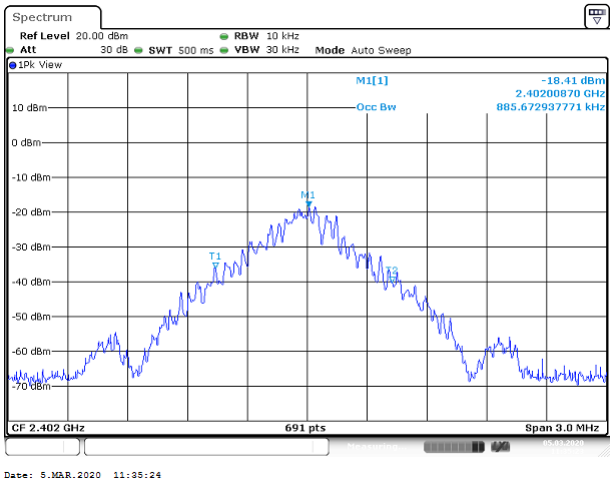
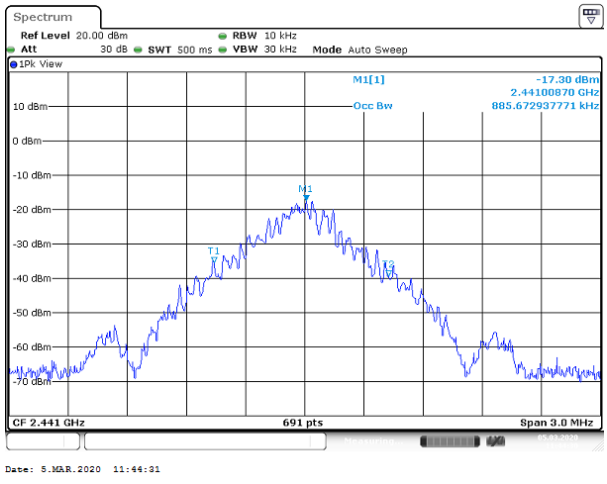
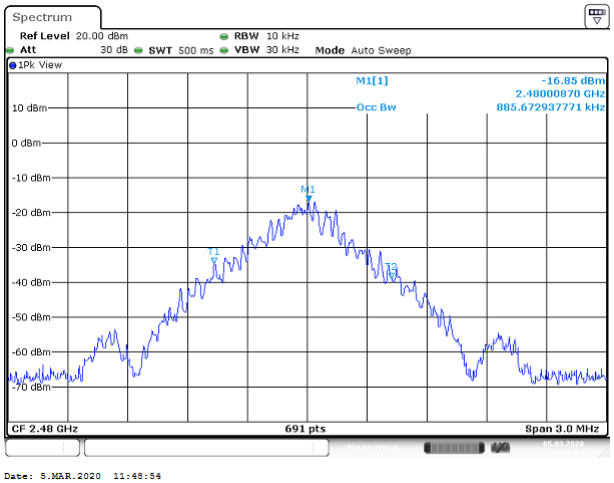
Test Data

BANDWIDTH 99%

GFSK_BDR-1Mbps mode	
Low CH	**Mid CH**
	
High CH	
	

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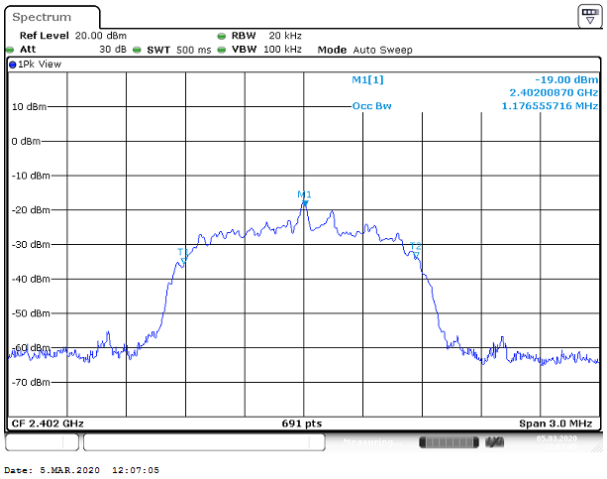
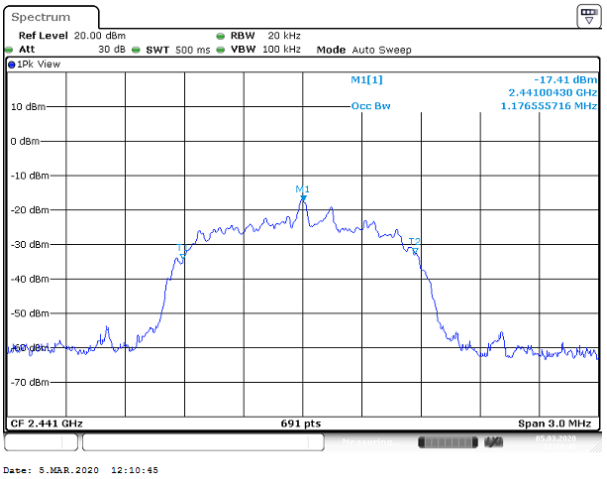
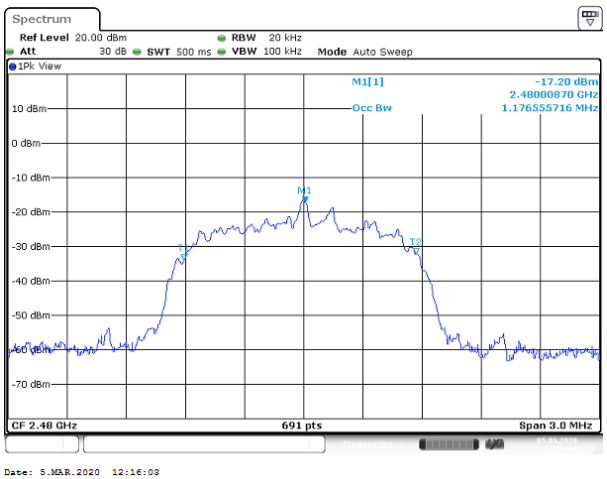
8DPSK_EDR-3Mbps mode	
Low CH	**Mid CH**
	
High CH	
	

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4.3 OUTPUT POWER MEASUREMENT

4.3.1 Test Limit

According to §15.247(a)(1)

Peak output power：

FCC

Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

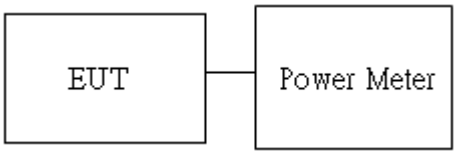
Limit	☒ Antenna not exceed 6 dBi：21dBm ☐ Antenna with DG greater than 6 dBi：21dBm [Limit = 30 – (DG – 6)]

Average output power：For reporting purposes only.

4.3.2 Test Procedure

1. The EUT RF output connected to the power meter by RF cable.
2. Setting maximum power transmit of EUT.
3. The path loss was compensated to the results for each measurement.
4. Measure and record the result of Peak output power and Average output power. in the test report.

4.3.3 Test Setup



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4.3.4 Test Result

Peak output power：

BT							
Config.	CH	Freq. (MHz)	Power Setting	PK Power (dBm)	PK Power (W)	DG (dBi)	Limit (dBm)
GFSK BR-1Mbps (DH5)	0	2402	8	6.58	0.0045	1.57	21
	39	2441	8	7.31	0.0054		
	78	2480	8	7.58	0.0057		
8DPSK EDR-3Mbps (3DH5)	0	2402	8	7.12	0.0052		
	39	2441	8	7.79	0.0060		
	78	2480	8	**8.05**	0.0064		

Average output power：

BT				
Config.	CH	Freq. (MHz)	Power setting	AV Power (dBm)
GFSK BR-1Mbps (DH5)	0	2402	8	4.44
	39	2441	8	5.25
	78	2480	8	5.54
8DPSK EDR-3Mbps (3DH5)	0	2402	8	2.03
	39	2441	8	2.83
	78	2480	8	3.14

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4.4 FREQUENCY SEPARATION

4.4.1 Test Limit

According to §15.247(a)(1)

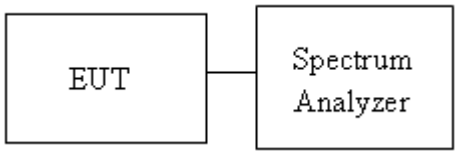
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Limit	> two-thirds of the 20 dB bandwidth

4.4.2 Test Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. EUT RF output port connected to the SA by RF cable.
3. Set the spectrum analyzer as RBW = 100kHz, VBW = 300kHz, Sweep = auto. Max hold, mark 3 peaks of hopping channel and record the 3 peaks frequency

4.4.3 Test Setup



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4.4.4 Test Result

Test mode: GFSK_BDR-1Mbps mode / 2402-2480 MHz				
Channel	**Frequency (MHz)**	**Channel Separation (MHz)**	**Channel Separation Limits (MHz)**	**Result**
Low	2402	0.9986	0.632	PASS
Mid	2441	0.9986	0.632	PASS
High	2480	0.9986	0.632	PASS

Test mode: 8DPSK_EDR-3Mbps mode / 2402-2480 MHz				
Channel	**Frequency (MHz)**	**Channel Separation (MHz)**	**Channel Separation Limits (MHz)**	**Result**
Low	2402	0.9942	0.855	PASS
Mid	2441	0.9942	0.855	PASS
High	2480	0.9942	0.855	PASS

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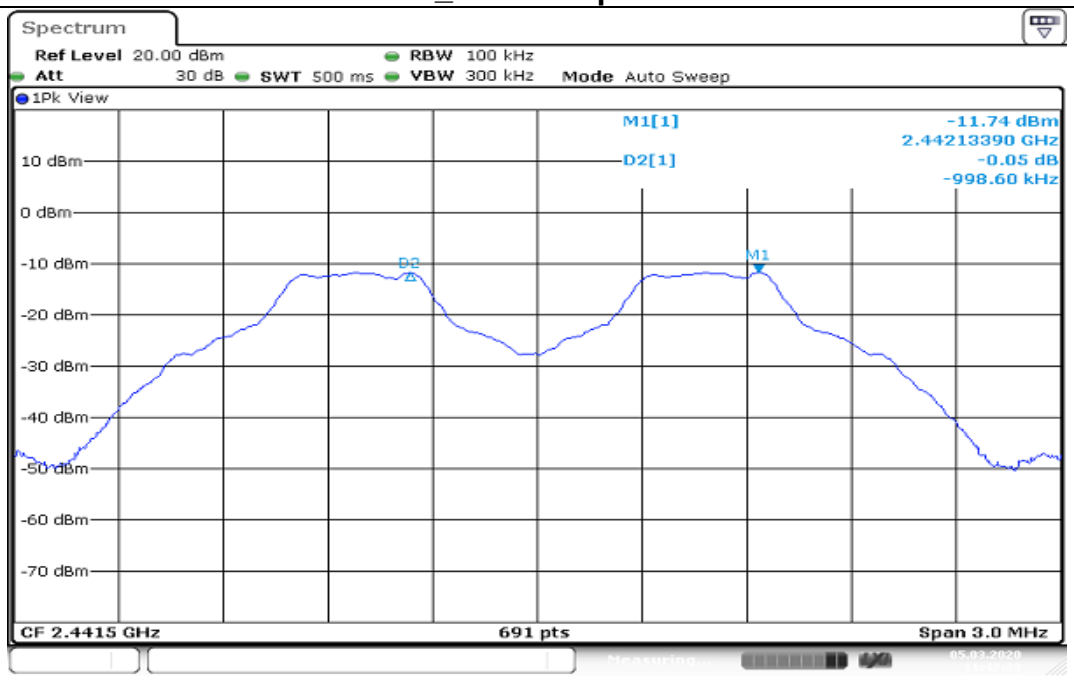
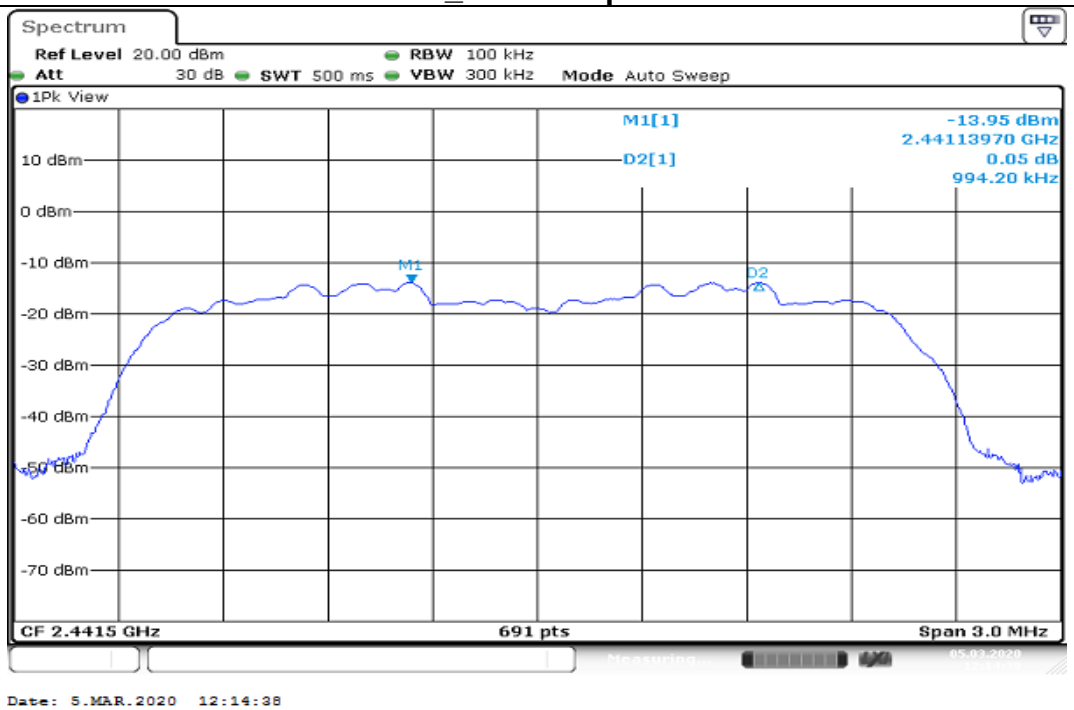
Test Data

GFSK_BDR-1Mbps mode



8DPSK_EDR-3Mbps mode



Note: We selected worst case to performed test in middle channel, The results can be meet other channel.

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4.5 NUMBER OF HOPPING

4.5.1 Test Limit

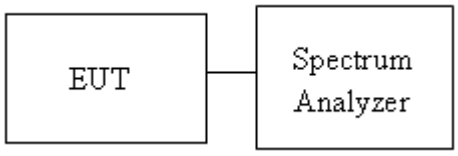
According to §15.247(a)(1)(iii)

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

4.5.2 Test Procedure

Test method Refer as ANSI C63.10: 2013 clause 7.8.3
1. Place the EUT on the table and set it in transmitting mode.
2. EUT RF output port connected to the SA by RF cable.
3. Set spectrum analyzer Start Freq. = 2400 MHz, Stop Freq. = 2483.5 MHz, RBW=100KHz, VBW = 300KHz.
4. Max hold, view and count how many channel in the band.

4.5.3 Test Setup



4.5.4 Test Result

Number of Hopping				
Mode	**Frequency (MHz)**	**Hopping Channel Number**	**Hopping Channel Number Limits**	**Result**
BDR-1Mbps	2402-2480	79	15	Pass
EDR-3Mbps	2402-2480	79	15	

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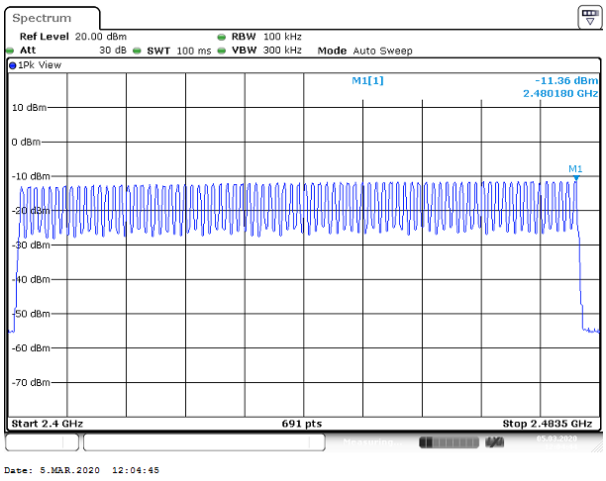
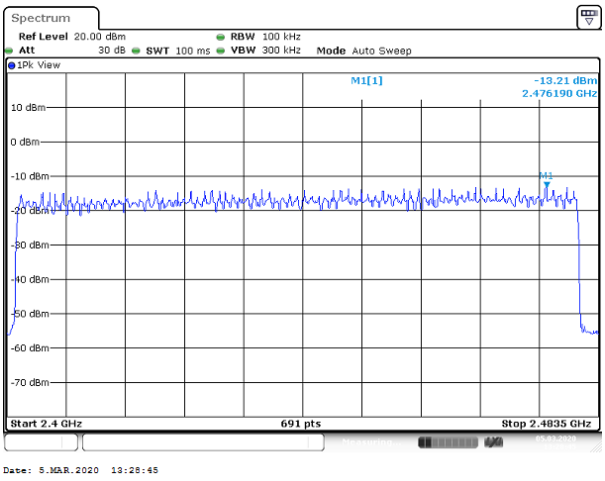
Test Data

Number of Hopping	
GFSK_BDR-1Mbps mode	8DPSK_EDR-3Mbps mode
	

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4.6 CONDUCTED BANDEDGE AND SPURIOUS EMISSION

4.6.1 Test Limit

According to §15.247(d)

Limit	-20 dBc

.

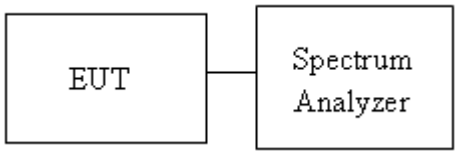
4.6.2 Test Procedure

1. EUT RF output port connected to the SA by RF cable, and the path loss was compensated to result.

2. SA setting, RBW=100kHz, VBW=300kHz, Detector=Peak, Trace mode = max hold, SWT = Auto.

3. The Band Edge at 2.4GHz and 2.4835GHz are investigated with both hopping “ON” and “OFF” modes “.

4.6.3 Test Setup



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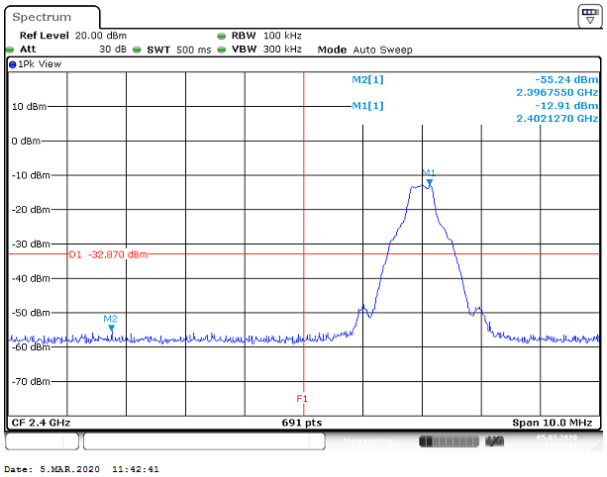
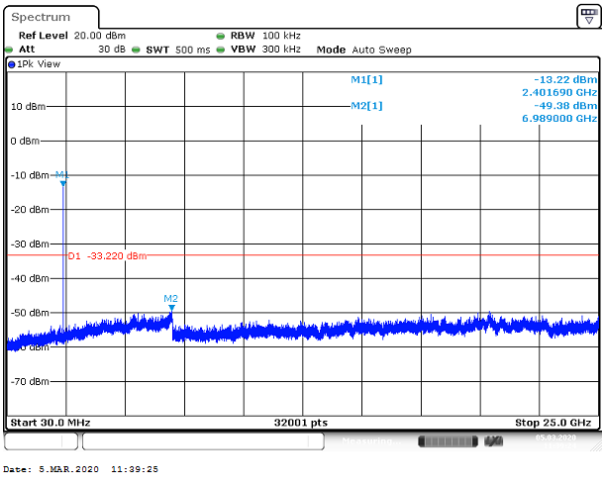
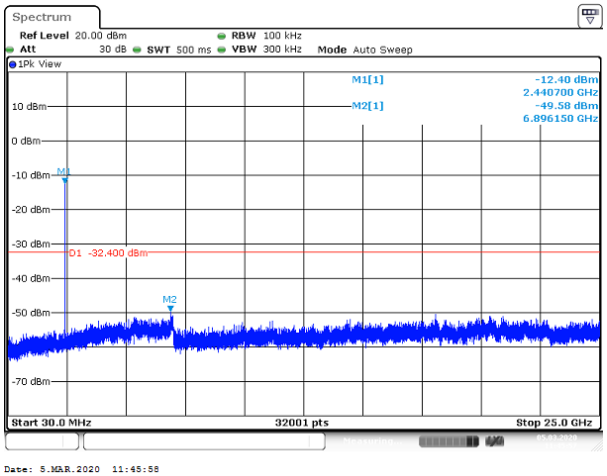
4.6.4 Test Result

Test Data

GFSK_BDR-1Mbps mode Low CH	
Band Edge	**Spurious Emission 30MHz-25GHz**
	
GFSK_BDR-1Mbps mode Mid CH	
Spurious Emission 30MHz-25GHz	
	

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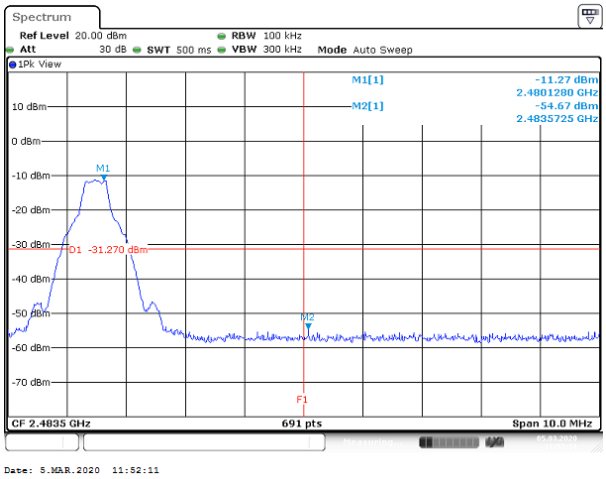
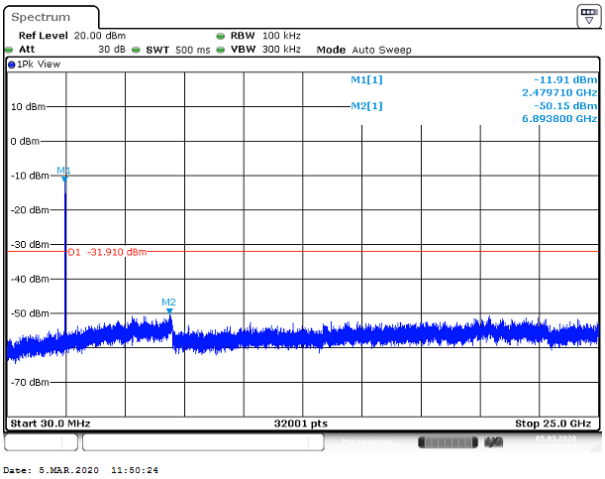
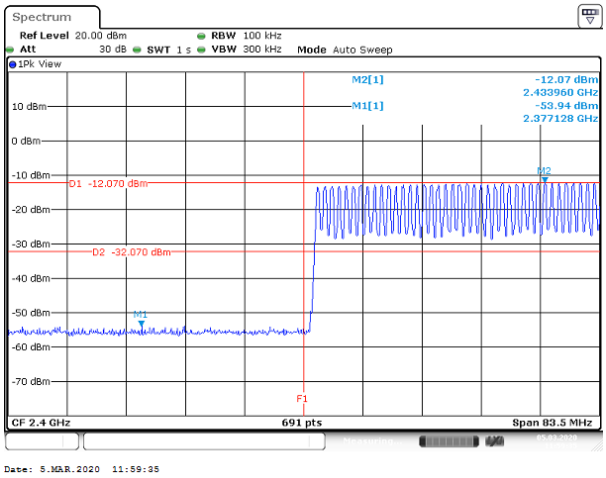
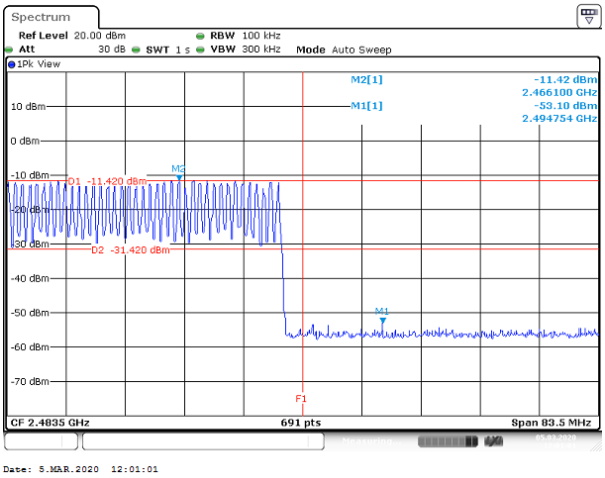
GFSK_BDR-1Mbps mode High CH	
Band Edge	**Spurious Emission 30MHz-25GHz**
	
GFSK_BDR-1Mbps Hopping mode	
Low Band Edge	**High Band Edge**
	

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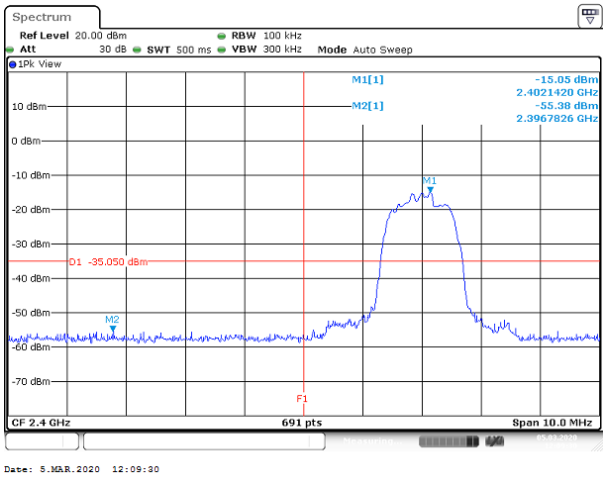
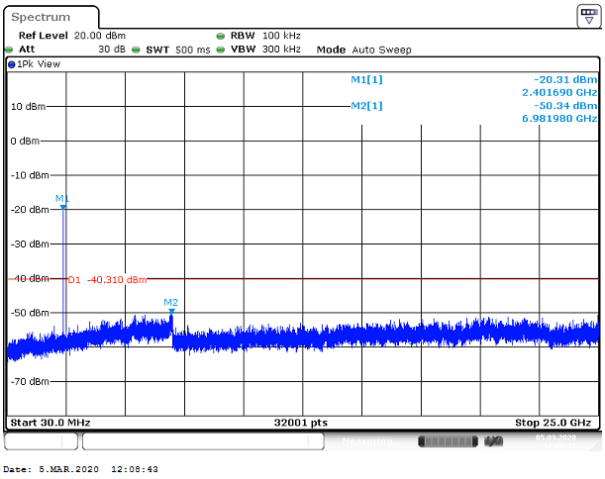
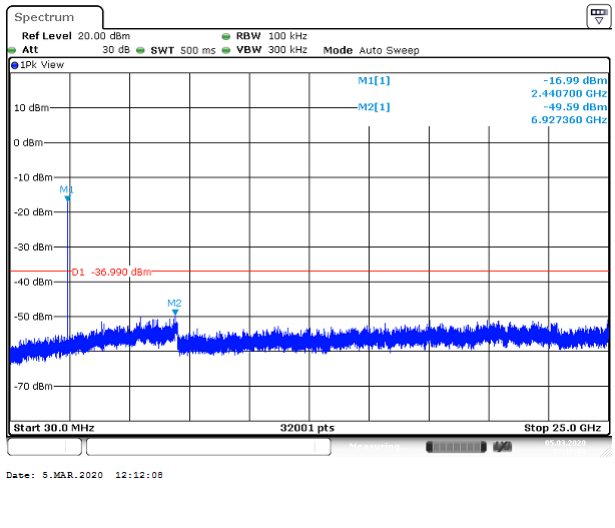
8DPSK_EDR-3Mbps mode Low CH	
Band Edge	**Spurious Emission 30MHz-25GHz**
	

8DPSK_EDR-3Mbps mode Mid CH
Spurious Emission 30MHz-25GHz


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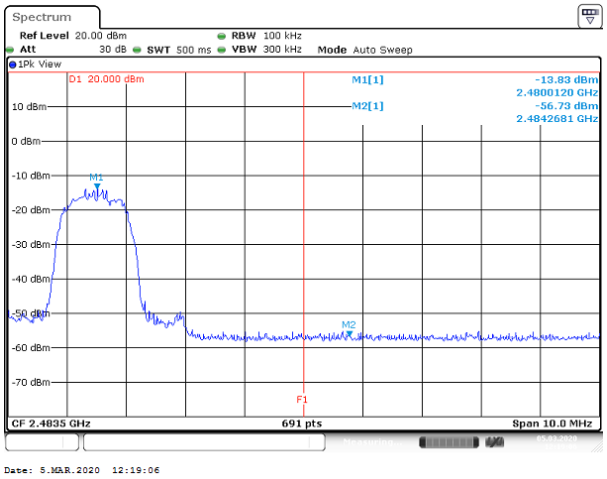
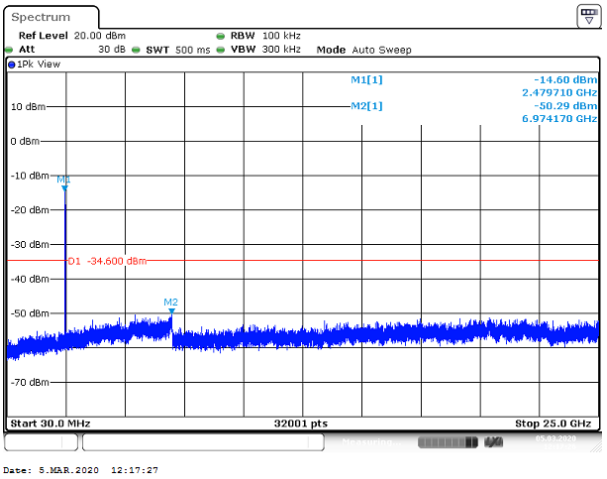
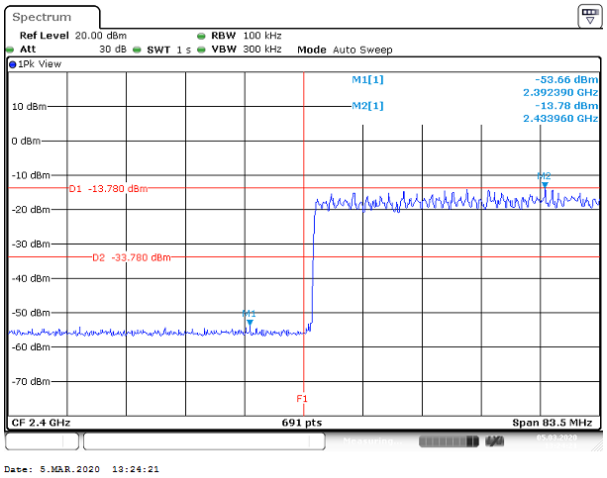
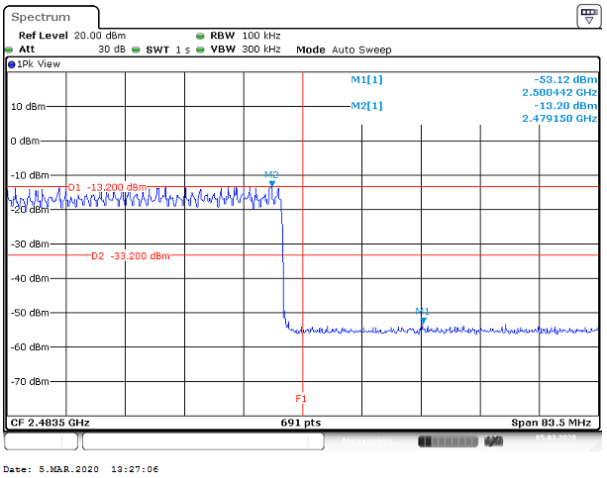
8DPSK_EDR-3Mbps mode High CH	
Band Edge	**Spurious Emission 30MHz-25GHz**
	
8DPSK_EDR-3Mbps Hopping mode	
Low Band Edge	**High Band Edge**
	

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4.7 TIME OF OCCUPANCY (DWELL TIME)

4.7.1 Test Limit

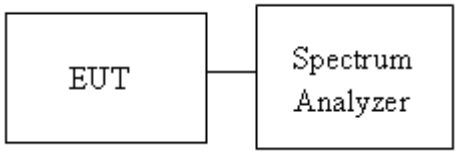
According to §15.247(a)(1)(iii)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

4.7.2 Test Procedure

1. EUT RF output port connected to the SA by RF cable.
2. Set center frequency of spectrum analyzer = operating frequency.
3. Set the spectrum analyzer as RBW, VBW=1MHz, Sweep = 1 ms

4.7.3 Test Setup



4.7.4 Test Result

Time of Occupancy (Dwell Time)							
Mode	Frequency (MHz)	Pulse Time Per Hopping (ms)	Minimum Number of Hopping Freq.	Number of pulse in (0.4 * N sec)	Dwell Time IN (0.4 * N sec)	Dwell Time Limits (s)	Result
BDR-1Mbps	2441	2.9275	79	106.67	0.3123	0.4	Pass
EDR-3Mbps	2441	2.9275	79	106.67	0.3138	0.4	
Non-AFH: DH5 Packet permit maximum 1600/ 79 / 6 = 3.37 hops per second in each channel (5 time slots RX, 1 time slot TX). So, the dwell time is the time duration of the pulse times 3.37 * 0.4 *79 = 106.6							

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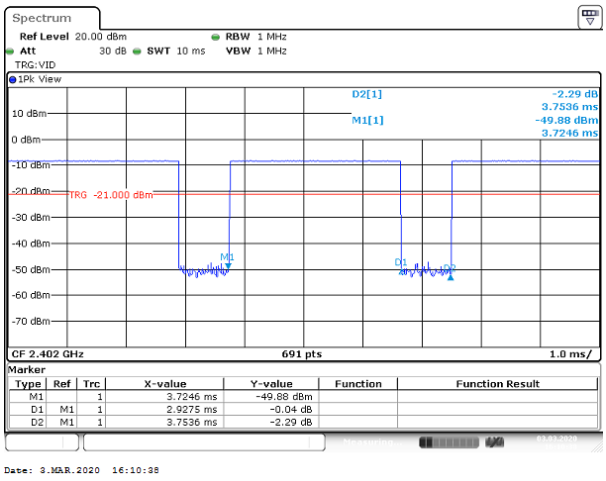
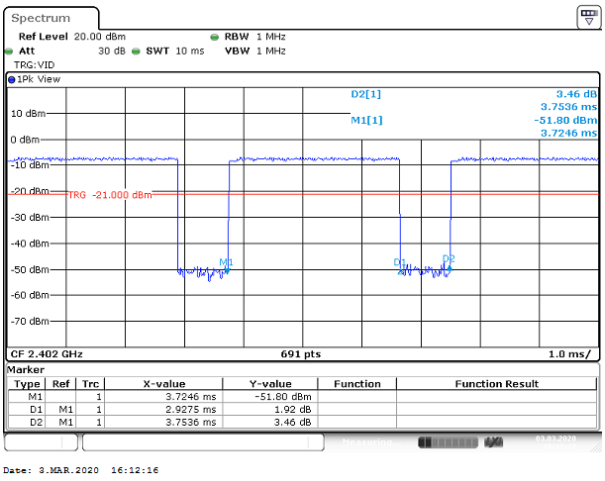
Test Data

Time of Occupancy (Dwell Time)	
GFSK_BDR-1Mbps mode	**8DPSK_EDR-3Mbps mode**
	

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4.8 RADIATION BANDEDGE AND SPURIOUS EMISSION

4.8.1 Test Limit

FCC according to §15.247(d), §15.209 and §15.205,

In any 100 kHz bandwidth outside the authorized frequency band, all harmonic and spurious must be least 20 dB below the highest emission level with the authorized frequency band. Radiation emission which fall in the restricted bands must also follow the FCC section 15.209 as below limit in table.

Below 30 MHz

Frequency	Field Strength (microvolts/m)	Magnetic H-Field (microamperes/m)	Measurement Distance (metres)
9-490 kHz	2,400/F (F in kHz)	2,400/F (F in kHz)	300
490-1,705 kHz	24,000/F (F in kHz)	24,000/F (F in kHz)	30
1.705-30 MHz	30	N/A	30

Above 30 MHz

Frequency (MHz)	Field Strength microvolts/m at 3 metres (watts, e.i.r.p.)	
	Transmitters	Receivers
30-88	100 (3 nW)	100 (3 nW)
88-216	150 (6.8 nW)	150 (6.8 nW)
216-960	200 (12 nW)	200 (12 nW)
Above 960	500 (75 nW)	500 (75 nW)

Remark:
Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

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4.8.2 Test Procedure

1. The EUT is placed on a turntable, Above 1 GHz is 1.5m and below 1 GHz is 0.8m above ground plane. The EUT Configured un accordance with ANSI C63.10: 2013, and the EUT set in a continuous mode.

2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level. And EUT is set 3m away from the receiving antenna, which is scanned from 1m to 4m above the ground plane to find out the highest emissions. Measurement are made polarized in both the vertical and the horizontal positions with antenna.

3. Span shall wide enough to full capture the emission measured. The SA from 9kHz to 26.5GHz set to the low, Mid and High channels with the EUT transmit.

Note: No emission found between lowest internal used/generated frequency to 30MHz(9KHz~30MHz)

4. For harmonic, the worst case of output power was BDR-1Mbps. Therefore only BDR-1Mbps record in the report.

5. The SA setting following：

(1) Below 1G：RBW = 100kHz, VBW ≥ 3 RBW, Sweep = Auto, Detector = Peak, Trace = Max hold.

(2) Above 1G：

(2.1) For Peak measurement：RBW = 1MHz, VBW ≥ 3 RBW, Sweep = Auto, Detector = Peak, Trace = Max hold.

(2.2) For Average measurement：RBW = 1MHz, VBW

˙If Duty Cycle ≥ 98%, VBW=10Hz.

˙If Duty Cycle < 98%, VBW≥1/T.

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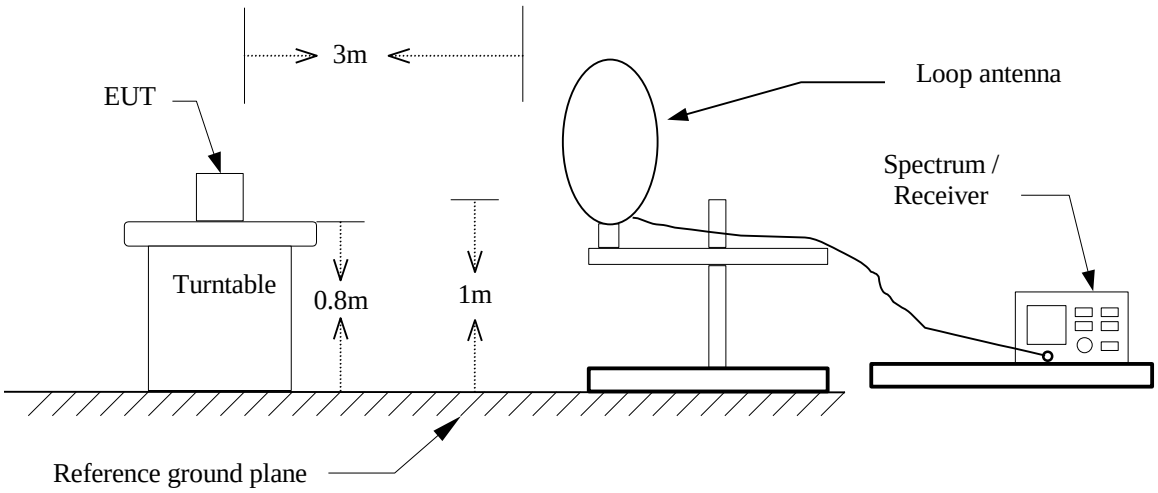
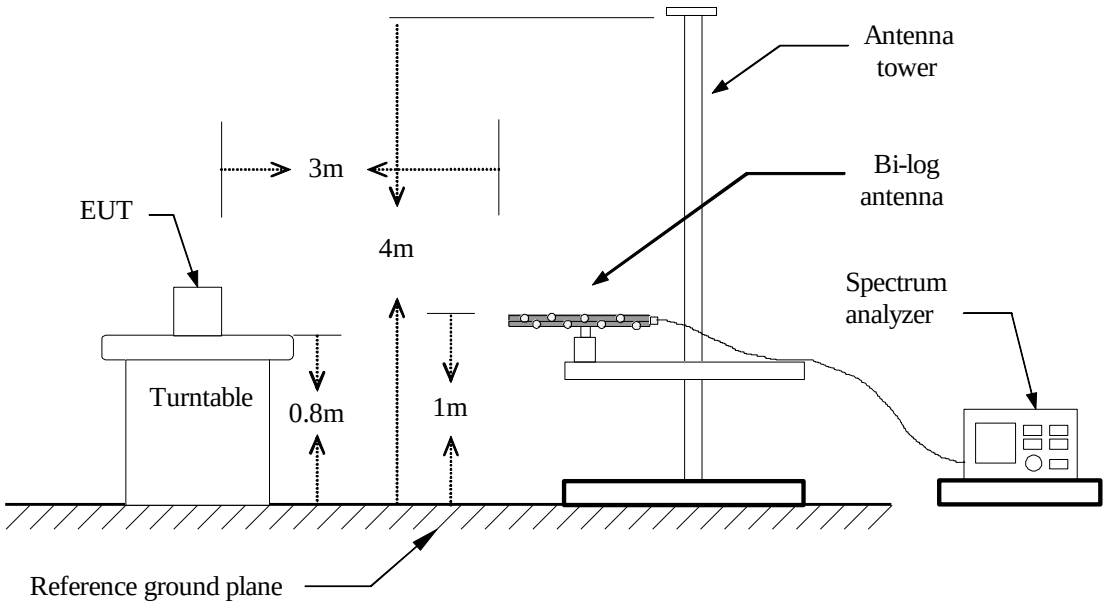
4.8.3 Test Setup

9kHz ~ 30MHz



30MHz ~ 1GHz



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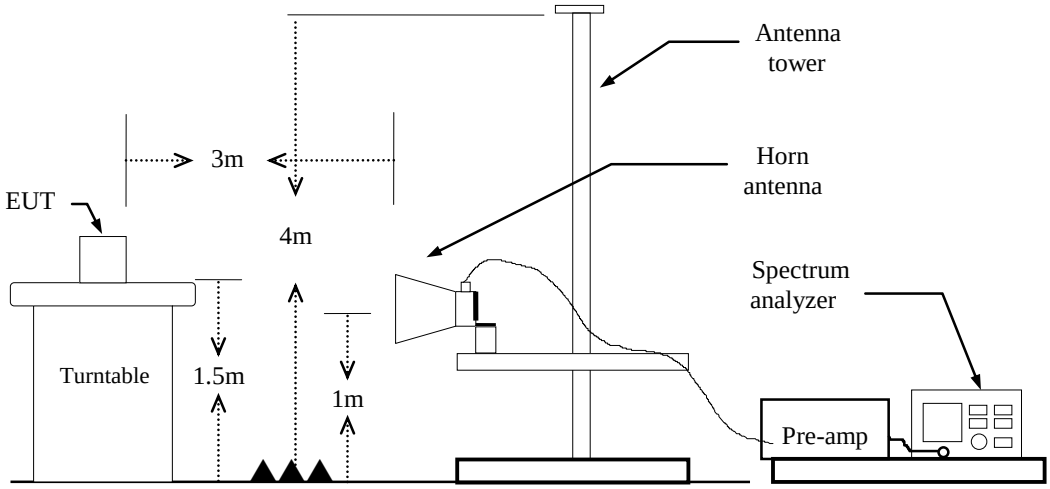
Above 1 GHz



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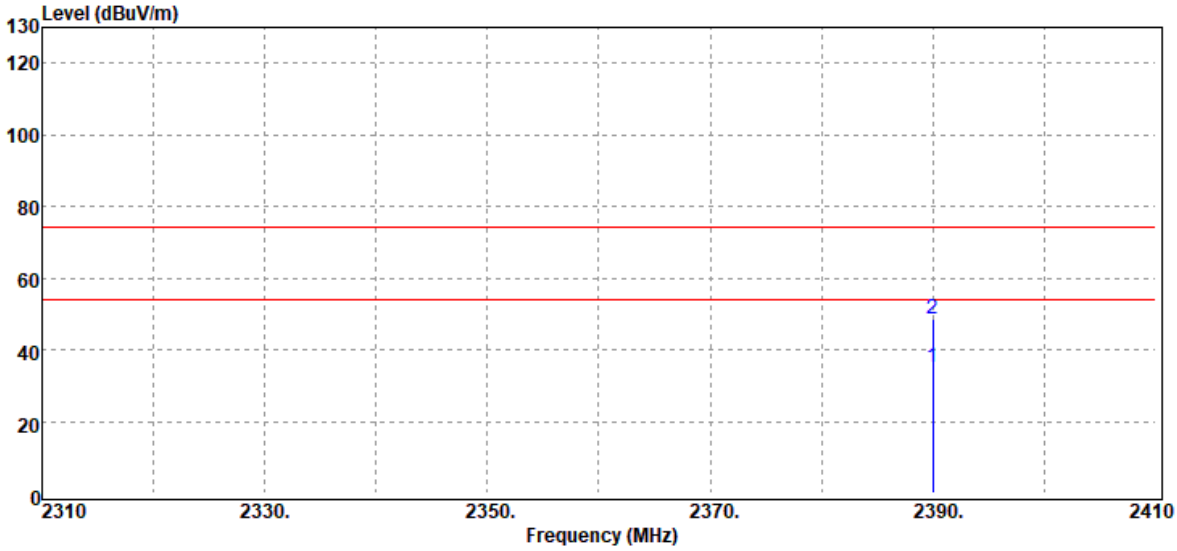
4.8.4 Test Result

Band Edge Test Data

Test Mode:	GFSK_BDR-1Mbps Low CH	Temp/Hum	23.3(℃)/ 56%RH
Test Item	Band Edge	Test Date	March 25, 2020
Polarize	Vertical	Test Engineer	Jerry Chang
Detector	Peak / Average		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2390.00	Average	38.37	-3.17	35.20	54.00	-18.80
2390.00	Peak	51.57	-3.17	48.40	74.00	-25.60

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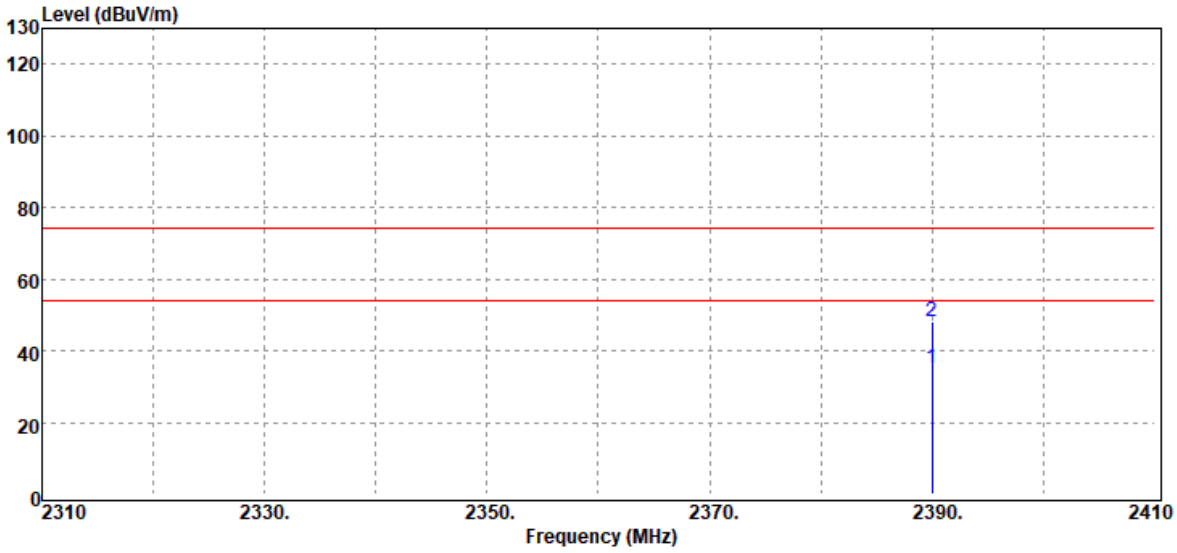
Test Mode:	GFSK_BDR-1Mbps Low CH	Temp/Hum	23.3(℃)/ 56%RH
Test Item	Band Edge	Test Date	March 25, 2020
Polarize	Horizontal	Test Engineer	Jerry Chang
Detector	Peak / Average		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2390.00	Average	38.31	-3.17	35.14	54.00	-18.86
2390.00	Peak	51.36	-3.17	48.19	74.00	-25.81

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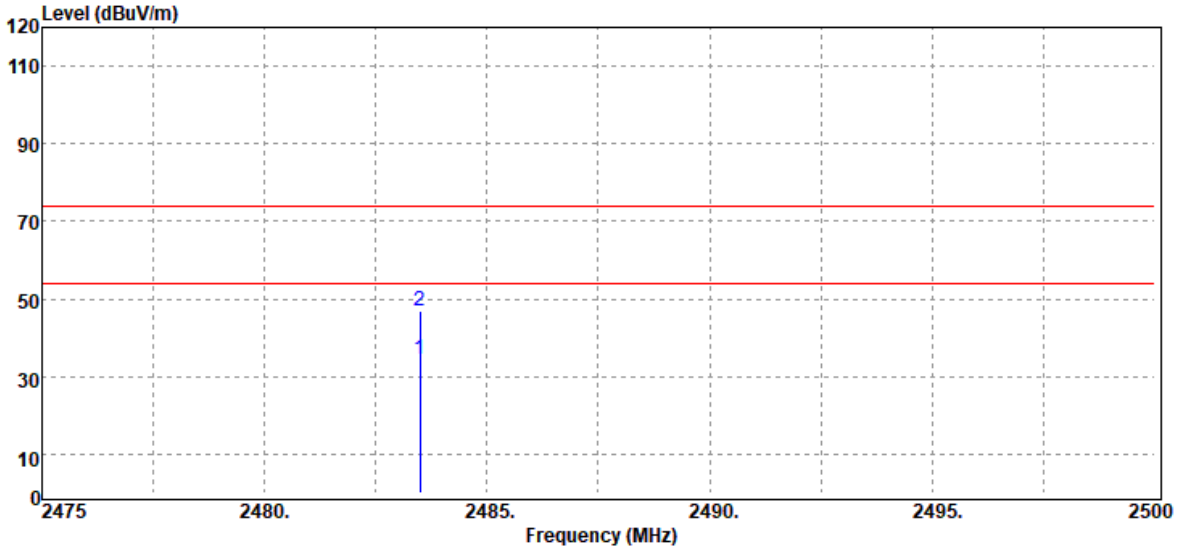
Test Mode:	GFSK_BDR-1Mbps High CH	Temp/Hum	23.3(℃)/ 56%RH
Test Item	Band Edge	Test Date	March 25, 2020
Polarize	Vertical	Test Engineer	Jerry Chang
Detector	Peak / Average		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2483.50	Average	37.24	-2.71	34.53	54.00	-19.47
2483.50	Peak	49.64	-2.71	46.93	74.00	-27.07

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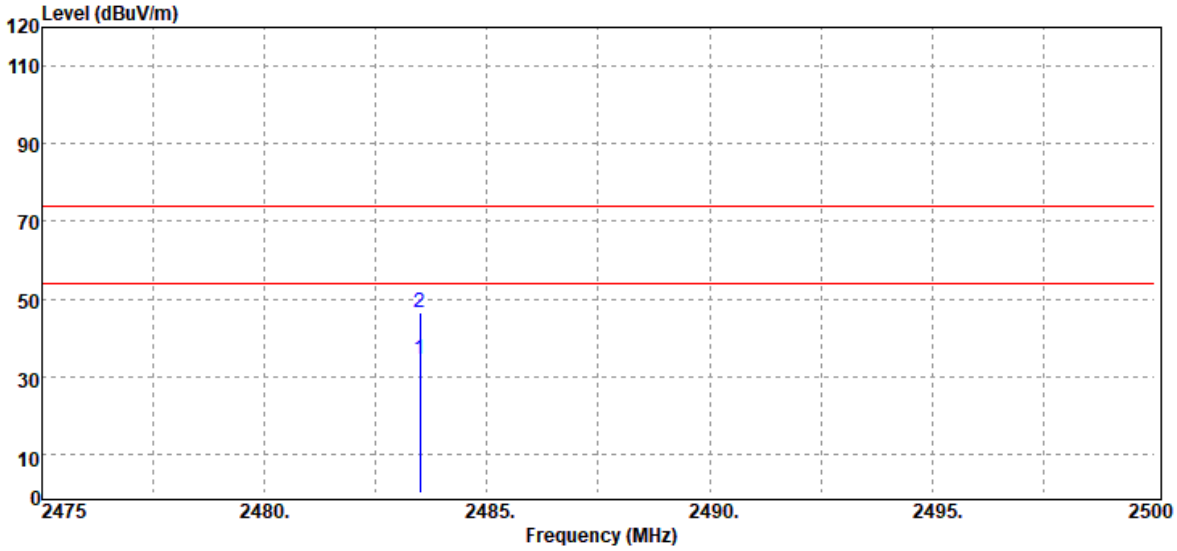
Test Mode:	GFSK_BDR-1Mbps High CH	Temp/Hum	23.3(℃)/ 56%RH
Test Item	Band Edge	Test Date	March 25, 2020
Polarize	Horizontal	Test Engineer	Jerry Chang
Detector	Peak / Average		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2483.50	Average	37.18	-2.71	34.47	54.00	-19.53
2483.50	Peak	49.09	-2.71	46.38	74.00	-27.62

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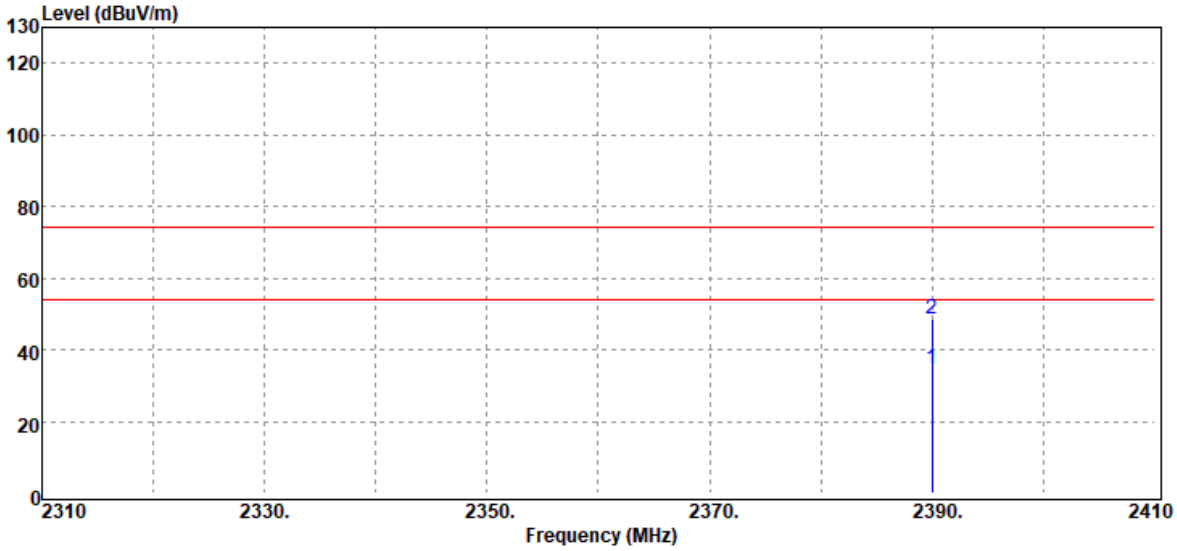
Test Mode:	GFSK_BDR-1Mbps Low CH Hopping	Temp/Hum	23.3(℃)/ 56%RH
Test Item	Band Edge	Test Date	March 25, 2020
Polarize	Vertical	Test Engineer	Jerry Chang
Detector	Peak / Average		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2390.00	Average	38.03	-3.17	34.86	54.00	-19.14
2390.00	Peak	51.80	-3.17	48.63	74.00	-25.37

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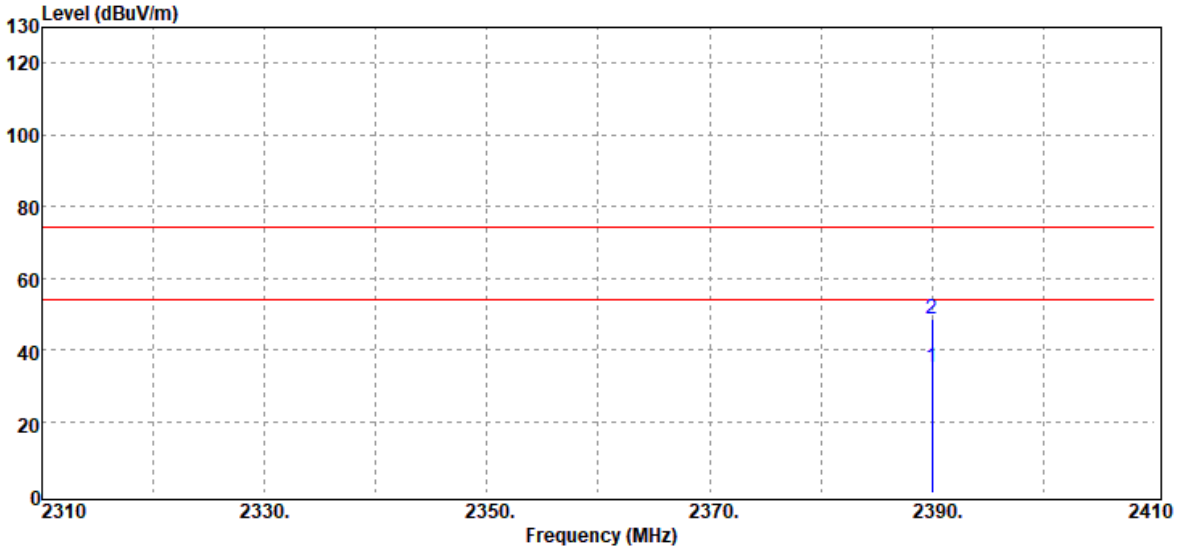
Test Mode:	GFSK_BDR-1Mbps Low CH Hopping	Temp/Hum	23.3(℃)/ 56%RH
Test Item	Band Edge	Test Date	March 25, 2020
Polarize	Horizontal	Test Engineer	Jerry Chang
Detector	Peak / Average		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2390.00	Average	38.06	-3.17	34.89	54.00	-19.11
2390.00	Peak	51.56	-3.17	48.39	74.00	-25.61

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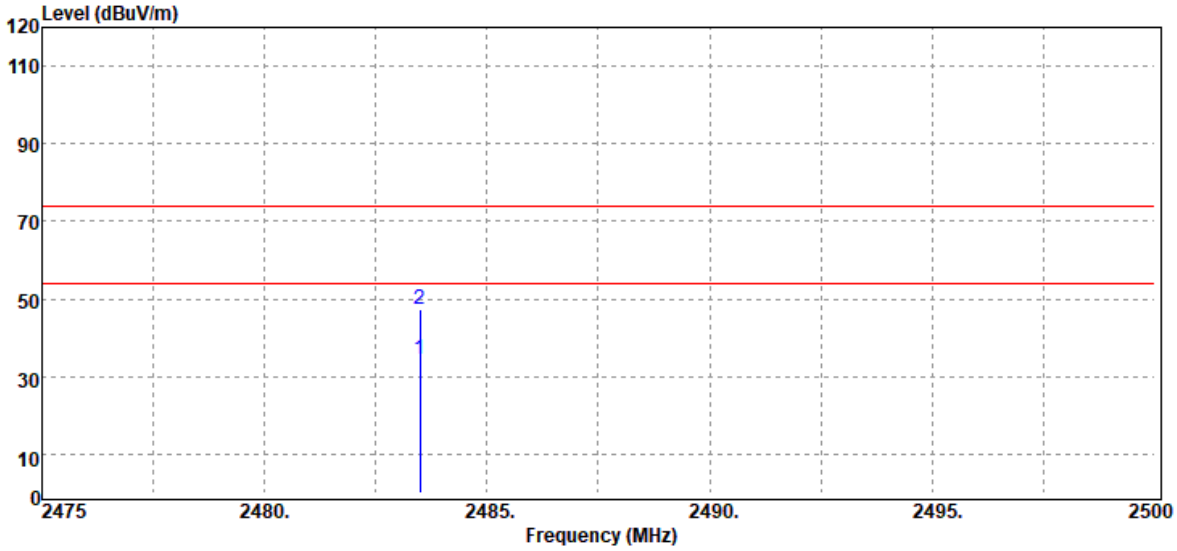
Test Mode:	GFSK_BDR-1Mbps High CH Hopping	Temp/Hum	23.3(℃)/ 56%RH
Test Item	Band Edge	Test Date	March 25, 2020
Polarize	Vertical	Test Engineer	Jerry Chang
Detector	Peak / Average		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2483.50	Average	37.10	-2.71	34.39	54.00	-19.61
2483.50	Peak	50.17	-2.71	47.46	74.00	-26.54

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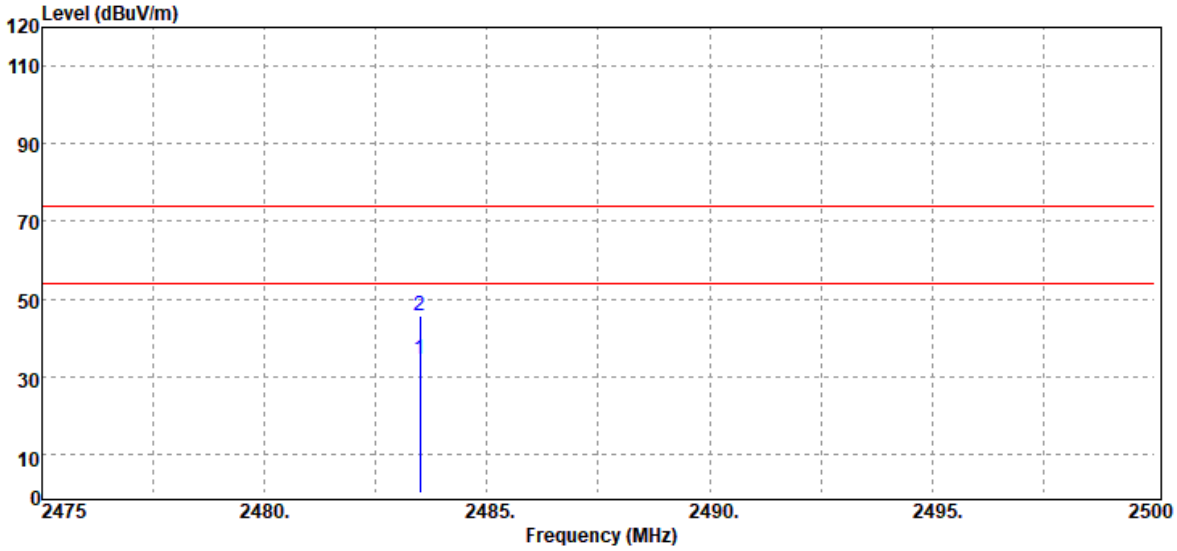
Test Mode:	GFSK_BDR-1Mbps High CH Hopping	Temp/Hum	23.3(℃)/ 56%RH
Test Item	Band Edge	Test Date	March 25, 2020
Polarize	Horizontal	Test Engineer	Jerry Chang
Detector	Peak / Average		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2483.50	Average	37.03	-2.71	34.32	54.00	-19.68
2483.50	Peak	48.27	-2.71	45.56	74.00	-28.44

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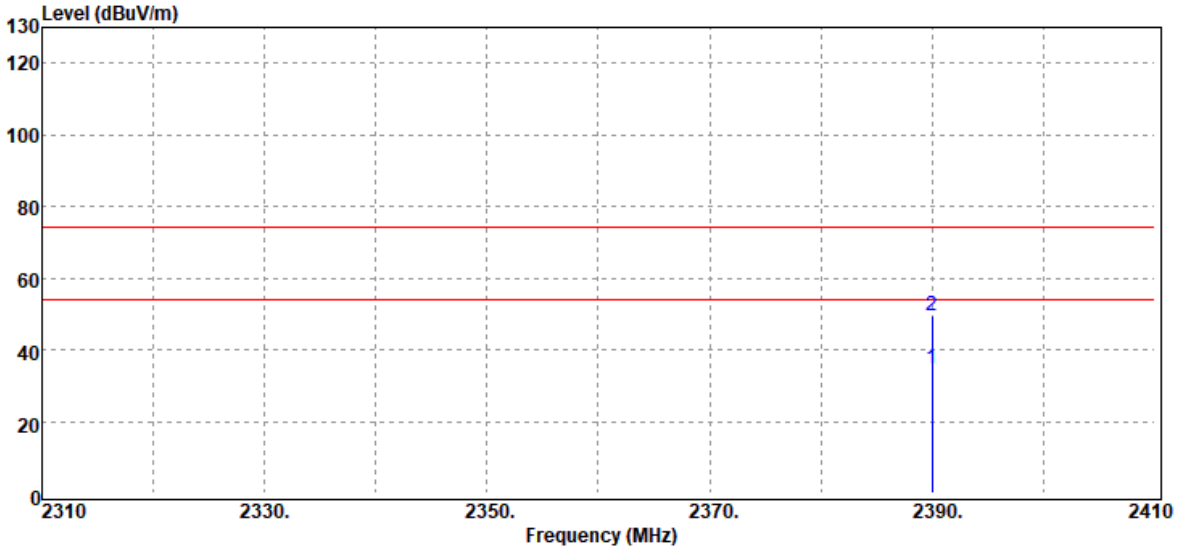
Test Mode:	8DPSK_EDR-3Mbps Low CH	Temp/Hum	23.3(℃)/ 56%RH
Test Item	Band Edge	Test Date	March 25, 2020
Polarize	Vertical	Test Engineer	Jerry Chang
Detector	Peak / Average		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2390.00	Average	38.00	-3.17	34.83	54.00	-19.17
2390.00	Peak	52.55	-3.17	49.38	74.00	-24.62

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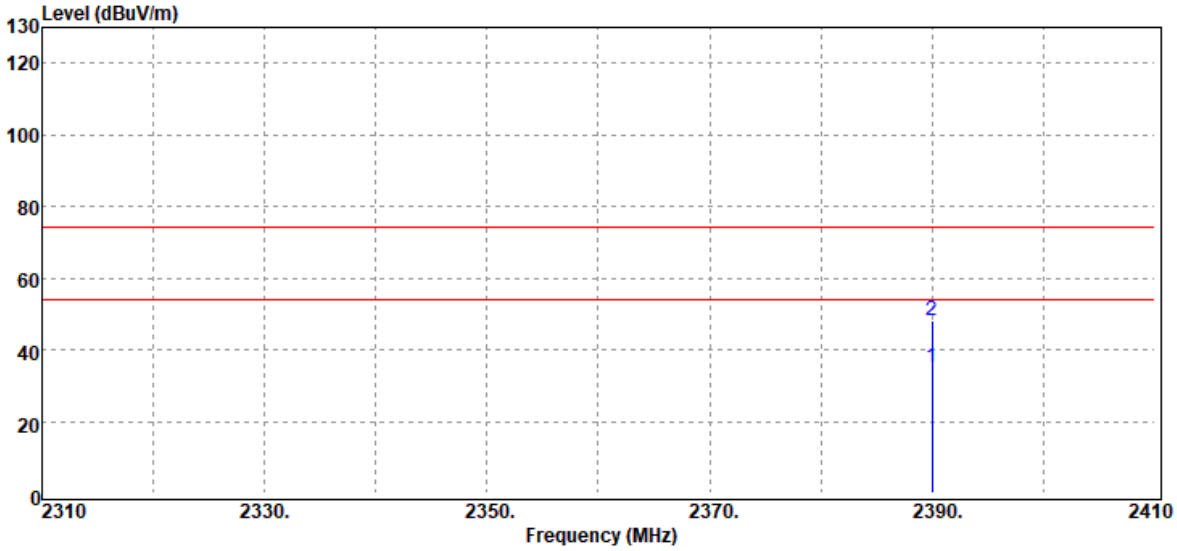
Test Mode:	8DPSK_EDR-3Mbps Low CH	Temp/Hum	23.3(℃)/ 56%RH
Test Item	Band Edge	Test Date	March 25, 2020
Polarize	Horizontal	Test Engineer	Jerry Chang
Detector	Peak / Average		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2390.00	Average	38.08	-3.17	34.91	54.00	-19.09
2390.00	Peak	51.37	-3.17	48.20	74.00	-25.80

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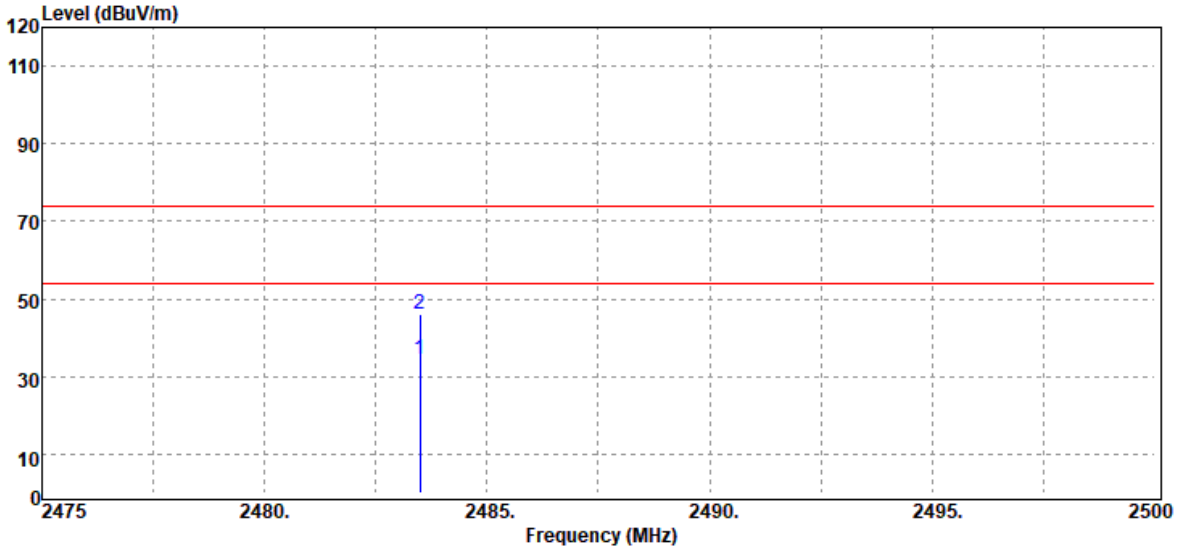
Test Mode:	8DPSK_EDR-3Mbps High CH	Temp/Hum	23.3(℃)/ 56%RH
Test Item	Band Edge	Test Date	March 25, 2020
Polarize	Vertical	Test Engineer	Jerry Chang
Detector	Peak / Average		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2483.50	Average	37.04	-2.71	34.33	54.00	-19.67
2483.50	Peak	48.88	-2.71	46.17	74.00	-27.83

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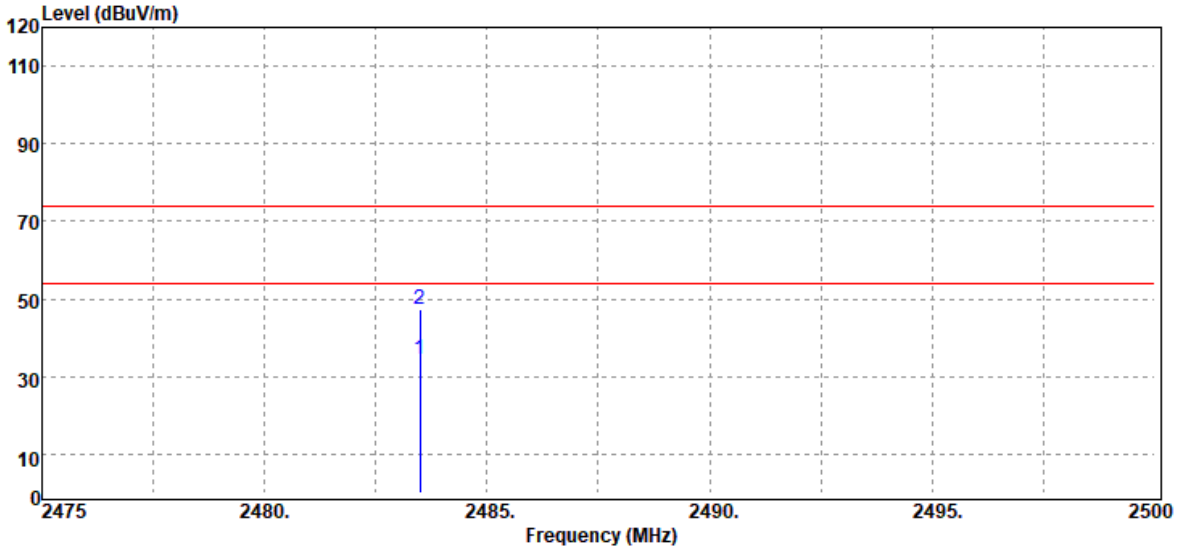
Test Mode:	8DPSK_EDR-3Mbps High CH	Temp/Hum	23.3(℃)/ 56%RH
Test Item	Band Edge	Test Date	March 25, 2020
Polarize	Horizontal	Test Engineer	Jerry Chang
Detector	Peak / Average		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2483.50	Average	36.97	-2.71	34.26	54.00	-19.74
2483.50	Peak	50.10	-2.71	47.39	74.00	-26.61

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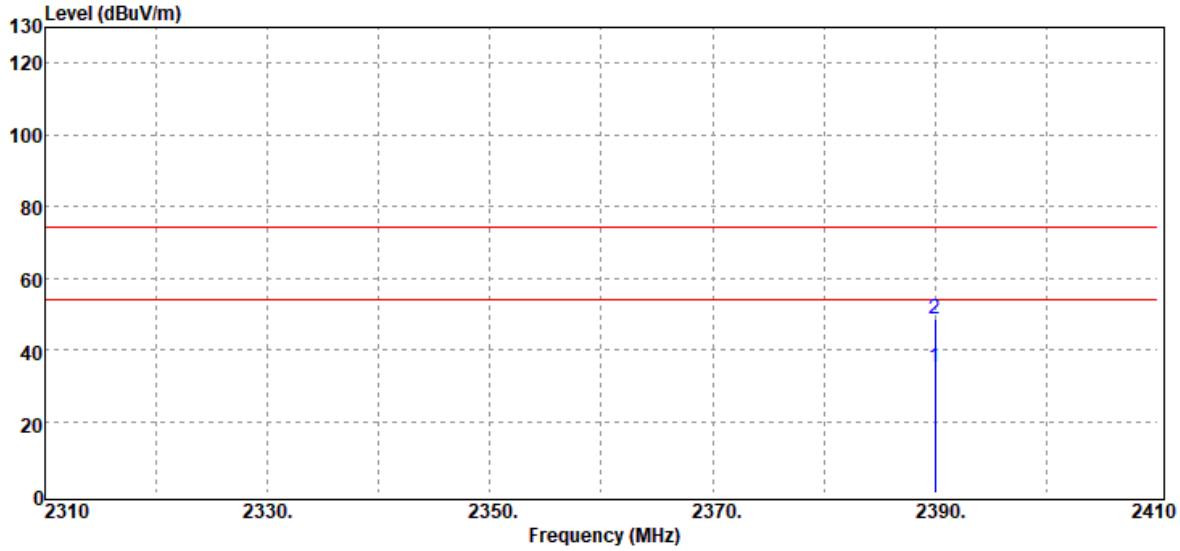
Test Mode:	8DPSK_EDR-3Mbps Low CH Hopping	Temp/Hum	23.3(℃)/ 56%RH
Test Item	Band Edge	Test Date	March 25, 2020
Polarize	Vertical	Test Engineer	Jerry Chang
Detector	Peak / Average		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2390.00	Average	38.05	-3.17	34.88	54.00	-19.12
2390.00	Peak	51.81	-3.17	48.64	74.00	-25.36

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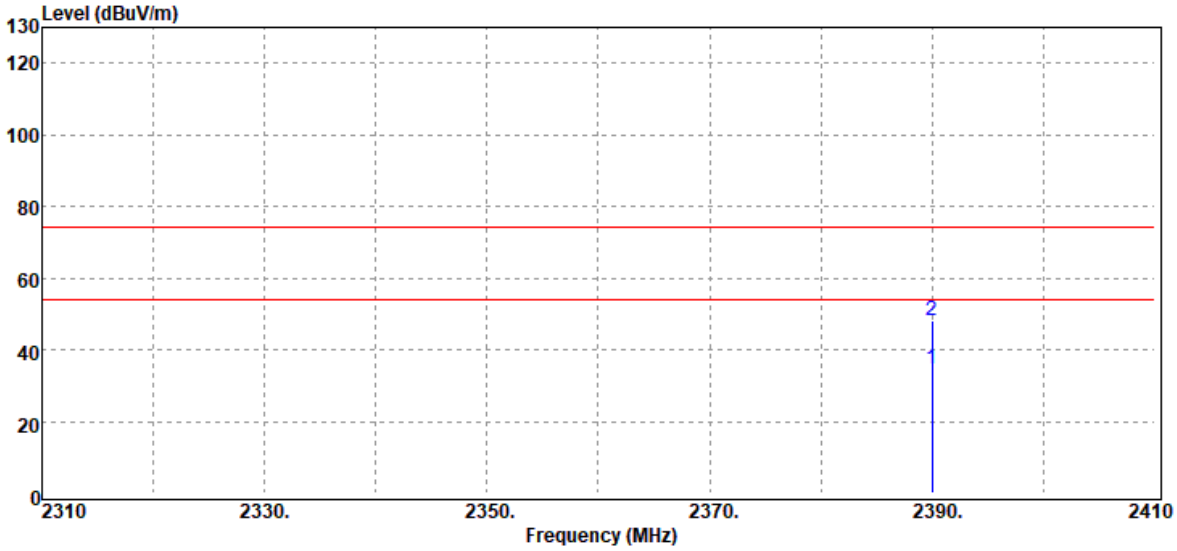
Test Mode:	8DPSK_EDR-3Mbps Low CH Hopping	Temp/Hum	23.3(℃)/ 56%RH
Test Item	Band Edge	Test Date	March 25, 2020
Polarize	Horizontal	Test Engineer	Jerry Chang
Detector	Peak / Average		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2390.00	Average	37.92	-3.17	34.75	54.00	-19.25
2390.00	Peak	51.51	-3.17	48.34	74.00	-25.66

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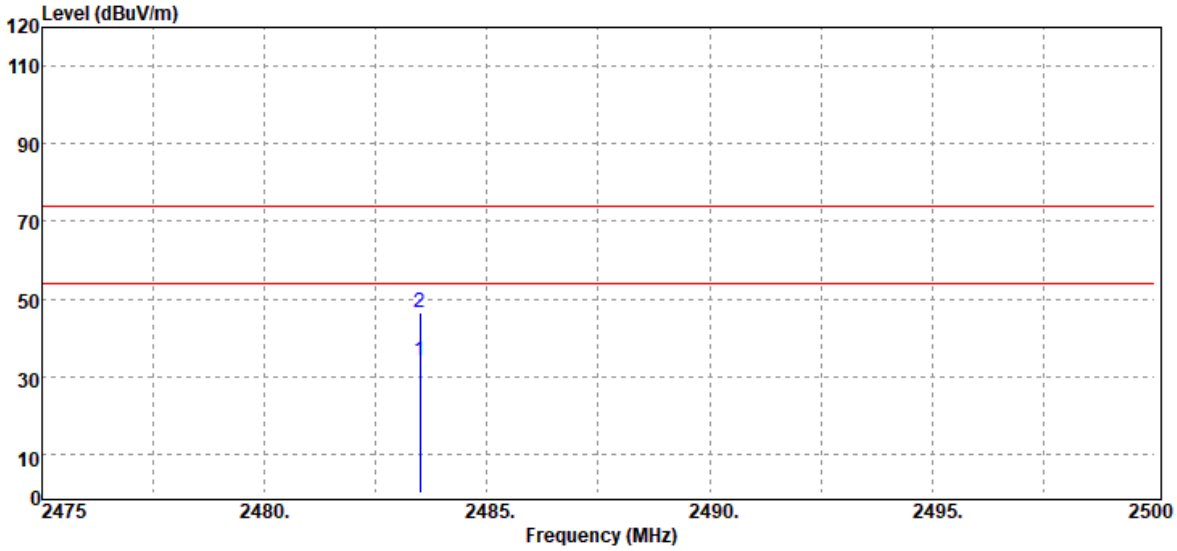
Test Mode:	8DPSK_EDR-3Mbps High CH Hopping	Temp/Hum	23.3(℃)/ 56%RH
Test Item	Band Edge	Test Date	March 25, 2020
Polarize	Vertical	Test Engineer	Jerry Chang
Detector	Peak / Average		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2483.50	Average	36.83	-2.71	34.12	54.00	-19.88
2483.50	Peak	49.15	-2.71	46.44	74.00	-27.56

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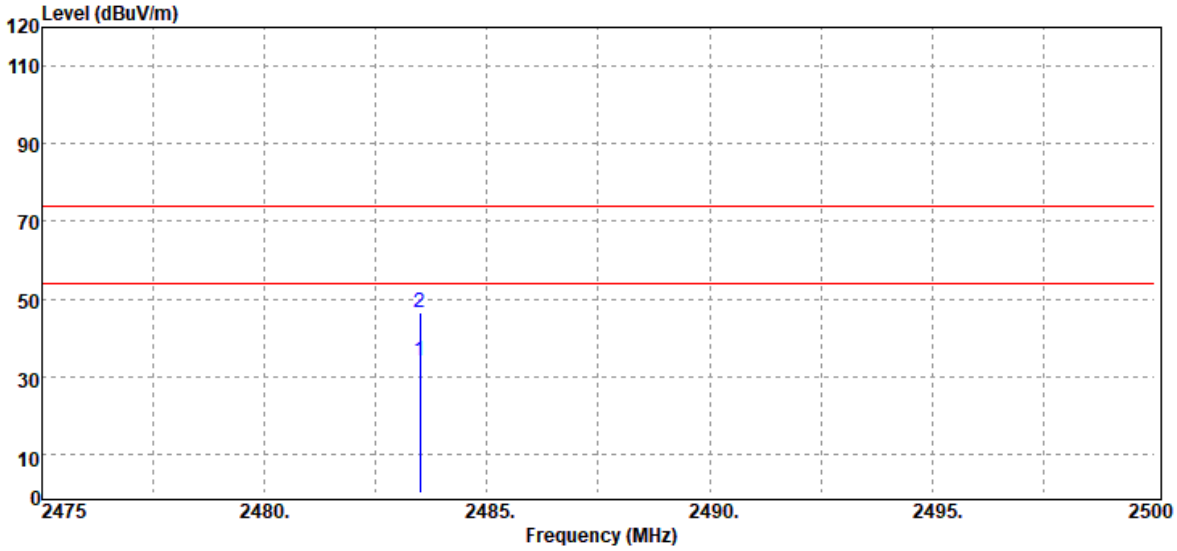
Test Mode:	8DPSK_EDR-3Mbps High CH Hopping	Temp/Hum	23.3(℃)/ 56%RH
Test Item	Band Edge	Test Date	March 25, 2020
Polarize	Horizontal	Test Engineer	Jerry Chang
Detector	Peak / Average		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2483.50	Average	36.89	-2.71	34.18	54.00	-19.82
2483.50	Peak	49.11	-2.71	46.40	74.00	-27.60

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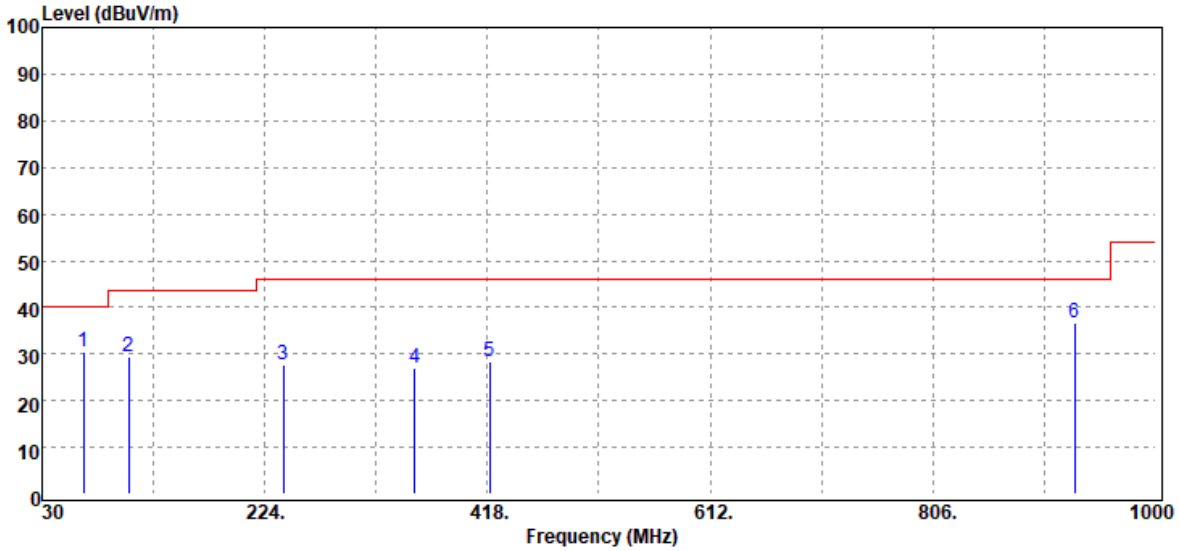
Below 1G Test Data

Test Mode:	BT Mode	Temp/Hum	23.3(℃)/ 56%RH
Test Item	30MHz-1GHz	Test Date	March 25, 2020
Polarize	Vertical	Test Engineer	Jerry Chang
Detector	Peak		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
65.89	Peak	45.90	-15.53	30.37	40.00	-9.63
105.66	Peak	40.59	-11.23	29.36	43.50	-14.14
240.49	Peak	38.14	-10.55	27.59	46.00	-18.41
354.95	Peak	33.92	-7.03	26.89	46.00	-19.11
419.94	Peak	33.58	-5.06	28.52	46.00	-17.48
929.19	Peak	33.17	3.66	36.83	46.00	-9.17

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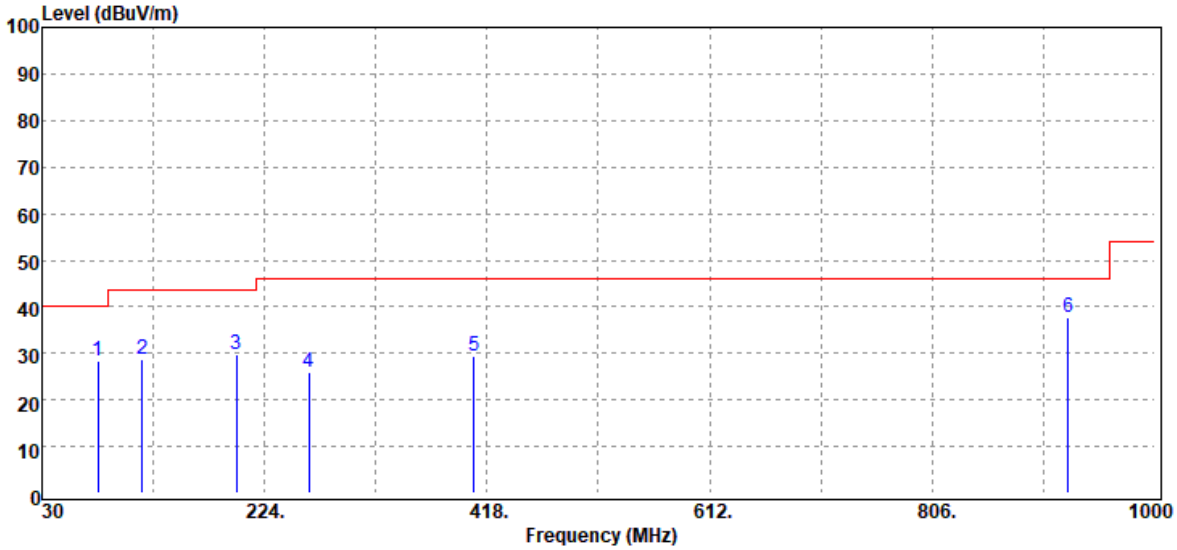
Test Mode:	BT Mode	Temp/Hum	23.3(℃)/ 56%RH
Test Item	30MHz-1GHz	Test Date	March 25, 2020
Polarize	Horizontal	Test Engineer	Jerry Chang
Detector	Peak		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
78.50	Peak	43.84	-15.33	28.51	40.00	-11.49
117.30	Peak	38.10	-9.38	28.72	43.50	-14.78
199.75	Peak	39.24	-9.58	29.66	43.50	-13.84
262.80	Peak	35.54	-9.55	25.99	46.00	-20.01
406.36	Peak	35.01	-5.62	29.39	46.00	-16.61
924.34	Peak	33.90	3.66	37.56	46.00	-8.44

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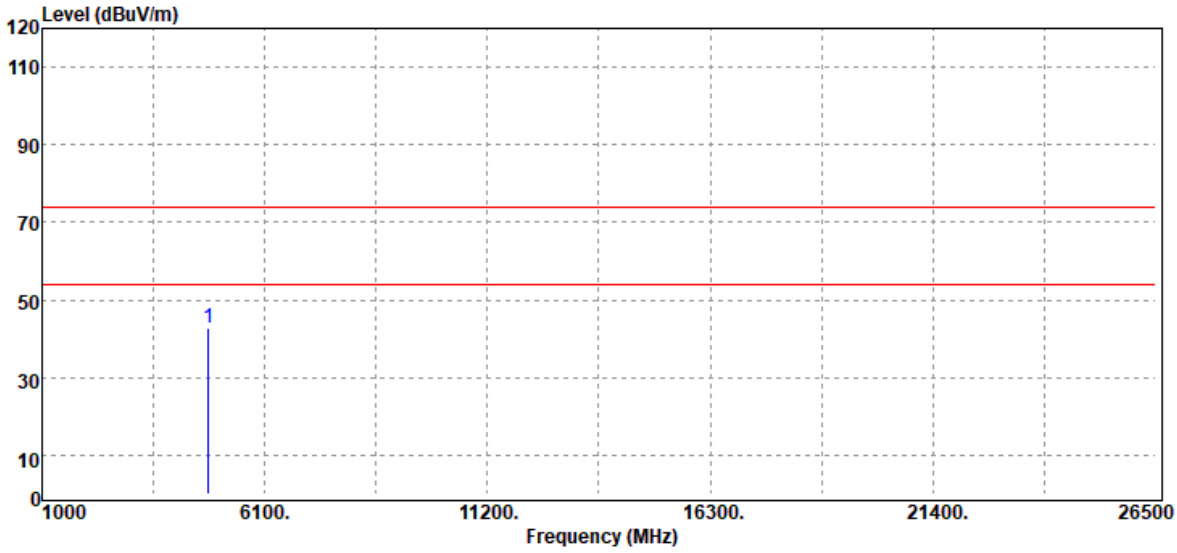
Above 1G Test Data

Test Mode:	GFSK_BDR-1Mbps Low CH	Temp/Hum	23.3(℃)/ 56%RH
Test Item	Harmonic	Test Date	March 25, 2020
Polarize	Vertical	Test Engineer	Jerry Chang
Detector	Peak		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
4804.00	Peak	39.57	3.36	42.93	74.00	-31.07
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *For above 1GHz,the EUT peak value was under average limit, therefore the Average value compliance with the average limit*

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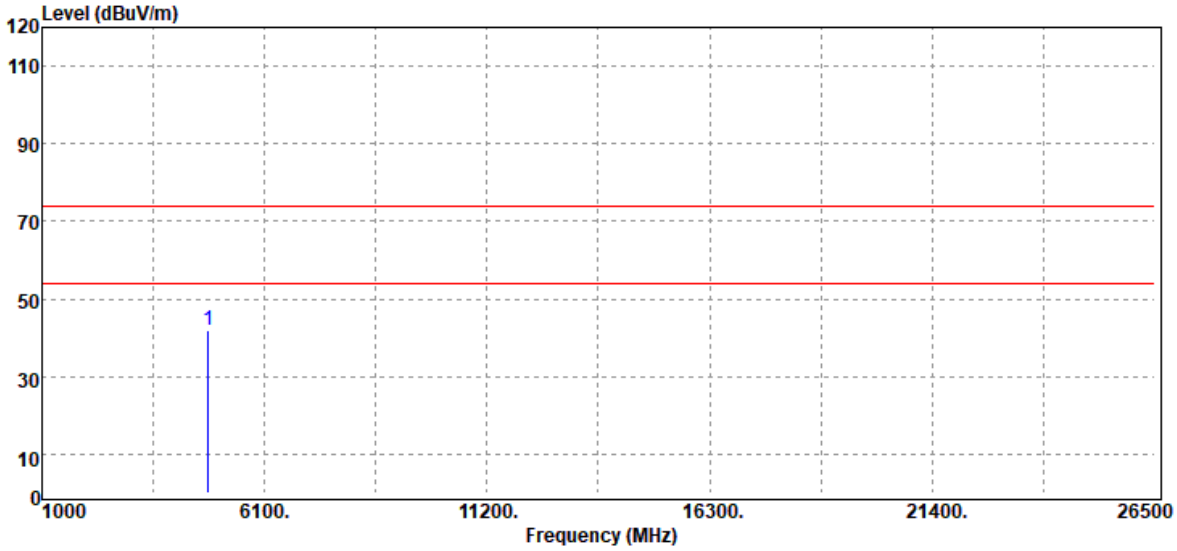
Test Mode:	GFSK_BDR-1Mbps Low CH	Temp/Hum	23.3(℃)/ 56%RH
Test Item	Harmonic	Test Date	March 25, 2020
Polarize	Horizontal	Test Engineer	Jerry Chang
Detector	Peak		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
4804.00	Peak	38.47	3.36	41.83	74.00	-32.17
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *For above 1GHz,the EUT peak value was under average limit, therefore the Average value compliance with the average limit*

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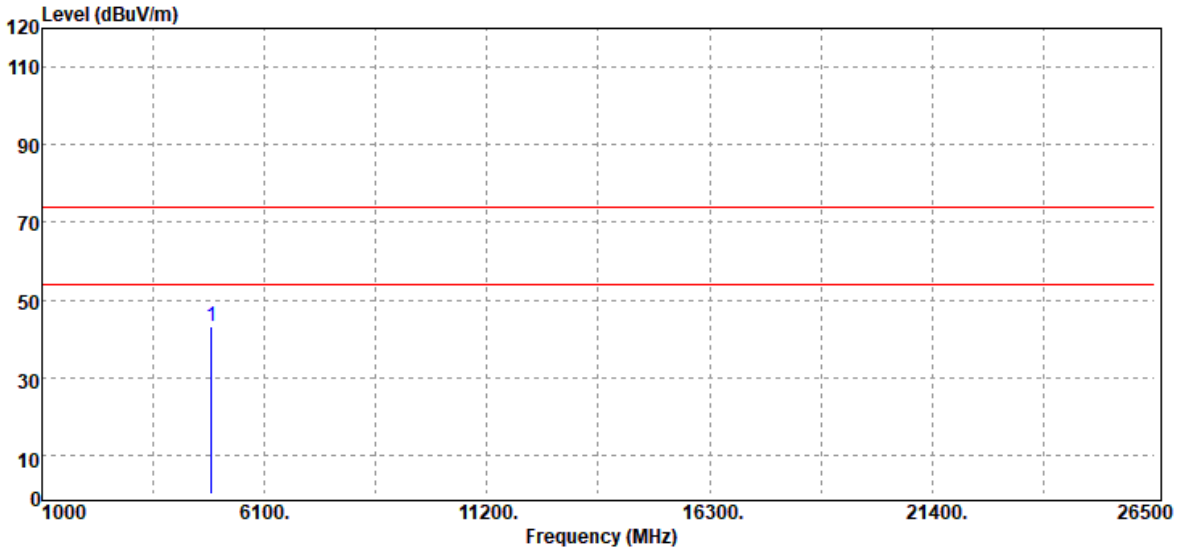
Test Mode:	GFSK_BDR-1Mbps Mid CH	Temp/Hum	23.3(℃)/ 56%RH
Test Item	Harmonic	Test Date	March 25, 2020
Polarize	Vertical	Test Engineer	Jerry Chang
Detector	Peak		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
4882.00	Peak	39.55	3.52	43.07	74.00	-30.93
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *For above 1GHz,the EUT peak value was under average limit, therefore the Average value compliance with the average limit*

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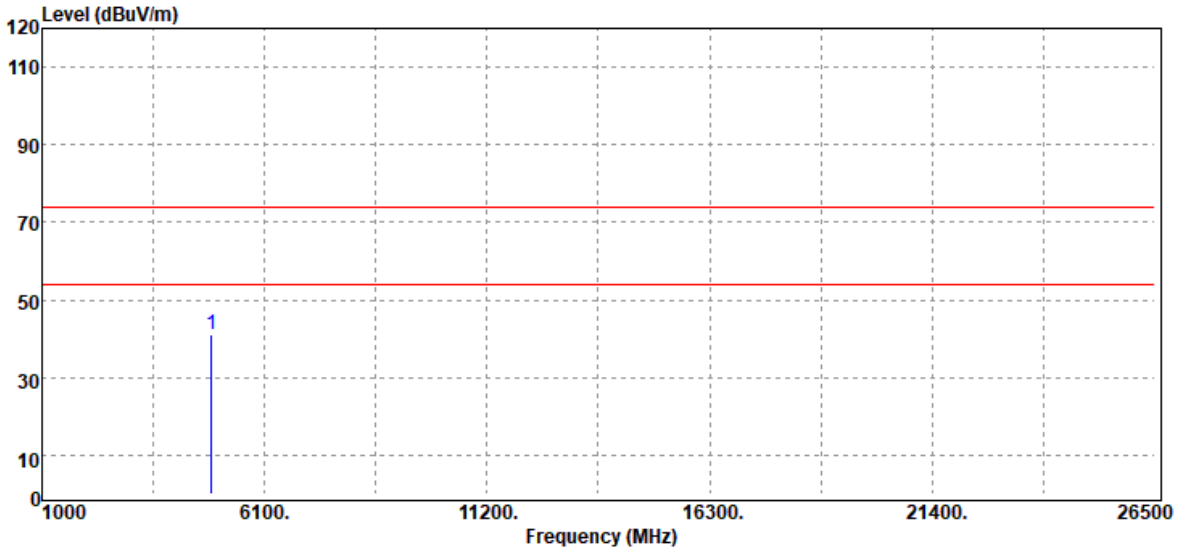
Test Mode:	GFSK_BDR-1Mbps Mid CH	Temp/Hum	23.3(℃)/ 56%RH
Test Item	Harmonic	Test Date	March 25, 2020
Polarize	Horizontal	Test Engineer	Jerry Chang
Detector	Peak		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
4882.00	Peak	37.41	3.52	40.93	74.00	-33.07
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *For above 1GHz,the EUT peak value was under average limit, therefore the Average value compliance with the average limit*

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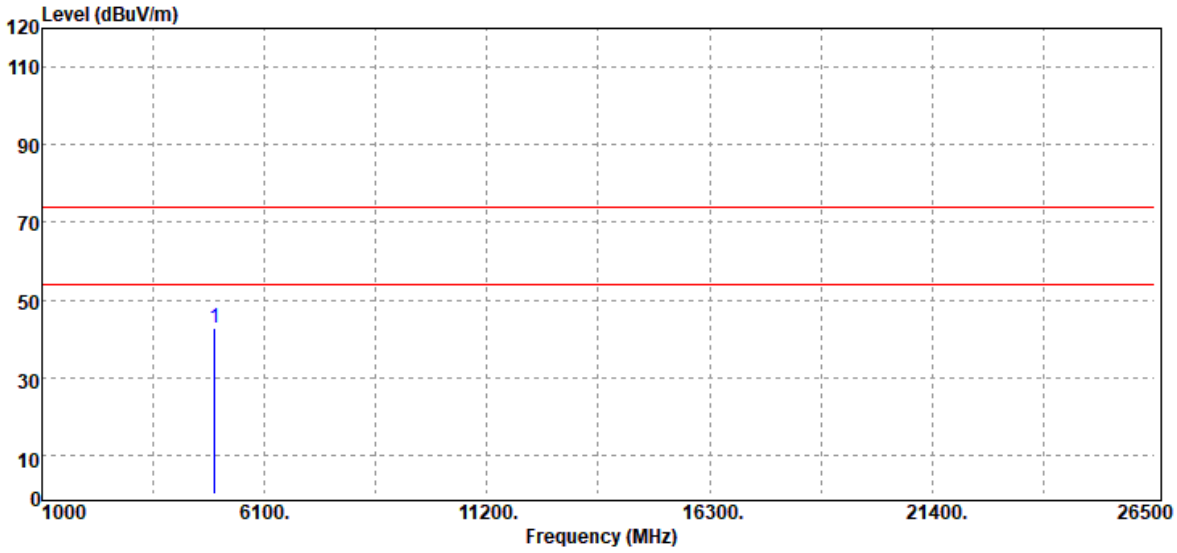
Test Mode:	GFSK_BDR-1Mbps High CH	Temp/Hum	23.3(℃)/ 56%RH
Test Item	Harmonic	Test Date	March 25, 2020
Polarize	Vertical	Test Engineer	Jerry Chang
Detector	Peak		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
4960.00	Peak	38.15	4.46	42.61	74.00	-31.39
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *For above 1GHz,the EUT peak value was under average limit, therefore the Average value compliance with the average limit*

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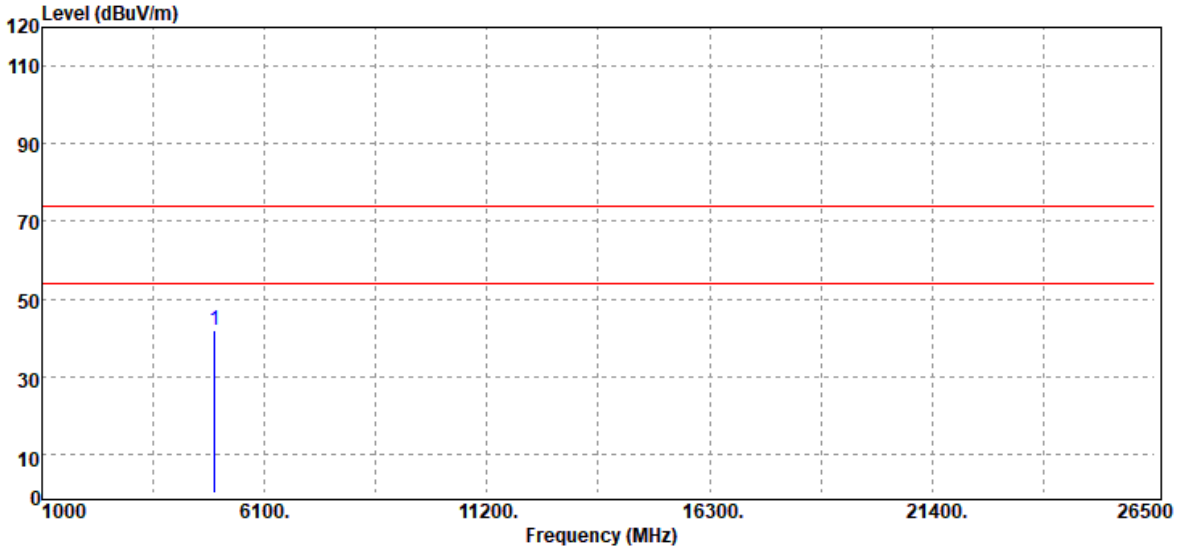
Test Mode:	GFSK_BDR-1Mbps High CH	Temp/Hum	23.3(℃)/ 56%RH
Test Item	Harmonic	Test Date	March 25, 2020
Polarize	Horizontal	Test Engineer	Jerry Chang
Detector	Peak		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
4960.00	Peak	37.58	4.46	42.04	74.00	-31.96
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit*

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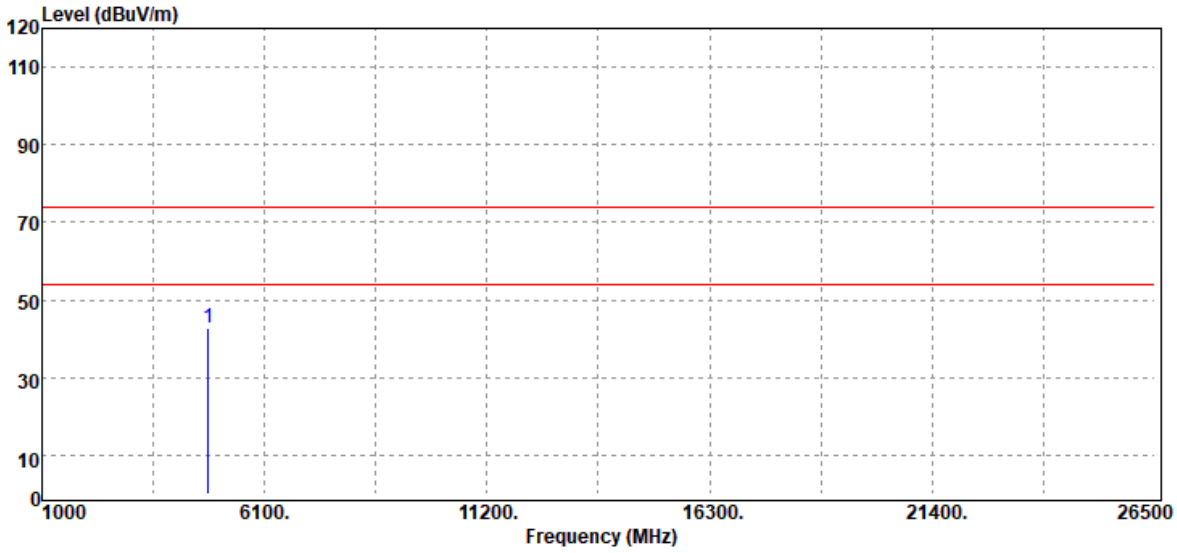
Test Mode	8DPSK_EDR-3Mbps Low CH	Temp/Hum	23.3(℃)/ 56%RH
Test Item	Harmonic	Test Date	March 25, 2020
Polarize	Vertical	Test Engineer	Jerry Chang
Detector	Peak		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
4804.00	Peak	39.29	3.36	42.65	74.00	-31.35
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit*

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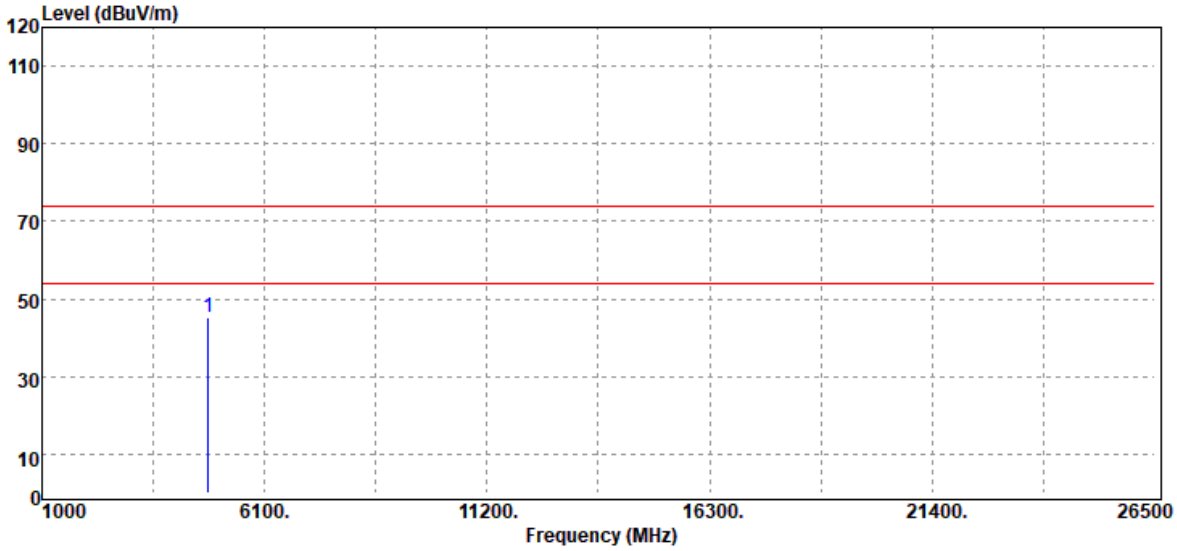
Test Mode	8DPSK_EDR-3Mbps Low CH	Temp/Hum	23.3(℃)/ 56%RH
Test Item	Harmonic	Test Date	March 25, 2020
Polarize	Horizontal	Test Engineer	Jerry Chang
Detector	Peak		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
4804.00	Peak	38.27	3.36	41.63	74.00	-32.37
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit*

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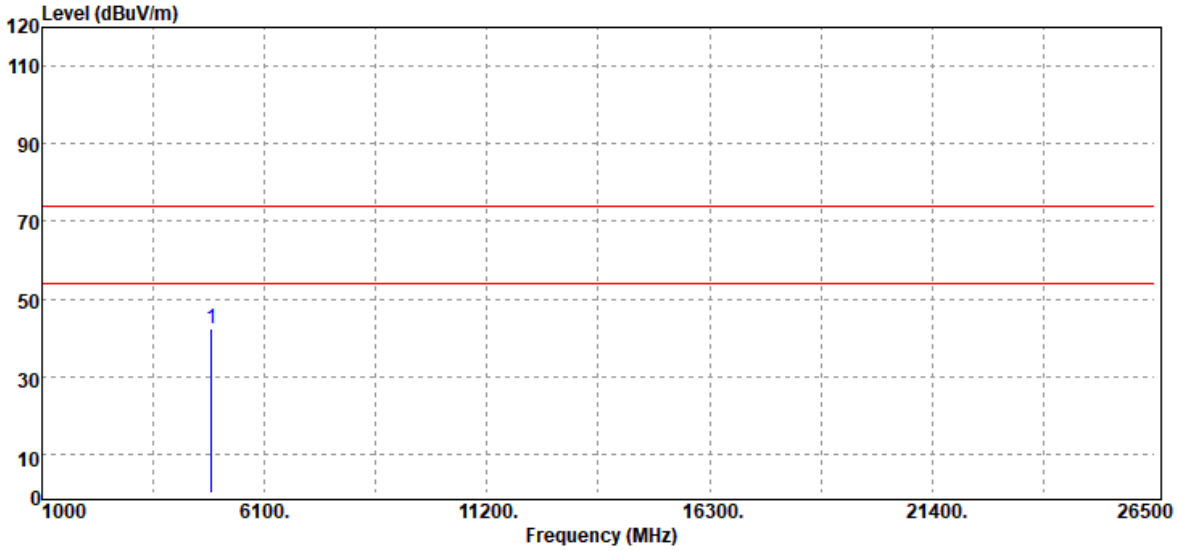
Test Mode	8DPSK_EDR-3Mbps Mid CH	Temp/Hum	23.3(℃)/ 56%RH
Test Item	Harmonic	Test Date	March 25, 2020
Polarize	Vertical	Test Engineer	Jerry Chang
Detector	Peak		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
4882.00	Peak	38.73	3.52	42.25	74.00	-31.75
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit*

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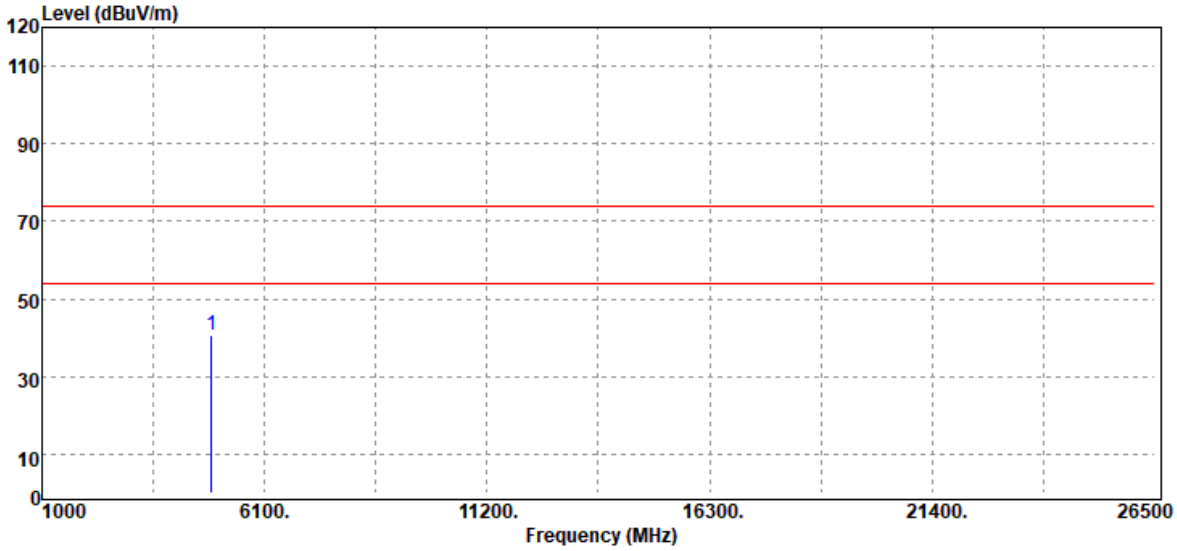
Test Mode	8DPSK_EDR-3Mbps Mid CH	Temp/Hum	23.3(℃)/ 56%RH
Test Item	Harmonic	Test Date	March 25, 2020
Polarize	Horizontal	Test Engineer	Jerry Chang
Detector	Peak		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
4882.00	Peak	37.02	3.52	40.54	74.00	-33.46
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit*

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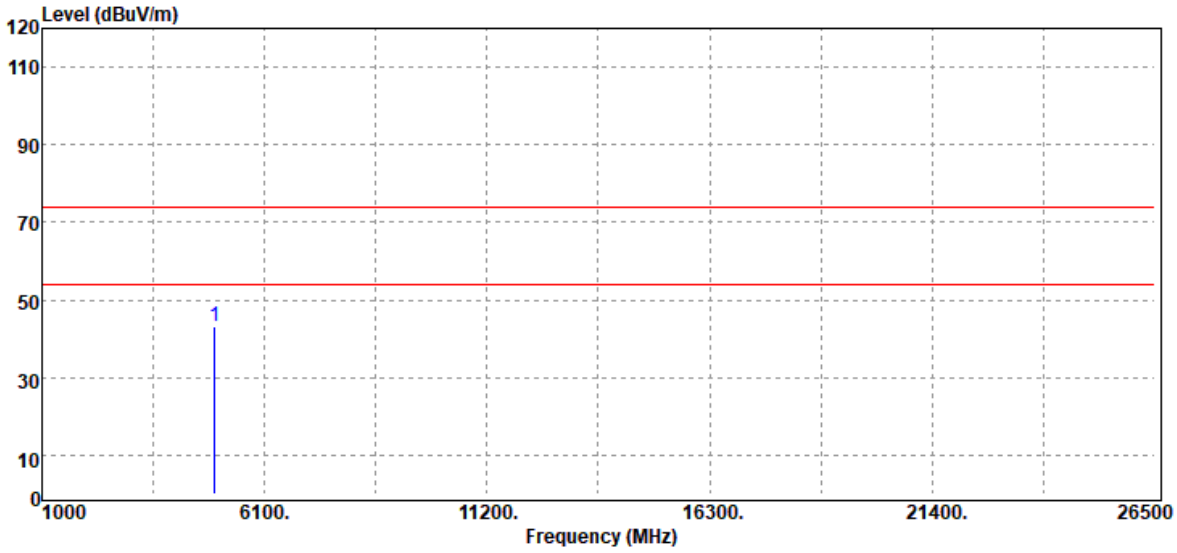
Test Mode	8DPSK_EDR-3Mbps High CH	Temp/Hum	23.3(℃)/ 56%RH
Test Item	Harmonic	Test Date	March 25, 2020
Polarize	Vertical	Test Engineer	Jerry Chang
Detector	Peak		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
4960.00	Peak	38.93	4.46	43.39	74.00	-30.61
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *For above 1GHz,the EUT peak value was under average limit, therefore the Average value compliance with the average limit*

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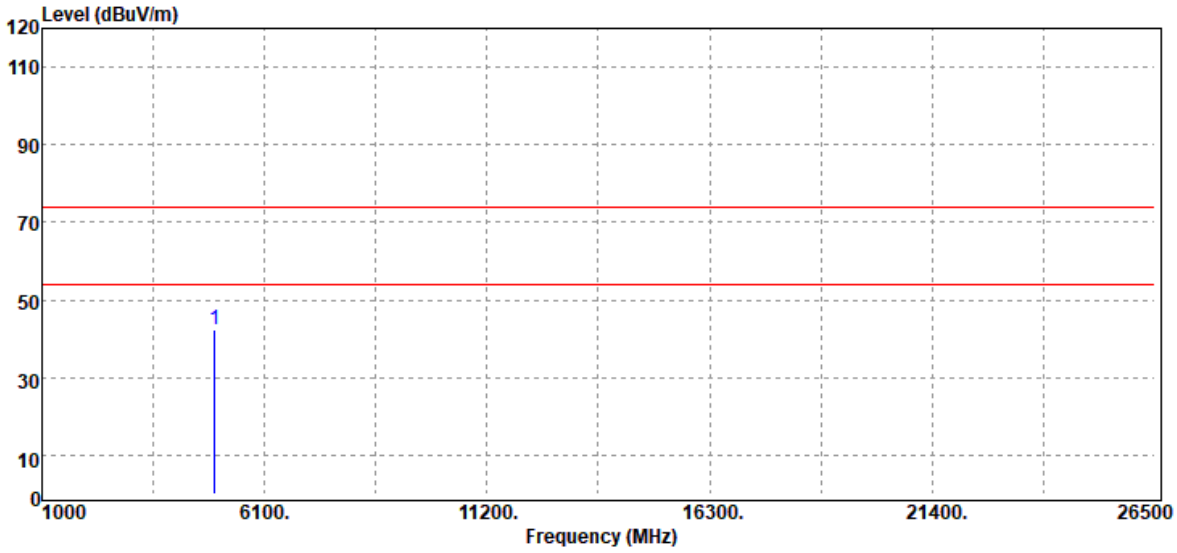
Test Mode	8DPSK_EDR-3Mbps High CH	Temp/Hum	23.3(℃)/ 56%RH
Test Item	Harmonic	Test Date	March 25, 2020
Polarize	Horizontal	Test Engineer	Jerry Chang
Detector	Peak		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
4960.00	Peak	38.00	4.46	42.46	74.00	-31.54
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit*

--End of Test Report--

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