



FCC Part 15.247

TEST REPORT

For

AAEON Technology Inc.

5F, No. 135, Lane 235, Pao Chiao Rd., Hsin-Tien Dist., New Taipei City 23145, Taiwan, R.O.C

FCC ID: OHBRTC700RKWBG

Report Type Original Report	Product Type: Rugged Tablet Computer
Report Producer :	Himiko Chen <i>Himiko Chen</i>
Report Number :	RLK1803004-00C
Report Date :	2018-05-23
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Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Taiwan)

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Revision History

Revision	Report Number	Issue Date	Description	Author/Revised by
1.0	RLK1803004-00C	2018.05.23	Original Report	Himiko Chen

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1 General Information

1.1 Product Description for Equipment under Test (EUT)

Applicant	AAEON Technology Inc. 5F, No. 135, Lane 235, Pao Chiao Rd., Hsin-Tien Dist., New Taipei City 23145, Taiwan, R.O.C
Manufacturer	AAEON Technology Inc. 5F, No. 135, Lane 235, Pao Chiao Rd., Hsin-Tien Dist., New Taipei City 23145, Taiwan, R.O.C
Brand(Trade) Name	 an ASUS assoc. co.
Product (Equipment)	Rugged Tablet Computer
Model Name	RTC-700RK-TAD-WBGR-6102
Series Model	xRTC-700RKx (x - Where x may be any combination of alphanumeric characters or "-" or blank.)
Model Discrepancy	For marketing purpose
EUT Function	BT: BR+EDR
Frequency Range	2402 MHz ~ 2480 MHz
Number of Channels	79 Channels
Output Power	BT BR(GFSK) Mode: -9.02 dBm (0.00013W) BT EDR($\pi/4$ -DQPSK) Mode: -12.76 dBm(0.00005W) BT EDR(8-DPSK) Mode: -12.64 dBm (0.00005W)
Received Date	Mar 01, 2018.
Date of Test	Mar 02, 2018 ~ May 23, 2018
Related Submittal(s)/Grant(s)	FCC Part 15.225 DXX with FCC ID : OHBRTC700RKWBG FCC Part 15.247 DTS with FCC ID : OHBRTC700RKWBG
Modulation Type	BT BR Mode: GFSK BT EDR-2M Mode: $\pi/4$ -DQPSK BT EDR-3M Mode: 8-DPSK

**All measurement and test data in this report was gathered from production sample serial number: 1803004
(Assigned by BACL, Taiwan).*

1.2 Operation Condition of EUT

Power Operation (Voltage Range)	☒ AC 120V/60Hz ☒ Adapter <i>Brand Name: FSP</i> <i>Model: FSP036-RBBN2</i> <i>I/P: 100-240Vac, 1.2A</i> <i>O/P: 12Vdc, 3A</i> ☐ By Power Core
	☐ DC Type ☐ DC Power Supply ☒ Battery : (1) <i>Rechargeable Li-polymer Battery</i> <i>Brand Name: AAEON</i> <i>Model: RTC600S</i> <i>7.4V = 1530mAh, 11.322Wh</i> (2) <i>Rechargeable Li-polymer Battery</i> <i>Brand Name: AAEON</i> <i>Model: RTC600H</i> <i>7.4V = 1530mAh, 11.322Wh</i> ☐ External from USB Cable ☐ External DC Adapter
	☐ Host System

**The worst was Adapter mode*

1.3 Objective and Test Methodology

The Objective of this Test Report was to document the compliance of the AAEON Technology Inc. Displays (Model: RTC-700RK-TAD-WBGR-6102, xRTC-700RKx (x - Where x may be any combination of alphanumeric characters or "-" or blank.)) to the requirements of the following Standards:

Part 2, Subpart J, Part 15, Subparts A and Part 15, Subparts C of the Federal Communication Commission's rules.

The objective is to determine compliance with FCC Part 15.247 rules and all measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

1.4 Measurement Uncertainty

Parameter	Expanded Measurement uncertainty
RF output power with Power Meter	± 0.55 dB
Occupied Channel Bandwidth	± 4.45 %
RF Conducted test with Spectrum	± 1.45 dB
AC Power Line Conducted Emission	± 4.64 dB
Radiated Below 1G	± 5.83 dB
Radiated Above 1G-18G	± 5.35 dB
Radiated Above 18G-40G	± 4.49 dB

1.5 Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Taiwan) to collect test data is located on

☒ 70, Lane 169, Sec. 2, Datong Road, Xizhi Dist., New Taipei City 22183, Taiwan, R.O.C.

☒ 68-3, Lane 169, Sec. 2, Datong Road, Xizhi Dist., New Taipei City 22183, Taiwan, R.O.C.

2 System Test Configuration

2.1 Description of Test Configuration

The system was configured for testing in testing mode which was provided by manufacturer.

No special accessory, No modification was made to the EUT and No special equipment used during test.

For BR/EDR mode, there are totally 79 channels.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	39	2441
1	2403	-	-
2	2404	-	-
3	2405	-	-
4	2406	76	2478
-	-	77	2479
38	2440	78	2480

For BT BR/EDR modes: Channel 0, 39 and 78 were tested.

Radiated below 1G were tested worst output power mode.

2.2 Description of Worst Test Configuration

Modulation Used for Conformance Test	
Configuration	Data Rate
BR (GFSK) mode	1 Mbps
EDR ($\pi/4$ -DQPSK) mode	2 Mbps
EDR (8DPSK) mode	3 Mbps

Worst Case of Power Setting			
EUT Exercise Software	RFTestTool		
Configuration	Low CH	Mid CH	High CH
BR (GFSK) mode	Default	Default	Default
EDR ($\pi/4$ -DQPSK) mode	Default	Default	Default
EDR (8DPSK) mode	Default	Default	Default

2.3 Support Equipment List and Details

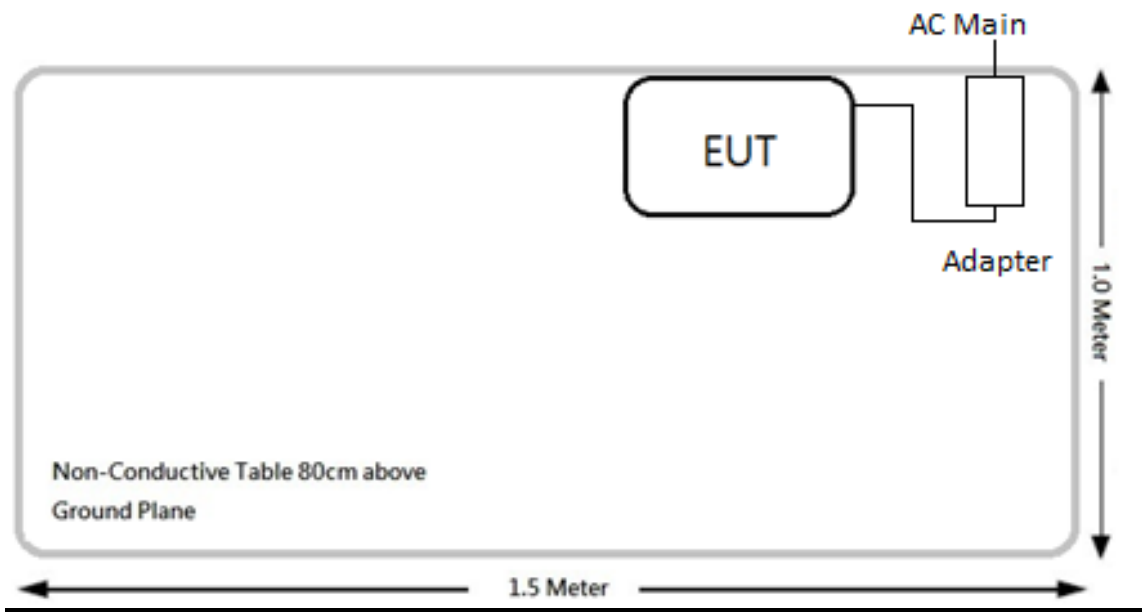
No.	Description	Manufacturer	Model Number	BSMI	FCC ID/DoC
A	N/A	N/A	N/A	N/A	N/A

2.4 External Cable List and Details

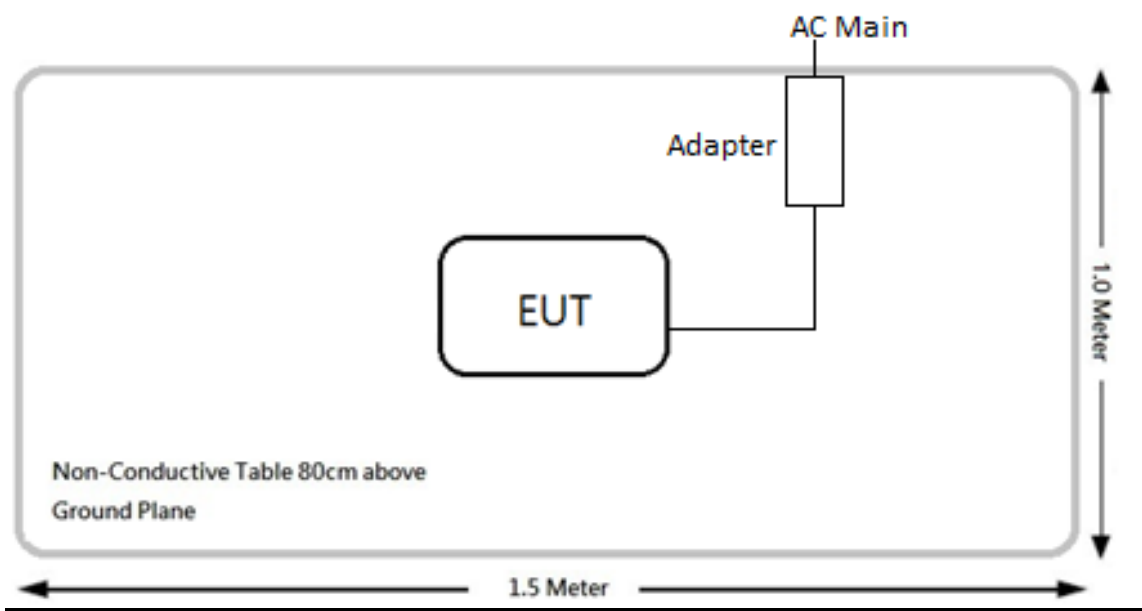
No.	Cable Description	Length (m)	From	To
1	N/A	N/A	N/A	N/A

2.5 Block Diagram of Test Setup

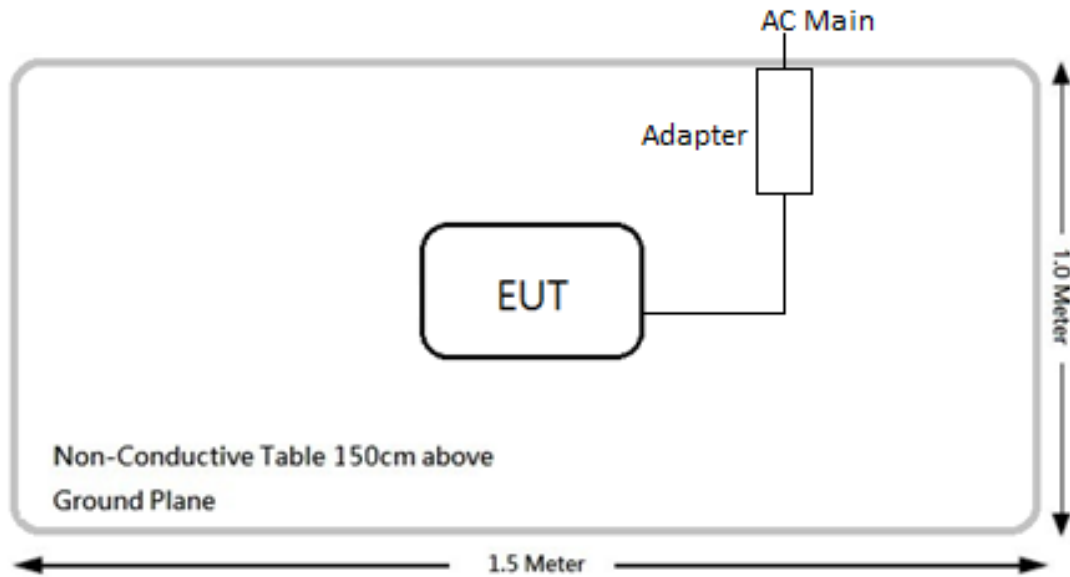
Conduction



Radiation below 1G



Radiation Above 1G



3 Summary of Test Results

FCC Rules	Description of Test	Result
§15.247(i), §2.1093	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207(a)	AC Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247(a)(1)	20 dB Emission Bandwidth	Compliance
§15.247 (a)(1)	Channel Separation Test	Compliance
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Compliance
§15.247(a)(1)(iii)	Quantity of hopping channel Test	Compliance
§15.247(b)(3)	Maximum Peak Output Power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance

4 FCC §15.247(i), § 2.1093 - RF Exposure

4.1 Applicable Standard

According to FCC §2.1093 and §1.1307(b) (1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB 447498 D01 General RF Exposure Guidance v06

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot$

$[\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

1. $f(\text{GHz})$ is the RF channel transmit frequency in GHz.

2. Power and distance are rounded to the nearest mW and mm before calculation.

3. The result is rounded to one decimal place for comparison.

4. 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

The test exclusions are applicable only when the minimum *test separation distance* is ≤ 50 mm, and for transmission frequencies between 100 MHz and 6 GHz. When the minimum *test separation distance* is < 5 mm, a distance of 5 mm according to 4.1 f) is applied to determine SAR test exclusion.

4.2 RF Exposure Evaluation Result

For BT BR/EDR Mode Worst:

Frequency (MHz)	Tunp-up Power		Evaluation Distance (mm)	SAR Excluion Result	Extremity SAR Exclusion Limit (1g SAR)
	(dBm)	(mW)			
2402-2480	-9	0.126	5	0.0397	3

Therefore, the stand-alone SAR evaluation for BT (BR/EDR) is not necessary.

5 FCC §15.203 – Antenna Requirements

5.1 Applicable Standard

According to § 15.203,

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna does not exceed 6 dBi

5.2 Antenna List and Details

Manufacturer	Model	Antenna Type	Antenna Gain	Result
Aristotle	RFA-25-JP19-70B-50	PIFA Antenna	3.89 dBi	Compliance

The EUT has an internal detachable antenna arrangement, fulfill the requirement of this section.

6 FCC §15.207 - AC Line Conducted Emissions

6.1 Applicable Standard

According to FCC §15.207

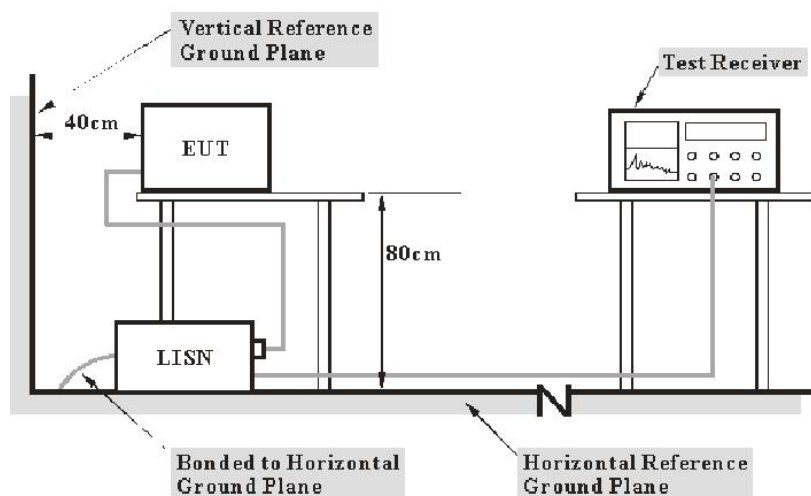
For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56 ^{Note 1}	56 to 46 ^{Note 2}
0.5-5	56	46
5-30	60	50

Note 1: Decreases with the logarithm of the frequency.

Note 2: A linear average detector is required

6.2 EUT Setup



Note: 1. Support units were connected to second LISN.

2. Both of LISNs (AMN) 80 cm from EUT and at the least 30 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

6.3 EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz. During the conducted emission test, the EMI test receiver was set with the following configurations

Frequency Range	Receiver RBW
150 kHz - 30 MHz	9 kHz

6.4 Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN. Maximizing procedure was performed on the six (6) highest emissions of the EUT. All data was recorded in the Quasi-peak and average detection mode.

6.5 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Date	Calibration Due Date
LISN	EMCO	3816/2	00075848	2017/08/02	2018/08/01
LISN	Rohde & Schwarz	ENV216	101248	2017/07/20	2018/07/19
EMI Test Receiver	Rohde & Schwarz	ESR7	101419	2017/11/06	2018/11/05
Pulse Limiter	Rohde & Schwarz	ESH3Z2	TXZEM104	2017/08/10	2018/08/09
RF Cable	EMEC	EM-CB5D	001	2017/07/10	2018/07/09
Software	AUDIX	E3	V9.150826k	N.C.R	N.C.R

***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).

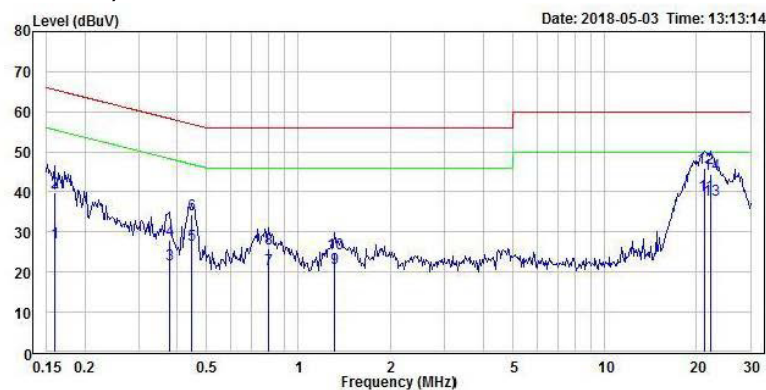
6.6 Test Environmental Conditions

Temperature:	25 °C
Relative Humidity:	58 %
ATM Pressure:	1010 hPa

The testing was performed by Ian on 2018-05-03

6.7 AC Line Conducted Emission Test Plot and Data

Mode: AC 120V/60 Hz, BT mode, Line



Condition: limit\FCC\FCC Conduction Clsaa-B QP.csv Line

EUT : Rugged Tablet Computer

Model : RTC-700RK-TAD-WBGR-6102

Note : BT MODE

Power : 120V/60Hz

	Freq	Level	Limit	Over		Read		
	MHz	dBuV	Line	Limit	Factor	Level	Remark	Pol/Phase
	MHz	dBuV	dBuV	dB	dB	dBuV		
1	0.159	27.45	55.54	-28.09	19.50	7.95	Average	Line
2	0.159	39.79	65.54	-25.75	19.50	20.29	QP	Line
3	0.378	22.02	48.32	-26.30	19.51	2.51	Average	Line
4	0.378	27.93	58.32	-30.39	19.51	8.42	QP	Line
5	0.447	26.88	46.93	-20.05	19.51	7.37	Average	Line
6	0.447	34.31	56.93	-22.62	19.51	14.80	QP	Line
7	0.799	20.63	46.00	-25.37	19.52	1.11	Average	Line
8	0.799	25.70	56.00	-30.30	19.52	6.18	QP	Line
9	1.310	21.05	46.00	-24.95	19.54	1.51	Average	Line
10	1.310	24.58	56.00	-31.42	19.54	5.04	QP	Line
11	21.298	39.17	50.00	-10.83	19.85	19.32	Average	Line
12	21.298	45.85	60.00	-14.15	19.85	26.00	QP	Line
13	22.163	38.12	50.00	-11.88	19.85	18.27	Average	Line
14	22.163	44.52	60.00	-15.48	19.85	24.67	QP	Line

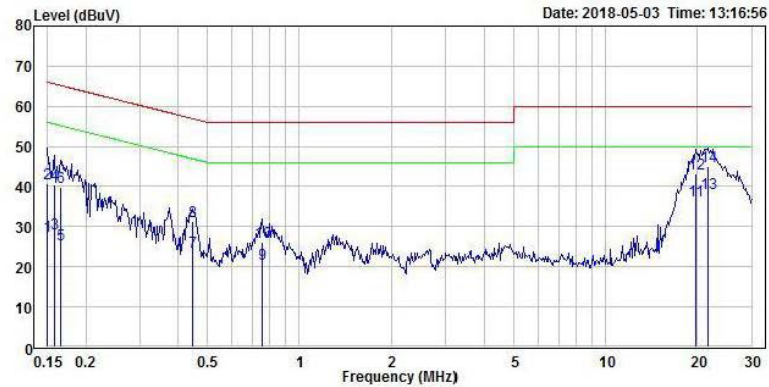
Note:

Level = Read Level + Factor

Over Limit (Margin) = Level – Limit Line

Factor = (LISN, ISN, PLC or current probe) Factor + Cable Loss + Attenuator

Mode: AC 120V/60 Hz, Wi-Fi mode, Neutral



Condition: limit\FCC\FCC Conduction Clsaa-B QP.csv Neutral

EUT : Rugged Tablet Computer

Model : RTC-700RK-TAD-WBGR-6102

Note : BT MODE

Power : 120V/60Hz

	Freq	Level	Limit	Over		Read		
	MHz	dBuV	Line	Limit	Factor	Level	Remark	Pol/Phase
	MHz	dBuV	dBuV	dB	dB	dBuV		
1	0.150	27.64	56.00	-28.36	19.63	8.01	Average	Neutral
2	0.150	40.84	66.00	-25.16	19.63	21.21	QP	Neutral
3	0.157	28.26	55.60	-27.34	19.63	8.63	Average	Neutral
4	0.157	40.34	65.60	-25.26	19.63	20.71	QP	Neutral
5	0.165	25.48	55.21	-29.73	19.63	5.85	Average	Neutral
6	0.165	39.94	65.21	-25.27	19.63	20.31	QP	Neutral
7	0.447	23.75	46.93	-23.18	19.64	4.11	Average	Neutral
8	0.447	31.25	56.93	-25.68	19.64	11.61	QP	Neutral
9	0.756	20.74	46.00	-25.26	19.66	1.08	Average	Neutral
10	0.756	26.05	56.00	-29.95	19.66	6.39	QP	Neutral
11	19.667	36.50	50.00	-13.50	20.04	16.46	Average	Neutral
12	19.667	43.17	60.00	-16.83	20.04	23.13	QP	Neutral
13	21.640	38.32	50.00	-11.68	20.06	18.26	Average	Neutral
14	21.640	44.90	60.00	-15.10	20.06	24.84	QP	Neutral

Note:

Level = Read Level + Factor

Over Limit (Margin) = Level – Limit Line

Factor = (LISN, ISN, PLC or current probe) Factor + Cable Loss + Attenuator

7 FCC §15.209, §15.205, §15.247(d) – Spurious Emissions

7.1 Applicable Standard

As per FCC §15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz.

As Per FCC §15.205(a) and RSS-Gen except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	960 – 1240	4.5 – 5.15
0.495 – 0.505	16.69475 – 16.69525	1300 – 1427	5.35 – 5.46
2.1735 – 2.1905	25.5 – 25.67	1435 – 1626.5	7.25 – 7.75
4.125 – 4.128	37.5 – 38.25	1645.5 – 1646.5	8.025 – 8.5
4.17725 – 4.17775	73 – 74.6	1660 – 1710	9.0 – 9.2
4.20725 – 4.20775	74.8 – 75.2	1718.8 – 1722.2	9.3 – 9.5
6.215 – 6.218	108 – 121.94	2200 – 2300	10.6 – 12.7
6.26775 – 6.26825	123 – 138	2310 – 2390	13.25 – 13.4
6.31175 – 6.31225	149.9 – 150.05	2483.5 – 2500	14.47 – 14.5
8.291 – 8.294	156.52475 – 156.52525	2690 – 2900	15.35 – 16.2
8.362 – 8.366	156.7 – 156.9	3260 – 3267	17.7 – 21.4
8.37625 – 8.38675	162.0125 – 167.17	3.332 – 3.339	22.01 – 23.12
8.41425 – 8.41475	167.72 – 173.2	3.3458 – 3.358	23.6 – 24.0
12.29 – 12.293	240 – 285	3.600 – 4.400	31.2 – 31.8
12.51975 – 12.52025	322 – 335.4		36.43 – 36.5
12.57675 – 12.57725	399.9 – 410		Above 38.6
13.36 – 13.41	608 – 614		

As per FCC §15.209(a): Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

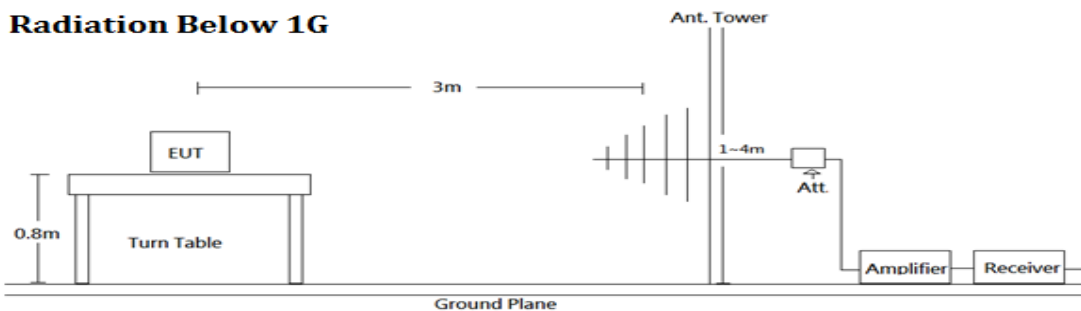
Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

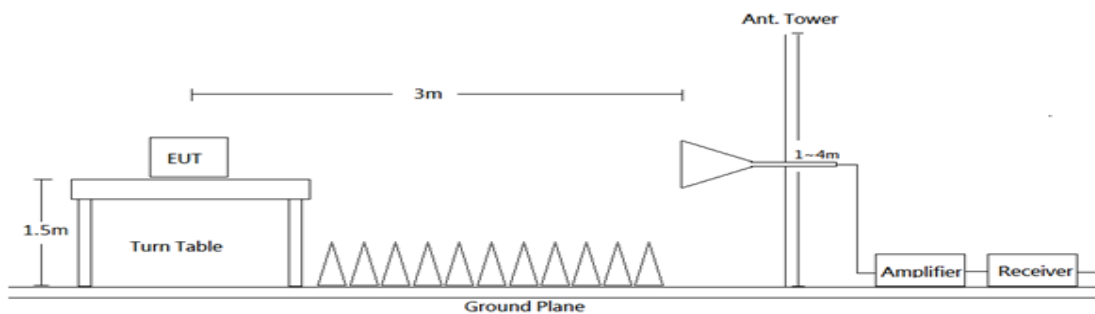
As per FCC §15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

7.2 EUT Setup

Radiation Below 1G



Radiation Above 1G



Radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC Part 15.209 and FCC 15.247 Limits.

7.3 EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 26.5 GHz. During the radiated emission test, the EMI test receiver was set with the following configurations measurement method 6.3 in ANSI C63.10.

Frequency Range	RBW	VBW	Measurement method
30-1000 MHz	120 kHz	/	QP
Above 1 GHz	1 MHz	3 MHz	PK
	1 MHz	10 Hz	Ave

7.4 Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the Quasi-peak detector mode from 30 MHz to 1 GHz and PK and average detector modes for frequencies above 1 GHz.

7.5 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
966A Room					
Bilog Antenna	Sunol & Mini-Circuits	JB6/UNAT-6+	A050115 / 15542_01	2017/12/20	2018/12/19
Horn Antenna	EMCO	3115	9311-4158	2017/05/31	2018/05/30
Horn Antenna	ETS-Lindgren	3116	00062638	2017/09/02	2018/09/01
Preamplifier	Sonoma	310N	130602	2017/07/03	2018/07/02
Preamplifier	EMEC	EM01G18G	060697	2017/04/14	2018/04/13
Preamplifier	EMEC	EM18G40G	060656	2018/01/15	2019/01/14
EMI Test Receiver	R & S	ESR7	101419	2017/11/06	2018/11/05
Spectrum Analyzer	Rohde & Schwarz	FSV40	101203	2017/07/13	2018/07/12
Microflex Cable	UTIFLEX	UFB311A-Q-1440-300300	220490-006	2017/10/31	2018/10/30
Microflex Cable	UTIFLEX	UFA210A-1-3149-300300	MFR64639 226389-001	2017/11/10	2018/11/09
Microflex Cable	ROSNOL	K1K50-UP0264-K1K50-450CM	160309-1	2018/03/05	2019/03/04
Microflex Cable	ROSNOL	K1K50-UP0264-K1K50-80CM	160309-2	2018/01/29	2019/01/28
20 dB Attenuator	NCL	BW-S20W5+	NA	Each Use	/
Turn Table	Champro	TT-2000	060772-T	N.C.R	N.C.R
Antenna Tower	Champro	AM-BS-4500-B	060772-A	N.C.R	N.C.R
Controller	Champro	EM1000	060772	N.C.R	N.C.R
Software	Farad	EZ EMC	BACL-03A1	N.C.R	N.C.R
Conducted Room					
Spectrum Analyzer	Rohde & Schwarz	FSU26	200268	2017/05/08	2018/05/07
Cable	WOKEN	SFL402	S02-160323-07	2018/02/21	2019/02/20

***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).

7.6 Test Environmental Conditions

Temperature:	23.5 °C
Relative Humidity:	55.4 %
ATM Pressure:	1015 hPa

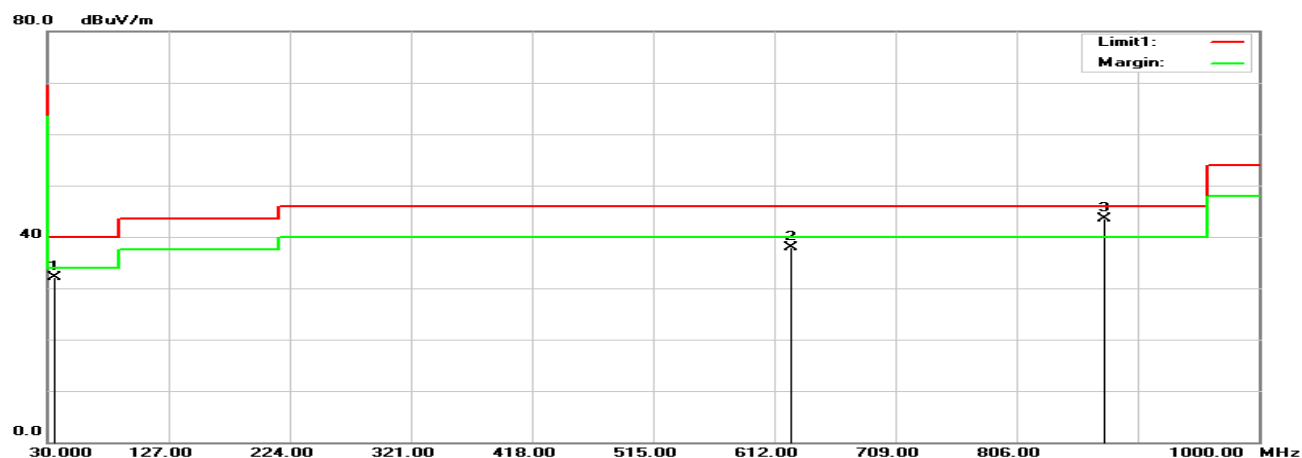
The testing was performed by Ian from 2018-03-21 to 2018-04-10

7.7 Radiated Emission Test Plot and Data

BT Mode: Transmitting Mode (Pre-scan with three orthogonal axis, and worse case as X axis)

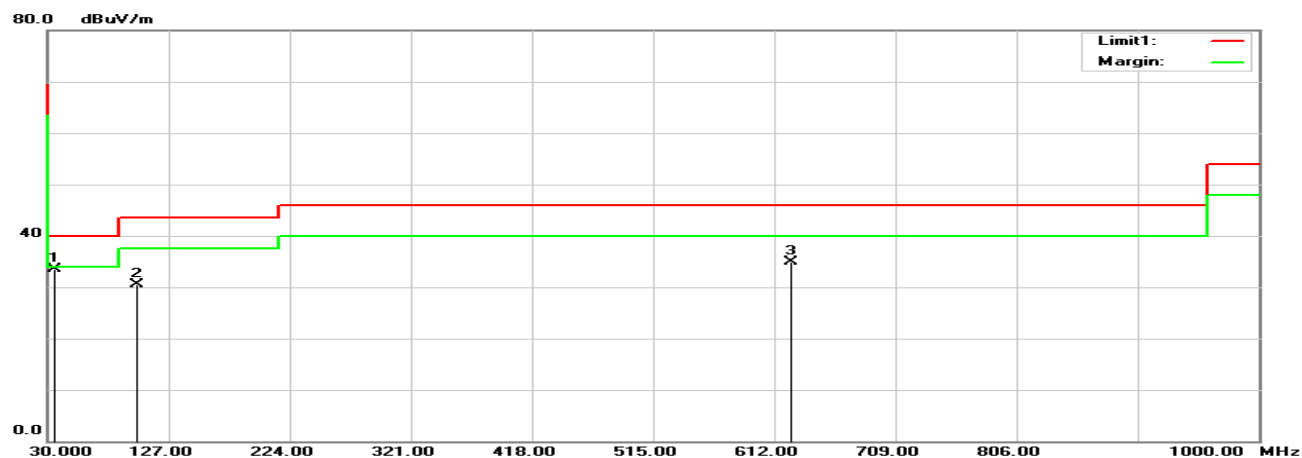
Below 1G (30 MHz-1 GHz) test the output power worst mode: Worst case is BR (GFSK) Low Channel

Horizontal



Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
35.8200	39.53	-7.35	32.18	40.00	-7.82	100	100	peak
625.5800	41.71	-3.81	37.90	46.00	-8.10	100	258	peak
875.8400	42.86	0.62	43.48	46.00	-2.52	100	103	QP

Vertical

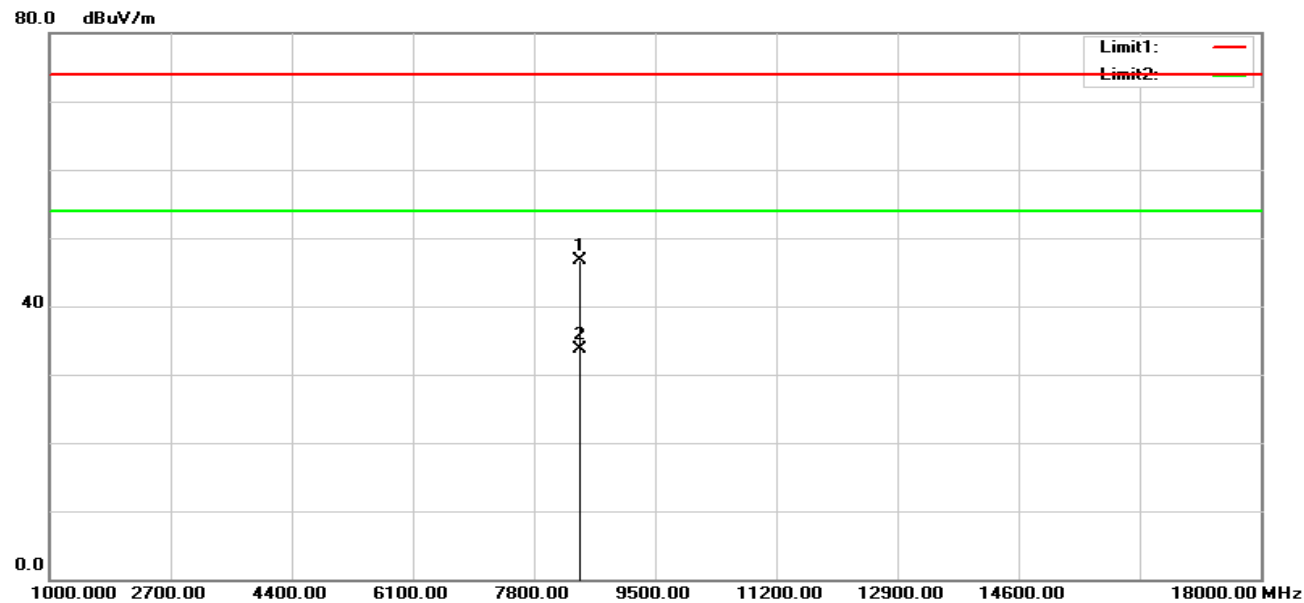


Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
35.8200	40.92	-7.35	33.57	40.00	-6.43	100	359	peak
101.7800	44.49	-14.07	30.42	43.50	-13.08	100	241	peak
625.5800	38.75	-3.81	34.94	46.00	-11.06	100	336	peak

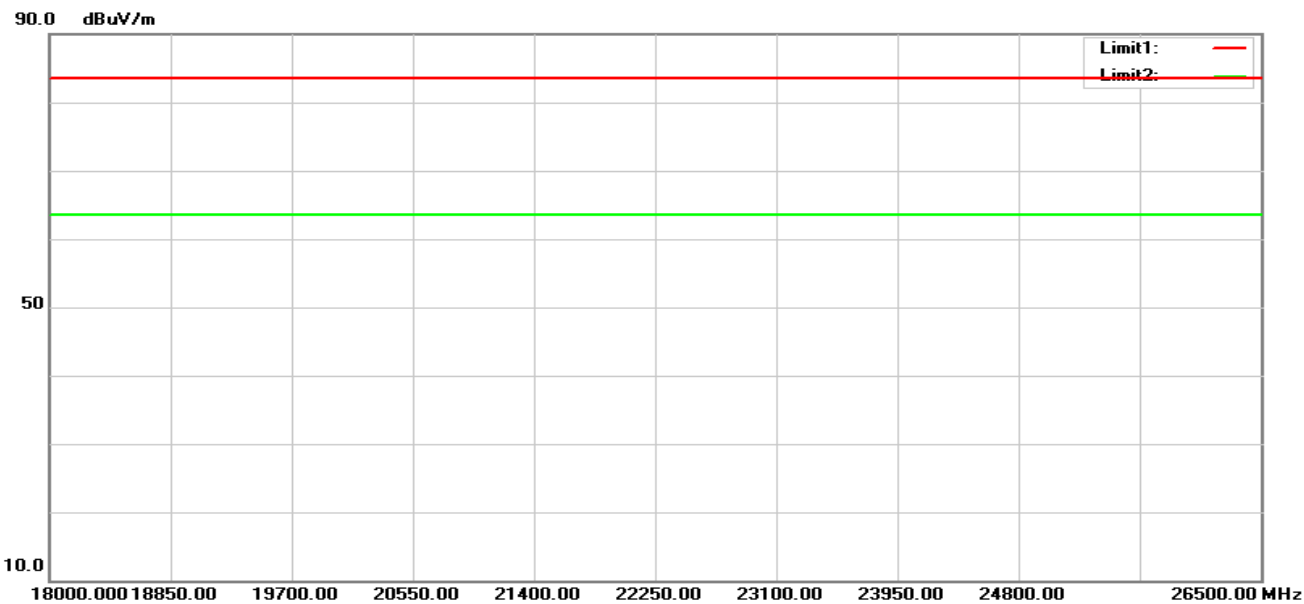
Above 1G (1 GHz-26.5 GHz) test the output power worst mode: Worst case is BR mode (GFSK)
Low channel)

Horizontal

1GHz-18GHz:

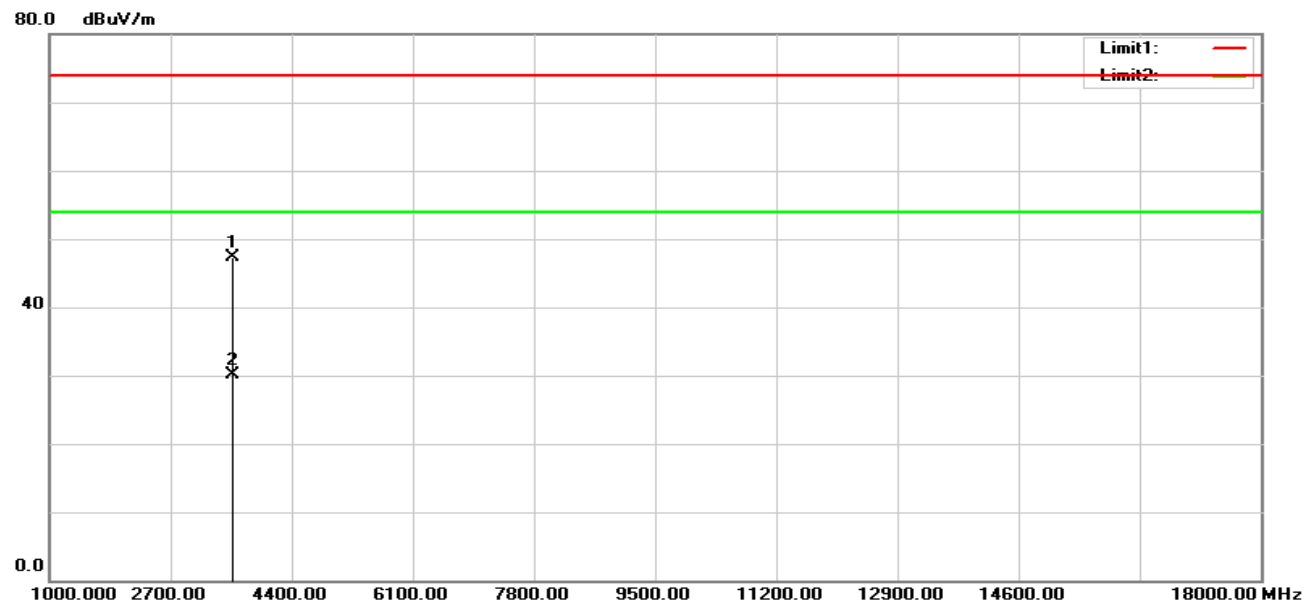


18GHz-26.5GHz:

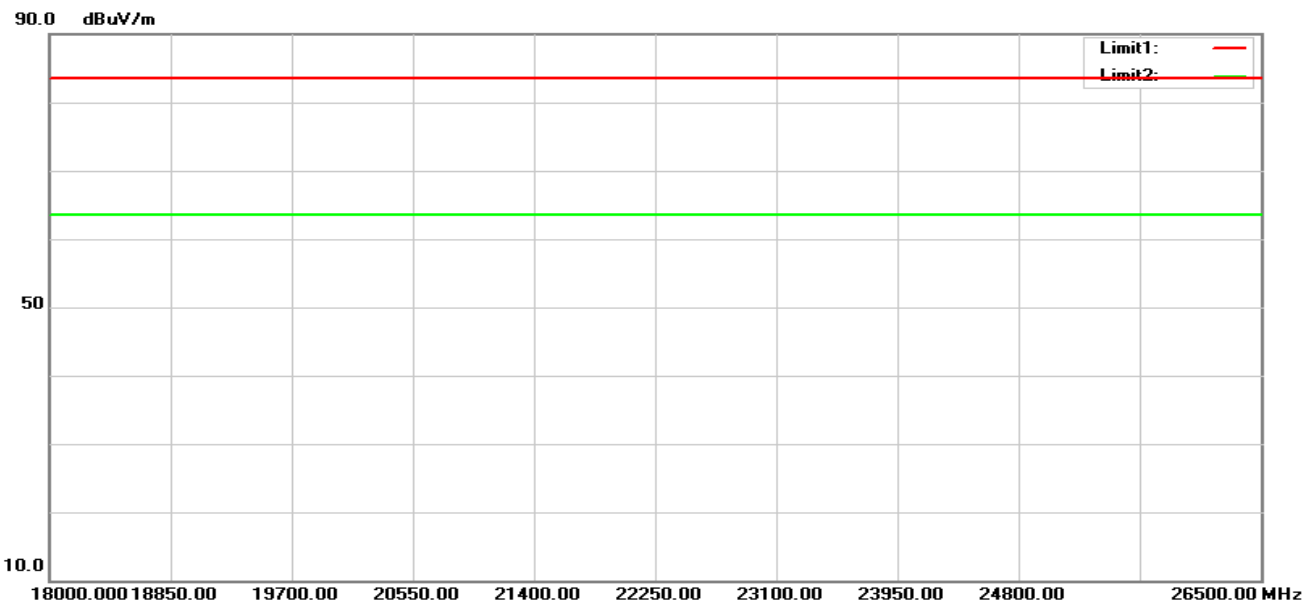


Vertical

1GHz-18GHz:



18GHz-26.5GHz:



BR mode (GFSK):**Horizontal**

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
Low Channel								
2375.265	48.54	-4.92	43.62	74.00	-30.38	150	219	peak
2375.265	32.35	-4.92	27.43	54.00	-26.57	150	219	AVG
2402.150	89.57	-4.86	84.71	N/A	N/A	150	195	peak
2402.150	88.96	-4.86	84.10	N/A	N/A	150	195	AVG
8446.000	37.29	9.44	46.73	74.00	-27.27	150	75	peak
8446.000	24.32	9.44	33.76	54.00	-20.24	150	75	AVG
Mid Channel								
2376.310	46.60	-4.92	41.68	74.00	-32.32	150	220	peak
2376.310	30.63	-4.92	25.71	54.00	-28.29	150	220	AVG
2440.910	88.70	-4.76	83.94	N/A	N/A	150	185	peak
2440.910	87.93	-4.76	83.17	N/A	N/A	150	185	AVG
2488.220	43.87	-4.67	39.20	74.00	-34.80	150	130	peak
2488.220	30.02	-4.67	25.35	54.00	-28.65	150	130	AVG
6168.000	40.00	3.91	43.91	74.00	-30.09	150	101	peak
6168.000	30.11	3.91	34.02	54.00	-19.98	150	101	AVG
High Channel								
2479.870	87.36	-4.68	82.68	N/A	N/A	150	185	peak
2479.870	86.42	-4.68	81.74	N/A	N/A	150	185	AVG
2498.290	44.28	-4.64	39.64	74.00	-34.36	150	352	peak
2498.290	29.97	-4.64	25.33	54.00	-28.67	150	352	AVG
8004.000	38.36	8.32	46.68	74.00	-27.32	150	289	peak
8004.000	29.96	8.32	38.28	54.00	-15.72	150	289	AVG

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported

Vertical

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
Low Channel								
2376.690	46.25	-4.92	41.33	74.00	-32.67	150	129	peak
2376.690	30.52	-4.92	25.60	54.00	-28.40	150	129	AVG
2401.865	71.46	-4.86	66.60	N/A	N/A	150	58	peak
2401.865	70.82	-4.86	65.96	N/A	N/A	150	58	AVG
3567.000	48.46	-1.13	47.33	74.00	-26.67	150	164	peak
3567.000	31.18	-1.13	30.05	54.00	-23.95	150	164	AVG
Mid Channel								
2373.460	45.97	-4.92	41.05	74.00	-32.95	150	145	peak
2373.460	29.78	-4.92	24.86	54.00	-29.14	150	145	AVG
2440.910	71.76	-4.76	67.00	N/A	N/A	150	55	peak
2440.910	70.83	-4.76	66.07	N/A	N/A	150	55	AVG
2493.920	43.45	-4.66	38.79	74.00	-35.21	150	271	peak
2493.920	30.25	-4.66	25.59	54.00	-28.41	150	271	AVG
9160.000	37.41	10.49	47.90	74.00	-26.10	150	135	peak
9160.000	29.93	10.49	40.42	54.00	-13.58	150	135	AVG
High Channel								
2479.840	71.00	-4.68	66.32	N/A	N/A	150	67	peak
2479.840	70.11	-4.68	65.43	N/A	N/A	150	67	AVG
2489.290	44.13	-4.67	39.46	74.00	-34.54	150	137	peak
2489.290	30.19	-4.67	25.52	54.00	-28.48	150	137	AVG
6848.000	39.22	5.31	44.53	74.00	-29.47	150	309	peak
6848.000	29.83	5.31	35.14	54.00	-18.86	150	309	AVG

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported

EDR mode (8-DPSK):**Horizontal**

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
Low Channel								
2376.215	48.35	-4.92	43.43	74.00	-30.57	150	221	peak
2376.215	30.19	-4.92	25.27	54.00	-28.73	150	221	AVG
2401.960	85.43	-4.86	80.57	N/A	N/A	150	204	peak
2401.960	81.75	-4.86	76.89	N/A	N/A	150	204	AVG
6984.000	39.20	5.71	44.91	74.00	-29.09	150	21	peak
6984.000	30.02	5.71	35.73	54.00	-18.27	150	21	AVG
Mid Channel								
2377.260	47.68	-4.92	42.76	74.00	-31.24	150	218	peak
2377.260	30.22	-4.92	25.30	54.00	-28.70	150	218	AVG
2440.910	84.68	-4.76	79.92	N/A	N/A	150	182	peak
2440.910	80.62	-4.76	75.86	N/A	N/A	150	182	AVG
2484.800	43.26	-4.67	38.59	74.00	-35.41	150	306	peak
2484.800	29.88	-4.67	25.21	54.00	-28.79	150	306	AVG
5743.000	40.46	3.06	43.52	74.00	-30.48	150	357	peak
5743.000	30.15	3.06	33.21	54.00	-20.79	150	357	AVG
High Channel								
2479.960	83.11	-4.68	78.43	N/A	N/A	150	186	peak
2479.960	79.49	-4.68	74.81	N/A	N/A	150	186	AVG
2493.400	44.09	-4.66	39.43	74.00	-34.57	150	304	peak
2493.400	30.19	-4.66	25.53	54.00	-28.47	150	304	AVG
9160.000	36.91	10.49	47.40	74.00	-26.60	150	354	peak
9160.000	30.27	10.49	40.76	54.00	-13.24	150	354	AVG

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported

Vertical

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
Low Channel								
2374.695	46.48	-4.92	41.56	74.00	-32.44	150	113	peak
2374.695	29.79	-4.92	24.87	54.00	-29.13	150	113	AVG
2402.055	66.45	-4.86	61.59	N/A	N/A	150	74	peak
2402.055	62.55	-4.86	57.69	N/A	N/A	150	74	AVG
9160.000	38.92	10.49	49.41	74.00	-24.59	150	180	peak
9160.000	30.62	10.49	41.11	54.00	-12.89	150	180	AVG
Mid Channel								
2373.080	46.16	-4.92	41.24	74.00	-32.76	150	141	peak
2373.080	29.79	-4.92	24.87	54.00	-29.13	150	141	AVG
2440.910	66.33	-4.76	61.57	N/A	N/A	150	57	peak
2440.910	60.45	-4.76	55.69	N/A	N/A	150	57	AVG
2493.160	43.32	-4.66	38.66	74.00	-35.34	150	99	peak
2493.160	30.42	-4.66	25.76	54.00	-28.24	150	99	AVG
7766.000	37.19	8.04	45.23	74.00	-28.77	150	296	peak
7766.000	30.29	8.04	38.33	54.00	-15.67	150	296	AVG
High Channel								
2479.990	66.59	-4.68	61.91	N/A	N/A	150	67	peak
2479.990	60.63	-4.68	55.95	N/A	N/A	150	67	AVG
2492.950	43.95	-4.66	39.29	74.00	-34.71	150	150	peak
2492.950	30.42	-4.66	25.76	54.00	-28.24	150	150	AVG
6899.000	40.24	5.46	45.70	74.00	-28.30	150	331	peak
6899.000	29.83	5.46	35.29	54.00	-18.71	150	331	AVG

Result = Reading + Correct Factor

Margin = Result – Limit

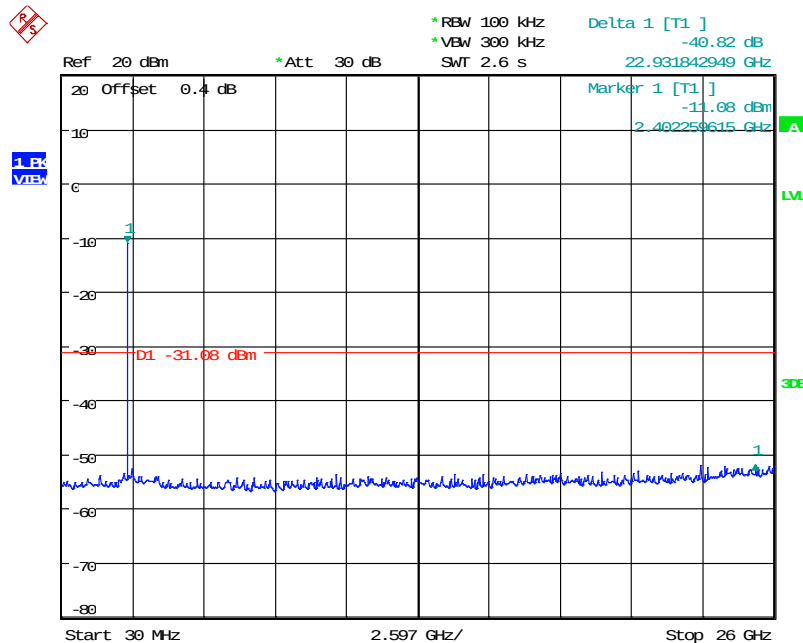
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported

Conducted Spurious Emissions:

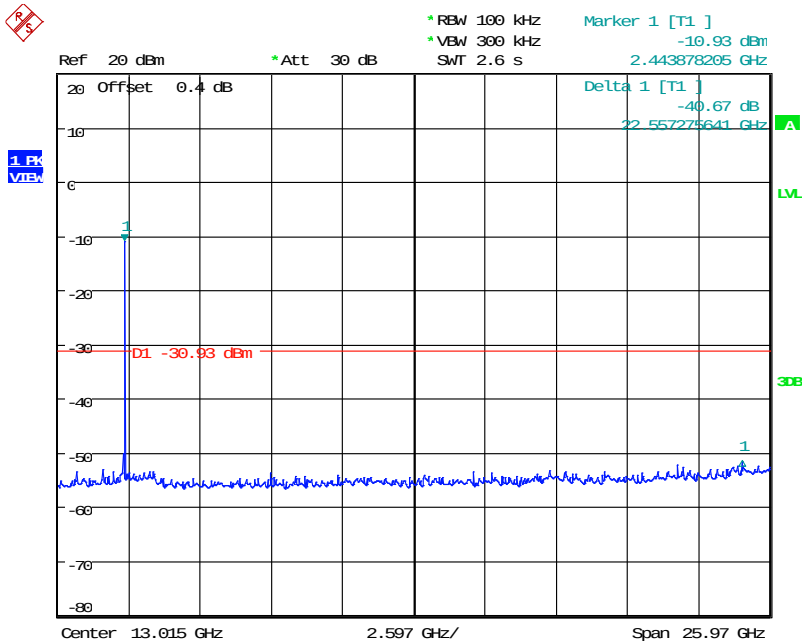
Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
BR mode (GFSK)				
Low	2402	40.82	≥ 20	Compliance
Mid	2441	40.67	≥ 20	Compliance
High	2480	40.50	≥ 20	Compliance
EDR mode (π4-DQPSK)				
Low	2402	33.41	≥ 20	Compliance
Mid	2441	32.16	≥ 20	Compliance
High	2480	32.93	≥ 20	Compliance
EDR mode (8DPSK)				
Low	2402	32.79	≥ 20	Compliance
Mid	2441	33.53	≥ 20	Compliance
High	2480	32.64	≥ 20	Compliance

Please refer to the following plots

BR mode (GFSK):**Low Channel**

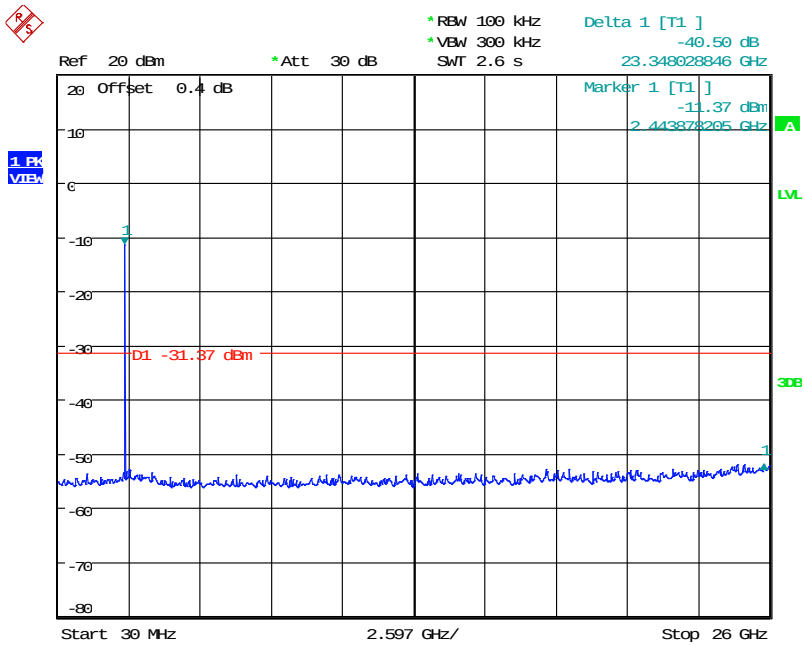
Date: 21.MAR.2018 01:06:34

Middle Channel



Date: 21.MAR.2018 01:21:00

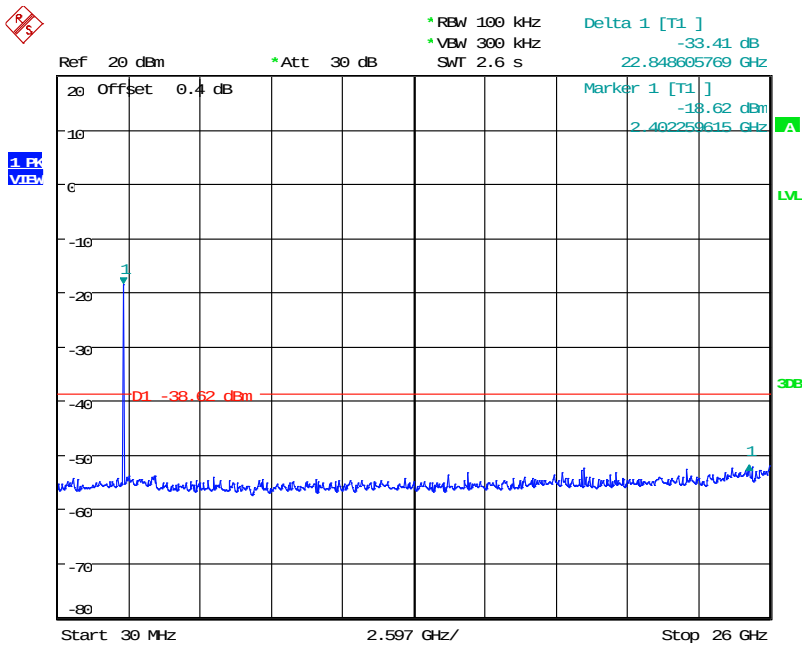
High Channel



Date: 21.MAR.2018 01:39:55

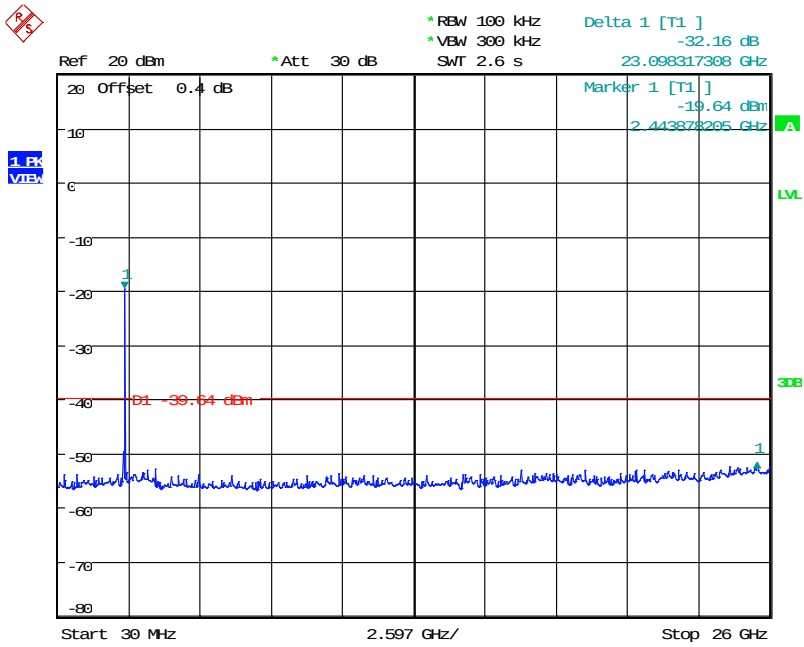
EDR mode (π /4-DQPSK):

Low Channel



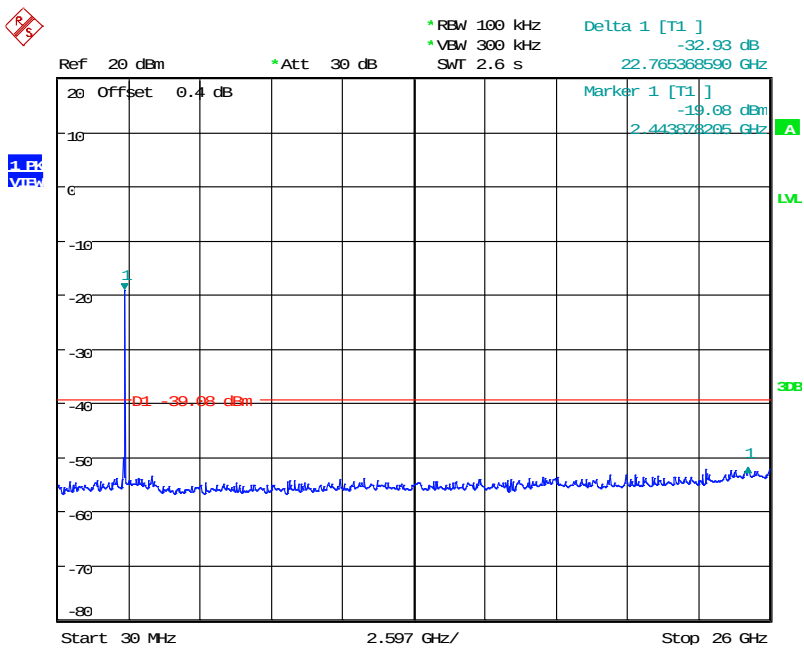
Date: 21.MAR.2018 02:07:50

Middle Channel



Date: 21.MAR.2018 02:14:32

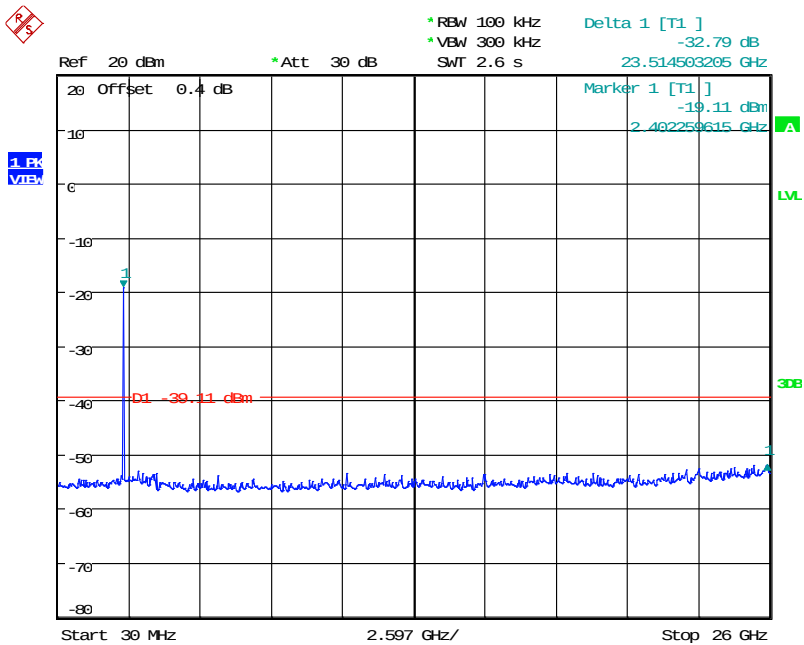
High Channel



Date: 21.MAR.2018 02:21:50

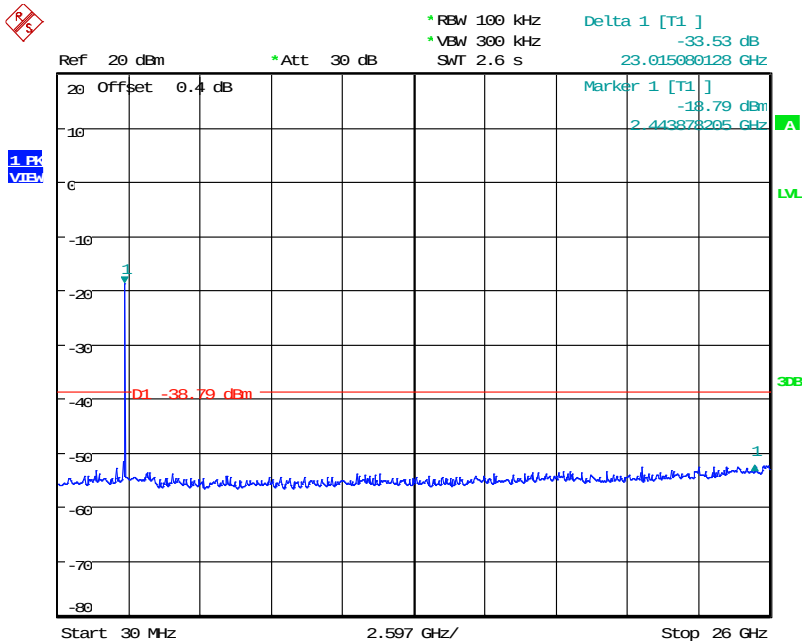
EDR mode (8DPSK):

Low Channel



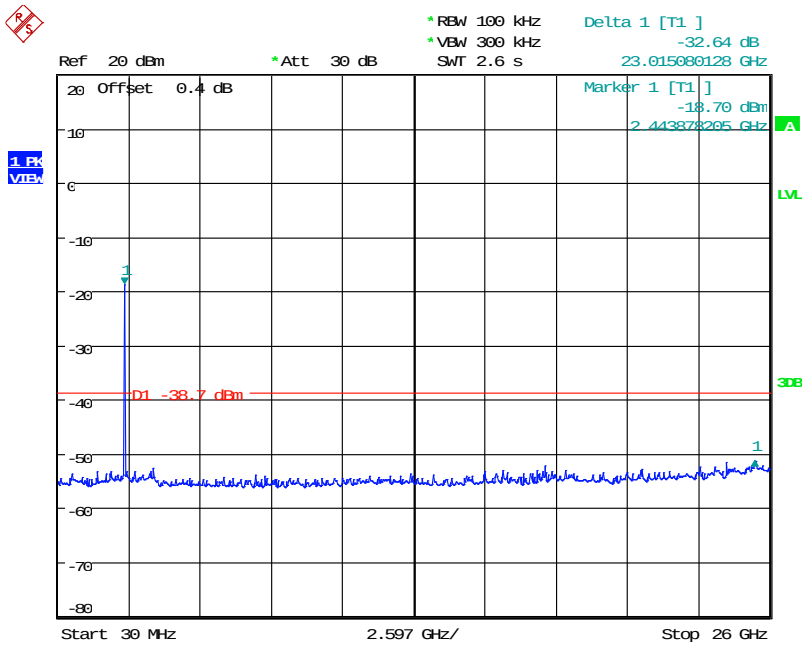
Date: 21.MAR.2018 02:49:55

Middle Channel



Date: 21.MAR.2018 02:55:53

High Channel



Date: 21.MAR.2018 03:04:22

8 FCC §15.247(a)(1) – 20 dB Emission Bandwidth

8.1 Applicable Standard

According to FCC §15.247(a) (1) the maximum 20 dB bandwidth of the hopping channel shall be presented.

8.2 Test Procedure

- (1) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- (2) Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- (3) Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
- (4) Repeat above procedures until all frequencies measured were complete.

8.3 Test Equipment List and Details

Descriptions	Manufacturers	Models	Serial Numbers	Calibration Date	Calibration Due Date
Spectrum Analyzer	Rohde & Schwarz	FSV40	101140	2017/11/15	2018/11/14
Cable	WOKEN	SFL402	S02-160323-07	2018/02/21	2019/02/20

***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).

8.4 Test Environmental Conditions

Temperature:	23.5 °C
Relative Humidity:	55.4 %
ATM Pressure:	1015 hPa

The testing was performed by Ian on 2018-03-21

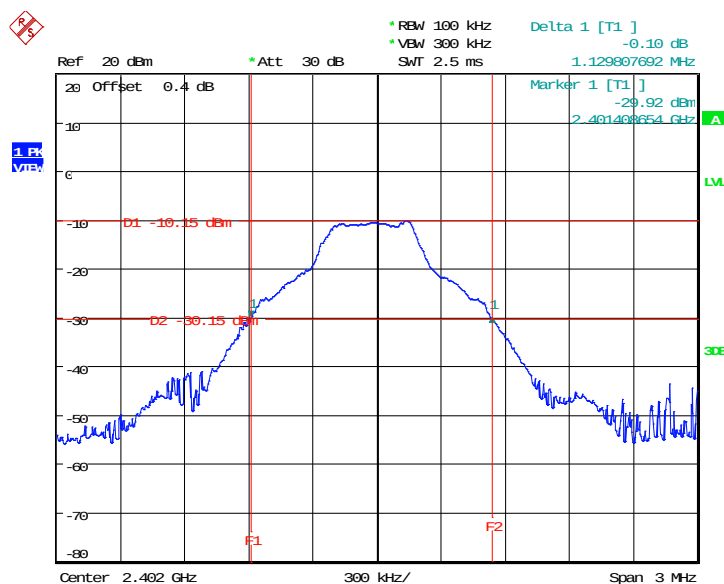
8.5 Test Results

Channel	Frequency (MHz)	20 dB OBW (MHz)
BR Mode (GFSK)		
Low	2402	1.1298
Middle	2441	1.1394
High	2480	1.1442
EDR Mode ($\pi/4$-DQPSK)		
Low	2402	1.4182
Middle	2441	1.4182
High	2480	1.4182
EDR Mode (8DPSK)		
Low	2402	1.4230
Middle	2441	1.4182
High	2480	1.4182

Please refer to the following plots

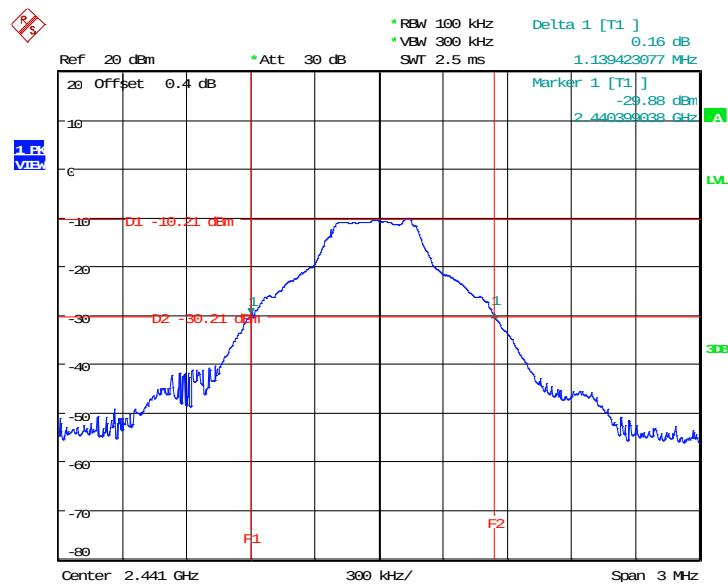
BR Mode (GFSK):

Low Channel



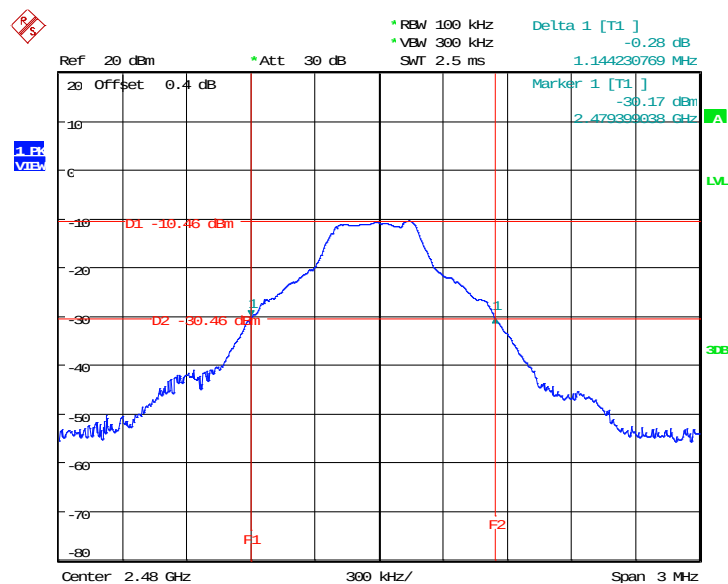
Date: 21.MAR.2018 01:00:01

Middle Channel



Date: 21.MAR.2018 01:12:16

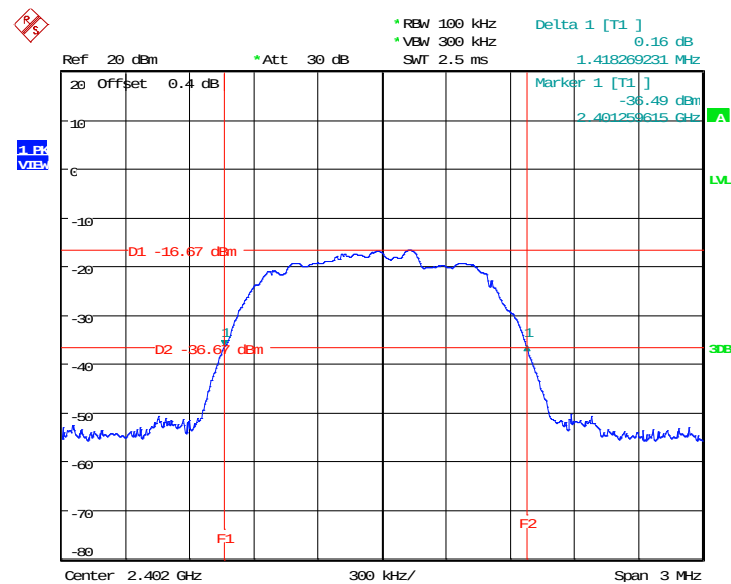
High Channel



Date: 21.MAR.2018 01:34:24

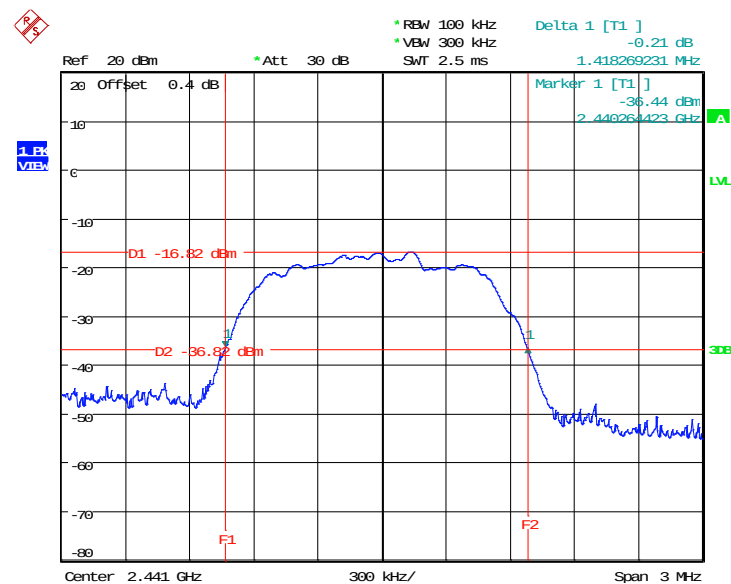
EDR Mode ($\pi/4$ -DQPSK):

Low Channel



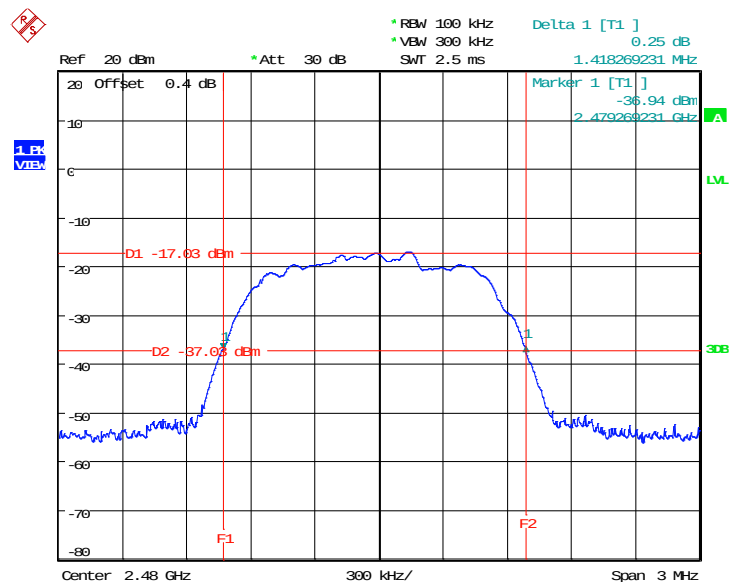
Date: 21.MAR.2018 02:05:02

Middle Channel



Date: 21.MAR.2018 02:12:18

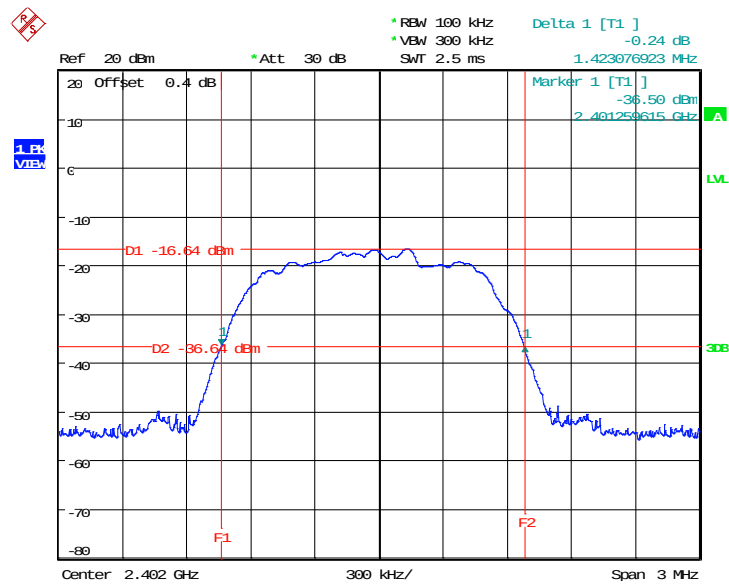
High Channel



Date: 21.MAR.2018 02:18:37

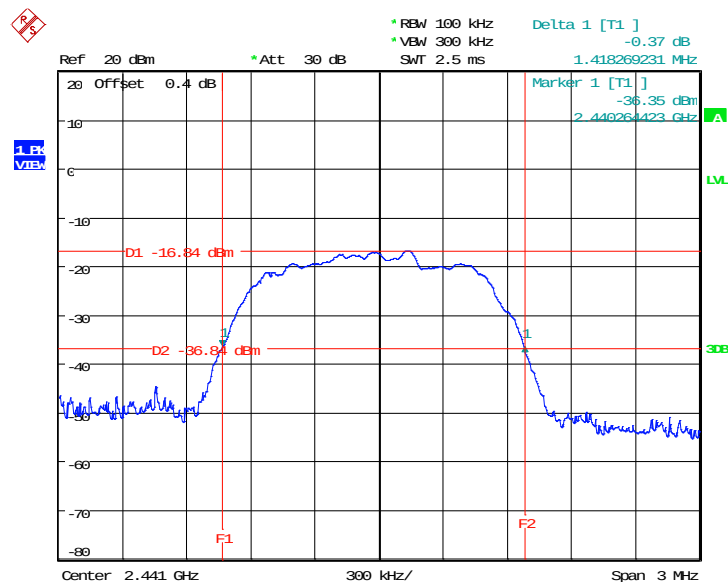
EDR Mode (8DPSK):

Low Channel



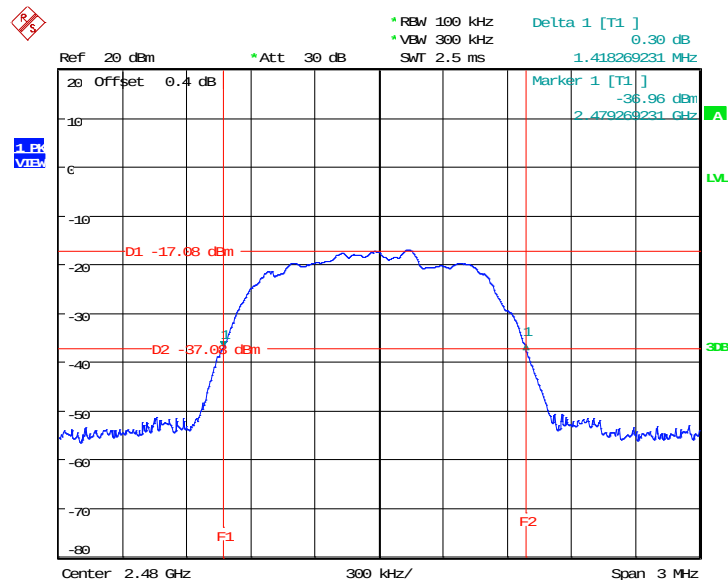
Date: 21.MAR.2018 02:45:20

Middle Channel



Date: 21.MAR.2018 02:53:54

High Channel



Date: 21.MAR.2018 03:00:13

9 FCC §15.247(a)(1) – Channel Separation Test

9.1 Applicable Standard

According to FCC §15.247(a) (1): Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. 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. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. 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.

9.2 Test Procedure

Span = wide enough to capture the peaks of two adjacent channels

Resolution (or IF) Bandwidth (RBW) $\approx$ 30% of the channel spacing, adjust as necessary to best identify the center of each individual channel

Video (or Average) Bandwidth (VBW) $\geq$ RBW

Sweep = auto

Detector function = peak Trace = max hold

9.3 Test Equipment List and Details

Descriptions	Manufacturers	Models	Serial Numbers	Calibration Date	Calibration Due Date
Spectrum Analyzer	Rohde & Schwarz	FSU26	101140	2017/11/15	2018/11/14
Cable	WOKEN	SFL402	S02-160323-07	2018/02/21	2019/02/20

***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).

9.4 Test Environmental Conditions

Temperature:	23.5 °C
Relative Humidity:	55.4 %
ATM Pressure:	1015 hPa

The testing was performed by Ian on 2018-03-21

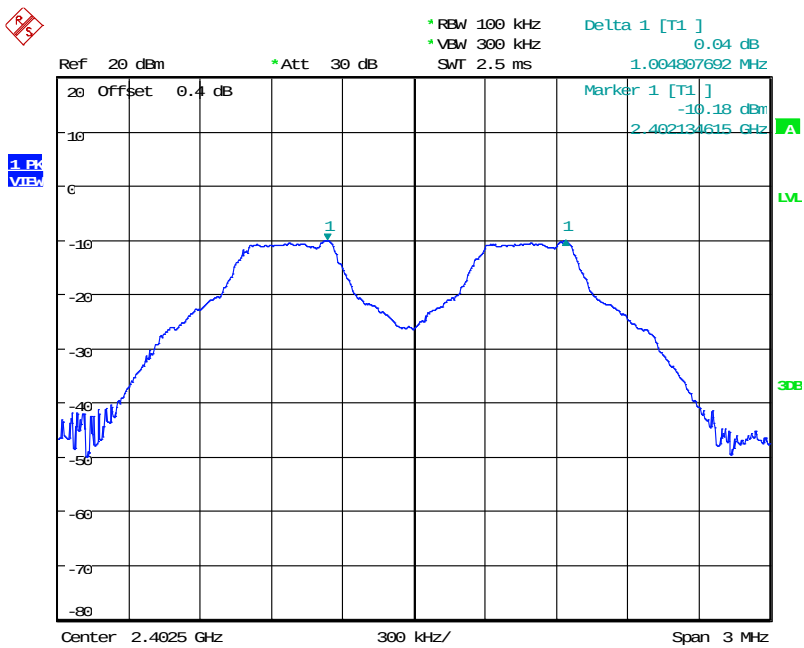
9.5 Test Results

Channel	Channel Separation (MHz)	20 dBc BW (MHz)	Two-thirds of the 20 dB bandwidth (MHz)	Limit (dBm)	Result
BR mode (GFSK)					
Low	1.0048	1.1298	0.753	>two-thirds of the 20 dB bandwidth	Compliance
Middle	1.0048	1.1394	0.760	>two-thirds of the 20 dB bandwidth	Compliance
High	1.0048	1.1442	0.763	>two-thirds of the 20 dB bandwidth	Compliance
EDR mode (π4-DQPSK)					
Low	1.0048	1.4182	0.945	>two-thirds of the 20 dB bandwidth	Compliance
Middle	1.0048	1.4182	0.945	>two-thirds of the 20 dB bandwidth	Compliance
High	1.0048	1.4182	0.945	>two-thirds of the 20 dB bandwidth	Compliance
EDR mode (8DPSK)					
Low	1.0048	1.4230	0.949	>two-thirds of the 20 dB bandwidth	Compliance
Middle	1.0048	1.4182	0.945	>two-thirds of the 20 dB bandwidth	Compliance
High	1.0048	1.4182	0.945	>two-thirds of the 20 dB bandwidth	Compliance

Please refer to the following plots

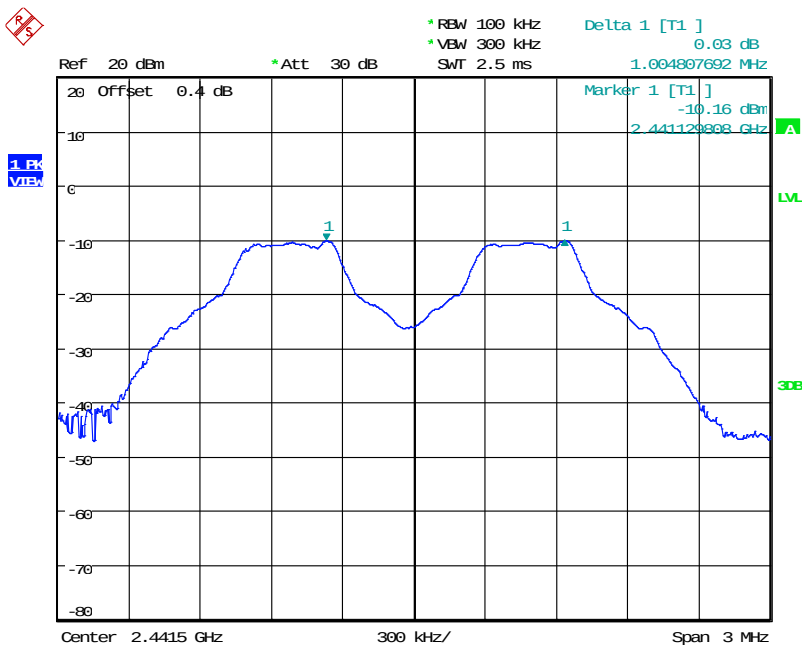
BR mode (GFSK):

Low Channel



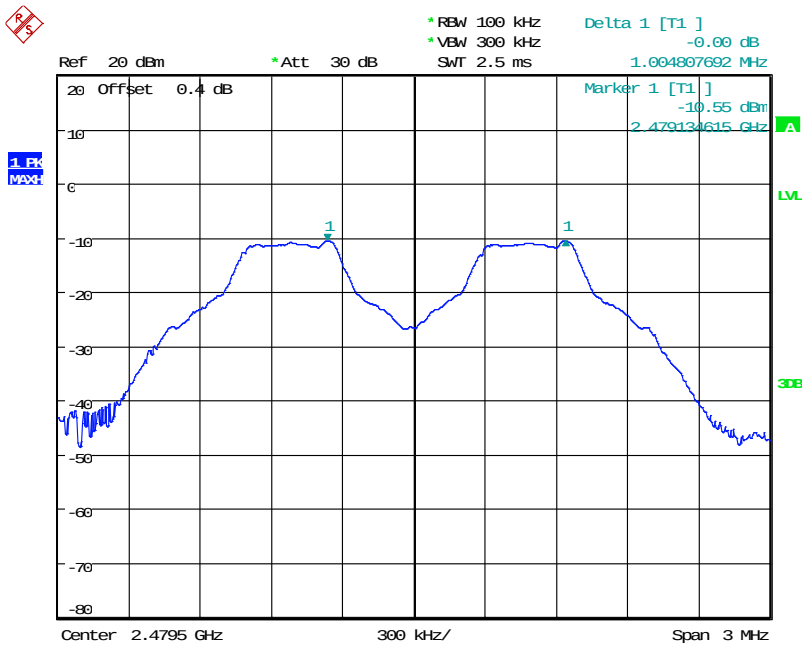
Date: 21.MAR.2018 01:10:12

Middle Channel



Date: 21.MAR.2018 01:27:02

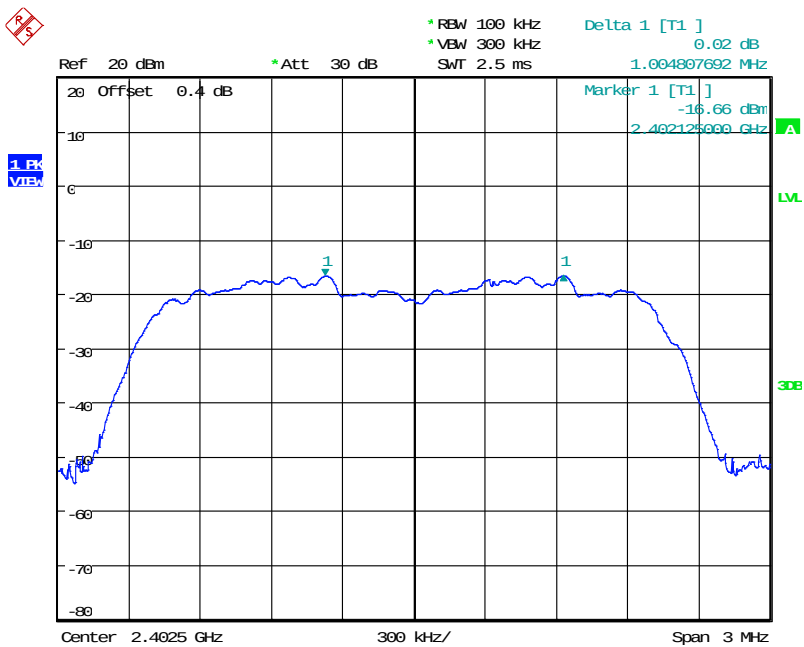
High Channel



Date: 21.MAR.2018 01:42:34

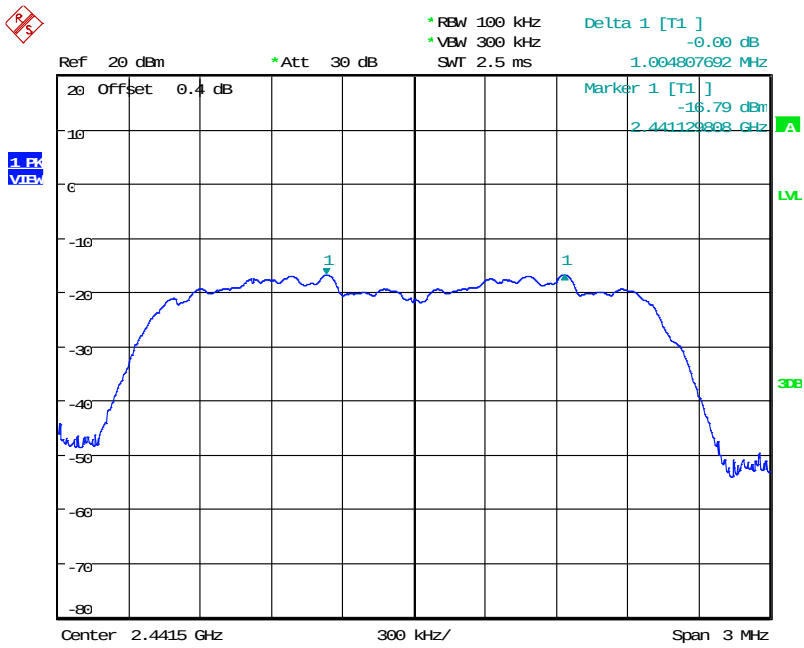
EDR mode (π 4-DQPSK):

Low Channel



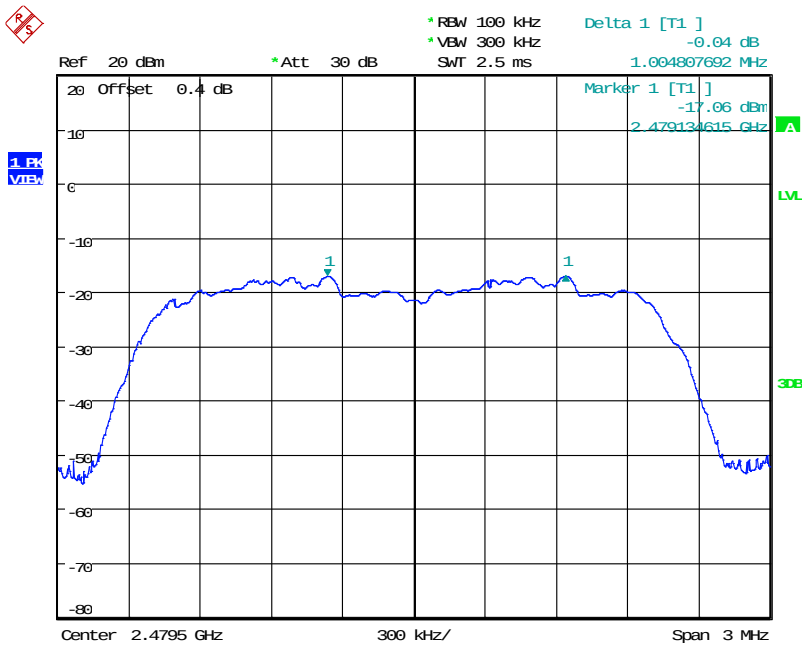
Date: 21.MAR.2018 02:10:09

Middle Channel



Date: 21.MAR.2018 02:16:39

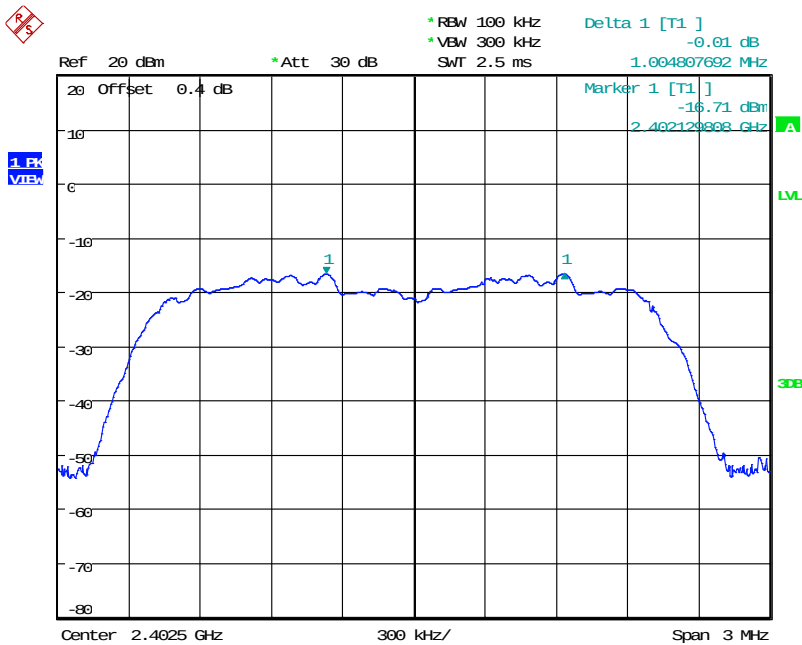
High Channel



Date: 21.MAR.2018 02:24:37

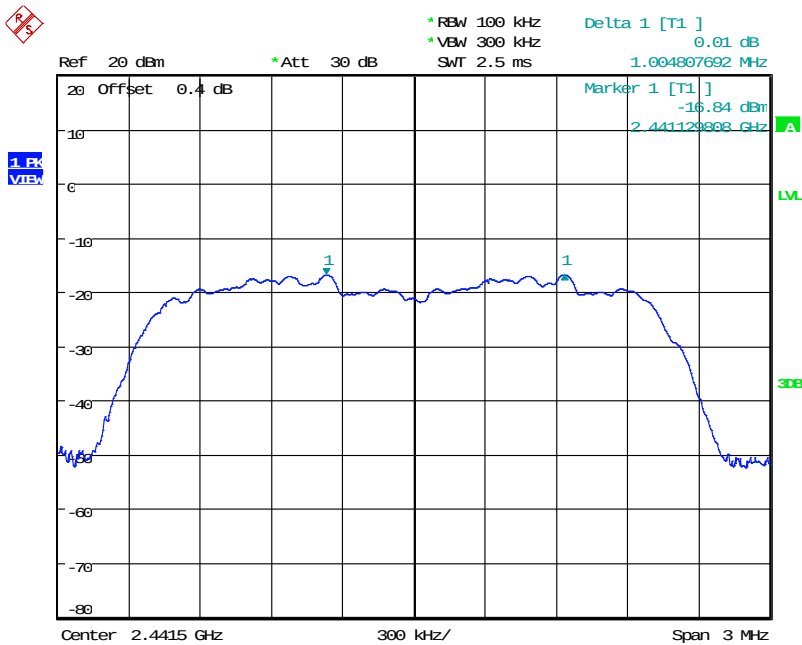
EDR mode (8-DPSK):

Low Channel



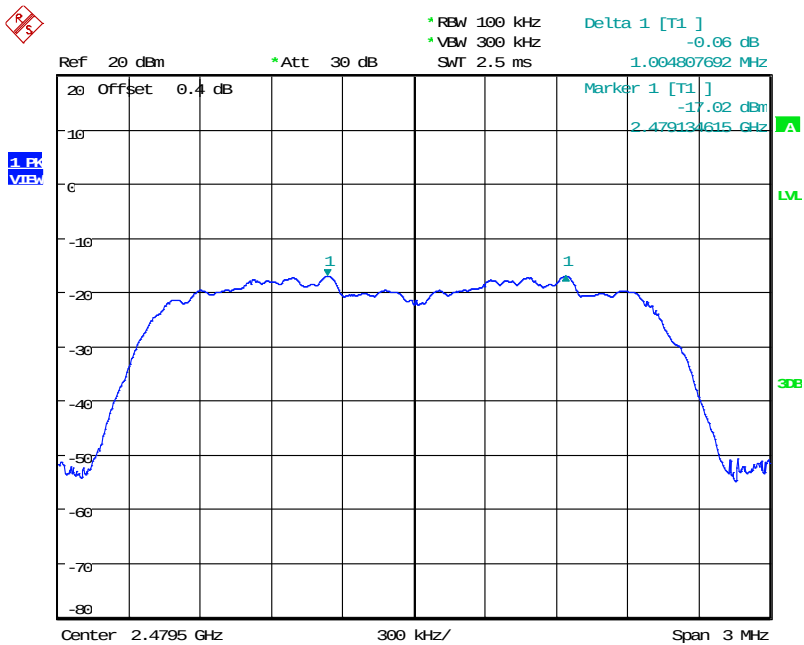
Date: 21.MAR.2018 02:51:41

Middle Channel



Date: 21.MAR.2018 02:58:36

High Channel



Date: 21.MAR.2018 03:07:08

10 FCC §15.247(a)(1)(iii) – Time of Occupancy (Dwell Time)

10.1 Applicable Standard

According to FCC §15.247(a) (1)(iii).

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. 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. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

10.2 Test Procedure

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings: Span = zero span, centered on a hopping channel

RBW ≤ channel spacing and where possible RBW should be set $\gg 1/T$, where T is the expected dwell time per channel

Sweep = as necessary to capture the entire dwell time per hopping channel Detector function = peak

Trace = max hold

Use the marker-delta function to determine the transmit time per hop. If this value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in transmit time.

Repeat the measurement using a longer sweep time to determine the number of hops over the period specified in the requirements. The sweep time shall be equal to, or less than, the period specified in the requirements.

Determine the number of hops over the sweep time and calculate the total number of hops in the period specified in the requirements, using the following equation:

(Number of hops in the period specified in the requirements) = (number of hops on spectrum analyzer) x (period specified in the requirements / analyzer sweep time)

The average time of occupancy is calculated from the transmit time per hop multiplied by the number of hops in the period specified. If the number of hops in a specific time varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation.

10.3 Test Equipment List and Details

Descriptions	Manufacturers	Models	Serial Numbers	Calibration Date	Calibration Due Date
Spectrum Analyzer	Rohde & Schwarz	FSU26	101140	2017/11/15	2018/11/14
Cable	WOKEN	SFL402	S02-160323-07	2018/02/21	2019/02/20

***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).

10.4 Test Environmental Conditions

Temperature:	23.5 °C
Relative Humidity:	55.4 %
ATM Pressure:	1015 hPa

The testing was performed by Ian on 2018-03-21.

10.5 Test Results

Mode	Pulse Time (ms)	Hopping Number	Period Time (s)	Total of Dwell (ms)	Limit (ms)	Result
BR mode (GFSK) : 2402-2480 MHz						
DH1	0.44	330	31.6	145.2	<400	Compliance
DH3	1.73	150	31.6	259.5	<400	Compliance
DH5	2.93	110	31.6	322.3	<400	Compliance
EDR mode (π4-DQPSK) : 2402-2480 MHz						
2DH1	0.46	310	31.6	142.6	<400	Compliance
2DH3	1.72	160	31.6	275.2	<400	Compliance
2DH5	2.96	90	31.6	266.4	<400	Compliance
EDR mode (8DPSK) : 2402-2480 MHz						
3DH1	0.46	320	31.6	147.2	<400	Compliance
3DH3	1.71	170	31.6	290.7	<400	Compliance
3DH5	2.96	110	31.6	325.6	<400	Compliance

*A period time = $0.4 * 79 = 31.6$ (s), Total of Dwell= Pulse Time * Hopping Number

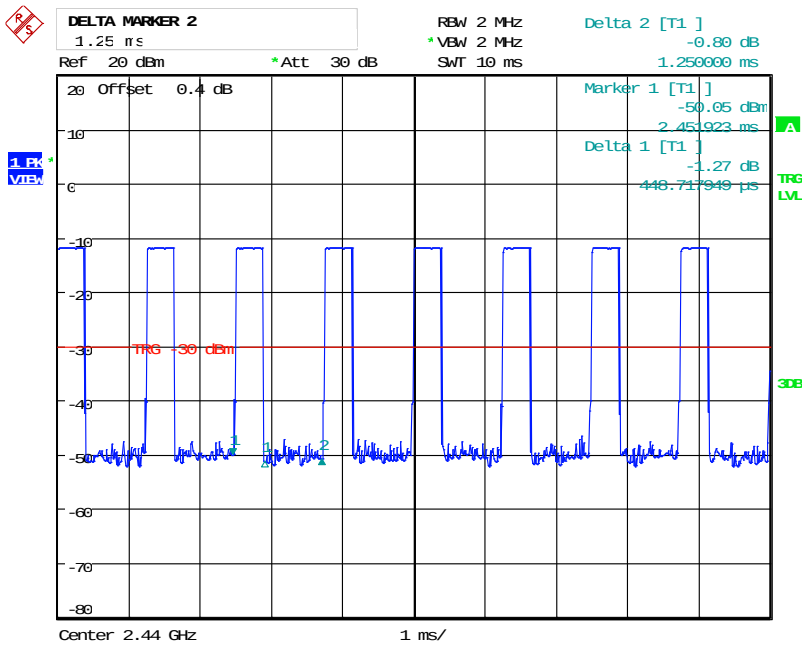
*Hopping Number = Hopping Number/10 * 10

* Hopping Number/10 = Total of highest signals. (Second High signals were other channel)

Please refer to the following plots

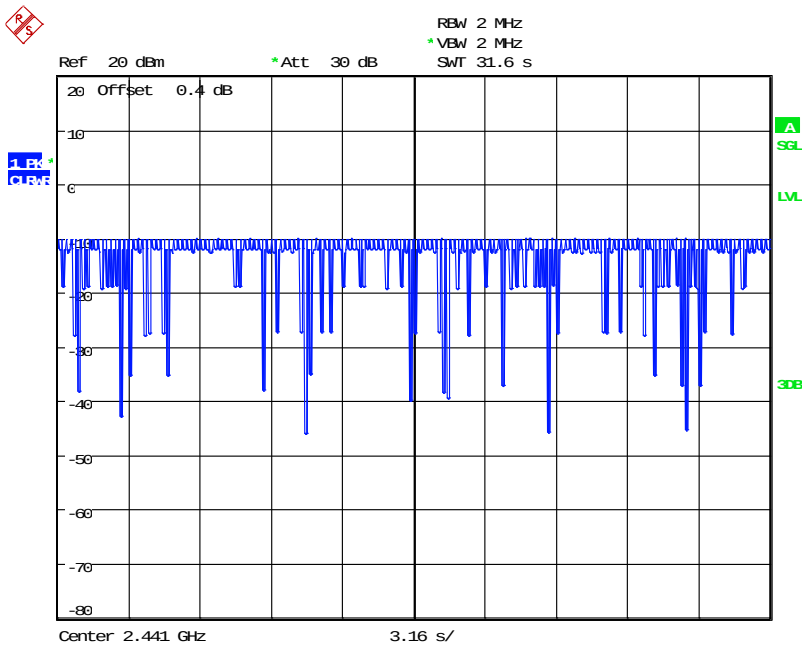
BR mode (GFSK):

DH1: Pulse Width



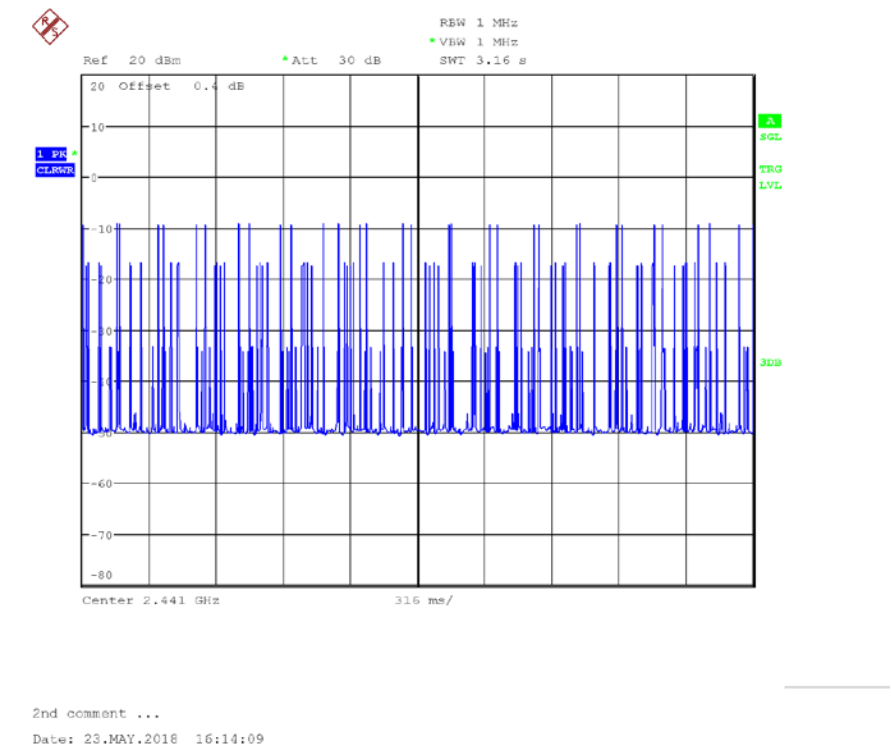
Date: 21.MAR.2018 00:54:48

DH1: Hopping Number

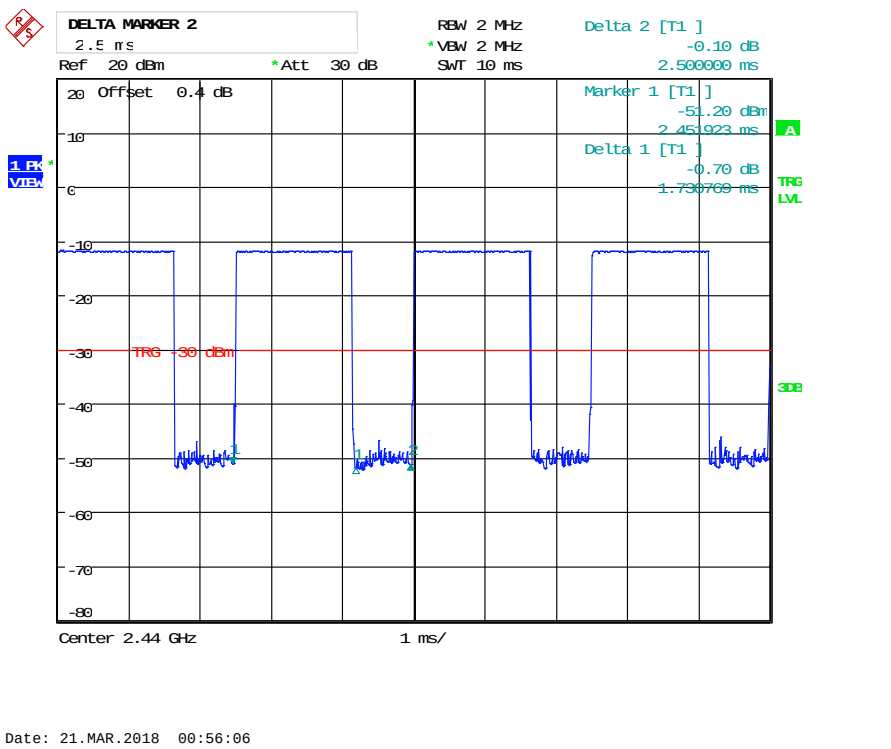


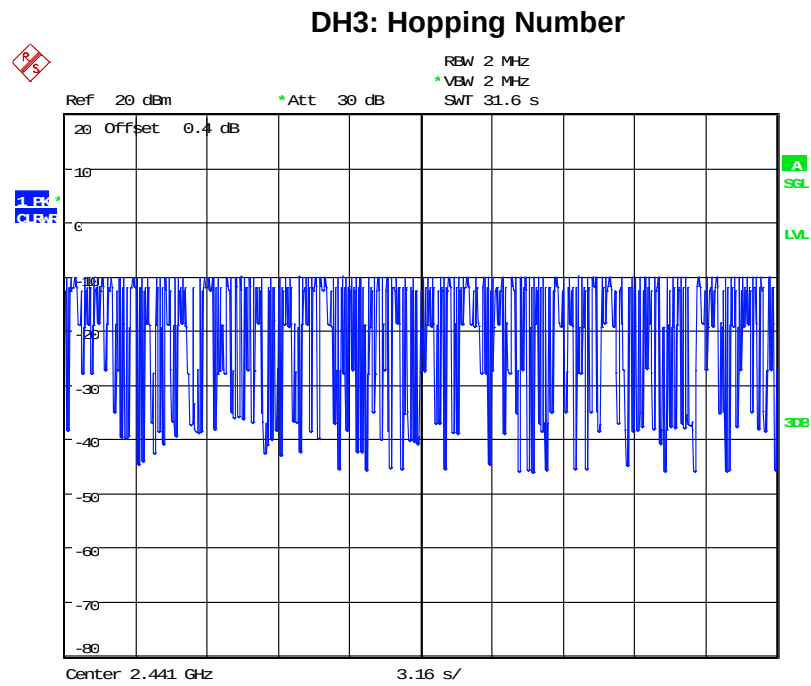
Date: 21.MAR.2018 01:53:41

DH1: Hopping Number/10
(Hopping Number = 33 in 1/10 period of highest signals, Second High signals were other channel)



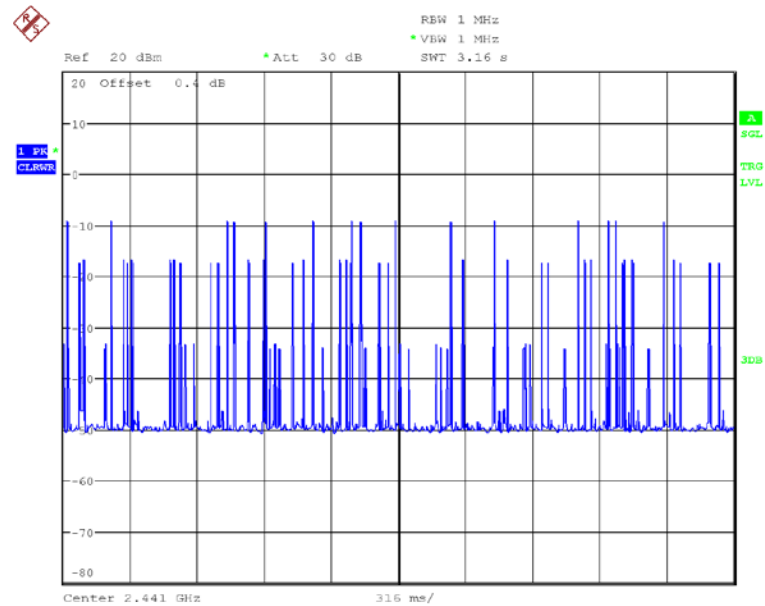
DH3: Pulse Width





Date: 21.MAR.2018 01:55:32

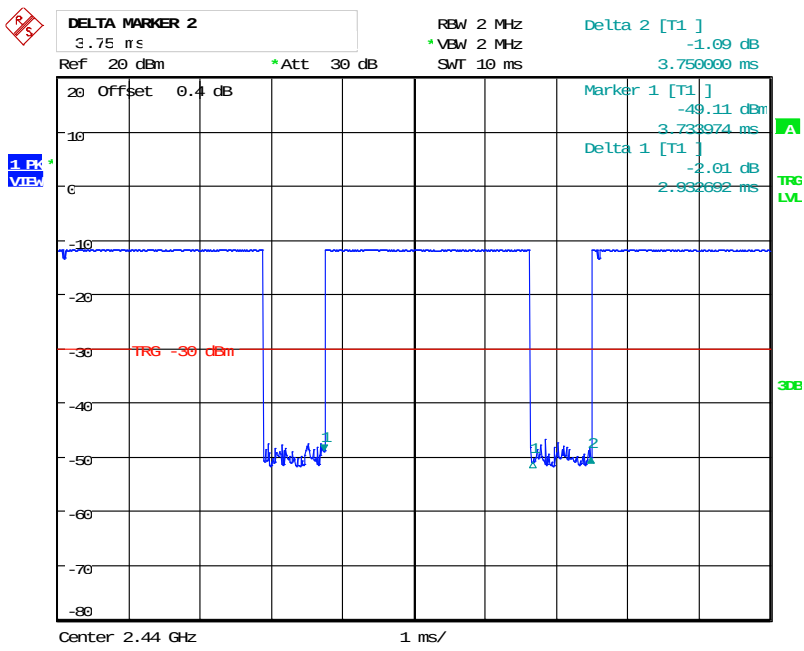
DH3: Hopping Number/10
(Hopping Number = 15 in 1/10 period of highest signals, Second High signals were other channel)



2nd comment ...

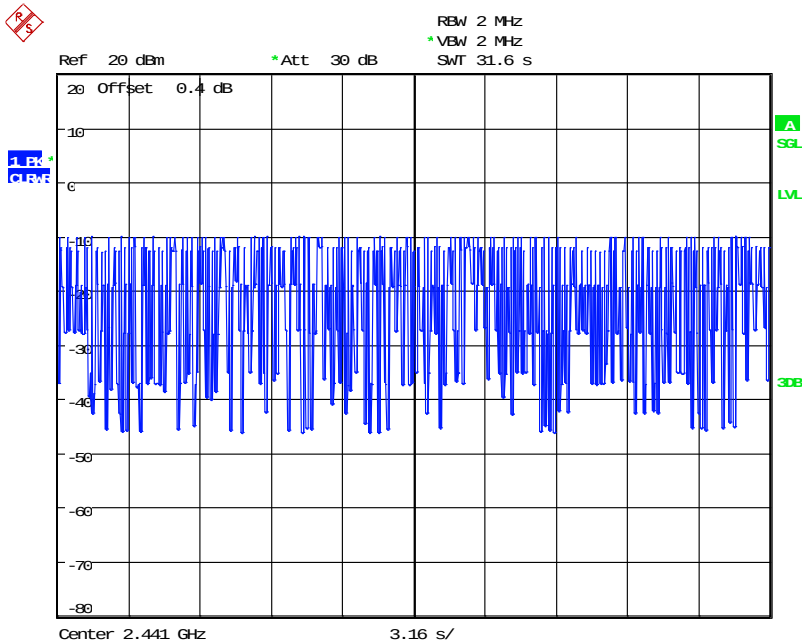
Date: 23.MAY.2018 16:06:41

DH5: Pulse Width



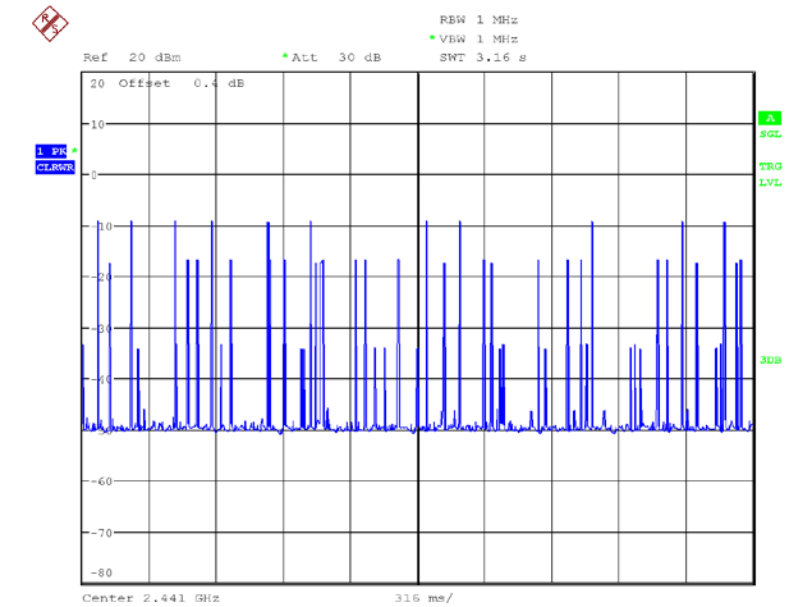
Date: 21.MAR.2018 00:56:48

DH5: Hopping Number



Date: 21.MAR.2018 01:56:46

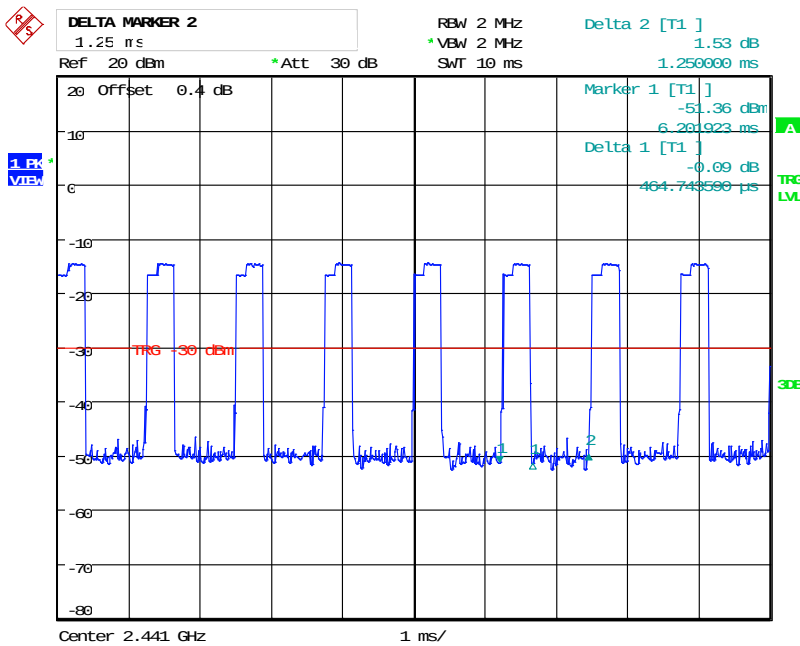
DH5: Hopping Number/10
(Hopping Number = 11 in 1/10 period of highest signals, Second High signals were other channel)



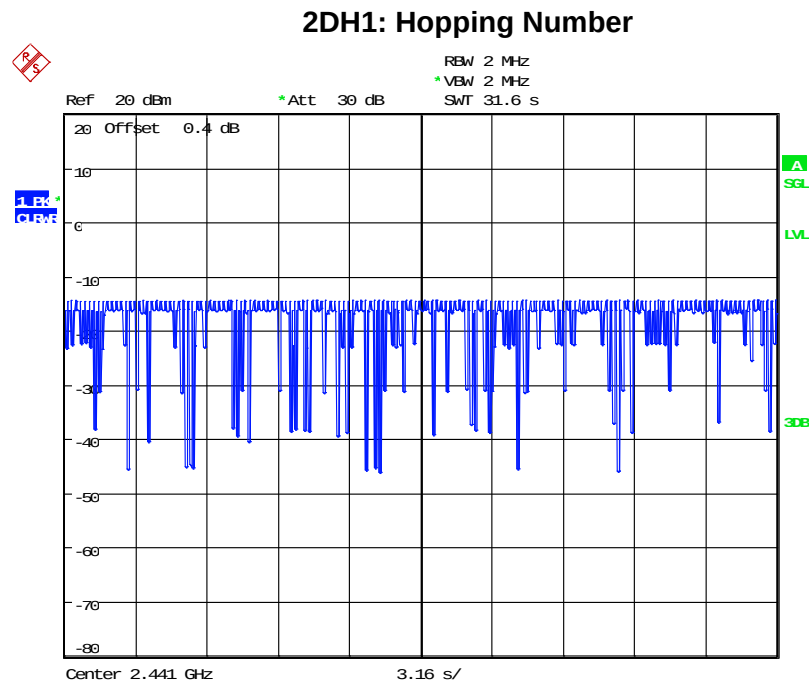
2nd comment ...
Date: 23.MAY.2018 16:06:12

EDR mode (π 4-DQPSK):

2DH1: Pulse Width

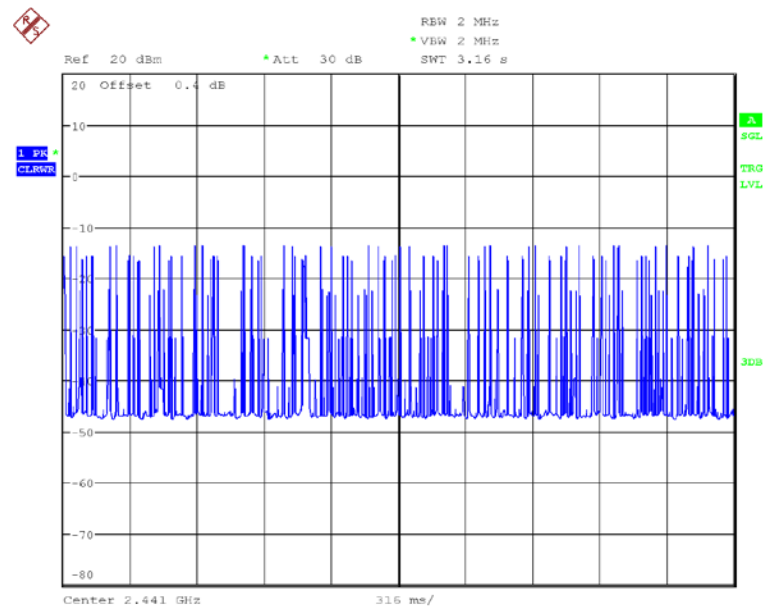


Date: 21.MAR.2018 02:00:48



Date: 21.MAR.2018 02:26:26

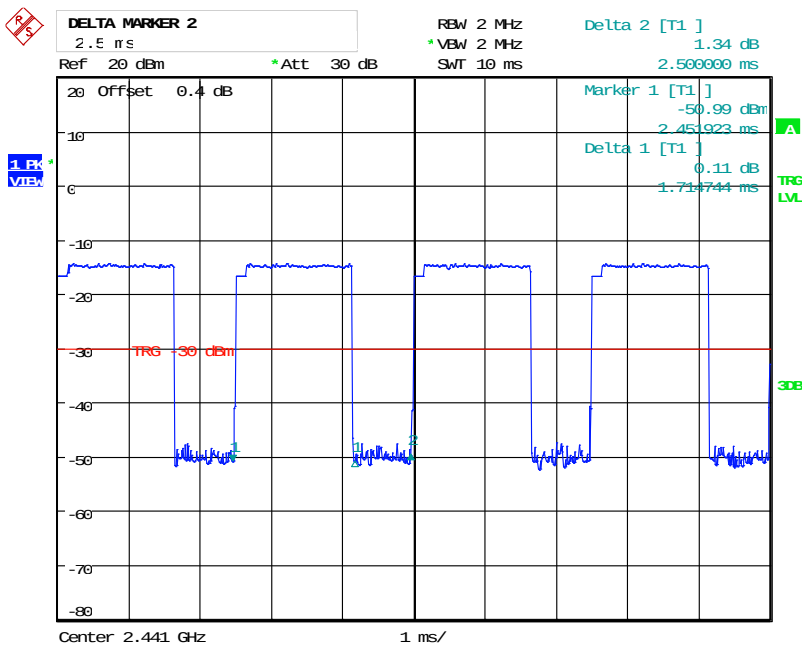
2DH1: Hopping Number/10
(Hopping Number = 31 in 1/10 period of highest signals, Second High signals were other channel)



2nd comment ...

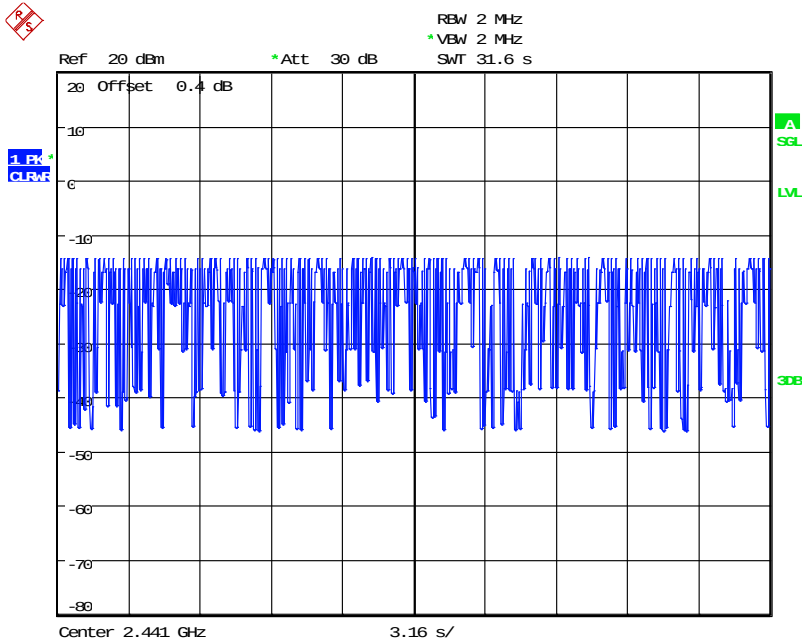
Date: 23.MAY.2018 16:04:41

2DH3: Pulse Width



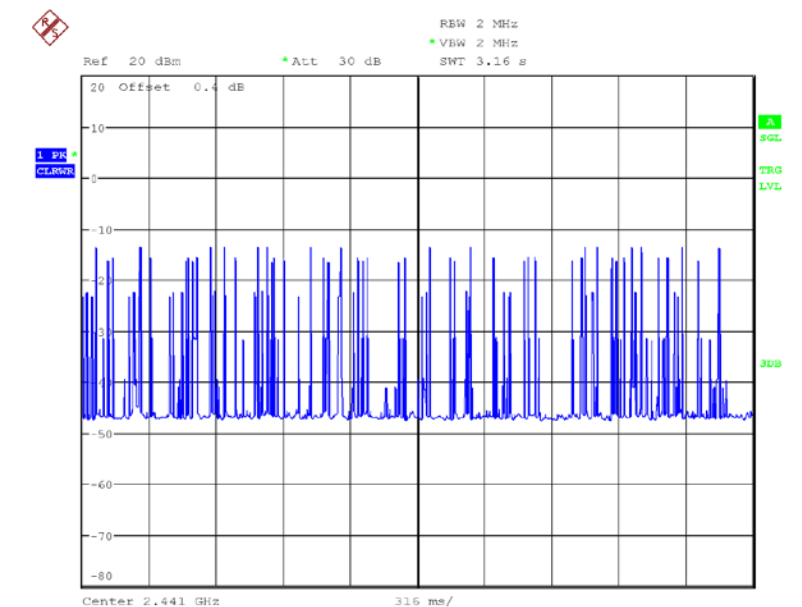
Date: 21.MAR.2018 02:01:41

2DH3: Hopping Number



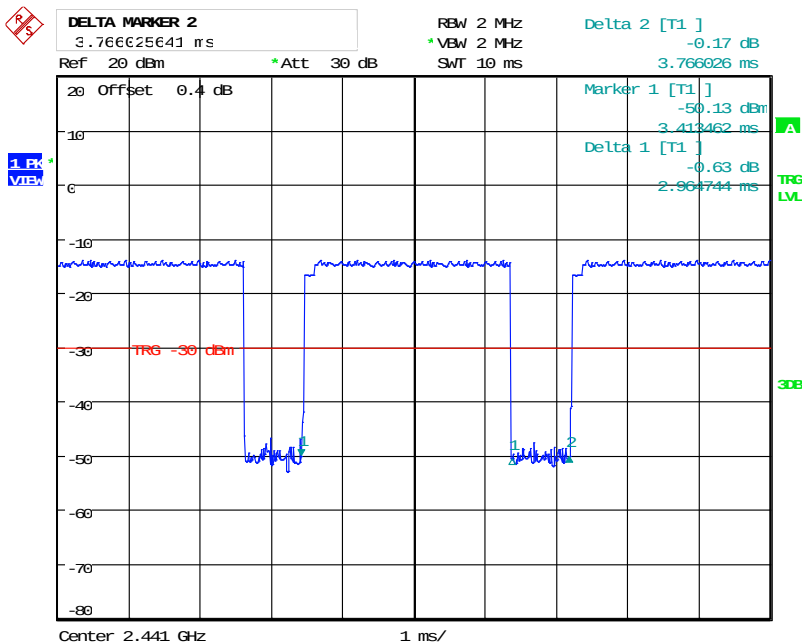
Date: 21.MAR.2018 02:27:44

2DH3: Hopping Number/10
(Hopping Number = 16 in 1/10 period of highest signals, Second High signals were other channel)

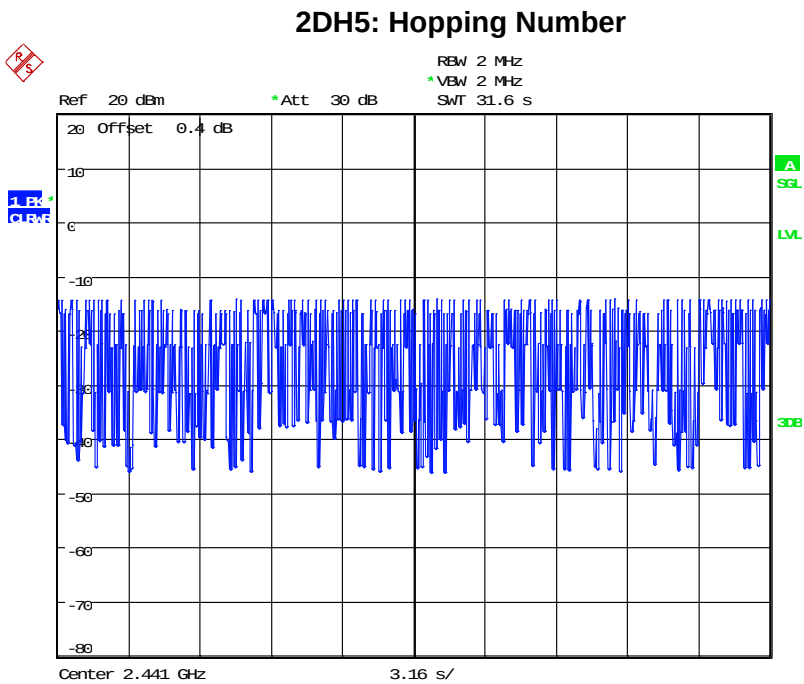


2nd comment ...
Date: 23.MAY.2018 16:01:52

2DH5: Pulse Width

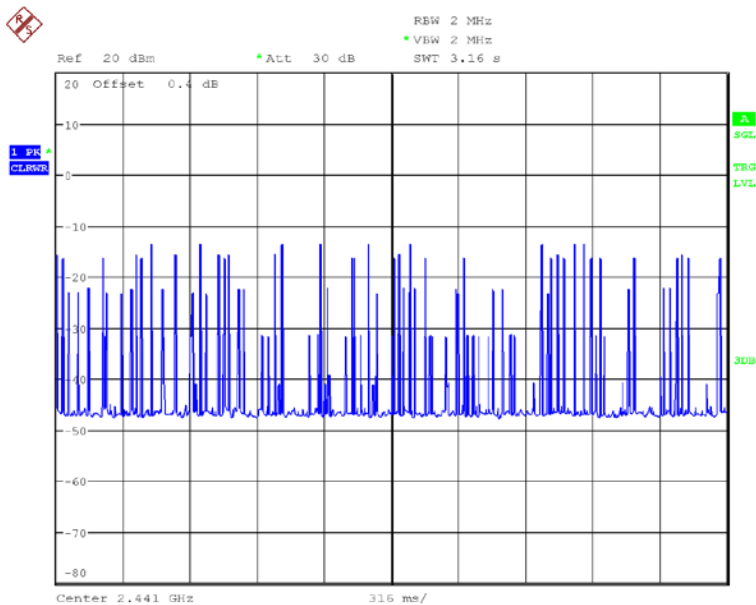


Date: 21.MAR.2018 02:02:52



Date: 21.MAR.2018 02:29:30

2DH5: Hopping Number/10
(Hopping Number = 9 in 1/10 period of highest signals, Second High signals were other channel)

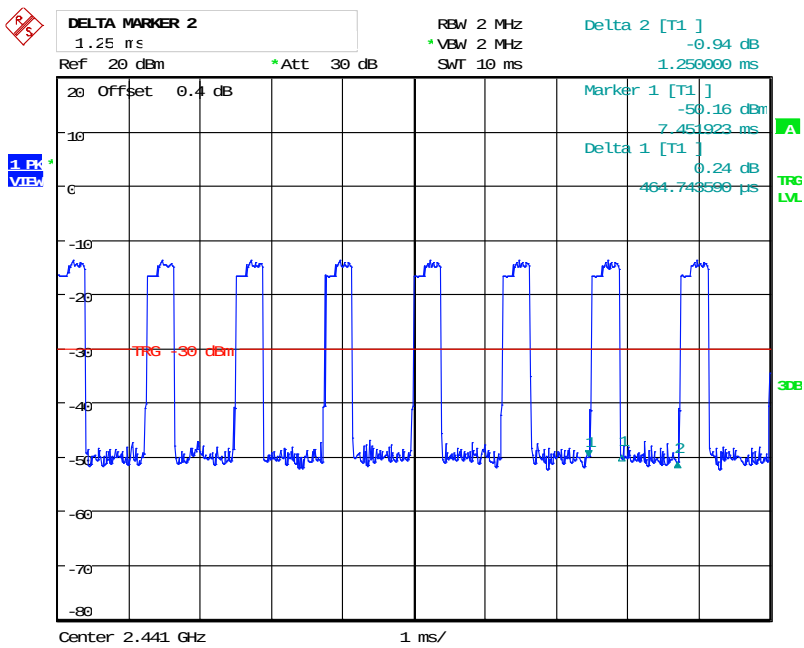


2nd comment ...

Date: 23.MAY.2018 16:00:58

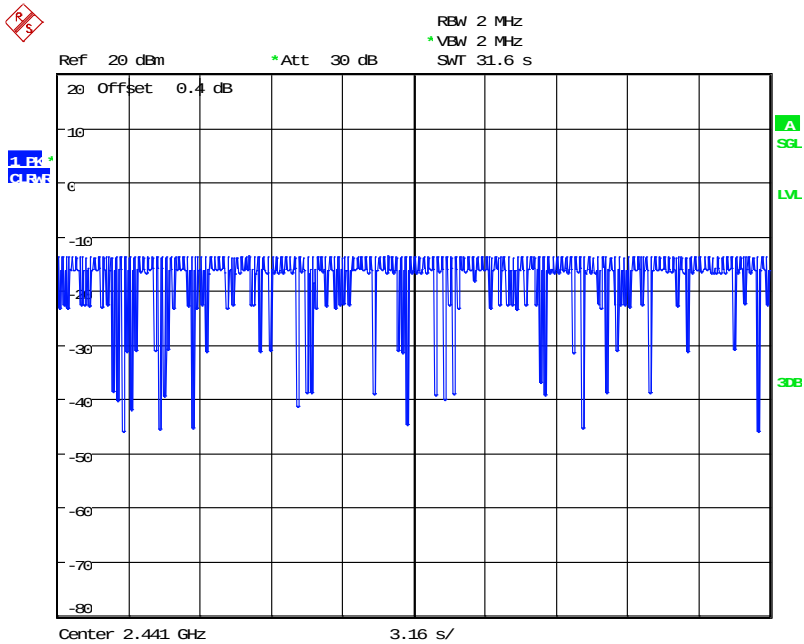
EDR mode (8-DPSK):

3DH1: Pulse Width



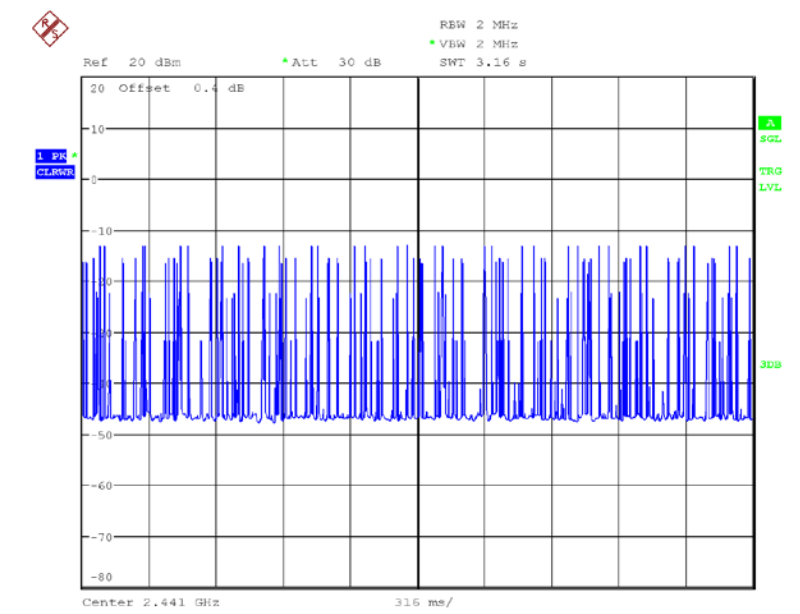
Date: 21.MAR.2018 02:41:15

3DH1: Hopping Number



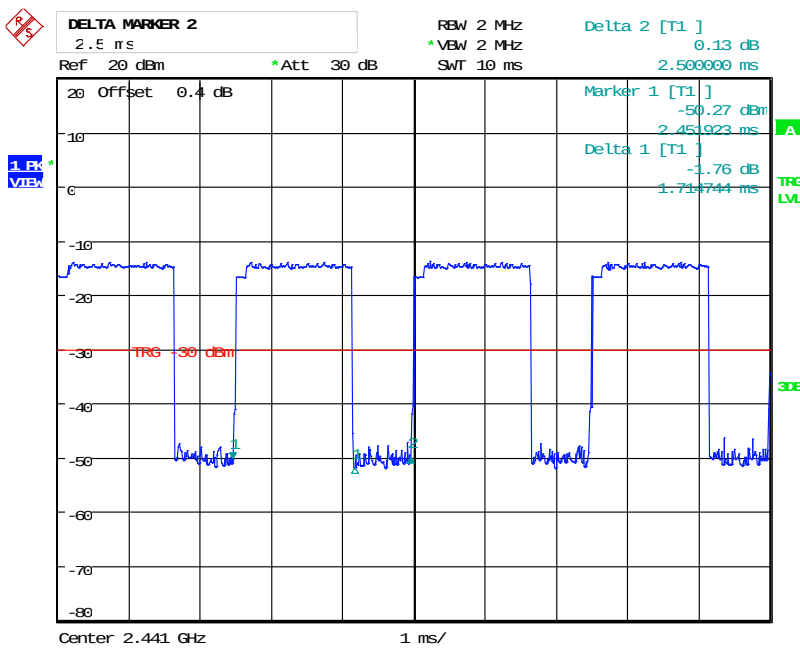
Date: 21.MAR.2018 03:17:00

3DH1: Hopping Number/10
(Hopping Number = 32 in 1/10 period of highest signals, Second High signals were other channel)



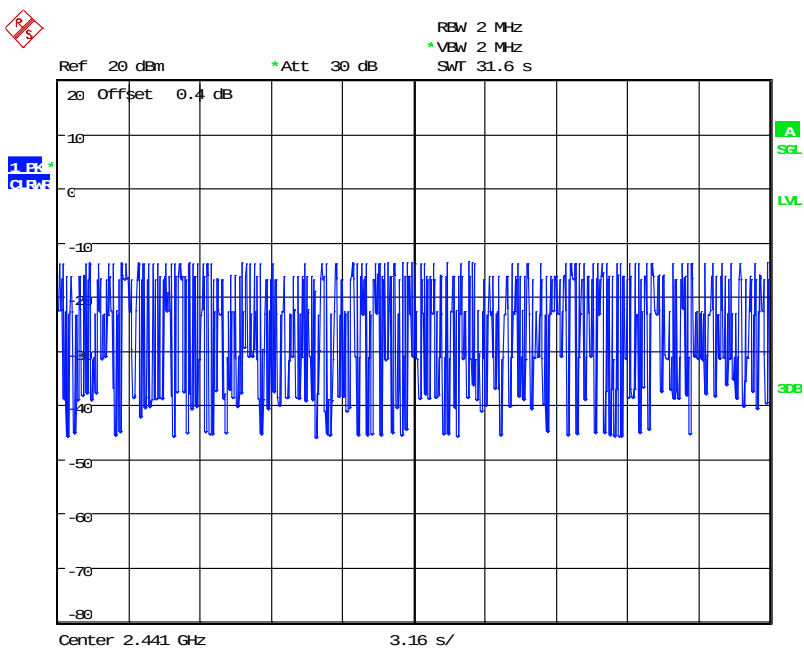
2nd comment ...
Date: 23.MAY.2018 15:59:45

3DH3: Pulse Width



Date: 21.MAR.2018 02:42:06

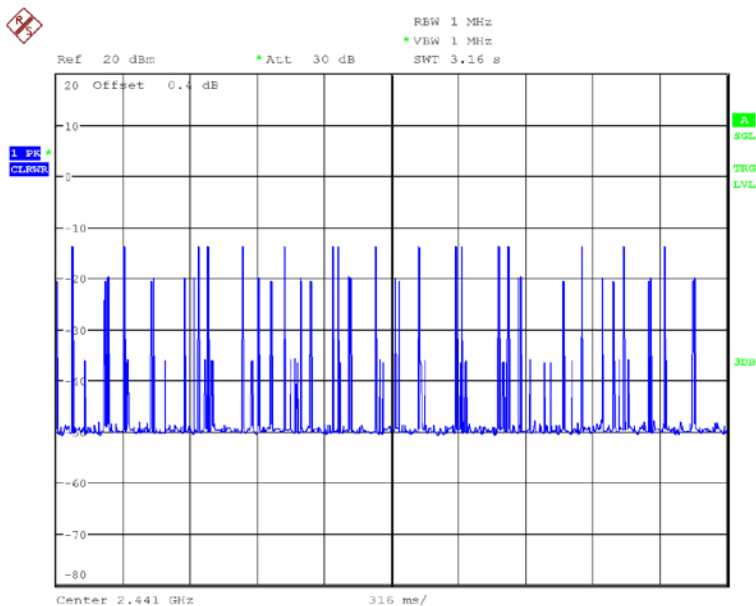
3DH3: Hopping Number



Date: 21.MAR.2018 03:19:26

3DH3: Hopping Number/10

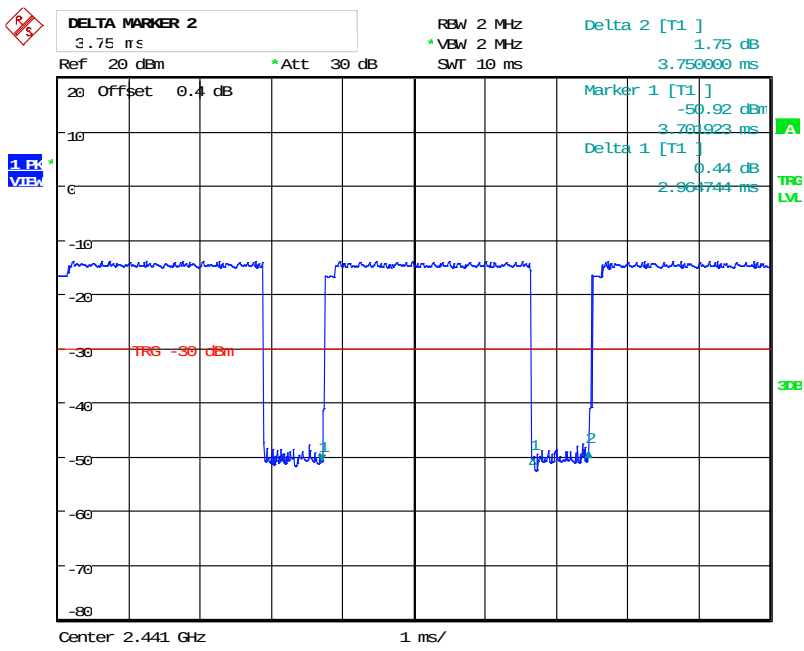
(Hopping Number = 17 in 1/10 period of highest signals, Second High signals were other channel)



2nd comment ...

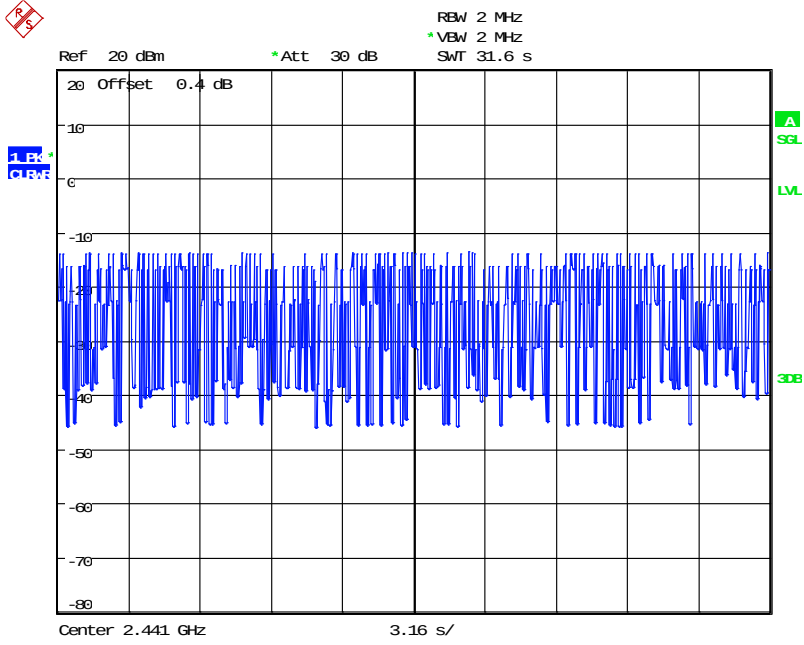
Date: 23.MAY.2018 16:36:13

3DH5: Pulse Width



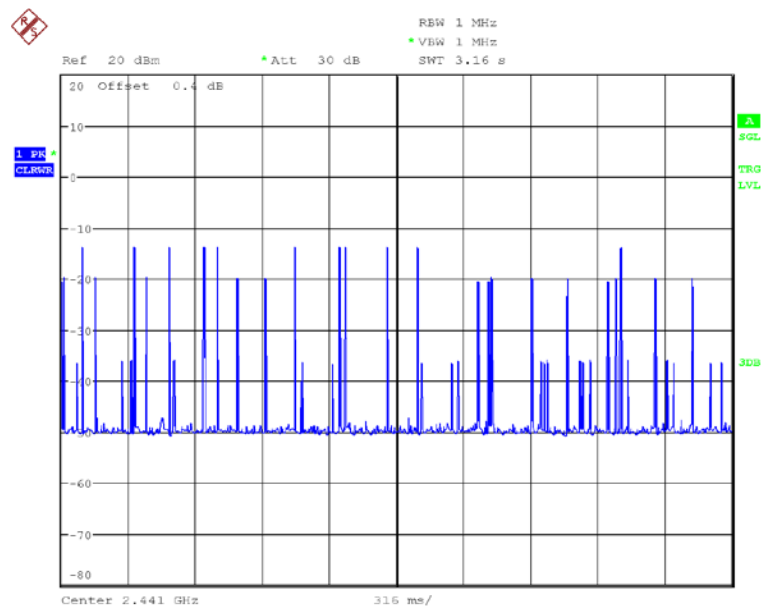
Date: 21.MAR.2018 02:42:58

3DH5: Hopping Number



Date: 21.MAR.2018 03:19:26

3DH5: Hopping Number/10
(Hopping Number = 11 in 1/10 period of highest signals, Second High signals were other channel)



2nd comment ...
Date: 23.MAY.2018 16:39:39

11 FCC §15.247(a)(1)(iii) –Quantity of hopping channel Test

11.1 Applicable Standard

According to FCC §15.247(a) (1) (iii).

Frequency hopping systems in the 2400-2483.5

MHz band shall use at least 15 channels. 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.

Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

11.2 Test Procedure

Span = the frequency band of operation

RBW < 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller VBW ≥ RBW

Sweep = auto

Detector function = peak Trace = max hold

11.3 Test Equipment List and Details

Descriptions	Manufacturers	Models	Serial Numbers	Calibration Date	Calibration Due Date
Spectrum Analyzer	Rohde & Schwarz	FSU26	101140	2017/11/15	2018/11/14
Cable	WOKEN	SFL402	S02-160323-07	2018/02/21	2019/02/20

**Statement of Traceability: The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).*

11.4 Test Environmental Conditions

Temperature:	23.5 °C
Relative Humidity:	55.4 %
ATM Pressure:	1015 hPa

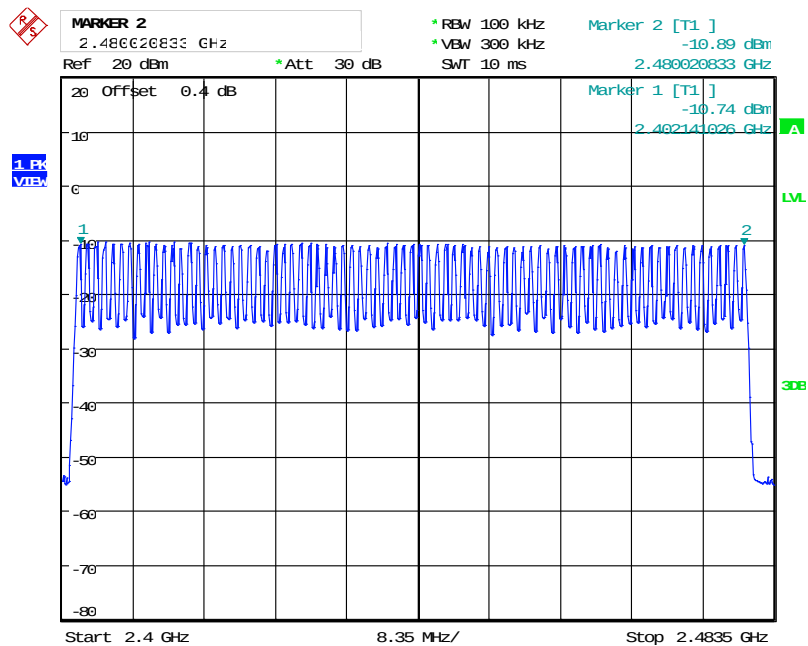
The testing was performed by Ian from 2018-03-21.

11.5 Test Results

Mode	Frequency Range (MHz)	Number of Hopping Channel	Limit (CH)	Result
GFSK	2402-2480	79	>15	Compliance
$\pi/4$ -DQPSK	2402-2480	79	>15	Compliance
8DPSK	2402-2480	79	>15	Compliance

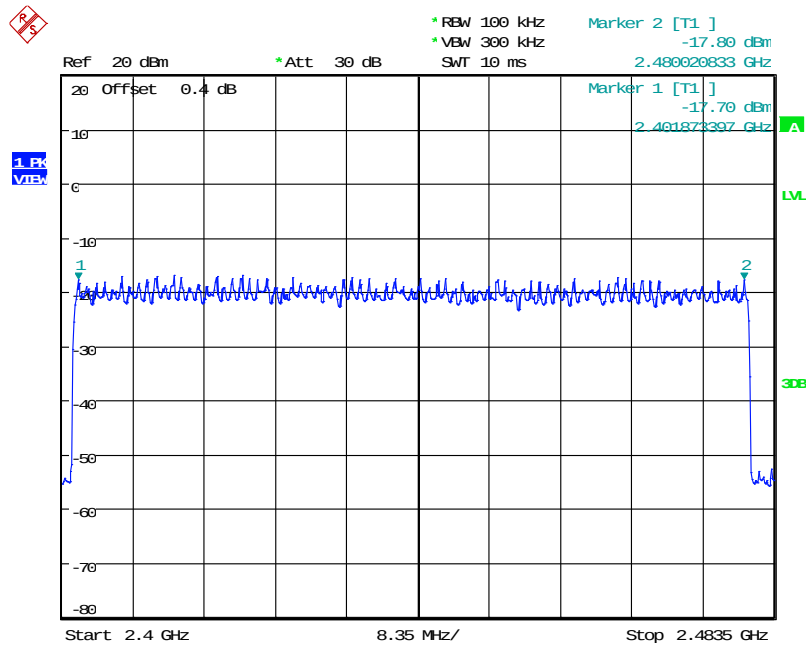
Please refer to the following plots

BR mode (GFSK):



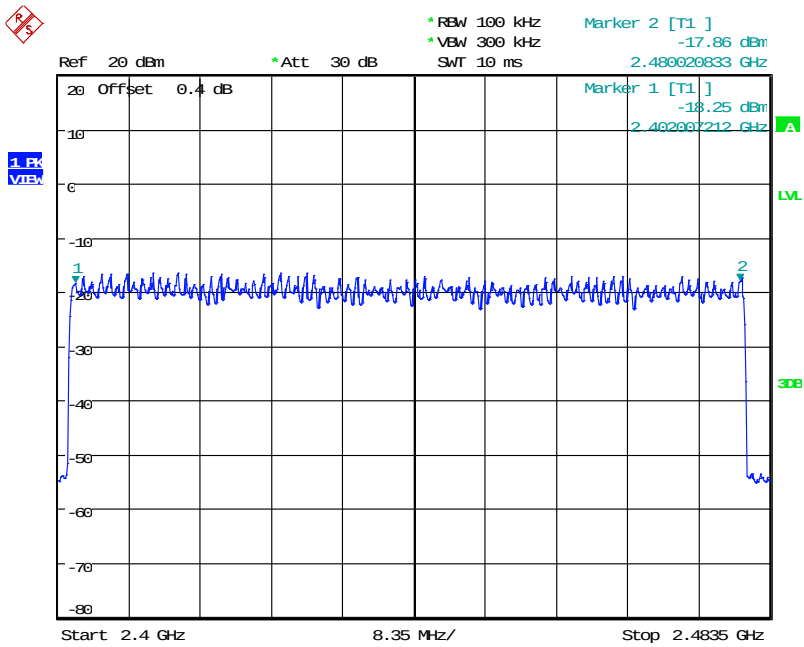
Date: 21.MAR.2018 01:46:51

EDR mode ($\pi/4$ -DQPSK):



Date: 21.MAR.2018 02:33:12

EDR mode (8DPSK):



Date: 21.MAR.2018 03:10:11

12 FCC §15.247(b)(1) – Maximum Output Power

12.1 Applicable Standard

According to FCC §15.247(b) (1): For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

12.2 Test Procedure

Place the EUT on a bench and set it in transmitting mode.

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to an Power sensor.

12.3 Test Equipment List and Details

Descriptions	Manufacturers	Models	Serial Numbers	Calibration Date	Calibration Due Date
Power Sensor	KEYSIGHT	U2021XA	MY54080018	2018/03/07	2019/03/06
Cable	WOKEN	SFL402	S02-160323-07	2018/02/21	2019/02/20

***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).

12.4 Test Environmental Conditions

Temperature:	23.5 °C
Relative Humidity:	55.4 %
ATM Pressure:	1015 hPa

The testing was performed by Ian from 2018-03-21.

12.5 Test Results

Channel	Frequency (MHz)	Maximum peak Conducted Output Power (dBm)	Limit (dBm)	Result
BR mode (GFSK)				
Low	2402	-9.02	21	Compliance
Middle	2441	-9.26	21	Compliance
High	2480	-9.20	21	Compliance
EDR mode ($\pi/4$ -DQPSK)				
Low	2402	-12.76	21	Compliance
Middle	2441	-12.85	21	Compliance
High	2480	-12.91	21	Compliance
EDR mode (8DPSK)				
Low	2402	-12.68	21	Compliance
Middle	2441	-12.64	21	Compliance
High	2480	-12.72	21	Compliance

13 FCC §15.247(d) – 100 kHz Bandwidth of Frequency Band Edge

13.1 Applicable Standard

According to FCC §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emissions limits specified in §15.209(a) see §15.205(c)

13.2 Test Procedure

Span = wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation

RBW = 100 kHz VBW = 300 kHz

Sweep = coupled

Detector function = peak Trace = max hold

13.3 Test Equipment List and Details

Descriptions	Manufacturers	Models	Serial Numbers	Calibration Date	Calibration Due Date
Spectrum Analyzer	Rohde & Schwarz	FSU26	101140	2017/11/15	2018/11/14
Cable	WOKEN	SFL402	S02-160323-07	2018/02/21	2019/02/20

***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).

13.4 Test Environmental Conditions

Temperature:	23.5 °C
Relative Humidity:	55.4 %
ATM Pressure:	1015 hPa

The testing was performed by Ian on 2018-03-21

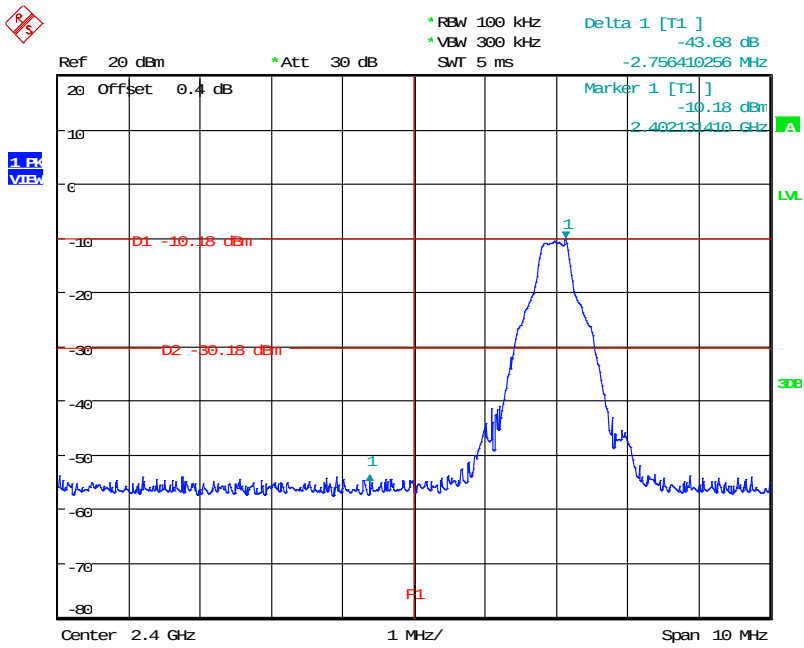
13.5 Test Results

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
BR mode (GFSK)				
Low	2402	43.68	≥ 20	Compliance
High	2480	42.42	≥ 20	Compliance
BR Hopping mode (GFSK)				
Low	2402	42.17	≥ 20	Compliance
High	2480	41.15	≥ 20	Compliance
EDR mode (π4-DQPSK)				
Low	2402	37.20	≥ 20	Compliance
High	2480	36.15	≥ 20	Compliance
EDR Hopping mode (π4-DQPSK)				
Low	2402	35.91	≥ 20	Compliance
High	2480	35.42	≥ 20	Compliance
EDR mode (8DPSK)				
Low	2402	36.18	≥ 20	Compliance
High	2480	35.85	≥ 20	Compliance
EDR Hopping mode (8DPSK)				
Low	2402	35.56	≥ 20	Compliance
High	2480	35.58	≥ 20	Compliance

Please refer to the following plots

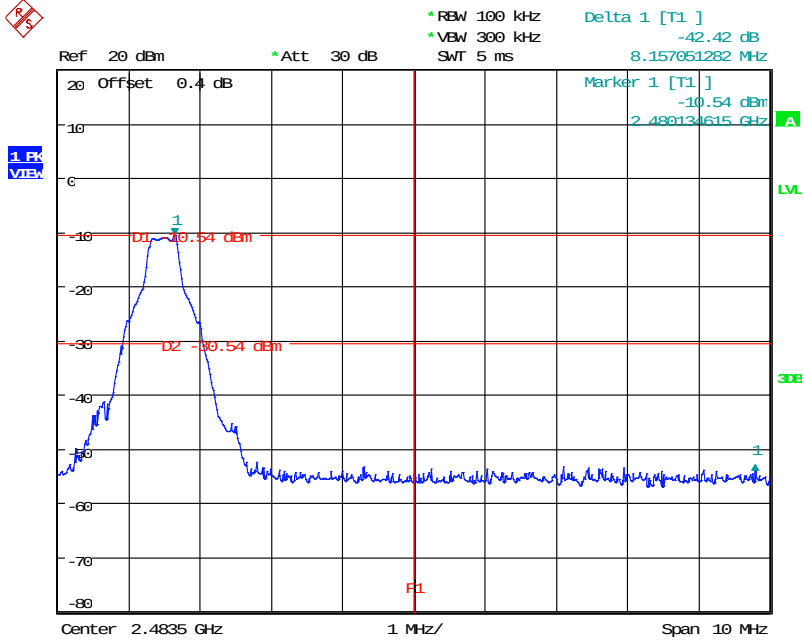
BR mode (GFSK):

Band Edge, Left Side



Date: 21.MAR.2018 01:05:16

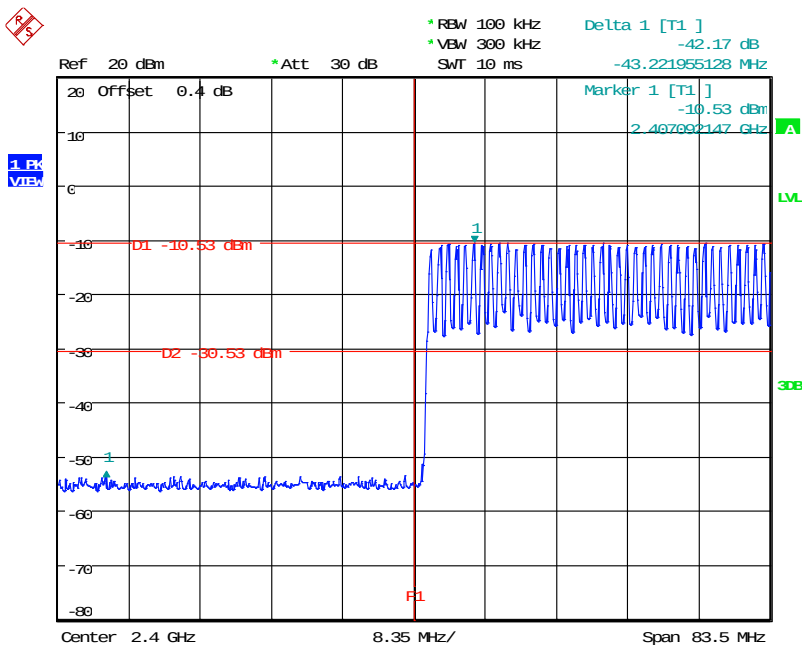
Band Edge, Right Side



Date: 21.MAR.2018 01:38:22

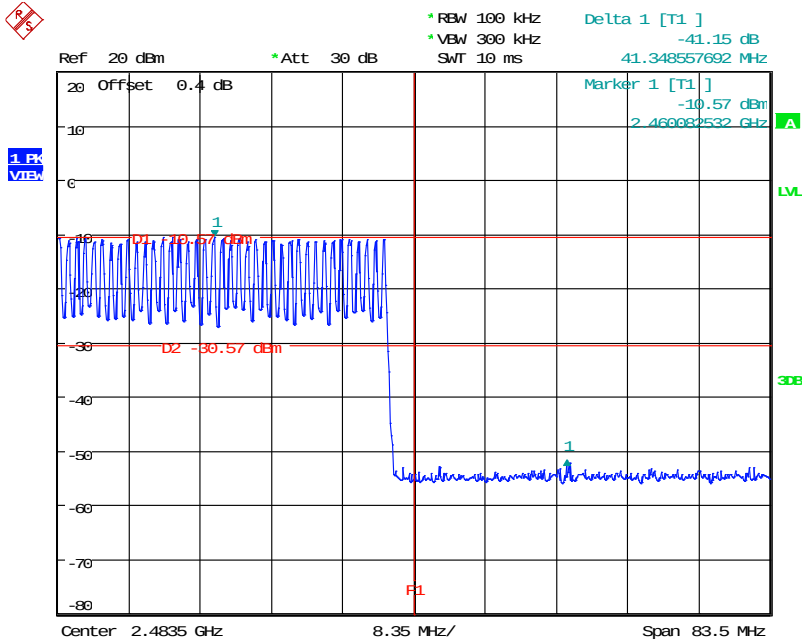
BR Hopping mode (GFSK):

Band Edge, Left Side



Date: 21.MAR.2018 01:49:32

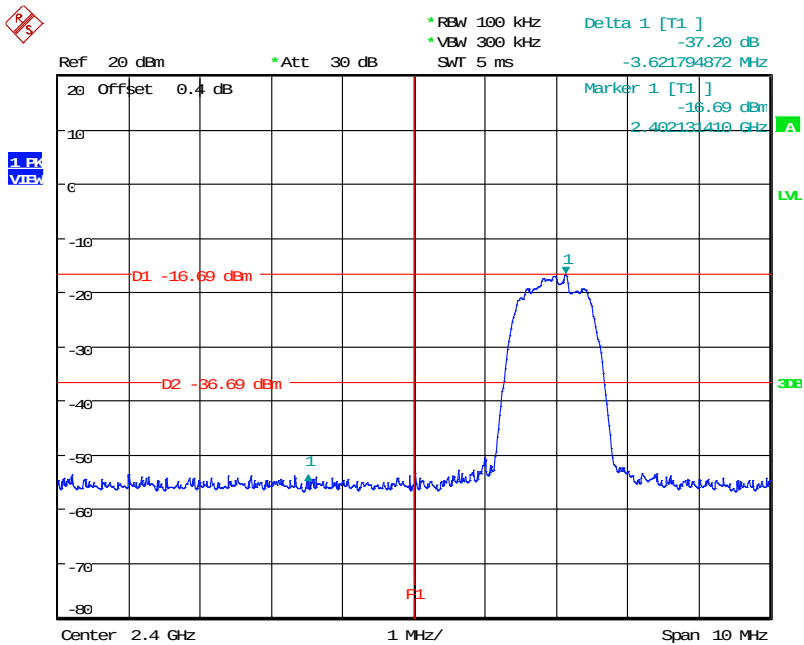
Band Edge, Right Side



Date: 21.MAR.2018 01:51:12

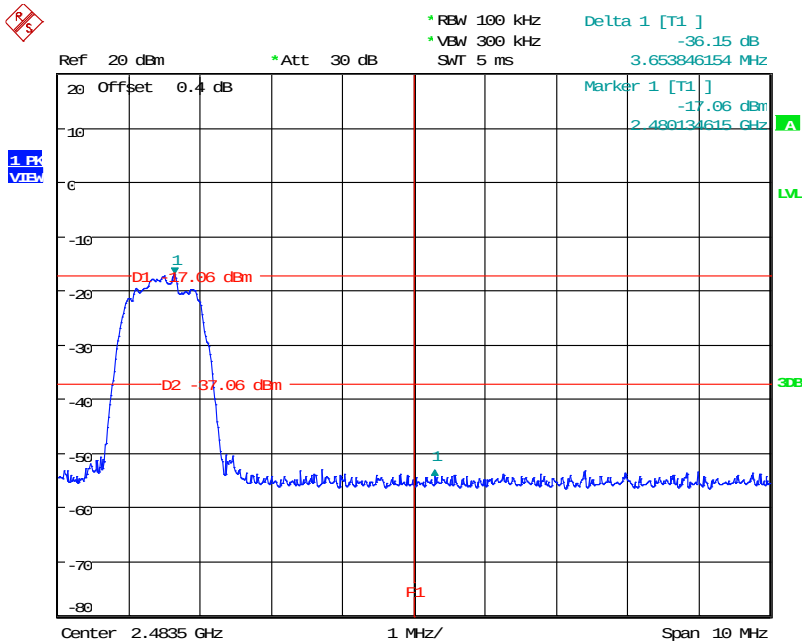
EDR mode ($\pi/4$ -DQPSK):

Band Edge, Left Side



Date: 21.MAR.2018 02:07:01

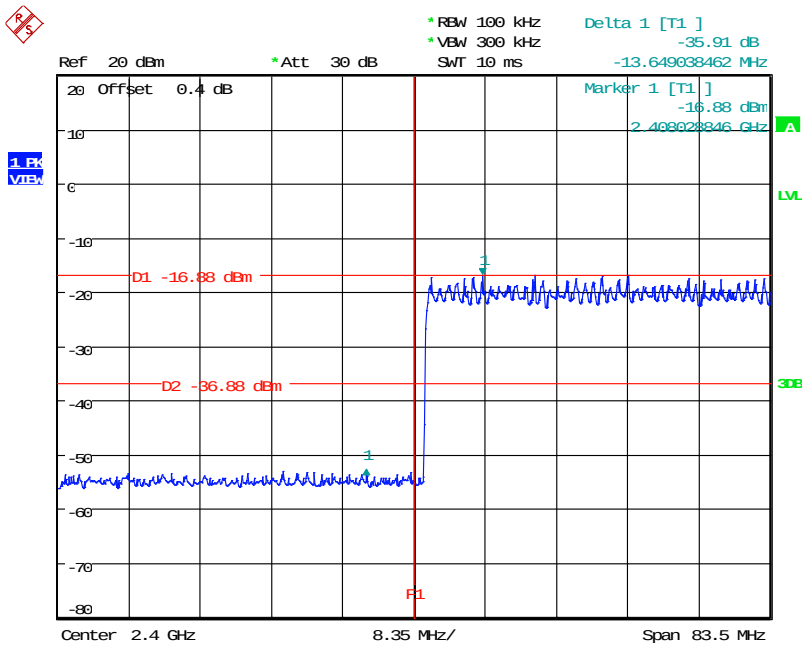
Band Edge, Right Side



Date: 21.MAR.2018 02:20:35

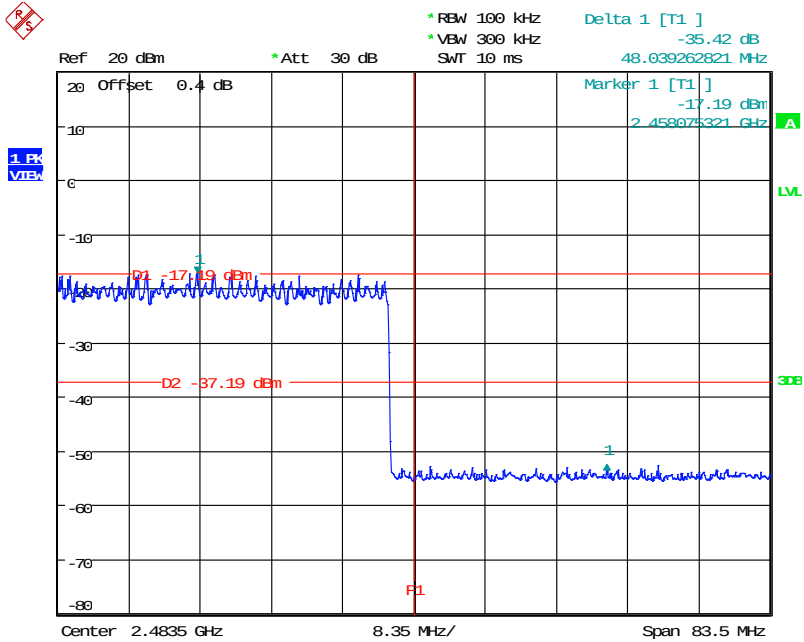
EDR Hopping mode ($\pi/4$ -DQPSK):

Band Edge, Left Side



Date: 21.MAR.2018 02:35:27

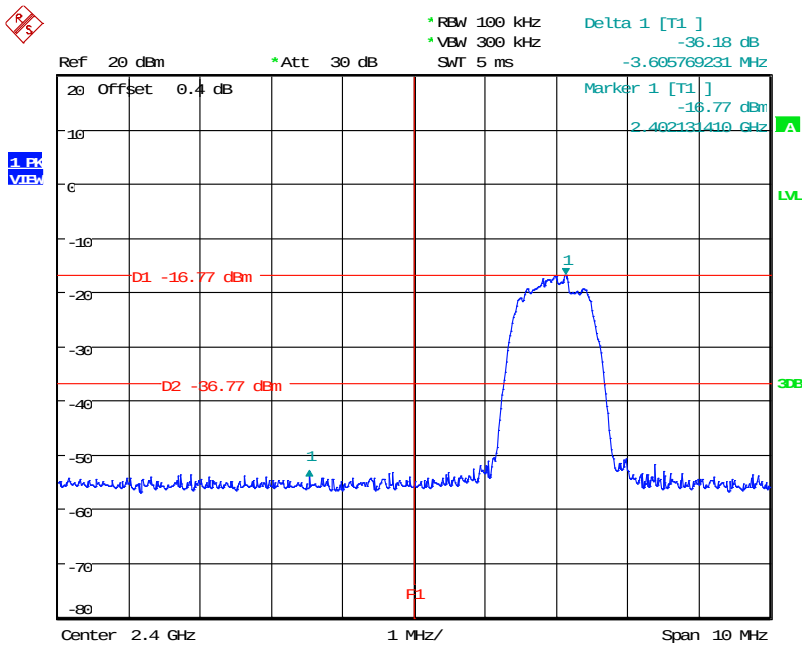
Band Edge, Right Side



Date: 21.MAR.2018 02:37:41

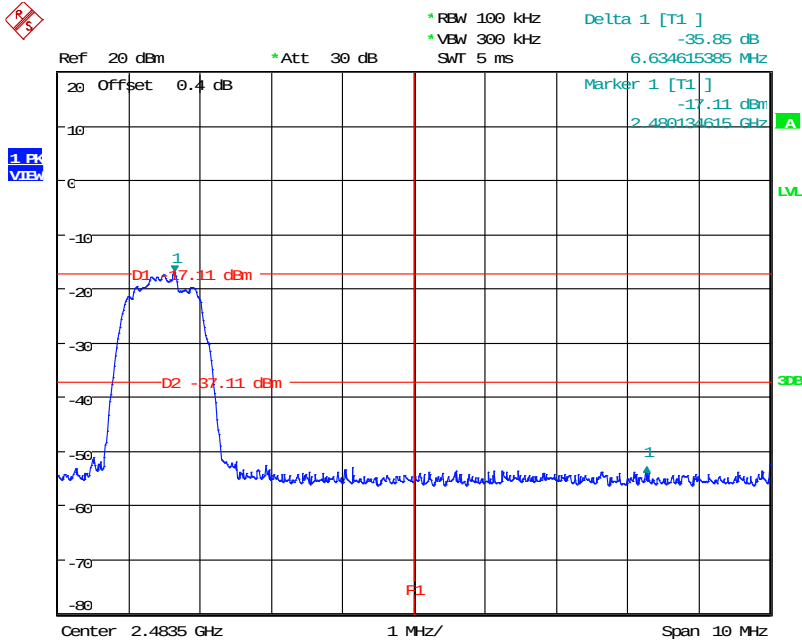
EDR mode (8DPSK):

Band Edge, Left Side



Date: 21.MAR.2018 02:49:03

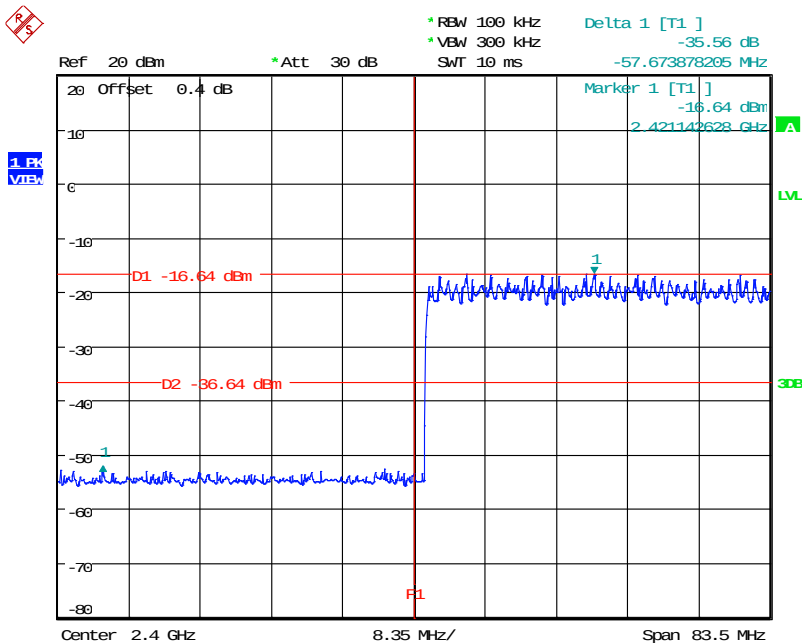
Band Edge, Right Side



Date: 21.MAR.2018 03:02:45

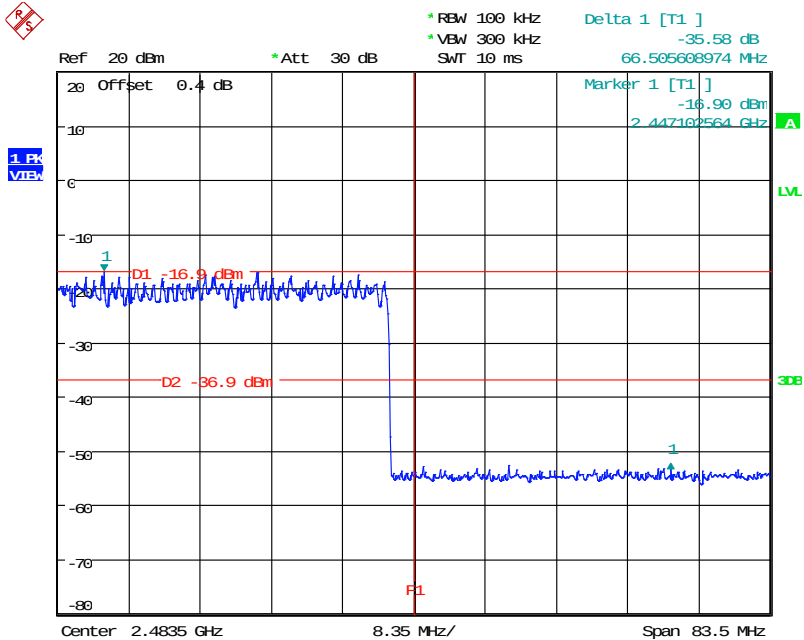
EDR Hopping mode (8DQSK):

Band Edge, Left Side



Date: 21.MAR.2018 03:12:37

Band Edge, Right Side



Date: 21.MAR.2018 03:14:45

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