FCC PART 15.247

TEST REPORT

For

Chengdu Vantron Technology, Ltd.

No.5 GaoPeng Road, Hi-Tech Zone, Chengdu, SiChuan, P.R. China 610045

FCC ID: 2AAGEVTTABLET-5081

Report Type:	**Equipment Name:**
Original Report	Tablet Computer

Report Number:	RSC181119002-0F
Report Date:	2018-12-06
Reviewed By:	Sula Huang EMC Director
Prepared By:	Bay Area Compliance Laboratories Corp. (Chengdu) No.5040, Huilongwan Plaza, No. 1, Shawan Road, Jinniu District, Chengdu, Sichuan, China Tel: +86-28-65525123 Fax: +86-28-65525125 www.baclcorp.com

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. (Chengdu). This report must not be used by the customer to claim product certification, approval, or endorsement by A2LA* or any agency of the Federal Government. * This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "*".

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The ***Chengdu Vantron Technology, Ltd.***'s product, model number: **VT-TABLET-5081 (FCC ID: 2AAGEVTTABLET-5081)** or the "EUT" as referred to in this report was the **Tablet Computer**.

Mechanical Description of EUT

The EUT was measured approximately: 235 mm (L) x 153 mm (W) x 21 mm (H).
Rated input voltage: DC 3.7V rechargeable Li-ion battery or DC 5V from adapter

Adapter Information
Manufacturer: Anthin
Model: APS318-0530
Input: AC 100-220V; 50/60Hz
Output: DC 5V, 3A

Note: The products, test model: VT-TABLET-5081, multiple model: ETAB-8-VAN-01-FNQ. Their differences were presented in Product Difference Statement provided by the applicant. So we selected model VT-TABLET-5081 to fully test.

**All measurement and test data in this report was gathered from final production sample, serial number: 181119002/01 (assigned by the BACL, Chengdu). It may have deviation from any other sample. The EUT supplied by the applicant was received on 2018-11-19, and EUT conformed to test requirement.*

Objective

This report is prepared on behalf of ***Chengdu Vantron Technology, Ltd.*** in accordance with Part 2, Subpart J, Part 15, Subparts A and C of the Federal Communications Commission's rules.

The tests were performed in order to determine the Bluetooth BDR and EDR mode of EUT compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

FCC Part 15B JBP submissions with FCC ID: 2AAGEVTTABLET-5081
FCC Part 15C DTS submissions with FCC ID: 2AAGEVTTABLET-5081
FCC Part 15E NII submissions with FCC ID: 2AAGEVTTABLET-5081
FCC Part 15C DXX submissions with FCC ID: 2AAGEVTTABLET-5081

Measurement Uncertainty

Item			Uncertainty
AC power line conducted emission			2.93 dB
Radiated Emission(Field Strength)	30MHz-200MHz	H	4.63 dB
		V	4.88 dB
	200MHz-1GHz	H	5.02 dB
		V	6.06 dB
	1GHz-6GHz		4.51 dB
	6GHz-18GHz		4.49 dB
	18GHz-40GHz		5.48 dB
Conducted RF Power			±0.61dB
Power Spectrum Density			±0.61dB
Occupied Bandwidth			±5%
Conducted Emission			±1.5dB
Humidity			±5%
Temperature			±1℃

Test Methodology

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.

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Chengdu) to collect test data is located No.5040, Huilongwan Plaza, No. 1, Shawan Road, Jinniu District, Chengdu, Sichuan, China.

Bay Area Compliance Laboratories Corp. (Chengdu) lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4324.01) and the FCC designation No. CN1186 under the FCC KDB 974614 D01. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in engineering mode.

Equipment Modifications

No modification was made to the EUT.

EUT Exercise Software

Test software: “RF test tool” installed in device was used during test, the setting was configured as below:

Test Software Version		RF test tool		
Test Frequency		2402MHz	2441MHz	2480MHz
GFSK	Power Level	0	0	0
π/4-DQPSK	Power Level	0	0	0
8PSK	Power Level	0	0	0

Support Equipment List and Details

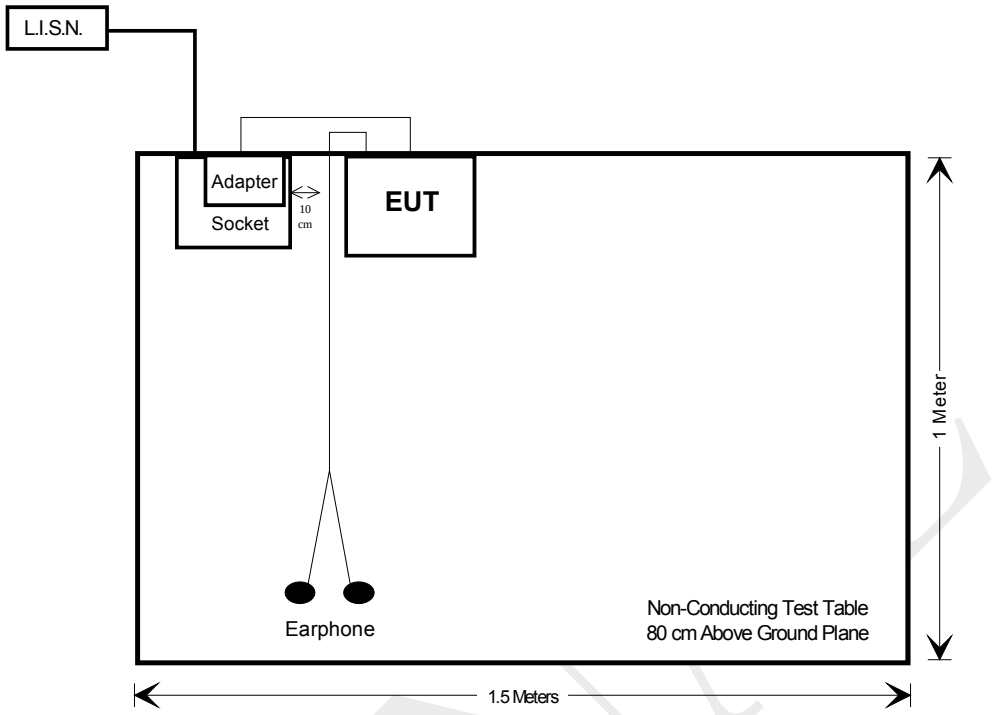
Manufacturer	Description	Model	Serial Number
CHOETECH	Wireless Charger	T517	None
HUAWEI	Adapter	HW-05200C01	None
HUAWEI	Earphone	P9	None

External I/O Cable

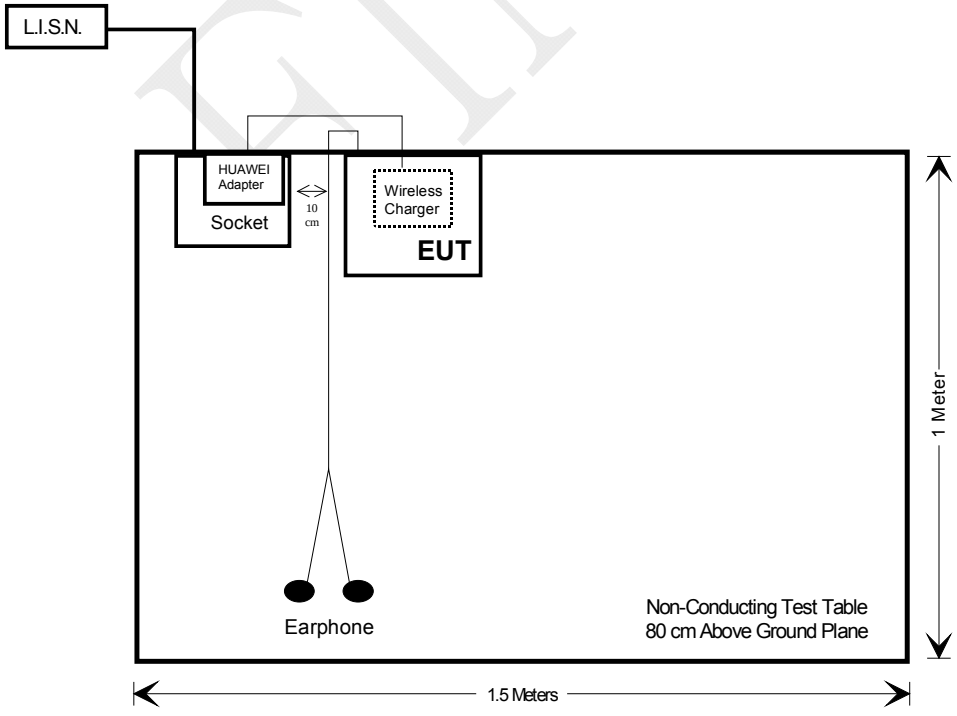
Cable Description	Length (m)	From	To
Adapter Mode			
Unshielded Power Cable	1.2	Adapter	EUT
Unshielded Earphone Cable	1.0	EUT	Earphone
Wireless Charging Mode			
Unshielded Power Cable	1.2	HUAWEI Adapter	Wireless Charger
Unshielded Earphone Cable	1.0	EUT	Earphone

Block Diagram of Test Setup

Conducted Emissions
Adapter Mode



Wireless Charging Mode



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.247 & §1.1310 & §2.1093	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247 (a)(1)	20 dB 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)(1)	Peak Output Power Measurement	Compliance
§15.247(d)	Band Edges	Compliance

TEST EQUIPMENTS LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emission					
Rohde & Schwarz	EMI Test Receiver	ESCS 30	836858/0016	2018-04-18	2019-04-19
Rohde & Schwarz	L.I.S.N.	ENV216	100018	2018-04-18	2019-04-19
HP	RF Limiter	11947A	3107A01270	2018-08-13	2019-08-12
Unknown	Conducted Cable	L-E003	000003	2018-11-02	2019-11-01
Rohde & Schwarz	EMC32	EMC32	V 8.52.0	N/A	N/A
Radiated Emission					
EMCT	Semi-Anechoic Chamber	966	001	2017-05-18	2020-05-17
Sonoma	Pre-Amplifier	310N	186684	2018-08-24	2019-08-23
Rohde & Schwarz	Spectrum Analyzer	FSU26	20083	2018-05-09	2019-05-08
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2018-04-18	2019-04-17
A.H. Systems, Inc	Amplifier	PAM-0118P	467	2018-10-19	2019-10-18
EM Electronics	RF Pre-Amplifier	EM18G40	060725	2018-03-28	2019-03-27
SUNOL SCIENCES	Broadband Antenna	JB3	A121808	2017-05-19	2020-05-18
ETS	Horn Antenna	3115	003-6076	2017-05-19	2020-05-18
A.H. Systems, Inc	Horn Antenna	SAS-574	510	2017-05-19	2020-05-18
INMET	Attenuator	18N-6dB	64671	2018-10-27	2019-10-26
Sinoscite.,Co Ltd	Reject Band Filter	BSF 2402-2480MN	0898-005	2018-11-10	2019-11-09
Unknown	RF Cable (below 1GHz)	L-E005	000005	2018-10-27	2019-10-26
Unknown	RF Cable (below 1GHz)	T-E128	000128	2018-11-10	2019-11-09
Unknown	RF Cable (below 1GHz)	T-E129	000129	2018-11-10	2019-11-09
Unknown	RF Cable (above 1GHz)	T-E069	000069	2018-11-10	2019-11-09
Micro-coax	RF Cable (above 1GHz)	T-E209	MFR 64639 2310	2018-03-14	2019-03-13
Rohde & Schwarz	EMC32	EMC32	V 8.52.0	N/A	N/A

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2018-05-09	2019-05-08
WEINSCHEL ENGINEERING	Attenuator	1A10dB	AA4135	2018-11-10	2019-11-09
Agilent	USB Wideband Power Sensor	U2021XA	MY53320008	2018-01-18	2019-01-17
E-Microwave	DC Block	EMDCB-00036	OE01304225	2018-10-27	2019-10-26
Unknown	RF Cable	No	000007	Each Time	

*** Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

FCC §15.247 (I) & §1.1310 & §2.1093- RF EXPOSURE

Applicable Standard

According to§15.247(i) and §1.1310, 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 KDB447498 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:
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- 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 5) in section 4.1 is applied to determine SAR test exclusion.

Measurement Result

The max conducted power including tune-up tolerance is 5.0 dBm (3.16mW).
[(max. power of channel, mW)/(min. test separation distance, mm)][√f(GHz)]
= 3.16/5*(√2.48) = 1.0 < 3.0

So the stand-alone SAR evaluation is not necessary.

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to FCC § 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 use of a standard antenna jack or electrical connector is prohibited.

Antenna Connector Construction

The EUT has one WIFI/BT antenna and one NFC antenna, which are permanently attached and fulfill the requirement of this section. Please refer to the EUT photos.

RF Module	Manufacturer	Antenna Model	Antenna Gain	Antenna Type
2.4G WLAN	shenzhen bogesi communication technology co.,ltd	WCC-005A	3dBi	FPC Antenna
5G WLAN				
Bluetooth				
NFC	SHENZHEN SUNSHINE GOOD ELECTRONICS CO.,LTD	P134FQ1990A0	0dBi	FPC Antenna

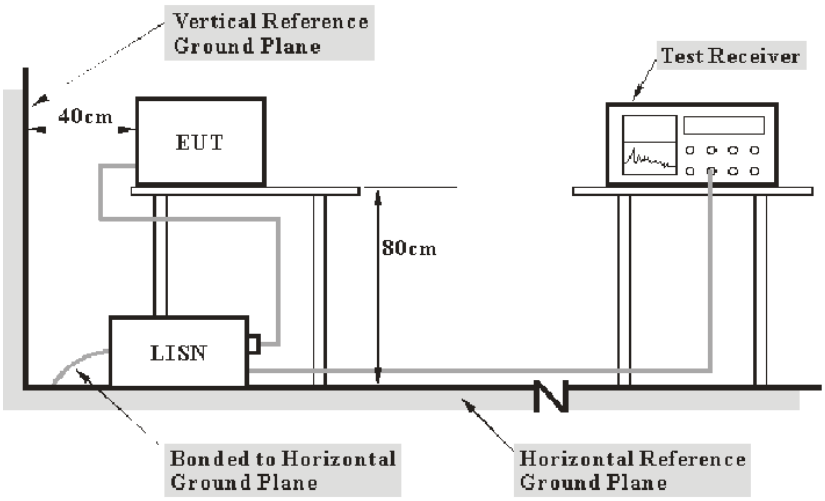
Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 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.

The spacing between the peripherals was 10 cm.

The adapter was connected to an AC 120 V/60 Hz power source.

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	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the first 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.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$V_C = V_R + A_C + VDF$

Herein,
V_C: corrected voltage amplitude
V_R: reading voltage amplitude
A_c: attenuation caused by cable loss
VDF: voltage division factor of AMN or ISN

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Data

Environmental Conditions

Temperature:	23 °C
Relative Humidity:	64 %
ATM Pressure:	94.8 kPa

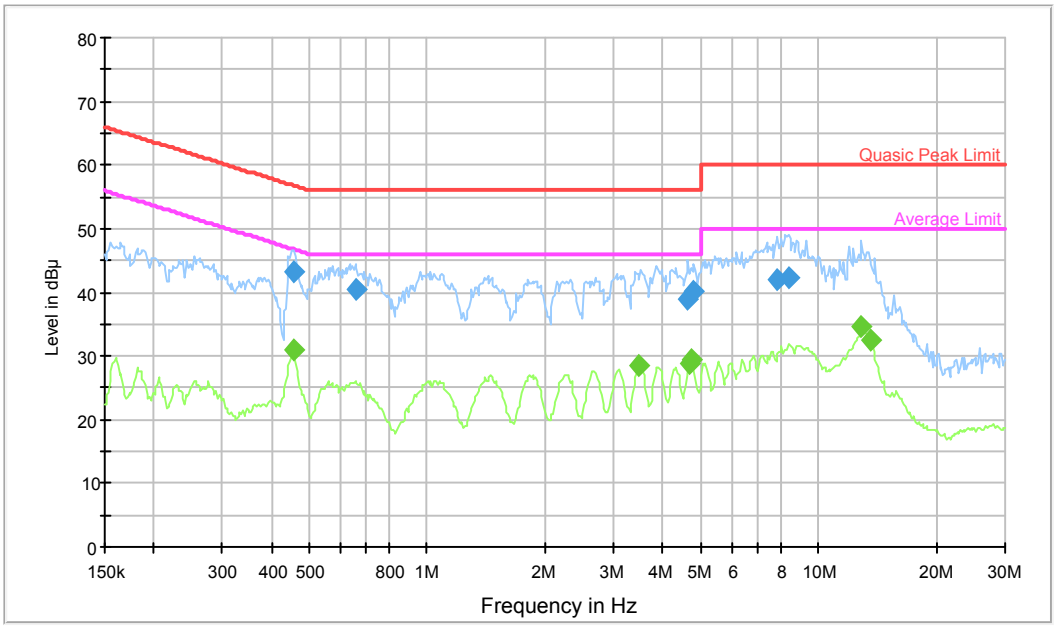
The testing was performed by Tom Tang on 2018-11-20.

Test Mode: Transmitting

Low channel of EDR (8DPSK) mode - Worst Case

Adapter Mode

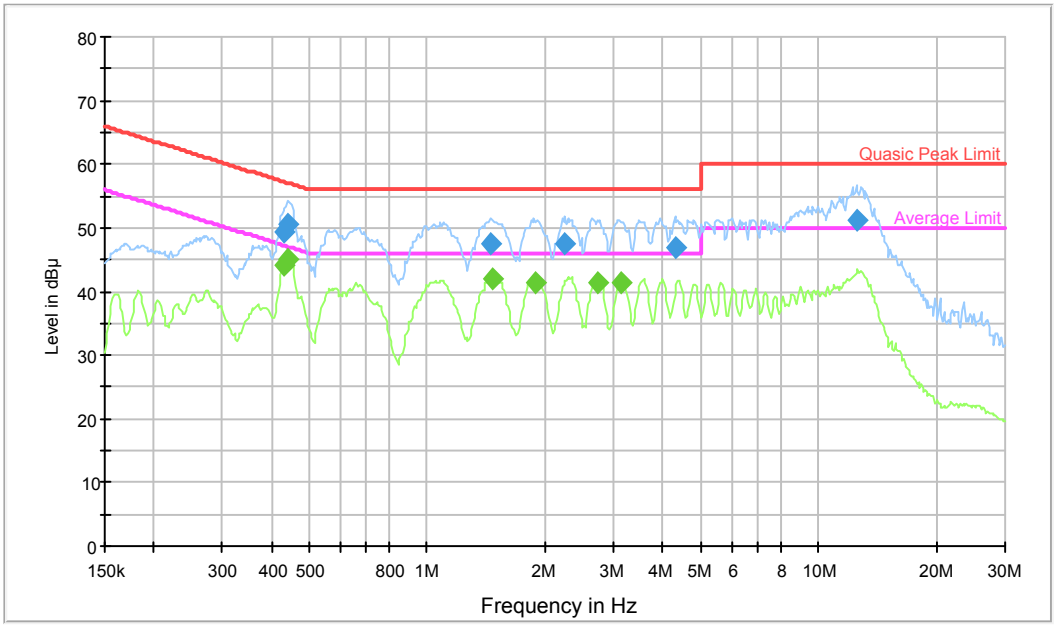
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dB µ V)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Margin (dB)	Limit (dB µ V)
0.454052	43.1	9.000	L1	19.6	13.7	56.8
0.655073	40.5	9.000	L1	19.6	15.5	56.0
4.651370	38.8	9.000	L1	19.8	17.2	56.0
4.802010	40.0	9.000	L1	19.8	16.0	56.0
7.870023	42.1	9.000	L1	19.9	17.9	60.0
8.388036	42.4	9.000	L1	19.9	17.6	60.0

Frequency (MHz)	Average (dB µ V)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Margin (dB)	Limit (dB µ V)
0.454052	31.0	9.000	L1	19.6	15.8	46.8
3.463707	28.6	9.000	L1	19.8	17.4	46.0
4.688581	28.9	9.000	L1	19.8	17.1	46.0
4.726090	29.6	9.000	L1	19.8	16.4	46.0
12.898197	34.6	9.000	L1	20.1	15.4	50.0
13.638064	32.6	9.000	L1	20.1	17.4	50.0

AC120 V, 60 Hz, Neutral:



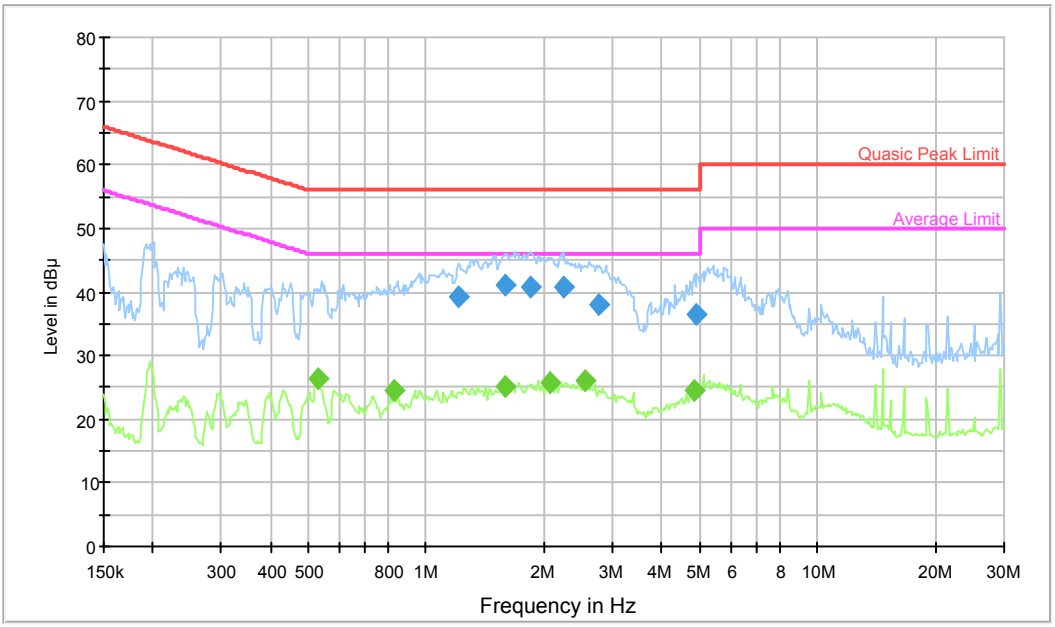
Frequency (MHz)	QuasiPeak (dB µ V)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Margin (dB)	Limit (dB µ V)
0.429420	49.4	9.000	N	19.6	7.9	57.3
0.443327	50.7	9.000	N	19.6	6.3	57.0
1.453260	47.6	9.000	N	19.8	8.4	56.0
2.252540	47.4	9.000	N	19.9	8.6	56.0
4.295123	47.0	9.000	N	20.0	9.0	56.0
12.493579	51.0	9.000	N	20.2	9.0	60.0

Frequency (MHz)	Average (dB µ V)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Margin (dB)	Limit (dB µ V)
0.429420	44.1	9.000	N	19.6	3.2	47.3
0.443327	44.9	9.000	N	19.6	*2.1	47.0
1.476605	41.9	9.000	N	19.8	4.1	46.0
1.890344	41.4	9.000	N	19.9	4.6	46.0
2.727252	41.5	9.000	N	19.9	4.5	46.0
3.122873	41.4	9.000	N	19.9	4.6	46.0

**Within measurement uncertainty!*

Wireless Charging Mode

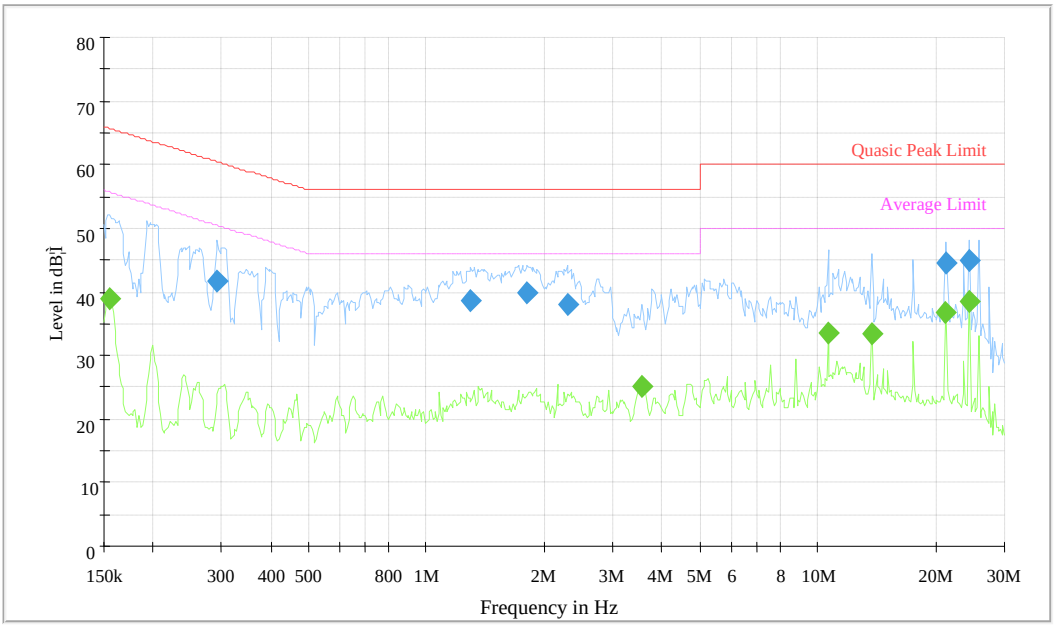
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dB µ V)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Margin (dB)	Limit (dB µ V)
1.209904	39.3	9.000	L1	19.7	16.7	56.0
1.599078	41.1	9.000	L1	19.7	14.9	56.0
1.845692	40.8	9.000	L1	19.7	15.2	56.0
2.252540	40.7	9.000	L1	19.7	15.3	56.0
2.771062	38.0	9.000	L1	19.8	18.0	56.0
4.918182	36.5	9.000	L1	19.8	19.5	56.0

Frequency (MHz)	Average (dB µ V)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Margin (dB)	Limit (dB µ V)
0.528270	26.2	9.000	L1	19.5	19.8	46.0
0.825364	24.5	9.000	L1	19.6	21.5	46.0
1.599078	25.2	9.000	L1	19.7	20.8	46.0
2.063510	25.9	9.000	L1	19.7	20.1	46.0
2.558827	26.2	9.000	L1	19.8	19.8	46.0
4.840426	24.5	9.000	L1	19.8	21.5	46.0

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dB µ V)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Margin (dB)	Limit (dB µ V)
0.292938	41.7	9.000	N	19.7	18.7	60.4
1.299858	38.8	9.000	N	19.8	17.2	56.0
1.816511	39.7	9.000	N	19.8	16.3	56.0
2.288725	38.0	9.000	N	19.9	18.0	56.0
21.307992	43.8	9.000	N	20.3	16.2	60.0
24.398974	44.1	9.000	N	20.4	15.9	60.0

Frequency (MHz)	Average (dB µ V)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Margin (dB)	Limit (dB µ V)
0.154858	39.0	9.000	N	19.5	16.7	55.7
3.547503	25.2	9.000	N	19.9	20.8	46.0
10.653105	34.4	9.000	N	20.2	15.6	50.0
13.747168	34.1	9.000	N	20.2	15.9	50.0
21.307992	35.1	9.000	N	20.3	14.9	50.0
24.398974	37.6	9.000	N	20.4	12.4	50.0

Note:
1) Corrected Amplitude = Reading + Correction Factor
2) Correction Factor =LISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter
3) Margin = Limit – Corrected Amplitude

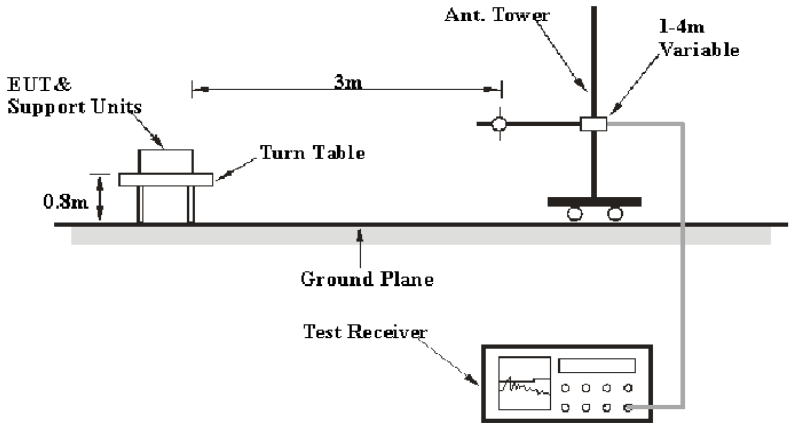
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

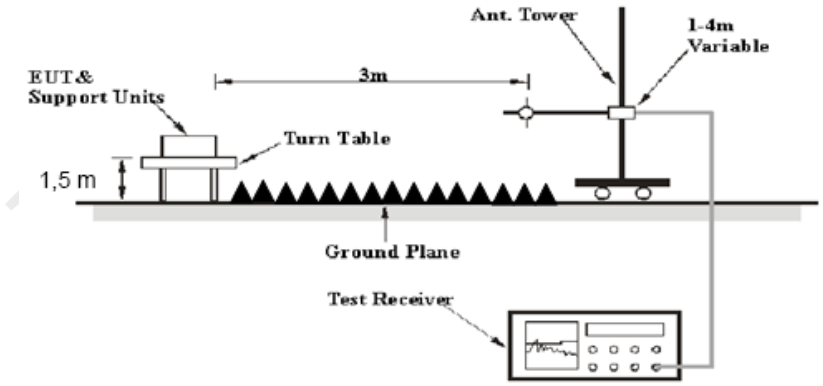
FCC §15.247 (d); §15.209; §15.205;

EUT Setup

Below 1GHz:



Above 1GHz:



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

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

The adapter was connected to one AC 120 V/60 Hz power source.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver setup was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1GHz	1MHz	3 MHz	/	PK
	1MHz	3 MHz	/	AV

Test Procedure

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

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz - 1 GHz, peak and average detection modes for frequencies above 1 GHz.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Data

Environmental Conditions

Temperature:	23 °C
Relative Humidity:	56 %
ATM Pressure:	96.1 kPa

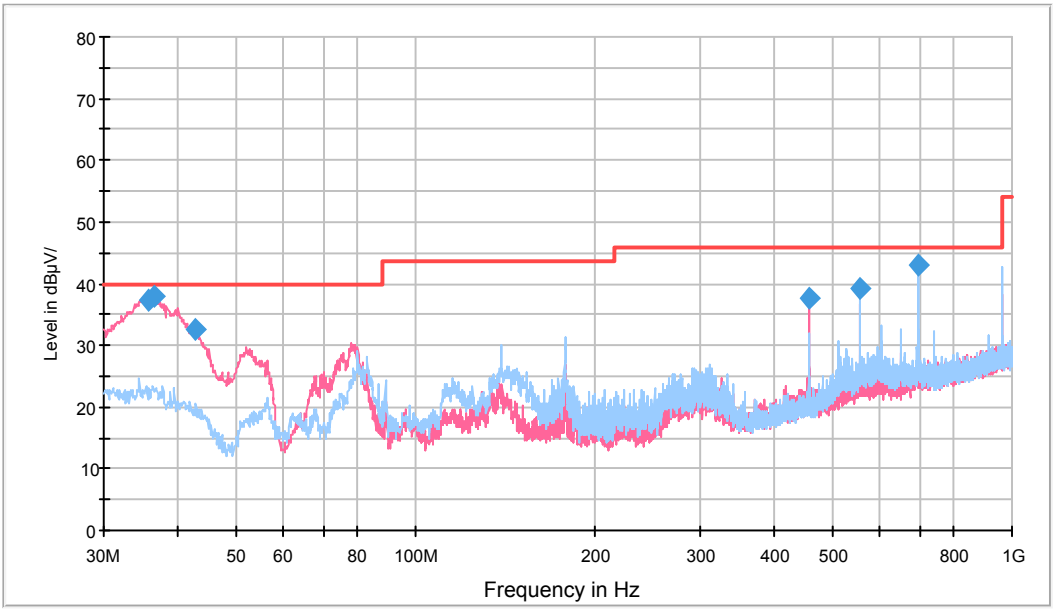
** The testing was performed by Tom Tang on 2018-11-22.*

Test Mode: Transmitting

Low channel of EDR mode(8DPSK)-Worst Case

1) 30 MHz to 1 GHz:

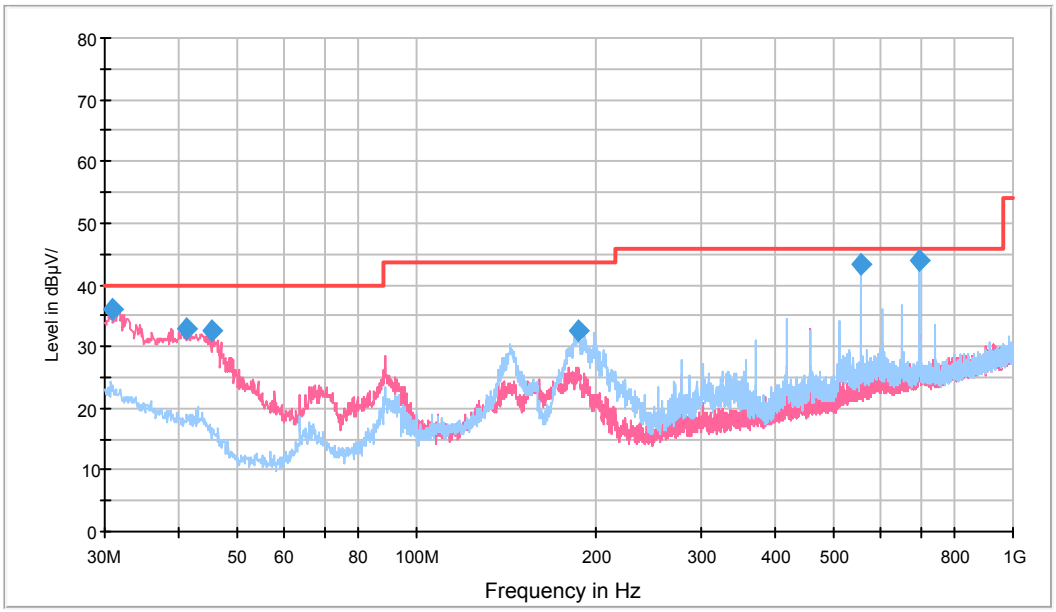
Adapter Mode



Frequency (MHz)	QuasicPeak (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corrected Factor (dB/m)	Margin (dB)	Limit (dBµV/m)
35.577500	37.4	100.0	V	266.0	-8.6	*2.6	40.0
36.426250	38.0	100.0	V	209.0	-9.1	*2.0	40.0
42.731250	32.5	100.0	V	194.0	-13.0	7.5	40.0
456.072500	37.6	110.0	V	39.0	-7.9	8.4	46.0
556.952500	39.3	130.0	H	109.0	-5.1	6.7	46.0
696.268750	43.1	150.0	H	177.0	-3.0	*2.9	46.0

**Within measurement uncertainty!*

Wireless Charging Mode



Frequency (MHz)	QuasicPeak (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corrected Factor (dB/m)	Margin (dB)	Limit (dBµV/m)
30.848750	35.9	100.0	V	197.0	-5.4	*4.1	40.0
41.033750	32.9	100.0	V	219.0	-11.9	7.1	40.0
45.398750	32.4	100.0	V	0.0	-14.5	7.6	40.0
186.655000	32.6	135.0	H	157.0	-13.4	10.9	43.5
556.952500	43.3	150.0	H	121.0	-5.1	*2.7	46.0
696.268750	43.7	110.0	H	134.0	-3.0	*2.3	46.0

**Within measurement uncertainty!*

2) 1GHz-25GHz:

BDR Mode (GFSK):

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Measurement	Polar	Factor					
MHz	dBμV	PK/AV	H/V	(dB/m)	dB	dB	dBμV/m	dBμV/m	dB
Frequency:2402 MHz									
2402	59.67	PK	H	28.71	3.06	0.00	91.44	N/A	N/A
2402	48.49	AV	H	28.71	3.06	0.00	80.26	N/A	N/A
2402	67.48	PK	V	28.71	3.06	0.00	99.25	N/A	N/A
2402	56.28	AV	V	28.71	3.06	0.00	88.05	N/A	N/A
2390	29.45	PK	V	28.67	3.06	0.00	61.18	74.00	12.82
2390	15.87	AV	V	28.67	3.06	0.00	47.60	54.00	6.40
4804	52.76	PK	V	33.85	4.35	44.73	46.23	74.00	27.77
4804	38.96	AV	V	33.85	4.35	44.73	32.43	54.00	21.57
7206	47.78	PK	V	36.39	5.41	43.92	45.66	74.00	28.34
7206	34.94	AV	V	36.39	5.41	43.92	32.82	54.00	21.18
Frequency: 2441MHz									
2441	60.66	PK	H	28.82	3.09	0.00	92.57	N/A	N/A
2441	49.14	AV	H	28.82	3.09	0.00	81.05	N/A	N/A
2441	69.12	PK	V	28.82	3.09	0.00	101.03	N/A	N/A
2441	58.08	AV	V	28.82	3.09	0.00	89.99	N/A	N/A
4882	53.04	PK	V	34.07	4.40	44.72	46.79	74.00	27.21
4882	39.89	AV	V	34.07	4.40	44.72	33.64	54.00	20.36
7323	47.61	PK	V	36.55	5.44	44.23	45.37	74.00	28.63
7323	34.28	AV	V	36.55	5.44	44.23	32.04	54.00	21.96
Frequency:2480MHz									
2480	61.81	PK	H	28.94	3.12	0.00	93.87	N/A	N/A
2480	50.09	AV	H	28.94	3.12	0.00	82.15	N/A	N/A
2480	70.83	PK	V	28.94	3.12	0.00	102.89	N/A	N/A
2480	60.11	AV	V	28.94	3.12	0.00	92.17	N/A	N/A
2483.5	31.68	PK	V	28.95	3.12	0.00	63.75	74.00	10.25
2483.5	20.07	AV	V	28.95	3.12	0.00	52.14	54.00	*1.86
4960	53.84	PK	V	34.29	4.44	44.71	47.86	74.00	26.14
4960	41.16	AV	V	34.29	4.44	44.71	35.18	54.00	18.82
7440	47.44	PK	V	36.72	5.48	44.54	45.10	74.00	28.90
7440	33.77	AV	V	36.72	5.48	44.54	31.43	54.00	22.57

**Within measurement uncertainty!*

EDR Mode (π/4-DQPSK):

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Measurement	Polar	Factor					
MHz	dBμV	PK/AV	H/V	(dB/m)	dB	dB	dBμV/m	dBμV/m	dB
Frequency:2402 MHz									
2402	59.86	PK	H	28.71	3.06	0.00	91.63	N/A	N/A
2402	48.13	AV	H	28.71	3.06	0.00	79.90	N/A	N/A
2402	67.21	PK	V	28.71	3.06	0.00	98.98	N/A	N/A
2402	55.46	AV	V	28.71	3.06	0.00	87.23	N/A	N/A
2390	27.62	PK	V	28.67	3.06	0.00	59.35	74.00	14.65
2390	15.94	AV	V	28.67	3.06	0.00	47.67	54.00	6.33
4804	52.41	PK	V	33.85	4.35	44.73	45.88	74.00	28.12
4804	38.36	AV	V	33.85	4.35	44.73	31.83	54.00	22.17
7206	47.09	PK	V	36.39	5.41	43.92	44.97	74.00	29.03
7206	33.85	AV	V	36.39	5.41	43.92	31.73	54.00	22.27
Frequency:2441 MHz									
2441	58.30	PK	H	28.82	3.09	0.00	90.21	N/A	N/A
2441	46.07	AV	H	28.82	3.09	0.00	77.98	N/A	N/A
2441	66.51	PK	V	28.82	3.09	0.00	98.42	N/A	N/A
2441	54.19	AV	V	28.82	3.09	0.00	86.10	N/A	N/A
4882	51.25	PK	V	34.07	4.40	44.72	45.00	74.00	29.00
4882	38.24	AV	V	34.07	4.40	44.72	31.99	54.00	22.01
7323	45.30	PK	V	36.55	5.44	44.23	43.06	74.00	30.94
7323	33.43	AV	V	36.55	5.44	44.23	31.19	54.00	22.81
Frequency:2480 MHz									
2480	56.98	PK	H	28.94	3.12	0.00	89.04	N/A	N/A
2480	44.03	AV	H	28.94	3.12	0.00	76.09	N/A	N/A
2480	66.26	PK	V	28.94	3.12	0.00	98.32	N/A	N/A
2480	53.23	AV	V	28.94	3.12	0.00	85.29	N/A	N/A
2483.5	29.81	PK	V	28.95	3.12	0.00	61.88	74.00	12.12
2483.5	19.26	AV	V	28.95	3.12	0.00	51.33	54.00	*2.67
4960	50.39	PK	V	34.29	4.44	44.71	44.41	74.00	29.59
4960	38.33	AV	V	34.29	4.44	44.71	32.35	54.00	21.65
7440	43.99	PK	V	36.72	5.48	44.54	41.65	74.00	32.35
7440	33.12	AV	V	36.72	5.48	44.54	30.78	54.00	23.22

**Within measurement uncertainty!*

EDR Mode (8-DPSK):

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Measurement	Polar	Factor					
MHz	dBμV	PK/AV	H/V	(dB/m)	dB	dB	dBμV/m	dBμV/m	dB
Frequency:2402 MHz									
2402	59.88	PK	H	28.71	3.06	0.00	91.65	N/A	N/A
2402	49.66	AV	H	28.71	3.06	0.00	81.43	N/A	N/A
2402	67.26	PK	V	28.71	3.06	0.00	99.03	N/A	N/A
2402	57.16	AV	V	28.71	3.06	0.00	88.93	N/A	N/A
2390	27.15	PK	V	28.67	3.06	0.00	58.88	74.00	15.12
2390	15.79	AV	V	28.67	3.06	0.00	47.52	54.00	6.48
4804	51.99	PK	V	33.85	4.35	44.73	45.46	74.00	28.54
4804	38.09	AV	V	33.85	4.35	44.73	31.56	54.00	22.44
7206	47.35	PK	V	36.39	5.41	43.92	45.23	74.00	28.77
7206	34.06	AV	V	36.39	5.41	43.92	31.94	54.00	22.06
Frequency: 2441 MHz									
2441	58.94	PK	H	28.82	3.09	0.00	90.85	N/A	N/A
2441	46.94	AV	H	28.82	3.09	0.00	78.85	N/A	N/A
2441	67.16	PK	V	28.82	3.09	0.00	99.07	N/A	N/A
2441	55.25	AV	V	28.82	3.09	0.00	87.16	N/A	N/A
4882	51.63	PK	V	34.07	4.40	44.72	45.38	74.00	28.62
4882	38.46	AV	V	34.07	4.40	44.72	32.21	54.00	21.79
7323	45.98	PK	V	36.55	5.44	44.23	43.74	74.00	30.26
7323	33.51	AV	V	36.55	5.44	44.23	31.27	54.00	22.73
Frequency: 2480 MHz									
2480	57.78	PK	H	28.94	3.12	0.00	89.84	N/A	N/A
2480	43.91	AV	H	28.94	3.12	0.00	75.97	N/A	N/A
2480	66.76	PK	V	28.94	3.12	0.00	98.82	N/A	N/A
2480	53.34	AV	V	28.94	3.12	0.00	85.40	N/A	N/A
2483.5	29.05	PK	V	28.95	3.12	0.00	61.12	74.00	12.88
2483.5	18.23	AV	V	28.95	3.12	0.00	50.30	54.00	*3.70
4960	51.13	PK	V	34.29	4.44	44.71	45.15	74.00	28.85
4960	38.79	AV	V	34.29	4.44	44.71	32.81	54.00	21.19
7440	44.24	PK	V	36.72	5.48	44.54	41.90	74.00	32.10
7440	32.94	AV	V	36.72	5.48	44.54	30.60	54.00	23.40

**Within measurement uncertainty!*

Note:

Corrected Amplitude = Corrected Factor + Reading

Corrected Factor=Antenna factor (RX) + Cable Loss – Amplifier Factor

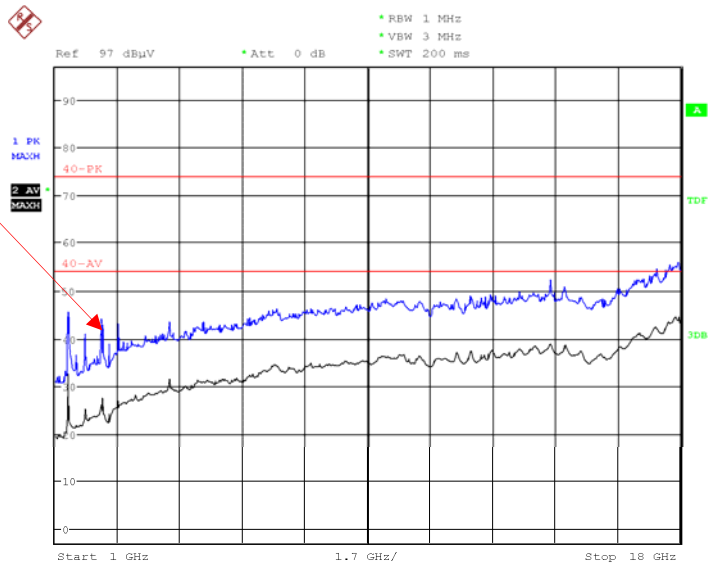
Margin = Limit- Corr. Amplitude

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

Please refer to the below pre-scan plot of worst case:

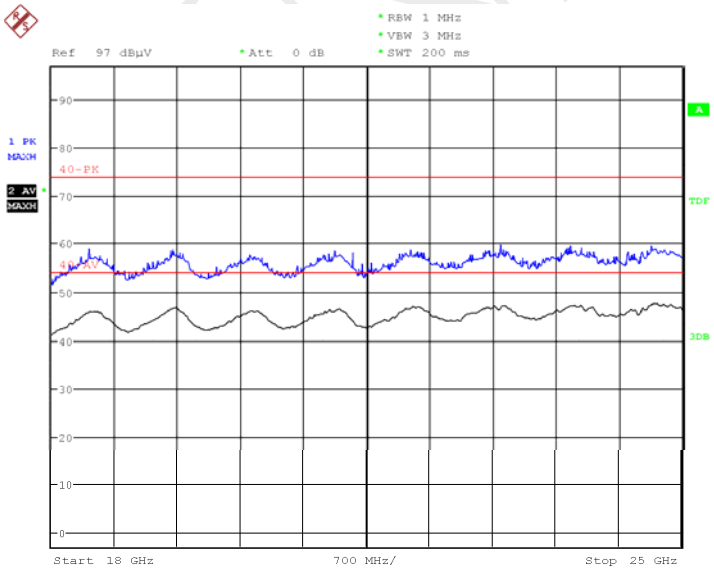
EDR Mode (π/4-DQPSK): Low Channel_Horizontal_1GHz-18GHz

Fundamental with Reject Band Filter



Date: 22.NOV.2018 09:40:08

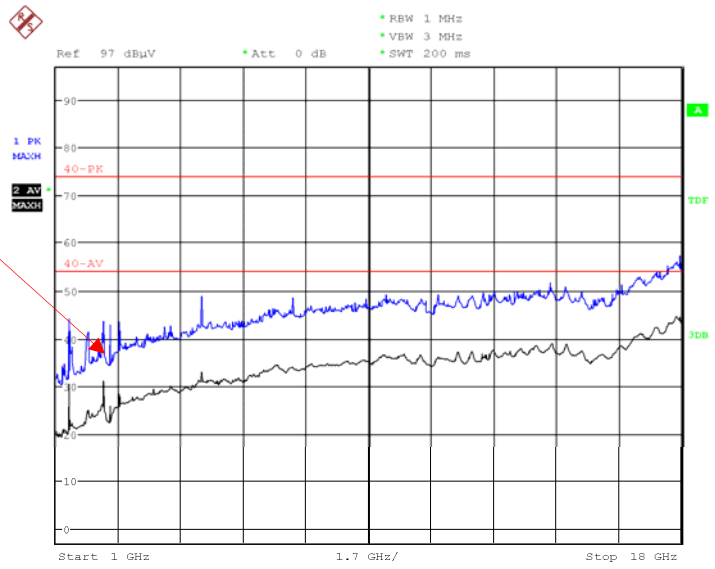
EDR Mode (π/4-DQPSK): Low Channel_Horizontal_18GHz-25GHz



Date: 22.NOV.2018 10:27:17

EDR Mode (π/4-DQPSK): Low Channel_Vertical_1GHz-18GHz

Fundamental with Reject Band Filter



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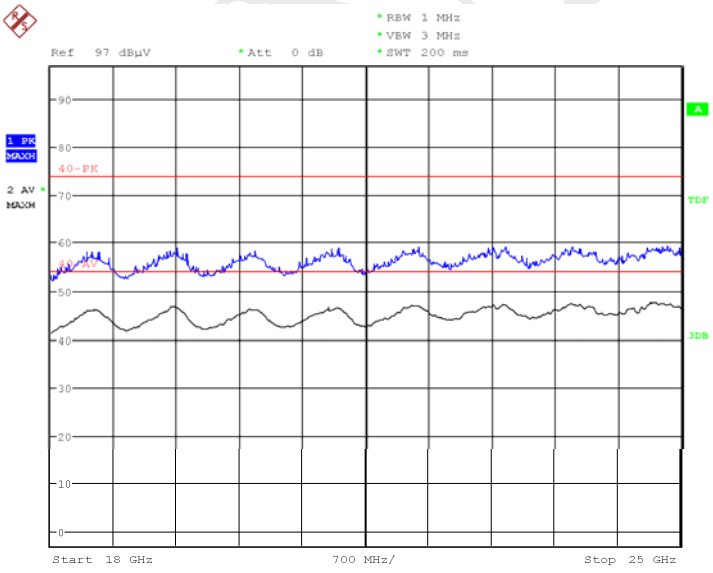
EDR Mode (π/4-DQPSK): Low Channel_Vertical_18GHz-25GHz



Date: 22.NOV.2018 10:25:32

FCC §15.247(A) (1) - CHANNEL SEPARATION TEST

Applicable Standard

Frequency hopping systems shall have hoping channel carrier frequencies separated by a minimum of 25 kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.50 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater provided the systems operate with an output power no greater than 125 mW.

Test Procedure

1. Set the EUT in transmitting mode, spectrum Bandwidth was set at 30 kHz, maxhold the channel.
2. Set the adjacent channel of the EUT maxhold another trace.
3. Measure the channel separation.

Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	56 %
ATM Pressure:	96.1 kPa

** The testing was performed by Tom Tang on 2018-11-26.*

Test Result: Compliance.

Please refer to following tables and plots.

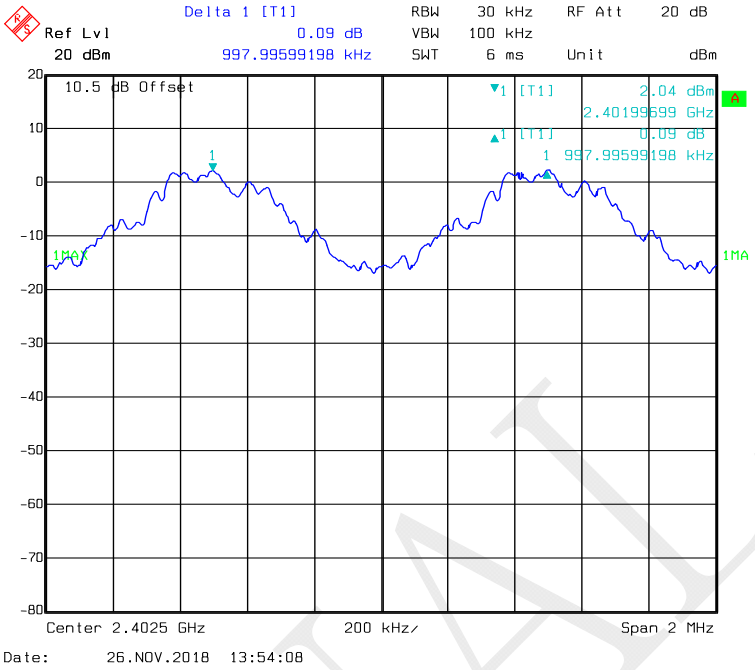
Test Mode: Transmitting

Mode	Channel	Frequency	Channel Separation	Limit
		MHz	MHz	MHz
BDR (GFSK)	Low	2402	0.998	0.71
	Adjacent	2403		
	Middle	2441	1.002	0.70
	Adjacent	2442		
	High	2480	1.002	0.70
	Adjacent	2479		
EDR (π/4-DQPSK)	Low	2402	1.002	0.90
	Adjacent	2403		
	Middle	2441	1.002	0.91
	Adjacent	2442		
	High	2480	0.998	0.90
	Adjacent	2479		
EDR (8DPSK)	Low	2402	1.006	0.89
	Adjacent	2403		
	Middle	2441	1.002	0.88
	Adjacent	2442		
	High	2480	1.006	0.87
	Adjacent	2479		

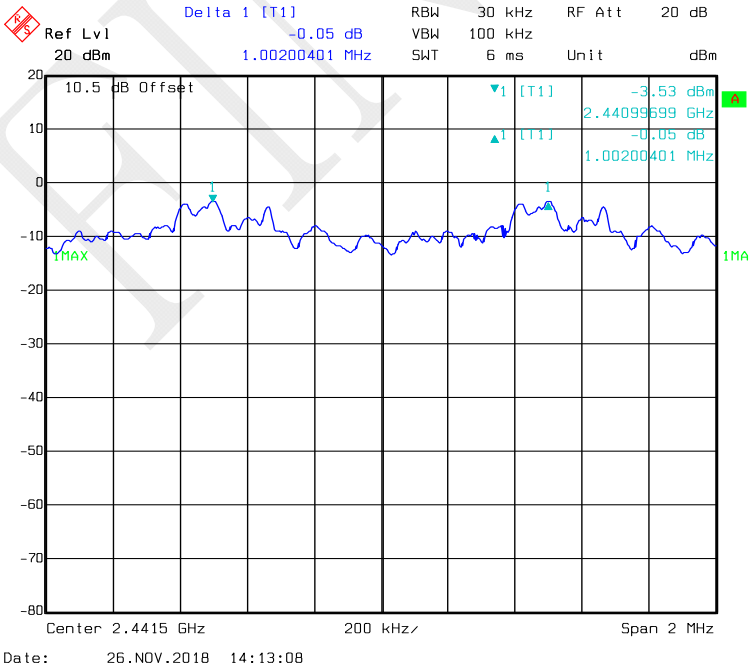
Note: Limit= (2/3) × 20dB bandwidth

BDR Mode (GFSK):

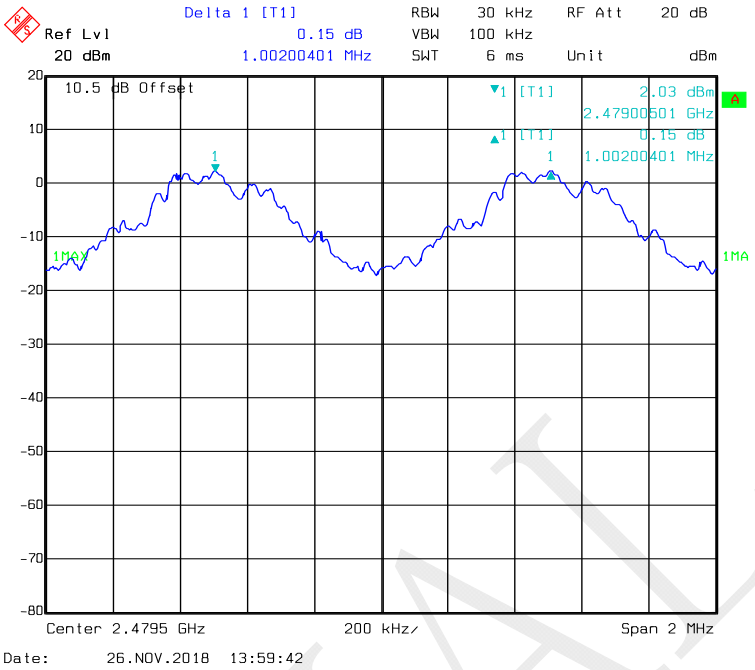
Low Channel



Middle Channel

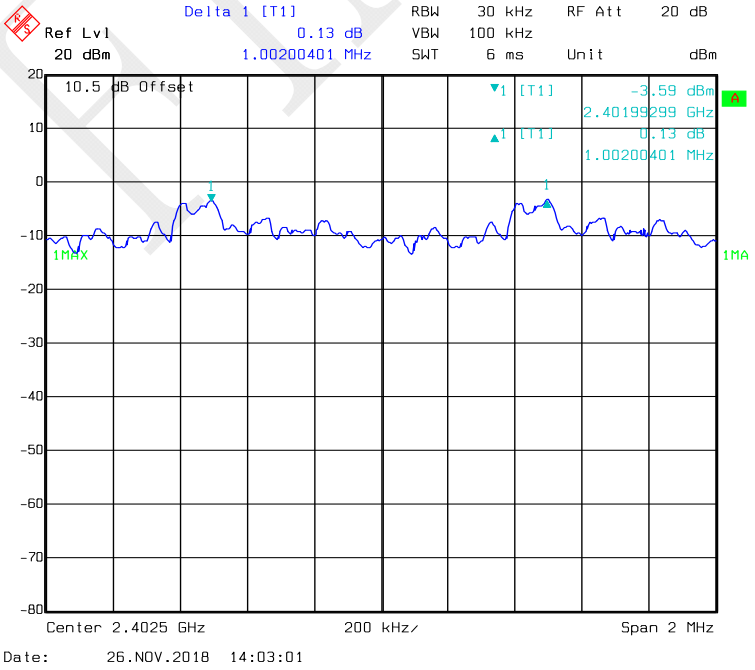


High Channel

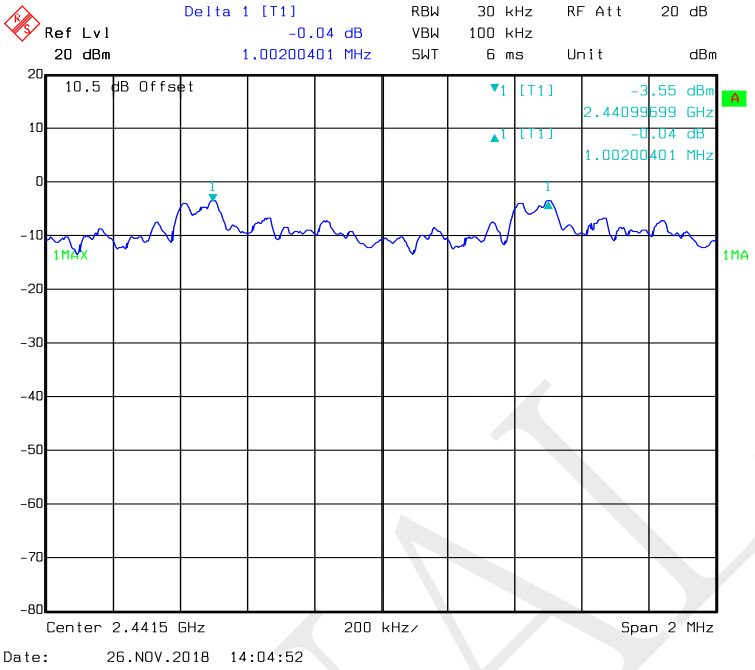


EDR Mode (π/4-DQPSK):

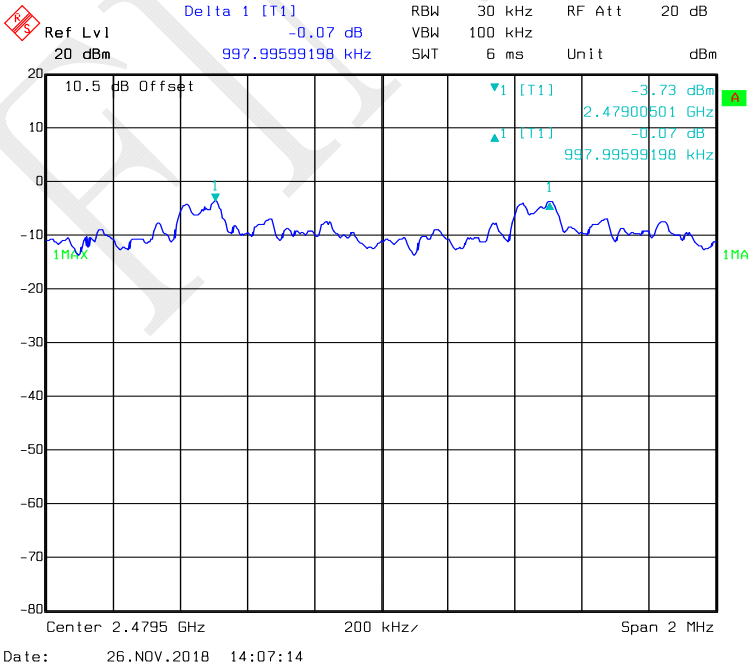
Low Channel



Middle Channel

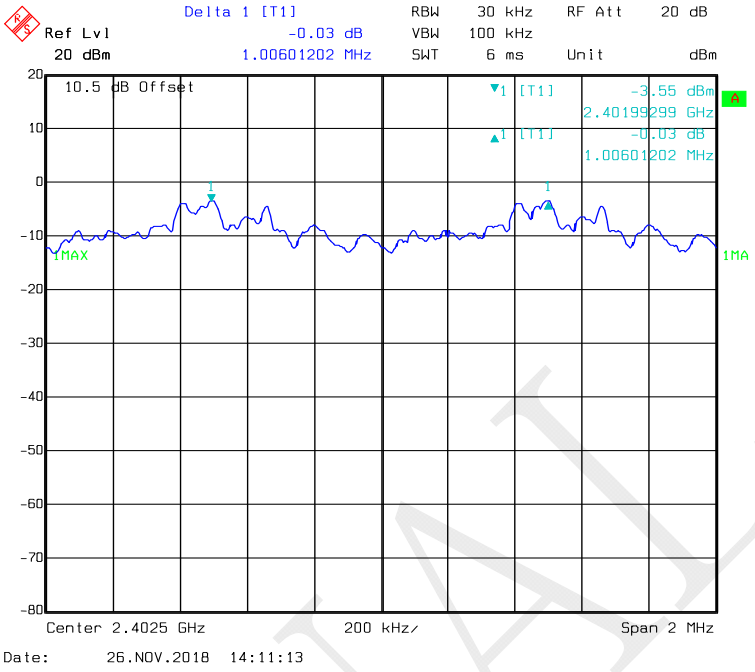


High Channel

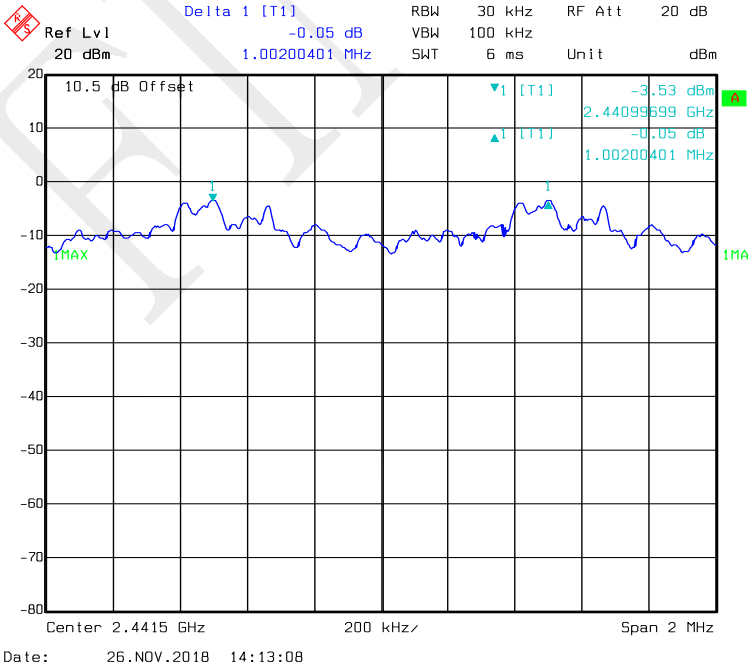


EDR Mode (8-DPSK):

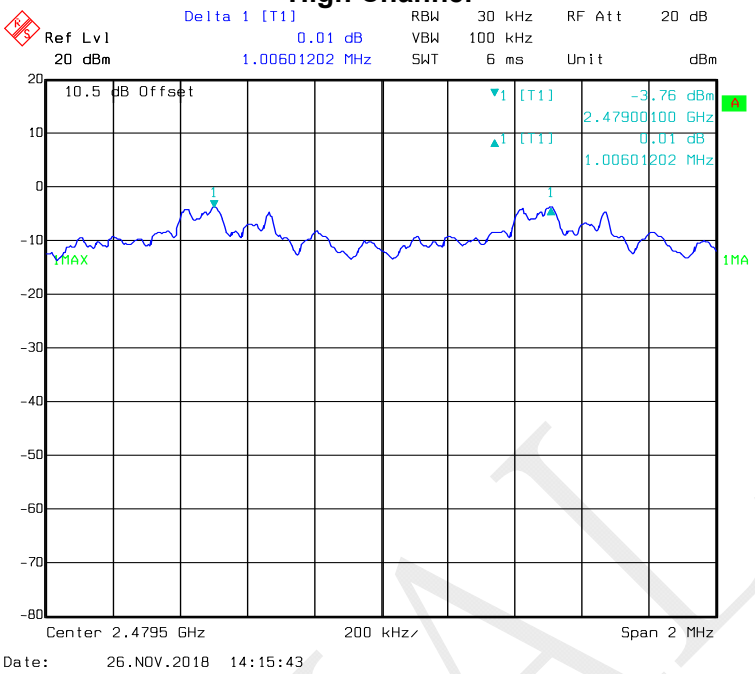
Low Channel



Middle Channel



High Channel



FCC §15.247(a) (1) – 20 dB BANDWIDTH TESTING

Applicable Standard

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.

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 on the test table without connection to measurement instrument. Turn on the EUT. 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.

Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	56 %
ATM Pressure:	96.1 kPa

** The testing was performed by Tom Tang on 2018-11-26.*

Test Result: Compliance.

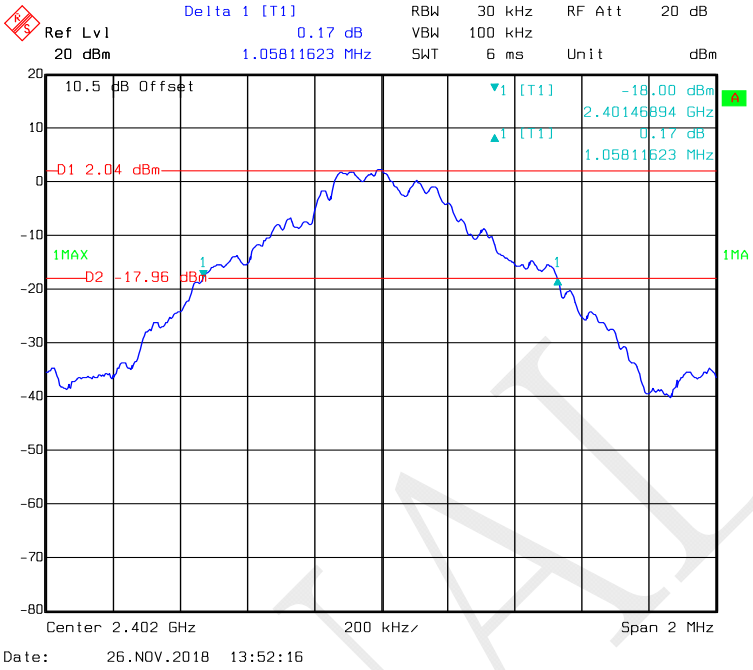
Please refer to following tables and plots

Test Mode: Transmitting

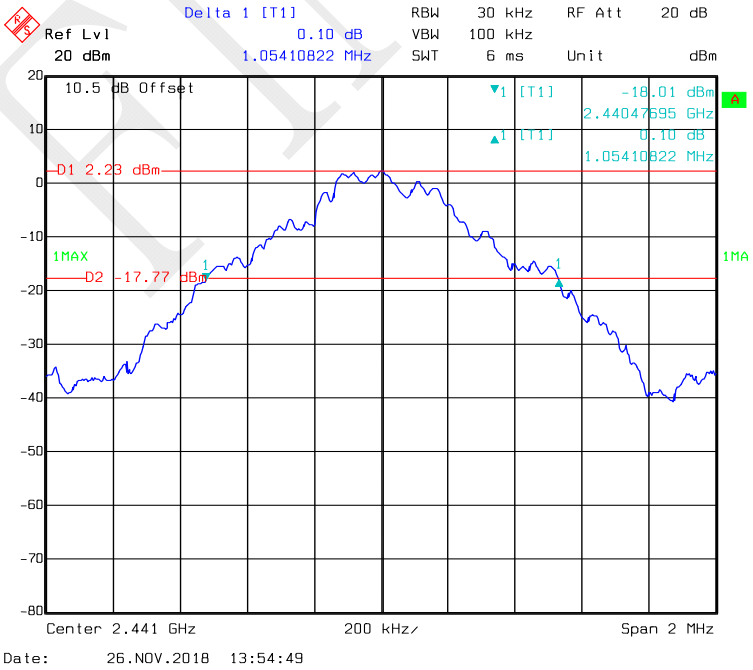
Mode	Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
BDR Mode (GFSK)	Low	2402	1.06
	Middle	2441	1.05
	High	2480	1.05
EDR Mode (π/4-DQPSK)	Low	2402	1.35
	Middle	2441	1.36
	High	2480	1.35
EDR Mode (8-DPSK)	Low	2402	1.33
	Middle	2441	1.32
	High	2480	1.31

BDR Mode (GFSK):

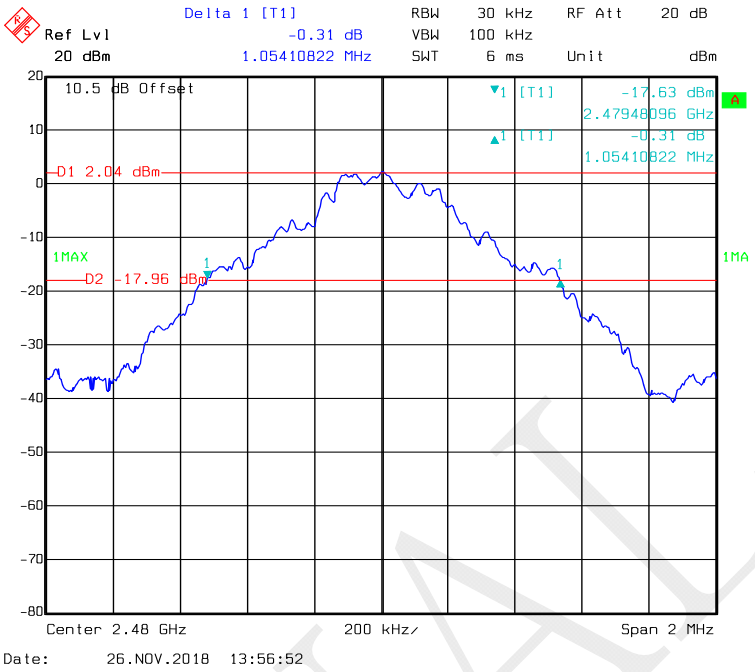
Low Channel



Middle Channel

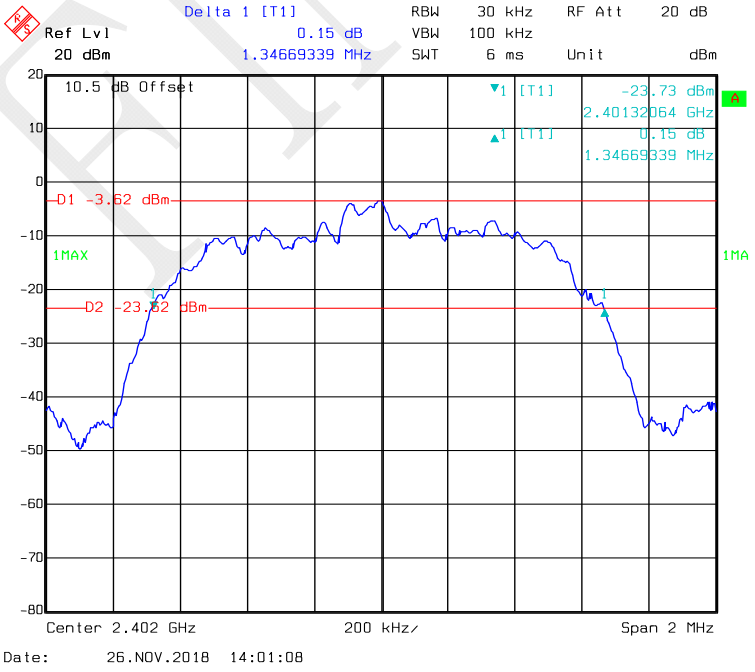


High Channel

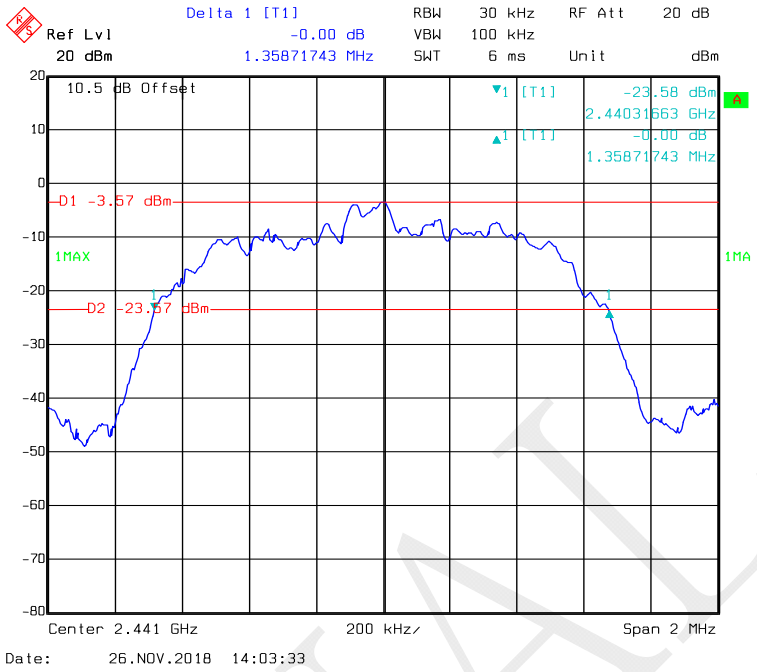


EDR Mode (π/4-DQPSK):

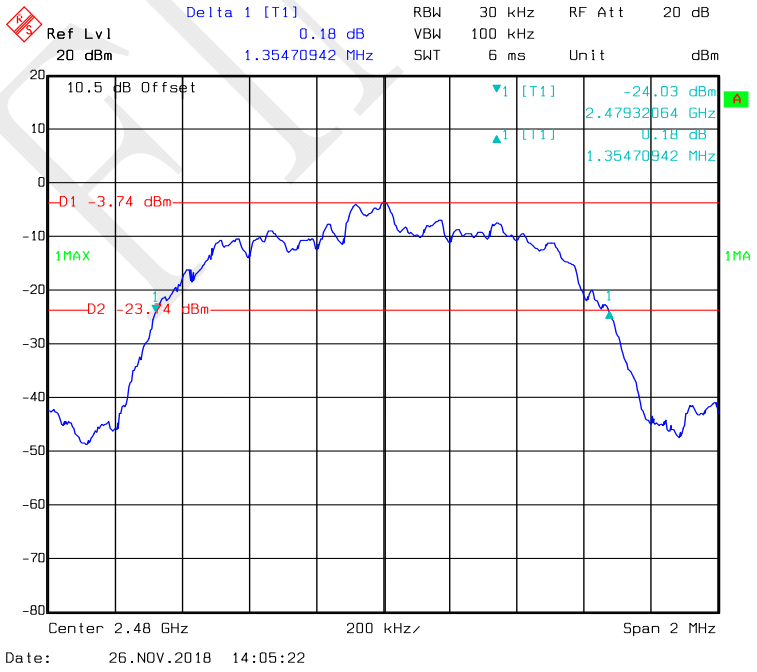
Low Channel



Middle Channel

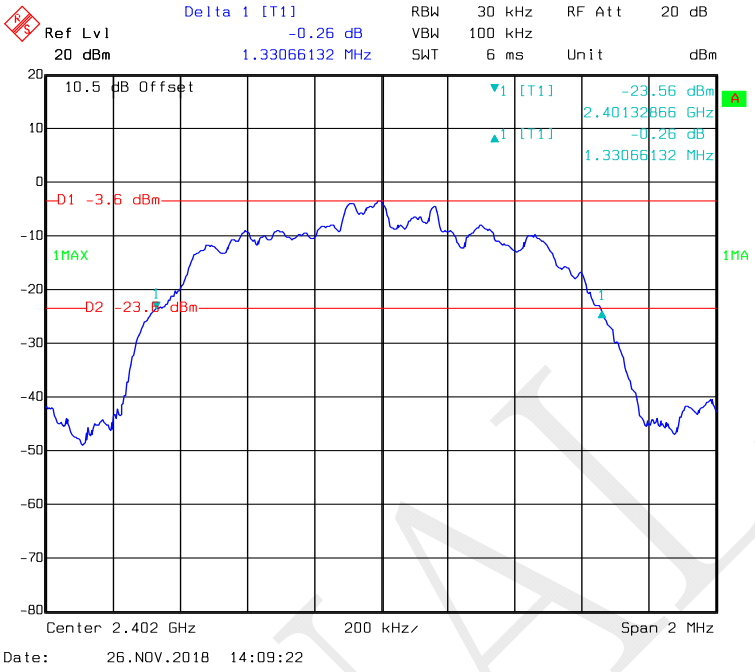


High Channel

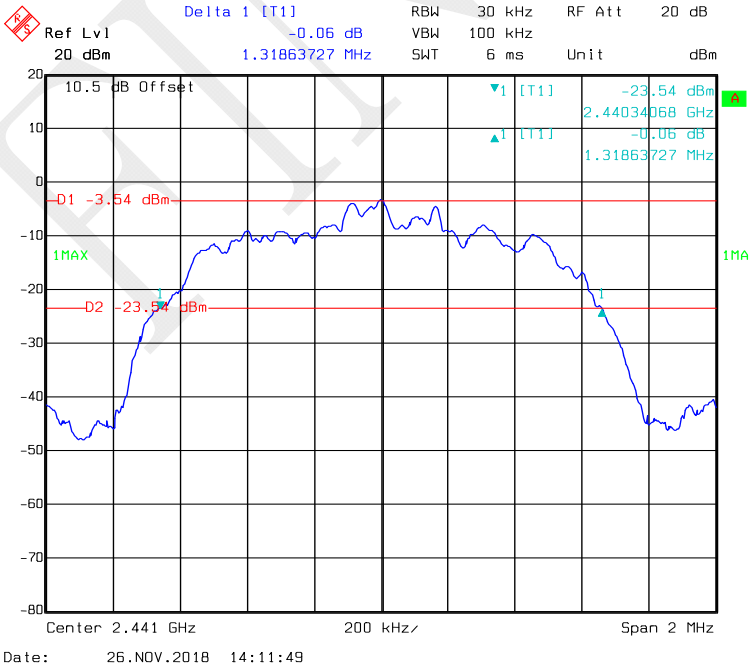


EDR Mode (8-DPSK):

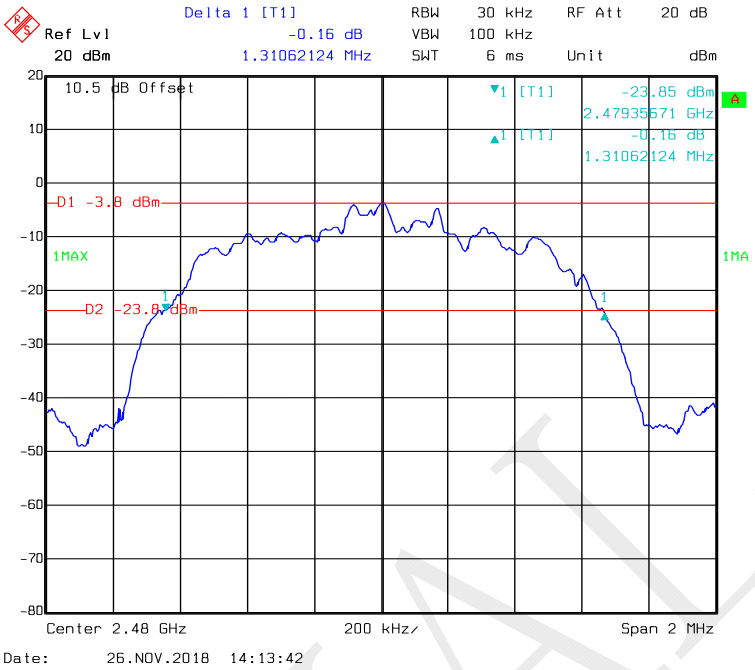
Low Channel



Middle Channel



High Channel



FCC §15.247(a) (1) (iii) - QUANTITY OF HOPPING CHANNEL TEST

Applicable Standard

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.

Test Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Set the EUT in hopping mode from first channel to last.
3. By using the Max-Hold function record the Quantity of the channel.

Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	56 %
ATM Pressure:	95.0 kPa

** The testing was performed by Tom Tang on 2018-11-26.*

Test Result: Compliance.

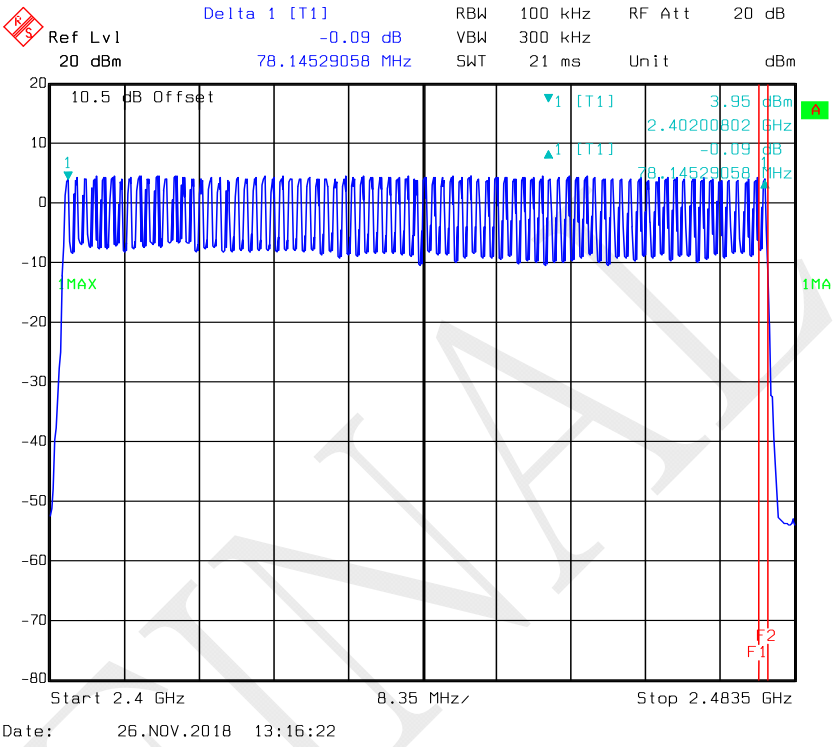
Please refer to following tables and plots.

Test Mode: Transmitting

BDR Mode (GFSK):

Frequency Range (MHz)	Number of Hopping Channel	Limit
2400-2483.5	79	≥15

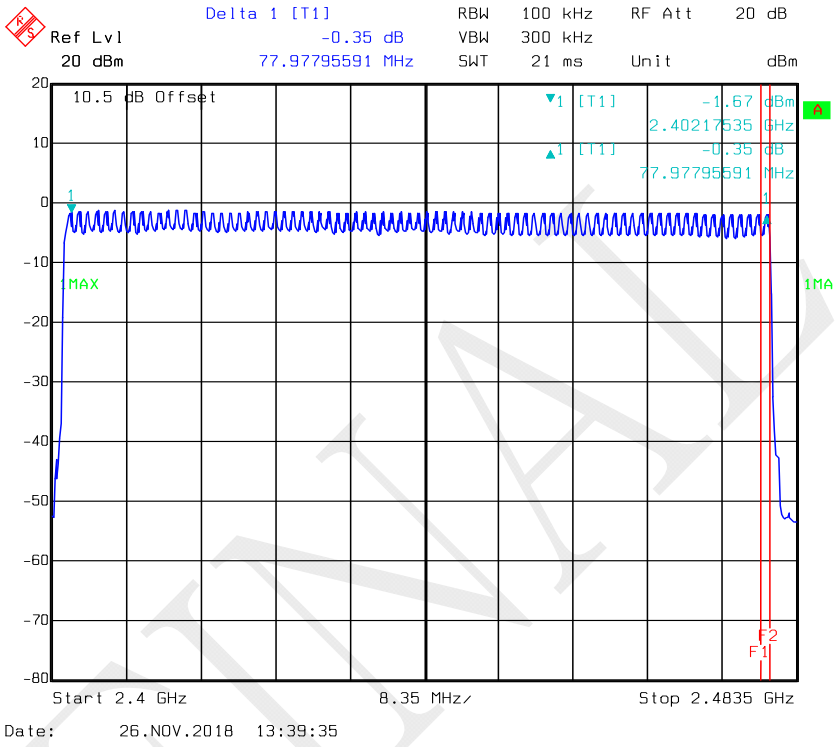
Number of Hopping Channels



EDR Mode (π/4-DQPSK):

Frequency Range (MHz)	Number of Hopping Channel	Limit
2400-2483.5	79	≥15

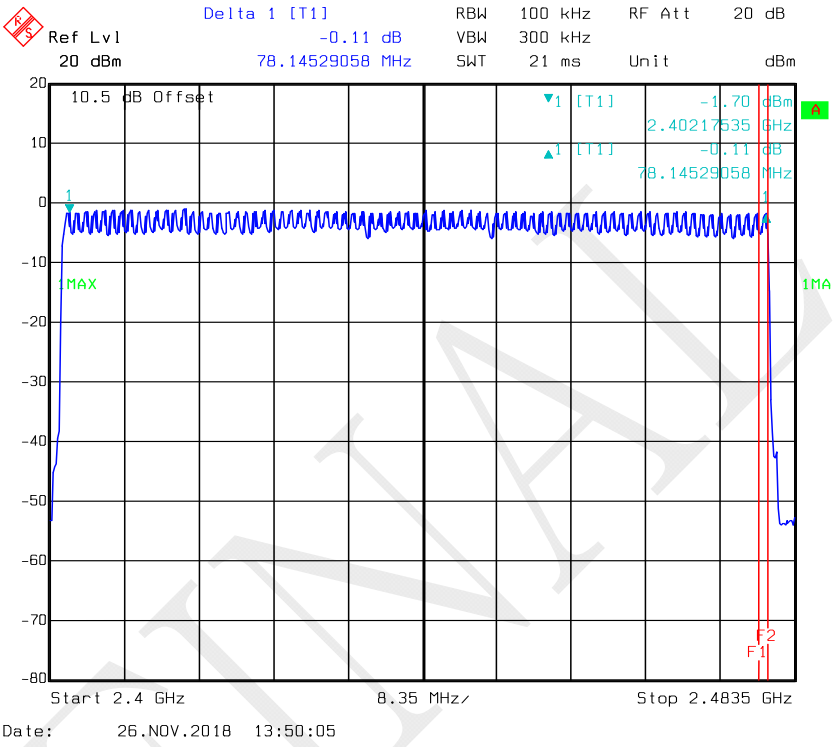
Number of Hopping Channels



EDR Mode (8-DPSK):

Frequency Range (MHz)	Number of Hopping Channel	Limit
2400-2483.5	79	≥15

Number of Hopping Channels



FCC §15.247(a) (1) (iii) - TIME OF OCCUPANCY (DWELL TIME)

Applicable Standard

Frequency hopping systems in the 2400-2483.5 MHz 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.

Test Procedure

The EUT was worked in hopping mode, Spectrum Analyzer SPAN was set as 0, the time of single pulse was tested.

Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	56 %
ATM Pressure:	96.1 kPa

** The testing was performed by Tom Tang on 2018-11-26.*

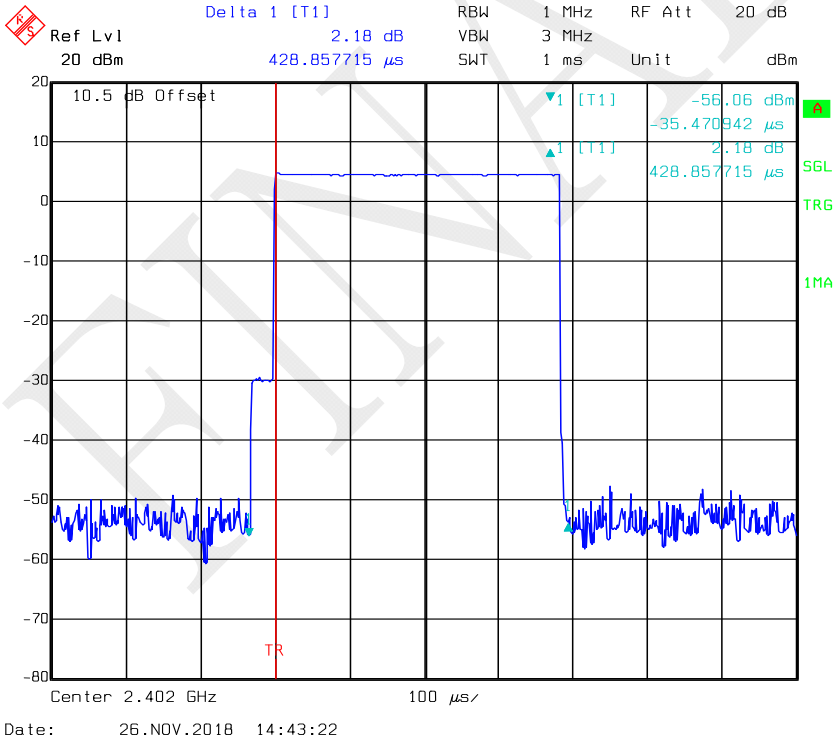
Test Result: Compliance. Please refer to following tables and plots

Test Mode: Transmitting

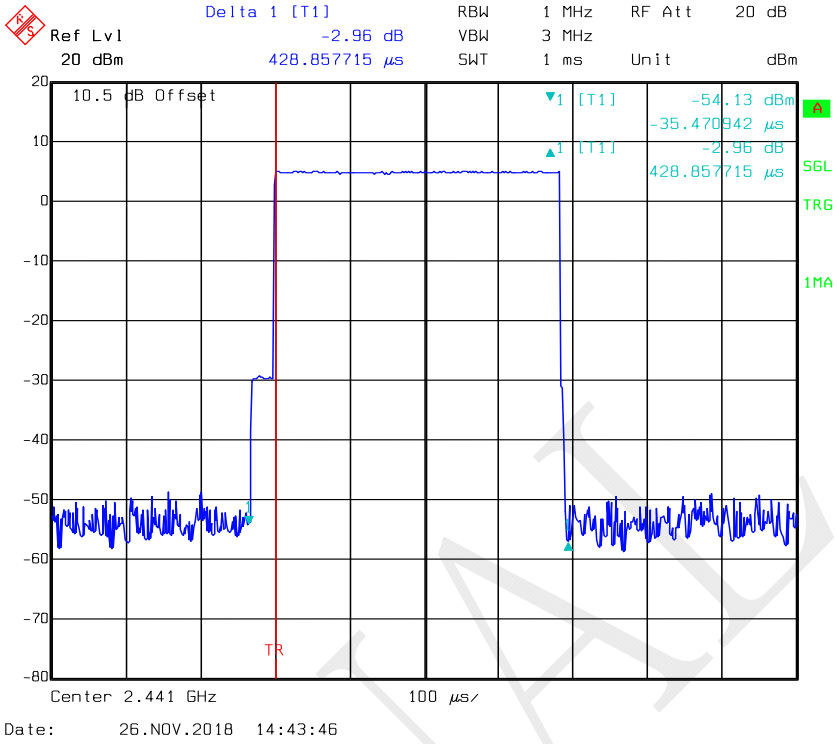
BDR Mode (GFSK):

Mode	Channel	Pulse Width (ms)	Dwell Time (s)	Limit (s)	Result
DH1	Low	0.429	0.137	0.4	Compliance
	Middle	0.429	0.137	0.4	Compliance
	High	0.429	0.137	0.4	Compliance
	Note: Dwell time=Pulse time (ms) × (1600/2/79) ×31.6 s				
DH3	Low	1.689	0.270	0.4	Compliance
	Middle	1.689	0.270	0.4	Compliance
	High	1.689	0.270	0.4	Compliance
	Note: Dwell time=Pulse time (ms) × (1600/4/79) ×31.6 s				
DH5	Low	2.946	0.314	0.4	Compliance
	Middle	2.946	0.314	0.4	Compliance
	High	2.946	0.314	0.4	Compliance
	Note: Dwell time=Pulse time (ms) × (1600/6/79) ×31.6 s				

DH1: Low Channel

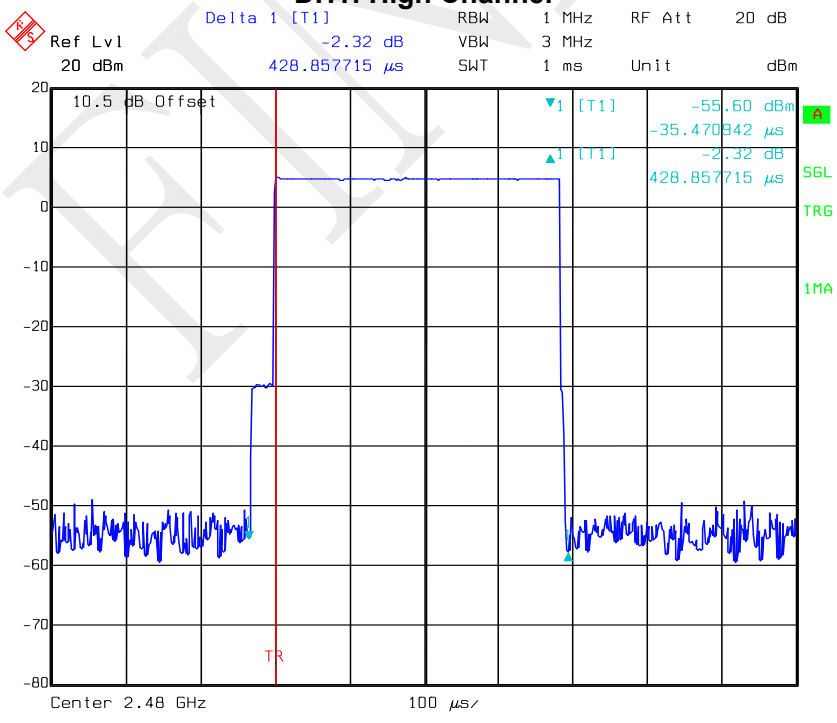


DH1: Middle Channel



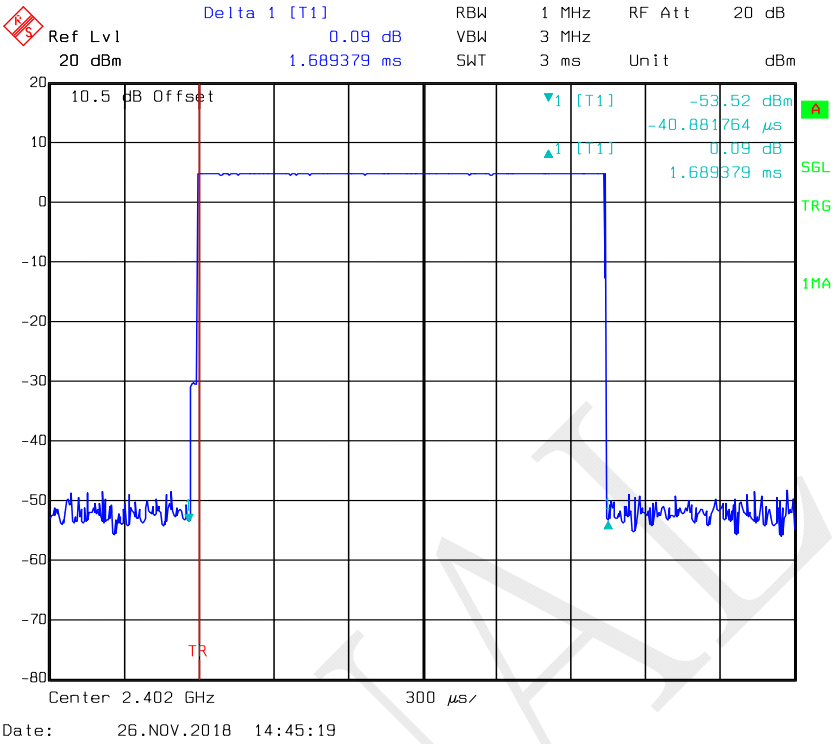
Date: 26.NOV.2018 14:43:46

DH1: High Channel



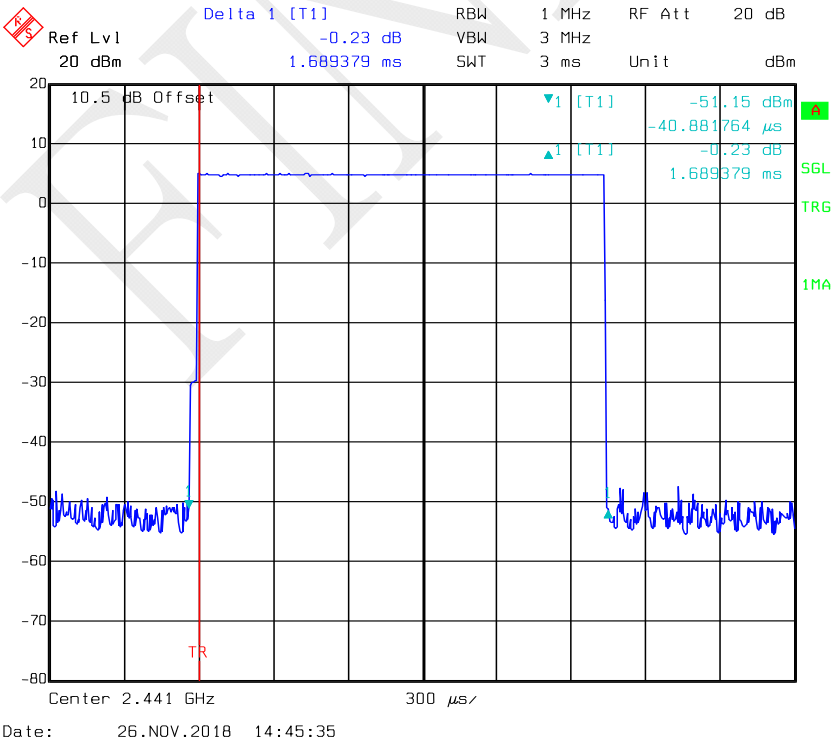
Date: 26.NOV.2018 14:43:59

DH3: Low Channel



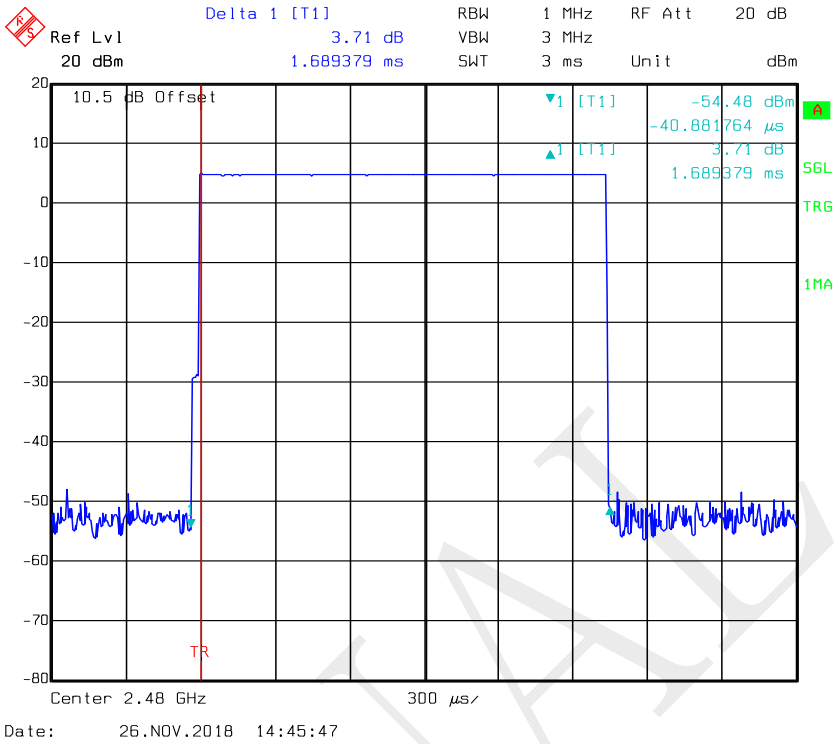
Date: 26.NOV.2018 14:45:19

DH3: Middle Channel

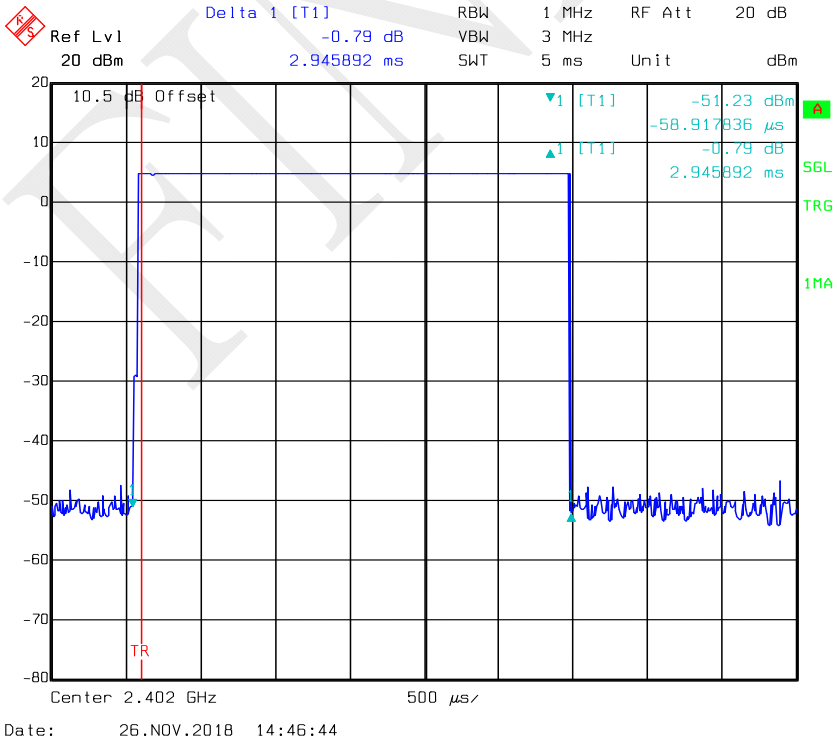


Date: 26.NOV.2018 14:45:35

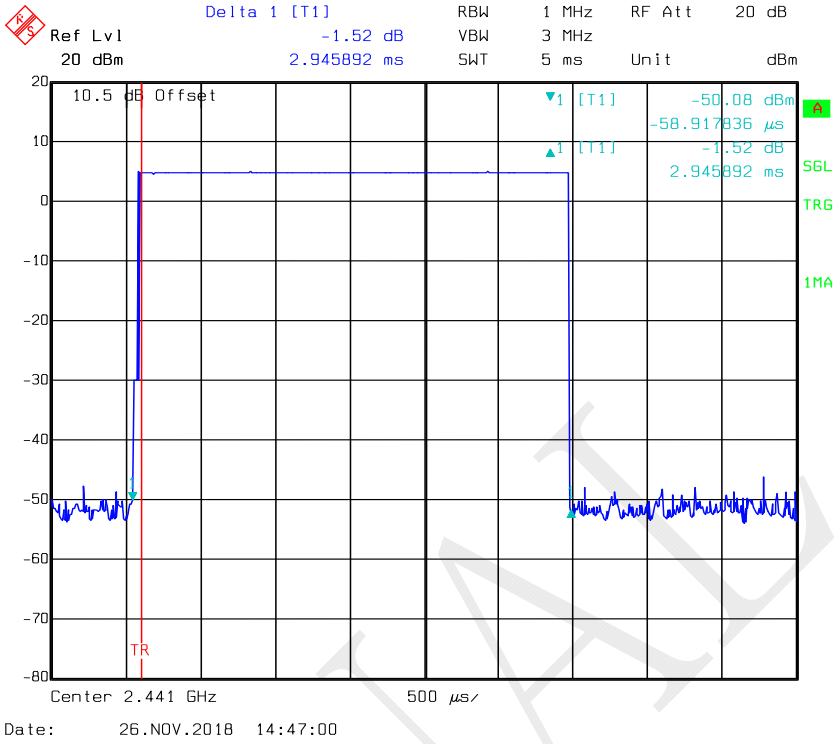
DH3: High Channel



DH5: Low Channel

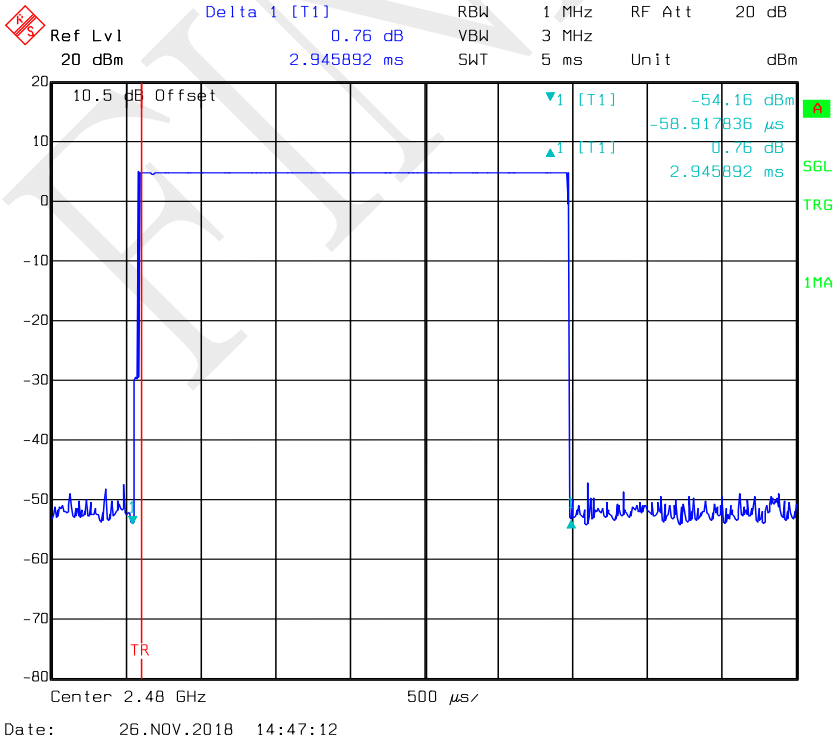


DH5: Middle Channel



Date: 26.NOV.2018 14:47:00

DH5: High Channel

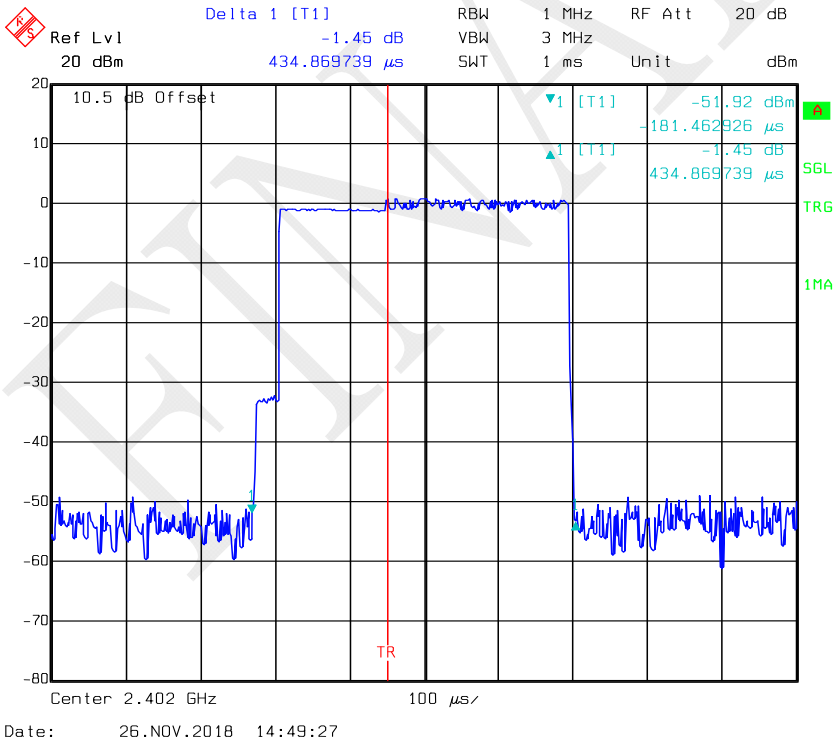


Date: 26.NOV.2018 14:47:12

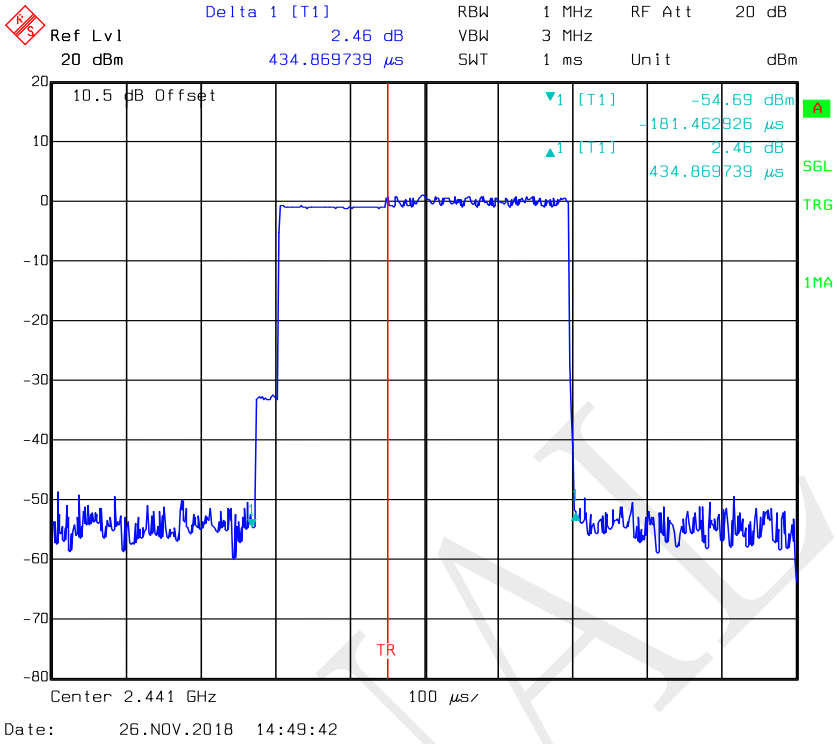
EDR Mode (π/4-DQPSK):

Mode	Channel	Pulse Width (ms)	Dwell Time (s)	Limit (s)	Result
2DH1	Low	0.435	0.139	0.4	Compliance
	Middle	0.435	0.139	0.4	Compliance
	High	0.435	0.139	0.4	Compliance
	Note: Dwell time=Pulse time (ms) × (1600/2/79) ×31.6 s				
2DH3	Low	1.696	0.271	0.4	Compliance
	Middle	1.696	0.271	0.4	Compliance
	High	1.696	0.271	0.4	Compliance
	Note: Dwell time=Pulse time (ms) × (1600/4/79) ×31.6 s				
2DH5	Low	2.956	0.315	0.4	Compliance
	Middle	2.956	0.315	0.4	Compliance
	High	2.956	0.315	0.4	Compliance
	Note: Dwell time=Pulse time (ms) × (1600/6/79) ×31.6 s				

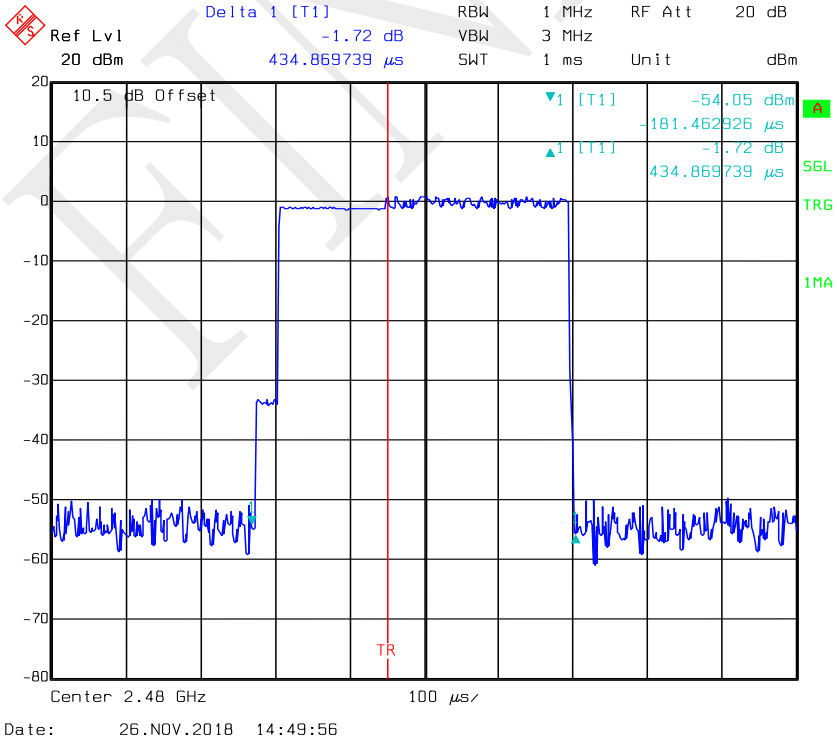
2DH1: Low Channel



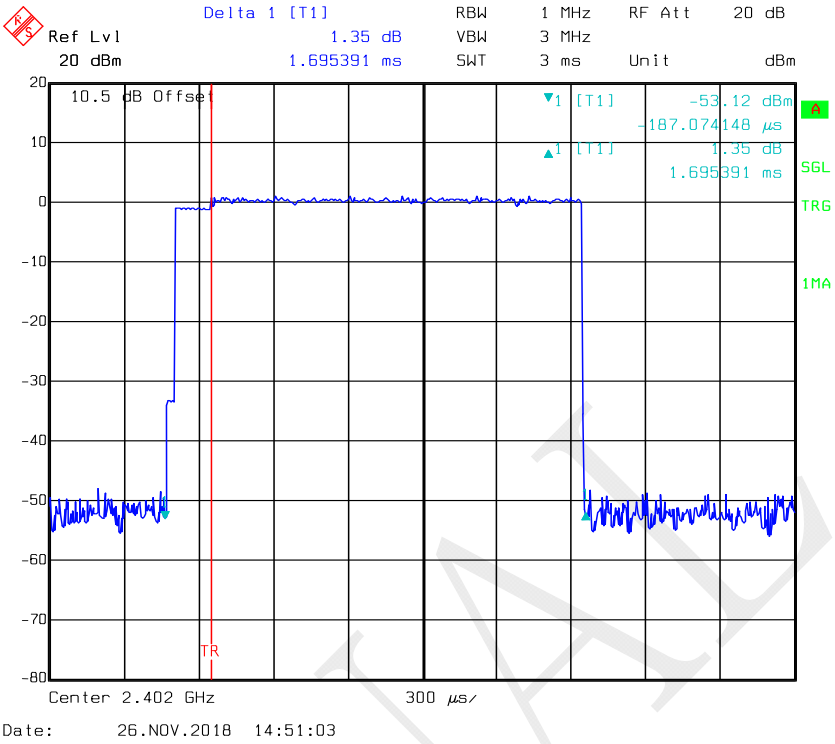
2DH1: Middle Channel



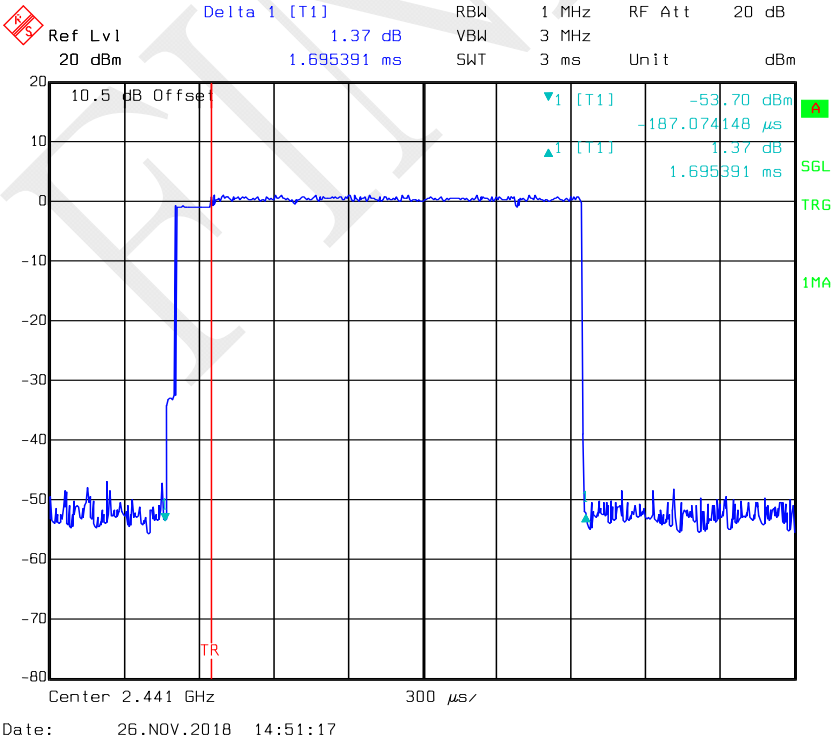
2DH1: High Channel



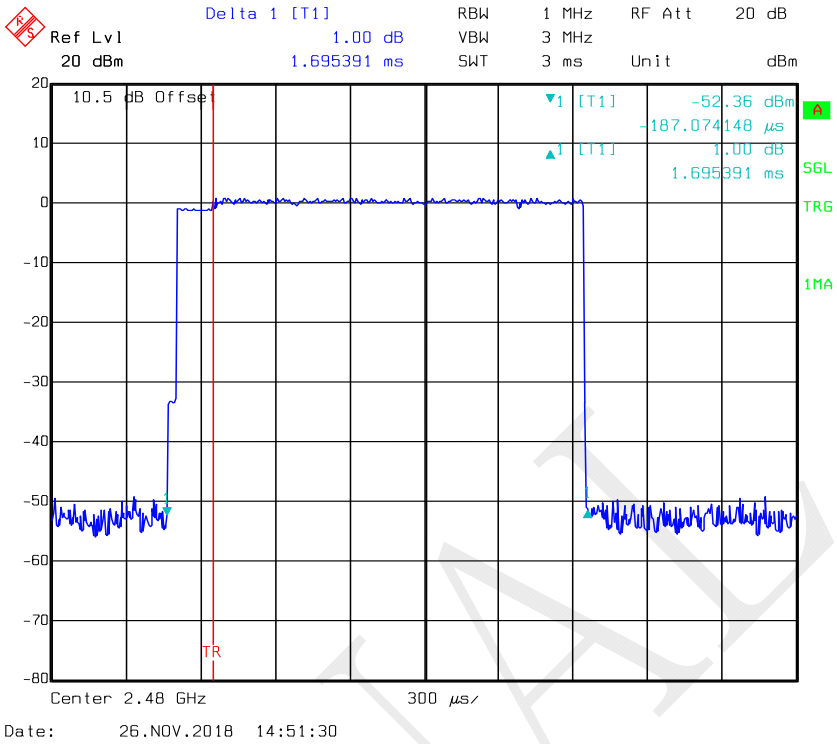
2DH3: Low Channel



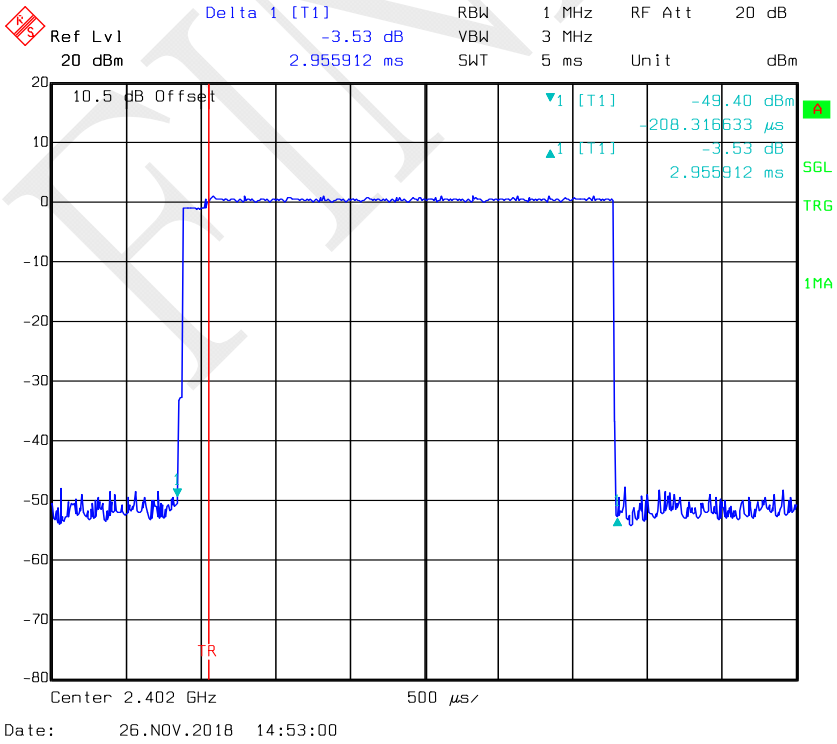
2DH3: Middle Channel



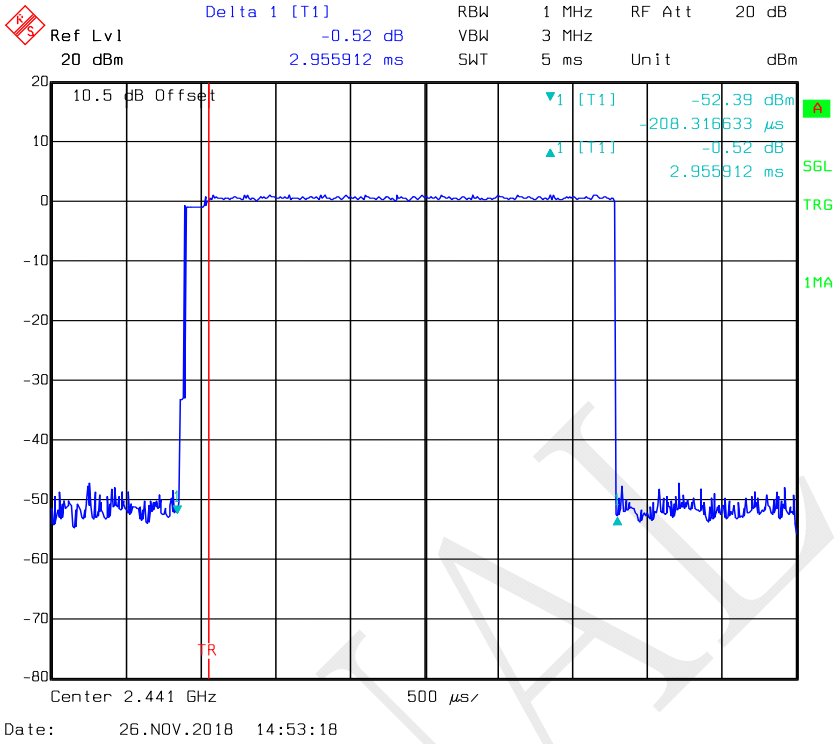
2DH3: High Channel



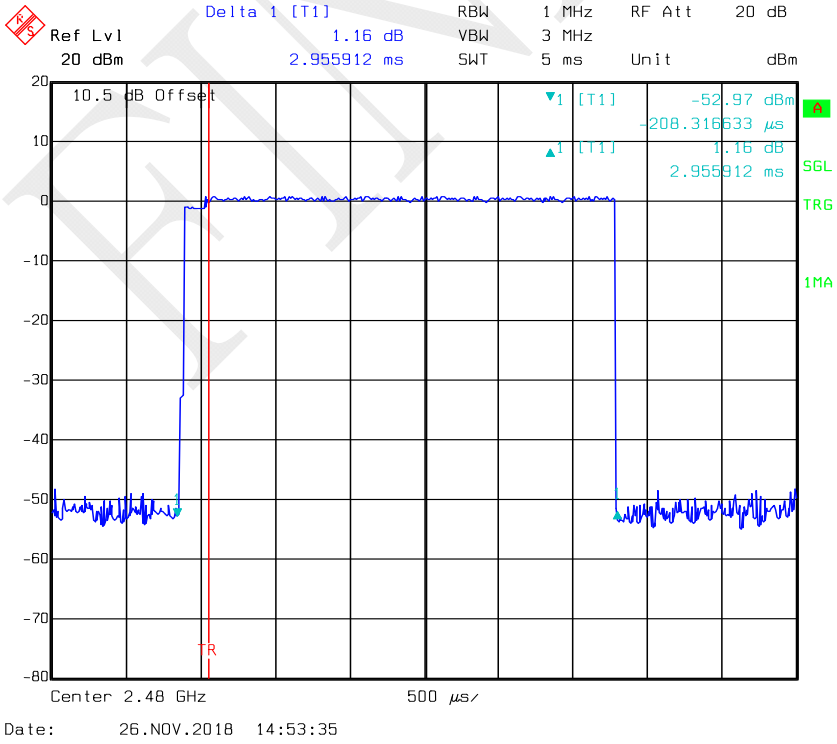
2DH5: Low Channel



2DH5: Middle Channel



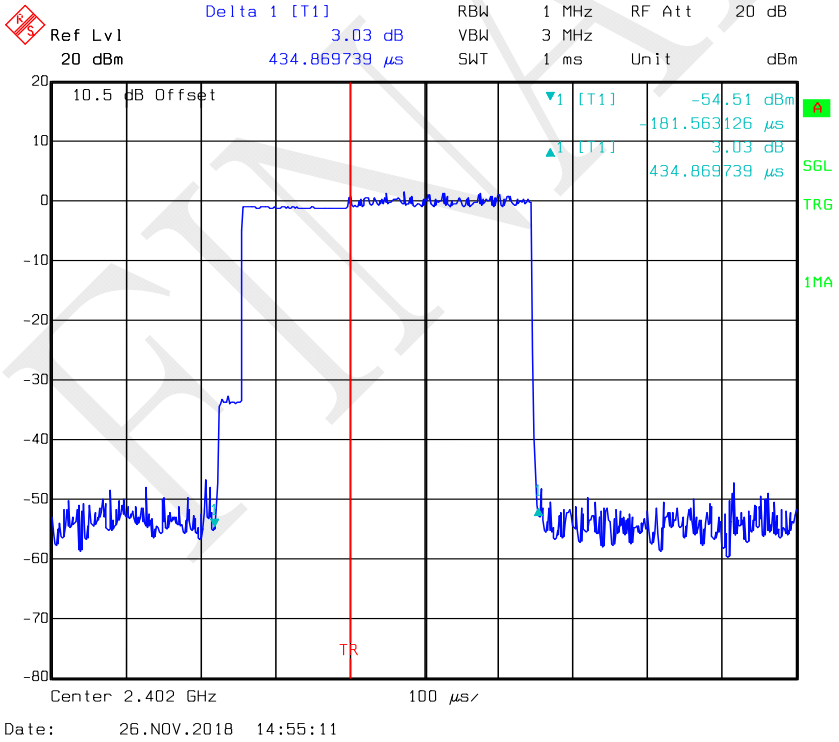
2DH5: High Channel



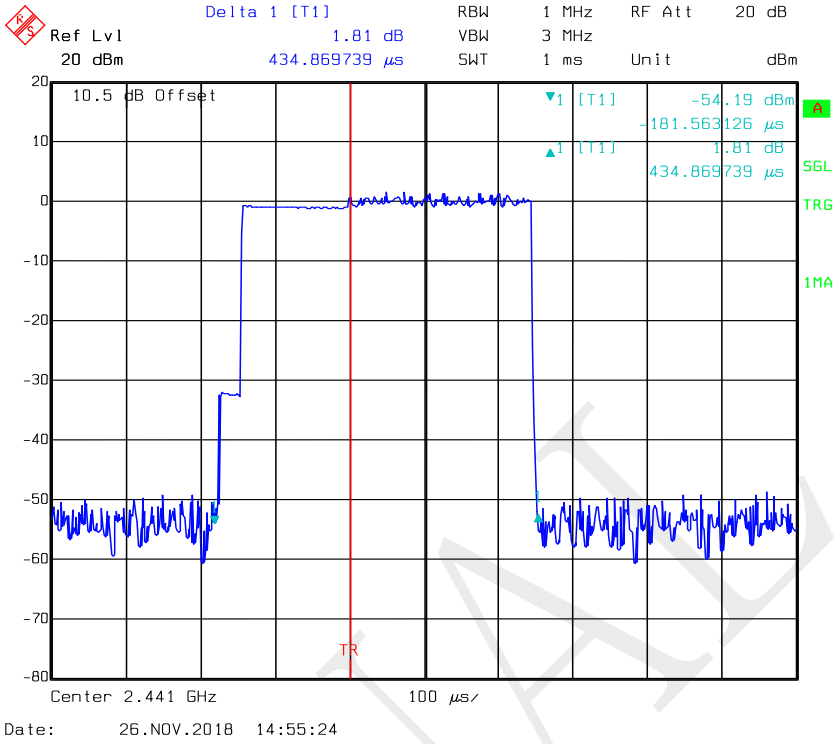
EDR Mode (8-DPSK):

Mode	Channel	Pulse Width (ms)	Dwell Time (s)	Limit (s)	Result
3DH1	Low	0.435	0.139	0.4	Compliance
	Middle	0.435	0.139	0.4	Compliance
	High	0.435	0.139	0.4	Compliance
	Note: Dwell time=Pulse time (ms) × (1600/2/79) ×31.6 s				
3DH3	Low	1.701	0.272	0.4	Compliance
	Middle	1.701	0.272	0.4	Compliance
	High	1.701	0.272	0.4	Compliance
	Note: Dwell time=Pulse time (ms) × (1600/4/79) ×31.6 s				
3DH5	Low	2.946	0.314	0.4	Compliance
	Middle	2.946	0.314	0.4	Compliance
	High	2.946	0.314	0.4	Compliance
	Note: Dwell time=Pulse time (ms) × (1600/6/79) ×31.6 s				

3DH1: Low Channel

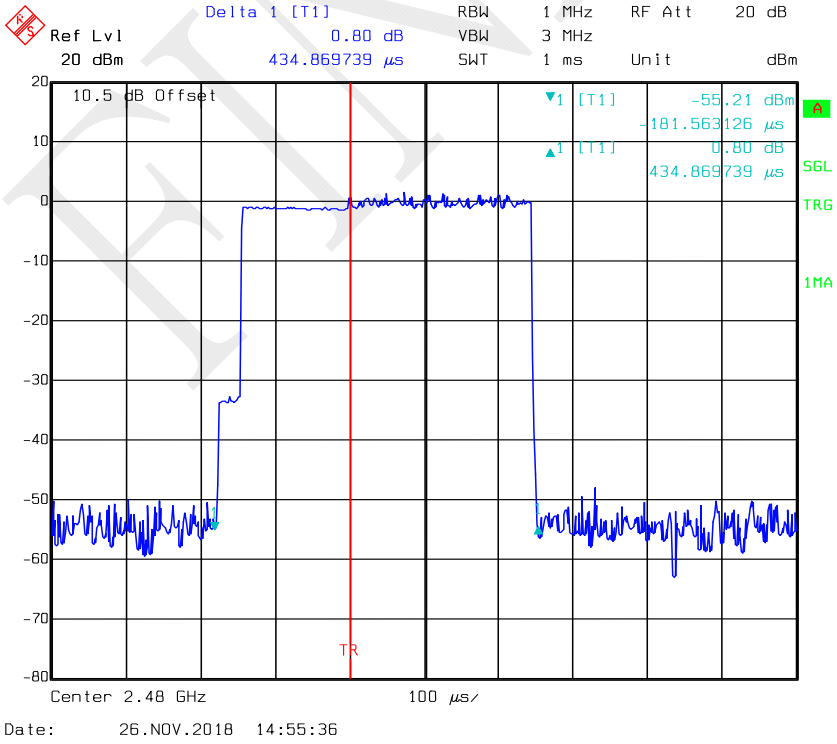


3DH1: Middle Channel



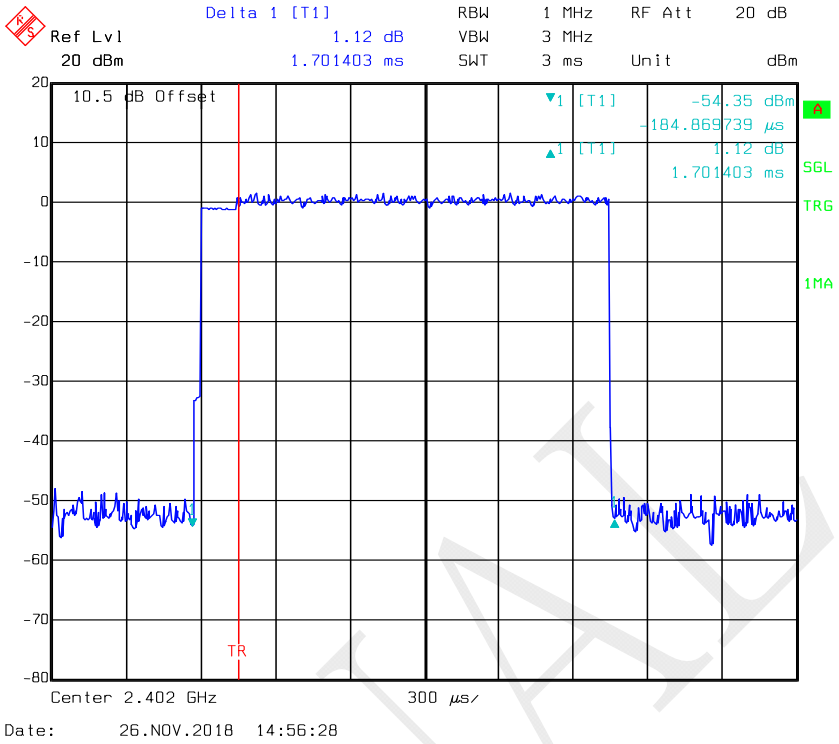
Date: 26.NOV.2018 14:55:24

3DH1: High Channel



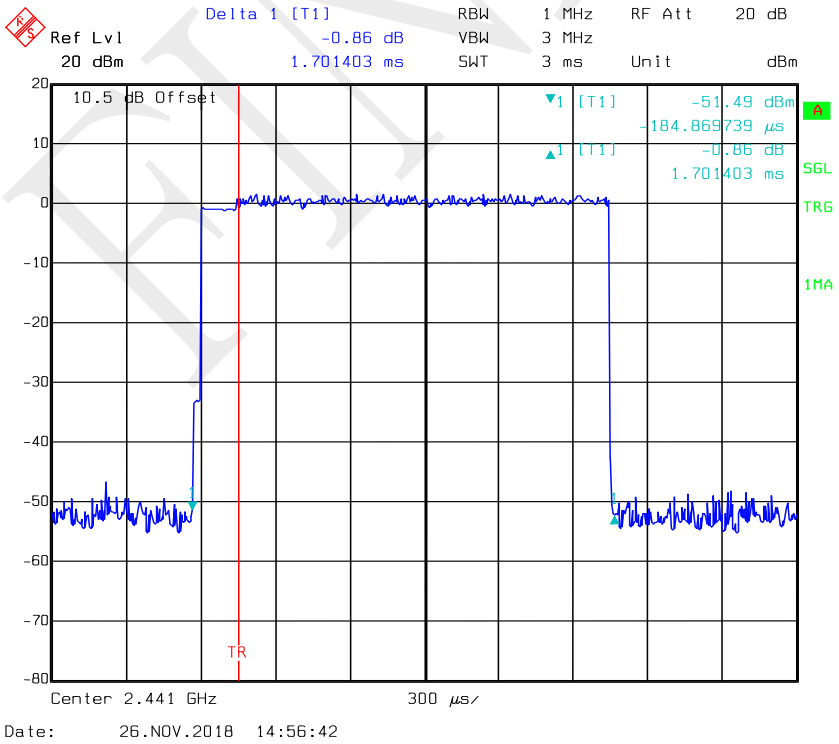
Date: 26.NOV.2018 14:55:36

3DH3: Low Channel



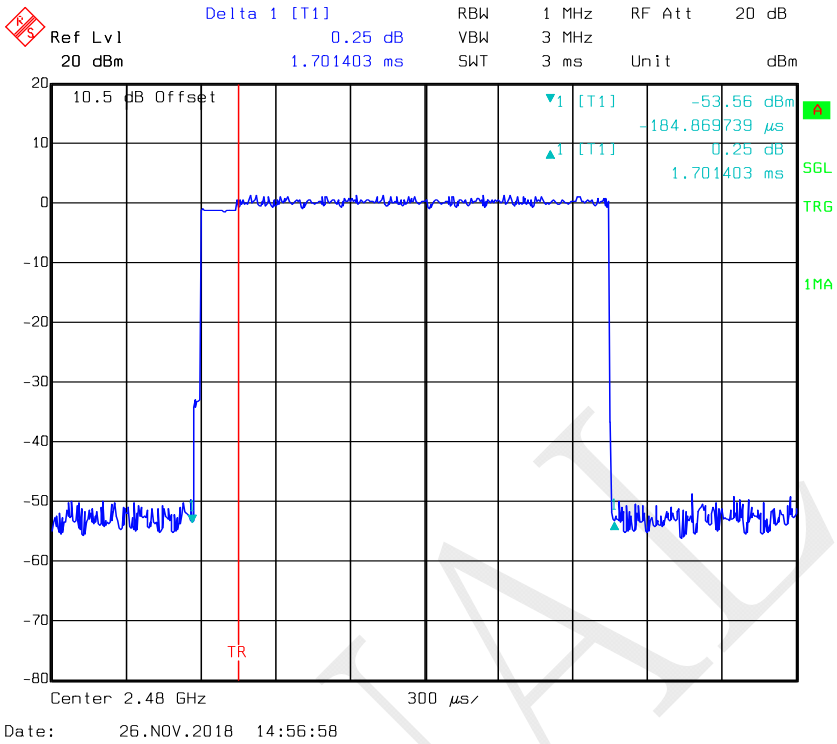
Date: 26.NOV.2018 14:56:28

3DH3: Middle Channel



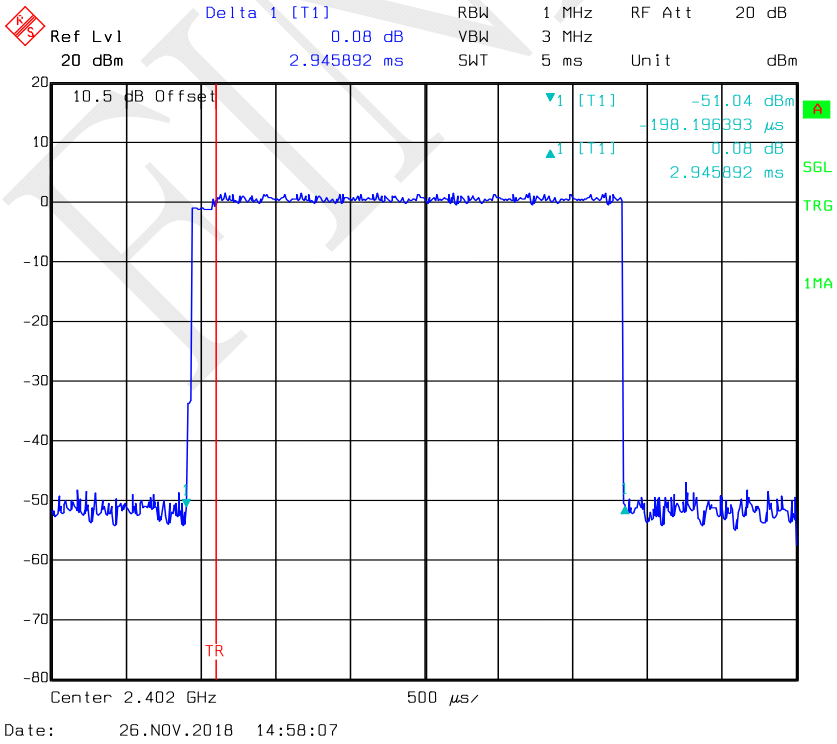
Date: 26.NOV.2018 14:56:42

3DH3: High Channel



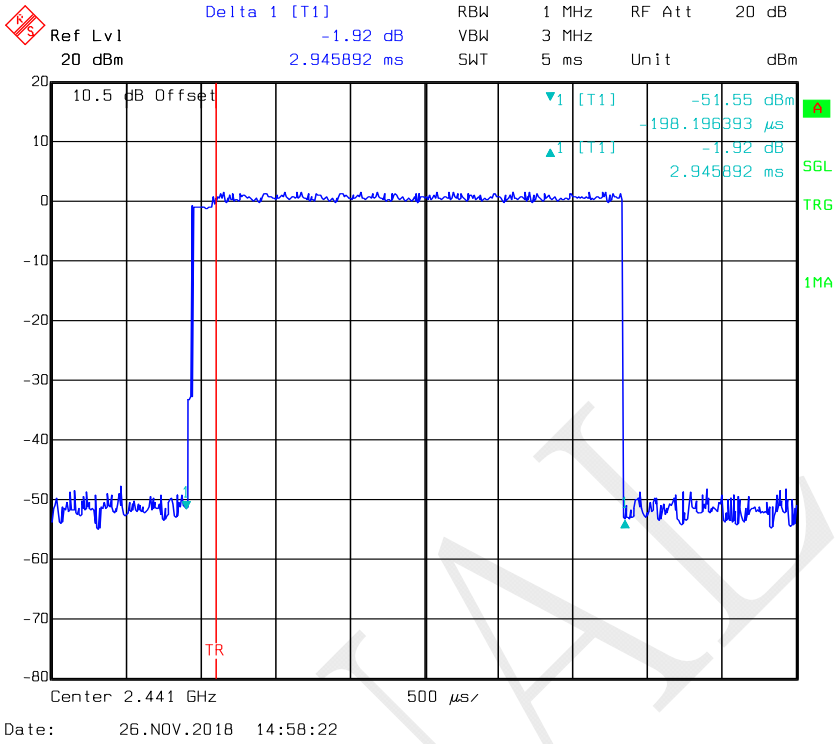
Date: 26.NOV.2018 14:56:58

3DH5: Low Channel



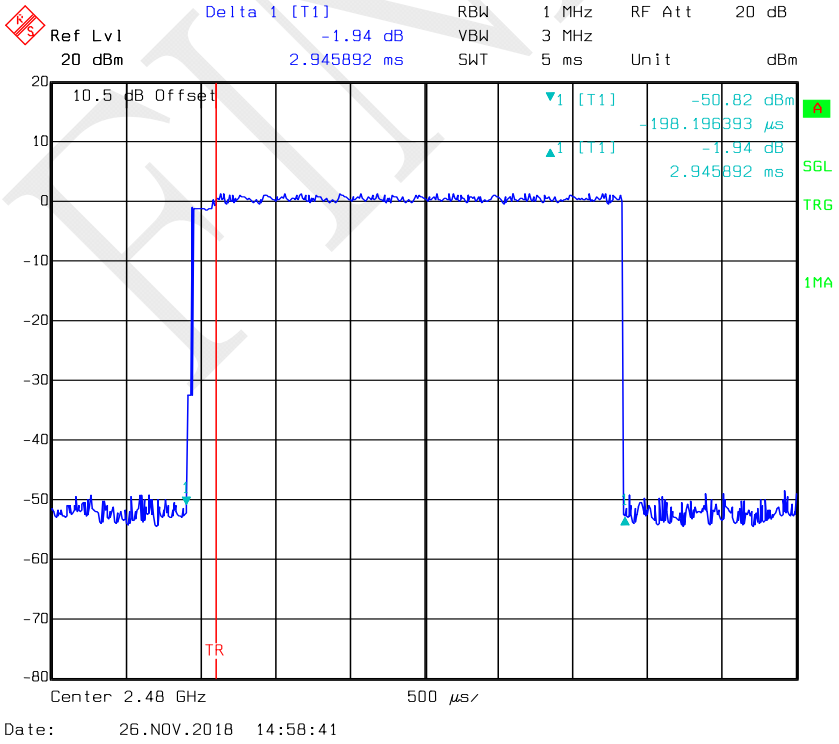
Date: 26.NOV.2018 14:58:07

3DH5: Middle Channel



Date: 26.NOV.2018 14:58:22

3DH5: High Channel



Date: 26.NOV.2018 14:58:41

FCC §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT

Applicable Standard

According to §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.

Test Procedure

1. Place the EUT on a bench and set in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.
3. Add a correction factor to the display.

Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	56 %
ATM Pressure:	96.1 kPa

** The testing was performed by Tom Tang on 2018-11-26.*

Test Result: Compliance. Please refer to following tables and plots

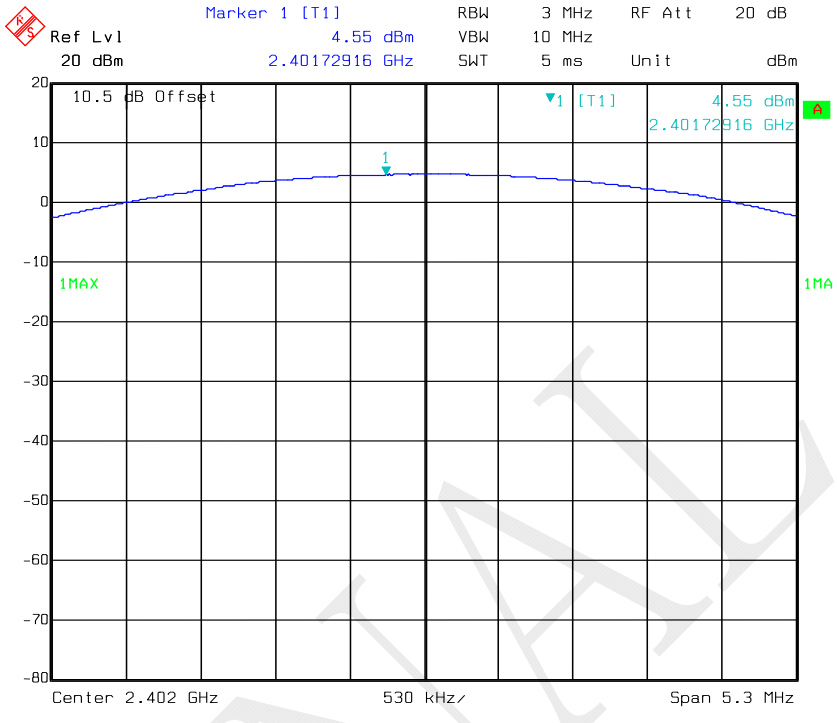
Test Mode: Transmitting

Mode	Channel	Frequency (MHz)	Peak Output power (dBm)	Limit (dBm)
BDR Mode (GFSK)	Low	2402	4.55	30
	Middle	2441	4.69	30
	High	2480	4.55	30
EDR Mode (π/4-DQPSK)	Low	2402	1.10	30
	Middle	2441	1.10	30
	High	2480	0.85	30
EDR Mode (8-DPSK)	Low	2402	1.74	30
	Middle	2441	1.74	30
	High	2480	1.49	30

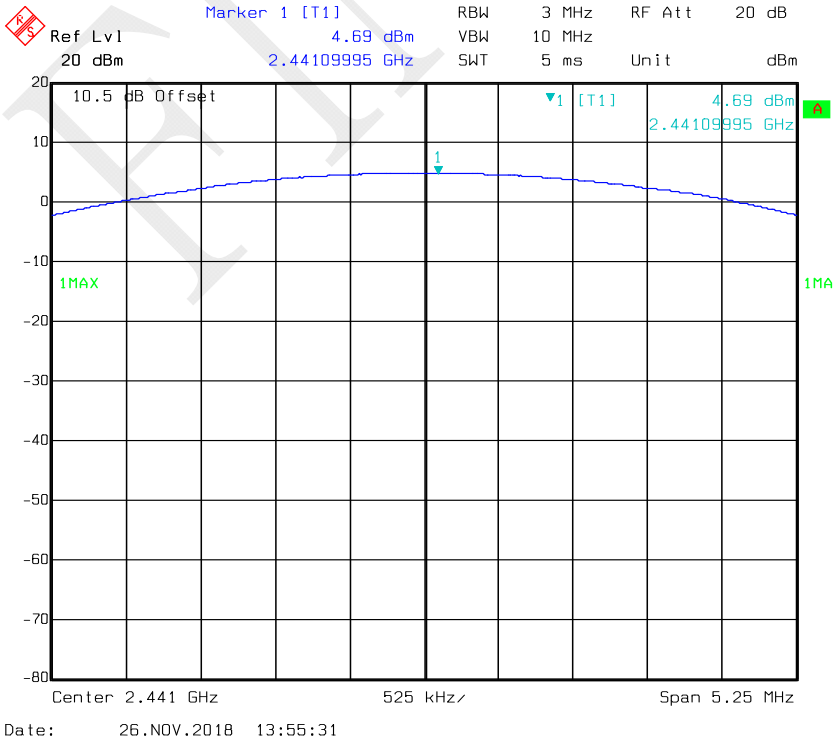
Note: The data above was tested in conducted mode.

BDR Mode (GFSK):

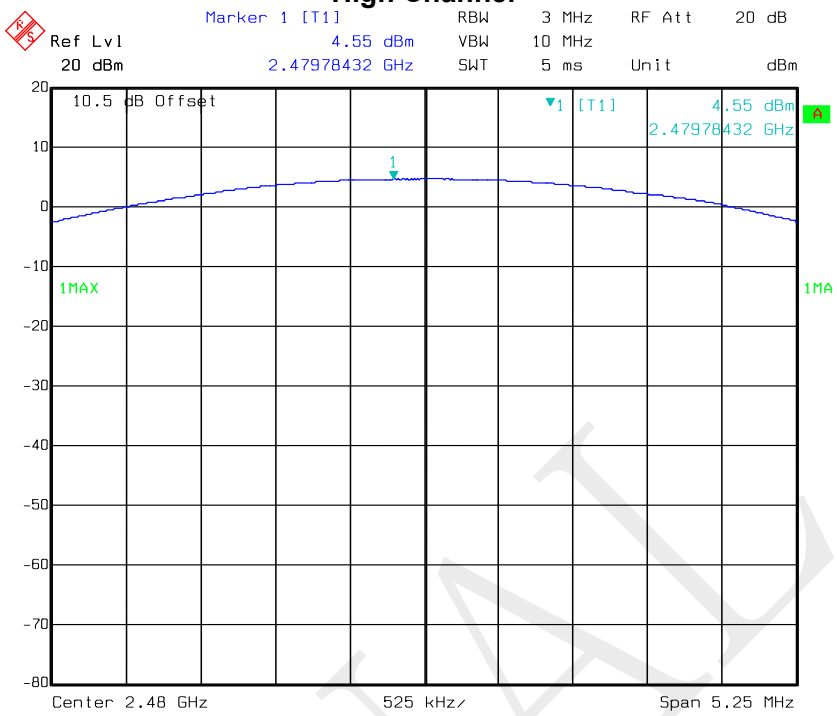
Low Channel



Middle Channel

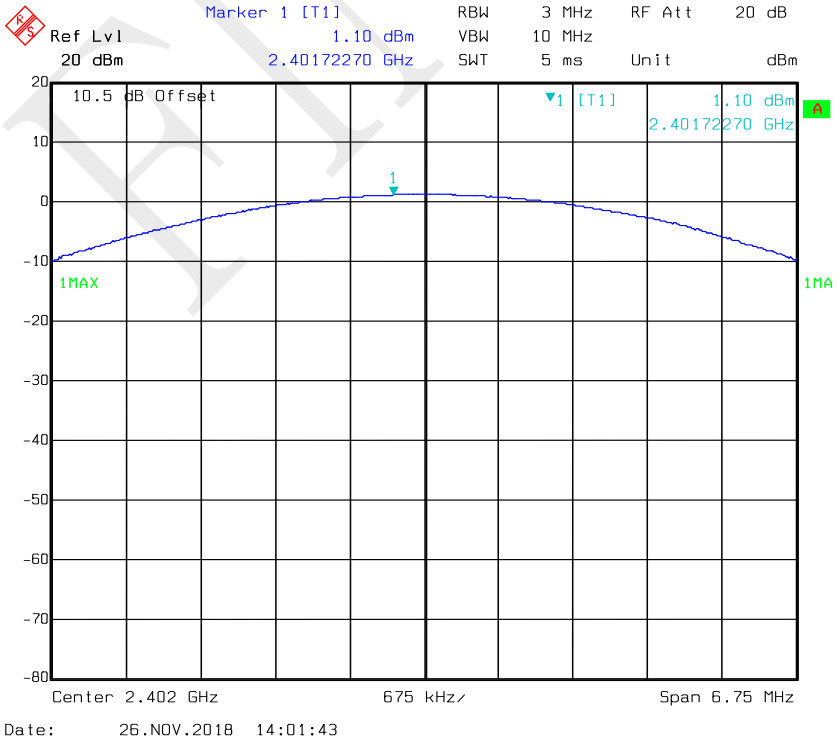


High Channel

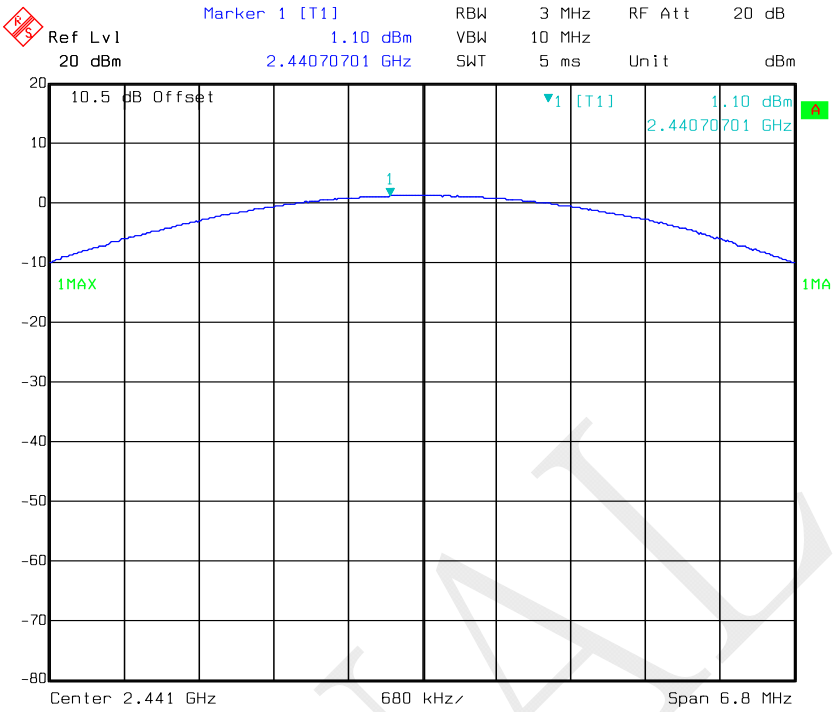


EDR Mode (π/4-DQPSK):

Low Channel

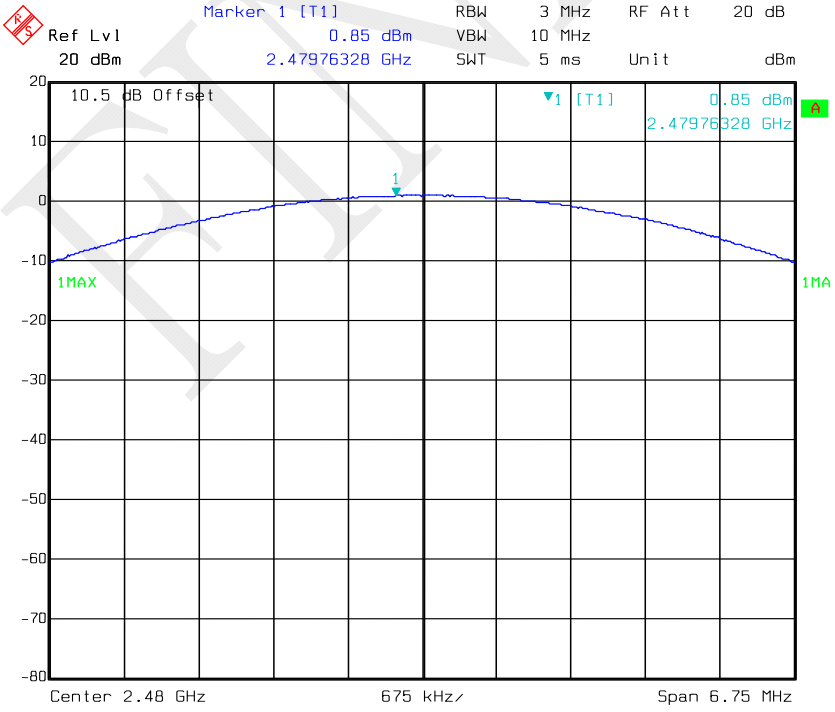


Middle Channel



Date: 26.NOV.2018 14:04:12

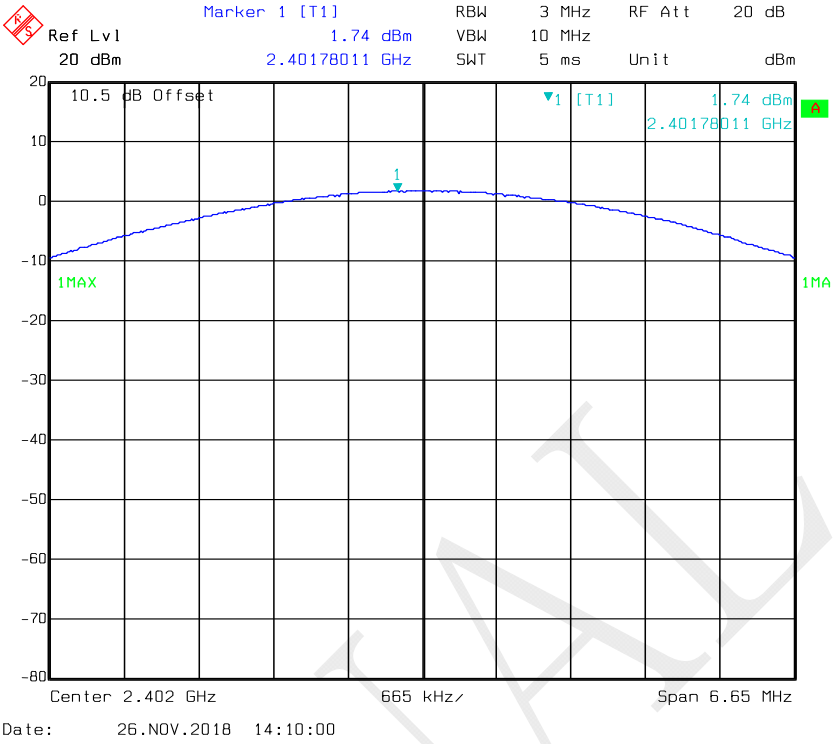
High Channel



Date: 26.NOV.2018 14:06:03

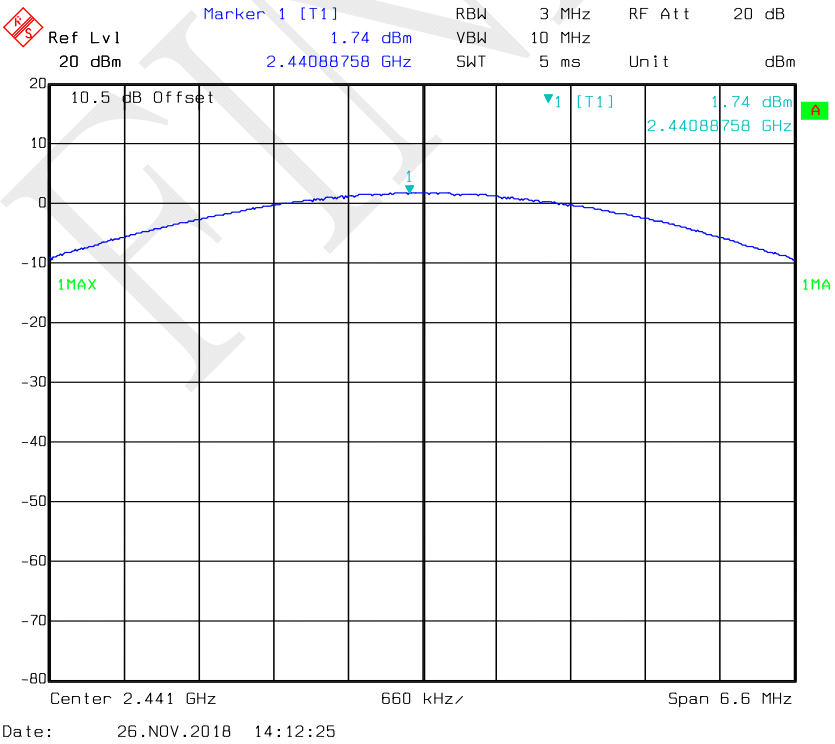
EDR Mode (8-DPSK):

Low Channel



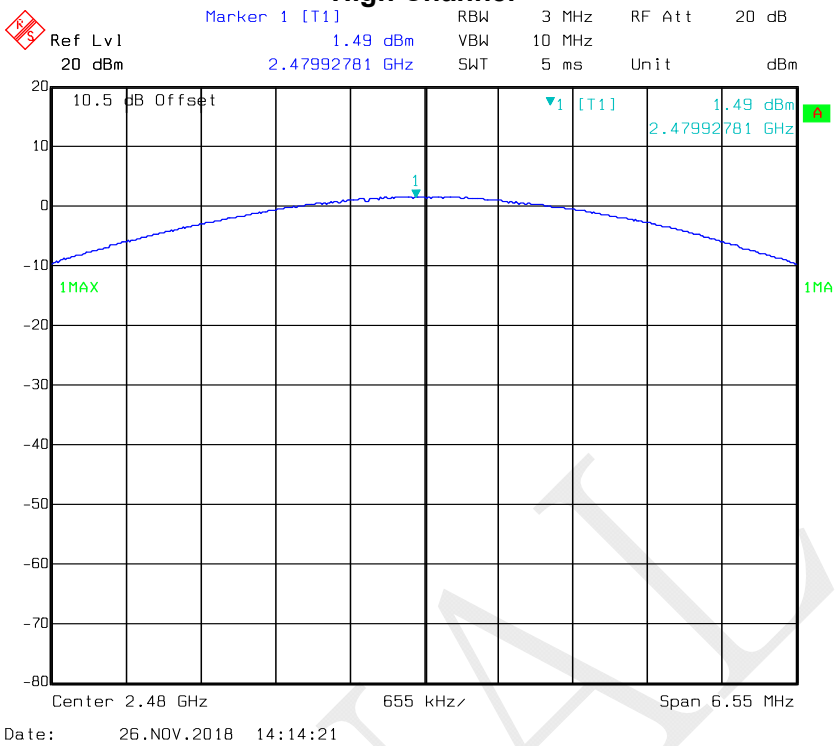
Date: 26.NOV.2018 14:10:00

Middle Channel



Date: 26.NOV.2018 14:12:25

High Channel



FCC §15.247(d) - BAND EDGES TESTING

Applicable Standard

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)).

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW=100 kHz; VBW=300 kHz.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

Test Data

Environmental Conditions

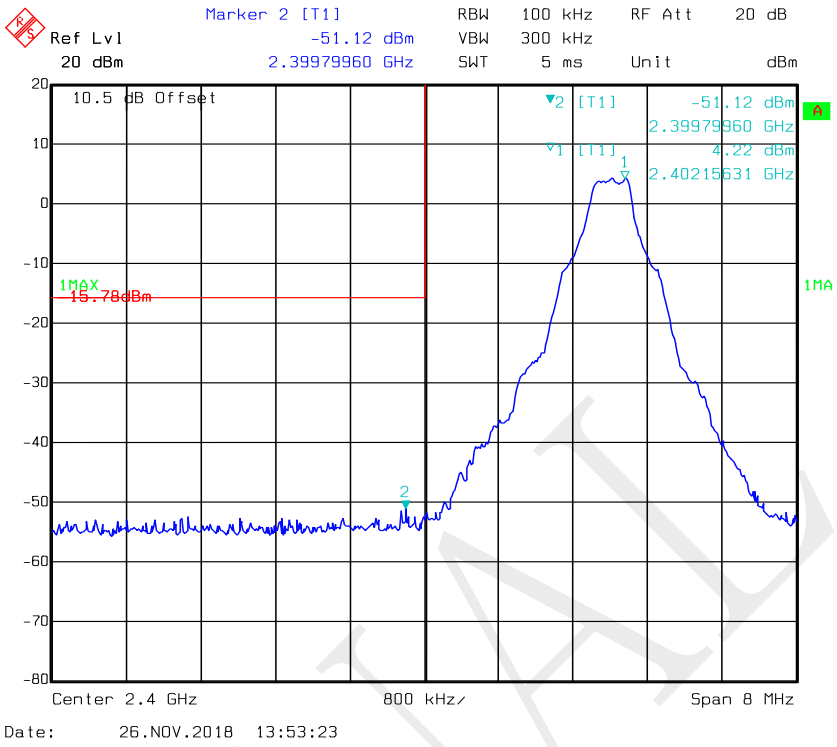
Temperature:	24 °C
Relative Humidity:	56 %
ATM Pressure:	96.1 kPa

** The testing was performed by Tom Tang on 2018-11-26.*

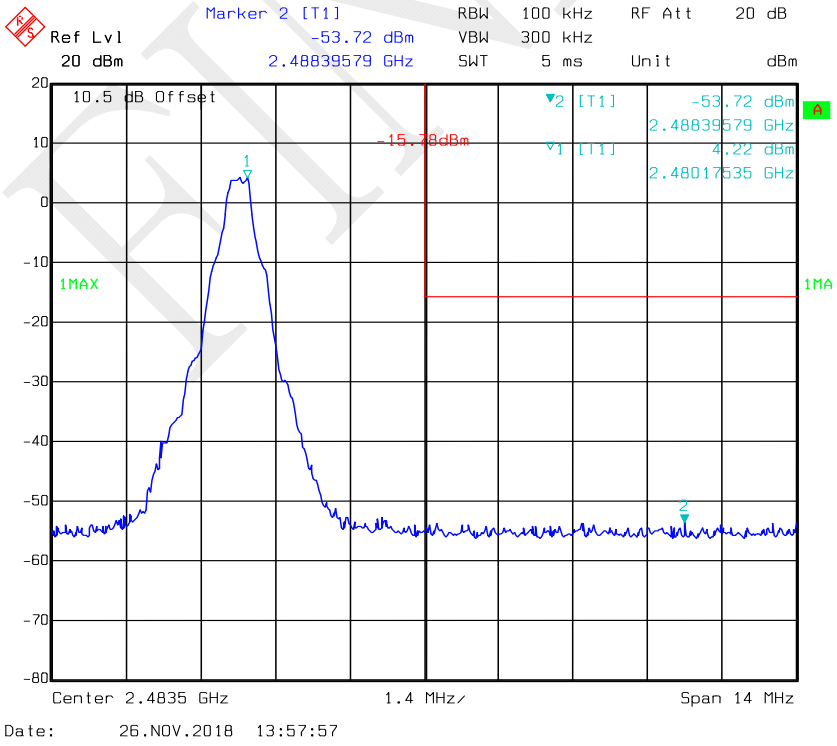
Test Result: Compliance. Please refer to the below plots:

BDR Mode (GFSK):

Band Edge, Left Side

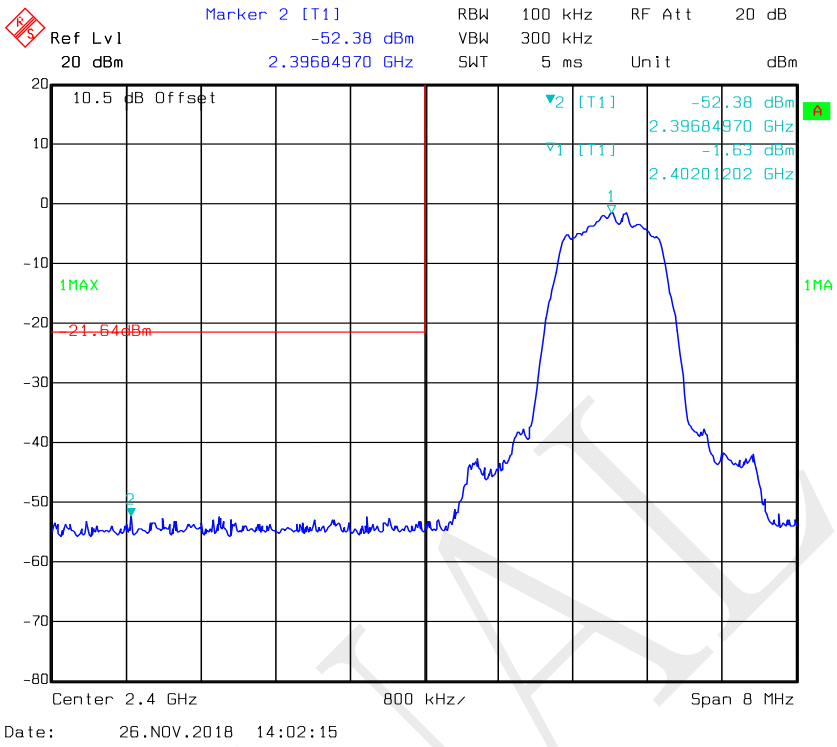


Band Edge, Right Side

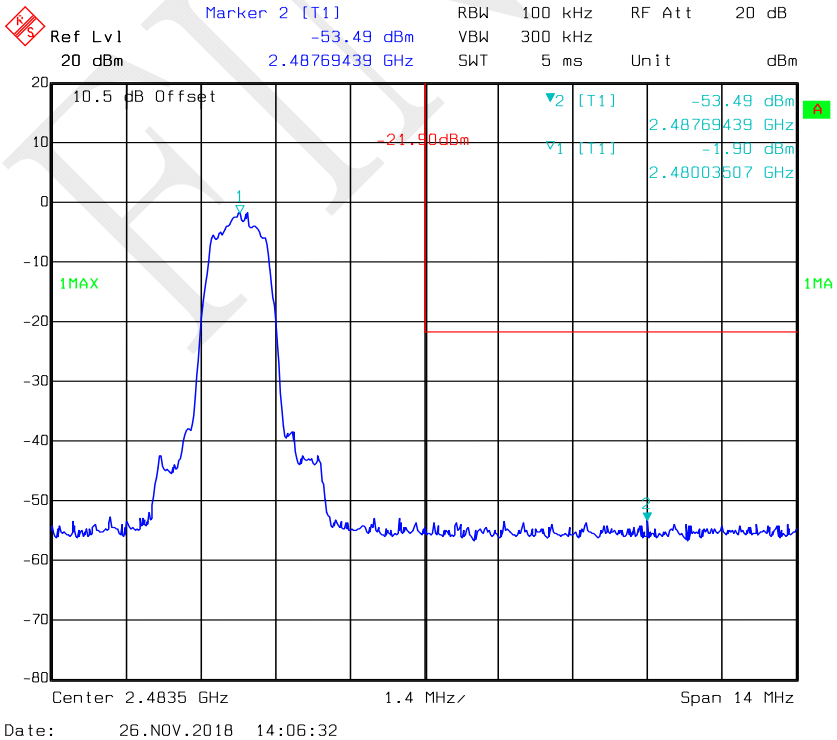


EDR Mode (π/4-DQPSK):

Band Edge, Left Side

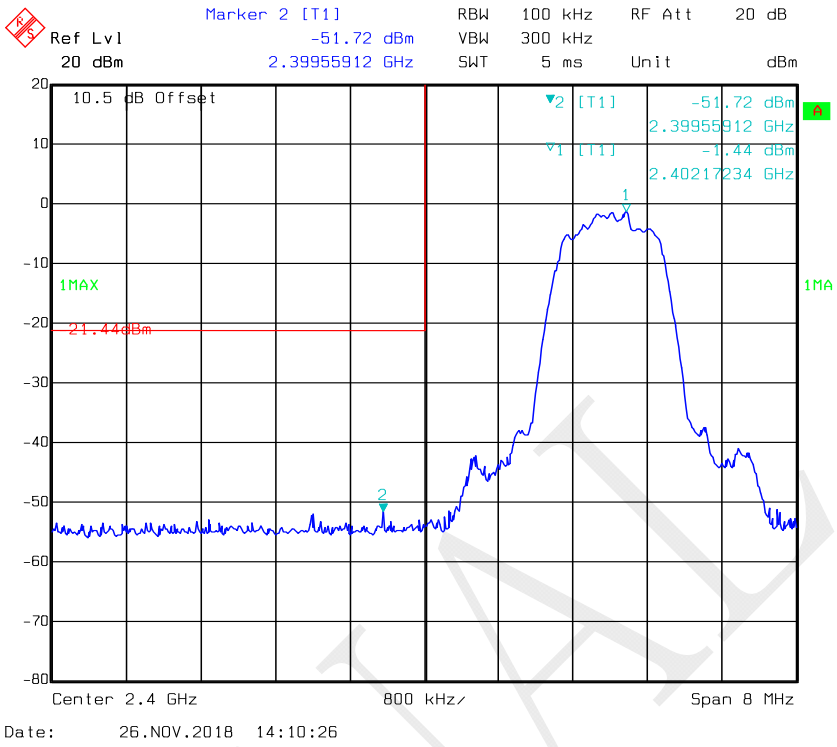


Band Edge, Right Side

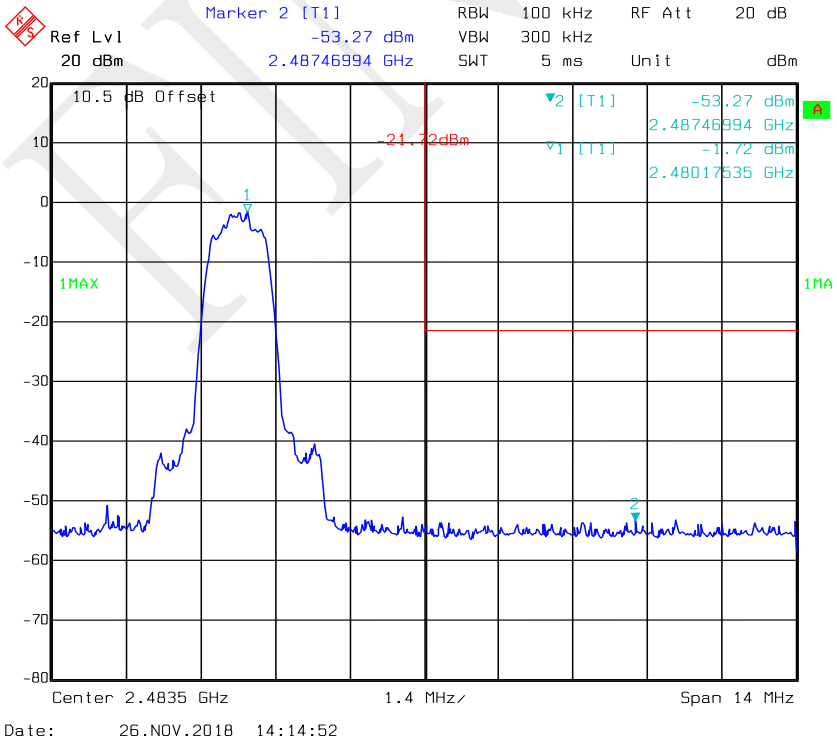


EDR Mode (8-DPSK):

Band Edge, Left Side



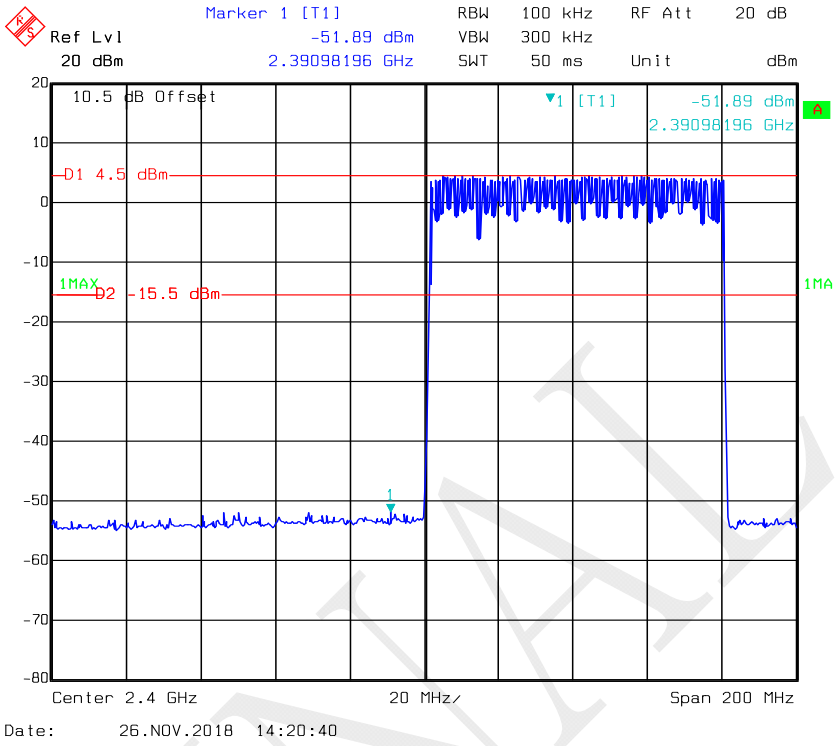
Band Edge, Right Side



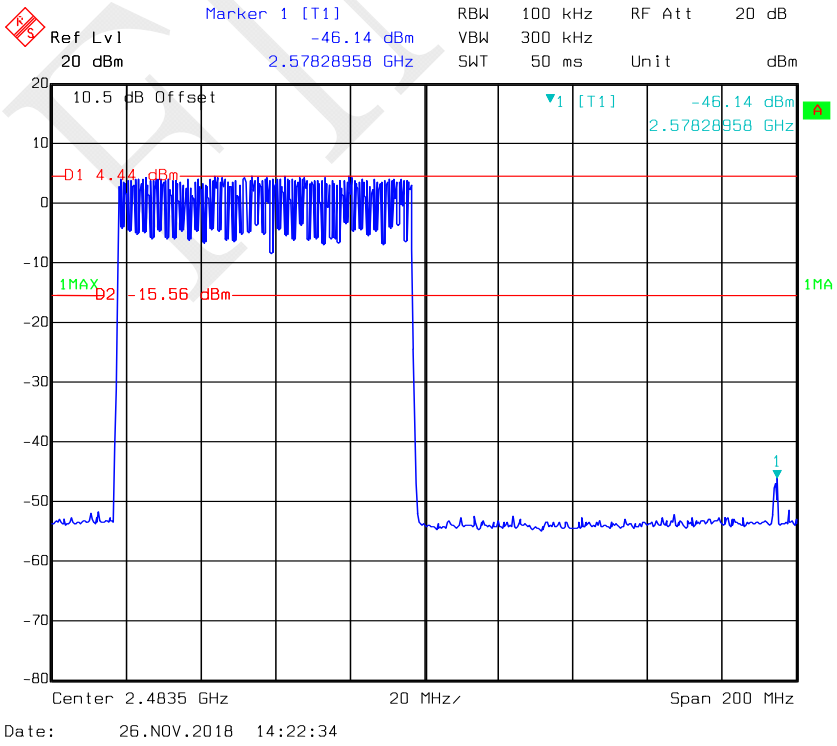
Hopping:

BDR Mode (GFSK):

Band Edge, Left Side

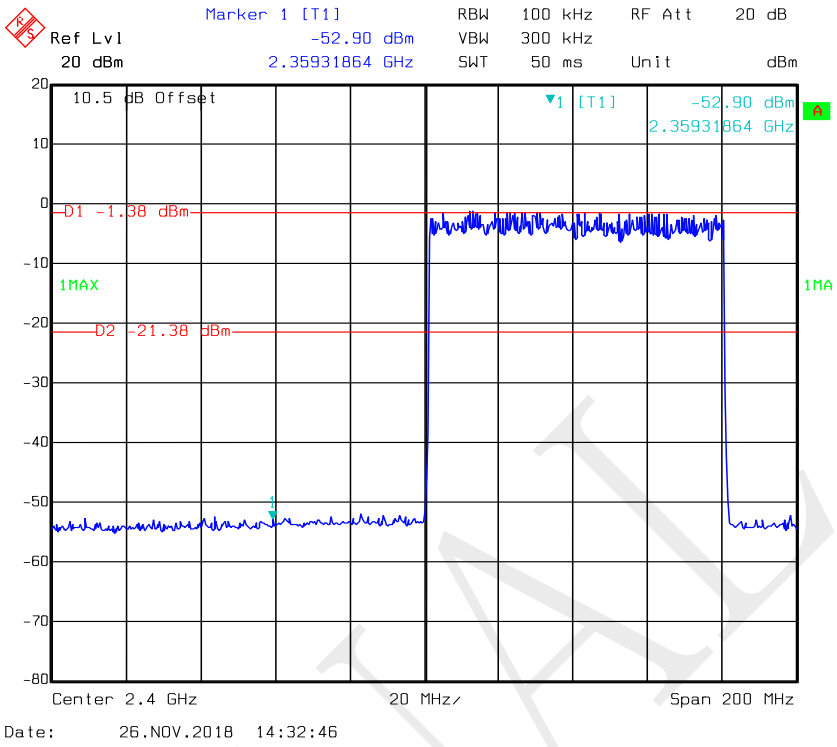


Band Edge, Right Side

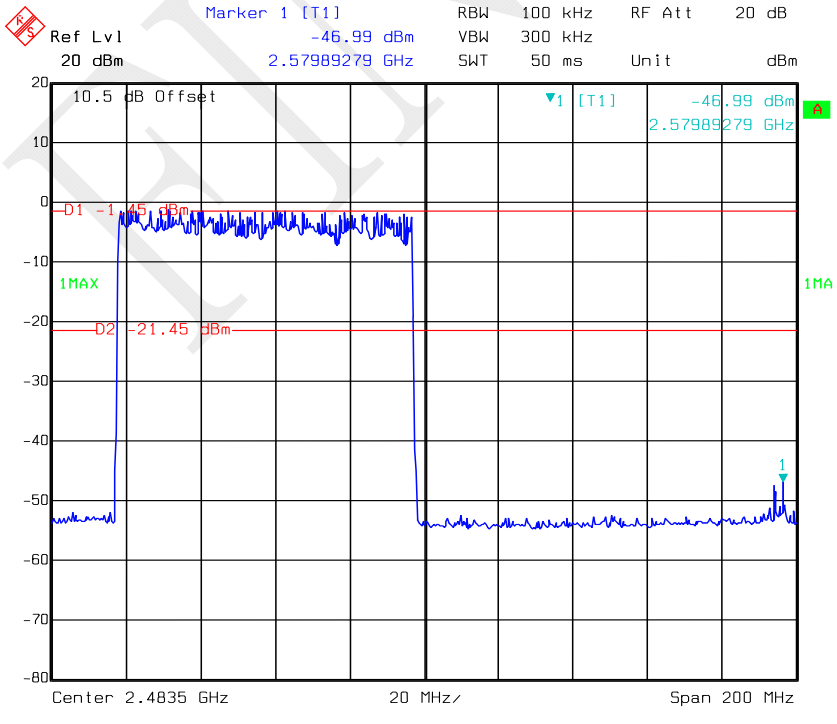


EDR Mode (π/4-DQPSK):

Band Edge, Left Side

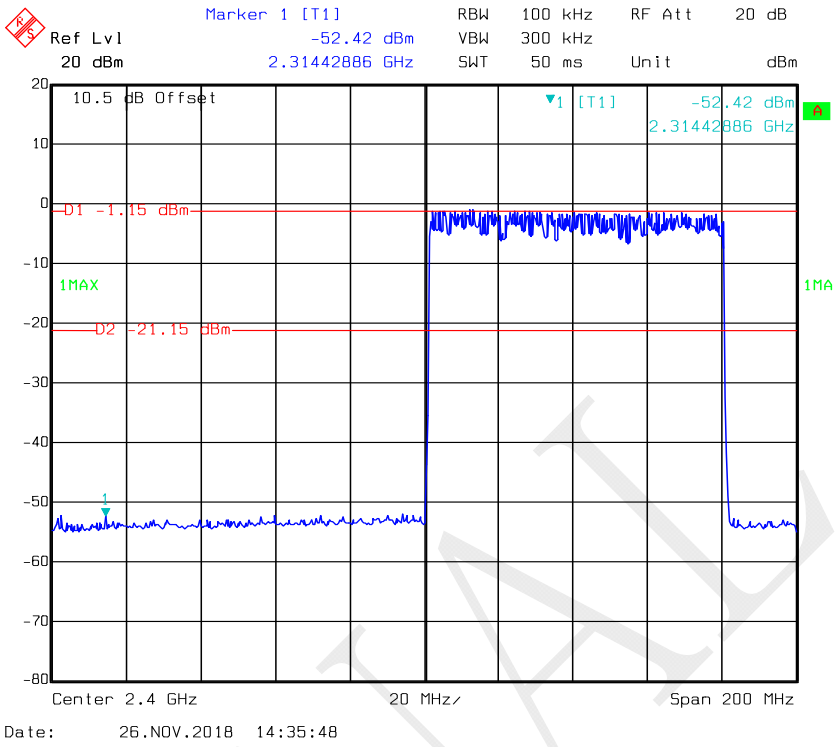


Band Edge, Right Side

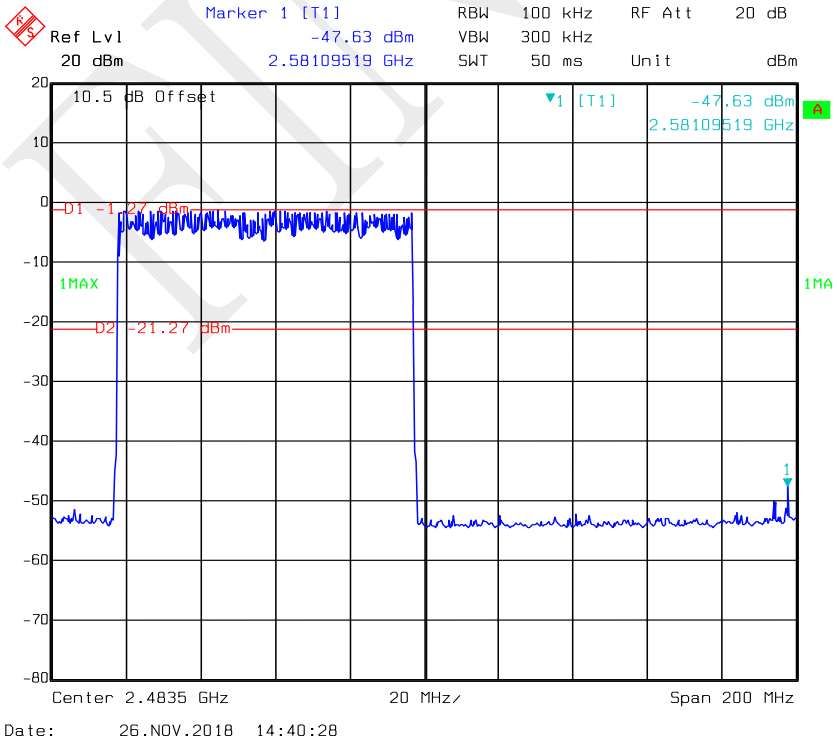


EDR Mode (8-DPSK):

Band Edge, Left Side



Band Edge, Right Side



******END OF REPORT******