RADIO TEST REPORT

For

SHENZHEN AUKEY E BUSINESS CO., LTD

Product Name:	Bluetooth receiver
Model :	BR-C1
Series Model:	AUKEY BR-C1
FCC ID:	2AFHP- BR-C1
Prepared By :	BSL Testing Co.,LTD.. NO. 24, ZH Park, Nantou, Shenzhen, 518000 China
Test Date:	Jan. 20-25, 2018
Date of Report :	Jan.25, 2018
Test Result	PASS
Report No.:	BSL1703495230005Y-ER-2

TEST RESULT CERTIFICATION

Applicant's name	:	SHENZHEN AUKEY E BUSINESS CO., LTD
Address	:	Room 102, Bld P09, Huanan International Zone, No.1 Huanan Rd,PinghuTown Longgang District, Shenzhen,China
Manufacture's Name.....	:	SHENZHEN JILONGCHANG ELECTRONICS CO.,LTD
Address	:	134 Gangzai streetFurong Indurstrial park, Shajing Town, Bao'an District, Shenzhen City, Guangdong province, China.

Product description ;

Product name	:	Bluetooth receiver
Model and/or type reference	:	BR-C1
Series Model	:	AUKEY BR-C1
Standards	:	FCC Part15.247
Test procedure	:	ANSI C63.10-2013, ANSI C63.4-2014

Testing Engineer : Lisa . Ji

Technical Manager : arno.liu

Authorized Signatory : Aileno

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	SHENZHEN AUKEY E BUSINESS CO., LTD
Address of applicant:	Room 102, Bld P09, Huanan International Zone, No.1 Huanan Rd,PinghuTown Longgang District,Shenzhen,China

General Description of EUT

Product Name:	Bluetooth receiver
Trade Name:	AUKEY
Model No.:	BR-C1
Adding Model(s):	AUKEY BR-C1
Rated Voltage:	Cpacity ; 200mAH Rated Voltage ； DC3.7V

Note: The test data is gathered from a production sample provided by the manufacturer. The appearance of others models listed in the report is different from main-test model BR-C1*, but the circuit and the electronic construction do not change, declared by the manufacturer.*

Technical Characteristics of EUT

Bluetooth Version:	V3.0
Frequency Range:	2402-2480MHz
RF Output Power:	5.43 dBm (Conducted)
Data Rate:	1Mbps, 2Mbps, 3Mbps
Modulation:	GFSK, Pi/4 QDPSK, 8DPSK
Quantity of Channels:	79
Channel Separation:	1MHz
Type of Antenna:	PCB
Antenna Gain:	1dBi
Lowest Internal Frequency of EUT:	26MHz

1.2 Test Standards

The following report is prepared on behalf of the SHENZHEN AUKEY E BUSINESS CO., LTD in accordance with FCC Part 15, Subpart B, Subpart C, and section,15.203, 15.205, 15.207, 15.209 , 15.247of the Federal Communication Commissions rules.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices, and ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

1.4 Test Facility

BSL Testing Co.,LTD.

NO. 24, ZH Park, Nantou, Shenzhen, 518000 China
Designation Number :CN1217
Test Firm Registration Number:866035
Tel: 86- 755-26508703
Fax: 86- 755-26508703

1.5 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	Low Channel	2402MHz
TM2	Middle Channel	2441MHz
TM3	High Channel	2480MHz
TM4	Hopping	2402-2480MHz

Modulation Configure			
Modulation	Packet	Packet Type	Packet Size
GFSK	DH1	4	27
	DH3	11	183
	DH5	15	339
Pi/4 DQPSK	2DH1	20	54
	2DH3	26	367
	2DH5	30	379
8DPSK	3DH1	24	83
	3DH3	27	552
	3DH5	31	1021
Normal mode: the Bluetooth has been tested on the modulation of GFSK, (Pi/4)DQPSK and 8DPSK, compliance test and record the worst case.			

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EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
/	/	/	/

1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
RF Output Power	Conducted	±0.42dB
Occupied Bandwidth	Conducted	±1.5%
Conducted Spurious Emission	Conducted	±2.17dB
Conducted Emissions	Conducted	±2.88dB
Transmitter Spurious Emissions	Radiated	±5.1dB

1.7 Test Equipment List andDetails

Description	Manufacturer	Model	Serial No.	Cal Date	Due. Date
Communication Tester	Rohde & Schwarz	CMW500	100358	2017-10-21	2018-10-20
Spectrum Analyzer	R&S	FSP40	100550	2017-10-21	2018-10-20
Test Receiver	R&S	ESCI7	US47140102	2017-10-21	2018-10-20
Signal Generator	HP	83630B	3844A01028	2017-10-22	2018-10-21
Test Receiver	R&S	ESPI-3	100180	2017-10-21	2018-10-20
Amplifier	Agilent	8449B	4035A00116	2017-10-22	2018-10-21
Amplifier	HP	8447E	2945A02770	2017-10-22	2018-10-21
Signal Generator	IFR	2023A	202307/242	2017-10-22	2018-10-21
Broadband Antenna	SCHAFFNER	2774	2774	2017-10-17	2018-10-16
Biconical and log periodic antennas	ELECTRO-METRICS	EM-6917B-1	171	2017-10-17	2018-10-16
Horn Antenna	R&S	HF906	100253	2017-10-17	2018-10-16
Horn Antenna	EM	EM-6961	6462	2017-10-17	2018-10-16
LISN	R&S	ESH3-Z5	100196	2017-10-17	2018-10-16
LISN	COM-POWER	LI-115	02027	2017-10-17	2018-10-16
3m Semi-Anechoic Chamber	Chengyu Electron	9 (L)*6 (W)* 6 (H)	BSL086	2017-10-21	2018-10-20
Horn Antenna	A-INFOMW	LB-180400KF	BSL088	2017-10-21	2018-10-20

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 2.1093	RF Exposure	Compliant
§ 15.203; § 15.247(b)(4)(i)	Antenna Requirement	Compliant
§15.205	Restricted Band of Operation	Compliant
§ 15.207(a)	Conducted Emission	Compliant
§ 15.209(a)	Radiated Spurious Emissions	Compliant
§ 15.247(a)(1)(iii)	Quantity of Hopping Channel	Compliant
§ 15.247(a)(1)	Channel Separation	Compliant
§ 15.247(a)(1)(iii)	Time of Occupancy (Dwell time)	Compliant
§ 15.247(a)	20dB Bandwidth	Compliant
§ 15.247(b)(1)	RF Power Output	Compliant
§ 15.247(d)	Band Edge (Out of Band Emissions)	Compliant
§ 15.247(a)(1)	Frequency Hopping Sequence	Compliant
§ 15.247(g), (h)	Frequency Hopping System	Compliant

N/A: not applicable

3. RF Exposure

3.1 Standard Applicable

According to § 1.1307 and § 2.1093, the portable transmitter must comply the RF exposure requirements.

3.2 Test Result

This product complied with the requirement of the RF exposure, please see the RF Exposure Report.

4. Antenna Requirement

4.1 Standard Applicable

According to FCC Part 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.

4.2 Evaluation Information

This product has a PCB antenna, fulfill the requirement of this section.

5. Frequency Hopping System Requirements

5.1 Standard Applicable

According to FCC Part 15.247(a)(1), 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.

(g) Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

(h) The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

5.2 Frequency Hopping System

This transmitter device is frequency hopping device, and complies with FCC part 15.247 rule.

This device uses Bluetooth radio which operates in 2400-2483.5 MHz band. Bluetooth uses a radio technology called frequency-hopping spread spectrum, which chops up the data being sent and transmits chunks of it on up to 79 bands (1 MHz each; centred from 2402 to 2480 MHz) in the range 2,400-2,483.5 MHz. The transmitter switches hop frequencies 1,600 times per second to assure a high degree of data security. All Bluetooth devices participating in a given piconet are synchronized to the frequency-hopping channel for the piconet. The frequency hopping sequence is determined by the master's device address and the phase of the hopping sequence (the frequency to hop at a specific time) is determined by the master's internal clock. Therefore, all slaves in a piconet must know the master's device address and must synchronize their clocks with the master's clock.

Adaptive Frequency Hopping (AFH) was introduced in the Bluetooth specification to provide an effective way for a Bluetooth radio to counteract normal interference. AFH identifies "bad" channels, where either other wireless devices are interfering with the Bluetooth signal or the Bluetooth signal is interfering with another device. The AFH-enabled Bluetooth device will then communicate with other devices within its piconet to share details of any identified bad channels. The devices will then switch to alternative available "good" channels, away from the areas of interference, thus having no impact on the bandwidth used.This device was tested with an bluetooth system

receiver to check that the device maintained hopping synchronization, and the device complied with these requirements for DA 00-705 and FCC Part 15.247 rule.

5.3 EUT Pseudorandom Frequency Hopping Sequence

Pseudorandom Frequency Hopping Sequence Table as below:
Channel: 08, 24, 40, 56, 40, 56, 72, 09, 01, 09, 33, 41, 33, 41, 65, 73, 53, 69, 06, 22, 04, 20, 36, 52, 38, 46, 70, 78, 68, 76, 21, 29, 10, 26, 42, 58, 44, 60, 76, 13, 03, 11, 35, 43, 37, 45, 69, 77, 55, 71, 08, 24, 08, 24, 40, 56, 40, 48, 72, 01, 72, 01, 25, 33, 12, 28, 44, 60, 42, 58, 74, 11, 05, 13, 37, 45 etc.

The system receiver have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

6. Quantity of Hopping Channels and Channel Separation

6.1 Standard Applicable

According to FCC 15.247(a)(1), 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, and frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

6.2 Test Procedure

According to the DA 00-705, the number of hopping frequencies test method as follows.
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Set span = the frequency band of operation (2400MHz to 2483.5MHz)

RBW ≥ 1% of the span

VBW ≥ RBW Sweep = auto

Detector function = peak Trace = max hold

Allow the trace to stabilize, observed the band of 2400MHz to 2483.5MHz, than count it out the number of channels for comparing with the FCC rules.

The channel spacing test method as follows:

Set span = wide enough to capture the peaks of two adjacent channels
Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span
Video (or Average) Bandwidth (VBW) ≥ RBW
Sweep = auto; Detector function = peak; Trace = max hold
Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section. Submit this plot.

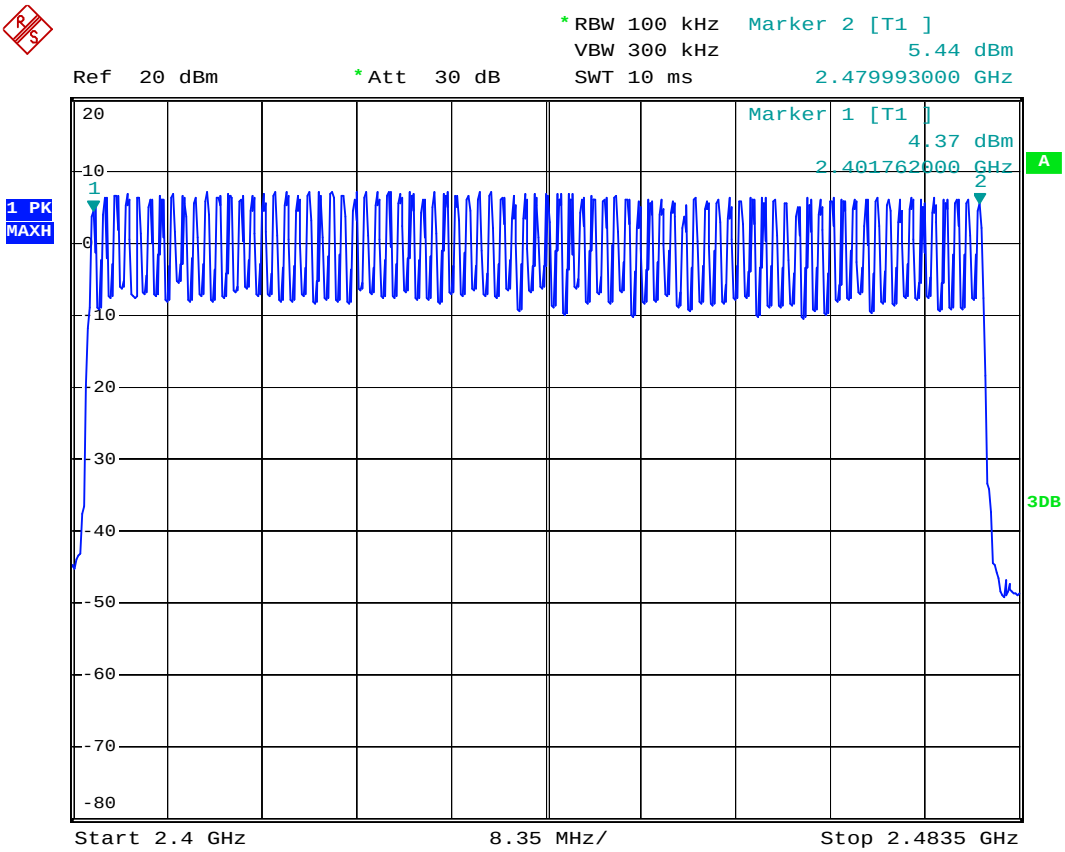
6.3 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	50%
ATM Pressure:	101.1 mbar

6.4 Summary of Test Results/Plots

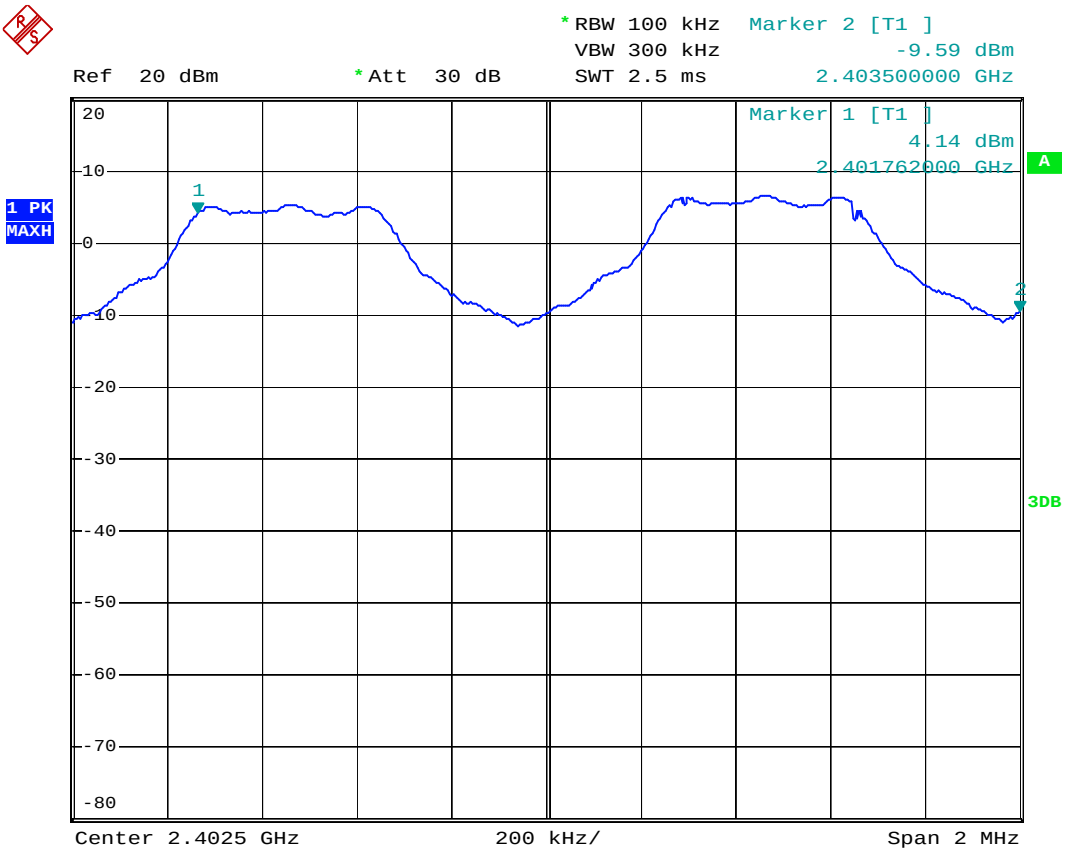
pass

No. of Channel = 79

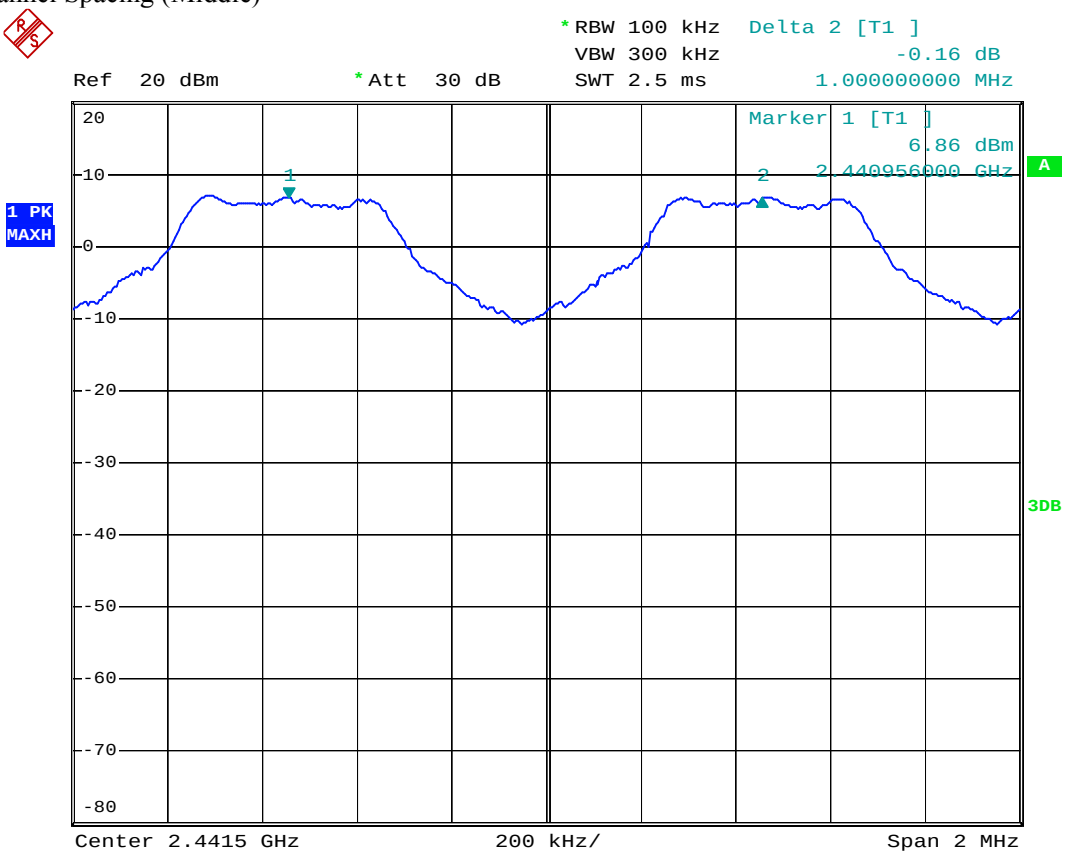


For GFSK mode

Channel Spacing (Low)



Channel Spacing (Middle)



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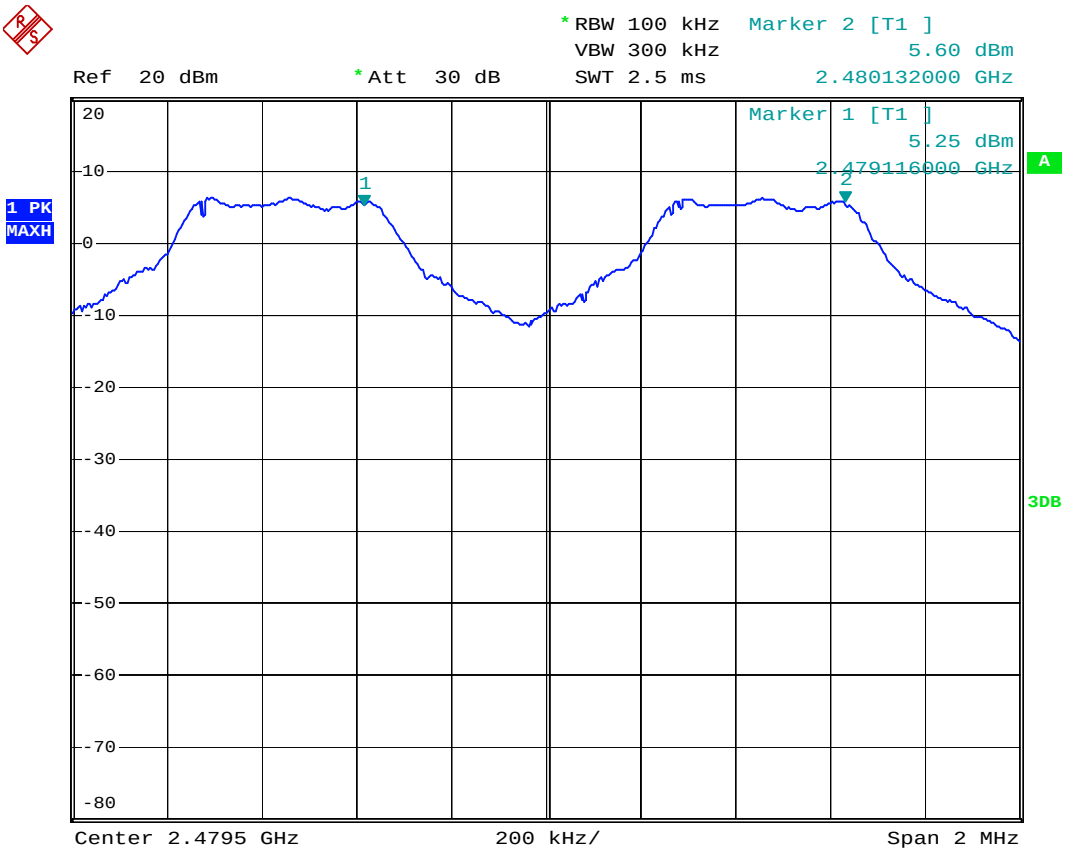
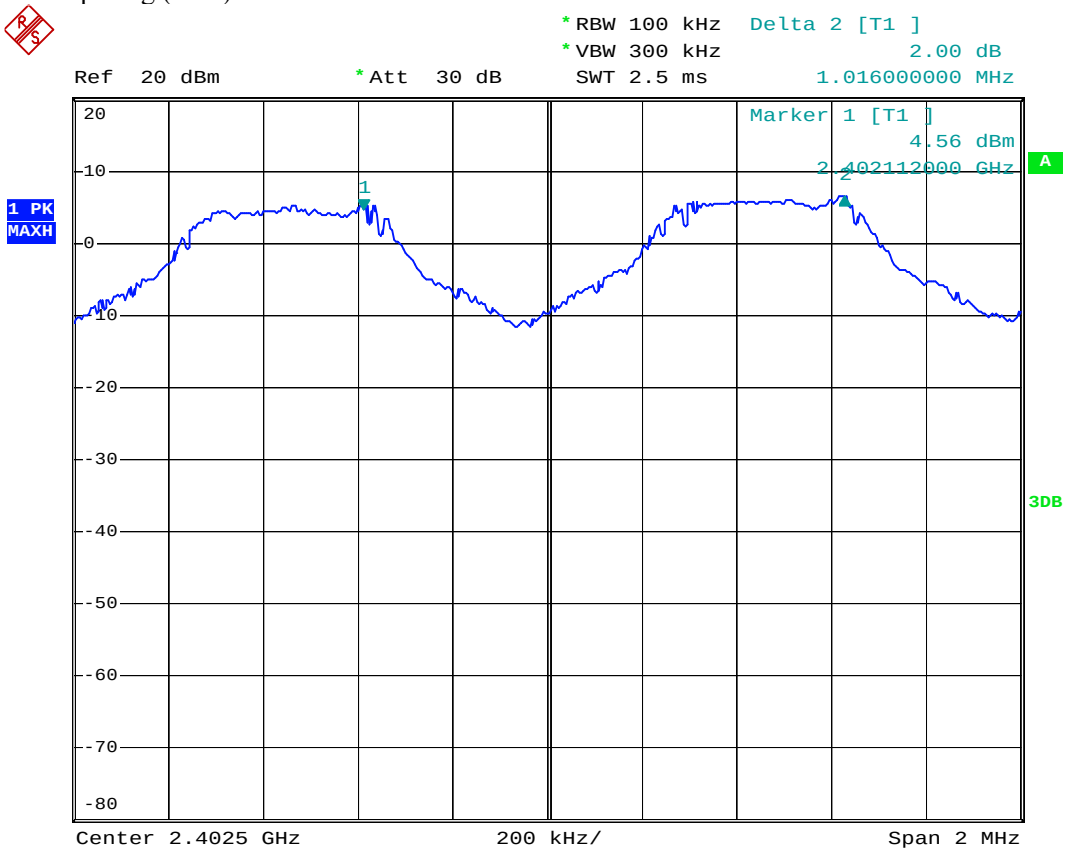
Channel Spacing (High)



For 8DPSK mode

Channel Spacing (Low)



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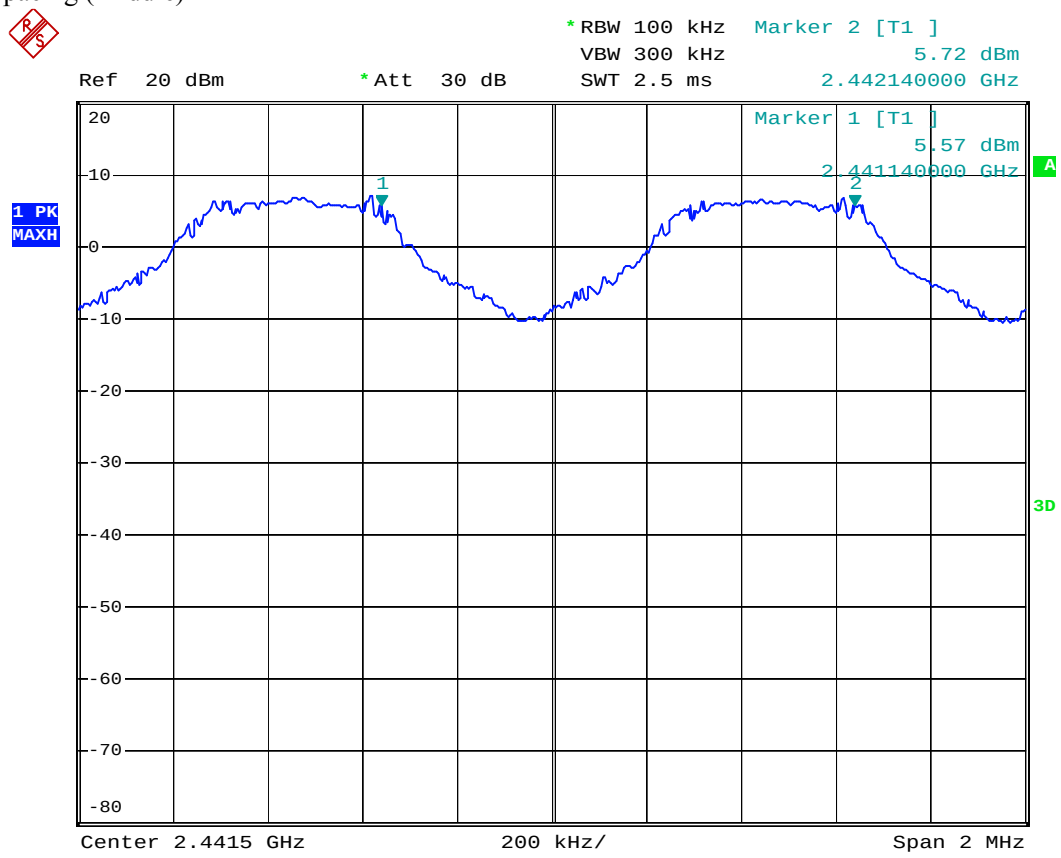
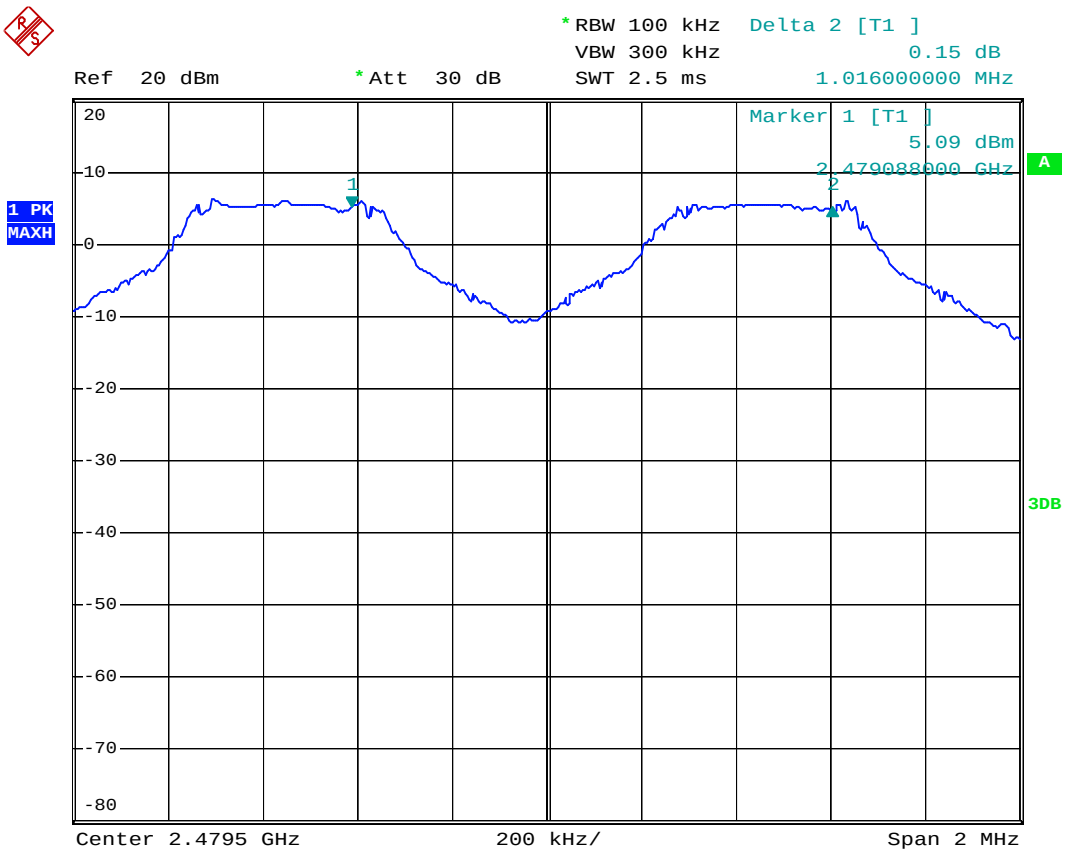
Channel Spacing (Middle)



Channel Spacing (Hig)



7. Dwell Time of Hopping Channel

7.1 Standard Applicable

According to 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.

7.2 Test Procedure

According to the DA 00-705, the dwell time of a hopping channel test method as follows.

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
Span = zero span, centered on a hopping channel
RBW = 1 MHz
VBW ≥ RBW
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 dwell time

7.3 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	50%
ATM Pressure:	101.1 mbar

7.4 Summary of Test Results/Plots

pass

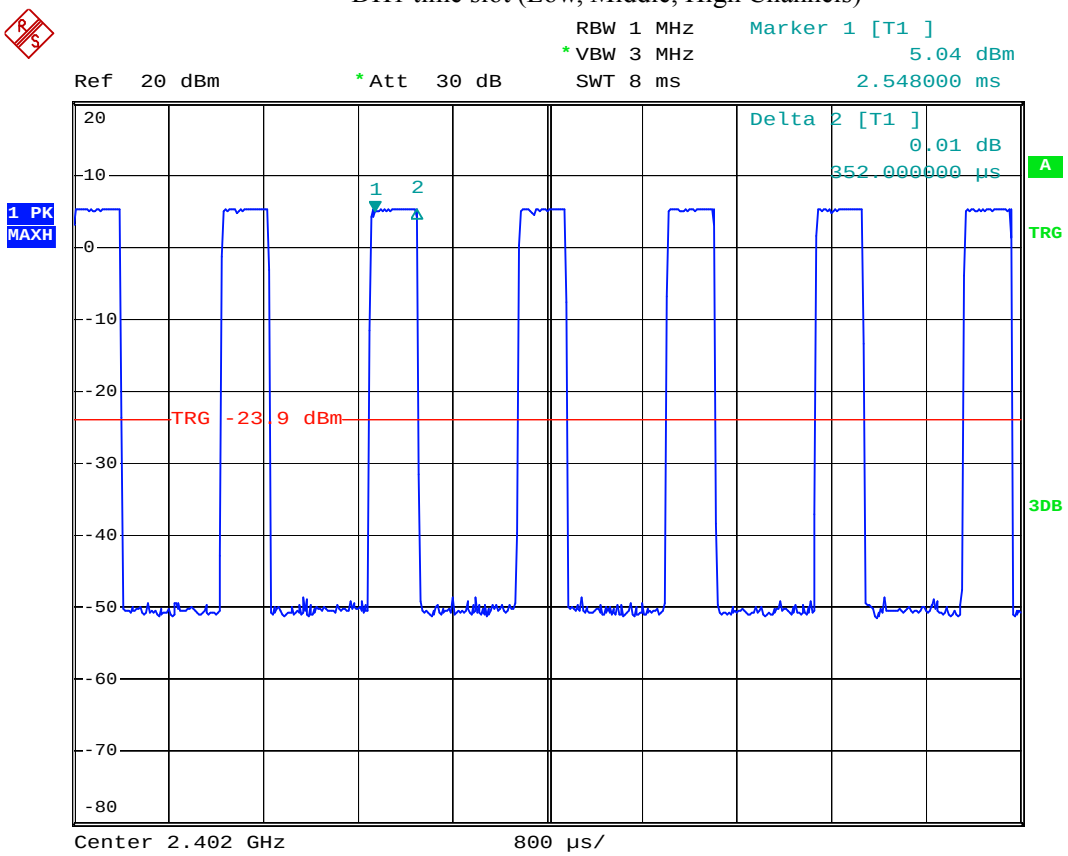
The dwell time within a period in data mode is independent from the packet type (packet length).
Test data is corrected with the worse case, which the packet length is DH1, DH3, and DH5.

The test period: T = 0.4 Second * 79 Channel = 31.6 s
Dwell time
DH1: Measured time*(1600/2/79)*31.6
DH3: Measured time*(1600/4/79)*31.6
DH5: Measured time*(1600/6/79)*31.6

Modulation	Test Channel	packet	Time Slot Length(ms)	Dwell Time(ms)	Limit(ms)
GFSK	2402	DH1	0.352	112.64	400
		DH3	1.664	266.24	400
		DH5	2.880	307.2	400
8DPSK	2402	3DH1	0.334	106.88	400
		3DH3	1.664	266.24	400
		3DH5	2.912	310.61	400

Please refer to the test plots as below:

DH1 time slot (Low, Middle, High Channels)



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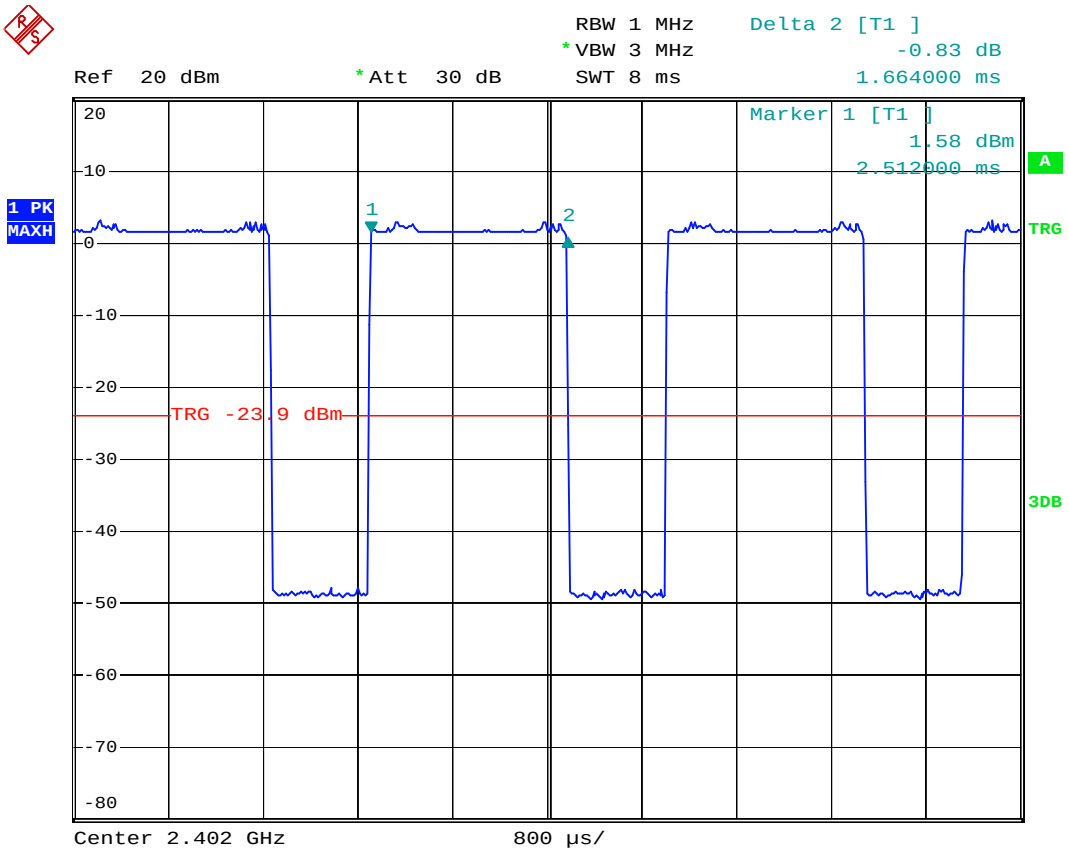
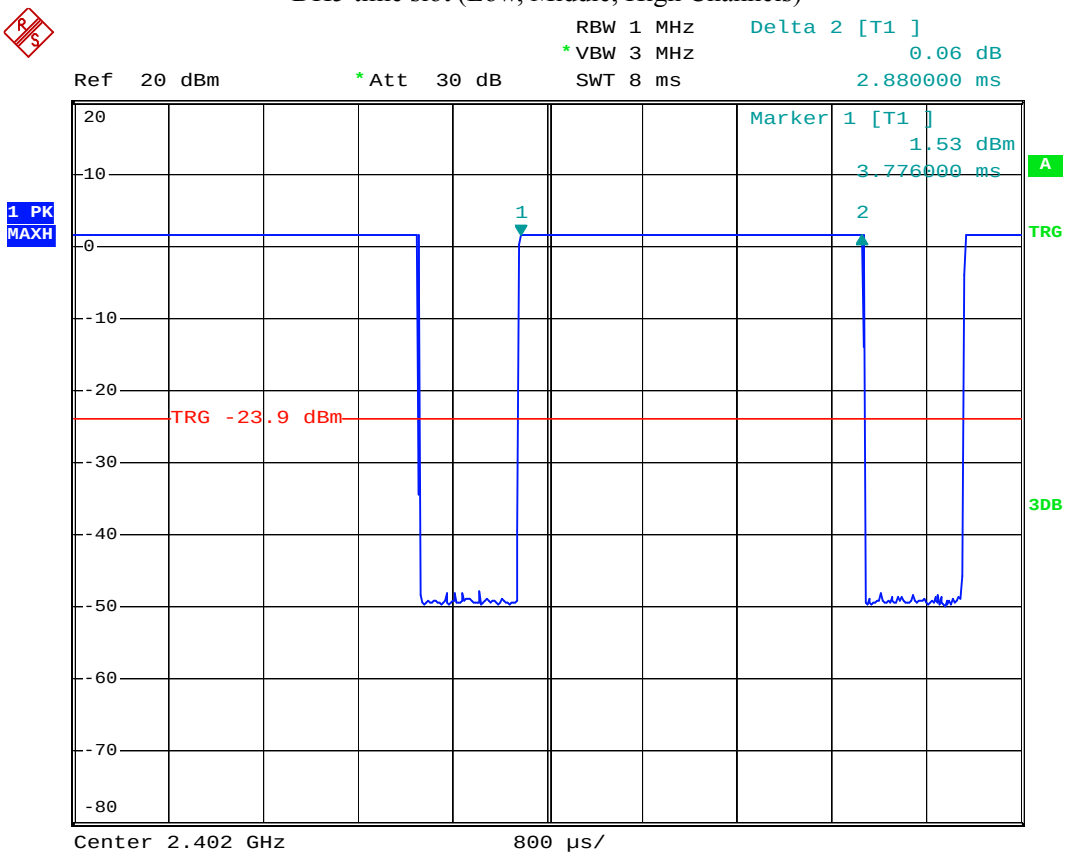
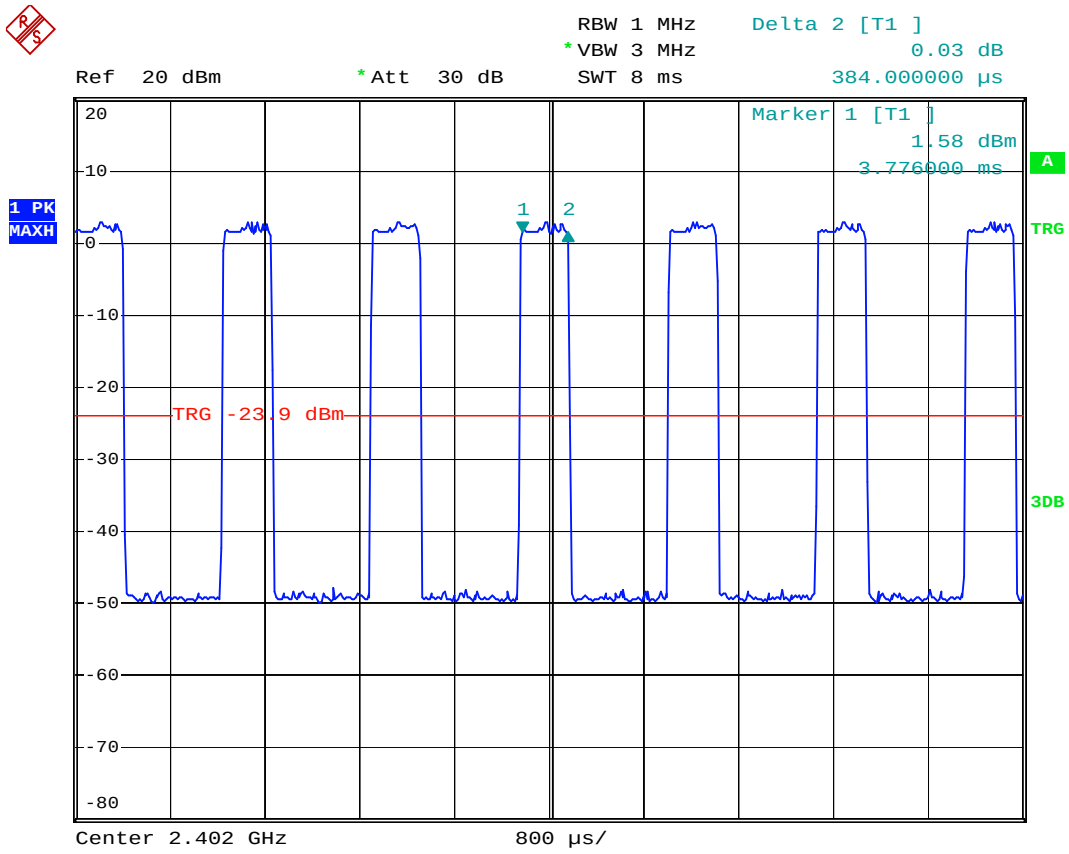
DH3 time slot (Low, Middle, High Channels)



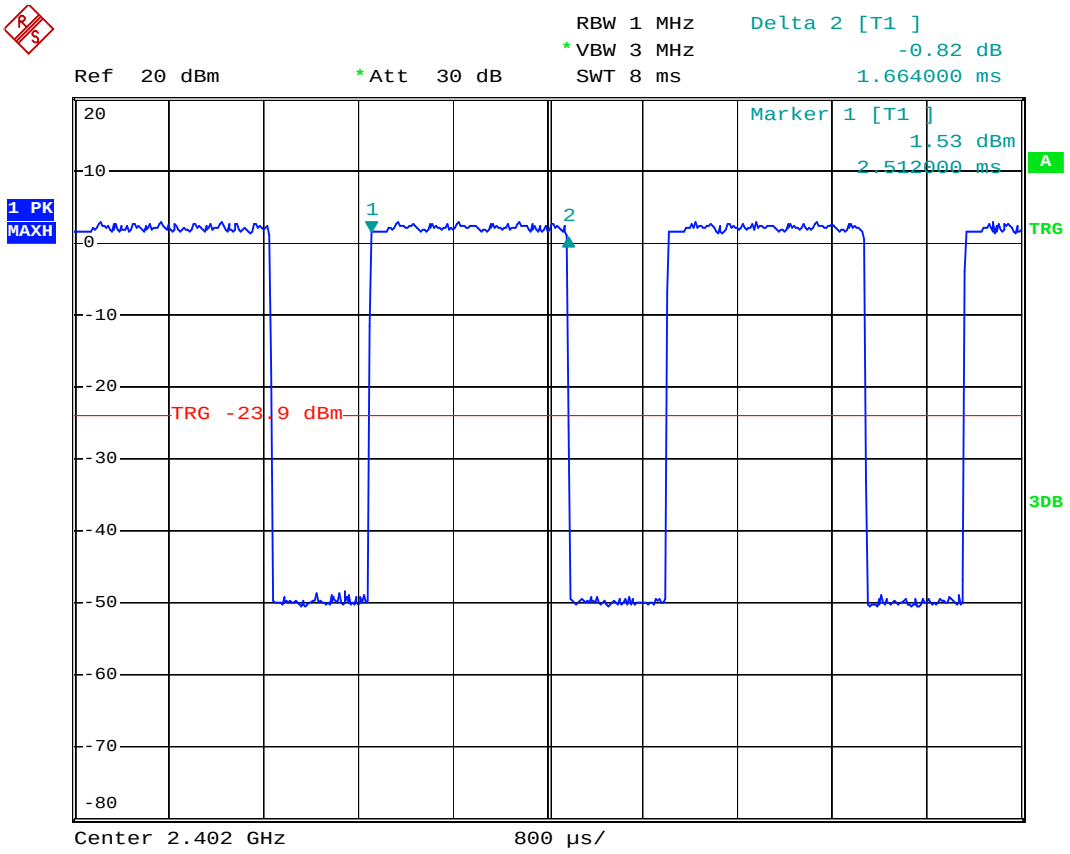
DH5 time slot (Low, Middle, High Channels)



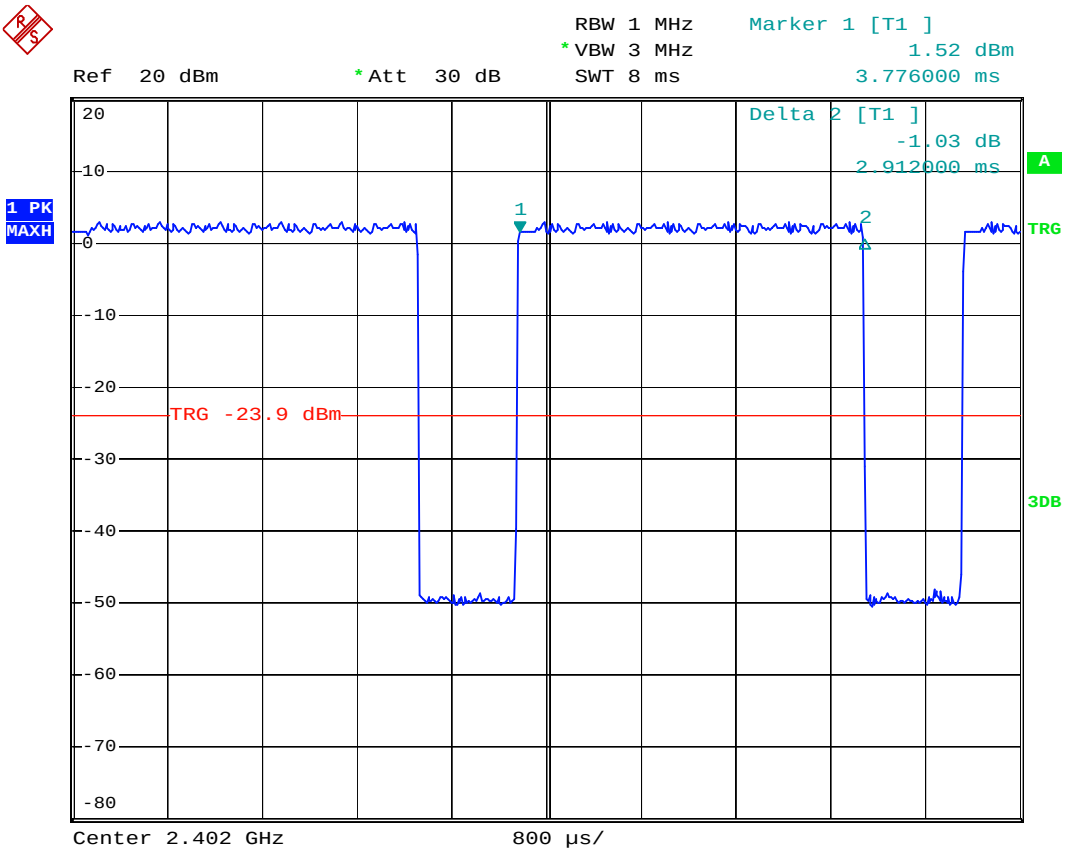
3DH1 time slot (Low, Middle, High Channels)



3DH3 time slot (Low, Middle, High Channels)



3DH5 time slot (Low, Middle, High Channels)



8. 20dB Bandwidth

8.1 Standard Applicable

According to 15.247(a) and 15.215(c). 20dB bandwidth is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

8.2 Tes t Procedure

According to the DA 00-705, the 20dB bandwidth test method as follows.

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel
RBW ≥ 1% of the 20 dB bandwidth
VBW ≥ RBW
Sweep = auto; Detector function = peak
Trace = max hold

All the trace to stabilize, use the marker-to-peak function to set the marker to the peak of the emission, use the marker-delta function to measure and record the 20dB down bandwidth of the emission.

8.3 Environmental Conditions

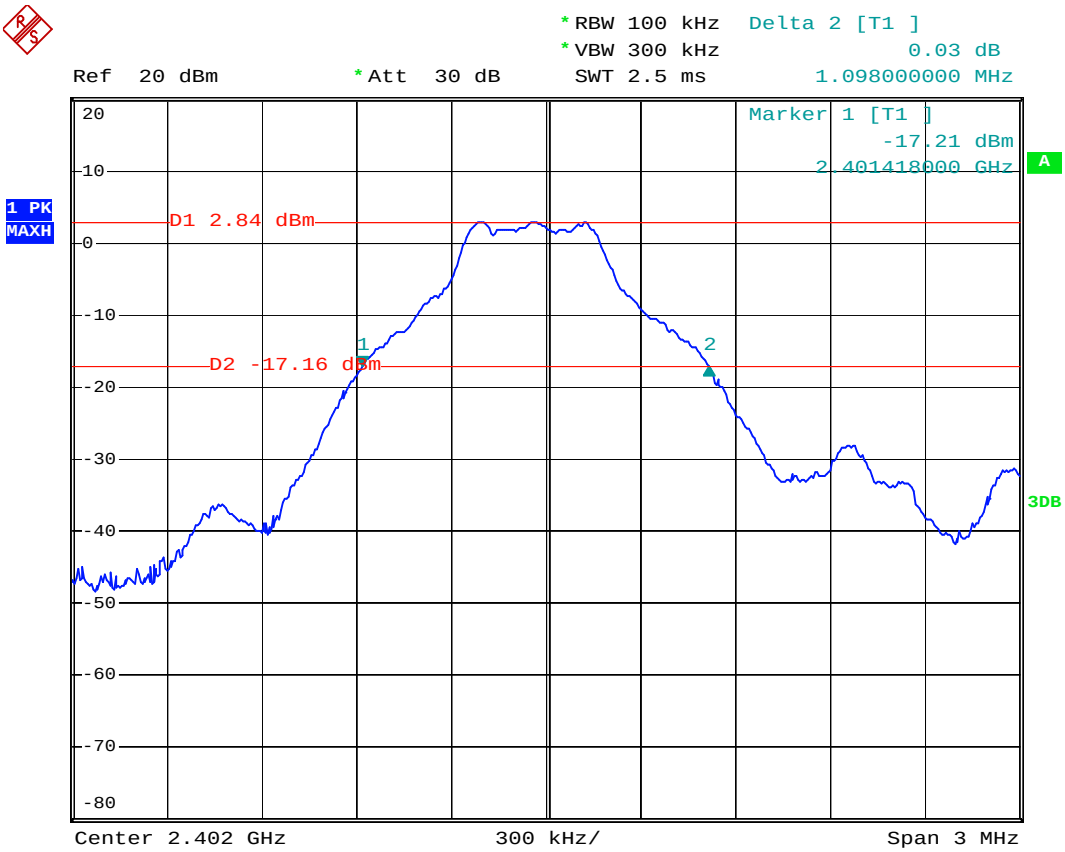
Temperature:	25 °C
Relative Humidity:	50%
ATM Pressure:	101.1 mbar

8.4Summary of Test Results/Plots

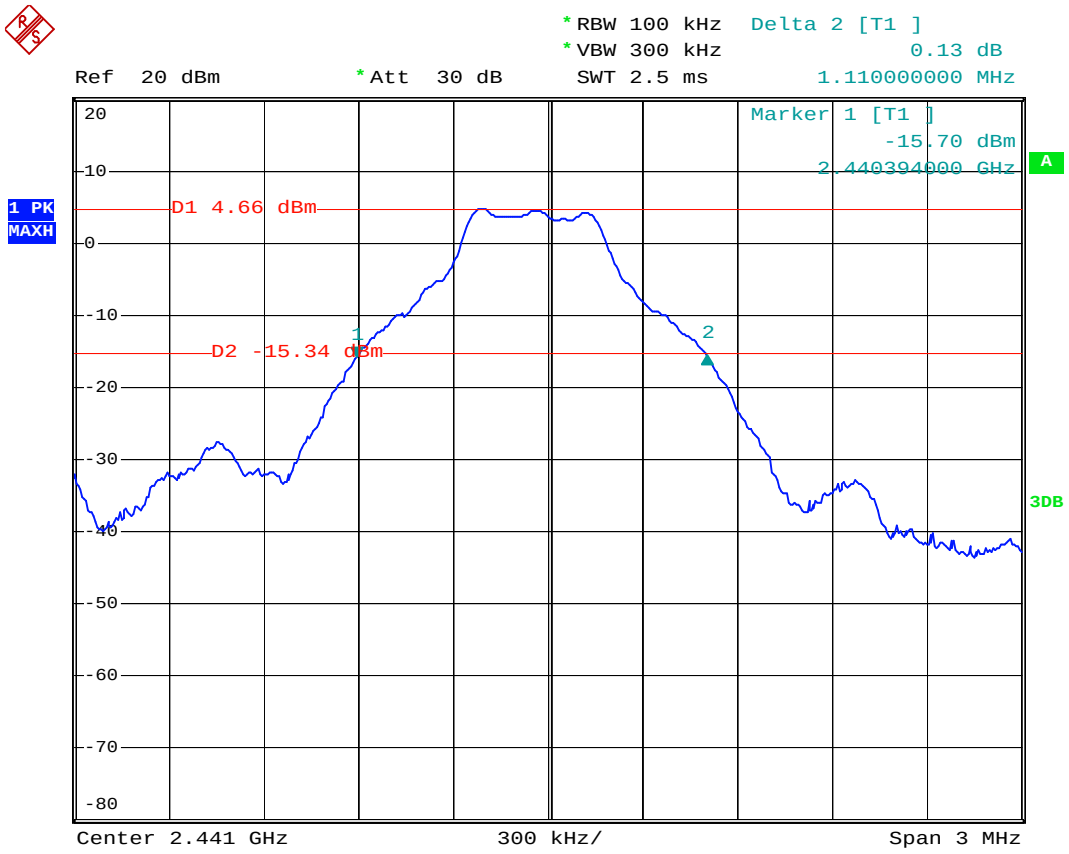
pass

For GFSK

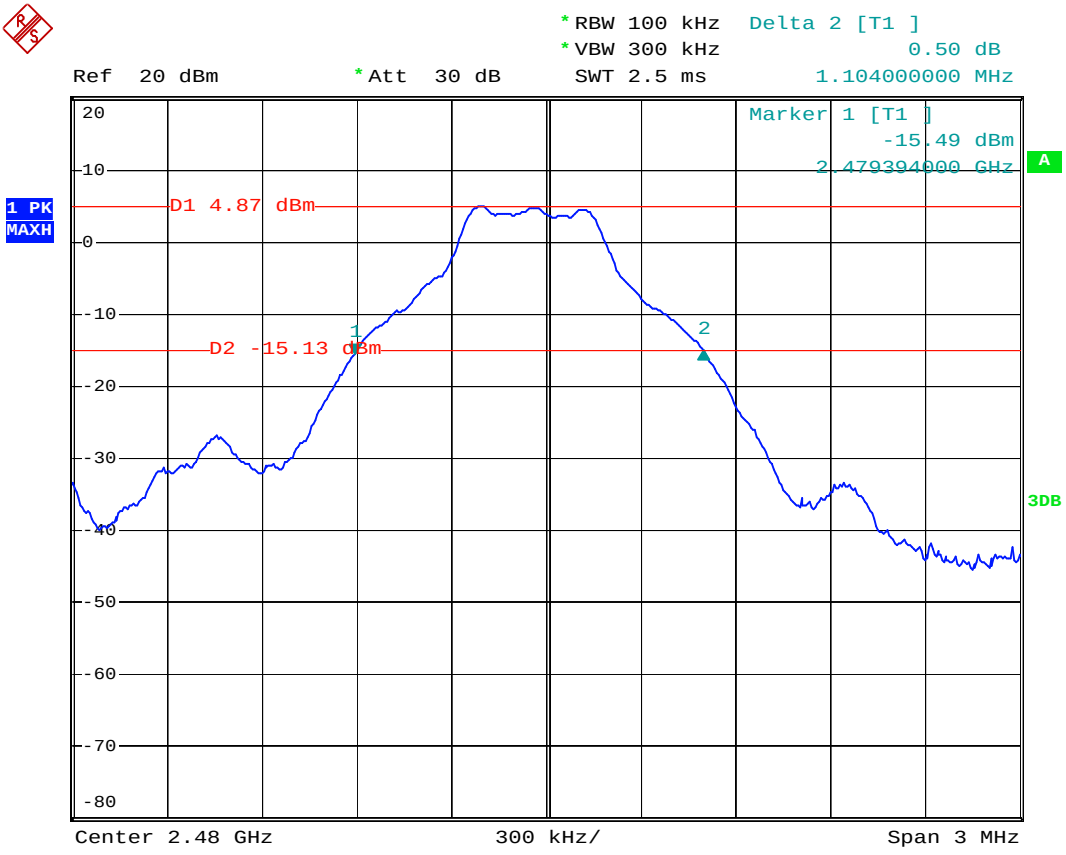
Low Channel:



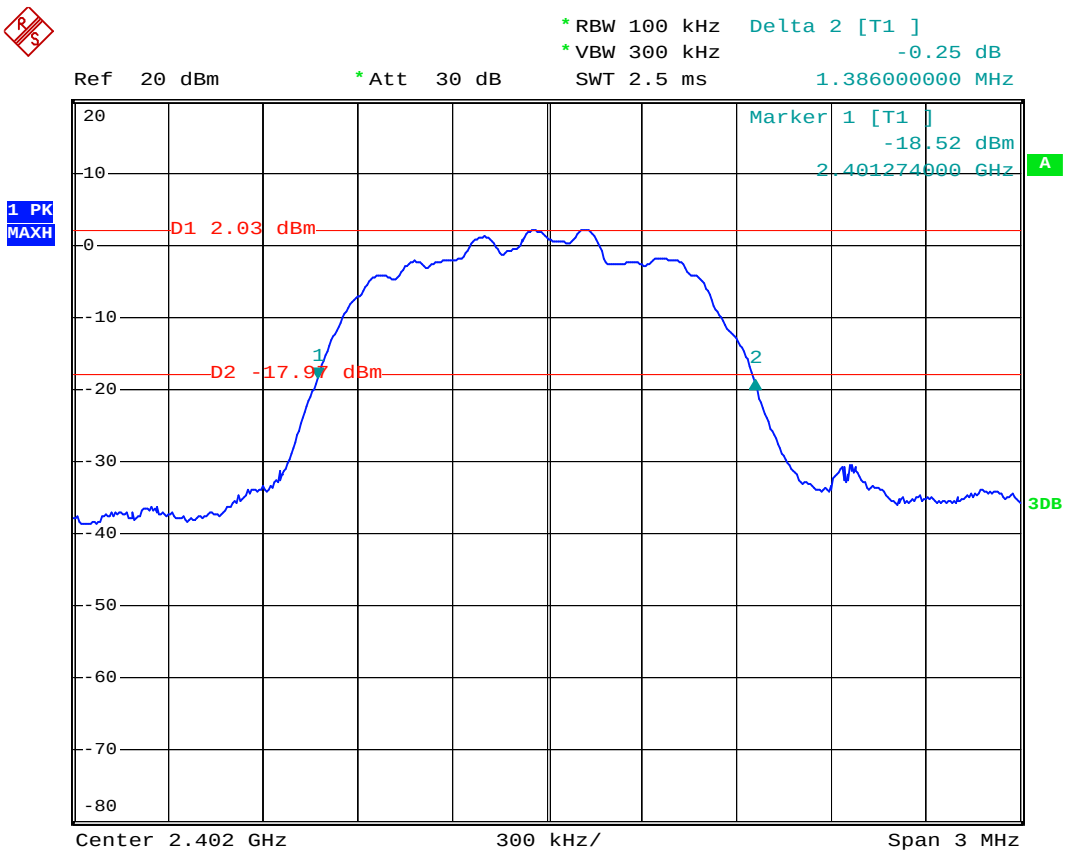
Middle Channel:



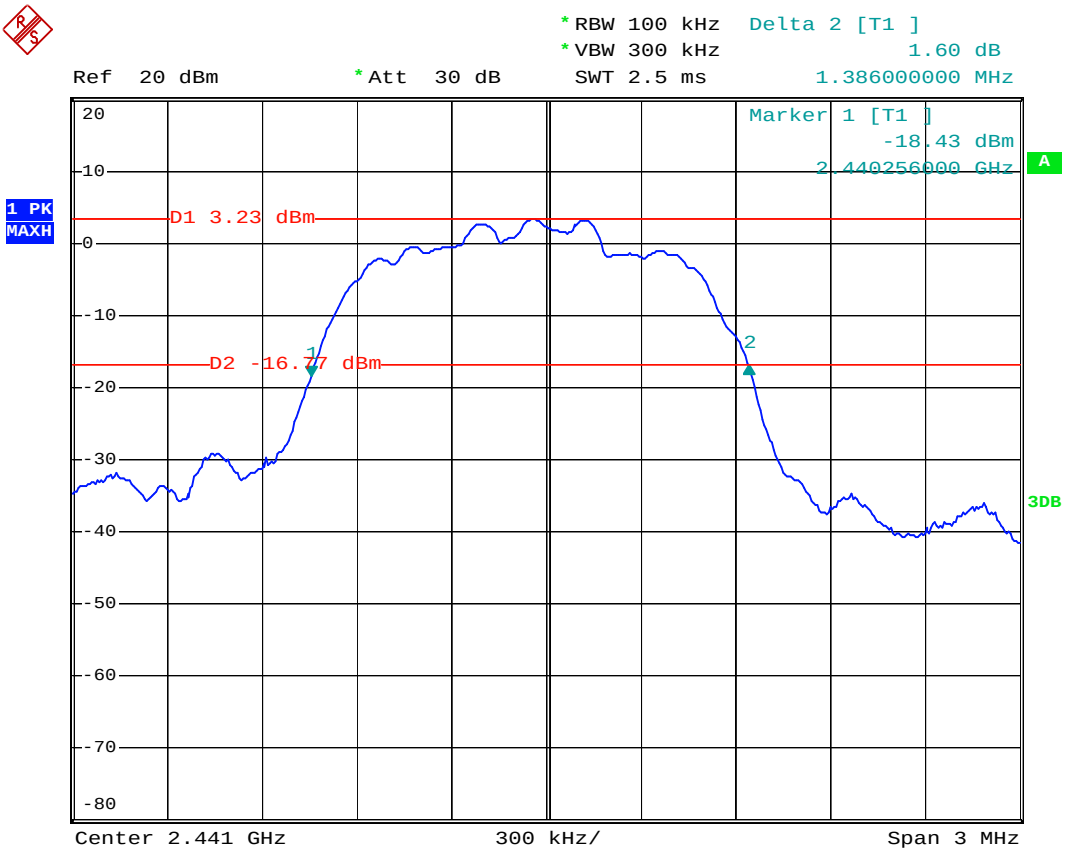
High Channel:



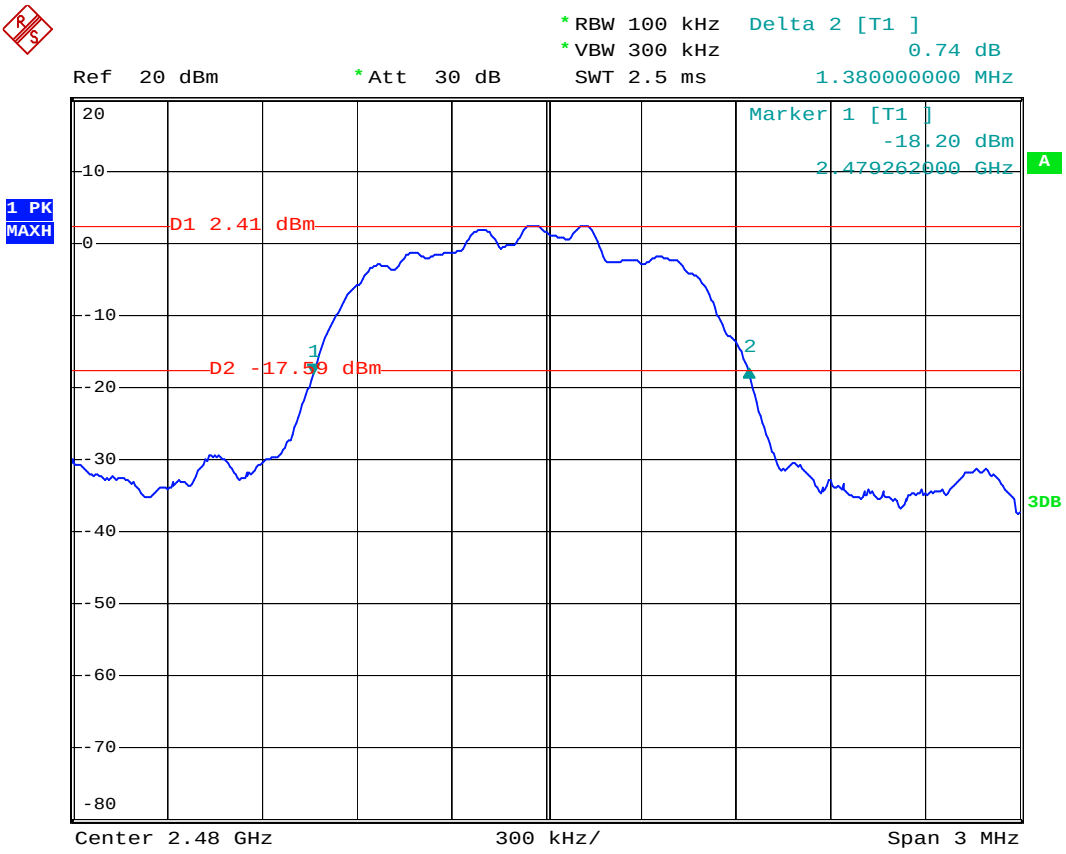
For 8DPSK
Low Channel:



Middle Channel:



High Channel:



9. RF Output Power

9.1 Standard Applicable

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.

9.2 Test Procedure

According to the DA 00-705, the peak output power test method as follows.
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
RBW > the 20 dB bandwidth of the emission being measured
VBW ≥ RBW Sweep = auto

Detector function = peak Trace = max hold
All the trace to stabilize, use the marker-to-peak function to set the marker to the peak of the emission, the indicated level is the peak output power (the external attenuation and cable loss shall be considered).

9.3 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	50%
ATM Pressure:	101.1 mbar

9.4 Summary of Test Results/Plots

pass

For GFSK

Channel	Frequency MHz	Measured Value dBm	Output Power mW	Limit mW
Low Channel	2402	4.69	2.944	1000
Middle Channel	2441	4.86	3.062	1000
High Channel	2480	4.04	2.535	1000

For Pi/4 QDPSK

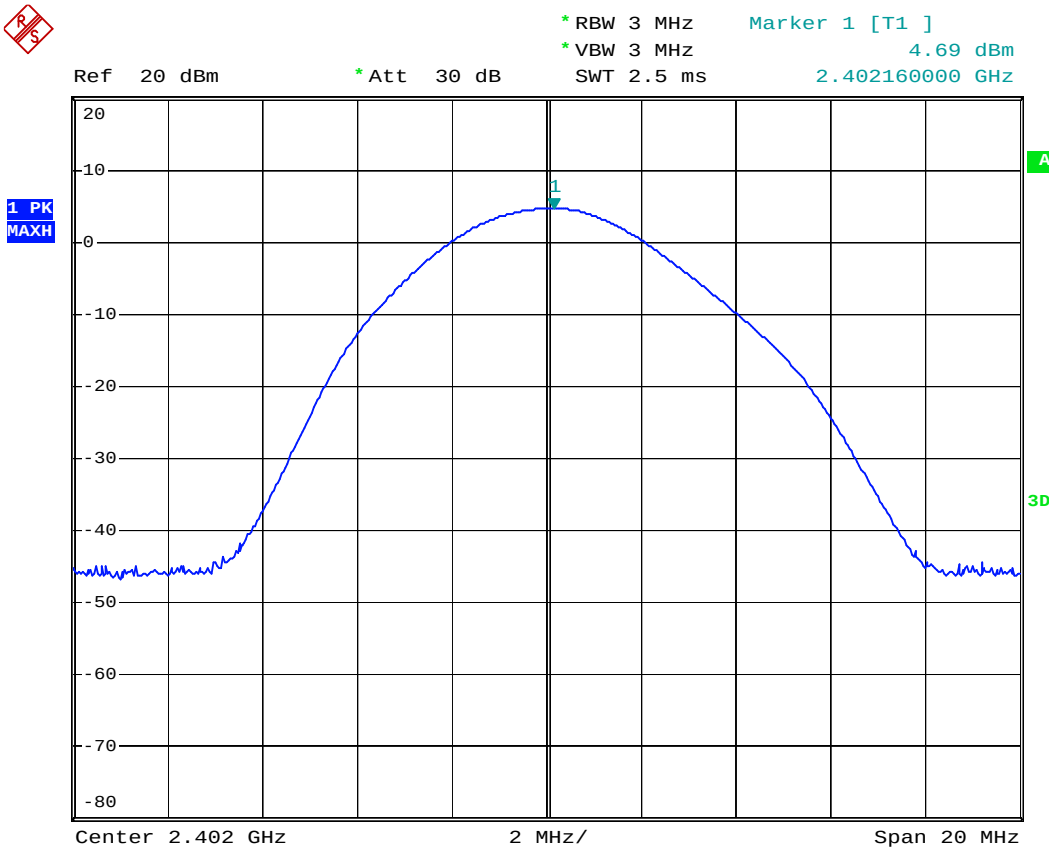
Channel	Frequency MHz	Measured Value dBm	Output Power mW	Limit mW
Low Channel	2402	-1.31	0.740	1000
Middle Channel	2441	2.07	1.611	1000
High Channel	2480	1.16	1.306	1000

For 8DPSK

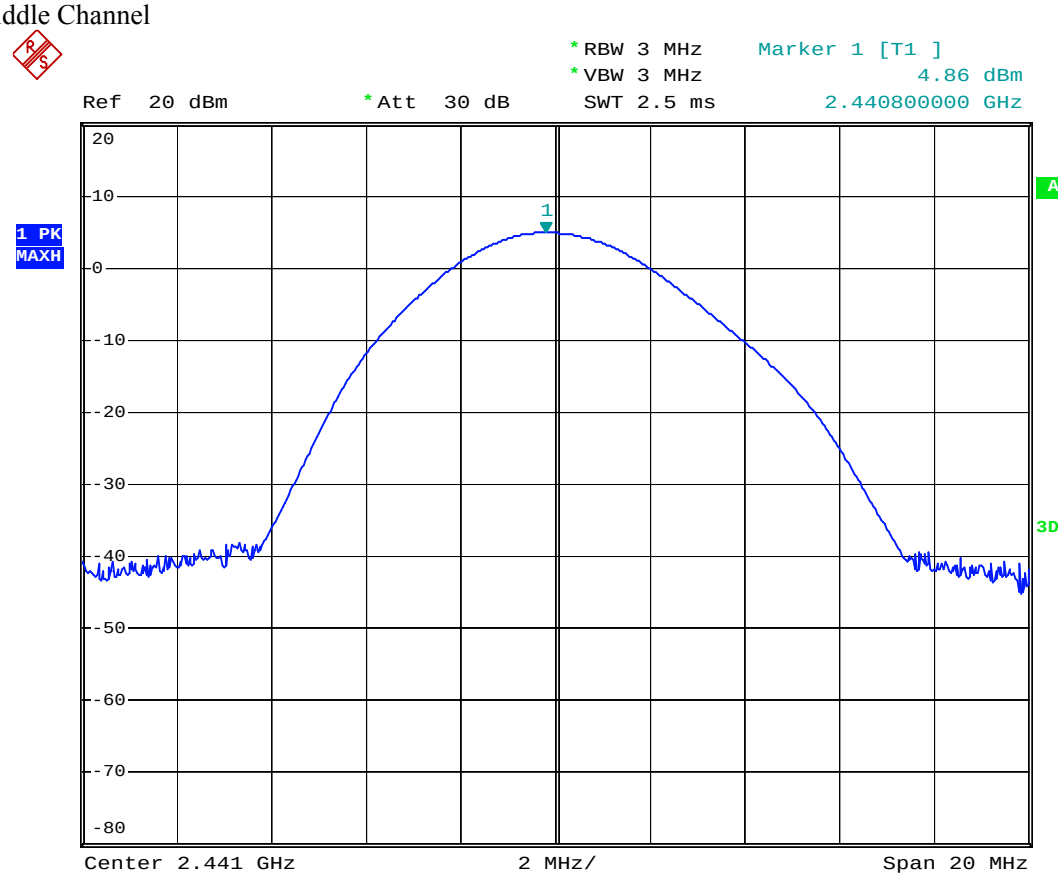
Channel	Frequency MHz	Measured Value dBm	Output Power mW	Limit mW
Low Channel	2402	4.42	2.767	1000
Middle Channel	2441	5.43	3.491	1000
High Channel	2480	4.65	2.917	1000

Note: the antenna gain of 1dBi less than 6dBi maximum permission antenna gain value based on 1 watt peak output power limit.

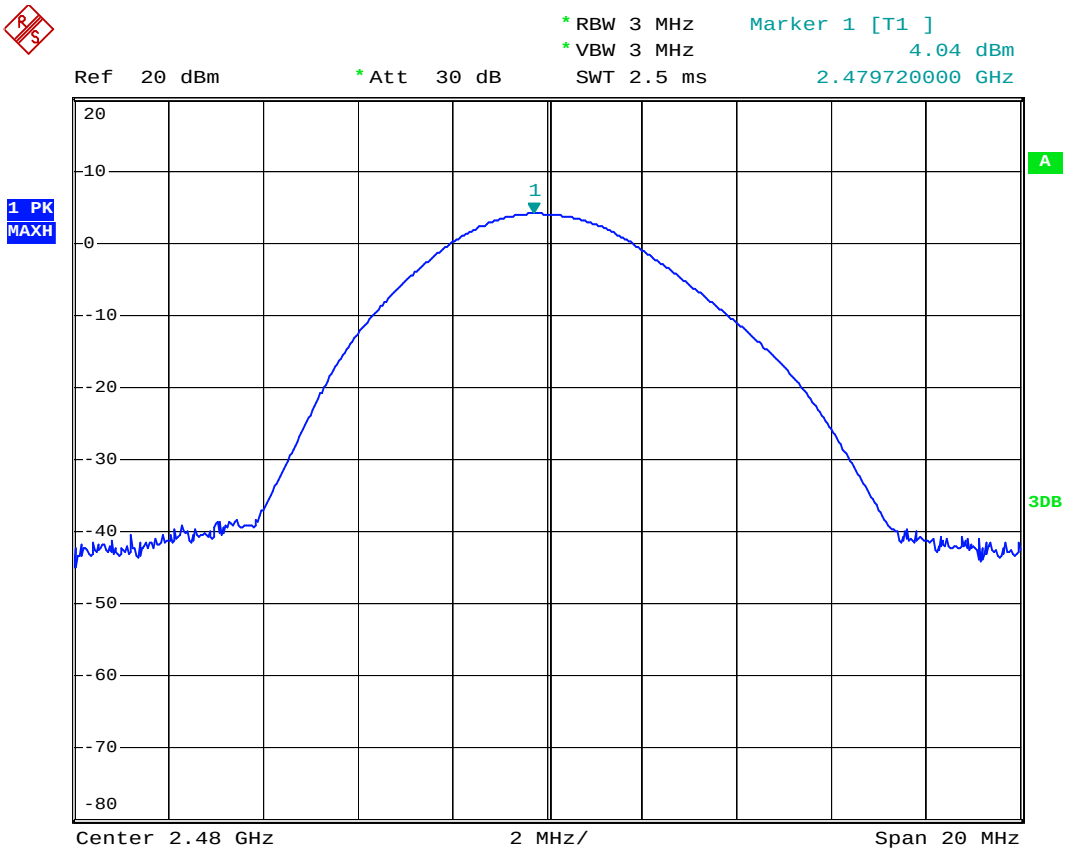
GFSK Low Channel



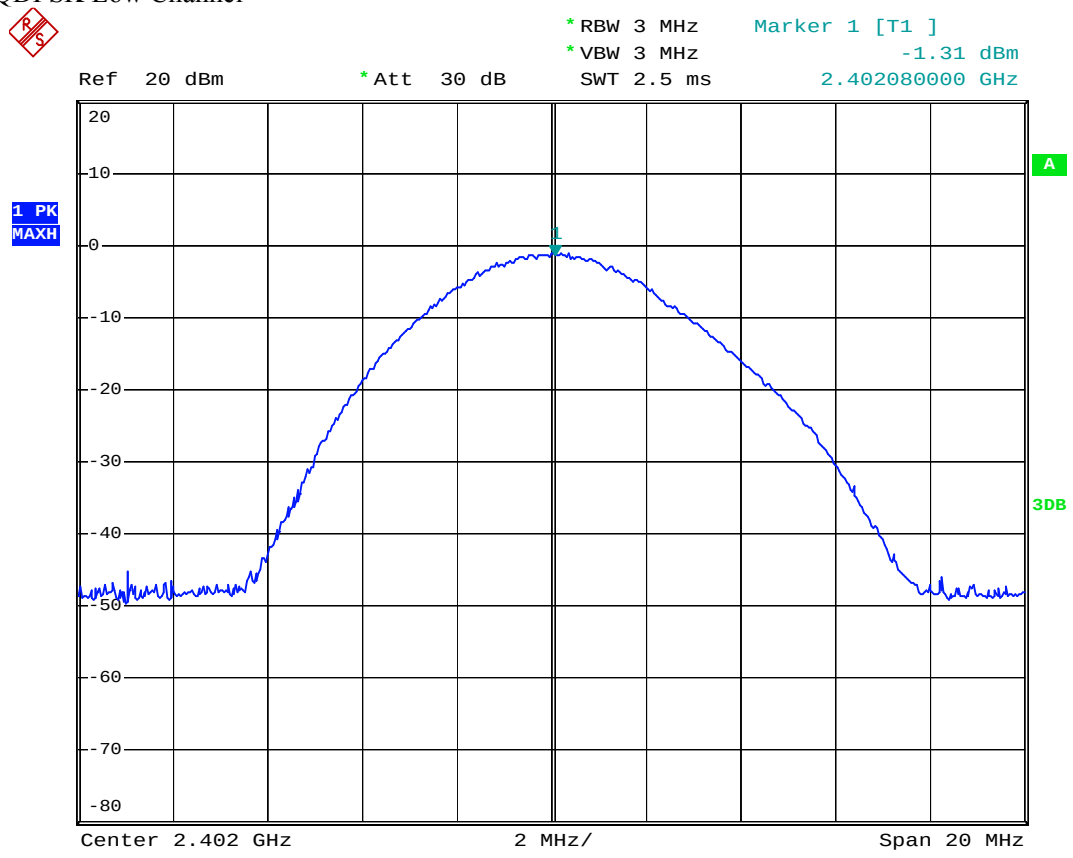
GFSK Middle Channel



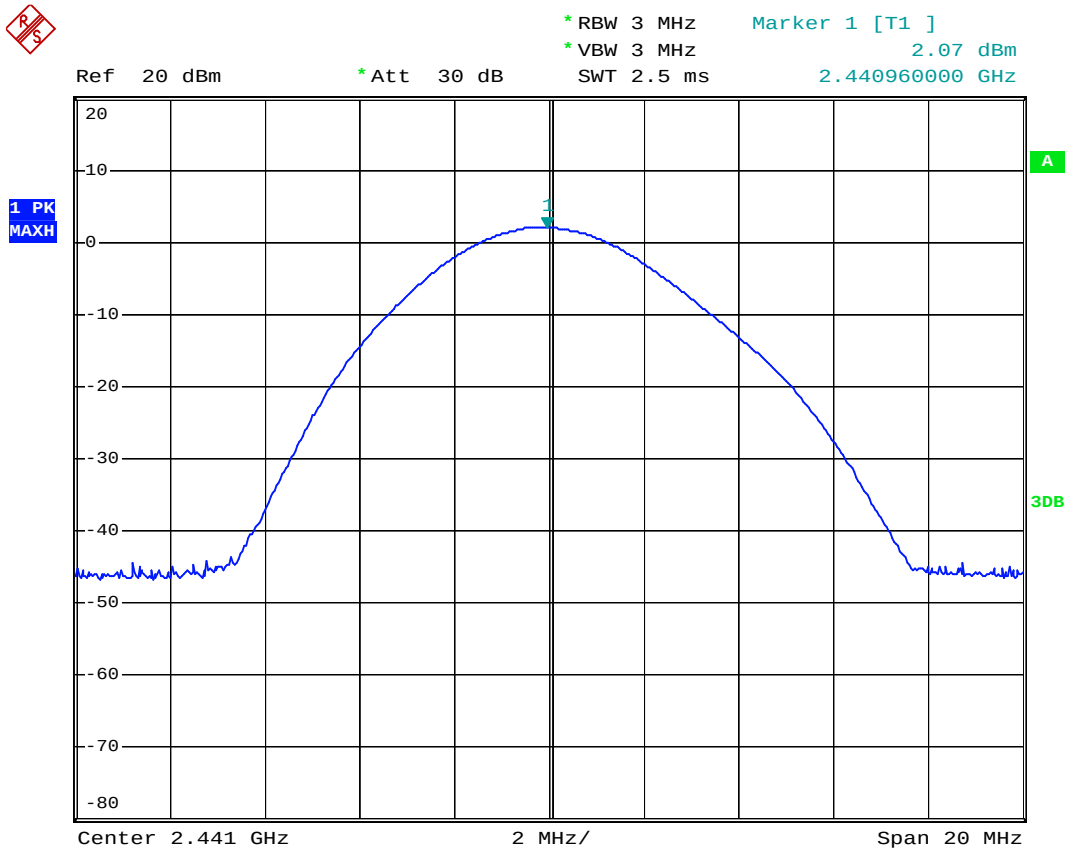
GFSK High Channel



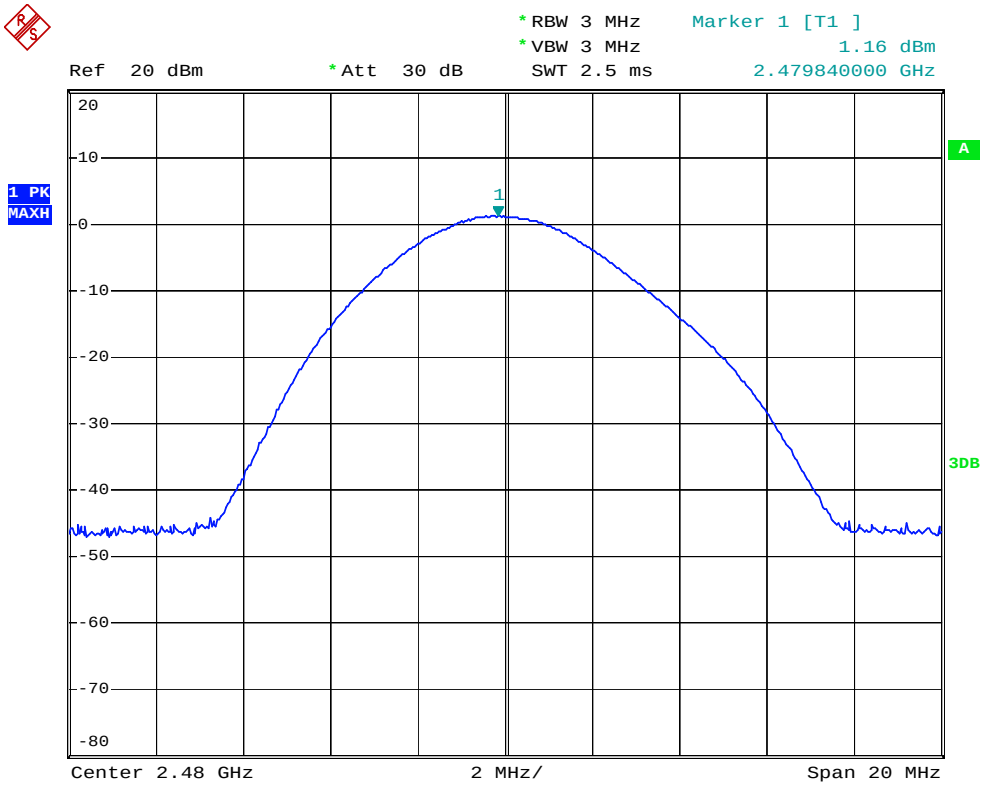
For Pi/4 QDPSK Low Channel



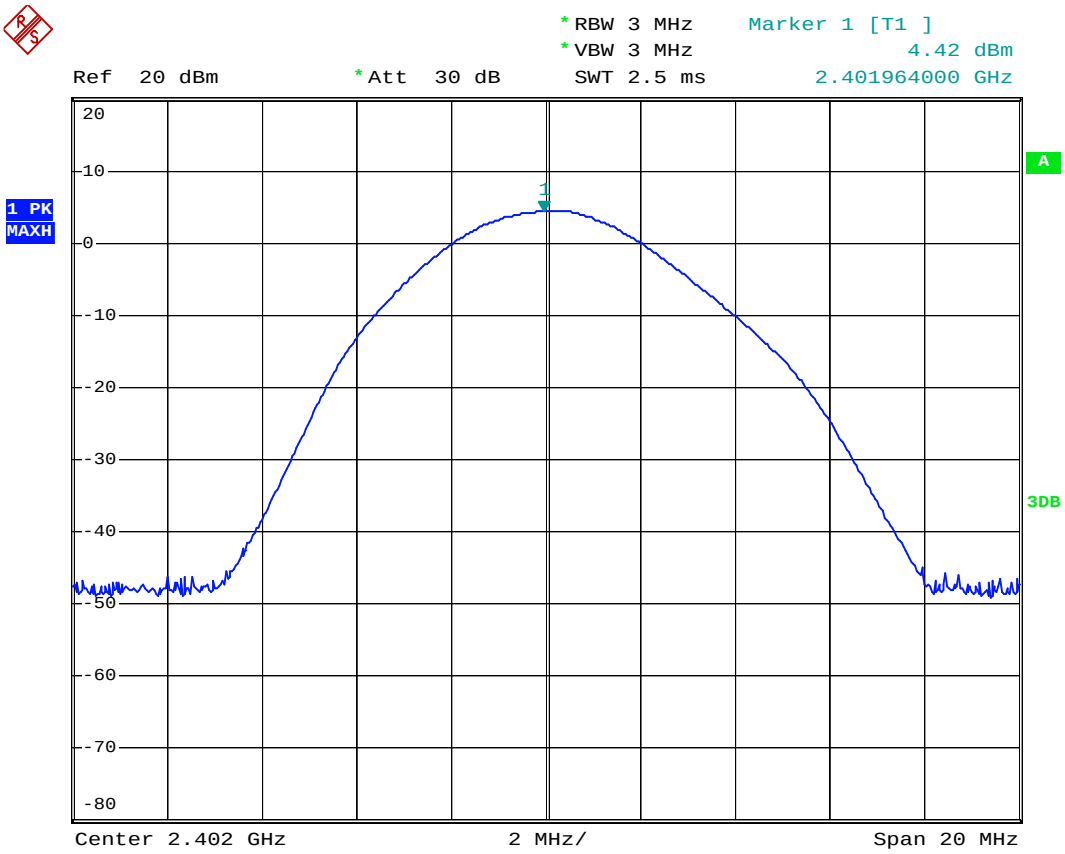
For Pi/4 QDPSK Middle Channel



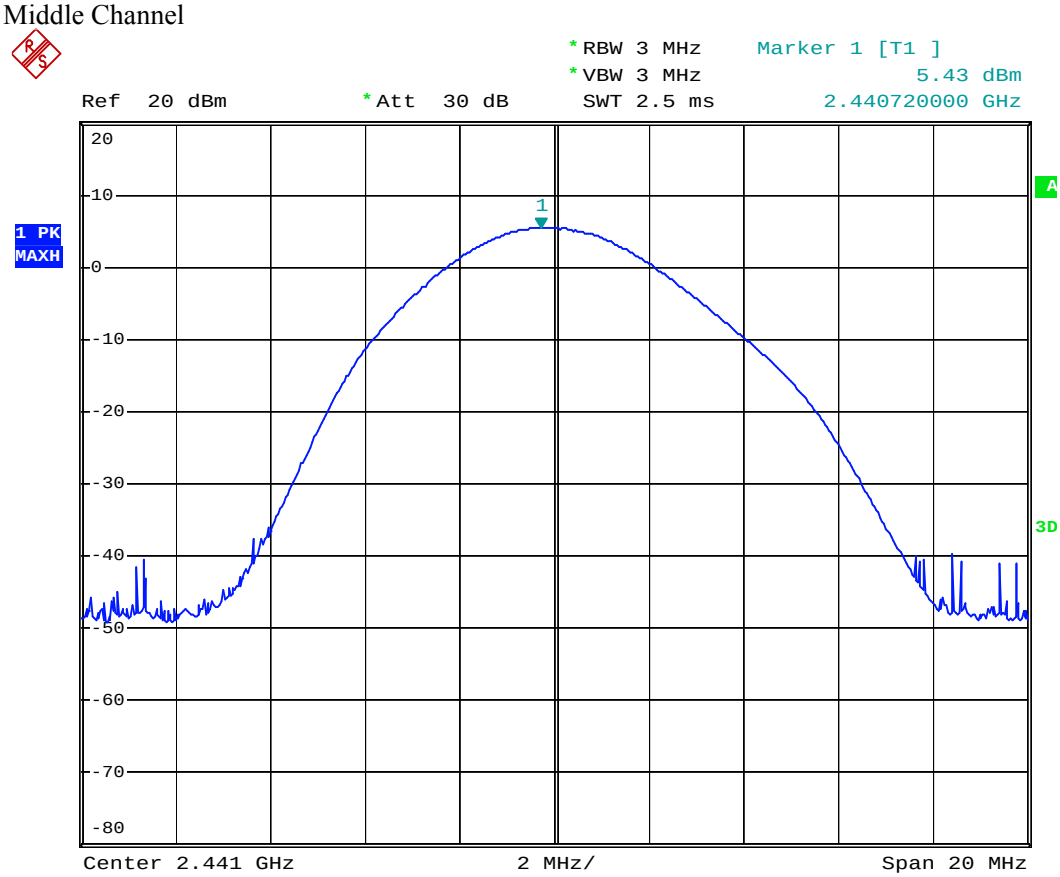
For Pi/4 QDPSK High Channel



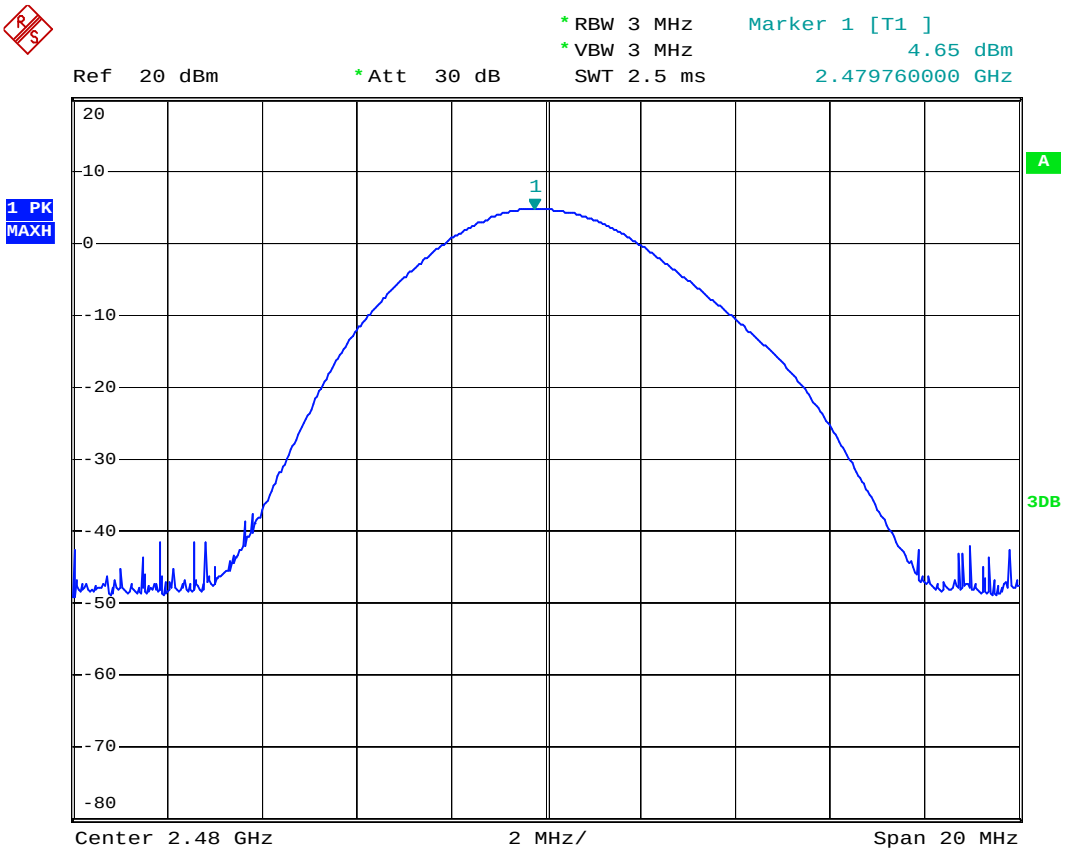
8DPSK Low Channel



8DPSK Middle Channel



8DPSK High Channel



10. Field Strength of Spurious Emissions

10.1 Standard Applicable

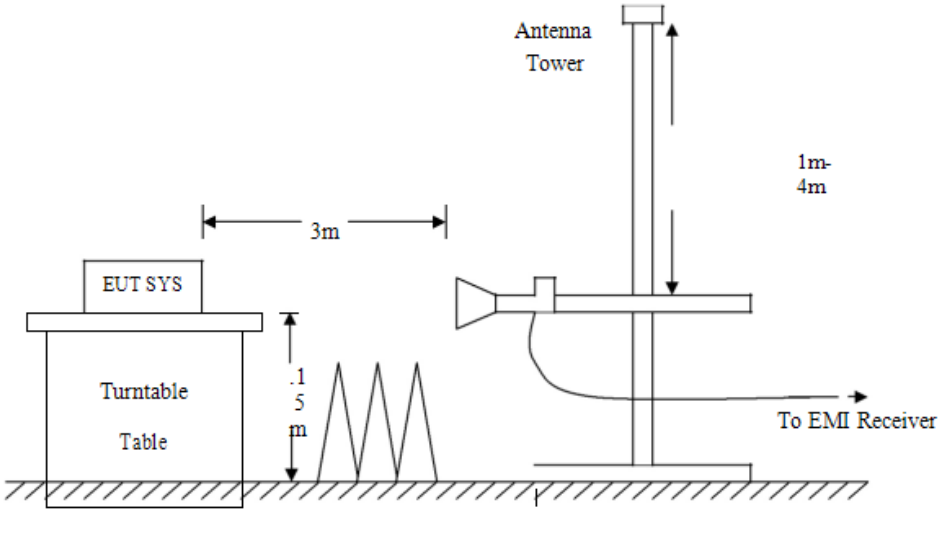
According to §15.247(d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within 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).

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

10.2 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.205 15.247(a) and FCC Part 15.209 Limit.

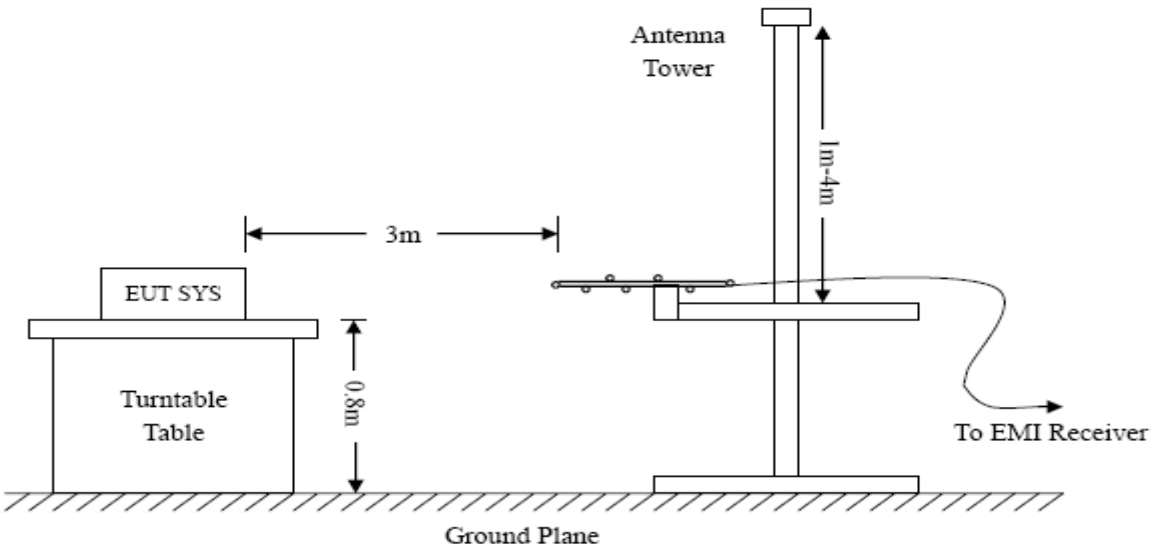
The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle. The spacing between the peripherals was 10 cm.



Frequency :9kHz-30MHz
RBW=10KHz,
VBW =30KHz
Sweep time= Auto
Trace = max hold
Detector function = peak

Frequency :30MHz-1GHz
RBW=120KHz,
VBW=300KHz
Sweep time= Auto
Trace = max hold
Detector function = peak, QP

Frequency :Above 1GHz
RBW=1MHz,
VBW=3MHz(Peak), 10Hz(AV)
Sweep time= Auto
Trace = max hold
Detector function = peak, AV



10.3 Corrected Amplitude & Margin Calculation

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

Corr. Ampl. = Indicated Reading + Ant. Factor + Cable Loss – Ampl. Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dBμV means the emission is 6dBμV below the maximum limit. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – FCC Part 15 Limit

10.4 Environmental Conditions

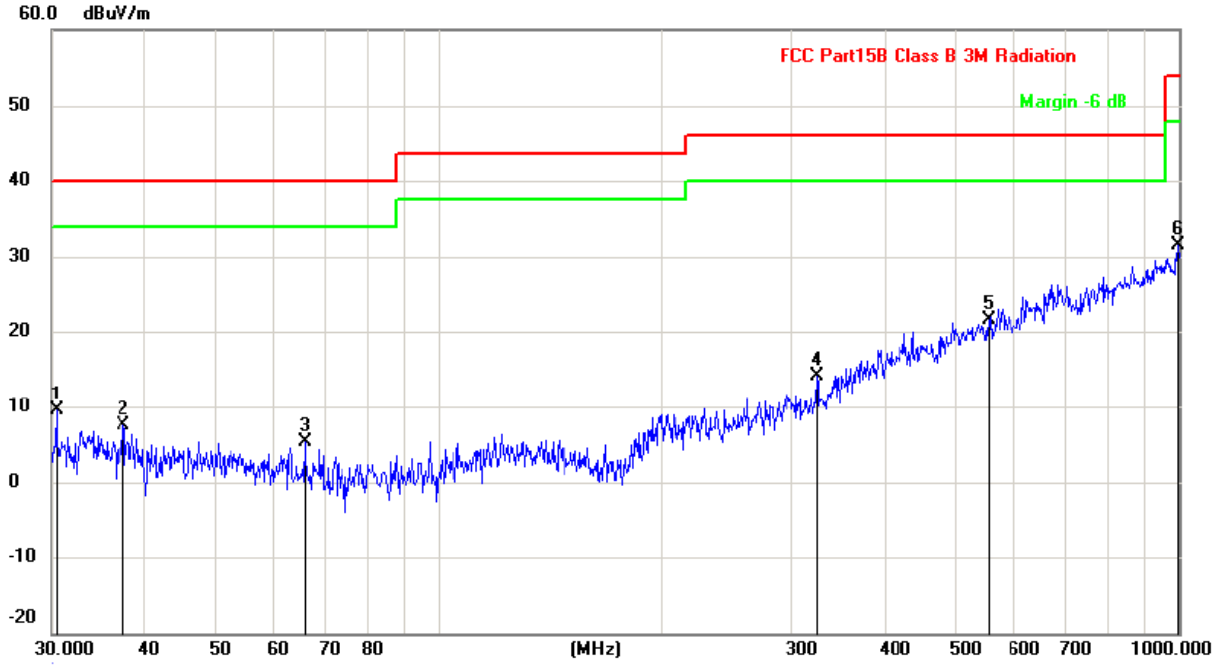
Temperature:	25 °C
Relative Humidity:	50%
ATM Pressure:	101.1 mbar

10.5 Summary of Test Results/Plots

pass

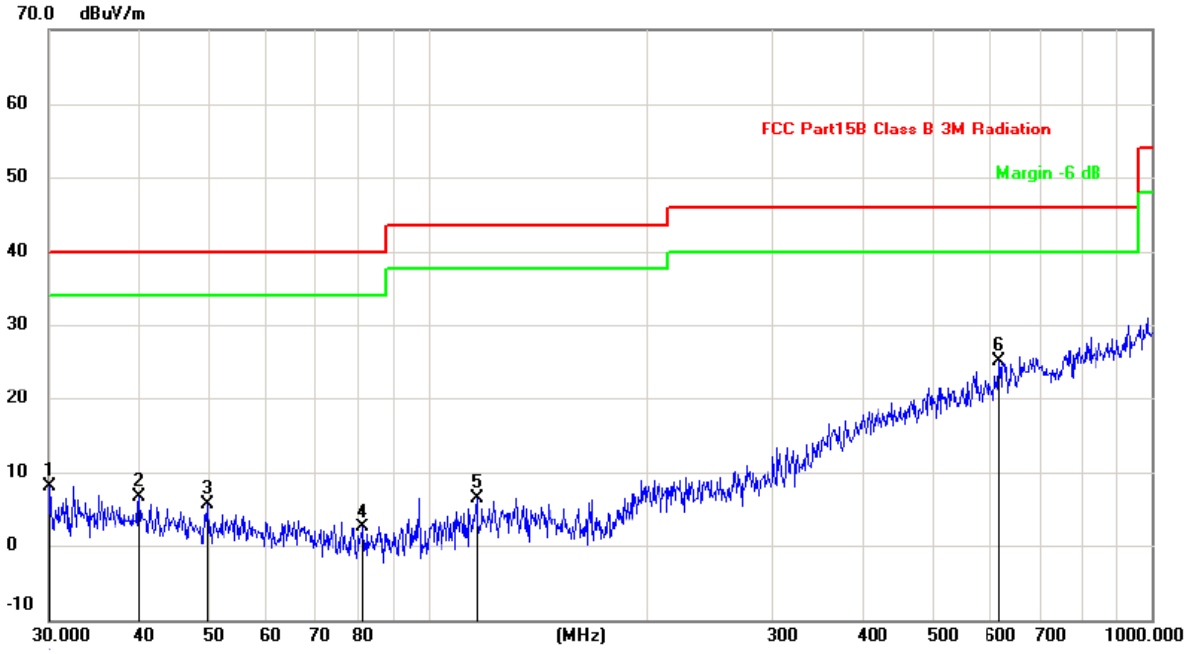
Note:
1. Worst-case radiated emission below 1GHz is GFSK 1DH1 (CH Low, Middle, High) mode.
2. Worst-case radiated emission above 1GHz is Pi/4 QDPSK 2DH1(CH Low, Middle, High) mode.
Worst-case radiated emission above 1GHz is 8QDPSK 3DH1(CH Low, Middle, High) mode.

Test Specification: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dBuV/m	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		30.4238	15.83	-6.36	9.47	40.00	-30.53	peak			
2		37.4165	14.95	-7.44	7.51	40.00	-32.49	peak			
3		65.8031	15.61	-10.32	5.29	40.00	-34.71	peak			
4		324.4561	14.46	-0.38	14.08	46.00	-31.92	peak			
5		552.8832	13.42	8.07	21.49	46.00	-24.51	peak			
6	*	996.4996	15.13	16.38	31.51	54.00	-22.49	peak			

Test Specification: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dBuV/m	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		30.1054	14.47	-6.32	8.15	40.00	-31.85	peak			
2		39.9942	14.84	-8.07	6.77	40.00	-33.23	peak			
3		49.5328	14.69	-9.01	5.68	40.00	-34.32	peak			
4		81.4970	13.09	-10.53	2.56	40.00	-37.44	peak			
5		116.9495	14.47	-8.06	6.41	43.50	-37.09	peak			
6	*	616.3718	15.28	9.90	25.18	46.00	-20.82	peak			

Spurious Emissions Above 1GHz

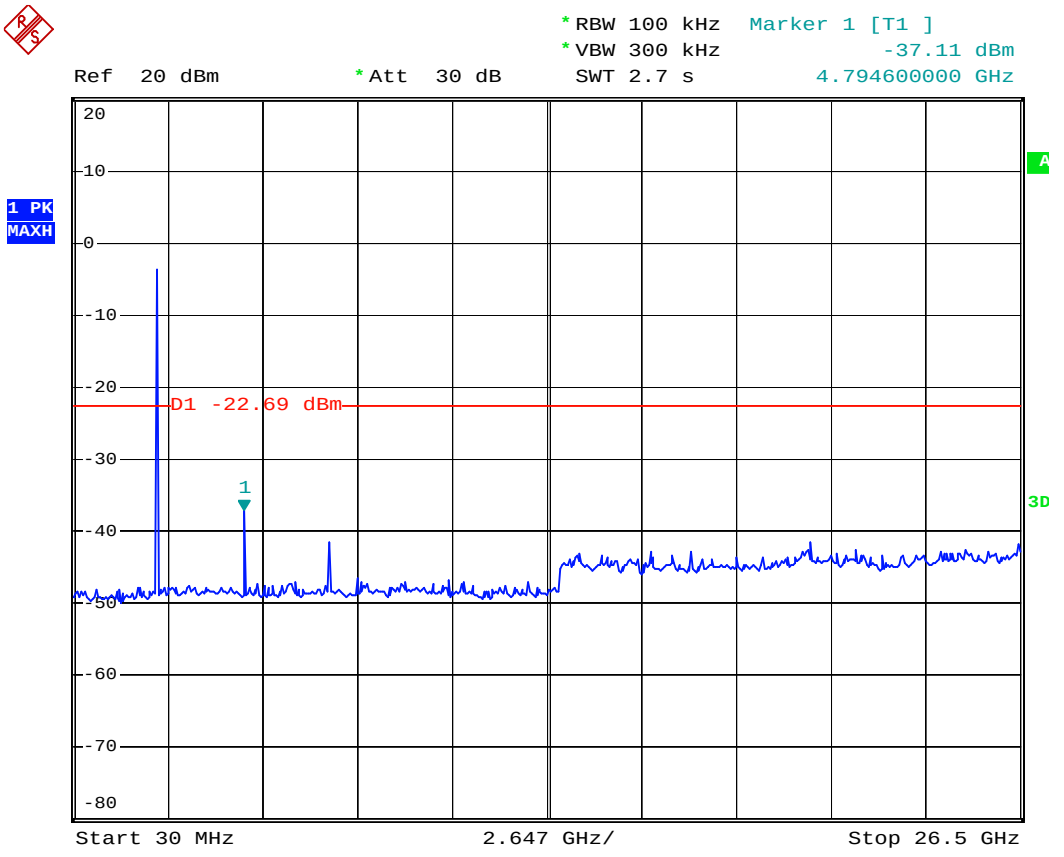
Frequency (MHz)	Reading (dBuV/m)	Correct dB	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polar H/V	Detector
Low Channel-2402MHz							
4832	52.21	-3.59	48.82	74	-25.18	H	PK
4832	33.41	-3.59	29.82	54	-24.18	H	AV
7308	51.09	-0.52	50.57	74	-23.43	H	PK
7308	32.15	-0.52	31.63	54	-22.37	H	AV
4832	51.15	-3.59	47.36	74	-26.64	V	PK
4832	39.34	-3.59	35.75	54	-18.25	V	AV
7308	55.24	-0.52	54.72	74	-19.28	V	PK
7308	40.78	-0.52	40.26	54	-13.74	V	AV
Middle Channel-2441MHz							
4820	55.54	-3.49	52.13	74	-21.87	H	PK
4820	43.37	-3.49	39.96	54	-14.04	H	AV
7401	54.55	-0.47	54.13	74	-19.87	H	PK
7401	40.42	-0.47	40.00	54	-14.00	H	AV
4820	52.78	-3.49	49.37	74	-24.63	V	PK
4820	42.35	-3.49	38.94	54	-15.06	V	AV
7401	53.61	-0.47	53.19	74	-20.81	V	PK
7401	40.72	-0.47	40.3	54	-13.7	V	AV
High Channel-2480MHz							
4523	55.88	-3.41	52.47	74	-21.53	H	PK
4523	43.59	-3.41	40.18	54	-13.82	H	AV
7380	51.64	-0.42	51.22	74	-22.78	H	PK
7380	42.33	-0.42	41.91	54	-12.09	H	AV
4960	53.56	-3.41	50.15	74	-23.85	V	PK
4960	39.85	-3.41	36.44	54	-17.56	V	AV
7440	52.35	-0.42	51.93	74	-22.07	V	PK
7440	41.30	-0.42	40.88	54	-13.12	V	AV

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, other than listed in the table above are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured

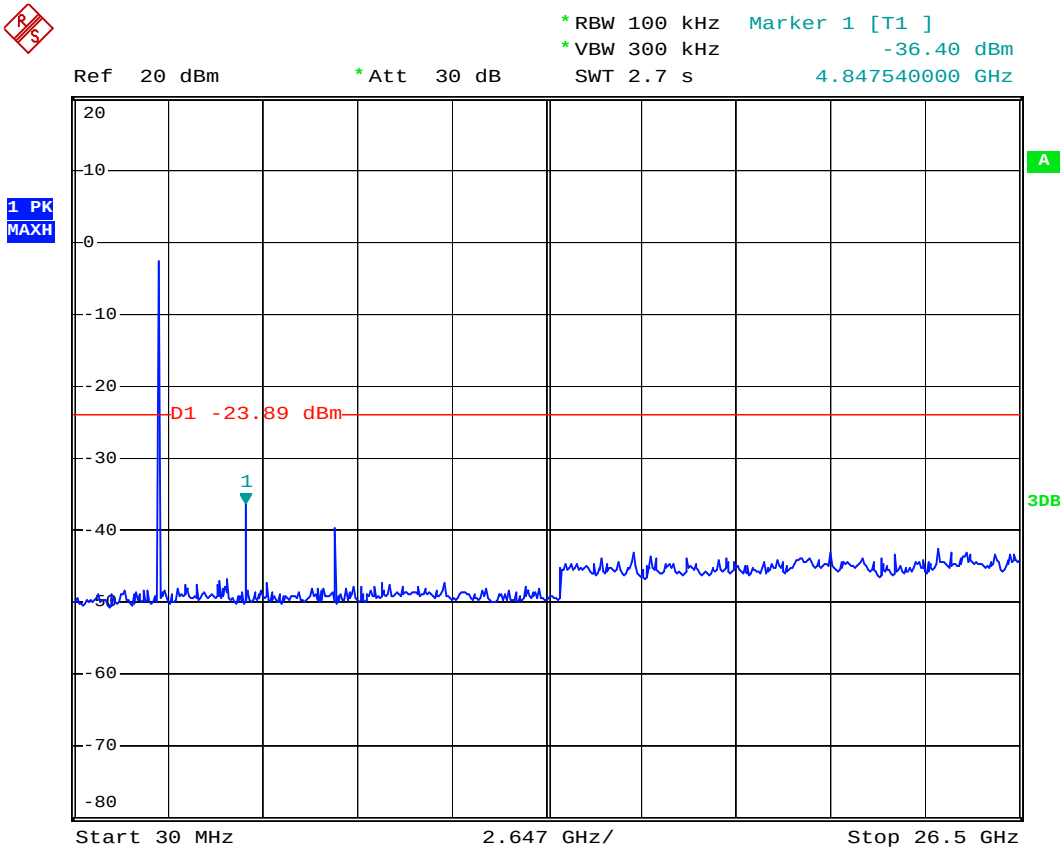
Spurious Emission(Conducted)

For GFSK(DH1)

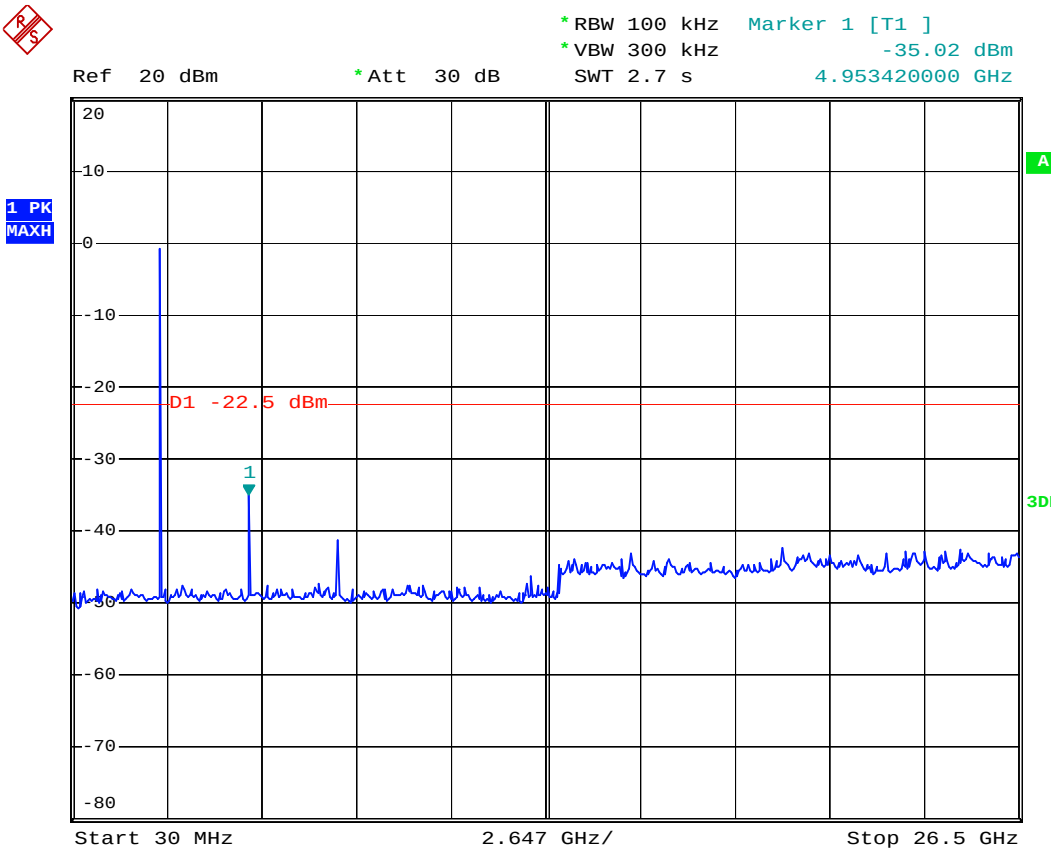
Low channel:



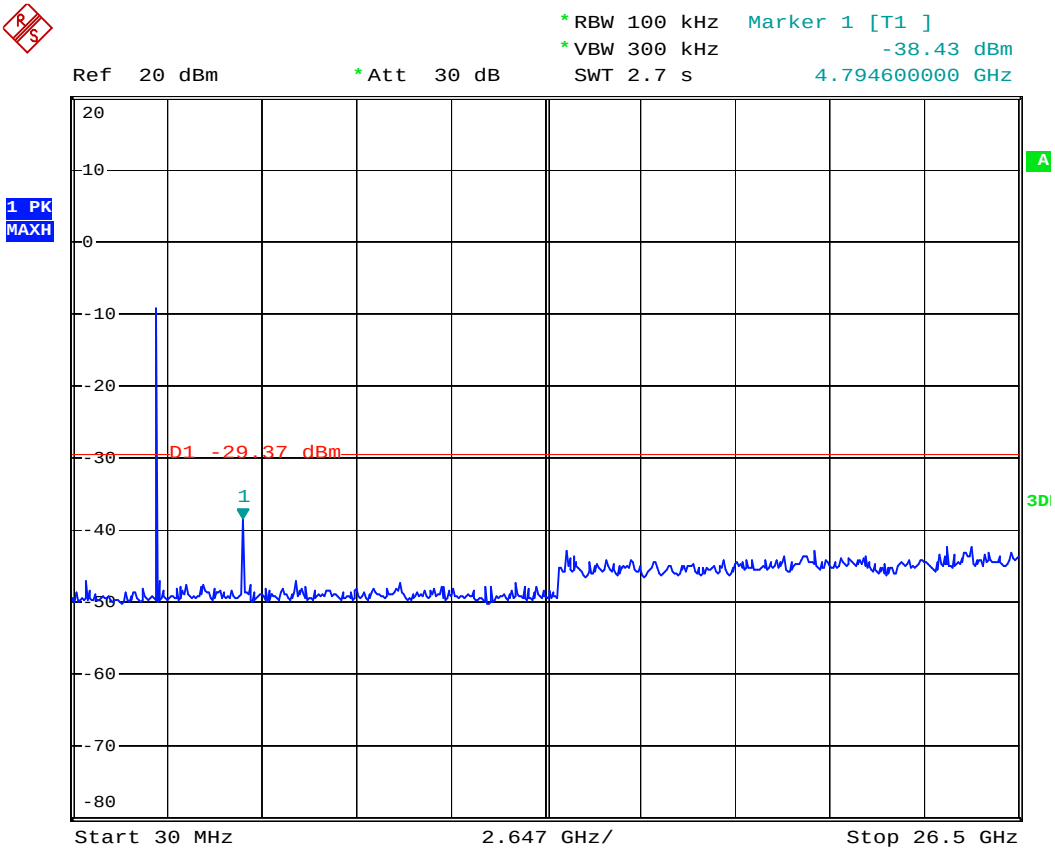
Middle channel:



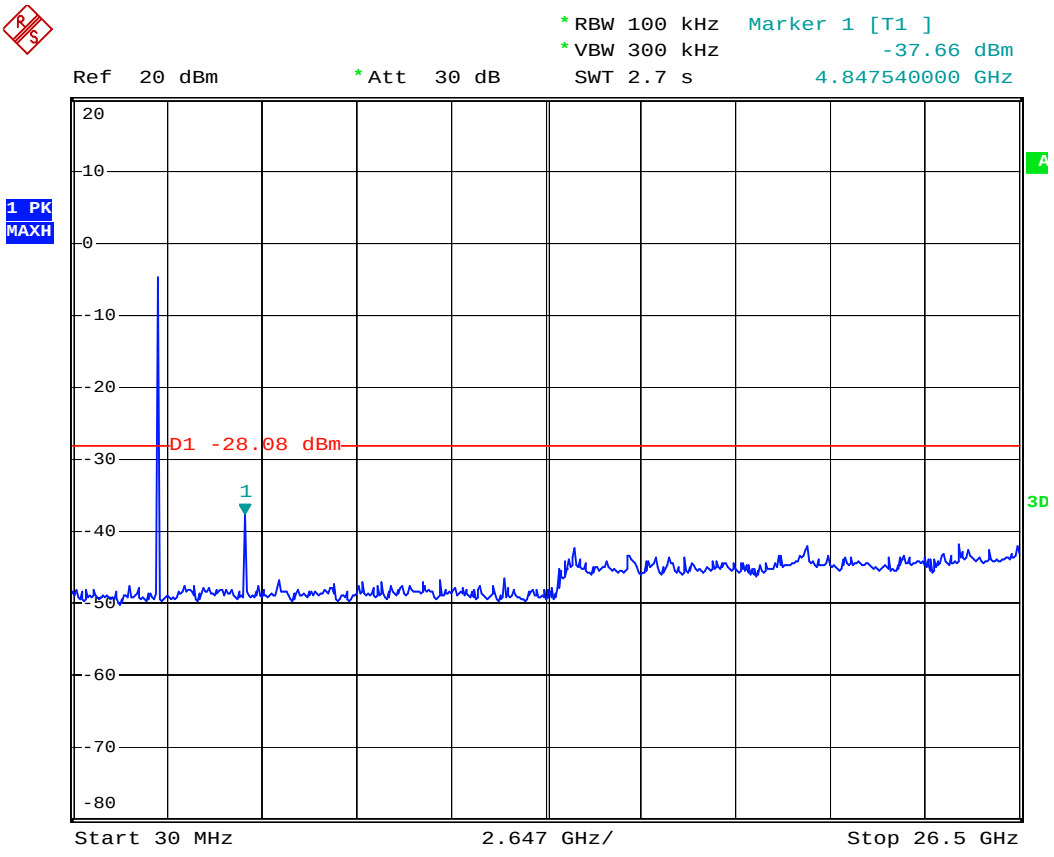
High channel:



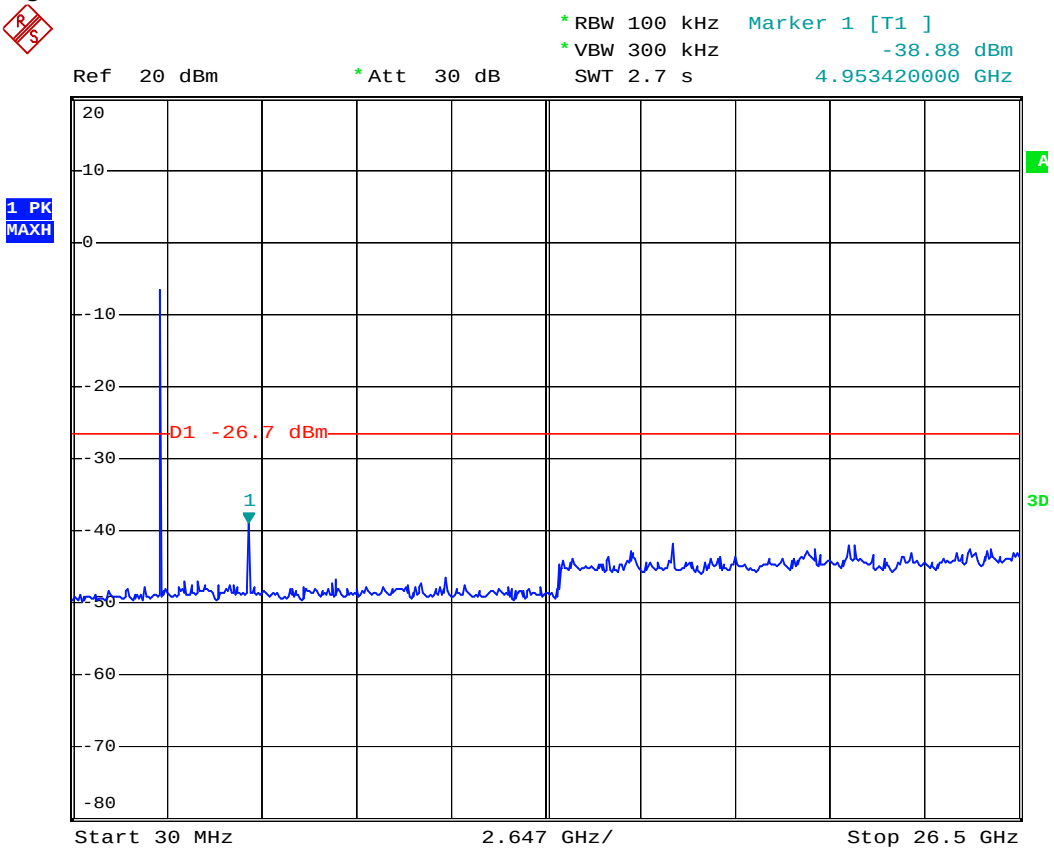
For Pi/4 QDPSK(2DH1)
Low channel:



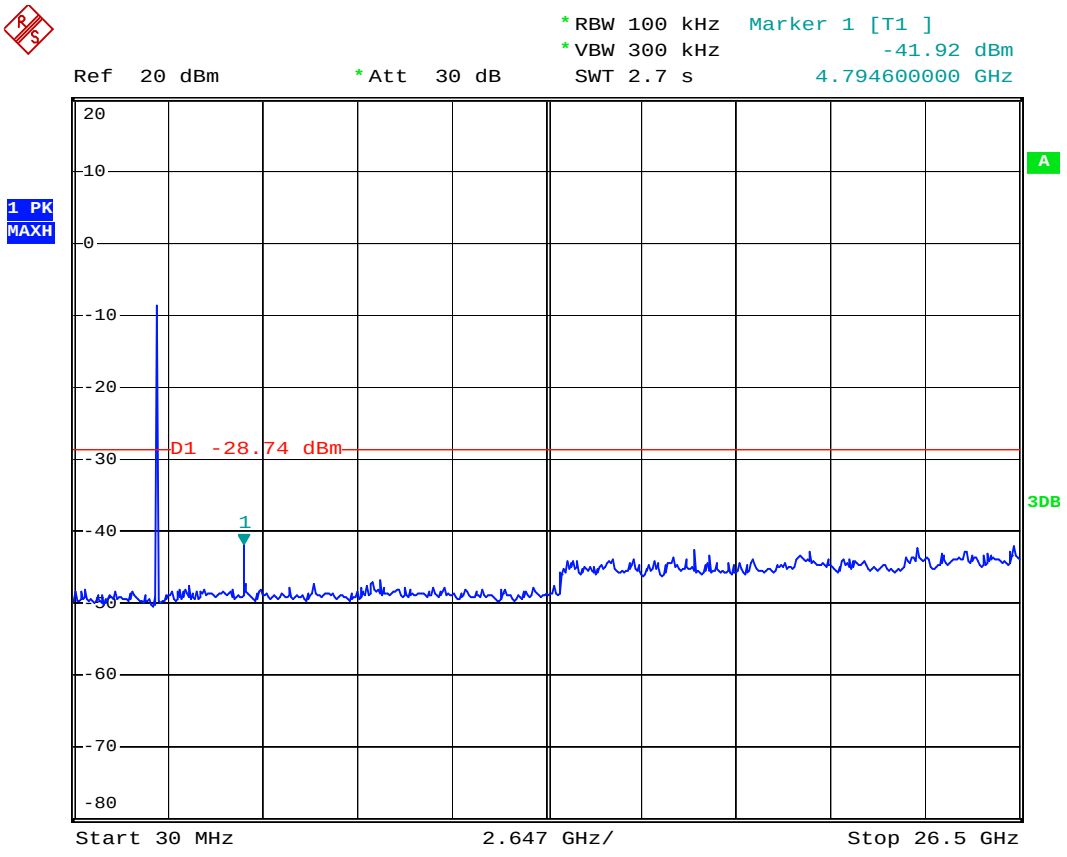
Middle channel:



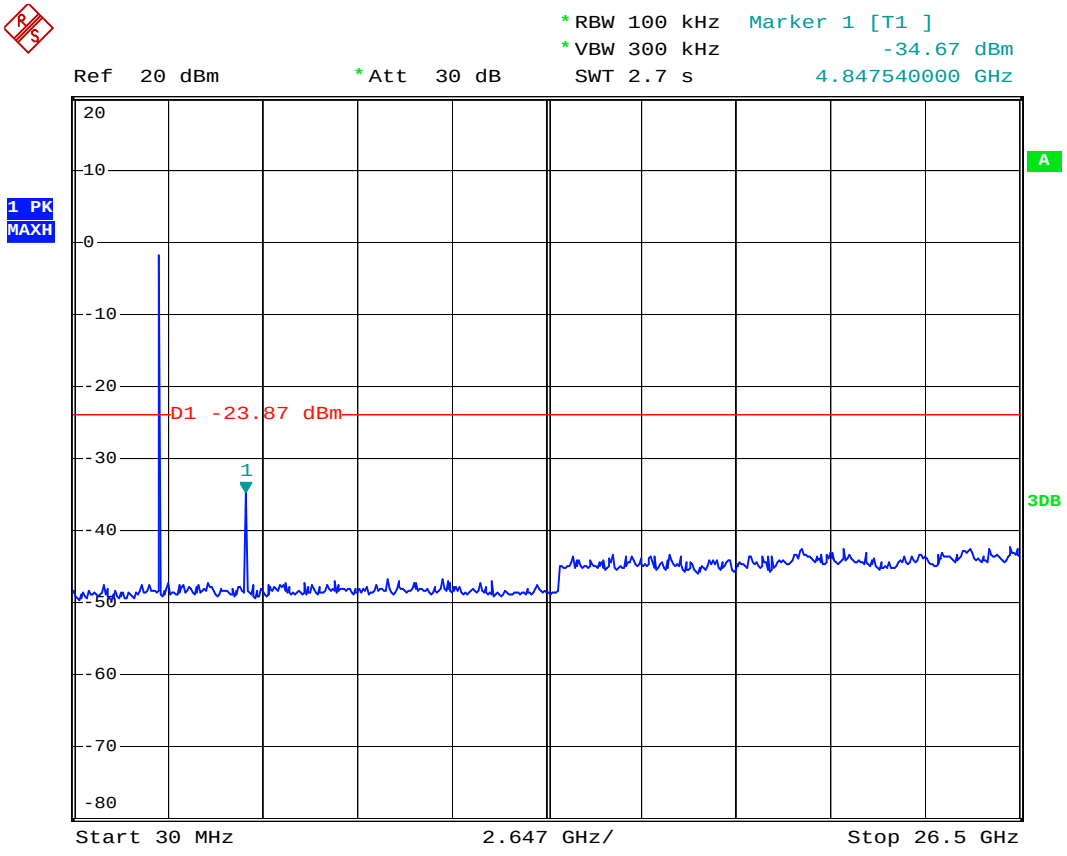
High channel:



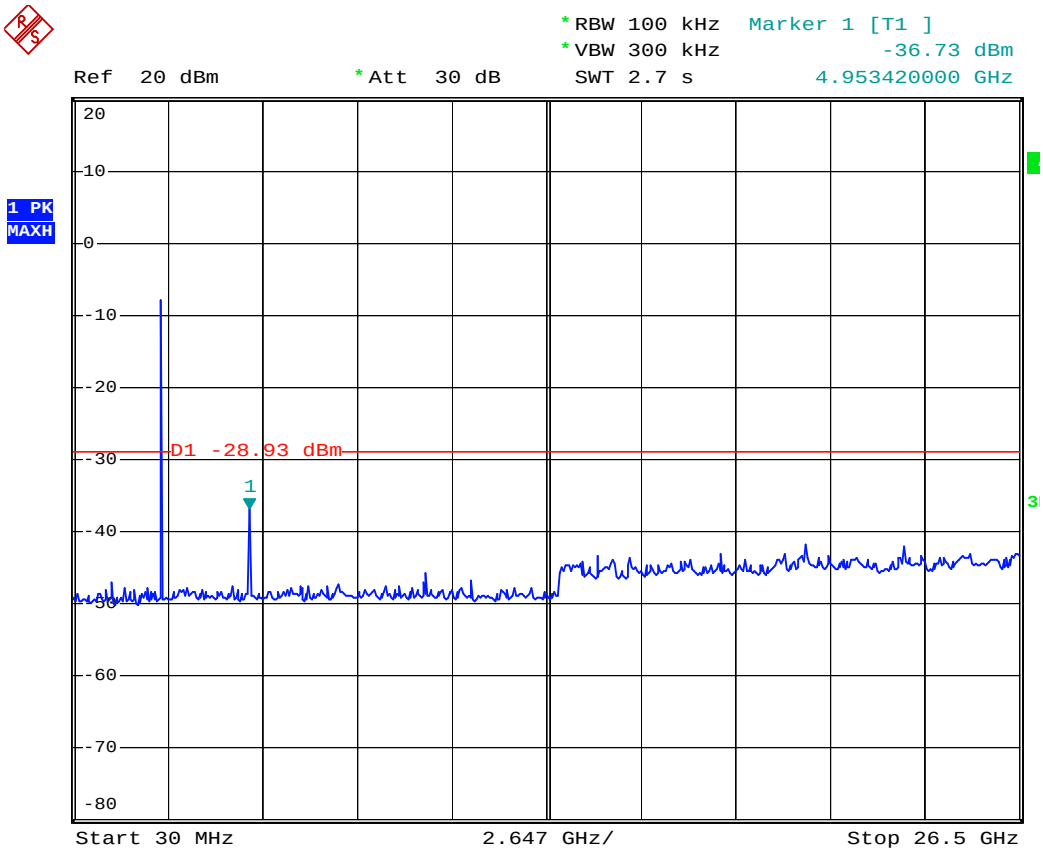
8DPSK(3DH1)
Low channel:

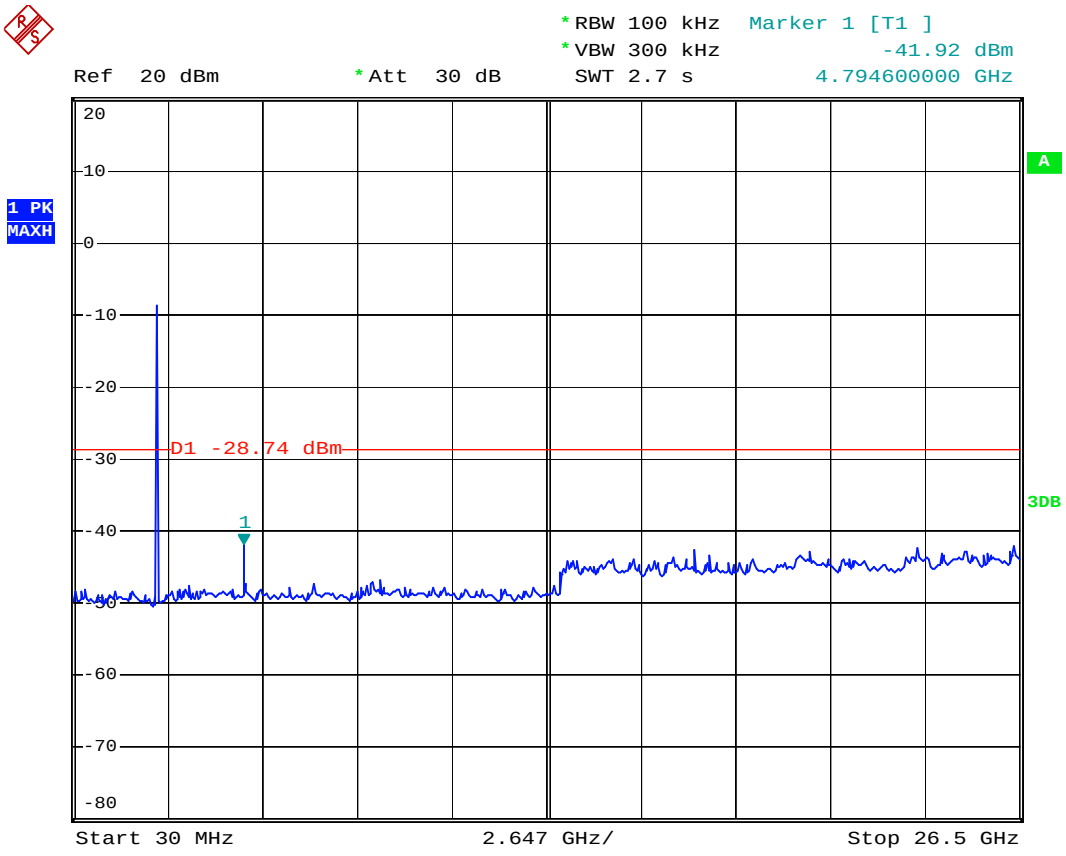


Middle channel



Hig channel


*RBW 100 kHz
*VBW 300 kHz
Marker 1 [T1]
-36.73 dBm
4.953420000 GHz
Ref 20 dBm
*Att 30 dB
SWT 2.7 s
1 PK
MAXH
D1 -28.93 dBm
Start 30 MHz
2.647 GHz/
Stop 26.5 GHz


*RBW 100 kHz
*VBW 300 kHz
Marker 1 [T1]
-41.92 dBm
4.794600000 GHz
Ref 20 dBm
*Att 30 dB
SWT 2.7 s
1 PK
MAXH
A
D1 -28.74 dBm
3DB
Start 30 MHz
2.647 GHz/
Stop 26.5 GHz

11. Out of Band Emissions

11.1 Standard Applicable

According to §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).

11.2 Test Procedure

According to the DA 00-705, the band-edge radiated test method as follows.

Set span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation low bandedge, 2470MHz to 2500MHz for the high bandedge)
RBW = 1MHz, VBW = 1MHz for peak value measured RBW
= 1MHz, VBW = 10Hz for average value measured Sweep =
auto; Detector function = peak; Trace = max hold

All the trace to stabilize, set the marker on the emission at the bandedge, or on the highest modulation porduct outside of the band, if this level is greater than that at the bandedge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. Those emission must comply with the 15.209 limit for fall in the restricted bands listed in section 15.205. Note that the method of measurement KDB publication number: 913591 may be used for the radiated bandedge measurements.
According to the DA 00-705, the band-edge conducted test method as follows:
Set span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation (2380MHz to 2410MHz for low bandedge, 2470MHz to 2500MHz for the high bandedge)
RBW = 100kHz, VBW = 300kHz
Sweep = auto; Detector function = peak; Trace = max hold

All the trace to stabilize, set the marker on the emission at the bandedge, or on the highest modulation porduct outside of the band, if this level is greater than that at the bandedge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. Those emission must comply

with the limit specified in this section (at least 20dB attenuation).

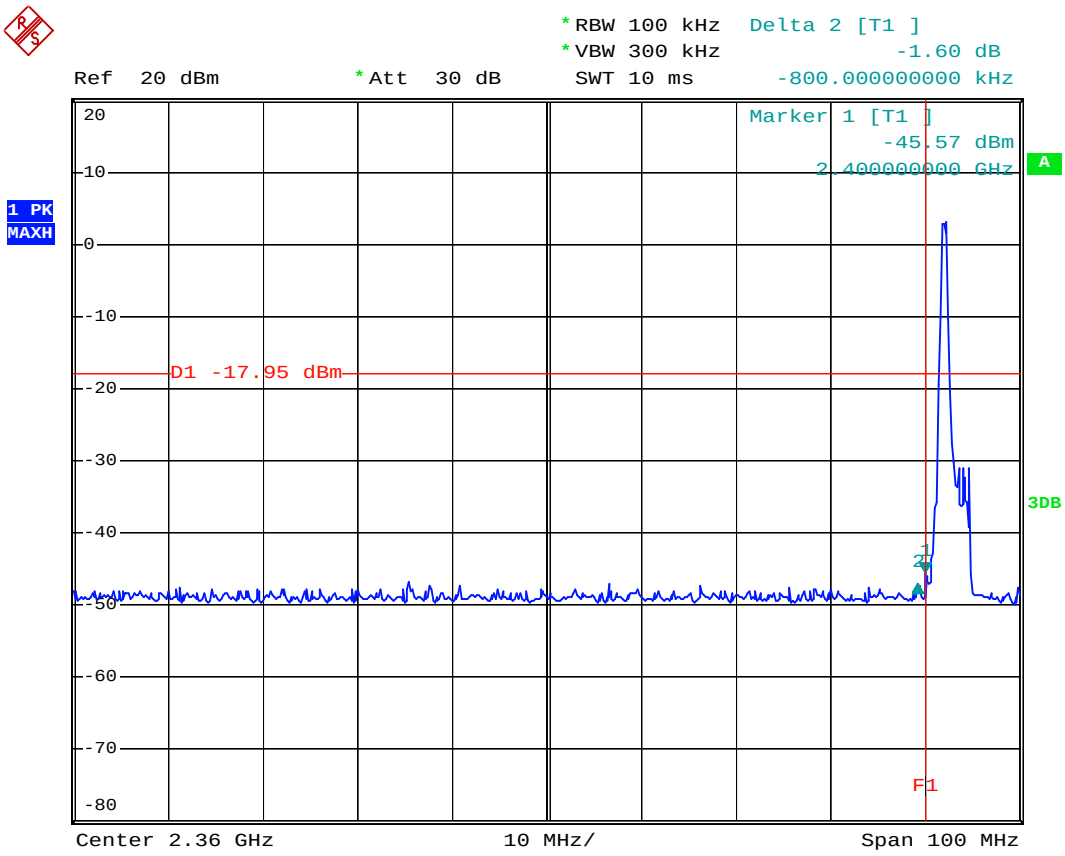
11.3 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	50%
ATM Pressure:	101.1 mbar

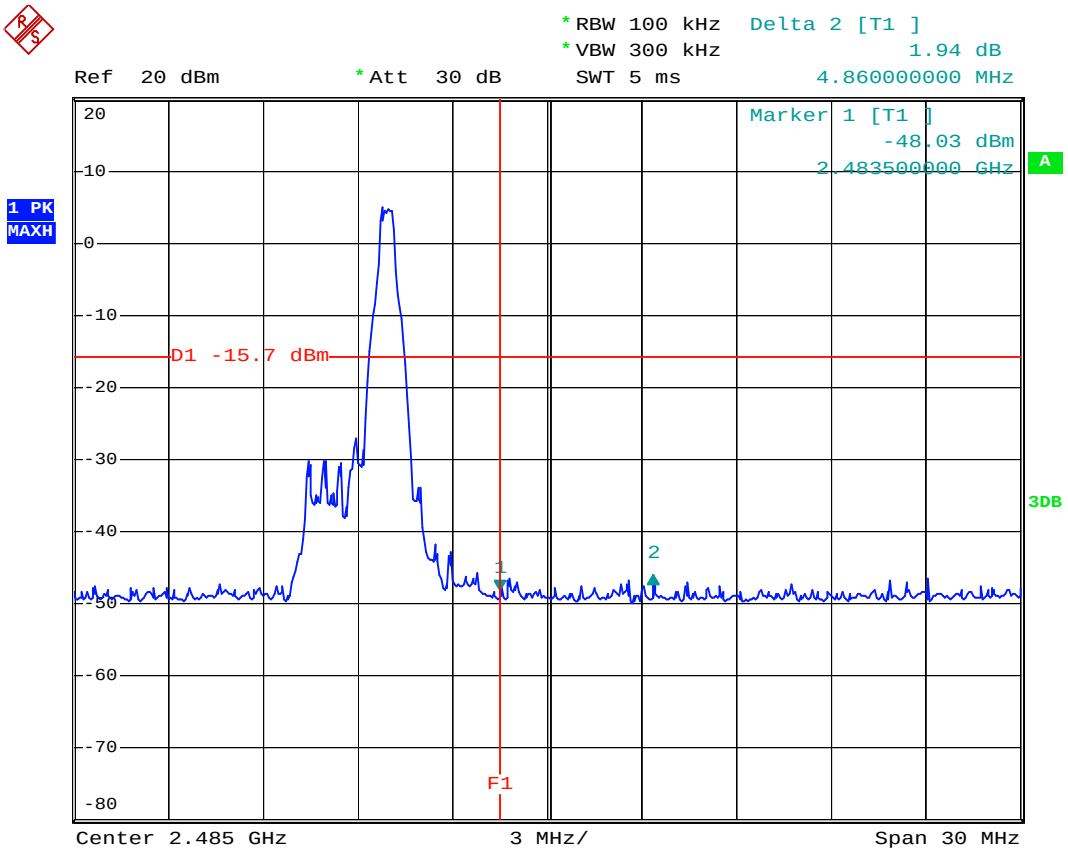
11.4 Summary of Test Results/Plots

pass

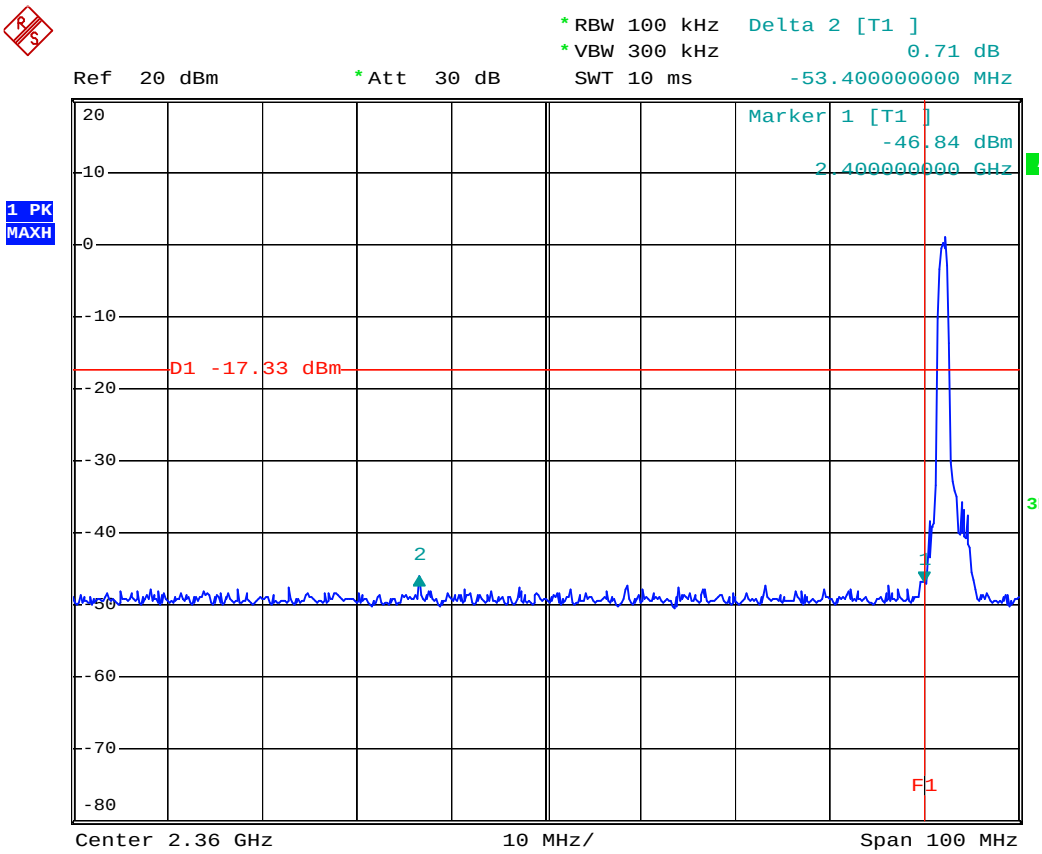
GFSK
Bandedge (Conducted)
Lowest



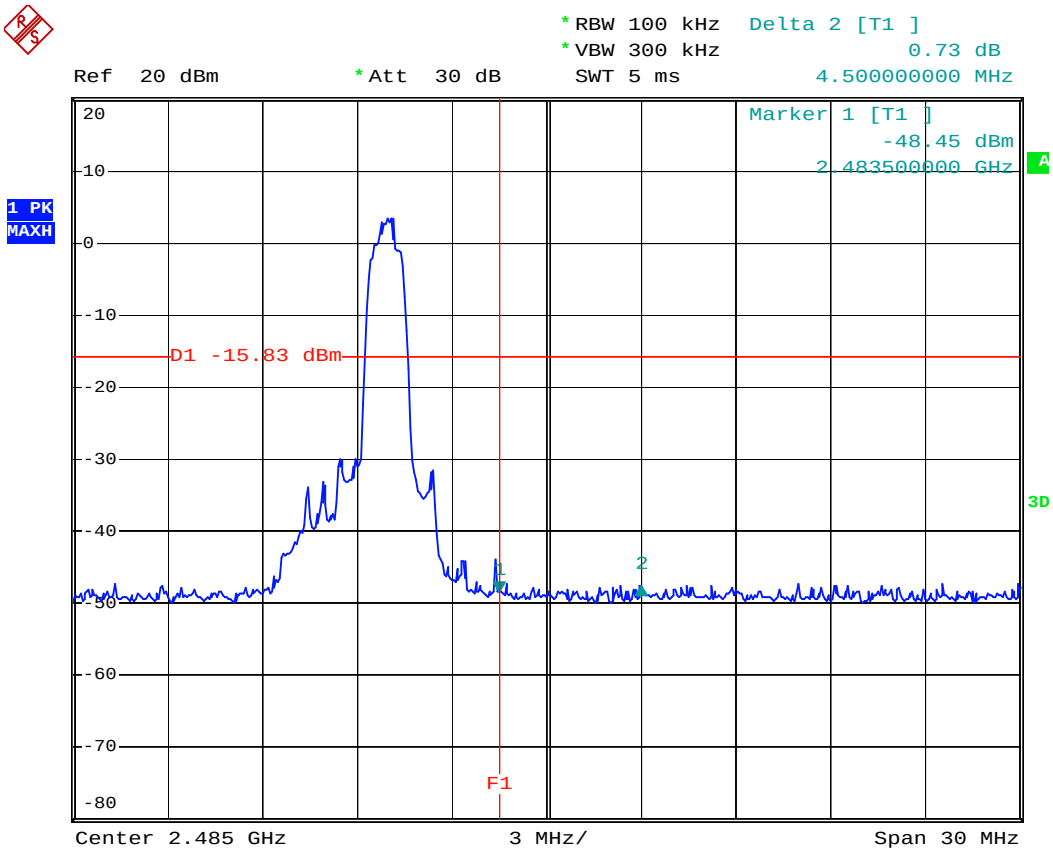
Highest



8DPSK
Lowest

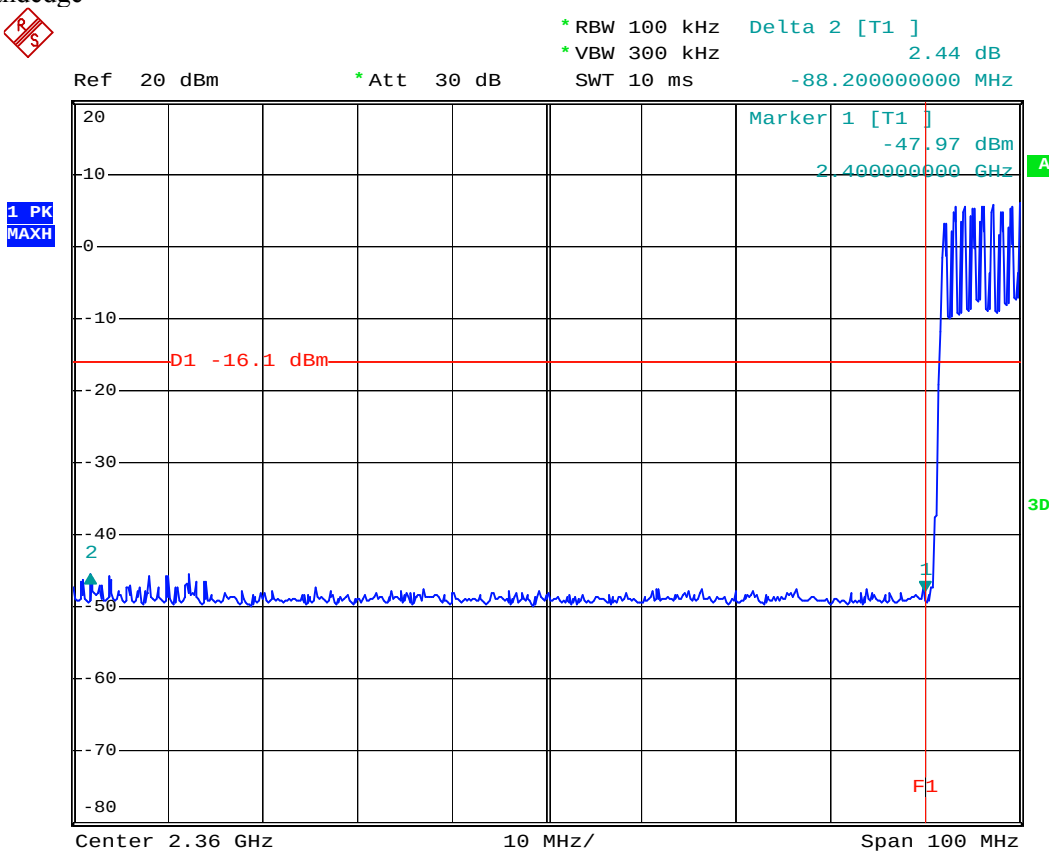


Highest

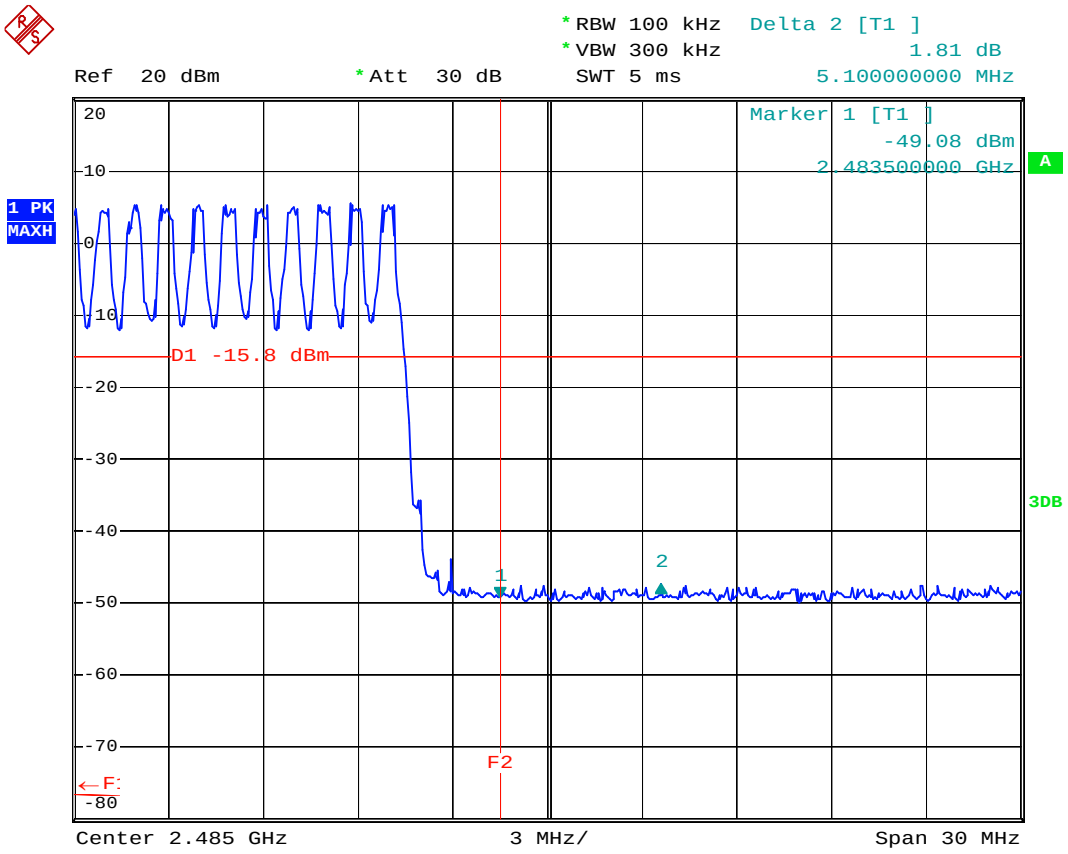


Hopping Bandedge (Conducted)
GFSK

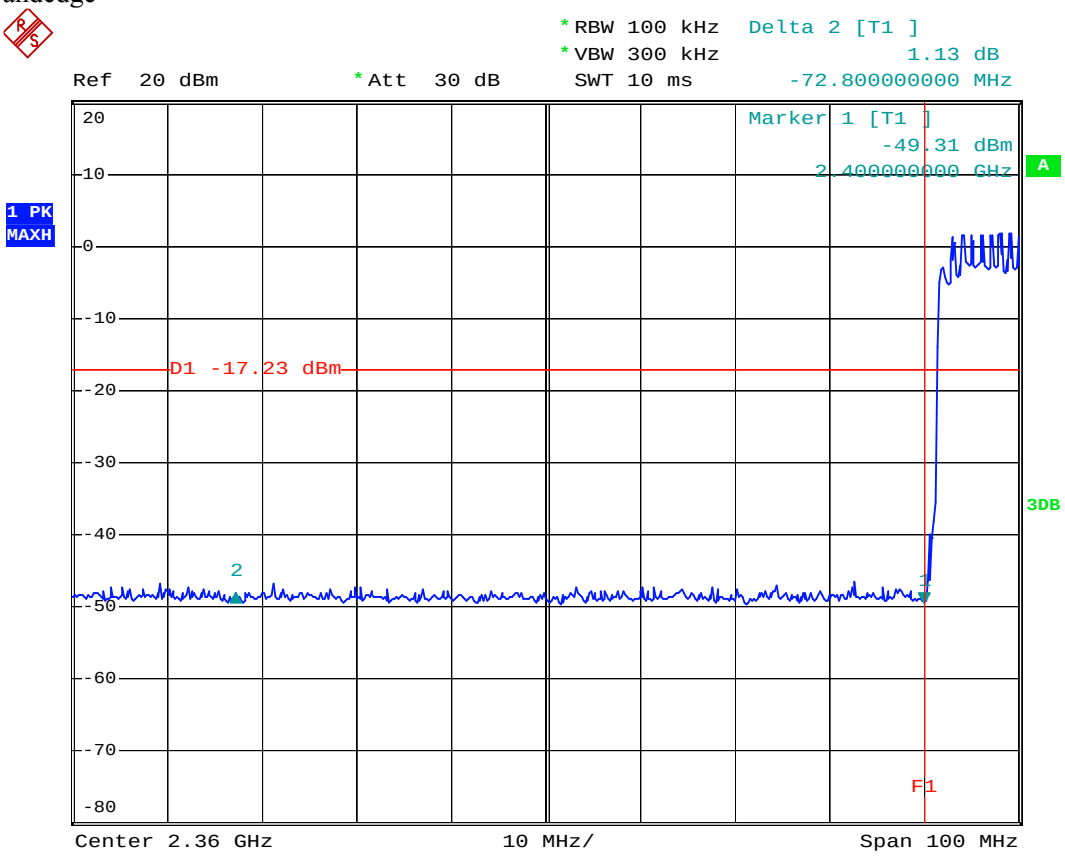
Lowest Bandedge



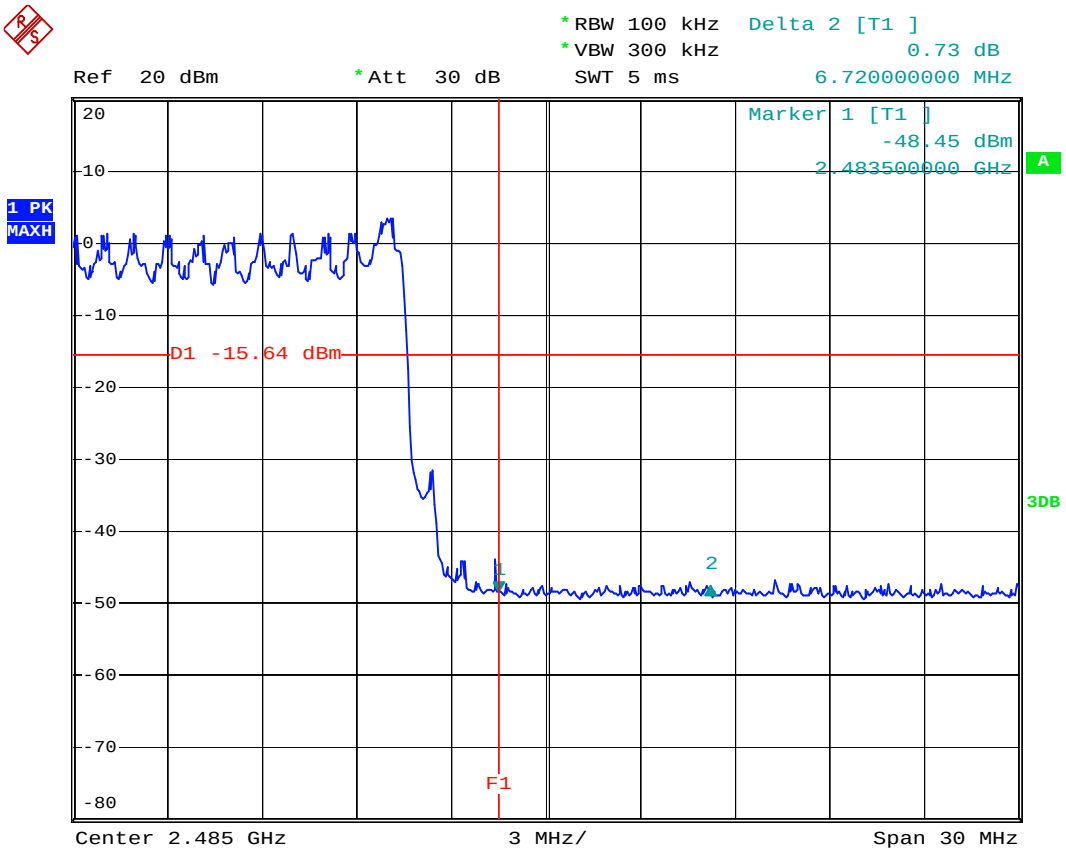
Highest Bandedge



8DPSK
Lowest Bandedge



Highest Bandedge



12. Conducted Emissions

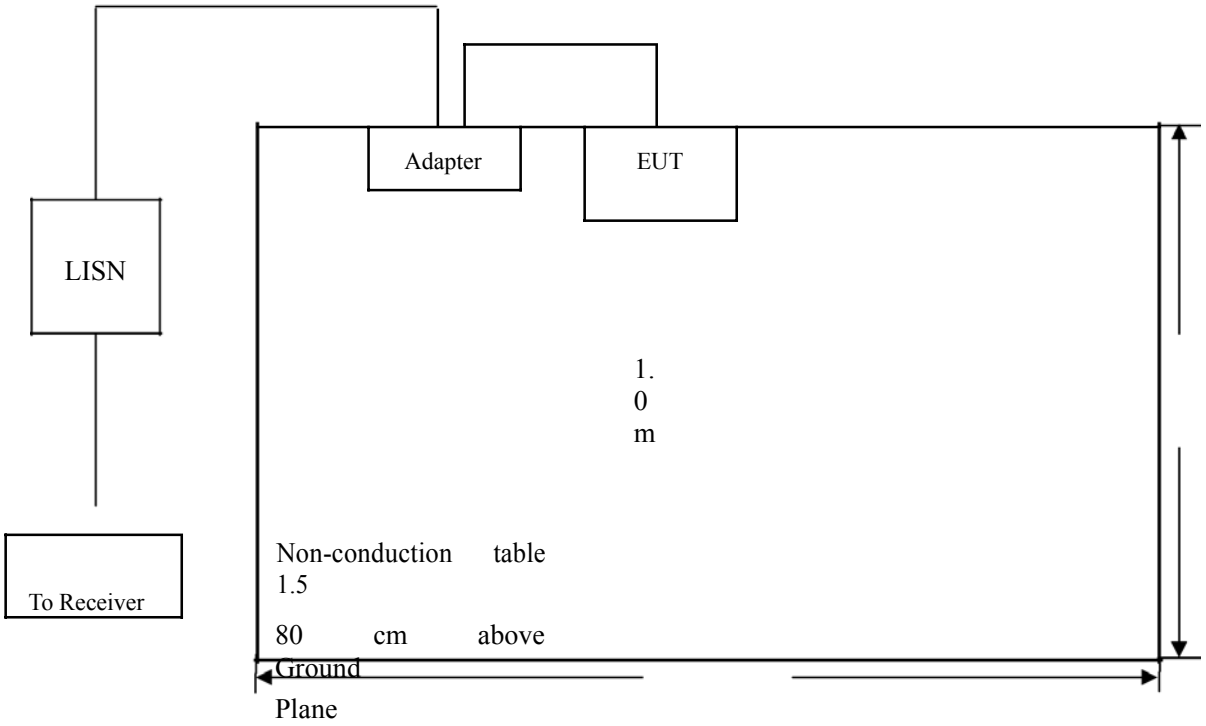
12.1 Test Procedure

The setup of EUT is according with per ANSI C63.4-2014 measurement procedure. The specification used was with the FCC Part 15.207 Limit.

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.

12.2 Basic Test Setup Block Diagram



12.3 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	50%
ATM Pressure:	1012 mbar

12.4 Test Receiver Setup

During the conducted emission test, the test receiver was set with the following configurations:

Start Frequency ..... 150 kHz
Stop Frequency..... 30 MHz
Sweep Speed .....Auto
IF Bandwidth ..... 10 kHz
Quasi-Peak Adapter Bandwidth ..... 9 kHz
Quasi-Peak Adapter Mode ..... Normal

12.5 Summary of Test Results/Plots

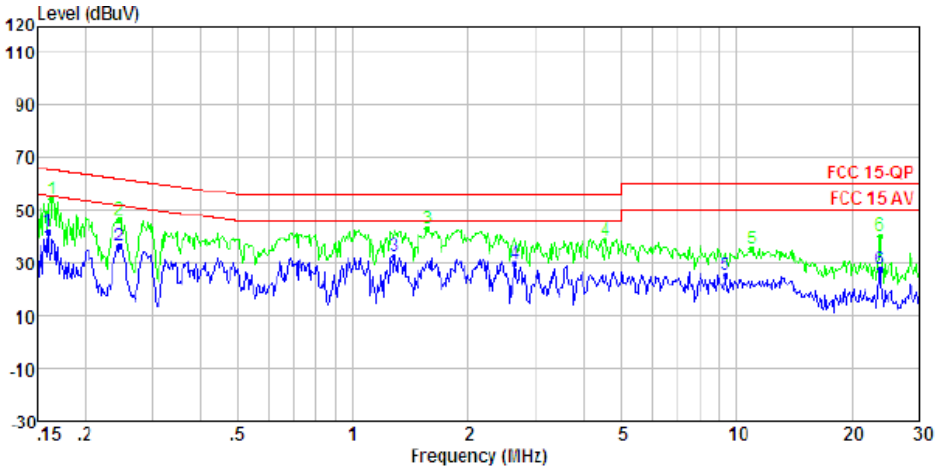
pass

According to the data in section 12.6, the EUT complied with the FCC Part 15.207 Conducted margin for this device, with the *worst* margin reading of:

-5.05 dB at 0.6419 MHz in the **Neutral** mode**, peak** detector, **0.15-30MHz**

12.6 Conducted Emissions Test Data

L



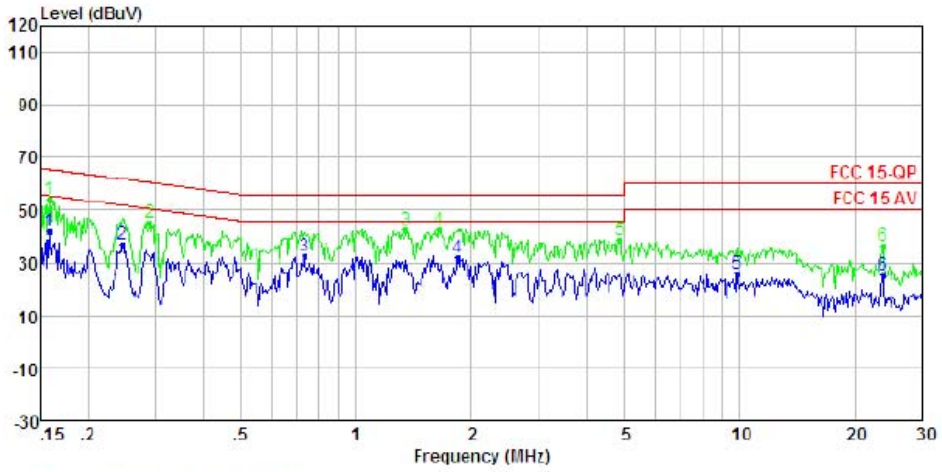
Condition:
: RBW:9.000KHz VBW:30.000KHz

	Freq	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dBuV	dB		
1 Max	0.161	42.1	55.4	-13.3	Average	LINE
2	0.247	36.6	51.9	-15.3	Average	LINE
3	1.282	32.8	46.0	-13.2	Average	LINE
4	2.650	29.9	46.0	-16.1	Average	LINE
5	9.352	25.2	50.0	-24.8	Average	LINE
6	23.636	27.6	50.0	-22.4	Average	LINE

Condition:
: RBW:9.000KHz VBW:30.000KHz

	Freq	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dBuV	dB		
1 Max	0.164	53.9	65.3	-11.4	Peak	LINE
2	0.247	46.6	61.9	-15.3	Peak	LINE
3	1.568	43.1	56.0	-12.9	Peak	LINE
4	4.549	38.7	56.0	-17.3	Peak	LINE
5	11.021	35.2	60.0	-24.8	Peak	LINE
6	23.636	40.2	60.0	-19.8	Peak	LINE

N



Condition:
: RBW:9.000KHz VBW:30.000KHz

	Freq	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dBuV	dB		
1 Max	0.159	42.2	55.5	-13.3	Average	NEUTRAL
2	0.247	36.9	51.9	-15.0	Average	NEUTRAL
3	0.735	32.3	46.0	-13.7	Average	NEUTRAL
4	1.839	31.8	46.0	-14.2	Average	NEUTRAL
5	9.861	25.8	50.0	-24.2	Average	NEUTRAL
6	23.636	25.4	50.0	-24.6	Average	NEUTRAL

Condition:
: RBW:9.000KHz VBW:30.000KHz

	Freq	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dBuV	dB		
1 Max	0.159	54.0	65.5	-11.5	Peak	NEUTRAL
2	0.289	45.2	60.5	-15.3	Peak	NEUTRAL
3	1.352	42.6	56.0	-13.4	Peak	NEUTRAL
4	1.645	42.7	56.0	-13.3	Peak	NEUTRAL
5	4.874	38.7	56.0	-17.3	Peak	NEUTRAL
6	23.636	36.3	60.0	-23.7	Peak	NEUTRAL

END REPORT