RADIO TEST REPORT

For

DongGuan Sonicway Electrical Appliance Co.,ltd.

Product Name:	Bluetooth Remote Control
Model :	ARTL8762AR-1105-2492
Series Model:	ARTL8762AR-1406-2427
FCC ID:	2AMK3-ARTL
Prepared　By :	Shenzhen BST Technology Co., Ltd. Building No.23-24, Zhiheng Industrial Park, Guankouer Road, Nantou,Nanshan District,Shenzhen,Guangdong,China
Test Date:	June 05-20, 2017
Date of Report :	June 20, 2017
Test Result	pass
Report No.:	BST1706814340003Y-ER-2-1

TEST RESULT CERTIFICATION

Applicant's name .... : DongGuan Sonicway Electrical Appliance Co.,ltd.

Address .... : NO. 2 Xinghua Road, Xincheng Industrial Road, Hengli, DongGuan,Guangdong, China

Manufacture's Name............. : DongGuan Sonicway Electrical Appliance Co.,ltd.

Address .... NO. 2 Xinghua Road, Xincheng Industrial Road, Hengli, DongGuan,Guangdong, China

Product name ....:

Model and/or type reference : ARTL8762AR-1105-2492

Series Model .... : ARTL8762AR-1406-2427

Standards ....: FCC Part15.247

Test procedure ....: ANSI C63.10-2013, ANSI C63.4-2014

Testing Engineer : _Vicky Lm_

Technical Manager : _Jacky Chen_

Authorized Signatory : _Andy Yan_

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	DongGuan Sonicway Electrical Appliance Co.,ltd.
Address of applicant:	NO. 2 Xinghua Road, Xincheng Industrial Road, Hengli, DongGuan,Guangdong, China
Manufacturer:	DongGuan Sonicway Electrical Appliance Co.,ltd.
Address of manufacturer:	NO. 2 Xinghua Road, Xincheng Industrial Road, Hengli, DongGuan,Guangdong, China

General Description of EUT

Product Name:	Bluetooth Remote Control
Trade Name:	**Cloudnet** 云网行
Model No.:	ARTL8762AR-1105-2492
Adding Model(s):	ARTL8762AR-1406-2427
Rated Voltage:	DC 2.2V-3.6V
Adapter information:	N/A

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 ARTL8762AR-1105-2492, but the circuit and the electronic construction do not change, declared by the manufacturer.

Technical Characteristics of EUT

Bluetooth Version:	V4.0
Frequency Range:	2402-2480MHz
RF Output Power:	2.66 dBm (Conducted)
Data Rate:	1Mbps, 2Mbps, 3Mbps
Modulation:	GFSK, Pi/4 QDPSK, 8DPSK
Quantity of Channels:	79
Channel Separation:	1MHz
Type of Antenna:	integral
Antenna Gain:	0.5dBi
Lowest Internal Frequency of EUT:	32.768KHz

1.2 Test Standards

The following report is prepared on behalf of the Rider best, Inc in accordance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 of the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

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. The measurement guide DA 00-705 for frequency hopping spread spectrum systems shall be performed also.

1.4 Test Facility

Shenzhen Asia Test Technology Co.,Ltd..

Add. : 7 / F, Xinwei Building, Gushu Village, Xixiang Town, Baoan

District, Shenzhen, China

FCC Registration No.: 348715

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 and Details

Description	Manufacturer	Model	Serial Number	Cal Date	Due Date
Spectrum Analyzer	Agilent	E4407B	US44300368	2017-06-04	2018-06-03
Spectrum Analyzer	Rohde & Schwarz	FSP	836079/035	2017-06-04	2018-06-03
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2017-06-04	2018-06-03
Amplifier	Agilent	8447F	3113A06717	2017-06-04	2018-06-03
Amplifier	C&D	PAP-1G8	2002	2017-06-04	2018-06-03
Broadband Antenna	Schwarz beck	VULB9163	9163-333	2017-06-04	2018-06-03
Horn Antenna	ETS	3117	00086197	2017-06-04	2018-06-03
Horn Antenna	ETS	3116B	00088203	2017-06-04	2018-06-03
Loop Antenna	Schwarz beck	FMZB 1516	9773	2017-06-04	2018-06-03
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2017-06-04	2018-06-03
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2017-06-04	2018-06-03
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2017-06-04	2018-06-03

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	N/A
§ 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

Note: 1.N/A is not applicable.

2.The EUT is a remote control using a button battery,so the Conducted Emission is 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 an antenna attached on the PCB, 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:	23°C
Relative Humidity:	56%
ATM Pressure:	101.1 mbar

6.4 Summary of Test Results/Plots
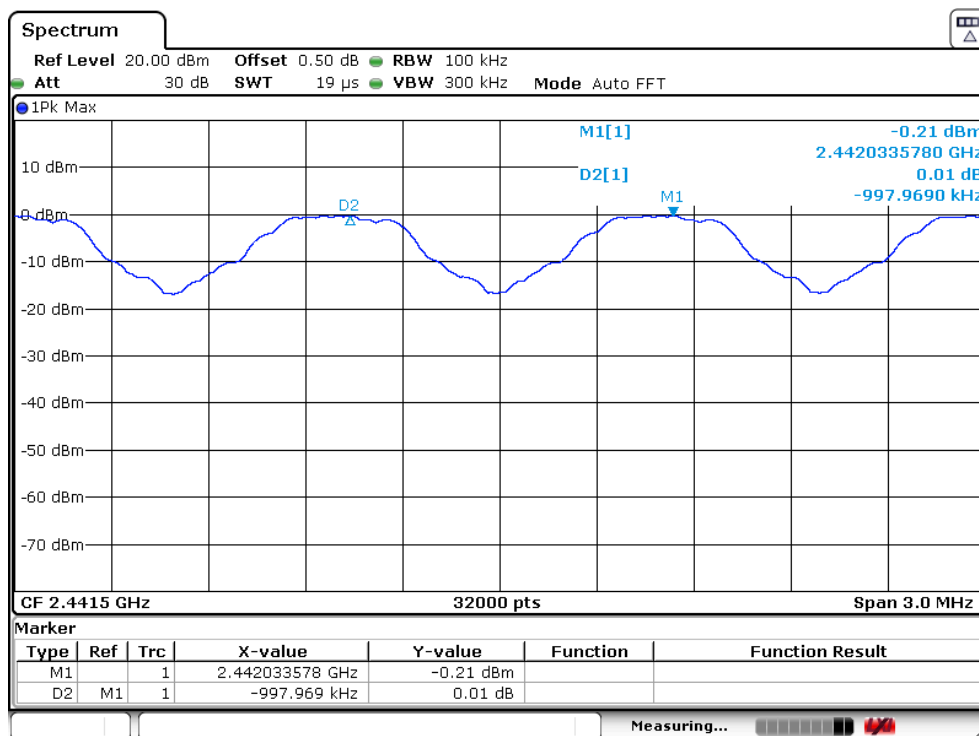
No. of Channel = 79
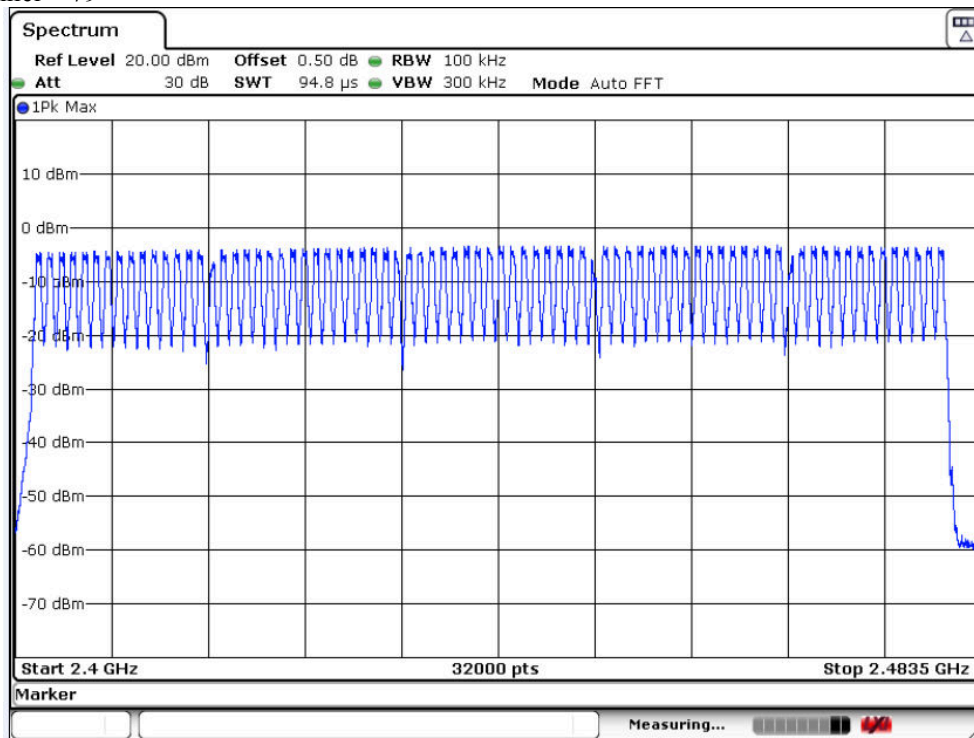
For GFSK mode

Channel Spacing (Low CH=1MHz)
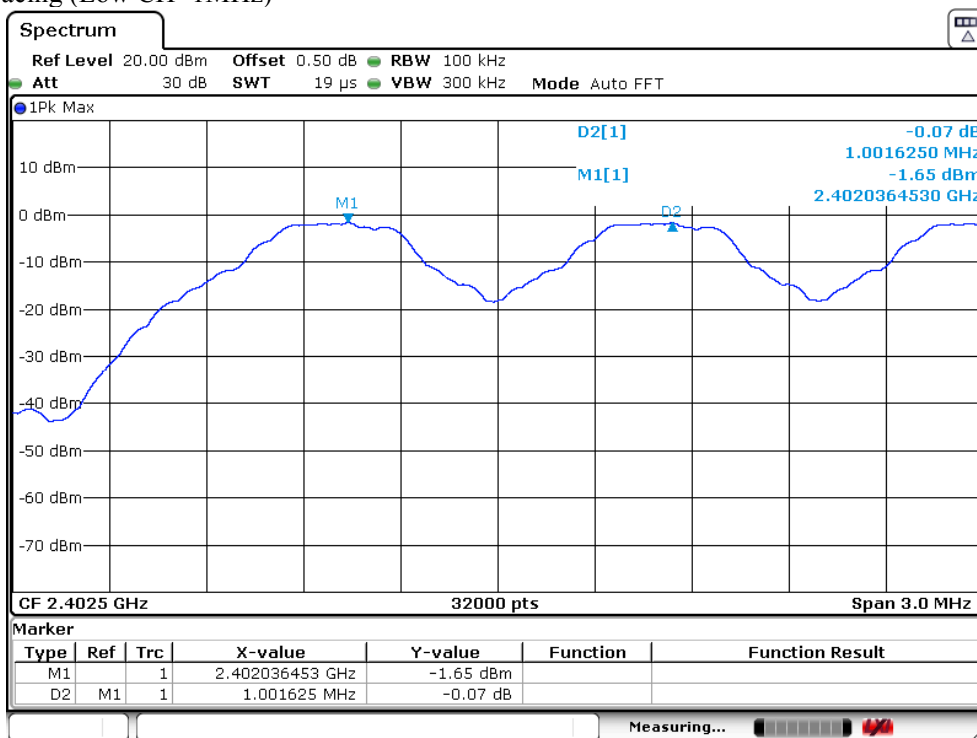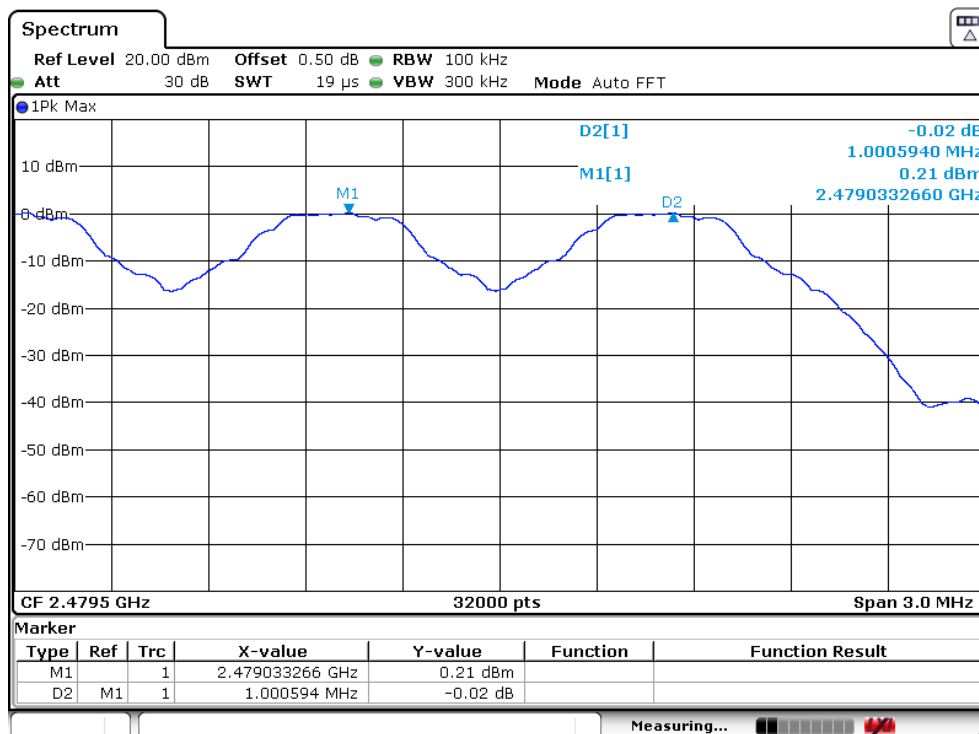

Date:2 JUN .2017 18:20:52

Channel Spacing (Middle CH=1MHz)

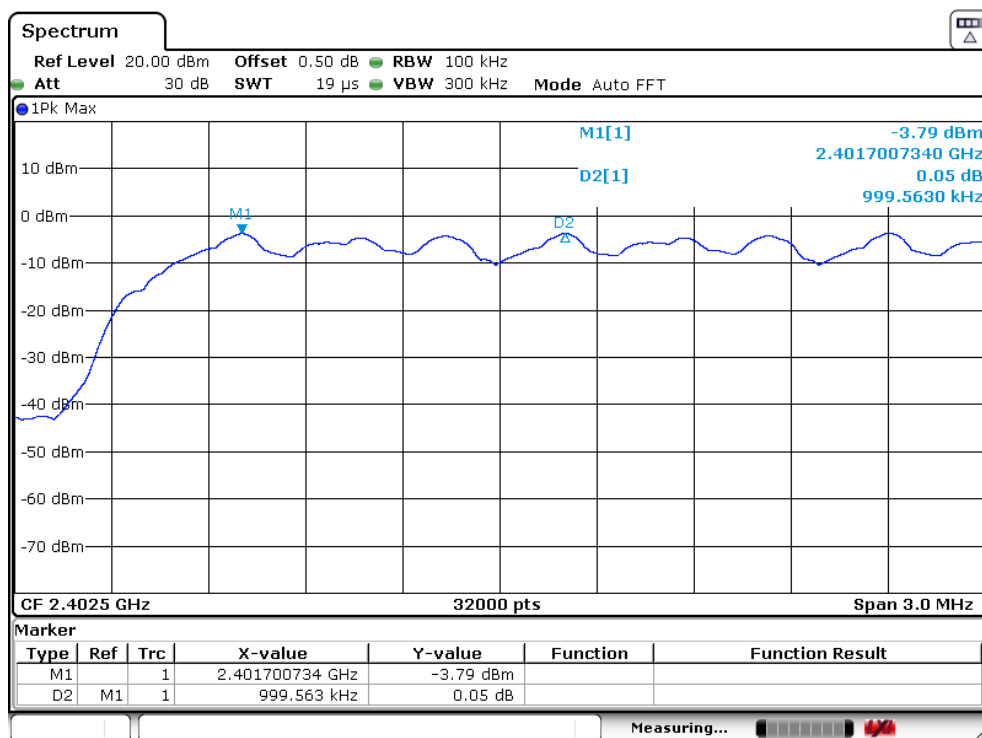Date: 2 JUN.2017 18:23:28

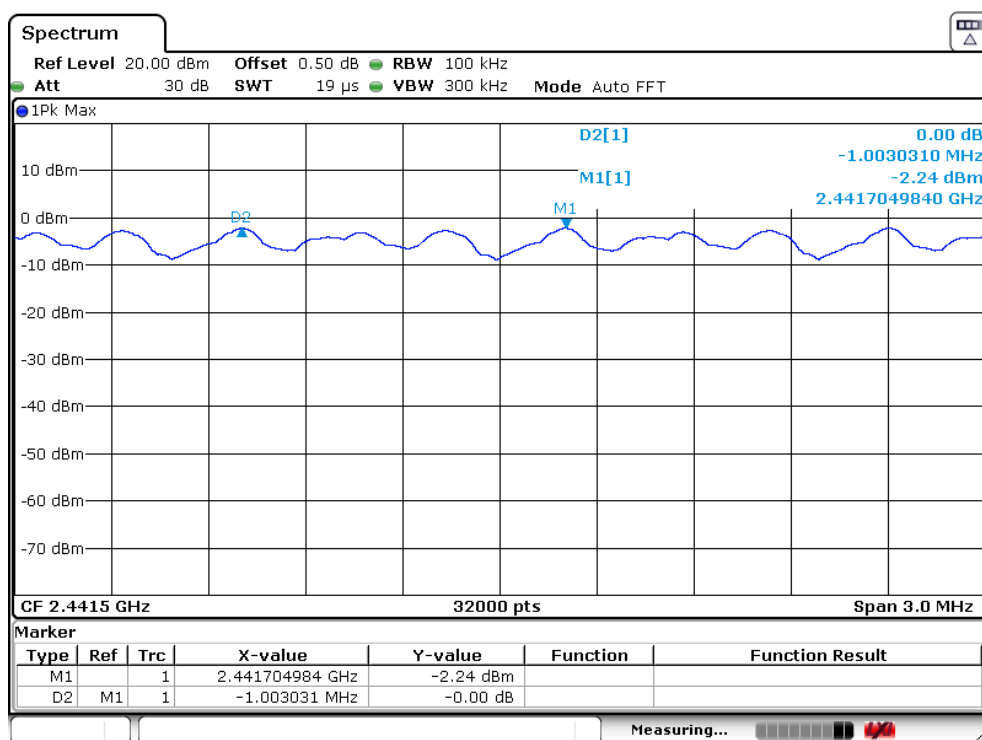Channel Spacing (High CH=1MHz)

Date: 2 JUN.2017 18:24:07

For 8DPSK mode

Channel Spacing (Low CH=1MHz)

Channel Spacing (Middle CH=1MHz)
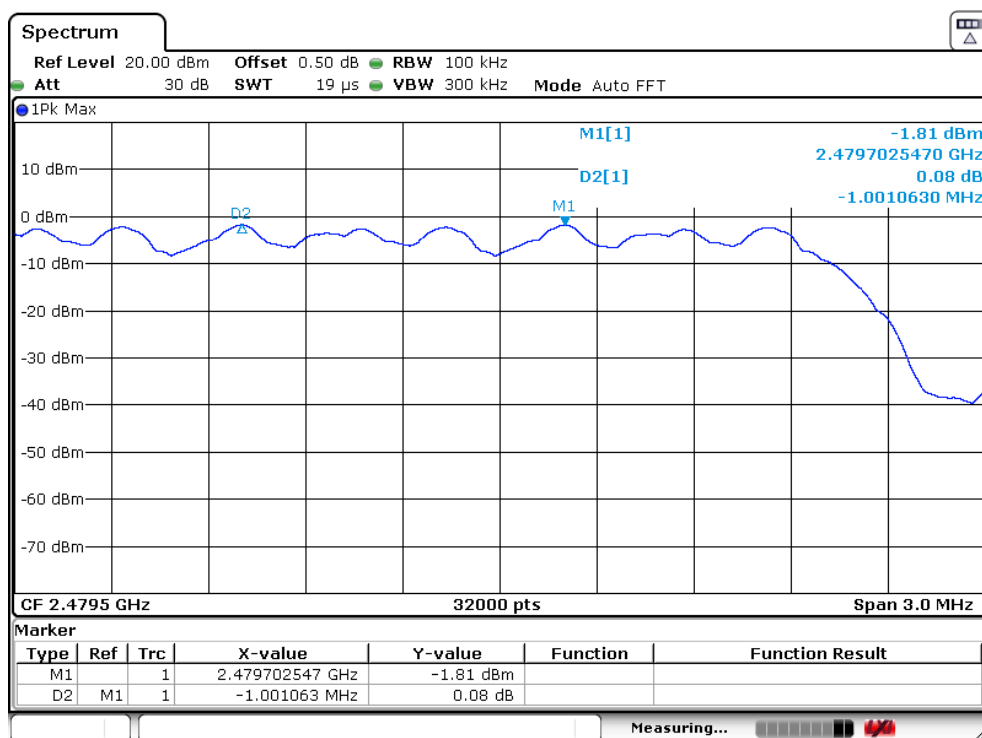
Channel Spacing (High CH=1MHz)

Date: 2 JUN .2017 18:26:13

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:	23°C
Relative Humidity:	56%
ATM Pressure:	101.1 mbar

7.4 Summary of Test Results/Plots

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
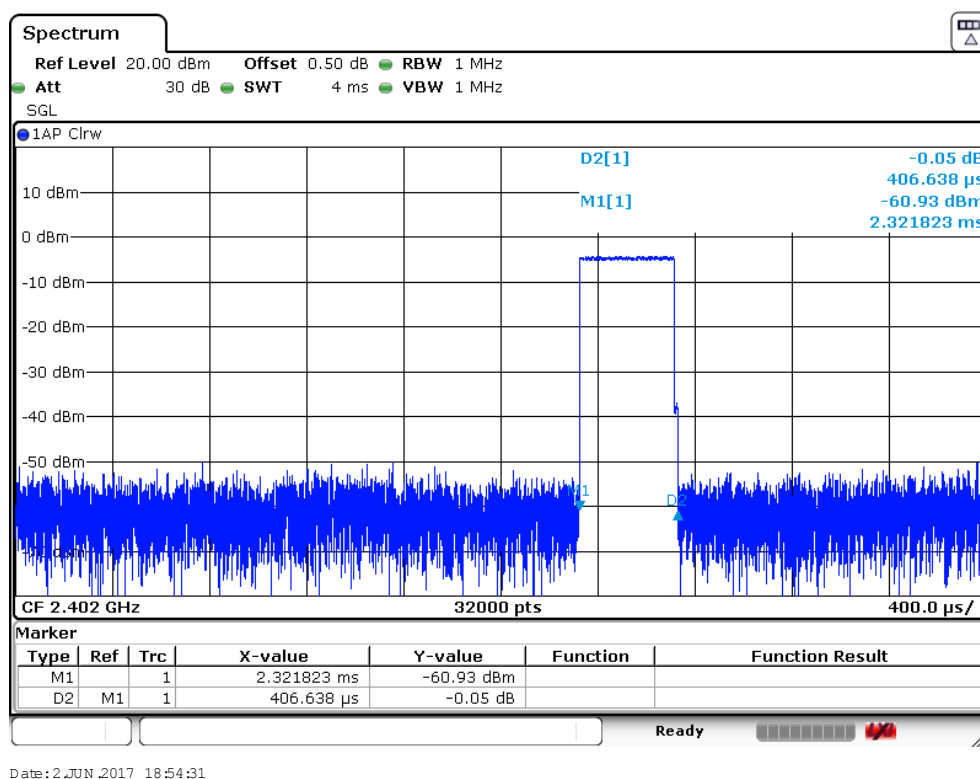
Modulation	Test Channel	packet	Time Slot Length(ms)	Dwell Time(ms)	Limit(ms)
GFSK	2402	DH1	0.407	130.24	400
		DH3	1.663	266.08	400
		DH5	2.844	303.36	400
8DPSK	2402	3DH1	0.420	134.40	400
		3DH3	1.660	265.60	400
		3DH5	2.881	307.31	400

Please refer to the test plots as below:

DH1 time slot (Low, Middle, High Channels)

Date: 2 JUN 2017 18:54:31

DH3 time slot (Low, Middle, High Channels)
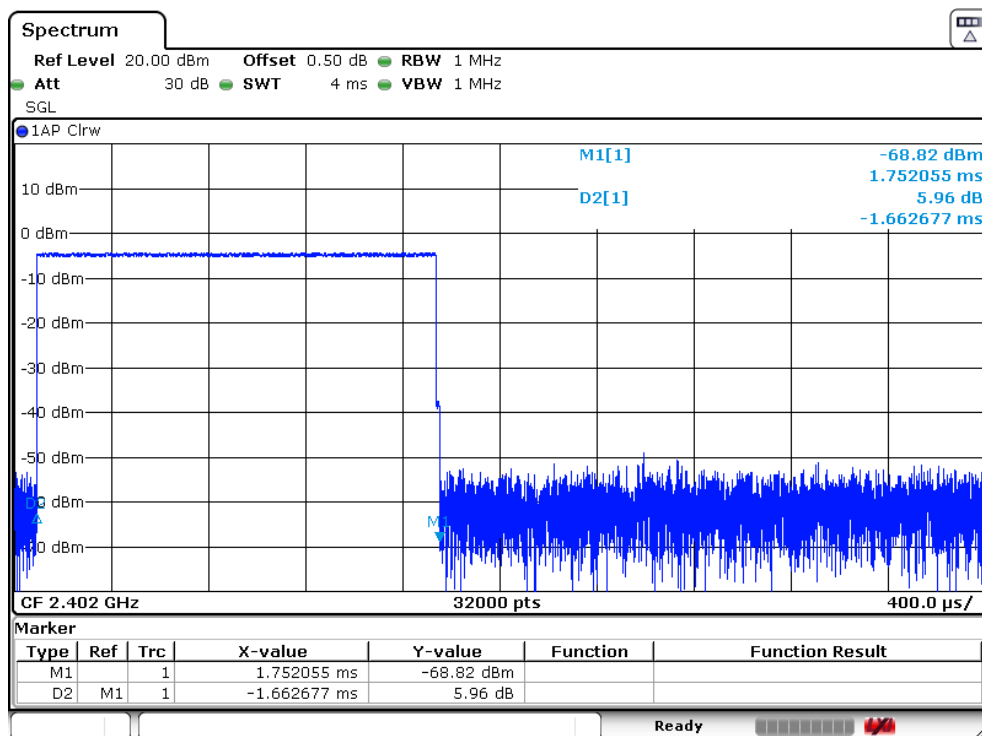
Date: 2 JUN .2017 18:55:25

DH5 time slot (Low, Middle, High Channels)
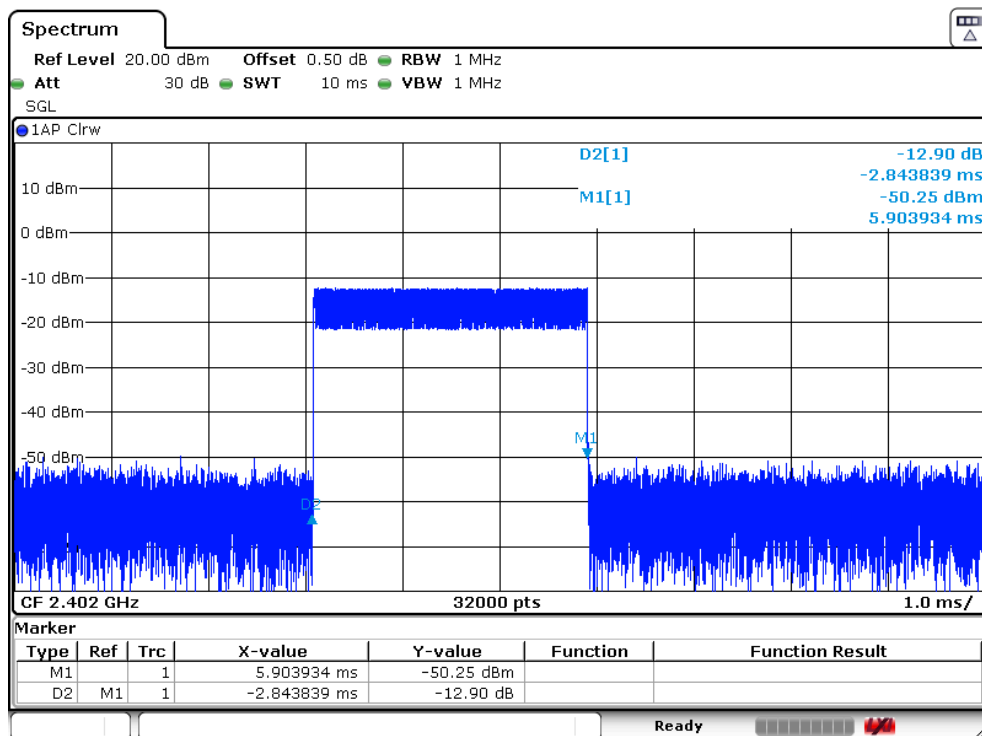
Date: 2 JUN .2017 18:56:57

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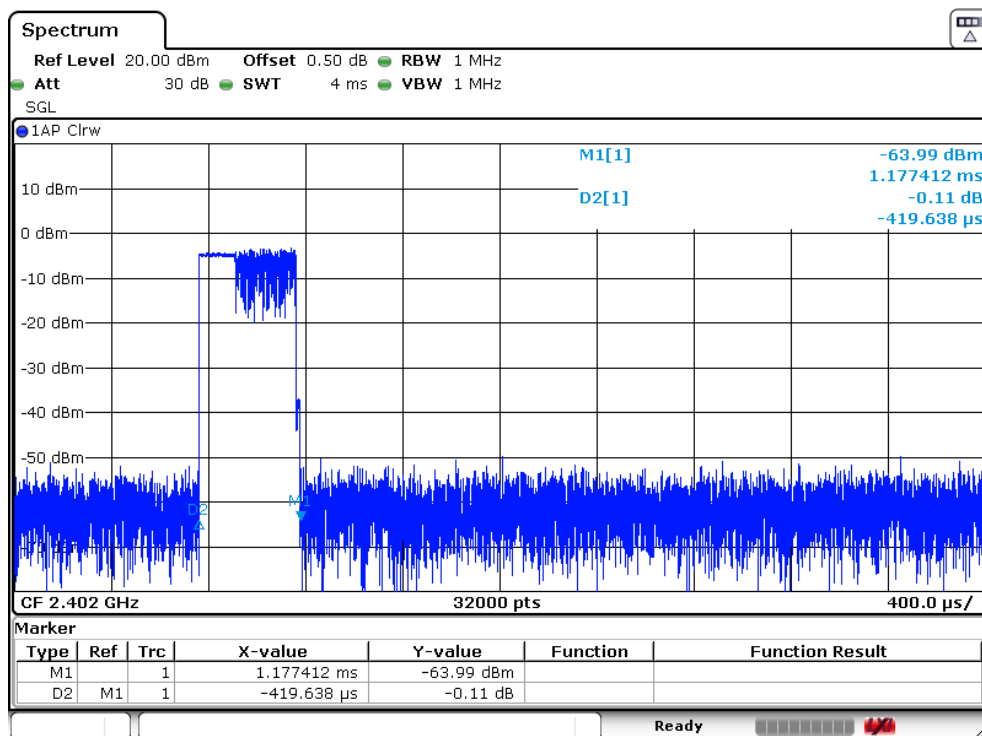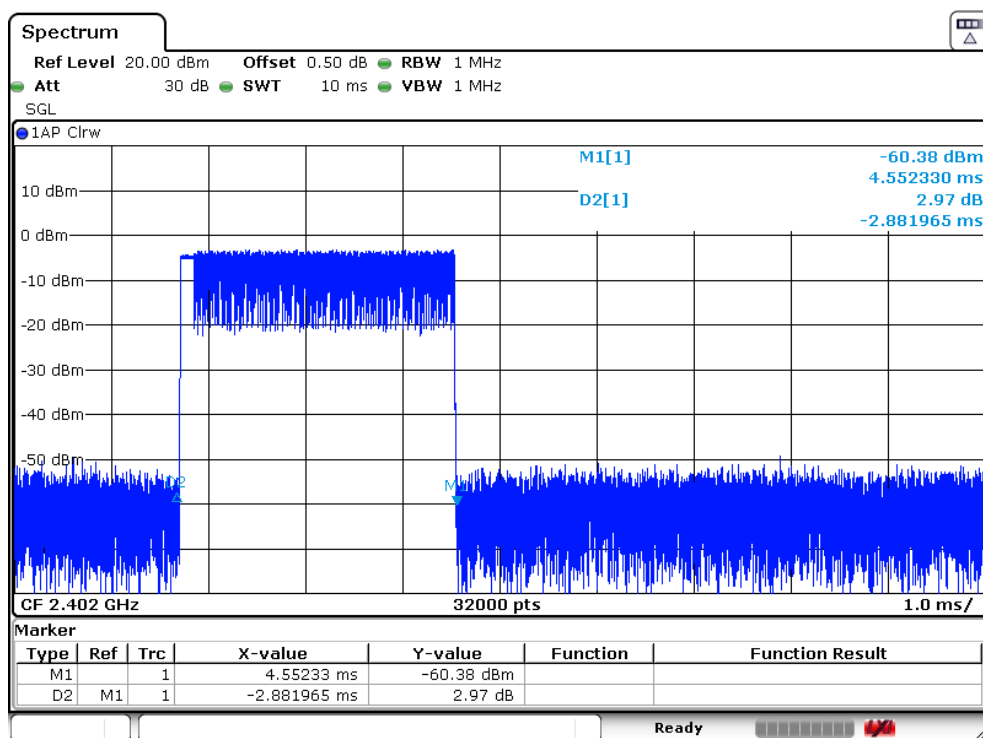

Date: 2 JUN 2017 18:59:35

3DH3 time slot (Low, Middle, High Channels)
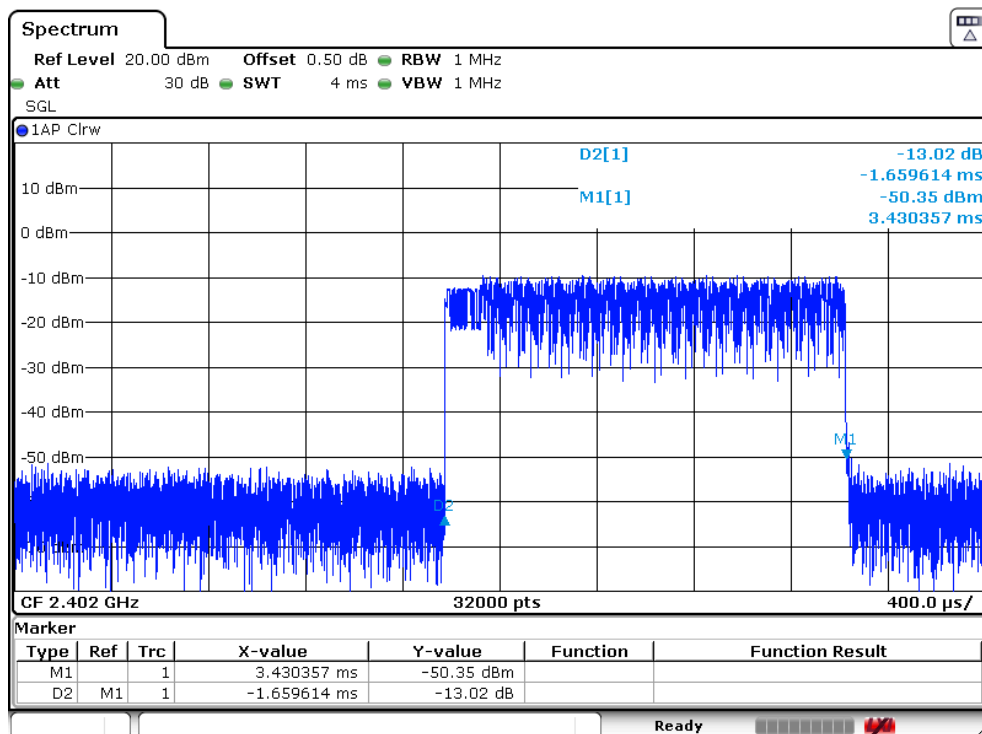
Date: 2 JUN 2017 18:58:44

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

Date: 2 JUN .2017 18:58:04

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 Test 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.
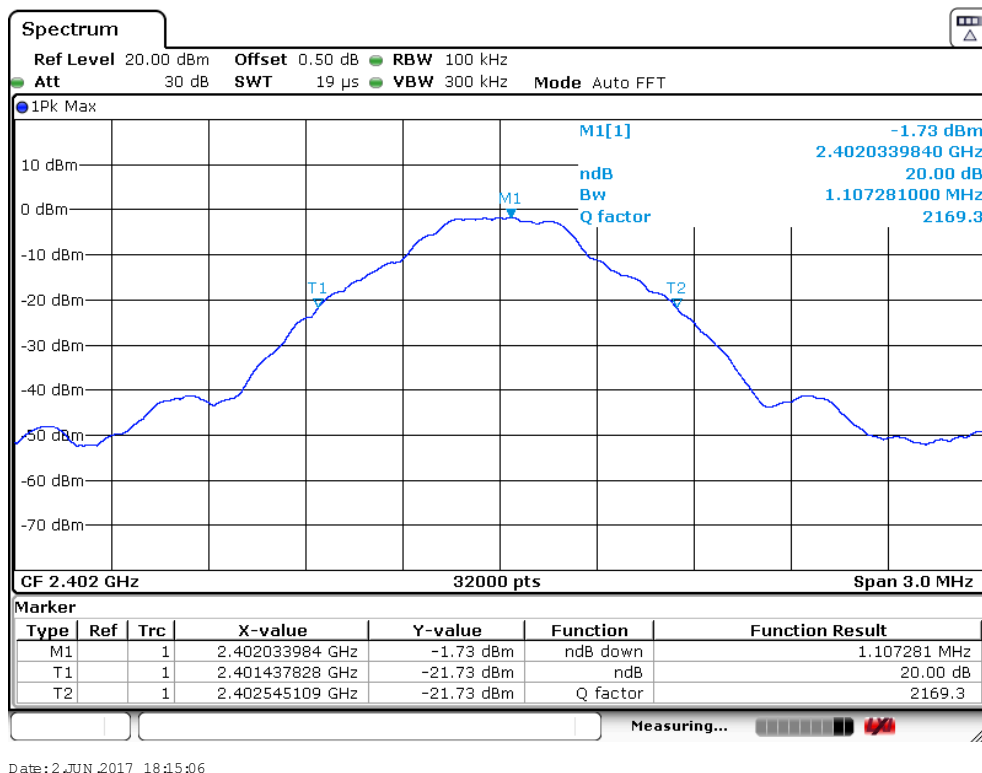
8.3 Environmental Conditions

Temperature:	23°C
Relative Humidity:	56%
ATM Pressure:	101.1 mbar

For GFSK

Low Channel:

Date: 2.JUN.2017 18:15:06

Middle Channel:

Date: 2.JUN.2017 18:14:37
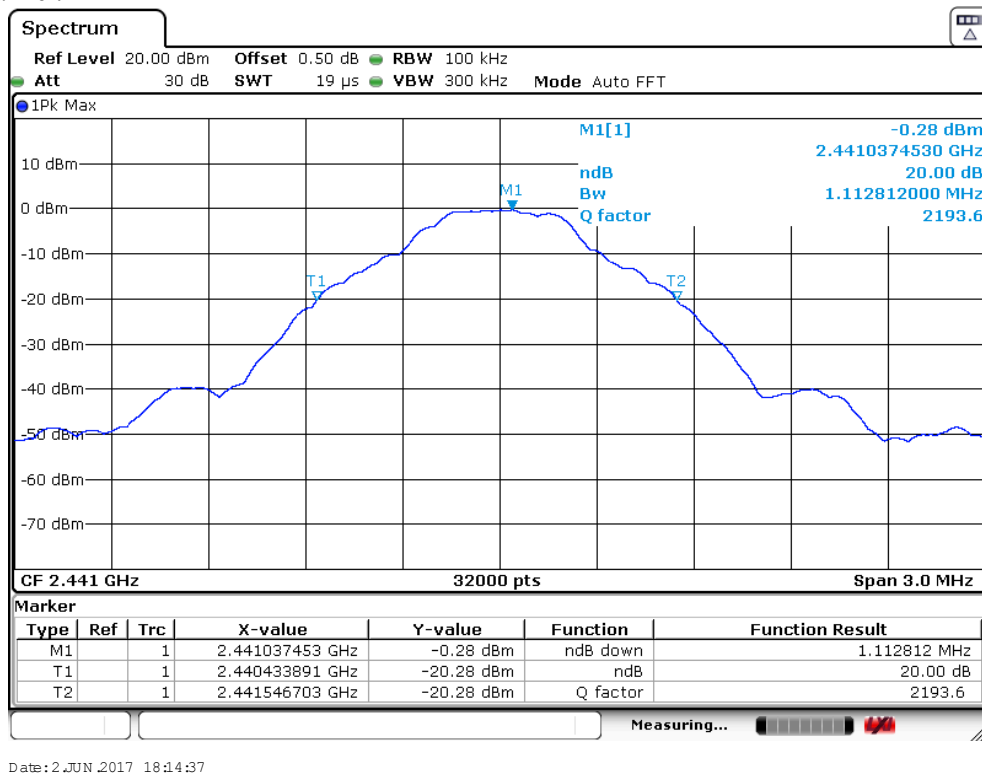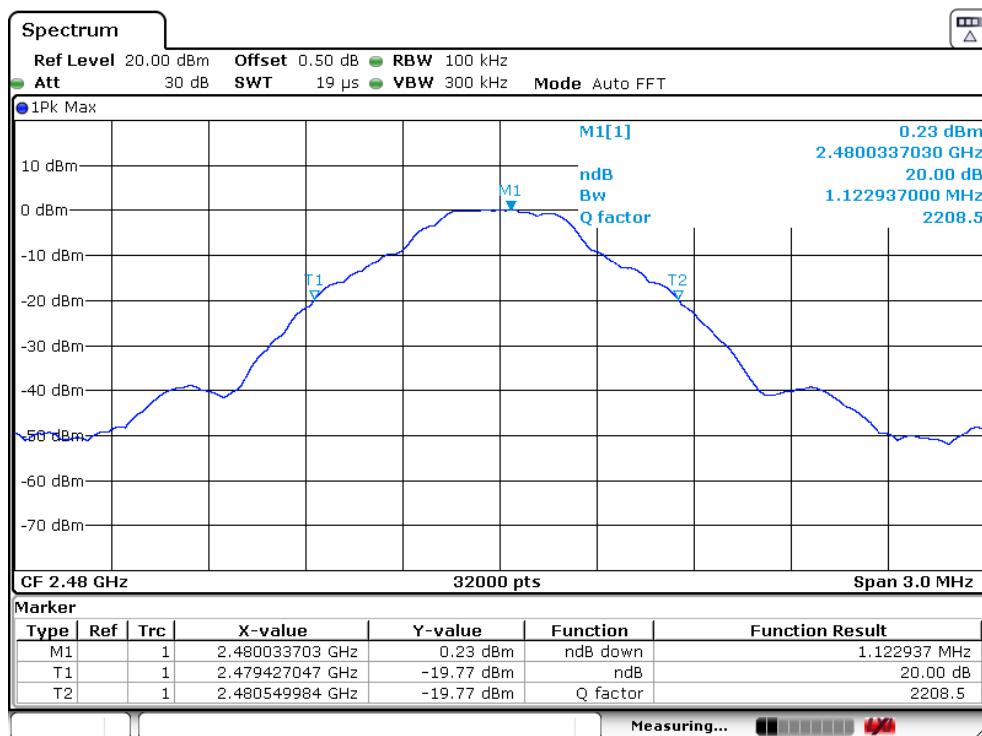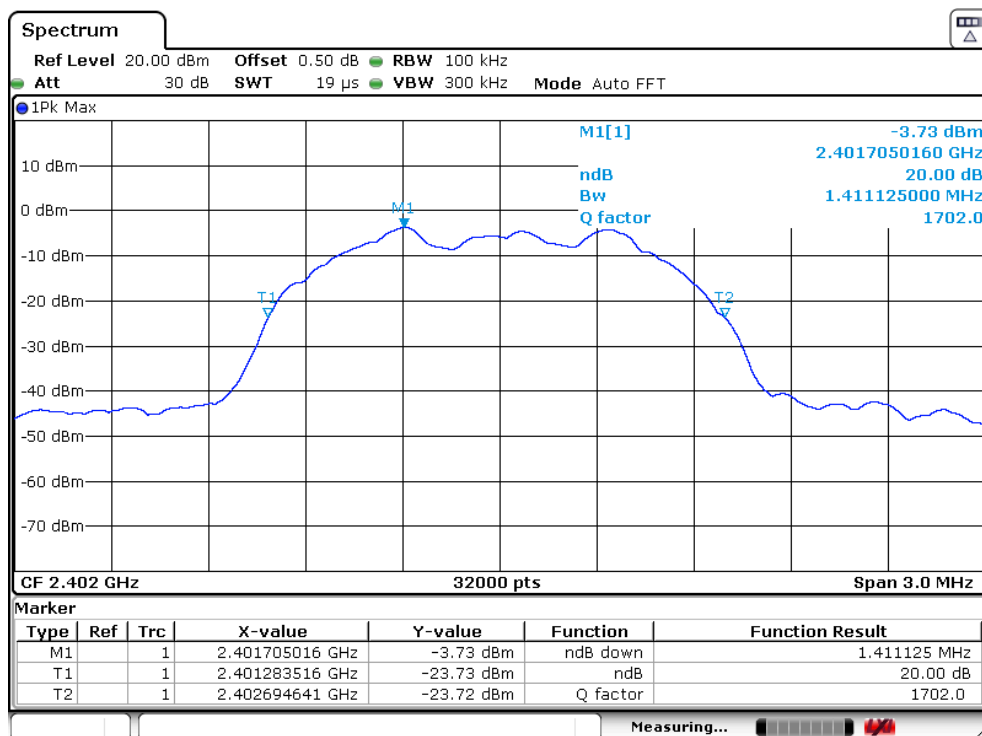
High Channel:

Date: 2 JUN 2017 18:14:22
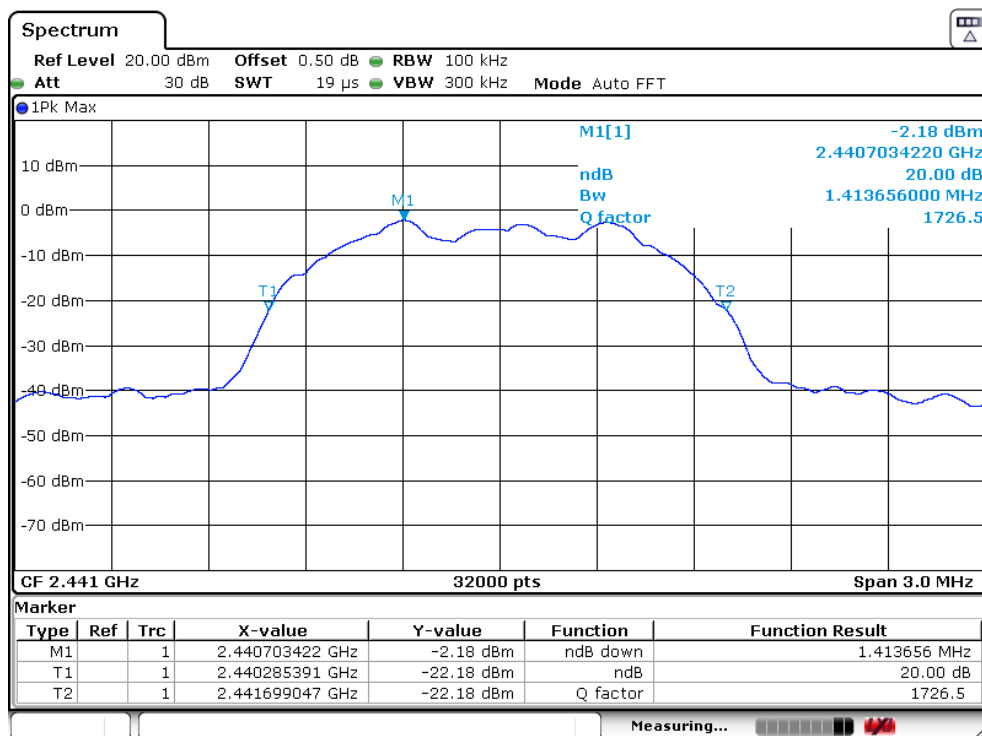
For 8DPSK

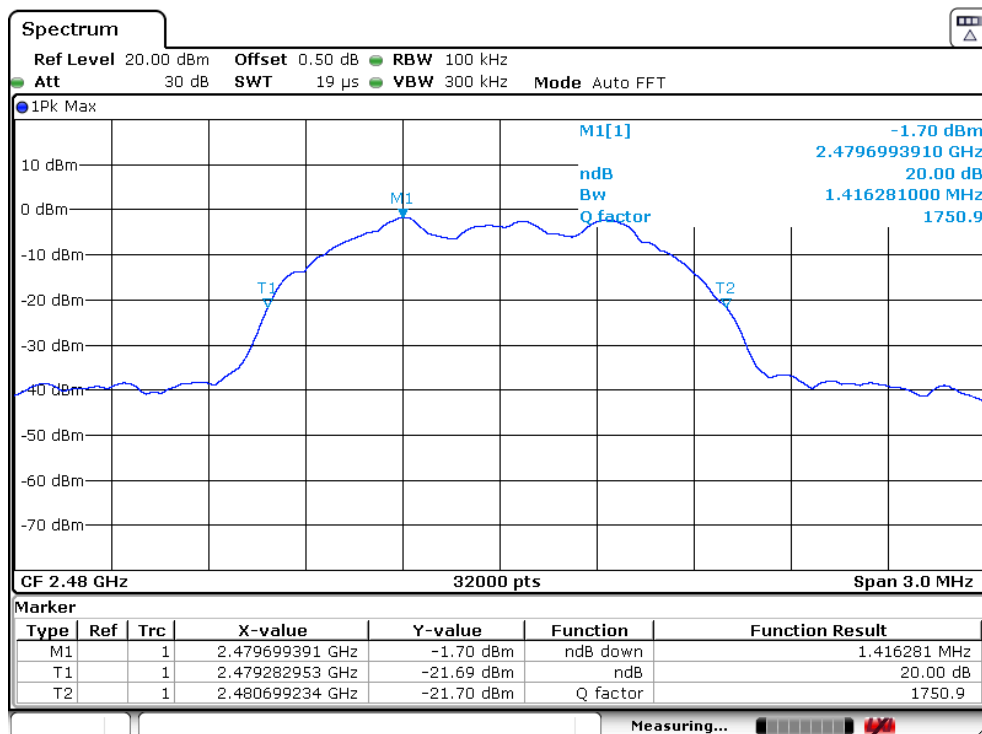Low Channel:

Date: 2 JUN 2017 18:13:04

Middle Channel:

Date: 2 JUN .2017 18:12:47

High Channel:

Date: 2 JUN .2017 18:12:27

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:	23°C
Relative Humidity:	56%
ATM Pressure:	101.1 mbar

9.4 Summary of Test Results/Plots

For GFSK

Channel	Frequency MHz	Measured Value dBm	Output Power mW	Limit mW
Low Channel	2402	-0.62	0.867	1000
Middle Channel	2441	0.94	1.242	1000
High Channel	2480	1.35	1.365	1000

For Pi/4 QDPSK

Channel	Frequency MHz	Measured Value dBm	Output Power mW	Limit mW
Low Channel	2402	0.50	1.122	1000
Middle Channel	2441	2.21	1.663	1000
High Channel	2480	2.59	1.816	1000

For 8DPSK

Channel	Frequency MHz	Measured Value dBm	Output Power mW	Limit mW
Low Channel	2402	0.47	1.114	1000
Middle Channel	2441	2.32	1.706	1000
High Channel	2480	2.66	1.845	1000

Note: the antenna gain of 1dBi less than 6dBi maximum permission antenna gain value based on 1 watt peak output power limit.
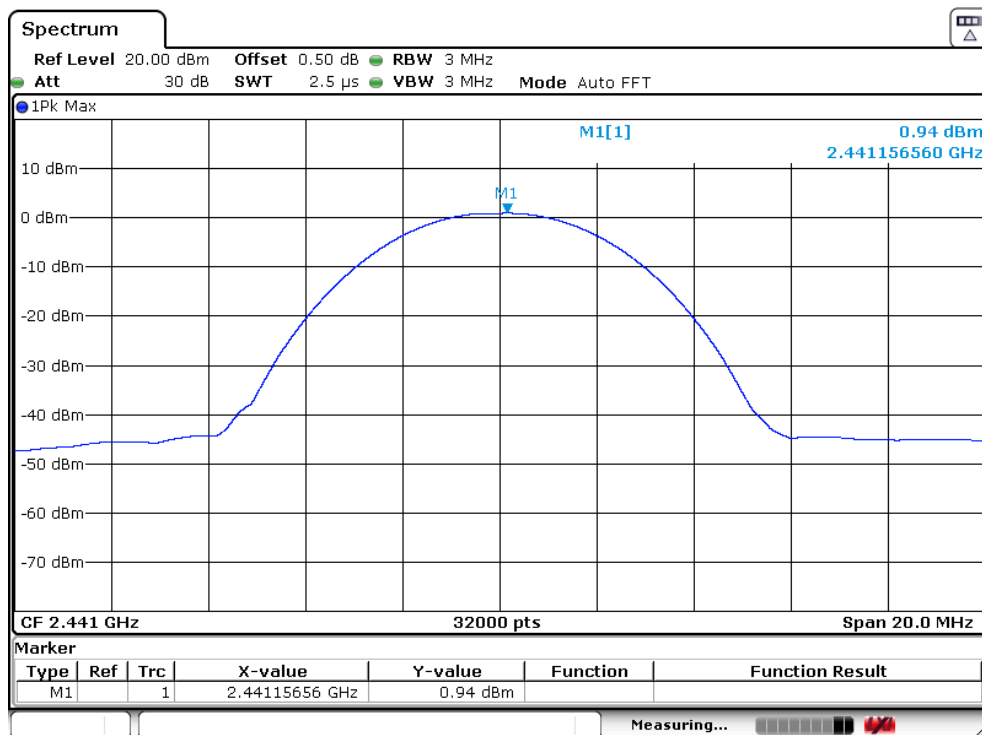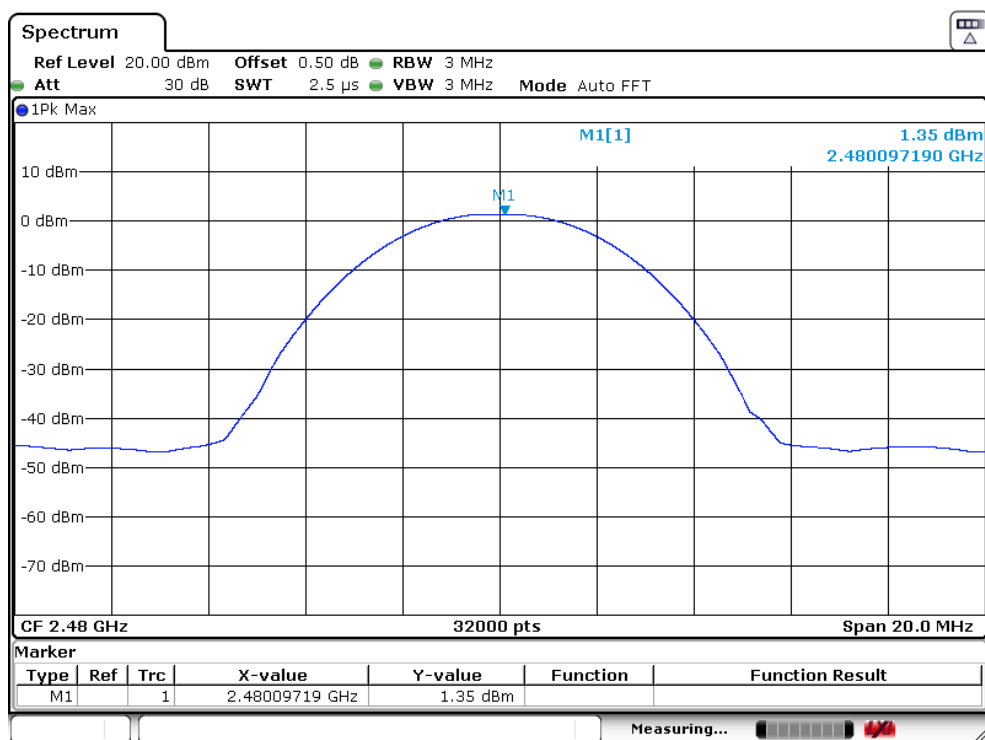
GFSK Low Channel
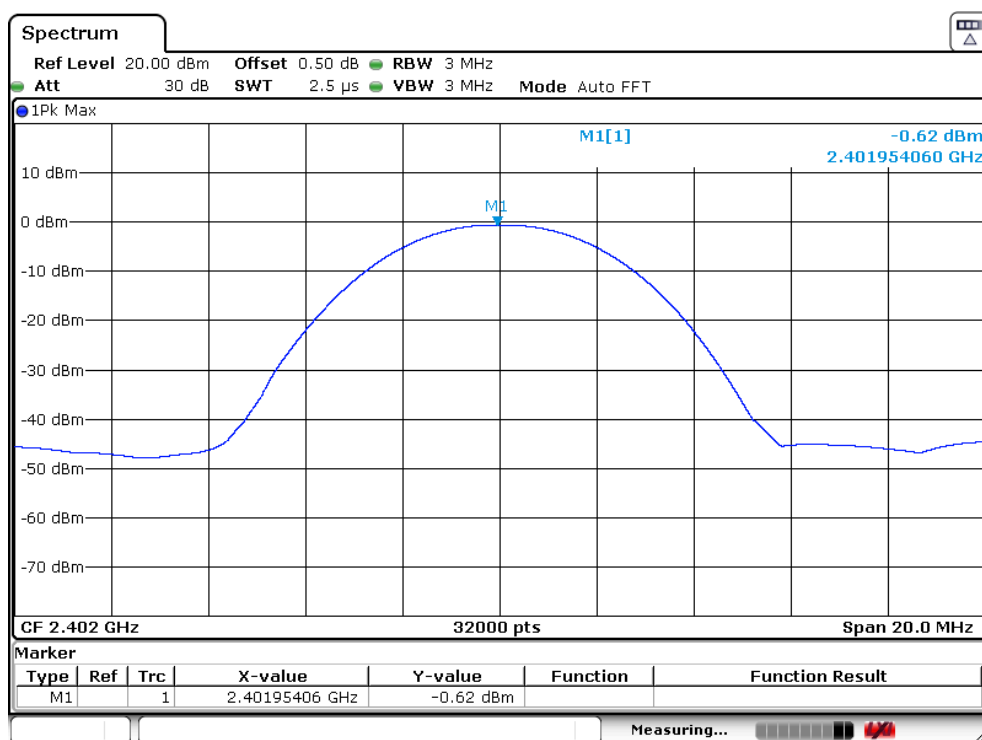
Date: 2 JUN 2017 18:08:31

GFSK Middle Channel
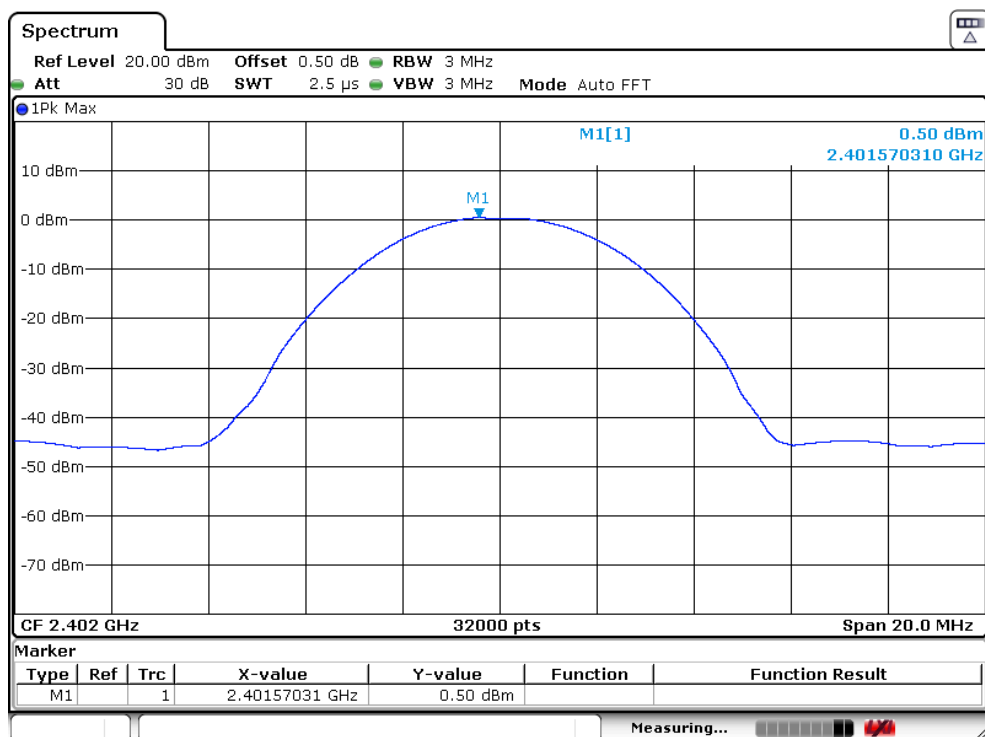

Date: 2 JUN 2017 18:10:55

GFSK High Channel

Date:2 JUN 2017 18:09:22

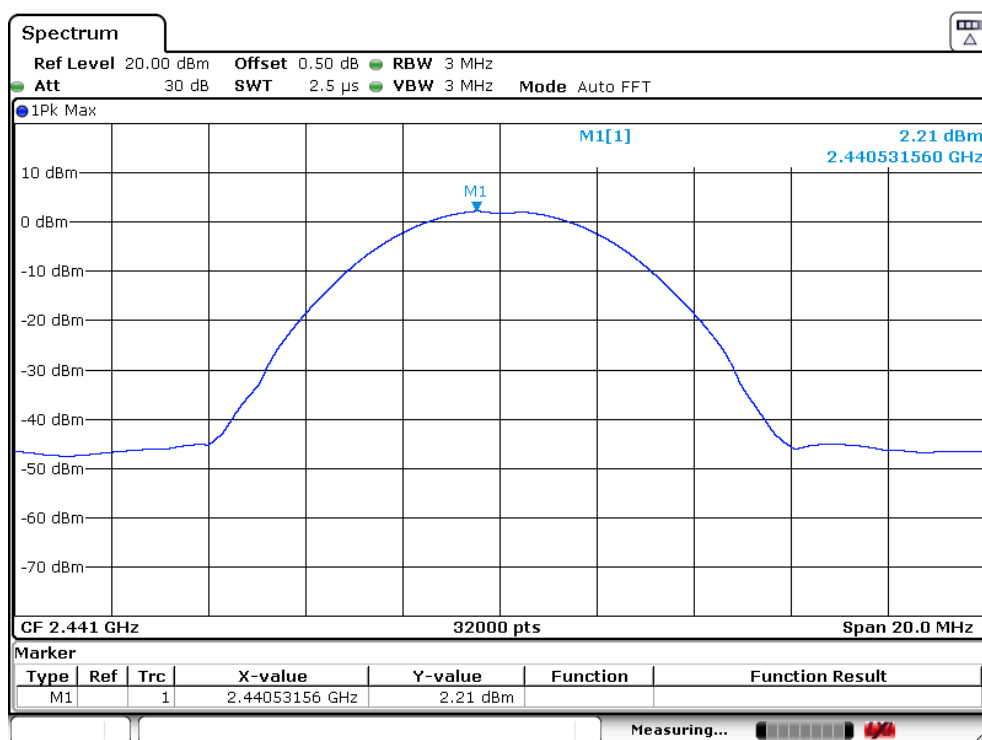For Pi/4 QDPSK Low Channel

Date:2 JUN 2017 18:10:30
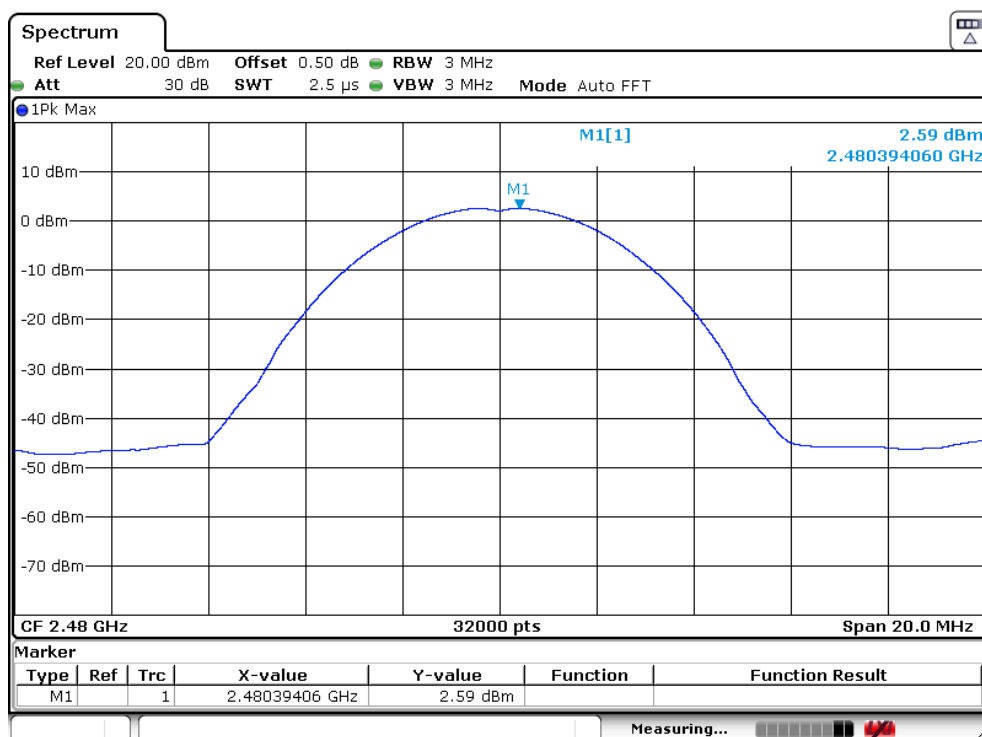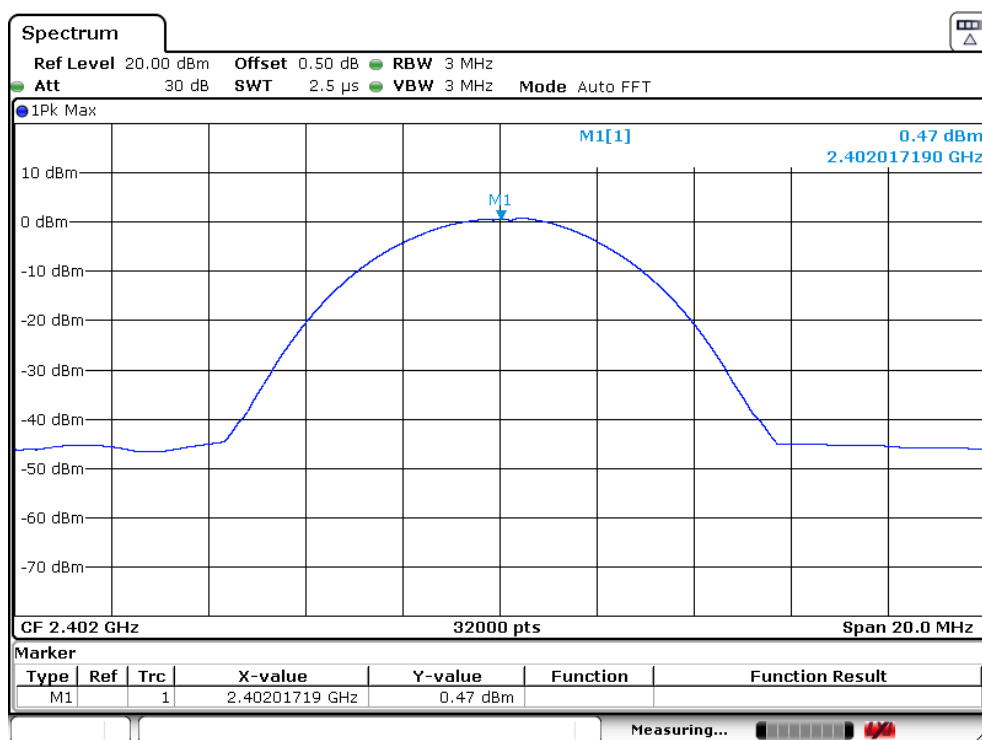
For Pi/4 QDPSK Middle Channel
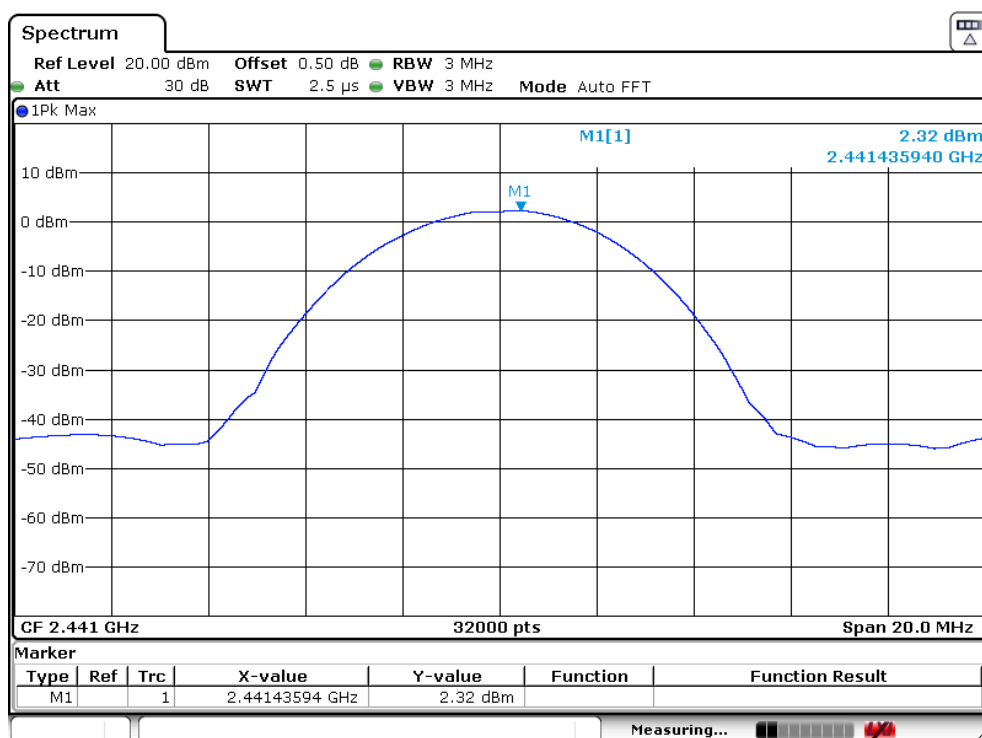

For Pi/4 QDPSK High Channel

8DPSK Low Channel

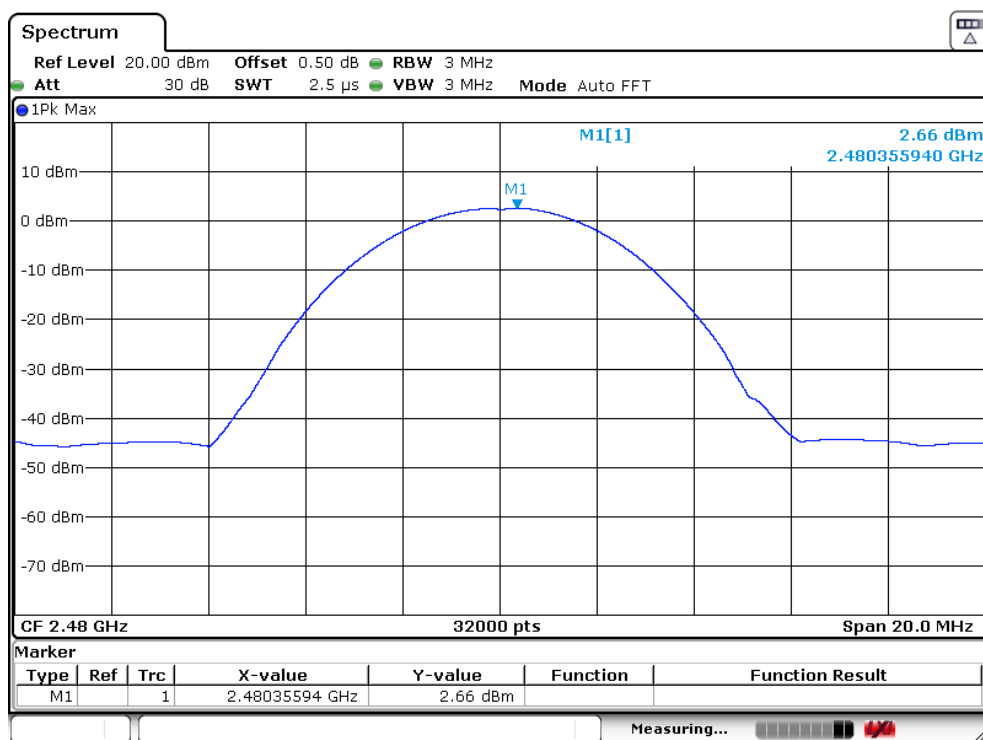Date: 2 JUN 2017 18:11:17

8DPSK Middle Channel

Date: 2 JUN 2017 18:11:40

8DPSK High Channel

Date: 2 JUN 2017 18:12:05

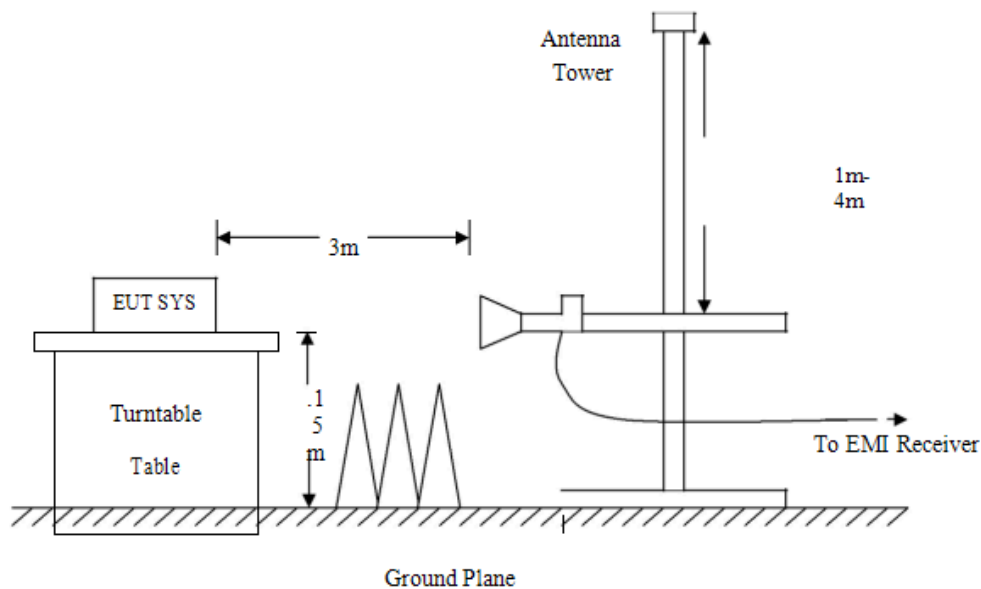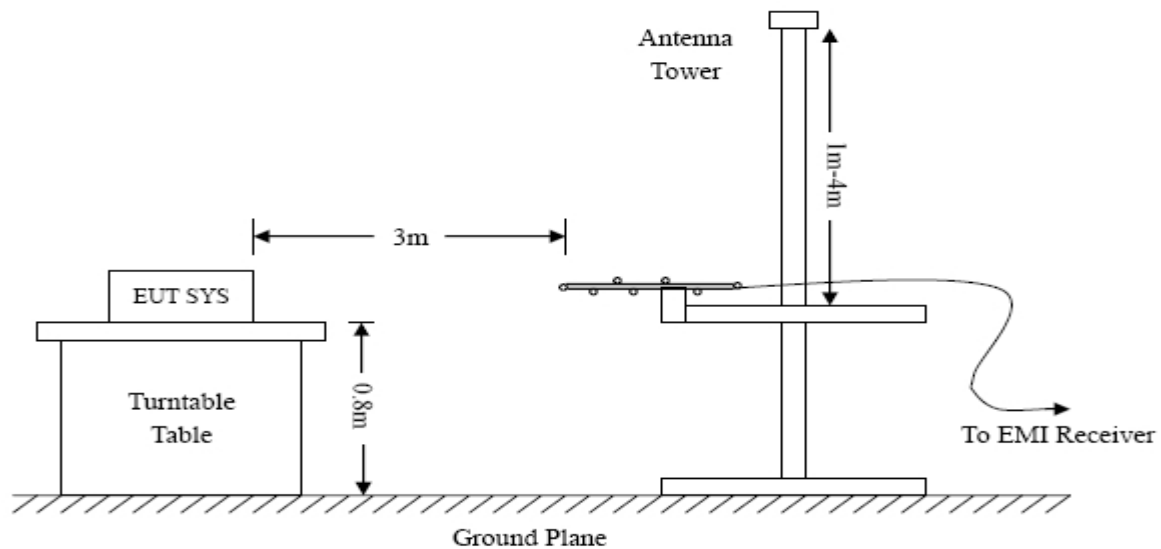# 10. Field Strength of Spurious Emissions

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.

Antenna Tower

3m

EUT SYS

Turntable Table

0.8m

1m-4m

To EMI Receiver

Ground Plane

Antenna Tower

3m

EUT SYS

Turntable

Table

.15m

1m-4m

To EMI Receiver

Ground Plane

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:	23°C
Relative Humidity:	56%
ATM Pressure:	101.1 mbar

10.5 Summary of Test Results/Plots

Test Specification: Vertical

Radiated Emission Measurement

File :20170607   Data #1   Date: 2017-06-07   Time: 6:08:00 PM
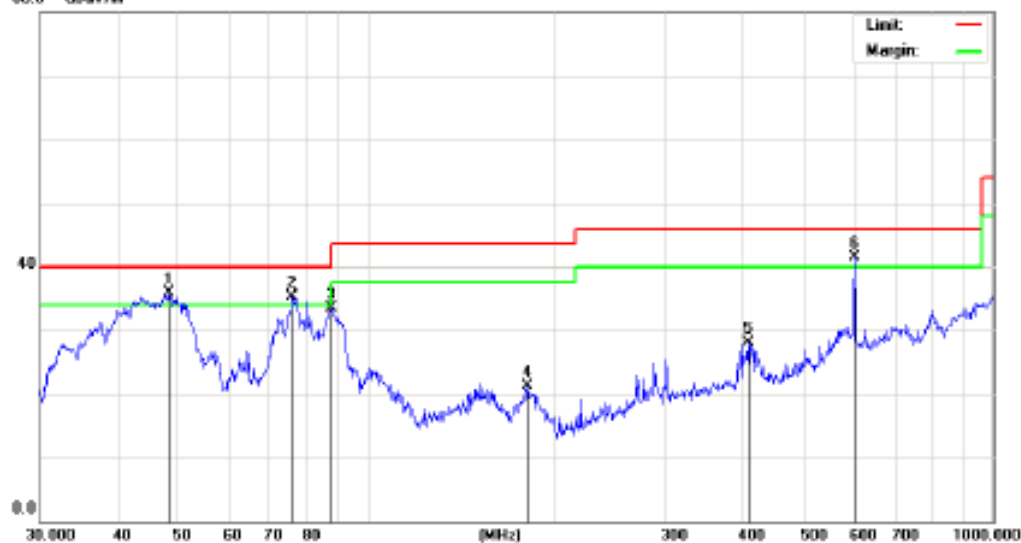
Site
Limit: FCC_PART15_B_03m_QP_
EUT:
M/N: HDMI主机
Mode: BT
Note:

Polarization: **Vertical**   Temperature: 25
Power: AC 120V/60Hz   Humidity: 50 %
Distance: 3m

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	48.1626	54.28	-18.37	35.91	40.00	-4.09	QP			
2	!	75.9773	54.58	-19.18	35.40	40.00	-4.60	QP			
3		87.7248	52.04	-18.60	33.44	40.00	-6.56	QP			
4		180.0165	36.47	-15.22	21.25	43.50	-22.25	QP			
5		406.0880	34.48	-6.34	28.14	46.00	-17.86	QP			
6	!	601.4265	42.41	-0.89	41.52	46.00	-4.48	QP			

Test Specification: Horizontal

Site
Limit: FCC_PART15_B_03m_QP_
EUT:
M/N: HDMI主机
Mode: BT
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		cm	degree	
1		47.1599	37.22	-14.27	22.95	40.00	-17.05	QP			
2	"	88.3421	53.72	-17.13	36.59	43.50	-6.91	QP			
3		183.2005	44.92	-11.34	33.58	43.50	-9.92	QP			
4		300.3672	44.90	-9.59	35.31	46.00	-10.69	QP			
5		413.2706	39.03	-6.63	32.40	46.00	-13.60	QP			
6		601.4265	38.05	-1.74	36.31	46.00	-9.69	QP			

Spurious Emissions Above 1GHz

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel-2402MHz							
4804	53.86	-3.48	50.38	74	-23.62	H	PK
4804	37.79	-3.489	34.301	54	-19.699	H	AV
7206	54.34	-0.41	53.93	74	-20.07	H	PK
7206	35.95	-0.41	35.54	54	-18.46	H	AV
4804	56.05	-3.48	52.57	74	-21.43	V	PK
4804	38.18	-3.489	34.691	54	-19.309	V	AV
7206	55.51	-0.41	55.1	74	-18.9	V	PK
7206	38.37	-0.41	37.96	54	-16.04	V	AV
Middle Channel-2441MHz							
4882	54.35	-3.31	51.04	74	-22.96	H	PK
4882	43.73	-3.31	40.42	54	-13.58	H	AV
7323	56.85	-0.33	56.52	74	-17.48	H	PK
7323	43.97	-0.33	43.64	54	-10.36	H	AV
4882	55.85	-3.31	52.54	74	-21.46	V	PK
4882	43.08	-3.31	39.77	54	-14.23	V	AV
7323	56.04	-0.33	55.71	74	-18.29	V	PK
7323	44.481	-0.33	44.151	54	-9.849	V	AV
High Channel-2480MHz							
4960	56.75	-3.29	53.46	74	-20.54	H	PK
4960	43.02	-3.29	39.73	54	-14.27	H	AV
7440	53.85	-0.3	53.55	74	-20.45	H	PK
7440	44.51	-0.3	44.21	54	-9.79	H	AV
4960	58.85	-3.29	55.56	74	-18.44	V	PK
4960	43.91	-3.29	40.62	54	-13.38	V	AV
7440	55.08	-0.3	54.78	74	-19.22	V	PK
7440	46.12	-0.3	45.82	54	-8.18	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

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 (2310MHz to 2410MHz for 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:	23°C
Relative Humidity:	56%
ATM Pressure:	101.1 mbar

11.4 Summary of Test Results/Plots

GFSK

Bandedge (Conducted)
Lowest

Date: 2 JUN 2017 18:37:02
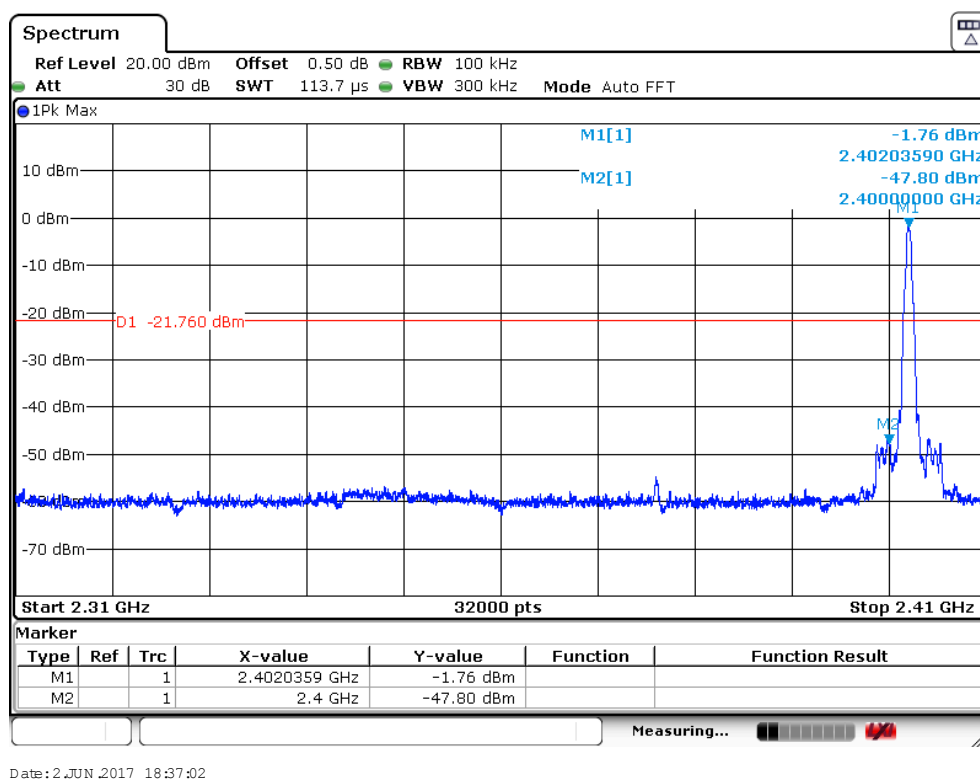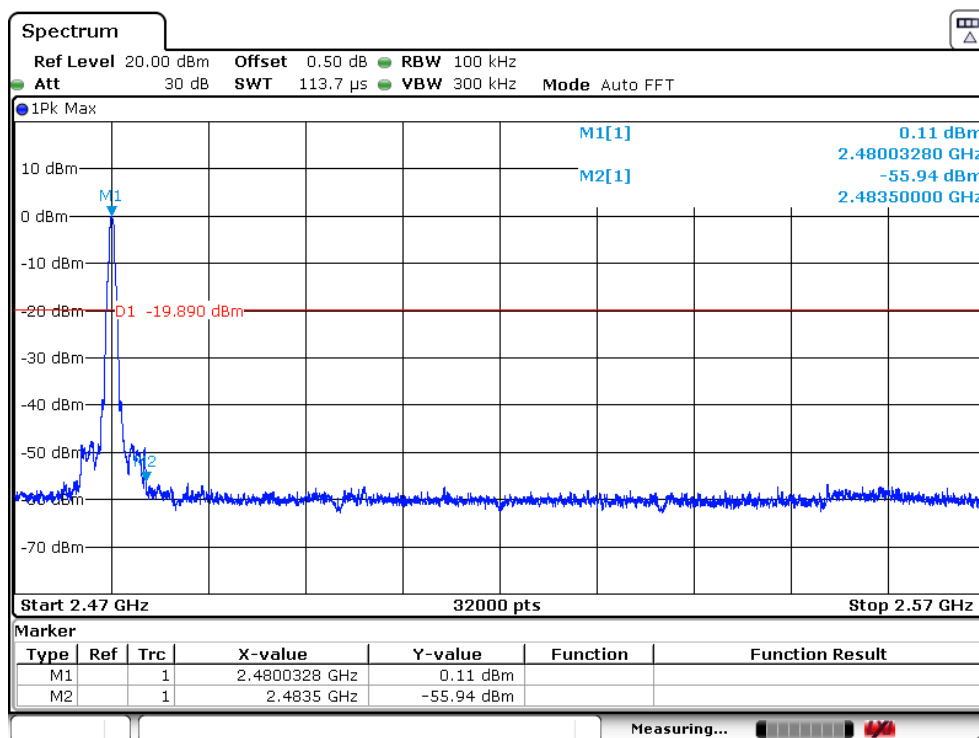
Highest

Date: 2 JUN 2017 18:34:15
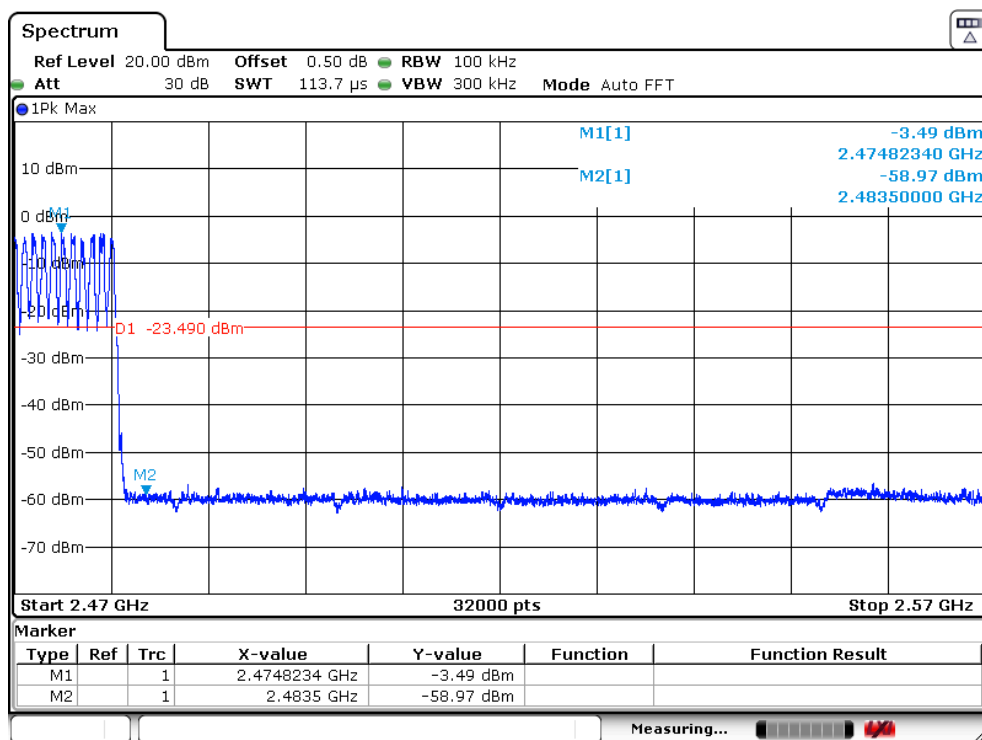
Hopping Bandedge (Conducted)
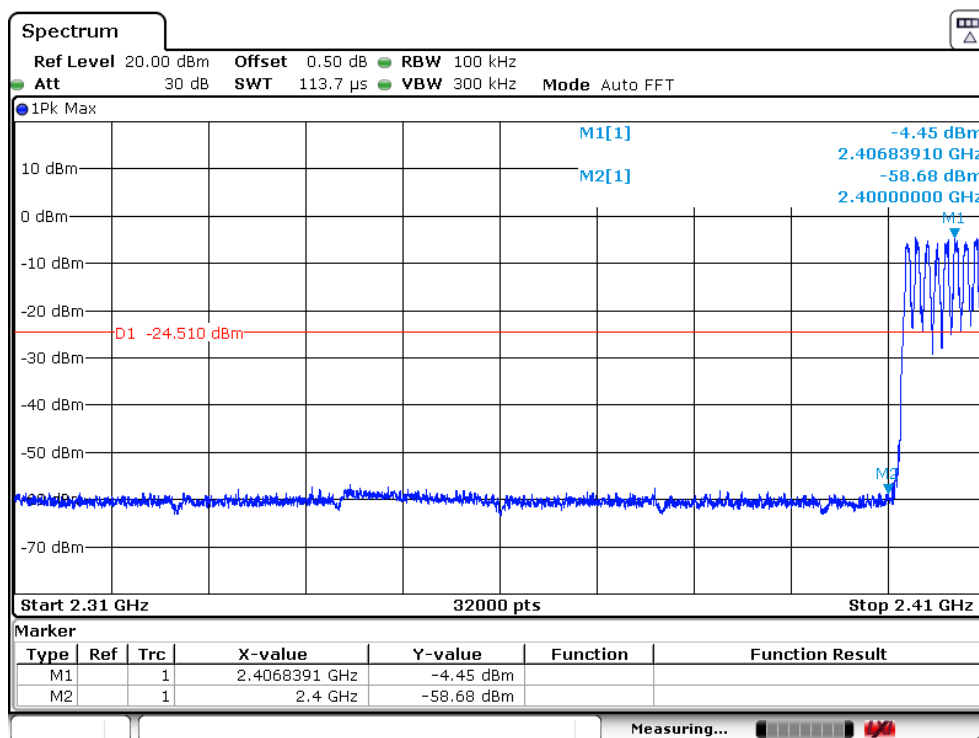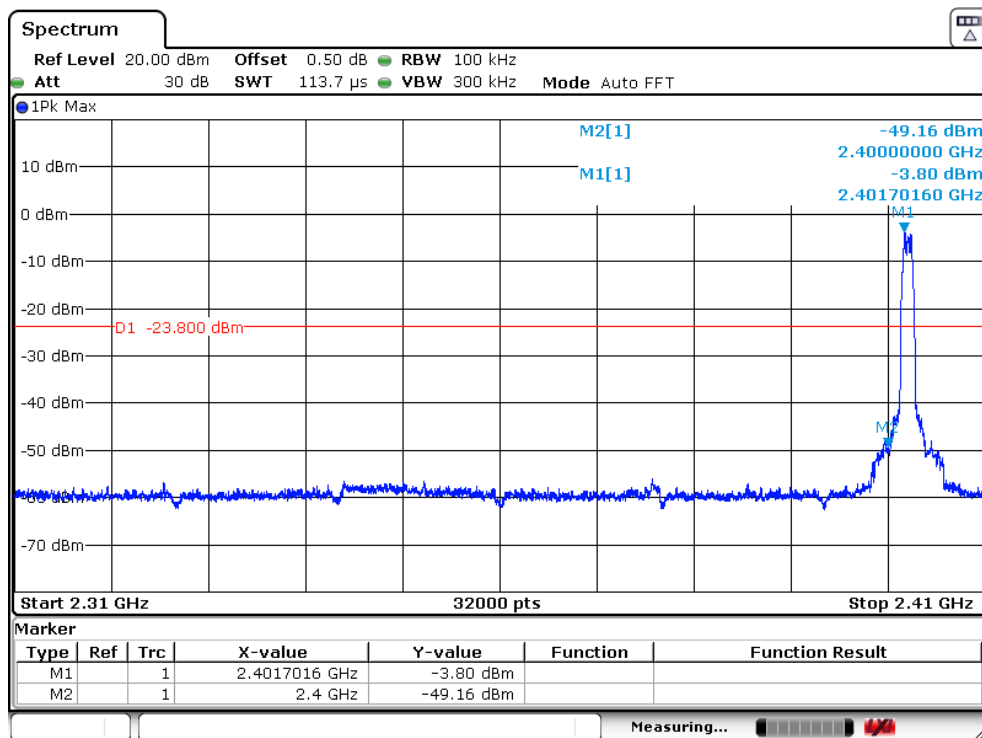
Lowest Bandedge

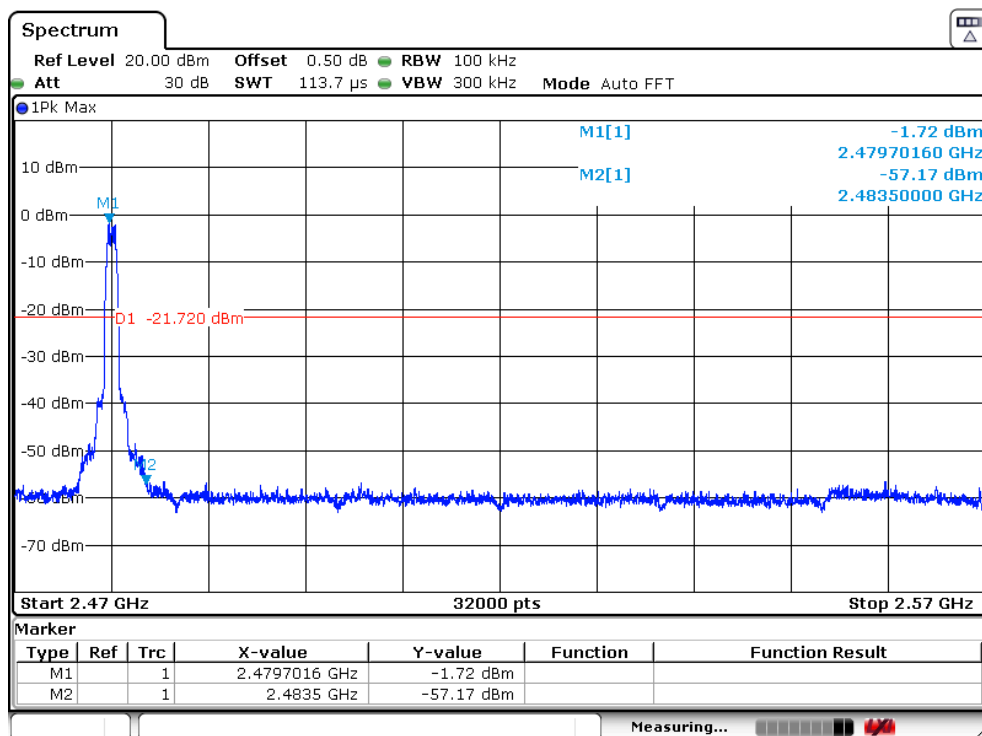Date: 2 JUN 2017 18:36:03

Highest Bandedge

Date: 2.JUN.2017 18:35:23

8DPSK
Bandedge (Conducted)
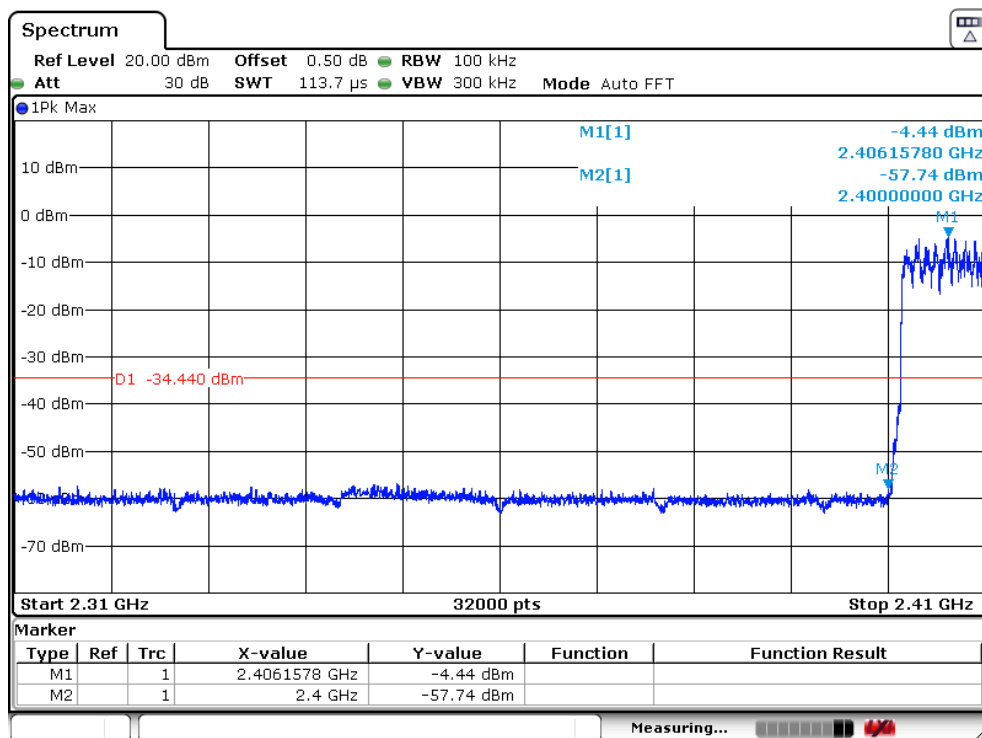Lowest

Date: 2.JUN.2017 18:29:52

Highest

Date:2 JUN .2017 18:32:15
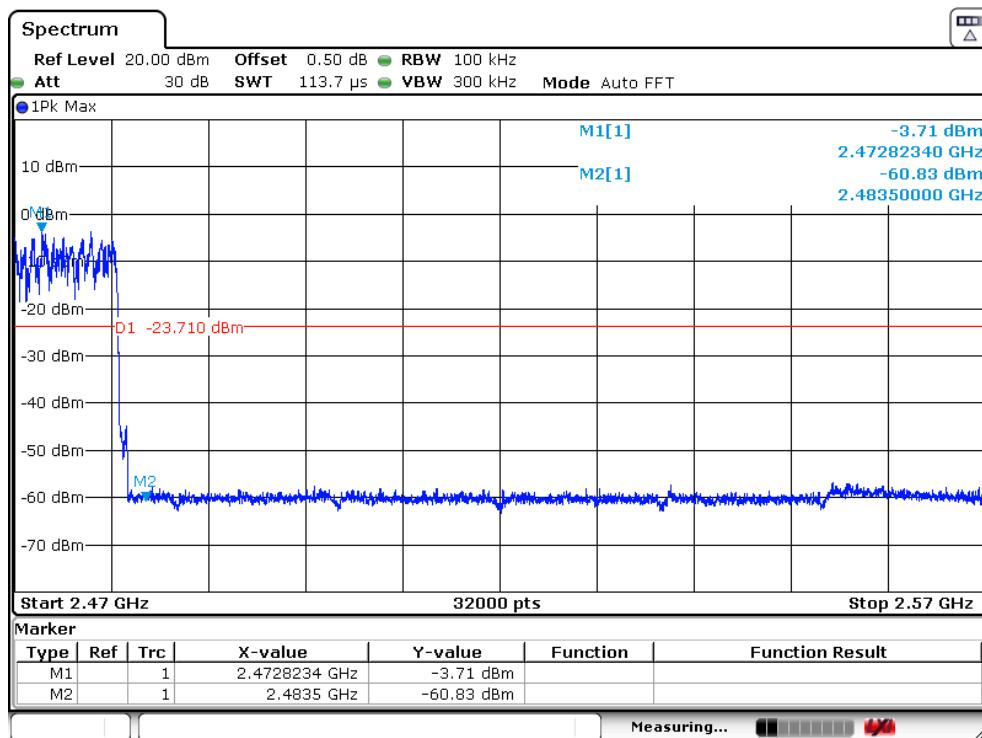
Hopping Bandedge (Conducted)

Lowest Bandedge
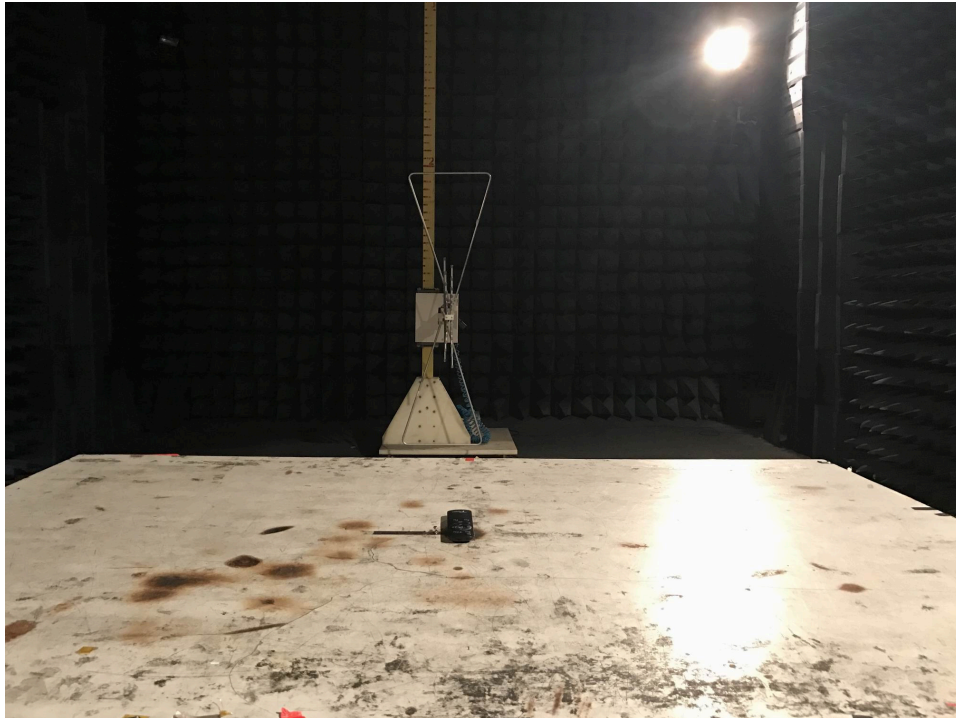

Date:2 JUN .2017 18:30:54

Highest Bandedge

Date:2.JUN.2017 18:31:43

13 test photo

Radiated Measurement Photos

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