COMPLIANCE
For FCC PART 15 Subpart C

Applicant Name:	Date of Testing
Glosys Inc.	June 14, 2016 to June 28, 2016
	Test Site/Location
Address:	#23, Gokhyeon-ro 480 Beon-gil, Mohyeon-myeon, Cheoin-gu, Yongin-si, Gyeonggi-do 449-853, South Korea
#510, Venture Valley B/D, 40, Omokcheon-ro 152beon-gil, Gwonseon-gu, Suwon-si, Gyeonggi-do, Korea	**Test Report No.:** BWS-16-RF-0003
	BWS FRN: 0009936881
FCC ID:	**YE4-XSG3B**

Model(s):	XSG3B
EUT Type:	In-Vehicle Infotainment System
Frequency Range:	2402-2480 MHz
Modulation Type	BDR(GFSK), EDR(π /4-DQPSK), EDR(8DPSK)
FCC Classification:	Spread Spectrum Transmitter (DSS)
FCC Rule Part(s):	FCC Part 15 Subpart C §15.247

The product was received on June 14, 2016 and testing was completed on June 28, 2016. We, BWS TECH Inc. would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of BWS TECH Inc. the test report shall not be reproduced except in full.

(Date) 06/29/2016

Tested by **Hyun-Yong, Seol**

(Date)06/29/2016

Reviewed by **Bang-Hyun, Nam**

BWS TECH INC.

#23, Gokhyeon-ro 480 Beon-gil, Mohyeon-myeon, Cheoin-gu, Yongin-si, Gyeonggi-do 449-853, South Korea
TEL: +82-31-333-5997, FAX: +82-31-333-0017
http://www.bws.co.kr

TABLE OF CONTENTS

FCC TEST REPORT

Scope – *Measurement and determination of electromagnetic emission(EME) of radio frequency devices including intentional radiators and/or unintentional radiators for compliance with the technical rules and regulations of the U.S Federal Communications Commission(FCC)*

1. General Information

1.1 Applicant

- **Company Name** : **Glosys Inc.**
- **Company Address** : **#510, Venture Valley B/D, 40, Omokcheon-ro 152beon-gil, Gwonseon-gu,Suwon-si, Gyeonggi-do, Korea**
- **Phone/Fax** : Tel No. : +82-31-291-1450 Fax No. : +82-31-291-1451

1.2 Manufacturer

- **Company Name** : **Glosys Inc.**
- **Company Address** : **#510, Venture Valley B/D, 40, Omokcheon-ro 152beon-gil, Gwonseon-gu,Suwon-si, Gyeonggi-do, Korea**
- **Phone/Fax** : Tel No. : +82-31-291-1450 Fax No. : +82-31-291-1451

1.3 EUT Description

- **EUT Type** : In-Vehicle Infotainment System
- **Model Name** : XSG3B
- **S/N** : Prototype
- **Freq. Range** : 2402-2480 MHz
- **Number of Channels** : BDR(79 Channel), EDR(79 Channel)
- **Modulation Method** : BDR(GFSK), EDR(π /4-DQPSK), EDR(8DPSK)
- **Power source** : DC 12 V only (Vehicle Battery)
- **Antenna Peak Gain** : -4.54 dBi

1.4 Other Information

- **FCC Rule Part(s)** : Part 15 Subpart C §15.247
- **Test Procedure** : ANSI C63.10-2013, DA 00-705
- **FCC ID** : YE4-XSG3B
- **Date of Test** : June 14, 2016 to June 28, 2016
- **Place of Test** : BWS TECH Inc.(FCC Registration Number : 287786)
  #23, Gokhyeon-ro 480 Beon-gil, Mohyeon-myeon,
  Cheoin-gu, Yongin-si, Gyeonggi-do 449-853, South Korea

  TEL: +82-31-333-5997 FAX: +82-31-333-0017

2. Description of Test Facility

Site Description

Test Lab. :

Accredited by Industry Canada, February 10, 2015
The Certificate Registration Number is 4963A-2.

Accredited by FCC, September 03, 2013
The Certificate Registration Number is 287786.

Accredited by VCCI, September 11, 2015
The Certificate Registration Number is C-4326

Accredited by RRA(EMC,RF, SAR), December 16, 2016
The Certificate Registration Number is KR0017

Accredited by KOLAS(KS Q ISO/IEC 17025), April 8, 2016
The Certificate Registration Number is KT174

Name of Firm : BWS TECH Inc.

Site Location : #23, Gokhyeon-ro 480 Beon-gil, Mohyeon-myeon, Cheoin-gu, Yongin-si, Gyeonggi-do 449-853, South Korea

3. Test Methodology

The tests documented in this report were performed in accordance with ANSI C63.10: 2013 and the requirements of FCC Rules Part 15.207, 15.209 and 15.247.
Radio testing was performed according to DA 00-705.

3.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application

3.2 EUT Exercise

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

3.3 FCC Part 15.205 Restricted Bands of Operations

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])
13.36 - 13.41			

1 Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
2 Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions.
The provisions in Section 15.35 apply to these measurements.

3.4 Description of Test Modes

The EUT has been tested under operating condition.
After verification, all tests were carried out with the worst case test modes as shown below GFSK(1Mbps) Channel Low (2402MHz), Mid (2441MHz) and High (2480MHz), these were chosen for full testing

Summary table of Test Cases			
Test Item	**Data Rate (Modulation)**		
	Bluetooth BDR 1Mbps (GFSK)	**Bluetooth EDR 2Mbps (π /4-DQPSK)**	**Bluetooth EDR 3Mbps (8-DPSK)**
Output Power	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz	Mode 4: CH00_2402 MHz Mode 5: CH39_2441 MHz Mode 6: CH78_2480 MHz	Mode 7: CH00_2402 MHz Mode 8: CH39_2441 MHz Mode 9: CH78_2480 MHz
Conducted Test Case	**Data Rate (Modulation)**		
	Bluetooth BDR 1Mbps (GFSK)	**Bluetooth EDR 1Mbps (8-DPSK)**	
	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz	Mode 7: CH00_2402 MHz Mode 8: CH39_2441 MHz Mode 9: CH78_2480 MHz	
Radiated Test Case	**Data Rate (Modulation)**		
	Bluetooth BDR 1Mbps (GFSK)		
	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz		
AC Conducted Emission	**Data Rate (Modulation)**		
	Bluetooth BDR 1Mbps (GFSK)		
	Mode 2: CH39_2441 MHz		
Remark: For radiated test cases, the worst mode data rate 1Mbps was reported only, because this data rate has the highest RF output power at preliminary tests, and the conducted spurious emissions and conducted band edge measurement for each data rate are no worse than 1Mbps, and no other significantly frequencies found in conducted spurious emission.			

4. Summary of Test Results

Spread Spectrum Transmitter (DSS)				
Clause	**TEST Description**	**Standard Section**	**Requirements**	**Result**
5.1	**Number of Channels**	§15.247(a)(1)	≥ 15 Channel Number	Pass
5.2	**Hopping Channel Separation**	§15.247(a)(1)	≥ 2/3 of 20 dB Bandwidth	Pass
5.3	**Dwell Time of Each Channel**	§15.247(a)(1)	≤ 0.4 s	Pass
5.4	**20dB and 99% Bandwidth**	§15.247(a)(1)	N/A	Pass
5.5	**Maximum Peak Conducted Output Power**	§15.247(b)(1)	≤ 125mW	Pass
5.6	**Conducted Spurious Emission**	§15.247(d)	≥20dBc/100kHz	Pass
5.7	**Radiated Spurious Emission**	§15.247(d), §15.209(a), §15.35(b)	§15.209, §15.247(d)	Pass
5.8	**Band Edges Measurement**	§15.247(d)	§15.205(a), §15.209(a)	Pass
5.8	**AC Power Conducted Emission**	§15.207	§15.207(a)	Pass
5.9	**Antenna Application**	§15.247(b), §15.203	§15.247(b), §15.203	Pass

5. Test Data

5.1 Number of Channels

5.1.1 Test Equipment

EQUIPMENT	MODEL	MANUFACTURE	SERIAL NUMBER	Calibration Due date (year/month/date)
Spectrum Analyzer	N9020A	Agilent	US46220101	2016/09/14
DC Power Supply	UDP-6015R	Unicorn tech	131007	2016/09/10

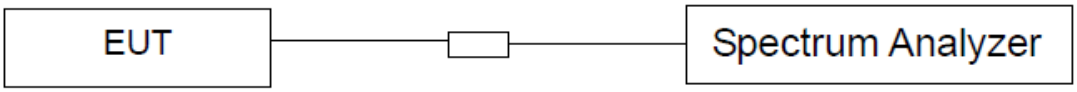
5.1.2 Test Limit

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

5.1.3 Test Procedure

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings: Span = the frequency band of operation; RBW ≥ 1% of the span; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
6. The number of hopping frequency used is defined as the number of total channel.
7. Record the measurement data derived from spectrum analyzer.

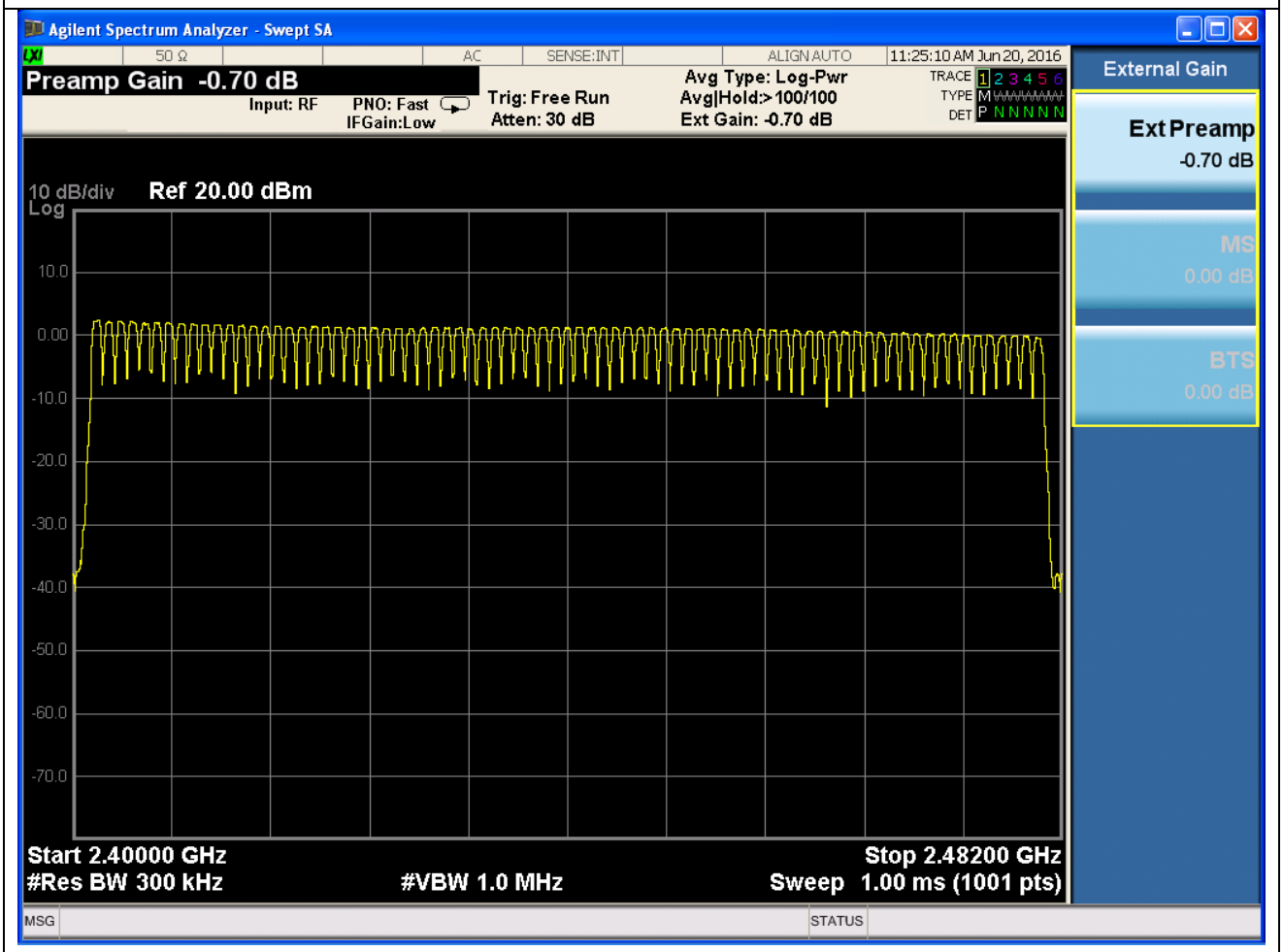
5.1.4 Block Diagram of Test Setup



5.1.5 Test Result

Number of Hopping(Channel)	Channel Number
79	≥15

Number of Hopping Channel



5.2 Hopping Channel Separation

5.2.1 Test Equipment

EQUIPMENT	MODEL	MANUFACTURE	SERIAL NUMBER	Calibration Due date (year/month/date)
Spectrum Analyzer	N9020A	Agilent	US46220101	2016/09/14
DC Power Supply	UDP-6015R	Unicorn tech	131007	2016/09/10

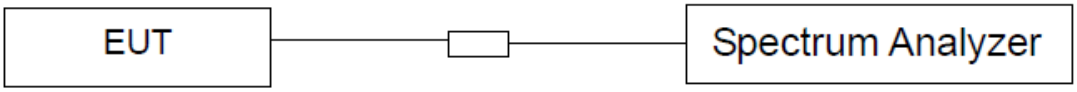
5.2.2 Test Limit

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.

5.2.3 Test Procedure

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The Path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peaks of two adjacent channels; RBW ≥ 1% of the span; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
6. Measure and record the results in the test report.

5.2.4 Block Diagram of Test Setup



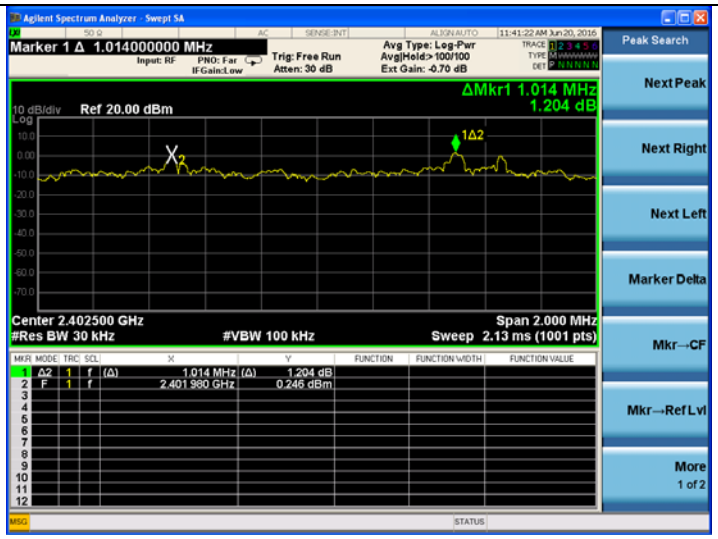
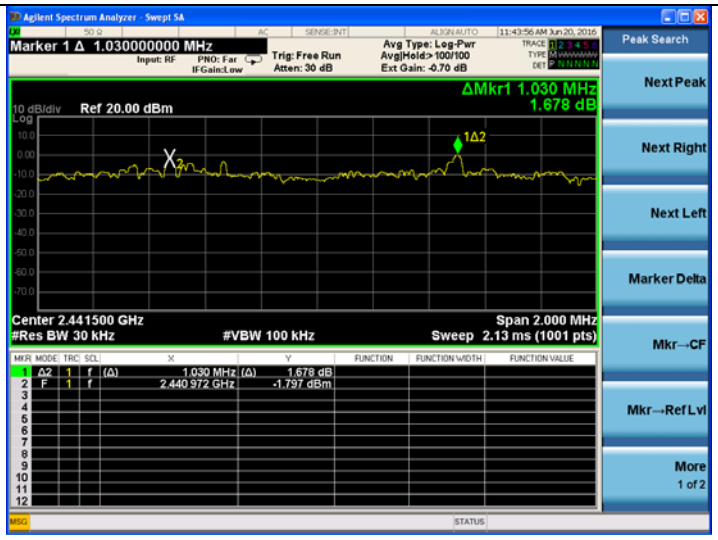
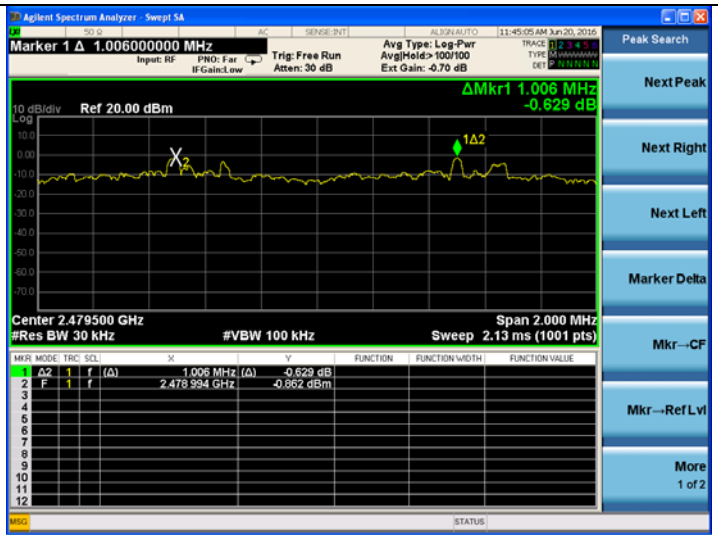
5.2.5 Test Result

Modulation	Channel	Test Result (kHz)	Limit (kHz) (2/3 of 20dB BW)
BDR(GFSK)	Low	988	≥615
	Middle	1056	≥621
	High	998	≥615
EDR(8DPSK)	Low	1014	≥839
	Middle	1030	≥838
	High	1006	≥836

Hopping Channel Separation - BDR(GFSK)

Low Channel	
Middle Channel	
High Channel	

Hopping Channel Separation - EDR(8DPSK)

Low Channel	
Middle Channel	
High Channel	

5.3 Dwell Time of Each Channel

5.3.1 Test Equipment

EQUIPMENT	MODEL	MANUFACTURE	SERIAL NUMBER	Calibration Due date (year/month/date)
Spectrum Analyzer	N9020A	Agilent	US46220101	2016/09/14
DC Power Supply	UDP-6015R	Unicorn tech	131007	2016/09/10

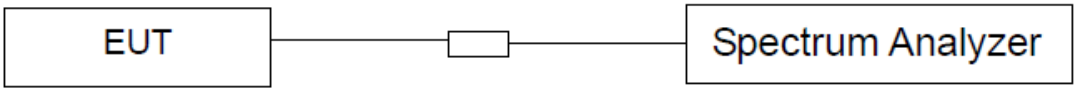
5.3.2 Test Limit

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.

5.3.3 Test Procedure

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings: 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.
6. Measure and record the results in the test report.

5.3.4 Block Diagram of Test Setup



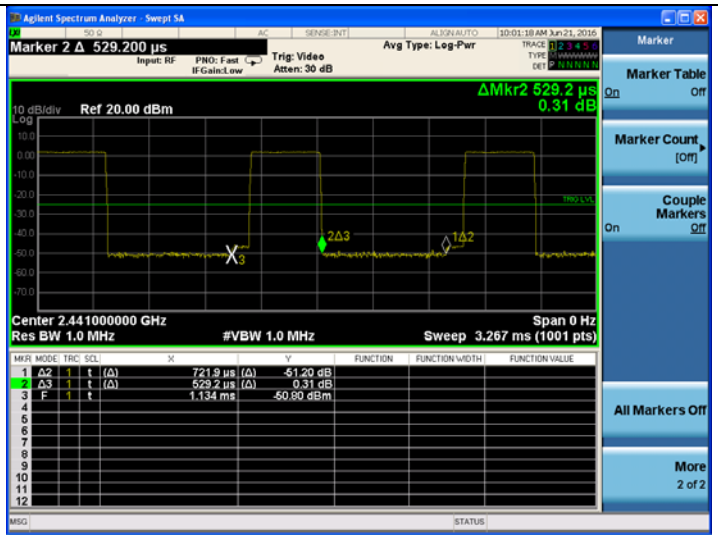
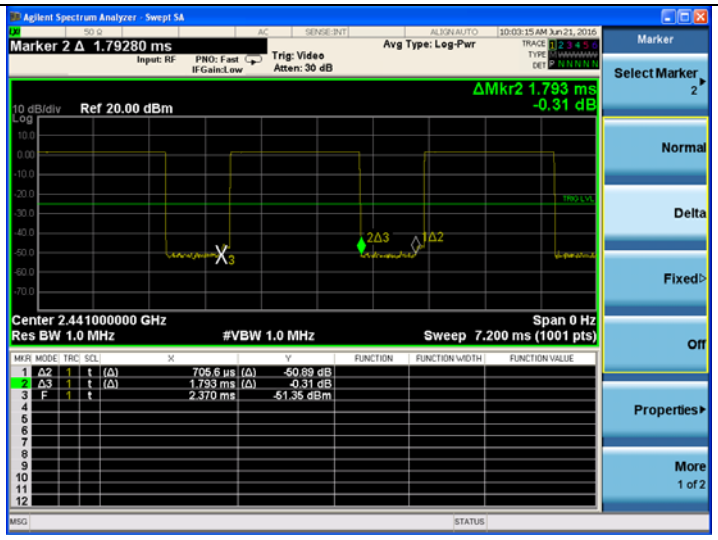
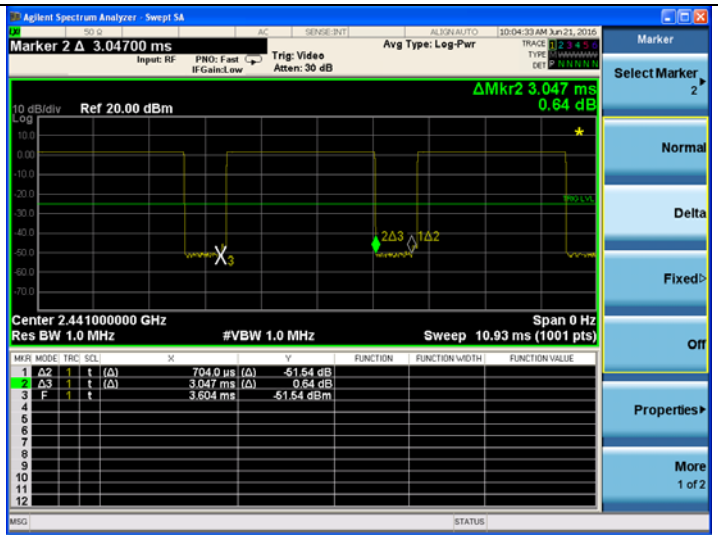
5.3.5 Test Result

Modulation	Packet	Time Slot Length (ms)	Dwell Time (ms)	Limit (ms)
BDR(GFSK)	DH1	0.53	169.6	≤400
	DH3	1.79	286.4	≤400
	DH5	3.05	325.3	≤400
EDR(8DPSK)	DH1	0.81	259.2	≤400
	DH3	1.81	289.6	≤400
	DH5	3.09	329.6	≤400

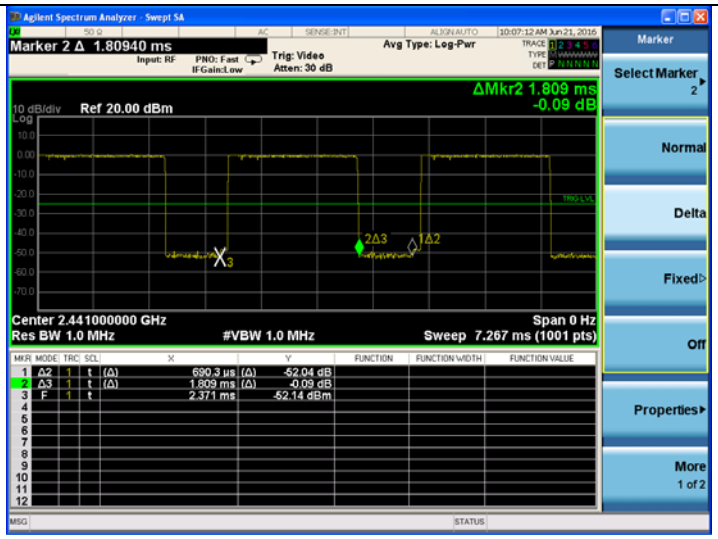
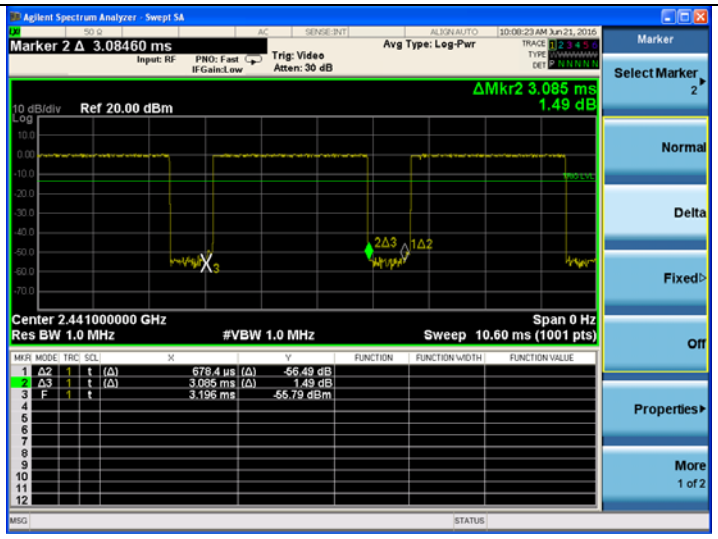
The test period: T = 0.4 Second * 79 Channel = 31.6 s

Dwell time = time slot length * (Hopping rate / Number of hopping channels) * Period

Dwell Time of Each Channel - BDR(GFSK)

DH1	
DH3	
DH5	

Dwell Time of Each Channel - EDR(8DPSK)

DH1	
DH3	
DH5	

5.4 20dB and 99% Bandwidth

5.4.1 Test Equipment

EQUIPMENT	MODEL	MANUFACTURE	SERIAL NUMBER	Calibration Due date (year/month/date)
Spectrum Analyzer	N9020A	Agilent	US46220101	2016/09/14
DC Power Supply	UDP-6015R	Unicorn tech	131007	2016/09/10

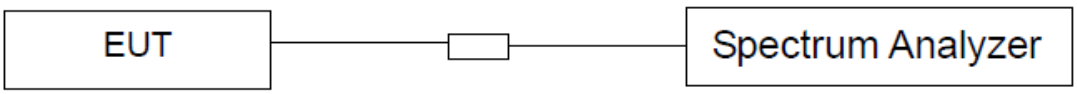
5.4.2 Test Limit

Reporting only

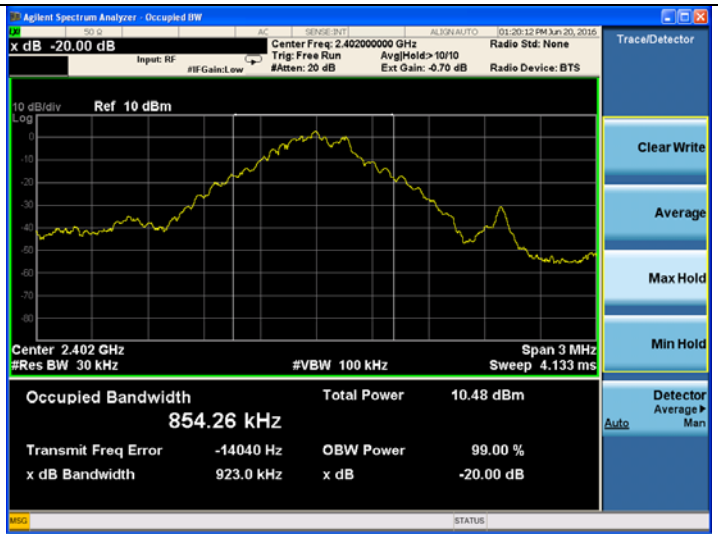
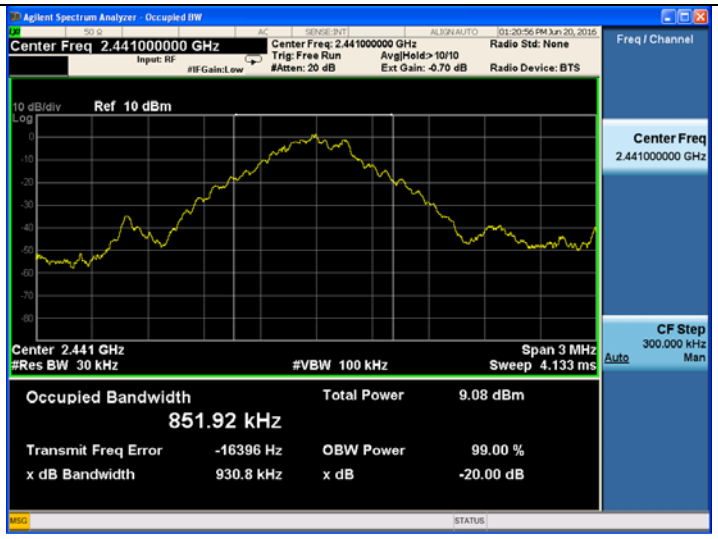
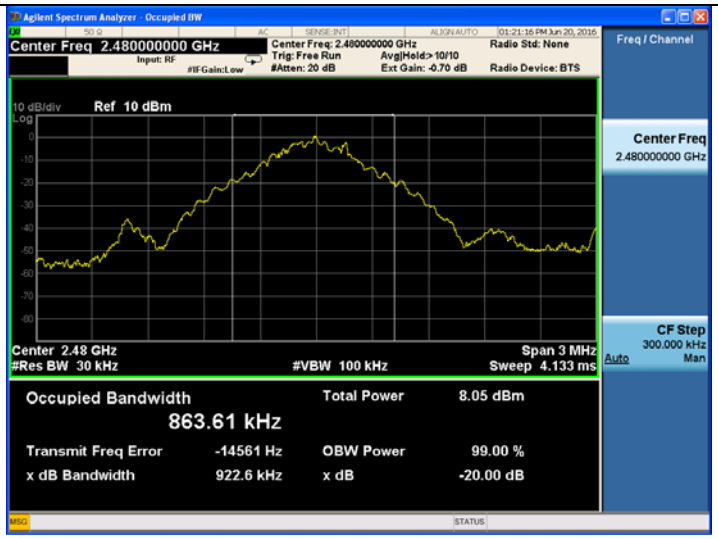
5.4.3 Test Procedure

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Use the following spectrum analyzer settings for 20dB Bandwidth measurement.
   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.
5. Use the following spectrum analyzer settings for 99 % Bandwidth measurement.
   For 99% Bandwidth measurement, the RBW=30kHz, and VBW = 100kHz. Sweep = auto ; Detector function = sample. Trace = max hold.
6. Measure and record the results in the test report.

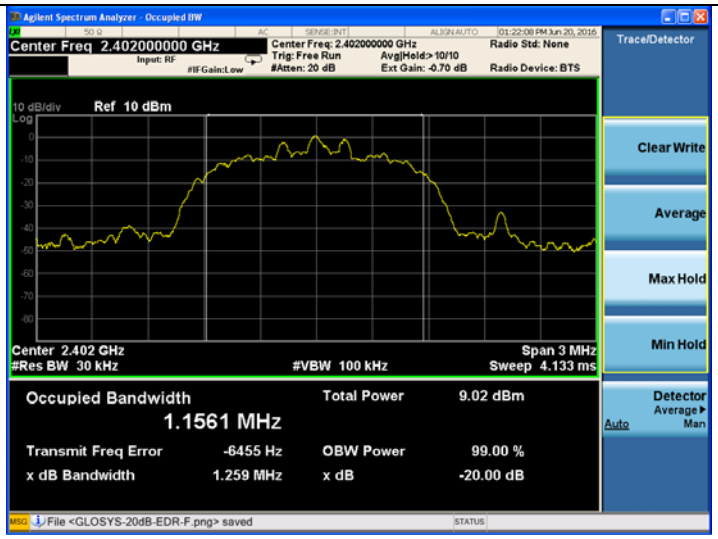
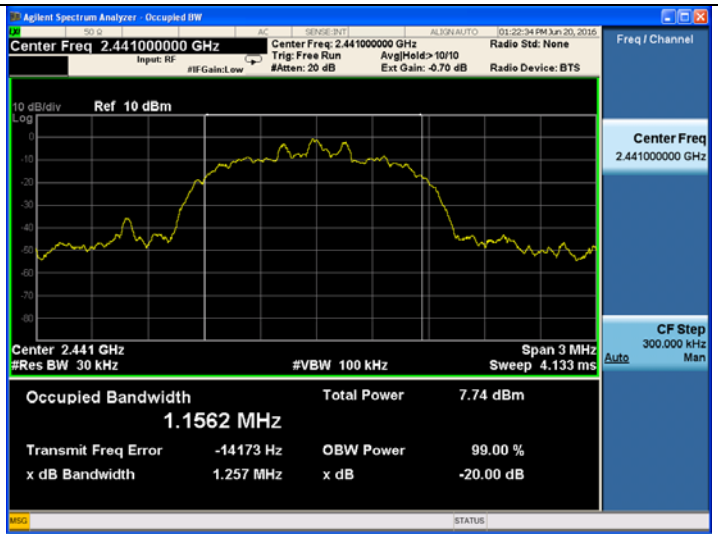
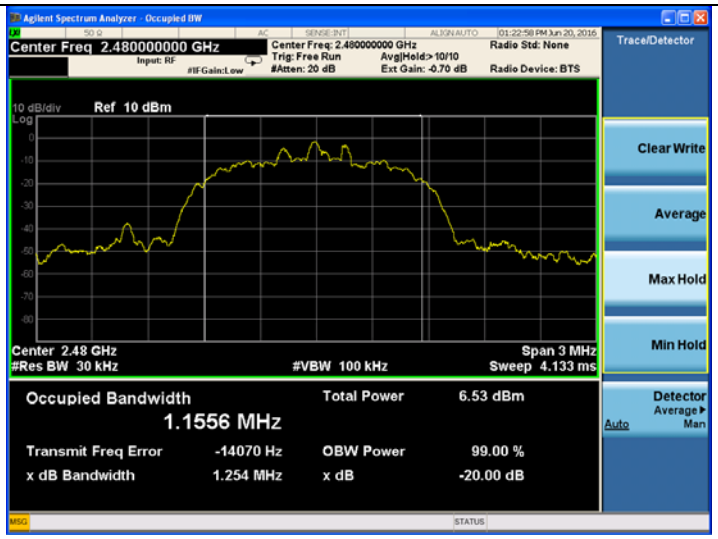
5.4.4 Block Diagram of Test Setup



5.4.5 Test Result

20dB and 99% Bandwidth - BDR(GFSK)	
2402MHz	
2441MHz	
2480MHz	

20dB and 99% Bandwidth - EDR(8DPSK)

2402MHz	
2441MHz	
2480MHz	

5.5 Maximum Peak Conducted Output Power

5.5.1 Test Equipment

EQUIPMENT	MODEL	MANUFACTURE	SERIAL NUMBER	Calibration Due date (year/month/date)
Spectrum Analyzer	N9020A	Agilent	US46220101	2016/09/14
DC Power Supply	UDP-6015R	Unicorn tech	131007	2016/09/10

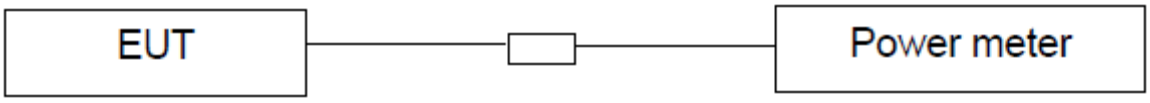
5.5.2 Test Limit

Section 15.247 (b) The maximum peak conducted output power of the intentional radiator shall not exceed the following: (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. The power limit for 1Mbps is 1watt, and for 2Mbps, 3Mbps and AFH are 0.125 watts.

5.5.3 Test Procedure

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power with cable loss and record the results in the test report.
5. Measure and record the results in the test report.

5.5.4 Block Diagram of Test Setup



5.5.5 Test Result

BDR(GFSK)

Frequency(MHz)	Test Result(dBm)	Limit(dBm)
2402	3.07	≤20.97
2441	2.25	≤20.97
2480	1.07	≤20.97

EDR(π/4-DQPSK)

Frequency(MHz)	Test Result(dBm)	Limit(dBm)
2402	0.02	≤20.97
2441	-1.09	≤20.97
2480	-2.37	≤20.97

EDR(8DPSK)

Frequency(MHz)	Test Result(dBm)	Limit(dBm)
2402	0.02	≤20.97
2441	-1.09	≤20.97
2480	-2.37	≤20.97

Note: Limit(dBm) is the value of Limit(mW) to be conversioned as follows:

10log125 = 20.97dBm

5.6 Conducted Spurious Emission

5.6.1 Test Equipment

EQUIPMENT	MODEL	MANUFACTURE	SERIAL NUMBER	Calibration Due date (year/month/date)
Spectrum Analyzer	N9020A	Agilent	US46220101	2016/09/14
DC Power Supply	UDP-6015R	Unicorn tech	131007	2016/09/10

5.6.2 Test Limit

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

Note: Wireless charger configuration was evaluated.

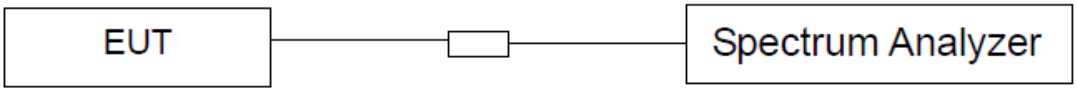
Frequency (MHz)	Field Strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

.

5.6.3 Test Procedure

1. The testing follows the guidelines in Band-edge Compliance of RF Conducted Emissions of FCC Public Notice DA 00-705 Measurement Guidelines.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Set RBW = 100kHz (≥ 1% span=10MHz), VBW = 300kHz (≥ RBW). Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100kHz RBW. The attenuation shall be 30 dB instead of 20 dB when RMS conducted output power procedure is used.
4. Enable hopping function of the EUT and then repeat step 2. and 3.
5. Measure and record the results in the test report.

5.6.4 Block Diagram of Test Setup



5.6.5 Test Result

Conducted Spurious Emission - BDR(GFSK)	
Low Channel	
Middle Channel	
High Channel	

Conducted Spurious Emission - EDR(8DPSK)

Low Channel	
Middle Channel	
High Channel	

5.7 Radiated Spurious Emission

5.7.1 Test Equipment

EQUIPMENT	MODEL	MANUFACTURE	SERIAL NUMBER	Calibration Due date (year/month/date)
Antenna Mast(4m)	AM-4.0	MATURO	AM4.0/225/17240915	N/A
Antenna Mast(2m)	AM-2.5	MATURO	AM2.5/226/17240915	N/A
Positioner Controller	CO2000	MATURO	NCU/459/17240915	N/A
RF Amplifier	8447E	H.P	2945A02712	2017/01/06
RF Amplifier	PAM-118A	COM-POWER	551019	2016/07/20
RE_10 m CHAMBER #1	N/A	SY Corp.	N/A	N/A
DC Power Supply	UDP-6015R	Unicorn tech	131007	2016/09/10
Loop Antenna	HFH2-Z2	ROHDE & SCHWARZ	881056/6	2017/01/06
Bilog Antenna	VULB9160	SCHWARZBECK	9160-3052	2017/10/06
Bilog Antenna	VULB9161	SCHWARZBECK	9160-4067	2017/05/08
Horn Antenna	AHA-118	COM-POWER CORP.	701064	2017/06/15
Horn Antenna	BBHA 9120 D	SCHWARZBECK	BBHA 9120 D 517	2016/10/16
EMI Test Receiver	ESR	ROHDE & SCHWARZ	103120	2017/03/25

5.7.2 Test Limit

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

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

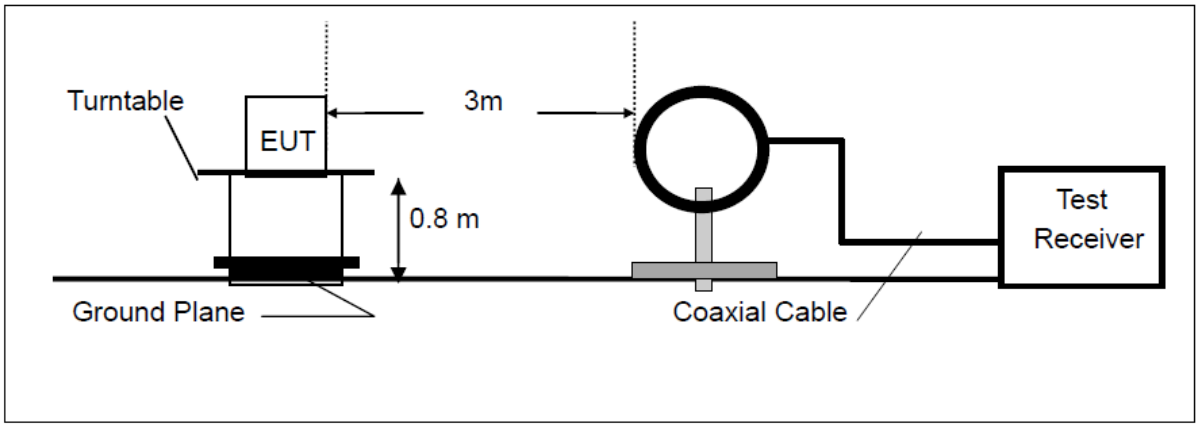
5.7.3 Test Procedure

1. The testing follows the guidelines in Spurious Radiated Emissions of FCC Public Notice DA 00-705 Measurement Guidelines.
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 kHz for f < 1 GHz, RBW=1MHz for f>1GHz ; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak
   (3) For average measurement: use duty cycle correction factor method per 15.35(c).
   Duty cycle = On time/100 milliseconds
   On time = $N_1*L_1+N_2*L_2+...+N_{n-1}*LN_{n-1}+N_n*L_n$
   Where N_1 is number of type 1 pulses, L_1 is length of type 1 pulses, etc.
   Average Emission Level = Peak Emission Level + 20*log(Duty cycle)
7. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

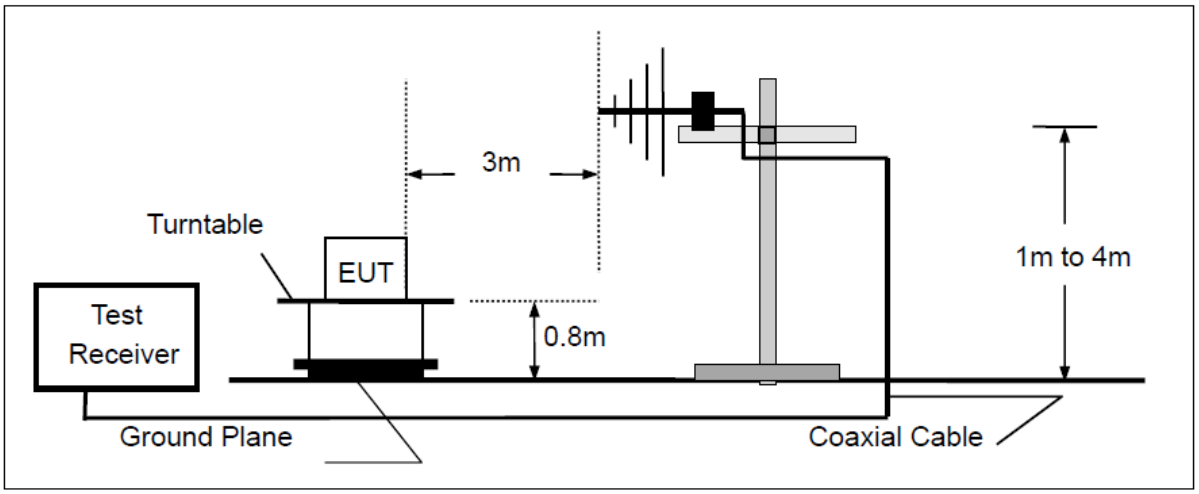
Note: The average levels were calculated from the peak level corrected with duty cycle correction factor (-28.92dB) derived from 20log (dwell time/100ms). This correction is only for signals that hop with the fundamental signal, such as band-edge and harmonic. Other spurious signals that are independent of the hopping signal would not use this correction.

5.7.4 Block Diagram of Test Setup

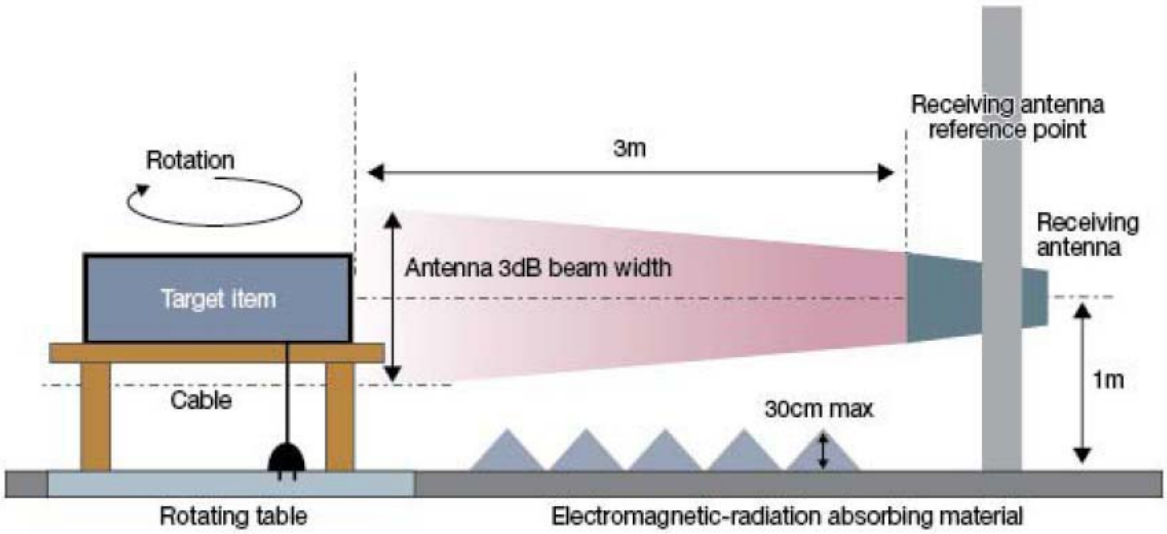
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency Below 1000MHz



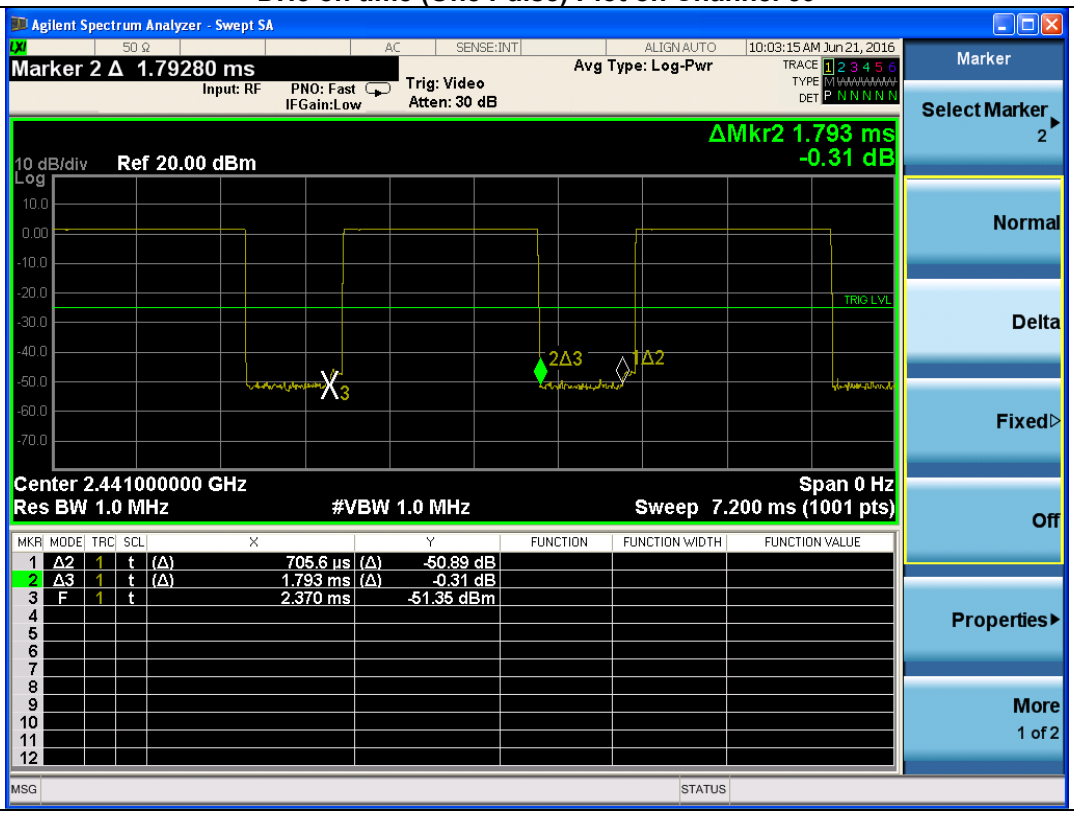
(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



5.7.5 Test Result

5.7.5.1 Duty cycle correction factor for average measurement

DH5 on time (One Pulse) Plot on Channel 39



There cannot be 2 complete hopping sequences within 100ms period, considering the random hopping behavior, maximum 2 hops can be possibly observed within the period. [100ms / 57.6ms] = 2 hops

Thus, the maximum possible ON time:

1.79 ms x 2 = 3.58 ms

Worst case Duty Cycle Correction factor, which is derived from the maximum possible ON time,

20 x log(3.58 ms/100ms) = -28.92 dB

5.7.5.2 0.009–30 MHz

Frequency [MHz]	Reading [dB µV]	Polarization [*H/**V]	Ant. Factor [dB]	Cable Loss [dB]	AMP Gain [dB]	Limit [dB µV/m]	Emission Level [dB µV/m]	Result.
-	-	-	-	-	-	-	-	Pass

Note: §15.31(o)_The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

5.7.5.3 30–1000 MHz

BDR(GFSK)- 2402 MHz(Low)

Frequency (MHz)	QuasiPeak (dBuV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Margin (dB)	Limit (dBuV/m)
64.871500	29.8	120.000	100.0	V	48.0	10.20	40.00
114.826500	18.2	120.000	100.0	V	171.0	25.30	43.50
127.970000	32.0	120.000	200.0	H	286.0	11.60	43.50
175.985000	34.6	120.000	300.0	H	194.0	8.90	43.50
279.484000	29.6	120.000	100.0	H	299.0	16.40	46.00
289.766000	25.6	120.000	100.0	V	157.0	20.40	46.00
368.045000	30.1	120.000	100.0	H	0.0	15.90	46.00
439.873500	32.9	120.000	100.0	V	142.0	13.10	46.00
635.377000	28.1	120.000	200.0	V	0.0	17.90	46.00
883.357500	23.0	120.000	100.0	H	136.0	23.10	46.00

BDR(GFSK)- 2441 MHz(Middle)

Frequency (MHz)	QuasiPeak (dBuV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Margin (dB)	Limit (dBuV/m)
66.035500	32.3	120.000	100.0	V	149.0	7.70	40.00
66.278000	19.3	120.000	300.0	H	178.0	20.70	40.00
103.477500	23.8	120.000	300.0	V	244.0	19.70	43.50
109.443000	19.2	120.000	200.0	H	46.0	24.30	43.50
137.524500	16.6	120.000	200.0	V	346.0	27.00	43.50
161.968500	38.2	120.000	300.0	H	297.0	5.30	43.50
175.936500	18.9	120.000	100.0	V	350.0	24.60	43.50
191.990000	39.2	120.000	200.0	H	125.0	4.30	43.50
368.045000	28.8	120.000	100.0	H	345.0	17.20	46.00
537.601000	34.5	120.000	200.0	V	6.0	11.60	46.00
718.894000	20.6	120.000	100.0	V	335.0	25.40	46.00
823.702500	34.3	120.000	100.0	H	234.0	11.70	46.00

BDR(GFSK)- 2480 MHz(Upper)

Frequency (MHz)	QuasiPeak (dBuV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Margin (dB)	Limit (dBuV/m)
66.132500	30.5	120.000	100.0	V	204.0	9.50	40.00
66.423500	19.1	120.000	400.0	H	177.0	20.90	40.00
95.960000	35.2	120.000	200.0	H	47.0	8.30	43.50
159.980000	32.6	120.000	300.0	H	274.0	10.90	43.50
161.968500	38.6	120.000	300.0	V	237.0	4.90	43.50
175.985000	37.9	120.000	200.0	H	64.0	5.60	43.50
191.990000	40.6	120.000	100.0	H	121.0	2.90	43.50
279.435500	32.6	120.000	100.0	H	121.0	13.40	46.00
437.448500	21.4	120.000	100.0	V	218.0	24.60	46.00
586.440500	32.0	120.000	100.0	V	182.0	14.10	46.00
721.998000	18.8	120.000	100.0	V	47.0	27.20	46.00

5.7.5.4 Above 1 GHz

BDR(GFSK)- 2402 MHz(Low)

Frequency [MHz]	Reading [dB μV]	Polarization [*H/**V]	Ant. Factor [dB]	Cable Loss [dB]	AMP Gain [dB]	Limit [dB μV/m]	Emission Level [dB μV/m]	Detector
1325.60	47.14	H	25.50	3.35	40.40	74	35.60	Peak
1920.30	47.06	H	26.09	4.07	40.71	74	36.50	Peak
2645.20	49.32	V	27.09	4.65	41.17	74	39.90	Peak
3322.20	46.63	H	28.18	5.36	41.57	74	38.60	Peak
5124.70	42.98	V	31.07	6.57	41.02	74	39.60	Peak
6473.40	42.34	H	34.74	7.55	43.53	74	41.10	Peak

BDR(GFSK)- 2441 MHz(Middle)

Frequency [MHz]	Reading [dB μV]	Polarization [*H/**V]	Ant. Factor [dB]	Cable Loss [dB]	AMP Gain [dB]	Limit [dB μV/m]	Emission Level [dB μV/m]	Detector
1325.40	47.04	H	25.50	3.35	40.40	74	35.50	Peak
1920.30	46.86	H	26.09	4.07	40.71	74	36.30	Peak
2645.20	49.32	V	27.09	4.65	41.17	74	39.90	Peak
3322.10	46.53	H	28.18	5.36	41.57	74	38.50	Peak
5124.70	42.98	V	31.07	6.57	41.02	74	39.60	Peak
6473.40	39.11	H	34.74	7.55	40.30	74	41.10	Peak

BDR(GFSK)- 2480 MHz(Upper)

Frequency [MHz]	Reading [dB μV]	Polarization [*H/**V]	Ant. Factor [dB]	Cable Loss [dB]	AMP Gain [dB]	Limit [dB μV/m]	Emission Level [dB μV/m]	Detector
1325.70	47.04	H	25.50	3.35	40.40	74	35.50	Peak
1920.30	47.16	H	26.09	4.07	40.71	74	36.60	Peak
2645.20	49.32	V	27.09	4.65	41.17	74	39.90	Peak
3322.50	46.63	H	28.18	5.36	41.57	74	38.60	Peak
5125.20	43.08	V	31.07	6.57	41.02	74	39.70	Peak
6474.10	39.20	H	34.74	7.55	40.30	74	41.20	Peak

EDR(8DPSK)- 2402 MHz(Low)

Frequency [MHz]	Reading [dB μV]	Polarization [*H/**V]	Ant. Factor [dB]	Cable Loss [dB]	AMP Gain [dB]	Limit [dB μV/m]	Emission Level [dB μV/m]	Detector
1438.60	47.09	H	25.52	3.56	40.46	74	35.70	Peak
3317.10	45.55	H	28.36	5.35	41.57	74	37.70	Peak
4323.50	45.13	V	30.06	6.20	41.59	74	39.80	Peak
5604.30	40.61	H	31.82	6.79	40.62	74	38.60	Peak
7895.90	35.11	V	36.62	8.47	40.69	74	39.50	Peak
9012.40	35.30	H	36.75	9.52	40.36	74	41.20	Peak

EDR(8DPSK)- 2441 MHz(Middle)

Frequency [MHz]	Reading [dB μV]	Polarization [*H/**V]	Ant. Factor [dB]	Cable Loss [dB]	AMP Gain [dB]	Limit [dB μV/m]	Emission Level [dB μV/m]	Detector
1438.20	47.09	H	25.52	3.56	40.46	74	35.70	Peak
3315.80	45.66	H	28.36	5.35	41.57	74	37.80	Peak
4324.20	45.43	V	30.06	6.20	41.59	74	40.10	Peak
5603.20	40.81	H	31.82	6.79	40.62	74	38.80	Peak
7897.10	35.50	V	36.62	8.47	40.69	74	39.90	Peak
9012.90	35.30	H	36.75	9.52	40.36	74	41.20	Peak

EDR(8DPSK)- 2480 MHz(Upper)

Frequency [MHz]	Reading [dB μV]	Polarization [*H/**V]	Ant. Factor [dB]	Cable Loss [dB]	AMP Gain [dB]	Limit [dB μV/m]	Emission Level [dB μV/m]	Detector
1438.60	47.19	H	25.52	3.56	40.46	74	35.80	Peak
3317.80	45.45	H	28.36	5.36	41.57	74	37.60	Peak
4323.80	45.23	V	30.06	6.20	41.59	74	39.90	Peak
5605.90	40.80	H	31.82	6.79	40.62	74	38.80	Peak
7898.30	35.30	V	36.62	8.47	40.69	74	39.70	Peak
9012.80	35.40	H	36.75	9.52	40.36	74	41.30	Peak

5.8 Band Edges Measurement

5.8.1 Test Equipment

EQUIPMENT	MODEL	MANUFACTURE	SERIAL NUMBER	Calibration Due date (year/month/date)
Spectrum analyzer	N9020A	Agilent	US46220101	2016/09/14
Antenna Mast(2m)	AM-2.5	MATURO	AM2.5/226/17240915	N/A
Positioner Controller	CO2000	MATURO	NCU/459/17240915	N/A
RF Amplifier	PAM-118A	COM-POWER	551019	2016/07/20
RE_10 m CHAMBER #1	N/A	SY Corp.	N/A	N/A
DC Power Supply	UDP-6015R	Unicorn tech	131007	2016/09/10
Horn Antenna	AHA-118	COM-POWER CORP.	701064	2017/06/15
Horn Antenna	BBHA 9120 D	SCHWARZBECK	BBHA 9120 D 517	2016/10/16
EMI Test Receiver	ESR	ROHDE & SCHWARZ	103120	2017/03/25

5.8.2 Test Limit

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, 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 in15.209(a).

5.8.3 Test Procedure

The EUT is placed on a turntable with 0.8 meter for frequency below 1 GHz and 1.5 meter for frequency

above 1 GHz respectively above ground.

The turntable shall be rotated for 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.

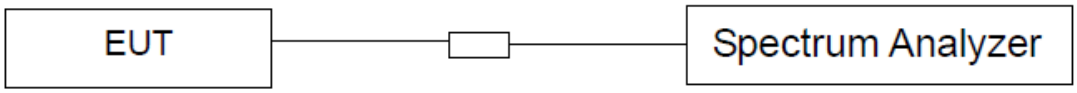
Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:

PEAK: RBW=VBW=1MHz / Sweep=AUTO
AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO

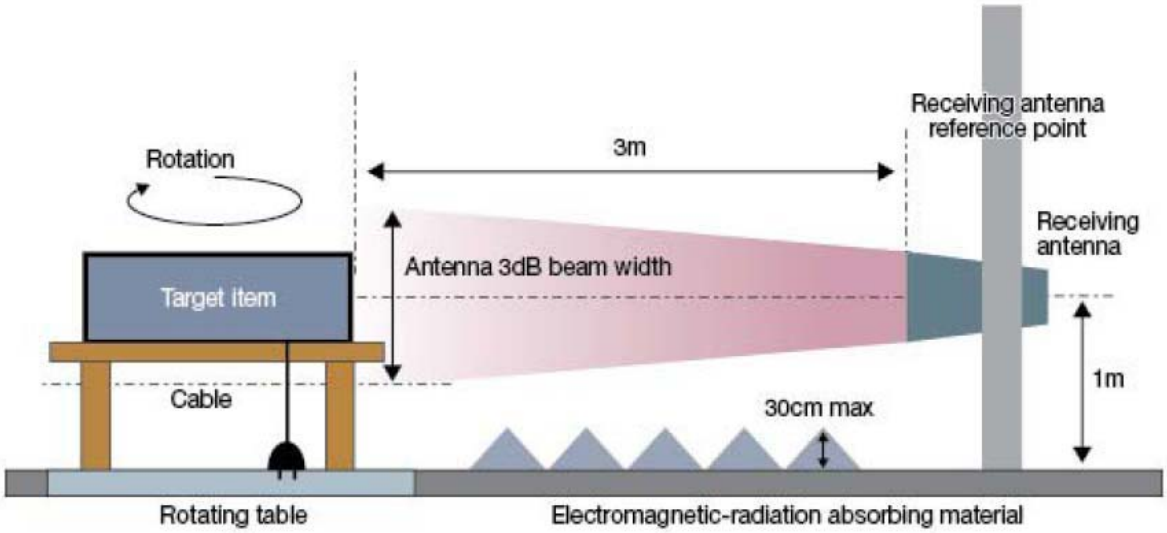
Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

5.8.4 Test SET-UP (Block Diagram of Configuration)

(a) Conducted Emission Test Set-Up, Frequency above 1000MHz



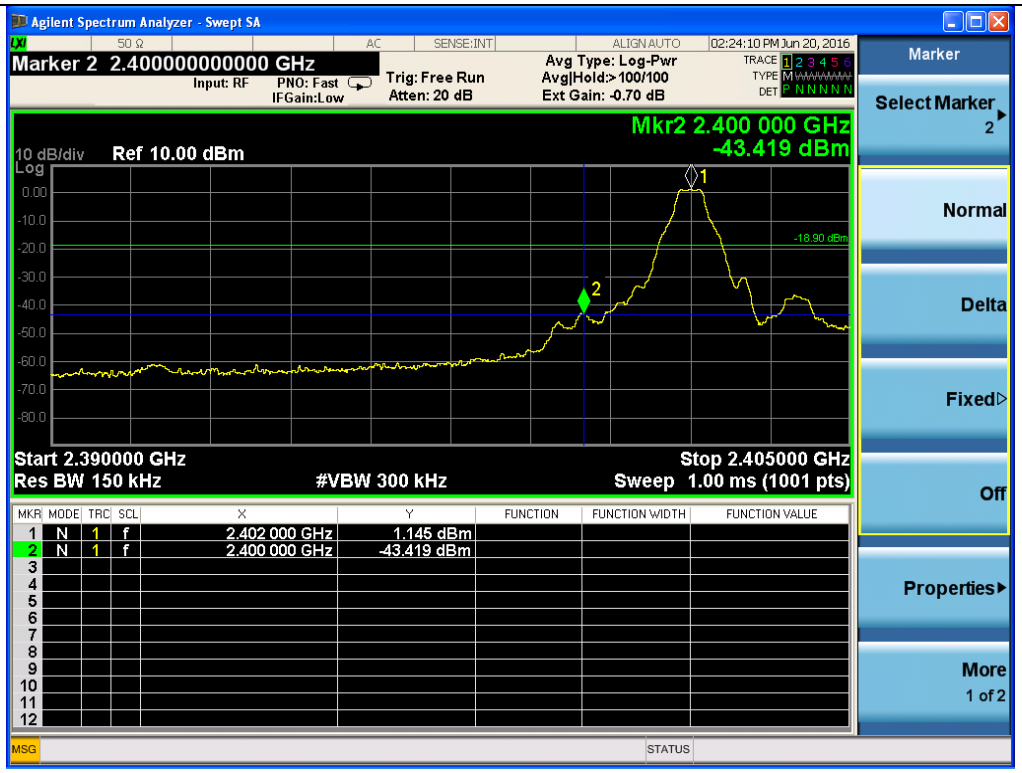
(b)Radiated Emission Test Set-Up, Frequency above 1000MHz



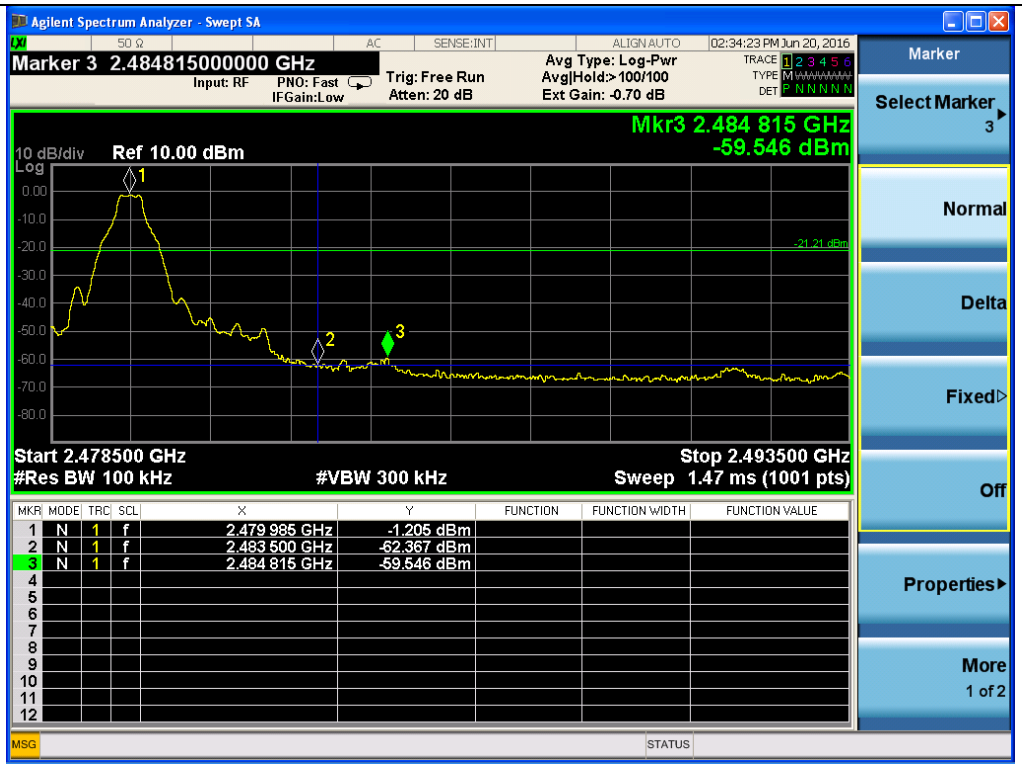
5.8.5 Test Result

5.8.5.1 Conducted Band Edges

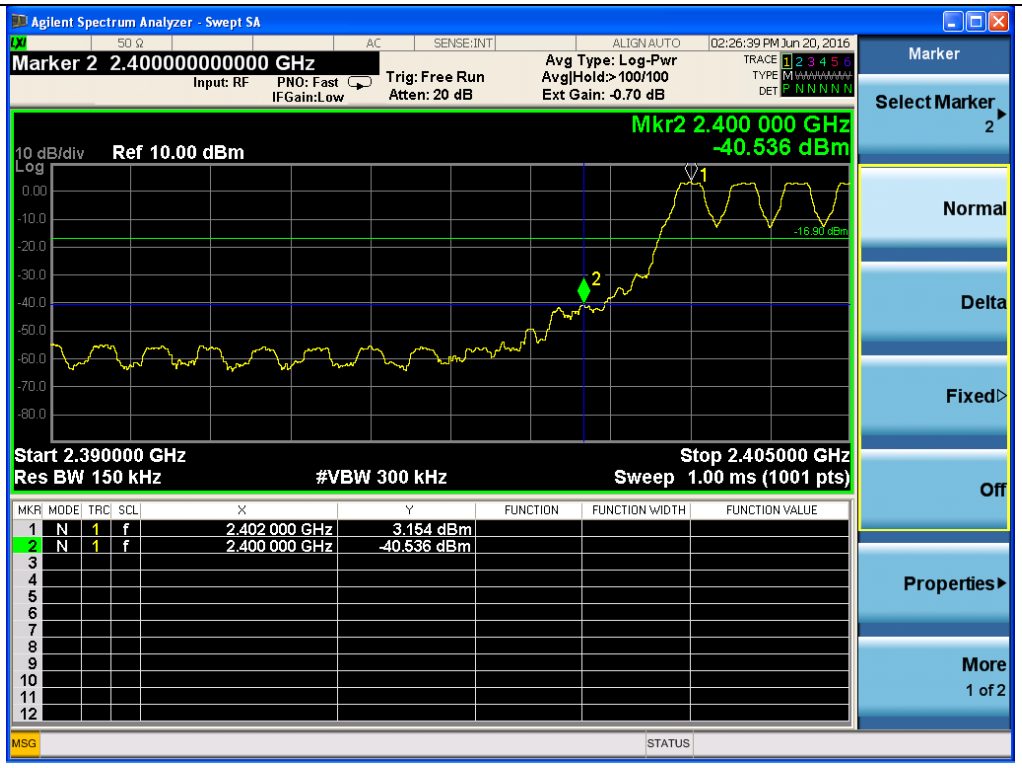
Low Band Edge – BDR(GFSK)



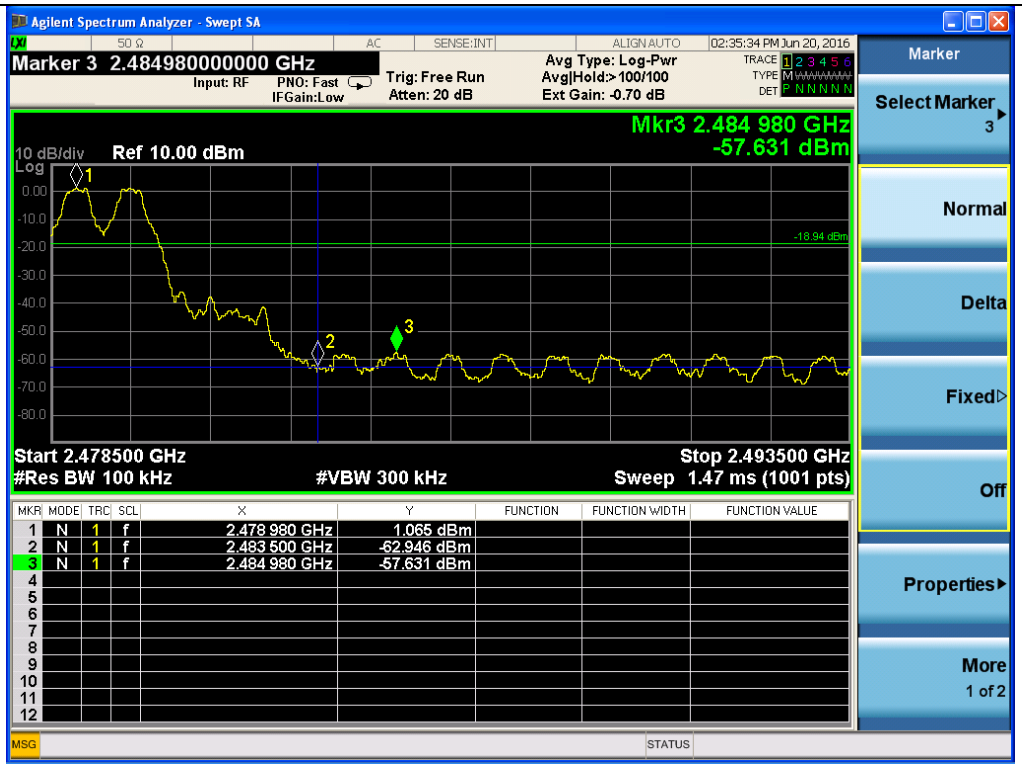
High Band Edge – BDR(GFSK)



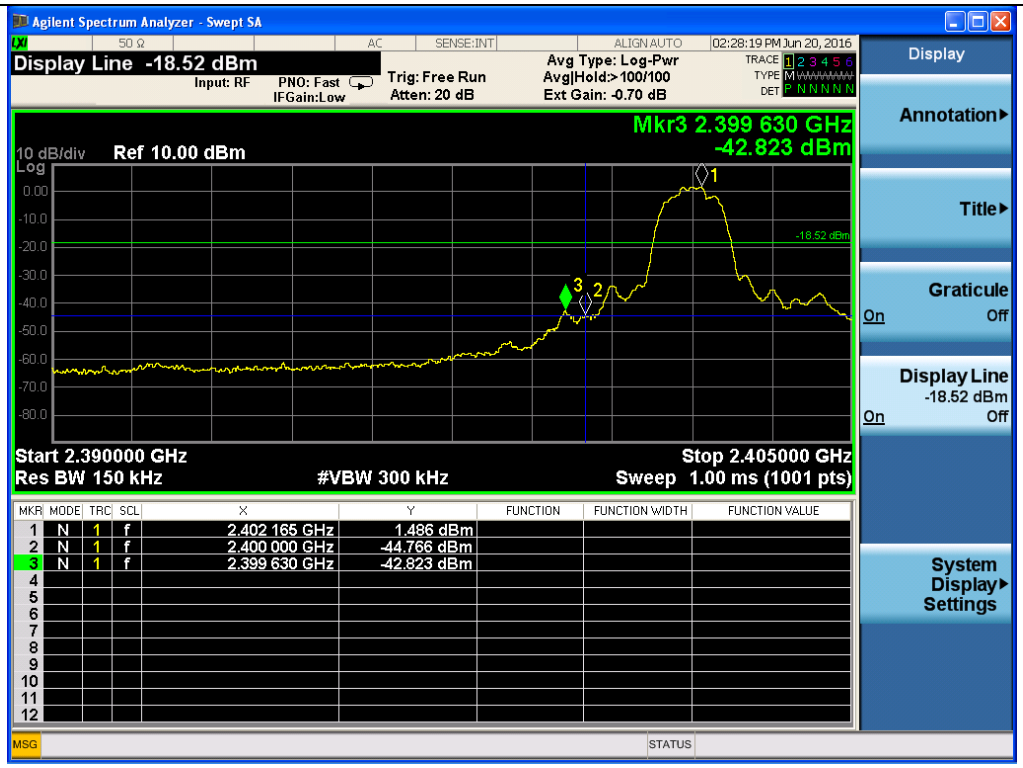
Hopping Mode - Low Band Edge – BDR(GFSK)



Hopping Mode - High Band Edge – BDR(GFSK)

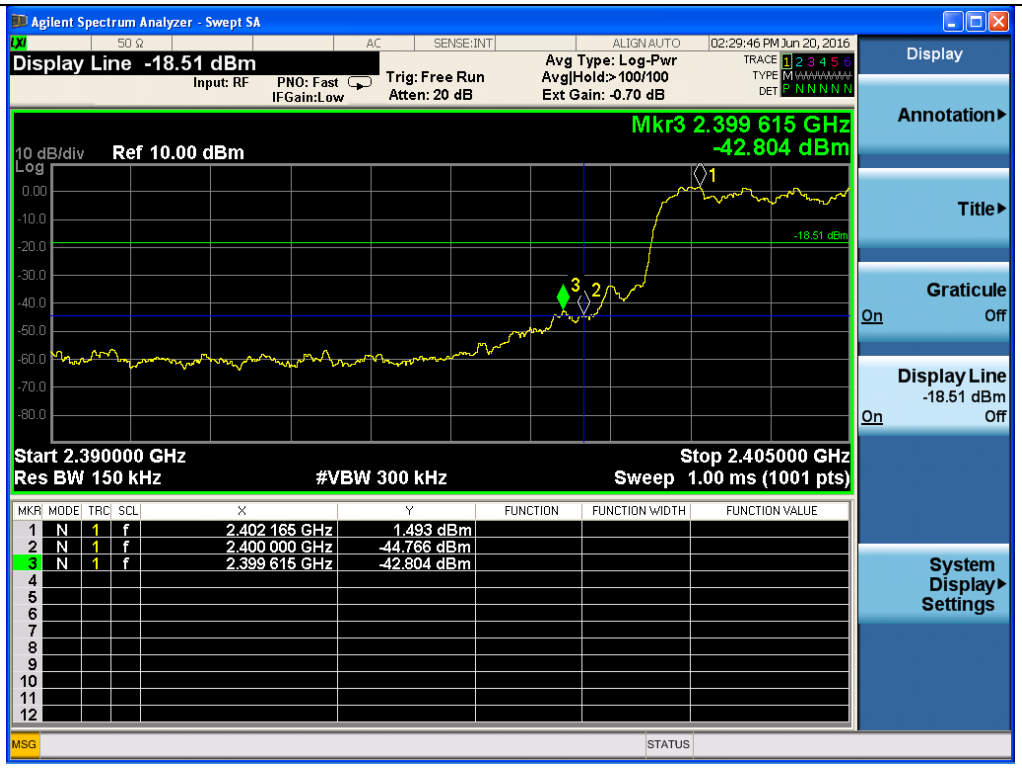


Low Band Edge – EDR(8DPSK)

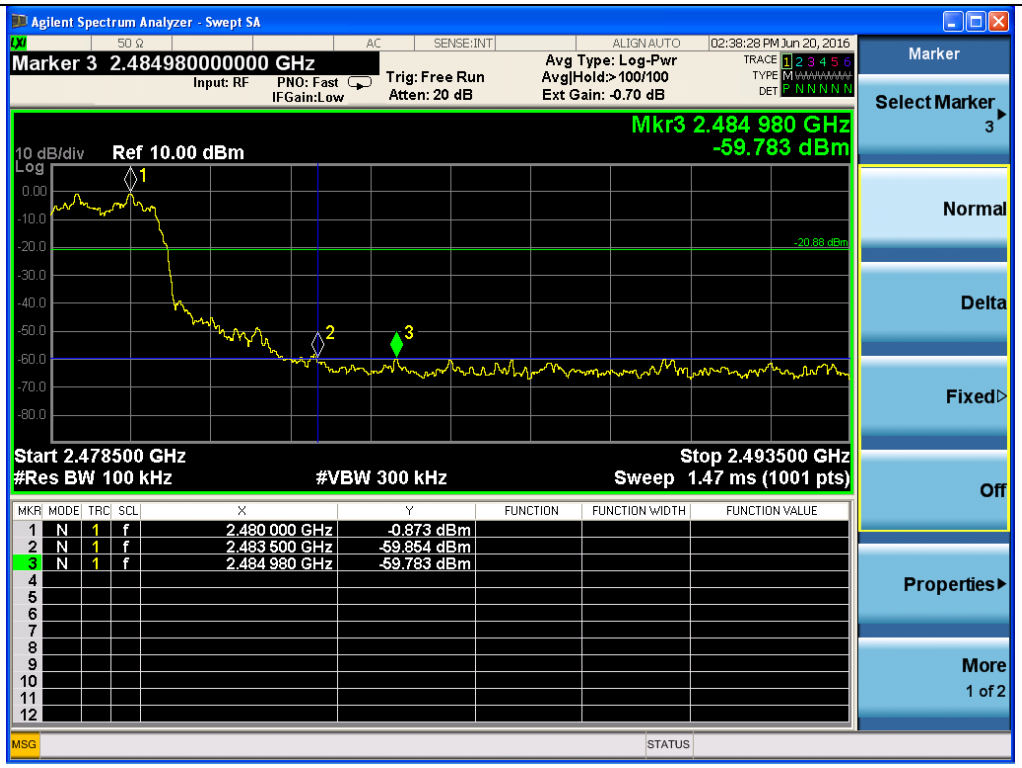


High Band Edge – EDR(8DPSK)

Hopping Mode - Low Band Edge – EDR(8DPSK)

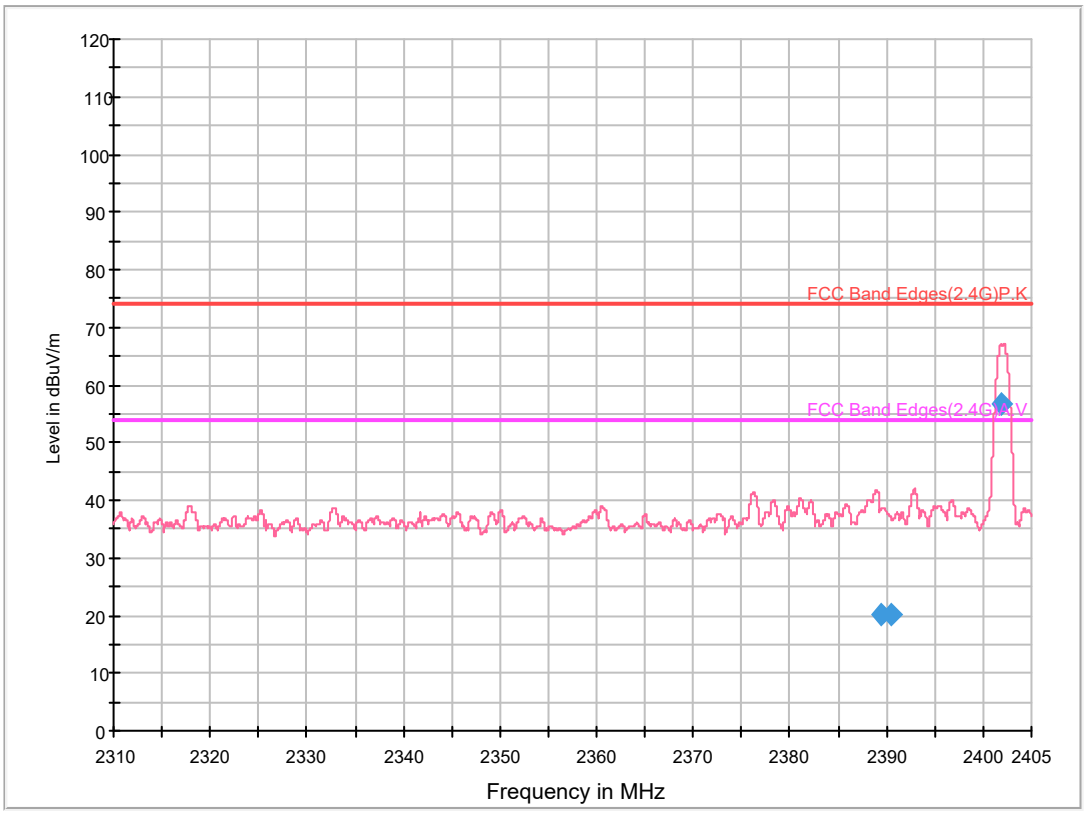


Hopping Mode - High Band Edge – EDR(8DPSK)



Radiated Band Edge (2402 MHz)_Vertical

EUT Name: In-Vehicle Infotainment System
Manufacturer: Glosys
Model Name: XSG3B
Test Mode: GFSK-2402(low)

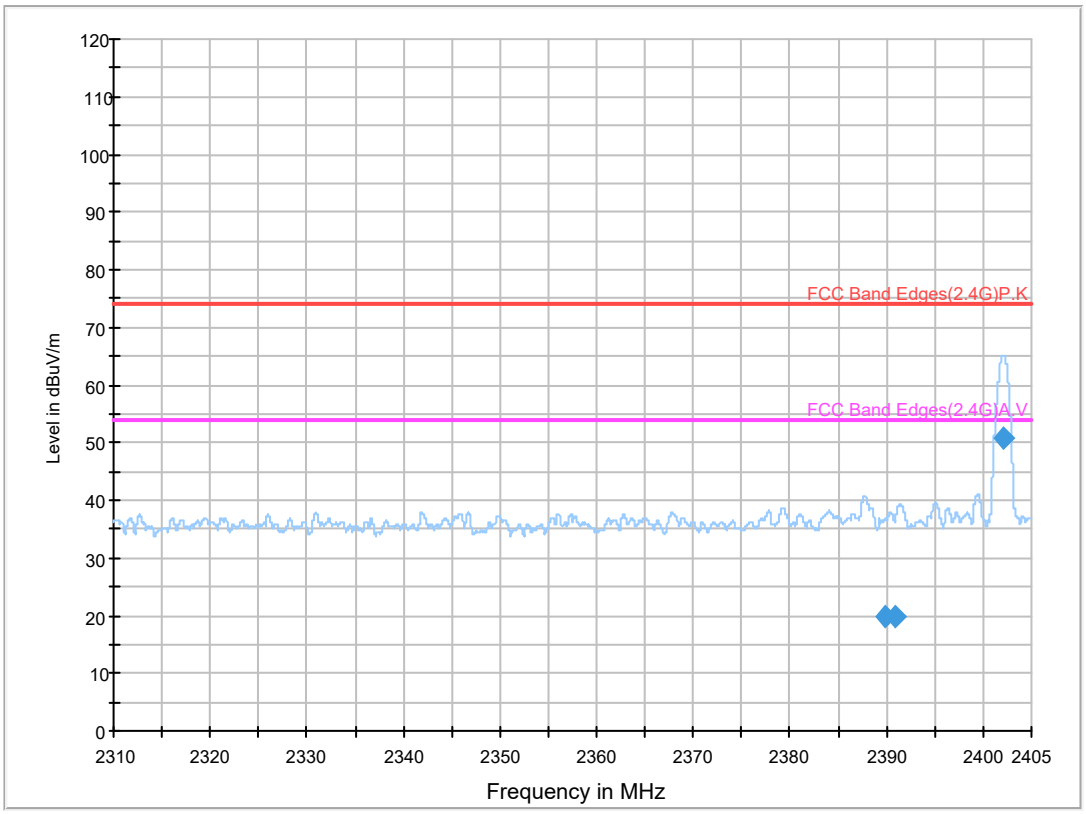


Frequency (MHz)	Result (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBuV/m)	
2389.638500	37.0	100.0	V	94.0	-5.0	37.0	74.0	PK
2389.288600	19.8	100.0	V	94.0	-5.0	34.2	54.0	AV
2390.940000	41.1	100.0	V	254.0	-5.0	32.9	74.0	PK
2391.041600	21.8	100.0	V	254.0	-5.0	32.2	54.0	AV
*2401.827000	68.0	100.0	V	35.0	-5.0	-	-	PK
*2402.173000	64.6	100.0	V	35.0	-5.0	-	-	AV

Remark: Correction Factor[dB] = Antenna Factor[dB] + Cable Factor[dB] – Pre-amplifier Factor[dB],
Result [dB μV/m] = Reading [dB μV] + Correction Factor [dB],
Margin[dB] = Limit [dB μV/m] - Result [dB μV/m]

Radiated Band Edge (2402 MHz)_Horizontal

EUT Name: In-Vehicle Infotainment System
Manufacturer: Glosys
Model Name: XSG3B
Test Mode: GFSK-2402(low)

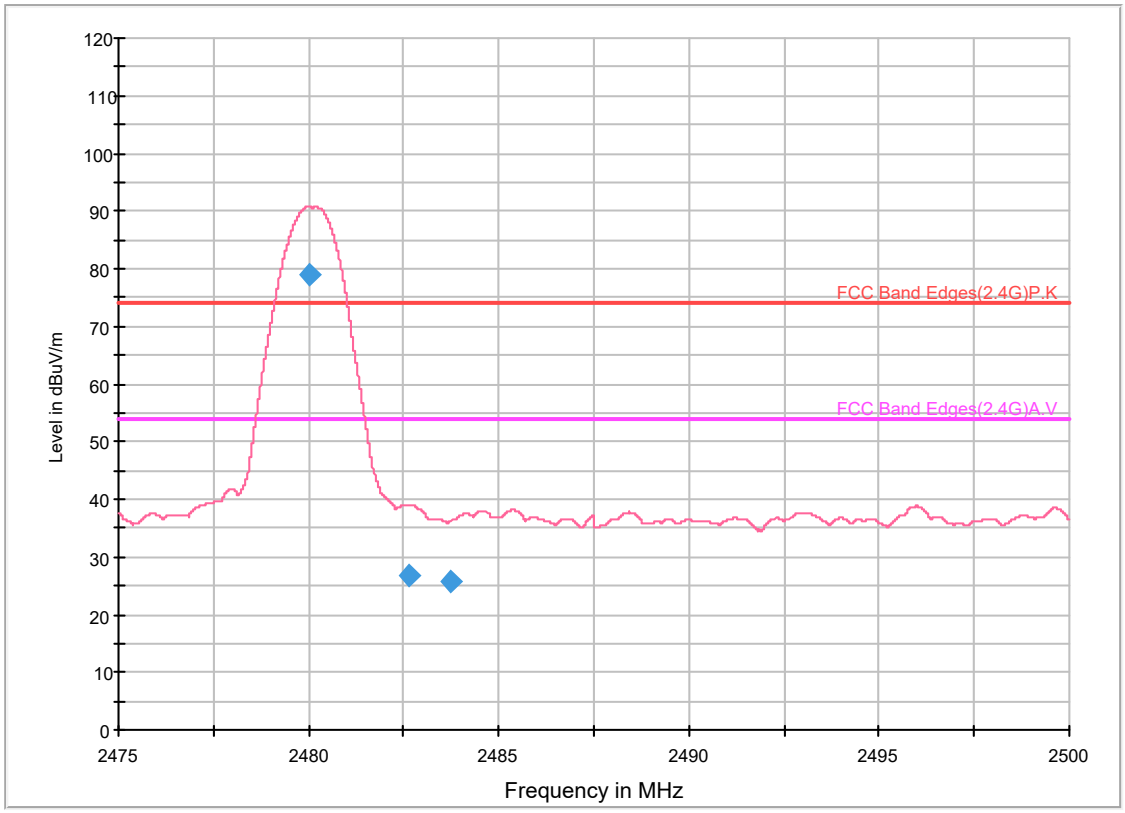


Frequency (MHz)	Result (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBuV/m)	
2370.201500	35.9	100.0	H	14.0	-5.1	38.1	74.0	PK
2369.907100	19.7	100.0	H	14.0	-5.1	34.3	54.0	AV
2389.999500	37.2	100.0	H	204.0	-5.0	54.4	74.0	PK
2390.118300	19.6	100.0	H	204.0	-5.0	34.4	54.0	AV
2390.607500	35.9	100.0	H	351.0	-5.0	14.6	74.0	PK
2390.596300	22.0	100.0	H	351.0	-5.0	32.0	54.0	AV
*2401.846000	66.7	100.0	H	234.0	-5.0	-	-	PK
*2402.146400	59.4	100.0	H	234.0	-5.0	-	-	AV

Remark: Correction Factor[dB] = Antenna Factor[dB] + Cable Factor[dB] – Pre-amplifier Factor[dB],
Result [dB μV/m] = Reading [dB μV] + Correction Factor [dB],
Margin[dB] = Limit [dB μV/m] - Result [dB μV/m]

Radiated Band Edges (2480 MHz)_Vertical

EUT Name: In-Vehicle Infotainment System
Manufacturer: Glosys
Model Name: XSG3B
Test Mode: GFSK-2480(High)

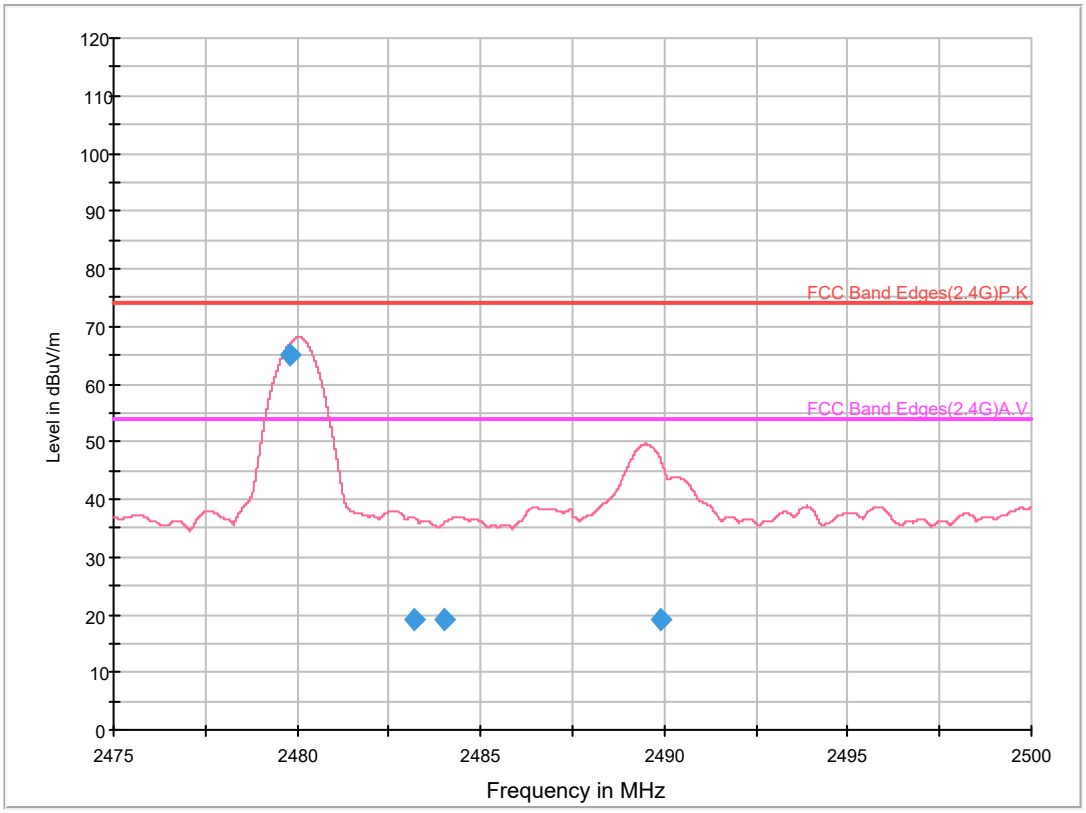


Frequency (MHz)	Result (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBuV/m)	
*2479.867500	67.9	100.0	H	198.0	-4.7	-	-	PK
*2480.125100	61.4	100.0	H	198.0	-4.7	-	-	AV
2483.297500	37.3	100.0	H	281.0	-4.7	36.7	74.0	PK
2482.816800	19.2	100.0	H	281.0	-4.7	34.8	54.0	AV
2483.520000	37.3	100.0	H	281.0	-4.7	36.7	74.0	PK
2483.807600	19.1	100.0	H	281.0	-4.7	34.9	54.0	AV

Remark: Correction Factor[dB] = Antenna Factor[dB] + Cable Factor[dB] – Pre-amplifier Factor[dB],
Result [dB μV/m] = Reading [dB μV] + Correction Factor [dB],
Margin[dB] = Limit [dB μV/m] - Result [dB μV/m]

Radiated Band Edge (2480 MHz)_Horizontal

EUT Name: In-Vehicle Infotainment System
Manufacturer: Glosys
Model Name: XSG3B
Test Mode: GFSK-2480(High)



Frequency (MHz)	Result (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBuV/m)	
*2480.042500	68.1	100.0	V	34.0	-4.7	-	-	PK
*2479.816100	65.2	100.0	V	34.0	-4.7	-	-	AV
2483.490000	36.3	100.0	V	124.0	-4.7	37.7	74.0	PK
2483.170900	19.2	100.0	V	124.0	-4.7	34.8	54.0	AV
2483.680000	35.8	100.0	V	124.0	-4.7	38.2	74.0	PK
2483.995700	19.1	100.0	V	124.0	-4.7	34.9	54.0	AV

Remark: Correction Factor[dB] = Antenna Factor[dB] + Cable Factor[dB] – Pre-amplifier Factor[dB],
Result [dB μV/m] = Reading [dB μV] + Correction Factor [dB],
Margin[dB] = Limit [dB μV/m] - Result [dB μV/m]

5.9 AC Power Conducted Emission

5.9.1 Test Equipment

EQUIPMENT	MODEL	MANUFACTURE	SERIAL NUMBER	Calibration Due date (year/month/date)
Impuls-Begrenzer Pulse Limiter	ESH3-Z2	ROHDE & SCHWARZ	100092	2017/01/06
LISN	LN2-20-25	EMCIS	LN14004	2017/05/21
EMI Test Receiver	ESPI	ROHDE & SCHWARZ	100063	2017/01/08
CE CHAMBER	N/A	SY Corp.	N/A	N/A
DC Power Supply	UDP-6015R	Unicorn tech	131007	2016/09/10

5.9.2 Test Limit

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

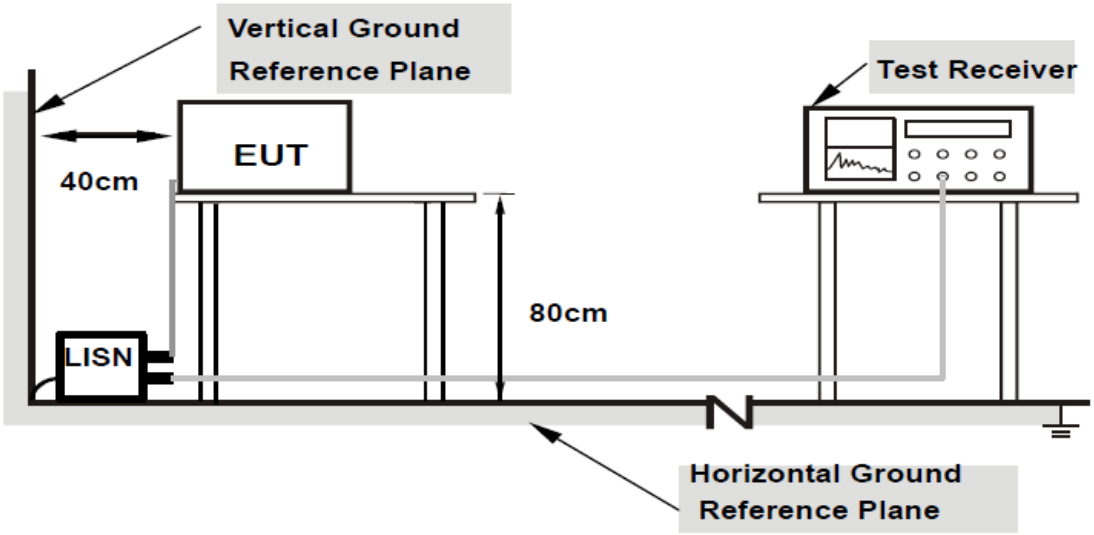
Frequency of emission(MHz)	Conducted limit(dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

5.9.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network(LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

5.9.4 Block Diagram of Test Setup



5.9.5 Test Result

Direct Current +

Conducted Test Report BWS TECH EMC Team

BWS TECH INC.

EMI Measurement Test Report

Device Under Test	XSG3B
Operating Conditions	+
Operator Name	
Test Specification	FCC SUBPART15 CLASS B
Comment	

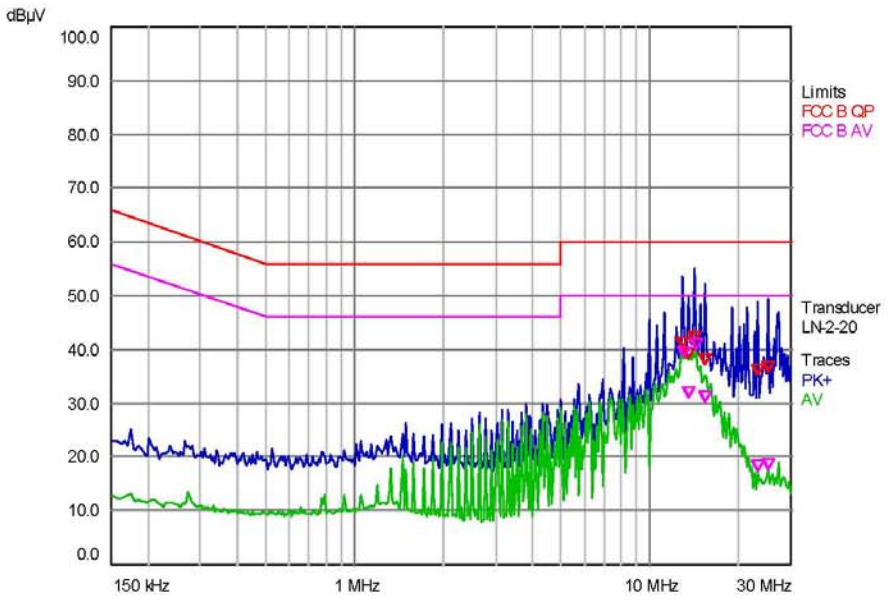
Scan Settings (3 Ranges)

Frequencies			Receiver Settings			
Start	**Stop**	**Step**	**Res BW**	**M-Time**	**Atten**	**Preamp**
150 kHz	500 kHz	4 kHz	9 kHz (6dB)	50 ms	20 dB	On
500 kHz	5 MHz	4 kHz	9 kHz (6dB)	20 ms	20 dB	On
5 MHz	30 MHz	4 kHz	9 kHz (6dB)	10 ms	20 dB	On

Final Measurement

Detectors:	QP, CA	Meas Time:	2 s
Peaks:	6	Acc. Margin:	6 dB

Pre-measurement Graph



1 of 2

Conducted Test Report BWS TECH EMC Team

Final Measurement Results

Trace	Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Delta Limit (dB)	Delta Ref (dB)	Comment
1 QP	12.972	40.23	60.00	-19.77		
2 CA	13.072	38.56	50.00	-11.44		
2 CA	13.532	31.05	50.00	-18.95		
1 QP	13.576	38.31	60.00	-21.69		
1 QP	14.18	41.37	60.00	-18.63		
2 CA	14.26	40.03	50.00	-9.97		
1 QP	15.384	37.10	60.00	-22.90		
2 CA	15.384	30.18	50.00	-19.82		
1 QP	23.252	35.19	60.00	-24.81		
2 CA	23.252	17.23	50.00	-32.77		
1 QP	25.048	35.76	60.00	-24.24		
2 CA	25.048	17.68	50.00	-32.32		

* = limit exceeded

2 of 2

Direct Current -

Conducted Test Report BWS TECH EMC Team

BWS TECH INC.

EMI Measurement Test Report

Device Under Test XSG3B
Operating Conditions -
Operator Name
Test Specification FCC SUBPART15 CLASS B
Comment

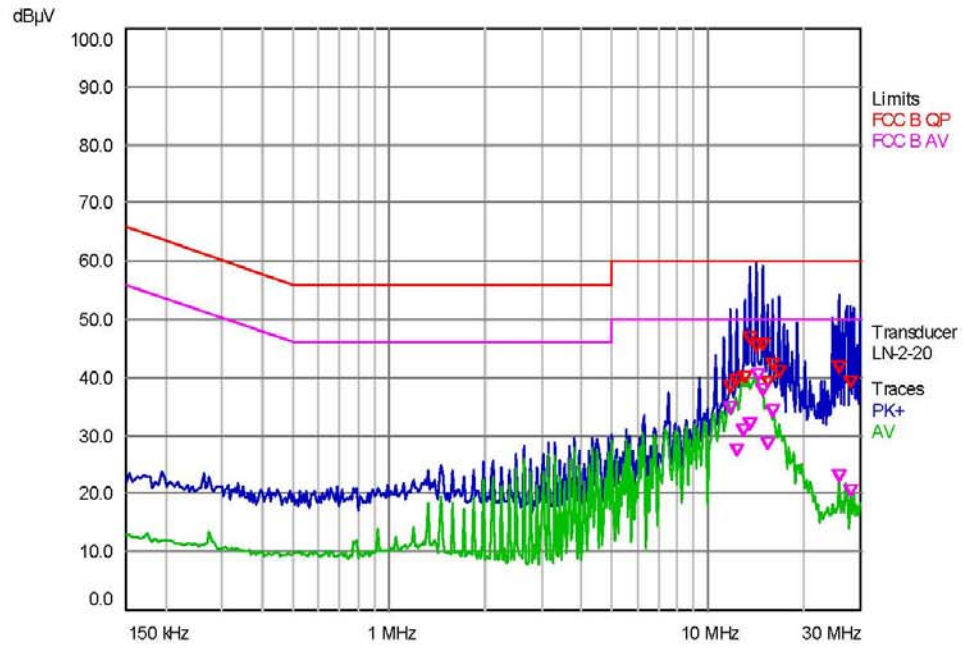
Scan Settings (3 Ranges)

Frequencies			Receiver Settings			
Start	Stop	Step	Res BW	M-Time	Atten	Preamp
150 kHz	500 kHz	4 kHz	9 kHz (6dB)	50 ms	20 dB	On
500 kHz	5 MHz	4 kHz	9 kHz (6dB)	20 ms	20 dB	On
5 MHz	30 MHz	4 kHz	9 kHz (6dB)	10 ms	20 dB	On

Final Measurement

Detectors: QP, CA
Peaks: 6
Meas Time: 2 s
Acc. Margin: 6 dB

Pre-measurement Graph



1 of 2

Conducted Test Report BWS TECH EMC Team

Final Measurement Results

Trace	Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Delta Limit (dB)	Delta Ref (dB)	Comment
2 CA	11.752	33.89	50.00	-16.11		
1 QP	11.776	37.47	60.00	-22.53		
1 QP	12.38	38.55	60.00	-21.45		
2 CA	12.38	26.60	50.00	-23.40		
2 CA	12.944	29.92	50.00	-20.08		
1 QP	12.984	39.19	60.00	-20.81		
2 CA	13.532	30.95	50.00	-19.05		
1 QP	13.584	45.87	60.00	-14.13		
1 QP	14.188	44.32	60.00	-15.68		
2 CA	14.26	39.49	50.00	-10.51		
1 QP	14.788	44.68	60.00	-15.32		
2 CA	14.788	36.90	50.00	-13.10		
2 CA	15.384	27.74	50.00	-22.26		
1 QP	15.392	38.17	60.00	-21.83		
2 CA	15.976	33.19	50.00	-16.81		
1 QP	15.996	41.32	60.00	-18.68		
1 QP	16.6	40.01	60.00	-19.99		
1 QP	25.664	40.82	60.00	-19.18		
2 CA	25.664	21.97	50.00	-28.03		
1 QP	28.072	38.26	60.00	-21.74		
2 CA	28.072	19.65	50.00	-30.35		

* = limit exceeded

2 of 2

5.10 Antenna Application

5.10.1 Antenna Requirement

Standard	Requirement
FCC CRF 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. 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

For intentional device, according to FCC 47 CFR Section 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. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Antenna Type	Frequency	Antenna Gain	Limit
Chip Antenna	2.4 GHz	-4.54 dBi	≤6 dBi

5.10.2 Result

PASS