TEST REPORT

DT&C Co., Ltd. 42, Yurim-ro, 154Beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea Tel : 031-321-2664, Fax : 031-321-1664	Report No : DRTFCC1604-0057 Pages:(1) / (80) page	Dt&C

1. Customer

   • Name : GT Telecom Co., Ltd.

   • Address : 848-16 Gupyeong-Dong, Gyeongbuk Gumi-City South Korea

2. Use of Report : FCC Original Grant

3. Product Name (FCCID) : Bluetooth Stereo Earset (UZCGBH-S880)

4. Date of Test : 2016-04-01 ~ 2016-04-05

5. Test Method Used: FCC Part 15 Subpart C.247

6. Testing Environment : See appended test report

7. Test Result : ☒ Pass ☐ Fail

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This Test Report cannot be reproduced, except in full.

Affirmation	Tested by Name : Donghyun Kang (Signature)	Technical Manager Name : WonJung Lee (Signature)

2016 . 04 . 25 .

DT&C Co., Ltd.

* If this test report is required to confirmation of authenticity, please contact to report@dtnc.net

Test Report Version

Test Report No.	Date	Description
DRTFCC1604-0057	Apr. 25, 2016	Initial issue

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1. General Information

1.1 Testing Laboratory

DT&C Co., Ltd.			
Standard		**Site number**	**Address**
FCC	☒	**165783**	42, Yurim-ro 154 beon-gil, Cheoin -gu, Yongin-si, Gyeonggi -do, South Korea 449-935
	☐	**804488**	42, Yurim-ro 154 beon-gil, Cheoin -gu, Yongin-si, Gyeonggi -do, South Korea 449-935
	☐	**596748**	42, Yurim-ro 154 beon-gil, Cheoin -gu, Yongin-si, Gyeonggi -do, South Korea 449-935
	☐	**678747**	683-3, Yubang-dong, Cheoin-gu, Yongin-si, Kyeonggi-do, Korea, 449-080
IC	☐	**5740A-3**	42, Yurim-ro 154 beon-gil, Cheoin -gu, Yongin-si, Gyeonggi -do, South Korea 449-935
	☐	**5740A-2**	683-3, Yubang-dong, Cheoin-gu, Yongin-si, Kyeonggi-do, Korea, 449-080
www.dtnc.net			
Telephone	:	+ 82-31-321-2664	
FAX	:	+ 82-31-321-1664	

1.2 Details of Applicant

Applicant : GT Telecom Co., Ltd.
Address : 848-16 Gupyeong-Dong, Gyeongbuk Gumi-City South Korea
Contact person : Hodong Ryu

1.3 Description of EUT

EUT	Bluetooth Stereo Earset
Model Name	GBH-S880
Add Model Name	GBH-S870, GBH-S850, GBH-S840, GBH-S860, GBH-S851
Serial Number	Identical prototype
Power Supply	DC 3.7V
Frequency Range	2402 MHz ~ 2480 MHz
Modulation Technique	GFSK, π/4-DQPSK, 8DPSK
Number of Channels	79
Antenna Type	Internal Antenna
Antenna Gain	PK : 3.29 dBi

Note: All models have been evaluated and worst case of GBH-S880 was set for final test.

1.4 Declaration by the applicant / manufacturer

- NA

1.5 Information about the FHSS characteristics

- This Bluetooth module has been tested by a Bluetooth Qualification Lab, and we confirm the following :

  A) The hopping sequence is pseudorandom

  B) All channels are used equally on average

  C) The receiver input bandwidth equals the transmit bandwidth

  D) The receiver hops in sequence with the transmit signal

- 15.247(g) : In accordance with the Bluetooth Industry Standard, the system is designed to comply with all of the regulations in Section 15.247 when the transmitter is presented with a continuous data (or information) system.
- 15.247(h) : In accordance with the Bluetooth Industry Standard, the system does not coordinate its channels selection / hopping sequence with other frequency hopping systems for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters.
- 15.247(h) : The EUT employs Adaptive Frequency Hopping (AFH) which identifies sources of interference namely devices operating in 802.11 WLAN and excludes them from the list of available channels. The process of re-mapping reduces the number of test channels from 79 channels to a minimum number of 20 channels.

1.6 Test conditions

Ambient Condition	
▪ Temperature	+21 ℃ ~ +25 ℃
▪ Relative Humidity	40 % ~ 45 %

1.7 Test Equipment List

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Signal Analyzer	Agilent Technologies	N9020A	16/01/06	17/01/06	MY46471096
Signal Analyzer	Agilent Technologies	N9020A	15/09/09	16/09/09	MY50410163
Signal Generator	Rohde Schwarz	SMF100A	15/06/29	16/06/29	102341
Dynamic Measurement DC Source	Agilent Technologies	66332A	16/01/27	17/01/27	US37473833
Power Meter & Wide Bandwidth Sensor	Anritsu	ML2495A	15/10/20	16/10/20	1338003
		MA2490A			1249304
Multimeter	HP	34401A	16/02/25	17/02/25	3146A13475
3dB Attenuator	SMAJK	SMAJK-2-3	15/10/12	16/10/12	1
Thermohygrometer	BODYCOM	BJ5478	15/05/08	16/05/08	120612-1
Loop Antenna	Schwarzbeck	FMZB1513	14/04/29	16/04/29	1513-128
TRILOG Broadband Test-Antenna	Schwarzbeck	VULB9160	14/07/31	16/07/31	9160-3363
Horn Antenna	ETS-LINDGREN	3115	15/02/09	17/02/09	9202-3820
Horn Antenna	A.H.Systems Inc.	SAS-574	15/04/30	17/04/30	154
Highpass Filter	Wainwright Instruments	WHKX12-2580-3000-18000-80SS	15/09/23	16/09/23	3
Highpass Filter	Wainwright Instruments	WHNX6-6320-8000-26500-40CC	15/09/23	16/09/23	1
PreAmplifier	TSJ	MLA-010K01-B01-27	16/03/10	17/03/10	1844539
PreAmplifier	Agilent	8449B	16/02/24	17/02/24	3008A00370
EMI Test Receiver	Rohde Schwarz	ESR7	15/10/19	16/10/19	101109

1.8 Summary of Test Results

FCC Part RSS Std.	Parameter	Limit (Using in 2400~ 2483.5 MHz)	Test Condition	Status Note 1
15.247(a) RSS-247(5.1)	Carrier Frequency Separation	>= 20 dB BW or >= Two thirds of the 20 dB BW, whichever is greater.	Conducted	C
	Number of Hopping Frequencies	>= 15 hops		C
	20 dB Bandwidth	N/A		C
	Dwell Time	=< 0.4 seconds		C
15.247(b) RSS-247(5.4)	Transmitter Output Power	**For FCC** =< 1 Watt , if CHs >= 75 Others =< 0.125 W **For IC** if CHs >= 75 =< 1 Watt For Conducted Power =< 4 Watt For e.i.r.p, Others =< 0.125 W For Conducted Power. =< 0.5 Watt For e.i.r.p		C
15.247(d) RSS-247(5.5)	Conducted Spurious Emissions	The radiated emission to any 100 kHz of out-band shall be at least 20 dB below the highest in-band spectral density.		C
RSS Gen(6.6)	Occupied Bandwidth (99 %)	N/A		NA
15.205 & 209 RSS-247(5.5) RSS-Gen (8.9 & 8.10)	Radiated Spurious Emissions	FCC 15.209 Limits RSS-Gen 8.9	Radiated	C Note2
15.207 RSS-Gen(8.8)	AC Conducted Emissions	FCC 15.207 Limits	AC Line Conducted	NA Note 3
15.203 RSS-Gen(8.3)	Antenna Requirements	FCC 15.203	-	C

Note 1 : **C** = Comply **NC** = Not Comply **NT** = Not Tested **NA** = Not Applicable

Note 2 : This test item was performed in each axis and the worst case data was reported.

Note 3: The power of this device is only DC(Internal Battery) and Bluetooth function is disabled in charging status.

Note 4 : The sample was tested according to the following specifications :

- ANSI C63.10-2013

1.9 Conclusion of worst-case and operation mode

The EUT has three type of modulation (GFSK, π/4DQPSK and 8DPSK).

Therefore all applicable requirements were tested with all the modulations.

The field strength of spurious emission was measured in three orthogonal EUT positions (X-axis, Y-axis and Z-axis).

Tested frequency information,

- Hopping Function : Enable

	TX Frequency (MHz)	RX Frequency (MHz)
Hopping Band	2402 ~ 2480	2402 ~ 2480

- Hopping Function : Disable

	TX Frequency (MHz)	RX Frequency (MHz)
Lowest Channel	2402	2402
Middle Channel	2441	2441
Highest Channel	2480	2480

2. Maximum Peak Output Power Measurement

2.1 Test Setup

Refer to the APPENDIX I.

2.2 Limit

▣ FCC Requirements

The maximum peak output power of the intentional radiator shall not exceed the following :

1. §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.
2. §15.247(b)(1), For frequency hopping systems operating in the 2400 – 2483.5 MHz employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725 – 5805 MHz band : 1 Watt.

▣ IC Requirements

1. RSS-247(5.4), For FHSs operating in the band 2400 - 2483.5 MHz, the maximum peak conducted output power shall not exceed 1.0 W and the e.i.r.p. shall not exceed 4 W if the hopset uses 75 or more hopping channels the maximum peak conducted output power shall not exceed 0.125 W and the e.i.r.p. shall not exceed 0.5 W if the hopset uses less than 75 hopping channels

2.3 Test Procedure

1. The RF output power was measured with a spectrum analyzer connected to the RF Antenna connector (conducted measurement) while EUT was operating in transmit mode at the appropriate center frequency, A spectrum analyzer was used to record the shape of the transmit signal.
2. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using ;
   Span = approximately 5 times of the 20 dB bandwidth, centered on a hopping channel
   RBW ≥ 20 dB BW
   VBW ≥ RBW
   Sweep = auto
   Detector function = peak
   Trace = max hold

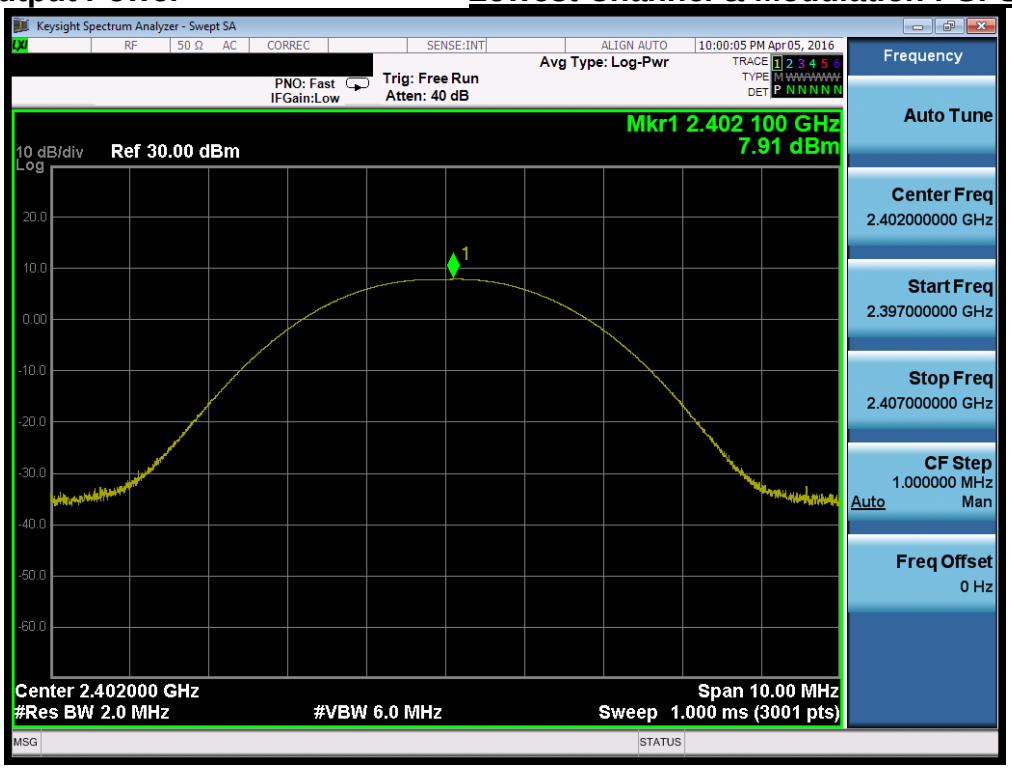
2.4 Test Results

Modulation	Tested Channel	Frame Average Output Power		Peak Output Power	
		dBm	mW	dBm	mW
GFSK	**Lowest**	5.88	3.873	7.91	6.180
	Middle	5.86	3.855	7.78	5.998
	Highest	**6.04**	**4.018**	**7.94**	**6.223**
π/4DQPSK	**Lowest**	2.95	1.972	7.12	5.152
	Middle	3.92	2.466	7.22	5.272
	Highest	**4.08**	**2.559**	**7.50**	**5.623**
8DPSK	**Lowest**	2.99	1.991	7.37	5.458
	Middle	3.98	2.500	7.38	5.470
	Highest	**4.12**	**2.582**	**7.58**	**5.728**

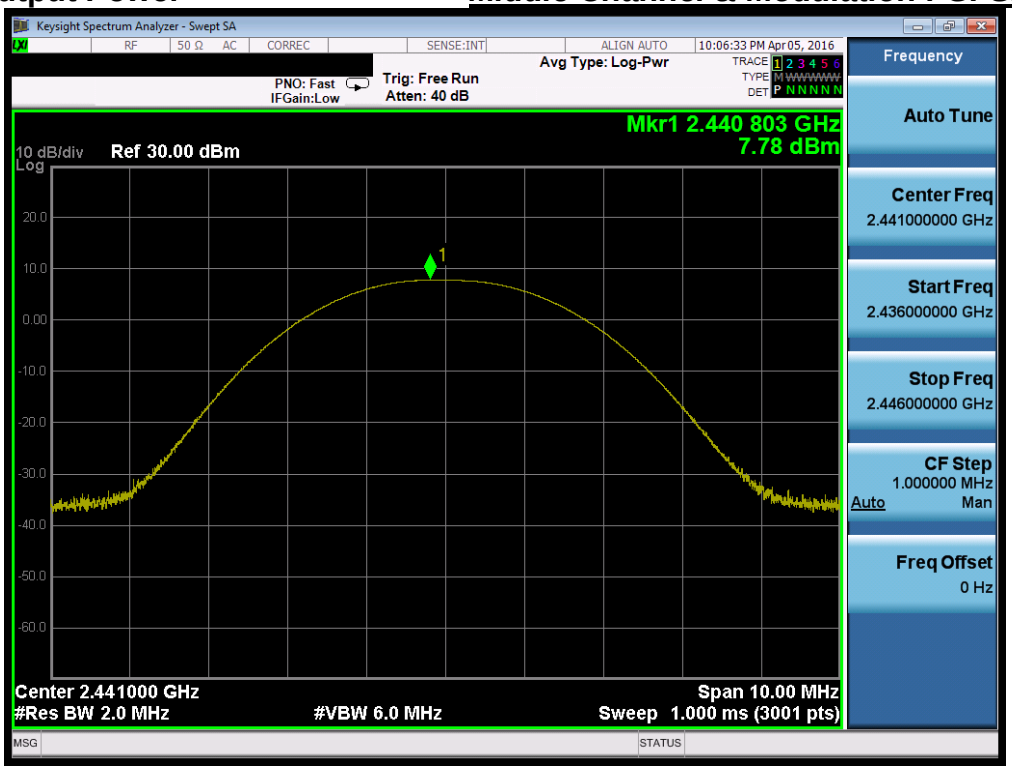
Note 1 : Average output power was using the average power meter for reference only.

Note 2 : See next pages for actual measured spectrum plots.

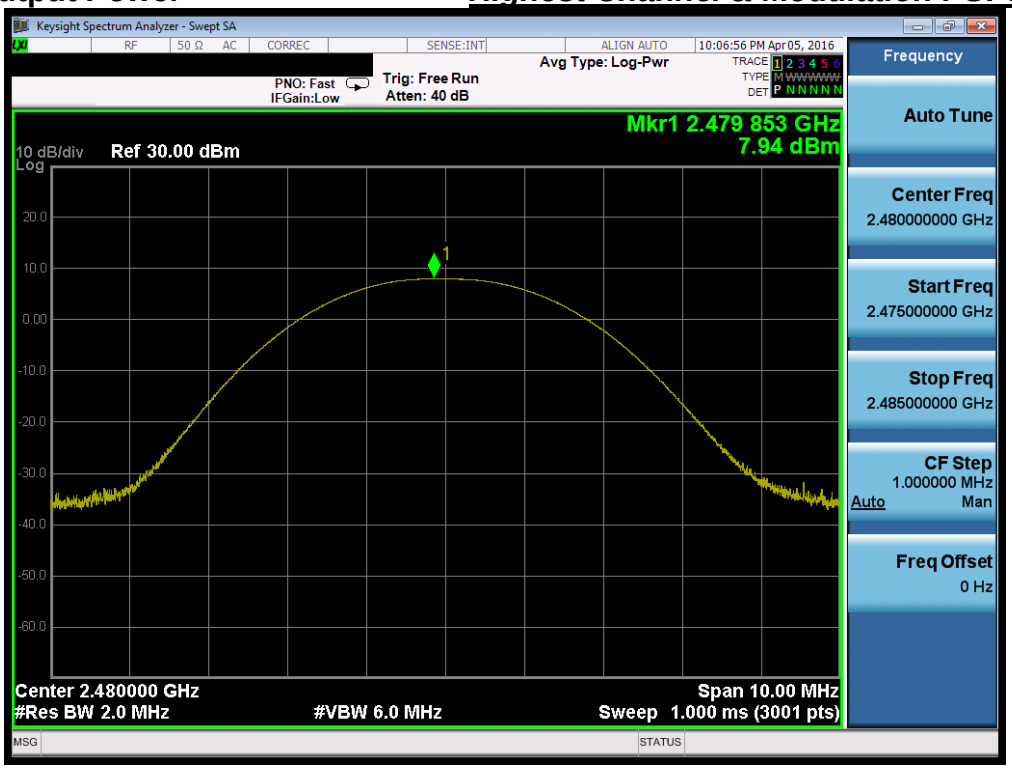
Peak Output Power ***Lowest Channel & Modulation : GFSK***



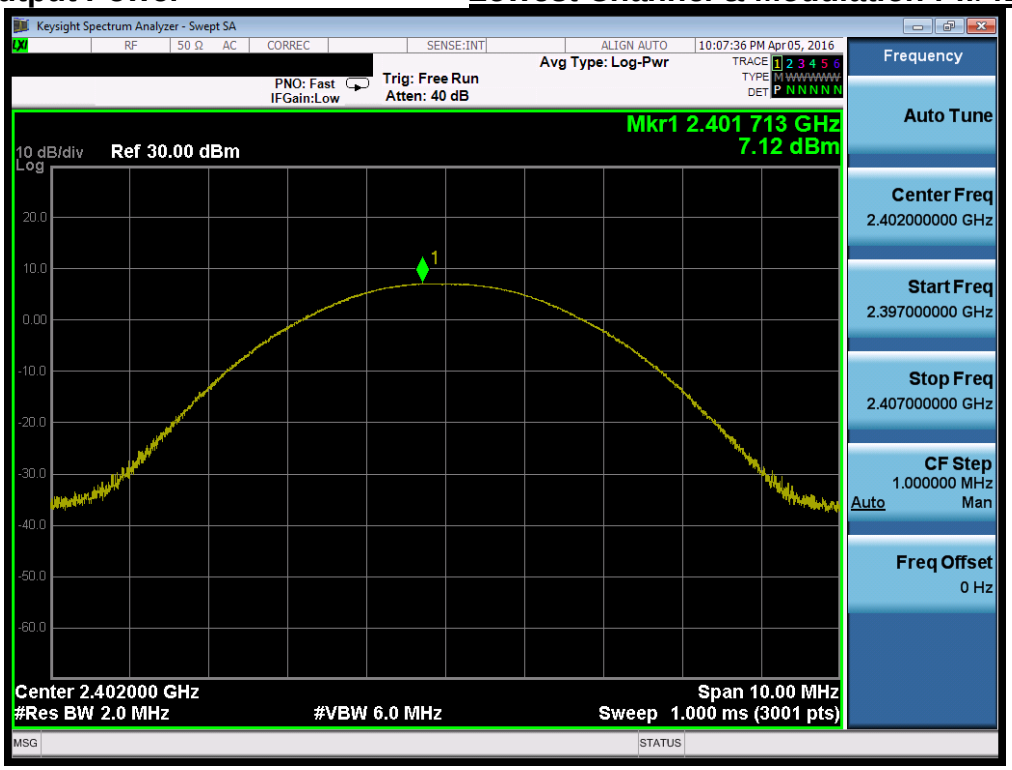
Peak Output Power ***Middle Channel & Modulation : GFSK***



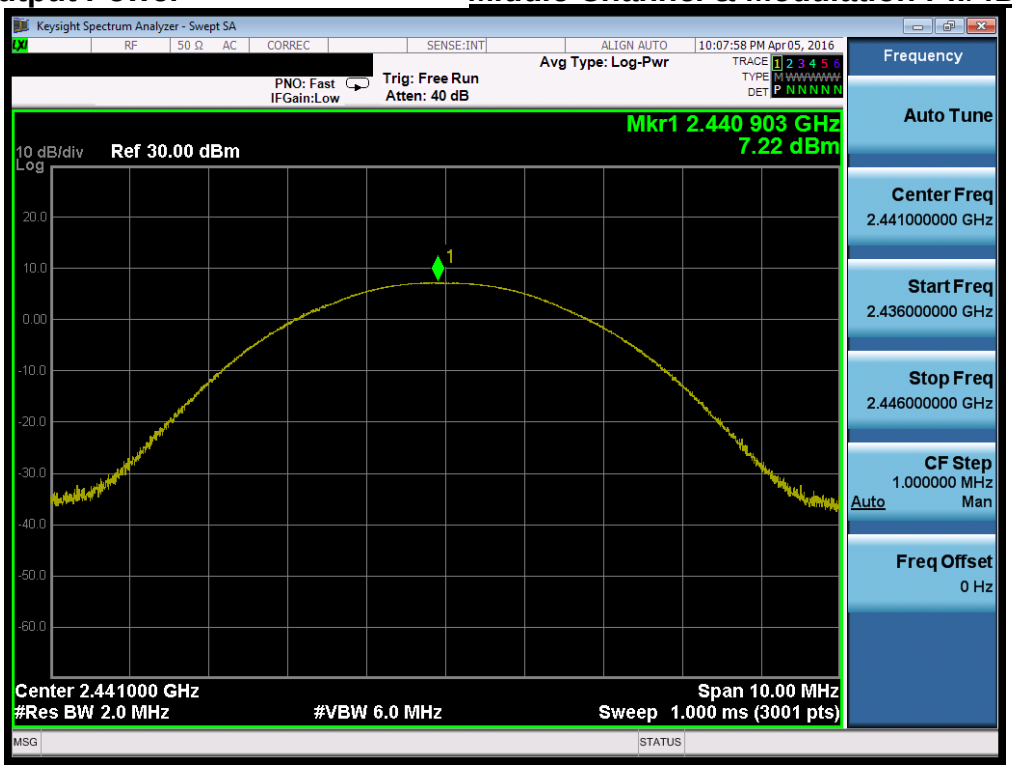
Peak Output Power ***Highest Channel & Modulation : GFSK***



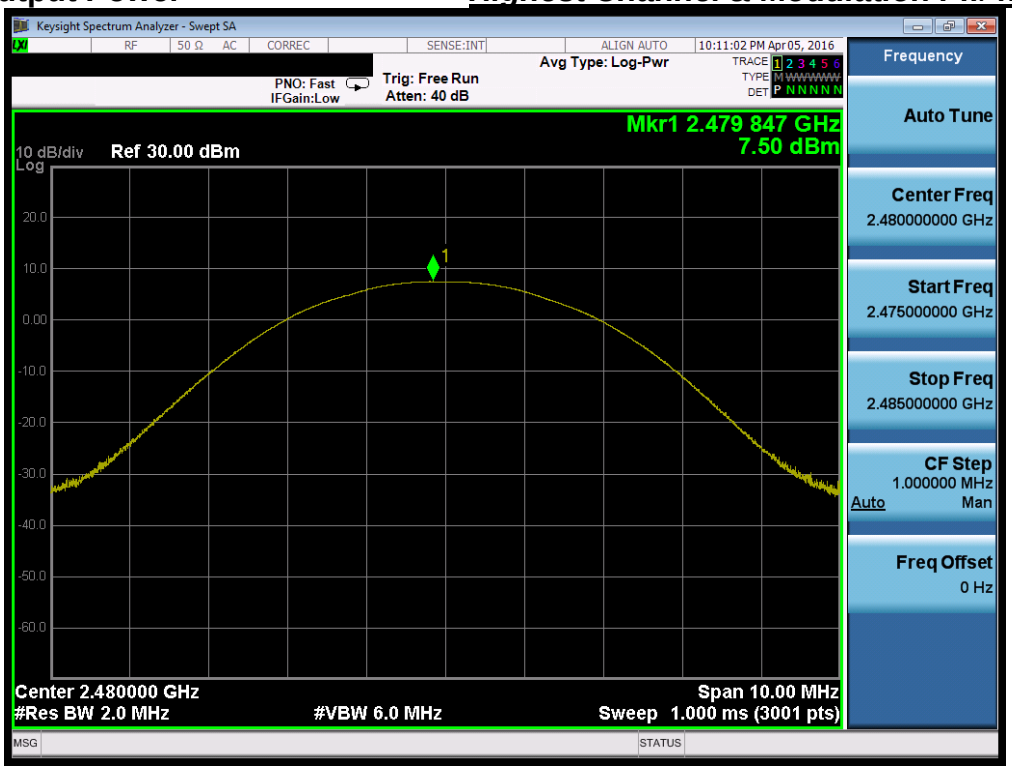
Peak Output Power ***Lowest Channel & Modulation : π/4DQPSK***



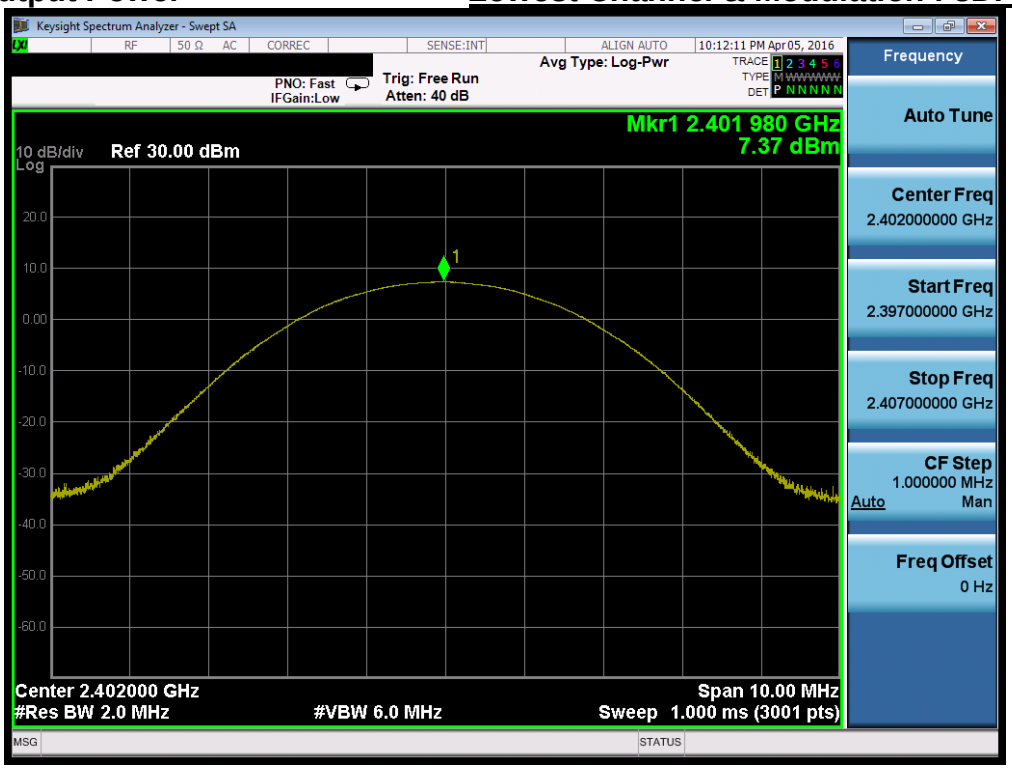
Peak Output Power ***Middle Channel & Modulation : π/4DQPSK***



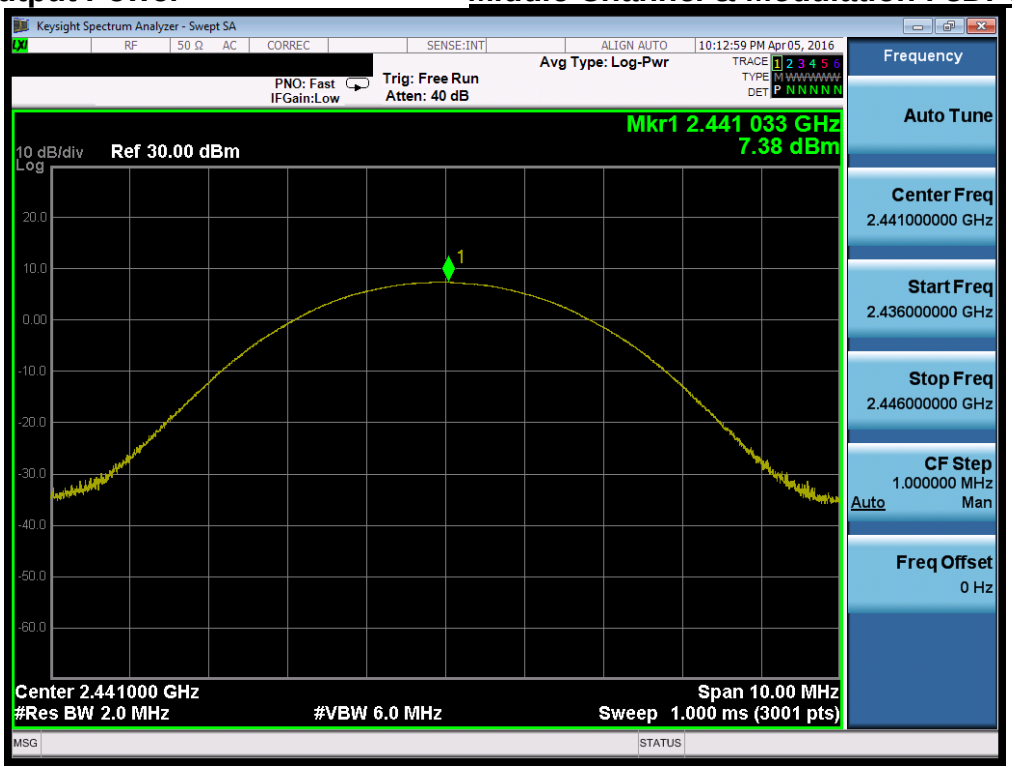
Peak Output Power ***Highest Channel & Modulation : π/4DQPSK***



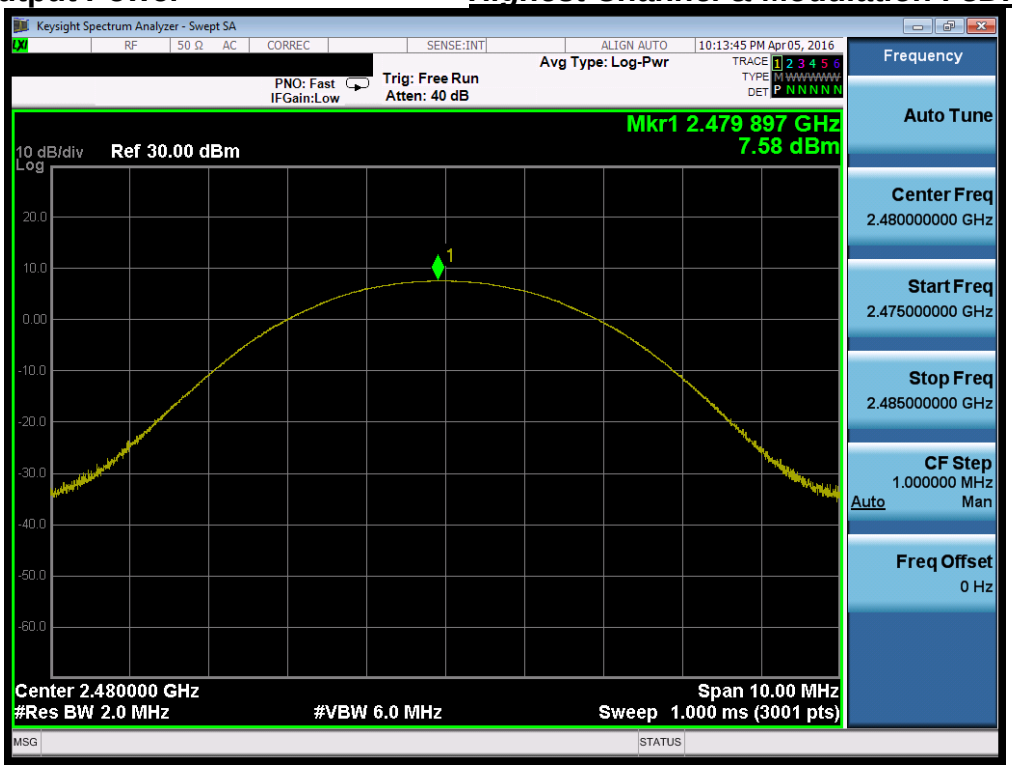
Peak Output Power ***Lowest Channel & Modulation : 8DPSK***



Peak Output Power ***Middle Channel & Modulation : 8DPSK***



Peak Output Power ***Highest Channel & Modulation : 8DPSK***



3. 20 dB BW

3.1 Test Setup

Refer to the APPENDIX I.

3.2 Limit

Limit : Not Applicable

3.3 Test Procedure

1. The 20 dB bandwidth were measured with a spectrum analyzer connected to RF antenna Connector (conducted measurement) while EUT was operating in transmit mode. The analyzer center frequency was set to the EUT carrier frequency, using the analyzer.
2. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using below setting: RBW shall be in the range of 1% to 5% of the 20 dB bandwidth and VBW ≥ 3 × RBW, Span = between two times and five times the 20 dB bandwidth.

3.4 Test Results

Modulation	Tested Channel	20 dB BW (MHz)
GFSK	**Lowest**	0.942
	Middle	0.933
	Highest	0.933
π/4DQPSK	**Lowest**	1.296
	Middle	1.296
	Highest	1.305
8DPSK	**Lowest**	1.317
	Middle	1.320
	Highest	1.326

Note 1 : See next pages for actual measured spectrum plots.

20 dB Bandwidth ***Lowest Channel & Modulation : GFSK***

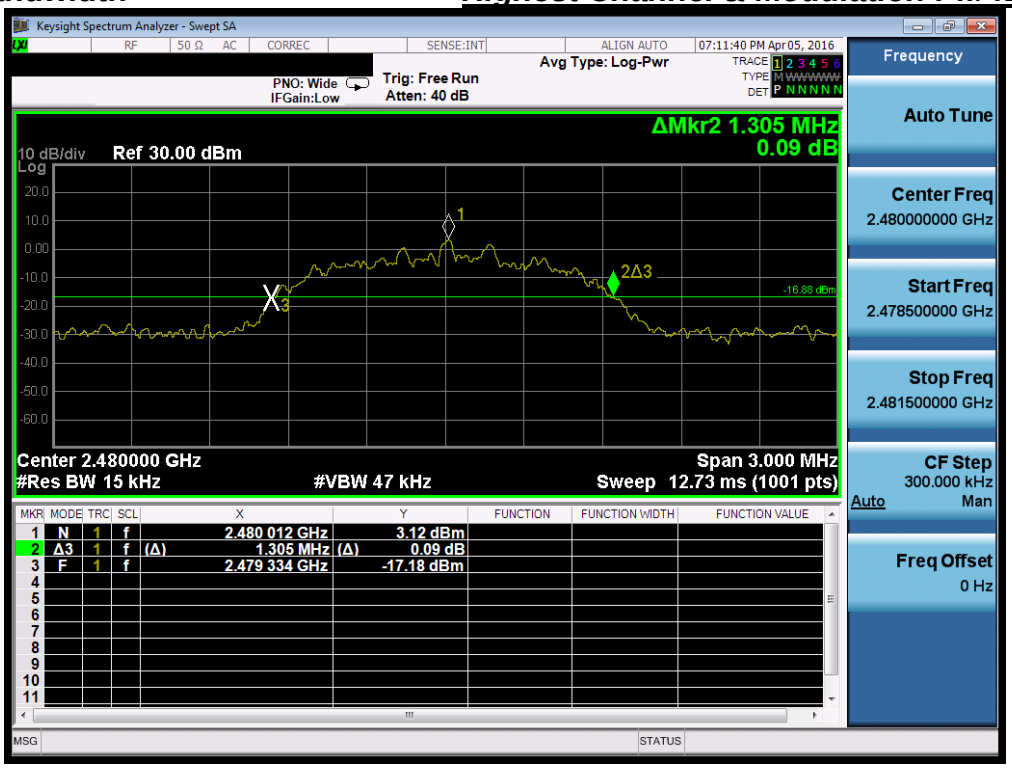
20 dB Bandwidth ***Middle Channel & Modulation : GFSK***

20 dB Bandwidth ***Highest Channel & Modulation : GFSK***

20 dB Bandwidth ***Lowest Channel & Modulation : π/4DQPSK***

20 dB Bandwidth ***Middle Channel & Modulation : π/4DQPSK***

20 dB Bandwidth ***Highest Channel & Modulation : π/4DQPSK***



20 dB Bandwidth ***Lowest Channel & Modulation : 8DPSK***

20 dB Bandwidth ***Middle Channel & Modulation : 8DPSK***

20 dB Bandwidth ***Highest Channel & Modulation : 8DPSK***