KSIGN®

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TEST REPORT

Report No.....:	**KS1911S00188E**
FCC ID.....:	**2AVBU-T50**
Applicant.....:	GUANGZHOU BACKWIN TECHNOLOGY CO.,LIMITED
Address.....:	6/F, Block C, Shijing Building, 18 Shisha Road, Baiyun District, Guangzhou, China
Manufacturer.....:	GUANGZHOU BACKWIN TECHNOLOGY CO.,LIMITED
Address.....:	6/F, Block C, Shijing Building, 18 Shisha Road, Baiyun District, Guangzhou, China
Product Name.....:	**Sports bluetooth headset**
Trade Mark.....:	BACKWIN
Model/Type reference.....:	T50
Listed Model(s).....:	T33, T35, T37, T39, T52, T56, T80, T58, T67, T61, T63, T21, T22, T23, T24, T25, T26, T27
Standard.....:	**FCC CFR Title 47 Part 15 Subpart C Section 15.247**
Date of Receipt.....:	Nov.11, 2019
Date of Test Date.....:	Nov.11, 2019-Dec.06, 2019
Date of issue.....:	Dec.06, 2019
Test result.....:	**Pass**

Compiled by: (Printed name+signature)	Emiya Lin Emiya Lin
Supervised by: (Printed name+signature)	Kelly Cheng Kelly Cheng
Approved by: (Printed name+signature)	Cary Luo Cary Luo

KSIGN(Guangdong) Testing Co., Ltd. KSIGN APPROVED

Testing Laboratory Name.....:	**KSIGN(Guangdong) Testing Co., Ltd.**
Address.....:	First Floor West Side, Building C, Zone A,Fuyuan New Factory, Jiujiu Industrial Park, Minzhu Village, Shatou Community, Shajing Street, Bao'an District, Shenzhen City,Guangdong Province, P. R. China

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1. TEST SUMMARY

1.1. Test Standards

The tests were performed according to following standards:

FCC Rules Part 15.247: Operation within the bands of 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz.

ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.

1.2. Report version

Revised No.	Date of issue	Description
01	Dec.06, 2019	Original

1.3. Test Description

FCC Part 15 Subpart C(15.247)			
Test Item	Standard Section	Result	Test Engineer
	FCC		
Antenna Requirement	15.203	Pass	Emiya Lin
Conducted Emission	15.207	Pass	Emiya Lin
Restricted Bands	15.205	Pass	Emiya Lin
Hopping Channel Separation	15.247(a)(1)	Pass	Emiya Lin
Dwell Time	15.247(a)(1)	Pass	Emiya Lin
Peak Output Power	15.247(b)(1)	Pass	Emiya Lin
Number of Hopping Frequency	15.247(b)(1)	Pass	Emiya Lin
Band Edge Emissions	15.247(d)	Pass	Emiya Lin
Radiated Spurious Emission	15.247(c)&15.209	Pass	Emiya Lin
99% Occupied Bandwidth & 20dB Bandwidth	15.247(a)	Pass	Emiya Lin
Pseudorandom Frequency Hopping Sequence	15.247 (a)(1)	Pass	Emiya Lin

Note: The measurement uncertainty is not included in the test result.

1.4. Test Facility

Address of the report laboratory

KSIGN(Guangdong) Testing Co., Ltd.

First Floor West Side, Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu Village, Shatou Community, Shajing Street, Bao'an District, Shenzhen City, Guangdong Province, P. R. China

Laboratory accreditation

The test facility is recognized, certified, or accredited by the following organizations:

A2LA-Lab Cert. No.: 5457.01
KSIGN(Guangdong) Testing Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

IC Registration No.: CN0096

The 3m alternate test site of KSIGN(Guangdong) Testing Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: CN0096

FCC-Registration No.: CN1272

KSIGN(Guangdong) Testing Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

1.5. Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01" Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the Zhejiang Kezheng Electronic Product Inspection quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device. Below is the best measurement capability for Zhejiang Kezheng Electronic Product Inspection.

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.42 dB	(1)
Transmitter power Radiated	2.14 dB	(1)
Conducted spurious emissions 9kHz~40GHz	1.60 dB	(1)
Radiated spurious emissions 9kHz~40GHz	2.20 dB	(1)
Conducted Emissions 9kHz~30MHz	3.20 dB	(1)
Radiated Emissions 30~1000MHz	4.70 dB	(1)
Radiated Emissions 1~18GHz	5.00 dB	(1)
Radiated Emissions 18~40GHz	5.54 dB	(1)
Occupied Bandwidth	2.80 dB	(1)

Note (1): This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

1.6. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15~35°C
Relative Humidity:	30~60 %
Air Pressure:	950~1050mba

2. GENERAL INFORMATION

2.1. Client Information

Applicant:	GUANGZHOU BACKWIN TECHNOLOGY CO.,LIMITED
Address:	6/F, Block C, Shijing Building, 18 Shisha Road, Baiyun District, Guangzhou, China
Manufacturer:	GUANGZHOU BACKWIN TECHNOLOGY CO.,LIMITED
Address:	6/F, Block C, Shijing Building, 18 Shisha Road, Baiyun District, Guangzhou, China

2.2. General Description of EUT

Product Name:	Sports bluetooth headset
Model/Type reference:	T50
Marketing Name:	BACKWIN
Listed Model(s):	T33, T35, T37, T39, T52, T56, T80, T58, T67, T61, T63, T21, T22, T23, T24, T25, T26, T27
Model Difference:	The difference between product models only depends on the appearance color and the model naming is different. Other power supply methods, safety structure and key components are the same, which do not affect the safety and electromagnetic compatibility performance.
Power supply(Battery):	DC3.7Vdc from Li-ion Battery
Hardware version:	V4.0
Software version:	/
BT5.0	
Modulation:	GFSK, π/4-DQPSK, 8DPSK
Operation frequency:	2402MHz~2480MHz
Max Peak Output Power:	GFSK: -3.93dBm π/4-DQPSK: -2.53dBm 8DPSK: -2.32dBm
Channel number:	79
Channel separation:	1MHz
Antenna type:	Ceramic Antenna
Antenna gain:	-0.58dBi

2.3. Operation state

Operation Frequency List: The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing. BT EDR, 79 channels are provided to the EUT. Channels 00/39/78 were selected for testing.

Operation Frequency List:

Channel	Frequency (MHz)
00	**2402**
01	2403
⋮	⋮
38	2440
39	**2441**
40	2442
⋮	⋮
77	2479
78	**2480**

Note: The display in grey were the channel selected for testing.

Test mode

For RF test items:
The engineering test program was provided and enabled to make EUT continuous transmit
For AC power line conducted emissions:
The EUT was set to connect with the Bluetooth instrument under large package sizes transmission.
For Radiated spurious emissions test item:
The engineering test program was provided and enabled to make EUT continuous transmit. The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

2.4. Measurement Instruments List

Tonscend JS0806-2 Test system					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
1	Spectrum Analyzer	R&S	FSV40-N	101798	Apr.25, 2020
2	Vector Signal Generator	Agilent	N5182A	MY50142520	Apr.10, 2020
3	Analog Signal Generator	HP	83752A	3344A00337	Apr.10, 2020
4	Power Sensor	Agilent	E9304A	MY50390009	Apr.10, 2020
5	Power Sensor	Agilent	E9300A	MY41498315	Apr.10, 2020
6	Wideband Radio Communication Tester	R&S	CMU200	115297	Apr.10, 2020
7	Climate Chamber	Angul	AGNH80L	1903042120	Apr.10, 2020
8	Dual Output DC Power Supply	Agilent	E3646A	MY40009992	Apr.10, 2020
9	RF Control Unit	Tonscend	JS0806-2	/	Apr.10, 2020

Transmitter spurious emissions & Receiver spurious emissions					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	EMI Test Receiver	R&S	ESR	102525	Apr.10, 2020
2	High Pass Filter	Chengdu E-Microwave	OHF-3-18-S	0E01901038	Apr.15, 2020
3	High Pass Filter	Chengdu E-Microwave	OHF-6.5-18-S	0E01901039	Apr.15, 2020
4	Spectrum Analyzer	HP	8593E	3831U02087	Apr.10, 2020
5	Ultra-Broadband logarithmic period Antenna	Schwarzbeck	VULB 9163	01230	Apr.17, 2020
6	Loop Antenna	Beijin ZHINAN	ZN30900C	18050	Apr.17, 2020
7	Horn Antenna	R&S	Sep-60	69483	Apr.10, 2020
8	Spectrum Analyzer	R&S	FSV40-N	101798	Apr.25, 2020
9	Horn Antenna	Schwarzbeck	BBHA 9120 D	2023	Apr.10, 2020
10	Pre-Amplifier	Schwarzbeck	BBV 9745	9745#129	Apr.10, 2020
11	Pre-Amplifier	EMCI	EMC051835SE	980662	Apr.17, 2020
12	Power Meter	Agilent	E4419B	GB41293710	Apr.10, 2020

Note:
1)The Cal. Interval was one year.
2)The cable loss has calculated in test result which connection between each test instruments.

2.5. Test Software

Software name	Model	Version
Conducted emission Measurement Software	EZ-EMC	EMC-Con 3A1.1
Radiated emission Measurement Software	EZ-EMC	FA-03A.2.RE
Bluetooth and WIFI Test System	JS1120-3	2.5.77.0418

3. TEST ITEM AND RESULTS

3.1. Antenna requirement

Requirement

FCC CFR Title 47 Part 15 Subpart C Section 15.203:

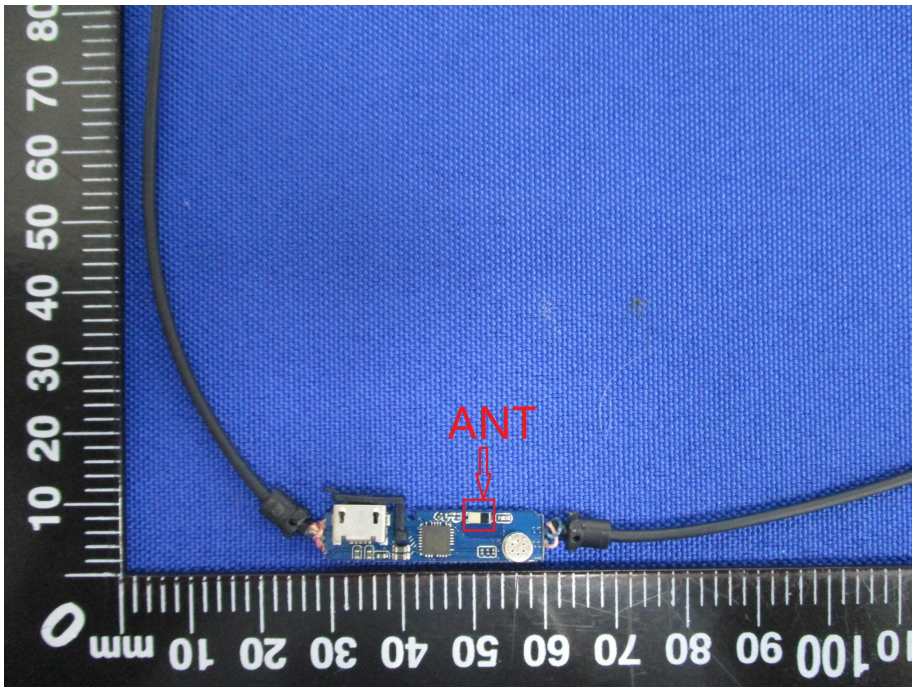
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):

(i) Systems operating in the 2400~2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

Test Result

The directional gain of the antenna less than 6dBi, please refer to the EUT internal photographs antenna photo.



3.2. Conducted Emission

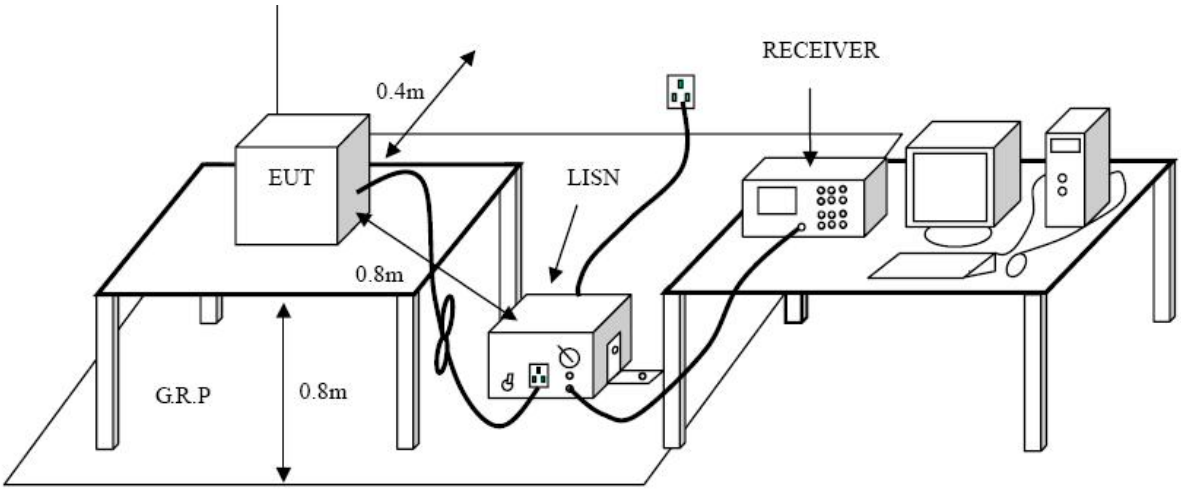
Limit

Conducted Emission Test Limit

Frequency	Maximum RF Line Voltage (dBμV)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Notes:
(1) *Decreasing linearly with logarithm of the frequency.
(2) The lower limit shall apply at the transition frequencies.
(3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

Test Configuration



Test Procedure

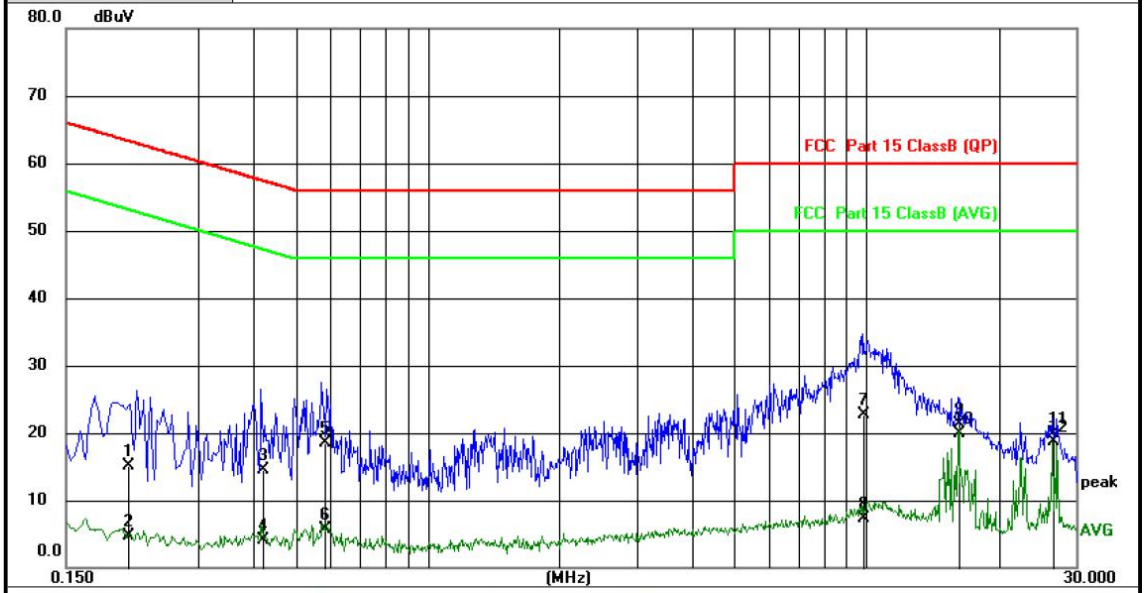
1. The EUT was setup according to ANSI C63.10:2013 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50ohm /50uH coupling impedance for the measuring equipment.
   The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
4. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
5. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
6. Conducted Emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
7. During the above scans, the emissions were maximized by cable manipulation.

Test Mode:

Please refer to the clause 2.3.

Test Results

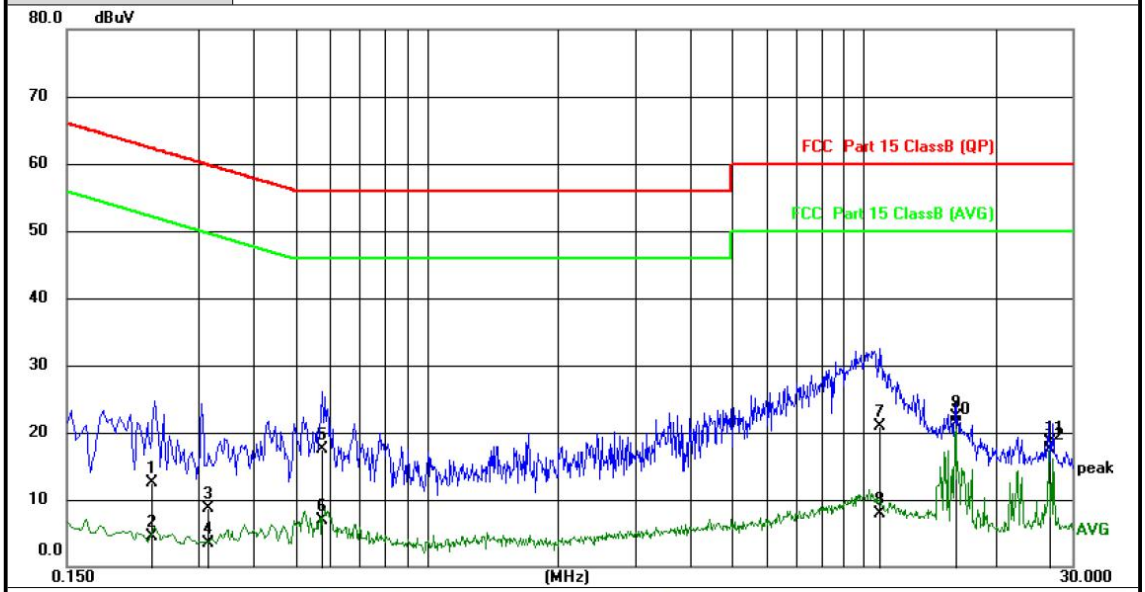
Test Voltage:	AC 120V/60 Hz
Terminal:	Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.2080	5.29	9.87	15.16	63.28	-48.12	QP
2		0.2080	-5.22	9.87	4.65	53.28	-48.63	AVG
3		0.4205	4.69	9.72	14.41	57.44	-43.03	QP
4		0.4205	-5.55	9.72	4.17	47.44	-43.27	AVG
5		0.5846	8.66	9.75	18.41	56.00	-37.59	QP
6		0.5846	-3.97	9.75	5.78	46.00	-40.22	AVG
7		9.8101	12.60	10.09	22.69	60.00	-37.31	QP
8		9.8101	-2.80	10.09	7.29	50.00	-42.71	AVG
9		16.1660	11.13	10.09	21.22	60.00	-38.78	QP
10	*	16.1660	9.85	10.09	19.94	50.00	-30.06	AVG
11		26.6102	9.69	10.20	19.89	60.00	-40.11	QP
12		26.6102	8.53	10.20	18.73	50.00	-31.27	AVG

Remarks:
1.Measurement = Reading Level+ Correct Factor
2.Over = Measurement -Limit

Test Voltage:	AC 120V/60 Hz
Terminal:	Neutral



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.2333	2.66	9.82	12.48	62.33	-49.85	QP
2		0.2333	-5.24	9.82	4.58	52.33	-47.75	AVG
3		0.3133	-0.91	9.70	8.79	59.88	-51.09	QP
4		0.3133	-6.26	9.70	3.44	49.88	-46.44	AVG
5		0.5750	7.71	9.75	17.46	56.00	-38.54	QP
6		0.5750	-2.92	9.75	6.83	46.00	-39.17	AVG
7		10.8652	10.85	10.00	20.85	60.00	-39.15	QP
8		10.8652	-2.02	10.00	7.98	50.00	-42.02	AVG
9		16.2285	12.27	10.09	22.36	60.00	-37.64	QP
10	*	16.2285	11.25	10.09	21.34	50.00	-28.66	AVG
11		26.6087	8.33	10.20	18.53	60.00	-41.47	QP
12		26.6087	7.23	10.20	17.43	50.00	-32.57	AVG

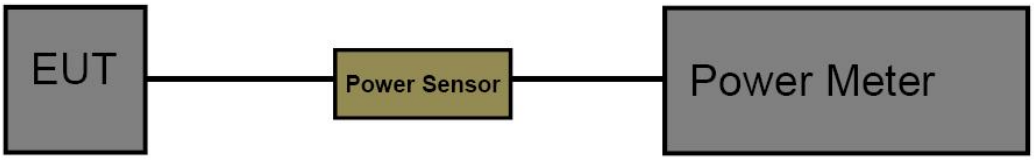
Remarks:
1.Measurement = Reading Level+ Correct Factor
2.Over = Measurement -Limit

3.3. Peak Output Power

Limit

Test Item	Limit	Frequency Range(MHz)
Peak Output Power	Hopping Channels>75 Power<1W(30dBm) Other <125mW(21dBm)	2400~2483.5

Test Configuration



Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. Spectrum Setting:
   Peak Detector: RBW=1 MHz, VBW=3 MHz for bandwidth less than 1MHz.
   RBW=3 MHz, VBW=10 MHz for bandwidth more than 1MHz.

Test Mode

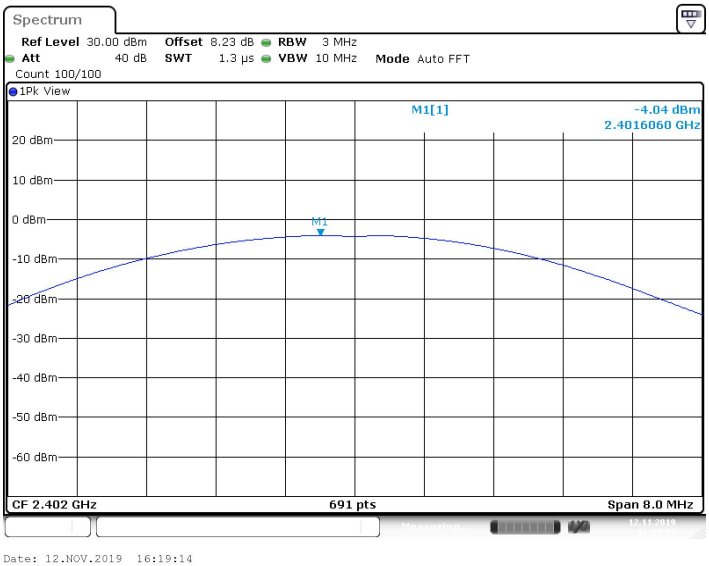
Please refer to the clause 2.3

Test Result

Test Mode:	GFSK Mode	
Channel frequency (MHz)	**Test Result (dBm)**	**Limit (dBm)**
2402	-4.04	**30**
2441	-3.93	
2480	-4.60	

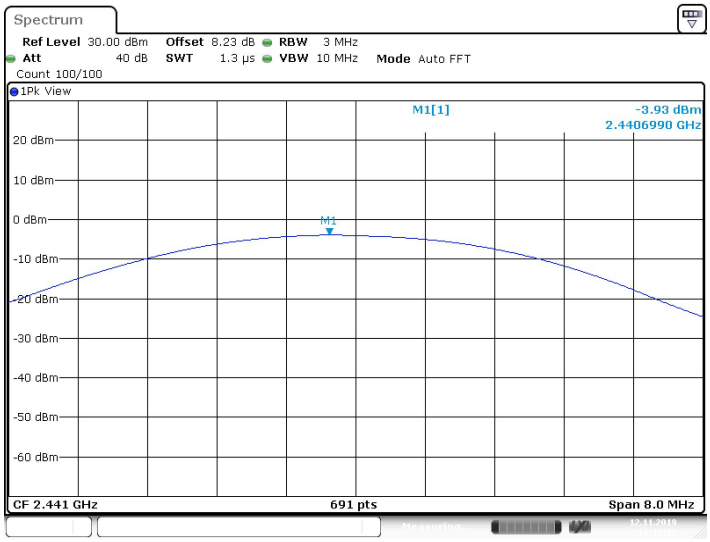
GFSK Mode

2402 MHz



GFSK Mode

2441 MHz



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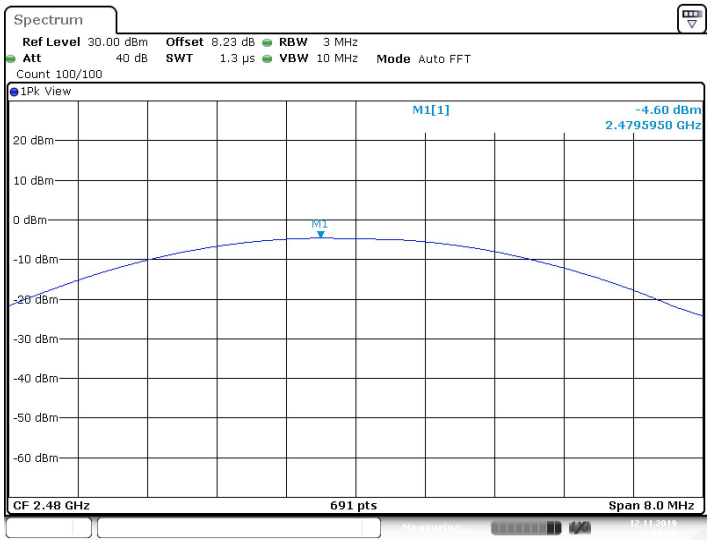
GFSK Mode

2480 MHz



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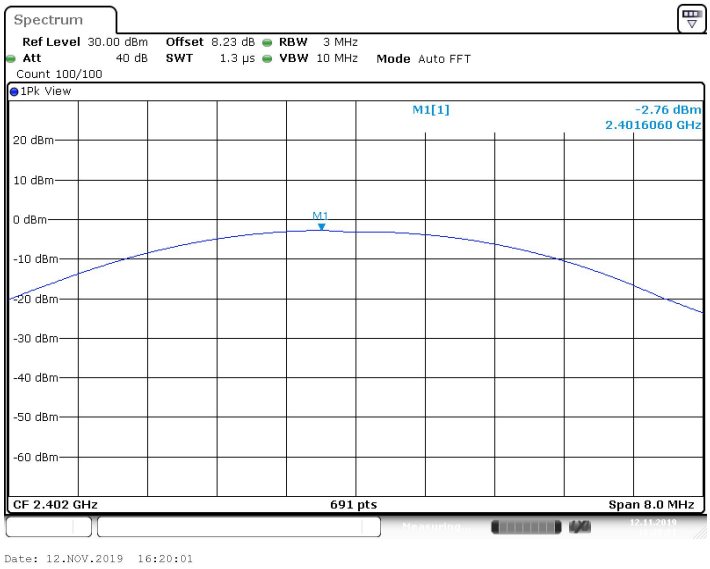
Test Mode:	π /4-DQPSK Mode	
Channel frequency (MHz)	**Test Result (dBm)**	**Limit (dBm)**
2402	-2.76	**30**
2441	-2.53	
2480	-2.95	

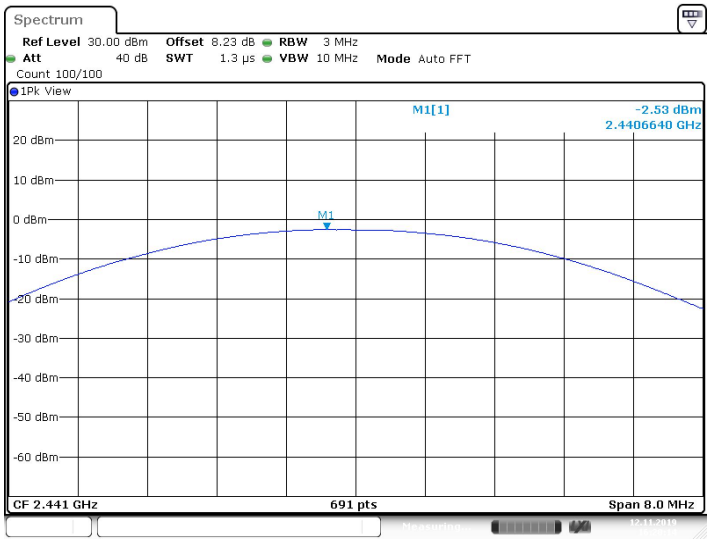
π/4-DQPSK Mode

2402 MHz



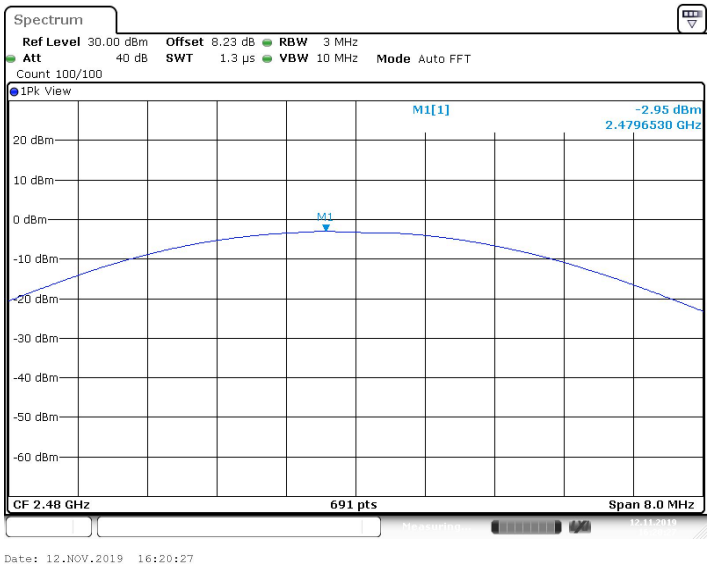
π/4-DQPSK Mode

2441 MHz



π/4-DQPSK Mode

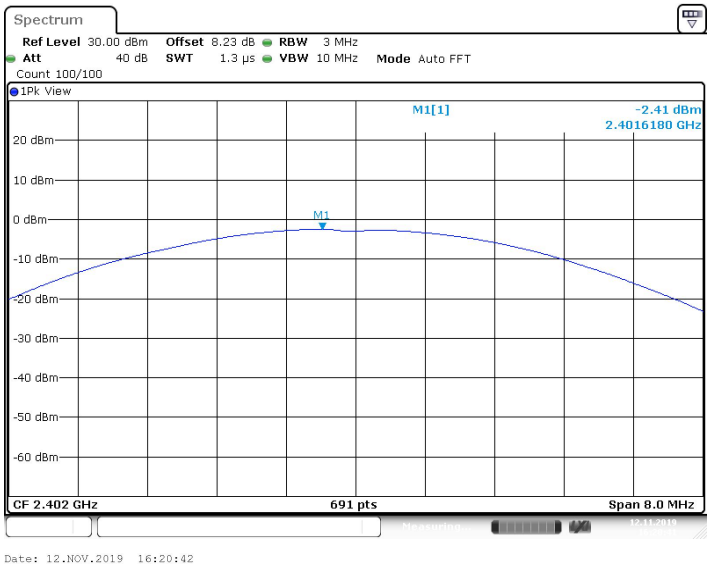
2480 MHz



Test Mode:	8DPSK	
Channel frequency (MHz)	**Test Result (dBm)**	**Limit (dBm)**
2402	-2.41	**30**
2441	-2.32	
2480	-2.74	

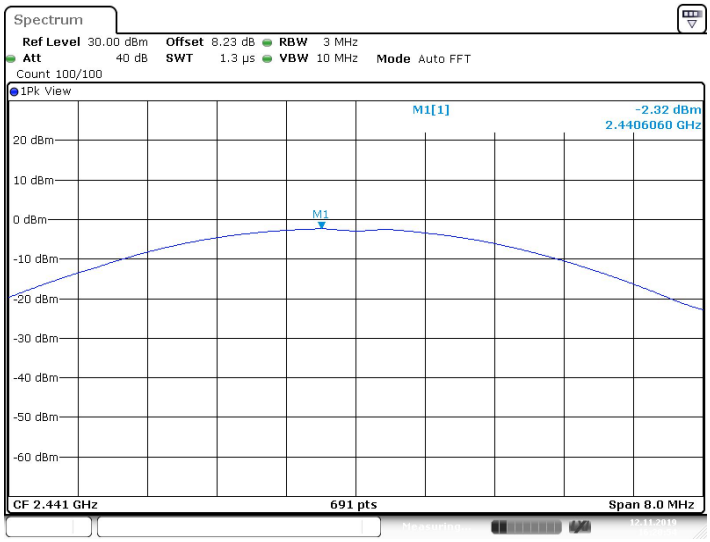
8DPSK Mode

2402 MHz



8DPSK Mode

2441 MHz



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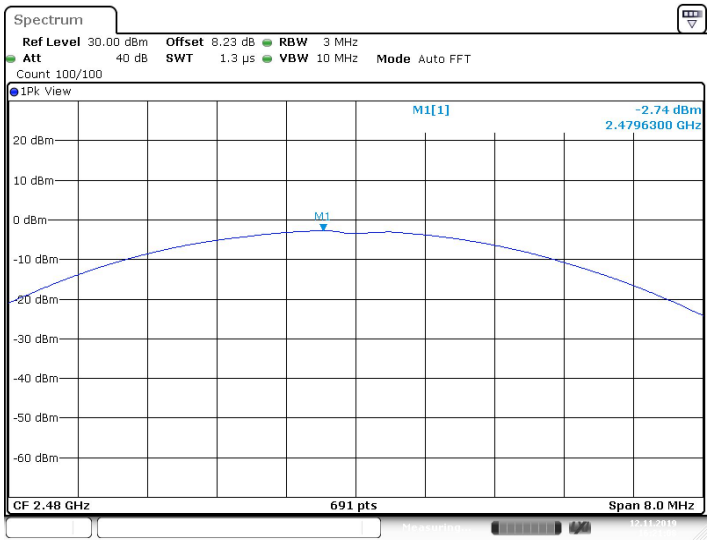
8DPSK Mode

2480 MHz



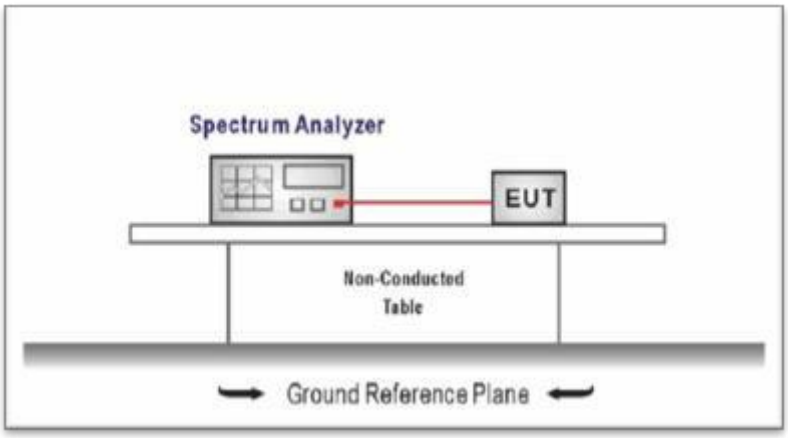
Date: 12.NOV.2019 16:21:08

3.4. 99% Occupied Bandwidth & 20dB Bandwidth

Limit

Test Item	Limit	Frequency Range(MHz)
Bandwidth	<=1 MHz (20dB bandwidth)	2400~2483.5

Test Configuration



Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. Spectrum Setting:

   20dB Bandwidth
   (1) Set RBW = 30 kHz.
   (2) Set the video bandwidth (VBW) ≥ 3 RBW.
   (3) Detector = Peak.
   (4) Trace mode = Max hold.
   (5) Sweep = Auto couple.

   99% Occupied Bandwidth
   (1) Set RBW = 20 kHz.
   (2) Set the video bandwidth (VBW) =100 kHz.
   (3) Detector = Peak.
   (4) Trace mode = Max hold.
   (5) Sweep = Auto couple.

   NOTE: The EUT was set to continuously transmitting in each mode and low, Middle and high channel for the test.

Test Mode

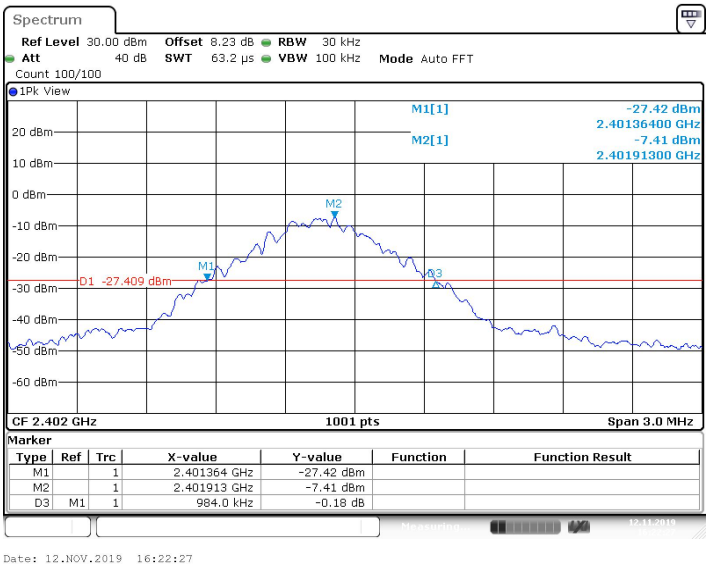
Please refer to the clause 2.3.

Test Results

Test Mode:	GFSK Mode			
Channel frequency (MHz)	20dB Bandwidth [MHz]	FL[MHz]	FH[MHz]	Verdict
2402	0.984	2401.364	2402.348	PASS
2441	1.035	2440.313	2441.348	PASS
2480	1.032	2479.313	2480.345	PASS

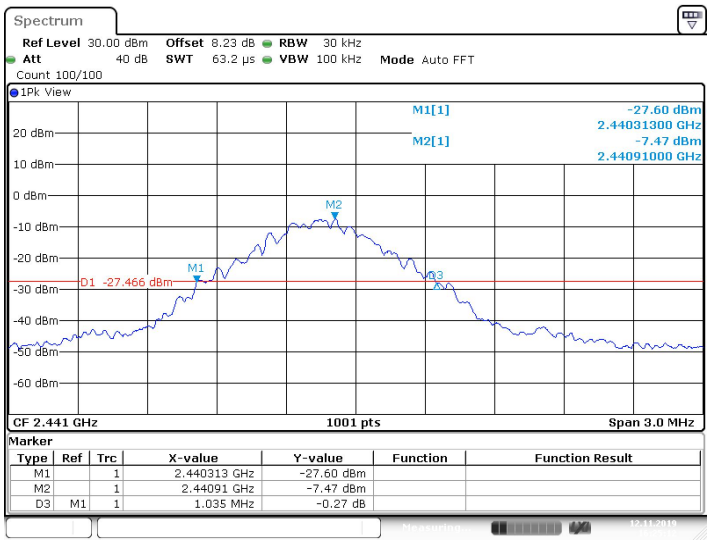
GFSK Mode

2402 MHz



GFSK Mode

2441 MHz



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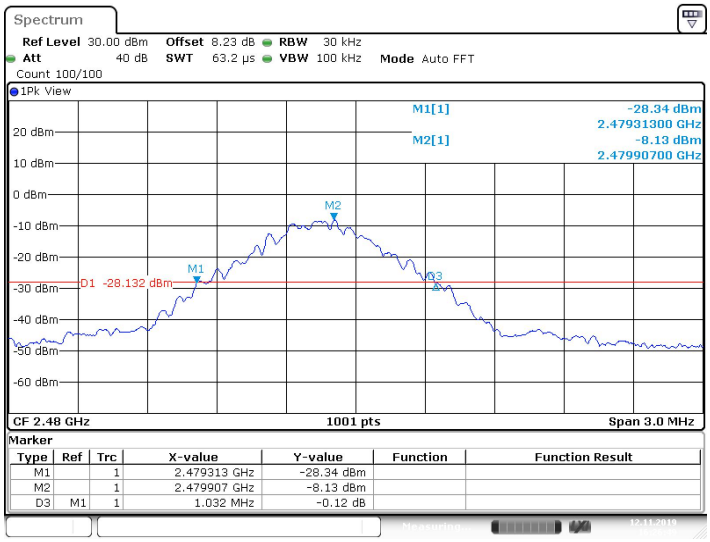
GFSK Mode

2480 MHz



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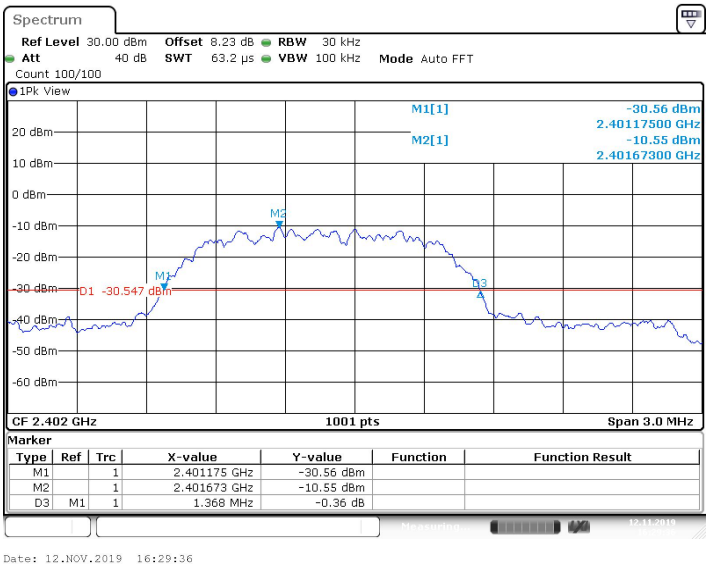
Test Mode:	π/4DQPSK Mode			
Channel frequency (MHz)	20dB Bandwidth [MHz]	FL[MHz]	FH[MHz]	Verdict
2402	1.368	2401.175	2402.543	PASS
2441	1.365	2440.172	2441.537	PASS
2480	1.365	2479.169	2480.534	PASS

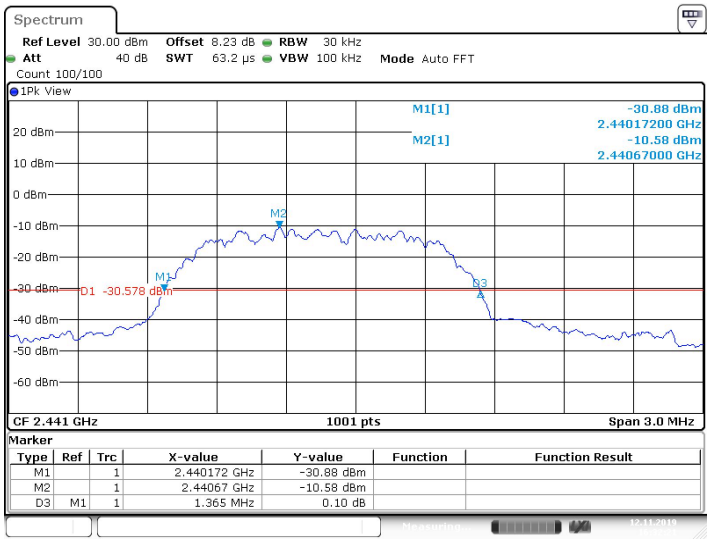
π/4DQPSK Mode

2402 MHz



π/4DQPSK Mode

2441 MHz



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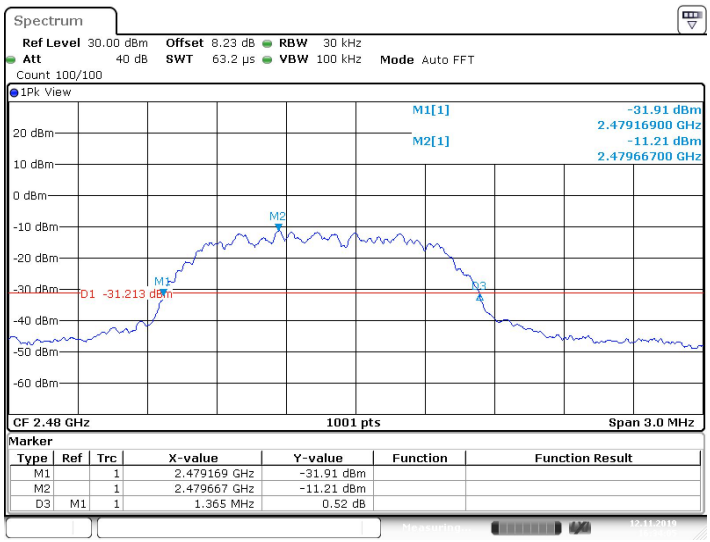
π/4DQPSK Mode

2480 MHz



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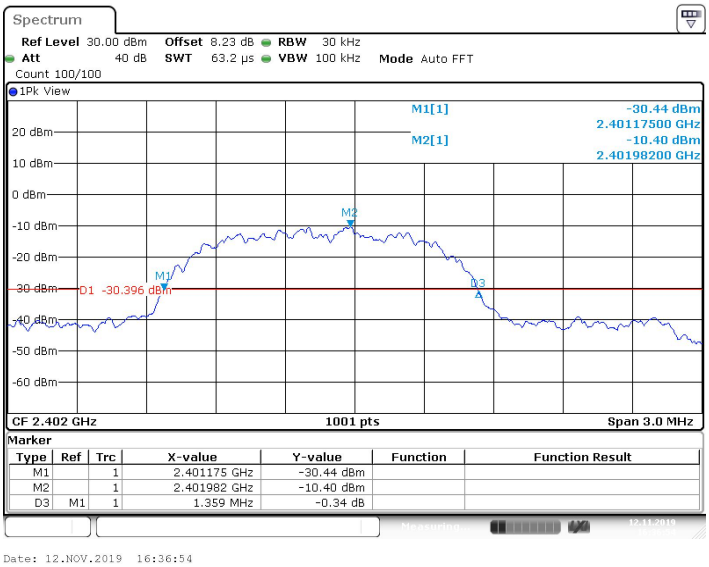
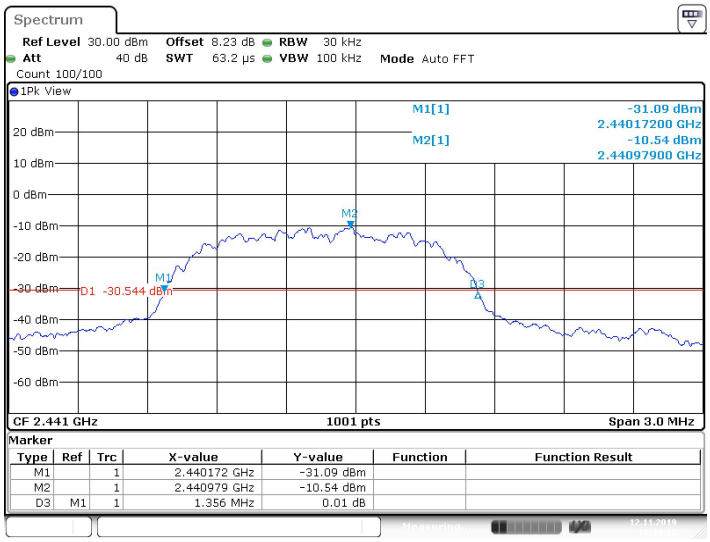
Test Mode:	8DPSK Mode			
Channel frequency (MHz)	20dB Bandwidth [MHz]	FL[MHz]	FH[MHz]	Verdict
2402	1.359	2401.175	2402.534	PASS
2441	1.356	2440.172	2441.528	PASS
2480	1.350	2479.172	2480.522	PASS
π/4DQPSK Mode				
2402 MHz				



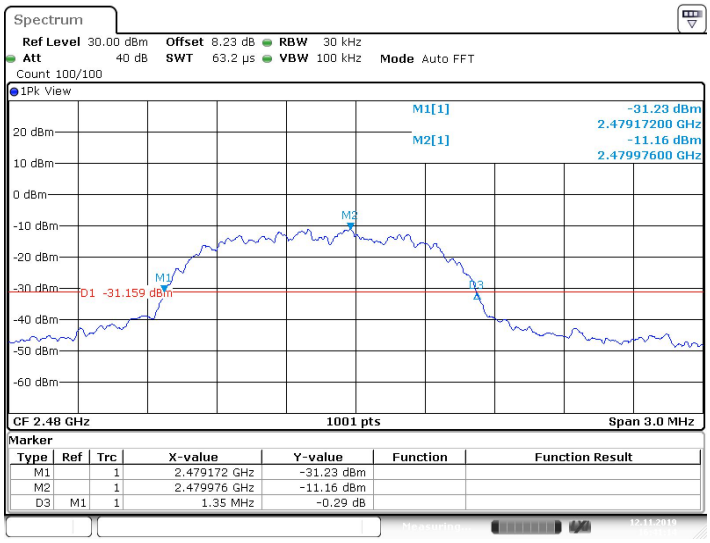
π/4DQPSK Mode

2441 MHz



π/4DQPSK Mode

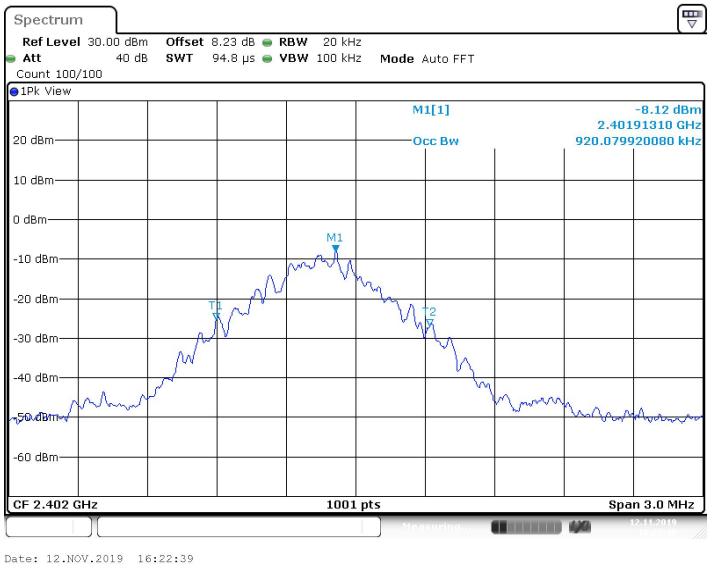
2480 MHz



Test Mode:	GFSK Mode			
Channel frequency (MHz)	99% OCB [MHz]	FL[MHz]	FH[MHz]	Verdict
2402	0.920	2401.398	2402.318	PASS
2441	0.917	2440.398	2441.315	PASS
2480	0.920	2479.395	2480.315	PASS

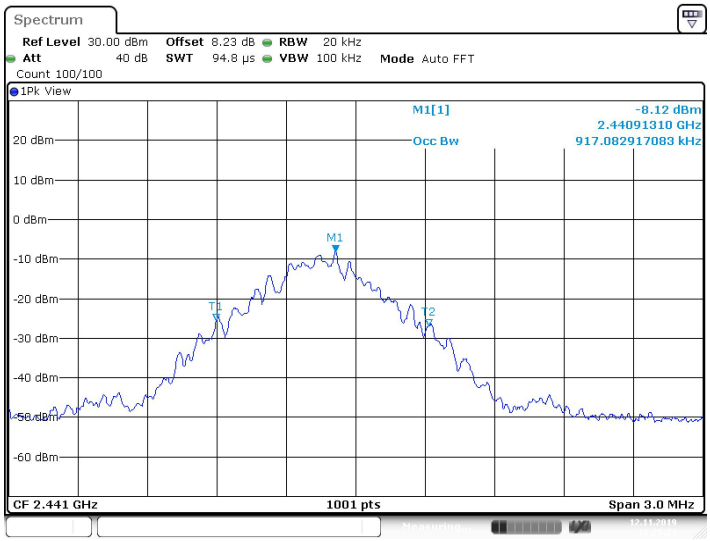
GFSK Mode

2402 MHz



GFSK Mode

2441 MHz



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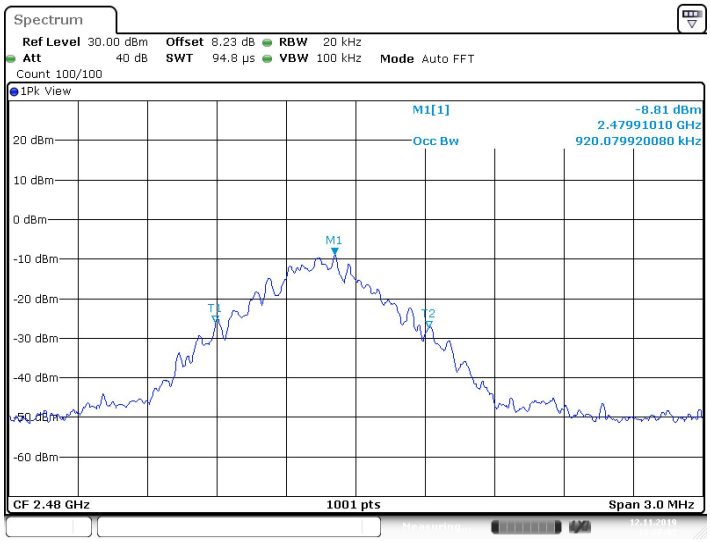
GFSK Mode

2480 MHz



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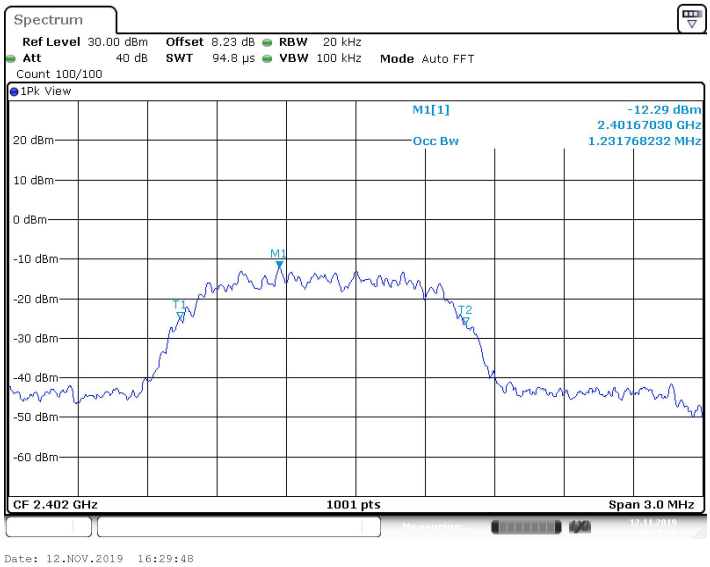
Test Mode:	π/4DQPSK Mode			
Channel frequency (MHz)	99% OCB [MHz]	FL[MHz]	FH[MHz]	Verdict
2402	1.232	2401.242	2402.474	PASS
2441	1.211	2440.248	2441.459	PASS
2480	1.208	2479.245	2480.453	PASS

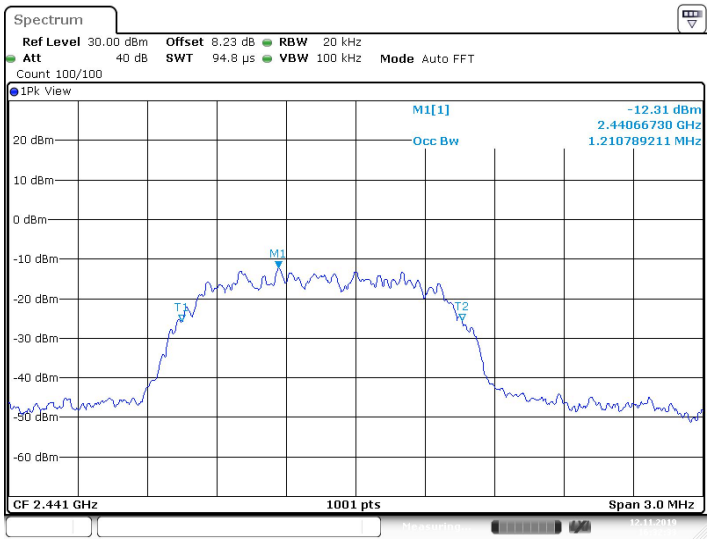
π/4DQPSK Mode

2402 MHz



π/4DQPSK Mode

2441 MHz



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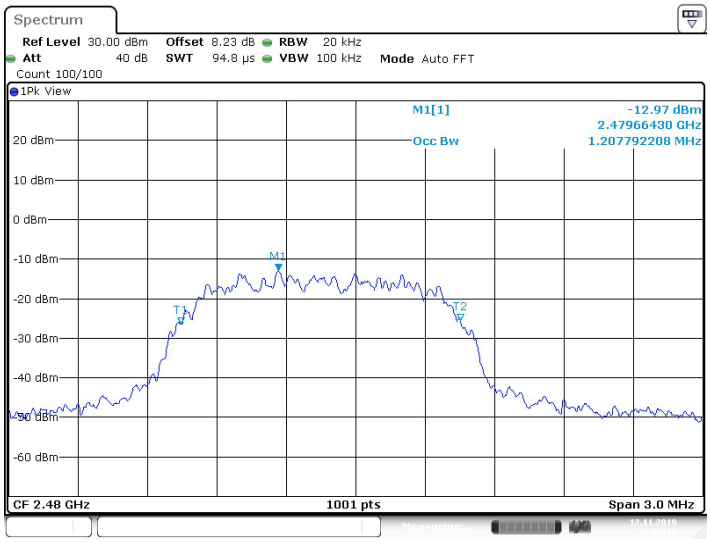
π/4DQPSK Mode

2480 MHz



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