CTC Laboratories, Inc.

2/F., Building 1 and 1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Longhua District, Shenzhen, Guangdong, China

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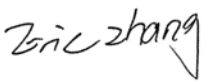
TEST REPORT

Report No. ·····:	**GTI20191151F**
FCC ID·····:	**SRQ-ZTEF322**
Applicant·····:	**ZTE Corporation**
Address·····:	ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R. China
Manufacturer·····:	ZTE Corporation
Address·····:	ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R. China
Product Name·····:	WCDMA/GSM Feature Phone
Trade Mark·····:	ZTE
Model/Type reference·····:	ZTE F322
Listed Model(s) ·····:	N/A
Standard·····:	**FCC CFR Title 47 Part 15 Subpart C Section 15.247**
Date of receipt of test sample…:	2019-05-10
Date of testing……..:	2019-05-10 to 2019-06-12
Date of issue……..:	2019-06-12
Result……..:	**PASS**

Compiled by: (Printed name+signature)	Zaki Zhang	
Supervised by: (Printed name+signature)	Eric Zhang	
Approved by: (Printed name+signature)	Walter Chen	

Testing Laboratory Name.....	**CTC Laboratories, Inc.**
Address.....	1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, 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	2019-06-12	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	Roy Wu
Conducted Emission	15.207	Pass	Roy Wu
Restricted Bands	15.205	Pass	Roy Wu
Hopping Channel Separation	15.247(a)(1)	Pass	Roy Wu
Dwell Time	15.247(a)(1)	Pass	Roy Wu
Peak Output Power	15.247(b)(1)	Pass	Roy Wu
Number of Hopping Frequency	15.247(b)(1)	Pass	Roy Wu
Band Edge Emissions	15.247(d)	Pass	Roy Wu
Radiated Spurious Emission	15.247(c)&15.209	Pass	Roy Wu
99% Occupied Bandwidth & 20dB Bandwidth	15.247(a)	Pass	Roy Wu

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

1.4. Test Facility

Address of the report laboratory

CTC Laboratories, Inc.

Add: 2/F., Building 1 and 1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Longhua District, Shenzhen, Guangdong, China

Laboratory accreditation

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

CNAS-Lab Code: L5365
CTC Laboratories, Inc. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No.: 4340.01
CTC Laboratories, Inc. 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: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

ISED Registration No.: CN0029

The 3m alternate test site of CTC Laboratories, Inc. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: CN0029 on Dec, 2018.

FCC-Registration No.: CN1208

CTC Laboratories, Inc. 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. Registration CN1208, Sep 07, 2017

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 CTC Laboratories, Inc. 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 CTC Laboratories, Inc.

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	---------	(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:	ZTE Corporation
Address:	ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R. China
Manufacturer:	ZTE Corporation
Address:	ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R. China
Factory:	ZTE Corporation
Address:	ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R. China

2.2. General Description of EUT

Product Name:	WCDMA/GSM Feature Phone
Model/Type reference:	ZTE F322
Marketing Name:	ZTE
Listed Model(s):	/
Power supply:	3.7Vdc 800mAh from Li-ion Battery
Battery 1:	Model: Li3708T42P3h533456 3.7Vdc 800mAh
Battery 2:	Model: 5C0802 3.7Vdc 800mAh
Adapter 1:	Model:50.069MX03 Input:100-240Vac 50/60Hz 0.2A Output:5Vdc/0.5A
Adapter 2:	Model:TPA-97050050U01 Input:100-240Vac 50/60Hz 0.15A Output:5Vdc/0.5A
Hardware version:	HS520_MB_V2.0
Software version:	ZTE_F322V1.0_20190603
Bluetooth EDR	
Modulation:	GFSK, π/4-DQPSK, 8-DPSK
Operation frequency:	2402MHz~2480MHz
Max Peak Output Power:	9.47dBm(GFSK)
Channel number:	79
Channel separation:	1MHz
Antenna type:	Internal Antenna
Antenna gain:	-2.59dBi

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.	Calibrated Date	Calibrated until
1	Spectrum Analyzer	Rohde & Schwarz	FSU26	100105	Dec. 29, 2018	Dec. 28, 2019
2	Spectrum Analyzer	Rohde & Schwarz	FUV40-N	101331	Dec. 29, 2018	Dec. 28, 2019
3	MXG Vector Signal Generator	Agilent	N5182A	MY47420864	Dec. 29, 2018	Dec. 28, 2019
4	Signal Generator	Agilent	E8257D	MY46521908	Dec. 29, 2018	Dec. 28, 2019
5	Power Sensor	Agilent	U2021XA	MY5365004	Dec. 29, 2018	Dec. 28, 2019
6	Power Sensor	Agilent	U2021XA	MY5365006	Dec. 29, 2018	Dec. 28, 2019
7	Simultaneous Sampling DAQ	Agilent	U2531A	TW54493510	Dec. 29, 2018	Dec. 28, 2019
8	Climate Chamber	TABAI	PR-4G	A8708055	Dec. 29, 2018	Dec. 28, 2019
9	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	116410	Dec. 29, 2018	Dec. 28, 2019
10	Climate Chamber	ESPEC	MT3065	/	Dec. 29, 2018	Dec. 28, 2019
11	300328 v2.1.1 test system	TONSCEND	v2.6	/	/	/

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	EMI Test Receiver	Rohde & Schwarz	ESCI	100658	Dec. 28, 2019
2	High pass filter	micro-tranics	HPM50111	142	Dec. 28, 2019
3	Log-Bicon Antenna	Schwarzbeck	CBL6141A	4180	Dec. 28, 2019
4	Ultra-Broadband Antenna	ShwarzBeck	BBHA9170	25841	Dec. 28, 2019
5	Loop Antenna	LAPLAC	RF300	9138	Dec. 28, 2019
6	Spectrum Analyzer	Rohde & Schwarz	FSU26	100105	Dec. 28, 2019
7	Horn Antenna	Schwarzbeck	BBHA 9120D	647	Dec. 28, 2019
8	Pre-Amplifier	HP	8447D	1937A03050	Dec. 28, 2019
9	Pre-Amplifier	EMCI	EMC051835	980075	Dec. 28, 2019
10	Antenna Mast	UC	UC3000	N/A	N/A
11	Turn Table	UC	UC3000	N/A	N/A
12	Cable Below 1GHz	Schwarzbeck	AK9515E	33155	Dec. 28, 2019
13	Cable Above 1GHz	Hubersuhner	SUCOFLEX102	DA1580	Dec. 28, 2019
14	Splitter	Mini-Circuit	ZAPD-4	400059	Dec. 28, 2019
15	RF Connection Cable	HUBER+SUHNER	RE-7-FL	N/A	Dec. 28, 2019
16	RF Connection Cable	Chengdu E-Microwave	---	---	Dec. 28, 2019
17	High pass filter	Compliance Direction systems	BSU-6	34202	Dec. 28, 2019

18	Attenuator	Chengdu E-Microwave	EMCAXX-10R NZ-3	---	Dec. 28, 2019
19	High and low temperature box	ESPEC	MT3065	12114019	Dec. 28, 2019

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

3. TEST ITEM AND RESULTS

3.1. 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

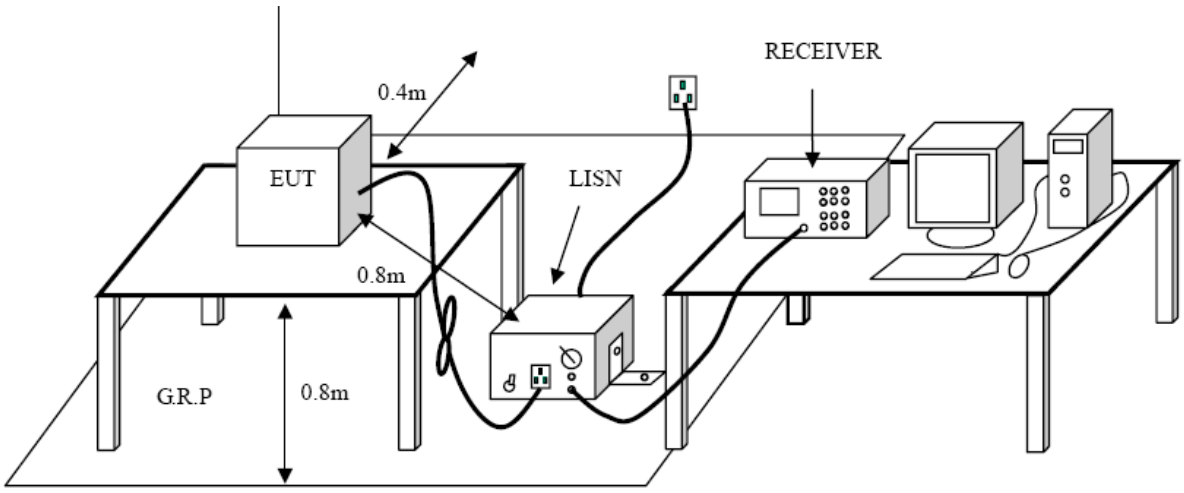
Notes:

(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.

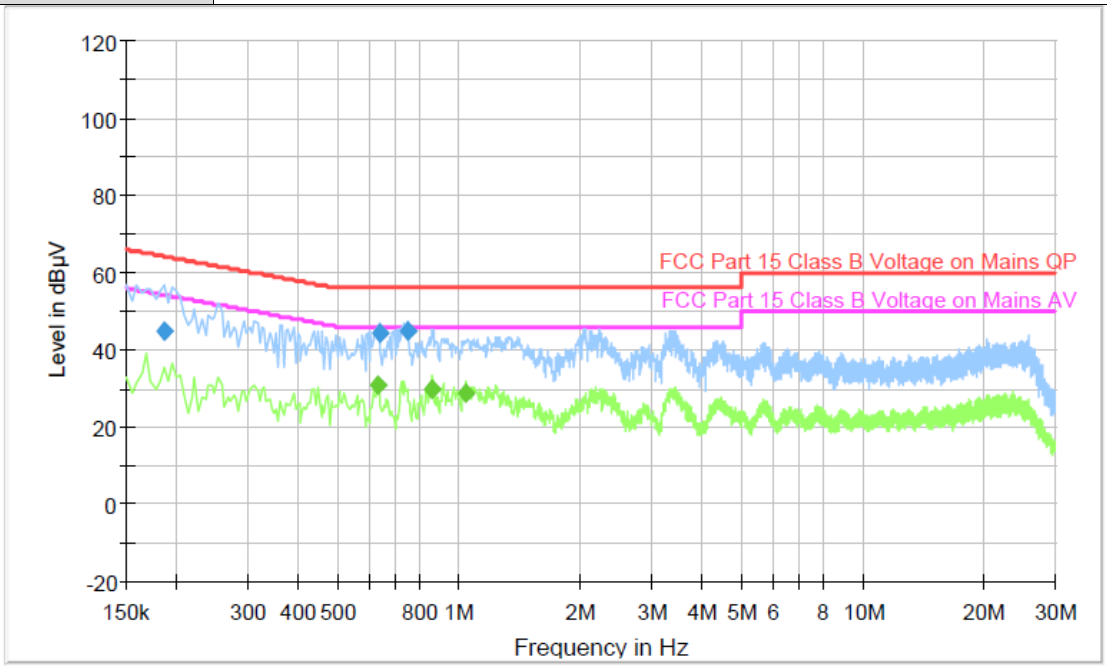
Test Mode:

Please refer to the clause 2.2.

Test Results

Only show worst adapter data.

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



Final Measurement Detector 1

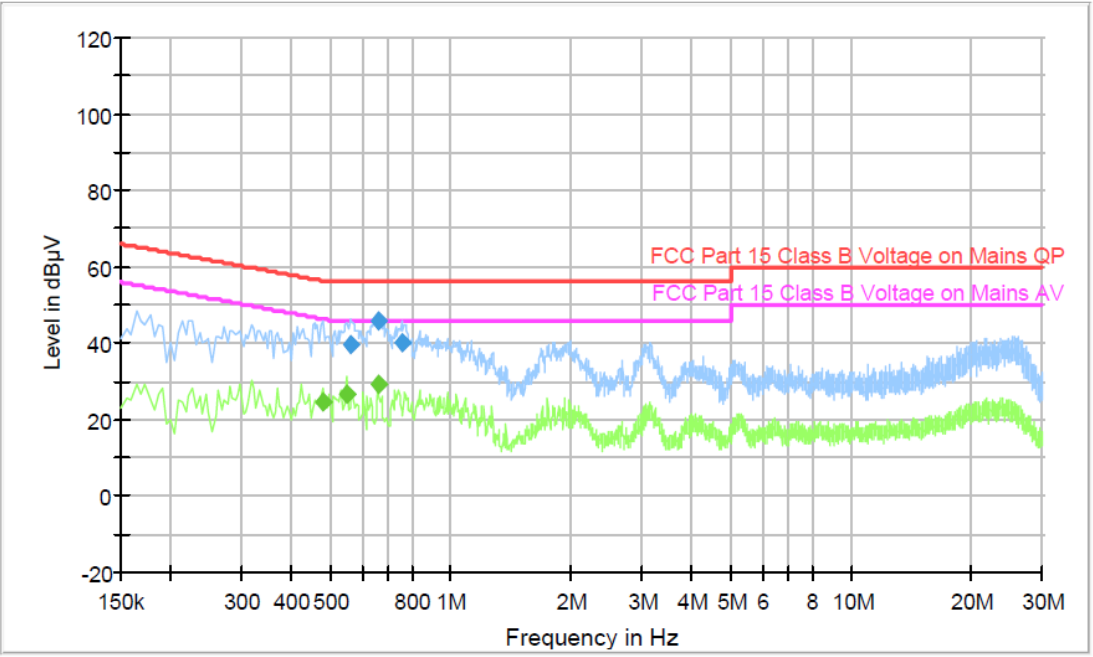
Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.186000	44.9	1000.000	9.000	Off	L1	10.0	19.3	64.2	
0.636000	44.2	1000.000	9.000	Off	L1	9.8	11.8	56.0	
0.744000	45.0	1000.000	9.000	Off	L1	9.8	11.0	56.0	

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.627000	30.8	1000.000	9.000	Off	L1	9.8	15.2	46.0	
0.861000	29.8	1000.000	9.000	Off	L1	9.9	16.2	46.0	
1.045500	28.7	1000.000	9.000	Off	L1	9.9	17.3	46.0	

Emission Level= Read Level+ Correct Factor

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



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.559500	39.6	1000.000	9.000	Off	N	10.1	16.4	56.0	
0.658500	46.0	1000.000	9.000	Off	N	10.0	10.0	56.0	
0.753000	40.3	1000.000	9.000	Off	N	10.0	15.7	56.0	

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.478500	24.7	1000.000	9.000	Off	N	10.1	21.7	46.4	
0.550500	26.8	1000.000	9.000	Off	N	10.1	19.2	46.0	
0.658500	29.5	1000.000	9.000	Off	N	10.0	16.5	46.0	

Emission Level= Read Level+ Correct Factor

3.2. Radiated Emission

Limit

Radiated Emission Limits (9 kHz~1000 MHz)

Frequency (MHz)	Field Strength (microvolt/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

Radiated Emission Limit (Above 1000MHz)

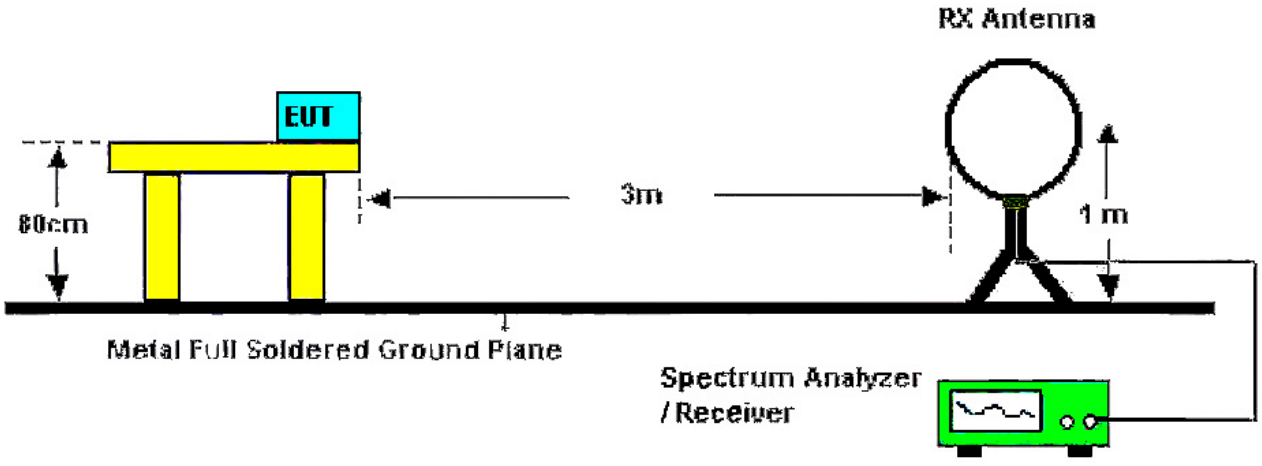
Frequency (MHz)	Distance Meters(at 3m)	
	Peak	Average
Above 1000	74	54

Note:

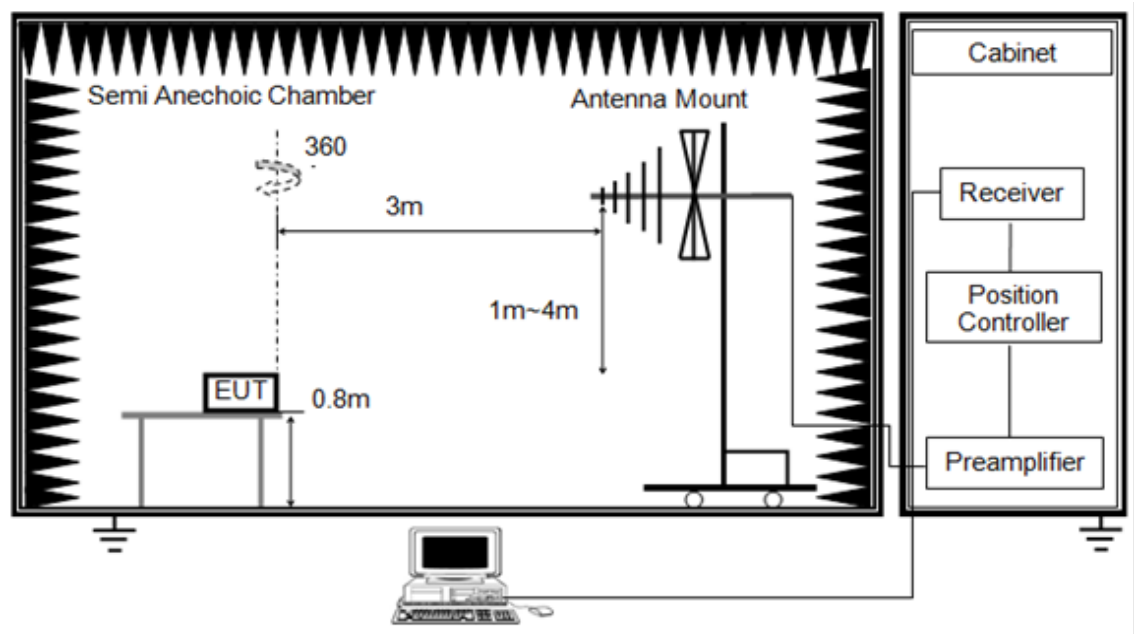
(1) The tighter limit applies at the band edges.

(2) Emission Level (dBuV/m)=20log Emission Level (uV/m).

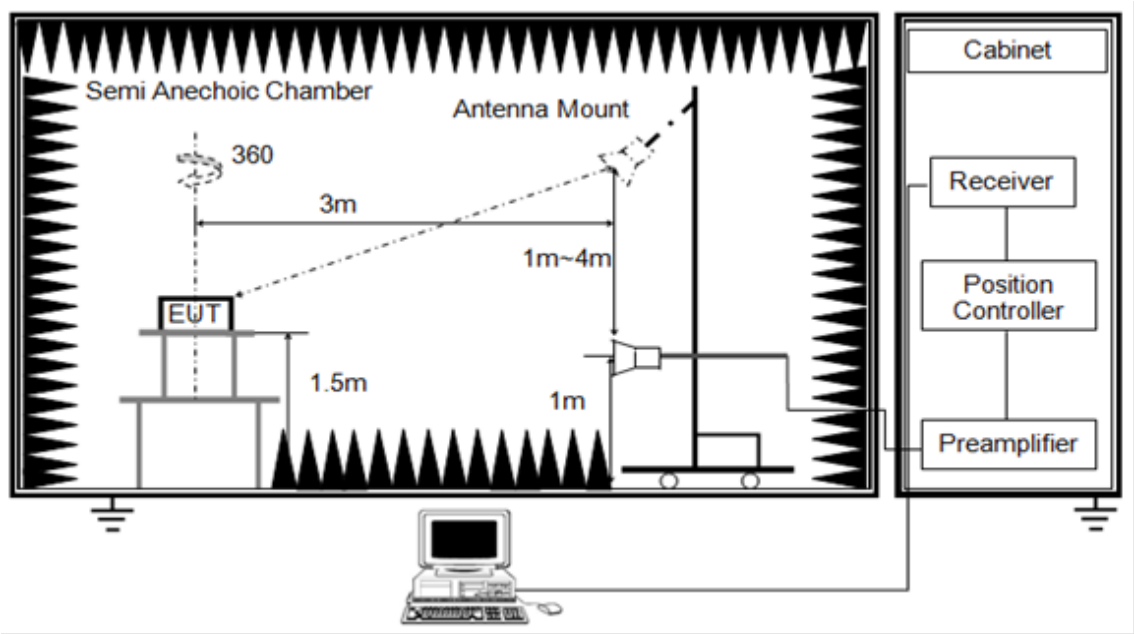
Test Configuration



Below 30MHz Test Setup



Below 1000MHz Test Setup



Above 1000MHz Test Setup

Test Procedure

1. The EUT was setup and tested according to ANSI C63.10:2013
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was set 3 meters from the 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) Below 1 GHz:
   RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;
   If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
   (3) From 1 GHz to 10^{th} harmonic:
   RBW=1MHz, VBW=3MHz Peak detector for Peak value.
   RBW=1MHz, VBW=3MHz RMS detector for Average value.

Test Mode

Please refer to the clause 2.2.

Test Result

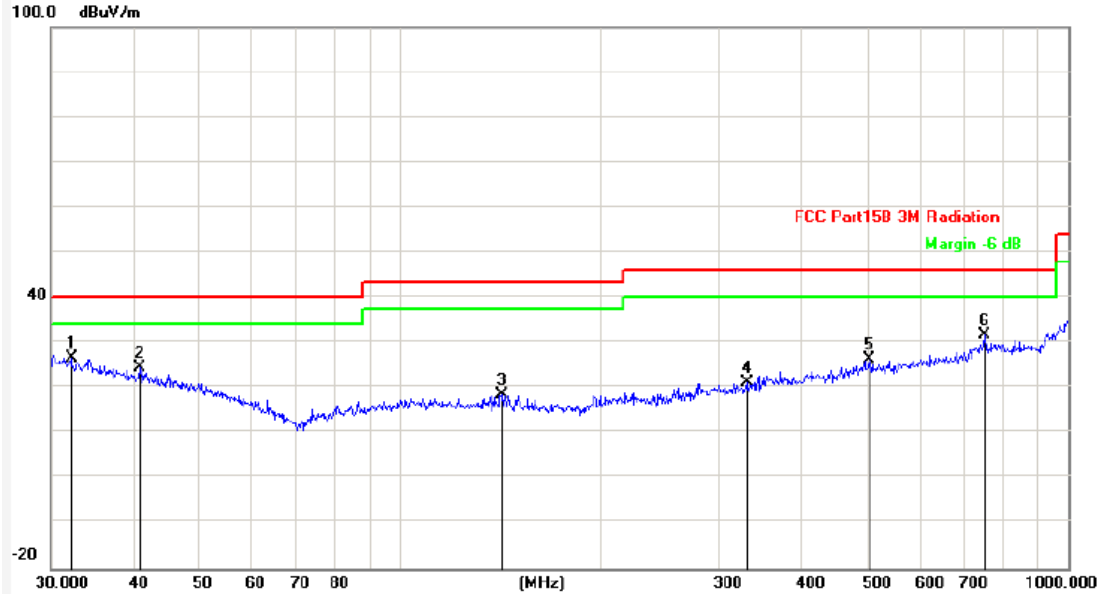
9 KHz~30 MHz

From 9 KHz to 30 MHz: Conclusion: PASS

Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

30MHz-1GHz

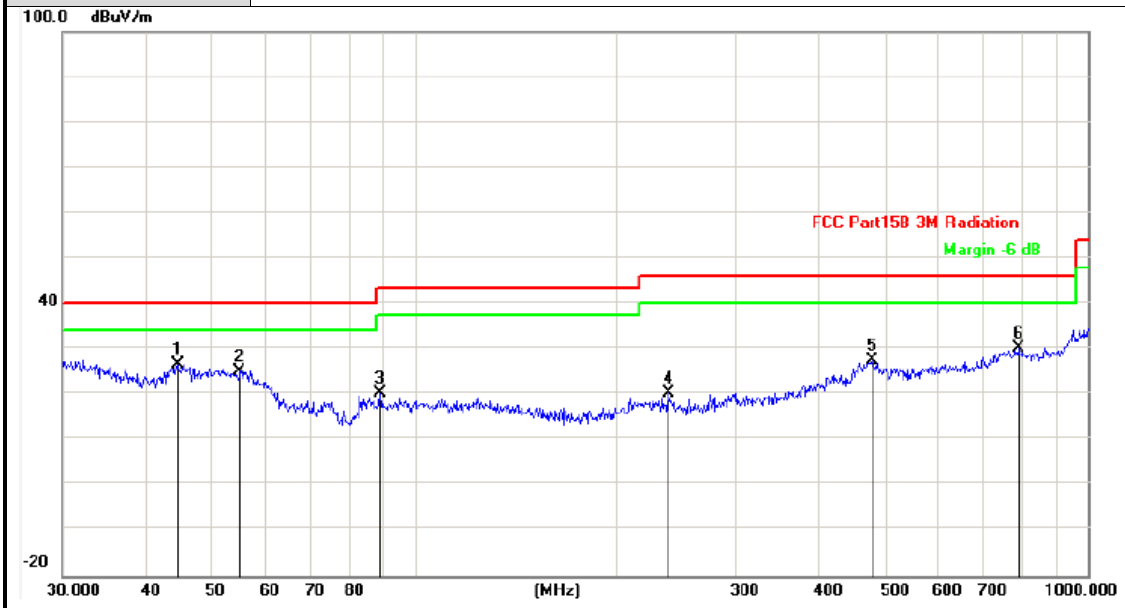
Ant. Pol.	Horizontal



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	32.1795	-4.59	31.13	26.54	40.00	-13.46	QP
2	40.7016	-7.68	32.18	24.50	40.00	-15.50	QP
3	141.8262	-13.97	32.38	18.41	43.50	-25.09	QP
4	330.1949	-10.92	32.25	21.33	46.00	-24.67	QP
5	502.9395	-6.78	33.14	26.36	46.00	-19.64	QP
6	750.1083	-1.85	33.75	31.90	46.00	-14.10	QP

Emission Level= Read Level+ Correct Factor

Ant. Pol.	Vertical



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	44.4308	-8.72	35.52	26.80	40.00	-13.20	QP
2	55.0274	-12.45	37.58	25.13	40.00	-14.87	QP
3	88.9639	-14.99	35.21	20.22	43.50	-23.28	QP
4	238.3102	-13.33	33.74	20.41	46.00	-25.59	QP
5	478.8456	-7.68	35.16	27.48	46.00	-18.52	QP
6	787.8513	-1.82	32.01	30.19	46.00	-15.81	QP

Emission Level= Read Level+ Correct Factor

Adobe 1GHz

Only show worse case:GFSK

No report for the emission which more than 20 dB below the prescribed limit.

Test Mode: GFSK - 2402MHz							
Frequency (MHz)	**Reading (dBuV)**	**Antenna Factor (dB/m)**	**Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Pole (V/H)**	**Remark**
4804	48.02	3.09	51.11	74	-22.89	V	peak
7206	47.69	5.21	52.9	74	-21.10	V	peak
4804	46.34	3.09	49.43	74	-24.57	H	peak
7206	47.21	5.21	52.42	74	-21.58	H	peak

Remark:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

Test Mode: GFSK - 2441MHz							
Frequency (MHz)	**Reading (dBuV)**	**Antenna Factor (dB/m)**	**Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Pole (V/H)**	**Remark**
4882	47.26	3.37	50.63	74	-23.37	V	peak
7323	46.89	5.56	52.45	74	-21.55	V	peak
4882	46.61	3.37	49.98	74	-24.02	H	peak
4882	47.32	3.37	50.69	74	-23.31	V	peak

Remark:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

Test Mode: GFSK - 2480MHz							
Frequency (MHz)	**Reading (dBuV)**	**Antenna Factor (dB/m)**	**Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Pole (V/H)**	**Remark**
4960	46.08	3.44	49.52	74	-24.48	V	peak
7440	45.13	5.64	50.77	74	-23.23	V	peak
4960	47.54	3.44	50.98	74	-23.02	H	peak
7440	48.17	5.64	53.81	74	-20.19	H	peak

Remark:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

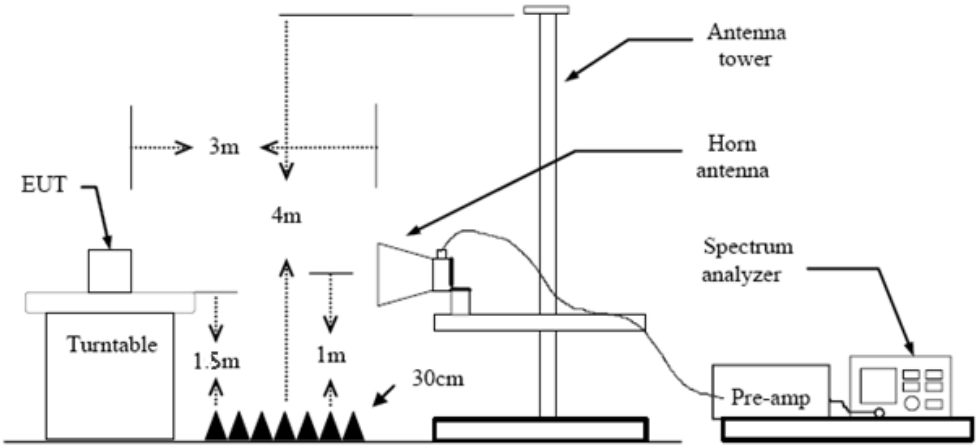
2.Margin value = Level -Limit value

3.3. Band Edge Emissions

Limit

Restricted Frequency Band (MHz)	(dBuV/m)(at 3m)	
	Peak	Average
2310 ~2390	74	54
2483.5 ~2500	74	54
Note: All restriction bands have been tested, only the worst case is reported.		

Test Configuration



Test Procedure

1. The EUT was setup and tested according to ANSI C63.10:2013 requirements.
2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT waspositioned such that the distance from antenna to the EUT was 3 meters.
4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. Thisis repeated for both horizontal and vertical polarization of the antenna. In order to find themaximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.
5. The receiver set as follow:
   RBW=1MHz, VBW=3MHz PEAK detector for Peak value.
   RBW=1MHz, VBW=10Hz with PEAK Detector for Average Value.

Test Mode

Please refer to the clause 2.2.

Test Results

(1) Radiation Test

Only show worse case:GFSK

EDR	2402MHz						
Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
2390	51.08	3.28	54.36	74	-19.64	Vertical	Peak
2400	52.21	3.85	56.06	74	-17.94	Vertical	Peak
2390	53.29	3.02	56.31	74	-17.69	Horizontal	Peak
2400	50.51	3.67	54.18	74	-19.82	Horizontal	Peak
2390	44.27	3.28	47.55	54	-6.45	Vertical	Average
2400	45.12	3.85	48.97	54	-5.03	Vertical	Average
2390	43.91	3.02	46.93	54	-7.07	Horizontal	Average
2400	43.82	3.67	47.49	54	-6.51	Horizontal	Average

EDR	2480MHz						
Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
2483.5	51.32	3.79	55.11	74	-18.89	Vertical	Peak
2500	52.54	4.09	56.63	74	-17.37	Vertical	Peak
2483.5	52.87	3.65	56.52	74	-17.48	Horizontal	Peak
2500	54.21	3.95	58.16	74	-15.84	Horizontal	Peak
2483.5	43.32	3.79	47.11	54	-6.89	Vertical	Average
2500	44.41	4.09	48.5	54	-5.5	Vertical	Average
2483.5	43.69	3.65	47.34	54	-6.66	Horizontal	Average
2500	44.78	3.95	48.73	54	-5.27	Horizontal	Average

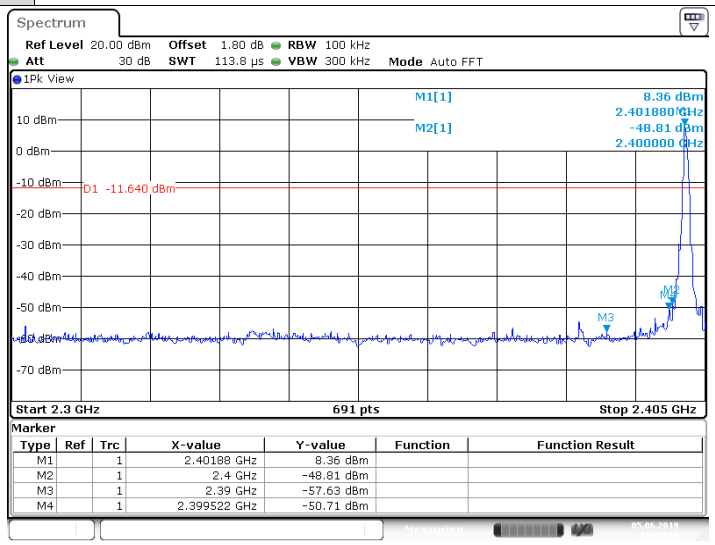
Remark:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

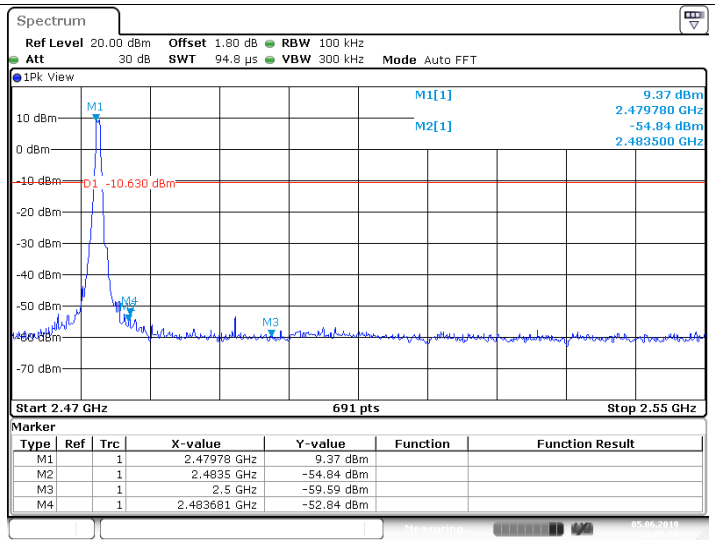
2.Margin value = Level -Limit value

(2) Conducted Test

Test Mode:	GFSK Mode 2402MHz/2480 MHz

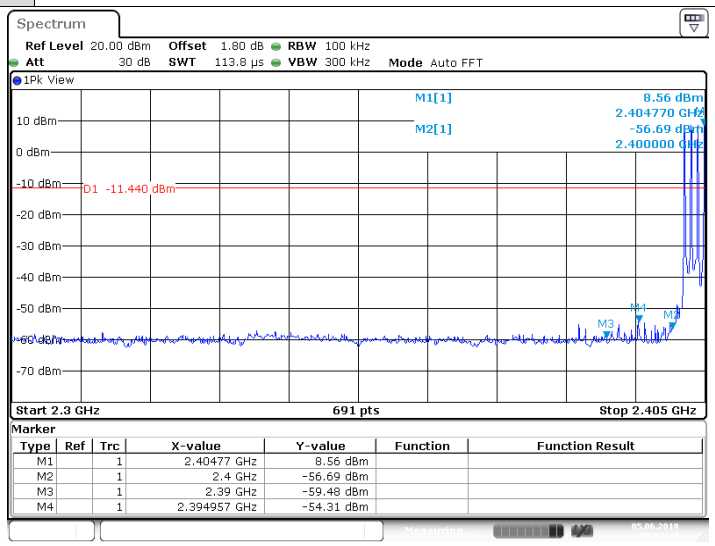


Date: 5.JUN.2019 19:57:13



Date: 5.JUN.2019 20:07:58

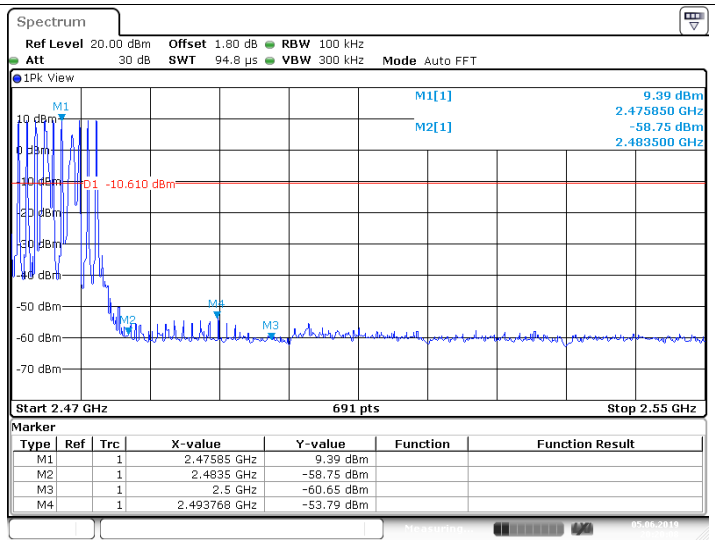
Test Mode:	GFSK Hopping Mode



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40477 GHz	8.56 dBm		
M2		1	2.4 GHz	-56.69 dBm		
M3		1	2.39 GHz	-59.48 dBm		
M4		1	2.394957 GHz	-54.31 dBm		

Date: 5.JUN.2019 20:11:48

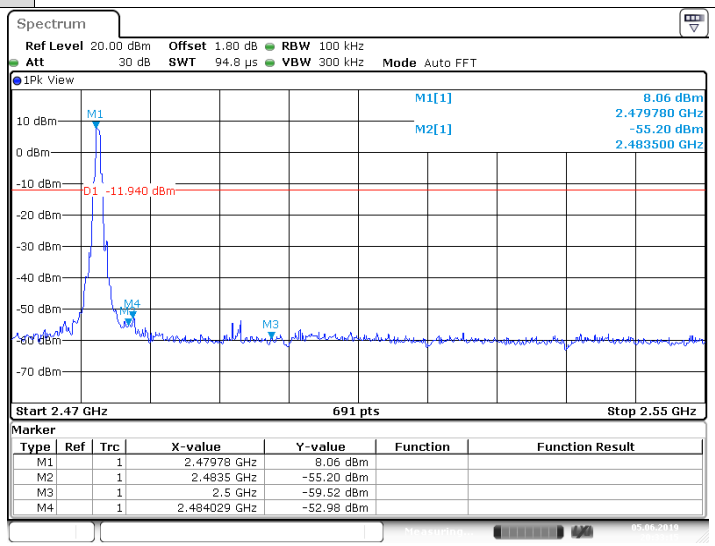


Marker

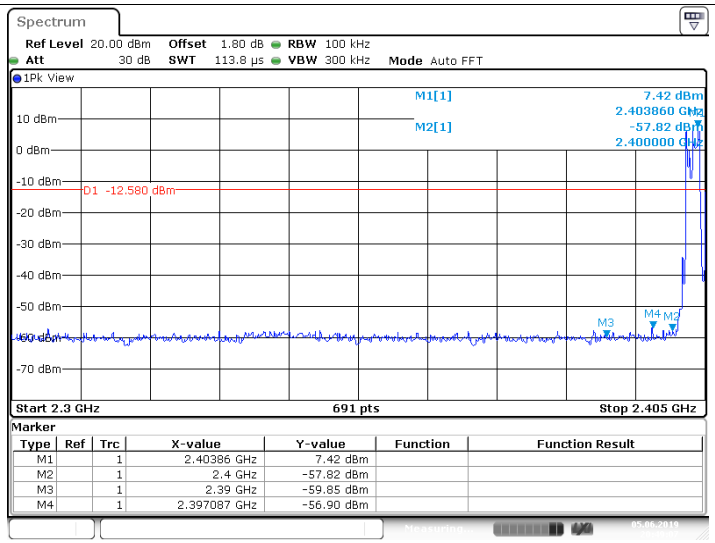
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.47585 GHz	9.39 dBm		
M2		1	2.4835 GHz	-58.75 dBm		
M3		1	2.5 GHz	-60.65 dBm		
M4		1	2.493768 GHz	-53.79 dBm		

Date: 5.JUN.2019 20:20:07

Test Mode:	π/4-DQPSK Mode 2402MHz/2480 MHz

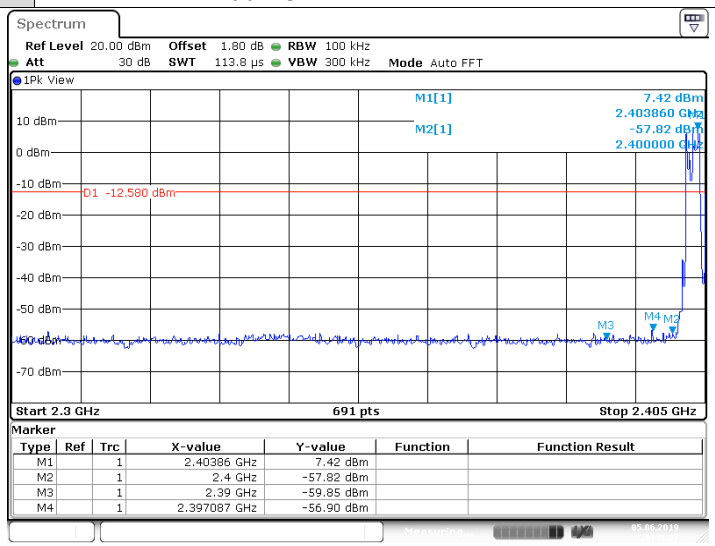


Date: 5.JUN.2019 20:33:16

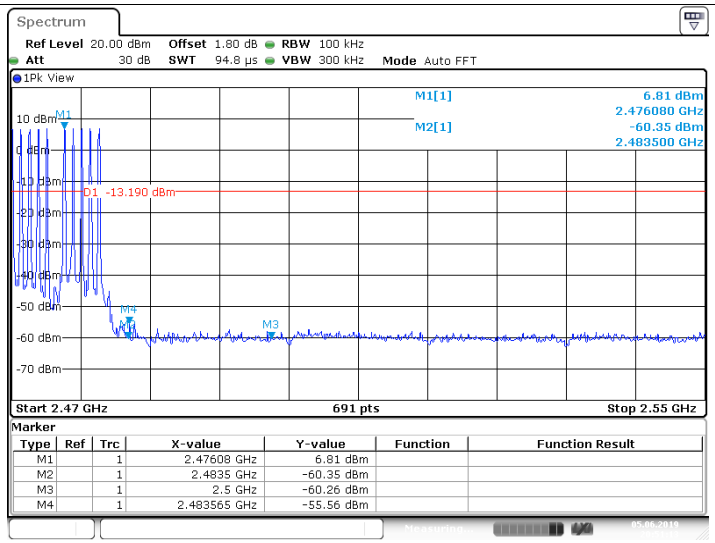


Date: 5.JUN.2019 20:49:08

Test Mode:	π/4-DQPSK Hopping Mode

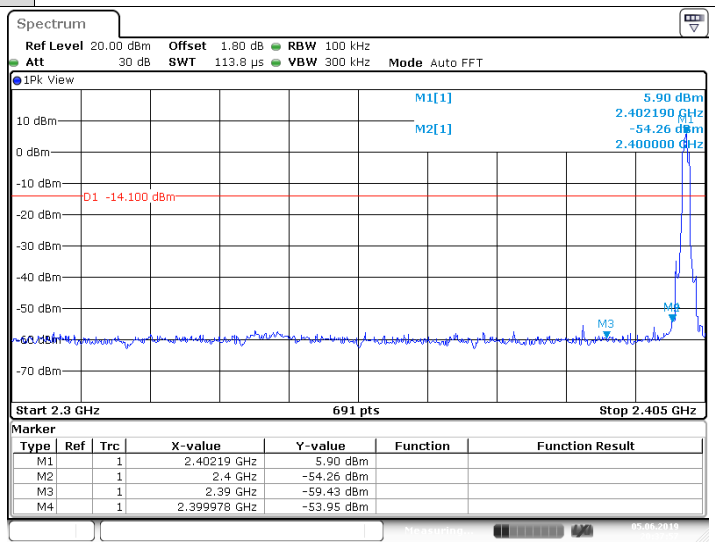


Date: 5.JUN.2019 20:49:08

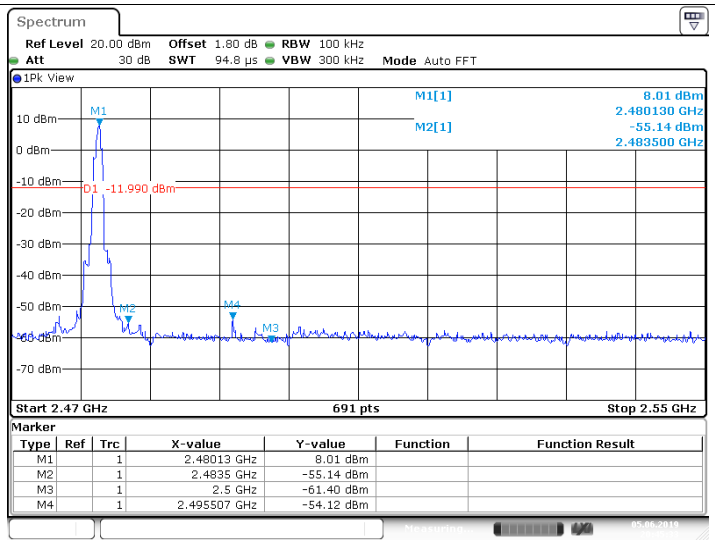


Date: 5.JUN.2019 20:51:12

Test Mode:	8-DPSK Mode 2402MHz/2480 MHz

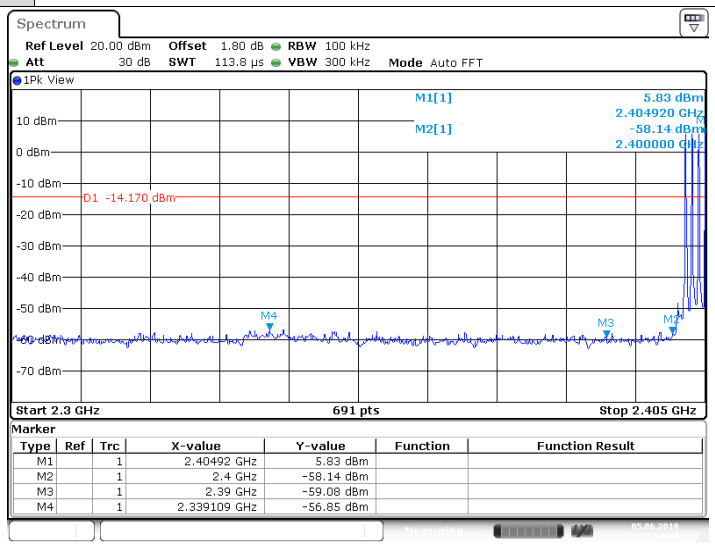


Date: 5.JUN.2019 20:37:56

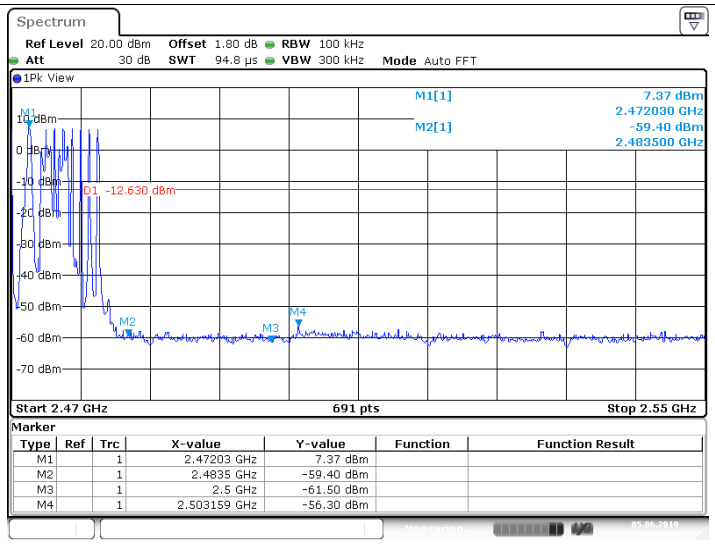


Date: 5.JUN.2019 20:45:33

Test Mode:	8-DPSK Hopping Mode



Date: 5.JUN.2019 20:54:47



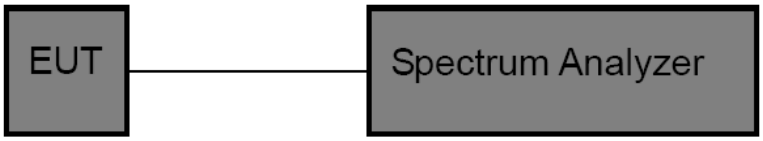
Date: 5.JUN.2019 20:56:48

3.4. Bandwidth and Channel Separation

Limit

Test Item	Limit	Frequency Range(MHz)
20dB Occupied Bandwidth	/	2400-2483.5
99% Occupied Bandwidth	/	2400-2483.5
Channel Separation	>25KHz or >two-thirds of the 20 dB bandwidth Which is greater	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:
   (1) Set RBW = For 20dB Occupied Bandwidth:1% of the 20 dB bandwidth
   (2) Set RBW = For 99% Occupied Bandwidth: 1% to 5% of the occupied bandwidth
   (3) Set VBW= For 20dB Occupied Bandwidth: ≥ RBW
   (4) Set VBW= For 99% Occupied Bandwidth: approximately 3×RBW
   (5) Detector = Peak
   (6) Trace mode = Max hold.
   (7) 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

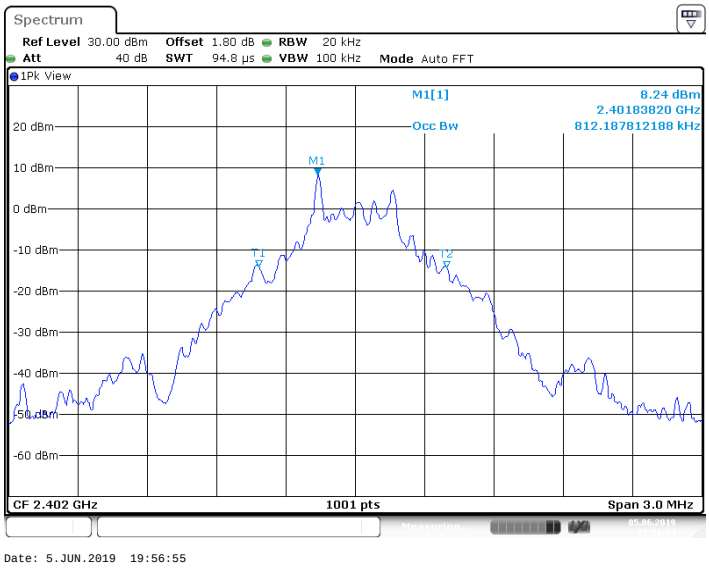
Please refer to the clause 2.2.

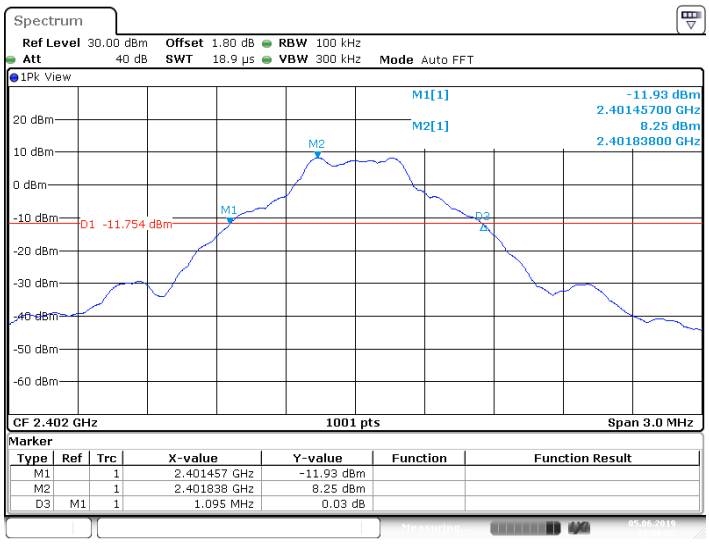
Test Results

Test Mode:	GFSK Mode		
Channel frequency (MHz)	**99% OBW (kHz)**	**20dB Bandwidth (kHz)**	**20dB Bandwidth *2/3 (kHz)**
2402	812	1095	730
2441	809	1095	730
2480	815	1089	726

GFSK Mode

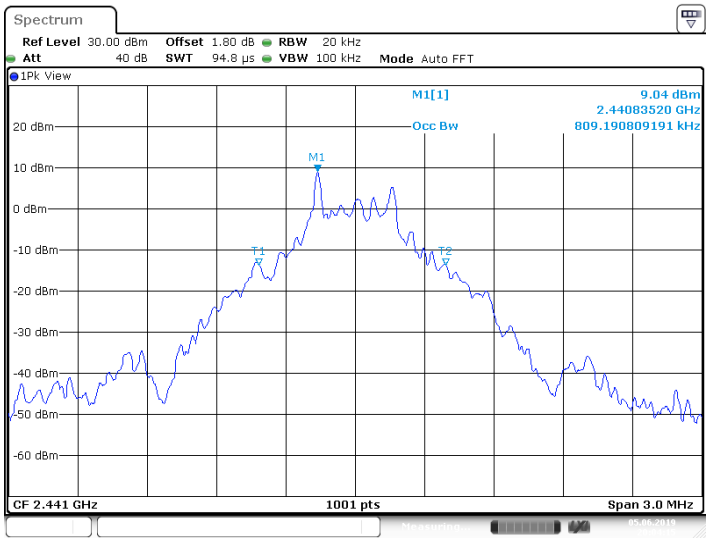
2402 MHz



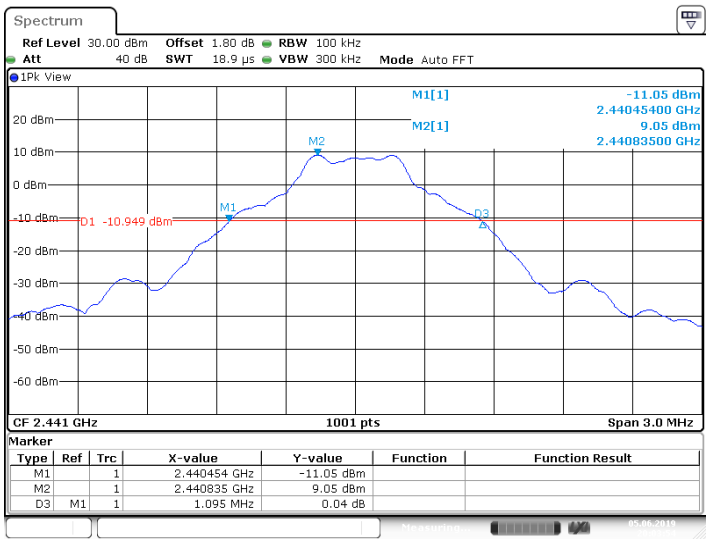


GFSK Mode

2441 MHz



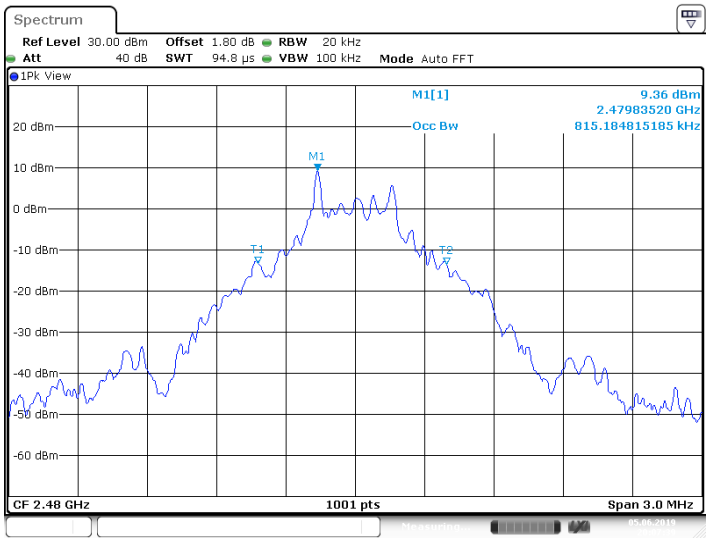
Date: 5.JUN.2019 20:04:14

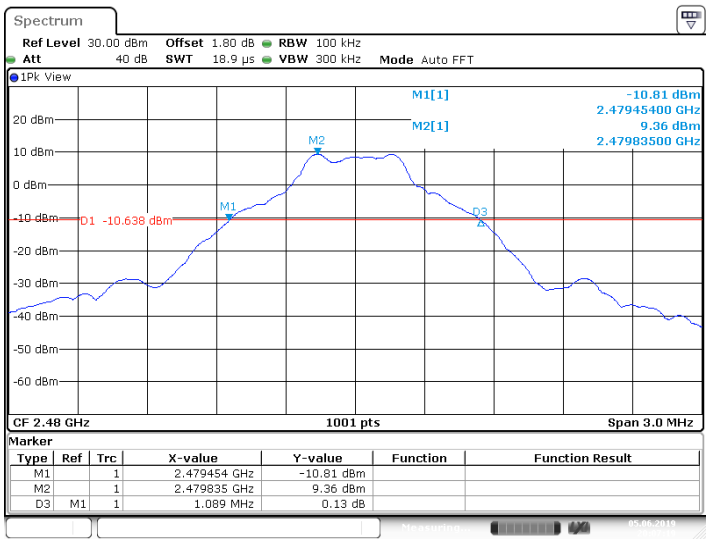


Date: 5.JUN.2019 20:03:54

GFSK Mode

2480 MHz

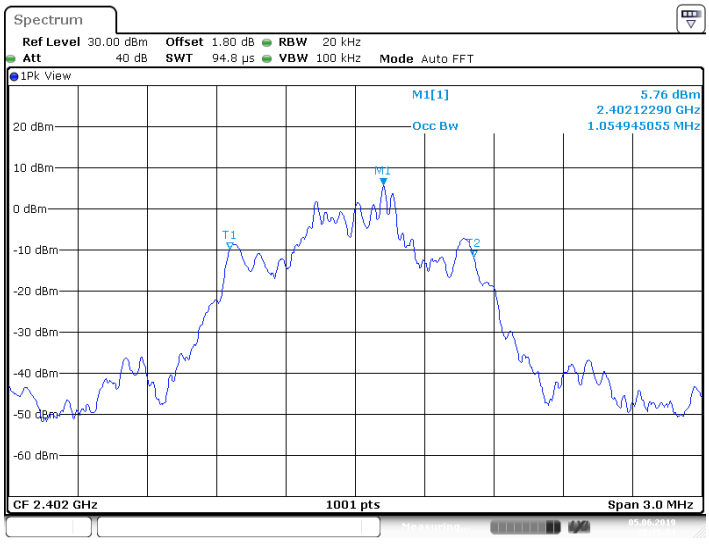


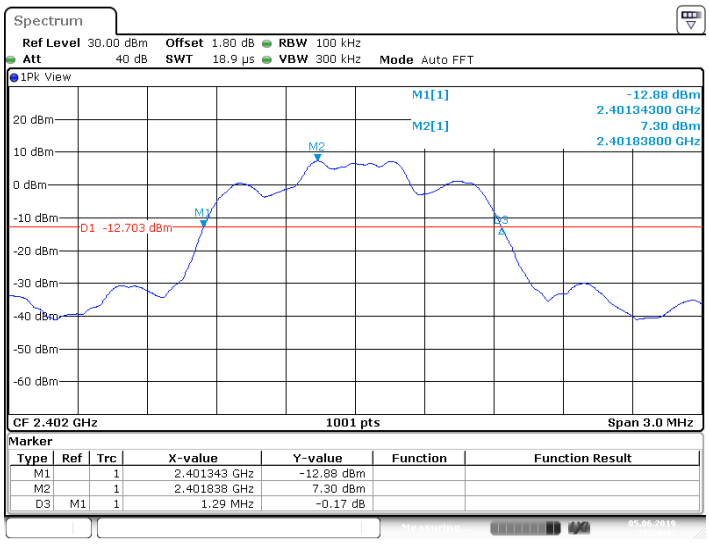


Test Mode:	π/4-DQPSK Mode		
Channel frequency (MHz)	**99% OBW (kHz)**	**20dB Bandwidth (kHz)**	**20dB Bandwidth *2/3 (kHz)**
2402	1055	1290	860
2441	1058	1290	860
2480	1058	1290	860

π/4-DQPSK Mode

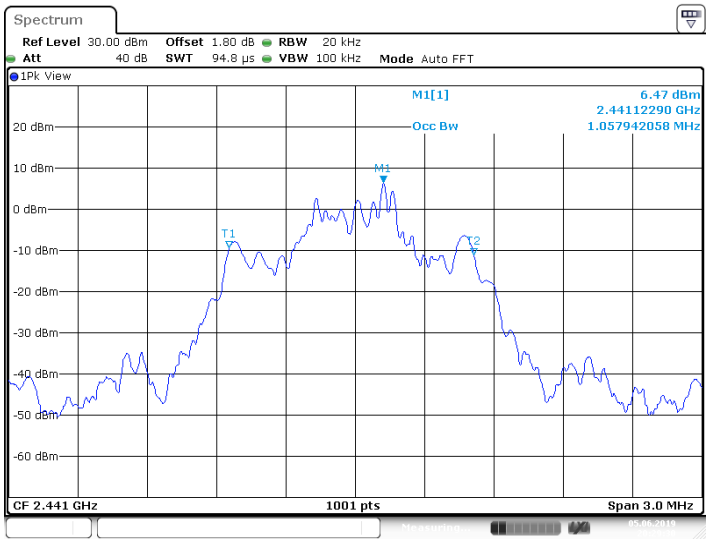
2402 MHz



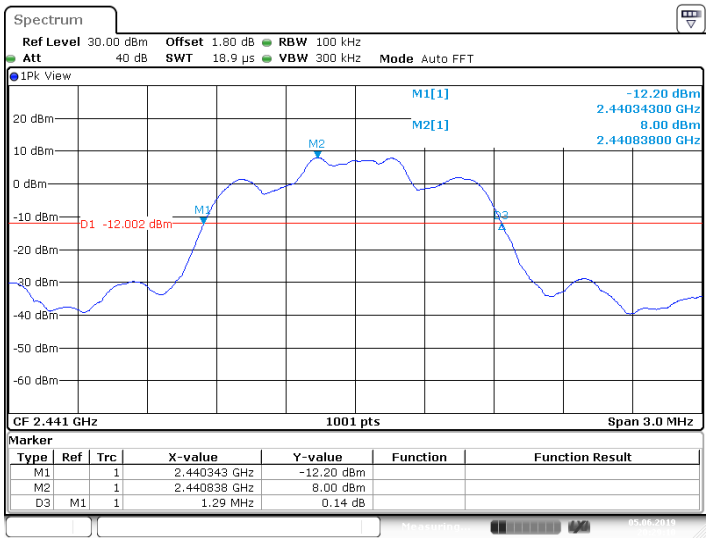


π/4-DQPSK Mode

2441 MHz



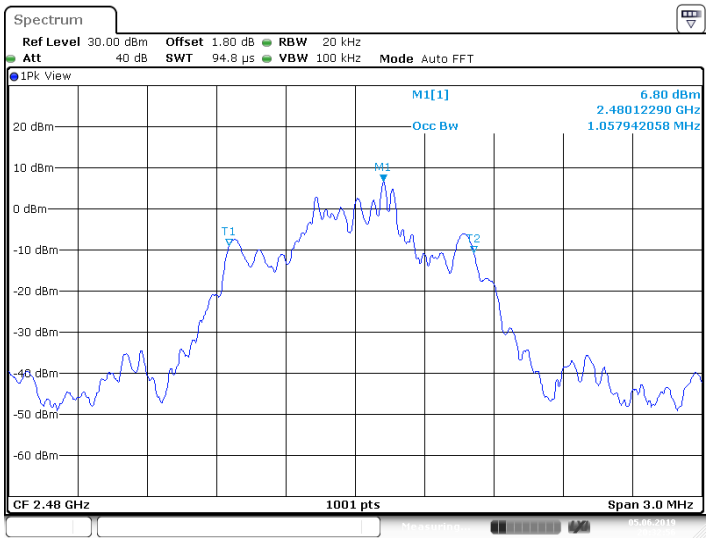
Date: 5.JUN.2019 20:29:30

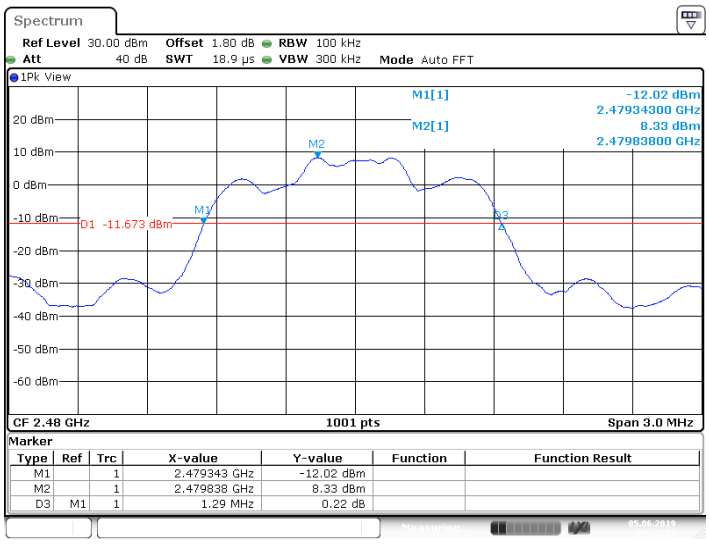


Date: 5.JUN.2019 20:29:10

π/4-DQPSK Mode

2480 MHz

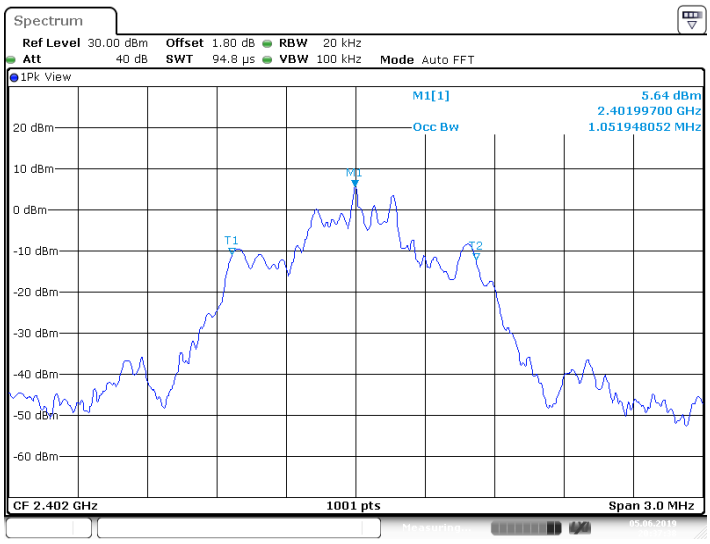


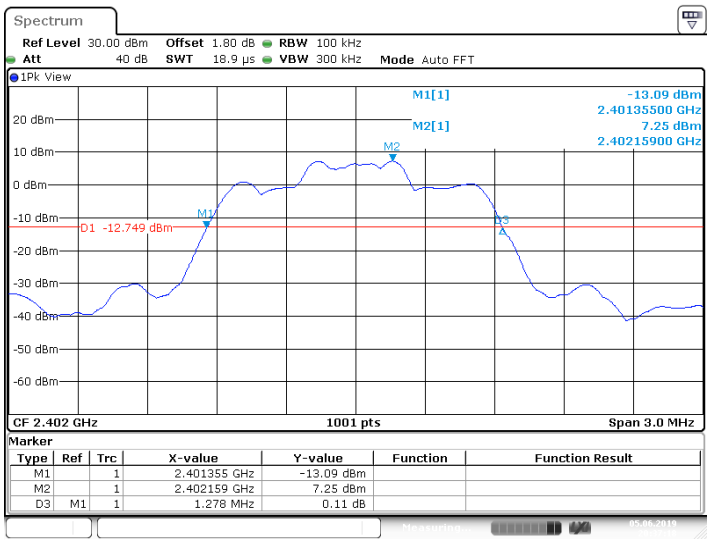


Test Mode:	8-DPSK Mode		
Channel frequency (MHz)	**99% OBW (kHz)**	**20dB Bandwidth (kHz)**	**20dB Bandwidth *2/3 (kHz)**
2402	1052	1322.115	881.41
2441	1052	1322.115	881.41
2480	1055	1317.307	878.20

8-DPSK Mode

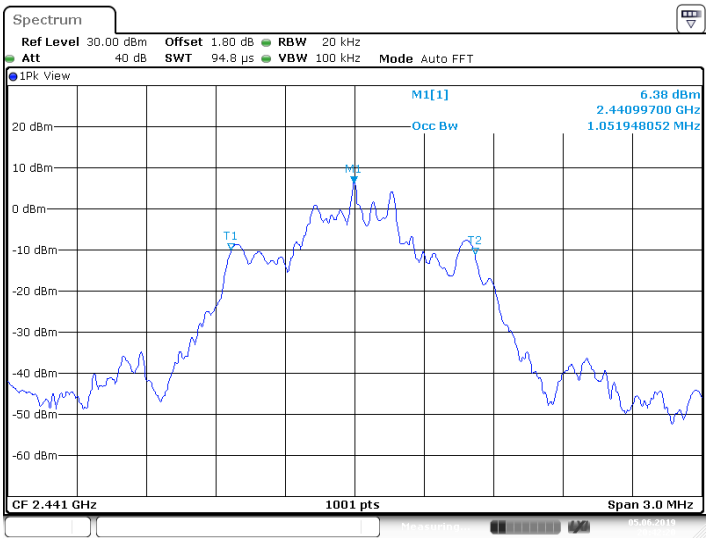
2402 MHz



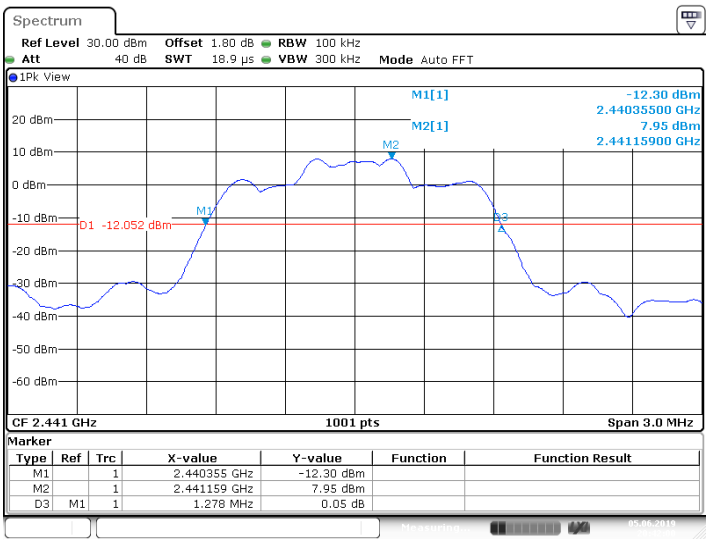


8-DPSK Mode

2441 MHz



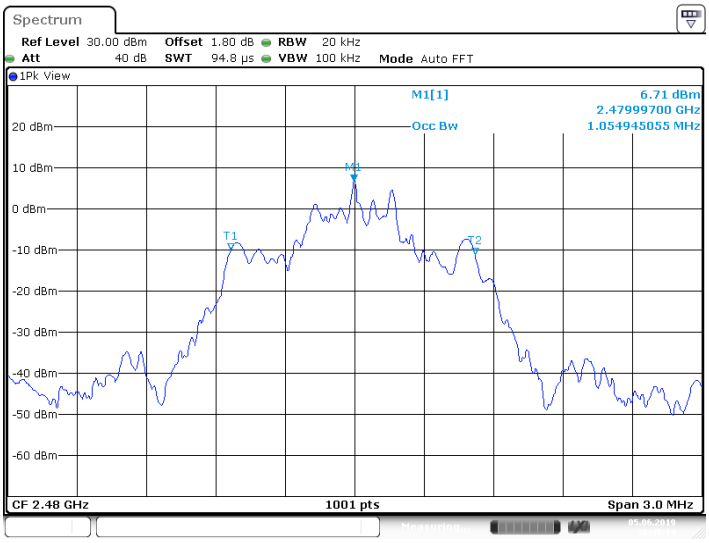
Date: 5.JUN.2019 20:42:20

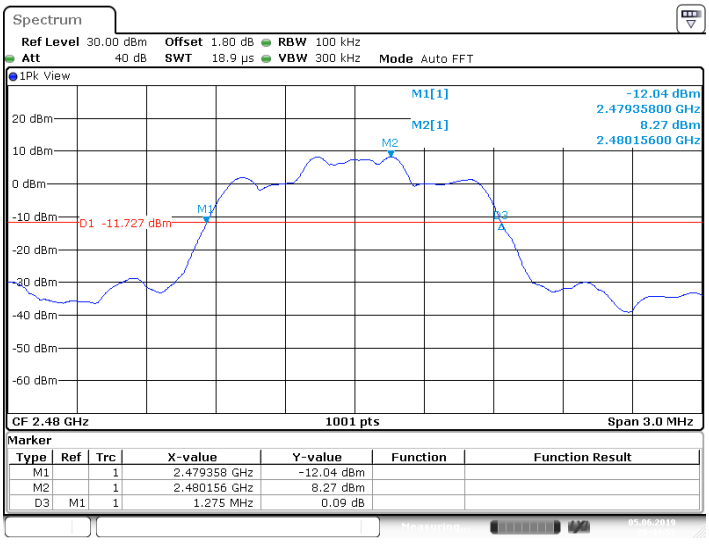


Date: 5.JUN.2019 20:42:00

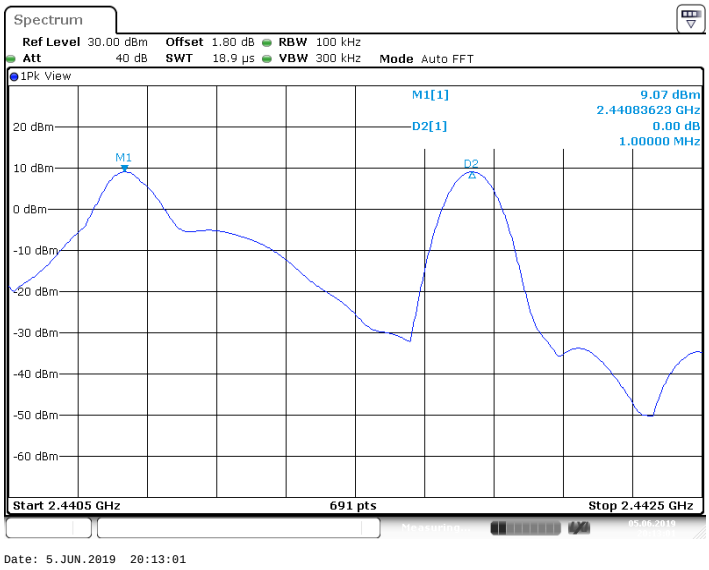
8-DPSK Mode

2480 MHz

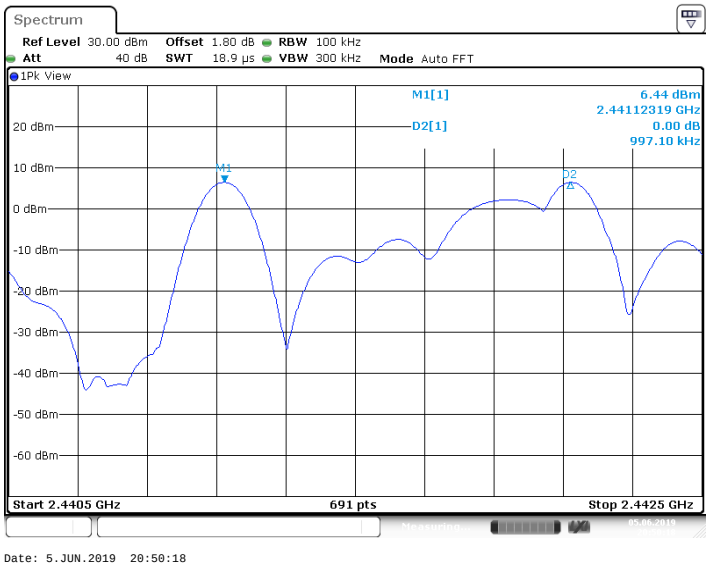




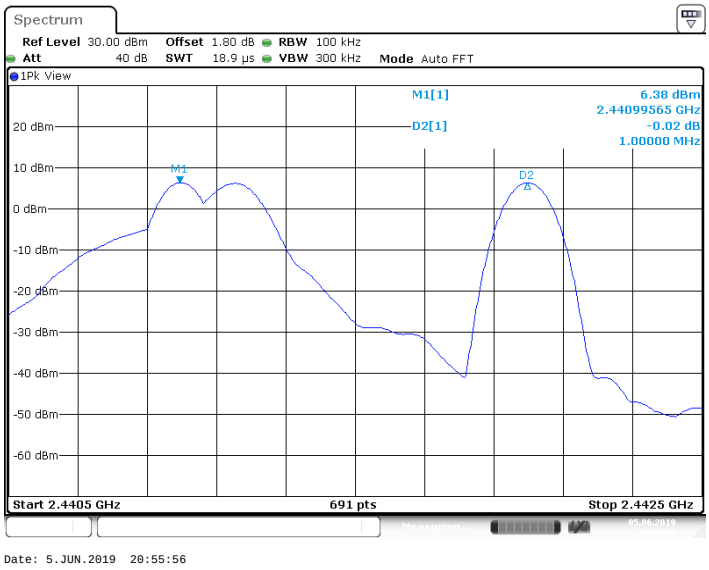
Test Mode:	GFSK Hopping Mode	
Channel frequency (MHz)	**Separation Read Value (kHz)**	**Separation Limit (kHz)**
2441	1000.00	701.92
GFSK Hopping Mode		
2402 MHz		



Test Mode:	π/4-DQPSK Hopping Mode	
Channel frequency (MHz)	**Separation Read Value (kHz)**	**Separation Limit (kHz)**
2441	997	862.18
π/4-DQPSK Hopping Mode		



Test Mode:	8-DPSK Hopping Mode	
Channel frequency (MHz)	**Separation Read Value (kHz)**	**Separation Limit (kHz)**
2441	1000	881.41
8-DPSK Hopping Mode		

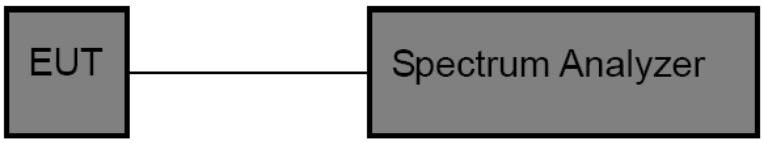


3.5. Number of Hopping Channel

Limit

Section	Test Item	Limit
15.247	Number of Hopping Channel	>15

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:
   (1) Peak Detector: RBW=100 kHz, VBW□RBW, Sweep time= Auto.

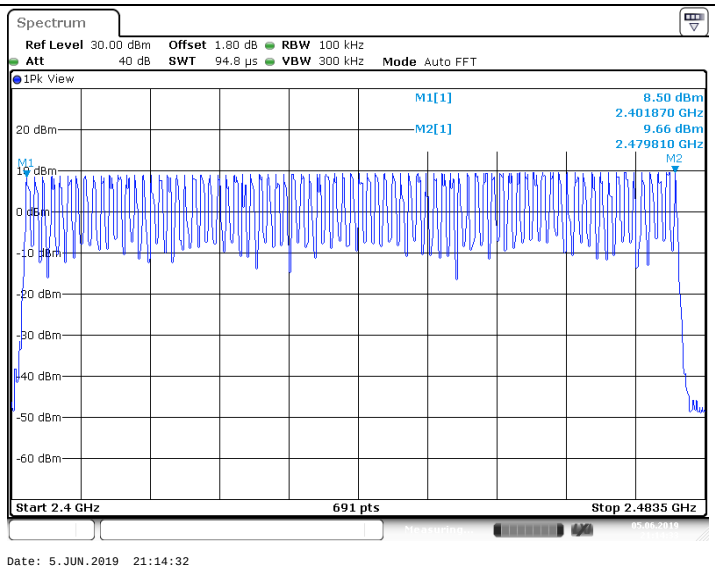
Test Mode

Please refer to the clause 2.2.

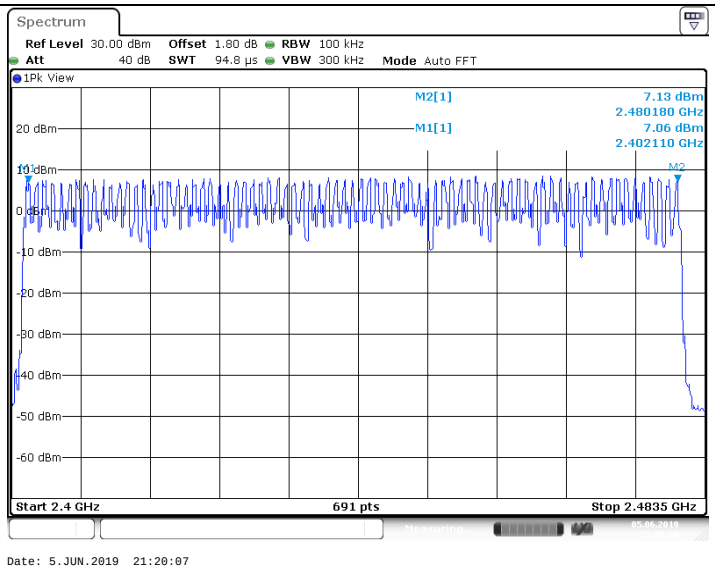
Test Result

Test Mode:	Hopping Mode		
Frequency Range	**Test Mode**	**Quantity of Hopping Channel**	**Limit**
2402MHz~2483.5MHz	GFSK	79	**>15**
	π/4-DQPSK	79	
	8-DPSK	79	

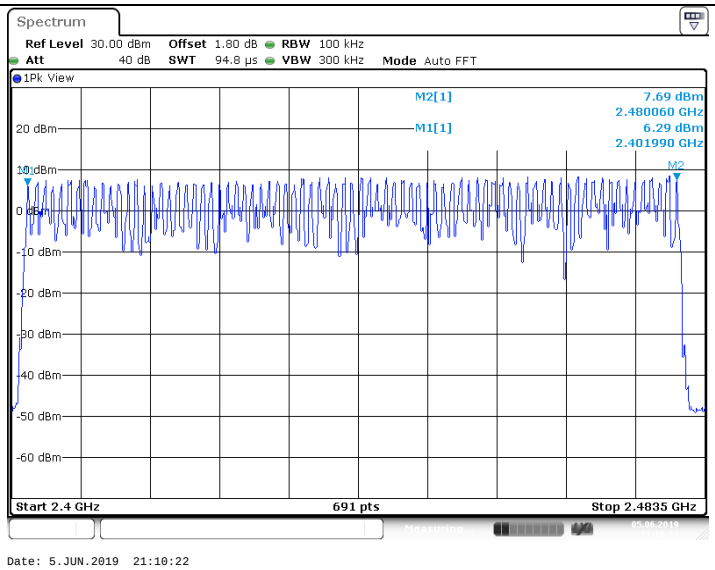
GFSK Mode



π/4-DQPSK Mode



8-DPSK Mode

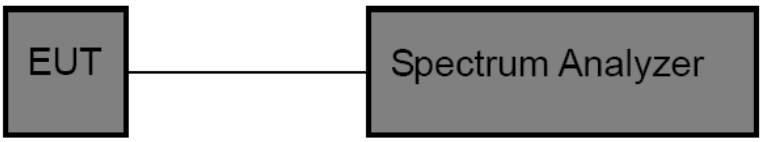

Spectrum
Ref Level 30.00 dBm Offset 1.80 dB RBW 100 kHz
Att 40 dB SWT 94.8 µs VBW 300 kHz Mode Auto FFT
1Pk View
M2[1] 7.69 dBm
2.480060 GHz
M1[1] 6.29 dBm
2.401990 GHz
M2
20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
Start 2.4 GHz
691 pts
Stop 2.4835 GHz
Date: 5.JUN.2019 21:10:22

3.6. Dwell Time

Limit

Section	Test Item	Limit
15.247(a)(1)/ RSS-210 Annex 8(A8.1d)	Average Time of Occupancy	0.4 sec

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:
   (1) Spectrum Setting: RBW=1MHz, VBW□RBW.
   (2) Use video trigger with the trigger level set to enable triggering only on full pulses.
   (3) Sweep Time is more than once pulse time.
   (4) Set the center frequency on any frequency would be measure and set the frequency span to zero.
   (5) Measure the maximum time duration of one single pulse.
   (6) Set the EUT for packet transmitting.

Test Mode

Please refer to the clause 2.2

Test Result

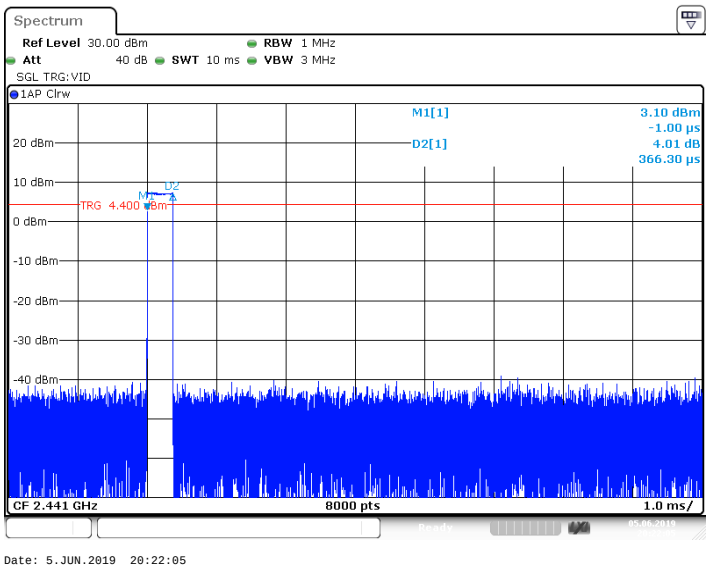
Test Mode:	Hopping Mode (GFSK)					
Test Mode	**Channel (MHz)**	**Pulse Time (ms)**	**Total of Dwell (ms)**	**Period Time (s)**	**Limit (ms)**	**Result**
DH1	Hop	0.37	330	0.121	**400**	**PASS**
DH3	Hop	1.62	180	0.291	**400**	**PASS**
DH5	Hop	2.86	130	0.371	**400**	**PASS**

DH1 Total of Dwell= Pulse Time(1600/2)*31.6/79*

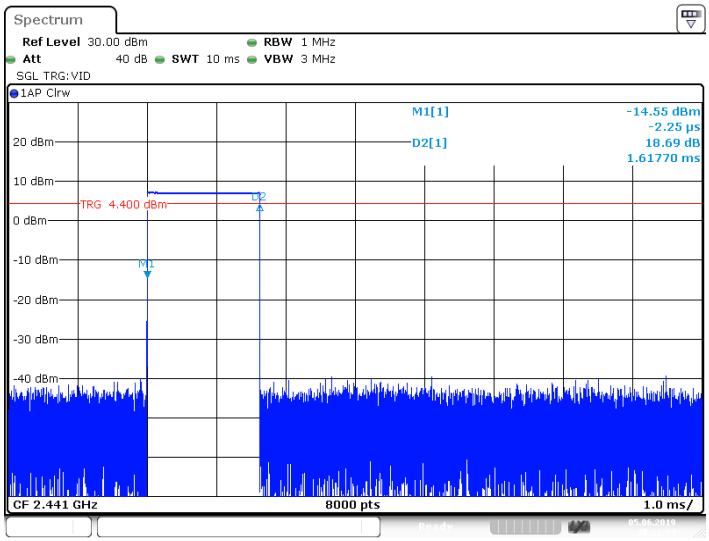
DH3 Total of Dwell= Pulse Time(1600/4)*31.6/79*

DH5 Total of Dwell= Pulse Time(1600/6)*31.6/79*

GFSK Hopping Mode DH1

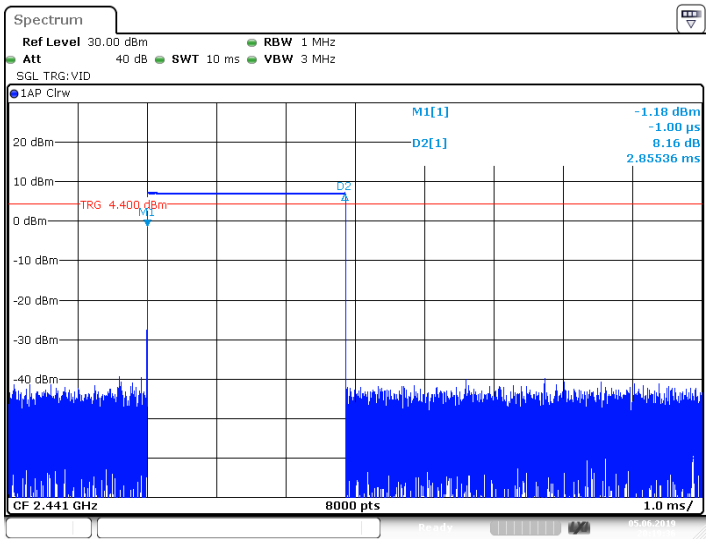


GFSK Hopping Mode DH3



Date: 5.JUN.2019 20:22:54

GFSK Hopping Mode DH5



Date: 5.JUN.2019 20:19:37

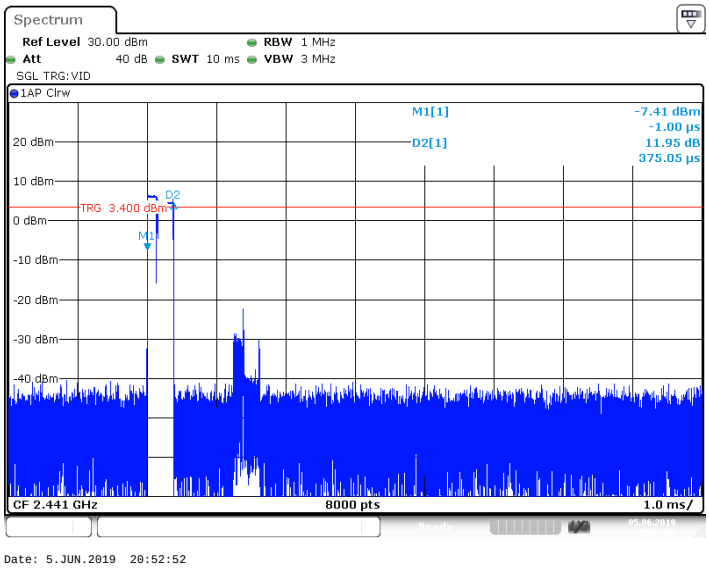
Test Mode:	Hopping Mode (π/4-DQPSK)					
Test Mode	**Channel (MHz)**	**Pulse Time (ms)**	**Total of Dwell (ms)**	**Period Time (s)**	**Limit (ms)**	**Result**
2DH1	2441	0.38	330	0.124	**400**	**PASS**
2DH3	2441	1.62	170	0.275	**400**	**PASS**
2DH5	2441	2.86	110	0.315	**400**	**PASS**

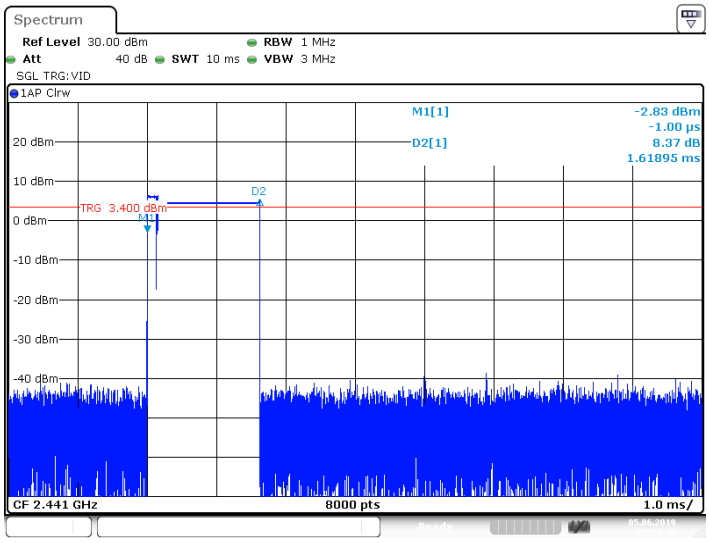
2DH1 Total of Dwell= Pulse Time(1600/2)*31.6/79*

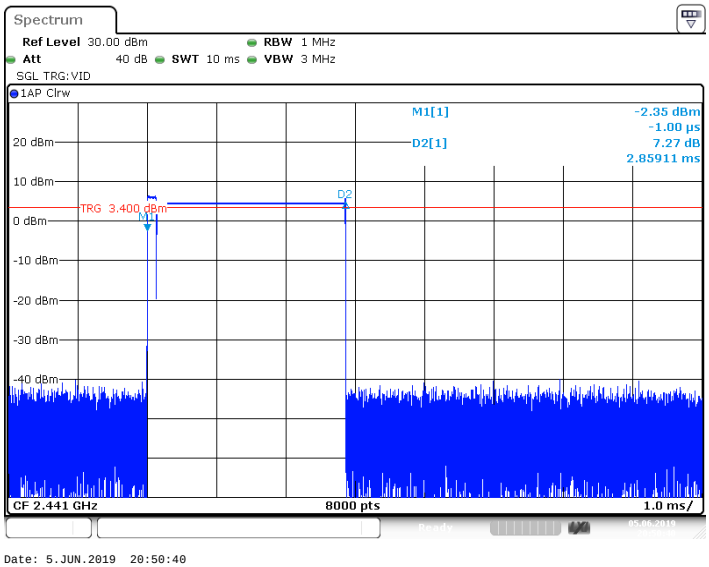
2DH3 Total of Dwell= Pulse Time(1600/4)*31.6/79*

2DH5 Total of Dwell= Pulse Time(1600/6)*31.6/79*

π/4-DQPSK Hopping Mode 2DH1



π/4-DQPSK Hopping Mode 2DH3


π/4-DQPSK Hopping Mode 2DH5


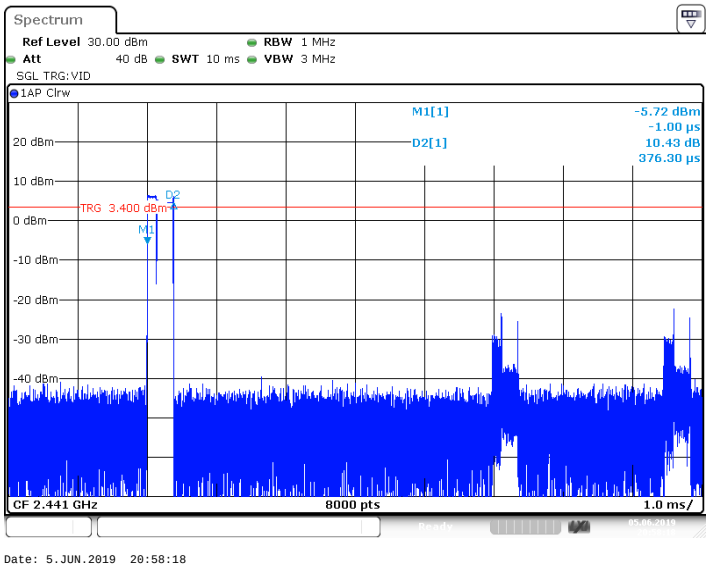
Test Mode:	Hopping Mode (8-DPSK)					
Test Mode	**Channel (MHz)**	**Pulse Time (ms)**	**Total of Dwell (ms)**	**Period Time (s)**	**Limit (ms)**	**Result**
3DH1	2441	0.38	330	0.124	**400**	**PASS**
3DH3	2441	1.62	160	0.259	**400**	**PASS**
3DH5	2441	2.85	304	-0.001	**400**	**PASS**

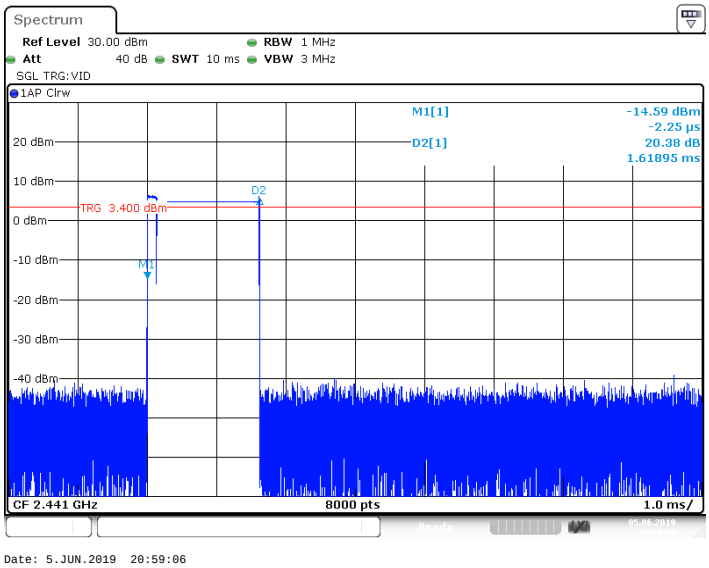
3DH1 Total of Dwell= Pulse Time(1600/2)*31.6/79*

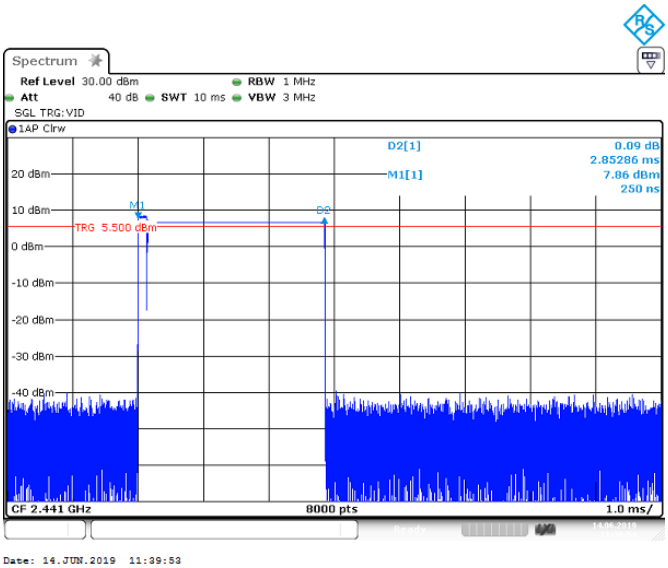
3DH3 Total of Dwell= Pulse Time(1600/4)*31.6/79*

3DH5 Total of Dwell= Pulse Time(1600/6)*31.6/79*

8-DPSK Hopping Mode 3DH1



8-DPSK Hopping Mode 3DH3


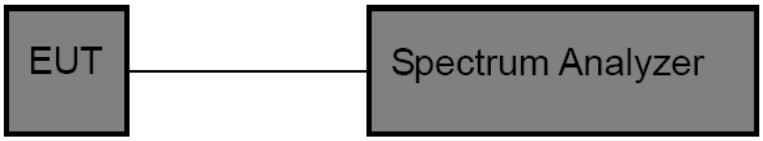
8-DPSK Hopping Mode 3DH5


3.7. 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□DTS Bandwidth, VBW□3*RBW.
Sweep time=Auto.
Detector= Peak.
Trace mode= Maxhold.

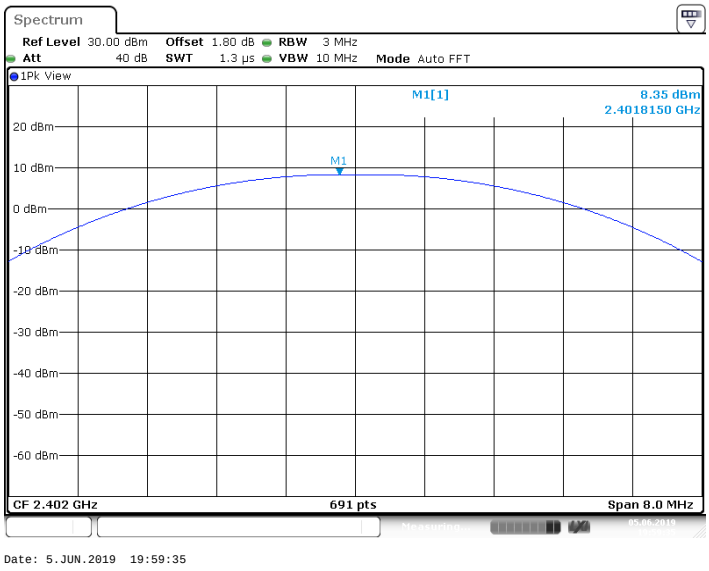
Allow trace to fully stabilize. Then use the peak marker function to determine the maximum amplitude level.

Test Mode

Please refer to the clause 2.2

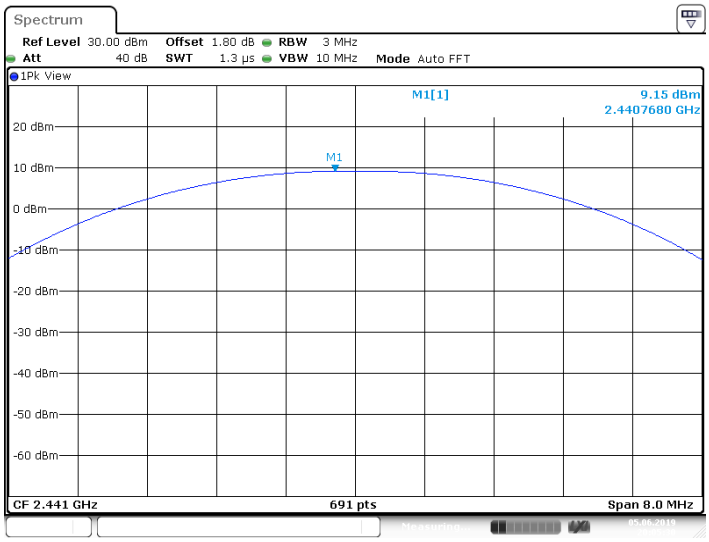
Test Result

Test Mode:	GFSK Mode	
Channel frequency (MHz)	**Test Result (dBm)**	**Limit (dBm)**
2402	8.35	21
2441	9.15	
2480	9.47	
GFSK Mode		
2402 MHz		



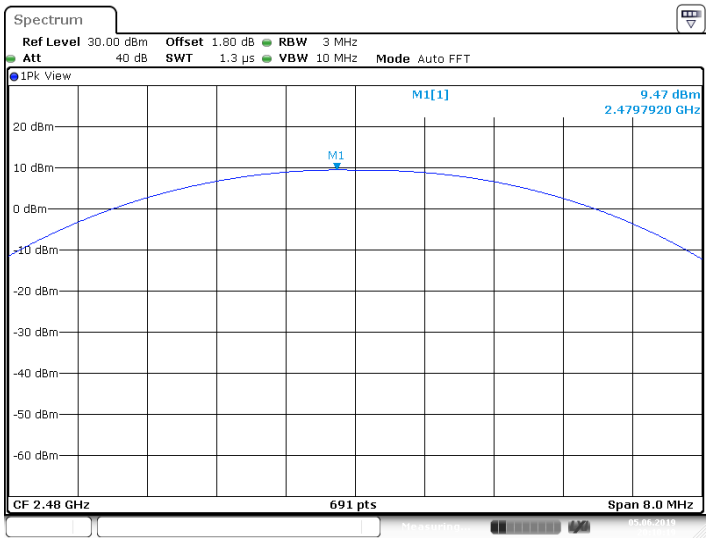
GFSK Mode

2441 MHz

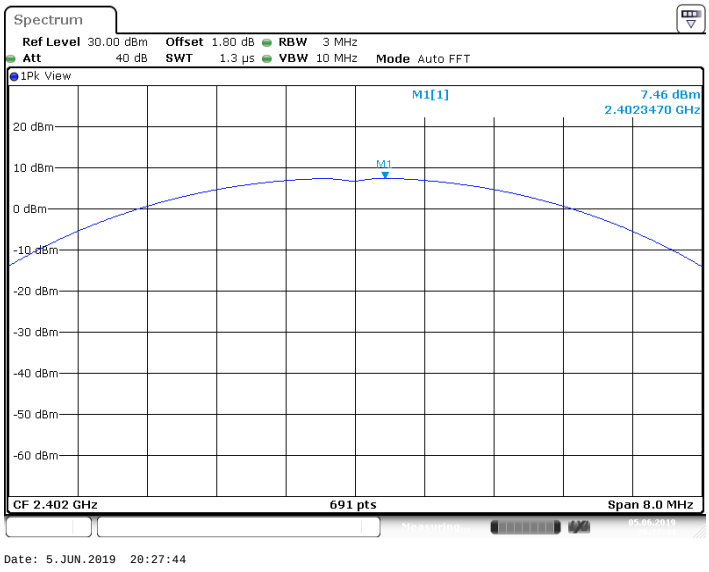


GFSK Mode

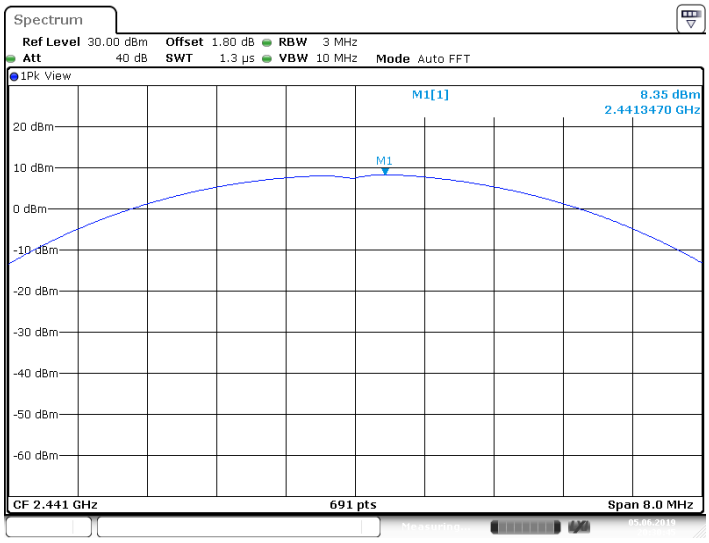
2480 MHz



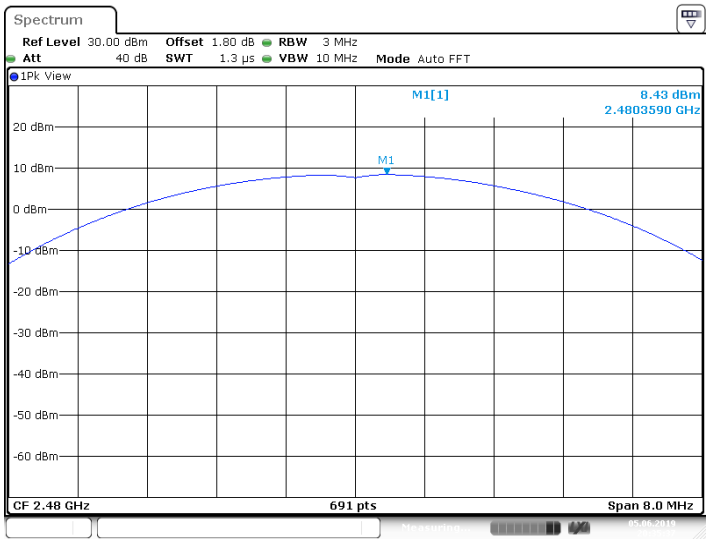
Test Mode:	π/4-DQPSK Mode	
Channel frequency (MHz)	**Test Result (dBm)**	**Limit (dBm)**
2402	7.46	21
2441	8.35	
2480	8.43	
π/4-DQPSK Mode		
2402 MHz		



π/4-DQPSK Mode
2441 MHz



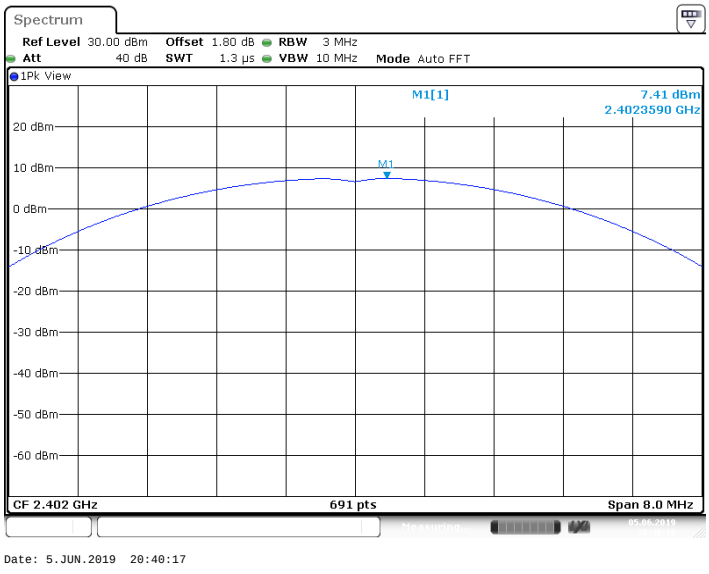
π/4-DQPSK Mode
2480 MHz



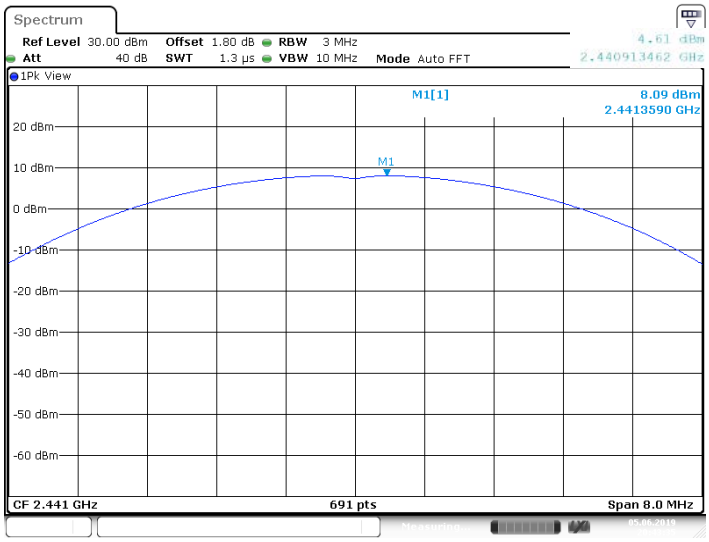
Test Mode:	8-DPSK Mode	
Channel frequency (MHz)	**Test Result (dBm)**	**Limit (dBm)**
2402	7.41	21
2441	8.09	
2480	8.40	

8-DPSK Mode

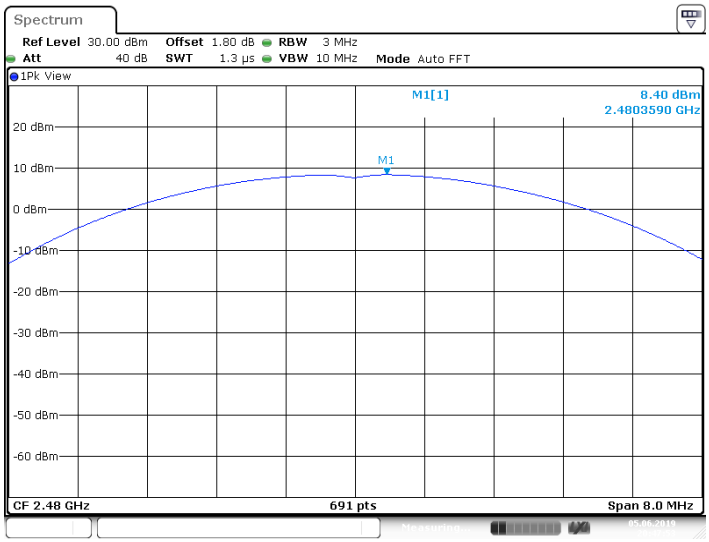
2402 MHz



8-DPSK Mode
2441 MHz



8-DPSK Mode
2480 MHz



3.8. 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 anantenna 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.

4.EUT TEST PHOTOS

Reference to the document No.: Test Photographs 1.

5.PHOTOGRAPHS OF EUT CONSTRUCTIONAL

Reference to the document No.: External Photographs and Internal Photographs.

**********THE END**********