



TEST REPORT

No. I20D00101-SRD21

For

Client: NetEase Youdao Information Technology

(Beijing) Co., Ltd.

Production: Youdao Dictionary Pen 2

Model Name: YDP021

Brand Name: youdao

FCC ID: 2AV6G-YDP021

Hardware Version: WM86-V4

Software Version: V1.3.6AD

Issued date: 2020-09-15

NOTE

1. The test results in this test report relate only to the devices specified in this report.
2. This report shall not be reproduced except in full without the written approval of East China Institute of Telecommunications.
3. For the test results, the uncertainty of measurement is not taken into account when judging the compliance with specification, and the results of measurement or the average value of measurement results are taken as the criterion of the compliance with specification directly.

Test Laboratory:

East China Institute of Telecommunications

Add: Block No.4, No.766, Jingang Road, Pudong District, Shanghai, P. R. China

Tel: +86 21 63843300

E-Mail: welcome@ecit.org.cn

Revision Version

Report Number	Revision	Date	Memo
I20D00101-SRD21	00	2020-09-02	Initial creation of test report
I20D00101-SRD21	01	2020-09-15	First modification of test report

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1. Test Laboratory

1.1. Testing Location

Company Name	East China Institute of Telecommunications
Address	Block No.4, No.766, Jingang Road, Pudong District, Shanghai, P. R. China
Postal Code	201206
Telephone	+86 21 63843300
FCC registration No	CN1177

1.2. Testing Environment

Normal Temperature	15°C-35°C
Relative Humidity	20%-75%

1.3. Project Data

Project Leader	Xu Yuting
Testing Start Date	2020-07-20
Testing End Date	2020-08-29

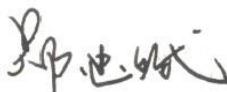
1.4. Signature



Liu Yan
(Prepared this test report)



Fan Songyan
(Reviewed this test report)



Zheng Zhongbin
(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name	NetEase Youdao Information Technology (Beijing) Co., Ltd.
Address	No.7 Building,Zhongguancun Software Park West No.10 Xibeiwang East RD,Haidian
Telephone	+86 13810968741
Postcode	100193

2.2. Manufacturer Information

Company Name	Mobiwire Mobiles(NingBo) Co.,LTD
Address	Building A, No.999 Dacheng East Road, Fenghua District, Ningbo City, Zhejiang Province, PRC
Telephone	13586835362
Postcode	/

3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Production	Youdao Dictionary Pen 2
Model name	YDP021
BT Frequency	2402MHz-2480MHz
BT Channel	Ch0-78
BT type of modulation	GFSK/ $\pi/4$ DQPSK/8DPSK
Extreme Temperature	-10/+50°C
Nominal Voltage	3.85V
Extreme High Voltage	4.40 V
Extreme Low Voltage	3.50V
Maximum of Antenna Gain	Bluetooth: -0.52dBi

Note:

- Photographs of EUT are shown in ANNEX A of this test report.
- The value of the antenna gain is provided by the customer. For specific antenna information, please check the antenna specifications of the customer.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version	Date of receipt
N01	/	WM86-V4	V1.3.6AD	2020-07-14
N02	/	WM86-V4	V1.3.6AD	2020-07-14
N04	/	WM86-V4	V1.3.6AD	2020-07-14

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Internal Identification of AE used during the test

AE ID*	Description	Type	Manufacturer
AE1	RF cable	---	AE1

*AE ID: is used to identify the test sample in the lab internally.

4. Reference Documents

4.1. Documents supplied by applicant

All technical documents are supplied by the client or manufacturer, which is the basis of testing.

4.2. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part15	FCC CFR 47, Part 15,Subpart C: 15.205 Restricted bands of operation; 15.209 Radiated emission limits, general requirements; 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz.	2018-10-01
ANSI C63.10	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices	2013
KDB 558074	Guidance for Performing Compliance Measurements on Frequency Hopping Spread Spectrum systems (DSS) Operating Under §15.247	v05r02

5. Test Results

5.1. Summary of Test Results

Measurement Items	Sub-clause of Part15C	Verdict
Maximum Peak Output Power	15.247(b)	P
20dB Occupied Bandwidth	15.247(a)	P
Band Edges Compliance	15.247(b)	P
Time Of Occupancy (Dwell Time)	15.247(a)	P
Carrier Frequency Separation	15.247(a)	P
Number Of Hopping Channels	15.247(a)	P
Transmitter Spurious Emission-Conducted	15.247	P
Transmitter Spurious Emission-Radiated	15.209/15.247	P
AC Powerline Conducted Emission	15.107/15.207	P

Note: please refer to Annex A in this test report for the detailed test results.

The following terms are used in the above table.

P	Pass, the EUT complies with the essential requirements in the standard.
NP	Not Perform, the test was not performed by ECIT.
NA	Not Applicable, the test was not applicable.
F	Fail, the EUT does not comply with the essential requirements in the standard.

Test Conditions

T _{nom}	Normal Temperature
T _{min}	Low Temperature
T _{max}	High Temperature
V _{nom}	Normal Voltage
V _{min}	Low Voltage
V _{max}	High Voltage
H _{nom}	Norm Humidity
A _{nom}	Norm Air Pressure

For this report, all the test case listed above are tested under Normal Temperature and Normal Voltage, and also under norm humidity, the specific conditions as following:

Temperature	T _{nom}	25°C
Voltage	V _{nom}	3.85V
Humidity	H _{nom}	48%
Air Pressure	A _{nom}	1010hPa

Note:

- a. All the test data for each data were verified, but only the worst case was reported.
- b. The GFSK, $\pi/4$ DQPSK and 8DPSK were set in DH1 for GFSK, 2-DH1 for $\pi/4$ DQPSK, 3-DH1 for 8DPSK.
- c. The DC and low frequency voltages' measurement uncertainty is $\pm 2\%$.

5.2. Statements

The Youdao Dictionary Pen 2 is new product for testing.

ECIT only performed test cases which identified with P/NP/NA/F results in Annex A.

ECIT has verified that the compliance of the tested device specified in section 3 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 4 of this test report.

6. Test Equipments Utilized

6.1. Conducted Test System

Item	Instrument Name	Type	SN	Manufacturer	Cal. Date	Cal. interval
1	Vector Signal Analyzer	FSQ26	101091	R&S	2020-05-10	1 year
2	DC Power Supply	ZUP60-14	LOC-220Z0 06-0007	TDL-Lambda	2020-05-10	1 year

6.2. Radiated Emission Test System

Item	Instrument Name	Type	SN	Manufacturer	Cal. Date	Cal. interval
1	Universal Radio Communication Tester	CMU200	123123	R&S	2020-05-10	1 year
2	EMI Test Receiver	ESU40	100307	R&S	2020-05-10	1 year
3	TRILOG Broadband Antenna	VULB9163	VULB9163-515	Schwarzbeck	2020-02-28	2 years
4	Double- ridged Waveguide Antenna	ETS-3117	00135890	ETS	2020-02-28	2 years
5	2-Line V-Network	ENV216	101380	R&S	2020-05-10	1 year

Climate chamber

No.	Equipment	Model	Serial Number	Manufacturer	Cal. Date	Cal. interval
1	Climate chamber	UT333 BT	C191995461	UNI-T	2020-05-10	1 years

6.3. Software

Name	Version
Eagle CE WLAN auto test system	V3.0
EMC32	V9.15

Anechoic chamber

Fully anechoic chamber by ETS.

7. Measurement Uncertainty

Measurement uncertainty for all the testing in this report are within the limit specified in ECIT documents . The detailed measurement uncertainty is defined in ECIT documents.

Measurement Items	Range	Confidence Level	Calculated Uncertainty
Peak Output Power-Conducted	2402MHz-2480MHz	95%	± 0.544dB
Frequency Band Edges-Conducted	2402MHz-2480MHz	95%	± 0.544dB
Conducted Emission	30MHz-2GHz	95%	± 0.90dB
Conducted Emission	2GHz-3.6GHz	95%	± 0.88dB
Conducted Emission	3.6GHz-8GHz	95%	± 0.96dB
Conducted Emission	8GHz-20GHz	95%	± 0.94dB
Conducted Emission	20GHz-22GHz	95%	± 0.88dB
Conducted Emission	22GHz-26GHz	95%	± 0.86dB
Transmitter Spurious Emission-Radiated	9KHz-30MHz	95%	± 5.66dB
Transmitter Spurious Emission-Radiated	30MHz-1000MHz	95%	± 4.98dB
Transmitter Spurious Emission-Radiated	1000MHz -18000MHz	95%	± 5.06dB
Transmitter Spurious Emission-Radiated	18000MHz -40000MHz	95%	± 5.20dB
Dwell Time	2402MHz-2480MHz	95%	± 0.218ms
20dB Bandwidth	2402MHz-2480MHz	95%	± 62.04Hz
AC Power line Conducted Emission	0.15MHz-30MHz	95%	± 3.66 dB

8. Test Environment

Shielding Room1 (6.0 meters×3.0 meters×2.7 meters) did not exceed following limits along the conducted RF performance testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	> 100 dB
Ground system resistance	< 0.5 Ω

Control room did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω

Fully-anechoic chamber1 (6.9 meters×10.9 meters×5.4 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 25 %, Max. = 75 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω
VSWR	Between 0 and 6 dB, from 1GHz to 18GHz
Site Attenuation Deviation	Between -4 and 4 dB, 30MHz to 1GHz
Uniformity of field strength	Between 0 and 6 dB, from 80MHz to 3000 MHz

ANNEX A. Detailed Test Results

ANNEX A.1. Peak Output Power-Conducted

A.1.1 Measurement Limit

Standard	Limit (dBm)
FCC 47 Part 15.247(b)(1)	< 21

A.1.2 Test Condition:

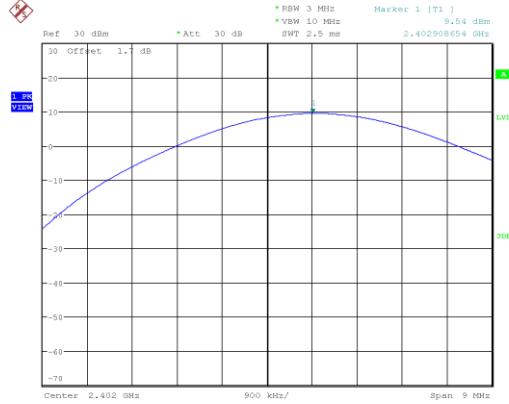
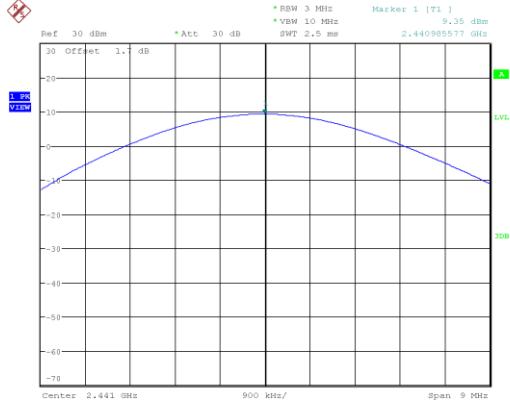
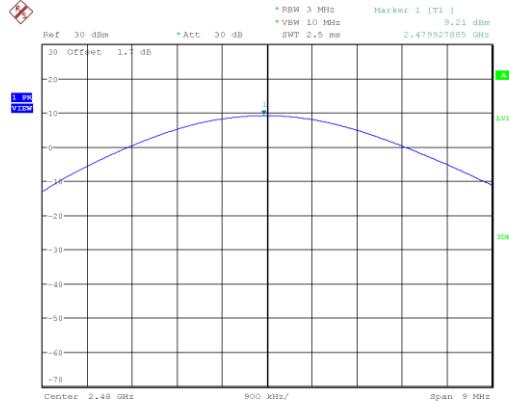
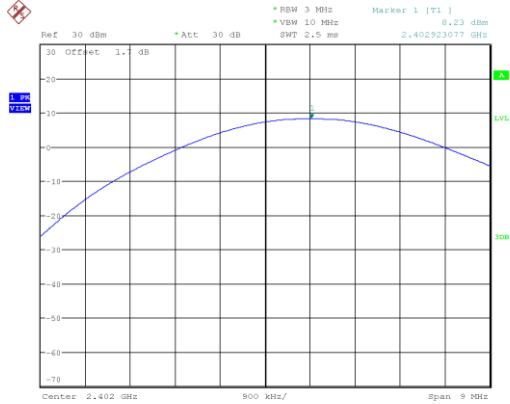
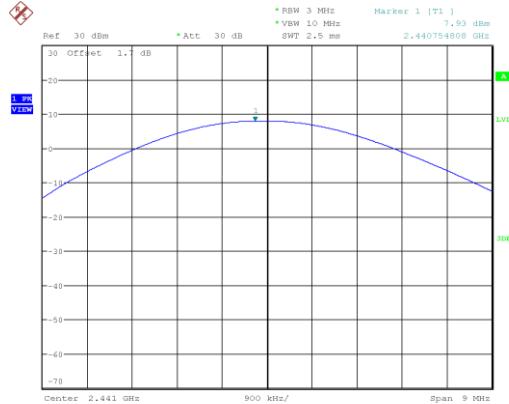
Hopping Mode	RBW	VBW	Span	Sweeptime
Hopping OFF	3MHz	10MHz	9MHz	Auto

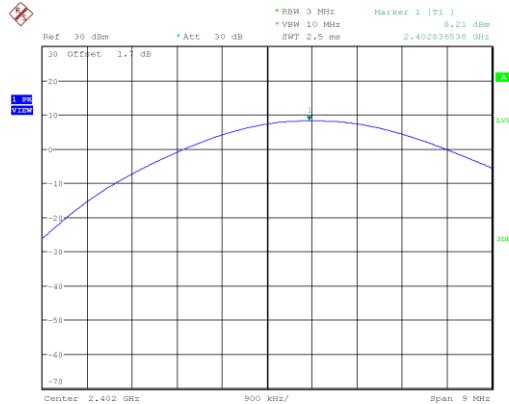
A.1.3 Test procedure

The measurement is according to ANSI C63.10 clause 7.8.5.

1. The output power of EUT was connected to the spectrum analyzer and CBT32 by cable and divide. The path loss was compensated to the results for each measurement.
2. Enable EUT transmitter maximum power continuously.
3. Measure the conducted output power and record the results it.

Measurement Results:

Peak Conducted Output Power CH0, DH5(dBm)	9.54	Peak Conducted Output Power CH39, DH5(dBm)	9.35
 Date: 16.JUL.2020 17:16:20		 Date: 16.JUL.2020 17:37:48	
Peak Conducted Output Power CH78, DH5(dBm)	9.21	Peak Conducted Output Power CH0, 2DH5(dBm)	8.23
 Date: 16.JUL.2020 17:39:22		 Date: 16.JUL.2020 17:43:34	
Peak Conducted Output Power CH39, 2DH5(dBm)	7.93	Peak Conducted Output Power CH78, 2DH5(dBm)	7.84
 Date: 16.JUL.2020 17:47:53		 Date: 16.JUL.2020 17:49:02	

Peak Conducted Output Power CH0, 3DH5(dBm)	8.21	Peak Conducted Output Power CH39, 3DH5(dBm)	8.06
 <p>Ref 30 dBm * Att 30 dB Marker 1 [T1] 8.21 dBm VBW 3 MHz * VBW 10 MHz SWT 2.5 ms 2.402036530 GHz Offset 1.7 dB 30 0 -10 -20 -30 -40 -50 -60 -70 1000 kHz/ 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300 2400 2500 2600 2700 2800 2900 3000 3100 3200 3300 3400 3500 3600 3700 3800 3900 4000 4100 4200 4300 4400 4500 4600 4700 4800 4900 5000 5100 5200 5300 5400 5500 5600 5700 5800 5900 6000 6100 6200 6300 6400 6500 6600 6700 6800 6900 7000 7100 7200 7300 7400 7500 7600 7700 7800 7900 8000 8100 8200 8300 8400 8500 8600 8700 8800 8900 9000 9100 9200 9300 9400 9500 9600 9700 9800 9900 10000 10100 10200 10300 10400 10500 10600 10700 10800 10900 11000 11100 11200 11300 11400 11500 11600 11700 11800 11900 12000 12100 12200 12300 12400 12500 12600 12700 12800 12900 13000 13100 13200 13300 13400 13500 13600 13700 13800 13900 14000 14100 14200 14300 14400 14500 14600 14700 14800 14900 15000 15100 15200 15300 15400 15500 15600 15700 15800 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49100 49200 49300 49400 49500 49600 49700 49800 49900 50000 50100 50200 50300 50400 50500 50600 50700 50800 50900 51000 51100 51200 51300 51400 51500 51600 51700 51800 51900 52000 52100 52200 52300 52400 52500 52600 52700 52800 52900 53000 53100 53200 53300 53400 53500 53600 53700 53800 53900 54000 54100 54200 54300 54400 54500 54600 54700 54800 54900 55000 55100 55200 55300 55400 55500 55600 55700 55800 55900 56000 56100 56200 56300 56400 56500 56600 56700 56800 56900 57000 57100 57200 57300 57400 57500 57600 57700 57800 57900 58000 58100 58200 58300 58400 58500 58600 58700 58800 58900 59000 59100 59200 59300 59400 59500 59600 59700 59800 59900 60000 60100 60200 60300 60400 60500 60600 60700 60800 60900 61000 61100 61200 61300 61400 61500 61600 61700 61800 61900 62000 62100 62200 62300 62400 62500 62600 62700 62800 62900 63000 63100 63200 63300 63400 63500 63600 63700 63800 63900 64000 64100 64200 64300 64400 64500 64600 64700 64800 64900 65000 65100 65200 65300 65400 65500 65600 65700 65800 65900 66000 66100 66200 66300 66400 66500 66600 66700 66800 66900 67000 67100 67200 67300 67400 67500 67600 67700 67800 67900 68000 68100 68200 68300 68400 68500 68600 68700 68800 68900 69000 69100 69200 69300 69400 69500 69600 69700 69800 69900 70000 70100 70200 70300 70400 70500 70600 70700 70800 70900 71000 71100 71200 71300 71400 71500 71600 71700 71800 71900 72000 72100 72200 72300 72400 72500 72600 72700 72800 72900 73000 73100 73200 73300 73400 73500 73600 73700 73800 73900 74000 74100 74200 74300 74400 74500 74600 74700 74800 74900 75000 75100 75200 75300 75400 75500 75600 75700 75800 75900 76000 76100 76200 76300 76400 76500 76600 76700 76800 76900 77000 77100 77200 77300 77400 77500 77600 77700 77800 77900 78000 78100 78200 78300 78400 78500 78600 78700 78800 78900 79000 79100 79200 79300 79400 79500 79600 79700 79800 79900 80000 80100 80200 80300 80400 80500 80600 80700 80800 80900 81000 81100 81200 81300 81400 81500 81600 81700 81800 81900 82000 82100 82200 82300 82400 82500 82600 82700 82800 82900 83000 83100 83200 83300 83400 83500 83600 83700 83800 83900 84000 84100 84200 84300 84400 84500 84600 84700 84800 84900 85000 85100 85200 85300 85400 85500 85600 85700 85800 85900 86000 86100 86200 86300 86400 86500 86600 86700 86800 86900 87000 87100 87200 87300 87400 87500 87600 87700 87800 87900 88000 88100 88200 88300 88400 88500 88600 88700 88800 88900 89000 89100 89200 89300 89400 89500 89600 89700 89800 89900 90000 90100 90200 90300 90400 90500 90600 90700 90800 90900 91000 91100 91200 91300 91400 91500 91600 91700 91800 91900 92000 92100 92200 92300 92400 92500 92600 92700 92800 92900 93000 93100 93200 93300 93400 93500 93600 93700 93800 93900 94000 94100 94200 94300 94400 94500 94600 94700 94800 94900 95000 95100 95200 95300 95400 95500 95600 95700 95800 95900 96000 96100 96200 96300 96400 96500 96600 96700 96800 96900 97000 97100 97200 97300 97400 97500 97600 97700 97800 97900 98000 98100 98200 98300 98400 98500 98600 98700 98800 98900 99000 99100 99200 99300 99400 99500 99600 99700 99800 99900 100000</p>			
Peak Conducted Output Power CH39, 3DH5(dBm)	8.06		

ANNEX A.2. Frequency Band Edges-Conducted

A.2.1 Measurement Limit:

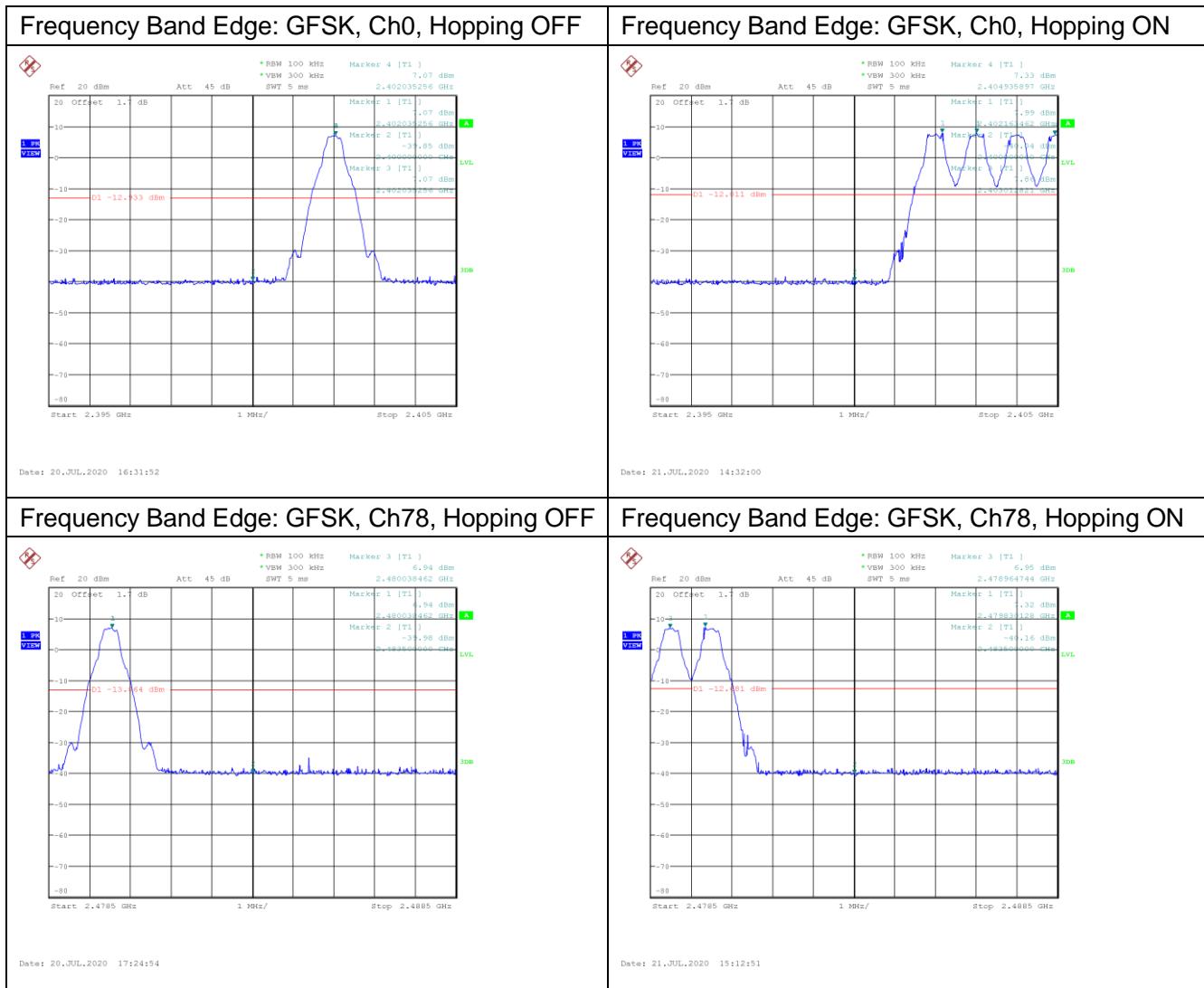
Standard	Limited(dBc)
FCC 47 CFR Part 15.247(d)	>20

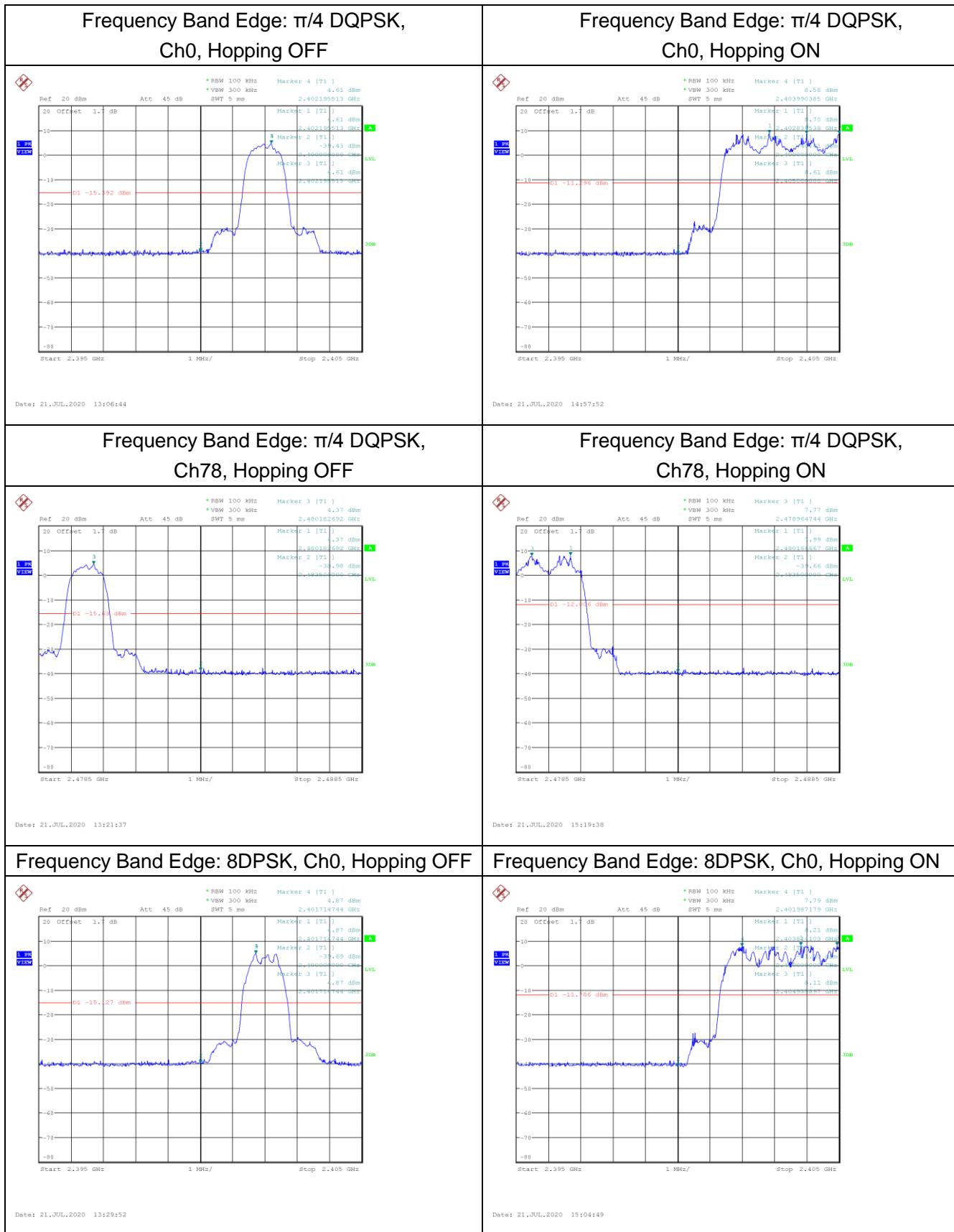
A.2.2 Test procedure

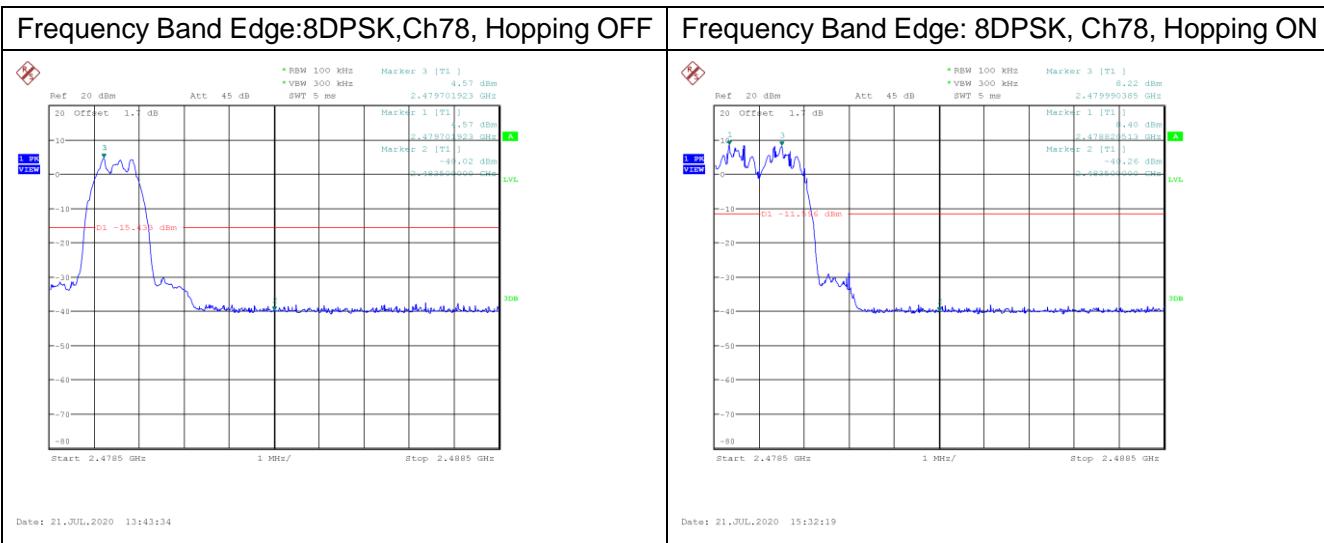
The measurement is according to ANSI C63.10 clause 7.8.6.

1. Connect the EUT to spectrum analyzer.
2. Set RBW=100KHz, VBW=300KHz, span more than 1.5 times channel bandwidth (2MHz).
3. Detector =peak, sweep time=auto couple, trace mode=max hold.
4. Allow sweep to continue until the trace stabilizes.

Measurement results:







ANNEX A.3. Conducted Emission

A.3.1 Measurement Limit:

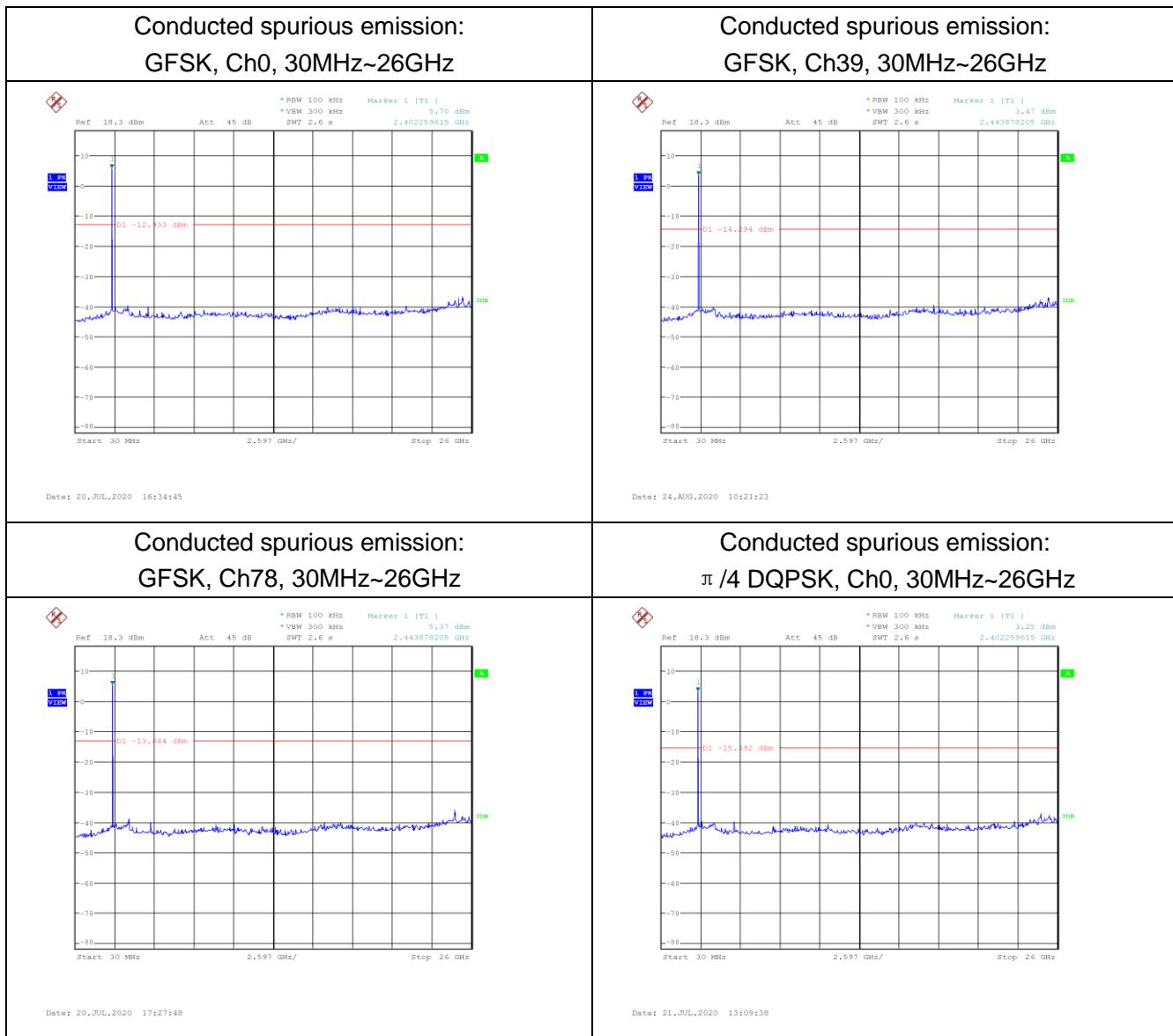
Standard	Limit
FCC 47 CFR Part15.247 (d)	20dB below peak output power in 100KHz bandwidth

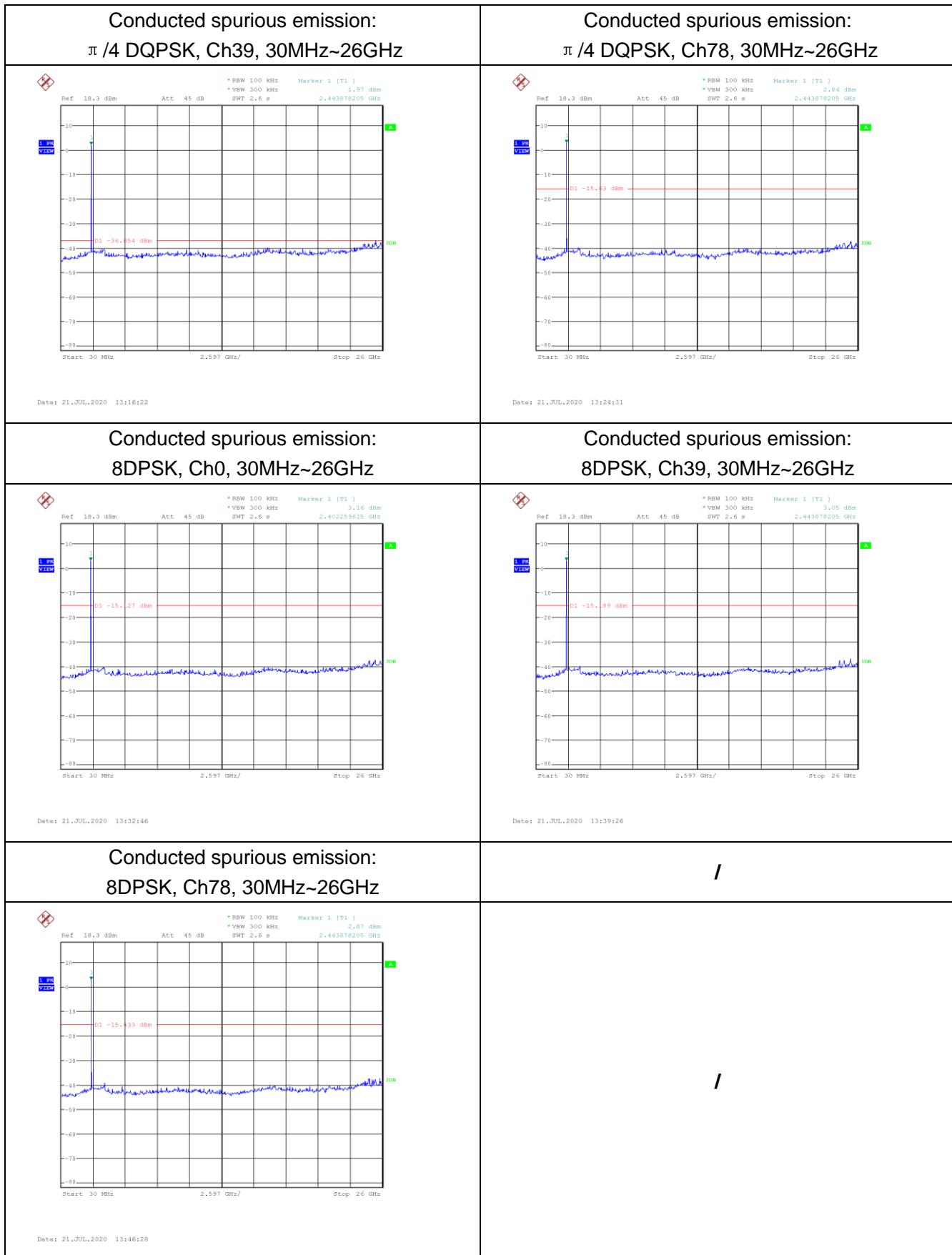
A.3.2 Test procedures

The measurement is according to ANSI C63.10 clause 7.8.8.

1. Connect the EUT to spectrum analyzer.
2. Set RBW=100KHz, VBW=300KHz.
3. Detector =peak, sweep time=auto couple, trace mode=max hold.

Measurement Results:





ANNEX A.4. Radiated Emission**A.4.1 Measurement Limit:**

Standard	Limit
FCC 47 CFR Part 15.247, 15.205, 15.209	20dB below peak output 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 in 15.209(a) (see 15.205(c)).

Limit in restricted band:

Frequency of emission (MHz)	Field strength (uV/m)	Field strength (dBuV/m)
30~88	100	40
88~216	150	43.5
216~960	200	46
Above 960	500	54

A.4.2 Test Method

Portable, small, lightweight, or modular devices that may be handheld, worn on the body, or placed on a table during operation shall be positioned on a non-conducting platform, the top of which is 80 cm above the reference ground plane. The preferred area occupied by the EUT arrangement is 1 m by 1.5 m. For emissions testing at or below 1 GHz, the table height shall be 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. but it may be larger or smaller to accommodate various sized EUTs. For testing purposes, ceiling- and wall-mounted devices also shall be positioned on a tabletop (see also ANSI C63.10-2013 section 6.3.4 and 6.3.5). In making any tests involving handheld, body-worn, or ceiling-mounted equipment, it is essential to recognize that the measured levels may be dependent on the orientation (attitude) of the three orthogonal axes of the EUT. Thus, exploratory tests as specified in 8.3.1 shall be carried out for various axes orientations to determine the attitude having maximum or near-maximum emission level.

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

Frequency of emission (MHz)	RBW/VBW	Sweep Time (s)
30~1000	100KHz/300KHz	5
1000~4000	1MHz/3MHz	15
4000~18000	1MHz/3MHz	40
18000~26500	1MHz/3MHz	20

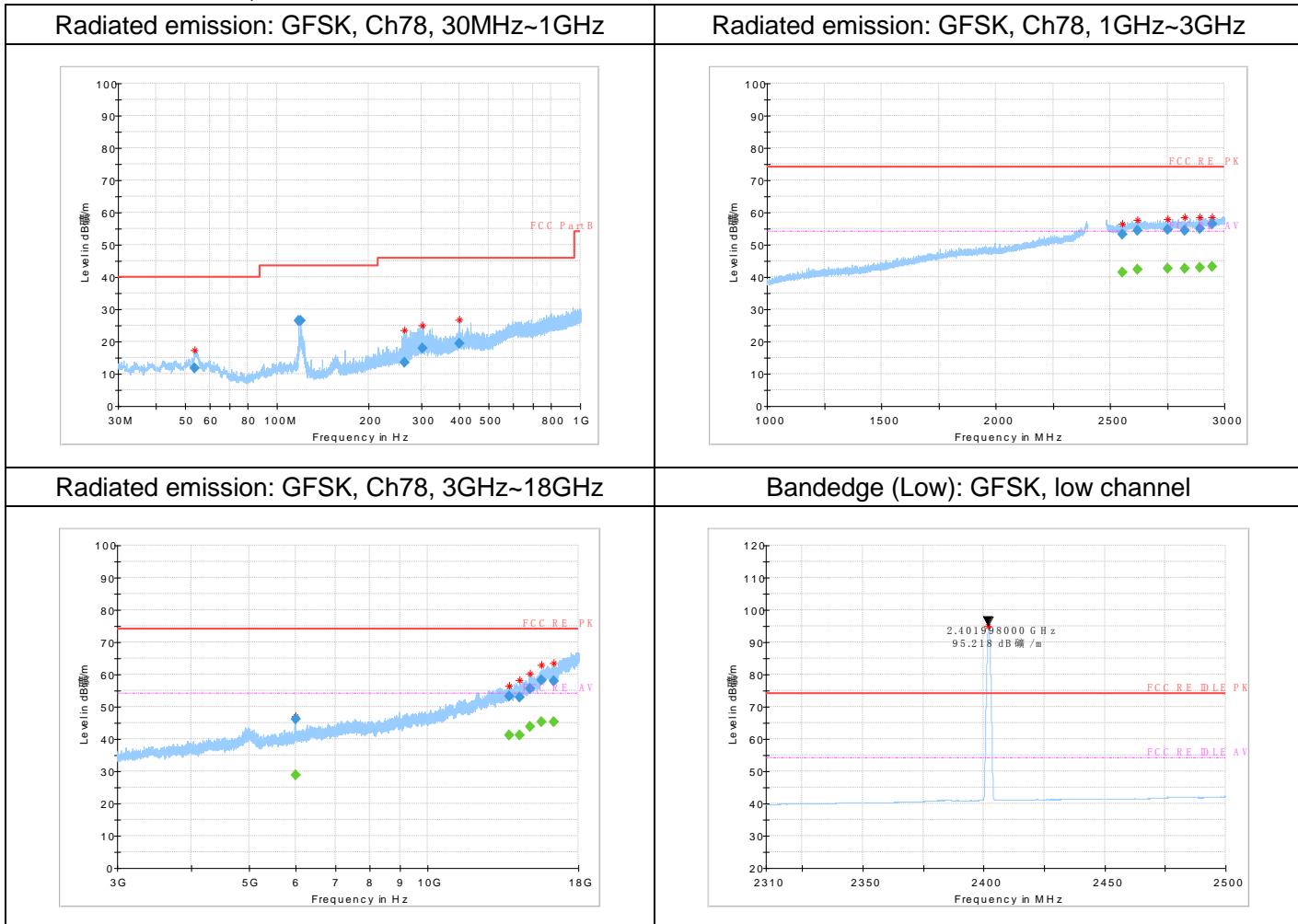
A.4.3 Measurement Results:

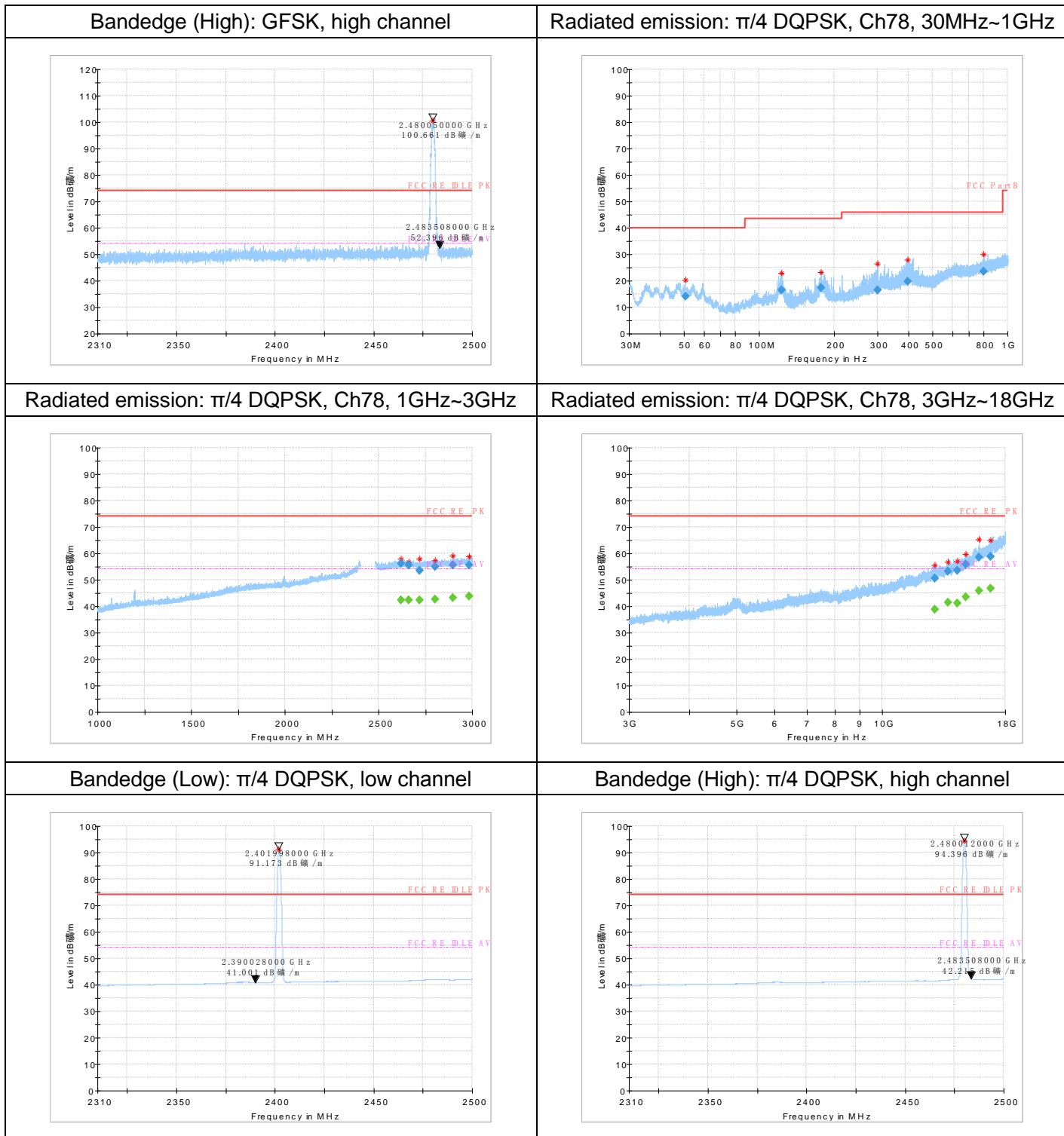
A “reference path loss” is established and A_{Rpi} is the attenuation of “reference path loss”, and including the gain of receive antenna, the gain of the preamplifier, the cable loss.

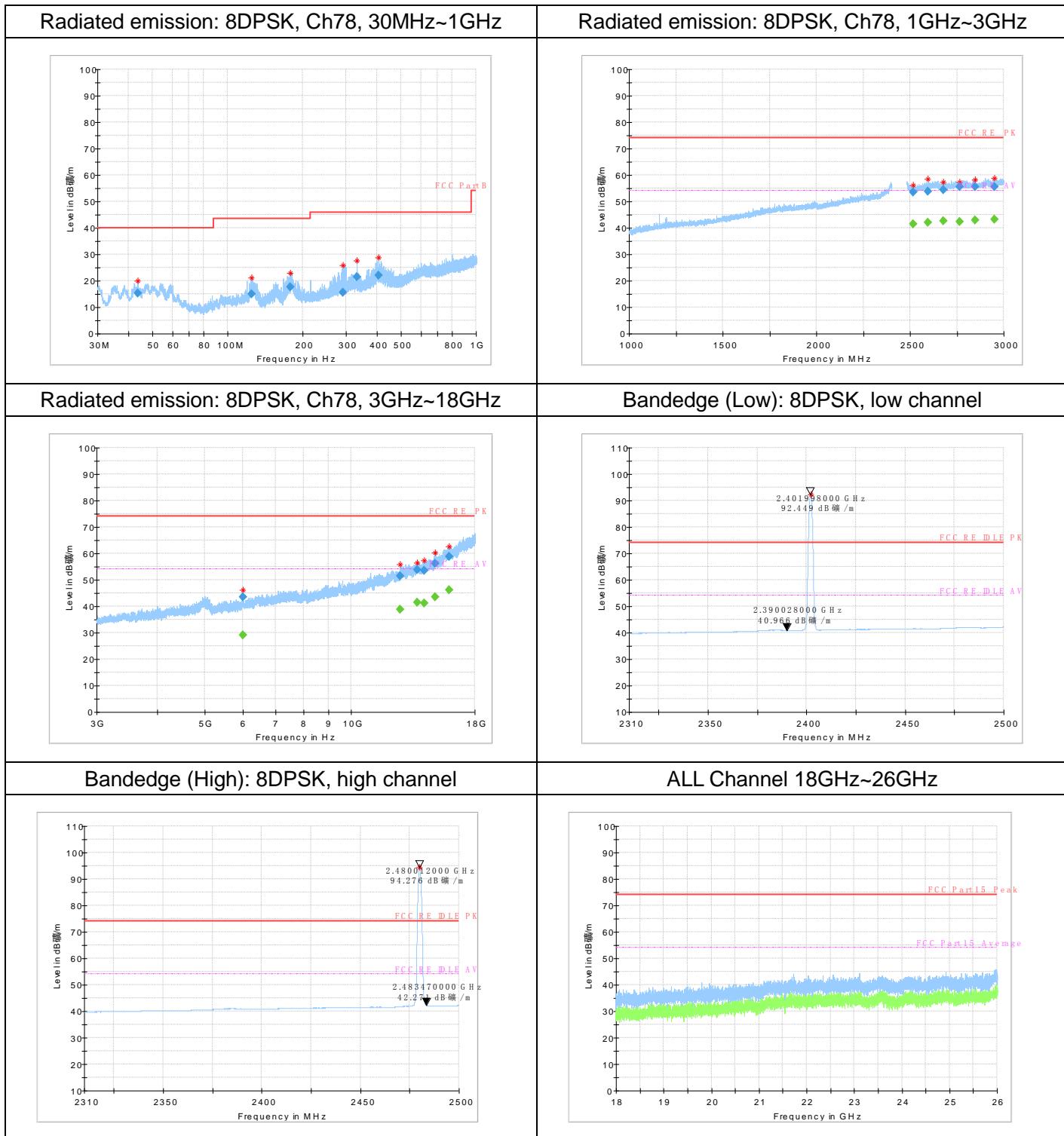
The measurement results are obtained as described below:

A_{Rpi} = Cable loss + Antenna Gain-Preamplifier gain

Result = $P_{Mea} + A_{Rpi}$







GFSK Ch0 30MHz-1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl(dB)	PMea(dBuV/m)	Polarity
54.2	12.23	-15.4	27.63	V
118.0	13.38	-16.4	29.78	H
123.3	11.37	-16.9	28.27	H
230.8	12.29	-13.5	25.79	V
328.9	13.17	-10.2	23.37	V
331.9	18.75	-10.2	28.95	V

GFSK Ch0 1GHz-3GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl(dB)	PMea(dBuV/m)	Polarity
2586.0	54.23	17.6	36.63	H
2669.4	55.25	17.8	37.45	H
2751.1	55.04	18	37.04	H
2820.6	55.03	18.3	36.73	V
2901.7	55.15	18.7	36.45	H
2961.7	55.58	19	36.58	V

GFSK Ch0 1GHz-3GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl(dB)	PMea(dBuV/m)	Polarity
2586.0	42.08	17.6	24.48	H
2669.4	42.44	17.8	24.64	H
2751.1	42.6	18	24.6	H
2820.6	42.61	18.3	24.31	V
2901.7	43.33	18.7	24.63	H
2961.7	43.18	19	24.18	V

GFSK Ch0 3GHz-18GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
4803.8	46.84	1.3	45.54	H
13677.9	53.34	18.3	35.04	V
14422.9	53.73	19.5	34.23	V
14961.8	55.05	21.7	33.35	V
15947.2	58.53	25.3	33.23	V
16745.2	58.93	26.8	32.13	V

GFSK Ch0 3GHz-18GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
14961.8	42.79	21.7	21.09	V
15947.2	46.21	25.3	20.91	V
16745.2	46.99	26.8	20.19	V

 $\pi/4$ DQPSK Ch0 30MHz-1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
54.6	11.98	-15.4	27.38	V
118.1	25.23	-16.4	41.63	H
120.0	27.46	-16.6	44.06	H
168.0	16.58	-16.2	32.78	V
291.2	18.1	-11.7	29.8	V
602.5	19.31	-3	22.31	V

π/4 DQPSK Ch0 1GHz-3GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2583.6	54.62	17.5	37.12	H
2671.0	54.23	17.8	36.43	H
2736.0	56	17.9	38.1	H
2797.8	55.13	18.2	36.93	V
2863.3	54.95	18.4	36.55	V
2944.0	55.37	18.8	36.57	H

π/4 DQPSK Ch0 1GHz-3GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2583.6	42.12	17.5	24.62	H
2671.0	42.44	17.8	24.64	H
2736.0	42.62	17.9	24.72	H
2797.8	42.84	18.2	24.64	V
2863.3	42.68	18.4	24.28	V
2944.0	43.34	18.8	24.54	H

π/4 DQPSK Ch0 3GHz-18GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
4803.8	48.45	1.3	47.15	H
13723.5	53.45	18.4	35.05	H
14877.0	55.92	21.8	34.12	V
15575.2	57.41	24.4	33.01	V
16008.8	58.07	25.2	32.87	H
16750.8	59.05	26.8	32.25	V

$\pi/4$ DQPSK Ch0 3GHz-18GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
14877.0	43.38	21.8	21.58	V
15575.2	45	24.4	20.6	V
16008.8	46.1	25.2	20.9	H
16750.8	47	26.8	20.2	V

8DPSK Ch0 30MHz-1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
35.9	14.13	-16.6	30.73	V
58.7	15.96	-15.4	31.36	V
126.9	17.25	-17.3	34.55	H
182.1	16.58	-15.8	32.38	H
293.0	17.09	-11.7	28.79	H
419.5	21.4	-8.3	29.7	H

8DPSK Ch0 1GHz-3GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2548.1	53.3	17	36.3	V
2646.4	54.3	17.8	36.5	V
2720.9	54.56	17.9	36.66	V
2802.5	55.23	18.2	37.03	H
2886.6	54.26	18.6	35.66	V
2963.8	55.46	19	36.46	H

8DPSK Ch0 1GHz-3GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2646.4	42.36	17.8	24.56	V
2720.9	42.21	17.9	24.31	V
2802.5	42.75	18.2	24.55	H
2886.6	42.85	18.6	24.25	V
2963.8	43.21	19	24.21	H

8DPSK Ch0 3GHz-18GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
4803.7	48.18	1.3	46.88	H
12905.4	50.56	16.3	34.26	H
13830.4	52.55	18.3	34.25	V
14851.5	54.93	21.3	33.63	H
15572.5	56.69	24.3	32.39	H
16860.3	59.66	27.1	32.56	V

8DPSK Ch0 3GHz-18GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
14851.5	42.7	21.3	21.4	H
15572.5	44.96	24.3	20.66	H
16860.3	47.27	27.1	20.17	V

Note: Only the worst case is written in the report.

ANNEX A.5. Time Of Occupancy (Dwell Time)**A.5.1 Measurement Limit:**

Standard	Limit (ms)
FCC 47 Part 15.247 (a) (1) (iii)	< 400

A.5.2 Test procedures

The measurement is according to ANSI C63.10 clause 7.8.4

1. Connect the EUT through cable and divide with CBT32 and spectrum analyzer.
2. Enable the EUT transmit maximum power.
3. Set the spectrum analyzer as step 4 to step 8.
4. Span: Zero span, centered on a hopping channel.
5. RBW shall be \leq channel spacing and where possible RBW should be set $>> 1 / T$, where T is the expected dwell time per channel.
6. Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel.
7. Detector function: Peak.
8. Trace: Max hold.
9. Use the marker-delta function, and record it.

Note: For AFH mode, Test Period = 0.4 (second/ channel) x 20 Channel = 8 sec,

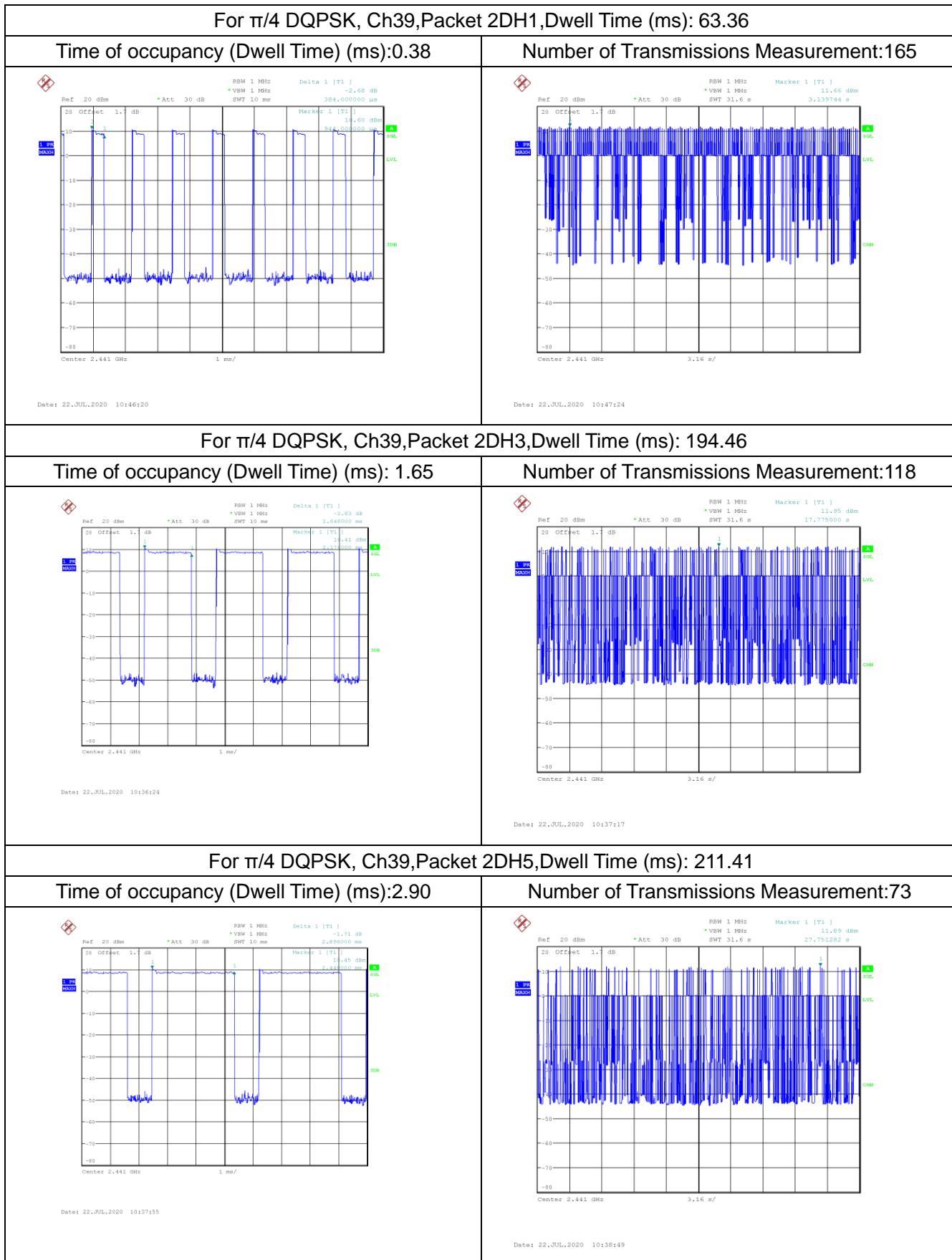
For FHSS mode, Test Period = 0.4 (second/ channel) x 79 Channel = 31.6 sec,

So the Time of Occupancy (Dwell Time) of AFH mode= Time of Occupancy (Dwell Time) of FHSS mode / 79 Channel x 20 Channel

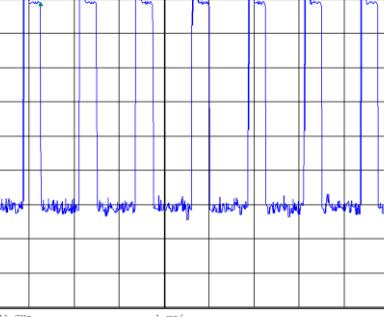
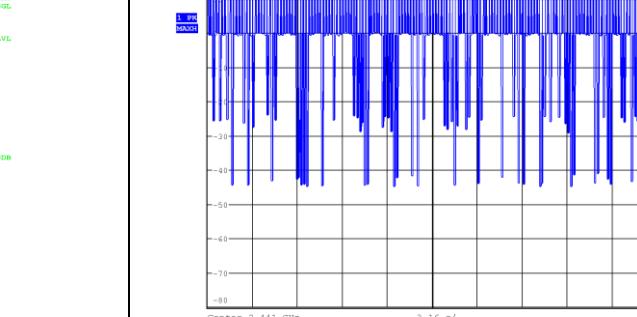
Modulation type	Frequency(MHz)	Dwell Time (ms)	Limit(ms)	Conclusion
AFH(GFSK DH5)	2402-2421MHz	63.36	400	P
AFH($\pi/4$ DQPSK DH5)	2402-2421MHz	67.2	400	P
AFH(8DPSK DH5)	2402-2421MHz	65.6	400	P

Measurement Result:

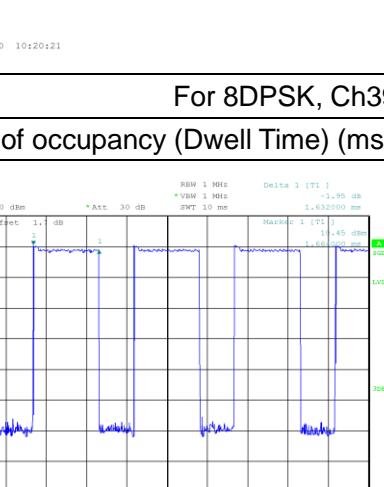
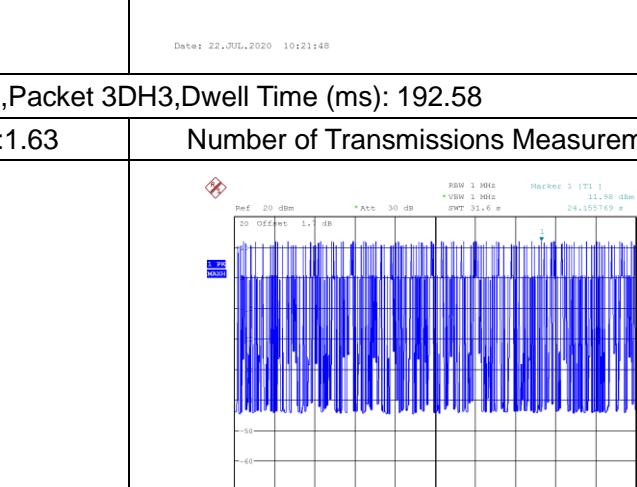
For GFSK, Ch39,Packet DH1,Dwell Time (ms): 51.15	
Time of occupancy (Dwell Time) (ms): 0.37	Number of Transmissions Measurement:139
For GFSK, Ch39,Packet DH3,Dwell Time (ms): 192.82	
Time of occupancy (Dwell Time) (ms):1.65	Number of Transmissions Measurement:117
For GFSK, Ch39,Packet DH5,Dwell Time (ms): 218.88	
Time of occupancy (Dwell Time) (ms):2.88	Number of Transmissions Measurement:76



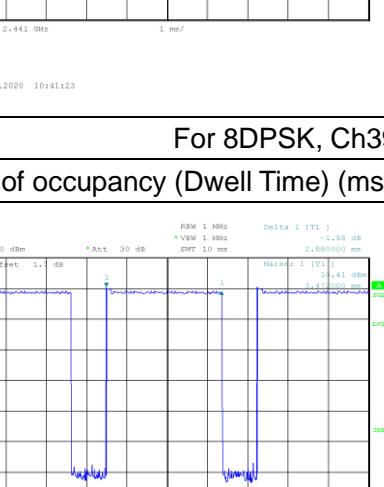
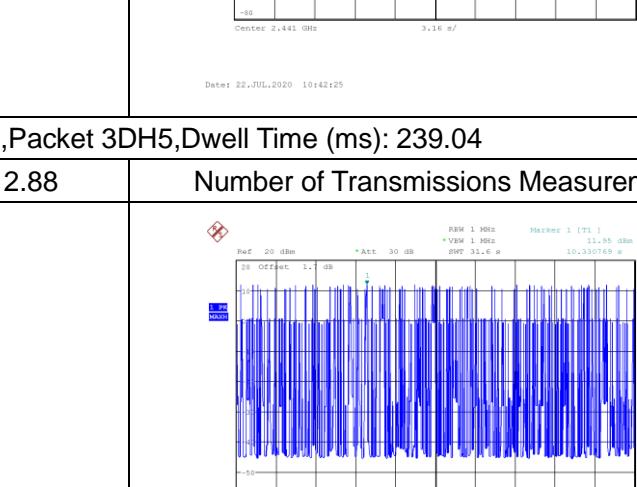
For 8DPSK, Ch39,Packet 3DH1,Dwell Time (ms): 63.74

Time of occupancy (Dwell Time) (ms):0.38	Number of Transmissions Measurement:166
	
Date: 22.JUL.2020 10:20:21	Date: 22.JUL.2020 10:21:48

For 8DPSK, Ch39,Packet 3DH3,Dwell Time (ms): 192.58

Time of occupancy (Dwell Time) (ms):1.63	Number of Transmissions Measurement:118
	
Date: 22.JUL.2020 10:41:23	Date: 22.JUL.2020 10:42:25

For 8DPSK, Ch39,Packet 3DH5,Dwell Time (ms): 239.04

Time of occupancy (Dwell Time) (ms) 2.88	Number of Transmissions Measurement:83
	
Date: 22.JUL.2020 14:48:13	Date: 22.JUL.2020 14:49:08

ANNEX A.6. 20dB Bandwidth

A.6.1 Measurement Limit:

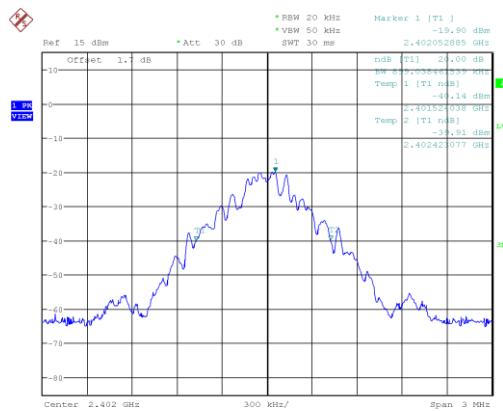
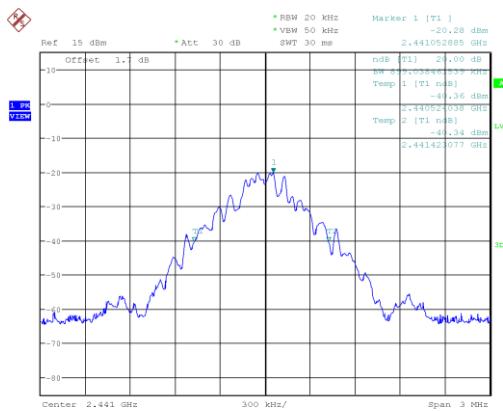
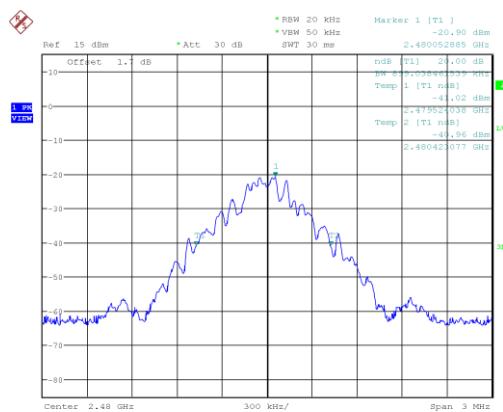
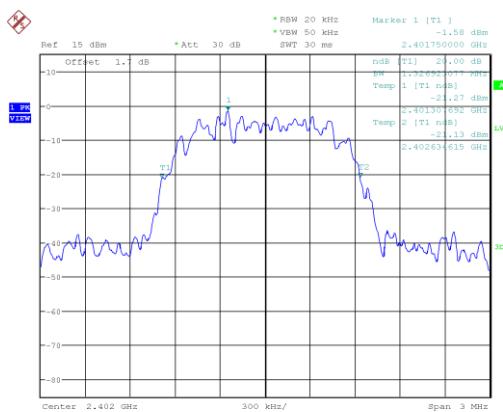
Standard	Limit
FCC 47 Part 15.247 (a) (1)	N/A

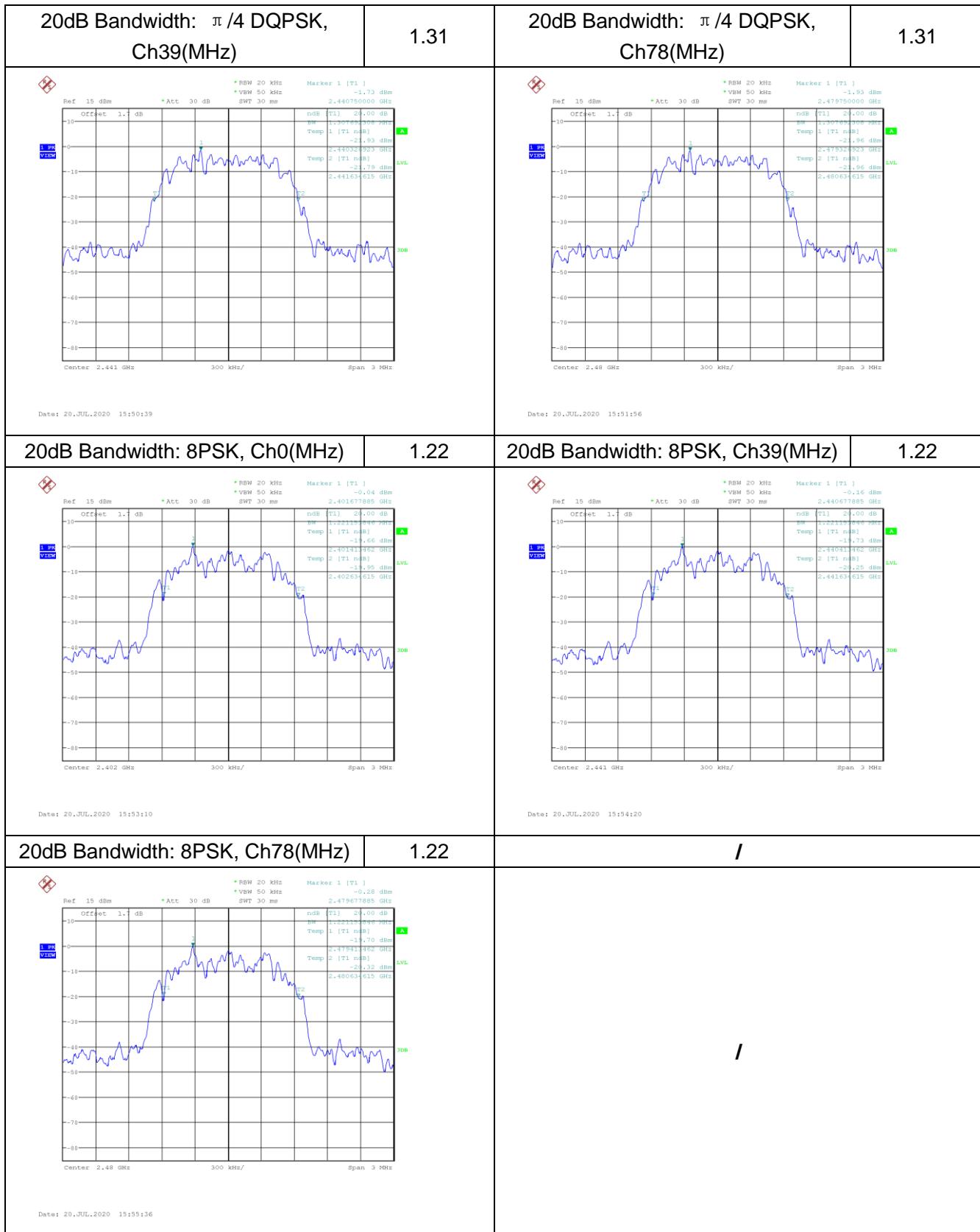
A.6.2 Test procedures

The measurement is according to ANSI C63.10 clause 7.8.7

1. Connect the EUT through cable and divide with CBT32 and spectrum analyzer.
2. Enable the EUT transmit maximum power.
3. Set the spectrum analyzer as step 4 to step 7.
4. Span: two or five times of OBW
5. RBW= 1% to 5% of the OBW; VBW is approximately three times of RBW; Max Hold.
6. Select the max peak, and N DB DOWN=20dB.
7. Record the results.

Measurement Result:

20dB Bandwidth: GFSK, Ch0(MHz)	0.89	20dB Bandwidth: GFSK, Ch39(MHz)	0.89
			
Date: 20.JUL.2020 15:16:49		Date: 20.JUL.2020 15:18:04	
20dB Bandwidth: GFSK, Ch78(MHz)	0.89	20dB Bandwidth: π/4 DQPSK, Ch0(MHz)	1.32
			
Date: 20.JUL.2020 15:19:25		Date: 20.JUL.2020 15:49:30	



ANNEX A.7. Carrier Frequency Separation**A.7.1 Measurement Limit:**

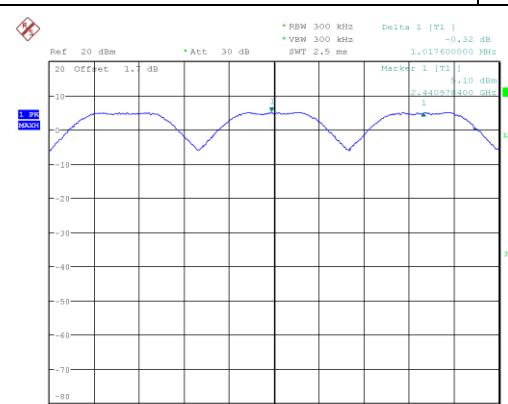
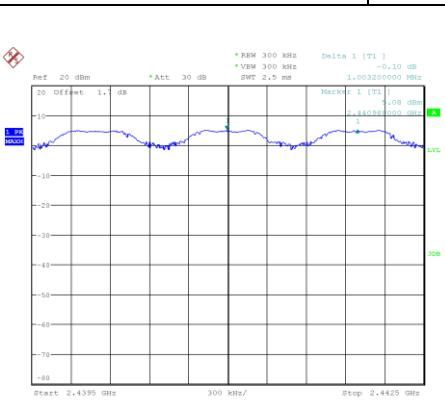
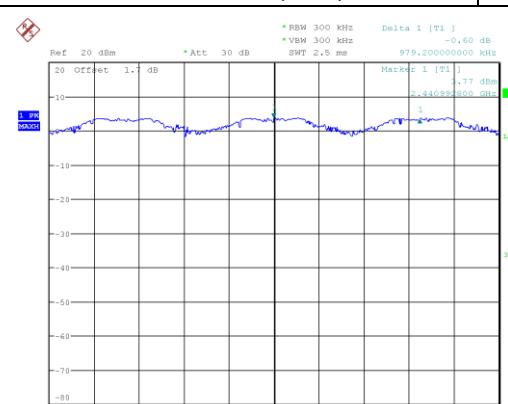
Standard	Limit (KHz)
FCC 47 Part 15.247 (a) (1)	Over 25KHz or $(2/3)^*20$ dB bandwidth

A.7.2 Test procedures

The measurement is according to ANSI C63.10 clause 7.8.2.

1. Connect the EUT through cable and divide with CBT32 and spectrum analyzer.
2. Enable the EUT transmit in hopping mode.
3. Span: Wide enough to capture the peaks of two adjacent channels.
4. RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
5. Video (or average) bandwidth (VBW) \geq RBW.
6. Sweep: Auto.
7. Detector function: Peak.
8. Trace: Max hold.
9. Allow the trace to stabilize.

Measurement Result:

Carrier separation measurement: GFSK, Ch39(KHz)	1017.6	Carrier separation measurement: $\pi/4$ DQPSK, Ch39(KHz)	1003.2
 Date: 20.AUG.2020 12:15:31		 Date: 20.AUG.2020 12:17:16	
Carrier separation measurement: 8DPSK, Ch39(KHz)	979.2	/	/
 Date: 20.AUG.2020 12:21:12			

ANNEX A.8. Number Of Hopping Channels

A.8.1 Measurement Limit:

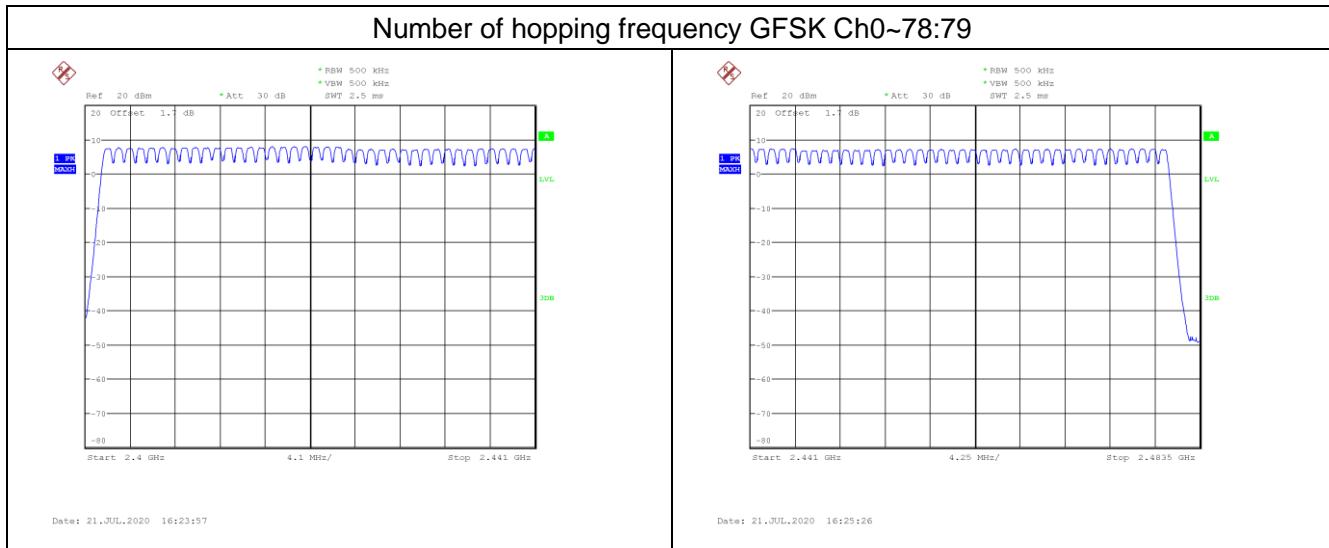
Standard	Limit
FCC 47 CFR Part 15.247 (a)(1)(iii)	At least 15 non-overlapping channels

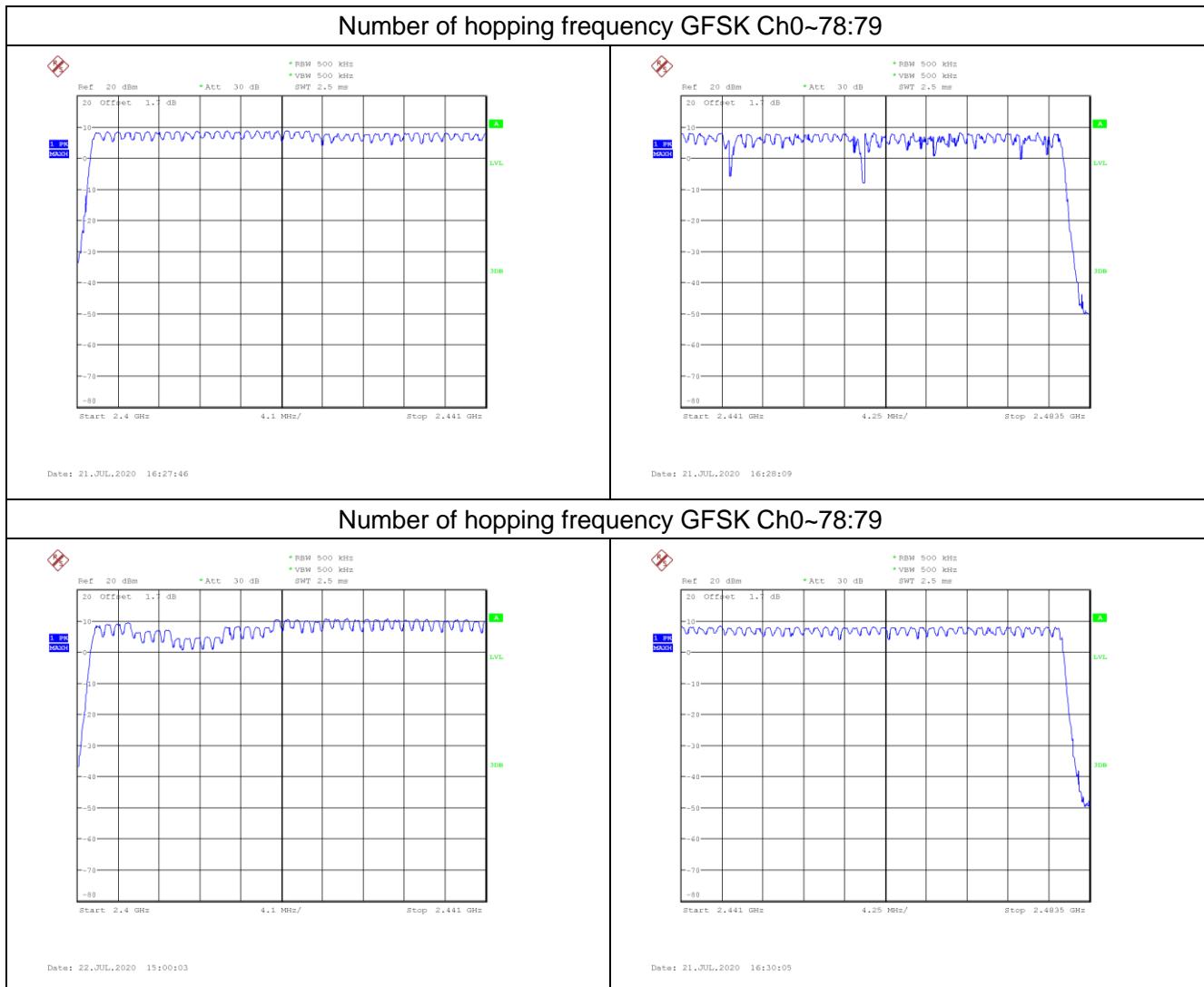
A.8.2 Test procedure

The measurement is according to ANSI C63.10 clause 7.8.3.

1. Connect the EUT through cable and divide with CBT32 and spectrum analyzer.
2. Enable the EUT transmit in hopping mode.
3. Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
4. RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
5. VBW \geq RBW.
6. Sweep: Auto.
7. Detector function: Peak.
8. Trace: Max hold.
9. Allow the trace to stabilize.
10. Record the test results.

Measurement Result:





ANNEX A.9. AC Powerline Conducted Emission

Method of Measurement: See ANSI C63.10-2013-clause 6.2

- 1 The one EUT cable configuration and arrangement and mode of operation that produced the emission with the highest amplitude relative to the limit is selected for the final measurement, while applying the appropriate modulating signal to the EUT.
- 2 If the EUT is relocated from an exploratory test site to a final test site, the highest emissions shall be remaximized at the final test location before final ac power-line conducted emission measurements are performed.
- 3 The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment in the system) is then performed for the full frequency range for which the EUT is being tested for compliance without further variation of the EUT arrangement, cable positions, or EUT mode of operation.
- 4 If the EUT is comprised of equipment units that have their own separate ac power connections, e.g., floor-standing equipment with independent power cords for each shelf that are able to connect directly to the ac power network, each current-carrying conductor of one unit is measured while the other units are connected to a second (or more) LISN(s). All units shall be separately measured. If a power strip is provided by the manufacturer, to supply all of the units making up the EUT, only the conductors in the power cord of the power strip shall be measured.

If the EUT uses a detachable antenna, these measurements shall be made with a suitable dummy load connected to the antenna output terminals; otherwise, the tests shall be made with the antenna connected and, if adjustable, fully extended. When measuring the ac conducted emissions from a device that operates between 150 kHz and 30 MHz a non-detachable antenna may be replaced with a dummy load for the measurements within the fundamental emission band of the transmitter, but only for those measurements.36 Record the six highest EUT emissions relative to the limit of each of the current-carrying conductors of the power cords of the equipment that comprises the EUT over the frequency range specified by the procuring or regulatory agency. Diagram or photograph the test setup that was used. See Clause 8 for full reporting requirements.

Test Condition:

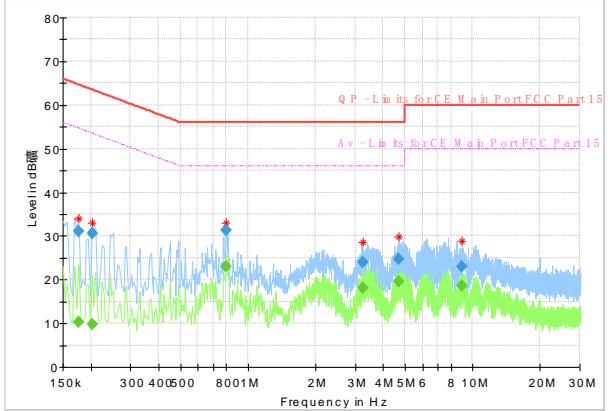
Voltage (V)	Frequency (Hz)
120	60

Measurement Result and limit:

(Quasi-peak-average Limit)

Frequency range (MHz)		Average Limit (dB μ V)	Conclusion
	Quasi-peak Limit (dB μ V)		
0.15 to 0.5	66 to 56	56 to 46	P
0.5 to 5	56	46	
5 to 30	60	50	

NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.



Frequency (MHz)	QuasiPeak (dB μ V)	Average (dB μ V)	Limit (dB μ)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.176119	---	10.16	54.67	44.51	15000.	9.000	L1	ON	9.6
0.176119	31.17	---	64.67	33.49	15000.	9.000	L1	ON	9.6
0.202238	---	9.80	53.52	43.72	15000.	9.000	N	ON	9.7
0.202238	30.48	---	63.52	33.03	15000.	9.000	N	ON	9.7
0.799238	---	22.96	46.00	23.04	15000.	9.000	L1	ON	9.6
0.799238	31.42	---	56.00	24.58	15000.	9.000	L1	ON	9.6
3.246938	---	18.19	46.00	27.81	15000.	9.000	N	ON	9.9
3.246938	24.00	---	56.00	32.00	15000.	9.000	N	ON	9.9
4.676006	---	19.45	46.00	26.55	15000.	9.000	L1	ON	9.8
4.676006	24.66	---	56.00	31.34	15000.	9.000	L1	ON	9.8
8.925900	---	18.48	50.00	31.52	15000.	9.000	L1	ON	9.9
8.925900	22.93	---	60.00	37.07	15000.	9.000	L1	ON	9.9

ANNEX B. Accreditation Certificate**Accredited Laboratory**

A2LA has accredited

EAST CHINA INSTITUTE OF TELECOMMUNICATIONS

Shanghai, People's Republic of China

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017
General requirements for the competence of testing and calibration laboratories. This accreditation demonstrates
technical competence for a defined scope and the operation of a laboratory quality management system
(refer to joint ISO-JLAC-IAF Communiqué dated April 2017).



Presented this 6th day of May 2019.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3682.01
Valid to February 28, 2021

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

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