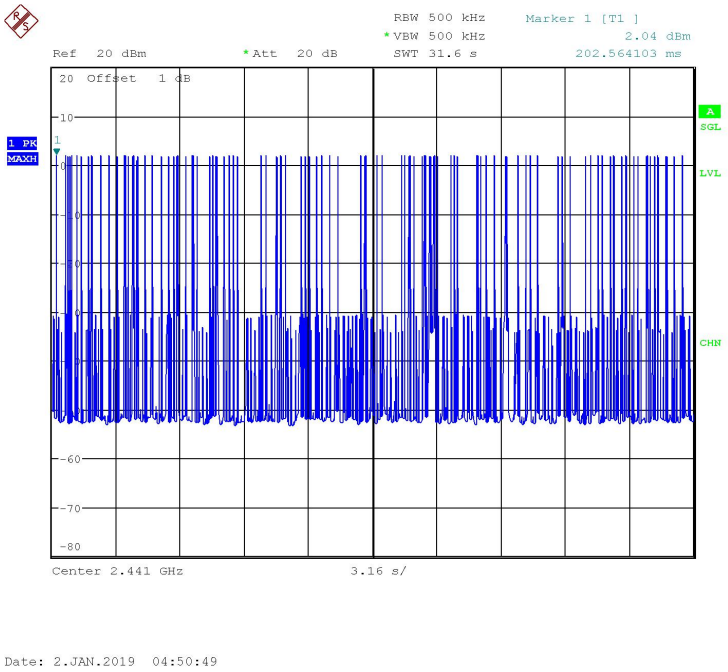

Fig.72 Number of Transmissions Measurement: Ch39, Packet 3-DH5

6.6. 20dB Bandwidth

6.6.1 Measurement Limit:

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

6.6.2 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.

6.6.3 Measurement Uncertainty:

Measurement Uncertainty	±0.0031MHz

Measurement Result:

For GFSK

Channel	20dB Bandwidth (MHz)	Conclusion

0	Fig.73	1254.808	P
39	Fig.74	1264.423	P
78	Fig.75	1250	P

For π/4 DQPSK

Channel	20dB Bandwidth (MHz)		Conclusion
0	Fig.76	1336.538	P
39	Fig.77	1302.885	P
78	Fig.78	1331.731	P

For 8DPSK

Channel	20dB Bandwidth (MHz)		Conclusion
0	Fig.79	1269.231	P
39	Fig.80	1283.654	P
78	Fig.81	1269.231	P

Conclusion: PASS

Test graphs as below:

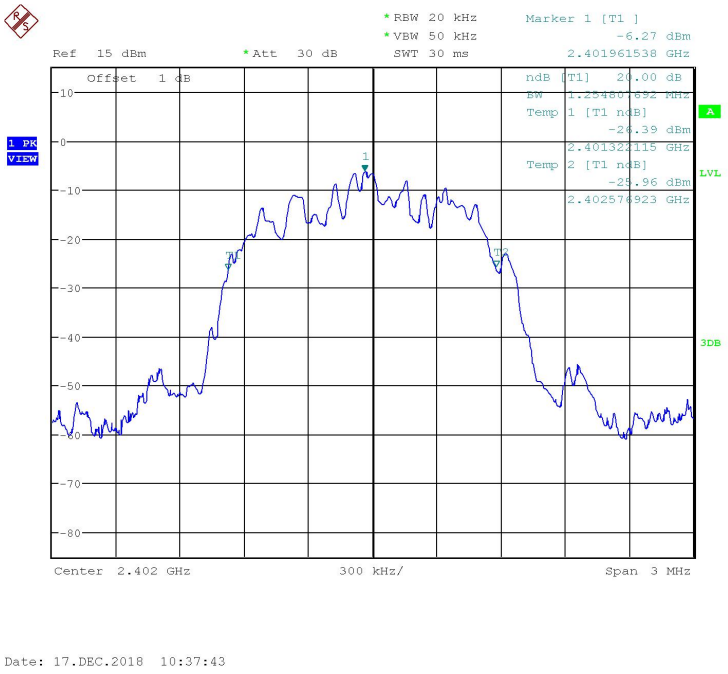

Fig.73 20dB Bandwidth: GFSK, Ch0

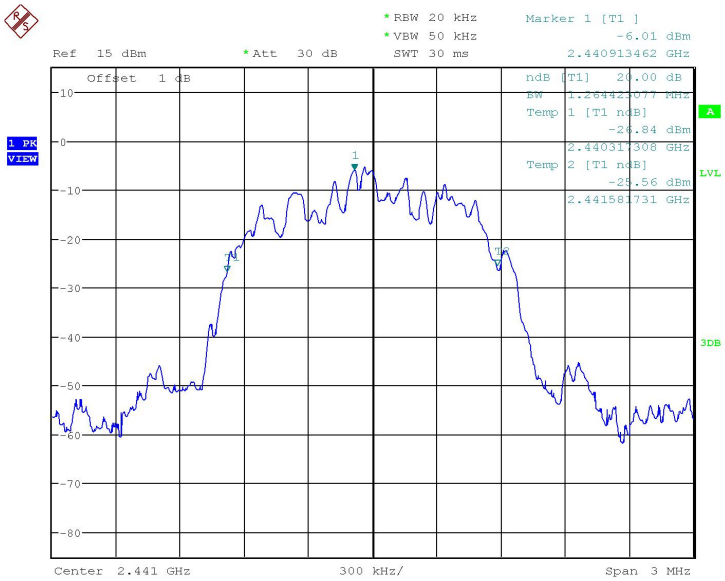

Fig.74 20dB Bandwidth: GFSK, Ch39

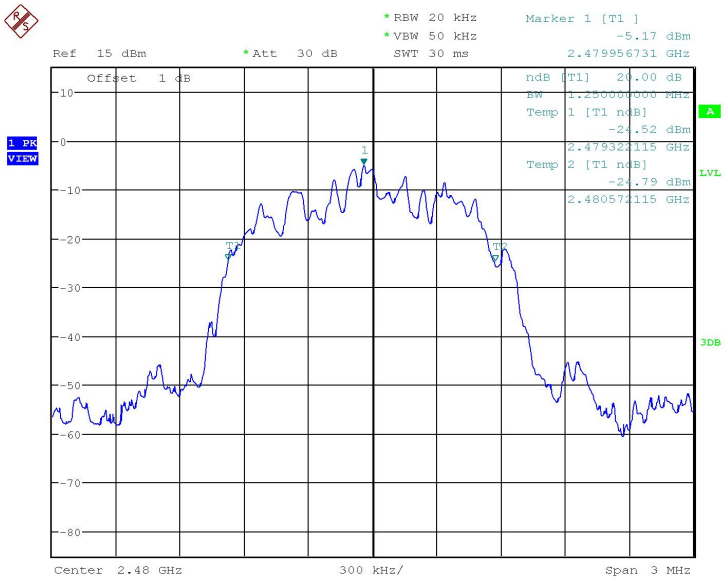

Fig.75 20dB Bandwidth: GFSK, Ch78

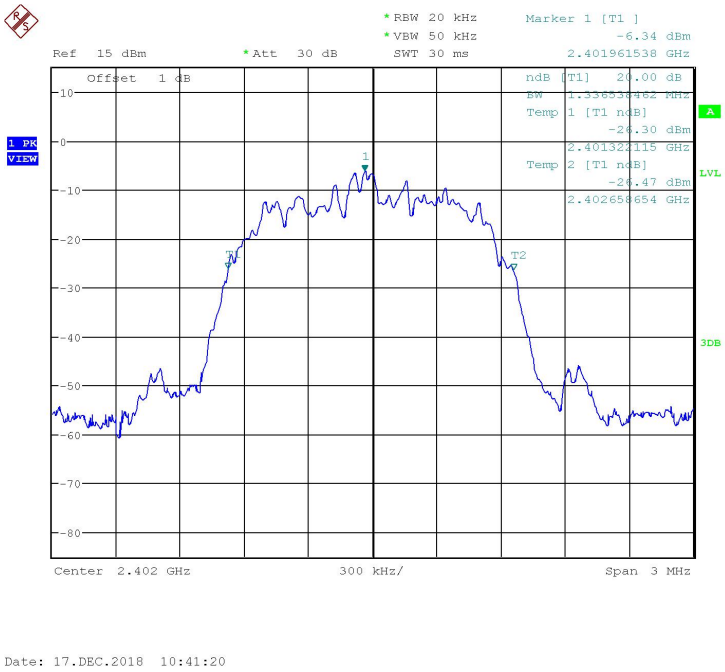

Fig.76 20dB Bandwidth: π/4 DQPSK, Ch0

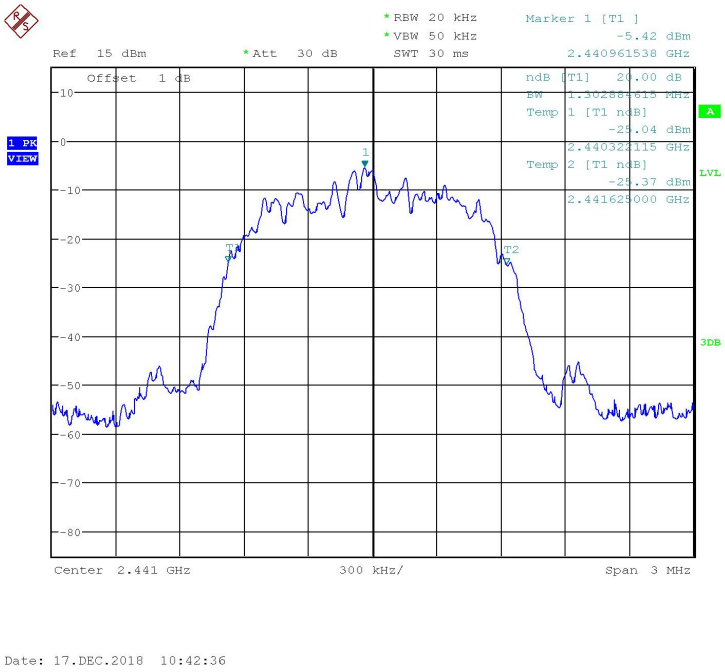

Fig.77 20dB Bandwidth: π/4 DQPSK, Ch39

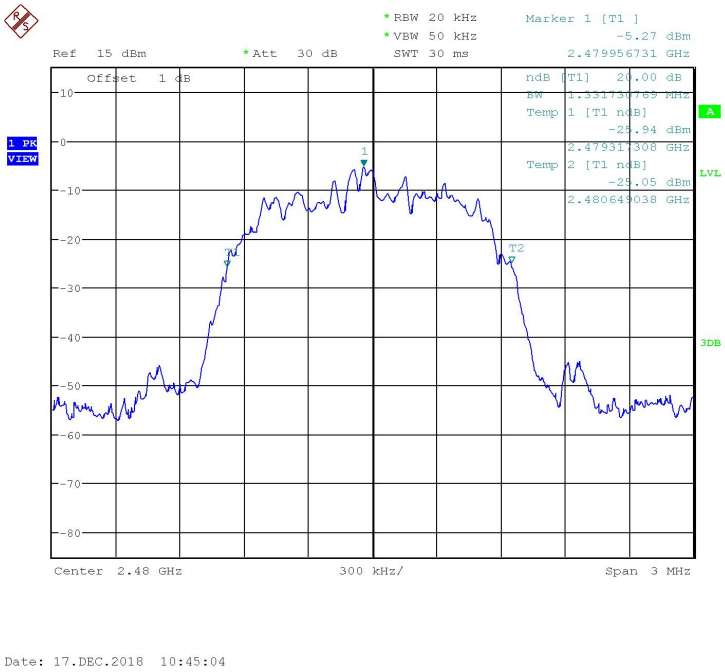

Fig.78 20dB Bandwidth: π/4 DQPSK, Ch78

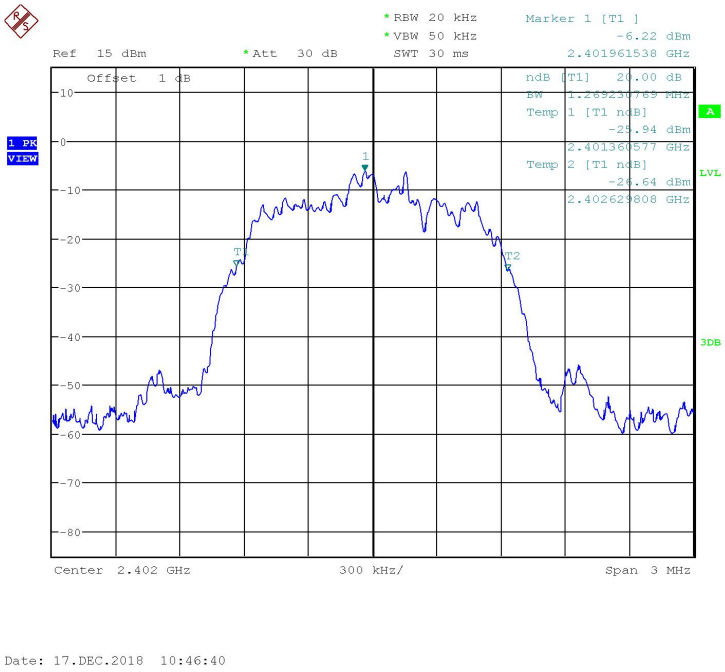

Fig.79 20dB Bandwidth: 8DPSK, Ch0

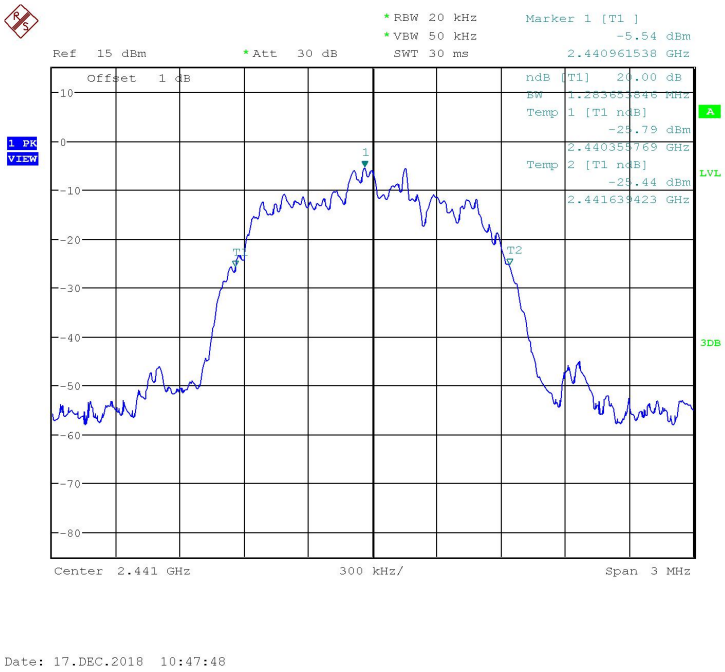

Fig.80 20dB Bandwidth: 8DPSK, Ch39

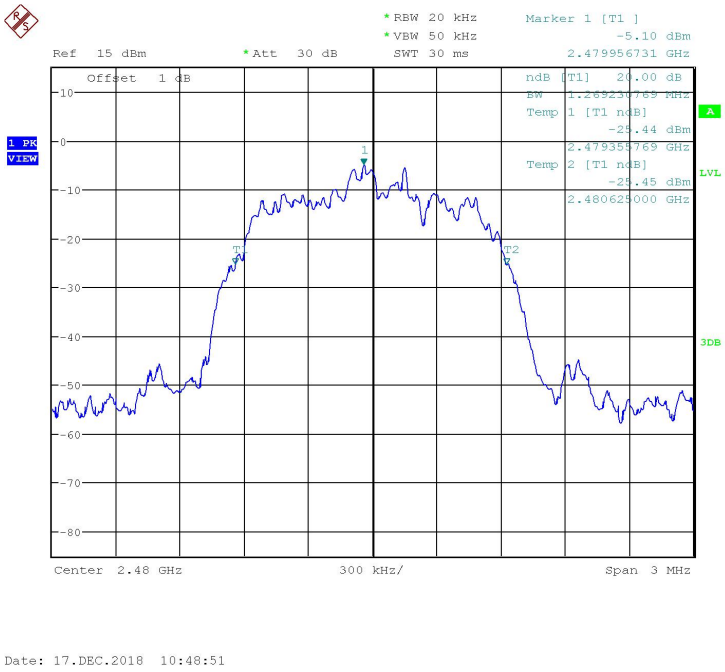

Fig.81 20dB Bandwidth: 8DPSK, Ch78

6.7. Carrier Frequency Separation

6.7.1 Measurement Limit:

Standard	Limit (KHz)

FCC 47 CFR Part 15.247 (a) (1)	Over 25KHz or (2/3)*20dB bandwidth

6.7.2 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) ≥ RBW.
6. Sweep: Auto.
7. Detector function: Peak.
8. Trace: Max hold.
9. Allow the trace to stabilize.

6.7.3 Measurement Result:

For GFSK

Channel	Carrier separation (kHz)		Conclusion
39	Fig.82	1004.8	P

For π/4 DQPSK

Channel	Carrier separation (kHz)		Conclusion
39	Fig.83	1024	P

For 8DPSK

Channel	Carrier separation (kHz)		Conclusion
39	Fig.84	1046.4	P

Conclusion: PASS

Test graphs as below:

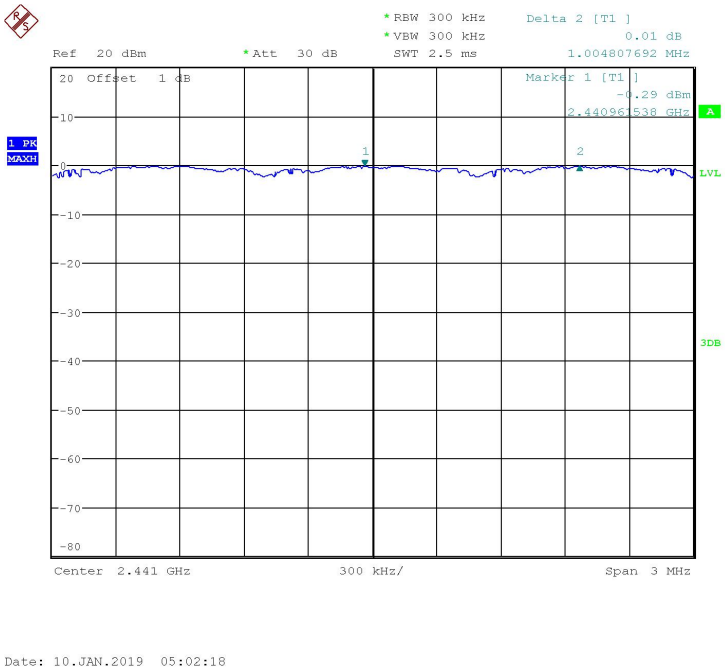

Fig.82 Carrier separation measurement: GFSK, Ch39

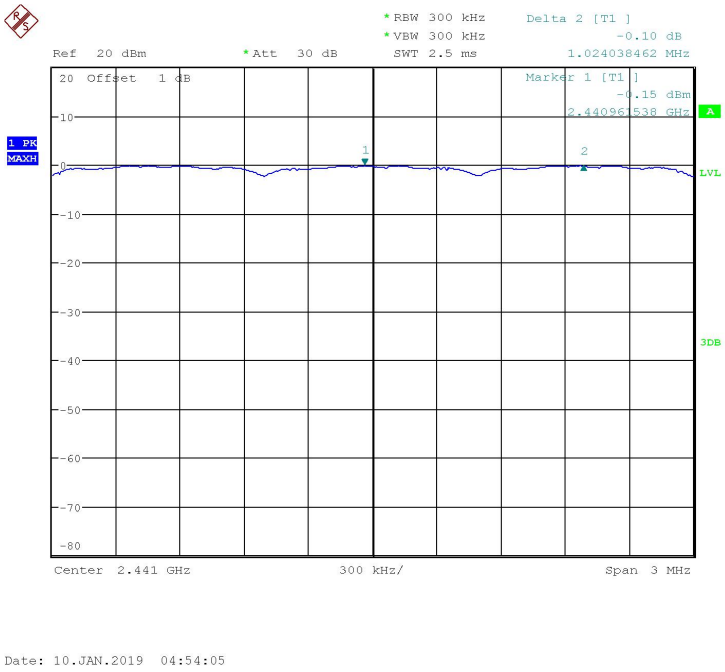

Fig.83 Carrier separation measurement: π/4 DQPSK, Ch39

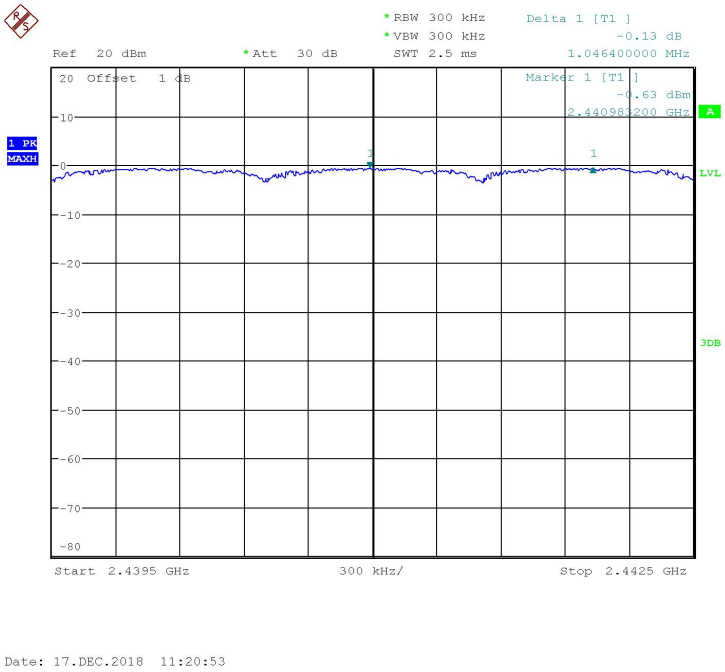

Fig.84 Carrier separation measurement: 8DPSK, Ch39

6.8. Number Of Hopping Channels

6.8.1 Measurement Limit:

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

6.8.2 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 ⩾ RBW.
6. Sweep: Auto.
7. Detector function: Peak.
8. Trace: Max hold.
9. Allow the trace to stabilize.
10. Record the test rsults.

6.8.3 Measurement Result:

For GFSK

Channel	Number of hopping channels		Conclusion
0~39	Fig.85	79	P
40~78	Fig.86		P

For π/4 DQPSK

Channel	Number of hopping channels		Conclusion
0~39	Fig.87	79	P
40~78	Fig.88		P

For 8DPSK

Channel	Number of hopping channels		Conclusion
0~39	Fig.89	79	P
40~78	Fig.90		P

Conclusion: PASS

Test graphs as below:

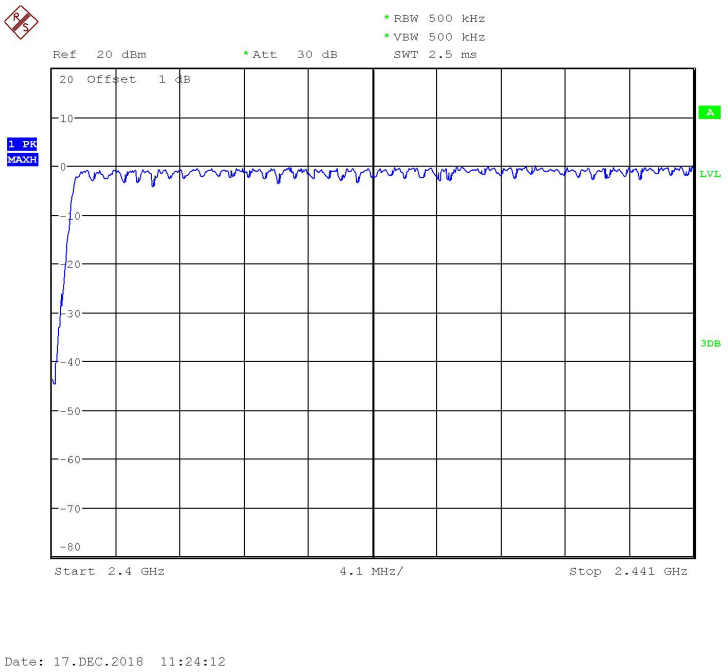

Fig.85 Number of hopping frequency: GFSK, Ch0~39

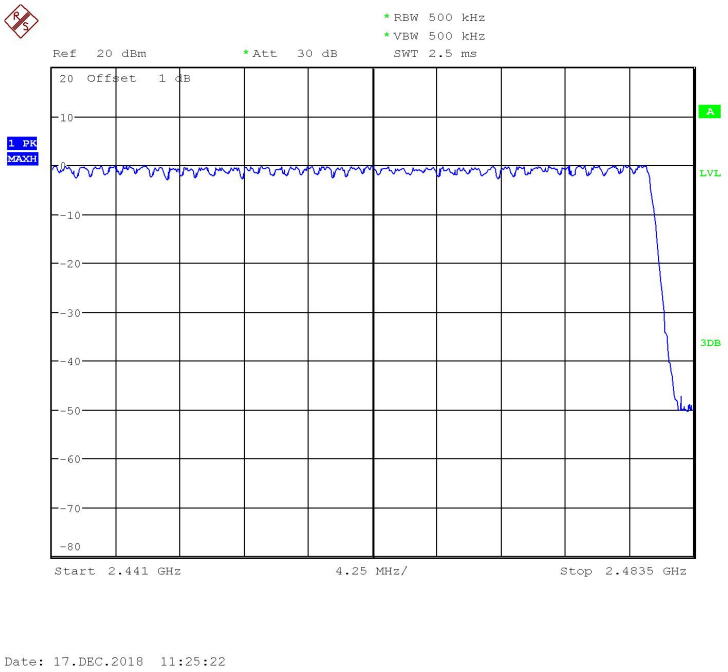

Fig.86 Number of hopping frequency: GFSK, Ch40~78

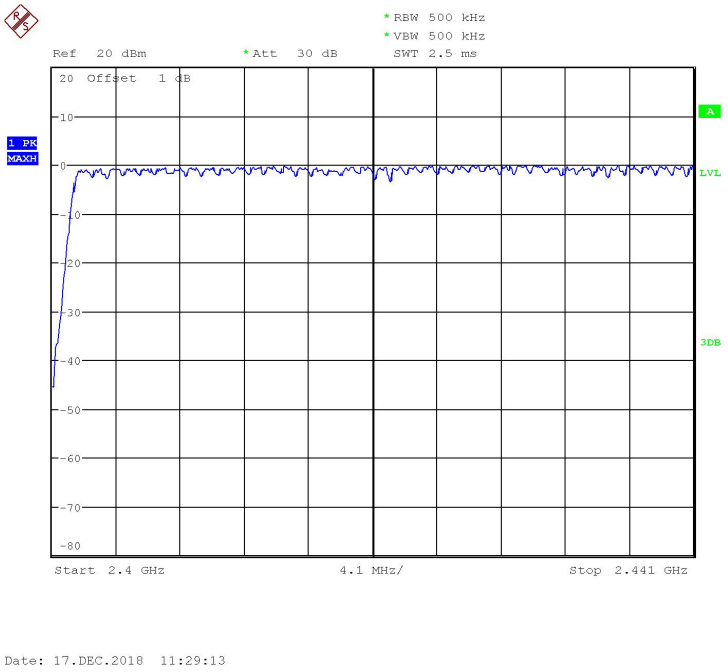

Fig.87 Number of hopping frequency: π/4 DQPSK, Ch0~39

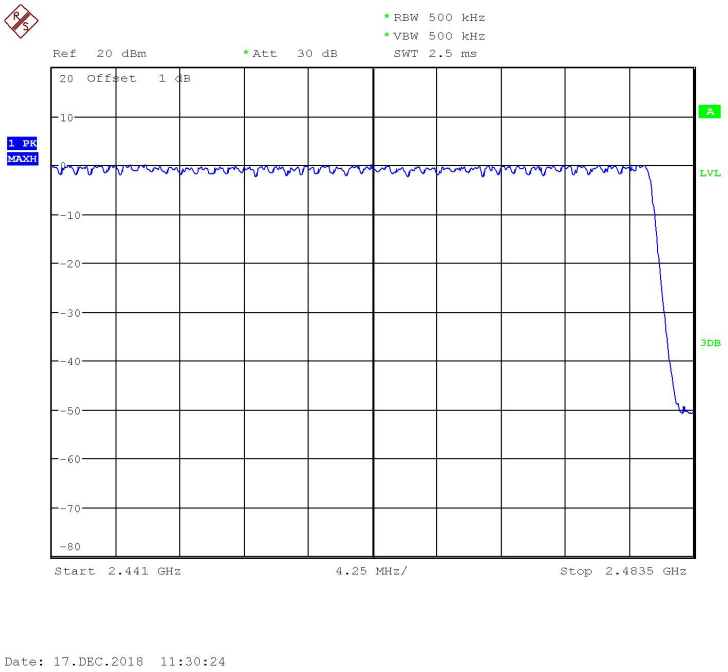

Fig.88 Number of hopping frequency: π/4 DQPSK, Ch40~78

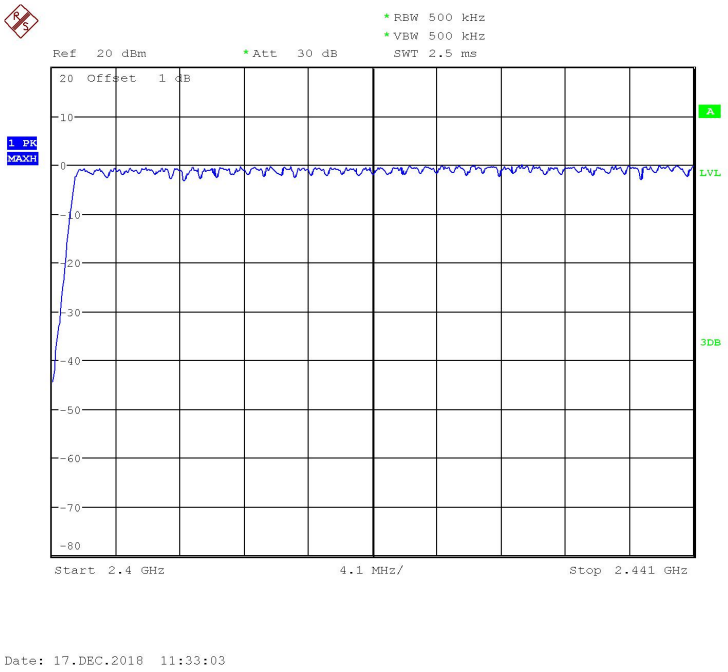

Fig.89 Number of hopping frequency: 8DPSK, Ch0~39

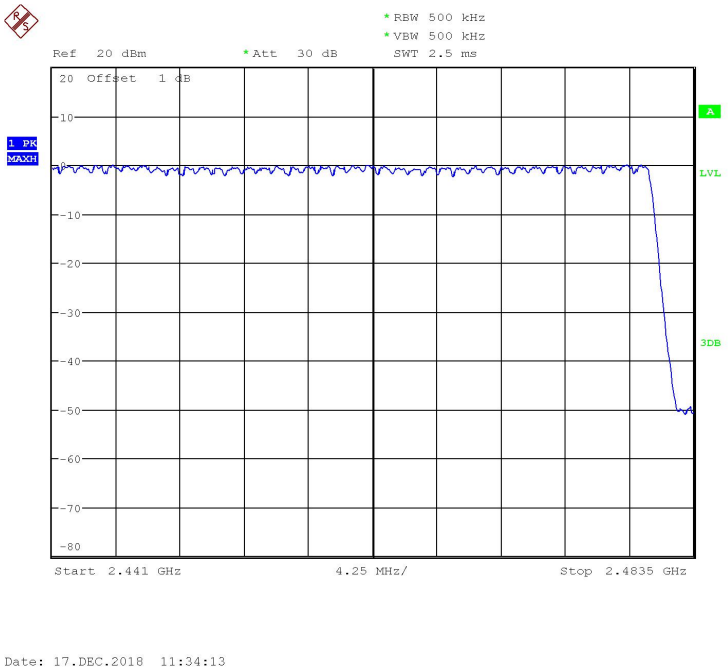

Fig.90 Number of hopping frequency: 8DPSK, Ch40~78

6.9. 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 Uncertainty

Measurement Items	Range	Confidence Level	Calculated Uncertainty
AC Power line Conducted Emission	0.15MHz-30MHz	95%	±5.66 db

Measurement Result and limit:

(Quasi-peak-average Limit)

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Average Limit (dBμV)	Result (dBμV) With charger BT	Conclusion
0.15 to 0.5	66 to 56	56 to 46	Fig.91	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.				

Conclusion: Pass

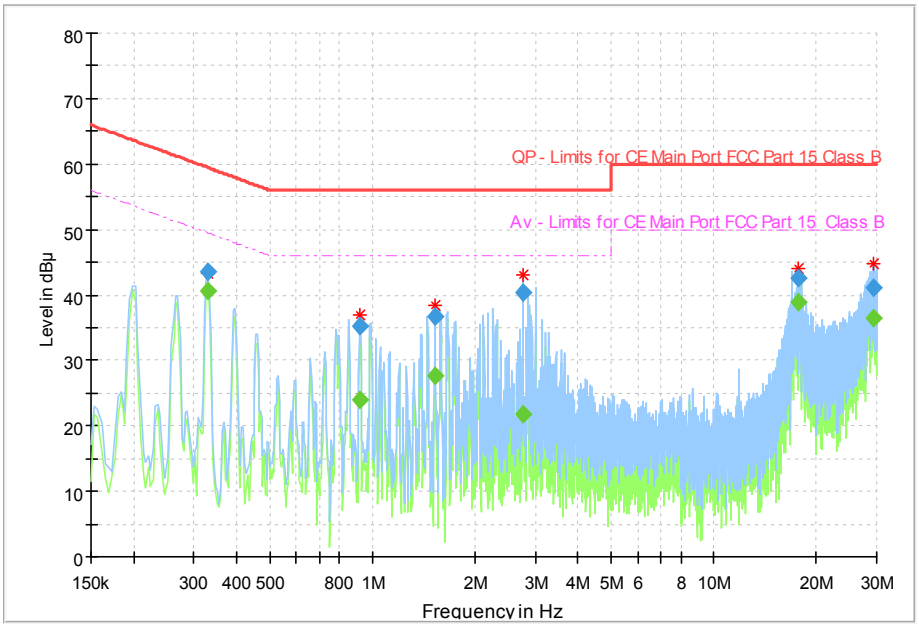

Fig.91 AC Powerline Conducted Emission

Frequency (MHz)	QuasiPeak (dB µ V)	Average (dB µ V)	Limit (dB µ	Margin (dB)	Meas. Time	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.329100	---	40.52	49.47	8.95	1000.0	9.000	N	ON	9.7
0.329100	43.43	---	59.47	16.05	1000.0	9.000	N	ON	9.7
0.918638	35.25	---	56.00	20.75	1000.0	9.000	L1	ON	9.7
0.918638	---	24.09	46.00	21.91	1000.0	9.000	L1	ON	9.7
1.526831	---	27.56	46.00	18.44	1000.0	9.000	L1	ON	9.7
1.526831	36.65	---	56.00	19.35	1000.0	9.000	L1	ON	9.7
2.761875	---	21.72	46.00	24.28	1000.0	9.000	N	ON	9.7
2.761875	40.44	---	56.00	15.56	1000.0	9.000	N	ON	9.7
17.668219	42.56	---	60.00	17.44	1000.0	9.000	L1	ON	9.9
17.668219	---	38.83	50.00	11.17	1000.0	9.000	L1	ON	9.9
29.320913	---	36.44	50.00	13.56	1000.0	9.000	N	ON	9.9
29.320913	41.10	---	60.00	18.90	1000.0	9.000	N	ON	9.9

7. Test Equipment and Ancillaries Used For Tests

The test equipments and ancillaries used are as follows.

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration date	Cal.interval
1	Vector Signal	FSQ26	101091	Rohde&Schwarz	2018-05-11	1 Year
2	DC Power Supply	ZUP60-14	LOC-220Z006	TDL-Lambda	2018-05-11	1 Year
3	Bluetooth Tester	CBT32	100785	Rohde&Schwarz	2018-05-11	1 Year

Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration date	Cal.interval
1	Universal Radio Communication Tester	CMU200	123123	R&S	2018-05-11	1 Year
2	EMI Test Receiver	ESU40	100307	R&S	2018-05-11	1 Year
3	TRILOG Broadband Antenna	VULB9163	VULB9163-515	Schwarzbeck	2017-02-25	3 Year
4	Double- ridged Waveguide Antenna	ETS-3117	00135890	ETS	2017-01-11	3 Year
5	2-Line V-Network	ENV216	101380	R&S	2018-05-11	1 Year

Anechoic chamber

Fully anechoic chamber by Frankonia German.

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 ℃, Max. = 35 ℃
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	> 100 dB
Ground system resistance	< 0.5

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

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

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

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. = 25 %, Max. = 75 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 10 k
Ground system resistance	< 0.5
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. Deviations from Prescribed Test Methods

No deviation from Prescribed Test Methods.

ANNEX B. Accreditation Certificate

ilac-MRA a2LA

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 17025:2005 *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-ILAC-IAF Communiqué dated 8 January 2009*).

Presented this 15th day of March 2017.

President and CEO
For the Accreditation Council
Certificate Number 3682.01
Valid to February 28, 2019

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

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