Full

TEST REPORT

No. I18D00119-SRD02

For

Client : Shanghai Sunmi Technology Co.,Ltd.

Production : POS System

Model Name : L1521, L1522, L1523

FCC ID : 2AH25T2

Hardware Version: V1.02

Software Version: 1.0.16, 1.0.17

Issued date: 2018-08-15

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of ECIT Shanghai.

Test Laboratory:

ECIT Shanghai, East China Institute of Telecommunications

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Revision Version

Report Number	Revision	Date	Memo
I18D00119-SRD02	00	2018-08-15	Initial creation of test report

CONTENTS

1. Test Laboratory

1.1. Testing Location

Company Name:	ECIT Shanghai, East China Institute of Telecommunications
Address:	7-8F, G Area, No. 668, Beijing East Road, Huangpu District, Shanghai, P. R. China
Postal Code:	200001
Telephone:	(+86)-021-63843300
Fax:	(+86)-021-63843301

1.2. Testing Environment

Normal Temperature:	15-35℃
Extreme Temperature:	-10/+55℃
Relative Humidity:	20-75%

1.3. Project data

Project Leader:	Yu Anlu
Testing Start Date:	2018-07-13
Testing End Date:	2018-08-07

1.4. Signature

Yang Dejun
(Prepared this test report)

Shi Hongqi
(Reviewed this test report)

Zheng Zhongbin
Director of the laboratory
(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name:	Shanghai Sunmi Technology Co.,Ltd.
Address:	Room 505, KIC Plaza, No.388 Song Hu Road, Yang Pu District, Shanghai, China
Postcode:	200433
Telephone:	18721736693

2.2. Manufacturer Information

Company Name:	Shanghai Sunmi Technology Co.,Ltd.
Address:	Room 505, KIC Plaza, No.388 Song Hu Road, Yang Pu District, Shanghai, China
Postcode:	200433
Telephone:	18721736693

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

3.1. About EUT

EUT Description	POS System
Model name	L1521, L1522, L1523
Bluetooth Frequency	2402MHz-2480Mhz
Bluetooth Channel	Channel0-Channel39
Bluetooth Modulation	GFSK;
Extreme Temperature	-10/+55℃
Nominal Voltage	24V
Extreme High Voltage	25V
Extreme Low Voltage	23V

Note: Photographs of EUT are shown in ANNEX A of this test report.

3.2. Internal Identification of EUT used during the test

EUT ID*	Model Name	SN or IMEI	HW Version	SW Version	Date of receipt
N02	L1523	N/A	V1.02	1.0.16	2018-06-28
N04	L1523	N/A	V1.02	1.0.16	2018-06-28
N03	L1522	N/A	V1.02	1.0.17	2018-06-28
N05	L1521	N/A	V1.02	1.0.16	2018-06-28

*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	SN
AE1	RF cable	---
AE2	---	---

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

4. Reference Documents

4.1. 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.	Jun,2016 Edition
ANSI C63.10	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices	2013

5. Summary of Test Results

A brief summary of the tests carried out is shown as following.

Measurement Items	Sub-clause of Part15C	Sub-clause of IC	Verdict
Maximum Peak Output Power	15.247(b)	/	P
Peak Power Spectral Density	15.247(e)	/	P
6dB Occupied Bandwidth	15.247(a)	/	P
Band Edges Compliance	15.247(d)	/	P
Transmitter Spurious Emission-Conducted	15.247	/	P
Transmitter Spurious Emission-Radiated	15.247	/	P
AC Powerline Conducted Emission	15.107,15.207	/	P

Please refer to part 5 for detail.

The measurements are according to ANSI C63.10.

Terms used in Verdict column

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

Tnom	Normal Temperature
Tmin	Low Temperature
Tmax	High Temperature
Vnom	Normal Voltage
Vmin	Low Voltage
Vmax	High Voltage
Hnom	Norm Humidity
Anom	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	Tnom	25℃
Voltage	Vnom	24
Humidity	Hnom	48%
Air Pressure	Anom	1010hPa

Note:

a. All the test data for each data were verified, but only the worst case was reported.

b. The GFSK was set in DH1.

c. The DC and low frequency voltages' measurement uncertainty is ±2%.

5.1. Notes

All reported tests were carried out on a sample equipment to demonstrate limited compliance with section 3.

The test results of this test report relate exclusively to the item(s) tested as specified in section 5.

5.2. Statements

The L1521，L1522，1523, supporting BT/BLE/ WIFI, manufactured by Shanghai Sunmi Technology Co.,Ltd., which is a new product for testing.

Note: The project has three prototypes, L1521, L1522, L1523.The L1523 we tested all the test items. The other two we only tested worse case.

ECIT has verified that the compliance of the tested device specified in section 5 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 5 of this test report.

6. Test result

6.1. Peak Output Power-Conducted

6.1.1 Measurement Limit

Standard	Limit (dBm)
FCC Part 15.247(b)(1)	< 30

6.1.2 Test Condition:

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

6.1.3 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 by cable. 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.

6.1.4 Measurement Results:

For GFSK

Channel	Ch0 2402 MHz	Ch19 2440 MHz	CH39 2480 MHz	Conclusion
Peak Conducted Output Power (dBm)	0.068	0.488	-0.107	P
	Fig.1	Fig.2	Fig.3	

Conclusion: PASS

Test graphs an below

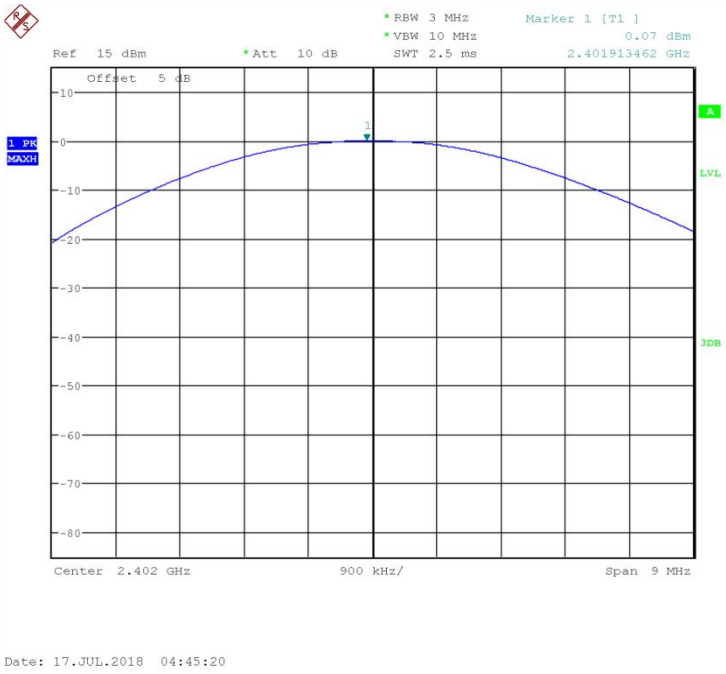

Fig.1 Peak Conducted Output Power CH0, DH1

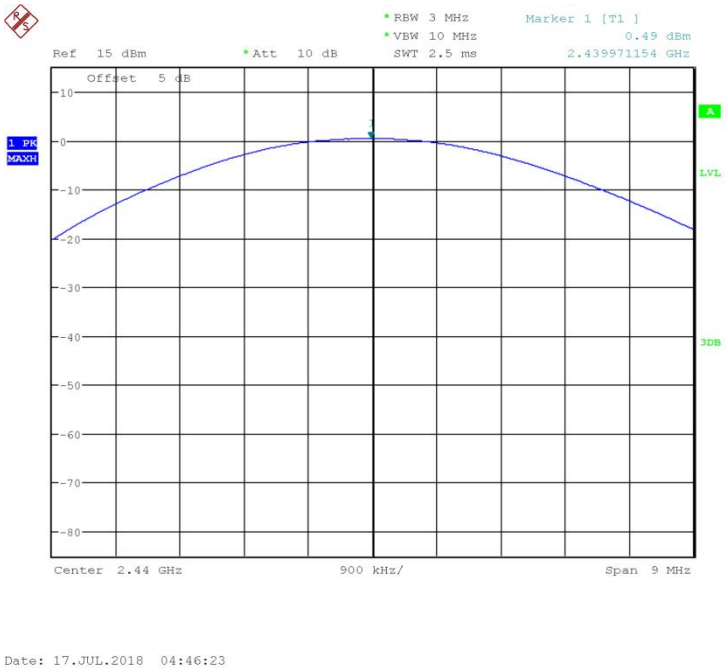

Fig.2 Peak Conducted Output Power CH19, DH1

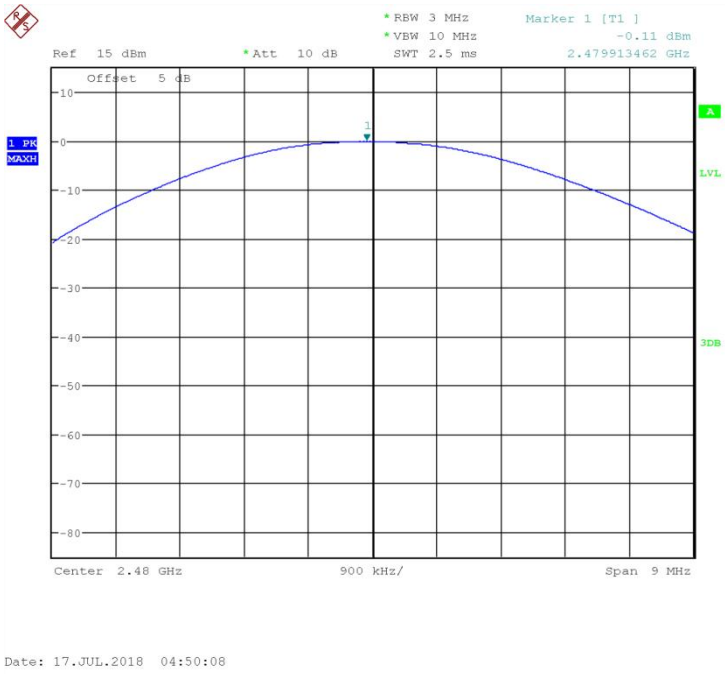

Fig.3 Peak Conducted Output Power CH39, DH1

6.2. Peak Power Spectral Density

6.2.1 Measurement Limit:

Standard	Limit
FCC CFR Part 15.247(e)	< 8dBm/3 KHz

6.2.2 Test procedures

The measurement is according to ANSI C63.10 clause 11.10.

1. The output power of EUT was connected to the spectrum analyzer. The path loss was compensated to the results for each measurement.
2. Enable EUT transmitter maximum power continuously.
3. Set analyzer center frequency to DTS channel center frequency.
4. Set the span to 1.5 times the DTS bandwidth.
5. Set the RBW to 3 kHz $\leqslant$ RBW $\leqslant$ 100 kHz.
6. Set the VBW $\geqslant$ [3 $\times$ RBW].
7. Detector = peak.
8. Sweep time = auto couple.
9. Trace mode = max hold.
10. Allow trace to fully stabilize.
11. Use the peak marker function to determine the maximum amplitude level within the RBW.
12. If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.

6.2.3 Measurement Uncertainty:

Measurement Uncertainty	0.75dB

6.2.4 Measurement Results:

Mode	Channel	Power Spectral Density(dBm/3kHz)		Conclusion
BT-LE	00	Fig.4	-15.568	P
	19	Fig.5	-15.168	P
	39	Fig.6	-15.768	P

Test figure as below:

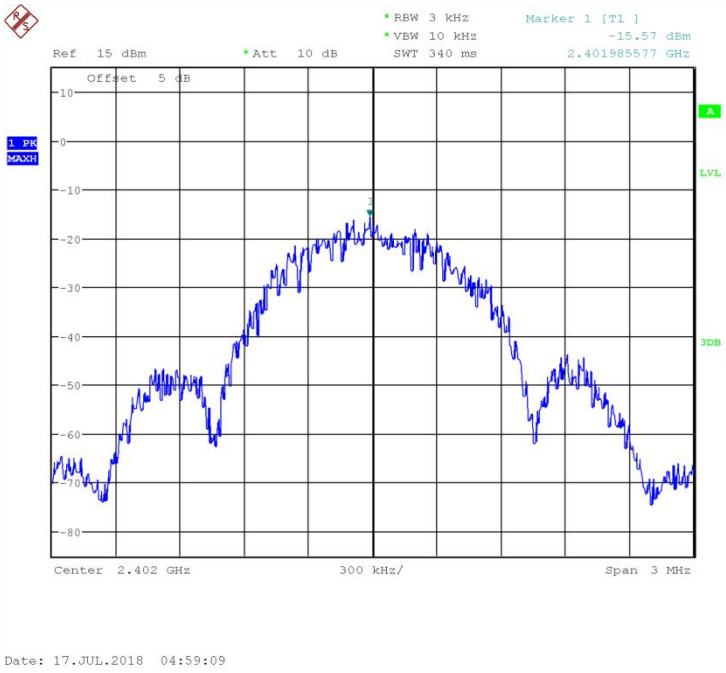

Fig.4 Power spectral density: CH0

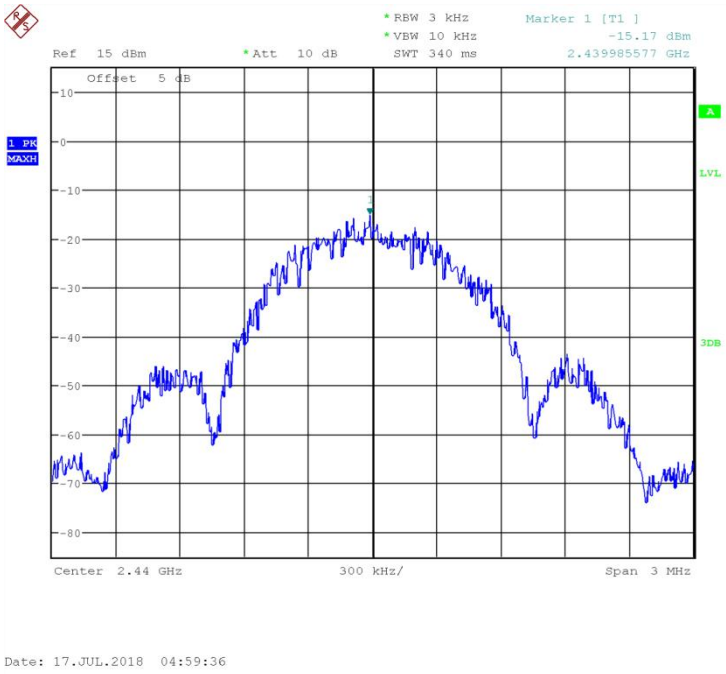

Fig.5 Power spectral density: CH19

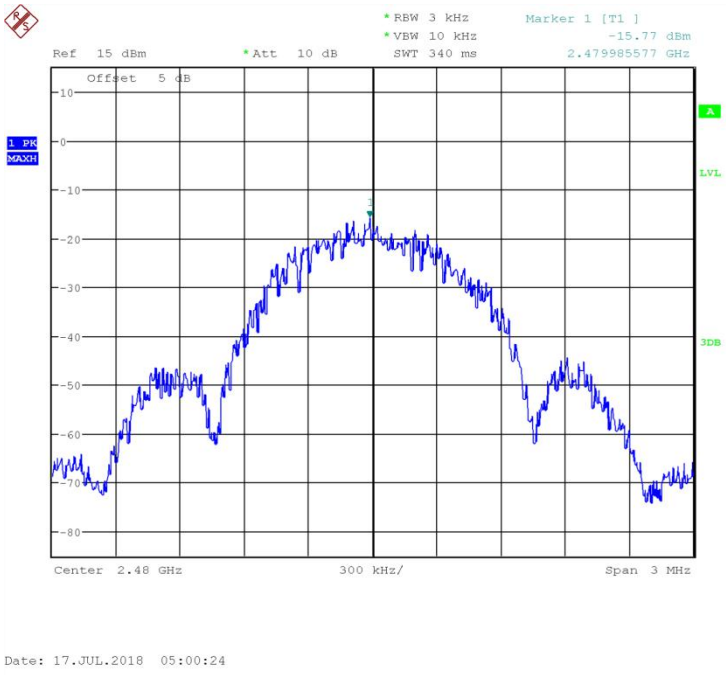

Fig.6 Power spectral density: CH39

6.3. 6dB Bandwidth

6.3.1 Measurement Limit:

Standard	Limit

FCC 47 CFR Part 15.247 (a) (1)	⩾500k

6.3.2 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 DTS channel center frequency.
4. Span: two or five times of OBW
5. RBW= 1% to 5% of the OBW; VBW⩾3RBW; Max Hold.
6. Select the max peak, and N DB DOWN=6dB.
7. Record the results.

Measurement Result:

For GFSK

Channel	6dB Bandwidth (KHz)		Conclusion
0	Fig.7	668	P
39	Fig.8	673	P
78	Fig.9	678	P

Conclusion: PASS

Test graphs as below:

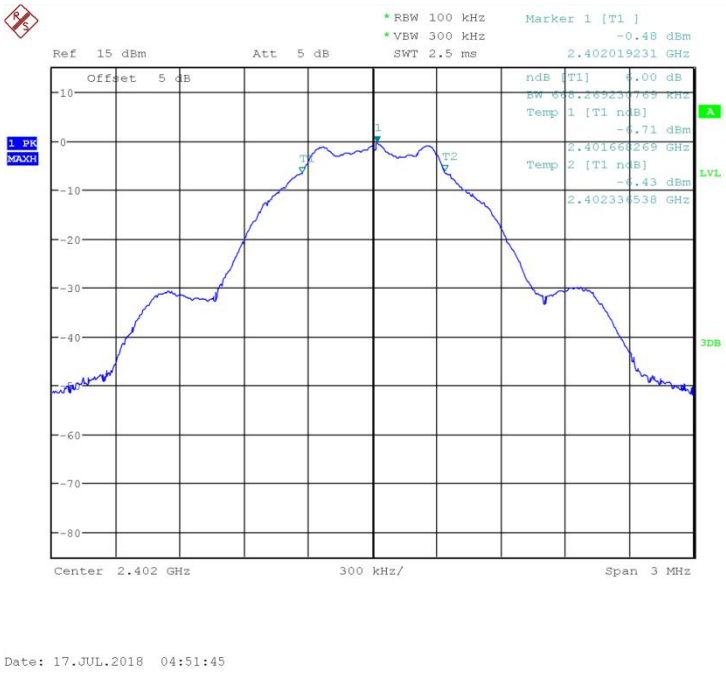

Fig.7 6dB Bandwidth: Ch0

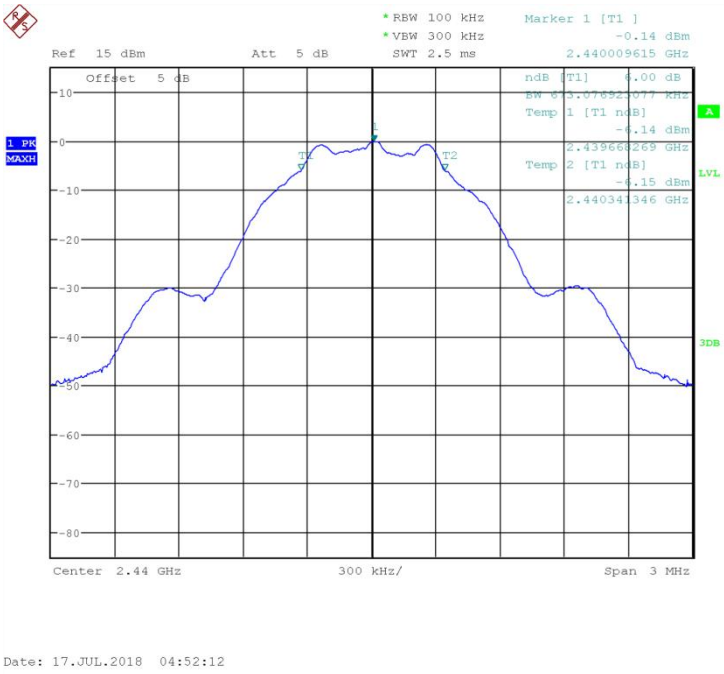

Fig.8 6dB Bandwidth: Ch19

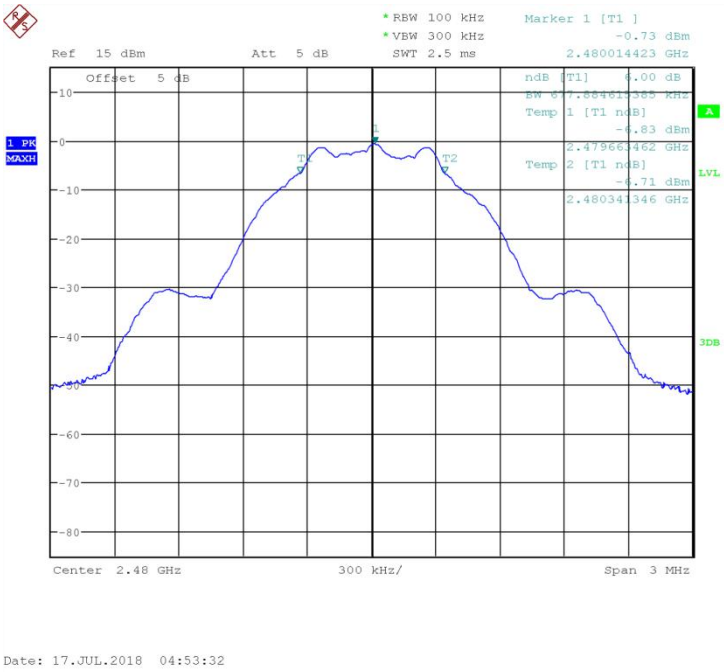

Fig.9 6dB Bandwidth: Ch39

6.4. Frequency Band Edges-Conducted

6.4.1 Measurement Limit:

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

6.4.2 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.

6.4.3 Measurement results

For GFSK

Channel	Band Edge Power (dBc)	Conclusion
00	Fig.10	P
39	Fig.11	P

Conclusion: PASS

Test graphs an below

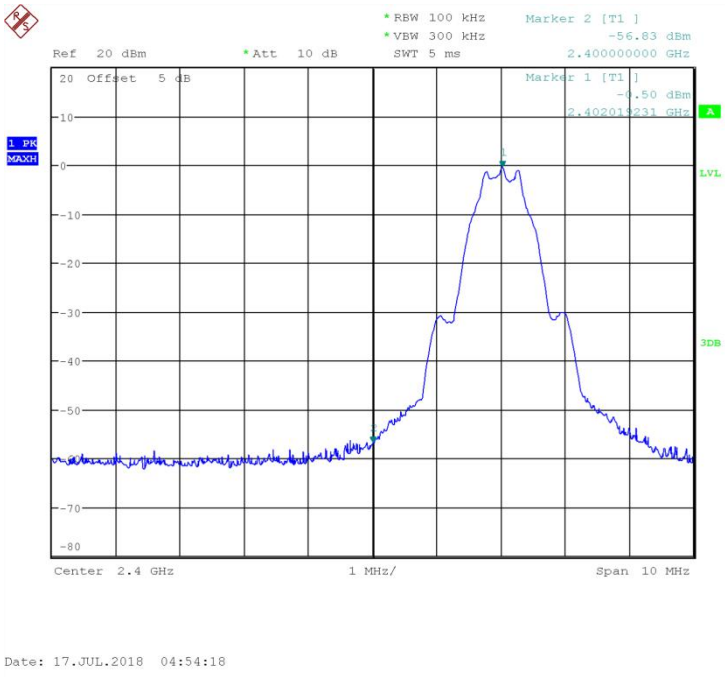

Fig.10 Frequency Band Edge: GFSK, Ch0, Hopping OFF

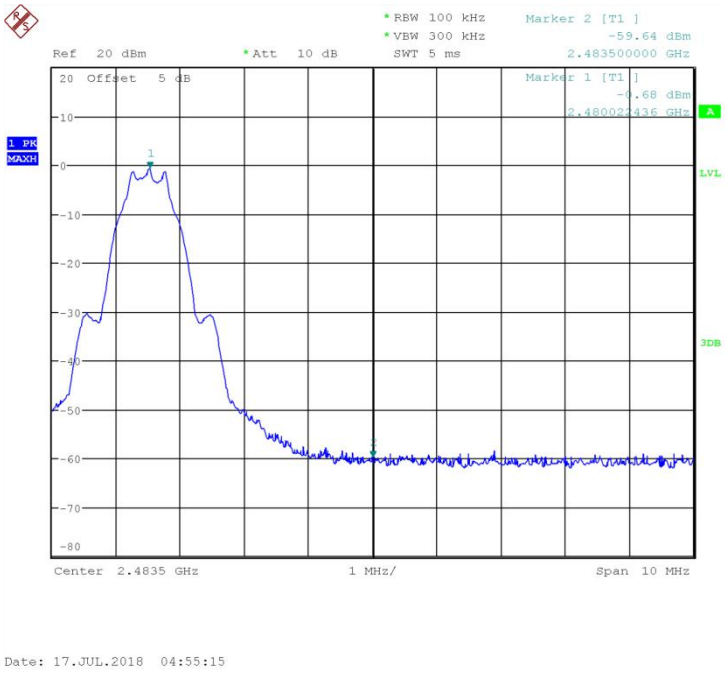

Fig.11 Frequency Band Edge: GFSK, Ch39, Hopping OFF

6.5. Conducted Emission

6.5.1 Measurement Limit:

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

6.5.2 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.

6.5.3 Measurement Results:

Channel	Frequency Range	Test Results	Conclusion
Ch0 2402MHz	Center Freq.	Fig.12	P
	30MHz~26GHz	Fig.13	P
Ch19 2440MHz	Center Freq.	Fig.14	P
	30MHz~26GHz	Fig.15	P

Ch39 2480MHz	Center Freq.	Fig.16	P
	30MHz~26GHz	Fig.17	P

Conclusion: PASS

Test graphs as below

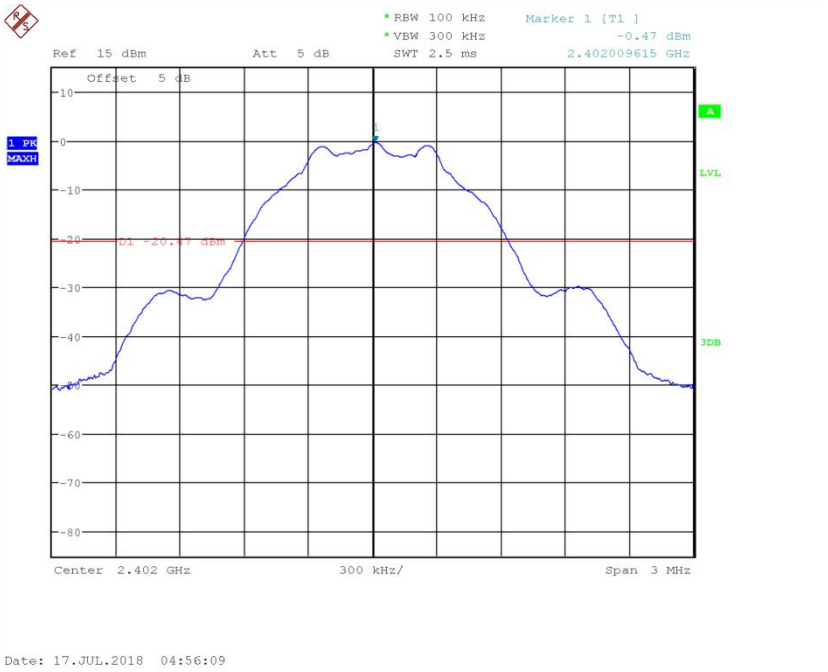

Fig.12 Conducted spurious emission: Ch0, 2402MHz

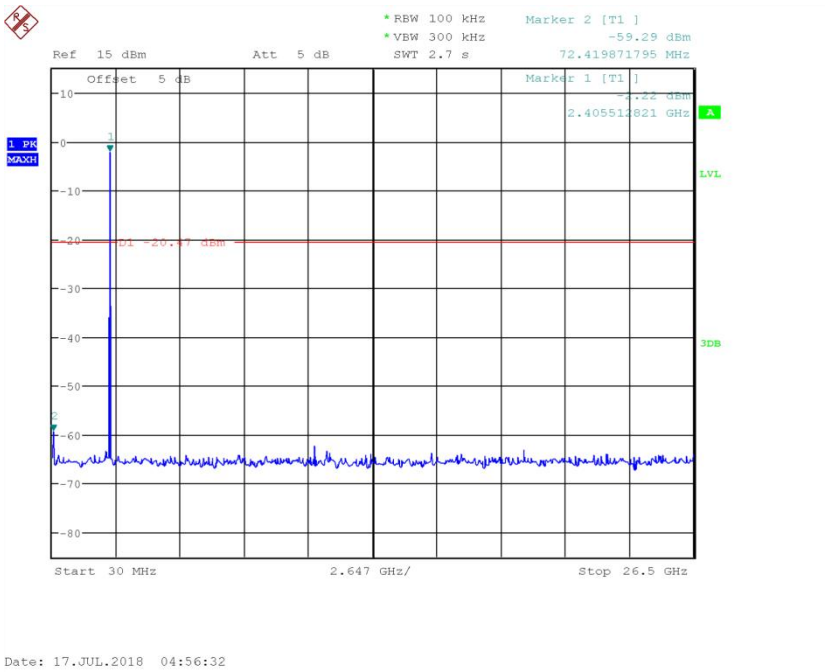

Fig.13 Conducted spurious emission: Ch0, 30MHz~26GHz

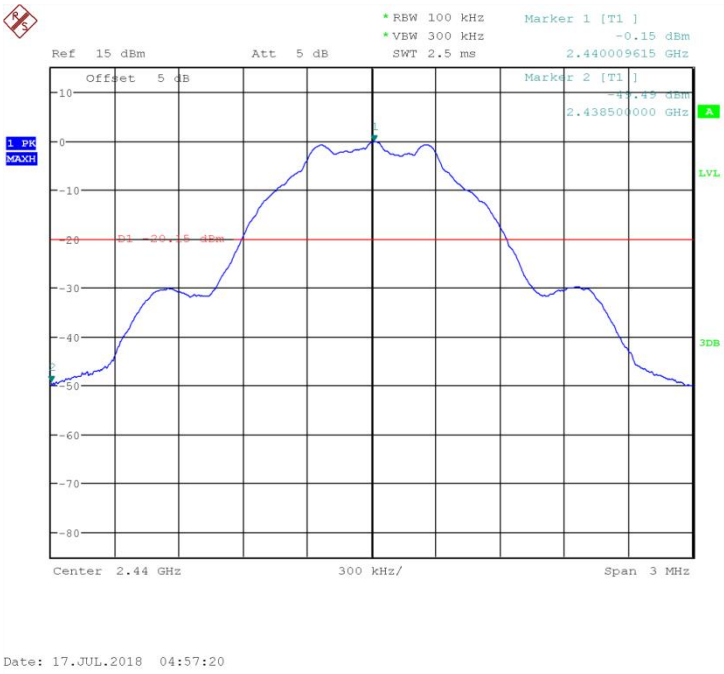

Fig.14 Conducted spurious emission: Ch19, 2440MHz

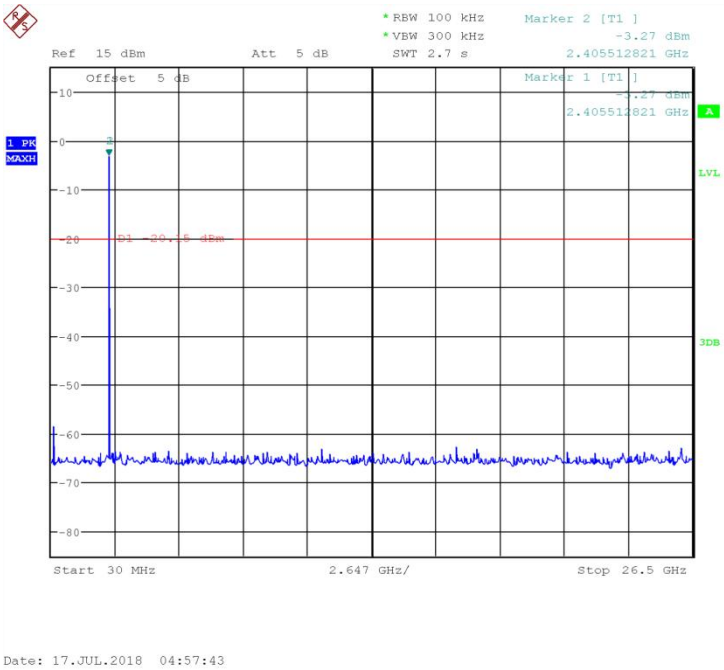

Fig.15 Conducted spurious emission: Ch19, 30MHz~26GHz

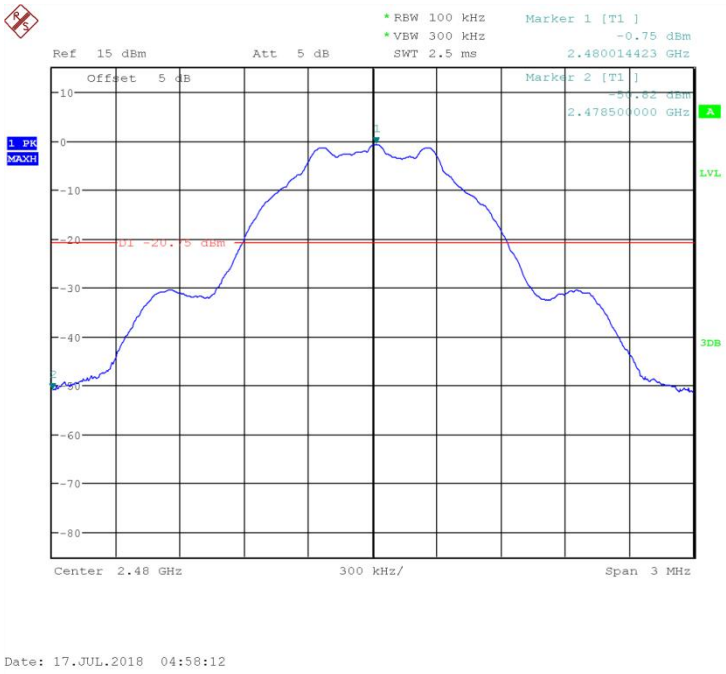

Fig.16 Conducted spurious emission: Ch39, 2480MHz

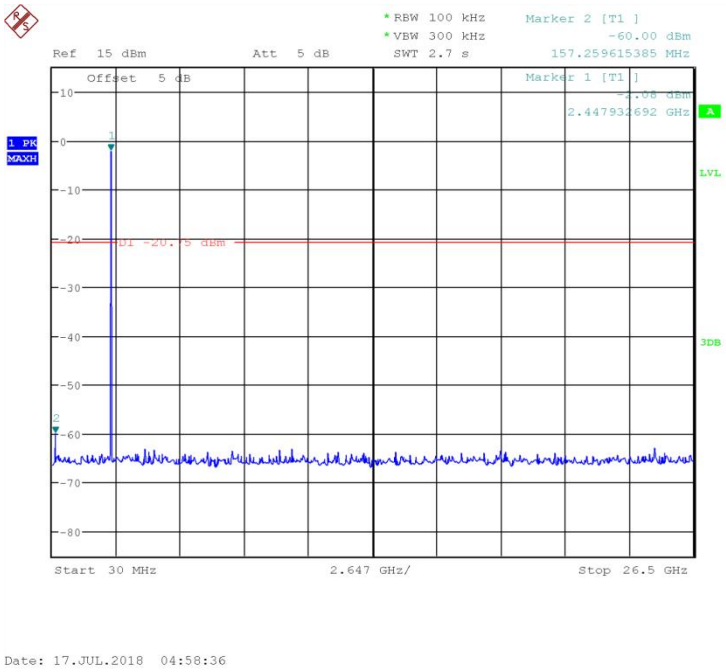

Fig.17 Conducted spurious emission: Ch39, 30MHz~26GHz

6.6. Radiated Emission

6.6.1 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

6.6.2 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, 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/1MHz	15
4000~18000	1MHz/1MHz	40
18000~26500	1MHz/1MHz	20

6.6.3 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}

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Channel	Frequency Range	Test Results	Conclusion
Ch0 2402MHz	30MH~1GHz	Fig.18	P
	1GHz~3GHz	Fig.19	P
	3GHz~18GHz	Fig.20	P

Channel	Frequency Range	Test Results	Conclusion
Ch39 2480MHz	30MH~1GHz	Fig.21	P
	1GHz~3GHz	Fig.22	P
	3GHz~18GHz	Fig.23	P

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Channel	Frequency Range	Test Results	Conclusion
Ch0 2402MHz	30MH~1GHz	Fig.24	P
	1GHz~3GHz	Fig.25	P
	3GHz~18GHz	Fig.26	P

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Channel	Frequency Range	Test Results	Conclusion
Ch0 2402MHz	30MH~1GHz	Fig.27	P
	1GHz~3GHz	Fig.28	P
	3GHz~18GHz	Fig.29	P

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Ch0 30MHz-1GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
34.3	18.41	-22	40.41	V
49.4	28.29	-19.9	48.19	V

74.3	24.33	-26	50.33	V
178.8	29.4	-25.3	54.7	H
280.3	27.71	-22.4	50.11	H
698.5	29.2	-12.7	41.9	H

Ch0 1GHz-3GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
1997.1	55.53	1.9	53.63	H
2531.0	55	6.9	48.1	H
2581.0	54.55	7.3	47.25	V
2643.8	55.39	7.7	47.69	H
2707.4	54.45	7.9	46.55	V
2749.5	54.24	7.7	46.54	H

Ch0 1GHz-3GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
1997.1	36.47	1.9	34.57	H
2531.0	41.62	6.9	34.72	H
2581.0	41.84	7.3	34.54	V
2643.8	42.28	7.7	34.58	H
2707.4	42.34	7.9	34.44	V
2749.5	42.32	7.7	34.62	H

Ch0 3GHz-18GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
12847.2	53.1	16.8	36.3	V
13344.2	53.55	16.8	36.75	H
13790.1	54.25	18.5	35.75	H
14694.7	55.48	21.1	34.38	V

15511.5	55.27	22.6	32.67	V
16270.9	58.77	25.5	33.27	H

Ch0 3GHz-18GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
13790.1	42.26	18.5	23.76	H
14694.7	43.29	21.1	22.19	V
15511.5	43.45	22.6	20.85	V
16270.9	46.55	25.5	21.05	H

Ch39 30MHz-1GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
34.8	18.07	-21.9	39.97	V
50.3	26.05	-19.9	45.95	V
180.5	31.89	-25.2	57.09	H
275.7	28.28	-22.5	50.78	H
328.2	27.73	-21	48.73	V
687.7	28.68	-12.9	41.58	H

Ch39 1GHz-3GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2307.7	52.21	5.2	47.01	H
2352.0	52.14	6.4	45.74	H
2536.5	54.84	7	47.84	H
2568.5	53.1	7.2	45.9	V
2627.9	53.63	7.5	46.13	V
2669.0	54.83	7.8	47.03	V

Ch39 1GHz-3GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2536.5	41.68	7	34.68	H

2669.0	42.45	7.8	34.65	V

Ch39 3GHz-18GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
12979.0	52.69	17.3	35.39	H
13798.5	54.17	18.6	35.57	H
14200.7	53.86	19	34.86	H
14750.8	55.47	20.8	34.67	H
15330.0	56.2	21.9	34.3	H
16110.9	58.41	24.8	33.61	V

Ch39 3GHz-18GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
13798.5	42.27	18.6	23.67	H
14750.8	43.02	20.8	22.22	H
15330.0	43.63	21.9	21.73	H
16110.9	46.51	24.8	21.71	V

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

Conclusion: PASS

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Ch0 30MHz-1GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
33.9	17.92	-22	39.92	V
50.7	25.76	-20	45.76	V
101.5	23.35	-23.5	46.85	H
180.1	30.09	-25.2	55.29	H
284.6	27.52	-22.3	49.82	H
698.0	28.56	-12.7	41.26	H

Ch0 1GHz-3GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
1994.7	53.35	1.7	51.65	H
2518.9	54.12	6.9	47.22	H
2563.8	53.78	7.2	46.58	V
2600.1	54.55	7.3	47.25	H
2628.3	54.35	7.5	46.85	V
2672.4	54.79	7.8	46.99	V

Ch0 1GHz-3GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2518.9	41.63	6.9	34.73	H
2600.1	41.91	7.3	34.61	H
2628.3	42.06	7.5	34.56	V
2672.4	42.37	7.8	34.57	V

Ch0 3GHz-18GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
12762.5	51.71	16.4	35.31	H
13217.8	52.02	16.9	35.12	H
13809.6	54.33	18.6	35.73	H
14315.1	55.5	20.6	34.9	H
15325.4	55.72	21.8	33.92	H
15940.5	59.05	24.6	34.45	V

Ch0 3GHz-18GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
13809.6	42.04	18.6	23.44	H
14315.1	42.97	20.6	22.37	H
15325.4	43.52	21.8	21.72	H

15940.5	46.06	24.6	21.46	V

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Ch0 30MHz-1GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
34.3	15.97	-22	37.97	V
48.9	26.84	-19.9	46.74	V
74.5	24.15	-26.1	50.25	V
179.4	29.92	-25.2	55.12	H
277.1	28.56	-22.5	51.06	H
551.3	19.14	-15.5	34.64	V

Ch0 1GHz-3GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2518.5	53.68	6.9	46.78	H
2537.7	53.79	7	46.79	V
2571.5	52.97	7.2	45.77	V
2602.1	54.23	7.3	46.93	V
2631.1	54.19	7.6	46.59	H
2657.5	55.29	7.7	47.59	H

Ch0 1GHz-3GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2602.1	41.89	7.3	34.59	V
2631.1	41.93	7.6	34.33	H
2657.5	42.48	7.7	34.78	H

Ch0 3GHz-18GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
12138.1	50.75	14.8	35.95	V

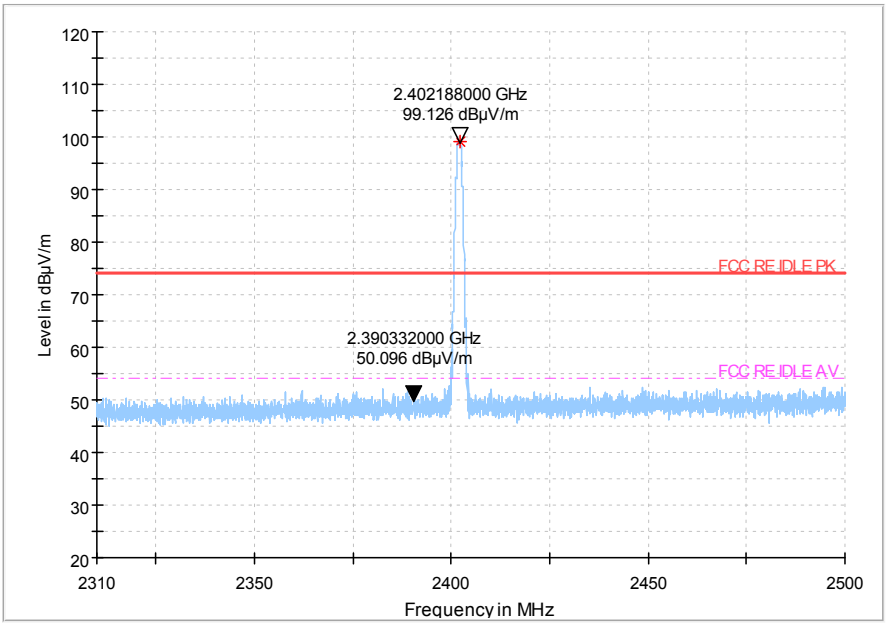
12844.0	52.05	16.8	35.25	V
13263.7	53.41	17	36.41	H
14307.5	54.9	20.7	34.2	H
15389.3	56.36	22.6	33.76	V
15982.4	59.12	25.2	33.92	H

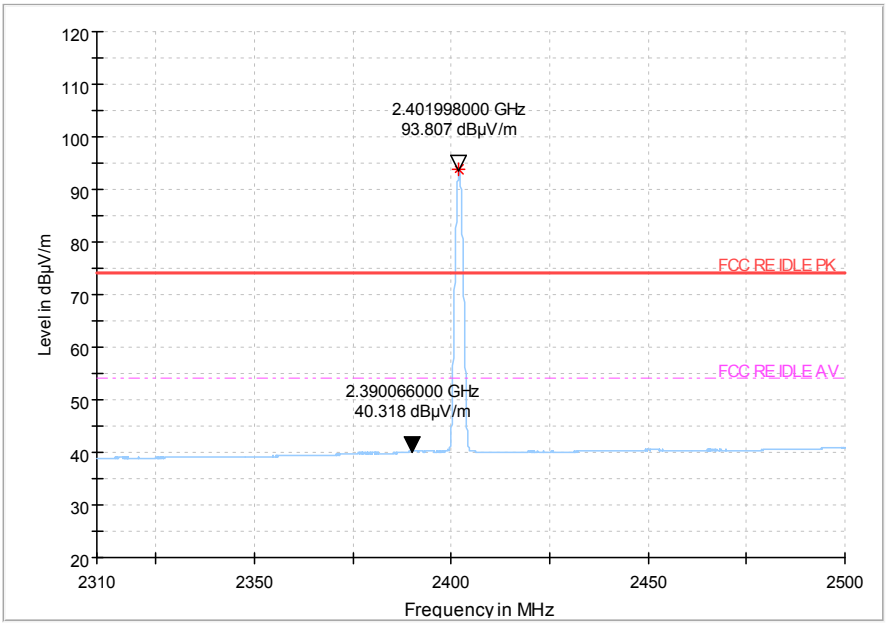
Ch0 3GHz-18GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
14307.5	42.69	20.7	21.99	H
15389.3	43.84	22.6	21.24	V
15982.4	46.91	25.2	21.71	H

Test graphs as below:

L1523





Bandedge:ch0

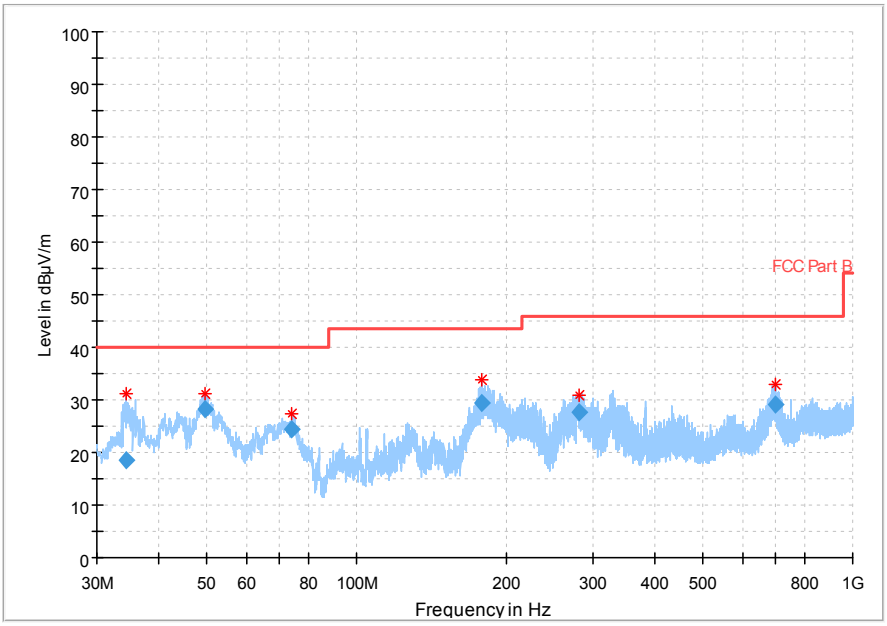


Fig.18 Radiated emission: Ch0, 30MHz~1GHz

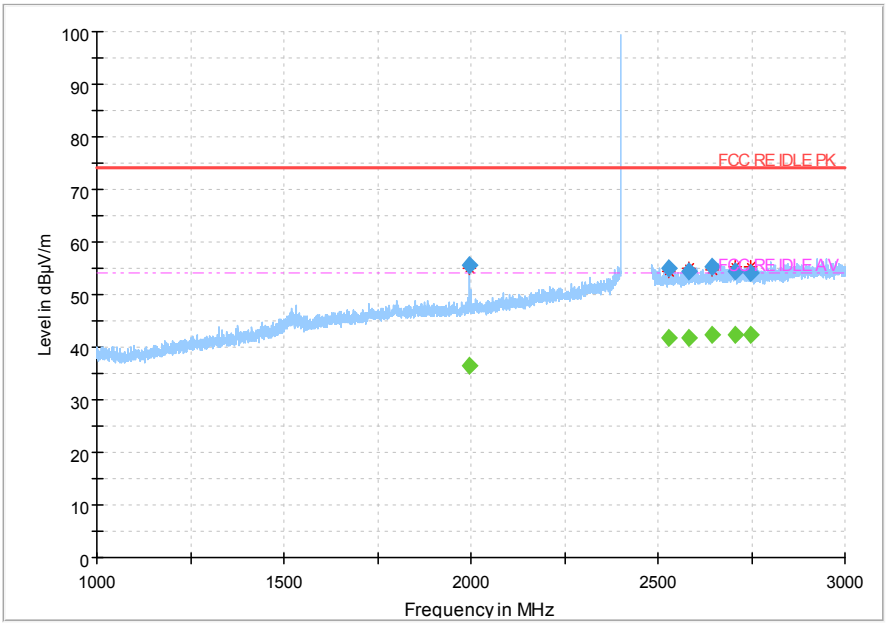


Fig.19 Radiated emission: Ch0, 1GHz~3GHz

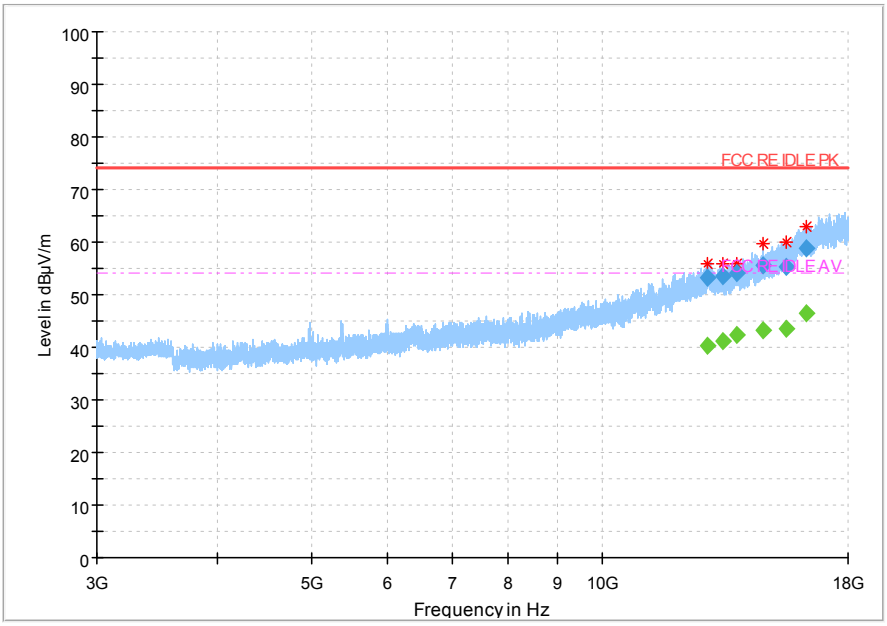
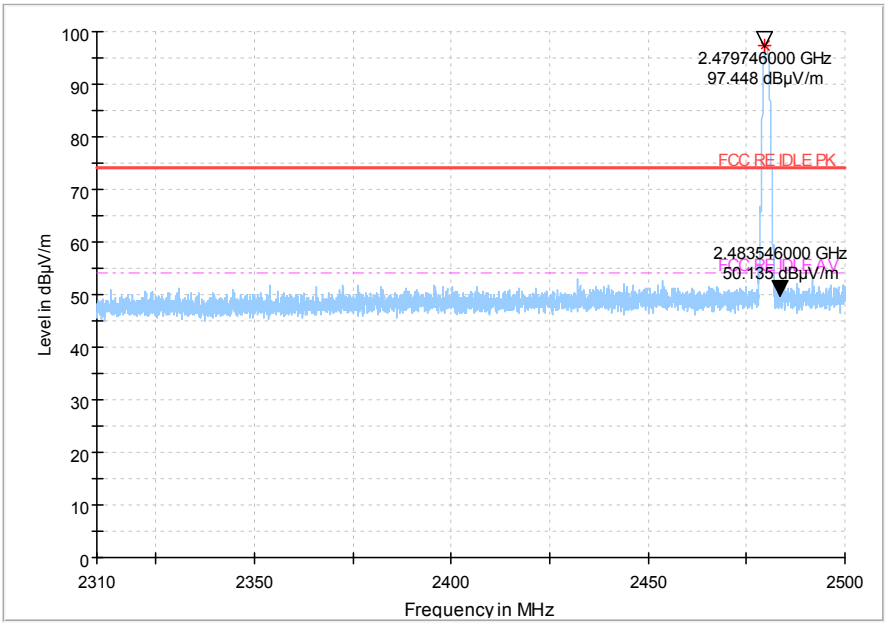
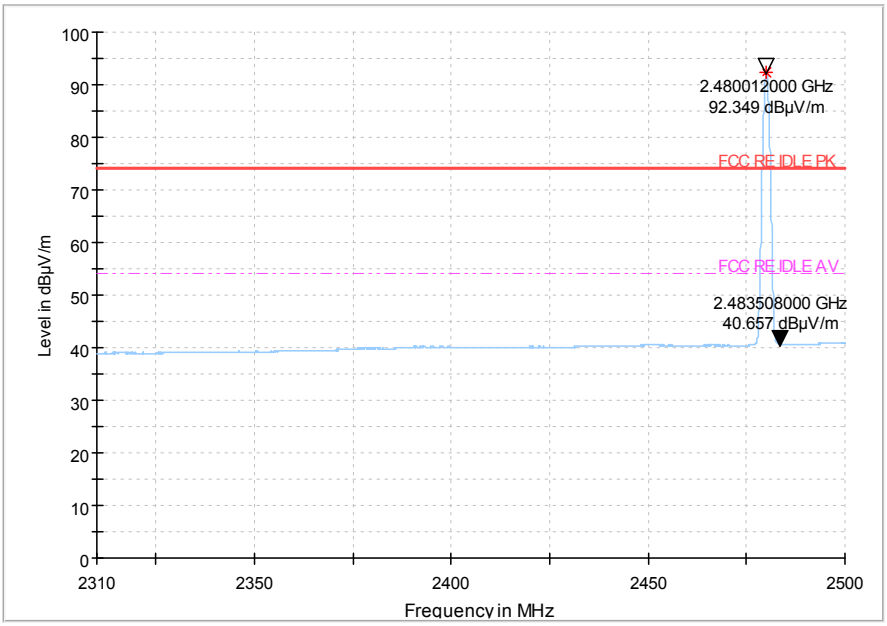


Fig.20 Radiated emission: Ch0, 3GHz~18GHz





Bandedge:ch39

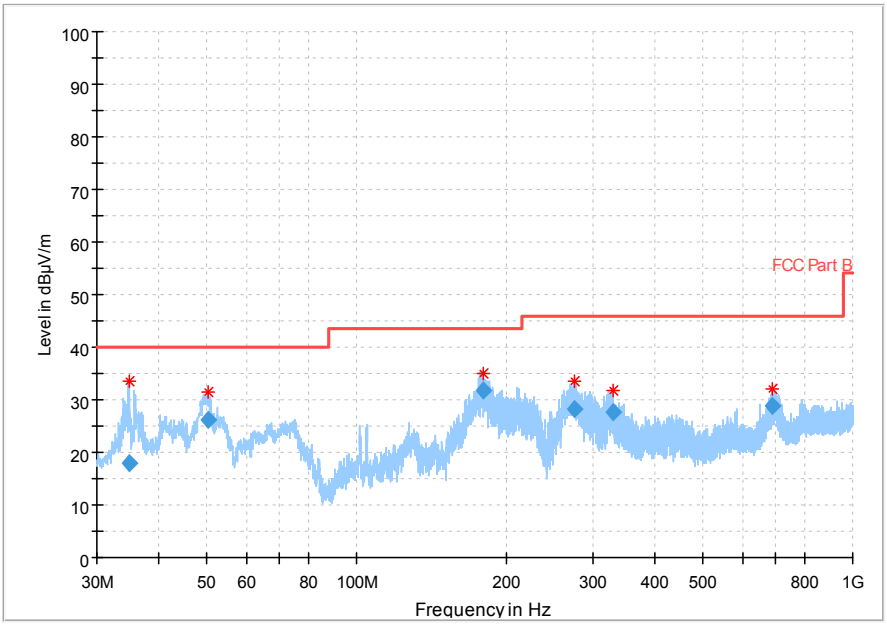


Fig.21 Radiated emission: Ch39, 30MHz~1GHz

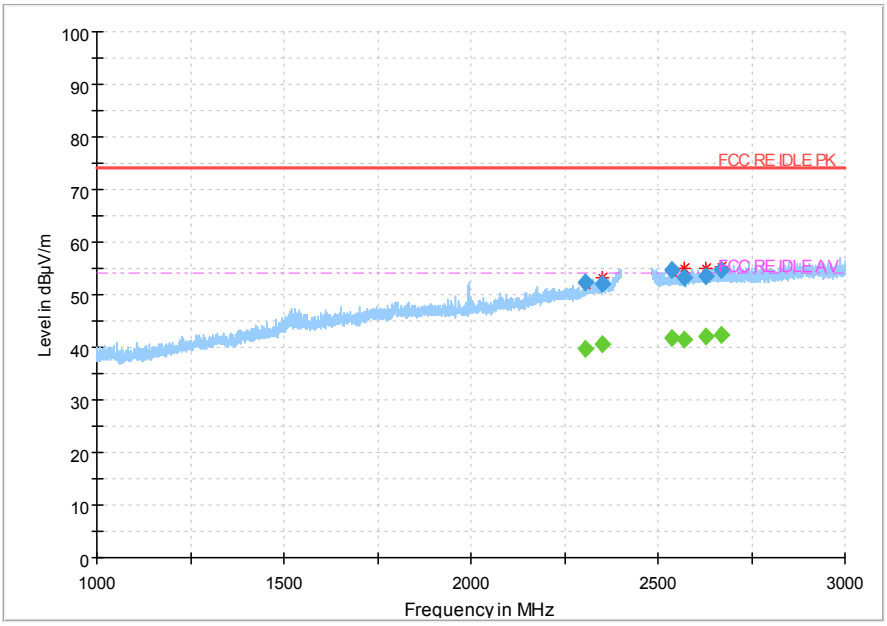


Fig.22 Radiated emission: Ch39, 1GHz~3GHz

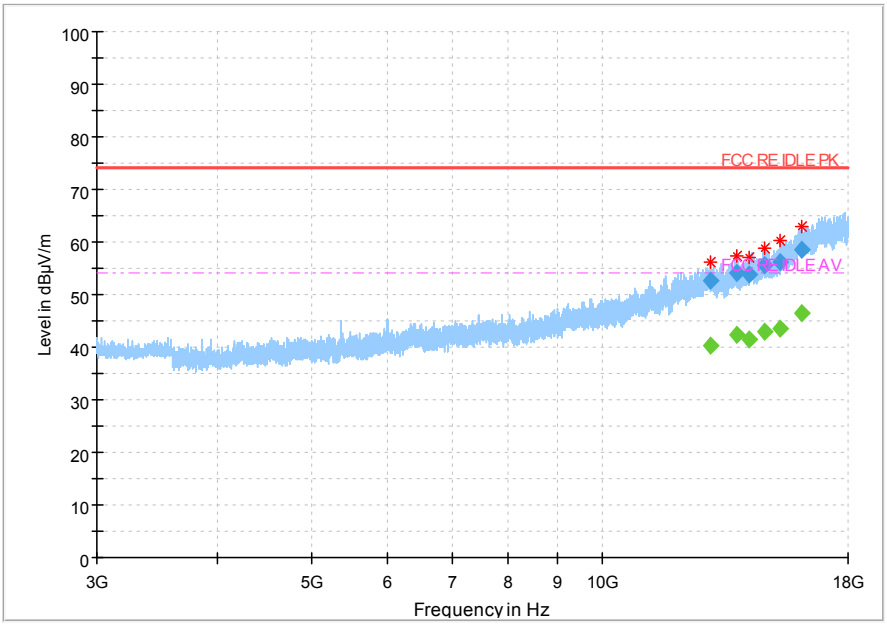
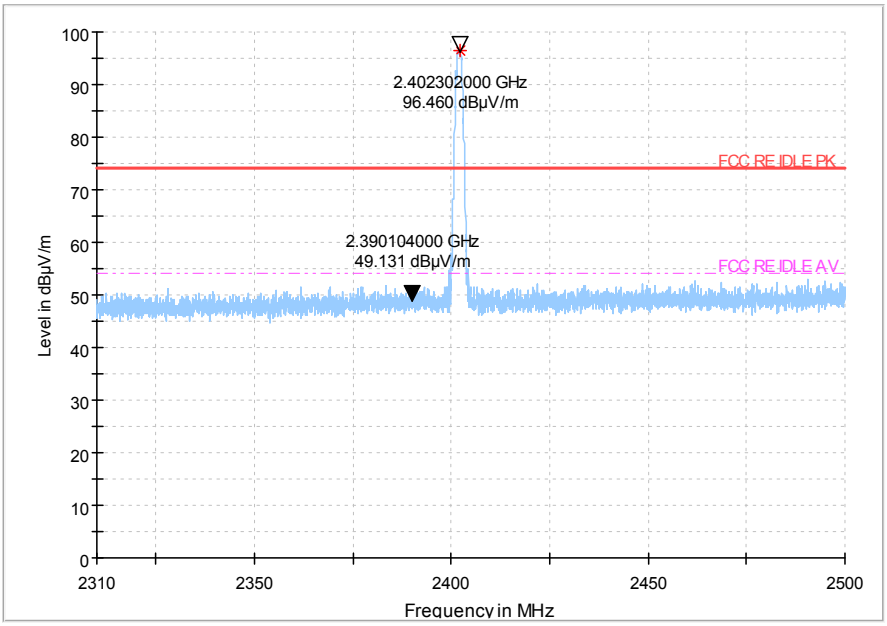
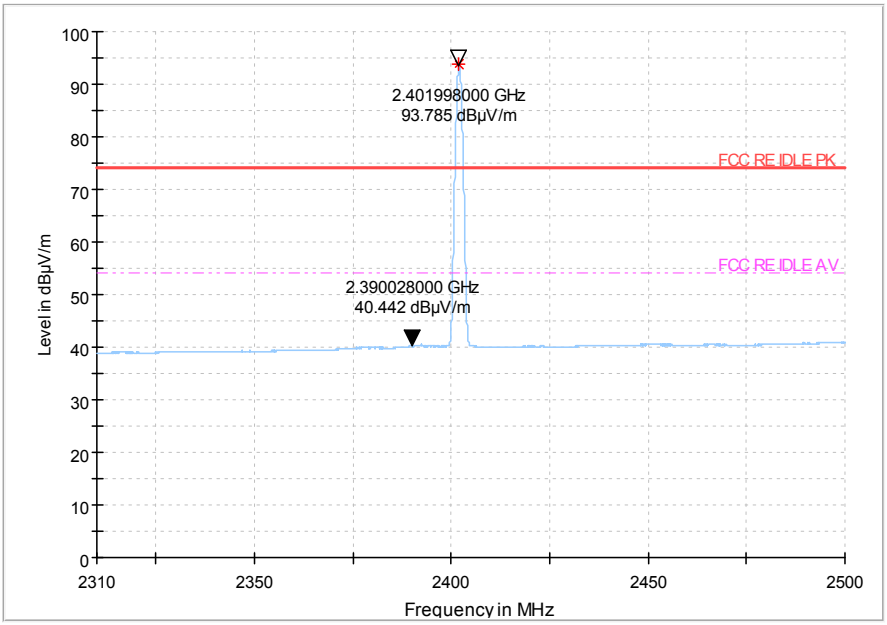


Fig.23 Radiated emission: Ch39, 3GHz~18GHz

L1522





Bandedge:ch0

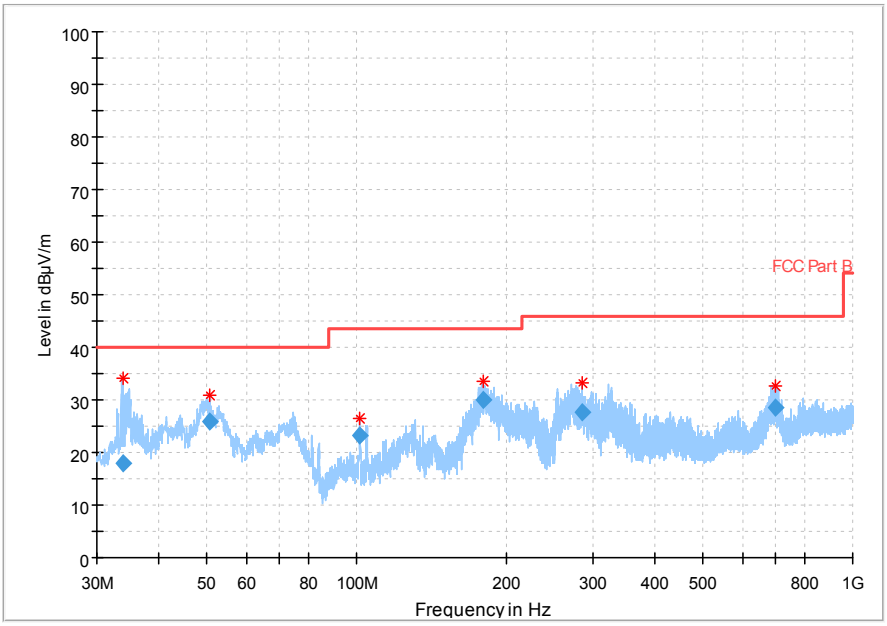


Fig.24 Radiated emission: Ch0, 30MHz~1GHz

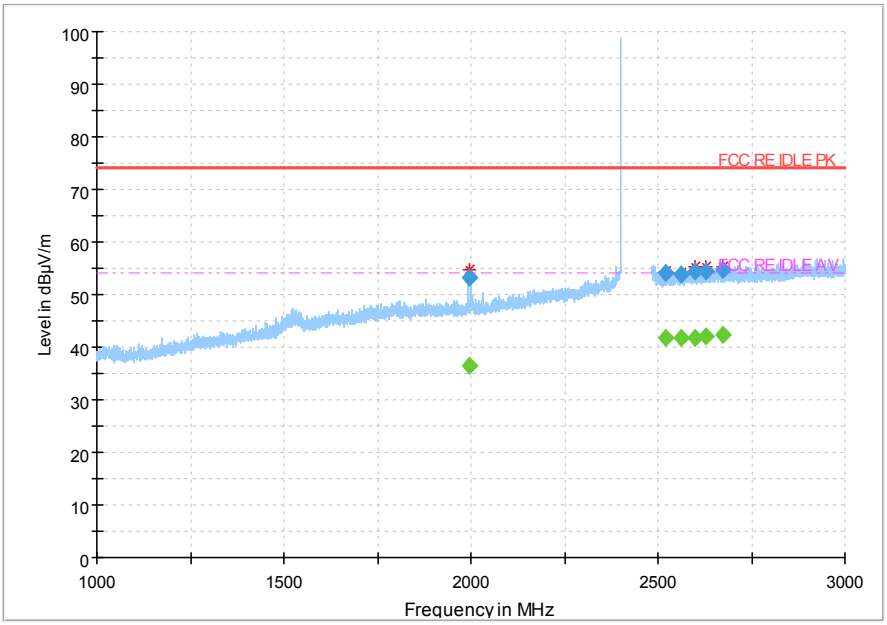


Fig.25 Radiated emission: Ch0, 1GHz~3GHz

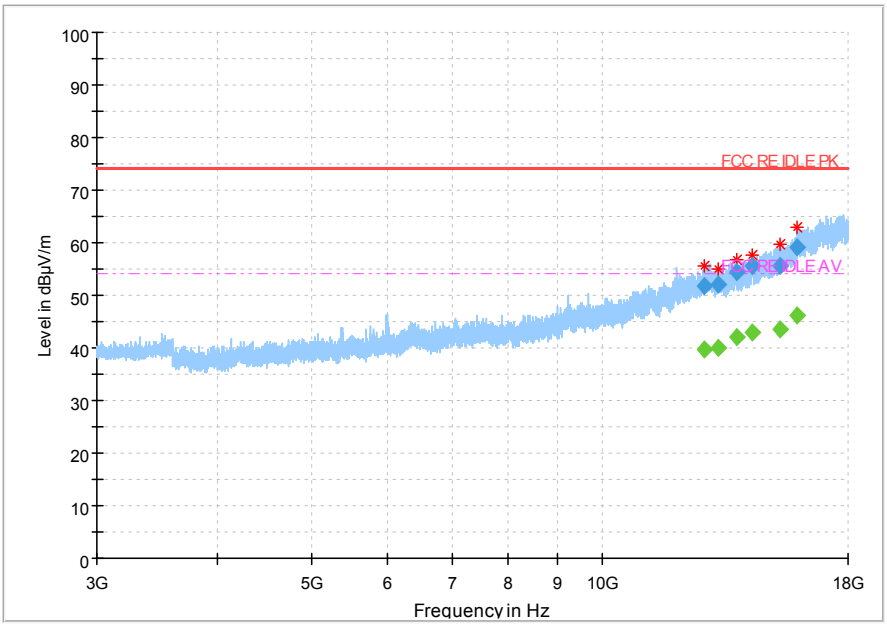
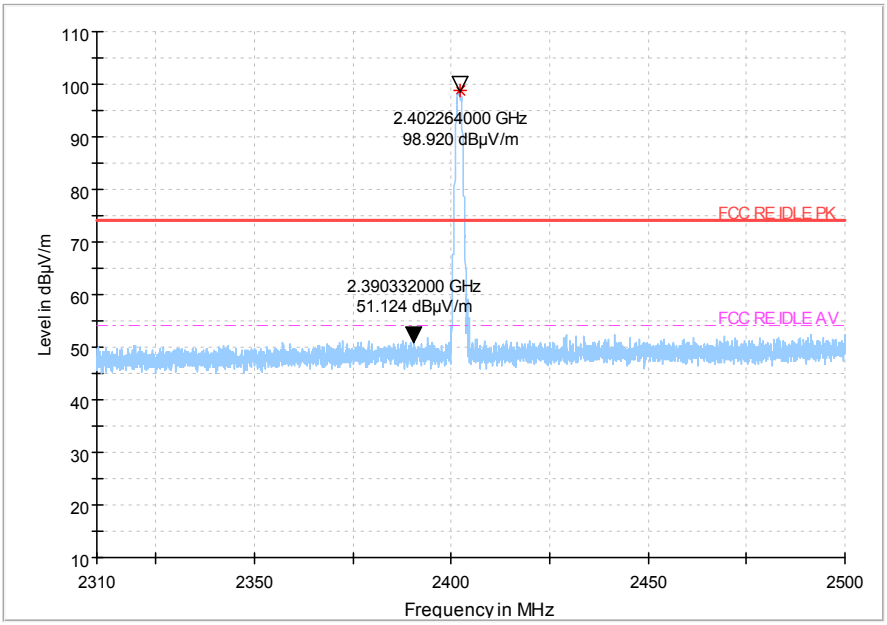
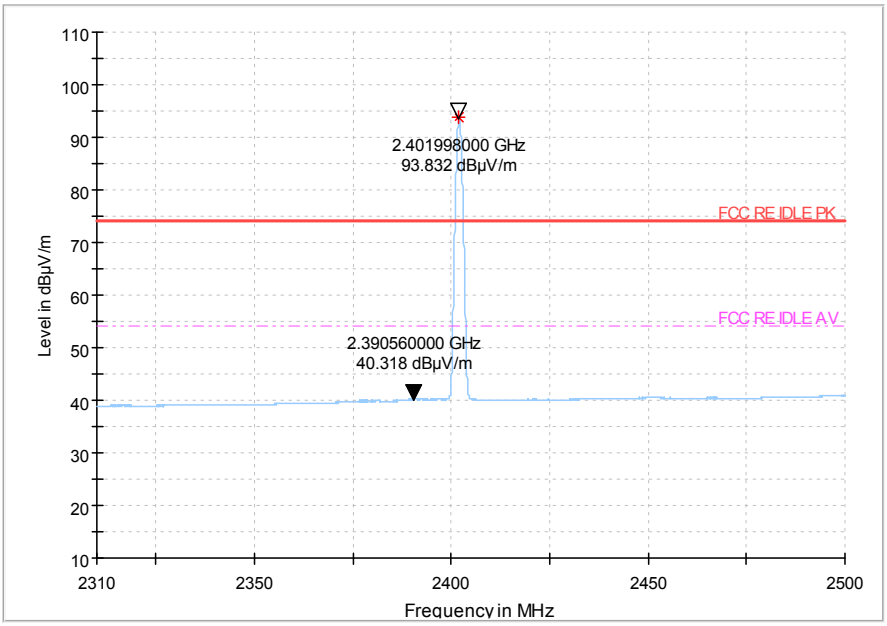


Fig.26 Radiated emission: Ch0, 3GHz~18GHz

L1521





Bandedge:ch0

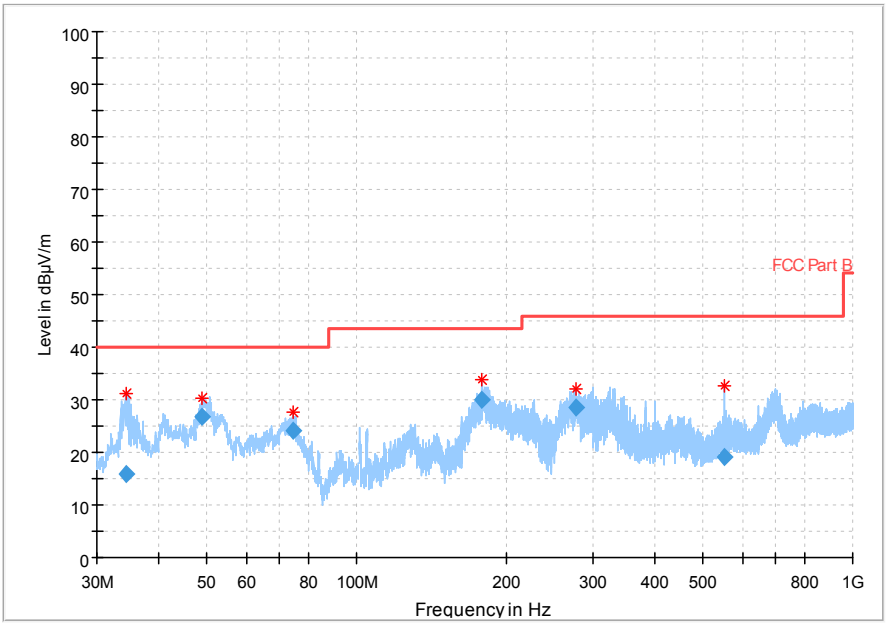


Fig.27 Radiated emission: Ch0, 30MHz~1GHz

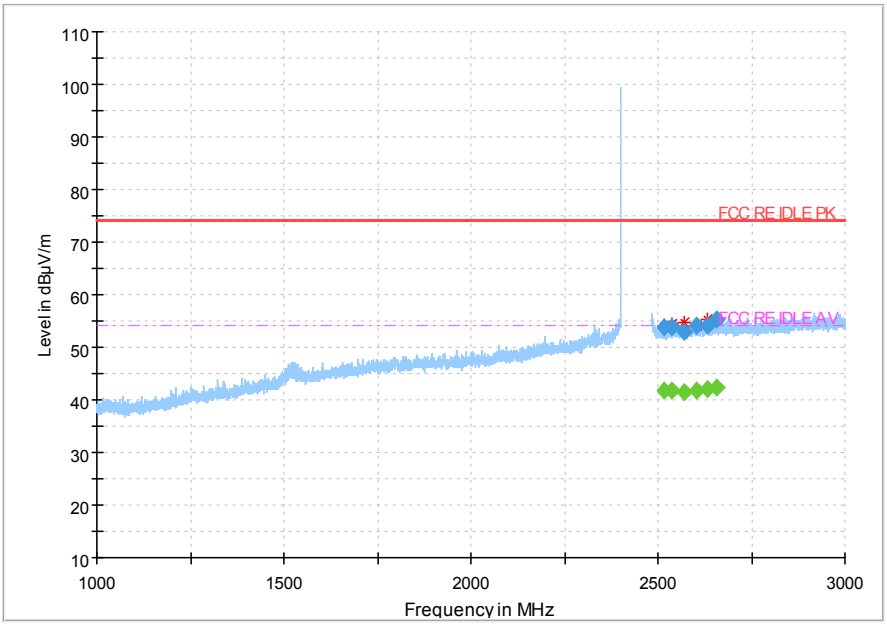


Fig.28 Radiated emission: Ch0, 1GHz~3GHz

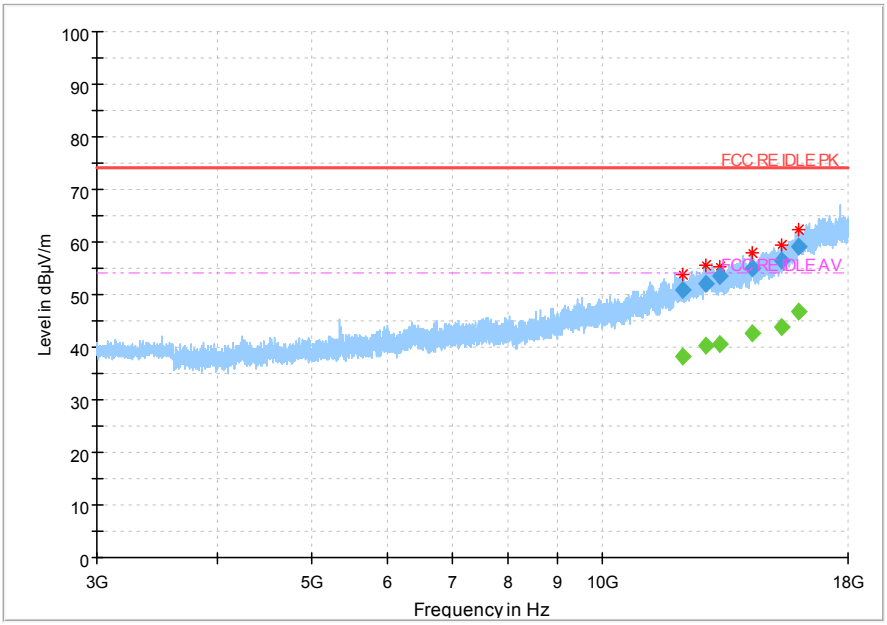
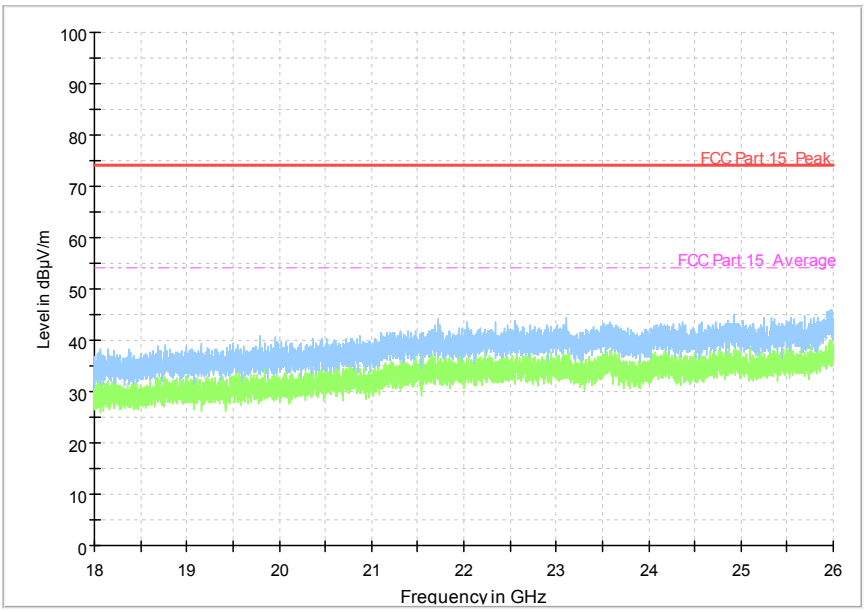


Fig.29 Radiated emission: Ch0, 3GHz~18GHz



ALL Channel 18GHz~26GHz

6.7. 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)	Quasi-peak Limit (dBμV)	Average Limit (dBμV)	Result (dBμV)	Conclusion
			With charger	
			BLE	
0.15 to 0.5	66 to 56	56 to 46	Fig.24	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.24 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)
0.258206	---	14.45	51.49	37.04	1000.0	9.000	L1	ON	9.7
0.258206	31.90	---	61.49	29.59	1000.0	9.000	L1	ON	9.7
0.340294	25.20	---	59.20	34.00	1000.0	9.000	N	ON	9.7
0.340294	---	7.12	49.20	42.08	1000.0	9.000	N	ON	9.7
1.571606	16.01	---	56.00	39.99	1000.0	9.000	N	ON	9.7
1.571606	---	5.86	46.00	40.14	1000.0	9.000	N	ON	9.7
4.575262	21.68	---	56.00	34.32	1000.0	9.000	L1	ON	9.7
4.575262	---	14.01	46.00	31.99	1000.0	9.000	L1	ON	9.7
6.619988	20.87	---	60.00	39.13	1000.0	9.000	L1	ON	9.8
6.619988	---	13.92	50.00	36.08	1000.0	9.000	L1	ON	9.8
15.075000	---	16.60	50.00	33.40	1000.0	9.000	N	ON	9.9
15.075000	22.61	---	60.00	37.39	1000.0	9.000	N	ON	9.9

7. Test Equipment and Ancillaries Used For Tests

The test equipment and ancillaries used are as follows.

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration date	Cal.interval
1	Vector Signal Analyzer	FSQ26	101096	Rohde&Schwarz	2018-05-11	1 Year
2	DC Power Supply	ZUP60-14	LOC-220Z006-0007	TDL-Lambda	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. =25 %, Max. = 75 %
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

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************