



Full

TEST REPORT

No. I18D00189-SRD02

For

Client : Shanghai Sunmi Technology Co.,Ltd.

Production : POS System

Model Name : L1321/L1323

Brand Name : SUNMI

FCC ID : 2AH25T2MININFC

Hardware Version: V1.03

Software Version: MST2MINI_EQ000_2EE0.123BBE2.9530

762_180824_100_V01_T15

Issued date: 2018-12-25

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

Add: 7-8F, G Area, No.668, Beijing East Road, Huangpu District, Shanghai, P. R. China

Tel: (+86)-021-63843300, E-Mail: welcome@ecit.org.cn

Revision Version

| Report Number | Revision | Date | Memo |
|-----------------|----------|------------|---------------------------------|
| I18D00189-SRD02 | 00 | 2018-12-13 | Initial creation of test report |
| I18D00189-SRD02 | 01 | 2018-12-24 | Second creation of test report |
| I18D00189-SRD02 | 02 | 2018-12-25 | Third creation of test report |

CONTENTS

| | |
|---|----|
| 1. TEST LABORATORY..... | 5 |
| 1.1. TESTING LOCATION..... | 5 |
| 1.2. TESTING ENVIRONMENT..... | 5 |
| 1.3. PROJECT DATA..... | 5 |
| 1.4. SIGNATURE..... | 5 |
| 2. CLIENT INFORMATION..... | 6 |
| 2.1. APPLICANT INFORMATION..... | 6 |
| 2.2. MANUFACTURER INFORMATION..... | 6 |
| 3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT (AE)..... | 7 |
| 3.1. ABOUT EUT..... | 7 |
| 3.2. INTERNAL IDENTIFICATION OF EUT USED DURING THE TEST..... | 7 |
| 3.3. INTERNAL IDENTIFICATION OF AE USED DURING THE TEST..... | 7 |
| 4. REFERENCE DOCUMENTS..... | 8 |
| 4.1. REFERENCE DOCUMENTS FOR TESTING..... | 8 |
| 5. SUMMARY OF TEST RESULTS..... | 9 |
| 5.1. NOTES..... | 10 |
| 5.2. STATEMENTS..... | 10 |
| 6. TEST RESULT..... | 11 |
| 6.1. PEAK OUTPUT POWER-CONDUCTED..... | 11 |
| 6.2. PEAK POWER SPECTRAL DENSITY..... | 13 |
| 6.3. 6DB BANDWIDTH..... | 15 |
| 6.4. FREQUENCY BAND EDGES-CONDUCTED..... | 18 |
| 6.5. CONDUCTED EMISSION..... | 20 |
| 6.6. RADIATED EMISSION..... | 24 |
| 6.7. AC POWERLINE CONDUCTED EMISSION..... | 39 |

| | |
|--|-----------|
| 7. TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS..... | 43 |
| 8. TEST ENVIRONMENT..... | 44 |
| ANNEX A. DEVIATIONS FROM PRESCRIBED TEST METHODS..... | 45 |
| ANNEX B. ACCREDITATION CERTIFICATE..... | 46 |

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 |
| FCC registration No | 958356 |

1.2. Testing Environment

| | |
|----------------------|----------|
| Normal Temperature: | 15-35℃ |
| Extreme Temperature: | -30/+50℃ |
| Relative Humidity: | 20-75% |

1.3. Project data

| | |
|---------------------|------------|
| Project Leader: | Zhou Yan |
| Testing Start Date: | 2018-09-18 |
| Testing End Date: | 2018-09-30 |

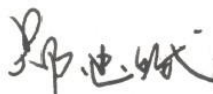
1.4. Signature



Yang Dejun
(Prepared this test report)



Shi Hongqi
(Reviewed this test report)



Zheng Zhongbin
(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
Telephone: 8618721763396
Postcode: 200433

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
Telephone: 8618721763396
Postcode: 200433

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

3.1. About EUT

| | |
|-----------------------------------|----------------------------------|
| EUT Description | POS System |
| Model name | L1321/L1323 |
| BLE Frequency | 2402MHz-2480MHz |
| BLE Channel | Channel0-Channel39 |
| BLE Modulation | GFSK; |
| GSM Frequency Band | GSM 850//GSM 1900 |
| UMTS Frequency Band | Band 2/5 |
| CDMA Frequency Band | BC 0 |
| LTE Frequency Band | Band 38/41 |
| Additional Communication Function | BT/BLE/2.4G WLAN b/g/n20/n40/NFC |
| Extreme Temperature | -30/+50℃ |
| 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 |
|---------|------------|------------|------------|--|-----------------|
| N10 | L1321 | / | V1.03 | MST2MINI_EQ000_2EE 0.123BBE2.9530762_18 0824_100_V01_T15 | 2018-09-07 |
| N04 | L1321 | / | V1.03 | MST2MINI_EQ000_2EE 0.123BBE2.9530762_18 0824_100_V01_T15 | 2018-09-07 |
| N01 | L1323 | / | V1.03 | MST2MINI_EQ000_2EE 0.123BBE2.9530762_18 0824_100_V01_T15 | 2018-09-07 |

*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 | --- |

*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. | 2017/10/01 |
| 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 | 24V |
| Humidity | Hnom | 48% |
| Air Pressure | Anom | 1010hPa |

Note:

- All the test data for each data were verified, but only the worst case was reported.
- The GFSK was set in DH1.
- The DC and low frequency voltages' measurement uncertainty is $\pm 2\%$.

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 L1321/L1323, supporting GPRS/EDGE/WCDMA/CDMA/LTE/BT/WLAN/BLE/NFC, manufactured by Shanghai Sunmi Technology Co.,Ltd., which is a new product for testing.

Note: The project has two prototypes, L1321 and L1323. The L1321 we tested all the test items. The other one we only tested worse case of RSE and AC Powerline.

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:

| DTS procedure | RBW | VBW | Span | Sweeptime |
|---------------|------|-------|------|-----------|
| BT-LE | 3MHz | 10MHz | 9MHz | Auto |

6.1.3 Test procedure

The measurement is according to ANSI C63.10 clause 11.9.1

- Set the RBW \geq DTS bandwidth.
- Set VBW \geq [3 \times RBW].
- Set span \geq [3 \times RBW].
- Sweep time = auto couple.
- Detector = peak.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use peak marker function to determine the peak amplitude level.

6.1.4 Measurement Uncertainty:

| | |
|-------------------------|---------------------|
| Measurement Uncertainty | $\pm 0.88\text{dB}$ |
|-------------------------|---------------------|

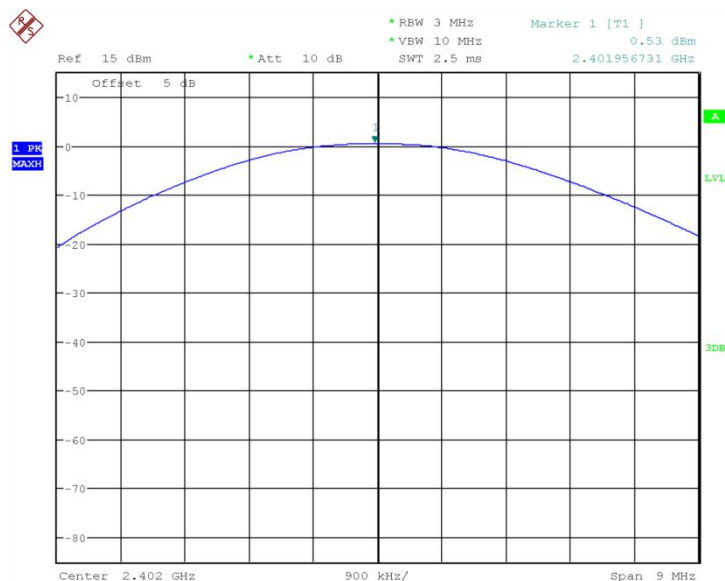
6.1.5 Measurement Results:

For GFSK

| Channel | Ch0 2402 MHz | Ch19 2440 MHz | CH39 2480 MHz | Conclusion |
|-----------------------------------|--------------|---------------|---------------|------------|
| Peak Conducted Output Power (dBm) | 0.533 | 1.983 | 0.625 | P |
| | Fig.1 | Fig.2 | Fig.3 | |

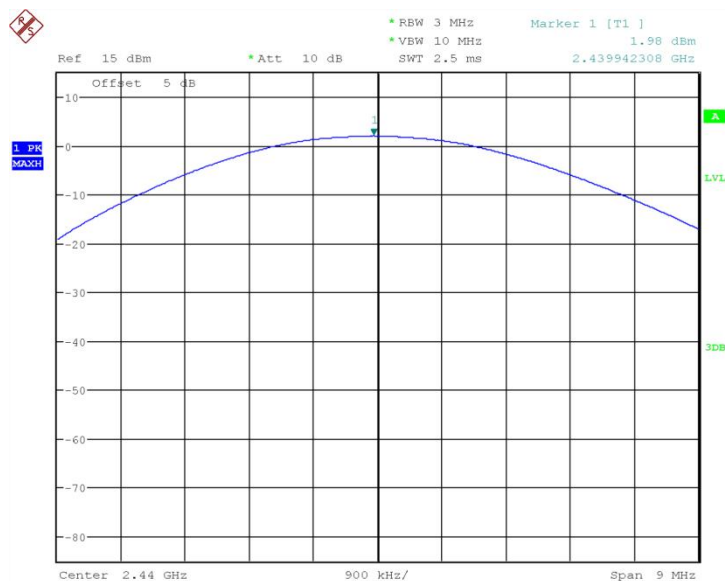
Conclusion: PASS

Test graphs an below



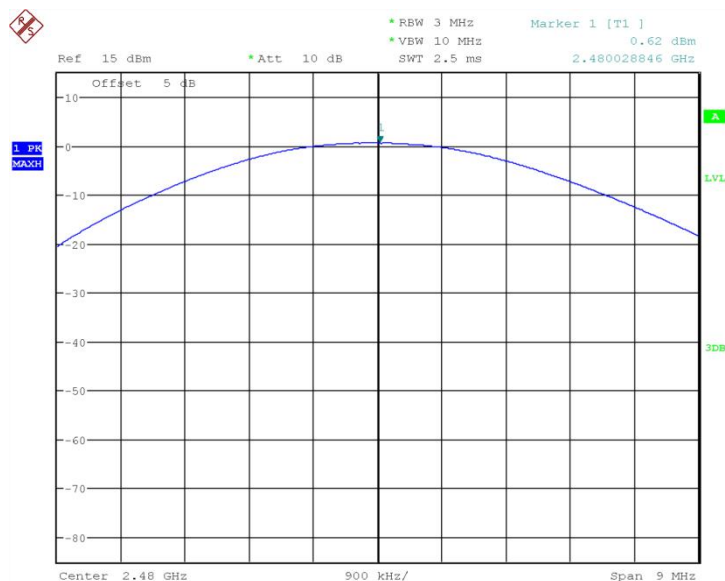
Date: 12.SEP.2018 10:15:39

Fig.1 Peak Conducted Output Power CH0, DH1



Date: 12.SEP.2018 10:16:00

Fig.2 Peak Conducted Output Power CH19, DH1



Date: 12.SEP.2018 10:16:19

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 $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
6. Set the VBW $\geq [3 \times \text{RBW}]$.
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.

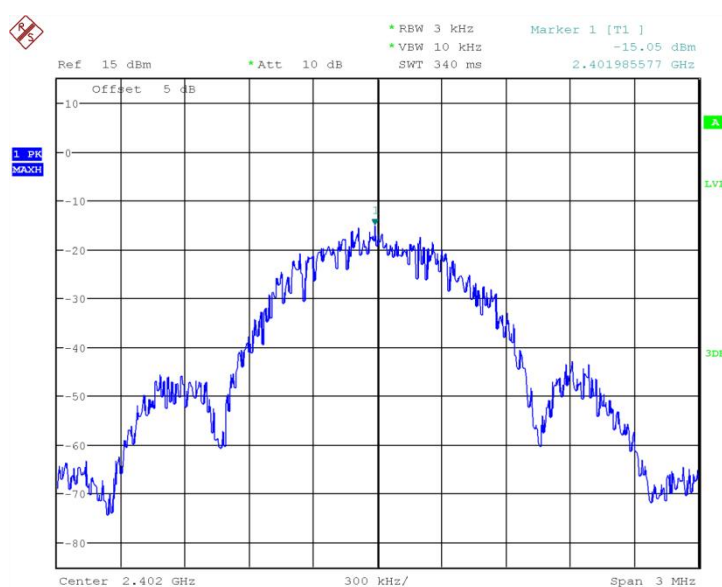
6.2.3 Measurement Uncertainty:

| | |
|-------------------------|---------------------|
| Measurement Uncertainty | $\pm 0.88\text{dB}$ |
|-------------------------|---------------------|

6.2.4 Measurement Results:

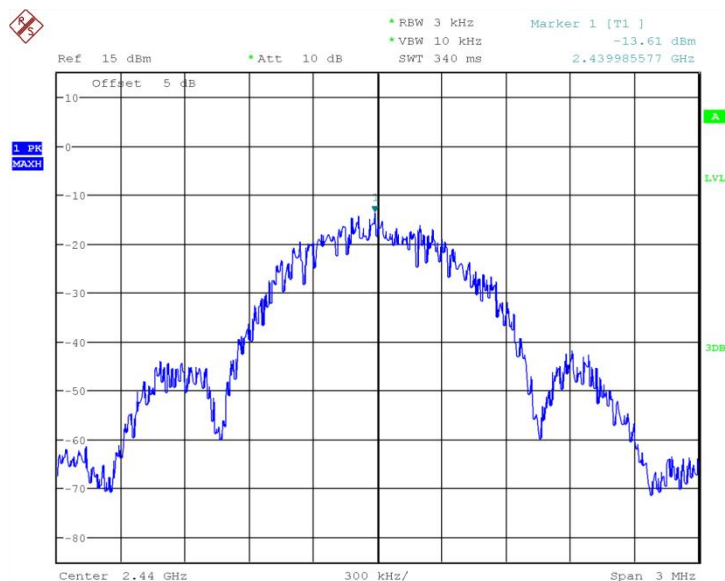
| Mode | Channel | Power Spectral Density(dBm/3kHz) | | Conclusion |
|-------|---------|----------------------------------|---------|------------|
| BT-LE | 0 | Fig.4 | -15.046 | P |
| | 19 | Fig.5 | -13.615 | P |
| | 39 | Fig.6 | -14.878 | P |

Test figure as below:



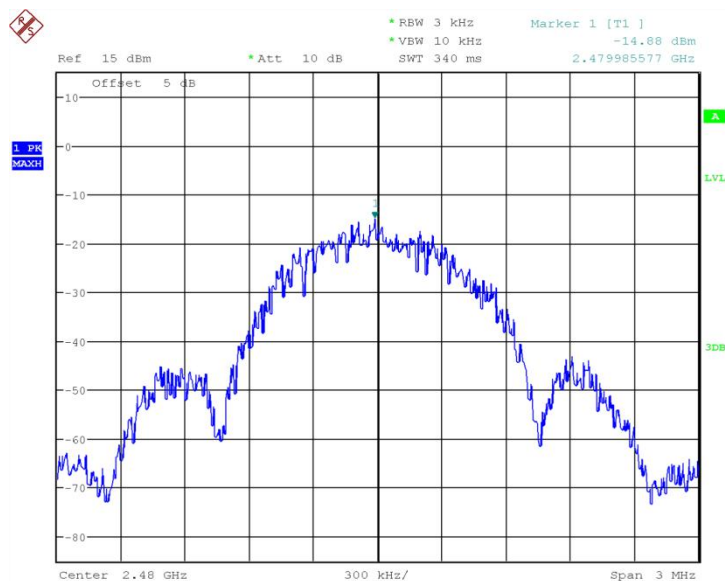
Date: 12.SEP.2018 10:16:59

Fig.4 Power spectral density: CH0



Date: 12.SEP.2018 10:17:25

Fig.5 Power spectral density: CH19



Date: 12.SEP.2018 10:17:50

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) | $\geq 500k$ |

6.3.2 Test procedures

The measurement is according to ANSI C63.10 clause 11.8.

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 RBW = 100 kHz.
4. Set the VBW $\geq [3 \times \text{RBW}]$.
5. Detector = peak.
6. Trace mode = max hold.
7. Sweep = auto couple.
8. Allow the trace to stabilize.
9. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

6.3.3 Measurement Uncertainty:

| | |
|-------------------------|------------------------|
| Measurement Uncertainty | $\pm 0.0031\text{MHz}$ |
|-------------------------|------------------------|

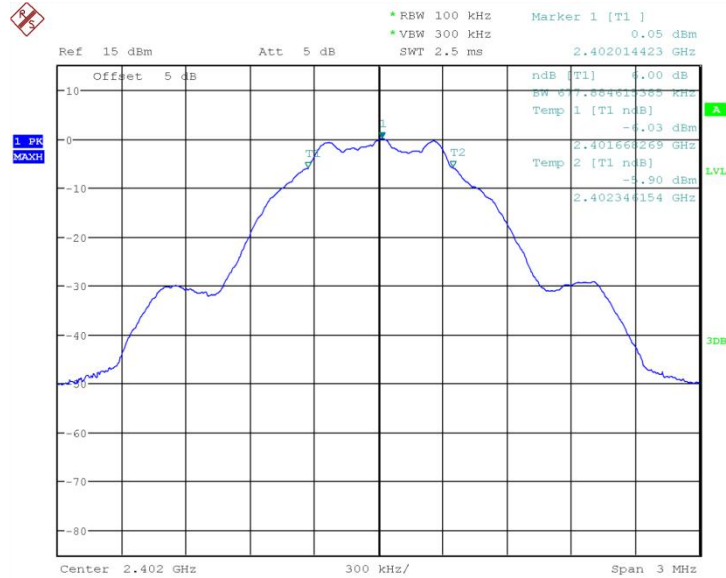
Measurement Result:

For GFSK

| Channel | 6dB Bandwidth (KHz) | | Conclusion |
|---------|---------------------|-----|------------|
| 0 | Fig.7 | 678 | P |
| 19 | Fig.8 | 673 | P |
| 39 | Fig.9 | 673 | P |

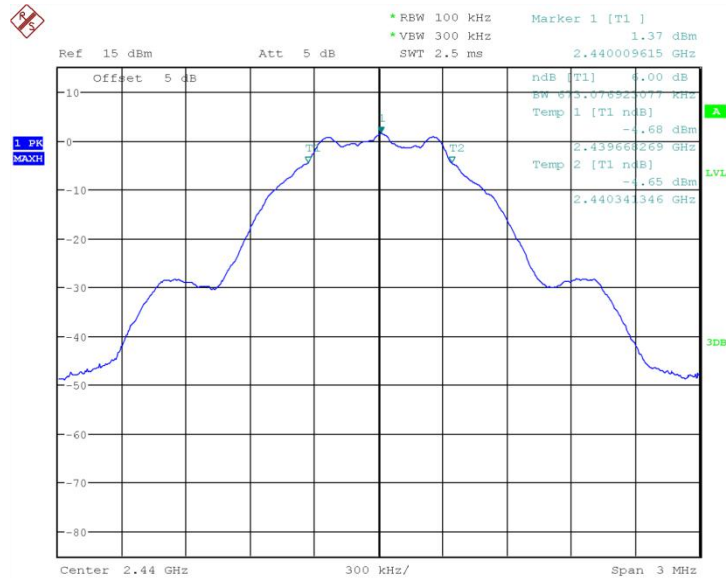
Conclusion: PASS

Test graphs as below:



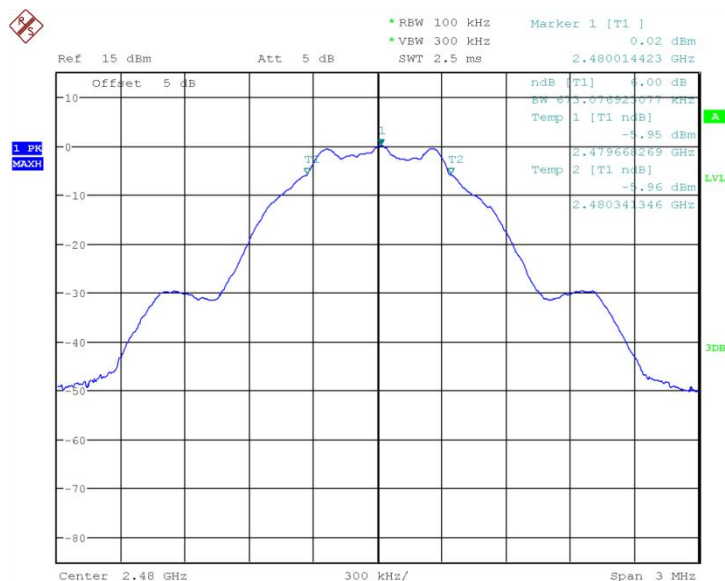
Date: 12.SEP.2018 10:23:39

Fig.7 6dB Bandwidth: Ch0



Date: 12.SEP.2018 10:24:06

Fig.8 6dB Bandwidth: Ch19



Date: 12.SEP.2018 10:24:34

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 11.13.2

- 1) Span: Wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products that fall outside of the authorized band of operation.
- 2) Reference level: As required to keep the signal from exceeding the maximum instrument input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than $[10 \log (OBW/RBW)]$ below the reference level. Specific guidance is given in 4.1.5.2.
- 3) Attenuation: Auto (at least 10 dB preferred).
- 4) Sweep time: Coupled.
- 5) Resolution bandwidth: 100 kHz.
- 6) Video bandwidth: 300 kHz.
- 7) Detector: Peak.
- 8) Trace: Max hold..

6.4.3 Measurement Uncertainty:

| | |
|-------------------------|---------------------|
| Measurement Uncertainty | $\pm 4.56\text{dB}$ |
|-------------------------|---------------------|

6.4.4 Measurement results

For GFSK

| Channel | Band Edge Power (dBc) | Conclusion |
|---------|-----------------------|------------|
| 0 | Fig.10 | P |
| 39 | Fig.11 | P |

Conclusion: PASS

Test graphs an below

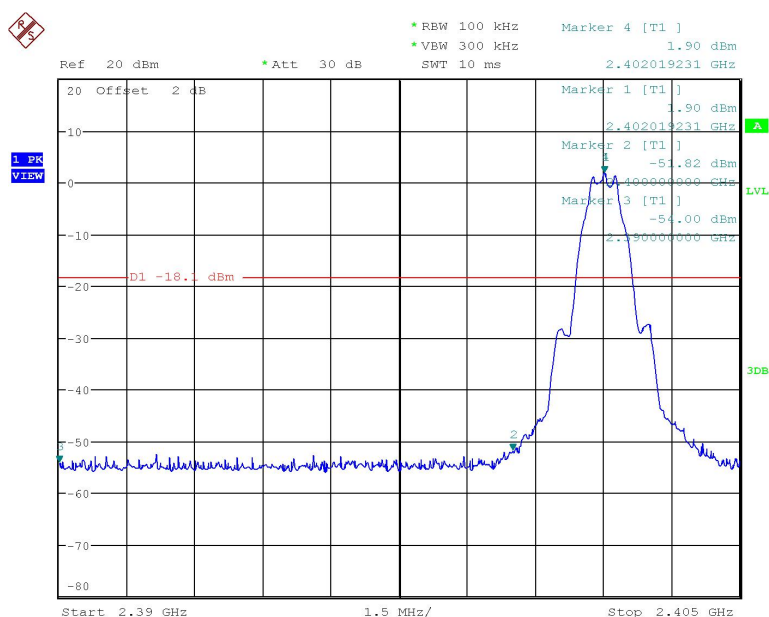
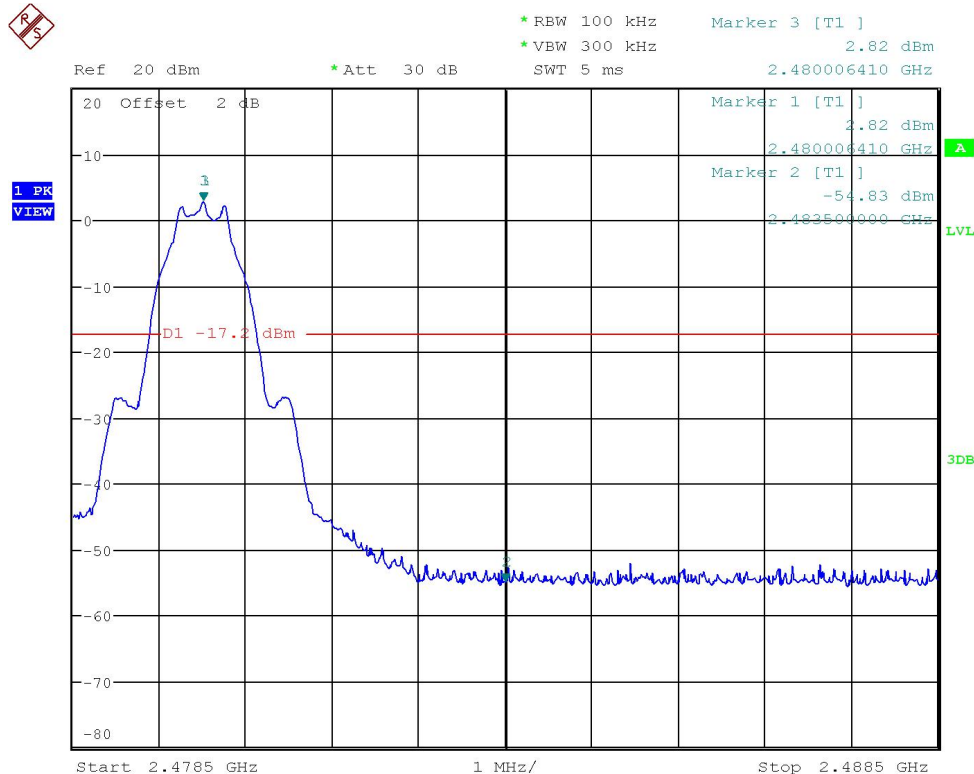


Fig.10 Frequency Band Edge: GFSK, Ch0



Date: 6.DEC.2018 05:01:36

Fig.11 Frequency Band Edge: GFSK, Ch39

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

This measurement is according to ANSI C63.10 clause 11.11.

- The output power of EUT was connected to the spectrum analyzer. The path loss was compensated to the results for each measurement.
- Enable EUT transmitter maximum power continuously.

Reference level measurement

- Set instrument center frequency to DTS channel center frequency.
- Set the span to ≥ 1.5 times the DTS bandwidth.
- Set the RBW = 100 kHz.
- Set the VBW $\geq [3 \times \text{RBW}]$.
- Detector = peak.
- 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 PSD level.

Emission level measurement

12. Set the center frequency and span to encompass frequency range to be measured.
13. Set the RBW = 100 kHz.
14. Set the VBW $\geq [3 \times \text{RBW}]$.
15. Detector = peak.
16. Sweep time = auto couple.
17. Trace mode = max hold.
18. Allow trace to fully stabilize.
19. Use the peak marker function to determine the maximum amplitude level.

6.5.3 Measurement Uncertainty:

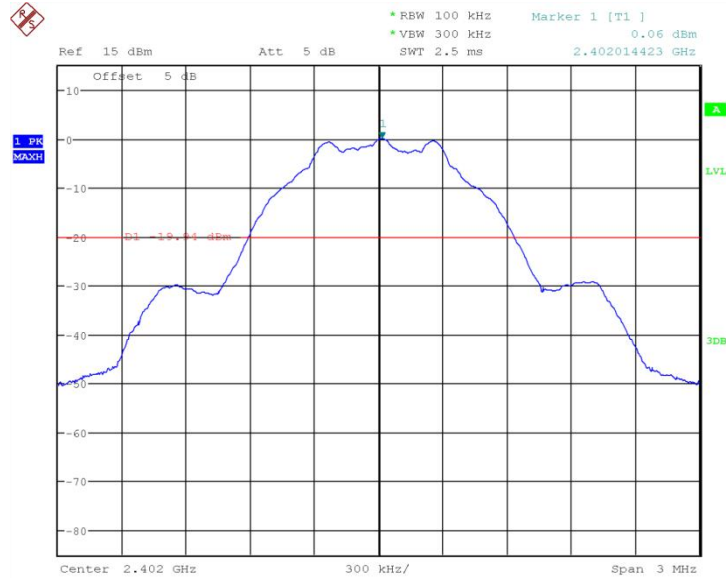
| | |
|-------------------------|---------------------|
| Measurement Uncertainty | $\pm 4.56\text{dB}$ |
|-------------------------|---------------------|

6.5.4 Measurement Results:

| Channel | Frequency Range | Test Results | Conclusion |
|---------------------|-----------------|--------------|------------|
| Ch0 2402MHz | Center Freq. | Fig.12 | P |
| | 30MHz~26.5GHz | Fig.13 | P |
| Ch19 2440MHz | Center Freq. | Fig.14 | P |
| | 30MHz~26.5GHz | Fig.15 | P |
| Ch39 2480MHz | Center Freq. | Fig.16 | P |
| | 30MHz~26.5GHz | Fig.17 | P |

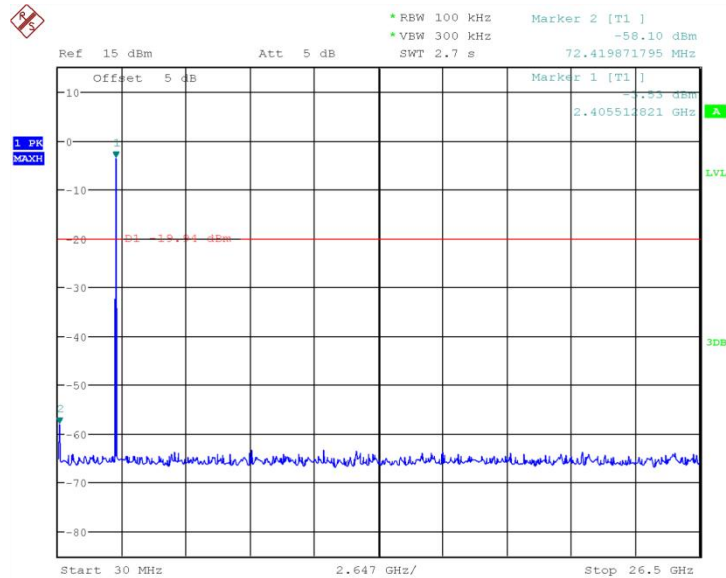
Conclusion: PASS

Test graphs as below



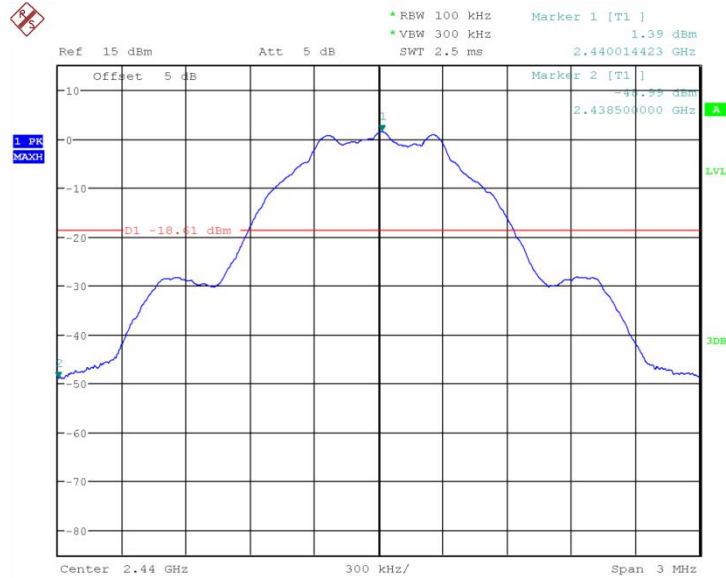
Date: 12.SEP.2018 10:19:27

Fig.12 Conducted spurious emission: Ch0, 2402MHz



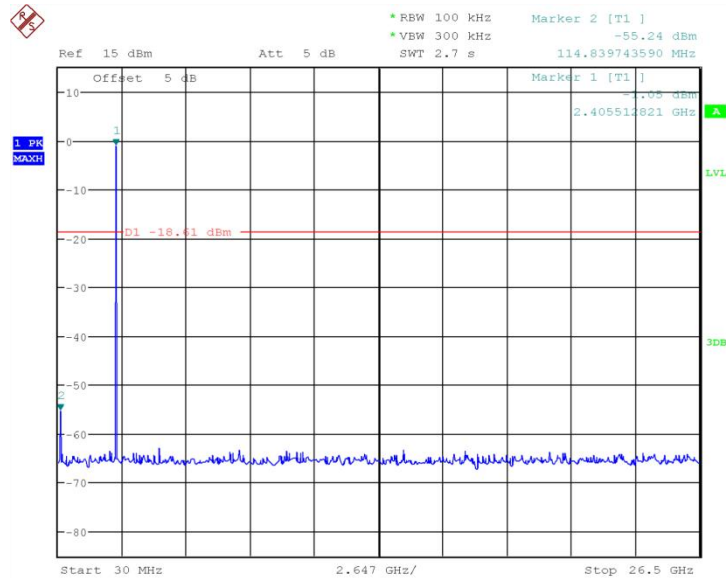
Date: 12.SEP.2018 10:19:51

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



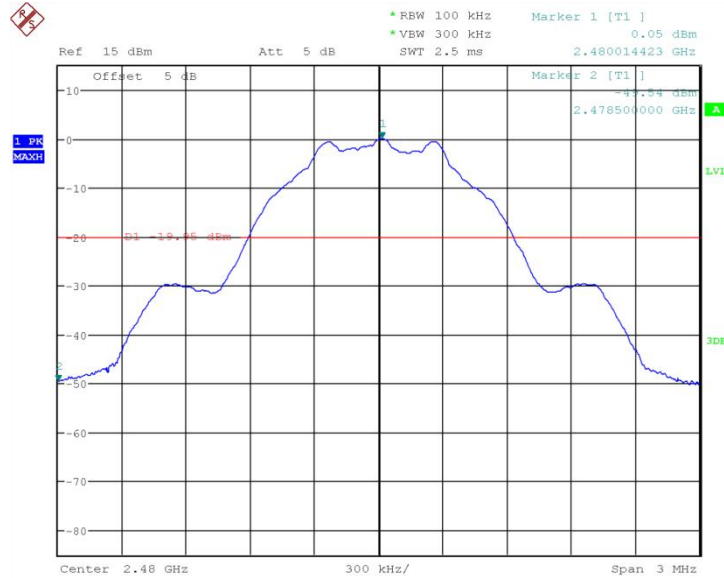
Date: 12.SEP.2018 10:20:28

Fig.14 Conducted spurious emission: Ch19, 2440MHz



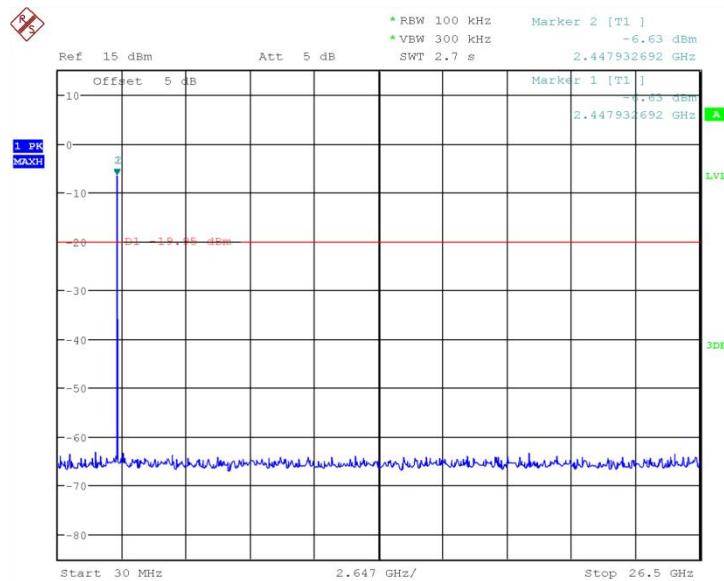
Date: 12.SEP.2018 10:20:52

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



Date: 12.SEP.2018 10:21:24

Fig.16 Conducted spurious emission: Ch39, 2480MHz



Date: 12.SEP.2018 10:21:48

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, 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 |

Measurement Uncertainty

| Measurement Items | Range | Confidence Level | Calculated Uncertainty |
|--|--------------------|------------------|------------------------|
| Transmitter Spurious Emission-Radiated | 9KHz-30MHz | 95% | $\pm 5.66\text{db}$ |
| Transmitter Spurious Emission-Radiated | 30MHz-1000MHz | 95% | $\pm 4.98\text{db}$ |
| Transmitter Spurious Emission-Radiated | 1000MHz -18000MHz | 95% | $\pm 5.06\text{db}$ |
| Transmitter Spurious Emission-Radiated | 18000MHz -40000MHz | 95% | $\pm 5.20\text{db}$ |

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

L1321

| Channel | Frequency Range | Test Results | Conclusion |
|--------------|-----------------|--------------|------------|
| Ch0 2402MHz | 30MH~1GHz | Fig.18 | P |
| | 1GHz~3GHz | Fig.19 | P |
| | 3GHz~18GHz | Fig.20 | P |
| Bandedge:CH0 | 2.31GHz~2.5GHz | Fig.21 | P |

| Channel | Frequency Range | Test Results | Conclusion |
|---------------|-----------------|--------------|------------|
| Ch39 2480MHz | 30MH~1GHz | Fig.22 | P |
| | 1GHz~3GHz | Fig.23 | P |
| | 3GHz~18GHz | Fig.24 | P |
| Bandedge:CH39 | 2.31GHz~2.5GHz | Fig.25 | P |

Ch0 30MHz-1GHz

| Frequency(MHz) | Result(dBuV/m) | A_{Rpi} (dB) | P_{Mea} (dBuV/m) | Polarity |
|----------------|----------------|----------------|--------------------|----------|
| 34.6 | 20.27 | -22 | 42.27 | V |
| 53.1 | 31.77 | -20.6 | 52.37 | V |

| | | | | |
|-------|-------|-------|-------|---|
| 71.6 | 38.53 | -25.3 | 63.83 | V |
| 166.9 | 29.61 | -26.4 | 56.01 | H |
| 262.4 | 32.88 | -22.6 | 55.48 | V |
| 357.8 | 33.44 | -20.4 | 53.84 | H |

Ch0 1GHz-3GHz (Peak)

| Frequency(MHz) | Result(dBuV/m) | ARpl (dB) | PMea(dBuV/m) | Polarity |
|----------------|----------------|-----------|--------------|----------|
| 2578.9 | 53.99 | 7.2 | 46.79 | V |
| 2648.2 | 54.2 | 7.7 | 46.5 | V |
| 2676.2 | 54.1 | 7.8 | 46.3 | H |
| 2799.2 | 54.38 | 7.9 | 46.48 | V |
| 2885.6 | 55.96 | 8.7 | 47.26 | V |
| 2983.9 | 56 | 8.9 | 47.1 | H |

Ch0 1GHz-3GHz (Average)

| Frequency(MHz) | Result(dBuV/m) | ARpl (dB) | PMea(dBuV/m) | Polarity |
|----------------|----------------|-----------|--------------|----------|
| 2648.2 | 42.16 | 7.7 | 34.46 | V |
| 2676.2 | 42.2 | 7.8 | 34.4 | H |
| 2799.2 | 42.51 | 7.9 | 34.61 | V |
| 2885.6 | 43.11 | 8.7 | 34.41 | V |
| 2983.9 | 43.32 | 8.9 | 34.42 | H |

Ch0 3GHz-18GHz (Peak)

| Frequency(MHz) | Result(dBuV/m) | ARpl (dB) | PMea(dBuV/m) | Polarity |
|----------------|----------------|-----------|--------------|----------|
| 12824.6 | 51.87 | 16.8 | 35.07 | V |
| 13986.8 | 52.5 | 18.9 | 33.6 | V |
| 14802.8 | 55.09 | 20.5 | 34.59 | V |
| 16174.6 | 58.15 | 24.9 | 33.25 | H |
| 16882.2 | 60.3 | 27.4 | 32.9 | H |

| | | | | |
|---------|-------|------|-------|---|
| 17759.0 | 60.18 | 27.9 | 32.28 | V |
|---------|-------|------|-------|---|

Ch0 3GHz-18GHz (Average)

| Frequency(MHz) | Result(dBuV/m) | ARpl (dB) | PMea(dBuV/m) | Polarity |
|----------------|----------------|-----------|--------------|----------|
| 14802.8 | 42.72 | 20.5 | 22.22 | V |
| 16174.6 | 46.17 | 24.9 | 21.27 | H |
| 16882.2 | 48.22 | 27.4 | 20.82 | H |
| 17759.0 | 48.1 | 27.9 | 20.2 | V |

Ch39 30MHz-1GHz

| Frequency(MHz) | Result(dBuV/m) | ARpl (dB) | PMea(dBuV/m) | Polarity |
|----------------|----------------|-----------|--------------|----------|
| 33.9 | 21.49 | -22 | 43.49 | V |
| 53.1 | 32.43 | -20.6 | 53.03 | V |
| 71.6 | 38.64 | -25.3 | 63.94 | V |
| 214.6 | 32.36 | -24.2 | 56.56 | V |
| 357.8 | 33.23 | -20.4 | 53.63 | H |
| 477.0 | 35.54 | -17.4 | 52.94 | H |

Ch39 1GHz-3GHz (Peak)

| Frequency(MHz) | Result(dBuV/m) | ARpl (dB) | PMea(dBuV/m) | Polarity |
|----------------|----------------|-----------|--------------|----------|
| 2603.7 | 53.88 | 7.3 | 46.58 | H |
| 2655.9 | 54.15 | 7.7 | 46.45 | V |
| 2747.7 | 54.1 | 7.7 | 46.4 | V |
| 2853.0 | 54.32 | 8.3 | 46.02 | V |
| 2930.3 | 55.2 | 8.7 | 46.5 | H |
| 2987.1 | 58.18 | 8.9 | 49.28 | H |

Ch39 1GHz-3GHz (Average)

| Frequency(MHz) | Result(dBuV/m) | ARpl (dB) | PMea(dBuV/m) | Polarity |
|----------------|----------------|-----------|--------------|----------|
| 2655.9 | 42.44 | 7.7 | 34.74 | V |

| | | | | |
|--------|-------|-----|-------|---|
| 2747.7 | 42.27 | 7.7 | 34.57 | V |
| 2853.0 | 42.68 | 8.3 | 34.38 | V |
| 2930.3 | 43.28 | 8.7 | 34.58 | H |
| 2987.1 | 43.34 | 8.9 | 34.44 | H |

Ch39 3GHz-18GHz (Peak)

| Frequency(MHz) | Result(dBuV/m) | ARpl (dB) | PMea(dBuV/m) | Polarity |
|----------------|----------------|-----------|--------------|----------|
| 14320.0 | 54.66 | 20.5 | 34.16 | V |
| 14748.1 | 54.72 | 20.8 | 33.92 | H |
| 15444.1 | 55.65 | 22.7 | 32.95 | H |
| 16256.2 | 58.65 | 25.4 | 33.25 | V |
| 16814.7 | 60.67 | 27.2 | 33.47 | H |
| 17796.2 | 60.5 | 28.4 | 32.1 | H |

Ch39 3GHz-18GHz (Average)

| Frequency(MHz) | Result(dBuV/m) | ARpl (dB) | PMea(dBuV/m) | Polarity |
|----------------|----------------|-----------|--------------|----------|
| 14320.0 | 42.91 | 20.5 | 22.41 | V |
| 14748.1 | 42.66 | 20.8 | 21.86 | H |
| 15444.1 | 43.88 | 22.7 | 21.18 | H |
| 16256.2 | 46.53 | 25.4 | 21.13 | V |
| 16814.7 | 48.14 | 27.2 | 20.94 | H |
| 17796.2 | 48.29 | 28.4 | 19.89 | H |

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

Conclusion: PASS

Test graphs as below:

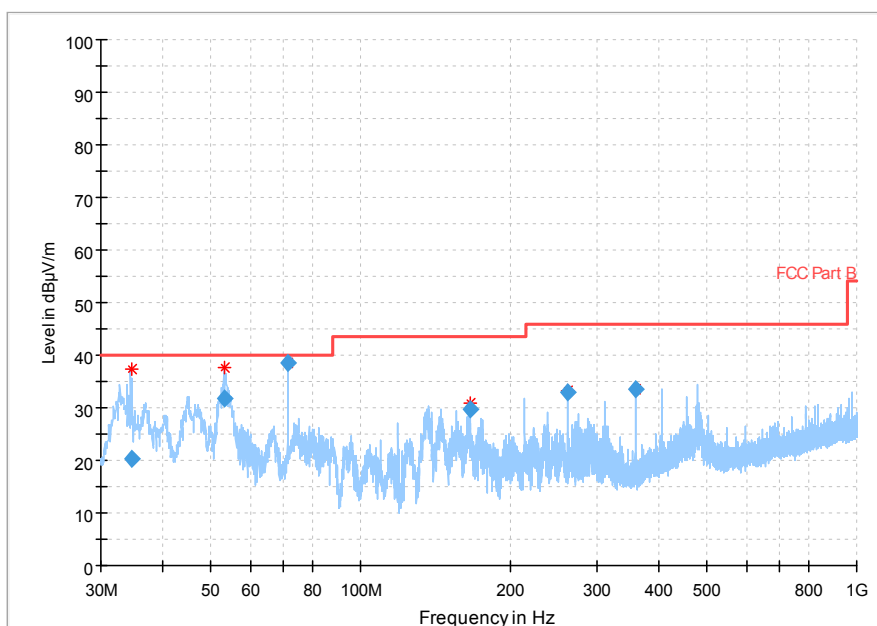


Fig.18 Radiated emission: CH0, 30MHz~1GHz

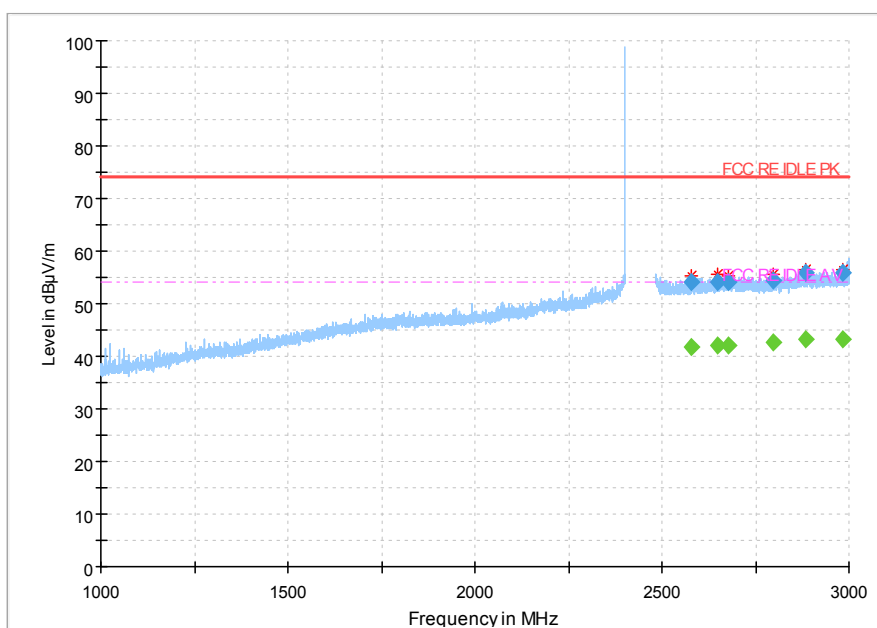


Fig.19 Radiated emission: CH0, 1GHz~3GHz

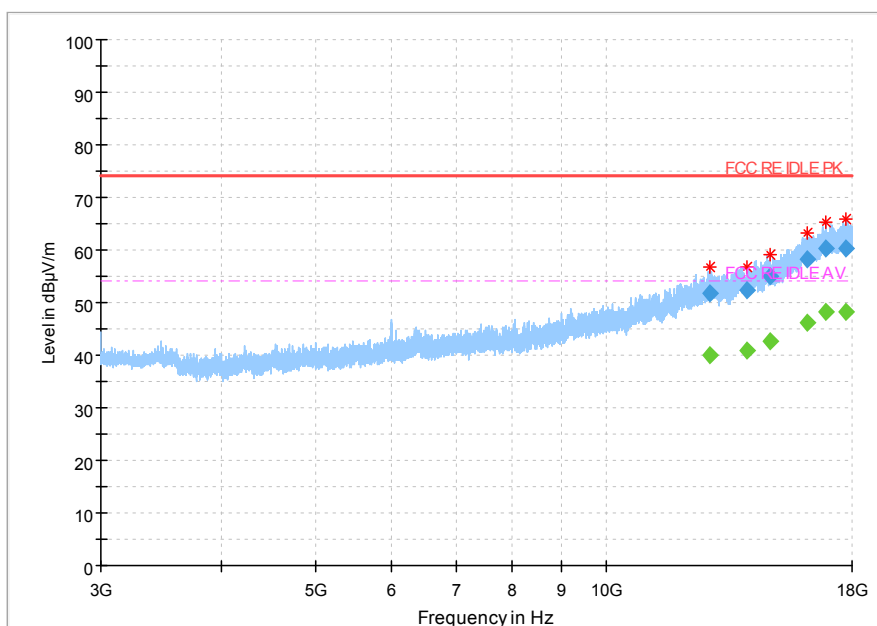
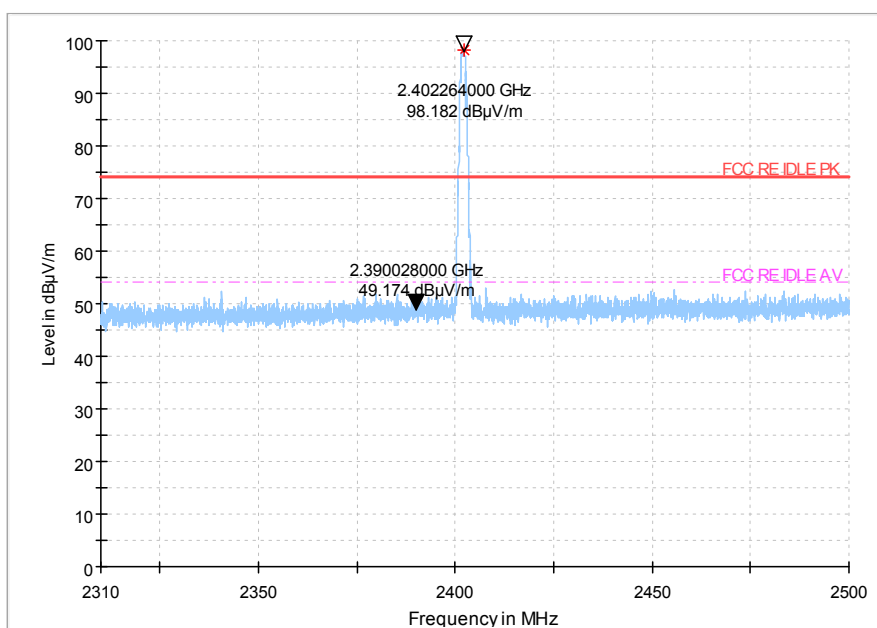


Fig.20 Radiated emission: CH0, 3GHz~18GHz



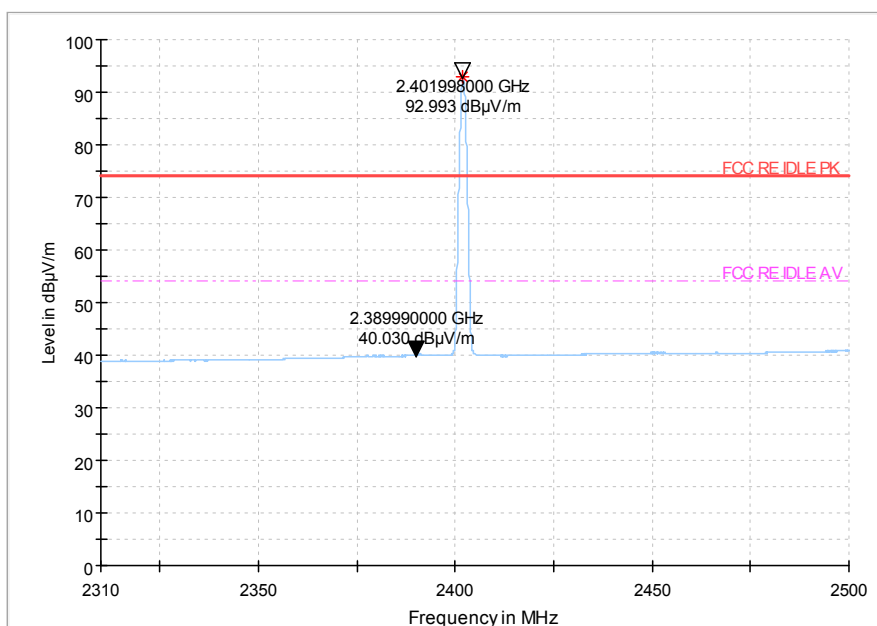


Fig.21 Bandedge: CH0

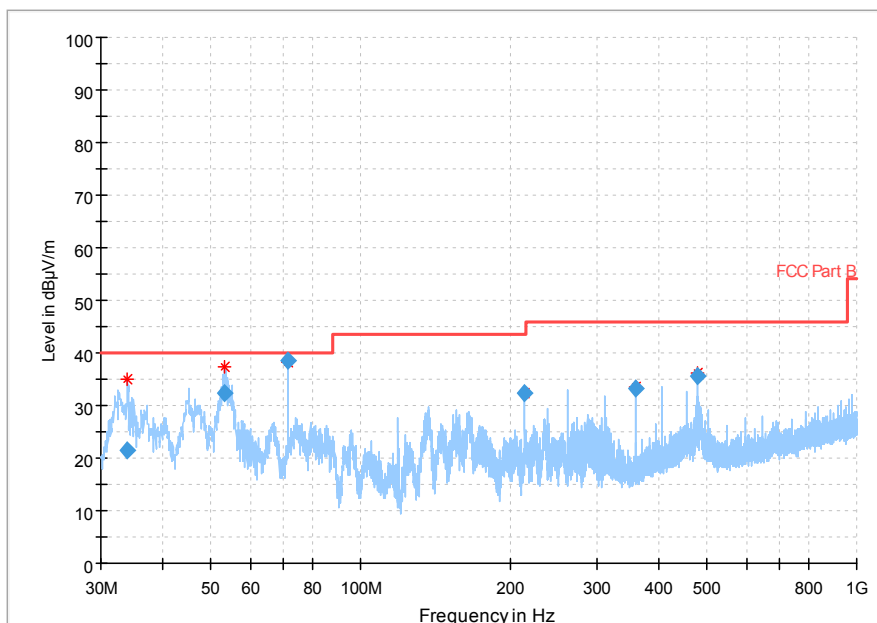


Fig.22 Radiated emission: CH39, 30MHz~1GHz

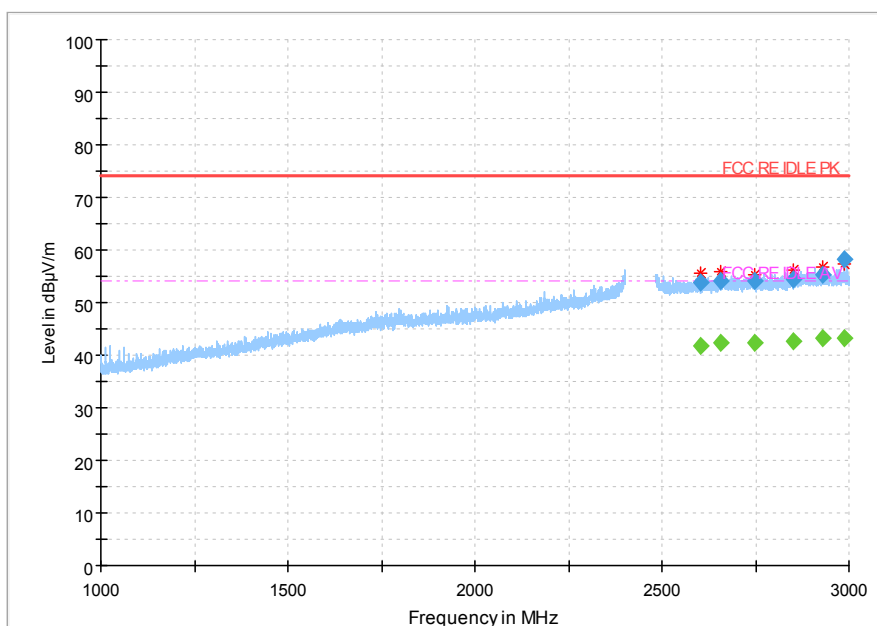


Fig.23 Radiated emission: CH39, 1GHz~3GHz

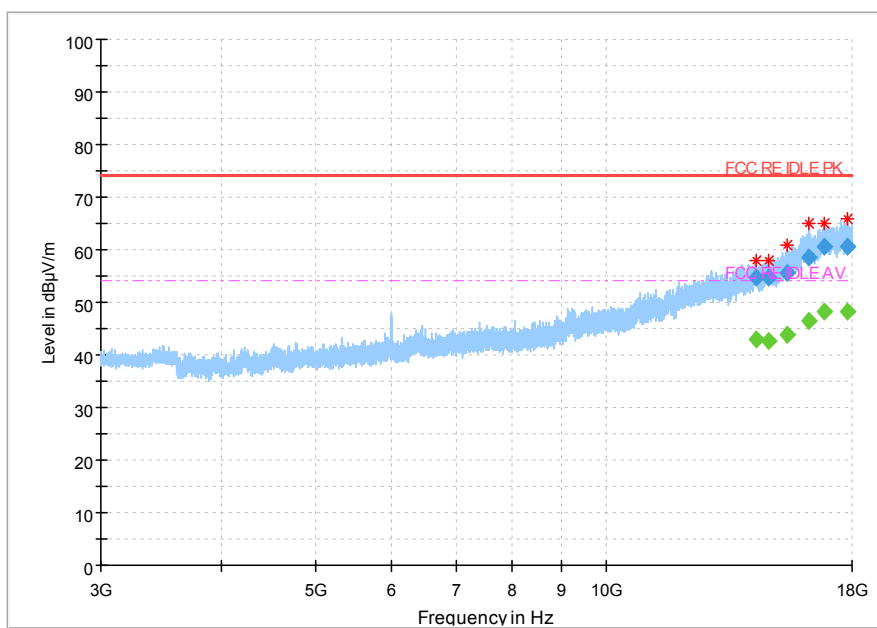


Fig.24 Radiated emission: CH39, 3GHz~18GHz

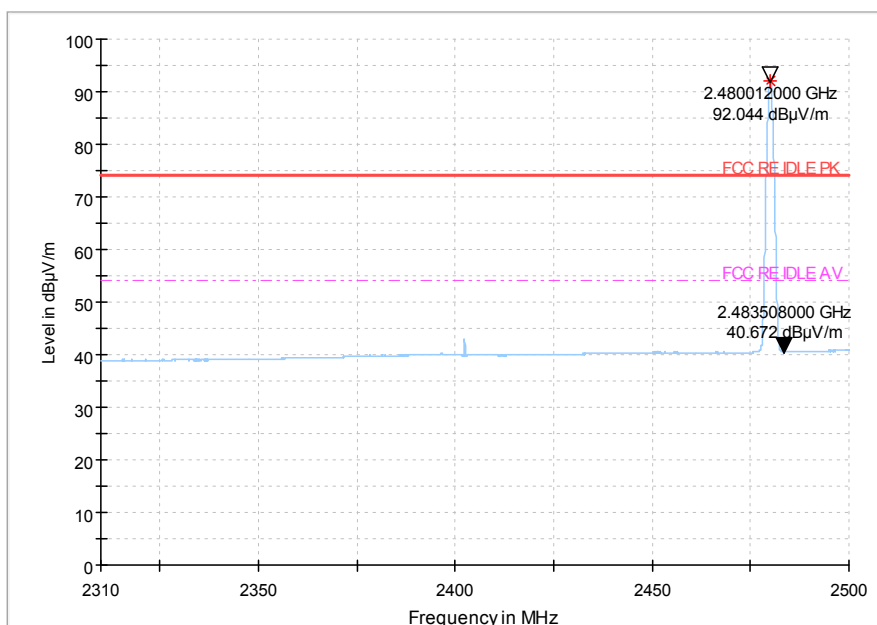
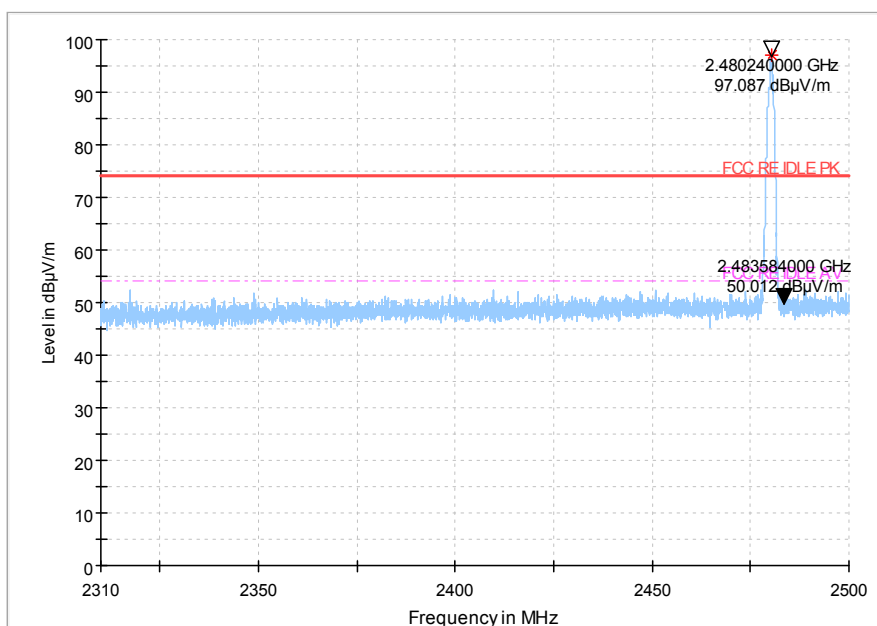


Fig.25 Bandedge:CH39

L1323

| Channel | Frequency Range | Test Results | Conclusion |
|--------------|-----------------|--------------|------------|
| Ch39 2480MHz | 30MH~1GHz | Fig.26 | P |
| | 1GHz~3GHz | Fig.27 | P |
| | 3GHz~18GHz | Fig.28 | P |

| | | | |
|---------------|----------------|--------|---|
| Bandedge:CH39 | 2.31GHz~2.5GHz | Fig.29 | P |
|---------------|----------------|--------|---|

Ch39 30MHz-1GHz

| Frequency(MHz) | Result(dBuV/m) | ARpl (dB) | PMea(dBuV/m) | Polarity |
|----------------|----------------|-----------|--------------|----------|
| 33.2 | 20.71 | -22 | 42.71 | V |
| 34.6 | 20.77 | -22 | 42.77 | V |
| 53.2 | 21.28 | -20.6 | 41.88 | V |
| 152.9 | 24.75 | -27.7 | 52.45 | H |
| 182.0 | 24.49 | -25.1 | 49.59 | H |
| 306.4 | 24.89 | -21.4 | 46.29 | H |

Ch39 1GHz-3GHz (Peak)

| Frequency(MHz) | Result(dBuV/m) | ARpl (dB) | PMea(dBuV/m) | Polarity |
|----------------|----------------|-----------|--------------|----------|
| 2645.4 | 54.25 | 7.7 | 46.55 | V |
| 2724.7 | 54.43 | 7.8 | 46.63 | H |
| 2816.4 | 54.34 | 8 | 46.34 | V |
| 2897.9 | 55.77 | 8.9 | 46.87 | H |
| 2936.4 | 55.9 | 8.7 | 47.2 | H |
| 2987.1 | 59.46 | 8.9 | 50.56 | H |

Ch39 1GHz-3GHz (Average)

| Frequency(MHz) | Result(dBuV/m) | ARpl (dB) | PMea(dBuV/m) | Polarity |
|----------------|----------------|-----------|--------------|----------|
| 2645.4 | 42.16 | 7.7 | 34.46 | V |
| 2724.7 | 42.17 | 7.8 | 34.37 | H |
| 2816.4 | 42.57 | 8 | 34.57 | V |
| 2897.9 | 43.33 | 8.9 | 34.43 | H |
| 2936.4 | 43.43 | 8.7 | 34.73 | H |
| 2987.1 | 43.42 | 8.9 | 34.52 | H |

Ch39 3GHz-18GHz (Peak)

| Frequency(MHz) | Result(dBuV/m) | ARpl (dB) | PMea(dBuV/m) | Polarity |
|----------------|----------------|-----------|--------------|----------|
| 14067.9 | 53.21 | 18.5 | 34.71 | H |
| 14703.3 | 55.35 | 21.1 | 34.25 | H |
| 15649.5 | 56.3 | 23 | 33.3 | H |
| 15998.5 | 58.66 | 25.4 | 33.26 | H |
| 17182.5 | 60.67 | 27.3 | 33.37 | H |
| 17811.3 | 59.94 | 28.3 | 31.64 | H |

Ch39 3GHz-18GHz (Average)

| Frequency(MHz) | Result(dBuV/m) | ARpl (dB) | PMea(dBuV/m) | Polarity |
|----------------|----------------|-----------|--------------|----------|
| 14703.3 | 43.22 | 21.1 | 22.12 | H |
| 15649.5 | 44.33 | 23 | 21.33 | H |
| 15998.5 | 47.11 | 25.4 | 21.71 | H |
| 17182.5 | 48.14 | 27.3 | 20.84 | H |
| 17811.3 | 48.26 | 28.3 | 19.96 | H |

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

Conclusion: PASS

Test graphs as below:

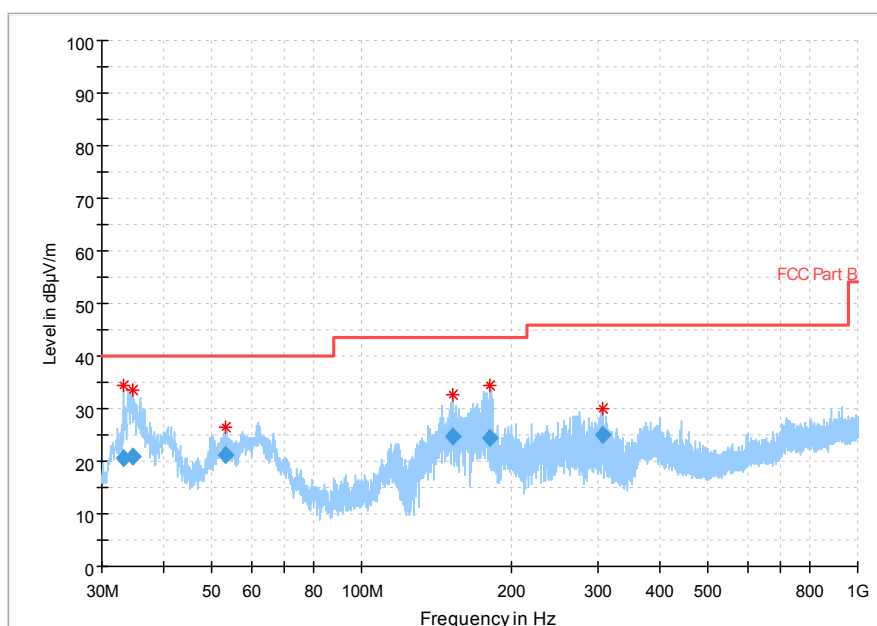


Fig.26 Radiated emission: CH39, 30MHz~1GHz

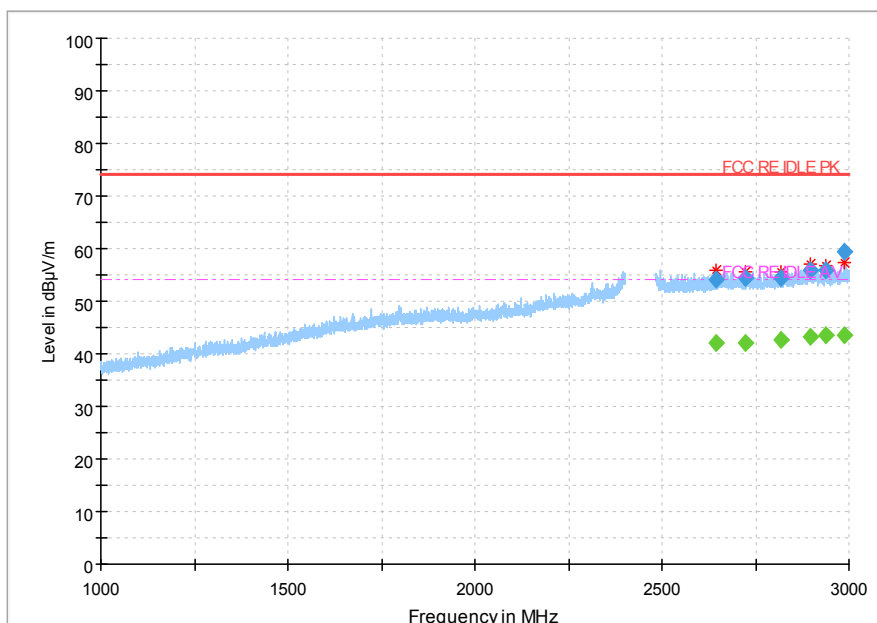


Fig.27 Radiated emission: CH39, 1GHz~3GHz

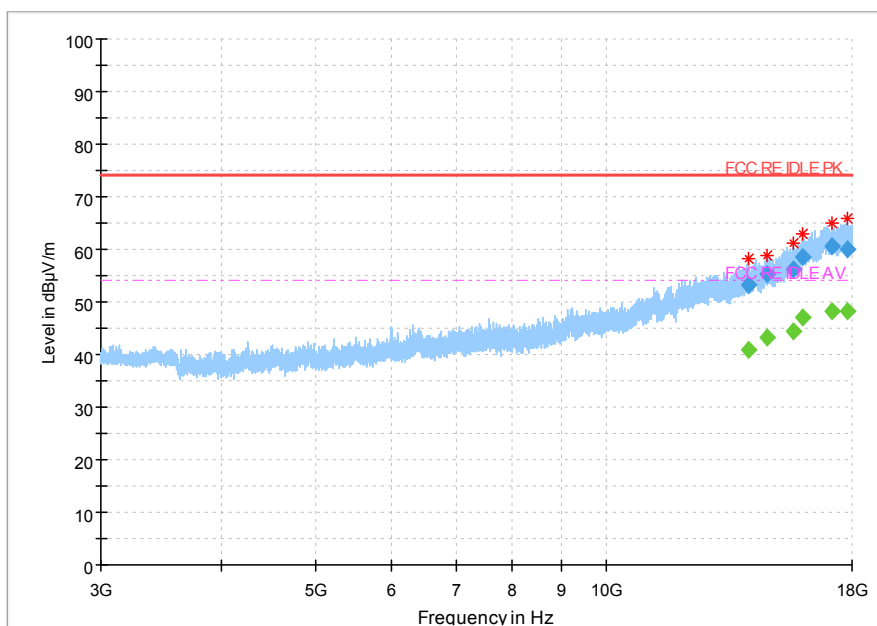


Fig.28 Radiated emission: CH39, 3GHz~18GHz

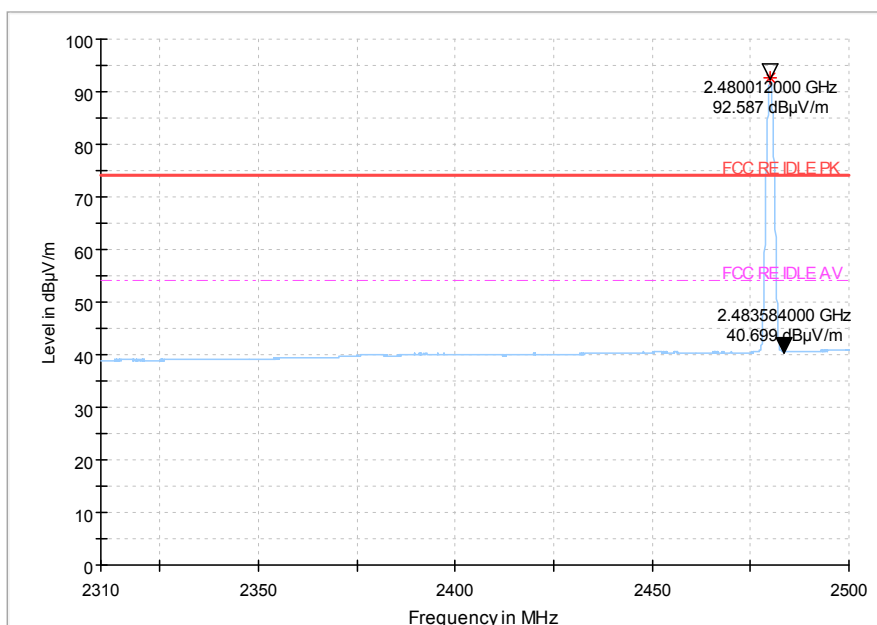
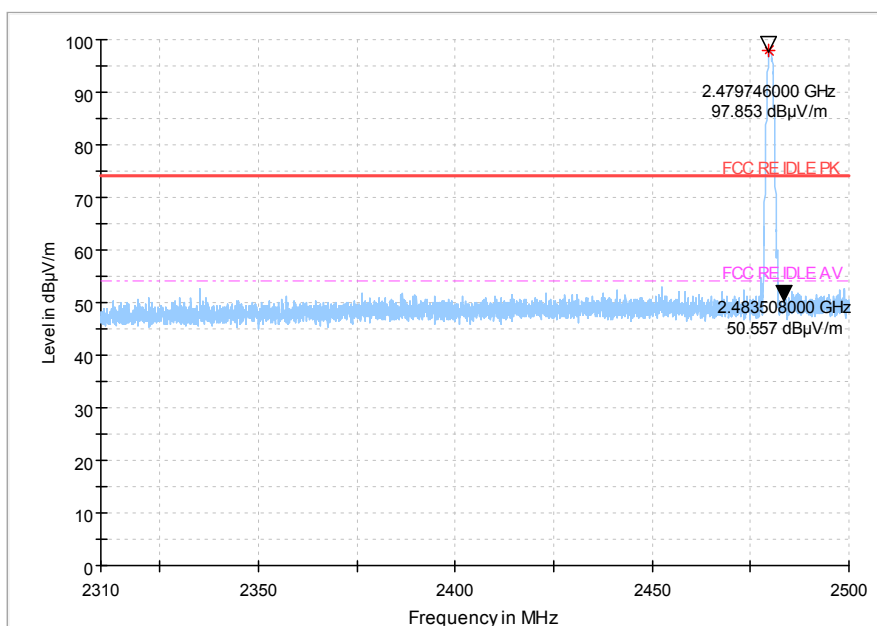
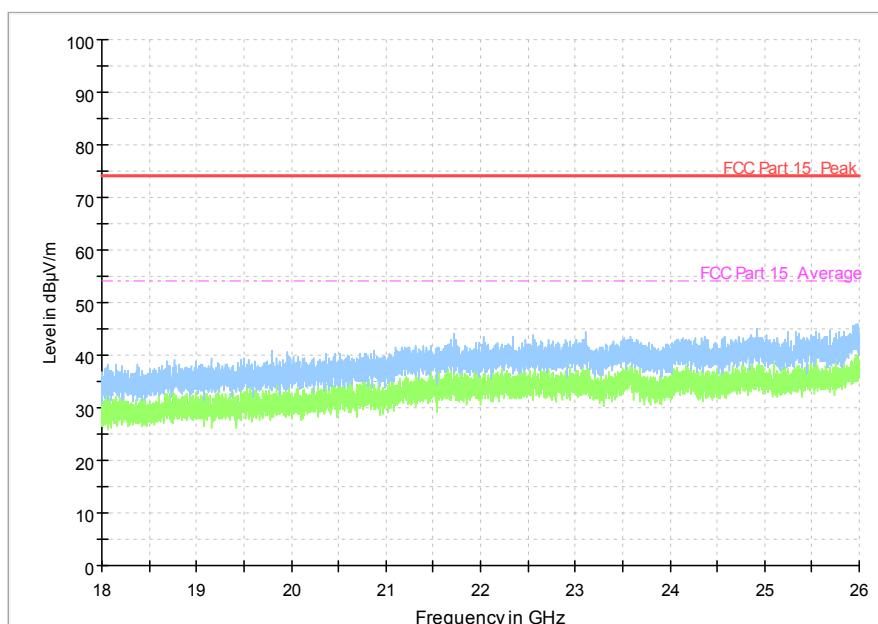


Fig.29 Bandedge:CH39



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 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)

L1321

| Frequency range (MHz) | Quasi-peak Limit (dB μ V) | Average Limit (dB μ V) | Result (dB μ V) | Conclusion |
|-----------------------|-------------------------------|----------------------------|---------------------|------------|
| | | | With charger | |
| | | | BLE | |
| 0.15 to 0.5 | 66 to 56 | 56 to 46 | Fig.30 | 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

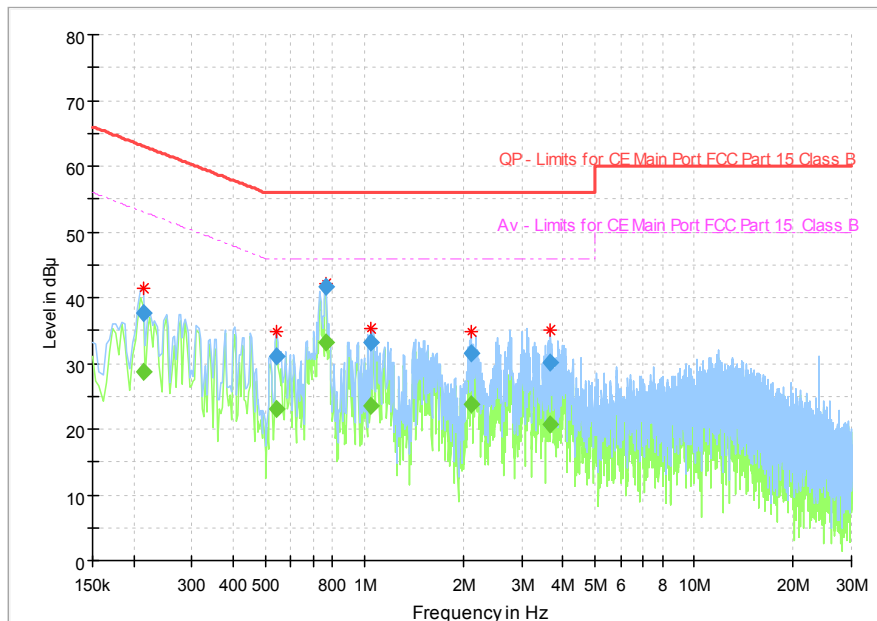


Fig.30 AC Powerline Conducted Emission

| Frequency (MHz) | QuasiPeak (dB μ V) | Average (dB μ V) | Limit (dB μ V) | Margin (dB) | Meas. Time | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|------------------------|----------------------|--------------------|-------------|------------|-----------------|------|--------|------------|
| 0.213431 | --- | 28.80 | 53.07 | 24.27 | 1000.0 | 9.000 | L1 | ON | 9.7 |
| 0.213431 | 37.72 | --- | 63.07 | 25.35 | 1000.0 | 9.000 | L1 | ON | 9.7 |
| 0.541781 | --- | 23.09 | 46.00 | 22.91 | 1000.0 | 9.000 | L1 | ON | 9.7 |
| 0.541781 | 31.05 | --- | 56.00 | 24.95 | 1000.0 | 9.000 | L1 | ON | 9.7 |
| 0.765656 | 41.53 | --- | 56.00 | 14.47 | 1000.0 | 9.000 | N | ON | 9.7 |
| 0.765656 | --- | 33.24 | 46.00 | 12.76 | 1000.0 | 9.000 | N | ON | 9.7 |
| 1.049231 | --- | 23.56 | 46.00 | 22.44 | 1000.0 | 9.000 | N | ON | 9.7 |
| 1.049231 | 33.12 | --- | 56.00 | 22.88 | 1000.0 | 9.000 | N | ON | 9.7 |
| 2.116369 | 31.59 | --- | 56.00 | 24.41 | 1000.0 | 9.000 | L1 | ON | 9.7 |
| 2.116369 | --- | 23.74 | 46.00 | 22.26 | 1000.0 | 9.000 | L1 | ON | 9.7 |
| 3.672300 | --- | 20.77 | 46.00 | 25.23 | 1000.0 | 9.000 | N | ON | 9.8 |
| 3.672300 | 30.18 | --- | 56.00 | 25.82 | 1000.0 | 9.000 | N | ON | 9.8 |

L1323

| Frequency range (MHz) | Quasi-peak Limit (dB μ V) | Average Limit (dB μ V) | Result (dB μ V) | Conclusion |
|-----------------------|-------------------------------|----------------------------|---------------------|------------|
| | | | With charger | |
| | | | BLE | |
| 0.15 to 0.5 | 67 to 56 | 56 to 46 | Fig.31 | 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

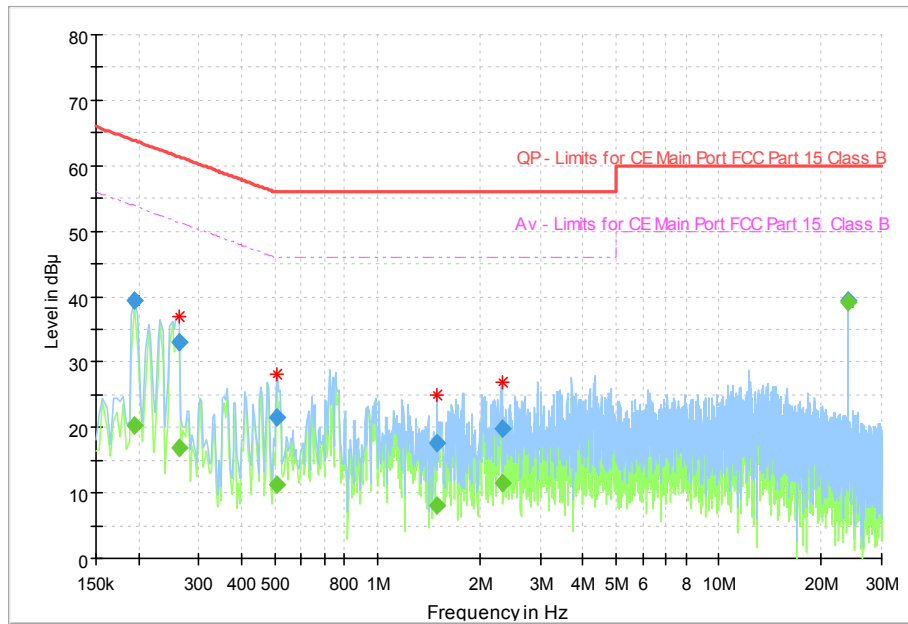


Fig.31 AC Powerline Conducted Emission

| Frequency (MHz) | QuasiPeak (dB μ V) | Average (dB μ V) | Limit (dB μ V) | Margin (dB) | Meas. Time | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|--------------------|---------------------------|-------------------------|-----------------------|----------------|---------------|--------------------|------|--------|---------------|
| 0.194775 | --- | 20.23 | 53.83 | 33.60 | 1000.0 | 9.000 | L1 | ON | 9.7 |
| 0.194775 | 39.50 | --- | 63.83 | 24.33 | 1000.0 | 9.000 | L1 | ON | 9.7 |
| 0.261938 | 32.96 | --- | 61.37 | 28.41 | 1000.0 | 9.000 | N | ON | 9.7 |
| 0.261938 | --- | 16.78 | 51.37 | 34.59 | 1000.0 | 9.000 | N | ON | 9.7 |
| 0.508200 | --- | 11.28 | 46.00 | 34.72 | 1000.0 | 9.000 | L1 | ON | 9.7 |
| 0.508200 | 21.49 | --- | 56.00 | 34.51 | 1000.0 | 9.000 | L1 | ON | 9.7 |
| 1.496981 | --- | 8.01 | 46.00 | 37.99 | 1000.0 | 9.000 | N | ON | 9.7 |
| 1.496981 | 17.56 | --- | 56.00 | 38.44 | 1000.0 | 9.000 | N | ON | 9.7 |
| 2.317856 | 19.81 | --- | 56.00 | 36.19 | 1000.0 | 9.000 | L1 | ON | 9.7 |
| 2.317856 | --- | 11.45 | 46.00 | 34.55 | 1000.0 | 9.000 | L1 | ON | 9.7 |
| 24.000150 | --- | 39.04 | 50.00 | 10.96 | 1000.0 | 9.000 | N | ON | 9.9 |
| 24.000150 | 39.34 | --- | 60.00 | 20.66 | 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 °C, Max. = 35 °C |
| 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 °C, Max. = 35 °C |
| 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 °C, Max. = 35 °C |
| 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

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