



# FCC PART 15C TEST REPORT No. I17N00290-BLE

**For**

**Doro AB**

**LTE phone**

**Model Name: DSB-0090**

**With**

**Hardware Version: 1011**

**Software Version: FRANK01A-S10A\_DSB0090\_201\_USER\_170503**

**FCC ID: WS5DSB0090**

**Issued Date: 2017-05-05**

**Test Laboratory:**

***FCC 2.948 Listed: No.342690***

**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 CTTL.

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## **REPORT HISTORY**

| <b>Report Number</b> | <b>Revision</b> | <b>Description</b> | <b>Issue Date</b> |
|----------------------|-----------------|--------------------|-------------------|
| I17N00290-BLE        | Rev.0           | 1st edition        | 2017-05-05        |

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## **1. Test Laboratory**

### **1.1. Testing Location**

Location: CTTL(South Branch)  
Address: TCL International E city, No. 1001, Zhongshanyuan Road, Nanshan  
District, Shenzhen, Guangdong, China 518000

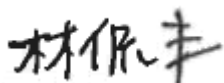
### **1.2. Testing Environment**

Normal Temperature: 15-35℃  
Relative Humidity: 20-75%

### **1.3. Project data**

Testing Start Date: 2017-03-21  
Testing End Date: 2017-04-26

### **1.4. Signature**



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Lin Kanfeng  
(Prepared this test report)



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Tang Weisheng  
(Reviewed this test report)



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Zhang Bojun  
(Approved this test report)



## **2. Client Information**

### **2.1. Applicant Information**

Company Name: Doro AB  
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City: Lund  
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Country: Sweden  
Telephone: +46 46 280 5000  
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### **2.2. Manufacturer Information**

Company Name: CK TELECOM LTD.  
Address: Technology Road. High-Tech Development Zone. Heyuan,  
Guangdong, P.R. China  
City: Heyuan  
Postal Code: /  
Country: China  
Telephone: 0755-26739100 ext.8515  
Fax: 0755-26739600

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

#### **3.1. About EUT**

|                    |                 |
|--------------------|-----------------|
| Description        | LTE phone       |
| Model Name         | DSB-0090        |
| Market Name        | Doro8040        |
| Frequency Band     | 2402MHz~2480MHz |
| Type of Modulation | GFSK            |
| Number of Channels | 40              |
| FCC ID             | WS5DSB0090      |

#### **3.2. Internal Identification of EUT**

| EUT ID* | IMEI                | HW Version | SW Version                                | Receive Date |
|---------|---------------------|------------|---|--------------|
| EUT1    | 35511508<br>0003723 | 1011       | FRANK01A-S10A_DSB0090_201_U<br>SER_170503 | 2017-03-21   |

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

#### **3.3. Internal Identification of AE**

| AE ID* | Description | SN |
|--------|-------------|----|
| AE1    | Charger     | /  |
| AE2    | Charger     | /  |

AE1

|              |  |
|--------------|--|
| Model        | A2-3762-501000                           |
| Manufacturer | Dongguan Aohai Power Technology Co., LTD |

AE2

|              |  |
|--------------|--|
| Model        | A806A-050100U-UK1                        |
| Manufacturer | Dongguan Aohai Power Technology Co., LTD |

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

## **4. Reference Documents**

### **4.1. Documents supplied by applicant**

EUT feature information is supplied by the applicant or manufacturer, which is the basis of testing.

### **4.2. Reference Documents for testing**

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

| <b>Reference</b> | <b>Title</b>  | <b>Version</b> |
|------------------|---|----------------|
| FCC Part15       | FCC CFR 47, Part 15, Subpart C:<br>15.205 Restricted bands of operation;<br>15.209 Radiated emission limits, general requirements;<br>15.247 Operation within the bands 902–928MHz,<br>2400–2483.5 MHz, and 5725–5850 MHz | Nov,2015       |
| ANSI C63.10      | American National Standard for Testing Unlicensed<br>Wireless Devices   | Jun,2013       |



## 5. Test Results

### 5.1. Summary of Test Results

| No | Test cases                                | Sub-clause of Part15C  | Verdict |
|----|---|------------------------|---------|
| 0. | Antenna Requirement                       | 15.203                 | P       |
| 1. | Maximum Peak Output Power                 | 15.247 (b)             | P       |
| 2. | Peak Power Spectral Density               | 15.247 (e)             | P       |
| 3. | Occupied 6dB Bandwidth                    | 15.247 (a)             | P       |
| 4. | Band Edges Compliance                     | 15.247 (d)             | P       |
| 5. | Transmitter Spurious Emission - Conducted | 15.247 (d)             | P       |
| 6. | Transmitter Spurious Emission - Radiated  | 15.247, 15.205, 15.209 | P       |
| 7. | AC Powerline Conducted Emission           | 15.107, 15.207         | P       |

See **ANNEX A** and **ANNEX B** for details.

### 5.2. Statements

CTTL has evaluated the test cases requested by the applicant/manufacture as listed in section 5.1 of this report, for the EUT specified in section 3, according to the standards or reference documents listed in section 4.2.

### 5.3. Terms used in the result table

Terms used in Verdict column

|    |               |
|----|---------------|
| P  | Pass          |
| NA | Not Available |
| F  | Fail          |

Abbreviations

|          |   |
|----------|---|
| AC       | Alternating Current                             |
| AFH      | Adaptive Frequency Hopping                      |
| BW       | Band Width                                      |
| E.I.R.P. | equivalent isotropic radiated power             |
| ISM      | Industrial, Scientific and Medical              |
| R&TTE    | Radio and Telecommunications Terminal Equipment |
| RF       | Radio Frequency                                 |
| Tx       | Transmitter                                     |

#### 5.4. Laboratory Environment

**Semi-anechoic chamber** did not exceed following limits along the EMC testing

|                                   |   |
|-----------------------------------|---|
| Temperature                       | Min. = 15 °C, Max. = 30 °C                        |
| Relative humidity                 | Min. = 35 %, Max. = 60 %                          |
| Shielding effectiveness           | 0.014MHz - 1MHz, >60dB;<br>1MHz - 1000MHz, >90dB. |
| Electrical insulation             | > 2 MΩ  |
| Ground system resistance          | < 4Ω  |
| Normalised site attenuation (NSA) | < ±4dB, 3m/10m distance, from 30 to 1000 MHz      |
| Uniformity of field strength      | Between 0 and 6 dB, from 80 to 3000 MHz           |

**Shielded room** did not exceed following limits along the EMC testing

|                          |   |
|--------------------------|---|
| Temperature              | Min. = 15 °C, Max. = 30 °C                        |
| Relative humidity        | Min. = 35 %, Max. = 60 %                          |
| Shielding effectiveness  | 0.014MHz - 1MHz, >60dB;<br>1MHz - 1000MHz, >90dB. |
| Electrical insulation    | > 2 MΩ  |
| Ground system resistance | < 4 Ω   |

**Fully-anechoic chamber** did not exceed following limits along the EMC testing

|                                    |   |
|------------------------------------|---|
| Temperature                        | Min. = 15 °C, Max. = 30 °C                        |
| Relative humidity                  | Min. = 35 %, Max. = 60 %                          |
| Shielding effectiveness            | 0.014MHz - 1MHz, >60dB;<br>1MHz - 1000MHz, >90dB. |
| Electrical insulation              | > 2 MΩ  |
| Ground system resistance           | < 4Ω  |
| Voltage Standing Wave Ratio (VSWR) | ≤6dB, from 1 to 18 GHz, 3m distance               |

## 6. Test Facilities Utilized

### Conducted test system

| No. | Equipment              | Model | Serial Number | Manufacturer    | Calibration Due date | Calibration Period |
|-----|------------------------|-------|---------------|-----------------|----------------------|--------------------|
| 1   | Vector Signal Analyzer | FSV40 | 100903        | Rohde & Schwarz | 2018-01-18           | 1 year             |

### Radiated emission test system

| No. | Equipment         | Model     | Serial Number | Manufacturer | Calibration Due date | Calibration Period |
|-----|-------------------|-----------|---------------|--------------|----------------------|--------------------|
| 1   | LISN              | ESH2-Z5   | 100196        | R&S          | 2018-01-05           | 1 year             |
| 2   | Test Receiver     | ESCI      | 100701        | R&S          | 2017-08-09           | 1 year             |
| 3   | Loop Antenna      | HLA6120   | 35779         | TESEQ        | 2019-05-02           | 3 years            |
| 4   | BiLog Antenna     | VULB9163  | 9163 329      | Schwarzbeck  | 2020-02-17           | 3 years            |
| 5   | Horn Antenna      | 3117      | 00066585      | ETS-Lindgren | 2019-03-05           | 3 years            |
| 6   | Test Receiver     | ESR7      | 101675        | R&S          | 2017-07-21           | 1 year             |
| 7   | Spectrum Analyzer | FSP 40    | 100378        | R&S          | 2017-12-15           | 1 year             |
| 8   | Chamber           | FACT5-2.0 | 4166          | ETS-Lindgren | 2018-05-13           | 3 years            |

### Anechoic chamber

Fully anechoic chamber by ETS-Lindgren

**ANNEX A: MEASUREMENT RESULTS FOR RECEIVER****A.0 Antenna requirement****Measurement Limit:**

| Standard            | Requirement  |
|---------------------|--|
| FCC CRF Part 15.203 | An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded. |

**Conclusion: The Directional gains of antenna used for transmitting is 1.0dBi.****The RF transmitter uses an integrate antenna without connector.**

### A.1 Maximum Average Output Power

#### Measurement Limit:

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

#### Measurement Results:

| Mode | Channel | Maximum Peak Output Power (dBm) |       | Conclusion |
|------|---------|---------------------------------|-------|------------|
| GFSK | 0       | Fig.1                           | -0.41 | P          |
|      | 19      | Fig.2                           | 0.17  | P          |
|      | 39      | Fig.3                           | -1.58 | P          |

See ANNEX B for test graphs.

Conclusion: Pass

### A.2 Peak Power Spectral Density

#### Measurement Limit:

| Standard               | Limit         |
|------------------------|---------------|
| FCC CRF Part 15.247(d) | < 8 dBm/3 kHz |

#### Measurement Results:

| Mode | Channel | Peak Power Spectral Density (dBm) |        | Conclusion |
|------|---------|-----------------------------------|--------|------------|
| GFSK | 0       | Fig.4                             | -15.68 | P          |
|      | 19      | Fig.5                             | -15.21 | P          |
|      | 39      | Fig.6                             | -16.86 | P          |

See ANNEX B for test graphs.

Conclusion: PASS

### A.3 Occupied 6dB Bandwidth

**Measurement Limit:**

| Standard                   | Limit (kHz) |
|----------------------------|-------------|
| FCC 47 CFR Part 15.247 (a) | $\geq 500$  |

**Measurement Result:**

| Mode | Channel | Test Results ( kHz) |       | conclusion |
|------|---------|---------------------|-------|------------|
| GFSK | 0       | Fig.7               | 707.5 | P          |
|      | 19      | Fig.8               | 703.5 | P          |
|      | 39      | Fig.9               | 707.0 | P          |

See ANNEX B for test graphs.

Conclusion: PASS

### A.4 Band Edges Compliance

**Measurement Limit:**

| Standard                   | Limit (dBc) |
|----------------------------|-------------|
| FCC 47 CFR Part 15.247 (d) | $> 20$      |

**Measurement Result:**

| Mode | Channel | Test Results | Conclusion |
|------|---------|--------------|------------|
| GFSK | 0       | Fig.10       | P          |
|      | 39      | Fig.11       | P          |

See ANNEX B for test graphs.

Conclusion: Pass

## A.5 Transmitter Spurious Emission

### A.5.1 Transmitter Spurious Emission - Conducted

#### Measurement Limit:

| Standard                   | Limit   |
|----------------------------|---|
| FCC 47 CFR Part 15.247 (d) | 20dB below peak output power in 100 kHz bandwidth |

#### Measurement Results:

| MODE | Channel      | Frequency Range | Test Results | Conclusion |
|------|--------------|-----------------|--------------|------------|
| GFSK | 0            | 2.402 GHz       | Fig.12       | P          |
|      |              | 30 MHz-3 GHz    | Fig.13       | P          |
|      |              | 3GHz-18GHz      | Fig.14       | P          |
|      | 19           | 2.440 GHz       | Fig.15       | P          |
|      |              | 30 MHz-3 GHz    | Fig.16       | P          |
|      |              | 3GHz-18GHz      | Fig.17       | P          |
|      | 39           | 2.480 GHz       | Fig.18       | P          |
|      |              | 30 MHz-3 GHz    | Fig.19       | P          |
|      |              | 3GHz-18GHz      | Fig.20       | P          |
| /    | All channels | 18GHz-26GHz     | Fig.21       | P          |

See ANNEX B for test graphs.

Conclusion: Pass

**A.5.2 Transmitter Spurious Emission - Radiated****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( $\mu$ V/m) | Measurement distance(meters) |
|-----------------------------|----------------------------|------------------------------|
| 0.009-0.490                 | 2400/F(kHz)                | 300                          |
| 0.490-1.705                 | 24000/F(kHz)               | 30                           |
| 1.705-30.0                  | 30                         | 30                           |
| 30-88                       | 100                        | 3                            |
| 88-216                      | 150                        | 3                            |
| 216-960                     | 200                        | 3                            |
| Above 960                   | 500                        | 3                            |

**Test Condition:**

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                     | 120kHz/300kHz | 5             |
| 1000-4000                   | 1MHz/3MHz     | 15            |
| 4000-18000                  | 1MHz/3MHz     | 40            |
| 18000-26500                 | 1MHz/3MHz     | 20            |

**Note:** According to the performance evaluation, the radiated emission margin of EUT is over 20dB in the band from 9kHz to 30MHz. Therefore, the measurement starts from 30MHz to tenth harmonic.

The measurement results include the horizontal polarization and vertical polarization measurements.



**Measurement Results:**

|      |             |                     |        |   |
|------|-------------|---------------------|--------|---|
| GFSK | 0           | 1 GHz ~18 GHz       | Fig.22 | P |
|      | 19          | 9 kHz ~30 MHz       | Fig.23 | P |
|      |             | 30 MHz ~1 GHz       | Fig.24 | P |
|      |             | 1 GHz ~18 GHz       | Fig.25 | P |
|      |             | 18 GHz~ 26.5 GHz    | Fig.26 | P |
|      | 39          | 1 GHz ~18 GHz       | Fig.27 | P |
|      | Power(CH0)  | 2.38 GHz ~ 2.45 GHz | Fig.28 | P |
|      | Power(CH39) | 2.45 GHz ~ 2.5 GHz  | Fig.29 | P |

**GFSK CH0 (1-18GHz)**

| Frequency (MHz) | MaxPeak (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Corr. (dB) | Pol |
|-----------------|------------------|----------------|-------------|------------|-----|
| 13999.00000     | 55.72            | 74.00          | 18.28       | 20.0       | H   |
| 14679.50000     | 56.79            | 74.00          | 17.21       | 21.4       | V   |
| 15078.00000     | 58.62            | 74.00          | 15.38       | 22.2       | V   |
| 15719.50000     | 61.12            | 74.00          | 12.88       | 24.0       | H   |
| 16594.00000     | 62.01            | 74.00          | 11.99       | 26.3       | H   |
| 17710.50000     | 61.00            | 74.00          | 13.00       | 27.7       | H   |

| Frequency (MHz) | Average (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Corr. (dB) | Pol |
|-----------------|------------------|----------------|-------------|------------|-----|
| 13913.00000     | 44.60            | 54.00          | 9.40        | 20.9       | V   |
| 14676.00000     | 45.33            | 54.00          | 8.67        | 21.4       | V   |
| 15111.50000     | 46.82            | 54.00          | 7.18        | 22.8       | H   |
| 15969.00000     | 48.43            | 54.00          | 5.57        | 25.6       | V   |
| 16589.50000     | 50.15            | 54.00          | 3.85        | 26.3       | V   |
| 17707.50000     | 49.97            | 54.00          | 4.03        | 27.6       | V   |

**GFSK CH19 (1-18GHz)**

| Frequency (MHz) | MaxPeak (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Corr. (dB) | Pol |
|-----------------|------------------|----------------|-------------|------------|-----|
| 12788.50000     | 55.49            | 74.00          | 18.51       | 19.6       | V   |
| 14693.50000     | 56.73            | 74.00          | 17.27       | 21.6       | H   |
| 15572.00000     | 58.52            | 74.00          | 15.48       | 23.6       | V   |
| 15968.00000     | 60.37            | 74.00          | 13.63       | 25.6       | V   |
| 16592.50000     | 61.55            | 74.00          | 12.45       | 26.3       | V   |
| 17706.50000     | 61.46            | 74.00          | 12.54       | 27.6       | H   |

| Frequency (MHz) | Average (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Corr. (dB) | Pol |
|-----------------|------------------|----------------|-------------|------------|-----|
| 13909.00000     | 44.55            | 54.00          | 9.45        | 21.1       | V   |
| 14677.00000     | 44.92            | 54.00          | 9.08        | 21.4       | V   |
| 15577.00000     | 46.77            | 54.00          | 7.23        | 23.8       | H   |
| 15959.00000     | 48.38            | 54.00          | 5.62        | 25.3       | V   |
| 16592.50000     | 50.06            | 54.00          | 3.94        | 26.3       | H   |
| 17705.50000     | 49.84            | 54.00          | 4.16        | 27.6       | V   |

**GFSK CH39 (1-18GHz)**

| Frequency (MHz) | MaxPeak (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Corr. (dB) | Pol |
|-----------------|------------------|----------------|-------------|------------|-----|
| 13910.00000     | 56.07            | 74.00          | 17.93       | 21.2       | V   |
| 14629.00000     | 56.34            | 74.00          | 17.66       | 21.4       | H   |
| 15576.50000     | 58.44            | 74.00          | 15.56       | 23.8       | V   |
| 15623.00000     | 60.04            | 74.00          | 13.96       | 24.2       | V   |
| 16617.00000     | 61.85            | 74.00          | 12.15       | 26.1       | V   |
| 17992.50000     | 62.57            | 74.00          | 11.43       | 27.5       | V   |

| Frequency (MHz) | Average (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Corr. (dB) | Pol |
|-----------------|------------------|----------------|-------------|------------|-----|
| 13909.50000     | 44.42            | 54.00          | 9.58        | 21.1       | V   |
| 14683.00000     | 44.81            | 54.00          | 9.19        | 21.5       | H   |
| 15108.50000     | 46.69            | 54.00          | 7.31        | 22.7       | H   |
| 15740.00000     | 48.53            | 54.00          | 5.47        | 24.4       | V   |
| 17110.00000     | 49.97            | 54.00          | 4.03        | 26.2       | V   |
| 17705.50000     | 49.89            | 54.00          | 4.11        | 27.6       | H   |

**See ANNEX B for test graphs.**

**Conclusion: Pass**

**Note:** A "reference path loss" is established and the  $A_{Rpl}$  is the attenuation of "reference path loss", and including the gain of receive antenna, the gain of the preamplifier, the cable loss.

$P_{Mea}$  is the field strength recorded from the instrument. The measurement results are obtained as described below:  $Result = P_{Mea} + A_{Rpl} = P_{Mea} + Cable Loss + Antenna Factor$

## A.6 AC Powerline Conducted Emission

### Test Condition:

| Voltage (V) | Frequency (Hz) |
|-------------|----------------|
| 120         | 60             |

### Measurement Result and limit:

BLE (Quasi-peak Limit)-AE1

| Frequency range (MHz) | Quasi-peak Limit (dB $\mu$ V) | Result (dB $\mu$ V) | Conclusion |
|-----------------------|-------------------------------|---------------------|------------|
|                       |                               | Traffic             |            |
| 0.15 to 0.5           | 66 to 56                      | Fig.30              | P          |
| 0.5 to 5              | 56                            |                     |            |
| 5 to 30               | 60                            |                     |            |

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

BLE (Average Limit)-AE1

| Frequency range (MHz) | Average-peak Limit (dB $\mu$ V) | Result (dB $\mu$ V) | Conclusion |
|-----------------------|---------------------------------|---------------------|------------|
|                       |                                 | Traffic             |            |
| 0.15 to 0.5           | 56 to 46                        | Fig.30              | P          |
| 0.5 to 5              | 46                              |                     |            |
| 5 to 30               | 50                              |                     |            |

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

BLE (Quasi-peak Limit)-AE1

| Frequency range (MHz) | Quasi-peak Limit (dB $\mu$ V) | Result (dB $\mu$ V) | Conclusion |
|-----------------------|-------------------------------|---------------------|------------|
|                       |                               | Idle                |            |
| 0.15 to 0.5           | 66 to 56                      | Fig.31              | P          |
| 0.5 to 5              | 56                            |                     |            |
| 5 to 30               | 60                            |                     |            |

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

BLE (Average Limit)-AE1

| Frequency range (MHz) | Average-peak Limit (dB $\mu$ V) | Result (dB $\mu$ V) | Conclusion |
|-----------------------|---------------------------------|---------------------|------------|
|                       |                                 | Idle                |            |
| 0.15 to 0.5           | 56 to 46                        | Fig.31              | P          |
| 0.5 to 5              | 46                              |                     |            |
| 5 to 30               | 50                              |                     |            |

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

## BLE (Quasi-peak Limit)-AE2

| Frequency range<br>(MHz)   | Quasi-peak<br>Limit (dBμV) | Result (dBμV) | Conclusion |
|--|----------------------------|---------------|------------|
|  |                            | Traffic       |            |
| 0.15 to 0.5  | 66 to 56                   | Fig.32        | P          |
| 0.5 to 5   | 56                         |               |            |
| 5 to 30  | 60                         |               |            |
| NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz. |                            |               |            |

## BLE (Average Limit)-AE2

| Frequency range<br>(MHz)   | Average-peak<br>Limit (dBμV) | Result (dBμV) | Conclusion |
|--|------------------------------|---------------|------------|
|  |                              | Traffic       |            |
| 0.15 to 0.5  | 56 to 46                     | Fig.32        | P          |
| 0.5 to 5   | 46                           |               |            |
| 5 to 30  | 50                           |               |            |
| NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz. |                              |               |            |

## BLE (Quasi-peak Limit)-AE2

| Frequency range<br>(MHz)   | Quasi-peak<br>Limit (dBμV) | Result (dBμV) | Conclusion |
|--|----------------------------|---------------|------------|
|  |                            | Idle          |            |
| 0.15 to 0.5  | 66 to 56                   | Fig.33        | P          |
| 0.5 to 5   | 56                         |               |            |
| 5 to 30  | 60                         |               |            |
| NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz. |                            |               |            |

## BLE (Average Limit)-AE2

| Frequency range<br>(MHz)   | Average-peak<br>Limit (dBμV) | Result (dBμV) | Conclusion |
|--|------------------------------|---------------|------------|
|  |                              | Idle          |            |
| 0.15 to 0.5  | 56 to 46                     | Fig.33        | P          |
| 0.5 to 5   | 46                           |               |            |
| 5 to 30  | 50                           |               |            |
| NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz. |                              |               |            |

**Test Condition:**

| Voltage (V) | Frequency (Hz) |
|-------------|----------------|
| 240         | 60             |

**Measurement Result and limit:**

BLE (Quasi-peak Limit)-AE1

| Frequency range<br>(MHz) | Quasi-peak<br>Limit (dBμV) | Result (dBμV) | Conclusion |
|--------------------------|----------------------------|---------------|------------|
|                          |                            | Traffic       |            |
| 0.15 to 0.5              | 66 to 56                   | Fig.34        | P          |
| 0.5 to 5                 | 56                         |               |            |
| 5 to 30                  | 60                         |               |            |

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

BLE (Average Limit)-AE1

| Frequency range<br>(MHz) | Average-peak<br>Limit (dBμV) | Result (dBμV) | Conclusion |
|--------------------------|------------------------------|---------------|------------|
|                          |                              | Traffic       |            |
| 0.15 to 0.5              | 56 to 46                     | Fig.34        | P          |
| 0.5 to 5                 | 46                           |               |            |
| 5 to 30                  | 50                           |               |            |

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

BLE (Quasi-peak Limit)-AE1

| Frequency range<br>(MHz) | Quasi-peak<br>Limit (dBμV) | Result (dBμV) | Conclusion |
|--------------------------|----------------------------|---------------|------------|
|                          |                            | Idle          |            |
| 0.15 to 0.5              | 66 to 56                   | Fig.35        | P          |
| 0.5 to 5                 | 56                         |               |            |
| 5 to 30                  | 60                         |               |            |

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

BLE (Average Limit)-AE1

| Frequency range<br>(MHz) | Average-peak<br>Limit (dBμV) | Result (dBμV) | Conclusion |
|--------------------------|------------------------------|---------------|------------|
|                          |                              | Idle          |            |
| 0.15 to 0.5              | 56 to 46                     | Fig.35        | P          |
| 0.5 to 5                 | 46                           |               |            |
| 5 to 30                  | 50                           |               |            |

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

## BLE (Quasi-peak Limit)-AE2

| Frequency range<br>(MHz)   | Quasi-peak<br>Limit (dBμV) | Result (dBμV) | Conclusion |
|--|----------------------------|---------------|------------|
|  |                            | Traffic       |            |
| 0.15 to 0.5  | 66 to 56                   | Fig.36        | P          |
| 0.5 to 5   | 56                         |               |            |
| 5 to 30  | 60                         |               |            |
| NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz. |                            |               |            |

## BLE (Average Limit)-AE2

| Frequency range<br>(MHz)   | Average-peak<br>Limit (dBμV) | Result (dBμV) | Conclusion |
|--|------------------------------|---------------|------------|
|  |                              | Traffic       |            |
| 0.15 to 0.5  | 56 to 46                     | Fig.36        | P          |
| 0.5 to 5   | 46                           |               |            |
| 5 to 30  | 50                           |               |            |
| NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz. |                              |               |            |

## BLE (Quasi-peak Limit)-AE2

| Frequency range<br>(MHz)   | Quasi-peak<br>Limit (dBμV) | Result (dBμV) | Conclusion |
|--|----------------------------|---------------|------------|
|  |                            | Idle          |            |
| 0.15 to 0.5  | 66 to 56                   | Fig.37        | P          |
| 0.5 to 5   | 56                         |               |            |
| 5 to 30  | 60                         |               |            |
| NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz. |                            |               |            |

## BLE (Average Limit)-AE2

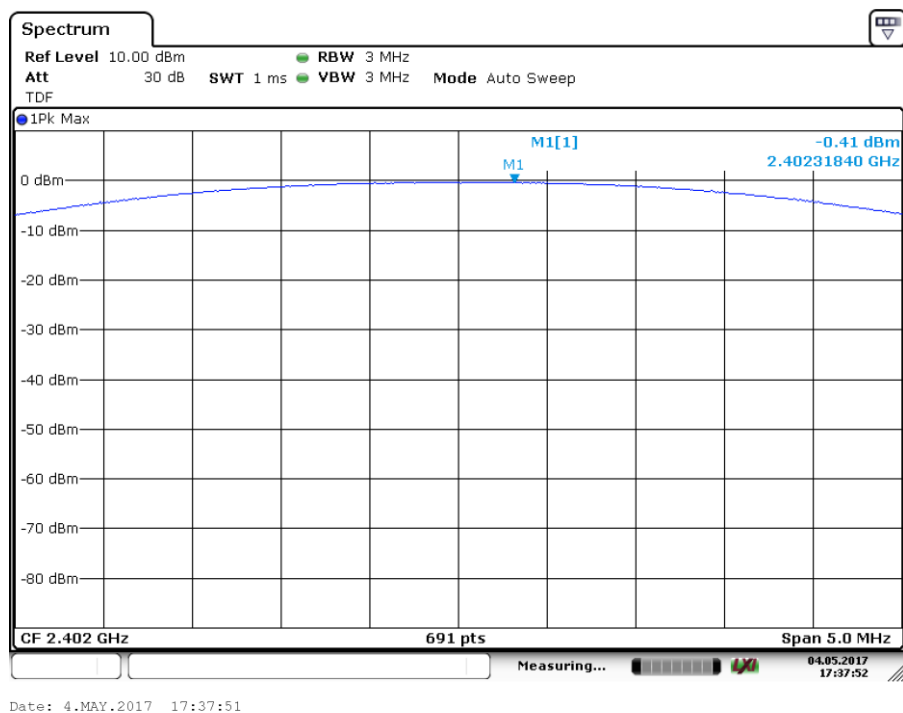
| Frequency range<br>(MHz)   | Average-peak<br>Limit (dBμV) | Result (dBμV) | Conclusion |
|--|------------------------------|---------------|------------|
|  |                              | Idle          |            |
| 0.15 to 0.5  | 56 to 46                     | Fig.37        | P          |
| 0.5 to 5   | 46                           |               |            |
| 5 to 30  | 50                           |               |            |
| NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz. |                              |               |            |

**Note:** The measurement results include the L1 and N measurements.

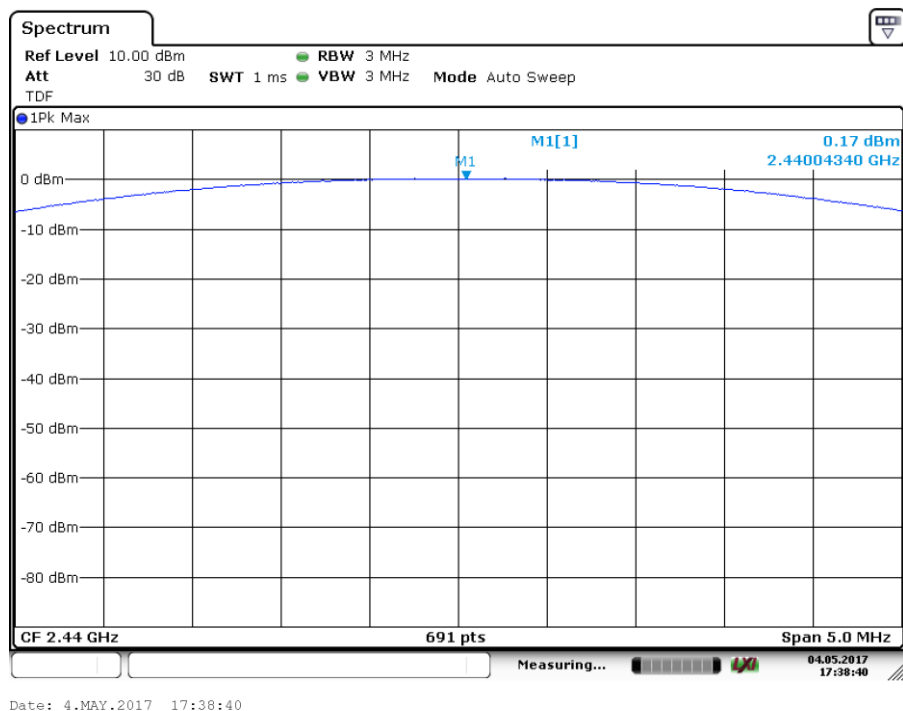
**See ANNEX B for test graphs.**

**Conclusion: Pass**

## ANNEX B: TEST FIGURE LIST

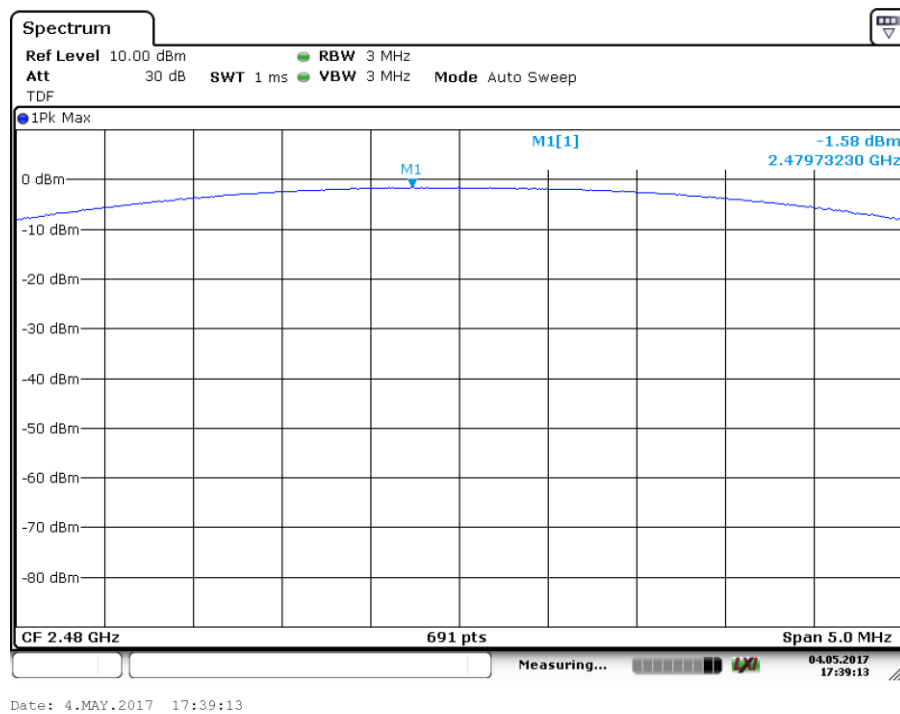


**Fig.1 Maximum Peak Output Power(GFSK, Ch 0)**

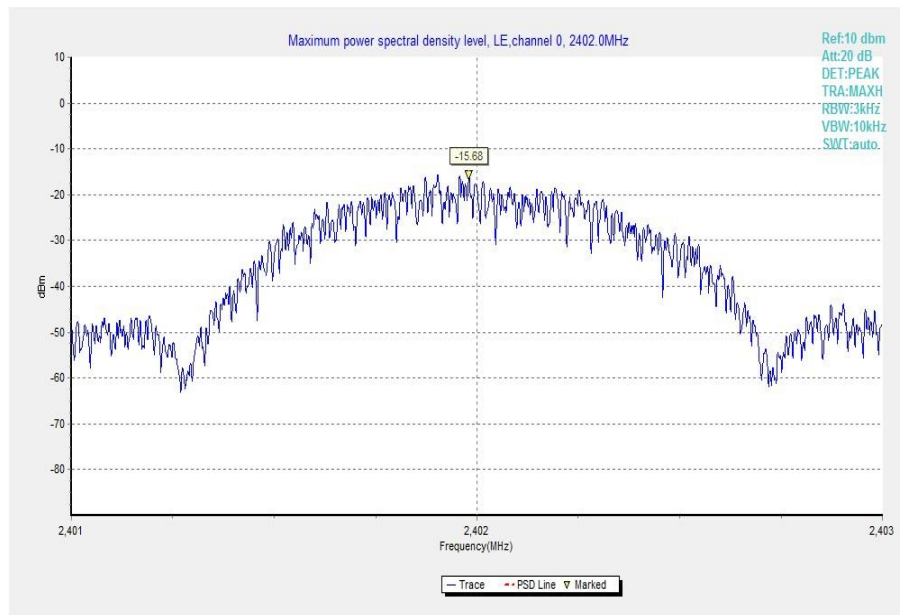


**Fig.2 Maximum Peak Output Power(GFSK, Ch 19)**

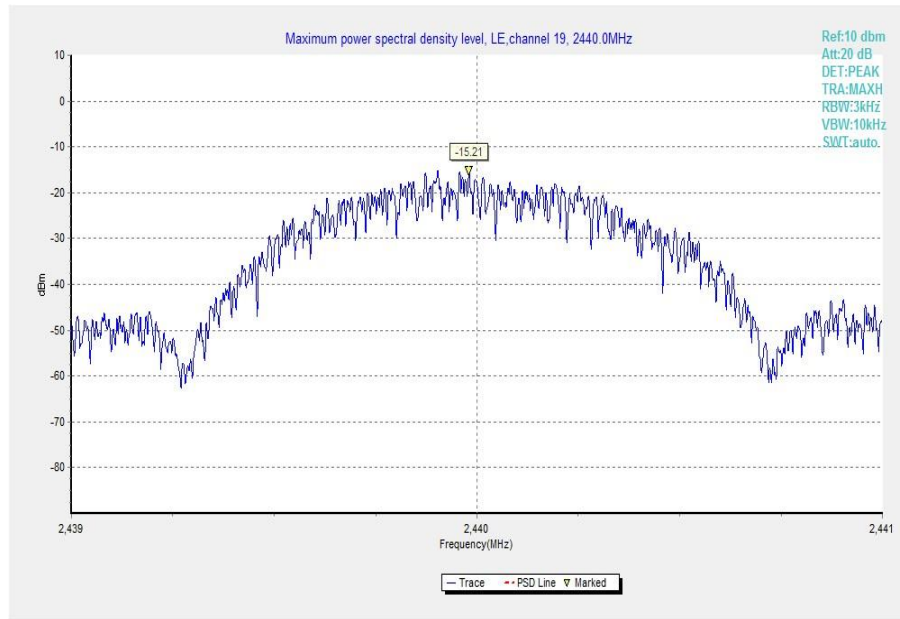




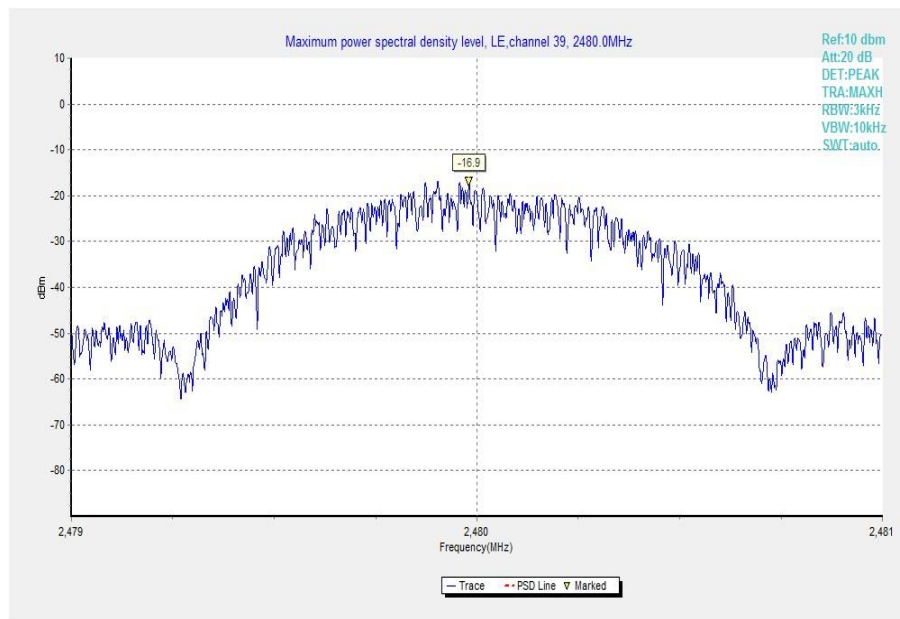
**Fig.3 Maximum Peak Output Power(GFSK, Ch 39)**



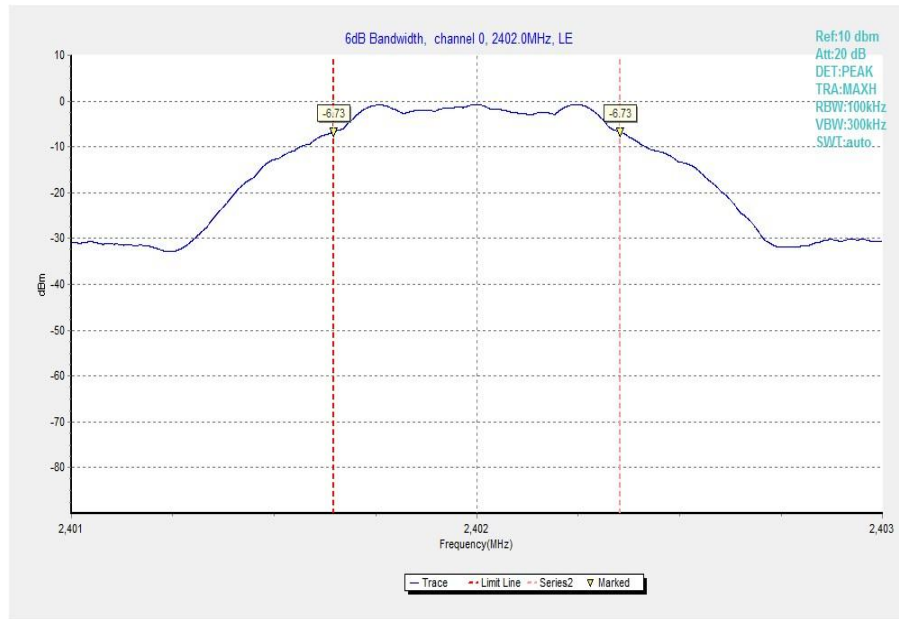
**Fig.4 Power Spectral Density (Ch 0)**



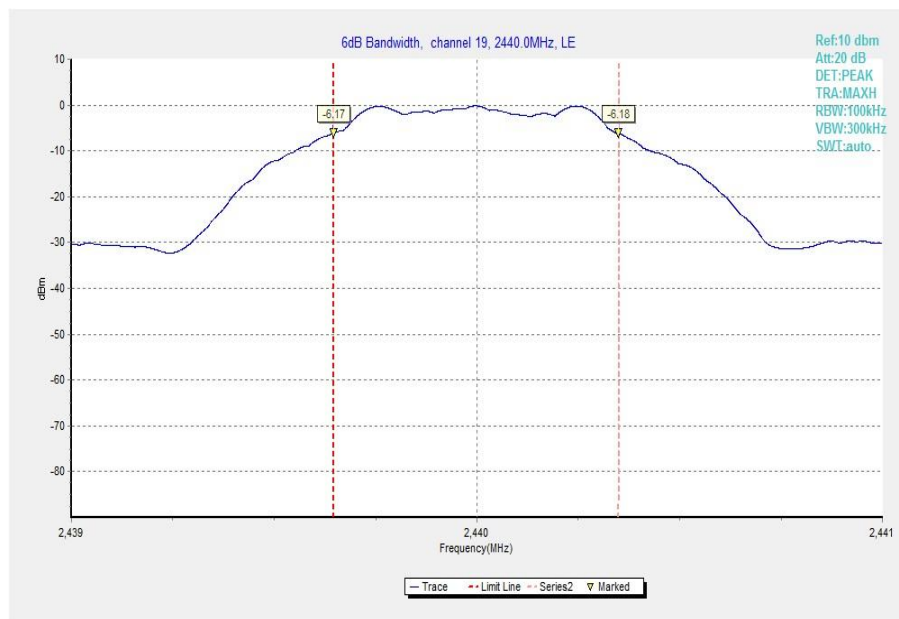
**Fig.5 Power Spectral Density (Ch 19)**



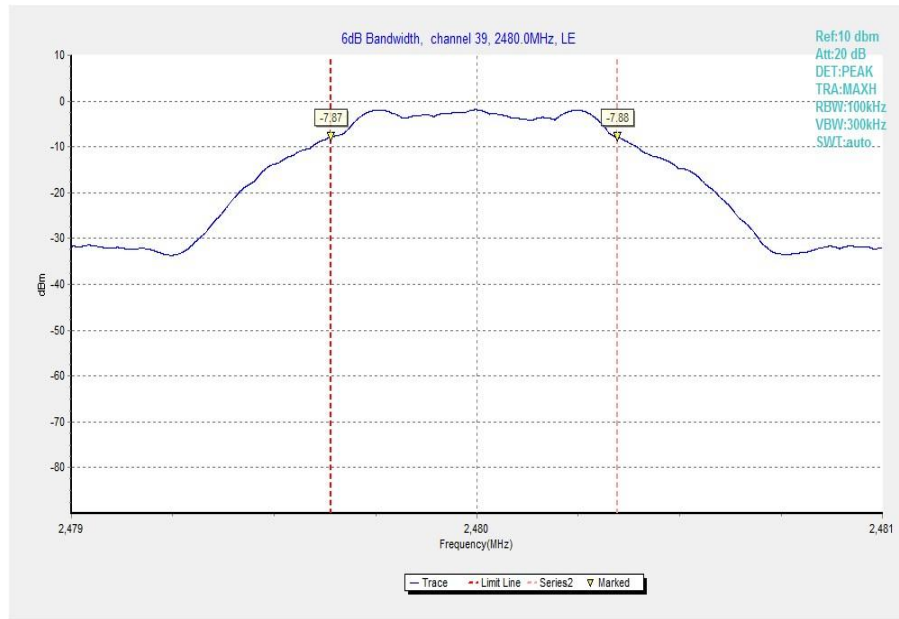
**Fig.6 Power Spectral Density (Ch 39)**



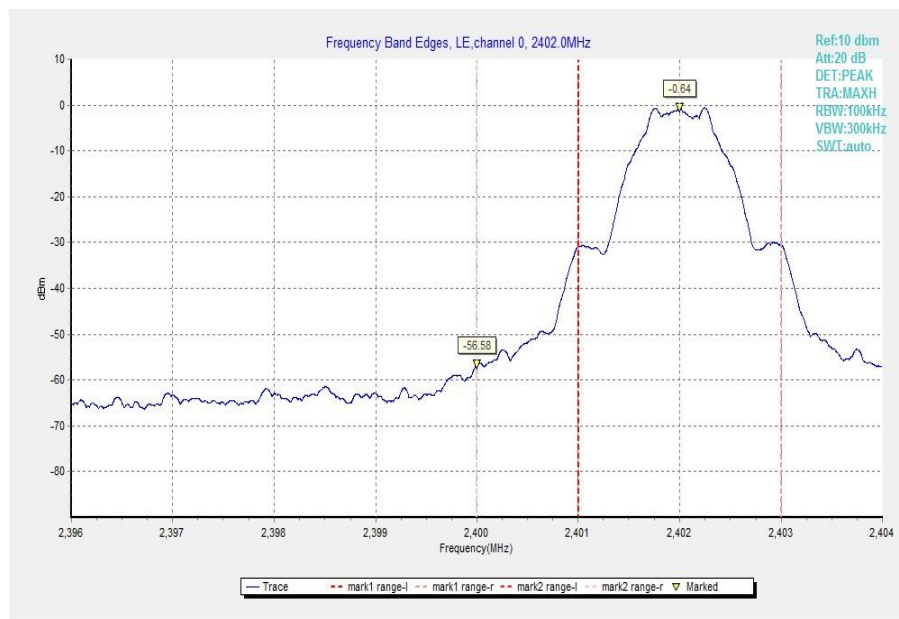
**Fig.7 Occupied 6dB Bandwidth (Ch 0)**



**Fig.8 Occupied 6dB Bandwidth (Ch 19)**



**Fig.9 Occupied 6dB Bandwidth (Ch 39)**



**Fig.10 Band Edges (Ch 0)**

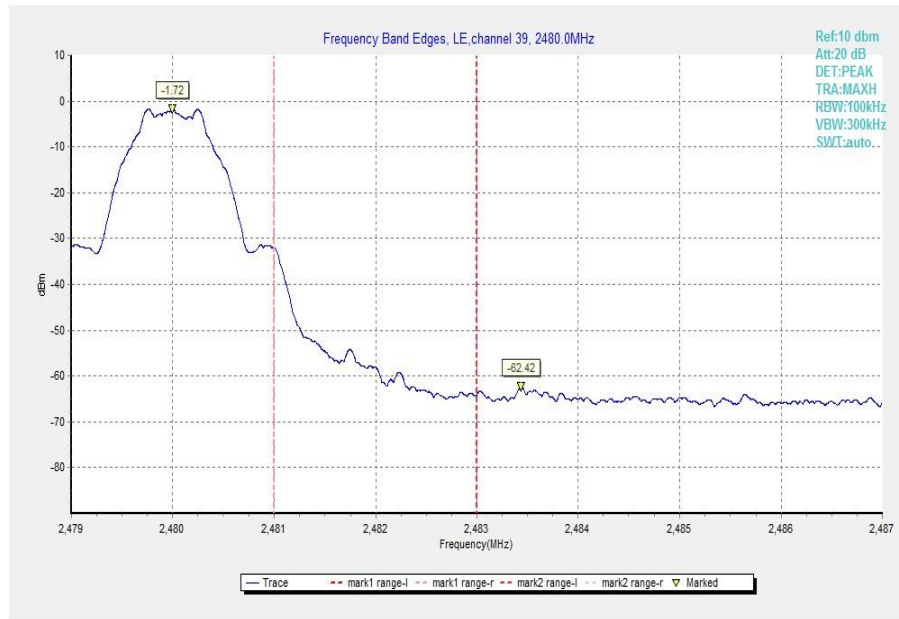


Fig.11 Band Edges (Ch 39)

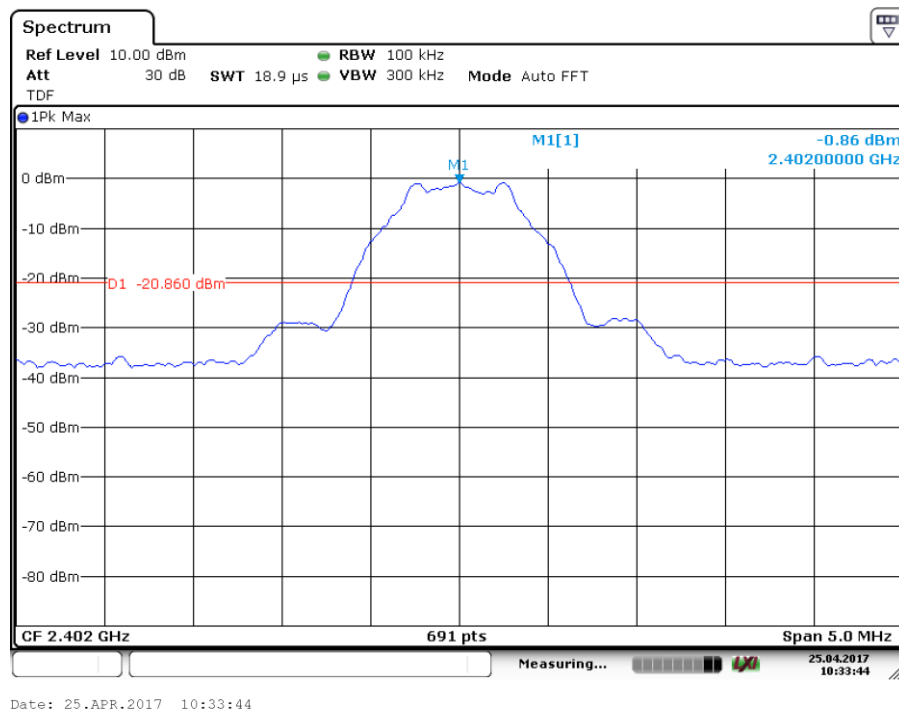
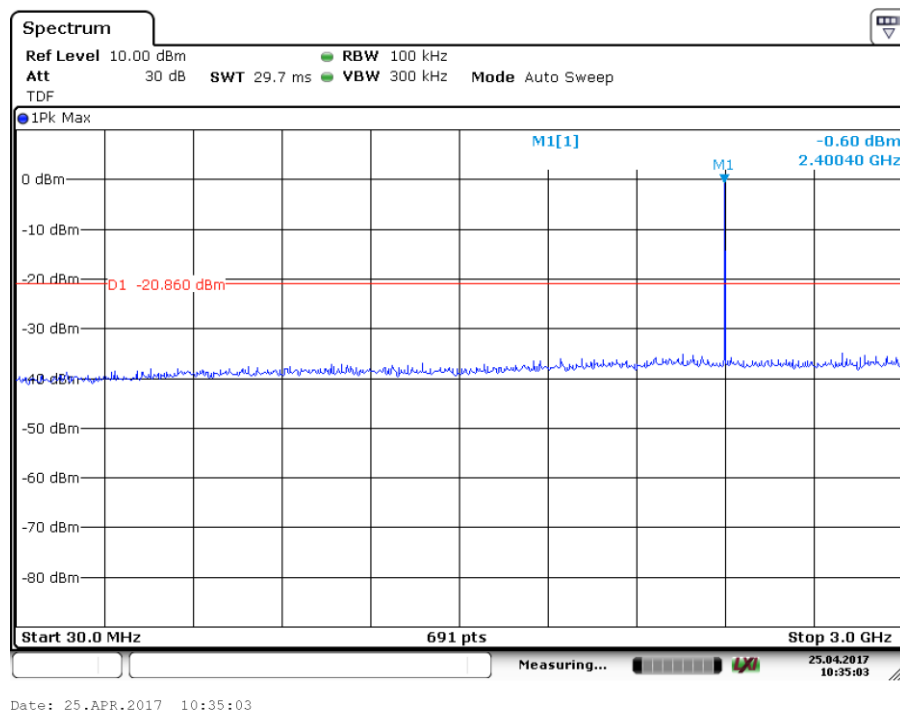
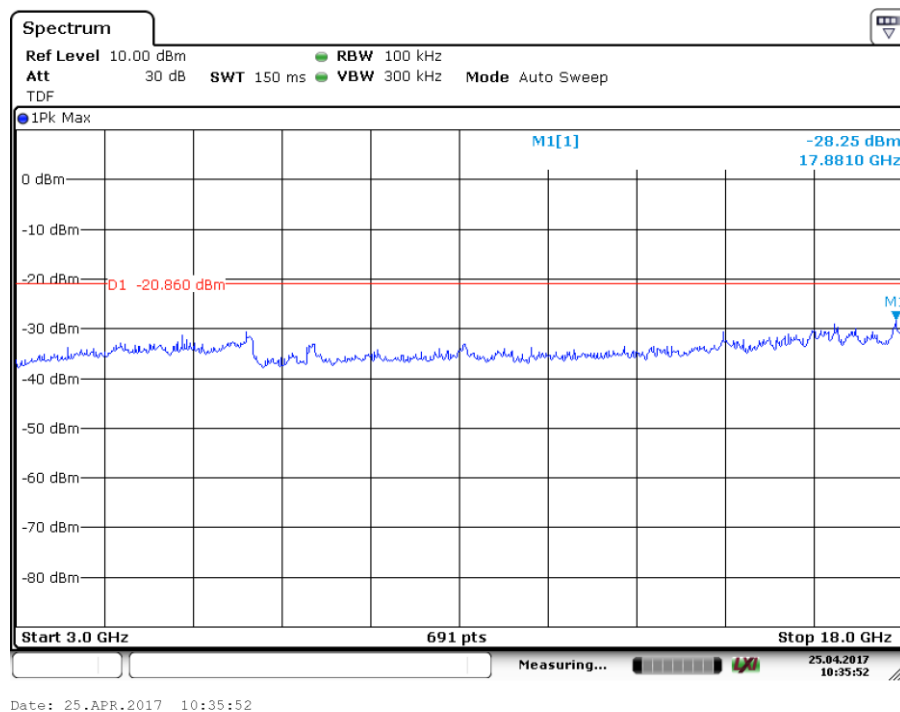


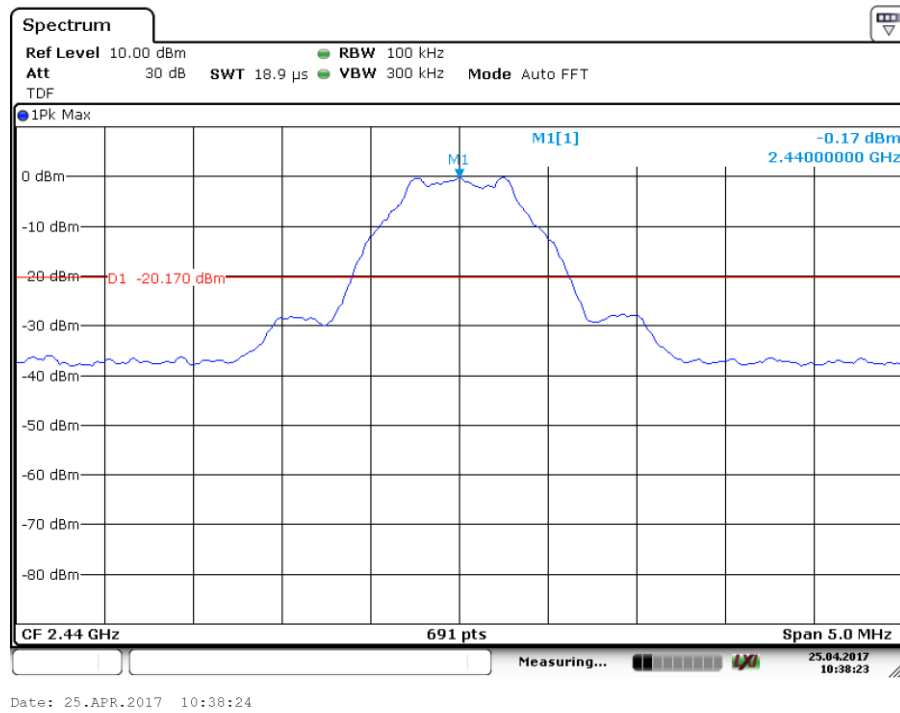
Fig.12 Conducted Spurious Emission (Ch0, Center Frequency)



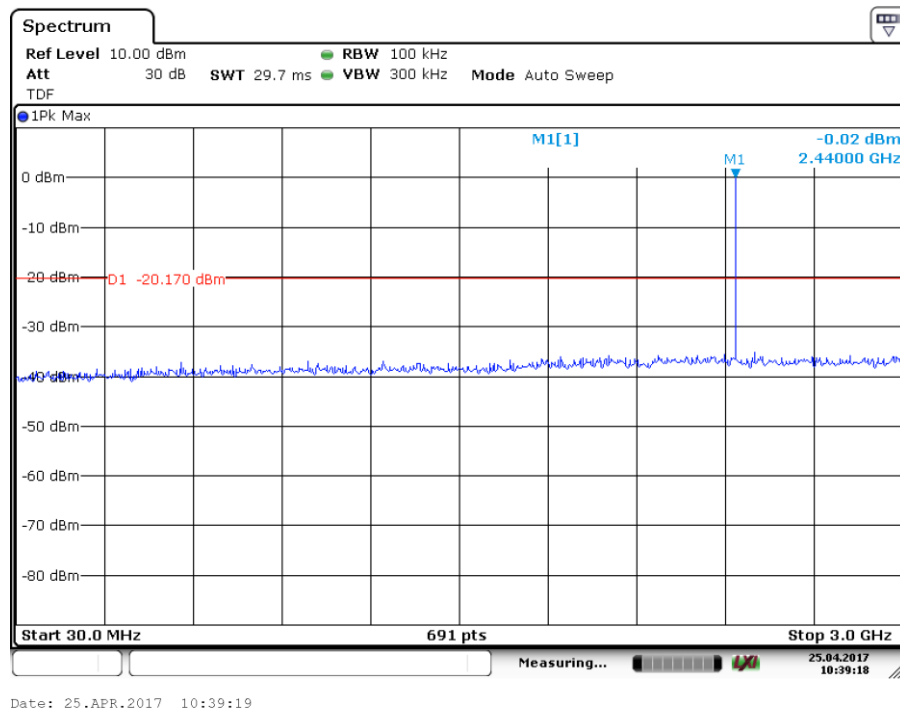
**Fig.13 Conducted Spurious Emission (Ch0, 30 MHz-3 GHz)**



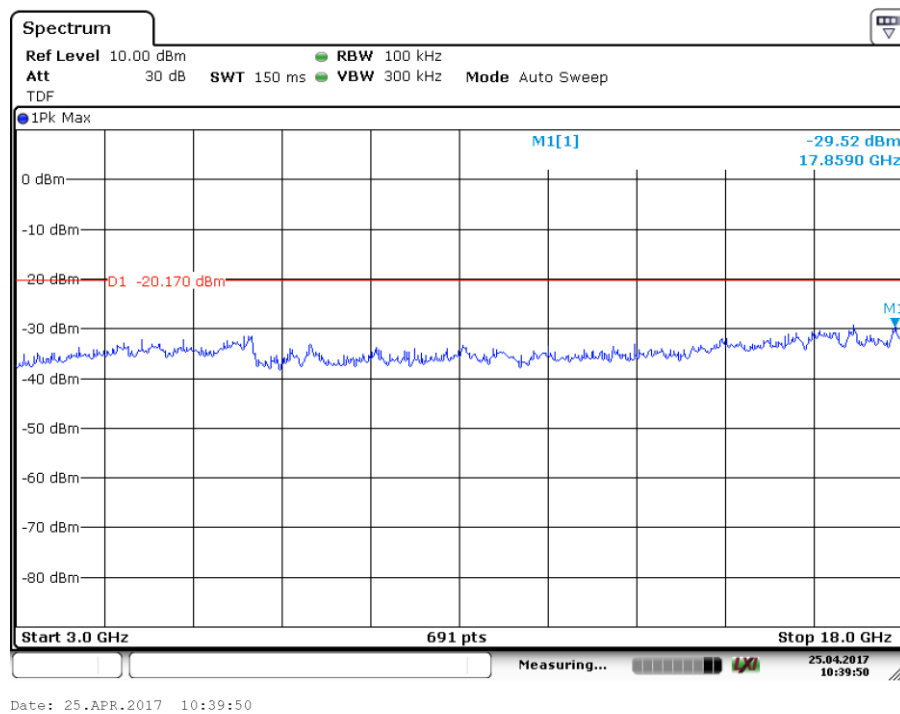
**Fig.14 Conducted Spurious Emission (Ch0, 3 GHz-18 GHz)**



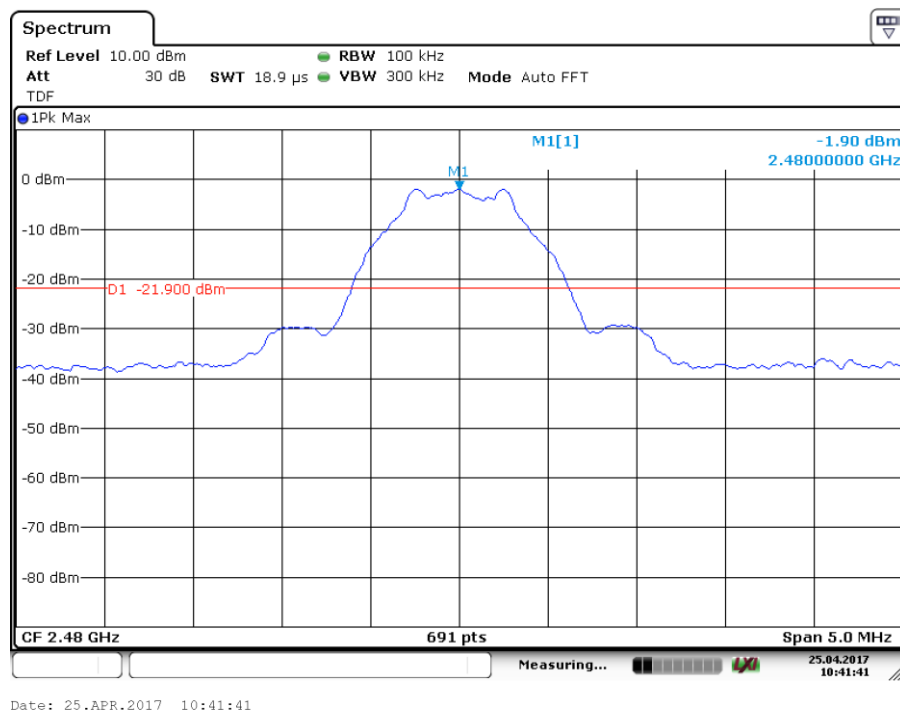
**Fig.15 Conducted Spurious Emission (Ch19, Center Frequency)**



**Fig.16 Conducted Spurious Emission (Ch19, 30 MHz-3 GHz)**

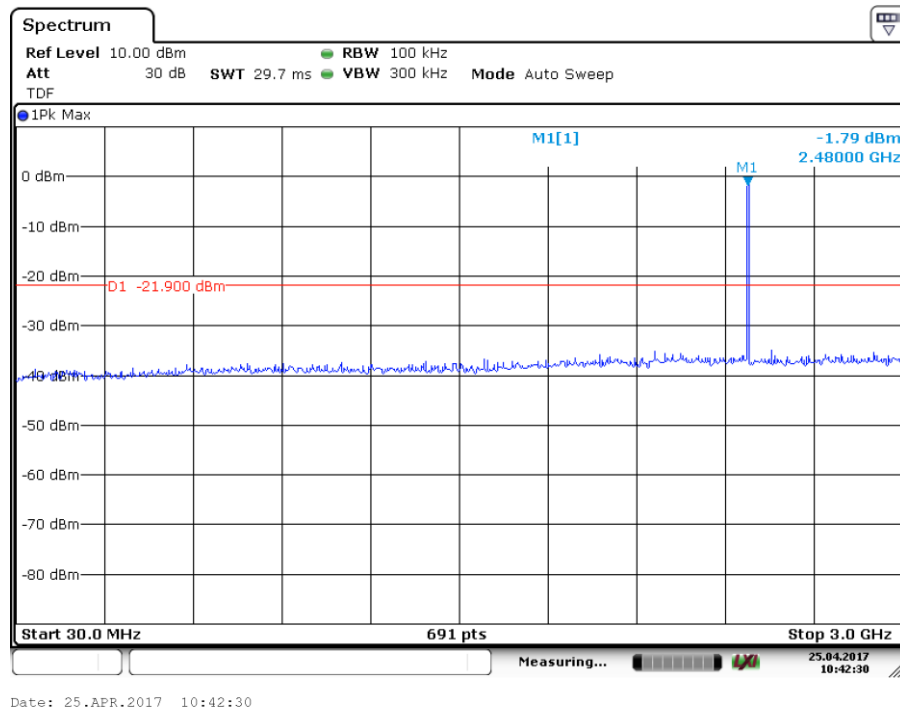


**Fig.17 Conducted Spurious Emission (Ch19, 3 GHz-18 GHz)**

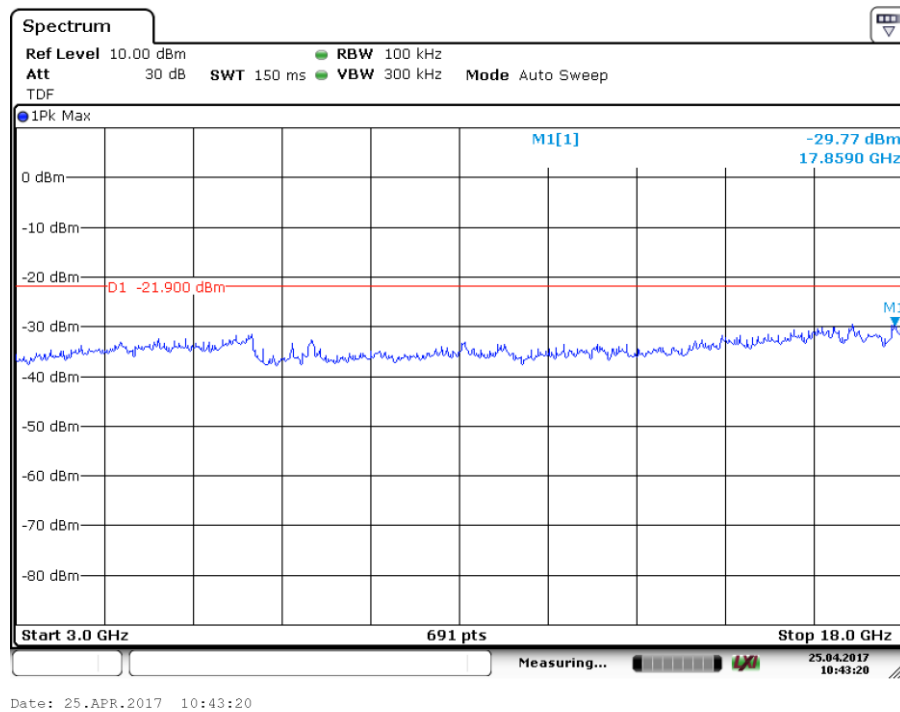


**Fig.18 Conducted Spurious Emission (Ch39, Center Frequency)**

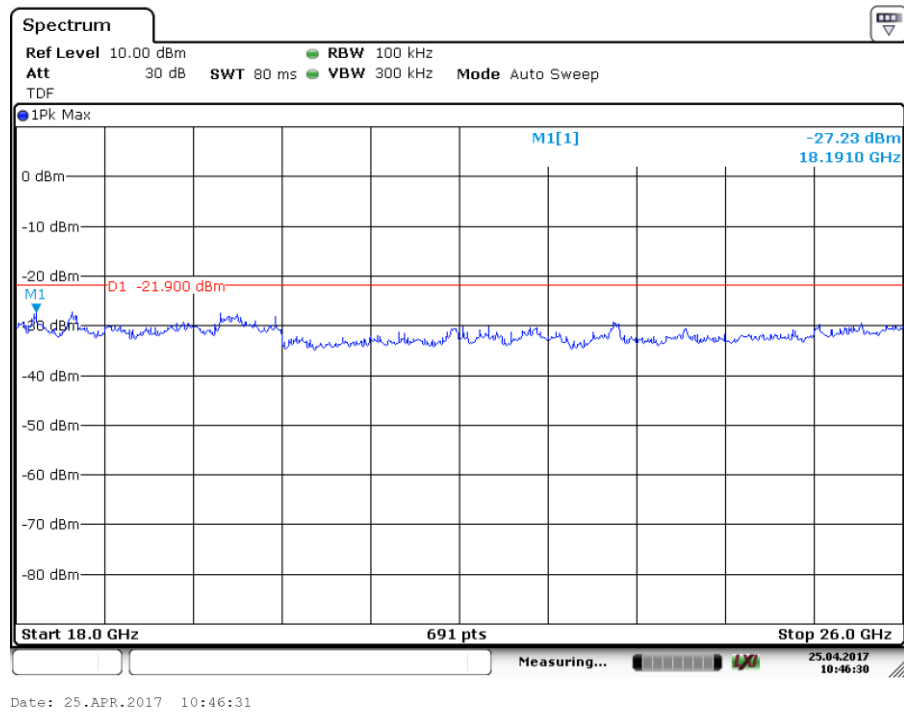




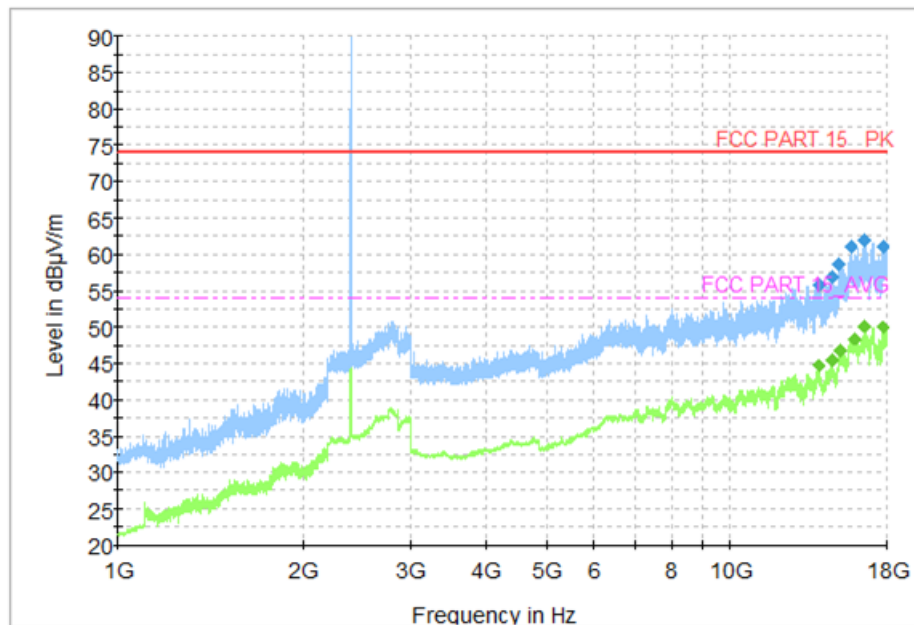
**Fig.19 Conducted Spurious Emission (Ch39, 30 MHz-3 GHz)**



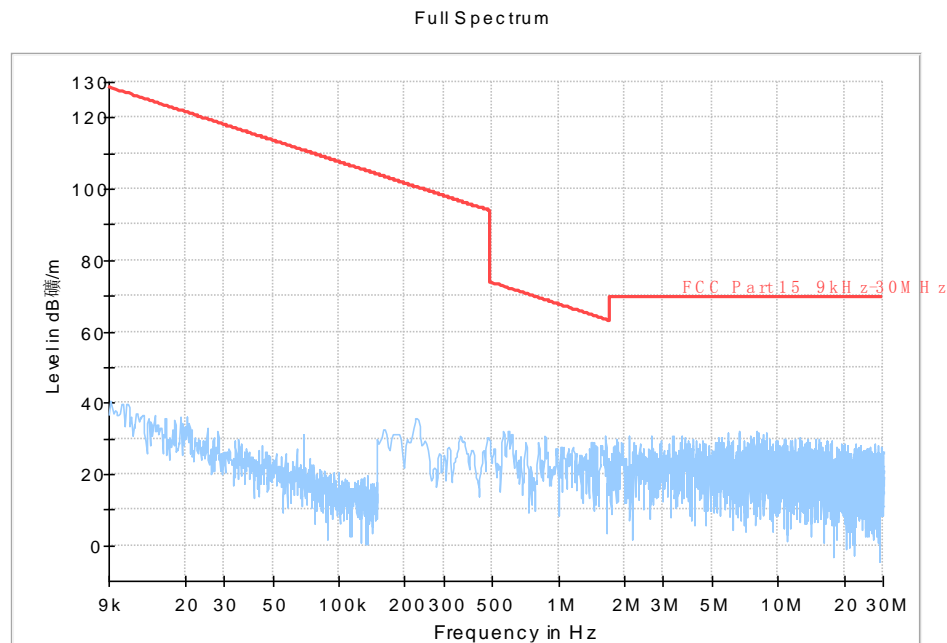
**Fig.20 Conducted Spurious Emission (Ch39, 3 GHz-18 GHz)**



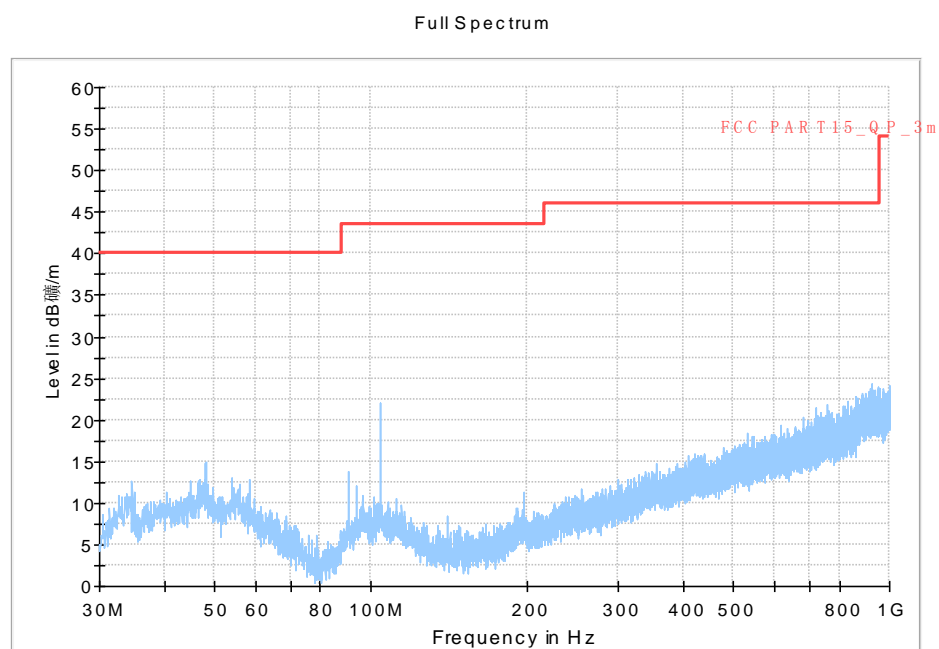
**Fig.21 Conducted Spurious Emission (All channels, 18 GHz-26 GHz)**



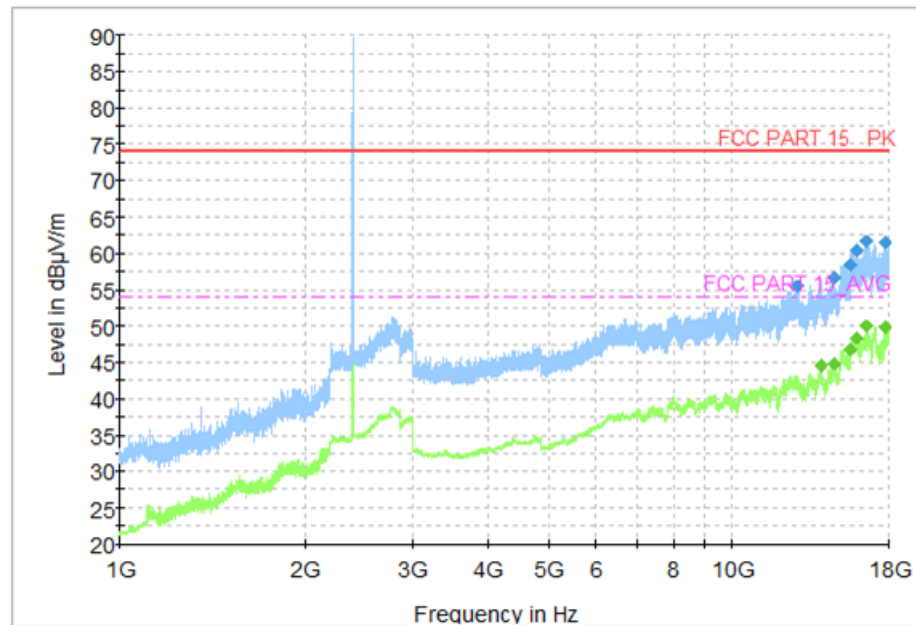
**Fig.22 Radiated Spurious Emission (GFSK, Ch0, 1 GHz ~18 GHz)**



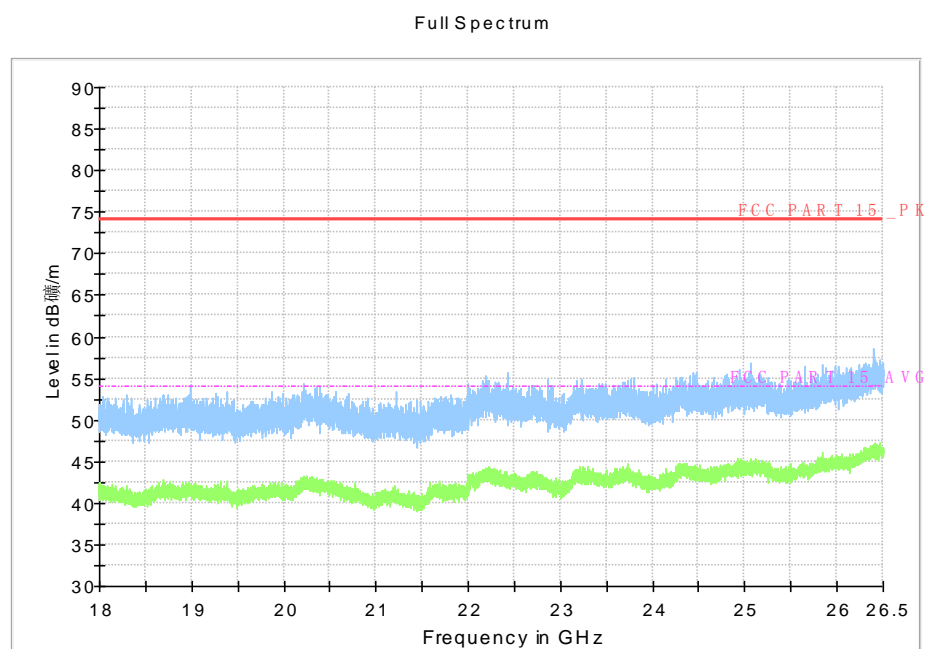
**Fig.23 Radiated Spurious Emission (Ch19, 9 kHz-30 MHz)**



**Fig.24 Radiated Spurious Emission (Ch19, 30 MHz-1 GHz)**



**Fig.25 Radiated Spurious Emission (Ch19, 1 GHz- 18 GHz)**



**Fig.26 Radiated Spurious Emission (Ch19, 18 GHz-26.5 GHz)**

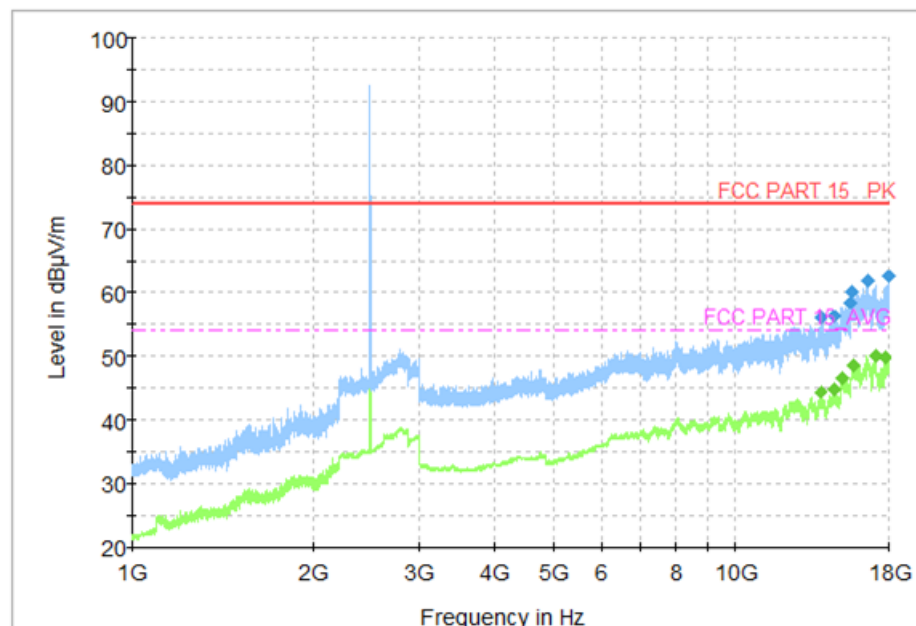


Fig.27 Radiated Spurious Emission (Ch39, 1 GHz-18 GHz)

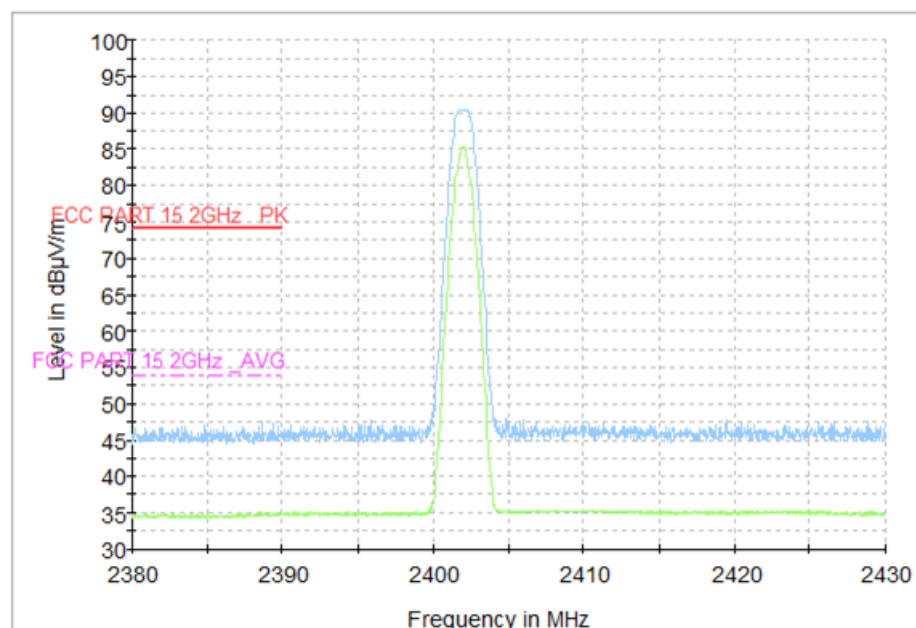


Fig.28 Radiated Emission Power (GFSK, Ch0, 2380GHz~2450GHz)

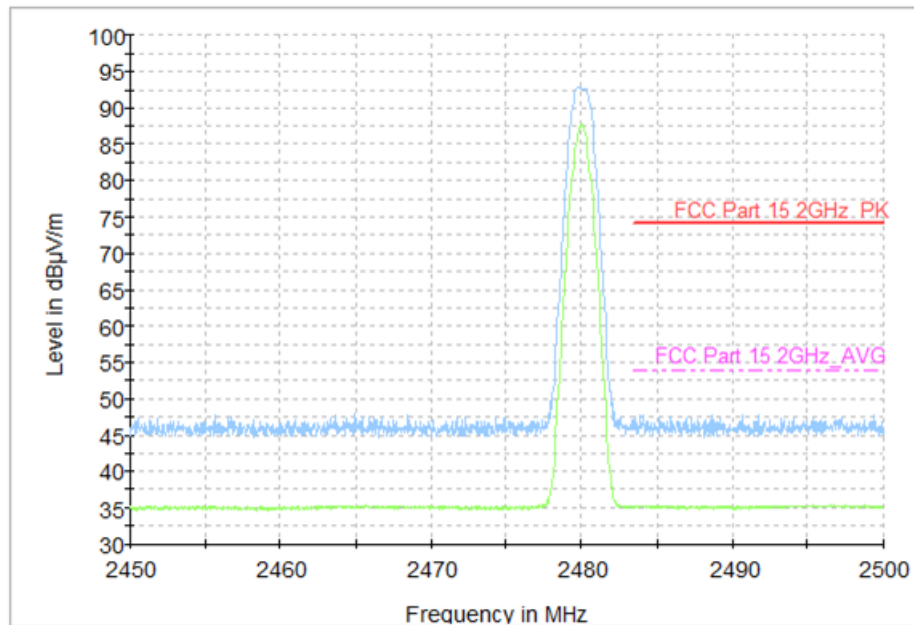


Fig.29 Radiated Emission Power (GFSK, Ch39, 2450GHz~2500GHz)

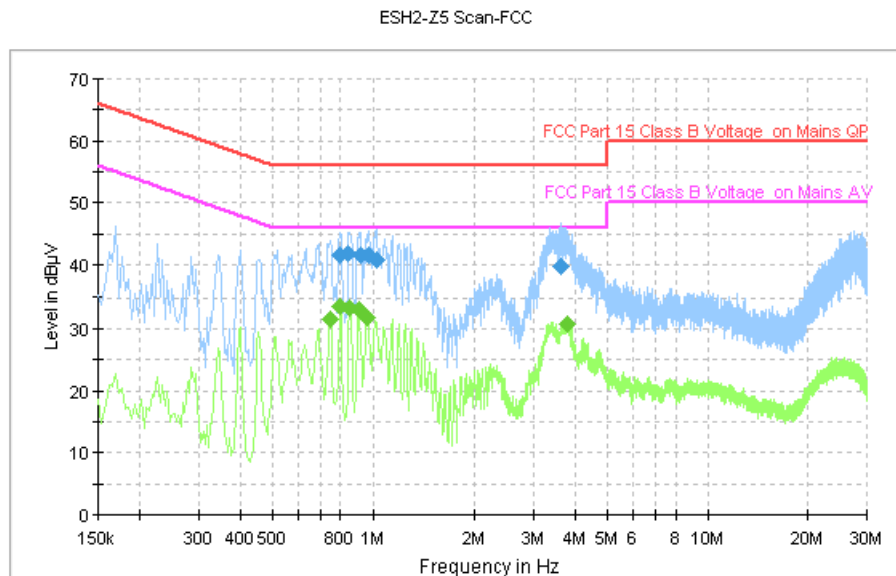


Fig.30 AC Powerline Conducted Emission (Traffic, AE1, 120V)

MEASUREMENT RESULT: " QuasiPeak "

| Frequency (MHz) | QuasiPeak (dBμV) | PE  | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|------------------|-----|------|------------|-------------|--------------|
| 0.794000        | 41.7             | GND | N    | 9.6        | 14.3        | 56.0         |
| 0.846000        | 41.8             | GND | N    | 9.5        | 14.2        | 56.0         |
| 0.918000        | 41.6             | GND | N    | 9.6        | 14.4        | 56.0         |
| 0.974000        | 41.6             | GND | N    | 9.6        | 14.4        | 56.0         |
| 1.026000        | 40.8             | GND | N    | 9.5        | 15.2        | 56.0         |
| 3.610000        | 39.7             | GND | N    | 9.6        | 16.3        | 56.0         |

MEASUREMENT RESULT: " Average "

| Frequency (MHz) | Average (dBμV) | PE  | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|----------------|-----|------|------------|-------------|--------------|
| 0.742000        | 31.5           | GND | N    | 9.5        | 14.5        | 46.0         |
| 0.798000        | 33.5           | GND | N    | 9.6        | 12.5        | 46.0         |
| 0.854000        | 33.3           | GND | N    | 9.5        | 12.7        | 46.0         |
| 0.906000        | 33.0           | GND | N    | 9.6        | 13.0        | 46.0         |
| 0.962000        | 31.7           | GND | N    | 9.6        | 14.3        | 46.0         |
| 3.790000        | 30.7           | GND | N    | 9.6        | 15.3        | 46.0         |

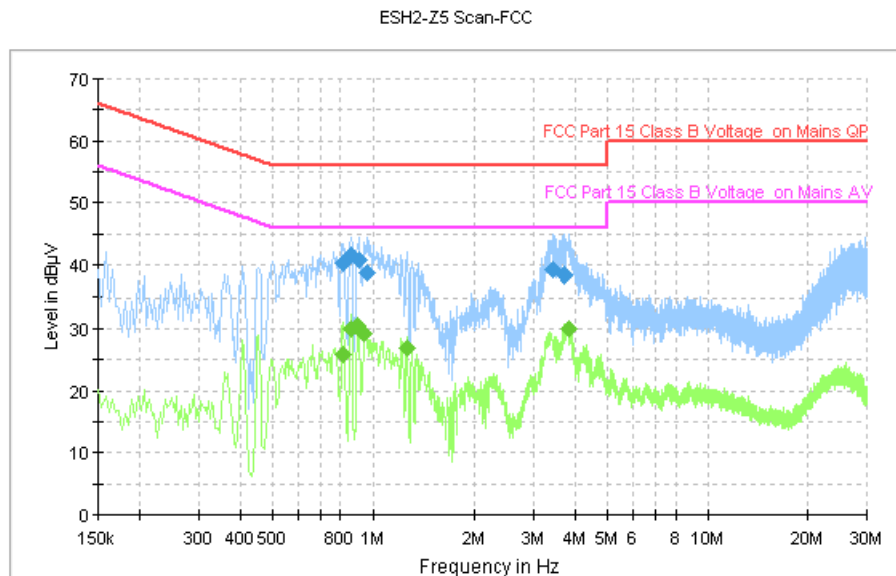


Fig.31 AC Power line Conducted Emission (Idle, AE1, 120V)

MEASUREMENT RESULT: " QuasiPeak "

| Frequency (MHz) | QuasiPeak (dBμV) | PE  | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|------------------|-----|------|------------|-------------|--------------|
| 0.814000        | 40.3             | GND | N    | 9.6        | 15.7        | 56.0         |
| 0.862000        | 41.6             | GND | N    | 9.6        | 14.4        | 56.0         |
| 0.910000        | 40.9             | GND | N    | 9.6        | 15.1        | 56.0         |
| 0.958000        | 38.6             | GND | N    | 9.6        | 17.4        | 56.0         |
| 3.414000        | 39.3             | GND | N    | 9.6        | 16.7        | 56.0         |
| 3.718000        | 38.4             | GND | N    | 9.6        | 17.6        | 56.0         |

MEASUREMENT RESULT: " Average "

| Frequency (MHz) | Average (dBμV) | PE  | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|----------------|-----|------|------------|-------------|--------------|
| 0.814000        | 25.9           | GND | N    | 9.6        | 20.1        | 46.0         |
| 0.858000        | 30.1           | GND | N    | 9.5        | 15.9        | 46.0         |
| 0.902000        | 30.5           | GND | N    | 9.6        | 15.5        | 46.0         |
| 0.942000        | 29.3           | GND | N    | 9.6        | 16.7        | 46.0         |
| 1.270000        | 27.0           | GND | N    | 9.6        | 19.0        | 46.0         |
| 3.822000        | 29.9           | GND | N    | 9.6        | 16.1        | 46.0         |



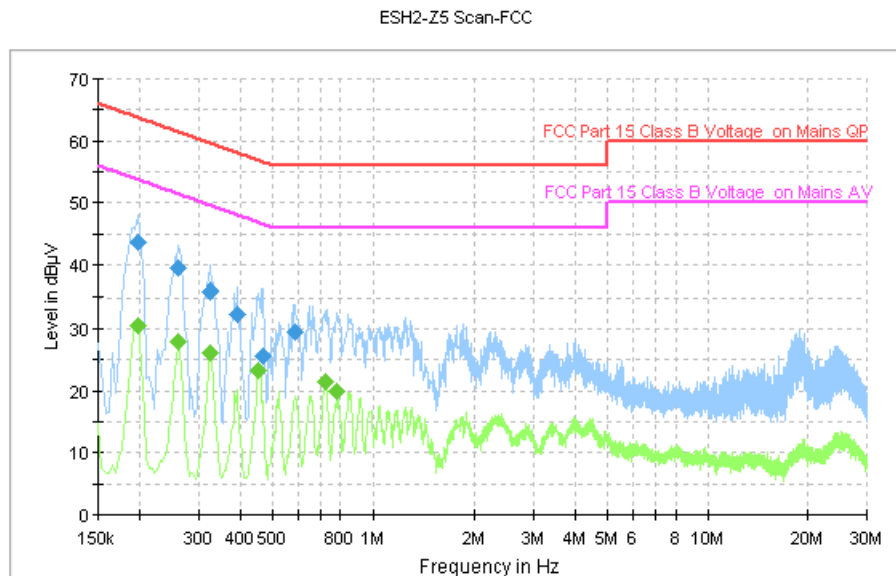


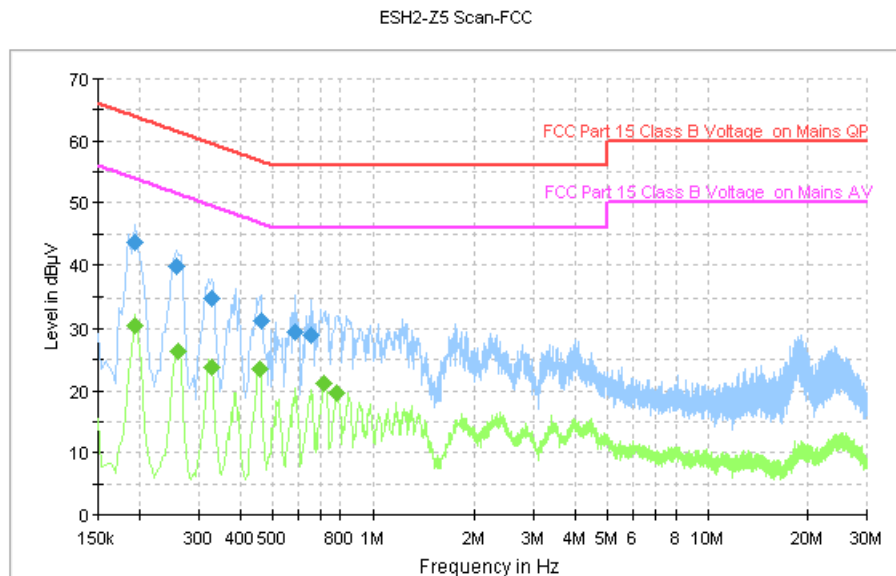
Fig.32 AC Powerline Conducted Emission (Traffic, AE2, 120V)

MEASUREMENT RESULT: " QuasiPeak "

| Frequency (MHz) | QuasiPeak (dBµV) | PE  | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|-----------------|------------------|-----|------|------------|-------------|--------------|
| 0.198000        | 43.6             | GND | N    | 9.6        | 20.1        | 63.7         |
| 0.262000        | 39.6             | GND | N    | 9.6        | 21.8        | 61.4         |
| 0.326000        | 35.8             | GND | N    | 9.6        | 23.7        | 59.6         |
| 0.394000        | 32.2             | GND | N    | 9.6        | 25.8        | 58.0         |
| 0.470000        | 25.6             | GND | N    | 9.7        | 30.9        | 56.5         |
| 0.582000        | 29.5             | GND | N    | 9.6        | 26.5        | 56.0         |

MEASUREMENT RESULT: " Average "

| Frequency (MHz) | Average (dBµV) | PE  | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|-----------------|----------------|-----|------|------------|-------------|--------------|
| 0.198000        | 30.6           | GND | N    | 9.6        | 23.1        | 53.7         |
| 0.262000        | 27.8           | GND | N    | 9.6        | 23.6        | 51.4         |
| 0.326000        | 26.0           | GND | N    | 9.6        | 23.5        | 49.6         |
| 0.454000        | 23.4           | GND | N    | 9.7        | 23.4        | 46.8         |
| 0.722000        | 21.5           | GND | N    | 9.5        | 24.5        | 46.0         |
| 0.782000        | 19.9           | GND | N    | 9.6        | 26.1        | 46.0         |



**Fig.33 AC Power line Conducted Emission (Idle, AE2, 120V)**

**MEASUREMENT RESULT: " QuasiPeak "**

| Frequency (MHz) | QuasiPeak (dBµV) | PE  | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|-----------------|------------------|-----|------|------------|-------------|--------------|
| 0.194000        | 43.6             | GND | N    | 9.6        | 20.3        | 63.9         |
| 0.258000        | 39.8             | GND | N    | 9.6        | 21.7        | 61.5         |
| 0.330000        | 34.9             | GND | N    | 9.6        | 24.6        | 59.5         |
| 0.462000        | 31.2             | GND | N    | 9.7        | 25.5        | 56.7         |
| 0.582000        | 29.3             | GND | N    | 9.6        | 26.7        | 56.0         |
| 0.650000        | 29.0             | GND | N    | 9.6        | 27.0        | 56.0         |

**MEASUREMENT RESULT: " Average "**

| Frequency (MHz) | Average (dBµV) | PE  | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|-----------------|----------------|-----|------|------------|-------------|--------------|
| 0.194000        | 30.4           | GND | N    | 9.6        | 23.4        | 53.9         |
| 0.262000        | 26.4           | GND | N    | 9.6        | 25.0        | 51.4         |
| 0.330000        | 23.7           | GND | N    | 9.6        | 25.7        | 49.5         |
| 0.458000        | 23.5           | GND | N    | 9.7        | 23.2        | 46.7         |
| 0.714000        | 21.2           | GND | N    | 9.5        | 24.8        | 46.0         |
| 0.782000        | 19.5           | GND | N    | 9.6        | 26.5        | 46.0         |

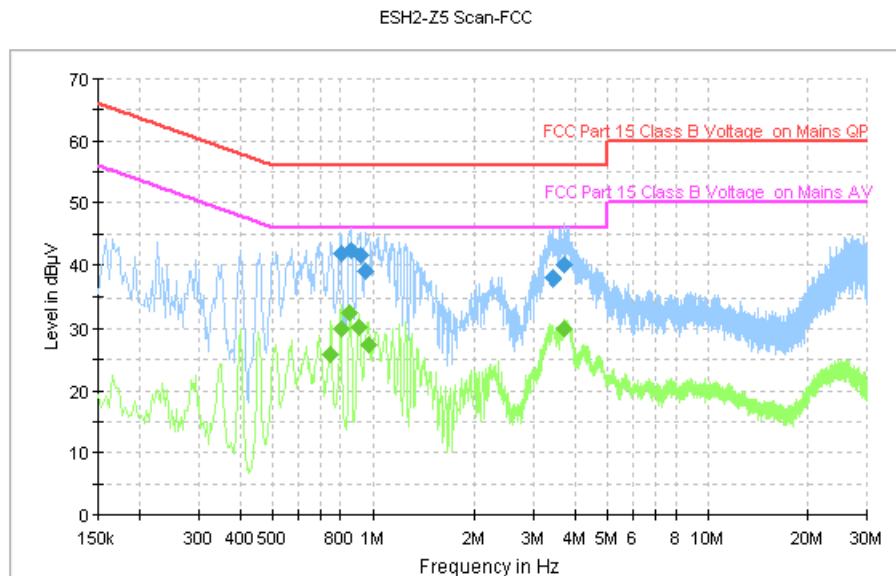


Fig.34 AC Powerline Conducted Emission (Traffic, AE1, 240V)

MEASUREMENT RESULT: " QuasiPeak "

| Frequency (MHz) | QuasiPeak (dBµV) | PE  | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|-----------------|------------------|-----|------|------------|-------------|--------------|
| 0.802000        | 41.7             | GND | N    | 9.6        | 14.3        | 56.0         |
| 0.858000        | 42.4             | GND | N    | 9.5        | 13.6        | 56.0         |
| 0.918000        | 41.6             | GND | N    | 9.6        | 14.4        | 56.0         |
| 0.954000        | 39.0             | GND | N    | 9.6        | 17.0        | 56.0         |
| 3.430000        | 38.0             | GND | N    | 9.6        | 18.0        | 56.0         |
| 3.722000        | 40.0             | GND | N    | 9.6        | 16.0        | 56.0         |

MEASUREMENT RESULT: " Average "

| Frequency (MHz) | Average (dBµV) | PE  | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|-----------------|----------------|-----|------|------------|-------------|--------------|
| 0.746000        | 25.9           | GND | N    | 9.6        | 20.1        | 46.0         |
| 0.802000        | 30.0           | GND | N    | 9.6        | 16.0        | 46.0         |
| 0.854000        | 32.5           | GND | N    | 9.5        | 13.5        | 46.0         |
| 0.914000        | 30.1           | GND | N    | 9.6        | 15.9        | 46.0         |
| 0.970000        | 27.4           | GND | N    | 9.6        | 18.6        | 46.0         |
| 3.718000        | 29.8           | GND | N    | 9.6        | 16.2        | 46.0         |

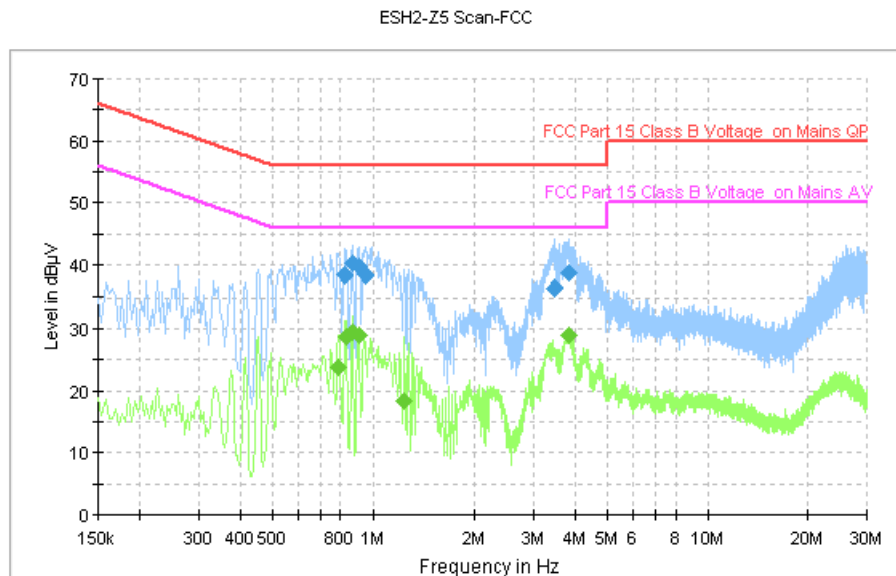


Fig.35 AC Power line Conducted Emission (Idle, AE1, 240V)

MEASUREMENT RESULT: " QuasiPeak "

| Frequency (MHz) | QuasiPeak (dBμV) | PE  | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|------------------|-----|------|------------|-------------|--------------|
| 0.826000        | 38.5             | GND | N    | 9.5        | 17.5        | 56.0         |
| 0.870000        | 40.2             | GND | N    | 9.6        | 15.8        | 56.0         |
| 0.910000        | 39.9             | GND | N    | 9.6        | 16.1        | 56.0         |
| 0.954000        | 38.5             | GND | N    | 9.6        | 17.5        | 56.0         |
| 3.482000        | 36.4             | GND | N    | 9.6        | 19.6        | 56.0         |
| 3.834000        | 38.7             | GND | N    | 9.6        | 17.3        | 56.0         |

MEASUREMENT RESULT: " Average "

| Frequency (MHz) | Average (dBμV) | PE  | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|----------------|-----|------|------------|-------------|--------------|
| 0.790000        | 23.8           | GND | N    | 9.6        | 22.2        | 46.0         |
| 0.830000        | 28.8           | GND | N    | 9.5        | 17.2        | 46.0         |
| 0.866000        | 29.5           | GND | N    | 9.6        | 16.5        | 46.0         |
| 0.906000        | 28.9           | GND | N    | 9.6        | 17.1        | 46.0         |
| 1.242000        | 18.4           | GND | N    | 9.6        | 27.6        | 46.0         |
| 3.838000        | 29.0           | GND | N    | 9.6        | 17.0        | 46.0         |

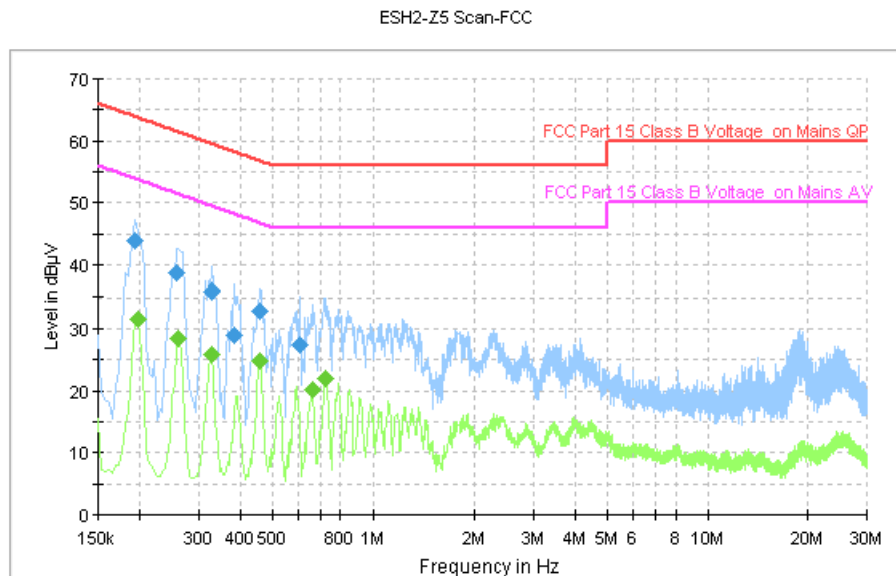


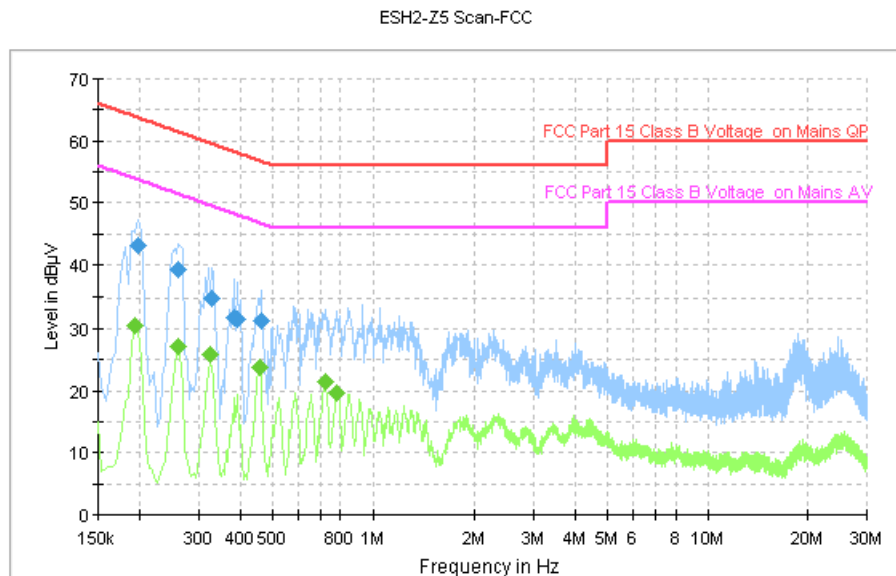
Fig.36 AC Powerline Conducted Emission (Traffic, AE2, 240V)

MEASUREMENT RESULT: " QuasiPeak "

| Frequency (MHz) | QuasiPeak (dBμV) | PE  | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|------------------|-----|------|------------|-------------|--------------|
| 0.194000        | 43.9             | GND | N    | 9.6        | 20.0        | 63.9         |
| 0.258000        | 38.8             | GND | N    | 9.6        | 22.7        | 61.5         |
| 0.330000        | 35.9             | GND | N    | 9.6        | 23.5        | 59.5         |
| 0.382000        | 29.0             | GND | N    | 9.6        | 29.2        | 58.2         |
| 0.458000        | 32.7             | GND | N    | 9.7        | 24.0        | 56.7         |
| 0.602000        | 27.4             | GND | N    | 9.6        | 28.6        | 56.0         |

MEASUREMENT RESULT: " Average "

| Frequency (MHz) | Average (dBμV) | PE  | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|----------------|-----|------|------------|-------------|--------------|
| 0.198000        | 31.5           | GND | N    | 9.6        | 22.2        | 53.7         |
| 0.262000        | 28.5           | GND | N    | 9.6        | 22.9        | 51.4         |
| 0.330000        | 25.7           | GND | N    | 9.6        | 23.7        | 49.5         |
| 0.458000        | 24.8           | GND | N    | 9.7        | 22.0        | 46.7         |
| 0.658000        | 20.3           | GND | N    | 9.6        | 25.7        | 46.0         |
| 0.718000        | 22.0           | GND | N    | 9.5        | 24.0        | 46.0         |



**Fig.37 AC Power line Conducted Emission (Idle, AE2, 240V)**

**MEASUREMENT RESULT: " QuasiPeak "**

| Frequency (MHz) | QuasiPeak (dBμV) | PE  | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|------------------|-----|------|------------|-------------|--------------|
| 0.198000        | 43.2             | GND | N    | 9.6        | 20.5        | 63.7         |
| 0.262000        | 39.3             | GND | N    | 9.6        | 22.1        | 61.4         |
| 0.330000        | 34.8             | GND | N    | 9.6        | 24.7        | 59.5         |
| 0.386000        | 31.8             | GND | N    | 9.6        | 26.3        | 58.1         |
| 0.394000        | 31.5             | GND | N    | 9.6        | 26.5        | 58.0         |
| 0.462000        | 31.3             | GND | N    | 9.7        | 25.3        | 56.7         |

**MEASUREMENT RESULT: " Average "**

| Frequency (MHz) | Average (dBμV) | PE  | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|----------------|-----|------|------------|-------------|--------------|
| 0.194000        | 30.6           | GND | N    | 9.6        | 23.3        | 53.9         |
| 0.262000        | 27.1           | GND | N    | 9.6        | 24.2        | 51.4         |
| 0.326000        | 25.8           | GND | N    | 9.6        | 23.8        | 49.6         |
| 0.458000        | 23.7           | GND | N    | 9.7        | 23.0        | 46.7         |
| 0.718000        | 21.5           | GND | N    | 9.5        | 24.5        | 46.0         |
| 0.782000        | 19.7           | GND | N    | 9.6        | 26.3        | 46.0         |

**ANNEX C: Persons involved in this testing**

| Test Name                                 | Tester                     |
|---|----------------------------|
| Maximum Peak Output Power                 | Lin Kanfeng, Tang Weisheng |
| Peak Power Spectral Density               | Lin Kanfeng, Tang Weisheng |
| Occupied 6dB Bandwidth                    | Lin Kanfeng, Tang Weisheng |
| Band Edges Compliance                     | Lin Kanfeng, Tang Weisheng |
| Transmitter Spurious Emission - Conducted | Lin Kanfeng, Tang Weisheng |
| Transmitter Spurious Emission - Radiated  | Lin Kanfeng, Tang Weisheng |
| AC Powerline Conducted Emission           | Lin Kanfeng, Tang Weisheng |

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