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TEST REPORT

For

Fujian LANDI Commercial Equipment Co., Ltd.

Building 17, Section A, Software Park, No. 89 Software Road, Gulou District, Fuzhou Municipality, Fujian Province, P.R. China.

FCC ID: 2AG6NAC01116
IC: 23725-AC01116

| | |
|--|---|
| Report Type: Original Report | Product Type: RF Module |
| Report Number: | RXM171225063-00B |
| Report Date: | 2018-04-26 |
| Reviewed By: | Jerry Zhang EMC Manager |
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Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan).

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

| | |
|-----------------------------|---|
| EUT Name: | AC01116 |
| EUT Type: | RF Module |
| EUT Model: | AC01116 |
| FCC ID: | 2AG6NAC01116 |
| IC: | 23725-AC01116 |
| Rated Input Voltage: | DC 3.9V |
| External Dimension: | Length (41mm)*Width (41mm)*High (2.8mm) |
| Serial Number: | 171225063 |
| EUT Received Date: | 2017.12.25 |

Objective

This report is prepared on behalf of **Fujian Landi Commercial Equipment Co., Ltd.** in accordance with Part 2, Subpart J, Part 15, Subparts A and C of the Federal Communications Commission's rules and RSS-247, Issue 2, February 2017 of the Innovation, Science and Economic Development Canada, RSS-Gen Issue 4, November 2014 of the Innovation, Science and Economic Development Canada.

The tests were performed in order to determine the Bluetooth BDR and EDR mode of EUT compliance with FCC Rules Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules and RSS-247, Issue 2, February 2017, RSS-Gen Issue 4, November 2014 of the Innovation, Science and Economic Development Canada.

Related Submittal(s)/Grant(s)

FCC Part 15C DTS submissions with FCC ID: 2AG6NAC01116.

FCC Part 22H,24E,27,90 PCB submissions with FCC ID: 2AG6NAC01116.

RSS-247 DTSS, RSS-132, RSS-133, RSS-139, RSS-199, RSS-130 submissions with IC: 23725-AC01116

Test Methodology

All measurements detailed in this Test Report were performed in accordance with ANSI C63.10-2013 "American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices", And RSS-247, Issue 2, February 2017 of the Innovation, Science and Economic Development Canada, RSS-Gen Issue 4, November 2014 of the Innovation, Science and Economic Development Canada.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan).

Measurement Uncertainty

| Parameter | Measurement Uncertainty |
|-----------------------------------|--|
| Occupied Channel Bandwidth | ±5 % |
| RF output power, conducted | ±0.61dB |
| Power Spectral Density, conducted | ±0.61 dB |
| Unwanted Emissions, radiated | 30M~200MHz: 4.58 dB for Horizontal, 4.59 dB for Vertical 200M~1GHz: 4.83 dB for Horizontal, 5.85 dB for Vertical 1G~6GHz: 4.45 dB, 6G~26.5GHz: 5.23 dB |
| Unwanted Emissions, conducted | ±1.5 dB |
| Temperature | ±1 °C |
| Humidity | ±5% |
| DC and low frequency voltages | ±0.4% |
| Duty Cycle | 1% |
| AC Power Lines Conducted Emission | 3.12 dB (150 kHz to 30 MHz) |

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218, the FCC Designation No. : CN1220.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062D.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in engineering mode.

Antenna Information:

| Manufacturer | Description | Model | Antenna Gain/Frequency Range |
|--------------|----------------|------------|------------------------------|
| Huayuan ANT | Dipole antenna | HYT-2400-2 | 2.0 dBi/2400-2500MHz |

EUT Exercise Software

The test software 'QRCT ' configured the maximum power level as below setting:

| Test Software Version | QRCT | | |
|-----------------------|---------|---------|---------|
| Test Frequency | 2402MHz | 2441MHz | 2480MHz |
| GFSK | 9 | 9 | 9 |
| $\pi/4$ -DQPSK | 9 | 9 | 9 |
| 8DPSK | 9 | 9 | 9 |

Equipment Modifications

No modification was made to the EUT.

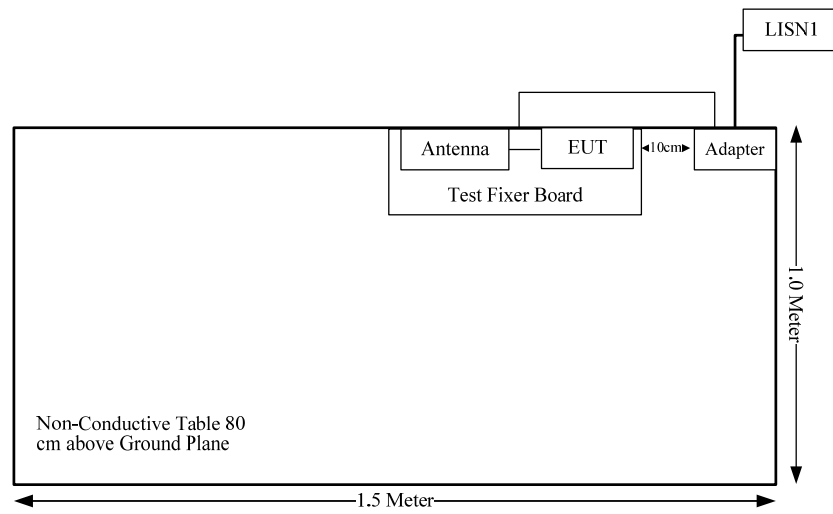
Support Equipment List and Details

| Manufacturer | Description | Model | Serial Number |
|---|------------------|---------------|------------------|
| Huntkey | Adapter | HKC0115021-2D | H11S90181A000061 |
| Fujian Landi Commercial Equipment Co., Ltd. | Test Fixer Board | N/A | N/A |

Support Cable List and Details

| Cable Description | Shielding Type | Ferrite Core | Length (m) | From Port | To |
|-------------------|----------------|--------------|------------|-----------|------------------|
| USB Cable | No | No | 1.5 | adapter | Test Fixer Board |

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

| FCC Rules | Description of Test | Result |
|---|----------------------------------|------------|
| §15.247(i), §1.1310, §2.1091 RSS-102§4 | Maximum Permissible Exposure | Compliance |
| §15.203 RSS-GEN Clause 8.3 | Antenna Requirement | Compliance |
| §15.207 (a) RSS-Gen Clause 8.8 | Conducted Emissions | Compliance |
| §15.205, §15.209, §15.247(d) RSS-247 Clause 5.5, RSS-Gen Clause 8.10 | Spurious Emissions | Compliance |
| §15.247 (a)(1) RSS-247 Clause 5.1 b) RSS-Gen Clause 6.6 | 20 dB Bandwidth | Compliance |
| §15.247(a)(1) RSS-247 Clause 5.1 b) | Channel Separation Test | Compliance |
| §15.247(a)(1)(iii) RSS-247 Clause 5.1 d) | Time of Occupancy (Dwell Time) | Compliance |
| §15.247(a)(1)(iii) RSS-247 Clause 5.1 d) | Quantity of hopping channel Test | Compliance |
| §15.247(b)(1) RSS-247 Clause 5.4 b) | Peak Output Power Measurement | Compliance |
| §15.247(d) RSS-247 Clause 5.5 | Band Edges | Compliance |

FCC §1.1310, §2.1091& RSS-102 § 4 - MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

| (B) Limits for General Population/Uncontrolled Exposure | | | | |
|---|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| Frequency Range (MHz) | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) | Power Density (mW/cm ²) | Averaging Time (minutes) |
| 0.3–1.34 | 614 | 1.63 | *(100) | 30 |
| 1.34–30 | 824/f | 2.19/f | *(180/f ²) | 30 |
| 30–300 | 27.5 | 0.073 | 0.2 | 30 |
| 300–1500 | / | / | f/1500 | 30 |
| 1500–100,000 | / | / | 1.0 | 30 |

f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

According to RSS-102 § 4 Table 4, RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

| Frequency Range (MHz) | Electric Field (V/m rms) | Magnetic Field (A/m rms) | Power Density (W/m ²) | Reference Period (minutes) |
|--|---------------------------|--|-----------------------------------|----------------------------|
| 0.003-10 ⁻²¹ | 83 | 90 | - | Instantaneous* |
| 0.1-10 | - | 0.73/ f | - | 6** |
| 1.1-10 | 87/ f ^{0.5} | - | - | 6** |
| 10-20 | 27.46 | 0.0728 | 2 | 6 |
| 20-48 | 58.07/ f ^{0.25} | 0.1540/ f ^{0.25} | 8.944/ f ^{0.5} | 6 |
| 48-300 | 22.06 | 0.05852 | 1.291 | 6 |
| 300-6000 | 3.142 f ^{0.3417} | 0.008335 f ^{0.3417} | 0.02619 f ^{0.6834} | 6 |
| 6000-15000 | 61.4 | 0.163 | 10 | 6 |
| 15000-150000 | 61.4 | 0.163 | 10 | 616000/ f ^{1.2} |
| 150000-300000 | 0.158 f ^{0.5} | 4.21 x 10 ⁻⁴ f ^{0.5} | 6.67 x 10 ⁻⁵ f | 616000/ f ^{1.2} |
| Note: f is frequency in MHz. *Based on nerve stimulation (NS). ** Based on specific absorption rate (SAR). | | | | |

Calculation Formula:

Prediction of power density at the distance of the applicable MPE limit:

$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm²);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

$$\Rightarrow G = S4\pi R^2/P$$

For simultaneously system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

Calculated Data:**For WLAN part:**

| Mode | Frequency Band | Antenna Gain | | Max. Target Power including Tolerance | | Evaluation Distance (cm) | FCC Power Density (mW/cm ²) | ISED Power Density (W/m ²) | FCC MPE Limit (mW/cm ²) | ISED MPE Limit (W/m ²) |
|---------|----------------|--------------|-----------|---------------------------------------|--------|--------------------------|---|--|-------------------------------------|------------------------------------|
| | | (dBi) | (numeric) | (dBm) | (mW) | | | | | |
| BDR/EDR | 2402-2480 | 2 | 1.58 | 13.5 | 22.39 | 20.00 | 0.007 | 0.07 | 1.0 | 5.35 |
| BLE | 2402-2480 | 2 | 1.58 | 2 | 1.58 | 20.00 | 0.0005 | 0.005 | 1.0 | 5.35 |
| WIFI | 2412-2462 | 2 | 1.58 | 24 | 251.19 | 20.00 | 0.07924 | 0.7924 | 1.0 | 5.37 |

Note: Bluetooth and WIFI can't transmit simultaneously.

Bluetooth or WIFI can transmit simultaneously with WWAN. The maximum MPE to limit ratio for WLAN is WIFI: $0.7924/5.37=0.148$ (ISED limit was the used for calculation)

Calculated Maximum antenna gain allowed base on ERP/EIRP:

| Mode | Frequency Range (MHz) | Conducted Power including Tolerance (dBm) | ERP/EIRP Limit (dBm) | Maximum Antenna Gain Allowed (dBi) |
|--------------|-----------------------|---|----------------------|------------------------------------|
| GSM850 | 824-849 | 32 | 38.45 | 6.45 |
| GSM1900 | 1850-1910 | 30 | 33 | 3 |
| WCDMA Band 2 | 1850-1910 | 24 | 33 | 9 |
| WCDMA Band 4 | 1710-1755 | 24 | 30 | 6 |
| WCDMA Band 5 | 824-849 | 24 | 38.45 | 14.45 |
| LTE Band 2 | 1850-1910 | 24 | 33 | 9 |
| LTE Band 4 | 1710-1755 | 24 | 30 | 6 |
| LTE Band 5 | 824-849 | 24 | 38.45 | 14.45 |
| LTE band 7 | 2500-2570 | 24 | 33 | 9 |
| LTE band 12 | 699-716 | 24 | 34.77 | 10.77 |
| LTE band 13 | 777-787 | 24 | 34.77 | 10.77 |
| LTE band 17 | 704-716 | 24 | 34.77 | 10.77 |
| LTE band 25 | 1850-1915 | 24 | 33 | 9 |
| LTE band 26 | 814-849 | 24 | 38.45 | 14.45 |
| LTE band 41 | 2496-2690 | 24 | 33 | 9 |

Calculated Maximum antenna gain allowed base on MPE:

| Mode | Frequency Range (MHz) | Conducted Power including Tolerance (dBm) | power density Limits (W/m ²) | Maximum Power Density (S _{WWAN}) (W/m ²) | Evaluation Distance (cm) | Maximum Antenna Gain Allowed base on MPE | |
|--------------|-----------------------|---|--|--|--------------------------|--|-------|
| | | | | | | (numeric) | (dBi) |
| GSM850 | 824-849 | 29 | 2.58 | 2.198 | 20 | 1.39 | 1.43 |
| GSM1900 | 1850-1910 | 27 | 4.48 | 3.817 | 20 | 3.83 | 5.83 |
| WCDMA Band 2 | 1850-1910 | 24 | 4.48 | 3.817 | 20 | 7.63 | 8.83 |
| WCDMA Band 4 | 1710-1755 | 24 | 4.24 | 3.612 | 20 | 7.22 | 8.59 |
| WCDMA Band 5 | 824-849 | 24 | 2.58 | 2.198 | 20 | 4.40 | 6.43 |
| LTE Band 2 | 1850-1910 | 24 | 4.48 | 3.817 | 20 | 7.63 | 8.83 |
| LTE Band 4 | 1710-1755 | 24 | 4.24 | 3.612 | 20 | 7.22 | 8.59 |
| LTE Band 5 | 824-849 | 24 | 2.58 | 2.198 | 20 | 4.40 | 6.43 |
| LTE band 7 | 2500-2570 | 24 | 5.50 | 4.686 | 20 | 9.37 | 9.72 |
| LTE band 12 | 699-716 | 24 | 2.30 | 1.960 | 20 | 3.92 | 5.93 |
| LTE band 13 | 777-787 | 24 | 2.47 | 2.104 | 20 | 4.21 | 6.24 |
| LTE band 17 | 704-716 | 24 | 2.31 | 1.968 | 20 | 3.94 | 5.95 |
| LTE band 25 | 1850-1915 | 24 | 4.48 | 3.817 | 20 | 7.63 | 8.83 |
| LTE band 26 | 814-849 | 24 | 2.55 | 2.173 | 20 | 4.35 | 6.38 |
| LTE band 41 | 2496-2690 | 24 | 5.49 | 4.677 | 20 | 9.35 | 9.71 |

Note 1: for GSM850 and 1900, maximum time-average was reduced by 3dBc for worst 4 up time slots

Note 2: the strict limit is ISEDG, which was used for MPE evaluation.

Note 3:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

$$= S_{WLAN} / S_{limit-WLAN} + S_{WWAN} / S_{limit-WWAN}$$

$$\Rightarrow \text{Maximum } S_{WWAN} = (1 - S_{WLAN} / S_{limit-WLAN}) * S_{limit-WWAN} = (1 - 0.148) * S_{limit-WWAN} = 0.852 * S_{limit-WWAN}$$

Result: The device meets MPE requirement for Devices Used by the General Public at 20cm distance with the maximum antenna gain for each band as below table:

| Frequency Range (MHz) | Maximum Antenna Gain Allowed (dBi) |
|-----------------------|------------------------------------|
| 814-849 | 1.43 |
| 1850-1915 | 3.0 |
| 1710-1755 | 6.0 |
| 699-716 | 5.93 |
| 777-787 | 6.24 |
| 2496-2690 | 9.0 |

FCC §15.203& RSS-GEN CLAUSE 8.3 - ANTENNA REQUIREMENT

Applicable Standard

According to § 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 user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.
- c. Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

According to RSS-Gen §8.3, The applicant for equipment certification, as per RSP-100, must provide a list of all antenna types that may be used with the licence-exempt transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna.

Licence-exempt transmitters that have received equipment certification may operate with different types of antennas. However, it is not permissible to exceed the maximum equivalent isotropically radiated power (e.i.r.p.) limits specified in the applicable standard (RSS) for the licence-exempt apparatus.

Testing shall be performed using the highest gain antenna of each combination of licence-exempt transmitter and antenna type, with the transmitter output power set at the maximum level.⁹ When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer.

User manuals for transmitters equipped with detachable antennas shall also contain the following notice in a conspicuous location:

This radio transmitter (identify the device by certification number or model number if Category II) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types approved for use with the transmitter, indicating the maximum permissible antenna gain (in dBi).

Antenna Connector Construction

The EUT has a dipole antenna use a unique type of connector to attach to the EUT for Bluetooth, and the antenna gain is 2.0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

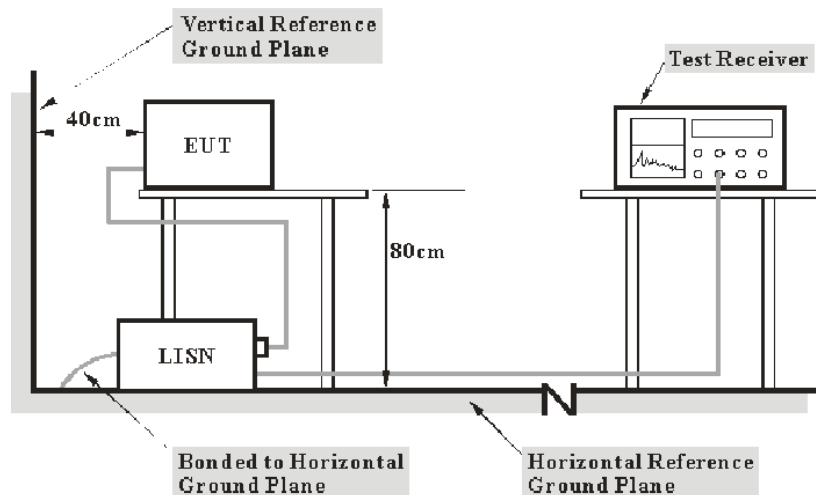
Result: Compliance.

FCC §15.207 (a) & RSS-GEN CLAUSE 8.8 – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207(a) and RSS-GEN CLAUSE 8.8.

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits and RSS-Gen limits.

The spacing between the peripherals was 10 cm.

The adapter was connected to the main LISN with a 120 V/60 Hz AC power source.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

| Frequency Range | IF B/W |
|------------------|--------|
| 150 kHz – 30 MHz | 9 kHz |

Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the first LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$$V_C = V_R + A_C + VDF$$

Herein,

V_C : corrected voltage amplitude

V_R : reading voltage amplitude

A_C : attenuation caused by cable loss

VDF: voltage division factor of AMN or ISN

The “**Margin**” column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|--------------|--------------------|-----------|---------------|------------------|----------------------|
| R&S | EMI Test Receiver | ESCS 30 | 830245/006 | 2017-12-11 | 2018-12-11 |
| R&S | Two-line V-network | ENV 216 | 101614 | 2017-12-08 | 2018-12-08 |
| Unknow | Coaxial Cable | C-NJNJ-50 | C-0200-01 | 2017-09-05 | 2018-09-05 |
| R&S | Test Software | EMC32 | Version8.53.0 | N/A | N/A |

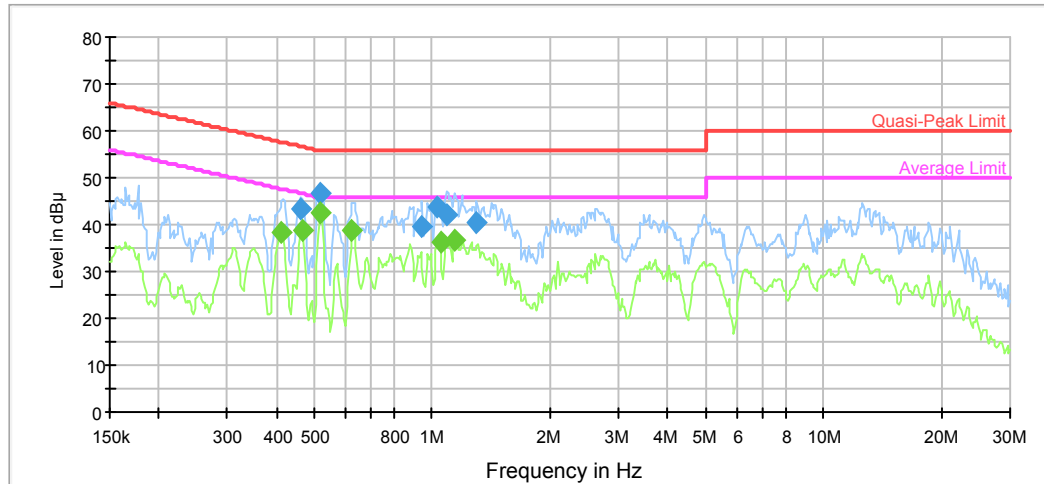
* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

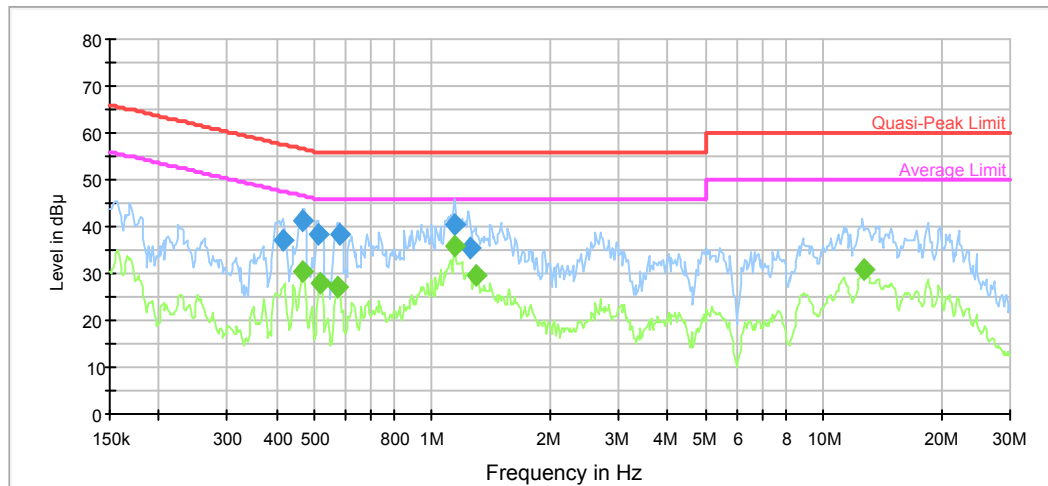
| | |
|--------------------|-----------|
| Temperature: | 27.5 °C |
| Relative Humidity: | 57 % |
| ATM Pressure: | 101.7 kPa |

The testing was performed by Sider Huang on 2018-04-25.

Test Mode: Transmitting**AC120 V, 60 Hz, Line:**

| Frequency (MHz) | QuasiPeak (dBμV) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) | Comment |
|-----------------|------------------|-----------------|------|------------|-------------|--------------|------------|
| 0.461346 | 43.4 | 9.000 | L1 | 9.9 | 13.3 | 56.7 | Compliance |
| 0.519918 | 46.6 | 9.000 | L1 | 9.9 | 9.4 | 56.0 | Compliance |
| 0.945093 | 39.5 | 9.000 | L1 | 9.8 | 16.5 | 56.0 | Compliance |
| 1.031669 | 43.8 | 9.000 | L1 | 9.8 | 12.2 | 56.0 | Compliance |
| 1.090848 | 42.2 | 9.000 | L1 | 9.8 | 13.8 | 56.0 | Compliance |
| 1.299858 | 40.3 | 9.000 | L1 | 9.8 | 15.7 | 56.0 | Compliance |

| Frequency (MHz) | Average (dBμV) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) | Comment |
|-----------------|----------------|-----------------|------|------------|-------------|--------------|------------|
| 0.412647 | 38.4 | 9.000 | L1 | 10.0 | 9.2 | 47.6 | Compliance |
| 0.465037 | 38.9 | 9.000 | L1 | 9.9 | 7.7 | 46.6 | Compliance |
| 0.519918 | 42.4 | 9.000 | L1 | 9.9 | 3.6 | 46.0 | Compliance |
| 0.624492 | 38.9 | 9.000 | L1 | 9.8 | 7.1 | 46.0 | Compliance |
| 1.048242 | 36.1 | 9.000 | L1 | 9.8 | 9.9 | 46.0 | Compliance |
| 1.144267 | 36.9 | 9.000 | L1 | 9.8 | 9.1 | 46.0 | Compliance |

AC120 V, 60 Hz, Neutral:

| Frequency (MHz) | QuasiPeak (dBμV) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) | Comment |
|-----------------|------------------|-----------------|------|------------|-------------|--------------|------------|
| 0.415949 | 37.1 | 9.000 | N | 10.0 | 20.4 | 57.5 | Compliance |
| 0.468757 | 41.5 | 9.000 | N | 9.9 | 15.0 | 56.5 | Compliance |
| 0.511698 | 38.4 | 9.000 | N | 9.9 | 17.6 | 56.0 | Compliance |
| 0.581275 | 38.4 | 9.000 | N | 9.8 | 17.6 | 56.0 | Compliance |
| 1.144267 | 40.4 | 9.000 | N | 9.8 | 15.6 | 56.0 | Compliance |
| 1.249088 | 35.4 | 9.000 | N | 9.8 | 20.6 | 56.0 | Compliance |

| Frequency (MHz) | Average (dBμV) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) | Comment |
|-----------------|----------------|-----------------|------|------------|-------------|--------------|------------|
| 0.468757 | 30.5 | 9.000 | N | 9.9 | 16.0 | 46.5 | Compliance |
| 0.519918 | 27.8 | 9.000 | N | 9.9 | 18.2 | 46.0 | Compliance |
| 0.576662 | 27.2 | 9.000 | N | 9.8 | 18.8 | 46.0 | Compliance |
| 1.144267 | 36.0 | 9.000 | N | 9.8 | 10.0 | 46.0 | Compliance |
| 1.289541 | 29.6 | 9.000 | N | 9.8 | 16.4 | 46.0 | Compliance |
| 12.694276 | 31.0 | 9.000 | N | 9.9 | 19.0 | 50.0 | Compliance |

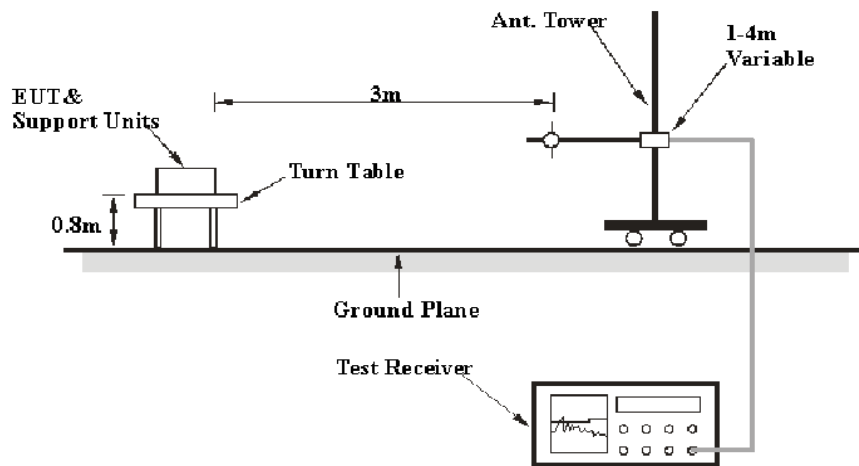
FCC §15.209, §15.205 & §15.247(d) & RSS-247 CLAUSE 5.5, RSS -GEN CLAUSE 8.10 - SPURIOUS EMISSIONS

Applicable Standard

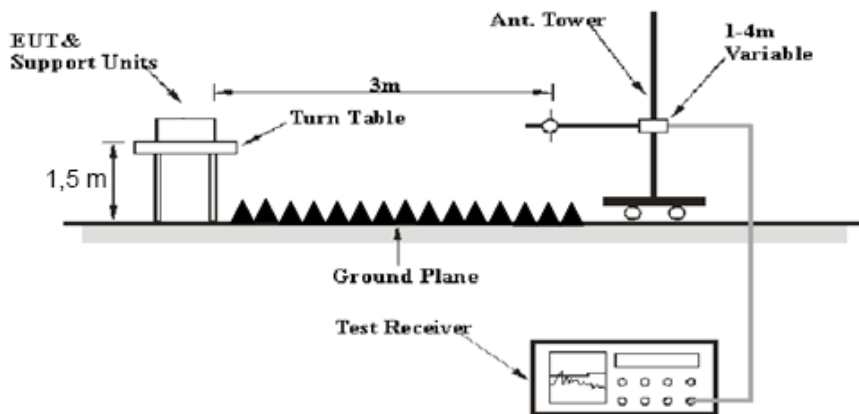
FCC §15.247 (d); §15.209; §15.205 and RSS-247 Clause 5.5, RSS-GEN Clause 8.10

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission Below 1GHz tests were performed in the 3 meters chamber A, above 1GHz tests were performed in the 3 meters chamber B, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits and RSS-247 Clause 5.5, RSS-GEN Clause 8.10 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

| Frequency Range | RBW | Video B/W | IF B/W | Measurement |
|-------------------|---------|-----------|---------|-------------|
| 30 MHz – 1000 MHz | 120 kHz | 300 kHz | 120 kHz | QP |
| Above 1 GHz | 1MHz | 3 MHz | / | PK |
| | 1MHz | 10 Hz | / | PK |

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz - 1 GHz, peak and average detection modes for frequencies above 1 GHz.

Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|-----------------------|-----------------------|------------------------|--------------------|------------------|----------------------|
| Sunol Sciences | Antenna | JB3 | A060611-1 | 2017-11-10 | 2020-11-10 |
| R&S | EMI Test Receiver | ESCI | 100224 | 2017-12-11 | 2018-12-11 |
| HP | Amplifier | 8447D | 2727A05902 | 2017-09-05 | 2018-09-05 |
| Agilent | Spectrum Analyzer | E4440A | SG43360054 | 2017-12-08 | 2018-12-08 |
| ETS-Lindgren | Horn Antenna | 3115 | 000 527 35 | 2016-01-05 | 2019-01-04 |
| MITEQ | Amplifier | AFS42-00101800-25-S-42 | 2001271 | 2017-09-05 | 2018-09-05 |
| Ducommun Technologies | Horn Antenna | ARH-4223-02 | 1007726-01 1304 | 2016-11-18 | 2019-11-18 |
| Quinstar | Amplifier | QLW-18405536-JO | 15964001001 | 2017-06-27 | 2018-06-27 |
| Chengdu Ouli | Band Rejection Filter | 2400-2483.5 | 002 | 2017-09-05 | 2018-09-05 |
| Unknow | Coaxial Cable | C-NJNJ-50 | C-0400-01 | 2017-09-05 | 2018-09-05 |
| Unknow | Coaxial Cable | C-NJNJ-50 | C-0075-01 | 2017-09-05 | 2018-09-05 |
| Unknow | Coaxial Cable | C-NJNJ-50 | C-1000-01 | 2017-09-05 | 2018-09-05 |
| Unknow | Coaxial Cable | C-SJSJ-50 | C-0800-01 | 2017-09-05 | 2018-09-05 |
| Farad | Test Software | EZ-EMC | V1.1.4.2 | N/A | N/A |

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Data

Environmental Conditions

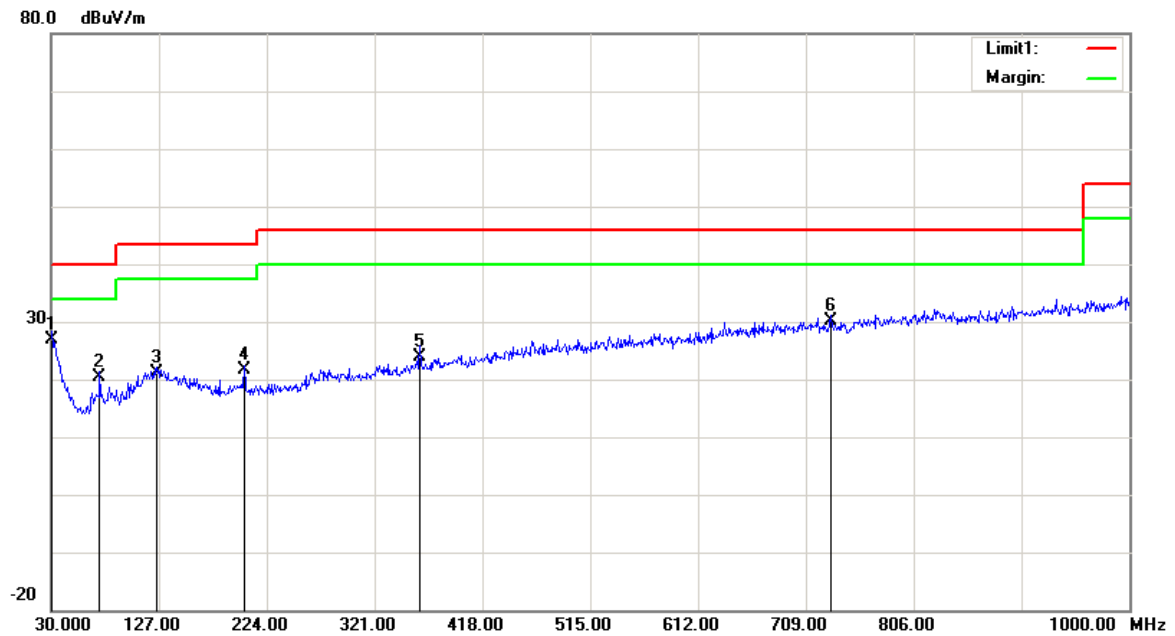
| | |
|--------------------|--------------|
| Temperature: | 21.2~21.9 °C |
| Relative Humidity: | 34~50 % |
| ATM Pressure: | 100.6 kPa |

** The testing was performed by Sunny Cen and Blake Yang on 2018-03-05 & 2018-03-19.*

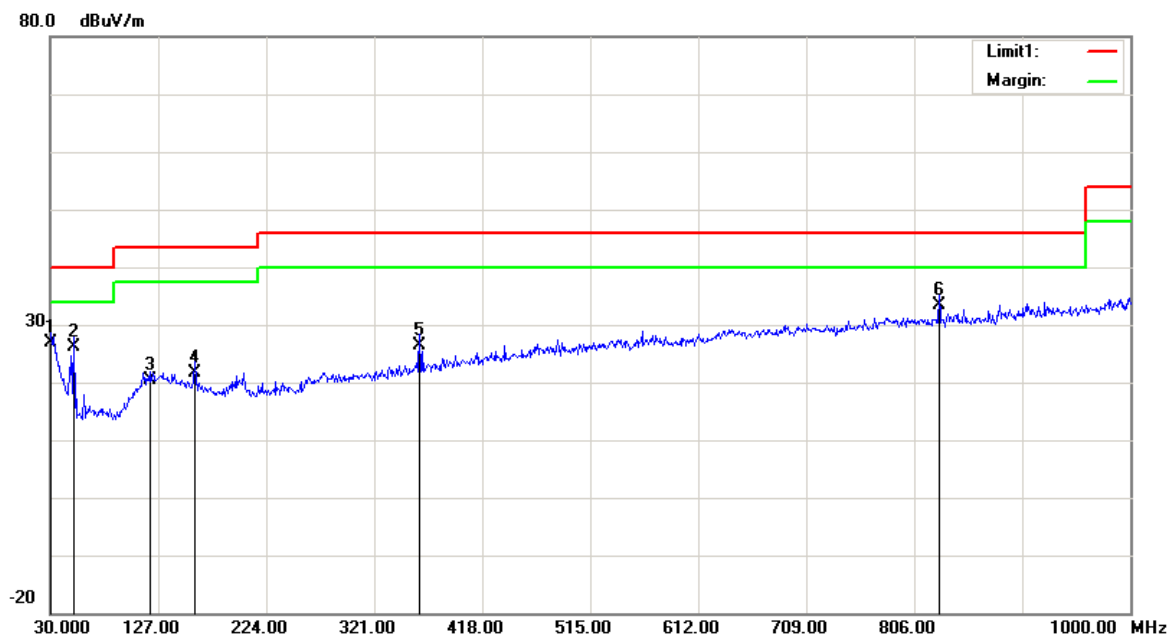
Test Mode: Transmitting

1) 30MHz-1GHz(GFSK High channel was the worst)

Horizontal:



| Frequency (MHz) | Receiver Reading (dBμV) | Detector | Correction Factor (dB/m) | Cord. Amp. (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|-------------------------|----------|--------------------------|---------------------|----------------|-------------|
| 30.9700 | 25.99 | QP | 0.81 | 26.80 | 40.00 | 13.20 |
| 73.6500 | 31.58 | QP | -11.18 | 20.40 | 40.00 | 19.60 |
| 125.0600 | 25.87 | QP | -4.77 | 21.10 | 43.50 | 22.40 |
| 203.6300 | 27.96 | QP | -6.36 | 21.60 | 43.50 | 21.90 |
| 361.7400 | 26.62 | QP | -2.82 | 23.80 | 46.00 | 22.20 |
| 731.3100 | 26.77 | QP | 3.33 | 30.10 | 46.00 | 15.90 |

Vertical:

| Frequency (MHz) | Receiver Reading (dBμV) | Detector | Correction Factor (dB/m) | Cord. Amp. (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|-------------------------|----------|--------------------------|---------------------|----------------|-------------|
| 30.0000 | 25.26 | QP | 1.54 | 26.80 | 40.00 | 13.20 |
| 51.3400 | 37.84 | QP | -11.64 | 26.20 | 40.00 | 13.80 |
| 119.2400 | 25.44 | QP | -5.04 | 20.40 | 43.50 | 23.10 |
| 159.9800 | 27.71 | QP | -6.01 | 21.70 | 43.50 | 21.80 |
| 361.7400 | 29.32 | QP | -2.82 | 26.50 | 46.00 | 19.50 |
| 828.3100 | 28.05 | QP | 5.35 | 33.40 | 46.00 | 12.60 |

2)1GHz-25GHz:*BDR Mode (GFSK):*

| Frequency (MHz) | Receiver | | Rx Antenna | | Cable loss (dB) | Amplifier Gain (dB) | Corrected Amplitude (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|--------------------------|-------------------|----------|----------------|------------------|-----------------------|---------------------------|------------------------------------|-------------------|----------------|
| | Reading (dBμV) | Detector | Polar (H/V) | Factor (dB/m) | | | | | |
| Low Channel: 2402 MHz | | | | | | | | | |
| 2402.00 | 70.64 | PK | H | 28.10 | 1.80 | 0.00 | 100.54 | N/A | N/A |
| 2402.00 | 59.62 | AV | H | 28.10 | 1.80 | 0.00 | 89.52 | N/A | N/A |
| 2402.00 | 74.58 | PK | V | 28.10 | 1.80 | 0.00 | 104.48 | N/A | N/A |
| 2402.00 | 63.43 | AV | V | 28.10 | 1.80 | 0.00 | 93.33 | N/A | N/A |
| 2390.00 | 25.46 | PK | V | 28.08 | 1.80 | 0.00 | 55.34 | 74.00 | 18.66 |
| 2390.00 | 15.37 | AV | V | 28.08 | 1.80 | 0.00 | 45.25 | 54.00 | 8.75 |
| 4804.00 | 49.27 | PK | V | 32.91 | 3.17 | 37.20 | 48.15 | 74.00 | 25.85 |
| 4804.00 | 39.44 | AV | V | 32.91 | 3.17 | 37.20 | 38.32 | 54.00 | 15.68 |
| 7206.00 | 46.34 | PK | V | 35.74 | 4.82 | 37.23 | 49.67 | 74.00 | 24.33 |
| 7206.00 | 36.52 | AV | V | 35.74 | 4.82 | 37.23 | 39.85 | 54.00 | 14.15 |
| Middle Channel: 2441 MHz | | | | | | | | | |
| 2441.00 | 70.40 | PK | H | 28.18 | 1.82 | 0.00 | 100.40 | N/A | N/A |
| 2441.00 | 58.77 | AV | H | 28.18 | 1.82 | 0.00 | 88.77 | N/A | N/A |
| 2441.00 | 73.33 | PK | V | 28.18 | 1.82 | 0.00 | 103.33 | N/A | N/A |
| 2441.00 | 61.13 | AV | V | 28.18 | 1.82 | 0.00 | 91.13 | N/A | N/A |
| 4882.00 | 50.95 | PK | V | 33.06 | 3.27 | 37.21 | 50.07 | 74.00 | 23.93 |
| 4882.00 | 40.81 | AV | V | 33.06 | 3.27 | 37.21 | 39.93 | 54.00 | 14.07 |
| 7323.00 | 48.76 | PK | V | 36.04 | 4.62 | 37.38 | 52.04 | 74.00 | 21.96 |
| 7323.00 | 37.26 | AV | V | 36.04 | 4.62 | 37.38 | 40.54 | 54.00 | 13.46 |
| High Channel: 2480 MHz | | | | | | | | | |
| 2480.00 | 69.47 | PK | H | 28.26 | 1.84 | 0.00 | 99.57 | N/A | N/A |
| 2480.00 | 58.65 | AV | H | 28.26 | 1.84 | 0.00 | 88.75 | N/A | N/A |
| 2480.00 | 73.13 | PK | V | 28.26 | 1.84 | 0.00 | 103.23 | N/A | N/A |
| 2480.00 | 62.45 | AV | V | 28.26 | 1.84 | 0.00 | 92.55 | N/A | N/A |
| 2483.50 | 27.34 | PK | V | 28.27 | 1.84 | 0.00 | 57.45 | 74.00 | 16.55 |
| 2483.50 | 15.74 | AV | V | 28.27 | 1.84 | 0.00 | 45.85 | 54.00 | 8.15 |
| 4960.00 | 51.47 | PK | V | 33.22 | 3.23 | 37.25 | 50.67 | 74.00 | 23.33 |
| 4960.00 | 40.86 | AV | V | 33.22 | 3.23 | 37.25 | 40.06 | 54.00 | 13.94 |
| 7440.00 | 47.97 | PK | V | 36.34 | 4.41 | 37.52 | 51.20 | 74.00 | 22.80 |
| 7440.00 | 39.05 | AV | V | 36.34 | 4.41 | 37.52 | 42.28 | 54.00 | 11.72 |

EDR Mode ($\pi/4$ -DQPSK):

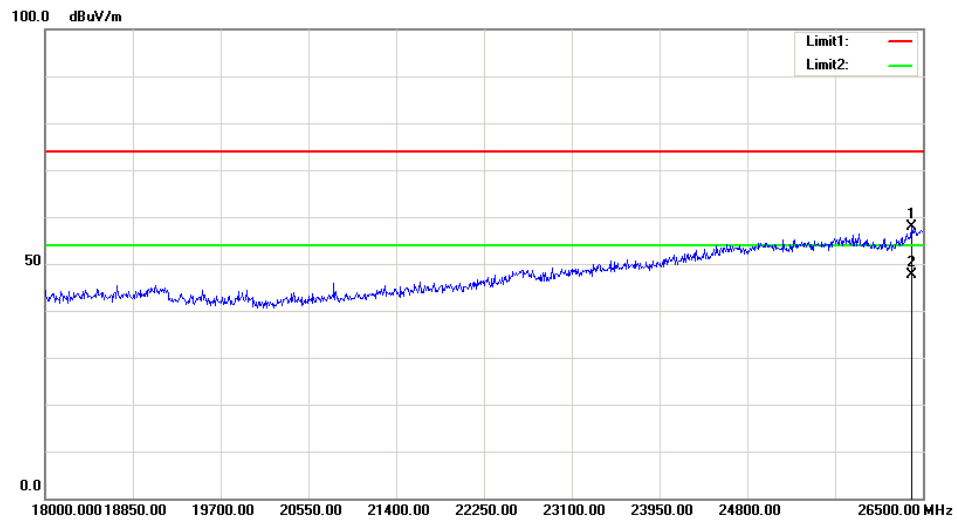
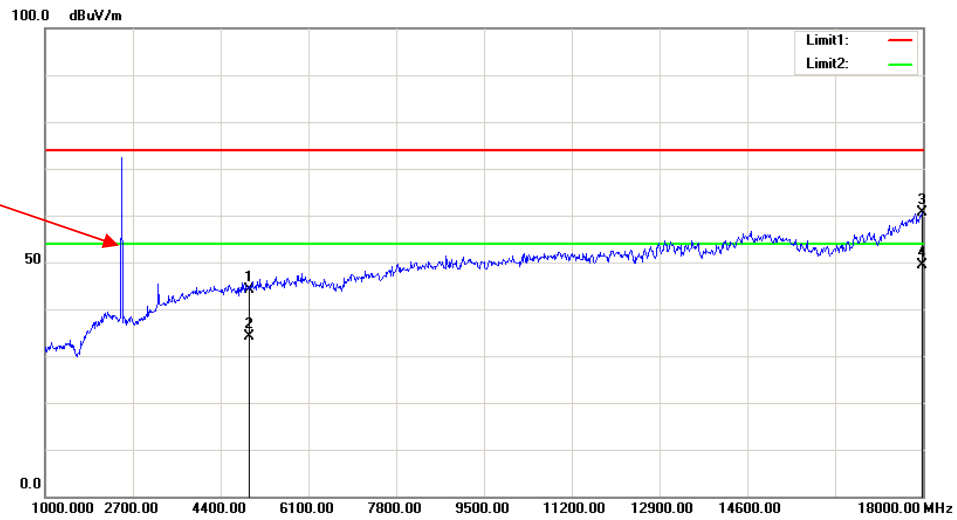
| Frequency (MHz) | Receiver | | Rx Antenna | | Cable loss (dB) | Amplifier Gain (dB) | Corrected Amplitude (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|--------------------------|-------------------|----------|----------------|------------------|-----------------------|---------------------------|------------------------------------|-------------------|----------------|
| | Reading (dBμV) | Detector | Polar (H/V) | Factor (dB/m) | | | | | |
| Low Channel: 2402 MHz | | | | | | | | | |
| 2402.00 | 70.94 | PK | H | 28.10 | 1.80 | 0.00 | 100.84 | N/A | N/A |
| 2402.00 | 60.13 | AV | H | 28.10 | 1.80 | 0.00 | 90.03 | N/A | N/A |
| 2402.00 | 75.19 | PK | V | 28.10 | 1.80 | 0.00 | 105.09 | N/A | N/A |
| 2402.00 | 64.31 | AV | V | 28.10 | 1.80 | 0.00 | 94.21 | N/A | N/A |
| 2390.00 | 24.71 | PK | V | 28.08 | 1.80 | 0.00 | 54.59 | 74.00 | 19.41 |
| 2390.00 | 14.62 | AV | V | 28.08 | 1.80 | 0.00 | 44.50 | 54.00 | 9.50 |
| 4804.00 | 49.74 | PK | V | 32.91 | 3.17 | 37.20 | 48.62 | 74.00 | 25.38 |
| 4804.00 | 41.40 | AV | V | 32.91 | 3.17 | 37.20 | 40.28 | 54.00 | 13.72 |
| 7206.00 | 47.07 | PK | V | 35.74 | 4.82 | 37.23 | 50.40 | 74.00 | 23.60 |
| 7206.00 | 37.09 | AV | V | 35.74 | 4.82 | 37.23 | 40.42 | 54.00 | 13.58 |
| Middle Channel: 2441 MHz | | | | | | | | | |
| 2441.00 | 69.97 | PK | H | 28.18 | 1.82 | 0.00 | 99.97 | N/A | N/A |
| 2441.00 | 57.48 | AV | H | 28.18 | 1.82 | 0.00 | 87.48 | N/A | N/A |
| 2441.00 | 73.80 | PK | V | 28.18 | 1.82 | 0.00 | 103.80 | N/A | N/A |
| 2441.00 | 61.68 | AV | V | 28.18 | 1.82 | 0.00 | 91.68 | N/A | N/A |
| 4882.00 | 49.02 | PK | V | 33.06 | 3.27 | 37.21 | 48.14 | 74.00 | 25.86 |
| 4882.00 | 39.75 | AV | V | 33.06 | 3.27 | 37.21 | 38.87 | 54.00 | 15.13 |
| 7323.00 | 45.60 | PK | V | 36.04 | 4.62 | 37.38 | 48.88 | 74.00 | 25.12 |
| 7323.00 | 33.45 | AV | V | 36.04 | 4.62 | 37.38 | 36.73 | 54.00 | 17.27 |
| High Channel: 2480 MHz | | | | | | | | | |
| 2480.00 | 69.34 | PK | H | 28.26 | 1.84 | 0.00 | 99.44 | N/A | N/A |
| 2480.00 | 58.79 | AV | H | 28.26 | 1.84 | 0.00 | 88.89 | N/A | N/A |
| 2480.00 | 72.98 | PK | V | 28.26 | 1.84 | 0.00 | 103.08 | N/A | N/A |
| 2480.00 | 61.84 | AV | V | 28.26 | 1.84 | 0.00 | 91.94 | N/A | N/A |
| 2483.50 | 26.34 | PK | V | 28.27 | 1.84 | 0.00 | 56.45 | 74.00 | 17.55 |
| 2483.50 | 14.68 | AV | V | 28.27 | 1.84 | 0.00 | 44.79 | 54.00 | 9.21 |
| 4960.00 | 45.78 | PK | V | 33.22 | 3.23 | 37.25 | 44.98 | 74.00 | 29.02 |
| 4960.00 | 37.75 | AV | V | 33.22 | 3.23 | 37.25 | 36.95 | 54.00 | 17.05 |
| 7440.00 | 43.94 | PK | V | 36.34 | 4.41 | 37.52 | 47.17 | 74.00 | 26.83 |
| 7440.00 | 35.06 | AV | V | 36.34 | 4.41 | 37.52 | 38.29 | 54.00 | 15.71 |

EDR Mode (8-DPSK):

| Frequency (MHz) | Receiver | | Rx Antenna | | Cable loss (dB) | Amplifier Gain (dB) | Corrected Amplitude (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|--------------------------|-------------------|----------|----------------|------------------|-----------------------|---------------------------|------------------------------------|-------------------|----------------|
| | Reading (dBμV) | Detector | Polar (H/V) | Factor (dB/m) | | | | | |
| Low Channel: 2402 MHz | | | | | | | | | |
| 2402.00 | 71.24 | PK | H | 28.10 | 1.80 | 0.00 | 101.14 | N/A | N/A |
| 2402.00 | 59.34 | AV | H | 28.10 | 1.80 | 0.00 | 89.24 | N/A | N/A |
| 2402.00 | 74.59 | PK | V | 28.10 | 1.80 | 0.00 | 104.49 | N/A | N/A |
| 2402.00 | 61.54 | AV | V | 28.10 | 1.80 | 0.00 | 91.44 | N/A | N/A |
| 2390.00 | 26.54 | PK | V | 28.08 | 1.80 | 0.00 | 56.42 | 74.00 | 17.58 |
| 2390.00 | 14.87 | AV | V | 28.08 | 1.80 | 0.00 | 44.75 | 54.00 | 9.25 |
| 4804.00 | 48.45 | PK | V | 32.91 | 3.17 | 37.20 | 47.33 | 74.00 | 26.67 |
| 4804.00 | 37.98 | AV | V | 32.91 | 3.17 | 37.20 | 36.86 | 54.00 | 17.14 |
| 7206.00 | 42.97 | PK | V | 35.74 | 4.82 | 37.23 | 46.30 | 74.00 | 27.70 |
| 7206.00 | 35.49 | AV | V | 35.74 | 4.82 | 37.23 | 38.82 | 54.00 | 15.18 |
| Middle Channel: 2441 MHz | | | | | | | | | |
| 2441.00 | 67.86 | PK | H | 28.18 | 1.82 | 0.00 | 97.86 | N/A | N/A |
| 2441.00 | 59.12 | AV | H | 28.18 | 1.82 | 0.00 | 89.12 | N/A | N/A |
| 2441.00 | 74.89 | PK | V | 28.18 | 1.82 | 0.00 | 104.89 | N/A | N/A |
| 2441.00 | 60.05 | AV | V | 28.18 | 1.82 | 0.00 | 90.05 | N/A | N/A |
| 4882.00 | 47.32 | PK | V | 33.06 | 3.27 | 37.21 | 46.44 | 74.00 | 27.56 |
| 4882.00 | 37.39 | AV | V | 33.06 | 3.27 | 37.21 | 36.51 | 54.00 | 17.49 |
| 7323.00 | 44.46 | PK | V | 36.04 | 4.62 | 37.38 | 47.74 | 74.00 | 26.26 |
| 7323.00 | 34.05 | AV | V | 36.04 | 4.62 | 37.38 | 37.33 | 54.00 | 16.67 |
| High Channel: 2480 MHz | | | | | | | | | |
| 2480.00 | 69.19 | PK | H | 28.26 | 1.84 | 0.00 | 99.29 | N/A | N/A |
| 2480.00 | 57.87 | AV | H | 28.26 | 1.84 | 0.00 | 87.97 | N/A | N/A |
| 2480.00 | 74.03 | PK | V | 28.26 | 1.84 | 0.00 | 104.13 | N/A | N/A |
| 2480.00 | 62.67 | AV | V | 28.26 | 1.84 | 0.00 | 92.77 | N/A | N/A |
| 2483.50 | 26.21 | PK | V | 28.27 | 1.84 | 0.00 | 56.32 | 74.00 | 17.68 |
| 2483.50 | 15.56 | AV | V | 28.27 | 1.84 | 0.00 | 45.67 | 54.00 | 8.33 |
| 4960.00 | 48.15 | PK | V | 33.22 | 3.23 | 37.25 | 47.35 | 74.00 | 26.65 |
| 4960.00 | 38.31 | AV | V | 33.22 | 3.23 | 37.25 | 37.51 | 54.00 | 16.49 |
| 7440.00 | 45.53 | PK | V | 36.34 | 4.41 | 37.52 | 48.76 | 74.00 | 25.24 |
| 7440.00 | 34.14 | AV | V | 36.34 | 4.41 | 37.52 | 37.37 | 54.00 | 16.63 |

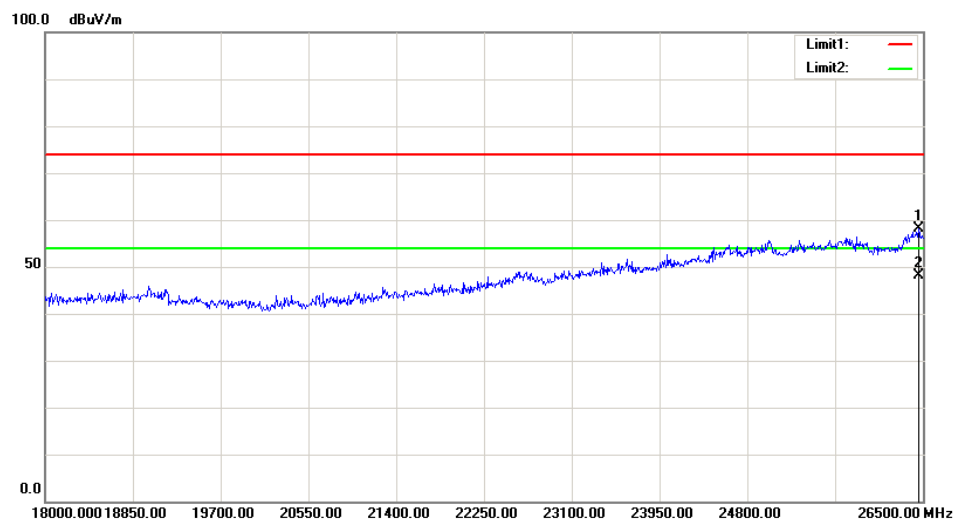
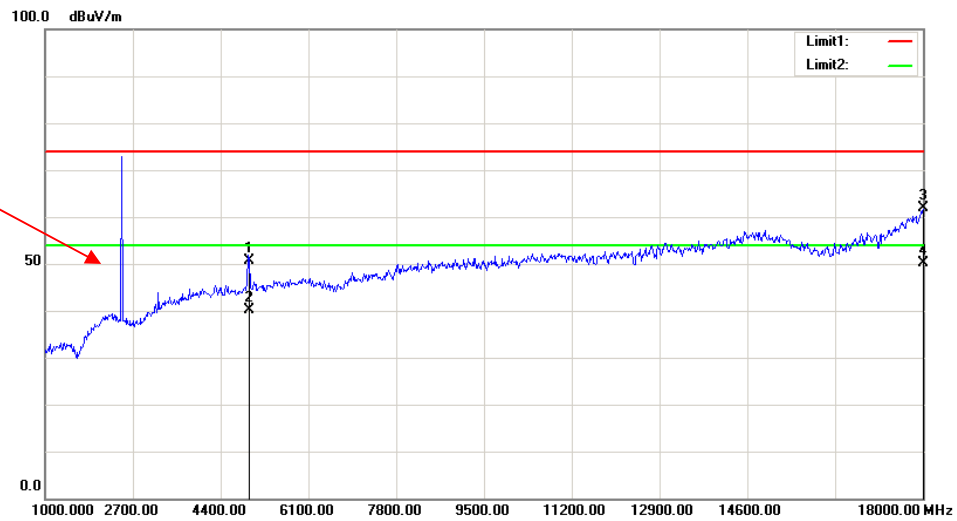
Worst plots(GFSK High channel) **Horizontal**

Fundamental
Test with Band
Rejection Filter



Vertical

Fundamental
Test with Band
Rejection Filter



FCC §15.247(a) (1) & RSS-247 CLAUSE 5.1 b) - CHANNEL SEPARATION TEST**Applicable Standard**

According to FCC §15.247(a) (1)&RSS-247 Clause 5.1 b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.50 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater provided the systems operate with an output power no greater than 125 mW.

Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-----------------|-------------|---------------|------------------|----------------------|
| Rohde & Schwarz | Signal Analyzer | FSIQ26 | 831929/005 | 2017-08-31 | 2018-08-31 |
| Unknow | Coaxial Cable | C-SJ00-0010 | C0010/03 | Each Time | / |

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Procedure

1. Set the EUT in transmitting mode, spectrum Bandwidth was set at 30 kHz, maxhold the channel.
2. Set the adjacent channel of the EUT maxhold another trace.
3. Measure the channel separation.

Test Data**Environmental Conditions**

| | |
|--------------------|-----------|
| Temperature: | 24.9 °C |
| Relative Humidity: | 38 % |
| ATM Pressure: | 101.2 kPa |

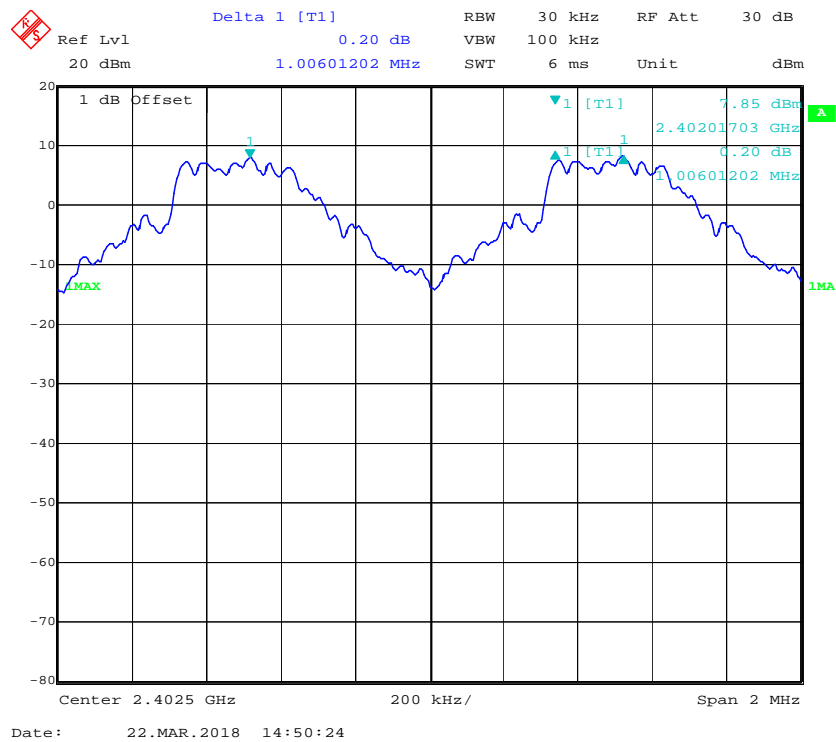
* The testing was performed by Swim Lv on 2018-03-22.

Test Result: Compliance.

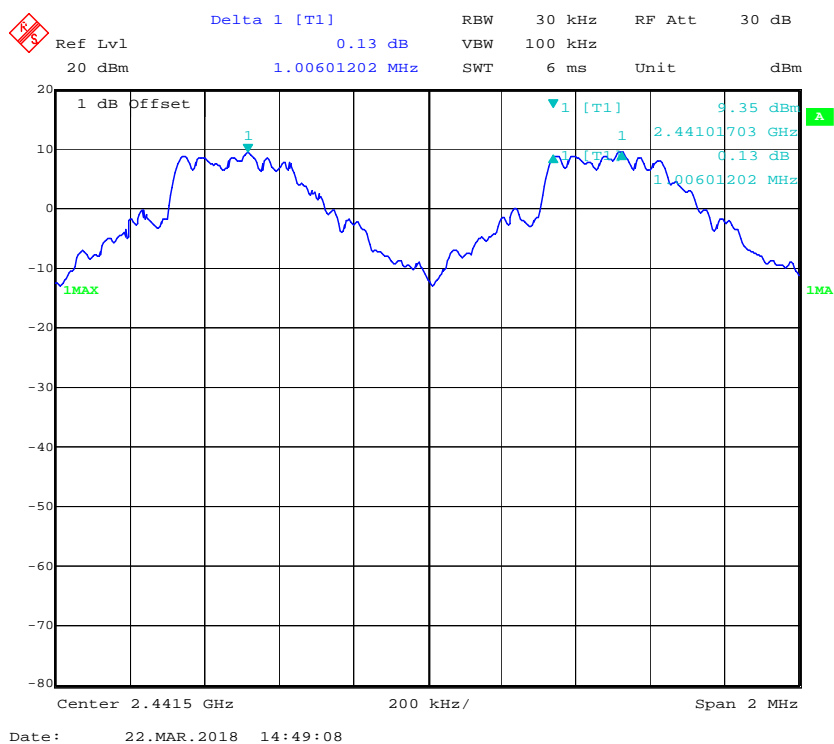
Please refer to following tables and plots

Note: Limit= $(2/3) \times 20dB$ bandwidth

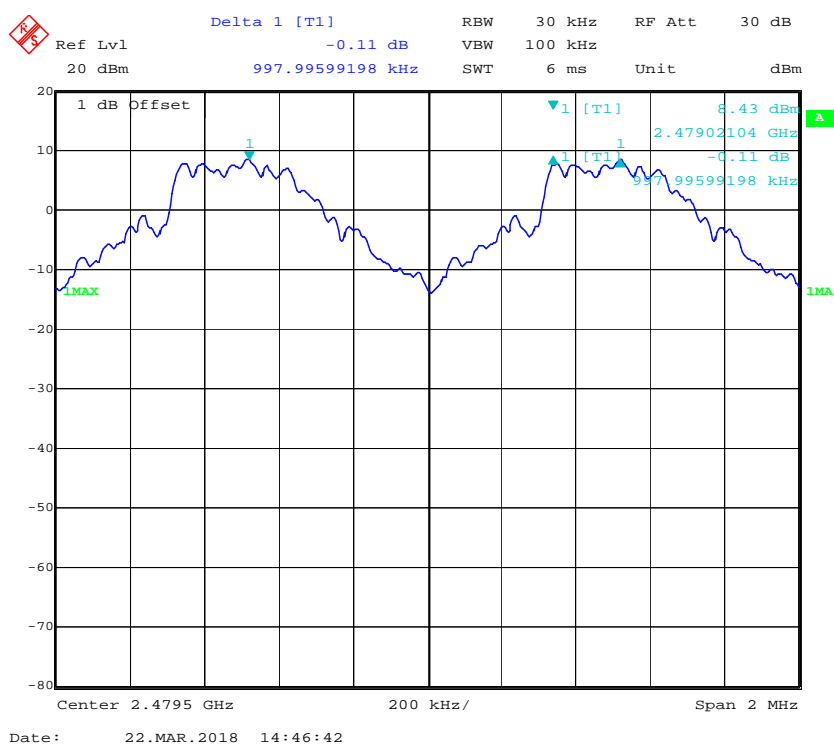
Low Channel



Middle Channel

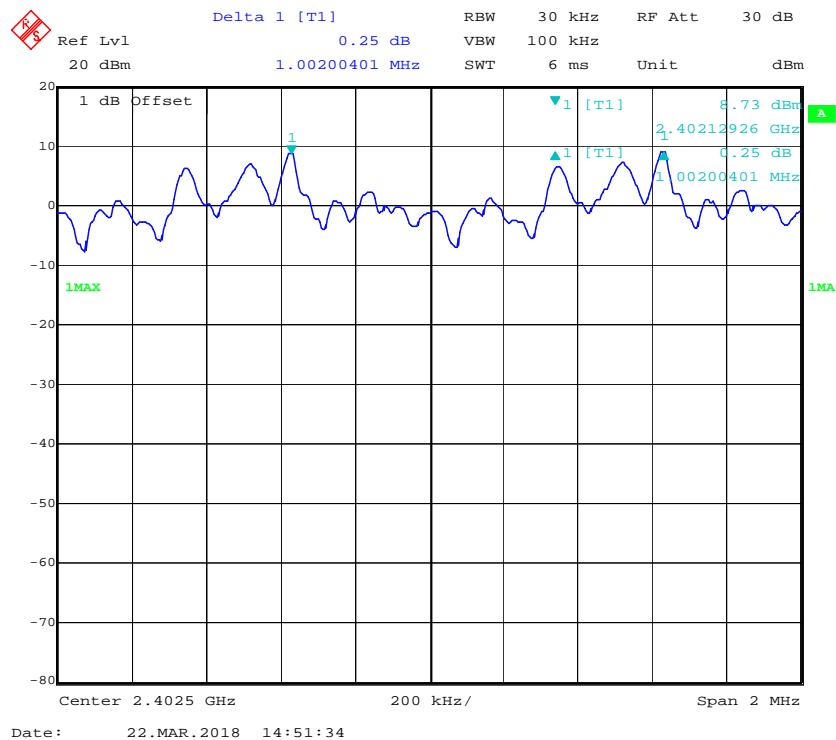


High Channel

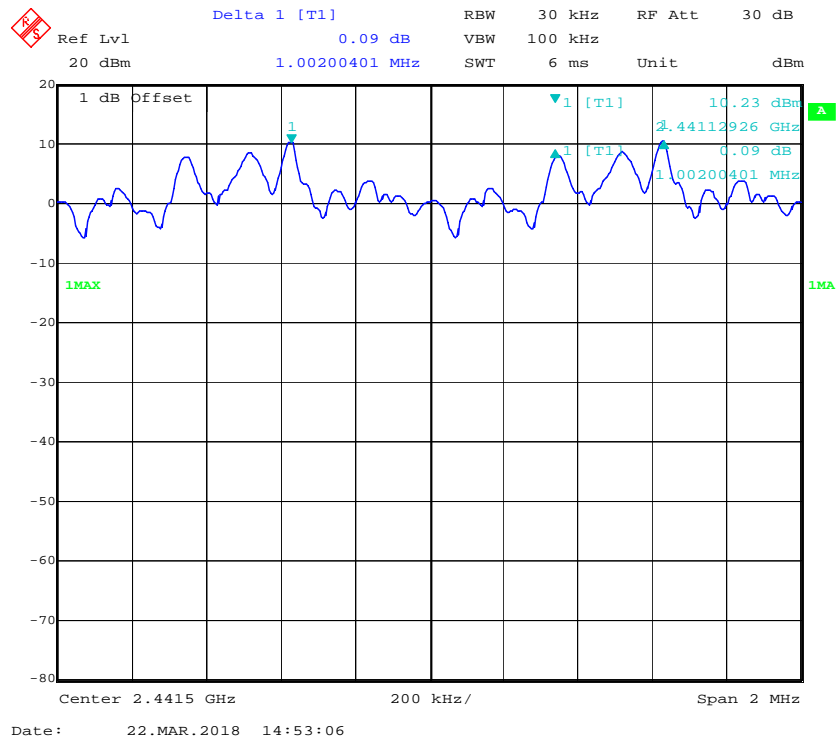


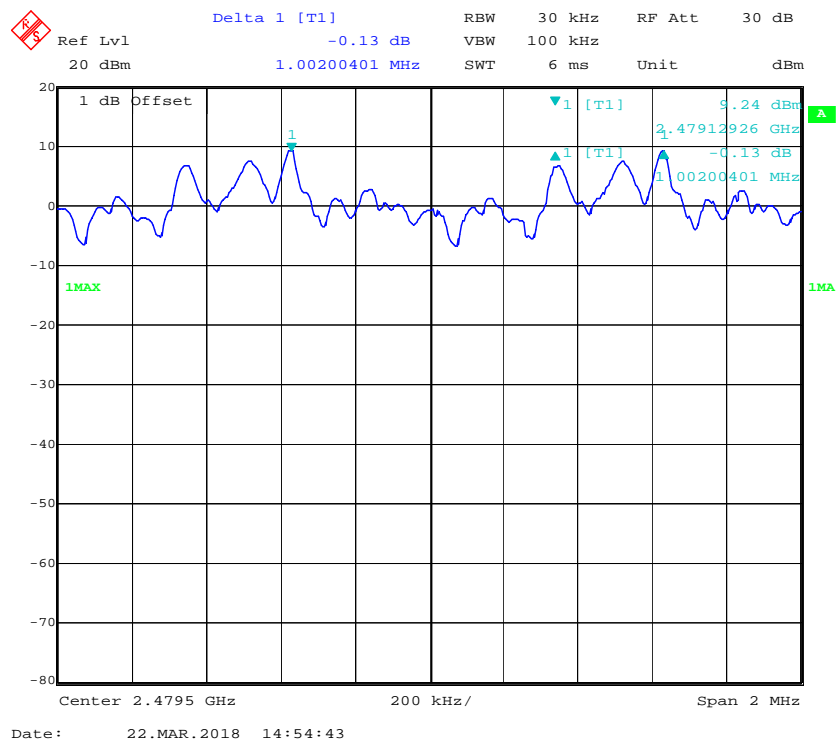
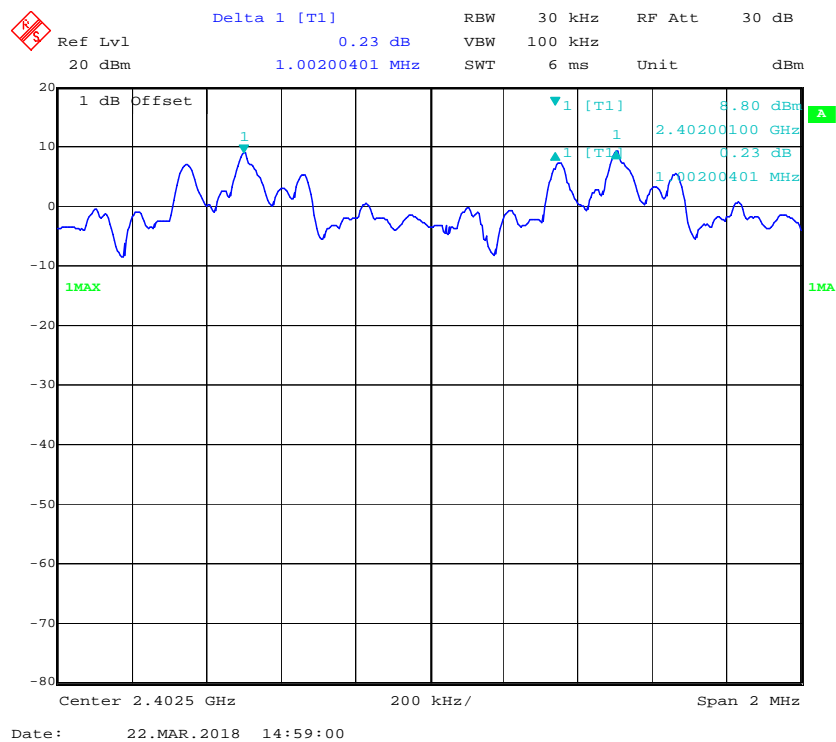
EDR Mode ($\pi/4$ -DQPSK):

Low Channel



Middle Channel



High Channel*EDR Mode (8-DPSK):***Low Channel**

FCC §15.247(a) (1) & RSS-247 CLAUSE 5.1&RSS-GEN CLAUSE 6.6– 20 dB BANDWIDTH TESTING

Applicable Standard

According to FCC §15.247(a) (1):

Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

According to RSS-247 Clause 5.1 b):

- b) FHSs shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, FHSs operating in the band 2400-2483.5 MHz may have hopping channel carrier frequencies that are separated by 25 kHz or two thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided that the systems operate with an output power no greater than 0.125 W.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on the test table without connection to measurement instrument. Turn on the EUT. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Use Occupied bandwidth test function, measure the 99% Occupied bandwidth.
5. Repeat above procedures until all frequencies measured were complete.

Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-----------------|-------------|---------------|------------------|----------------------|
| Rohde & Schwarz | Signal Analyzer | FSIQ26 | 831929/005 | 2017-08-31 | 2018-08-31 |
| Unknown | Coaxial Cable | C-SJ00-0010 | C0010/03 | Each Time | / |

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

| | |
|---------------------------|-----------|
| Temperature: | 24.9 °C |
| Relative Humidity: | 38 % |
| ATM Pressure: | 101.2 kPa |

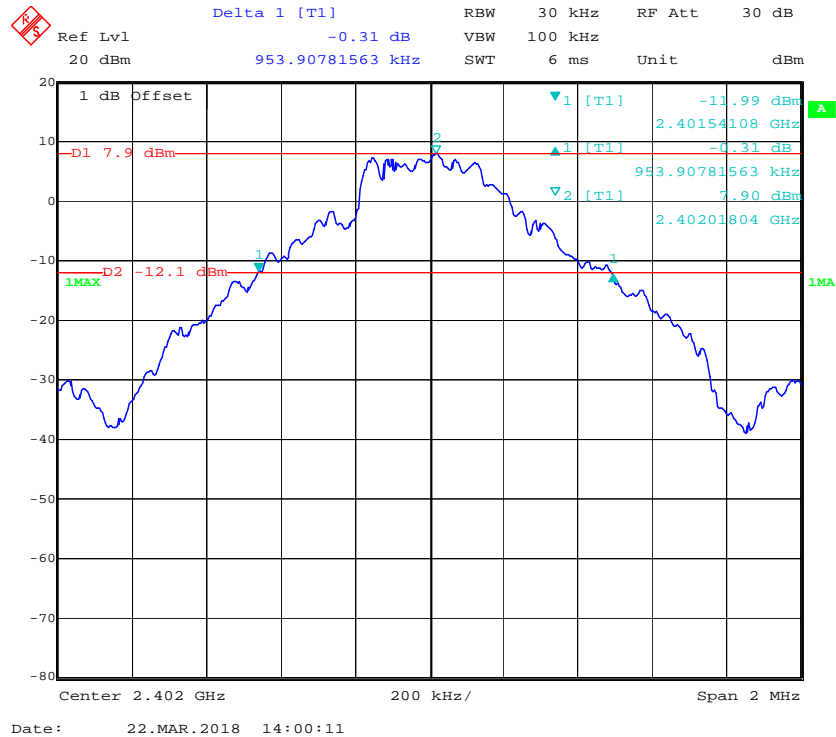
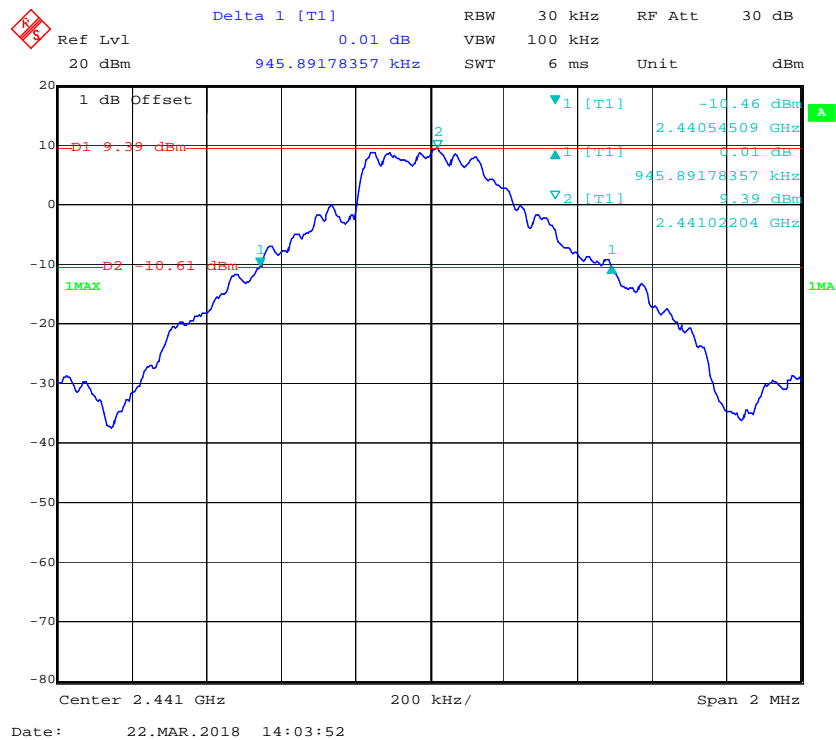
* The testing was performed by Swim Lv on 2018-03-22.

Test Result: Compliance.

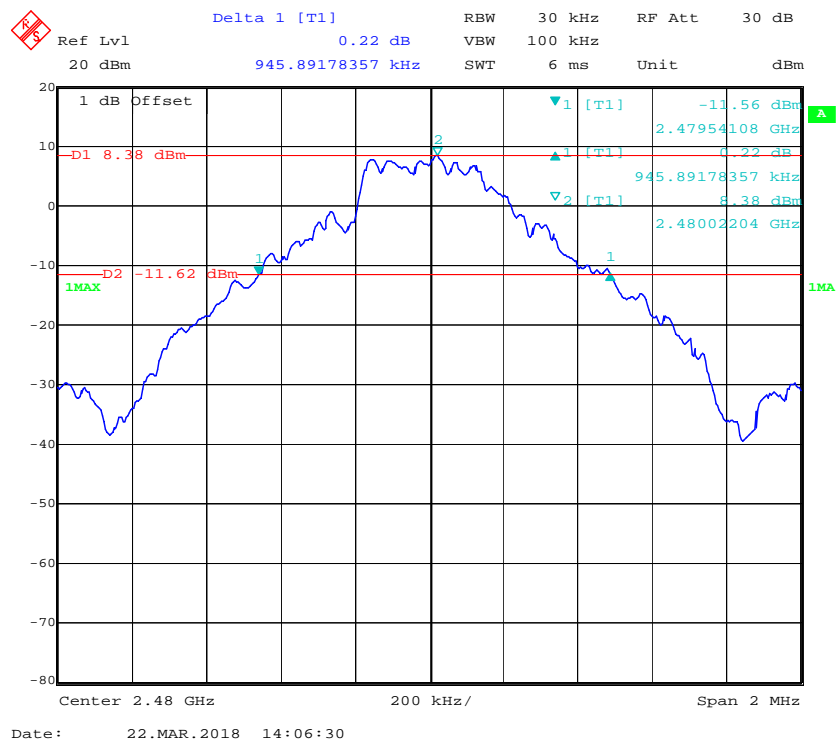
Please refer to following tables and plots

Test Mode: Transmitting

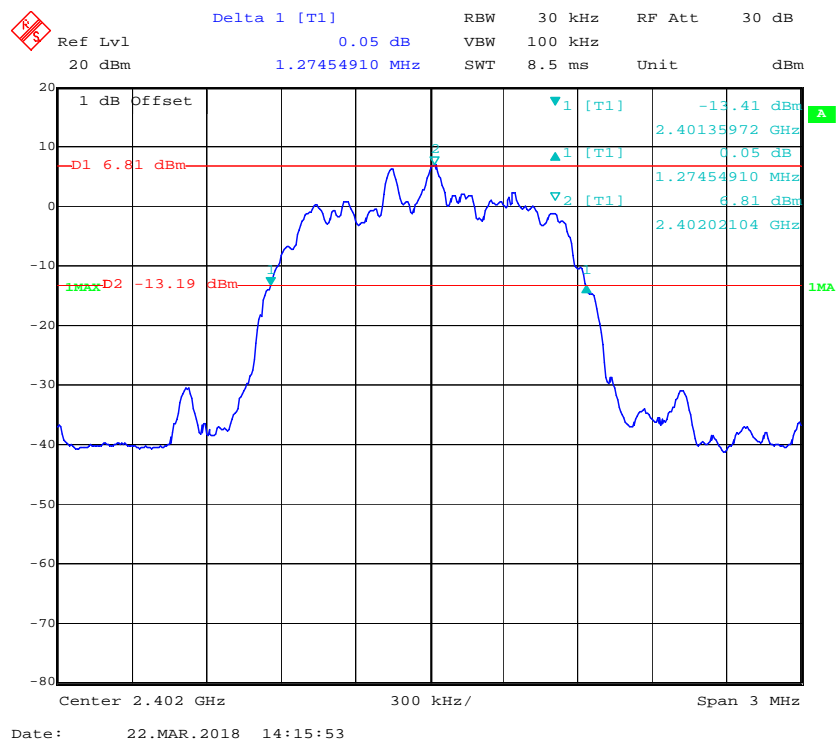
| Mode | Channel | Frequency (MHz) | 20 dB Bandwidth (MHz) | 99% occupied Bandwidth (MHz) |
|----------------------------|---------|-----------------|-----------------------|------------------------------|
| BDR Mode (GFSK) | Low | 2402 | 0.954 | 0.874 |
| | Middle | 2441 | 0.946 | 0.878 |
| | High | 2480 | 0.946 | 0.874 |
| EDR Mode ($\pi/4$ -DQPSK) | Low | 2402 | 1.275 | 1.160 |
| | Middle | 2441 | 1.275 | 1.166 |
| | High | 2480 | 1.275 | 1.166 |
| EDR Mode (8-DPSK) | Low | 2402 | 1.251 | 1.154 |
| | Middle | 2441 | 1.251 | 1.160 |
| | High | 2480 | 1.257 | 1.160 |

20 dB Bandwidth
*BDR Mode (GFSK):***Low Channel****Middle Channel**

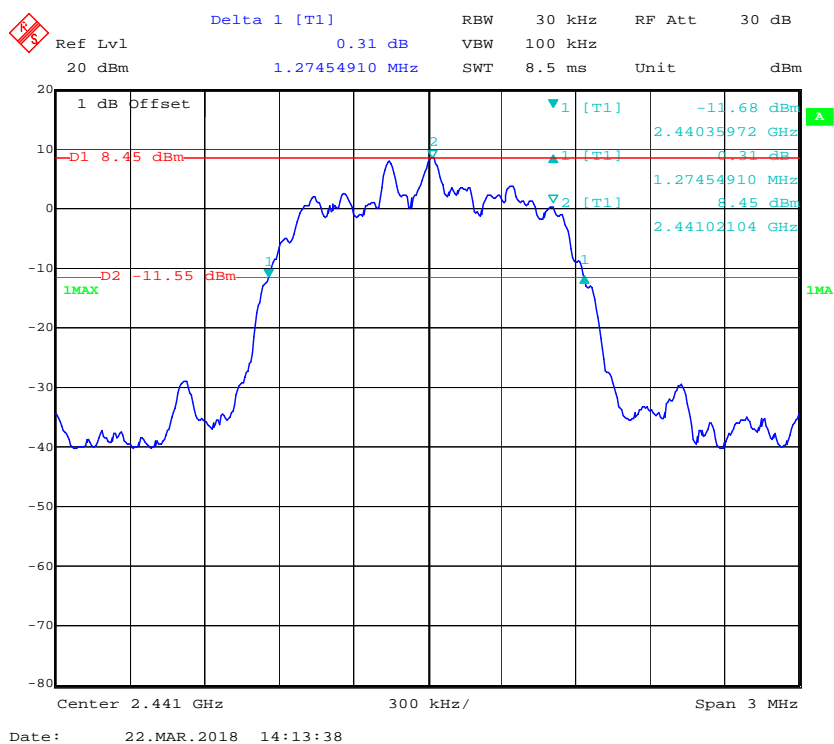
High Channel

EDR Mode ($\pi/4$ -DQPSK):

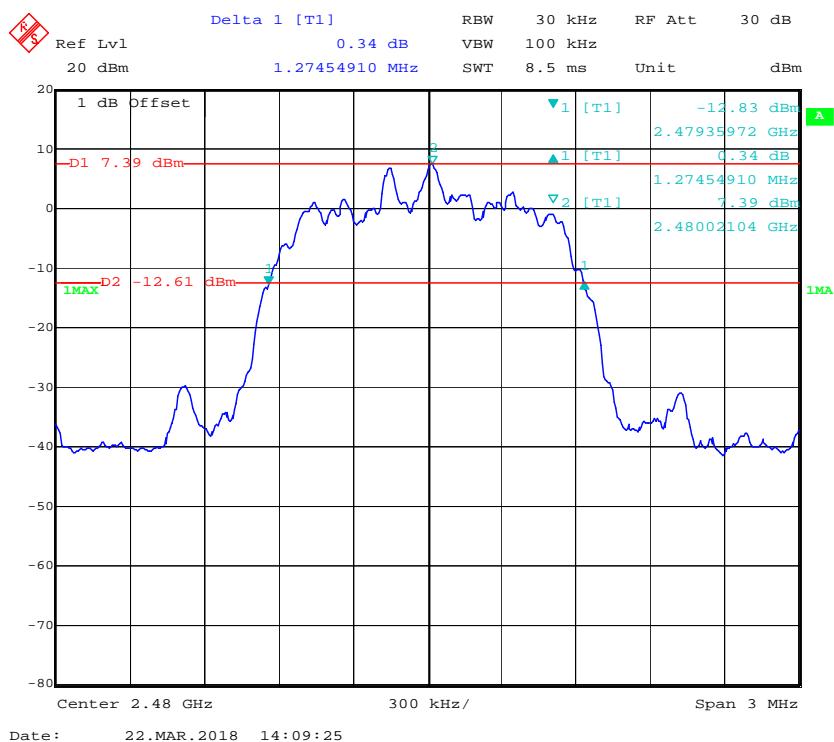
Low Channel



Middle Channel

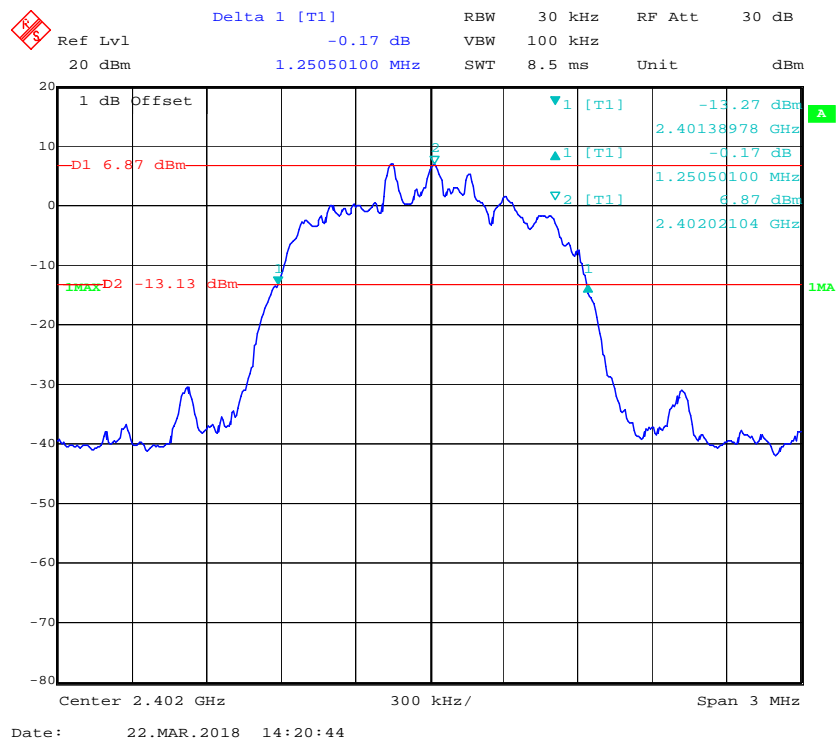


High Channel

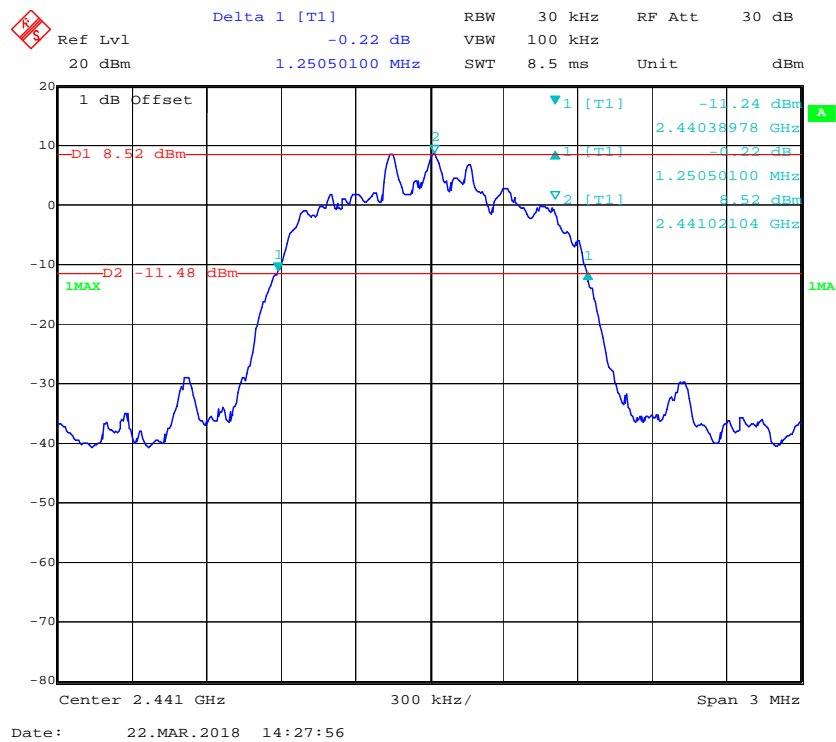


EDR Mode (8-DPSK):

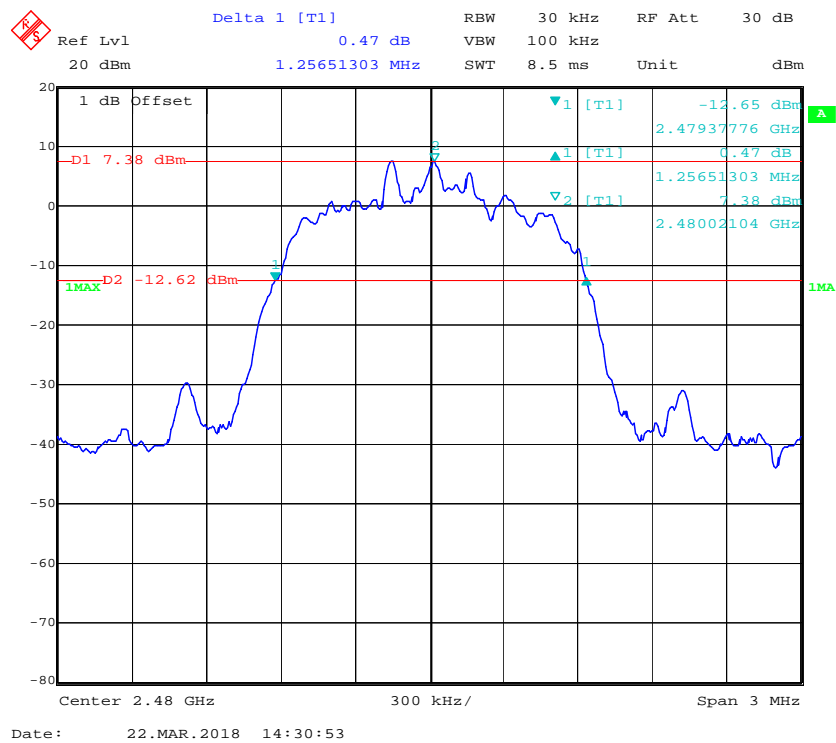
Low Channel



Middle Channel

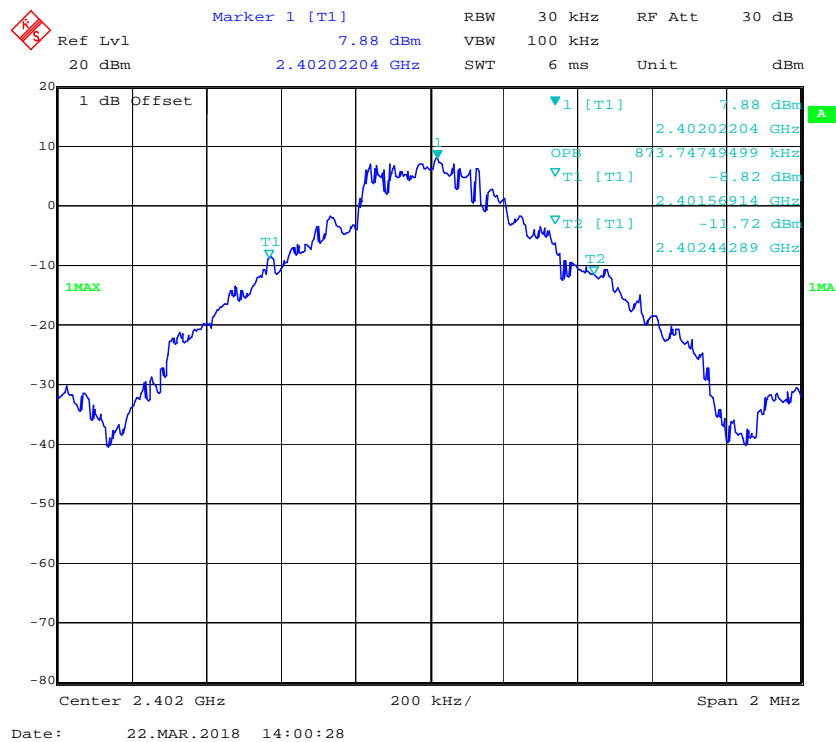


High Channel

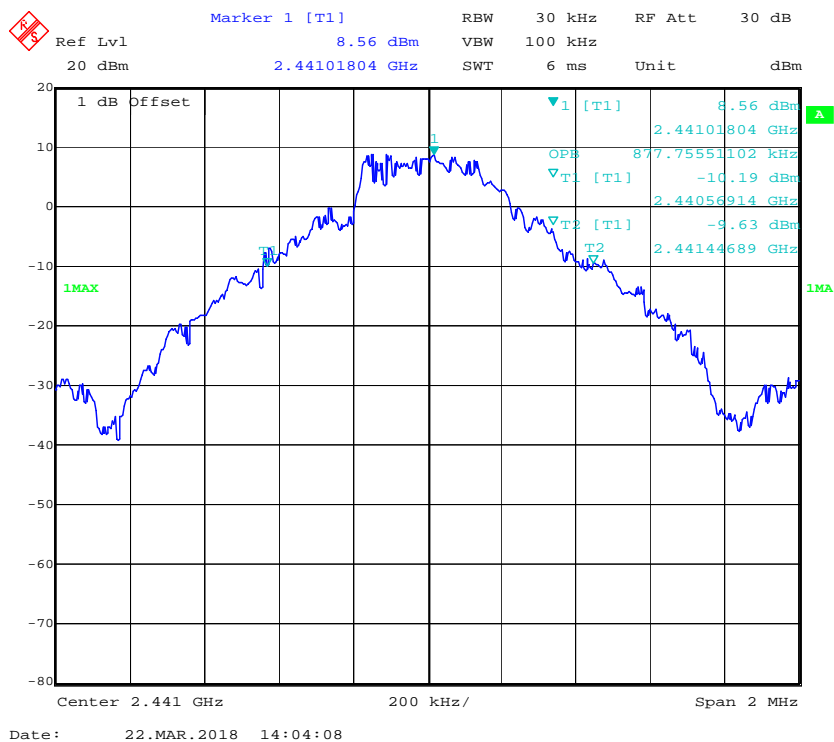


99% occupied Bandwidth
BDR Mode (GFSK):

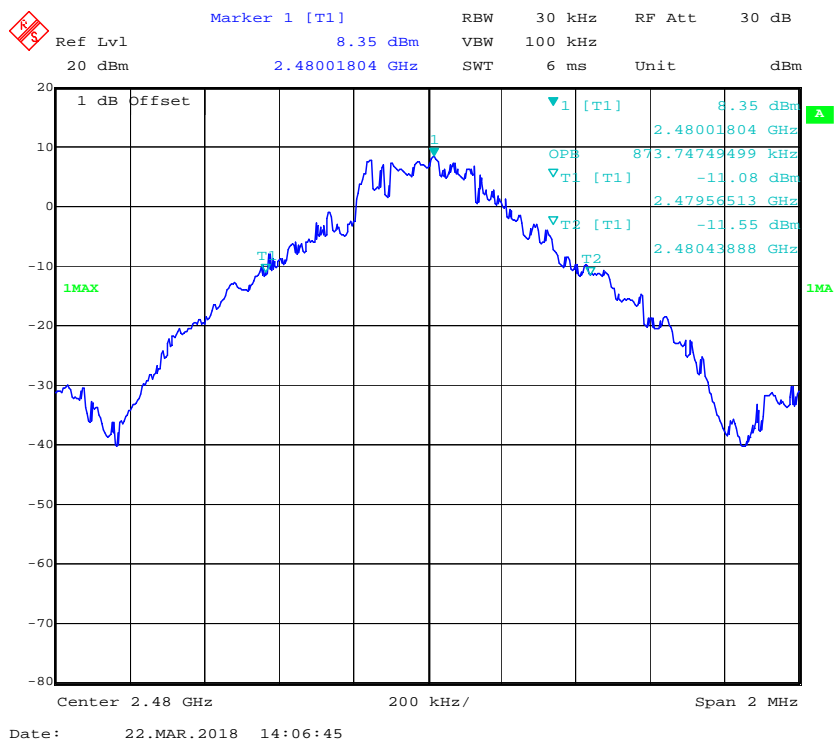
Low Channel



Middle Channel

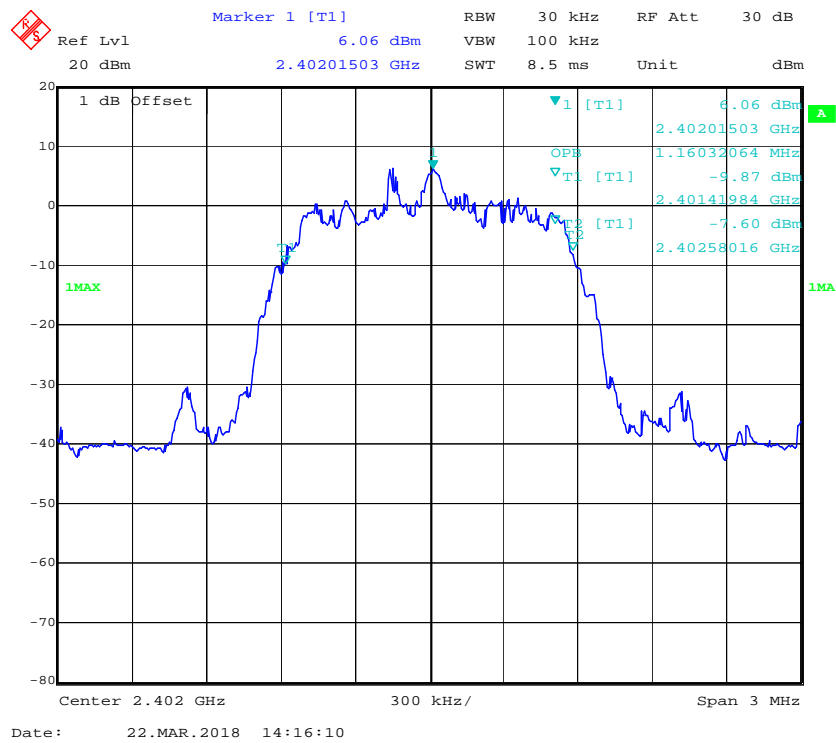


High Channel

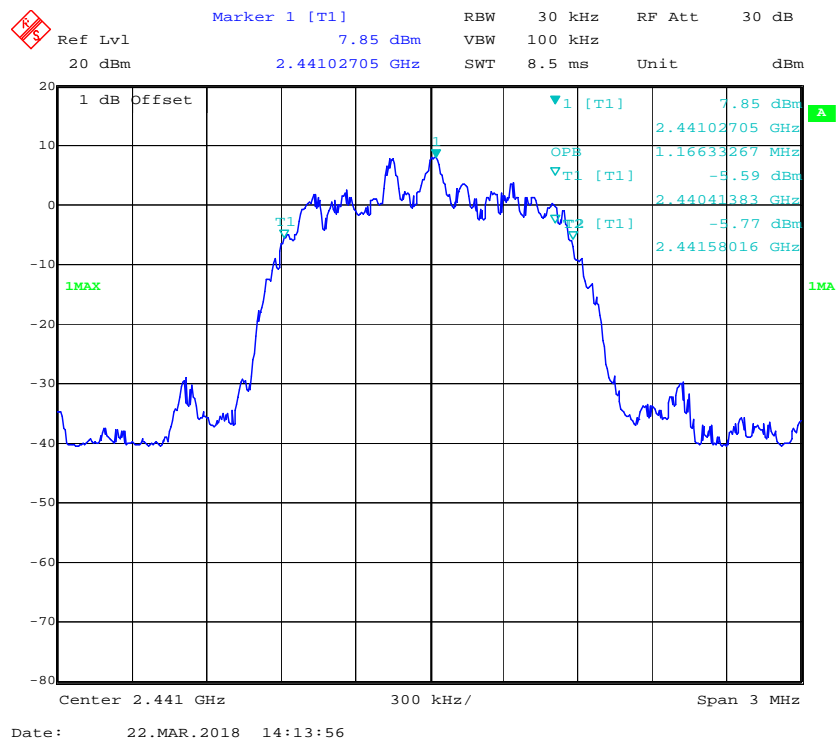


EDR Mode ($\pi/4$ -DQPSK):

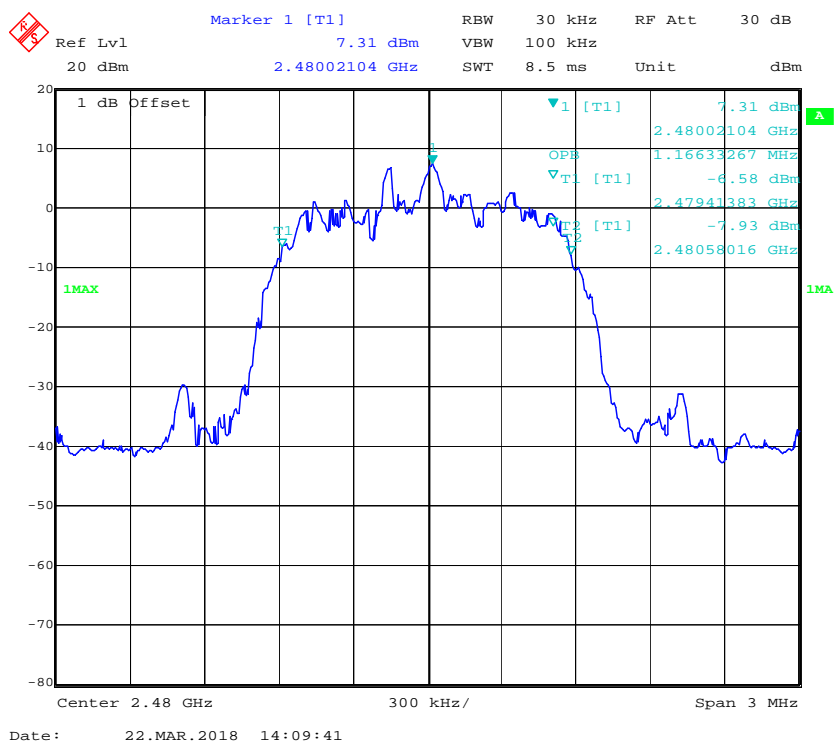
Low Channel



Middle Channel



High Channel

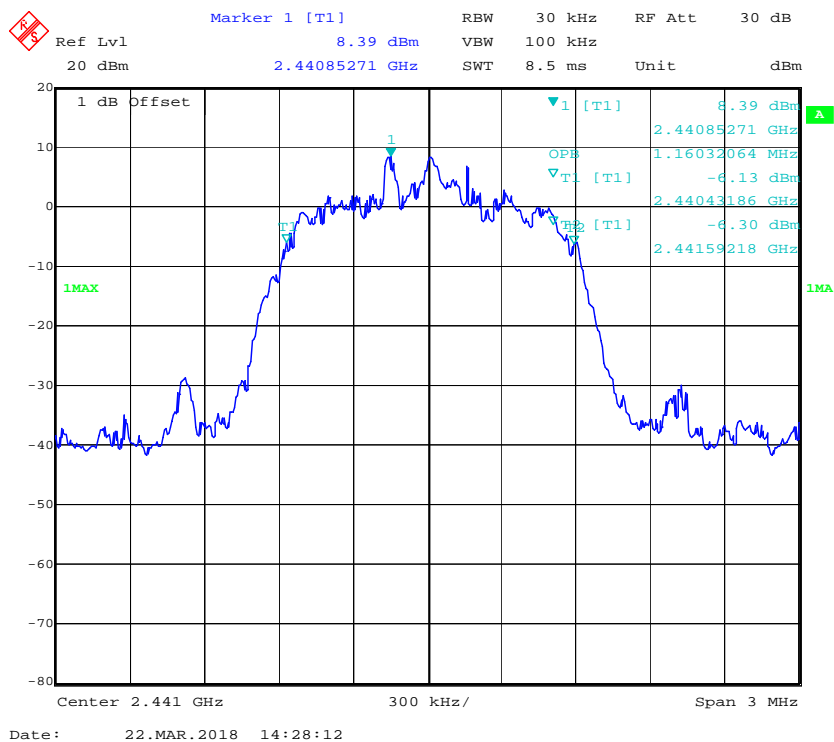


EDR Mode (8-DPSK):

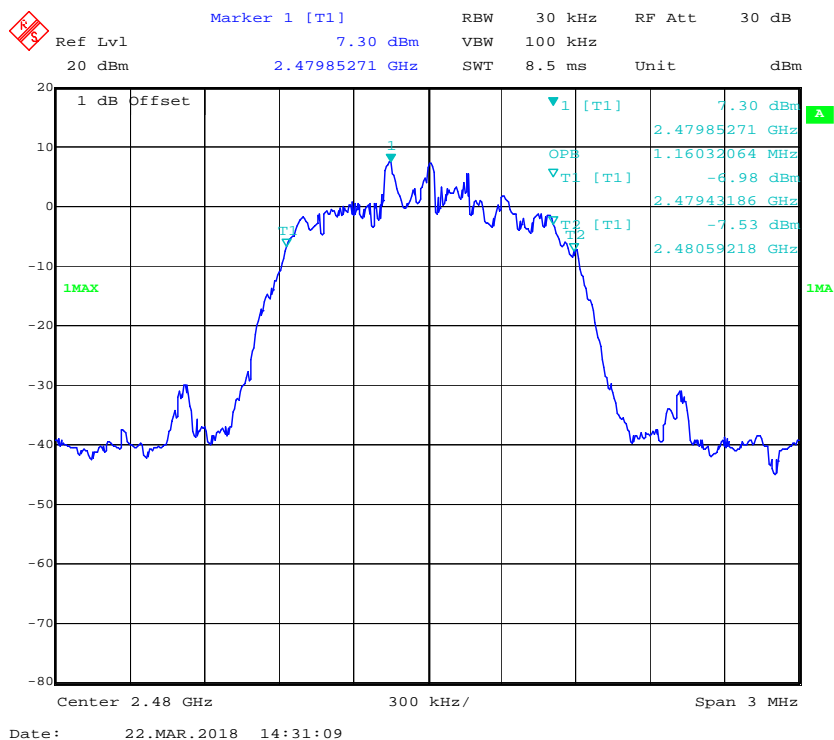
Low Channel



Middle Channel



High Channel



FCC §15.247(a) (1) (iii) & RSS-247 CLAUSE 5.1 d)- QUANTITY OF HOPPING CHANNEL TEST

Applicable Standard

According to FCC §15.247(a) (1) (iii) & RSS-247 Clause 5.1 d)

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Test Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Set the EUT in hopping mode from first channel to last.
3. By using the Max-Hold function record the Quantity of the channel.

Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-----------------|-------------|---------------|------------------|----------------------|
| Rohde & Schwarz | Signal Analyzer | FSIQ26 | 831929/005 | 2017-08-31 | 2018-08-31 |
| Unknow | Coaxial Cable | C-SJ00-0010 | C0010/03 | Each Time | / |

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

| | |
|--------------------|-----------|
| Temperature: | 24.9 °C |
| Relative Humidity: | 38 % |
| ATM Pressure: | 101.2 kPa |

* The testing was performed by Swim Lv on 2018-03-22.

Test Result: Compliance.

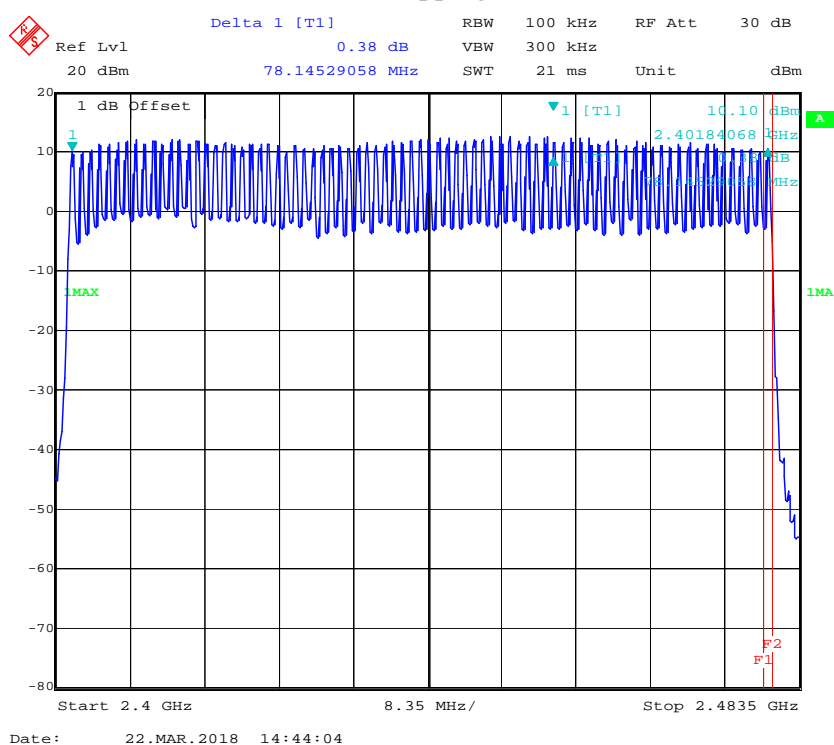
Please refer to following tables and plots

Test Mode: Transmitting

BDR Mode (GFSK):

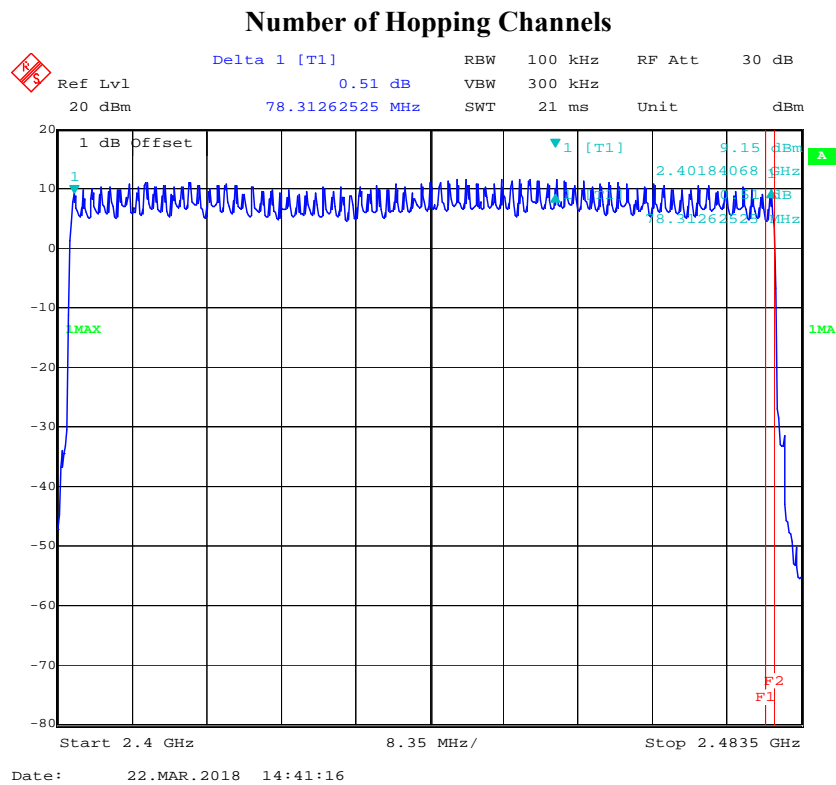
| Frequency Range (MHz) | Number of Hopping Channel | Limit |
|-----------------------|---------------------------|-------|
| 2400-2483.5 | 79 | ≥15 |

Number of Hopping Channels



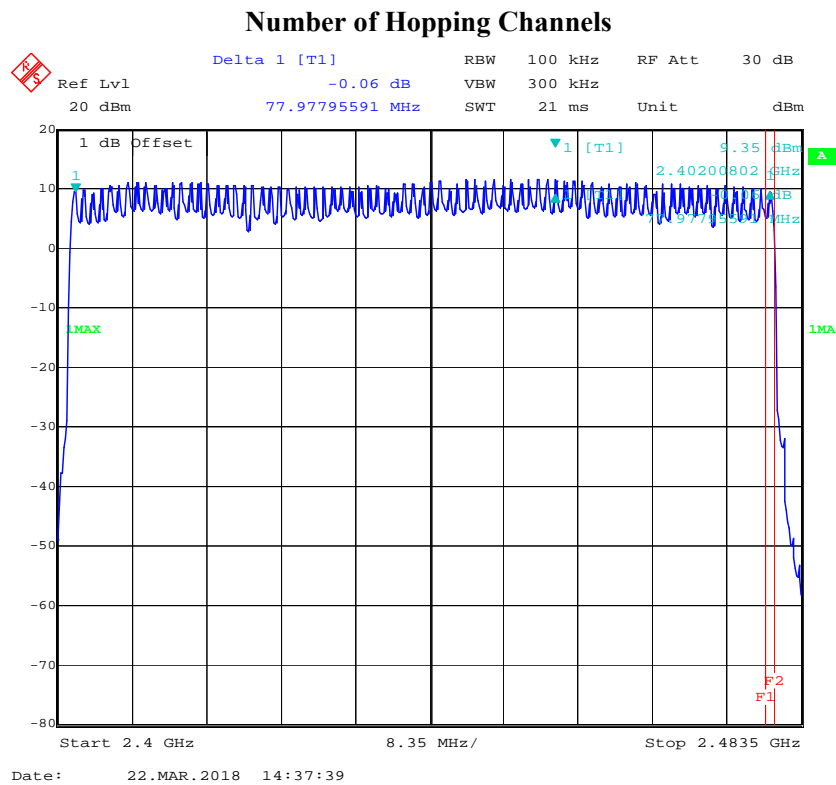
EDR Mode ($\pi/4$ -DQPSK):

| Frequency Range (MHz) | Number of Hopping Channel | Limit |
|-----------------------|---------------------------|-----------|
| 2400-2483.5 | 79 | ≥ 15 |



EDR Mode (8-DPSK):

| Frequency Range (MHz) | Number of Hopping Channel | Limit |
|--------------------------|------------------------------|-------|
| 2400-2483.5 | 79 | ≥15 |



FCC §15.247(a) (1) (iii) & RSS-247 Clause 5.1 d)- TIME OF OCCUPANCY (DWELL TIME)**Applicable Standard**

According to FCC §15.247(a) (1) (iii) & RSS-247 Clause 5.1 d)

Frequency hopping systems in the 2400-2483.5 MHz shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Test Procedure

The EUT was worked in channel hopping; the time of single pulses was tested.

Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-----------------|-------------|---------------|------------------|----------------------|
| Rohde & Schwarz | Signal Analyzer | FSIQ26 | 831929/005 | 2017-08-31 | 2018-08-31 |
| Unknow | Coaxial Cable | C-SJ00-0010 | C0010/03 | Each Time | / |

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

| | |
|--------------------|-----------|
| Temperature: | 24.9 °C |
| Relative Humidity: | 38% |
| ATM Pressure: | 101.2 kPa |

* The testing was performed by Swim Lv on 2018-03-22.

Test Result: Compliance.

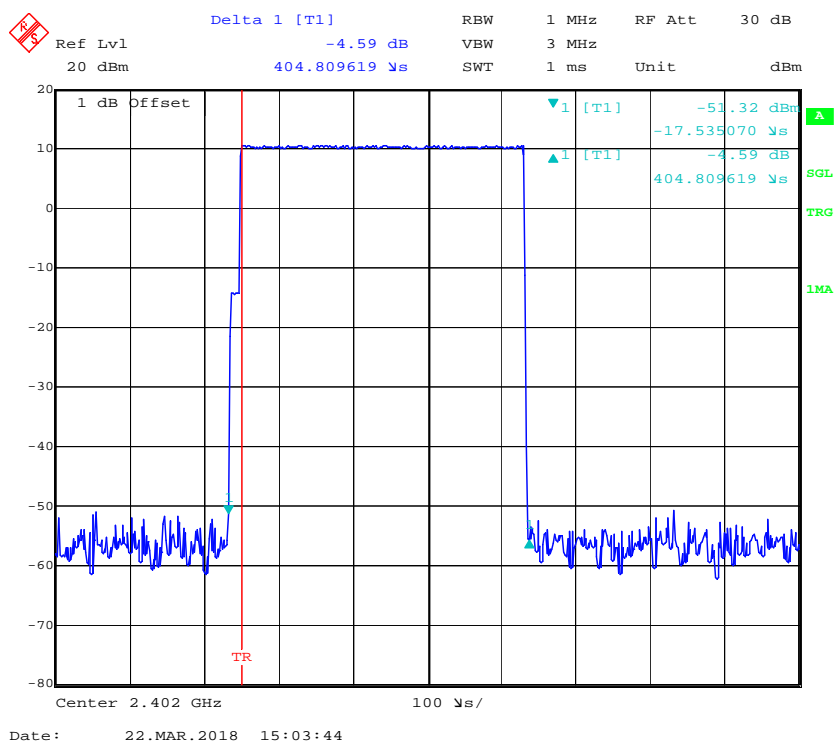
Please refer to following tables and plots

Test Mode: Transmitting

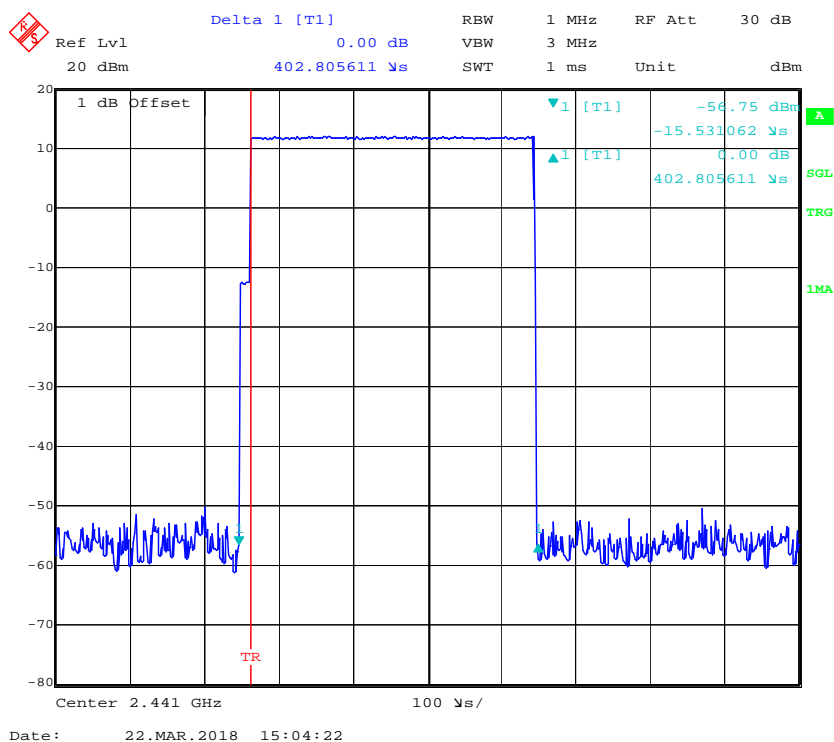
BDR Mode (GFSK):

| Mode | Channel | Pulse Width (ms) | Dwell Time (s) | Limit (s) | Result |
|------------|---|------------------|----------------|-----------|------------|
| DH1 | Low | 0.405 | 0.130 | 0.4 | Compliance |
| | Middle | 0.403 | 0.129 | 0.4 | Compliance |
| | High | 0.403 | 0.129 | 0.4 | Compliance |
| | Note: Dwell time=Pulse time (ms) × (1600/2/79) × 31.6 s | | | | |
| DH3 | Low | 1.673 | 0.268 | 0.4 | Compliance |
| | Middle | 1.673 | 0.268 | 0.4 | Compliance |
| | High | 1.673 | 0.268 | 0.4 | Compliance |
| | Note: Dwell time=Pulse time (ms) × (1600/4/79) × 31.6 s | | | | |
| DH5 | Low | 2.936 | 0.313 | 0.4 | Compliance |
| | Middle | 2.926 | 0.312 | 0.4 | Compliance |
| | High | 2.926 | 0.312 | 0.4 | Compliance |
| | Note: Dwell time=Pulse time (ms) × (1600/6/79) × 31.6 s | | | | |

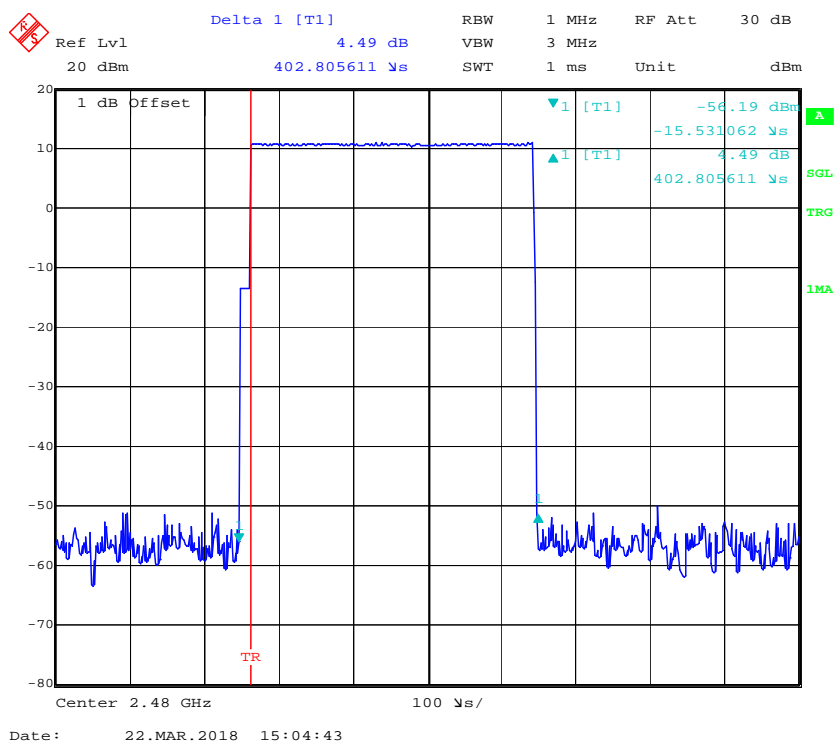
DH1: Low Channel



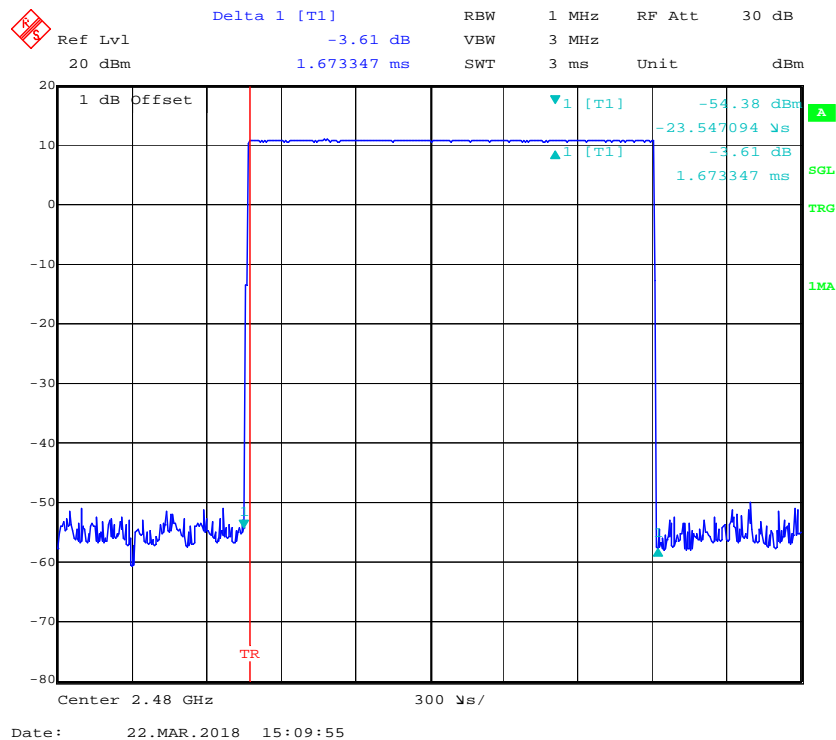
DH1: Middle Channel



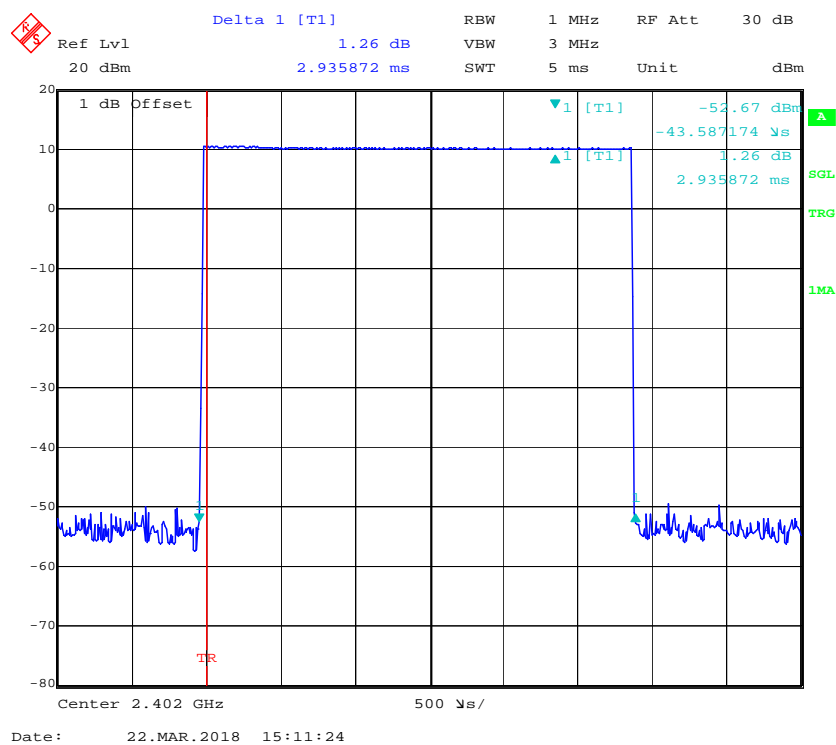
DH1: High Channel

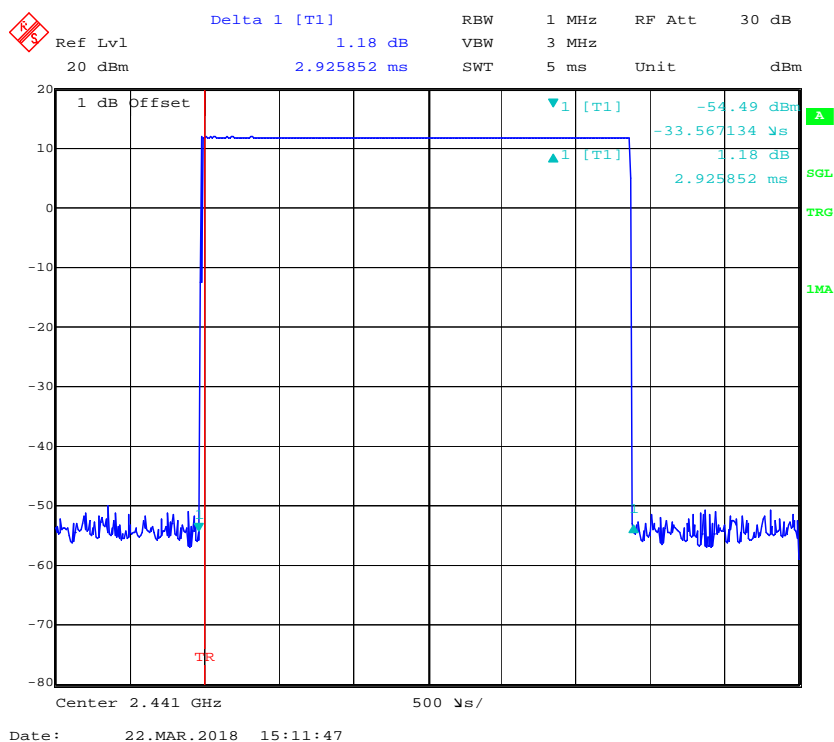
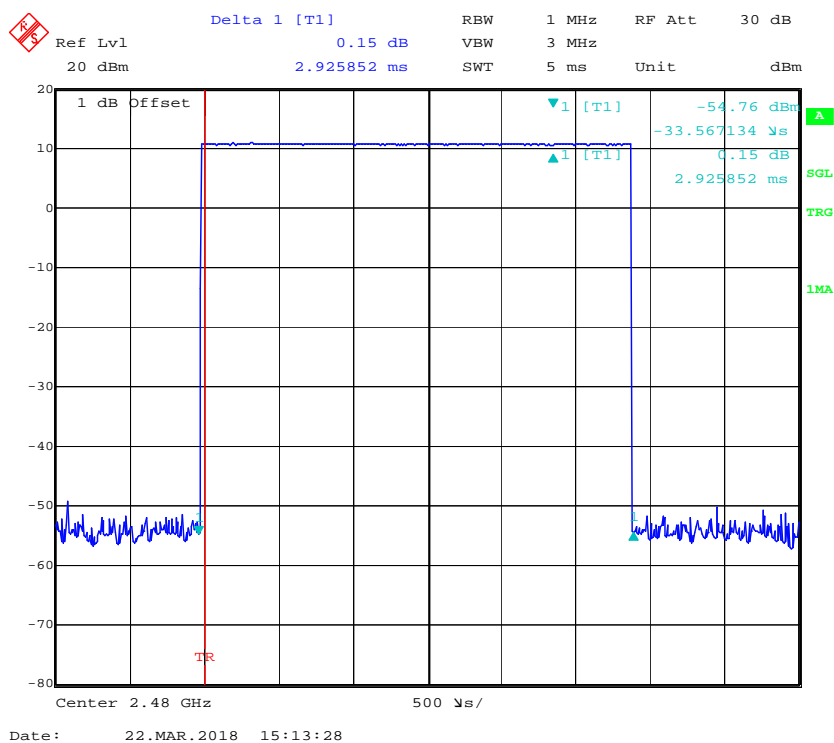


DH3: High Channel



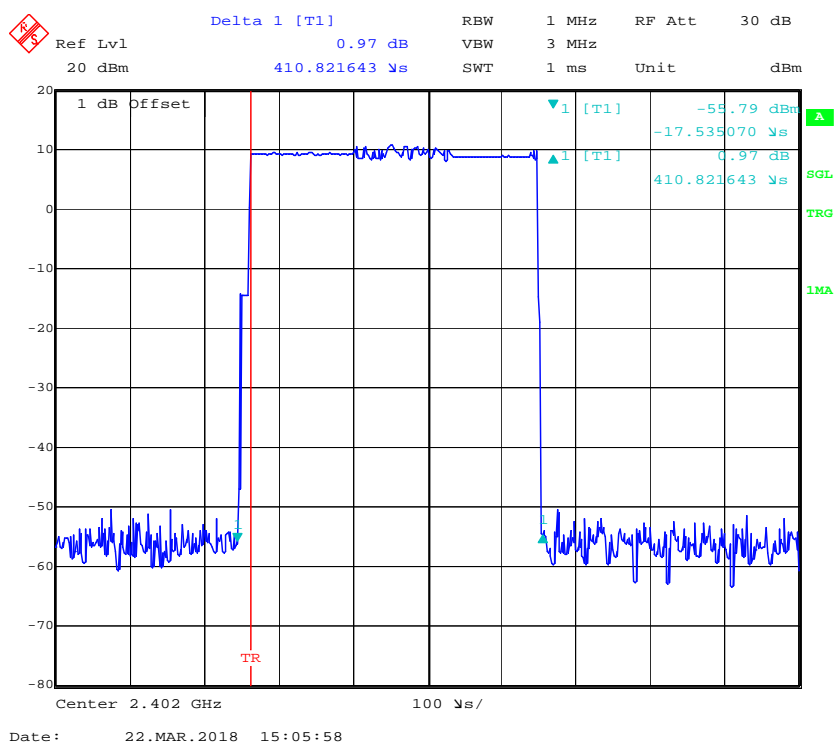
DH5: Low Channel



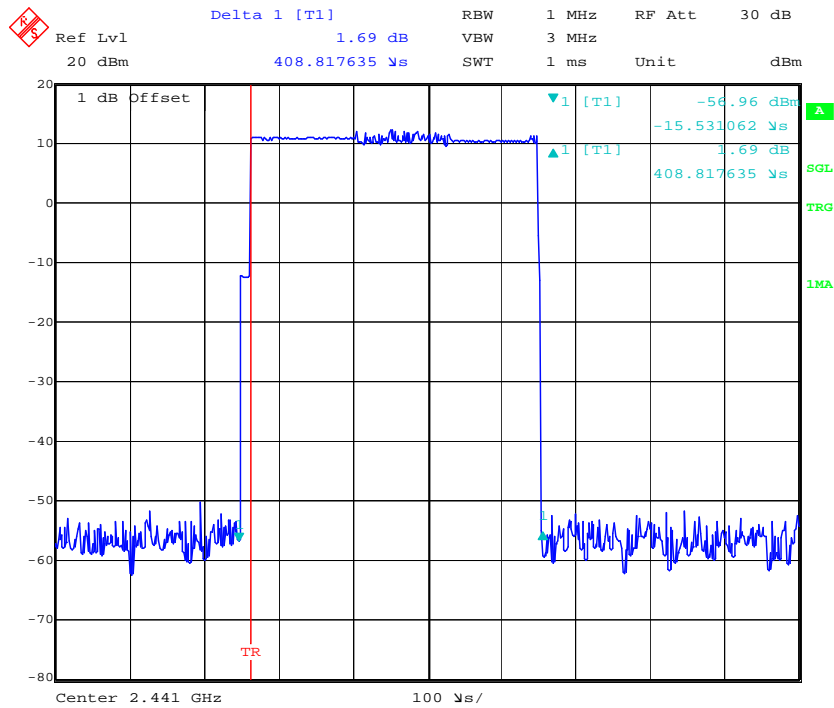
DH5: Middle Channel**DH5: High Channel**

EDR Mode ($\pi/4$ -DQPSK):

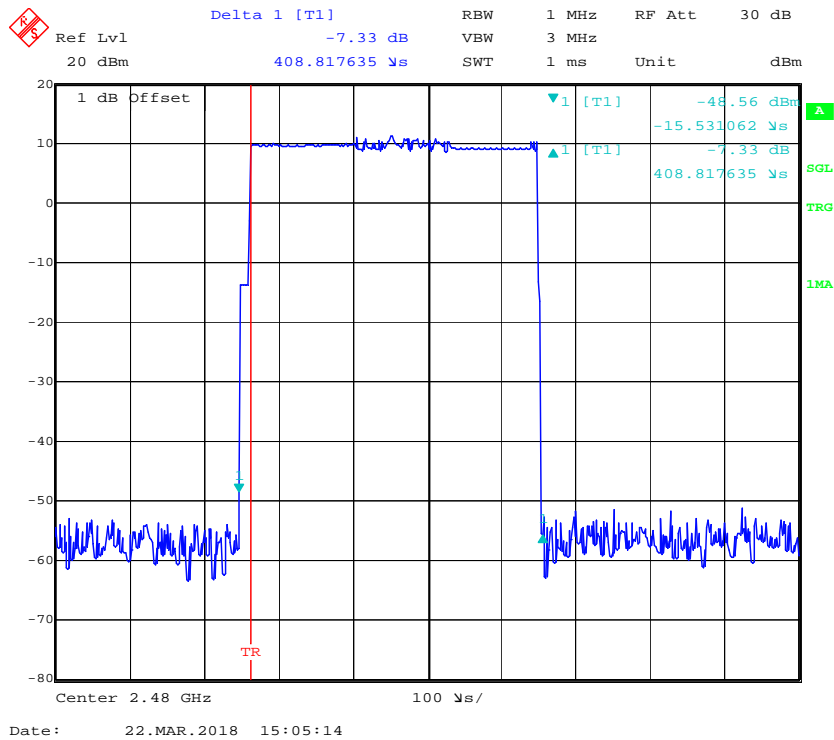
| Mode | Channel | Pulse Width (ms) | Dwell Time (s) | Limit (s) | Result |
|-------------|---|------------------|----------------|-----------|------------|
| 2DH1 | Low | 0.411 | 0.132 | 0.4 | Compliance |
| | Middle | 0.409 | 0.131 | 0.4 | Compliance |
| | High | 0.409 | 0.131 | 0.4 | Compliance |
| | Note: Dwell time=Pulse time (ms) \times (1600/2/79) \times 31.6 s | | | | |
| 2DH3 | Low | 1.673 | 0.268 | 0.4 | Compliance |
| | Middle | 1.673 | 0.268 | 0.4 | Compliance |
| | High | 1.673 | 0.268 | 0.4 | Compliance |
| | Note: Dwell time=Pulse time (ms) \times (1600/4/79) \times 31.6 s | | | | |
| 2DH5 | Low | 2.926 | 0.312 | 0.4 | Compliance |
| | Middle | 2.926 | 0.312 | 0.4 | Compliance |
| | High | 2.936 | 0.313 | 0.4 | Compliance |
| | Note: Dwell time=Pulse time (ms) \times (1600/6/79) \times 31.6 s | | | | |

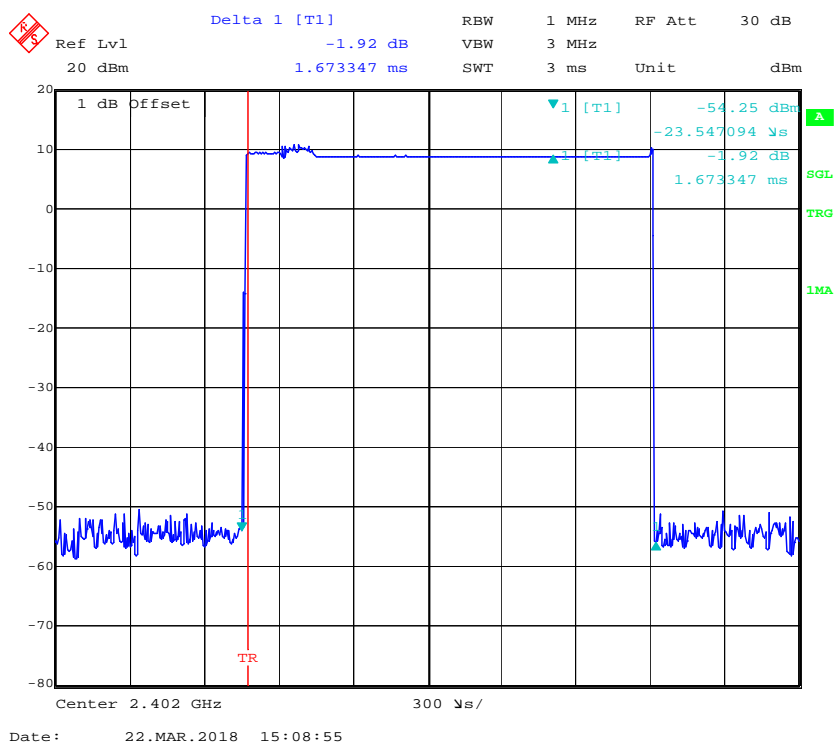
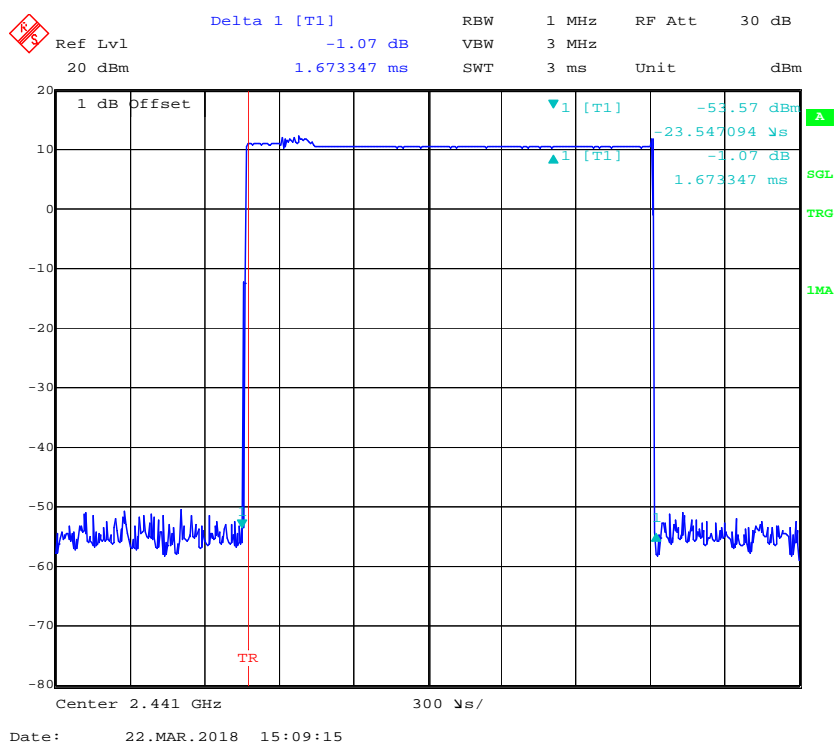
2DH1: Low Channel

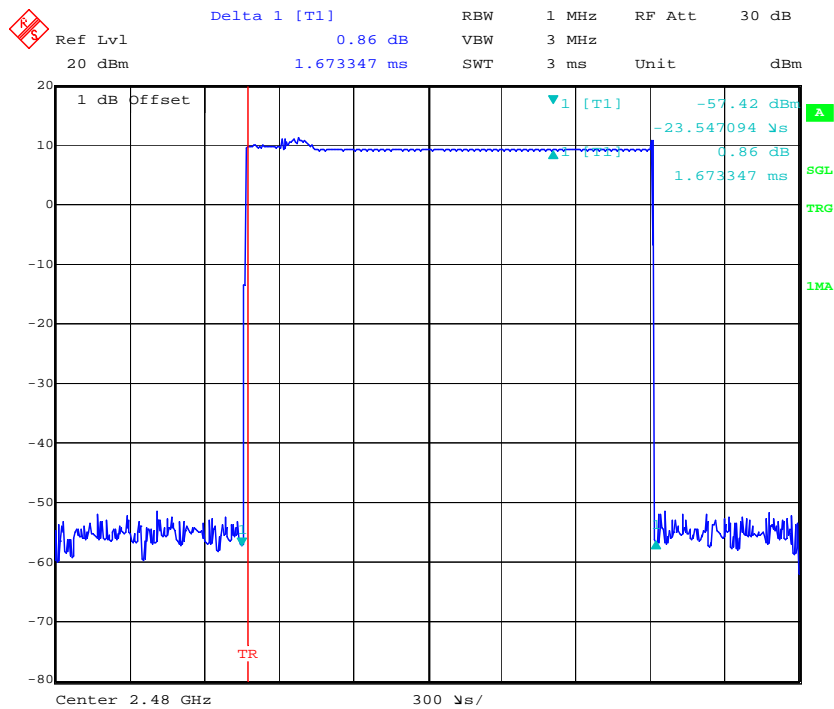
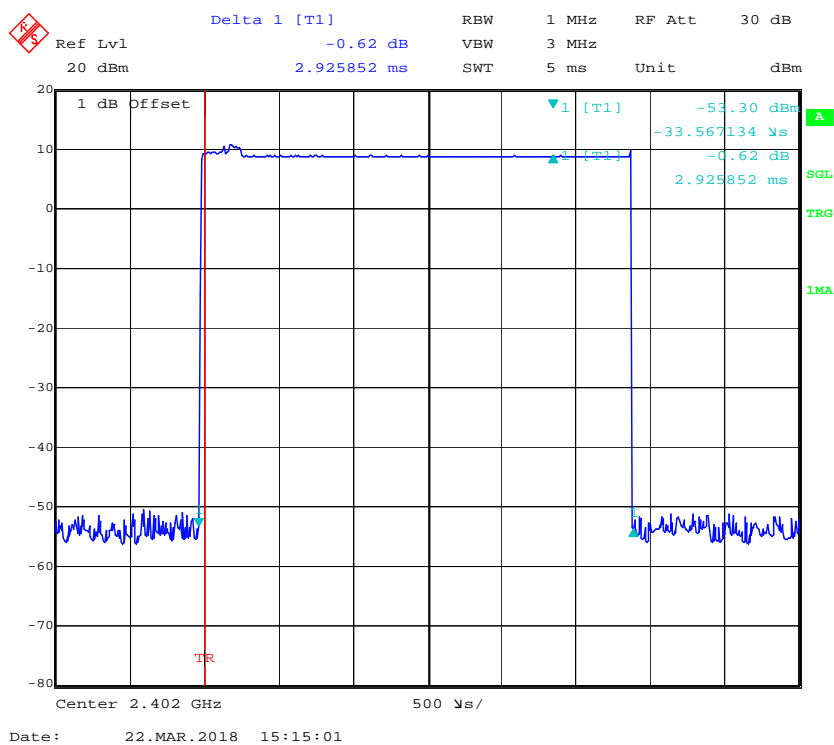
2DH1: Middle Channel

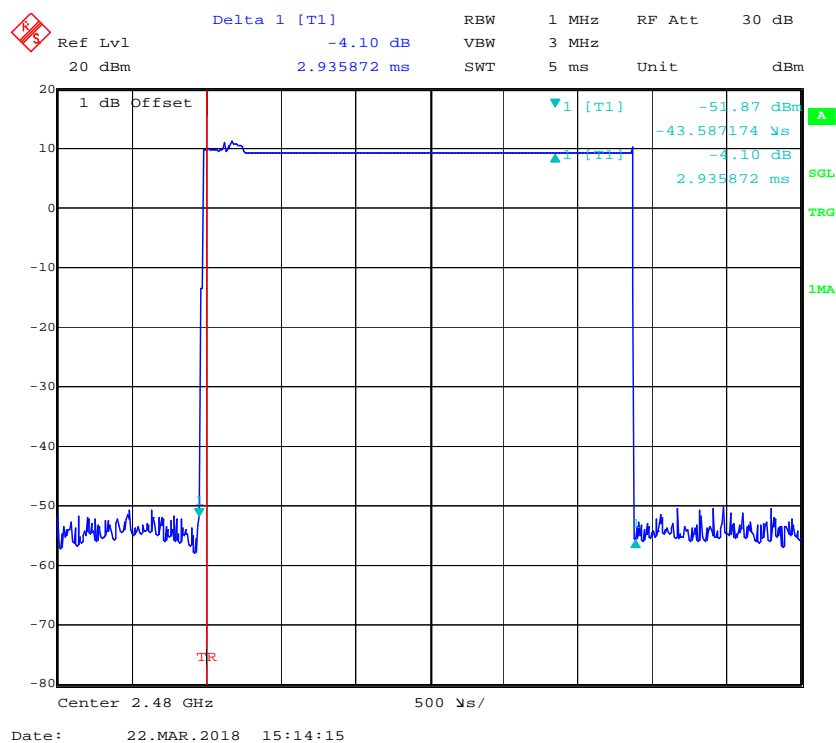
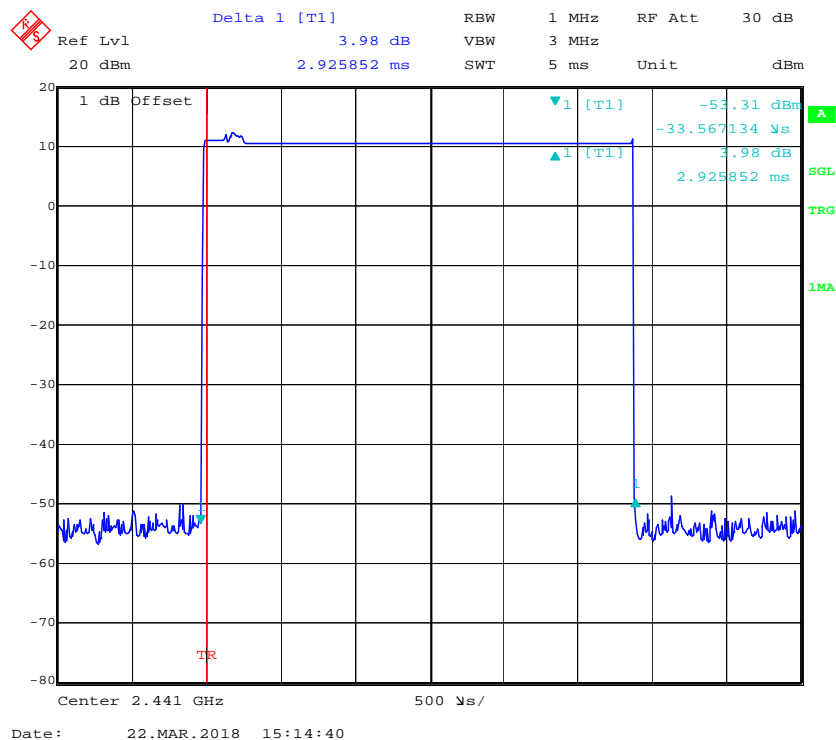


2DH1: High Channel



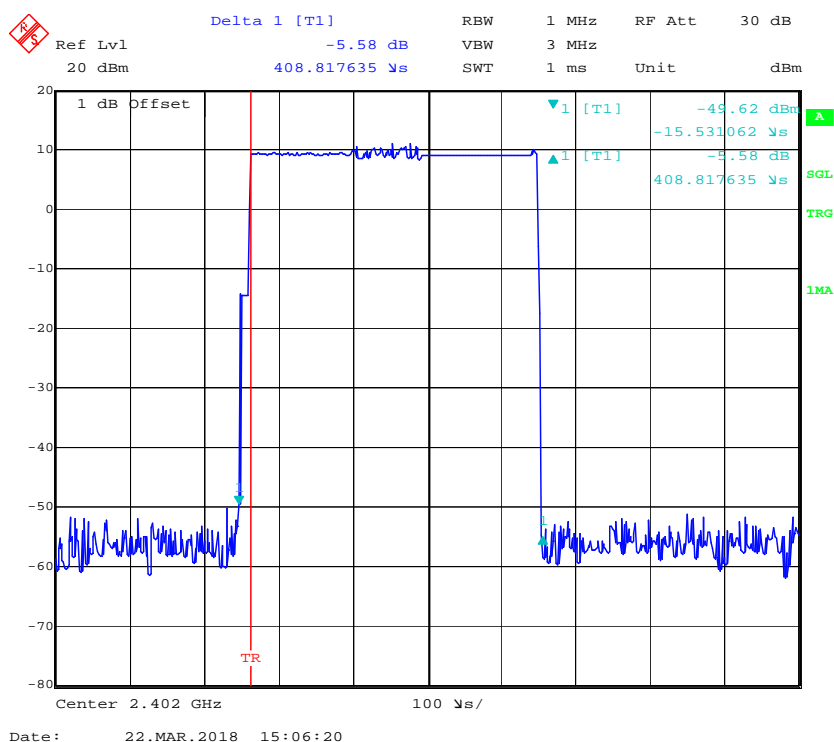
2DH3: Low Channel**2DH3: Middle Channel**

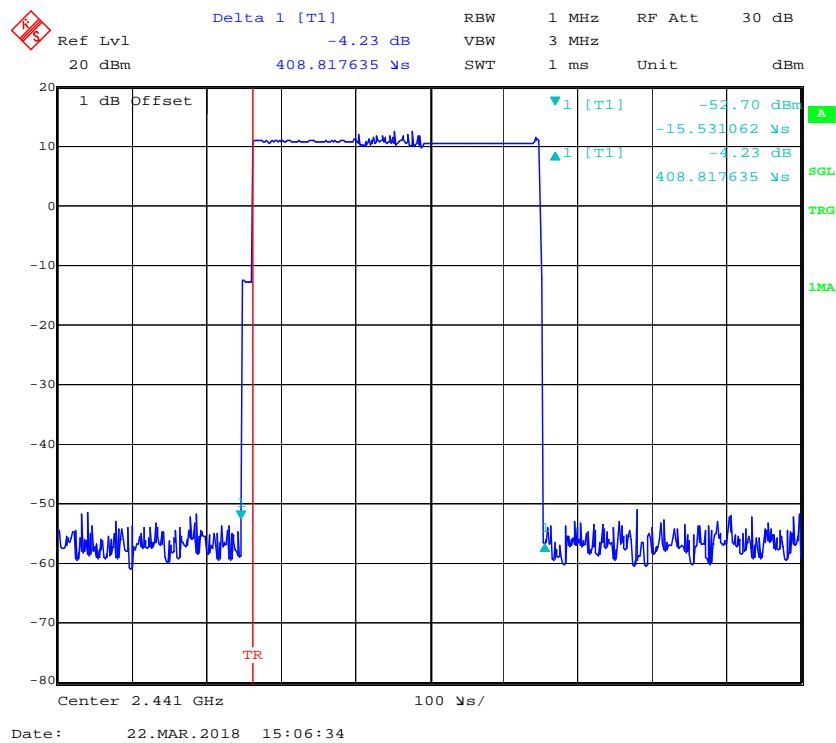
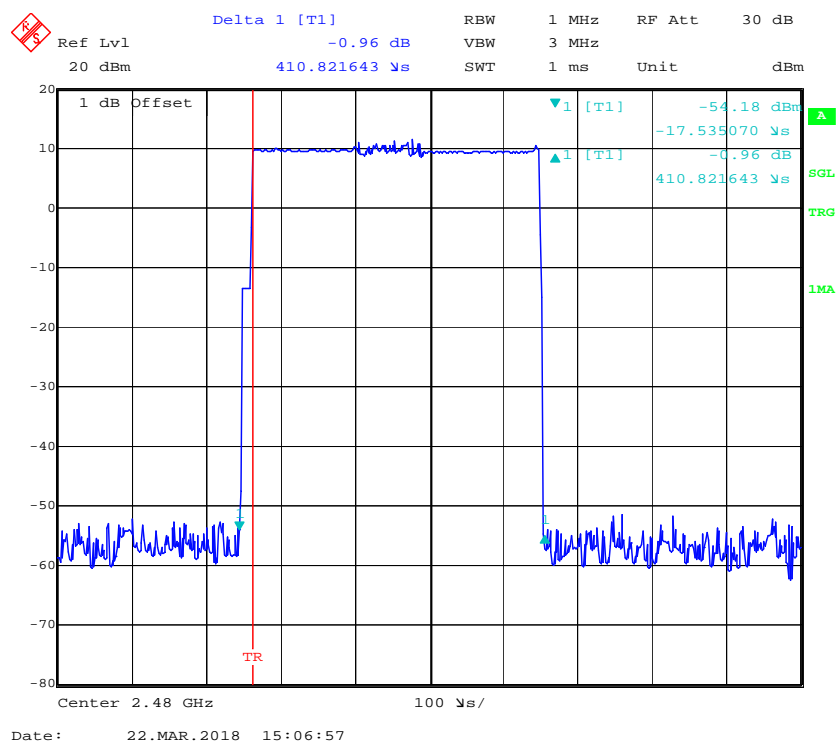
2DH3: High Channel**2DH5: Low Channel**

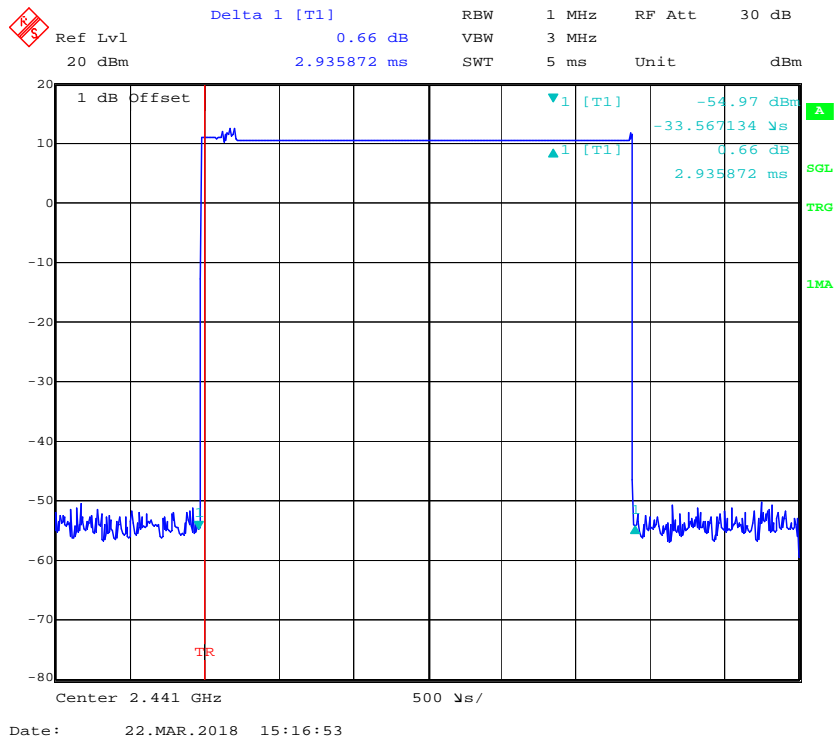
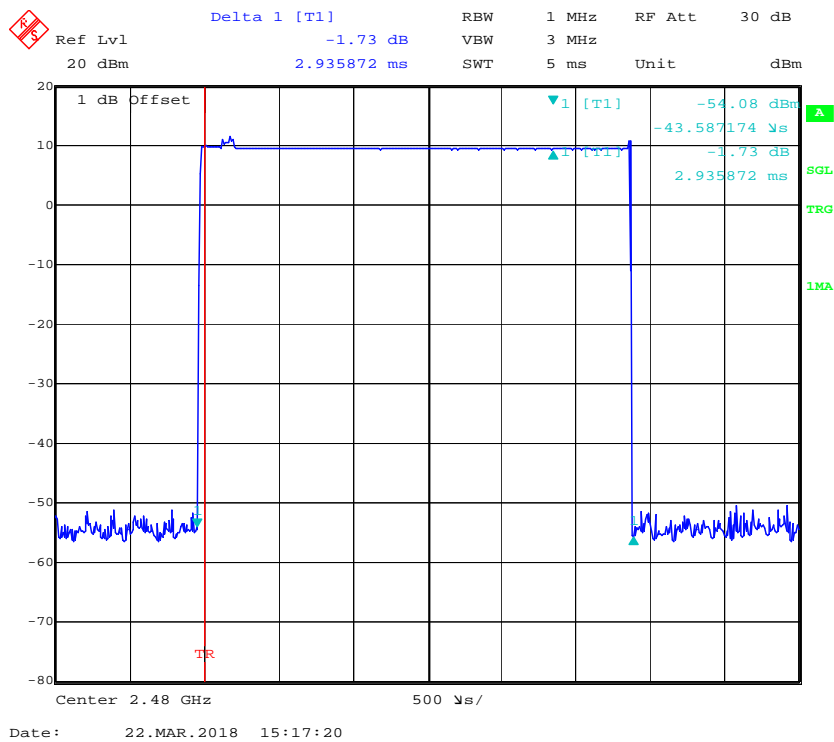
2DH5: Middle Channel

EDR Mode (8-DPSK):

| Mode | Channel | Pulse Width (ms) | Dwell Time (s) | Limit (s) | Result |
|-------------|---|------------------|----------------|-----------|------------|
| 3DH1 | Low | 0.409 | 0.131 | 0.4 | Compliance |
| | Middle | 0.409 | 0.131 | 0.4 | Compliance |
| | High | 0.411 | 0.132 | 0.4 | Compliance |
| | Note: Dwell time=Pulse time (ms) × (1600/2/79) × 31.6 s | | | | |
| 3DH3 | Low | 1.673 | 0.268 | 0.4 | Compliance |
| | Middle | 1.673 | 0.268 | 0.4 | Compliance |
| | High | 1.673 | 0.268 | 0.4 | Compliance |
| | Note: Dwell time=Pulse time (ms) × (1600/4/79) × 31.6 s | | | | |
| 3DH5 | Low | 2.936 | 0.313 | 0.4 | Compliance |
| | Middle | 2.936 | 0.313 | 0.4 | Compliance |
| | High | 2.936 | 0.313 | 0.4 | Compliance |
| | Note: Dwell time=Pulse time (ms) × (1600/6/79) × 31.6 s | | | | |

3DH1: Low Channel

3DH1: Middle Channel**3DH1: High Channel**

3DH5: Middle Channel**3DH5: High Channel**

FCC §15.247(b) (1) & RSS-247 Clause 5.4 b) - PEAK OUTPUT POWER MEASUREMENT

Applicable Standard

According to §15.247(b) (1), for frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts

According to RSS-247 Clause 5.4 b)

- b) For FHSs operating in the band 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1.0 W if the hopset uses 75 or more hopping channels; the maximum peak conducted output power shall not exceed 0.125 W if the hopset uses less than 75 hopping channels. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e).

Test Procedure

1. Place the EUT on a bench and set in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.
3. Add a correction factor to the display.

Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-----------------|-------------|---------------|------------------|----------------------|
| Rohde & Schwarz | Signal Analyzer | FSIQ26 | 831929/005 | 2017-08-31 | 2018-08-31 |
| Unknow | Coaxial Cable | C-SJ00-0010 | C0010/03 | Each Time | / |

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

| | |
|--------------------|-----------|
| Temperature: | 24.9 °C |
| Relative Humidity: | 38% |
| ATM Pressure: | 101.2 kPa |

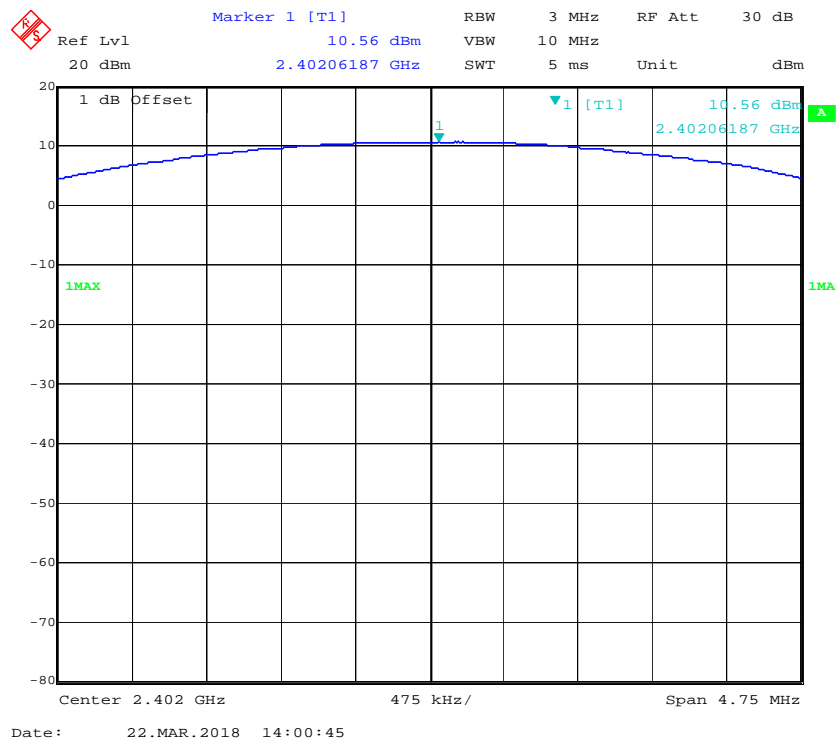
* The testing was performed by Swim Lv on 2018-03-22.

Test Result: Compliance.

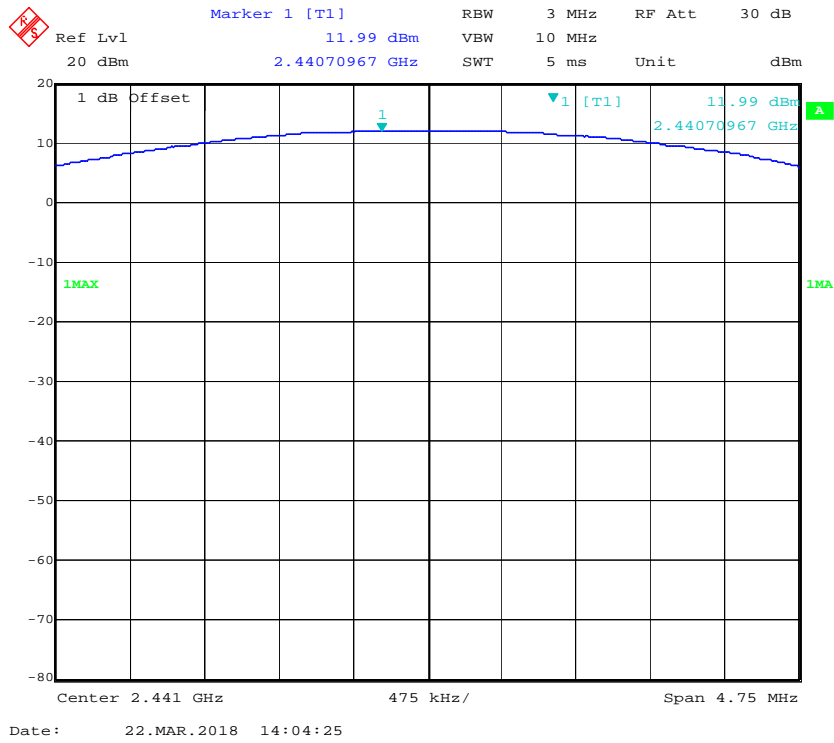
Test Mode: Transmitting

| Mode | Frequency (MHz) | Peak Conducted Output power (dBm) | Limit (dBm) |
|----------------------------|-----------------|-----------------------------------|-------------|
| BDR Mode (GFSK) | 2402 | 10.56 | 21 |
| | 2441 | 11.99 | 21 |
| | 2480 | 10.90 | 21 |
| EDR Mode ($\pi/4$ -DQPSK) | 2402 | 11.40 | 21 |
| | 2441 | 12.81 | 21 |
| | 2480 | 11.73 | 21 |
| EDR Mode (8-DPSK) | 2402 | 11.51 | 21 |
| | 2441 | 13.00 | 21 |
| | 2480 | 11.99 | 21 |

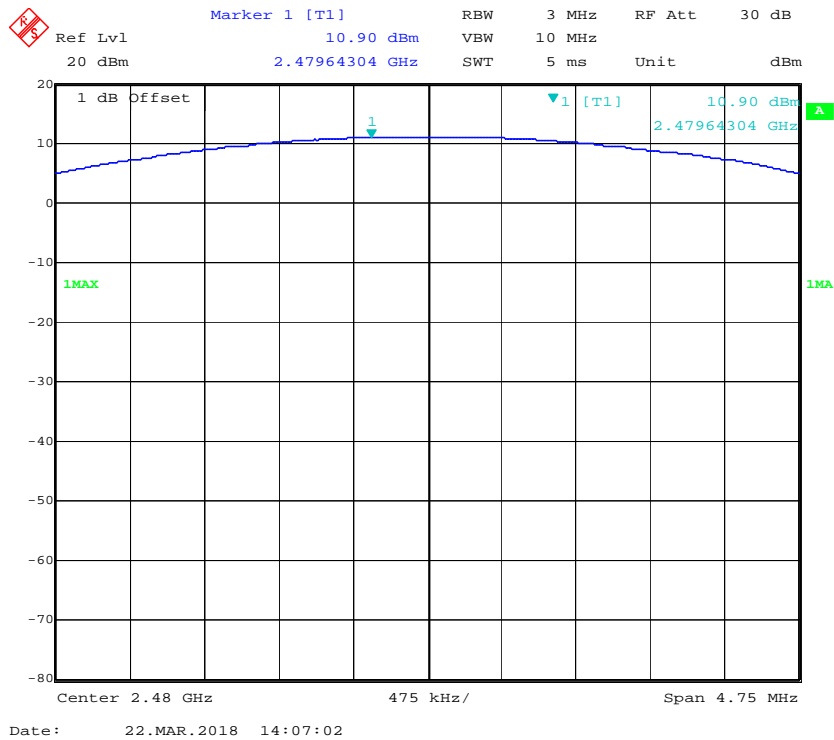
Note: The data above was tested in conducted mode.

BDR Mode (GFSK):**Low Channel**

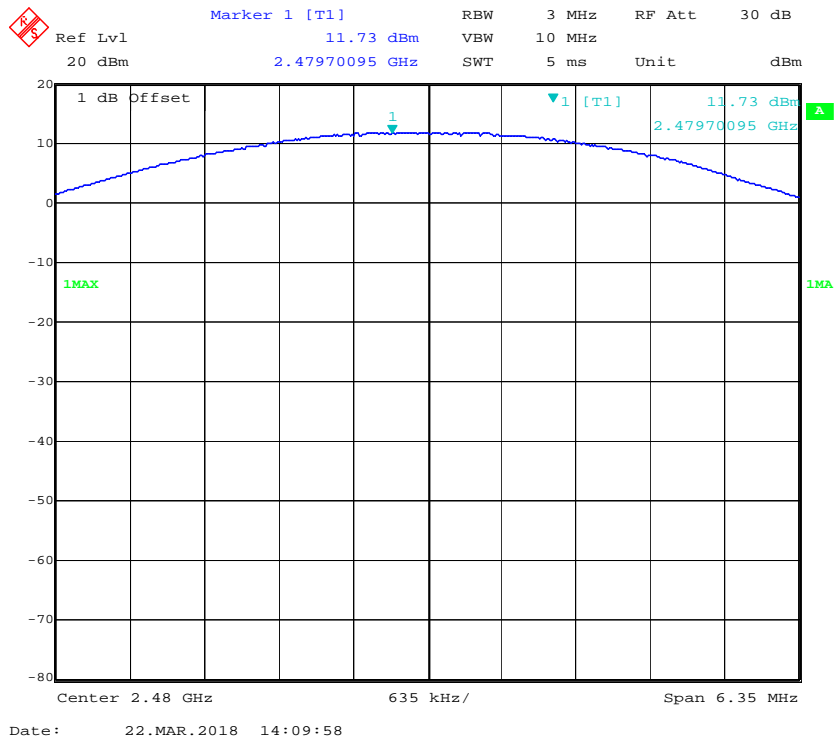
Middle Channel



High Channel

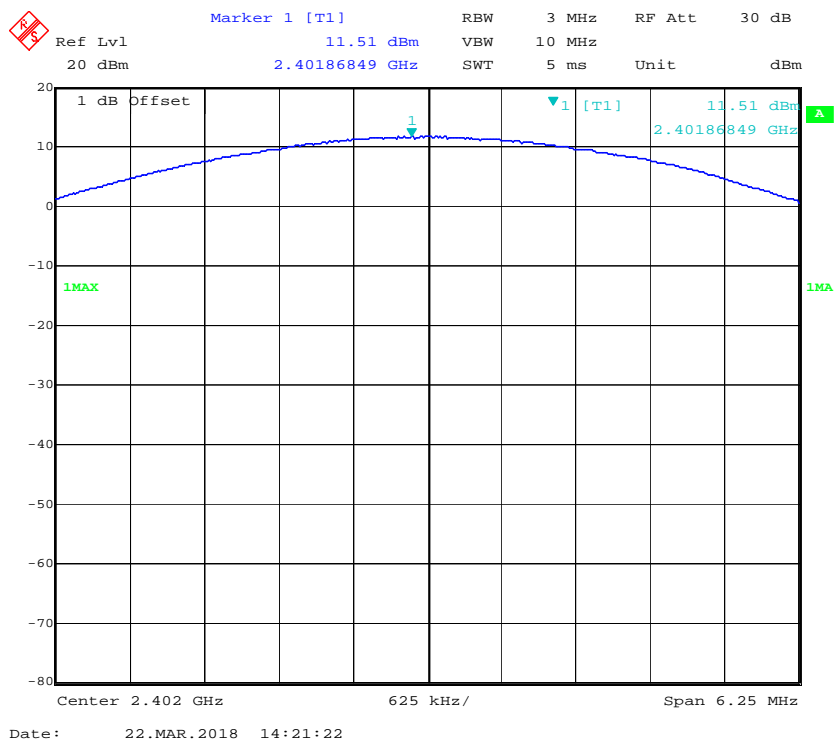


High Channel

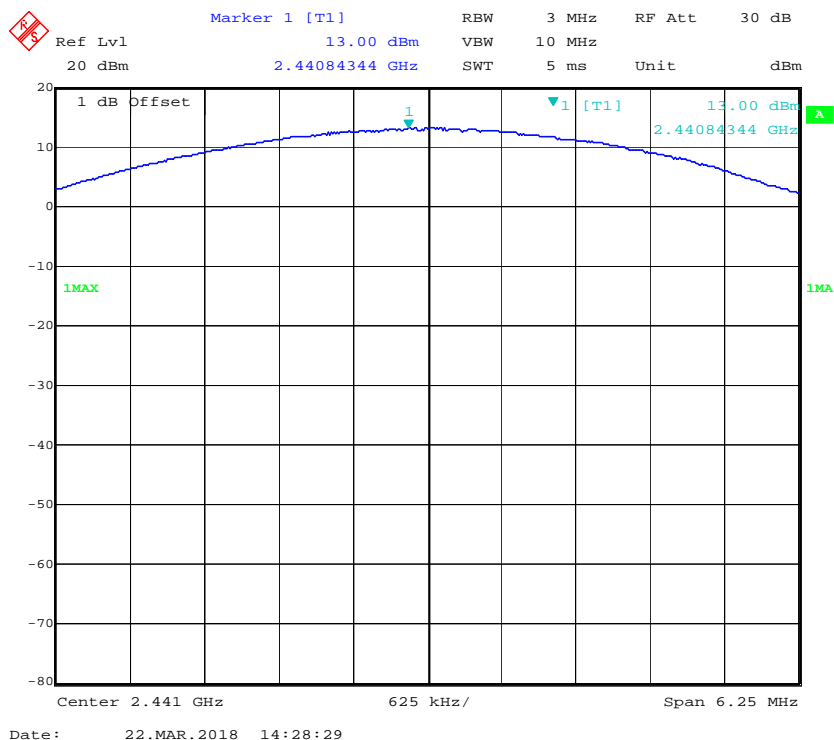


EDR Mode (8-DPSK):

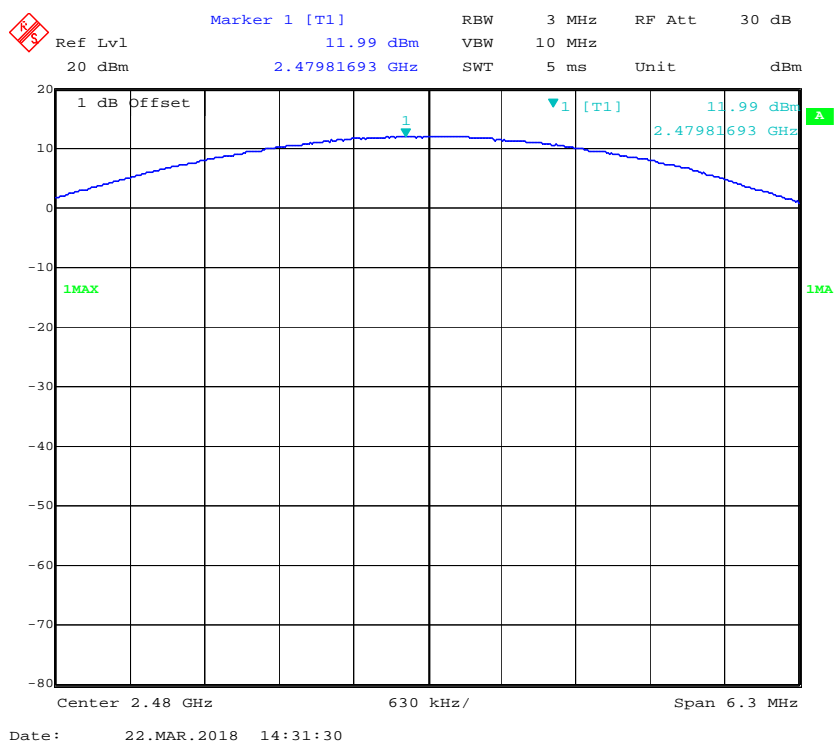
Low Channel



Middle Channel



High Channel



FCC §15.247(d)& RSS-247 Clause 5.5 - BAND EDGES TESTING

Applicable Standard

According to FCC §15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. 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)).

According to RSS-247 Clause 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW/ VBW of spectrum analyzer to 100/300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-----------------|-------------|---------------|------------------|----------------------|
| Rohde & Schwarz | Signal Analyzer | FSIQ26 | 831929/005 | 2017-08-31 | 2018-08-31 |
| Unknown | Coaxial Cable | C-SJ00-0010 | C0010/03 | Each Time | / |

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

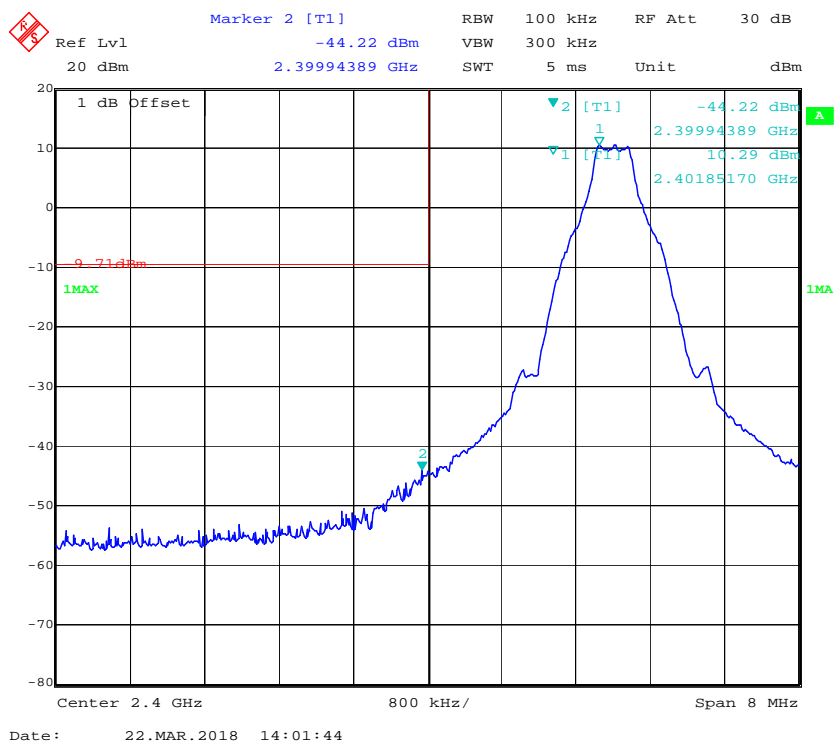
| | |
|--------------------|-----------|
| Temperature: | 24.9 °C |
| Relative Humidity: | 38 % |
| ATM Pressure: | 101.2 kPa |

* The testing was performed by Swim Lv on 2018-03-22.

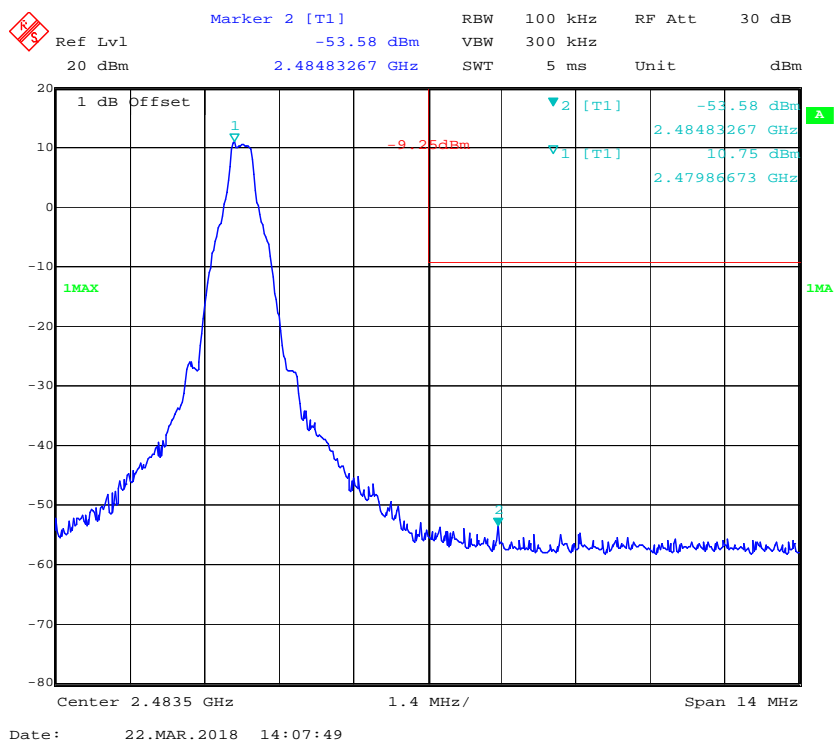
Test Result: Compliance

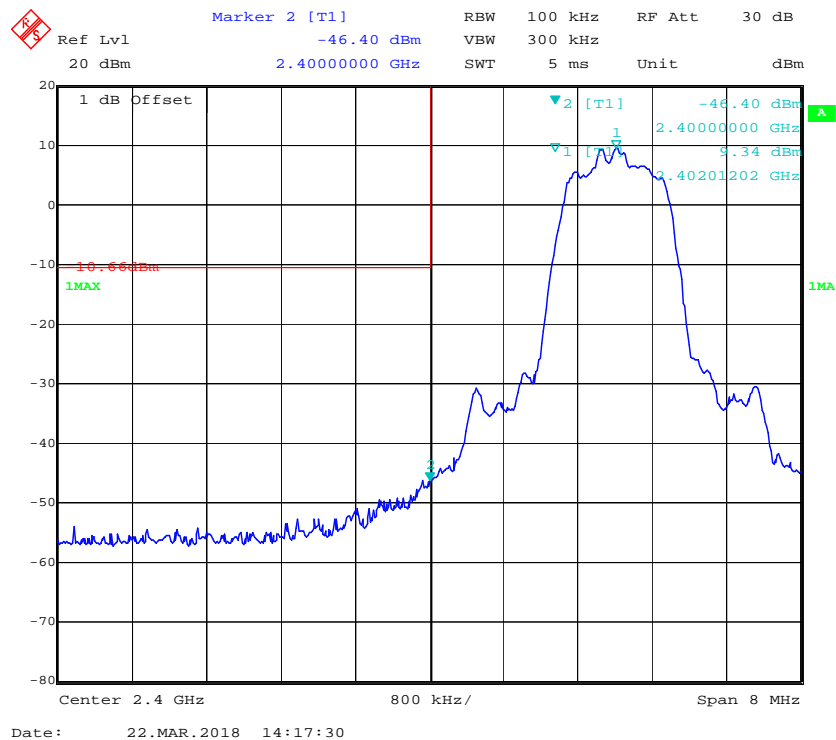
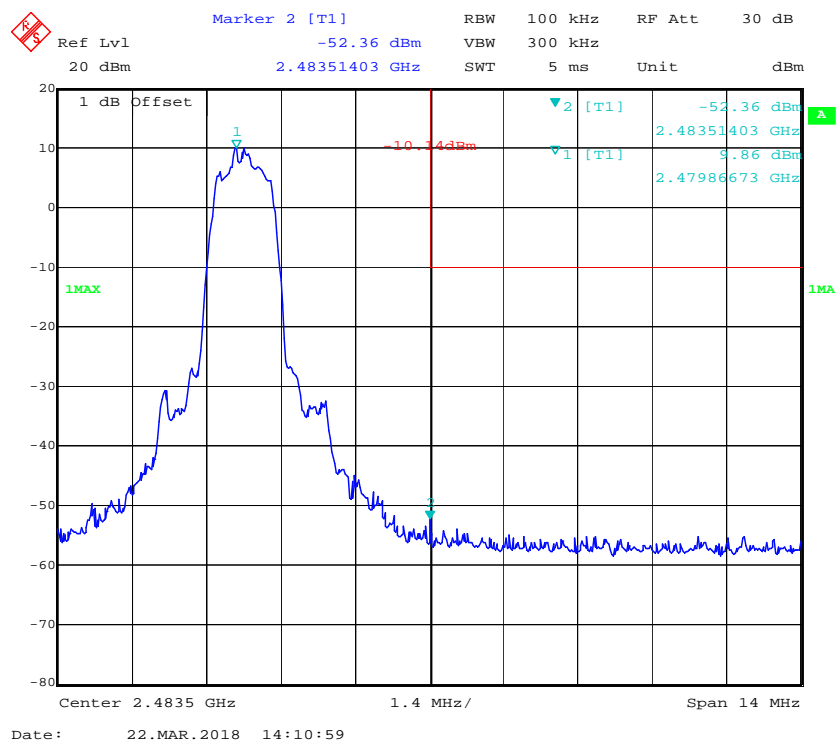
Single Channel Mode,
BDR Mode (GFSK):

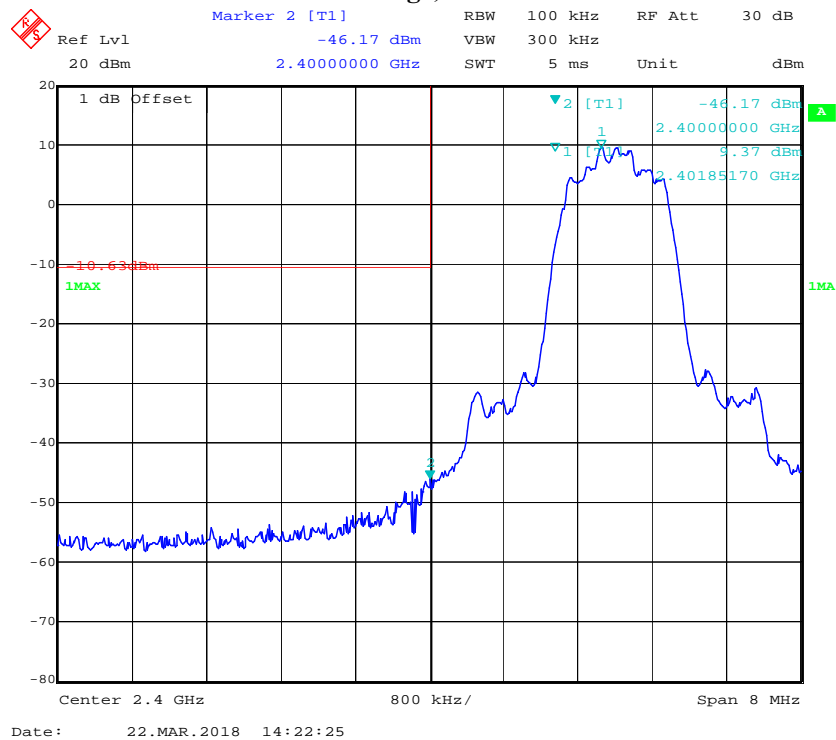
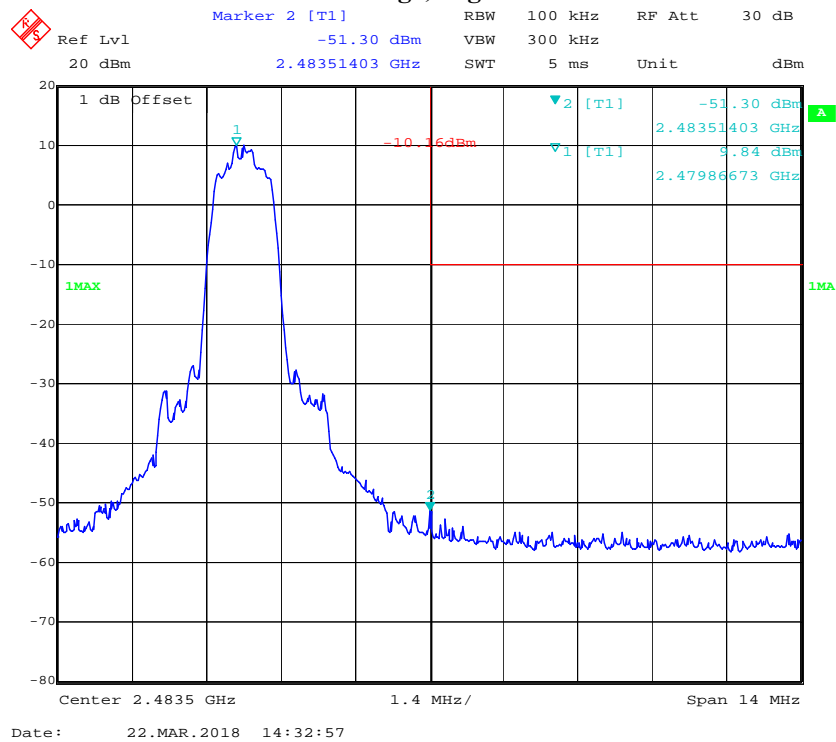
Band Edge, Left Side



Band Edge, Right Side

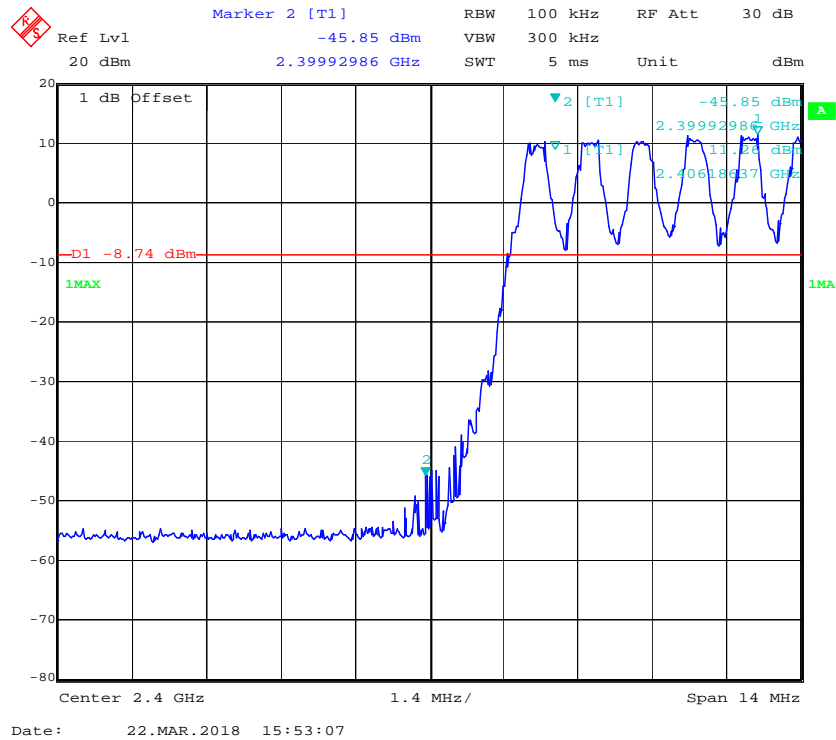


*EDR Mode ($\pi/4$ -DQPSK):***Band Edge, Left Side****Band Edge, Right Side**

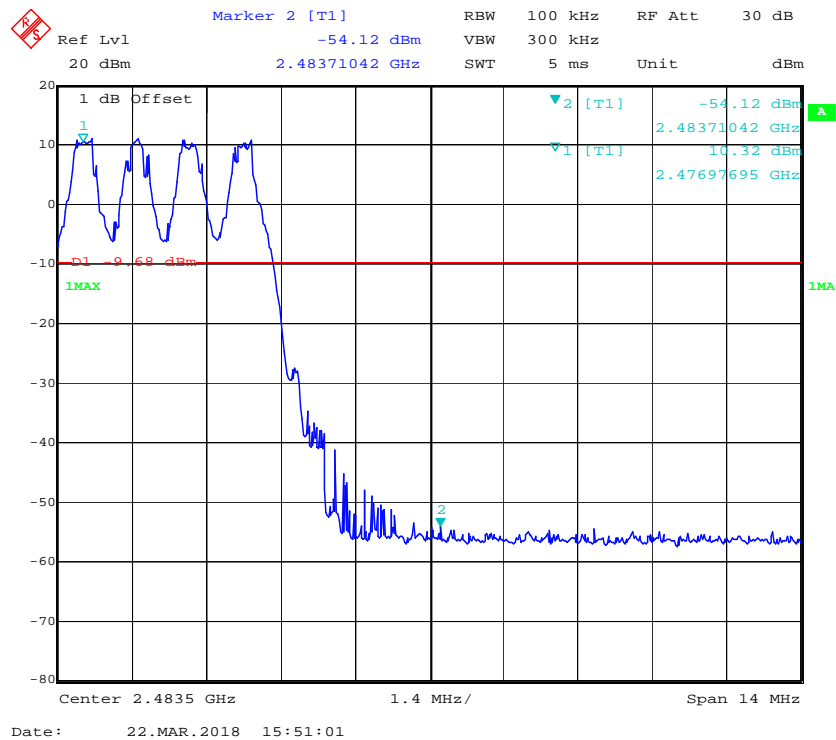
*EDR Mode (8-DPSK):***Band Edge, Left Side****Band Edge, Right Side**

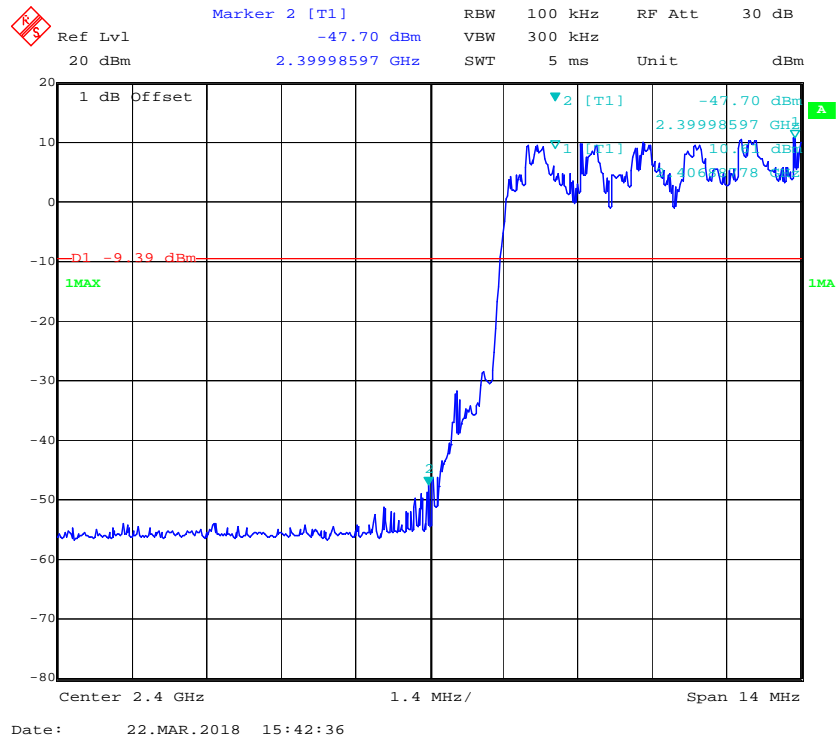
Hopping Mode,
BDR Mode (GFSK):

Band Edge, Left Side



Band Edge, Right Side



*EDR Mode ($\pi/4$ -DQPSK):***Band Edge, Left Side****Band Edge, Right Side**