

# FCC PART 15.247 TEST REPORT

For

**Alinket Electronic Technology (Shanghai) Co., Ltd.**

Room 403, No.10, Lane 198, Zhangheng Road, Pudong, Shanghai, China

**FCC ID: 2AELJ-ALXCOMBA**

|                                                                                                                                                                                                                                                   |                                                             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| <b>Report Type:</b><br>Original Report                                                                                                                                                                                                            | <b>Product Type:</b><br>Alinket Wi-Fi & BT Combo Controller |
| <b>Test Engineer:</b> Chris Wang <i>Chris Wang</i>                                                                                                                                                                                                |                                                             |
| <b>Report Number:</b> RKS161031009-00A                                                                                                                                                                                                            |                                                             |
| <b>Report Date:</b> 2016-11-01                                                                                                                                                                                                                    |                                                             |
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**Note:** This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

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## GENERAL INFORMATION

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### Product Description for Equipment under Test (EUT)

The Alinket Electronic Technology (Shanghai) Co., Ltd.'s product, model number: ALXC2X (FCC ID: 2AELJ-ALXCOMBA) or the "EUT" in this report was a Alinket Wi-Fi & BT Combo Controller, which was measured approximately: 28mm(L)×14.3mm(W)×2.2 mm(H), rated input voltage: DC 3.3V.

*\*The product's series model number: ALXC1X & ALX85X. The difference between them was explained in the declaration letter.*

*\*All measurement and test data in this report was gathered from production sample serial number: 20160527001.*

*(Assigned by BACL, Kunshan). The EUT was received on 2016-05-27.*

### Objective

This test report is prepared on behalf of Alinket Electronic Technology (Shanghai) Co., Ltd. in accordance with Part 2-Subpart J, Part 15-Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

### Related Submittal(s)/Grant(s)

FCC part 15.407 NII and Part 15.247 DTS submissions with FCC ID: 2AELJ-ALXCOMBA.

### Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices and DA 00-705 March 30, 2000.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement uncertainty with radiated emission is 5.91 dB for 30MHz-1GHz, and 4.92 dB for above 1GHz, 1.95dB for conducted measurement.

### **Test Facility**

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road,Kunshan,Jiangsu province,China.

Test site at Bay Area Compliance Laboratories Corp. (Kunshan) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 06, 2014. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 815570. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

The system was configured for testing in an engineering mode which was controlled by the software.

### EUT Exercise Software

BLUETOOL\_MI\_1.9.4.4

GFSK: Power level 9

$\pi$ /4-DQPSK: Power level 9

8DPSK: Power level 9

### Special Accessories

No special accessory.

### Equipment Modifications

No modification was made to the EUT tested.

### Support Equipment List and Details

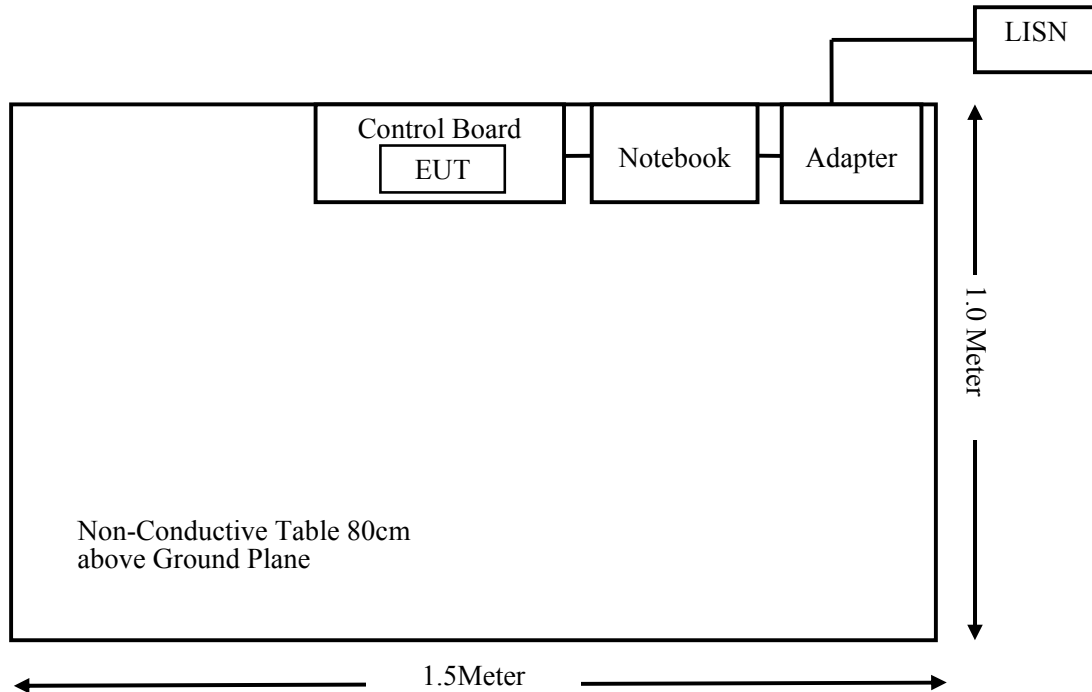
| Manufacturer | Description   | Model | Serial Number |
|--------------|---------------|-------|---------------|
| DELL         | Notebook      | GX620 | D65874152     |
| Alinket      | Control Board | N/A   | N/A           |

### External I/O Cable

| Cable Description | Shielding Type | Length (m) | From Port     | To       |
|-------------------|----------------|------------|---------------|----------|
| USB Cable         | Unshielding    | 0.3        | Control Board | Notebook |

## Block Diagram of Test Setup

For Conducted Emissions:



**SUMMARY OF TEST RESULTS**

| FCC Rules                      | Description of Test                | Result     |
|--------------------------------|------------------------------------|------------|
| §15.247 (i), §1.1310 & §2.1091 | MAXIMUM PERMISSIBLE EXPOSURE (MPE) | Compliance |
| §15.203                        | Antenna Requirement                | Compliance |
| §15.207(a)                     | AC Line Conducted Emissions        | Compliance |
| §15.205, §15.209 & §15.247(d)  | Radiated Emissions                 | Compliance |
| §15.247(a)(1)                  | 20 dB Emission Bandwidth           | Compliance |
| §15.247(a)(1)                  | Channel Separation Test            | Compliance |
| §15.247(a)(1)(iii)             | Time of Occupancy (Dwell Time)     | Compliance |
| §15.247(a)(1)(iii)             | Quantity of hopping channel Test   | Compliance |
| §15.247(b)(1)                  | Peak Output Power Measurement      | Compliance |
| §15.247(d)                     | Band edges                         | Compliance |

## FCC§15.247 (i), §1.1310& §2.1091 –MAXIMUM PERMISSIBLE EXPOSURE (MPE)

### Applicable Standard

According to subpart 15.247(i) and 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 <sup>2</sup> ) | Averaging Time (minutes) |
| 0.3-1.34                                                | 614                           | 1.63                          | *(100)                              | 30                       |
| 1.34-30                                                 | 824/f                         | 2.19/f                        | *(180/f <sup>2</sup> )              | 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.

### Calculated Formulary:

Predication of MPE limit at a given distance

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

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);

### Measurement Result

| Mode         | Frequency Range | Antenna Gain |           | Output Power |       | Evaluation Distance | Power Density         | MPE Limit             |
|--------------|-----------------|--------------|-----------|--------------|-------|---------------------|-----------------------|-----------------------|
|              | (MHz)           | (dBi)        | (numeric) | (dBm)        | (mW)  | (cm)                | (mW/cm <sup>2</sup> ) | (mW/cm <sup>2</sup> ) |
| 802.11b      | 2412-2462       | 1.0          | 1.26      | 18.00        | 63.10 | 20                  | 0.0158                | 1                     |
| 802.11g      | 2412-2462       | 1.0          | 1.26      | 18.00        | 63.10 | 20                  | 0.0158                | 1                     |
| 802.11n HT20 | 2412-2462       | 1.0          | 1.26      | 18.00        | 63.10 | 20                  | 0.0158                | 1                     |
| BLE          | 2402-2480       | 1.0          | 1.26      | 4.00         | 2.51  | 20                  | 0.0006                | 1                     |
| BT           | 2402-2480       | 1.0          | 1.26      | 7.00         | 5.01  | 20                  | 0.0013                | 1                     |
| 802.11a      | 5150-5250       | 1.0          | 1.26      | 14.00        | 25.12 | 20                  | 0.0063                | 1                     |
| 802.11n-HT20 |                 | 1.0          | 1.26      | 14.00        | 25.12 | 20                  | 0.0063                | 1                     |
| 802.11a      | 5725-5850       | 1.0          | 1.26      | 14.00        | 25.12 | 20                  | 0.0063                | 1                     |
| 802.11n-HT20 |                 | 1.0          | 1.26      | 14.00        | 25.12 | 20                  | 0.0063                | 1                     |

Note: (1) The target output power:

- 802.11b:  $17 \pm 1$  dBm, which declared by the Manufacturer.
- 802.11g:  $17 \pm 1$  dBm, which declared by the Manufacturer.
- 802.11n HT20:  $17 \pm 1$  dBm, which declared by the Manufacturer.
- BLE:  $3 \pm 1$  dBm, which declared by the Manufacturer.
- BT:  $5 \pm 2$  dBm, which declared by the Manufacturer.
- 802.11a:  $12 \pm 2$  dBm, which declared by the Manufacturer.
- 802.11n-HT20:  $12 \pm 2$  dBm, which declared by the Manufacturer.

(2) The EUT has the BT, 2.4GHz WIFI, 5GHz WIFI functions, they can transmitting simultaneously. According to KDB 447498 D01 General RF Exposure Guidance v06 and test data, the BT, 2.4G WIFI (802.11n HT20), 5GHz WIFI (802.11a 5150-5250) model is the worst case, their sum of MPE ratio is 0.0234 which is less than 1.0, so the collocation exposure exclusion applies.

**Result:** The device meet FCC MPE at 20 cm distance.

**FCC §15.203 – ANTENNA REQUIREMENT**

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**Applicable Standard**

According to FCC § 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.

**Antenna Connector Construction**

The EUT has a ceramics antenna arrangement for Bluetooth, which the antenna gain is 1 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

**Result:** Compliance.

## FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

### Applicable Standard

FCC §15.207(a)

### Measurement Uncertainty

Input quantities to be considered for conducted disturbance measurements maybe receiver reading, attenuation of the connection between LISN and receiver, LISN voltage division factor, LISN VDF frequency interpolation and receiver related input quantities, etc.

Based on CISPR 16-4-2, the expended combined standard uncertainty of conducted disturbance test at Bay Area Compliance Laboratories Corp. (Kunshan) is shown as below. And the uncertainty will not be taken into consideration for the test data recorded in the report.

| Port     | Expanded Measurement uncertainty       |
|----------|----------------------------------------|
| AC Mains | 3.26 dB (k=2, 95% level of confidence) |
| CAT 3    | 3.70 dB (k=2, 95% level of confidence) |
| CAT 5    | 3.86 dB (k=2, 95% level of confidence) |
| CAT 6    | 4.64 dB (k=2, 95% level of confidence) |

### 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 measurement procedure of EUT setup is according with ANSI C63.10-2013. The related limit was specified in FCC Part 15.207.

The adapter was connected to a 120 VAC/60 Hz 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 LISN.

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

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

## Test Equipment List and Details

| Manufacturer    | Description       | Model                 | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|-----------------------|---------------|------------------|----------------------|
| Rohde & Schwarz | EMI Test Receiver | ESCS30                | 934115/007    | 2015-11-12       | 2016-11-11           |
| Rohde & Schwarz | LISN              | ESH3-Z5               | 862770/011    | 2015-11-12       | 2016-11-11           |
| Rohde & Schwarz | LISN              | ESH3-Z5               | 892239/018    | 2016-07-04       | 2017-07-03           |
| Rohde & Schwarz | Pulse limiter     | ESH3-Z2               | 879940/0058   | 2016-06-19       | 2017-06-18           |
| HP              | Current probe     | 8710-1744             | 636           | 2016-06-19       | 2017-06-18           |
| FCC             | ISN               | FCC-TLISN-T8-02       | 20376         | 2016-06-23       | 2017-06-22           |
| Rohde & Schwarz | CE Test software  | EMC 32                | V 09.10.0     | /                | /                    |
| MICRO-COAX      | Coaxial line      | UFB-293B-1-0480-50X50 | 97F0173       | 2016-09-08       | 2017-09-08           |

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

## Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

$$\text{Correction Factor} = \text{LISN VDF} + \text{Cable Loss} + \text{Transient Limiter Attenuation}$$

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

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

## Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207, the worst margin reading as below:

**13.70dB at 0.185000MHz** in the **Neutral** conducted mode

Refer to CISPR16-4-2 and CISPR 16-4-1, the measured level complies with the limit if

$$L_m + U_{(L_m)} \leq L_{\text{lim}} + U_{\text{cispr}}$$

In BACL,  $U_{(L_m)}$  is less than  $U_{\text{cispr}}$ , if  $L_m$  is less than  $L_{\text{lim}}$ , it implies that the EUT complies with the limit.

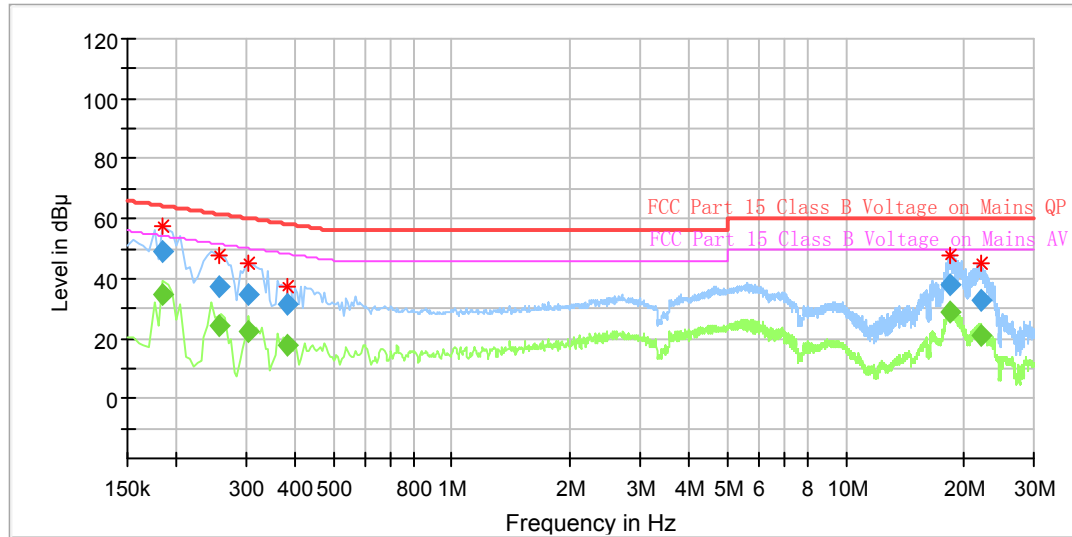
## Test Data

### Environmental Conditions

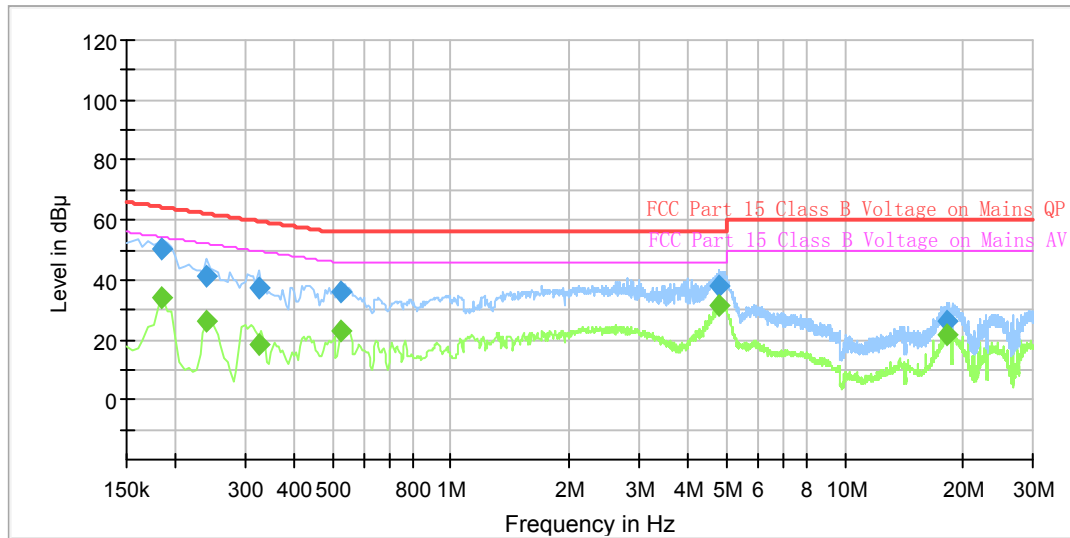
|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 27 °C     |
| <b>Relative Humidity:</b> | 58 %      |
| <b>ATM Pressure:</b>      | 101.3 kPa |

*The testing was performed by Chris Wang on 2016-10-25.*

*EUT operation mode: Transmitting (Worst case)*

**AC 120V/60 Hz, Line**

| Frequency (MHz) | QuasiPeak (dBμV) | Average (dB μ V) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) | Comment    |
|-----------------|------------------|------------------|-----------------|------|------------|-------------|--------------|------------|
| 0.185000        | ---              | 34.42            | 9.000           | L1   | 10.3       | 19.84       | 54.26        | Compliance |
| 0.185000        | 49.03            | ---              | 9.000           | L1   | 10.3       | 15.23       | 64.26        | Compliance |
| 0.255000        | ---              | 24.05            | 9.000           | L1   | 10.3       | 27.54       | 51.59        | Compliance |
| 0.255000        | 37.29            | ---              | 9.000           | L1   | 10.3       | 24.30       | 61.59        | Compliance |
| 0.305000        | ---              | 22.27            | 9.000           | L1   | 10.3       | 27.84       | 50.11        | Compliance |
| 0.305000        | 34.92            | ---              | 9.000           | L1   | 10.3       | 25.19       | 60.11        | Compliance |
| 0.380000        | ---              | 17.65            | 9.000           | L1   | 10.3       | 30.63       | 48.28        | Compliance |
| 0.380000        | 31.72            | ---              | 9.000           | L1   | 10.3       | 26.56       | 58.28        | Compliance |
| 18.285000       | ---              | 28.94            | 9.000           | L1   | 10.5       | 21.06       | 50.00        | Compliance |
| 18.285000       | 37.93            | ---              | 9.000           | L1   | 10.5       | 22.07       | 60.00        | Compliance |
| 22.140000       | ---              | 20.90            | 9.000           | L1   | 10.5       | 29.10       | 50.00        | Compliance |
| 22.140000       | 32.70            | ---              | 9.000           | L1   | 10.5       | 27.30       | 60.00        | Compliance |

**AC 120V/60 Hz, Neutral**

| Frequency (MHz) | QuasiPeak (dBμV) | Average (dB μ V) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) | Comment    |
|-----------------|------------------|------------------|-----------------|------|------------|-------------|--------------|------------|
| 0.185000        | ---              | 34.14            | 9.000           | N    | 10.3       | 20.12       | 54.26        | Compliance |
| 0.185000        | 50.56            | ---              | 9.000           | N    | 10.3       | 13.70       | 64.26        | Compliance |
| 0.240000        | ---              | 26.55            | 9.000           | N    | 10.3       | 25.55       | 52.10        | Compliance |
| 0.240000        | 41.22            | ---              | 9.000           | N    | 10.3       | 20.88       | 62.10        | Compliance |
| 0.325000        | ---              | 18.36            | 9.000           | N    | 10.3       | 31.22       | 49.58        | Compliance |
| 0.325000        | 37.07            | ---              | 9.000           | N    | 10.3       | 22.51       | 59.58        | Compliance |
| 0.525000        | ---              | 23.02            | 9.000           | N    | 10.3       | 22.98       | 46.00        | Compliance |
| 0.525000        | 36.19            | ---              | 9.000           | N    | 10.3       | 19.81       | 56.00        | Compliance |
| 4.805000        | ---              | 31.38            | 9.000           | N    | 10.6       | 14.62       | 46.00        | Compliance |
| 4.805000        | 37.70            | ---              | 9.000           | N    | 10.6       | 18.30       | 56.00        | Compliance |
| 18.080000       | ---              | 21.74            | 9.000           | N    | 10.5       | 28.26       | 50.00        | Compliance |
| 18.080000       | 26.19            | ---              | 9.000           | N    | 10.5       | 33.81       | 60.00        | Compliance |

**Note:**

- 1) Corr.=LISN VDF (Voltage Division Factor) + Cable Loss
- 2) Corrected Amplitude = Reading + Corr.
- 3) Margin = Limit –Corrected Amplitude

## **FCC §15.205, §15.209 & §15.247(d) – RADIATED EMISSIONS**

### **Applicable Standard**

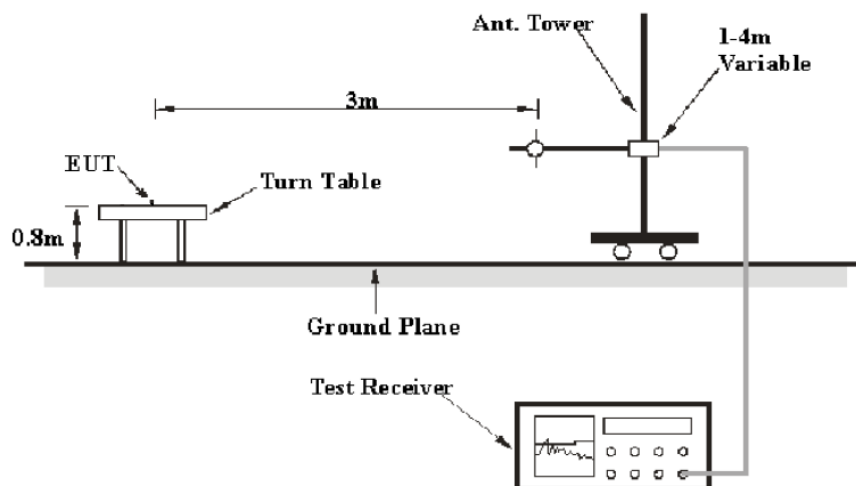
FCC §15.205; §15.209; §15.247(d)

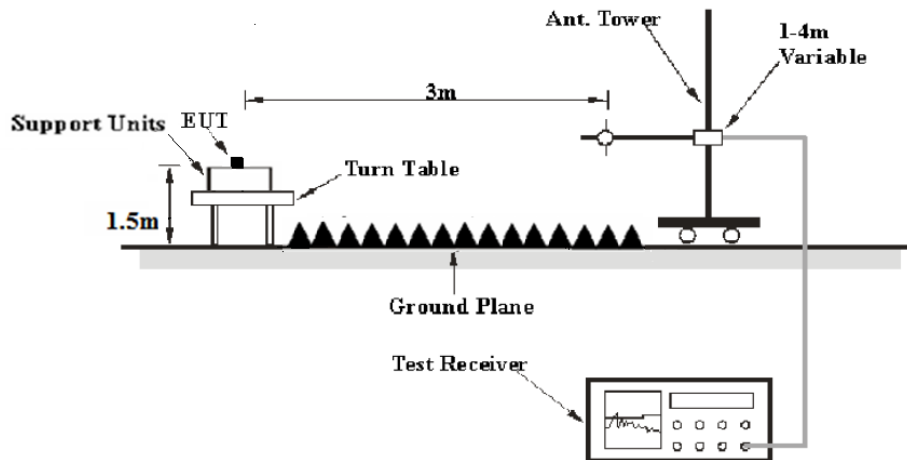
### **Measurement Uncertainty**

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

### **EUT Setup**

**Below 1 GHz:**



**Above 1GHz:**

The radiated emission tests were performed in the 3 meters, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209 and FCC 15.247 limits.

The adapter was connected to a 120 VAC/60 Hz power source.

**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  | Detector |
|-------------------|---------|-----------|---------|----------|
| 30 MHz – 1000 MHz | 100 kHz | 300 kHz   | 120 kHz | QP       |
| Above 1 GHz       | 1 MHz   | 3 MHz     | /       | PK       |
|                   | 1 MHz   | 10 Hz     | /       | Ave.     |

**Test Procedure**

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

All final data was recorded in Quasi-peak detection mode for frequency range of 30 MHz -1 GHz and peak and Average detection modes for frequencies above 1 GHz.

## 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 Equipment List and Details

| Manufacturer      | Description        | Model           | Serial Number | Calibration Date | Calibration Due Date |
|-------------------|--------------------|-----------------|---------------|------------------|----------------------|
| Sonoma Instrument | Amplifier          | 330             | 171377        | 2016-10-21       | 2017-10-21           |
| Rohde & Schwarz   | EMI Test Receiver  | ESCI            | 100195        | 2016-11-12       | 2017-11-11           |
| Sunol Sciences    | Broadband Antenna  | JB3             | A090314-2     | 2016-01-09       | 2019-01-08           |
| ETS               | Horn Antenna       | 3115            | 6229          | 2016-11-07       | 2017-11-06           |
| EMCO              | Horn Antenna       | 3116            | 2516          | 2016-11-07       | 2019-11-06           |
| Rohde & Schwarz   | Signal Analyzer    | FSIQ26          | 836131/009    | 2016-09-21       | 2017-09-21           |
| Mini              | Pre-amplifier      | ZVA-183-S+      | 857001418     | 2016-09-16       | 2017-09-16           |
| DUCOMMUN          | Pre-amplifier      | ALN-22093530-01 | 990147        | 2016-09-16       | 2017-09-16           |
| champrotek        | Chamber            | Chamber A       | 1#            | /                | /                    |
| R&S               | Auto test Software | EMC32           | V 09.10.0     | /                | /                    |
| BACL              | RF cable           | KS-LAB-012      | KS-LAB-012    | 2015-12-16       | 2016-12-15           |
| BACL              | RF cable           | KS-LAB-010      | KS-LAB-010    | 2016-09-16       | 2017-09-15           |

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

## Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247.

### 2.16dB at 4804 MHz in the Horizontal polarization

Refer to CISPR16-4-2 and CISPR 16-4-1, the measured level complies with the limit if

$$L_m + U_{(L_m)} \leq L_{lim} + U_{cispr}$$

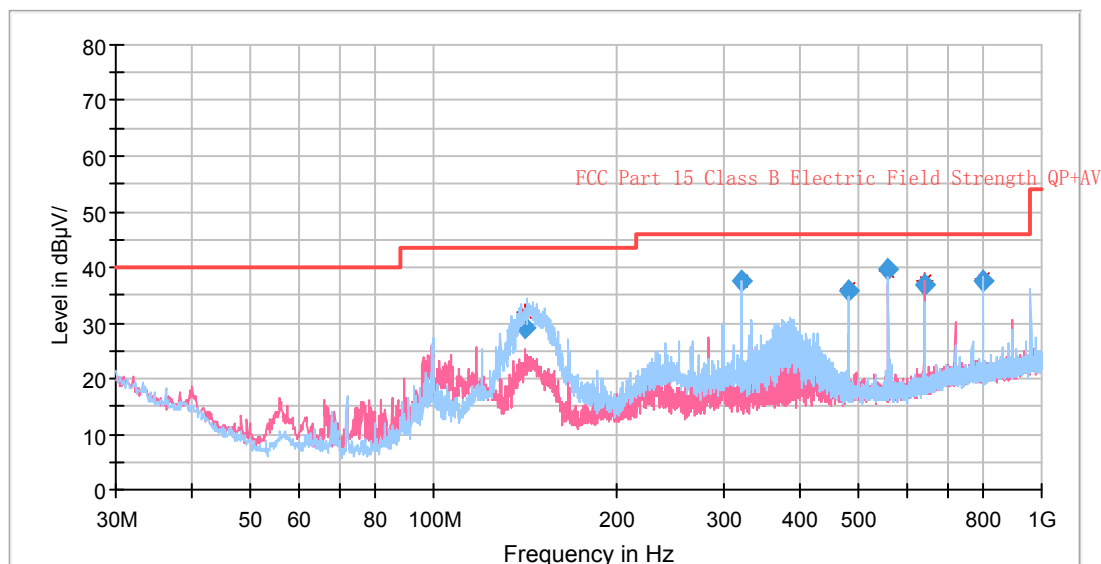
In BACL,  $U_{(L_m)}$  is less than  $+U_{cispr}$ , if  $L_m$  is less than  $L_{lim}$ , it implies that the EUT complies with the limit.

**Test Data****Environmental Conditions**

|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 27 °C     |
| <b>Relative Humidity:</b> | 56 %      |
| <b>ATM Pressure:</b>      | 101.0 kPa |

The testing was performed by Chris Wang on 2016-10-25.

EUT operation mode: Normal operation

**30MHz-1GHz:**

| Frequency (MHz) | Receiver |              | Turntable Degree | Rx Antenna |       | Corrected Factor (dB) | Corrected Amplitude (dBμV/m) | FCC Part 15.247/205/209 |        |
|-----------------|----------|--------------|------------------|------------|-------|-----------------------|------------------------------|-------------------------|--------|
|                 | Reading  | Detector     |                  | Height     | Polar |                       |                              | Limit                   | Margin |
|                 | (dBμV)   | (PK/QP/Ave.) |                  | (cm)       | (H/V) |                       |                              | (dB μ V/m)              | (dB)   |
| 71.66920        | 24.25    | QP           | 104              | 100        | V     | -17.1                 | 7.15                         | 40.0                    | 32.85  |
| 96.32265        | 47.80    | QP           | 165              | 100        | H     | -16.0                 | 31.80                        | 43.5                    | 11.70  |
| 144.43805       | 37.52    | QP           | 165              | 100        | H     | -12.0                 | 25.52                        | 43.5                    | 17.98  |
| 192.52035       | 26.82    | QP           | 161              | 100        | H     | -12.3                 | 14.52                        | 43.5                    | 28.98  |
| 239.47960       | 45.55    | QP           | 151              | 100        | H     | -12.1                 | 33.45                        | 46.0                    | 12.55  |
| 336.46655       | 36.02    | QP           | 151              | 100        | H     | -9.6                  | 26.42                        | 46.0                    | 19.58  |

*EUT operation mode: Transmitting*

**1GHz -25 GHz:** (Scan with GFSK,  $\pi/4$ -DQPSK, 8-DPSK mode, the worst case is BDR Mode (GFSK))

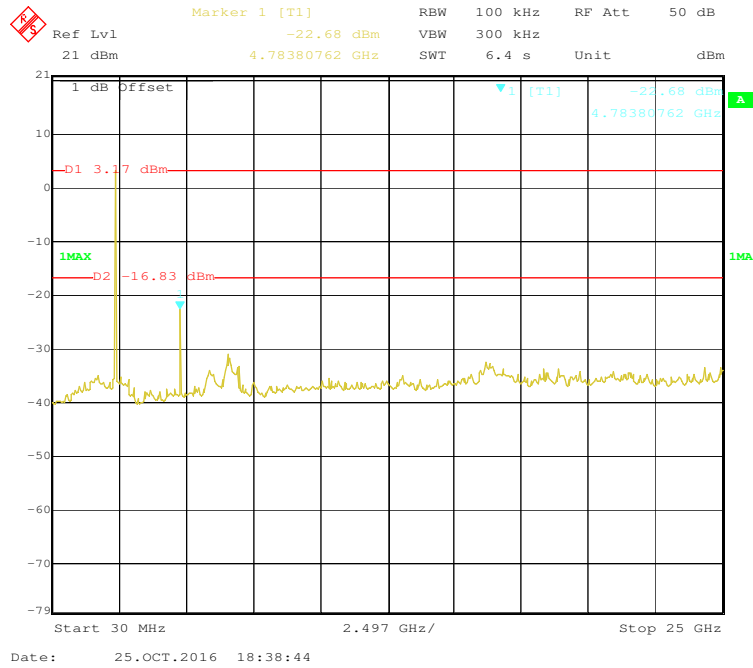
| Frequency<br>(MHz)     | Receiver          |                          | Turntable<br>Degree | Rx Antenna     |                | Corrected<br>Factor<br>(dB) | Corrected<br>Amplitude<br>(dBμV/m) | FCC Part<br>15.247/205/209 |                |
|------------------------|-------------------|--------------------------|---------------------|----------------|----------------|-----------------------------|------------------------------------|----------------------------|----------------|
|                        | Reading<br>(dBμV) | Detector<br>(PK/QP/Ave.) |                     | Height<br>(cm) | Polar<br>(H/V) |                             |                                    | Limit<br>(dB<br>μ<br>V/m)  | Margin<br>(dB) |
| Low Channel (2402 MHz) |                   |                          |                     |                |                |                             |                                    |                            |                |
| 2402.0                 | 93.89             | PK                       | 313                 | 136            | V              | -3.0                        | 90.89                              | /                          | /              |
| 2402.0                 | 90.32             | Ave                      | 313                 | 136            | V              | -3.0                        | 87.32                              | /                          | /              |
| 2402.0                 | 93.18             | PK                       | 6                   | 163            | H              | -3.0                        | 90.18                              | /                          | /              |
| 2402.0                 | 89.79             | Ave                      | 6                   | 163            | H              | -3.0                        | 86.79                              | /                          | /              |
| 2390.0                 | 70.37             | PK                       | 330                 | 148            | V              | -3.0                        | 67.37                              | 74                         | 6.63           |
| 2390.0                 | 40.48             | Ave                      | 330                 | 148            | V              | -3.0                        | 37.48                              | 54                         | 16.52          |
| 2370.0                 | 62.79             | PK                       | 271                 | 181            | V              | -3.0                        | 59.79                              | 74                         | 14.21          |
| 2370.0                 | 41.31             | Ave                      | 271                 | 181            | V              | -3.0                        | 38.31                              | 54                         | 15.69          |
| 1589.0                 | 46.42             | PK                       | 43                  | 227            | H              | -6.0                        | 40.41                              | 74                         | 33.59          |
| 1589.0                 | 29.20             | Ave                      | 43                  | 227            | H              | -6.0                        | 23.19                              | 54                         | 30.81          |
| 4804.0                 | 54.77             | PK                       | 49                  | 127            | V              | 7.2                         | 61.93                              | 74                         | 12.07          |
| 4804.0                 | 44.68             | Ave                      | 49                  | 127            | V              | 7.2                         | 51.84                              | 54                         | 2.16           |
| 7206.0                 | 30.04             | PK                       | 307                 | 165            | H              | 16.0                        | 46.04                              | 74                         | 27.96          |
| 7236.0                 | 16.63             | Ave                      | 307                 | 165            | H              | 16.0                        | 32.63                              | 54                         | 21.37          |

| Frequency<br>(MHz)        | Receiver          |                          | Turntable<br>Degree | Rx Antenna     |                | Corrected<br>Factor<br>(dB) | Corrected<br>Amplitude<br>(dBμV/m) | FCC Part<br>15.247/205/209 |                |
|---------------------------|-------------------|--------------------------|---------------------|----------------|----------------|-----------------------------|------------------------------------|----------------------------|----------------|
|                           | Reading<br>(dBμV) | Detector<br>(PK/QP/Ave.) |                     | Height<br>(cm) | Polar<br>(H/V) |                             |                                    | Limit<br>(dB<br>μ<br>V/m)  | Margin<br>(dB) |
| Middle Channel (2441 MHz) |                   |                          |                     |                |                |                             |                                    |                            |                |
| 2441.0                    | 93.56             | PK                       | 129                 | 222            | V              | -3.0                        | 90.56                              | /                          | /              |
| 2441.0                    | 89.29             | Ave                      | 129                 | 195            | V              | -3.0                        | 85.69                              | /                          | /              |
| 2441.0                    | 88.14             | PK                       | 208                 | 101            | H              | -3.0                        | 89.46                              | /                          | /              |
| 2441.0                    | 84.01             | Ave                      | 208                 | 101            | H              | -3.0                        | 86.02                              | /                          | /              |
| 1573.0                    | 38.30             | PK                       | 291                 | 6              | V              | -7.0                        | 38.30                              | 74                         | 35.70          |
| 1573.0                    | 22.05             | Ave                      | 291                 | 6              | V              | -7.0                        | 22.05                              | 54                         | 31.95          |
| 1696.0                    | 51.50             | PK                       | 342                 | 55             | H              | -5.4                        | 51.50                              | 74                         | 22.50          |
| 1696.0                    | 34.77             | Ave                      | 342                 | 55             | H              | -5.4                        | 34.77                              | 54                         | 19.23          |
| 4882.0                    | 61.65             | PK                       | 285                 | 89             | V              | 7.3                         | 61.65                              | 74                         | 12.35          |
| 4882.0                    | 42.12             | Ave                      | 285                 | 89             | V              | 7.3                         | 51.12                              | 54                         | 2.88           |
| 6670.0                    | 49.57             | PK                       | 289                 | 66             | H              | 13.8                        | 49.57                              | 74                         | 24.43          |
| 6670.0                    | 35.78             | Ave                      | 289                 | 66             | H              | 13.8                        | 35.78                              | 54                         | 18.22          |
| 7323.0                    | 46.98             | PK                       | 96                  | 8              | H              | 16.3                        | 46.98                              | 74                         | 27.02          |
| 7323.0                    | 32.99             | Ave                      | 96                  | 8              | H              | 16.3                        | 32.99                              | 54                         | 21.01          |

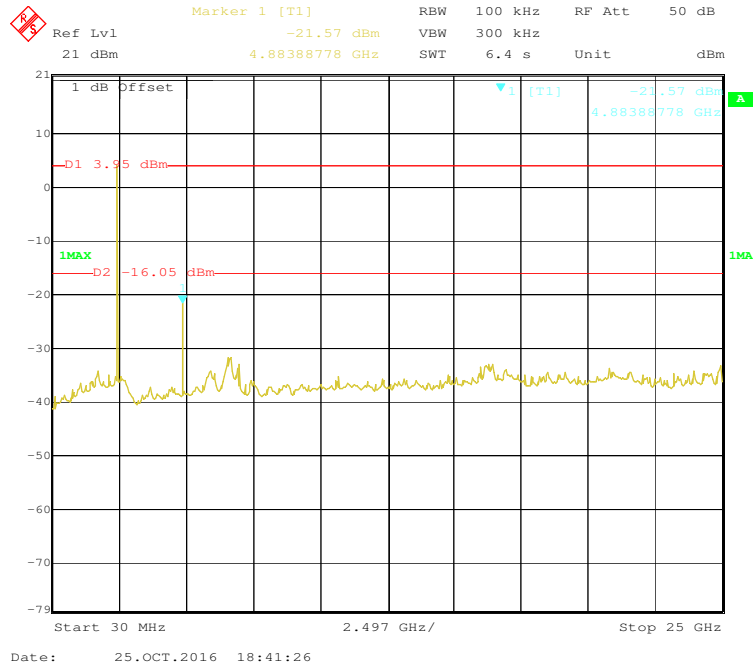
| Frequency<br>(MHz)     | Receiver          |                          | Turntable<br>Degree | Rx Antenna     |                | Corrected<br>Factor<br>(dB) | Corrected<br>Amplitude<br>(dBμV/m) | FCC Part<br>15.247/205/209 |                |
|------------------------|-------------------|--------------------------|---------------------|----------------|----------------|-----------------------------|------------------------------------|----------------------------|----------------|
|                        | Reading<br>(dBμV) | Detector<br>(PK/QP/Ave.) |                     | Height<br>(cm) | Polar<br>(H/V) |                             |                                    | Limit<br>(dB<br>μ<br>V/m)  | Margin<br>(dB) |
| High Channel (2480MHz) |                   |                          |                     |                |                |                             |                                    |                            |                |
| 2480.0                 | 94.41             | PK                       | 293                 | 106            | V              | -3.0                        | 91.41                              | /                          | /              |
| 2480.0                 | 90.60             | Ave                      | 293                 | 106            | V              | -3.0                        | 87.60                              | /                          | /              |
| 2480.0                 | 93.47             | PK                       | 205                 | 133            | H              | -3.0                        | 90.47                              | /                          | /              |
| 2480.0                 | 89.75             | Ave                      | 205                 | 133            | H              | -3.0                        | 86.75                              | /                          | /              |
| 2483.5                 | 61.10             | PK                       | 89                  | 182            | V              | -3.0                        | 58.10                              | 74                         | 15.90          |
| 2483.5                 | 39.94             | Ave                      | 89                  | 182            | V              | -3.0                        | 36.94                              | 54                         | 17.06          |
| 2491.0                 | 67.91             | PK                       | 139                 | 125            | V              | -2.6                        | 65.31                              | 74                         | 8.69           |
| 2491.0                 | 43.36             | Ave                      | 139                 | 125            | V              | -2.6                        | 40.76                              | 54                         | 13.24          |
| 4960.0                 | 52.70             | PK                       | 98                  | 143            | H              | 7.4                         | 60.10                              | 74                         | 13.90          |
| 4960.0                 | 42.56             | Ave                      | 98                  | 143            | H              | 7.4                         | 49.96                              | 54                         | 4.04           |
| 6681.0                 | 28.76             | PK                       | 337                 | 227            | H              | 14.0                        | 42.76                              | 74                         | 31.24          |
| 6681.0                 | 8.53              | Ave                      | 337                 | 227            | H              | 14.0                        | 22.53                              | 54                         | 31.47          |
| 7440.0                 | 28.26             | PK                       | 280                 | 143            | H              | 19.8                        | 48.06                              | 74                         | 25.94          |
| 7440.0                 | 13.49             | Ave                      | 280                 | 143            | H              | 19.8                        | 33.29                              | 54                         | 20.71          |

Spurious Emissions at Antenna Port:

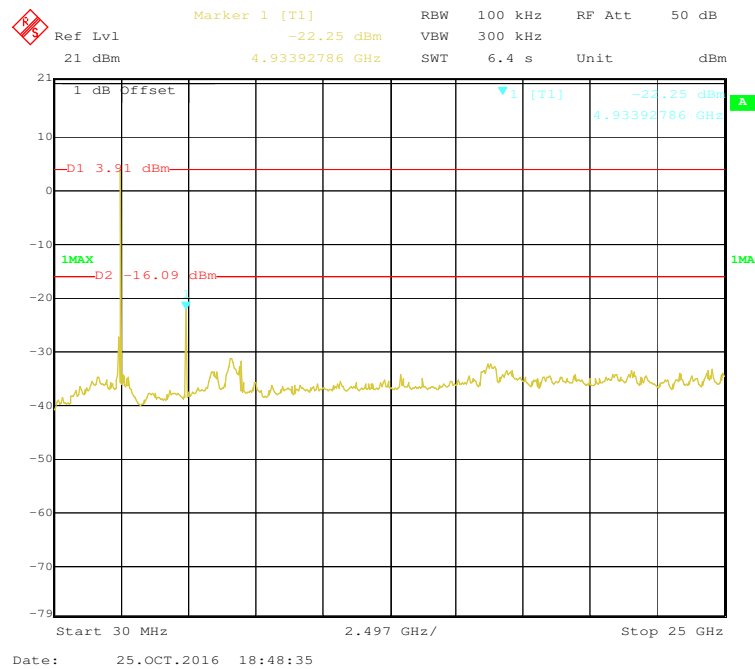
Low Channel



Middle Channel



## High Channel



Note:

Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor

Corrected Amplitude = Corrected Factor + Reading

Margin = Limit - Corrected. Amplitude

**FCC §15.247(a) (1)-CHANNEL SEPARATION TEST****Applicable Standard**

Frequency hopping systems 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, 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.

**Test Procedure**

1. Set the EUT in transmitting mode, maxhold the channel.
2. Set the adjacent channel of the EUT and maxhold another trace.
3. Measure the channel separation.

**Test Equipment List and Details**

| Manufacturer    | Description     | Model      | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-----------------|------------|---------------|------------------|----------------------|
| Rohde & Schwarz | Signal Analyzer | FSIQ26     | 836131/009    | 2016-09-21       | 2017-09-21           |
| BACL            | RF cable        | KS-LAB-012 | KS-LAB-012    | 2015-12-16       | 2016-12-15           |

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

**Test Data****Environmental Conditions**

|                    |           |
|--------------------|-----------|
| Temperature:       | 26 °C     |
| Relative Humidity: | 55 %      |
| ATM Pressure:      | 101.0 kPa |

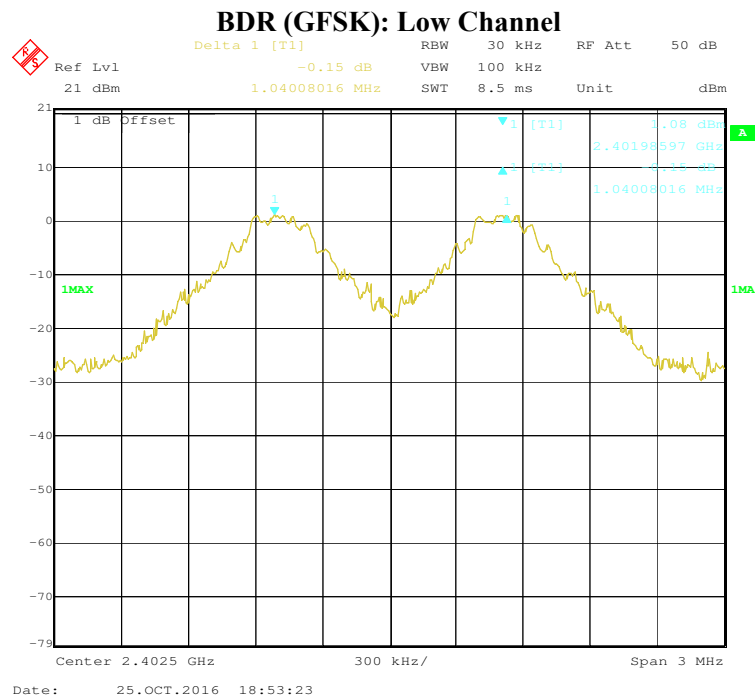
*The testing was performed by Chris Wang on 2016-10-25 to 2016-10-26.*

*EUT operation mode: Transmitting*

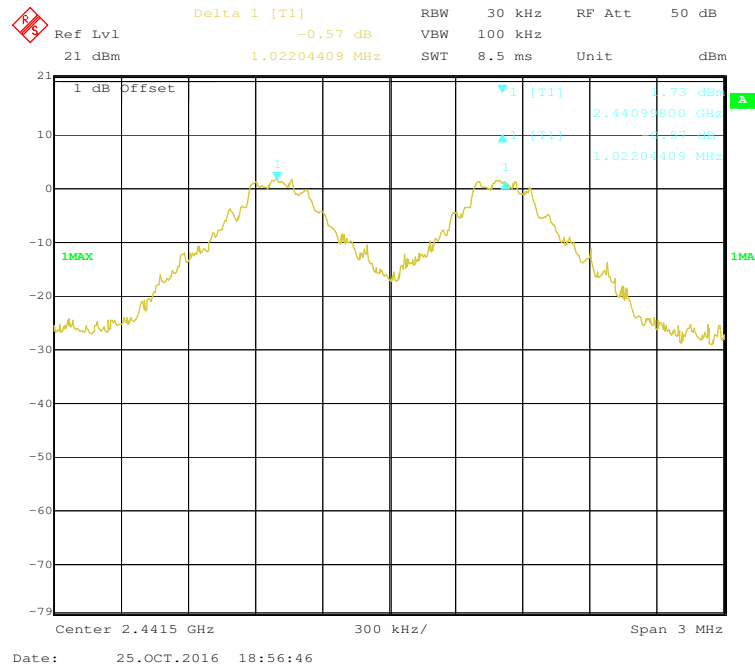
*Test Result: Compliance. Please refer to following tables and plots*

| Mode                   | Channel  | Frequency (MHz) | Channel Separation (MHz) | ≥Limit (MHz) | Result |
|------------------------|----------|-----------------|--------------------------|--------------|--------|
| <b>BDR (GFSK)</b>      | Low      | 2402            | 1.040                    | 0.741        | Pass   |
|                        | Adjacent | 2403            |                          |              |        |
|                        | Middle   | 2441            | 1.022                    | 0.741        | Pass   |
|                        | Adjacent | 2442            |                          |              |        |
|                        | High     | 2480            | 1.088                    | 0.737        | Pass   |
|                        | Adjacent | 2479            |                          |              |        |
| <b>EDR (π/4-DQPSK)</b> | Low      | 2402            | 1.004                    | 0.930        | Pass   |
|                        | Adjacent | 2403            |                          |              |        |
|                        | Middle   | 2441            | 1.010                    | 0.942        | Pass   |
|                        | Adjacent | 2442            |                          |              |        |
|                        | High     | 2480            | 1.010                    | 0.938        | Pass   |
|                        | Adjacent | 2479            |                          |              |        |
| <b>EDR (8DPSK)</b>     | Low      | 2402            | 1.004                    | 0.934        | Pass   |
|                        | Adjacent | 2403            |                          |              |        |
|                        | Middle   | 2441            | 1.004                    | 0.942        | Pass   |
|                        | Adjacent | 2442            |                          |              |        |
|                        | High     | 2480            | 1.004                    | 0.938        | Pass   |
|                        | Adjacent | 2479            |                          |              |        |

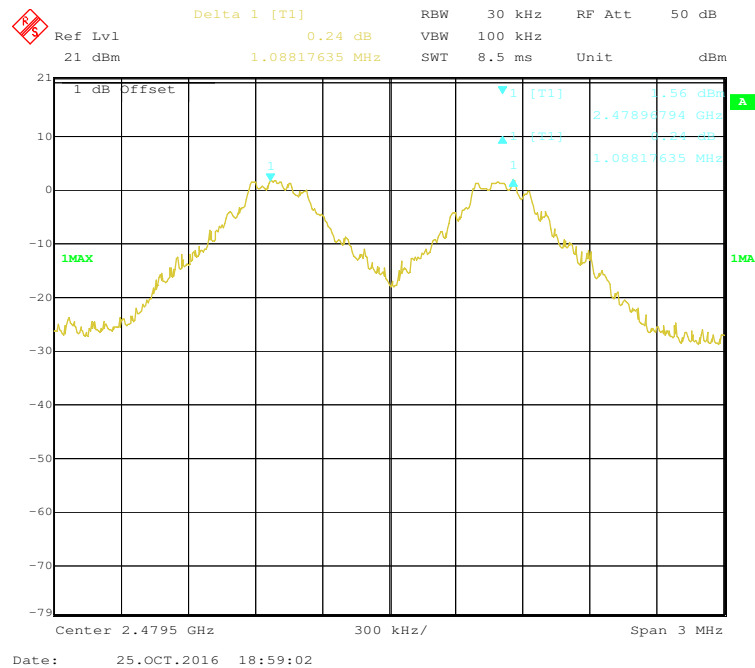
Note: Limit = 20 dB bandwidth \*2/3



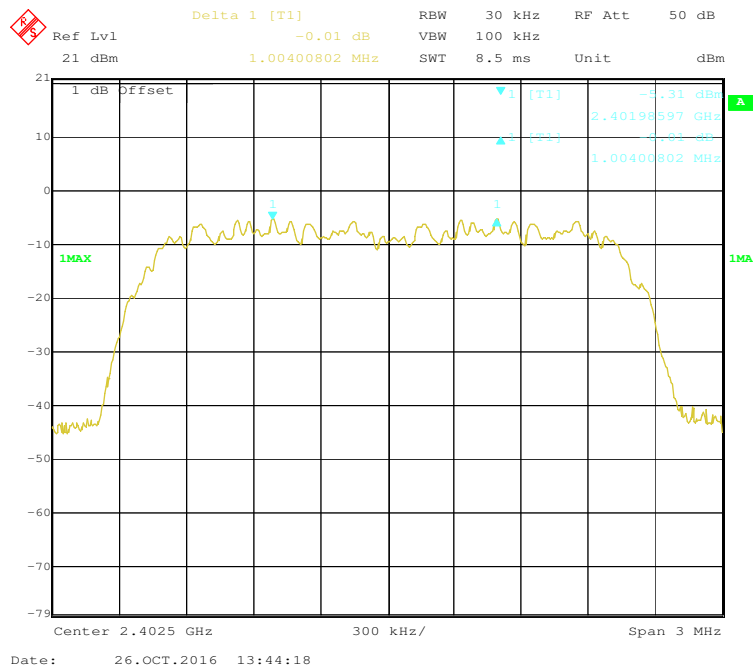
### BDR (GFSK): Middle Channel



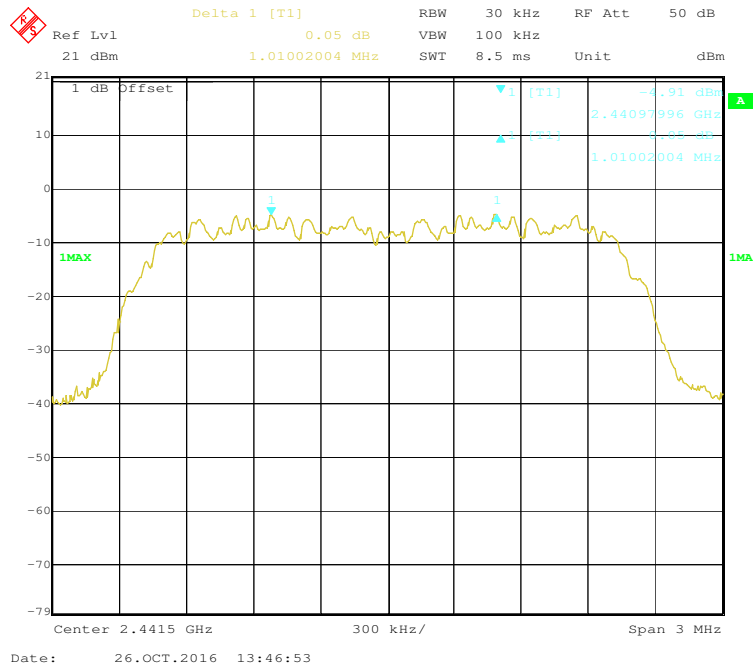
### BDR (GFSK): High Channel



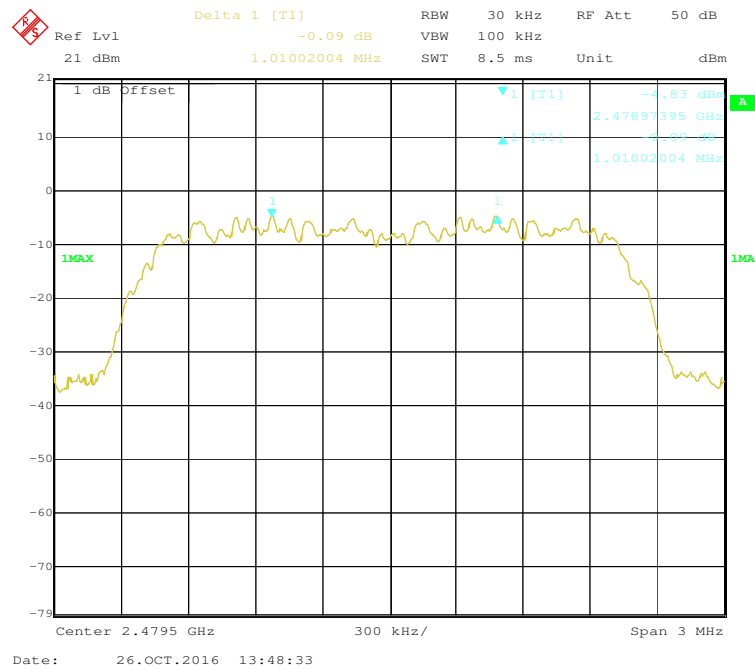
### EDR ( $\pi/4$ -DQPSK): Low Channel



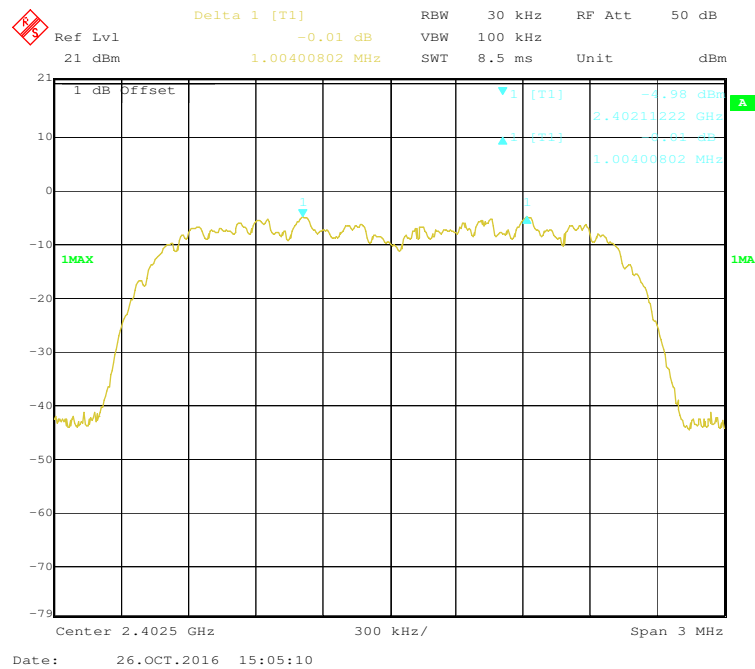
### EDR ( $\pi/4$ -DQPSK): Middle Channel



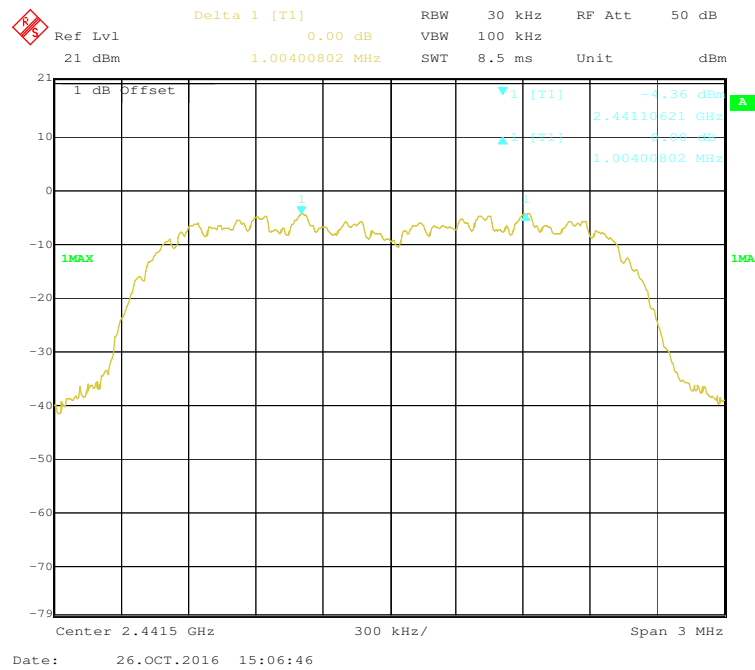
### EDR ( $\pi/4$ -DQPSK): High Channel



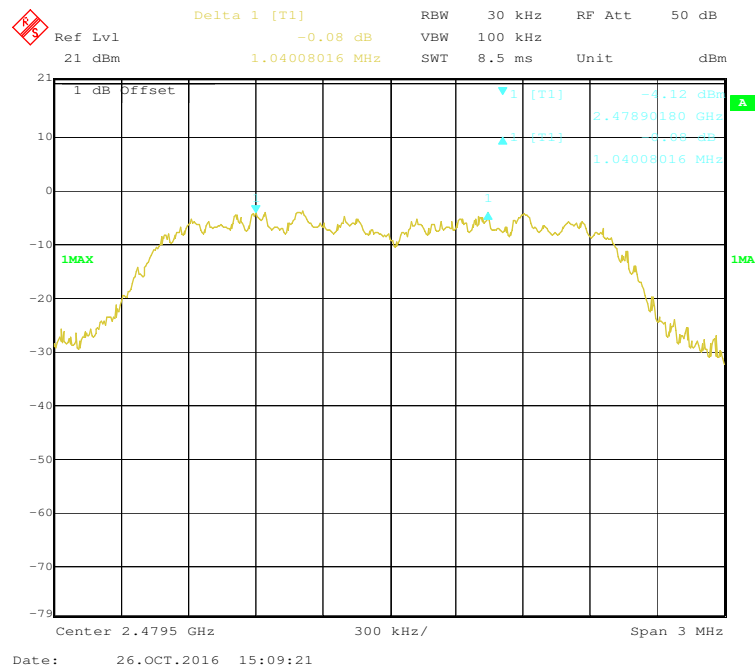
### EDR (8DPSK): Low Channel



### EDR (8DPSK): Middle Channel



### EDR (8DPSK): High Channel



**FCC §15.247(a) (1) – 20 dB EMISSION BANDWIDTH****Applicable Standard**

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.

**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 without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. 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. 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     | 836131/009    | 2016-09-21       | 2017-09-21           |
| BACL            | RF cable        | KS-LAB-012 | KS-LAB-012    | 2015-12-16       | 2016-12-15           |

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

**Test Data****Environmental Conditions**

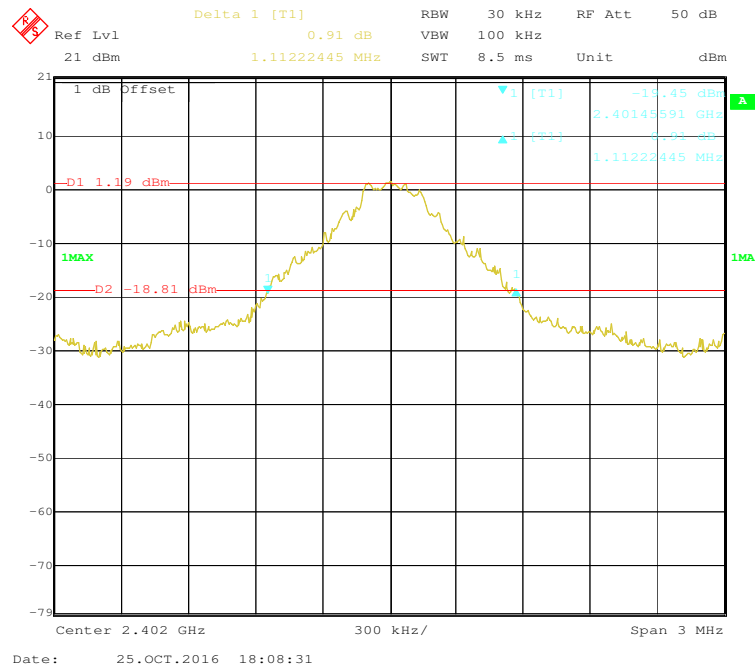
|                    |           |
|--------------------|-----------|
| Temperature:       | 26 °C     |
| Relative Humidity: | 56 %      |
| ATM Pressure:      | 101.0 kPa |

*The testing was performed by Chris Wang on 2016-10-25 to 2016-10-26.*

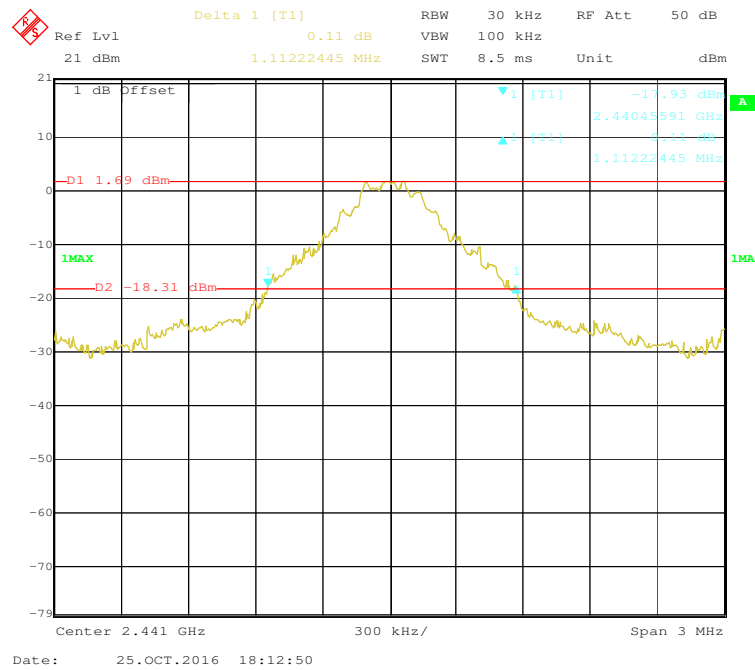
*EUT operation mode: Transmitting*

*Test Result: Compliance. Please refer to following tables and plots*

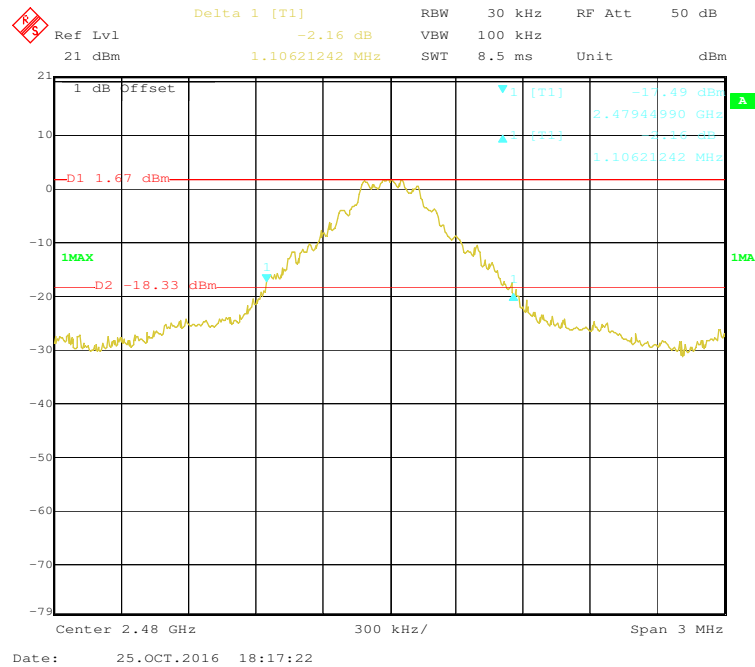
| Mode                                  | Channel | Frequency (MHz) | 20 dB Emission Bandwidth (MHz) |
|---------------------------------------|---------|-----------------|--------------------------------|
| <b>BDR (GFSK)</b>                     | Low     | 2402            | 1.112                          |
|                                       | Middle  | 2441            | 1.112                          |
|                                       | High    | 2480            | 1.106                          |
| <b>EDR (<math>\pi/4</math>-DQPSK)</b> | Low     | 2402            | 1.395                          |
|                                       | Middle  | 2441            | 1.413                          |
|                                       | High    | 2480            | 1.407                          |
| <b>EDR (8DPSK)</b>                    | Low     | 2402            | 1.401                          |
|                                       | Middle  | 2441            | 1.413                          |
|                                       | High    | 2480            | 1.407                          |

**BDR (GFSK): Low Channel**

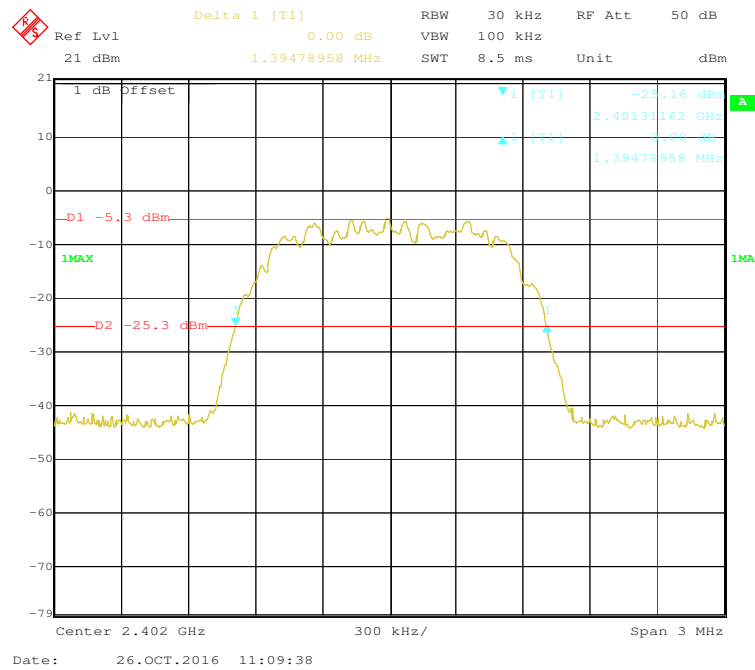
### BDR (GFSK): Middle Channel



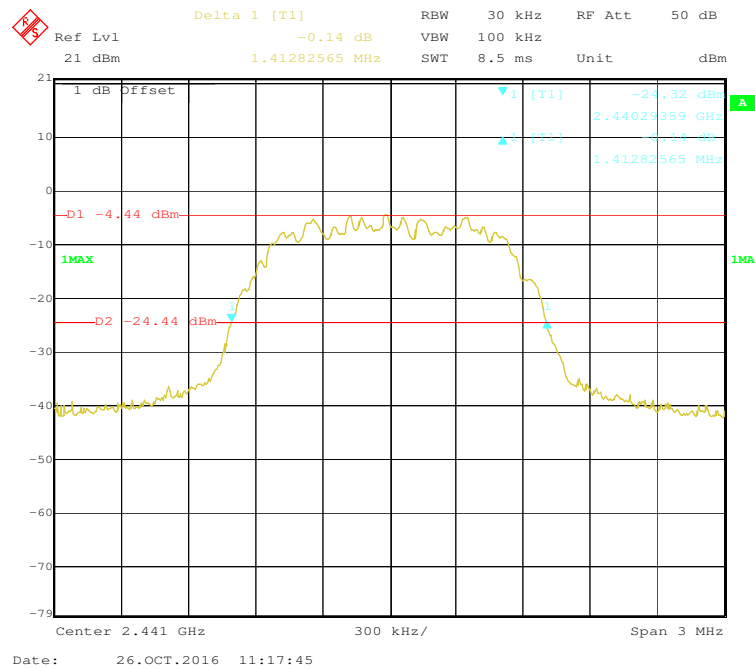
### BDR (GFSK): High Channel



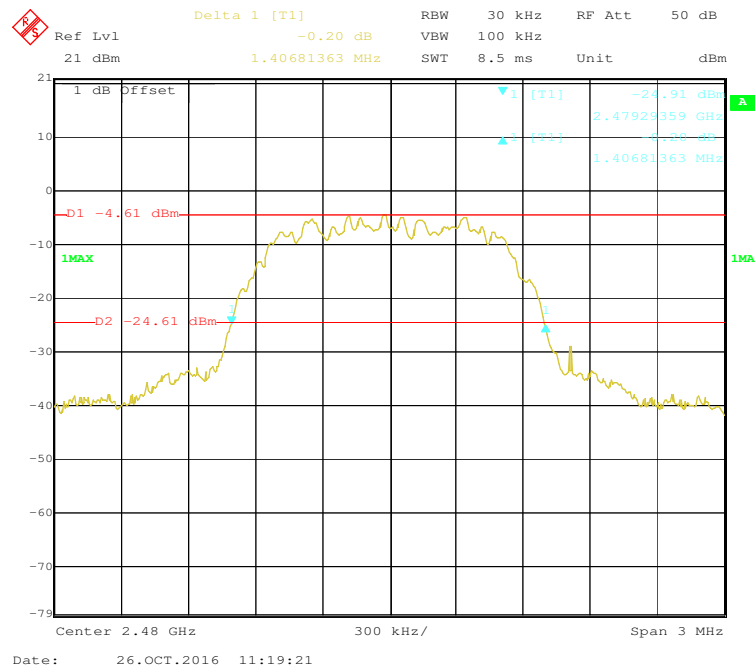
### EDR ( $\pi/4$ -DQPSK): Low Channel



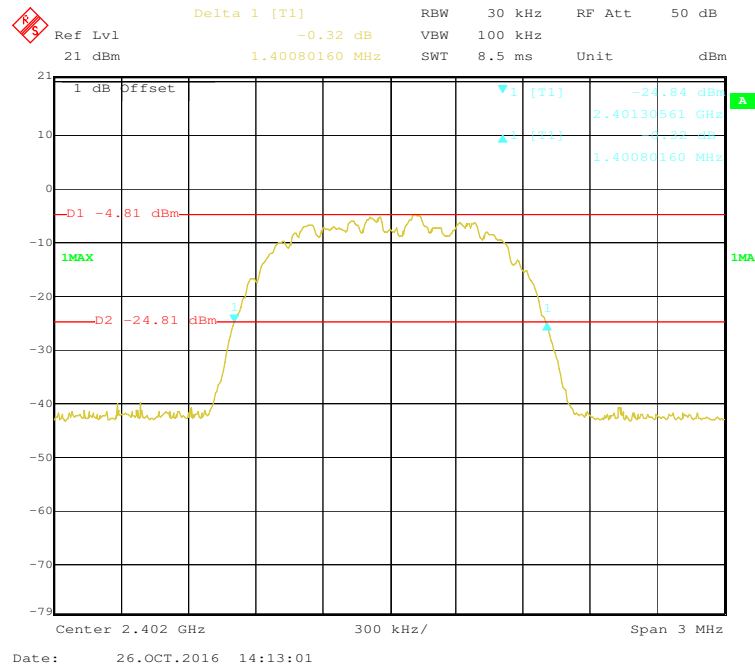
### EDR( $\pi/4$ -DQPSK): Middle Channel



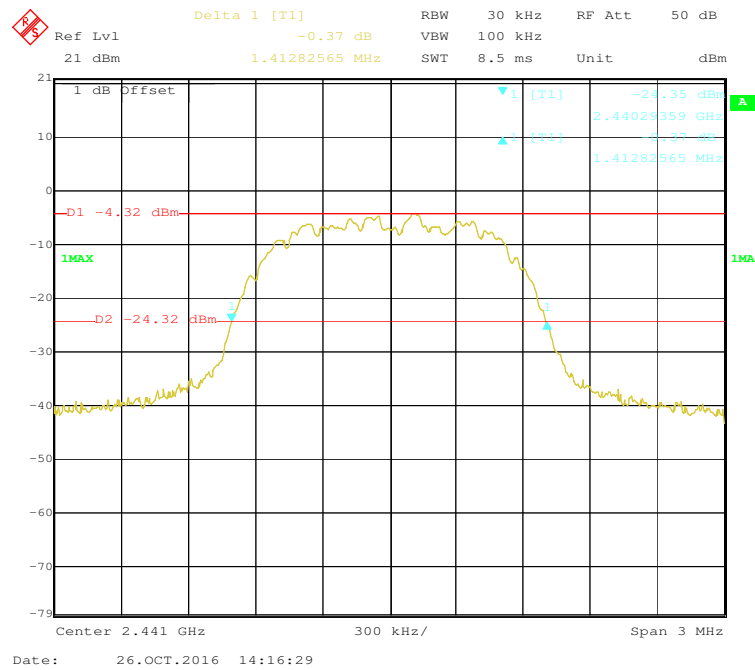
### EDR ( $\pi/4$ -DQPSK): High Channel



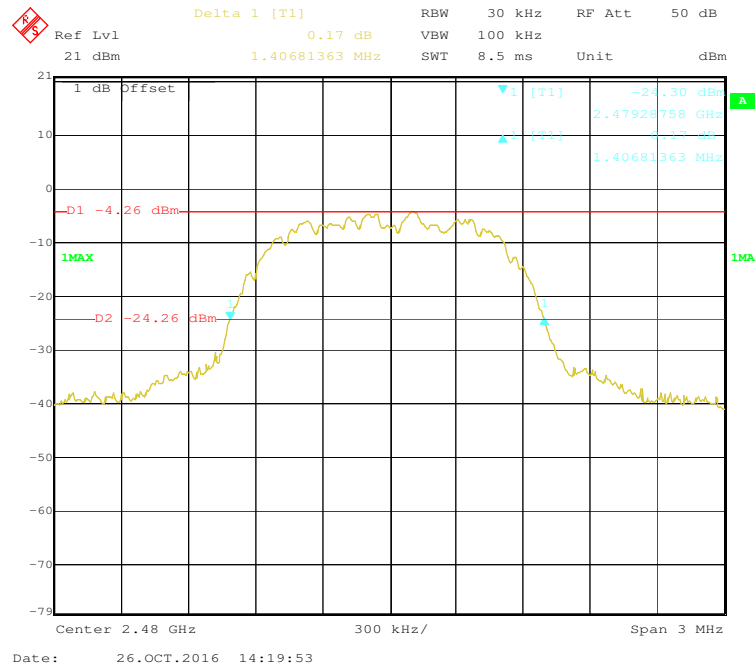
### EDR (8DPSK): Low Channel



### EDR (8DPSK): Middle Channel



### EDR (8DPSK): High Channel



**FCC §15.247(a) (1) (iii)-QUANTITY OF HOPPING CHANNEL TEST****Applicable Standard**

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     | 836131/009    | 2016-09-21       | 2017-09-21           |
| BACL            | RF cable        | KS-LAB-012 | KS-LAB-012    | 2015-12-16       | 2016-12-15           |

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

**Test Data****Environmental Conditions**

|                    |           |
|--------------------|-----------|
| Temperature:       | 26 °C     |
| Relative Humidity: | 55 %      |
| ATM Pressure:      | 101.0 kPa |

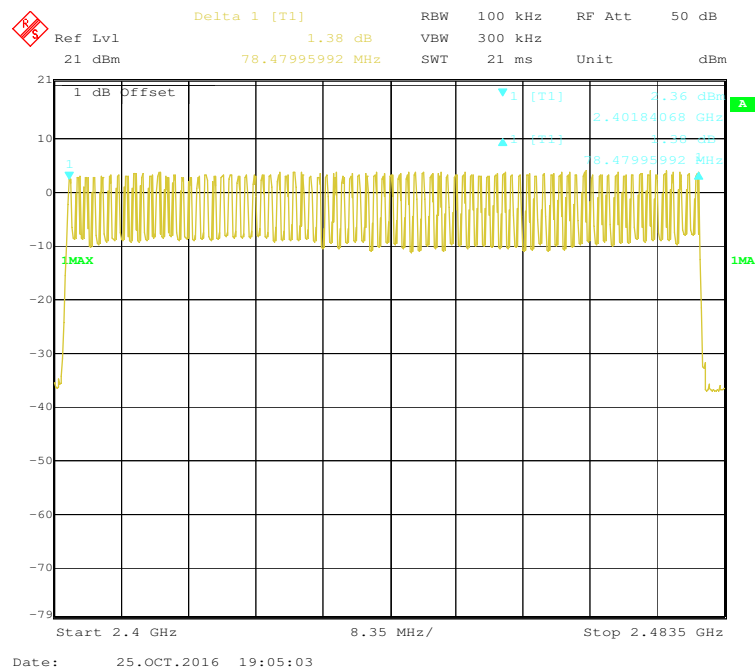
*The testing was performed by Chris Wang on 2016-10-25 to 2016-10-26.*

*EUT operation mode: Transmitting*

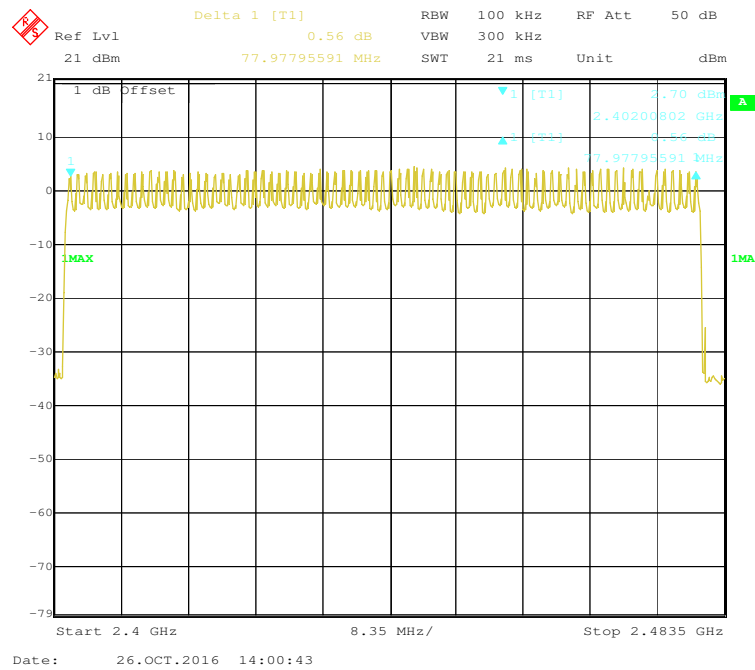
*Test Result: Compliance. Please refer to following tables and plots*

| Mode                  | Frequency Range (MHz) | Number of Hopping Channel (CH) | Limit (CH) |
|-----------------------|-----------------------|--------------------------------|------------|
| BDR (GFSK)            | 2400-2483.5           | 79                             | $\geq 15$  |
| EDR ( $\pi/4$ -DQPSK) | 2400-2483.5           | 79                             | $\geq 15$  |
| EDR (8DPSK)           | 2400-2483.5           | 79                             | $\geq 15$  |

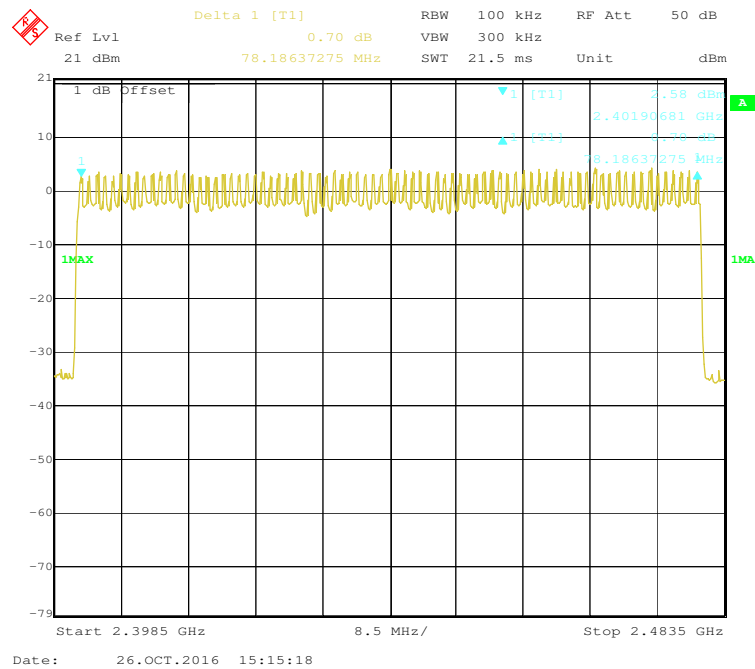
### BDR (GFSK): Number of Hopping Channels



### EDR ( $\pi/4$ -DQPSK): Number of Hopping Channels



### EDR (8DPSK): Number of Hopping Channels



**FCC §15.247(a) (1) (iii) - TIME OF OCCUPANCY (DWEELL TIME)****Applicable Standard**

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; Spectrum SPAN was set as 0. Sweep was set as 0.4 X channel no. (s), the quantity of pulse was get from single sweep. In addition, 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     | 836131/009    | 2016-09-21       | 2017-09-21           |
| BACL            | RF cable        | KS-LAB-012 | KS-LAB-012    | 2015-12-16       | 2016-12-15           |

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

**Test Data****Environmental Conditions**

|                    |           |
|--------------------|-----------|
| Temperature:       | 26 °C     |
| Relative Humidity: | 55 %      |
| ATM Pressure:      | 101.0 kPa |

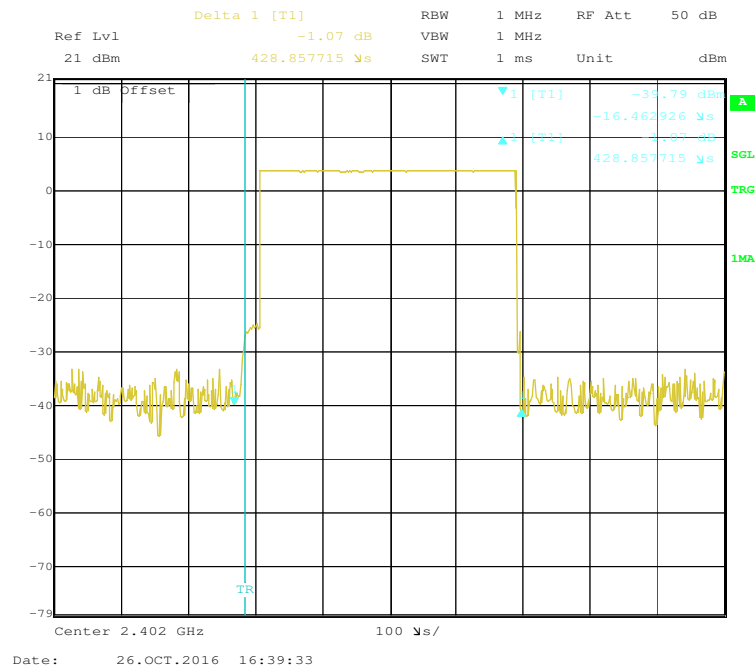
*The testing was performed by Chris Wang on 2016-10-26.*

*EUT operation mode: Transmitting*

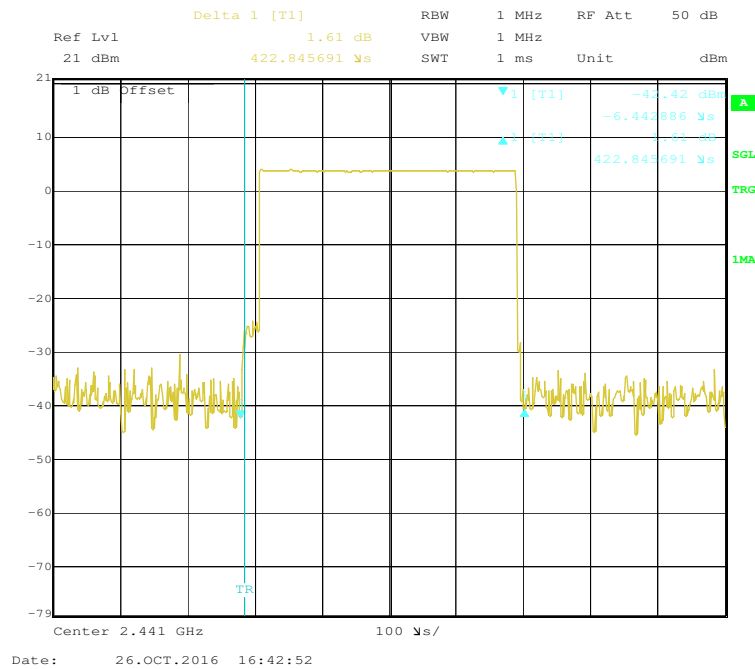
*Test Result: Compliance. Please refer to following tables and plots*

| Mode                     |      | Channel                                             | Pulse Width<br>(ms) | Dwell Time<br>(S) | Limit<br>(S) | Result |
|--------------------------|------|-----------------------------------------------------|---------------------|-------------------|--------------|--------|
| BDR<br>(GFSK)            | DH 1 | Low                                                 | 0.429               | 0.137             | 0.4          | Pass   |
|                          |      | Middle                                              | 0.423               | 0.135             | 0.4          | Pass   |
|                          |      | High                                                | 0.423               | 0.135             | 0.4          | Pass   |
|                          |      | Note: DH1:Dwell time = Pulse time*(1600/2/79)*31.6S |                     |                   |              |        |
|                          | DH 3 | Low                                                 | 1.683               | 0.269             | 0.4          | Pass   |
|                          |      | Middle                                              | 1.689               | 0.270             | 0.4          | Pass   |
|                          |      | High                                                | 1.689               | 0.270             | 0.4          | Pass   |
|                          |      | Note: DH3:Dwell time = Pulse time*(1600/4/79)*31.6S |                     |                   |              |        |
|                          | DH 5 | Low                                                 | 2.942               | 0.314             | 0.4          | Pass   |
|                          |      | Middle                                              | 2.934               | 0.313             | 0.4          | Pass   |
|                          |      | High                                                | 2.942               | 0.314             | 0.4          | Pass   |
|                          |      | Note: DH5:Dwell time = Pulse time*(1600/6/79)*31.6S |                     |                   |              |        |
| EDR<br>( $\pi/4$ -DQPSK) | DH 1 | Low                                                 | 0.431               | 0.138             | 0.4          | Pass   |
|                          |      | Middle                                              | 0.421               | 0.135             | 0.4          | Pass   |
|                          |      | High                                                | 0.425               | 0.136             | 0.4          | Pass   |
|                          |      | Note: DH1:Dwell time = Pulse time*(1600/2/79)*31.6S |                     |                   |              |        |
|                          | DH 3 | Low                                                 | 1.691               | 0.271             | 0.4          | Pass   |
|                          |      | Middle                                              | 1.697               | 0.272             | 0.4          | Pass   |
|                          |      | High                                                | 1.703               | 0.272             | 0.4          | Pass   |
|                          |      | Note: DH3:Dwell time = Pulse time*(1600/4/79)*31.6S |                     |                   |              |        |
|                          | DH 5 | Low                                                 | 2.982               | 0.318             | 0.4          | Pass   |
|                          |      | Middle                                              | 2.950               | 0.315             | 0.4          | Pass   |
|                          |      | High                                                | 2.966               | 0.316             | 0.4          | Pass   |
|                          |      | Note: DH5:Dwell time = Pulse time*(1600/6/79)*31.6S |                     |                   |              |        |
| EDR<br>(8DPSK)           | DH 1 | Low                                                 | 0.453               | 0.145             | 0.4          | Pass   |
|                          |      | Middle                                              | 0.451               | 0.144             | 0.4          | Pass   |
|                          |      | High                                                | 0.449               | 0.144             | 0.4          | Pass   |
|                          |      | Note: DH1:Dwell time = Pulse time*(1600/2/79)*31.6S |                     |                   |              |        |
|                          | DH 3 | Low                                                 | 1.792               | 0.287             | 0.4          | Pass   |
|                          |      | Middle                                              | 1.810               | 0.290             | 0.4          | Pass   |
|                          |      | High                                                | 1.792               | 0.287             | 0.4          | Pass   |
|                          |      | Note: DH3:Dwell time = Pulse time*(1600/4/79)*31.6S |                     |                   |              |        |
|                          | DH 5 | Low                                                 | 3.062               | 0.327             | 0.4          | Pass   |
|                          |      | Middle                                              | 3.046               | 0.325             | 0.4          | Pass   |
|                          |      | High                                                | 3.046               | 0.325             | 0.4          | Pass   |
|                          |      | Note: DH5:Dwell time = Pulse time*(1600/6/79)*31.6S |                     |                   |              |        |

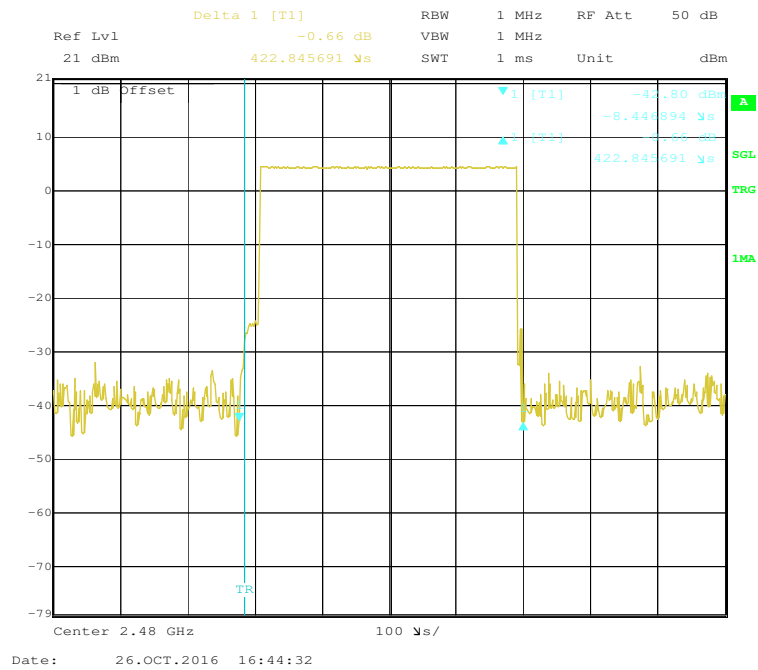
### BDR (GFSK): Pulse time, Low Channel, DH1



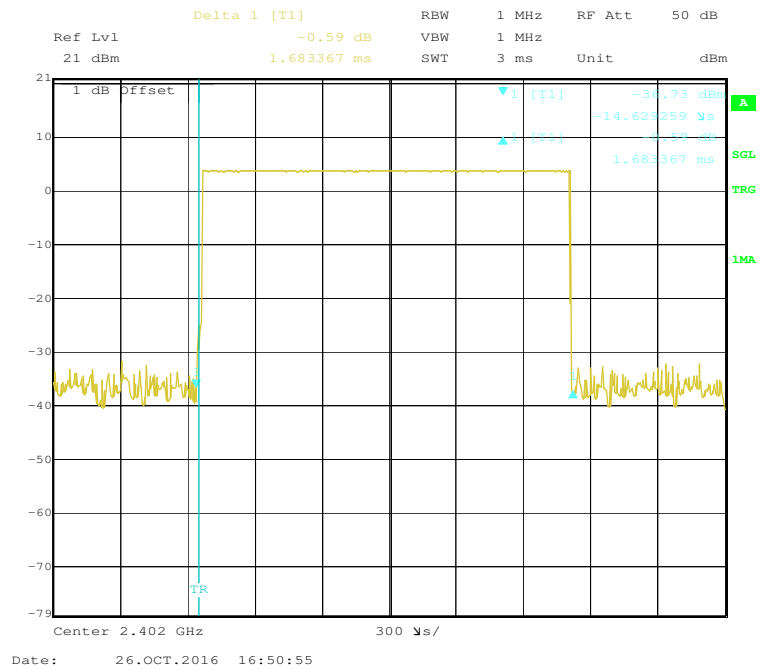
### Pulse time, Middle Channel, DH1



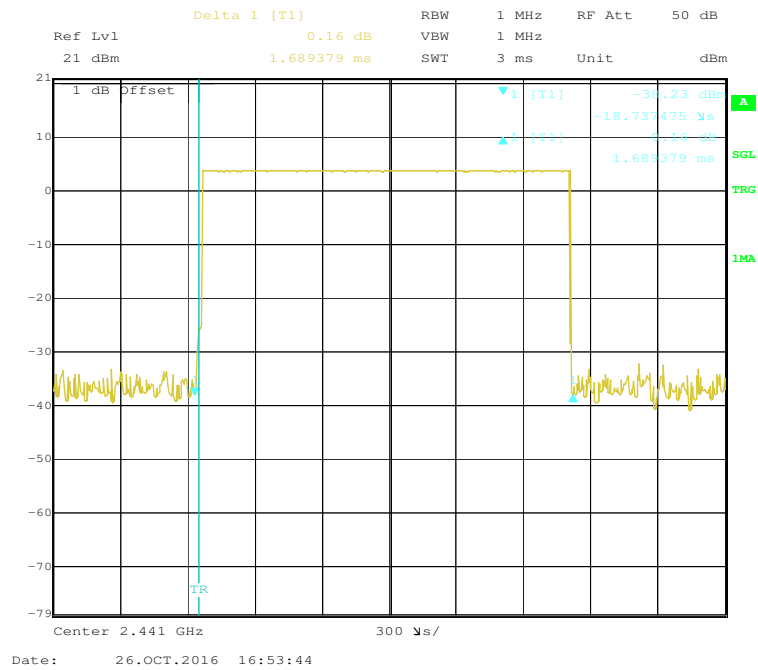
### Pulse time, High Channel, DH1



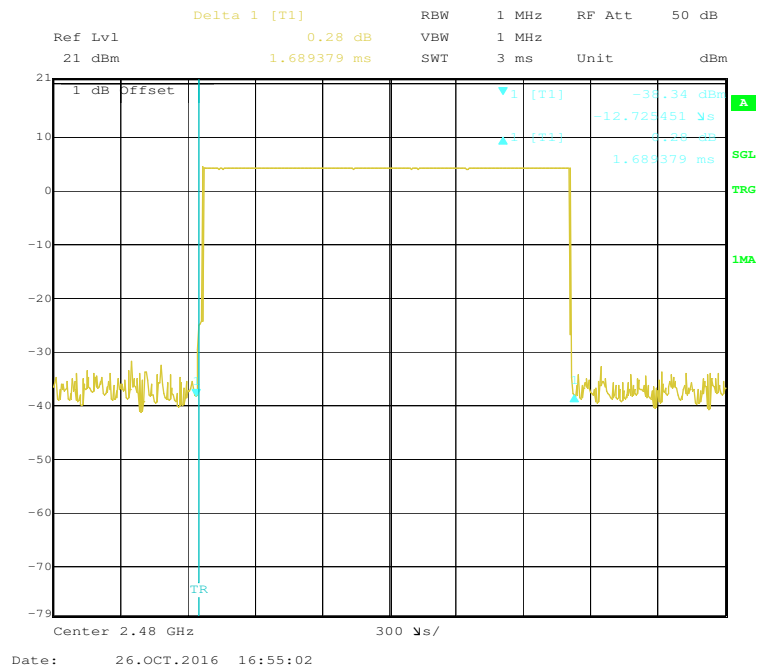
### Pulse time, Low Channel, DH3



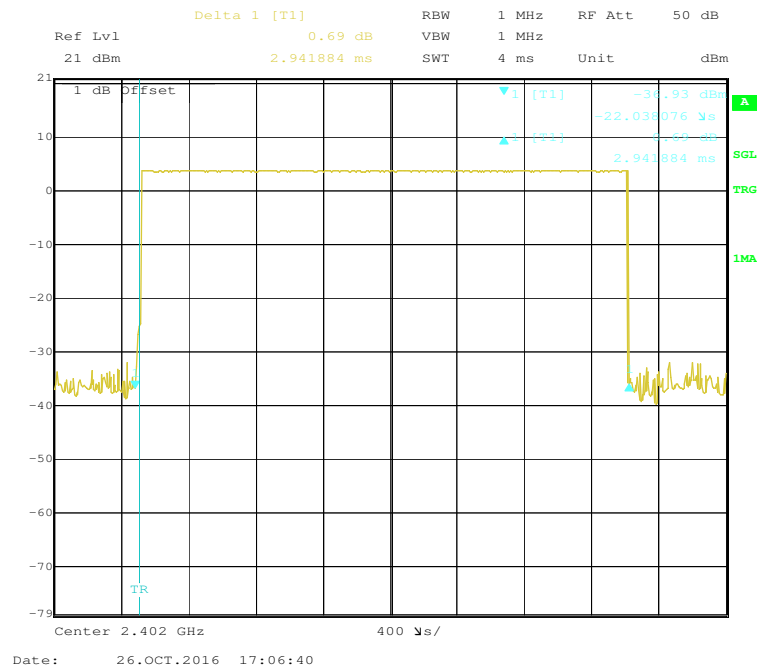
### Pulse time, Middle Channel, DH3



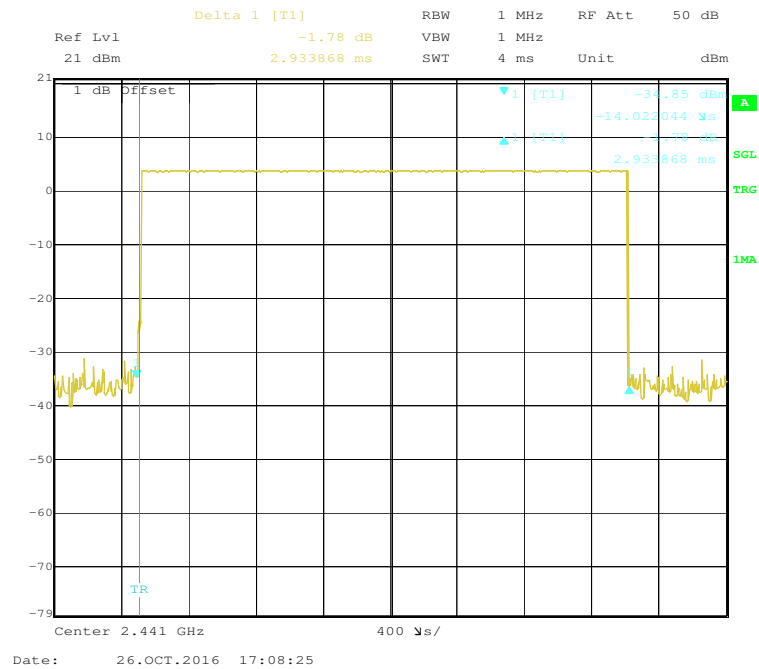
### Pulse time, High Channel, DH3



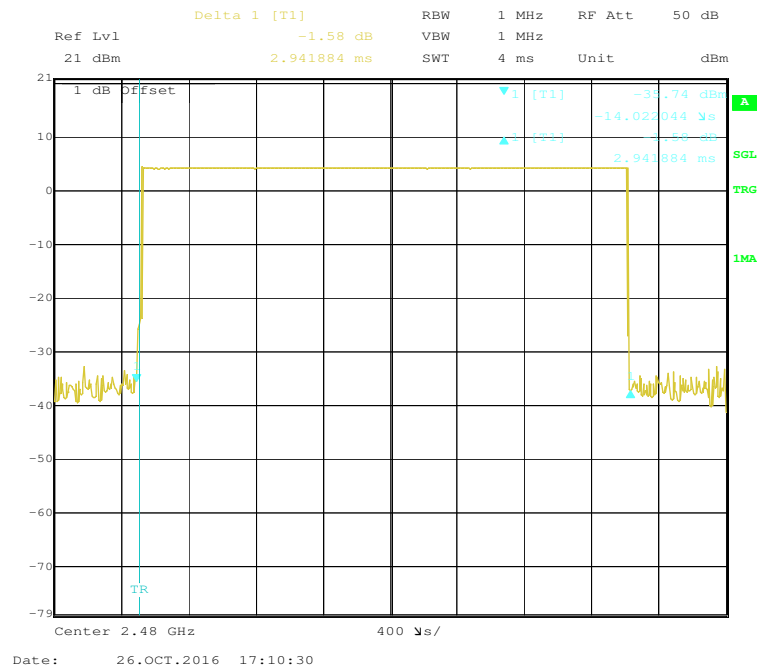
### Pulse time, Low Channel, DH5



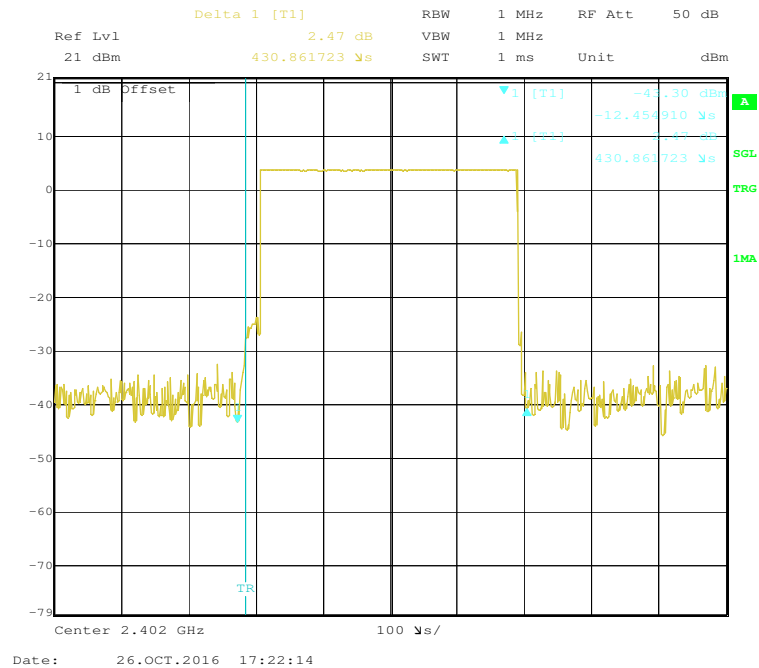
### Pulse time, Middle Channel, DH5



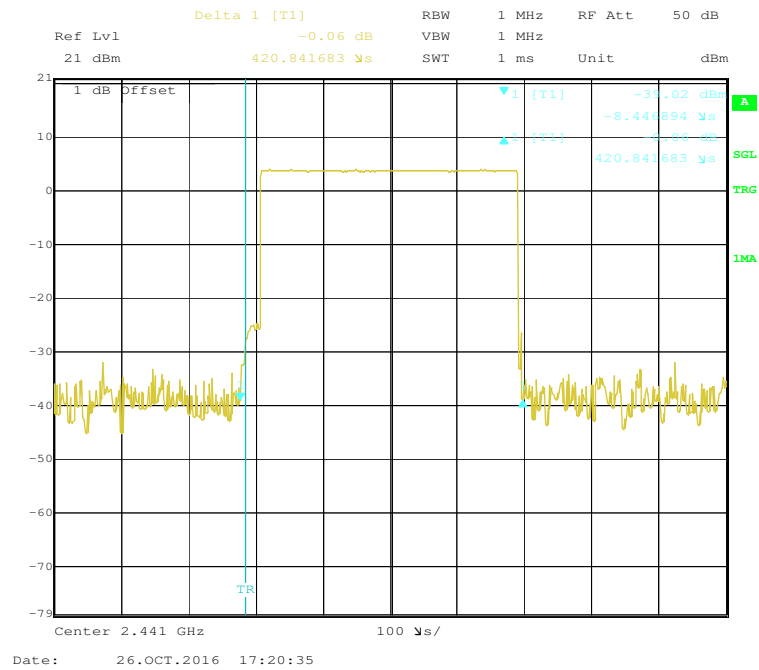
### Pulse time, High Channel, DH5



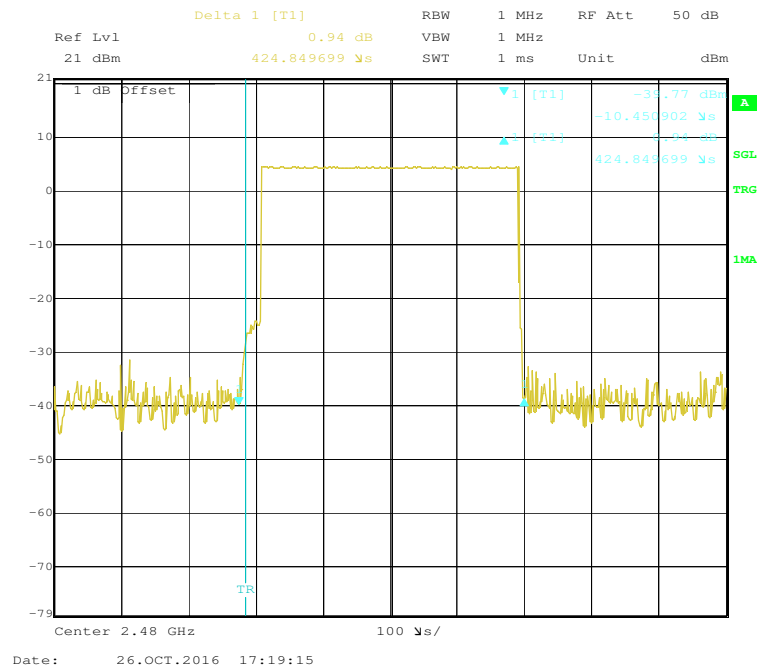
### EDR ( $\pi/4$ -DQPSK): Pulse time, Low Channel, DH1



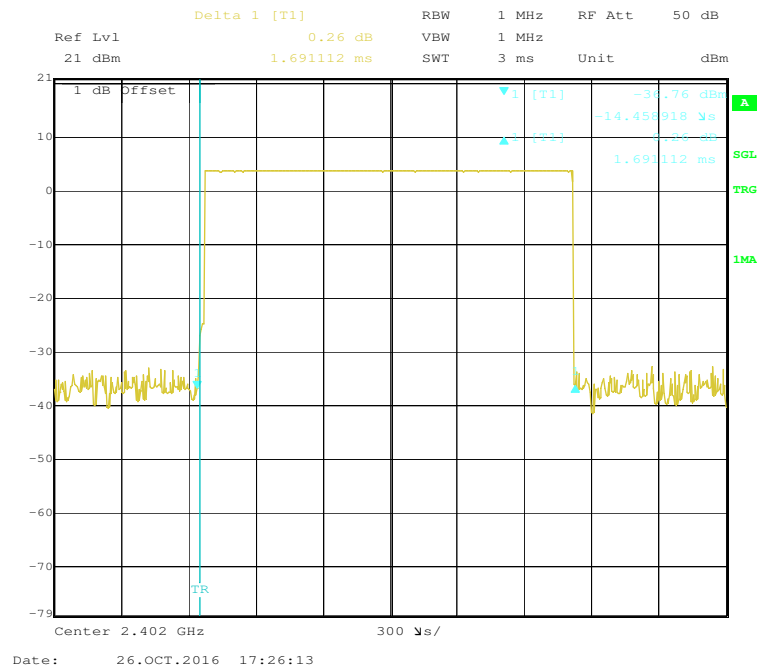
### Pulse time, Middle Channel, DH1



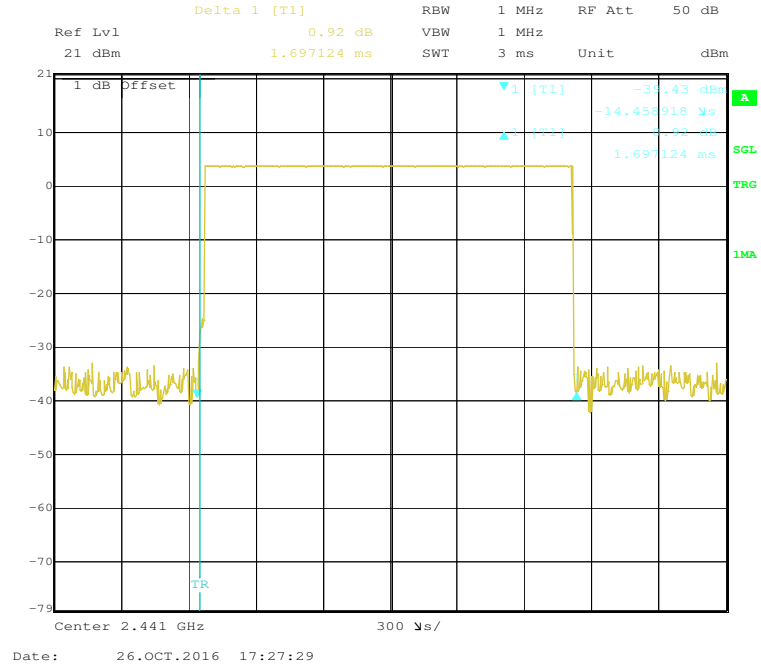
### Pulse time, High Channel, DH1



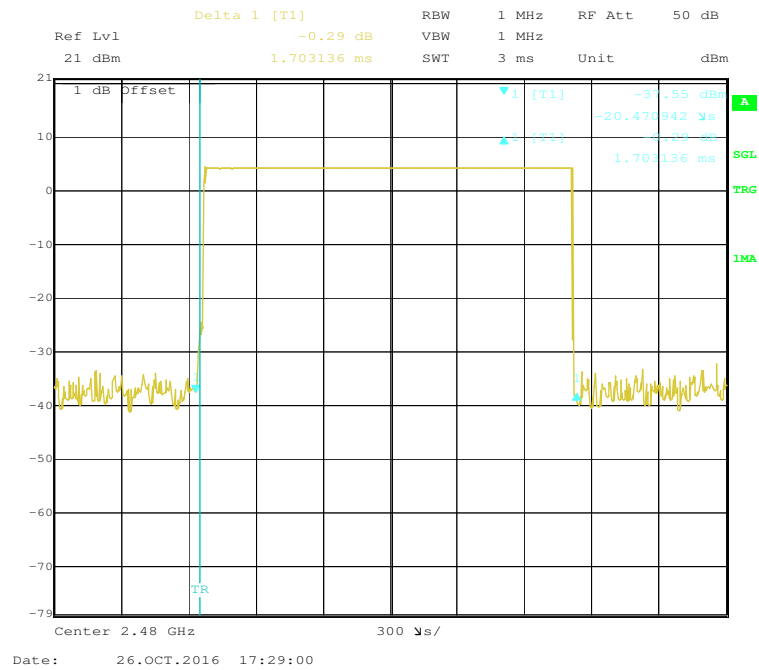
### Pulse time, Low Channel, DH3



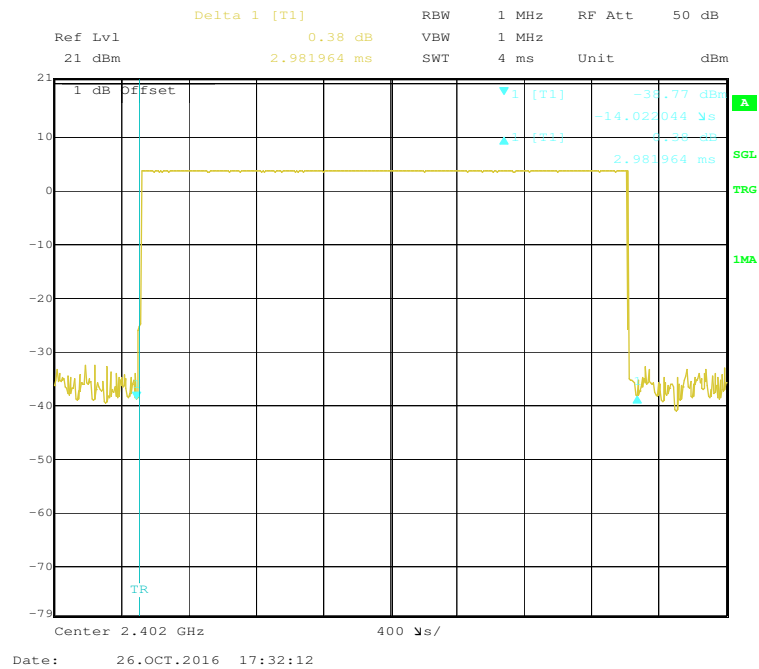
### Pulse time, Middle Channel, DH3



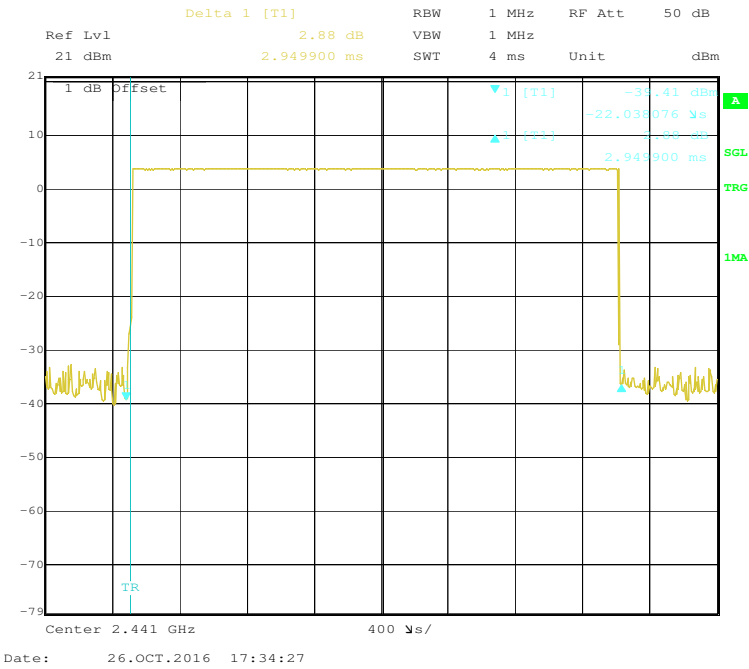
### Pulse time, High Channel, DH3



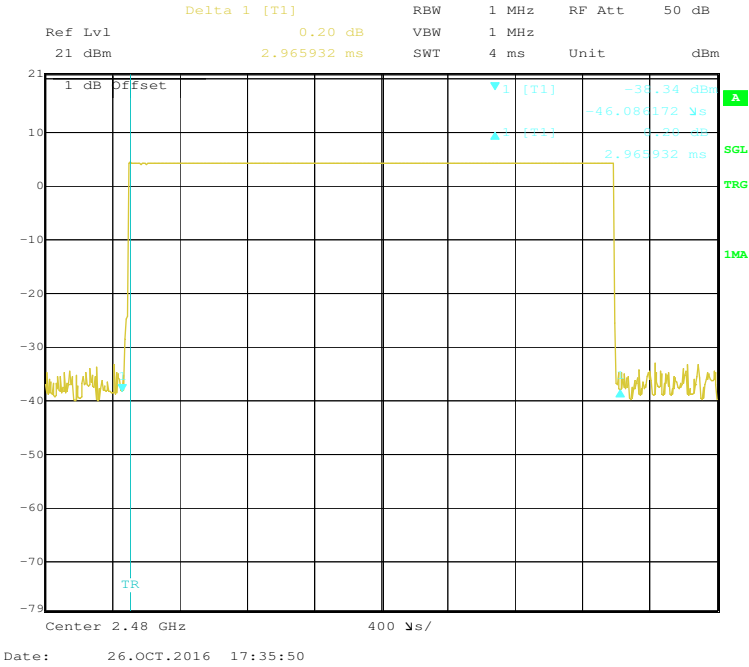
### Pulse time, Low Channel, DH5



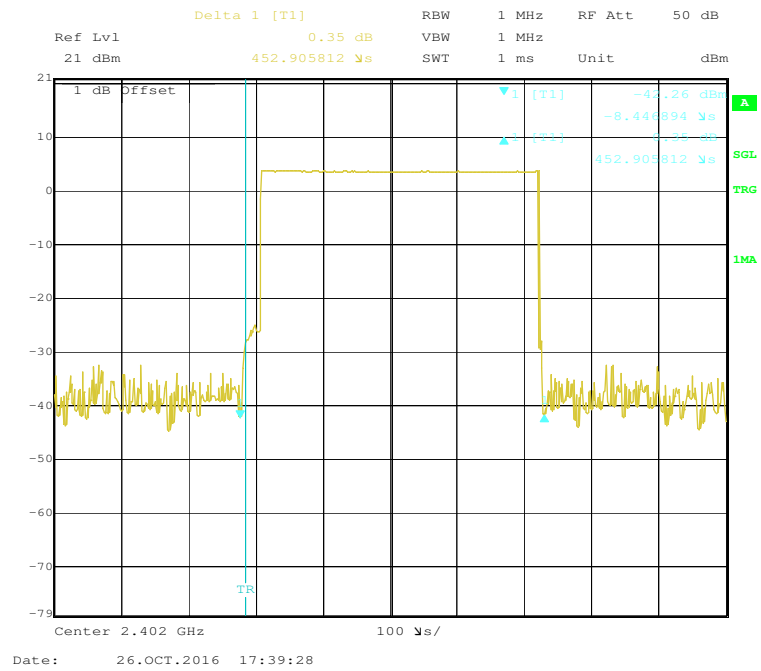
Pulse time, Middle Channel, DH5



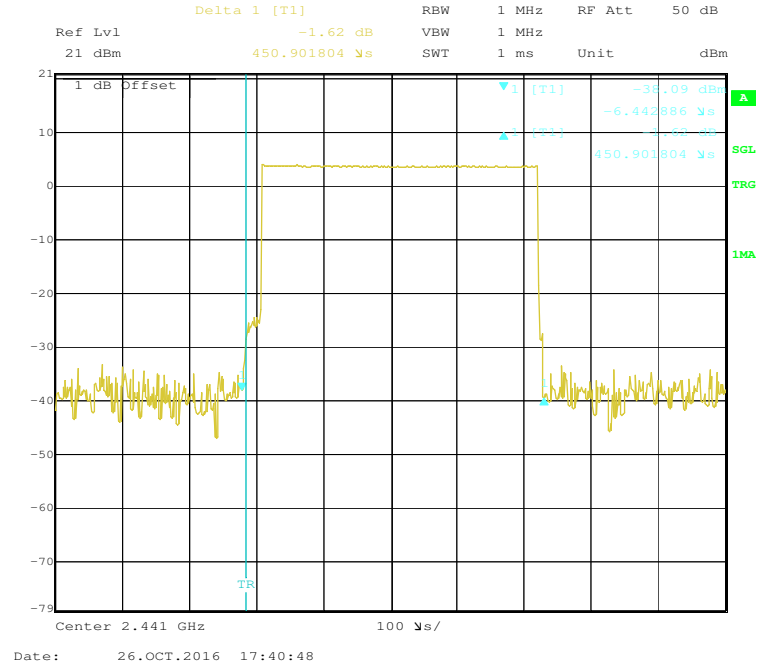
Pulse time, High Channel, DH5



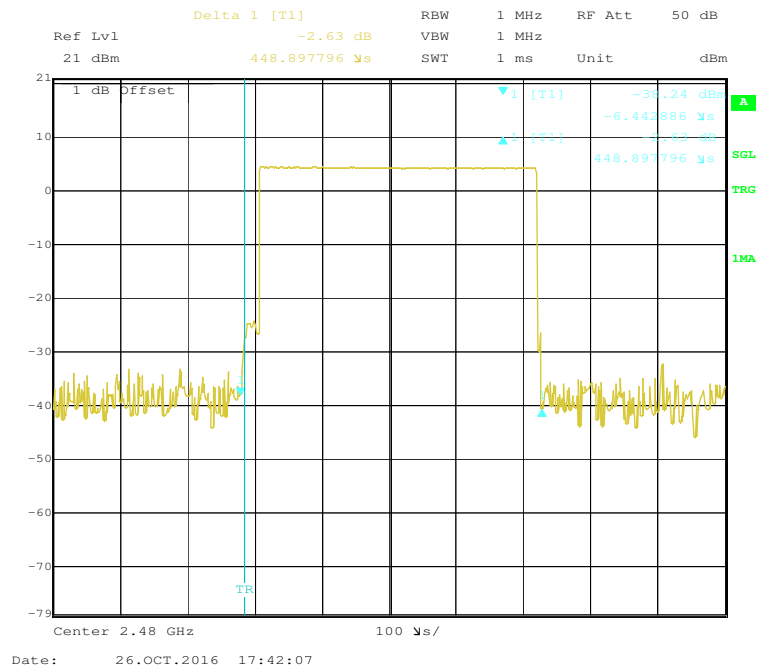
### EDR (8DPSK): Pulse time, Low Channel, DH1



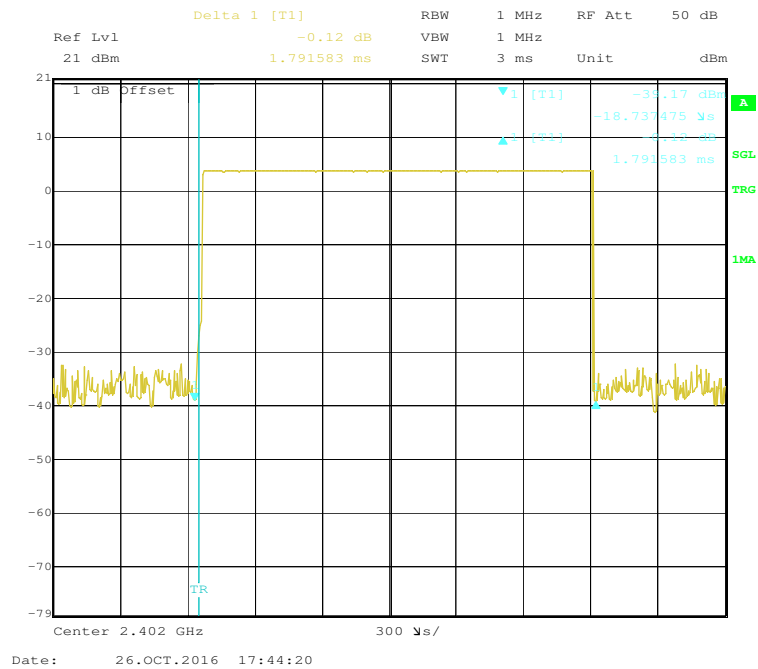
### Pulse time, Middle Channel, DH1



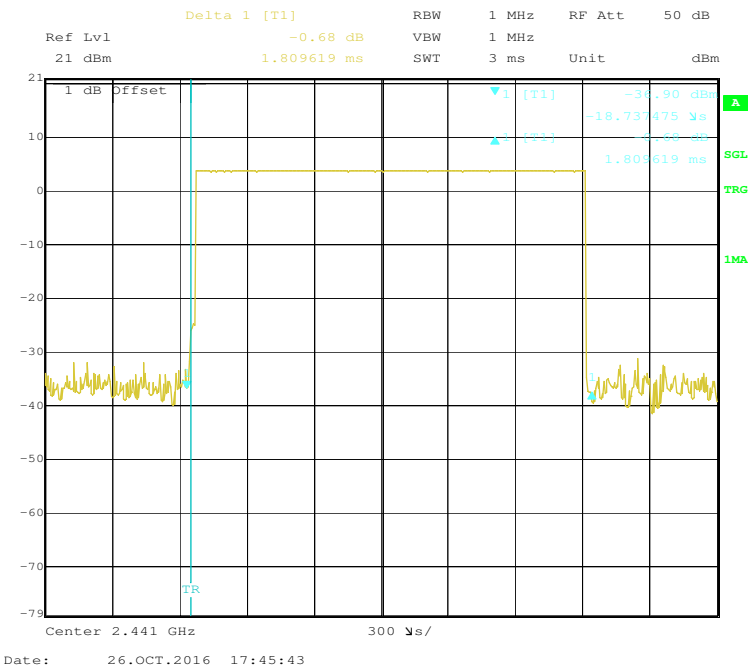
### Pulse time, High Channel, DH1



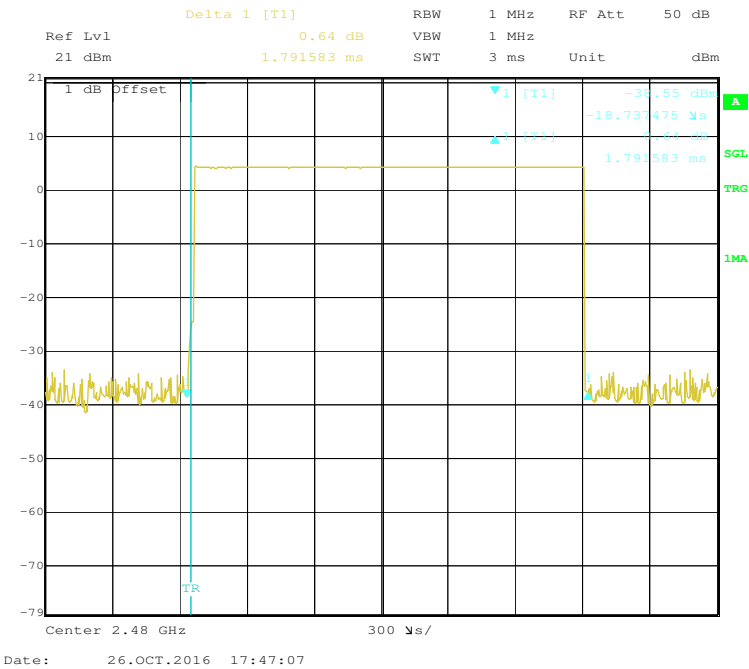
### Pulse time, Low Channel, DH3



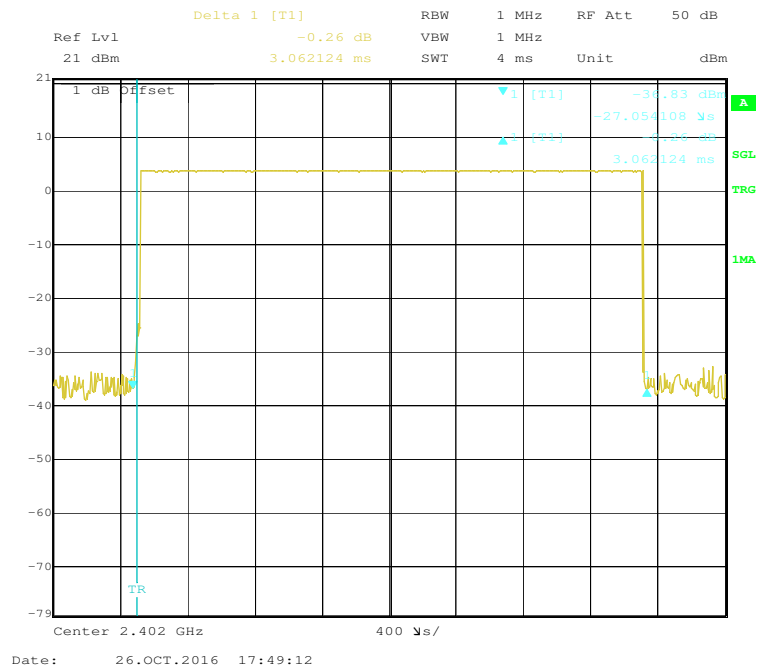
Pulse time, Middle Channel, DH3



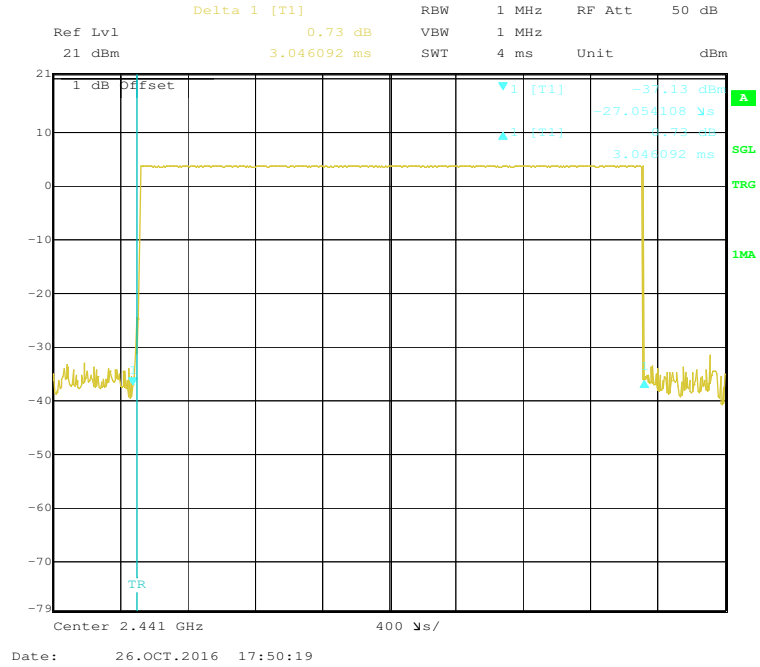
Pulse time, High Channel, DH3



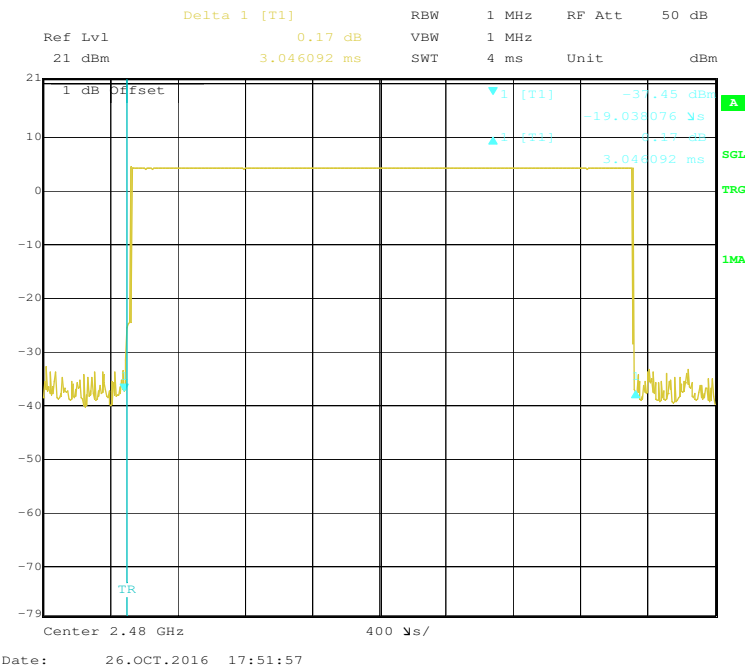
### Pulse time, Low Channel, DH5



### Pulse time, Middle Channel, DH5



Pulse time, High Channel, DH5



**FCC §15.247(b) (1) - 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. And for all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

**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     | 836131/009    | 2016-09-21       | 2017-09-21           |
| BACL            | RF cable        | KS-LAB-012 | KS-LAB-012    | 2015-12-16       | 2016-12-15           |

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

**Test Data****Environmental Conditions**

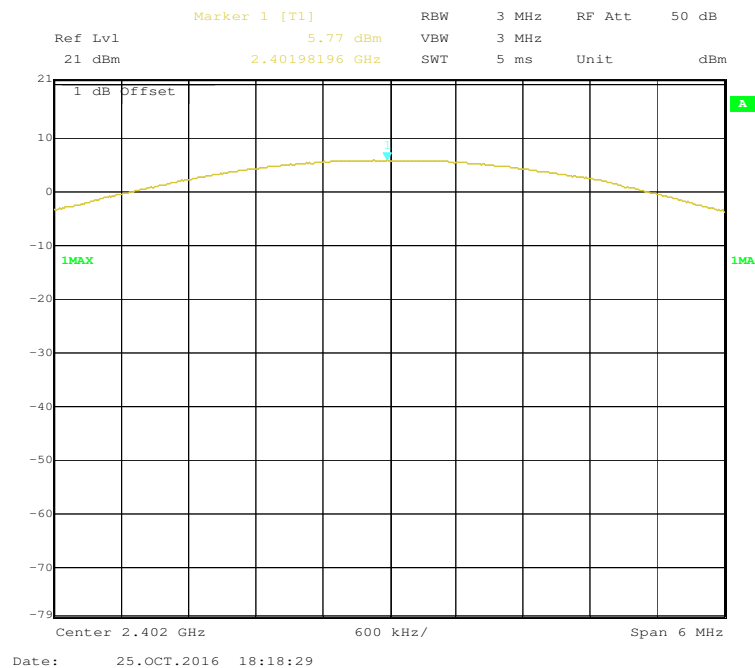
|                    |           |
|--------------------|-----------|
| Temperature:       | 26 °C     |
| Relative Humidity: | 55 %      |
| ATM Pressure:      | 101.0 kPa |

*The testing was performed by Chris Wang on 2016-10-25 to 2016-10-26.*

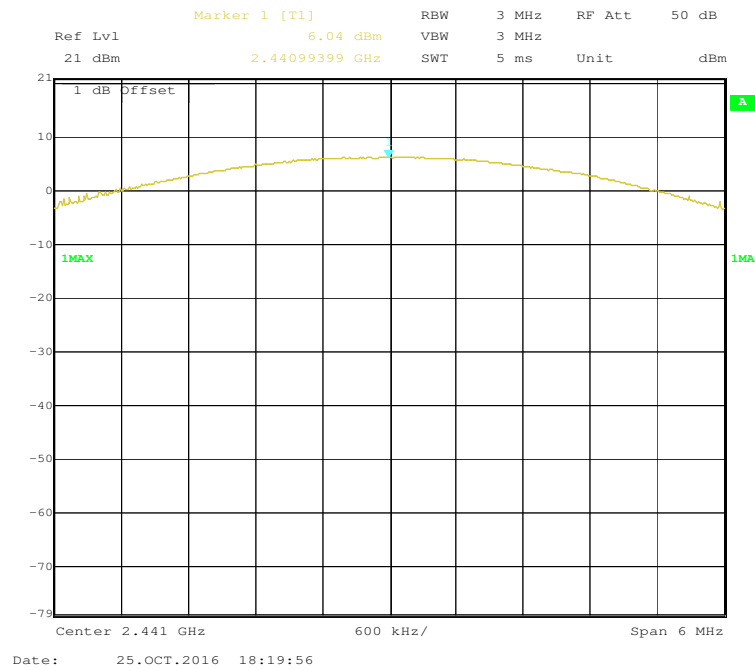
*EUT operation mode: Transmitting*

*Test Result: Compliance. Please refer to following tables and plots*

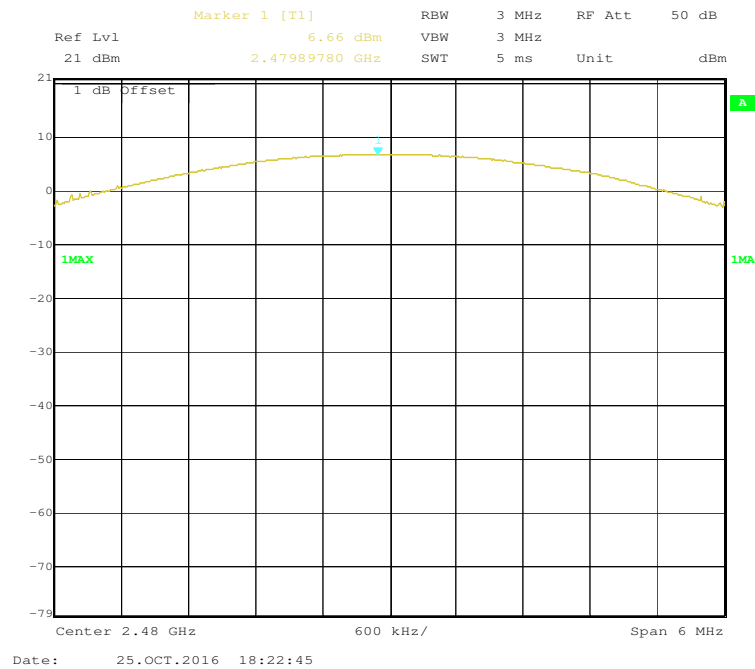
| Mode                                  | Channel | Frequency (MHz) | Output Power |      | Limit (mW) |
|---------------------------------------|---------|-----------------|--------------|------|------------|
|                                       |         |                 | (dBm)        | (mW) |            |
| <b>BDR (GFSK)</b>                     | Low     | 2402            | 5.77         | 3.78 | 1000       |
|                                       | Middle  | 2441            | 6.04         | 4.02 | 1000       |
|                                       | High    | 2480            | 6.66         | 4.63 | 1000       |
| <b>EDR (<math>\pi/4</math>-DQPSK)</b> | Low     | 2402            | 3.37         | 2.17 | 1000       |
|                                       | Middle  | 2441            | 4.10         | 2.57 | 1000       |
|                                       | High    | 2480            | 4.11         | 2.58 | 1000       |
| <b>EDR (8DPSK)</b>                    | Low     | 2402            | 4.00         | 2.51 | 1000       |
|                                       | Middle  | 2441            | 4.27         | 2.67 | 1000       |
|                                       | High    | 2480            | 4.38         | 2.74 | 1000       |

**BDR (GFSK): Low Channel**

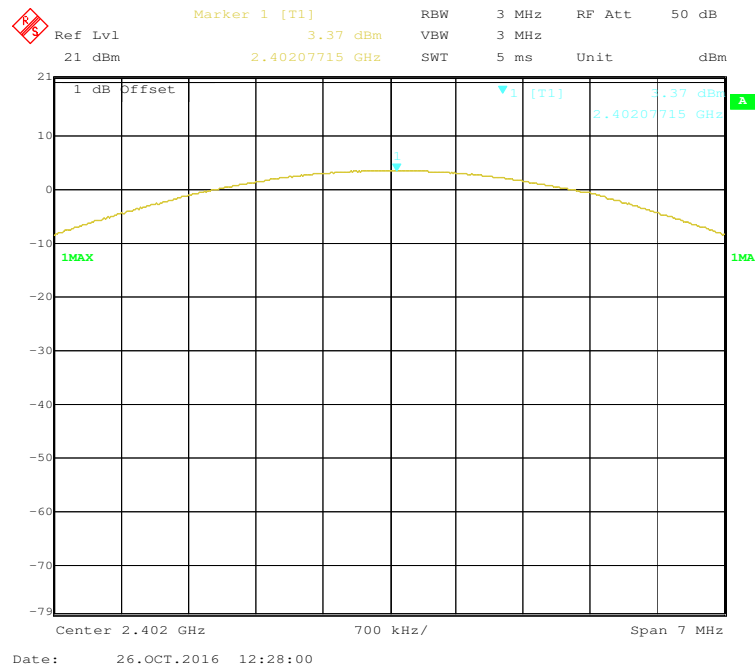
### BDR (GFSK): Middle Channel



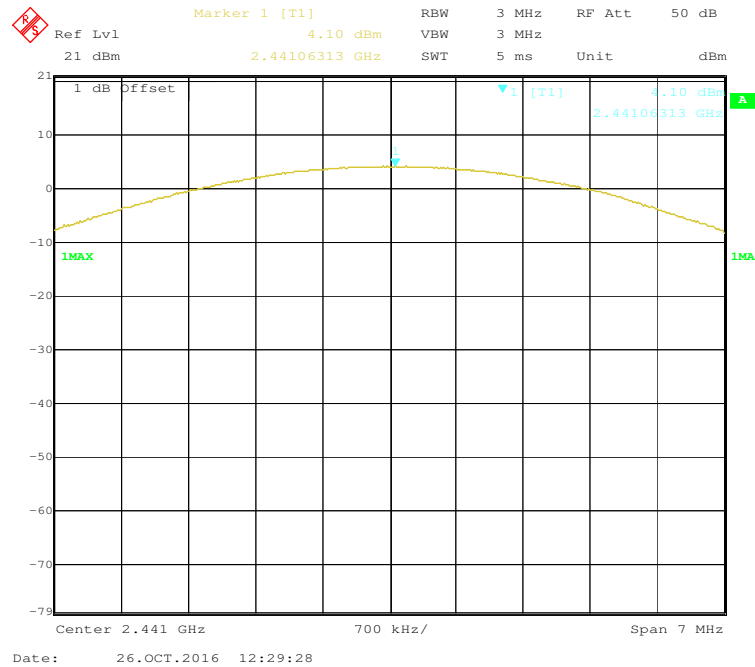
### BDR (GFSK): High Channel



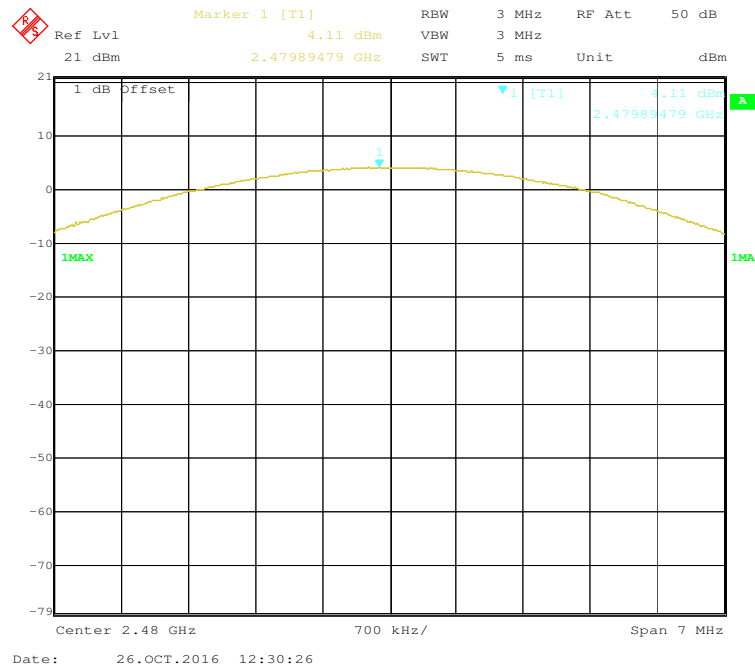
### EDR( $\pi/4$ -DQPSK): Low Channel



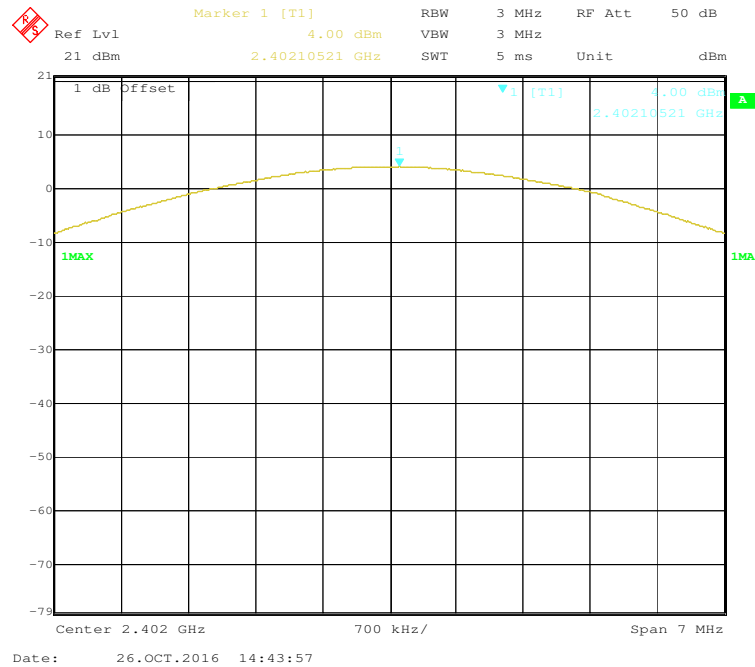
### EDR( $\pi/4$ -DQPSK): Middle Channel



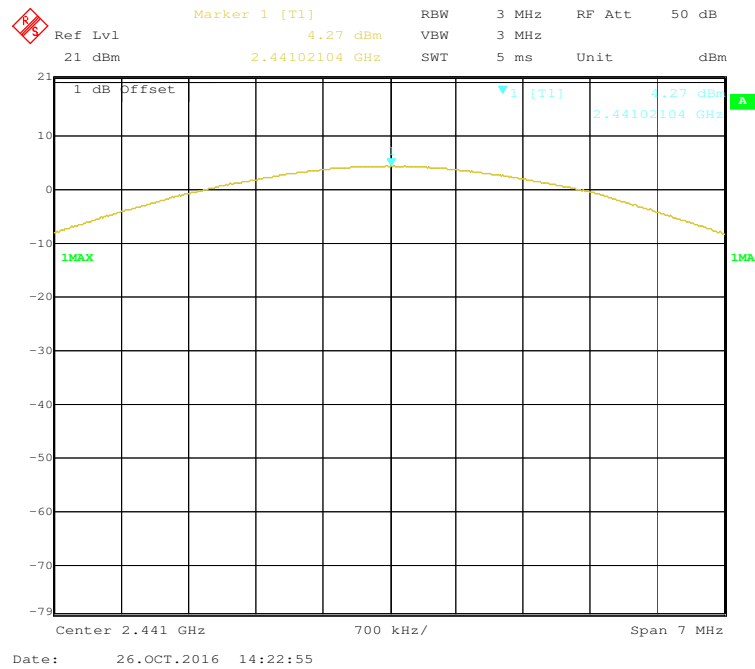
### EDR( $\pi/4$ -DQPSK): High Channel



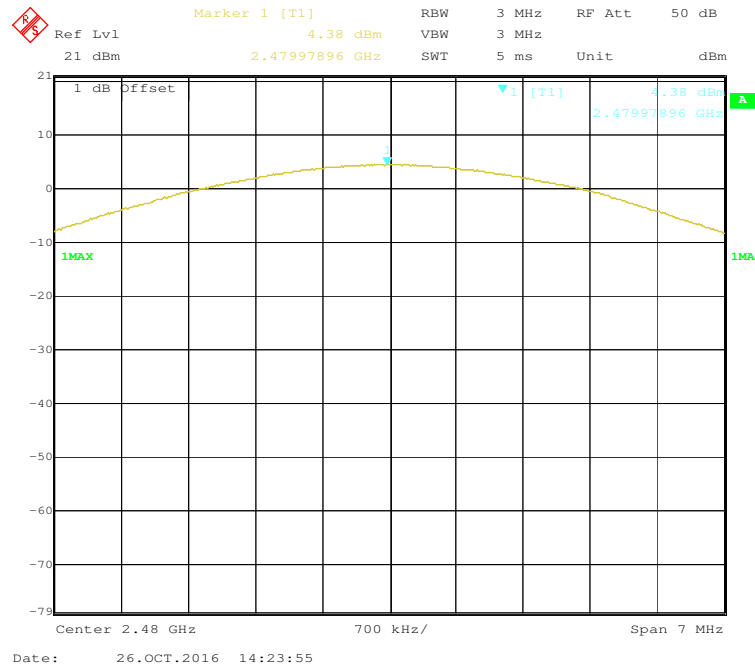
### EDR(8DPSK): Low Channel



### EDR(8DPSK): Middle Channel



### EDR(8DPSK): High Channel



## FCC §15.247(d) - BAND EDGES TESTING

### Applicable Standard

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)).

### 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 of spectrum analyzer to 100 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     | 836131/009    | 2016-09-21       | 2017-09-21           |
| BACL            | RF cable        | KS-LAB-012 | KS-LAB-012    | 2015-12-16       | 2016-12-15           |

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

### Test Data

#### Environmental Conditions

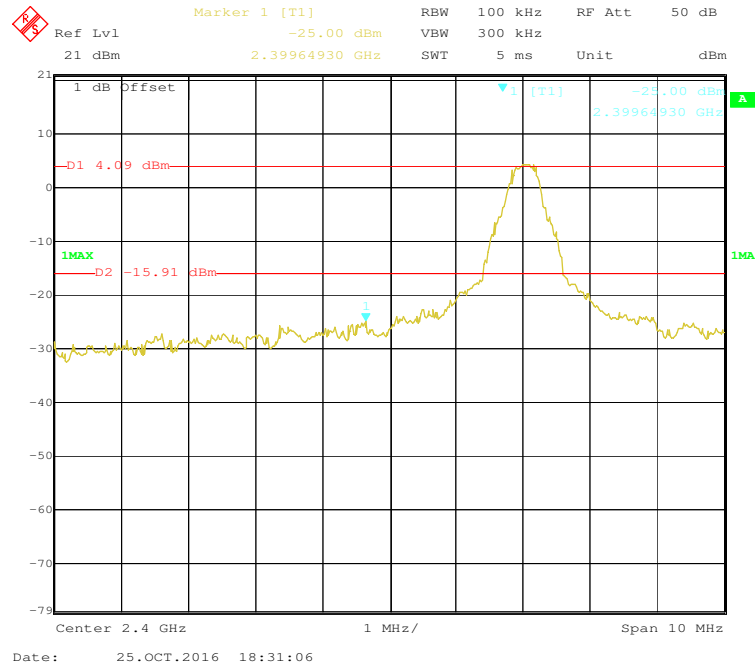
|                    |           |
|--------------------|-----------|
| Temperature:       | 26 °C     |
| Relative Humidity: | 55 %      |
| ATM Pressure:      | 101.0 kPa |

The testing was performed by Chris Wang on 2016-10-25 to 2016-10-26.

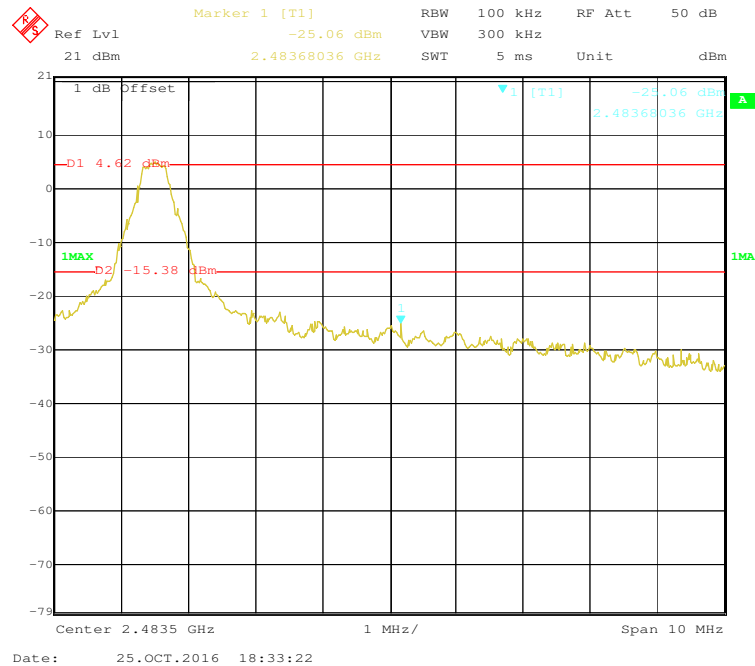
EUT operation mode: Transmitting

Test Result: Compliance. Please refer to following plots.

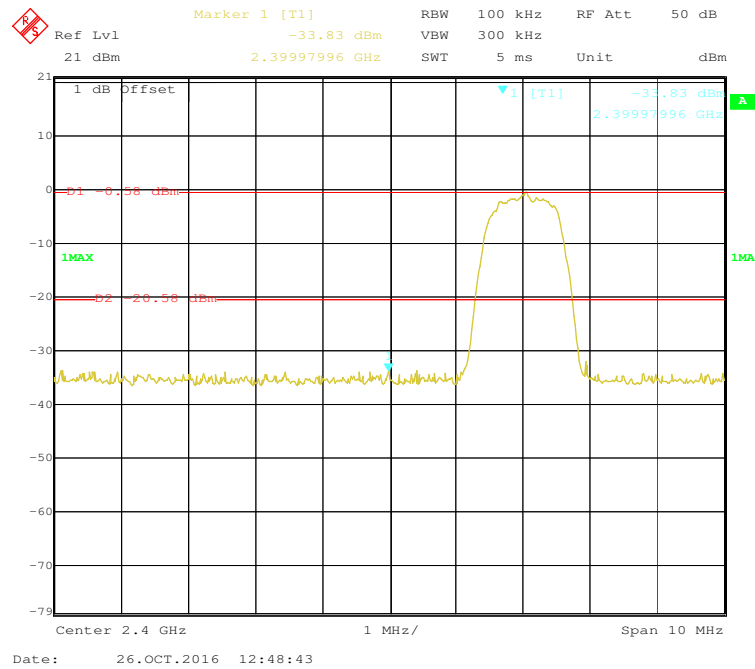
### BDR (GFSK): Band Edge-Left Side



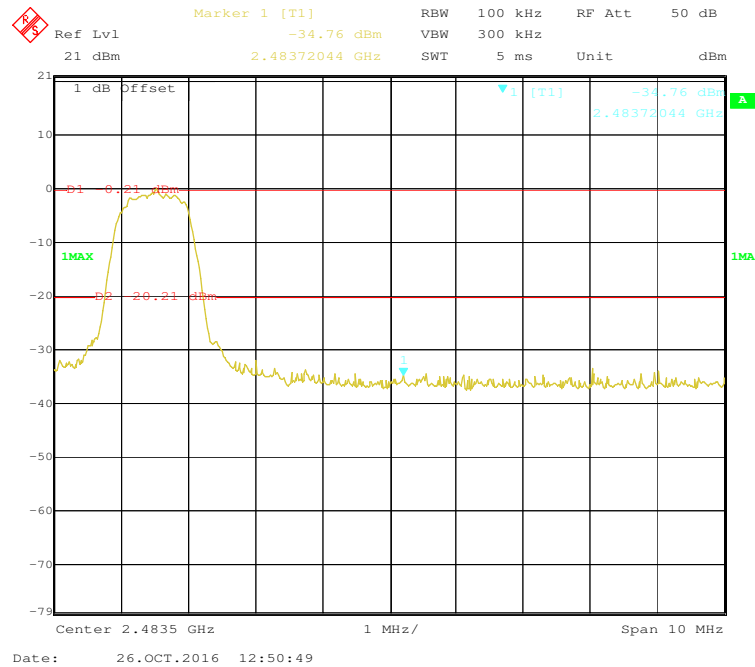
### BDR (GFSK): Band Edge-Right Side



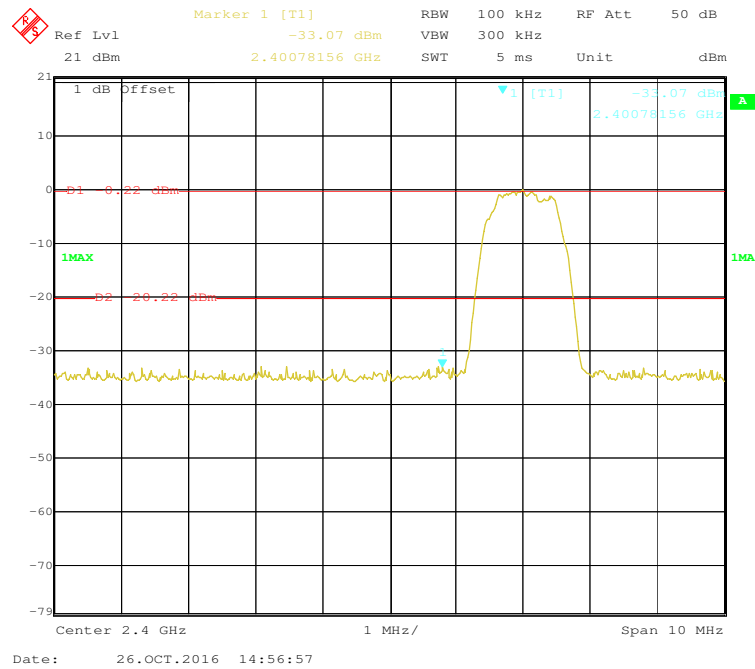
### EDR ( $\pi/4$ -DQPSK): Band Edge-Left Side



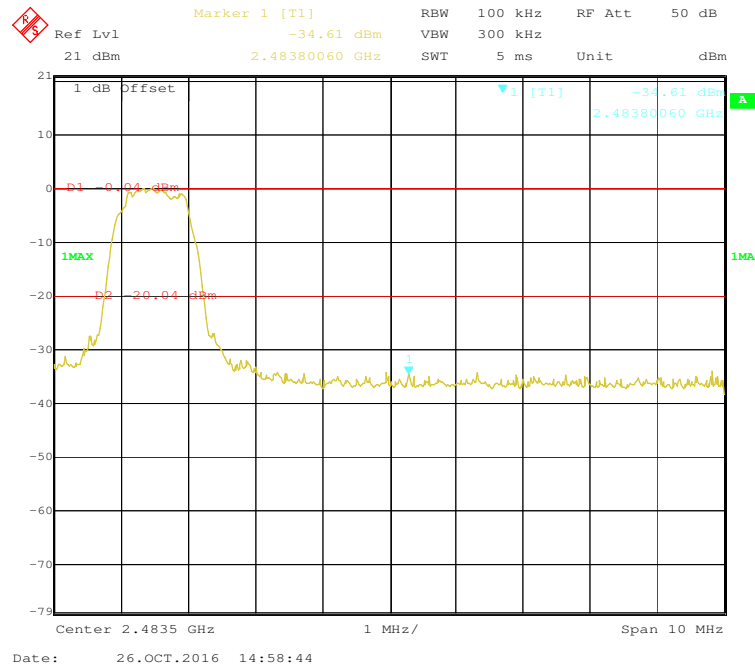
### EDR ( $\pi/4$ -DQPSK): Band Edge-Right Side



### EDR (8DPSK): Band Edge-Left Side



### BDR (8DPSK): Band Edge-Right Side



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