

## FCC PART 90

# TEST REPORT

For

## Hytera Communications Corporation Limited

Hytera Tower, Hi-Tech Industrial Park North, 9108# Beihuan Road, Nanshan District,  
Shenzhen, 518057 China

**FCC ID: YAMPT790EXF4**

|                                                                                                                                                                                                                                                                                                                  |                                          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| <b>Report Type:</b><br>Original Report                                                                                                                                                                                                                                                                           | <b>Product Type:</b><br>Ex Digital Radio |
| <b>Test Engineer:</b> Sonia Zhou <i>Sonia Zhou</i>                                                                                                                                                                                                                                                               |                                          |
| <b>Report Number:</b> RDG160630004-00A                                                                                                                                                                                                                                                                           |                                          |
| <b>Report Date:</b> 2016-08-04                                                                                                                                                                                                                                                                                   |                                          |
| <b>Reviewed By:</b> RF Engineer<br>Rocky Kang <i>Rocky Kang</i>                                                                                                                                                                                                                                                  |                                          |
| <b>Prepared By:</b> Bay Area Compliance Laboratories Corp. (Shenzhen)<br>6/F, the 3rd Phase of WanLi Industrial Building,<br>ShiHua Road, FuTian Free Trade Zone<br>Shenzhen, Guangdong, China<br>Tel: +86-755-33320018<br>Fax: +86-755-33320008<br><a href="http://www.baclcorp.com.cn">www.baclcorp.com.cn</a> |                                          |

**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 *Hytera Communications Corporation Limited*'s product, model number: *PT790Ex F4* (FCC ID: *YAMPT790EXF4*) or the "EUT" in this report was an *Ex Digital Radio*, which was measured approximately: 14.48 cm (L) x 5.50 cm (W) x 4.07 cm (H), rated input voltage: DC7.4V from rechargeable Li-ion battery or DC 12.0V charging from adapter.

#### Adapter Information:

Model: HKA01212010-XQ

Input: AC 100-240V, 50/60Hz, 0.5A

Output: DC12.0V, 1.0A

*\* All measurement and test data in this report was gathered from production sample serial number: 160630003 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2016-06-30.*

### Objective

This test report is prepared on behalf of *Hytera Communications Corporation Limited* in accordance with Part 2 and Part 90 of the Federal Communication Commissions rules.

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

No related submittal(s).

### Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of federal Regulations Title 47 Part 2, Sub-part J as well as the following individual parts:

Part 90 – Private Land Mobile Radio Service

Applicable Standards: TIA-603-D and ANSI 63.4-2014.

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

Measurement uncertainty with radiated emission is 5.81 dB for 30MHz-1GHz.and 4.88 dB for above 1GHz, 1.95dB for conducted measurement.

## **Test Facility**

The test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) 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 October 31, 2013. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. 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

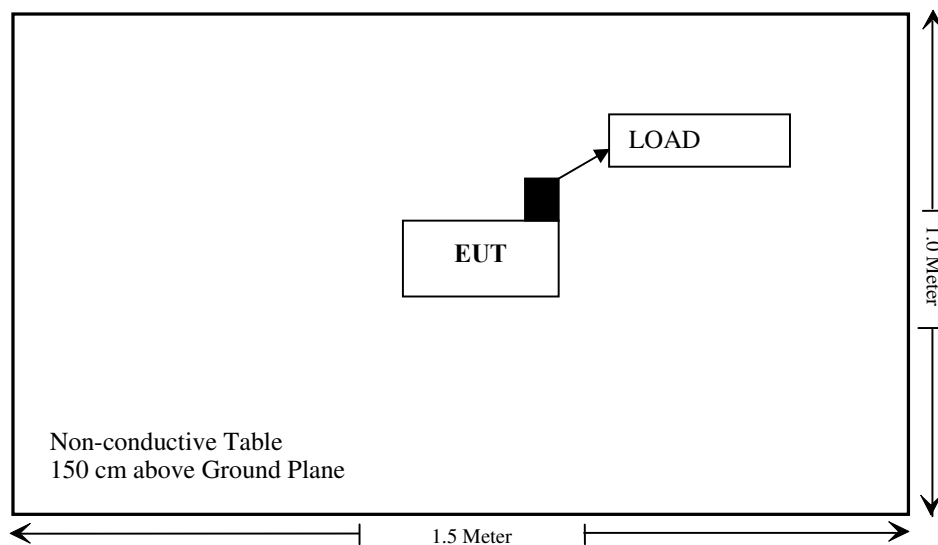
### Description of Test Configuration

The system was configured for testing in a test mode which has been done in the factory.

### Equipment Modifications

No modification was made to the EUT tested.

### Block Diagram of Test Setup



**SUMMARY OF TEST RESULTS**

| FCC Rules          | Description of Test                   | Results         |
|--------------------|---------------------------------------|-----------------|
| §1.1307(b);§2.1093 | RF Exposure                           | Compliance      |
| §90.205            | RF Output Power                       | Compliance      |
| §2.1047;§90.207    | Modulation Characteristic             | Not Applicable* |
| §90.210& §90.221   | Adjacent channel power                | Compliance      |
| §2.1049;§90.209;   | Occupied Bandwidth                    | Compliance      |
| §2.1051;§90.210    | Spurious Emission at Antenna Terminal | Compliance      |
| §2.1053;§90.210    | Spurious Radiated Emissions           | Compliance      |
| §2.1055;§90.213    | Frequency Stability                   | Compliance      |
| §90.214            | Transient Frequency Behavior          | Not Applicable* |

Not applicable\*: Modulation Characteristic test item is not required for digital device.

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## **FCC §1.1307(b) & §2.1093 - RF EXPOSURE**

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### **Applicable Standard**

According to FCC §1.1307(b) and §2.1093, portable device operates Part 90 should be subjected to routine environmental evaluation for RF exposure prior or equipment authorization or use.

**Result:** Compliance.

Please refer to SAR Report Number: RDG160630004-20A.

## FCC §90.205 - RF OUTPUT POWER

### Applicable Standard

FCC §2.1046 and §90.205

### Test Procedure

Conducted RF Output Power:

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

Spectrum Analyzer Setting:

|         |           |
|---------|-----------|
| R B/W   | Video B/W |
| 100 kHz | 300 kHz   |

### Test Equipment List and Details

| Manufacturer          | Description               | Model           | Serial Number | Calibration Date | Calibration Due Date |
|-----------------------|---------------------------|-----------------|---------------|------------------|----------------------|
| Rohde & Schwarz       | Signal Analyzer           | FSIQ26          | 8386001028    | 2016-04-14       | 2017-04-14           |
| HP Agilent            | RF Communication test set | 8920A           | 3325U00859    | 2016-05-07       | 2017-05-07           |
| Ducommun technologies | RF Cable                  | RG-214          | 3             | 2016-05-06       | 2017-05-06           |
| JFW                   | 30dB Attenuator           | 50FH-030-100 RF | 170006716507  | 2016-06-12       | 2017-06-12           |

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

### Test Data

#### Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature:       | 25 °C     |
| Relative Humidity: | 52 %      |
| ATM Pressure:      | 101.0 kPa |

*The testing was performed by Sonia Zhou on 2016-08-01.*

*Test Mode: Transmitting*

**Test Result:** Compliance. Please refer to following table.

For TMO:

| Frequency | Modulation | Channel space(kHz) | Output Power | Limit       |
|-----------|------------|--------------------|--------------|-------------|
|           |            |                    | (dBm)        | (dBm)       |
| 450.0125  | Digital    | 25                 | 29.22        | 29.03-30.79 |
| 460.0125  |            |                    | 29.18        | 29.03-30.79 |
| 469.9875  |            |                    | 29.20        | 29.03-30.79 |

For DMO:

| Frequency | Modulation | Channel space(kHz) | Output Power | Limit       |
|-----------|------------|--------------------|--------------|-------------|
|           |            |                    | (dBm)        | (dBm)       |
| 450.0125  | Digital    | 25                 | 29.16        | 29.03-30.79 |
| 460.0125  |            |                    | 29.41        | 29.03-30.79 |
| 469.9875  |            |                    | 29.24        | 29.03-30.79 |

Note: the rated power is 1W (30dBm), limit is  $1W \times (1-20\%)$  to  $1W \times (1+20\%)$

## FCC §90.210& §90.221- ADJACENT CHANNEL POWER

### Applicable Standard

FCC §2.1046, §90.210& §90.221

#### §90.221 Adjacent channel power limits.

(a) For the frequency bands indicated below, operations using equipment designed to operate with a 25 kHz channel bandwidth may be authorized up to a 22 kHz bandwidth if the equipment meets the adjacent channel power (ACP) limits below. The table specifies a value for the ACP as a function of the displacement from the channel center frequency and a measurement bandwidth of 18 kHz.

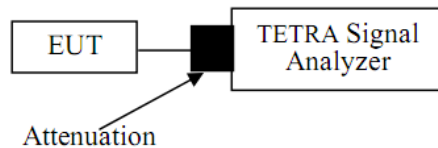
(b)(1) Maximum adjacent power levels for frequencies in the 450-470 MHz band:

| Frequency offset | Maximum ACP (dBc) for devices 1 watt and less | Maximum ACP (dBc) for devices above 1 watt |
|------------------|-----------------------------------------------|--------------------------------------------|
| 25 kHz           | -55 dBc                                       | -60 dBc                                    |
| 50 kHz           | -70 dBc                                       | -70 dBc                                    |
| 75 kHz           | -70 dBc                                       | -70 dBc                                    |

(2) In any case, no requirement in excess of -36 dBm shall apply.

### Test Procedure

The RF output of the transmitter was connected to the input of the TETRA Signal Analyzer through sufficient attenuation.



### Test Equipment List and Details

| Manufacturer | Description           | Model | Serial Number | Calibration Date | Calibration Due Date |
|--------------|-----------------------|-------|---------------|------------------|----------------------|
| AEROFLEX     | TETRA Signal Analyzer | 2310  | 231001/173    | 2016-03-11       | 2017-03-10           |

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

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

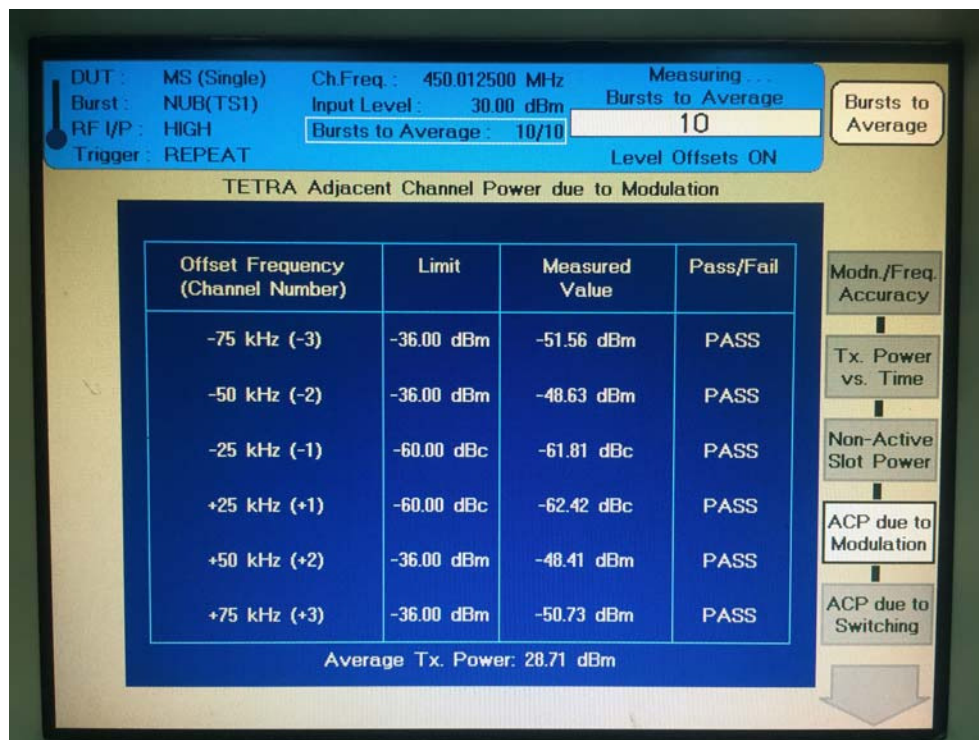
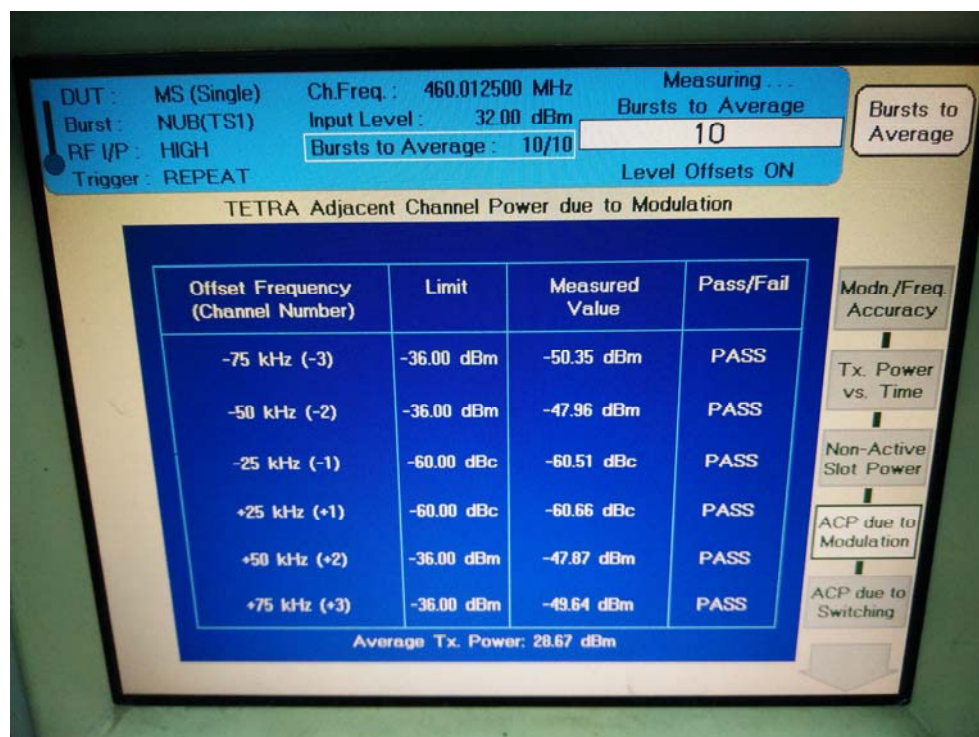
|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 25 °C     |
| <b>Relative Humidity:</b> | 52 %      |
| <b>ATM Pressure:</b>      | 101.0 kPa |

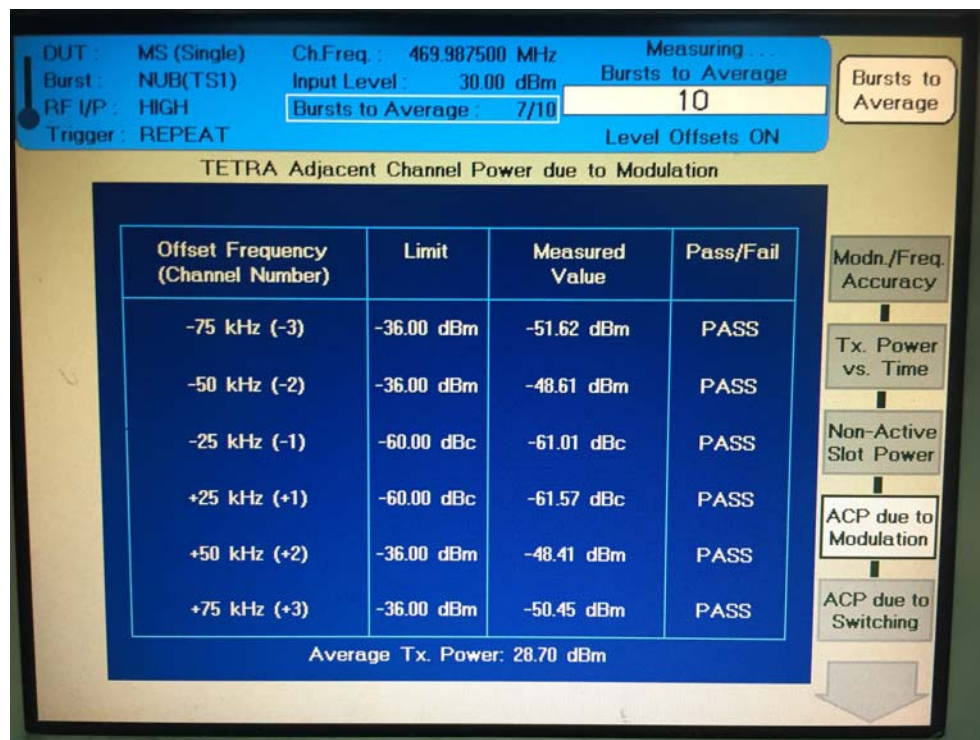
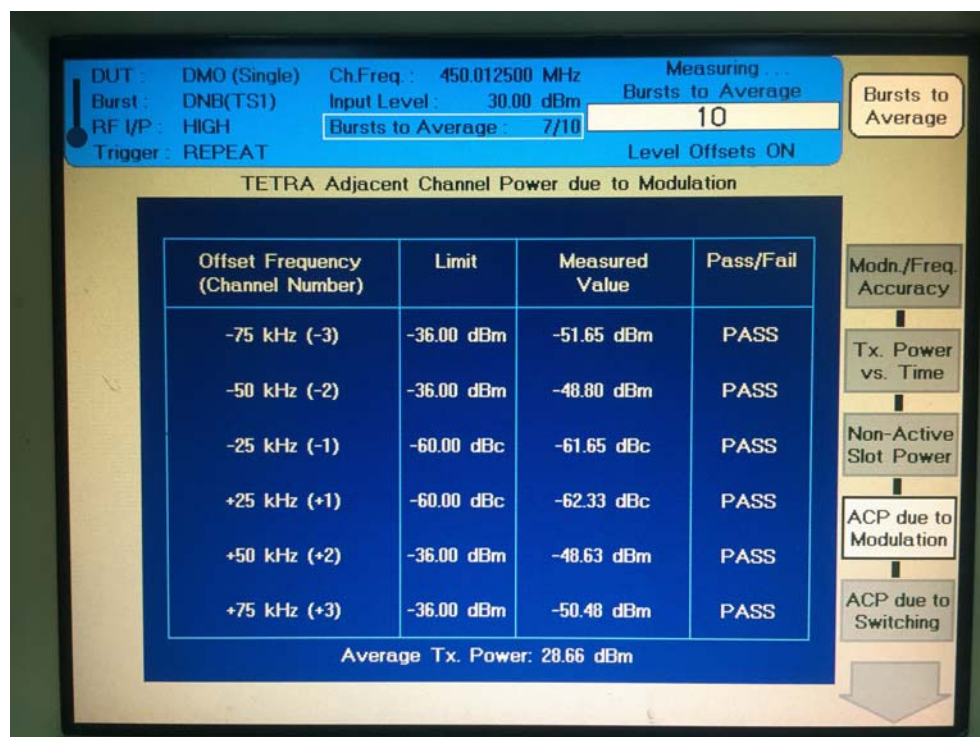
*The testing was performed by Sonia Zhou on 2016-08-01.*

*Test Mode: Transmitting*

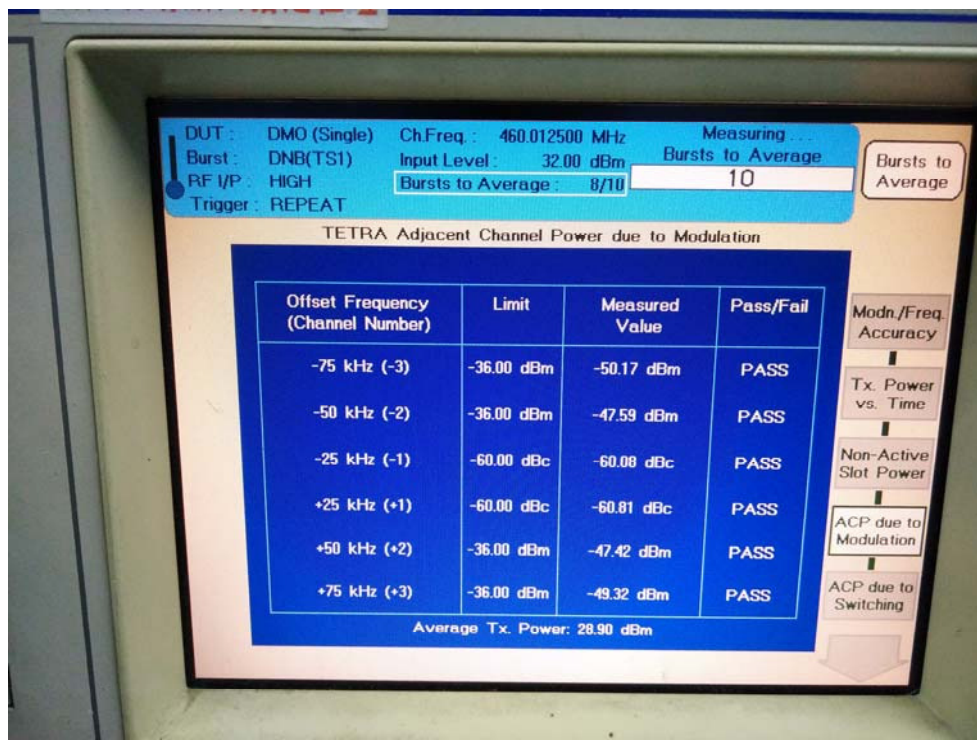
**Test Result:** Compliance. Please refer to following table.

| Operational Mode | Channel Frequency (MHz) | Channel Separation (kHz) | Frequency offset (kHz) | Adjacent Channel Ratio(dB) | Limit (dB) |
|------------------|-------------------------|--------------------------|------------------------|----------------------------|------------|
| TMO              | 450.0125                | 25                       | -25                    | -61.81                     | -55.0      |
|                  |                         |                          | 25                     | -62.42                     | -55.0      |
|                  | 460.0125                | 25                       | -25                    | -60.51                     | -55.0      |
|                  |                         |                          | 25                     | -60.66                     | -55.0      |
|                  | 469.9875                | 25                       | -25                    | -61.01                     | -55.0      |
|                  |                         |                          | 25                     | -61.57                     | -55.0      |
| DMO              | 450.0125                | 25                       | -25                    | -61.65                     | -55.0      |
|                  |                         |                          | 25                     | -62.33                     | -55.0      |
|                  | 460.0125                | 25                       | -25                    | -60.08                     | -55.0      |
|                  |                         |                          | 25                     | -60.81                     | -55.0      |
|                  | 469.9875                | 25                       | -25                    | -61.16                     | -55.0      |
|                  |                         |                          | 25                     | -61.96                     | -55.0      |

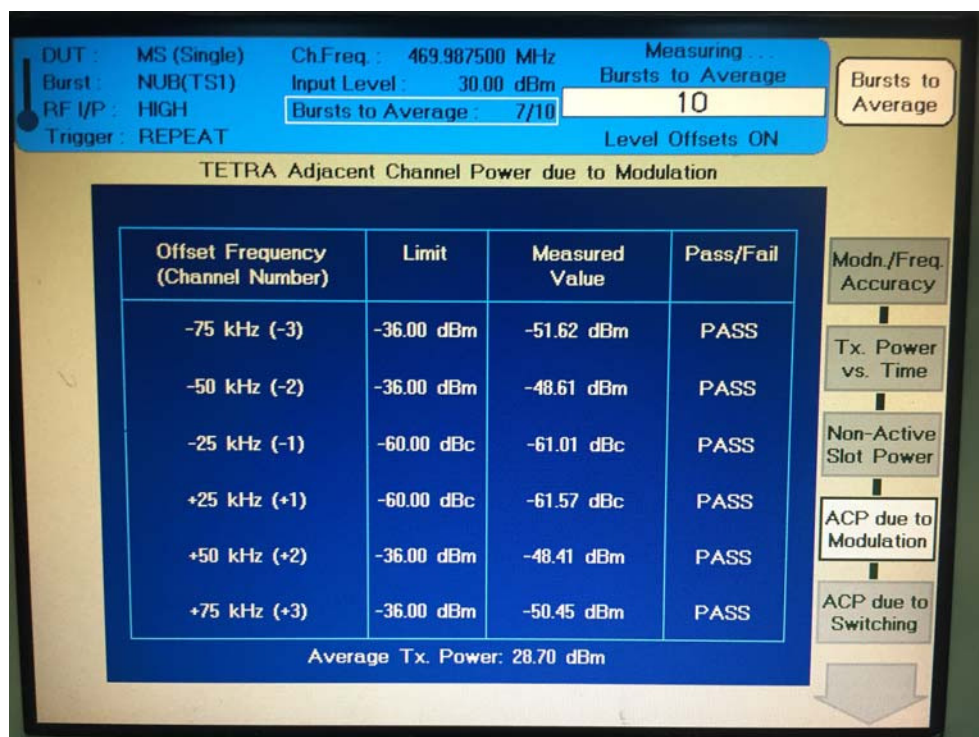
**Adjacent Channel Power for Frequency 450.0125 MHz (Modulation: TMO)****Adjacent Channel Power for Frequency 460.0125 MHz (Modulation: TMO)**

**Adjacent Channel Power for Frequency 469.9875MHz (Modulation: TMO)****Adjacent Channel Power for Frequency 450.0125 MHz (Modulation: DMO)**

## Adjacent Channel Power for Frequency 460 MHz (Modulation: DMO)



## Adjacent Channel Power for Frequency 469.9875 MHz (Modulation: DMO)



## FCC §2.1049 & §90.209 – OCCUPIED BANDWIDTH

### Applicable Standard

FCC §2.1049, §90.209

### 90.209 Bandwidth limitations

(a) Each authorization issued to a station licensed under this part will show an emission designator representing the class of emission authorized. The designator will be prefixed by a specified necessary bandwidth. This number does not necessarily indicate the bandwidth occupied by the emission at any instant. In those cases where §2.202 of this chapter does not provide a formula for the computation of necessary bandwidth, the occupied bandwidth, as defined in part 2 of this chapter, may be used in lieu of the necessary bandwidth.

(b) The maximum authorized single channel bandwidth of emission corresponding to the type of emission specified in §90.207 is as follows:

(5) Unless specified elsewhere, channel spacings and bandwidths that will be authorized in the following frequency bands are given in the following table.

STANDARD CHANNEL SPACING/BANDWIDTH

| Frequency band (MHz)                  | Channel spacing (kHz) | Authorized bandwidth (kHz)            |
|---------------------------------------|-----------------------|---------------------------------------|
| Below 25 <sup>2</sup>                 |                       |                                       |
| 25-50                                 | 20                    | 20                                    |
| 72-76                                 | 20                    | 20                                    |
| 150-174                               | 17.5                  | <sup>1</sup> 3 <sup>20</sup> /11.25/6 |
| 216-220 <sup>5</sup>                  | 6.25                  | 20/11.25/6                            |
| 220-222                               | 5                     | 4                                     |
| 406-512 <sup>2</sup>                  | <sup>1</sup> 6.25     | <sup>1</sup> 3 <sup>20</sup> /11.25/6 |
| 806-809/851-854                       | 12.5                  | 20                                    |
| 809-824/854-869                       | 25                    | 20                                    |
| 896-901/935-940                       | 12.5                  | 13.6                                  |
| 902-928 <sup>4</sup>                  |                       |                                       |
| 929-930                               | 25                    | 20                                    |
| 1427-1432 <sup>5</sup>                | 12.5                  | 12.5                                  |
| <sup>3</sup> 2450-2483.5 <sup>2</sup> |                       |                                       |
| Above 2500 <sup>2</sup>               |                       |                                       |

<sup>6</sup> Operations using equipment designed to operate with a 25 kHz channel bandwidth may be authorized up to a 22 kHz bandwidth if the equipment meets the Adjacent Channel Power limits of §90.221.

**Test Equipment List and Details**

| Manufacturer          | Description     | Model No.       | Serial No.   | Calibration Date | Calibration Due Date |
|-----------------------|-----------------|-----------------|--------------|------------------|----------------------|
| Rohde & Schwarz       | Signal Analyzer | FSIQ26          | 8386001028   | 2016-04-14       | 2017-04-14           |
| Ducommun technologies | RF Cable        | RG-214          | 3            | 2016-05-06       | 2017-05-06           |
| JFW                   | 30dB Attenuator | 50FH-030-100 RF | 170006716507 | 2016-06-12       | 2017-06-12           |

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

**Test Procedure**

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 100 Hz and the spectrum was recorded in the frequency band  $\pm 50$  kHz from the carrier frequency.

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

|                           |                 |
|---------------------------|-----------------|
| <b>Temperature:</b>       | 20~25 °C        |
| <b>Relative Humidity:</b> | 48~52 %         |
| <b>ATM Pressure:</b>      | 100.0~101.0 kPa |

*The testing was performed by Sonia Zhou on 2016-07-21 and 2016-08-01.*

*Test Mode: Transmitting*

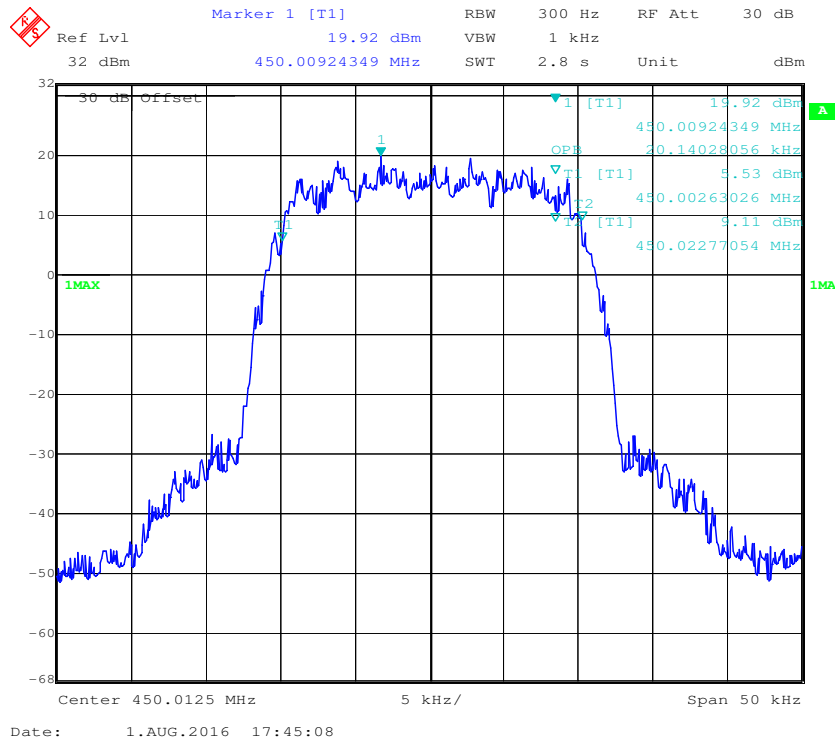
Please refer to the emission mask hereinafter table and plots.

| Modulation | Channel space(kHz) | Frequency(MHz) | 99% Bandwidth(kHz) | Authorize Bandwidth (kHz) |
|------------|--------------------|----------------|--------------------|---------------------------|
| TMO        | 25                 | 450.0125       | 20.14              | 22                        |
|            |                    | 460.0125       | 20.14              |                           |
|            |                    | 469.9875       | 20.24              |                           |

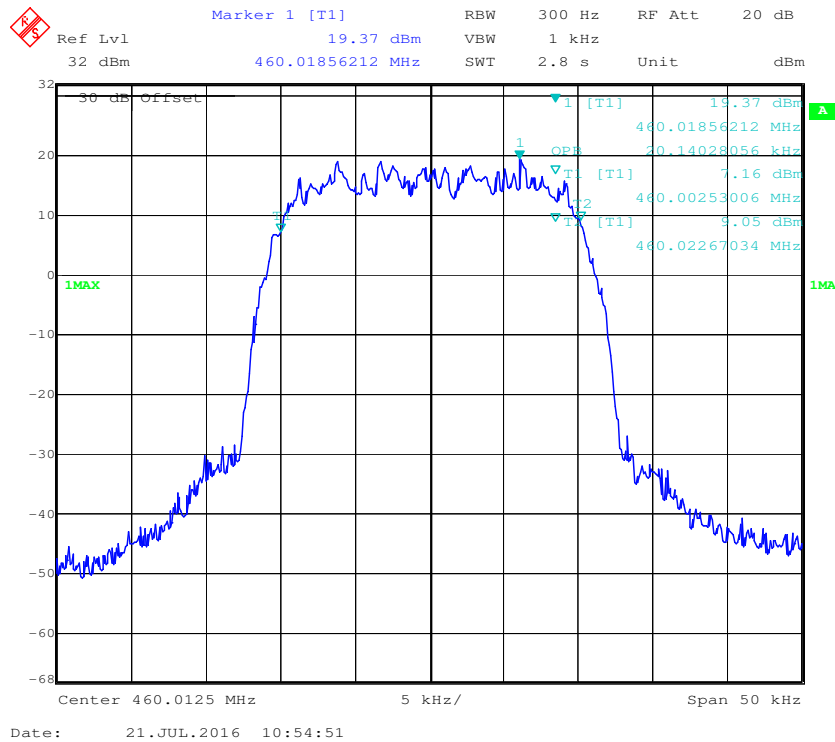
| Modulation | Channel space(kHz) | Frequency(MHz) | 99% Bandwidth(kHz) | Authorize Bandwidth (kHz) |
|------------|--------------------|----------------|--------------------|---------------------------|
| DMO        | 25                 | 450.0125       | 20.14              | 22                        |
|            |                    | 460.0125       | 20.44              |                           |
|            |                    | 469.9875       | 20.34              |                           |

## For TMO:

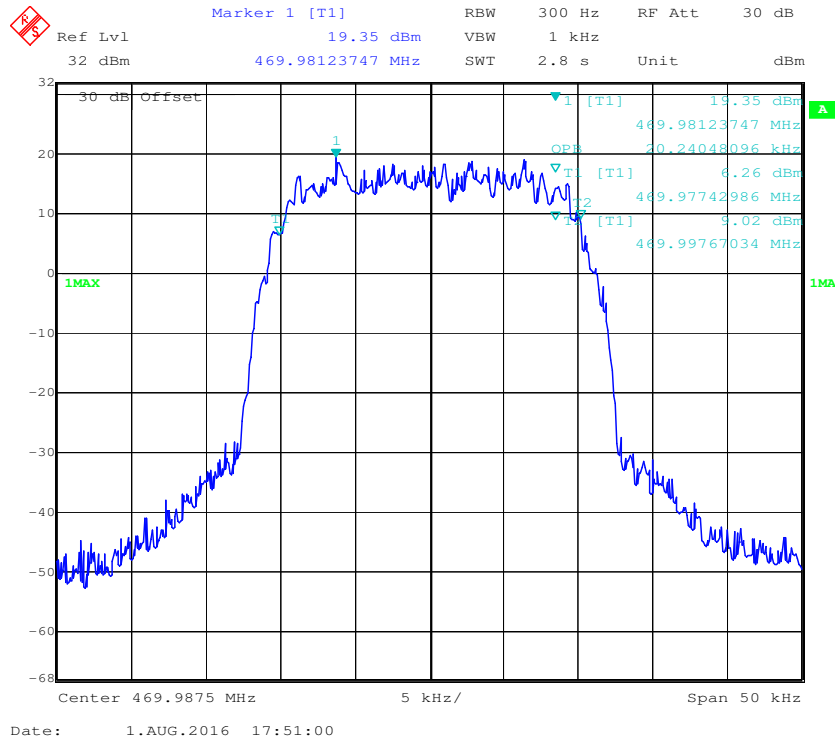
## 99% Occupied Bandwidth 25 kHz, 450.0125 MHz



## 99% Occupied Bandwidth 25 kHz, 460.0125 MHz

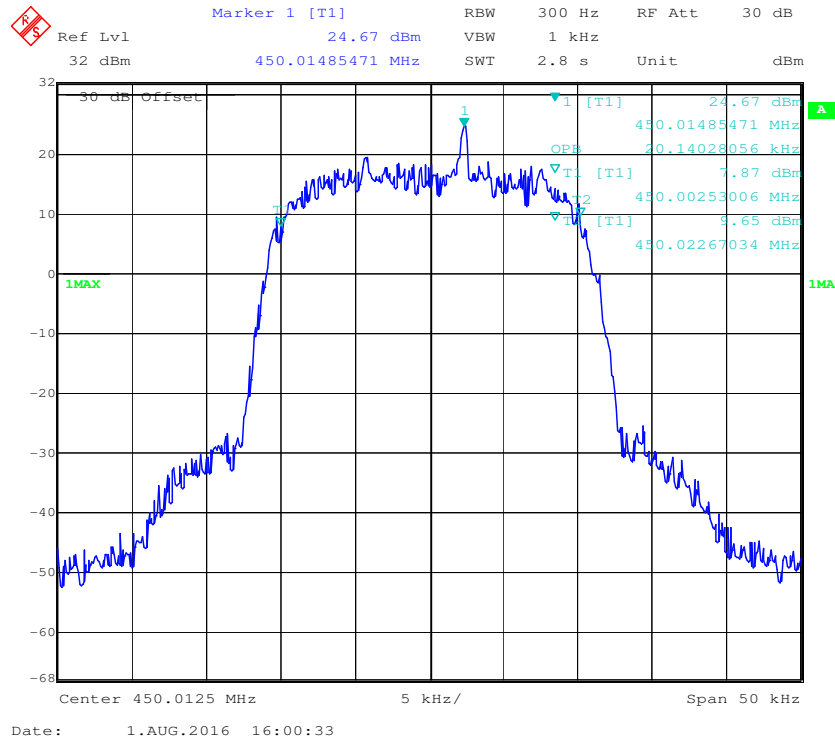


### 99% Occupied Bandwidth 25 kHz, 469.98750 MHz

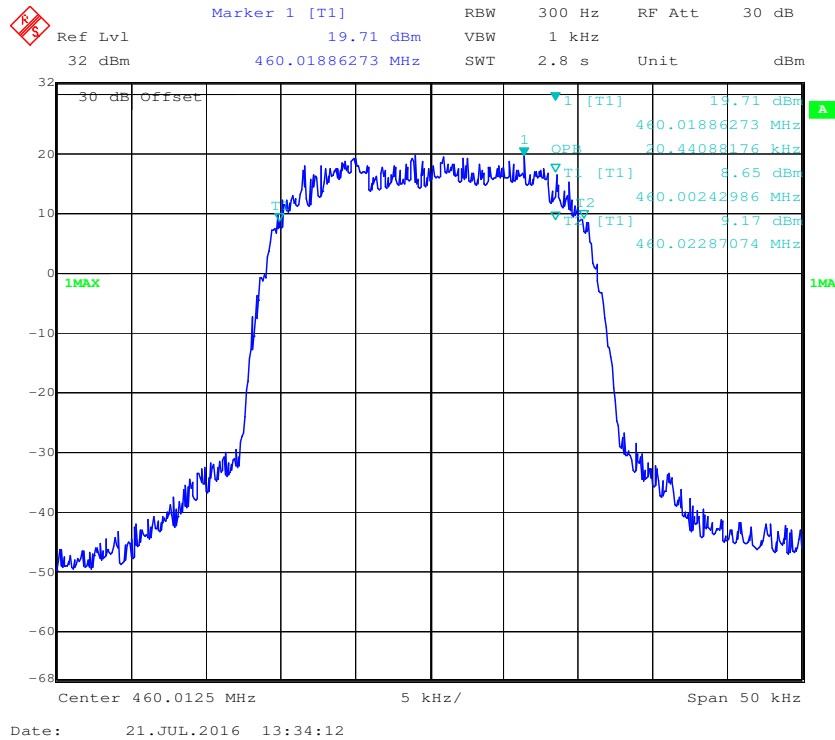


For DMO:

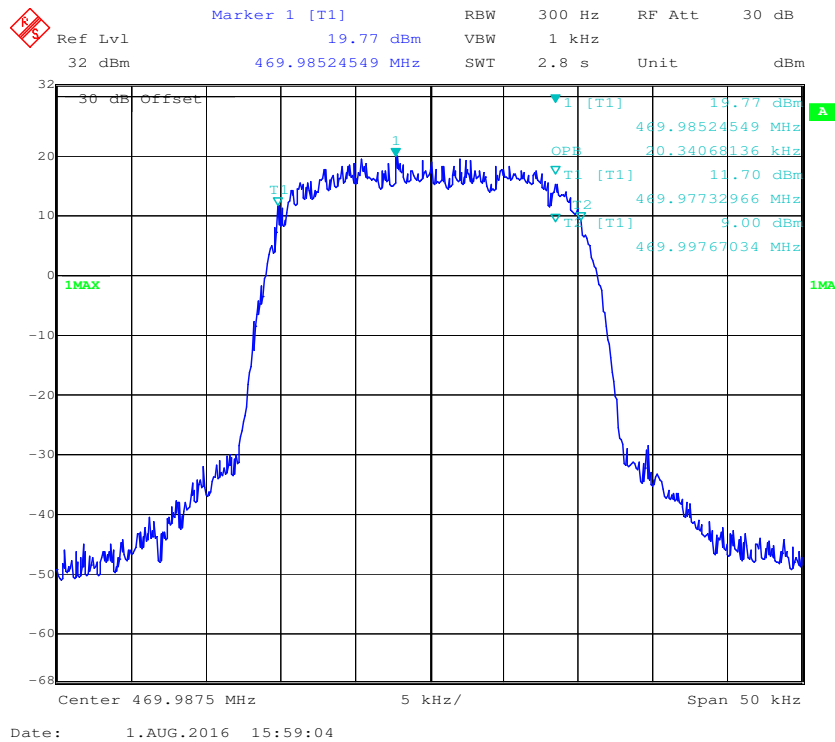
### 99% Occupied Bandwidth 25 kHz, 450.0125 MHz



### 99% Occupied Bandwidth 25 kHz, 460.0125 MHz



### 99% Occupied Bandwidth 25 kHz, 469.98750 MHz



## FCC §2.1051 & §90.210 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

### Applicable Standard

On any frequency removed from the assigned frequency by more than 75 kHz, the attenuation of any emission must be at least  $43 + 10 \log (P_{\text{watts}})$  dB.

### Test Equipment List and Details

| Manufacturer          | Description     | Model No.       | Serial No.   | Calibration Date | Calibration Due Date |
|-----------------------|-----------------|-----------------|--------------|------------------|----------------------|
| Rohde & Schwarz       | Signal Analyzer | FSIQ26          | 8386001028   | 2016-04-14       | 2017-04-14           |
| Ducommun technologies | RF Cable        | RG-214          | 3            | 2016-05-06       | 2017-05-06           |
| JFW                   | 30dB Attenuator | 50FH-030-100 RF | 170006716507 | 2016-06-12       | 2017-06-12           |

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

### Test Procedure

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz for below 1GHz, and 1MHz for above 1GHz. sufficient scans were taken to show any out of band emissions up to 10<sup>th</sup> harmonic.

### Test Data

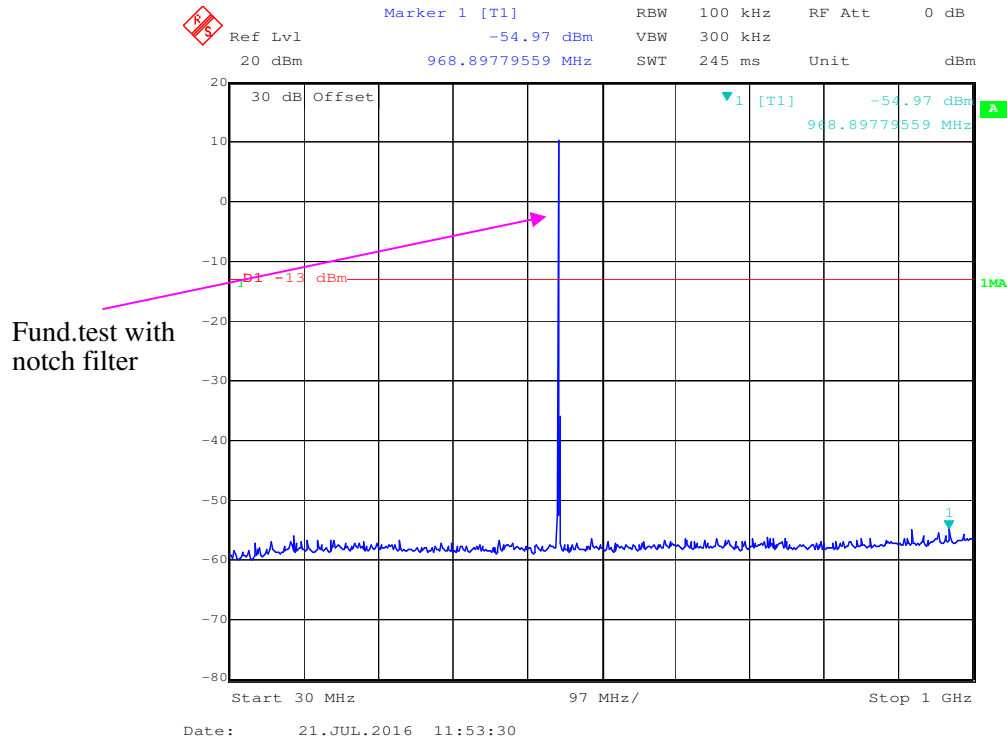
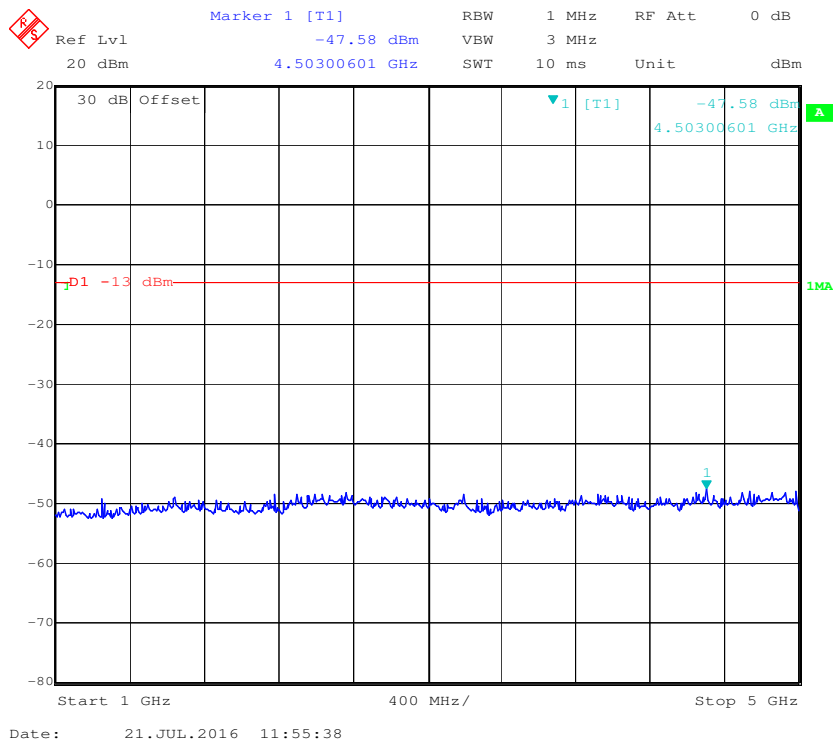
#### Environmental Conditions

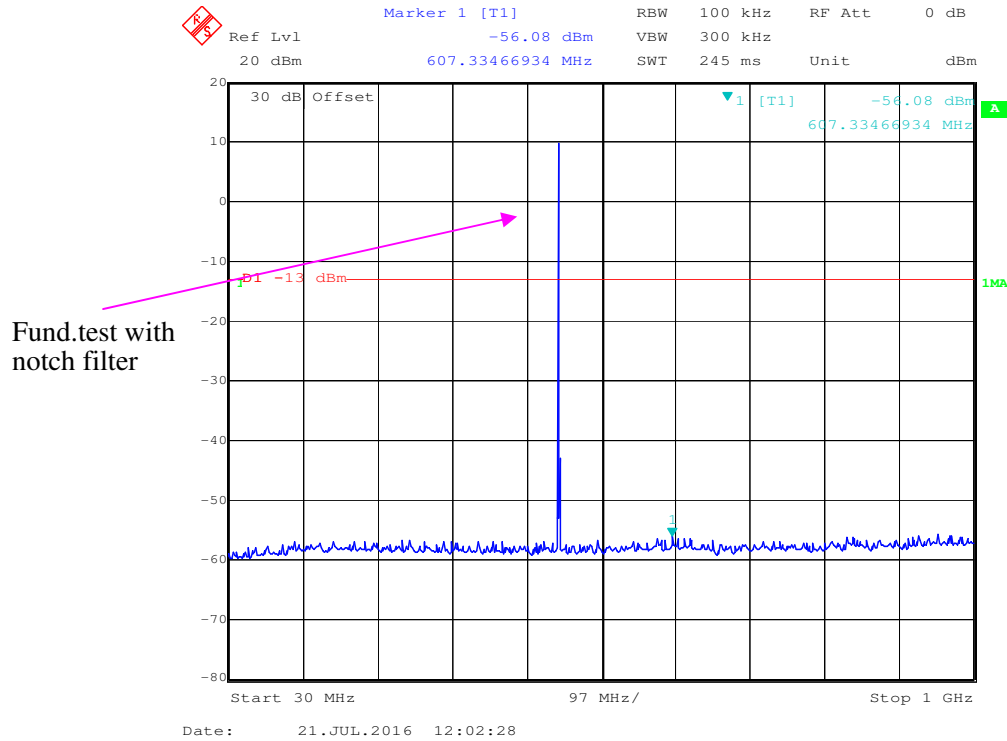
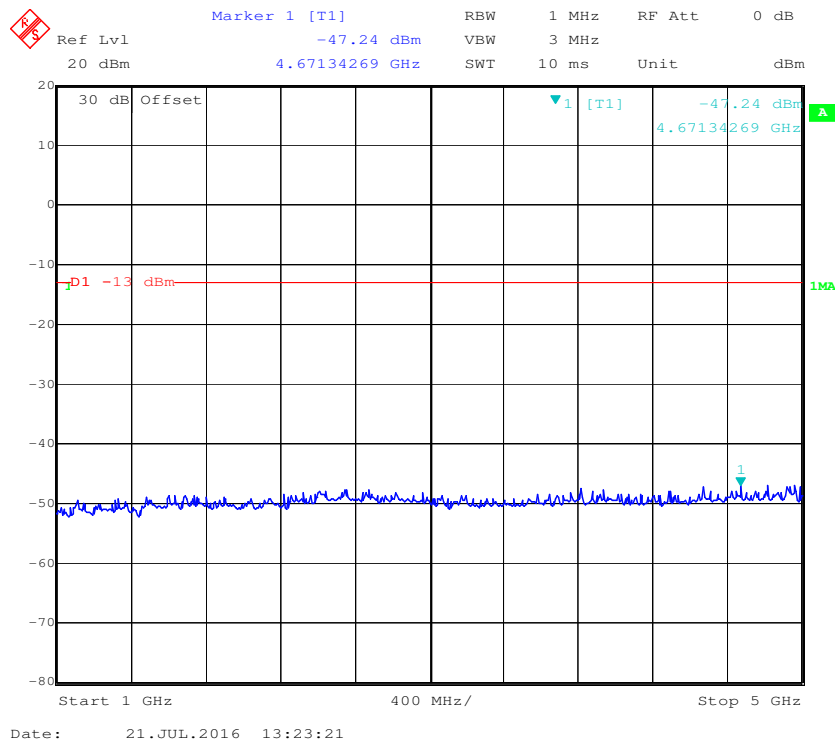
|                    |           |
|--------------------|-----------|
| Temperature:       | 21 °C     |
| Relative Humidity: | 52 %      |
| ATM Pressure:      | 101.0 kPa |

*The testing was performed by Sonia Zhou on 2016-07-21.*

*Test Mode: Transmitting*

Please refer to the following plots.

**For TMO:****30 MHz – 1 GHz, Spacing Channel 25 kHz, 460.0125 MHz****1 GHz – 5 GHz, Spacing Channel 25 kHz, 460.0125 MHz**

**For DMO:****30 MHz – 1 GHz, Spacing Channel 25 kHz, 460.0125 MHz****1 GHz – 5 GHz, Spacing Channel 25 kHz, 460.0125 MHz**

## FCC §2.1053 & §90.210 - RADIATED SPURIOUS EMISSIONS

### Applicable Standard

FCC §2.1053 and §90.210

### Test Equipment List and Details

| Manufacturer          | Description         | Model                 | Serial Number          | Calibration Date | Calibration Due Date |
|-----------------------|---------------------|-----------------------|------------------------|------------------|----------------------|
| Rohde & Schwarz       | EMI Test Receiver   | ESCI                  | 101120                 | 2015-12-15       | 2016-12-14           |
| HP                    | Amplifier           | HP8447E               | 1937A01046             | 2016-05-06       | 2017-05-06           |
| Sunol Sciences        | Bi-log Antenna      | JB1                   | A040904-2              | 2014-12-07       | 2017-12-06           |
| Rohde & Schwarz       | Signal Analyzer     | FSIQ26                | 8386001028             | 2016-04-14       | 2017-04-14           |
| Sunol Sciences        | Horn Antenna        | DRH-118               | A052604                | 2014-12-29       | 2017-12-28           |
| HP                    | Synthesized Sweeper | HP 8341B              | 2624A00116             | 2016-07-02       | 2017-07-01           |
| Mini                  | Amplifier           | ZVA-183-S+            | 5969001149             | 2016-04-23       | 2017-04-23           |
| A.H. System           | Horn Antenna        | SAS-200/571           | 135                    | 2015-08-18       | 2018-08-17           |
| Ducommun technologies | RF Cable            | UFA210A-1-4724-30050U | MFR64369<br>223410-001 | 2015-10-22       | 2016-10-22           |
| Ducommun technologies | RF Cable            | 104PEA                | 218124002              | 2015-10-22       | 2016-10-22           |
| Ducommun technologies | RF Cable            | RG-214                | 1                      | 2016-05-06       | 2017-05-06           |
| Ducommun technologies | RF Cable            | RG-214                | 2                      | 2016-05-06       | 2017-05-06           |
| COM POWER             | Dipole Antenna      | AD-100                | 041000                 | 2015-08-18       | 2016-08-18           |

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

### Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load, which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = 10 lg (TXpwr in Watts/0.001)-the absolute level

Spurious attenuation limit in dB = 50 + 10 Log<sub>10</sub> (power out in Watts) for EUT with a 12.5 kHz channel bandwidth.

Spurious attenuation limit in dB =  $55 + 10 \log_{10}$  (power out in Watts) for EUT with a 6.25 kHz channel bandwidth.

## Test Data

### Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature:       | 24 °C     |
| Relative Humidity: | 52 %      |
| ATM Pressure:      | 101.0 kPa |

The testing was performed by Sonia Zhou on 2016-07-21.

Test Mode: Transmitting

| Frequency<br>(MHz) | Receiver<br>Reading<br>(dBμV) | Turn<br>Table<br>Angle<br>Degree | Rx Antenna    |                | Substituted          |                       |                         | Absolute<br>Level<br>(dBm) | Part 90        |                |
|--------------------|-------------------------------|----------------------------------|---------------|----------------|----------------------|-----------------------|-------------------------|----------------------------|----------------|----------------|
|                    |                               |                                  | Height<br>(m) | Polar<br>(H/V) | SG<br>Level<br>(dBm) | Cable<br>Loss<br>(dB) | Antenna<br>Gain<br>(dB) |                            | Limit<br>(dBm) | Margin<br>(dB) |
| TMO 460.0125 MHz   |                               |                                  |               |                |                      |                       |                         |                            |                |                |
| 920.025            | 34.14                         | 238                              | 2.1           | H              | -62.9                | 0.70                  | 0                       | -63.60                     | -13            | 50.60          |
| 920.025            | 32.84                         | 33                               | 1.3           | V              | -64.2                | 0.70                  | 0                       | -64.90                     | -13            | 51.90          |
| 1380.04            | 36.78                         | 342                              | 1.1           | H              | -59.9                | 1.20                  | 6.40                    | -54.70                     | -13            | 41.70          |
| 1380.04            | 37.49                         | 51                               | 2.2           | V              | -59.2                | 1.20                  | 6.40                    | -54.00                     | -13            | 41.00          |
| 1840.05            | 43.12                         | 208                              | 1.1           | H              | -51.8                | 1.40                  | 7.10                    | -46.10                     | -13            | 33.10          |
| 1840.05            | 44.68                         | 233                              | 1.9           | V              | -49.1                | 1.40                  | 7.10                    | -43.40                     | -13            | 30.40          |
| DMO 460.0125 MHz   |                               |                                  |               |                |                      |                       |                         |                            |                |                |
| 920.025            | 33.11                         | 54                               | 2.0           | H              | -63.9                | 0.70                  | 0                       | -64.60                     | -13            | 51.60          |
| 920.025            | 34.01                         | 64                               | 2.4           | V              | -63.0                | 0.70                  | 0                       | -63.70                     | -13            | 50.70          |
| 1380.04            | 35.61                         | 237                              | 1.6           | H              | -61.0                | 1.20                  | 6.40                    | -55.80                     | -13            | 42.80          |
| 1380.04            | 35.07                         | 9                                | 1.3           | V              | -61.6                | 1.20                  | 6.40                    | -56.40                     | -13            | 43.40          |
| 1840.05            | 34.93                         | 187                              | 2.2           | H              | -60.0                | 1.40                  | 7.10                    | -54.30                     | -13            | 41.30          |
| 1840.05            | 34.56                         | 125                              | 2.0           | V              | -59.3                | 1.40                  | 7.10                    | -53.60                     | -13            | 40.60          |

**Note:**

Absolute Level = SG Level - Cable loss + Antenna Gain

Margin = Limit - Absolute Level

,

**FCC §2.1055 & §90.213- FREQUENCY STABILITY****Applicable Standard**

FCC §2.1055 and §90.213

**Test Equipment List and Details**

| Manufacturer          | Description                    | Model No.       | Serial No.   | Calibration Date | Calibration Due Date |
|-----------------------|--------------------------------|-----------------|--------------|------------------|----------------------|
| Hewlett-Packard       | Frequency Counter              | 5343A           | 2232A00827   | 2016-05-09       | 2019-05-08           |
| ESPEC                 | Temperature & Humidity Chamber | EL-10KA         | 09107726     | 2015-11-01       | 2016-10-31           |
| Ducommun technologies | RF Cable                       | RG-214          | 3            | 2016-05-06       | 2017-05-06           |
| JFW                   | 30dB Attenuator                | 50FH-030-100 RF | 170006716507 | 2016-06-12       | 2017-06-12           |
| Long Wei              | DC Power Supply                | TPR-6420D       | 398363       | NCR              | NCR                  |

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

**Test Procedure**

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to a frequency counter via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the counter.

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

|                    |           |
|--------------------|-----------|
| Temperature:       | 25 °C     |
| Relative Humidity: | 52 %      |
| ATM Pressure:      | 101.0 kPa |

*The testing was performed by Sonia Zhou on 2016-07-21.*

*Test Mode: Transmitting*

For TMO:

| Reference Frequency: 460.0125 MHz, Limit: 1 ppm |                                   |                                     |                       |
|-------------------------------------------------|-----------------------------------|-------------------------------------|-----------------------|
| Test Environment                                |                                   | Frequency Measure with Time Elapsed |                       |
| Temperature (°C)                                | Power Supplied (V <sub>DC</sub> ) | Measured Frequency (Hz)             | Frequency Error (ppm) |
| Frequency Stability versus Input Temperature    |                                   |                                     |                       |
| 50                                              | 7.4                               | -5.80                               | -0.013                |
| 40                                              | 7.4                               | -12.05                              | -0.026                |
| 30                                              | 7.4                               | -6.70                               | -0.015                |
| 20                                              | 7.4                               | 10.50                               | 0.023                 |
| 10                                              | 7.4                               | -2.50                               | -0.005                |
| 0                                               | 7.4                               | 4.70                                | 0.010                 |
| -10                                             | 7.4                               | -0.60                               | -0.001                |
| -20                                             | 7.4                               | -13.40                              | -0.029                |
| -30                                             | 7.4                               | 0.10                                | 0.000                 |
| Frequency Stability versus Input Voltage        |                                   |                                     |                       |
| 20                                              | 6.3                               | -4.90                               | -0.011                |

For DMO:

| Reference Frequency: 460.0125 MHz, Limit: 1 ppm |                                   |                                     |                       |
|-------------------------------------------------|-----------------------------------|-------------------------------------|-----------------------|
| Test Environment                                |                                   | Frequency Measure with Time Elapsed |                       |
| Temperature (°C)                                | Power Supplied (V <sub>DC</sub> ) | Measured Frequency (Hz)             | Frequency Error (ppm) |
| Frequency Stability versus Input Temperature    |                                   |                                     |                       |
| 50                                              | 7.4                               | -1.30                               | -0.003                |
| 40                                              | 7.4                               | -15.30                              | -0.033                |
| 30                                              | 7.4                               | -2.60                               | -0.006                |
| 20                                              | 7.4                               | 12.20                               | 0.027                 |
| 10                                              | 7.4                               | 3.30                                | 0.007                 |
| 0                                               | 7.4                               | -0.90                               | -0.002                |
| -10                                             | 7.4                               | 1.80                                | 0.004                 |
| -20                                             | 7.4                               | 7.70                                | 0.017                 |
| -30                                             | 7.4                               | -15.40                              | -0.033                |
| Frequency Stability versus Input Voltage        |                                   |                                     |                       |
| 20                                              | 6.3                               | 0.60                                | 0.001                 |

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