

## FCC PART 90

## TEST REPORT

For

### Shenzhen HQT Science&Technology Co., Ltd

5/F, East of Building M-8, Central Zone, Hi-tech Industrial Park,  
Nanshan District, Shenzhen, China

**FCC ID: P6NTH-288U**

|                                                                                                                                                                                                                                                                                                                  |                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| <b>Report Type:</b><br>Original Report                                                                                                                                                                                                                                                                           | <b>Product Type:</b><br>Two-way radio |
| <b>Test Engineer:</b> Candy Li                                                                                                                                                                                                                                                                                   | <i>Candy Li</i>                       |
| <b>Report Number:</b> RSZ141013550-00                                                                                                                                                                                                                                                                            |                                       |
| <b>Report Date:</b> 2014-11-04                                                                                                                                                                                                                                                                                   |                                       |
| <b>Reviewed By:</b> Jimmy Xiao<br>RF Engineer                                                                                                                                                                                                                                                                    | <i>Jimmy Xiao</i>                     |
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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 *Shenzhen HQT Science&Technology Co., Ltd*'s product, model number: *TH-288 (FCC ID: P6NTH-288U)* or the "EUT" in this report was a *Two-way radio*, which was measured approximately: 105 mm (L) × 54 mm (W) × 30 mm (H), rated with input voltage: DC 3.8V battery.

*\* All measurement and test data in this report was gathered from production sample serial number: 1410001 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2014-10-20.*

### Objective

This test report is prepared on behalf of *Shenzhen HQT Science&Technology Co., Ltd* 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 63.4-2009.

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 5.91 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. (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 December 06, 2010. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

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.

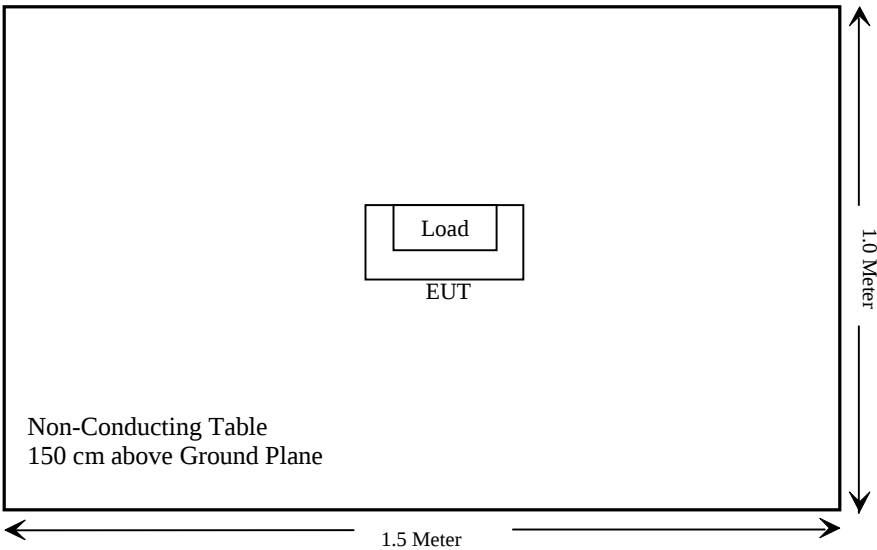
Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

| Manufacturer | Description | Model | Serial Number |
|--------------|-------------|-------|---------------|
| N/A          | 50 ohm Load | N/A   | N/A           |

Block Diagram of Test Setup



**SUMMARY OF TEST RESULTS**

| FCC Rules                 | Description of Test                   | Results    |
|---------------------------|---------------------------------------|------------|
| §1.1307 (b)(1), §2.1093   | RF Exposure                           | Compliance |
| §2.1046; §90.205          | RF Output Power                       | Compliance |
| §2.1047; §90.207          | Modulation Characteristic             | Compliance |
| §2.1049; §90.209; §90.210 | Occupied Bandwidth & Emission Mask    | 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          | Compliance |

**MEASUREMENT UNCERTAINTY**

| Test Items                               | Measurement uncertainty |
|------------------------------------------|-------------------------|
| RF Output Power                          | $\pm 1.95\text{dB}$     |
| Modulation Limiting                      | $\pm 0.2\text{kHz}$     |
| Audio Frequency Response                 | $\pm 1.95\text{dB}$     |
| Audio Frequency Low Pass Filter Response | $\pm 1.95\text{dB}$     |
| Occupied Bandwidth                       | $\pm 0.2\text{kHz}$     |
| Spurious Emission at Antenna Terminal    | $\pm 1.95\text{dB}$     |
| Spurious Radiated Emissions              | $\pm 4.92\text{dB}$     |
| Frequency Stability                      | $\pm 0.1\text{ppm}$     |
| Emission Mask                            | $\pm 1.95\text{dB}$     |
| Transient Frequency Behavior             | $\pm 0.2\text{kHz}$     |

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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: RSZ141013550-20.

## FCC §2.1046 & §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 | 837405/023    | 2013-11-12       | 2014-11-12           |
| HP Agilent      | RF Communication test set | 8920A  | 3325U00859    | 2014-06-03       | 2015-06-03           |

\* **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:       | 26        |
| Relative Humidity: | 52 %      |
| ATM Pressure:      | 101.0 kPa |

*The testing was performed by Candy Li on 2014-10-21.*

*Test Mode: Transmitting*

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

| Frequency (MHz) | Modulation | Power level | Conducted Output Power (dBm) | Conducted Output Power (W) |
|-----------------|------------|-------------|------------------------------|----------------------------|
| 400.0125        | Analog     | High        | 32.80                        | 1.91                       |
|                 |            | Low         | 30.38                        | 1.09                       |
| 435.0125        |            | High        | 32.99                        | 1.99                       |
|                 |            | Low         | 30.36                        | 1.09                       |
| 469.9875        |            | High        | 32.71                        | 1.87                       |
|                 |            | Low         | 30.40                        | 1.10                       |

Note : The rated high power is 2W. The limit of the high output power is 1.6W-2.4W.  
The rated low power is 1W. The limit of the low output power is 0.8W-1.2W.

**FCC §2.1047 §90.207 - MODULATION CHARACTERISTIC****Applicable Standard**

FCC §2.1047 and §90.207:

- (a) Equipment which utilizes voice modulated communication shall show the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz. for equipment which is required to have a low pass filter, the frequency response of the filter, or all of the circuitry installed between the modulation limited and the modulated stage shall be supplied.
- (b) Equipment which employs modulation limiting, a curve showing the percentage of modulation versus the modulation input voltage shall be supplied.

**Test Equipment List and Details**

| Manufacturer | Description               | Model No. | Serial No. | Calibration Date | Calibration Due Date |
|--------------|---------------------------|-----------|------------|------------------|----------------------|
| HP           | RF Communication Test Set | 8920A     | 3438A05201 | 2014-06-14       | 2015-06-13           |
| LEADER       | MILLIVOLTMETER            | LMV-181A  | 6041126    | 2014-06-09       | 2015-06-09           |

\* **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**

Test Method: TIA/EIA-603-D 2.2.3

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

|                    |           |
|--------------------|-----------|
| Temperature:       | 26        |
| Relative Humidity: | 52 %      |
| ATM Pressure:      | 101.0 kPa |

*The testing was performed by Candy Li on 2014-10-21.*

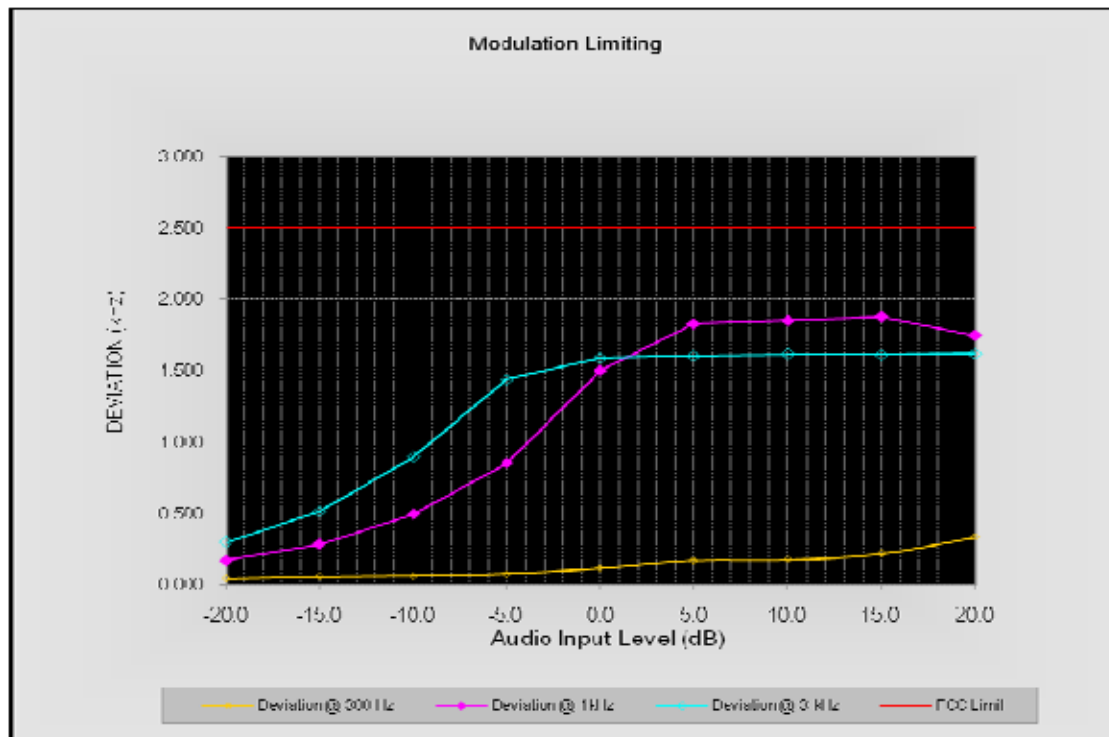
*Test Mode: Transmitting*

**Result:** Compliance.

**Analog Modulation:****MODULATION LIMITING**

Carrier Frequency: 435.0125MHz, Channel Separation=12.5 kHz

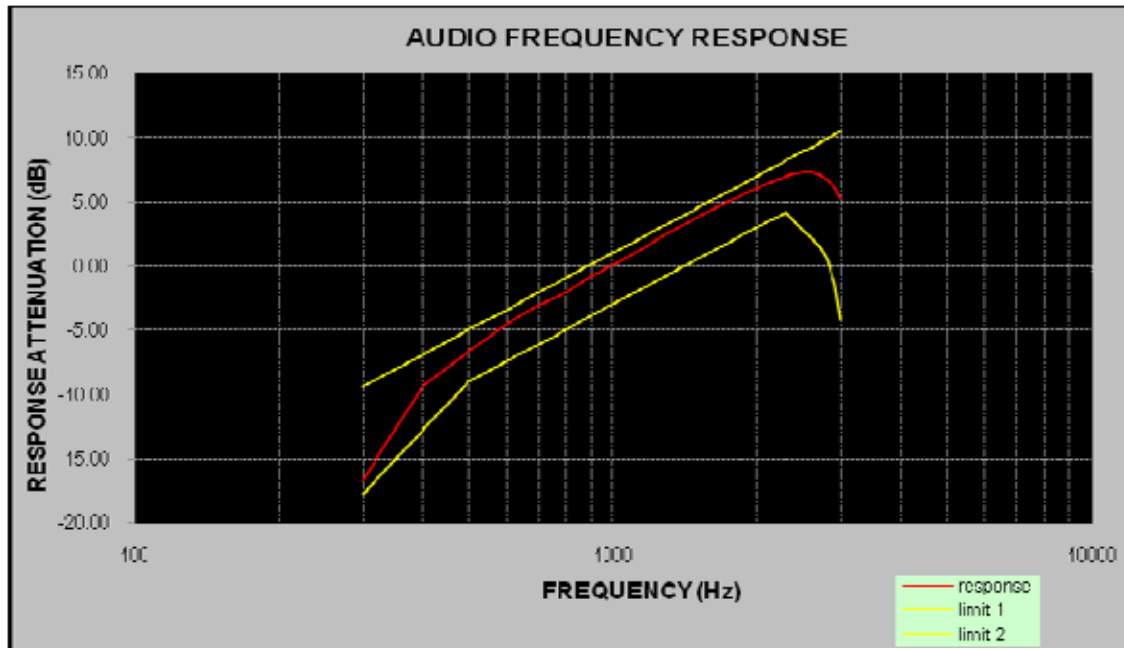
| Audio Input Level [dB] | Frequency Deviation (kHz) |        |         | Limit [kHz] |
|------------------------|---------------------------|--------|---------|-------------|
|                        | @ 300 Hz                  | @ 1kHz | @ 3 kHz |             |
| 20.0                   | 0.335                     | 1.745  | 1.619   | 2.5         |
| 15.0                   | 0.216                     | 1.877  | 1.611   | 2.5         |
| 10.0                   | 0.175                     | 1.849  | 1.614   | 2.5         |
| 5.0                    | 0.171                     | 1.829  | 1.605   | 2.5         |
| 0.0                    | 0.116                     | 1.500  | 1.589   | 2.5         |
| -5.0                   | 0.074                     | 0.852  | 1.436   | 2.5         |
| -10.0                  | 0.063                     | 0.495  | 0.894   | 2.5         |
| -15.0                  | 0.058                     | 0.283  | 0.512   | 2.5         |
| -20.0                  | 0.042                     | 0.170  | 0.297   | 2.5         |



**Audio Frequency Response**

Carrier Frequency: 435.0125MHz, Channel Separation=12.5 kHz

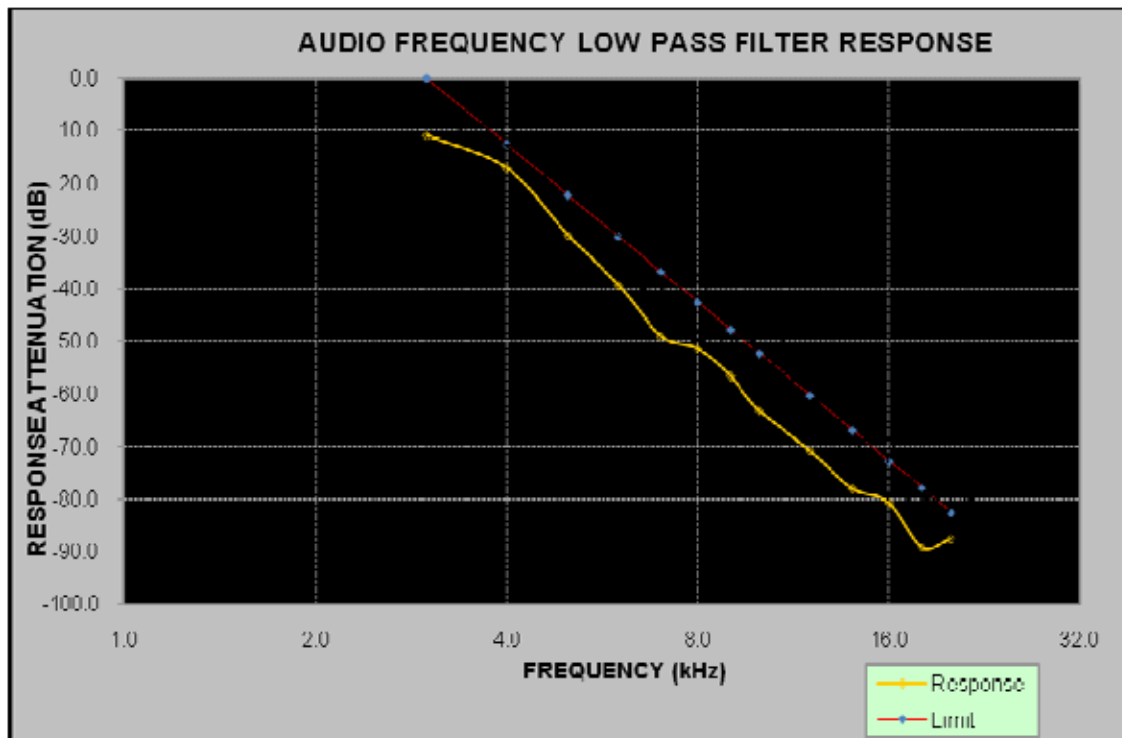
| Audio Frequency (Hz) | Response Attenuation (dB) |
|----------------------|---------------------------|
| 300                  | -16.71                    |
| 400                  | -9.42                     |
| 500                  | -6.63                     |
| 600                  | -4.50                     |
| 700                  | -3.05                     |
| 800                  | -2.05                     |
| 900                  | -0.82                     |
| 1000                 | 0.00                      |
| 1200                 | 1.76                      |
| 1400                 | 3.18                      |
| 1600                 | 4.35                      |
| 1800                 | 5.29                      |
| 2000                 | 6.05                      |
| 2100                 | 6.42                      |
| 2200                 | 6.71                      |
| 2300                 | 7.01                      |
| 2400                 | 7.17                      |
| 2500                 | 7.26                      |
| 2600                 | 7.22                      |
| 2700                 | 7.05                      |
| 2800                 | 6.75                      |
| 2900                 | 6.12                      |
| 3000                 | 5.27                      |



**Audio Frequency Low Pass Filter Response**

Carrier Frequency: 435.0125MHz, Channel Separation=12.5 kHz

| Audio Frequency (kHz) | Response Attenuation (dB) | FCC Limit (dB) |
|-----------------------|---------------------------|----------------|
| 3.0                   | -10.9                     | 0.0            |
| 4.0                   | -17.1                     | -12.5          |
| 5.0                   | -29.9                     | -22.2          |
| 6.0                   | -39.3                     | -30.1          |
| 7.0                   | -49.0                     | -36.8          |
| 8.0                   | -51.4                     | -42.6          |
| 9.0                   | -56.6                     | -47.7          |
| 10.0                  | -63.2                     | -52.3          |
| 12.0                  | -70.7                     | -60.2          |
| 14.0                  | -78.0                     | -66.9          |
| 16.0                  | -80.6                     | -72.7          |
| 18.0                  | -89.2                     | -77.8          |
| 20.0                  | -87.6                     | -82.5          |



## FCC §2.1049 & §90.209 & §90.210 – OCCUPIED BANDWIDTH & EMISSION MASK

### Applicable Standard

FCC §2.1049, §90.209 and §90.210

Emission Mask D—12.5 kHz channel bandwidth equipment. For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

- 1) For any frequency removed from the center of the authorized bandwidth  $f_0$  to 5.625 kHz removed from  $f_0$ , 0dB.
- 2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 5.626 kHz but no more than 12.5 kHz, at least 7.27 ( $f_d - 2.88$  kHz) dB.
- 3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 12.5 kHz: At least  $50 + 10 \log (P)$  dB or 70 dB, whichever is the lesser attenuation.

### Test Equipment List and Details

| Manufacturer    | Description               | Model No. | Serial No. | Calibration Date | Calibration Due Date |
|-----------------|---------------------------|-----------|------------|------------------|----------------------|
| Rohde & Schwarz | Signal Analyzer           | FSIQ26    | 837405/023 | 2014-08-22       | 2015-08-22           |
| HP              | RF Communication Test Set | 8920A     | 3438A05201 | 2014-06-14       | 2015-06-13           |

\* **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**

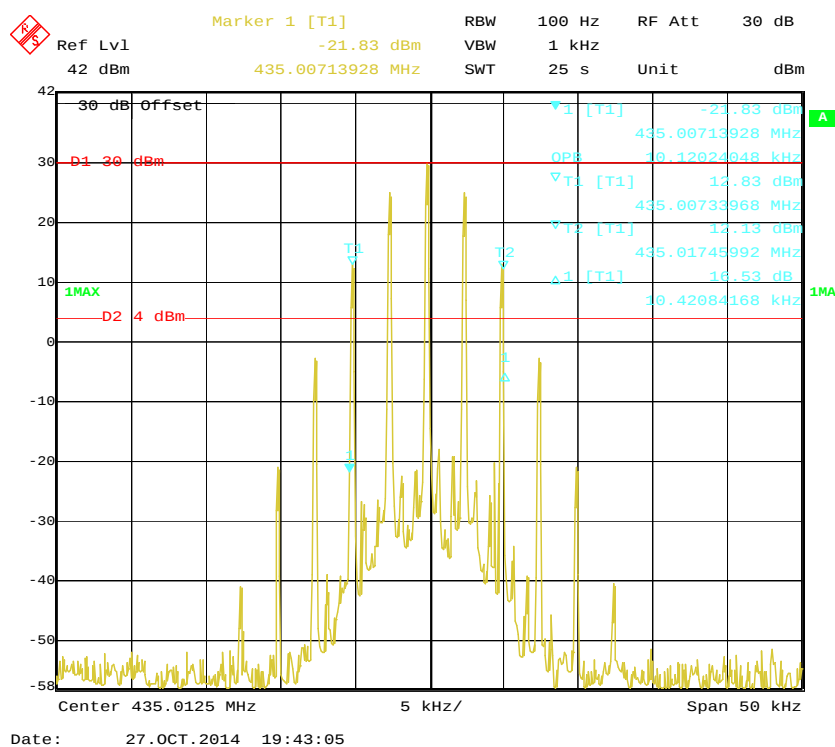
|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 25        |
| <b>Relative Humidity:</b> | 51 %      |
| <b>ATM Pressure:</b>      | 101.0 kPa |

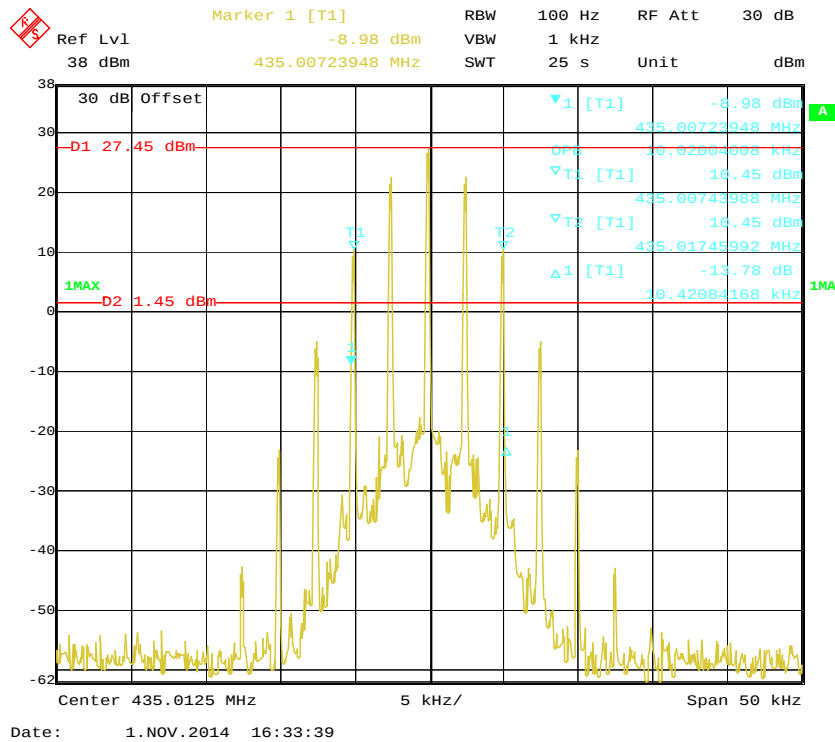
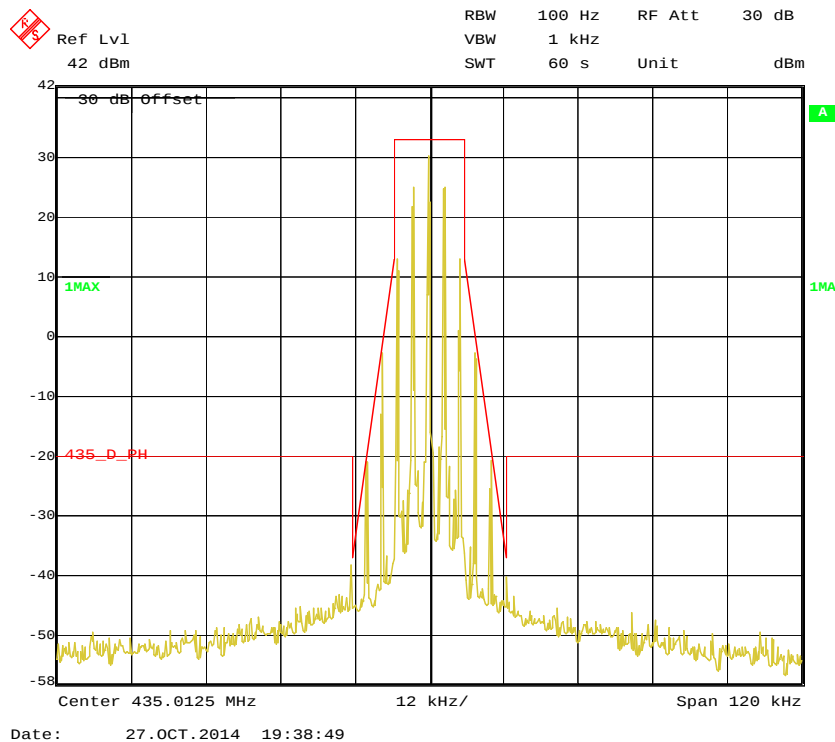
The testing was performed by Candy Li on 2014-10-27.

Test Mode: Transmitting

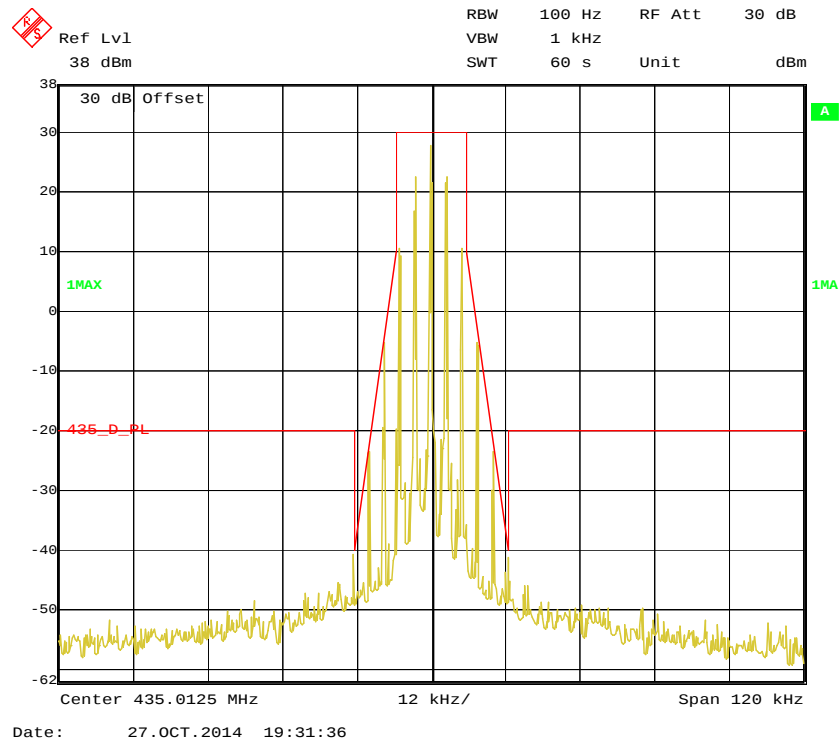
**Analog Modulation (435.0125 MHz)**

| Modulation | Frequency (MHz) | 99% Occupied Bandwidth (kHz) | 26 dB Emissions Bandwidth (kHz) | Power      |
|------------|-----------------|------------------------------|---------------------------------|------------|
| Analog     | 435.0125        | 10.12                        | 10.42                           | High Power |
|            |                 | 10.02                        | 10.42                           | Low Power  |

**99% Occupied Bandwidth & 26 dB Emissions Bandwidth with High Power**

**99% Occupied Bandwidth & 26 dB Emissions Bandwidth with Low Power****Emission Mask with High Power**

Emission Mask with Low Power



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

### Applicable Standard

Emission Mask D—12.5 kHz channel bandwidth equipment. For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

- 1) For any frequency removed from the center of the authorized bandwidth  $f_0$  to 5.625 kHz removed from  $f_0$ , 0 dB.
- 2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 5.626 kHz but no more than 12.5 kHz, at least 7.27 ( $f_d - 2.88$  kHz) dB.
- 3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 12.5 kHz: At least  $50 + 10 \log(P)$  dB or 70 dB, whichever is the lesser attenuation.

### Test Equipment List and Details

| Manufacturer               | Description         | Model No. | Serial No. | Calibration Date | Calibration Due Date |
|----------------------------|---------------------|-----------|------------|------------------|----------------------|
| Rohde & Schwarz            | Signal Analyzer     | FSIQ26    | 837405/023 | 2014-08-22       | 2015-08-22           |
| ANRITSU CORP.MADE IN JAPAN | HP Filter(UHF band) | MP526 D   | 995245     | 2013-11-24       | 2014-11-23           |

\* **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:       | 26        |
| Relative Humidity: | 51 %      |
| ATM Pressure:      | 100.0 kPa |

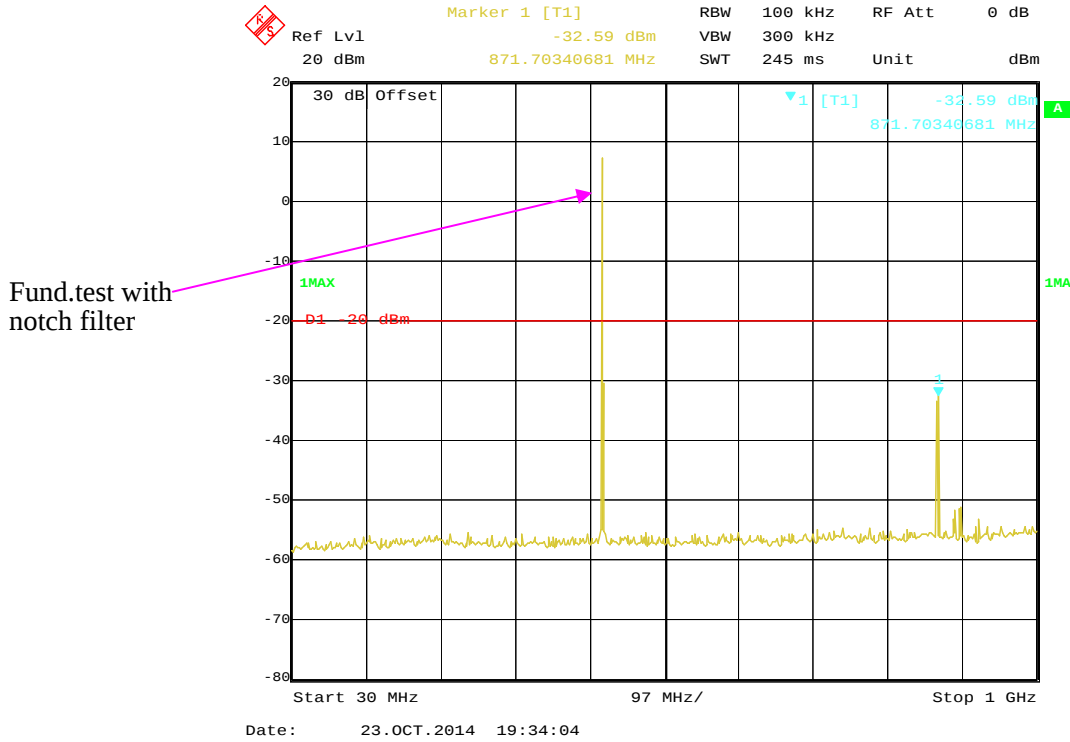
*The testing was performed by Candy Li on 2014-10-22.*

*Test Mode: Transmitting*

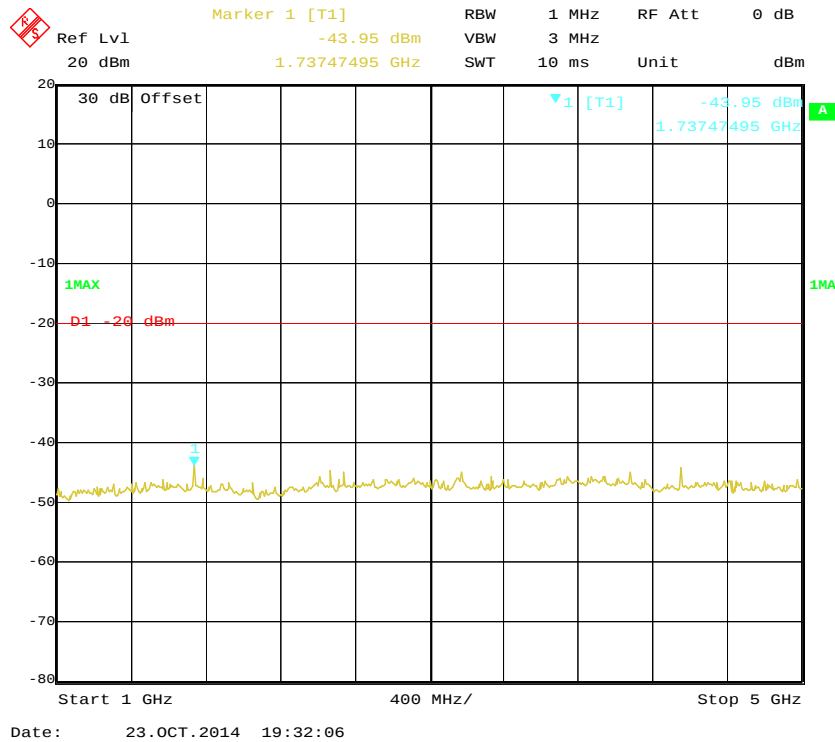
Please refer to the following plots.

**Analog Modulation:**

**30 MHz – 1 GHz, Spacing Channel 12.5 kHz**



**1 GHz – 5 GHz, Spacing Channel 12.5 kHz**



**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        | 2014-11-12       | 2015-11-12           |
| HP              | Amplifier           | 8447E       | 1937A01046    | 2014-05-06       | 2015-05-06           |
| Sunol Sciences  | Broadband Antenna   | JB1         | A040904-2     | 2011-11-28       | 2014-11-27           |
| Rohde & Schwarz | Signal Analyzer     | FSIQ26      | 8386001028    | 2013-11-24       | 2014-11-23           |
| Sunol Sciences  | Horn Antenna        | DRH-118     | A052304       | 2011-12-01       | 2014-11-30           |
| HP              | Synthesized Sweeper | 8341B       | 2624A00116    | 2014-06-03       | 2015-06-03           |
| Mini-Circuits   | Amplifier           | ZVA-183-S+  | 5969001149    | NCR              | NCR                  |
| A.H. System     | Horn Antenna        | SAS-200/571 | 135           | 2012-02-11       | 2015-02-10           |
| COM POWER       | Dipole Antenna      | AD-100      | 041000        | 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**

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 teeth 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.

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

|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 26        |
| <b>Relative Humidity:</b> | 52 %      |
| <b>ATM Pressure:</b>      | 101.0 kPa |

The testing was performed by Candy Li on 2014-10-21.

Test Mode: Transmitting

**30 MHz – 5 GHz:**

| Frequency<br>(MHz)                                       | Receiver<br>Reading<br>(dBμV) | Turn<br>Table<br>Angle<br>Degree | Rx Antenna    |                | Substituted          |                       |                         | Absolute<br>Level<br>(dBm) | FCC 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) |
| Analog Modulation 435.0125 MHz, Channel Spacing 12.5 kHz |                               |                                  |               |                |                      |                       |                         |                            |                |                |
| 870.025                                                  | 66.39                         | 313                              | 1.5           | H              | -30.1                | 0.70                  | 0                       | -30.80                     | -20            | 10.80          |
| 870.025                                                  | 65.92                         | 305                              | 1.1           | V              | -30.1                | 0.70                  | 0                       | -30.80                     | -20            | 10.80          |
| 1305.0375                                                | 54.89                         | 357                              | 1.8           | H              | -43.6                | 0.84                  | 8.50                    | -35.94                     | -20            | 15.94          |
| 1305.0375                                                | 58.26                         | 78                               | 2.3           | V              | -41.3                | 0.84                  | 8.50                    | -33.64                     | -20            | 13.64          |
| 1740.05                                                  | 59.76                         | 74                               | 1.5           | H              | -43.3                | 0.97                  | 9.40                    | -34.87                     | -20            | 14.87          |
| 1740.05                                                  | 59.98                         | 253                              | 1.9           | V              | -40.5                | 0.97                  | 9.40                    | -32.07                     | -20            | 12.07          |
| 2175.06                                                  | 49.20                         | 89                               | 2.1           | H              | -53.4                | 1.06                  | 10.00                   | -44.46                     | -20            | 24.46          |
| 2175.06                                                  | 52.29                         | 271                              | 1.9           | V              | -44.1                | 1.06                  | 10.00                   | -35.16                     | -20            | 15.16          |
| 2610.08                                                  | 47.53                         | 16                               | 1.2           | H              | -51.0                | 1.47                  | 10.80                   | -41.67                     | -20            | 21.67          |
| 2610.08                                                  | 41.44                         | 351                              | 1.7           | V              | -52.8                | 1.47                  | 10.80                   | -43.47                     | -20            | 23.47          |
| 3045.09                                                  | 43.55                         | 248                              | 1.8           | H              | -52.0                | 1.73                  | 10.90                   | -42.83                     | -20            | 22.83          |
| 3045.09                                                  | 40.16                         | 181                              | 2.0           | V              | -54.7                | 1.73                  | 10.90                   | -45.53                     | -20            | 25.53          |
| 3480.10                                                  | 48.52                         | 233                              | 1.2           | H              | -38.8                | 2.23                  | 10.70                   | -30.33                     | -20            | 10.33          |
| 3480.10                                                  | 44.96                         | 318                              | 1.3           | V              | -42.2                | 2.23                  | 10.70                   | -33.73                     | -20            | 13.73          |

**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 | 2013-05-09       | 2016-05-08           |
| ESPEC           | Temperature & Humidity Chamber | EL-10KA   | 09107726   | 2013-11-21       | 2014-11-21           |
| 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:       | 26        |
| Relative Humidity: | 52 %      |
| ATM Pressure:      | 101.0 kPa |

*The testing was performed by Candy Li on 2014-10-21.*

*Test Mode: Transmitting*

**For Analog Modulation**

| Reference Frequency: 435.0125 MHz, Limit: $\pm 2.5$ ppm, 12.5 kHz |                                      |                                     |                          |
|-------------------------------------------------------------------|--------------------------------------|-------------------------------------|--------------------------|
| Test Environment                                                  |                                      | Frequency Measure with Time Elapsed |                          |
| Temperature<br>( )                                                | Power Supplied<br>(V <sub>DC</sub> ) | Measured<br>Frequency<br>(MHz)      | Frequency Error<br>(ppm) |
| Frequency Stability versus Input Temperature                      |                                      |                                     |                          |
| 50                                                                | 3.8                                  | 435.012369                          | -0.301                   |
| 40                                                                | 3.8                                  | 435.012358                          | -0.326                   |
| 30                                                                | 3.8                                  | 435.012364                          | -0.313                   |
| 20                                                                | 3.8                                  | 435.012361                          | -0.320                   |
| 10                                                                | 3.8                                  | 435.012353                          | -0.338                   |
| 0                                                                 | 3.8                                  | 435.012352                          | -0.340                   |
| -10                                                               | 3.8                                  | 435.012360                          | -0.322                   |
| -20                                                               | 3.8                                  | 435.012366                          | -0.308                   |
| -30                                                               | 3.8                                  | 435.012359                          | -0.324                   |
| Frequency Stability versus Input Voltage                          |                                      |                                     |                          |
| 20                                                                | 3.1                                  | 435.012361                          | -0.320                   |

## FCC §90.214 - TRANSIENT FREQUENCY BEHAVIOR

### Applicable Standard

Regulations: FCC §90.214

Test method: ANSI/TIA-603-D 2010, section 2.2.19.3

### Test Equipment List and Details

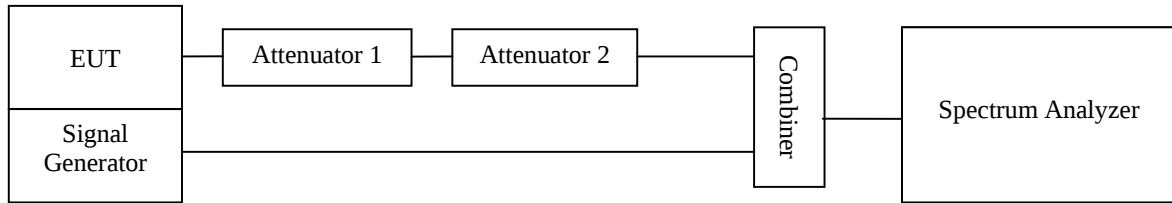
| Manufacturer    | Description               | Model No. | Serial No. | Calibration Date | Calibration Due Date |
|-----------------|---------------------------|-----------|------------|------------------|----------------------|
| Rohde & Schwarz | Spectrum Analyzer         | FSIQ26    | 837405/023 | 2014-08-22       | 2015-08-22           |
| HP              | RF Communication Test Set | 8920A     | 3438A05201 | 2014-06-14       | 2015-06-13           |

\* **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

- Connect the EUT and test equipment as shown on the following block diagram.
- Set the Spectrum Analyzer to measure FM deviation, and tune the RF frequency to the transmitter assigned frequency.
- Set the signal generator to the assigned transmitter frequency and modulate it with a 1 kHz tone at  $\pm 12.5$  kHz deviation and set its output level to -100dBm.
- Turn on the transmitter.
- Supply sufficient attenuation via the RF attenuator to provide an input level to the Spectrum Analyzer that is 40 dB below the maximum allowed input power when the transmitter is operating at its rated power level. Note this power level on the Spectrum Analyzer as  $P_0$ .
- Turn off the transmitter.
- Adjust the RF level of the signal generator to provide RF power equal to  $P_0$ . This signal generator RF level shall be maintained throughout the rest of the measurement.
- Remove the attenuation 1, so the input power to the Spectrum Analyzer is increased by 30 dB when the transmitter is turned on.
- Adjust the vertical amplitude control of the spectrum analyzer to display the 1000 Hz at  $\pm 4$  divisions vertically centered on the display. Set trigger mode of the Spectrum Analyzer to "Video", and tune the "trigger level" on suitable level. Then set the "trigger offset" to -10ms for turn on and -15ms for turn off.
- Turn on the transmitter and the transient wave will be captured on the screen of Spectrum Analyzer. Observe the stored display. The instant when the 1 kHz test signal is completely suppressed is considered to be  $t_{on}$ . The trace should be maintained within the allowed divisions during the period  $t_1$  and  $t_2$ .

- k) Then turn off the transmitter, and another transient wave will be captured on the screen of Spectrum Analyzer. The trace should be maintained within the allowed divisions during the period  $t_3$ .



## Test Data

### Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature:       | 25        |
| Relative Humidity: | 51 %      |
| ATM Pressure:      | 101.0 kPa |

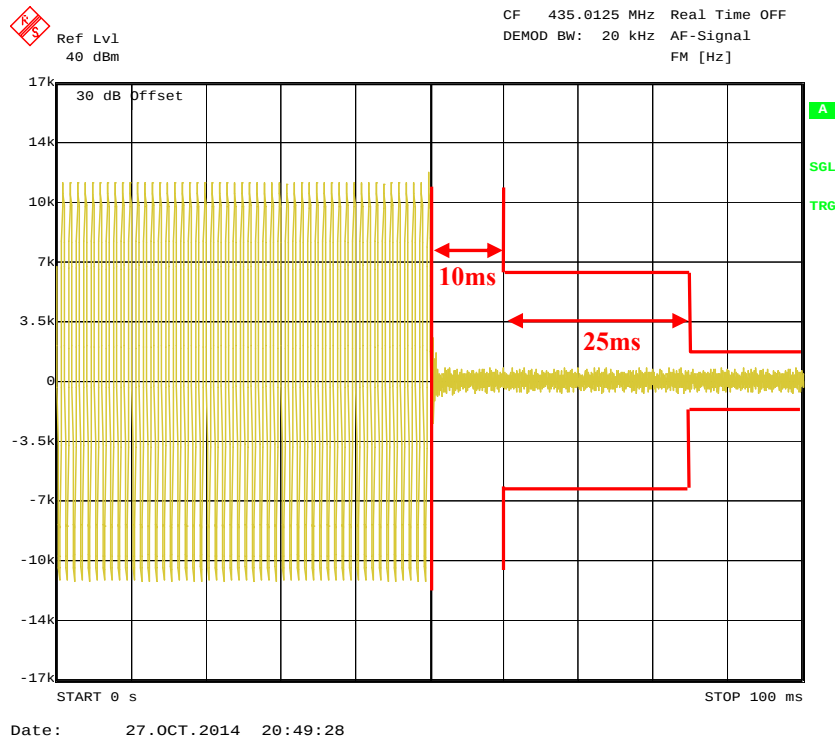
The testing was performed by Candy Li on 2014-10-27.

Test Mode: Transmitting

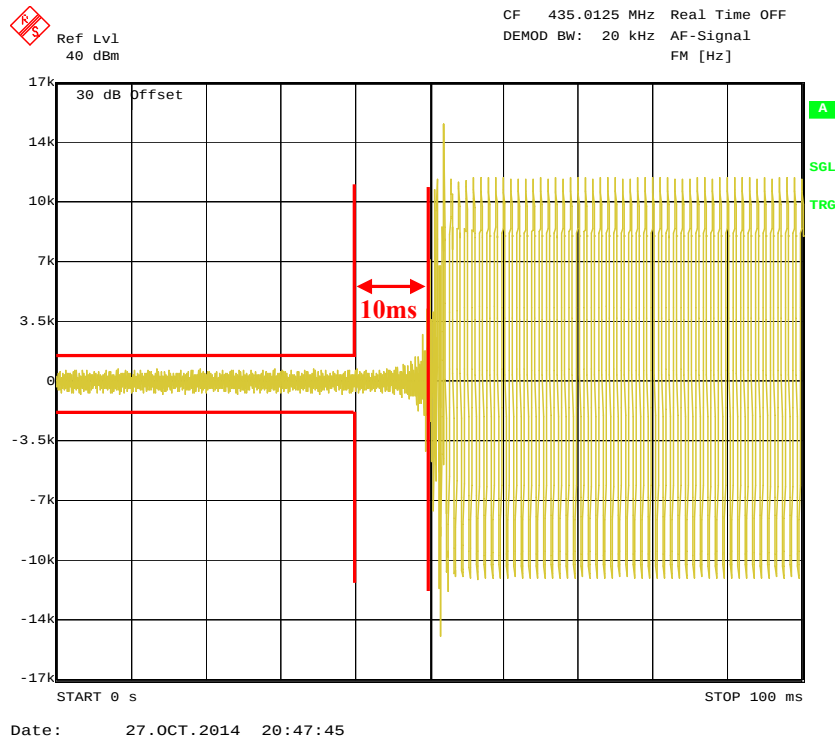
| Channel Separation (kHz) | Transient Period (ms) | Transient Frequency | Result |
|--------------------------|-----------------------|---------------------|--------|
| 12.5                     | 10 (t1)               | <+/-12.5 kHz        | Pass   |
|                          | 25 (t2)               | <+/-6.25 kHz        |        |
|                          | 10 (t3)               | <+/-12.5 kHz        |        |

Please refer to the following plots.

### Analog Modulation 435.0125 MHz, Turn on



### Analog Modulation 435.0125 MHz, Turn off



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