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Regulatory Compliance Group  
IT R&D Center  
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Yeongtong-gu, Suwon city,  
Gyeonggi-Do, Korea 443-742

## FCC CFR47 PART 27SUBPART CERTIFICATION REPORT

|                            |                      |
|----------------------------|----------------------|
| <b>Model Tested:</b>       | <b>SGH-T469</b>      |
| <b>FCC ID (Requested):</b> | <b>A3LSGHT469</b>    |
| <b>Report No:</b>          | <b>FG-163-R2</b>     |
| <b>Job No:</b>             | <b>FG-163</b>        |
| <b>Date issued:</b>        | <b>June 22, 2009</b> |

- Abstract -

All measurement reported here in accordance with FCC Rules, 47CFR  
Part2, Part27

**Prepared By**

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KJ KWON – Test Engineer

**Authorized By**

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WT JANG – Technical Manager

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## **MEASUREMENT REPORT**

### **1. FCC Certification Information**

The following information is in accordance with FCC Rules, 47CFR Part2, Subpart J, Sections 2.1033 – 2.1055.

#### **1.1 §2.1033 General Information**

- Applicant Name: SAMSUNG ELECTRONICS CO., LTD.
- Address: 416 Maetan3-Dong, Yeongtong-gu, Suwon City  
Gyeonggi-Do, Korea 443-742
- FCC ID: A3LSGHT469
- Model: SGH-T469
- Quantity: Quantity production is planned
- Emission Designators: 4M19F9W(AWS WCDMA)
- Tx Freq. Range: 1712.4 - 1752.5 MHz (AWS WCDMA)
- Rx Freq. Range: 2112.4 - 2152.5 MHz (AWS WCDMA)
- Max. Power Rating: 0.215 W AWS WCDMA(23.33 dBm)
- FCC Classification(s): PCS Licensed Transmitter Held to Ear (PCE)
- Equipment (EUT) Type: 850/1900 GSM/EDGE and AWS WCDMA Phone with Bluetooth.
- Modulation(s): WCDMA
- Frequency Tolerance:  $\pm 0.00025\%$  (2.5ppm)
- FCC Rule Part(s): §7(H), §.
- Dates of Test: June 10-11, 2009
- Place of Test: SAMSUNG Lab,
- Test Report S/N: FG-163-R2

## 2. INTRODUCTION

### 2.1 General

These measurement test were conducted at **SAMSUNG ELECTRONICS CO., LTD(SUWON)**.  
 The site address is 416 Maetan3-Dong, Yeongtong-gu, Suwon City, Gyeonggi-Do, Korea 443-742  
 The site have 1 Fully-anechoic chamber and measurement facility.



**Figure1. Map of the Suwon City area.**

### Measurement Procedure

The radiated and spurious measurements were made Fully-anechoic chamber at a 3-meter test range (see Figure2). The equipment under testing was placed on the rotating device at the same height and at a distance of 3-meters from the receive antenna. The rotating device which can rotate horizontal axis was mounted on the turn unit to facilitate rotation around a vertical axis. The measurement was made for each horizontal/vertical position combination with receive antenna horizontally polarized. This measurement was repeated with receive antenna vertically polarized.

The substitution antenna will replace the EUT antenna it the same position and in vertical polarization. The frequency of the signal generator shall be set to the frequencies that were measured on the EUT. The signal generator, output level, shall be adjusted until an equal or a known related level to what was measured from the EUT is obtained in the spectrum analyzer.

This level was recorded. For readings above 1 GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic antenna are taken into consideration.



**Figure2. Photograph of 3m Fully-Anechoic Chamber**

### **3. MEASURING INSTRUMENT CALIBRATION**

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

- End of page -

#### 4. TEST EQUIPMENT LIST

| Name Of Equipment               | Model               | Serial No.       | Due Date     |
|---------------------------------|---------------------|------------------|--------------|
| Spectrum Analyzer               | ESI26               | 836119/010       | 2009-10-21   |
|                                 | E4440A(3Hz~26.5GHz) | MY46187454       | 2010-03-06   |
|                                 | E4440A(3Hz~26.5GHz) | MY41000236       | 2010-04-14   |
| Network Analyzer                | 8753E               | JP38160590       | 2010-06-19   |
| Pre-Amplifier                   | 8449B               | 3008A00691       | 2009-12-15   |
| Communication test set          | 8960                | MY47510060       | 2010-03-06   |
|                                 | 8960                | GB42230535       | 2009-12-18   |
| Controller                      | CO2000              | CO2000/424       | Not Required |
| Turn Unit                       | CT0800              | CT0800/057       | Not Required |
| Rotating Device                 | DE3600-RH-PR        | DE3600-RH-PR/050 | Not Required |
| Antenna Master                  | MA4000              | MA4000/204       | Not Required |
| Horn Antenna                    | HF906               | 100134           | 2009-10-24   |
|                                 | HF906               | 360306/011       | 2010-06-13   |
|                                 | BBHA9120            | 9120D-637        | 2009-10-24   |
| Dipole Antenna                  | UHA 9105            | 9105-2412        | 2009-11-07   |
|                                 | UHA 9105            | 9105-2413        | 2010-06-13   |
| Power Supply                    | E3640A              | MY40003594       | 2010-06-19   |
|                                 | E3640A              | MY40003595       | 2010-05-25   |
|                                 | E3632A              | MY40022438       | 2010-03-06   |
| Divider                         | 11636B              | 51946            | Not Required |
|                                 | 11636B              | 56913            | Not Required |
|                                 | 11636B              | 56918            | Not Required |
| High Pass Filter                | WHK/3.0/18G-10SS    | 492              | Not Required |
|                                 | WHK/3.5/18G-10SS    | 4                | Not Required |
| Environmental Chamber           | SH-241              | 92000549         | 2009-11-14   |
|                                 | SH-241              | 92000548         | 2009-11-14   |
| Shielded Fully Anechoic Chamber | CHAMBER             | ANT0001          | Not Required |

## 5. FCC 3G MEASUREMENT PROCEDURES

The maximum output power is a measure of the maximum power the UE can transmit (i.e. the actual power as would be measured assuming no measurement error) in a band width of at least (1+a) times the chip rate of the radio access mode

The default test configuration is configure an established radio link between the UE and a communication test set using a 12.2kbps RMC (reference measurement channel) configured in Test Loop Mode 1. Maximum output is verified according to 3GPP TS 34.121 Section 5.2

1. Configure TCP (Transmit Power Control) set to "All 1" S.
2. RMC and AMR connections at 12.2kbps are measured under 3.4kbps SRB (signaling radio bearer)
3. Measure the mean power of the UE in a bandwidth of at least (1+a)times the chip rate o the radio access mode. The mean power shall be averaged over at least one timeslot.

Table1  
3GPP TS 34.121 Nominal Maximum Output Power

| Operating Band | Power Class3 |          | Power Class 4 |          |
|----------------|--------------|----------|---------------|----------|
|                | Power (dBm)  | Tol (dB) | Power (dBm)   | Tol (dB) |
| Band IV        | +24          | +1/-3    | +21           | +2/-2    |

| Operating Band | Channel | HSDPA Inactive |               | HSDPA Active  |
|----------------|---------|----------------|---------------|---------------|
|                |         | 12.2 kbps RMC  | 12.2 kbps AMR | 12.2 kbps RMC |
| AWS WCDMA      | 912     | 23.7762        | 23.647        | 22.7429       |
|                | 1050    | 23.7842        | 23.6036       | 22.3965       |
|                | 1113    | 23.4244        | 23.3801       | 22.4077       |

## 5.1 Effective Radiated Power / Equivalent Isotropic Radiated Power

### Test Set-up for the ERP/EIRP TEST

#### Test Set-up for the ERP/EIRP TEST

Effective Radiated Power Output and Equivalent Isotropic Radiated Power output Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004

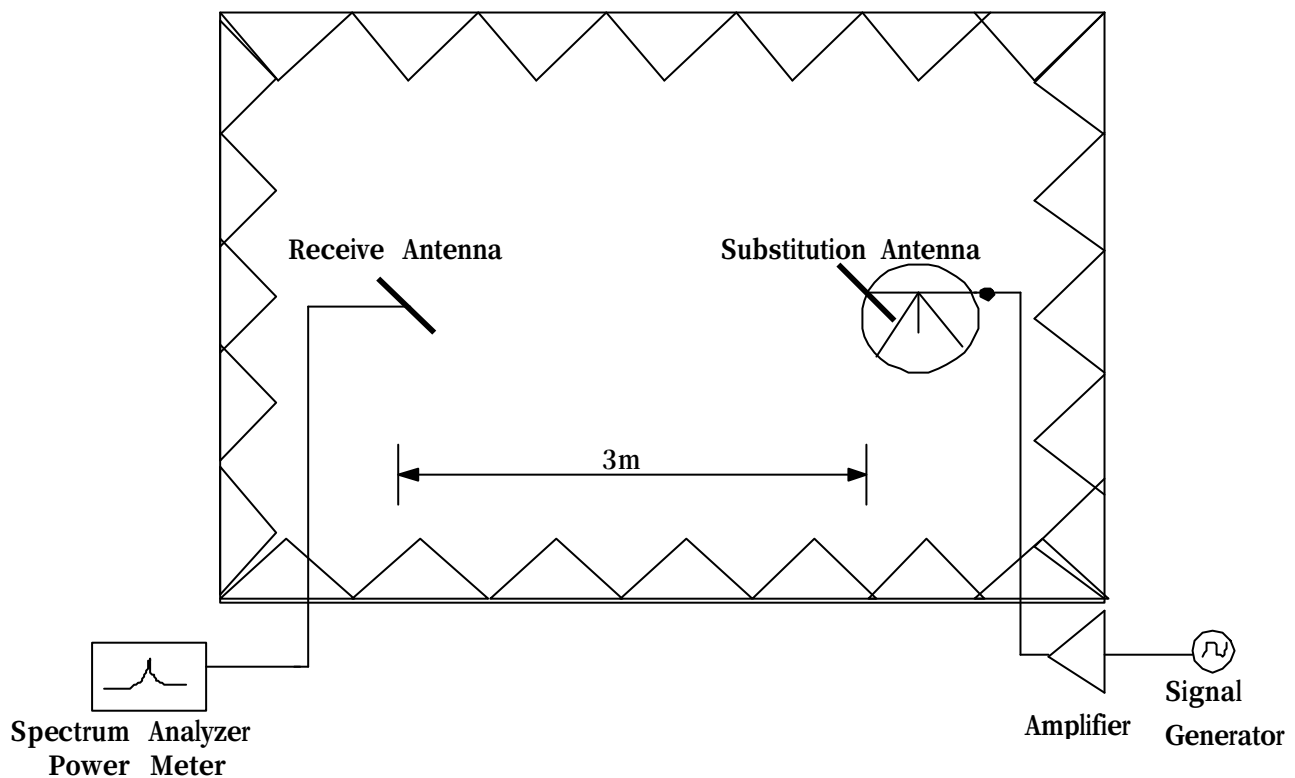


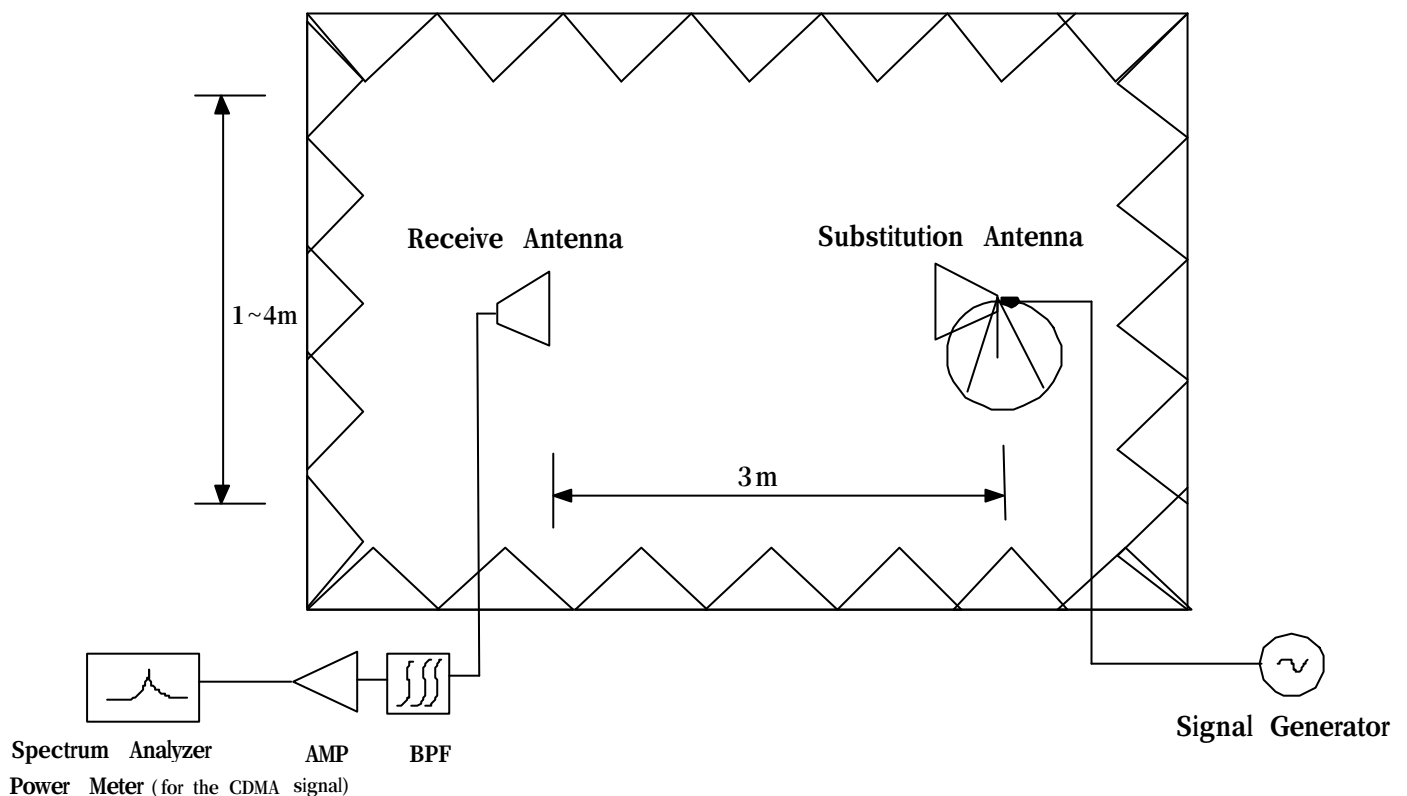
Figure 3. Diagram of ERP/EIRP test Set-up

The EUT was placed on the rotating device at 3-meters from the receive antenna. The turn unit and rotating device was adjusted for the highest reading on the receive spectrum analyzer. For GSM signals, an average detector is used, with RBW=VBW=3MHz, SPAN=10MHz. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminals of dipole is measured. The ERP and EIRP are recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

## 5.2 Radiated Spurious & Harmonic Emission

### Test Set-up for the Radiated Emission TEST

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004



**Figure 4. Diagram of Radiated Spurious & Harmonic test Set-up**

The EUT was placed on the rotating device at 3-meters from the receive antenna. The turn unit and rotating device was adjusted for the highest reading on the receive spectrum analyzer. The Spectrum was investigated from 30MHz to the 10<sup>th</sup> Harmonic of the fundamental. A peak detector is used, with RBW=VBW=1MHz. The value that we could measure was only reported. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

### SAMPLE CALCULATION

Example: Channel 600 PCS Mode 2<sup>nd</sup> Harmonic(3760MHz)



The receive analyzer reading at 3meters with the EUT on the turntable was  $-81.0\text{dBm}$ . The gain of the substituted antenna is  $8.1\text{dBi}$ . The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of  $-81.0\text{dBm}$  of the receive analyzer. The loss of the cable between the signal generator and the terminals of the substituted antenna is  $2.0\text{dB}$  at  $3760\text{MHz}$ . So  $6.1\text{dB}$  is added to the signal generator reading of  $-30.9\text{dBm}$  yielding  $-24.8\text{dBm}$ . The fundamental EIRP was  $25.5\text{dBm}$  so this harmonic was  $25.5\text{dBm} - (-24.8) = 50.3\text{dBc}$ .

- End of page -

### **5.3 Occupied Bandwidth**

#### **Test Procedure**

The EUT was setup to maximum output power at its lowest channel. The occupied bandwidth was measured using a spectrum analyzer. The measurements are repeated for the highest and a middle channel. The EUT's occupied bandwidth is measured as the width of the signal between two points, one below the carrier center frequency and one above the carrier frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power. Plots of the EUT's occupied bandwidth are shown herein.

### **5.4 Peak-Average Ratio**

A peak to average ratio measurement is performed at the conducted port of the EUT. An average and a peak trace are used on a spectrum analyzer to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth.

### **5.5 Spurious and Harmonic Emissions at Antenna Terminal**

#### **5.5.1 Occupied Bandwidth Emission Limits**

- (a) On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log(P)$  dB.
- (b) Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.
- (c) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.
- (d) The measurement of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

- End of page -

| BLOCK | Freq. Range (MHz)<br>Transmitter (Tx) | Freq. Range (MHz)<br>Receiver (Rx) |
|-------|---------------------------------------|------------------------------------|
| A     | 1850 – 1865                           | 1930 – 1945                        |
| B     | 1870 – 1885                           | 1950 – 1965                        |
| C     | 1895 – 1910                           | 1975 – 1990                        |
| D     | 1865 – 1870                           | 1945 – 1950                        |
| E     | 1885 – 1890                           | 1965 – 1970                        |
| F     | 1890 – 1895                           | 1970 – 1975                        |

**Table 1. Broadband PCS Service Frequency Blocks**

| BLOCK      | Freq. Range (MHz)<br>Transmitter (Tx) | Freq. Range (MHz)<br>Receiver (Rx) |
|------------|---------------------------------------|------------------------------------|
| A* Low + A | 824 – 835                             | 869 – 880                          |
| B          | 835 – 845                             | 880 – 890                          |
| A* High    | 845 – 846.5                           | 890 – 891.5                        |
| B*         | 846.5 – 849                           | 891.5 – 894                        |

**Table 2. Cellular Service Frequency Blocks**

### 5.5.2 Conducted Spurious Emission

#### **Minimum standard:**

On any frequency outside a license frequency block, the power of any emission shall be attenuated below the transmitter power(P) by at least  $43+10\log(P)$ dB. Limit equivalent to  $-13$ dBm, calculation shown below.

$$43 + 10\log(0.333 \text{ W}) = 38.22\text{dB}$$

$$25.22 \text{ dBm} - 38.22 \text{ dB} = -13 \text{ dBm}$$

#### **Test Procedure:**

The EUT was setup to maximum output power at its lowest channel. The Resolution BW of the analyzer is set to 1% of the emission bandwidth to show compliance with the  $-13$ dBm limit, in the 1MHz bands immediately outside and adjacent to the edge of the frequency block. The measurements are repeated for the EUT's highest channel. For the Out-of-Band measurements a 1MHz RBW was used to scan from 10MHz to 10GHz. (PCS Mode : 10MHz to 20GHz). A display line was placed at  $-13$ dBm to show compliance. The high, lowest and a middle channel were tested for out of band measurements. Plots are shown herein.

## 5.6 Frequency Stability / Temperature Variation

The frequency stability of the transmitter is measured by:

- a.) Temperature: The temperature is carried from -30 °C to +60 °C using an environmental chamber.
- b.) Primary Supply Voltage: The primary supply voltage is varied from 85% to 115% of the voltage normally at the input to the device or at the power supply terminals if cables are not normally supplied.

Specification- The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within  $\pm 0.00025$  ( $\pm 2.5$ ppm) of the center frequency.

Time Period and Procedure:

1. The carrier frequency of the transmitter and the individual oscillators is measured at room temperature (25 °C to 27 °C to provide a reference).
2. The equipment is subjected to an overnight "soak" at -30 °C without any power applied.
3. After the overnight "soak" at -30 °C (Usually 14~16 hours), the equipment is turned on in a "standby" condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter and the individual oscillators is made within a three minute interval after applying to the transmitter.
4. Frequency measurements are made at 10 °C interval up to room temperature. At least a period of one and one half-hour is provided to allow stabilization of the equipment at each temperature level.
5. Again the transmitter carrier frequency and the individual oscillators is measured at room temperature to begin measurement of the upper temperature levels.
6. Frequency measurements are at 10 intervals starting at -30 °C up to +60 °C allowing at least two hours at each temperature for stabilization. In all measurements the frequency is measured within three minutes after re-applying power to the transmitter.
7. The artificial load is mounted external to the temperature chamber.

NOTE : The EUT is tested down to the battery endpoint.

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## 6. TEST DATA

### 6.1 Conducted Output Power

A base station simulator was used to establish communication with the Samsung 850/1900 GSM/EDGE and AWS WCDMA Phone with Bluetooth.

FCC ID: A3LSGHT469. The base station simulator parameters were set to produce the maximum power from the EUT. This device was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA inactive at 12.2 kbps RMC. The WCDMA conducted powers are reported below, respectively.

| BAND | Channel | UMTS RF Conducted Power Table |                     |                     |                     |
|------|---------|-------------------------------|---------------------|---------------------|---------------------|
|      |         | HSDPA Inactive                |                     | HSDPA Active        |                     |
|      |         | 12.2 kbps RMC [dBm]           | 12.2 kbps AMR [dBm] | 12.2 kbps RMC [dBm] | 12.2 kbps AMR [dBm] |
| AWS  | 1312    | 23.7762                       | 23.647              | 22.7429             | 23.647              |
|      | 1412    | 23.7842                       | 23.6036             | 22.3965             | 23.6036             |
|      | 1862    | 23.4244                       | 23.3801             | 22.4077             | 23.3801             |

Table 6.1 WCDMA Conducted Output Powers

## 6.2 Equivalent Isotropic Radiated Power(E.I.R.P.)

**Supply Voltage : 3.7VDC**

**Modulation : AWS WCDMA**

### ■Reference level

| Frequency (MHz) | Output (dBm) | Polarization | P/M (dBm) | Ant gain (dBi) | Ref level (dBm) |
|-----------------|--------------|--------------|-----------|----------------|-----------------|
| 1712.4          | 22.00        | H            | -15.58    | 9.70           | -25.28          |
|                 |              | V            | -15.47    | 9.70           | -25.17          |
| 1732.4          | 23.00        | H            | -15.11    | 9.60           | -24.71          |
|                 |              | V            | -15.05    | 9.60           | -24.65          |
| 1752.5          | 23.00        | H            | -15.14    | 9.60           | -24.74          |
|                 |              | V            | -14.80    | 9.60           | -24.40          |

### ■Result

| Frequency (MHz) | From EUT Tested level (dBm) | Polarization (H/V) | Azimuth (angle) | EIRP (dBm) | EIRP (W) | Battery  |
|-----------------|-----------------------------|--------------------|-----------------|------------|----------|----------|
| 1712.4          | -25.20                      | V                  | 212/90          | 21.97      | 0.157    | Standard |
| 1732.4          | -24.32                      | V                  | 225/90          | 23.33      | 0.215    | Standard |
| 1752.5          | -24.45                      | V                  | 39/80           | 22.95      | 0.197    | Standard |

**NOTE : Standard batteries are the only battery options for this phone**

- All modes of operation were investigated, and the worst-case results are reported.

**Radiated measurements at 3 meters by Substitution Method**

### 6.3 AWS WCDMA Radiated Spurious & Harmonic measurement

Operating Frequency : 1852.4 MHz(Low), 1880.00 MHz(Middle), 1907.60 MHz(High)

Measured Output Power : 23.33 dBm = 0.215 W

Modulation Signal : AWS

**Limit :  $43 + 10\log_{10}(P) = 36.33$  dBc**

#### ■Result

| Channel | Harmonic | Frequency (MHz) | From EUT Tested level (dBm) | POL (H/V) | Result (dBc) |
|---------|----------|-----------------|-----------------------------|-----------|--------------|
| 9262    | 2        | 3704.80         | -58.28                      | H         | 58.18        |
|         | 3        | 5557.20         | -68.80                      | V         | 62.95        |
|         | 4        | 7409.60         | -64.80                      | V         | 54.90        |
|         | 5        | 9262.00         | -                           | -         | -            |
|         | 6        | 11114.40        | -                           | -         | -            |
|         | 7        | 12966.80        | -                           | -         | -            |
| 9400    | 2        | 3760.00         | -65.47                      | V         | 65.54        |
|         | 3        | 5640.00         | -68.58                      | V         | 63.14        |
|         | 4        | 7520.00         | -64.63                      | V         | 54.89        |
|         | 5        | 9400.00         | -                           | -         | -            |
|         | 6        | 11280.00        | -                           | -         | -            |
|         | 7        | 13160.00        | -                           | -         | -            |
| 9538    | 2        | 3815.20         | -60.91                      | H         | 60.58        |
|         | 3        | 5722.80         | -68.23                      | V         | 62.56        |
|         | 4        | 7630.40         | -68.32                      | H         | 57.90        |
|         | 5        | 9538.00         | -                           | -         | -            |
|         | 6        | 11445.60        | -                           | -         | -            |
|         | 7        | 13353.20        | -                           | -         | -            |

#### NOTE :

1. "-" Indicates the spurious emission could not be detected due to noise limitations or ambients.
2. The spectrum is measured from 30MHz to the 10<sup>th</sup> harmonic and All modes of operation were investigated, and the worst-case results are reported..

### Radiated Spurious Emission measurements at 3 meters by Substitution Method

## 6.4 AWS WCDMA Radiated Spurious & Harmonic Conversion Table

Date : June 11, 2009.

Test Engineer : KJ KWON

- ① Tx Cable loss
- ② Tx Horn Ant Gain
- ③ Tx Level to radiate -13dBm
- ④ ESI Level received from Tx with -13dBm
- ⑤ Tested Level from EUT
- ⑥ = EIRP - (-13 + ⑤ - ④)

| CH   | Har | Frequency (MHz) | ① Tx C/L dB | ②Tx Horn Gain dBi | ③Tx Level dBm | ④ ESI Level : H dBm | ④ ESI Level : V dBm | ⑤Tested EUT Level : H dBm | ⑤Tested EUT Level : V dBm | ⑥ Result EUT : H (dBc) | ⑥ Result EUT : V (dBc) |
|------|-----|-----------------|-------------|-------------------|---------------|---------------------|---------------------|---------------------------|---------------------------|------------------------|------------------------|
| 9262 | 2   | 3704.80         | -13.47      | 12.60             | -12.10        | -36.56              | -36.40              | -58.28                    | -60.51                    | 58.18                  | 60.57                  |
|      | 3   | 5557.20         | -17.04      | 12.60             | -8.60         | -42.21              | -42.31              | -68.82                    | -68.80                    | 63.07                  | 62.95                  |
|      | 4   | 7409.60         | -19.72      | 11.80             | -5.10         | -46.16              | -46.36              | -64.86                    | -64.80                    | 55.16                  | 54.90                  |
|      | 5   | 9262.00         | -22.33      | 11.40             | -2.10         | -49.75              | -49.66              | -                         | -                         | -                      | -                      |
|      | 6   | 11114.40        | -25.64      | 11.30             | 1.30          | -53.61              | -53.85              | -                         | -                         | -                      | -                      |
|      | 7   | 12966.80        | -27.34      | 12.60             | 1.70          | -56.97              | -56.76              | -                         | -                         | -                      | -                      |
| 9400 | 2   | 3760.00         | -13.58      | 12.40             | -11.80        | -36.15              | -36.39              | -66.09                    | -65.47                    | 66.40                  | 65.54                  |
|      | 3   | 5640.00         | -17.20      | 12.60             | -8.40         | -42.10              | -41.86              | -68.78                    | -68.58                    | 63.14                  | 63.18                  |
|      | 4   | 7520.00         | -19.93      | 11.00             | -4.10         | -46.11              | -46.20              | -64.91                    | -64.63                    | 55.26                  | 54.89                  |
|      | 5   | 9400.00         | -22.50      | 11.30             | -1.80         | -50.16              | -50.43              | -                         | -                         | -                      | -                      |
|      | 6   | 11280.00        | -24.94      | 11.70             | 0.20          | -54.63              | -54.72              | -                         | -                         | -                      | -                      |
|      | 7   | 13160.00        | -27.58      | 12.70             | 1.90          | -56.70              | -57.05              | -                         | -                         | -                      | -                      |
| 9538 | 2   | 3815.20         | -13.59      | 12.40             | -11.80        | -36.79              | -36.71              | -60.91                    | -62.83                    | 60.58                  | 62.58                  |
|      | 3   | 5722.80         | -17.12      | 13.10             | -9.00         | -42.16              | -42.13              | -68.92                    | -68.23                    | 63.22                  | 62.56                  |
|      | 4   | 7630.40         | -19.10      | 11.00             | -4.90         | -46.88              | -46.25              | -68.32                    | -68.80                    | 57.90                  | 59.01                  |
|      | 5   | 9538.00         | -22.45      | 11.30             | -1.90         | -50.45              | -50.55              | -                         | -                         | -                      | -                      |
|      | 6   | 11445.60        | -25.76      | 11.10             | 1.70          | -54.51              | -54.29              | -                         | -                         | -                      | -                      |
|      | 7   | 13353.20        | -28.26      | 12.80             | 2.50          | -57.35              | -57.47              | -                         | -                         | -                      | -                      |

## 6.5 Frequency Stability

### 6.5.1 AWS WCDMA Frequency Stability Table

Operating Frequency : 1,880,000,000 Hz

Channel : 9400

Reference Voltage : 3.7VDC

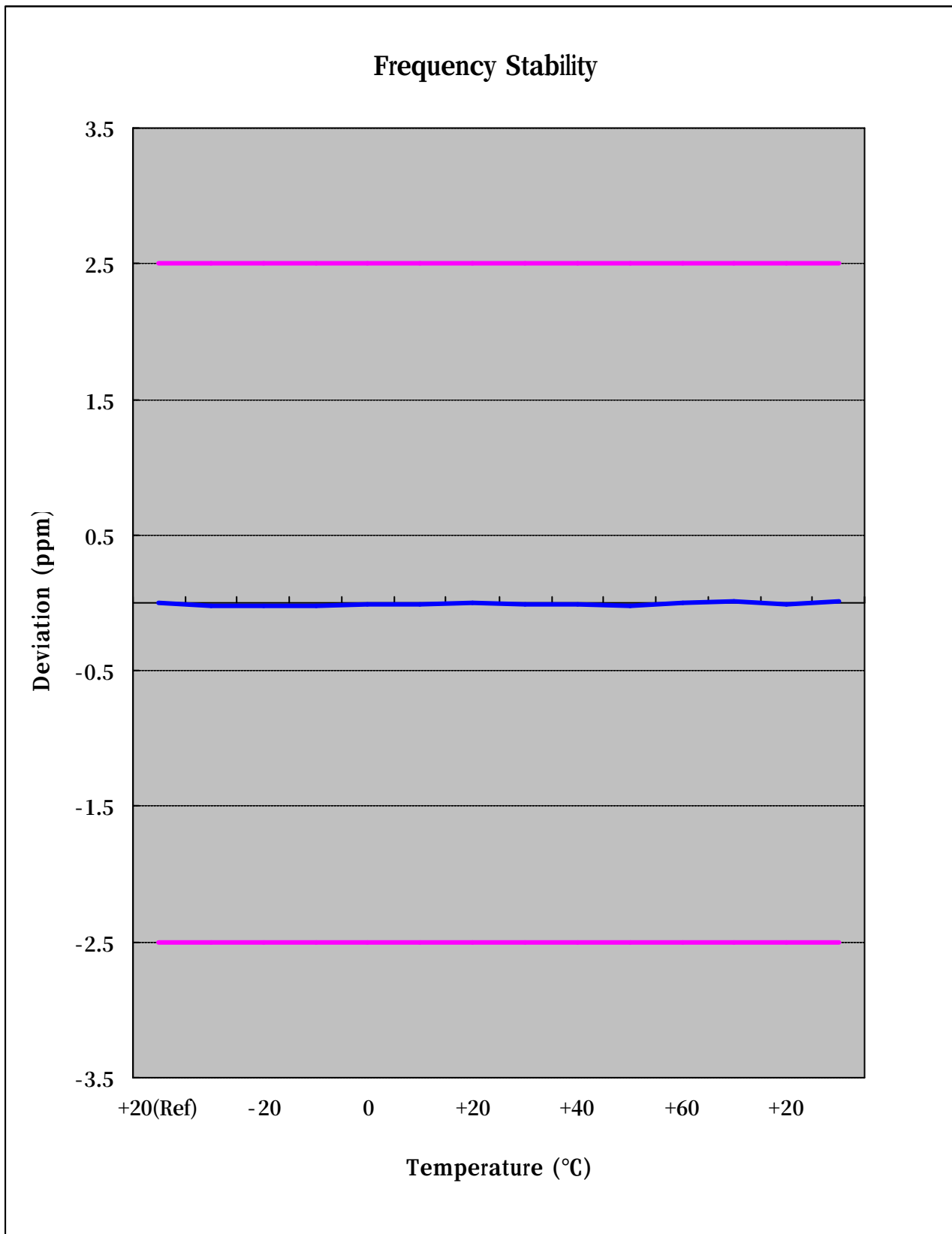
**Deviation Limit :  $\pm 0.00025$  % or 2.5ppm**

| Voltage (%)    | Power (VDC) | Temp. (°C) | Frequency Error (Hz) | Frequency (Hz) | Deviation (%) | ppm    |
|----------------|-------------|------------|----------------------|----------------|---------------|--------|
| 100%           | 3.70        | +20(Ref)   | 14.90                | 1,732,400,015  | 0.000001      | 0.009  |
| 100%           |             | -30        | -43.00               | 1,732,399,957  | -0.000002     | -0.025 |
| 100%           |             | -20        | -26.10               | 1,732,399,974  | -0.000002     | -0.015 |
| 100%           |             | -10        | -30.50               | 1,732,399,970  | -0.000002     | -0.018 |
| 100%           |             | 0          | -19.10               | 1,732,399,981  | -0.000001     | -0.011 |
| 100%           |             | +10        | -25.60               | 1,732,399,974  | -0.000001     | -0.015 |
| 100%           |             | +20        | 14.90                | 1,732,400,015  | 0.000001      | 0.009  |
| 100%           |             | +30        | -19.20               | 1,732,399,981  | -0.000001     | -0.011 |
| 100%           |             | +40        | -11.80               | 1,732,399,988  | -0.000001     | -0.007 |
| 100%           |             | +50        | -37.40               | 1,732,399,963  | -0.000002     | -0.022 |
| 100%           |             | +60        | -8.00                | 1,732,399,992  | 0.000000      | -0.005 |
| 85%            | 3.35        | +20        | 35.30                | 1,732,400,035  | 0.000002      | 0.020  |
| 115%           | 4.26        | +20        | -15.70               | 1,732,399,984  | -0.000001     | -0.009 |
| Batt. Endpoint | 3.35        | +20        | 35                   | 1,732,400,035  | 0.000002      | 0.020  |

**Note :** The temperature is varied from -30 °C to +60 °C using an environmental chamber.

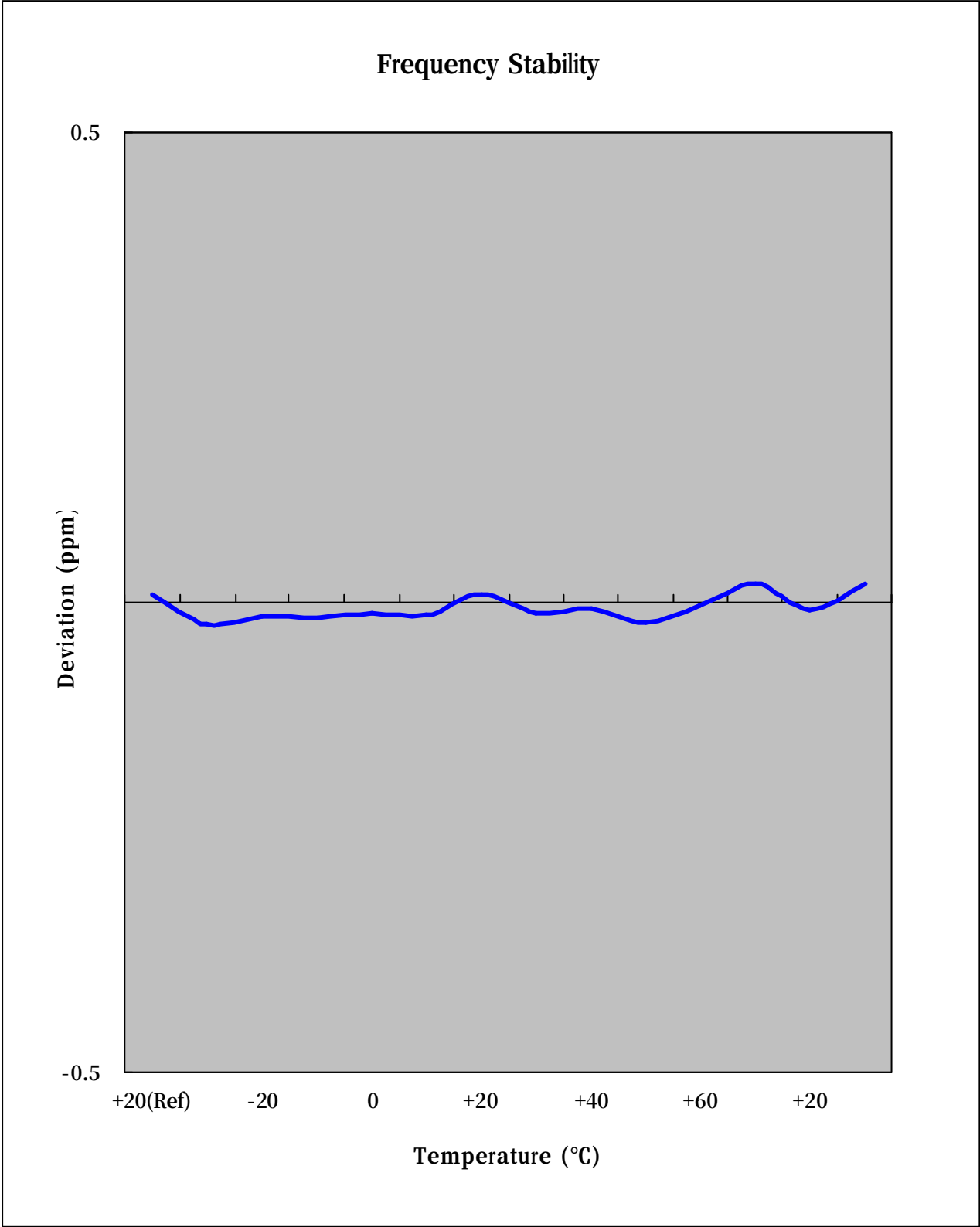
**The EUT is tested down to the battery end point**

### 6.5.2 AWS WCDMA Frequency Stability Graph



- End of page -

Zoom In



- End of page -

## 7. SAMPLE CALCULATION

### 7.1 Emission Designator

Emission Designator = 4M19F9W

CDMA BW = 4.19MHz

F = Frequency Modulation

9 = Composite Digital Info

W = Combination(Audio/Data)

(Measured at the 99.75% power bandwidth)

- End of page -



## **8. CONCLUSION**

The data collected shows that the SAMSUNG 850/1900 GSM/EDGE and AWS WCDMA Phone with Bluetooth

FCC ID : A3LSGHT469 complies with all the requirements of Parts 2, 27 of the FCC Rules.

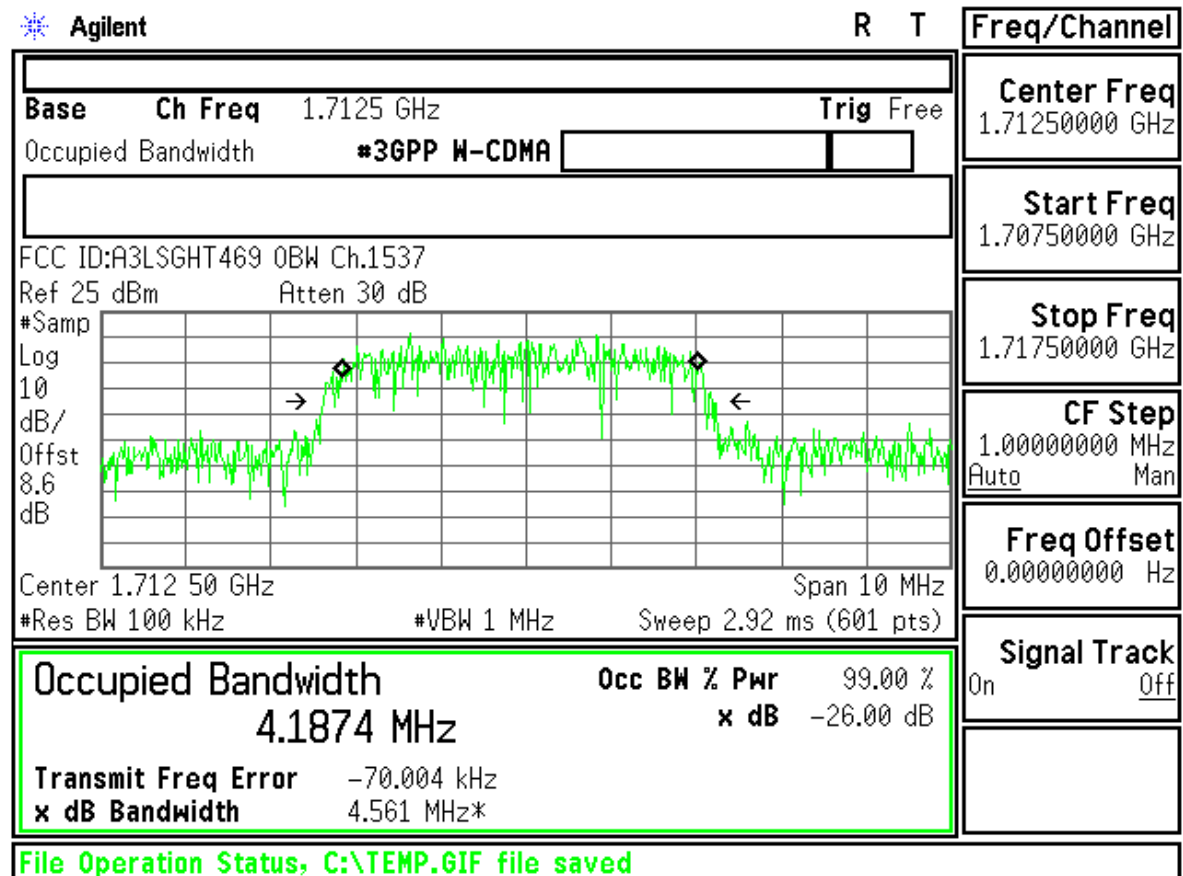
- End of page -

## 9. TEST PLOT

| Measurement/Instrument Screen |                            |                          |         |         |         |        |  |                              |  |
|-------------------------------|----------------------------|--------------------------|---------|---------|---------|--------|--|------------------------------|--|
| Control                       | Waveform Quality           |                          |         |         |         |        |  | Call Params                  |  |
| Waveform Quality Setup ▾      |                            |                          | Minimum | Maximum | Average |        |  | Cell Power                   |  |
|                               | EVM (%):                   | 5.56                     | 8.22    | 6.94    |         |        |  | -104.00                      |  |
|                               | Frequency Error (Hz):      | -54.42                   | 19.61   | -19.96  |         |        |  | dBm/3.84 MHz                 |  |
|                               | Origin Offset (dB):        | -30.59                   | -26.97  | -28.12  |         |        |  | Channel Type                 |  |
|                               | Phase Error (°):           | 2.74                     | 4.30    | 3.48    |         |        |  | 12.2k RMC                    |  |
|                               | Mag Error (%):             | 2.72                     | 3.72    | 3.33    |         |        |  |                              |  |
| Calibrate Measurements        | Time Error (chips):        | -0.10                    | 0.03    | -0.04   |         |        |  | Paging Service               |  |
|                               | Max PCDE:                  | -25.58 dB at Cch.64.16:0 |         |         |         |        |  | RB Test Mode                 |  |
|                               | 50 / 50                    |                          |         |         |         | Single |  |                              |  |
|                               | Thermal Power              |                          |         |         |         |        |  |                              |  |
|                               | Thermal Power<br>23.78 dBm |                          |         |         |         |        |  | HSDPA Parameters             |  |
|                               |                            |                          |         |         |         |        |  |                              |  |
| Swap Window Positions         | Single                     |                          |         |         |         |        |  | 34.121 Preset Call Configs ▾ |  |
|                               |                            |                          |         |         |         |        |  |                              |  |
| 1 of 2                        | Active Cell Connected      |                          |         |         |         |        |  | Channel (UARFCN) Params      |  |
|                               |                            |                          |         |         |         |        |  |                              |  |
|                               |                            |                          | IntRef  | Offset  | R T     |        |  | 1 of 3                       |  |

| Measurement/Instrument Screen |                            |                          |         |         |         |        |  |                              |  |
|-------------------------------|----------------------------|--------------------------|---------|---------|---------|--------|--|------------------------------|--|
| Control                       | Waveform Quality           |                          |         |         |         |        |  | Call Params                  |  |
| Waveform Quality Setup ▾      |                            |                          | Minimum | Maximum | Average |        |  | Cell Power                   |  |
|                               | EVM (%):                   | 6.14                     | 8.47    | 7.18    |         |        |  | -104.00                      |  |
|                               | Frequency Error (Hz):      | -49.28                   | 34.90   | -20.79  |         |        |  | dBm/3.84 MHz                 |  |
|                               | Origin Offset (dB):        | -29.25                   | -26.40  | -27.49  |         |        |  | Channel Type                 |  |
|                               | Phase Error (°):           | 2.90                     | 4.43    | 3.59    |         |        |  | 12.2k RMC                    |  |
|                               | Mag Error (%):             | 2.98                     | 3.78    | 3.48    |         |        |  |                              |  |
| Calibrate Measurements        | Time Error (chips):        | -0.21                    | -0.06   | -0.08   |         |        |  | Paging Service               |  |
|                               | Max PCDE:                  | -25.52 dB at Cch.64.16:0 |         |         |         |        |  | RB Test Mode                 |  |
|                               | 50 / 50                    |                          |         |         |         | Single |  |                              |  |
|                               | Thermal Power              |                          |         |         |         |        |  |                              |  |
|                               | Thermal Power<br>23.78 dBm |                          |         |         |         |        |  | HSDPA Parameters             |  |
|                               |                            |                          |         |         |         |        |  |                              |  |
| Swap Window Positions         | Single                     |                          |         |         |         |        |  | 34.121 Preset Call Configs ▾ |  |
|                               |                            |                          |         |         |         |        |  |                              |  |
| 1 of 2                        | Active Cell Connected      |                          |         |         |         |        |  | Channel (UARFCN) Params      |  |
|                               |                            |                          |         |         |         |        |  |                              |  |
|                               |                            |                          | IntRef  | Offset  | R T     |        |  | 1 of 3                       |  |

| Measurement/Instrument Screen |                       |                  |           |                       |                |        |         |                    |                              |        |  |
|-------------------------------|-----------------------|------------------|-----------|-----------------------|----------------|--------|---------|--------------------|------------------------------|--------|--|
| Control                       |                       | Waveform Quality |           |                       |                |        |         |                    | Call Params                  |        |  |
| Waveform Quality Setup ▾      |                       |                  | Minimum   |                       | Maximum        |        | Average |                    | Cell Power                   |        |  |
|                               | EVM (%):              |                  | 5.45      |                       | 7.66           |        | 6.53    |                    | -104.00                      |        |  |
|                               | Frequency Error (Hz): |                  | -45.72    |                       | 10.96          |        | -17.18  |                    | dBm/3.84 MHz                 |        |  |
|                               | Origin Offset (dB):   |                  | -31.01    |                       | -28.55         |        | -29.84  |                    | Channel Type                 |        |  |
|                               | Phase Error (°):      |                  | 2.66      |                       | 4.09           |        | 3.36    |                    | 12.2k RMC                    |        |  |
|                               | Mag Error (%):        |                  | 2.61      |                       | 3.14           |        | 2.84    |                    |                              |        |  |
|                               | Time Error (chips):   |                  | -0.19     |                       | -0.05          |        | -0.08   |                    | Paging Service               |        |  |
|                               | Max PCDE:             |                  | -26.00 dB |                       | at Cch.64.16:0 |        |         |                    | RB Test Mode                 |        |  |
|                               | 50 / 50               |                  |           |                       |                |        | Single  |                    |                              |        |  |
|                               |                       |                  |           |                       |                |        |         |                    |                              |        |  |
| Calibrate Measurements        |                       | Thermal Power    |           |                       |                |        |         |                    | HSDPA Parameters             |        |  |
|                               |                       | Thermal Power    |           |                       |                |        |         |                    |                              |        |  |
|                               |                       | 23.42 dBm        |           |                       |                |        |         |                    |                              |        |  |
| Swap Window Positions         |                       |                  |           |                       |                |        |         |                    | 34.121 Preset Call Configs ▾ |        |  |
|                               |                       |                  |           |                       |                |        |         |                    |                              |        |  |
|                               |                       |                  |           |                       |                |        |         |                    | Channel (UARFCN) Params      |        |  |
|                               |                       | Single           |           |                       |                |        |         |                    |                              |        |  |
|                               |                       |                  |           | Active Cell Connected |                |        |         | Sys Type: UTRA FDD |                              |        |  |
|                               |                       |                  |           |                       |                |        |         |                    |                              |        |  |
| 1 of 2                        |                       |                  |           | IntRef                |                | Offset |         | R T                |                              | 1 of 3 |  |



Agilent

R T

Freq/Channel

Base Ch Freq 1.7324 GHz Trig Free  
Occupied Bandwidth #3GPP W-CDMA

Center Freq  
1.73240000 GHz

Start Freq  
1.72740000 GHz

Stop Freq  
1.73740000 GHz

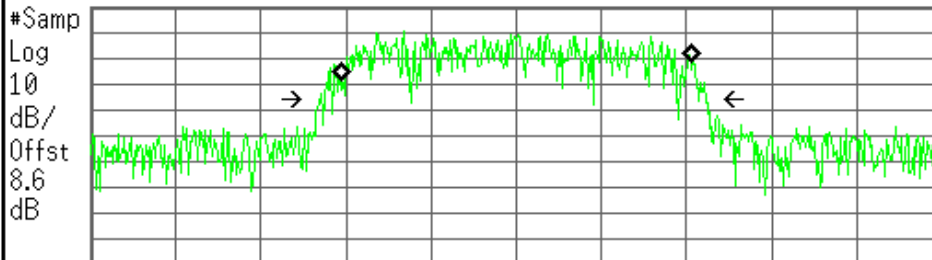
CF Step  
1.00000000 MHz  
Auto Man

Freq Offset  
0.00000000 Hz

Signal Track  
On Off

FCC ID:A3LSGHT469 0BW Ch.1637

Ref 25 dBm Atten 30 dB



Center 1.732 40 GHz Span 10 MHz  
#Res BW 100 kHz #VBW 1 MHz Sweep 2.92 ms (601 pts)

Occupied Bandwidth 4.0984 MHz  
Occ BW % Pwr 99.00 %  
x dB -26.00 dB  
Transmit Freq Error 359.766 Hz  
x dB Bandwidth 4.542 MHz\*

File Operation Status, C:\TEMP.GIF file saved

Agilent

R T

Freq/Channel

Base Ch Freq 1.7525 GHz Trig Free  
Occupied Bandwidth #3GPP W-CDMA

Center Freq  
1.75250000 GHz

Start Freq  
1.74750000 GHz

Stop Freq  
1.75750000 GHz

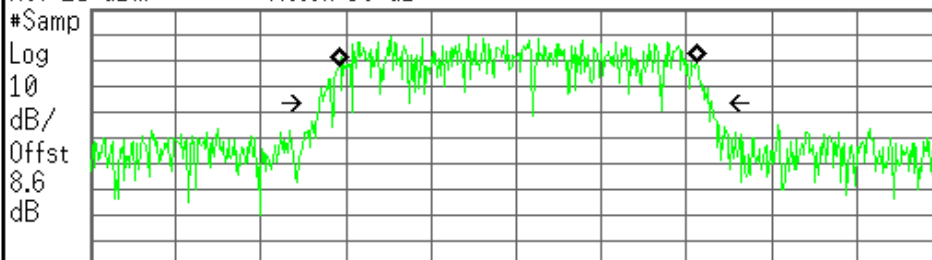
CF Step  
1.00000000 MHz  
Auto Man

Freq Offset  
0.00000000 Hz

Signal Track  
On Off

FCC ID:A3LSGHT469 0BW Ch.2087

Ref 25 dBm Atten 30 dB



Center 1.752 50 GHz Span 10 MHz  
#Res BW 100 kHz #VBW 1 MHz Sweep 2.92 ms (601 pts)

Occupied Bandwidth 4.1918 MHz  
Occ BW % Pwr 99.00 %  
x dB -26.00 dB  
Transmit Freq Error 13.055 kHz  
x dB Bandwidth 4.623 MHz\*

File Operation Status, C:\TEMP.GIF file saved

Agilent

R T

Freq/Channel

FCC ID:A3LSGHT469 Cond Spur Ch.1537

Ref 25 dBm

Atten 30 dB

#Peak

Log

10

dB/

Offst

8.6

dB

DI

-13.0

dBm

LgAv

M1 S2

S3 FC

$\mathcal{E}(f)$ :

FTun

Swp

AC Coupled: unspecified below 20 MHz

Center Freq

1.25500000 GHz

Start Freq

10.0000000 MHz

Stop Freq

2.50000000 GHz

CF Step

249.000000 MHz

Auto

Man

Freq Offset

0.00000000 Hz

Signal Track

On

Off

Center 1.255 GHz

#Res BW 1 MHz

#VBW 1 MHz

Span 2.49 GHz

Sweep 4.16 ms (601 pts)

File Operation Status, C:\TEMP.GIF file saved

Agilent

R T

Freq/Channel

FCC ID:A3LSGHT469 Cond Spur Ch.1537

Ref 25 dBm

Atten 30 dB

Mkr1 1.702 GHz

-23.26 dBm

#Peak

Log

10

dB/

Offst

8.6

dB

DI

-13.0

dBm

LgAv

V1 S2

S3 FC

$\mathcal{E}(f)$ :

FTun

Swp

AC Coupled: unspecified below 20 MHz

Center Freq

856.250000 MHz

Start Freq

10.0000000 MHz

Stop Freq

1.70250000 GHz

CF Step

169.250000 MHz

Auto

Man

Freq Offset

0.00000000 Hz

Signal Track

On

Off

Center 856 MHz

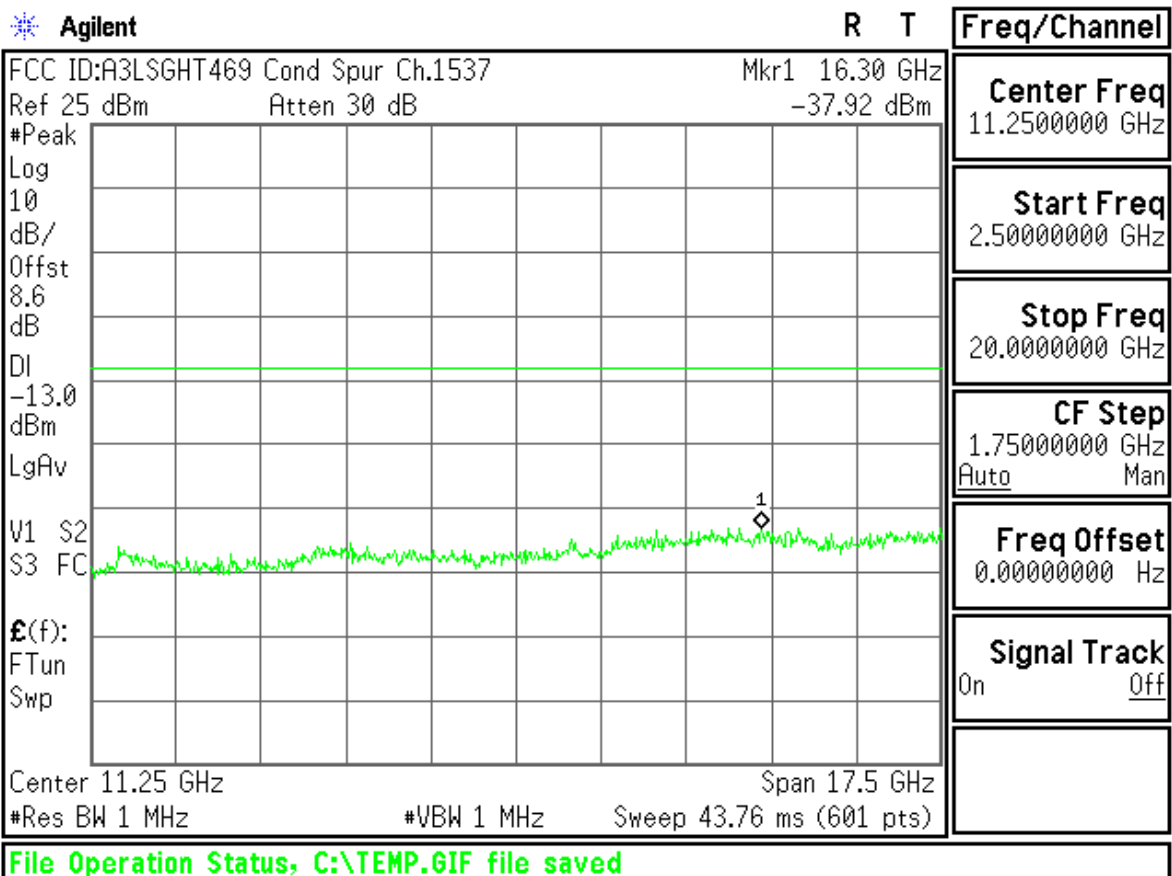
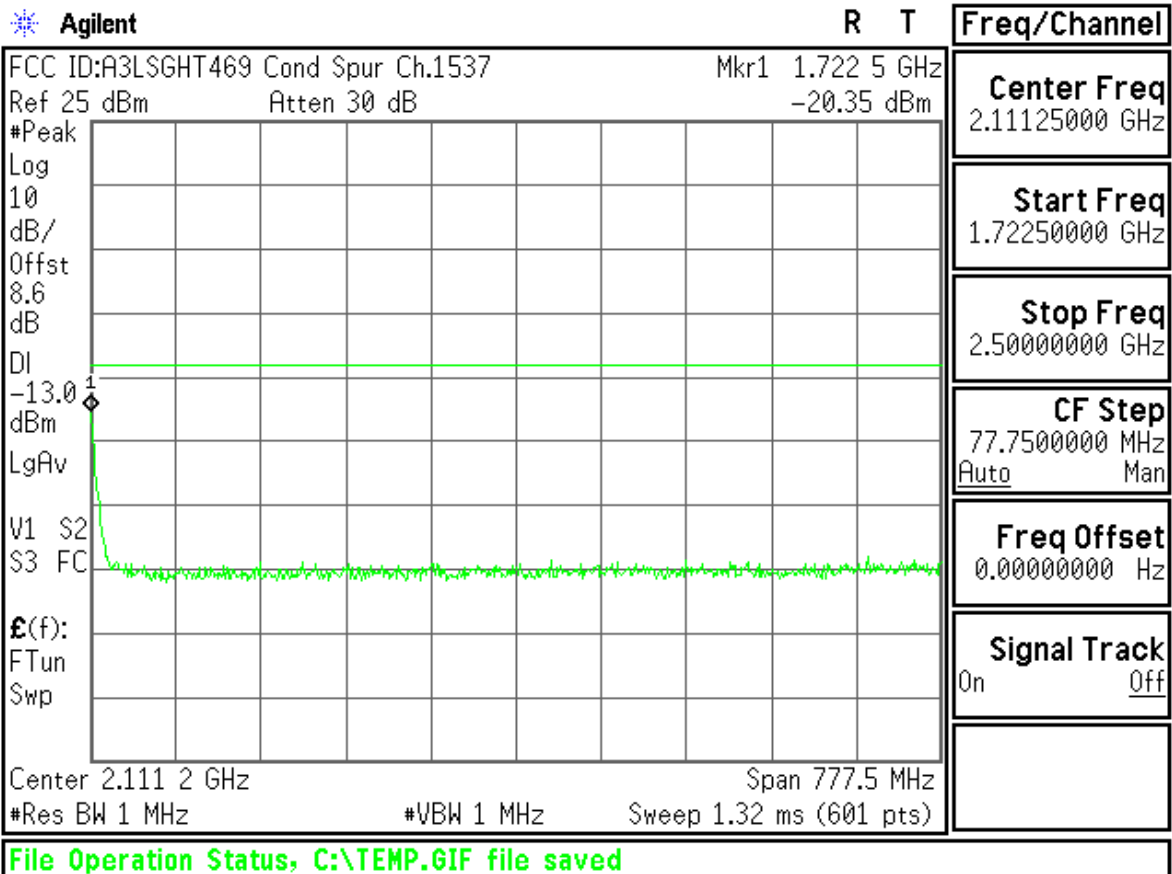
#Res BW 1 MHz

#VBW 1 MHz

Span 1.692 GHz

Sweep 2.84 ms (601 pts)

File Operation Status, C:\TEMP.GIF file saved



Agilent

R T

Freq/Channel

FCC ID:A3LSGHT469 Cond Spur Ch.1637

Ref 25 dBm

Atten 30 dB

#Peak

Log

10

dB/

Offst

8.6

dB

DI

-13.0

dBm

LgAv

M1 S2

S3 FC

£(f):

FTun

Swp

AC Coupled: unspecified below 20 MHz

Center Freq

1.25500000 GHz

Start Freq

10.00000000 MHz

Stop Freq

2.50000000 GHz

CF Step

249.0000000 MHz

Auto

Man

Freq Offset

0.00000000 Hz

Signal Track

On

Off

Center 1.255 GHz

#Res BW 1 MHz

#VBW 1 MHz

Span 2.49 GHz

Sweep 4.16 ms (601 pts)

File Operation Status, C:\TEMP.GIF file saved

Agilent

R T

Freq/Channel

FCC ID:A3LSGHT469 Cond Spur Ch.1637

Ref 25 dBm

Atten 30 dB

Mkr1 1.722 GHz

-22.86 dBm

#Peak

Log

10

dB/

Offst

8.6

dB

DI

-13.0

dBm

LgAv

M1 S2

S3 FC

£(f):

FTun

Swp

AC Coupled: unspecified below 20 MHz

Center Freq

866.2000000 MHz

Start Freq

10.00000000 MHz

Stop Freq

1.72240000 GHz

CF Step

171.2400000 MHz

Auto

Man

Freq Offset

0.00000000 Hz

Signal Track

On

Off

Center 866 MHz

#Res BW 1 MHz

#VBW 1 MHz

Span 1.712 GHz

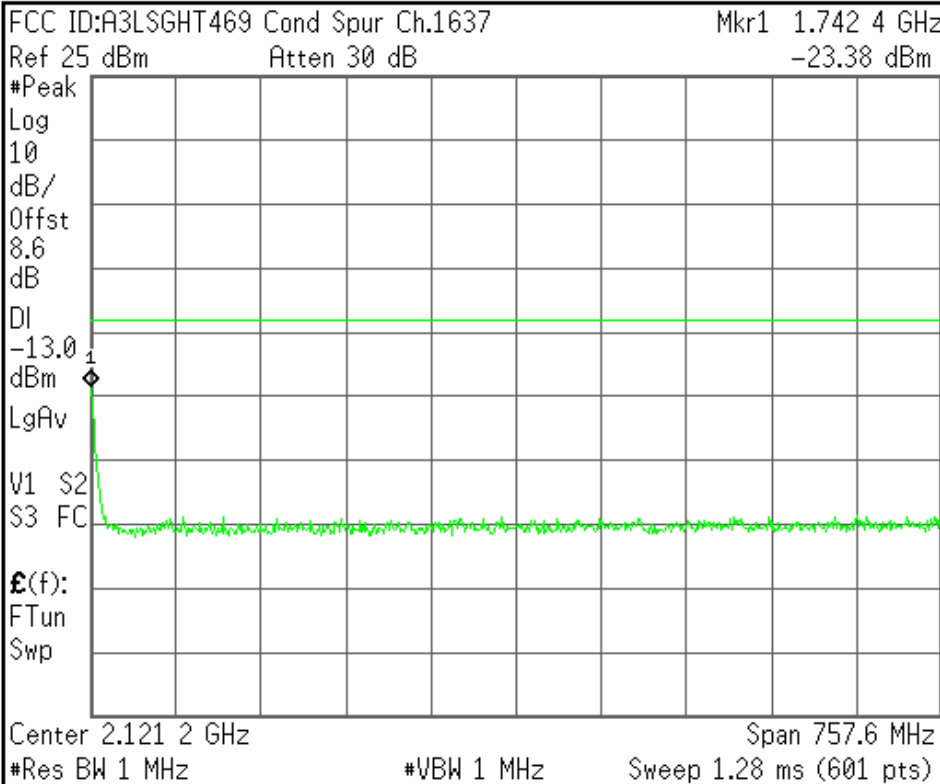
Sweep 2.88 ms (601 pts)

File Operation Status, C:\TEMP.GIF file saved

Agilent

R T

Freq/Channel



Center Freq  
2.12120000 GHz

Start Freq  
1.74240000 GHz

Stop Freq  
2.50000000 GHz

CF Step  
75.7600000 MHz  
Auto Man

Freq Offset  
0.00000000 Hz

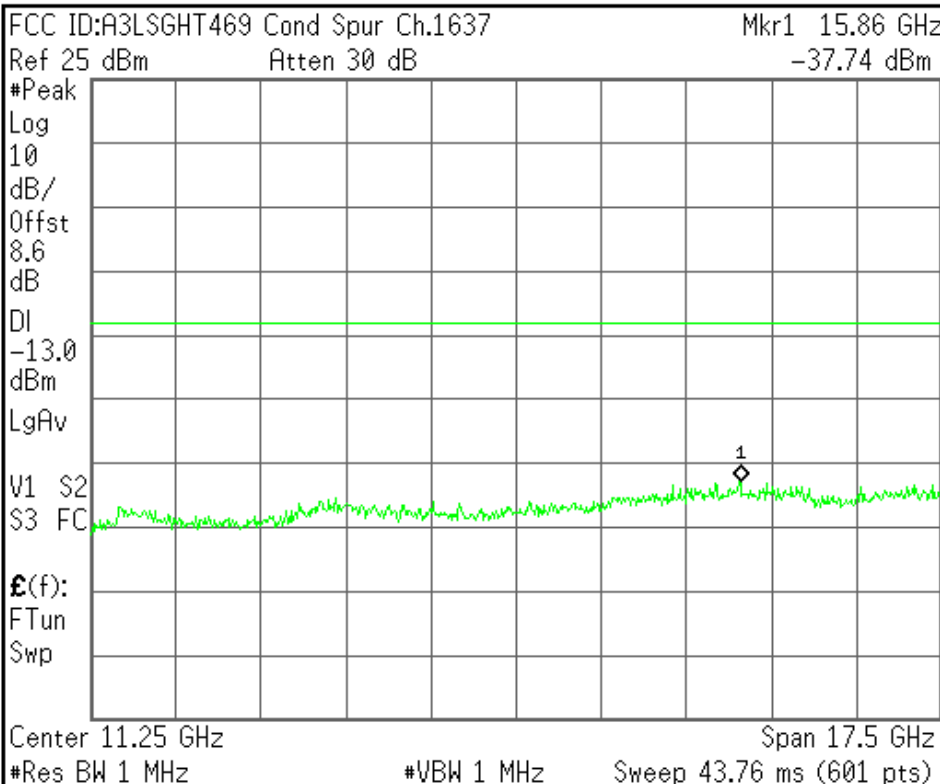
Signal Track  
On Off

File Operation Status, C:\TEMP.GIF file saved

Agilent

R T

Freq/Channel



Center Freq  
11.2500000 GHz

Start Freq  
2.50000000 GHz

Stop Freq  
20.0000000 GHz

CF Step  
1.75000000 GHz  
Auto Man

Freq Offset  
0.00000000 Hz

Signal Track  
On Off

File Operation Status, C:\TEMP.GIF file saved

Agilent

R T

Freq/Channel

FCC ID:A3LSGHT469 Cond Spur Ch.2087

Ref 25 dBm

Atten 30 dB

#Peak

Log

10

dB/

Offst

8.6

dB

DI

-13.0

dBm

LgAv

M1 S2

S3 FC

$\mathcal{E}(f)$ :

FTun

Swp

AC Coupled: unspecified below 20 MHz

Center 1.255 GHz

Span 2.49 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 4.16 ms (601 pts)

Center Freq  
1.25500000 GHz

Start Freq  
10.0000000 MHz

Stop Freq  
2.50000000 GHz

CF Step  
249.000000 MHz  
Auto Man

Freq Offset  
0.00000000 Hz

Signal Track  
On Off

File Operation Status, C:\TEMP.GIF file saved

Agilent

R T

Freq/Channel

FCC ID:A3LSGHT469 Cond Spur Ch.2087

Mkr1 1.742 GHz

Ref 25 dBm

Atten 30 dB

-23.11 dBm

#Peak

Log

10

dB/

Offst

8.6

dB

DI

-13.0

dBm

LgAv

V1 S2

S3 FC

$\mathcal{E}(f)$ :

FTun

Swp

AC Coupled: unspecified below 20 MHz

Center 876 MHz

Span 1.732 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 2.92 ms (601 pts)

Center Freq  
876.250000 MHz

Start Freq  
10.0000000 MHz

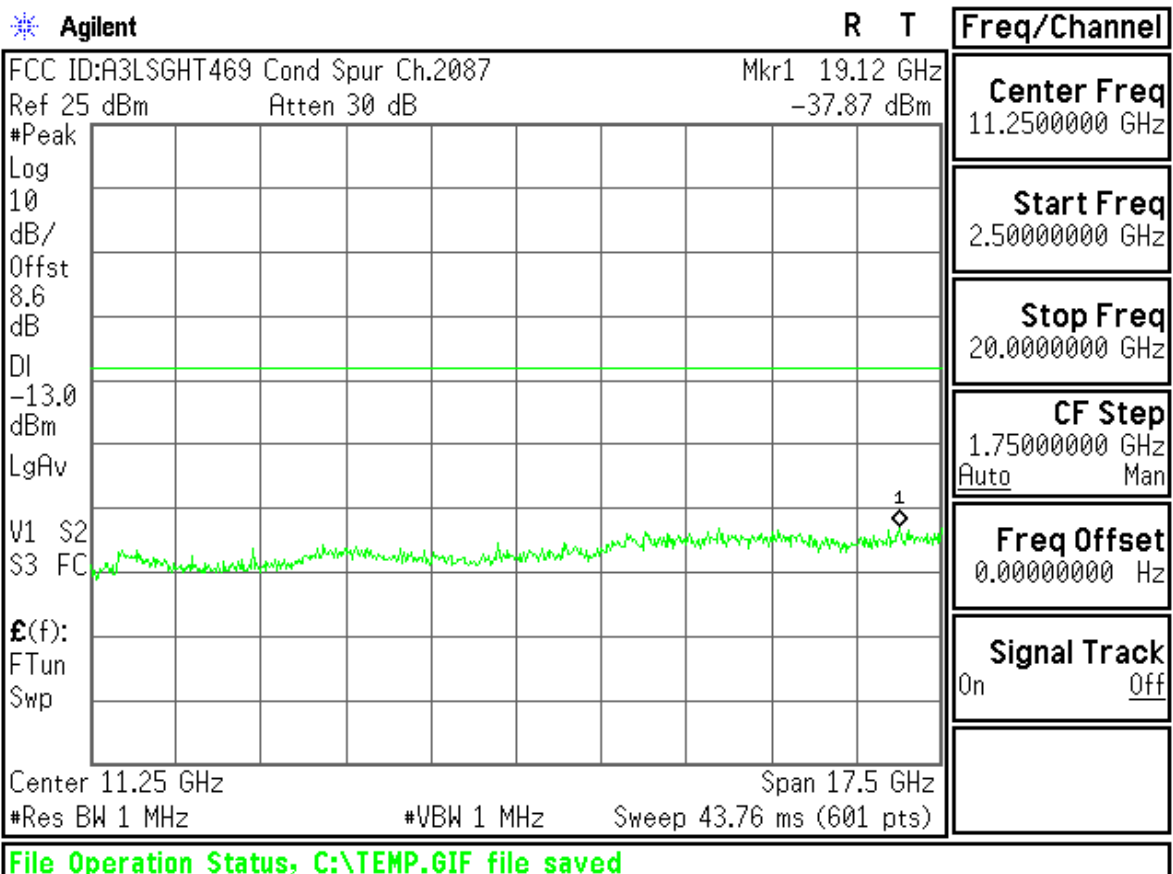
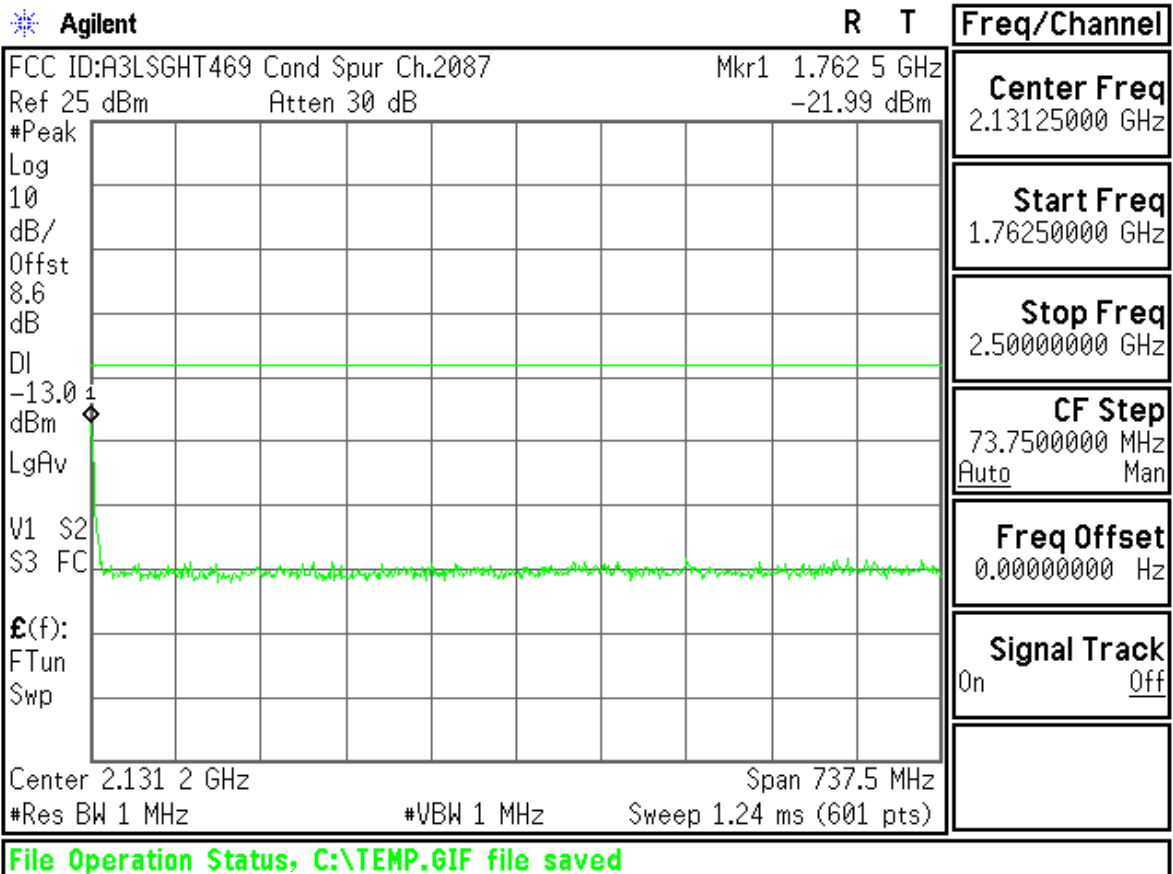
Stop Freq  
1.74250000 GHz

CF Step  
173.250000 MHz  
Auto Man

Freq Offset  
0.00000000 Hz

Signal Track  
On Off

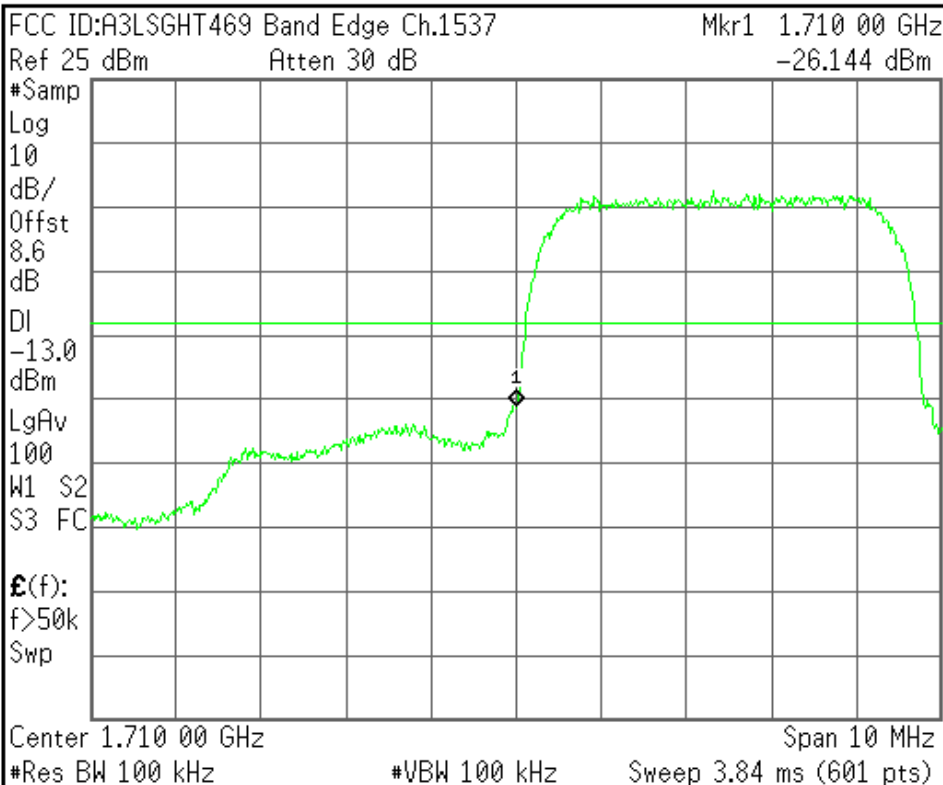
File Operation Status, C:\TEMP.GIF file saved



Agilent

R T

Freq/Channel



**Center Freq**  
1.71000000 GHz

**Start Freq**  
1.70500000 GHz

**Stop Freq**  
1.71500000 GHz

**CF Step**  
1.00000000 MHz  
Auto Man

**Freq Offset**  
0.00000000 Hz

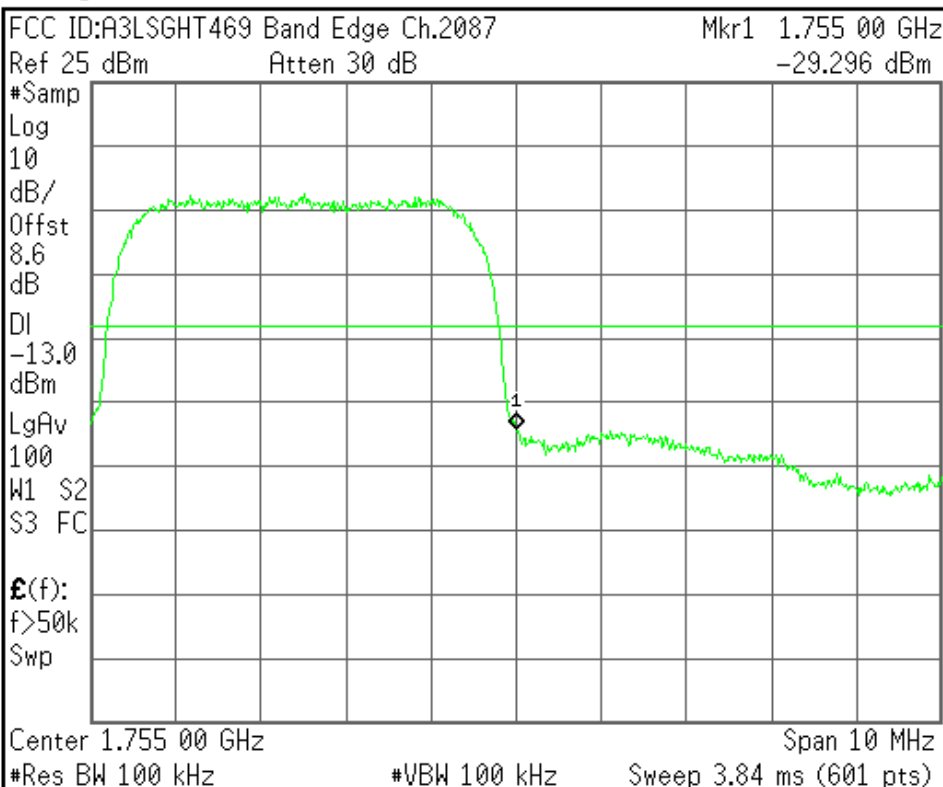
**Signal Track**  
On Off

File Operation Status, C:\TEMP.GIF file saved

Agilent

R T

Freq/Channel



**Center Freq**  
1.75500000 GHz

**Start Freq**  
1.75000000 GHz

**Stop Freq**  
1.76000000 GHz

**CF Step**  
1.00000000 MHz  
Auto Man

**Freq Offset**  
0.00000000 Hz

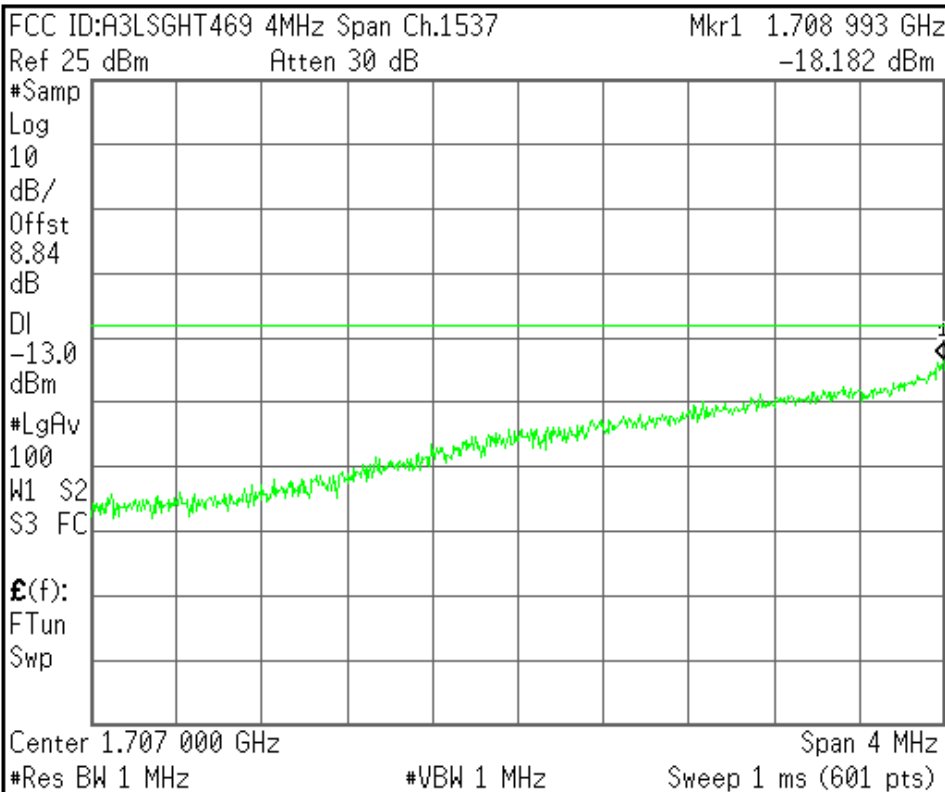
**Signal Track**  
On Off

File Operation Status, C:\TEMP.GIF file saved

Agilent

R T

Freq/Channel



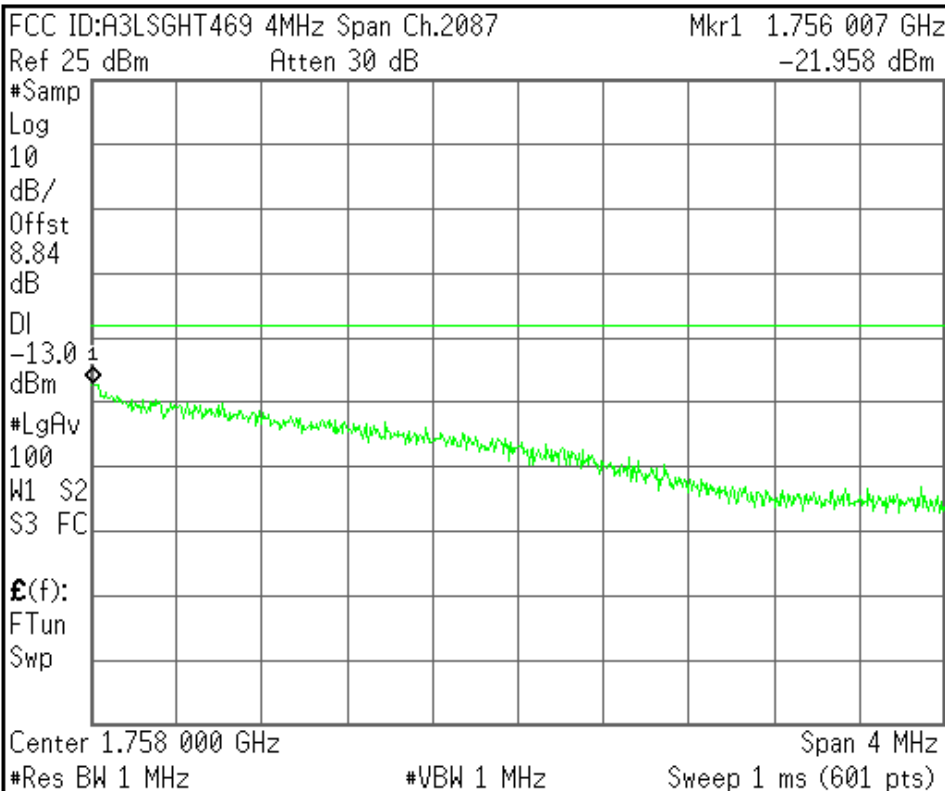
|                                              |
|----------------------------------------------|
| <b>Center Freq</b><br>1.70700000 GHz         |
| <b>Start Freq</b><br>1.70500000 GHz          |
| <b>Stop Freq</b><br>1.70900000 GHz           |
| <b>CF Step</b><br>400.000000 kHz<br>Auto Man |
| <b>Freq Offset</b><br>0.00000000 Hz          |
| <b>Signal Track</b><br>On Off                |

File Operation Status, C:\TEMP.GIF file saved

Agilent

R T

Freq/Channel



|                                              |
|----------------------------------------------|
| <b>Center Freq</b><br>1.75800000 GHz         |
| <b>Start Freq</b><br>1.75600000 GHz          |
| <b>Stop Freq</b><br>1.76000000 GHz           |
| <b>CF Step</b><br>400.000000 kHz<br>Auto Man |
| <b>Freq Offset</b><br>0.00000000 Hz          |
| <b>Signal Track</b><br>On Off                |

File Operation Status, C:\TEMP.GIF file saved

FCC ID:A3LSGHT469 P.A.R Ch.1637

Δ Mkr1 0 Hz

Ref 30 dBm

Atten 40 dB

-3.02 dB

#Avg

Log

10

dB/

Offst

8.84

dB

#LgAv

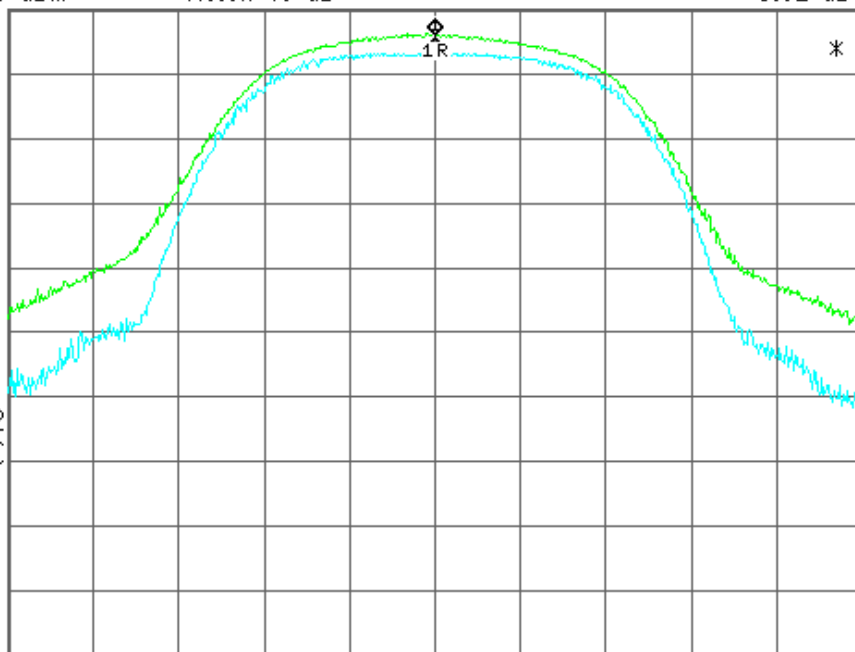
V1 V2

S3 FC

£(f):

FTun

Swp



Center 1.732 40 GHz

Span 20 MHz

#Res BW 5 MHz

VBW 5 MHz

Sweep 1 ms (601 pts)

Center Freq  
1.73240000 GHz

Start Freq  
1.72240000 GHz

Stop Freq  
1.74240000 GHz

CF Step  
2.00000000 MHz  
Auto Man

Freq Offset  
0.00000000 Hz

Signal Track  
On Off

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