

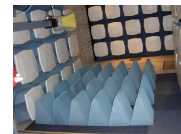


# PCTEST ENGINEERING LABORATORY, INC.

6660-B Dobbin Road, Columbia, MD 21045 USA

Tel. 410.290.6652 / Fax 410.290.6554

<http://www.pctestlab.com>



## MEASUREMENT REPORT

### FCC Part 90

**Applicant Name:**

IP Wireless  
Unit 7 Greenways Business Park  
Bellinger Close, Chippenham  
Wiltshire SN15 1BN

**Date of Testing:**

Sep. 24-Oct.6, 2010

**Test Site/Location:**

PCTEST Lab., Columbia, MD, USA

**Test Report Serial No.:**

0Y1008301445.PKT

**FCC ID:** PKTUSBSTKAGJ

**APPLICANT:** IP WIRELESS

**Application Type:** Certification

**FCC Classification:** Licensed Non-Broadcast Station Transmitter (TNB)

**FCC Rule Part(s):** §2; §90

**EUT Type:** 700MHz USB Stick Modem

**Model(s):** AGJ

**Tx Frequency Range:** 793-798MHz

**Max. RF Output Power:** 0.103 W ERP (20.14 dBm)

**Emission Designator(s):** 4M14G7D(QPSK), 4M17W7D(16QAM), 4M18W7D(64QAM)

**Test Device Serial No.:** *identical prototype* [S/N: AGJAA3200131A]

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in §2.947. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

**Grant Conditions:** Power output listed is ERP for Part 90.

PCTEST certifies that no party to this application has been subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.

  
Randy Ortanez  
President

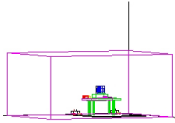


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| FCC ID: PKTUSBSTKAGJ                 |  | FCC Pt. 90 TD-CDMA MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1008301445.PKT | Test Dates:<br>Sep. 24-Oct.6, 2010                                                  | EUT Type:<br>700MHz USB Stick Modem                      |                                                                                       | Page 1 of 28                    |

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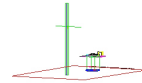
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## MEASUREMENT REPORT

### FCC Part 90

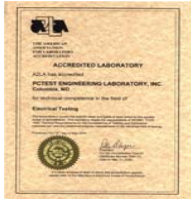


#### §2.1033 General Information

**APPLICANT:** IP Wireless  
**APPLICANT ADDRESS:** Unit 7 Greenways Business Park  
 Bellinger Close, Chippenham, Wiltshire SN15 1BN  
**TEST SITE:** PCTEST ENGINEERING LABORATORY, INC.  
**TEST SITE ADDRESS:** 6660-B Dobbin Road, Columbia, MD 21045 USA  
**FCC RULE PART(S):** §2; §90  
**BASE MODEL:** AGJ  
**FCC ID:** PKTUSBSTKAGJ  
**FCC CLASSIFICATION:** Licensed Non-Broadcast Station Transmitter (TNB)  
**EMISSION DESIGNATOR(S):** 4M14G7D(QPSK), 4M17W7D(16QAM), 4M18W7D(64QAM)  
**MODULATIONS:** TD-CDMA  
**FREQUENCY TOLERANCE:** 1.25ppm  
**Test Device Serial No.:** AGJAA3200131A ☐ Production ☒ Pre-Production ☐ Engineering  
**DATE(S) OF TEST:** Sep. 24-Oct.6, 2010  
**TEST REPORT S/N:** 0Y1008301445.PKT

#### Test Facility / Accreditations

Measurements were performed at PCTEST Engineering Lab. located in Columbia, MD 21045, U.S.A.



- PCTEST facility is an FCC registered (PCTEST Reg. No. 90864) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules and Industry Canada (2451A-1).
- PCTEST Lab is accredited to ISO 17025 by U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP Lab code: 100431-0) in EMC, FCC and Telecommunications.
- PCTEST Lab is accredited to ISO 17025-2005 by the American Association for Laboratory Accreditation (A2LA) in Specific Absorption Rate (SAR) testing, Hearing Aid Compatibility (HAC) testing, CTIA Test Plans, and wireless testing for FCC and Industry Canada Rules.
- PCTEST Lab is a recognized U.S. Conformity Assessment Body (CAB) in EMC and R&TTE (n.b. 0982) under the U.S.-EU Mutual Recognition Agreement (MRA).
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC Guide 65 by the American National Standards Institute (ANSI) in all scopes of FCC Rules and Industry Canada Standards (RSS).
- PCTEST facility is an IC registered (2451A-1) test laboratory with the site description on file at Industry Canada.
- PCTEST is a CTIA Authorized Test Laboratory (CATL) for AMPS, CDMA, and EvDO wireless devices and for Over-the-Air (OTA) Antenna Performance testing for AMPS, CDMA, GSM, GPRS, EGPRS, UMTS (W-CDMA), CDMA 1xEVDO, and CDMA 1xRTT.

|                                      |                                                                                     |                                                          |                                                                                       |                                 |
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## 1.0 INTRODUCTION

### 1.1 Scope

Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission.

### 1.2 Testing Facility

The map below shows the location of the PCTEST LABORATORY, its proximity to the FCC Laboratory, the Columbia vicinity area, the Baltimore-Washington Intern'l (BWI) airport, the city of Baltimore and the Washington, DC area. (See Figure 1-1).

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility in New Concept Business Park, Guilford Industrial Park, Columbia, Maryland. The site address is 6660-B Dobbin Road, Columbia, MD 21045. The test site is one of the highest points in the Columbia area with an elevation of 390 feet above mean sea level. The site coordinates are 39° 11'15" N latitude and 76° 49'38" W longitude. The facility is 1.5 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. There are no FM or TV transmitters within 15 miles of the site. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2003 on January 28, 2009.

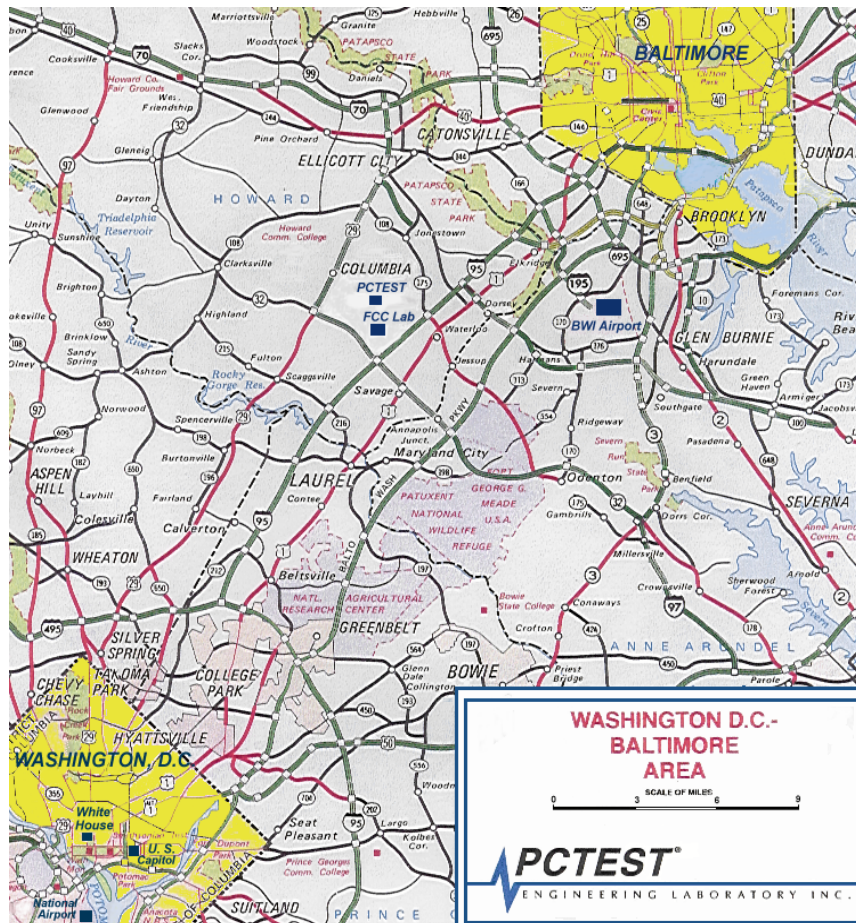


Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

|                                      |                                               |                                                          |                   |                                 |
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## 2.0 PRODUCT INFORMATION

### 2.1 Equipment Description

The Equipment Under Test (EUT) is the **IP Wireless 700MHz USB Stick Modem FCC ID: PKTUSBSTKAGJ**. The test data contained in this report pertains only to the emissions due to the EUT's 700MHz band function. The EUT consisted of the following component(s):

| Trade Name / Base Model  | FCC ID       | Description            |
|--------------------------|--------------|------------------------|
| IP Wireless / Model: AGJ | PKTUSBSTKAGJ | 700MHz USB Stick Modem |

**Table 2-1. EUT Equipment Description**

The EUT was set to continuous transmission for all timeslots at full power (i.e 24dBm) through test software installed in the laptop computer provided. The chip rate is set to 3.84Mcps for a channel bandwidth of 5MHz. Each available modulation type (i.e. QPSK, 16-QAM, 64-QAM) was tested to determine the configuration producing the worst case emissions.

### 2.2 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and no modifications were made during testing.

### 2.3 Labeling Requirements

Per 2.925

The FCC identifier shall be permanently affixed to the equipment and shall be readily visible to the purchaser at the time of purchase.

Per 15.19; Docket 95-19

In addition to this requirement, a device subject to certification shall be labeled as follows:

*This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.*

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the trade name and FCC ID must be displayed on the device per Section 15.19(b)(2).

Please see attachment for FCC ID label and label location.

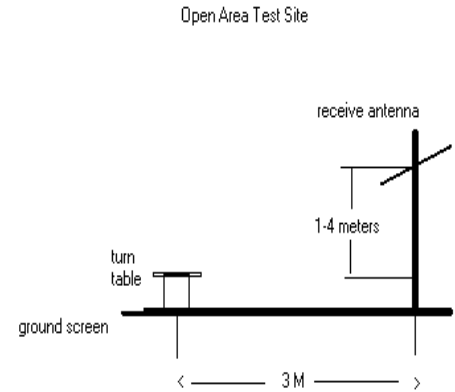
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## 3.0 DESCRIPTION OF TESTS

### 3.1 Measurement Procedure

The radiated spurious measurements were made outdoors at a 3-meter test range (See Figure 3-1). The equipment under test is placed on a wooden turntable 80cm above the ground plane and 3 meters from the receive antenna. The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer. This power level was recorded using a broadband average power meter. 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 level is recorded with the power meter. For readings above 1GHz, 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.



**Figure 3-1. Diagram of 3-meter outdoor test range**

Deviation from Measurement Procedure.....None

### 3.2 Occupied Bandwidth Emission Limits

#### §2.1049

- 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 1 MHz 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.

### 3.3 Emissions Mask

#### §90.210(n)

Transmitters designed for operation under this frequency band must meet the emission mask requirements of Emission Mask B. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

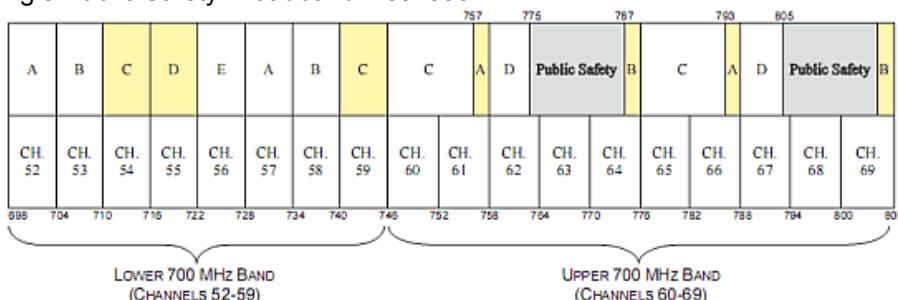
- a. On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.
- b. On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.
- c. On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least  $43 + 10 \log(P)$  dB.

|                                      |                                               |                                                          |                   |                                 |
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### 3.4 793-798MHz Frequency Band

#### §90.528

The 793–798 MHz band is allocated on a nationwide basis for public safety broadband operations and licensed to a single Public Safety Broadband Licensee.



### 3.5 Spurious and Harmonic Emissions at Antenna Terminal

#### §2.1051, §90.543(c), §90.543(e)(2),

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10<sup>th</sup> harmonic. 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. Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz for frequencies greater than 1GHz and a resolution bandwidth of 100kHz bandwidth for frequencies less than 1GHz.

Additionally, the power of any emission outside the licensee's frequency band of operation shall be attenuated below the transmitted power (P) within the licensed band(s) of operation, measured in watts, for all frequencies between 769-775 and 799-805MHz, by a factor not less than 65+10log(P)dB in a 6.25kHz band segment.

### 3.6 Radiated Power and Radiated Spurious Emissions

#### §2.1053, §90.543(c), §90.543(e)(2), §90.543(f),

Radiated power and radiated spurious emissions are measured outdoors at our 3-meter test range. The equipment under test is placed on a wooden turntable 80cm above the ground plane and 3 meters from the receive antenna. The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer. This level is then measured with a broadband average power meter. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10<sup>th</sup> harmonic. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive average power meter reading. This spurious level is recorded with the power meter. 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 or dipole antenna are taken into consideration. This device was tested in all configurations and the highest power is reported as shown in the following test results tables with their respective modulation. 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.

Additionally, all emissions including harmonics in the band 1559-1610MHz shall be limited to -70dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80dBW EIRP for discrete emissions of less than 700Hz bandwidth.

|                                      |                                                                                     |                                                          |                                                                                       |                                 |
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### 3.7 Frequency Stability / Temperature Variation

#### §2.1055, §90.539(e)

The frequency stability of the transmitter is measured by:

- a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.
- b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

*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  $\pm 0.000125\%$  ( $\pm 1.25$  ppm) of the center frequency.*

#### **Time Period and Procedure:**

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. 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 is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

|                                      |                                                                                     |                                                          |                                                                                       |                                 |
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## 4.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST).

| Manufacturer      | Model     | Description                        | Cal Date   | Cal Interval | Cal Due    | Serial Number |
|-------------------|-----------|------------------------------------|------------|--------------|------------|---------------|
| -                 | 263-10dB  | (DC-18GHz) 10 dB Attenuator        | N/A        |              | N/A        | N/A           |
| -                 | No.166    | (1000-26500MHz) Microwave RF Cable | N/A        |              | N/A        | N/A           |
| -                 | No.167    | (100kHz - 100MHz) RG58 Coax Cable  | N/A        |              | N/A        | N/A           |
| Agilent           | 11713A    | Attenuation/Switch Driver          | 12/2/2009  | Annual       | 12/2/2010  | 3439A02645    |
| Agilent           | 8449B     | (1-26.5GHz) Pre-Amplifier          | 12/2/2009  | Annual       | 12/2/2010  | 3008A00985    |
| Agilent           | 85650A    | Quasi-Peak Adapter                 | 12/2/2009  | Annual       | 12/2/2010  | 3303A01872    |
| Agilent           | 85650A    | Quasi-Peak Adapter                 | 3/30/2010  | Annual       | 3/30/2011  | 2043A00301    |
| Agilent           | 8566B     | (100Hz-22GHz) Spectrum Analyzer    | 12/2/2009  | Annual       | 12/2/2010  | 3638A08713    |
| Agilent           | 8648D     | (9kHz-4GHz) Signal Generator       | 9/19/2009  | Biennial     | 9/19/2011  | 3613A00315    |
| Agilent           | E4407B    | ESA Spectrum Analyzer              | 3/30/2010  | Annual       | 3/30/2011  | US39210313    |
| Agilent           | E4448A    | PSA (3Hz-50GHz) Spectrum Analyzer  | 11/1/2009  | Annual       | 11/1/2010  | US42510244    |
| Agilent           | E8257D    | (250kHz-20GHz) Signal Generator    | 3/30/2010  | Annual       | 3/30/2011  | MY45470194    |
| Agilent           | E8267C    | Vector Signal Generator            | 9/29/2009  | Biennial     | 9/29/2011  | US42340152    |
| Agilent           | N9020A    | MXA Signal Analyzer                | 10/22/2009 | Annual       | 10/22/2010 | US46470561    |
| Anritsu           | ML2495A   | Power Meter                        | 10/12/2009 | Annual       | 10/12/2010 | 941001        |
| Compliance Design | Roberts   | Dipole Set                         | 4/7/2010   | Biennial     | 4/7/2012   | 146           |
| Compliance Design | Roberts   | Dipole Set                         | 4/7/2010   | Biennial     | 4/7/2012   | 147           |
| Emco              | 3115      | Horn Antenna (1-18GHz)             | 10/14/2009 | Biennial     | 10/14/2011 | 9704-5182     |
| Emco              | 3115      | Horn Antenna (1-18GHz)             | 4/8/2010   | Biennial     | 4/8/2012   | 9205-3874     |
| Espec             | ESX-2CA   | Environmental Chamber              | 4/1/2010   | Annual       | 4/1/2011   | 17620         |
| K & L             | 11SH10    | Band Pass Filter                   | N/A        | Annual       | N/A        | 1300/4000     |
| K & L             | 11SH10    | Band Pass Filter                   | N/A        | Annual       | N/A        | 4000/12000    |
| MiniCircuits      | VHF-1300+ | High Pass Filter                   | N/A        |              | N/A        | 30716         |
| MiniCircuits      | VHF-3100+ | High Pass Filter                   | N/A        |              | N/A        | 30721         |
| Pasternack        | PE2208-6  | Bidirectional Coupler              | N/A        |              | N/A        | N/A           |
| Rohde & Schwarz   | CMU200    | Base Station Simulator             | 11/11/2009 | Annual       | 11/11/2010 | 836371/0079   |
| Rohde & Schwarz   | CMU200    | Base Station Simulator             | 6/21/2010  | Annual       | 6/21/2011  | 833855/0010   |
| Rohde & Schwarz   | CMU200    | Base Station Simulator             | 11/4/2009  | Annual       | 11/4/2010  | 109892        |
| Rohde & Schwarz   | CMU200    | Base Station Simulator             | 6/17/2010  | Annual       | 6/17/2011  | 836536/0005   |
| Rohde & Schwarz   | FSQ 26    | Spectrum Analyzer                  | 8/28/2010  | Annual       | 8/28/2011  | 200452        |
| Rohde & Schwarz   | CMW500    | LTE Radio Communication Tester     | 8/30/2010  | Annual       | 8/30/2011  | 100976        |
| Schwarzbeck       | UHA9105   | Dipole Antenna (400 - 1GHz) Rx     | 7/17/2009  | Biennial     | 7/17/2011  | 9105-2404     |
| Schwarzbeck       | UHA9105   | Dipole Antenna (400 - 1GHz) Tx     | 7/17/2009  | Biennial     | 7/17/2011  | 9105-2403     |
| Sunol             | DRH-118   | Horn Antenna (1 - 18GHz)           | 5/14/2009  | Biennial     | 5/14/2011  | A050307       |
| Sunol             | JB5       | Bi-Log Antenna (30M - 5GHz)        | 7/17/2009  | Biennial     | 7/17/2011  | A051107       |

Table 4-1. Test Equipment

|                                      |                                                                                     |                                                          |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
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## 5.0 SAMPLE CALCULATIONS

### Emission Designator

**Emission Designator = 4M12G7D**

TD-CDMA BW = 4.12 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Amplitude/Angle Modulated

### Spurious Radiated Emission – 700MHz Band

**Example: 701 MHz Block Mode 2<sup>nd</sup> Harmonic (1402.0 MHz)**

The average receive power meter reading at 3 meters with the EUT on the turntable was –81.0 dBm. The gain of the substituted antenna is 8.1 dBi. The signal generator connected to the substituted antenna terminal is adjusted to produce a reading of –81.0 dBm on the power meter. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 1402.0 MHz. So 6.1 dB is added to the signal generator reading of –30.9 dBm yielding –24.80 dBm. The fundamental EIRP was 25.501 dBm so this harmonic was 25.501 dBm – (–24.80) = 50.3 dBc.

|                                      |                                                                                     |                                                          |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: PKTUSBSTKAGJ                 |  | FCC Pt. 90 TD-CDMA MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1008301445.PKT | Test Dates:<br>Sep. 24-Oct.6, 2010                                                  | EUT Type:<br>700MHz USB Stick Modem                      |                                                                                       | Page 10 of 28                   |

## 6.0 TEST RESULTS

### 6.1 Summary

Company Name: IP Wireless  
 FCC ID: PKTUSBSTKAGJ  
 FCC Classification: Licensed Non-Broadcast Station Transmitter (TNB)  
 Mode(s): TD-CDMA

| FCC Part Section(s)             | Test Description                               | Test Limit                                                                                                                                                                                    | Test Condition | Test Result | Reference   |
|---------------------------------|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------|-------------|
| <b>TRANSMITTER MODE (TX)</b>    |                                                |                                                                                                                                                                                               |                |             |             |
| 2.1049                          | Occupied Bandwidth                             | N/A                                                                                                                                                                                           | CONDUCTED      | PASS        | Section 7.0 |
| 2.1051, 90.543(c), 90.543(e)(2) | Band Edge / Conducted Spurious Emissions       | < 43 + 10log <sub>10</sub> (P[Watts]) at Band Edge and for all out-of-band emissions<br><65 + 10 log (P[Watts]) in a 6.25kHz bandwidth for emissions in the 769–775 MHz and 799-805 MHz bands |                | PASS        | Section 7.0 |
| 90.210(n)                       | Emissions Mask                                 | Emissions Mask B                                                                                                                                                                              |                | PASS        | Section 7.0 |
| 2.1046                          | Transmitter Conducted Output Power             | N/A                                                                                                                                                                                           |                | PASS        | Section 6.2 |
| 90.542(a)(7)                    | Effective Radiated Power                       | < 3 Watts max. ERP                                                                                                                                                                            | RADIATED       | PASS        | Section 6.3 |
| 2.1053, 90.543(c), 90.543(e)(2) | Undesirable Emissions                          | < 43 + 10log <sub>10</sub> (P[Watts]) for all out-of-band emissions                                                                                                                           |                | PASS        | Section 6.4 |
| 2.1053, 90.53(f)                | Undesirable Emissions in the 1559-1610MHz band | < -40dBm/MHz EIRP (wideband)<br>< -50dBm EIRP (narrowband)                                                                                                                                    |                | PASS        | Section 6.5 |
| 2.1055, 90.539(e)               | Frequency Stability                            | < 1.25 ppm                                                                                                                                                                                    |                | PASS        | Section 6.6 |

**Table 6-1. Summary of Test Results**

|                                      |                                                                                     |                                                       |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: PKTUSBSTKAGJ                 |  | FCC Pt. 90 TD-CDMA MEASUREMENT REPORT (CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1008301445.PKT | Test Dates:<br>Sep. 24-Oct.6, 2010                                                  | EUT Type:<br>700MHz USB Stick Modem                   |                                                                                       | Page 11 of 28                   |

## 6.2 Transmitter Conducted Output Power

### §2.1046

The **IP Wireless 700MHz USB Stick Modem FCC ID: PKTUSBSTKAGJ** was powered by the Toshiba Laptop provided and connected to an Agilent spectrum analyzer (Model: N9020A) through the Receive and Transmit antenna ports of the device. Software installed on the laptop was used to transmit power (24dBm) for all timeslots at a given frequency band and the EUT uplink power was measured using the channel power function of the spectrum analyzer. The modulation (QPSK, 16QAM, 64QAM) of the uplink waveform was also programmed by software and the powers corresponding to each modulation are listed below.

| FCC Part                  | Part 90                |
|---------------------------|------------------------|
| 700MHz Band Block         | Public Safety          |
| Frequency Band            | <b>793-798</b>         |
| Center Tx Frequency (MHz) | 795.5                  |
| Rx Frequency (MHz)        | 765.5                  |
| Modulation                | Conducted Powers (dBm) |
| QPSK                      | 24.00                  |
| 16QAM                     | 23.90                  |
| 64QAM                     | 23.70                  |

**Table 6-2. Maximum Average Conducted Output Power**



**Figure 6-1. Conducted Output Power Test Setup Diagram**

|                                      |                                                                                     |                                                          |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: PKTUSBSTKAGJ                 |  | FCC Pt. 90 TD-CDMA MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1008301445.PKT | Test Dates:<br>Sep. 24-Oct.6, 2010                                                  | EUT Type:<br>700MHz USB Stick Modem                      |                                                                                       | Page 12 of 28                   |

### 6.3 Effective Radiated Power Output Data

§90.542(a)(6):

| Frequency [MHz] | Mode  | Measured Level [dBm] | Substitute Level [dBm] | Antenna Gain [dBd] | Pol [H/V] | ERP [dBm] | ERP [Watts] |
|-----------------|-------|----------------------|------------------------|--------------------|-----------|-----------|-------------|
| 795.50          | QPSK  | -17.780              | 20.14                  | 0.00               | H         | 20.14     | 0.103       |
| 795.50          | 16QAM | -19.030              | 18.89                  | 0.00               | H         | 18.89     | 0.077       |
| 795.50          | 64QAM | -18.800              | 19.12                  | 0.00               | H         | 19.12     | 0.082       |

**Table 6-3. Effective Radiated Power Output Data (793-798MHz Frequency Band)**

**NOTES:**

Effective Radiated Power Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden turn table 80cm above the ground plane and 3 meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. Final power measurements are made with a broadband average power meter. A Horn antenna was substituted in place of the EUT. This Horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading. This level is recorded using the power meter. The conducted power at the terminals of the Horn antenna is measured. The difference between the gain of the horn and an isotropic antenna is taken into consideration and the ERP is recorded.

This device was tested in all configurations and the highest power is reported as shown in the following test results tables with their respective modulation. This unit was tested while powered by the laptop via USB port. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case test configuration was found in the horizontal setup for ERP measurements and vertical setup for radiated spurious emissions. Modes QPSK, 16QAM and 64QAM were evaluated and QPSK produced the worst case radiated spurious emissions. The data reported in the table above was measured in this test setup.

|                                      |                                                                                     |                                                          |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: PKTUSBSTKAGJ                 |  | FCC Pt. 90 TD-CDMA MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1008301445.PKT | Test Dates:<br>Sep. 24-Oct.6, 2010                                                  | EUT Type:<br>700MHz USB Stick Modem                      |                                                                                       | Page 13 of 28                   |



## 6.4 TD-CDMA Radiated Measurements

§2.1053, §90.543(c)

### Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 795.50 MHz  
 MEASURED OUTPUT POWER: 20.140 dBm = 0.103 W  
 MODULATION SIGNAL: QPSK  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  33.14 dBc

| FREQUENCY (MHz) | LEVEL @ ANTENNA TERMINALS (dBm) | SUBSTITUTE ANTENNA GAIN (dBd) | SPURIOUS EMISSION LEVEL (dBm) | POL (H/V) | (dBc) |
|-----------------|---------------------------------|-------------------------------|-------------------------------|-----------|-------|
| 2386.50         | -53.74                          | 6.71                          | -47.03                        | V         | 67.2  |
| 3182.00         | -58.23                          | 7.55                          | -50.68                        | V         | 70.8  |
| 3977.50         | -56.49                          | 7.07                          | -49.42                        | V         | 69.6  |
| 4773.00         | -94.11                          | 9.05                          | -85.06                        | V         | 105.2 |

**Table 6-4. Radiated Spurious Data (793-798MHz Frequency Band)**

#### NOTES:

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden turn table 80cm above the ground plane and 3 meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. Final power measurements are made with a broadband average power meter. 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 spectrum analyzer reading. This spurious level is recorded using the power meter. 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.

This device was tested in all configurations and the highest power is reported as shown in the following test results tables with their respective modulation. This unit was tested while powered by the laptop via USB port The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case test configuration was found in the horizontal setup for ERP measurements and vertical setup for radiated spurious emissions. Modes QPSK, 16QAM and 64QAM were evaluated and QPSK produced the worst case radiated spurious emissions. The data reported in the table above was measured in this test setup.

|                                      |                                                                                     |                                                       |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: PKTUSBSTKAGJ                 |  | FCC Pt. 90 TD-CDMA MEASUREMENT REPORT (CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1008301445.PKT | Test Dates:<br>Sep. 24-Oct.6, 2010                                                  | EUT Type:<br>700MHz USB Stick Modem                   |                                                                                       | Page 14 of 28                   |

## 6.5 TD-CDMA Radiated Measurements in 1559 – 1610MHz Band

**§2.1053, §90.543(f)**

All of the emissions found in the 1559-1610 MHz band were wideband emissions and the limit -40dBm/MHz was applied.

### Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 795.50 MHz  
 MODULATION SIGNAL: QPSK  
 DISTANCE: 3 meters  
 NARROWBAND LIMIT: -50 dBm  
 WIDEBAND LIMIT: -40 dBm/MHz

| FREQUENCY (MHz) | LEVEL @ ANTENNA TERMINALS (dBm) | SUBSTITUTE ANTENNA GAIN (dBd) | SPURIOUS EMISSION LEVEL (dBm) | POL (H/V) | Margin (dB) |
|-----------------|---------------------------------|-------------------------------|-------------------------------|-----------|-------------|
| 1591.00         | -59.87                          | 6.39                          | -53.48                        | V         | -13.5       |
| 1594.45         | -62.18                          | 6.71                          | -55.47                        | V         | -15.5       |
| 1599.93         | -62.15                          | 7.55                          | -54.60                        | V         | -14.6       |

**Table 6-5. Radiated Spurious Data (793-798MHz Frequency Band)**

#### NOTES:

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden turn table 80cm above the ground plane and 3 meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. Final power measurements are made with a broadband average power meter. 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 spectrum analyzer reading. This spurious level is recorded using the power meter. 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.

This device was tested in all configurations and the highest power is reported as shown in the following test results tables with their respective modulation. This unit was tested while powered by the laptop via USB port The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case test configuration was found with the EUT in the polarity as indicated in the above tables while connected to the USB port of the laptop PC through a short USB extension cable. The data reported in the table above was measured in this test setup.

|                                      |                                                                                     |                                                       |                                                                                       |                                 |
|--------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: PKTUSBSTKAGJ                 |  | FCC Pt. 90 TD-CDMA MEASUREMENT REPORT (CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1008301445.PKT | Test Dates:<br>Sep. 24-Oct.6, 2010                                                  | EUT Type:<br>700MHz USB Stick Modem                   |                                                                                       | Page 15 of 28                   |

## 6.6 TD-CDMA Frequency Stability Measurements

\$2.1055, \$90.539(e)

Note: The EUT is operable from 4.75VDC to 5.25VDC. The EUT was not tested outside that voltage range.

OPERATING FREQUENCY: 795,500,000 Hz

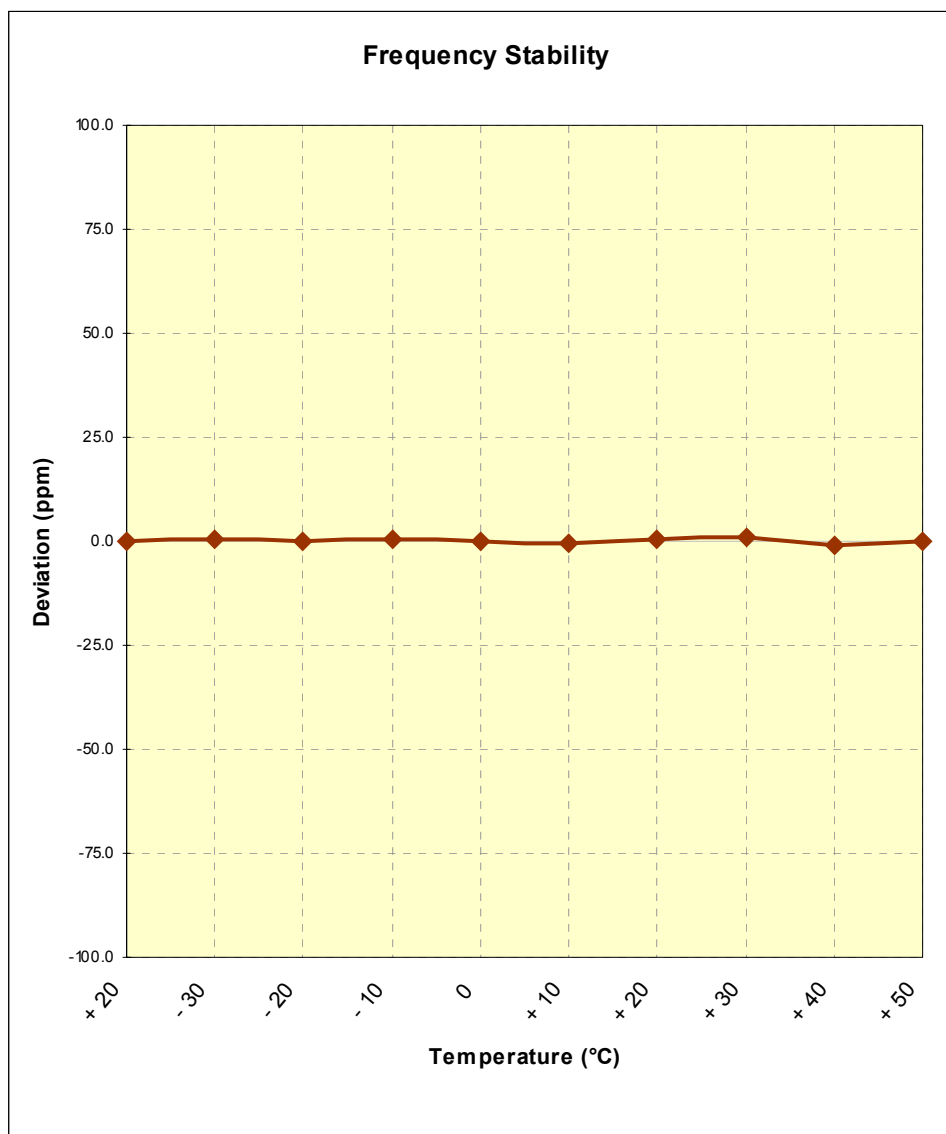
REFERENCE VOLTAGE: 5 VDC

| VOLTAGE (%)    | POWER (VDC) | TEMP (°C)  | FREQUENCY (Hz) | Freq. Dev. (Hz) | Deviation (%) |
|----------------|-------------|------------|----------------|-----------------|---------------|
| 100 %          | 5.00        | + 20 (Ref) | 795,500,113    | 113             | 0.000014      |
| 100 %          |             | - 30       | 795,500,228    | 228             | 0.000029      |
| 100 %          |             | - 20       | 795,499,935    | -65             | -0.000008     |
| 100 %          |             | - 10       | 795,500,222    | 222             | 0.000028      |
| 100 %          |             | 0          | 795,499,816    | -184            | -0.000023     |
| 100 %          |             | + 10       | 795,499,635    | -365            | -0.000046     |
| 100 %          |             | + 20       | 795,500,295    | 295             | 0.000037      |
| 100 %          |             | + 30       | 795,500,605    | 605             | 0.000076      |
| 100 %          |             | + 40       | 795,499,226    | -774            | -0.000097     |
| 100 %          |             | + 50       | 795,499,844    | -156            | -0.000020     |
| 105 %          | 5.25        | + 20       | 795,500,206    | 206             | 0.000026      |
| BATT. ENDPOINT | 4.75        | + 20       | 795,500,095    | 95              | 0.000012      |

Table 6-6. Frequency Stability Data (TD-CDMA Mode)

## TD-CDMA Frequency Stability Measurements (Cont'd)

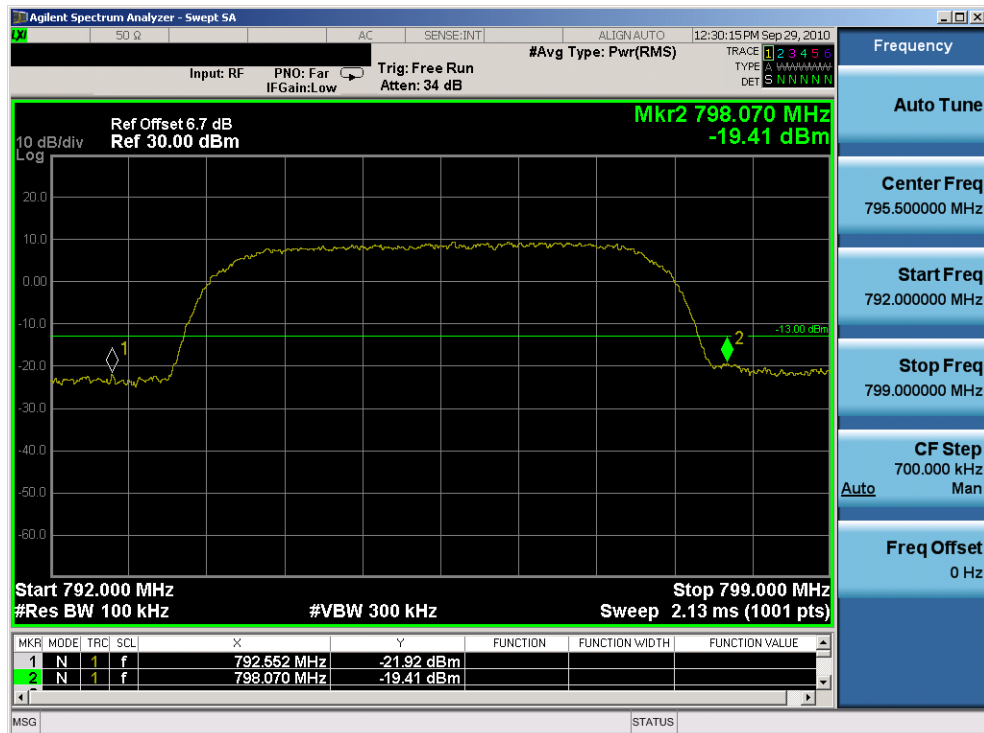
§2.1055, §27.54



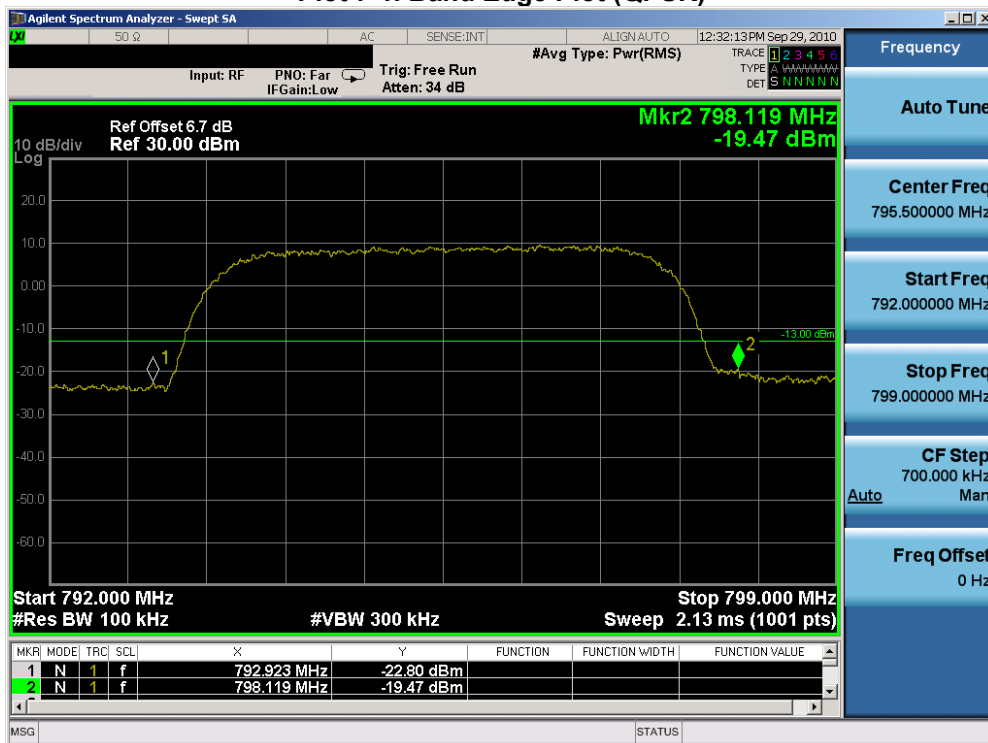
**Figure 6-2. Frequency Stability Graph (TD-CDMA Mode)**

|                                      |                                               |                                                          |                   |                                 |
|--------------------------------------|-----------------------------------------------|----------------------------------------------------------|-------------------|---------------------------------|
| FCC ID: PKTUSBSTKAGJ                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 90 TD-CDMA MEASUREMENT REPORT<br>(CERTIFICATION) | <b>IPWireless</b> | Reviewed by:<br>Quality Manager |
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## 7.0 PLOT(S) OF EMISSIONS

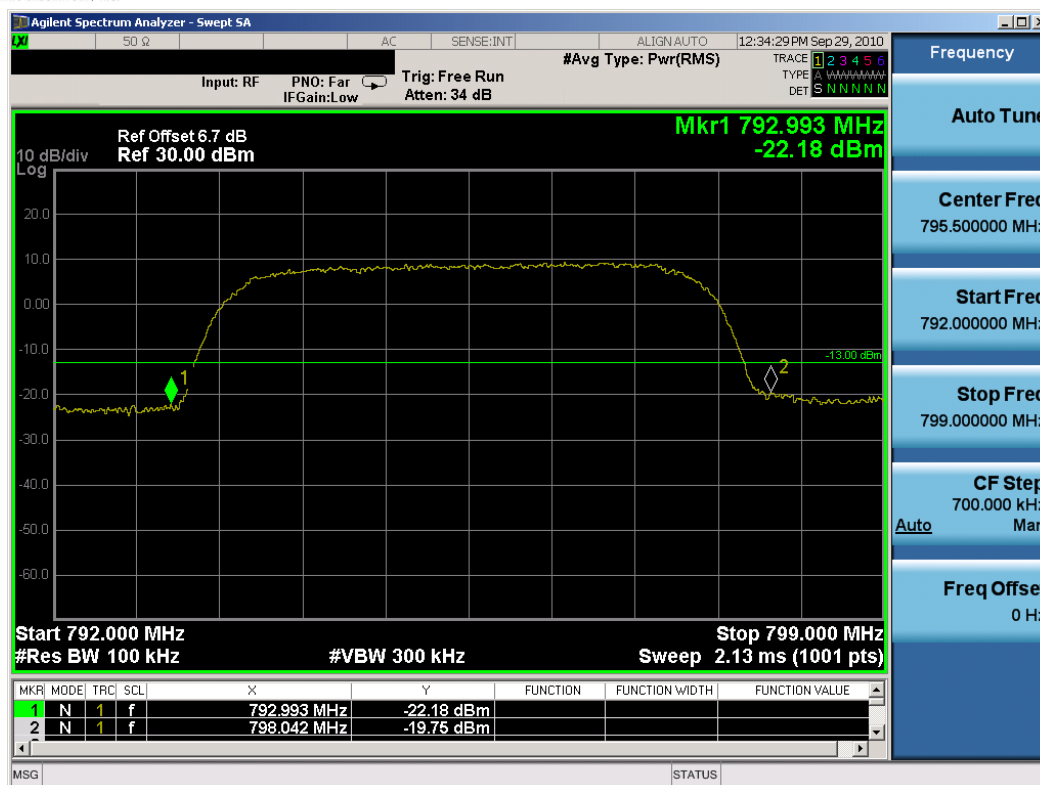


Plot 7-1. Band Edge Plot (QPSK)

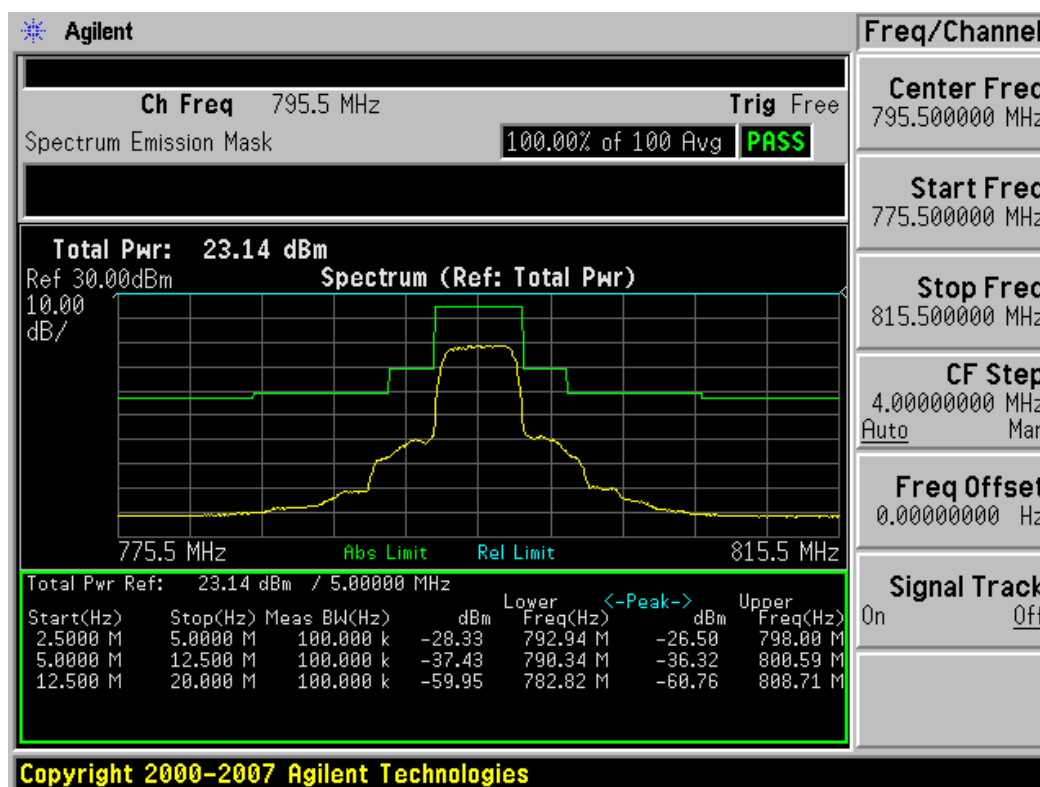


Plot 7-2. Band Edge Plot (16QAM)

|                                      |                                               |                                                          |                   |                                 |
|--------------------------------------|-----------------------------------------------|----------------------------------------------------------|-------------------|---------------------------------|
| FCC ID: PKTUSBSTKAGJ                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 90 TD-CDMA MEASUREMENT REPORT<br>(CERTIFICATION) | <b>IPWireless</b> | Reviewed by:<br>Quality Manager |
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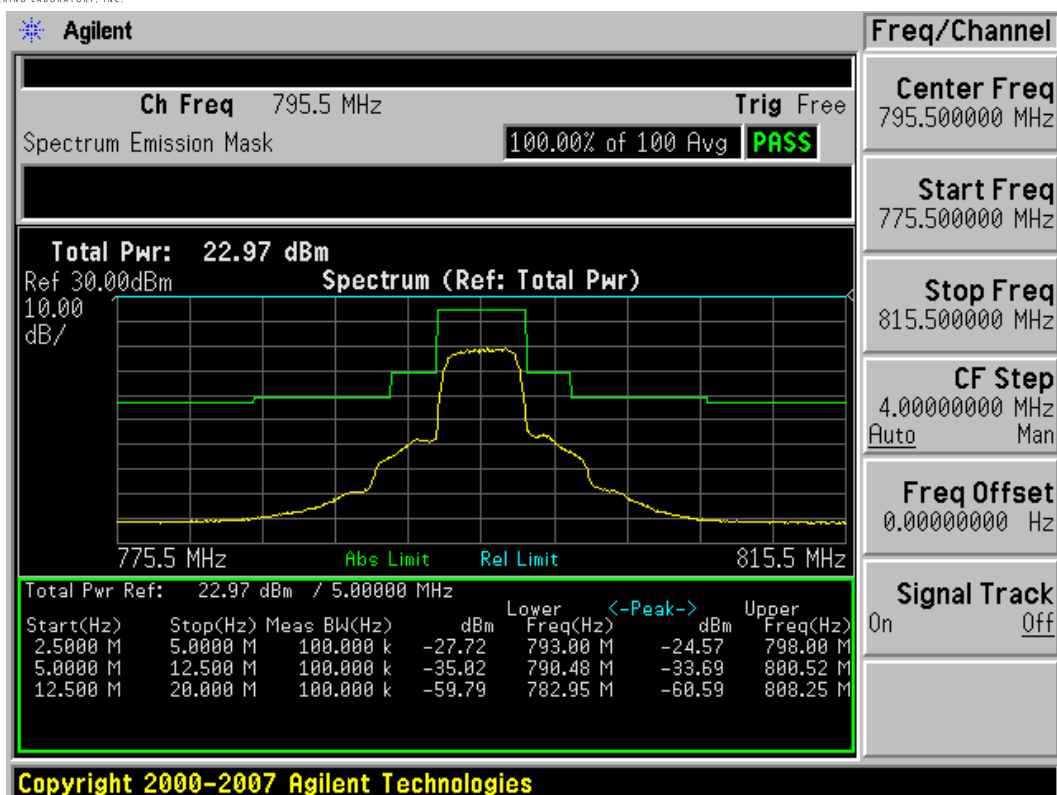


Plot 7-3. Band Edge Plot (64QAM)

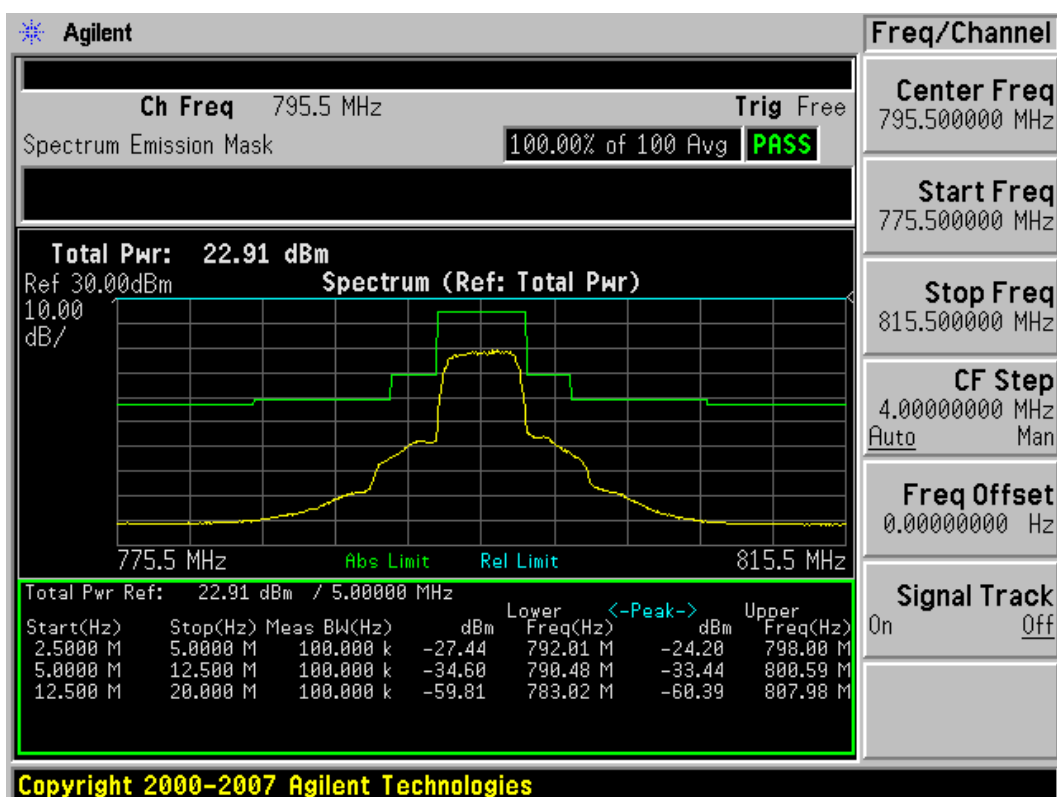


Plot 7-4. Emission Mask (QPSK)

|                                      |                                               |                                                          |                   |                                 |
|--------------------------------------|-----------------------------------------------|----------------------------------------------------------|-------------------|---------------------------------|
| FCC ID: PKTUSBSTKAGJ                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 90 TD-CDMA MEASUREMENT REPORT<br>(CERTIFICATION) | <b>IPWireless</b> | Reviewed by:<br>Quality Manager |
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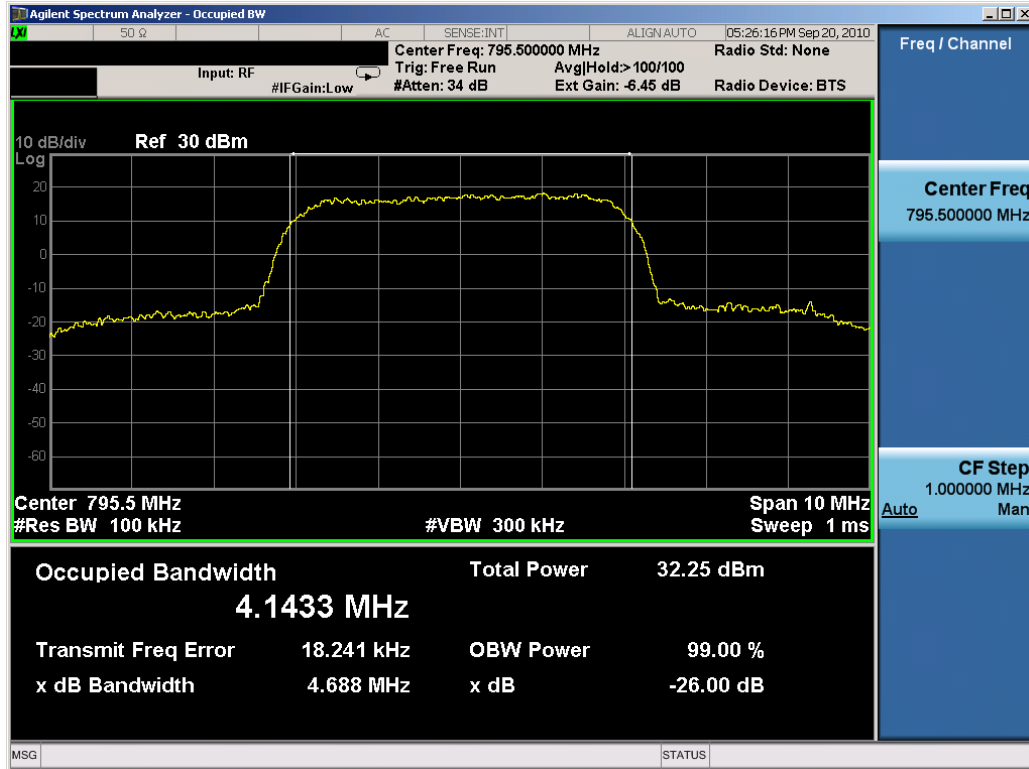
Plot 7-5. Emission Mask (16QAM)



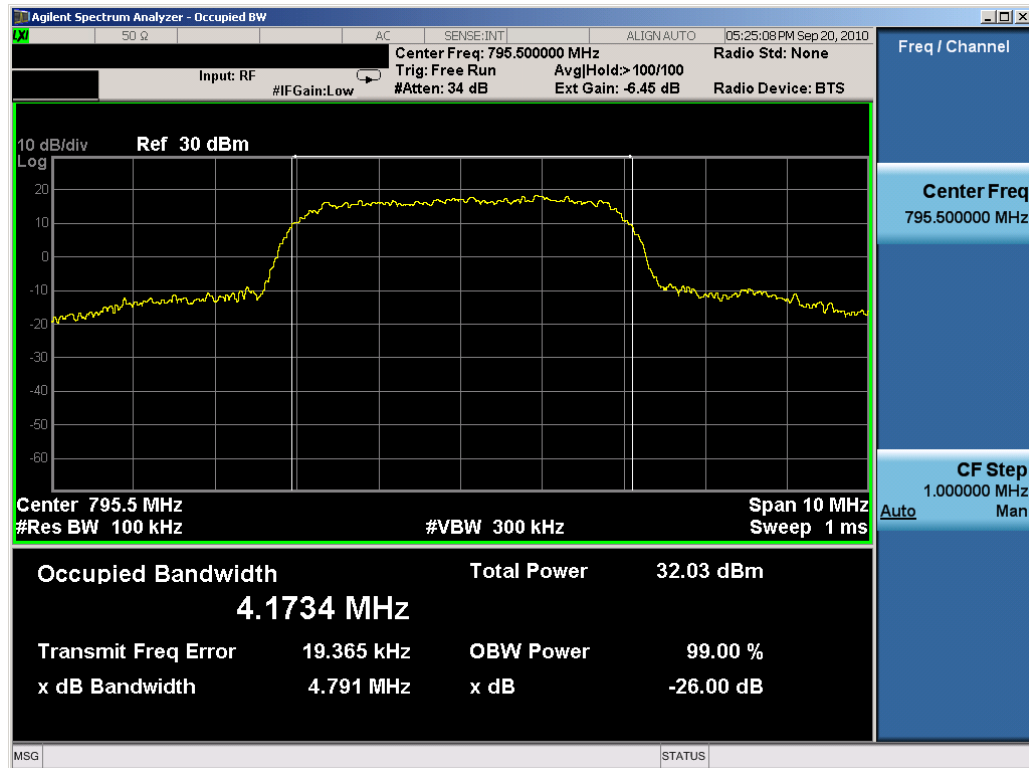
Plot 7-6. Emission Mask (64QAM)

|                                      |                                               |                                                          |                   |                                 |
|--------------------------------------|-----------------------------------------------|----------------------------------------------------------|-------------------|---------------------------------|
| FCC ID: PKTUSBSTKAGJ                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 90 TD-CDMA MEASUREMENT REPORT<br>(CERTIFICATION) | <b>IPWireless</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1008301445.PKT | Test Dates:<br>Sep. 24-Oct.6, 2010            | EUT Type:<br>700MHz USB Stick Modem                      |                   | Page 20 of 28                   |



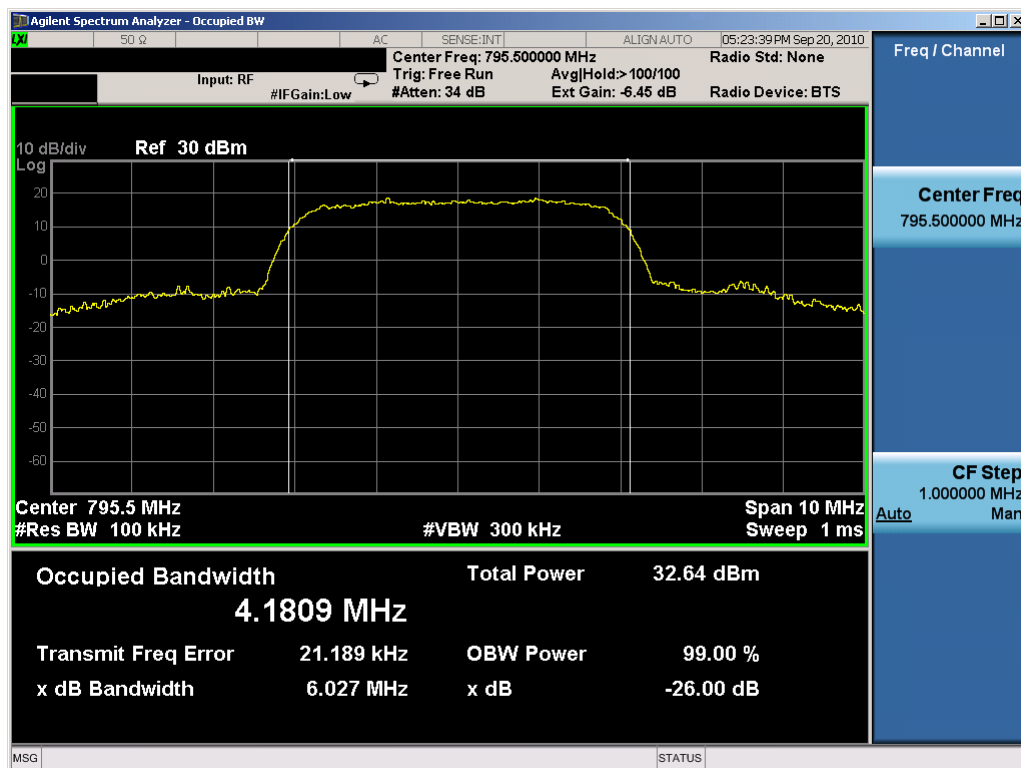


Plot 7-7. Occupied Bandwidth Plot (QPSK)



Plot 7-8. Occupied Bandwidth Plot (16QAM)

|                                      |                                               |                                                          |                   |                                 |
|--------------------------------------|-----------------------------------------------|----------------------------------------------------------|-------------------|---------------------------------|
| FCC ID: PKTUSBSTKAGJ                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 90 TD-CDMA MEASUREMENT REPORT<br>(CERTIFICATION) | <b>IPWireless</b> | Reviewed by:<br>Quality Manager |
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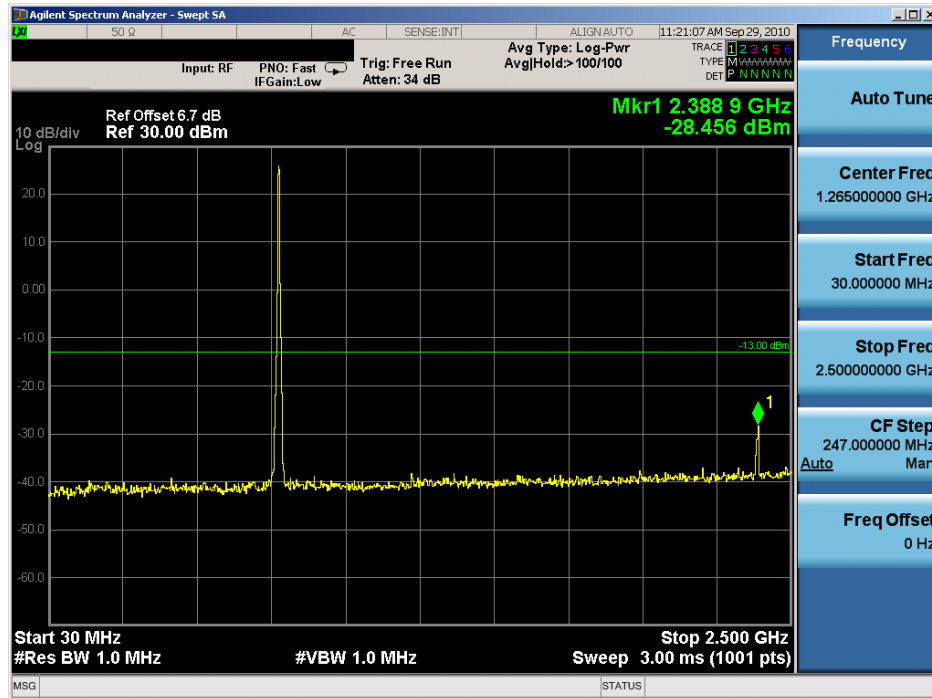


Plot 7-9. Occupied Bandwidth Plot (64QAM)

|                                      |                                               |                                                          |                   |                                 |
|--------------------------------------|-----------------------------------------------|----------------------------------------------------------|-------------------|---------------------------------|
| FCC ID: PKTUSBSTKAGJ                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 90 TD-CDMA MEASUREMENT REPORT<br>(CERTIFICATION) | <b>IPWireless</b> | Reviewed by:<br>Quality Manager |
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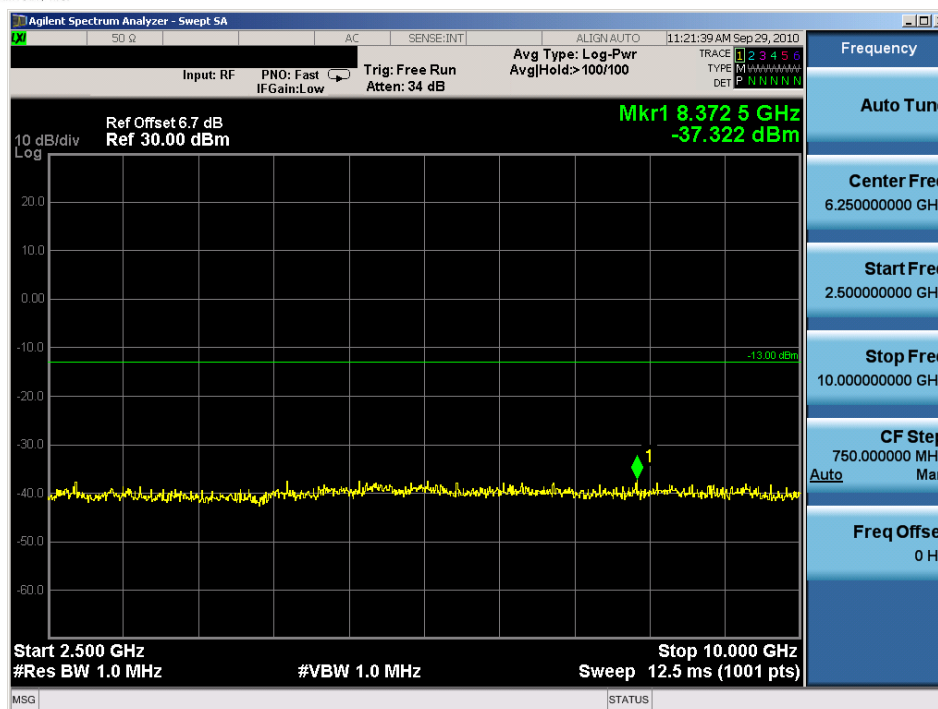
## Out-of-Band Spurious Emissions

For the following conducted spurious emission plots, all modulations were tested and 64QAM mode exhibited the worst case emissions.



Plot 7-10. Conducted Spurious Plot (64QAM)

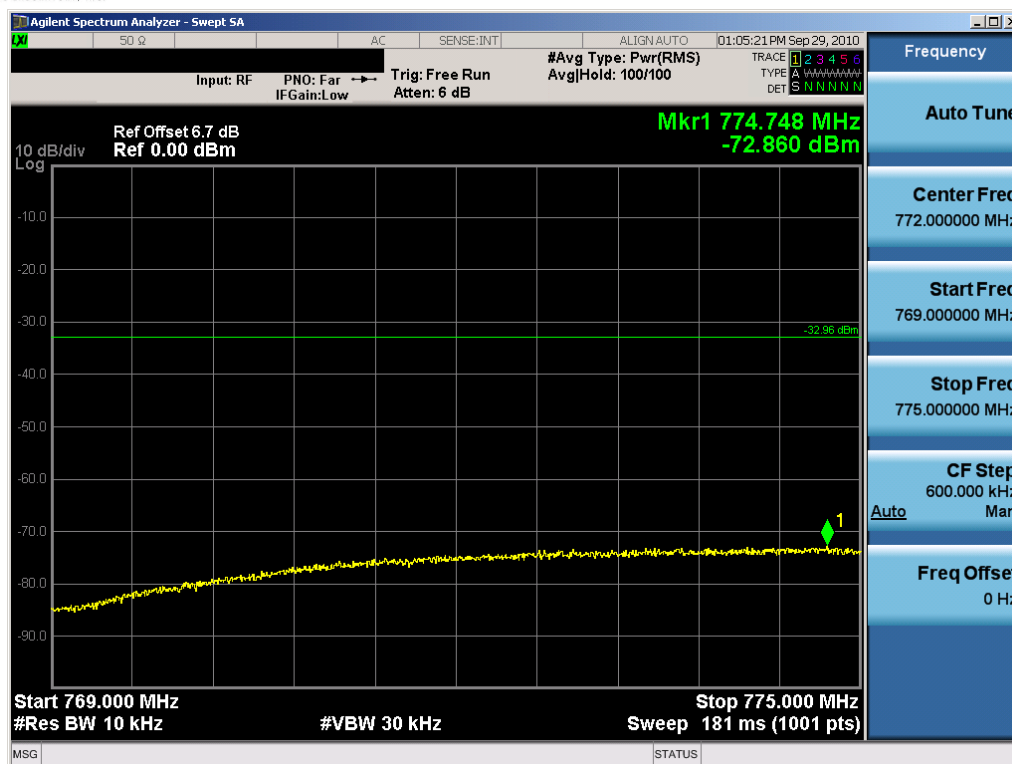
|                                      |                                               |                                                          |                   |                                 |
|--------------------------------------|-----------------------------------------------|----------------------------------------------------------|-------------------|---------------------------------|
| FCC ID: PKTUSBSTKAGJ                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 90 TD-CDMA MEASUREMENT REPORT<br>(CERTIFICATION) | <b>IPWireless</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1008301445.PKT | Test Dates:<br>Sep. 24-Oct.6, 2010            | EUT Type:<br>700MHz USB Stick Modem                      |                   | Page 23 of 28                   |



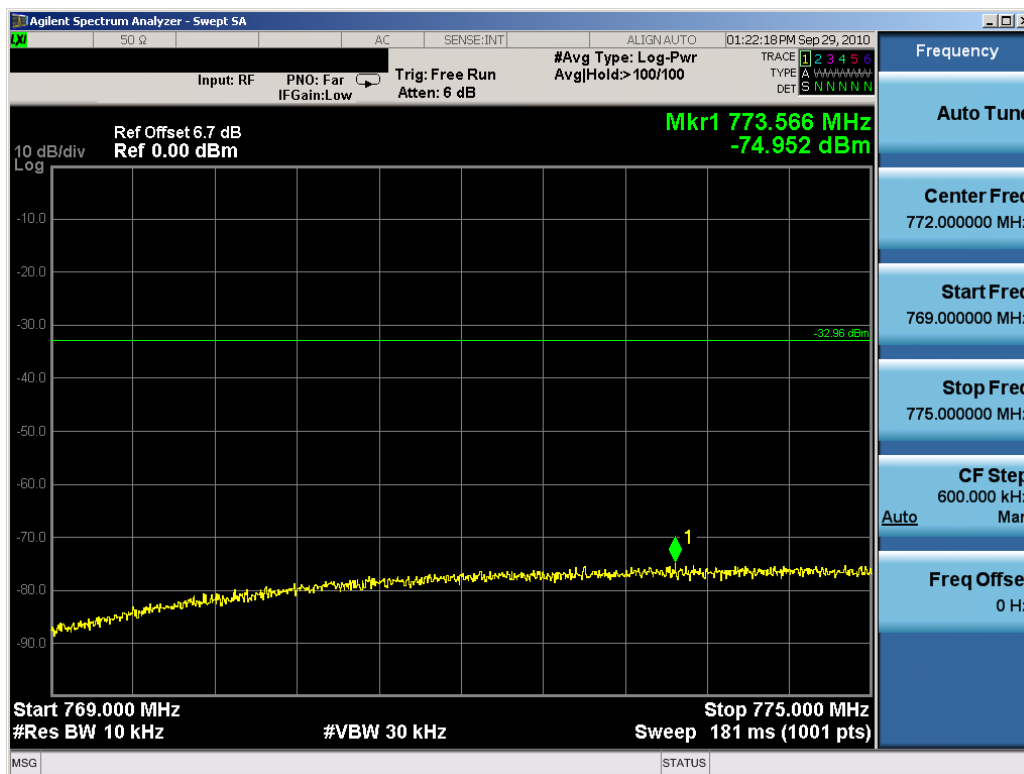
**Plot 7-11. Conducted Spurious Plot (64QAM)**

For the following conducted emissions plots in the 799 – 805MHz band, the FCC limit is  $65 + 10\log_{10}(P_{\text{Watts}}) = -35\text{dBm}$  in a 6.25kHz bandwidth. Since it was not possible to set the resolution bandwidth to 6.25kHz with the available equipment, a bandwidth of 10kHz was used instead to show compliance. By using a 10kHz bandwidth, the limit was adjusted by  $10\log_{10}(10\text{kHz}/6.25\text{kHz}) = 2.04\text{dB}$ . Thus, the limit shown in all plots in the 799 – 805MHz band for all available modulation types was  $-35\text{dBm} + 2.04\text{dB} = -32.96\text{dBm}$ .

|                                      |                                               |                                                          |                   |                                 |
|--------------------------------------|-----------------------------------------------|----------------------------------------------------------|-------------------|---------------------------------|
| FCC ID: PKTUSBSTKAGJ                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 90 TD-CDMA MEASUREMENT REPORT<br>(CERTIFICATION) | <b>IPWireless</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1008301445.PKT | Test Dates:<br>Sep. 24-Oct.6, 2010            | EUT Type:<br>700MHz USB Stick Modem                      |                   | Page 24 of 28                   |

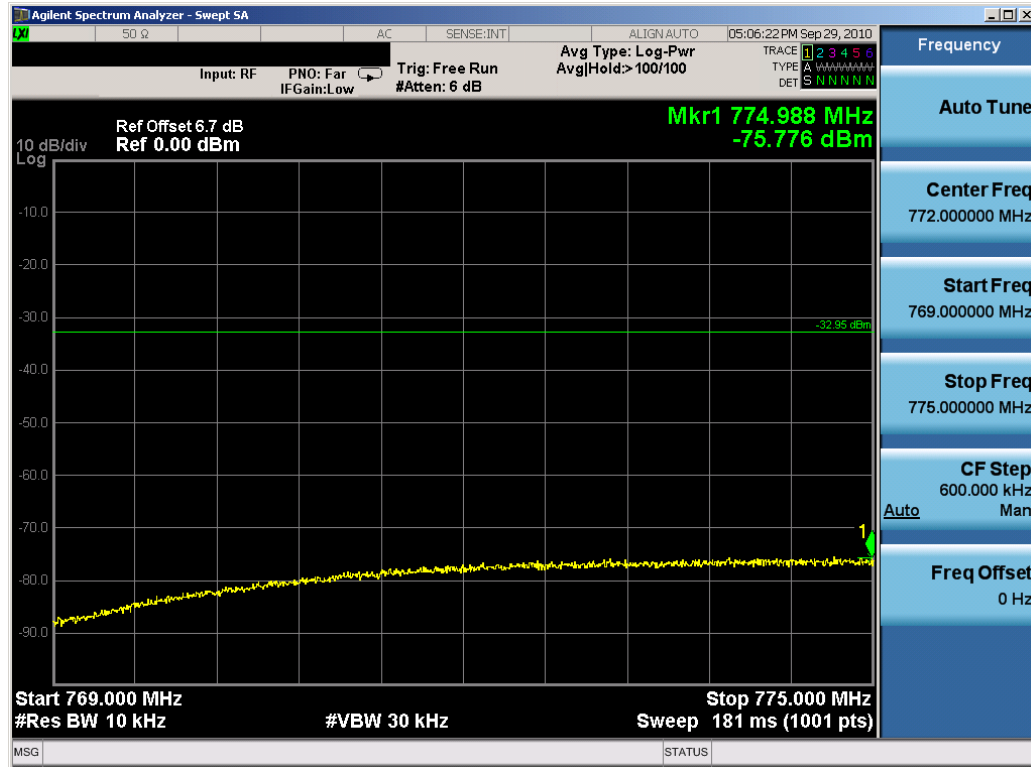


Plot 7-12. Conducted Emissions (769-775MHz) Plot (QPSK)



Plot 7-13. Conducted Emissions (769-775MHz) Plot (16QAM)

|                                      |                                               |                                                          |                   |                                 |
|--------------------------------------|-----------------------------------------------|----------------------------------------------------------|-------------------|---------------------------------|
| FCC ID: PKTUSBSTKAGJ                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 90 TD-CDMA MEASUREMENT REPORT<br>(CERTIFICATION) | <b>IPWireless</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1008301445.PKT | Test Dates:<br>Sep. 24-Oct.6, 2010            | EUT Type:<br>700MHz USB Stick Modem                      |                   | Page 25 of 28                   |



Plot 7-14. Conducted Emissions (769-775MHz) Plot (64QAM)



Plot 7-15. Conducted Emissions (799-805MHz) Plot (QPSK)

|                                      |                                               |                                                          |                   |                                 |
|--------------------------------------|-----------------------------------------------|----------------------------------------------------------|-------------------|---------------------------------|
| FCC ID: PKTUSBSTKAGJ                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 90 TD-CDMA MEASUREMENT REPORT<br>(CERTIFICATION) | <b>IPWireless</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1008301445.PKT | Test Dates:<br>Sep. 24-Oct.6, 2010            | EUT Type:<br>700MHz USB Stick Modem                      |                   | Page 26 of 28                   |



Plot 7-16. Conducted Emissions (799-805MHz) Plot (16QAM)



Plot 7-17. Conducted Emissions (799-805MHz) Plot (64QAM)

|                                      |                                               |                                                          |                   |                                 |
|--------------------------------------|-----------------------------------------------|----------------------------------------------------------|-------------------|---------------------------------|
| FCC ID: PKTUSBSTKAGJ                 | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 90 TD-CDMA MEASUREMENT REPORT<br>(CERTIFICATION) | <b>IPWireless</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1008301445.PKT | Test Dates:<br>Sep. 24-Oct.6, 2010            | EUT Type:<br>700MHz USB Stick Modem                      |                   | Page 27 of 28                   |



## 8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **IP Wireless 700MHz USB Stick Modem FCC ID: PKTUSBSTKAGJ** complies with all the requirements of Parts 2 and 90 of the FCC rules.

|                                             |                                                                                     |                                                                  |                                                                                       |                                        |
|---------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> PKTUSBSTKAGJ                 |  | <b>FCC Pt. 90 TD-CDMA MEASUREMENT REPORT<br/>(CERTIFICATION)</b> |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Test Report S/N:</b><br>0Y1008301445.PKT | <b>Test Dates:</b><br>Sep. 24-Oct.6, 2010                                           | <b>EUT Type:</b><br>700MHz USB Stick Modem                       |                                                                                       | Page 28 of 28                          |