

PCTEST ENGINEERING LABORATORY, INC.

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MEASUREMENT REPORT FCC Part 27 LTE

Applicant Name:

Sierra Wireless, Inc. 13811 Wireless Way Richmond, Canada

Date of Testing:

October 25-29, 2010 Test Site/Location: PCTEST Lab., Columbia, MD, USA Test Report Serial No.: 0Y1010261759.N7N

FCC ID: N7NMC7750

APPLICANT:

SIERRA WIRELESS, INC.

Application Type:	Certification
FCC Classification:	PCS Licensed Transmitter (PCB)
FCC Rule Part(s):	§2; §27
EUT Type:	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz LTE Wireless Module
Model(s):	MC7750
Tx Frequency Range:	779.5MHz - 784.5MHz (5MHz BW LTE - Band 13)
	782MHz (10MHz BW LTE - Band 13)
Max. RF Output Power:	0.224 W (5MHz BW - QPSK) (23.51 dBm)
	0.221 W (5MHz BW - 16-QAM) (23.45 dBm)
	0.227 W (10MHz BW - QPSK) (23.56 dBm)
	0.226 W (10MHz BW - 16-QAM) (23.55 dBm)
Emission Designator(s):	4M49G7D (5MHz BW, QPSK), 4M48W7D (5MHz BW, 16-QAM),
	8M90G7D (10MHz BW, QPSK), 8M91W7D (10MHz BW, 16-QAM)
Test Device Serial No.:	identical prototype [S/N: MCDK2433]

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 conducted.

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



FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SIERRA WIRELESS	Reviewed by: Quality Manager
Test Report S/N: Test Dates: EUT Type:			Page 1 of 36	
0Y1010261759.N7N October 25-29, 2010		Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz LTE Wireless Module		Fage 1 01 30
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TABLE OF CONTENTS

FCC	PART 2	27 MEASUREMENT REPORT	3
1.0	INTE	RODUCTION	4
	1.1	SCOPE	4
	1.2	TESTING FACILITY	4
2.0	PRC	DDUCT INFORMATION	5
	2.1	EQUIPMENT DESCRIPTION	5
	2.2	EMI SUPPRESSION DEVICE(S)/MODIFICATIONS	5
	2.3	LABELING REQUIREMENTS	5
3.0	DES	CRIPTION OF TESTS	6
	3.1	MEASUREMENT PROCEDURE	6
	3.2	OCCUPIED BANDWIDTH EMISSION LIMITS	-
	3.3	BLOCK C FREQUENCY RANGE	6
	3.4	SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL	7
	3.5	RADIATED POWER AND RADIATED SPURIOUS EMISSIONS	
	3.6	FREQUENCY STABILITY / TEMPERATURE VARIATION	7
4.0	TES	T EQUIPMENT CALIBRATION DATA	8
5.0	SAM	IPLE CALCULATIONS	9
6.0	TES	T RESULTS	10
	6.1	SUMMARY	10
	6.2	TRANSMITTER CONDUCTED OUTPUT POWER	11
	6.3	LTE RADIATED MEASUREMENTS	12
	6.4	LTE RADIATED MEASUREMENTS IN 1559 – 1610MHZ BAND	15
	6.5	LTE FREQUENCY STABILITY MEASUREMENTS	16
7.0	PLO	T(S) OF EMISSIONS – 5MHZ BANDWIDTH	18
8.0	PLO	T(S) OF EMISSIONS – 10MHZ BANDWIDTH	29
9.0	CON	NCLUSION	

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SIERRA WIRELESS	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 2 of 36
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700M	Hz LTE Wireless Module	Faye 2 01 30
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MEASUREMENT REPORT FCC Part 27



§2.1033 General Information

APPLICANT:	Sierra Wireless, Inc.				
APPLICANT ADDRESS:	13811 Wireless Way				
	Richmond, Canada				
TEST SITE:	PCTEST ENGINEERING LABORATORY, INC.				
TEST SITE ADDRESS:	6660-B Dobbin Road, Columbia, MD 21045 USA				
FCC RULE PART(S):	§2; §27				
BASE MODEL:	MC7750				
FCC ID:	N7NMC7750				
FCC CLASSIFICATION:	PCS Licensed Transmitter (PCB)				
EMISSION DESIGNATOR(S):	4M49G7D (5MHz BW, QPSK), 4M48W7D (5MHz BW, 16-QAM), 8M90G7D (10MHz BW, QPSK), 8M91W7D (10MHz BW, 16-QAM)				
MODULATIONS:	QPSK, 16-QAM (Uplink)				
FREQUENCY TOLERANCE:	Emission must remain in band				
Test Device Serial No.:	MCDK2433 Production Pre-Production Engineering				
DATE(S) OF TEST:	October 25-29, 2010				
TEST REPORT S/N:	0Y1010261759.N7N				

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.

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 3 of 36
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz LTE Wireless Module	Fage 5 01 50
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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 are, the Baltimore-Washington Internt'I (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.

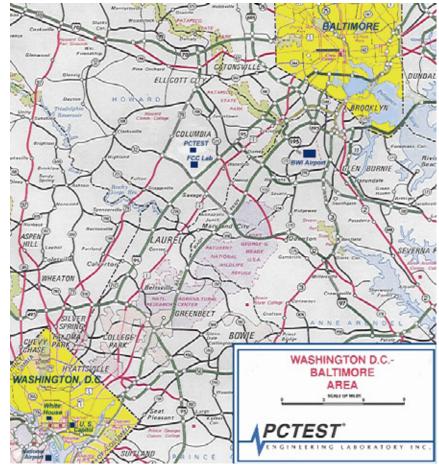


Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SIERRA WIRELESS	Reviewed by: Quality Manager
Test Report S/N: Test Dates:		EUT Type:		Page 4 of 36
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz	LTE Wireless Module	Fage 4 01 30
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2.0 **PRODUCT INFORMATION**

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Sierra Wireless Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz LTE Wireless Module FCC ID: N7NMC7750**. The test data contained in this report pertains only to the emissions due to the EUT's LTE function. The EUT consisted of the following component(s):

Trade Name / Base Model	FCC ID	Description
Sierra Wireless / Model: MC7750	N7NMC7750	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz LTE Wireless Module

 Table 2-1.
 EUT Equipment Description

Notes:

- The EUT was set to transmit at full power in each available channel bandwidth of 5MHz and 10MHz with a CMW500 LTE Base Station Simulator. Each available modulation type (i.e. QPSK, 16-QAM) and resource block size configuration was also tested to determine the configuration producing the worst case emissions.
- A monopole antenna was supplied as a proper termination to the RF antenna port and for allowing network connection during radiated spurious emissions testing.

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.

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SIERRA WIRELESS	Reviewed by: Quality Manager
Test Report S/N: Test Dates: EUT Type:			Page 5 of 36	
0Y1010261759.N7N October 25-29, 2010 Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz LTE Wireless Module			Fage 5 01 50	
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3.0 DESCRIPTION OF TESTS

3.1 Measurement Procedure

The radiated spurious measurements were made outdoors at a 3meter 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.

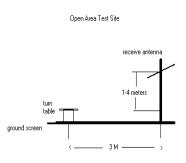


Figure 3-1. Diagram of 3-meter outdoor test range

Deviation from Measurement Procedure......None

3.2 Occupied Bandwidth Emission Limits §2.1049, §27.53(I)(6)

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1 percent of the selected span as is possible without being below 1 percent. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual. The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 percent of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded. The span between the two recorded frequencies is the occupied bandwidth.

3.3 Block C Frequency Range

§27.5(b)(3)

Two paired channels of 11 megahertz each are available for assignment in Block C in the 746-757 MHz and 776-787 MHz bands. In the event that no licenses for two channels in this Block C are assigned based on the results of the first auction in which such licenses were offered because the auction results do not satisfy the applicable reserve price, the spectrum in the 746-757 MHz and 776-787 MHz bands will instead be made available for assignment at a subsequent auction as follows: (i) Two paired channels of 6 megahertz each available for assignment in Block C1 in the 746-752 MHz and 776-782 MHz bands. (ii) Two paired channels of 5 megahertz each available for assignment in Block C2 in the 752-757 MHz and 782-787 MHz bands.

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SIERRA WIRELESS	Reviewed by: Quality Manager	
Test Report S/N:	Fest Report S/N: Test Dates: EUT Type:			Page 6 of 36	
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz LTE	E Wireless Module	Fage 6 01 36	

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3.4 Spurious and Harmonic Emissions at Antenna Terminal §2.1051, §27.53(c)

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 10th 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 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.

3.5 Radiated Power and Radiated Spurious Emissions

<u>§2.1053, §27.53(c)</u>

Spurious and harmonic radiated 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 10th 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 under all configurations and the worst case radiated power is reported while transmitting with the maximum number of resource blocks in each channel bandwidth.

3.6 Frequency Stability / Temperature Variation §2.1055, §27.54

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.

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 sufficient stabilization period at each temperature shall be used prior to each frequency requirement.

FCC ID: N7NMC7750		FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	Reviewed by: Quality Manager	
Test Report S/N: Test Dates:		EUT Type:	Baga 7 of 26	
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz LTE Wireless Module	Page 7 of 36	
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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	10/11/2010	Annual	10/11/2011	3613A00315
Agilent	E4407B	ESA Spectrum Analyzer	3/30/2010	Annual	3/30/2011	US39210313
Agilent	E4448A	PSA (3Hz-50GHz) Spectrum Analyzer	10/11/2010	Annual	10/11/2011	US42510244
Agilent	E5515C	Wireless Communications Test Set	10/11/2010	Annual	10/11/2011	GB46110872
Agilent	E5515C	Wireless Communications Test Set	10/11/2010	Annual	10/11/2011	GB46310798
Agilent	E5515C	Wireless Communications Test Set	8/12/2010	Annual	8/12/2011	GB41450275
Agilent	E8257D	(250kHz-20GHz) Signal Generator	3/30/2010	Annual	3/30/2011	MY45470194
Agilent	E8267C	Vector Signal Generator	10/11/2010	Annual	10/11/2011	US42340152
Agilent	N9020A	MXA Signal Analyzer	9/8/2010	Annual	9/8/2011	US46470561
Anritsu	ML2495A	Power Meter	10/13/2010	Annual	10/13/2011	941001
Anritsu	MA2411B	Pulse Sensor	11/13/2010	Annual	11/13/2011	1027293
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
Gigatronics	80701A	(0.05-18GHz) Power Sensor	10/11/2010	Annual	10/11/2011	1833460
Gigatronics	8651A	Universal Power Meter	10/11/2010	Annual	10/11/2011	8650319
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

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SIERRA WIRELESS	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 8 of 36
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz LTE Wireless Module		Fage 0 01 30
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5.0 SAMPLE CALCULATIONS

Emission Designator

QPSK Modulation

Emission Designator = 8M62G7D

LTE BW = 8.62 MHz G = Phase Modulation 7 = Quantized/Digital Info D = Amplitude/Angle Modulated

16QAM Modulation

Emission Designator = 8M45D7W

LTE BW = 8.45 MHz D = Amplitude/Angle Modulated 7 = Quantized/Digital Info W = Combination (Audio/Data)

Spurious Radiated Emission – LTE Band

Example: Middle Channel LTE Mode 2nd Harmonic (1564 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 terminals 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 1564 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).

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SIERRA WIRELESS	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 9 of 36
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MH	Hz LTE Wireless Module	Fage 9 01 30
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TEST RESULTS 6.0

Summary 6.1

Company Name:	<u>Sierra Wireless, Inc.</u>
FCC ID:	<u>N7NMC7750</u>
FCC Classification:	PCS Licensed Transmitter (PCB)
Mode(s):	LTE

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference			
TRANSMITTER MC	TRANSMITTER MODE (Tx)							
2.1049	Occupied Bandwidth	N/A		PASS	Sections 7.0, 8.0			
2.1051, 27.53(c)(2), 27.53(c)(4)	Band Edge / Conducted Spurious Emissions (*)	 < 43 + 10log₁₀ (P[Watts]) < 65 + 10log₁₀ (P[Watts]) in a 6.25kHz bandwidth for emissions in the 763 – 775MHz and 793 – 805MHz bands 	CONDUCTED	PASS	Sections 7.0, 8.0			
2.1046	Transmitter Conducted Output Power Measurements	N/A		N/A	Section 6.2			
2.1055, 27.54	Frequency Stability	Fundamental emissions must stay within the allotted band		PASS	Section 6.5			
2.1053, 27.53(c)(2) 27.53(c)(4)	Undesirable Out-of-Band Emissions	< 43 + 10log ₁₀ (P[Watts]) for all out-of-band emissions		PASS	Section 6.3			
2.1053, 27.53(f)	Undesirable Emissions in the 1559 – 1610MHz band	< -40dBm/MHz EIRP (wideband) < -50dBm EIRP (narrowband)	RADIATED	PASS	Section 6.4			

Table 6-1. Summary of Test Results

Notes:

* - For out of band conducted spurious emissions (including those at the band edges), the emissions of both QPSK and 16-QAM modulations were investigated for 5MHz and 10MHz channel bandwidths. The worst case transmitter emissions are shown in Sections 7.0 and 8.0.

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SIERRA WIRELESS	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 10 of 36
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz LTE Wireless Module		Fage 10 01 30
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6.2 **Transmitter Conducted Output Power** <u>§2.1046</u>

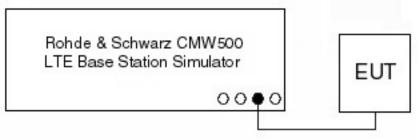
The Sierra Wireless Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz LTE Wireless Module FCC ID: N7NMC7750 was connected to a Rohde and Schwarz LTE Base Station Simulator (Model: CMW500). The EUT was configured through the CMW500 to produce all required combinations of modulations, channel bandwidths, and resource block sizes to determine the configuration producing the worst case emissions.

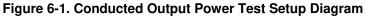
Modulation	Channel Bandwidth [MHz]	RB Size	RB Offset	Maximum Avg. Power [dBm]		Modulation	Channel Bandwidth [MHz]	RB Size	RB Offset	Maximum Avg. Power [dBm]
QPSK	5	1	0	23.36		QPSK	5	1	0	23.17
16-QAM	5	1	0	23.28		16-QAM	5	1	0	23.04
QPSK	5	1	24	23.44	F	QPSK	5	1	24	23.51
16-QAM	5	1	24	23.22	5MHz	16-QAM	5	1	24	23.44
QPSK	5	12	6	23.15	5.	QPSK	5	12	6	23.36
16-QAM	5	12	6	23.16	784.	16-QAM	5	12	6	23.45
QPSK	5	25	0	23.25		QPSK	5	25	0	23.37
16-QAM	5	25	0	23.31		16-QAM	5	25	0	23.39

Table 6-2. Maximum Average Conducted Output Power (5MHz Bandwidth)

	Modulation	Channel Bandwidth [MHz]	RB Size	RB Offset	Maximum Avg. Power [dBm]
	QPSK	10	1	0	23.27
	16-QAM	10	1	0	23.31
N	QPSK	10	1	49	23.21
ΗM	16-QAM	10	1	49	23.24
782MHz	QPSK	10	25	12	23.52
2	16-QAM	10	25	12	23.55
	QPSK	10	50	0	23.56
	16-QAM	10	50	0	23.54

Table 6-3. Maximum Average Conducted Output Power (10MHz Bandwidth)





FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SIERRA WIRELESS	Reviewed by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Page 11 of 36	
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz L	Fage 11 01 30		
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6.3 LTE Radiated Measurements §2.1053, §27.53(c)(2)

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY:	779.	<u>50</u> N	ΛHz
BANDWIDTH:	5	N	ИНz
MODULATION SIGNAL:	QPSK		
DISTANCE:	3	meters	
LIMIT:	-13	dBm	
DISTANCE:	3	•	

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	MARGIN (dB)
2342.84	-74.75	8.84	-65.91	V	-52.9
3122.34	-97.31	9.70	-87.61	V	-74.6
3901.84	-94.09	9.30	-84.79	V	-71.8
4681.34	-94.98	11.20	-83.78	V	-70.8

Table 6-4. Radiated Spurious Data (QPSK Modulation)

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.

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SIERRA WIRELESS	Reviewed by: Quality Manager
Test Report S/N: Test Dates:		EUT Type:		Page 12 of 36
0Y1010261759.N7N	October 25-29, 2010	25-29, 2010 Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz LTE Wireless Module		
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LTE Radiated Measurements (Cont'd) §2.1053, §27.53(c)(2)

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY:	784.	<u>50 MHz</u>
BANDWIDTH:	5	MHz
MODULATION SIGNAL:	QPSK	
DISTANCE:	3	meters
LIMIT:	-13	dBm

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	MARGIN (dB)
2349.11	-73.82	8.85	-64.97	V	-52.0
3133.61	-95.37	9.70	-85.67	V	-72.7
3918.11	-91.65	9.27	-82.38	V	-69.4
4702.61	-92.24	11.20	-81.04	V	-68.0

Table 6-5. Radiated Spurious Data (QPSK Modulation)

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.

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SIERRA WIRELESS	Reviewed by: Quality Manager
Test Report S/N: Test Dates: EUT Type:		Page 13 of 36		
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz LTE Wireless Module		Faye 13 01 30
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LTE Radiated Measurements (Cont'd) §2.1053, §27.53(c)(2)

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY:	782.	<u>00</u> MHz
BANDWIDTH:	10) MHz
MODULATION SIGNAL:	QPSK	
DISTANCE:	3	meters
LIMIT:	-13	dBm

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	MARGIN (dB)
2346.00	-74.03	8.84	-65.18	V	-52.2
3128.00	-97.28	9.70	-87.58	V	-74.6
3910.00	-94.02	9.29	-84.74	V	-71.7
4692.00	-94.92	11.20	-83.72	V	-70.7

Table 6-6. Radiated Spurious Data (QPSK Modulation)

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.

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SIERRA WIRELESS	Reviewed by: Quality Manager
Test Report S/N: Test Dates:		EUT Type:		Page 14 of 36
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz	LTE Wireless Module	Fage 14 01 50
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6.4 LTE Radiated Measurements in 1559 – 1610MHz Band §2.1053, §27.53(f)

Field Strength of SPURIOUS Radiation

lz

FREQUENCY (MHz)	EMISSION TYPE	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	MARGIN (dB)
1563.34	WIDEBAND	-75.14	8.53	-66.61	V	-26.61
1564.61	WIDEBAND	-75.54	8.54	-67.00	V	-27.00

 Table 6-7. Radiated Spurious Data

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.

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SIERRA WIRELESS	Reviewed by: Quality Manager
Test Report S/N: Test Dates: EUT Type:		Page 15 of 36		
0Y1010261759.N7N	October 25-29, 2010	2010 Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz LTE Wireless Module		
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6.5 LTE Frequency Stability Measurements §2.1055, §27.54

OPERATING FREQUENCY: 784,500,000 Hz

REFERENCE VOLTAGE: 5 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	5.00	+ 20 (Ref)	784,500,002	2	0.000000
100 %		- 30	784,500,002	2	0.000000
100 %		- 20	784,500,001	1	0.000000
100 %		- 10	784,499,995	-5	-0.000001
100 %		0	784,499,992	-8	-0.000001
100 %		+ 10	784,500,011	11	0.000001
100 %		+ 20	784,499,996	-4	-0.000001
100 %		+ 30	784,499,993	-7	-0.000001
100 %		+ 40	784,500,015	15	0.000002
100 %		+ 50	784,500,016	16	0.000002
115 %	5.75	+ 20	784,500,005	5	0.000001
85 %	4.25	+ 20	784,500,007	7	0.000001

Table 6-8. Frequency Stability Data

Note:

The frequency deviation was measured to ensure that the channel emissions remained within the authorized band with varying temperature and voltage.

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SIERRA WIRELESS	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 16 of 36
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz L	TE Wireless Module	Fage 10 01 30
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LTE Frequency Stability Measurements (Cont'd) §2.1055, §27.54

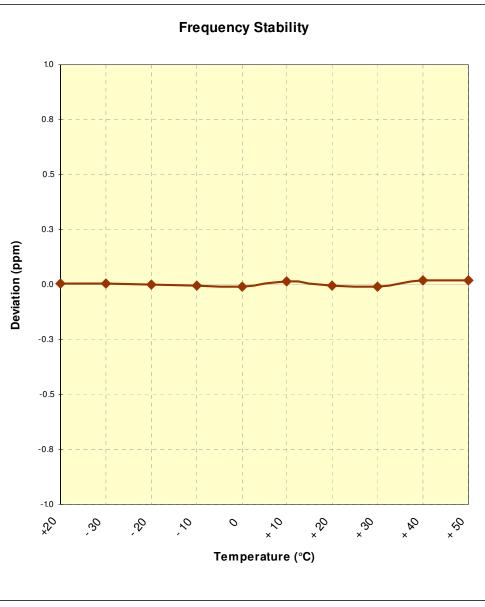


Figure 6-2. Frequency Stability Graph

Note:

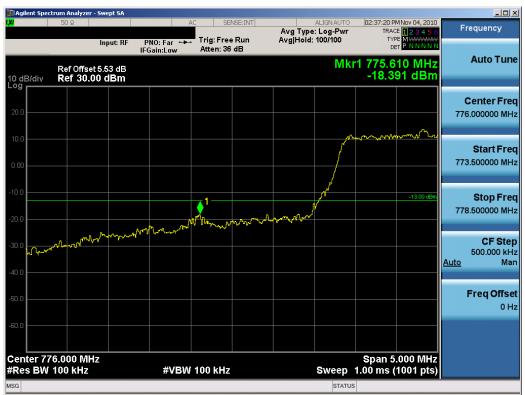
The frequency deviation was measured to ensure that the channel emissions remained within the authorized band with varying temperature and voltage.

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SIERRA WIRELESS	Reviewed by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Page 17 of 36	
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz	Faye 17 01 30		
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7.0 PLOT(S) OF EMISSIONS – 5MHZ BANDWIDTH

For all plots in Sections 7.0 and 8.0 showing emissions in the 763 – 775MHz and 793 – 805MHz band, the FCC limit is $65 + 10\log_{10}(P_{[Watts]}) = -35dBm$ 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 $10\log_{10}(10kHz/6.25kHz) = 2.04dB$. Thus, the limit shown in all plots in the 763 – 775MHz and 793 – 805MHz bands for all available modulation types was -35dBm + 2.04dB = -32.96dBm.



Plot 7-1. Lower Band Edge Plot (QPSK - Low Channel, RB Size 25)

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SIERRA WIRELESS	Reviewed by: Quality Manager	
Test Report S/N:	Test Report S/N: Test Dates: EUT Type:		Page 18 of 36		
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz LTE Wireless Module		Fage to 0130	
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	trum Analyzer - Swept SA					
l,XI	50 Ω	AC SEI		aLIGNAUTO g Type: Log-Pwr	02:39:36 PM Nov 04, 2010 TRACE 1 2 3 4 5 6	Frequency
	Input: RF	PNO: Far +++ Trig: Free IEGain:Low Atten: 36		Hold: 100/100	TYPE MWWWWWW DET P N N N N N	
		IFGain:Low Acten: 50		Mkr	1 774.976 MHz	Auto Tune
10 dB/div	Ref Offset 5.53 dB Ref 30.00 dBm			IVINI	-35.160 dBm	
						Center Freq
20.0						769.000000 MHz
10.0						Start Freq
0.00						763.000000 MHz
0.00						
-10.0						
						Stop Freq
-20.0						775.000000 MHz
-30.0					-32.96 0.	CF Step 1.200000 MHz
						Auto Man
-40.0					Lat. Margaret	
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Start 763					Stop 775.000 MHz	
#Res BW	10 kHz	#VBW 10 kHz		Sweep	145 ms (1001 pts)	
MSG				STATUS		

Plot 7-2. Lower Emission Mask (763 – 775MHz) Plot (QPSK – Low Channel, RB Size 25)



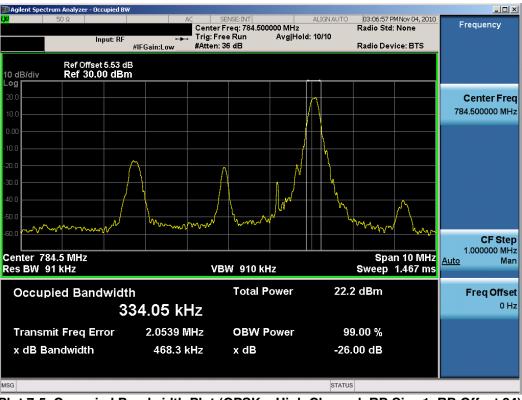
Plot 7-3. Occupied Bandwidth Plot (QPSK - Low Channel, RB Size 1, RB Offset 0)

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SIERRA WIRELESS	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 19 of 36
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MH	Fage 19 01 30	
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Plot 7-4. Occupied Bandwidth Plot (16-QAM – Low Channel, RB Size 1, RB Offset 0)

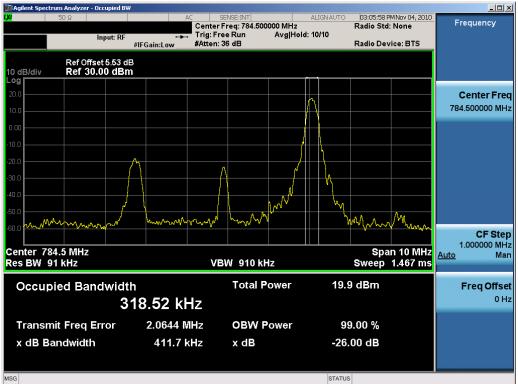


Plot 7-5. Occupied Bandwidth Plot (QPSK – High Channel, RB Size 1, RB Offset 24)

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	Reviewed by: Quality Manager			
Test Report S/N:	Test Dates:	EUT Type:	Page 20 of 36			
0Y1010261759.N7N October 25-29, 2010 Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz LTE Wireless Modu			Faye 20 01 30			

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Plot 7-6. Occupied Bandwidth Plot (16-QAM – High Channel, RB Size 1, RB Offset 24)



Plot 7-7. Occupied Bandwidth Plot (QPSK – Low Channel, RB Size 12, RB Offset 6)

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SIERRA WIRELESS	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 21 of 36
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz L	Fage 21 01 50	
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Plot 7-8. Occupied Bandwidth Plot (16-QAM – Low Channel, RB Size 12, RB Offset 6)



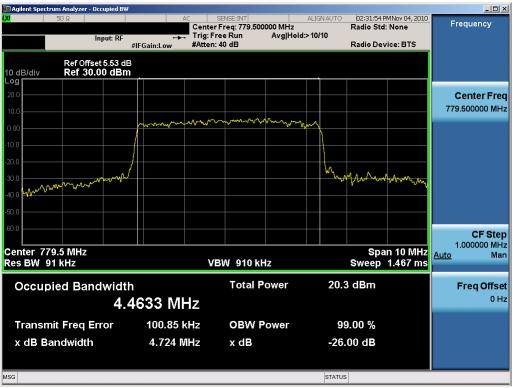
Plot 7-9. Occupied Bandwidth Plot (QPSK – High Channel, RB Size 12, RB Offset 6)

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SIERRA WIRELESS	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 22 of 36
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700M	Fage 22 01 30	
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Plot 7-10. Occupied Bandwidth Plot (16-QAM – High Channel, RB Size 12, RB Offset 6)

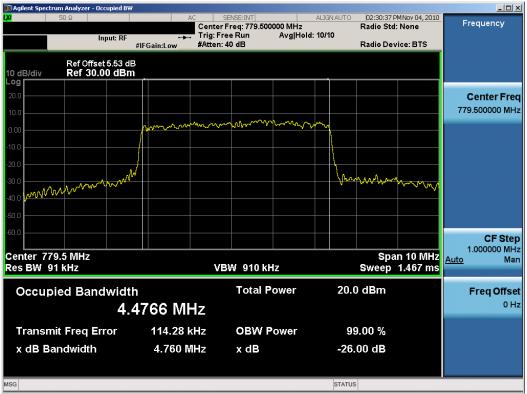


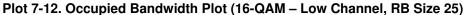
Plot 7-11. Occupied Bandwidth Plot (QPSK – Low Channel, RB Size 25)

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SIERRA WIRELESS	Reviewed by: Quality Manager
Test Report S/N: Test Dates: EUT Type:			Page 23 of 36	
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz L	Faye 23 01 30	
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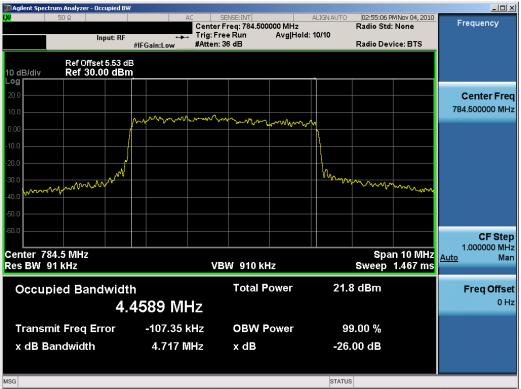


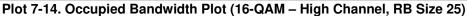


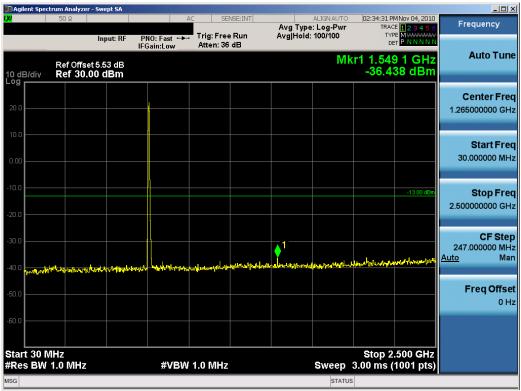
Plot 7-13. Occupied Bandwidth Plot (QPSK - High Channel, RB Size 25)

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SIERRA WIRELESS	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 24 of 36
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz L	Fage 24 01 30	
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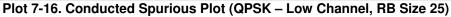


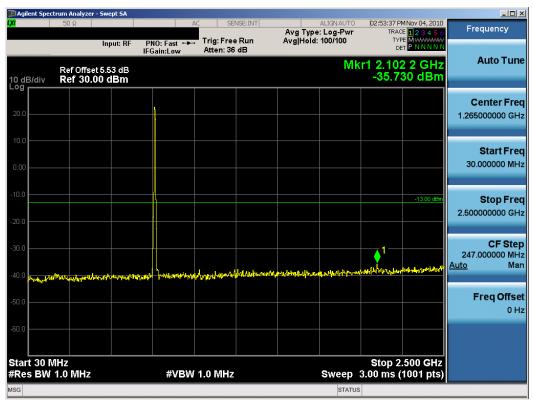
Plot 7-15. Conducted Spurious Plot (QPSK – Low Channel, RB Size 25)

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SIERRA WIRELESS	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 25 of 36
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700M	Page 25 01 36	
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🗊 Agilent Spectrum Analyzer - Sw	ept SA	-							_ 🗆 ×
LXI 50 Ω Ir		PNO: Fast 🔸			Avg Type Avg Hold:	ALIGNAUTO : Log-Pwr 100/100	TRAC	MNov 04, 2010 E 1 2 3 4 5 6 PE MWWWWWW T P N N N N N	Frequency
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20.0									Center Freq 5.250000000 GHz
0.00									Start Freq 2.500000000 GHz
-10.0								-13.00 dBm	Stop Frec 8.000000000 GHz
-30.0	and had to come the state of th	, and here the state of the sta	لام العربية الما ليس	an ya an	Wynyddyntaeu	Mulum	1	serie Melmadigarcost	CF Step 550.000000 MH <u>Auto</u> Mar
-50.0									Freq Offse 0 H
-60.0 Start 2.500 GHz #Res BW 1.0 MHz		#VBIA	1.0 MHz			Sween	Stop 8	.000 GHz 1001 pts)	
ANCO DAV 1.0 MITZ			10 10112			STATUS	1	reo proj	



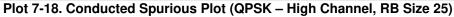


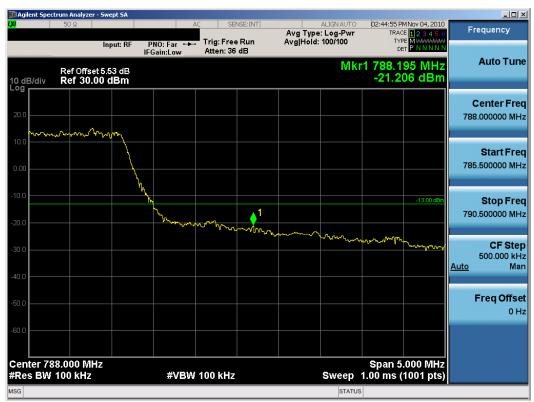
Plot 7-17. Conducted Spurious Plot (QPSK – High Channel, RB Size 25)

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	Reviewed by: Quality Manager			
Test Report S/N:	Test Dates:	EUT Type:	Page 26 of 36			
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz LTE Wireless Module	Fage 20 01 30			



🇊 Agilent Spectrum Analyzer - Swep	it SA				
LXI 50 Ω		AC SENSE:INT	ALIGNAUTO Avg Type: Log-Pwr Avg Hold: 100/100	02:54:14 PM Nov 04, 2010 TRACE 1 2 3 4 5 6 TYPE MWWWWW	Frequency
Ref Offset 5.53		Atten: 36 dB		r1 4.788 0 GHz -36.644 dBm	Auto Tune
20.0					Center Freq 5.250000000 GHz
0.00					Start Fred 2.500000000 GHz
-10.0				-13.00 dBm	Stop Frec 8.000000000 GHz
-30.0	mall the sheet and the second states of the second	1	signitus open with the strategic of the	ที่ไก่องกันการเป็นอยู่เป็นไปหมือนไปเป็น	CF Step 550.000000 MH: <u>Auto</u> Mar
60.0					Freq Offse 0 H
Start 2.500 GHz #Res BW 1.0 MHz	#VB	W 1.0 MHz	Sweep	Stop 8.000 GHz 9.20 ms (1001 pts)	
ISG			STATUS		





Plot 7-19. Upper Band Edge Plot (QPSK – High Channel, RB Size 25)

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SIERRA WIRELESS	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 27 of 36
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700M	Fage 27 01 30	
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09/13/10



Input: RF PNO: Far Trig: Free Run Avg Type: Log-Pwr Trace 2 3 4 5 G Frequency Ref Offset 5.53 dB Mkr1 803.596 MHz -46.785 dBm		trum Analyzer ·	- Swept SA								
Input: RF PNO: Far + Infg: Free Run Atten: 36 dB Avg/hei: 100/100 Tring: Free Run Atten: 36 dB Auto Tune Cert Precision dB/div Ref Offset 5.53 dB Mkr1 803.596 MHz -46.785 dBm -46.785 dBm Center Free 799.00000 MHz 00 Imput: Ref Offset 5.53 dB Start Free 799.000000 MHz Imput: Ref Offset 5.53 dB Center Free 799.00000 MHz 00 Imput: Ref Offset 5.53 dB Start Free 799.00000 MHz Imput: Ref Offset 5.53 dB Center Free 799.00000 MHz 00 Imput: Ref Offset 5.53 dB Imput: Ref Offset 5.53 dB Imput: Ref Offset 5.53 dB Center Free 799.00000 MHz 00 Imput: Ref Offset 5.53 dB Imput: Ref 5.53 dB Imput: Ref 5.53 d		50 Ω		A	C SE	NSE:INT	Aug Type	ALIGN AUTO			Frequency
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sweep 145 lins (1001 pts)				#\/D\M				Swoon	Stop 805	.000 MHz	
3 STATUS				#VDVV	IV KHZ			-		ioo r pis)	

Plot 7-20. Upper Emission Mask (793 – 805MHz) Plot (QPSK – High Channel, RB Size 25)

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SIERRA WIRELESS	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 28 of 36
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700M	1Hz LTE Wireless Module	Fage 20 01 30
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PLOT(S) OF EMISSIONS - 10MHZ BANDWIDTH 8.0





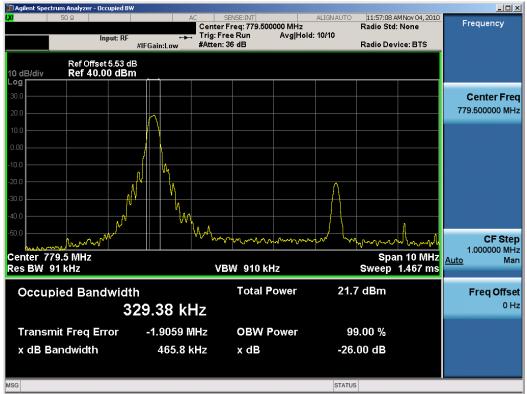


Plot 8-2. Lower Emission Mask (763 – 775MHz) Plot (QPSK – RB Size 50)

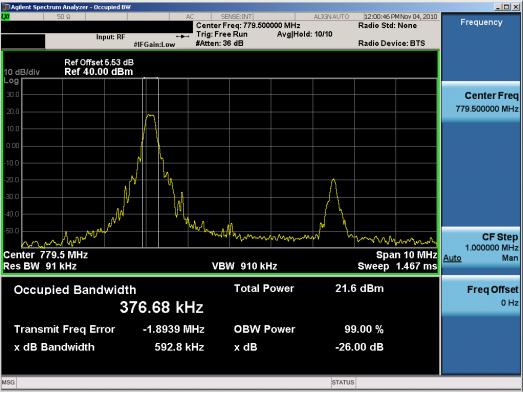
FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SIERRA WIRELESS	Reviewed by: Quality Manager
Test Report S/N: Test Dates:		EUT Type:		Page 29 of 36
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz L	TE Wireless Module	Fage 29 01 30
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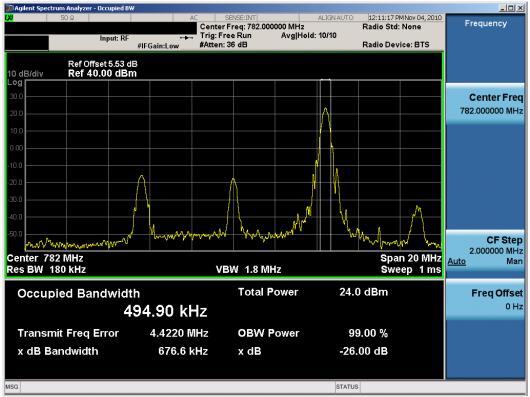
Plot 8-3. Occupied Bandwidth Plot (QPSK - RB Size 1, RB Offset 0)



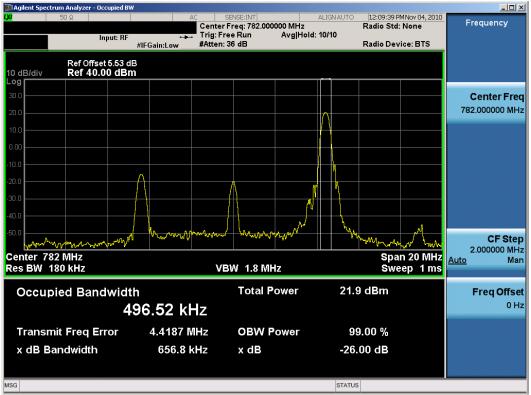
Plot 8-4. Occupied Bandwidth Plot (16-QAM - RB Size 1, RB Offset 0)

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SIERRA WIRELESS	Reviewed by: Quality Manager
Test Report S/N:	Test Report S/N: Test Dates: EUT Type:			Page 30 of 36
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz I	Fage 30 01 30	
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Plot 8-5. Occupied Bandwidth Plot (QPSK - RB Size 1, RB Offset 49)

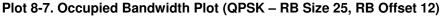


Plot 8-6. Occupied Bandwidth Plot (16-QAM - RB Size 1, RB Offset 49)

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SIERRA WIRELESS	Reviewed by: Quality Manager
Test Report S/N:	Test Report S/N: Test Dates: EUT Type:			Page 31 of 36
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz LT	E Wireless Module	Fage ST 01 So
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Plot 8-8. Occupied Bandwidth Plot (16-QAM – RB Size 25, RB Offset 12)

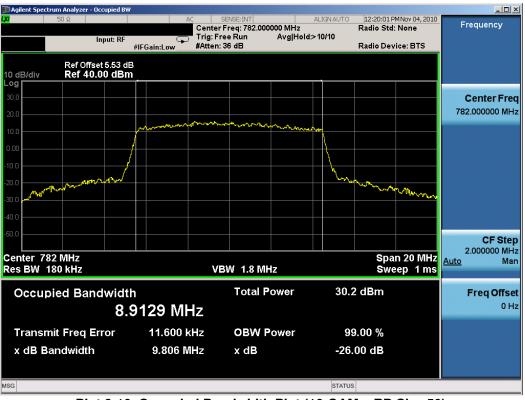
FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager	
Test Report S/N: Test Dates:		EUT Type:		Page 32 of 36	
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz LTE Wireless Mc	odule	raye 32 01 30	
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Plot 8-9. Occupied Bandwidth Plot (QPSK - RB Size 50)

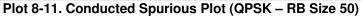


Plot 8-10. Occupied Bandwidth Plot (16-QAM - RB Size 50)

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SIERRA WIRELESS	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 33 of 36
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MI	Hz LTE Wireless Module	Fage 33 01 30
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🗊 Agilent Spectrum /				1		
1XI 50	Input: RF	AC SE		ALIGNAUTO vg Type: Log-Pwr /g Hold: 100/100	12:24:12 PMNov 04, 2010 TRACE 2 3 4 5 6 TYPE MWWWW	Frequency
10 dB/div Re		FGain:Low Atten: 36	6 dB	M	cr1 1.620 7 GHz -37.162 dBm	Auto Tune
20.0						Center Freq 1.265000000 GHz
0.00						Start Freq 30.000000 MHz
-10.0					-13.00 dBm	Stop Freq 2.500000000 GHz
-30.0	n throwing the state of		and the life and the dest	1 Mercarighethylogow	malinalisalisasi	CF Step 247.000000 MHz <u>Auto</u> Mar
-50.0						Freq Offset 0 Hz
-60.0 Start 30 MHz #Res BW 1.0		#VBW 1.0 MHz		Sweep	Stop 2.500 GHz 3.00 ms (1001 pts)	
MSG				STATU		



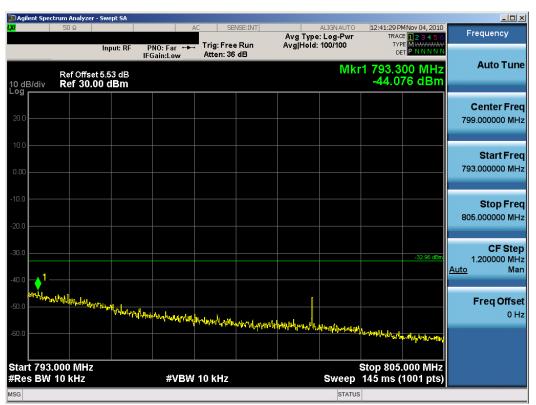


Plot 8-12. Conducted Spurious Plot (QPSK - RB Size 50)

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	Reviewed by: Quality Manager			
Test Report S/N:	Test Dates:	EUT Type:	Page 34 of 36			
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz LTE Wireless Module	Faye 34 01 30			







Plot 8-13. Upper Band Edge Plot (QPSK - RB Size 50)

Plot 8-14. Upper Emission Mask (793 – 805MHz) Plot (QPSK – RB Size 50)

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SIERRA WIRELESS	Reviewed by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Page 35 of 36	
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz	LTE Wireless Module	Fage 35 01 50	
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9.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Sierra Wireless Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MHz LTE Wireless Module FCC ID: N7NMC7750** complies with all the requirements of Parts 2 and 27 of the FCC rules.

FCC ID: N7NMC7750	PCTEST	FCC Pt. 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SIERRA WIRELESS	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 36 of 36
0Y1010261759.N7N	October 25-29, 2010	Cellular/PCS GSM/EDGE/WCDMA/CDMA/EvDO and 700MH	z LTE Wireless Module	Faye 50 01 50
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