



PCTEST ENGINEERING LABORATORY, INC.

6660-B Dobbin Road, Columbia, MD 21045 USA

Tel. 410.290.6652 / Fax 410.290.6654

<http://www.pctestlab.com>



MEASUREMENT REPORT FCC Part 90

Applicant Name:

Harris Corporation
150 Apollo Drive
Chelmsford, MA 01824
USA

Date of Testing:

Oct. 24, 2011 – Jan. 16, 2012

Test Site/Location:

PCTEST Lab., Columbia, MD, USA

Test Report Serial No.:

0Y1110271887-R4.BV8

FCC ID:**BV8BBPBM100****APPLICANT:****HARRIS CORPORATION****Application Type:** Certification**FCC Classification:** Licensed Non-Broadcast Transmitter (TNB)**FCC Rule Part(s):** §2; §90**EUT Type:** Wireless Module**Model(s):** PBM-100**Test Device Serial No.:** *identical prototype* [S/N: 15563355]

Mode	BW (MHz)	Emission Designator	Tx Frequency (MHz)	Modulation	Conducted Power		ERP	
					Max. Power (W)	Max. Power (dBm)	Max ERP (dBm)	Max ERP (Watts)
LTE Band 14	5	4M52G7D	795.5	QPSK	0.264	24.21	31.3	1.35
LTE Band 14	5	4M52W7D	795.5	16-QAM	0.254	24.04	31.13	1.3

* This revised test report (S/N: 0Y1110271887-R4.BV8) supersedes and replaces the previously issued test report on the same subject EUT for the same type of testing as indicated. Please discard or destroy the previously issued test report (S/N: 0Y1110271887-R3.BV8) and dispose of it accordingly.

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 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

FCC ID: BV8BBPBM100		FCC Pt. 90 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1110271887-R4.BV8	Test Dates: Oct. 24, 2011 – Jan. 16, 2012	EUT Type: Wireless Module		Page 1 of 25

T A B L E O F C O N T E N T S

FCC PART 90 MEASUREMENT REPORT.....	3
1.0 INTRODUCTION	4
1.1 SCOPE	4
1.2 TESTING FACILITY.....	4
2.0 PRODUCT INFORMATION.....	5
2.1 EQUIPMENT DESCRIPTION	5
2.2 EUT CAPABILITIES.....	5
2.3 EMI SUPPRESSION DEVICE(S)/MODIFICATIONS	5
2.4 LABELING REQUIREMENTS.....	5
3.0 DESCRIPTION OF TESTS	6
3.1 MEASUREMENT PROCEDURE	6
3.2 OCCUPIED BANDWIDTH EMISSION LIMITS	6
3.3 EMISSIONS MASK B	6
3.4 793-798MHZ FREQUENCY BAND.....	7
3.5 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL.....	7
3.6 RADIATED POWER AND RADIATED SPURIOUS EMISSIONS	7
3.7 FREQUENCY STABILITY / TEMPERATURE VARIATION	8
4.0 TEST EQUIPMENT CALIBRATION DATA	9
5.0 SAMPLE CALCULATIONS	10
6.0 TEST RESULTS.....	11
6.1 SUMMARY.....	11
6.2 CONDUCTED OUTPUT POWER.....	12
6.3 EFFECTIVE RADIATED POWER OUTPUT DATA	13
6.4 RADIATED SPURIOUS EMISSIONS	14
6.5 RADIATED SPURIOUS EMISSIONS IN 1559 – 1610MHZ BAND	15
6.6 FREQUENCY STABILITY MEASUREMENTS	16
7.0 PLOT(S) OF EMISSIONS	18
8.0 CONCLUSION.....	25

FCC ID: BV8BBPBM100		FCC Pt. 90 LTE MEASUREMENT REPORT (CERTIFICATION)	
Test Report S/N: 0Y1110271887-R4.BV8	Test Dates: Oct. 24, 2011 – Jan. 16, 2012	EUT Type: Wireless Module	Reviewed by: Quality Manager Page 2 of 25



MEASUREMENT REPORT

FCC Part 90

§2.1033 General Information

APPLICANT: Harris Corporation
APPLICANT ADDRESS: 150 Apollo Drive
Chelmsford, MA 01824, USA
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: PBM-100
FCC ID: BV8BBPBM100
FCC CLASSIFICATION: Licensed Non-Broadcast Transmitter (TNB)
MODULATIONS: LTE (QPSK/16-QAM)
FREQUENCY TOLERANCE: 1.25ppm
Test Device Serial No.: 15563355 Production Pre-Production Engineering
DATE(S) OF TEST: Oct. 24, 2011 – Jan. 16, 2012
TEST REPORT S/N: 0Y1110271887-R2.BV8

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: BV8BBPBM100		FCC Pt. 90 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1110271887-R2.BV8	Test Dates: Oct. 24, 2011 – Jan. 16, 2012	EUT Type: Wireless Module		Page 3 of 25

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, the Baltimore-Washington Intert'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.

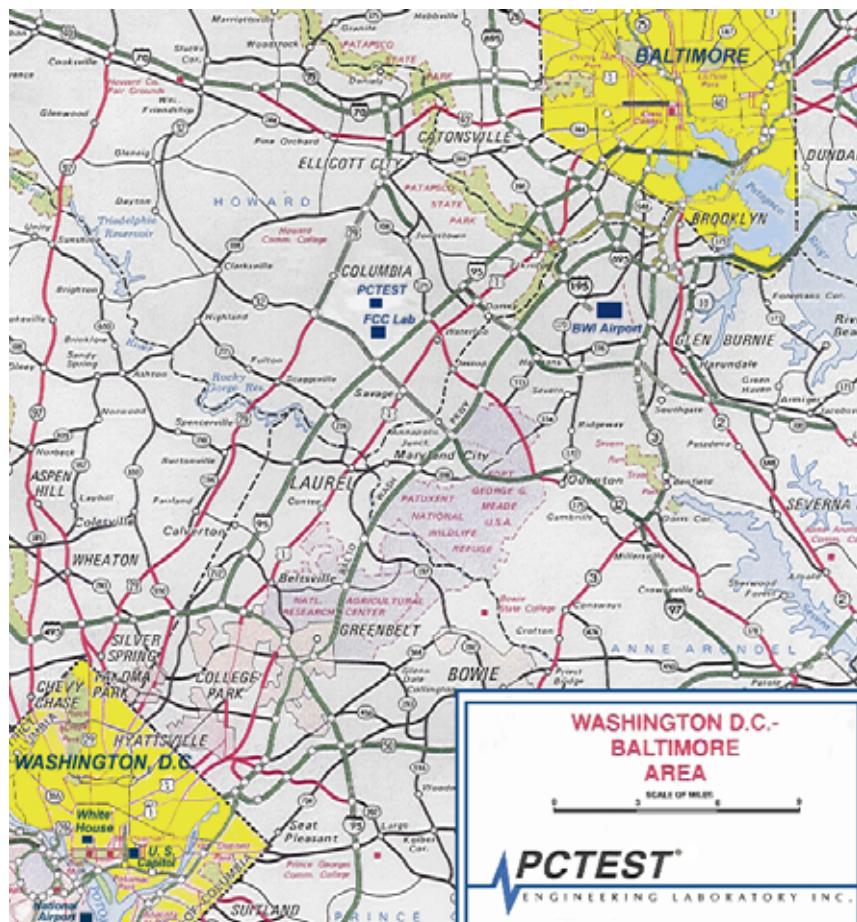


Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

FCC ID: BV8BBPBM100		FCC Pt. 90 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1110271887-R4.BV8	Test Dates: Oct. 24, 2011 – Jan. 16, 2012	EUT Type: Wireless Module		Page 4 of 25

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Harris Wireless Module FCC ID: BV8BBPBM100**. 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
Harris / Model: PBM-100	BV8BBPBM100	Wireless Module

Table 2-1. EUT Equipment Description

During testing, the EUT was attached to a test PCB (14014-9100-01 Rev1) that housed and powered the EUT. Power was provided via DC Power Supply. The EUT was set to continuous transmission at max power through connection to a CMW500 LTE Call Box. All modulations (QPSK, 16QAM) and RB sizes and RB offsets were investigated. Worst case emissions are reported.

During radiated testing, the EUT was connected to the *Laird* B7603 Mobile Load Coil Antenna. The gain of this antenna is 3 dBi, and the loss of the attached cable is 2.7 dB. This *Laird* antenna is only used to provide a termination to the main antenna port during various radiated measurements. Additionally, it will not be marketed with the EUT.

2.2 EUT Capabilities

The EUT has the following capabilities: LTE operating in Band 12 and Band 14

2.3 EMI Suppression Device(s)/Modifications

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

2.4 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: BV8BBPBM100		FCC Pt. 90 LTE MEASUREMENT REPORT (CERTIFICATION)	Reviewed by: Quality Manager
Test Report S/N: 0Y1110271887-R4.BV8	Test Dates: Oct. 24, 2011 – Jan. 16, 2012	EUT Type: Wireless Module	Page 5 of 25

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.

Deviation from Measurement Procedure.....None

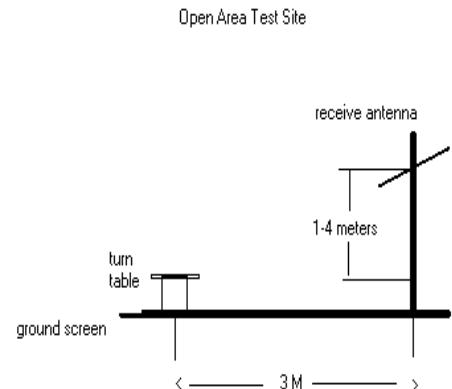


Figure 3-1. Diagram of 3-meter outdoor test range

3.2 Occupied Bandwidth Emission Limits

§2.1049

- 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.

3.3 Emissions Mask B

§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:

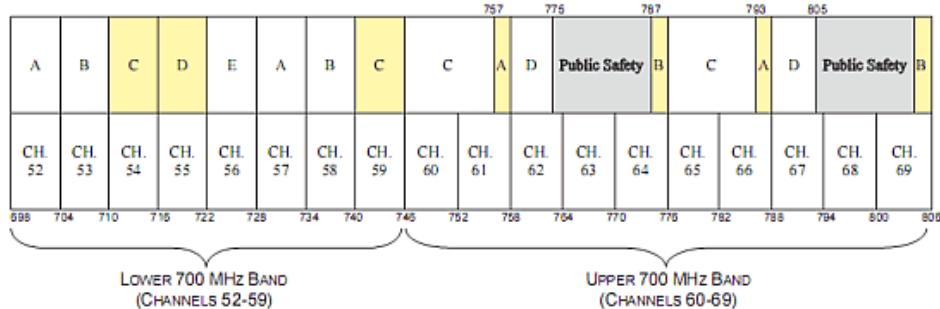
- On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.
- On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least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

FCC ID: BV8BBPBM100		FCC Pt. 90 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1110271887-R4.BV8	Test Dates: Oct. 24, 2011 – Jan. 16, 2012	EUT Type: Wireless Module		Page 6 of 25

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 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 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 $65+10\log(P)$ 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 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 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. 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.

FCC ID: BV8BBPBM100		FCC Pt. 90 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1110271887-R4.BV8	Test Dates: Oct. 24, 2011 – Jan. 16, 2012	EUT Type: Wireless Module		Page 7 of 25



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 $\pm 0.000125\%$ ($\pm 1.25 \text{ ppm}$) 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.

FCC ID: BV8BBPBM100		FCC Pt. 90 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1110271887-R4.BV8	Test Dates: Oct. 24, 2011 – Jan. 16, 2012	EUT Type: Wireless Module		Page 8 of 25

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	8449B	(1-26.5GHz) Pre-Amplifier	2/8/2011	Annual	2/8/2012	3008A00985
Agilent	85650A	Quasi-Peak Adapter	4/7/2011	Annual	4/7/2012	3303A01872
Agilent	85650A	Quasi-Peak Adapter	4/7/2011	Annual	4/7/2012	2043A00301
Agilent	8566B	(100Hz-22GHz) Spectrum Analyzer	4/7/2011	Annual	4/7/2012	3638A08713
Agilent	E4407B	ESA Spectrum Analyzer	4/5/2011	Annual	4/5/2012	US39210313
Agilent	E4448A	PSA (3Hz-50GHz) Spectrum Analyzer	11/30/2010	Annual	11/30/2011	US42510244
Agilent	E5515C	Wireless Communications Test Set	7/6/2011	Annual	7/6/2012	GBA1450275
Agilent	E8257D	(250kHz-20GHz) Signal Generator	4/8/2011	Annual	4/8/2012	MY45470194
Agilent	E5515C	Wireless Communications Test Set	2/8/2011	Annual	2/8/2012	GB45360985
Agilent	N9038A	MXE EMI Receiver	8/5/2011	Annual	8/5/2012	MY51210133
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)	4/8/2010	Biennial	4/8/2012	9205-3874
Espec	ESX-2CA	Environmental Chamber	4/21/2011	Annual	4/21/2012	17620
K & L	11SH10	Band Pass Filter	N/A		N/A	1300/4000
K & L	11SH10	Band Pass Filter	N/A		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	CMW500	LTE Radio Communication Tester	3/11/2011	Annual	3/11/2012	103962
Rohde & Schwarz	CMW500	LTE Radio Communication Tester	8/5/2011	Annual	8/5/2012	112347
Sunol	DRH-118	Horn Antenna (1 - 18GHz)	7/5/2011	Biennial	7/5/2013	A050307
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	12/17/2009	Biennial	12/17/2011	A051107
Sunol	DRH-118	Horn Antenna (1-18 GHz)	6/17/2011	Biennial	6/17/2013	A042511

Table 4-1. Test Equipment

FCC ID: BV8BBPBM100		FCC Pt. 90 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1110271887-R4.BV8	Test Dates: Oct. 24, 2011 – Jan. 16, 2012	EUT Type: Wireless Module		Page 9 of 25

5.0 SAMPLE CALCULATIONS

The calculations below are examples only and do not necessarily relate to the EUT.

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 = 8M45W7D

LTE BW = 8.45 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Combination (Audio/Data)

Spurious Radiated Emission – LTE

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

The spectrum analyzer 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 spectrum analyzer. 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 $25.501 \text{ dBm} - (-24.80) = 50.3 \text{ dBc}$.

FCC ID: BV8BBPBM100		FCC Pt. 90 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1110271887-R4.BV8	Test Dates: Oct. 24, 2011 – Jan. 16, 2012	EUT Type: Wireless Module		Page 10 of 25

6.0 TEST RESULTS

6.1 Summary

Company Name: Harris Corporation
 FCC ID: BV8BBPBM100
 FCC Classification: Licensed Non-Broadcast Transmitter (TNB)
 Mode(s): LTE

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
TRANSMITTER MODE (TX)					
2.1049	Occupied Bandwidth	N/A	CONDUCTED	PASS	Section 7.0
2.1051, 90.543(e)(2),	Band Edge / Conducted Spurious Emissions	< $43 + 10\log_{10}(P[\text{Watts}])$ at Band Edge and for all out-of-band emissions < $65 + 10 \log(P[\text{Watts}])$ in a 6.25kHz bandwidth for emissions in the 769–775 MHz and 799–805 MHz bands		PASS	Section 7.0
2.1046	Transmitter Conducted Output Power	N/A		PASS	Section 6.2
90.210(n)	Emissions Mask	Emissions Mask B		PASS	Section 7.0
90.542(a)(6) & (7)	ERP	Mobile Station: 30 Watts ERP Portable Station: 3 Watts ERP	RADIATED	PASS	Section 6.3
2.1053, 90.543(c), 90.543(e)(2)	Undesirable Emissions	< $43 + 10\log_{10}(P[\text{Watts}])$ for all out-of-band emissions		PASS	Section 6.4
2.1053, 90.543(f)	Undesirable Emissions in the 1559–1610MHz band	< -40dBm/MHz EIRP (wideband) < -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

Notes:

- The measurement data for low channel (790.5 MHz) of Band 14 is contained in the Part 27 FCC Test Report. This report only contains the high channel (795.5 MHz) of Band 14 as it is governed by Part 90.
- Although the ERP limit is, inherently, a radiated limit, the data shown in Section 6.3 is based on conducted measurements. The conducted measurements are converted to equivalent radiated measurements and compared to the radiated power limit in 90.542(a)(6) & (7).

FCC ID: BV8BBPBM100		FCC Pt. 90 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1110271887-R4.BV8	Test Dates: Oct. 24, 2011 – Jan. 16, 2012	EUT Type: Wireless Module		Page 11 of 25

6.2 Conducted Output Power

S2.1046

The **Harris Wireless Module FCC ID: BV8BBPBM100** was powered by a DC Power supply through a test PCB. The Main Antenna port of the EUT was connected to the CMW500 LTE Callbox via RF Cable. Transmit power readings were taken from the CMW500. Results are reported below.

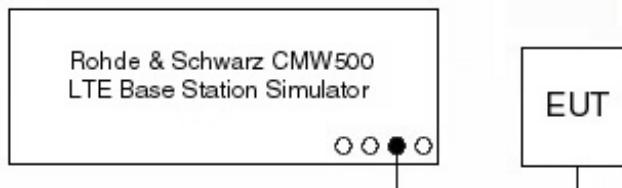


Figure 6-1. Conducted Output Power Test Setup Diagram

	Freq. (MHz)	MCS Level	Mod.	BW	RB Size	RB Offset	Maximum Average Power [dBm]
High Channel	795.5	0	QPSK	5 MHz	1	0	23.77
	795.5	11	16QAM	5 MHz	1	0	23.60
	795.5	0	QPSK	5 MHz	1	24	24.21
	795.5	11	16QAM	5 MHz	1	24	24.04
	795.5	0	QPSK	5 MHz	12	6	23.28
	795.5	11	16QAM	5 MHz	12	6	23.31
	795.5	0	QPSK	5 MHz	25	0	23.51
	795.5	11	16QAM	5 MHz	25	0	23.62

Table 6-2. Maximum Average Conducted Output Power

FCC ID: BV8BBPBM100		FCC Pt. 90 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1110271887-R4.BV8	Test Dates: Oct. 24, 2011 – Jan. 16, 2012	EUT Type: Wireless Module		Page 12 of 25



6.3 Effective Radiated Power Output Data

§90.542

According to §90.542(6) & §90.542(7) the ERP of devices operating in the 763 – 768 MHz and 793 – 798 MHz band must be limited to 30 Watts for Control and Mobile stations and 3 Watts for Portable Stations. Table 6-2 shows the maximum ERP for this device as based on the conducted output power and the maximum gain antennas that may be supplied with the device.

Frequency (MHz)	Mode	Modulation	Measured Conducted Power (dBm)	Max Antenna Gain (dBi)	Max EIRP (dBm)	Max ERP (dBm)	Max ERP (Watts)
795.5	LTE Band 14	QPSK	24.21	9.23	33.44	31.30	1.349
795.5	LTE Band 14	16-QAM	24.04	9.23	33.27	31.13	1.297

Table 6-3. Effective Radiated Power Output Data (Using Measured Conducted Power)

Frequency (MHz)	Mode	Modulation	Measured Conducted Power (dBm)	Max Antenna Gain (dBi)	Max EIRP (dBm)	Max ERP (dBm)	Max ERP (Watts)
795.5	LTE Band 14	QPSK	25.00	9.23	34.23	32.09	1.618
795.5	LTE Band 14	16-QAM	25.00	9.23	34.23	32.09	1.618

Table 6-4. Effective Radiated Power Output Data (Using Maximum Conducted Power)

FCC ID: BV8BBPBM100		FCC Pt. 90 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1110271887-R4.BV8	Test Dates: Oct. 24, 2011 – Jan. 16, 2012	EUT Type: Wireless Module		Page 13 of 25



6.4 Radiated Spurious Emissions

§2.1053, §90.543(c)

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 795.50 MHz
 BW / MODULATION SIGNAL: 5MHz QPSK
 DISTANCE: 3 meters
 LIMIT: -13.00 dBm

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	Margin (dB)
2386.50	-53.78	8.51	-45.26	V	-32.3
4116.50	-52.35	8.66	-43.70	V	-30.7
5846.50	-89.57	8.96	-80.60	V	-67.6
7576.50	-90.84	11.19	-79.65	V	-66.6

Table 6-5. 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.

This unit was tested while powered by a DC power supply. The EUT was tested in three orthogonal planes and in all test configurations and positioning. The worst case emissions were found while testing in QPSK modulation, 1RB size, and 0 RB Offset. The worst case emissions were found with the EUT in the horizontally flat position, with the antenna sitting vertical. The data reported in the table above was measured in this test setup.

FCC ID: BV8BBPBM100		FCC Pt. 90 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1110271887-R4.BV8	Test Dates: Oct. 24, 2011 – Jan. 16, 2012	EUT Type: Wireless Module		Page 14 of 25



6.5 Radiated Spurious Emissions in 1559 – 1610MHz Band

§2.1053, §90.543(f)

All spurious emissions found in the 1559-1610 MHz band were wideband emissions and the limit of -70dBW/MHz (-40dBm/MHz) was applied. Measurements in table below utilized resolution bandwidth of 1MHz.

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY:	795.50	MHz
BW / MODULATION:	5 MHz QPSK	
DISTANCE:	3	meters
NARROWBAND EMISSION LIMIT:	-50	dBm
WIDEBAND EMISSION LIMIT:	-40	dBm/MHz

FREQ (MHz)	EMISSION TYPE	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	MARGIN (dB)
1586.70	WIDEBAND	-54.60	8.45	-46.15	V	-6.15
1595.50	WIDEBAND	-55.16	8.46	-46.69	V	-6.69

Table 6-6. 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.

This unit was tested while powered by a DC power supply. The EUT was tested in three orthogonal planes and in all test configurations and positioning. The worst case emissions were found while testing in QPSK modulation, 1RB size, and 24 RB Offset. The worst case emissions were found with the EUT in the horizontally flat position, with the antenna sitting vertical. The data reported in the table above was measured in this test setup.

FCC ID: BV8BBPBM100		FCC Pt. 90 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1110271887-R4.BV8	Test Dates: Oct. 24, 2011 – Jan. 16, 2012	EUT Type: Wireless Module		Page 15 of 25



6.6 Frequency Stability Measurements

§2.1055, §90.539(e)

OPERATING FREQUENCY: 795,500,000 Hz

REFERENCE VOLTAGE: 3.3 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.30	+ 20 (Ref)	795,500,005	5	0.000001
100 %		- 30	795,500,007	7	0.000001
100 %		- 20	795,500,009	9	0.000001
100 %		- 10	795,500,003	3	0.000000
100 %		0	795,500,006	6	0.000001
100 %		+ 10	795,500,012	12	0.000002
100 %		+ 20	795,500,010	10	0.000001
100 %		+ 30	795,500,003	3	0.000000
100 %		+ 40	795,500,012	12	0.000002
100 %		+ 50	795,500,011	11	0.000001
115 %		+ 20	795,500,003	3	0.000000
85 %	2.80	+ 20	795,500,002	2	0.000000

Table 6-7. Frequency Stability Data

FCC ID: BV8BBPBM100		FCC Pt. 90 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1110271887-R4.BV8	Test Dates: Oct. 24, 2011 – Jan. 16, 2012	EUT Type: Wireless Module		Page 16 of 25

Frequency Stability Measurements (Cont'd)

§2.1055, §90.539(e)

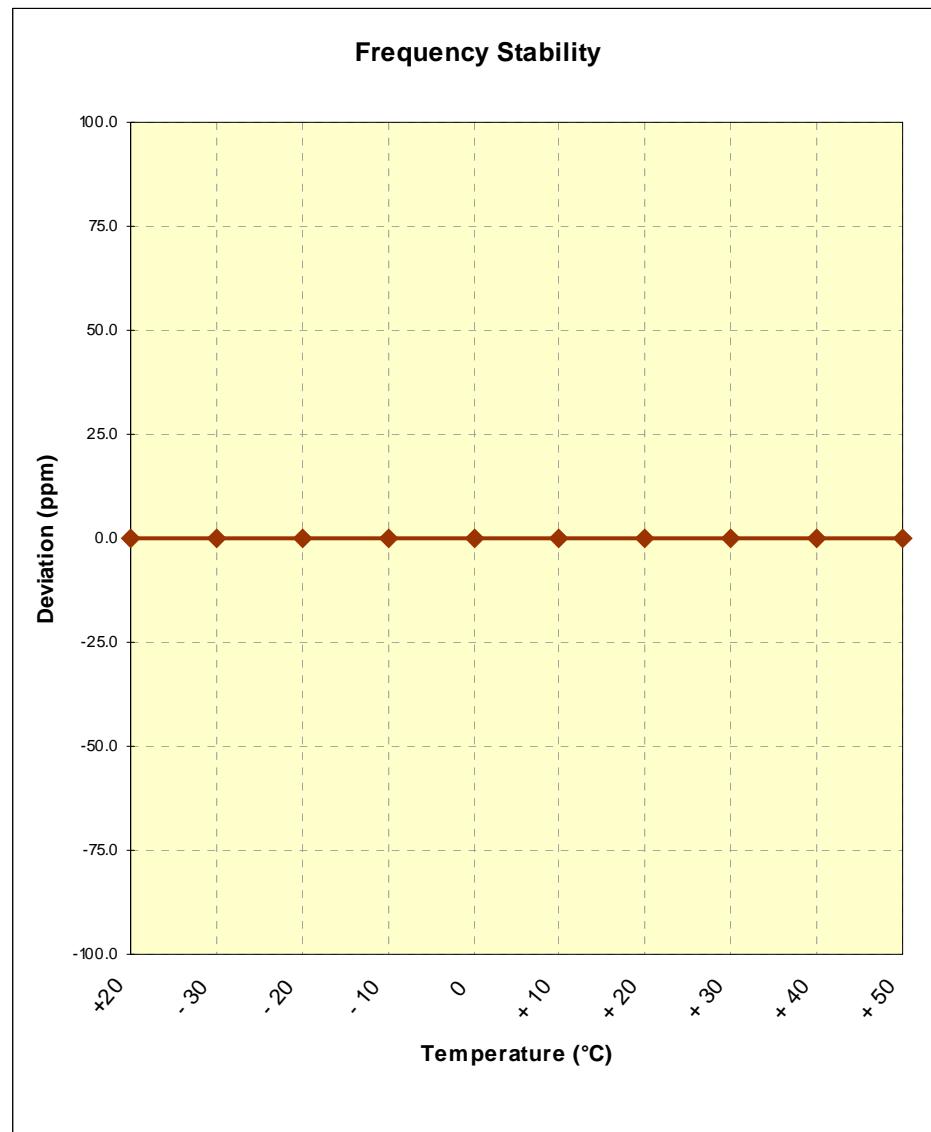
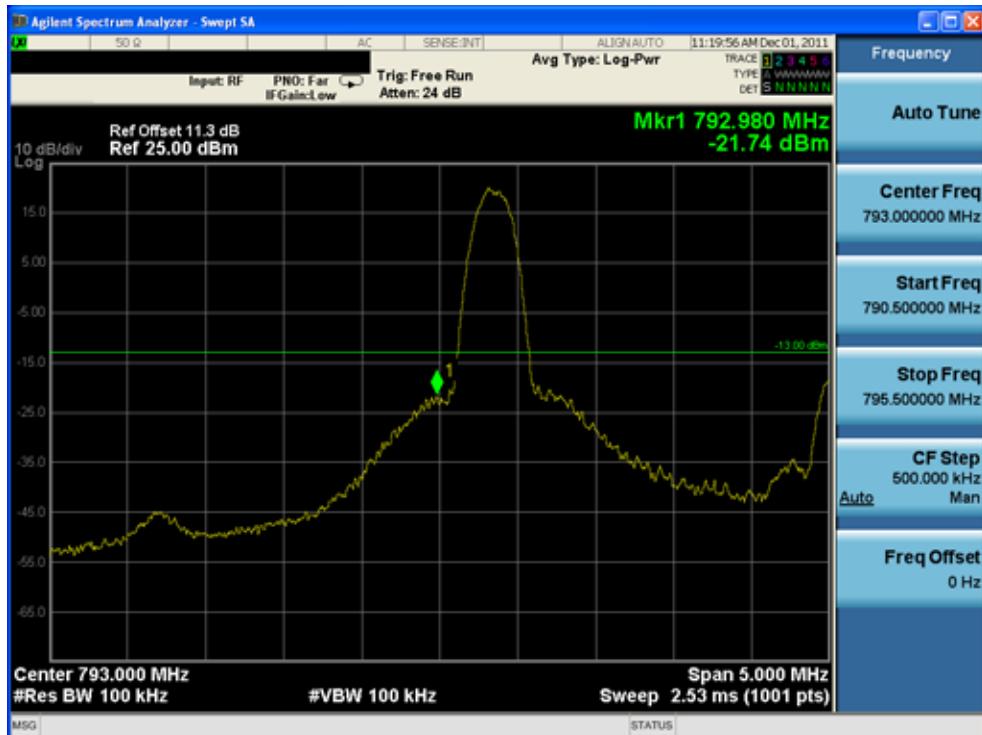


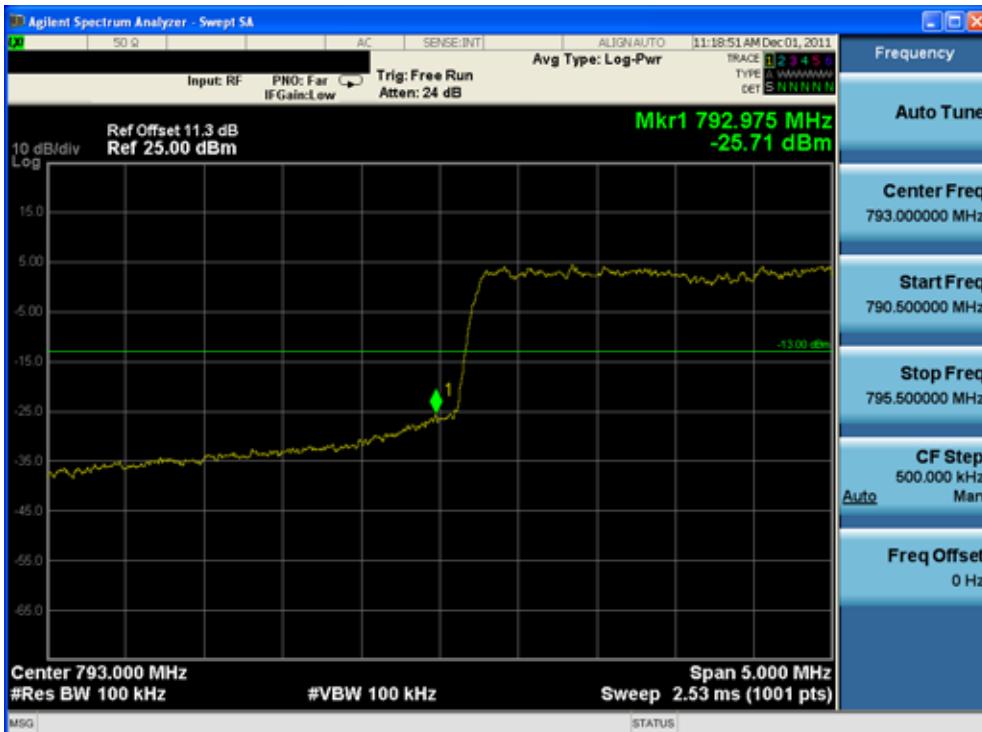
Figure 6-2. Frequency Stability Graph

FCC ID: BV8BBPBM100		FCC Pt. 90 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1110271887-R4.BV8	Test Dates: Oct. 24, 2011 – Jan. 16, 2012	EUT Type: Wireless Module		Page 17 of 25

7.0 PLOT(S) OF EMISSIONS

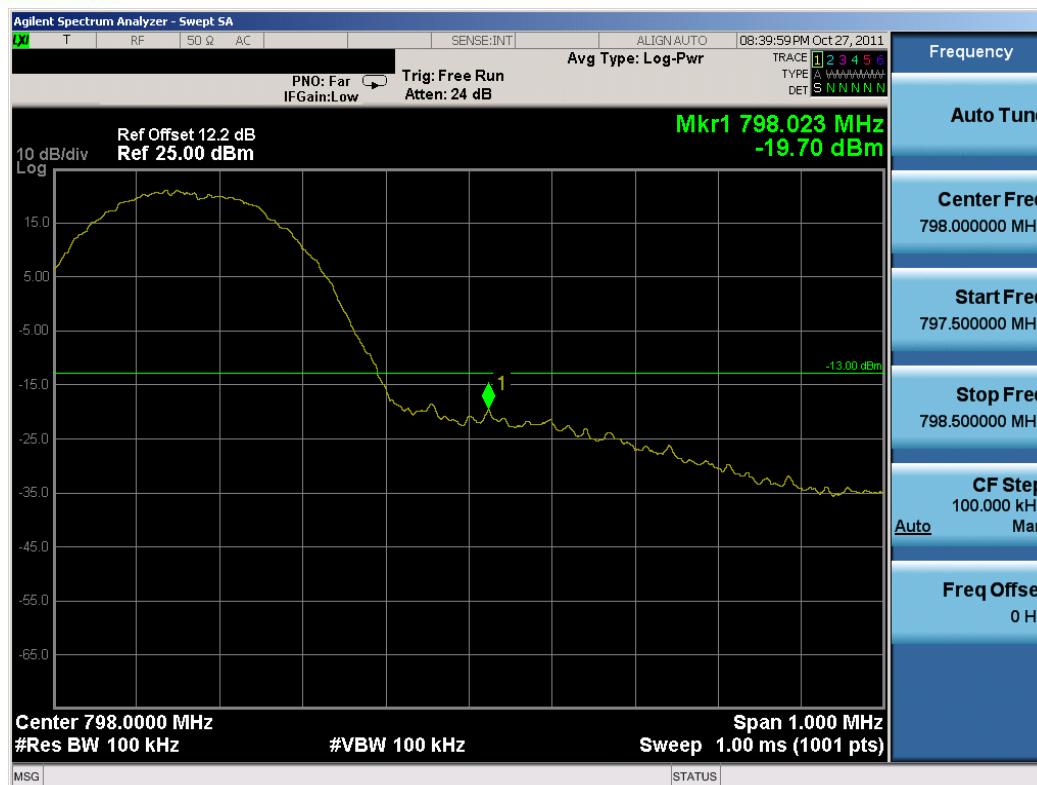


Plot 7-1. Lower Band Edge Plot (QPSK, 1RB, Offset 24)



Plot 7-2. Lower Band Edge Plot (QPSK, 25RB)

FCC ID: BV8BBPBM100		FCC Pt. 90 LTE MEASUREMENT REPORT (CERTIFICATION)	HARRIS	Reviewed by: Quality Manager
Test Report S/N: 0Y1110271887-R4.BV8	Test Dates: Oct. 24, 2011 – Jan. 16, 2012	EUT Type: Wireless Module		Page 18 of 25



Plot 7-3. Upper Band Edge Plot (QPSK, 1RB, Offset 24)

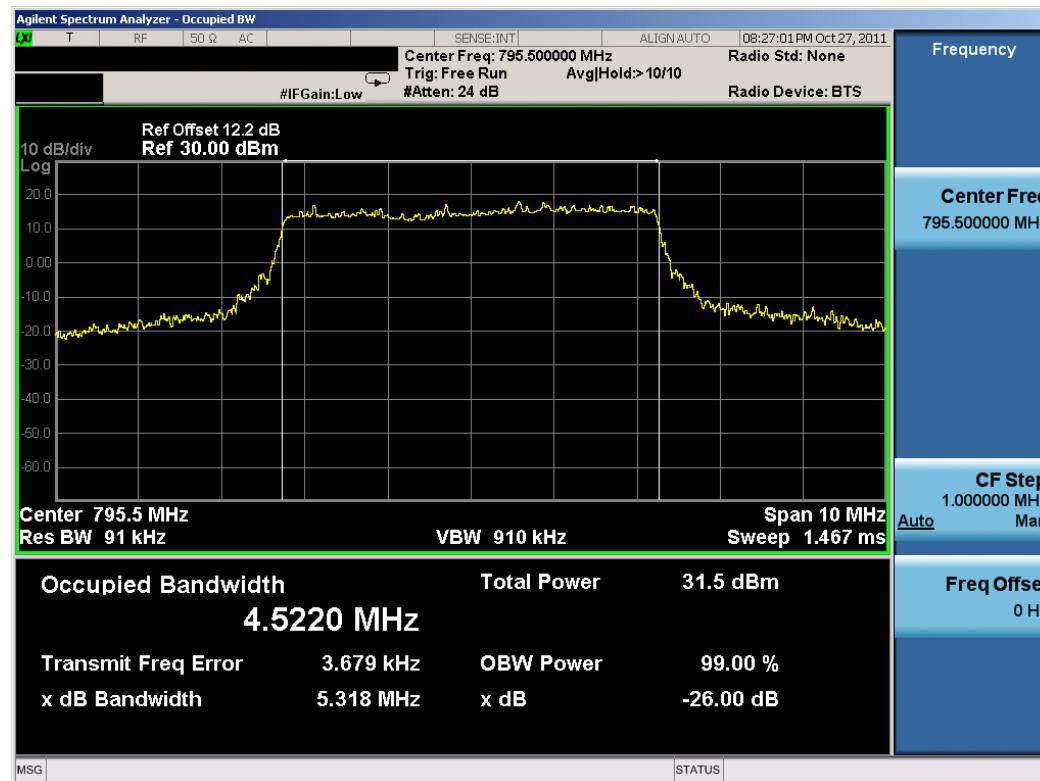


Plot 7-4. Upper Band Edge Plot (QPSK, 25RB)

FCC ID: BV8BBPBM100		FCC Pt. 90 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1110271887-R4.BV8	Test Dates: Oct. 24, 2011 – Jan. 16, 2012	EUT Type: Wireless Module		Page 19 of 25



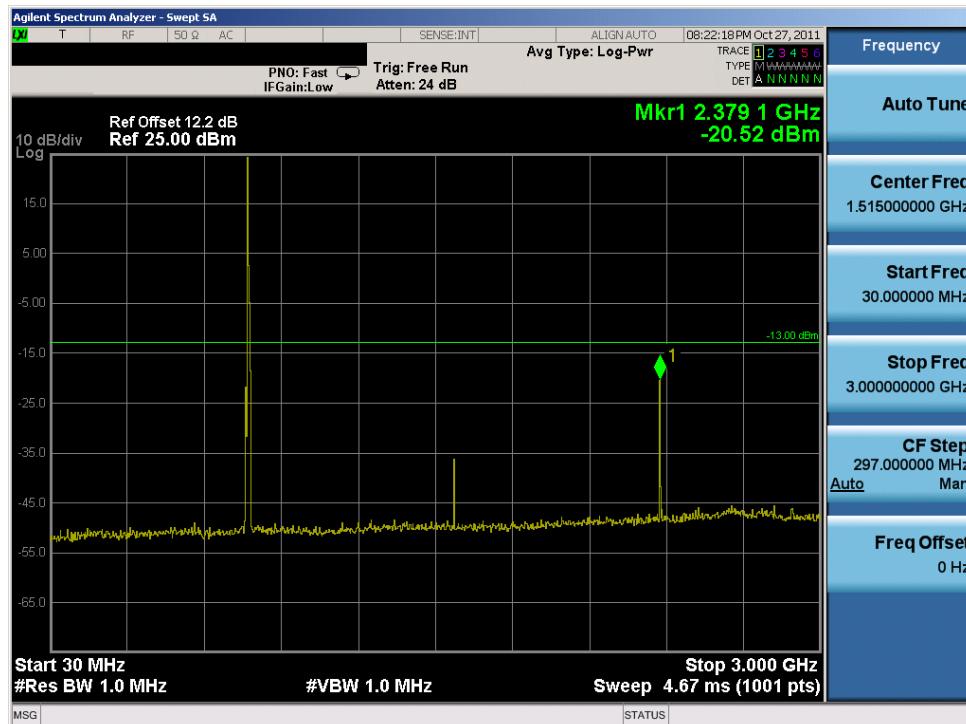
Plot 7-5. Occupied Bandwidth Plot (QPSK)



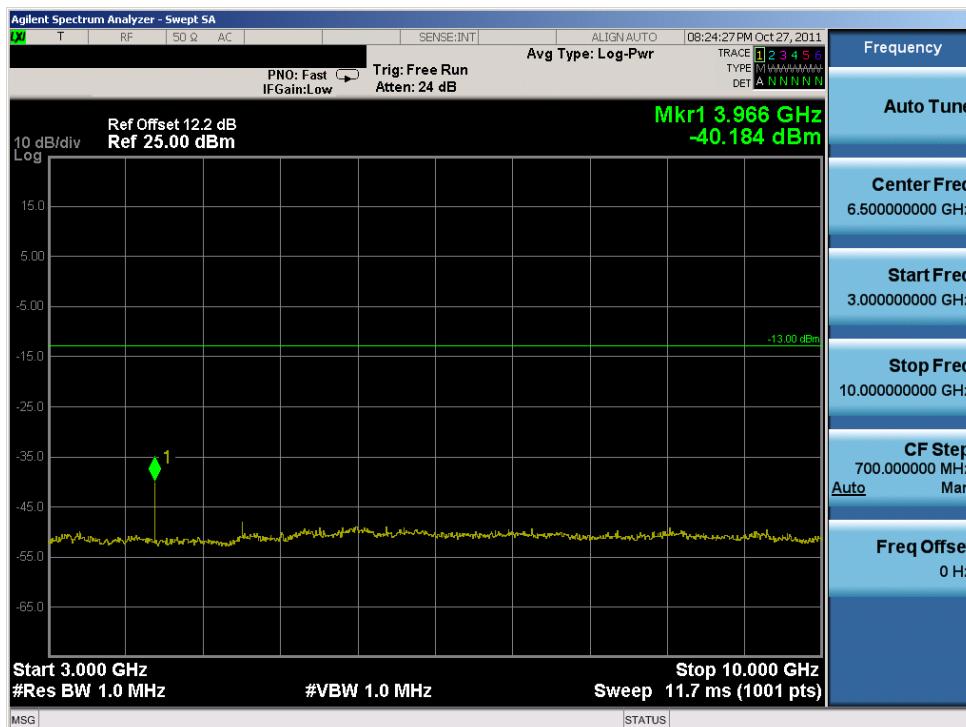
Plot 7-6. Occupied Bandwidth Plot (16QAM)

FCC ID: BV8BBPBM100		FCC Pt. 90 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1110271887-R4.BV8	Test Dates: Oct. 24, 2011 – Jan. 16, 2012	EUT Type: Wireless Module		Page 20 of 25

Out-of-Band Spurious Emissions Note: For the following conducted spurious emission plots, all modulations and RB configurations were tested. Worst case emissions were found in 16-QAM modulation, 1RB, and 0 RB Offset. Worst case plots are reported below:



Plot 7-7. Conducted Spurious Plot



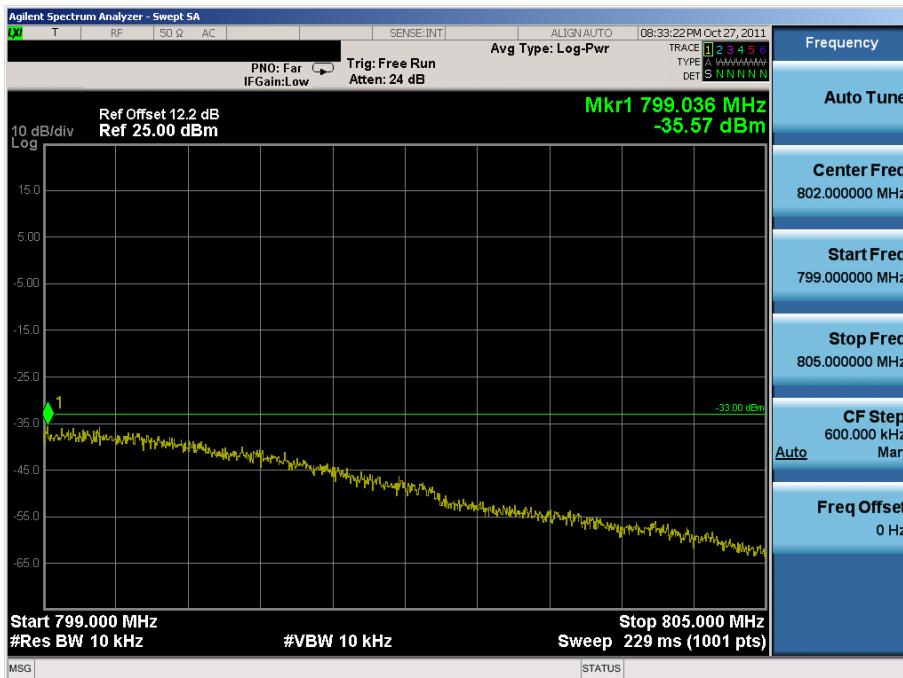
Plot 7-8. Conducted Spurious Plot

FCC ID: BV8BBPBM100		FCC Pt. 90 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1110271887-R4.BV8	Test Dates: Oct. 24, 2011 – Jan. 16, 2012	EUT Type: Wireless Module		Page 21 of 25

Emissions Mask Note: For the following conducted emissions plots in the 769-775MHz and 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 $-35\text{dBm} + 2.04\text{dB} = -32.96\text{dBm}$.

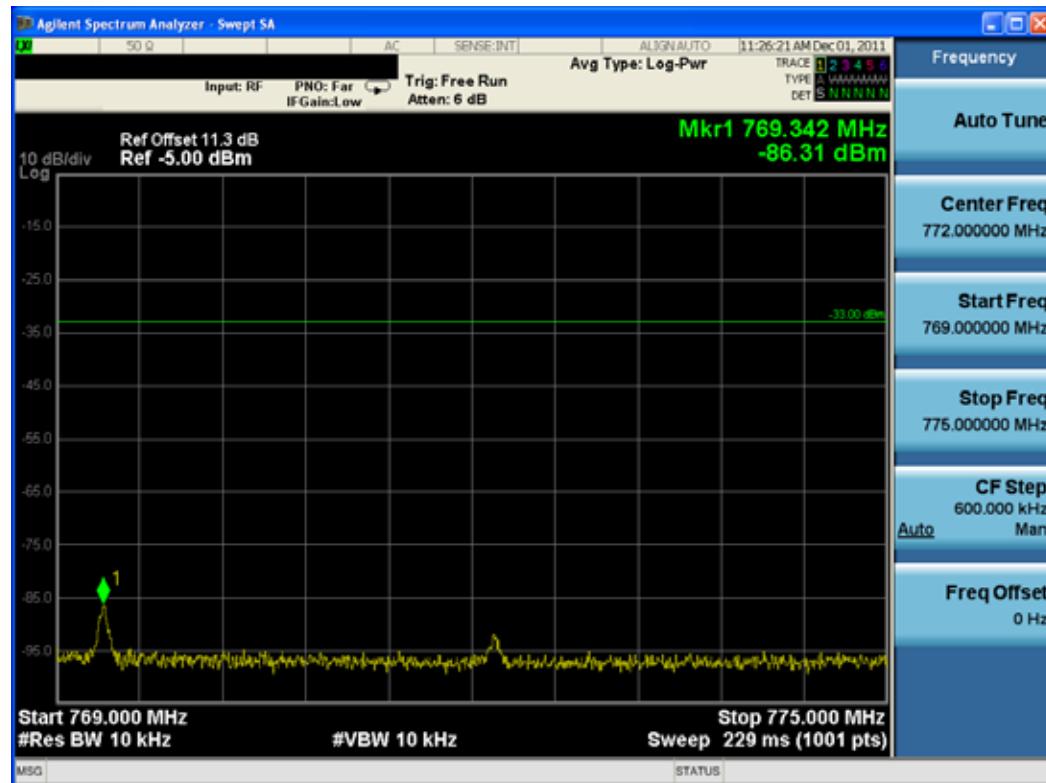


Plot 7-9. Conducted Emissions Mask (799-805 MHz) Plot (QPSK, 1RB, Offset 24)



Plot 7-10. Conducted Emissions Mask (799-805 MHz) Plot (QPSK, 25RB)

FCC ID: BV8BBPBM100		FCC Pt. 90 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1110271887-R4.BV8	Test Dates: Oct. 24, 2011 – Jan. 16, 2012	EUT Type: Wireless Module		Page 22 of 25



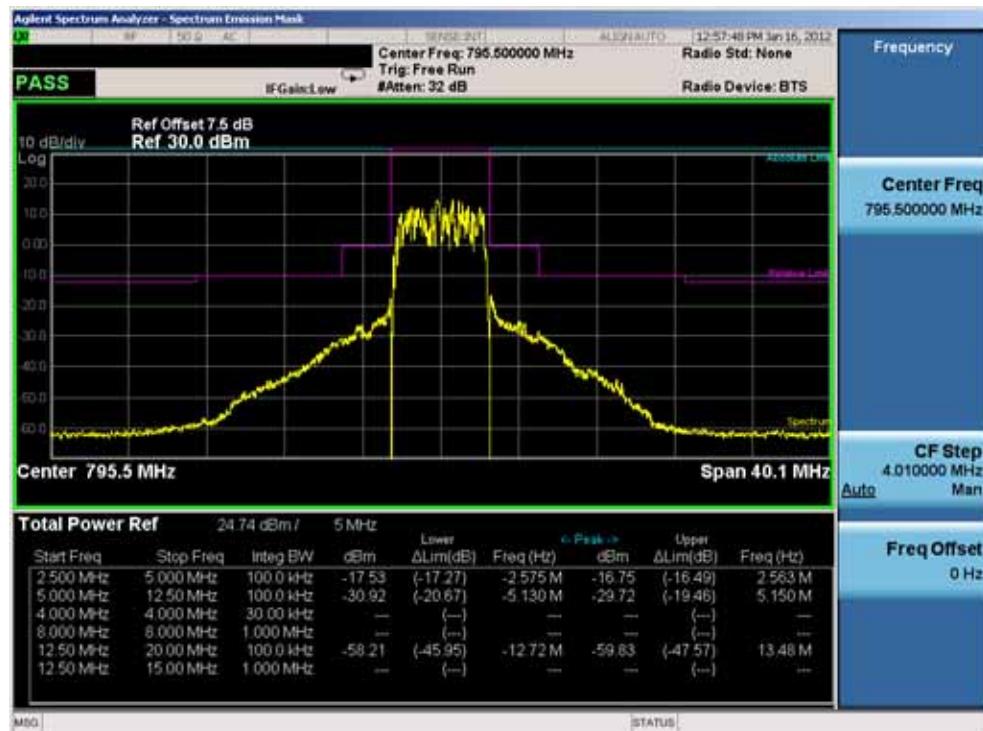
Plot 7-11. Conducted Emissions Mask (769-775 MHz) Plot (QPSK, 1RB, Offset 0)



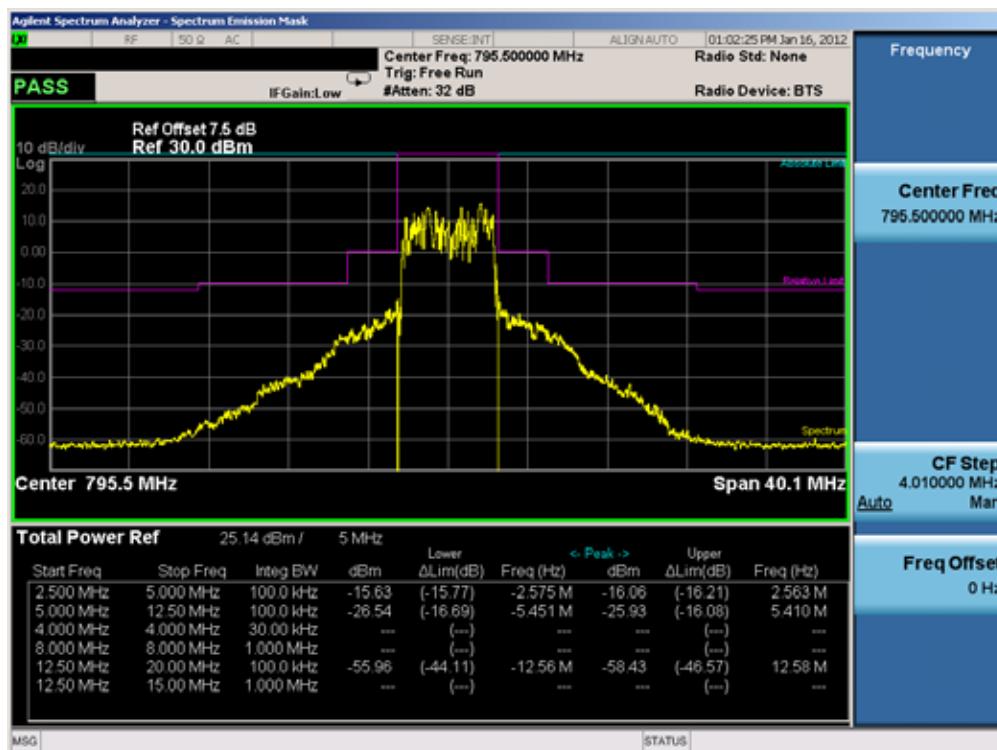
Plot 7-12. Conducted Emissions Mask (769-775 MHz) Plot (QPSK, 25RB)

FCC ID: BV8BBPBM100		FCC Pt. 90 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1110271887-R4.BV8	Test Dates: Oct. 24, 2011 – Jan. 16, 2012	EUT Type: Wireless Module		Page 23 of 25

Emissions Mask B Note: The following plots show compliance for Part 90.210(n). Different RB sizes and RB offsets were investigated. Worse case emissions are reported below with RB size = 25.



Plot 7-13. Emissions Mask B Plot (QPSK, 25RB)



Plot 7-14. Emissions Mask B Plot (16QAM, 25RB)

FCC ID: BV8BBPBM100		FCC Pt. 90 LTE MEASUREMENT REPORT (CERTIFICATION)	Reviewed by: Quality Manager
Test Report S/N: 0Y1110271887-R4.BV8	Test Dates: Oct. 24, 2011 – Jan. 16, 2012	EUT Type: Wireless Module	Page 24 of 25



8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Harris Wireless Module** **FCC ID: BV8BBPBM100** complies with all the requirements of Parts 2 and 90 of the FCC rules.

FCC ID: BV8BBPBM100		FCC Pt. 90 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1110271887-R4.BV8	Test Dates: Oct. 24, 2011 – Jan. 16, 2012	EUT Type: Wireless Module		Page 25 of 25