

FCC CFR47 PART 27 SUBPART M CLASS II PERMISSIVE CHANGE CERTIFICATION TEST REPORT

FOR

USB MODEM WITH EXTERNAL MULTI-BAND DIPOLE ANTENNAS

MODEL NUMBER: AC250U

FCC ID: N7NAC250U

REPORT NUMBER: 10U13459-3

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Prepared for

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Revision History

Rev.	Issue Date	Revisions	Revised By
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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SIERRA WIRELESS INC.

2200 FARADAY AVENUE, SUITE 150.

CARLSBAD, CA 92008, U.S.A.

EUT DESCRIPTION: USB MODEM WITH EXTERNAL MULTI-BAND DIPOLE

ANTENNAS

MODEL: AC250U

SERIAL NUMBER: 4

DATE TESTED: OCTOBER 26 TO 31, 2010

APPLICABLE STANDARDS

STANDARD

TEST RESULTS

FCC PART 27 SUBPART M

PASS

Compliance Certification Services (UL CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For UL CCS By: Tested By:

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MENGISTU MEKURIA EMC ENGINEER

UL CCS

THU CHAN
ENGINEERING MANAGER
UL CCS

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with TIA/EIA 603C (2004), FCC CFR 47 Part 2, FCC CFR 47 Part 27M.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB) 36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Multi band wireless modem that operates on CDMA2000 1xRTT, EVDO and WiMax networks. The USB modem is manufactured by Sierra Wireless.

5.2. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

The major change filed under this application is adding an external multi-band dipole antenna for AC250U.

5.3. MAXIMUM RF CONDUCTED OUTPUT POWER

The test measurement passed within \pm 0.5dBm of the original output power.

5.4. MAXIMUM OUTPUT POWER

The transmitter has a maximum EIRP as follows:

Mode	Channel	Frequency	EIRP	EIRP	
	Chamilei	(MHz)	(dBm)	(mW)	
5MHz QPSK	Mid	2593.00	24.70	295.12	
5MHz 16QAM	Mid	2593.00	24.50	281.84	
10MHz QPSK	Mid	2593.00	25.00	316.23	
10MHz 16QAM	Mid	2593.00	23.80	239.88	

Only the highest EIRP for each channel BW and modulation is listed above. Measured EIRP for L/M/H channel for each channel BW and modulation is documented in section 7.1 of test report.

5.5. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an external multi-band dipole antenna for the 2.5 GHz band with a maximum peak gain of 6.8dBi.

5.6. SOFTWARE AND FIRMWARE

The test utility software used during testing was 4.0 Beceem Diagnostic Control Panel Version 3.4.0.

5.7. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power.

Based on the EIRP results the worst-case is QPSK modulation for both 5 and 10MHz bands.

5.8. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST								
Description Manufacturer Model Serial Number FCC ID								
Laptop	IBM	Thinkpad T60	ZZ89085	DoC				
AC Adapter	IBM	92P1158	570002150B	DoC				
Dipole Antenna	Sierra Wireless	Clear	NA	NA				

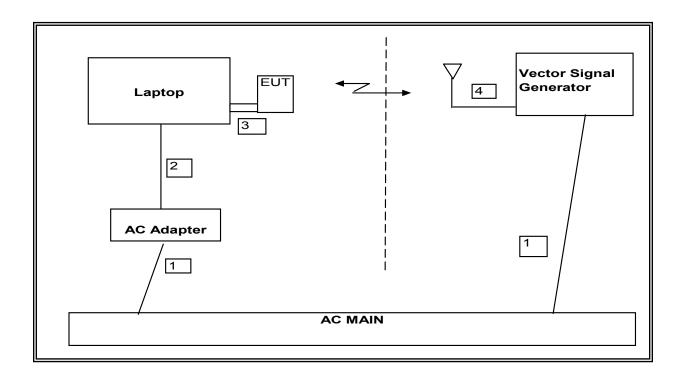
I/O CABLES (RF RADIATED TEST)

	I/O CABLE LIST							
Cable	Port	# of	Cable	Remarks				
No.		Identica	Туре	Type	Length			
		Ports						
1	AC	1	US 115V	Un-shielded	2.0m	NA		
2	DC	1	DC	Un-shielded	2.0m	Ferrite at one end		
3	Antenna Port	1	Dipole Antenna	Un-shielded	2.0m	NA		

TEST SETUP

The EUT is connected to the host laptop computer via USB cable during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST							
Description	Manufacturer	Model	Asset	Cal Due			
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	01/06/11			
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	07/14/11			
Antenna, Horn, 18 GHz	EMCO	3115	C00783	06/29/11			
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01016	07/12/11			
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	03/05/11			
EMI Test Receiver, 30 MHz	R&S	ESHS 20	N02396	05/06/11			
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	11/06/10			
LISN, 10 kHz~30 MHz	Solar	8012-50-R-24-BNC	N02481	11/06/10			
Highpass Filter, 4.0 GHz	Micro-Tronics	HPM13351	N02708	CNR			
Vector Signal Generator	Agilent / HP	E4438C	None	09/28/11			

7. RADIATED TEST RESULTS

7.1. RADIATED OUTPUT POWER (EIRP)

LIMITS

§2.1046 & §27.50 (h)(2) Mobile and other user stations. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

TEST PROCEDURE

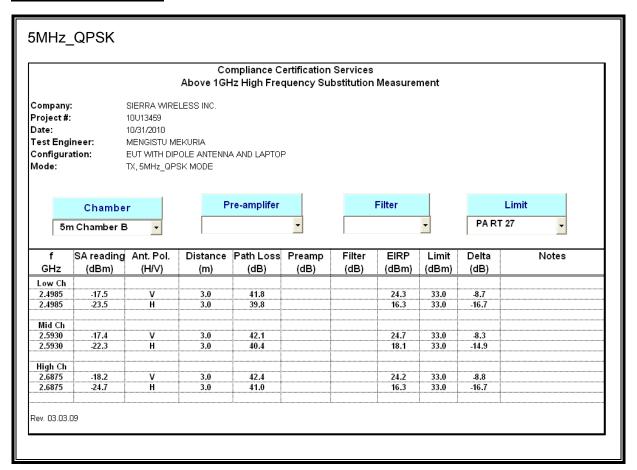
ANSI / TIA / EIA 603 Clause 2.2.17& FCC 27

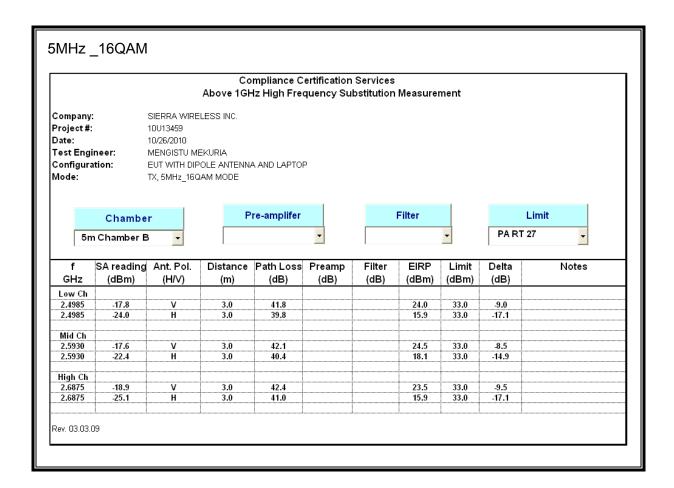
RESULTS

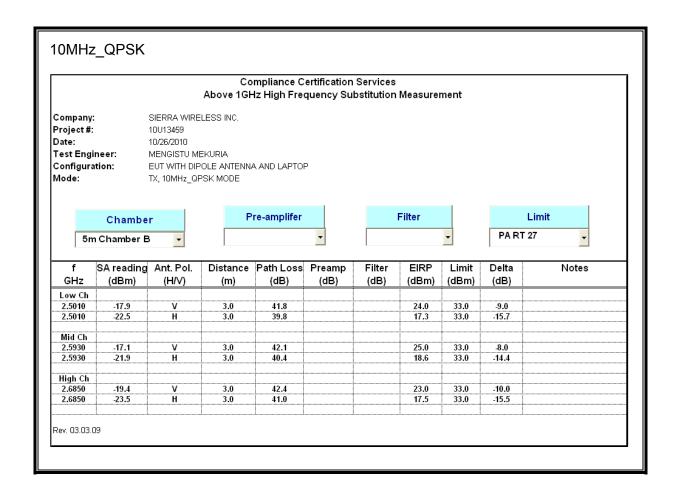
Measurement was made with ANT#1(PIFA) transmitting.

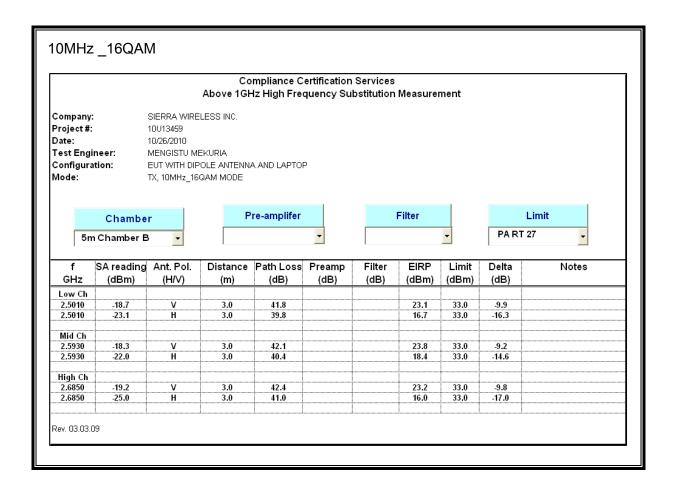
Mode	Channel Frequency		EIRP	EIRP
Wiode	Onamie	(MHz)	(dBm)	(mW)
	Low	2498.50	24.30	269.15
5MHz QPSK	Middle	2593.00	24.70	295.12
	High	2687.50	24.20	263.03
	Low	2498.50	24.00	251.19
5MHz 16QAM	Middle	2593.00	24.50	281.84
	High	2687.50	23.50	223.87
	Low	2501.50	24.00	251.19
10MHz QPSK	Middle	2593.00	25.00	316.23
	High	2685.00	23.00	199.53
	Low	2501.50	23.10	204.17
10MHz 16QAM	Middle	2593.00	23.80	239.88
	High	2685.00	23.20	208.93

OUTPUT POWER (EIRP)









7.2. FIELD STRENGTH OF SPURIOUS RADIATION

LIMIT

§2.1053

§27.53 (m)(4) For mobile digital stations, the attenuation factor shall be not less than 43 + 10 log (P) dB at the channel edge and 55 + 10 log (P) dB at 5.5 megahertz from the channel edges.

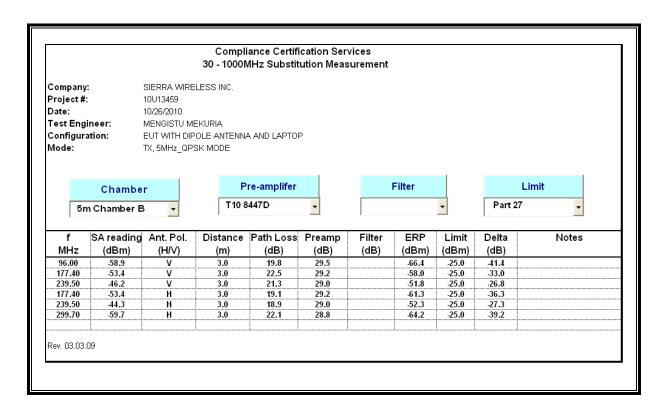
TEST PROCEDURE

ANSI / TIA / EIA 603 Clause 3.2.12 & FCC 27

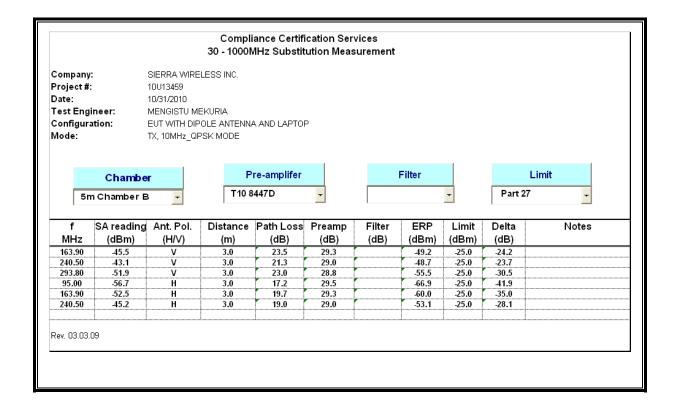
RESULTS

SPURIOUS & HARMONIC

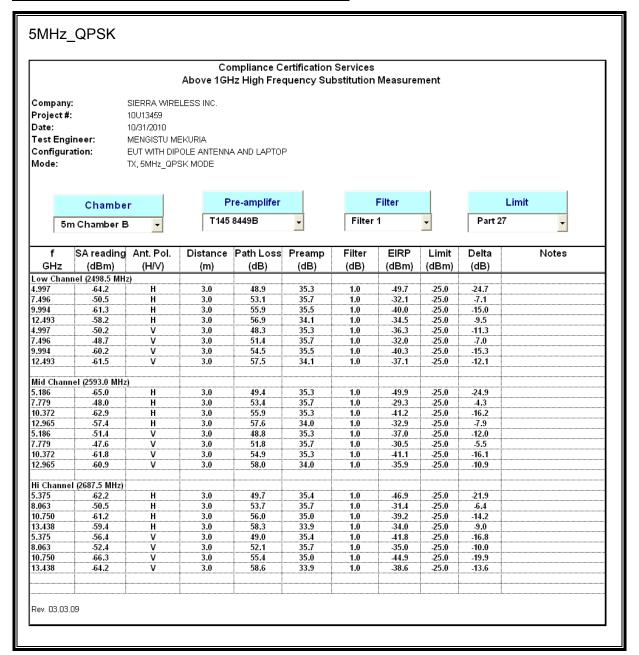
BELOW 1GHZ AT 5MHZ BANDWIDTH (WORST CASE)



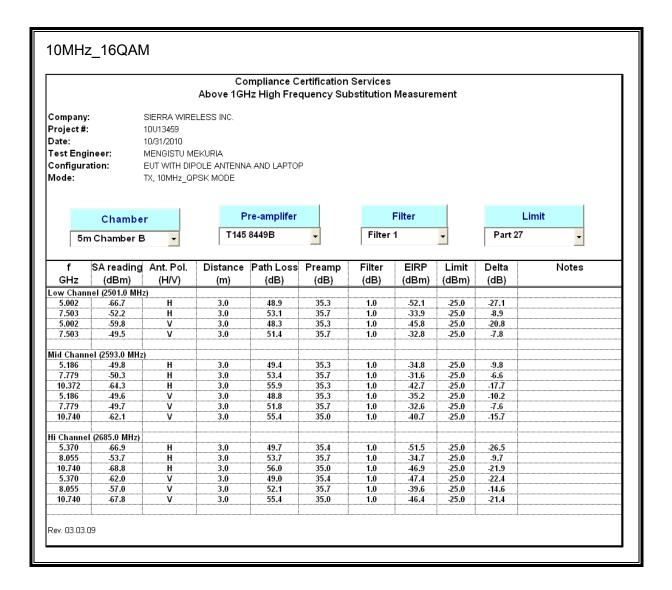
BELOW 1GHZ AT 10MHZ BANDWIDTH (WORST CASE)



ABOVE 1GHZ AT 5MHZ BANDWIDTH (WORST CASE)



ABOVE 1GHZ AT 10MHZ BANDWIDTH (WORST CASE)



8. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

Frequency of Emission (MHz)	Conducted I	.imit (dBuV)
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

Decreases with the logarithm of the frequency.

TEST PROCEDURE

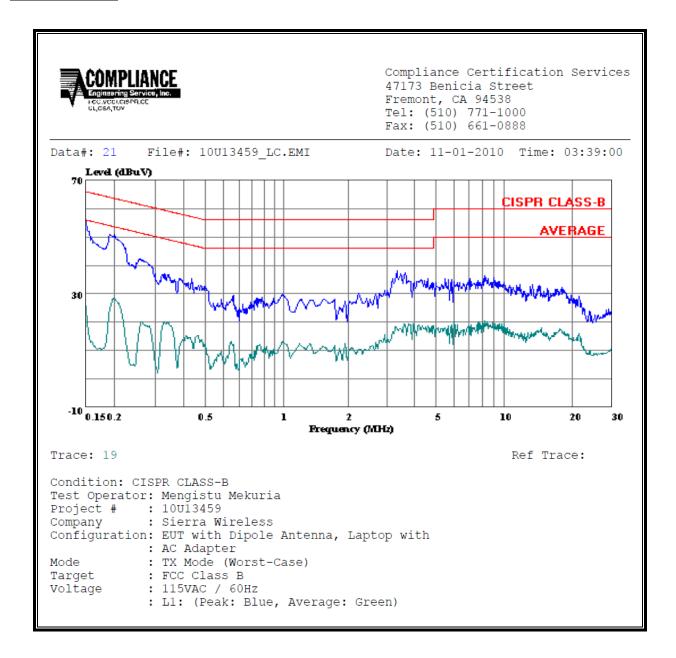
ANSI C63.4

RESULTS

6 WORST EMISSIONS

	CONDUCTED EMISSIONS DATA (115VAC 60Hz)								
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV(dB)	L1/L2
0.15	55.94		25.68	0.00	66.00	56.00	-10.06	-30.32	L1
0.19	50.78		28.47	0.00	63.91	53.91	-13.13	-25.44	L1
0.26	42.43		20.09	0.00	61.56	51.56	-19.13	-31.47	L1
0.15	56.14		25.35	0.00	66.00	56.00	-9.86	-30.65	L2
0.19	51.98		29.62	0.00	63.91	53.91	-11.93	-24.29	L2
0.26	44.10		22.25	0.00	61.56	51.56	-17.46	-29.31	L2
6 Worst l	6 Worst Data								

LINE 1 RESULTS



LINE 2 RESULTS

