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Report On

Partial Application for Grant of Equipment Authorization of the
Novatel Wireless Inc.

MT 3060 Asset locating and diagnostic data reporting device

FCC CFR 47 Part 2, Part 22 and Part 24
IC RSS-Gen, RSS-132 and RSS-133

Report No. SC1308862B_Rev1.0

September 2013



REPORT ON Radio Testing of the
Novatel Wireless Inc.
Asset locating and diagnostic data reporting device

TEST REPORT NUMBER SC1308862B_Rev1.0

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Title: EMC Manager

DATED

September 30th, 2013



Revision History

SC1308862B_Rev1.0 Novatel Wireless Inc. MT 3060 Asset locating and diagnostic data reporting device					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
09/13/2013	Initial Release				Fleury Chip
09/30/13	Initial Release	1.0	Remove reference in related documents section: UNII KDB N/A	6	Fleury Chip



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SECTION 1

REPORT SUMMARY

Radio Testing of the
Novatel Wireless Inc.
Asset locating and diagnostic data reporting device



1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Novatel Wireless Inc. Asset locating and diagnostic data reporting device to the requirements of the following:
FCC CFR 47 Part 2, Part 22 and Part 24

Objective	To perform limited Radio Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out. Note.- This is a partial report and Only covering PAR measurements to complement reports W7005-1 and W7005-2 from the original modular approval performed from NTS Labs . RF Power Output at antenna terminal were also recalculated to obtain Average values from Peak values from original reports by using the maximum PAR obtained in this report.
Manufacturer	Novatel Wireless Inc.
Model Number(s)	GSM2398-00
FCC ID Number	PKRNVWGS2398
IC Number	3229A-GSM2398
Serial Number(s)	Engineering Sample
Number of Samples Tested	1
Test Specification/Issue/Date	<ul style="list-style-type: none">• FCC CFR 47 Part 2, Part 22 and Part 24 (October 1, 2011).• RSS-132 - Cellular Telephones Employing New Technologies Operating in the Bands 824-849 MHz and 869-894 MHz (Issue 2, September 2005).• RSS-133 – 2 GHz Personal Communications Services (Issue 5, February 2009).• RSS-Gen - General Requirements and Information for the Certification of Radio Apparatus (Issue 3, December 2010).
Start of Test	September 13, 2013
Finish of Test	September 13, 2013
Name of Engineer(s)	Juan Manuel Gonzalez
Related Document(s)	<ul style="list-style-type: none">• Supporting documents for EUT certification are separate exhibits.



1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the limited tests carried out in accordance with FCC CFR 47 Part 2, Part 22 and Part 24 with cross-reference to the corresponding IC RSS standard is shown below.

Section	FCC Part Sections(s)	RSS Section(s)	Test Description	Result
2.1	2.1046	RSS-132(4.4),RSS-133(4.1)	Transmitter Conducted Output Power	Compliant (NTS Test Report W7005-1 & -2)
2.2	24.232(d)	RRSS-133(6.4)	Peak-Average Ratio	Compliant



1.3 PRODUCT INFORMATION

1.3.1 EUT General Description

The Equipment Under Test (EUT) was an Novatel Wireless Inc. MT 3060 Asset locating and diagnostic data reporting device for the Usage Based Insurance (UBI), telematics, and fleet management markets. It has embedded GSM0308 modules that provide the cellular (GSM/GPRS) functionality. The GSM2398-00 provides GPS radio functionality.

The GSM2398-00 is intended to be connected to a vehicle's OBD-II connection port, and has the following:

- On-Board Diagnostics II interface
- Three LEDs (the fourth location marked for Bluetooth is not populated)
- Modem Antenna
- GPS Antenna
- SIM Interface

1.3.2 EUT General Description

EUT Description	MT 3060 Asset locating and diagnostic data reporting device
Model Number(s)	GSM2398-00
FCC Classification	PCB - PCS Licensed Transmitter
Rated Voltage	+12VDC /2.0A (AC-DC Converter 100-240VAC 50-60Hz 0.8A)
Mode	GSM850 & GSM1900
Capability	GPS, GSM850 & GSM1900.
Frequency Tolerance	±0.00025% (2.5ppm)
Primary Unit (EUT)	<input type="checkbox"/> Production <input type="checkbox"/> Pre-Production <input checked="" type="checkbox"/> Engineering



Internal Antennas Details

(Client declaration, max. antenna gain covered under this test report)

Type: PIFA

Dimensions: (20.8) mm x (39.4) mm x (0.15) mm

Antenna Gain:

- GSM – 850MHz: -2.6dBi
- GSM – 1900MHz: 1.34dBi



1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	Description
A	Radiated test setup. EUT connected wirelessly with the wideband radio communication tester (CMW500, Tx a max power and connected to supply DC power adapter). Power meter connected directly to CMW500.

1.4.2 EUT Exercise Software

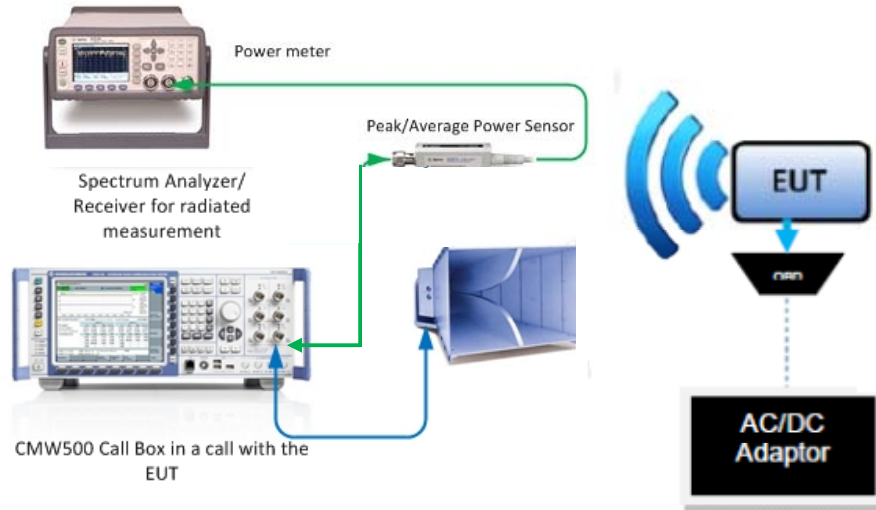
None

1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description

1.4.4 Simplified Test Configuration Diagram

Radiated Emissions Test Set up





1.5 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

1.6 MODIFICATION RECORD

Description of Modification	Modification Fitted By	Date Modification Fitted
Serial Number Engineering Sample		
N/A		

The table above details modifications made to the EUT during the test programme. The modifications incorporated during each test (if relevant) are recorded on the appropriate test pages.

1.7 TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements by Substitution method were conducted according to ANSI/TIA/EIA-603-C-2004, August 17,2004. Land Mobile FM or PM -Communications Equipment -Measurement and Performance Standards. For conducted and radiated emissions the equipment under test (EUT) was configured to measure its highest possible emission level. This level was based on the maximized cable configuration from exploratory testing per ANSI C63.4-2009. The test modes were adapted according to the Operating Instructions provided by the manufacturer/client.

1.8 TEST FACILITY

1.8.1 FCC – Registration No.: US5296

TUV SUD America Inc. (San Diego), a \$2.498 listed test firm operates the EMC Laboratory registered under Sony Electronics Inc. Product Quality Division EMC. This laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is US5296.

1.8.2 Industry Canada (IC) Registration No.: 3067A-1

The 10m Semi-anechoic chamber of TUV SUD America Inc. (San Diego), has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No. 3067A-1.



1.9 SAMPLE CALCULATIONS

1.9.1 CDMA Emission Designator

Emission Designator = 1M30F9W
 F = Frequency Modulation
 9= Composite Digital Info
 W = Combination (Audio/Data)

1.9.2 Spurious Radiated Emission (below 1GHz)

Measuring equipment raw measurement (dBµV/m) @ 30 MHz		24.4
Correction Factor (dB)	Asset# 1066 (cable)	0.3
	Asset# 1172 (cable)	0.3
	Asset# 1016 (preamplifier)	-30.7
	Asset# 1175(cable)	0.3
	Asset# 1002 (antenna)	17.2
Reported QuasiPeak Final Measurement (dBµV/m) @ 30MHz		11.8

1.9.3 Spurious Radiated Emission – Substitution Method

Example = 84dBµV/m @ 1413 MHz (numerical sample only)

The field strength reading of 84dBµV/m @ 1413 MHz (2nd Harmonic of 706.5 MHz) is the maximized measurement when the EUT is on the turntable measured at 3 meters. The gain of the substituted antenna is 7.8dBi while the transmit cable loss is 1.0 dB (cable between signal generator and the substituted antenna). The signal generator level is adjusted until the 84dBµV/m level at the receiving end is replicated (identical test setup, i.e. same antenna, cable/s and preamp). If the adjusted signal generator level is -18dBm, then we have the following for both EIRP and ERP as required:

$$\begin{aligned}
 P_{EIRP} &= -18 \text{ dBm} + 7.8 \text{ dBi} - 1 \text{ dB} \\
 &= 11.2 \text{ dBm} \\
 P_{ERP} &= P_{EIRP} - 2.15 \text{ dB} \\
 &= 11.2 \text{ dBm} - 2.15 \text{ dB} \\
 &= 9.05 \text{ dBm}
 \end{aligned}$$



SECTION 2

TEST DETAILS

Radio Testing of the
Novatel Wireless Inc.
Asset locating and diagnostic data reporting device



2.1 TRANSMITTER CONDUCTED POWER MEASUREMENTS

2.1.1 Specification Reference

Part 2.1046

2.1.2 Standard Applicable

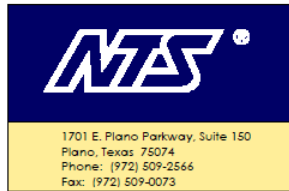
The conducted power measurements were made in accordance to FCC Part 2.1046, RSS-132 and RSS-133 and performed by NTS Laboratory (Reports W7005-1 & -2)

2.1.3 Additional Observations

- This test was performed using peak detector in the original modular approval and then Average data was calculated from PAR obtained in this test report.

2.1.4 Test Results

See attached table.



Certification Test Report

RSS 132, Issue 2
 RSS 133, Issue 3

Model: GSM0308-10 B2BRF
 GSM0308-11 B2BRF w/sim
 GSM0308-70 coax RF
 GSM0308-71 coax RF w/sim

IC CERTIFICATION NO. 4160A-GSM0308

Report Code: W7005-2

Revision: 1

Prepared for: Enfora, Inc.
 881 E. 18th St.
 Plano, TX 75074-5801

Author: Tom Tidwell, Manager of Wireless Services

Issued: 2 February 2007

A.8. Test Data

Channel	Modulation Mode	Limit (W)	Limit (dBm)	RF Power Output at Antenna Terminals (dBm)
128	GSM850	6.3	38.0	32.30
189	GSM850	6.3	38.0	31.93
251	GSM850	6.3	38.0	31.90
4	GSM1900	2.0	33.0	30.58
600	GSM1900	2.0	33.0	31.06
1196	GSM1900	2.0	33.0	31.17

Note: RF power output was measured using a peak rf power meter designed to quantify the true peak power using a high number of samples.

Test Date: 9 January, 2007

Calculated from Peak measurements using PAR data

Channel	Mode	RF Output dBm (PK)	PAR	RF Output dBm (AV)
128	GSM 850	32.3	5.78	26.52
189	GSM 850	31.93	5.95	25.98
251	GSM 850	31.90	5.75	26.15
4	GSM 1900	30.58	6.39	24.19
600	GSM 1900	31.06	6.08	24.98
1196	GSM 1900	31.17	4.70	26.47



2.2 PEAK-AVERAGE RATIO

2.2.1 Specification Reference

Part 24 Subpart E §24.232(d)

2.2.2 Standard Applicable

Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB

2.2.3 Equipment Under Test and Modification State

Serial No: Engineering Sample / Default Test Configuration

2.2.4 Date of Test/Initial of test personnel who performed the test

September 13, 2013/ JGM

2.2.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.6 Environmental Conditions

Ambient Temperature	24.3°C
Relative Humidity	50.4%
ATM Pressure	100.1 kPa

2.2.7 Additional Observations

- Measurement was done using the Power Meter PAR Function.
For GSM signals, an average and a peak trace are used to determine the largest deviation between the average and the peak power of the EUT in a bandwidth greater than the emission bandwidth.



- There are no measured PAR levels greater than 13dB. EUT complies.

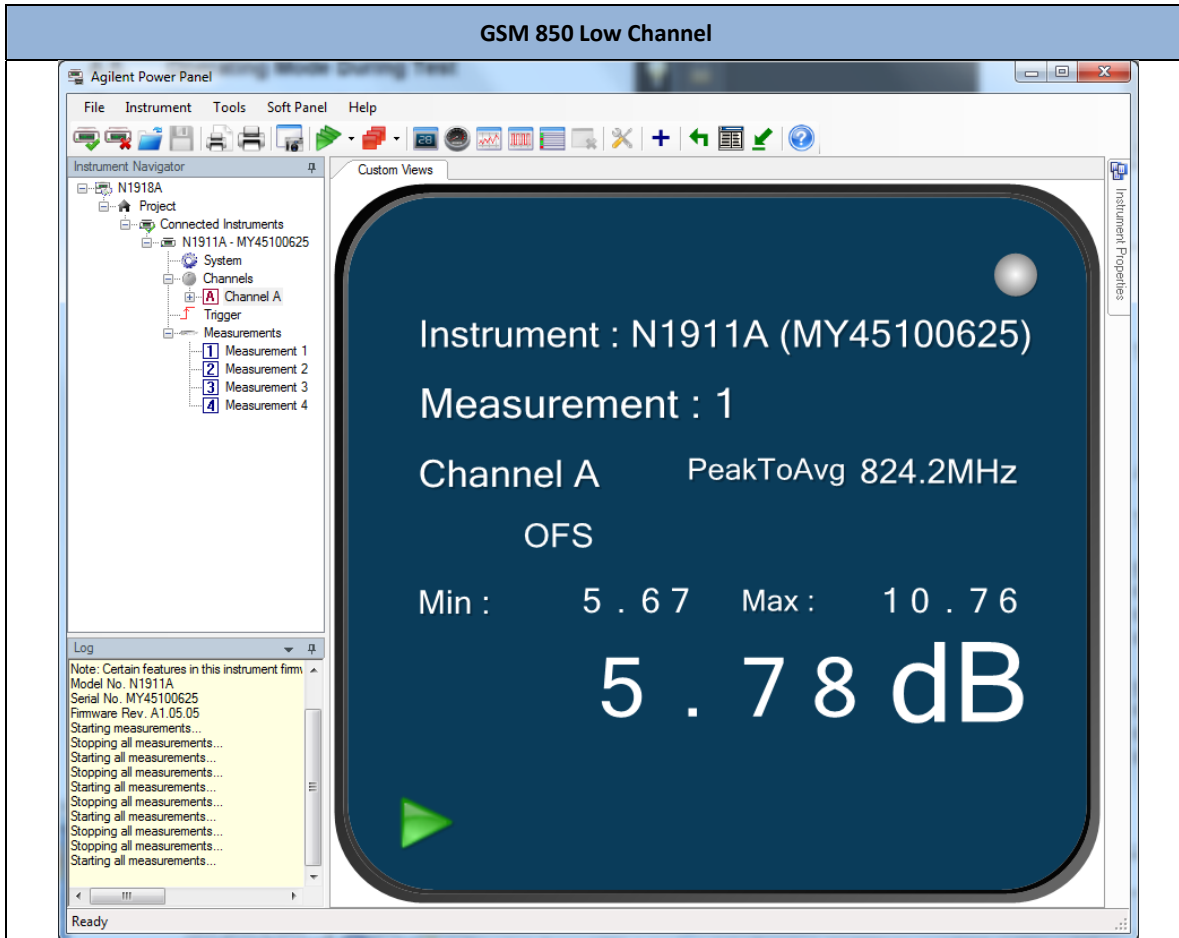
2.2.8 Test Results

The worst-case measured PARP level was performed each band (Cell and PCS).

See attached plots.



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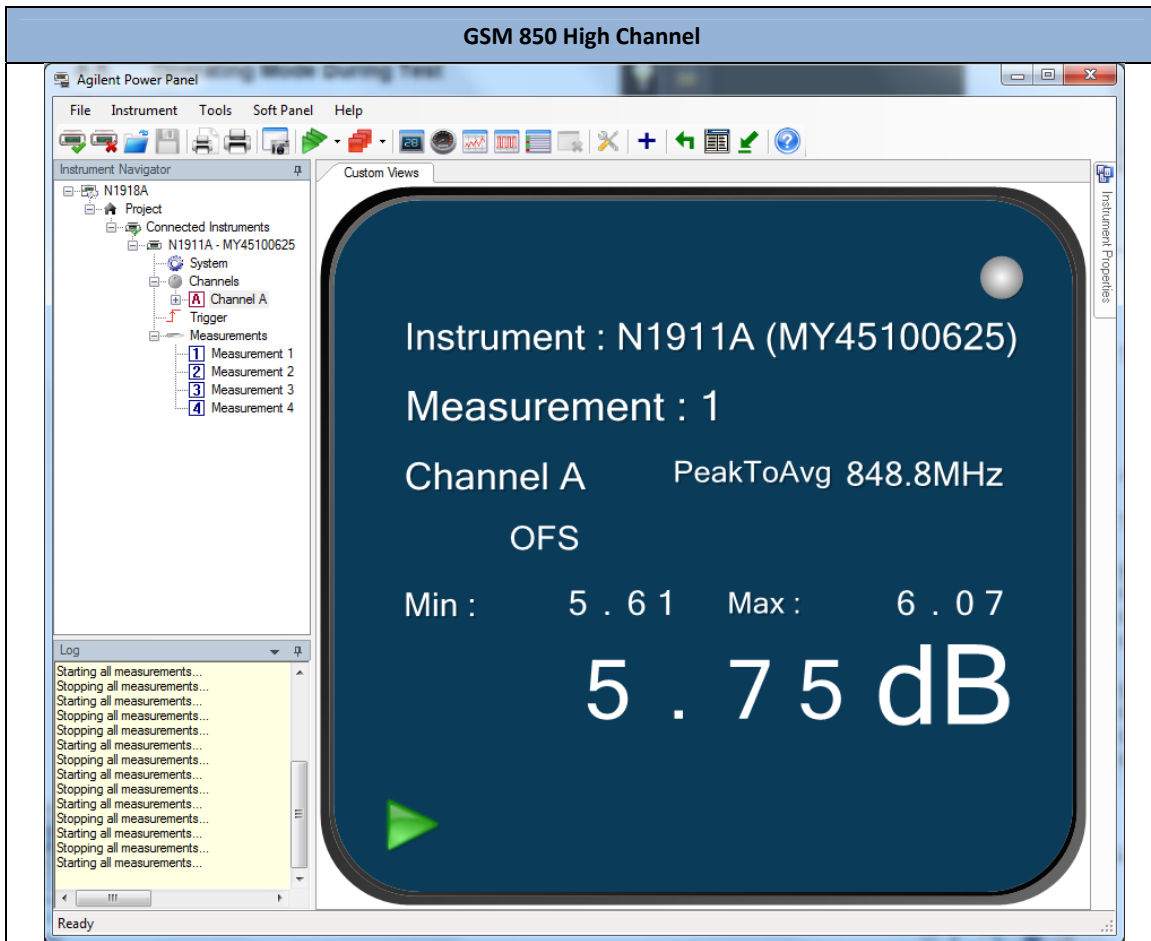
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GSM 850 Mid Channel

The screenshot displays the Agilent Power Panel software interface. The main display area shows the following measurement data:

- Instrument : N1911A (MY45100625)
- Measurement : 1
- Channel A PeakToAvg 836.4MHz
- OFS
- Min : 5 . 8 6 Max : 6 . 1 8
- 5 . 9 5 dB**

The interface includes an Instrument Navigator on the left showing a tree view with Project, Connected Instruments, System, Channels, Channel A, Trigger, and Measurements. A Log window at the bottom left shows a series of 'Starting all measurements...' and 'Stopping all measurements...' entries. The status bar at the bottom indicates 'Ready'.





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GSM 1900 Low Channel

Agilent Power Panel

File Instrument Tools Soft Panel Help

Instrument Navigator

- N1918A
 - Project
 - Connected Instruments
 - N1911A - MY45100625
 - System
 - Channels
 - Channel A
 - Trigger
 - Measurements
 - Measurement 1
 - Measurement 2
 - Measurement 3
 - Measurement 4

Custom Views

Instrument Properties

Instrument : N1911A (MY45100625)
Measurement : 1
Channel A PeakToAvg 1850MHz
OFS
Min : 6 . 2 6 Max : 7 . 2 4
6 . 3 9 dB

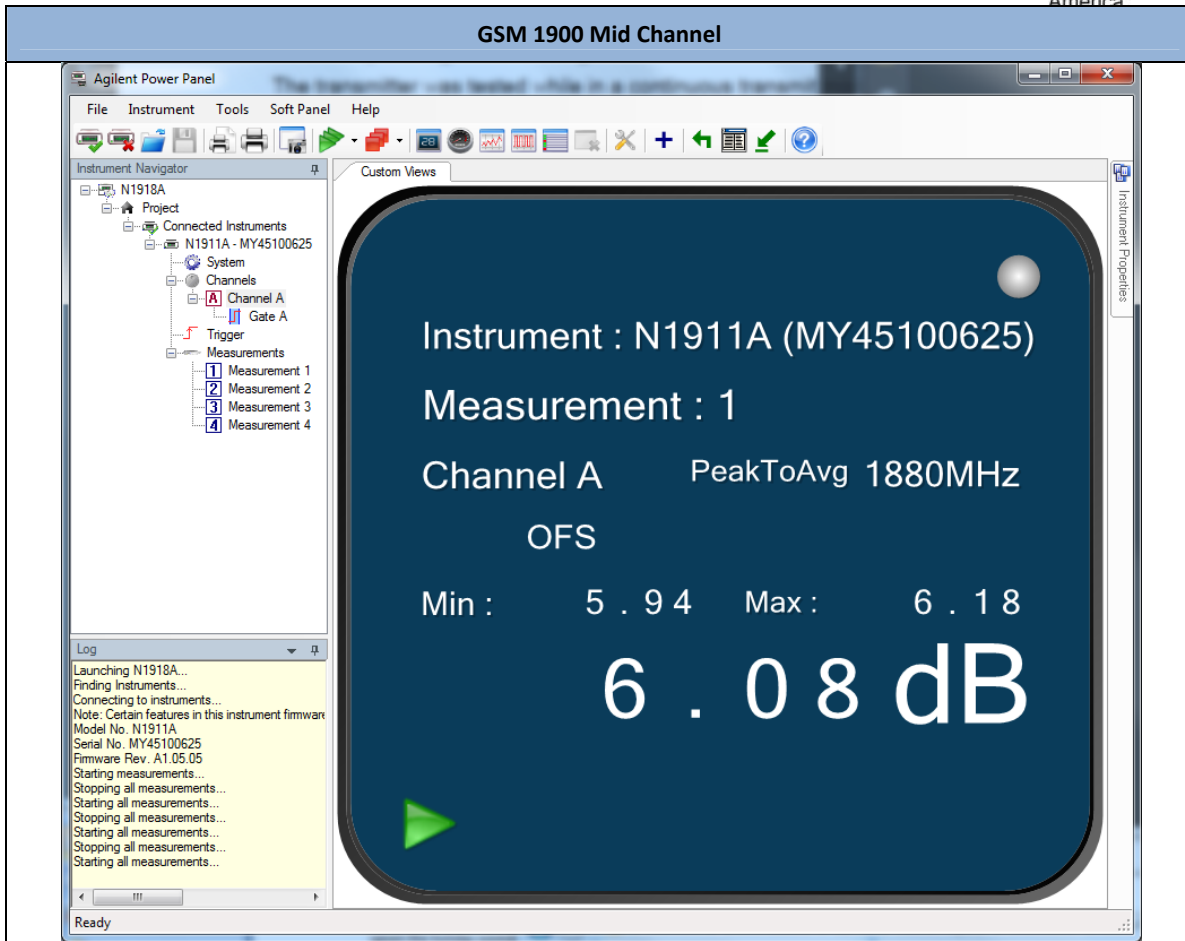
Log

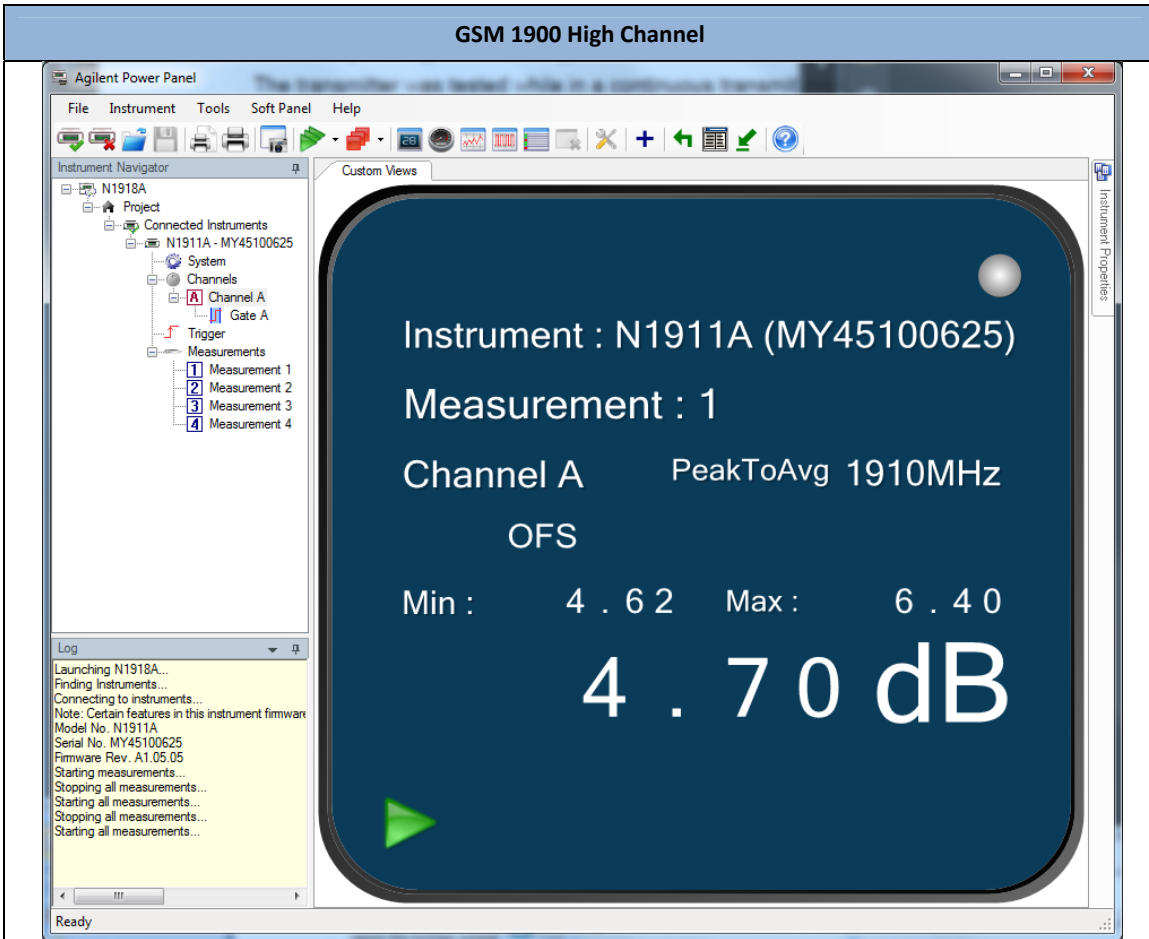
Stopping all measurements...
Starting all measurements...
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Starting all measurements...
Stopping all measurements...
Starting all measurements...

Ready



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SECTION 3

TEST EQUIPMENT USED



3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

ID Number (SDGE/SDRB)	Test Equipment	Type	Serial Number	Manufacturer	Cal Date	Cal Due Date
Conducted Port Setup						
7569	Series Power Meter	N1911A P-	MY45100625	Agilent	04/15/13	04/15/14
7570	50MHz-18GHz Wideband Power Sensor	N1921A	MY45240588	Agilent	05/06/13	05/06/14
6814	PSA Series Spectrum Analyzer	E4440A	MY42510441	Agilent	11/07/12	11/07/13
7571	Wideband Radio Communication Tester	CMW 500	1201.0002k50/103829	Rhode & Schwarz	Verified 04/04/13	
7575	Double-ridged waveguide horn antenna	3117	00155511	EMCO	03/25/13	03/25/14



3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:

3.2.1 Radiated Emission Measurements (Below 1GHz)

Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.45	0.26	0.07
2	Cables	Rectangular	0.50	0.29	0.08
3	Preamp	Rectangular	0.50	0.29	0.08
4	Antenna	Rectangular	0.75	0.43	0.19
5	Site	Rectangular	3.89	2.25	5.04
6	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty (u_c):					2.41
Coverage Factor (k):					2
Expanded Uncertainty:					4.82

3.2.2 Radiated Emission Measurements (Above 1GHz)

Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.57	0.33	0.11
2	Cables	Rectangular	0.70	0.40	0.16
3	Preamp	Rectangular	0.50	0.29	0.08
4	Antenna	Rectangular	0.37	0.21	0.05
5	Site	Rectangular	3.89	2.25	5.04
6	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty (u_c):					2.40
Coverage Factor (k):					2
Expanded Uncertainty:					4.81

3.2.3 Conducted Antenna Port Measurement

Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.57	0.33	0.11
2	Cables	Rectangular	0.50	0.29	0.08
3	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty (u_c):					0.72
Coverage Factor (k):					2
Expanded Uncertainty:					1.45



SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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