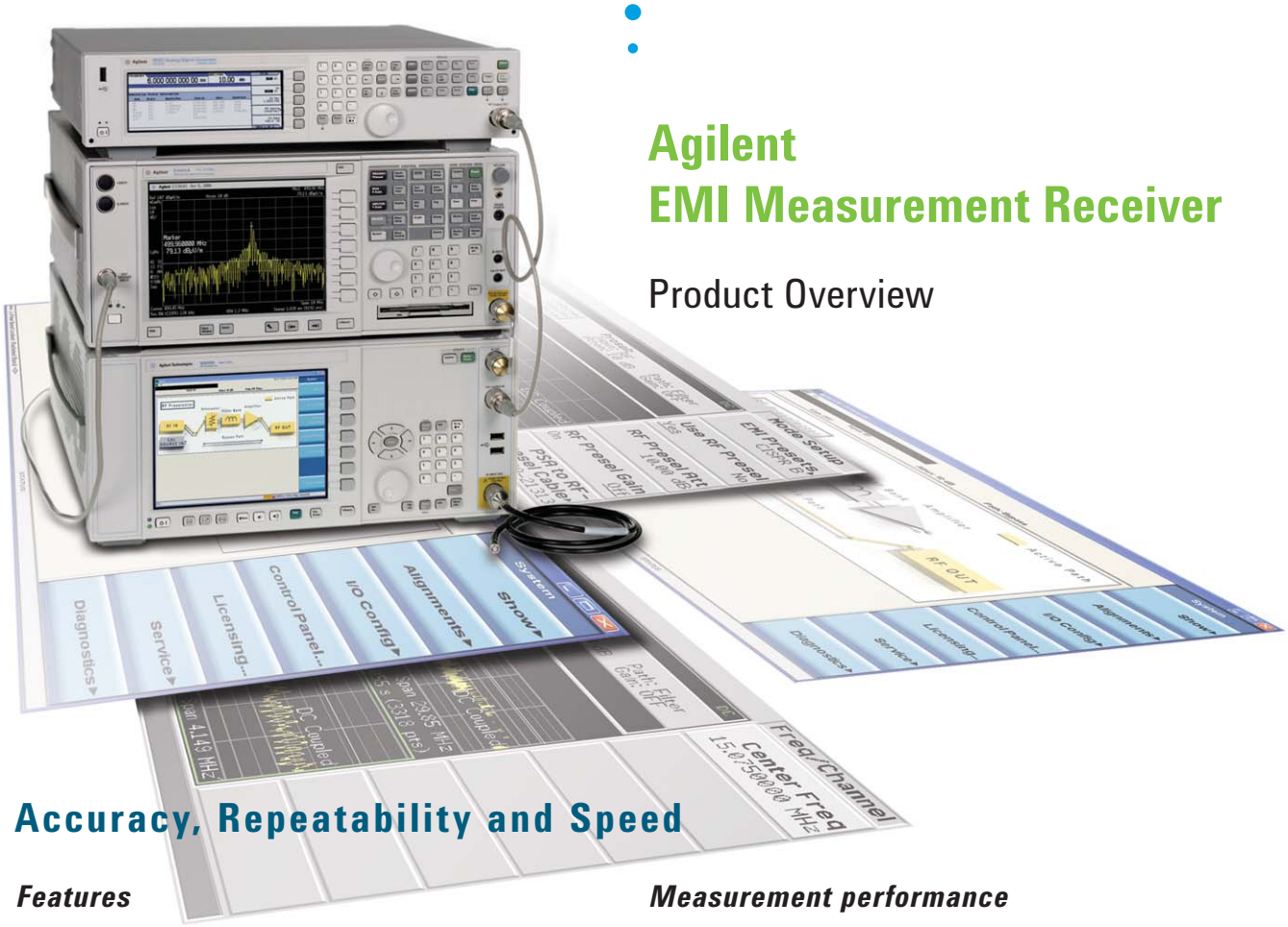


Agilent
EMI Measurement Receiver

Product Overview

Accuracy, Repeatability and Speed

Features

- RF preselection from 9 kHz to 1 GHz
- CISPR bandwidths
- CISPR detectors
- Limit lines and margins
- 3 separate correction factors
- Preselector filter calibration
- Built-in limiter in filtered path for conducted emissions
- Preamplifier for greater sensitivity

Measurement performance

- Radiated emissions band sensitivity to 1 GHz: 8.5 dBµV* (typical)
- Absolute amplitude accuracy ± 1.0 dB, 9 kHz to 1 GHz
- Input VSWR 1.2:1
- Preselected TOI +11 dBm @ 1 GHz (typical)
- Span accuracy @ 100 MHz span is 20 kHz typical

* 120 kHz RBW, 10 dB attenuation

Agilent Technologies

Agilent EMI Measurement Receiver

Combine the world class performance of the PSA Series spectrum analyzer and the new N9039A preselector and the result is an accurate, fast EMI measurement receiver.

EMI measurements you can trust

The N9039A allows you to perform CISPR-compliant EMI measurements from 9 kHz to 1 GHz with excellent accuracy and repeatability. Excellent span accuracy lets you return to a signal previously measured with very little uncertainty. Make EMI measurements above 1 GHz to as high as 50 GHz using the E4448A PSA spectrum analyzer.

EMI measurement throughput is key to fast new product introduction

Greater throughput can be achieved by sweeping broader spans. The PSA has continuously variable data points up to 8192, which means you can sweep the entire band from 30 MHz to 1 GHz with the 120 kHz resolution required by CISPR. With this broad sweep, you can take advantage of the broadband antennas available today, reducing the need to switch between biconical and log periodic antennas.

Improve your pass rate with greater receiver accuracy

The better the amplitude accuracy, the smaller the margin required. With smaller margins, the greater the pass rate. The all-digital IF maintains the highest amplitude accuracy independent of reference level position, even if the signal is off the top of the display. The PSA amplitude accuracy (±1.0 dB) holds true for any point on the display. Correct for antenna factors, cable loss and amplifier gains using the supplied disk or enter individual factors using front panel data entry.

System alignment using an external source assures high system accuracy with any combination of preselector and PSA*. The N5181A MXG signal source has excellent amplitude accuracy across the entire band.

**PSA with serial prefix US4430, MY4430, SG4430 or later.*

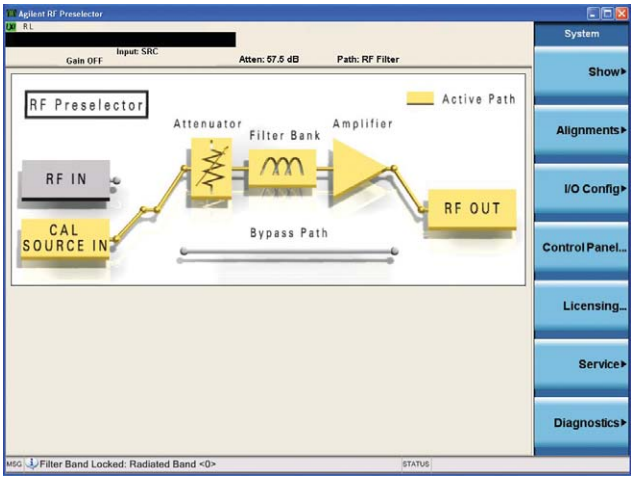


Figure 1. Preselector in calibration mode

The system sensitivity you need to make challenging measurements

Higher frequency measurements require excellent sensitivity. Antenna factors and cable losses become large. Correcting for these losses moves the noise floor closer to the limit lines. The closer the noise gets to the measurement limit, the more inaccurate the measurement. The greater the sensitivity, the larger the distance from the noise floor to the limit lines. The PSA has great sensitivity, leaving a large margin from the noise to the limit line.

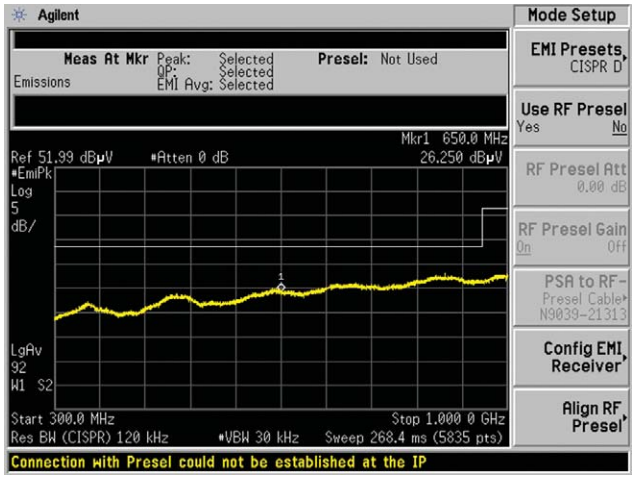


Figure 2. Radiated emissions testing with correction factors

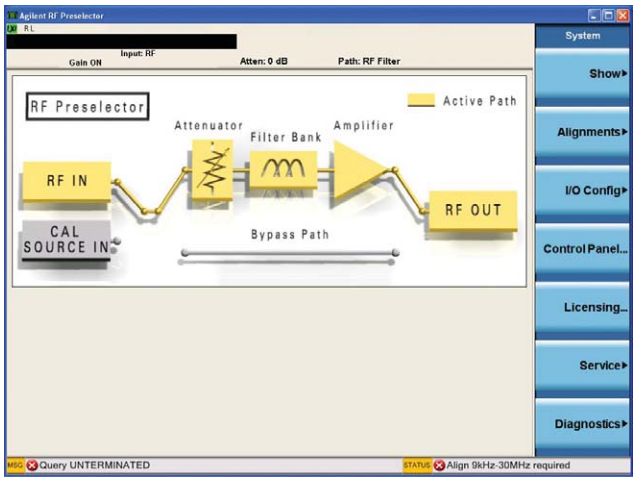


Figure 3. Preselector in filter mode

Perform compliant conducted emissions measurements

The EMI measurement receiver measures the conducted emissions from your device under test with the aid of an LISN (Line Impedance Stabilization Network). The preselector's built-in transient limiter in filter mode protects the front end of the spectrum analyzer from inductive spikes which could occur if the power is removed from the DUT.

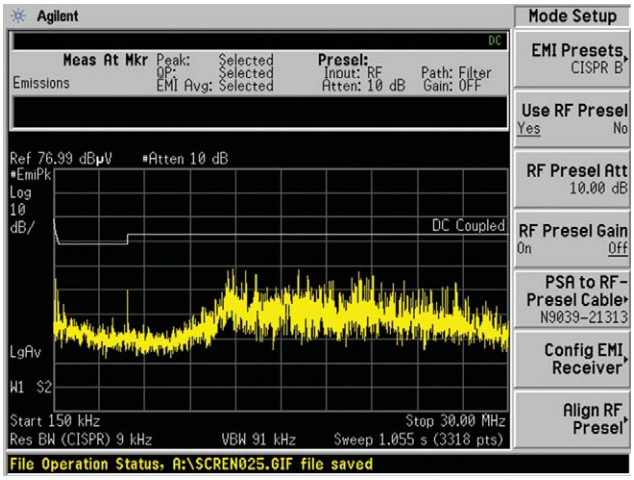


Figure 4. Conducted emissions test

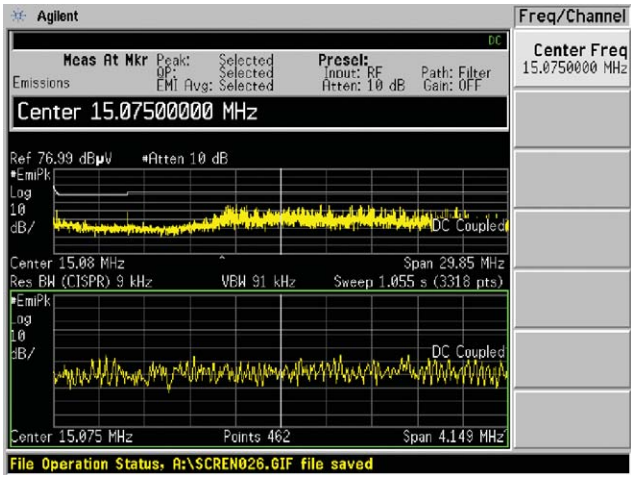


Figure 5. Broad span and zoom span

See the big picture and your signal of interest simultaneously

Look at an active broad span while zooming in on a specific signal for closer analysis. The display is split into two traces using the zoom key with the top showing the broad span and the bottom displaying the same data but zoomed in. Each window can be individually adjusted simply by activating the window by pressing “Next Window”.

Bypass mode

Perform fast prescans of your device using the bypass mode of the preselector. For those emissions in question, easily switch to preselected mode with the press of a button.

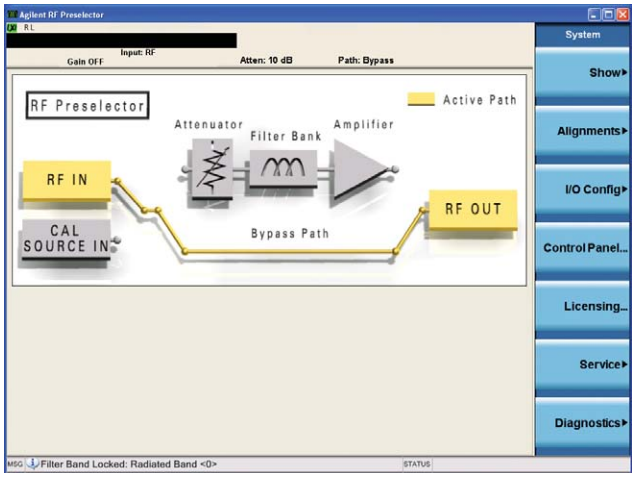


Figure 6. RF preselector in bypass mode

Measure the peak, average and quasi-peak amplitude of individual signals

Use the Measure at Marker feature to measure the peak, EMI average and quasi-peak of a signal. Select the average and quasi-peak detectors to characterize the signal to be measured.

Place the marker on a signal and press “Measure at Marker” to get the peak, average and quasi-peak values of a signal.

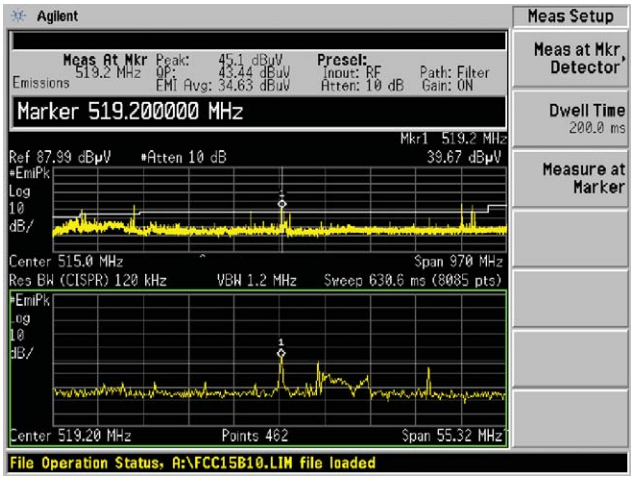


Figure 7. Measure at marker in active window

Specifications:

Frequency range:

Preselected mode: 9 kHz to 1 GHz
Bypass mode: 10 Hz to 26.5 GHz

Displayed average noise level (DANL)

Preselector on without gain:	***Contribution to DANL***
9 to 150 kHz	13.0 dB
150 kHz to 30 MHz	8.0 dB
30 to 300 MHz	6.0 dB
300 MHz to 1 GHz	5.0 dB

Preselector on with gain:	***Contribution to DANL***
9 to 150 kHz	3.0 dB (nominal)
150 kHz to 30 MHz	–3.0 dB (nominal)
30 to 300 MHz	–3.0 dB (nominal)
300 MHz to 1 GHz	–3.0 dB (nominal)

Preselector in bypass mode:	***Contribution to DANL***
9 to 150 kHz	0.5 dB (nominal)
150 kHz to 30 MHz	0.5 dB (nominal)
30 to 300 MHz	0.5 dB (nominal)
300 MHz to 1 GHz	1.0 dB (nominal)
1 to 10 GHz	2.0 dB (nominal)
10 to 23 GHz	3.0 dB (nominal)
23 to 26.5 GHz	5.5 dB (nominal)

E4440A Series PSA above 26.5 GHz:

26.5 to 31.15 GHz	–142 dBm
31.15 to 35 GHz	–134 dBm
35 to 38 GHz	–129 dBm
38 to 44 GHz	–131 dBm
44 to 49 GHz	–128 dBm
49 to 50 GHz	–127 dBm

E4440A Series PSA above 26.5 GHz with Option 110:

26.8 to 31.15 GHz	–157 dBm
31.15 to 35 GHz	–152 dBm
35 to 44 GHz	–146 dBm
44 to 49 GHz	–143 dBm
49 to 50 GHz	–140 dBm

Absolute amplitude accuracy

Preselector on without gain, 10 db Atten:

9 to 150 kHz	± 0.50 dB (typical)
150 kHz to 30 MHz	± 0.55 dB (typical)
30 to 300 MHz	± 0.65 dB (typical)
300 MHz to 1 GHz	± 0.75 dB (typical)

Third order intercept (TOI)

Preselector on without gain:

10 to 30 MHz	+9.0 dBm (typical)
30 to 300 MHz	+7.0 dBm (typical)
300 MHz to 1 GHz	+11.0 dBm (typical)

RF input VSWR

Preselector on without gain:

10 dB attenuation	1.16:1 dBm (typical)

Span Accuracy: ±0.2% of span

Configuration Guide

Required equipment and accessories

E4440A Series PSA with Option 239 EMI measurements[6, 7]

N5181A analog signal generator
(Other compatible sources are N5182A, 8648B, E4438C or E8257D with Option 1E1.)

N9039A RF Preselector[7]
Option 010 LAN connection kit or Option 011, which adds the GPIB gateway to the LAN connection kit for use with the 8648B signal generator (see matrix below for cable and connector options)

Accessories

11945A close field probe set
Tripod and antennas*
LISN (Line Impedance Stabilization Network) *

*Go to **www.agilent.com/find/EMC** for a list of third party venders for EMC accessories (antennas, LISNs, tripods, turntables, current clamps, etc.)

Order matrix

PSA	Frequency	Preselector	Cables	LAN
E4440A[1]	3 Hz to 26.5 GHz	N9039A	N9039A-019	N9039A-010[5]
E4443A[1]	3 Hz to 6.7 GHz			
E4445A[1]	3 Hz to 13.2 GHz			
E4440A-BAB[2]	3 Hz to 26.5 GHz	N9039A-BAB	N9039A-027	N9039A-010[5]
E4446A[3]	3 Hz to 44 GHz			
E4447A[3]	3 Hz to 42.98 GHz	N9039A-BAB	N9039A-030[4]	N9039A-010[5]
E4448A[3]	3 Hz to 50 GHz			

Recommended equipment and options

8447D amplifier 100 kHz to 1.3 GHz

11909A amplifier 9 kHz to 1 GHz, 32 dB gain

11947A transient limiter

E4440A Series PSA Option 110, 10 MHz to PSA top frequency preamp

E4440A Series PSA Option 115, extended memory (512)

E4440A Series PSA Option 111, high speed data (USB 2.0 device side)

E4440A Series PSA Option 215, signal source control

E4440A Series PSA Option 124, video output

Note: Option 117 secure memory erase is not compatible with Option 239 EMI measurements

1. Type-N connector standard
2. APC 3.5 connector option
3. 2.4 mm connector standard
4. This cable set adapts the APC3.5 on preselector to 2.4 mm on PSA
5. Order N9039A-011 if using 8648A signal generator
6. A disk with limit lines from most of the major regulatory agencies along with transducer correction factors is supplied
7. The E4440A Series PSA and the N9039A RF preselector can be calibrated separately and meet CISPR 16-1-1 requirements for an EMI receiver when used together. One preselector can be used with several PSAs.

Agilent Calibration Services

Accredited calibration of your EMI measurement receiver to ISO 17025 standards is available at selected Agilent service centers world wide. In North America service centers are accredited by A2LA (American Association for Laboratory Accreditation), and the N9039A is supported by Agilent's Roseville, California service center. Other regions' service centers are accredited by the appropriate local accreditation agency. Please contact your local service center for information about their services and accreditation level.

Agilent Technologies

AGILENT TECHNOLOGIES INTERNAL ASSESSMENT PROGRAM EMG E1021995

EMG Support Operation
10090 Foothills Blvd.
Roseville, CA. 95747
(800) 829-4444

Certificate of Calibration
Accredited Calibration
Certificate Number: 1-1151301259-1

ACCREDITED
Calibration Cert 1920.01

Manufacturer:	Agilent Technologies, Inc.	**Description:**	EMI preselector
Model Number:	N9039A	**Options Installed:**	
Serial Number:	MY46520128	**Customer Asset No.:**	
Customer:		**Location of Calibration:**	
Signal Analysis Division		EMG Support Operation	
1400 Fountaingrove Parkway, Dock 2LS		10090 Foothills Blvd.	
Santa Rosa CA 95403-1738		Roseville, CA. 95747	
UNITED STATES		(800) 829-4444	
Procedure:	24BR-N7817A-E.01.00-S		
Date of Calibration:	6 Nov 2007	**Customer PO Number**	
Temperature:	18-28 °C	**Humidity:**	20-80% RH

This certifies that the above product was calibrated in compliance with a quality system registered to ISO9001:2000 and accredited to ISO/IEC 17025:2005 using applicable Agilent Technologies procedures.

As Received Conditions:
Initial testing found the equipment to be **IN-SPECIFICATION** at the points tested.

As Shipped Conditions:
At the completion of the calibration, measured values were **IN-SPECIFICATION** at the points tested.

Remarks or Special Requirements:

Our calibration procedures are designed to provide measurement uncertainty of less than or equal to one quarter of the specification of the unit under test, where possible, with a coverage factor of 2. Measurement uncertainty is applied in accordance with the Agilent Calibration System Manual.

The test limits stated in the report correspond to the published specifications of the equipment, at the points tested.

This certificate is composed of 2 pages containing a summary of calibration information. Measurement data can be found in the attached measurement report. Tests not covered by our A2LA accredited capability are clearly identified and are included for completeness of the calibration report.

Based on the recommended calibration interval, the next calibration is due on 6 Nov 2008.

Print Date: 6 Nov 2007

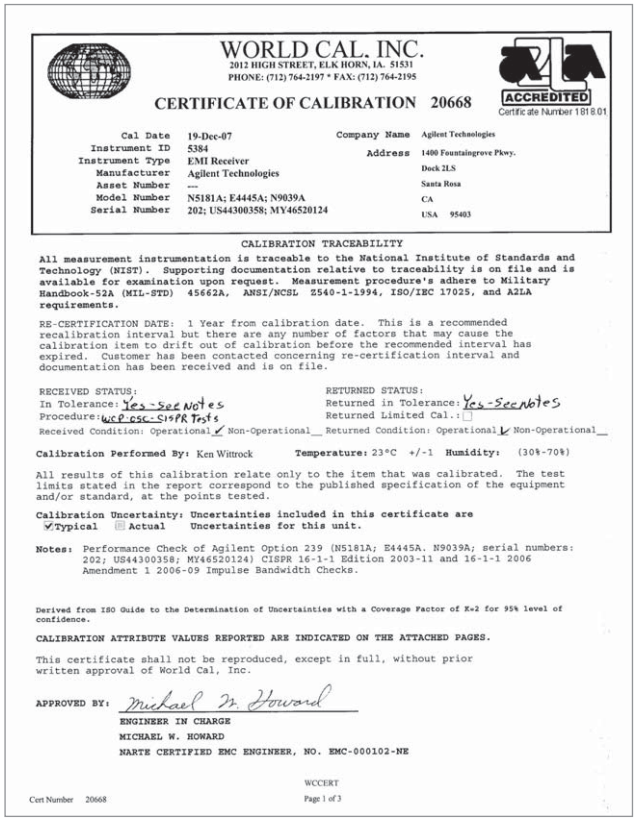
Larry Goins Calibration District Mgr.

Page 1 of 2

ver E.00.00

EMI Measurement Receiver Certification

The N9039A based EMI measurement receiver has been tested as fully compliant to CISPR 16-1-1 2003 and 2006 by World Cal. Inc., a well recognized independent calibration facility. As indicated on the certificate below the EMI measurement receiver meets all CISPR 16-1-1 2003 and 2006 requirements.



WORLD CAL. INC.
2012 HIGH STREET, ELK HORN, IA. 51531
PHONE: (712) 764-2197 * FAX: (712) 764-2195

ACCREDITED
Certific ate Number 1818.01

CERTIFICATE OF CALIBRATION 20668

Cal Date	19-Dec-07	Company Name	Agilent Technologies
Instrument ID	5384	Address	1400 Fountaingrove Pkwy.
Instrument Type	EMI Receiver		Dock 2LS
Manufacturer	Agilent Technologies		Santa Rosa
Asset Number	---		CA
Model Number	N5181A; E4445A; N9039A		USA 95403
Serial Number	202; US44300358; MY46520124		

CALIBRATION TRACEABILITY

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Supporting documentation relative to traceability is on file and is available for examination upon request. Measurement procedure's adhere to Military Handbook-52A (MIL-STD) 45662A, ANSI/NCSL Z540-1-1994, ISO/IEC 17025, and A2LA requirements.

RE-CERTIFICATION DATE: 1 Year from calibration date. This is a recommended recalibration interval but there are any number of factors that may cause the calibration item to drift out of calibration before the recommended interval has expired. Customer has been contacted concerning re-certification interval and documentation has been received and is on file.

RECEIVED STATUS:
In Tolerance: Yes - See Notes
Procedure: WCP CSC-CISPR Tests
Received Condition: Operational ✓ Non-Operational__

RETURNED STATUS:
Returned in Tolerance: Yes - See Notes
Returned Limited Cal.: ☐
Returned Condition: Operational ✓ Non-Operational__

Calibration Performed By: Ken Wittrock **Temperature:** 23°C +/-1 **Humidity:** (30%-70%)

All results of this calibration relate only to the item that was calibrated. The test limits stated in the report correspond to the published specification of the equipment and/or standard, at the points tested.

Calibration Uncertainty: Uncertainties included in this certificate are
☑ Typical ☐ Actual Uncertainties for this unit.

Notes: Performance Check of Agilent Option 239 (N5181A; E4445A. N9039A; serial numbers: 202; US44300358; MY46520124) CISPR 16-1-1 Edition 2003-11 and 16-1-1 2006 Amendment 1 2006-09 Impulse Bandwidth Checks.

Derived from ISO Guide to the Determination of Uncertainties with a Coverage Factor of K=2 for 95% level of confidence.

CALIBRATION ATTRIBUTE VALUES REPORTED ARE INDICATED ON THE ATTACHED PAGES.

This certificate shall not be reproduced, except in full, without prior written approval of World Cal, Inc.

APPROVED BY: Michael W. Howard
ENGINEER IN CHARGE
MICHAEL W. HOWARD
NARTE CERTIFIED EMC ENGINEER, NO. EMC-000102-NE

WCCERT

Cert Number 20668 Page 1 of 3

Remove all doubt

Our repair and calibration services will get your equipment back to you, performing like new, when promised. You will get full value out of your Agilent equipment throughout its lifetime. Your equipment will be serviced by Agilent-trained technicians using the latest factory calibration procedures, automated repair diagnostics and genuine parts. You will always have the utmost confidence in your measurements.

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Spain	34 (91) 631 3300
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Revised: October 1, 2008

Product specifications and descriptions in this document subject to change without notice.

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5989-6807EN

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