Plexus

MA 220

July 22, 2003

Report No. PLEX0357

Report Prepared By:

1-888-EMI-CERT

Test Report

NORTHWEST EMC

22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test

Issue Date: July 22, 2003
Plexus
Model: MA 220

Emissions

Description	Pass	Fail
FCC 15.207, AC Powerline Conducted Emissions	☒	☐
FCC 15.225, Field Strength of Fundamental	☒	☐
FCC 15.225, Field Strength of Spurious Emissions	☒	☐
FCC 15.225, Frequency Stability	☒	☐

The equipment was tested in the configuration and mode(s) of operation provided by the client. The specific tests and test levels were specified by the client. Any additional tests, or product configurations that should be tested are the responsibility of the client. Product compliance is the responsibility of the client.

Modifications made to the product

- See the modifications page of the report

Deviations to the test standard

- No deviations were made to the test standard

Approved By:

Dean Ghizzone, President

This Report may only be duplicated in its entirety. The results of this test pertain only to the sample(s) tested, the specific description is noted in each of the individual sections of the test report supporting this certificate of test.

Revision Number	Description	Date	Page Number
00	None		

FCC: The Open Area Test Sites, and conducted measurement facilities, have been fully described in reports filed with the FCC and accepted by the FCC in letters maintained in our files.

TCB: Northwest EMC has been accredited by ANSI to ISO/IEC Guide 65 as a product certifier. We have been designated by the FCC as a Telecommunications Certification Body (TCB). This allows Northwest EMC to certify transmitters to FCC specifications in accordance with 47 CFR 2.960 and 2.962.

A2LA: Accreditation has been granted to Northwest EMC, Inc. to perform the Electromagnetic Compatibility (EMC) tests described in the Scope of Accreditation. Assessment performed to ISO/IEC 17025.
Certificate Number: 1936-01, Certificate Number: 1936-02, Certificate Number 1936-03

Australia/New Zealand: The National Association of Testing Authorities (NATA), Australia has been appointed by the ACA as an accreditation body to accredit test laboratories and competent bodies for EMC standards. Accredited test reports or assessments by competent bodies must carry the NATA logo. Test reports made by an overseas laboratory that has been accredited for the relevant standards by an overseas accreditation body that has a Mutual Recognition Agreement (MRA) with NATA are also accepted as technical grounds for product conformity. The report should be endorsed with the respective logo of the accreditation body. (A2LA)

TÜV Product Service: Included in TUV Product Service Group's Listing of Recognized Laboratories. It qualifies in connection with the TUV Certification after Recognition of Agent's Testing Program for the product categories and/or standards shown in TUV's current Listing of CARAT Laboratories available from TUV. A certificate was issued to represent that this laboratory continues to meet TUV's CARAT Program requirements.
Certificate No. USA0302C

TÜV Rheinland: Authorized to carryout EMC tests by order and under supervision of TÜV Rheinland. This authorization is based on "Conditions for EMC-Subcontractors" of November 1992.

NEMKO: Assessed and accredited by NEMKO (Norwegian testing and certification body) for European emissions and immunity testing. As a result of NEMKO's laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification (Authorization No. ELA 119).

Technology International: Assessed in accordance with ISO Guide 25 defining the general international requirements for the competence of calibration and testing laboratories and with ITI assessment criteria LACO196. Based upon that assessment Interference Technology International, Ltd., has granted approval for specifications implementing the EU Directive on EMC (89/336/EEC and amendments). The scope of the approval was provided on a Schedule of Assessment supplied with the certificate and is available upon request.

Industry Canada: Accredited by Industry Canada for performance of radiated measurements. Our open area test sites comply with RSP 100, Issue 7, section 3.3.

VCCI: Accepted as an Associate Member to the VCCI, Acceptance No. 564. Conducted and radiated measurement facilities have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. *(Registration Nos. - Evergreen: C-1071 and R-1025, Trails End: C-694 and R-677, Sultan: C-905, R-871 and R-1172, North Sioux City C-1246, R-1185 and R-1217)*

BSMI: Northwest EMC has been designated by NIST and validated by C-Taipei (BSMI) as a CAB to conduct tests as described in the APEC Mutual Recognition Agreement. License No.SL2-IN-E-1017.

CAB: Designated by NIST and validated by the European Commission as a Conformity Assessment Body (CAB) to conduct tests and approve products to the EMC directive and transmitters to the R&TTE directive, as described in the U.S. - EU Mutual Recognition Agreement

GOST: Northwest EMC, Inc. has been assessed and accredited by the Russian Certification bodies Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC, to perform EMC and Hygienic testing for Information Technology Products. As a result of their laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification

Scope of Accreditations

	FCC	NIST	TUV PS	TUV Rheinland	Nemko	Technology International	Industry Canada	BSMI	VCCI	GOST	NATA
IEC 1000-4-2			✓	✓	✓	✓					
IEC 1000-4-3			✓	✓	✓	✓					
IEC 1000-4-4			✓	✓	✓	✓					
IEC 1000-4-5			✓	✓	✓	✓					
IEC 1000-4-6			✓	✓	✓	✓					
IEC 1000-4-8			✓	✓	✓	✓					
IEC 1000-4-11			✓	✓	✓	✓					
IEC 1000-3-2			✓	✓	✓	✓					
IEC 1000-3-3			✓	✓	✓	✓					
AS/NZS 3548											✓
CNS 13438								✓			
ISO/IEC Guide 25			✓	✓	✓	✓		✓			
ISO/IEC17025			✓	✓	✓	✓					
Radiated Emissions			✓	✓	✓	✓	✓	✓	✓	✓	
Conducted Emissions			✓	✓	✓	✓	✓	✓	✓	✓	
OATS Sites	✓		✓	✓	✓	✓	✓	✓	✓	✓	
Hillsboro 5-Meter Chamber (EV01)	✓		✓	✓	✓	✓	✓	✓	✓	✓	
TCB for Licensed Transmitters	✓										
TCB for un-Licensed Transmitters	✓										
Cab for R&TTE		✓									
CAB for EMC		✓									

Explanation of Northwest EMC Performance Criteria

How important is it to understand performance criteria?

It is the responsibility of the test laboratory to observe the results of the tests that are performed and to accurately report those results. As the responsible party (manufacturer, importer, etc) it is your responsibility to take those results, compare them against the specifications and standards, then, if appropriate make a declaration of conformity. As the responsible party it makes sense that you are fully aware of the requirements, how your device performs when tested to those requirements, and what information is being used to declare conformity.

To better assist you in making those conformity decisions, Northwest EMC has adopted a very simple, yet very clear performance assessment procedure. The following criteria is used when performing immunity or susceptibility tests:

Performance Criteria 1:

- The EUT exhibited no change in performance when operating as specified by the manufacturer. In this case no changes were observed during the test.
- In most cases this would be equivalent to Performance Criteria A. When operating the equipment in the modes or configurations specified by the responsible party, monitoring the parameters specified, no changes were observed. Basically nothing happened.

Performance Criteria 2:

- The EUT exhibited a change in performance when operating as specified by the manufacturer. In this case the equipment recovered without any operator intervention. The data sheets will detail the exact phenomena observed.
- In most cases this would be equivalent to Performance Criteria B. When operating the equipment in the modes or configurations specified by the responsible party, monitoring the parameters specified, changes were observed. The EUT was able to recover from those changes without any operator intervention.

Performance Criteria 3:

- The EUT exhibited a change in performance when operating as specified by the manufacturer. In this case the equipment required some operator intervention in order to recover. This intervention may be in the form of reducing the test levels, changing parameters, or even resetting the system. The data sheets will detail the exact phenomena observed.
- In most cases this would be equivalent to Performance Criteria C. When operating the equipment in the modes or configurations specified by the responsible party, monitoring the parameters specified, changes were observed. The EUT required some sort of operator intervention to recover. There was no permanent damage and the EUT appeared to function normally after completion test.

Performance Criteria 4:

- The EUT exhibited a change in performance when operating as specified by the manufacturer. In this case the equipment was damaged and would not recover. The data sheets will detail the exact phenomena observed.
- In most cases there is no specific criterion to compare this to, it typically ends the test. When operating the equipment in the modes or configurations specified by the responsible party, monitoring the parameters specified, changes were observed. There was no recovery; the equipment would no longer function as intended.

Each of the standards and specifications has unique performance criteria. In order to make an accurate assessment, one must compare the test results provided with the specific performance criteria. **To ensure that a responsible party is compliant with the specifications, one must read and understand those specifications. Provided below is a sample performance criteria, taken from EN 50082-1.**

EN 50082-1 Performance Criteria

Performance Criteria A: *The apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.*

Performance Criteria B: *The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.*

Performance Criteria C: *Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of controls.*

How should a device perform in order for a declaration of conformity to be made?

As already stated, it is the responsible party that must interpret and understand the results in such a way that a declaration of conformity is made. Having said that, we are often asked to render our opinion as to how a device should perform. Our recommendation simply follows the standards, as can be referenced below. Most of the standards and specifications offer the same performance criterion shown below as their requirements.

Test	Performance Criteria typically specified by the Standard	Equivalent Northwest EMC Performance Criteria
ESD	Performance Criteria B	Performance Criteria 1 or 2
Radiated RF	Performance Criteria A	Performance Criteria 1
EFT/Burst	Performance Criteria B	Performance Criteria 1 or 2
Surge	Performance Criteria B	Performance Criteria 1 or 2
Conducted RF	Performance Criteria A	Performance Criteria 1
Magnetic Field	Performance Criteria A	Performance Criteria 1
Voltage Dips and Variations	Performance Criteria B & C	Performance Criteria 1, 2, or 3

What is measurement uncertainty?

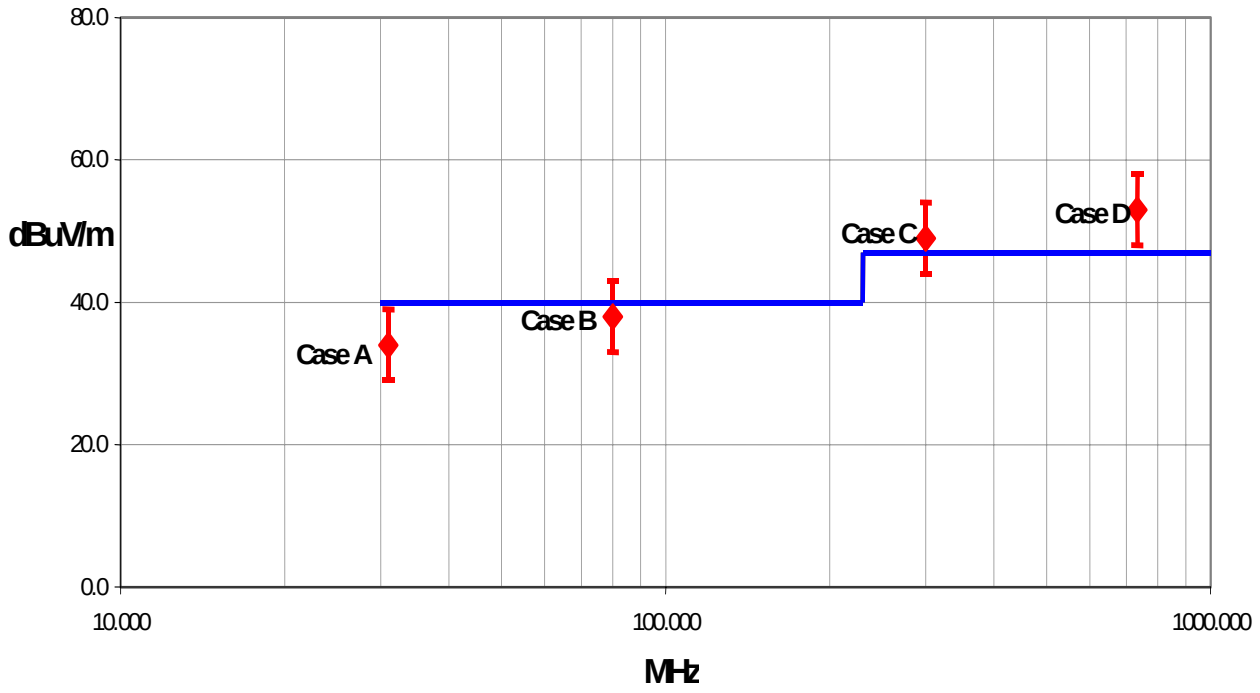
When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. The following statement of measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" value. In the case of transient tests (ESD, EFT, Surge, Voltage Dips and Interruptions), the test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements.

The following documents were the basis for determining the uncertainty levels of our measurements:

- "ISO Guide to the Expression of Uncertainty in Measurements", October 1993
- "NIS81: The Treatment of Uncertainty in EMC Measurements", May 1994
- "IEC CISPR 16-3 A1 f1 Ed.1: Radio-interference measurements and statistical techniques", December 2000

How might measurement uncertainty be applied to test results?

If the diamond marks the measured value for the test and the vertical bars bracket the range of + and – measurement uncertainty, then test results can be interpreted from the diagram below.



Test Result Scenarios:
Case A: Product complies.
Case B: Product conditionally complies. It is not possible to say with 95% confidence that the product complies.
Case C: Product conditionally does not comply. It is not possible to say with 95% confidence that the product does not comply.
Case D: Product does not comply.

Radiated Emissions ≤ 1 GHz		Value (dB)					
	Probability Distribution	Biconical Antenna		Log Periodic Antenna		Dipole Antenna	
Test Distance		3m	10m	3m	10m	3m	10m
Combined standard uncertainty $u_c(y)$	normal	+ 1.86 - 1.88	+ 1.82 - 1.87	+ 2.23 - 1.41	+ 1.29 - 1.26	+ 1.31 - 1.27	+ 1.25 - 1.25
Expanded uncertainty ***U*** (level of confidence ≈ 95%)	normal (k=2)	+ 3.72 - 3.77	+ 3.64 - 3.73	+ 4.46 -2.81	+ 2.59 - 2.52	+ 2.61 - 2.55	+ 2.49 - 2.49

Radiated Emissions > 1 GHz	Value (dB)		
	Probability Distribution	Without High Pass Filter	With High Pass Filter
Combined standard uncertainty $u_c(y)$	normal	+ 1.29 - 1.25	+ 1.38 - 1.35
Expanded uncertainty ***U*** (level of confidence ≈ 95%)	normal (k=2)	+ 2.57 - 2.51	+ 2.76 - -2.70

Conducted Emissions		
	Probability Distribution	Value (+/- dB)
Combined standard uncertainty ***uc(y)***	normal	1.48
Expanded uncertainty ***U*** (level of confidence ≈ 95 %)	normal (k = 2)	2.97

Radiated Immunity		
	Probability Distribution	Value (+/- dB)
Combined standard uncertainty ***uc(y)***	normal	1.05
Expanded uncertainty ***U*** (level of confidence ≈ 95 %)	normal (k = 2)	2.11

Conducted Immunity		
	Probability Distribution	Value (+/- dB)
Combined standard uncertainty ***uc(y)***	normal	1.05
Expanded uncertainty ***U*** (level of confidence ≈ 95 %)	normal (k = 2)	2.10

Legend

$u_c(y)$ = square root of the sum of squares of the individual standard uncertainties

U = combined standard uncertainty multiplied by the coverage factor: **k**. This defines an interval about the measured result that will encompass the true value with a confidence level of approximately 95%. If a higher level of confidence is required, then k=3 (CL of 99.7%) can be used. Please note that with a coverage factor of one, uc(y) yields a confidence level of only 68%.

California

Orange County Facility

41 Tesla Ave.
Irvine, CA 92618
(888) 364-2378
FAX (503) 844-3826

Oregon

Evergreen Facility

22975 NW Evergreen Pkwy.,
Suite 400
Hillsboro, OR 97124
(503) 844-4066
FAX (503) 844-3826

Oregon

Trails End Facility

30475 NE Trails End Lane
Newberg, OR 97132
(503) 844-4066
FAX (503) 537-0735

South Dakota

North Sioux City Facility

745 N. Derby Lane
P.O. Box 217
North Sioux City, SD 57049
(605) 232-5267
FAX (605) 232-3873

Washington

Sultan Facility

14128 339th Ave. SE
Sultan, WA 98294
(888) 364-2378
FAX (360) 793-2536

Party Requesting the Test

Company Name:	Plexus
Address:	21717 30th Drive S.E.
City, State, Zip:	Bothell, WA, 98021
Test Requested By:	John Prieve
Model:	MA220
First Date of Test:	04-24-2003
Last Date of Test:	07-17-2003
Receipt Date of Samples:	04-24-2003
Equipment Design Stage:	Prototype
Equipment Condition:	No visual damage.

Information Provided by the Party Requesting the Test

Clocks/Oscillators:	13.564MHz, 3.6864MHz, 7.159MHz, 14.318MHz, 16MHz, 20MHz
I/O Ports:	RS485/422, Ethernet, Wiegand

Functional Description of the EUT (Equipment Under Test):

Thumbprint/ Card reader identification unit.

Client Justification for EUT Selection:

The product is an engineering sample, representative of the final product.

Client Justification for Test Selection

These test satisfy the requirements for FCC verification and certification

Equipment modifications				
Item #	Test	Date	Modification	Note
1	AC Powerline Conducted Emissions	04-24-2003	Added one ferrite around all I/O cables.	Modified from delivered configuration.
2	Field Strength of Spurious Emissions	04-25-2003	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.
3	Field Strength of Fundamental	05-05-2003	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.
4	Frequency Stability	05-09-2003	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.
5	Field Strength of Fundamental Spot Check	07-17-2003	No EMI suppression devices were added or modified during this test.	Same configuration as delivered.
6	Field Strength of Spurious Emissions	07-17-2003	No EMI suppression devices were added or modified during this test.	Same configuration as delivered.

Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:
Single

Operating Modes Investigated:
Typical

Antennas Investigated:
Integral

Data Rates Investigated:
Maximum

Output Power Setting(s) Investigated:
Maximum

Power Input Settings Investigated:
110 VAC, 60 Hz.

Software\Firmware Applied During Test			
Exercise software	Morpho Access	Version	4.2
Description			
The system was tested using standard operating modes, which do not require software.			

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
EUT	Sagem	MA220	307990009
Power Brick	Elpac	FW3012	008492

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Power	No	2.0	Yes	EUT	Power Brick
AC Power	No	1.8	No	Power Brick	AC Mains
Ethernet	No	15	Yes	EUT	Unterminated
Serial	Yes	15	Yes	EUT	Unterminated
Wiegand	Yes	15	Yes	EUT	Unterminated

PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.

Measurement Equipment

Description	Manufacturer	Model	Identifier	Last Cal	Interval
Quasi-Peak Adapter	Hewlett-Packard	85650A	AQF	01/07/2003	12 mo
Spectrum Analyzer	Hewlett-Packard	8566B	AAL	01/07/2003	12 mo
Antenna, Loop	EMCO	6502	AOA	01/08/2002	36 mo

Test Description

Requirement: The field strength of the fundamental emission shall comply with the limits, as defined in 47 CFR 15.225. Field strength limits are specified at a distance of 30 meters.

Configuration: The only antenna to be used with the EUT was tested. The EUT was transmitting at its only available channel. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.4:1992).

The emissions were measured at both 3 meters and 5 meters. Per 15.31(f)(2), the results were extrapolated to 30 meters based upon the measured extrapolation factor. This factor was determined for each emission, at each antenna polarity.

Completed by:

NORTHWEST EMC

OATS DATA SHEET

REV df3.11 06/23/2003

EUT:	MA 220	Work Order:	PLEX0357
Serial Number:	307990009	Date:	07/16/03
Customer:	Plexus	Temperature:	75
Attendees:		Humidity:	39%
Cust. Ref. No.:		Barometric Pressure	30.09
Tested by:	Holly Ashkannejhad	Power: 120VAC, 60Hz	Job Site: EV01

TEST SPECIFICATIONS

Specification:	FCC Part 15.225	Year:	2000
Method:	ANSI C63.4	Year:	1992

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

One ferrite on all cables.

EUT OPERATING MODES

Scanning Mode

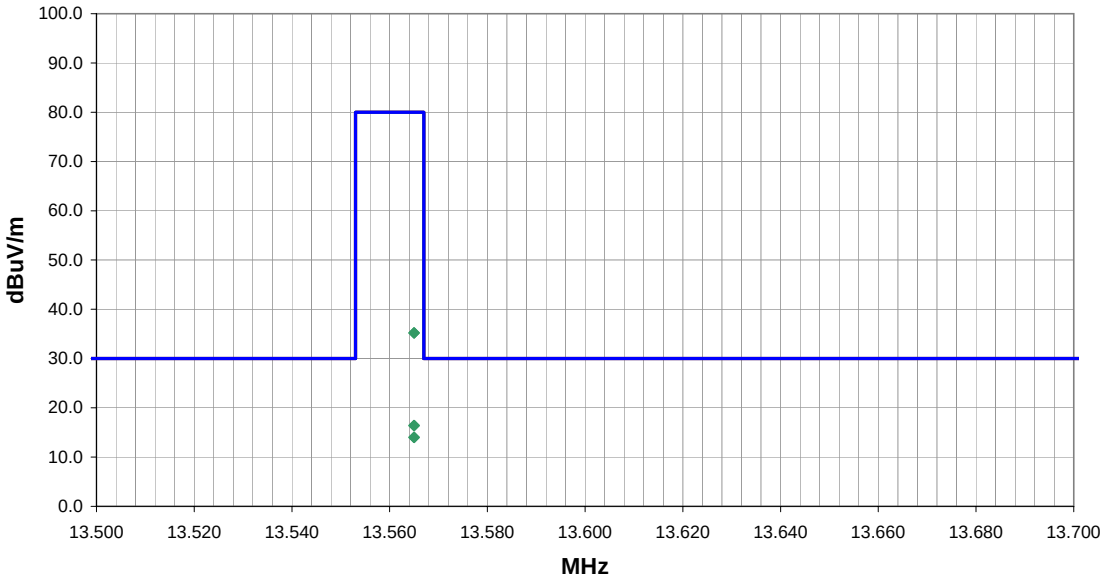
DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS	Run #
Pass	6

Other

Tested By: Holly Ashkannejhad



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
13.565	51.9	10.5	169.0	1.0	3.0	0.0	See Comment	QP	46.0	16.4	80.0	-63.6	Antenna Perp to gnd, Par to EUT.
13.565	50.4	10.5	87.0	2.7	3.0	0.0	See Comment	QP	25.7	35.2	80.0	-44.8	Antenna Perp to gnd, Perp to EUT
13.565	44.7	10.5	89.0	3.0	5.0	0.0	See Comment	QP	20.0	35.2	80.0	-44.8	Antenna Perp to gnd, Perp to EUT
13.565	47.2	10.5	187.0	1.9	3.0	0.0	See Comment	QP	43.7	14.0	80.0	-66.0	Antenna Par to gnd, Perp to EUT.
13.565	41.7	10.5	171.0	1.0	5.0	0.0	See Comment	QP	35.8	16.4	80.0	-63.6	Antenna Perp to gnd, Par to EUT.
13.565	37.5	10.5	217.0	2.6	5.0	0.0	See Comment	QP	34.0	14.0	80.0	-66.0	Antenna Par to gnd, Perp to EUT.

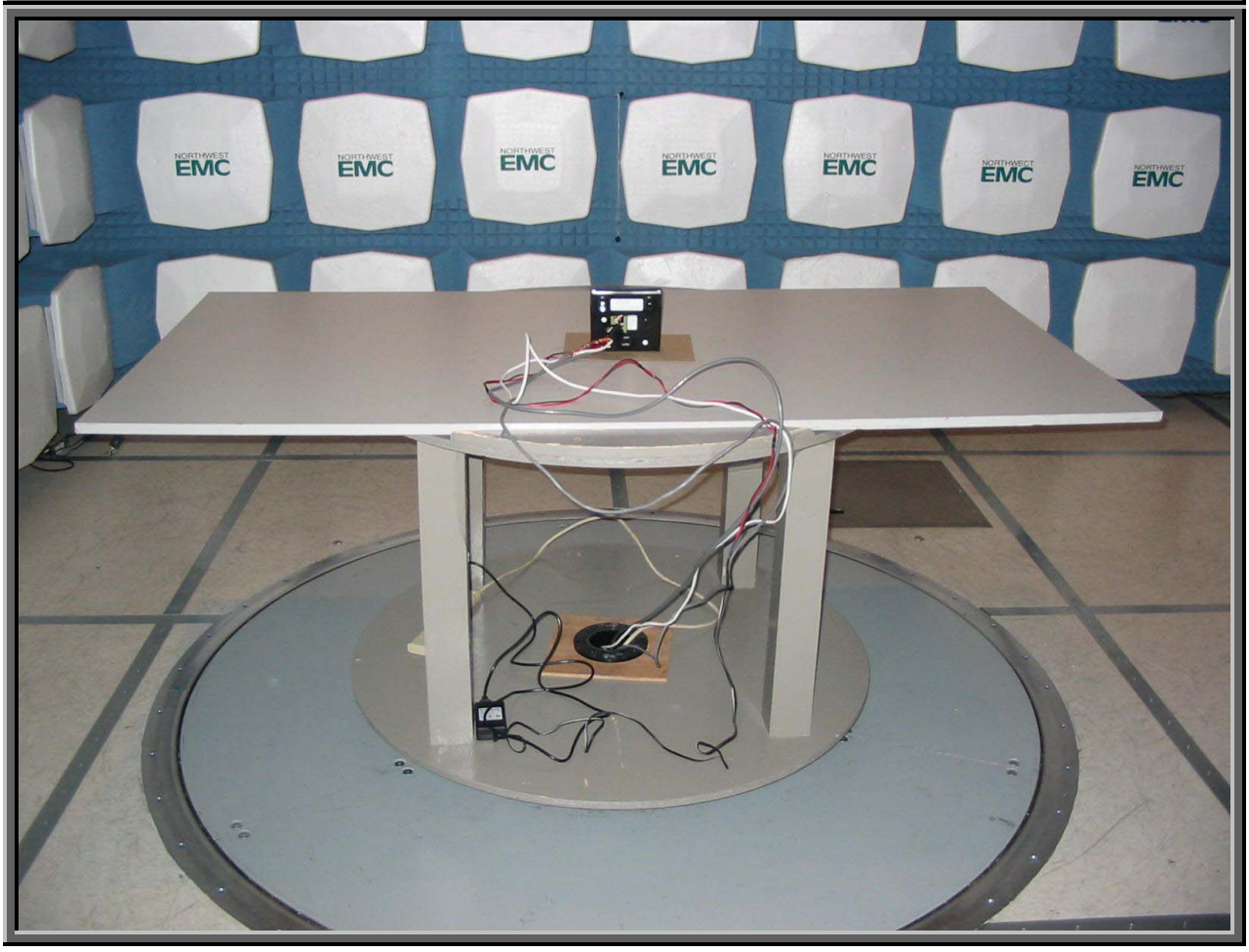
Distance Adjustment Factor for Radiated Emissions below 30 MHz

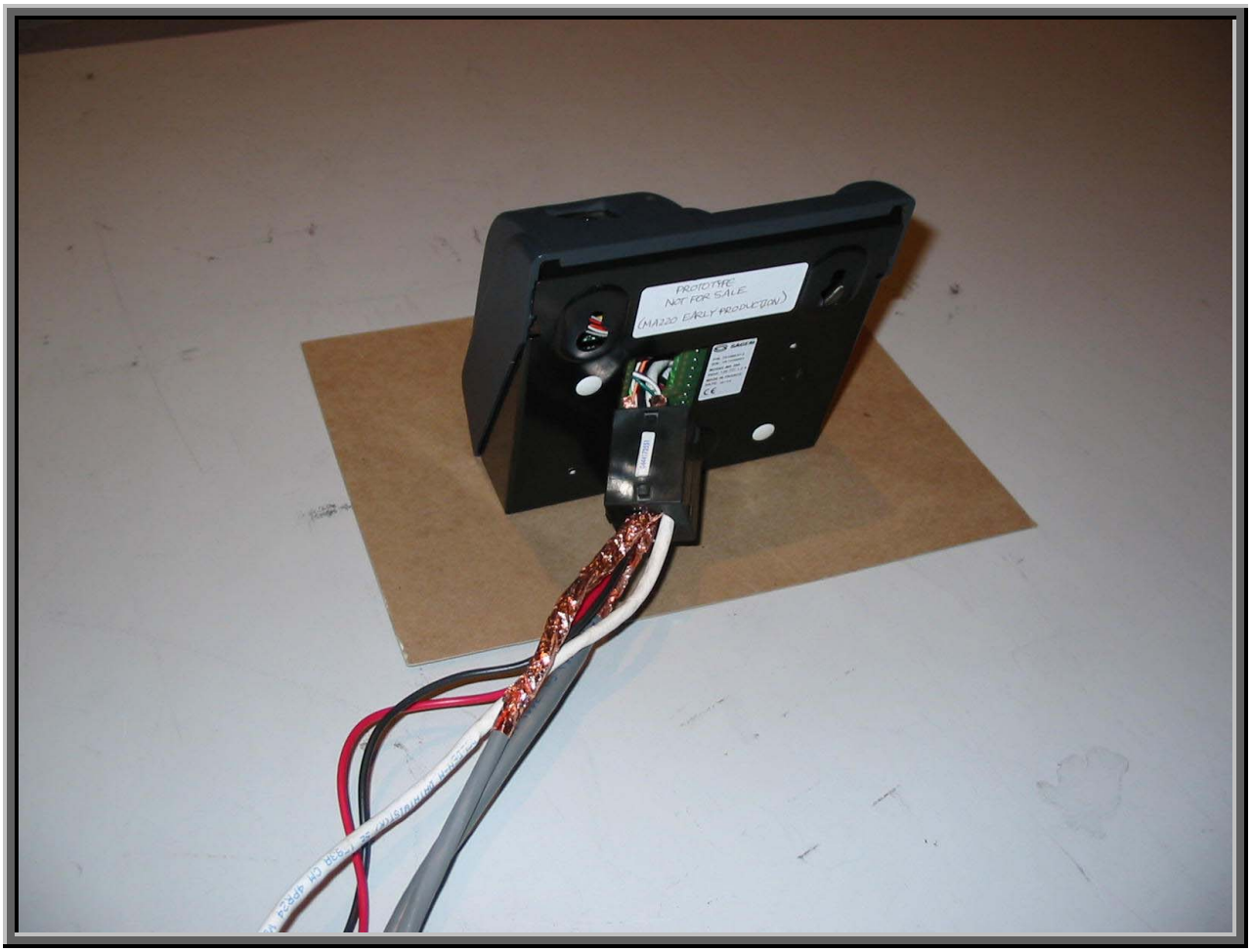
Method: Per 47 CFR 15.31(f)(2), the data was extrapolated based upon a the measured fall-off (at each frequency / polarity).

EUT: MA 220
S/N:
Date: 7/16/2003
Job Number: PLEX0357

Frequency (MHz)	Loop Antenna Polarity	Test Distance (meters)	Adjusted Level (dBuV/m)	Fall-Off from 3 to 5 m (dB)	Extrapolation Factor for Specification Limit (dB / decade)	Test Distance of Spec. Limit (meters)	Distance Adjustment Factor (dB)
13.565	Par/Gnd, Perp/EUT	3	57.7	9.7	43.7	30.0	43.7
13.565	Par/Gnd, Perp/EUT	5	48.0				34.0
13.565	Perp/Gnd, Perp/EUT	3	60.9	5.7	25.7	30.0	25.7
13.565	Perp/Gnd, Perp/EUT	5	55.2				20.0
13.565	Perp/Gnd, Par/EUT	3	62.4	10.2	46.0	30.0	46.0
13.565	Perp/Gnd, Par/EUT	5	52.2				35.8


NORTHWEST
EMC


NORTHWEST
EMC


PROTOTYPE
NOT FOR SALE
(MA220 EARLY PRODUCTION)

Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:
Single

Operating Modes Investigated:
Typical

Antennas Investigated:
Integral

Data Rates Investigated:
Maximum

Output Power Setting(s) Investigated:
Maximum

Power Input Settings Investigated:
110 VAC, 60 Hz.

Frequency Range Investigated			
Start Frequency	10 kHz	Stop Frequency	1 GHz

Software\Firmware Applied During Test			
Exercise software	Morpho Access	Version	4.2
Description			
The system was tested using standard operating modes, which do not require software.			

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
EUT	Sagem	MA220	none
Power Brick	Elpac	FW3012	008492

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Power	No	2.0	Yes	EUT	Power Brick
AC Power	No	1.8	No	Power Brick	AC Mains
Ethernet	No	15	Yes	EUT	Laptop
Serial	Yes	15	Yes	EUT	Laptop
Wiegand	Yes	15	Yes	EUT	Laptop

PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.

Measurement Equipment

Description	Manufacturer	Model	Identifier	Last Cal	Interval
Quasi-Peak Adapter	Hewlett-Packard	85650A	AQF	01/07/2003	12 mo
Spectrum Analyzer	Hewlett-Packard	8566B	AAL	01/07/2003	12 mo
Antenna, Loop	EMCO	6502	AOA	01/08/2002	36 mo
Quasi-Peak Adapter	Hewlett-Packard	85650A	AQA	11/14/2002	12 mo
Spectrum Analyzer	Hewlett-Packard	8567A	AAB	11/14/2002	12 mo
Antenna, Bicon	EMCO	3104C	ABA	11/07/2002	12 mo
Antenna, Log Periodic	EMCO	3146	ALA	11/08/2002	12 mo
Pre-Amplifier	Miteq	AM-1402	AOQ	11/13/2002	12 mo

Test Description

Requirement: Per 47 CFR 15.225, the field strength of any emissions outside the band of 13.553 – 13.567 MHz shall comply with the limits as defined in 47 CFR 15.209.

Configuration: The only antenna to be used with the EUT was tested. The EUT was transmitting at its only available channel. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.4:1992).

Below 30 MHz, the emissions were measured at both 3 meters and 5 meters. Per 15.31(f)(2), the results were extrapolated to the specification test distance (either 30 or 300 meters) based upon the measured extrapolation factor. This factor was determined for each emission, at each antenna polarity.

Above 30 MHz, the emissions were measured at 3 meters and compared to the 3-meter limit. No extrapolation factor was required.

Completed by:

NORTHWEST EMC

OATS DATA SHEET

REV df3.10 03/10/2003

EUT:	MA 220			Work Order:	PLEX0339
Serial Number:	none			Date:	04/25/03
Customer:	Plexus			Temperature:	67
Attendees:	Fritz Rivera			Humidity:	33%
Cust. Ref. No.:				Barometric Pressure	29.97
Tested by:	Ethan Schoonover	Power:	110V/60Hz	Job Site:	SU04

TEST SPECIFICATIONS

Specification:	FCC Part 15 Class B	Year:	2003
Method:	ANSI C63.4	Year:	1992

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

All cables connected to remote labtop. One ferrite on all cables. Shielded cables not grounded.

EUT OPERATING MODES

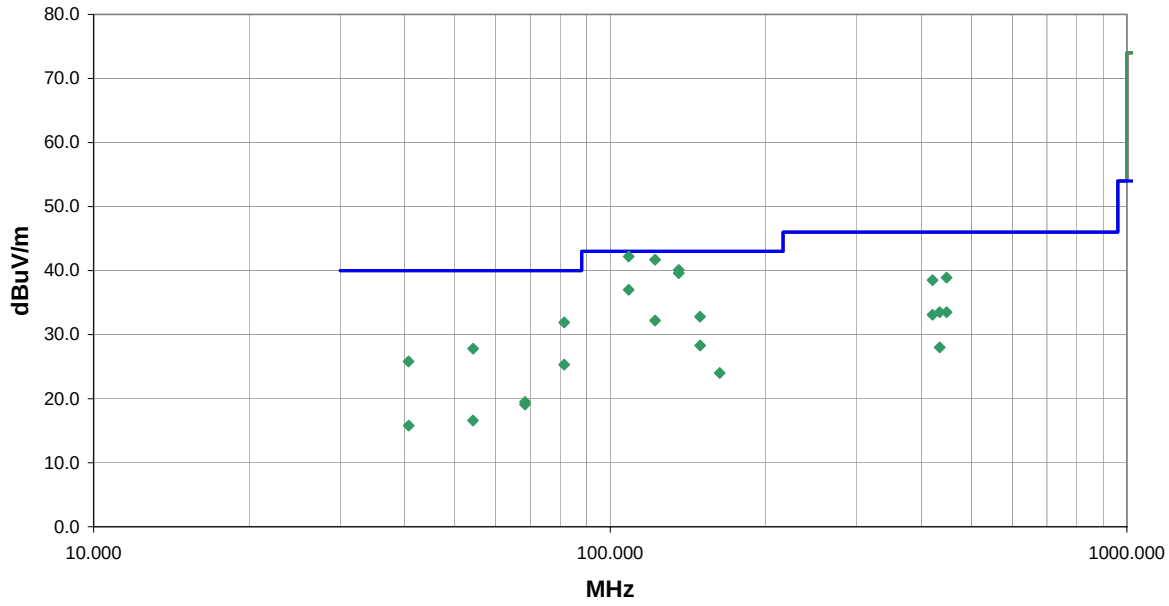
Scanning Mode

DEVIATIONS FROM TEST STANDARD

RESULTS	Run #
Pass	43

Other

Tested By:



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)
108.546	45.5	-3.3	32.0	1.0	3.0	0.0	V-Bicon	QP	0.0	42.2	43.0	-0.8
122.116	44.2	-2.5	172.0	1.0	3.0	0.0	V-Bicon	QP	0.0	41.7	43.0	-1.3
135.676	43.6	-3.5	341.0	1.1	3.0	0.0	V-Bicon	QP	0.0	40.1	43.0	-2.9
135.677	43.1	-3.5	111.0	2.6	3.0	0.0	H-Bicon	QP	0.0	39.6	43.0	-3.4
108.545	40.3	-3.3	101.0	1.4	3.0	0.0	H-Bicon	QP	0.0	37.0	43.0	-6.0
447.679	33.5	5.4	0.0	1.0	3.0	0.0	H-LPA	QP	0.0	38.9	46.0	-7.1
420.553	34.0	4.5	0.0	1.0	3.0	0.0	H-LPA	QP	0.0	38.5	46.0	-7.5
81.422	41.5	-9.6	0.0	1.0	3.0	0.0	V-Bicon	QP	0.0	31.9	40.0	-8.1
149.242	36.5	-3.7	343.0	1.0	3.0	0.0	V-Bicon	QP	0.0	32.8	43.0	-10.2
122.112	34.7	-2.5	256.0	1.6	3.0	0.0	H-Bicon	QP	0.0	32.2	43.0	-10.8
54.263	34.6	-6.8	252.0	1.0	3.0	0.0	V-Bicon	QP	0.0	27.8	40.0	-12.2
434.112	28.6	4.9	0.0	1.0	3.0	0.0	H-LPA	QP	0.0	33.5	46.0	-12.5
447.675	28.1	5.4	68.0	1.0	3.0	0.0	V-LPA	QP	0.0	33.5	46.0	-12.5
420.551	28.6	4.5	75.0	1.3	3.0	0.0	V-LPA	QP	0.0	33.1	46.0	-12.9
40.696	32.0	-6.2	0.0	1.0	3.0	0.0	V-Bicon	QP	0.0	25.8	40.0	-14.2
81.410	34.9	-9.6	124.0	2.2	3.0	0.0	H-Bicon	QP	0.0	25.3	40.0	-14.7
149.244	32.0	-3.7	117.0	1.0	3.0	0.0	H-Bicon	QP	0.0	28.3	43.0	-14.7
434.115	23.1	4.9	350.0	1.3	3.0	0.0	V-LPA	QP	0.0	28.0	46.0	-18.0
162.811	25.9	-1.9	284.0	2.0	3.0	0.0	H-Bicon	QP	0.0	24.0	43.0	-19.0
68.359	28.7	-9.2	231.0	1.0	3.0	0.0	V-Bicon	QP	0.0	19.5	40.0	-20.5
68.359	28.3	-9.2	0.0	2.6	3.0	0.0	H-Bicon	QP	0.0	19.1	40.0	-20.9
54.245	23.4	-6.8	155.0	2.3	3.0	0.0	H-Bicon	QP	0.0	16.6	40.0	-23.4
40.718	22.0	-6.2	198.0	1.9	3.0	0.0	H-Bicon	QP	0.0	15.8	40.0	-24.2

NORTHWEST EMC

OATS DATA SHEET

REV df3.11 06/23/2003

EUT:	MA 220	Work Order:	PLEX0357
Serial Number:		Date:	07/16/03
Customer:	Plexus	Temperature:	75
Attendees:		Humidity:	39%
Cust. Ref. No.:		Barometric Pressure	30.09
Tested by:	Holly Ashkannejhad	Power: 120VAC, 60Hz	Job Site: EV01

TEST SPECIFICATIONS

Specification:	FCC Part 15.225	Year:	2000
Method:	ANSI C63.4	Year:	1992

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

One ferrite on all cables.

EUT OPERATING MODES

Scanning Mode

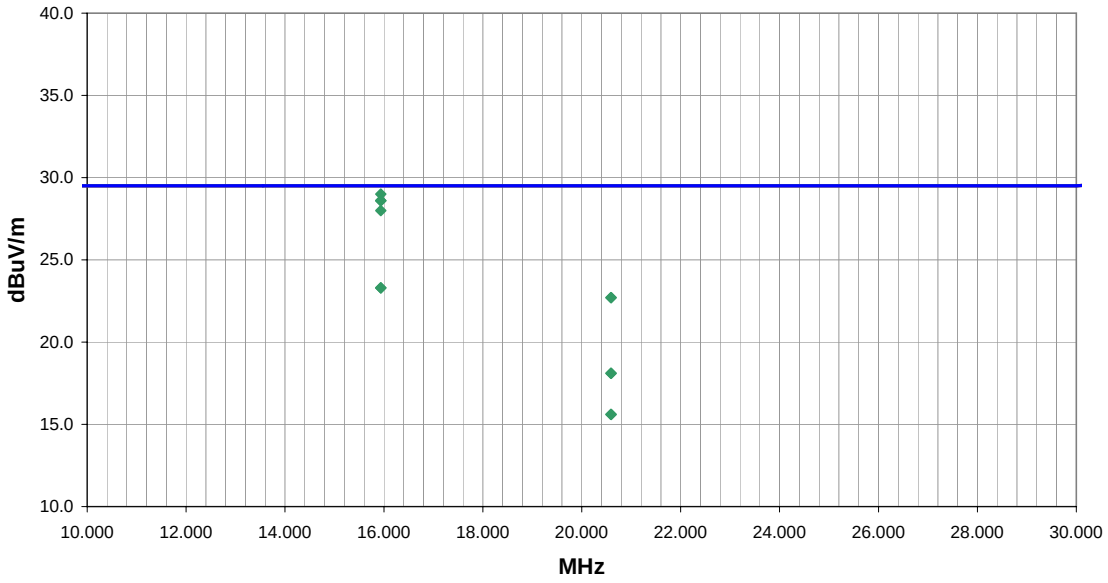
DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS	Run #
Pass	4

Other

Tested By:



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
20.592	29.0	10.3	165.0	1.0	3.0	0.0	See Comment	QP	21.2	18.1	29.5	-11.4	Antenna Perp to gnd, Perp to EUT.
20.592	24.3	10.3	176.0	1.2	5.0	0.0	See Comment	QP	16.5	18.1	29.5	-11.4	Antenna Perp to gnd, Perp to EUT.
20.592	27.4	10.3	153.0	1.0	3.0	0.0	See Comment	QP	22.1	15.6	29.5	-13.9	Antenna Par to gnd, Perp to EUT.
20.592	22.5	10.3	185.0	1.1	5.0	0.0	See Comment	QP	17.2	15.6	29.5	-13.9	Antenna Par to gnd, Perp to EUT.
20.592	19.1	10.3	101.0	1.1	5.0	0.0	See Comment	QP	6.7	22.7	29.5	-6.8	Antenna Perp to gnd, Par to EUT.
15.935	18.8	10.5	278.0	1.0	5.0	0.0	See Comment	QP	6.0	23.3	29.5	-6.2	Antenna Perp to gnd, Perp to EUT.
15.935	18.6	10.4	169.0	1.0	5.0	0.0	See Comment	QP	1.0	28.0	29.5	-1.5	Antenna Perp to gnd, Par to EUT.
15.935	18.6	10.4	169.0	2.0	5.0	0.0	See Comment	QP	0.4	28.6	29.5	-0.9	Antenna Par to gnd, Perp to EUT.
20.592	21.0	10.3	189.0	1.0	3.0	0.0	See Comment	QP	8.6	22.7	29.5	-6.8	Antenna Perp to gnd, Par to EUT.
15.935	20.5	10.5	142.0	2.3	3.0	0.0	See Comment	QP	7.7	23.3	29.5	-6.2	Antenna Perp to gnd, Perp to EUT.
15.935	18.7	10.4	339.0	1.2	3.0	0.0	See Comment	QP	0.5	28.6	29.5	-0.9	Antenna Par to gnd, Perp to EUT.
15.935	18.6	10.4	304.0	1.0	3.0	0.0	See Comment	QP	0.0	29.0	29.5	-0.5	Antenna Perp to gnd, Par to EUT.

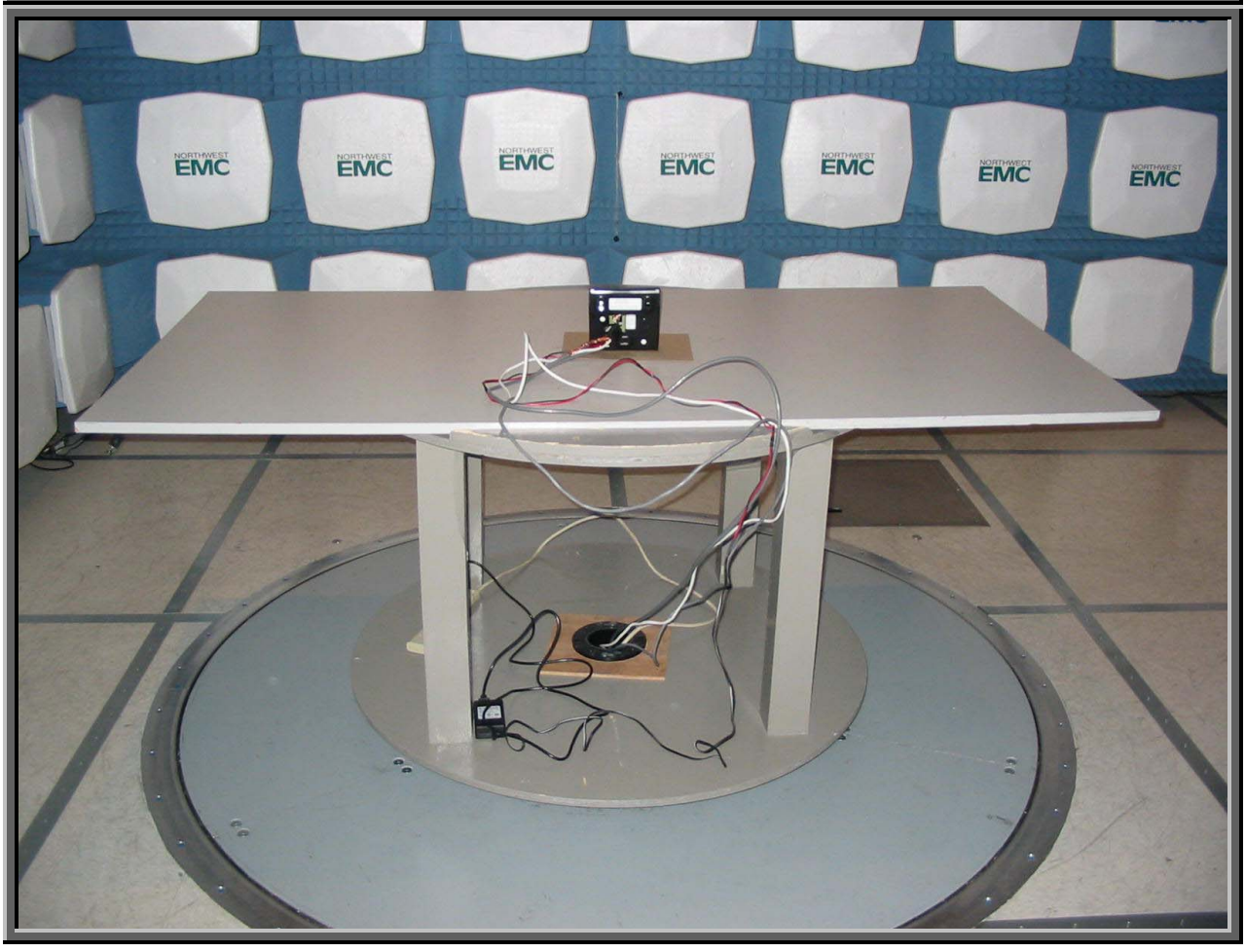
Distance Adjustment Factor for Radiated Emissions below 30 MHz

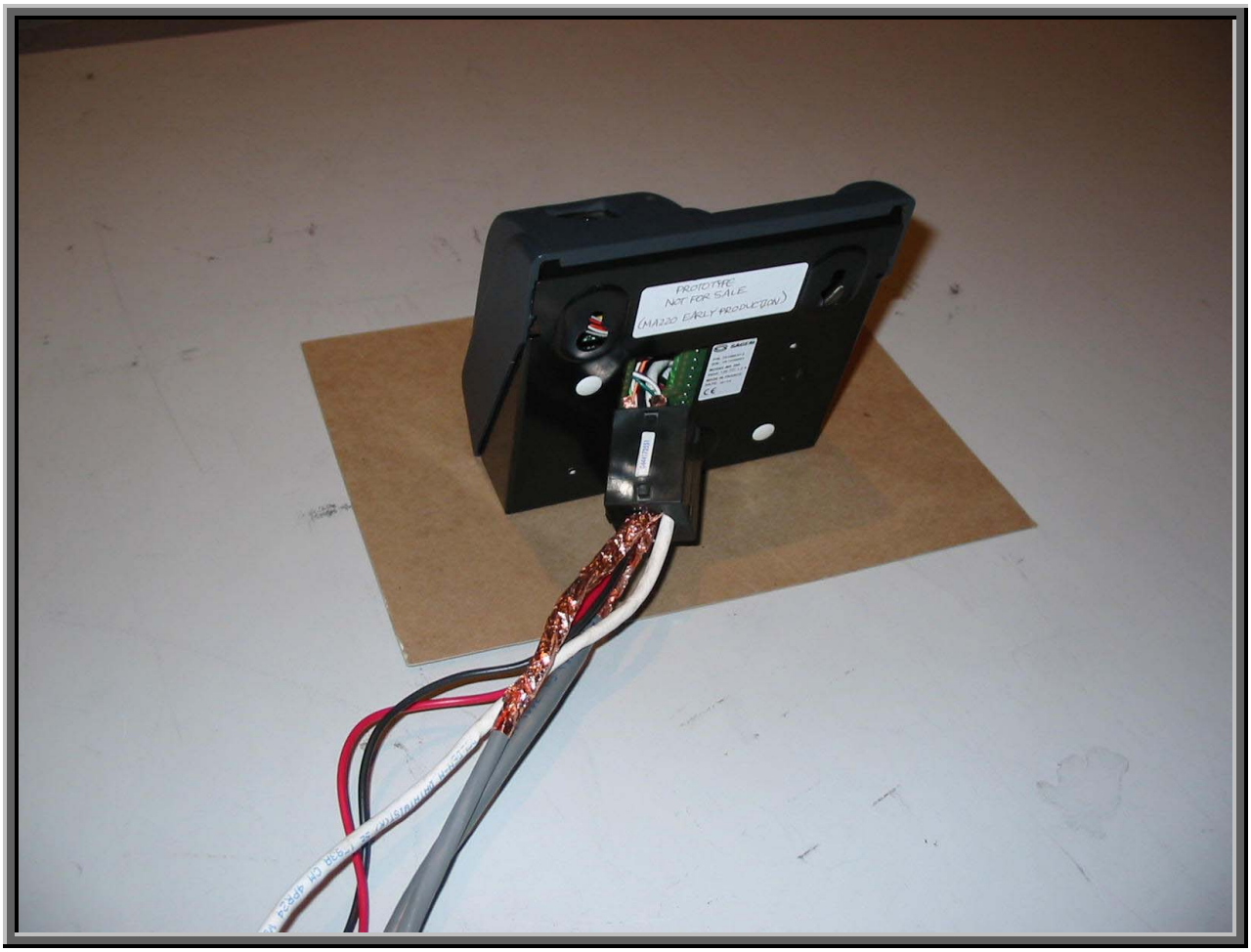
Method: Per 47 CFR 15.31(f)(2), the data was extrapolated based upon a the measured fall-off (at each frequency / polarity).

EUT: MA 220
S/N:
Date: 7/16/2003
Job Number: PLEX0357

Frequency (MHz)	Loop Antenna Polarity	Test Distance (meters)	Adjusted Level (dBuV/m)	Fall-Off from 3 to 5 m (dB)	Extrapolation Factor for Specification Limit (dB / decade)	Test Distance of Spec. Limit (meters)	Distance Adjustment Factor (dB)
20.592	Par/Gnd, Perp/EUT	3	37.7	4.9	22.1	30.0	22.1
20.592	Par/Gnd, Perp/EUT	5	32.8				17.2
20.592	Perp/Gnd, Perp/EUT	3	39.3	4.7	21.2	30.0	21.2
20.592	Perp/Gnd, Perp/EUT	5	34.6				16.5
20.592	Perp/Gnd, Par/EUT	3	31.3	1.9	8.6	30.0	8.6
20.592	Perp/Gnd, Par/EUT	5	29.4				6.7
15.935	Par/Gnd, Perp/EUT	3	29.1	0.1	0.5	30.0	0.5
15.935	Par/Gnd, Perp/EUT	5	29.0				0.4
15.935	Perp/Gnd, Perp/EUT	3	31.0	1.7	7.7	30.0	7.7
15.935	Perp/Gnd, Perp/EUT	5	29.3				6.0
15.935	Perp/Gnd, Par/EUT	3	29.0	0.0	0.0	30.0	0.0
15.935	Perp/Gnd, Par/EUT	5	29.0				0.4


NORTHWEST
EMC


NORTHWEST
EMC


PROTOTYPE
NOT FOR SALE
(MA220 EARLY PRODUCTION)

I'Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:
Single

Operating Modes Investigated:
Typical

Data Rates Investigated:
Maximum

Output Power Setting(s) Investigated:
Maximum

Power Input Settings Investigated:
110 VAC, 60 Hz

Software\Firmware Applied During Test

Exercise software	Morpho Access	Version	4.2
Description			
The system was tested using standard operating modes, which do not require software.			

Equipment Modifications

No EMI suppression devices were added or modified. The EUT was tested as delivered.

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
EUT	Sagem	MA220	307990003
Power Brick	Elpac	FW3012	008492

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Power	No	2.0	Yes	EUT	Power Brick
AC Power	No	1.8	No	Power Brick	AC Mains
Ethernet	No	15	Yes	EUT	Laptop
Serial	Yes	15	Yes	EUT	Laptop
Wiegand	Yes	15	Yes	EUT	Laptop

PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.

Measurement Equipment

Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Tektronix	2784	AAO	02/26/2003	24 mo
Near field probe	EMCO	7405	IPD	No cal required	N/A
AC Power Supply	Hewlett-Packard	6843A	THB	03/06/2003	12 mo
Temperature / Humidity Chamber	Cincinnati Sub-Zero	ZH-32-2-2-H/AC	TBA	9/20/2002	12 mo

Test Description

Requirement: Per 47 CFR 15.255, the frequency stability shall be measured with variation of ambient temperature and primary supply voltage. A spectrum analyzer or frequency counter can be used to measure the frequency stability. If using a spectrum analyzer, it must have a precision frequency reference that exceeds the stability requirement of the transmitter. A temperature / humidity chamber is required.

Configuration:

Variation of Supply Voltage

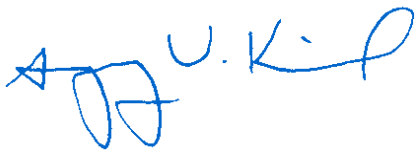
The primary supply voltage was varied from 85% to 115% of nominal. The EUT can only be operated from the public AC mains, so an AC lab supply was used to vary the supply voltage from 115% to 85% of 120 V, 60 Hz.

Variation of Ambient Temperature

Using a temperature chamber, the transmit frequency was recorded at the extremes of the specified temperature range (-20° to +50° C) and at 10°C intervals.

Measurements were made at the single transmit frequency. The antenna is integral to the EUT, so a radiated measurement was made using a spectrum analyzer and a near field probe. The spectrum analyzer is equipped with a precision frequency reference that exceeds the stability requirement of the EUT.

Completed by:



NORTHWEST EMC

EMISSIONS DATA SHEET

Rev BETA 01/30/01

EUT:	MA 220			Work Order:	PLEX0339
Serial Number:	307990003			Date:	05/09/03
Customer:	Plexus			Temperature:	24C
Attendees:	none	Tested by:	Greg Kiemel	Humidity:	38% RH
Customer Ref. No.:	N/A	Power:	120VAC /60 Hz\	Job Site:	EV09

TEST SPECIFICATIONS

Specification:	47 CFR 2.1055 & 15.225	Year:	2002	Method:	TIA/EIA - 603	Year:	1993

SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES

Transmitting

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Minimum frequency stability of +/-0.01% for variations of temperature and supply voltage (AC power)

RESULTS	MINIMUM FREQUENCY STABILITY
Pass	0.000339%

SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

Frequency Stability

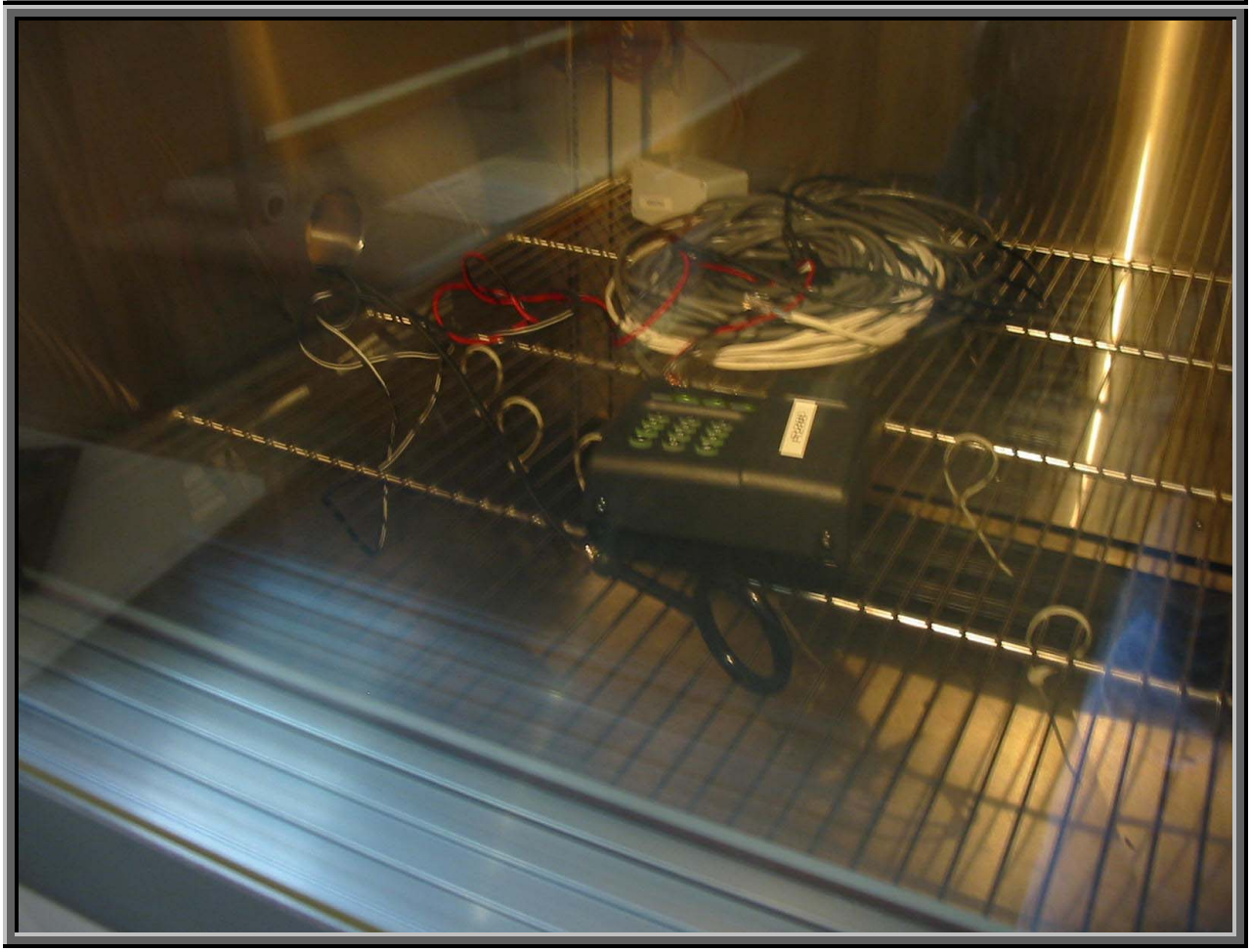
Frequency Stability with Variation of Ambient Temperature (Primary Supply = 120V, 60Hz)

Temp (°C)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Tolerance (%)	Specification (%)
-20	13.565174	13.565196	0.000162	+/-0.01
-10	13.565174	13.565197	0.000170	+/-0.01
0	13.565174	13.565188	0.000103	+/-0.01
10	13.565174	13.565186	0.000088	+/-0.01
20	13.565174	13.565191	0.000125	+/-0.01
30	13.565174	13.565204	0.000221	+/-0.01
40	13.565174	13.565218	0.000324	+/-0.01
50	13.565174	13.565220	0.000339	+/-0.01

Frequency Stability with Variation of Primary Supply Voltage (Ambient Temperature = 25C)

Voltage (VAC, 60Hz)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Tolerance (%)	Specification (%)
138 (115%)	13.565174	13.565174	0.000000	+/-0.01
132 (110%)	13.565174	13.565174	0.000000	+/-0.01
126 (105%)	13.565174	13.565174	0.000000	+/-0.01
120 (100%)	13.565174	13.565174	0.000000	+/-0.01
114 (95%)	13.565174	13.565174	0.000000	+/-0.01
108 (90%)	13.565174	13.565174	0.000000	+/-0.01
102 (85%)	13.565174	13.565174	0.000000	+/-0.01


SYSTEM START-UP PROCEDURE
32
CSZ
Don't forget to check the water level.
CAUTION



Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. All of the EUT parameters listed below were investigated. This includes, but may not be limited to, CPU speeds, video resolution settings, operational modes, and input voltages.

Operating Modes Investigated:
Transmitting

Power Input Settings Investigated:
110 VAC, 60 Hz

Software\Firmware Applied During Test			
Operating system	Morpho Access OS	Version	4.2
Exercise software	Morpho Access	Version	4.2
Description			
The system was tested using standard operating modes, which do not require software.			

Equipment Modifications

No modifications were added.

EUT and Peripherals in Test Setup Boundary

Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
EUT	Sagem	MA220	none
Power Brick	Elpac	FW3012	008492

Remote Equipment Outside of Test Setup Boundary

Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Laptop	Dell	PPX	000237

***Note : Equipment isolated from the EUT so as not to contribute to the measurement results are considered to be outside the test setup boundary**.

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Power	No	2.0	Yes	EUT	Power Brick
AC Power	No	1.8	No	Power Brick	AC Mains
Ethernet	No	15	Yes	EUT	Laptop
Serial	Yes	15	Yes	EUT	Laptop
Wiegand	Yes	15	Yes	EUT	Laptop

PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.

Measurement Equipment

Description	Manufacturer	Model	Identifier	Last Cal	Interval
LISN	Solar	9252-50-R	LID	11/13/2002	12 mo
Spectrum Analyzer	Hewlett-Packard	8593EM	AAM	11/19/2002	12 mo
High Pass Filter	TTE	H647-100k-50	HFA	11/12/2002	12 mo

Test Description

Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically those measurements are made using a LISN (Line Impedance Stabilization Network), the 50 Ω measuring port is terminated by a 50 Ω EMI meter or a 50 Ω resistive load. All 50 Ω measuring ports of the LISN are terminated by 50Ω.

Measurement Bandwidths

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 – 0.15	1.0	0.2	0.2
0.15 – 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0
Measurements were made using the bandwidths and detectors specified. No video filter was used.			

Completed by:

NORTHWEST EMC

CONDUCTED EMISSIONS DATA SHEET

REV df3.10 03/10/2003

EUT:	MA220			Work Order:	PLEX0339
Serial Number:	none			Date:	04/24/03
Customer:	Plexus			Temperature:	70
Attendees:	Fritz Rivera			Humidity:	37%
Cust. Ref. No.:				Barometric Pressure	30.01
Tested by:	Ethan Schoonover	Power:	110VAC/60Hz.	Job Site:	SU07

TEST SPECIFICATIONS

Specification:	CISPR22 Class B	Year:	1992
Method:	ANSI C63.4	Year:	1992

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

All cables connected to laptop outside of chamber. One ferrite on all cables. Shielded cables not grounded.

EUT OPERATING MODES

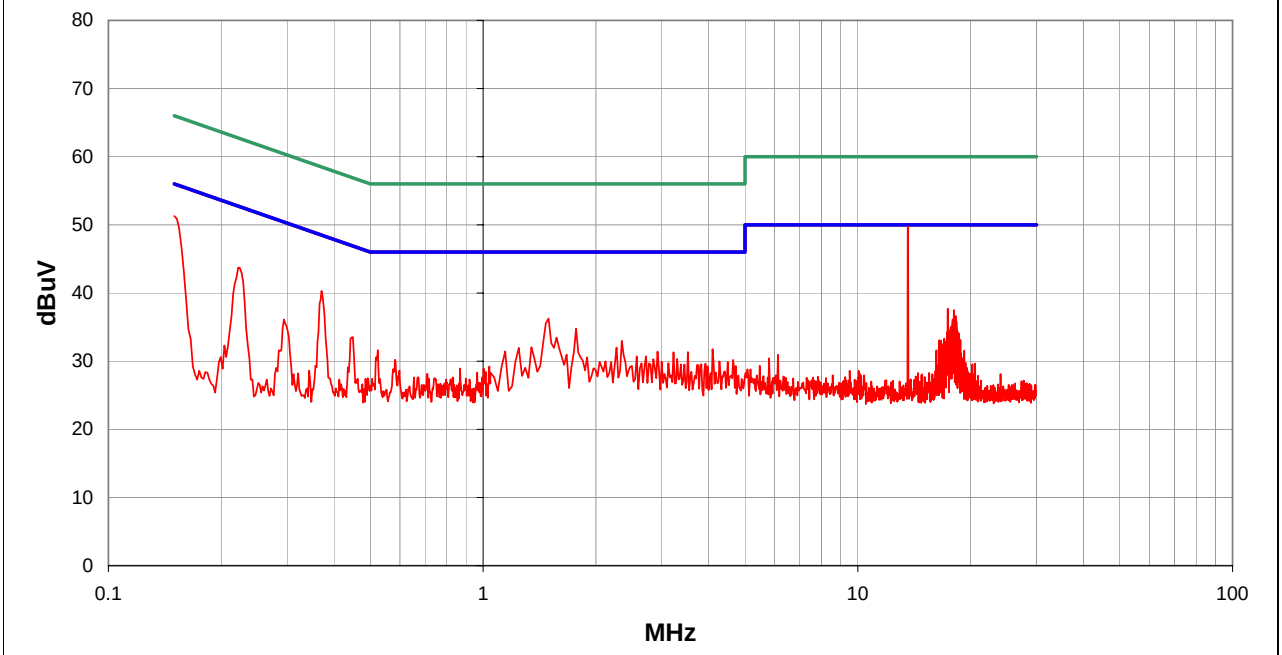
Transmitting

DEVIATIONS FROM TEST STANDARD

RESULTS	Line	Run #
Pass	L1	1

Other

Tested By:



Freq (MHz)	Amplitude (dBuV)			Transducer (dB)	Cable (dB)	External Attenuation (dB)		Detector (blank equal peaks [PK] from scan)		Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
13.590	29.2			0.0	0.6	20.0				49.8	50.0	-0.2
0.150	31.2			0.0	0.1	20.0				51.3	56.0	-4.7
0.370	20.2			0.0	0.1	20.0				40.3	48.5	-8.2
0.224	23.6			0.0	0.1	20.0				43.7	52.7	-9.0
1.495	16.1			0.0	0.2	20.0				36.3	46.0	-9.7
1.770	14.6			0.0	0.2	20.0				34.8	46.0	-11.2
17.370	17.1			0.0	0.6	20.0				37.7	50.0	-12.3
18.030	16.9			0.0	0.6	20.0				37.5	50.0	-12.5
2.346	12.8			0.0	0.2	20.0				33.0	46.0	-13.0
18.270	16.0			0.0	0.6	20.0				36.6	50.0	-13.4
0.449	13.4			0.0	0.1	20.0				33.5	46.9	-13.4
17.910	15.5			0.0	0.6	20.0				36.1	50.0	-13.9
1.345	11.9			0.0	0.1	20.0				32.0	46.0	-14.0
2.271	11.8			0.0	0.2	20.0				32.0	46.0	-14.0
1.245	11.8			0.0	0.1	20.0				31.9	46.0	-14.1
18.120	15.3			0.0	0.6	20.0				35.9	50.0	-14.1
18.330	15.2			0.0	0.6	20.0				35.8	50.0	-14.2

NORTHWEST EMC

CONDUCTED EMISSIONS DATA SHEET

REV df3.10 03/10/2003

EUT:	MA220			Work Order:	PLEX0339
Serial Number:	none			Date:	04/24/03
Customer:	Plexus			Temperature:	70
Attendees:	Fritz Rivera			Humidity:	37%
Cust. Ref. No.:				Barometric Pressure	30.01
Tested by:	Ethan Schoonover	Power:	110VAC/60Hz.	Job Site:	SU07

TEST SPECIFICATIONS

Specification:	CISPR22 Class B	Year:	1992
Method:	ANSI C63.4	Year:	1992

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

All cables connected to laptop outside of chamber. One ferrite on all cables. Shielded cables not grounded.

EUT OPERATING MODES

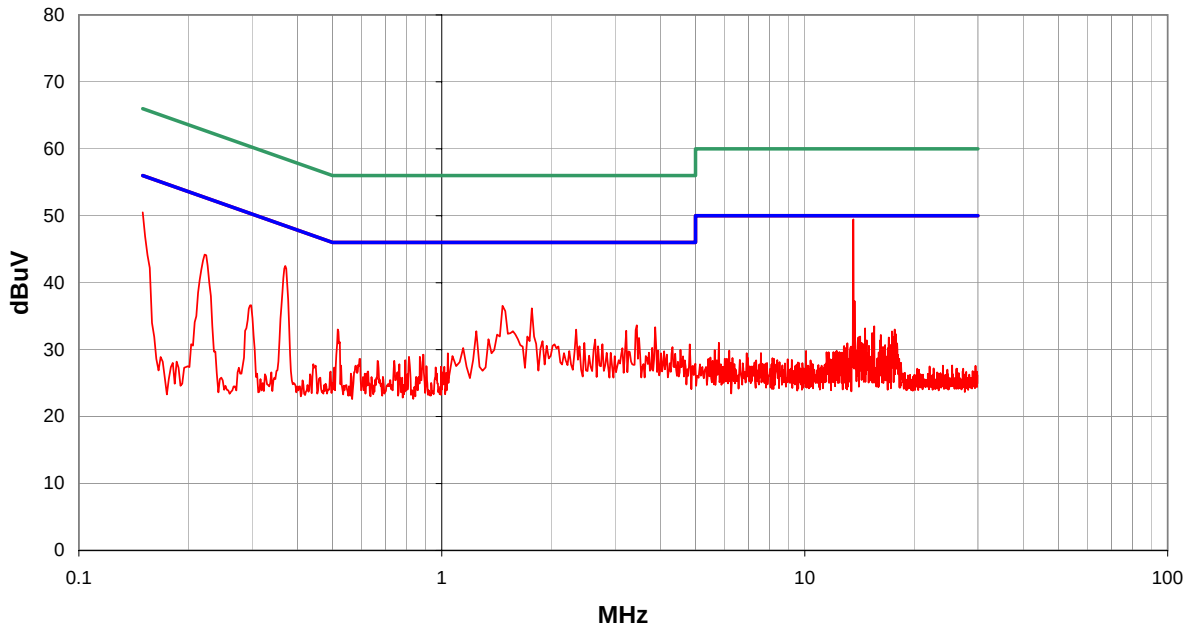
Transmitting

DEVIATIONS FROM TEST STANDARD

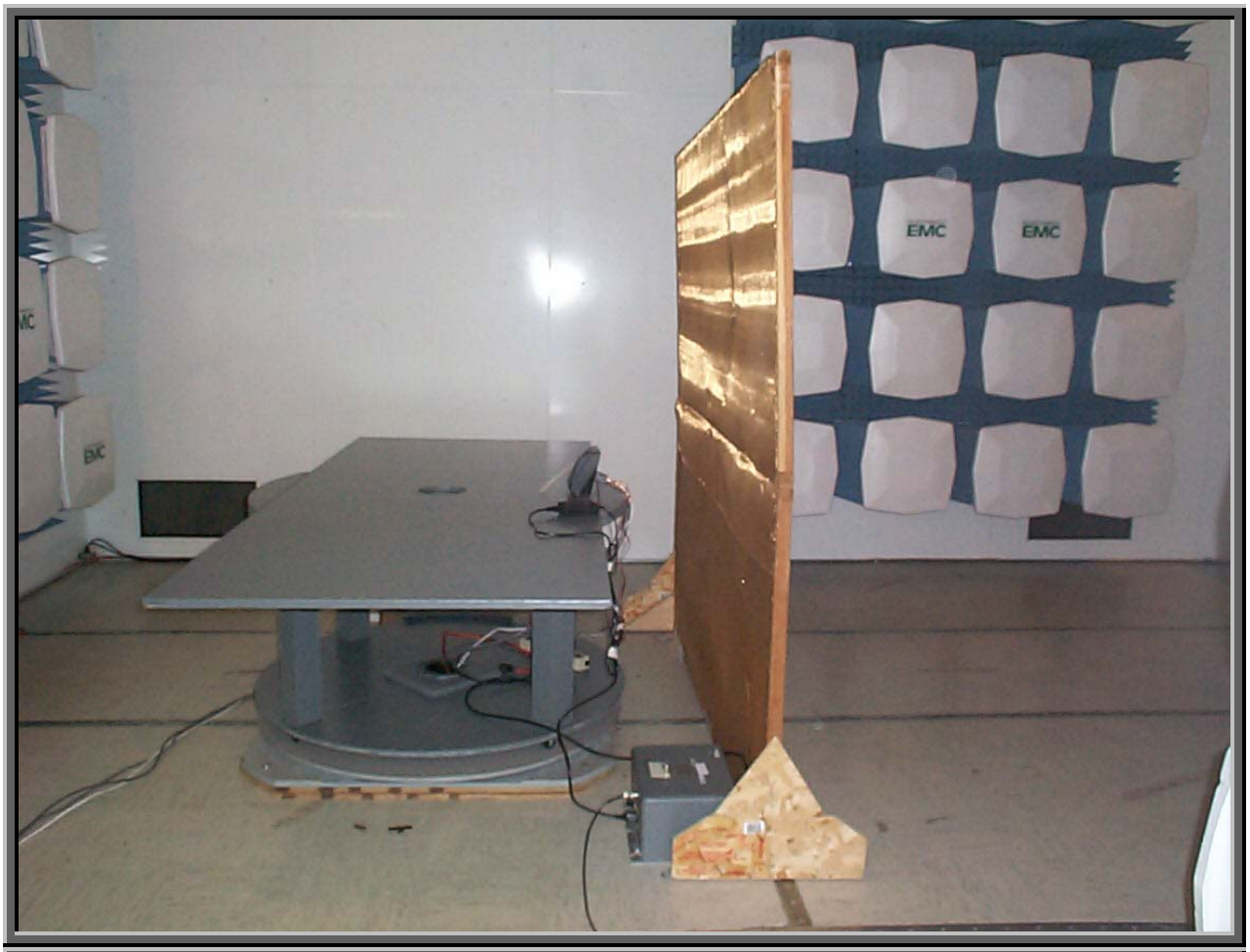
RESULTS	Line	Run #
Pass	N	2

Other

Tested By:



Freq (MHz)	Amplitude (dBuV)			Transducer (dB)	Cable (dB)	External Attenuation (dB)		Detector (blank equal peaks [PK] from scan)		Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
13.620	28.9			0.0	0.6	20.0				49.5	50.0	-0.5
0.150	30.4			0.0	0.1	20.0				50.5	56.0	-5.5
0.370	22.4			0.0	0.1	20.0				42.5	48.5	-6.0
0.222	24.1			0.0	0.1	20.0				44.2	52.7	-8.5
1.470	16.4			0.0	0.2	20.0				36.6	46.0	-9.4
1.770	16.0			0.0	0.2	20.0				36.2	46.0	-9.8
3.446	13.4			0.0	0.2	20.0				33.6	46.0	-12.4
3.871	13.1			0.0	0.3	20.0				33.4	46.0	-12.6
13.710	16.7			0.0	0.6	20.0				37.3	50.0	-12.7
0.517	12.9			0.0	0.1	20.0				33.0	46.0	-13.0
2.346	12.8			0.0	0.2	20.0				33.0	46.0	-13.0
3.221	12.6			0.0	0.2	20.0				32.8	46.0	-13.2
1.245	12.6			0.0	0.1	20.0				32.7	46.0	-13.3
0.298	16.5			0.0	0.1	20.0				36.6	50.3	-13.7
3.496	11.5			0.0	0.2	20.0				31.7	46.0	-14.3
1.345	11.4			0.0	0.1	20.0				31.5	46.0	-14.5
2.646	11.3			0.0	0.2	20.0				31.5	46.0	-14.5
1.895	11.1			0.0	0.2	20.0				31.3	46.0	-14.7
2.471	10.8			0.0	0.2	20.0				31.0	46.0	-15.0
2.771	10.6			0.0	0.2	20.0				30.8	46.0	-15.2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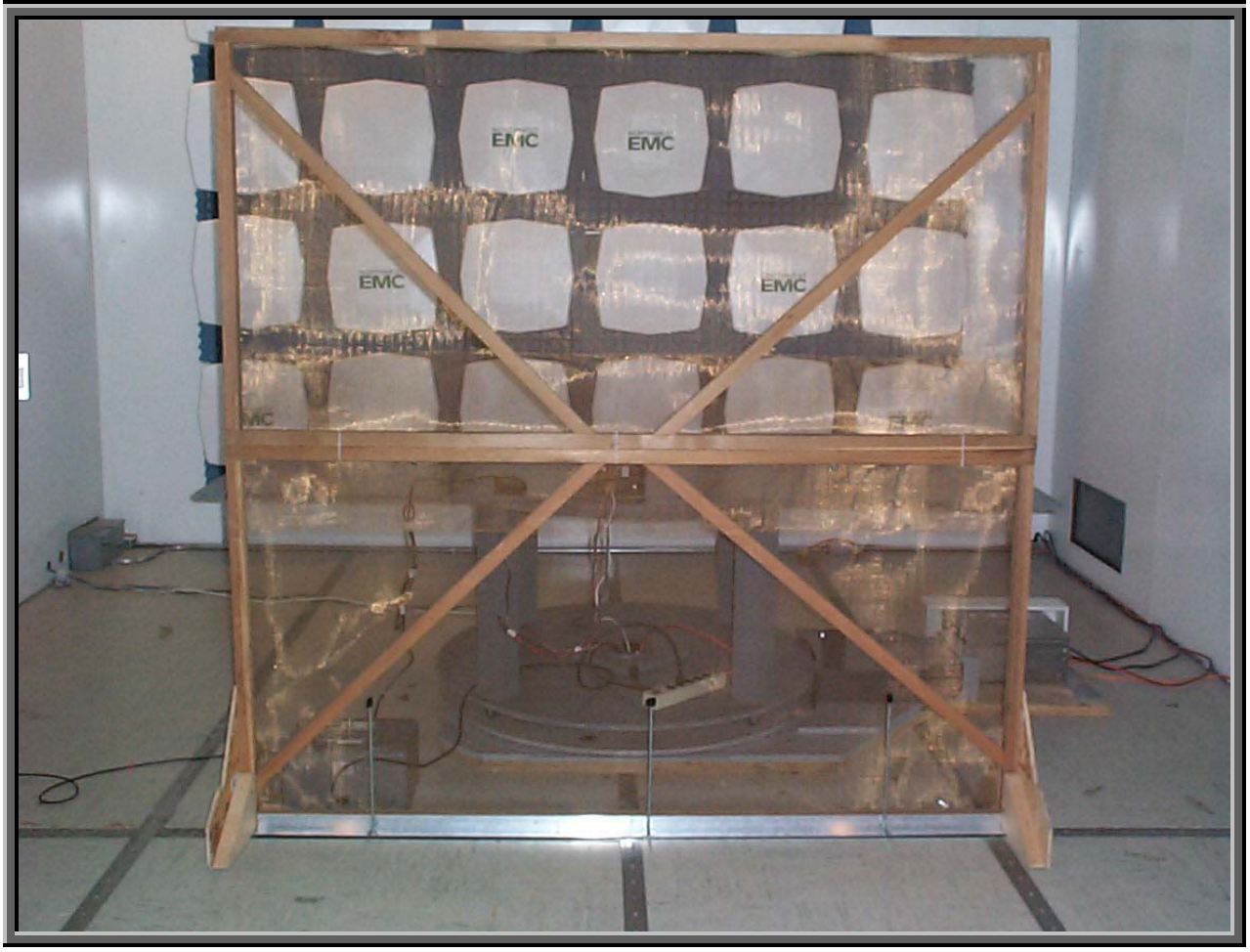
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