

SAGEM Morpho, Inc.

MA110

September 06, 2006

Report No. SAGM0007

Report Prepared By



www.nwemc.com
1-888-EMI-CERT

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EMC Test Report



22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test
Issue Date: September 06, 2006
SAGEM Morpho, Inc.
Model: MA110

Emissions				
Test Description	Specification	Test Method	Pass	Fail
Frequency Stability	FCC 15.225:2006	ANSI C63.4:2003	☒	☐
Field Strength of Fundamental	FCC 15.225:2006	ANSI C63.4:2003	☒	☐
Field Strength of Spurious Emissions	FCC 15.225:2006	ANSI C63.4:2003	☒	☐
Conducted Emissions	FCC 15.107:2006	ANSI C63.4:2003	☒	☐
Radiated Emissions	FCC 15.109:2006	ANSI C63.4:2003	☒	☐

Modifications made to the product

See the Modifications section of this report

Test Facility

The measurement facility used to collect the data is located at:

Northwest EMC, Inc.
22975 NW Evergreen Parkway, Suite 400; Hillsboro, OR 97124
Phone: (503) 844-4066
Fax: 844-3826

This site has been fully described in a report filed with and accepted by the FCC (Federal Communications Commission) and Industry Canada.

Approved By:

Greg Kiemel, Director of Engineering

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America.

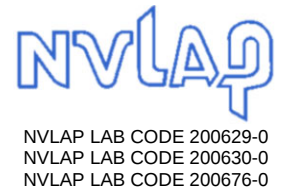
Product compliance is the responsibility of the client, therefore the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. This Report may only be duplicated in its entirety. The results of this test pertain only to the sample(s) tested, 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: Accredited by NVLAP for performance of FCC radio, digital, and ISM device testing. Our Open Area Test Sites, certification chambers, 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. 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.



NVLAP: Northwest EMC, Inc. is accredited under the United States Department of Commerce, National Institute of Standards and Technology, and National Voluntary Laboratory Accreditation Program for satisfactory compliance with the requirements of ISO/IEC 17025 for Testing Laboratories. The NVLAP accreditation encompasses Electromagnetic Compatibility Testing in accordance with the European Union EMC Directive 89/336/EEC, ANSI C63.4, MIL-STD 461E, DO-160D and SAE J1113. Additionally, Northwest EMC is accredited by NVLAP to perform radio testing in accordance with the European Union R&TTE Directive 1999/5/EEC, the requirements of FCC, and the RSS radio standards for Industry Canada.



Industry Canada: Accredited by NVLAP for performance of Industry Canada RSS and ICES testing. Our Open Area Test Sites and certification chambers comply with RSS 212, Issue 1 (Provisional) and have been filed with Industry Canada and accepted. Northwest EMC has been accredited by ANSI to ISO / IEC Guide 65 as a product certifier. We have been designated by NIST and recognized by Industry Canada as a Certification Body (CB) per the APEC Mutual Recognition Arrangement (MRA). This allows Northwest EMC to certify transmitters to Industry Canada technical requirements.



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.



TÜV Product Service: Included in TÜV Product Service Group's Listing of Recognized Laboratories. It qualifies in connection with the TÜV Certification after Recognition of Agent's Testing Program for the product categories and/or standards shown in TÜV's current Listing of CARAT Laboratories, available from TÜV. A certificate was issued to represent that this laboratory continues to meet TÜV's CARAT Program requirements. Certificate No. USA0401C.



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).



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 (NVLAP).



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 Numbers. - Hillsboro: C-1071, R-1025, and R-2318, Irvine: C-2094 and R-1943, Sultan: R-871, C-1784 and R-1761).



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.



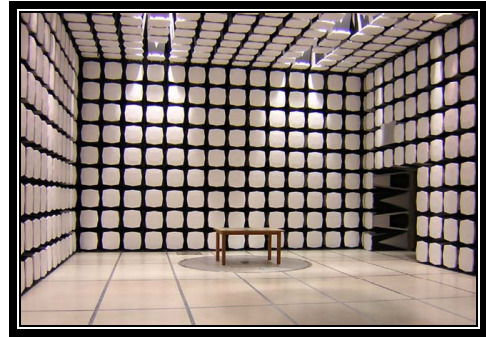
GOST: Northwest EMC, Inc. has been assessed and accredited by the Russian Certification bodies Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC, to perform EMC and Hygienic testing for Information Technology Products. As a result of their laboratory assessment, they will accept test results from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



SCOPE

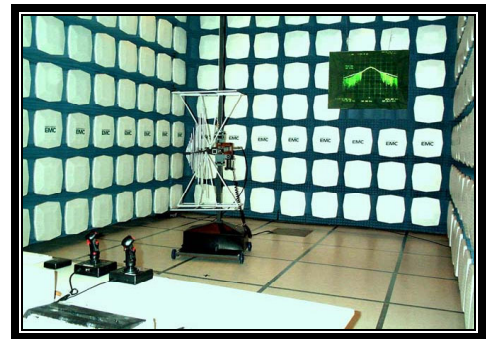
For details on the Scopes of our Accreditations, please visit:

<http://www.nwemc.com/scope.asp>



**California – Orange County Facility
Labs OC01 – OC13**

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



**Oregon – Evergreen Facility
Labs EV01 – EV11**

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



**Washington – Sultan Facility
Labs SU01 – SU07**

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

Party Requesting the Test

Company Name:	SAGEM Morpho, Inc.
Address:	1145 Broadway Plaza, Suite 200
City, State, Zip:	Tacoma, WA 98402
Test Requested By:	John Prieve
Model:	MA110
First Date of Test:	8/10/2006
Last Date of Test:	8/31/2006
Receipt Date of Samples:	8/10/2006
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test**Functional Description of the EUT (Equipment Under Test):**

Biometric (finger print) Reader

Testing Objective:

To satisfy the requirements for FCC 15.225.

EUT Photo

CONFIGURATION 1 SAGM0007

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Biometric (finger print) Reader	SAGEM Morpho, Inc.	MA110	062230117A

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Power Adapter	Elpac Power Systems	FW3012	038389

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Computer	Dell	Optiplex GX150	C044G11

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Ethernet	No	10m	Yes	Biometric (finger print) Reader	Computer
Weigand	No	10m	Yes	Biometric (finger print) Reader	Computer
Power	PA	2m	Yes	Biometric (finger print) Reader	Power Adapter
AC Power	No	2m	No	Power Adapter	AC Mains
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

Equipment modifications					
Item	Date	Test	Modification	Note	Disposition of EUT
1	8/10/2006	Field Strength of Spurious Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	8/28/2006	Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
3	8/29/2006	Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
4	8/30/2006	Frequency Stability	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
5	8/31/2006	Field Strength of Fundamental	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
6	8/31/2006	Field Strength of Spurious Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

MODES OF OPERATION

Card reader active mode.

POWER SETTINGS INVESTIGATED

120VAC/60Hz

FREQUENCY RANGE INVESTIGATED

Start Frequency	13.553 MHz	Stop Frequency	13.567 MHz
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SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Antenna, Loop	EMCO	6502	AZC	4/12/2005	24
EV01 cables c,g, h			EVA	3/30/2006	13
Spectrum Analyzer	Agilent	E4446A	AAT	4/4/2006	12

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.				

MEASUREMENT UNCERTAINTY

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

TEST DESCRIPTION

The antenna to be used with the EUT was tested. The EUT was transmitting while set at a single 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).

EUT:	MA110	Work Order:	SAGM0007
Serial Number:	062230117A	Date:	08/30/06
Customer:	SAGEM Morpho, Inc.	Temperature:	25
Attendees:	None	Humidity:	32%
Project:	NA	Barometric Pres.:	30.01
Tested by:	Holly Ashkannejhad	Power:	120VAC/60Hz
		Job Site:	EV01

TEST SPECIFICATIONS	Test Method
FCC 15.225:2006	ANSI C63.4:2003

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	5

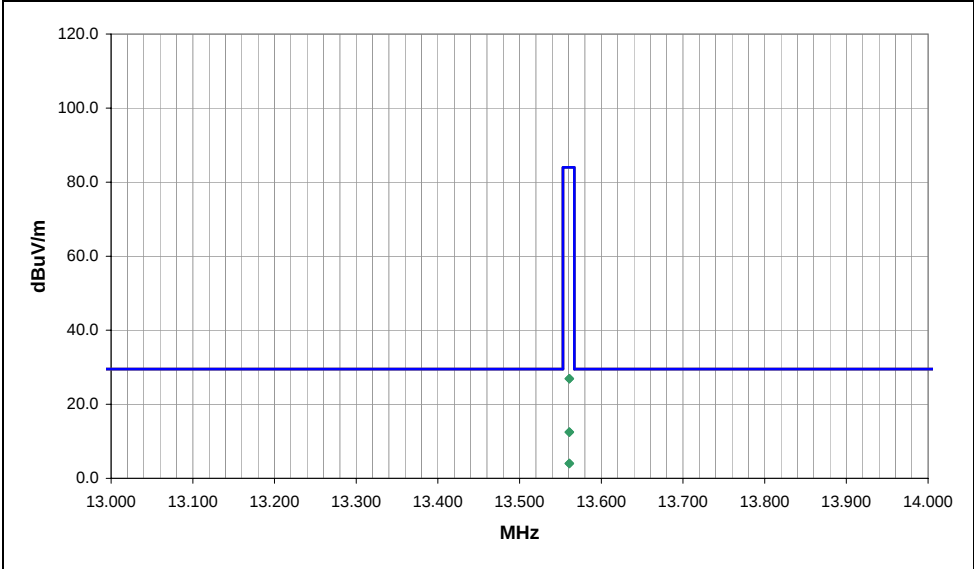
COMMENTS
Ethernet and weigand (com1) to remote pc.

EUT OPERATING MODES
Card reader active mode.

DEVIATIONS FROM TEST STANDARD
No deviations.

Run #	2	
Configuration #	1	
Results	Pass	NVLAP Lab Code 200630-0

Signature *Holly Ashkannejhad*

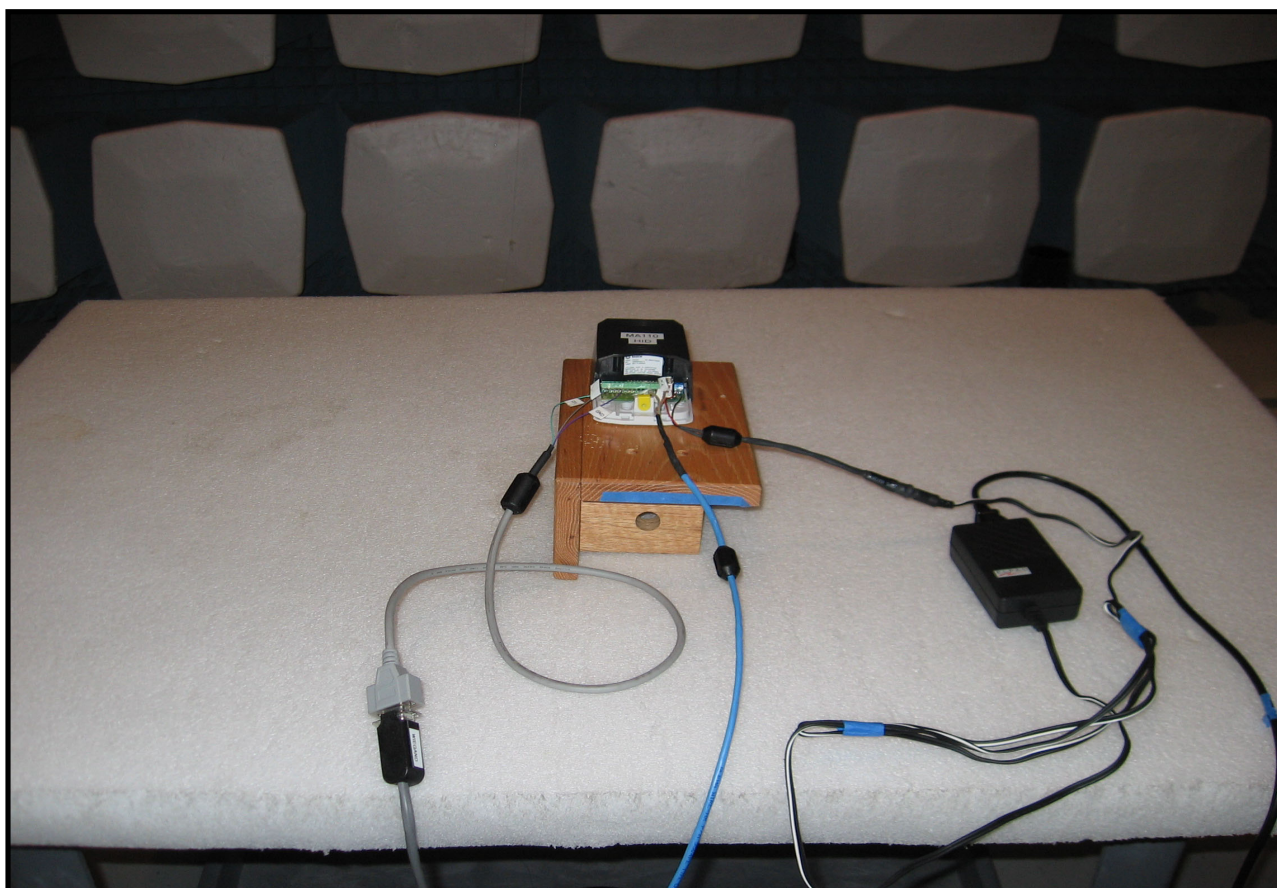


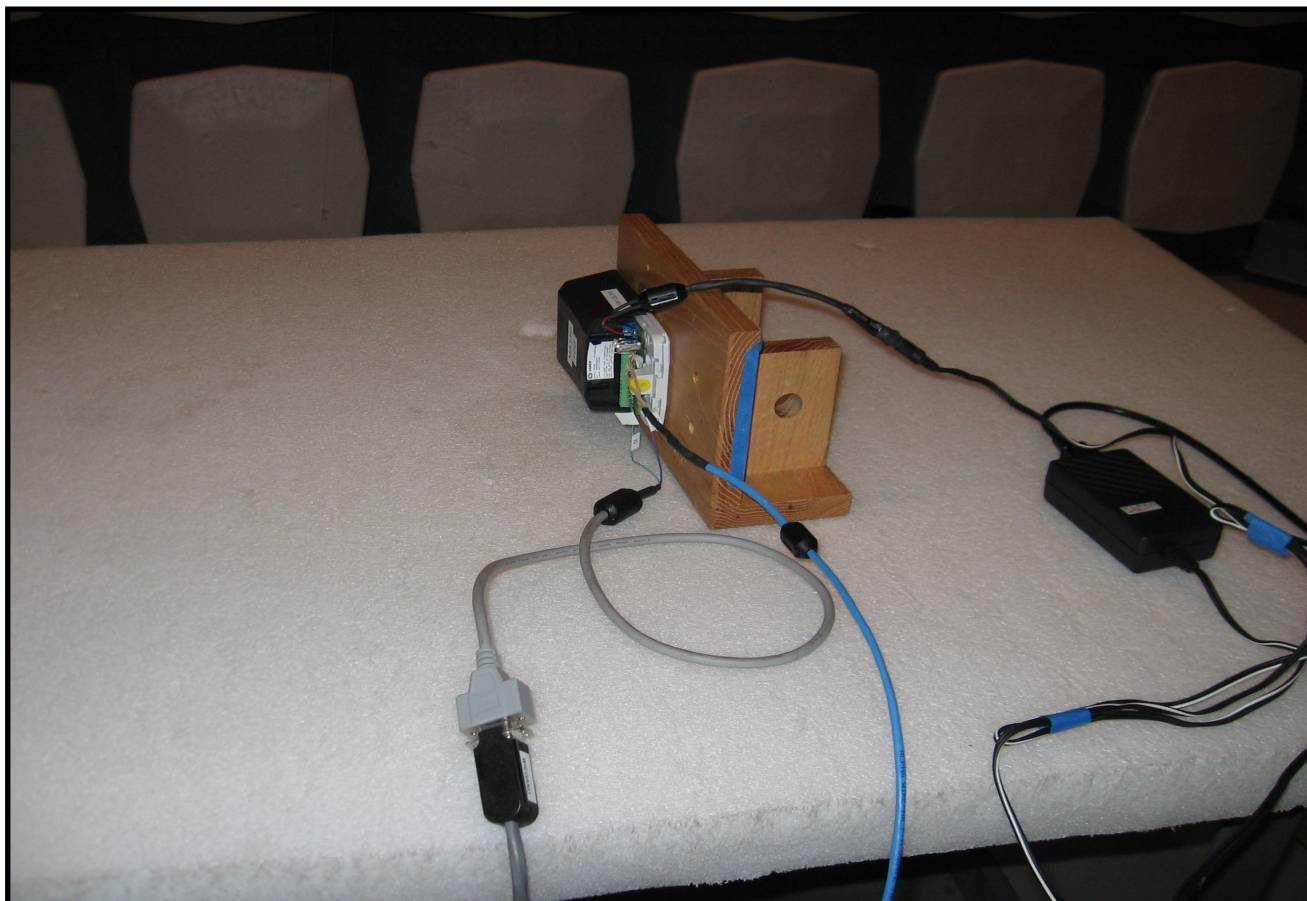
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
13.561	52.4	10.6	255.0	1.0	3.0	0.0	QP	50.5	12.5	84.0	-71.5	Antenna par to gnd, Perp to EUT.
13.561	41.2	10.6	360.0	2.3	5.0	0.0	QP	39.3	12.5	84.0	-71.5	Antenna par to gnd, Perp to EUT.
13.561	51.0	10.6	191.0	2.2	3.0	0.0	QP	34.7	26.9	84.0	-57.1	Antenna perp to gnd, Par to EUT.
13.561	43.3	10.6	191.0	2.0	5.0	0.0	QP	27.0	26.9	84.0	-57.1	Antenna perp to gnd, Par to EUT.
13.561	50.6	10.6	187.0	2.2	3.0	0.0	QP	57.2	4.0	84.0	-80.0	Antenna perp to gnd, Perp to EUT.
13.561	37.9	10.6	142.0	2.4	5.0	0.0	QP	44.5	4.0	84.0	-80.0	Antenna perp 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: MA110
S/N:
Date: 8/30/2006
Job Number: SAGM0007

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)
13.560	Par/Gnd, Perp/EUT	3	63.0	11.2	50.5	30.0	50.5
13.560	Par/Gnd, Perp/EUT	5	51.8				39.3
13.560	Perp/Gnd, Perp/EUT	3	61.2	12.7	57.2	30.0	57.2
13.560	Perp/Gnd, Perp/EUT	5	48.5				44.5
13.560	Perp/Gnd, Par/EUT	3	61.6	7.7	34.7	30.0	34.7
13.560	Perp/Gnd, Par/EUT	5	53.9				27.0





Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

MODES OF OPERATION

Card reader active mode.

POWER SETTINGS INVESTIGATED

120VAC/60Hz

FREQUENCY RANGE INVESTIGATED

Start Frequency	10 kHz	Stop Frequency	1000 MHz
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SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Pre-Amplifier	Miteq	AM-1616-1000	AOL	1/4/2006	13
Antenna, Biconilog	EMCO	3141	AXE	12/28/2005	24
EV01 cables c,g, h			EVA	3/30/2006	13
Antenna, Loop	EMCO	6502	AZC	4/12/2005	24
Spectrum Analyzer	Agilent	E4446A	AAT	4/4/2006	12

MEASUREMENT BANDWIDTHS

	Frequency Range	Peak Data	Quasi-Peak Data	Average Data
	(MHz)	(kHz)	(kHz)	(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.

MEASUREMENT UNCERTAINTY

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

TEST DESCRIPTION

The antenna to be used with the EUT was tested. The EUT was transmitting while set at a single 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).

NORTHWEST		PSA 2006.05.30										
EMC		EMI 2006.7.11										
FIELD STRENGTH OF SPURIOUS EMISSIONS												
EUT: MA110		Work Order: SAGM0007										
Serial Number: 062230117A		Date: 08/30/06										
Customer: SAGEM Morpho, Inc.		Temperature: 25										
Attendees: None		Humidity: 32%										
Project: NA		Barometric Pres.: 30.01										
Tested by: Holly Ashkannejhad		Power: 120VAC/60Hz										
Job Site: EV01												
TEST SPECIFICATIONS		Test Method										
FCC 15.225:2006		ANSI C63.4:2003										
TEST PARAMETERS												
Antenna Height(s) (m)		1 - 4										
Test Distance (m)		3										
COMMENTS												
Ethernet and weigand (com1) to remote pc.												
EUT OPERATING MODES												
Card reader active mode.												
DEVIATIONS FROM TEST STANDARD												
No deviations.												
Run #		3										
Configuration #		1										
Results		Pass										
NVLAP Lab Code 200630-0		Signature <i>Holly Ashkannejhad</i>										
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
16.747	19.4	10.4	9.0	1.8	3.0	0.0	QP	5.4	24.4	29.5	-5.1	Antenna par to gnd, perp to EUT.
16.750	18.2	10.4	129.0	1.3	5.0	0.0	QP	4.2	24.4	29.5	-5.1	Antenna par to gnd, perp to EUT.
27.148	18.2	8.7	82.0	3.4	3.0	0.0	QP	1.4	25.5	29.5	-4.0	Antenna par to gnd, perp to EUT.
27.448	17.9	8.7	57.0	1.0	5.0	0.0	QP	1.1	25.5	29.5	-4.0	Antenna par to gnd, perp to EUT.
16.479	17.7	10.4	344.0	1.0	5.0	0.0	QP	0.0	28.1	29.5	-1.4	Antenna perp to gnd, par to EUT.
16.794	17.7	10.4	81.0	1.8	3.0	0.0	QP	0.0	28.1	29.5	-1.4	Antenna perp to gnd, par to EUT.
27.129	18.5	8.7	100.0	3.4	3.0	0.0	QP	0.9	26.3	29.5	-3.2	Antenna perp to gnd, perp to EUT.
27.135	18.3	8.7	183.0	3.4	5.0	0.0	QP	0.7	26.3	29.5	-3.2	Antenna perp to gnd, perp to EUT.
16.661	19.5	10.4	237.0	1.0	5.0	0.0	QP	10.2	19.7	29.5	-9.8	Antenna perp to gnd, perp to EUT.
17.288	22.5	10.3	303.0	1.9	3.0	0.0	QP	13.1	19.7	29.5	-9.8	Antenna perp to gnd, perp to EUT.
27.130	21.1	8.7	134.0	1.9	3.0	0.0	QP	7.7	22.1	29.5	-7.4	Antenna perp to gnd, perp to EUT.
27.132	19.4	8.7	278.0	2.3	5.0	0.0	QP	6.0	22.1	29.5	-7.4	Antenna perp to gnd, perp to EUT.

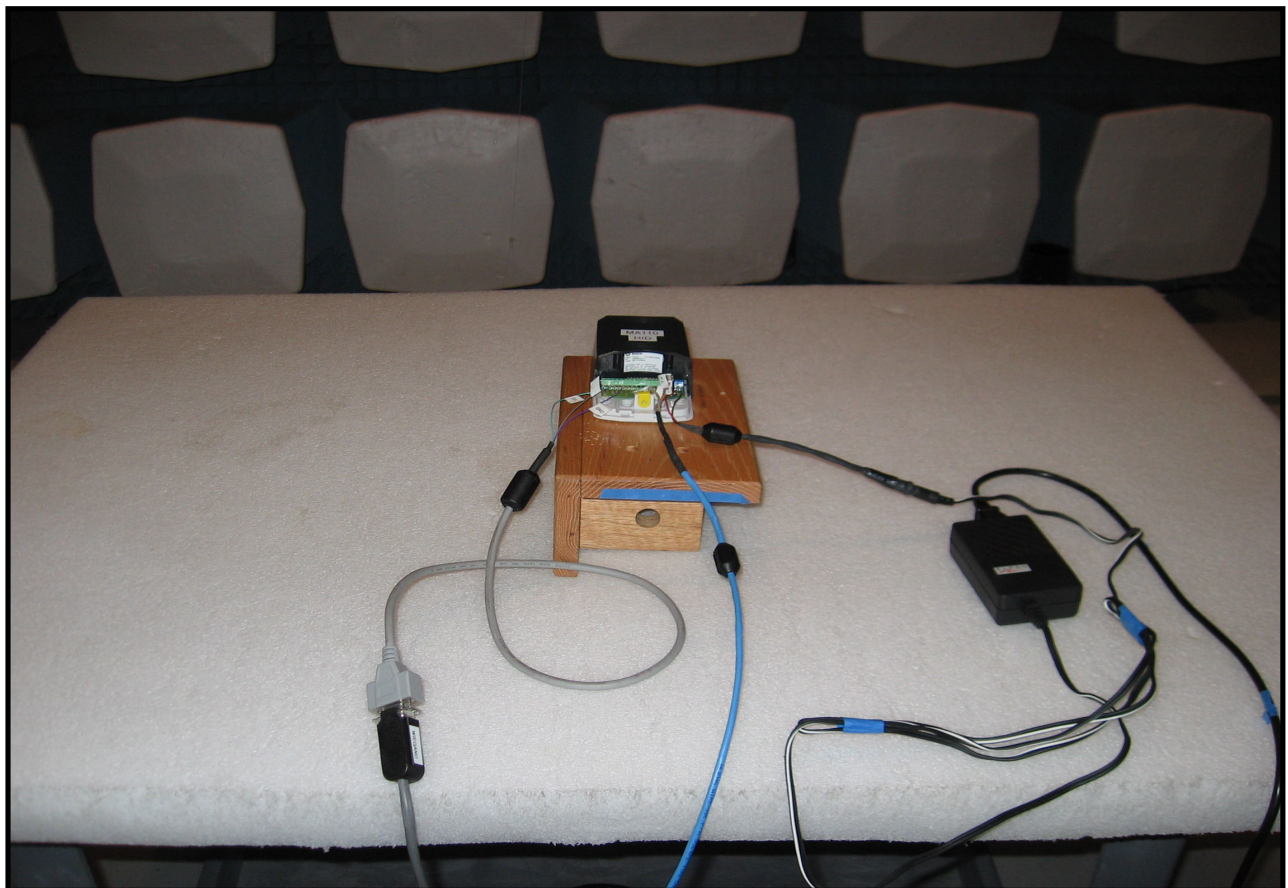
Distance Adjustment Factor for Radiated Emissions below 30 MHz

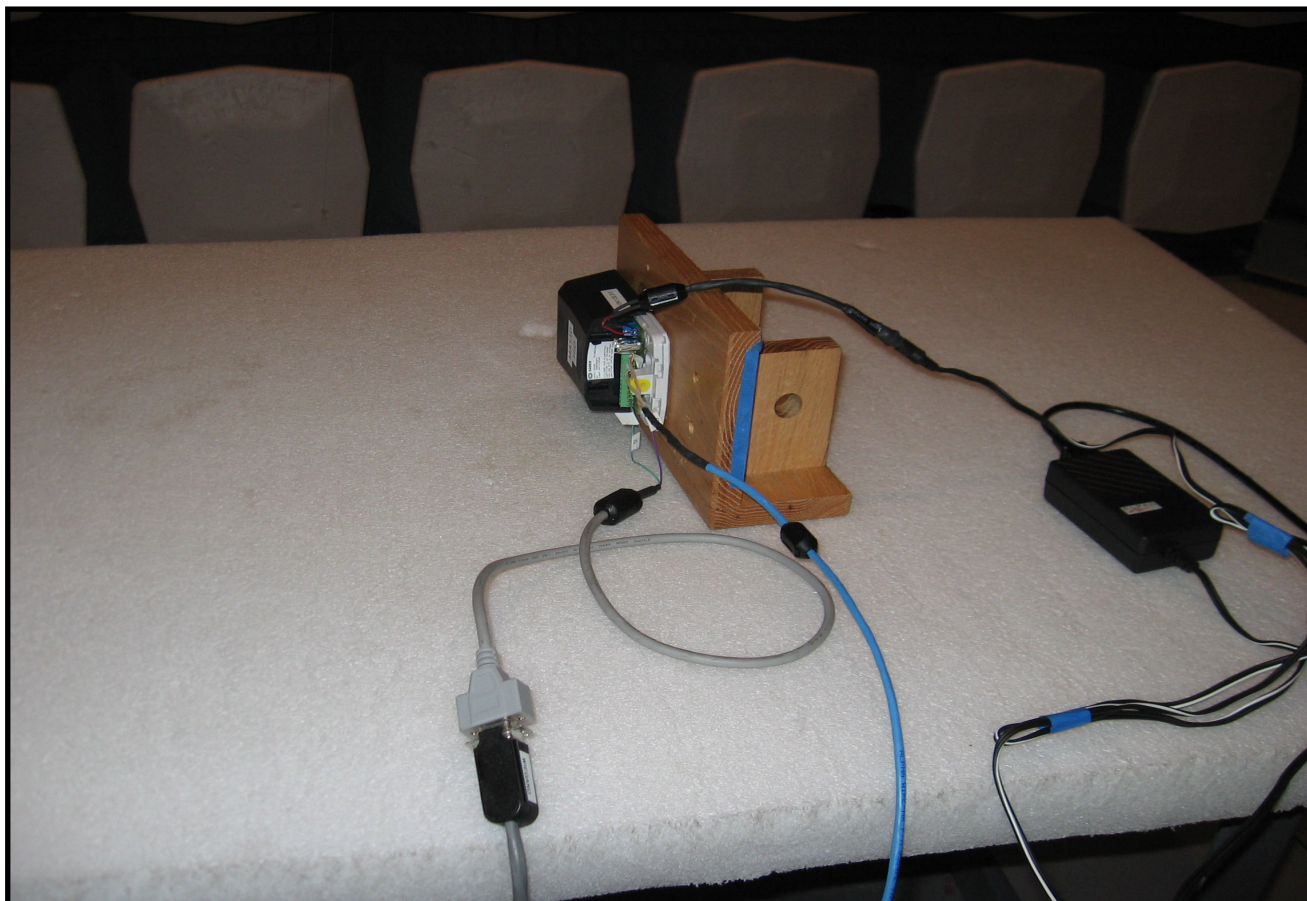
Method: Per 47 CFR 15.31(f)(2), the data was extrapolated based upon a the measured fall-off (at each frequency / polarity).
EUT: MA110
S/N:
Date: 8/30/2006
Job Number: SAGM0007

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)
16.750	Par/Gnd, Perp/EUT	3	29.8	1.2	5.4	30.0	5.4
16.750	Par/Gnd, Perp/EUT	5	28.6				4.2
16.750	Perp/Gnd, Perp/EUT	3	28.1	0.0	0.0	30.0	0.0
16.750	Perp/Gnd, Perp/EUT	5	28.1				0.0
16.750	Perp/Gnd, Par/EUT	3	32.8	2.9	13.1	30.0	13.1
16.750	Perp/Gnd, Par/EUT	5	29.9				10.2
27.130	Par/Gnd, Perp/EUT	3	26.9	0.3	1.4	30.0	1.4
27.130	Par/Gnd, Perp/EUT	5	26.6				1.1
27.130	Perp/Gnd, Perp/EUT	3	27.2	0.2	0.9	30.0	0.9
27.130	Perp/Gnd, Perp/EUT	5	27.0				0.7
27.130	Perp/Gnd, Par/EUT	3	29.8	1.7	7.7	30.0	7.7
27.130	Perp/Gnd, Par/EUT	5	28.1				6.0

NORTHWEST		FIELD STRENGTH OF SPURIOUS EMISSIONS		PSA 2006.05.30								
EMC				EMI 2006.7.11								
EUT: MA110			Work Order: SAGM0007									
Serial Number: 062230117A			Date: 08/31/06									
Customer: SAGEM Morpho, Inc.			Temperature: 25									
Attendees: None			Humidity: 32%									
Project: NA			Barometric Pres.: 30.01									
Tested by: Holly Ashkannejhad		Power: 120VAC/60Hz		Job Site: EV01								
TEST SPECIFICATIONS			Test Method									
FCC 15.225:2006			ANSI C63.4:2003									
TEST PARAMETERS												
Antenna Height(s) (m)		1 - 4		Test Distance (m)								
				3								
COMMENTS												
Ethernet and weigand (com1) to remote pc.												
EUT OPERATING MODES												
Card reader active mode.												
DEVIATIONS FROM TEST STANDARD												
No deviations.												
Run #		1										
Configuration #		1										
Results		Pass		NVLAP Lab Code 200630-0 <i>Holly Ashkannejhad</i> Signature								
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)
57.151	36.6	-5.9	78.0	1.0	3.0	0.0	V-Bilog	QP	0.0	30.7	40.0	-9.3
39.130	28.8	-1.0	147.0	1.0	3.0	0.0	V-Bilog	QP	0.0	27.8	40.0	-12.2
30.991	24.4	3.3	266.0	1.0	3.0	0.0	V-Bilog	QP	0.0	27.7	40.0	-12.3
99.449	36.4	-6.1	280.0	1.0	3.0	0.0	V-Bilog	QP	0.0	30.3	43.0	-12.7
31.501	18.2	3.0	186.0	1.0	3.0	0.0	H-Bilog	QP	0.0	21.2	40.0	-18.8
57.151	24.8	-5.9	326.0	3.3	3.0	0.0	H-Bilog	QP	0.0	18.9	40.0	-21.1
99.462	26.6	-6.1	0.0	2.0	3.0	0.0	H-Bilog	QP	0.0	20.5	43.0	-22.5
39.650	17.7	-1.3	54.0	1.0	3.0	0.0	H-Bilog	QP	0.0	16.4	40.0	-23.6

EMC FIELD STRENGTH OF SPURIOUS EMISSIONS





Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT					
Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Hewlett-Packard	8593E	AAN	1/25/2006	13
DC Power Supply	Topward	TPS-2000	TPD	NCR	0
Multimeter	Tektronix	DMM912	MMH	12/8/2005	13
Chamber, Temp./Humidity Chamber	Cincinnati Sub Zero (CSZ)	ZH-32-2-2-H/AC	TBA	7/31/2006	12
Chamber Temp. & Humidity Controlle	ESZ / Eurotherm	Dimension II	TBC	7/31/2006	12

MEASUREMENT UNCERTAINTY

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

TEST DESCRIPTION

Variation of Supply Voltage

The primary supply voltage was varied from 85% to 115% of nominal. The DC lab supply was used to vary the supply voltage up to 115% of 12V and down 85% of 12V.

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.

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.

EMC

FREQUENCY STABILITY

EUT: MA110		Work Order: SAGM0007	
Serial Number: 062230117A		Date: 08/30/06	
Customer: SAGEM Morpho, Inc.		Temperature: 23°C	
Attendees: None		Humidity: 33%	
Project: NA		Barometric Pres.: 30.3	
Tested by: Rod Peloquin		Power: 120V/60Hz	Job Site: EV06 & EV09
TEST SPECIFICATIONS		Test Method	
FCC 15.225:2006		ANSI C63.4:2003	
COMMENTS			
DEVIATIONS FROM TEST STANDARD			
Configuration #	1	Signature 	
		Value	Limit
FREQUENCY STABILITY		11.5 ppm	100 ppm
			Results
			Pass

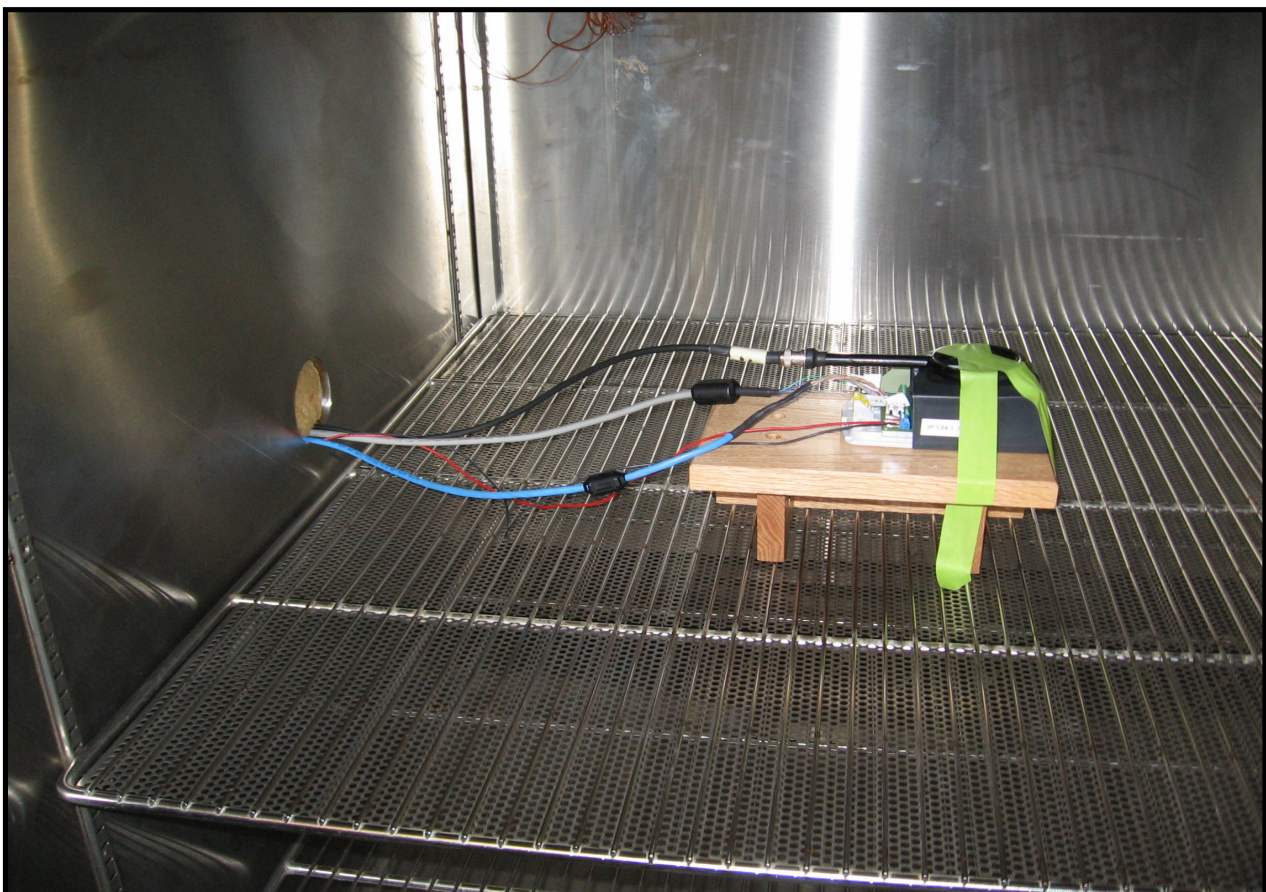
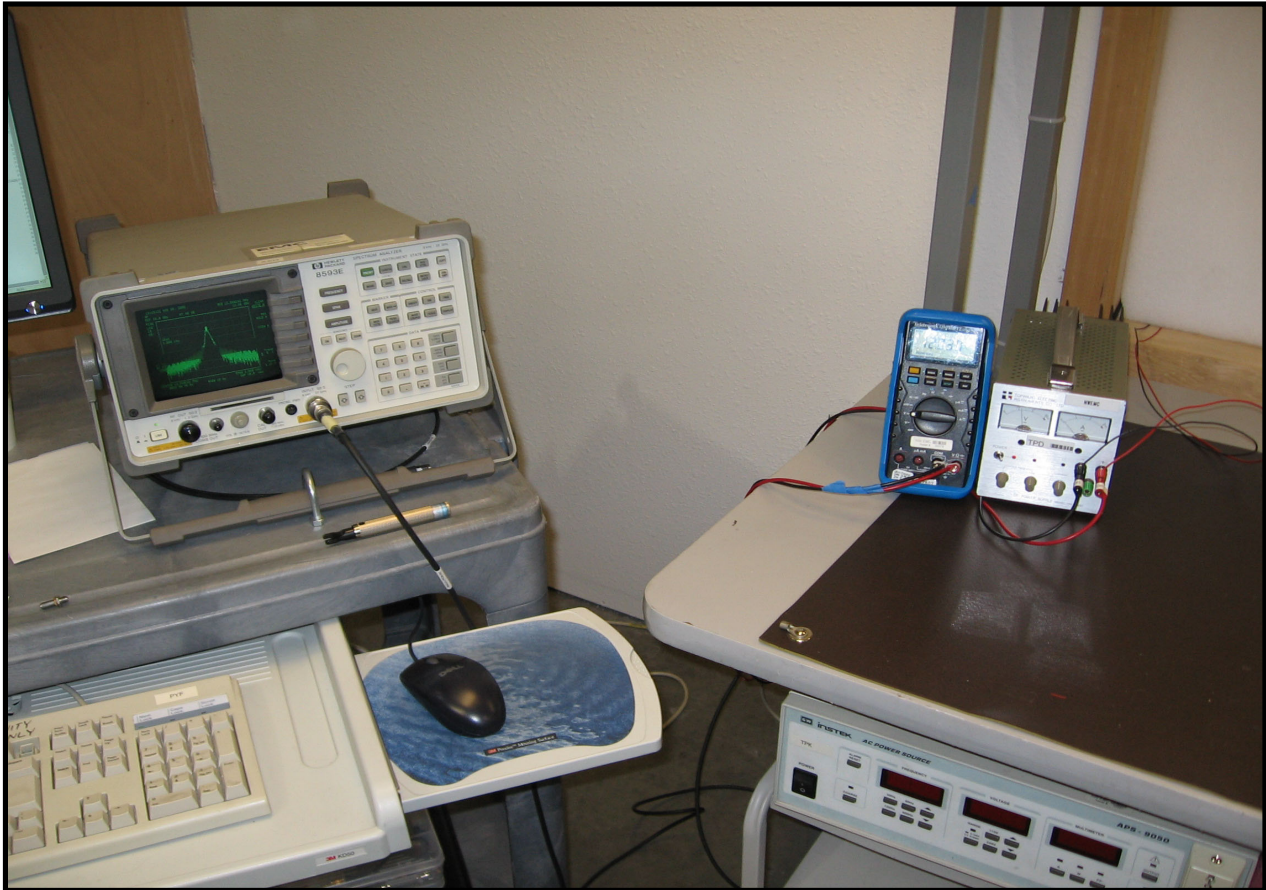
FREQUENCY STABILITY

FREQUENCY STABILITY

Result: Pass**Value:** 11.5 ppm**Limit:** 100 ppm

Temp (°C)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Tolerance (ppm)	Specification (ppm)
50	13.560000	13.560156	11.50	100
40	13.560000	13.560129	9.51	100
30	13.560000	13.560131	9.66	100
20	13.560000	13.560131	9.66	100
10	13.560000	13.560131	9.66	100
0	13.560000	13.560101	7.45	100
-10	13.560000	13.560081	5.97	100
-20	13.560000	13.560081	5.97	100

Voltage (Vdc)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Tolerance (ppm)	Specification (ppm)
10.2	13.560000	13.560131	9.66	100
12.0	13.560000	13.560131	9.66	100
13.8	13.560000	13.560131	9.66	100





Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

MODES OF OPERATION

Card reader in active mode.

MODE USED FOR FINAL DATA

Card reader in active mode.

POWER SETTINGS INVESTIGATED

120V/60Hz

POWER SETTINGS USED FOR FINAL DATA

120V/60Hz

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	1000 MHz
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SAMPLE CALCULATIONS

$$\text{Radiated Emissions: Field Strength} = \text{Measured Level} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain} + \text{Distance Adjustment Factor} + \text{External Attenuation}$$
TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Antenna, Biconilog	EMCO	3142	AXB	1/6/2005	24
Pre-Amplifier	Miteq	AM-1551	AOY	4/5/2006	13
Spectrum Analyzer	Agilent	E4443A	AAS	12/8/2005	12

MEASUREMENT BANDWIDTHS

	Frequency Range	Peak Data	Quasi-Peak Data	Average Data
	(MHz)	(kHz)	(kHz)	(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.

MEASUREMENT UNCERTAINTY

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, a final radiated emissions test was performed. The frequency range investigated (scanned), is also noted in this report. Radiated emissions measurements were made at the EUT azimuth and antenna height such that the maximum radiated emissions level will be detected. This requires the use of a turntable and an antenna positioner. The preferred method of a continuous azimuth search is utilized for frequency scans of the EUT field strength with both polarities of the measuring antenna. A calibrated, linearly polarized antenna was positioned at the specified distance from the periphery of the EUT.

Tests were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna was varied in height above the conducting ground plane to obtain the maximum signal strength. Though specified in the report, the measurement distance shall be 3 meters or 10 meters. At any measurement distance, the antenna height was varied from 1 meter to 4 meters. These height scans apply for both horizontal and vertical polarization, except that for vertical polarization the minimum height of the center of the antenna shall be increased so that the lowest point of the bottom of the antenna clears the ground surface by at least 25 cm.

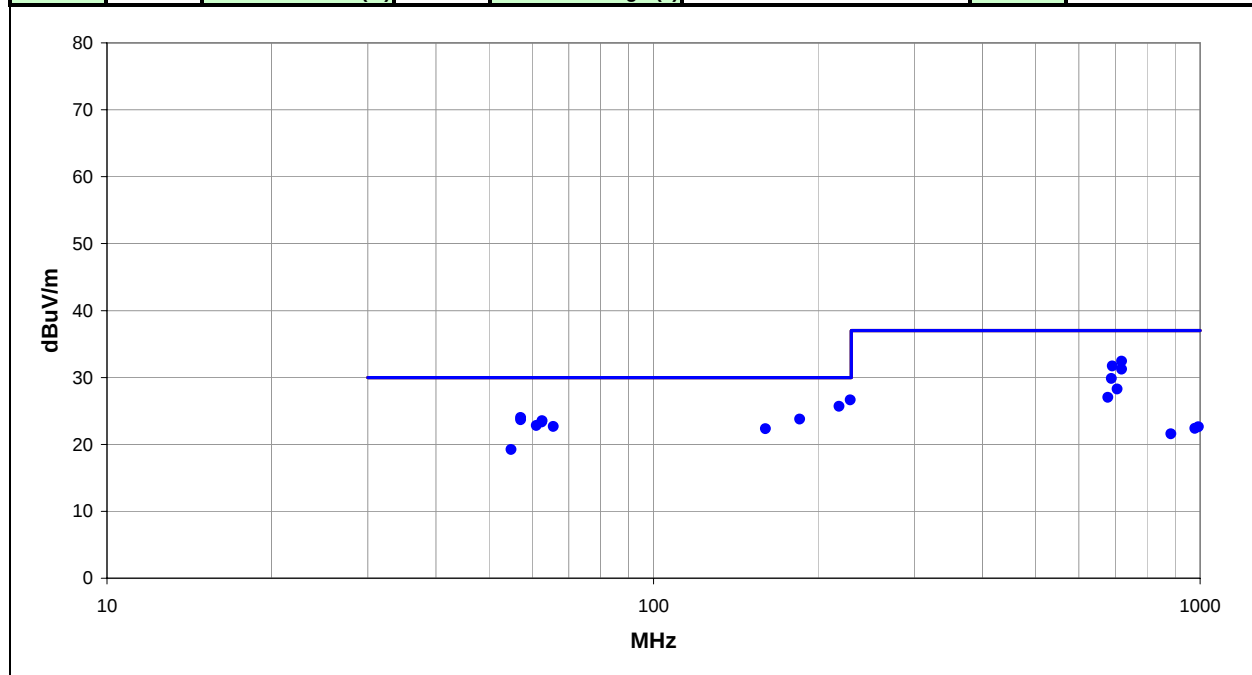
EMC

RADIATED EMISSIONS

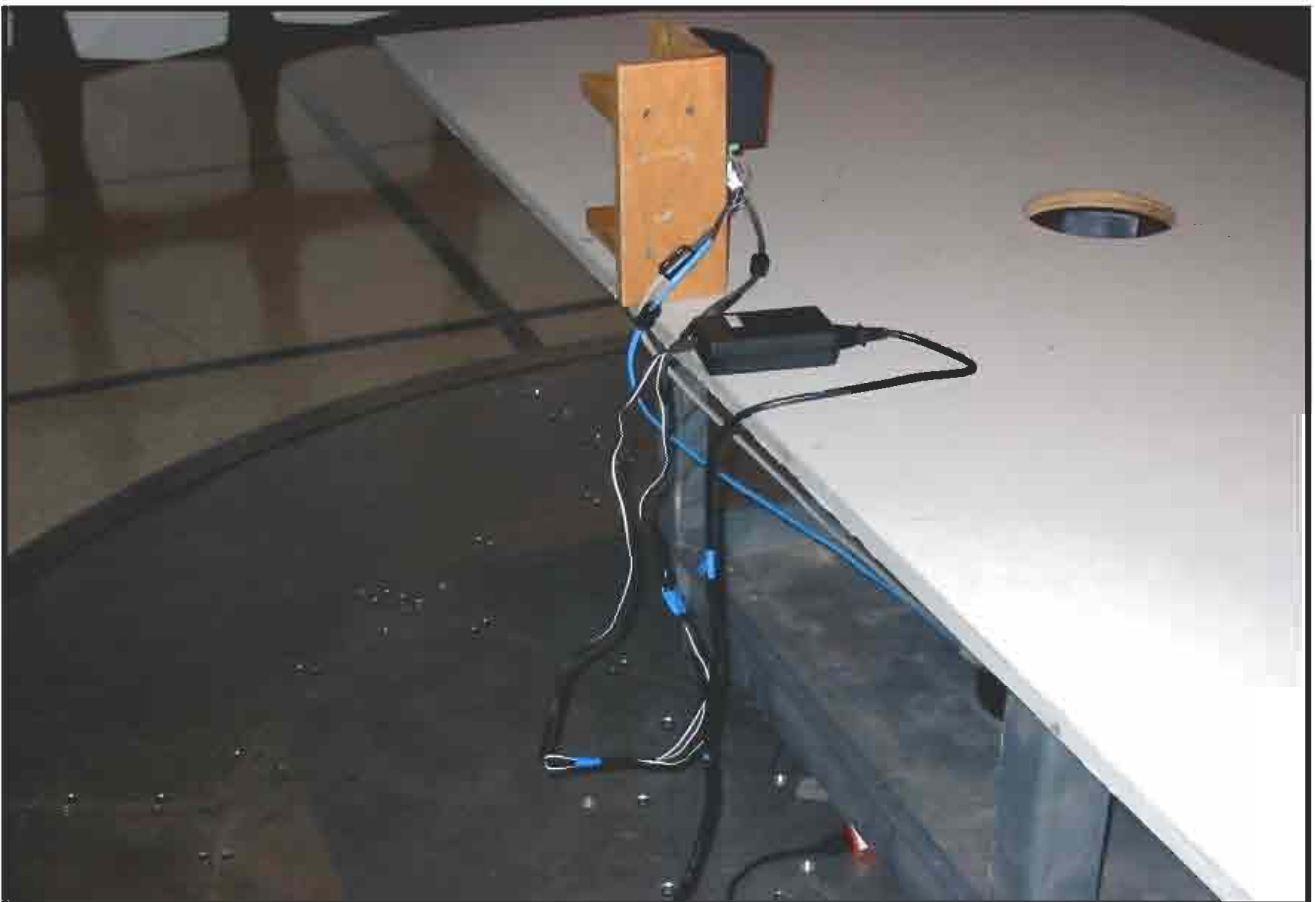
NVLAP Lab Code 200630-0

Work Order:	SAGM0007	Date:	08/29/06		
Project:	NA	Temperature:	25C		
Job Site:	EV11	Humidity:	45%		
Serial Number:	062230117A	Barometric Pres.:	30.07"		
				Tested by:	David DiVergigelis
EUT:	MA110				
Configuration:	1				
Customer:	SAGEM Morpho, Inc.				
Attendees:	None				
EUT Power:	120V/60Hz				
Operating Mode:	Card reader active mode.				
Deviations:	No deviations				
Comments:	None				

Test Specifications			Class B	Test Method		
FCC 15.109(g) (CISPR 22:1997) Class B				ANSI C63.4		
Run #	1	Test Distance (m)	10	Antenna Height(s)	1-4m	Results
						Pass



Freq	Amplitude	Factor	Antenna Height	Azimuth (degrees)	Test Distance	External Attenuation	Polarity/ Transducer Type	Detector	Distance Adjustment	Adjusted	Spec. Limit	Compared to Spec. (dB)
229.152	48.5	-21.9	3.5	110.0	10.0	0.0	Horz	QP	0.0	26.6	30.0	-3.4
218.653	48.0	-22.3	1.0	289.0	10.0	0.0	Vert	QP	0.0	25.7	30.0	-4.3
718.708	43.2	-10.8	2.6	320.0	10.0	0.0	Vert	QP	0.0	32.4	37.0	-4.6
691.587	42.9	-11.2	1.0	183.0	10.0	0.0	Horz	QP	0.0	31.7	37.0	-5.3
718.693	42.0	-10.8	1.0	188.0	10.0	0.0	Horz	QP	0.0	31.2	37.0	-5.8
57.147	49.7	-25.7	1.6	157.0	10.0	0.0	Vert	QP	0.0	24.0	30.0	-6.0
185.259	47.4	-23.6	1.5	12.0	10.0	0.0	Vert	QP	0.0	23.8	30.0	-6.2
57.166	49.4	-25.7	1.5	196.0	10.0	0.0	Vert	QP	0.0	23.7	30.0	-6.3
62.551	50.2	-26.7	2.1	57.0	10.0	0.0	Vert	QP	0.0	23.5	30.0	-6.5
62.505	50.0	-26.7	2.1	56.0	10.0	0.0	Vert	QP	0.0	23.3	30.0	-6.7
688.177	41.1	-11.3	3.0	361.0	10.0	0.0	Vert	QP	0.0	29.8	37.0	-7.2
61.013	49.3	-26.5	2.5	38.0	10.0	0.0	Vert	QP	0.0	22.8	30.0	-7.2
65.602	49.7	-27.0	2.2	42.0	10.0	0.0	Vert	QP	0.0	22.7	30.0	-7.3
160.352	46.9	-24.6	1.4	259.0	10.0	0.0	Vert	QP	0.0	22.3	30.0	-7.7
705.156	39.2	-10.9	1.2	210.0	10.0	0.0	Horz	QP	0.0	28.3	37.0	-8.7
678.031	38.5	-11.5	2.5	11.0	10.0	0.0	Vert	QP	0.0	27.0	37.0	-10.0
54.860	44.4	-25.2	3.5	139.0	10.0	0.0	Vert	QP	0.0	19.2	30.0	-10.8
993.926	30.4	-7.8	2.0	185.0	10.0	0.0	Vert	QP	0.0	22.6	37.0	-14.4
978.272	30.4	-8.0	3.0	279.0	10.0	0.0	Horz	QP	0.0	22.4	37.0	-14.6
884.860	30.8	-9.3	3.5	200.0	10.0	0.0	Horz	QP	0.0	21.5	37.0	-15.5



Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

MODES OF OPERATION

Card reader active mode.

POWER SETTINGS INVESTIGATED

120V/60Hz

SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
LISN	Solar	9252-50-R-24-BNC	LIQ	12/13/2005	13
Attenuator	Coaxicom	66702 2910-20	AUA	5/2/2006	13
High Pass Filter	T.T.E.	7766	HFG	12/19/2005	13
Receiver	Rohde & Schwartz	ESCI	ARG	6/22/2006	13

MEASUREMENT BANDWIDTHS

	Frequency Range	Peak Data	Quasi-Peak Data	Average Data
	(MHz)	(kHz)	(kHz)	(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.

MEASUREMENT UNCERTAINTY

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

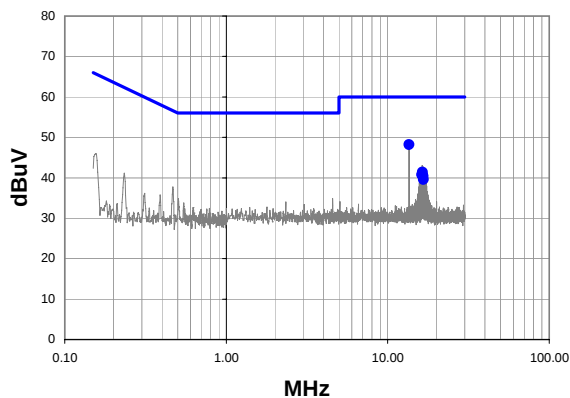
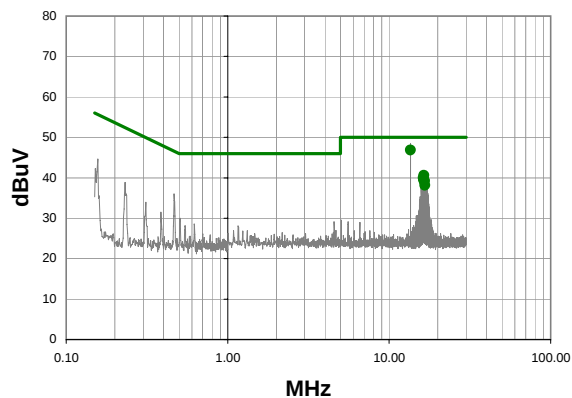
TEST DESCRIPTION

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 50 Ω .

EMC**CONDUCTED EMISSIONS**

NVLAP Lab Code 200630-0

Work Order:	SAGM0007	Date:	08/28/06	<i>David DiVergigelis</i> Tested by: David DiVergigelis	
Project:	NA	Temperature:	25C		
Job Site:	EV07	Humidity:	45%		
Serial Number:	062230117A	Barometric Pres.:	30.11"		
EUT:	MA110				
Configuration:	1				
Customer:	SAGEM Morpho, Inc.				
Attendees:	None				
EUT Power:	120V/60Hz				
Operating Mode:	Card reader active mode.				
Deviations:	No deviations				
Comments:					
Test Specifications FCC 15.107 Class B		Class B		Test Method ANSI C63.4	
Run #	1	Line:	Neutral	Ext. Attenuation: 20	Results Pass

Quasi-Peak**Average****Quasi Peak Data - vs - Quasi Peak Limit**

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
13.560	27.7	0.5	48.2	60.0	-11.8
16.416	20.9	0.5	41.4	60.0	-18.6
16.260	20.3	0.5	40.8	60.0	-19.2
16.340	20.2	0.5	40.7	60.0	-19.3
16.496	20.1	0.5	40.6	60.0	-19.4
16.570	19.9	0.5	40.4	60.0	-19.6
16.650	19.1	0.5	39.6	60.0	-20.4

Average Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
13.560	26.4	0.5	46.9	50.0	-3.1
16.416	20.1	0.5	40.6	50.0	-9.4
16.260	19.5	0.5	40.0	50.0	-10.0
16.340	19.1	0.5	39.6	50.0	-10.4
16.570	18.8	0.5	39.3	50.0	-10.7
16.496	18.7	0.5	39.2	50.0	-10.8
16.650	17.7	0.5	38.2	50.0	-11.8

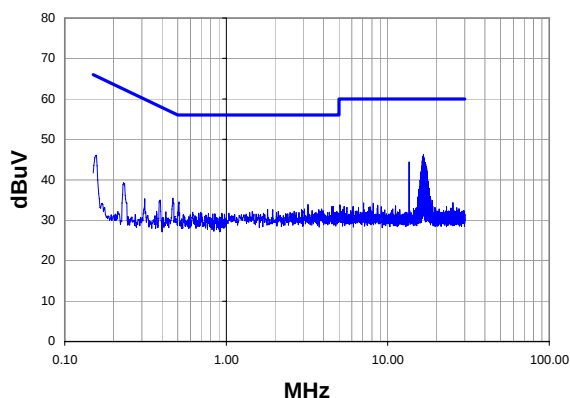
EMC

CONDUCTED EMISSIONS

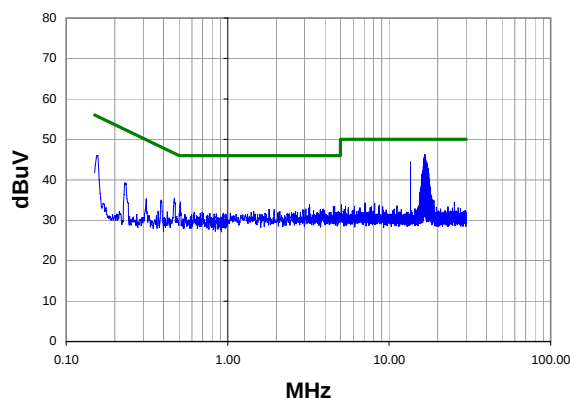
NVLAP Lab Code 200630-0

Work Order:	SAGM0007	Date:	08/28/06	<i>David DiVergigelis</i>			
Project:	NA	Temperature:	25C				
Job Site:	EV07	Humidity:	45%				
Serial Number:	062230117A	Barometric Pres.:	30.11"				
EUT:		MA110					
Configuration:	1						
Customer:	SAGEM Morpho, Inc.						
Attendees:	None						
EUT Power:	120V/60Hz						
Operating Mode:	Card reader active mode.						
Deviations:	No deviations						
Comments:							
Test Specifications		Class B		Test Method			
FCC 15.107 Class B				ANSI C63.4			
Run #	2	Line:	High Line	Ext. Attenuation:	20	Results	Pass

Quasi-Peak



Average



Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
16.650	25.8	0.5	46.3	60.0	-13.7
16.560	25.4	0.5	45.9	60.0	-14.1
16.490	25.2	0.5	45.7	60.0	-14.3
16.720	25.2	0.5	45.7	60.0	-14.3
16.800	24.8	0.5	45.3	60.0	-14.7
16.410	24.7	0.5	45.2	60.0	-14.8
16.330	24.2	0.5	44.7	60.0	-15.3
16.880	24.2	0.5	44.7	60.0	-15.3
13.560	23.9	0.5	44.4	60.0	-15.6
17.110	23.8	0.5	44.3	60.0	-15.7
17.040	23.4	0.5	43.9	60.0	-16.1
17.190	23.4	0.5	43.9	60.0	-16.1
16.960	23.2	0.5	43.7	60.0	-16.3
16.260	22.9	0.5	43.4	60.0	-16.6
17.270	22.9	0.5	43.4	60.0	-16.6
17.350	22.4	0.5	42.9	60.0	-17.1
17.420	22.3	0.5	42.8	60.0	-17.2
16.180	21.8	0.5	42.3	60.0	-17.7
16.100	21.7	0.5	42.2	60.0	-17.8
17.500	21.7	0.5	42.2	60.0	-17.8

Peak Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
16.650	25.8	0.5	46.3	50.0	-3.7
16.560	25.4	0.5	45.9	50.0	-4.1
16.490	25.2	0.5	45.7	50.0	-4.3
16.720	25.2	0.5	45.7	50.0	-4.3
16.800	24.8	0.5	45.3	50.0	-4.7
16.410	24.7	0.5	45.2	50.0	-4.8
16.330	24.2	0.5	44.7	50.0	-5.3
16.880	24.2	0.5	44.7	50.0	-5.3
13.560	23.9	0.5	44.4	50.0	-5.6
17.110	23.8	0.5	44.3	50.0	-5.7
17.040	23.4	0.5	43.9	50.0	-6.1
17.190	23.4	0.5	43.9	50.0	-6.1
16.960	23.2	0.5	43.7	50.0	-6.3
16.260	22.9	0.5	43.4	50.0	-6.6
17.270	22.9	0.5	43.4	50.0	-6.6
17.350	22.4	0.5	42.9	50.0	-7.1
17.420	22.3	0.5	42.8	50.0	-7.2
16.180	21.8	0.5	42.3	50.0	-7.7
16.100	21.7	0.5	42.2	50.0	-7.8
17.500	21.7	0.5	42.2	50.0	-7.8

