Visteon

VMVL3.1a

July 19, 2006

Report No. VIST0001

Report Prepared By

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

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EMC Test Report

NORTHWEST EMC

22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test

Issue Date: July 19, 2006
Visteon
Model: VMVL3.1a

Emissions				
Test Description	**Specification**	**Test Method**	**Pass**	**Fail**
Radiated Emissions	FCC 15.109(g) (CISPR 22:1997) Class A:2005-10	ANSI C63.4:2003	☒	☐
AC Powerline Conducted Emissions	FCC 15.207 AC Powerline Conducted Emissions: 2005-9	ANSI C63.4:2003	☒	☐
Occupied Bandwidth	FCC 15.247(a) Occupied Bandwidth:2005-9	ANSI C63.4:2003	☒	☐
Output Power	FCC 15.247(b) Output Power:2005-9	ANSI C63.4:2003	☒	☐
Band Edge Compliance	FCC 15.247(d) Band Edge Compliance:2005-9	ANSI C63.4:2003	☒	☐
Spurious Conducted Emissions	FCC 15.247(d) Spurious Conducted Emissions:2005-9	ANSI C63.4:2003	☒	☐
Spurious Radiated Emissions	FCC 15.247(d) Spurious Radiated Emissions:2005-9	ANSI C63.4:2003	☒	☐
Power Spectral Density	FCC 15.247(e) Power Spectral Density:2005-9	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:
Dean Ghizzone, President

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.

NVLAP LAB CODE 200629-0
NVLAP LAB CODE 200630-0
NVLAP LAB CODE 200676-0

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 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. 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).

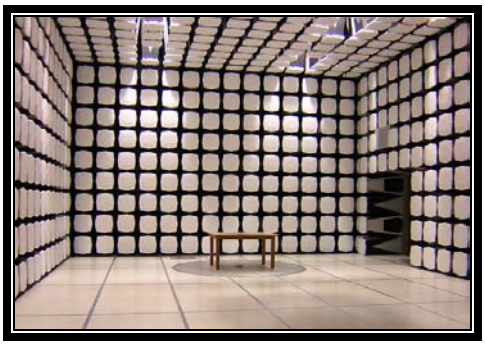
VCCI: Accepted as an Associate Member to the VCCI, Acceptance No. 564. Conducted and radiated measurement facilities have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. *(Registration Numbers. - Hillsboro: C-1071, R-1025, and R-2318, Irvine: C-2094 and R-1943, 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

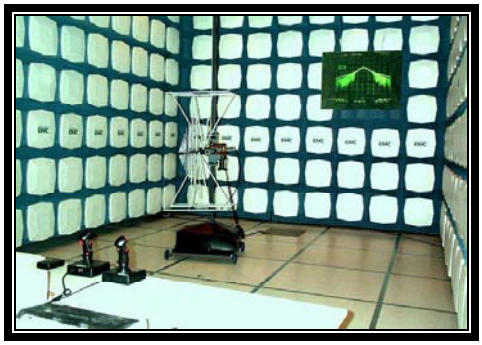
SCOPE

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:	Visteon
Address:	1 Village Center Drive
City, State, Zip:	Van Beren Township, MI 48111
Test Requested By:	David Pop
Model:	VMVL3.1a
First Date of Test:	June 29, 2006
Last Date of Test:	July 19, 2006
Receipt Date of Samples:	June 29, 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):
Bluetooth MVL Module

Testing Objective:
Meet the EMC requirements for FCC 15.247 Certification.

CONFIGURATION 1 VIST0001

Software/Firmware Running during test	
Description	**Version**
Bluetest	Unknown

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Bluetooth MVL Module	Visteon	VMVL3.1a	MLC5700187

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Test Box	Visteon	Unknown	Unknown
AC/DC Adapter	Panasonic	KX-TCA6	Unknown

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
Module Power/IO	No	3.8m	No	Bluetooth MVL Module	Test Box
DC Cable	No	6m	No	Test Box	AC/DC Adapter
AC Plug	No	0m	No	AC/DC Adapter	AC Mains
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATION 2 VIST0001

Software/Firmware Running during test	
Description	**Version**
Bluetest	Unknown

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Bluetooth MVL Module	Visteon	VMVL3.1a	MLC5700187

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Test Box	Visteon	Unknown	Unknown
AC/DC Adapter	Panasonic	KX-TCA6	Unknown

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
Module Power/IO	No	3.8m	No	Bluetooth MVL Module	Test Box
DC Cable	No	6m	No	Test Box	AC/DC Adapter
AC Plug	No	0m	No	AC/DC 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	6/29/2006	Digital 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.
2	6/30/2006	AC Power Line 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	6/29/2006	Spurious 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	7/11/2006	Occupied Bandwidth	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	7/11/2006	Output Power	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	7/11/2006	Power Spectral Density	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.
7	7/12/2006	Band Edge Compliance	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.
8	7/12/2006	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

RADIATED 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.

MODES OF OPERATION
Standby - Receive

MODE USED FOR FINAL DATA
Standby - Receive

POWER SETTINGS INVESTIGATED
120VAC/60Hz

POWER SETTINGS USED FOR FINAL DATA
120VAC/60Hz

FREQUENCY RANGE INVESTIGATED			
Start Frequency	30MHz	Stop Frequency	1GHz

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, Biconilog	EMCO	3142	AXJ	3/14/2006	24
OC10 cables a,b,c,d Bilog			OCH	3/30/2006	13
Pre-Amplifier	Miteq	AM-1616-1000	AOM	11/13/2005	13
Spectrum Analyzer	Agilent	E4446A	AAQ	7/15/2005	18

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.

NORTHWEST EMC

RADIATED EMISSIONS DATA SHEET

PSA 2006.05.30
EMI 2006.4.26

EUT:	VMVL3.1a			Work Order:	VIST0001
Serial Number:	MLC5700187			Date:	06/29/06
Customer:	Visteon			Temperature:	23
Attendees:	None			Humidity:	48%
Project:	None			Barometric Pres.:	29.96
Tested by:	Jeremiah Darden	Power:	120VAC/60Hz	Job Site:	OC10

TEST SPECIFICATIONS	Test Method
FCC 15.109(g) (CISPR 22:1997) Class A:2005-10	ANSI C63.4:2003

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

Modulated Transmit Mode

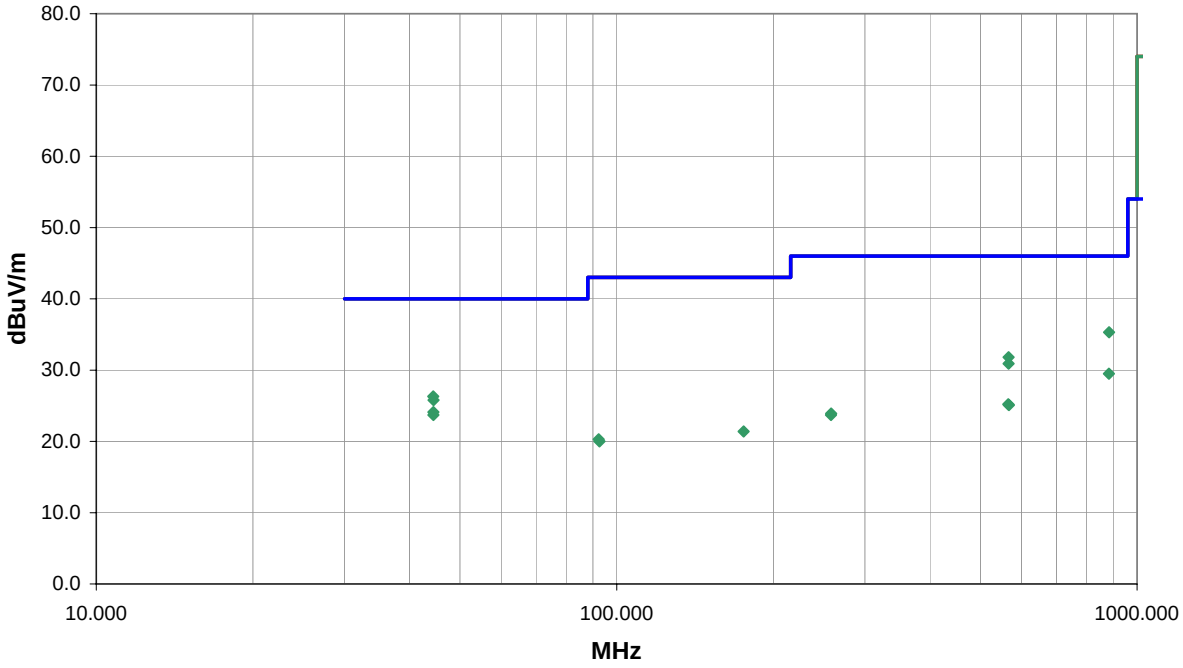
EUT OPERATING MODES

Standby

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	2		
Configuration #	1		
Results	Pass	NVLAP Lab Code 200629-0	*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)
883.180	25.4	9.9	210.0	3.5	3.0	0.0	H-Bilog	PK	0.0	35.3	46.0	-10.7
44.411	29.8	-3.5	63.0	3.2	3.0	0.0	H-Bilog	PK	0.0	26.3	40.0	-13.7
44.471	29.3	-3.5	205.0	1.0	3.0	0.0	V-Bilog	PK	0.0	25.8	40.0	-14.2
566.462	26.2	5.6	2.0	1.0	3.0	0.0	H-Bilog	PK	0.0	31.8	46.0	-14.2
566.571	25.3	5.6	240.0	1.0	3.0	0.0	V-Bilog	PK	0.0	30.9	46.0	-15.1
44.442	27.6	-3.5	63.0	3.2	3.0	0.0	H-Bilog	QP	0.0	24.1	40.0	-15.9
44.443	27.2	-3.5	205.0	1.0	3.0	0.0	V-Bilog	QP	0.0	23.7	40.0	-16.3
882.928	19.6	9.9	210.0	3.5	3.0	0.0	H-Bilog	QP	0.0	29.5	46.0	-16.5
565.654	19.6	5.6	2.0	1.0	3.0	0.0	H-Bilog	QP	0.0	25.2	46.0	-20.8
567.133	19.5	5.6	240.0	1.0	3.0	0.0	V-Bilog	QP	0.0	25.1	46.0	-20.9
175.324	25.8	-4.4	317.0	3.4	3.0	0.0	H-Bilog	PK	0.0	21.4	43.0	-21.6
258.335	25.2	-1.3	356.0	1.0	3.0	0.0	H-Bilog	PK	0.0	23.9	46.0	-22.1
258.055	25.0	-1.3	271.0	1.0	3.0	0.0	V-Bilog	PK	0.0	23.7	46.0	-22.3
92.326	26.1	-5.8	356.0	1.0	3.0	0.0	H-Bilog	PK	0.0	20.3	43.0	-22.7
92.672	25.8	-5.8	0.0	1.0	3.0	0.0	V-Bilog	PK	0.0	20.0	43.0	-23.0

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.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Hewlett-Packard	8593E	AAP	12/7/2005	13

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 occupied bandwidth was measured with the EUT set to low, medium, and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its maximum data rate in a no hop mode.

NORTHWEST EMC

OCCUPIED BANDWIDTH

XMit 2006.03.01

EUT:	VMVL3.1a			Work Order:	VIST0001
Serial Number:	MLC5700187			Date:	07/11/06
Customer:	Visteon			Temperature:	22°C
Attendees:	None			Humidity:	44%
Project:	None			Barometric Pres.:	29.9
Tested by:	Dean Ghizzone	Power:	DC	Job Site:	OC03

TEST SPECIFICATIONS	Test Method
FCC 15.247(a) Occupied Bandwidth 2005-9	ANSI C63.4 2003

COMMENTS

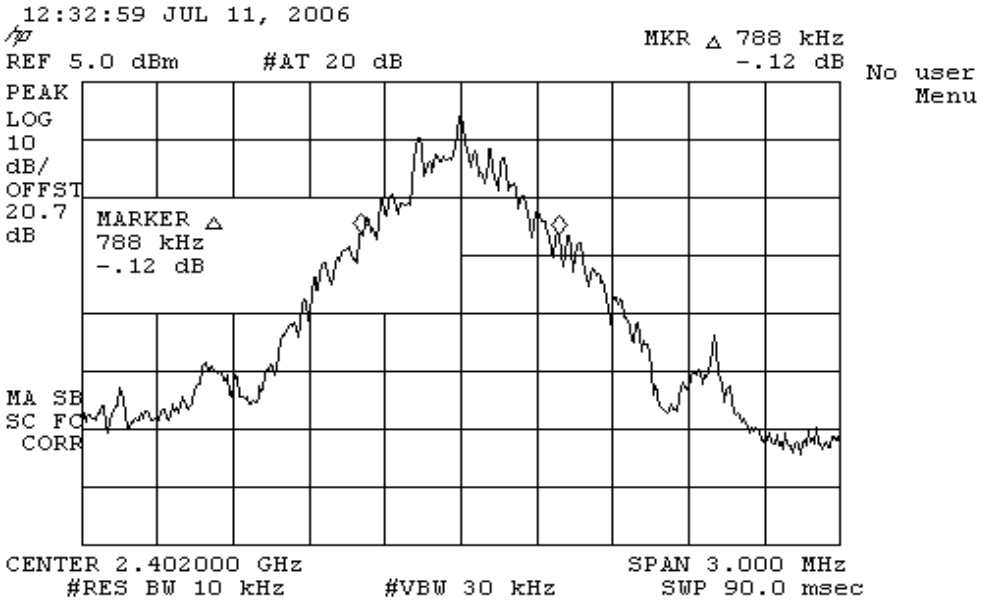
Bluetooth operating mode - Modulated

DEVIATIONS FROM TEST STANDARD

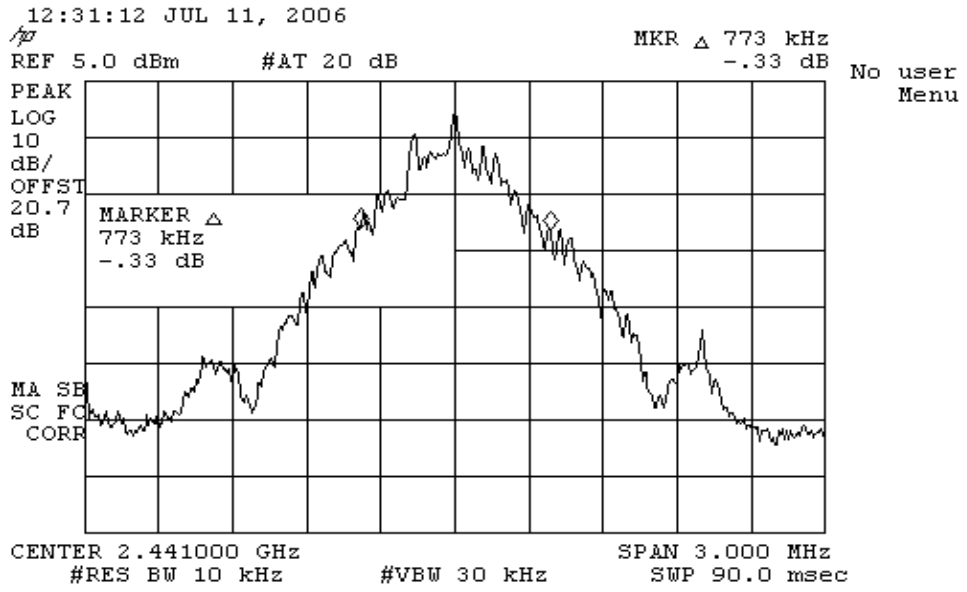
Configuration #	1	Signature

Modes of Operation and Test Conditions	Value	Limit	Result
Low Channel	788 kHz	≤ 1.5 MHz	Pass
Mid Channel	773 kHz	≤ 1.5 MHz	Pass
High Channel	780 kHz	≤ 1.5 MHz	Pass

Low Channel		
Result: Pass	**Value:** 788 kHz	**Limit:** ≤ 1.5 MHz

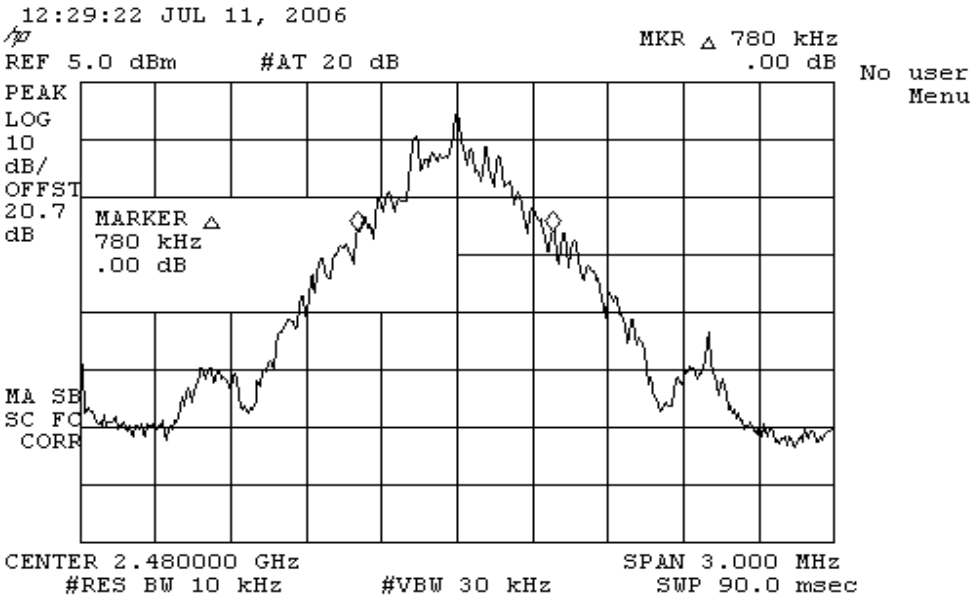


Mid Channel		
Result: Pass	**Value:** 773 kHz	**Limit:** ≤ 1.5 MHz

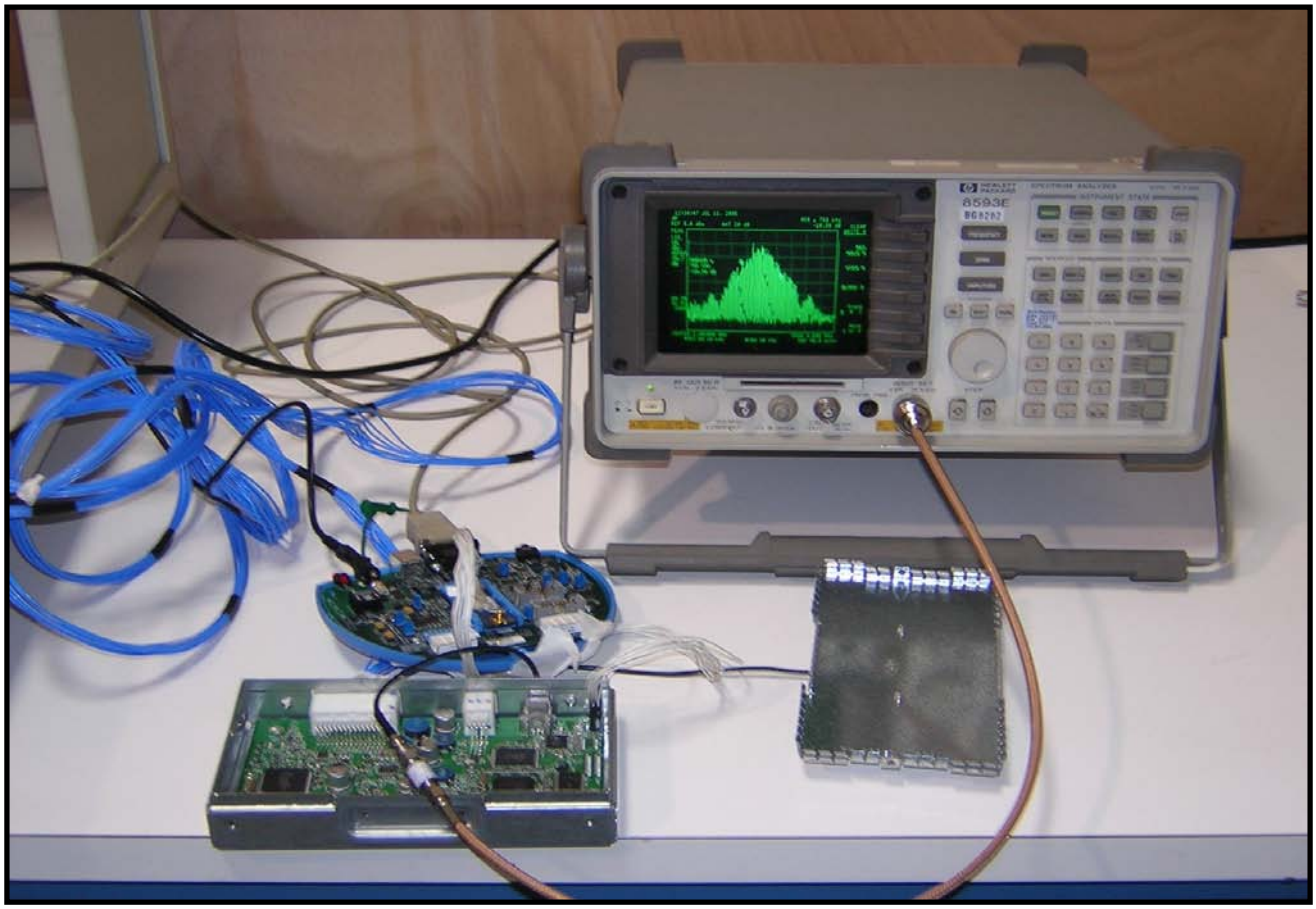


OCCUPIED BANDWIDTH

High Channel		
Result: Pass	**Value:** 780 kHz	**Limit:** ≤ 1.5 MHz



OCCUPIED BANDWIDTH



Output Power

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
Attenuator	Pasternack	PE7005-20	AUN	2/14/2006	13
Spectrum Analyzer	Hewlett-Packard	8593E	AAP	12/7/2005	13

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 peak output power was measured with the EUT set to low, medium, and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The EUT was transmitting at its maximum data rate in a no hop mode.

Prior to measuring the output power, the spectrum analyzer amplitude offset was calibrated using a power meter and signal generator thru substitution.

De Facto EIRP Limit: Per 47 CFR 15.247 (b)(1-3), the EUT meets the de facto EIRP limit of +36dBm.

NORTHWEST EMC

Output Power

XMit 2006.03.01

EUT:	VMVL3.1a			Work Order:	VIST0001
Serial Number:	MLC5700187			Date:	07/11/06
Customer:	Visteon			Temperature:	22°C
Attendees:	None			Humidity:	44%
Project:	None			Barometric Pres.:	29.9
Tested by:	Dean Ghizzone	Power:	DC	Job Site:	OC03

TEST SPECIFICATIONS	Test Method
FCC 15.247(b) Output Power 2005-9	ANSI C63.4 2003

COMMENTS

Bluetooth operating mode - Modulated

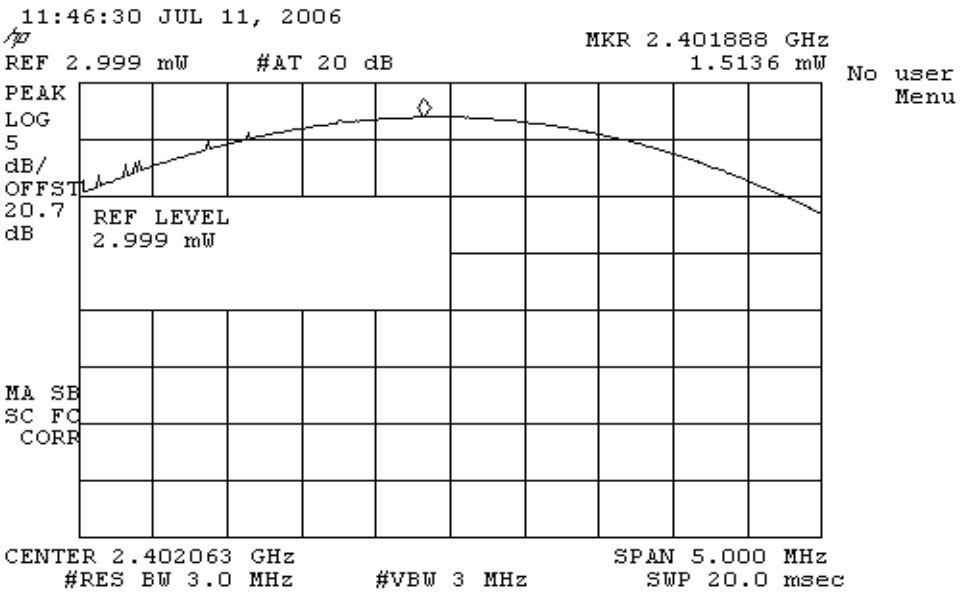
DEVIATIONS FROM TEST STANDARD

Configuration #	1	Signature

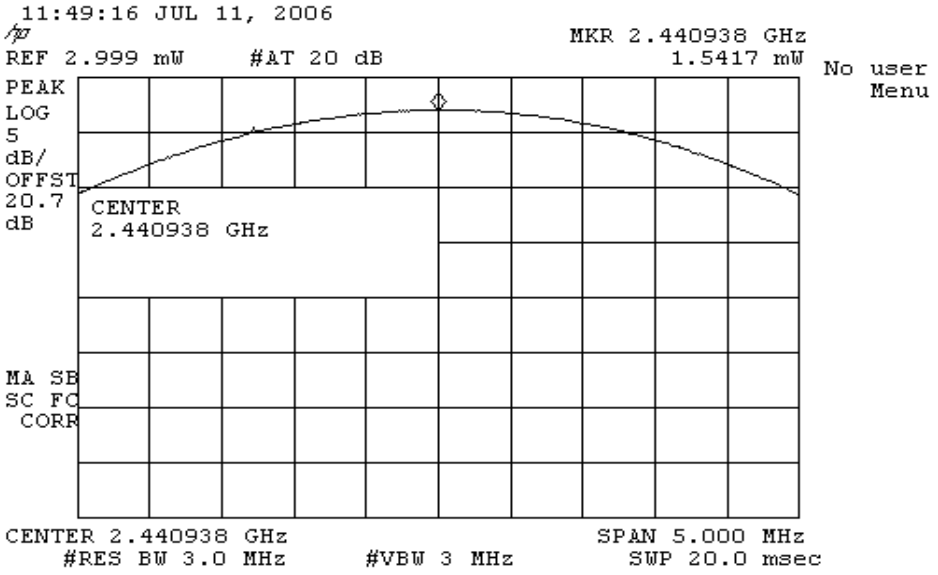
Modes of Operation and Test Conditions	Value	Limit	Result
Low	1.51 mW	<= 1 W	Pass
Mid	1.54 mW	<= 1 W	Pass
High	1.58 mW	<= 1 W	Pass

Output Power

Low					
Result:	Pass	**Value:**	1.51 mW	**Limit:**	<= 1 W

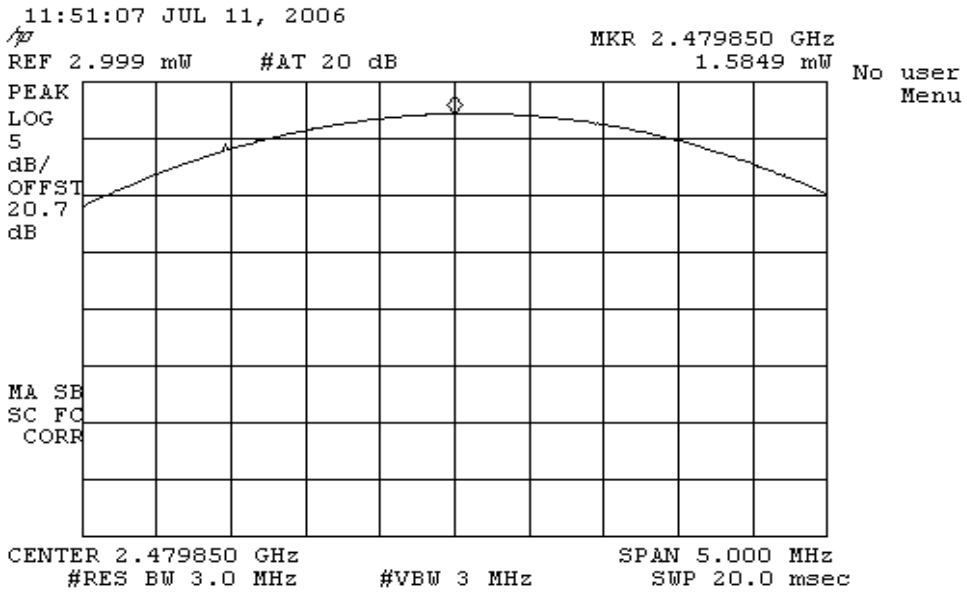


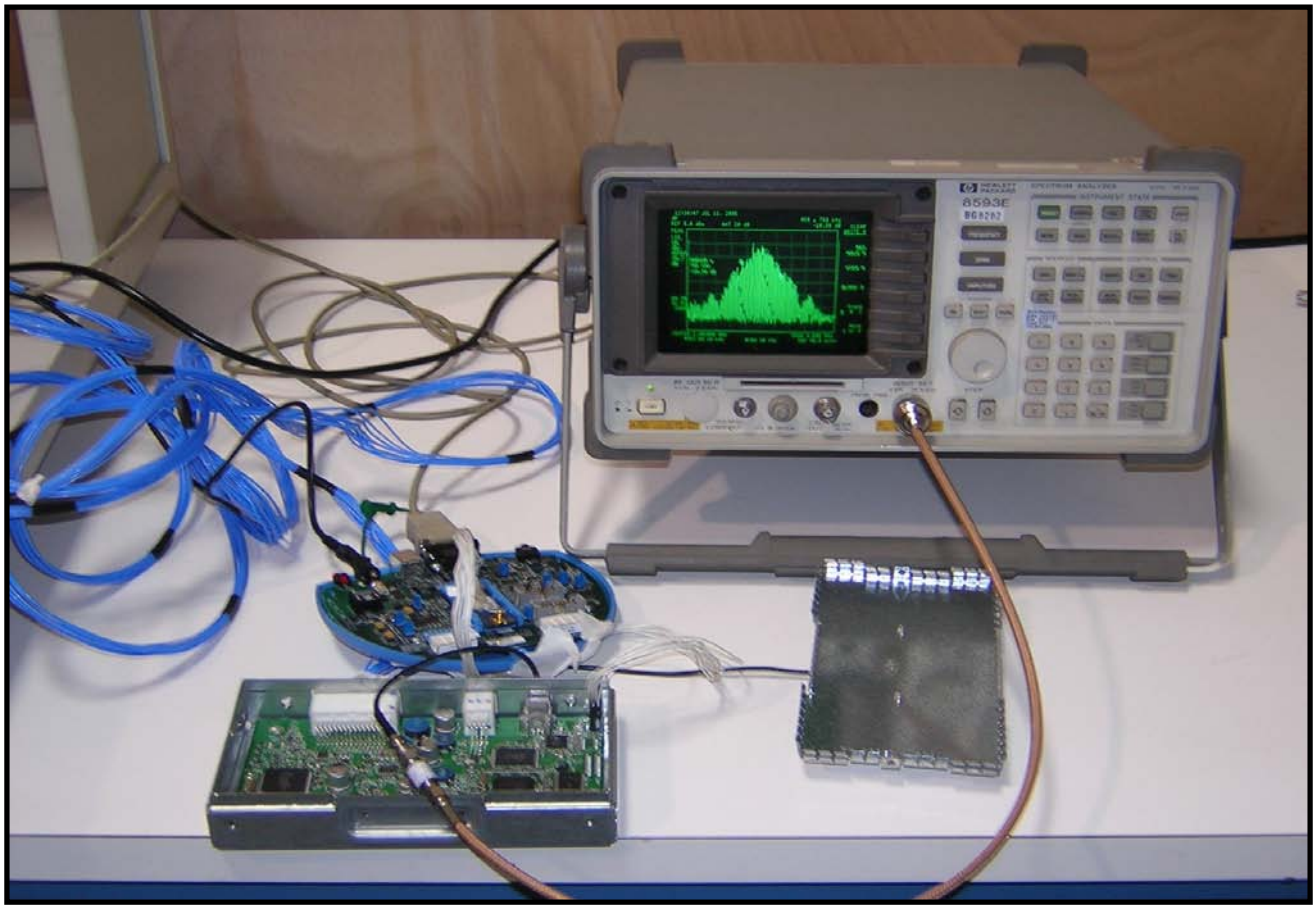
Mid					
Result:	Pass	**Value:**	1.54 mW	**Limit:**	<= 1 W



Output Power

High					
Result:	Pass	**Value:**	1.58 mW	**Limit:**	<= 1 W





BAND EDGE COMPLIANCE

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	AAP	12/7/2005	13

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 spurious RF conducted emissions at the edges of the authorized band were measured with the EUT set to low and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its maximum data rate in a no hop mode. The channels closest to the band edges were selected. The spectrum was scanned across each band edge from 5 MHz below the band edge to 5 MHz above the band edge.

NORTHWEST EMC

BAND EDGE COMPLIANCE

XMit 2006.03.01

EUT:	VMVL3.1a			Work Order:	VIST0001
Serial Number:	MLC5700187			Date:	07/12/06
Customer:	Visteon			Temperature:	22°C
Attendees:	None			Humidity:	44%
Project:	None			Barometric Pres.:	29.9
Tested by:	Dean Ghizzone	Power:	DC	Job Site:	OC03

TEST SPECIFICATIONS	Test Method
FCC 15.247(d) Band Edge Compliance 2005-9	ANSI C63.4 2003

COMMENTS

Bluetooth operating mode - Modulated

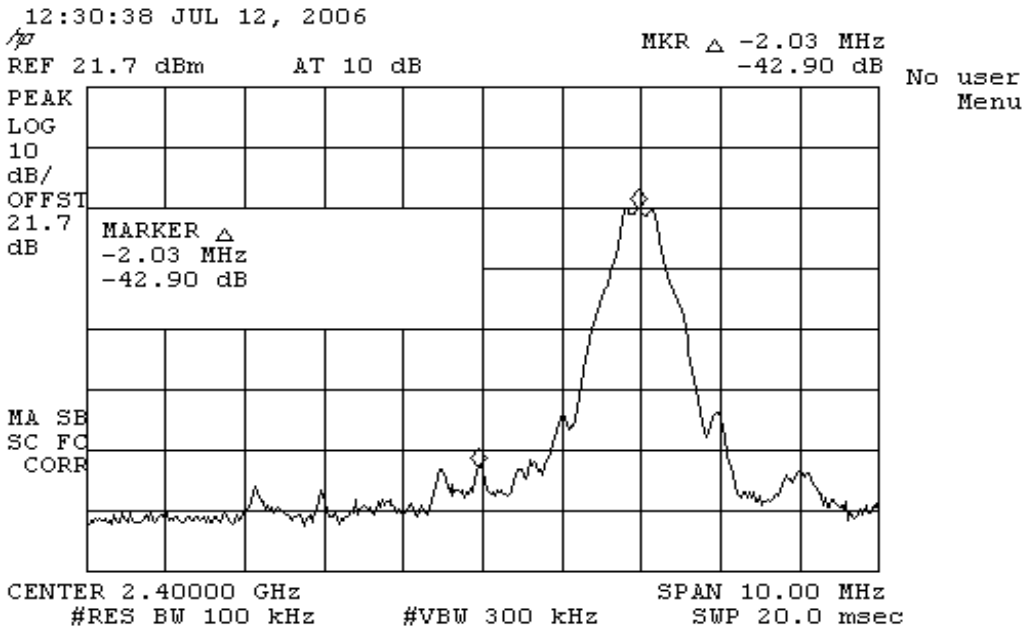
DEVIATIONS FROM TEST STANDARD

Configuration #	1	Signature

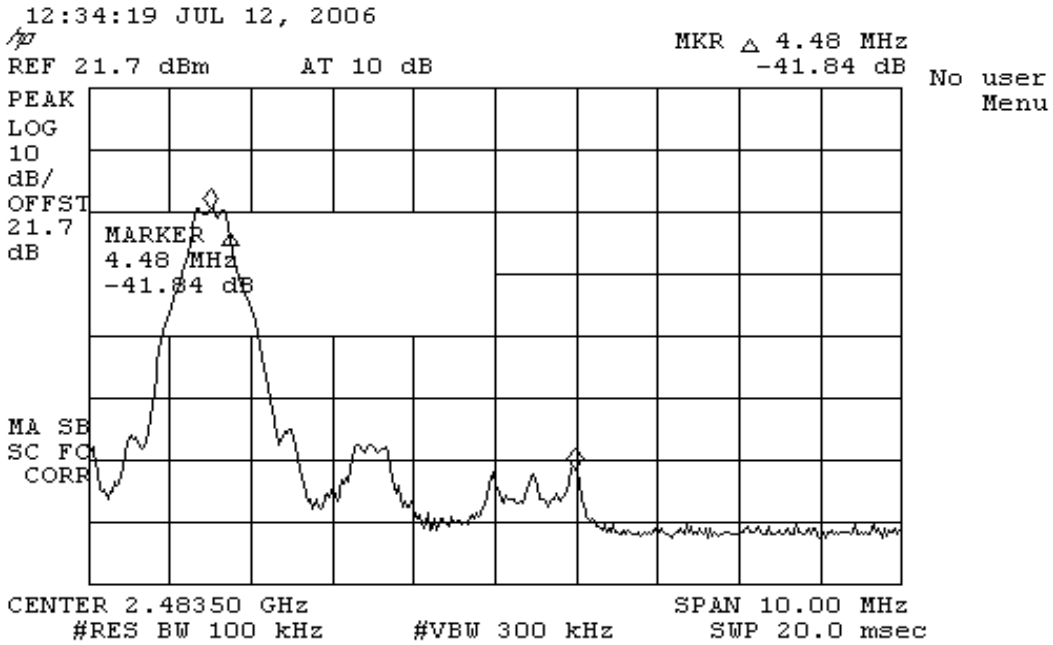
Modes of Operation and Test Conditions	Value	Limit	Result
Low Channel	-42.9 dBc	≤ -20 dBc	Pass
High Channel	-41.8 dBc	≤ -20 dBc	Pass

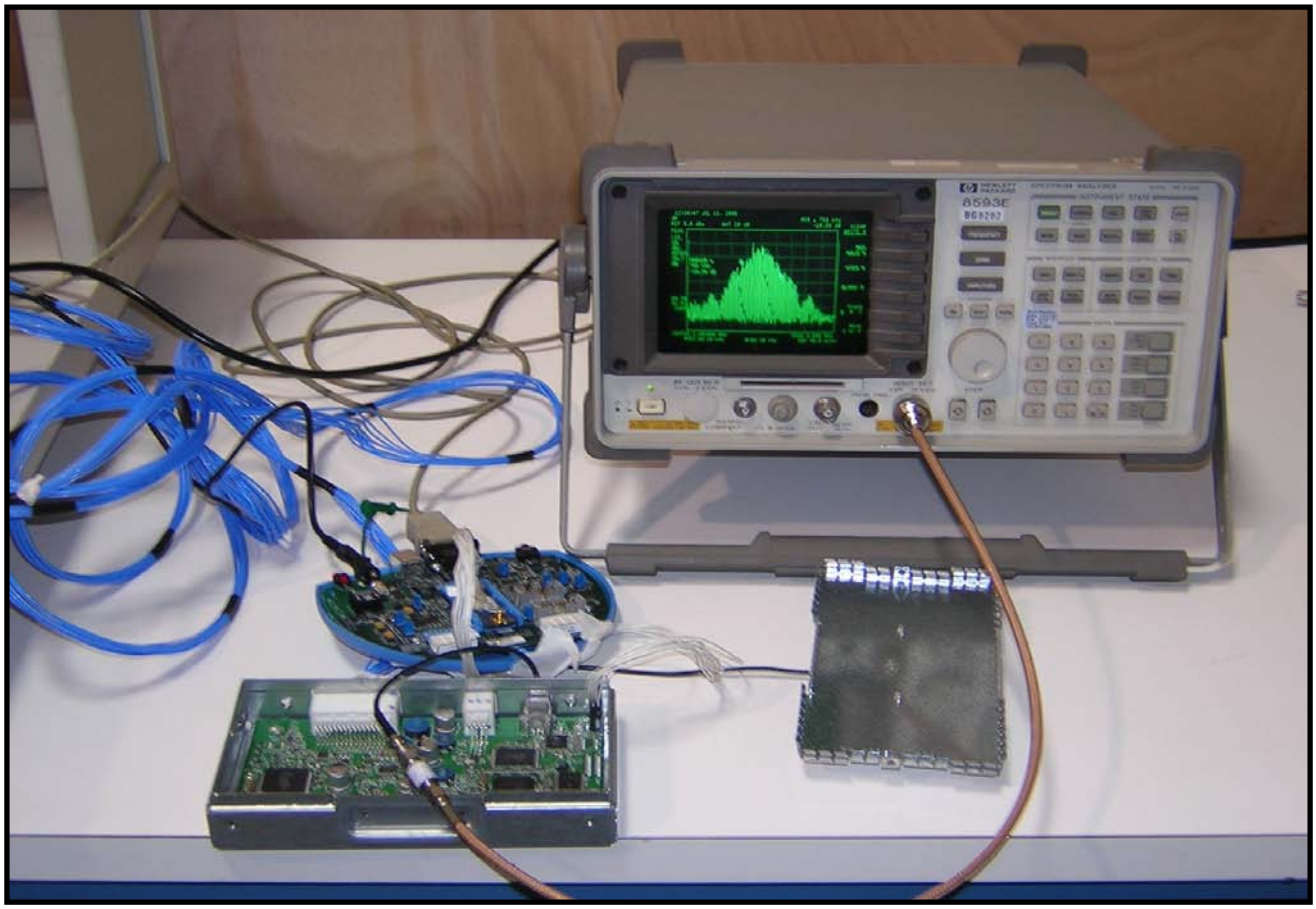
BAND EDGE COMPLIANCE

Low Channel					
Result:	Pass	**Value:**	-42.9 dBc	**Limit:**	≤ -20 dBc



High Channel					
Result:	Pass	**Value:**	-41.8 dBc	**Limit:**	≤ -20 dBc




8593E

SPURIOUS CONDUCTED 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	AAP	12/7/2005	13

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 spurious RF conducted emissions were measured with the EUT set to low, medium, and high transmit frequencies. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its maximum data rate in a no hop mode. For each transmit frequency, the spectrum was scanned throughout the specified frequency.

NORTHWEST EMC

SPURIOUS CONDUCTED EMISSIONS

XMit 2006.03.01

EUT:	VMVL3.1a			Work Order:	VIST0001
Serial Number:	MLC5700187			Date:	07/12/06
Customer:	Visteon			Temperature:	22°C
Attendees:	None			Humidity:	44%
Project:	None			Barometric Pres.:	29.9
Tested by:	Dean Ghizzone	Power:	DC	Job Site:	OC03

TEST SPECIFICATIONS	Test Method
FCC 15.247(d) Spurious Conducted Emissions 2005-9	ANSI C63.4 2003

COMMENTS

Bluetooth operating mode - Modulated

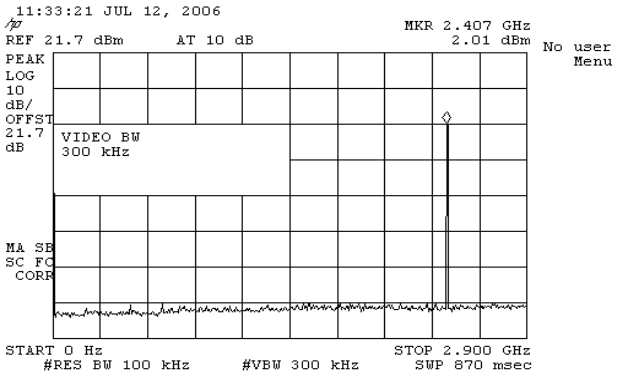
DEVIATIONS FROM TEST STANDARD

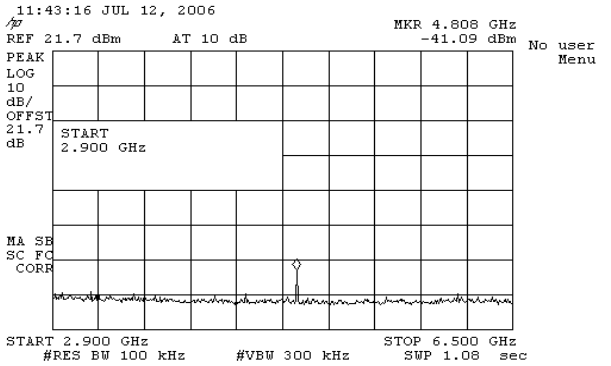
Configuration #	1	Signature

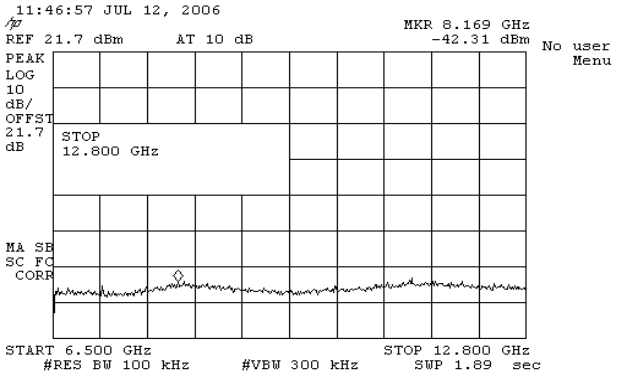
Modes of Operation and Test Conditions	Value	Limit	Result
Low Channel, 0MHz - 26GHz	≤ -30 dBc	≤ -20 dBc	Pass
Mid Channel, 0MHz - 26GHz	≤ -30 dBc	≤ -20 dBc	Pass
High Channel, 0MHz - 26GHz	≤ -30 dBc	≤ -20 dBc	Pass

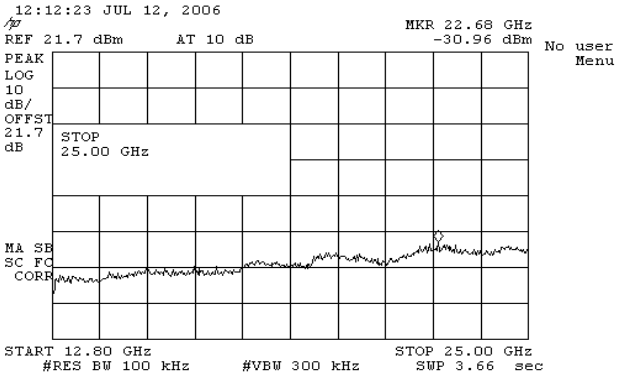
SPURIOUS CONDUCTED EMISSIONS

Low Channel, 0MHz - 26GHz		
Result: Pass	**Value:** ≤ -30 dBc	**Limit:** ≤ -20 dBc



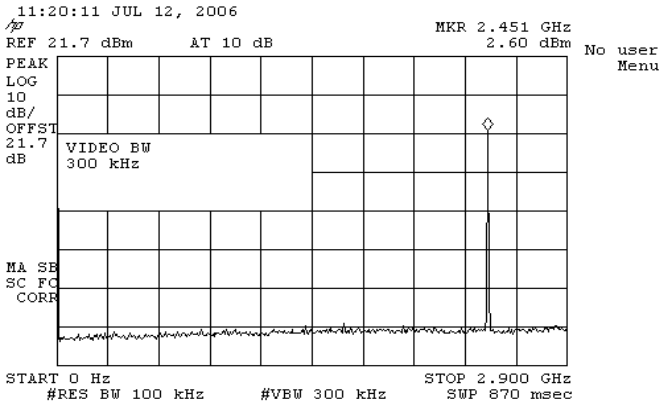


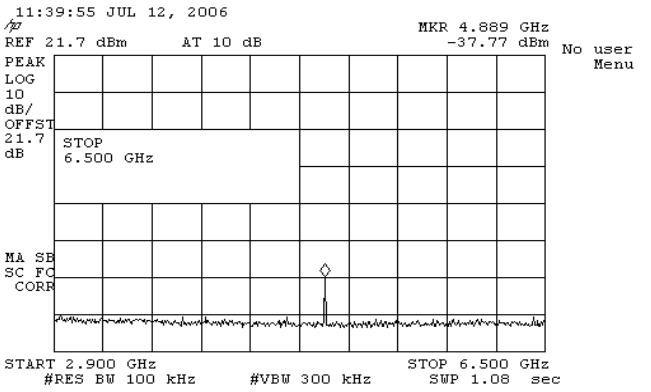


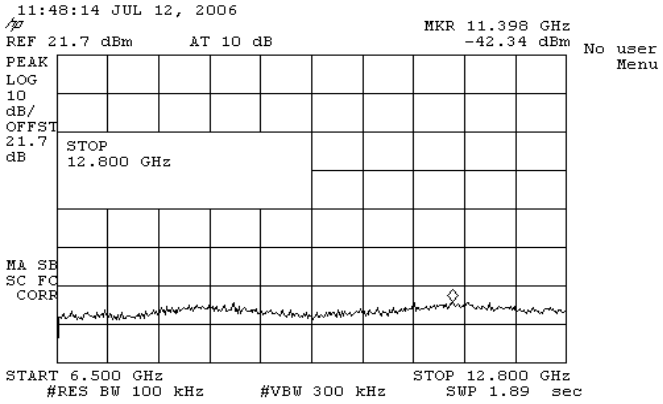


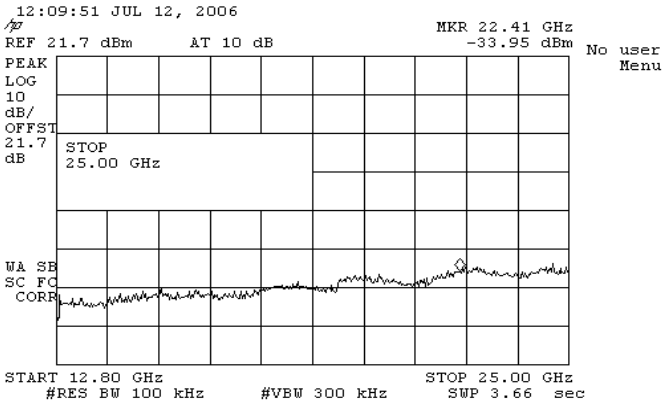
SPURIOUS CONDUCTED EMISSIONS

Mid Channel, 0MHz - 26GHz			
Result: Pass	**Value:** ≤ -30 dBc	**Limit:**	≤ -20 dBc



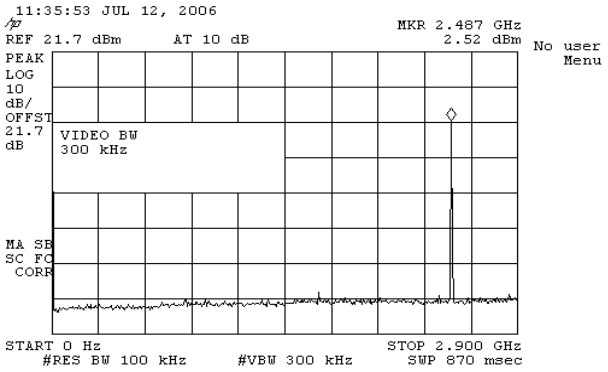


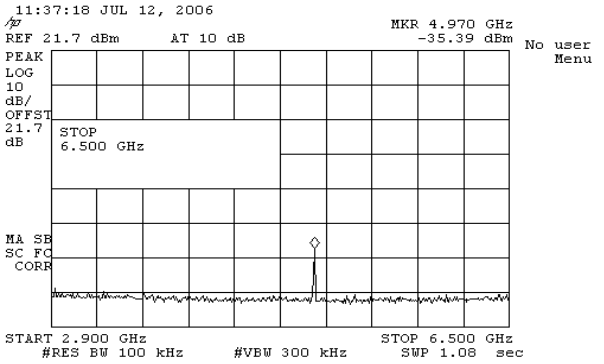


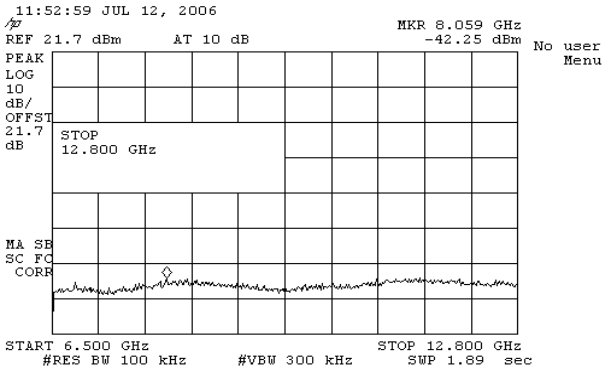


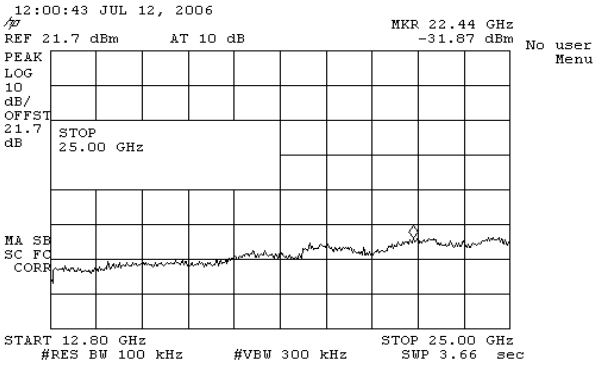
SPURIOUS CONDUCTED EMISSIONS

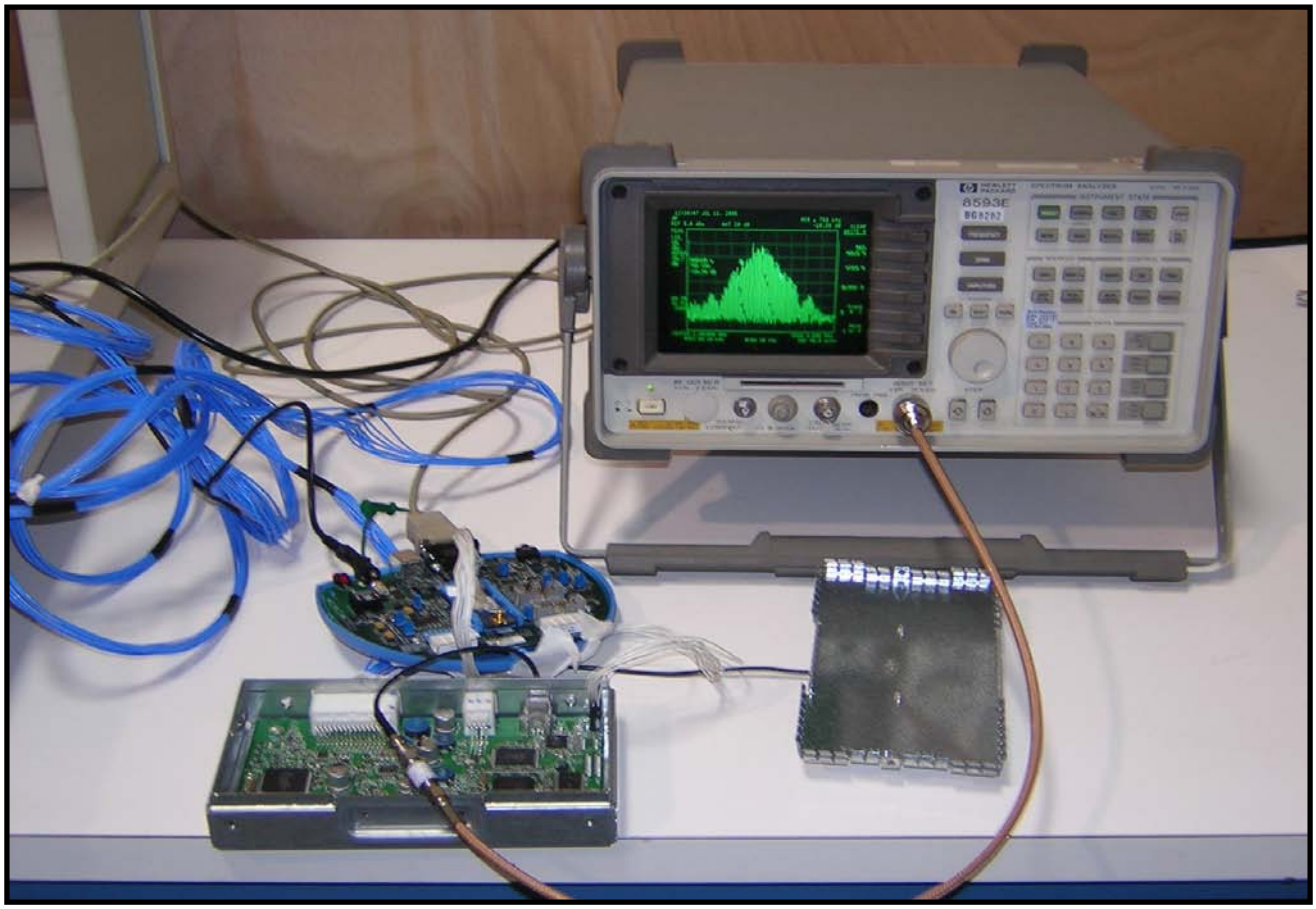
High Channel, 0MHz - 26GHz			
Result: Pass	**Value:** ≤ -30 dBc	**Limit:**	≤ -20 dBc











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	AAP	12/7/2005	13

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 peak power spectral density measurements were measured with the EUT set to low, mid, and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its maximum data. Per the procedure outlined in FCC 97-114, the spectrum analyzer was used as follows:

> The emission peak(s) were located and zoom in on within the passband. The resolution bandwidth was set to 3 kHz, the video bandwidth was set to greater than or equal to the resolution bandwidth. The sweep speed was set equal to the span divided by 3 kHz (sweep = (SPAN/3 kHz)). For example, given a span of 1.5 MHz, the sweep should be 1.5 x 10^6 ÷ 3 x 10^3 = 500 seconds. External attenuation was used and added to the reading. The following FCC procedure was used for modifying the power spectral density measurements:

"If the spectrum line spacing cannot be resolved on the available spectrum analyzer, the noise density function on most modern conventional spectrum analyzers will directly measure the noise power density normalized to a 1 Hz noise power bandwidth. Add 34.8 dB for correction to 3 kHz."

NORTHWEST EMC

POWER SPECTRAL DENSITY

XMit 2006.03.01

EUT:	MACH 3.1a			Work Order:	VIST0001
Serial Number:	None			Date:	07/19/06
Customer:	Visteon			Temperature:	22°C
Attendees:	None			Humidity:	44%
Project:	None			Barometric Pres.:	29.9
Tested by:	Dean Ghizzone	Power:	DC	Job Site:	OC03

TEST SPECIFICATIONS	Test Method
FCC 15.247(e) Power Spectral Density 2005-9	ANSI C63.4 2003

COMMENTS

Bluetooth operating mode - Modulated

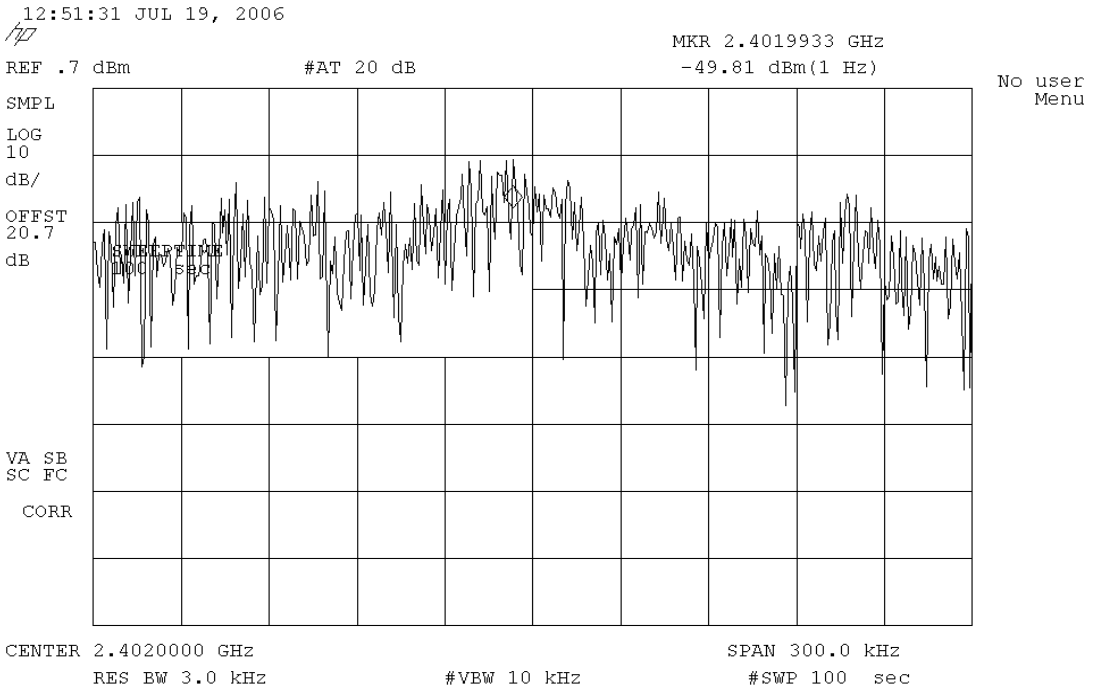
DEVIATIONS FROM TEST STANDARD

Configuration #	1	Signature

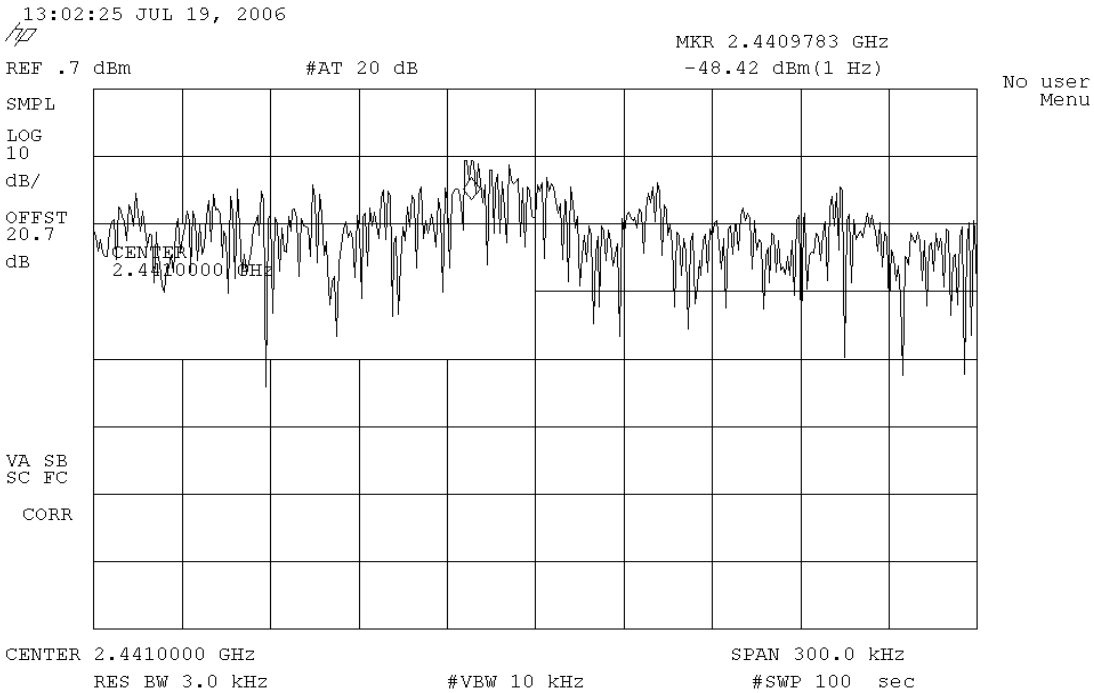
Modes of Operation and Test Conditions	Value	Limit	Result
Low Channel	-15.01 dBm / 3 kHz	≤ 8 dBm / 3 kHz	Pass
Mid Channel	-13.62 dBm / 3 kHz	≤ 8 dBm / 3 kHz	Pass
High Channel	-13.0 dBm / 3 kHz	≤ 8 dBm / 3 kHz	Pass

POWER SPECTRAL DENSITY

Low Channel					
Result:	Pass	**Value:**	-15.01 dBm / 3 kHz	**Limit:**	≤ 8 dBm / 3 kHz

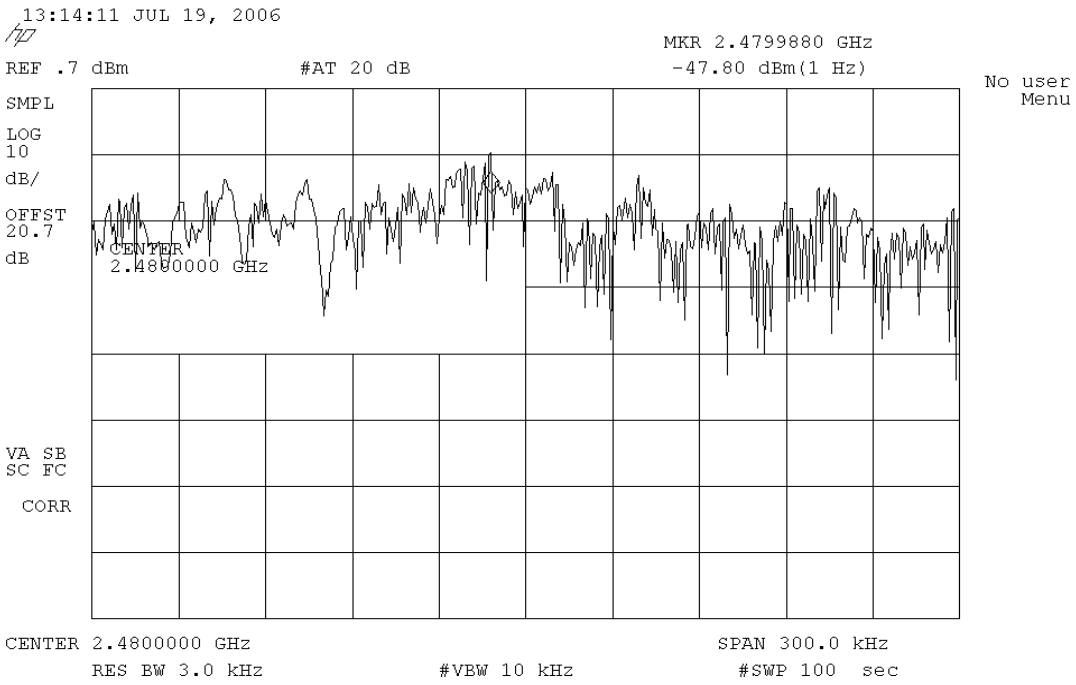


Mid Channel					
Result:	Pass	**Value:**	-13.62 dBm / 3 kHz	**Limit:**	≤ 8 dBm / 3 kHz

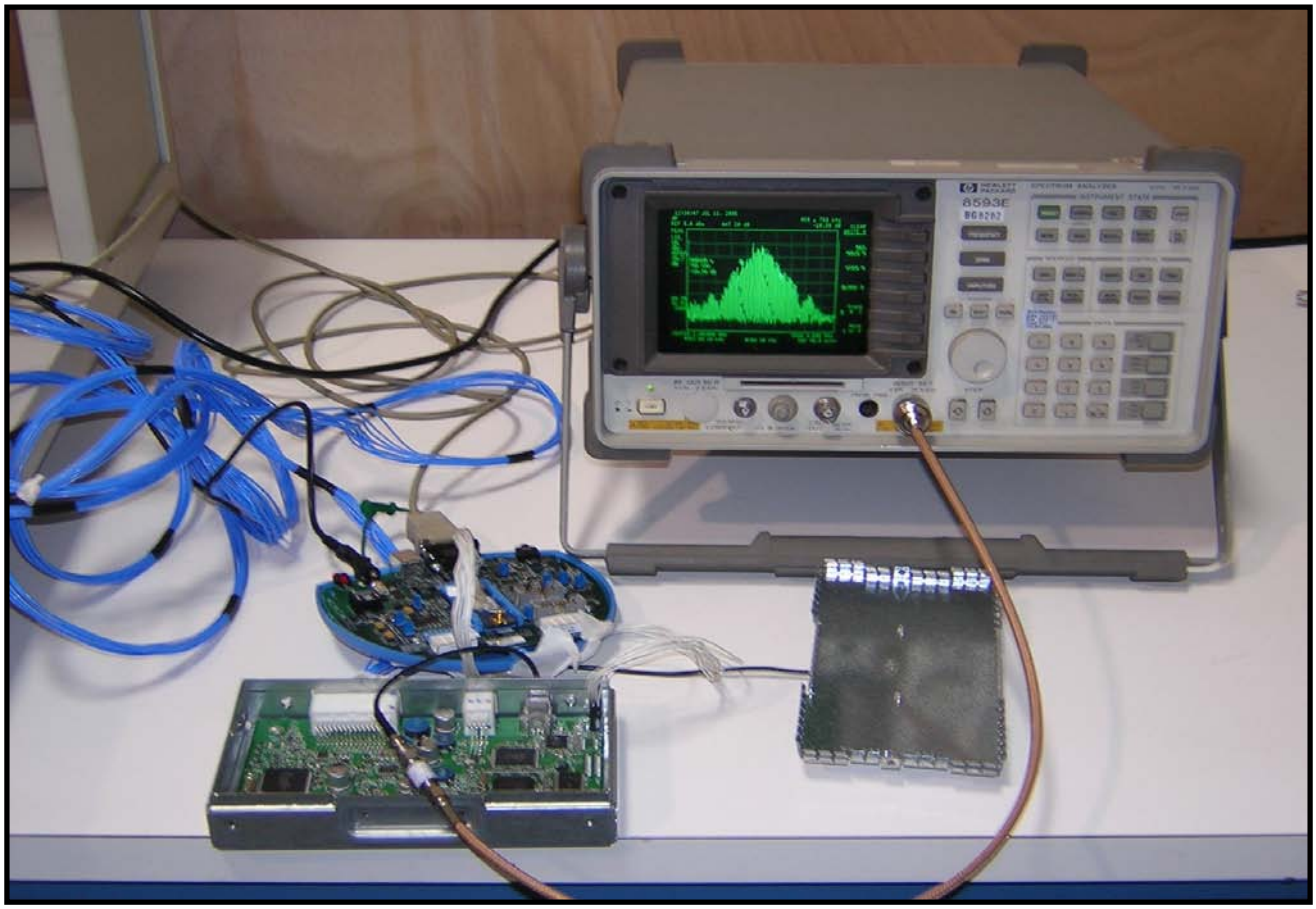


POWER SPECTRAL DENSITY

High Channel		
Result: Pass	**Value:** -13.0 dBm / 3 kHz	**Limit:** ≤ 8 dBm / 3 kHz



POWER SPECTRAL DENSITY



SPURIOUS RADIATED 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.

MODES OF OPERATION
High-Channel
Mid-Channel
Low-Channel

MODE USED FOR FINAL DATA
High-Channel
Mid-Channel
Low-Channel

POWER SETTINGS INVESTIGATED
120VAC/60Hz

POWER SETTINGS USED FOR FINAL DATA
120VAC/60Hz

FREQUENCY RANGE INVESTIGATED			
Start Frequency	30MHz	Stop Frequency	26GHz

CLOCKS AND OSCILLATORS
None

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	AMF-6F-18002650-25-10P	AOI	7/11/2006	13
Antenna, Horn	EMCO	3160-09	AHN	NCR	0
OC10 SMA cable for 18026 GHz			OCK	7/11/2006	13
Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AOJ	2/8/2006	13
Antenna, Horn	EMCO	3160-08	AHO	NCR	0
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AOK	2/8/2006	13
Antenna, Horn	EMCO	3160-07	AHP	NCR	0
Pre-Amplifier 0.5-18 GHz	Miteq	AMF-4D-005180-24-10P	APP	3/22/2006	13
Antenna, Horn	EMCO	3115	AHB	8/1/2005	24
OC10 cables a,b,c,e,f Horn Cables			OCJ	3/21/2006	13
Antenna, Biconilog	EMCO	3142	AXJ	3/14/2006	24
OC10 cables a,b,c,d Bilog			OCH	3/30/2006	13
Pre-Amplifier	Miteq	AM-1616-1000	AOM	11/13/2005	13
Spectrum Analyzer	Agilent	E4446A	AAQ	7/15/2005	18

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 highest gain of each type of antenna to be used with the EUT was tested. The EUT was configured for low, mid, and high band transmit frequencies. For each configuration, the spectrum was scanned throughout the specified range. In addition, measurements were made in the restricted bands to verify compliance. While scanning, emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and the EUT antenna in three orthogonal axis, and adjusting measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.4:2003). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

Justification for Duty Cycle Correction Factor

Dwell time in data mode The dwell time of 0.3797s within a 30 second period in data mode is independent from the packet type (packet length).
The calculation for a 30 second period is a follows: Dwell time = time slot length * hop rate / number of hopping channels *30s
Example for a DH1 packet (with a maximum length of one time slot)
Dwell time = 625 µs * 1600 1/s / 79 * 30s = 0.3797s (in a 30s period)
For multi-slot packet the hopping is reduced according to the length of the packet.
Example for a DH5 packet (with a maximum length of five time slots)
Dwell time = 5 * 625 µs * 1600 * 1/5 *1/s / 79 * 30s = 0.3797s (in a 30s period)
This is according the Bluetooth Core Specification V 1.0B (+ critical errata) for all Bluetooth devices. Therefore, all Bluetooth devices comply with the FCC dwell time requirement in the data mode. This was checked during the Bluetooth Qualification tests. The Dwell time in hybrid mode is approximately 2.6 mS (in a 12.8s period). A Bluetooth radio hops 1600 times a second across 79 channels. Each channel used equally on average. Therefore 1600/79 = 20.25 hops/sec on a single channel. The period of a single hop is 1sec/20.25 = 49.375 ms

The maximum length of a DH1 data packet is 625 us. The highest duty cycle = .625ms/49.375ms = .01266

The duty cycle correction factor for frequency hoppers is 20*log(highest duty cycle) for the actual period or 100 ms - whichever is shorter. So the duty cycle correction factor for a Bluetooth is:
20 * log (.01266) = -38 dB.

NORTHWEST EMC

SPURIOUS RADIATED EMISSIONS DATA SHEET

PSA 2006.05.30
EMI 2006.4.26

EUT:	VMVL3.1a			Work Order:	VIST0001
Serial Number:	MLC5700187			Date:	06/29/06
Customer:	Visteon			Temperature:	23
Attendees:	None			Humidity:	48%
Project:	None			Barometric Pres.:	29.96
Tested by:	Jeremiah Darden	Power:	120VAC/60Hz	Job Site:	OC10

TEST SPECIFICATIONS	Test Method
FCC 15.247(d) Spurious Radiated Emissions:2005-9	ANSI C63.4:2003

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

X-pos, Modulated Transmit Mode

EUT OPERATING MODES

Low-Channel

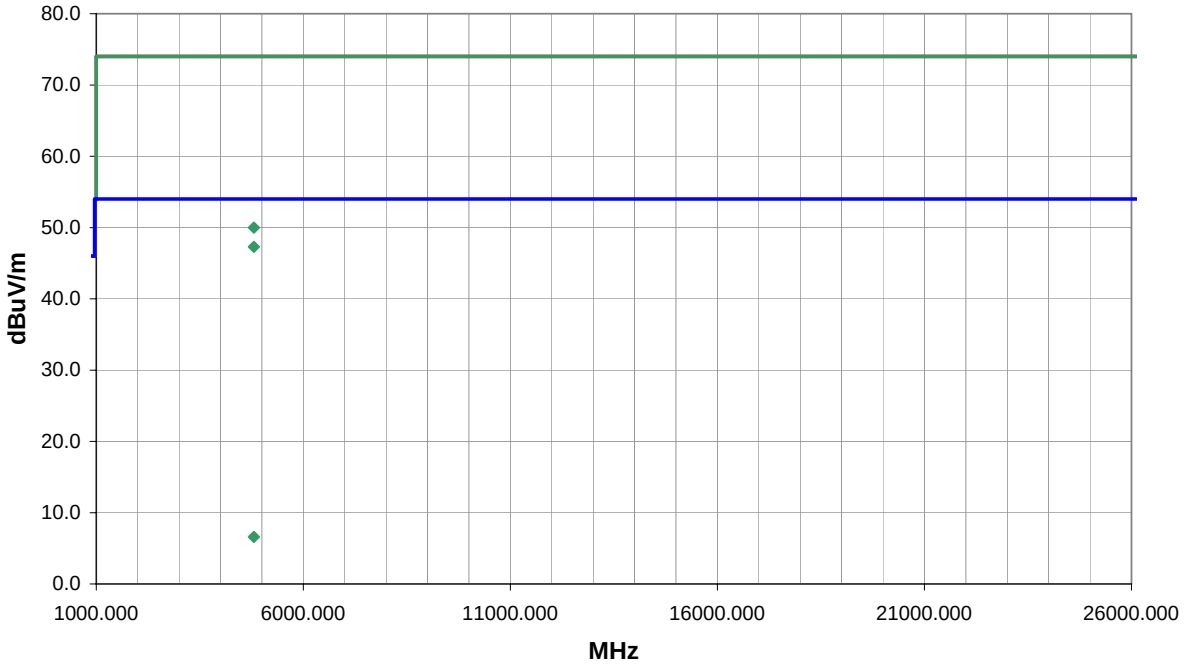
DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	4
Configuration #	2
Results	Pass

NVLAP Lab Code 200629-0

Signature



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Duty Cycle Correction (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)
4804.477	38.7	5.9	162.0	1.2	3.0	0.0	V-Horn	AV	38.0	6.6	54.0	-47.4
4804.483	30.8	5.9	98.0	1.2	3.0	0.0	H-Horn	AV	38.0	-1.3	54.0	-55.3
4804.667	44.1	5.9	162.0	1.2	3.0	0.0	V-Horn	PK	0.0	50.0	74.0	-24.0
4804.834	41.4	5.9	98.0	1.2	3.0	0.0	H-Horn	PK	0.0	47.3	74.0	-26.7

NORTHWEST EMC

SPURIOUS RADIATED EMISSIONS DATA SHEET

PSA 2006.05.30
EMI 2006.4.26

EUT:	VMVL3.1a			Work Order:	VIST0001
Serial Number:	MLC5700187			Date:	06/29/06
Customer:	Visteon			Temperature:	23
Attendees:	None			Humidity:	48%
Project:	None			Barometric Pres.:	29.96
Tested by:	Jeremiah Darden	Power:	120VAC/60Hz	Job Site:	OC10

TEST SPECIFICATIONS	Test Method
FCC 15.247(d) Spurious Radiated Emissions:2005-9	ANSI C63.4:2003

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

X-pos, Modulated Transmit Mode

EUT OPERATING MODES

Mid-Channel

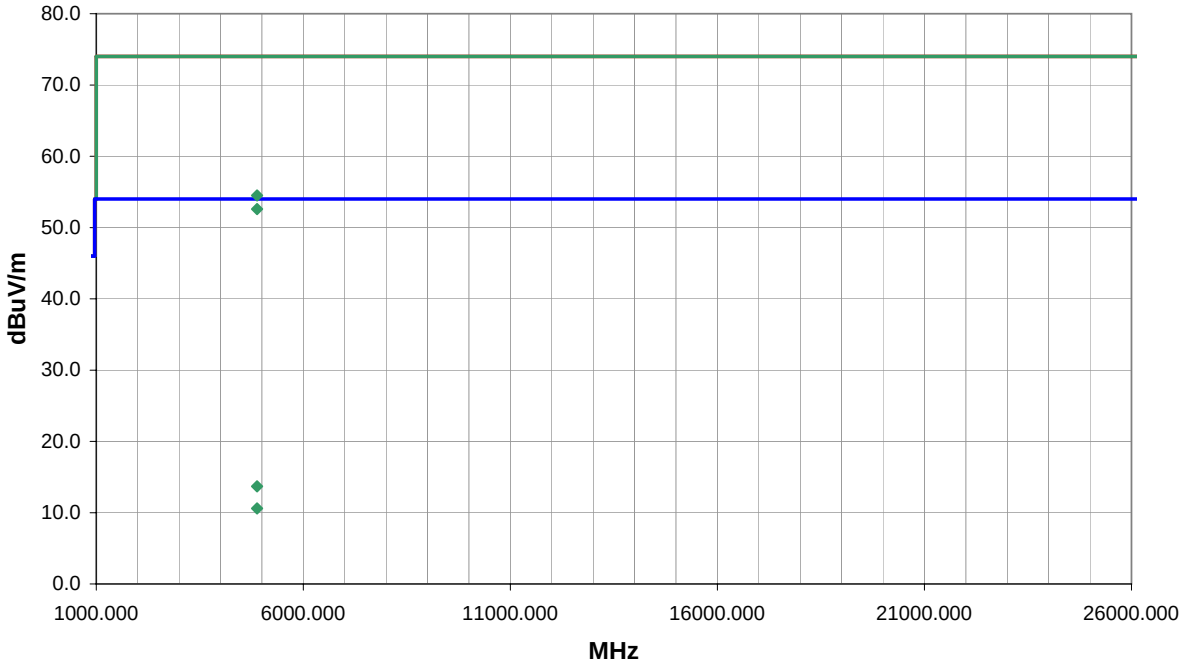
DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	3
Configuration #	2
Results	Pass

NVLAP Lab Code 200629-0

Signature



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Duty Cycle Correction (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)
4882.475	45.4	6.3	270.0	1.2	3.0	0.0	V-Horn	AV	38.0	13.7	54.0	-40.3
4882.464	42.3	6.3	64.0	1.2	3.0	0.0	H-Horn	AV	38.0	10.6	54.0	-43.4
4882.349	48.2	6.3	270.0	1.2	3.0	0.0	V-Horn	PK	0.0	54.5	74.0	-19.5
4882.596	46.3	6.3	64.0	1.2	3.0	0.0	H-Horn	PK	0.0	52.6	74.0	-21.4

NORTHWEST EMC

SPURIOUS RADIATED EMISSIONS DATA SHEET

PSA 2006.05.30
EMI 2006.4.26

EUT:	VMVL3.1a			Work Order:	VIST0001
Serial Number:	MLC5700187			Date:	06/29/06
Customer:	Visteon			Temperature:	23
Attendees:	None			Humidity:	48%
Project:	None			Barometric Pres.:	29.96
Tested by:	Jeremiah Darden	Power:	120VAC/60Hz	Job Site:	OC10

TEST SPECIFICATIONS	Test Method
FCC 15.247(d) Spurious Radiated Emissions:2005-9	ANSI C63.4:2003

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

X-pos, Modulated Transmit Mode

EUT OPERATING MODES

High-Channel

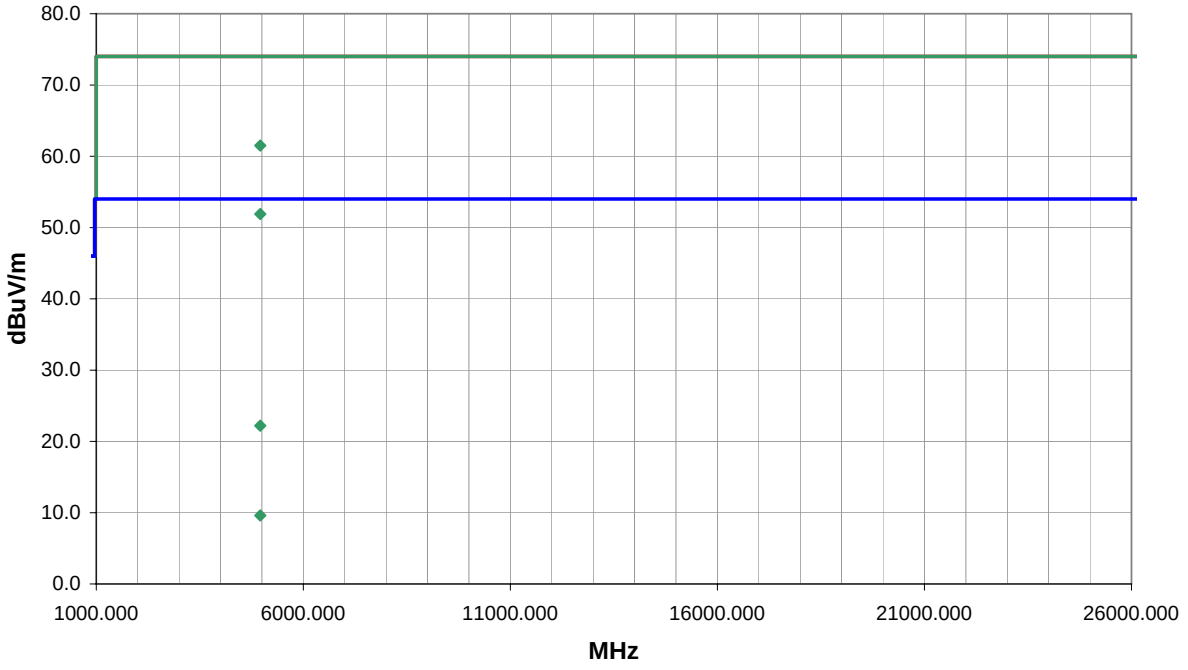
DEVIATIONS FROM TEST STANDARD

No deviations.

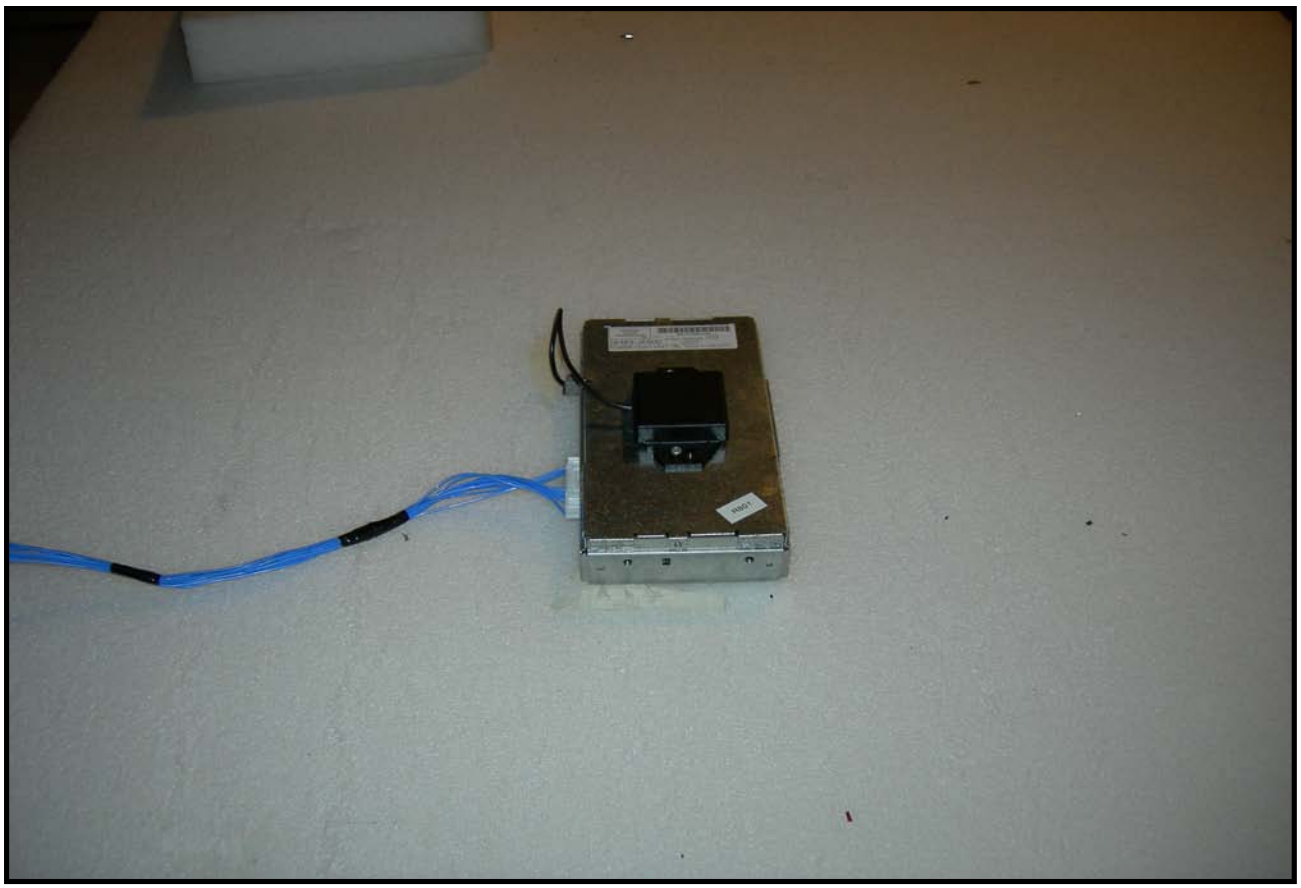
Run #	5
Configuration #	2
Results	Pass

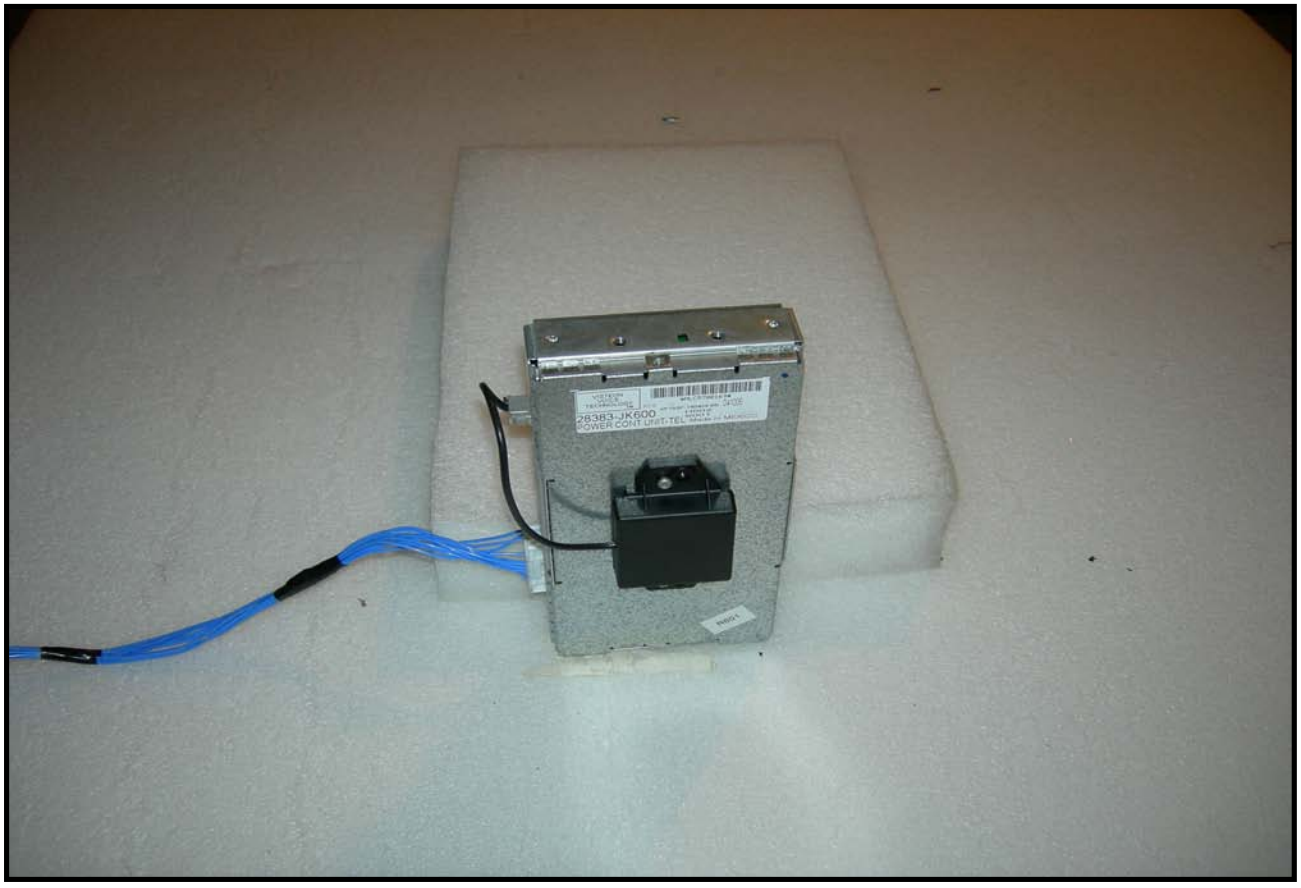
NVLAP Lab Code 200629-0

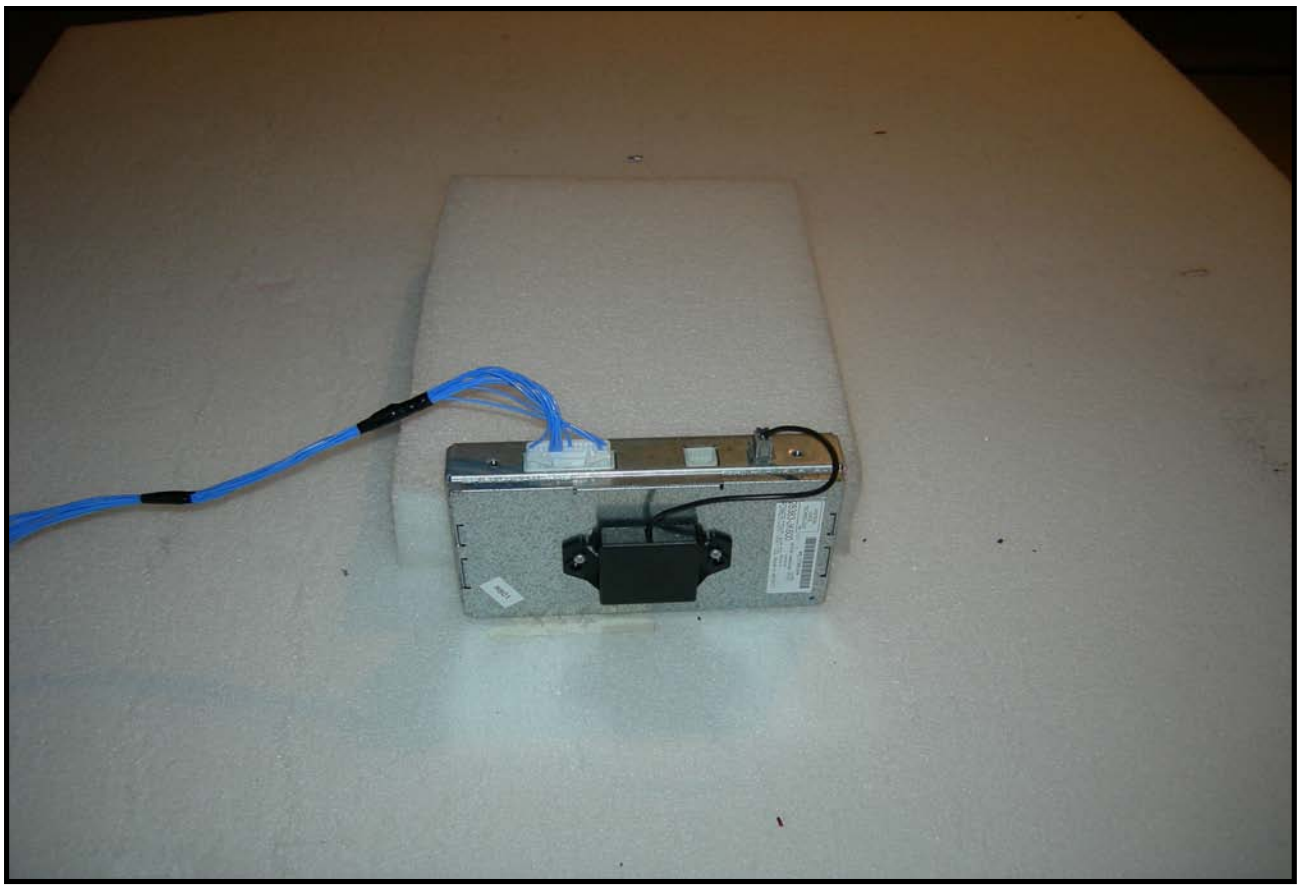
Signature



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Duty Cycle Correction (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)
4960.473	53.5	6.7	123.0	1.2	3.0	0.0	V-Horn	AV	38.0	22.2	54.0	-31.8
4960.470	40.9	6.7	290.0	1.9	3.0	0.0	H-Horn	AV	38.0	9.6	54.0	-44.4
4960.392	54.8	6.7	123.0	1.2	3.0	0.0	V-Horn	PK	0.0	61.5	74.0	-12.5
4960.438	45.2	6.7	290.0	1.9	3.0	0.0	H-Horn	PK	0.0	51.9	74.0	-22.1




26383-JK600
POWER CONT UNIT-TEL



CONDUCTED 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.

MODES OF OPERATION

High-Channel
Mid-Channel
Low-Channel

POWER SETTINGS INVESTIGATED

120VAC/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	LIC	4/24/2006	13
LISN	Solar	9252-50-24-BNC	LIB	5/8/2006	13
OC11 cables a-b-e-f			OCM	7/12/2006	13
Receiver	Schaffner	SCR 3101	ARC	5/4/2005	20
Spectrum Analyzer	Hewlett-Packard	8591E	AAH	12/21/2005	13

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

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.

NORTHWEST EMC

CONDUCTED EMISSIONS DATA SHEET

ACQ-2006.05.30
EMI 2005.9.18

EUT:	VMVL3.1a			Work Order:	VIST0001
Serial Number:	MLC5700187			Date:	06/29/06
Customer:	Visteon			Temperature:	23
Attendees:	None			Humidity:	48%
Project:	None			Barometric Pres.:	29.96
Tested by:	Jeremiah Darden	Power:	120VAC/60Hz	Job Site:	OC10

TEST SPECIFICATIONS	Test Method
FCC 15.207 AC Powerline Conducted Emissions: 2005-09	ANSI C63.4:2003

TEST PARAMETERS	
Cable or Line Tested	L1

COMMENTS

Modulated Transmit Mode

EUT OPERATING MODES

Low-Channel

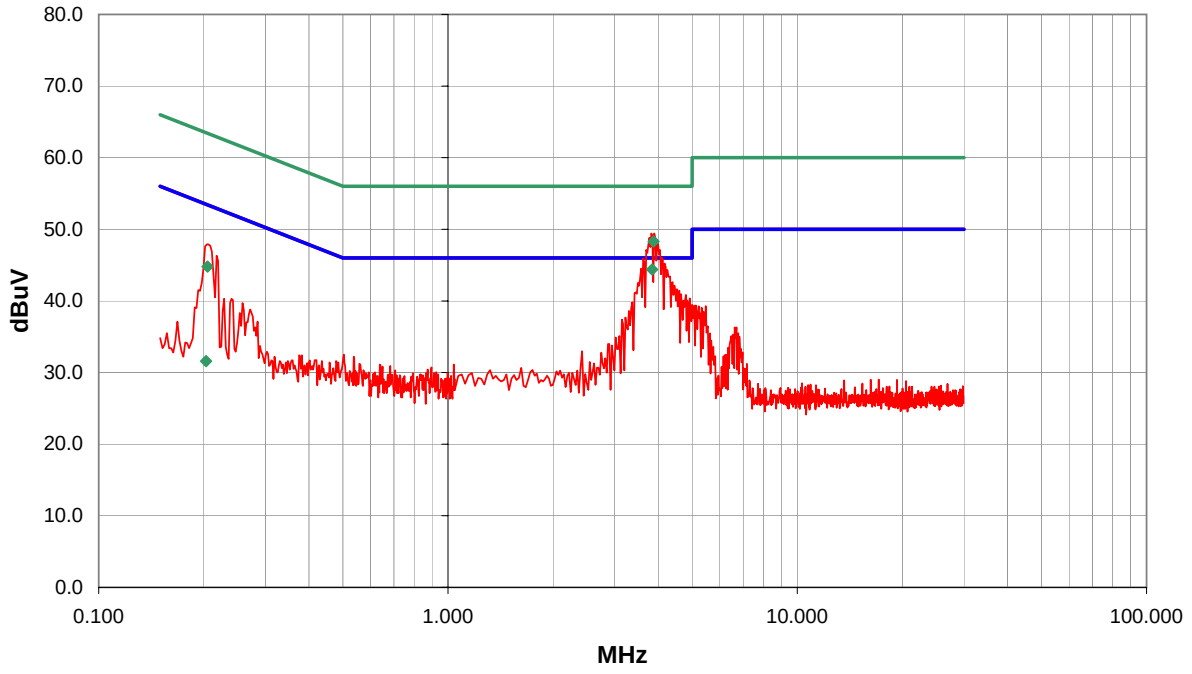
DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	2
Configuration #	1
Results	Pass

NVLAP Lab Code 200629-0

Signature



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)
3.843	24.2			0.0	0.2	20.0		AV		44.4	46.0	-1.6
3.877	28.1			0.0	0.2	20.0		QP		48.3	56.0	-7.7
0.205	24.8			0.0	0.0	20.0		QP		44.8	63.4	-18.6
0.203	11.6			0.0	0.0	20.0		AV		31.6	53.5	-21.9
4.397	22.4			0.0	0.2	20.0				42.6	46.0	-3.4
4.597	21.2			0.0	0.2	20.0				41.4	46.0	-4.6
4.647	20.7			0.0	0.2	20.0				40.9	46.0	-5.1
4.797	20.6			0.0	0.2	20.0				40.8	46.0	-5.2
0.206	27.8			0.0	0.1	20.0				47.9	53.4	-5.4
4.922	20.1			0.0	0.2	20.0				40.3	46.0	-5.7
4.847	19.8			0.0	0.2	20.0				40.0	46.0	-6.0
3.371	19.6			0.0	0.2	20.0				39.8	46.0	-6.2
4.997	19.2			0.0	0.2	20.0				39.4	46.0	-6.6
0.218	26.2			0.0	0.1	20.0				46.3	52.9	-6.6
3.146	17.2			0.0	0.2	20.0				37.4	46.0	-8.6
5.122	19.1			0.0	0.3	20.0				39.4	50.0	-10.6

NORTHWEST EMC

CONDUCTED EMISSIONS DATA SHEET

ACQ-2006.05.30
EMI 2005.9.18

EUT:	VMVL3.1a			Work Order:	VIST0001
Serial Number:	MLC5700187			Date:	06/30/06
Customer:	Visteon			Temperature:	23
Attendees:	None			Humidity:	48%
Project:	None			Barometric Pres.:	29.96
Tested by:	Jeremiah Darden	Power:	120VAC/60Hz	Job Site:	OC10

TEST SPECIFICATIONS	Test Method
FCC 15.207 AC Powerline Conducted Emissions: 2005-09	ANSI C63.4:2003

TEST PARAMETERS	
Cable or Line Tested	N

COMMENTS

Modulated Transmit Mode

EUT OPERATING MODES

Low-Channel

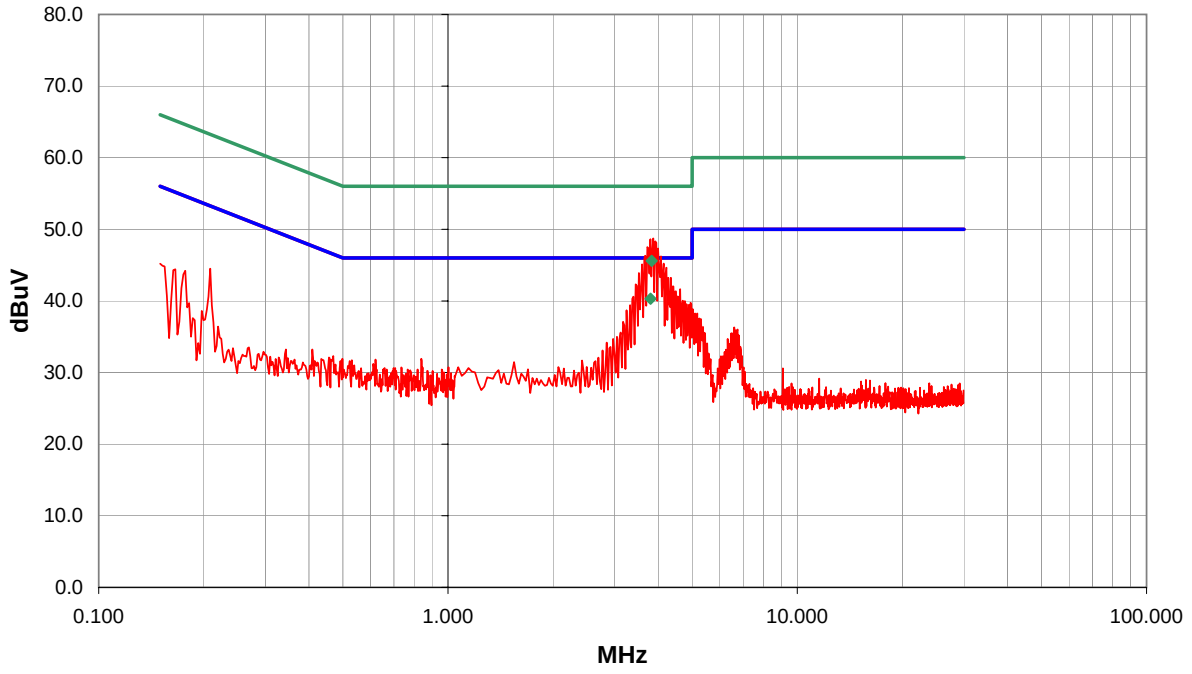
DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	3
Configuration #	1
Results	Pass

NVLAP Lab Code 200629-0

Signature



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)
3.800	20.1			0.0	0.2	20.0		AV		40.3	46.0	-5.7
3.830	25.4			0.0	0.2	20.0		QP		45.6	56.0	-10.4
3.446	22.1			0.0	0.2	20.0				42.3	46.0	-3.7
4.422	21.8			0.0	0.2	20.0				42.0	46.0	-4.0
4.622	21.4			0.0	0.2	20.0				41.6	46.0	-4.4
4.497	21.1			0.0	0.2	20.0				41.3	46.0	-4.7
4.547	20.4			0.0	0.2	20.0				40.6	46.0	-5.4
3.396	20.4			0.0	0.2	20.0				40.6	46.0	-5.4
4.697	19.8			0.0	0.2	20.0				40.0	46.0	-6.0
4.772	19.7			0.0	0.2	20.0				39.9	46.0	-6.1
4.947	19.5			0.0	0.2	20.0				39.7	46.0	-6.3
4.822	19.3			0.0	0.2	20.0				39.5	46.0	-6.5
4.897	19.2			0.0	0.2	20.0				39.4	46.0	-6.6

NORTHWEST EMC

CONDUCTED EMISSIONS DATA SHEET

ACQ-2006.05.30
EMI 2005.9.18

EUT:	VMVL3.1a			Work Order:	VIST0001
Serial Number:	MLC5700187			Date:	06/30/06
Customer:	Visteon			Temperature:	23
Attendees:	None			Humidity:	48%
Project:	None			Barometric Pres.:	29.96
Tested by:	Jeremiah Darden	Power:	120VAC/60Hz	Job Site:	OC10

TEST SPECIFICATIONS	Test Method
FCC 15.207 AC Powerline Conducted Emissions: 2005-09	ANSI C63.4:2003

TEST PARAMETERS

Cable or Line Tested	L1

COMMENTS

Modulated Transmit Mode

EUT OPERATING MODES

Mid-Channel

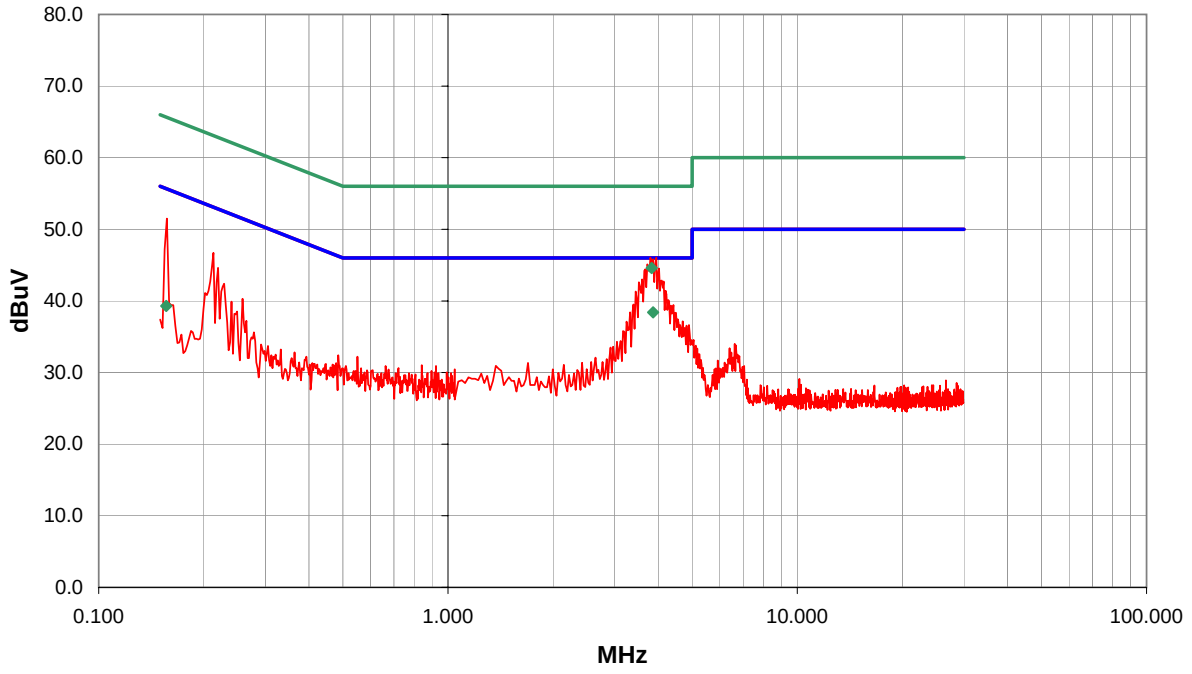
DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	4
Configuration #	1
Results	Pass

NVLAP Lab Code 200629-0

Signature



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)
3.866	18.2			0.0	0.2	20.0		AV		38.4	46.0	-7.6
3.830	24.4			0.0	0.2	20.0		QP		44.6	56.0	-11.4
0.156	19.3			0.0	0.0	20.0		QP		39.3	65.7	-26.4
3.596	22.8			0.0	0.2	20.0				43.0	46.0	-3.0
0.157	31.4			0.0	0.1	20.0				51.5	55.6	-4.1
4.197	21.2			0.0	0.2	20.0				41.4	46.0	-4.6
3.446	21.1			0.0	0.2	20.0				41.3	46.0	-4.7
0.213	26.6			0.0	0.1	20.0				46.7	53.1	-6.4
3.396	19.3			0.0	0.2	20.0				39.5	46.0	-6.5
4.422	19.2			0.0	0.2	20.0				39.4	46.0	-6.6
3.321	18.2			0.0	0.2	20.0				38.4	46.0	-7.6
4.497	18.1			0.0	0.2	20.0				38.3	46.0	-7.7
0.220	24.5			0.0	0.1	20.0				44.6	52.8	-8.2
4.697	16.9			0.0	0.2	20.0				37.1	46.0	-8.9
4.897	16.4			0.0	0.2	20.0				36.6	46.0	-9.4
4.822	16.3			0.0	0.2	20.0				36.5	46.0	-9.5

NORTHWEST EMC

CONDUCTED EMISSIONS DATA SHEET

ACQ-2006.05.30
EMI 2005.9.18

EUT:	VMVL3.1a			Work Order:	VIST0001
Serial Number:	MLC5700187			Date:	06/30/06
Customer:	Visteon			Temperature:	23
Attendees:	None			Humidity:	48%
Project:	None			Barometric Pres.:	29.96
Tested by:	Jeremiah Darden	Power:	120VAC/60Hz	Job Site:	OC10

TEST SPECIFICATIONS	Test Method
FCC 15.207 AC Powerline Conducted Emissions: 2005-09	ANSI C63.4:2003

TEST PARAMETERS	
Cable or Line Tested	N

COMMENTS

Modulated Transmit Mode

EUT OPERATING MODES

Mid-Channel

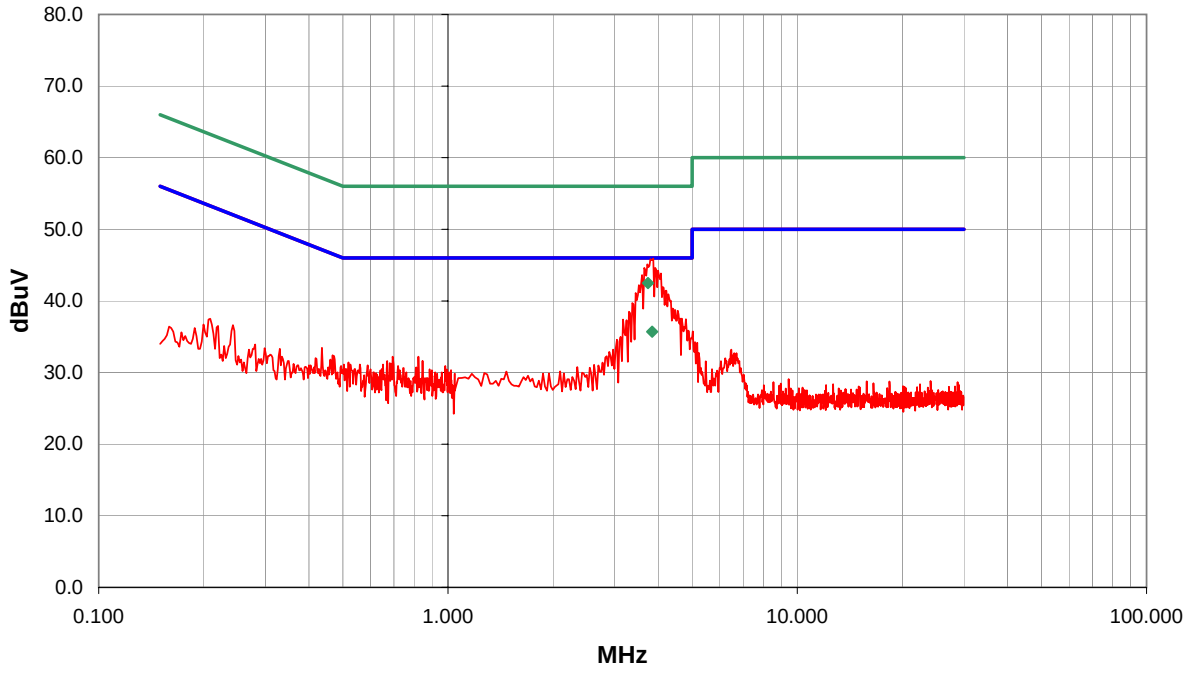
DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	5
Configuration #	1
Results	Pass

NVLAP Lab Code 200629-0

Signature



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)
3.843	15.5			0.0	0.2	20.0		AV		35.7	46.0	-10.3
3.736	22.3			0.0	0.2	20.0		QP		42.5	56.0	-13.5
4.222	21.2			0.0	0.2	20.0				41.4	46.0	-4.6
3.371	19.5			0.0	0.2	20.0				39.7	46.0	-6.3
3.296	18.3			0.0	0.2	20.0				38.5	46.0	-7.5
4.672	17.3			0.0	0.2	20.0				37.5	46.0	-8.5
3.171	17.2			0.0	0.2	20.0				37.4	46.0	-8.6
3.246	17.1			0.0	0.2	20.0				37.3	46.0	-8.7
3.121	14.8			0.0	0.2	20.0				35.0	46.0	-11.0
3.046	14.4			0.0	0.2	20.0				34.6	46.0	-11.4
2.971	13.0			0.0	0.2	20.0				33.2	46.0	-12.8
0.436	13.3			0.0	0.1	20.0				33.4	47.1	-13.7
0.823	12.1			0.0	0.1	20.0				32.2	46.0	-13.8
0.694	12.1			0.0	0.1	20.0				32.2	46.0	-13.8
0.467	12.3			0.0	0.1	20.0				32.4	46.6	-14.1

NORTHWEST EMC

CONDUCTED EMISSIONS DATA SHEET

ACQ-2006.05.30
EMI 2005.9.18

EUT:	VMVL3.1a			Work Order:	VIST0001
Serial Number:	MLC5700187			Date:	06/30/06
Customer:	Visteon			Temperature:	23
Attendees:	None			Humidity:	48%
Project:	None			Barometric Pres.:	29.96
Tested by:	Jeremiah Darden	Power:	120VAC/60Hz	Job Site:	OC10

TEST SPECIFICATIONS	Test Method
FCC 15.207 AC Powerline Conducted Emissions: 2005-09	ANSI C63.4:2003

TEST PARAMETERS	
Cable or Line Tested	L1

COMMENTS

Modulated Transmit Mode

EUT OPERATING MODES

High-Channel

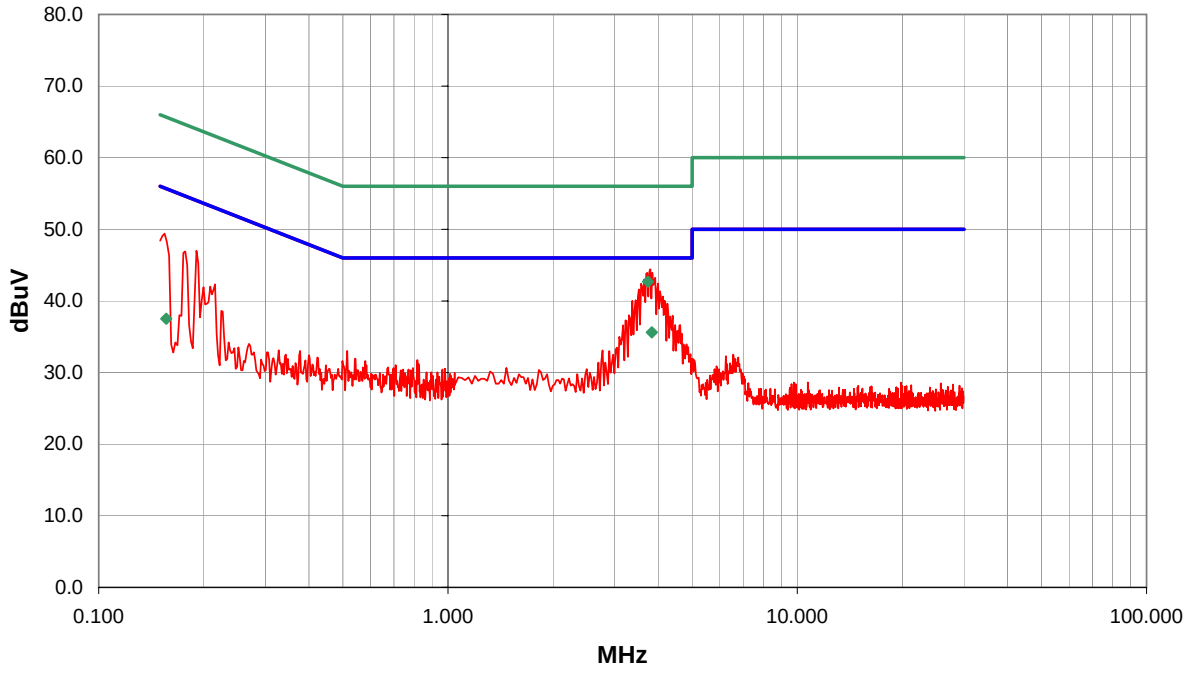
DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	6
Configuration #	1
Results	Pass

NVLAP Lab Code 200629-0

Signature



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)
3.835	15.4			0.0	0.2	20.0		AV		35.6	46.0	-10.4
3.736	22.5			0.0	0.2	20.0		QP		42.7	56.0	-13.3
0.156	17.5			0.0	0.0	20.0		QP		37.5	65.7	-28.2
3.646	22.8			0.0	0.2	20.0				43.0	46.0	-3.0
3.996	22.2			0.0	0.2	20.0				42.4	46.0	-3.6
3.521	21.4			0.0	0.2	20.0				41.6	46.0	-4.4
4.047	21.1			0.0	0.2	20.0				41.3	46.0	-4.7
3.446	19.9			0.0	0.2	20.0				40.1	46.0	-5.9
4.172	19.8			0.0	0.2	20.0				40.0	46.0	-6.0
3.371	19.8			0.0	0.2	20.0				40.0	46.0	-6.0
0.155	29.3			0.0	0.1	20.0				49.4	55.8	-6.4
4.247	19.4			0.0	0.2	20.0				39.6	46.0	-6.4
0.191	26.9			0.0	0.1	20.0				47.0	54.0	-7.0
0.177	26.8			0.0	0.1	20.0				46.9	54.6	-7.7
3.296	17.8			0.0	0.2	20.0				38.0	46.0	-8.0

NORTHWEST EMC

CONDUCTED EMISSIONS DATA SHEET

ACQ-2006.05.30
EMI 2005.9.18

EUT:	VMVL3.1a			Work Order:	VIST0001
Serial Number:	MLC5700187			Date:	06/30/06
Customer:	Visteon			Temperature:	23
Attendees:	None			Humidity:	48%
Project:	None			Barometric Pres.:	29.96
Tested by:	Jeremiah Darden	Power:	120VAC/60Hz	Job Site:	OC10

TEST SPECIFICATIONS	Test Method
FCC 15.207 AC Powerline Conducted Emissions: 2005-09	ANSI C63.4:2003

TEST PARAMETERS	
Cable or Line Tested	N

COMMENTS

Modulated Transmit Mode

EUT OPERATING MODES

High-Channel

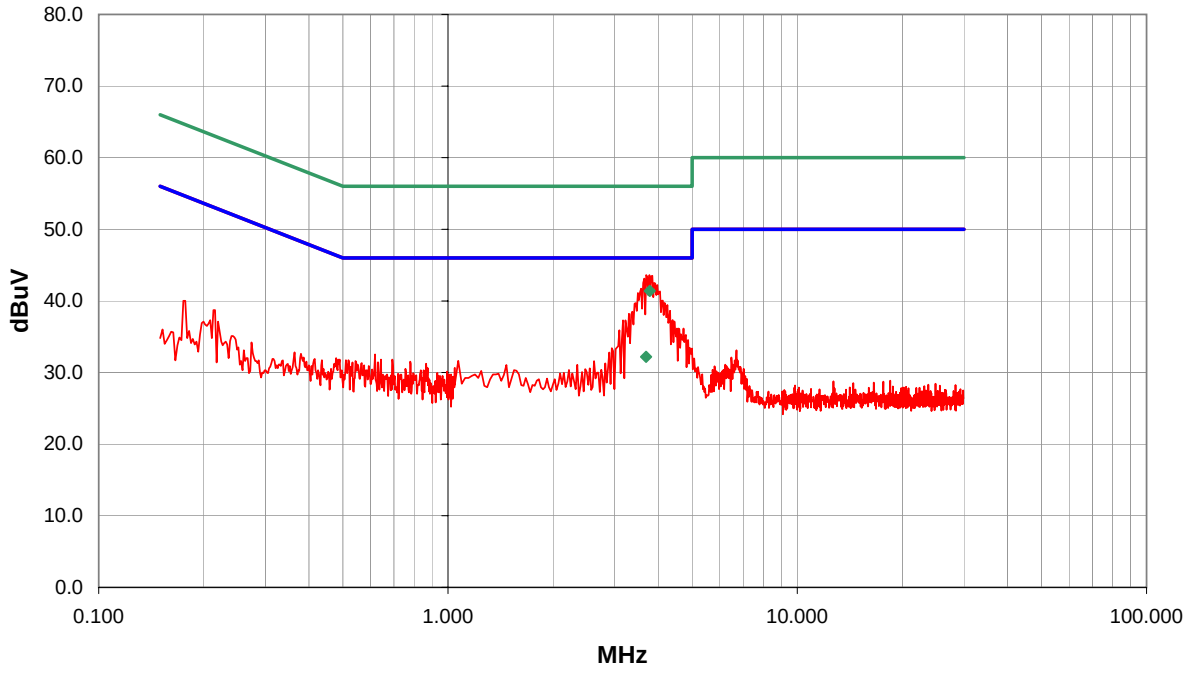
DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	7
Configuration #	1
Results	Pass

NVLAP Lab Code 200629-0

Signature



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)
3.692	12.0			0.0	0.2	20.0		AV		32.2	46.0	-13.8
3.783	21.2			0.0	0.2	20.0		QP		41.4	56.0	-14.6
3.896	22.3			0.0	0.2	20.0				42.5	46.0	-3.5
3.571	21.5			0.0	0.2	20.0				41.7	46.0	-4.3
3.296	18.0			0.0	0.2	20.0				38.2	46.0	-7.8
4.397	17.1			0.0	0.2	20.0				37.3	46.0	-8.7
3.221	17.1			0.0	0.2	20.0				37.3	46.0	-8.7
3.171	17.1			0.0	0.2	20.0				37.3	46.0	-8.7
4.447	16.9			0.0	0.2	20.0				37.1	46.0	-8.9
4.722	15.9			0.0	0.2	20.0				36.1	46.0	-9.9
4.572	15.9			0.0	0.2	20.0				36.1	46.0	-9.9
3.096	15.7			0.0	0.2	20.0				35.9	46.0	-10.1
4.872	14.3			0.0	0.2	20.0				34.5	46.0	-11.5
4.922	13.2			0.0	0.2	20.0				33.4	46.0	-12.6
2.946	13.2			0.0	0.2	20.0				33.4	46.0	-12.6
2.896	12.6			0.0	0.2	20.0				32.8	46.0	-13.2

BLUETOOTH APPROVALS

FCC Procedure Received from Joe Dichoso on 2-15-02

The following exhibit indicates the FCC Spread Spectrum requirements in Section 15.247 for devices meeting the Bluetooth Specifications in the 2.4 GHz band as of February 2001 operating in the USA. The purpose of this exhibit is to help expedite the approval process for Bluetooth devices. This exhibit provides items that vary for each device and also provides a list of items that are common to Bluetooth devices that explains the remaining requirements. The list of common items can be submitted for each application for equipment authorization. This exhibit only specifies requirements in Section 15.247, requirements in other rule Sections for intentional radiators such as in Section 15.203 or 15.207 must be also be addressed. A Bluetooth device is a FHSS transmitter in the data mode and applies as a Hybrid spread spectrum device in the acquisition mode.

For each individual device, the following items, 1-7 will vary from one device to another and must be submitted.

1) The occupied bandwidth in Section 15.247(a)(1)(ii).
2) Conducted output power specified in Section 15.247(b)(1).
3) EIRP limit in Section 15.247(b)(3).
4) RF safety requirement in Section 15.247(b)(4)
5) Spurious emission limits in Section 15.247(c).
6) Processing gain and requirements for Hybrids in Section 15.247(f) in the acquisition mode.
7) Power spectral density requirement in Section 15.247(f) in the acquisition mode.

For all devices, the following items, 1-12, are common to all Bluetooth devices and will not vary from one device to another. This list can be copied into the filing.

1 Output power and channel separation of a Bluetooth device in the different operating modes:

The different operating modes (data-mode, acquisition-mode) of a Bluetooth device don't influence the output power and the channel spacing. There is only one transmitter which is driven by identical input parameters concerning these two parameters.
Only a different hopping sequence will be used. For this reason, the RF parameters in one op-mode is sufficient.

2 Frequency range of a Bluetooth device:

The maximum frequency of the device is: **2402 – 2480 M**Hz.
This is according the Bluetooth Core Specification V 1.0B (+ critical errata) for devices which will be operated in the USA. Other frequency ranges (e.g. for Spain, France, Japan) which are allowed according the Core Specification must **not be** supported by the device.

3 Co-ordination of the hopping sequence in data mode to avoid simultaneous occupancy by multiple transmitters:

Bluetooth units which want to communicate with other units must be organized in a structure called piconet. This piconet consist of max. 8 Bluetooth units. One unit is the master the other seven are the slaves. The master co-ordinates frequency occupation in this piconet for all units. As the master hop sequence is derived from it's BD address which is unique for every Bluetooth device, additional masters intending to establish new piconets will always use different hop sequences.

4 Example of a hopping sequence in data mode:

Example of a 79 hopping sequence in data mode:
40, 21, 44, 23, 42, 53, 46, 55, 48, 33, 52, 35, 50, 65, 54, 67,
56, 37, 60, 39, 58, 69, 62, 71, 64, 25, 68, 27, 66, 57, 70, 59,
72, 29, 76, 31, 74, 61, 78, 63, 01, 41, 05, 43, 03, 73, 07, 75,
09, 45, 13, 47, 11, 77, 15, 00, 64, 49, 66, 53, 68, 02, 70, 06,
01, 51, 03, 55, 05, 04

5 Equally average use of frequencies in data mode and short transmissions:

The generation of the hopping sequence in connection mode depends essentially on two input values:
1. LAP/UAP of the master of the connection
2. Internal master clock

The LAP (lower address part) are the 24 LSB's of the 48 BD_ADDRESS. The BD_ADDRESS is an unambiguous number of every Bluetooth unit. The UAP (upper address part) are the 24 MSB's of the 48 BD_ADDRESS. The internal clock of a Bluetooth unit is derived from a free running clock which is never adjusted and is never turned off. For synchronization with other units, only the offsets are used. It has no relation to the time of the day. Its resolution is at least half the RX/TX slot length of 312.5 µs. The clock has a cycle of about one day (23h30). In most case it is implemented as 28 bit counter. For the deriving of the hopping sequence the entire LAP (24 bits), 4 LSB's (4 bits) (Input 1) and the 27 MSB's of the clock (Input 2) are used. With this input values different mathematical procedures (permutations, additions, XOR-operations) are performed to generate the sequence. This will be done at the beginning of every new transmission.
Regarding short transmissions, the Bluetooth system has the following behavior:
The first connection between the two devices is established, a hopping sequence is generated. For transmitting the wanted data, the complete hopping sequence is not used and the connection ends. The second connection will be established. A new hopping sequence is generated. Due to the fact that the Bluetooth clock has a different value, because the period between the two transmission is longer (and it cannot be shorter) than the minimum resolution of the clock (312.5 µs). The hopping sequence will always differ from the first one.

6 Receiver input bandwidth, synchronization and repeated single or multiple packets:

The input bandwidth of the receiver is 1 MHz.
In every connection, one Bluetooth device is the master and the other one is the slave. The master determines the hopping sequence (see chapter 5). The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master. Additionally the type of connection (e.g. single or multi-slot packet) is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing is according to the packet type of the connection. Also, the slave of the connection uses these settings. Repeating of a packet has no influence on the hopping sequence. The hopping sequence generated by the master of the connection will be followed in any case. That means, a repeated packet will not be send on the same frequency, it is send on the next frequency of the hopping sequence

7 Dwell time in data mode

The dwell time of 0.3797s within a 30 second period in data mode is independent from the packet type (packet length). The calculation for a 30 second period is a follows:
Dwell time = time slot length * hop rate / number of hopping channels *30s
Example for a DH1 packet (with a maximum length of one time slot)
Dwell time = 625 µs * 1600 1/s / 79 * 30s = 0.3797s (in a 30s period)

For multi-slot packet the hopping is reduced according to the length of the packet.
Example for a DH5 packet (with a maximum length of five time slots)
Dwell time = 5 * 625 µs * 1600 * 1/5 *1/s / 79 * 30s = 0.3797s (in a 30s period)
This is according the Bluetooth Core Specification V 1.0B (+ critical errata) for all Bluetooth devices. Therefore, all Bluetooth devices **comply** with the FCC dwell time requirement in the data mode.
This was checked during the Bluetooth Qualification tests.
The Dwell time in hybrid mode is approximately 2.6 mS (in a 12.8s period)

8 Channel Separation in hybrid mode

The nominal channel spacing of the Bluetooth system is 1Mhz independent of the operating mode.
The maximum “initial carrier frequency tolerance” which is allowed for Bluetooth is fcenter = 75 kHz.
This was checked during the Bluetooth Qualification tests (Test Case: TRM/CA/07-E) for three frequencies (2402, 2441, 2480 MHz).

9 Derivation and examples for a hopping sequence in hybrid mode

For the generation of the inquiry and page hop sequences the same procedures as described for the data mode are used (see item 5), but this time with different input vectors:
**For the inquiry hop sequence, a predefined fixed address is always used. This results in the same 32 frequencies used by all devices doing an inquiry but every time with a different start frequency and phase in this sequence.
**For the page hop sequence, the device address of the paged unit is used as the input vector. This results in the use of a subset of 32 frequencies which is specific for that initial state of the connection establishment between the two units. A page to different devices would result in a different subset of 32 frequencies.
So it is ensured that also in hybrid mode, the frequency is used equally on average.
Example of a hopping sequence in inquiry mode:
48, 50, 09, 13, 52, 54,41, 45, 56, 58, 11, 15, 60, 62, 43, 47, 00, 02, 64, 68, 04, 06, 17, 21, 08, 10, 66, 70, 12, 14, 19, 23
Example of a hopping sequence in paging mode:
08, 57, 68, 70, 51, 02, 42, 40, 04, 61, 44, 46, 63, 14, 50, 48, 16, 65, 52, 54, 67, 18, 58, 56, 20, 53, 60, 62, 55, 06, 66, 64

10 Receiver input bandwidth and synchronization in hybrid mode:

The receiver input bandwidth is the same as in the data mode (1 MHz). When two Bluetooth devices establish contact for the first time, one device sends an inquiry access code and the other device is scanning for this inquiry access code. If two devices have been connected previously and want to start a new transmission, a similar procedure takes place. The only difference is, instead of the inquiry access code, a special access code, derived from the BD_ADDRESS of the paged device will be, will be sent by the master of this connection. Due to the fact that both units have been connected before (in the inquiry procedure) the paging unit has timing and frequency information about the page scan of the paged unit. For this reason the time to establish the connection is reduced.

11 Spread rate / data rate of the direct sequence signal

The Spread rate / Data rate in inquiry and paging mode can be defined via the access code. The access code is the only criterion for the system to check if there is a valid transmission or not. If you regard the presence of a valid access code as one bit of information, and compare it with the length of the access code of 68 bits, the Spread rate / Data rate will be 68/1.

12 Spurious emission in hybrid mode

The Dwell in hybrid mode is shorter than in data mode. For this reason the spurious emissions average level in data mode is worst case. The spurious emissions peak level is the same for both modes.