

Graphic Products

DLTORO

Report No. GRAP0001

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
Last Date of Test: May 20, 2011
Graphic Products
Model: DLTORO

Emissions			
Test Description	Specification	Test Method	Pass/Fail
Field Strength of Fundamental	FCC 15.225:2011	ANSI C63.10:2009	Pass
Field Strength of Spurious Emissions	FCC 15.225:2011	ANSI C63.10:2009	Pass
Occupied Bandwidth	FCC 15.225:2011	ANSI C63.10:2009	Pass
Frequency Stability	FCC 15.225:2011	ANSI C63.10:2009	Pass
AC Powerline Conducted Emissions	FCC 15.225:2011	ANSI C63.10:2009	Pass

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 (Site filing #2834D-2).

Approved By:

Don Facteau, IS Manager



NVLAP Lab Code: 200630-0

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		

Barometric Pressure

The recorded barometric pressure has been normalized to sea level.



Accreditations and Authorizations

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 National Voluntary Laboratory Accreditation Program (NVLAP) for satisfactory compliance with the requirements of ISO/IEC 17025 for Testing Laboratories. NVLAP is administered by the National Institute of Standards and Technology (NIST), an agency of the U.S. Commerce Department. The NVLAP accreditation encompasses Electromagnetic Compatibility Testing in accordance with the European Union EMC Directive 2004/108/EC, and ANSI C63.4. 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-Gen, Issue 2 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. (*Site Filing Numbers - Hillsboro: 2834D-1, 2834D-2, Sultan: 2834C-1, Irvine: 2834B-1, 2834B-2, Brooklyn Park: 2834E-1*)

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.

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).



Accreditations and Authorizations

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, G-84, C-2687, T-1658, and R-2318, Irvine: R-1943, G-85, C-2766, and T-1659, Sultan: R-871, G-83, C-1784, and T-1511, Brooklyn Park: R-3125, G-86, G-141, C-3464, and T-1634).*

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 (US0017).

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

KCC

Northwest EMC, Inc is a CAB designated by MRA partners and recognized by Korea. *(Assigned Lab Numbers: Hillsboro: US0017, Irvine: US0158, Sultan: US0157, Brooklyn Park: US0175)*

VIETNAM

Vietnam MIC has approved Northwest EMC as an accredited test lab. Per Decision No. 194/QD-QLCL (dated December 15, 2009), Northwest EMC test reports can be used for Vietnam approval submissions.

SCOPE

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

<http://www.nwemc.com/accreditations/>



Northwest EMC Locations



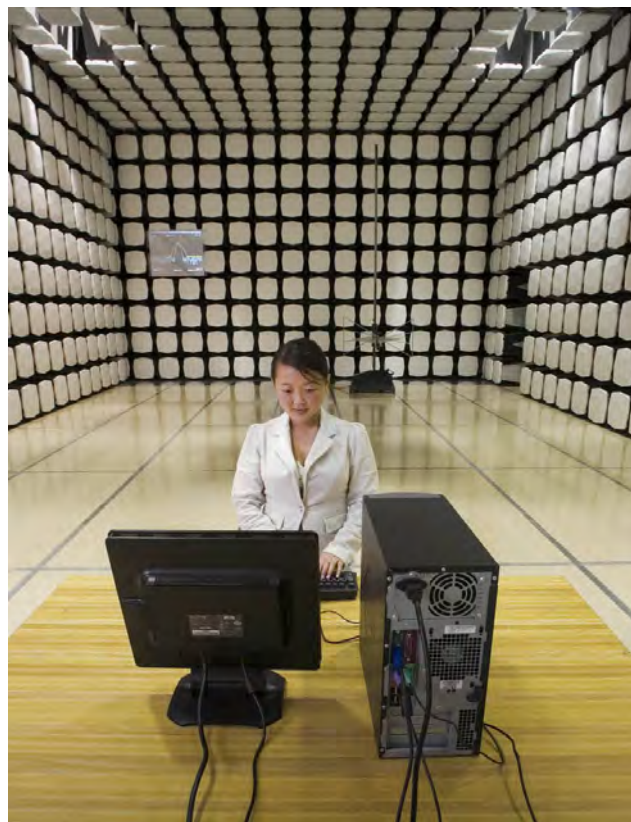
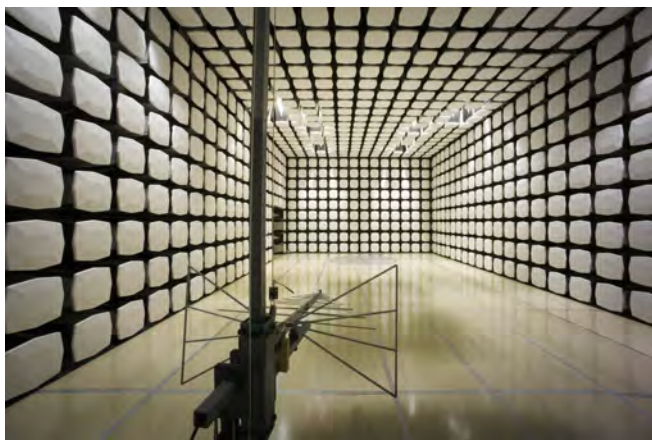
Oregon
Labs EV01-EV12
22975 NW Evergreen Pkwy
Suite 400
Hillsboro, OR 97124
(503) 844-4066

California
Labs OC01-OC13
41 Tesla
Irvine, CA 92618
(949) 861-8918

Minnesota
Labs MN01-MN08
9349 W Broadway Ave.
Brooklyn Park,
MN 55445
(763) 425-2281

Washington
Labs SU01-SU07
14128 339th Ave. SE
Sultan, WA 98294
(360) 793-8675

New York
Labs WA01-WA04
4939 Jordan Rd.
Elbridge, NY 13060
(315) 685-0796



Party Requesting the Test

Company Name:	Graphic Products
Address:	9730 SW Sunshine Court
City, State, Zip:	Beaverton, OR 97005
Test Requested By:	Bob Martell
Model:	DLTORO
First Date of Test:	May 19, 2011
Last Date of Test:	May 20, 2011
Receipt Date of Samples:	May 19, 2011
Equipment Design Stage:	Prototype
Equipment Condition:	No Damage

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

13.56 MHz RFID. This is a low Power Part 15 transmitter. Less than 0dBm output power

Testing Objective:

RFID seeking TCB certification under FCC 15.225

CONFIGURATION 1 GRAP0001

Software/Firmware Running during test	
Description	Version
Printer firmware	0Z2
EMI Test	1.0

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Label/Sign Printer	Graphic Products	DLTORO	B4

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Power Adapter	Wearnes	WDS120240	100600000012

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC leads	No	1.5m	PA	Label/Sign Printer	Power Adapter
AC Power	No	1.8m	No	Power Adapter	AC Mains
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATION 3 GRAP0001

Software/Firmware Running during test	
Description	Version
Printer firmware	0Z2
EMI Test	1.0

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Label/Sign Printer	Graphic Products	DLTORO	A02

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Power Adapter	Wearnes	WDS120240	100600000012

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC leads	No	1.5m	PA	Label/Sign Printer	Power Adapter
AC Power	No	1.8m	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	5/19/2011	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.
2	5/19/2011	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.
3	5/20/2011	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.
4	5/20/2011	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	5/20/2011	AC Powerline Conducted 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

Tx without RFID receiver

POWER SETTINGS INVESTIGATED

120VAC/60Hz

FREQUENCY RANGE INVESTIGATED

Start Frequency	13 MHz	Stop Frequency	14.1 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	8/3/2009	24
EV12 Cables	N/A	Bilog Cables	EVS	7/14/2010	12
Spectrum Analyzer	Agilent	E4440A	AAW	4/19/2011	12

MEASUREMENT BANDWIDTHS

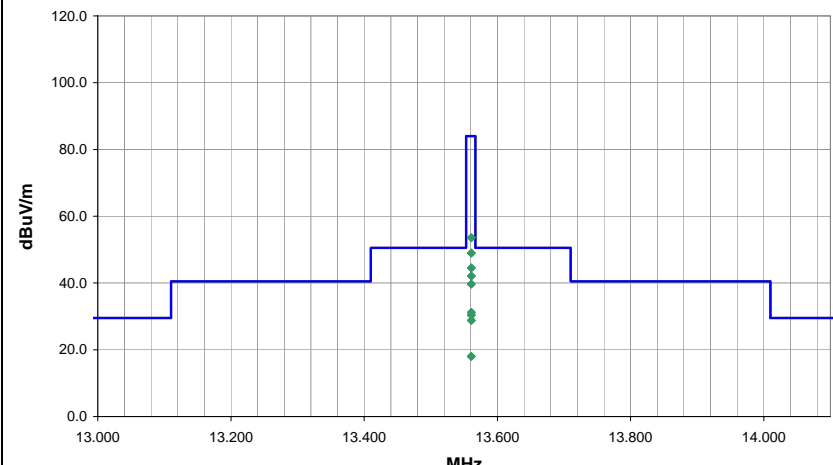
	Frequency Range	Peak Data	Quasi-Peak Data	Average Data
	(MHz)	(kHz)	(kHz)	(kHz)
	0.01 - 0.15	1.0	0.2	0.2
	0.15 - 30.0	10.0	9.0	9.0
	30.0 - 1000	100.0	120.0	120.0
	Above 1000	1000.0	N/A	1000.0
Measurements were made using the bandwidths and detectors specified. No video filter was used.				

MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. The measurement uncertainty estimation is available upon request.

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was transmitting and receiving while set at the lowest channel, a middle channel, and the highest channel available. 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 C63.10:2009).

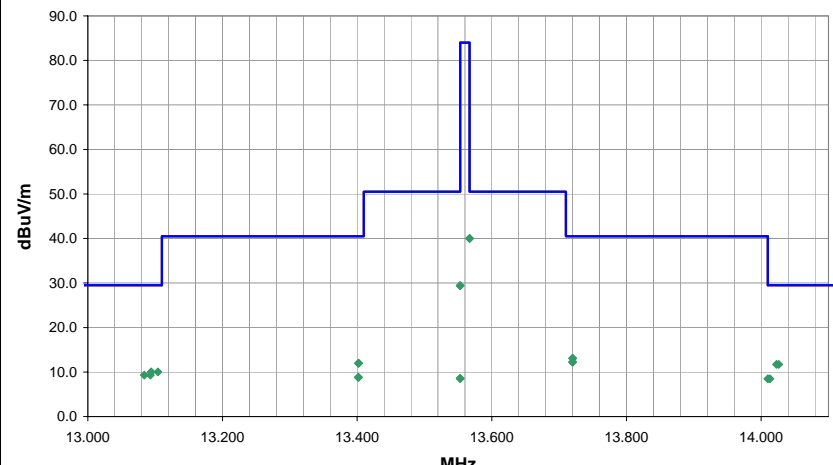
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(dB)</th><th>Comments</th></tr></thead><tbody><tr><td>13.561</td><td>55.2</td><td>10.6</td><td>135.0</td><td>1.0</td><td>3.0</td><td>0.0</td><td>oop/Active</td><td>QP</td><td>12.2</td><td>53.6</td><td>84.0</td><td>-30.4</td><td>EUT Vert Antenna Perp to EUT, Perp to ground. 3m</td></tr><tr><td>13.561</td><td>61.0</td><td>10.6</td><td>135.0</td><td>1.0</td><td>1.0</td><td>0.0</td><td>oop/Active</td><td>QP</td><td>18.0</td><td>53.6</td><td>84.0</td><td>-30.4</td><td>EUT Vert Antenna Perp to EUT, Perp to ground. 1m</td></tr><tr><td>13.561</td><td>67.5</td><td>10.6</td><td>234.0</td><td>1.0</td><td>1.0</td><td>0.0</td><td>oop/Active</td><td>QP</td><td>29.1</td><td>49.0</td><td>84.0</td><td>-35.0</td><td>EUT Horz Antenna Perp to EUT, Perp to ground. 1m</td></tr><tr><td>13.561</td><td>58.1</td><td>10.6</td><td>234.0</td><td>1.0</td><td>3.0</td><td>0.0</td><td>oop/Active</td><td>QP</td><td>19.7</td><td>49.0</td><td>84.0</td><td>-35.0</td><td>EUT Horz Antenna Perp to EUT, Perp to ground. 3m</td></tr><tr><td>13.561</td><td>60.5</td><td>10.6</td><td>338.0</td><td>1.0</td><td>3.0</td><td>0.0</td><td>oop/Active</td><td>QP</td><td>26.6</td><td>44.5</td><td>84.0</td><td>-39.5</td><td>EUT Onside Antenna Perp to EUT, Perp to ground. 3m</td></tr><tr><td>13.561</td><td>73.2</td><td>10.6</td><td>338.0</td><td>1.0</td><td>1.0</td><td>0.0</td><td>oop/Active</td><td>QP</td><td>39.3</td><td>44.5</td><td>84.0</td><td>-39.5</td><td>EUT Onside Antenna Perp to EUT, Perp to ground. 1m</td></tr><tr><td>13.561</td><td>62.5</td><td>10.6</td><td>342.0</td><td>1.8</td><td>1.0</td><td>0.0</td><td>oop/Active</td><td>QP</td><td>31.0</td><td>42.1</td><td>84.0</td><td>-41.9</td><td>EUT Horz Antenna Perp to EUT, Par to ground. 1m</td></tr><tr><td>13.561</td><td>52.5</td><td>10.6</td><td>342.0</td><td>2.3</td><td>3.0</td><td>0.0</td><td>oop/Active</td><td>QP</td><td>21.0</td><td>42.1</td><td>84.0</td><td>-41.9</td><td>EUT Horz Antenna Perp to EUT, Par to ground. 3m</td></tr><tr><td>13.561</td><td>71.8</td><td>10.6</td><td>162.0</td><td>1.0</td><td>1.0</td><td>0.0</td><td>oop/Active</td><td>QP</td><td>42.7</td><td>39.7</td><td>84.0</td><td>-44.3</td><td>EUT Horz Antenna Par to EUT, Perp to ground. 1m</td></tr><tr><td>13.561</td><td>58.0</td><td>10.6</td><td>162.0</td><td>1.0</td><td>3.0</td><td>0.0</td><td>oop/Active</td><td>QP</td><td>28.9</td><td>39.7</td><td>84.0</td><td>-44.3</td><td>EUT Horz Antenna Par to EUT, Perp to ground. 3m</td></tr><tr><td>13.561</td><td>50.8</td><td>10.6</td><td>330.0</td><td>1.0</td><td>3.0</td><td>0.0</td><td>oop/Active</td><td>QP</td><td>30.2</td><td>31.2</td><td>84.0</td><td>-52.8</td><td>EUT Vert Antenna Par to EUT, Perp to ground. 3m</td></tr><tr><td>13.561</td><td>65.2</td><td>10.6</td><td>330.0</td><td>1.7</td><td>1.0</td><td>0.0</td><td>oop/Active</td><td>QP</td><td>44.6</td><td>31.2</td><td>84.0</td><td>-52.8</td><td>EUT Vert Antenna Par to EUT, Perp to ground. 1m</td></tr><tr><td>13.561</td><td>53.5</td><td>10.6</td><td>352.0</td><td>2.6</td><td>3.0</td><td>0.0</td><td>oop/Active</td><td>QP</td><td>33.7</td><td>30.4</td><td>84.0</td><td>-53.6</td><td>EUT Onside Antenna Perp to EUT, Par to ground. 3m</td></tr><tr><td>13.561</td><td>69.6</td><td>10.6</td><td>352.0</td><td>1.0</td><td>1.0</td><td>0.0</td><td>oop/Active</td><td>QP</td><td>49.8</td><td>30.4</td><td>84.0</td><td>-53.6</td><td>EUT Onside Antenna Perp to EUT, Par to ground. 1m</td></tr><tr><td>13.561</td><td>75.8</td><td>10.6</td><td>246.0</td><td>1.0</td><td>1.0</td><td>0.0</td><td>oop/Active</td><td>QP</td><td>57.6</td><td>28.8</td><td>84.0</td><td>-55.2</td><td>EUT Onside Antenna Par to EUT, Perp to ground. 1m</td></tr><tr><td>13.561</td><td>57.2</td><td>10.6</td><td>246.0</td><td>1.0</td><td>3.0</td><td>0.0</td><td>oop/Active</td><td>QP</td><td>39.0</td><td>28.8</td><td>84.0</td><td>-55.2</td><td>EUT Onside Antenna Par to EUT, Perp to ground. 3m</td></tr><tr><td>13.561</td><td>51.2</td><td>10.6</td><td>360.0</td><td>1.6</td><td>3.0</td><td>0.0</td><td>oop/Active</td><td>QP</td><td>43.8</td><td>18.0</td><td>84.0</td><td>-66.0</td><td>EUT Vert Antenna Perp to EUT, Par to ground. 3m</td></tr><tr><td>13.561</td><td>72.1</td><td>10.6</td><td>360.0</td><td>1.0</td><td>1.0</td><td>0.0</td><td>oop/Active</td><td>QP</td><td>64.7</td><td>18.0</td><td>84.0</td><td>-66.0</td><td>EUT Vert Antenna Perp to EUT, Par to ground. 1m</td></tr></tbody></table>						Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments	13.561	55.2	10.6	135.0	1.0	3.0	0.0	oop/Active	QP	12.2	53.6	84.0	-30.4	EUT Vert Antenna Perp to EUT, Perp to ground. 3m	13.561	61.0	10.6	135.0	1.0	1.0	0.0	oop/Active	QP	18.0	53.6	84.0	-30.4	EUT Vert Antenna Perp to EUT, Perp to ground. 1m	13.561	67.5	10.6	234.0	1.0	1.0	0.0	oop/Active	QP	29.1	49.0	84.0	-35.0	EUT Horz Antenna Perp to EUT, Perp to ground. 1m	13.561	58.1	10.6	234.0	1.0	3.0	0.0	oop/Active	QP	19.7	49.0	84.0	-35.0	EUT Horz Antenna Perp to EUT, Perp to ground. 3m	13.561	60.5	10.6	338.0	1.0	3.0	0.0	oop/Active	QP	26.6	44.5	84.0	-39.5	EUT Onside Antenna Perp to EUT, Perp to ground. 3m	13.561	73.2	10.6	338.0	1.0	1.0	0.0	oop/Active	QP	39.3	44.5	84.0	-39.5	EUT Onside Antenna Perp to EUT, Perp to ground. 1m	13.561	62.5	10.6	342.0	1.8	1.0	0.0	oop/Active	QP	31.0	42.1	84.0	-41.9	EUT Horz Antenna Perp to EUT, Par to ground. 1m	13.561	52.5	10.6	342.0	2.3	3.0	0.0	oop/Active	QP	21.0	42.1	84.0	-41.9	EUT Horz Antenna Perp to EUT, Par to ground. 3m	13.561	71.8	10.6	162.0	1.0	1.0	0.0	oop/Active	QP	42.7	39.7	84.0	-44.3	EUT Horz Antenna Par to EUT, Perp to ground. 1m	13.561	58.0	10.6	162.0	1.0	3.0	0.0	oop/Active	QP	28.9	39.7	84.0	-44.3	EUT Horz Antenna Par to EUT, Perp to ground. 3m	13.561	50.8	10.6	330.0	1.0	3.0	0.0	oop/Active	QP	30.2	31.2	84.0	-52.8	EUT Vert Antenna Par to EUT, Perp to ground. 3m	13.561	65.2	10.6	330.0	1.7	1.0	0.0	oop/Active	QP	44.6	31.2	84.0	-52.8	EUT Vert Antenna Par to EUT, Perp to ground. 1m	13.561	53.5	10.6	352.0	2.6	3.0	0.0	oop/Active	QP	33.7	30.4	84.0	-53.6	EUT Onside Antenna Perp to EUT, Par to ground. 3m	13.561	69.6	10.6	352.0	1.0	1.0	0.0	oop/Active	QP	49.8	30.4	84.0	-53.6	EUT Onside Antenna Perp to EUT, Par to ground. 1m	13.561	75.8	10.6	246.0	1.0	1.0	0.0	oop/Active	QP	57.6	28.8	84.0	-55.2	EUT Onside Antenna Par to EUT, Perp to ground. 1m	13.561	57.2	10.6	246.0	1.0	3.0	0.0	oop/Active	QP	39.0	28.8	84.0	-55.2	EUT Onside Antenna Par to EUT, Perp to ground. 3m	13.561	51.2	10.6	360.0	1.6	3.0	0.0	oop/Active	QP	43.8	18.0	84.0	-66.0	EUT Vert Antenna Perp to EUT, Par to ground. 3m	13.561	72.1	10.6	360.0	1.0	1.0	0.0	oop/Active	QP	64.7	18.0	84.0	-66.0	EUT Vert Antenna Perp to EUT, Par to ground. 1m
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments																																																																																																																																																																																																																																																																		
13.561	55.2	10.6	135.0	1.0	3.0	0.0	oop/Active	QP	12.2	53.6	84.0	-30.4	EUT Vert Antenna Perp to EUT, Perp to ground. 3m																																																																																																																																																																																																																																																																		
13.561	61.0	10.6	135.0	1.0	1.0	0.0	oop/Active	QP	18.0	53.6	84.0	-30.4	EUT Vert Antenna Perp to EUT, Perp to ground. 1m																																																																																																																																																																																																																																																																		
13.561	67.5	10.6	234.0	1.0	1.0	0.0	oop/Active	QP	29.1	49.0	84.0	-35.0	EUT Horz Antenna Perp to EUT, Perp to ground. 1m																																																																																																																																																																																																																																																																		
13.561	58.1	10.6	234.0	1.0	3.0	0.0	oop/Active	QP	19.7	49.0	84.0	-35.0	EUT Horz Antenna Perp to EUT, Perp to ground. 3m																																																																																																																																																																																																																																																																		
13.561	60.5	10.6	338.0	1.0	3.0	0.0	oop/Active	QP	26.6	44.5	84.0	-39.5	EUT Onside Antenna Perp to EUT, Perp to ground. 3m																																																																																																																																																																																																																																																																		
13.561	73.2	10.6	338.0	1.0	1.0	0.0	oop/Active	QP	39.3	44.5	84.0	-39.5	EUT Onside Antenna Perp to EUT, Perp to ground. 1m																																																																																																																																																																																																																																																																		
13.561	62.5	10.6	342.0	1.8	1.0	0.0	oop/Active	QP	31.0	42.1	84.0	-41.9	EUT Horz Antenna Perp to EUT, Par to ground. 1m																																																																																																																																																																																																																																																																		
13.561	52.5	10.6	342.0	2.3	3.0	0.0	oop/Active	QP	21.0	42.1	84.0	-41.9	EUT Horz Antenna Perp to EUT, Par to ground. 3m																																																																																																																																																																																																																																																																		
13.561	71.8	10.6	162.0	1.0	1.0	0.0	oop/Active	QP	42.7	39.7	84.0	-44.3	EUT Horz Antenna Par to EUT, Perp to ground. 1m																																																																																																																																																																																																																																																																		
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13.561	50.8	10.6	330.0	1.0	3.0	0.0	oop/Active	QP	30.2	31.2	84.0	-52.8	EUT Vert Antenna Par to EUT, Perp to ground. 3m																																																																																																																																																																																																																																																																		
13.561	65.2	10.6	330.0	1.7	1.0	0.0	oop/Active	QP	44.6	31.2	84.0	-52.8	EUT Vert Antenna Par to EUT, Perp to ground. 1m																																																																																																																																																																																																																																																																		
13.561	53.5	10.6	352.0	2.6	3.0	0.0	oop/Active	QP	33.7	30.4	84.0	-53.6	EUT Onside Antenna Perp to EUT, Par to ground. 3m																																																																																																																																																																																																																																																																		
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13.561	75.8	10.6	246.0	1.0	1.0	0.0	oop/Active	QP	57.6	28.8	84.0	-55.2	EUT Onside Antenna Par to EUT, Perp to ground. 1m																																																																																																																																																																																																																																																																		
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13.561	51.2	10.6	360.0	1.6	3.0	0.0	oop/Active	QP	43.8	18.0	84.0	-66.0	EUT Vert Antenna Perp to EUT, Par to ground. 3m																																																																																																																																																																																																																																																																		
13.561	72.1	10.6	360.0	1.0	1.0	0.0	oop/Active	QP	64.7	18.0	84.0	-66.0	EUT Vert Antenna Perp to EUT, Par to ground. 1m																																																																																																																																																																																																																																																																		

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: DLTORO
S/N: B4
Date: 5/19/2011
Job Number: GRAP0001

Frequency (MHz)	EUT Orientation	Loop Antenna Polarity	Test Distance (meters)	Adjusted Level (dBuV/m)	Fall-Off from 1 to 3 m (dB)	Extrapolation Factor for Specification Limit (dB / decade)	Test Distance of Spec. Limit (meters)	Distance Adjustment Factor (dB)
13.561	Horz	Par/Gnd, Perp/EUT	1.00	73.1	10.0	21.0	30.0	31.0
13.561	Horz	Par/Gnd, Perp/EUT	3.00	63.1				21.0
13.561	Horz	Perp/Gnd, Perp/EUT	1.00	78.1	9.4	19.7	30.0	29.1
13.561	Horz	Perp/Gnd, Perp/EUT	3.00	68.7				19.7
13.561	Horz	Perp/Gnd, Par/EUT	1.00	82.4	13.8	28.9	30.0	42.7
13.561	Horz	Perp/Gnd, Par/EUT	3.00	68.6				28.9
13.561	Vert	Par/Gnd, Perp/EUT	1.00	82.7	20.9	43.8	30.0	64.7
13.561	Vert	Par/Gnd, Perp/EUT	3.00	61.8				43.8
13.561	Vert	Perp/Gnd, Perp/EUT	1.00	71.6	5.8	12.2	30.0	18.0
13.561	Vert	Perp/Gnd, Perp/EUT	3.00	65.8				12.2
13.561	Vert	Perp/Gnd, Par/EUT	1.00	75.8	14.4	30.2	30.0	44.6
13.561	Vert	Perp/Gnd, Par/EUT	3.00	61.4				30.2
13.561	On Side	Par/Gnd, Perp/EUT	1.00	80.2	16.1	33.7	30.0	49.8
13.561	On Side	Par/Gnd, Perp/EUT	3.00	64.1				33.7
13.561	On Side	Perp/Gnd, Perp/EUT	1.00	83.8	12.7	26.6	30.0	39.3
13.561	On Side	Perp/Gnd, Perp/EUT	3.00	71.1				26.6
13.561	On Side	Perp/Gnd, Par/EUT	1.00	86.4	18.6	39.0	30.0	57.6
13.561	On Side	Perp/Gnd, Par/EUT	3.00	67.8				39.0

NORTHWEST		Field Strength of Fundamental		PSA 2011.05.11									
EMC				EMI 2008.1.9									
EUT:DLTORO		Work Order:GRAP0001											
Serial Number:B4		Date:05/19/11											
Customer:Graphic Products		Temperature:22.8											
Attendees:Bob Martell, Div Tummala		Humidity:32%											
Project:None		Barometric Pres.:1021											
Tested by:Ethan Schoonover		Power:120VAC/60Hz		Job Site:EV12									
TEST SPECIFICATIONS		Test Method											
FCC 15.225:2011		ANSI C63.10:2009											
TEST PARAMETERS													
Antenna Height(s) (m)		1 - 4		Test Distance (m)									
				1 & 3									
COMMENTS													
EUT Horz													
EUT OPERATING MODES													
Tx without RFID receiver													
DEVIATIONS FROM TEST STANDARD													
No deviations.													
Run #		2											
Configuration #		1											
Results		Pass		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)	Comments
13.567	61.9	10.6	319.0	1.0	1.0	0.0	oop/Active	QP	32.5	40.0	50.5	-10.5	EUT On side Antenna Perp to EUT, Perp to ground. 1m
13.567	51.4	10.6	319.0	1.0	3.0	0.0	oop/Active	QP	22.0	40.0	50.5	-10.5	EUT On side Antenna Perp to EUT, Perp to ground. 3m
14.023	7.3	10.6	289.0	1.0	1.0	0.0	oop/Active	QP	6.2	11.7	29.5	-17.8	EUT Vert Antenna Perp to EUT, Perp to ground. 1m
14.026	5.3	10.6	289.0	1.0	3.0	0.0	oop/Active	QP	4.2	11.7	29.5	-17.8	EUT Vert Antenna Perp to EUT, Perp to ground. 3m
13.104	12.2	10.6	142.0	1.0	3.0	0.0	oop/Active	QP	12.8	10.0	29.5	-19.5	EUT Vert Antenna Perp to EUT, Perp to ground. 3m
13.094	18.3	10.6	142.0	1.0	1.0	0.0	oop/Active	QP	18.9	10.0	29.5	-19.5	EUT Vert Antenna Perp to EUT, Perp to ground. 1m
13.093	24.1	10.6	136.0	1.0	1.0	0.0	oop/Active	QP	25.4	9.3	29.5	-20.2	EUT On side Antenna Perp to EUT, Perp to ground. 1m
13.084	15.9	10.6	136.0	1.0	3.0	0.0	oop/Active	QP	17.2	9.3	29.5	-20.2	EUT On side Antenna Perp to EUT, Perp to ground. 3m
14.013	5.9	10.6	318.0	1.0	3.0	0.0	oop/Active	QP	8.0	8.5	29.5	-21.0	EUT Horz Antenna Perp to EUT, Perp to ground. 3m
14.010	9.7	10.6	318.0	1.0	1.0	0.0	oop/Active	QP	11.8	8.5	29.5	-21.0	EUT Horz Antenna Perp to EUT, Perp to ground. 1m
13.553	41.4	10.6	20.0	1.0	1.0	0.0	oop/Active	QP	22.6	29.4	50.5	-21.1	EUT Vert Antenna Perp to EUT, Perp to ground. 1m
13.553	34.1	10.6	20.0	1.7	3.0	0.0	oop/Active	QP	15.3	29.4	50.5	-21.1	EUT Vert Antenna Perp to EUT, Perp to ground. 3m
13.720	17.1	10.6	173.0	1.0	1.0	0.0	oop/Active	QP	14.6	13.1	40.5	-27.4	EUT Vert Antenna Perp to EUT, Perp to ground. 1m
13.720	12.4	10.6	173.0	1.0	3.0	0.0	oop/Active	QP	9.9	13.1	40.5	-27.4	EUT Vert Antenna Perp to EUT, Perp to ground. 3m
13.720	26.7	10.6	353.0	1.0	1.0	0.0	oop/Active	QP	25.1	12.2	40.5	-28.3	EUT On side Antenna Perp to EUT, Perp to ground. 1m
13.720	18.6	10.6	353.0	1.0	3.0	0.0	oop/Active	QP	17.0	12.2	40.5	-28.3	EUT On side Antenna Perp to EUT, Perp to ground. 3m

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: DLTORO
S/N: B4
Date: 5/19/2011
Job Number: GRAP0001

Frequency (MHz)	EUT Orientation	Loop Antenna Polarity	Test Distance (meters)	Adjusted Level (dBuV/m)	Fall-Off from 1 to 3 m (dB)	Extrapolation Factor for Specification Limit (dB / decade)	Test Distance of Spec. Limit (meters)	Distance Adjustment Factor (dB)
13.110	Horz	Perp/Gnd, Perp/EUT	1.00	37.8	15.9	33.3	30.0	49.2
13.110	Horz	Perp/Gnd, Perp/EUT	3.00	21.9				33.3
13.410	Horz	Perp/Gnd, Perp/EUT	1.00	43.0	17.3	36.3	30.0	53.6
13.410	Horz	Perp/Gnd, Perp/EUT	3.00	25.7				36.3
13.710	Horz	Perp/Gnd, Perp/EUT	1.00	39.9	16.8	35.2	30.0	52.0
13.710	Horz	Perp/Gnd, Perp/EUT	3.00	23.1				35.2
14.010	Horz	Perp/Gnd, Perp/EUT	1.00	20.3	3.8	8.0	30.0	11.8
14.010	Horz	Perp/Gnd, Perp/EUT	3.00	16.5				8.0

13.110	On Side	Perp/Gnd, Perp/EUT	1.00	34.7	8.2	17.2	30.0	25.4
13.110	On Side	Perp/Gnd, Perp/EUT	3.00	26.5				17.2
13.410	On Side	Perp/Gnd, Perp/EUT	1.00	42.3	9.8	20.5	30.0	30.3
13.410	On Side	Perp/Gnd, Perp/EUT	3.00	32.5				20.5
13.553	On Side	Perp/Gnd, Perp/EUT	1.00	68.0	19.2	40.2	30.0	59.4
13.553	On Side	Perp/Gnd, Perp/EUT	3.00	48.8				40.2
13.567	On Side	Perp/Gnd, Perp/EUT	1.00	72.5	10.5	22.0	30.0	32.5
13.567	On Side	Perp/Gnd, Perp/EUT	3.00	62.0				22.0
13.710	On Side	Perp/Gnd, Perp/EUT	1.00	37.3	8.1	17.0	30.0	25.1
13.710	On Side	Perp/Gnd, Perp/EUT	3.00	29.2				17.0
14.010	On Side	Perp/Gnd, Perp/EUT	1.00	28.6	9.9	20.7	30.0	30.6
14.010	On Side	Perp/Gnd, Perp/EUT	3.00	18.7				20.7

13.110	Vert	Perp/Gnd, Perp/EUT	1.00	28.9	6.1	12.8	30.0	18.9
13.110	Vert	Perp/Gnd, Perp/EUT	3.00	22.8				12.8
13.410	Vert	Perp/Gnd, Perp/EUT	1.00	31.4	7.3	15.3	30.0	22.6
13.410	Vert	Perp/Gnd, Perp/EUT	3.00	24.1				15.3
13.553	Vert	Perp/Gnd, Perp/EUT	1.00	52.0	7.3	15.3	30.0	22.6
13.553	Vert	Perp/Gnd, Perp/EUT	3.00	44.7				15.3
13.710	Vert	Perp/Gnd, Perp/EUT	1.00	27.7	4.7	9.9	30.0	14.6
13.710	Vert	Perp/Gnd, Perp/EUT	3.00	23.0				9.9
14.010	Vert	Perp/Gnd, Perp/EUT	1.00	17.9	2.0	4.2	30.0	6.2
14.010	Vert	Perp/Gnd, Perp/EUT	3.00	15.9				4.2

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.

MODES OF OPERATION

Tx without RFID receiver

POWER SETTINGS INVESTIGATED

120VAC/60Hz

FREQUENCY RANGE INVESTIGATED

Start Frequency	490kHz	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
Antenna, Loop	EMCO	6502	AZC	8/3/2009	24
Antenna, Biconilog	EMCO	3141	AXG	3/15/2010	24
EV12 Cables	N/A	Bilog Cables	EVS	7/14/2010	12
Pre-Amplifier	Miteq	AM-1616-1000	AVM	7/14/2010	12
Spectrum Analyzer	Agilent	E4440A	AAW	4/19/2011	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

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. The measurement uncertainty estimation is available upon request.

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was transmitting and receiving while set at the lowest channel, a middle channel, and the highest channel available. 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 C63.10:2009).

EUT:	DLTORO	Work Order:	GRAP0001
Serial Number:	B4	Date:	05/19/11
Customer:	Graphic Products	Temperature:	22.8
Attendees:	Bob Martell, Div Tummala	Humidity:	32%
Project:	None	Barometric Pres.:	1021
Tested by:	Ethan Schoonover	Power:	120VAC/60Hz
		Job Site:	EV12

TEST SPECIFICATIONS	Test Method
FCC 15.225:2011	ANSI C63.10:2009

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

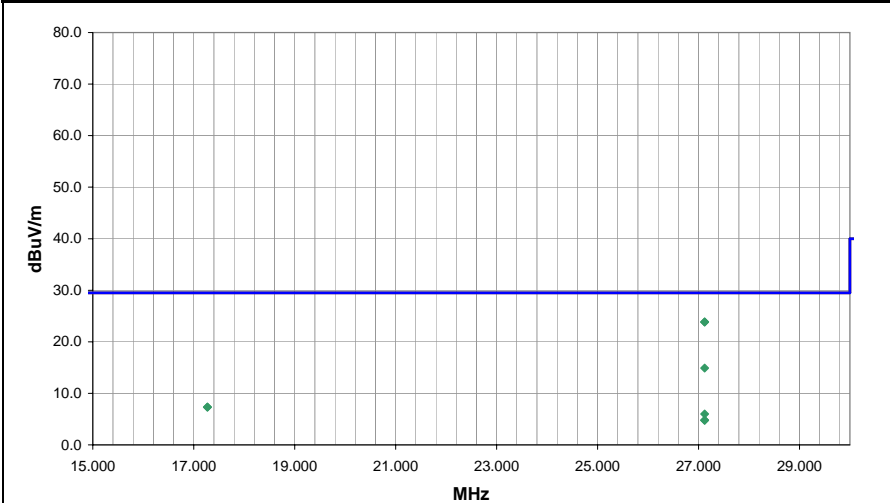
COMMENTS
EUT Horz

EUT OPERATING MODES
Tx without RFID receiver

DEVIATIONS FROM TEST STANDARD
No deviations.

Run #	3
Configuration #	1
Results	Pass

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)	Comments
17.271	9.1	10.3	162.0	1.0	1.0	0.0	oop/Active	QP	12.1	7.3	29.5	-22.2	EUT Horz Antenna Perp to EUT, Perp to ground. 1m
17.272	5.2	10.3	162.0	1.0	3.0	0.0	oop/Active	QP	8.2	7.3	29.5	-22.2	EUT Horz Antenna Perp to EUT, Perp to ground. 3m
27.122	32.0	9.5	232.0	1.0	1.0	0.0	oop/Active	QP	17.6	23.9	29.5	-5.6	EUT Horz Antenna Par to EUT, Perp to ground. 1m
27.122	26.3	9.5	232.0	1.0	3.0	0.0	oop/Active	QP	11.9	23.9	29.5	-5.6	EUT Horz Antenna Par to EUT, Perp to ground. 3m
12.716	23.2	10.6	260.0	1.0	1.0	0.0	oop/Active	QP	28.8	5.0	29.5	-24.5	EUT Horz Antenna Perp to EUT, Perp to ground. 1m
12.693	13.9	10.6	260.0	1.0	3.0	0.0	oop/Active	QP	19.5	5.0	29.5	-24.5	EUT Horz Antenna Perp to EUT, Perp to ground. 3m
27.122	35.5	9.5	305.0	1.0	1.0	0.0	oop/Active	QP	39.0	6.0	29.5	-23.5	EUT Horz Antenna Perp to EUT, Par to ground. 1m
27.122	31.8	9.5	305.0	1.0	3.0	0.0	oop/Active	QP	26.4	14.9	29.5	-14.6	EUT Horz Antenna Perp to EUT, Par to ground. 3m
27.122	43.9	9.5	354.0	1.0	1.0	0.0	oop/Active	QP	48.6	4.8	29.5	-24.7	EUT Horz Antenna Perp to EUT, Perp to ground. 1m
27.122	28.2	9.5	354.0	1.0	3.0	0.0	oop/Active	QP	32.9	4.8	29.5	-24.7	EUT Horz Antenna Perp to EUT, Perp to ground. 3m

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: DLTORO
S/N: B4
Date: 5/19/2011
Job Number: GRAP0001

Frequency (MHz)	EUT Orientation	Loop Antenna Polarity	Test Distance (meters)	Adjusted Level (dBuV/m)	Fall-Off from 1 to 3 m (dB)	Extrapolation Factor for Specification Limit (dB / decade)	Test Distance of Spec. Limit (meters)	Distance Adjustment Factor (dB)
17.272	Horz	Perp/Gnd, Perp/EUT	1.00	19.4	3.9	8.2	30.0	12.1
17.271	Horz	Perp/Gnd, Perp/EUT	3.00	15.5				8.2
27.122	Horz	Perp/Gnd, Par/EUT	1.00	41.5	5.7	11.9	30.0	17.6
27.122	Horz	Perp/Gnd, Par/EUT	3.00	35.8				11.9
12.716	Horz	Perp/Gnd, Perp/EUT	1.00	33.8	9.3	19.5	30.0	28.8
12.693	Horz	Perp/Gnd, Perp/EUT	3.00	24.5				19.5
27.122	Horz	Par/Gnd, Perp/EUT	1.00	53.9	12.6	26.4	30.0	39.0
27.122	Horz	Par/Gnd, Perp/EUT	3.00	41.3				26.4
27.122	Horz	Perp/Gnd, Perp/EUT	1.00	53.4	15.7	32.9	30.0	48.6
27.122	Horz	Perp/Gnd, Perp/EUT	3.00	37.7				32.9

NORTHWEST		PSA 2011.05.11 EMI 2008.1.9										
EMC		Field Strength of Spurious Emissions										
EUT: DLTORO		Work Order: GRAP0001										
Serial Number: B4		Date: 05/20/11										
Customer: Graphic Products		Temperature: 22.8										
Attendees: Bob Martell, Div Tummala		Humidity: 32%										
Project: None		Barometric Pres.: 1021										
Tested by: Ethan Schoonover		Power: 120VAC/60Hz	Job Site: EV12									
TEST SPECIFICATIONS		Test Method										
FCC 15.225:2011		ANSI C63.10:2009										
TEST PARAMETERS												
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3									
COMMENTS												
EUT Horz												
EUT OPERATING MODES												
Tx without RFID receiver												
DEVIATIONS FROM TEST STANDARD												
No deviations.												
Run #	4	<i>Signature</i>										
Configuration #	1											
Results	Pass											
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)
623.059	39.0	9.3	240.0	1.2	3.0	0.0	H-Bilog	QP	-20.0	28.3	46.0	-17.7
40.685	41.4	-2.7	131.0	1.2	3.0	0.0	V-Bilog	QP	-20.0	18.7	40.0	-21.3
54.247	37.2	-6.2	333.0	1.0	3.0	0.0	V-Bilog	QP	-20.0	11.0	40.0	-29.0
40.684	33.5	-2.7	192.0	3.5	3.0	0.0	H-Bilog	QP	-20.0	10.8	40.0	-29.2
220.376	32.0	-2.2	13.0	1.8	3.0	0.0	H-Bilog	QP	-20.0	9.8	46.0	-36.2
54.245	27.6	-6.2	66.0	2.3	3.0	0.0	H-Bilog	QP	-20.0	1.4	40.0	-38.6

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
Antenna, Loop	EMCO	6502	AZC	8/3/2009	24
Spectrum Analyzer	Agilent	E4440A	AAW	4/19/2011	12

MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

TEST DESCRIPTION

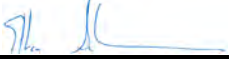
The occupied bandwidth was measured utilizing the analyzer's peak detector and measuring the carrier's 20 dB occupied bandwidth.

The antenna is integral to the EUT, so a measurement was made with a probe configuration. The resolution bandwidth was >1% of the 20dB bandwidth and the video bandwidth was greater than the resolution bandwidth.

The occupied bandwidth was measured with the EUT configured for continuous modulated operation of the operational band.

EMC

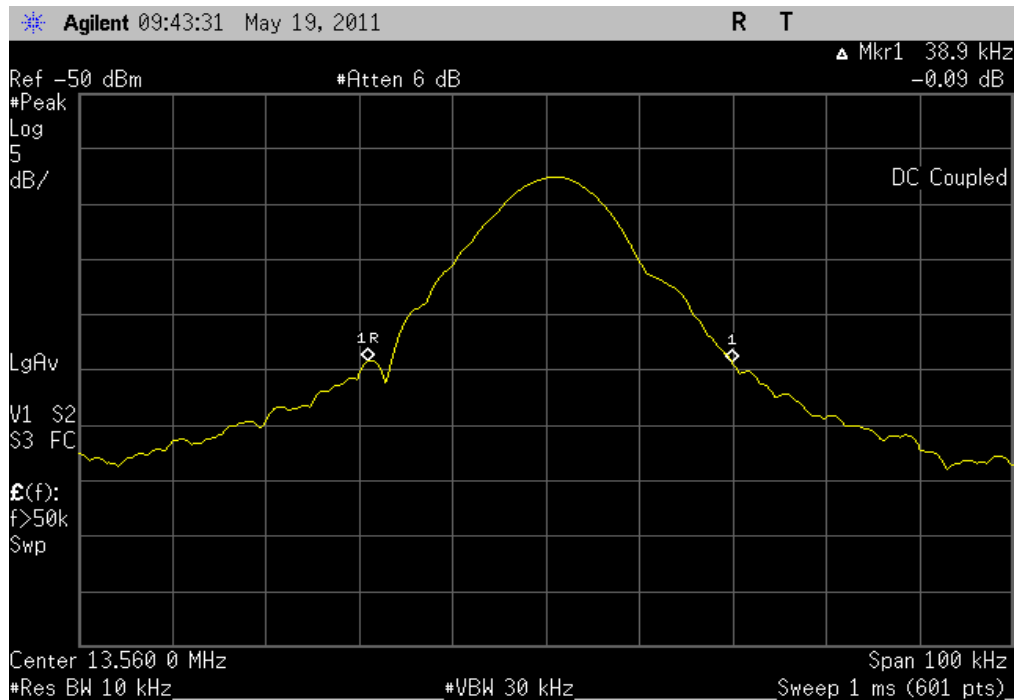
OCCUPIED BANDWIDTH

EUT: DLTORO		Work Order: GRAP0001	
Serial Number: B4	Date: 05/19/11		
Customer: Graphic Products		Temperature: 22.8°C	
Attendees: Bob Martell, Div Tummala		Humidity: 32%	
Project: None		Barometric Pres.: 1021	
Tested by: Ethan Schoonover		Power: 120VAC/ 60Hz	Job Site: EV12
TEST SPECIFICATIONS			
FCC 15.225:2011		Test Method ANSI C63.10:2009	
COMMENTS			
Printer On			
DEVIATIONS FROM TEST STANDARD			
No Deviations			
Configuration #	1	Signature 	
		Value	Limit
OCCUPIED BANDWIDTH		38.9 kHz	≤ 500 kHz
			Results
			Pass

OCCUPIED BANDWIDTH

Result: Pass

Value: 38.9 kHz

Limit: ≤ 500 kHz

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	Agilent	E4440A	AFD	6/1/2009	24
Near Field Probe	EMCO	7405	IPD	NCR	0
40GHz DC Block	Miteq	DCB4000	AMD	8/5/2010	13
EV06 Direct Connect Cable	ESM Cable Corp.	TT	ECA	NCR	0
Multimeter	Tektronix	DMM912	MMH	1/28/2011	24
DC Power Supply	Topward	TPS-2000	TPD	NCR	0
Chamber Temp. & Humidity Controller	ESZ / Eurotherm	Dimension II	TBC	NCR	0
Chamber, Temp./Humidity Chamber	Cincinnati Sub Zero (CSZ)	ZH-32-2-2-H/AC	TBA	8/20/2010	24

MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

TEST DESCRIPTION

Variation of Supply Voltage

The primary supply voltage was varied from the nominal of 24 VDC. The EUT can only be battery operated, so a DC lab supply was used to vary the supply voltage up to the maximum of the battery voltage and the EUT's voltage end point.


Variation of Ambient Temperature

Using a temperature chamber, the transmit frequency was recorded at the extremes of the specified temperature range (-30° 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: DLTORO		Work Order: GRAP0001
Serial Number: B4		Date: 05/20/11
Customer: Graphic Products		Temperature: 23.3°C
Attendees: Bob Martell, Div Tummala		Humidity: 29%
Project: None		Barometric Pres.: 30.11 in
Tested by: Rod Peloquin		Power: 24 VDC
Job Site: EV06 & EV09		
TEST SPECIFICATIONS		
FCC 15.225:2011		Test Method
		ANSI C63.10:2009
COMMENTS		
Transmit mode with modulation, no RFID Tag. Manufacturer's declared maximum of battery pack and low dc endpoint of operation.		
DEVIATIONS FROM TEST STANDARD		
No Deviations		
Configuration #	1	Signature 

FREQUENCY STABILITY

Frequency Stability with Variation of DC Voltage (Ambient Temperature = 20°C)

Voltage (VDC)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Tolerance (ppm)	Specification (ppm)
25 (Max)	13.560000	13.560730	53.83	100
24 (100%)	13.560000	13.560730	53.83	100
22 (Min)	13.560000	13.560730	53.83	100

Frequency Stability with Variation of Ambient Temperature (Primary Supply = 24 VDC)

Temp (°C)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Tolerance (ppm)	Specification (ppm)
50	13.560000	13.560730	53.83	100
40	13.560000	13.560730	53.83	100
30	13.560000	13.560730	53.83	100
20	13.560000	13.560730	53.83	100
10	13.560000	13.560727	53.61	100
0	13.560000	13.560730	53.83	100
-10	13.560000	13.560740	54.57	100
-20	13.560000	13.560750	55.31	100
-30	13.560000	13.560750	55.31	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

RFID Tx.

POWER SETTINGS INVESTIGATED

120VAC/60Hz

CONFIGURATIONS INVESTIGATED

GRAP0001 - 1

GRAP0001 - 3

SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Receiver	Rohde & Schwarz	ESCI	ARH	3/30/2011	12 mo
High Pass Filter	TTE	H97-100K-50-720B	HFX	2/9/2011	24 mo
Attenuator	Coaxicom	66702 2910-20	ATO	8/6/2010	12 mo
EV07 Cables	N/A	Conducted Cables	EVG	6/21/2010	12 mo
LISN	Solar	9252-50-R-24-BNC	LIN	5/9/2011	12 mo

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

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are 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 50ohm measuring port is terminated by a 50ohm EMI meter or a 50ohm resistive load. All 50ohm measuring ports of the LISN are terminated by 50ohm. Per FCC KDB Publication #174176, for devices transmitting below 30 MHz that have permanent non-detachable antennas, the FCC will accept measurements done with a suitable dummy load, in lieu of the permanent antenna under the following conditions: (1) perform the AC line conducted tests with the permanent antenna to determine compliance with the Section 15.207 limits outside the transmitter's fundamental emission band; (2) retest with a dummy load in lieu of the permanent antenna to determine compliance with the Section 15.207 limits within the transmitter's fundamental emission band.

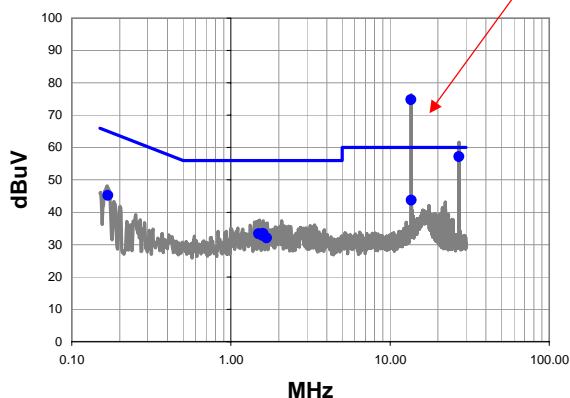
Work Order:	GRAP0001	Date:	05/20/11	
Project:	None	Temperature:	23.5 °C	
Job Site:	EV07	Humidity:	29.1	
Serial Number:	B4	Barometric Pres.:	1017.7 mb	
		Tested by:		Dan Haas
EUT:	DLTORO			
Configuration:	1 - Basic Config			
Customer:	Graphic Products			
Attendees:	Bob Martell, Div Tummala			
EUT Power:	120VAC/60Hz			
Operating Mode:	RFID Tx			
Deviations:	None			
Comments:	None			

Test Specifications FCC 15.207:2011	Test Method ANSI C63.10:2009
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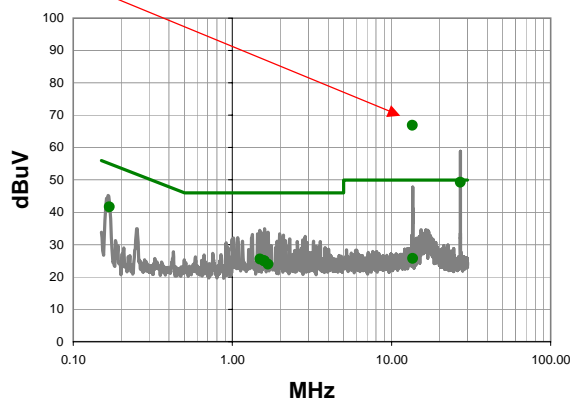
Run #	1	Line:	High Line	Ext. Attenuation:	20	Results	Pass
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Transmit Frequency. Re-tested with 50Ohm termination. See additional data

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit




Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
13.562	54.1	20.7	74.8	60.0	14.8
27.120	35.8	21.4	57.2	60.0	-2.8
13.598	23.0	20.7	43.7	60.0	-16.3
0.169	25.0	20.2	45.2	65.0	-19.8
1.596	13.2	20.2	33.4	56.0	-22.6
1.492	13.1	20.2	33.3	56.0	-22.7
1.576	12.6	20.2	32.8	56.0	-23.2
1.680	11.9	20.2	32.1	56.0	-23.9

Average Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
13.562	46.2	20.7	66.9	50.0	16.9
27.120	27.9	21.4	49.3	50.0	-0.7
13.598	21.5	20.2	41.7	55.0	-13.3
0.169	5.3	20.2	25.5	46.0	-20.5
1.576	4.8	20.2	25.0	46.0	-21.0
1.596	4.7	20.2	24.9	46.0	-21.1
1.680	3.7	20.2	23.9	46.0	-22.1
13.598	5.0	20.7	25.7	50.0	-24.3

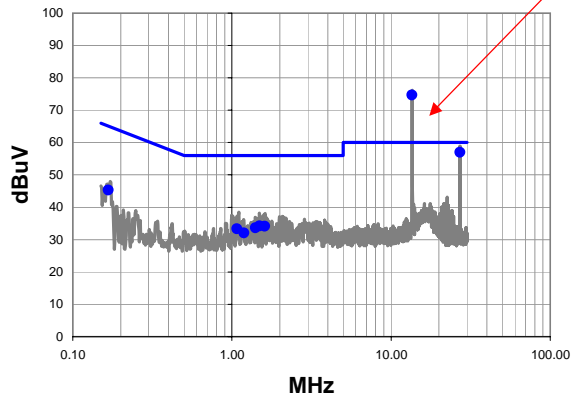
Work Order:	GRAP0001	Date:	05/20/11		
Project:	None	Temperature:	23.5 °C		
Job Site:	EV07	Humidity:	29.1		
Serial Number:	B4	Barometric Pres.:	1017.7 mb		
				Tested by:	Dan Haas
EUT:	DLTORO				
Configuration:	1 - Basic Config				
Customer:	Graphic Products				
Attendees:	Bob Martell, Div Tummala				
EUT Power:	120VAC/60Hz				
Operating Mode:	RFID Tx				
Deviations:	None				
Comments:	None				

Test Specifications FCC 15.207:2011	Test Method ANSI C63.10:2009
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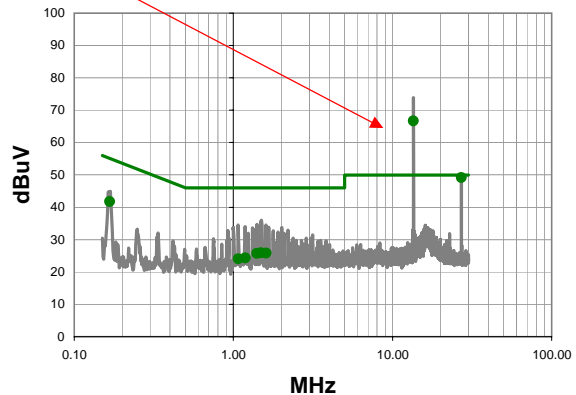
Run #	2	Line:	Neutral	Ext. Attenuation:	20	Results	Pass
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Transmit Frequency. Re-tested with 50Ohm termination. See additional data

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit




Quasi Peak Data - vs - Quasi Peak Limit

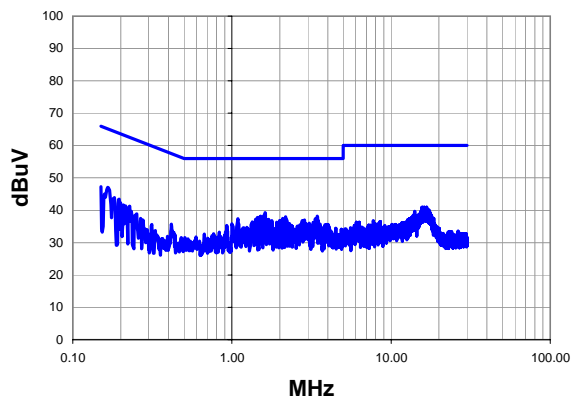
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
13.560	54.0	20.7	74.7	60.0	14.7
27.120	35.6	21.4	57.0	60.0	-3.0
0.167	25.1	20.2	45.3	65.1	-19.8
1.492	14.0	20.2	34.2	56.0	-21.8
1.612	13.9	20.2	34.1	56.0	-21.9
1.408	13.4	20.2	33.6	56.0	-22.4
1.076	13.1	20.2	33.3	56.0	-22.7
1.188	11.9	20.2	32.1	56.0	-23.9

Average Data - vs - Average Limit

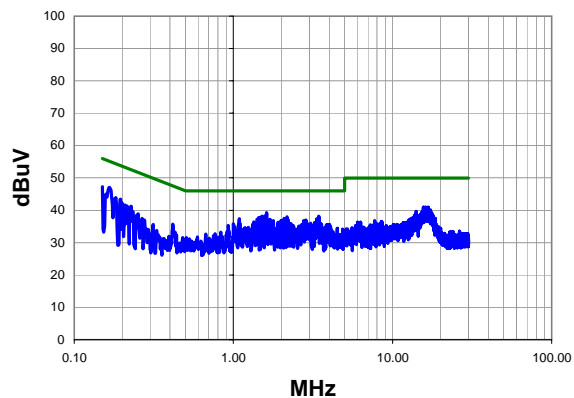
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
13.560	46.0	20.7	66.7	50.0	16.7
27.120	27.8	21.4	49.2	50.0	-0.8
0.167	21.6	20.2	41.8	55.1	-13.3
1.492	5.7	20.2	25.9	46.0	-20.1
1.612	5.6	20.2	25.8	46.0	-20.2
1.408	5.5	20.2	25.7	46.0	-20.3
1.188	4.1	20.2	24.3	46.0	-21.7
1.076	3.9	20.2	24.1	46.0	-21.9

Work Order:	GRAP0001	Date:	05/20/11				
Project:	None	Temperature:	23.5 °C				
Job Site:	EV07	Humidity:	29.1				
Serial Number:	A2	Barometric Pres.:	1017.7 mb				
EUT:	DLTORO						
Configuration:	3 - Conducted Emissions Configuration, 50ohm termination						
Customer:	Graphic Products						
Attendees:	Bob Martell, Div Tummala						
EUT Power:	120VAC/60Hz						
Operating Mode:	RFID Tx.						
Deviations:	None						
Comments:	50ohm termination in place of antenna.						
Test Specifications FCC 15.207:2011				Test Method ANSI C63.10:2009			
Run #	4	Line:	High Line	Ext. Attenuation:	20	Results	Pass

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit




Peak Data - vs - Quasi Peak Limit

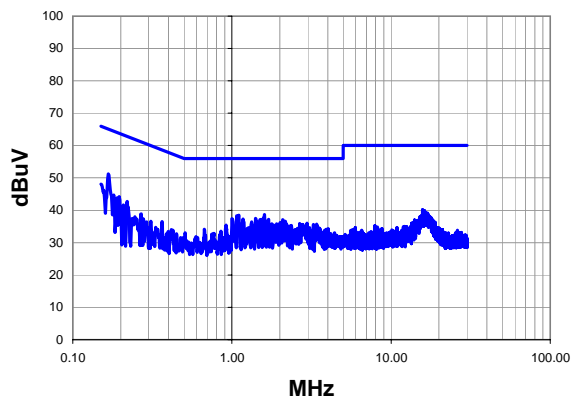
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
1.616	19.1	20.2	39.3	56.0	-16.7
3.440	18.0	20.2	38.2	56.0	-17.8
1.512	18.0	20.2	38.2	56.0	-17.8
2.176	17.8	20.2	38.0	56.0	-18.0
0.165	26.9	20.2	47.1	65.2	-18.1
1.448	17.6	20.2	37.8	56.0	-18.2
2.088	17.3	20.2	37.5	56.0	-18.5
3.336	17.2	20.2	37.4	56.0	-18.6
1.088	17.2	20.2	37.4	56.0	-18.6
0.150	27.1	20.2	47.3	66.0	-18.7
1.704	17.0	20.2	37.2	56.0	-18.8
2.856	16.8	20.2	37.0	56.0	-19.0
16.720	20.1	20.9	41.0	60.0	-19.0
16.130	20.1	20.8	40.9	60.0	-19.1
15.710	20.1	20.8	40.9	60.0	-19.1
2.824	16.6	20.2	36.8	56.0	-19.2
2.768	16.6	20.2	36.8	56.0	-19.2
15.630	20.0	20.8	40.8	60.0	-19.2
1.784	16.6	20.2	36.8	56.0	-19.2
1.992	16.6	20.2	36.8	56.0	-19.2

Peak Data - vs - Average Limit

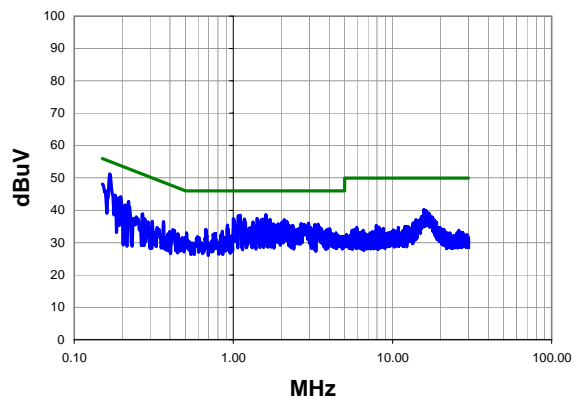
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
1.616	19.1	20.2	39.3	46.0	-6.7
3.440	18.0	20.2	38.2	46.0	-7.8
1.512	18.0	20.2	38.2	46.0	-7.8
2.176	17.8	20.2	38.0	46.0	-8.0
0.165	26.9	20.2	47.1	55.2	-8.1
1.448	17.6	20.2	37.8	46.0	-8.2
2.088	17.3	20.2	37.5	46.0	-8.5
3.336	17.2	20.2	37.4	46.0	-8.6
1.088	17.2	20.2	37.4	46.0	-8.6
0.150	27.1	20.2	47.3	56.0	-8.7
1.704	17.0	20.2	37.2	46.0	-8.8
2.856	16.8	20.2	37.0	46.0	-9.0
16.720	20.1	20.9	41.0	50.0	-9.0
16.130	20.1	20.8	40.9	50.0	-9.1
15.710	20.1	20.8	40.9	50.0	-9.1
2.824	16.6	20.2	36.8	46.0	-9.2
2.768	16.6	20.2	36.8	46.0	-9.2
15.630	20.0	20.8	40.8	50.0	-9.2
1.784	16.6	20.2	36.8	46.0	-9.2
1.992	16.6	20.2	36.8	46.0	-9.2

Work Order:	GRAP0001	Date:	05/20/11				
Project:	None	Temperature:	23.5 °C				
Job Site:	EV07	Humidity:	29.1				
Serial Number:	A2	Barometric Pres.:	1017.7 mb				
EUT:	DLTORO						
Configuration:	3 - Conducted Emissions Configuration, 50ohm termination						
Customer:	Graphic Products						
Attendees:	Bob Martell, Div Tummala						
EUT Power:	120VAC/60Hz						
Operating Mode:	RFID Tx.						
Deviations:	None						
Comments:	50ohm termination in place of antenna.						
Test Specifications FCC 15.207:2011			Test Method ANSI C63.10:2009				
Run #	5	Line:	Neutral	Ext. Attenuation:	20	Results	Pass

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.167	31.1	20.2	51.3	65.1	-13.8
1.600	18.5	20.2	38.7	56.0	-17.3
1.104	18.3	20.2	38.5	56.0	-17.5
0.150	27.9	20.2	48.1	66.0	-17.9
1.408	17.3	20.2	37.5	56.0	-18.5
1.000	17.2	20.2	37.4	56.0	-18.6
1.176	17.1	20.2	37.3	56.0	-18.7
1.704	17.0	20.2	37.2	56.0	-18.8
1.528	17.0	20.2	37.2	56.0	-18.8
2.088	16.9	20.2	37.1	56.0	-18.9
2.160	16.4	20.2	36.6	56.0	-19.4
0.196	24.1	20.2	44.3	63.8	-19.5
1.328	16.2	20.2	36.4	56.0	-19.6
0.181	24.5	20.2	44.7	64.5	-19.8
2.008	16.0	20.2	36.2	56.0	-19.8
15.770	19.3	20.8	40.1	60.0	-19.9
2.968	15.8	20.2	36.0	56.0	-20.0
0.220	22.6	20.2	42.8	62.8	-20.1
2.664	15.7	20.2	35.9	56.0	-20.1
16.210	19.0	20.8	39.8	60.0	-20.2

Peak Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.167	31.1	20.2	51.3	55.1	-3.8
1.600	18.5	20.2	38.7	46.0	-7.3
1.104	18.3	20.2	38.5	46.0	-7.5
0.150	27.9	20.2	48.1	56.0	-7.9
1.408	17.3	20.2	37.5	46.0	-8.5
1.000	17.2	20.2	37.4	46.0	-8.6
1.176	17.1	20.2	37.3	46.0	-8.7
1.704	17.0	20.2	37.2	46.0	-8.8
1.528	17.0	20.2	37.2	46.0	-8.8
2.088	16.9	20.2	37.1	46.0	-8.9
2.160	16.4	20.2	36.6	46.0	-9.4
0.196	24.1	20.2	44.3	53.8	-9.5
1.328	16.2	20.2	36.4	46.0	-9.6
0.181	24.5	20.2	44.7	54.5	-9.8
2.008	16.0	20.2	36.2	46.0	-9.8
15.770	19.3	20.8	40.1	50.0	-9.9
2.968	15.8	20.2	36.0	46.0	-10.0
0.220	22.6	20.2	42.8	52.8	-10.1
2.664	15.7	20.2	35.9	46.0	-10.1
16.210	19.0	20.8	39.8	50.0	-10.2