



## **Graphic Products**

### **GPECHO**

#### **Echo Poster Printer**

**FCC 15.225:2014**

**FCC 15.207:2014**

**Report #: GRAP0033**



Report Prepared By Northwest EMC Inc.

NORTHWEST EMC – (888) 364-2378 – [www.nwemc.com](http://www.nwemc.com)

California – Minnesota – Oregon – New York – Washington

# CERTIFICATE OF TEST

**Last Date of Test: February 19, 2014**  
**Graphic Products**  
**Model: GPECHO**

## Emissions

Test Description	Specification	Test Method	Pass/Fail
Field Strength of Fundamental	FCC 15.225:2014	ANSI C63.10:2009	Pass
Field Strength of Spurious Emissions < 30 MHz	FCC 15.225:2014	ANSI C63.10:2009	Pass
Field Strength of Spurious Emissions > 30 MHz	FCC 15.225:2014	ANSI C63.4:2009	Pass
Frequency Stability	FCC 15.225:2014	ANSI C63.4:2009	Pass
Powerline Conducted Emissions	FCC 15.207:2014	ANSI C63.10:2009	Pass

## Deviations From Test Standards

None

## Approved By:



Kyle Holgate, Operations 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 HISTORY

Revision Number	Description	Date	Page Number
00	None		

## Barometric Pressure

The recorded barometric pressure has been normalized to sea level.

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## United States

**FCC** - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

**A2LA** - Accredited by A2LA to ISO / IEC Guide 65 as a product certifier. This allows Northwest EMC to certify transmitters to FCC and IC specifications.

**NVLAP** - Each laboratory is accredited by NVLAP to ISO 17025

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## Canada

**IC** - Recognized by Industry Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with IC.

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## European Union

**European Commission** – Validated by the European Commission as a Conformity Assessment Body (CAB) under the EMC directive and as a Notified Body under the R&TTE Directive.

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## Australia/New Zealand

**ACMA** - Recognized by ACMA as a CAB for the acceptance of test data.

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## Korea

**KCC / RRA** - Recognized by KCC's RRA as a CAB for the acceptance of test data.

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## Japan

**VCCI** - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

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## Taiwan

**BSMI** – Recognized by BSMI as a CAB for the acceptance of test data.

**NCC** - Recognized by NCC as a CAB for the acceptance of test data.

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## Singapore

**IDA** – Recognized by IDA as a CAB for the acceptance of test data.

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## Hong Kong

**OFTA** – Recognized by OFTA as a CAB for the acceptance of test data.

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## Vietnam

**MIC** – Recognized by MIC as a CAB for the acceptance of test data.

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## Russia

**GOST** – Accredited by Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC to perform EMC and Hygienic testing for Information Technology products to GOST standards.

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## SCOPE

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

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

## Measurement Uncertainty

When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement uncertainty is a statistical expression of measurement error qualified by a probability distribution.

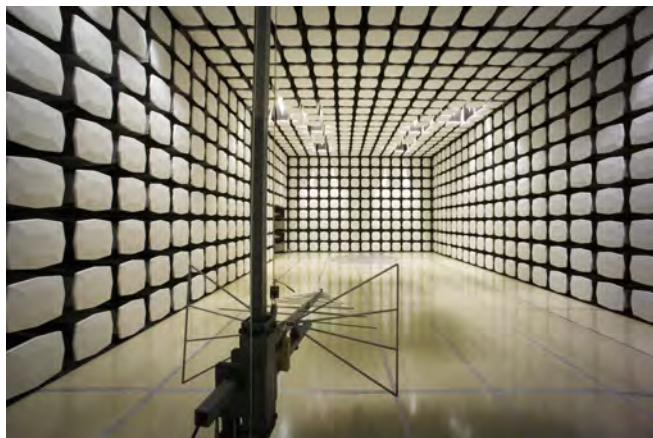
A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) for each test is on each data sheet. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-1 as applicable), and are available upon request.

The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

<b>Test</b>	<b>+ MU</b>	<b>- MU</b>
Frequency Accuracy (Hz)	0.12	-0.01
Amplitude Accuracy (dB)	0.49	-0.49
Conducted Power (dB)	0.41	-0.41
Radiated Power via Substitution (dB)	0.69	-0.68
Temperature (degrees C)	0.81	-0.81
Humidity (% RH)	2.89	-2.89
Field Strength (dB)	4.00	-4.00
AC Powerline Conducted Emissions (dB)	2.70	-2.70



<b>Oregon</b> Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	<b>California</b> Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	<b>New York</b> Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 685-0796	<b>Minnesota</b> Labs MN01-08 9349 W Broadway Ave. Brooklyn Park, MN 55445 (763) 425-2281	<b>Washington</b> Labs NC01-05, SU02, SU07 19201 120 <sup>th</sup> Ave. NE Bothell, WA 98011 (425) 984-6600
<b>VCCI</b>				
A-0108	A-0029		A-0109	A-0110
<b>Industry Canada</b>				
2834D-1, 2834D-2	2834B-1, 2834B-2, 2834B-3		2834E-1	2834C-1
<b>NVLAP</b>				
NVLAP Lab Code: 200630-0	NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200629-0







# PRODUCT DESCRIPTION

## Client and Equipment Under Test (EUT) Information

<b>Company Name:</b>	Graphic Products
<b>Address:</b>	6445 SW Fallbrook Pl
<b>City, State, Zip:</b>	Beaverton, OR 97008
<b>Test Requested By:</b>	Bob Martell
<b>Model:</b>	GPECHO
<b>First Date of Test:</b>	February 10, 2014
<b>Last Date of Test:</b>	February 19, 2014
<b>Receipt Date of Samples:</b>	February 10, 2014
<b>Equipment Design Stage:</b>	Production
<b>Equipment Condition:</b>	No Damage

## Information Provided by the Party Requesting the Test

<b>Functional Description of the EUT (Equipment Under Test):</b>
RFID Printer
<b>Testing Objective:</b>
To demonstrate compliance to FCC Part 15.225 specifications.

## Configuration GRAP0033- 2

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
RFID Printer	Graphic Products	GPECHO	B2

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Laptop	Dell	Latitude 2100	2WRHLL1
AC/DC Adapter	Dell	LA65NS1-00	CN-0YD637-72438-07F-180B

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
USB	Yes	5m	No	Printer	Laptop
DC Power (AC/DC Adapter)	PA	1.5m	Yes	AC/DC adapter	Laptop
AC Power Cable	No	.8m	No	AC/DC adapter	AC mains
Ethernet	No	3m	No	Printer	Laptop
AC Power Cable	No	1.5	No	Printer	AC mains
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

## Configuration GRAP0033- 5

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
RFID Printer	Graphic Products	GPECHO	B2

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Laptop	Dell	Latitude 2100	2WRHLL1
AC/DC Adapter	Dell	LA65NS1-00	CN-0YD637-72438-07F-180B

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Power (AC/DC Adapter)	PA	1.5m	Yes	AC/DC adapter	Laptop
AC Power Cable	No	.8m	No	AC/DC adapter	AC mains
AC Power Cable	No	1.5	No	Printer	AC mains
Ethernet Cable	No	2m	No	Printer	Laptop
USB	Yes	1.5m	No	Printer	Laptop
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					



## Configuration GRAP0033- 8

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
RFID Printer	Graphic Products	GPECHO	B2

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Laptop	Dell	Latitude 2100	2WRHLL1
AC/DC Adapter	Dell	LA65NS1-00	CN-0YD637-72438-07F-180B

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
USB	Yes	5m	No	Printer	Laptop
DC Power (AC/DC Adapter)	PA	1.5m	Yes	AC/DC adapter	Laptop
AC Power Cable	No	.8m	No	AC/DC adapter	AC mains
AC Power Cable	No	1.5	No	Printer	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	2/10/2014	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	2/10/2014	Field Strength of Spurious Emissions < 30 MHz	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	2/10/2014	Field Strength of Spurious Emissions > 30 MHz	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	2/11/2014	Powerline 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.
5	2/19/2014	Frequency Stability	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. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

## MODES OF OPERATION

Tx, Poling 13.56 MHz, Scanner and Printer idle.

## POWER SETTINGS INVESTIGATED

110VAC/60Hz

## CONFIGURATIONS INVESTIGATED

GRAP0033 - 5

## FREQUENCY RANGE INVESTIGATED

Start Frequency	490 kHz	Stop Frequency	30 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
Spectrum Analyzer	Agilent	E4440A	AFD	7/5/2012	24 mo
Pre-Amplifier	Miteq	AM-1616-1000	AVM	8/30/2013	12 mo
Antenna, Loop	EMCO	6502	AOA	6/28/2011	36 mo

## 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

## TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

While scanning, fundamental carrier from the EUT was maximized by rotating the EUT, adjusting the measurement antenna height and orientation in 3 orthogonal planes, the EUT and/or associated antenna is positioned in 3 orthogonal planes (per ANSI C63.10). An active loop antenna was used for this test in order to provide sufficient measurement sensitivity.

As outlined in 15.209(e) and 15.31(f)(2), measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.



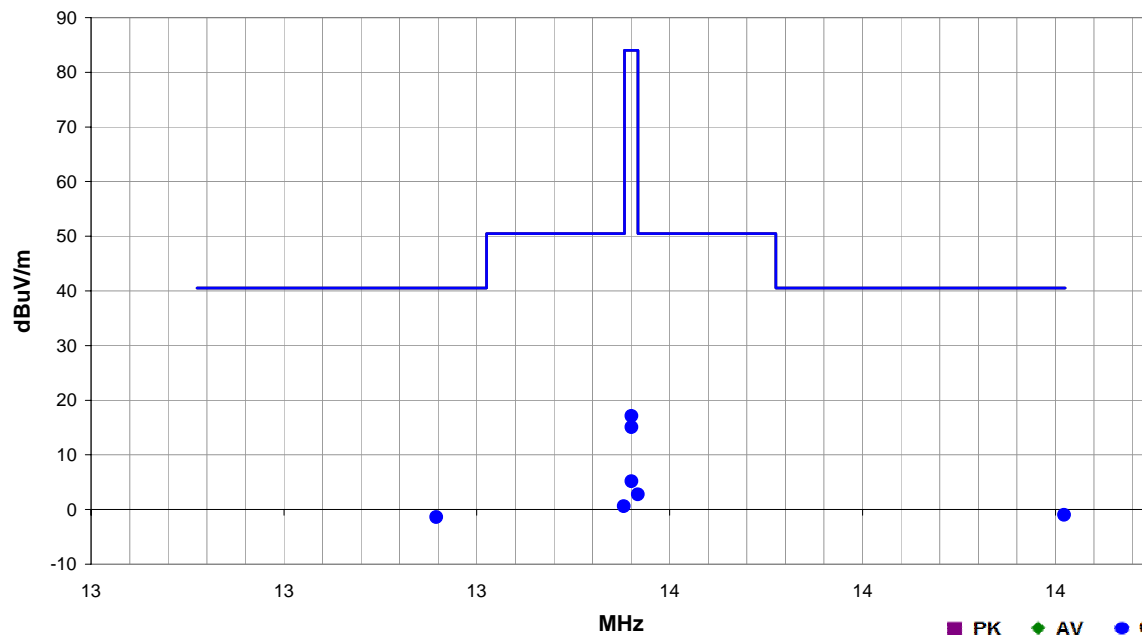
# FIELD STRENGTH OF FUNDAMENTAL

PSA-ESCI 2012.12.14  
EmiR5 2014.01.02

Work Order:	GRAP0033	Date:	02/10/14	
Project:	None	Temperature:	20.4 °C	
Job Site:	EV11	Humidity:	28.1% RH	
Serial Number:	B2	Barometric Pres.:	1013 mbar	
EUT:		GPECHO		
Configuration:	5			
Customer:	Graphic Products			
Attendees:	Bob Martell			
EUT Power:	110VAC/60Hz			
Operating Mode:	Tx, Poling 13.56 MHz, Scanner and Printer idle.			
Deviations:	None			
Comments:	Stand alone device.			

Test Specifications	Test Method
FCC 15.225:2014	ANSI C63.10:2009

Run #	2	Test Distance (m)	10	Antenna Height(s)	1-4m	Results	Pass
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Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
14.009	6.6	11.5	1.0	112.0	10.0	0.0	Horz	QP	-19.1	-1.0	40.5	-41.5	Ant perp to grd, perp to EUT
13.358	6.2	11.5	1.0	140.0	10.0	0.0	Horz	QP	-19.1	-1.4	40.5	-41.9	Ant perp to grd, perp to EUT
13.567	10.4	11.5	1.0	30.0	10.0	0.0	Horz	QP	-19.1	2.8	50.5	-47.7	Ant perp to grd, perp to EUT
13.553	8.2	11.5	1.0	364.0	10.0	0.0	Horz	QP	-19.1	0.6	50.5	-49.9	Ant perp to grd, perp to EUT
13.561	24.7	11.5	1.0	22.0	10.0	0.0	Vert	QP	-19.1	17.1	84.0	-66.9	Ant perp to grd, perp to EUT
13.561	22.7	11.5	1.0	24.0	10.0	0.0	Horz	QP	-19.1	15.1	84.0	-68.9	Ant para to grd, perp to EUT
13.561	12.8	11.5	1.0	7.0	10.0	0.0	Horz	QP	-19.1	5.2	84.0	-78.8	Ant perp to grd, para to EUT

# FIELD STRENGTH OF SPURIOUS EMISSIONS < 30MHz

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. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

## MODES OF OPERATION

Tx, Poling 13.56 MHz, Scanner and Printer idle.

## POWER SETTINGS INVESTIGATED

110VAC/60Hz

## CONFIGURATIONS INVESTIGATED

GRAP0033 - 5

## FREQUENCY RANGE INVESTIGATED

Start Frequency	10 kHz	Stop Frequency	30 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
Spectrum Analyzer	Agilent	E4440A	AFD	7/5/2012	24 mo
EV11 Cables	N/A	3m Test Distance Cables	EVM	3/13/2013	12 mo
Antenna, Loop	EMCO	6502	AOA	6/28/2011	36 mo

## 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

## TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

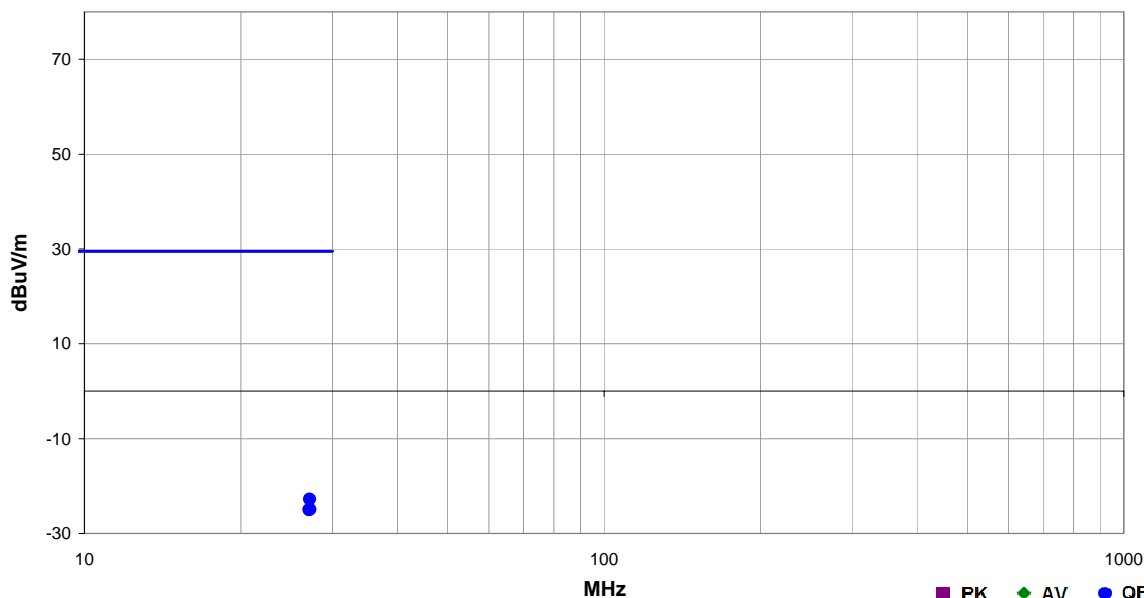
While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and orientation in 3 orthogonal planes, the EUT and/or associated antenna is positioned in 3 orthogonal planes (per ANSI C63.10). An active loop antenna was used for this test in order to provide sufficient measurement sensitivity.

As outlined in 15.209(e) and 15.31(f)(2), measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.



Work Order:	GRAP0033	Date:	02/10/14	
Project:	None	Temperature:	20.4 °C	
Job Site:	EV11	Humidity:	28.1% RH	
Serial Number:	B2	Barometric Pres.:	1013 mbar	
EUT:	GPECHO			
Configuration:	5			
Customer:	Graphic Products			
Attendees:	Bob Martell			
EUT Power:	110VAC/60Hz			
Operating Mode:	Tx, Poling 13.56 MHz, Scanner and Printer idle.			
Deviations:	None			
Comments:	Stand alone device, EUT is in the Horizontal orientation.			

Test Specifications	Test Method
FCC 15.225:2014	ANSI C63.10:2009
Run #	4
Test Distance (m)	3
Antenna Height(s)	1-4m
Results	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
27.121	7.6	9.6	1.0	351.0	3.0	0.0	Horz	QP	-40.0	-22.8	29.5	-52.3	Ant Perp to Grd, Perp to EUT
27.157	5.5	9.6	1.0	157.0	3.0	0.0	Horz	QP	-40.0	-24.9	29.5	-54.4	Ant Perp to Grd, Para to EUT
27.073	5.4	9.6	1.0	256.0	3.0	0.0	Vert	QP	-40.0	-25.0	29.5	-54.5	Ant Para to Grd, Perp to EUT



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. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

## MODES OF OPERATION

Tx, Poling 13.56 MHz, Scanner and Printer idle.

## POWER SETTINGS INVESTIGATED

110VAC/60Hz

## CONFIGURATIONS INVESTIGATED

GRAP0033 - 2

## FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	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
EV01 Cables	N/A	Bilog Cables	EVA	6/20/2013	12 mo
Pre-Amplifier	Miteq	AM-1616-1000	AOL	6/20/2013	12 mo
Antenna, Biconilog	EMCO	3141	AXG	4/10/2012	36 mo
Spectrum Analyzer	Agilent	E4446A	AAT	6/28/2012	24 mo

## 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

## TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and orientation in 3 orthogonal planes, the EUT and/or associated antenna is positioned in 3 orthogonal planes (per ANSI C63.10). An active loop antenna was used for this test in order to provide sufficient measurement sensitivity.

For measurements below 30 MHz, as outlined in 15.209(e) and 15.31(f)(2), measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

If there are no detectable emissions above the noise floor, the data included will show noise floor measurements for reference only.



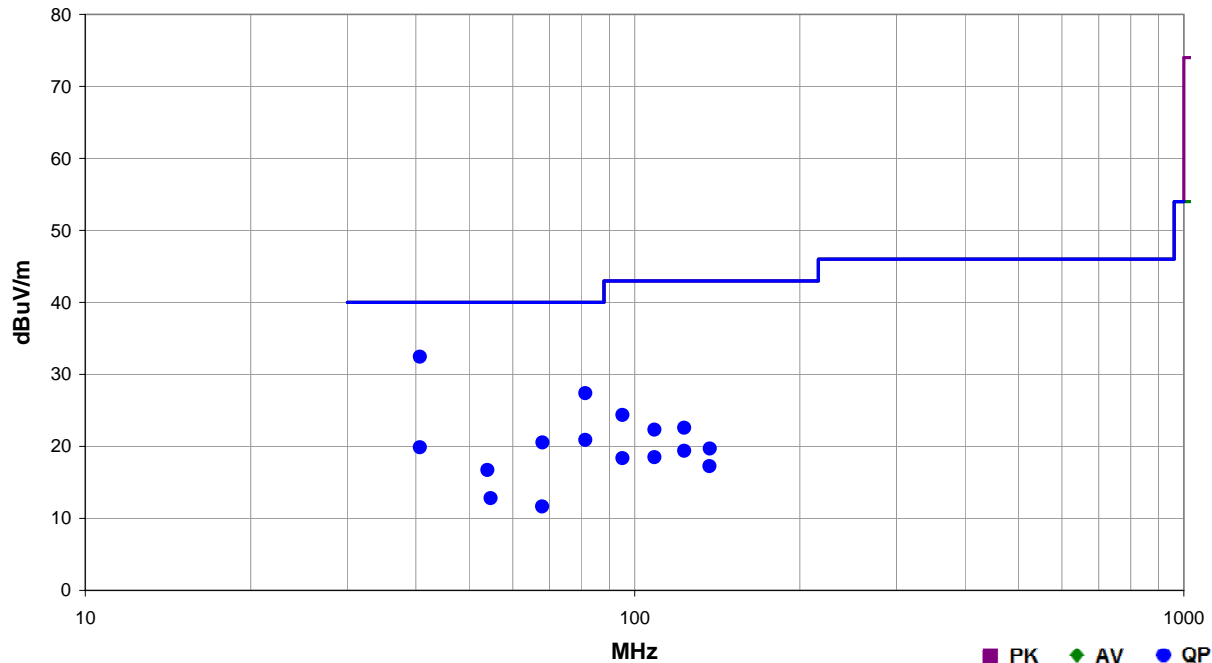
# FIELD STRENGTH OF SPURIOUS EMISSIONS > 30MHz

PSA-ESCI 2012.12.14  
EmiR5 2014.01.02

<b>Work Order:</b>	GRAP0033	<b>Date:</b>	02/10/14	
<b>Project:</b>	None	<b>Temperature:</b>	20.7 °C	
<b>Job Site:</b>	EV01	<b>Humidity:</b>	29.6% RH	
<b>Serial Number:</b>	B2	<b>Barometric Pres.:</b>	1022 mbar	
<b>EUT:</b> GPECHO				<b>Tested by:</b> Brandon Hobbs
<b>Configuration:</b> 2				
<b>Customer:</b> Graphic Products				
<b>Attendees:</b> Bob Martell				
<b>EUT Power:</b> 110VAC/60Hz				
<b>Operating Mode:</b> Tx, Poling 13.56 MHz, Scanner and Printer idle.				
<b>Deviations:</b> None				
<b>Comments:</b> Stand alone device, The EUT was in the horizontal orientation only.				

Test Specifications	Test Method
FCC 15.225:2012	ANSI C63.10:2009

Run #	1	Test Distance (m)	3	Antenna Height(s)	1-4m	Results	Pass
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Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)
40.690	35.4	-2.9	1.0	261.0	3.0	0.0	Vert	QP	0.0	32.5	40.0	-7.5
81.372	35.6	-8.2	1.0	248.0	3.0	0.0	Vert	QP	0.0	27.4	40.0	-12.6
95.121	31.3	-6.9	1.0	307.0	3.0	0.0	Vert	QP	0.0	24.4	43.0	-18.6
81.377	29.1	-8.2	3.8	21.0	3.0	0.0	Horz	QP	0.0	20.9	40.0	-19.1
67.956	28.7	-8.2	1.0	305.0	3.0	0.0	Vert	QP	0.0	20.5	40.0	-19.5
40.673	22.8	-2.9	2.0	240.0	3.0	0.0	Horz	QP	0.0	19.9	40.0	-20.1
123.264	30.3	-7.7	1.0	169.0	3.0	0.0	Vert	QP	0.0	22.6	43.0	-20.4
108.712	29.0	-6.7	1.0	146.0	3.0	0.0	Vert	QP	0.0	22.3	43.0	-20.7
54.004	24.0	-7.3	1.0	282.0	3.0	0.0	Vert	QP	0.0	16.7	40.0	-23.3
137.107	26.9	-7.2	1.0	306.0	3.0	0.0	Vert	QP	0.0	19.7	43.0	-23.3
123.199	27.1	-7.7	2.6	327.0	3.0	0.0	Horz	QP	0.0	19.4	43.0	-23.6
108.723	25.2	-6.7	3.7	318.0	3.0	0.0	Horz	QP	0.0	18.5	43.0	-24.5
95.135	25.3	-6.9	2.2	123.0	3.0	0.0	Horz	QP	0.0	18.4	43.0	-24.6
136.995	24.5	-7.2	2.1	164.0	3.0	0.0	Horz	QP	0.0	17.3	43.0	-25.7
54.740	20.2	-7.4	3.7	195.0	3.0	0.0	Horz	QP	0.0	12.8	40.0	-27.2
67.941	19.8	-8.2	2.0	354.0	3.0	0.0	Horz	QP	0.0	11.6	40.0	-28.4

## FREQUENCY STABILITY

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
Near Field Probe	EMCO	7405	IPD	NCR	0
AC Power Source	Instek	APS-9050	TPK	NCR	0
Temp./Humidity Chamber	Cincinnati Sub Zero (CSZ)	ZH-32-2-2-H/AC	TBA	NCR	0
Humidity Temperature Meter	Omegaette	HH311	DTY	3/29/2011	36
Spectrum Analyzer	Agilent	E4440	AFE	11/4/2013	24

### TEST DESCRIPTION

#### Variation of Supply Voltage

The primary supply voltage was varied from 85% to 115% of nominal. The EUT can only be operated from the public AC mains, so an AC lab supply was used to vary the supply voltage from 115% to 85% of 110 V, 60 Hz.

#### Variation of Ambient Temperature

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

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

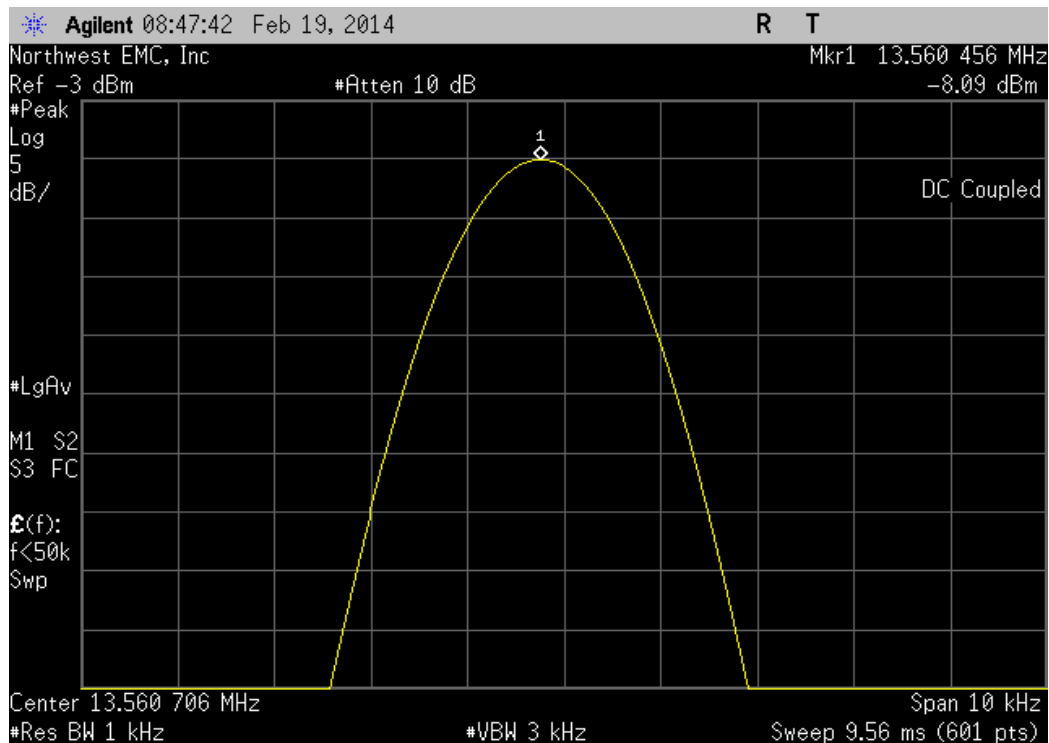


# FREQUENCY STABILITY

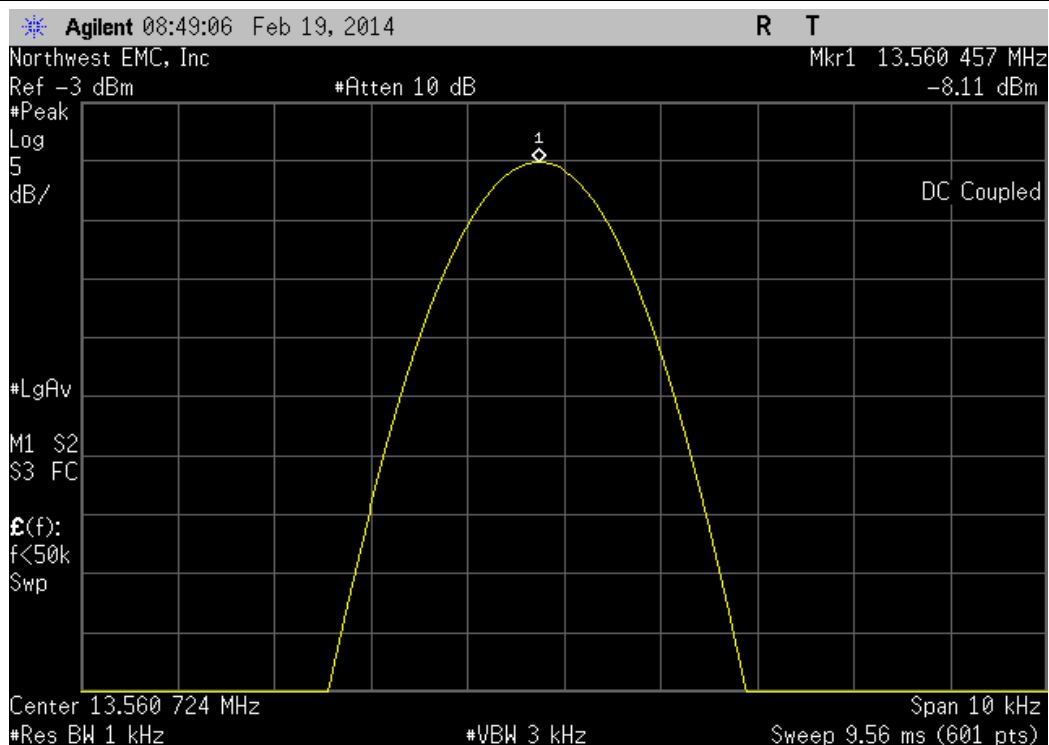
XMit 2013.08.15  
PsaTx 2013.10.23

EUT: GPECHO		Work Order: GRAP0033				
Serial Number: B2		Date: 02/19/14				
Customer: Graphic Products		Temperature: 22.4°C				
Attendees: Bob Martell, Tim Martin		Humidity: 35%				
Project: None		Barometric Pres.: 1023.1				
Tested by: Brandon Hobbs		Power: 230VAC/50Hz				
Job Site: EV09		Test Method				
FCC 15.225:2014		ANSI C63.10:2009				
COMMENTS						
Stand-alone device with no tag used.						
DEVIATIONS FROM TEST STANDARD						
Configuration #	8	Signature				
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Result
NFC Frequency 13.56 MHz						
	Voltage: 115%	13.560456	13.56	33.6	100	Pass
	Voltage: 100%	13.560457	13.56	33.7	100	Pass
	Voltage: 85%	13.560456	13.56	33.6	100	Pass
	Temperature: +50°	13.560373	13.56	27.5	100	Pass
	Temperature: +40°	13.560373	13.56	27.5	100	Pass
	Temperature: +30°	13.560389	13.56	28.7	100	Pass
	Temperature: +20°	13.560439	13.56	32.4	100	Pass
	Temperature: +10°	13.560473	13.56	34.9	100	Pass
	Temperature: 0°	13.560491	13.56	36.2	100	Pass
	Temperature: -10°	13.560506	13.56	37.3	100	Pass
	Temperature: -20°	13.560473	13.56	34.9	100	Pass
	Temperature: -30°	13.560423	13.56	31.2	100	Pass

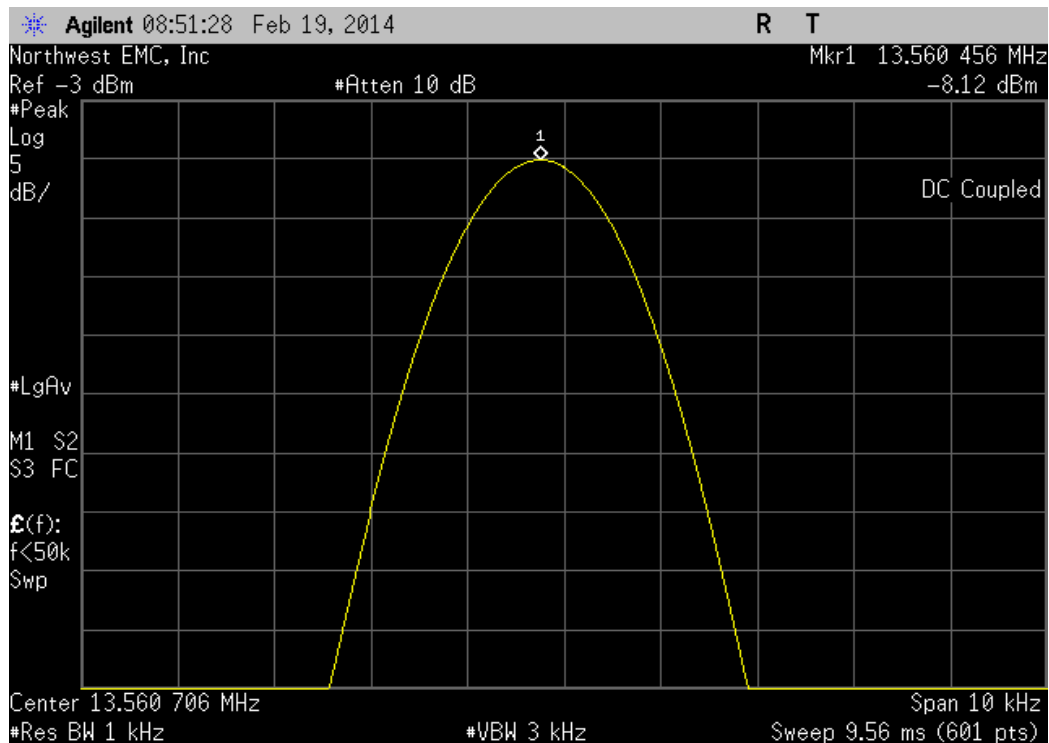
NFC Frequency 13.56 MHz, Voltage: 115%					
Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Result	
13.560456	13.56	33.6	100	Pass	



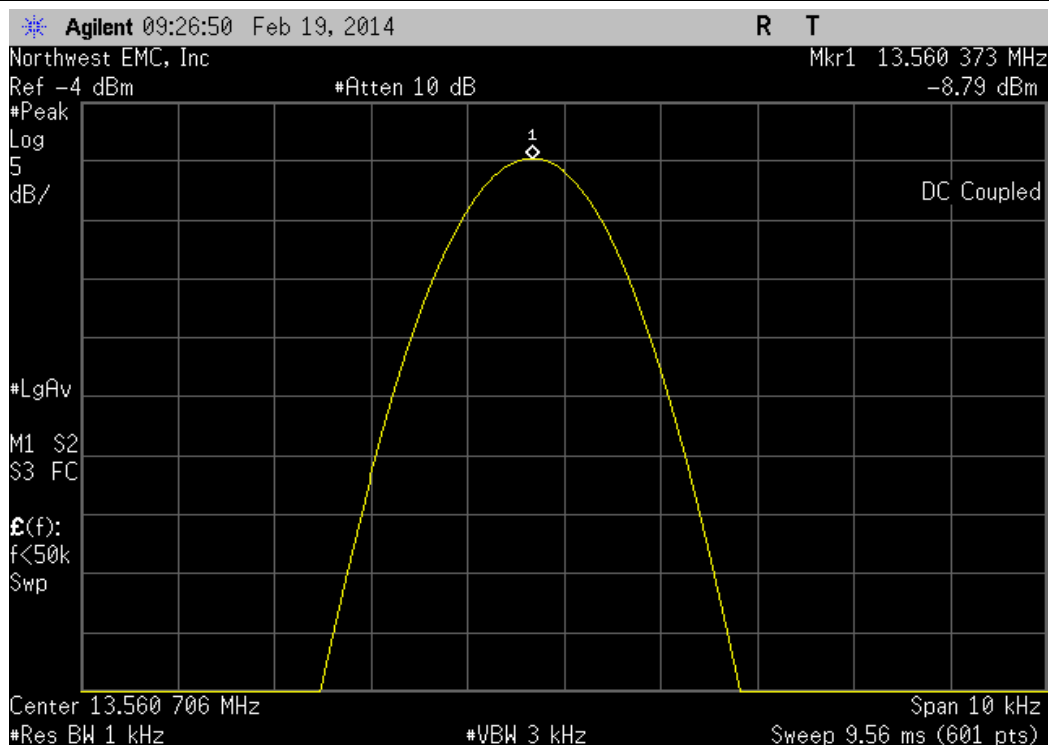
NFC Frequency 13.56 MHz, Voltage: 100%					
Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Result	
13.560457	13.56	33.7	100	Pass	



NFC Frequency 13.56 MHz, Voltage: 85%					
	Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Result
	13.560456	13.56	33.6	100	Pass

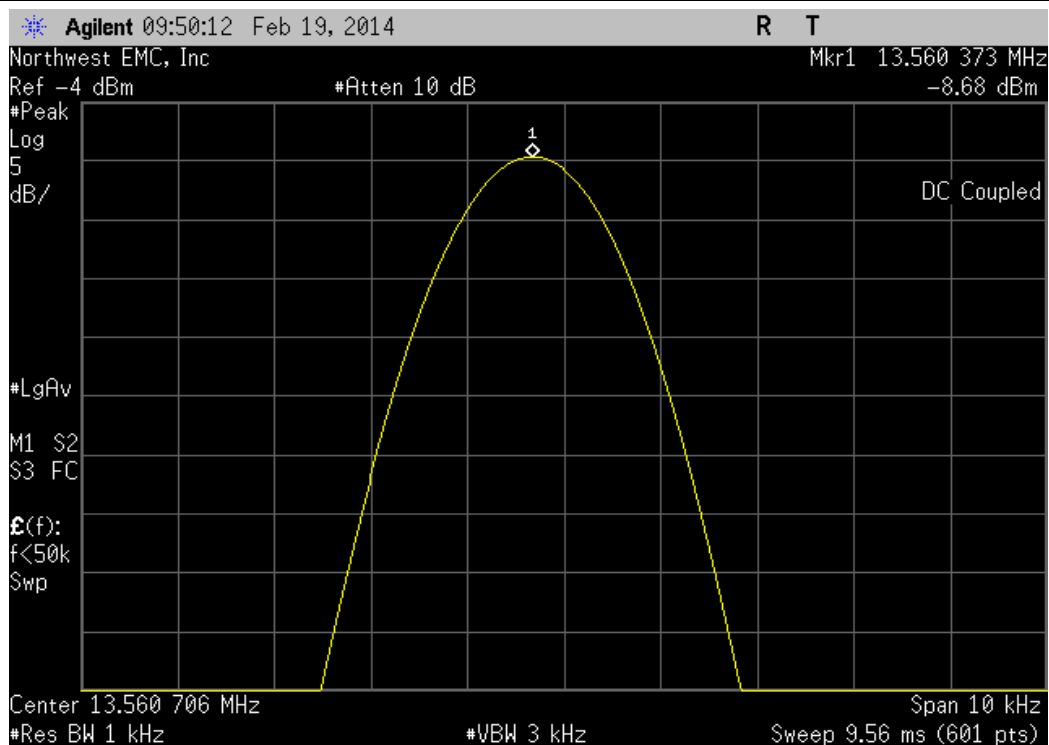


NFC Frequency 13.56 MHz, Temperature: +50°					
	Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Result
	13.560373	13.56	27.5	100	Pass

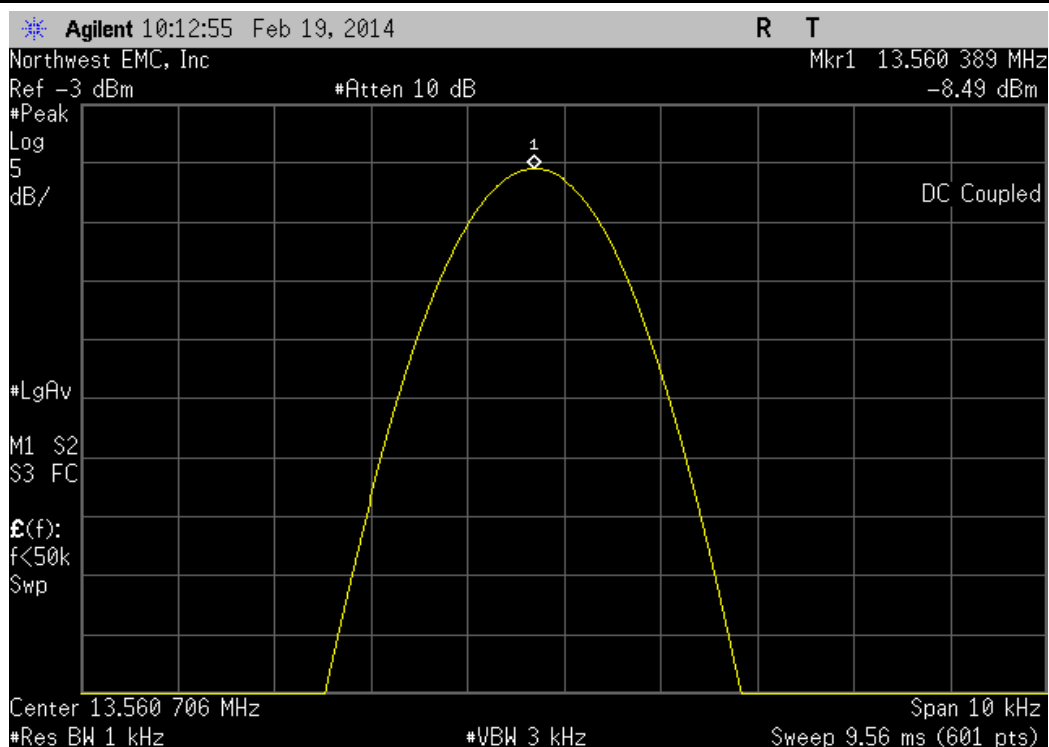




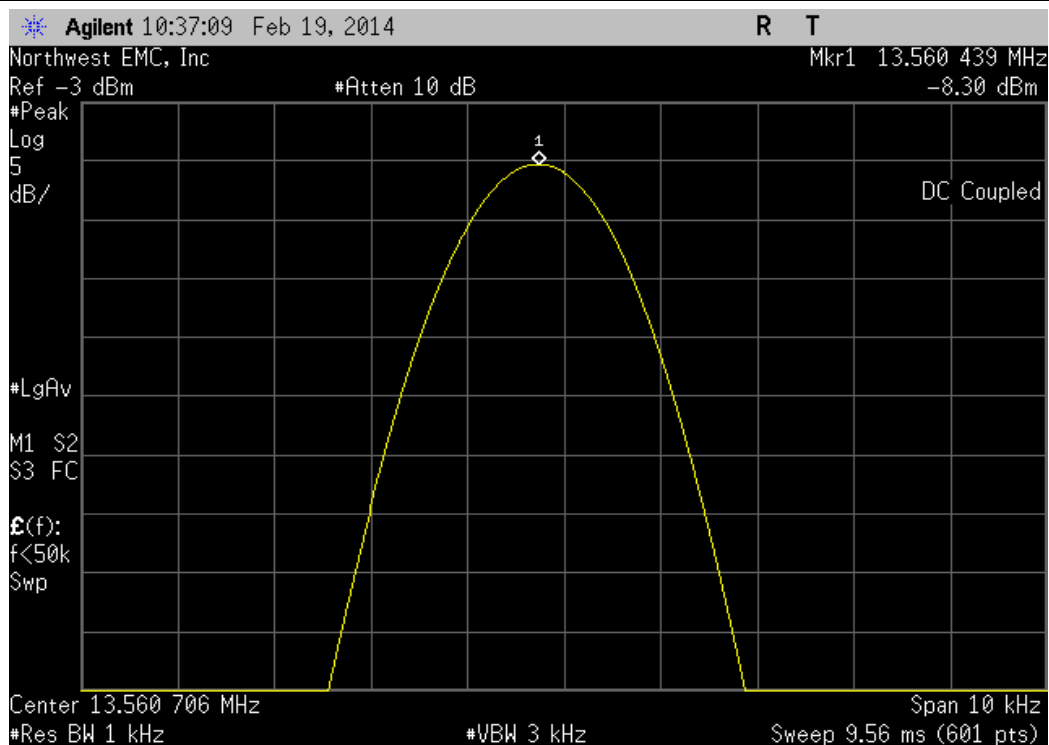
NFC Frequency 13.56 MHz, Temperature: +40°					
	Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Result
	13.560373	13.56	27.5	100	Pass



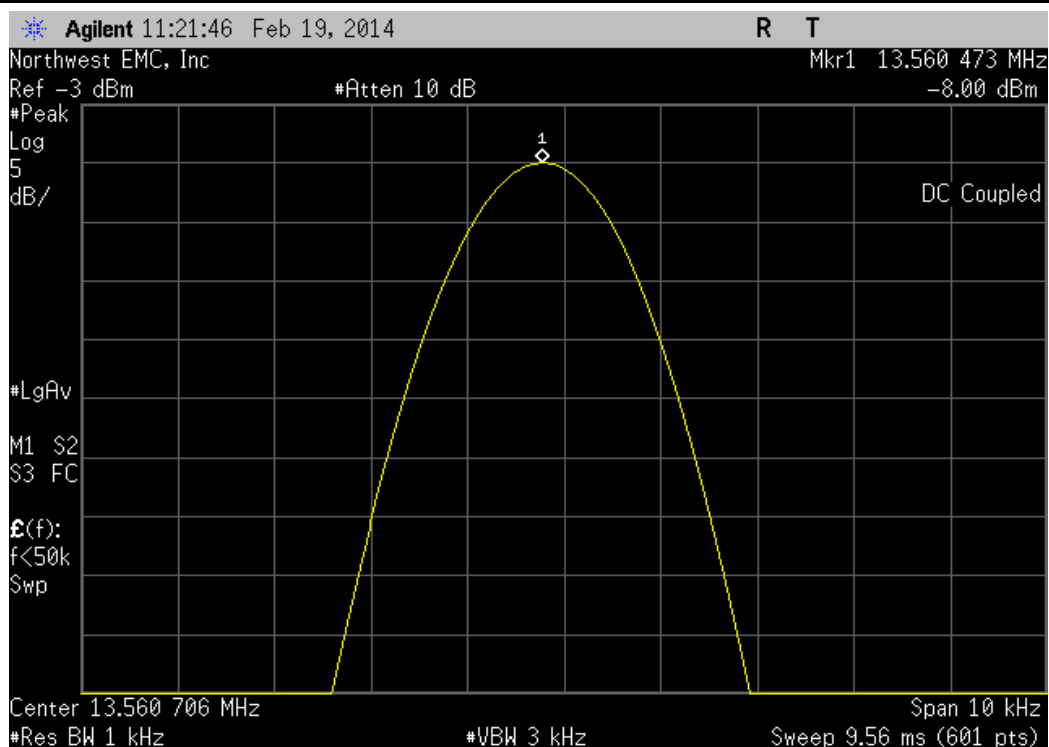
NFC Frequency 13.56 MHz, Temperature: +30°					
	Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Result
	13.560389	13.56	28.7	100	Pass



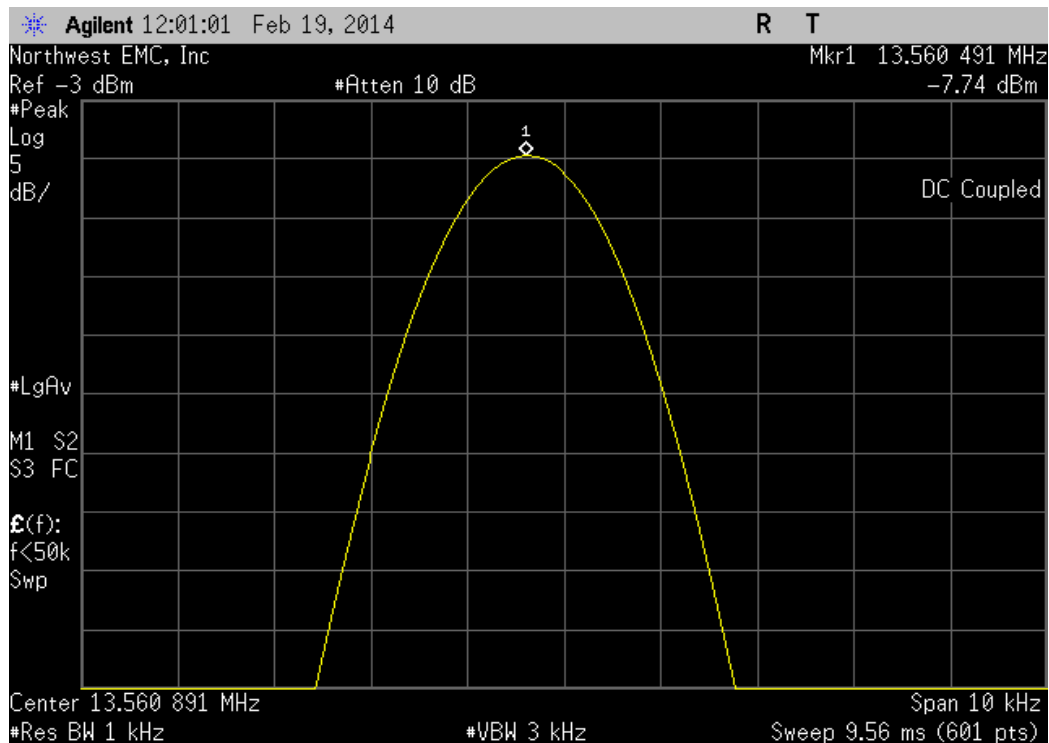
NFC Frequency 13.56 MHz, Temperature: +20°					
	Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Result
	13.560439	13.56	32.4	100	Pass



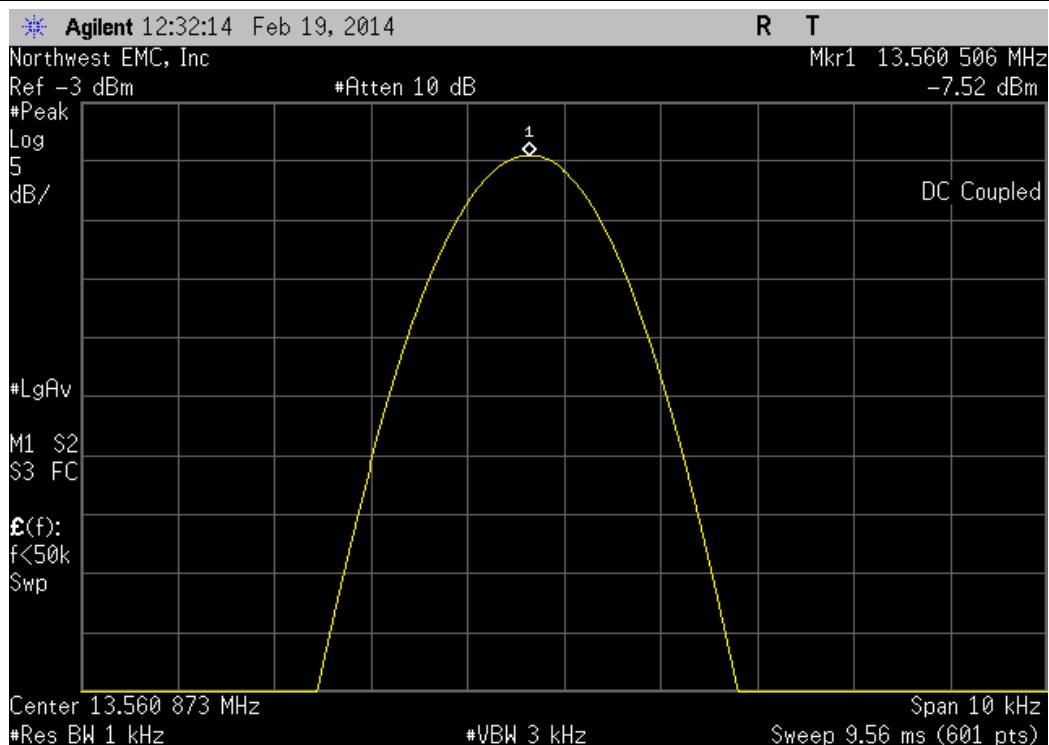
NFC Frequency 13.56 MHz, Temperature: +10°					
	Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Result
	13.560473	13.56	34.9	100	Pass



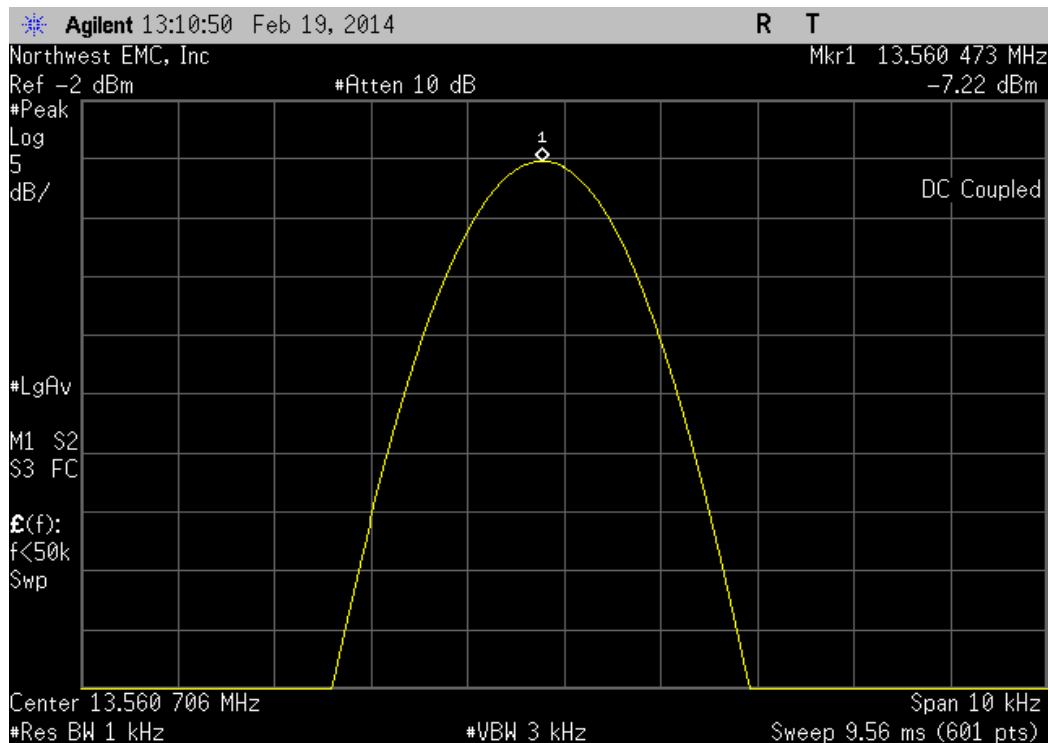
NFC Frequency 13.56 MHz, Temperature: 0°					
	Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Result
	13.560491	13.56	36.2	100	Pass



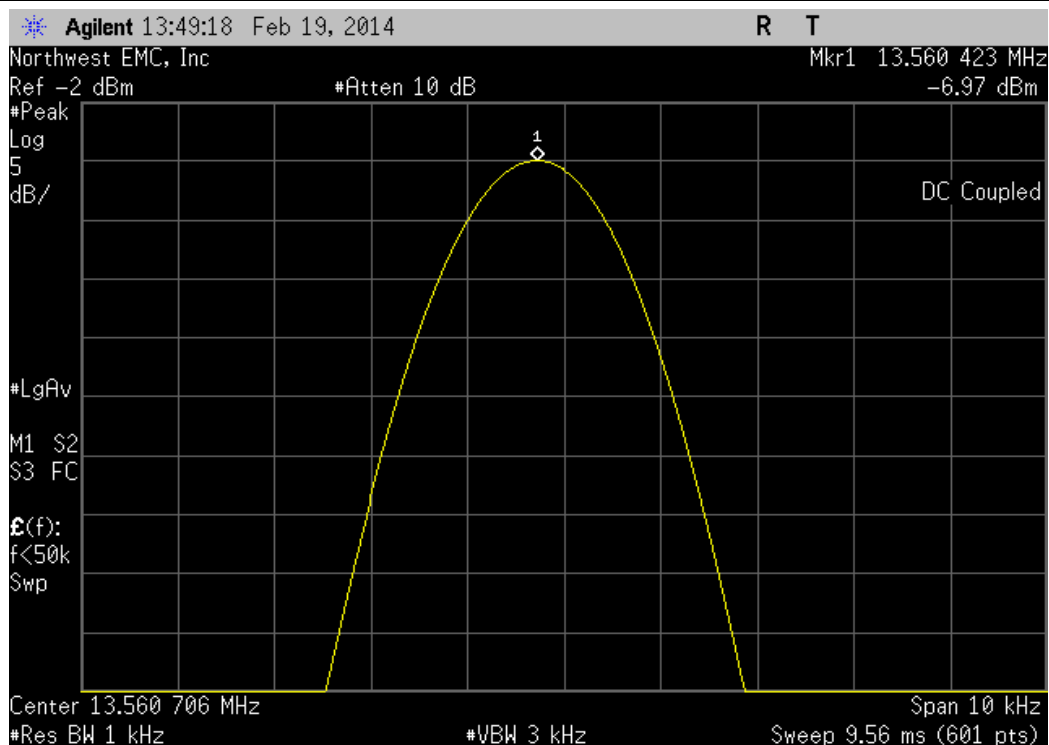
NFC Frequency 13.56 MHz, Temperature: -10°					
	Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Result
	13.560506	13.56	37.3	100	Pass



NFC Frequency 13.56 MHz, Temperature: -20°					
	Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Result
	13.560473	13.56	34.9	100	Pass



NFC Frequency 13.56 MHz, Temperature: -30°					
	Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Result
	13.560423	13.56	31.2	100	Pass



# POWERLINE CONDUCTED EMISSIONS

## 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  $\Omega$  measuring port is terminated by a 50  $\Omega$  EMI meter or a 50  $\Omega$  resistive load. All 50  $\Omega$  measuring ports of the LISN are terminated by 50 $\Omega$ . Both transmit and standby modes were tested to prove out the radio related emissions against the specified limit. All unintentional emissions were noted in each graph.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
EV07 Cables	N/A	Conducted Cables	EVG	04/25/2013	12 mo
Attenuator	Fairview Microwave	SA6B10W-20	RKA	10/24/2013	12 mo
High Pass Filter	TTE	H97-100K-50-720B	HHD	01/22/2014	12 mo
Receiver	Rohde & Schwarz	ESCI	ARH	02/05/2014	12 mo
LISN	Solar	9252-50-R-24-BNC	LIR	10/09/2013	12 mo

## MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.94 dB	-2.94 dB

## CONFIGURATIONS INVESTIGATED

GRAP0033-2

## MODES INVESTIGATED

Not transmitting, Scanner and Printer idle.

Tx, Poling at 13.56 MHz, Scanner and Printer idle.

# POWERLINE CONDUCTED EMISSIONS

EUT:	GPECHO	Work Order:	GRAP0033
Serial Number:	B2	Date:	02/11/2014
Customer:	Graphic Products	Temperature:	21.9°C
Attendees:	Bob Martell	Relative Humidity:	32.4%
Customer Project:	None	Bar. Pressure:	1020.7 mb
Tested By:	Brandon Hobbs	Job Site:	EV07
Power:	110VAC/60Hz	Configuration:	GRAP0033-2

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2014	ANSI C63.10:2009

## TEST PARAMETERS

Run #:	3	Line:	High Line	Ext. Attenuation (dB):	20
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## COMMENTS

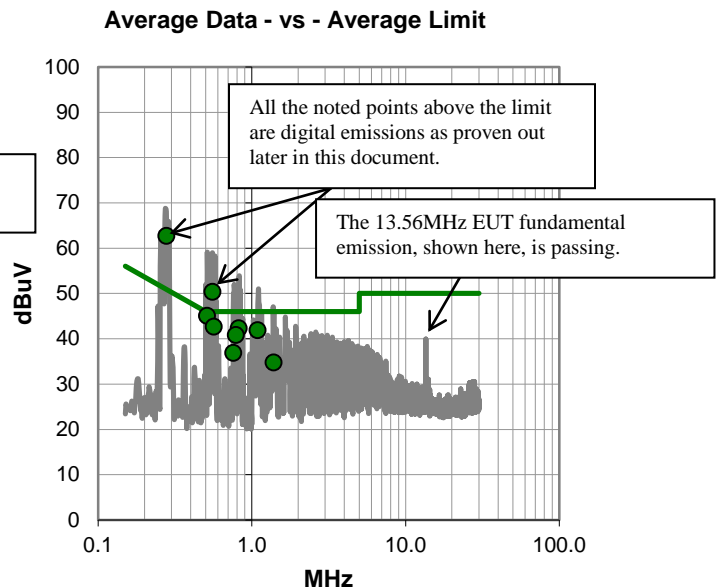
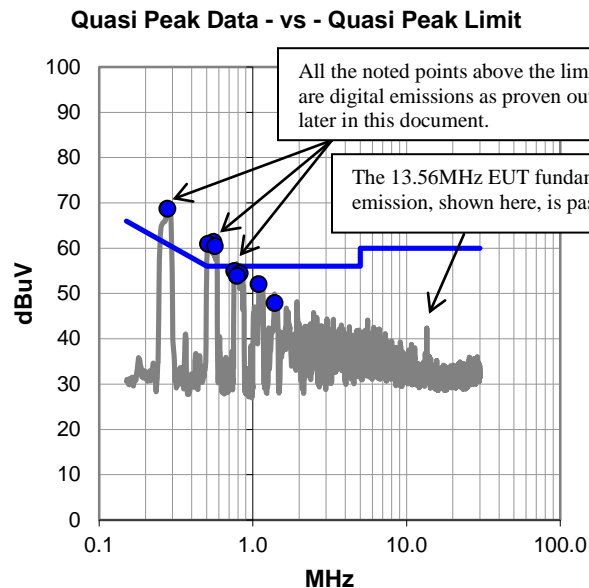
Stand-alone device.

## EUT OPERATING MODES

Tx, Poling at 13.56 MHz, Scanner and Printer idle.

## DEVIATIONS FROM TEST STANDARD

None





# POWERLINE CONDUCTED EMISSIONS

## RESULTS - Run #3

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.278	48.4	20.3	68.7	60.9	7.8
0.555	41.1	20.3	61.4	56.0	5.4
0.512	40.7	20.3	61.0	56.0	5.0
0.565	40.2	20.3	60.5	56.0	4.5
0.757	34.6	20.3	54.9	56.0	-1.1
0.823	34.1	20.3	54.4	56.0	-1.6
0.789	33.6	20.3	53.9	56.0	-2.1
1.092	31.7	20.3	52.0	56.0	-4.0
1.384	27.5	20.4	47.9	56.0	-8.1

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.278	42.4	20.3	62.7	50.9	11.8
0.555	30.1	20.3	50.4	46.0	4.4
0.512	24.8	20.3	45.1	46.0	-0.9
0.565	22.4	20.3	42.7	46.0	-3.3
0.823	22.0	20.3	42.3	46.0	-3.7
1.092	21.5	20.3	41.8	46.0	-4.2
0.789	20.5	20.3	40.8	46.0	-5.2
0.757	16.6	20.3	36.9	46.0	-9.1
1.384	14.4	20.4	34.8	46.0	-11.2

## CONCLUSION

Pass



Tested By

# POWERLINE CONDUCTED EMISSIONS

EUT:	GPECHO	Work Order:	GRAP0033
Serial Number:	B2	Date:	02/11/2014
Customer:	Graphic Products	Temperature:	21.9°C
Attendees:	Bob Martell	Relative Humidity:	32.4%
Customer Project:	None	Bar. Pressure:	1020.7 mb
Tested By:	Brandon Hobbs	Job Site:	EV07
Power:	110VAC/60Hz	Configuration:	GRAP0033-2

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2014	ANSI C63.10:2009

## TEST PARAMETERS

Run #:	4	Line:	High Line	Ext. Attenuation (dB):	20
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## COMMENTS

Stand-alone device.

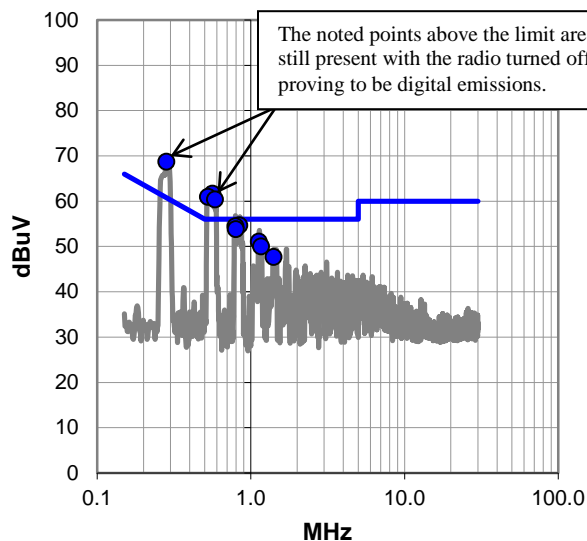
## EUT OPERATING MODES

Not transmitting Scanner and Printer idle.

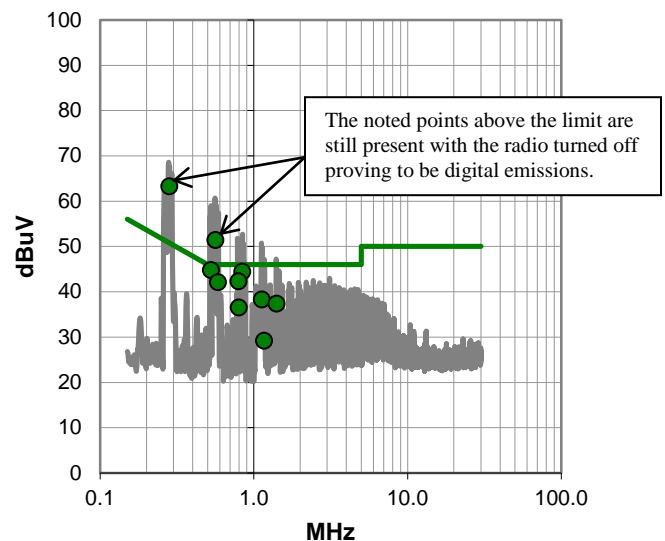
## DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



# POWERLINE CONDUCTED EMISSIONS

## RESULTS - Run #4

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.283	48.4	20.3	68.7	60.7	8.0
0.564	41.4	20.3	61.7	56.0	5.7
0.526	40.7	20.3	61.0	56.0	5.0
0.585	40.1	20.3	60.4	56.0	4.4
0.844	34.3	20.3	54.6	56.0	-1.4
0.794	34.1	20.3	54.4	56.0	-1.6
0.799	33.5	20.3	53.8	56.0	-2.2
1.128	30.7	20.4	51.1	56.0	-4.9
1.168	29.6	20.4	50.0	56.0	-6.0
1.404	27.3	20.4	47.7	56.0	-8.3

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.283	43.0	20.3	63.3	50.7	12.6
0.564	31.1	20.3	51.4	46.0	5.4
0.526	24.5	20.3	44.8	46.0	-1.2
0.844	24.1	20.3	44.4	46.0	-1.6
0.794	22.0	20.3	42.3	46.0	-3.7
0.585	21.8	20.3	42.1	46.0	-3.9
1.128	17.9	20.4	38.3	46.0	-7.7
1.404	17.0	20.4	37.4	46.0	-8.6
0.799	16.2	20.3	36.5	46.0	-9.5
1.168	8.8	20.4	29.2	46.0	-16.8

## CONCLUSION

Pass



Tested By

# POWERLINE CONDUCTED EMISSIONS

EUT:	GPECHO	Work Order:	GRAP0033
Serial Number:	B2	Date:	02/11/2014
Customer:	Graphic Products	Temperature:	21.9°C
Attendees:	Bob Martell	Relative Humidity:	32.4%
Customer Project:	None	Bar. Pressure:	1020.7 mb
Tested By:	Brandon Hobbs	Job Site:	EV07
Power:	110VAC/60Hz	Configuration:	GRAP0033-2

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2014	ANSI C63.10:2009

## TEST PARAMETERS

Run #:	5	Line:	Neutral	Ext. Attenuation (dB):	20
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## COMMENTS

Stand-alone device.

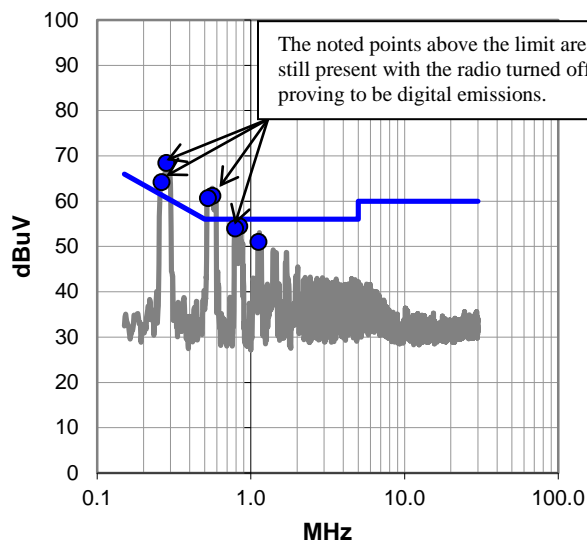
## EUT OPERATING MODES

Not transmitting Scanner and Printer idle.

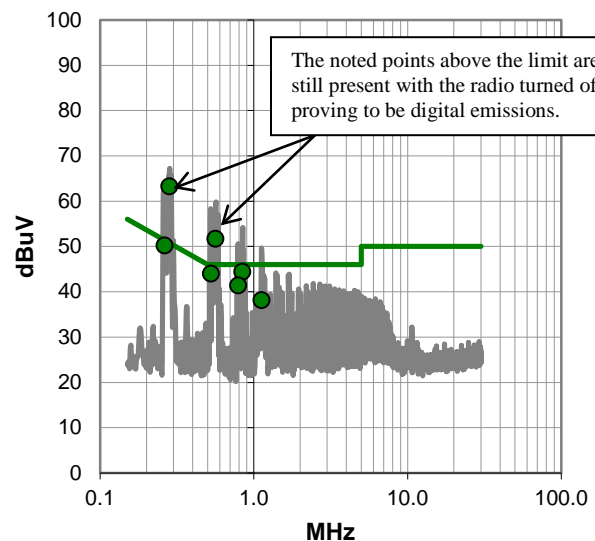
## DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



# POWERLINE CONDUCTED EMISSIONS

## RESULTS - Run #5

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.283	48.1	20.3	68.4	60.7	7.7
0.563	40.9	20.3	61.2	56.0	5.2
0.526	40.4	20.3	60.7	56.0	4.7
0.263	43.9	20.3	64.2	61.3	2.9
0.843	34.1	20.3	54.4	56.0	-1.6
0.793	33.6	20.3	53.9	56.0	-2.1
1.124	30.6	20.4	51.0	56.0	-5.0

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.283	43.0	20.3	63.3	50.7	12.6
0.563	31.4	20.3	51.7	46.0	5.7
0.263	29.9	20.3	50.2	51.3	-1.1
0.843	24.1	20.3	44.4	46.0	-1.6
0.526	23.7	20.3	44.0	46.0	-2.0
0.793	21.1	20.3	41.4	46.0	-4.6
1.124	17.8	20.4	38.2	46.0	-7.8

## CONCLUSION

Pass



Tested By

# POWERLINE CONDUCTED EMISSIONS

EUT:	GPECHO	Work Order:	GRAP0033
Serial Number:	B2	Date:	02/11/2014
Customer:	Graphic Products	Temperature:	21.9°C
Attendees:	Bob Martell	Relative Humidity:	32.4%
Customer Project:	None	Bar. Pressure:	1020.7 mb
Tested By:	Brandon Hobbs	Job Site:	EV07
Power:	110VAC/60Hz	Configuration:	GRAP0033-2

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2014	ANSI C63.10:2009

## TEST PARAMETERS

Run #:	6	Line:	Neutral	Ext. Attenuation (dB):	20
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## COMMENTS

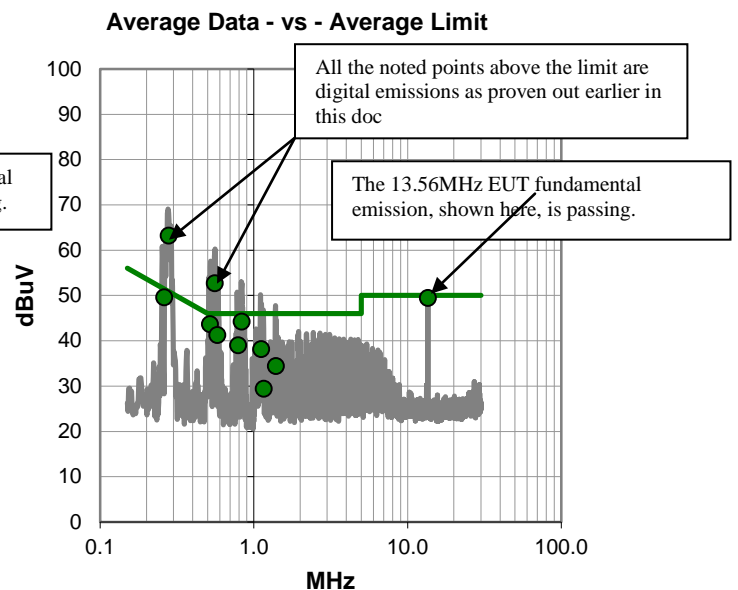
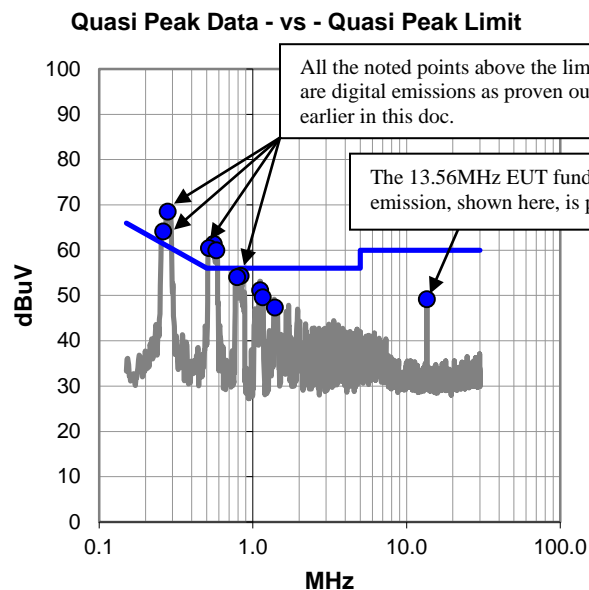
Stand-alone device.

## EUT OPERATING MODES

Tx, Poling at 13.56 MHz, Printer and Scanner idle.

## DEVIATIONS FROM TEST STANDARD

None



# POWERLINE CONDUCTED EMISSIONS

## RESULTS - Run #6

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.280	48.2	20.3	68.5	60.8	7.7
0.558	41.1	20.3	61.4	56.0	5.4
0.518	40.2	20.3	60.5	56.0	4.5
0.580	39.7	20.3	60.0	56.0	4.0
0.262	43.8	20.3	64.1	61.4	2.7
0.836	34.0	20.3	54.3	56.0	-1.7
0.791	33.7	20.3	54.0	56.0	-2.0
1.116	30.8	20.4	51.2	56.0	-4.8
1.160	29.2	20.4	49.6	56.0	-6.4
1.396	26.9	20.4	47.3	56.0	-8.7
13.560	28.0	21.1	49.1	60.0	-10.9

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.280	42.9	20.3	63.2	50.8	12.4
0.558	32.4	20.3	52.7	46.0	6.7
13.560	28.3	21.1	49.4	50.0	-0.6
0.262	29.3	20.3	49.6	51.4	-1.8
0.836	23.9	20.3	44.2	46.0	-1.8
0.518	23.4	20.3	43.7	46.0	-2.3
0.580	21.0	20.3	41.3	46.0	-4.7
0.791	18.7	20.3	39.0	46.0	-7.0
1.116	17.8	20.4	38.2	46.0	-7.8
1.396	14.0	20.4	34.4	46.0	-11.6
1.160	9.0	20.4	29.4	46.0	-16.6

## CONCLUSION

Pass



Tested By