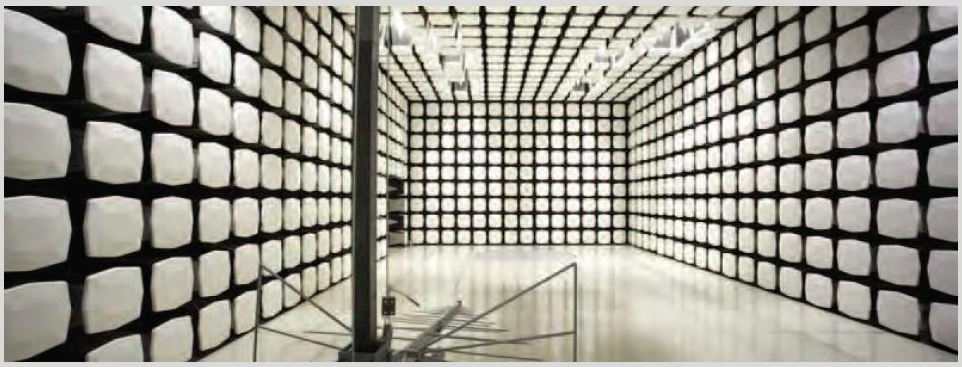
Graphic Products, Inc.

Bronco Max

FCC 15.225:2021
13.56MHz

Report: GRAP0078.1 Rev. 1, Issue Date: August 17, 2022



CERT #3310.03

CERTIFICATE OF TEST

Last Date of Test: August 10, 2021
Graphic Products, Inc.
EUT: Bronco Max

Radio Equipment Testing

Standards

Specification	Method
FCC 15.107:2021	ANSI C63.4:2014
FCC 15.207:2021	ANSI C63.10:2013
FCC 15.225:2021	

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	Yes	Pass	
6.4	Field Strength of Fundamental	Yes	Pass	
6.4	Field Strength of Spurious Emissions Less Than 30 MHz	Yes	Pass	
6.5	Field Strength of Spurious Emissions Greater Than 30 MHz	Yes	Pass	
6.8	Frequency Stability	Yes	Pass	
6.9	Occupied Bandwidth	Yes	Pass	

Deviations From Test Standards

None

Approved By:

Kyle Holgate, Operations Manager

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. 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. This report reflects only those tests from the referenced standards shown in the certificate of test. It does not include inspection or verification of labels, identification, marking or user information. As indicated in the Statement of Work sent with the quotation, Element's standard process is to always use the latest published version of the test methods even when earlier versions are cited in the test specification. Issuance of a purchase order was de facto acceptance of this approach. Otherwise, the client would have advised Element in writing of the specific version of the test methods they wanted applied to the subject testing.

REVISION HISTORY

Revision Number	Description	Date (yyyy-mm-dd)	Page Number
01	Added power table	2022-08-17	11
	The frequency stability has been updated. Used the measured value at 20C as the nominal.	2022-08-17	38
	Added OBW to the GRAP0078.2 Rev. 1 report folder and updated the CoT.	2022-08-17	46
	Block diagram updated.	2022-08-17	7
	Added OBW photos to photos only report	2022-08-17	N/A
	Updated the cover, accreditation and facilities pages.	2022-08-17	1, 4, 5
	Updated test dates	2022-08-17	1, 10, 13
	Updated the frequency range investigated and added a note in the deviations on Spurious above 30MHz.	2022-08-17	36-37

ACCREDITATIONS AND AUTHORIZATIONS

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 - Each laboratory is accredited by A2LA to ISO / IEC 17025, and as a product certifier to ISO / IEC 17065 which allows Element to certify transmitters to FCC and IC specifications.

Canada

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB) and as a CAB for the acceptance of test data.

European Union

European Commission – Recognized as an EU Notified Body validated for the EMCD and RED Directives.

United Kingdom

BEIS – Recognized by the UK as an Approved Body under the UK Radio Equipment and UK EMC Regulations.

Australia/New Zealand

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

Korea

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

Japan

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

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.

Singapore

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

Israel

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

Hong Kong

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

Vietnam

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

SCOPE

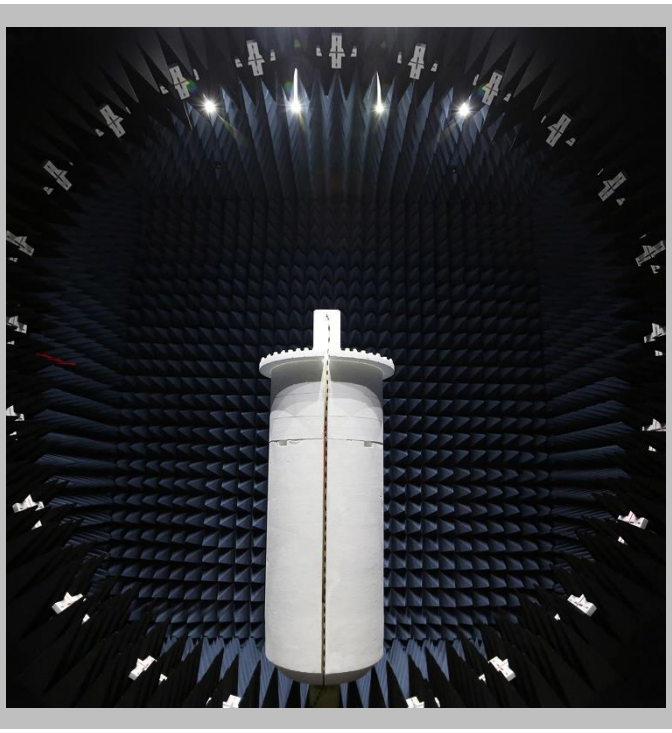
For details on the Scopes of our Accreditations, please visit:

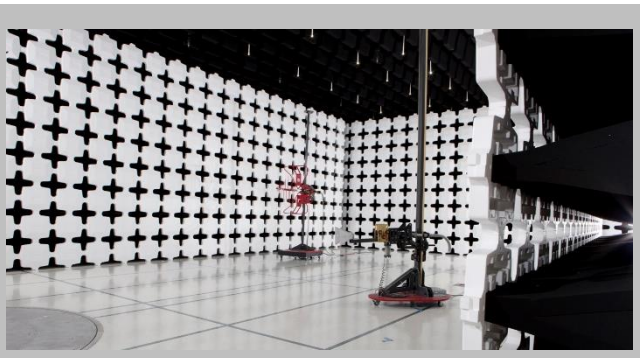
California Minnesota Oregon Texas Washington

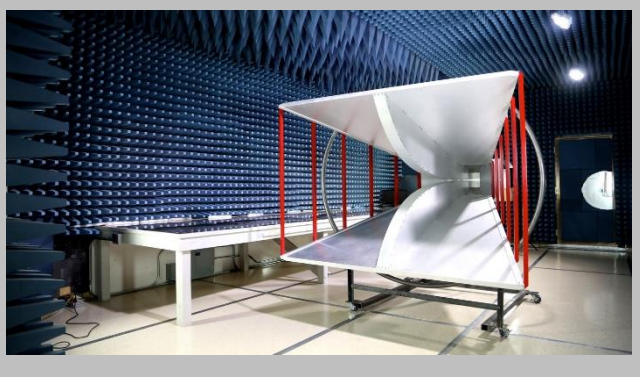
FACILITIES

element
2020.12.15

California	Minnesota	Oregon	Texas	Washington
Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-11 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Labs NC01-05 19201 120th Ave NE Bothell, WA 98011 (425)984-6600
A2LA				
Lab Code: 3310.04	Lab Code: 3310.05	Lab Code: 3310.02	Lab Code: 3310.03	Lab Code: 3310.06
Innovation, Science and Economic Development Canada				
2834B-1, 2834B-3	2834E-1, 2834E-3	2834D-1	2834G-1	2834F-1
BSMI				
SL2-IN-E-1154R	SL2-IN-E-1152R	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI				
A-0029	A-0109	A-0108	A-0201	A-0110
Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA				
US0158	US0175	US0017	US0191	US0157







MEASUREMENT UNCERTAINTY

element
TMU.2015.07.10

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 QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable test description page. 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 16-4-2 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.

Test	+ MU	- MU
Frequency Accuracy	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	1.2 dB	-1.2 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.2 dB	-5.2 dB
AC Powerline Conducted Emissions (dB)	2.6 dB	-2.6 dB

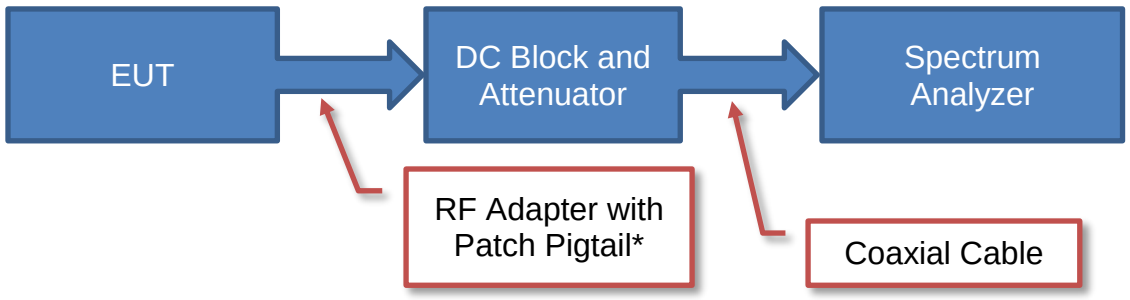
Test Setup Block Diagrams

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

Unless otherwise stated, measurements were made using the bandwidths and detectors specified. No video filter was used.

Antenna Port Conducted Measurements

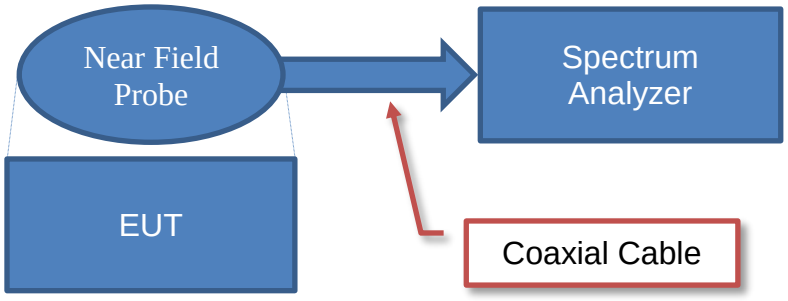


Sample Calculation (logarithmic units)

Measured Value		Measured Level		Reference Level Offset
71.2	=	42.6	+	28.6

*Patch pigtail connector used during measurements and accounted for in reference level offset.

Near Field Test Fixture Measurements

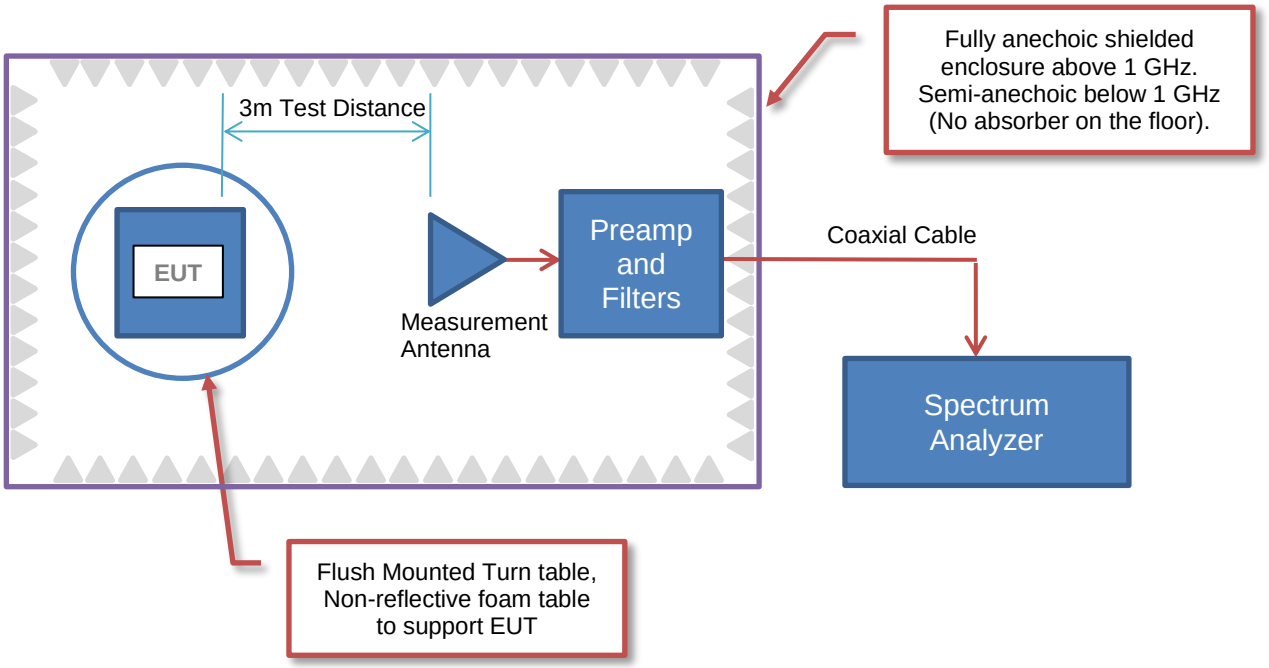


Sample Calculation (logarithmic units)

Measured Value		Measured Level		Reference Level Offset
71.2	=	42.6	+	28.6

Test Setup Block Diagrams

Emissions Measurements



Sample Calculation (logarithmic units)

Radiated Emissions:

Measured Level (Amplitude)		Factor: Antenna Factor		Factor: Cable Factor		Factor: Amplifier Gain		Distance Adjustment Factor		External Attenuation		Field Strength
42.6	+	28.6	+	3.1	-	40.8	+	0.0	+	0.0	=	**33.5**

Conducted Emissions:

Measured Level (Amplitude)		Factor: Transducer Factor		Factor: Cable Factor		External Attenuation		Adjusted Level
26.7	+	0.3	+	0.1	+	20.0	=	**47.1**

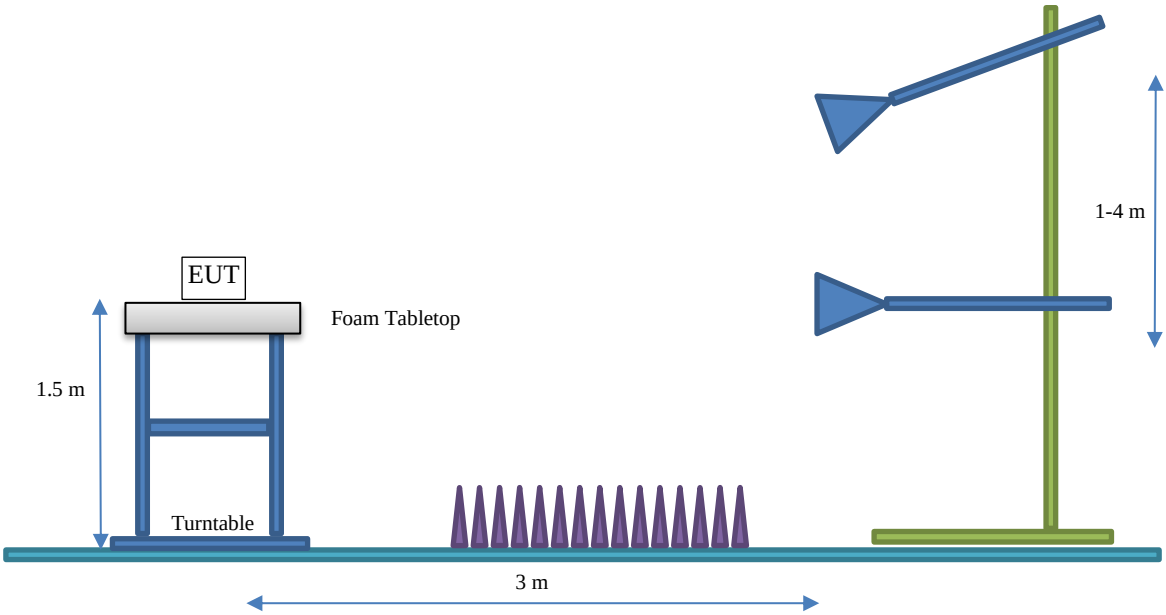
Radiated Power (ERP/EIRP) – Substitution Method:

Measured Level into Substitution Antenna (Amplitude dBm)		Substitution Antenna Factor (dBi)		EIRP to ERP (if applicable)		Measured power (dBm ERP/EIRP)
10.0	+	6.0	-	2.15	=	**13.9/16.0**

Test Setup Block Diagrams

Bore Sighting (>1GHz)

The diameter of the illumination area is the dimension of the line tangent to the EUT formed by 3 dB beamwidth of the measurement antenna at the measurement distance. At a 3 meter test distance, the diameter of the illumination area was 3.8 meters at 1 GHz and greater than 2.1 meters up to 6 GHz. Above 1 GHz, when required by the measurement standard, the antenna is pointed for both azimuth and elevation to maintain the receive antenna within the cone of radiation from the EUT. The specified measurement detectors were used for comparison of the emissions to the peak and average specification limits.



PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	Graphic Products, Inc.
Address:	9825 SW Sunshine Court
City, State, Zip:	Beaverton, OR 97005
Test Requested By:	Michael Noble
EUT:	Bronco Max
First Date of Test:	February 17, 2021
Last Date of Test:	August 10, 2021
Receipt Date of Samples:	February 15, 2021
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
Standalone thermal transfer printer with a display and keyboard

Testing Objective:
To demonstrate compliance to FCC Part 15.225 specifications.

POWER SETTINGS AND ANTENNAS

The power settings, antenna gain value(s) and cable loss (if applicable) used for the testing contained in this report were provided by the customer and will affect the validity of the results. Element assumes no responsibility for the accuracy of this information.

ANTENNA GAIN (dBi)

Type	Model	Provided by:	Frequency Range (MHz)	ISO Protocol	Gain (dBi)
3.75" x 4.5" Single Turn Loop Antenna	DA-AN12	Manufacturer	13.56 MHz	ISO 15693	N/A

No adjustable power settings were provided. The EUT was tested using power settings pre-defined by the manufacturer.

CONFIGURATIONS

Configuration GRAP0078- 1

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Thermal Transfer Printer	Graphic Products, Inc.	Bronco Max	Cert 1

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Power Supply	Wearnes	WDS5150240	200400000014

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Laptop PC	Acer	V5-131-2887	3340294334

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
AC Power Cable	No	1.8 m	No	Power Supply	AC Mains
CAT 5e	No	4.6 m	No	Thermal Transfer Printer	Laptop PC
DC Power Cable	No	1 m	Yes	Thermal Transfer Printer	Power Supply

CONFIGURATIONS

Configuration GRAP0078- 2

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Thermal Transfer Printer	Graphic Products, Inc.	Bronco Max	Cert 1

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Power Supply	Wearnes	WDS5150240	200400000014

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Laptop PC	Acer	V5-131-2887	3340294334

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
AC Power Cable	No	1.8 m	No	Power Supply	AC Mains
CAT 5e	No	4.6 m	No	Thermal Transfer Printer	Laptop PC
DC Power Cable	No	1 m	Yes	Thermal Transfer Printer	Power Supply
USB 1	Yes	4.6 m	No	Thermal Transfer Printer	Laptop PC
USB 2	Yes	4.6 m	No	Thermal Transfer Printer	Laptop PC

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2021-02-17	Field Strength of Fundamental	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	2021-02-17	Field Strength of Spurious Emissions Less Than 30 MHz	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
3	2021-02-18	Field Strength of Spurious Emissions Greater Than 30 MHz	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
4	2021-02-19	Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
5	2021-02-22	Frequency Stability	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
6	2021-08-10	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

POWERLINE CONDUCTED EMISSIONS

element
WTD.2020.12.03.1
EmiR5 2021.01.08.0, PSA-ESCI
2021.01.22.0

TEST DESCRIPTION

The EUT will be powered either directly or indirectly from the AC power line. Therefore, conducted emissions measurements were made on the AC input of the EUT, or on the AC input of the device used to power the EUT.

The EUT was transmitting at its maximum data rate. For each mode, the spectrum was scanned from 150 kHz to 30 MHz. The test setup and procedures were in accordance with ANSI C63.10.

In the event that the operating frequency of 13.56 MHz is causing the product to fail the FCC 15.207 limits, the following guidance can be used:

FCC KDB 174176 D01 AC Conducted FAQ v01r01, June 3, 2015 Section Q5:

> For a device with a permanent or detachable antenna operating at or below 30 MHz, the FCC will accept measurements performed with a suitable dummy load in lieu of the antenna under the following conditions:
>
> (1) perform the AC power-line conducted tests with the antenna connected to determine compliance with Section 15.207 limits outside the transmitter's fundamental emission band;
>
> (2) retest with a dummy load in lieu of the antenna to determine compliance with Section 15.207 limits within the transmitter's fundamental emission band. For a detachable antenna, remove the antenna and connect a suitable dummy load to the antenna connector. For a permanent antenna, remove the antenna and terminate the RF output with a dummy load or network which simulates the antenna in the fundamental frequency band.
>
> All measurements must be performed as specified in clause 6.2 of ANSI C63.10-2013.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Receiver	Rohde & Schwarz	ESR7	ARI	2020-07-09	2021-07-09
LISN	Solar Electronics	9252-50-R-24-BNC	LIP	2020-08-31	2021-08-31
Cable - Conducted Cable Assembly	Northwest EMC	EVG, HHD, RKT	EVGA	2021-01-05	2022-01-05

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.6 dB	-2.6 dB

CONFIGURATIONS INVESTIGATED

GRAP0078-2

MODES INVESTIGATED

On, RFID continuous transmit at 13.56MHz
On, RFID off

POWERLINE CONDUCTED EMISSIONS

element
WTD.2020.12.03.1
EmiR5 2021.01.08.0, PSA-ESCI 2021.01.22.0

EUT:	Bronco Max	Work Order:	GRAP0078
Serial Number:	Cert 1	Date:	2021-02-19
Customer:	Graphic Products, Inc.	Temperature:	23.4°C
Attendees:	Chad Schaffer	Relative Humidity:	34.5%
Customer Project:	None	Bar. Pressure:	1025 mb
Tested By:	Cole Ghizzone	Job Site:	EV07
Power:	110VAC/60Hz	Configuration:	GRAP0078-2

TEST SPECIFICATIONS

Specification: Equipment Class A	Method:
FCC 15.107:2021	ANSI C63.4:2014

TEST PARAMETERS

Run #:	10	Line:	Neutral	Add. Ext. Attenuation (dB):	0

COMMENTS

The EUT is a class A device and meets the class A limits in FCC 15.107.

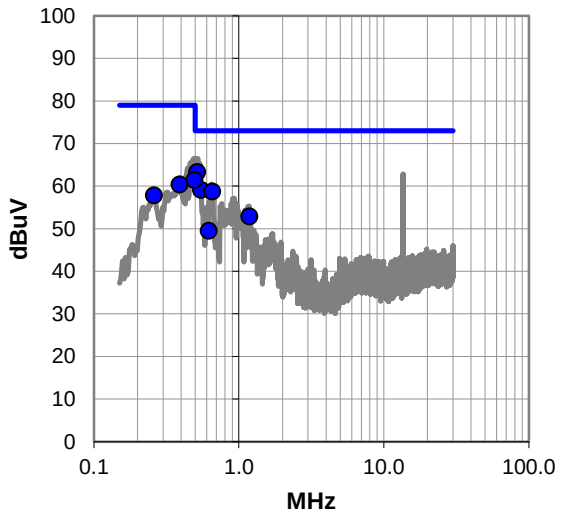
EUT OPERATING MODES

On, RFID continuous transmit at 13.56MHz

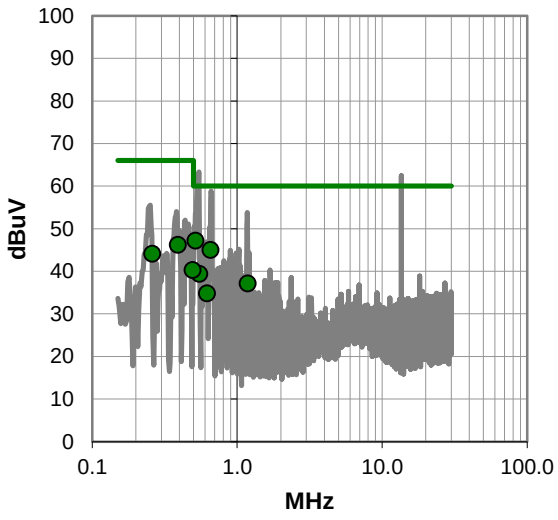
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

element
WTD.2020.12.03.1
EmiR5 2021.01.08.0, PSA-ESCI
2021.01.22.0

RESULTS - Run #10

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.517	43.3	20.0	63.3	73.0	-9.7
0.548	39.1	20.0	59.1	73.0	-13.9
0.656	38.7	20.0	58.7	73.0	-14.3
0.494	41.4	20.0	61.4	79.0	-17.6
0.390	40.4	20.0	60.4	79.0	-18.6
1.180	32.9	20.0	52.9	73.0	-20.1
0.260	37.8	20.0	57.8	79.0	-21.2
0.619	29.5	20.0	49.5	73.0	-23.5

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.517	27.2	20.0	47.2	60.0	-12.8
0.656	25.0	20.0	45.0	60.0	-15.0
0.390	26.2	20.0	46.2	66.0	-19.8
0.548	19.4	20.0	39.4	60.0	-20.6
0.260	24.1	20.0	44.1	66.0	-21.9
1.180	17.1	20.0	37.1	60.0	-22.9
0.619	14.8	20.0	34.8	60.0	-25.2
0.494	20.3	20.0	40.3	66.0	-25.7

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS

element
WTD.2020.12.03.1
EmiR5 2021.01.08.0, PSA-ESCI 2021.01.22.0

EUT:	Bronco Max	Work Order:	GRAP0078
Serial Number:	Cert 1	Date:	2021-02-19
Customer:	Graphic Products, Inc.	Temperature:	23.4°C
Attendees:	Chad Schaffer	Relative Humidity:	34.5%
Customer Project:	None	Bar. Pressure:	1025 mb
Tested By:	Cole Ghizzone	Job Site:	EV07
Power:	110VAC/60Hz	Configuration:	GRAP0078-2

TEST SPECIFICATIONS

Specification: Equipment Class A	Method:
FCC 15.107:2021	ANSI C63.4:2014

TEST PARAMETERS

Run #:	11	Line:	High Line	Add. Ext. Attenuation (dB):	0

COMMENTS

The EUT is a class A device and meets the class A limits in FCC 15.107.

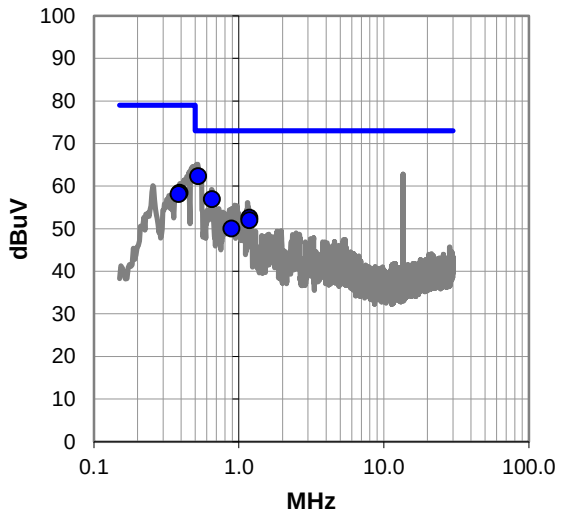
EUT OPERATING MODES

On, RFID continuous transmit at 13.56MHz

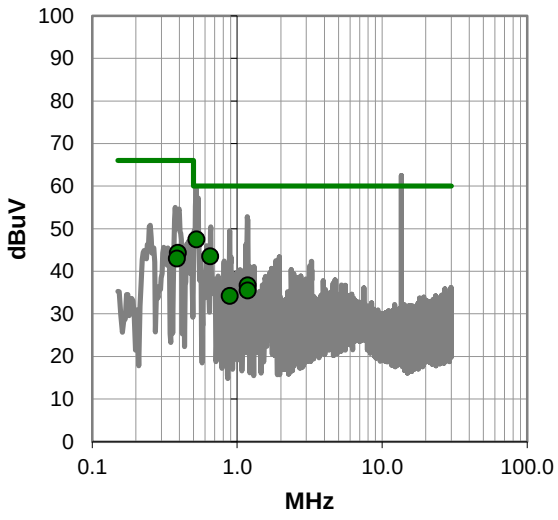
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

element
WTD.2020.12.03.1
EmiR5 2021.01.08.0, PSA-ESCI
2021.01.22.0

RESULTS - Run #11

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.524	42.3	20.0	62.3	73.0	-10.7
0.653	36.9	20.0	56.9	73.0	-16.1
1.181	32.6	20.0	52.6	73.0	-20.4
0.390	38.4	20.0	58.4	79.0	-20.6
0.384	38.1	20.0	58.1	79.0	-20.9
1.185	32.0	20.0	52.0	73.0	-21.0
0.888	30.0	20.0	50.0	73.0	-23.0

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.524	27.5	20.0	47.5	60.0	-12.5
0.653	23.5	20.0	43.5	60.0	-16.5
0.390	24.3	20.0	44.3	66.0	-21.7
0.384	23.0	20.0	43.0	66.0	-23.0
1.181	16.7	20.0	36.7	60.0	-23.3
1.185	15.5	20.0	35.5	60.0	-24.5
0.888	14.2	20.0	34.2	60.0	-25.8

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS

element
WTD.2020.12.03.1
EmiR5 2021.01.08.0, PSA-ESCI
2021.01.22.0

EUT:	Bronco Max	Work Order:	GRAP0078
Serial Number:	Cert 1	Date:	2021-02-19
Customer:	Graphic Products, Inc.	Temperature:	23.4°C
Attendees:	Chad Schaffer	Relative Humidity:	34.5%
Customer Project:	None	Bar. Pressure:	1025 mb
Tested By:	Cole Ghizzone	Job Site:	EV07
Power:	110VAC/60Hz	Configuration:	GRAP0078-2

TEST SPECIFICATIONS

Specification: Equipment Class A	Method:
FCC 15.107:2021	ANSI C63.4:2014

TEST PARAMETERS

Run #:	12	Line:	High Line	Add. Ext. Attenuation (dB):	0

COMMENTS

The data shows no significant change to the emissions with the radio powered off.

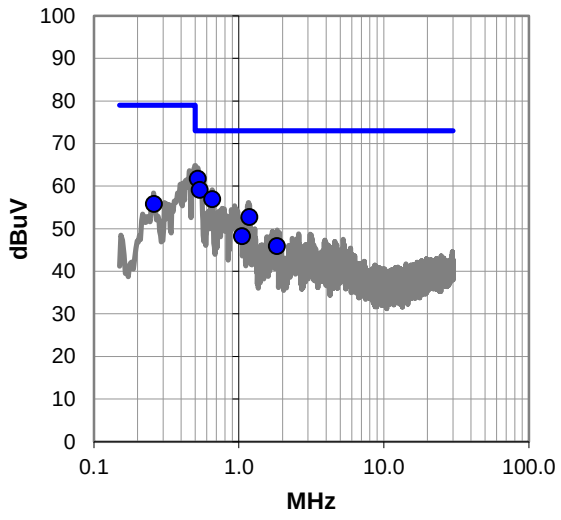
EUT OPERATING MODES

On, RFID off

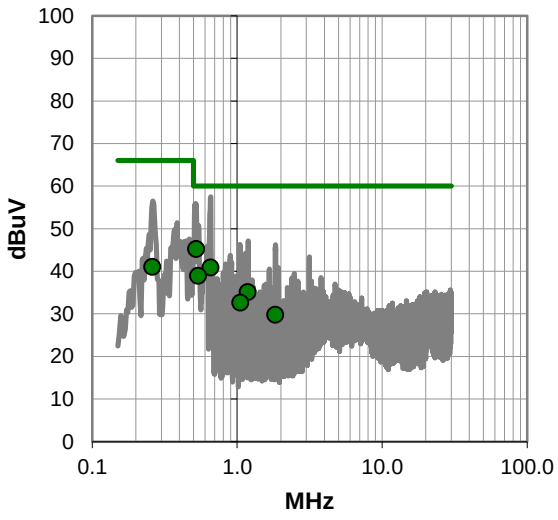
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

element
WTD.2020.12.03.1
EmiR5 2021.01.08.0, PSA-ESCI
2021.01.22.0

RESULTS - Run #12

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.520	41.7	20.0	61.7	73.0	-11.3
0.537	39.1	20.0	59.1	73.0	-13.9
0.657	36.9	20.0	56.9	73.0	-16.1
1.183	32.7	20.0	52.7	73.0	-20.3
0.260	35.8	20.0	55.8	79.0	-23.2
1.052	28.2	20.0	48.2	73.0	-24.8
1.836	25.9	20.0	45.9	73.0	-27.1

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.520	25.2	20.0	45.2	60.0	-14.8
0.657	20.9	20.0	40.9	60.0	-19.1
0.537	18.9	20.0	38.9	60.0	-21.1
1.183	15.1	20.0	35.1	60.0	-24.9
0.260	21.0	20.0	41.0	66.0	-25.0
1.052	12.6	20.0	32.6	60.0	-27.4
1.836	9.8	20.0	29.8	60.0	-30.2

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS

element
WTD.2020.12.03.1
EmiR5 2021.01.08.0, PSA-ESCI 2021.01.22.0

EUT:	Bronco Max	Work Order:	GRAP0078
Serial Number:	Cert 1	Date:	2021-02-19
Customer:	Graphic Products, Inc.	Temperature:	23.4°C
Attendees:	Chad Schaffer	Relative Humidity:	34.5%
Customer Project:	None	Bar. Pressure:	1025 mb
Tested By:	Cole Ghizzone	Job Site:	EV07
Power:	110VAC/60Hz	Configuration:	GRAP0078-2

TEST SPECIFICATIONS

Specification: Equipment Class A	Method:
FCC 15.107:2021	ANSI C63.4:2014

TEST PARAMETERS

Run #:	13	Line:	Neutral	Add. Ext. Attenuation (dB):	0

COMMENTS

The data shows no significant change to the emissions with the radio powered off.

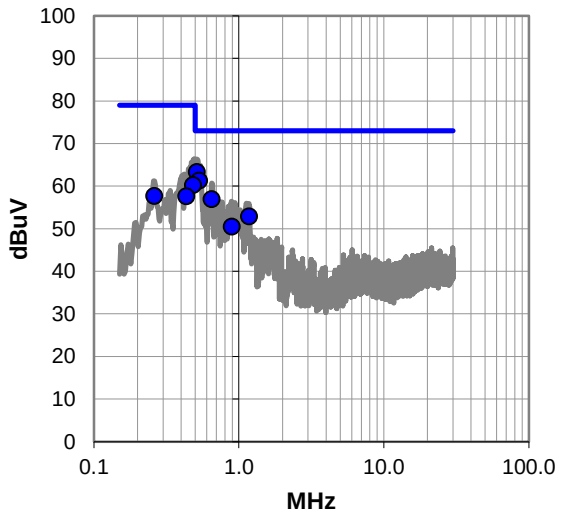
EUT OPERATING MODES

On, RFID off

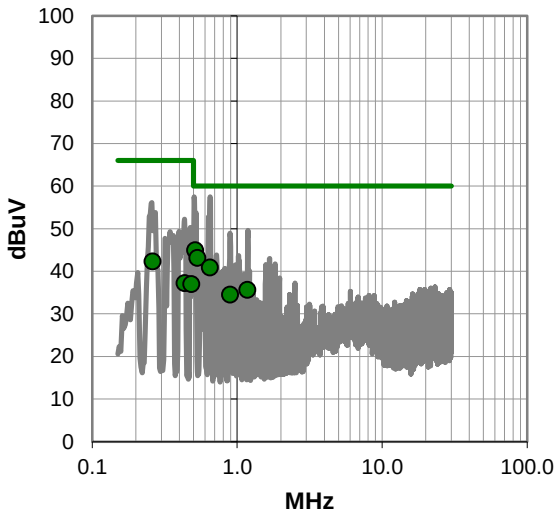
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

element
WTD.2020.12.03.1
EmiR5 2021.01.08.0, PSA-ESCI
2021.01.22.0

RESULTS - Run #13

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.514	43.3	20.0	63.3	73.0	-9.7
0.532	41.3	20.0	61.3	73.0	-11.7
0.648	36.9	20.0	56.9	73.0	-16.1
0.482	40.2	20.0	60.2	79.0	-18.8
1.180	32.9	20.0	52.9	73.0	-20.1
0.261	37.7	20.0	57.7	79.0	-21.3
0.435	37.6	20.0	57.6	79.0	-21.4
0.892	30.5	20.0	50.5	73.0	-22.5

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.514	24.9	20.0	44.9	60.0	-15.1
0.532	23.1	20.0	43.1	60.0	-16.9
0.648	20.9	20.0	40.9	60.0	-19.1
0.261	22.3	20.0	42.3	66.0	-23.7
1.180	15.6	20.0	35.6	60.0	-24.4
0.892	14.5	20.0	34.5	60.0	-25.5
0.435	17.2	20.0	37.2	66.0	-28.8
0.482	17.0	20.0	37.0	66.0	-29.0

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS

element
WTD.2020.12.03.1
EmiR5 2021.01.08.0, PSA-ESCI 2021.01.22.0

EUT:	Bronco Max	Work Order:	GRAP0078
Serial Number:	Cert 1	Date:	2021-02-19
Customer:	Graphic Products, Inc.	Temperature:	23.4°C
Attendees:	Chad Schaffer	Relative Humidity:	34.5%
Customer Project:	None	Bar. Pressure:	1025 mb
Tested By:	Cole Ghizzone	Job Site:	EV07
Power:	110VAC/60Hz	Configuration:	GRAP0078-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2021	ANSI C63.10:2013

TEST PARAMETERS

Run #:	11	Line:	High Line	Add. Ext. Attenuation (dB):	0

COMMENTS

None

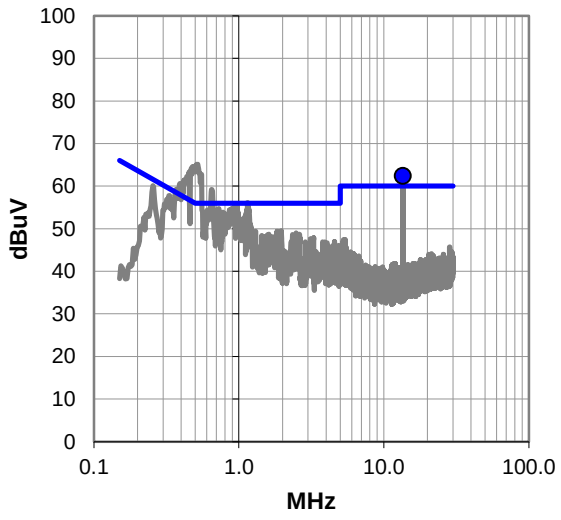
EUT OPERATING MODES

On, RFID continuous transmit at 13.56MHz

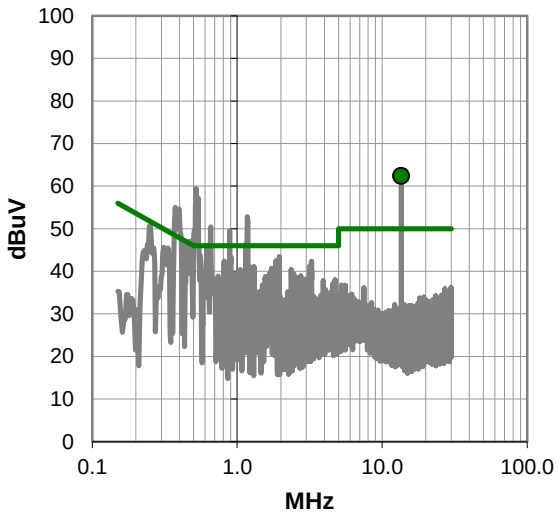
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

element
WTD.2020.12.03.1
EmiR5 2021.01.08.0, PSA-ESCI 2021.01.22.0

RESULTS - Run #11

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.560	42.1	20.3	62.4	60.0	2.4

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.560	42.1	20.3	62.4	50.0	12.4

CONCLUSION

Fail

Tested By

POWERLINE CONDUCTED EMISSIONS

element
WTD.2020.12.03.1
EmiR5 2021.01.08.0, PSA-ESCI 2021.01.22.0

EUT:	Bronco Max	Work Order:	GRAP0078
Serial Number:	Cert 1	Date:	2021-02-19
Customer:	Graphic Products, Inc.	Temperature:	23.4°C
Attendees:	Chad Schaffer	Relative Humidity:	34.5%
Customer Project:	None	Bar. Pressure:	1025 mb
Tested By:	Cole Ghizzone	Job Site:	EV07
Power:	110VAC/60Hz	Configuration:	GRAP0078-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2021	ANSI C63.10:2013

TEST PARAMETERS

Run #:	10	Line:	Neutral	Add. Ext. Attenuation (dB):	0

COMMENTS

None

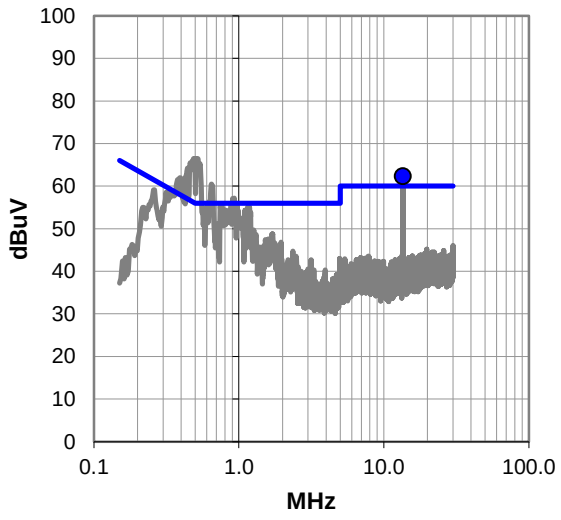
EUT OPERATING MODES

On, RFID continuous transmit at 13.56MHz

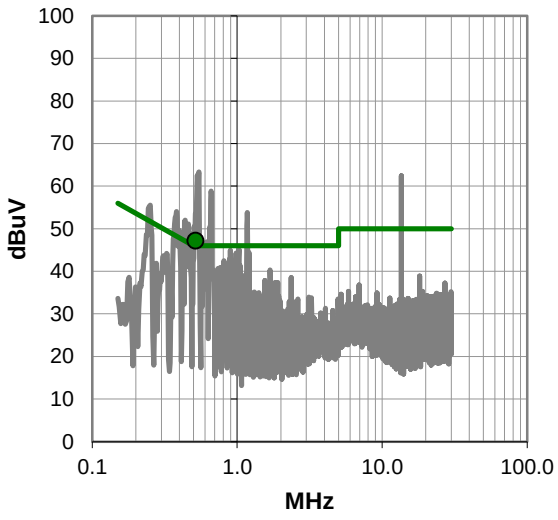
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

element
WTD.2020.12.03.1
EmiR5 2021.01.08.0, PSA-ESCI 2021.01.22.0

RESULTS - Run #10

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.561	42.0	20.3	62.3	60.0	2.3

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.517	27.2	20.0	47.2	46.0	1.2

CONCLUSION

Fail

Tested By

POWERLINE CONDUCTED EMISSIONS

element
WTD.2020.12.03.1
EmiR5 2021.01.08.0, PSA-ESCI 2021.01.22.0

EUT:	Bronco Max	Work Order:	GRAP0078
Serial Number:	Cert 1	Date:	2021-02-19
Customer:	Graphic Products, Inc.	Temperature:	23.4°C
Attendees:	Chad Schaffer	Relative Humidity:	34.5%
Customer Project:	None	Bar. Pressure:	1025 mb
Tested By:	Cole Ghizzone	Job Site:	EV07
Power:	110VAC/60Hz	Configuration:	GRAP0078-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2021	ANSI C63.10:2013

TEST PARAMETERS

Run #:	14	Line:	Neutral	Add. Ext. Attenuation (dB):	0

COMMENTS

RFID antenna removed.

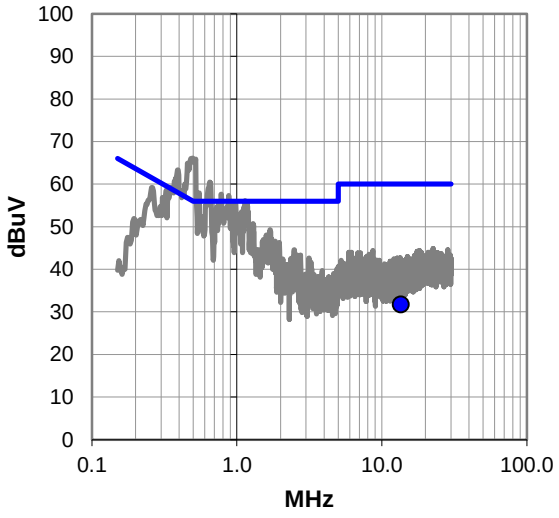
EUT OPERATING MODES

On, RFID continuous transmit at 13.56MHz

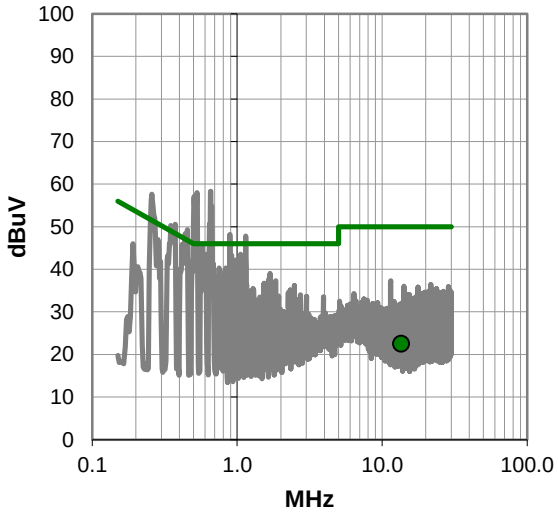
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

element
WTD.2020.12.03.1
EmiR5 2021.01.08.0, PSA-ESCI
2021.01.22.0

RESULTS - Run #14

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.560	11.4	20.3	31.7	60.0	-28.3

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.560	2.2	20.3	22.5	50.0	-27.5

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS

element
WTD.2020.12.03.1
EmiR5 2021.01.08.0, PSA-ESCI 2021.01.22.0

EUT:	Bronco Max	Work Order:	GRAP0078
Serial Number:	Cert 1	Date:	2021-02-19
Customer:	Graphic Products, Inc.	Temperature:	23.4°C
Attendees:	Chad Schaffer	Relative Humidity:	34.5%
Customer Project:	None	Bar. Pressure:	1025 mb
Tested By:	Cole Ghizzone	Job Site:	EV07
Power:	110VAC/60Hz	Configuration:	GRAP0078-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2021	ANSI C63.10:2013

TEST PARAMETERS

Run #:	15	Line:	High Line	Add. Ext. Attenuation (dB):	0

COMMENTS

RFID antenna removed.

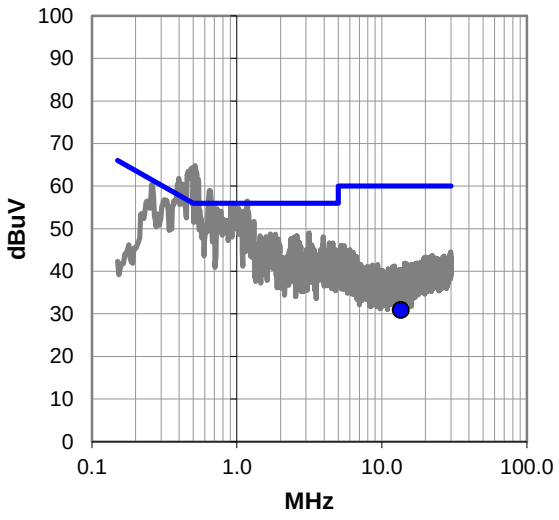
EUT OPERATING MODES

On, RFID continuous transmit at 13.56MHz

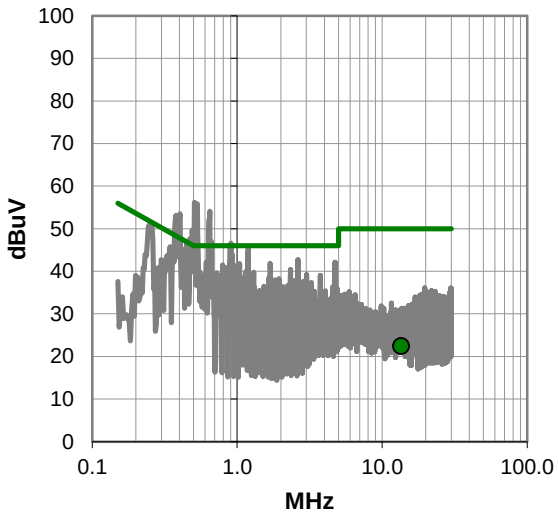
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

element
WTD.2020.12.03.1
EmiR5 2021.01.08.0, PSA-ESCI
2021.01.22.0

RESULTS - Run #15

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.560	10.6	20.3	30.9	60.0	-29.1

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.560	2.1	20.3	22.4	50.0	-27.6

CONCLUSION

Pass

Tested By

FIELD STRENGTH OF FUNDAMENTAL

PSA-ESCI 2021.01.22.0

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

MODES OF OPERATION

On, continuous transmit RFID at 13.56MHz.

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

GRAP0078 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency	9 kHz	Stop Frequency	30 MHz

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.	Cal. Due
Cable	None	10m Test Distance Cable	EVL	2021-02-02	2022-02-02
Antenna - Loop	EMCO	6502	AOA	2020-07-06	2022-07-06
Analyzer - Spectrum Analyzer	Agilent	E4443A	AFB	2020-06-26	2021-06-26

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.

The fundamental carrier of the EUT was maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna height and polarization (per ANSI C63.10). A calibrated active loop antenna was used for this test in order to provide sufficient measurement sensitivity. The reference point of the loop antenna was maintained at 1m above the ground plane during the testing.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

As outlined in 15.209(e), 15.31(f)(2), and RSS-GEN, 6.5, 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.

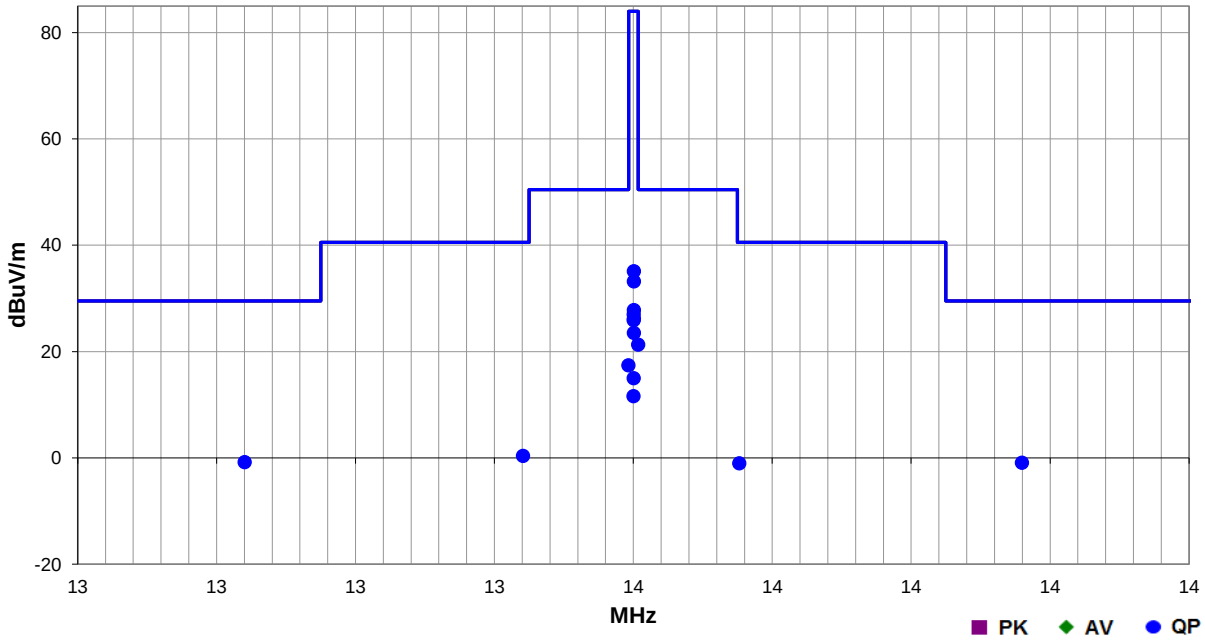
FIELD STRENGTH OF FUNDAMENTAL

EmiR5 2021.01.08.0 PSA-ESCI 2021.01.22.0

Work Order:	GRAP0078	**Date:**	2021-02-17		
Project:	None	**Temperature:**	22.8 °C		
Job Site:	EV11	**Humidity:**	33.3% RH		
Serial Number:	Cert 1	**Barometric Pres.:**	1031 mbar	**Tested by:**	Cole Ghizzone
EUT:	Bronco Max				
Configuration:	2				
Customer:	Graphic Products, Inc.				
Attendees:	Chad Schaffer				
EUT Power:	110VAC/60Hz				
Operating Mode:	On, continuous transmit RFID at 13.56MHz.				
Deviations:	None				
Comments:	See data comments for EUT orientation.				

Test Specifications	**Test Method**
FCC 15.225:2021	ANSI C63.10:2013

Run #	12	**Test Distance (m)**	10	**Antenna Height(s)**	1 (m)	**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
13.567	28.4	12.0	1.0	187.0	10.0	0.0	Perp EUT	QP	-19.1	21.3	50.5	-29.2	EUT Vertical
13.000	6.2	12.1	1.0	187.0	10.0	0.0	Perp EUT	QP	-19.1	-0.8	29.5	-30.3	EUT Vertical
14.119	6.2	12.0	1.0	187.0	10.0	0.0	Perp EUT	QP	-19.1	-0.9	29.5	-30.4	EUT Vertical
13.553	24.5	12.0	1.0	181.0	10.0	0.0	Perp EUT	QP	-19.1	17.4	50.5	-33.1	EUT Vertical
13.401	7.4	12.1	1.0	181.0	10.0	0.0	Perp EUT	QP	-19.1	0.4	40.5	-40.1	EUT Vertical
13.712	6.1	12.0	1.0	187.0	10.0	0.0	Perp EUT	QP	-19.1	-1.0	40.5	-41.5	EUT Vertical
13.561	42.2	12.0	1.0	192.0	10.0	0.0	Perp EUT	QP	-19.1	35.1	84.0	-48.9	EUT Vertical
13.561	40.3	12.0	1.0	114.0	10.0	0.0	Perp EUT	QP	-19.1	33.2	84.0	-50.8	EUT Horizontal
13.561	34.9	12.0	1.0	200.0	10.0	0.0	Para Floor	QP	-19.1	27.8	84.0	-56.2	EUT Vertical
13.561	34.1	12.0	1.0	286.0	10.0	0.0	Para EUT	QP	-19.1	27.0	84.0	-57.0	EUT Vertical
13.561	33.3	12.0	1.0	202.0	10.0	0.0	Para EUT	QP	-19.1	26.2	84.0	-57.8	EUT Horizontal
13.561	33.0	12.0	1.0	93.0	10.0	0.0	Para Floor	QP	-19.1	25.9	84.0	-58.1	EUT Horizontal
13.561	30.6	12.0	1.0	47.0	10.0	0.0	Perp EUT	QP	-19.1	23.5	84.0	-60.5	EUT On Side
13.561	22.1	12.0	1.0	190.0	10.0	0.0	Para Floor	QP	-19.1	15.0	84.0	-69.0	EUT On Side
13.560	18.7	12.0	1.0	112.0	10.0	0.0	Para EUT	QP	-19.1	11.6	84.0	-72.4	EUT On Side

FIELD STRENGTH OF SPURIOUS EMISSIONS LESS THAN 30 MHZ

PSA-ESCI 2021.01.22.0

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

MODES OF OPERATION

On, continuous transmit RFID at 13.56MHz.

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

GRAP0078 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency	9 kHz	Stop Frequency	30 MHz

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.	Cal. Due
Cable	None	10m Test Distance Cable	EVL	2021-02-02	2022-02-02
Antenna - Loop	EMCO	6502	AOA	2020-07-06	2022-07-06
Analyzer - Spectrum Analyzer	Agilent	E4443A	AFB	2020-06-26	2021-06-26

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.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis if required, and adjusting the measurement antenna height and polarization (per ANSI C63.10). An active loop antenna was used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

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

As outlined in 15.209(e), 15.31(f)(2), and RSS-GEN, 6.5, 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.

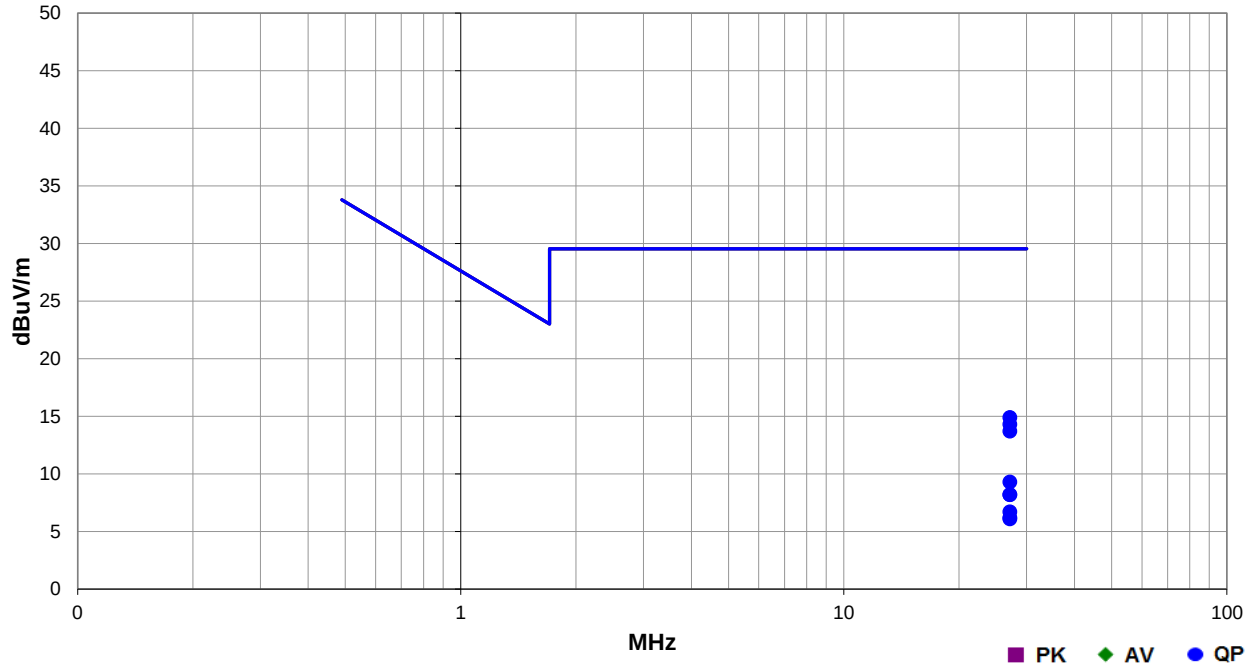
FIELD STRENGTH OF SPURIOUS EMISSIONS LESS THAN 30 MHZ

EmiR5 2021.01.08.0 PSA-ESCI 2021.01.22.0

Work Order:	GRAP0078	**Date:**	2021-02-17		
Project:	None	**Temperature:**	22.8 °C		
Job Site:	EV11	**Humidity:**	33.3% RH		
Serial Number:	Cert 1	**Barometric Pres.:**	1031 mbar	**Tested by:**	Cole Ghizzone
EUT:	Bronco Max				
Configuration:	2				
Customer:	Graphic Products, Inc.				
Attendees:	Chad Schaffer				
EUT Power:	110VAC/60Hz				
Operating Mode:	On, continuous transmit RFID at 13.56MHz.				
Deviations:	None				
Comments:	See data comments for EUT orientation.				

Test Specifications	**Test Method**
FCC 15.225:2021	ANSI C63.10:2013

Run #	12	**Test Distance (m)**	10	**Antenna Height(s)**	1(m)	**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	14.2	10.2	0.1	284.0	10.0	0.0	Perp EUT	QP	-9.5	14.9	29.5	-14.6	EUT On Side
27.121	13.6	10.2	1.0	323.0	10.0	0.0	Perp EUT	QP	-9.5	14.3	29.5	-15.2	EUT Vertical
27.121	13.0	10.2	1.0	27.0	10.0	0.0	Perp EUT	QP	-9.5	13.7	29.5	-15.8	EUT Horizontal
27.121	8.6	10.2	1.0	325.0	10.0	0.0	Para Floor	QP	-9.5	9.3	29.5	-20.2	EUT On Side
27.120	7.5	10.2	1.0	322.0	10.0	0.0	Para Floor	QP	-9.5	8.2	29.5	-21.3	EUT Horizontal
27.121	7.5	10.2	1.0	250.0	10.0	0.0	Para Floor	QP	-9.5	8.2	29.5	-21.3	EUT Vertical
27.123	6.0	10.2	1.0	256.0	10.0	0.0	Para EUT	QP	-9.5	6.7	29.5	-22.8	EUT Vertical
27.123	5.5	10.2	1.0	176.0	10.0	0.0	Para EUT	QP	-9.5	6.2	29.5	-23.3	EUT Horizontal
27.117	5.4	10.2	1.0	169.0	10.0	0.0	Para EUT	QP	-9.5	6.1	29.5	-23.4	EUT On Side

FIELD STRENGTH OF SPURIOUS EMISSIONS GREATER THAN 30 MHZ

PSA-ESCI 2021.01.22.0

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

MODES OF OPERATION

On, continuous transmit RFID 13.56MHz

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

GRAP0078 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	10 GHz

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.	Cal. Due
Filter - Low Pass	Fairview Microwave	FMFL020	PLE	2021-02-02	2022-02-02
Amplifier - Pre-Amplifier	Fairview Microwave	FMAM63001	PAY	2021-02-02	2022-02-02
Antenna - Biconilog	Teseq	CBL 6141B	AXR	2020-10-13	2022-10-13
Analyzer - Spectrum Analyzer	Agilent	E4443A	AFB	2020-06-26	2021-06-26

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 transmitting while set at the operating channel.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions as well as the restricted band requirements.

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

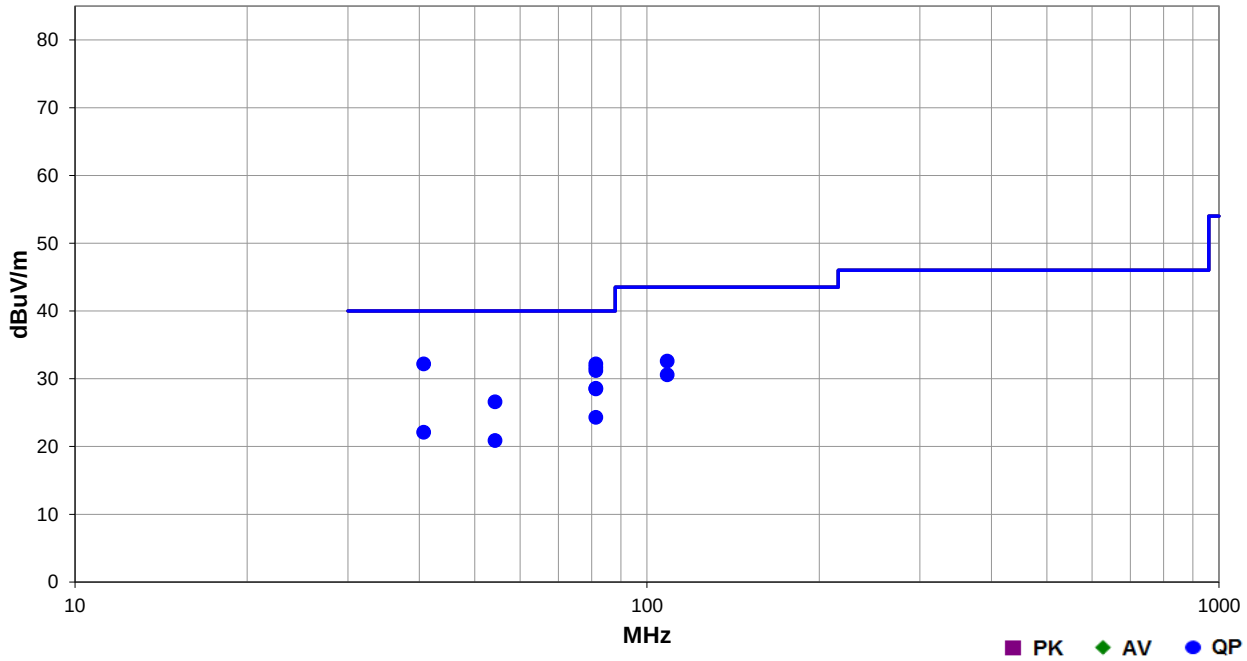
FIELD STRENGTH OF SPURIOUS EMISSIONS GREATER THAN 30 MHZ

EmiR5 2021.01.08.0 PSA-ESCI 2021.01.22.0

Work Order:	GRAP0078	**Date:**	2021-02-18		
Project:	None	**Temperature:**	22.3 °C		
Job Site:	EV11	**Humidity:**	31.8% RH		
Serial Number:	Cert 1	**Barometric Pres.:**	1024 mbar	**Tested by:**	Cole Ghizzone
EUT:	Bronco Max				
Configuration:	2				
Customer:	Graphic Products, Inc.				
Attendees:	Chad Schaffer				
EUT Power:	110VAC/60Hz				
Operating Mode:	On, continuous transmit RFID 13.56MHz				
Deviations:	Measurements in the 1 GHz - 10 GHz range were done using an 80cm table height.				
Comments:	See data comments for EUT orientation.				

Test Specifications	**Test Method**
FCC 15.225:2021	ANSI C63.10:2013

Run #	21	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**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
81.368	59.3	-27.1	1.0	178.0	3.0	0.0	Vert	QP	0.0	32.2	40.0	-7.8	EUT Vertical
40.686	49.3	-17.1	1.0	95.0	3.0	0.0	Vert	QP	0.0	32.2	40.0	-7.8	EUT Vertical
81.367	58.8	-27.1	3.86	288.0	3.0	0.0	Horz	QP	0.0	31.7	40.0	-8.3	EUT Horizontal
81.367	58.3	-27.1	3.87	122.0	3.0	0.0	Horz	QP	0.0	31.2	40.0	-8.8	EUT Vertical
108.488	56.3	-23.7	1.0	25.0	3.0	0.0	Vert	QP	0.0	32.6	43.5	-10.9	EUT Vertical
81.365	55.7	-27.1	1.0	291.0	3.0	0.0	Vert	QP	0.0	28.6	40.0	-11.4	EUT On Side
81.366	55.6	-27.1	1.0	54.0	3.0	0.0	Vert	QP	0.0	28.5	40.0	-11.5	EUT Horizontal
108.493	54.3	-23.7	2.72	310.0	3.0	0.0	Horz	QP	0.0	30.6	43.5	-12.9	EUT Horizontal
54.251	49.9	-23.3	1.0	63.0	3.0	0.0	Vert	QP	0.0	26.6	40.0	-13.4	EUT Vertical
81.367	51.4	-27.1	2.07	105.0	3.0	0.0	Horz	QP	0.0	24.3	40.0	-15.7	EUT On Side
40.685	39.2	-17.1	3.75	139.0	3.0	0.0	Horz	QP	0.0	22.1	40.0	-17.9	EUT Horizontal
54.246	44.1	-23.2	3.06	267.0	3.0	0.0	Horz	QP	0.0	20.9	40.0	-19.1	EUT Horizontal

FREQUENCY STABILITY

XMit 2020.12.30.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Probe - Near Field Set	EMCO	7405	IPD	NCR	NCR
Chamber - Temperature/Humidity	Cincinnati Sub Zero (CSZ)	ZPH-8-2-SCT/AC	TBI	NCR	NCR
Thermometer	Omegaette	HH311	DTY	2021-02-04	2024-02-04
Meter - Multimeter	Tektronix	DMM912	MMH	2019-02-15	2022-02-15
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	2020-03-13	2021-03-13
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFA	2020-02-28	2021-02-28

TEST DESCRIPTION

The spectrum analyzer is equipped with a precision frequency reference that exceeds the stability requirement of the EUT.

Measurements were made on the single transmit frequency as called out on the data sheets. Testing was done while the EUT was continuously polling.

The primary supply voltage was varied from 85 % to 115% of the nominal voltage while at ambient temperature. Using a temperature chamber, the transmit frequency was recorded at the extremes of the specified temperature range of -20 ° to +50° C and at 10°C intervals.

The requirement of a frequency tolerance of ±0.01% is equivalent to 100 ppm
The formula to check for compliance is:

ppm = (Measured Frequency / Measured Nominal Frequency - 1) * 1,000,000

FREQUENCY STABILITY

element

TbtTx 2019.08.30.0 XMit 2020.12.30.0

EUT:	Bronco Max			**Work Order:**	GRAP0078
Serial Number:	Cert 1			**Date:**	22-Feb-21
Customer:	Graphic Products, Inc.			**Temperature:**	22.3 °C
Attendees:	Chad Schaffer			**Humidity:**	33% RH
Project:	None			**Barometric Pres.:**	1039 mbar
Tested by:	Cole Ghizzone	**Power:**	110VAC/60Hz	**Job Site:**	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.225:2021	ANSI C63.10:2013

COMMENTS

None

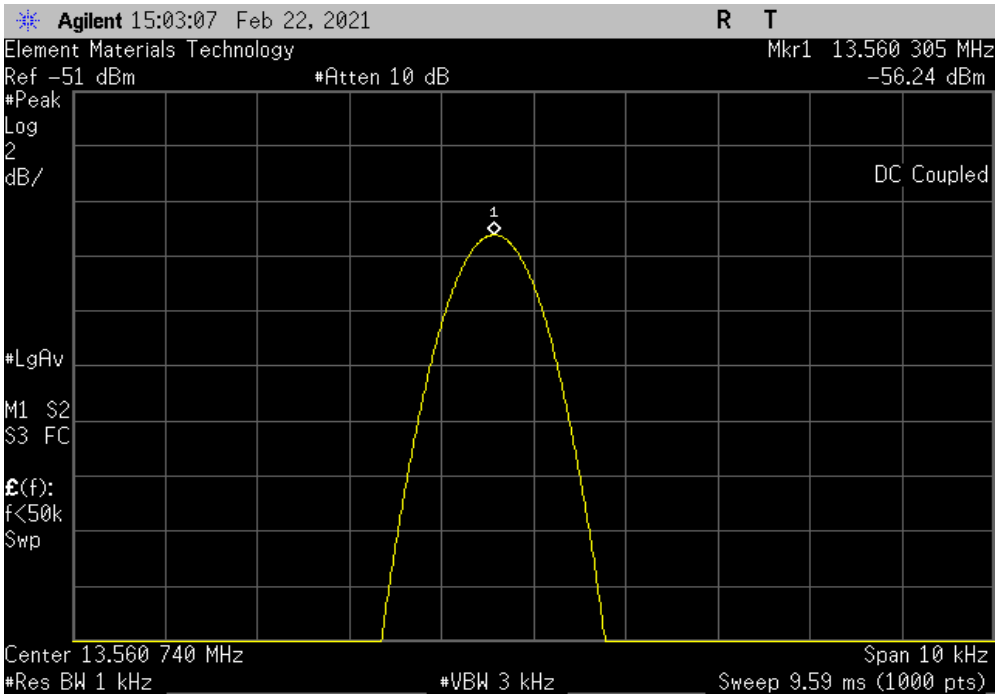
DEVIATIONS FROM TEST STANDARD

None

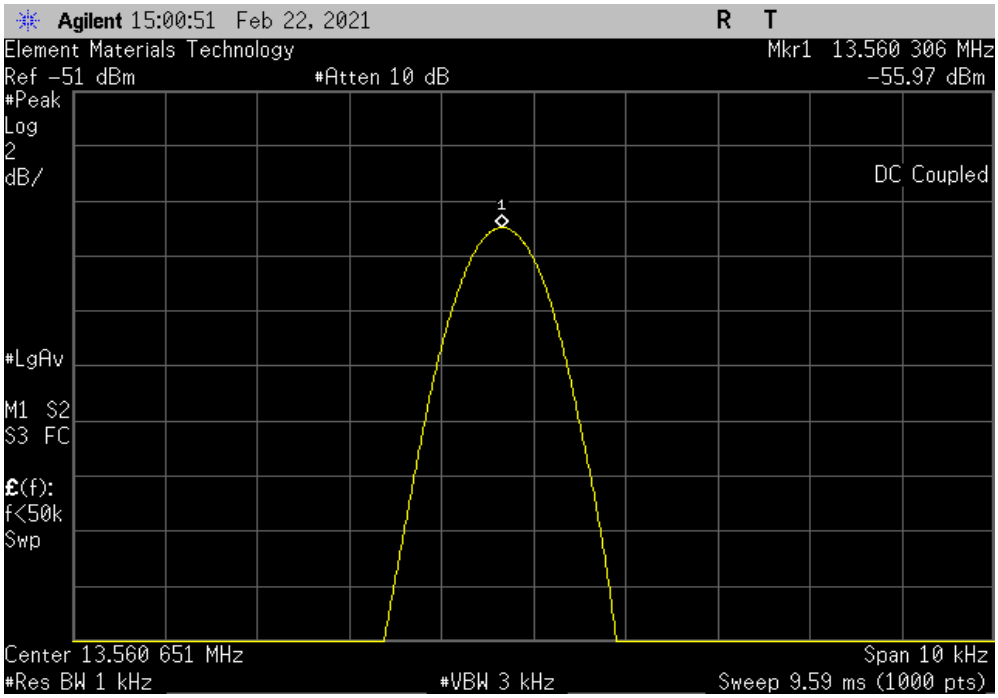
Configuration #	1	Signature

	Measured Value (MHz)	Measured Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
Continuous Tx, RFID, 13.56 MHz					
AC Voltage: 115%	13.560305	13.560308	0.2	100	Pass
AC Voltage: 100%	13.560306	13.560308	0.2	100	Pass
AC Voltage: 85%	13.560307	13.560308	0.1	100	Pass
Temperature: +50°	13.560356	13.560308	0.1	100	Pass
Temperature: +40°	13.560326	13.560308	1.3	100	Pass
Temperature: +30°	13.560315	13.560308	1.3	100	Pass
Temperature: +20°	13.560308	13.560308	0.0	100	Pass
Temperature: +10°	13.560308	13.560308	0.0	100	Pass
Temperature: 0°	13.560328	13.560308	1.5	100	Pass
Temperature: -10°	13.560348	13.560308	1.5	100	Pass
Temperature: -20°	13.560343	13.560308	2.6	100	Pass

Continuous Tx, RFID, 13.56 MHz, AC Voltage: 115%						
		Measured Value (MHz)	Measured Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560305	13.560308	0.2	100	Pass

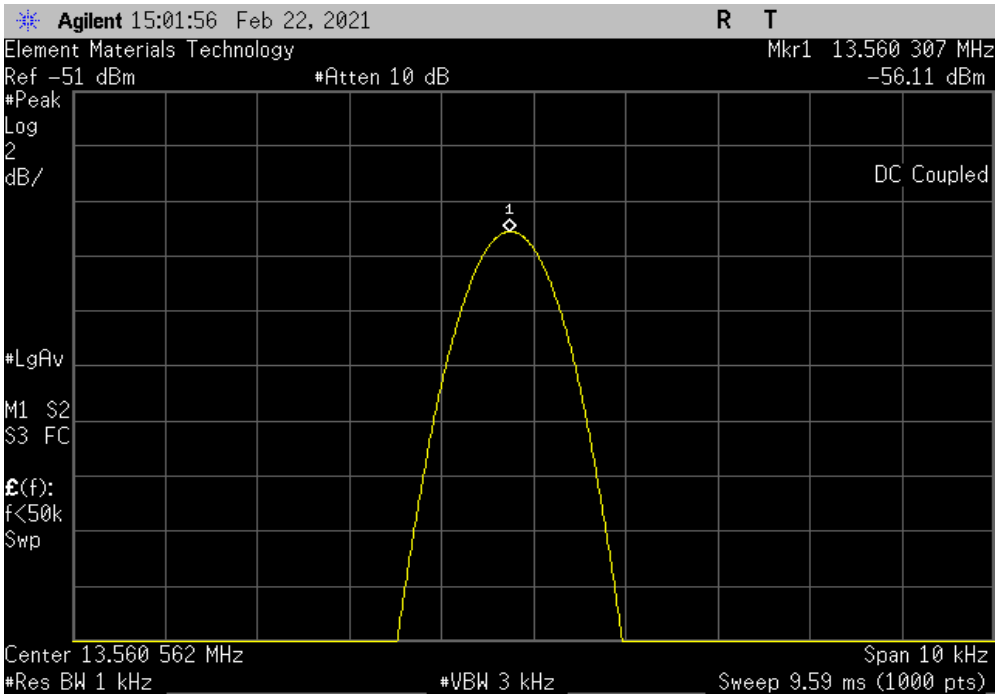


Continuous Tx, RFID, 13.56 MHz, AC Voltage: 100%						
		Measured Value (MHz)	Measured Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560306	13.560308	0.2	100	Pass

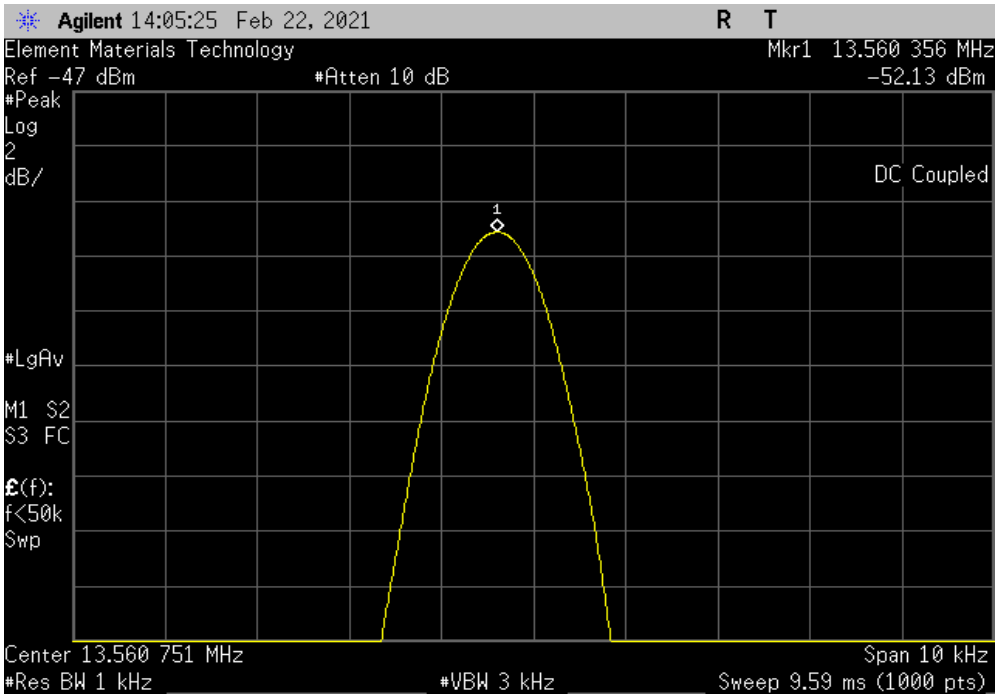


FREQUENCY STABILITY

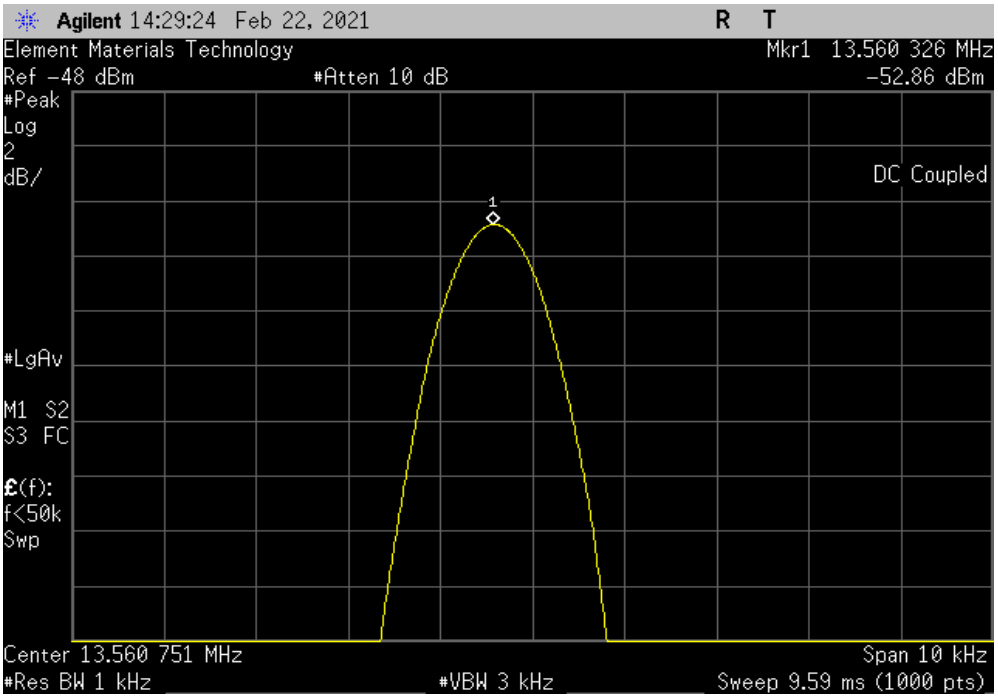
Continuous Tx, RFID, 13.56 MHz, AC Voltage: 85%						
		Measured Value (MHz)	Measured Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560307	13.560308	0.1	100	Pass



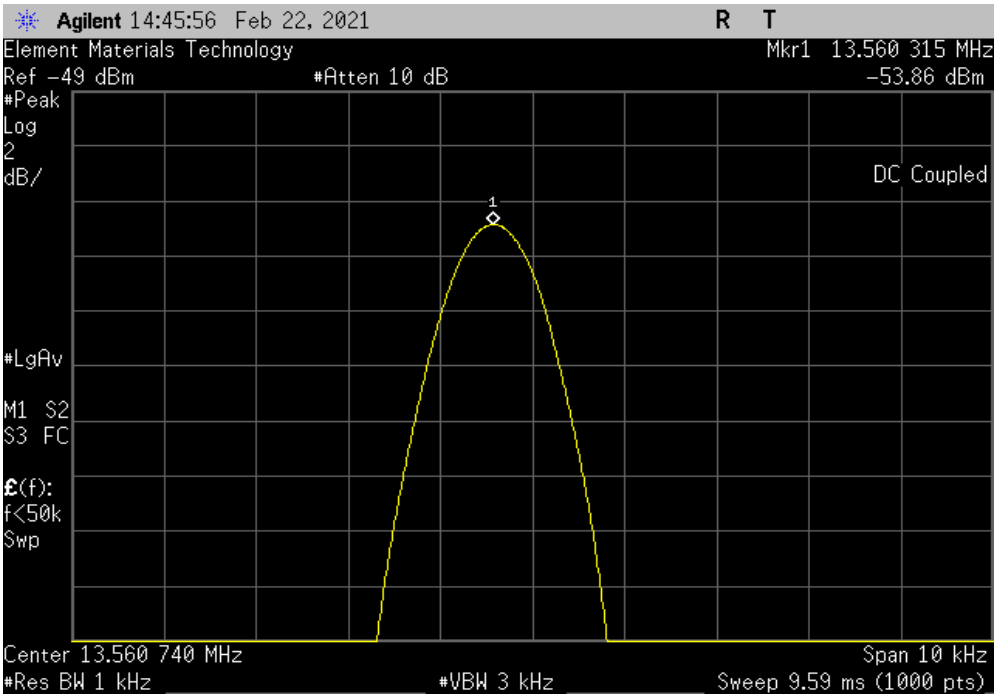
Continuous Tx, RFID, 13.56 MHz, Temperature: +50°						
		Measured Value (MHz)	Measured Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560356	13.560308	0.1	100	Pass



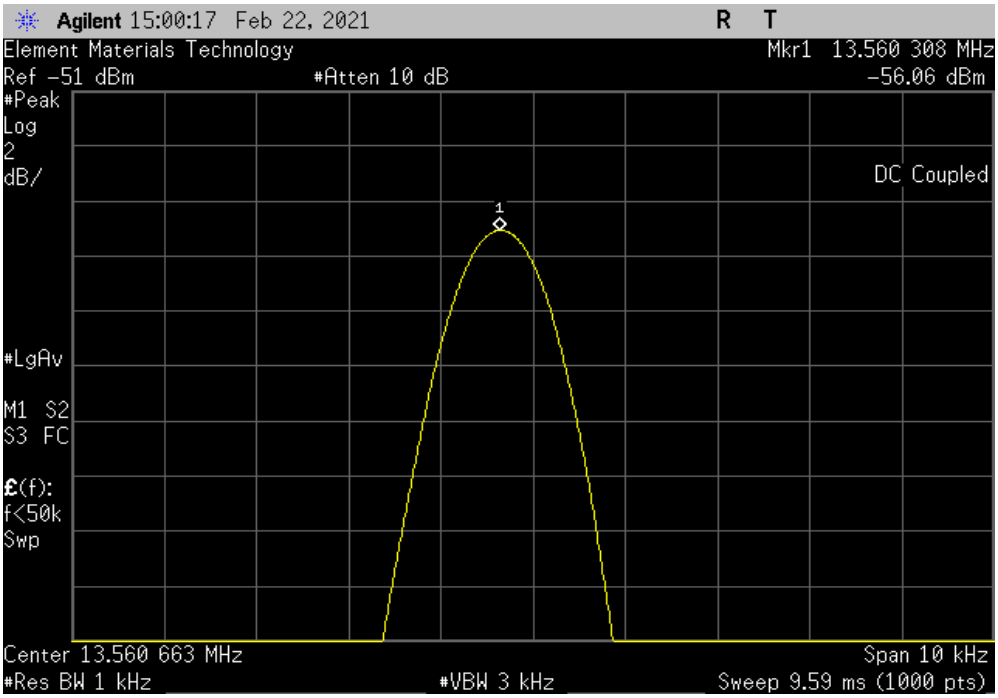
Continuous Tx, RFID, 13.56 MHz, Temperature: +40°						
		Measured Value (MHz)	Measured Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560326	13.560308	1.3	100	Pass



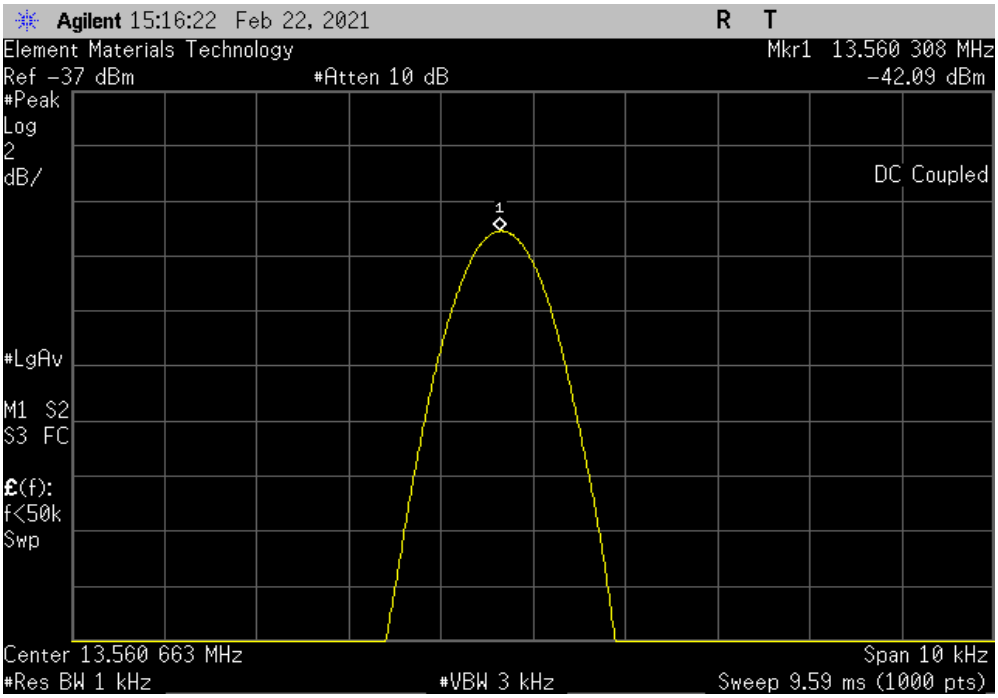
Continuous Tx, RFID, 13.56 MHz, Temperature: +30°						
		Measured Value (MHz)	Measured Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560315	13.560308	1.3	100	Pass



Continuous Tx, RFID, 13.56 MHz, Temperature: +20°						
		Measured Value (MHz)	Measured Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560308	13.560308	0.0	100	Pass

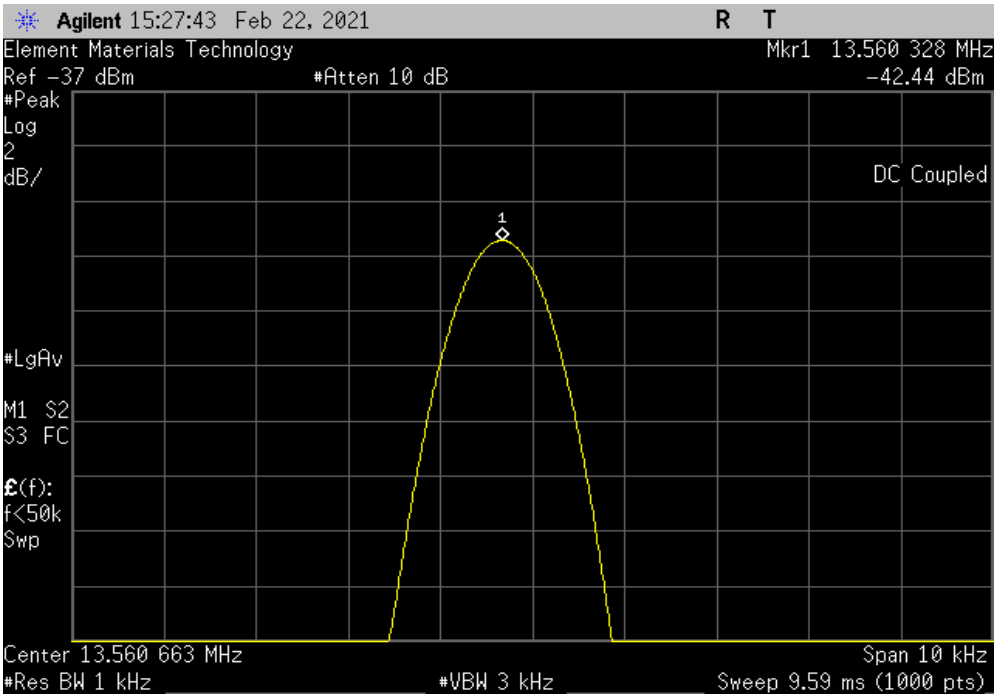


Continuous Tx, RFID, 13.56 MHz, Temperature: +10°						
		Measured Value (MHz)	Measured Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560308	13.560308	0.0	100	Pass

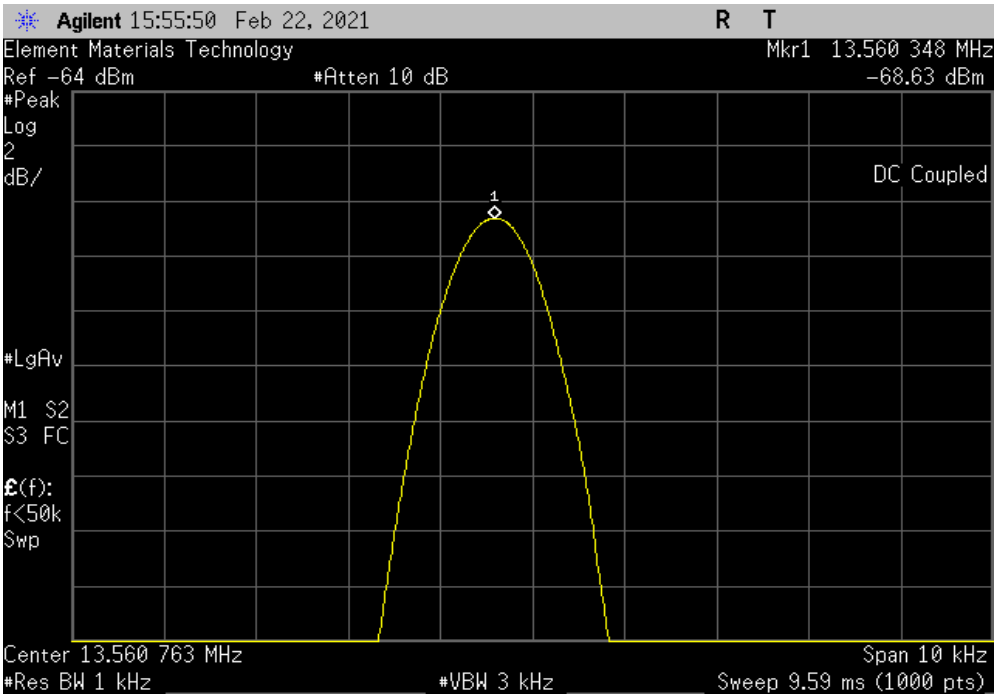


FREQUENCY STABILITY

Continuous Tx, RFID, 13.56 MHz, Temperature: 0°						
		Measured Value (MHz)	Measured Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560328	13.560308	1.5	100	Pass



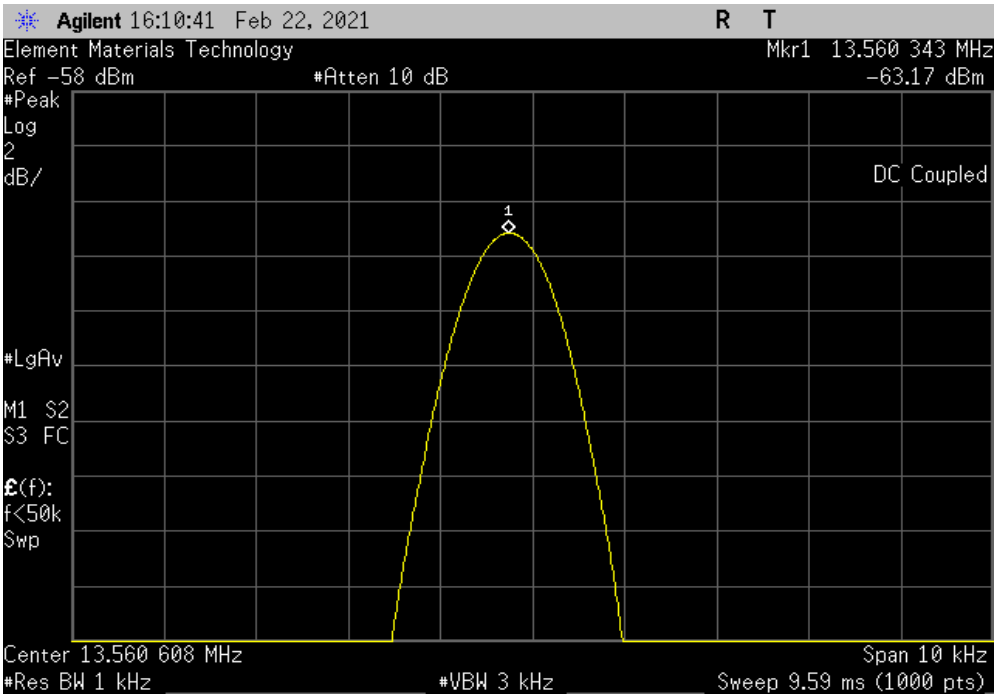
Continuous Tx, RFID, 13.56 MHz, Temperature: -10°						
		Measured Value (MHz)	Measured Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560348	13.560308	1.5	100	Pass



FREQUENCY STABILITY

TbtTx 2019.08.30.0 XMit 2020.12.30.0

Continuous Tx, RFID, 13.56 MHz, Temperature: -20°						
		Measured Value (MHz)	Measured Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560343	13.560308	2.6	100	Pass



OCCUPIED BANDWIDTH

XMit 2020.12.30.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Probe - Near Field Set	EMCO	7405	IPD	NCR	NCR
Cable	None	Conducted Cable	EVN	2021-02-16	2022-02-16
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAW	2020-12-16	2021-12-16

TEST DESCRIPTION

When the occupied bandwidth limit is not stated in the applicable RSS or reference measurement method, the transmitted signal bandwidth shall be reported as the 99% emission bandwidth as defined in RSS-Gen.

The 99% As defined in FCC 15.215 Part (c), intentional radiators must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise by specified in the specific rule section under which the equipment operates, is contained within the frequency band designed in the rule section under which the equipment is operated.

The 20 dB bandwidth must be contained within the band 13.110-14.010 MHz.

The emissions bandwidth was measured with the EUT configured for continuous modulated operation.

The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.

The resolution bandwidth (RBW) of the spectrum analyzer was set to the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) bandwidth was set to at least 3 times the resolution bandwidth. The analyzer sweep time was set to auto to prevent video filtering or averaging. A sample detector was used unless the device was not able to be operated in a continuous transmit mode, in which case a peak detector was used.

The spectrum analyzer occupied bandwidth measurement function was used to find the emissions bandwidth.

OCCUPIED BANDWIDTH

XMit 2020.12.30.0

EUT:	**Bronco Max**			**Work Order:**	**GRAP0085**
Serial Number:	**Cert 1**			**Date:**	**10-Aug-21**
Customer:	**Graphic Products, Inc.**			**Temperature:**	**22.7 °C**
Attendees:	**Chad Schaffer**			**Humidity:**	**35.5% RH**
Project:	**None**			**Barometric Pres.:**	**1012 mbar**
Tested by:	**Cole Ghizzone**	**Power:**	**110VAC/60Hz**	**Job Site:**	**EV11**

TEST SPECIFICATIONS	**Test Method**
FCC 15.225:2021	ANSI C63.10:2013

COMMENTS

Emissions bandwidth taken with a 26 dB bandwidth. This is worst case as compared with the 20 dB bandwidth called out in FCC 15.215.

DEVIATIONS FROM TEST STANDARD

None

Configuration #	**2**	*Signature*

	OBW	**Limit**	**Result**
Continuous transmit RFID at 13.56MHz, reading tag.	490.3806 kHz	N/A	Pass

OCCUPIED BANDWIDTH

XMit 2020.12.30.0

Continuous transmit RFID at 13.56MHz						
				OBW	Limit	Result
				490.3806 kHz	N/A	Pass