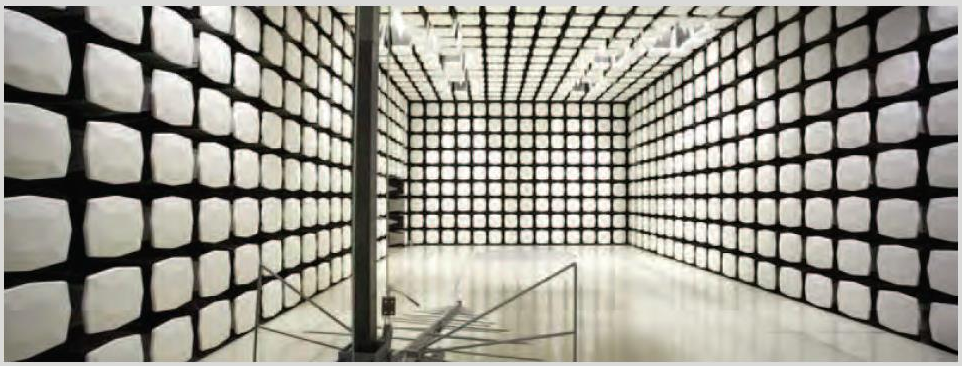
Graphic Products, Inc.

Kodiak Max Printer

FCC 15.225:2024

13.56 MHz radio using RFID

Report: GRAP0098.1 Rev. 1, Issue Date: January 23, 2024



CERT #3310.02

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CERTIFICATE OF TEST

Last Date of Test: January 23, 2024
Graphic Products, Inc.
EUT: Kodiak Max Printer

Radio Equipment Testing

Standards

Specification	Method
FCC 15.225:2024	ANSI C63.10:2013

Results

Test Description	Result	Specification Section(s)	Method Section(s)	Comments
Powerline Conducted Emissions	Pass	15.207	6.2	
Emissions Bandwidth (20 dB)	N/A	15.215(c)	6.9.2	See Data.
Field Strength of Fundamental	Pass	15.225(a)-(c)	6.4	
Field Strength of Spurious Emissions (Less Than 30 MHz)	Pass	15.225(d), 15.209	6.4	
Field Strength of Spurious Emissions (Greater Than 30 MHz)	Pass	15.225(d), 15.209	6.5	
Frequency Stability	N/A	15.225(e), 15.31(e), 15.215(c), 2.1055	6.8	See Data.

Deviations From Test Standards

None

Approved By:

Adam Bruno, 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	Updated Field Strength Of Spurious Emissions (less Than 30 Mhz) to show the highest frequency clock is 2 GHz.	2024-01-24	29-32
	Updated last date of test to reflect updated data.	2024-01-24	3, 11, 14

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

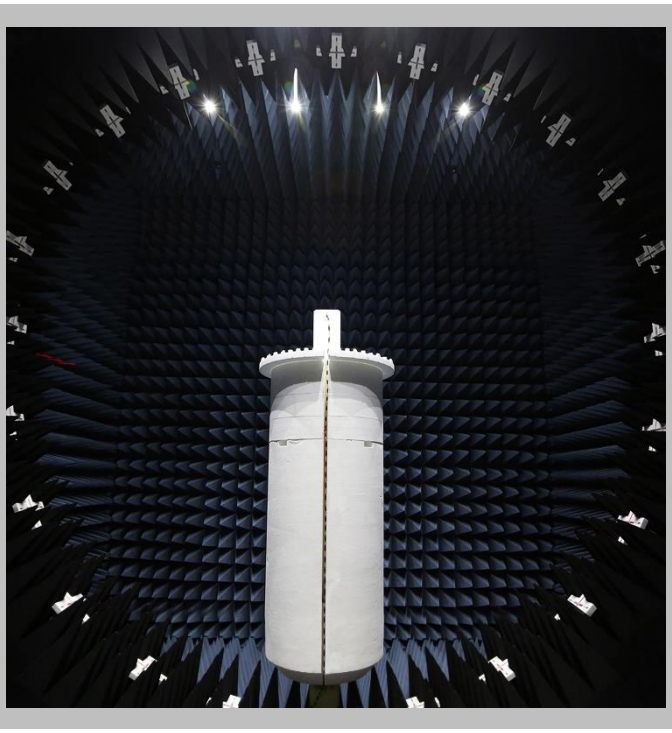
For details on the Scopes of our Accreditations, please visit:

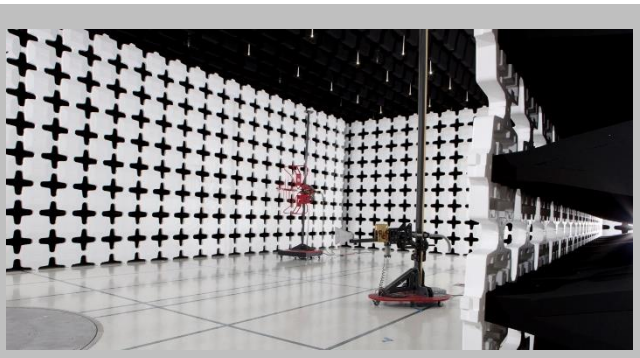
California Minnesota Oregon Texas Washington

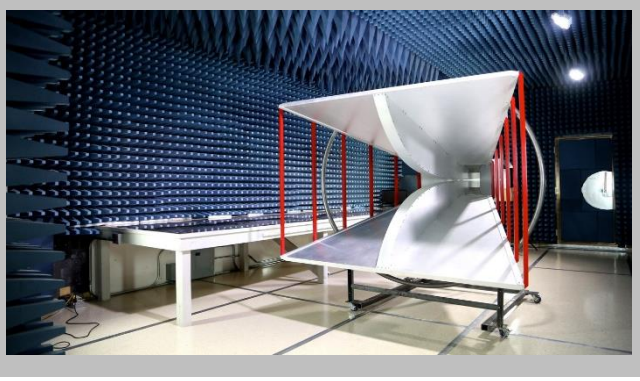
FACILITIES

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
RP.2023.05.08.0

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 in the table below. A lab specific value may also be found in the applicable test description section. 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 Location: Oregon

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)	3.2 dB	-3.2 dB

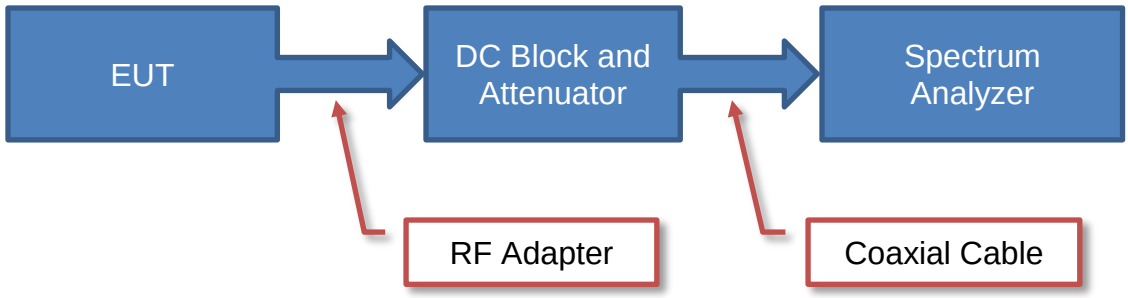
TEST SETUP BLOCK DIAGRAMS

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.

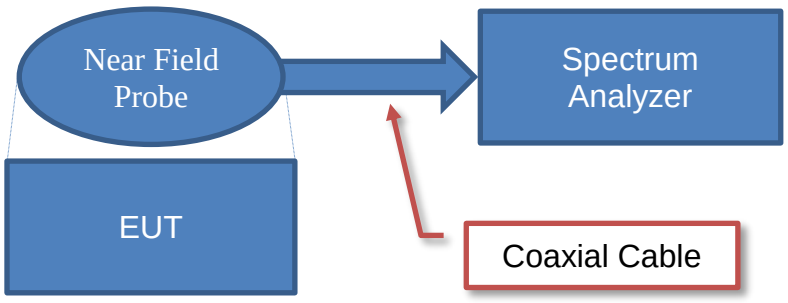
Antenna Port Conducted Measurements



Sample Calculation (logarithmic units)

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

Near Field Test Fixture Measurements

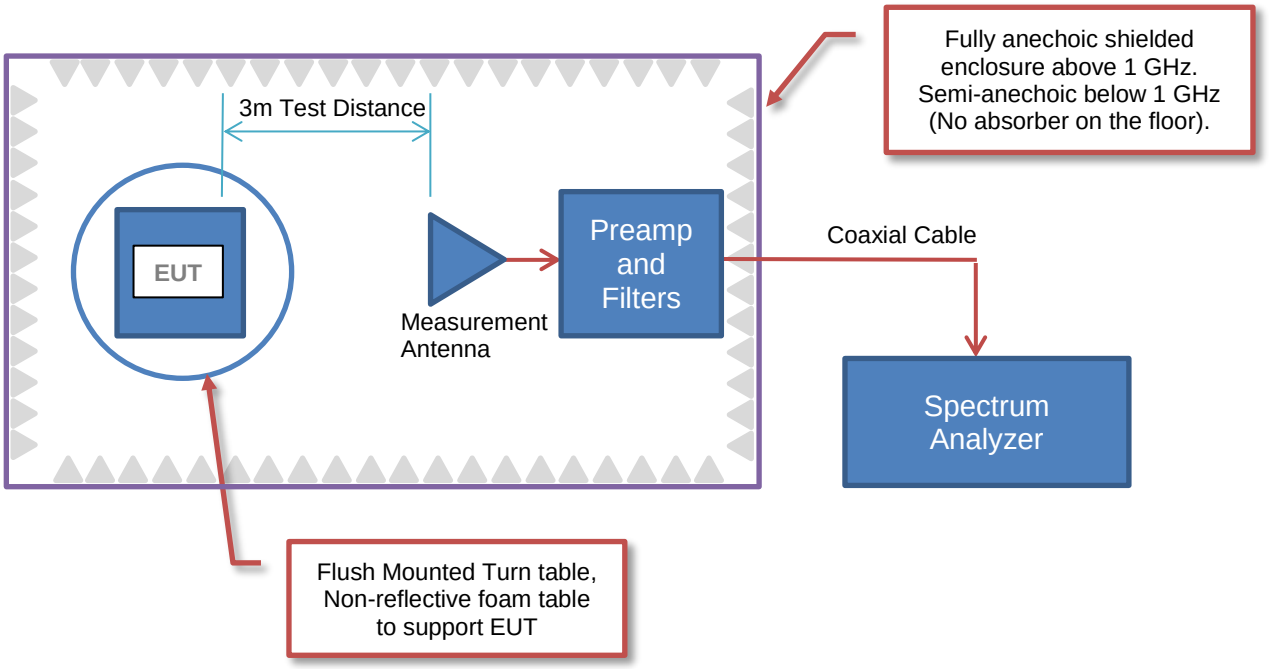


Sample Calculation (logarithmic units)

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**

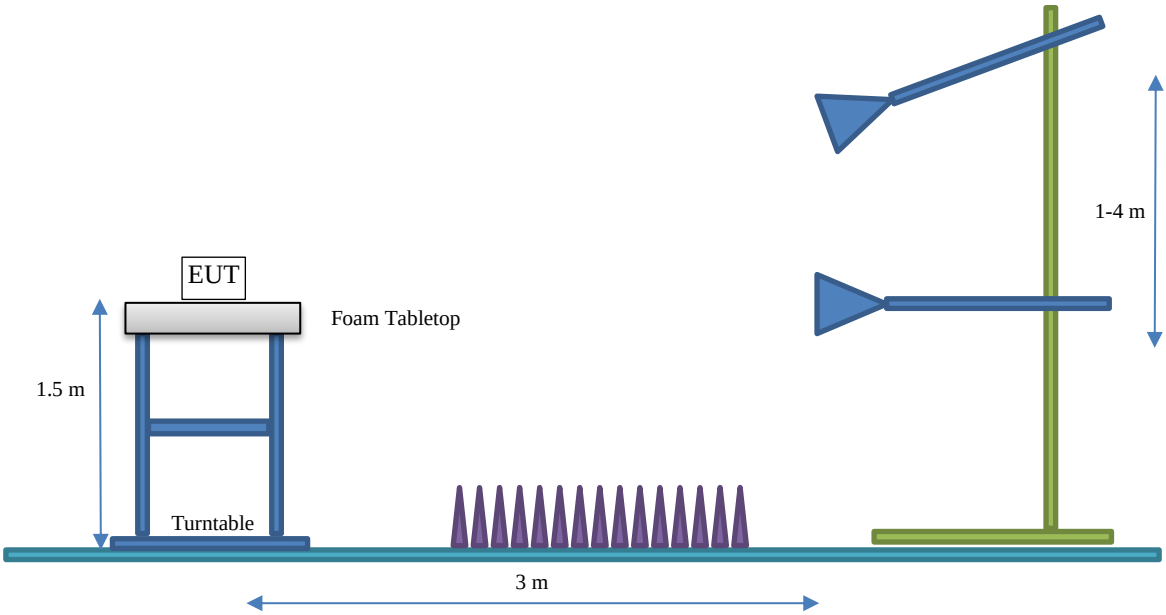
Radiated Power (ERP/EIRP) – Substitution Method:

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 Ct.
City, State, Zip:	Beaverton, OR 97005
Test Requested By:	Dan Olson
EUT:	Kodiak Max Printer
First Date of Test:	July 31, 2023
Last Date of Test:	January 23, 2024
Receipt Date of Samples:	July 31, 2023
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
Printer

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. The power settings below reflect the maximum power that the EUT is allowed to transmit at during normal operation.

ANTENNA INFORMATION

Type	Provided by:	Dimensions
Loop	Graphic Products, Inc.	50 x 40 mm

The EUT was tested using the power settings provided by the manufacturer which were based upon:

X Test software settings Test software/firmware installed on EUT: 1.0.3
☐ Rated power settings

SETTINGS FOR ALL TESTS IN THIS REPORT

Radio	Modulation Type	Protocol	Data Rate	Frequency	Power Setting (mA)
RFID	ASK	ISO 15693	26.69 kbps	13.56 MHz	16.5

CONFIGURATIONS

Configuration GRAP0098-1

Software/Firmware Running During Test	
Description	**Version**
Firmware	1.0.3

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Printer	Graphic Products, Inc.	Kodiak Max Printer	A1

Peripherals in Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
USB Keyboard	Dell	KB-212B	CN-0DJ454-71581-36R-07A2-A00
USB Mouse	Dell	None	None

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Laptop	Acer	Aspire V5-131	NXM89AA003334072F93400

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
CAT 5	No	4.6	No	Printer	Laptop
USB Cable (Mouse)	Yes	1.8	No	Printer	USB Mouse
USB Cable (Keybaord)	Yes	1.8	No	Printer	USB Keyboard
USB	Yes	4.6	No	Printer	Laptop

Configuration GRAP0098-2

Software/Firmware Running During Test	
Description	**Version**
Firmware	1.0.3

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Printer	Graphic Products, Inc.	Kodiak Max Printer	A1

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
AC Power Cable	No	1.8	No	AC Power	Printer

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2023-07-31	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.
2	2023-08-01	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.
3	2023-08-01	Emissions Bandwidth (20 Db)	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	2023-08-01	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	2023-08-02	Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT was taken home by the client before the next scheduled test.
7	2024-01-23	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.	Scheduled testing was completed.

POWERLINE CONDUCTED EMISSIONS

element
WTD.2023.04.25.0
EmiR5 2022.07.06.0
PSA-ESCI 2023.04.25.0

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	Gauss Instruments	TDEMI 30M	ARN	2023-05-08	2024-05-08
Cable - Conducted Cable Assembly	Northwest EMC	EVG, HHD, RKT, VAB	EVGA	2023-05-16	2024-05-16
LISN	Solar Electronics	9252-50-R-24-BNC	LIP	2022-09-08	2023-09-08

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	3.2 dB	-3.2 dB

CONFIGURATIONS INVESTIGATED

GRAP0098-1

MODES INVESTIGATED

ISO 15693, 13.56 MHz RFID

POWERLINE CONDUCTED EMISSIONS

element
WTD.2023.04.25.0
EmiR5 2022.07.06.0
PSA-ESCI 2023.04.25.0

EUT:	Kodiak Max Printer	Work Order:	GRAP0098
Serial Number:	A1	Date:	2023-08-02
Customer:	Graphic Products, Inc.	Temperature:	22.6°C
Attendees:	Mark Thueson and Dan Olson	Relative Humidity:	43.6%
Customer Project:	None	Bar. Pressure (PMSL):	1018 mb
Tested By:	Julie Husko, Cole Ghizzone	Job Site:	EV07
Power:	110VAC/60Hz	Configuration:	GRAP0098-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2023	ANSI C63.10:2013

TEST PARAMETERS

Run #:	3	Line:	Neutral	Add. Ext. Attenuation (dB):	0

COMMENTS

None

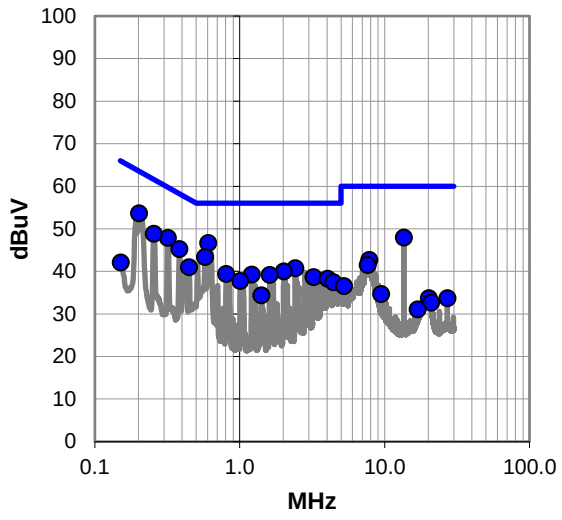
EUT OPERATING MODES

ISO 15693, 13.56 MHz RFID

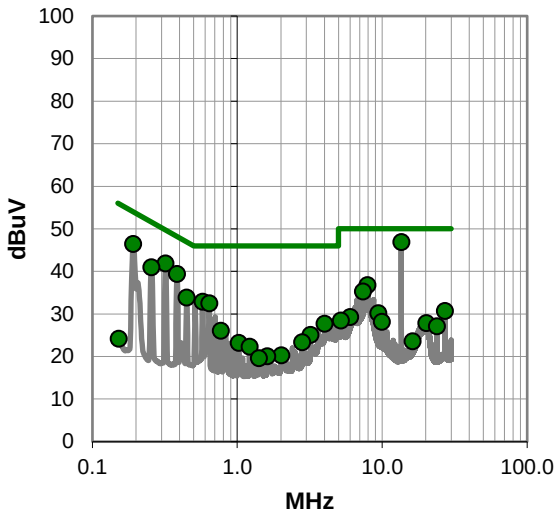
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

element
WTD.2023.04.25.0
EmiR5 2022.07.06.0
PSA-ESCI 2023.04.25.0

RESULTS - Run #3

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.606	26.8	19.9	46.7	56.0	-9.3
0.202	33.7	20.0	53.7	63.5	-9.8
0.319	27.9	20.0	47.9	59.7	-11.8
13.562	27.4	20.6	48.0	60.0	-12.0
0.576	23.6	19.8	43.4	56.0	-12.6
0.255	28.9	20.0	48.9	61.6	-12.7
0.383	25.4	19.9	45.3	58.2	-12.9
2.422	20.7	20.1	40.8	56.0	-15.2
0.448	21.2	19.8	41.0	56.9	-15.9
2.016	19.9	20.1	40.0	56.0	-16.0
0.808	19.5	19.9	39.4	56.0	-16.6
1.209	19.4	19.9	39.3	56.0	-16.7
1.610	19.2	20.0	39.2	56.0	-16.8
3.229	18.5	20.2	38.7	56.0	-17.3
7.860	22.4	20.3	42.7	60.0	-17.3
4.039	18.1	20.2	38.3	56.0	-17.7
1.008	17.9	19.9	37.8	56.0	-18.2
4.436	17.3	20.2	37.5	56.0	-18.5
7.663	21.2	20.3	41.5	60.0	-18.5
1.409	14.4	20.0	34.4	56.0	-21.6
5.243	16.4	20.2	36.6	60.0	-23.4
0.152	22.0	20.1	42.1	65.9	-23.8
9.450	14.2	20.5	34.7	60.0	-25.3
20.153	12.8	20.9	33.7	60.0	-26.3
27.120	12.4	21.3	33.7	60.0	-26.3

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.560	26.3	20.6	46.9	50.0	-3.1
0.191	26.5	20.0	46.5	54.0	-7.5
0.319	21.9	20.0	41.9	49.7	-7.8
0.383	19.5	19.9	39.4	48.2	-8.8
0.255	21.0	20.0	41.0	51.6	-10.6
0.448	14.1	19.8	33.9	46.9	-13.0
0.576	13.1	19.8	32.9	46.0	-13.1
7.922	16.5	20.3	36.8	50.0	-13.2
0.640	12.6	19.9	32.5	46.0	-13.5
7.373	15.0	20.3	35.3	50.0	-14.7
4.000	7.5	20.2	27.7	46.0	-18.3
27.120	9.4	21.3	30.7	50.0	-19.3
9.389	9.7	20.5	30.2	50.0	-19.8
0.768	6.2	19.9	26.1	46.0	-19.9
6.001	9.0	20.3	29.3	50.0	-20.7
3.202	4.9	20.2	25.1	46.0	-20.9
5.199	8.3	20.2	28.5	50.0	-21.5
9.938	7.7	20.5	28.2	50.0	-21.8
20.153	7.0	20.9	27.9	50.0	-22.1
2.800	3.3	20.1	23.4	46.0	-22.6
1.023	3.3	19.9	23.2	46.0	-22.8
23.898	6.0	21.1	27.1	50.0	-22.9
1.215	2.4	19.9	22.3	46.0	-23.7
2.013	0.2	20.1	20.3	46.0	-25.7
1.613	0.1	20.0	20.1	46.0	-25.9

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS

element
WTD.2023.04.25.0
EmiR5 2022.07.06.0
PSA-ESCI 2023.04.25.0

EUT:	Kodiak Max Printer	Work Order:	GRAP0098
Serial Number:	A1	Date:	2023-08-02
Customer:	Graphic Products, Inc.	Temperature:	22.6°C
Attendees:	Mark Thueson and Dan Olson	Relative Humidity:	43.6%
Customer Project:	None	Bar. Pressure (PMSL):	1018 mb
Tested By:	Julie Husko, Cole Ghizzone	Job Site:	EV07
Power:	110VAC/60Hz	Configuration:	GRAP0098-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2023	ANSI C63.10:2013

TEST PARAMETERS

Run #:	4	Line:	High Line	Add. Ext. Attenuation (dB):	0

COMMENTS

None

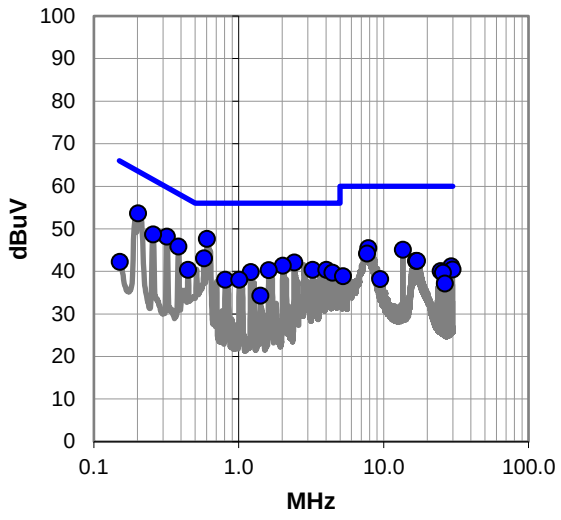
EUT OPERATING MODES

ISO 15693, 13.56 MHz RFID

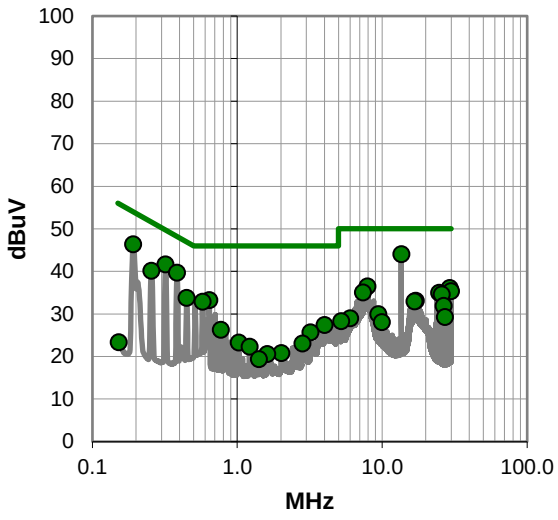
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

element
WTD.2023.04.25.0
EmiR5 2022.07.06.0
PSA-ESCI 2023.04.25.0

RESULTS - Run #4

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.605	27.8	19.9	47.7	56.0	-8.3
0.202	33.7	20.0	53.7	63.5	-9.8
0.319	28.2	20.0	48.2	59.7	-11.5
0.383	26.0	19.9	45.9	58.2	-12.3
0.257	28.7	20.0	48.7	61.5	-12.8
0.576	23.3	19.8	43.1	56.0	-12.9
2.420	22.0	20.1	42.1	56.0	-13.9
7.858	25.2	20.3	45.5	60.0	-14.5
2.016	21.3	20.1	41.4	56.0	-14.6
13.560	24.5	20.6	45.1	60.0	-14.9
3.228	20.2	20.2	40.4	56.0	-15.6
4.033	20.2	20.2	40.4	56.0	-15.6
1.612	20.3	20.0	40.3	56.0	-15.7
7.672	23.9	20.3	44.2	60.0	-15.8
1.209	20.0	19.9	39.9	56.0	-16.1
4.436	19.5	20.2	39.7	56.0	-16.3
0.448	20.6	19.8	40.4	56.9	-16.5
16.699	21.7	20.8	42.5	60.0	-17.5
17.019	21.7	20.8	42.5	60.0	-17.5
0.806	18.2	19.9	38.1	56.0	-17.9
1.008	18.2	19.9	38.1	56.0	-17.9
29.272	19.7	21.5	41.2	60.0	-18.8
29.857	18.9	21.6	40.5	60.0	-19.5
24.715	18.9	21.2	40.1	60.0	-19.9
25.718	18.5	21.2	39.7	60.0	-20.3

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.560	23.5	20.6	44.1	50.0	-5.9
0.191	26.4	20.0	46.4	54.0	-7.6
0.319	21.7	20.0	41.7	49.7	-8.0
0.383	19.8	19.9	39.7	48.2	-8.5
0.255	20.2	20.0	40.2	51.6	-11.4
0.640	13.4	19.9	33.3	46.0	-12.7
0.448	14.0	19.8	33.8	46.9	-13.1
0.576	13.1	19.8	32.9	46.0	-13.1
7.922	16.2	20.3	36.5	50.0	-13.5
29.272	14.6	21.5	36.1	50.0	-13.9
29.857	13.8	21.6	35.4	50.0	-14.6
7.373	14.8	20.3	35.1	50.0	-14.9
24.715	13.8	21.2	35.0	50.0	-15.0
25.718	13.4	21.2	34.6	50.0	-15.4
17.083	12.3	20.8	33.1	50.0	-16.9
16.699	12.2	20.8	33.0	50.0	-17.0
26.498	10.6	21.3	31.9	50.0	-18.1
4.001	7.2	20.2	27.4	46.0	-18.6
0.768	6.4	19.9	26.3	46.0	-19.7
9.389	9.5	20.5	30.0	50.0	-20.0
3.200	5.5	20.2	25.7	46.0	-20.3
27.122	8.0	21.3	29.3	50.0	-20.7
6.001	8.7	20.3	29.0	50.0	-21.0
5.200	8.1	20.2	28.3	50.0	-21.7
9.938	7.6	20.5	28.1	50.0	-21.9

CONCLUSION

Pass

Tested By

EMISSIONS BANDWIDTH (20 DB)

element
WTD.2023.05.05.0

TEST DESCRIPTION

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.

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 be 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 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 emissions bandwidth (EBW) and video bandwidth (VBW) bandwidth was set to at least 3 times the resolution bandwidth. The analyzer sweep time was set to auto and a peak detector was used.

The spectrum analyzer bandwidth measurement function was used to measure the 20 dB bandwidth.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	2023-02-24	2024-02-24
Block - DC	Fairview Microwave	SD3379	AMW	2023-03-13	2024-03-13
Attenuator	S.M. Electronics	SA26B-20	AUY	2023-03-13	2024-03-13
Cable	Micro-Coax	UFD150A-1-0720-200200	EVI	2022-12-02	2023-12-02
Meter - Multimeter	Tektronix	DMM912	MMH	2023-04-03	2024-04-03
Transformer	Powerstat	236B	XFG	NCR	NCR

EMISSIONS BANDWIDTH (20 DB)

element
WTD.2023.05.05.0

EUT:	Kodiak Max Printer	Work Order:	GRAP0098
Serial Number:	A1	Date:	2023-08-01
Customer:	Graphic Products, Inc.	Temperature:	22.8°C
Attendees:	Mark Thueson and Dan Olson	Relative Humidity:	45.2%
Customer Project:	None	Bar. Pressure (PMSL):	1018 mbar
Tested By:	Jeff Alcoke	Job Site:	EV06
Power:	110VAC/60Hz	Configuration:	GRAP0098-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.225:2023	ANSI C63.10:2013

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

None

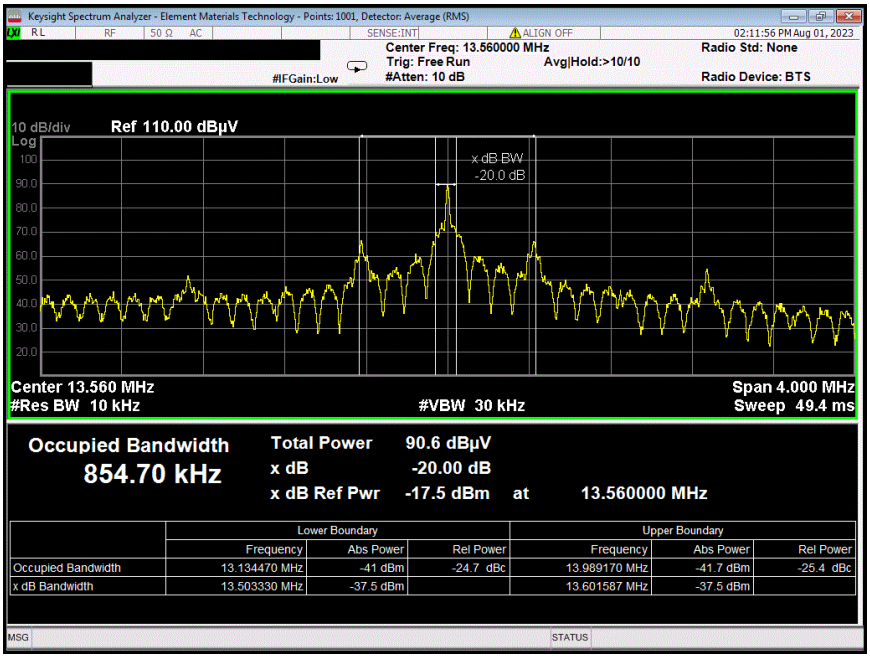
TESTED BY

Jeff Alcoke

TEST RESULTS

	F_low (MHz)	F_High (MHz)	20 dB BW (kHz)	20 dB BW In Band (Y/N)	Limit	Result
13.56 MHz RFID, ISO/IEC 15693						
Normal Conditions	13.5	13.6	110	Yes	Yes	Pass

EMISSIONS BANDWIDTH (20 DB)



	Lower Boundary			Upper Boundary		
	Frequency	Abs Power	Rel Power	Frequency	Abs Power	Rel Power
Occupied Bandwidth	13.134470 MHz	-41 dBm	-24.7 dBc	13.989170 MHz	-41.7 dBm	-25.4 dBc
x dB Bandwidth	13.503330 MHz	-37.5 dBm		13.601587 MHz	-37.5 dBm	

13.56 MHz RFID, ISO/IEC 15693

Normal Conditions

FIELD STRENGTH OF FUNDAMENTAL

element
WTD.2023.04.25.0
EmiR5 2022.07.06.0
PSA-ESCI 2023.04.25.0

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), 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.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Antenna - Loop	EMCO	6502	AOA	2022-07-13	2024-07-13
Cable	None	10m Test Distance Cable	EVL	2023-01-16	2024-01-16
Receiver	Rohde & Schwarz	ESCI	ARF	2022-09-26	2023-09-26

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	1.7 dB	-1.7 dB

FREQUENCY RANGE INVESTIGATED

11.56 MHz TO 15.56 MHz

POWER INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

GRAP0098-1

MODES INVESTIGATED

ISO 15693, 13.56 MHz RFID

FIELD STRENGTH OF FUNDAMENTAL

element
WTD.2023.04.25.0
EmiR5 2022.07.06.0
PSA-ESCI 2023.04.25.0

EUT:	Kodiak Max Printer	Work Order:	GRAP0098
Serial Number:	A1	Date:	2023-08-01
Customer:	Graphic Products, Inc.	Temperature:	23.1°C
Attendees:	Mark Thueson and Dan Olson	Relative Humidity:	44.8%
Customer Project:	None	Bar. Pressure (PMSL):	1018 mb
Tested By:	Cole Ghizzone	Job Site:	EV11
Power:	110VAC/60Hz	Configuration:	GRAP0098-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.225:2023	ANSI C63.10:2013

TEST PARAMETERS

Run #:	14	Test Distance (m):	10	Ant. Height(s) (m):	1 to 4(m)

COMMENTS

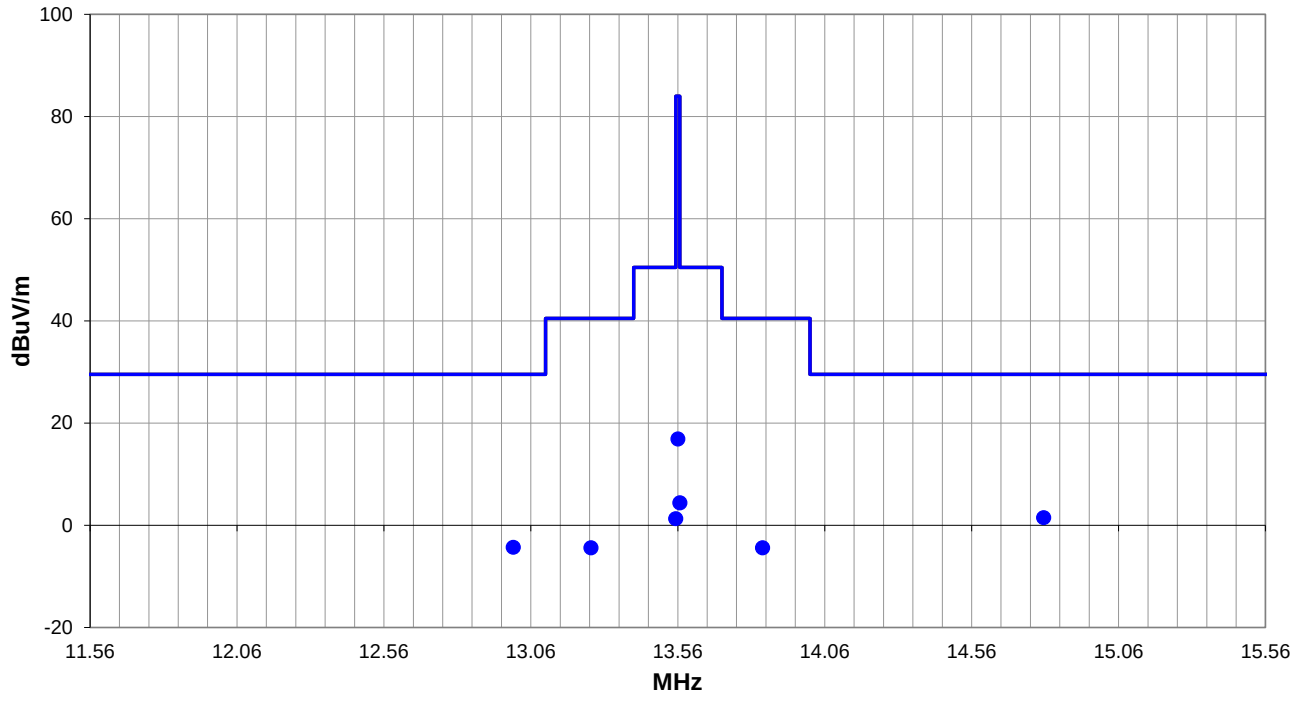
Using the worst case orientation found from pre-compliance testing

EUT OPERATING MODES

ISO 15693, 13.56 MHz RFID

DEVIATIONS FROM TEST STANDARD

None



Run #: 14 ■ PK ◆ AV ● QP

FIELD STRENGTH OF FUNDAMENTAL

element
WTD.2023.04.25.0
EmiR5 2022.07.06.0
PSA-ESCI 2023.04.25.0

RESULTS - Run #14

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	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
14.805	8.8	11.8	1.0	214.0	10.0	0.0	Perpindicular to EUT	QP	-19.1	1.5	29.5	-28.0	EUT Vertical
13.000	3.0	11.8	1.0	214.0	10.0	0.0	Perpindicular to EUT	QP	-19.1	-4.3	29.5	-33.8	EUT Vertical
13.265	2.9	11.8	1.0	100.0	10.0	0.0	Perpindicular to EUT	QP	-19.1	-4.4	40.5	-44.9	EUT Vertical
13.849	2.8	11.9	1.0	100.0	10.0	0.0	Perpindicular to EUT	QP	-19.1	-4.4	40.5	-44.9	EUT Vertical
13.567	11.6	11.9	1.0	100.0	10.0	0.0	Perpindicular to EUT	QP	-19.1	4.4	50.5	-46.1	EUT Vertical
13.553	8.5	11.9	1.0	100.0	10.0	0.0	Perpindicular to EUT	QP	-19.1	1.3	50.5	-49.2	EUT Vertical
13.560	24.1	11.9	1.0	100.0	10.0	0.0	Perpindicular to EUT	QP	-19.1	16.9	84.0	-67.1	EUT Vertical

CONCLUSION

Pass

Tested By

FIELD STRENGTH OF SPURIOUS EMISSIONS (LESS THAN 30 MHz)

element
WTD.2023.04.25.0
EmiR5 2022.07.06.0
PSA-ESCI 2023.04.25.0

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), 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.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Antenna - Loop	EMCO	6502	AOA	2022-07-13	2024-07-13
Cable	None	10m Test Distance Cable	EVL	2023-01-16	2024-01-16
Receiver	Rohde & Schwarz	ESCI	ARF	2022-09-26	2023-09-26

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	1.7 dB	-1.7 dB

FREQUENCY RANGE INVESTIGATED

0.009 MHz TO 30 MHz

POWER INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

GRAP0098-1

MODES INVESTIGATED

ISO 15693, 13.56 MHz RFID

FIELD STRENGTH OF SPURIOUS EMISSIONS (LESS THAN 30 MHz)

element
WTD.2023.04.25.0
EmiR5 2022.07.06.0
PSA-ESCI 2023.04.25.0

EUT:	Kodiak Max Printer	Work Order:	GRAP0098
Serial Number:	A1	Date:	2023-08-01
Customer:	Graphic Products, Inc.	Temperature:	22.2°C
Attendees:	Mark Thueson and Dan Olson	Relative Humidity:	45%
Customer Project:	None	Bar. Pressure (PMSL):	1019 mb
Tested By:	Jeff Alcoke	Job Site:	EV11
Power:	110VAC/60Hz	Configuration:	GRAP0098-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.225:2023	ANSI C63.10:2013

TEST PARAMETERS

Run #:	18	Test Distance (m):	10	Ant. Height(s) (m):	1(m)

COMMENTS

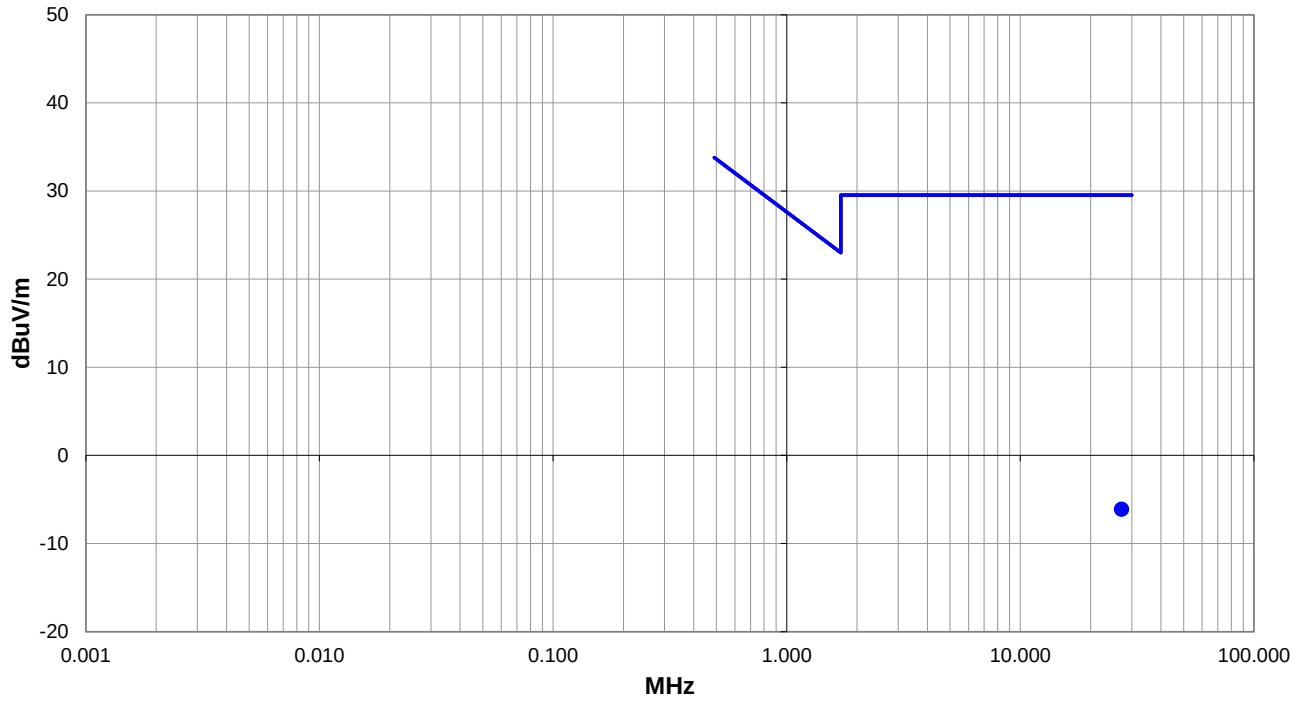
All emissions are more than 20 dB below the limit.

EUT OPERATING MODES

ISO 15693, 13.56 MHz RFID

DEVIATIONS FROM TEST STANDARD

None



Run #: 18 ■ PK ◆ AV ● QP

FIELD STRENGTH OF SPURIOUS EMISSIONS (LESS THAN 30 MHz)

element
WTD.2023.04.25.0
EmiR5 2022.07.06.0
PSA-ESCI 2023.04.25.0

RESULTS - Run #18

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	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
27.116	3.0	10.0	1.0	67.0	10.0	0.0	Perp EUT	QP	-19.1	-6.1	29.5	-35.6	EUT Horizontal

CONCLUSION
Pass

Tested By

FIELD STRENGTH OF SPURIOUS EMISSIONS (GREATER THAN 30 MHz)

element
WTD.2023.04.25.0
EmiR5 2022.07.06.0
PSA-ESCI 2023.04.25.0

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.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Antenna - Biconilog	EMCO	3141	AXG	2021-08-13	2023-08-13
Cable	None	10m Test Distance Cable	EVL	2023-01-16	2024-01-16
Amplifier - Pre-Amplifier	Fairview Microwave	FMAM63001	PAY	2023-01-16	2024-01-16
Receiver	Rohde & Schwarz	ESCI	ARF	2022-09-26	2023-09-26
Filter - Low Pass	Fairview Microwave	FMFL020	PLE	2023-02-13	2024-02-13

*TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFO	2023-10-04	2024-10-04
Antenna - Double Ridge	ETS Lindgren	3115	AIZ	2022-03-02	2024-03-02
Antenna - Standard Gain	ETS Lindgren	3160-07	AHU	NCR	NCR
Antenna - Standard Gain	ETS Lindgren	3160-08	AHV	NCR	NCR
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	PAG	2023-03-26	2024-03-26
Amplifier - Pre-Amplifier	L-3 Narda-MITEQ	AMF-6F-08001200-30-10P	PAO	2023-10-31	2024-10-31
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVD	2023-10-31	2024-10-31
Cable	N/A	Double Ridge Horn Cables	EVB	2023-03-26	2024-03-26
Cable	None	Standard Gain Horn Cables	EVF	2023-10-31	2024-10-31

*Test equipment list for measurements made in EV01 on 1/23/2024 from 1GHz – 18GHz. There were no emissions from the device worth maximizing.

FIELD STRENGTH OF SPURIOUS EMISSIONS (GREATER THAN 30 MHz)

element
WTD.2023.04.25.0
EmiR5 2022.07.06.0
PSA-ESCI 2023.04.25.0

MEASUREMENT UNCERTAINTY (30MHz – 1GHz)

Description		
Expanded k=2	4.8 dB	-4.8 dB

MEASUREMENT UNCERTAINTY (1GHz – 18GHz)

Description		
Expanded k=2	5.2 dB	-5.2 dB

FREQUENCY RANGE INVESTIGATED

30 MHz TO 18000 MHz

POWER INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

GRAP0098-1

MODES INVESTIGATED

ISO 15693, 13.56 MHz RFID

FIELD STRENGTH OF SPURIOUS EMISSIONS (GREATER THAN 30 MHz)

element
WTD.2023.04.25.0
EmiR5 2022.07.06.0
PSA-ESCI 2023.04.25.0

EUT:	Kodiak Max Printer	Work Order:	GRAP0098
Serial Number:	A1	Date:	2023-07-31
Customer:	Graphic Products, Inc.	Temperature:	22.3°C
Attendees:	Mark Thueson and Dan Olson	Relative Humidity:	44.9%
Customer Project:	None	Bar. Pressure (PMSL):	1020 mb
Tested By:	Cole Ghizzone	Job Site:	EV11
Power:	110VAC/60Hz	Configuration:	GRAP0098-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.225:2023	ANSI C63.10:2013

TEST PARAMETERS

Run #:	3	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)

COMMENTS

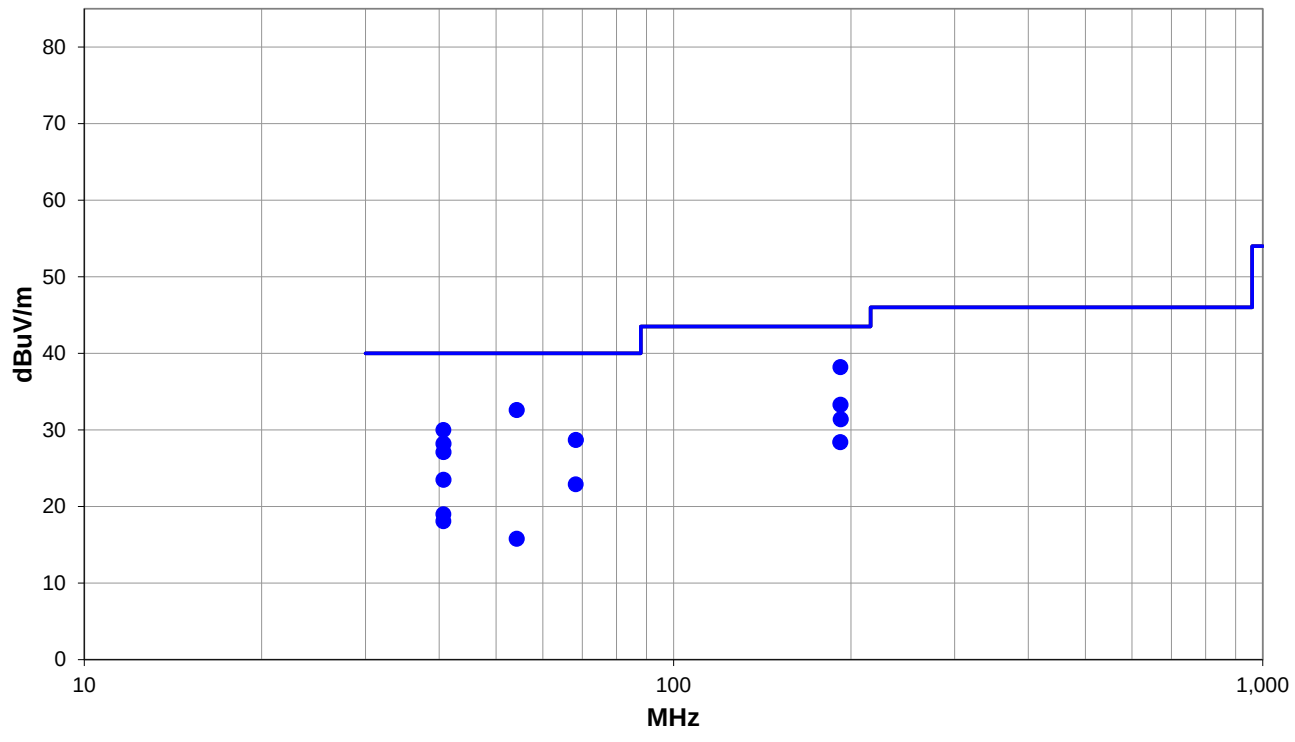
None

EUT OPERATING MODES

ISO 15693, 13.56 MHz RFID

DEVIATIONS FROM TEST STANDARD

None



Run #: 3 ■ PK ◆ AV ● QP

FIELD STRENGTH OF SPURIOUS EMISSIONS (GREATER THAN 30 MHz)

element
WTD.2023.04.25.0
EmiR5 2022.07.06.0
PSA-ESCI 2023.04.25.0

RESULTS - Run #3

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	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
191.955	62.8	-24.6	1.6	214.0	3.0	0.0	Horz	QP	0.0	38.2	43.5	-5.3	EUT Horz
54.184	60.6	-28.0	1.0	240.0	3.0	0.0	Vert	QP	0.0	32.6	40.0	-7.4	EUT Vertical
40.678	54.1	-24.1	1.0	263.0	3.0	0.0	Vert	QP	0.0	30.0	40.0	-10.0	EUT Vertical
192.026	57.9	-24.6	1.59	113.0	3.0	0.0	Horz	QP	0.0	33.3	43.5	-10.2	EUT Vertical
68.248	57.6	-28.9	1.11	361.0	3.0	0.0	Vert	QP	0.0	28.7	40.0	-11.3	EUT Vertical
40.683	52.3	-24.1	1.0	212.0	3.0	0.0	Vert	QP	0.0	28.2	40.0	-11.8	EUT On Side
192.184	56.0	-24.6	1.58	106.0	3.0	0.0	Horz	QP	0.0	31.4	43.5	-12.1	EUT Vertical
40.683	51.2	-24.1	1.0	303.0	3.0	0.0	Vert	QP	0.0	27.1	40.0	-12.9	EUT Horz
191.882	53.0	-24.6	1.0	258.0	3.0	0.0	Vert	QP	0.0	28.4	43.5	-15.1	EUT Vertical
40.693	47.6	-24.1	3.95	135.0	3.0	0.0	Horz	QP	0.0	23.5	40.0	-16.5	EUT Vertical
68.236	51.8	-28.9	3.13	298.0	3.0	0.0	Horz	QP	0.0	22.9	40.0	-17.1	EUT Vertical
40.677	43.1	-24.1	3.81	73.0	3.0	0.0	Horz	QP	0.0	19.0	40.0	-21.0	EUT Horz
40.678	42.2	-24.1	4.0	-10.0	3.0	0.0	Horz	QP	0.0	18.1	40.0	-21.9	EUT On Side
54.184	43.8	-28.0	2.16	274.0	3.0	0.0	Horz	QP	0.0	15.8	40.0	-24.2	EUT Vertical

CONCLUSION

Pass

Tested By

FREQUENCY STABILITY

element
WTD.2023.05.05.0

TEST DESCRIPTION

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 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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	2023-02-24	2024-02-24
Block - DC	Fairview Microwave	SD3379	AMW	2023-03-13	2024-03-13
Attenuator	S.M. Electronics	SA26B-20	AUY	2023-03-13	2024-03-13
Cable	Micro-Coax	UFD150A-1-0720-200200	EVI	2022-12-02	2023-12-02
Probe - Near Field Set	EMCO	7405	IPD	NCR	NCR
Meter - Multimeter	Tektronix	DMM912	MMH	2023-04-03	2024-04-03
Transformer	Powerstat	236B	XFG	NCR	NCR
Chamber - Temperature/Humidity	Cincinnati Sub Zero (CSZ)	ZPH-8-1-1-H/AC	TBI	NCR	NCR
Thermometer	Omegaette	HH311	DTY	2021-02-04	2024-02-04

FREQUENCY STABILITY

element
WTD.2023.05.05.0

EUT:	Kodiak Max Printer	Work Order:	GRAP0098
Serial Number:	A1	Date:	2023-08-01
Customer:	Graphic Products, Inc.	Temperature:	23°C
Attendees:	Mark Thueson and Dan Olson	Relative Humidity:	45.5%
Customer Project:	None	Bar. Pressure (PMSL):	1015 mbar
Tested By:	Jeff Alcoke	Job Site:	EV06
Power:	110VAC/60Hz	Configuration:	GRAP0098-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.225:2023	ANSI C63.10:2013

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

None

TESTED BY

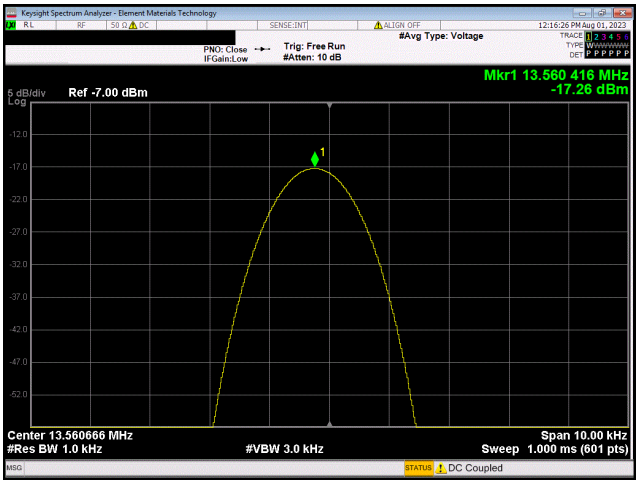
Jeff Alcoke

TEST RESULTS

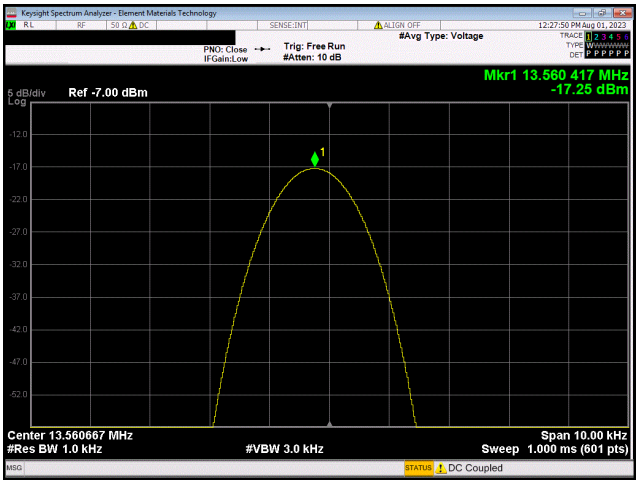
	Measured Value (MHz)	Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
13.56 MHz RFID, ISO/IEC 15693					
Normal Conditions	13.560416	13.560416	0	100	Pass
Extreme Voltage 115%	13.560417	13.560416	0.07	100	Pass
Extreme Voltage 85%	13.56041667	13.560416	0.05	100	Pass
Extreme Temperature +50°C	13.56040033	13.560416	1.16	100	Pass
Extreme Temperature +40°C	13.56039967	13.560416	1.2	100	Pass
Extreme Temperature +30°C	13.5604	13.560416	1.18	100	Pass
Extreme Temperature +20°C	13.560417	13.560416	0.07	100	Pass
Extreme Temperature +10°C	13.560434	13.560416	1.33	100	Pass
Extreme Temperature +0°C	13.56045	13.560416	2.51	100	Pass
Extreme Temperature -10°C	13.56045033	13.560416	2.53	100	Pass
Extreme Temperature -20°C	13.560417	13.560416	0.07	100	Pass

FREQUENCY STABILITY

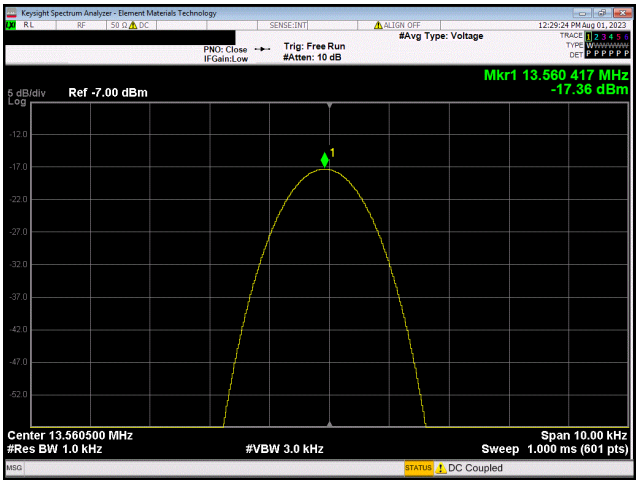
element
WTD.2023.05.05.0



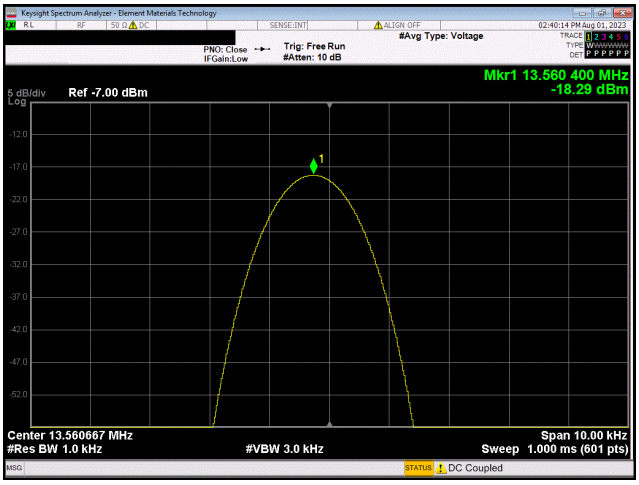
13.56 MHz RFID, ISO/IEC 15693
Normal Conditions



13.56 MHz RFID, ISO/IEC 15693
Extreme Voltage 115%



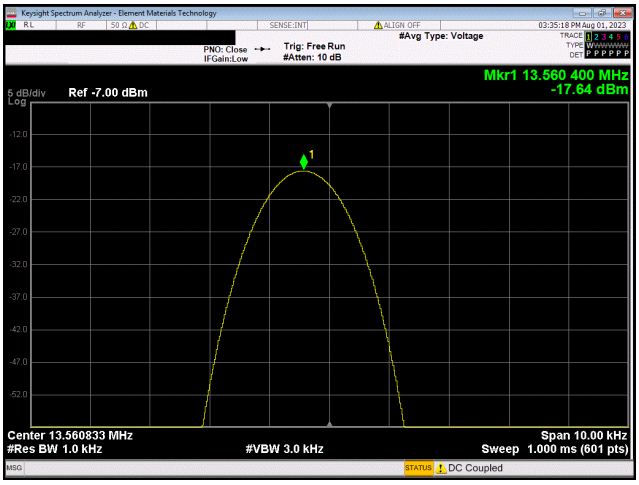
13.56 MHz RFID, ISO/IEC 15693
Extreme Voltage 85%



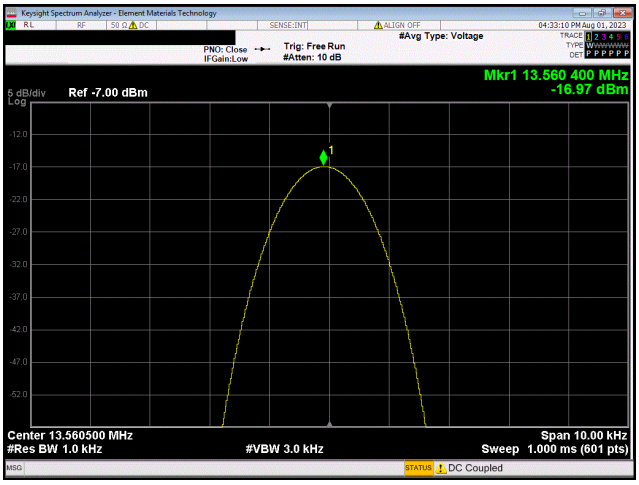
13.56 MHz RFID, ISO/IEC 15693
Extreme Temperature +50°C

FREQUENCY STABILITY

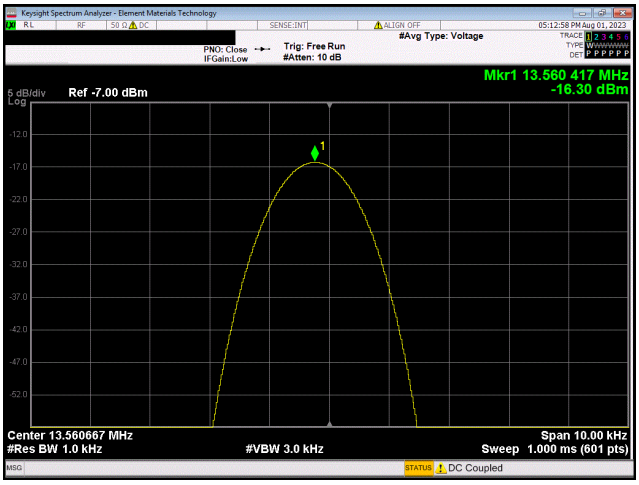
element
WTD.2023.05.05.0



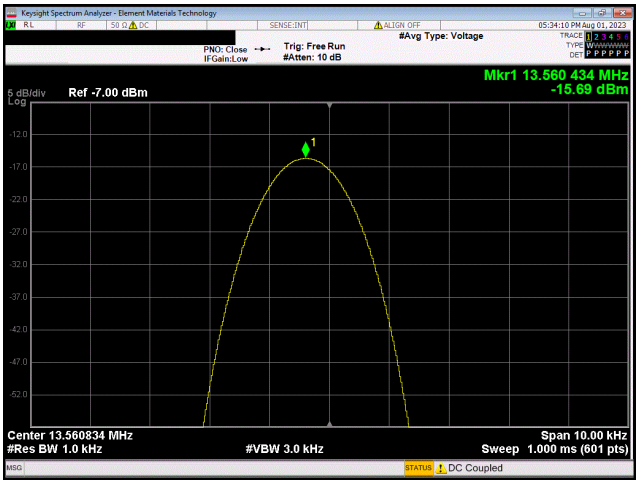
13.56 MHz RFID, ISO/IEC 15693
Extreme Temperature +40°C



13.56 MHz RFID, ISO/IEC 15693
Extreme Temperature +30°C



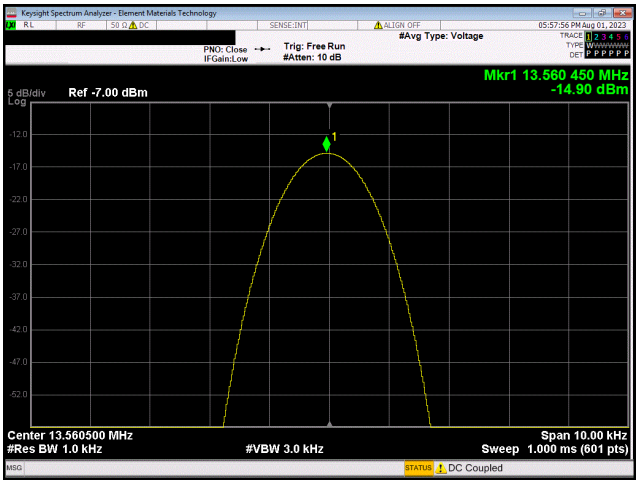
13.56 MHz RFID, ISO/IEC 15693
Extreme Temperature +20°C



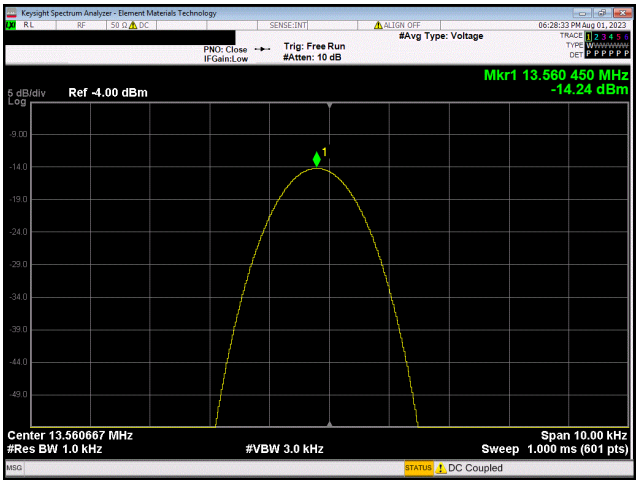
13.56 MHz RFID, ISO/IEC 15693
Extreme Temperature +10°C

FREQUENCY STABILITY

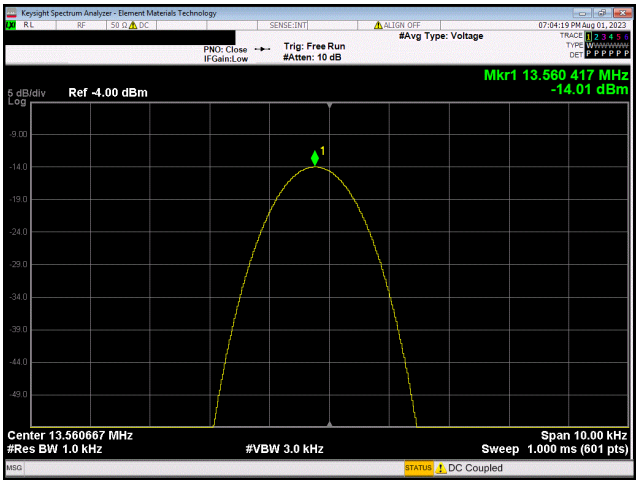
element
WTD.2023.05.05.0



13.56 MHz RFID, ISO/IEC 15693
Extreme Temperature +0°C



13.56 MHz RFID, ISO/IEC 15693
Extreme Temperature -10°C



13.56 MHz RFID, ISO/IEC 15693
Extreme Temperature -20°C

End of Test Report