

NORTHWEST EMC

Preco Electronics, Inc.

PreView

(Sentry, Side Defender, BlindSpotter)

FCC 15.249:2016

24.0-24.25 GHz Tranceiver

Report # PRCO0080



NVLAP Lab Code: 200630-0

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America. This Report may only be duplicated in its entirety

CERTIFICATE OF TEST



Last Date of Test: June 29, 2016
Preco Electronics, Inc.
Model: PreView

Radio Equipment Testing

Standards

Specification	Method
FCC 15.249:2016	ANSI C63.10:2013

Results

Method Clause	Test Description	Applied	Results	Comments
6.5, 6.6	Field Strength of Harmonics and Spurious Radiated Emissions	Yes	Pass	
6.6	Field Strength of Fundamental	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.

REVISION HISTORY

Revision Number		Description	Date	Page Number
00		None		

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 - Accredited by A2LA to ISO / IEC 17065 as a product certifier. This allows Northwest EMC to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

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

European Union

European Commission – Validated by the European Commission as a Notified Body under the R&TTE Directive.

Australia/New Zealand

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

Korea

MSIP / 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:

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

<http://gsi.nist.gov/global/docs/cabs/designations.html>

MEASUREMENT UNCERTAINTY

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.

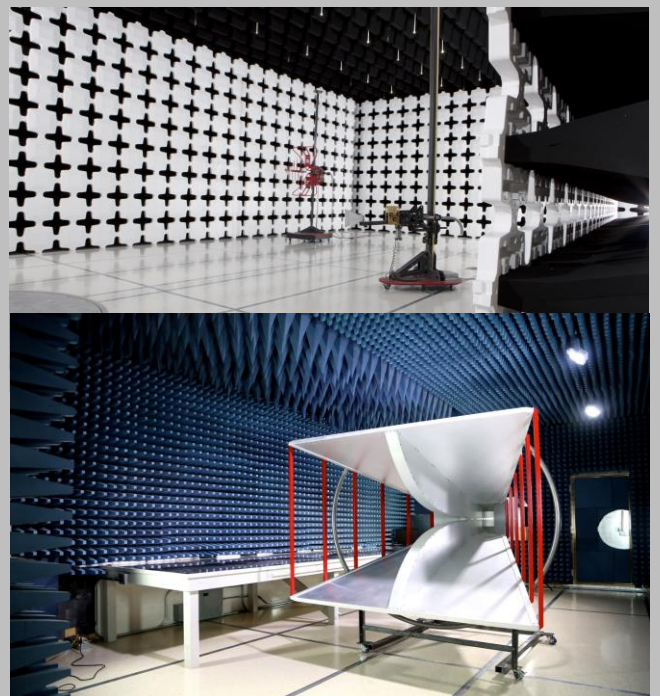
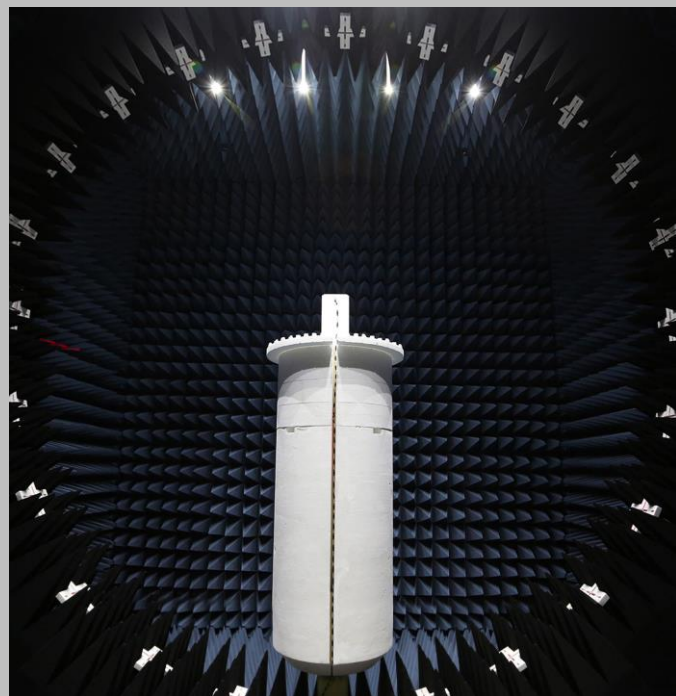
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 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)	2.4 dB	-2.4 dB

FACILITIES



California Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	Minnesota Labs MN01-08, MN10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	New York Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	Oregon Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	Texas Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Washington Labs NC01-05 19201 120 th Ave NE Bothell, WA 98011 (425)984-6600
NVLAP					
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
Industry Canada					
2834B-1, 2834B-3	2834E-1	N/A	2834D-1, 2834D-2	2834G-1	2834F-1
BSMI					
SL2-IN-E-1154R	SL2-IN-E-1152R	N/A	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI					
A-0029	A-0109	N/A	A-0108	A-0201	A-0110
Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRR, MIC, MOC, NCC, OFCA					
US0158	US0175	N/A	US0017	US0191	US0157



PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	Preco Electronics, Inc.
Address:	10335 W Emerald St
City, State, Zip:	Boise, ID 83704-5018
Test Requested By:	Brad Eylander
Model:	PreView
First Date of Test:	June 13, 2016
Last Date of Test:	June 29, 2016
Receipt Date of Samples:	June 13, 2016
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
Vehicle mounted radar unit using an FM modulated 24 GHz transceiver
Testing Objective:
Seeking to demonstrate compliance under FCC 15.249:2016 for operation in the 24.0-24.25 GHz Band.

CONFIGURATIONS

Configuration PRCO0080- 1

Software/Firmware Running during test	
Description	Version
NextGen PET	1.6.1

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Radar Unit 1	Preco Electronics, Inc.	None	Unit 1

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Remote Laptop	Hewlett Packard	ProBook 6545b	CND03005M8
DC Linear Power Supply (TPD)	TOPWARD ELECTRONIC INSTRUMENTS	TPS 2000	TPD

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
I/O Cable	No	10.0m	No	Radar	Laptop
Breakout DC Leads	No	1.2m	No	Radar	DC Power Supply

Configuration PRCO0080- 2

Software/Firmware Running during test	
Description	Version
NextGen PET	1.6.1

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Radar Unit 2	Preco Electronics, Inc.	None	Unit 2

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Remote Laptop	Hewlett Packard	ProBook 6545b	CND03005M8
DC Linear Power Supply (TPD)	TOPWARD ELECTRONIC INSTRUMENTS	TPS 2000	TPD

CONFIGURATIONS

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
I/O Cable	No	10.0m	No	Radar	Laptop
Breakout DC Leads	No	1.2m	No	Radar	DC Power Supply

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	6/13/2016	Field Strength of Fundamental	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	6/29/2016	Field Strength of Harmonics and Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

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

MODES OF OPERATION

Mode 1

Mode 2

CHANNELS OF OPERATION

Low Frequency 24005 MHz

Low Frequency 24008 MHz

Mid Frequency 24125 MHz

High Frequency 24242 MHz

High Frequency 24246 MHz

POWER SETTINGS INVESTIGATED

12VDC via 110VAC/60Hz

CONFIGURATIONS INVESTIGATED

PRCO0080 - 1

PRCO0080 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency	23800 MHz	Stop Frequency	24400 MHz
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SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	4/22/2016	12 mo
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	6/7/2016	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-09	AHY	NCR	0 mo

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was transmitting and while set at the lowest channel, a middle channel, and the highest channel available. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT and EUT antenna in 3 orthogonal planes.

To determine the "true peak level", the measurement procedure described by Andy Leimer of the FCC OET Laboratory (FCC Procedure for Pulsed Signals.txt, dated 11/16/99) was used. Per part (a) of the FCC Procedure stated above there is no pulse desensitization factor added to the unmodulated carrier measured as described below.

RBW: 1MHz

VBW: = 1MHz

Detector: Peak

The average level of the fundamental emission is the "true peak level" measured above minus the calculated duty cycle factor in dB. The duty cycle correction factor is calculated from Equation 4 in HP Note 150-2 ($DCCF = 20\log(T_{eff}/T)$). The mode 1 pulse on-time (T_{eff}) was measured to be 27.62mS with a period (T) measured to be 115mS; therefore, a -11.18 dB duty cycle correction factor was used for mode 1. Due to mode 2 measurement limitations an assumed pulse on-time (T_{eff}) of 1mS used with a period (T) measured to be 10.83mS; therefore, a -20.8 dB duty cycle correction factor was used for mode 2.



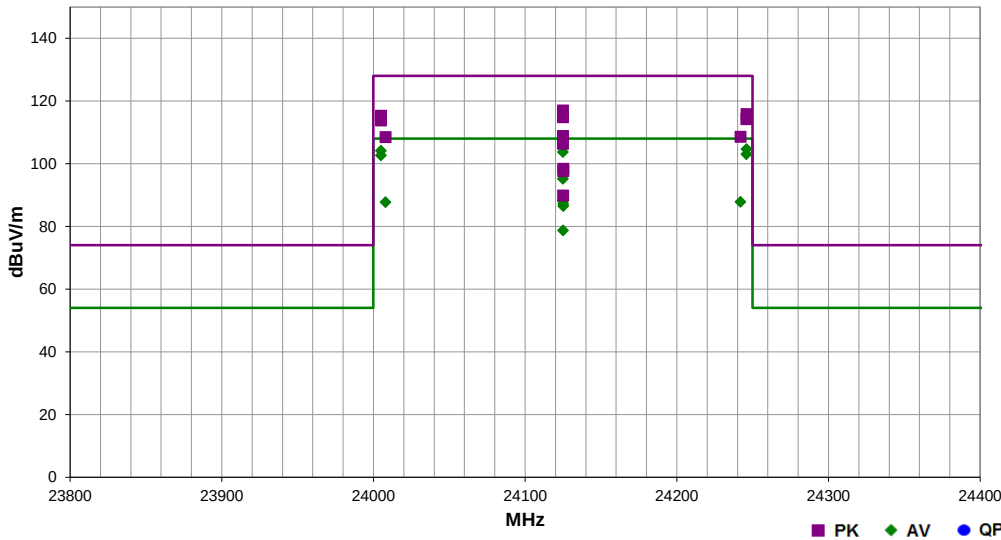
FIELD STRENGTH OF FUNDAMENTAL

PSA-ESCI 2016.03.11
EmiR5 2016.03.11

Work Order:	PRCO0080	Date:	06/13/16		
Project:	None	Temperature:	22.5 °C		
Job Site:	EV01	Humidity:	43% RH		
Serial Number:	See Configuration	Barometric Pres.:	1021 mbar		
EUT:	PreView			Tested by:	Brandon Hobbs
Configuration:	1,2				
Customer:	Preco Electronics, Inc.				
Attendees:	Brad Eylander				
EUT Power:	12VDC via 110VAC/60Hz				
Operating Mode:	On, transmitting				
Deviations:	None				
Comments:	Please reference the data comments for EUT orientation, mode and frequency. Unit 1 was used for Mode 1 and Unit 2 was used for Mode 2. A 1mS theoretical pulse on time was used for mode 2 duty cycle correction. Modes 1 and 2 have different High and Low frequencies.				

Test Specifications	Test Method
FCC 15.249:2016	ANSI C63.10:2013

Run #	1	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
24124.900	73.1	43.9	1.4	342.0	-11.2	0.0	Vert	AV	0.0	105.8	108.0	-2.2	Mid Frequency 24.125GHz, Mode 1, EUT E Field Vertical
24246.010	71.9	43.9	1.6	351.0	-11.2	0.0	Horz	AV	0.0	104.6	108.0	-3.4	High Frequency 24.246GHz, Mode 1, EUT E Field On Side
24004.980	71.5	43.8	1.6	351.0	-11.2	0.0	Horz	AV	0.0	104.1	108.0	-3.9	Low Frequency 24.005GHz, Mode 1, EUT E Field On Side
24124.900	71.0	43.9	1.4	340.0	-11.2	0.0	Horz	AV	0.0	103.7	108.0	-4.3	Mid Frequency 24.125GHz, Mode 1, EUT E Field On Side
24245.900	70.3	43.9	1.6	348.0	-11.2	0.0	Vert	AV	0.0	103.0	108.0	-5.0	High Frequency 24.246GHz, Mode 1, EUT E Field Vertical
24005.010	70.0	43.8	1.6	348.0	-11.2	0.0	Vert	AV	0.0	102.6	108.0	-5.4	Low Frequency 24.005GHz, Mode 1, EUT E Field Vertical
24124.900	73.1	43.9	1.4	342.0	0.0	0.0	Vert	PK	0.0	117.0	128.0	-11.0	Mid Frequency 24.125GHz, Mode 1, EUT E Field Vertical
24246.010	71.9	43.9	1.6	351.0	0.0	0.0	Horz	PK	0.0	115.8	128.0	-12.2	High Frequency 24.246GHz, Mode 1, EUT E Field On Side
24004.980	71.5	43.8	1.6	351.0	0.0	0.0	Horz	PK	0.0	115.3	128.0	-12.7	Low Frequency 24.005GHz, Mode 1, EUT E Field On Side
24124.900	62.5	43.9	1.6	290.0	-11.2	0.0	Vert	AV	0.0	95.2	108.0	-12.8	Mid Frequency 24.125GHz, Mode 1, EUT E Field Horizontal
24124.900	71.0	43.9	1.4	340.0	0.0	0.0	Horz	PK	0.0	114.9	128.0	-13.1	Mid Frequency 24.125GHz, Mode 1, EUT E Field On Side
24245.900	70.3	43.9	1.6	348.0	0.0	0.0	Vert	PK	0.0	114.2	128.0	-13.8	High Frequency 24.246GHz, Mode 1, EUT E Field Vertical
24005.010	70.0	43.8	1.6	348.0	0.0	0.0	Vert	PK	0.0	113.8	128.0	-14.2	Low Frequency 24.005GHz, Mode 1, EUT E Field Vertical
24124.930	65.0	43.9	1.5	53.0	0.0	0.0	Horz	PK	0.0	108.9	128.0	-19.1	Mid Frequency 24.125GHz, Mode 2, EUT E Field Vertical
24241.980	64.7	43.9	1.5	53.0	0.0	0.0	Vert	PK	0.0	108.6	128.0	-19.4	High Frequency 24.242GHz, Mode 2, EUT E Field Vertical
24007.960	64.7	43.8	1.5	53.0	0.0	0.0	Horz	PK	0.0	108.5	128.0	-19.5	Low Frequency 24.008GHz, Mode 2, EUT E Field Vertical
24124.930	65.0	43.9	1.5	53.0	-20.8	0.0	Horz	AV	0.0	88.1	108.0	-19.9	Mid Frequency 24.125GHz, Mode 2, EUT E Field Horizontal
24241.980	64.7	43.9	1.5	53.0	-20.8	0.0	Vert	AV	0.0	87.8	108.0	-20.2	High Frequency 24.242GHz, Mode 2, EUT E Field Vertical
24007.960	64.7	43.8	1.5	53.0	-20.8	0.0	Horz	AV	0.0	87.7	108.0	-20.3	Low Frequency 24.008GHz, Mode 2, EUT E Field Horizontal
24125.120	54.5	43.9	1.4	340.0	-11.2	0.0	Vert	AV	0.0	87.2	108.0	-20.8	Mid Frequency 24.125GHz, Mode 1, EUT E Field On Side
24125.150	53.8	43.9	1.4	4.0	-11.2	0.0	Horz	AV	0.0	86.5	108.0	-21.5	Mid Frequency 24.125GHz, Mode 1, EUT E Field Vertical
24124.900	62.5	43.9	1.6	290.0	0.0	0.0	Vert	PK	0.0	106.4	128.0	-21.6	Mid Frequency 24.125GHz, Mode 1, EUT E Field Horizontal
24125.020	46.0	43.9	1.6	219.0	-11.2	0.0	Horz	AV	0.0	78.7	108.0	-29.3	Mid Frequency 24.125GHz, Mode 1, EUT E Field Horizontal
24125.120	54.5	43.9	1.4	340.0	0.0	0.0	Vert	PK	0.0	98.4	128.0	-29.6	Mid Frequency 24.125GHz, Mode 1, EUT E Field On Side
24125.150	53.8	43.9	1.4	4.0	0.0	0.0	Horz	PK	0.0	97.7	128.0	-30.3	Mid Frequency 24.125GHz, Mode 1, EUT E Field Vertical
24125.020	46.0	43.9	1.6	219.0	0.0	0.0	Horz	PK	0.0	89.9	128.0	-38.1	Mid Frequency 24.125GHz, Mode 1, EUT E Field Horizontal

FIELD STRENGTH OF HARMONICS

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
Antenna	OML, Inc.	M08HWAX	AIL	8/20/2013	8/20/2016
Antenna	OML, Inc.	M12HWAX	AIK	8/20/2013	8/20/2016
Antenna	OML, Inc.	M19HWAX	AIJ	8/20/2013	8/20/2016
Diplexer	OML, Inc.	DPL26	DAA	NCR	NCR
Cable	Semplex, Inc.	119BFSS1003904	SUN	NCR	NCR
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	4/22/2016	4/22/2017

TEST DESCRIPTION

The measurement was made in a radiated configuration of the fundamental with the carrier fully maximized for its highest radiated power. The EUT was transmitting with an unmodulated carrier. The testing was done at distances closer than 3m as called out in the data sheets. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna orientation and polarization, and manipulating the EUT and EUT antenna in 3 orthogonal planes (per ANSI C63.10:2009). The specification limit was adjusted for the closer test distances at 20 dB per decade as called out in the following table:

	Spec Limit	Spec Limit	Spec Limit	Spec Limit	Spec Limit
	3m	20 cm	10 cm	5 cm	2 cm
Average	68	91.5	97.5	103.6	111.5
Peak	88	111.5	117.5	123.6	131.5

The analyzer display was offset with the value of the test equipment losses (mixers, duplexers, and cables) specific to each band and the antenna factor per the following set of tables seen on the next page.

The duty cycle correction factor is calculated from Equation 4 in HP Note 150-2 ($DCCF = 20\log(T_{eff}/T)$). The mode 1 pulse on-time (T_{eff}) was measured to be 27.62mS with a period (T) measured to be 115mS; therefore, a -11.18 dB duty cycle correction factor was used for mode 1. Due to mode 2 measurement limitations an assumed pulse on-time (T_{eff}) of 1mS used with a period (T) measured to be 10.83mS; therefore, a -20.8 dB duty cycle correction factor was used for mode 2.

FIELD STRENGTH OF HARMONICS

Spectrum Analyzer Offsets

Mode 1

Low Channel

Freq (MHz)	Antenna Gain (dBi)	Antenna Factor (dB/m)	Mixer / Duplexer loss (dB)	Analyzer Offset (dB)
48010.00	24.00	39.85	30.92	70.77
72015.00	24.00	43.37	41.07	84.44
96020.00	24.00	45.87	39.30	85.17

Mid Channel

Freq (MHz)	Antenna Gain (dBi)	Antenna Factor (dB/m)	Mixer / Duplexer loss (dB)	Analyzer Offset (dB)
48250.00	24.00	39.89	30.06	69.95
72375.00	24.00	43.41	38.08	81.49
96500.00	24.00	45.91	36.48	82.39

High Channel

Freq (MHz)	Antenna Gain (dBi)	Antenna Factor (dB/m)	Mixer / Duplexer loss (dB)	Analyzer Offset (dB)
48492.00	24.00	39.93	29.60	69.53
72738.00	24.00	43.46	37.00	80.46
96984.00	24.00	45.95	33.63	79.58

Mode 2

Low Channel

Freq (MHz)	Antenna Gain (dBi)	Antenna Factor (dB/m)	Mixer / Duplexer loss (dB)	Analyzer Offset (dB)
48016.00	24.00	39.85	30.90	70.75
72024.00	24.00	43.37	40.99	84.36
96032.00	24.00	45.87	39.23	85.10

Mid Channel

Freq (MHz)	Antenna Gain (dBi)	Antenna Factor (dB/m)	Mixer / Duplexer loss (dB)	Analyzer Offset (dB)
48250.00	24.00	39.89	30.06	69.95
72375.00	24.00	43.41	38.08	81.49
96500.00	24.00	45.91	36.48	82.39

High Channel

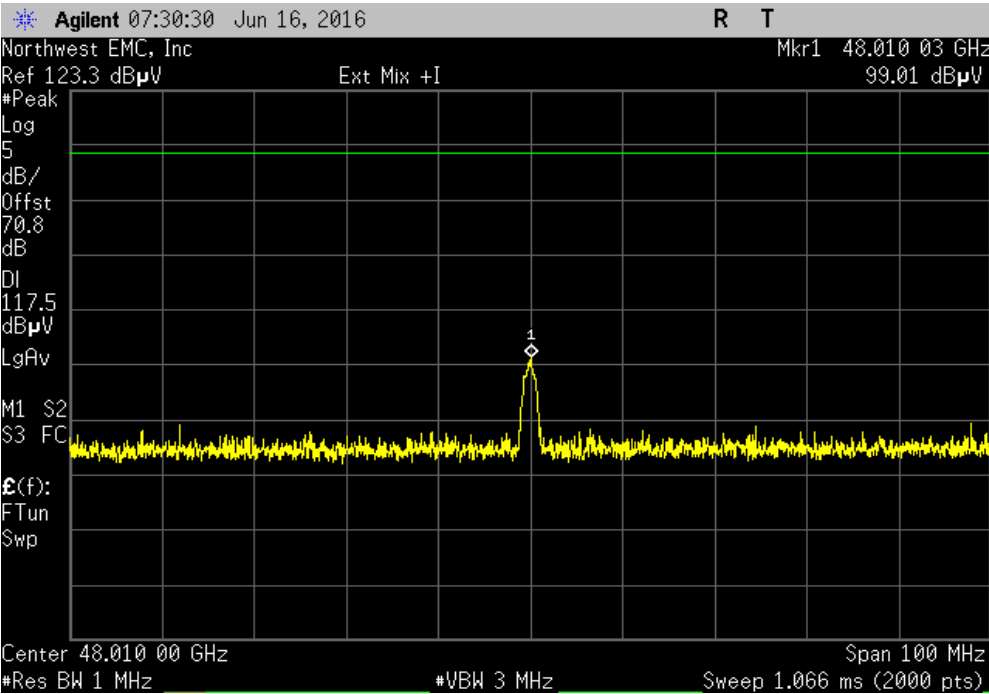
Freq (MHz)	Antenna Gain (dBi)	Antenna Factor (dB/m)	Mixer / Duplexer loss (dB)	Analyzer Offset (dB)
48484.00	24.00	39.93	29.59	69.52
72726.00	24.00	43.45	36.66	80.11
96968.00	24.00	45.95	33.73	79.68

FIELD STRENGTH OF HARMONICS

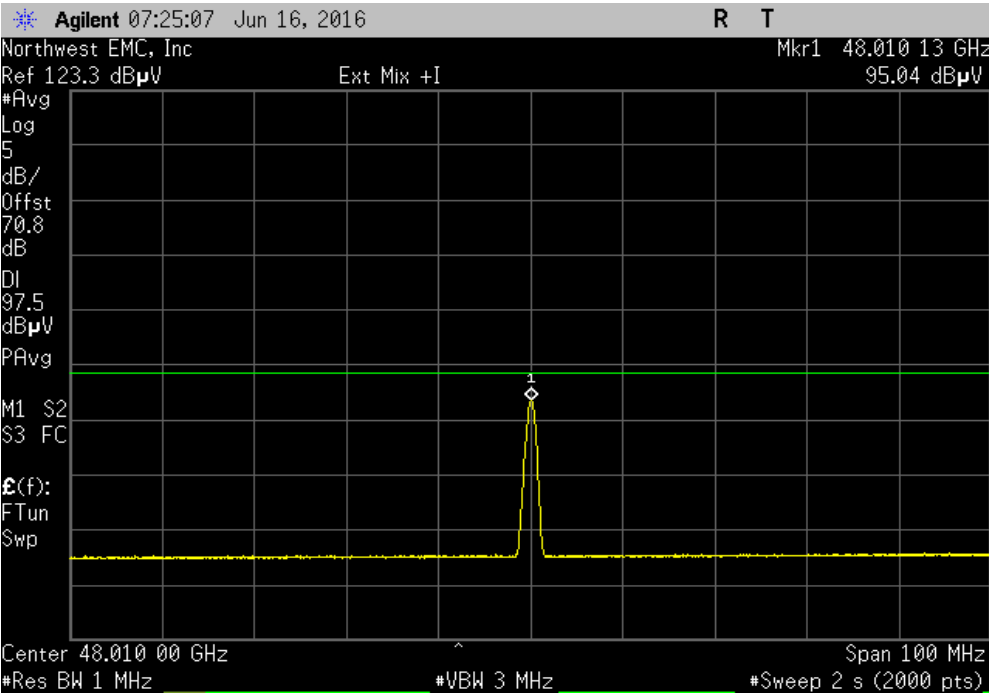
EUT: PreView			Work Order: PRCO0080		
Serial Number: See Configurations			Date: 06/21/16		
Customer: Preco Electronics, Inc.			Temperature: 22.7 °C		
Attendees: None			Humidity: 43.3% RH		
Project: None			Barometric Pres.: 1029 mbar		
Tested by: Brandon Hobbs		Power: 12VDC via 110VAC/60Hz	Job Site: EV06		
TEST SPECIFICATIONS			Test Method		
FCC 15.249:2016		ANSI C63.10:2013			
COMMENTS					
EUT was maximized on all three orthoginal orientations					
DEVIATIONS FROM TEST STANDARD					
None					
Configuration #	1,2	Signature 			
			initial Value (dBuV)	Duty Cycle Correction	Final Value (dBuV) Limit (dBuV) Result
Mode 1					
2nd Harmonic					
Low Frequency 24005 MHz					
Peak			99.01	N/A	99.01 117.5 @ 10 cm Pass
Average			95.04	-11.18	83.86 97.5 @ 10 cm Pass
Mid Frequency 24125 MHz					
Peak			96.49	N/A	96.49 117.5 @ 10 cm Pass
Average			91.95	-11.18	80.77 97.5 @ 10 cm Pass
High Frequency 24246 MHz					
Peak			99.7	N/A	99.7 117.5 @ 10 cm Pass
Average			94.4	-11.18	83.22 97.5 @ 10 cm Pass
3rd Harmonic					
Low Frequency 24005 MHz					
Peak			106.84	N/A	106.84 123.6 @ 5 cm Pass
Average			97.44	-11.18	86.26 103.6 @ 5 cm Pass
Mid Frequency 24125 MHz					
Peak			104.13	N/A	104.13 123.6 @ 5 cm Pass
Average			94.15	-11.18	82.97 103.6 @ 5 cm Pass
High Frequency 24246 MHz					
Peak			102.98	N/A	102.98 123.6 @ 5 cm Pass
Average			92.07	-11.18	80.89 103.6 @ 5 cm Pass
4th Harmonic					
Low Frequency 24005 MHz					
Peak			108.88	N/A	108.88 131.5 @ 2 cm Pass
Average			103.63	-11.18	92.45 111.5 @ 2 cm Pass
Mid Frequency 24125 MHz					
Peak			108.35	N/A	108.35 131.5 @ 2 cm Pass
Average			98.58	-11.18	87.4 111.5 @ 2 cm Pass
High Frequency 24246 MHz					
Peak			104.67	N/A	104.67 131.5 @ 2 cm Pass
Average			94.38	-11.18	83.2 111.5 @ 2 cm Pass
Mode 2					
2nd Harmonic					
Low Frequency 24008 MHz					
Peak			98.49	N/A	98.49 117.5 @ 10 cm Pass
Average			94.9	-20.8	74.1 97.5 @ 10 cm Pass
Mid Frequency 24125 MHz					
Peak			97.62	N/A	97.62 117.5 @ 10 cm Pass
Average			94.94	-20.8	74.14 97.5 @ 10 cm Pass
High Frequency 24242 MHz					
Peak			98.4	N/A	98.4 117.5 @ 10 cm Pass
Average			97.14	-20.8	76.34 97.5 @ 10 cm Pass
3rd Harmonic					
Low Frequency 24008 MHz					
Peak			105.66	N/A	105.66 123.6 @ 5 cm Pass
Average			94.57	-20.8	73.77 103.6 @ 5 cm Pass
Mid Frequency 24125 MHz					
Peak			106.62	N/A	106.62 123.6 @ 5 cm Pass
Average			92.24	-20.8	71.44 103.6 @ 5 cm Pass
High Frequency 24242 MHz					
Peak			106.03	N/A	106.03 123.6 @ 5 cm Pass
Average			90.69	-20.8	69.89 103.6 @ 5 cm Pass
4th Harmonic					
Low Frequency 24008 MHz					
Peak			109.59	N/A	109.59 131.5 @ 2 cm Pass
Average			97.51	-20.8	76.71 111.5 @ 2 cm Pass
Mid Frequency 24125 MHz					
Peak			106.11	N/A	106.11 131.5 @ 2 cm Pass
Average			100.5	-20.8	79.7 111.5 @ 2 cm Pass
High Frequency 24242 MHz					
Peak			101.83	N/A	101.83 131.5 @ 2 cm Pass
Average			94.38	-20.8	73.58 111.5 @ 2 cm Pass

FIELD STRENGTH OF HARMONICS

Mode 1, 2nd Harmonic, Low Frequency 24005 MHz, Peak						
	initial	Duty Cycle	Final	Limit (dBuV)	Result	
	Value (dBuV)	Correction	Value (dBuV)			
	99.01	N/A	99.01	117.5 @ 10 cm	Pass	

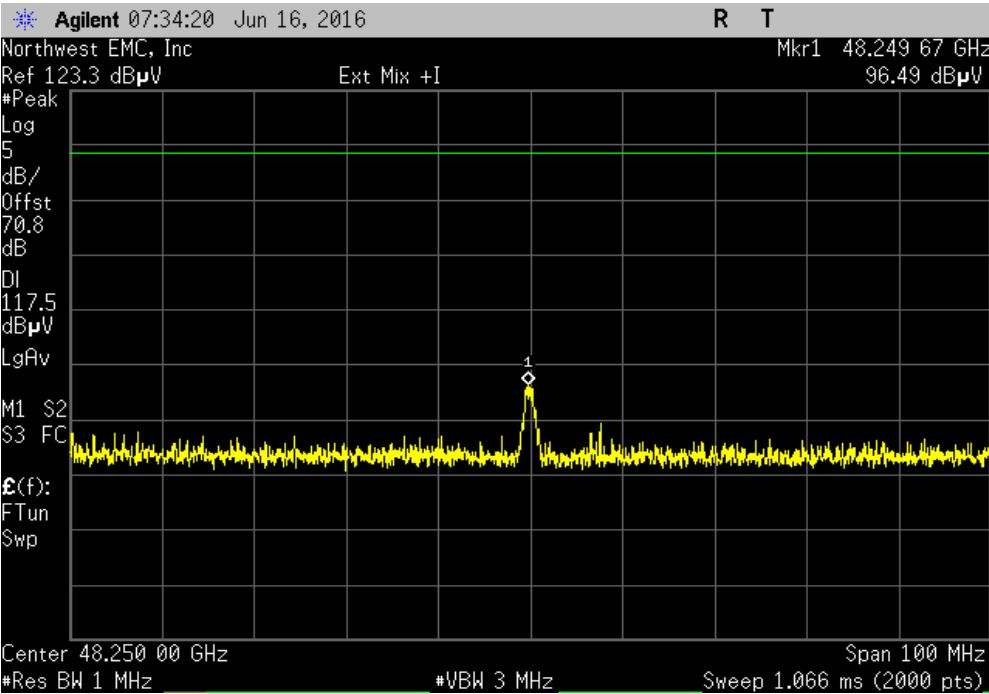


Mode 1, 2nd Harmonic, Low Frequency 24005 MHz, Average						
	initial	Duty Cycle	Final	Limit (dBuV)	Result	
	Value (dBuV)	Correction	Value (dBuV)			
	95.04	-11.18	83.86	97.5 @ 10 cm	Pass	

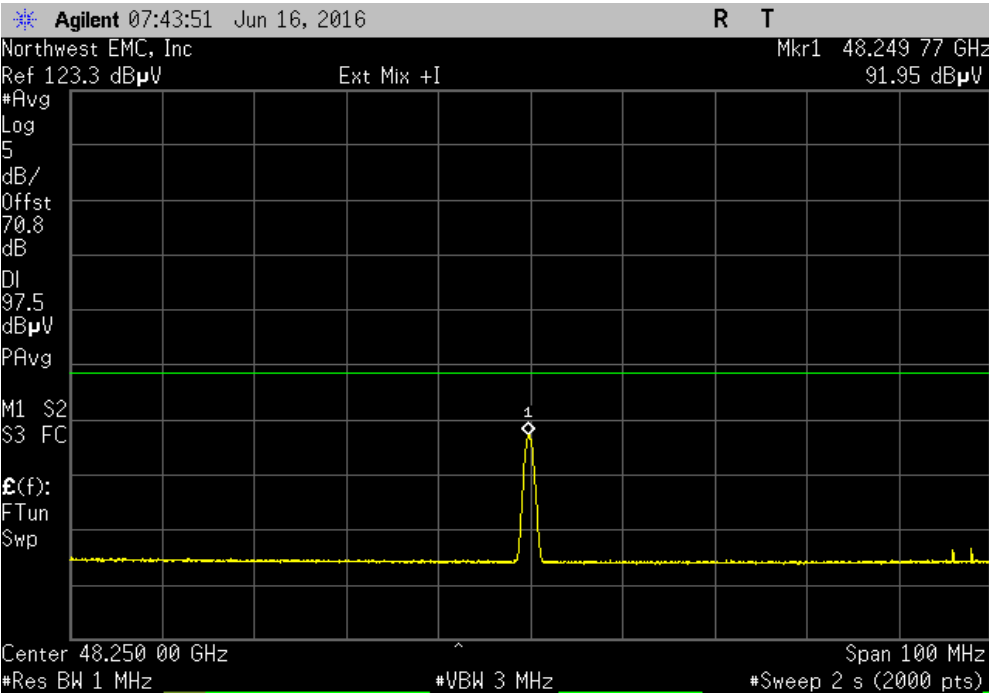


FIELD STRENGTH OF HARMONICS

Mode 1, 2nd Harmonic, Mid Frequency 24125 MHz, Peak						
	initial	Duty Cycle	Final	Limit (dBuV)	Result	
	Value (dBuV)	Correction	Value (dBuV)			
	96.49	N/A	96.94	117.5 @ 10 cm	Pass	

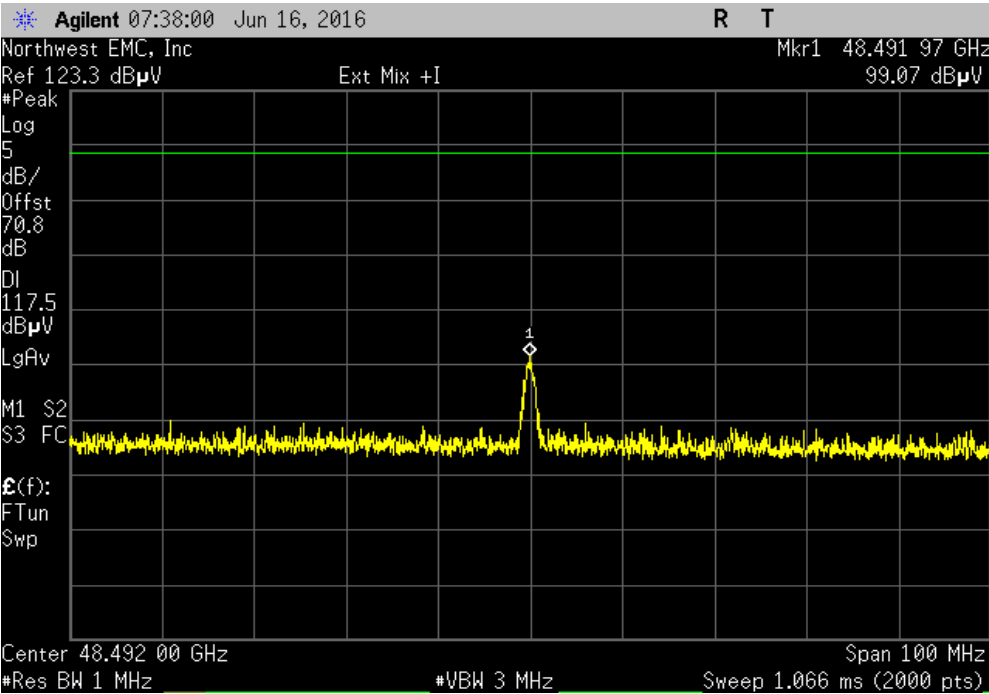


Mode 1, 2nd Harmonic, Mid Frequency 24125 MHz, Average						
	initial	Duty Cycle	Final	Limit (dBuV)	Result	
	Value (dBuV)	Correction	Value (dBuV)			
	91.95	-11.18	80.77	97.5 @ 10 cm	Pass	

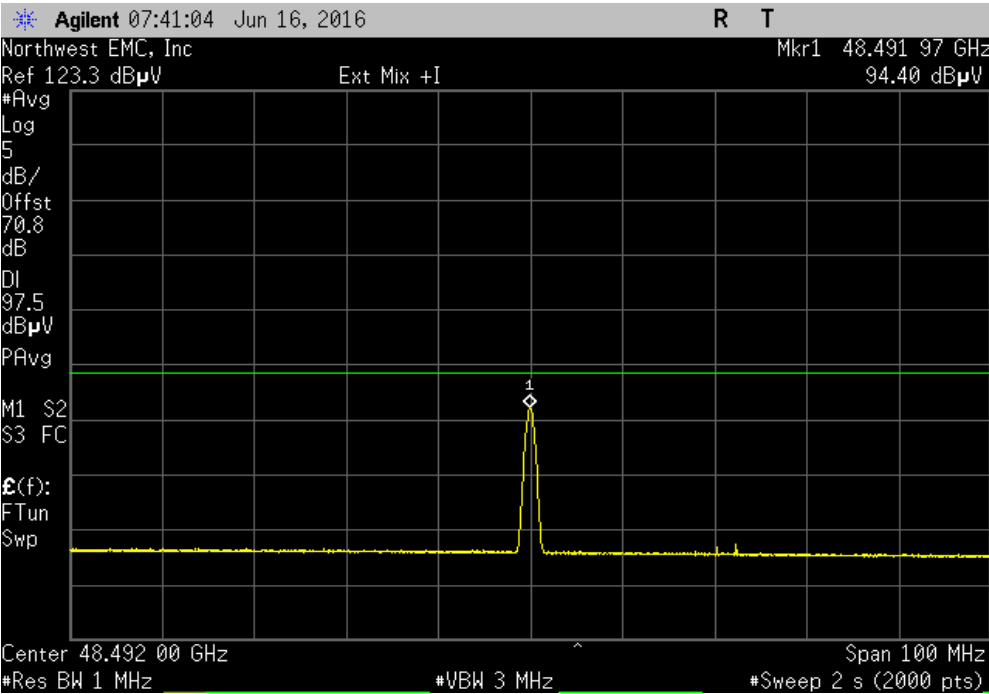


FIELD STRENGTH OF HARMONICS

Mode 1, 2nd Harmonic, High Frequency 24246 MHz, Peak						
	initial	Duty Cycle	Final			
	Value (dBuV)	Correction	Value (dBuV)	Limit (dBuV)	Result	
	99.7	N/A	99.7	117.5 @ 10 cm	Pass	

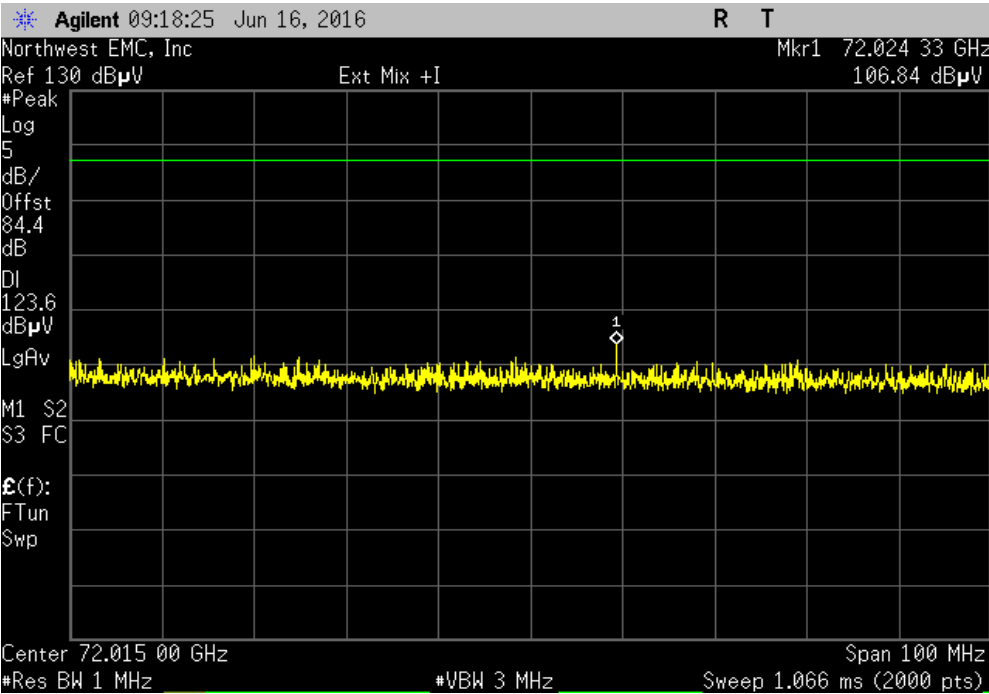


Mode 1, 2nd Harmonic, High Frequency 24246 MHz, Average						
	initial	Duty Cycle	Final			
	Value (dBuV)	Correction	Value (dBuV)	Limit (dBuV)	Result	
	94.4	-11.18	83.22	97.5 @ 10 cm	Pass	

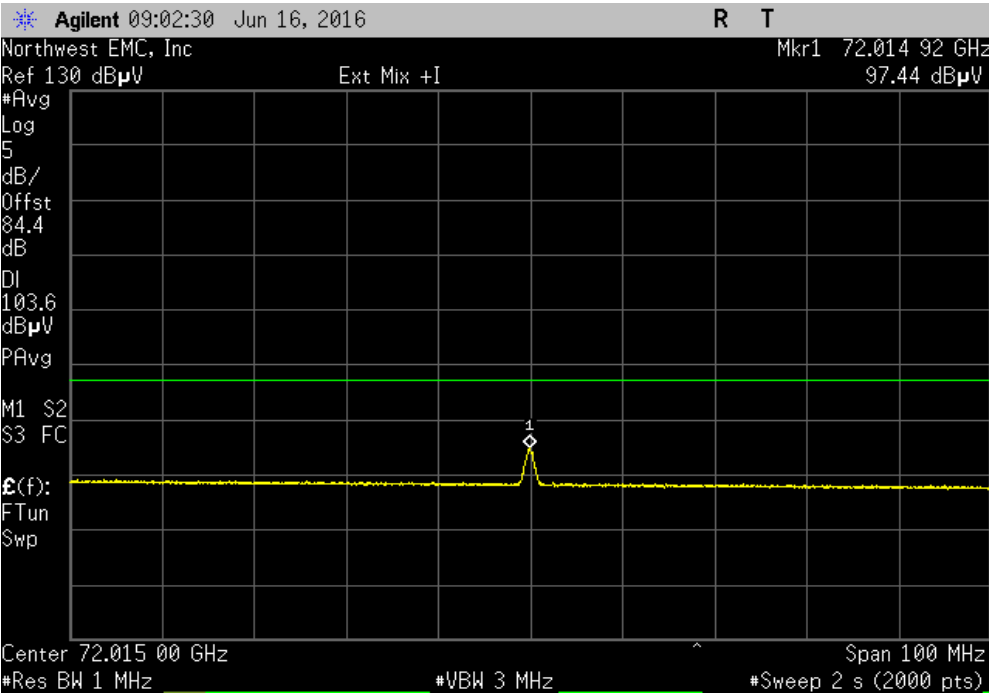


FIELD STRENGTH OF HARMONICS

Mode 1, 3rd Harmonic, Low Frequency 24005 MHz, Peak						
	initial	Duty Cycle	Final	Limit (dBuV)	Result	
	Value (dBuV)	Correction	Value (dBuV)			
	106.84	N/A	106.84	123.6 @ 5 cm	Pass	

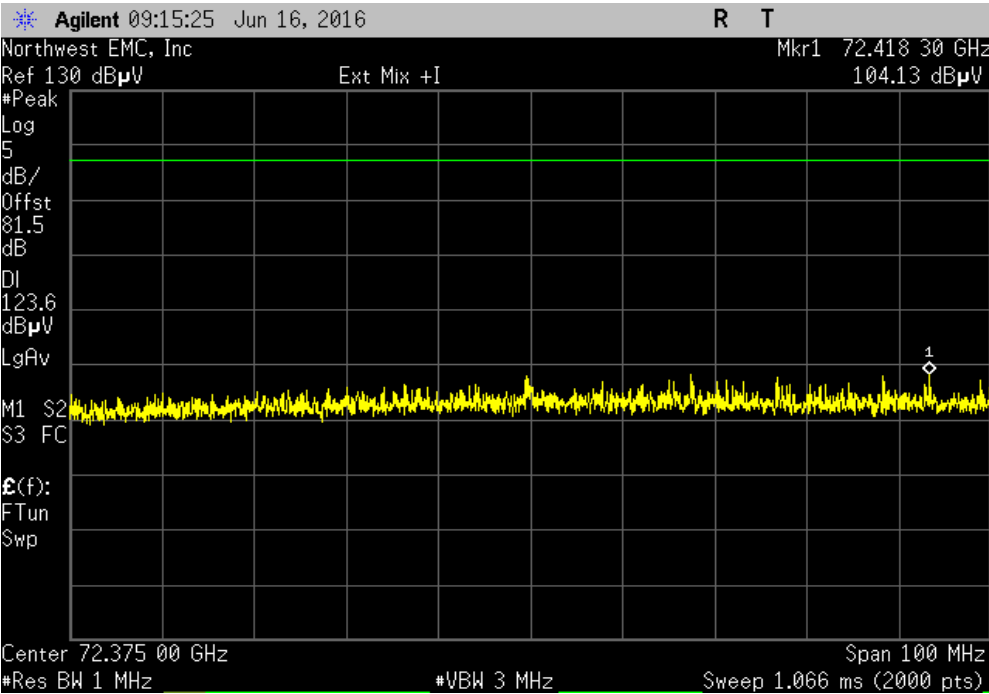


Mode 1, 3rd Harmonic, Low Frequency 24005 MHz, Average						
	initial	Duty Cycle	Final	Limit (dBuV)	Result	
	Value (dBuV)	Correction	Value (dBuV)			
	97.44	-11.18	86.26	103.6 @ 5 cm	Pass	

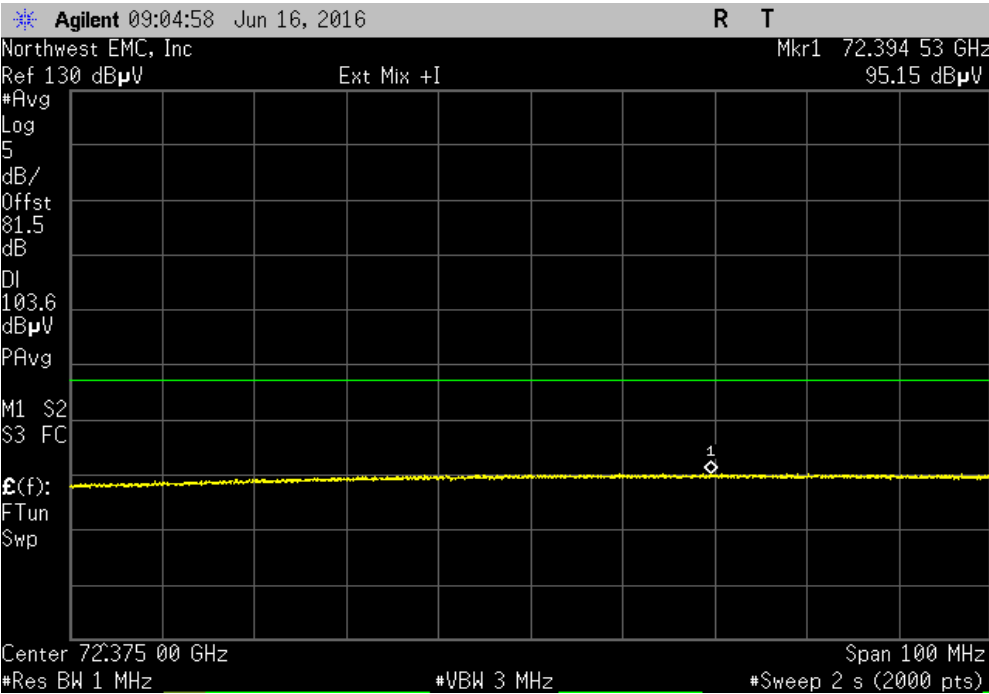


FIELD STRENGTH OF HARMONICS

Mode 1, 3rd Harmonic, Mid Frequency 24125 MHz, Peak						
	initial	Duty Cycle	Final			
	Value (dBuV)	Correction	Value (dBuV)	Limit (dBuV)	Result	
	104.13	N/A	104.13	123.6 @ 5 cm	Pass	

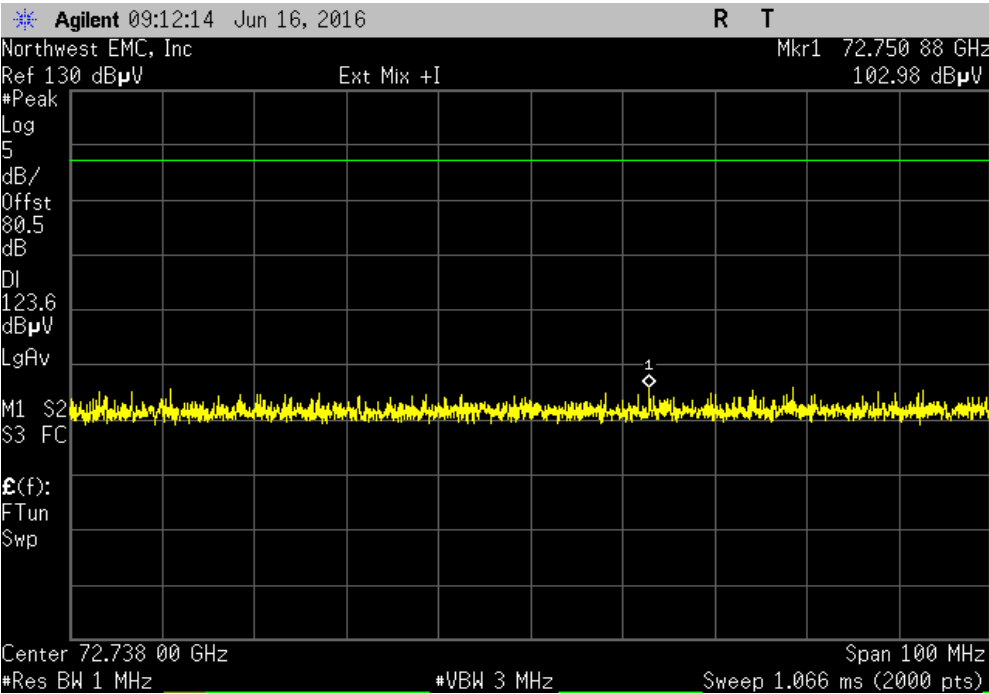


Mode 1, 3rd Harmonic, Mid Frequency 24125 MHz, Average						
	initial	Duty Cycle	Final			
	Value (dBuV)	Correction	Value (dBuV)	Limit (dBuV)	Result	
	94.15	-11.18	82.97	103.6 @ 5 cm	Pass	

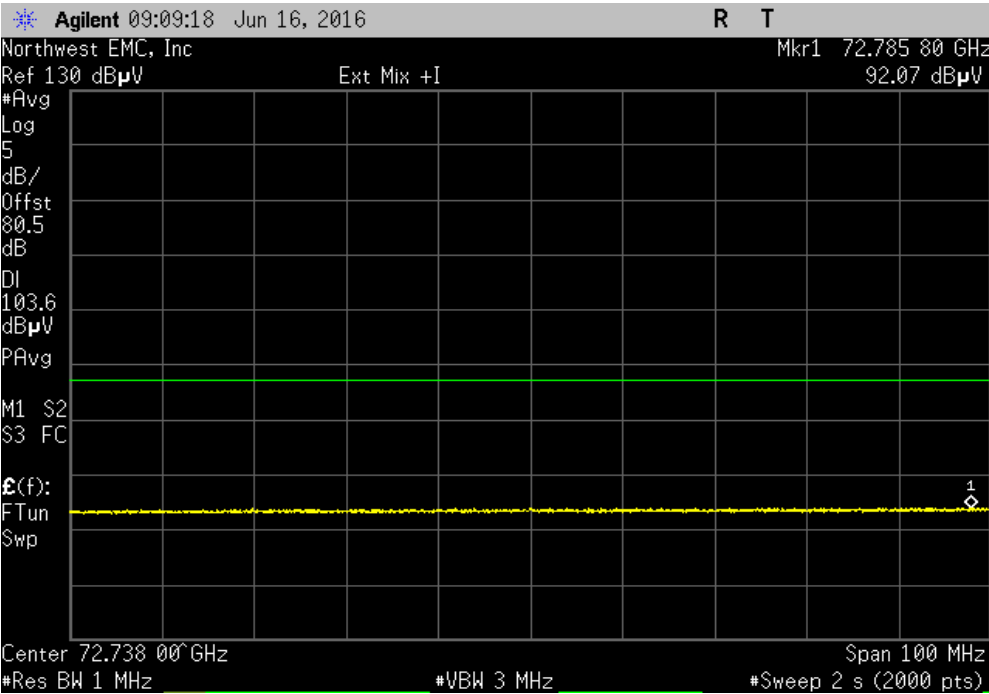


FIELD STRENGTH OF HARMONICS

Mode 1, 3rd Harmonic, High Frequency 24246 MHz, Peak						
	initial	Duty Cycle	Final			
	Value (dBuV)	Correction	Value (dBuV)	Limit (dBuV)	Result	
	102.98	N/A	102.98	123.6 @ 5 cm	Pass	

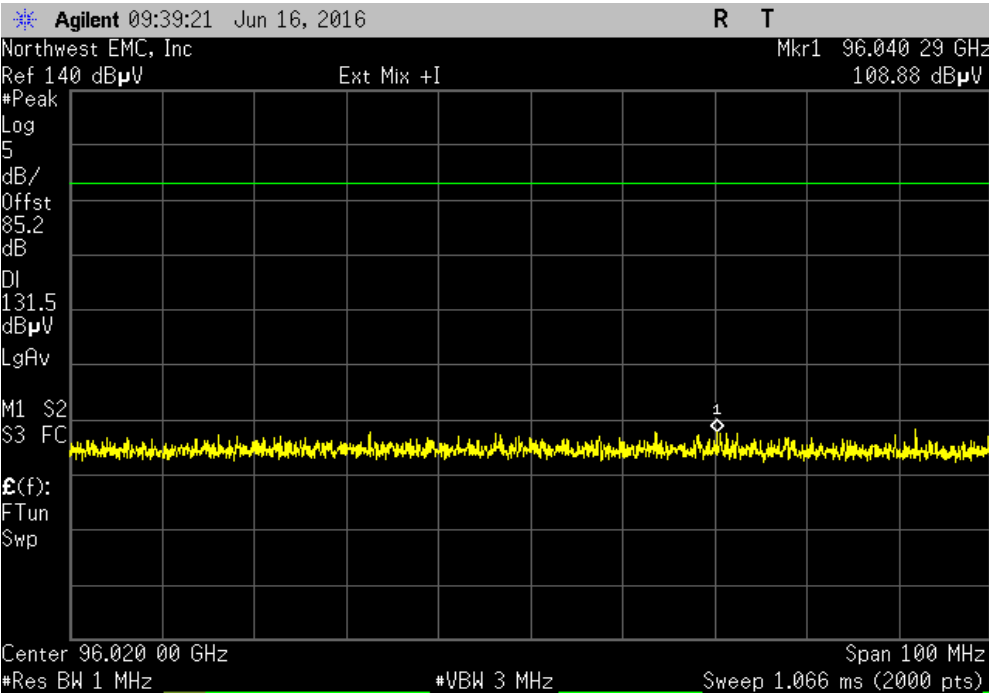


Mode 1, 3rd Harmonic, High Frequency 24246 MHz, Average						
	initial	Duty Cycle	Final			
	Value (dBuV)	Correction	Value (dBuV)	Limit (dBuV)	Result	
	92.07	-11.18	80.89	103.6 @ 5 cm	Pass	

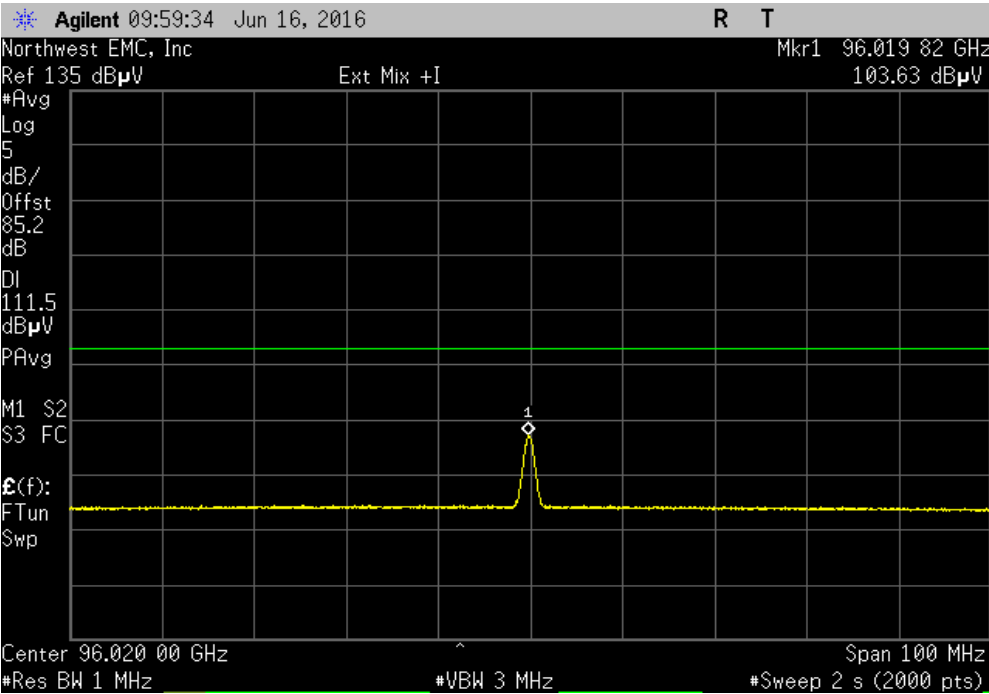


FIELD STRENGTH OF HARMONICS

Mode 1, 4th Harmonic, Low Frequency 24005 MHz, Peak						
	initial	Duty Cycle	Final	Limit (dBuV)	Result	
	Value (dBuV)	Correction	Value (dBuV)			
	108.88	N/A	108.88	131.5 @ 2 cm	Pass	

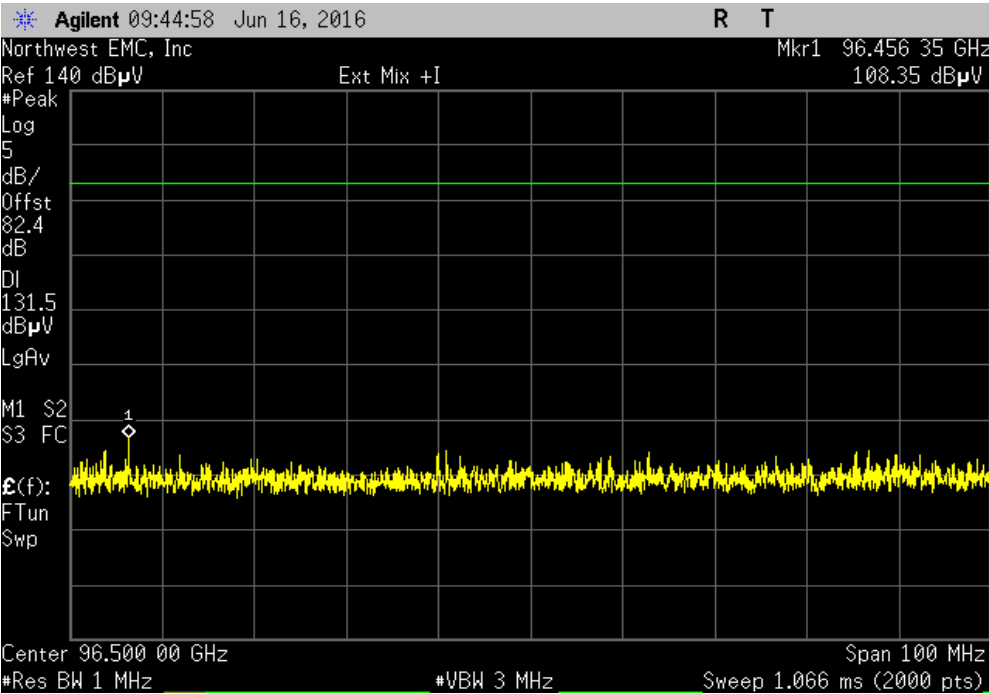


Mode 1, 4th Harmonic, Low Frequency 24005 MHz, Average						
	initial	Duty Cycle	Final	Limit (dBuV)	Result	
	Value (dBuV)	Correction	Value (dBuV)			
	103.63	-11.18	92.45	111.5 @ 2 cm	Pass	

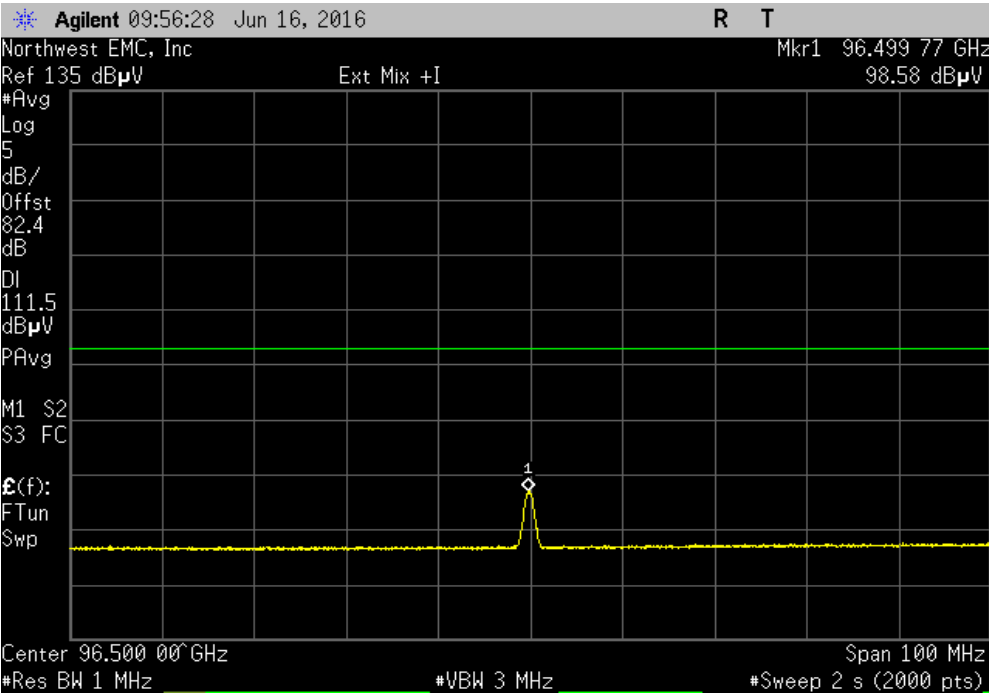


FIELD STRENGTH OF HARMONICS

Mode 1, 4th Harmonic, Mid Frequency 24125 MHz, Peak						
	initial	Duty Cycle	Final			
	Value (dBuV)	Correction	Value (dBuV)	Limit (dBuV)	Result	
	108.35	N/A	108.35	131.5 @ 2 cm	Pass	

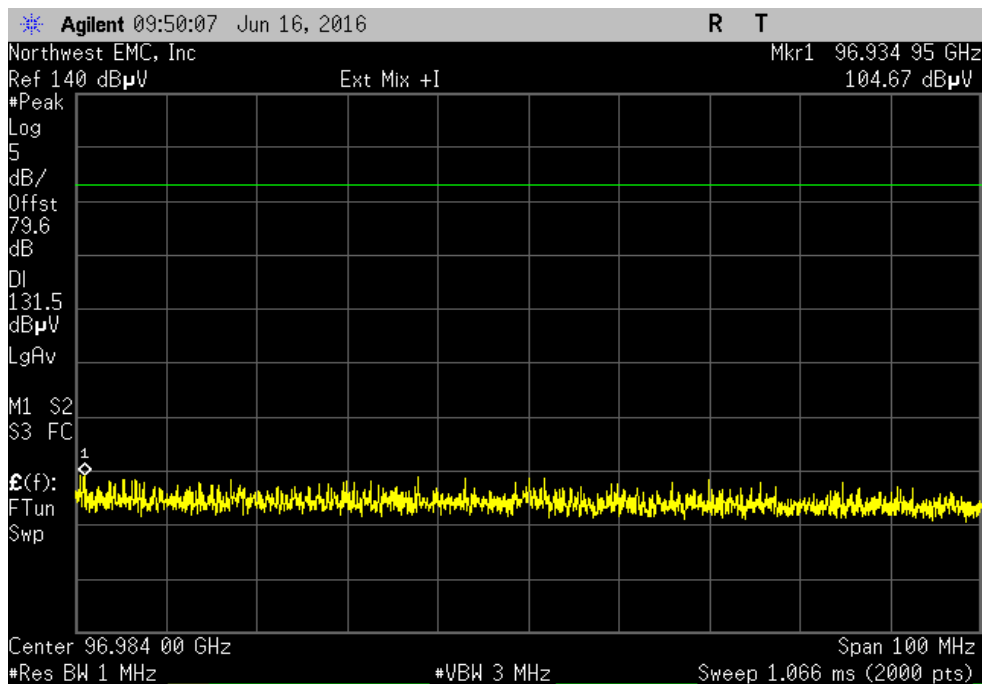


Mode 1, 4th Harmonic, Mid Frequency 24125 MHz, Average						
	initial	Duty Cycle	Final			
	Value (dBuV)	Correction	Value (dBuV)	Limit (dBuV)	Result	
	98.58	-11.18	87.4	111.5 @ 2 cm	Pass	

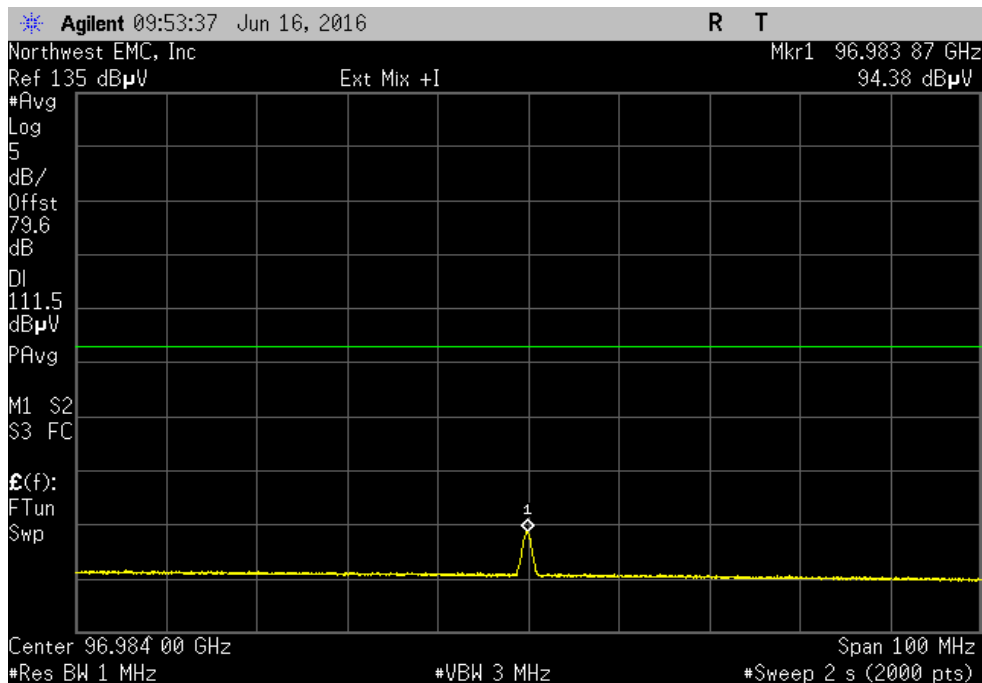


FIELD STRENGTH OF HARMONICS

Mode 1, 4th Harmonic, High Frequency 24246 MHz, Peak					
	initial Value (dBuV)	Duty Cycle Correction	Final Value (dBuV)	Limit (dBuV)	Result
	104.67	N/A	104.67	131.5 @ 2 cm	Pass

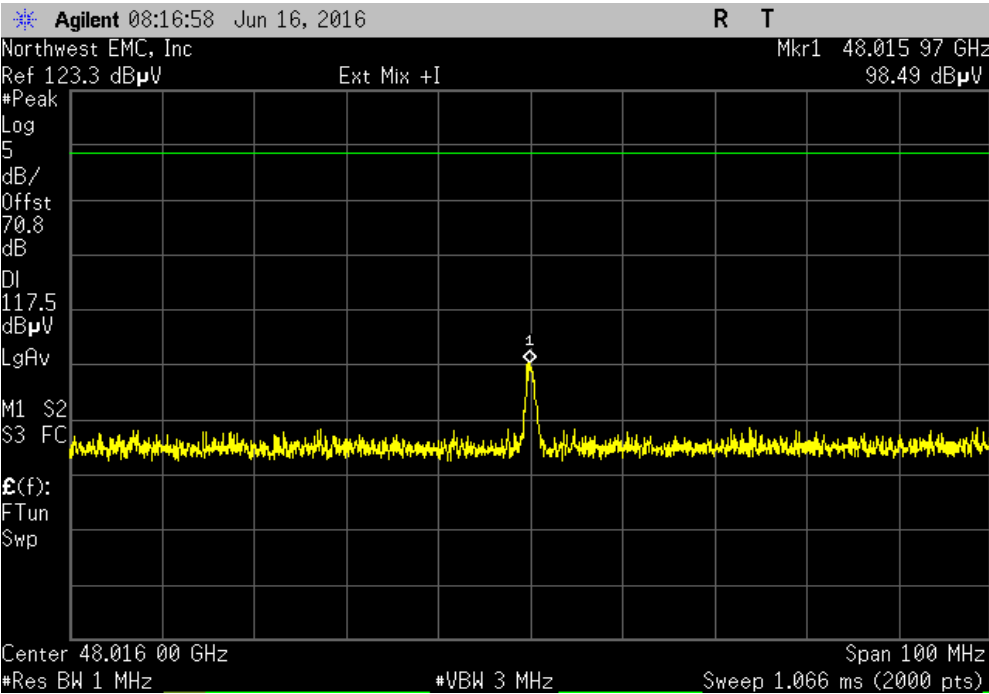


Mode 1, 4th Harmonic, High Frequency 24246 MHz, Average					
	initial Value (dBuV)	Duty Cycle Correction	Final Value (dBuV)	Limit (dBuV)	Result
	94.38	-11.18	83.2	111.5 @ 2 cm	Pass

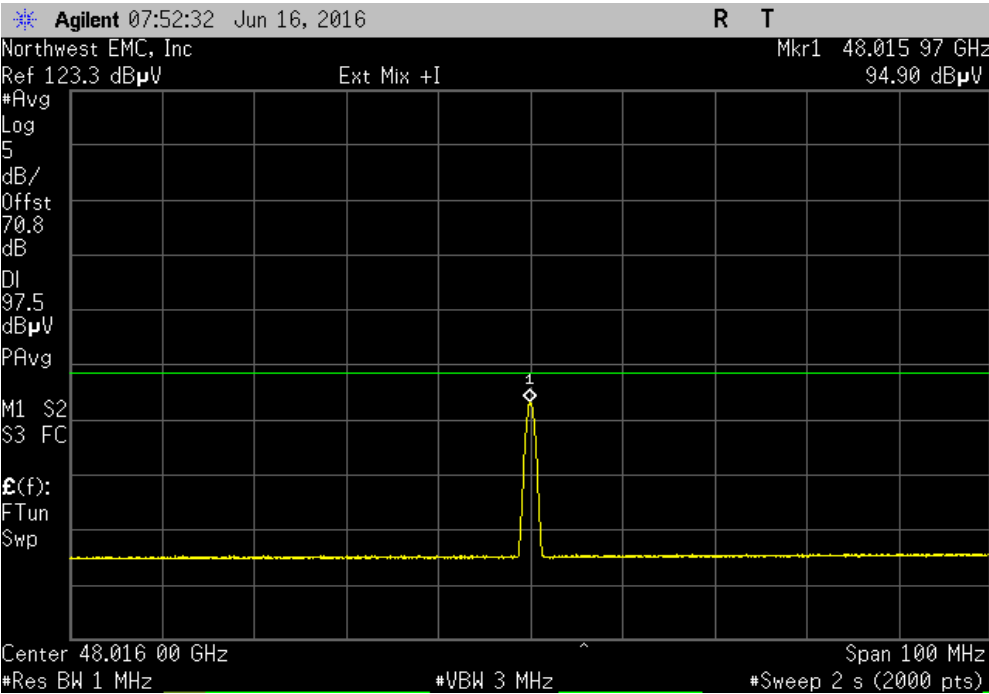


FIELD STRENGTH OF HARMONICS

Mode 2, 2nd Harmonic, Low Frequency 24008 MHz, Peak						
	initial	Duty Cycle	Final	Limit (dBuV)	Result	
	Value (dBuV)	Correction	Value (dBuV)			
	98.49	N/A	98.49	117.5 @ 10 cm	Pass	

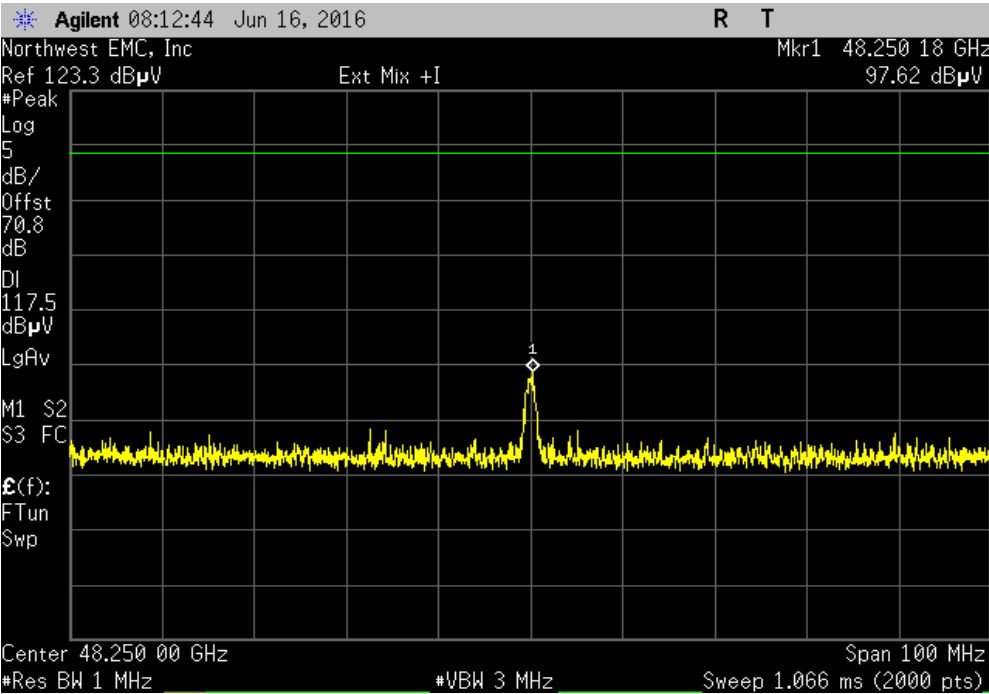


Mode 2, 2nd Harmonic, Low Frequency 24008 MHz, Average						
	initial	Duty Cycle	Final	Limit (dBuV)	Result	
	Value (dBuV)	Correction	Value (dBuV)			
	94.9	-20.8	74.1	97.5 @ 10 cm	Pass	

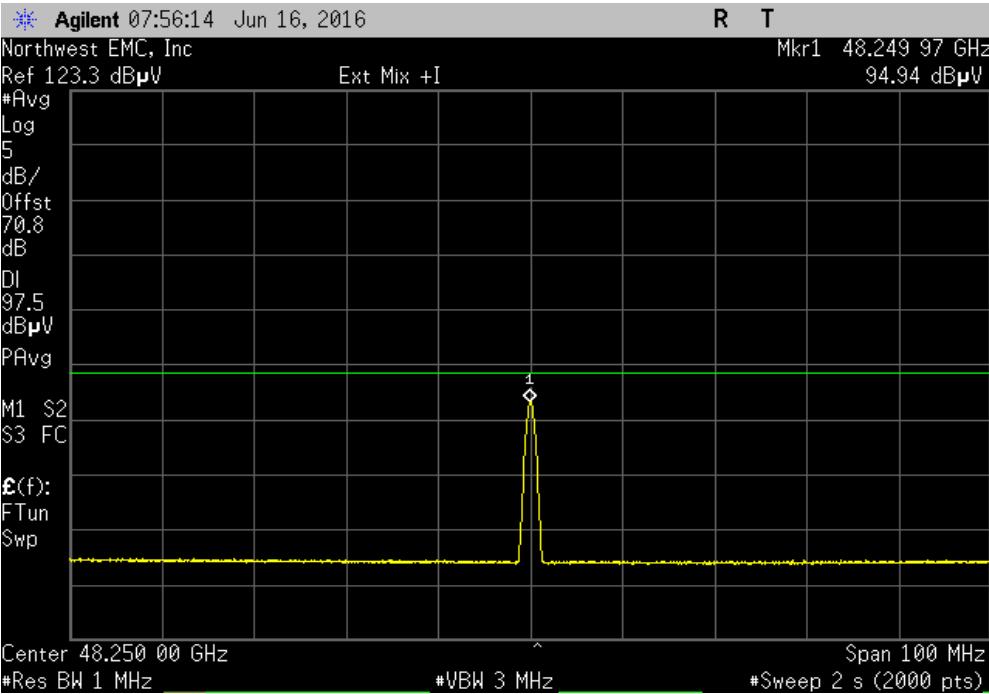


FIELD STRENGTH OF HARMONICS

Mode 2, 2nd Harmonic, Mid Frequency 24125 MHz, Peak						
	initial	Duty Cycle	Final	Limit (dBuV)	Result	
	Value (dBuV)	Correction	Value (dBuV)			
	97.62	N/A	97.62	117.5 @ 10 cm	Pass	

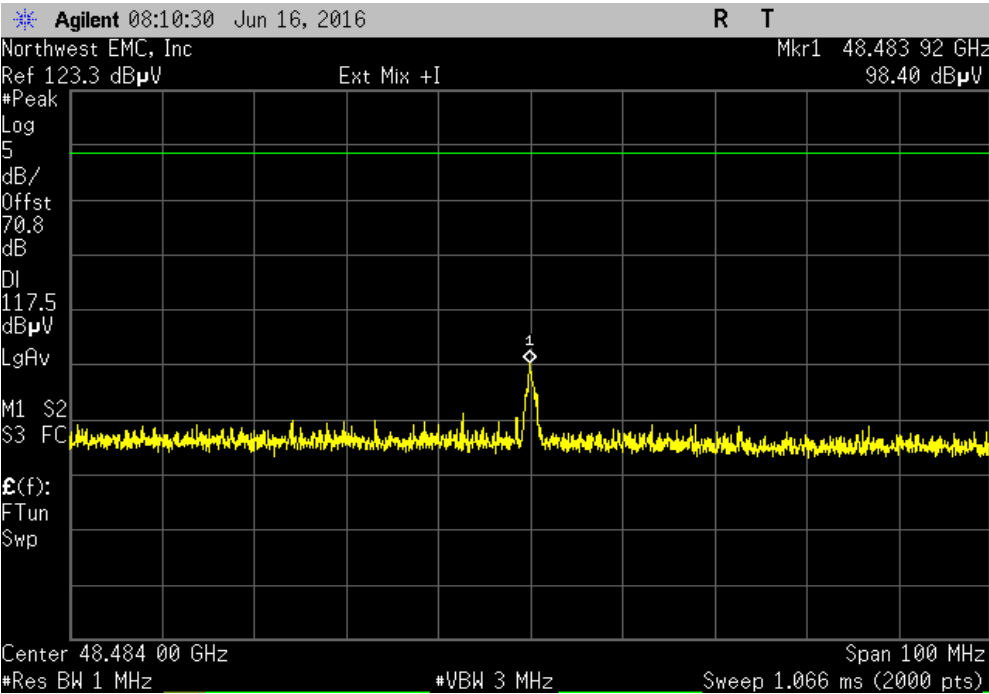


Mode 2, 2nd Harmonic, Mid Frequency 24125 MHz, Average						
	initial	Duty Cycle	Final	Limit (dBuV)	Result	
	Value (dBuV)	Correction	Value (dBuV)			
	94.94	-20.8	74.14	97.5 @ 10 cm	Pass	

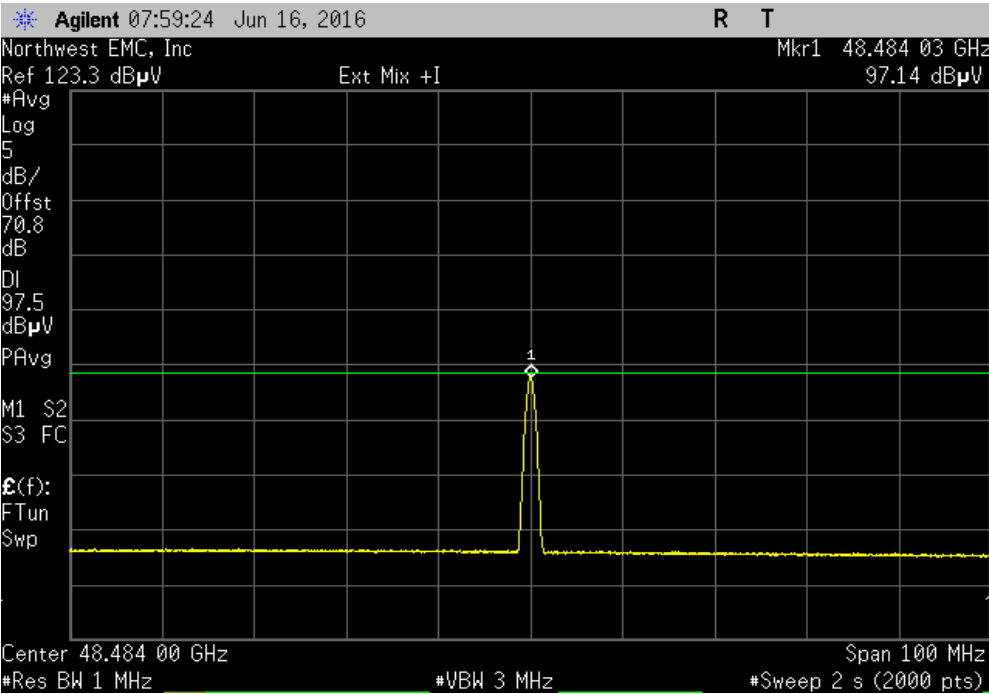


FIELD STRENGTH OF HARMONICS

Mode 2, 2nd Harmonic, High Frequency 24242 MHz, Peak						
	initial	Duty Cycle	Final			
	Value (dBuV)	Correction	Value (dBuV)	Limit (dBuV)	Result	
	98.4	N/A	98.4	117.5 @ 10 cm	Pass	

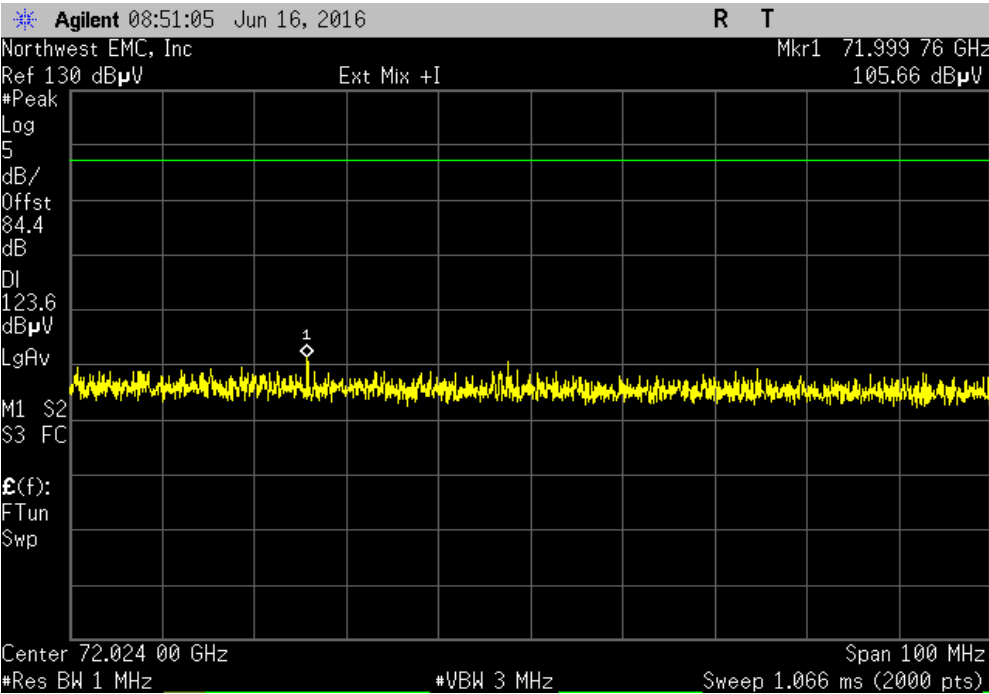


Mode 2, 2nd Harmonic, High Frequency 24242 MHz, Average						
	initial	Duty Cycle	Final			
	Value (dBuV)	Correction	Value (dBuV)	Limit (dBuV)	Result	
	97.14	-20.8	76.34	97.5 @ 10 cm	Pass	

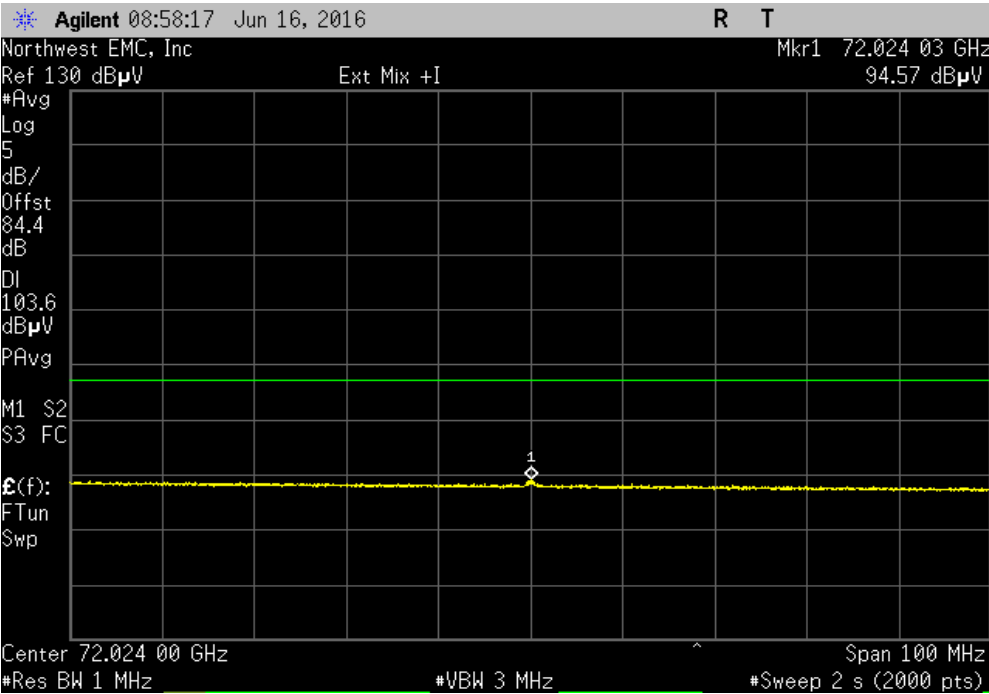


FIELD STRENGTH OF HARMONICS

Mode 2, 3rd Harmonic, Low Frequency 24008 MHz, Peak						
	initial	Duty Cycle	Final	Limit (dBuV)	Result	
	Value (dBuV)	Correction	Value (dBuV)			
	105.66	N/A	105.66	123.6 @ 5 cm	Pass	

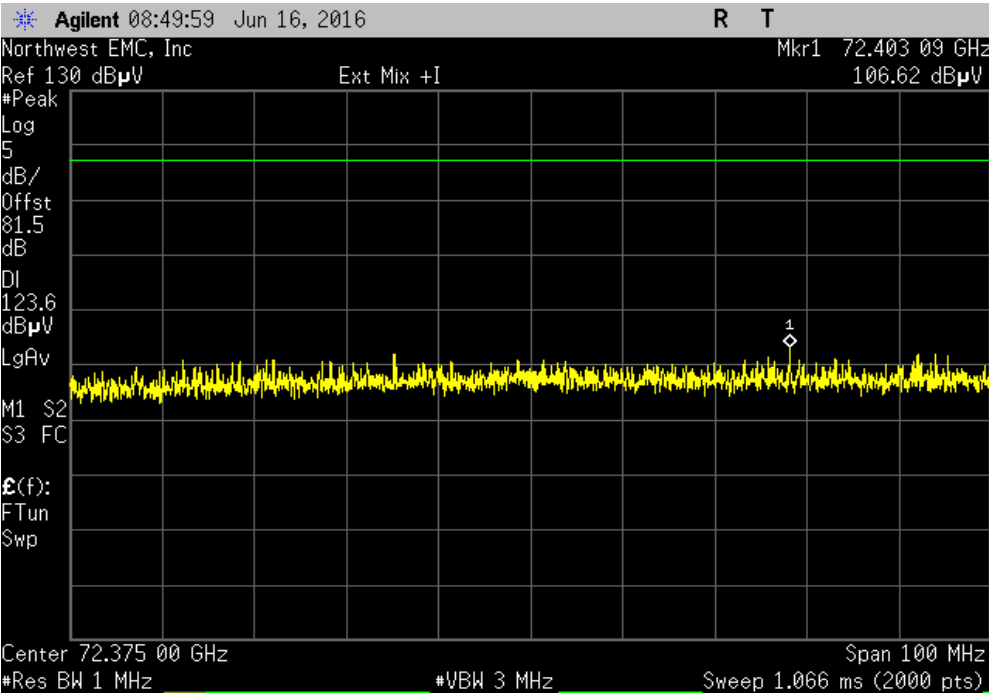


Mode 2, 3rd Harmonic, Low Frequency 24008 MHz, Average						
	initial	Duty Cycle	Final	Limit (dBuV)	Result	
	Value (dBuV)	Correction	Value (dBuV)			
	94.57	-20.8	73.77	103.6 @ 5 cm	Pass	

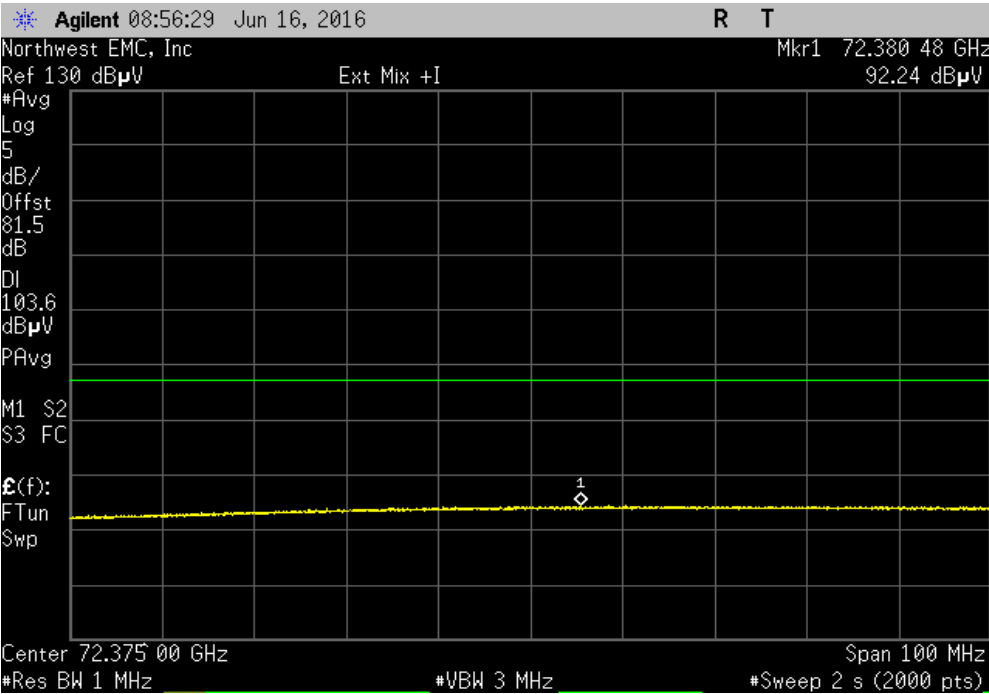


FIELD STRENGTH OF HARMONICS

Mode 2, 3rd Harmonic, Mid Frequency 24125 MHz, Peak						
	initial	Duty Cycle	Final	Limit (dBuV)	Result	
	Value (dBuV)	Correction	Value (dBuV)			
	106.62	N/A	106.62	123.6 @ 5 cm	Pass	

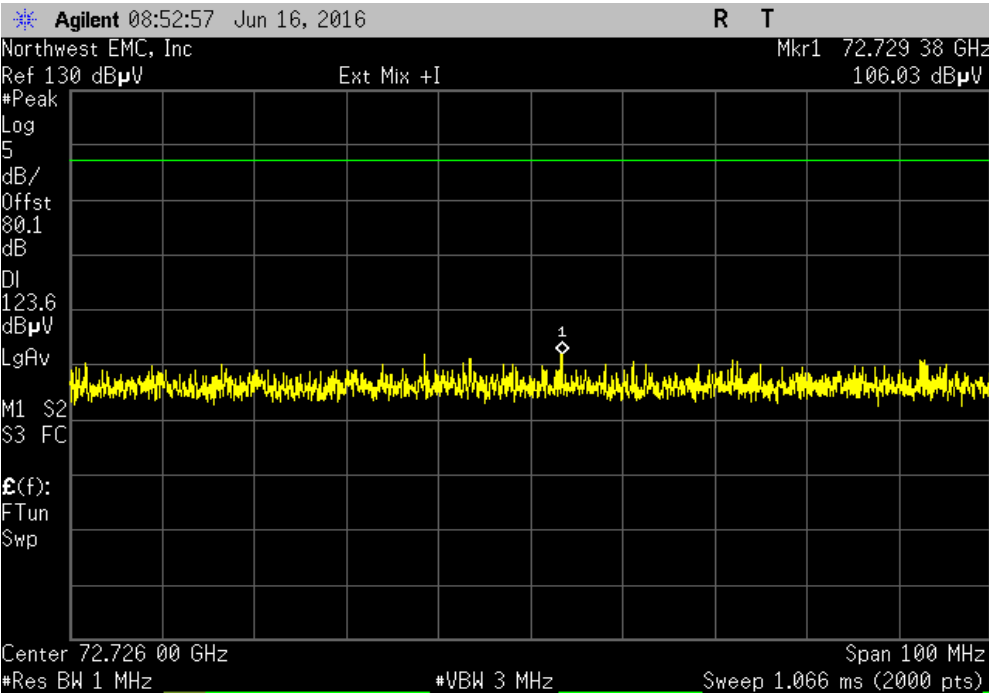


Mode 2, 3rd Harmonic, Mid Frequency 24125 MHz, Average						
	initial	Duty Cycle	Final	Limit (dBuV)	Result	
	Value (dBuV)	Correction	Value (dBuV)			
	92.24	-20.8	71.44	103.6 @ 5 cm	Pass	

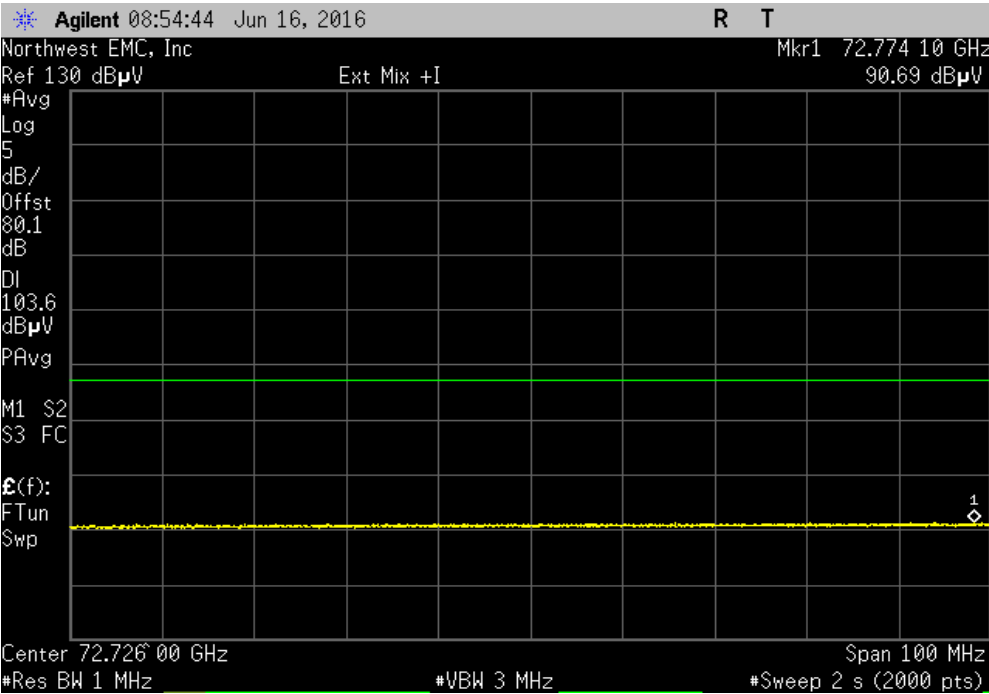


FIELD STRENGTH OF HARMONICS

Mode 2, 3rd Harmonic, High Frequency 24242 MHz, Peak						
	initial	Duty Cycle	Final			
	Value (dBuV)	Correction	Value (dBuV)	Limit (dBuV)	Result	
	106.03	N/A	106.03	123.6 @ 5 cm	Pass	

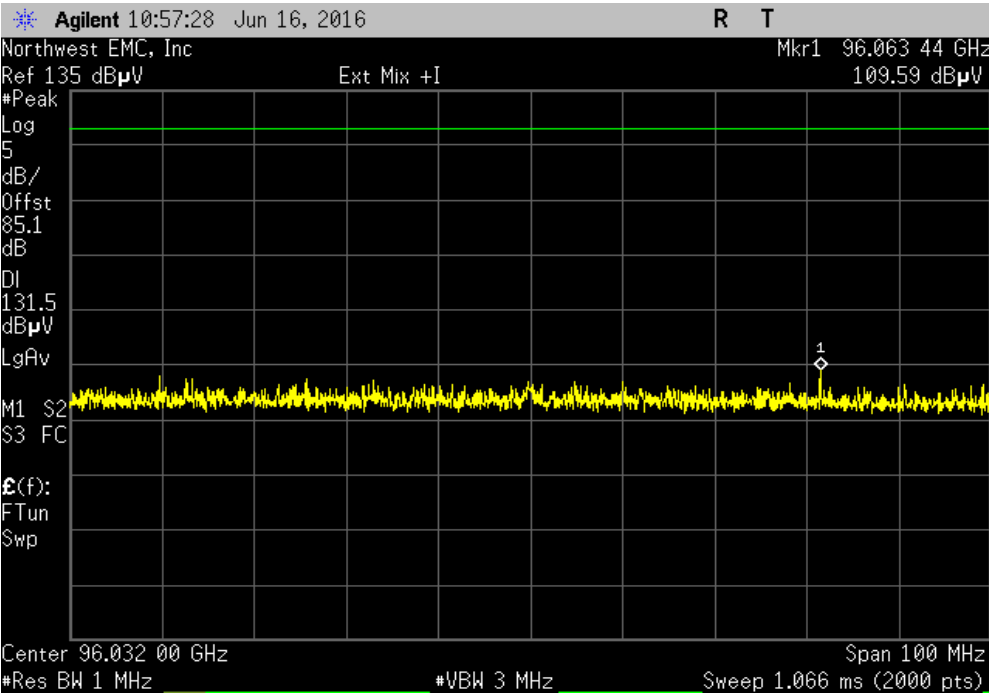


Mode 2, 3rd Harmonic, High Frequency 24242 MHz, Average						
	initial	Duty Cycle	Final			
	Value (dBuV)	Correction	Value (dBuV)	Limit (dBuV)	Result	
	90.69	-20.8	69.89	103.6 @ 5 cm	Pass	

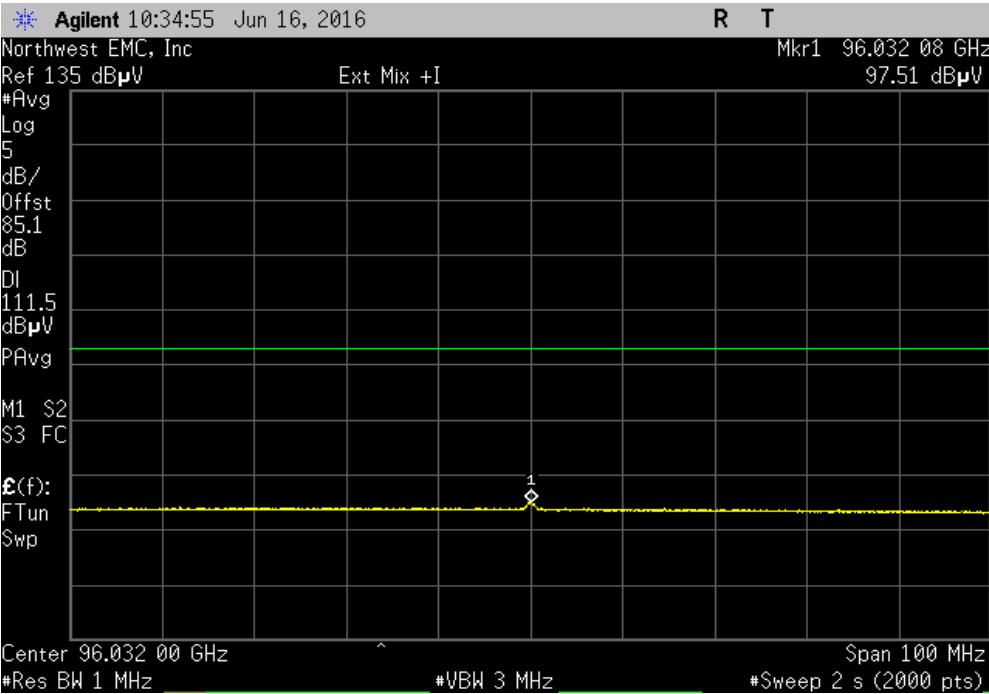


FIELD STRENGTH OF HARMONICS

Mode 2, 4th Harmonic, Low Frequency 24008 MHz, Peak						
	initial	Duty Cycle	Final	Limit (dBuV)	Result	
	Value (dBuV)	Correction	Value (dBuV)			
	109.59	N/A	109.59	131.5 @ 2 cm	Pass	

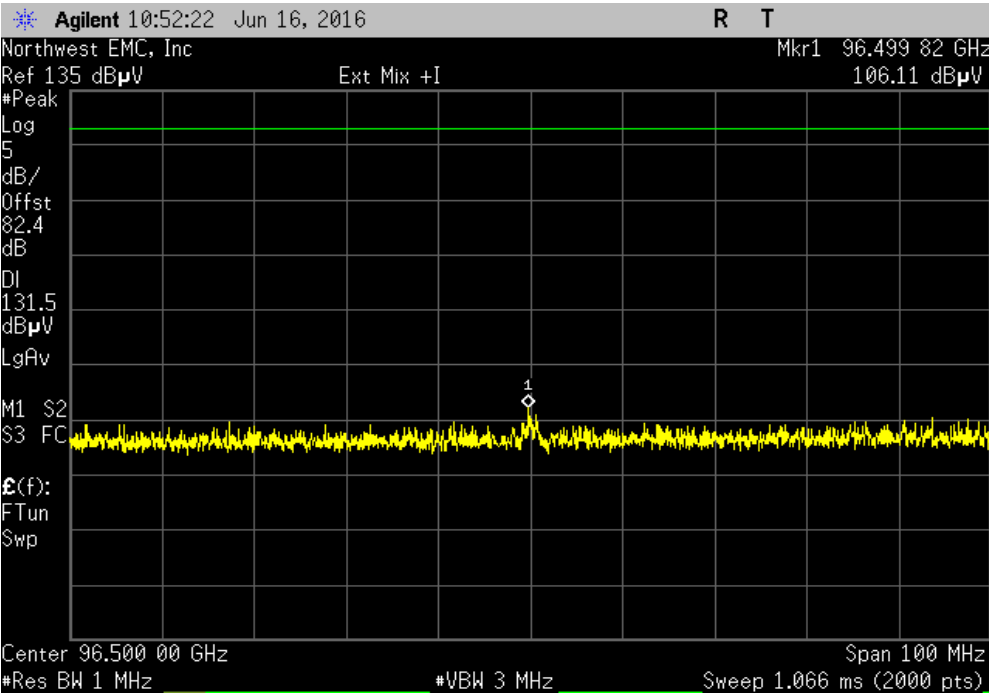


Mode 2, 4th Harmonic, Low Frequency 24008 MHz, Average						
	initial	Duty Cycle	Final	Limit (dBuV)	Result	
	Value (dBuV)	Correction	Value (dBuV)			
	97.51	-20.8	76.71	111.5 @ 2 cm	Pass	

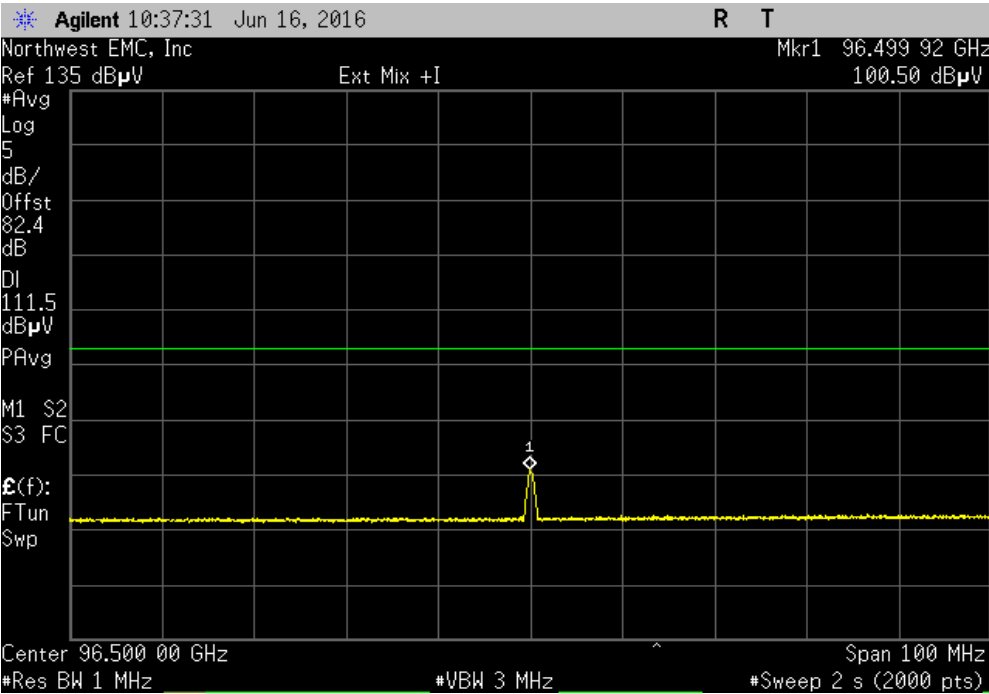


FIELD STRENGTH OF HARMONICS

Mode 2, 4th Harmonic, Mid Frequency 24125 MHz, Peak						
	initial	Duty Cycle	Final	Limit (dBuV)	Result	
	Value (dBuV)	Correction	Value (dBuV)			
	106.11	N/A	106.11	131.5 @ 2 cm	Pass	

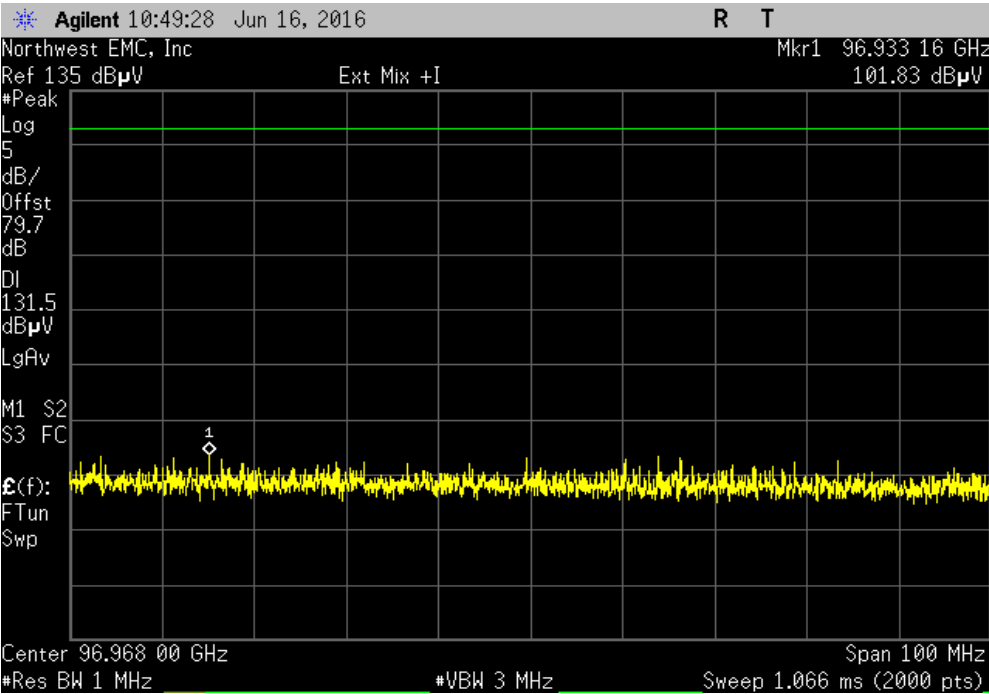


Mode 2, 4th Harmonic, Mid Frequency 24125 MHz, Average						
	initial	Duty Cycle	Final	Limit (dBuV)	Result	
	Value (dBuV)	Correction	Value (dBuV)			
	100.5	-20.8	79.7	111.5 @ 2 cm	Pass	

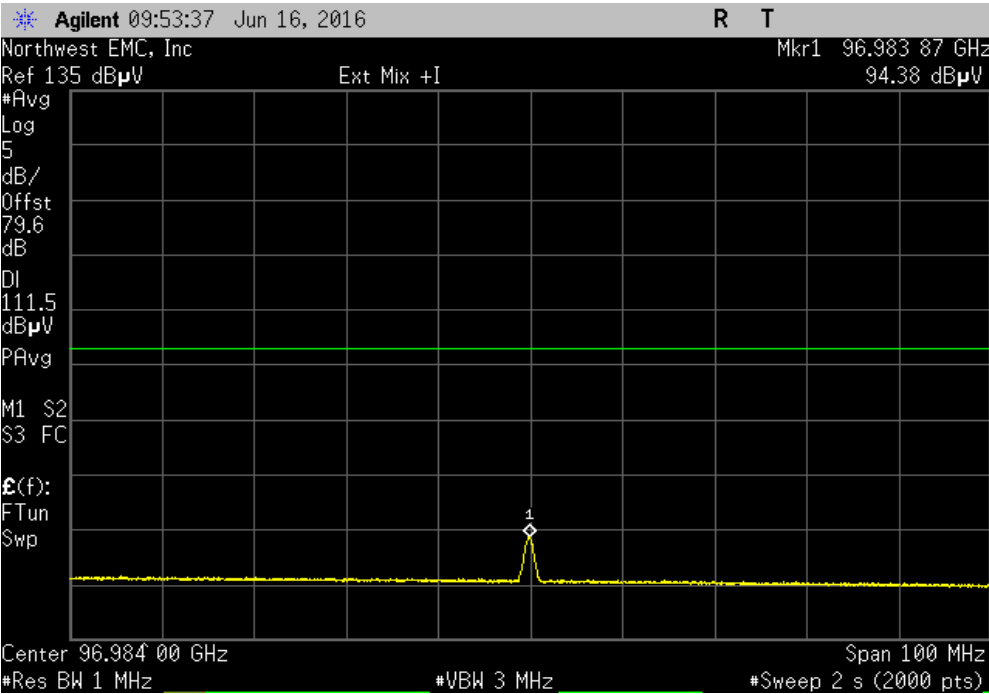


FIELD STRENGTH OF HARMONICS

Mode 2, 4th Harmonic, High Frequency 24242 MHz, Peak						
	initial	Duty Cycle	Final	Limit (dBuV)	Result	
	Value (dBuV)	Correction	Value (dBuV)			
	101.83	N/A	101.83	131.5 @ 2 cm	Pass	



Mode 2, 4th Harmonic, High Frequency 24242 MHz, Average						
	initial	Duty Cycle	Final	Limit (dBuV)	Result	
	Value (dBuV)	Correction	Value (dBuV)			
	94.38	-20.8	73.58	111.5 @ 2 cm	Pass	



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

Mode 1

Mode 2

CHANNELS OF OPERATION

Mode 1 Low Frequency 24005 MHz

Mode 2 Low Frequency 24008 MHz

Mode 1 Mid Frequency 24125 MHz

Mode 2 Mid Frequency 24125 MHz

Mode 1 High Frequency 24246 MHz

Mode 2 High Frequency 24242 MHz

POWER SETTINGS INVESTIGATED

12VDC via 110VAC/60Hz

CONFIGURATIONS INVESTIGATED

PRCO0080 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	40000 MHz
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SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

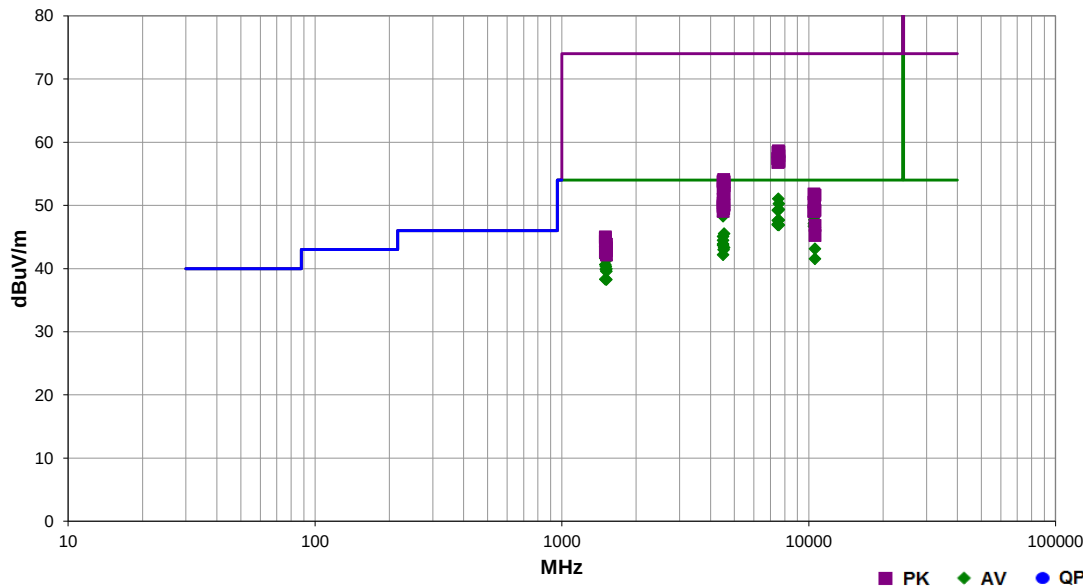
Description	Manufacturer	Model	ID	Last Cal.	Interval
Cable	ESM Cable Corp.	KMKM-72	EVE	6/6/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	JSW45-26004000-40-5P	PAE	6/6/2016	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-10	AIW	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVD	3/11/2016	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-08	AHV	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D00100800-32-13P	AVF	7/13/2015	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVC	3/11/2016	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AHU	NCR	0 mo
Cable	N/A	Double Ridge Horn Cables	EVB	3/11/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	PAG	3/11/2016	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AIZ	2/3/2016	24 mo
Cable	N/A	Bilog Cables	EVA	3/11/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AOL	3/11/2016	12 mo
Antenna - Biconilog	EMCO	3141	AXE	8/29/2014	24 mo
Antenna - Standard Gain	ETS Lindgren	3160-09	AHY	NCR	0 mo
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	6/7/2016	12 mo
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	4/22/2016	12 mo

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was transmitting and receiving while set at the lowest channel, a middle channel, and the highest channel available. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal plane. A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

Work Order:	PRCO0080	Date:	06/29/16	
Project:	None	Temperature:	23.8 °C	
Job Site:	EV01	Humidity:	44.1% RH	
Serial Number:	See Configurations	Barometric Pres.:	1024 mbar	
EUT:	PreView			
Configuration:	1.2			
Customer:	Preco Electronics, Inc.			
Attendees:	None			
EUT Power:	12VDC via 110VAC/60Hz			
Operating Mode:	On, transmitting			
Deviations:	None			
Comments:	Please reference the data comments for E-Field orientation, mode and frequency.			

Test Specifications	Test Method
FCC 15.249:2016	ANSI C63.10:2013
Run #	38
Test Distance (m)	3
Antenna Height(s)	1 to 4(m)
Results	Pass

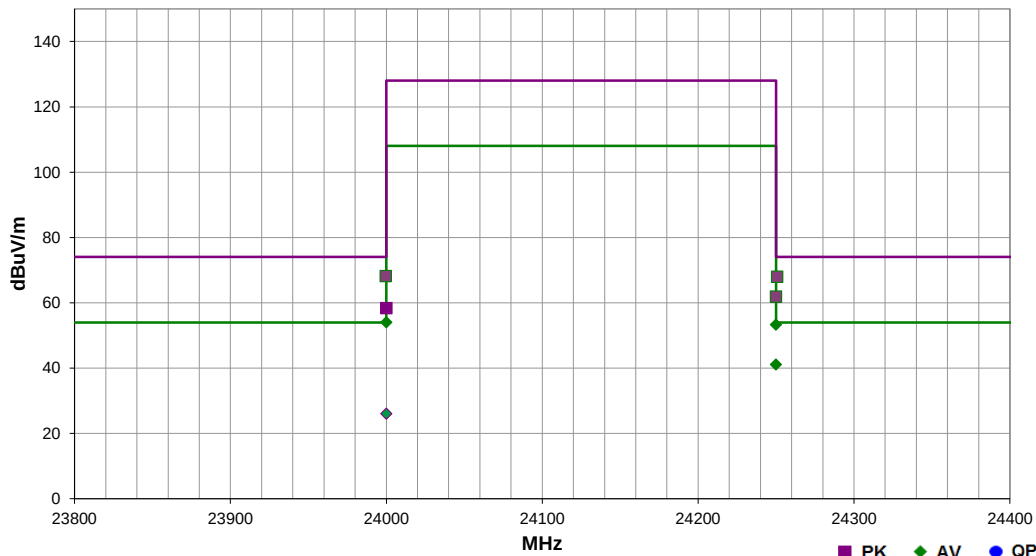


Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7539.105	32.4	18.6	2.1	34.0	3.0	0.0	Horz	AV	0.0	51.0	54.0	-3.0	Mid 24125MHz, Mode 1, E-Field Vertical
4500.900	41.9	8.5	1.4	14.0	3.0	0.0	Horz	AV	0.0	50.4	54.0	-3.6	Low 24005MHz, Mode 1, E-Field Vertical
4523.425	41.8	8.5	2.3	8.0	3.0	0.0	Vert	AV	0.0	50.3	54.0	-3.7	Mid 24125MHz, Mode 1, E-Field On Side
7576.900	31.8	18.5	2.1	37.0	3.0	0.0	Horz	AV	0.0	50.3	54.0	-3.7	High 24246MHz, Mode 1, E-Field Vertical
4500.935	41.7	8.5	2.1	7.0	3.0	0.0	Vert	AV	0.0	50.2	54.0	-3.8	Low 24005MHz, Mode 1, E-Field On Side
10503.480	55.9	-5.8	2.3	347.0	3.0	0.0	Horz	AV	0.0	50.1	54.0	-3.9	Low 24008MHz, Mode 2, E-Field Vertical
4523.475	41.4	8.5	2.0	6.0	3.0	0.0	Horz	AV	0.0	49.9	54.0	-4.1	Mid 24125MHz, Mode 1, E-Field Vertical
4546.105	41.2	8.5	2.3	4.0	3.0	0.0	Horz	AV	0.0	49.7	54.0	-4.3	High 24246MHz, Mode 1, E-Field Vertical
10605.880	55.1	-5.4	2.3	347.0	3.0	0.0	Horz	AV	0.0	49.7	54.0	-4.3	High 24242MHz, Mode 2, E-Field Vertical
7576.917	30.9	18.5	1.9	25.0	3.0	0.0	Vert	AV	0.0	49.4	54.0	-4.6	High 24246MHz, Mode 1, E-Field On Side
4546.165	40.8	8.5	2.6	17.0	3.0	0.0	Vert	AV	0.0	49.3	54.0	-4.7	High 24246MHz, Mode 1, E-Field On Side
7538.950	30.6	18.6	1.2	22.0	3.0	0.0	Vert	AV	0.0	49.2	54.0	-4.8	Mid 24125MHz, Mode 1, E-Field On Side
7501.508	30.4	18.8	1.2	17.0	3.0	0.0	Vert	AV	0.0	49.2	54.0	-4.8	Low 24005MHz, Mode 1, E-Field On Side
10503.490	54.1	-5.8	3.4	342.0	3.0	0.0	Vert	AV	0.0	48.3	54.0	-5.7	Low 24008MHz, Mode 2, E-Field On Side
4500.930	39.8	8.5	2.1	300.0	3.0	0.0	Vert	AV	0.0	48.3	54.0	-5.7	Low 24005MHz, Mode 1, E-Field Horizontal
10554.660	53.3	-5.6	1.7	1.0	3.0	0.0	Vert	AV	0.0	47.7	54.0	-6.3	Mid 24125MHz, Mode 1, E-Field On Side
7575.567	29.2	18.5	2.2	318.0	3.0	0.0	Vert	AV	0.0	47.7	54.0	-6.3	High 24242MHz, Mode 2, E-Field On Side
7502.392	28.8	18.8	1.1	315.0	3.0	0.0	Vert	AV	0.0	47.6	54.0	-6.4	Low 24008MHz, Mode 2, E-Field On Side
10554.650	52.8	-5.6	1.0	23.0	3.0	0.0	Horz	AV	0.0	47.2	54.0	-6.8	Mid 24125MHz, Mode 1, E-Field Vertical
10502.180	52.9	-5.8	1.0	24.0	3.0	0.0	Horz	AV	0.0	47.1	54.0	-6.9	Low 24005MHz, Mode 2, E-Field Vertical
7501.567	28.2	18.8	1.5	241.0	3.0	0.0	Horz	AV	0.0	47.0	54.0	-7.0	Low 24005MHz, Mode 1, E-Field Vertical
7502.500	28.1	18.8	3.8	357.0	3.0	0.0	Horz	AV	0.0	46.9	54.0	-7.1	Low 24008MHz, Mode 2, E-Field Vertical
7575.458	28.4	18.5	1.0	321.0	3.0	0.0	Horz	AV	0.0	46.9	54.0	-7.1	High 24242MHz, Mode 2, E-Field Vertical
10502.180	52.5	-5.8	1.8	4.0	3.0	0.0	Vert	AV	0.0	46.7	54.0	-7.3	Low 24005MHz, Mode 2, E-Field On Side
10605.880	51.9	-5.4	1.0	30.0	3.0	0.0	Vert	AV	0.0	46.5	54.0	-7.5	High 24242MHz, Mode 2, E-Field On Side
4545.335	37.0	8.5	3.8	41.0	3.0	0.0	Horz	AV	0.0	45.5	54.0	-8.5	High 24242MHz, Mode 2, E-Field Vertical
4500.860	36.6	8.5	1.0	7.0	3.0	0.0	Vert	AV	0.0	45.1	54.0	-8.9	Low 24005MHz, Mode 1, E-Field Vertical
4501.483	36.0	8.5	2.2	45.0	3.0	0.0	Horz	AV	0.0	44.5	54.0	-9.5	Low 24008MHz, Mode 2, E-Field Vertical
4500.945	35.4	8.5	2.0	10.0	3.0	0.0	Horz	AV	0.0	43.9	54.0	-10.1	Low 24005MHz, Mode 1, E-Field Horizontal
4500.905	35.2	8.5	2.2	30.0	3.0	0.0	Horz	AV	0.0	43.7	54.0	-10.3	Low 24005MHz, Mode 1, E-Field On Side

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
4545.365	34.8	8.5	1.0	50.0	3.0	0.0	Vert	AV	0.0	43.3	54.0	-10.7	High 24242MHz, Mode 2, E-Field On Side
10607.630	48.5	-5.4	1.8	51.0	3.0	0.0	Vert	AV	0.0	43.1	54.0	-10.9	High 24246MHz, Mode 1, E-Field On Side
4523.450	34.5	8.5	2.2	22.0	3.0	0.0	Horz	AV	0.0	43.0	54.0	-11.0	Mid 24125MHz, Mode 2, E-Field Vertical
4501.508	33.7	8.5	1.2	50.0	3.0	0.0	Vert	AV	0.0	42.2	54.0	-11.8	Low 24008MHz, Mode 2, E-Field On Side
1500.467	46.0	-4.3	1.0	89.0	3.0	0.0	Vert	AV	0.0	41.7	54.0	-12.3	Low 24008MHz, Mode 2, E-Field On Side
1500.235	45.9	-4.3	1.0	226.0	3.0	0.0	Vert	AV	0.0	41.6	54.0	-12.4	Low 24005MHz, Mode 1, E-Field On Side
10607.610	46.9	-5.4	1.0	13.0	3.0	0.0	Horz	AV	0.0	41.5	54.0	-12.5	High 24246MHz, Mode 1, E-Field Vertical
1515.125	45.6	-4.3	1.0	93.0	3.0	0.0	Vert	AV	0.0	41.3	54.0	-12.7	High 24242MHz, Mode 2, E-Field On Side
1500.340	44.9	-4.3	1.0	82.0	3.0	0.0	Horz	AV	0.0	40.6	54.0	-13.4	Low 24005MHz, Mode 1, E-Field Vertical
1507.870	44.6	-4.3	1.0	296.0	3.0	0.0	Horz	AV	0.0	40.3	54.0	-13.7	Mid 24125MHz, Mode 1, E-Field Vertical
1515.360	44.2	-4.3	1.0	228.0	3.0	0.0	Vert	AV	0.0	39.9	54.0	-14.1	High 24246MHz, Mode 1, E-Field On Side
1507.760	44.1	-4.3	1.0	222.0	3.0	0.0	Vert	AV	0.0	39.8	54.0	-14.2	Mid 24125MHz, Mode 1, E-Field On Side
1515.370	43.8	-4.3	1.0	296.0	3.0	0.0	Horz	AV	0.0	39.5	54.0	-14.5	High 24246MHz, Mode 1, E-Field Vertical
7539.025	40.0	18.6	2.1	34.0	3.0	0.0	Horz	PK	0.0	58.6	74.0	-15.4	Mid 24125MHz, Mode 1, E-Field Vertical
7576.733	40.0	18.5	2.1	37.0	3.0	0.0	Horz	PK	0.0	58.5	74.0	-15.5	High 24246MHz, Mode 1, E-Field Vertical
7501.283	39.6	18.8	1.2	17.0	3.0	0.0	Vert	PK	0.0	58.4	74.0	-15.6	Low 24005MHz, Mode 1, E-Field On Side
7538.920	39.7	18.6	1.2	22.0	3.0	0.0	Vert	PK	0.0	58.3	74.0	-15.7	Mid 24125MHz, Mode 1, E-Field On Side
1500.475	42.6	-4.3	1.0	180.0	3.0	0.0	Horz	AV	0.0	38.3	54.0	-15.7	Low 24008MHz, Mode 2, E-Field Vertical
1515.095	42.5	-4.3	1.0	181.0	3.0	0.0	Horz	AV	0.0	38.2	54.0	-15.8	High 24242MHz, Mode 2, E-Field Vertical
7576.975	39.4	18.5	1.9	25.0	3.0	0.0	Vert	PK	0.0	57.9	74.0	-16.1	High 24246MHz, Mode 1, E-Field On Side
7502.200	38.6	18.8	1.1	315.0	3.0	0.0	Vert	PK	0.0	57.4	74.0	-16.6	Low 24008MHz, Mode 2, E-Field On Side
7498.017	38.6	18.8	3.8	357.0	3.0	0.0	Horz	PK	0.0	57.4	74.0	-16.6	Low 24008MHz, Mode 2, E-Field Vertical
7575.917	38.6	18.5	2.2	318.0	3.0	0.0	Vert	PK	0.0	57.1	74.0	-16.9	High 24242MHz, Mode 2, E-Field On Side
7574.108	38.4	18.5	1.0	321.0	3.0	0.0	Horz	PK	0.0	56.9	74.0	-17.1	High 24242MHz, Mode 2, E-Field Vertical
7501.633	38.0	18.8	1.5	241.0	3.0	0.0	Horz	PK	0.0	56.8	74.0	-17.2	Low 24005MHz, Mode 1, E-Field Vertical
4523.630	45.6	8.5	2.3	8.0	3.0	0.0	Vert	PK	0.0	54.1	74.0	-19.9	Mid 24125MHz, Mode 1, E-Field On Side
4500.875	45.4	8.5	2.1	7.0	3.0	0.0	Vert	PK	0.0	53.9	74.0	-20.1	Low 24005MHz, Mode 1, E-Field On Side
4546.170	45.2	8.5	2.3	4.0	3.0	0.0	Horz	PK	0.0	53.7	74.0	-20.3	High 24246MHz, Mode 1, E-Field Vertical
4523.330	45.2	8.5	2.0	6.0	3.0	0.0	Horz	PK	0.0	53.7	74.0	-20.3	Mid 24125MHz, Mode 1, E-Field Vertical
4500.880	45.2	8.5	1.4	14.0	3.0	0.0	Horz	PK	0.0	53.7	74.0	-20.3	Low 24005MHz, Mode 1, E-Field Vertical
4546.220	44.6	8.5	2.6	17.0	3.0	0.0	Vert	PK	0.0	53.1	74.0	-20.9	High 24246MHz, Mode 1, E-Field On Side
4501.035	44.2	8.5	2.1	300.0	3.0	0.0	Vert	PK	0.0	52.7	74.0	-21.3	Low 24005MHz, Mode 1, E-Field Horizontal
4545.645	43.4	8.5	3.8	41.0	3.0	0.0	Horz	PK	0.0	51.9	74.0	-22.1	High 24242MHz, Mode 2, E-Field Vertical
10503.610	57.6	-5.8	2.3	347.0	3.0	0.0	Horz	PK	0.0	51.8	74.0	-22.2	Low 24008MHz, Mode 2, E-Field Vertical
10605.810	57.0	-5.4	2.3	347.0	3.0	0.0	Horz	PK	0.0	51.6	74.0	-22.4	High 24242MHz, Mode 2, E-Field Vertical
4500.855	42.5	8.5	1.0	7.0	3.0	0.0	Vert	PK	0.0	51.0	74.0	-23.0	Low 24005MHz, Mode 1, E-Field Vertical
10503.480	56.3	-5.8	3.4	342.0	3.0	0.0	Vert	PK	0.0	50.5	74.0	-23.5	Low 24008MHz, Mode 2, E-Field On Side
4500.890	41.9	8.5	2.0	10.0	3.0	0.0	Horz	PK	0.0	50.4	74.0	-23.6	Low 24005MHz, Mode 1, E-Field Horizontal
4545.330	41.5	8.5	1.0	50.0	3.0	0.0	Vert	PK	0.0	50.0	74.0	-24.0	High 24242MHz, Mode 2, E-Field On Side
4501.608	41.5	8.5	2.2	45.0	3.0	0.0	Horz	PK	0.0	50.0	74.0	-24.0	Low 24008MHz, Mode 2, E-Field Vertical
10554.720	55.4	-5.6	1.7	1.0	3.0	0.0	Vert	PK	0.0	49.8	74.0	-24.2	Mid 24125MHz, Mode 1, E-Field On Side
4501.185	41.3	8.5	2.2	30.0	3.0	0.0	Horz	PK	0.0	49.8	74.0	-24.2	Low 24005MHz, Mode 1, E-Field On Side
4523.350	41.0	8.5	2.2	22.0	3.0	0.0	Horz	PK	0.0	49.5	74.0	-24.5	Mid 24125MHz, Mode 2, E-Field Vertical
10554.700	54.9	-5.6	1.0	23.0	3.0	0.0	Horz	PK	0.0	49.3	74.0	-24.7	Mid 24125MHz, Mode 1, E-Field Vertical
10605.750	54.6	-5.4	1.0	30.0	3.0	0.0	Vert	PK	0.0	49.2	74.0	-24.8	High 24242MHz, Mode 2, E-Field On Side
10502.030	54.9	-5.8	1.0	24.0	3.0	0.0	Horz	PK	0.0	49.1	74.0	-24.9	Low 24005MHz, Mode 2, E-Field Vertical
4501.592	40.6	8.5	1.2	50.0	3.0	0.0	Vert	PK	0.0	49.1	74.0	-24.9	Low 24008MHz, Mode 2, E-Field On Side
10502.190	54.8	-5.8	1.8	4.0	3.0	0.0	Vert	PK	0.0	49.0	74.0	-25.0	Low 24005MHz, Mode 2, E-Field On Side
10607.650	52.2	-5.4	1.8	51.0	3.0	0.0	Vert	PK	0.0	46.8	74.0	-27.2	High 24246MHz, Mode 1, E-Field On Side
10607.630	50.6	-5.4	1.0	13.0	3.0	0.0	Horz	PK	0.0	45.2	74.0	-28.8	High 24246MHz, Mode 1, E-Field Vertical
1500.180	49.3	-4.3	1.0	226.0	3.0	0.0	Vert	PK	0.0	45.0	74.0	-29.0	Low 24005MHz, Mode 1, E-Field On Side
1500.417	49.1	-4.3	1.0	89.0	3.0	0.0	Vert	PK	0.0	44.8	74.0	-29.2	Low 24008MHz, Mode 2, E-Field On Side
1500.220	48.6	-4.3	1.0	82.0	3.0	0.0	Horz	PK	0.0	44.3	74.0	-29.7	Low 24005MHz, Mode 1, E-Field Vertical
1515.065	48.1	-4.3	1.0	93.0	3.0	0.0	Vert	PK	0.0	43.8	74.0	-30.2	High 24242MHz, Mode 2, E-Field On Side
1507.810	47.7	-4.3	1.0	296.0	3.0	0.0	Horz	PK	0.0	43.4	74.0	-30.6	Mid 24125MHz, Mode 1, E-Field Vertical
1515.295	47.5	-4.3	1.0	228.0	3.0	0.0	Vert	PK	0.0	43.2	74.0	-30.8	High 24246MHz, Mode 1, E-Field On Side
1507.735	47.4	-4.3	1.0	222.0	3.0	0.0	Vert	PK	0.0	43.1	74.0	-30.9	Mid 24125MHz, Mode 1, E-Field On Side
1515.485	47.1	-4.2	1.0	296.0	3.0	0.0	Horz	PK	0.0	42.9	74.0	-31.1	High 24246MHz, Mode 1, E-Field Vertical
1500.200	46.9	-4.3	1.0	180.0	3.0	0.0	Horz	PK	0.0	42.6	74.0	-31.4	Low 24008MHz, Mode 2, E-Field Vertical
1515.245	46.4	-4.3	1.0	181.0	3.0	0.0	Horz	PK	0.0	42.1	74.0	-31.9	High 24242MHz, Mode 2, E-Field Vertical

Work Order:	PRCO0080	Date:	06/15/16	
Project:	None	Temperature:	21.5 °C	
Job Site:	EV01	Humidity:	40.4% RH	
Serial Number:	See Configurations	Barometric Pres.:	1017 mbar	
EUT:	PreView			
Configuration:	1,2			
Customer:	Preco Electronics, Inc.			
Attendees:	Brad Eylander			
EUT Power:	12VDC via 110VAC/60Hz			
Operating Mode:	On, transmitting			
Deviations:	None			
Comments:	Please reference the data comments for EUT orientation, frequency and mode.			

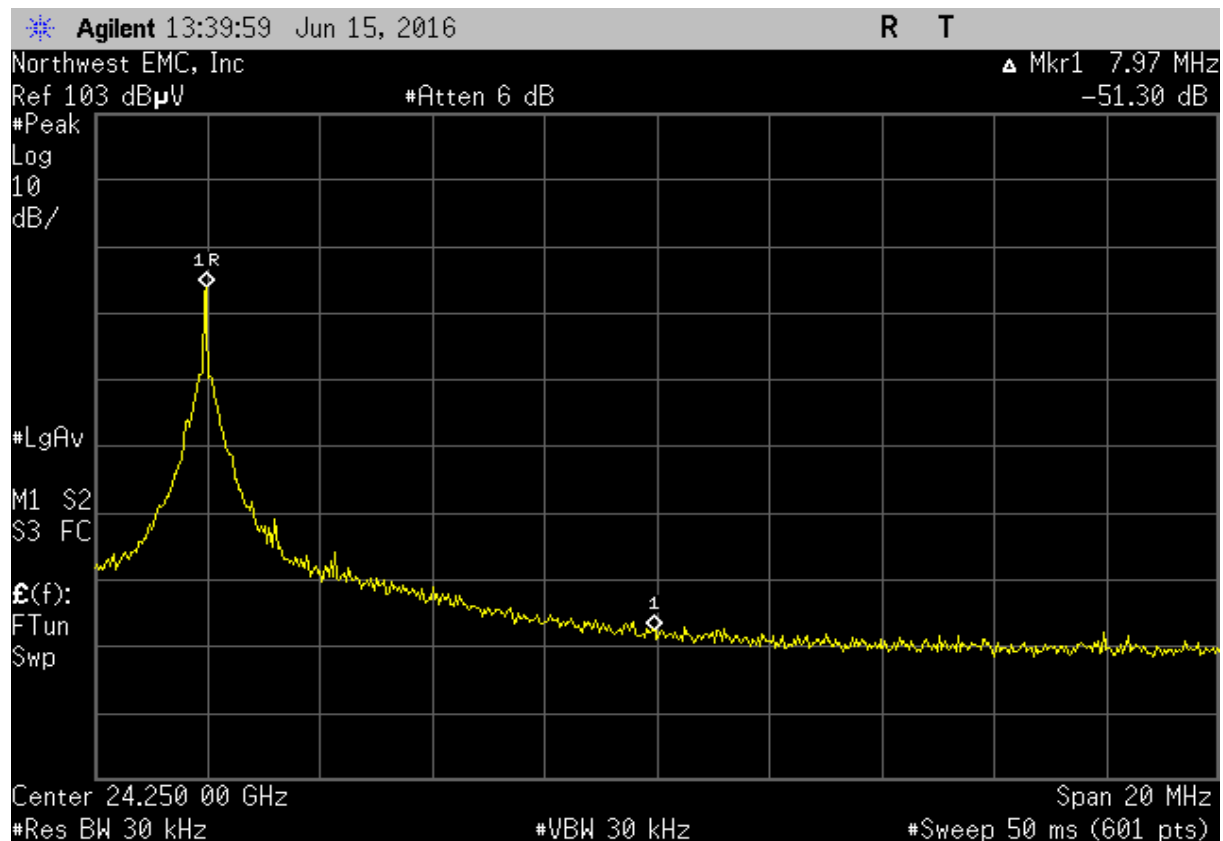
Test Specifications	Test Method
FCC 15.249:2016	ANSI C63.10:2013
Run #	13
Test Distance (m)	0.2
Antenna Height(s)	1 to 4(m)
Results	Pass



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
23999.990	38.1	43.8	1.6	260.0	0.2	0.0	Horz	AV	-23.5	104.1			Fundamental, Mode 1 EUT E-Field On Side
24000.000				260.0	0.2	0.0	Horz	AV	-23.5	54.0	54.0	0.0	Mode 1 EUT E-Field On Side, Marker Delta Method Peak 104.1 + -50.1 dBc = 54
24250.100	38.4	43.9	1.6	260.0	0.2	0.0	Horz	AV	-23.5	104.6			Fundamental, Mode 1 EUT E-Field On Side
24250.000				260.0	0.2	0.0	Horz	AV	-23.5	53.3	54.0	-0.7	Mode 1 EUT E-Field On Side, Marker Delta Method Peak 104.6 + -51.3 dBc = 53.3
24250.020	71.0	43.9	1.6	307.0	0.2	0.0	Vert	PK	-23.5	108.6			Fundamental, Mode 2 EUT E-Field Vertical
24250.000				307.0	0.2	0.0	Vert	PK	-23.5	61.9	74.0	-12.1	Mode 2 EUT E-Field Vertical, Marker Delta Method Peak 108.6 + -46.7 dBc = 61.9
24250.290	52.7	43.9	1.6	307.0	0.2	0.0	Vert	AV	-23.5	87.8			Fundamental, Mode 2 EUT E-Field Vertical
24250.000				307.0	0.2	0.0	Vert	AV	-23.5	41.1	54.0	-12.9	Mode 2 EUT E-Field Vertical, Marker Delta Method RMS Average 87.8 + -46.7 dBc = 41.1
23999.880	56.1	43.8	1.6	307.0	0.2	0.0	Horz	PK	-23.5	108.5			Fundamental, Mode 2 EUT E-Field Vertical
24000.000				307.0	0.2	0.0	Horz	PK	-23.5	58.4	74.0	-15.6	Mode 2 EUT E-Field On Side, Marker Delta Method Peak 108.5 + -50.1 dBc = 58.4
23999.750	41.6	43.8	1.6	307.0	0.2	0.0	Horz	AV	-23.5	87.7			Fundamental, Mode 2 EUT E-Field Vertical
24000.000				307.0	0.2	0.0	Horz	AV	-23.5	26.0	54.0	-28.0	Mode 2 EUT E-Field Vertical, Marker Delta Method RMS Average 87.7 + -61.7 dBc = 26
23999.570	47.9	43.8	1.6	260.0	0.2	0.0	Horz	PK	-23.5	68.2	74.0	-5.8	Low Frequency, Mode 1, EUT E-Field On Side
24250.740	47.6	43.9	1.6	260.0	0.2	0.0	Horz	PK	-23.5	68.0	74.0	-6.0	High Frequency, Mode 1, EUT E-Field On Side

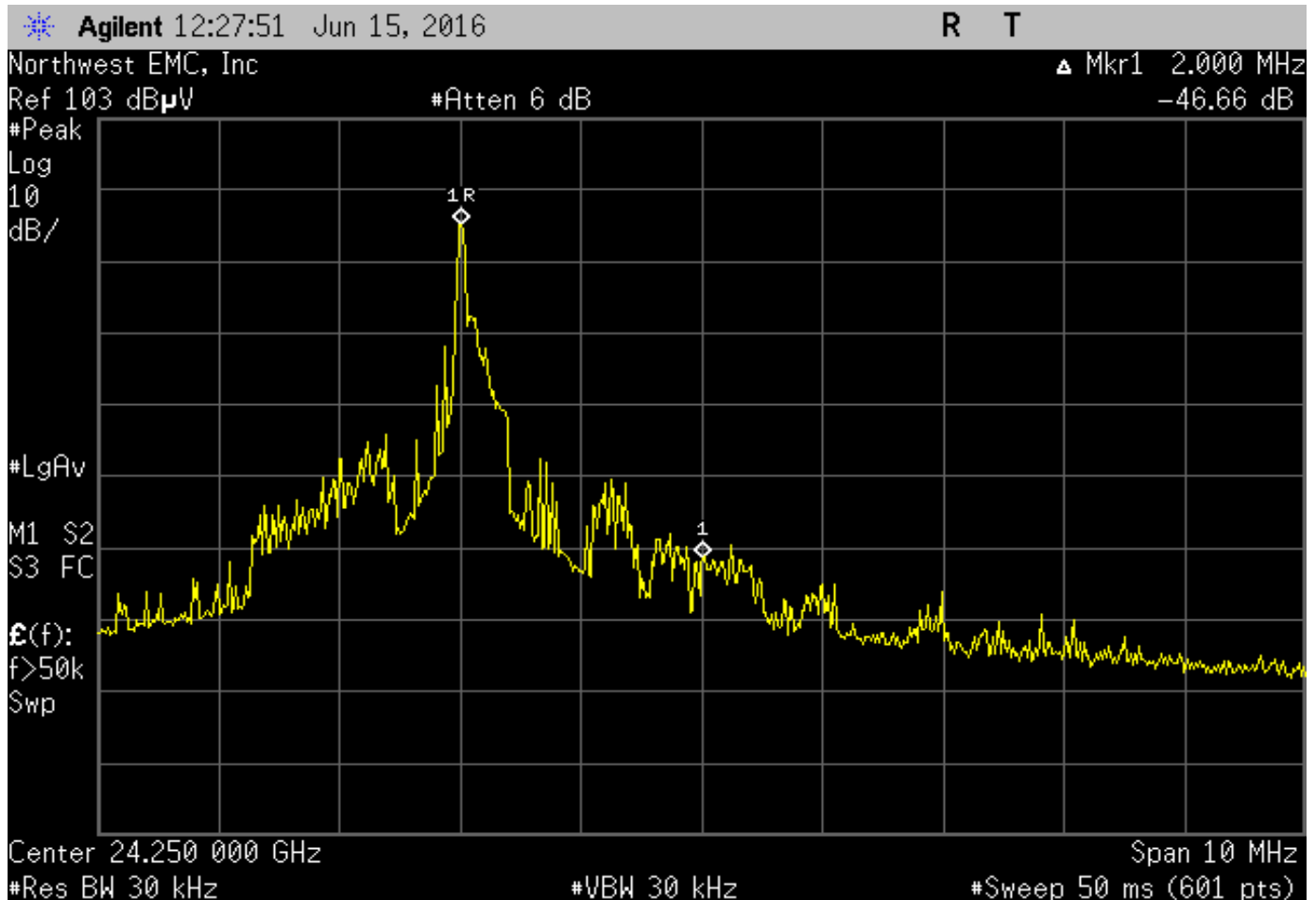
Work Order:	PRCO0080	Date:	06/15/16		
Project:	None	Temperature:	21.5 °C		
Job Site:	EV01	Humidity:	40.4% RH		
Serial Number:	See Configurations	Barometric Pres.:	1017 mbar	Tested by:	Brandon Hobbs
EUT:	PreView				
Configuration:	1,2				
Customer:	Preco Electronics, Inc.				
Attendees:	Brad Eylander				
EUT Power:	12VDC via 110VAC/60Hz				
Operating Mode:	On, transmitting				
Deviations:	None				
Comments:	Mode 1 EUT E-Field On Side, Marker Delta				

Test Specifications	FCC 15.249:2016		Test Method	ANSI C63.10:2013	
Run #	NA	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)
			Results	NA	



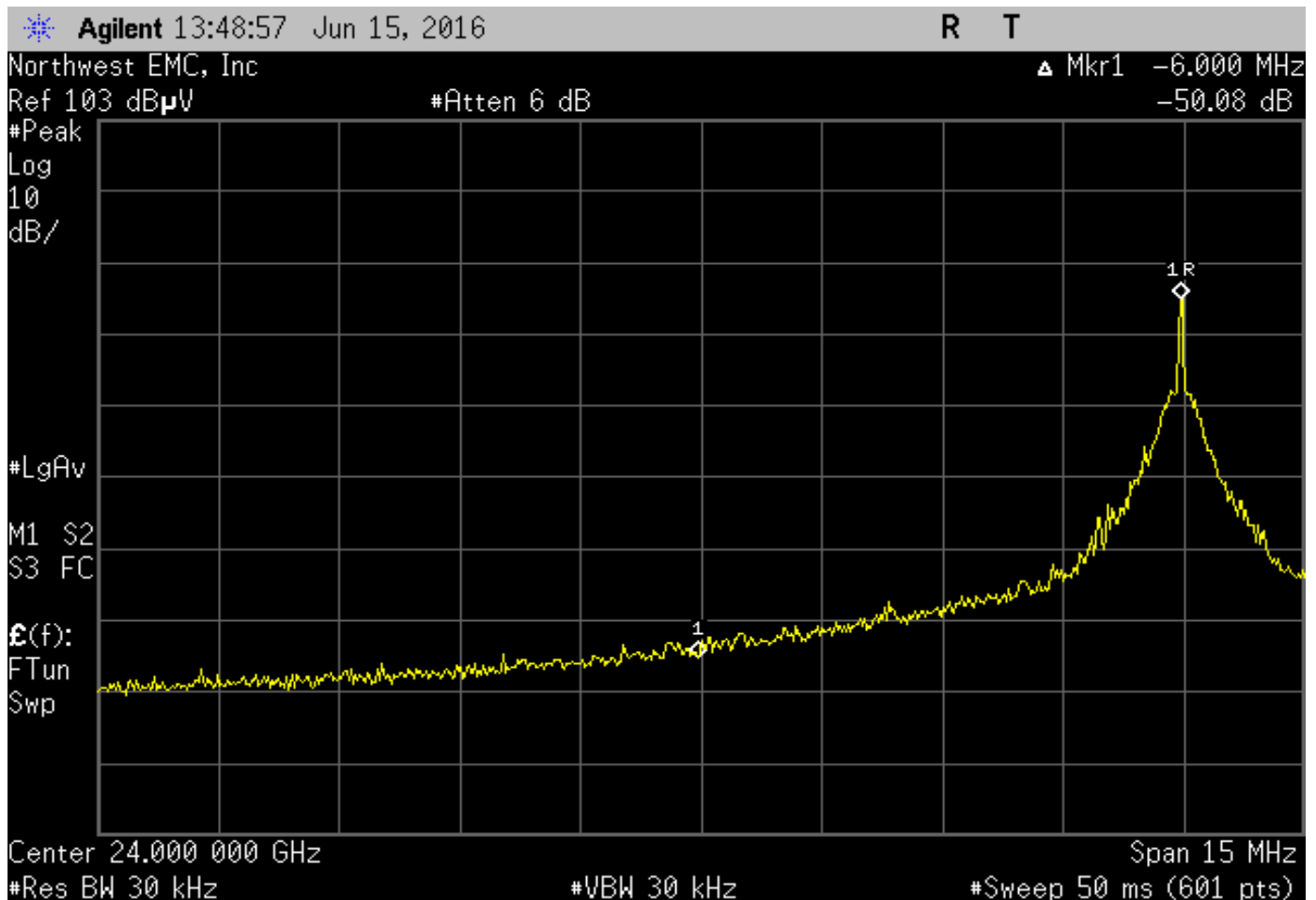
Work Order:	PRCO0080	Date:	06/15/16		
Project:	None	Temperature:	21.5 °C		
Job Site:	EV01	Humidity:	40.4% RH		
Serial Number:	See Configurations	Barometric Pres.:	1017 mbar	Tested by:	Brandon Hobbs
EUT:	PreView				
Configuration:	1,2				
Customer:	Preco Electronics, Inc.				
Attendees:	Brad Eylander				
EUT Power:	12VDC via 110VAC/60Hz				
Operating Mode:	On, transmitting				
Deviations:	None				
Comments:	Mode 2 EUT E-Field Vertical, Marker Delta				

Test Specifications	FCC 15.249:2016		Test Method	ANSI C63.10:2013	
Run #	NA	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)
			Results	NA	



Work Order:	PRCO0080	Date:	06/15/16		
Project:	None	Temperature:	21.5 °C		
Job Site:	EV01	Humidity:	40.4% RH		
Serial Number:	See Configurations	Barometric Pres.:	1017 mbar	Tested by:	Brandon Hobbs
EUT:	PreView				
Configuration:	1,2				
Customer:	Preco Electronics, Inc.				
Attendees:	Brad Eylander				
EUT Power:	12VDC via 110VAC/60Hz				
Operating Mode:	On, transmitting				
Deviations:	None				
Comments:	Mode 1 EUT E-Field On Side, Marker Delta				

Test Specifications	FCC 15.249:2016		Test Method	ANSI C63.10:2013	
Run #	NA	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)
			Results	NA	



Work Order:	PRCO0080	Date:	06/15/16		
Project:	None	Temperature:	21.5 °C		
Job Site:	EV01	Humidity:	40.4% RH		
Serial Number:	See Configurations	Barometric Pres.:	1017 mbar	Tested by:	Brandon Hobbs
EUT:	PreView				
Configuration:	1,2				
Customer:	Preco Electronics, Inc.				
Attendees:	Brad Eylander				
EUT Power:	12VDC via 110VAC/60Hz				
Operating Mode:	On, transmitting				
Deviations:	None				
Comments:	Mode 2 EUT E-Field Vertical, Marker Delta				

Test Specifications	FCC 15.249:2016		Test Method	ANSI C63.10:2013	
Run #	NA	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)
			Results	NA	

