

NORTHWEST EMC

Preco, Inc.

Wireless WorkSight Preview Sensor Model WWS7220

FCC 15.249:2015

Report # PRCO0072



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: April 30, 2015
Preco, Inc.

Model: Wireless WorkSight Preview Sensor Model WWS7220

Radio Equipment Testing

Standards

Specification	Method
FCC 15.249:2015	ANSI C63.10:2009

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	AC Powerline Conducted Emissions	No	N/A	Vehicle mounted.
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.

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

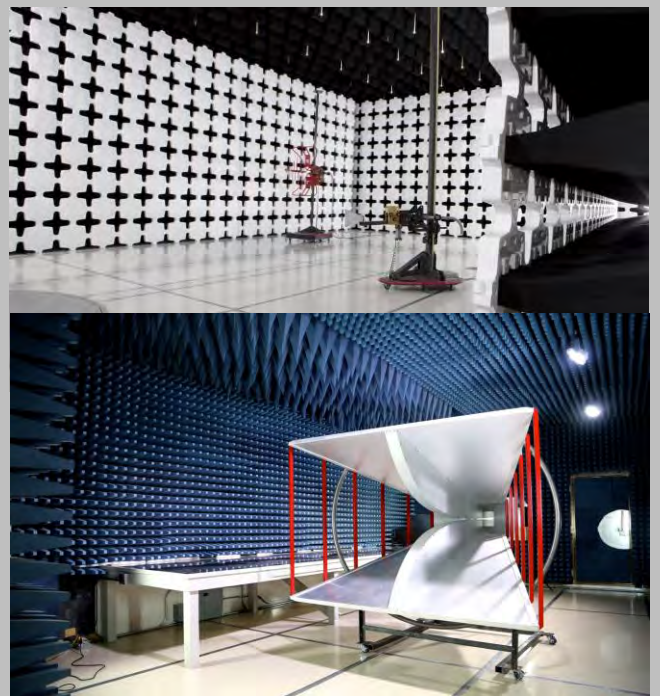
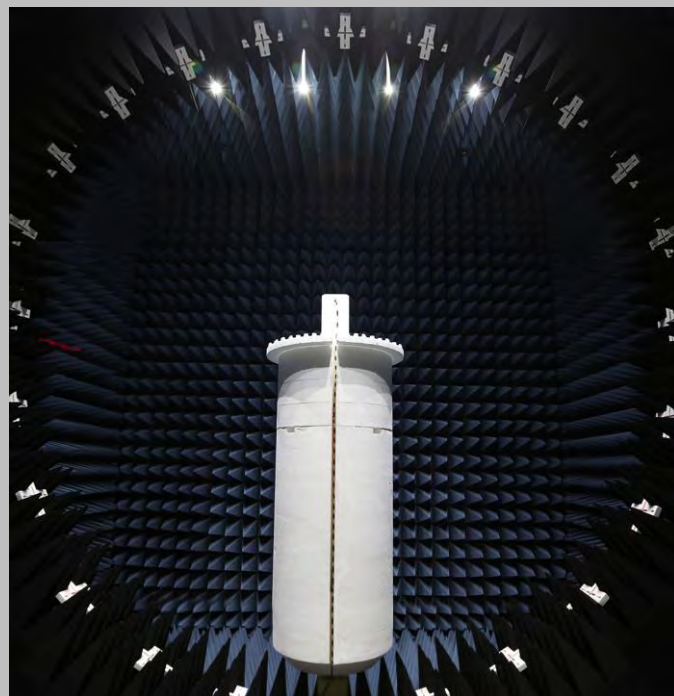
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

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)	2.9 dB	-2.9 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 9801 (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, Inc.
Address:	10335 W Emerald St
City, State, Zip:	Boise, ID 83704
Test Requested By:	John Fadgen
Model:	Wireless WorkSight Preview Sensor Model WWS7220
First Date of Test:	April 30, 2015
Last Date of Test:	April 30, 2015
Receipt Date of Samples:	April 30, 2015
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
'Sensor' unit utilizing a 5.8 GHz pulsed radio for sensing objects and a 2.4 GHz DTS radio for communicating with the LCD display.
Testing Objective:
Seeking to demonstrate compliance under FCC 15.249 for operation in the 5725 - 5875 MHz Band.

CONFIGURATIONS

Configuration PRCO0072- 1

Software/Firmware Running during test	
Description	Version
Firmware	1.1

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Sensor	Preco, Inc.	WWS7220	10345

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
LCD Display	Preco, Inc.	WWS7102	3

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC and I/O Cable	No	1.6m	No	DC Power Supply	Cable Adapter
DC and I/O Cable	No	1.8m	No	Sensor	DC and I/O Cable

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	4/30/2015	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	4/30/2015	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

Tx Continuous, 5.8 GHz Radar

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

PRCO0072 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	40 GHz
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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	6/25/2014	12 mo
Pre-Amplifier	Miteq	JSW45-26004000-40-5P	PAE	6/25/2014	12 mo
Antenna, Horn	ETS Lindgren	3160-10	AIW	NCR	0 mo
Cable	ESM Cable Corp.	KMKM-72	EVY	11/9/2014	12 mo
Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AVU	11/9/2014	12 mo
Antenna, Horn	ETS Lindgren	3160-09	AIV	NCR	0 mo
Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVD	4/16/2015	12 mo
Antenna, Horn	ETS	3160-08	AHV	NCR	0 mo
Cable	None	Standard Gain Horns Cable	EVF	4/20/2015	12 mo
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVC	4/20/2015	12 mo
Antenna, Horn	ETS	3160-07	AHU	NCR	0 mo
Cable	N/A	Double Ridge Horn Cables	EVB	4/16/2015	12 mo
Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	PAG	4/16/2015	12 mo
Antenna, Horn	ETS	3115	AIZ	1/27/2014	24 mo
Cable	N/A	Bilog Cables	EVA	2/10/2015	12 mo
Pre-Amplifier	Miteq	AM-1616-1000	AOL	2/10/2015	12 mo
Antenna, Biconilog	EMCO	3141	AXE	8/29/2014	24 mo
Signal Analyzer	Keysight	KT-N9010A	AFN	2/10/2015	12 mo

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was transmitting and receiving while set at the lowest channel, a middle channel, and the highest channel available. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.10:2009). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.



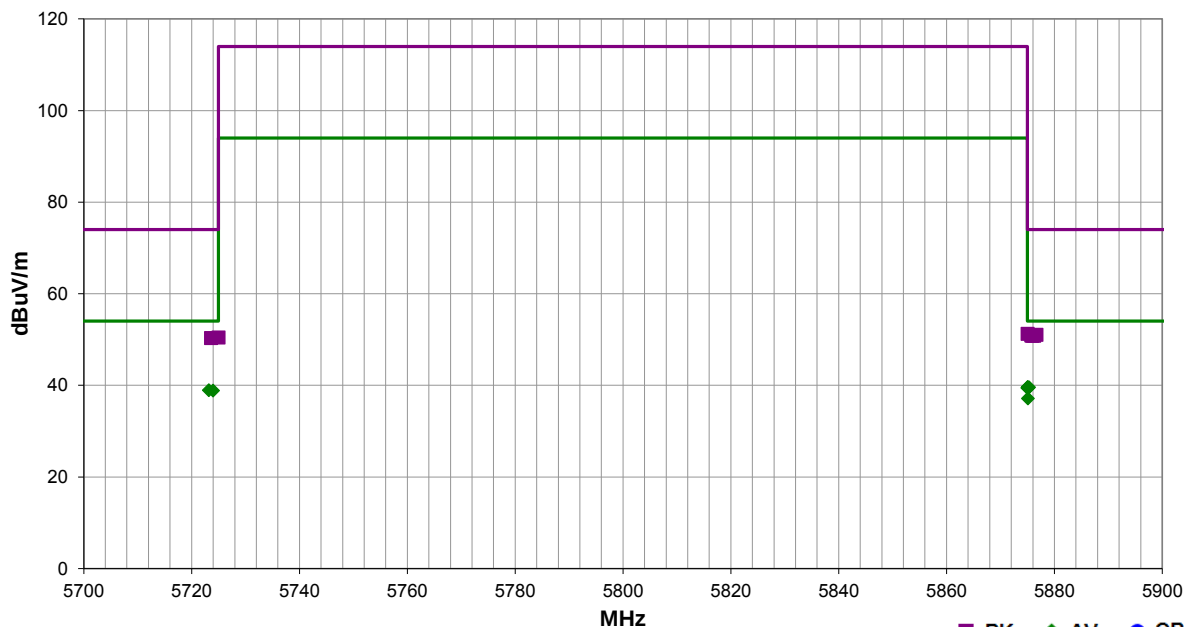
FIELD STRENGTH OF HARMONICS AND SPURIOUS RADIATED EMISSIONS

PSA-ESCI 2015.03.03
EmiR5 2015.03.19.1

Work Order:	PRCO0072	Date:	04/30/15	
Project:	None	Temperature:	23.7 °C	
Job Site:	EV01	Humidity:	39.7% RH	
Serial Number:	10345	Barometric Pres.:	1025.4 mbar	
EUT:		Wireless WorkSight Preview Sensor Model WWS7220		
Configuration:	1			
Customer:	Preco, Inc.			
Attendees:	Jon Fix			
EUT Power:	12 VDC			
Operating Mode:	Tx Continuous, 5.8 GHz Radar			
Deviations:	None			
Comments:	Please reference the data comments for EUT orientation.			

Test Specifications	Test Method
FCC 15.249:2012	ANSI C63.10:2009

Run #	1	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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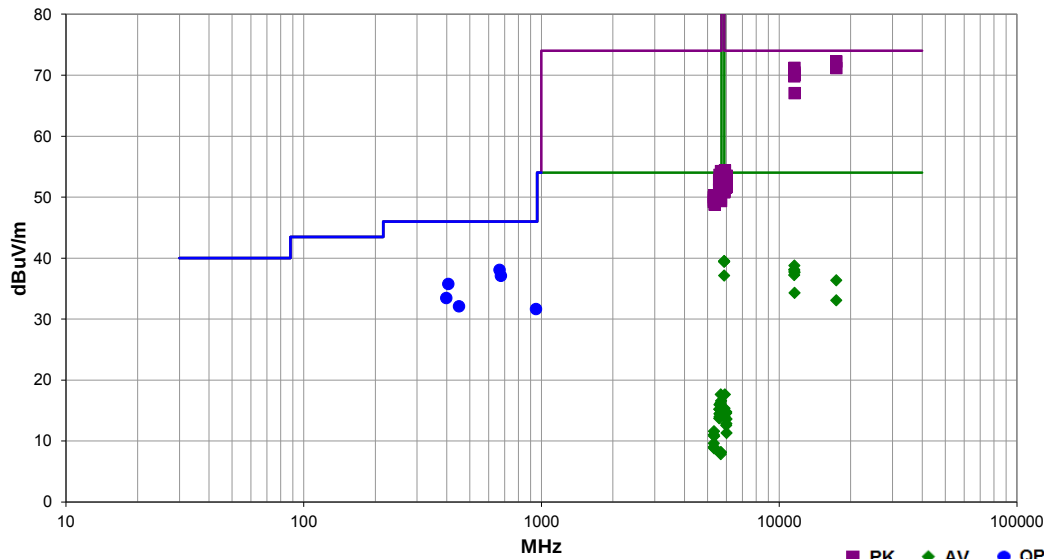


Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
5875.077	28.4	11.2	1.0	0.0	3.0	0.0	Vert	AV	0.0	39.6	54.0	-14.4	EUT On Side
5875.320	28.3	11.2	1.0	125.0	3.0	0.0	Horz	AV	0.0	39.5	54.0	-14.5	EUT On Side
5875.063	28.3	11.2	1.0	158.0	3.0	0.0	Horz	AV	0.0	39.5	54.0	-14.5	EUT Vert
5875.130	28.2	11.2	1.0	280.0	3.0	0.0	Horz	AV	0.0	39.4	54.0	-14.6	EUT Horz
5875.003	28.2	11.2	1.0	131.0	3.0	0.0	Vert	AV	0.0	39.4	54.0	-14.6	EUT Horz
5723.210	28.6	10.3	1.0	157.0	3.0	0.0	Horz	AV	0.0	38.9	54.0	-15.1	EUT On Side
5724.000	28.5	10.3	3.2	11.0	3.0	0.0	Vert	AV	0.0	38.8	54.0	-15.2	EUT On Side
5875.093	25.9	11.2	3.1	12.0	3.0	0.0	Vert	AV	0.0	37.1	54.0	-16.9	EUT Vert
5875.027	40.0	11.2	1.0	0.0	3.0	0.0	Vert	PK	0.0	51.2	74.0	-22.8	EUT On Side
5876.687	39.8	11.2	1.0	131.0	3.0	0.0	Vert	PK	0.0	51.0	74.0	-23.0	EUT Horz
5875.870	39.7	11.2	1.0	280.0	3.0	0.0	Horz	PK	0.0	50.9	74.0	-23.1	EUT Horz
5875.723	39.7	11.2	1.0	125.0	3.0	0.0	Horz	PK	0.0	50.9	74.0	-23.1	EUT On Side
5876.230	39.6	11.2	3.1	12.0	3.0	0.0	Vert	PK	0.0	50.8	74.0	-23.2	EUT Vert
5875.893	39.6	11.2	1.0	158.0	3.0	0.0	Horz	PK	0.0	50.8	74.0	-23.2	EUT Vert
5724.980	40.1	10.3	3.2	11.0	3.0	0.0	Vert	PK	0.0	50.4	74.0	-23.6	EUT On Side
5723.603	40.0	10.3	1.0	157.0	3.0	0.0	Horz	PK	0.0	50.3	74.0	-23.7	EUT On Side

Work Order:	PRCO0072	Date:	04/30/15	
Project:	None	Temperature:	21.8 °C	
Job Site:	EV01	Humidity:	39.9% RH	
Serial Number:	10345	Barometric Pres.:	1017 mbar	
EUT:		Wireless WorkSight Preview Sensor Model WWS7220		
Configuration:	1			
Customer:	Precor, Inc.			
Attendees:	Jon Fix			
EUT Power:	12 VDC			
Operating Mode:	Tx Continuous, 5.8 GHz Radar			
Deviations:	None			
Comments:	Please reference the data comments for EUT orientation.			

Test Specifications	Test Method
FCC 15.249:2012	ANSI C63.10:2009

Run #	8	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 (meters)	Pulse Desense Factor (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
17397.370	31.6	16.2	1.5	109.0	0.0	24.5	Horz	PK	0.0	72.3	74.0	-1.7	Line Spectrum Mode 100kHz RBW, EUT On Side
11595.530	48.9	-2.2	1.3	62.0	0.0	24.5	Horz	PK	0.0	71.2	74.0	-2.8	Line Spectrum Mode 100kHz RBW, EUT On Side
17397.370	30.5	16.2	1.0	2.0	0.0	24.5	Vert	PK	0.0	71.2	74.0	-2.8	Line Spectrum Mode 100kHz RBW, EUT Vert
11587.500	48.3	-2.3	1.3	56.0	0.0	24.5	Horz	PK	0.0	70.5	74.0	-3.5	Line Spectrum Mode 100kHz RBW, EUT On Side
11601.570	48.0	-2.2	1.0	48.0	0.0	24.5	Vert	PK	0.0	70.3	74.0	-3.7	Line Spectrum Mode 100kHz RBW, EUT Vert
11613.630	47.6	-2.0	1.4	69.0	0.0	24.5	Horz	PK	0.0	70.1	74.0	-3.9	Line Spectrum Mode 100kHz RBW, EUT On Side
11587.500	47.6	-2.3	1.0	47.0	0.0	24.5	Vert	PK	0.0	69.8	74.0	-4.2	Line Spectrum Mode 100kHz RBW, EUT Vert
11613.630	44.6	-2.0	1.0	360.0	0.0	24.5	Vert	PK	0.0	67.1	74.0	-6.9	Line Spectrum Mode 100kHz RBW, EUT Vert
666.748	31.8	6.3	1.0	146.0	3.0	0.0	Horz	QP	0.0	38.1	46.0	-7.9	EUT On Side
674.780	31.4	5.7	1.0	155.0	3.0	0.0	Horz	QP	0.0	37.1	46.0	-8.9	EUT On Side
405.675	35.7	0.1	1.0	135.0	3.0	0.0	Horz	QP	0.0	35.8	46.0	-10.2	EUT On Side
397.641	33.3	0.2	1.0	175.0	3.0	0.0	Horz	QP	0.0	33.5	46.0	-12.5	EUT On Side
449.855	31.2	0.9	1.0	170.0	3.0	0.0	Horz	QP	0.0	32.1	46.0	-13.9	EUT On Side
947.902	22.2	9.5	1.0	219.0	3.0	0.0	Horz	QP	0.0	31.7	46.0	-14.3	EUT On Side
5875.063	28.3	11.2	1.0	158.0	3.0	0.0	Horz	AV	0.0	39.5	54.0	-14.5	EUT Vert
5875.130	28.2	11.2	1.0	280.0	3.0	0.0	Horz	AV	0.0	39.4	54.0	-14.6	EUT Horz
5875.003	28.2	11.2	1.0	131.0	3.0	0.0	Vert	AV	0.0	39.4	54.0	-14.6	EUT Horz
11593.530	48.1	-2.2	1.3	62.0	-31.6	24.5	Horz	AV	0.0	38.8	54.0	-15.2	Line Spectrum Mode 100kHz RBW, EUT On Side
11587.500	47.5	-2.3	1.3	56.0	-31.6	24.5	Horz	AV	0.0	38.1	54.0	-15.9	Line Spectrum Mode 100kHz RBW, EUT On Side
11603.570	47.1	-2.1	1.0	48.0	-31.6	24.5	Vert	AV	0.0	37.9	54.0	-16.1	Line Spectrum Mode 100kHz RBW, EUT Vert
11611.600	46.8	-2.1	1.4	69.0	-31.6	24.5	Horz	AV	0.0	37.6	54.0	-16.4	Line Spectrum Mode 100kHz RBW, EUT On Side
11587.500	46.6	-2.3	1.0	47.0	-31.6	24.5	Vert	AV	0.0	37.2	54.0	-16.8	Line Spectrum Mode 100kHz RBW, EUT Vert
5875.093	25.9	11.2	3.1	12.0	3.0	0.0	Vert	AV	0.0	37.1	54.0	-16.9	EUT Vert
17397.330	27.3	16.2	1.5	109.0	-31.6	24.5	Horz	AV	0.0	36.4	54.0	-17.6	Line Spectrum Mode 100kHz RBW, EUT On Side
5916.300	42.9	11.5	1.5	19.0	0.0	0.0	Horz	PK	0.0	54.4	74.0	-19.6	EUT On Side
11617.630	43.4	-2.0	1.0	360.0	-31.6	24.5	Vert	AV	0.0	34.3	54.0	-19.7	Line Spectrum Mode 100kHz RBW, EUT Vert
5695.533	44.1	10.2	1.5	15.0	0.0	0.0	Horz	PK	0.0	54.3	74.0	-19.7	EUT On Side
5607.200	43.7	9.9	1.5	14.0	0.0	0.0	Horz	PK	0.0	53.6	74.0	-20.4	EUT On Side
6010.767	41.4	12.1	1.5	22.0	0.0	0.0	Horz	PK	0.0	53.5	74.0	-20.5	EUT On Side
5896.400	42.1	11.3	2.2	16.0	0.0	0.0	Horz	PK	0.0	53.4	74.0	-20.6	EUT On Side
5992.467	41.4	12.0	1.4	21.0	0.0	0.0	Horz	PK	0.0	53.4	74.0	-20.6	EUT On Side
5701.767	43.2	10.2	2.5	18.0	0.0	0.0	Horz	PK	0.0	53.4	74.0	-20.6	EUT On Side
17399.330	24.0	16.2	1.0	2.0	-31.6	24.5	Vert	AV	0.0	33.1	54.0	-20.9	Line Spectrum Mode 100kHz RBW, EUT Vert
5674.833	42.8	10.1	1.7	13.0	0.0	0.0	Horz	PK	0.0	52.9	74.0	-21.1	EUT On Side

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (meters)	Pulse Desense Factor (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
5982.300	40.9	11.9	1.2	14.0	0.0	0.0	Horz	PK	0.0	52.8	74.0	-21.2	EUT On Side
5922.667	41.3	11.5	1.4	18.0	0.0	0.0	Vert	PK	0.0	52.8	74.0	-21.2	EUT Vert
5596.967	42.9	9.9	2.3	17.0	0.0	0.0	Horz	PK	0.0	52.8	74.0	-21.2	EUT On Side
5914.400	41.3	11.5	1.0	17.0	0.0	0.0	Vert	PK	0.0	52.8	74.0	-21.2	EUT Vert
5898.400	41.4	11.4	1.0	17.0	0.0	0.0	Vert	PK	0.0	52.8	74.0	-21.2	EUT Vert
5687.333	42.4	10.1	1.0	30.0	0.0	0.0	Vert	PK	0.0	52.5	74.0	-21.5	EUT Vert
6000.767	40.2	12.1	1.5	29.0	0.0	0.0	Vert	PK	0.0	52.3	74.0	-21.7	EUT Vert
5689.500	42.1	10.1	4.0	277.0	0.0	0.0	Horz	PK	0.0	52.2	74.0	-21.8	EUT Horz
5922.333	40.7	11.5	2.2	22.0	0.0	0.0	Horz	PK	0.0	52.2	74.0	-21.8	EUT On Side
5601.267	42.2	9.9	1.0	28.0	0.0	0.0	Vert	PK	0.0	52.1	74.0	-21.9	EUT Vert
5626.900	42.0	10.0	1.6	19.0	0.0	0.0	Horz	PK	0.0	52.0	74.0	-22.0	EUT On Side
5703.367	41.8	10.2	1.0	28.0	0.0	0.0	Vert	PK	0.0	52.0	74.0	-22.0	EUT Vert
6019.367	39.5	12.2	1.7	27.0	0.0	0.0	Vert	PK	0.0	51.7	74.0	-22.3	EUT Vert
5972.700	39.7	11.9	1.0	17.0	0.0	0.0	Vert	PK	0.0	51.6	74.0	-22.4	EUT Vert
5676.800	41.4	10.1	1.0	26.0	0.0	0.0	Vert	PK	0.0	51.5	74.0	-22.5	EUT Vert
5623.067	41.5	10.0	1.0	32.0	0.0	0.0	Vert	PK	0.0	51.5	74.0	-22.5	EUT Vert
5590.900	41.4	9.9	1.0	28.0	0.0	0.0	Vert	PK	0.0	51.3	74.0	-22.7	EUT Vert
5876.687	39.8	11.2	1.0	131.0	3.0	0.0	Vert	PK	0.0	51.0	74.0	-23.0	EUT Horz
5875.870	39.7	11.2	1.0	280.0	3.0	0.0	Horz	PK	0.0	50.9	74.0	-23.1	EUT Horz
5876.230	39.6	11.2	3.1	12.0	3.0	0.0	Vert	PK	0.0	50.8	74.0	-23.2	EUT Vert
5875.893	39.6	11.2	1.0	158.0	3.0	0.0	Horz	PK	0.0	50.8	74.0	-23.2	EUT Vert
5323.767	42.1	8.2	1.1	47.0	0.0	0.0	Horz	PK	0.0	50.3	74.0	-23.7	EUT On Side
5309.833	41.9	8.1	1.1	45.0	0.0	0.0	Horz	PK	0.0	50.0	74.0	-24.0	EUT On Side
5689.300	39.8	10.1	1.0	215.0	0.0	0.0	Vert	PK	0.0	49.9	74.0	-24.1	EUT On Side
5341.367	41.4	8.3	1.1	47.0	0.0	0.0	Horz	PK	0.0	49.7	74.0	-24.3	EUT On Side
5681.633	39.5	10.1	1.0	168.0	0.0	0.0	Vert	PK	0.0	49.6	74.0	-24.4	EUT Horz
5316.367	41.4	8.1	3.7	15.0	0.0	0.0	Vert	PK	0.0	49.5	74.0	-24.5	EUT Vert
5695.633	39.2	10.2	2.6	320.0	0.0	0.0	Horz	PK	0.0	49.4	74.0	-24.6	EUT Vert
5305.833	41.2	8.0	1.9	0.0	0.0	0.0	Vert	PK	0.0	49.2	74.0	-24.8	EUT Vert
5345.767	40.4	8.4	1.9	356.0	0.0	0.0	Vert	PK	0.0	48.8	74.0	-25.2	EUT Vert
5689.400	39.1	10.1	1.5	15.0	-31.6	0.0	Horz	AV	0.0	17.6	54.0	-36.4	EUT On Side
5910.267	37.8	11.4	1.5	19.0	-31.6	0.0	Horz	AV	0.0	17.6	54.0	-36.4	EUT On Side
5701.400	38.0	10.2	2.5	18.0	-31.6	0.0	Horz	AV	0.0	16.6	54.0	-37.4	EUT On Side
5679.367	37.7	10.1	1.7	13.0	-31.6	0.0	Horz	AV	0.0	16.2	54.0	-37.8	EUT On Side
5611.000	37.6	10.0	1.5	14.0	-31.6	0.0	Horz	AV	0.0	16.0	54.0	-38.0	EUT On Side
5898.167	35.6	11.4	2.2	16.0	-31.6	0.0	Horz	AV	0.0	15.4	54.0	-38.6	EUT On Side
5691.367	36.8	10.1	1.0	30.0	-31.6	0.0	Vert	AV	0.0	15.3	54.0	-38.7	EUT Vert
5599.000	36.9	9.9	2.3	17.0	-31.6	0.0	Horz	AV	0.0	15.2	54.0	-38.8	EUT On Side
5621.033	36.8	10.0	1.6	19.0	-31.6	0.0	Horz	AV	0.0	15.2	54.0	-38.8	EUT On Side
5990.567	34.4	12.0	1.4	21.0	-31.6	0.0	Horz	AV	0.0	14.8	54.0	-39.2	EUT On Side
5920.267	34.8	11.5	2.2	22.0	-31.6	0.0	Horz	AV	0.0	14.7	54.0	-39.3	EUT On Side
5687.333	36.1	10.1	4.0	277.0	-31.6	0.0	Horz	AV	0.0	14.6	54.0	-39.4	EUT Horz
5904.233	34.8	11.4	1.0	17.0	-31.6	0.0	Vert	AV	0.0	14.6	54.0	-39.4	EUT Vert
5988.533	34.2	12.0	1.2	14.0	-31.6	0.0	Horz	AV	0.0	14.6	54.0	-39.4	EUT On Side
5611.067	36.1	10.0	1.0	28.0	-31.6	0.0	Vert	AV	0.0	14.5	54.0	-39.5	EUT Vert
5920.267	34.5	11.5	1.4	18.0	-31.6	0.0	Vert	AV	0.0	14.4	54.0	-39.6	EUT Vert
5679.300	35.8	10.1	1.0	26.0	-31.6	0.0	Vert	AV	0.0	14.3	54.0	-39.7	EUT Vert
5701.400	35.7	10.2	1.0	28.0	-31.6	0.0	Vert	AV	0.0	14.3	54.0	-39.7	EUT Vert
5898.233	34.3	11.4	1.0	17.0	-31.6	0.0	Vert	AV	0.0	14.1	54.0	-39.9	EUT Vert
5621.033	35.6	10.0	1.0	32.0	-31.6	0.0	Vert	AV	0.0	14.0	54.0	-40.0	EUT Vert
5598.933	35.4	9.9	1.0	28.0	-31.6	0.0	Vert	AV	0.0	13.7	54.0	-40.3	EUT Vert
6010.633	33.1	12.1	1.5	22.0	-31.6	0.0	Horz	AV	0.0	13.6	54.0	-40.4	EUT On Side
5998.667	32.4	12.0	1.5	29.0	-31.6	0.0	Vert	AV	0.0	12.8	54.0	-41.2	EUT Vert
5988.467	32.2	12.0	1.0	17.0	-31.6	0.0	Vert	AV	0.0	12.6	54.0	-41.4	EUT Vert
5323.867	35.0	8.2	1.1	47.0	-31.6	0.0	Horz	AV	0.0	11.6	54.0	-42.4	EUT On Side
6010.633	30.8	12.1	1.7	27.0	-31.6	0.0	Vert	AV	0.0	11.3	54.0	-42.7	EUT Vert
5313.800	34.5	8.1	1.1	45.0	-31.6	0.0	Horz	AV	0.0	11.0	54.0	-43.0	EUT On Side
5335.833	34.1	8.3	1.1	47.0	-31.6	0.0	Horz	AV	0.0	10.8	54.0	-43.2	EUT On Side
5315.800	33.1	8.1	3.7	15.0	-31.6	0.0	Vert	AV	0.0	9.6	54.0	-44.4	EUT Vert
5313.767	32.5	8.1	1.9	0.0	-31.6	0.0	Vert	AV	0.0	9.0	54.0	-45.0	EUT Vert
5335.933	32.1	8.3	1.9	356.0	-31.6	0.0	Vert	AV	0.0	8.8	54.0	-45.2	EUT Vert
5691.400	29.6	10.1	2.6	320.0	-31.6	0.0	Horz	AV	0.0	8.1	54.0	-45.9	EUT Vert
5687.400	29.6	10.1	1.0	168.0	-31.6	0.0	Vert	AV	0.0	8.1	54.0	-45.9	EUT Horz
5689.400	29.3	10.1	1.0	215.0	-31.6	0.0	Vert	AV	0.0	7.8	54.0	-46.2	EUT On Side

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

MODES OF OPERATION

Tx Continuous, 5.8 GHz Radar

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

PRCO0072 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	5725 MHz	Stop Frequency	5875 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	N/A	Double Ridge Horn Cables	EVB	4/16/2015	12 mo
Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	PAG	4/16/2015	12 mo
Signal Analyzer	Keysight	KT-N9010A	AFN	2/10/2015	12 mo
Antenna, Horn	ETS	3115	AIZ	1/27/2014	24 mo

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was transmitting and/or receiving while set at the lowest channel, a middle channel, and the highest channel available. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.10:2009).

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 step (C), if the emission is viewed in pulse spectrum mode, the level of the fundamental emissions is measured using analyzer settings as listed in the Hewlett Packard Application Note 150-2 (Spectrum Analysis...Pulsed RF, Nov. 1971) such that a true pulse spectrum is obtained (RBW greater than PRF). The video bandwidth should be equal to, or greater than the RBW. The pulse repetition frequency (PRF) was measured to be 2 MHz; therefore a 3 MHz resolution bandwidth (RBW) and an 8 MHz video bandwidth (VBW) were used to measure the fundamental emission. A pulse desensitization factor in dB (calculated from Equation 10 in HP Note 150-2) is added to this measured level to obtain the "true peak level". The pulse width was measured to be 13.3 nS; therefore a 24.44 dB pulse desensitization factor was used ($k = 1.5$, $B = 3$ MHz).

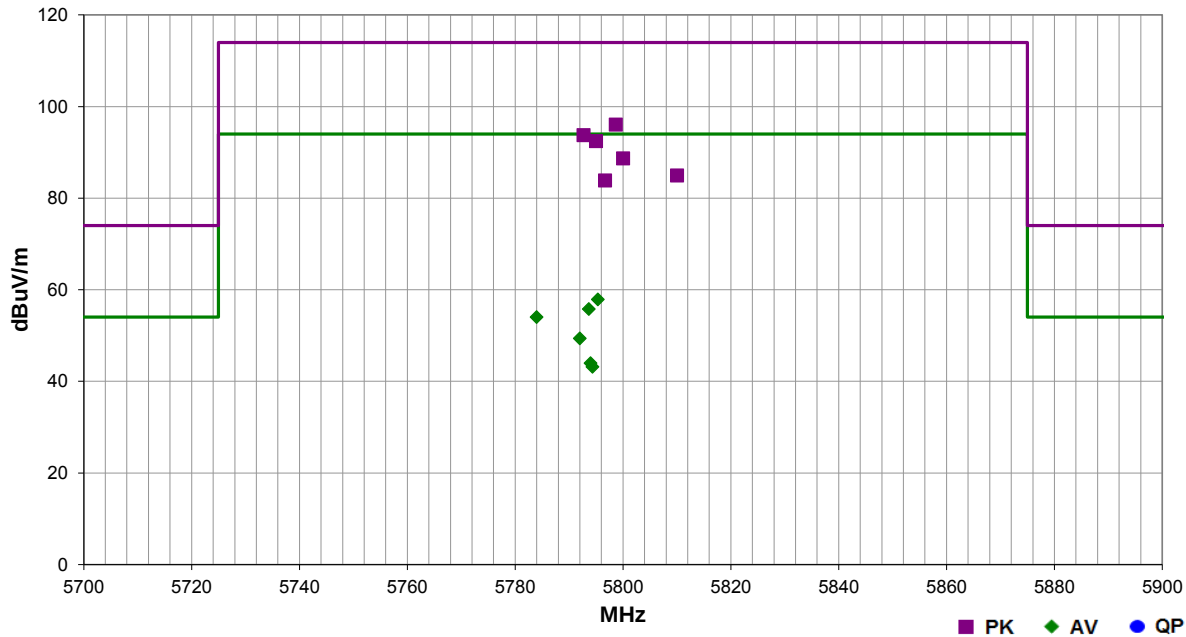
The average level of the fundamental emission is the "true peak level" measured above minus the calculated duty cycle factor in dB. The duty cycle correction factor is calculated from Equation 4 in HP Note 150-2. The pulse width was measured to be 13.3 nS and the PRF = 2 MHz; therefore a 31.5 dB duty cycle correction factor was used.

The main lobe of the fundamental emission lies entirely within the specified frequency band.

Work Order:	PRCO0072	Date:	04/30/15	
Project:	None	Temperature:	22.9 °C	
Job Site:	EV01	Humidity:	38% RH	
Serial Number:	10345	Barometric Pres.:	1025.4 mbar	
EUT: Wireless WorkSight Preview Sensor Model WWS7220				Tested by: Brandon Hobbs
Configuration:	1			
Customer:	Preco, Inc.			
Attendees:	Jon Fix			
EUT Power:	12 VDC			
Operating Mode:	Tx Continuous, 5.8 Radar			
Deviations:	None			
Comments:	Please reference the data comments for EUT orientation.			

Test Specifications	Test Method
FCC 15.249:2015	ANSI C63.10:2009

Run #	0	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)	Pulse Desense Factor (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
5798.667	60.8	10.8	1.4	12.0	0.0	24.5	Horz	PK	0.0	96.1	114.0	-17.9	EUT Vert
5792.667	58.5	10.7	1.4	10.0	0.0	24.5	Vert	PK	0.0	93.7	114.0	-20.3	EUT On Side
5795.000	57.2	10.8	3.4	208.0	0.0	24.5	Horz	PK	0.0	92.5	114.0	-21.5	EUT Horz
5800.000	53.4	10.8	3.7	208.0	0.0	24.5	Vert	PK	0.0	88.7	114.0	-25.3	EUT Horz
5810.000	49.6	10.8	2.8	46.0	0.0	24.5	Vert	PK	0.0	84.9	114.0	-29.1	EUT Vert
5796.667	48.6	10.8	1.0	241.0	0.0	24.5	Horz	PK	0.0	83.9	114.0	-30.1	EUT On Side
5795.333	54.2	10.8	1.4	12.0	-31.6	24.5	Horz	AV	0.0	57.9	94.0	-36.1	EUT Vert
5793.667	52.1	10.8	1.4	10.0	-31.6	24.5	Vert	AV	0.0	55.8	94.0	-38.2	EUT On Side
5784.000	50.4	10.7	3.4	208.0	-31.6	24.5	Horz	AV	0.0	54.0	94.0	-40.0	EUT Horz
5792.000	45.7	10.7	3.7	208.0	-31.6	24.5	Vert	AV	0.0	49.3	94.0	-44.7	EUT Horz
5794.000	40.3	10.8	2.8	46.0	-31.6	24.5	Vert	AV	0.0	44.0	94.0	-50.0	EUT On Side
5794.333	39.5	10.8	1.0	241.0	-31.6	24.5	Horz	AV	0.0	43.2	94.0	-50.8	EUT Vert