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LEIDOS SECURITY DETECTION & AUTOMATION, INC.

TEST REPORT

SCOPE OF WORK

EMISSIONS TESTING – ProVision 3, SafeView HD, PV2 to PV3 upgrade kit

REPORT NUMBER
104357499BOX-001

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IEC 60601-1-2 ed 4.0 EMC Report Shell Rev. December 2017

EMISSIONS TEST REPORT

(FULL COMPLIANCE)

Report Number: 104357499BOX-001
Project Number: G104357499

Report Issue Date: 08/06/2020
Revision Date: 06/03/2021

Model(s) Tested: ProVision 3, SafeView HD, PV2 to PV3 upgrade kit
Model(s) Partially Tested: None
Model(s) Not Tested but declared equivalent by the client: None

Standards: CFR 47 FCC Part 15C, 15.209 (08/2020)
FCC Waver ET Docket No. 16-45

Tested by:
Intertek Testing Services
70 Codman Hill Road
Boxborough, MA 01719
USA

Client:
Leidos Security Detection & Automation, Inc.
One Radcliff Drive
Tewksbury, MA 01876
USA

Report prepared by:

Vathana Ven / EMC Staff Engineer

Report reviewed by:

Kouma Sinn / EMC Staff Engineer

Table of Contents

1 Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 4.0. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested **complies** with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

2 Test Summary

Section	Test full name	Result
3	Client Information	--
4	Description of Equipment Under Test and Variant Models	--
5	System Setup and Method	--
6	Fundamental Emissions CFR 47 FCC Part 15C, 15.209(a) (08/2020), FCC Waver ET Docket No. 16-45	Pass
7	Unwanted Emissions CFR 47 FCC Part 15C, 15.209(c) (08/2020)	Pass
8	AC Mains Conducted Emissions CFR 47 FCC Part 15C, 15.207(a) (08/2020)	Pass
9	Appendix A - FCC Waiver ET Docket No. 16-45	--
10	Appendix B – Mixer/Horn Calibration Certificates	--
11	Revision History	--

3 Client Information

This EUT was tested at the request of:

Client: Leidos Security Detection & Automation, Inc.
One Radcliff Drive
Tewksbury, MA 01876
USA

Contact: Uresh Patel
Telephone: (781) 939-1614
Fax: None
Email: Uresh.Patel@leidos.com

4 Description of Equipment Under Test and Variant Models

Manufacturer: Leidos Security Detection & Automation, Inc.
One Radcliff Drive
Tewksbury, MA 01876
USA

Equipment Under Test			
Description	Manufacturer	Model Number	Serial Number
Security Body Scanner	Leidos Security Detection & Automation, Inc.	ProVision 3, SafeView HD, PV2 to PV3 upgrade kit	BOX2006091441-001 (Intertek Assigned)

Receive Date:	06/09/2020
Received Condition:	Good
Type:	Production

Description of Equipment Under Test (provided by client)
The ProVision® 3 security scanner is an advanced personnel screener that uses wideband frequencies to drive superior levels of detection and throughput while achieving the industry's lowest alarm rates. The system quickly screens passengers using safe millimeter wave (MMW) technology to automatically detect concealed objects made of a broad variety of materials – both metallic and nonmetallic, including emerging threats like HMEs.

Equipment Under Test Power Configuration			
Rated Voltage	Rated Current	Rated Frequency	Number of Phases
100-120 VAC	12 Amps	50/60 Hz	1
220-240 VAC	6 Amps	50/60 Hz	1

Operating modes of the EUT:

No.	Descriptions of EUT Exercising
1	Transmitter frequency sweep active
2	Transmitter frequency sweep disabled. Low, Mid, and High channels were selected.

Software used by the EUT:

No.	Descriptions of EUT Exercising
1	FCC -FieldTest

Radio/Receiver Characteristics	
Frequency Band(s)	20.5-39.9 GHz
Modulation Type(s)	FMCW
Maximum Output Power	-21.64 dBm or 0.0000069W (EIRP)
Test Channels	20.5, 30.0, 39.9 GHz (Sweep Ranges: 20.5-39.9 GHz)
Occupied Bandwidth	19.52 GHz
Equipment Type	20-40 GHz Radio in a host
Antenna Type and Gain	Integrated antenna, +4 dBi

Variant Models:

The following variant models were not tested as part of this evaluation, but have been identified by the manufacturer as being electrically identical models, depopulated models, or with reasonable similarity to the model(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

- None

5 System Setup and Method

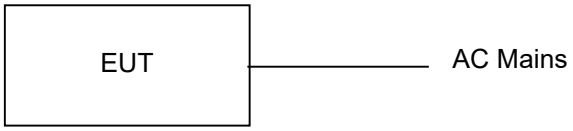
Cables					
ID	Description	Length (m)	Shielding	Ferrites	Termination
1	AC Mains	3	None	None	AC Mains

Support Equipment			
Description	Manufacturer	Model Number	Serial Number
Keyboard	Dell	SK-8115	Not labeled
PC	Lenovo	Thinkcenter	8SSS50S93851F1WH998001B
Monitor	Dell	1907FPI	Not labeled
Mouse	Lenovo	MOIUUO	Not labeled

5.1 Method:

Configuration as required by ANSI C63.10:2013, ANSI C63.4:2014, and FCC Waver ET Docket No. 16-45.

5.2 EUT Block Diagram:



6 Fundamental Emissions

6.1 Method

Tests are performed in accordance with ANSI C63.10 and FCC Waver ET Docket No. 16-45.

TEST SITE: 10m ALSE

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
Radiated Emissions, 10m	30-1000 MHz	5.6 dB	6.3 dB
Radiated Emissions, 3m	30-1000 MHz	4.9 dB	6.3 dB
Radiated Emissions, 3m	1-6 GHz	4.4 dB	5.2 dB
Radiated Emissions, 3m	6-15 GHz	4.9 dB	5.5 dB
Radiated Emissions, 3m	15-18 GHz	4.6 dB	5.5 dB
Radiated Emissions, 3m	18-40 GHz	4.6 dB	N/A

Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG

Where FS = Field Strength in dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 52.0 dBμV
AF = 7.4 dB/m
CF = 1.6 dB
AG = 29.0 dB
FS = 32 dBμV/m

To convert from dBμV to μV or mV the following was used:

$UF = 10^{(NF / 20)}$ where UF = Net Reading in μV
NF = Net Reading in dBμV

Example:

FS = RA + AF + CF – AG = 52.0 + 7.4 + 1.6 – 29.0 = 32.0
$UF = 10^{(32\ dB\mu V / 20)}$ = 39.8 μV/m

Alternately, when BAT-EMC Emission Software is used, the “Level” includes all losses and gains and is compared directly in the “Margin” column to the “Limit”. The “Correction” includes Antenna Factor, Preamp, and Cable Loss. These are already accounted for in the “Level” column.

6.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV007'	Weather Station Vantage Vue	Davis	6250	MS191212 003	03/12/2020	03/12/2021
EMC04'	Antenna, 18-40 GHz	EMCO	3116	2090	12/10/2019	12/10/2020
CBLHF2012-2M-1'	Cable, 2m 9kHz-40GHz - SET1	Huber & Suhner	SF102	252675001	02/17/2020	02/17/2021
CBLSHF205;	Cable, SMA-SMA, 9kHz-40GHz, (Cable Kit5)	Huber + Suhner	Sucoflex 102EA	234715001	09/06/2019	09/06/2020
ROS005-1'	Signal and Spectrum Analyzer	R&S	FSW43	100646	10/10/2019	10/10/2020

Software Utilized:

Name	Manufacturer	Version
Excel 2003	Microsoft	(11.8231.8221) SP3
EMI Boxborough.xls	Intertek	08/27/10

6.3 Results:

The sample tested was found to Comply.

Fundamental emissions Limits (FCC Part 15C, 15.209):

Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)	Detector
0.009-0.490[1]	2400/F(kHz)	300	Quasi-peak [see Note 1]
0.490-1.705	24000/F(kHz)	30	Quasi-peak
1.705-30.0	30	30	Quasi-peak
30-88	100	3	Quasi-peak
88-216	150	3	Quasi-peak
216-960	200	3	Quasi-peak
960-40,000[2]	500	3	Quasi-peak [see Note 2]

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

Note 2: The emission limits for the frequencies above 1 GHz are based on measurements employing a linear average detector.

6.4 Setup Photographs:

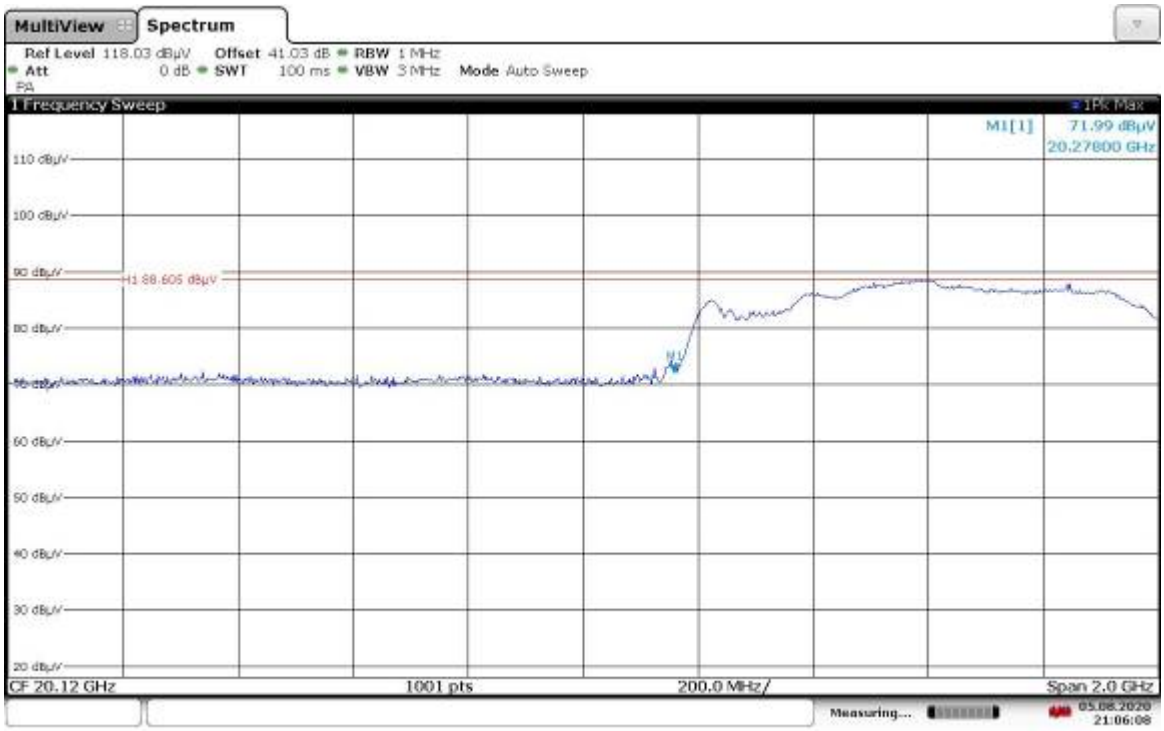
Photos are available in a separate exhibit

6.5 Plots/Data:

Company: LEIDOS SECURITY DETECTION & AUTOMATION, INC. Antenna & Cables: SHF Bands: N, LF, HF, SHF
Model #: ProVision 3, SafeView HD, PV2 to PV3 upgrade kit Antenna: EMC04_1M_vert_12-10-2020.txt EMC04_1M_Hor_12-10-2020.txt
Serial #: BOX2006091441-001 (Intertek Assigned) Cable(s): MEG002_09-19-2020.txt CBLHF2012-2M-2_02-17-2021 cable factors.txt
Engineers: Vathana Ven Location: 10M Barometer: DAV007 Filter: NONE
Project #: G104357499 Date(s): 07/22/20
Standard: FCC Part 15 Subpart C 15.209 Temp/Humidity/Pressure: 27 deg C 39% 1006 mB
Receiver: ROS005-1_10-10-20 Limit Distance (m): 3
PreAmp: PRE8 Data 2020.txt Test Distance (m): 1
PreAmp Used? (Y or N): Y Voltage/Frequency: 120VAC 60Hz Frequency Range: 18-40GHz
Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB)
Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth	FCC	IC
Module 1, Tx/Rx pair at Low CH, CW mode for peak and constant chirp for average measurements													
PK	H	20500.000	51.31	45.33	14.61	20.21	9.54	81.50	95.00	-13.50	100kHz/1 MHz	RB	RB
AVG	H	20500.000	21.30	45.33	14.61	20.21	9.54	51.49	54.00	-2.51	1/3 MHz	RB	RB
Module 1, Tx/Rx pair at Mid CH, CW mode for peak and constant chirp for average measurements													
PK	H	30000.000	73.39	46.78	18.10	40.54	9.54	88.19	95.00	-6.81	100kHz/1 MHz		
AVG	H	30000.000	33.50	46.78	18.10	40.54	9.54	48.30	54.00	-5.70	1/3 MHz		
Module 1, Tx/Rx pair at High CH, CW mode for peak and constant chirp for average measurements													
PK	H	39500.000	40.30	46.28	22.69	38.00	9.54	61.72	95.00	-33.28	100kHz/1 MHz	RB	RB
AVG	H	39500.000	30.50	46.28	22.69	38.00	9.54	51.92	54.00	-2.08	1/3 MHz	RB	RB
Module 5, Tx/Rx pair at Low CH, CW mode for peak and constant chirp for average measurements													
PK	V	20500.000	54.28	45.22	14.61	20.21	9.54	84.36	95.00	-10.64	100kHz/1 MHz	RB	RB
AVG	V	20500.000	21.30	45.22	14.61	20.21	9.54	51.38	54.00	-2.62	1/3 MHz	RB	RB
Module 5, Tx/Rx pair at Mid CH, CW mode for peak and constant chirp for average measurements													
PK	V	30000.000	70.01	46.69	18.10	40.54	9.54	84.72	95.00	-10.28	100kHz/1 MHz		
AVG	V	30000.000	32.70	46.69	18.10	40.54	9.54	47.41	54.00	-6.59	1/3 MHz		
Module 5, Tx/Rx pair at High CH, CW mode for peak and constant chirp for average measurements													
PK	V	39500.000	52.85	46.42	22.69	38.00	9.54	74.41	95.00	-20.59	100kHz/1 MHz		
AVG	V	39500.000	30.50	46.42	22.69	38.00	9.54	52.06	54.00	-1.94	1/3 MHz		
Module 9, Tx/Rx pair at Low CH, CW mode for peak and constant chirp for average measurements													
PK	V	20500.000	54.07	45.22	14.61	20.21	9.54	84.15	95.00	-10.85	100kHz/1 MHz	RB	RB
AVG	V	20500.000	20.20	45.22	14.61	20.21	9.54	50.28	54.00	-3.72	1/3 MHz	RB	RB
Module 9, Tx/Rx pair at Mid CH, CW mode for peak and constant chirp for average measurements													
PK	V	30000.000	65.60	46.69	18.10	40.54	9.54	80.31	95.00	-14.69	100kHz/1 MHz		
AVG	V	30000.000	33.80	46.69	18.10	40.54	9.54	48.51	54.00	-5.49	1/3 MHz		
Module 9, Tx/Rx pair at High CH, CW mode for peak and constant chirp for average measurements													
PK	H	39500.000	50.17	46.28	22.69	38.00	9.54	71.59	95.00	-23.41	100kHz/1 MHz		
AVG	H	39500.000	30.70	46.28	22.69	38.00	9.54	52.12	54.00	-1.88	1/3 MHz		

Occupied Bandwidth: 19.52 GHz



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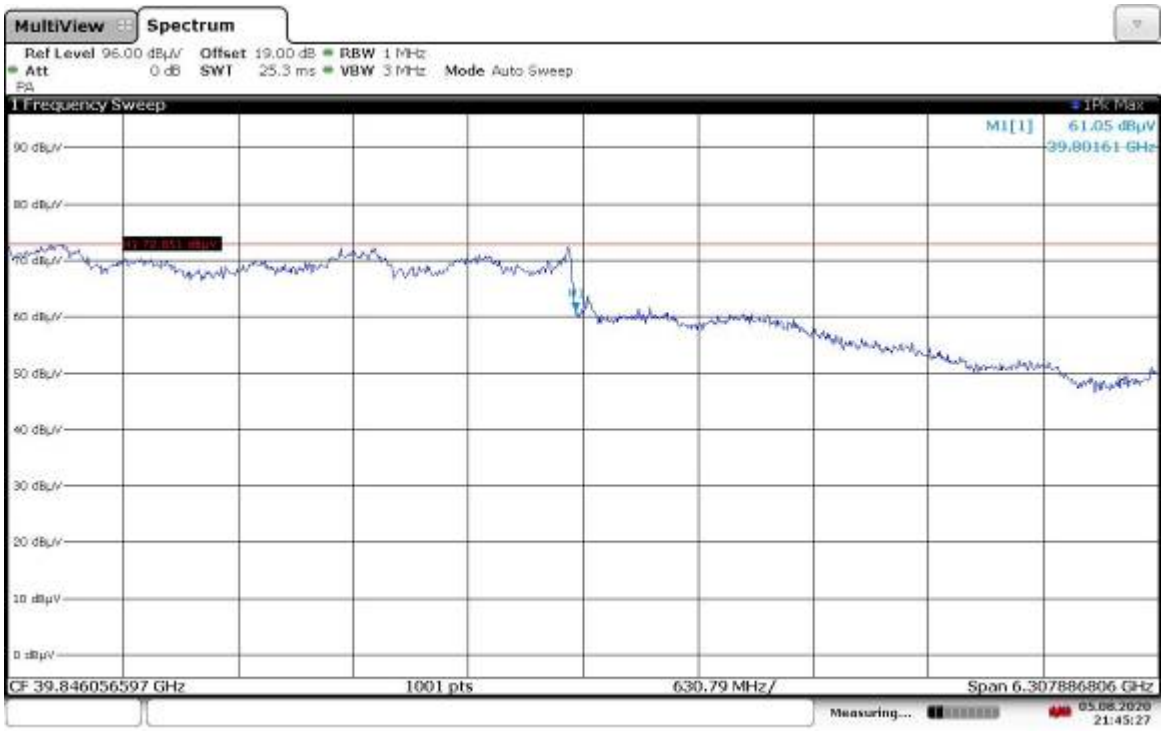

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Test Personnel:	Vathana Ven VJV	Test Date:	07/22/2020
Supervising/Reviewing Engineer: (Where Applicable)	Kouma Sinn KPS		
Product Standard:	FCC Part 15C, 15.209	Limit Applied:	Section 6.3
Input Voltage:	120VAC 60Hz		
Pretest Verification w/ Ambient Signals or BB Source:	**Yes**	Ambient Temperature:	27 ºC
		Relative Humidity:	39 %
		Atmospheric Pressure:	1006 mbars

Deviations, Additions, or Exclusions: None

7 Unwanted Emissions

7.1 Method

The procedure described in Subclauses 6.3-6.6 and 9.9 of ANSI C63.10-2013 and Subclause 5.5.4 (field strength method) of ANSI C63.26-2015 were utilized to determine unwanted emissions.

Radiated emission measurements are performed from 9 kHz to 231 GHz. Measurements for frequencies less than or equal to 1 GHz are made with an EMI receiver employing a CISPR quasi-peak detector. Measurements for frequencies above 1 GHz are made with an EMI receiver or a spectrum analyzer employing an average detector and a peak detector.

Quasi-peak measurements are performed for frequencies less than or equal to 1 GHz. The quasi-peak level of radiated emissions was measured with a resolution bandwidth (RBW) of 9 kHz for frequencies below 30 MHz and 120 kHz for frequencies between 30 MHz to 1 GHz.

Both Peak and Average measurements are performed for frequencies above 1 GHz. The peak level of radiated emissions was measured with a resolution bandwidth (RBW) of 1 MHz, a video bandwidth (VBW) of 3 MHz, and a peak detector. The average level of radiated emissions was measured with a resolution bandwidth (RBW) of 1 MHz, a video bandwidth (VBW) of 3 MHz, and an RMS detector with trace averaging.

Radiated emissions measurement is performed at 10 meters distance for frequencies below 1 GHz, 3 meters for frequency between 1 GHz and 18 GHz, and 1 meter for frequencies above 18 GHz. If the emission level is too low for measurement at that distance, a pre-amplifier is used and/or the test is performed at a closer distance.

The EUT is configured to transmit continuously at its maximum data rate. The EUT is placed 80 cm in height for frequencies below 1 GHz and 1.5 meters in height for frequency above 1 GHz. For portable or handheld devices, the EUT is manipulated through three orthogonal orientations.

For radiated emissions measurements Below 30 MHz, the measuring antenna is positioned with its plane perpendicular to the ground at the specified distance from the EUT. The lowest height of the measurement antenna is 1 m above the ground. During the test, the EUT is rotated 0° through 360° and the measuring antenna orientations are varied (parallel, perpendicular, and ground-parallel) during the search for maximum emission level. EMI receiver's resolution bandwidth is set at 9 kHz.

For radiated emissions measurements between 30 MHz to 18 GHz, measurements are performed with the EUT rotated from 0° to 360°, the measuring antenna height scanned between 1 to 4 meters, and the measuring antenna varied for both horizontal and vertical polarization, to determine the maximum emission level.

For radiated emissions measurements between 18 GHz to 200 GHz, handheld measurement is performed at a far field distance. As the surfaces of the EUT are scanned, the test antenna is kept pointed toward the EUT and the measuring antenna polarization is varied slowly to cover all possible polarizations and orientations of the emission(s).

Data included is representative of the worst-case configuration (the configuration which resulted in the highest emission levels). Plots below are corrected for distance, cables, preamp, filters, antenna factors, and conversion factors then compared to the limits.

TEST SITE: 10m ALSE

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
Radiated Emissions, 10m	30-1000 MHz	5.6 dB	6.3 dB
Radiated Emissions, 3m	30-1000 MHz	4.9 dB	6.3 dB
Radiated Emissions, 3m	1-6 GHz	4.4 dB	5.2 dB
Radiated Emissions, 3m	6-15 GHz	4.9 dB	5.5 dB
Radiated Emissions, 3m	15-18 GHz	4.6 dB	5.5 dB
Radiated Emissions, 3m	18-40 GHz	4.6 dB	N/A

Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG

Where FS = Field Strength in dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 52.0 dBμV
AF = 7.4 dB/m
CF = 1.6 dB
AG = 29.0 dB
FS = 32 dBμV/m

To convert from dBμV to μV or mV the following was used:

$UF = 10^{(NF / 20)}$ where UF = Net Reading in μV
NF = Net Reading in dBμV

Example:

FS = RA + AF + CF – AG = 52.0 + 7.4 + 1.6 – 29.0 = 32.0
$UF = 10^{(32\ dB\mu V / 20)}$ = 39.8 μV/m

Alternately, when BAT-EMC Emission Software is used, the “Level” includes all losses and gains and is compared directly in the “Margin” column to the “Limit”. The “Correction” includes Antenna Factor, Preamp, and Cable Loss. These are already accounted for in the “Level” column.

7.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
IW001'	Cable, 2 meter	Insulated Wire	2801-NPS	001	10/08/2019	10/08/2020
145-406'	Cable, 10m Track A In-floor Cable #1	Huber + Suhner	sucoflex 160-19220mm	001	12/10/2019	12/10/2020
HS001'	Cable, DC-18GHz 1.5m long	Huber & Suhner	SucoFlex 106A	HS001	11/19/2019	11/19/2020
IW003'	Cable, 8.4 meter	Insulated Wire	2800-NPS	003	10/08/2019	10/08/2020
145145'	Antenna, 30 MHz - 3 GHz	sunAR	JB3	A122313	05/07/2020	05/07/2021
PRE11'	Preamplifier, 50 dB gain	Pasternack	PRE11	PRE11	08/30/2019	08/30/2020
ETS002'	Antenna, 1-18GHz	ETS Lindgren	3117	00143260	06/20/2019	06/20/2020
BONN001'	Preamplifier, 1-18GHz	Bonn	BLMA 0118-M	1811749	07/11/2019	07/11/2020
IW001'	Cable, 2 meter	Insulated Wire	2801-NPS	001	10/08/2019	10/08/2020
145-408'	Cable, 10m Chamber - 3m Track B In-floor	Huber + Suhner	sucoflex 106-11000mm	001	12/10/2019	12/10/2020
HS002'	Cable, DC-18GHz 1.5m long	Huber & Suhner	SucoFlex 106A	HS002	11/19/2019	11/19/2020
IW006'	Cable, DC-18GHz 8.4m long	Insulated Wire	2800-NPS	IW006	11/19/2019	11/19/2020
EMC04'	Antenna, 18-40 GHz	EMCO	3116	2090	12/10/2019	12/10/2020
ROS005-1'	Signal and Spectrum Analyzer	R&S	FSW43	100646	10/10/2019	10/10/2020
CBLHF2012-2M-1'	Cable, 2m 9kHz-40GHz - SET1	Huber & Suhner	SF102	252675001	02/17/2020	02/17/2021
CBLSHF205;	Cable, SMA-SMA, 9kHz-40GHz, (Cable Kit5)	Huber + Suhner	Sucoflex 102EA	234715001	09/06/2019	09/06/2020
OML3'	Mixer / Antenna	Oleson Microwave Lab	M12HWD	E21011-1	06/18/2020	06/18/2021
OML4'	Mixer / Antenna	Oleson Microwave Lab	M19HWA	U21011-1	06/18/2020	06/18/2021
OML5'	mmWave Harmonic Generator	Oleson Microwave Lab	40200WGS	21011-1	06/18/2020	06/18/2021
OML6'	WR-04 Horn antenna 22-24dBi, 170-260GHz	OML	M04RH	19042901	06/18/2020	06/18/2021
OML7'	WR-04 Harmonic Mixer, 170-260GHz	OML	M04HWD	190429-1	06/18/2020	06/18/2021
PRE8'	Preamplifier, 1- 40 GHz	MITEQ	NSP4000-NF	507145	11/01/2019	11/01/2020
DAV007'	Weather Station Vantage Vue	Davis	6250	MS191212003	03/12/2020	03/12/2021

Software Utilized:

Name	Manufacturer	Version
BAT-EMC	Nexio	3.17.0.3
Excel 2003	Microsoft	(11.8231.8221) SP3
EMI Boxborough.xls	Intertek	08/27/10

7.3 Results:

The sample tested was found to Comply.

Unwanted emissions Limits (FCC Part 15C, 15.209):

Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)	Detector
0.009-0.490[1]	2400/F(kHz)	300	Quasi-peak [see Note 1]
0.490-1.705	24000/F(kHz)	30	Quasi-peak
1.705-30.0	30	30	Quasi-peak
30-88	100	3	Quasi-peak
88-216	150	3	Quasi-peak
216-960	200	3	Quasi-peak
960-40,000[2]	500	3	Quasi-peak [see Note 2]

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

Note 2: The emission limits for the frequencies above 1 GHz are based on measurements employing a linear average detector.

7.4 Setup Photographs:

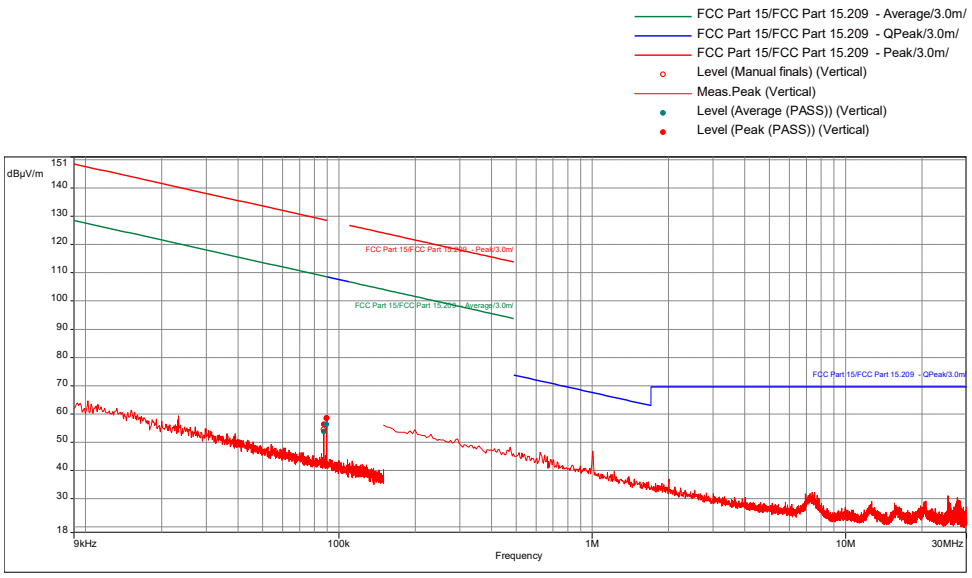
Photos are available in a separate exhibit

7.5 Plots/Data:

Powered from 120VAC 60Hz, 9kHz-30 MHz

Test Information:

Date and Time	7/22/2020 6:14:12 PM
Client and Project Number	L3 Communication
Engineer	Vathana Ven
Temperature	27 deg C
Humidity	39%
Atmospheric Pressure	1006mbar
Comments	RE 9kHz-30MHz_120VAC 60Hz_Loop antenna, Electric Field, 3M Location (FCC 15.209)



Results:

Peak (PASS) (2)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Atnena Pol.	RBW (Hz)	Correction (dB)
0.08715	56.34	128.79	-72.45	309.00	1.00	Vertical	200.00	11.71
0.08945	58.48	128.58	-70.10	311.00	1.00	Vertical	200.00	11.73

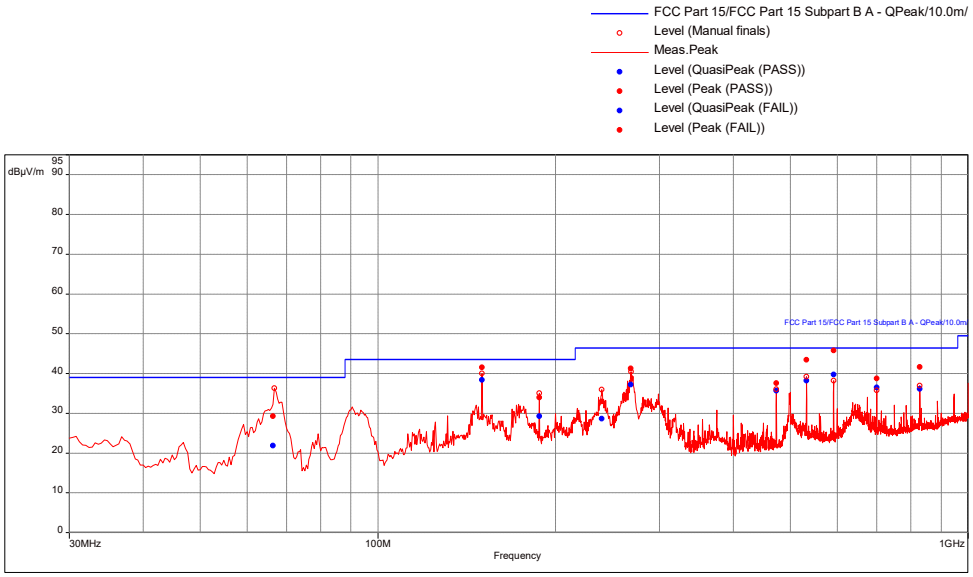
Average (PASS) (2)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Atnena Pol.	RBW (Hz)	Correction (dB)
0.08715	53.77	108.79	-55.02	309.00	1.00	Vertical	200.00	11.71
0.08945	56.28	108.58	-52.30	311.00	1.00	Vertical	200.00	11.73

Powered from 120VAC 60Hz, 30 MHz – 1000MHz

Test Information:

Date and Time	6/10/2020 8:50:22 AM
Client and Project Number	L3 Communication
Engineer	Kouma Sinn
Temperature	22C
Humidity	45%
Atmospheric Pressure	1009mbar
Comments	Scan 1: 120VAC 60Hz, 30-1000MHz SA mode



Results:

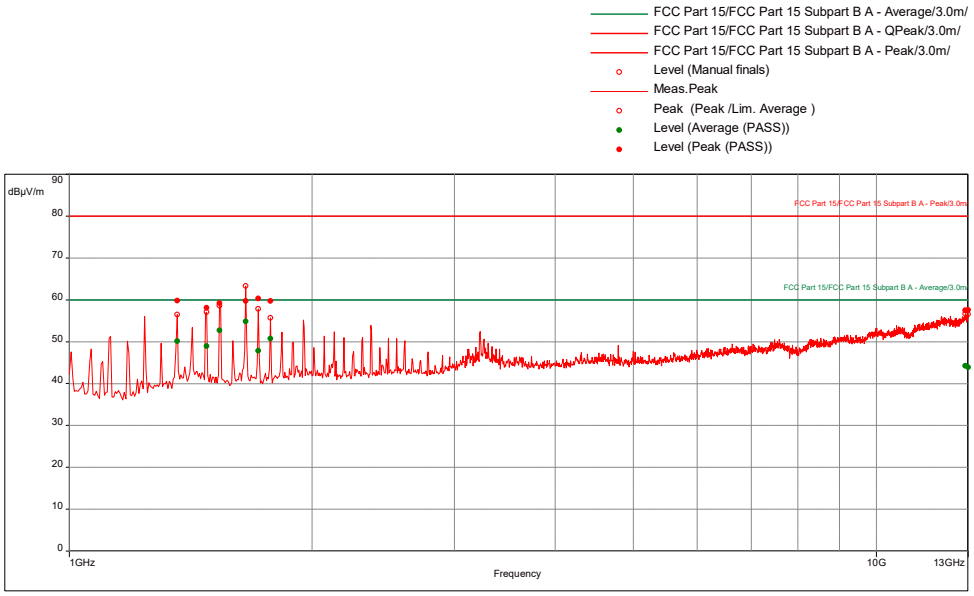
QuasiPeak (Pass) (10)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Antenna Pol.	RBW (kHz)	Correction (dB)
150	38.36	43.50	-5.14	359.00	3.87	Vertical	120	-19.66
268.08	37.25	46.40	-9.15	226.00	2.84	Vertical	120	-18.35
532.27	38.17	46.40	-8.23	336.00	1.00	Horizontal	120	-12.04
591.44	39.72	46.40	-6.68	32.00	1.00	Horizontal	120	-11.69
700	36.54	46.40	-9.86	261.00	1.88	Vertical	120	-9.04
828.02	36.10	46.40	-10.30	239.00	1.00	Vertical	120	-6.75
66.23	21.85	39.00	-17.15	359.00	2.41	Horizontal	120	-24.76
187.51	29.31	43.50	-14.19	0.00	2.54	Vertical	120	-20.53
239.57	28.63	46.40	-17.77	122.00	3.01	Horizontal	120	-20.02
473.17	35.64	46.40	-10.76	306.00	1.00	Horizontal	120	-12.98

Powered from 120VAC 60Hz, 1-40 GHz

Test Information:

Date and Time	6/17/2020 5:50:50 PM
Client and Project Number	L3 Communication
Engineer	Vathana Ven
Temperature	27 deg C
Humidity	31%
Atmospheric Pressure	1013mbar
Comments	RE 1 to 13 GHz_120VAC 60Hz_



Results:

Peak (PASS) (8)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Antenna Pol.	RBW (Hz)	Correction (dB)
1360	59.85	80.00	-20.15	292.00	2.80	Vertical	1000000.00	-20.91
1478.16	58.11	80.00	-21.89	275.00	2.40	Vertical	1000000.00	-21.56
1537.37	59.21	80.00	-20.79	114.00	1.55	Vertical	1000000.00	-21.55
1655.53	59.75	80.00	-20.25	247.00	1.00	Vertical	1000000.00	-21.01
1714.74	60.29	80.00	-19.71	268.00	1.10	Vertical	1000000.00	-20.47
1774.74	59.73	80.00	-20.27	298.00	1.20	Vertical	1000000.00	-19.59
12900.53	57.49	80.00	-22.51	84.00	3.44	Horizontal	1000000.00	4.15
12997.89	57.62	80.00	-22.38	319.00	2.05	Horizontal	1000000.00	4.42

Average (PASS) (8)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Antenna Pol.	RBW (Hz)	Correction (dB)
1360	50.11	60.00	-9.89	292.00	2.80	Vertical	1000000.00	-20.91
1478.16	48.96	60.00	-11.04	275.00	2.40	Vertical	1000000.00	-21.56
1537.37	52.70	60.00	-7.30	114.00	1.55	Vertical	1000000.00	-21.55
1655.53	54.84	60.00	-5.16	247.00	1.00	Vertical	1000000.00	-21.01
1714.74	47.87	60.00	-12.13	268.00	1.10	Vertical	1000000.00	-20.47
1774.74	50.70	60.00	-9.30	298.00	1.20	Vertical	1000000.00	-19.59
12900.53	44.26	60.00	-15.74	84.00	3.44	Horizontal	1000000.00	4.15
12997.89	43.88	60.00	-16.12	319.00	2.05	Horizontal	1000000.00	4.42

Radiated Spurious Emissions

Company: LEIDOS SECURITY DETECTION & AUTOMATION, INC. Antenna & Cables: SHF Bands: N, LF, HF, SHF
Model #: ProVision 3, SafeView HD, PV2 to PV3 upgrade kit Antenna: ETS002 ETS002
Serial #: BOX2006091441-001 (Intertek Assigned) Cable(s): CBLSHF205 CBLHF2012-2M-1
Engineers: Vathana Ven Location: 10M Barometer: DAV007 Filter: NONE
Project #: G104357499 Date(s): 06/10/20
Standard: FCC Part 15 Subpart C 15.209 Temp/Humidity/Pressure: 22 deg C 45% 1009 mB
Receiver: ROS005-1_10-10-20 Limit Distance (m): 3
PreAmp: PRE8 Data 2020.txt Test Distance (m): 1
PreAmp Used? (Y or N): Y Voltage/Frequency: 120VAC 60Hz Frequency Range: 13-40GHz
Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB)
Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth	FCC	IC
No emissions were detected above the measuring equipment noise floor.													

Manual scans were performed from 13-40GHz at < 1m from the EUT, no spurious emissions were detected above the measuring equipment noise floor.

Powered from 120VAC 60Hz, 40-200 GHz

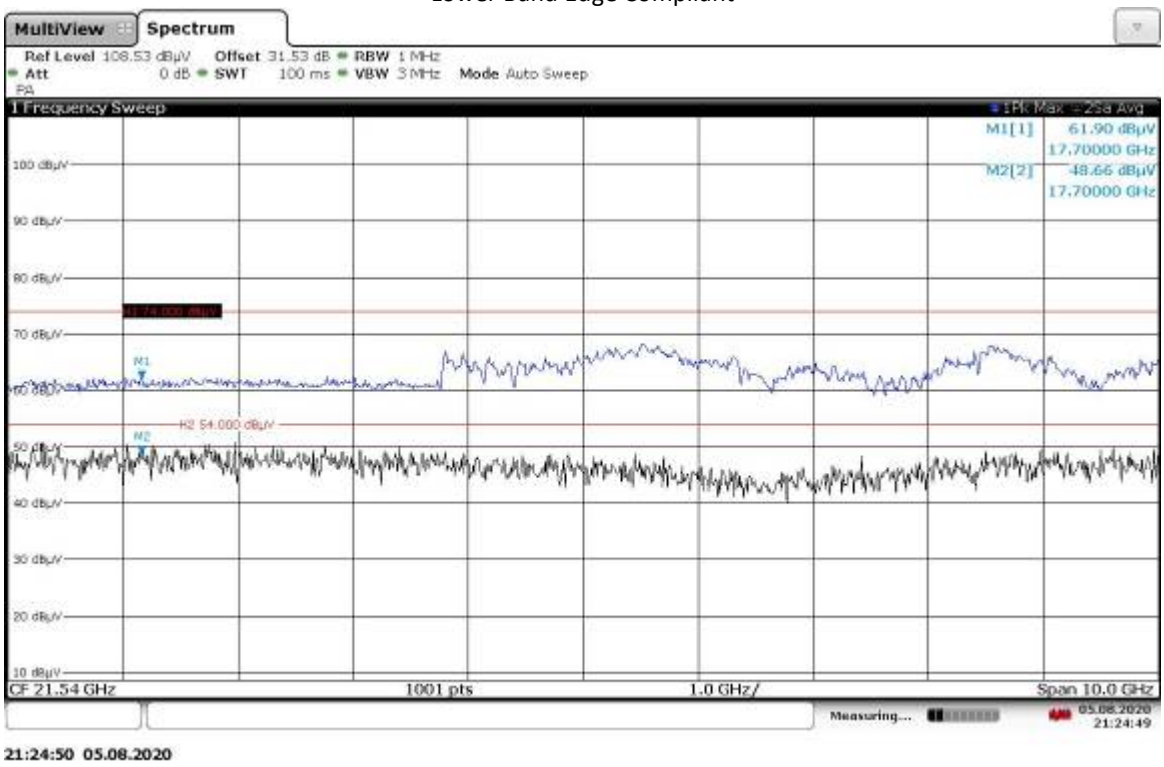
Radiated Emissions

Company: LEIDOS SECURITY DETECTION & AUTOMATION, INC. Antenna & Cables: SHF Bands: N, LF, HF, SHF
Model #: ProVision 3, SafeView HD, PV2 to PV3 upgrade kit Antenna: M19HWD, M12HWD, M08HWD M05HWD
Serial #: BOX2006091441-001(Intertek Assigned) Cable(s): CBLSHF205
Engineers: Vathana Ven Location: 10M Barometer: DAV007 Filter: NONE
Project #: G104357499 Date(s): 08/05/20
Standard: FCC Part 15 Subpart C 15.209 Temp/Humidity/Pressure: 28deg C 40% 1006 mB
Receiver: ROS005-1_10-10-20 Limit Distance (m): 3
PreAmp: PRE8 Data 2020.txt Test Distance (m): 0.1
PreAmp Used? (Y or N): N Voltage/Frequency: 120VAC 60Hz Frequency Range: 40-200GHz
Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB)
Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth	FCC	IC	Harmonic?
Module 1, Tx/Rx pair at Low CH, CW mode for peak and constant chirp for average measurements														
PK	H	41000.000	31.09	38.44	1.64	0.00	11.16	60.01	74.00	-13.99	1/3 MHz			Noise Floor
AVG	H	41000.000	20.30	38.44	1.64	0.00	11.16	49.22	54.00	-4.78	1/3 MHz			Noise Floor
PK	H	61500.000	38.90	41.96	1.64	0.00	29.52	52.98	74.00	-21.02	1/3 MHz			Noise Floor
AVG	H	61500.000	29.20	41.96	1.64	0.00	29.52	43.28	54.00	-10.72	1/3 MHz			Noise Floor
PK	H	82000.000	38.70	41.96	1.64	0.00	29.52	52.78	74.00	-21.22	1/3 MHz			Noise Floor
AVG	H	82000.000	29.00	41.96	1.64	0.00	29.52	43.08	54.00	-10.92	1/3 MHz			Noise Floor
Module 1, Tx/Rx pair at Mid CH, CW mode for peak and constant chirp for average measurements														
PK	H	60000.000	30.60	41.75	1.64	0.00	11.16	62.83	74.00	-11.17	1/3 MHz			Noise Floor
AVG	H	60000.000	21.00	41.75	1.64	0.00	11.16	53.23	54.00	-0.77	1/3 MHz			Noise Floor
PK	H	90000.000	39.19	41.75	1.64	0.00	29.52	53.06	74.00	-20.94	1/3 MHz			Noise Floor
AVG	H	90000.000	28.90	41.75	1.64	0.00	29.52	42.77	54.00	-11.23	1/3 MHz			Noise Floor
Module 1, Tx/Rx pair at High CH, CW mode for peak and constant chirp for average measurements														
PK	H	80000.000	39.52	44.25	1.64	0.00	29.52	55.89	74.00	-18.11	1/3 MHz			Noise Floor
AVG	H	80000.000	29.20	44.25	1.64	0.00	29.54	45.55	54.00	-8.45	1/3 MHz			Noise Floor
Module 5, Tx/Rx pair at Low CH, CW mode for peak and constant chirp for average measurements														
PK	H	41000.000	31.09	38.44	1.64	0.00	11.16	60.01	74.00	-13.99	1/3 MHz			Noise Floor
AVG	H	41000.000	20.30	38.44	1.64	0.00	11.16	49.22	54.00	-4.78	1/3 MHz			Noise Floor
PK	H	61500.000	38.90	41.96	1.64	0.00	29.52	52.98	74.00	-21.02	1/3 MHz			Noise Floor
AVG	H	61500.000	29.20	41.96	1.64	0.00	29.52	43.28	54.00	-10.72	1/3 MHz			Noise Floor
PK	H	82000.000	38.70	41.96	1.64	0.00	29.52	52.78	74.00	-21.22	1/3 MHz			Noise Floor
AVG	H	82000.000	29.00	41.96	1.64	0.00	29.52	43.08	54.00	-10.92	1/3 MHz			Noise Floor
Module 5, Tx/Rx pair at Mid CH, CW mode for peak and constant chirp for average measurements														
PK	H	60000.000	30.60	41.75	1.64	0.00	11.16	62.83	74.00	-11.17	1/3 MHz			Noise Floor
AVG	H	60000.000	21.00	41.75	1.64	0.00	11.16	53.23	54.00	-0.77	1/3 MHz			Noise Floor
PK	H	90000.000	39.19	41.75	1.64	0.00	29.52	53.06	74.00	-20.94	1/3 MHz			Noise Floor
AVG	H	90000.000	28.90	41.75	1.64	0.00	29.52	42.77	54.00	-11.23	1/3 MHz			Noise Floor
Module 5, Tx/Rx pair at High CH, CW mode for peak and constant chirp for average measurements														
PK	H	80000.000	39.52	44.25	1.64	0.00	29.52	55.89	74.00	-18.11	1/3 MHz			Noise Floor
AVG	H	80000.000	29.20	44.25	1.64	0.00	29.54	45.55	54.00	-8.45	1/3 MHz			Noise Floor
Module 9, Tx/Rx pair at Low CH, CW mode for peak and constant chirp for average measurements														
PK	H	41000.000	31.09	38.44	1.64	0.00	11.16	60.01	74.00	-13.99	1/3 MHz			Noise Floor
AVG	H	41000.000	20.30	38.44	1.64	0.00	11.16	49.22	54.00	-4.78	1/3 MHz			Noise Floor
PK	H	61500.000	38.90	41.96	1.64	0.00	29.52	52.98	74.00	-21.02	1/3 MHz			Noise Floor
AVG	H	61500.000	29.20	41.96	1.64	0.00	29.52	43.28	54.00	-10.72	1/3 MHz			Noise Floor
PK	H	82000.000	38.70	41.96	1.64	0.00	29.52	52.78	74.00	-21.22	1/3 MHz			Noise Floor
AVG	H	82000.000	29.00	41.96	1.64	0.00	29.52	43.08	54.00	-10.92	1/3 MHz			Noise Floor
Module 9, Tx/Rx pair at Mid CH, CW mode for peak and constant chirp for average measurements														
PK	H	60000.000	30.60	41.75	1.64	0.00	11.16	62.83	74.00	-11.17	1/3 MHz			Noise Floor
AVG	H	60000.000	21.00	41.75	1.64	0.00	11.16	53.23	54.00	-0.77	1/3 MHz			Noise Floor
PK	H	90000.000	39.19	41.75	1.64	0.00	29.52	53.06	74.00	-20.94	1/3 MHz			Noise Floor
AVG	H	90000.000	28.90	41.75	1.64	0.00	29.52	42.77	54.00	-11.23	1/3 MHz			Noise Floor
Module 9, Tx/Rx pair at High CH, CW mode for peak and constant chirp for average measurements														
PK	H	80000.000	39.52	44.25	1.64	0.00	29.52	55.89	74.00	-18.11	1/3 MHz			Noise Floor
AVG	H	80000.000	29.20	44.25	1.64	0.00	29.54	45.55	54.00	-8.45	1/3 MHz			Noise Floor

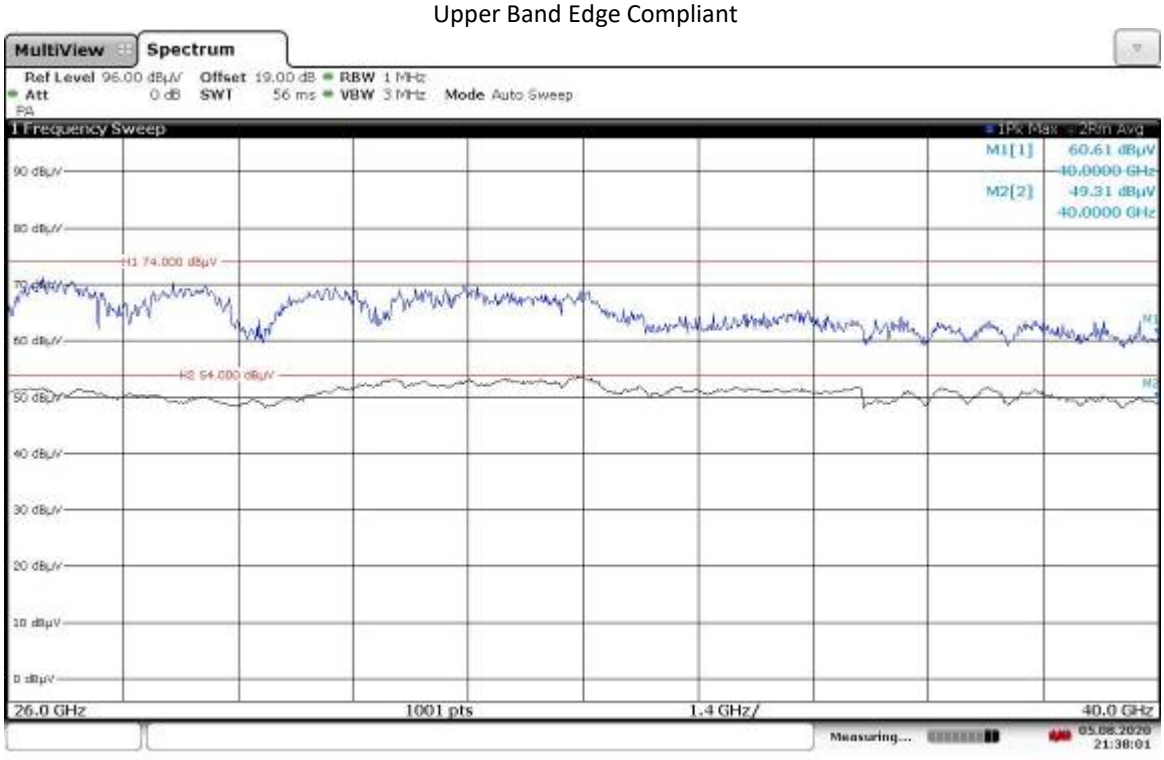
Note: Exporatory seach for emissions were performed at <10cm distance to the EUT, no emissions were detected. Noise floor measurements of the some harmonics were taken and presented above.

Lower Band Edge Compliant



21:24:50 05.08.2020

Upper Band Edge Compliant



21:38:01 05.08.2020

Note: Antenna, cable, and pre-amp factors were compensated in the receiver.

Test Personnel:	Vathana Ven VSV Kouma Sin KPS	Test Date:	06/10/2020 06/17/2020 08/05/2020
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	FCC 15.209	Limit Applied:	Section 7.3
Input Voltage:	120VAC 60Hz		
Pretest Verification w/ Ambient Signals or BB Source:	**Yes**	Ambient Temperature:	23, 19, 28 ºC
		Relative Humidity:	50, 34, 40 %
		Atmospheric Pressure:	1005, 1002, 1006 mbars

Deviations, Additions, or Exclusions: None

8 AC Mains Conducted Emissions

8.1 Method

Tests are performed in accordance with ANSI C63.10 and ANSI C63.4.

TEST SITE: EMC Lab

The EMC Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
AC Line Conducted Emissions	150 kHz - 30 MHz	1.2 dB	3.4 dB
Telco Port Emissions	150 kHz - 30 MHz	2.8 dB	5.0 dB

As shown in the table above our conducted emissions U_{lab} is less than the corresponding U_{CISPR} reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.

Sample Calculations

The following is how net line-conducted readings were determined:

NF = RF + LF + CF + AF
Where NF = Net Reading in dBμV
RF = Reading from receiver in dBμV
LF = LISN or ISN Correction Factor in dB
CF = Cable Correction Factor in dB

AF = Attenuator Loss Factor in dB

To convert from dBμV to μV or mV the following was used:

$UF = 10^{(NF / 20)}$ where UF = Net Reading in μV
NF = Net Reading in dBμV

Example:
NF = RF + LF + CF + AF = 28.5 + 0.2 + 0.4 + 20.0 = 49.1 dBμV
$UF = 10^{(49.1\ dB\mu V / 20)}$ = 285.1 μV/m

Alternately, when BAT-EMC Emission Software is used, the "Level" includes all losses and gains and is compared directly in the "Margin" column to the "Limit". The "Correction" includes Antenna Factor, Preamp, and Cable Loss. These are already accounted for in the "Level" column.

8.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
NAR006'	EMI CISPR Receiver	NARDA	PMM 9010	696WW30303	02/27/2019	02/27/2020
CBL2012-4'	Cable, 15 ft	Pomona	RG58	CBL044	05/11/2019	05/11/2020
DS23'	Attenuator, 20dB	Mini Circuits	20dB, 50 Ω	DS23	10/25/2019	10/25/2020
LISN30'	LISN - CISPR16 Compliant 9kHz-30MHz	Com-Power	LI-215A	191961	11/13/2019	11/13/2020
DAV005'	Weather Station	Davis	6250	MS191218083	02/05/2020	02/05/2021

Software Utilized:

Name	Manufacturer	Version
BAT-EMC	Nexio	3.17.0.3

8.3 Results:

The sample tested was found to Comply.

8.4 Setup Photographs:

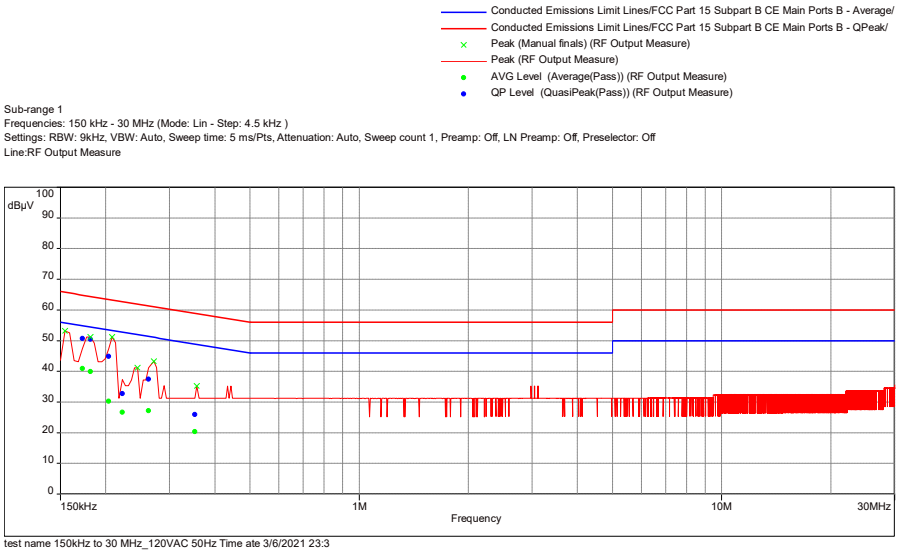
Photos are available in a separate exhibit

8.5 Plots/Data:

EUT Powered From 120VAC 60Hz, 15.207(a)

Test Information:

Date and Time	6/24/2020 5:19:15 PM
Client and Project Number	L3_G104357499
Engineer	Vathana Ven
Temperature	22 deg
Humidity	39%
Atmospheric Pressure	995 mB
Comments	150kHz to 30 MHz_120VAC 60Hz



Results:

QuasiPeak(Pass) (6)

Frequency (MHz)	SR	QP Level (dBµV)	QP Limit (dBuV)	QP Margin (dB)	Position	RBW (Hz)	Correction (dB)
0.1725	1	50.70	79.00	-28.30	Phase 1	9000.00	20.17
0.17943	1	50.46	79.00	-28.54	Phase 1	9000.00	20.17
0.2045	1	44.92	79.00	-34.08	Phase 1	9000.00	20.16
0.2215	1	32.72	79.00	-46.28	Neutral	9000.00	20.29
0.2615	1	37.42	79.00	-41.58	Neutral	9000.00	20.28
0.351	1	25.96	79.00	-53.04	Phase 1	9000.00	20.16

Average(Pass) (6)

Frequency (MHz)	SR	AVG Level (dBµV)	AVG Limit (dBuV)	AVG Margin (dB)	Position	RBW (Hz)	Correction (dB)
0.1725	1	40.91	66.00	-25.09	Phase 1	9000.00	20.17
0.17943	1	39.96	66.00	-26.04	Phase 1	9000.00	20.17
0.2045	1	30.29	66.00	-35.71	Phase 1	9000.00	20.16
0.2215	1	26.70	66.00	-39.30	Neutral	9000.00	20.29
0.2615	1	27.13	66.00	-38.87	Neutral	9000.00	20.28
0.351	1	20.30	66.00	-45.70	Phase 1	9000.00	20.16

Test Personnel:	Vathana Ven VJV	Test Date:	06/24/2020
Supervising/Reviewing Engineer: (Where Applicable)			
Product Standard:	FCC 15.207(a)	Limit Applied:	Class B
Input Voltage:	120VAC 60Hz		
Pretest Verification w/ Ambient Signals or BB Source:	BB Source	Ambient Temperature:	22 ºC
		Relative Humidity:	53 %
		Atmospheric Pressure:	1017 mbars

Deviations, Additions, or Exclusions: None

9 Appendix A - FCC Waver ET Docket No. 16-45

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
L-3 Communications Security and Detection Systems, Inc.	)	
	)	
	)	ET Docket No. 16-45
Request for Waiver of Sections 15.31(c), 15.35(b) and 15.205(a) of the Commission's Rules to Permit the Deployment of Security Screening Portal Devices that Operate in the 20-40 GHz Range	)	

ORDER

Adopted: November 22, 2016 **Released: November 22, 2016**

By the Chief, Office of Engineering and Technology:

I. INTRODUCTION

1. By this Order, we grant the request for waiver filed by L-3 Communications Security and Detection Systems, Inc. (L-3) on January 28, 2016 so it can obtain FCC certification to market a new generation of its ProVision screening device that is used at locations such as airports to identify metallic and non-metallic weapons or contraband on a person. L-3 seeks the same rule waivers, under the same conditions, that the Office of Engineering and Technology (OET) granted in 2006 for the first generation ProVision device, with one exception. The new scanning device would have a wider operating bandwidth, increasing the swept frequency signal range from 24.25-30 GHz to 20-40 GHz. For the reasons discussed below, we find that there is good cause to grant L-3's request for waiver.

II. BACKGROUND

2. The ProVision is a security portal that uses imaging technology to detect weapons or contraband carried on a person, including non-metallic objects or explosives, which might otherwise require intrusive manual searches or be missed entirely by existing metal detectors. A person is scanned by stepping briefly into a transparent, upright cylinder seven feet high by four feet in diameter. Two vertical antenna masts rotate around the person over a two-second interval. Each antenna element in turn sweeps from 24.25-30 GHz, operating for approximately six microseconds per sweep. The device measures reflections of the radio signals from the subject and produces an image that shows hidden objects, if any exist.

3. On August 3, 2006, OET adopted an Order that waived the provisions of Section 15.31(c) and Section 15.35(b) of the Commission's rules to permit the marketing and unlicensed operation of the SafeScout (now the ProVision 100) device.[1] Specifically, OET granted SafeView (now L-3) a waiver of

[1] *SafeView, Inc. Request for Waiver of Section 15.31 and 15.35 of the Commission's Rules to Permit the Deployment of Security Screening Portal Devices that Operate in the 24.25-30 GHz Range,* Order, 21 FCC Rcd 8814 (OET 2006) (*2006 Waiver Order*), *aff'd*, Memorandum Opinion and Order, FCC 10-13, 25 FCC Rcd 592 (2010) .

9 Appendix A – FCC Waiver ET Docket No. 16-45 *(Continued)*

the rules to permit the measurement of the device's average radiated emissions with the frequency sweep active, rather than stopped as Section 15.31(c) of the rules requires. In addition, OET waived the requirement of Section 15.35(b) which specifies a limit on peak emissions from unlicensed devices of 20 dB above the corresponding maximum average emission limit specified in Section 15.209.[2] It placed specific operational and marketing conditions on the ProVision 100 device to ensure that licensed users operating in the 24.25-30.00 GHz and adjacent frequency bands are not subject to harmful interference.[3]

4. On January 28, 2016, L-3 filed a request for waiver of three Commission rules so it can obtain FCC certification to market a new generation of its ProVision screening device ("Next Gen ProVision device").[4] It seeks the same rule waivers, under the same conditions, that OET granted for the first generation ProVision device, with one exception. Specifically, the new scanning device would have a wider operating bandwidth, increasing the swept frequency signal range from 24.25-30 GHz to 20-40 GHz. L-3 requests that OET once again waive Section 15.31(c) of the rules as it did in 2006 to allow radiated measurements to be performed with the device's frequency sweep active, and that it waive Section 15.35(b) to allow the peak level of radiated emissions to exceed the average emission limit by 41 dB.[5] L-3 also requests a waiver of Section 15.205(a) to allow transmissions in five "restricted bands" where only spurious emissions are permitted: 22.01-23.12 GHz, 23.6-24 GHz, 31.2-31.8 GHz, 36.43-36.5 GHz, and 38.6-40 GHz.[6]

5. L-3 argues that a waiver of the rules is necessary to allow marketing of an improved version of the ProVision device that is better able to detect threats.[7] It states that increasing the bandwidth over which the device sweeps from 5.75 GHz to 20 GHz will increase its resolution and improve its depth resolution by a factor of more than three.[8] L-3 argues that the frequency band of 20-40 GHz is ideal for this device's operation, because frequencies above the 20-40 GHz band produce a stronger clothing signature that distorts the data, while lower frequency bands with longer wavelengths will have poorer resolution.[9] Because operation in the 20-40 GHz band would result in transmissions within five restricted bands, a waiver of Section 15.205(a) would be necessary to allow this operation.[10]

[2] 47 C.F.R. § 15.209.

[3] OET initially placed a time limit on the waiver and limited the number of units that could be installed, but subsequently removed these restrictions. *See SafeView, Inc. Request for Waiver of Section 15.31 and 15.35 of the Commission's Rules to Permit the Deployment of Security Screening Portal Devices that Operate in the 24.25-30 GHz Range*, Letter Order, 26 FCC Rcd 10250 (OET 2011).

[4] Request by L-3 Communications Security and Detection Systems, Inc. for Waiver of Sections 15.31, 15.35, and 15.205 of the Commission's Rules (filed Jan. 28, 2016) (L-3 Waiver Request).

[5] 47 C.F.R. § 15.31(c) and 47 C.F.R. § 15.35(b). Section 15.31(c) requires that when average radiated emissions limits are specified for a device, the peak radiated emission level may not exceed the average emission limit by more than 20 dB. Section 15.35(b) requires that swept frequency devices be tested with the frequency sweep stopped at the frequencies chosen for measurement.

[6] 47 C.F.R. § 15.205(a). Spurious emissions are emissions on a frequency or frequencies which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. 47 C.F.R. § 2.1.

[7] L-3 Waiver Request at 6.

[8] *Id.* at 6-7.

[9] *Id.* at 4.

[10] *Id.* at 9-10.

9 Appendix A – FCC Waiver ET Docket No. 16-45 *(Continued)*

6. L-3 argues that waivers of Sections 15.31(c) and 15.35(b) continue to be necessary because measuring emissions with the frequency sweep stopped overstates the interference potential of the device.[11] L-3 further argues that the maximum power of the device cannot be reduced without impairing its functionality, so a waiver of the peak power limit is necessary.[12]

7. On February 19, 2016, OET issued a public notice seeking comment on L-3's request for a waiver.[13] No parties filed comments in response to this notice.

III. DISCUSSION

8. We are authorized to grant a waiver under Section 1.3 of the Commission's rules if the petitioner demonstrates good cause for such action.[14] Good cause, in turn, may be found and a waiver granted "where particular facts would make strict compliance inconsistent with the public interest."[15] To make this public interest determination, the waiver cannot undermine the purposes of the rule, and there must be a stronger public interest benefit in granting the waiver than in applying the rule.[16]

9. We find that the requested waiver of 47 C.F.R. §§ 15.31(c), 15.35(b) and 15.205(a) is consistent with these principles. The Next Gen ProVision device will serve the public interest because its enhanced resolution and scanning depth will help improve security procedures at entry checkpoints by facilitating the identification of concealed dangerous objects, thereby promoting national security objectives. We also conclude that, with appropriate operational and technical restrictions to prevent harmful interference to authorized services, granting L-3's request for waiver does not undermine the policy underlying our rules, *i.e.,* to prevent harmful interference to authorized services. Weighing the strong public interest benefits associated with promoting improved security against the limited utility of the application of the rule to this case, we find the criteria has been met for granting a waiver of our rules to L-3 for its Next Gen ProVision device.

10. Based on the information submitted with the waiver request, and the lack of any reported interference from the current generation of ProVision equipment, we conclude that the Next Gen ProVision device poses very little potential for causing harmful interference to authorized operations. We find that the L-3 device when operated in fixed indoor locations would pose very little, if any, potential for harmful interference to licensed operations that are located either outdoors or indoors. Many of the

[11] *Id.* at 8.

[12] *Id.* at 9.

[13] *Office of Engineering and Technology Declares L-3 Communications Security and Detection Systems, Inc. Request for Waiver of Part 15 Measurement and Restricted Band Rules to be a "Permit-but-Disclose" Proceeding for Ex Parte Purposes and Requests Comment*, Public Notice, 31 FCC Rcd 1167 (2016).

[14] 47 C.F.R. § 1.3. *See also ICO Global Communications (Holdings) Limited v. FCC*, 428 F.3d 264 (D.C. Cir. 2005); *Northeast Cellular Telephone Co. v. FCC*, 897 F.2d 1164 (D.C. Cir. 1990); *WAIT Radio v. FCC*, 418 F.2d 1153 (D.C. Cir. 1969).

[15] *Northeast Cellular*, 897 F.2d at 1166; *see also ICO Global Communications*, 428 F.3d at 269 (quoting *Northeast Cellular*); *WAIT Radio*, 418 F.2d at 1157-59.

[16] *See, e.g., WAIT Radio*, 418 F.2d at 1157 (stating that even though the overall objectives of a general rule have been adjudged to be in the public interest, it is possible that application of the rule to a specific case may not serve the public interest if an applicant's proposal does not undermine the public interest policy served by the rule); *Northeast Cellular*, 897 F.2d at 1166 (stating that in granting a waiver, an agency must explain why deviation from the general rule better serves the public interest than would strict adherence to the rule).

9 Appendix A – FCC Waiver ET Docket No. 16-45 *(Continued)*

factors that supported our prior waiver for L-3's first-generation device continue to be relevant and favor L-3's present application. At frequencies in the ProVision's operating range, free space loss is significant. We concur with L-3 that this factor, added to building attenuation, can prevent harmful interference to licensed devices operating outdoors.[17] Also, the L-3 device's very low duty cycle signals and fast sweep speeds would further mitigate any potential interference to licensed receivers that operate at much longer transmission time periods in the affected frequency bands. Moreover, the Next Gen ProVision device would have a faster sweep than the current device. This characteristic will reduce the time that a signal occupies any given frequency band, and will further reduce the likelihood of harmful interference.[18]

11. The wider sweep range of the Next Gen ProVision device will cause it to transmit in additional frequency bands where the current device does not. The services potentially impacted by the increased sweep range include the Amateur Radio Service at 24 GHz[19], as well as those in five restricted bands: 22.01-23.12 GHz, 23.6-24 GHz, 31.2-31.8 GHz, 36.43-36.5 GHz, and 38.6-40 GHz.[20] The first four bands are restricted to protect radio astronomy and satellite services, while the fifth is part of a blanket restriction on operations at frequencies above 38.6 GHz.[21] We find that the factors described above (high path loss, building attenuation, low duty cycle and sweep speeds that are faster than those of the existing ProVision device) will make interference to services in those bands, as well as other services in the 20-40 GHz band, highly unlikely. However, we will take additional measures to protect radio astronomy operations in the 20-40 GHz band.

12. With regard to radio astronomy, L-3 states that it will agree as a condition of the waiver to coordinate installations for any location closer than 50 kilometers to a radio astronomy facility that observes in the 20-40 GHz frequency range, and to coordinate any installation which is line-of-sight to the observatory at Kitt Peak.[22] L-3 argues that the limited number of radio astronomy sites observing at these frequencies, the non-consumer nature of the L-3 device, and L-3's commitment to maintain a list of locations where the devices are installed make distance separation a reliable means of preventing harmful interference.[23] We agree, and will therefore condition the waiver accordingly.

13. Consistent with L-3's request, we will impose the same operational and marketing conditions on operation of the Next Gen ProVision device as we imposed on the ProVision 100 device in the *2006*

[17] L-3 Waiver Request at 13-14.

[18] *Id.* at 14.

[19] The band 24.0-24.05 GHz is allocated on a primary basis for the Amateur Radio Service, and the Amateur Radio Service may use the 24.05-25 GHz on a secondary basis to Federal radiolocation operations. As previously noted, L-3's first generation device has successfully operated in the 24.25-30 GHz band without reports of harmful interference.

[20] 47 CFR § 15.205(a).

[21] The increased sweep range of the NexGen ProVision device will encompass frequency bands (37-38.6 GHz and 38.6-40 GHz) for which the Commission recently adopted new and modified wireless service rules. *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services*, Report and Order and Further Notice of Proposed Rulemaking, 81 FCC Rcd 58269 (2016). Under the general conditions of operation for unlicensed devices, in the event the NextGen ProVision causes harmful interference to authorized services in these bands, it must cease operation until the harmful interference has been corrected. 47 CFR § 15.5.

[22] L-3 Waiver Request at 10-11.

[23] *Id.* at 10.

9 Appendix A – FCC Waiver ET Docket No. 16-45 *(Continued)*

Waiver Order, except that we are specifying that operation will be permitted over the wider frequency range of 20-40 GHz.[24] These conditions will significantly limit the potential for harmful interference from the Next Gen ProVision imaging device, while allowing deployments in airports, prisons and other similar locations, and providing transportation, law enforcement and security entities with a reliable and innovative means of protecting the American public. Specifically, we will require L-3 to install its equipment indoors only, thereby ensuring that building attenuation and free space loss will prevent any measurable power from the L-3 device reaching licensed receivers in the vicinity. We are also limiting the allowable radiated peak power levels to no more than 41 dB above the average emissions limit in Section 15.209(a).[25]

14. We will require compliance with certain notification and recordkeeping requirements as we did previously. Specifically, we will require L-3 to create and maintain a record of installations of all devices operating under this waiver, including the identity of the customer, the type of installation, and street address and/or geographical coordinates. The information will assist L-3, the Commission and NTIA in determining whether an L-3 device is operating within close proximity to an authorized operation should harmful interference occur, thus facilitating investigation of an interference complaint. We are also requiring L-3 to inform purchasers that Next Gen ProVision imaging devices may not be resold to third parties for use at another installation in the United States unless appropriate arrangements are made to meet all of the conditions of this waiver. This condition will ensure that equipment will continue to be listed in the L-3 database even if it is resold. Finally, we will require L-3 to obligate parties who purchase this device to operate them consistent with the terms of this Order.[26]

15. Accordingly, pursuant to the delegated authority in Sections 0.31 and 0.241 of the Commission's rules, we waive the requirements of Sections 15.31(c), 15.35(b) and Section 15.205(a) of our rules to permit the certification and marketing of the Next Gen ProVision device. This waiver is subject to the following conditions:

1) The Next Gen ProVision imaging device shall be certified by the Commission and must comply with the technical specifications applicable to operation under Part 15 of 47 C.F.R.[27] However, for this particular swept frequency device, compliance with the average power level need not be demonstrated under the requirement of 47 C.F.R. § 15.31(c) and the requirement of §15.35(b) is relaxed to allow a total radiated peak power level up to 41 dB above the maximum permitted average power in Section 15.209(a) when measured as specified herein.

2) The intentional emissions generated by the Next Gen ProVision imaging device must be completely contained within the 20 to 40 GHz frequency range.

3) All installations of the Next Gen ProVision imaging devices operated under this waiver shall be restricted to indoor use.

[24] *2006 Waiver Order*, 21 FCC Rcd at 8823, para. 29.

[25] For frequencies above 960 MHz, the limit in this section is 500 microvolts per meter, measured at a distance of three meters.

[26] The provisions of 47 CFR §2.939(a) allow the Commission to revoke the certification grant if L-3 or any operator of these devices fails to comply with the obligations placed on them in accordance with the equipment authorization program.

[27] L-3 shall include a copy of this waiver order with its application for certification of the Next Gen ProVision imaging device.

9 Appendix A – FCC Waiver ET Docket No. 16-45 *(Continued)*

4) L-3 shall create and maintain a record of installations of all devices operating under this waiver, including the identity of the customer, type of location (*e.g.*, airport or government building), and street address and/or coordinates. This list shall be made available to the Commission and to NTIA upon request.

5) L-3 shall inform purchasers that Next Gen ProVision imaging devices may not be resold to third parties for use at another installation in the United States unless appropriate arrangements are made to meet all of the conditions of this waiver.

6) This waiver shall apply to the Next Gen ProVision imaging device produced by L-3 as described herein and provided no major changes are made to the transmitter circuitry or to the housing and position of the antenna masts that would increase the devices radiated power or bandwidth.

7) L-3 shall follow the same measurement procedures for determining the average radiated power and the peak radiated power as specified in the initial waiver grant.[28] These measurement procedures are specific to the Next Gen ProVision imaging device and are not generally applicable to all swept-frequency transmitting systems.

8) L-3 shall coordinate operation of its Next Gen Provision imaging system with any radio astronomy facilities within 50 kilometers that receive signals in the 20-40 GHz band, and shall coordinate any installation which is within line of sight of the observatory at Kitt Peak.

IV. ORDERING CLAUSE

16. Accordingly, pursuant to authority delegated in sections 0.31 and 0.241 of the Commission's rules, 47 C.F.R. sections 0.31, 0.241, and section 1.3 of the Commission's rules, 47 C.F.R. section 1.3, IT IS ORDERED that the Request for Waiver filed by L-3 Communications Security and Detection Systems, Inc. on January 28, 2016 IS GRANTED consistent with the terms of this Order. This action is taken pursuant to Sections 4(i), 302, 303(e), and 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154(i), 302, 303(e), and 303(r). This action is effective upon release of this Order.

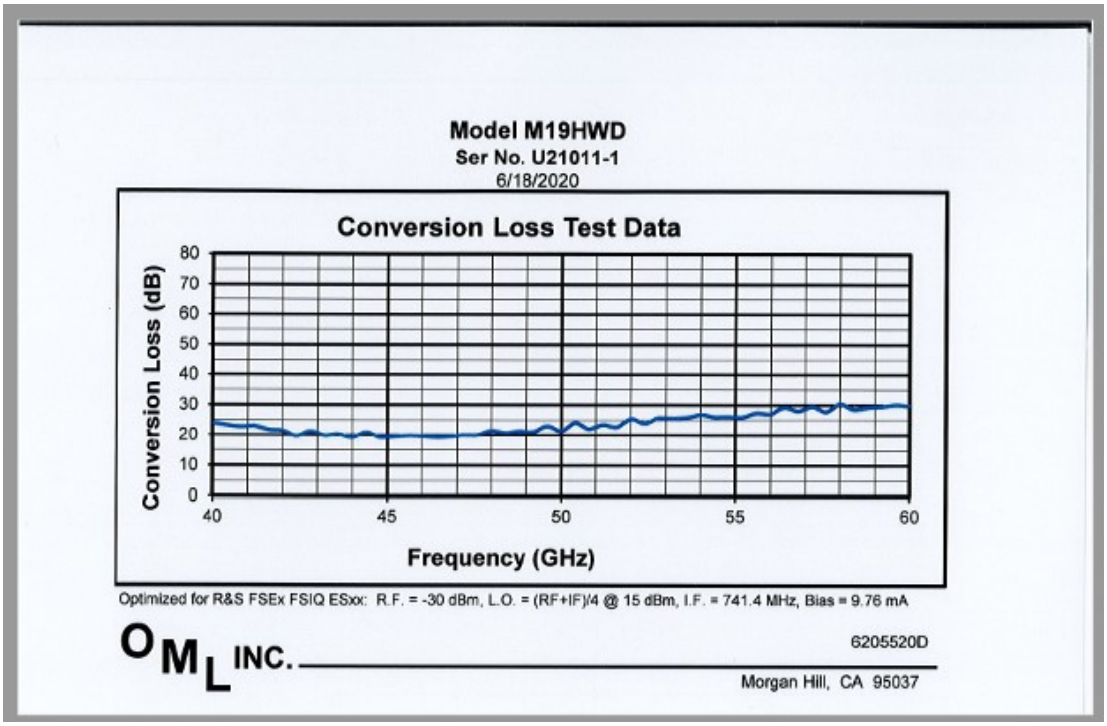
17. IT IS FURTHER ORDERED that, if no applications for review are timely filed, this proceeding SHALL BE TERMINATED and the docket CLOSED.

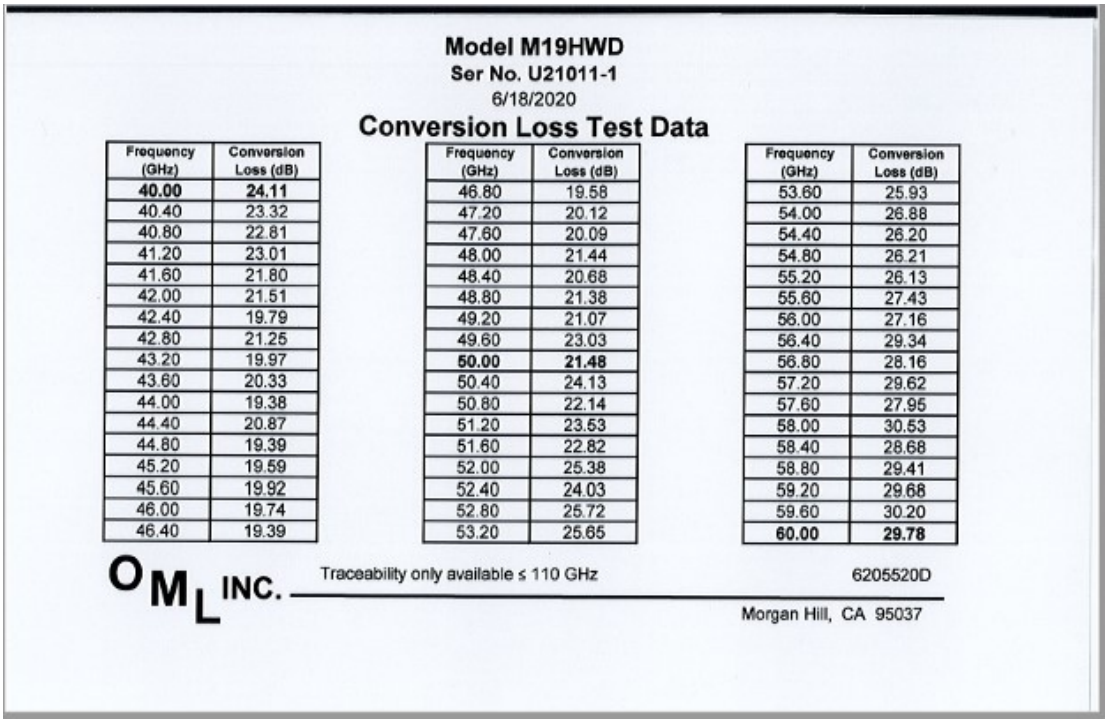
FEDERAL COMMUNICATIONS COMMISSION

Julius P. Knapp
Chief, Office of Engineering and Technology

[28] *2006 Waiver Order*, 21 FCC Rcd at 8823, para. 29.

10 Appendix B - Mixer/Horn Calibration Certificates





Model M19HWD
Ser No. U21011-1
6/18/2020

Conversion Loss Test Data

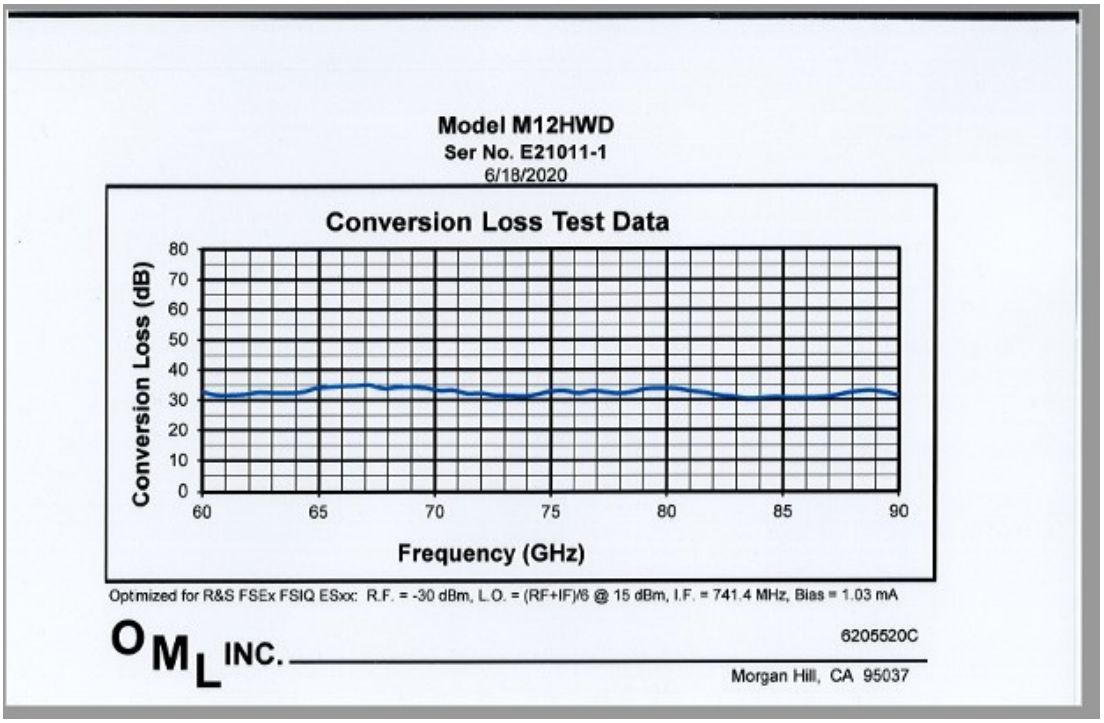
Frequency (GHz)	Conversion Loss (dB)
40.00	**24.11**
40.40	23.32
40.80	22.81
41.20	23.01
41.60	21.80
42.00	21.51
42.40	19.79
42.80	21.25
43.20	19.97
43.60	20.33
44.00	19.38
44.40	20.87
44.80	19.39
45.20	19.59
45.60	19.92
46.00	19.74
46.40	19.39

Frequency (GHz)	Conversion Loss (dB)
46.80	19.58
47.20	20.12
47.60	20.09
48.00	21.44
48.40	20.68
48.80	21.38
49.20	21.07
49.60	23.03
50.00	**21.48**
50.40	24.13
50.80	22.14
51.20	23.53
51.60	22.82
52.00	25.38
52.40	24.03
52.80	25.72
53.20	25.65

Frequency (GHz)	Conversion Loss (dB)
53.60	25.93
54.00	26.88
54.40	26.20
54.80	26.21
55.20	26.13
55.60	27.43
56.00	27.16
56.40	29.34
56.80	28.16
57.20	29.62
57.60	27.95
58.00	30.53
58.40	28.68
58.80	29.41
59.20	29.68
59.60	30.20
60.00	**29.78**

OML INC. Traceability only available ≤ 110 GHz 6205520D
Morgan Hill, CA 95037

10 Appendix B – Mixer/orn Calibration Certificates *(Continued)*



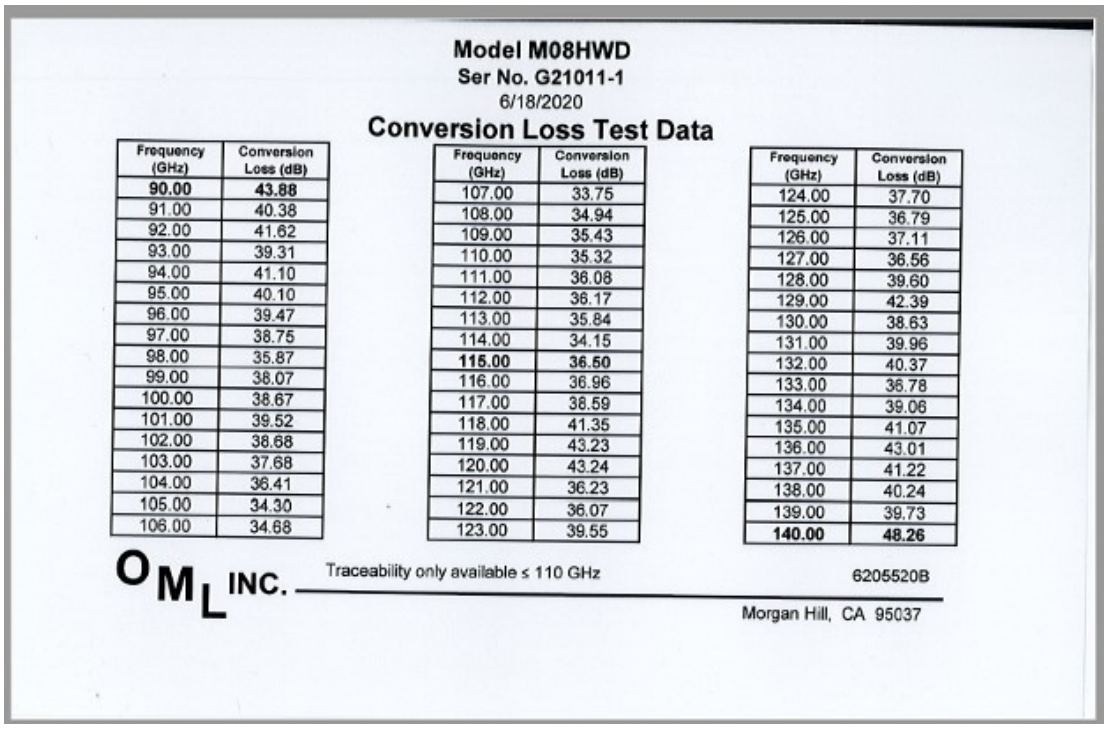
Model M12HWD
Ser No. E21011-1
6/18/2020

Conversion Loss Test Data

Frequency (GHz)	Conversion Loss (dB)
60.00	**32.71**
60.60	31.82
61.20	31.77
61.80	31.97
62.40	32.59
63.00	32.48
63.60	32.41
64.20	32.61
64.80	33.82
65.40	34.42
66.00	34.73
66.60	34.86
67.20	35.03
67.80	33.85
68.40	34.31
69.00	34.43
69.60	33.96
70.20	33.21
70.80	33.27
71.40	32.19
72.00	32.25
72.60	31.64
73.20	31.57
73.80	31.31
74.40	31.87
75.00	**32.94**
75.60	33.17
76.20	32.34
76.80	33.15
77.40	32.70
78.00	32.23
78.60	32.97
79.20	33.76
79.80	33.83
80.40	33.77
81.00	33.09
81.60	32.55
82.20	31.66
82.80	31.25
83.40	30.57
84.00	30.64
84.60	31.02
85.20	30.87
85.80	30.76
86.40	30.88
87.00	31.20
87.60	32.04
88.20	32.89
88.80	33.14
89.40	32.49
90.00	**31.49**

OML INC. Traceability only available ≤ 110 GHz 6205520C
Morgan Hill, CA 95037

10 Appendix B – Mixer/orn Calibration Certificates *(Continued)*

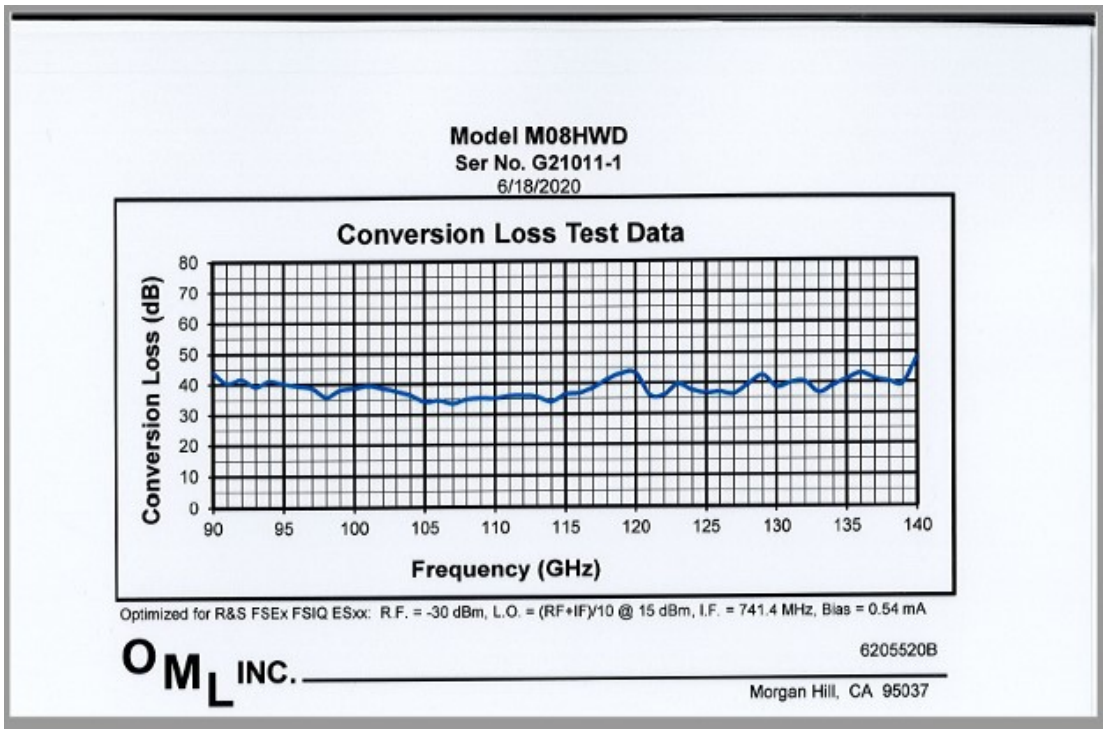


Model M08HWD
Ser No. G21011-1
6/18/2020

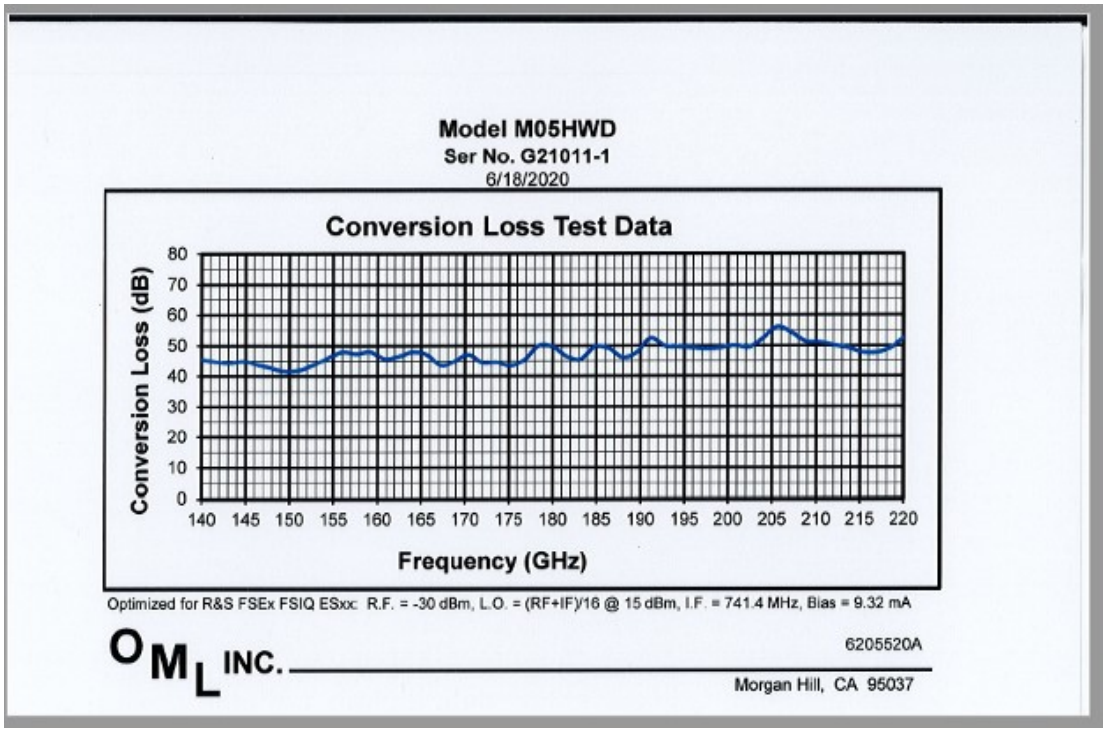
Conversion Loss Test Data

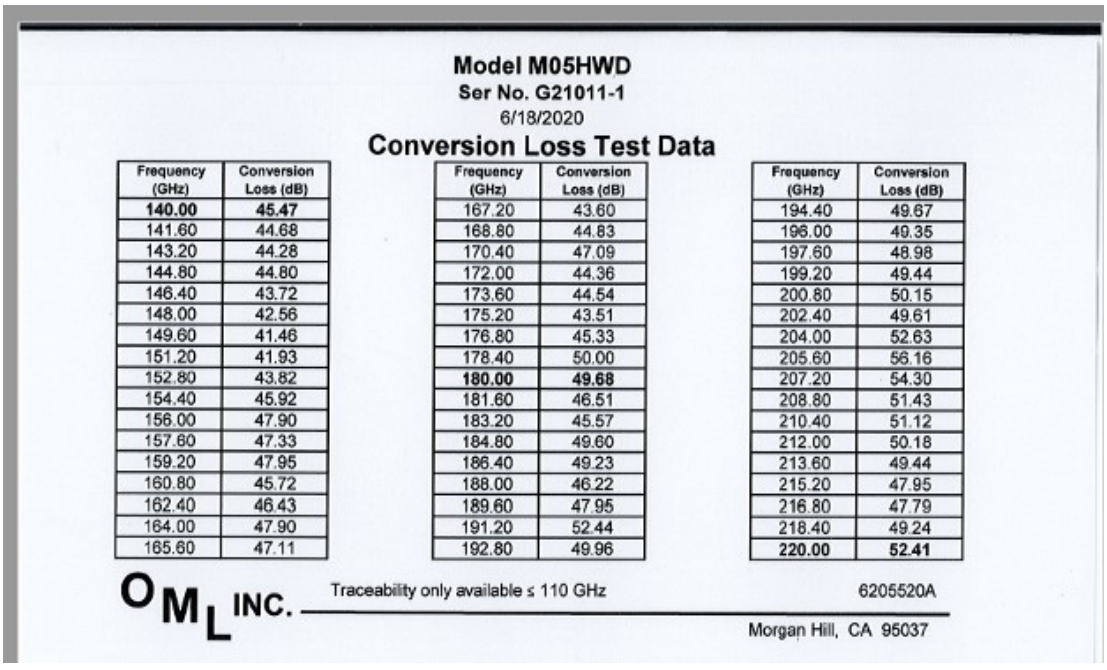
Frequency (GHz)	Conversion Loss (dB)
90.00	**43.88**
91.00	40.38
92.00	41.62
93.00	39.31
94.00	41.10
95.00	40.10
96.00	39.47
97.00	38.75
98.00	35.87
99.00	38.07
100.00	38.67
101.00	39.52
102.00	38.68
103.00	37.68
104.00	36.41
105.00	34.30
106.00	34.68
107.00	33.75
108.00	34.94
109.00	35.43
110.00	35.32
111.00	36.08
112.00	36.17
113.00	35.84
114.00	34.15
115.00	**36.50**
116.00	36.96
117.00	38.59
118.00	41.35
119.00	43.23
120.00	43.24
121.00	36.23
122.00	36.07
123.00	39.55
124.00	37.70
125.00	36.79
126.00	37.11
127.00	36.56
128.00	39.60
129.00	42.39
130.00	38.63
131.00	39.96
132.00	40.37
133.00	36.78
134.00	39.06
135.00	41.07
136.00	43.01
137.00	41.22
138.00	40.24
139.00	39.73
140.00	**48.26**

OML INC. Traceability only available ≤ 110 GHz 6205520B
Morgan Hill, CA 95037



10 Appendix B – Mixer/orn Calibration Certificates *(Continued)*





Model M05HWD
Ser No. G21011-1
6/18/2020

Conversion Loss Test Data

Frequency (GHz)	Conversion Loss (dB)
140.00	**45.47**
141.60	44.68
143.20	44.28
144.80	44.80
146.40	43.72
148.00	42.56
149.60	41.46
151.20	41.93
152.80	43.82
154.40	45.92
156.00	47.90
157.60	47.33
159.20	47.95
160.80	45.72
162.40	46.43
164.00	47.90
165.60	47.11
167.20	43.60
168.80	44.83
170.40	47.09
172.00	44.36
173.60	44.54
175.20	43.51
176.80	45.33
178.40	50.00
180.00	**49.68**
181.60	46.51
183.20	45.57
184.80	49.60
186.40	49.23
188.00	46.22
189.60	47.95
191.20	52.44
192.80	49.96
194.40	49.67
196.00	49.35
197.60	48.98
199.20	49.44
200.80	50.15
202.40	49.61
204.00	52.63
205.60	56.16
207.20	54.30
208.80	51.43
210.40	51.12
212.00	50.18
213.60	49.44
215.20	47.95
216.80	47.79
218.40	49.24
220.00	**52.41**

OML INC. Traceability only available ≤ 110 GHz 6205520A
Morgan Hill, CA 95037

10 Appendix B – Mixer/orn Calibration Certificates *(Continued)*

Certificate of Compliance

Certificate No: 6205520D-U21011-1

Manufacturer: OML, Inc.

Model/Part No: M19HWD **Serial/ID No:** U21011-1

Description: WR-19 Harmonic Mixer

Date of Test: June 18, 2020
Temperature: (23 +/- 5) deg C **Humidity:** 20 to 65% RH
Procedure:

This certifies that the above product was tested in compliance with OML specifications using applicable OML's procedures.

As Received : Physical Condition: Good
Within Tolerance: Yes

As Shipped: At the completion of the test, the product COMPLIED with the performance capability.

Remarks: Functional Verification Service

Traceability Information: Traceability is to national standards administered by U.S. NIST, NRC Canada, Euromet members (NPL, PTB, BNM, etc.) or other recognized standards laboratories. Some measurements are traceable to natural physical constants, consensus standards or ratio type measurements. Supporting documentation relative to traceability is available for review by appointment.
In the absence of power standards above 110 GHz, power measurements and conversion loss measurements above 110 GHz are to confirm operation functionality and traceable only to OML.

This certificate shall not be reproduced, except in full, without the written approval of OML.

Mitzi Chow, Material Manager — 06/24/2020 Date

OML Inc.
300 Digital Drive, Morgan Hill, CA 95037 USA Tel. (408) 779 2698 Fax (408) 778 0491

10 Appendix B – Mixer/orn Calibration Certificates *(Continued)*

Certificate of Compliance

Certificate No: 6205520C-E21011-1

Manufacturer: OML, Inc.

Model/Part No: M12HWD **Serial/ID No:** E21011-1

Description: WR-12 Harmonic Mixer

Date of Test: June 18, 2020
Temperature: (23 +/- 5) deg C **Humidity:** 20 to 65% RH
Procedure:

This certifies that the above product was tested in compliance with OML specifications using applicable OML's procedures.

As Received : Physical Condition: Good
Within Tolerance: Yes

As Shipped: At the completion of the test, the product COMPLIED with the performance capability.

Remarks: Functional Verification Service

Traceability Information: Traceability is to national standards administered by U.S. NIST, NRC Canada, Euromet members (NPL, PTB, BNM, etc.) or other recognized standards laboratories. Some measurements are traceable to natural physical constants, consensus standards or ratio type measurements. Supporting documentation relative to traceability is available for review by appointment.
In the absence of power standards above 110 GHz, power measurements and conversion loss measurements above 110 GHz are to confirm operation functionality and traceable only to OML.

This certificate shall not be reproduced, except in full, without the written approval of OML.

Mitzi Chow, Material Manager — 06/24/2020 Date

OML Inc.
300 Digital Drive, Morgan Hill, CA 95037 USA Tel. (408) 779 2698 Fax (408) 778 0491

10 Appendix B – Mixer/orn Calibration Certificates *(Continued)*

Certificate of Compliance

Certificate No: 6205520B-F21011-1

Manufacturer: OML, Inc.

Model/Part No: M08HWD **Serial/ID No:** F21011-1

Description: WR-08 Harmonic Mixer

Date of Test: June 18, 2020
Temperature: (23 +/- 5) deg C **Humidity:** 20 to 65% RH
Procedure:

This certifies that the above product was tested in compliance with OML specifications using applicable OML's procedures.

As Received : Physical Condition: Fair
Within Tolerance: Yes

As Shipped: At the completion of the test, the product COMPLIED with the performance capability.

Remarks: Functional Verification Service

Traceability Information: Traceability is to national standards administered by U.S. NIST, NRC Canada, Euromet members (NPL, PTB, BNM, etc.) or other recognized standards laboratories. Some measurements are traceable to natural physical constants, consensus standards or ratio type measurements. Supporting documentation relative to traceability is available for review by appointment.
In the absence of power standards above 110 GHz, power measurements and conversion loss measurements above 110 GHz are to confirm operation functionality and traceable only to OML.

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10 Appendix B – Mixer/orn Calibration Certificates *(Continued)*

Certificate of Compliance

Certificate No: 6205520A-G21011-1

Manufacturer: OML, Inc.

Model/Part No: M05HWD **Serial/ID No:** G21011-1

Description: WR-05 Harmonic Mixer

Date of Test: June 18, 2020
Temperature: (23 +/- 5) deg C **Humidity:** 20 to 65% RH
Procedure:

This certifies that the above product was tested in compliance with OML specifications using applicable OML's procedures.

As Received : Physical Condition: Fair
Within Tolerance: Yes

As Shipped: At the completion of the test, the product COMPLIED with the performance capability.

Remarks: Functional Verification Service

Traceability Information: Traceability is to national standards administered by U.S. NIST, NRC Canada, Euromet members (NPL, PTB, BNM, etc.) or other recognized standards laboratories. Some measurements are traceable to natural physical constants, consensus standards or ratio type measurements. Supporting documentation relative to traceability is available for review by appointment.
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11 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	08/06/2020	104357499BOX-001	VFV	KPS	Original Issue
0	06/03/2021	104357499BOX-001	VFV	KPS	Added line-conducted emissions data for 15.207