Test Certificate

A sample of the following product received on March 27, 2019 and tested on March 27, 28 and 29, 2019 complied with the requirements of,

- **EN 301 489-1 V2.2.3 "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for ElectroMagnetic Compatibility"**
- **EN 301 489-3 V2.1.1 "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz; Harmonised standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU"**
- **EN 301 489-17 V3.2.4 "ElectroMagnetic Compatibility (EMC) standard for radio equipment; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU"**

given the measurement uncertainties as detailed in National Technical Systems report FR-126925.01-ENEMC Rev 0.

Viavi Solutions
Model MicroNIR OnSite-W

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EMC Test Report

EN 301 489-1 v2.2.3
EN 301 489-3 v2.1.1
EN 301 489-17 v3.2.4

Model: MicroNIR OnSite-W

COMPANY:	Viavi Solutions 2789 Northpoint Parkway Santa Rosa, CA 95407
TEST SITE(S):	National Technical Systems 41039 Boyce Road. Fremont, CA. 94538-2435
PROJECT NUMBER:	PR126925
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VALIDATING SIGNATORIES

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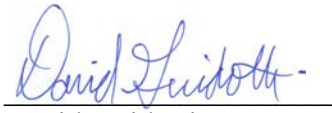
FINAL REPORT PREPARER:



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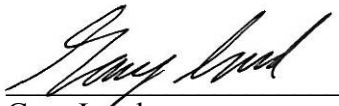
QUALITY ASSURANCE DELEGATE



Gary Izard
Quality Assurance Representative

REVISION HISTORY

Rev#	Date	Comments	Modified By
-	Novembeer 4, 2020	First release	

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SCOPE

The European Committee for Electrotechnical Standardization (CENELEC), the European Telecommunications Standards Institute (ETSI) and the International Electrotechnical Commission (IEC) publish standards regarding the electromagnetic compatibility of electronic devices. Electromagnetic compatibility tests have been performed on the Viavi Solutions model MicroNIR OnSite-W in accordance with these standards. The tests were performed in accordance with the current, published versions of the basic standards referenced in the following standards, as outlined in National Technical Systems test procedures. The test data has been provided as an appendix to this report for reference.

Standard	Title	Date
EN 301 489-1	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of the Directive 2014/53/EU and the essential requirements of article 6 of the Directive 2014/30/EU	2019-11 (V2.2.3)
EN 301 489-3	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz; Harmonised standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU	2019-03 (V2.1.1)
EN 301 489-17	ElectroMagnetic Compatibility (EMC) standard for radio equipment; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU	2020-09 (V3.2.4)

National Technical Systems is accredited by the A2LA, certificate number 0214.26, to perform the test(s) listed in this report, except where noted otherwise.

OBJECTIVE

The objective of the manufacturer is to declare conformity with one of the essential requirements of the Radio Equipment Directive 2014/53/EU. In order to demonstrate compliance, the manufacturer or a contracted laboratory makes measurements and takes the necessary steps to ensure that the equipment complies with the appropriate technical standards.

STATEMENT OF COMPLIANCE

The tested sample of Viavi Solutions model MicroNIR OnSite-W, given the performance criteria as specified by the manufacturer, complied with the requirements of the following standard(s):

Standard/Regulation	Version	Standard Date
EN 301 489-1	2.2.3	2019-11
EN 301 489-3	2.1.1	2019-03
EN 301 489-17	3.2.4	2020-09

The test results recorded herein are based on a single type test of the Viavi Solutions model MicroNIR OnSite-W and therefore apply only to the tested sample. The sample was selected and prepared by Michael Klimek of Viavi Solutions

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product that could result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different enclosure, different line filter or power supply, harnessing and/or interface cable changes, etc.).

DEVIATIONS FROM THE STANDARD

No deviations were made from the published requirements listed in the scope of this report.

TEST RESULTS

The following tests were performed on the Viavi Solutions model MicroNIR OnSite-W. The results are based upon performance criteria defined by the manufacturer. The actual test results and associated performance criteria are contained within an appendix of this report.

EMISSIONS TESTING

Test	Port	Basic Standard	Level (Margin)	Status
Radiated Emissions 30MHz – 6GHz TX	Enclosure	EN 55022 EN 55032	22.0 dBµV/m @ 30.71 MHz (-8.0 dB)	Pass
Radiated Emissions 30MHz – 6GHz Standby	Enclosure	EN 55022 EN 55032	22.4 dBµV/m @ 30.11 MHz (-7.6 dB)	Pass
Conducted Emissions 0.15 – 30MHz	AC Power	EN 55022 EN 55032	Testing was not performed as the EUT is battery operated.	
Harmonic Current Emissions		EN 61000-3-2	Testing was not performed as the EUT is battery operated.	
Voltage Fluctuations		EN 61000-3-3	Testing was not performed as the EUT is battery operated.	
Conducted Emissions 0.15 – 30MHz	DC Power	EN 55022 EN 55032	Testing was not performed as the EUT is battery operated.	
Conducted Emissions 0.15 – 30 MHz	Telecommunications Ports Wired Network Port	EN 55022 EN 55032	Testing was not performed as the EUT does not have any telecommunication ports.	

IMMUNITY TESTING

Test	Basic Standard	Level Required	Level Tested	Criterion Met	Status
ElectroStatic Discharge	EN 61000-4-2	4 kV CD, 8 kV AD	4 kV CD, 8 kV AD	A / TT / TR	Complied
Radio frequency Electromagnetic Field	EN 61000-4-3	80-1000 MHz 1000-6000 MHz 3 V/m 80% 1 kHz AM	80-1000 MHz 1000-6000 MHz 3 V/m 80% 1 kHz AM	A / CT / CR	Complied
Fast Transients AC Power Ports	EN 61000-4-4	1 kV	Testing was not performed as the EUT is battery operated.		
Fast Transients DC Power Ports	EN 61000-4-4	1kV	Testing was not performed as the EUT is battery operated.		
Fast Transients Telecommunication / Signal / Control Ports	EN 61000-4-4	0.5kV	The EUT does not have any signal ports that are intended to connect to cables longer than 3m in length		
Surge, AC Power Port	EN 61000-4-5	2kV CM / 1kV DM	Testing was not performed as the EUT is battery operated.		
Surge Transients Telecommunication Ports Wired Network Port (indoor cables)	EN 61000-4-5	0.5kV	The EUT does not have any signal ports that are intended to connect to cables longer than 3m in length		
Surge Transients Telecommunication Ports Wired Network Port (outdoor cables)	EN 61000-4-5	1.0kV	The EUT does not have any interface ports that would connect to long distance telecommunication lines wired network (over 30m).		
Vehicular Surges	ISO 7637-1, ISO 7637-2	pulses 1, 2a, 2b, 3a, 3b, and 4, using immunity test level III.	Testing was not performed as the EUT is not intended to be used in a vehicular environment		
Radio Frequency Common Mode AC Power Ports	EN 61000-4-6	0.15-80 MHz, 3 Vrms 80% 1 kHz AM	Testing was not performed as the EUT is battery operated.		
Radio Frequency Common Mode DC Power Ports	EN 61000-4-6		Testing was not performed as the EUT is battery operated.		
Radio Frequency Common Mode Telecommunication Ports Wired Network Port / Signal / Control Ports	EN 61000-4-6		The EUT does not have any signal ports that are intended to connect to cables longer than 3m in length		
Voltage Dips and Interrupts	EN 61000-4-11	100%/ ½-cycle 100%/ 1-cycle 30% /25-cycles 100%/250-cycles	Testing was not performed as the EUT is battery operated.		

MEASUREMENT UNCERTAINTIES

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the test results be included in the report. The measurement uncertainties given below are based on a standard uncertainty multiplied by a coverage factor of k=2, providing a 95% confidence level and were calculated in accordance with NAMAS document LAB 34. For emissions tests, the uncertainties were calculated using the approach described in CISPR 16-4-2:2003 and the levels were found to be below levels of Ucispr and therefore no adjustment of the data for measurement uncertainty is required.

Measurement Type	Measurement Unit	Frequency Range	Expanded Uncertainty
Conducted Emissions	dBuV or dBuA	150 kHz – 30 MHz	± 2.2 dB
Radiated Electric Field	dBuV/m	30-1000 MHz	± 3.6 dB
		1000-40,000 MHz	± 6.0 dB
AC Current Harmonics	Amps	50 to 2,000 Hz	± 0.12 %
AC Voltage Flicker	Voltage	N/A	± 0.12 %
	Pst, Plt	N/A	± 3.46 %
Radiated Immunity	V/m	80-2700 MHz	- 26.3%, + 29.97%
ESD	KV	N/A	± 8.6%
Fast Transients	Voltage	N/A	± 5.98 %
	Timing	N/A	± 8.60 %
Surge	Voltage	N/A	± 4.92 %
RF Common Mode (CDN method)	Vrms	N/A	-12.64 %, +13.33 %
RF Common Mode (BCI method)	Vrms	N/A	-13.45 %, +15.32 %
Voltage Dips	Voltage	N/A	± 2.32 %
	Timing	N/A	± 0.08 mS

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The Viavi Solutions model MicroNIR OnSite-W is a spectrometer that is designed to be a ruggedized, handheld spectrometer for rapid material analysis in the field. Since the EUT could be placed on a tabletop during operation, the EUT was treated as tabletop equipment during testing to simulate the end-user environment. The EUT is battery powered by integrated (non-replaceable) 18650 cell, 3.7Volts ~3350mAh capacity.

The sample was received on March 27, 2019 and tested on March 27, 28 and 29, 2019. The EUT consisted of the following component(s):

Manufacturer	Model	Description	Serial Number
Viavi Solutions	MicroNIR OnSite-W	spectrometer	M1-0000108

EUT CLASSIFICATION

Portable use equipment.

ENCLOSURE

The EUT enclosure is primarily constructed of metal. It measures approximately 4.75 cm wide by 14.6 cm long.

MODIFICATIONS

The EUT did not require modifications during testing in order to comply with the immunity specification.

SUPPORT EQUIPMENT

The following equipment was used as local support equipment for immunity testing:

Stand-By Mode

Manufacturer	Model	Description	Serial Number
Microsoft	Surface	Notepad computer	-

The following equipment was used as remote support equipment for immunity testing:

Transceiver Mode

Manufacturer	Model	Description	Serial Number
Microsoft	Surface	Notepad computer	-

Note: transceiver disabled in USB mode.

EUT INTERFACE PORTS

The I/O cabling configuration during immunity testing was as follows:

Stand-By Mode

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
USB	Notepad	Multi-wire	Shielded	2

Transceiver Mode

Note: Transceiver disabled when USB connected. No cables connected during Transceiver mode.

EUT OPERATION DURING EMISSIONS TESTING

During testing in Stand-by Mode: The LED lights flash sequentially and remained connected to tablet software.

During testing in transceiver mode: The LED lights stay still and wireless connection continued to pass data wirelessly to tablet.

EUT OPERATION DURING IMMUNITY TESTING

During testing in Stand-by Mode: The LED lights flash sequentially and remained connected to tablet software

During testing in transceiver mode: The LED lights stay still and wireless connection continued to pass data wirelessly to tablet.

EUT PERFORMANCE CRITERIA

Criterion A / CT / CR: Stand-by Mode: The LED lights flash sequentially and remained connected to tablet software via USB.

During testing in transceiver mode: The LED lights stay still and wireless connection continued to pass data wirelessly to tablet.

EMISSIONS TEST SITE

GENERAL INFORMATION

Final test measurements were taken at the National Technical Systems Anechoic Chambers listed below. The test sites contain separate areas for radiated and conducted emissions testing. The sites conform to the requirements of ANSI C63.4: 2014 American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz and CISPR 16-1-4:2010 - Specification for radio disturbance and immunity measuring apparatus and methods Part 1-4: Radio disturbance and immunity measuring apparatus Ancillary equipment Radiated disturbances. They are registered with the VCCI and are on file with the FCC.

Site	Registration Numbers			Location
	VCCI	FCC	Canada	
Chamber 3	A-0169	A2LA accredited	US0027	41039 Boyce Road Fremont, CA 94538-2435

Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent requirements.

RADIATED EMISSIONS CONSIDERATIONS

The FCC has determined that radiated measurements made in non-anechoic shielded enclosure are not suitable for determining levels of radiated emissions. Radiated measurements are performed in an anechoic chamber, as defined in CISPR 16-1-4. The test site is maintained free of conductive objects within the defined elliptical area. Site correction factors for antennas, cables, amplifiers, etc. used during measurements are given in an appendix of this report.

EMISSIONS MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1-1 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 7 GHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000 MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz.

INSTRUMENT CONTROL COMPUTER

The receivers utilize either a Rohde & Schwarz EZM Spectrum Monitor/Controller or contain an internal Spectrum Monitor/Controller to view and convert the receiver measurements to the field strength at an antenna or voltage developed at the LISN measurement port, which is then compared directly with the appropriate specification limit. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are printed in a graphic and/or tabular format, as appropriate. A personal computer is used to record all measurements made with the receivers. The software used for radiated and conducted emissions measurements is NTS EMI Test Software (rev 2.10)

The Spectrum Monitor provides a visual display of the signal being measured. In addition, the controller or a personal computer runs automated data collection programs that control the receivers. This provides added accuracy since all site correction factors, such as cable loss and antenna factors are added automatically.

LINE IMPEDANCE STABILIZATION NETWORK (LISN)

Line conducted emission measurements utilize a fifty microhenry Line Impedance Stabilization Network as the monitoring point. The LISN used also contains a 250 uH CISPR adapter. This network provides for calibrated radio frequency noise measurements by the design of the internal low pass and high pass filters on the EUT and measurement ports, respectively.

IMPEDANCE STABILIZATION NETWORK (ISN)

Telecommunication port conducted emission measurements utilize an Impedance Stabilization Network with a 150 ohm termination impedance and specific longitudinal conversion loss as the voltage monitoring point. This network provides for calibrated radio frequency noise measurements by the design of the internal circuitry on the EUT and measurement ports, respectively. For current measurements, a current probe with a uniform frequency response and less than 1 ohm insertion impedance is used.

FILTERS/ATTENUATORS

External filters and precision attenuators are often connected between the receiving antenna or LISN and the receiver. This eliminates saturation effects and non-linear operation due to high amplitude transient events.

ANTENNAS

A biconical antenna is used to cover the range from 30 MHz to 300 MHz and a log periodic antenna is utilized from 300 MHz to 1000 MHz. Narrowband tuned dipole antennas are used over the entire 30 to 1000 MHz frequency range for precision measurements of field strength. Above 1000 MHz, a horn antenna is used. The antenna calibration factors are included in site factors that are programmed into the test receivers.

ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height.

ANSI C63.4 and CISPR 32 specify that the test height above ground for table mounted devices shall be 80 centimeters. Floor mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material up to 12 mm thick if the device is normally used on a non-conductive floor. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the company's specifications. An appendix of this report contains the list of test equipment used and calibration information.

EMISSIONS TEST PROCEDURES

EUT AND CABLE PLACEMENT

The standards require that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst-case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.4 and CISPR 32, and the worst-case orientation is used for final measurements.

RADIATED EMISSIONS

General

FCC Part 15 references the test methods of ANSI C63.4-2014 (American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz) for emissions measurements. Radiated emissions measurements are performed in two phases, preliminary scan and final maximization.

Preliminary Scan

A preliminary scan of emissions is conducted in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed, one or more of these with the antenna polarized vertically and one or more of these are performed with the antenna polarized horizontally. During the preliminary scans, the EUT is rotated through 360°, the antenna height is varied and cable positions are varied as necessary to determine the highest emission relative to the limit.

Note that for the frequency range of 1-6 GHz in the “free space” test environment, CISPR 32 allows the antenna to be set at fixed height equal to the center height of the EUT, except for cases where additional scans are necessary with the antenna height adjusted up and down to ensure the measurement antenna illuminates the entire height of the EUT. However, in cases where a single “free space” test is performed in the 1-6 GHz frequency to simultaneously meet the requirements of FCC Part 15 (ANSI C63.4-2014 test methods) and CISPR 22, the antenna height is by default varied since required by ANSI C63.4.

In the frequency range of 30-1000 MHz, a speaker (with demodulation) is provided in the receiver to aid in discriminating between EUT and ambient emissions if required. Other possible methods for discriminating between EUT and ambient emissions involve scanning with near-field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

Final Maximization

During final maximization, the highest-amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth that results in the highest emission is then maintained while varying the antenna height from one to four meters. The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain. Emissions that have values close to the specification limit may also be measured with a tuned dipole antenna to determine compliance.

Final measurements in the frequency range of 30-1000 MHz are made using a quasi-peak detector and compared to the quasi-peak limit. Final measurements above 1 GHz are made using average and peak detectors and compared to the average and peak limits respectively.

When testing above 1 GHz, the receive antenna is restricted to a maximum height of 2.5 m. Maximum emissions are found within this restricted range because emission levels decrease over distance and as the antenna is raised above 2.5 m, the distance from the EUT increases. As a result of the increased measurement distance, at antenna heights above 2.5 m, lower emission levels are measured as compared to emissions levels measured at antenna heights at 2.5 m and below. Final measurements are captured at 3 meters test distance except in cases where a closer test distance is required due to noise-floor considerations of the test-and-measurement equipment.

For measurements above 1 GHz every effort is made to ensure the EUT remains within the cone of radiation of the measurement antenna (i.e. 3 dB beam-width of the antenna). This may include rotating the product and/or angling the measurement antenna.

SAMPLE CALCULATIONS

SAMPLE CALCULATIONS - RADIATED EMISSIONS

Receiver readings are compared directly to the specification limit (decibel form). The receiver internally corrects for cable loss, preamplifier gain, and antenna factor. The calculations are in the reverse direction of the actual signal flow, thus cable loss is added and the amplifier gain is subtracted. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements. A distance factor, when used for electric field measurements, is calculated by using the following formula:

$$F_d = 20*LOG_{10} (D_m/D_s)$$

where:

F_d = Distance Factor in dB
D_m = Measurement Distance in meters
D_s = Specification Distance in meters

Measurement Distance is the distance at which the measurements were taken and Specification Distance is the distance at which the specification limits are based. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

The margin of a given emission peak relative to the limit is calculated as follows:

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

R_r = Receiver Reading in dBuV/m
F_d = Distance Factor in dB
R_c = Corrected Reading in dBuV/m
L_s = Specification Limit in dBuV/m
M = Margin in dB Relative to Spec

IMMUNITY TEST DESCRIPTIONS

GENERAL INFORMATION

Final tests were performed at the National Technical Systems Test Sites located at 41039 Boyce Road, Fremont, CA 94538-2435. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent CENELEC and IEC standards.

All immunity tests were performed with the host system operating from an AC source voltage within the operating ranges specified for the product.

MEASUREMENT INSTRUMENTATION

ELECTROSTATIC DISCHARGE TEST SYSTEM

An ESD generator is used for all testing. It is capable of applying electrostatic discharges in both contact discharge mode to 8 kV and air discharge mode to 16.5 kV in both positive and negative polarities in accordance with the EN 61000-4-2 basic EMC publication.

ELECTROMAGNETIC FIELD TEST SYSTEM

A signal generator and power amplifiers are used to provide a signal at the appropriate power and frequency to an antenna to obtain the required electromagnetic field at the position of the EUT in accordance with the EN 61000-4-3 basic EMC publication.

INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the company's specifications. An appendix of this report contains the list of test equipment used and calibration information.

IMMUNITY TEST PROCEDURES

EQUIPMENT PLACEMENT

IEC 61000-4-2 specifies that a floor-standing EUT shall be placed on an insulating support 5 - 15 centimeters above a ground plane and that all cables be isolated from the ground plane by 0.5 ± 0.05 millimeter thick insulating material. For tabletop equipment, the EUT shall be placed a table 0.8 ± 0.08 meters high with a 1.6 ± 0.02 by 0.8 ± 0.02 meter metal sheet placed on the table and connected to the ground plane via a metal strap with two 470-kΩ resistors in series. The EUT and attached cables shall be isolated from this metal sheet by 0.5 ± 0.05 millimeter thick insulating material. During the tests, the EUT and cables were positioned over a ground reference plane in conformance with this requirement.

IEC 61000-4-3 specifies that a tabletop EUT shall be placed on a non-conducting table 80 centimeters high and that floor-mounted equipment should be mounted on non-conductive supports 0.05 to 0.15 m high or may be placed on an 80 centimeter high platform, if practicable. During the IEC 61000-4-3 tests, the EUT was positioned in a shielded anechoic test chamber on an insulating support in conformance with this requirement. The anechoic materials are used to reduce reflections from the internal surfaces of the chamber.

APPLICATION OF ELECTROSTATIC DISCHARGES

The points of application of the test discharges directly to the EUT are determined after consideration of the parts of the EUT that are accessible to the operator during normal operation. Contact and air discharges are applied to the EUT, contact discharges to conducting surfaces and air-gap discharges to insulating surfaces. Contact discharges are also applied to the coupling planes to simulate nearby ESD events.

APPLICATION OF ELECTROMAGNETIC FIELD

The electromagnetic field is established at the front edge of the EUT. The frequency range is swept through the frequency range of the test using a power level necessary to obtain the required field strength at the EUT. The field is amplitude modulated using a 1 kHz or 400Hz sine wave to a depth of 80% for the swept frequency test in accordance with EN 61000-4-3.

The test is repeated with each of the four sides of the EUT facing the field generating antenna. For small, portable products the test is also performed with the top and bottom sides of the EUT facing the antenna.

Appendix A Test Equipment Calibration Data

Manufacturer	Description	Model	Asset #	Calibrated	Cal Due
Radiated Emissions, 30 - 1,000 MHz, 29-Mar-19					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	0		N/A
Com-Power	Preamplifier, 30-1000 MHz	PA-103	1632	1/7/2019	1/7/2020
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB 7	1756	7/7/2018	7/7/2019
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	2197	10/4/2017	10/4/2019
Radiated Emissions, 1000 - 6000 MHz, 29-Mar-19					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	0		N/A
EMCO	Antenna, Horn, 1-18 GHz (SA40-Blu)	3115	1386	10/8/2018	10/8/2020
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	2199	8/30/2018	8/30/2019
Hewlett Packard	Spectrum Analyzer (SA40) Purple 9 kHz - 40 GHz,	8564E (84125C)	2415	2/13/2019	2/13/2020
Radiated Immunity, 80 - 6,000 MHz, 27-Mar-19					
Amplifier Research	Amplifier, 0.8-4.2GHz, 50Watts	50S1G4A	1493		N/A
Werlatone	Directional Coupler, 0.1-1000 MHz, 40dB, 500w	C6021	1533		N/A
ETS Lindgren	Biconilog Antenna 26 MHz - 3 GHz, Radiated Immunity Only	3140B	1775		N/A
EMCO	Antenna, Horn, 1-18 GHz (SA40-Purple). Used for Chamber 6	3115	1779		N/A
Amplifier Research	Amplifier, 15W, 4.2 to 18 GHz	15T4G18M1	2065		N/A
Agilent Technologies	MXG Analog Signal Generator 6 GHz	N5181A	2146	1/10/2019	1/10/2020
Advanced Technical Materials	Directional Coupler, 1.0-11.0GHz, 35dB, 50w	CHP223G-35FNF	2320		N/A
Rohde & Schwarz	Power Meter, Dual Channel	NRVD	3268	6/21/2018	6/21/2019
Rohde & Schwarz	Power Sensor, 1 uW-100 mW, DC-18 GHz, 50ohms	NRV-Z51	WC068 114	7/19/2018	7/19/2019
Radiated Immunity, 80 - 6,000 MHz, 28-Mar-19					
Amplifier Research	Amplifier, 0.8-4.2GHz, 50Watts	50S1G4A	1493		N/A
Werlatone	Directional Coupler, 0.1-1000 MHz, 40dB, 500w	C6021	1533		N/A
ETS Lindgren	Biconilog Antenna 26 MHz - 3 GHz, Radiated Immunity Only	3140B	1775		N/A
EMCO	Antenna, Horn, 1-18 GHz (SA40-Purple). Used for Chamber 6	3115	1779		N/A
Amplifier Research	Amplifier, 15W, 4.2 to 18 GHz	15T4G18M1	2065		N/A
Agilent Technologies	MXG Analog Signal Generator 6 GHz	N5181A	2146	1/10/2019	1/10/2020
Advanced Technical Materials	Directional Coupler, 1.0-11.0GHz, 35dB, 50w	CHP223G-35FNF	2320		N/A
Rohde & Schwarz	Power Meter, Dual Channel	NRVD	3268	6/21/2018	6/21/2019
Rohde & Schwarz	Power Sensor, 1 uW-100 mW, DC-18 GHz, 50ohms	NRV-Z51	WC068 114	7/19/2018	7/19/2019

Manufacturer	Description	Model	Asset #	Calibrated	Cal Due
ESD, 29-Mar-19					
National Technical Systems	ESD, Vertical Plane, 19-3/4 x 19-3/4	ESD, VP, 19-3/4 x 19-3/4	610		N/A
Teseq Schaffner	ESD Gun (Red), 100pF-1500 ohm & 150pF-330 ohm tips	NSG-438	3010	11/5/2018	11/5/2019

Appendix B Test Data Log Sheets

ELECTROMAGNETIC EMISSIONS

TEST LOG SHEETS

AND

MEASUREMENT DATA

TL087916-01-EMC Pages 24 – 68

Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
System Configuration:		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	
Emissions Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2	Class:	
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-1, -3, -17 Tx & Standby Modes	Environment:	

EMC Test Data

For The

Viavi Solutions

Product

MicroNIR OnSite-W

Date of Last Test: 3/29/2019

Client:	Viavi Solutions	PR Number:	PR087916-01
Model:	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Standard:	EN 61326-1:2013, KN 11, KN 61000-2	Class:	Enter on cover sheet

Radiated Emissions

(NTS Silicon Valley, Fremont Facility, Semi-Anechoic Chamber)

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 3/29/2019
Test Engineer: Roy Zheng
Test Location: Fremont Chamber #3
Config. Used: 1
Config Change: None
EUT Voltage: Battery Operated

General Test Configuration

The EUT and any local support equipment were located on the turntable for radiated emissions testing. Any remote support equipment was located outside the semi-anechoic chamber. Any cables running to remote support equipment were routed through metal conduit and when possible passed through a ferrite clamp upon exiting the chamber.

Radiated emissions tests above 1 GHz to FCC Part 15 were performed with floor absorbers in place in accordance with the test methods of ANSI C63.4 and CISPR 16-1-4.

The test distance and extrapolation factor (if applicable) are detailed under each run description.

Note, preliminary testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. Maximized testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

Ambient Conditions:

Temperature: 21.3 °C
Rel. Humidity: 41 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	Radiated Emissions 30 - 1000 MHz, Preliminary	Class B	Pass	Refer to individual runs
2	Radiated Emissions 30 - 1000 MHz, Maximized	Class B	Pass	22.0 dBµV/m @ 30.71 MHz (-8.0 dB)
3a	Radiated Emissions 1 GHz - 6 GHz Maximized	EN 55032 Class B	Pass	20.0 dBµV/m @ 1277.9 MHz (-30.0 dB)

Client:	Viavi Solutions	PR Number:	PR087916-01
Model:	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Standard:	EN 61326-1:2013, KN 11, KN 61000-2	Class:	Enter on cover sheet

Modifications Made During Testing

No modifications were made to the EUT during testing

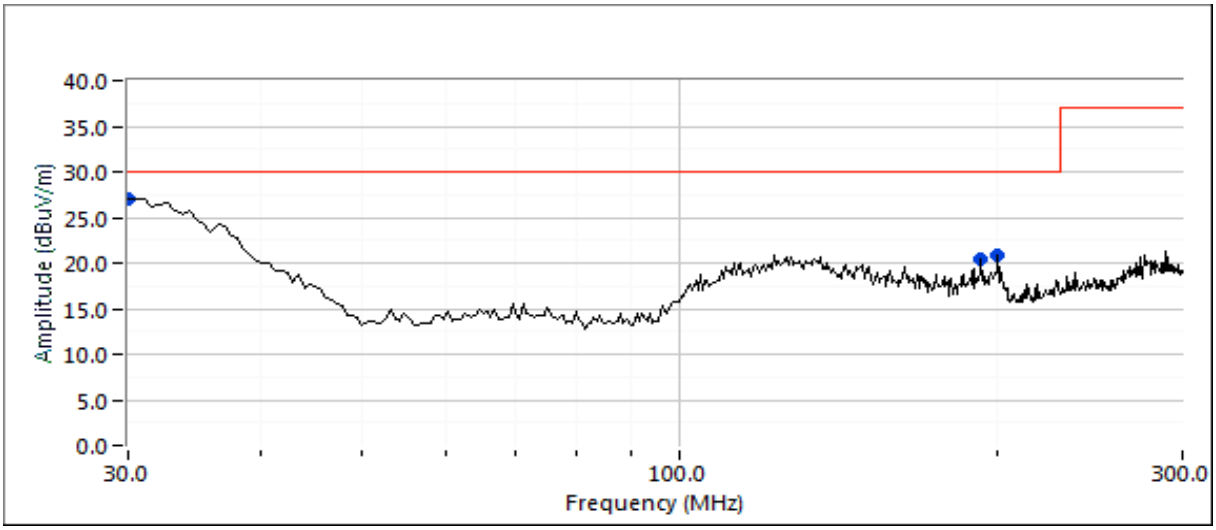
Deviations From The Standard

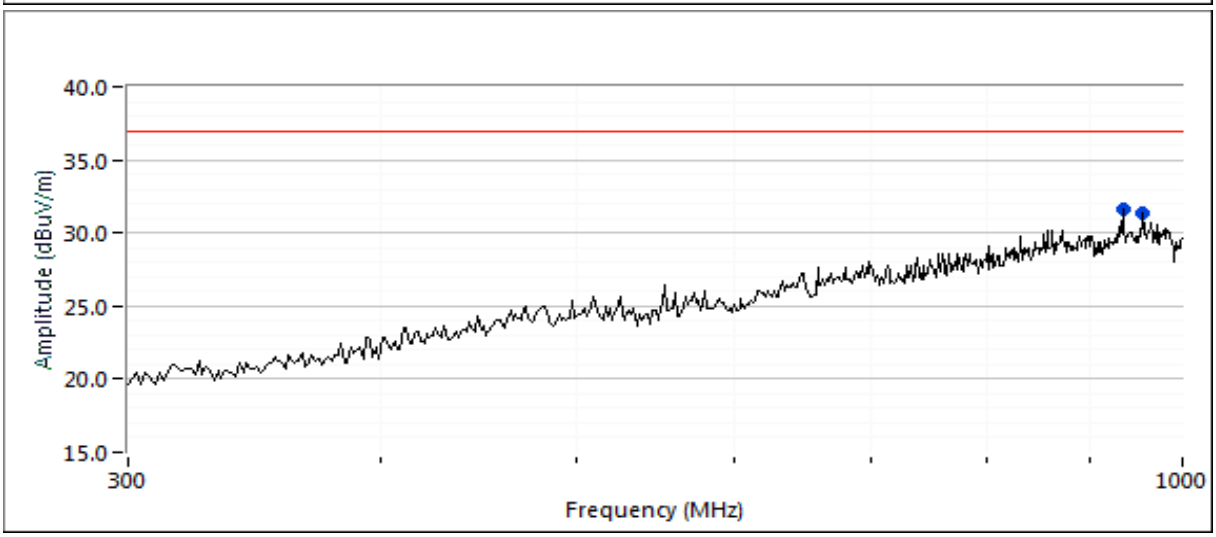
No deviations were made from the requirements of the standard.

Client:	Viavi Solutions	PR Number:	PR087916-01
Model:	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Standard:	EN 61326-1:2013, KN 11, KN 61000-2	Class:	Enter on cover sheet

Run #1: Preliminary Radiated Emissions, 30 - 1000 MHz

Test Parameters for Preliminary Scan(s)			
Frequency Range (MHz)	Prescan Distance (meters)	Limit Distance (meters)	Extrapolation Factor (dB, applied to data)
30 - 1000	10	10	0.0





Client:	Viavi Solutions	PR Number:	PR087916-01
Model:	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Standard:	EN 61326-1:2013, KN 11, KN 61000-2	Class:	Enter on cover sheet

Preliminary peak readings captured during pre-scan

Frequency	Level	Pol	Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
30.000	*27.1*	*H*	*30.0*	*-2.9*	*Peak*	*123*	*4.0*	
193.407	*20.5*	*V*	*30.0*	*-9.5*	*Peak*	*105*	*1.5*	
200.441	*20.8*	*V*	*30.0*	*-9.2*	*Peak*	*155*	*1.0*	
934.068	*31.6*	*H*	*37.0*	*-5.4*	*Peak*	*149*	*2.5*	
956.513	*31.3*	*V*	*37.0*	*-5.7*	*Peak*	*78*	*2.0*	

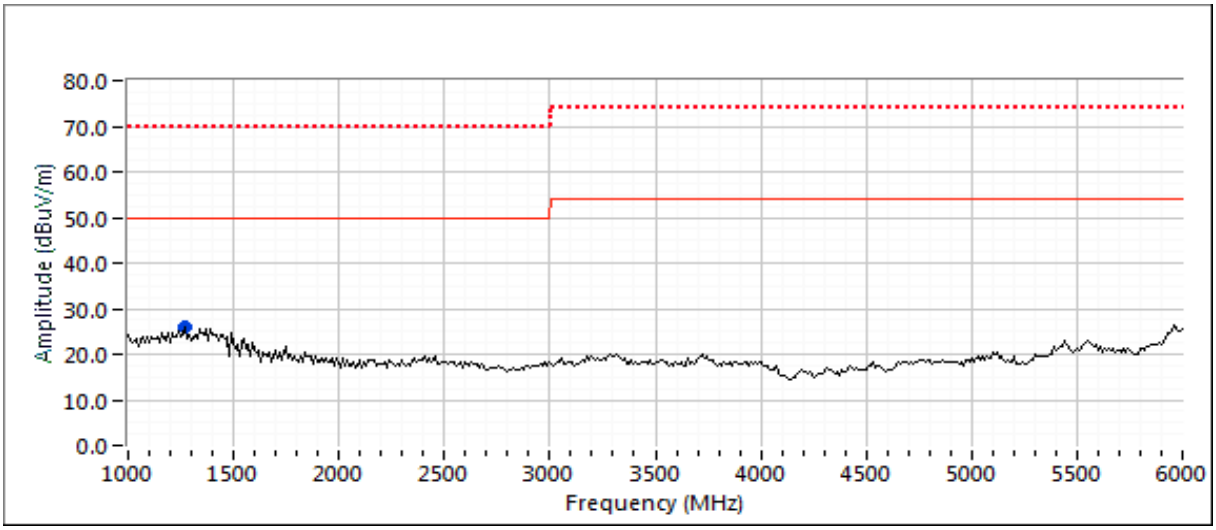
Final quasi-peak readings (no manipulation of EUT interface cables)

Frequency	Level	Pol	Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
30.714	22.0	H	30.0	-8.0	QP	127	4.0	QP (1.00s)
953.778	26.1	V	37.0	-10.9	QP	75	2.0	QP (1.00s)
928.415	25.8	H	37.0	-11.2	QP	146	2.5	QP (1.00s)
200.068	14.9	V	30.0	-15.1	QP	175	1.0	QP (1.00s)
192.828	13.6	V	30.0	-16.4	QP	103	1.5	QP (1.00s)

Client:	Viavi Solutions	PR Number:	PR087916-01
Model:	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Standard:	EN 61326-1:2013, KN 11, KN 61000-2	Class:	Enter on cover sheet

Run #2: Maximized Readings, 1000 - 6000 MHz

Test Parameters for Preliminary Scan(s)			
Frequency Range (MHz)	Prescan Distance (meters)	Limit Distance (meters)	Extrapolation Factor (dB, applied to data)
1000 - 6000	3	3	0.0



Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

EN 55022/32 limit used for pre-scan (i.e. worst case of EN 55022/32 and FCC)

Frequency	Level	Pol	EN 55032 Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1270.540	*25.8*	*V*	*50.0*	*-24.2*	*Peak*	*312*	*2.0*	

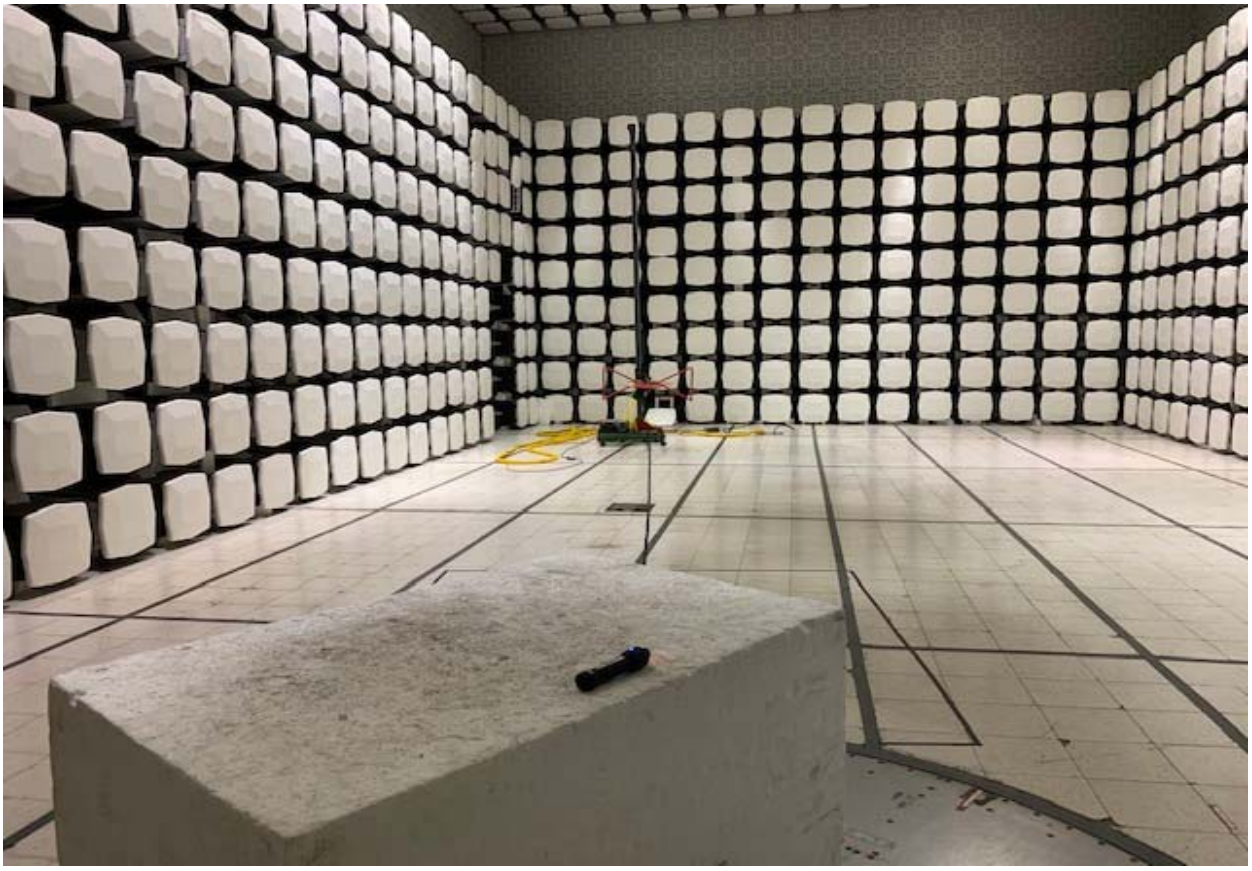
Final peak and average readings (vs. EN 55022/32 limits)

All final readings collected at 3 meters test distance, unless otherwise noted

Frequency	Level	Pol	EN 55032 Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1277.850	20.0	V	50.0	-30.0	AVG	309	2.0	AVG (0.10s)
1277.850	33.9	V	70.0	-36.1	PK	309	2.0	PK (0.10s)

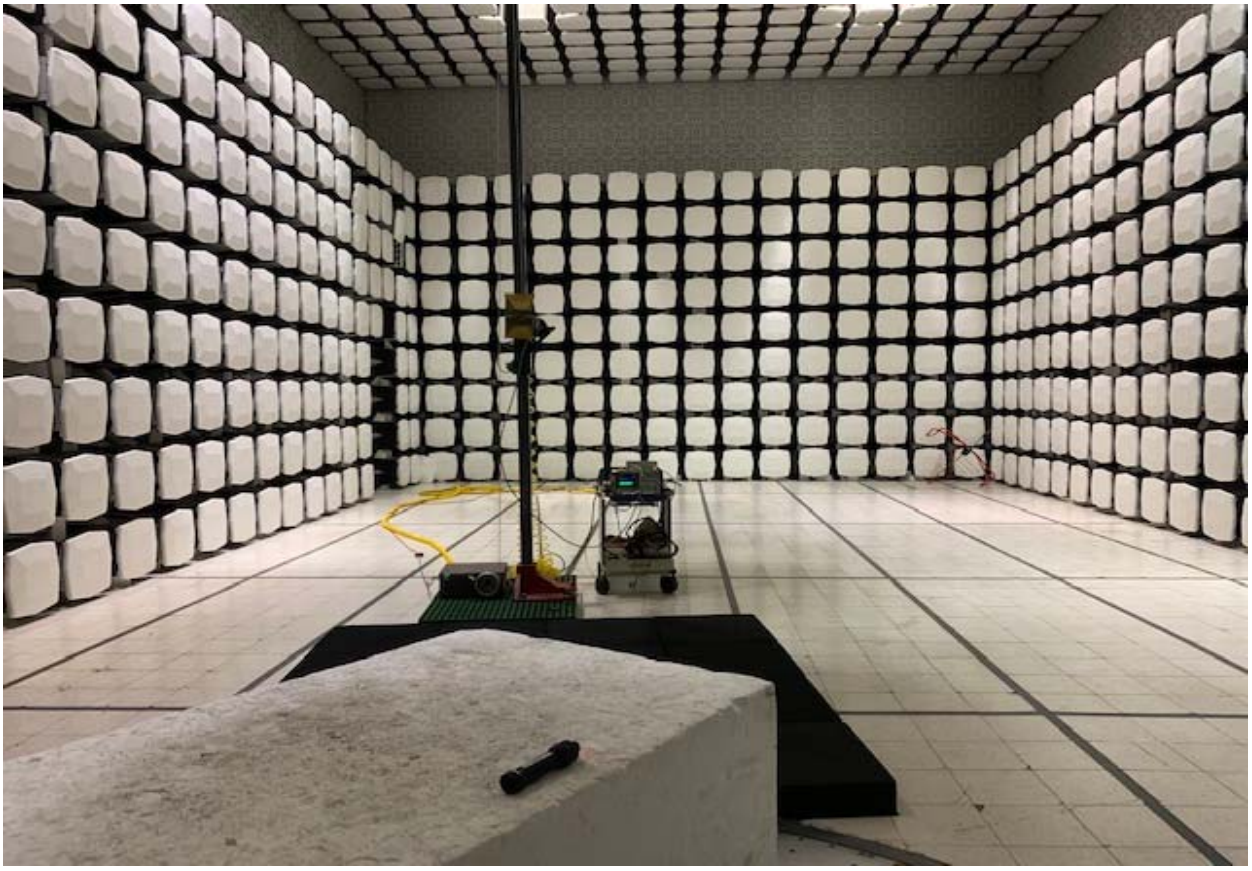
Client:	Viavi Solutions	PR Number:	PR087916-01
Model:	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Standard:	EN 61326-1:2013, KN 11, KN 61000-2	Class:	Enter on cover sheet

Test Configuration Photograph #1
(Radiated Emissions)



Client:	Viavi Solutions	PR Number:	PR087916-01
Model:	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Standard:	EN 61326-1:2013, KN 11, KN 61000-2	Class:	Enter on cover sheet

Test Configuration Photograph #2
(Radiated Emissions)



Client:	Viavi Solutions	PR Number:	PR087916-01
Model:	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Standard:	EN 61326-1:2013, KN 11, KN 61000-2	Class:	Enter on cover sheet

Radiated Emissions

(NTS Silicon Valley, Fremont Facility, Semi-Anechoic Chamber)

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 3/29/2019
Test Engineer: Roy Zheng
Test Location: Fremont Chamber #3
Config. Used: 1
Config Change: None
EUT Voltage: Battery Operated

General Test Configuration

The EUT and any local support equipment were located on the turntable for radiated emissions testing. Any remote support equipment was located outside the semi-anechoic chamber. Any cables running to remote support equipment were routed through metal conduit and when possible passed through a ferrite clamp upon exiting the chamber.

Radiated emissions tests above 1 GHz to FCC Part 15 were performed with floor absorbers in place in accordance with the test methods of ANSI C63.4 and CISPR 16-1-4.

The test distance and extrapolation factor (if applicable) are detailed under each run description.

Note, preliminary testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. Maximized testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

Ambient Conditions:

Temperature: 21.3 °C
Rel. Humidity: 41 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	Radiated Emissions 30 - 1000 MHz, Preliminary	Class B	Pass	Refer to individual runs
2	Radiated Emissions 30 - 1000 MHz, Maximized	Class B	Pass	22.4 dBµV/m @ 30.11 MHz (-7.6 dB)
3a	Radiated Emissions 1 GHz - 6 GHz Maximized	EN 55032 Class B	Pass	30.1 dBµV/m @ 5959.9 MHz (-23.9 dB)

Client:	Viavi Solutions	PR Number:	PR087916-01
Model:	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Standard:	EN 61326-1:2013, KN 11, KN 61000-2	Class:	Enter on cover sheet

Modifications Made During Testing

No modifications were made to the EUT during testing

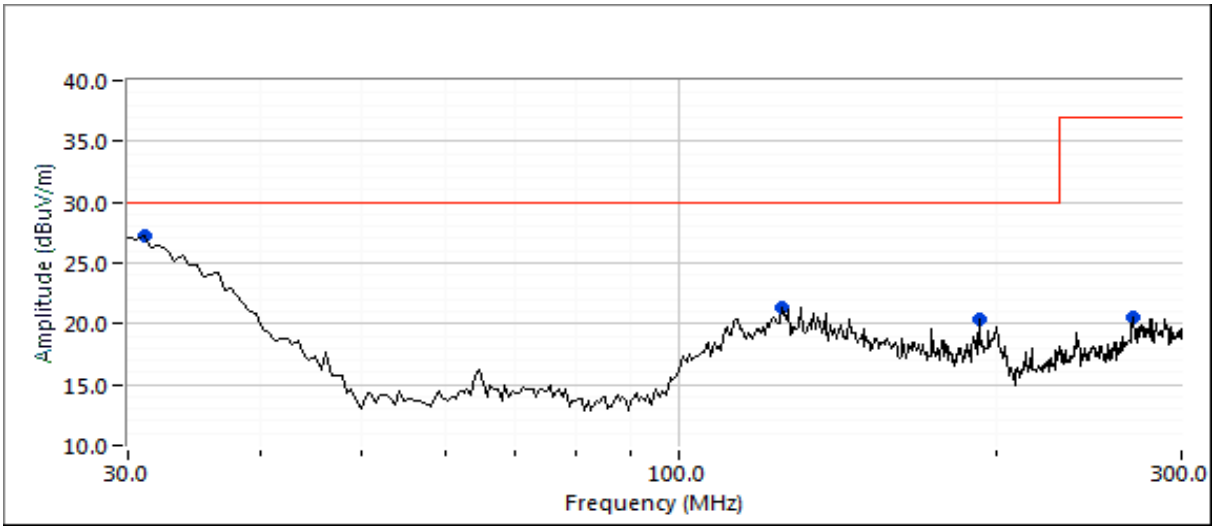
Deviations From The Standard

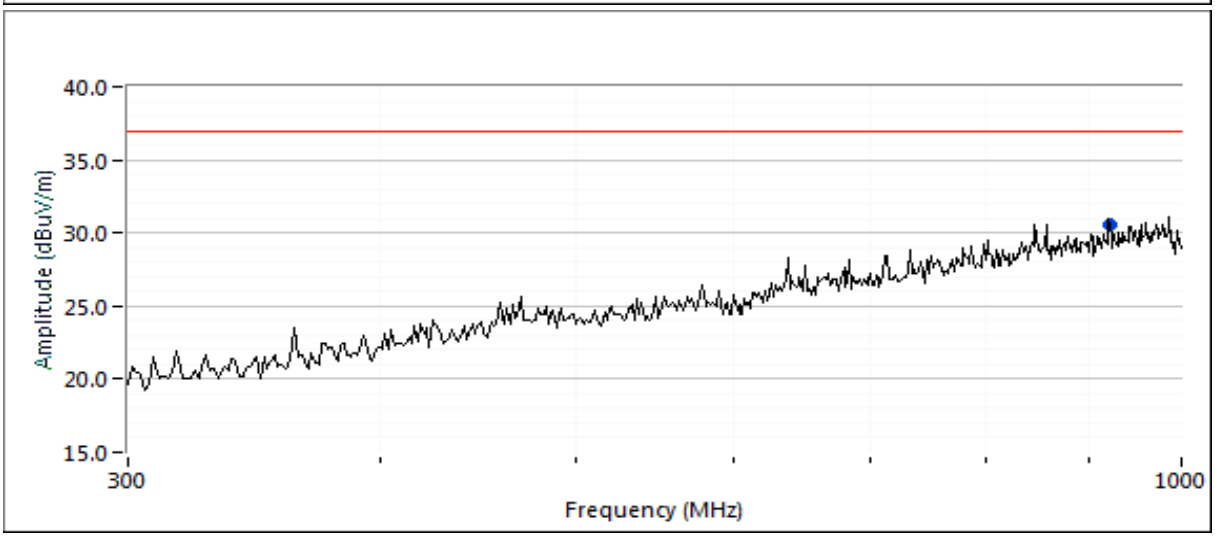
No deviations were made from the requirements of the standard.

Client:	Viavi Solutions	PR Number:	PR087916-01
Model:	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Standard:	EN 61326-1:2013, KN 11, KN 61000-2	Class:	Enter on cover sheet

Run #1: Preliminary Radiated Emissions, 30 - 1000 MHz

Test Parameters for Preliminary Scan(s)			
Frequency Range (MHz)	Prescan Distance (meters)	Limit Distance (meters)	Extrapolation Factor (dB, applied to data)
30 - 1000	10	10	0.0





Client:	Viavi Solutions	PR Number:	PR087916-01
Model:	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Standard:	EN 61326-1:2013, KN 11, KN 61000-2	Class:	Enter on cover sheet

Preliminary peak readings captured during pre-scan

Frequency	Level	Pol	Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
31.082	*27.2*	*V*	*30.0*	*-2.8*	*Peak*	*182*	*1.5*	
125.230	*21.4*	*H*	*30.0*	*-8.6*	*Peak*	*360*	*4.0*	
192.866	*20.3*	*V*	*30.0*	*-9.7*	*Peak*	*185*	*2.5*	
269.699	*20.6*	*V*	*37.0*	*-16.4*	*Peak*	*261*	*2.5*	
921.443	*30.6*	*V*	*37.0*	*-6.4*	*Peak*	*127*	*2.0*	

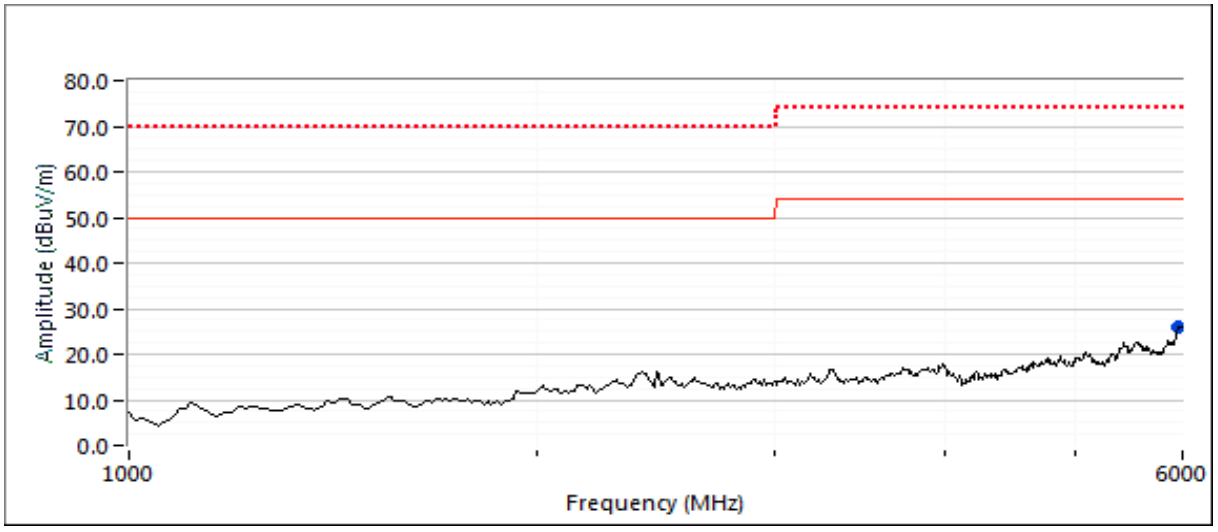
Final quasi-peak readings (no manipulation of EUT interface cables)

Frequency	Level	Pol	Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
30.114	22.4	V	30.0	-7.6	QP	184	1.5	QP (1.00s)
926.591	25.8	V	37.0	-11.2	QP	124	2.0	QP (1.00s)
126.545	15.7	H	30.0	-14.3	QP	360	4.0	QP (1.00s)
192.265	13.7	V	30.0	-16.3	QP	189	2.5	QP (1.00s)
270.549	14.9	V	37.0	-22.1	QP	263	2.5	QP (1.00s)

Client:	Viavi Solutions	PR Number:	PR087916-01
Model:	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Standard:	EN 61326-1:2013, KN 11, KN 61000-2	Class:	Enter on cover sheet

Run #2: Maximized Readings, 1000 - 6000 MHz

Test Parameters for Preliminary Scan(s)			
Frequency Range (MHz)	Prescan Distance (meters)	Limit Distance (meters)	Extrapolation Factor (dB, applied to data)
1000 - 6000	3	3	0.0



Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

EN 55022/32 limit used for pre-scan (i.e. worst case of EN 55022/32 and FCC)

Frequency	Level	Pol	EN 55032 Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5959.920	*25.9*	*H*	*54.0*	*-28.1*	*Peak*	*174*	*2.0*	

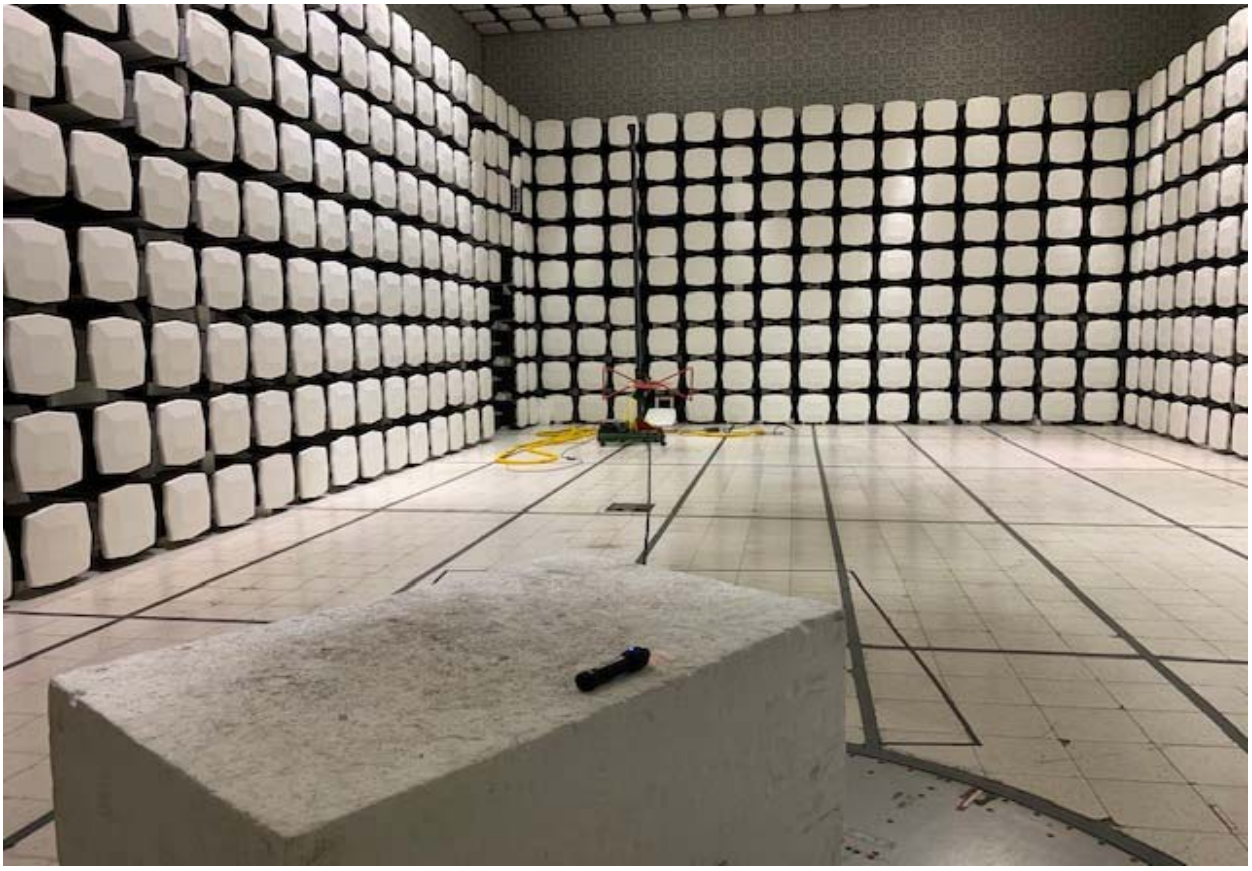
Final peak and average readings (vs. EN 55022/32 limits)

All final readings collected at 3 meters test distance, unless otherwise noted

Frequency	Level	Pol	EN 55032 Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5959.920	30.1	H	54.0	-23.9	AVG	176	2.0	AVG (0.10s)
5959.920	44.2	H	74.0	-29.8	PK	176	2.0	PK (0.10s)

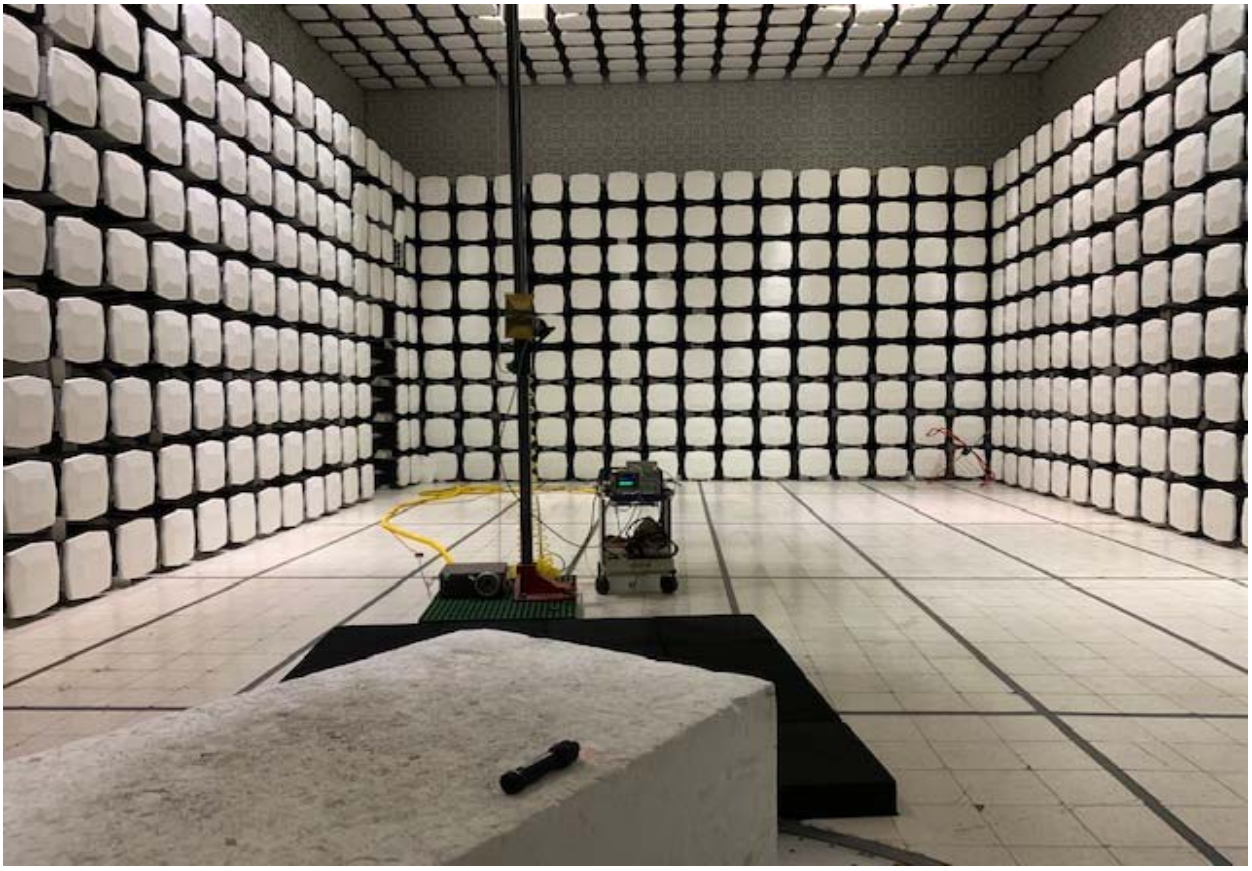
Client:	Viavi Solutions	PR Number:	PR087916-01
Model:	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Standard:	EN 61326-1:2013, KN 11, KN 61000-2	Class:	Enter on cover sheet

Test Configuration Photograph #1
(Radiated Emissions)



Client:	Viavi Solutions	PR Number:	PR087916-01
Model:	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Standard:	EN 61326-1:2013, KN 11, KN 61000-2	Class:	Enter on cover sheet

Test Configuration Photograph #2
(Radiated Emissions)



Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-	Environment:	Cover sheet

Electrostatic Discharge (EN 61000-4-2)

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 3/29/2019 13:13 Config. Used: 1
Test Engineer: Roy Zheng Config Change: None
Test Location: Fremont EMC Lab #2 EUT Voltage: 220V/60Hz

General Test Configuration

For tabletop equipment, the EUT and all local support equipment were located on a 0.5-mm thick insulating layer above a horizontal coupling plane, 80 cm above a ground reference plane. For floor-standing equipment, the EUT was isolated from the ground reference plane by an insulating support of 10 cm (± 5 cm), and EUT cables were isolated from the ground reference plane by an insulating support of 0.5 mm (± 0.05 mm).

Unless otherwise stated, ten discharges at each voltage, and polarity, were applied to each test point listed. Contact discharges (CD) were applied to coupling planes and conductive surfaces of the EUT. Air discharges (AD) were applied to any non-conductive surfaces of the EUT. The VCP was located on the tabletop for tabletop devices and 80cm above the ground plane for floor-standing equipment.

The determination as to the test point being a part of a conductive or non-conductive surface was based on testing the surface for conductivity using an ohmmeter.

Ambient Conditions:

Temperature: 23.4 °C
Relative Humidity: 38.9 %

Summary of Results - Electrostatic Discharges

Run #	Port	Test Level		Performance Criteria		Comments
		Required	Applied	Required	Met / Result	
1	Enclosure	4 kV CD 8 kV AD	4 kV CD 8 kV AD	B	A / Pass	Linked to Laptop

Modifications Made During Testing

No modifications were made to the EUT during testing.

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-	Environment:	Cover sheet

Run #1: Electrostatic Discharge

Indirect Discharges (To Coupling Planes)	Positive Polarity (kV)				Negative Polarity (kV)			
Contact Mode	Level 1 2	Level 2 4	Level 3 6	Level 4 8	Level 1 2	Level 2 4	Level 3 6	Level 4 8
Vertical Coupling Plane (VCP) located 10cm from the front, rear, left and right sides of the EUT	X	X			X	X		
Horizontal Coupling Plane (HCP) located 10cm from the front, rear, left and right sides of the EUT	X	X			X	X		

Direct Discharges (To the EUT)	Positive Polarity (kV)				Negative Polarity (kV)			
Contact Mode	Level 1 2	Level 2 4	Level 3 6	Level 4 8	Level 1 2	Level 2 4	Level 3 6	Level 4 8
Figure 1 Front	X	X			X	X		
Figure 2 Right	X	X			X	X		
Figure 3 Back	X	X			X	X		
Figure 4 Left	X	X			X	X		
Figure 5 Bottom	X	X			X	X		
Figure 6 Top	X	X			X	X		
Screw x 2	X	X			X	X		
Top ring near the glass	X	X			X	X		
Air Discharge Mode	Level 1 2	Level 2 4	Level 3 8	Level 4 15	Level 1 2	Level 2 4	Level 3 8	Level 4 15
Bottom LED	ND	ND	ND		ND	ND	ND	

Note: An "X" indicates that the unit continued to operate as intended. The LED lights flash sequentially .

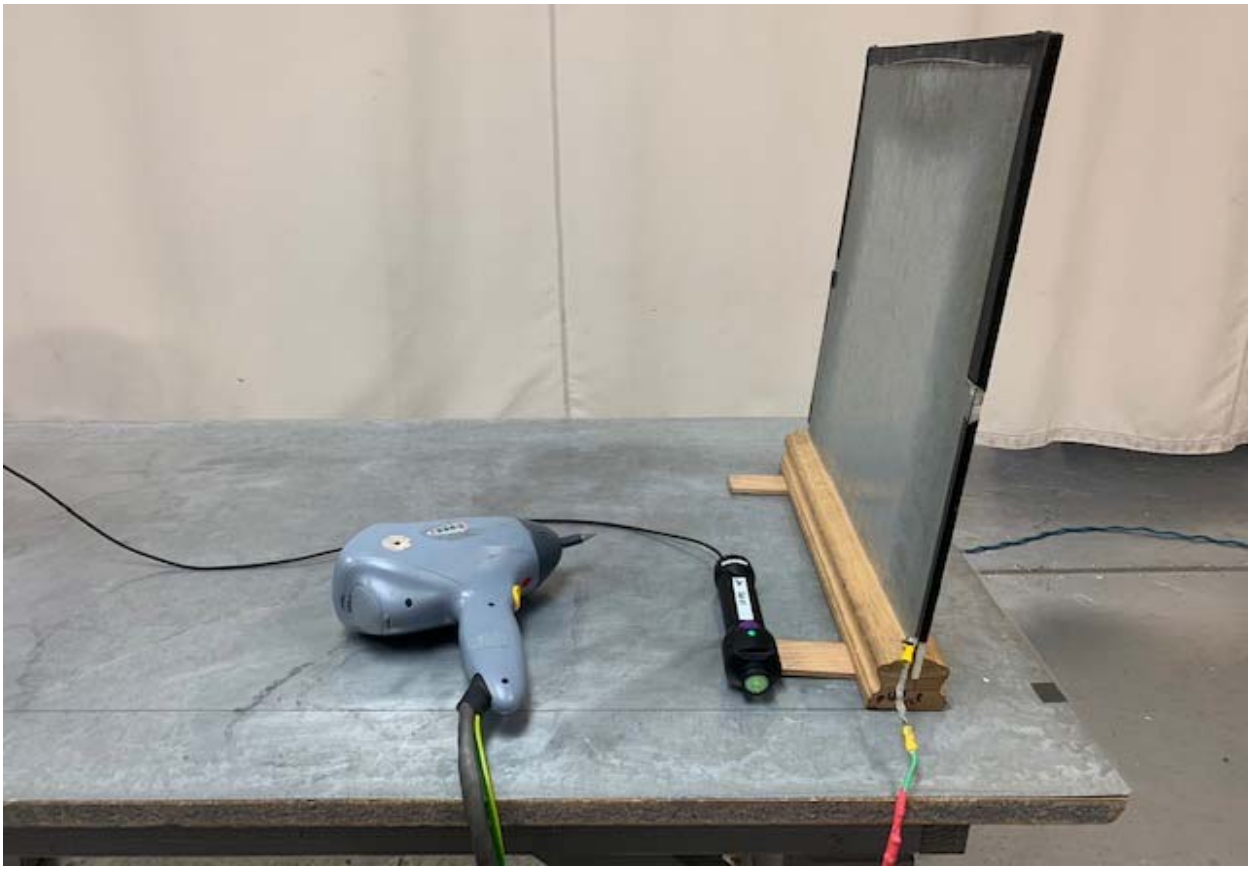
Note: ND: No discharge was possible due to the lack of a discharge path to ground from the test point.
HCP: Horizontal Coupling Plane. VCP: Vertical Coupling Plane

Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-	Environment:	Cover sheet

Test Configuration Photograph [General View of Test Setup]
(Electrostatic Discharge, EN 61000-4-2)

Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-	Environment:	Cover sheet

Test Configuration Photograph [General View of Test Setup - Alternate View]
(Electrostatic Discharge, EN 61000-4-2)



Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-	Environment:	Cover sheet

Detailed Photo(s) of ESD Test Locations

Figure 1

Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-	Environment:	Cover sheet

Figure 2

Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-	Environment:	Cover sheet

Figure 3

Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-	Environment:	Cover sheet

Figure 4

Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-	Environment:	Cover sheet

Figure 5

Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-	Environment:	Cover sheet

Figure 6

Legend
- Contact Discharge
- Air Discharge

Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-	Environment:	Cover sheet

Electrostatic Discharge (EN 61000-4-2)

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 3/29/2019 13:13 Config. Used: 1
Test Engineer: Roy Zheng Config Change: None
Test Location: Fremont EMC Lab #2 EUT Voltage: Battery Operated

General Test Configuration

For tabletop equipment, the EUT and all local support equipment were located on a 0.5-mm thick insulating layer above a horizontal coupling plane, 80 cm above a ground reference plane. For floor-standing equipment, the EUT was isolated from the ground reference plane by an insulating support of 10 cm (± 5 cm), and EUT cables were isolated from the ground reference plane by an insulating support of 0.5 mm (± 0.05 mm).

Unless otherwise stated, ten discharges at each voltage, and polarity, were applied to each test point listed. Contact discharges (CD) were applied to coupling planes and conductive surfaces of the EUT. Air discharges (AD) were applied to any non-conductive surfaces of the EUT. The VCP was located on the tabletop for tabletop devices and 80cm above the ground plane for floor-standing equipment.

The determination as to the test point being a part of a conductive or non-conductive surface was based on testing the surface for conductivity using an ohmmeter.

Ambient Conditions:

Temperature: 23.4 °C
Relative Humidity: 38.9 %

Summary of Results - Electrostatic Discharges

Run #	Port	Test Level		Performance Criteria		Comments
		Required	Applied	Required	Met / Result	
1	Enclosure	4 kV CD 8 kV AD	4 kV CD 8 kV AD	B	A / Pass	Connected to Laptop Wirelessly

Modifications Made During Testing

No modifications were made to the EUT during testing.

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-	Environment:	Cover sheet

Run #1: Electrostatic Discharge

Indirect Discharges (To Coupling Planes)	Positive Polarity (kV)				Negative Polarity (kV)			
Contact Mode	Level 1 2	Level 2 4	Level 3 6	Level 4 8	Level 1 2	Level 2 4	Level 3 6	Level 4 8
Vertical Coupling Plane (VCP) located 10cm from the front, rear, left and right sides of the EUT	X	X			X	X		
Horizontal Coupling Plane (HCP) located 10cm from the front, rear, left and right sides of the EUT	X	X			X	X		

Direct Discharges (To the EUT)	Positive Polarity (kV)				Negative Polarity (kV)			
Contact Mode	Level 1 2	Level 2 4	Level 3 6	Level 4 8	Level 1 2	Level 2 4	Level 3 6	Level 4 8
Figure 1 Front	ND	ND			ND	ND		
Figure 2 Left	ND	ND			ND	ND		
Figure 3 Back	ND	ND			ND	ND		
Figure 4 Right	ND	ND			ND	ND		
Figure 5 Bottom	ND	ND			ND	ND		
Figure 6 Top	ND	ND			ND	ND		
Screw x 2	ND	ND			ND	ND		
Top ring near the glass	ND	ND			ND	ND		
Air Discharge Mode	Level 1 2	Level 2 4	Level 3 8	Level 4 15	Level 1 2	Level 2 4	Level 3 8	Level 4 15
LED lights	ND	ND	ND		ND	ND	ND	

Note: An "X" indicates that the unit continued to operate as intended. The LED lights stay still.

Note: ND: No discharge was possible due to the lack of a discharge path to ground from the test point.
HCP: Horizontal Coupling Plane. VCP: Vertical Coupling Plane

Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-	Environment:	Cover sheet

Test Configuration Photograph [General View of Test Setup]
(Electrostatic Discharge, EN 61000-4-2)

Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-	Environment:	Cover sheet

Detailed Photo(s) of ESD Test Locations

Figure 1

Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-	Environment:	Cover sheet

Figure 2

Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-	Environment:	Cover sheet

Figure 3

Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-	Environment:	Cover sheet

Figure 4

Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-	Environment:	Cover sheet

Figure 5

Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-	Environment:	Cover sheet

Figure 6

Legend

- Contact Discharge
- Air Discharge

Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-	Environment:	Cover sheet

Radiated Immunity (EN 61000-4-3)

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 3/28/2019 8:34
Test Engineer: BaoTri Nguyen
Test Location: Fremont Chamber #6
Config. Used: Trx/Rx
Config Change: None
EUT Voltage: 3.7VDC nominal battery

General Test Configuration

The EUT and all local support equipment were located on a turntable in an anechoic chamber. All remote support equipment was located outside the chamber. Interface cabling to the remote support equipment was routed along the floor and, where possible, passed through ferrite clamps at the exit point from the chamber.

Unless otherwise noted, the "right side" of the EUT is considered the side on the right when standing behind the EUT and the "left side" of the EUT is considered the side on the left when standing behind the EUT.

Ambient Conditions:

Temperature: 23-25 °C
Rel. Humidity: 30-35 %

Summary of Results-Radiated Immunity

Run #	Port	Test Level		Performance Criteria		Comments
		Required	Applied	Required	Met / Result	
KN35 Requirements						
1	Enclosure	80-1000 MHz 1kHz 80% AM 3 V/m	80-1000 MHz 1kHz 80% AM 3 V/m	A	A / Pass	
1	Enclosure	Spot Frequencies 1kHz 80% AM 3 V/m	1800, 2600, 3500, 5000 MHz 1kHz 80% AM 3 V/m	A	A / Pass	
EN 301 489-1 V2.1.1 Requirements						
1	Enclosure	80-1000 MHz 1.0-6.0GHz 1kHz 80% AM 3 V/m	80-1000 MHz 1.0-6.0GHz 1kHz 80% AM 3 V/m	A	A / Pass	

Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-	Environment:	Cover sheet

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

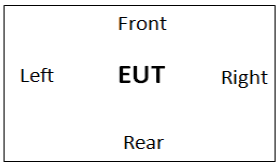
EMC Test Data

Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-	Environment:	Cover sheet

Run #1: Radiated Immunity, 80-6000 MHz (EN61000-4-3)

Frequency:	80-1000 MHz	1-4.2 GHz	4.2-6 GHz
Step Size:	1 %	1 %	1 %
Dwell time:	2874 ms	2874 ms	2874 ms
Field Uniformity:	1.5m x 1.5m	1.0m x 1.0m	1.0m x 1.0m
Test Distance:	2	1.25	1.8

Modulation Details	
Modulating Frequency:	1 kHz
Modulation:	AM
Depth / Deviation:	80%



Frequency Range (MHz)	Level V/m	Front		Left Side		Rear		Right		Top		Bottom	
		Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.
80-1000	3	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
1000-4200	3	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
4200-6000	3	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
KN35 Spot Frequencies (Note 2)	3	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A

Note:	An "X" indicates that the unit continued to operate as intended. There were no data errors reported by the monitoring software.
Note 2:	Radiated Immunity Spot Tests at 1800, 2600, 3500 and 5000MHz (+/- 1%)
Note 4:	The following exclusion bands were used per EN 301 489-1:

EN 301 489-1 Exclusion Bands:

	Band		Bandwidth	Exclusion Band	
	Start (MHz)	Stop (MHz)	(MHz)	Start (MHz)	Stop (MHz)
2.4GHz wifi	2400	2483.5	-	2280	2603.5
5GHz wifi	5150	5725	-	4880	5995
Bluetooth	2400	2483.5	-	2280	2603.5

Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-	Environment:	Cover sheet

Test files used for this run:
The following calibration files from U:\EMC Stuff\Radiated Immunity Playback Files\CH6\Current\80-1000 MHz 20Vm (July 2018)\ were used:

Antenna tip 2m from UFA, 1.55m height 80 MHz - 1000 MHz H 3Vm.crf
Antenna tip 2m from UFA, 1.55m height 80 MHz - 1000 MHz V 3Vm.crf

The following calibration files from U:\EMC Stuff\Radiated Immunity Playback Files\CH6\Current\1-4.2 GHz (October 2017)\3 Vm\ were used:

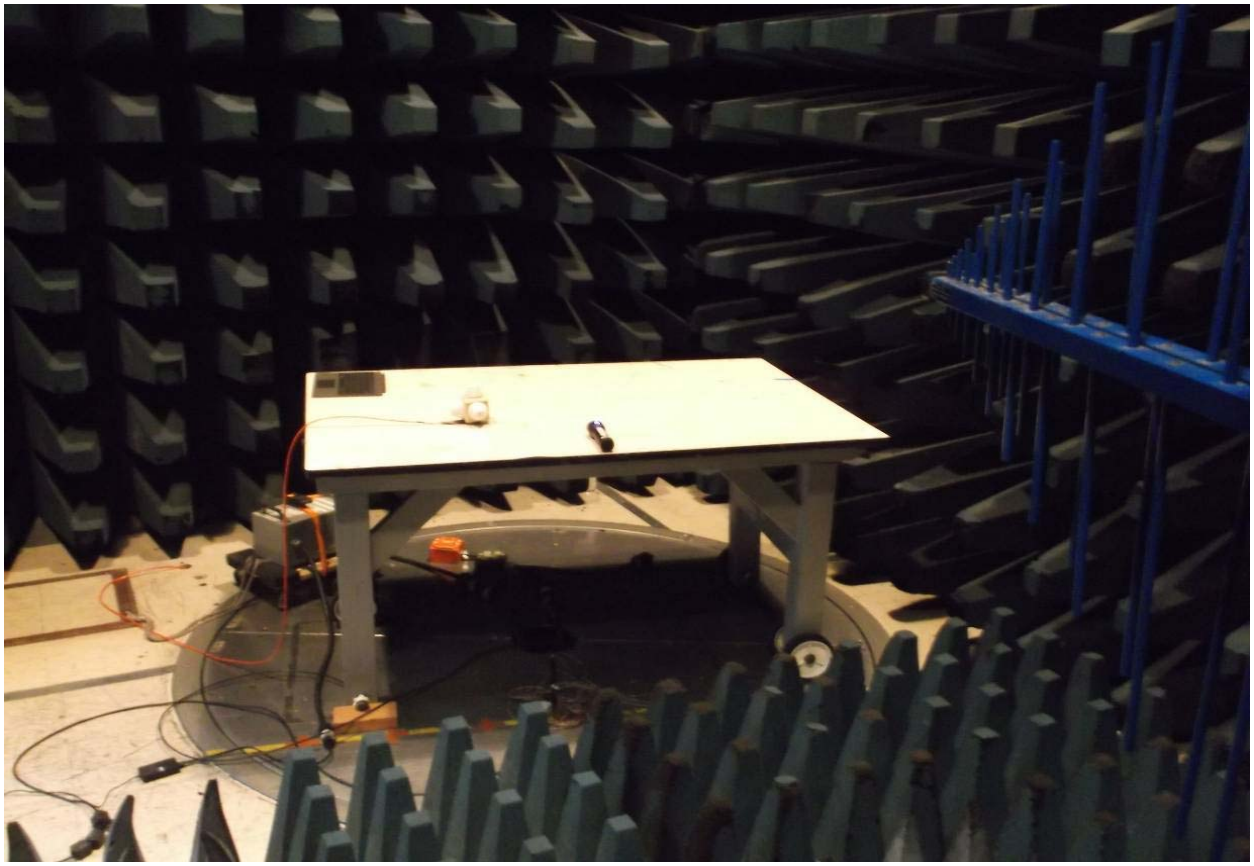
Antenna 1.25 m from UFA, 1.25 m high 1000 MHz - 4200 MHz V 3Vm.crf
Antenna 1.25m from UFA, 1.25 m high 1000 MHz - 4200 MHz H 3Vm.crf

The following calibration files from U:\EMC Stuff\Radiated Immunity Playback Files\CH6\Current\4.2 - 6.0 GHz (Aug 2018)\3 Vm\ were used:

1.8m from UFA, 1.25m high 4200 MHz - 6000 MHz H 3Vm.crf
1.8m from UFA, 1.25m high 4200 MHz - 6000 MHz V 3Vm.crf

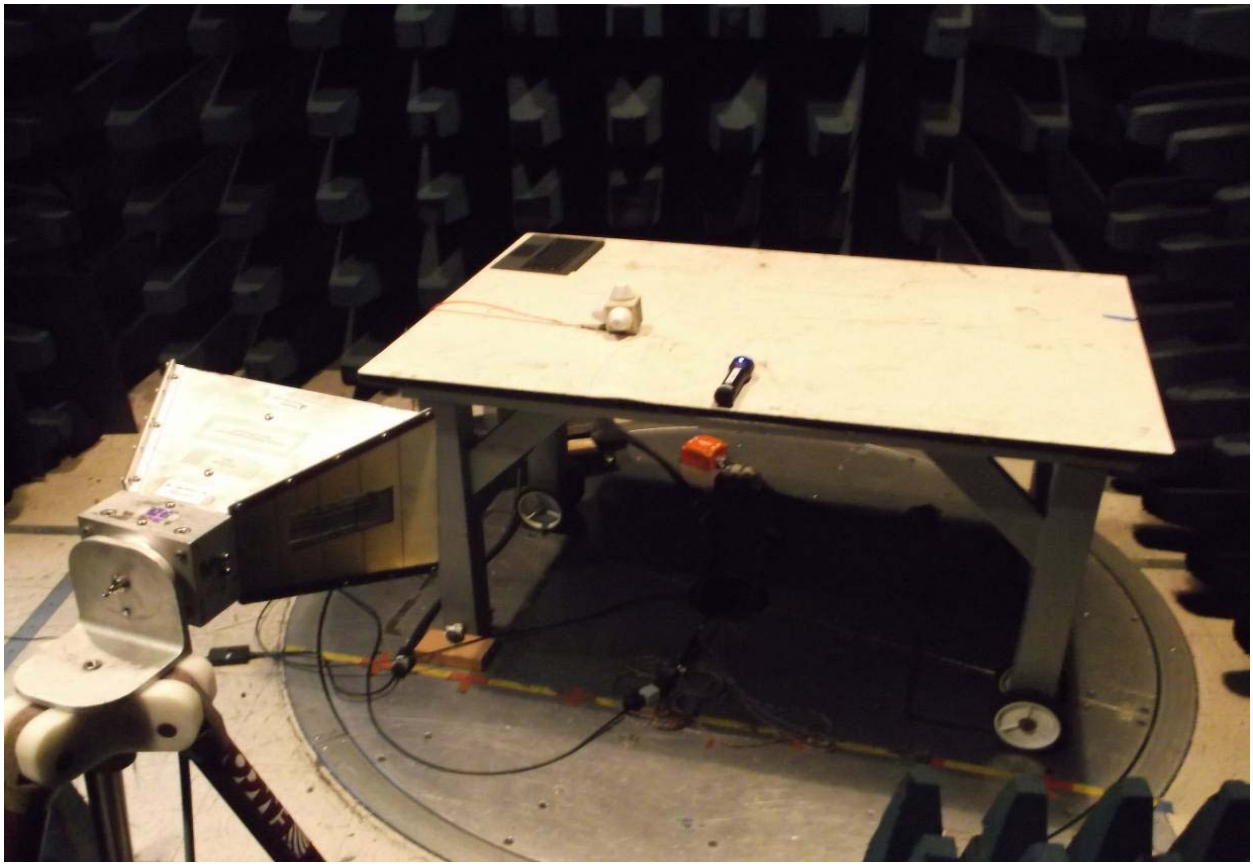
Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-	Environment:	Cover sheet

Test Configuration Photograph #1
(Radiated Immunity, EN 61000-4-3)



Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-	Environment:	Cover sheet

Test Configuration Photograph #2
(Radiated Immunity, EN 61000-4-3)



Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-	Environment:	Cover sheet

Radiated Immunity (EN 61000-4-3)

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 3/27/2019 9:00
Test Engineer: BaoTri Nguyen
Test Location: Fremont Chamber #6
Config. Used: Standby (Bluetooth advertising)
Config Change: None
EUT Voltage: 3.7VDC nominal battery

General Test Configuration

The EUT and all local support equipment were located on a turntable in an anechoic chamber. All remote support equipment was located outside the chamber. Interface cabling to the remote support equipment was routed along the floor and, where possible, passed through ferrite clamps at the exit point from the chamber.

Unless otherwise noted, the "right side" of the EUT is considered the side on the right when standing behind the EUT and the "left side" of the EUT is considered the side on the left when standing behind the EUT.

Ambient Conditions:

Temperature: 23-25 °C
Rel. Humidity: 30-35 %

Summary of Results-Radiated Immunity

Run #	Port	Test Level		Performance Criteria		Comments
		Required	Applied	Required	Met / Result	
KN35 Requirements						
1	Enclosure	80-1000 MHz 1kHz 80% AM 3 V/m	80-1000 MHz 1kHz 80% AM 3 V/m	A	A / Pass	
1	Enclosure	Spot Frequencies 1kHz 80% AM 3 V/m	1800, 2600, 3500, 5000 MHz 1kHz 80% AM 3 V/m	A	A / Pass	
EN 301 489-1 V2.1.1 Requirements						
1	Enclosure	80-1000 MHz 1.0-6.0GHz 1kHz 80% AM 3 V/m	80-1000 MHz 1.0-6.0GHz 1kHz 80% AM 3 V/m	A	A / Pass	

Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-	Environment:	Cover sheet

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

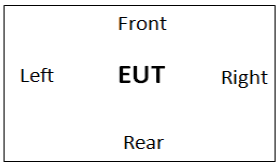
EMC Test Data

Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-	Environment:	Cover sheet

Run #1: Radiated Immunity, 80-6000 MHz (EN61000-4-3)

Frequency:	80-1000 MHz	1-4.2 GHz	4.2-6 GHz
Step Size:	1 %	1 %	1 %
Dwell time:	2874 ms	2874 ms	2874 ms
Field Uniformity:	1.5m x 1.5m	1.0m x 1.0m	1.0m x 1.0m
Test Distance:	2	1.25	1.8

Modulation Details	
Modulating Frequency:	1 kHz
Modulation:	AM
Depth / Deviation:	80%



Note: Laptop is supporting equipment and is not used during standby mode testing

Frequency Range (MHz)	Level V/m	Front		Left Side		Rear		Right		Top		Bottom	
		Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.
80-1000	3	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
1000-4200	3	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
4200-6000	3	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
KN35 Spot Frequencies (Note 2)	3	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A

Test files used for this run:
The following calibration files from U:\EMC Stuff\Radiated Immunity Playback Files\CH6\Current\80-1000 MHz 20Vm (July 2018)\ were used:

Antenna tip 2m from UFA, 1.55m height 80 MHz - 1000 MHz H 3Vm.crf
Antenna tip 2m from UFA, 1.55m height 80 MHz - 1000 MHz V 3Vm.crf

The following calibration files from U:\EMC Stuff\Radiated Immunity Playback Files\CH6\Current\1-4.2 GHz (October 2017)\3 Vm\ were used:

Antenna 1.25 m from UFA, 1.25 m high 1000 MHz - 4200 MHz V 3Vm.crf
Antenna 1.25m from UFA, 1.25 m high 1000 MHz - 4200 MHz H 3Vm.crf

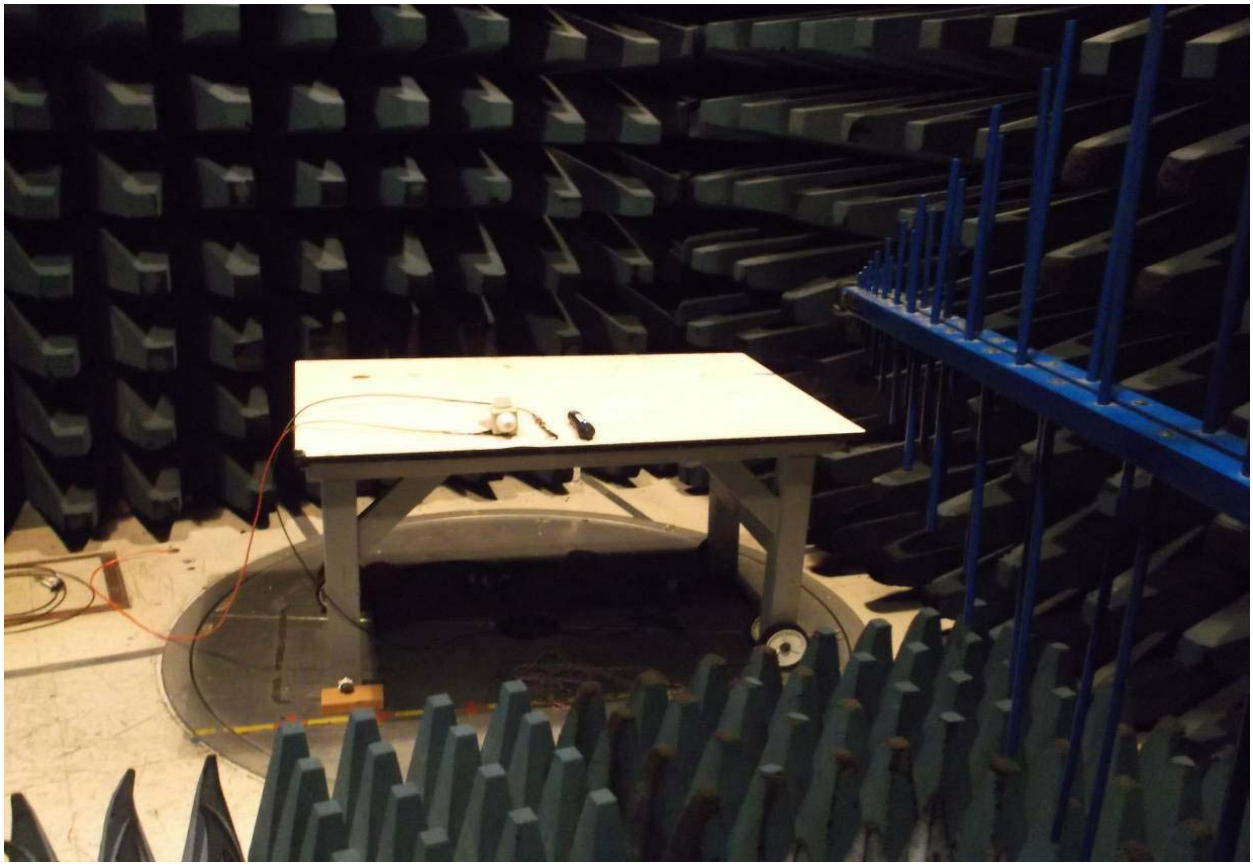
The following calibration files from U:\EMC Stuff\Radiated Immunity Playback Files\CH6\Current\4.2 - 6.0 GHz (Aug 2018)\3 Vm\ were used:

1.8m from UFA, 1.25m high 4200 MHz - 6000 MHz H 3Vm.crf
1.8m from UFA, 1.25m high 4200 MHz - 6000 MHz V 3Vm.crf

Note:	An "X" indicates that the unit continued to operate as intended. Other than bluetooth advertising frequencies (2.402 GHz, 2.426 GHz, 2.48 GHz), there were no other transmission coming from EUT.
Note 2:	Radiated Immunity Spot Tests at 1800, 2600, 3500 and 5000MHz (+/- 1%)

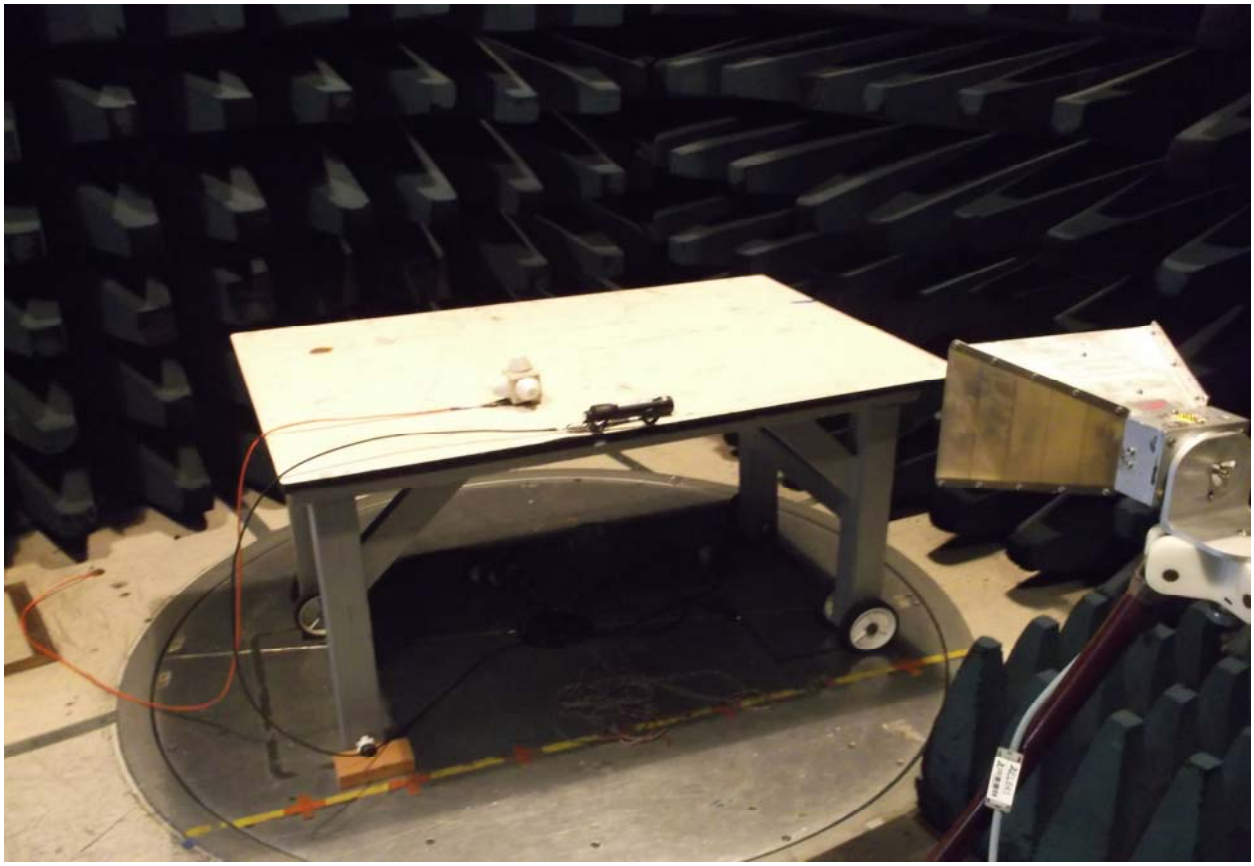
Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-	Environment:	Cover sheet

Test Configuration Photograph #1
(Radiated Immunity, EN 61000-4-3)



Client:	Viavi Solutions	PR Number:	PR087916-01
Product	MicroNIR OnSite-W	T-Log Number:	TL087916-01-EMC
		Project Manager:	Deepa Shetty
Contact:	Michael Klimek	Project Engineer:	-
Immunity Standard(s):	EN 61326-1:2013, KN 11, KN 61000-2, KN 301 489-	Environment:	Cover sheet

Test Configuration Photograph #2
(Radiated Immunity, EN 61000-4-3)



End of Report

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