VCCI
TEST REPORT

for

Network Switch

MODEL: ODS-VL2

Issued to:

Radware Ltd.

22 Raoul Wallenberg St. Tel Avivi 69710, Israel

Issued by:

Compliance Certification Services Inc.

Xindian Lab.

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Issued Date: December 1, 2021

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Revision History

Rev.		Issue Date		Revisions	Effect Page	Revised By
00		December 1, 2021		Initial Issue	ALL	Linda Wu

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1 TEST RESULT CERTIFICATION

Product:	Network Switch
Model:	ODS-VL2
Brand:	Radware
Applicant:	**Radware Ltd.** 22 Raoul Wallenberg St. Tel Avivi 69710, Israel
Manufacturer:	**Radware Ltd.** 22 Raoul Wallenberg St. Tel Avivi 69710, Israel
Tested:	May 27, 2014 ~ September 2, 2019

EMISSION			
Standard	**Item**	**Result**	**Remarks**
VCCI-CISPR 32: 2016	Conducted (Power Port)	PASS	Meet Class A limit
	Conducted (Wired Network Ports)	PASS	Meet Class A limit
	Radiated	PASS	Meet Class A limit
	Radiated emissions from FM receivers	N/A	Please see the page 27
	Conducted differential voltage emissions from Class B equipment	N/A	Please see the page 31

Statements of Conformity
Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

The above equipment has been tested by Compliance Certification Services Inc., and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Approved by:

Jason Lee
Section Manager

Reviewed by:

Eva Fan
Supervisor of report document dept.

2 EUT DESCRIPTION

Product	Network Switch
Brand Name	Radware
Model	ODS-VL2
Applicant	Radware Ltd.
Housing material	Metal case
Identify Number	T210720D12
Received Date	July 20, 2021
EUT Power Rating	100-240VAC, 50-60Hz, 5-3A -36~-72VDC, 12-6A
AC Power During Test	110VAC / 50Hz & 230VAC / 50Hz

I/O PORT

I/O PORT TYPES	Q'TY	TESTED WITH
1. USB Port	1	1
2. LAN Port	8	8
3. Console Port	1	1
4. Fiber Port	2	2

Note: Client consigns only one model sample to test (Model Number: ODS-VL2).

3 TEST METHODOLOGY

3.1. DECISION OF FINAL TEST MODE

The EUT was tested together with the below additional components, and a configuration, which produced the worst emission levels, was selected and recorded in this report.

The test configuration modes are as the following:

Conduction Modes (Power port):

1	**AC Power Left Mode**	**110VAC, 50Hz**
2		**230VAC, 50Hz**
3	**AC Power Right Mode**	**110VAC, 50Hz**
4	**DC Power Left Mode**	**110VAC, 50Hz**
5	**DC Power Right Mode**	**110VAC, 50Hz**

Conduction Modes (Wired Network Ports):

1	**LAN 1**	**ISN Mode**
2	**LAN 8**	

Radiation Modes:

1	**AC Mode**	**110VAC, 50Hz**
2	**AC Mode**	**230VAC, 50Hz**
	AC Mode / 1-6GHz	
3	**DC Mode**	**110VAC, 50Hz**

Worst:
Conduction (Power port): Mode 1
Conduction (Wired Network Ports): Mode 1
Radiation: Mode 2

3.2. EUT SYSTEM OPERATION

1. EUT console port connects Notebook.
2. Set Putty to “19200”, press the “sure” to test.

Note: Test program is self-repeating throughout the test.

4 SETUP OF EQUIPMENT UNDER TEST

4.1. DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

EUT Devices:

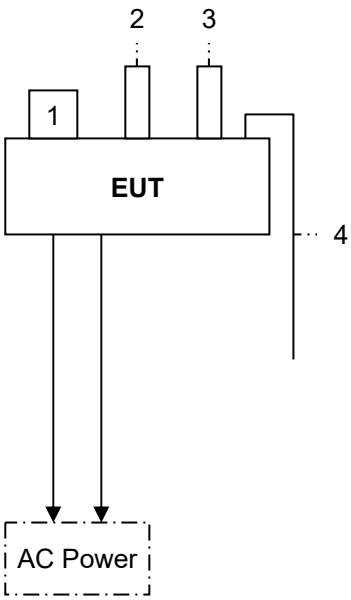
No.	Equipment	Model No.	Brand Name
1	CPU (3.3GHz)	E3-1230V2	Intel
2	Mother board	COB-G501	CASWELL
3	Memory (8GB) X4	N/A	WARIS
4	HDD (500GB)	N/A	HGST
5	Power Supply	YH-5301K DC	3Y POWER
6		YH-5301E AC	3Y POWER
7	Security Adapter	CNN3530-500-NHB-2.0-G	CAVIUM INC
8	Transceivers	FTLX8571D3BCL-RW	Finisar
9		FTLX1471D3BCL-RW	Finisar
10		SI8512-X5ATO-3C	Sanoc
11		SI1312-10ATO	Sanoc
12		SI1512-80ATO	Sanoc
13		DM7041-R-L	Methode

Peripherals Devices:

No.	Equipment	Model No.	Serial No.	FCC ID / BSMI ID	Brand Name	Data Cable	Power Cord
1	USB Flash Disk	N/A	N/A	N/A	ADATA	N/A	N/A
2	LAN Loop	N/A	N/A	N/A	N/A	Unshielded, 3.0m x4	N/A
3	Fiber Loop	N/A	N/A	N/A	N/A	Unshielded, 0.5m	N/A
4	Console Cable	N/A	N/A	N/A	N/A	Unshielded, 1.5m	N/A

Note:
1) All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2) Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4.2. CONFIGURATION OF SYSTEM UNDER TEST



5 FACILITIES AND ACCREDITATIONS

5.1. FACILITIES

All measurement facilities used to collect the measurement data are located at CCSrf Taiwan Xindian Lab. at No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan.

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. All receiving equipment conforms to CISPR 16-1-1, CISPR 16-1-2, CISPR 16-1-3, CISPR 16-1-4 and CISPR 16-1-5.

5.2. ACCREDITATIONS

Our laboratories are accredited and approved by the following accreditation body according to ISO/IEC 17025.

Taiwan	TAF
USA	A2LA

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada	Industry Canada
Japan	VCCI
Taiwan	BSMI
USA	FCC

Copies of granted accreditation certificates are available for downloading from our web site, http:///www.ccsrf.com

5.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Uncertainty
Conducted emissions (Power port)	0.15MHz ~ 30MHz	± 2.8
Conducted emissions (Wired network ports)	0.15MHz ~ 30MHz	± 3.2
Radiated emissions	30MHz ~ 1000MHz	± 5.3
	1000MHz ~ 6000MHz	± 4.6

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Consistent with industry standard (e.g. CISPR 22: 2005, clause 11, Measurement Uncertainty) determining compliance with the limits shall be base on the results of the compliance measurement. Consequently the measure emissions being less than the maximum allowed emission result in this be a compliant test or passing test.

The acceptable measurement uncertainty value without requiring revision of the compliance statement is base on conducted and radiated emissions being less than U_{CISPR} which is 3.8dB(AMN); 5.0dB(AAN); 5.2dB(OATS) and 5.5dB(1-6GHz) respectively. CCS values (called U_{Lab} in CISPR 16-4-2) is less than U_{CISPR} as shown in the table above. Therefore, MU need not be considered for compliance.

6 CONDUCTED EMISSION MEASUREMENT

6.1. LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

NOTE:
(1) The lower limit shall apply at the transition frequencies.
(2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
(3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

6.2. TEST INSTRUMENTS

Conducted Emission room # B				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
BNC Cable	EMCI	CFD300-NL	BNC#B5	01/06/2020
EMI Test Receiver	R&S	ESCI	100234	05/06/2020
LISN	Schwarzbeck	NSLK 8127	8127526	05/07/2020
LISN(EUT)	Schwarzbeck	NSLK 8127	8127382	05/07/2020
Pulse Limiter	R&S	ESH3-Z2	100374	01/06/2020
Thermo-Hygro Meter	Wisewind	201A	SD-S017	09/26/2019
Test S/W	EZ-EMC			

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. N.C.R = No Calibration Request.
3. Mains port conducted EMI measurement facility: C-14352

6.3. TEST PROCEDURES

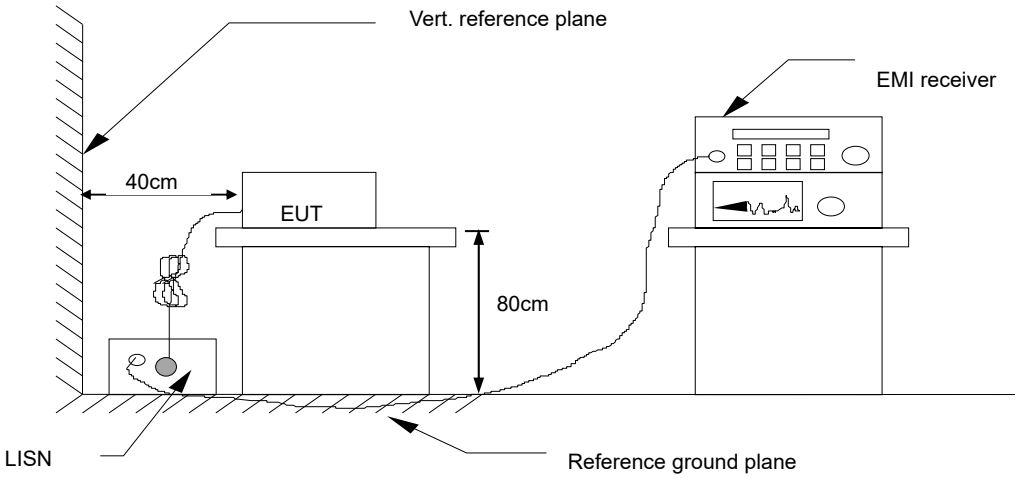
Procedure of Preliminary Test

- The EUT and Support equipment, if needed, was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per VCCI-CISPR 32 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor standing equipment, it is placed on the ground plane, which has a 15 cm non-conductive covering to insulate the EUT from the ground plane.
- All I/O cables were positioned to simulate typical actual usage as per VCCI-CISPR 32.
- The test equipment EUT installed received AC main power, through a Line Impedance Stabilization Network (LISN), which supplied power source and was grounded to the ground plane.
- All support equipment power received from a second LISN.
- The EUT test program was started. Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.
- The Receiver scanned from 150kHz to 30MHz for emissions in each of the test modes.
- During the above scans, the emissions were maximized by cable manipulation.
- The test mode(s) described in Item 3.1 were scanned during the preliminary test.
- After the preliminary scan, we found the test mode described in Item 3.1 producing the highest emission level.
- The EUT configuration and cable configuration of the above highest emission levels were recorded for reference of the final test.

Procedure of Final Test

- EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.
- A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.
- The test data of the worst-case condition(s) was recorded.

6.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

6.5. DATA SAMPLE

Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector (P/Q/A)	Line (L1/L2)
x.xx	42.95	0.55	43.50	73	-29.50	Q	L1

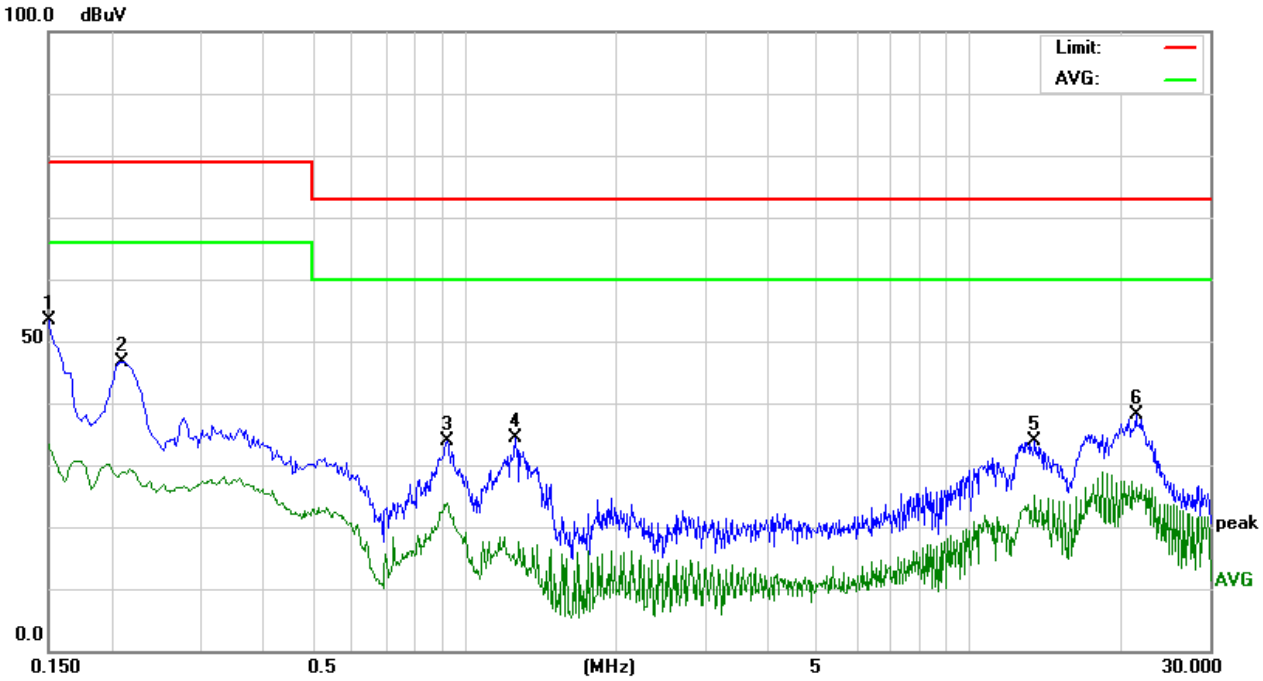
Freq. = Emission frequency in MHz
Reading = Uncorrected Analyzer/Receiver reading
Factor = Insertion loss of LISN + Cable Loss + Pulse Limit
Result = Reading + Factor
Limit = Limit stated in standard
Margin = Reading in reference to limit
P = Peak Reading
Q = Quasi-peak Reading
A = Average Reading
L1 = Hot side
L2 = Neutral side

Calculation Formula

Margin (dB) = Result (dBuV) – Limit (dBuV)

6.6. TEST RESULTS

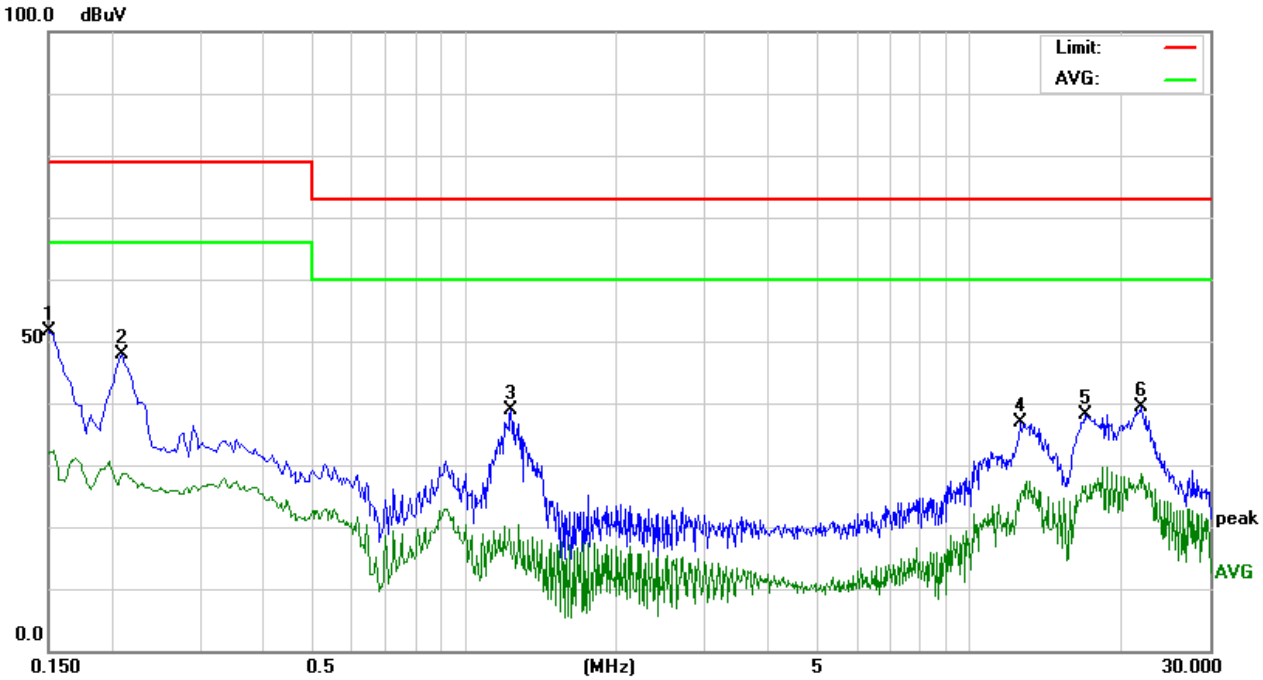
Model No.	ODS-VL2	**6dB Bandwidth**	9 kHz
Environmental Conditions	23°C, 62% RH	**Test Mode**	Mode 1
Tested by	Pipo Hou	**Phase**	L1
Standard	VCCI-CISPR 32 CLASS A		



Conducted Emission Readings							
Frequency Range Investigated				**150 kHz to 30 MHz**			
Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector (P/Q/A)	Line (L1/L2)
0.1500	**43.25**	**10.08**	**53.33**	**79.00**	**-25.67**	**P**	**L1**
0.2100	**36.70**	**10.05**	**46.75**	**79.00**	**-32.25**	**P**	**L1**
0.9260	**23.84**	**10.15**	**33.99**	**73.00**	**-39.01**	**P**	**L1**
1.2660	**24.17**	**10.17**	**34.34**	**73.00**	**-38.66**	**P**	**L1**
13.5100	**23.18**	**10.62**	**33.80**	**73.00**	**-39.20**	**P**	**L1**
21.4420	**27.27**	**10.81**	**38.08**	**73.00**	**-34.92**	**P**	**L1**

Note: 1. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).

Model No.	ODS-VL2	**6dB Bandwidth**	9 kHz
Environmental Conditions	23ºC, 62% RH	**Test Mode**	Mode 1
Tested by	Pipo Hou	**Phase**	L2
Standard	VCCI-CISPR 32 CLASS A		



Conducted Emission Readings							
Frequency Range Investigated				**150 kHz to 30 MHz**			
Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector (P/Q/A)	Line (L1/L2)
0.1500	**41.51**	**10.08**	**51.59**	**79.00**	**-27.41**	**P**	**L2**
0.2100	**37.71**	**10.05**	**47.76**	**79.00**	**-31.24**	**P**	**L2**
1.2420	**28.76**	**10.17**	**38.93**	**73.00**	**-34.07**	**P**	**L2**
12.6420	**26.23**	**10.60**	**36.83**	**73.00**	**-36.17**	**P**	**L2**
17.0140	**27.46**	**10.70**	**38.16**	**73.00**	**-34.84**	**P**	**L2**
21.9300	**28.53**	**10.81**	**39.34**	**73.00**	**-33.66**	**P**	**L2**

Note: 1. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).

7 REQUIREMENTS FOR ASYMMETRIC MODE CONDUCTED EMISSIONS

7.1. LIMITS

For Class A Equipment

FREQUENCY (MHz)	Voltage Limit (dBuV)		Current Limit (dBuA)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 ~ 0.5	97 ~ 87	84 ~ 74	53 ~ 43	40 ~ 30
0.5 ~ 30.0	87	74	43	30

NOTE: The limits decrease linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

For Class B Equipment

FREQUENCY (MHz)	Voltage Limit (dBuV)		Current Limit (dBuA)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	84 ~ 74	74 ~ 64	40 ~ 30	30 ~ 20
0.5 - 30.0	74	64	30	20

NOTE: The limits decrease linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

7.2. TEST INSTRUMENTS

Conducted Emission room # B				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
BNC Cable	EMCI	CFD300-NL	BNC#B5	01/06/2020
EMI Test Receiver	R&S	ESCI	100234	05/06/2020
ISN	Teseq	ISN T800	30847	05/07/2020
LISN	Schwarzbeck	NSLK 8127	8127526	05/07/2020
LISN(EUT)	Schwarzbeck	NSLK 8127	8127382	05/07/2020
Pulse Limiter	R&S	ESH3-Z2	100374	01/06/2020
Thermo-Hygro Meter	Wisewind	201A	SD-S017	09/26/2019
Test S/W	EZ-EMC			

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. N.C.R = No Calibration Request.
3. Telecommunication ports conducted EMI measurement facility: T-11337

7.3. TEST PROCEDURES

- Selecting AAN for unscreened cable or a current probe for screened cable to take measurement.
- The port of the EUT was connected to the remote side support equipment through the AAN/Current Probe and communication in normal condition.
- Making a overall range scan by using the test receiver controlled by controller and record at least six highest emissions for showing in the test report.
- Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.
- In case of measuring on the screened cable, the current limit shall be applied; otherwise the voltage limit should be applied.
- The following test mode was scanned during the preliminary test:

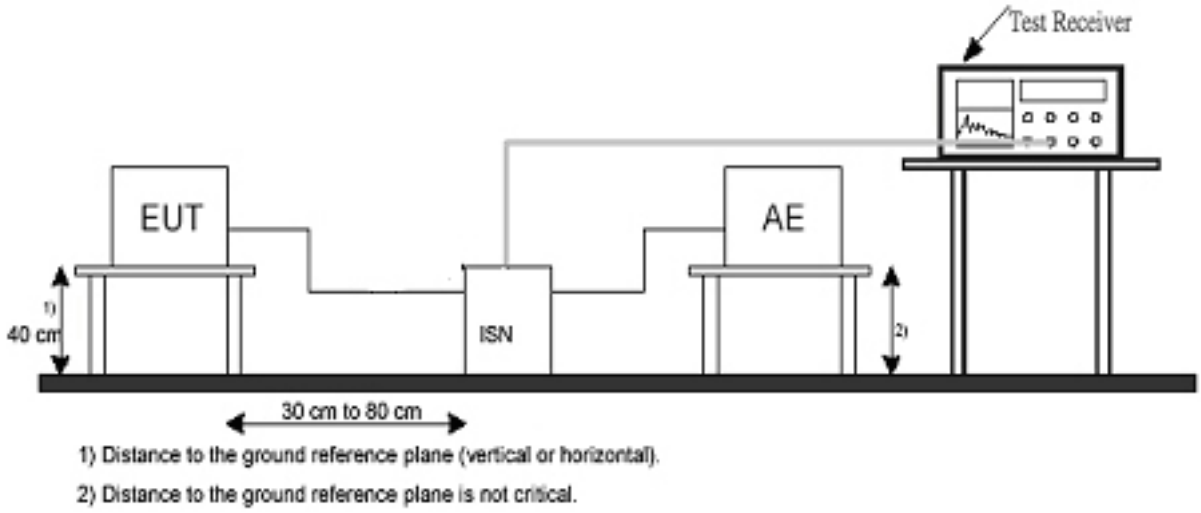
Modes:

1	**LAN 1**	**ISN Mode**
2	**LAN 8**	

- After the preliminary scan, we found the following test mode(s) producing the highest emission level and test data of the worst case was recorded.

Mode: 1

7.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.5. DATA SAMPLE

Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector (P/Q/A)
x.xx	62.95	0.55	63.50	87	-23.50	Q

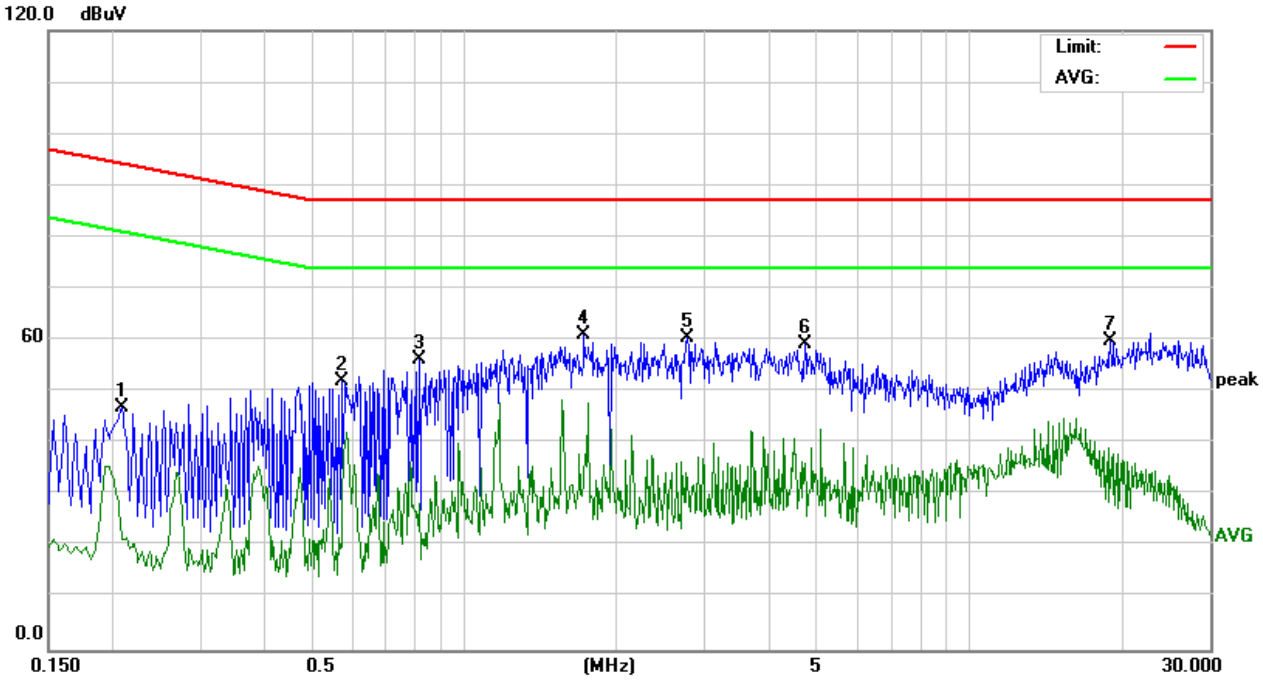
Freq. = Emission frequency in MHz
Reading = Uncorrected Analyzer/Receiver reading
Factor = Insertion loss of LISN + Cable Loss + Pulse Limit
Result = Reading + Factor
Limit = Limit stated in standard
Margin = Reading in reference to limit
P = Peak Reading
Q = Quasi-peak Reading
A = Average Reading

Calculation Formula

Margin (dB) = Result (dBuV) – Limit (dBuV)

7.6. TEST RESULTS

Model No.	ODS-VL2	**6dB Bandwidth**	9 kHz
Environmental Conditions	23°C, 62% RH	**Test Mode**	Mode 1
Tested by	Pipo Hou	**Standard**	VCCI-CISPR 32 CLASS A



Conducted Emission Readings						
Frequency Range Investigated				**150 kHz to 30 MHz**		
Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector (P/Q/A)
0.2100	**27.08**	**19.92**	**47.00**	**94.20**	**-47.20**	**P**
0.5740	**32.48**	**19.69**	**52.17**	**87.00**	**-34.83**	**P**
0.8139	**36.51**	**19.66**	**56.17**	**87.00**	**-30.83**	**P**
1.7260	**41.40**	**19.66**	**61.06**	**87.00**	**-25.94**	**P**
2.7740	**40.90**	**19.67**	**60.57**	**87.00**	**-26.43**	**P**
4.7340	**39.58**	**19.68**	**59.26**	**87.00**	**-27.74**	**P**
19.0620	**40.11**	**19.83**	**59.94**	**87.00**	**-27.06**	**P**

8 RADIATED EMISSION MEASUREMENT

8.1. LIMITS OF RADIATED EMISSION MEASUREMENT

Below 1GHz

FREQUENCY (MHz)	dBuV/m (At 10m)		dBuV/m (At 3m)	
	Class A	Class B	Class A	Class B
30 ~ 230	40	30	50	40
230 ~ 1000	47	37	57	47

Above 1GHz

Frequency (MHz)	Class A (dBuV/m) (At 3m)		Class B (dBuV/m) (At 3m)	
	Average	Peak	Average	Peak
1000 ~ 3000	56	76	50	70
3000 ~ 6000	60	80	54	74

NOTE: The lower limit shall apply at the transition frequencies.

According to VCCI-CISPR 32: 2016 Table 1 the measurement frequency range shown in the following table:

Table 1 – Required highest frequency for radiated measurement

Highest internal frequency (F_X)	Highest internal frequency
$F_X \leq 108$ MHz	1 GHz
108 MHz < $F_X \leq 500$ MHz	2 GHz
500 MHz < $F_X \leq 1$ GHz	5 GHz
$F_X > 1$ GHz	5 x F_X up to a maximum of 6 GHz
NOTE 1 For FM and TV broadcast receivers, F_X is determined from the highest frequency generated or used excluding the local oscillator and tuned frequencies. NOTE 2 F_X is defined in 3.1.19.	

Where F_x is unknown, the radiated emission measurements shall be performed up to 6 GHz.

Radiated emissions from FM receivers

Frequency range MHz	Measurement		Class B limit dB(μV/m)	
	Distance m	Detector type / bandwidth	Fundamental	Harmonics
			OATS / SAC (see Table A.1)	OATS / SAC (see Table A.1)
30 – 230	10	Quasi peak/ 120kHz	50	42
230 – 300				42
300 – 1000				46
30 – 230	3		60	52
230 – 300				52
300 – 1000				56
These relaxed limits apply only to emissions at the fundamental and harmonic frequencies of the local oscillator. Signals at all other frequencies shall be compliant with the limits given in 7.3.1 Class B Limit				

8.2. TEST INSTRUMENTS

Open Area Test Site # H				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Bilog Antenna	Teseq	CBL 6112D	40529	09/02/2019
Cable	EMEC	CFD400NL-LW	N-Type#H11	08/14/2020
EMI Test Receiver	R&S	ESCI	101340	03/19/2020
Pre-Amplifier	HP	8447D	1937A01554	09/27/2019
Thermo-Hygro Meter	Wisewind	201A	No. 03	05/21/2020
Test S/W	EZ-EMC			
Chamber # E (Above 1GHz Used)				
Horn Antenna	ETS	3117	00139062	09/13/2019
K-Type Cable	Rosnol	K1K50-UP0264-K1k50-1000	170803-1	08/06/2020
Microflex Cable	EMEC	EM104-7M	SD-R051	08/06/2020
Pre-Amplifier	Com-Power	PAM-118A	551041	06/17/2020
Signal Analyzer	R&S	FSV40	101269	03/29/2020
Test S/W	EZ-EMC			

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. N.C.R = No Calibration Request.
3. Radiated EMI measurement below 1GHz facility: R-13321
4. Radiated EMI measurement above 1GHz facility: G-20036

8.3. TEST PROCEDURES

Procedure of Preliminary Test

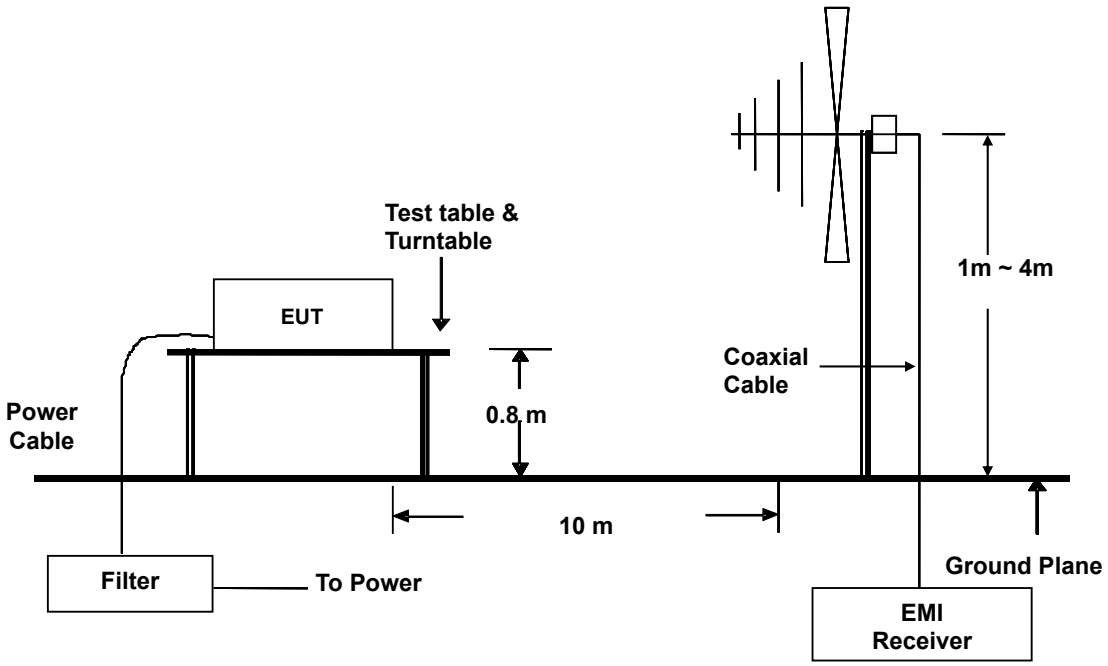
- The equipment was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane. When the EUT is a floor standing equipment, it is placed on the ground plane which has a 15 cm non-conductive covering to insulate the EUT from the ground plane.
- Support equipment, if needed, was placed as per VCCI-CISPR 32.
- All I/O cables were positioned to simulate typical usage as per VCCI-CISPR 32.
- The EUT received AC power source from the outlet socket under the turntable. All support equipment power received from another socket under the turntable.
- The antenna was placed at 3 or 10 meters away from the EUT as stated in VCCI-CISPR 32. The antenna connected to the Spectrum Analyzer via a cable and at times a pre-amplifier would be used.
- The Analyzer / Receiver quickly scanned from 30MHz to 6000MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- The test mode(s) described in Item 3.1 were scanned during the preliminary test:
- After the preliminary scan, we found the test mode described in Item 3.1 producing the highest emission level.
- The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the final test.

Procedure of Final Test

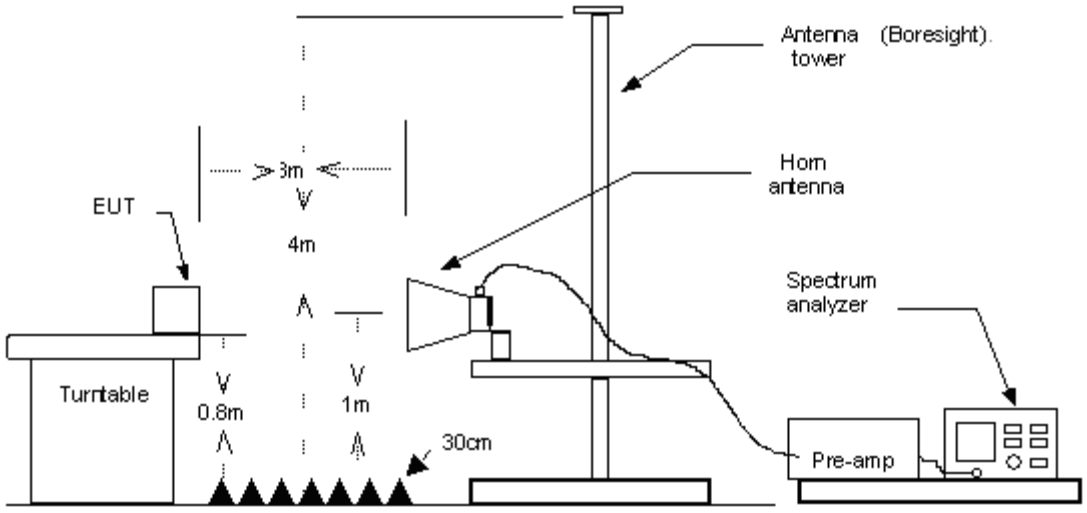
- EUT and support equipment were set up on the turntable as per the configuration with highest emission level in the preliminary test.
- The Analyzer / Receiver scanned from 30MHz to 6000MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. Below 1GHz the Q.P. reading and above 1GHz the Peak and Average reading are presented.
- The test data of the worst-case condition(s) was recorded.

8.4. TEST SETUP

Below 1GHz



Above 1GHz



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

8.5. DATA SAMPLE

Below 1GHz

Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (P/Q)	Pol. (H/V)
x.xx	14.0	12.2	26.2	40	-13.8	Q	H

Above 1GHz

Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (P/A)	Pol. (H/V)
x.xx	42.95	0.55	43.50	60	-16.50	A	H

Freq. = Emission frequency in MHz
Reading = Uncorrected Analyzer/Receiver reading
Factor = Antenna Factor + Cable Loss - Amplifier Gain
Result = Reading + Factor
Limit = Limit stated in standard
Margin = Reading in reference to limit
P = Peak Reading
Q = Quasi-peak Reading
A = Average Reading
H = Antenna Polarization: Horizontal
V = Antenna Polarization: Vertical

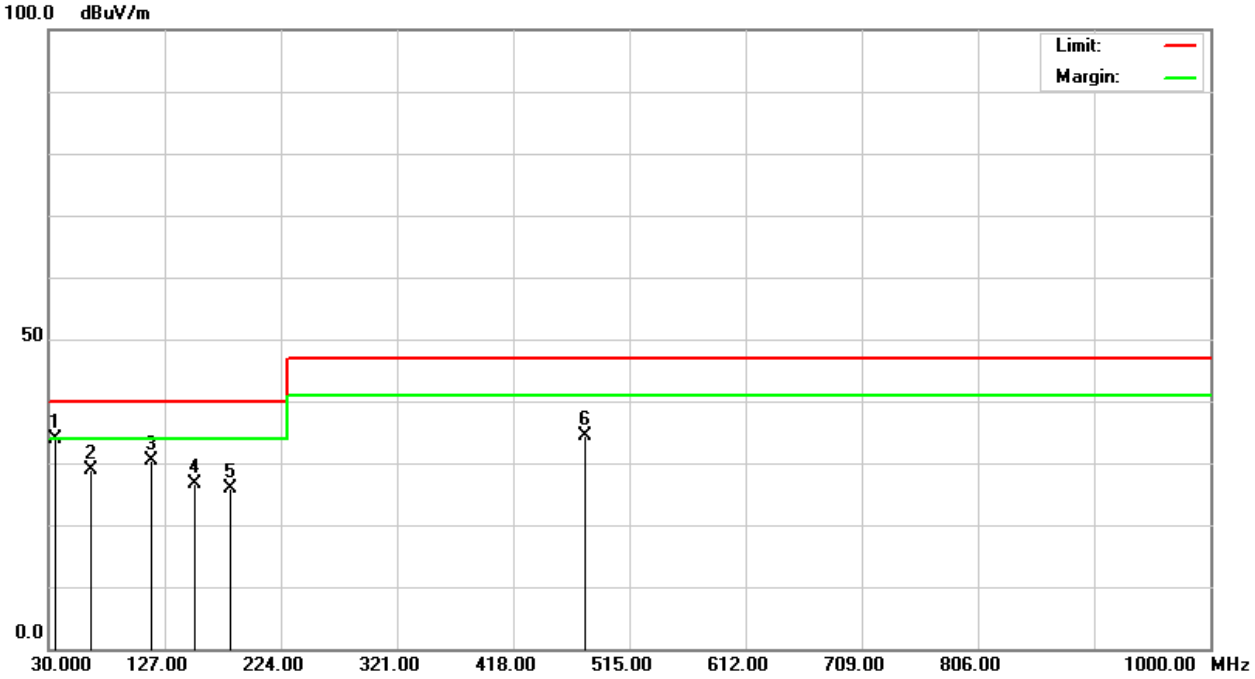
Calculation Formula

Margin (dB) = Result (dBuV/m) – Limit (dBuV/m)

8.6. TEST RESULTS

Below 1GHz

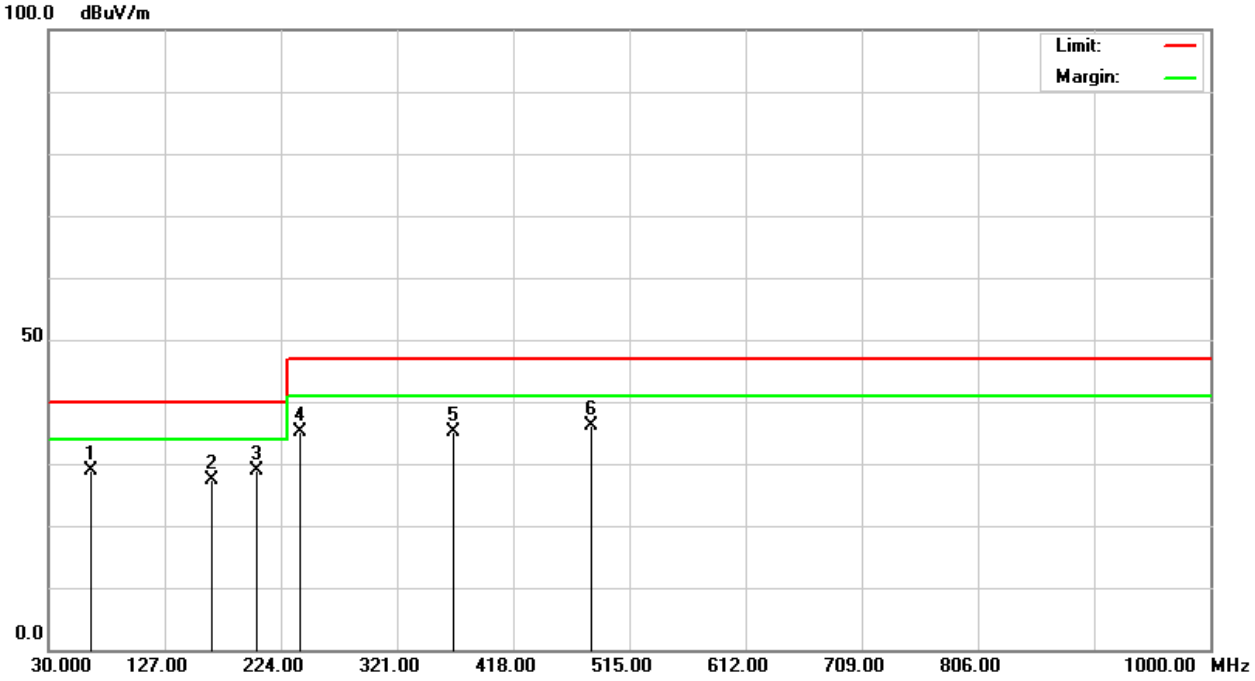
Model No.	ODS-VL2	Test Mode	Mode 2
Environmental Conditions	26°C, 60% RH	6dB Bandwidth	120 kHz
Antenna Pole	Vertical	Antenna Distance	10m
Detector Function	Quasi-peak.	Tested by	Pipo Hou
Standard	VCCI-CISPR 32 CLASS A		



Radiated Emission Readings									
Frequency Range Investigated				30 MHz to 1000 MHz at 10m					
Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Detector (P/Q)	Pol. (H/V)
36.2400	39.20	-5.20	34.00	40.00	-6.00	100	110	Q	V
66.1800	43.10	-14.34	28.76	40.00	-11.24	100	265	Q	V
116.2800	38.20	-7.82	30.38	40.00	-9.62	100	310	Q	V
152.3400	36.10	-9.40	26.70	40.00	-13.30	100	215	Q	V
182.5800	36.40	-10.59	25.81	40.00	-14.19	100	160	Q	V
478.2600	35.50	-1.06	34.44	47.00	-12.56	400	190	Q	V

Note: 1. P= Peak Reading; Q= Quasi-peak Reading.

Model No.	ODS-VL2	Test Mode	Mode 2
Environmental Conditions	26°C, 60% RH	6dB Bandwidth	120 kHz
Antenna Pole	Horizontal	Antenna Distance	10m
Detector Function	Quasi-peak.	Tested by	Pipo Hou
Standard	VCCI-CISPR 32 CLASS A		



Radiated Emission Readings									
Frequency Range Investigated				30 MHz to 1000 MHz at 10m					
Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Detector (P/Q)	Pol. (H/V)
65.1200	43.10	-14.11	28.99	40.00	-11.01	400	125	Q	H
166.2400	37.50	-10.06	27.44	40.00	-12.56	400	310	Q	H
204.3800	38.60	-9.78	28.82	40.00	-11.18	400	295	Q	H
240.0500	43.10	-7.88	35.22	47.00	-11.78	400	190	Q	H
368.1200	39.20	-4.11	35.09	47.00	-11.91	100	120	Q	H
483.2200	37.20	-1.10	36.10	47.00	-10.90	100	210	Q	H

Note: 1. P= Peak Reading; Q= Quasi-peak Reading.

Above 1GHz

Model No.	ODS-VL2	Test Mode	Mode 2
Environmental Conditions	26°C, 60% RH	6dB Bandwidth	1 MHz
Antenna Pole	Vertical / Horizontal	Antenna Distance	3m
Highest frequency generated or used	3300MHz	Upper frequency	6000MHz
Detector Function	Peak and average.	Tested by	Pipo Hou
Standard	VCCI-CISPR 32 CLASS A		

Radiated Emission Readings							
Frequency Range Investigated			Above 1GHz at 3m				
Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (P/A)	Pol. (H/V)
1030.000	50.00	-7.26	42.74	76.00	-33.26	P	V
1595.000	47.92	-6.81	41.11	76.00	-34.89	P	V
1920.000	47.39	-3.63	43.76	76.00	-32.24	P	V
2670.000	47.43	-2.34	45.09	76.00	-30.91	P	V
3095.000	46.75	2.54	49.29	80.00	-30.71	P	V
4985.000	48.74	0.47	49.21	80.00	-30.79	P	V

Radiated Emission Readings							
Frequency Range Investigated			Above 1GHz at 3m				
Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (P/A)	Pol. (H/V)
1105.000	56.95	-7.61	49.34	76.00	-26.66	P	H
1235.000	49.38	-6.76	42.62	76.00	-33.38	P	H
1435.000	50.13	-6.79	43.34	76.00	-32.66	P	H
1710.000	48.59	-5.73	42.86	76.00	-33.14	P	H
2395.000	47.28	-2.93	44.35	76.00	-31.65	P	H
3125.000	48.24	0.92	49.16	80.00	-30.84	P	H
5475.000	48.04	1.41	49.45	80.00	-30.55	P	H

Note: 1. P= Peak Reading; A= Average Reading.

Radiated emissions from FM receivers

Model No.	N/A	**Test Mode**	N/A
Environmental Conditions	N/A	**6dB Bandwidth**	N/A
Antenna Pole	N/A	**Antenna Distance**	N/A
Detector Function	N/A	**Tested by**	N/A

Note: No applicable, the EUT doesn't have FM port.

9 CONDUCTED DIFFERENTIAL VOLTAGE EMISSIONS FROM CLASS B EQUIPMENT

Applicable to
1. TV broadcast receiver tuner ports with an accessible connector
2. RF modulator output ports
3. FM broadcast receiver tuner ports with an accessible connector

Frequency range MHz	Class B limits DB(μV) 75 Ω			Applicability
	other	Local Oscillator Fundamental	Local Oscillator Harmonics	
30 – 950	46	46	46	See a)
950 – 2 150	46	54	54	
950 – 2 150	46	54	54	See b)
30 – 300	46	54	50	See c)
300 – 1 000			52	
30 – 300	46	66	59	See d)
300 – 1 000			52	
30 – 950	46	76	46	See e)
950 – 2 150		n/a	54	

a) Television receivers (analogue or digital), video recorders and PC TV broadcast receiver tuner cards working in channels between 30 MHz and 1 GHz, and digital audio receivers.

b) Tuner units (not the LNB) for satellite signal reception.

c) Frequency modulation audio receivers and PC tuner cards.

d) Frequency modulation car radios.

e) Applicable to EUTs with RF modulator output ports (for example DVD equipment, video recorders, camcorders and decoders etc.) designed to connect to TV broadcast receiver tuner ports.

Testing is required at only one EUT supply voltage and frequency.

The term ‘other’ refers to all emissions other than the fundamental and the harmonics of the local oscillator.

The test shall be performed with the device operating at each reception channel.

The test shall cover the entire frequency range.

9.1. TEST INSTRUMENTS

Conducted Emission room #				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. N.C.R = No Calibration Request.

9.2. TEST PROCEDURES

Procedure of Preliminary Test

- The equipment was set up as per the test configuration to simulate typical usage per the user's manual. The EUT was place on a wooden table with a height of 0.8 meters was used that was placed on the ground plane.
- Support equipment, if needed, was placed as per VCCI-CISPR 32.
- All I/O cables were positioned to simulate typical usage as per VCCI-CISPR 32.
- The EUT received AC power source, from the outlet socket. All support equipment received power was from another socket.
- Added a 75←→50Ω matching network, between EUT and EMI test receiver to get impedance match condition during the test.
- The output level of the auxiliary signal generator shall be set to give the value of 60 dB (μV) for FM receiver or 70 dB (μV) for TV and VCR to the input of the frequency-modulation or television receiver (or video recorder) respectively, on a 75Ω impedance. An additional amplifier should be insert at the generator output, if necessary.
- The output level of the auxiliary signal generator shall be a standard TV color bar Move signal for TV receivers and video recorders with sound carrier that defined in Table A12 of VCCI-CISPR 32 .An additional amplifier should be insert at the generator output, if necessary.
- The results shall be expressed in the terms of the substitution voltage in decibels (μV), as supplied by the standard signal generator. The specified source impedance of the receiver shall be stated with the results.
- When measurements are made at the antenna terminals of the EUT, an auxiliary signal generator shall be used to feed the equipment under test input with a standard test signal (see Table A.12 of CISPR 32/ VCCI-CISPR 32) at the receiver tuning frequency (30MHz to 2150MHz).
- The test mode(s) described in Item 4.1 were scanned during the preliminary test:
- After the preliminary scan, we found the test mode described in Item 4.1 producing the highest emission level.
- The EUT and cable configuration of the above highest emission levels were recorded for the final test.

Procedure of Final Test

- EUT and support equipment were set up on the table as per the configuration with highest emission level in the preliminary test.
- The Analyzer / Receiver scanned from 30MHz to 2150MHz. recorded the value, the local frequency, amplitude, were recorded in which correction factors were used to calculate the emission level and compare reading to the applicable limit, and only Q.P reading will record in this report.
- Recorded at least the six highest emissions. Emission frequencies, amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and only Q.P. reading is presented.
- The test data of the worst-case condition(s) was recorded.

9.3. DATA SAMPLE

Freq. (MHz)	Matching Factor (dB)	Spectrum Reading (dBuV)	SG Level (dBuV)	Emission (dBuV)	Limit Line (dBuV)	Over Limit (dB)	Note (F/H/O)
x.xx	12.2	14.0	38.4	26.2	46	-19.8	F

Freq. = Emission frequency in MHz
Matching Factor = Matching network(50/75Ω) attenuation
Spectrum Reading=Spectrum analyzer reading
S.G. Level = Standard S.G. output level
Emission = SG Level - Matching Factor
Limit Line = Limit stated in standard
Over Limit = Reading in reference to limit
F = Fundamental
H = Harmonics
O = Other

Calculation Formula

Over Limit (dB) = Emission (dBμV) – Limit Line (dBμV)

9.4. TEST RESULTS

Model No.	N/A	**6dB Bandwidth**	N/A
Environmental Conditions	N/A	**Test Mode**	N/A
Tested by	N/A		

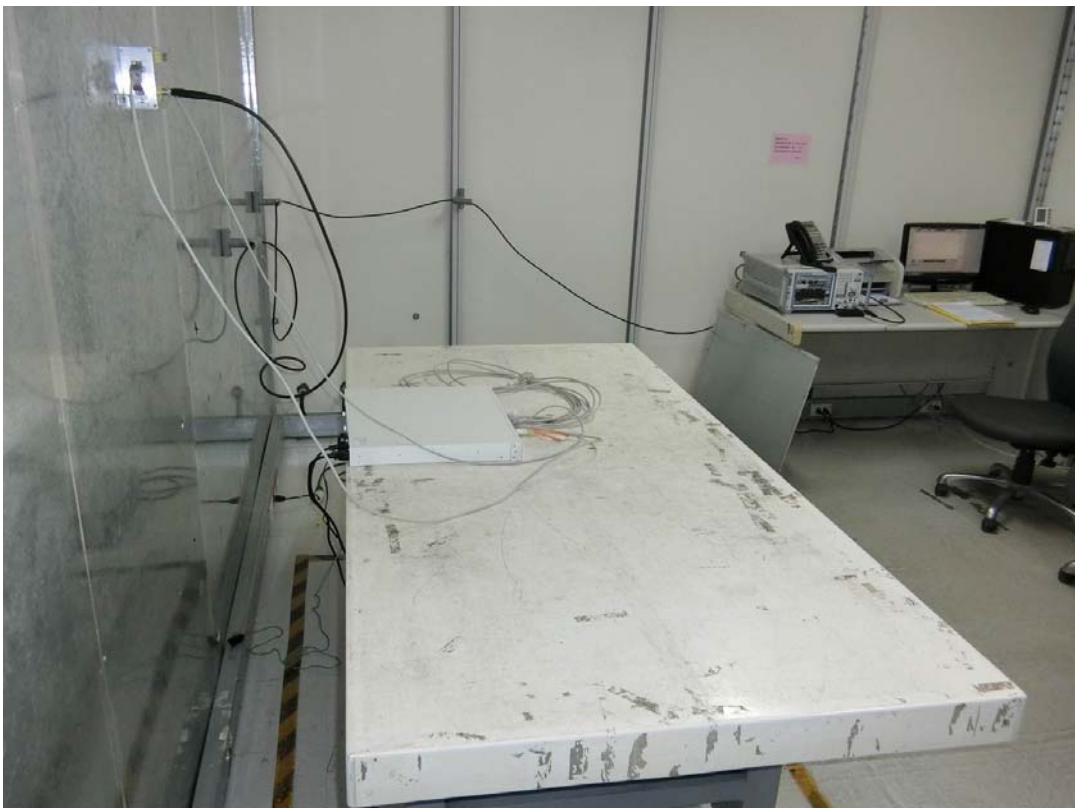
Note: No applicable, the EUT doesn't have tuner port.

10 PHOTOGRAPHS OF THE TEST CONFIGURATION

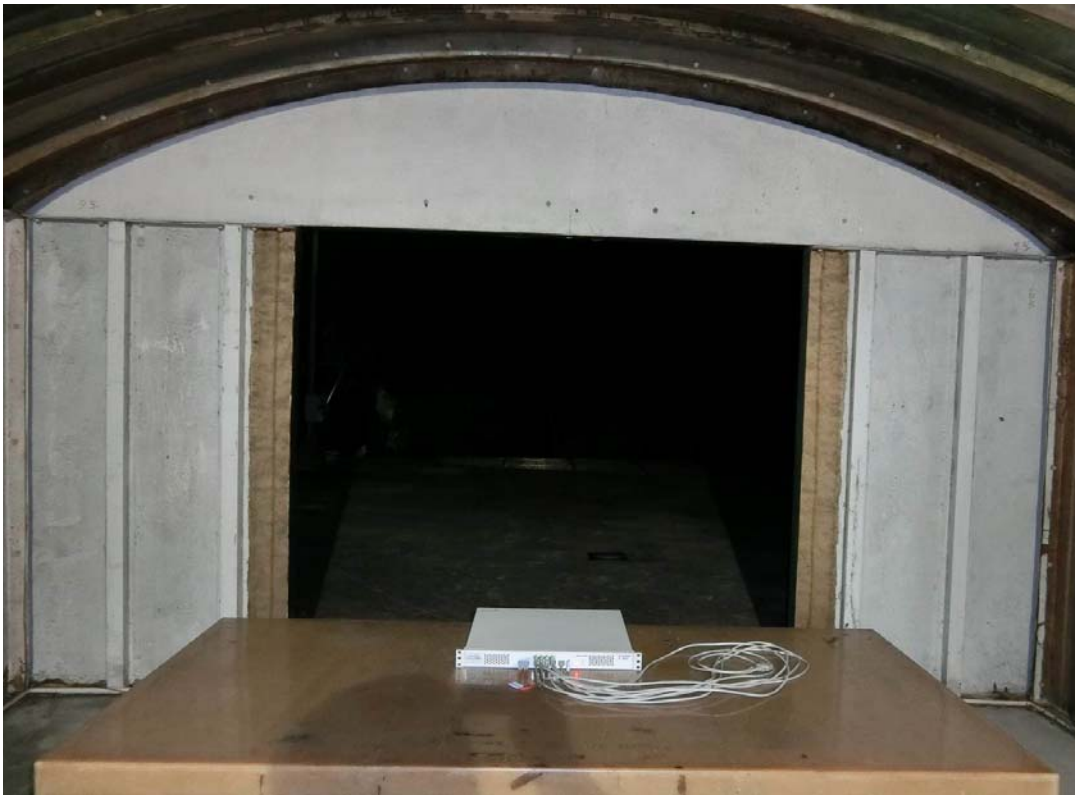
CONDUCTED EMISSION TEST

CONDUCTED EMISSION TEST AT TELECOMMUNICATION PORTS

RJ45 Telecom Port with ISN

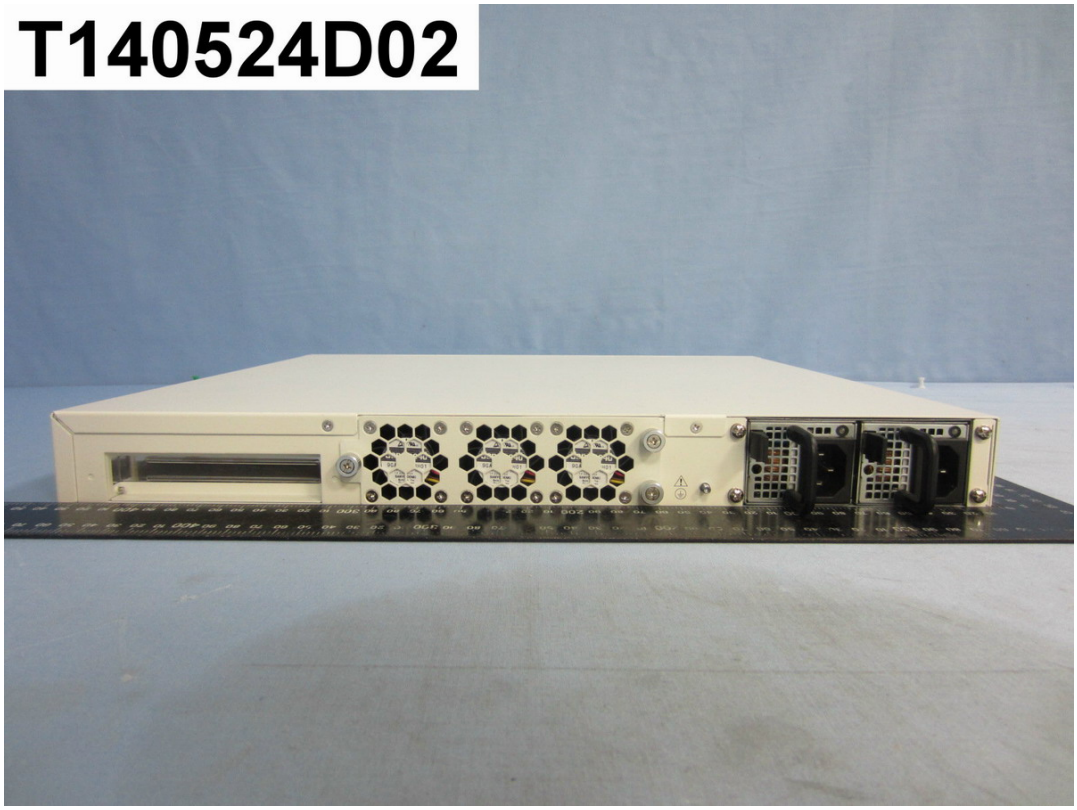


RADIATED EMISSION TEST



APPENDIX 1 - PHOTOGRAPHS OF EUT

AC Power

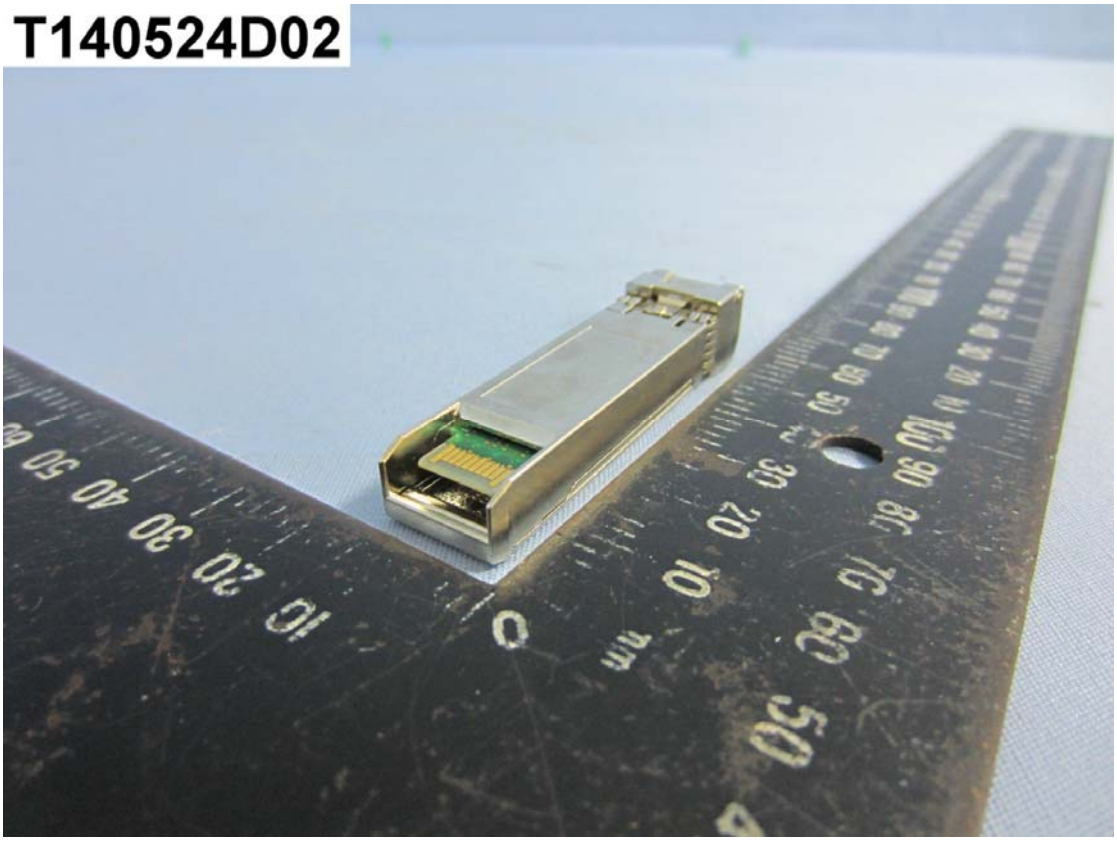


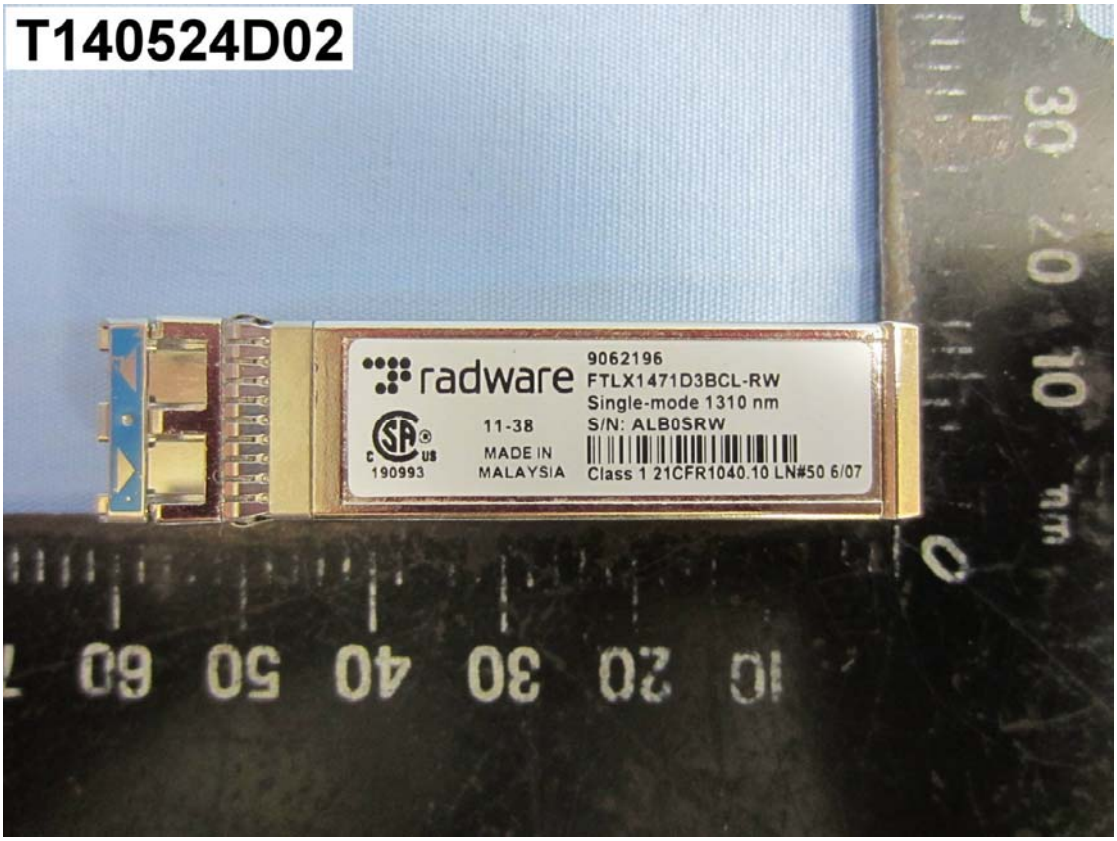
DC Power

Transceivers: Finisar / FTLX8571D3BCL-RW

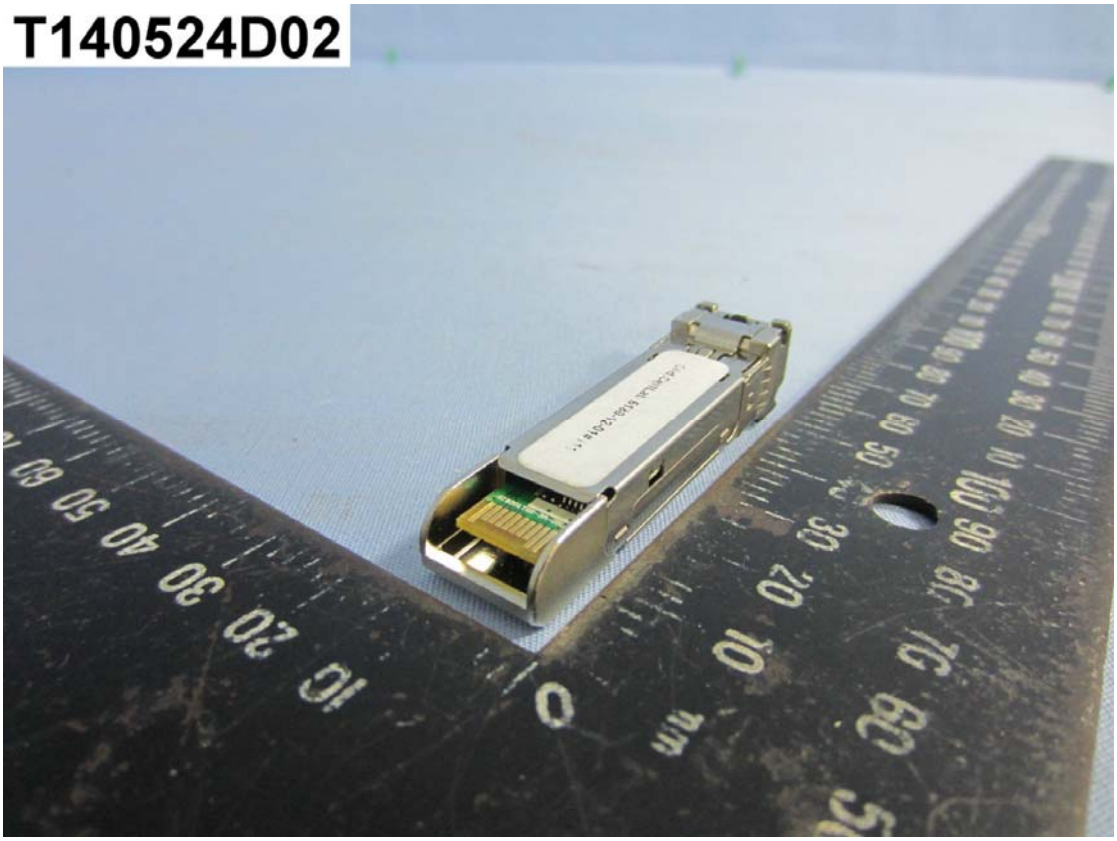
Report No.: TMXD2111001485DE **Ref. No.:** T210720D12

Transceivers: Finisar / FTLX1471D3BCL-RW



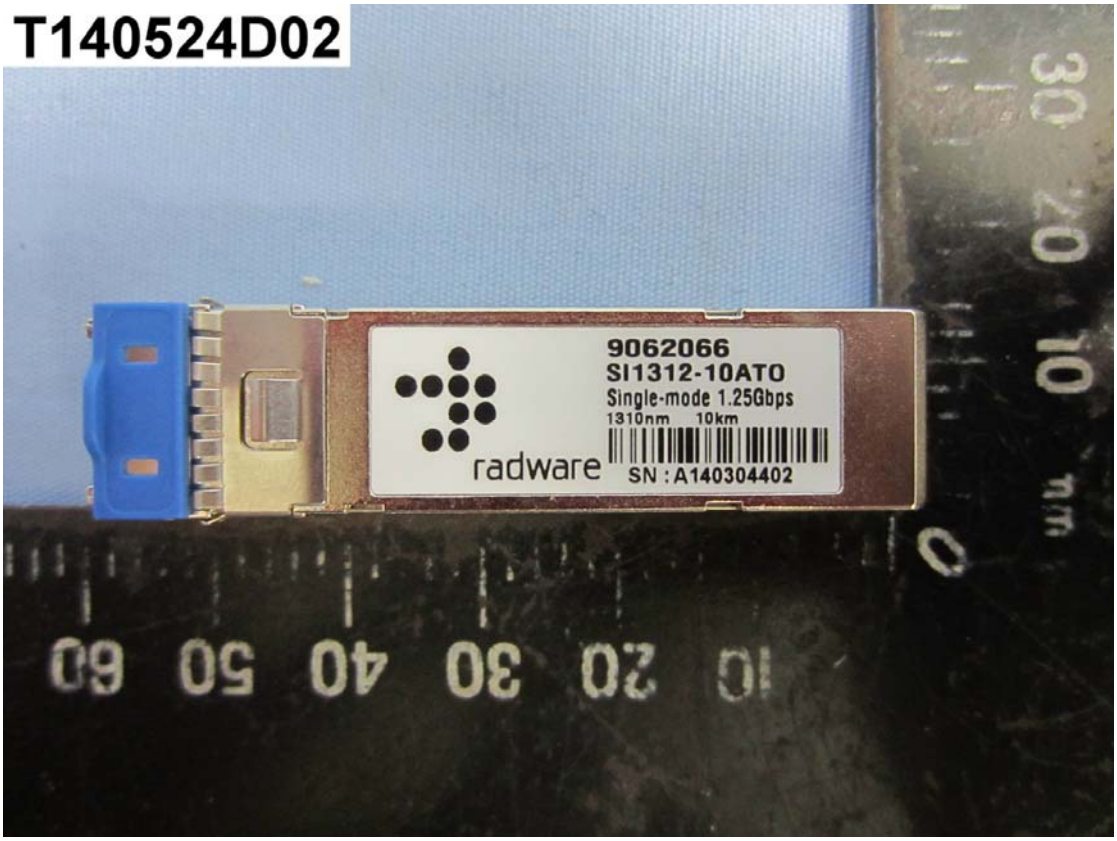


Transceivers: Sanoc / SI8512-X5ATO-3C

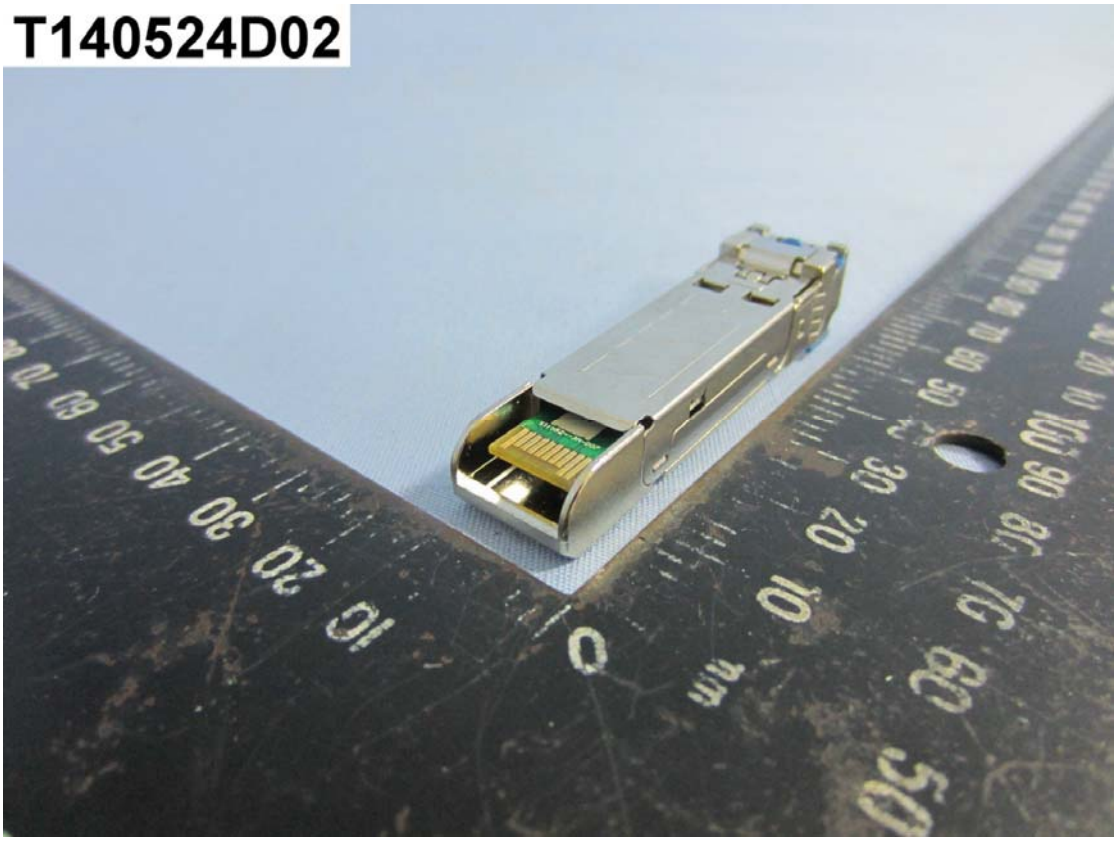


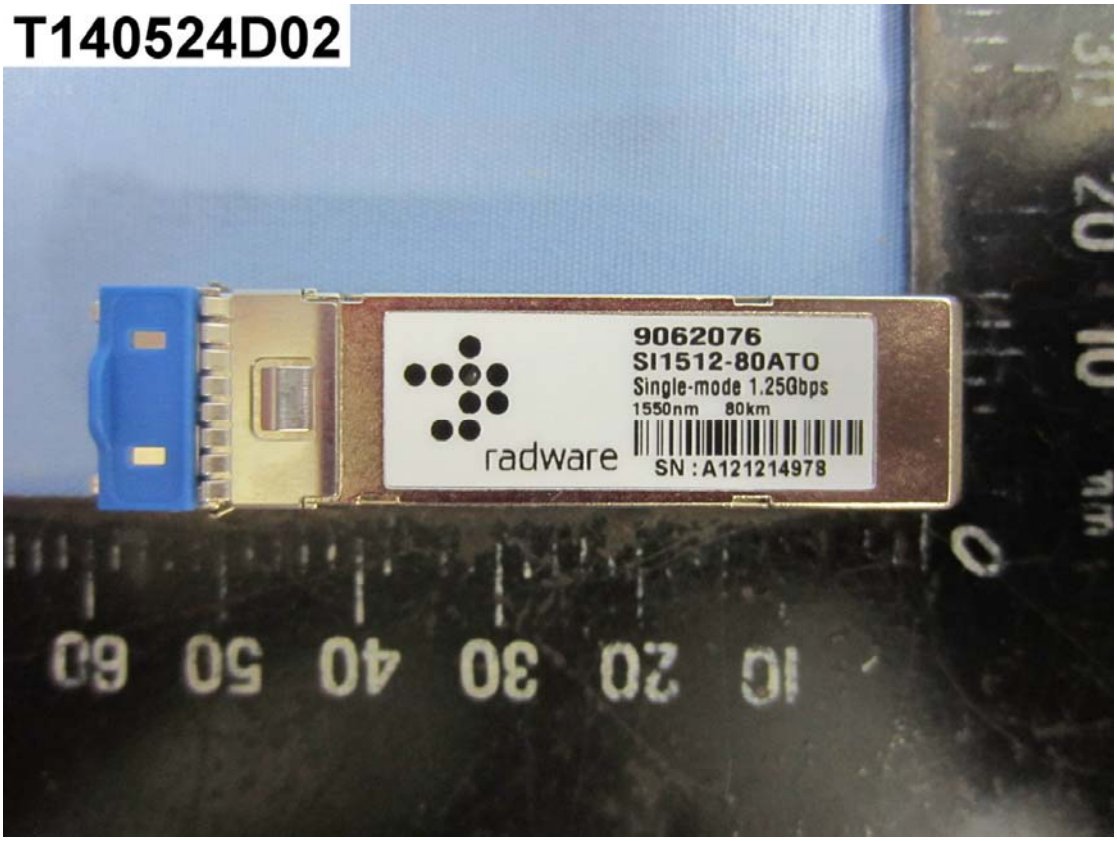
Report No.: TMXD2111001485DE **Ref. No.:** T210720D12

Transceivers: Sanoc / SI1312-10ATO



Transceivers: Sanoc / SI1512-80ATO





Transceivers: Methode / DM7041-R-L