FCC TEST REPORT

for

PCIEx4 to USB3.1*2 port module

MODEL: xPER-T499x (x-where x may be any combination of alphanumeric characters or "-" or blank)

Test Report Number:
T180402D06-B-F

Issued to:

AAEON Technology Inc.

**5F, No.135, Lane 235, Pao Chiao Rd, Hsin-Tien Dist.,
New Taipei City, Taiwan, R.O.C**

Issued by:

Compliance Certification Services Inc.

Xindian Lab.

**No.163-1, Jhongsheng Rd., Xindian Dist.,
New Taipei City, 23151 Taiwan.**

TEL: 886-2-22170894

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Issued Date: April 12, 2018

TAF Testing Laboratory 1108

ACCREDITED TESTING CERT #0824.01

Revision History

Rev.		Issue Date		Revisions	Effect Page	Revised By
00		April 12, 2018		Initial Issue	ALL	Panny Chou

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1 TEST RESULT CERTIFICATION

Product:	PCIEx4 to USB3.1*2 port module
Model:	xPER-T499x (x-where x may be any combination of alphanumeric characters or "-" or blank)
Brand:	AAEON
Applicant:	**AAEON Technology Inc.** 5F, No.135, Lane 235, Pao Chiao Rd, Hsin-Tien Dist., New Taipei City, Taiwan, R.O.C
Manufacturer:	**AAEON Technology Inc.** 5F, No.135, Lane 235, Pao Chiao Rd, Hsin-Tien Dist., New Taipei City, Taiwan, R.O.C
Tested:	April 10, 2018 & April 11, 2018

EMISSION			
Standard	**Item**	**Result**	**Remarks**
FCC 47 CFR Part 15 Subpart B, ICES-003 Issue 6-2016 ANSI C63.4-2014	Conducted (Power Port)	PASS	Meet Class A limit
	Radiated	PASS	Meet Class A limit

Note: 1. The statements of test result on the above are decided by the request of test standard only; the measurement uncertainties are not factored into this compliance determination.
2. The information of measurement uncertainty is available upon the customer's request.

Deviation from Applicable Standard
None

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:

Sam Hu
Assistant Manager

Reviewed by:

Eva Fan
Supervisor of report document dept.

2 EUT DESCRIPTION

Product	PCIEx4 to USB3.1*2 port module
Brand Name	AAEON
Model	xPER-T499x (x-where x may be any combination of alphanumeric characters or "-" or blank)
Applicant	AAEON Technology Inc.
Housing material	N/A
Identify Number	T180402D06-B
Received Date	April 02, 2018
EUT Power Rating	3.3VDC / 12VDC from Host PC Power Supply
AC Power During Test	120VAC / 60Hz to Host PC Power Supply

Model Differences

Model Name	Difference	Tested (Checked)
PER-T499-A10-00	Original	☒
xPER-T499x	1. x-where x may be any combination of alphanumeric characters or "-" or blank. 2. For marketing purpose only.	☐

I/O PORT

I/O PORT TYPES	Q'TY	TESTED WITH
1. USB Port	2	2

Note: Client consigns only one model sample to test (Model Number: PER-T499-A10-00).

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 mode is as the following:

Conduction Mode:

1	**DATA R/W Mode**

Radiation Mode:

1	**DATA R/W Mode**

Worst:

Conduction (Power port): Mode 1

Radiation: Mode 1

3.2. EUT SYSTEM OPERATION

1. Windows 10 boots system.
2. Run Emctest.exe to activate all peripherals and display “H” pattern on monitor screen.
3. Run Winemc.exe and choose “F:/ & G:/” to test EUT.

   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.

Host PC Devices:

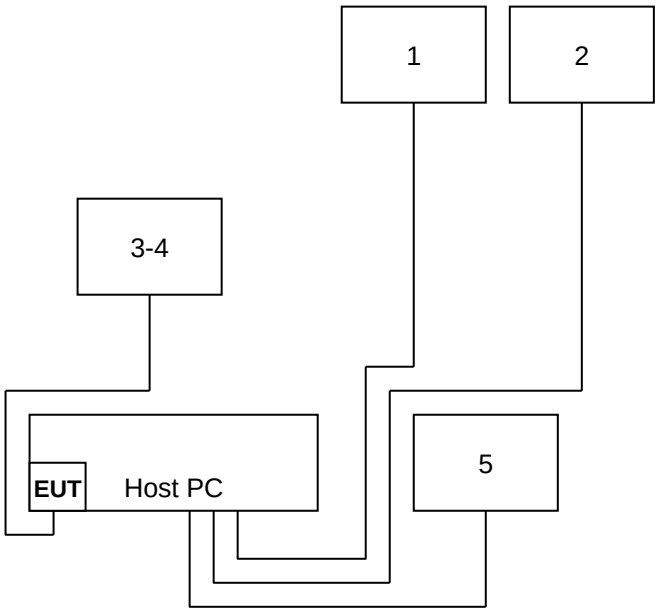
No.	Equipment	Model No.	Brand Name
1	Motherboard	PBA-QM77	AAEON
2	CPU (1.70GHz)	Intel® Core™ i7-3517UE Processor	Intel
3	HDD (256GB)	SSD370	Transcend
4	Memory (2GB / 1333MHz DDR3 SO DIMM)	TS256MSK64V3N-I	Transcend
5	Adaptor	FSP220-ABAN2	FSP

Peripherals Devices:

No.	Equipment	Model No.	Serial No.	FCC ID / BSMI ID	Brand Name	Data Cable	Power Cord
1	USB Mouse	M-U0026	810-002181	DOC BSMI: T41126	Logitech	Shielded, 1.8m	N/A
2	USB Keyboard	Y-U0011	N/A	DOC BSMI: T51160	Logitech	Shielded, 1.8m	N/A
3-4	USB HDD	HD-EG5	N/A	DOC BSMI: D33021	SONY	Shielded, 0.5m	N/A
5	Monitor	P2314Ht	N/A	DOC BSMI: R43004	DELL	Shielded, 1.8m With two cores	Unshielded, 1.8m

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, 23151 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	0.15MHz ~ 30MHz	± 1.06
Radiated emissions	30MHz ~ 1000MHz	± 4.86

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 3.6dB and 5.2dB 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 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#B4	01/07/2019
EMI Test Receiver	R&S	ESCI	100234	05/19/2018
LISN	Schwarzbeck	NSLK 8127	8127382	05/21/2018
LISN(EUT)	Schwarzbeck	NSLK 8127	8127691	05/21/2018
Pulse Limiter	R&S	ESH3-Z2	100374	01/07/2019
Thermo-Hygro Meter	Wisewind	201A	No. 05	05/23/2018
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.

6.3. TEST PROCEDURES (please refer to measurement standard or CCS SOP PA-031)

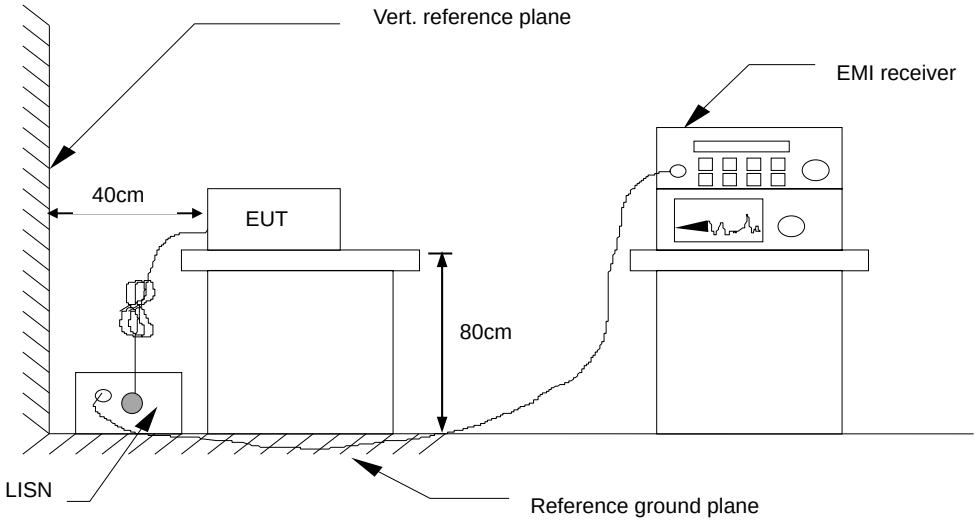
Procedure of Preliminary Test

- The EUT and support equipment, if needed, were 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 ANSI C63.4 (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 12 mm non-conductive covering to insulate the EUT from the ground plane.
- All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
- The test equipment EUT installed by AC main power, through a Line Impedance Stabilization Network (LISN), which was supplied power source and was grounded to the ground plane.
- All support equipment power by from a second LISN.
- The test program of the EUT 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 worst configuration of EUT and cable of the above highest emission level 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

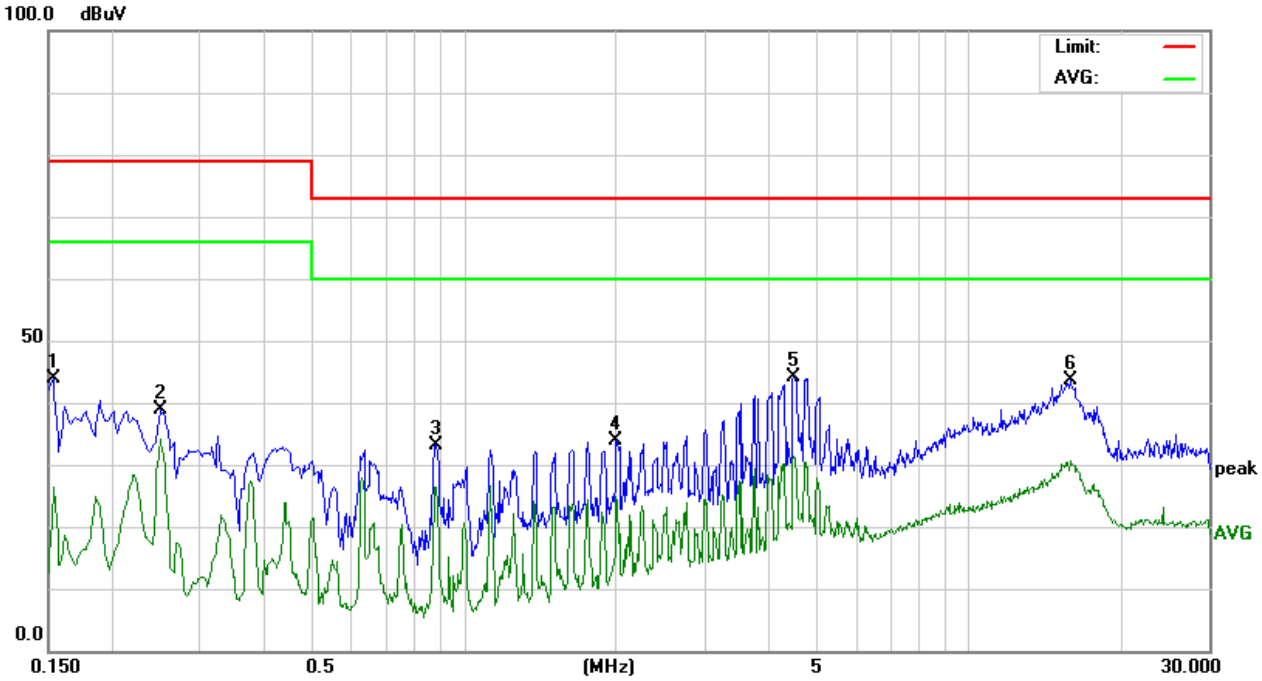
Freq. = Emission frequency in MHz
Reading = Uncorrected Analyzer/Receiver reading
Factor = Insertion loss of LISN + Cable Loss + Pulse Limit
Result = Reading + Factor
Limit = Limit stated in standard
Margin = Reading in reference to limit
P = Peak Reading
Q = Quasi-peak Reading
A = Average Reading
L1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

Calculation Formula

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

6.6. TEST RESULTS

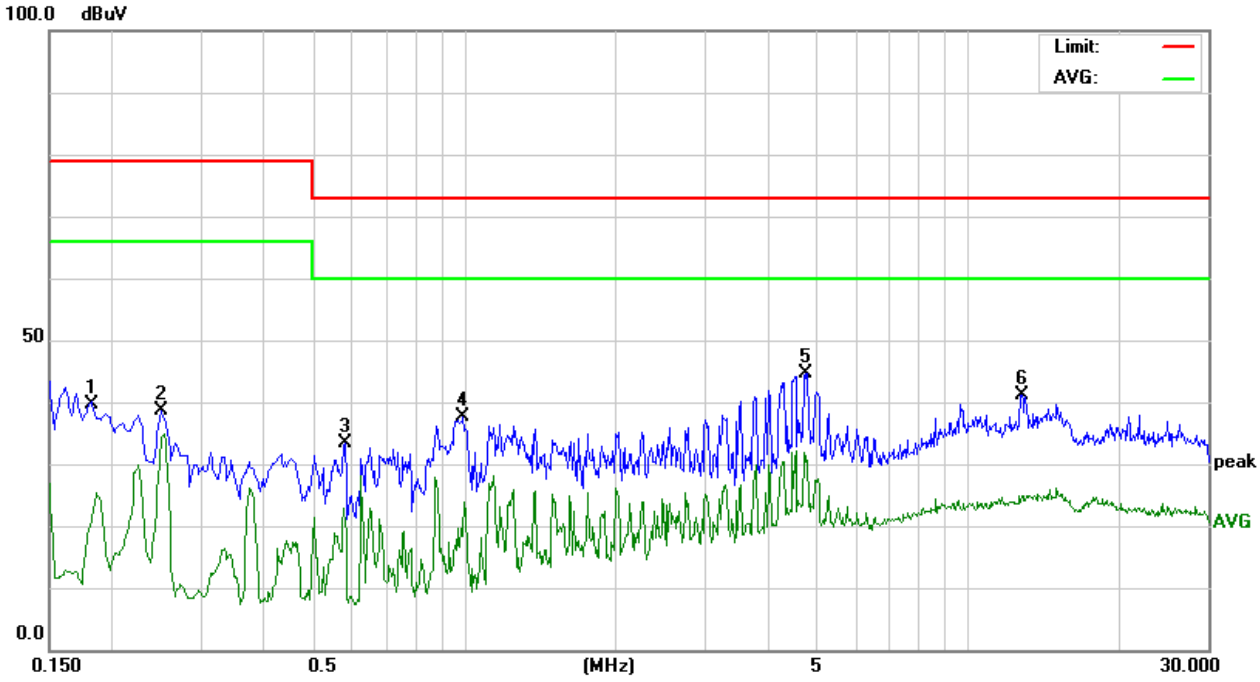
Model No.	PER-T499-A10-00	6dB Bandwidth	9 kHz
Environmental Conditions	23°C, 62% RH	Test Mode	Mode 1
Tested by	Pipo Hou	Phase	L1
Standard	FCC CLASS A		



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)
0.1539	**33.94**	**9.99**	**43.93**	**79.00**	**-35.07**	**P**	**L1**
0.2500	**28.84**	**9.94**	**38.78**	**79.00**	**-40.22**	**P**	**L1**
0.8820	**23.13**	**9.98**	**33.11**	**73.00**	**-39.89**	**P**	**L1**
2.0100	**23.76**	**10.06**	**33.82**	**73.00**	**-39.18**	**P**	**L1**
4.5060	**34.02**	**10.21**	**44.23**	**73.00**	**-28.77**	**P**	**L1**
15.8900	**32.97**	**10.54**	**43.51**	**73.00**	**-29.49**	**P**	**L1**

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

Model No.	PER-T499-A10-00	6dB Bandwidth	9 kHz
Environmental Conditions	23°C, 62% RH	Test Mode	Mode 1
Tested by	Pipo Hou	Phase	L2
Standard	FCC 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)
0.1825	**29.58**	**9.94**	**39.52**	**79.00**	**-39.48**	**P**	**L2**
0.2500	**28.69**	**9.92**	**38.61**	**79.00**	**-40.39**	**P**	**L2**
0.5820	**23.40**	**9.95**	**33.35**	**73.00**	**-39.65**	**P**	**L2**
0.9980	**27.60**	**9.97**	**37.57**	**73.00**	**-35.43**	**P**	**L2**
4.7660	**34.37**	**10.20**	**44.57**	**73.00**	**-28.43**	**P**	**L2**
12.8060	**30.75**	**10.43**	**41.18**	**73.00**	**-31.82**	**P**	**L2**

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

7 RADIATED EMISSION MEASUREMENT

7.1. LIMITS OF RADIATED EMISSION MEASUREMENT

Below 1GHz (for digital device)

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

Limit tables for non-digital device:

Class A Radiated Emission limit at 10m (for others)

Frequency (MHZ)	Field Strength Limit (uV/m)Q.P.	Field Strength Limit (dBuV/m)Q.P.
30 - 88	90	39
88 - 216	150	43.5
216 – 960	210	46.4
Above 960	300	49.5

Class B Radiated Emission limit at 3m (for others)

Frequency (MHZ)	Field Strength Limit (uV/m)Q.P.	Field Strength Limit (dBuV/m)Q.P.
30 - 88	100	40
88 - 216	150	43.5
216 – 960	200	46
Above 960	500	54

Above 1GHz(for all device)

Frequency (MHZ)	Class A (dBuV/m) (At 10m)		Class B (dBuV/m) (At 3m)	
	Average	Peak	Average	Peak
Above 1000	49.5	69.5	54	74

NOTE: (1) The lower limit shall apply at the transition frequencies.
(2) Emission level (dBuV/m) = 20 log Emission level (uV/m).
(3) The measurement above 1GHz is at close-in distances 3m,and determine the limit **L_2** corresponding to the close-in distance **d_2** by applying the following relation: **$L_2 = L_1 (d_1/d_2)$**, where **L_1** is the specified limit in microvolts per metre (**uV/m**) at the distance **d_1** (**10m**), **L_2** is the new limit for distance **d_2** (**3m**).
So the new Class A limit above 1GHz at 3m is as following table:

Frequency (MHZ)	Class A (dBuV/m) (At 3m)	
	Average	Peak
Above 1000	60	80

According to FCC Part 15.33 (b), for an unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit is specified, up to the frequency shown in the following table:

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30
1.705-108	1000
108-500	2000
500-1000	5000
Above 1000	5^{th} harmonic of the highest frequency or 40GHz, whichever is lower

7.2. TEST INSTRUMENTS

Open Area Test Site # H				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Bilog Antenna	Teseq	CBL 6112D	36995	06/27/2018
Cable	EMEC	CFD400NL-LW	N-Type#H11	08/17/2018
EMI Test Receiver	R&S	ESCI	101340	03/26/2019
Pre-Amplifier	HP	8447D	1937A01554	09/28/2018
Thermo-Hygro Meter	Wisewind	201A	No. 03	06/04/2018
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.

7.3. TEST PROCEDURES (please refer to measurement standard or CCS SOP PA-031)

Procedure of Preliminary Test

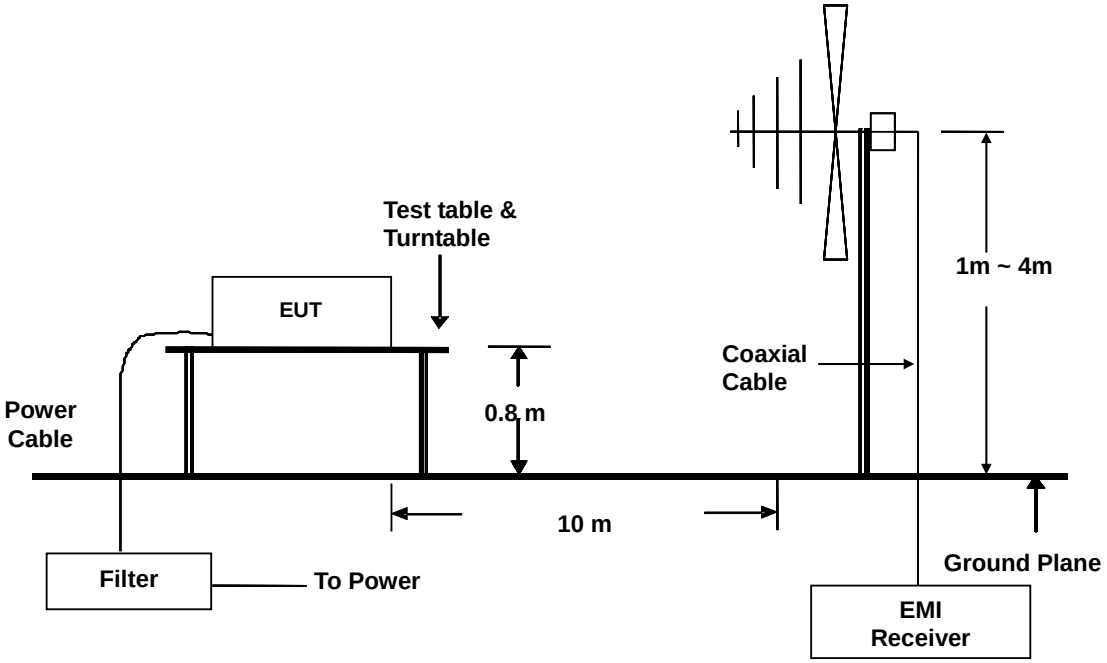
- The equipment was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane. When the EUT is a floor standing equipment, it is placed on the ground plane which has a 12 mm non-conductive covering to insulate the EUT from the ground plane.
- Support equipment, if needed, was placed as per ANSI C63.4.
- All I/O cables were positioned to simulate typical usage as per ANSI C63.4.
- 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 meter away from the EUT as stated in ANSI C63.4. 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 40GHz. 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 worst configuration of EUT and cable of the above highest emission level were recorded for reference of the final test.

Procedure of Final Test

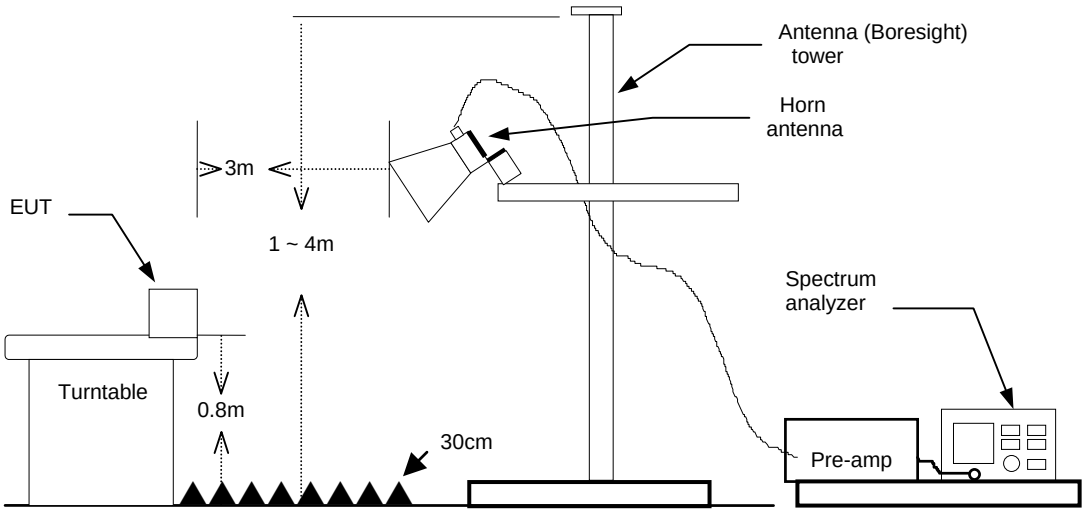
- EUT and support equipment were set up on the turntable as per the configuration with highest emission level in the preliminary test.
- The Analyzer / Receiver scanned from 30MHz to 40GHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 or 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- Recording 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.

7.4. TEST SETUP

Below 1GHz



Above 1GHz



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

7.5. 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

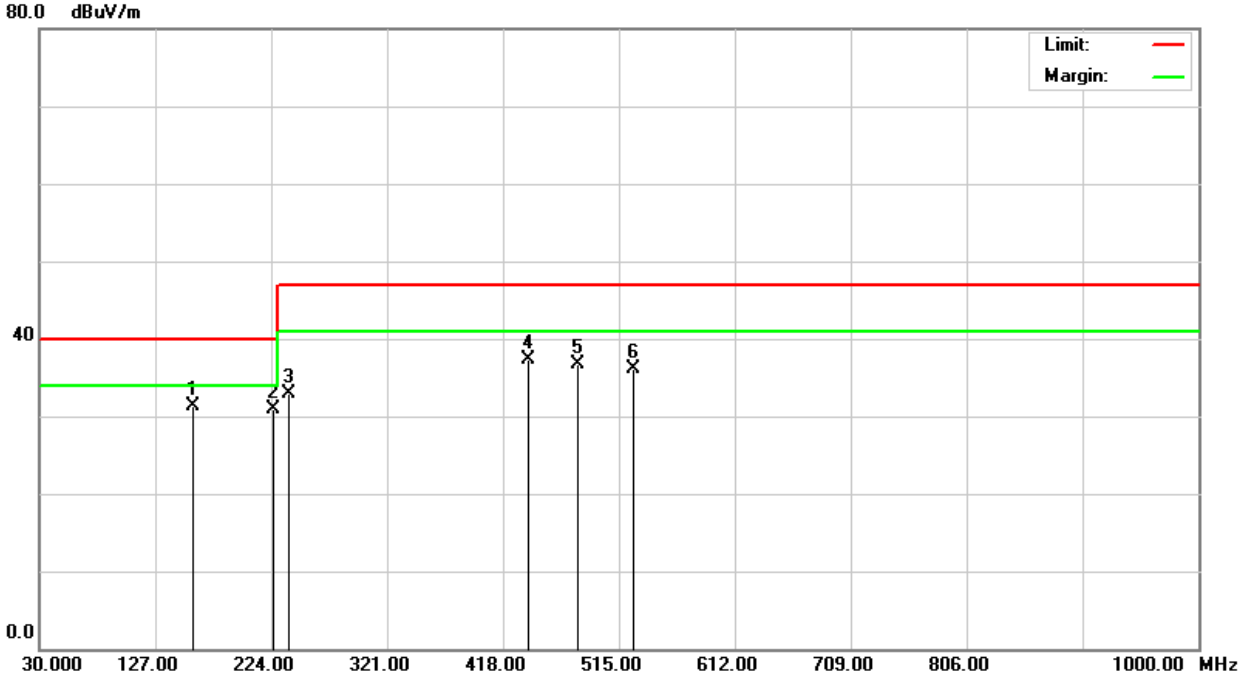
Calculation Formula

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

7.6. TEST RESULTS

Below 1GHz

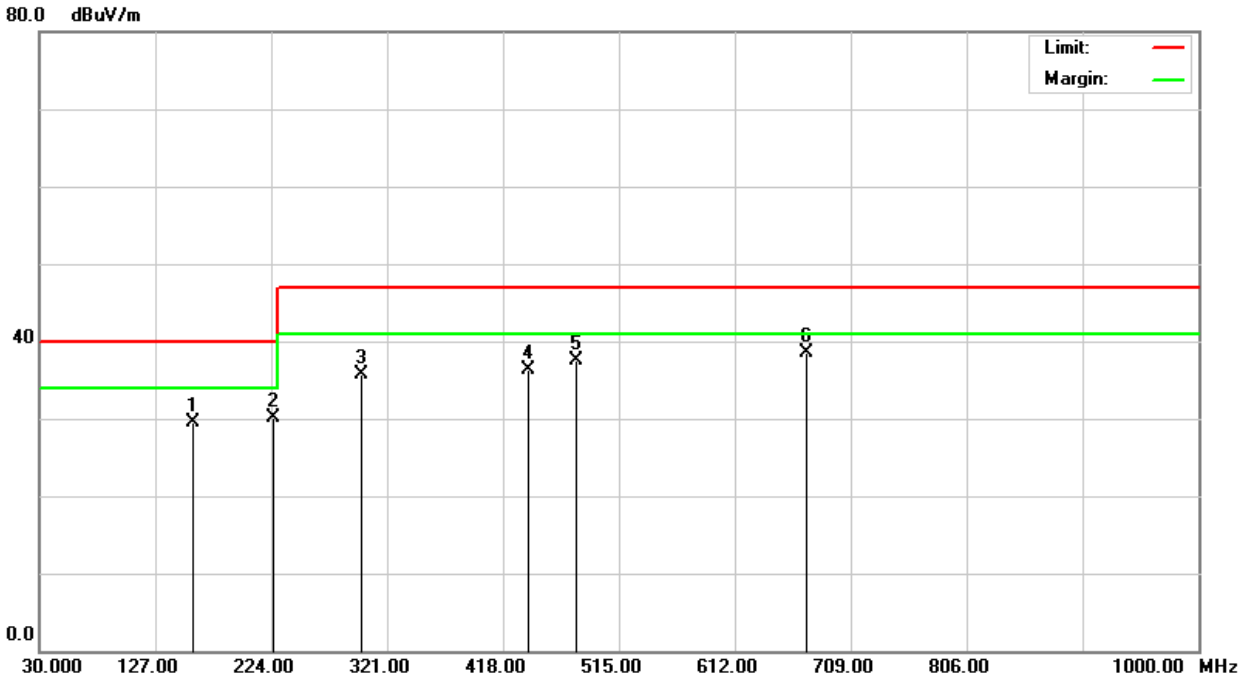
Model No.	PER-T499-A10-00	Test Mode	Mode 1
Environmental Conditions	26ºC, 60% RH	6dB Bandwidth	120 kHz
Antenna Pole	Vertical	Antenna Distance	10m
Detector Function	Quasi-peak.	Tested by	Pipo Hou
Standard	FCC CLASS A W/ CISPR 22 CLASS A LIMIT		



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)
158.9900	41.20	-9.96	31.24	40.00	-8.76	100	140	Q	V
226.1800	40.60	-9.65	30.95	40.00	-9.05	100	330	Q	V
239.4500	41.30	-8.31	32.99	47.00	-14.01	100	165	Q	V
439.2500	39.60	-2.25	37.35	47.00	-9.65	400	185	Q	V
480.1600	38.40	-1.76	36.64	47.00	-10.36	400	205	Q	V
527.2199	36.50	-0.40	36.10	47.00	-10.90	400	210	Q	V

Note: 1. 30MHz to 1000MHz test is Applicable CISPR 22 standard.
2. P= Peak Reading; Q= Quasi-peak Reading.

Model No.	PER-T499-A10-00	Test Mode	Mode 1
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	FCC CLASS A W/ CISPR 22 CLASS A LIMIT		



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)
159.1500	39.50	-9.95	29.55	40.00	-10.45	400	135	Q	H
226.3400	39.70	-9.62	30.08	40.00	-9.92	400	275	Q	H
299.1200	42.00	-6.25	35.75	47.00	-11.25	400	320	Q	H
439.4400	38.50	-2.24	36.26	47.00	-10.74	100	195	Q	H
480.0500	39.20	-1.76	37.44	47.00	-9.56	100	280	Q	H
672.2500	37.50	0.99	38.49	47.00	-8.51	100	295	Q	H

Note: 1. 30MHz to 1000MHz test is Applicable CISPR 22 standard.
2. P= Peak Reading; Q= Quasi-peak Reading.

Above 1GHz

Model No.	PER-T499-A10-00	**Test Mode**	N/A
Environmental Conditions	N/A	**6dB Bandwidth**	N/A
Antenna Pole	N/A	**Antenna Distance**	N/A
Highest frequency generated or used	20MHz	**Upper frequency**	See note
Detector Function	N/A	**Tested by**	N/A

Note: No applicable, when the highest frequency of the internal sources of the EUT is less than 108MHz, the measurement shall only be made up to 1 GHz.

8 PHOTOGRAPHS OF THE TEST CONFIGURATION

CONDUCTED EMISSION TEST

RADIATED EMISSION TEST