

Certificate of Test

May 2018

MSTronic CO., LTD.

Product Name : Power over Ethernet
Model Number : MIT-09G-56D, MIT-09X-VVFF (X=G with Gigabite module or blank ; VV=Output Voltage for 24 or 48 or 56 ; FF=D(DETECTION) or blank)
FF= D (DETECTION) or R (REVERSE) or blank)
Test Report Number : 1803024E-01
Date of Test : May 04, 2018 – May 22, 2018

This product was tested according to the standards as below at the laboratory of Global EMC Standard Tech. Corp..

Standards:

EN 55032:2015, Class B
EN 55024: 2010+A1:2015, IEC 61000-4 Series
EN 61000-3-2: 2014 & EN 61000-3-3: 2013
AS/NZS CISPR 32: 2015

[http : //www.gestek.com.tw](http://www.gestek.com.tw)



Sharon Chang, President

GLOBAL EMC STANDARD TECH. CORP.

No.3, Baodoucuokeng, Linkou Dist., New Taipei
City 244, Taiwan(R.O.C.)
TEL:886-2-2603-5321
FAX:886-2-2603-5325

Issue Date: May 29, 2018



Declaration of Conformity

We, Manufacturer/Importer
(full address)

declare that the product
(description of the apparatus, system, installation to which it refers)

EUT: Power over Ethernet

**Model Number: MIT-09G-56D, MIT-09X-VVFF (X=G with Gigabite module or blank ;
VV=Output Voltage for 24 or 48 or 56; FF=D(DETECTION) or blank)FF= D (DETECTION) or
R (REVERSE) or blank)**

is in conformity with

(reference to the specification under which conformity is declared)
in accordance with 2014/30/EU-EMC Directive

- | | | | |
|--|--|---|---|
| ☐ EN 55011 | Limits and methods of measurement of radio disturbance characteristics of industrial, scientific and medical (ISM) high frequency equipment | ☒ EN 61000-3-2 | Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase |
| ☐ EN 55013 | Limits and methods of measurement Information Technology of radio disturbance characteristics of broadcast receivers and associated equipment | ☒ EN 61000-3-3 | Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection |
| ☒ EN 55032 | Electromagnetic compatibility of multimedia equipment-Emission requirements | ☒ EN 55024 | Information Technology equipment-Immunity characteristics-Limits and methods of measurement |
| ☐ EN 55014-1 | Limits and methods of measurement of radio disturbance characteristics of household electrical appliances, portable tools and similar electrical apparatus | ☐ EN 61000-6-1 | Generic standards-Immunity for residential, commercial and light-industrial environments |
| ☐ EN 61000-6-3 | Generic standards-Emission standard for residential, commercial and light-industrial environments | ☐ EN 61000-6-2 | Generic standards-Immunity for industrial environments |
| ☐ EN 61000-6-4 | Generic standards-Emission standard for industrial environments | ☐ EN 55014-2 | Immunity requirements for household appliances tools and similar apparatus |
| ☐ EN 55015 | Limits and methods of measurement of radio disturbance characteristics of fluorescent lamps and luminaries | ☐ EN 50091- 2 | EMC requirements for uninterruptible power systems (UPS) |
| ☐ DIN VDE 0855 part 10 part 12 | Cabled distribution systems; Equipment for receiving and/or distribution from sound and television signals | ☐ EN 55020 | Immunity from radio interference of broadcast receivers and associated equipment |
| ☒ CE marking | | ☐ EN 61204-3 | Low voltage power supplies, d.c. output - Part 3: Electromagnetic compatibility. (EMC) |



(EC conformity marking)

The manufacturer also declares the conformity of above mentioned product with the actual required safety standards in accordance with LVD 2014/35/EU

- | | | | |
|--|---|--|---|
| ☐ EN 60065 | Safety requirements for mains operated electronic and related apparatus for household and similar general use | ☐ EN 60950 | Safety for information technology equipment including electrical business equipment |
| ☐ EN 60335 | Safety of household and similar electrical appliances | ☐ EN 50091-1 | General and Safety requirements for uninterruptible power systems (UPS) |

Manufacturer/Importer

Signature: _____

(Stamp)

Date: _____

Name: _____



EMC Test Report For:

MSTronic CO., LTD.

EUT: Power over Ethernet

Model Number:

**MIT-09G-56D, MIT-09X-VVFF (X=G with Gigabite module or blank ;
VV=Output Voltage for 24 or 48 or 56 ; FF=D(DETECTION) or
blank)FF= D (DETECTION) or R (REVERSE) or blank)**

Prepared for:

MSTronic CO., LTD.

**2F., NO.12, Gong shang Rd., Wugu Dist, New Taipei City 248,
Taiwan (R.O.C.)**

**Report By : Global EMC Standard Tech. Corp.
No.3 Pau-Tou-Tsuo Valley, Chia-Pau
Tsuen, Lin Kou Hsiang, Taipei County,
Taiwan, R.O.C.
Tel : 886-2-2603-5321
Fax: 886-2-2603-5325**

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1. CERTIFICATION

Applicant : MStronic CO., LTD.

EUT Description : Power over Ethernet

Model Number : MIT-09G-56D, MIT-09X-VVFF (X=G with Gigabite module or blank ; VV=Output Voltage for 24 or 48 or 56 ; FF=D(DETECTION) or blank)FF= D (DETECTION) or R (REVERSE) or blank)

Brand Name : MSE

Serial Number : N/A

STANDARDS OF TEST METHOD:

EN 55032: 2015 AND

EN 61000-3-2: 2014 & EN 61000-3-3: 2013

EN 55024: 2010+A1: 2015 AND IEC 61000-4 SERIES REGULATIONS

AS/NZS CISPR 32: 2015

GENERAL REMARKS:

The tests were performed according to the technical requirement of EUT.

- ☒ Electro-magnetic Radiated Emission Interference Measurement (EN 55032)
- ☒ Electro-magnetic Conducted Emission Interference Measurement (EN 55032)
- ☒ Harmonic Current Emissions (EN 61000-3-2)
- ☒ Voltage Fluctuation and Flicker Measurement (EN 61000-3-3)
- ☒ ESD Immunity Test (IEC 61000-4-2)
- ☒ RF Field strength Susceptibility Test (IEC 61000-4-3)
- ☒ Electrical Fast Transient/Burst Immunity Test (IEC 61000-4-4)
- ☒ Surge Immunity Test (IEC 61000-4-5)
- ☒ Conducted disturbance Susceptibility Test (IEC 61000-4-6)
- ☒ Power Frequency Magnetic Field Immunity Test (IEC 61000-4-8)
- ☒ Voltage Dips/Short Interruptions Test (IEC 61000-4-11)

☒ AS/NZS CISPR 32 Electromagnetic compatibility of multimedia equipment - Emission requirements:2015

Sample Received Data : March 23, 2018

Date of Test : May 04, 2018 – May 22, 2018

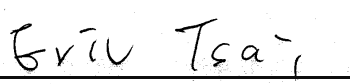
Issue Date : May 29, 2018

In order to ensure the quality and accuracy of this document, the contents have been thoroughly reviewed by the following qualified personnel from Global EMC Standard Tech. Corp. Lab.

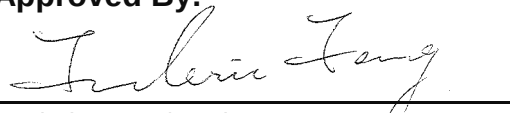
Documented By :


Susan Chen / Report Author

Tested By:


Eric Tsai / Eng. Dept. Supervisor

Approved By:


Frederic Fang / Assistant Manager

2. SUMMARY OF TEST RESULTS

STANDARD	TEST ITEM	TEST RESULT	REMARKS
EN 55032: 2015 Class B (1)AS/NZS CISPR 32 (for Australia)	Conducted emission (Mode 2)	PASS	The worst emission frequency is <u>0.2494</u> MHz And minimum passing margin is <u>-4.76</u> dB The measurement uncertainty is 4.40 dB.
	Conducted emission (Mode 2) For LAN 10Mbps	PASS	The worst emission frequency is <u>0.1930</u> MHz. And minimum passing margin is <u>0.82</u> dB. The measurement uncertainty is 4.36 dB.
	Radiated emission (Mode 2)	PASS	The worst emission frequency is <u>33.8800</u> MHz at <u>Vertical</u> . And minimum passing margin is <u>-5.13</u> dB. Height of antenna is <u>100cm</u> . Angle of turntable is <u>117°</u> . The measurement uncertainty is 4.33 dB.
EN 61000-3-2: 2014	Harmonic Current Emissions	PASS	The measurement uncertainty is 8.94 mA
EN 61000-3-3: 2013	Voltage Fluctuation and Flicker Measurement	PASS	The Value of Pst shall not be greater than 1.0 The measurement uncertainty under consideration
EN 55024 IEC 61000-4-2:2008	Electrostatic Discharge(ESD)	PASS	Contact discharge up to <u>±4kV</u> Air discharge up to <u>±8kV</u> .
EN 55024 IEC 61000-4-3:2006	RF field strength Susceptibility	PASS	80-1000MHz (1kHz sinewave with 80% Amplitude Modulation: 3V/m) 80, 120, 160, 230, 434, 460, 600, 863 and 900MHz: 3V/m
EN 55024 IEC 61000-4-4: 2012	Electrical Fast Transients/Burst	PASS	±0.5kV, ±1.0kV (AC Input) ±0.5kV (LAN Cable)
EN 55024 IEC 61000-4-5: 2014	Surge	PASS	±0.5kV, ±1kV, ±2kV (AC Input)
EN 55024 IEC 61000-4-6:2013	Conducted Disturbance Susceptibility	PASS	0.15-80MHz (1kHz sinewave with 80% Amplitude Modulation: 3V) 0.2, 1, 7.1, 13.56, 21, 27.12 and 40.68MHz: 3V
EN 55024 IEC 61000-4-8:2009	Magnetic Field Measurement	PASS	1A/m at 50Hz
EN 55024 IEC 61000-4-11: 2004	Voltage short Interruptions	PASS	>95% reduction, 5s at 50/60Hz
	Voltage Dips		>95% reduction, 10 ms at 50Hz >95% reduction, 8.33 ms at 60Hz 30% reduction, 500 ms at 50/60Hz

3. GENERAL INFORMATION

3.1 PRODUCT DESCRIPTION

Product Name : Power over Ethernet
Model Number : MIT-09G-56D, MIT-09X-VVFF (X=G with Gigabite module or blank ;
VV=Output Voltage for 24 or 48 or 56 ; FF=D(DETECTION) or
blank)FF= D (DETECTION) or R (REVERSE) or blank)
Brand Name : MSE
Serial Number : N/A
Applicant : MStronic CO., LTD.
Address : 2F., NO.12, Gong shang Rd., Wugu Dist, New Taipei City 248, Taiwan
(R.O.C.)
Manufacturer : MStronic CO., LTD.
Address : 2F., NO.12, Gong shang Rd., Wugu Dist, New Taipei City 248, Taiwan
(R.O.C.)
Power Supply : Input: 100V-240V, 50-60Hz;
Output: MIT-09G-24: 24V
MIT-09G-48: 48V
MIT-09G-56D: 56V
Power Cord : 3Pins, 1.8m, Non-Shielded, Non-Core

3.2 TEST MODES & EUT COMPONENTS DESCRIPTION

Test Mode	Mode 1 – Pre-Scan	Mode 2 – Worst Case	Mode 3 – Pre-Scan
Test Model Number	MIT-09G-24	MIT-09G-48	MIT-09G-56D
Mother Board	MStronic CO., LTD., M/N: MIT-09		

Note:

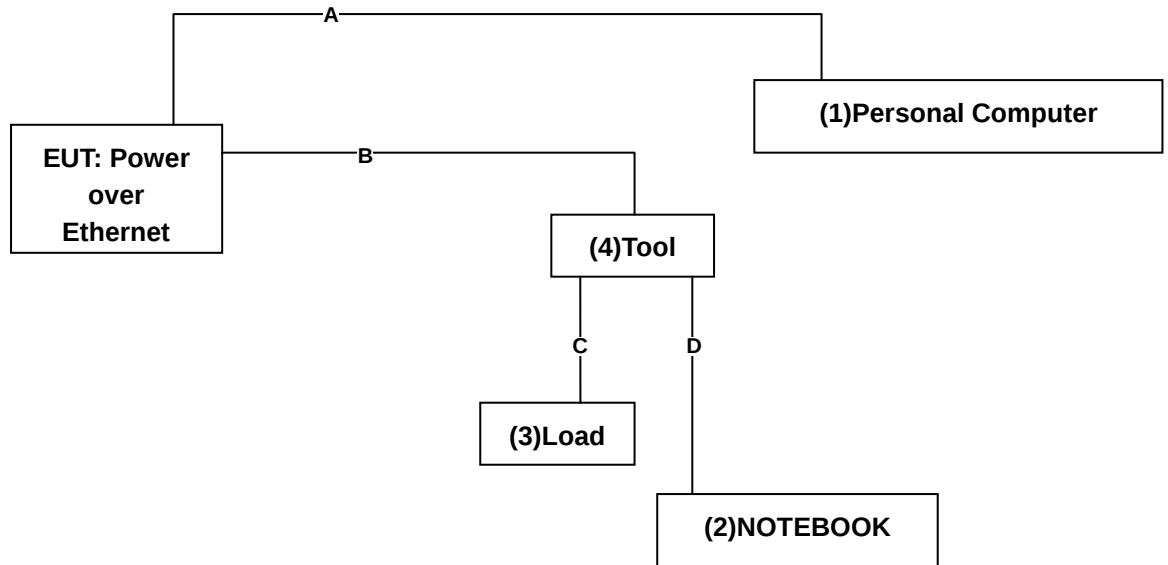
1. According to pre-scan data, we determine the data (Mode 2) shown in this test report, which reflects the worst-case data for each operation mode.
2. The EUT has serial model numbers for the requirement of marketing.

3.3 CONFIGURATION OF THE SYSTEM UNDER TEST

Item	Device	No.	Configuration
1	Personal Computer	ACER L001432	Model Name : Aspire M1935 System Number : UDSJRTA2283481DB2B0000 Mother Board : IPIBM-AR Manufacturer : ACER CPU : Intel Celeron G1620 2.7G 2M 55W SDRAM : 4GB DDR III H.D.D. : 500GB SATA O.D.D : Super Multi VIDEO : Built-in Graphics AUDIO : Integrated audio LAN : Integrated LAN 10/100/1000 FDD : None S.P.S : FSP ATX-250PA(1)
2	Notebook	-----	Manufacturer : Dell Model Number : XPS502
3	LOAD	-----	Load: 46.2Ω
4	Tool	-----	Manufacturer : MStronic CO., LTD. Model Number : Tool

Note: All the peripherals above were selected specifically after confirming that there is no impact on test results.

3.4 BLOCK DIAGRAM OF CONNECTIONS BETWEEN EUT AND SIMULATORS



Signal Cable Description of the above support units				
No.	Signal Cable Description	Shielded	Core type	Length (m)
A	RJ45 Cable	☐ Yes ☒ No	☒ No ☐ 1(near EUT) ☐ 1(near Aux) ☐ 2	3
B	RJ45 Cable	☐ Yes ☒ No	☒ No ☐ 1(near EUT) ☐ 1(near Aux) ☐ 2	3
C	RJ45 Cable	☐ Yes ☒ No	☒ No ☐ 1(near EUT) ☐ 1(near Aux) ☐ 2	0.15
D	RJ45 Cable	☐ Yes ☒ No	☒ No ☐ 1(near EUT) ☐ 1(near Aux) ☐ 2	1

3.5 LAB AMBIENT

Items	Range Requirement
Temperature (°C)	10-40
Humidity (%RH)	10-90
Barometric pressure (mbar)	860-1060

3.6 TEST FACILITY ACCREDITATION

Global EMC Standard Tech. Corp. is accredited in respect of laboratory and the accreditation criteria is ISO/IEC 17025: 2005.

Site Description : Registration on VCCI effective through February 18, 2021.
VCCI Member No.708

Recognized by the Council of Taiwan Accreditation Foundation
As an accredited laboratory and registration No.:1082.
Registration on TAF effective through September 18, 2018.

Aug. 10, 1995 /Aug. 25, 1998 File on FCC Engineering Laboratory
Federal Communications Commission
Designation Number: TW1031, TW1032

Name of firm : Global EMC Standard Tech. Corp.

Site location : No.3, Baodoucuokeng, Linkou Dist., New Taipei City 244, Taiwan (R.O.C.)



4. CONDUCTED EMISSION MEASUREMENT

4.1 TEST EQUIPMENTS

Item	Instrument	Manufacturer	Model	S/N or Version	Next Cal. Date
1	TEST RECEIVER	RS	ESCS30	100392	2019.03.14
2	L.I.S.N.(EUT)	RS	ENV216	100108	2019.03.26
3	CABLE	GTK	N/A	GTK-E-A154-01	2019.01.06
4	Software	FARAD	EZ-EMC	2A1.1(USB)	N/A
5	ISN	RS	ENV216	100108	2019.03.26

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.

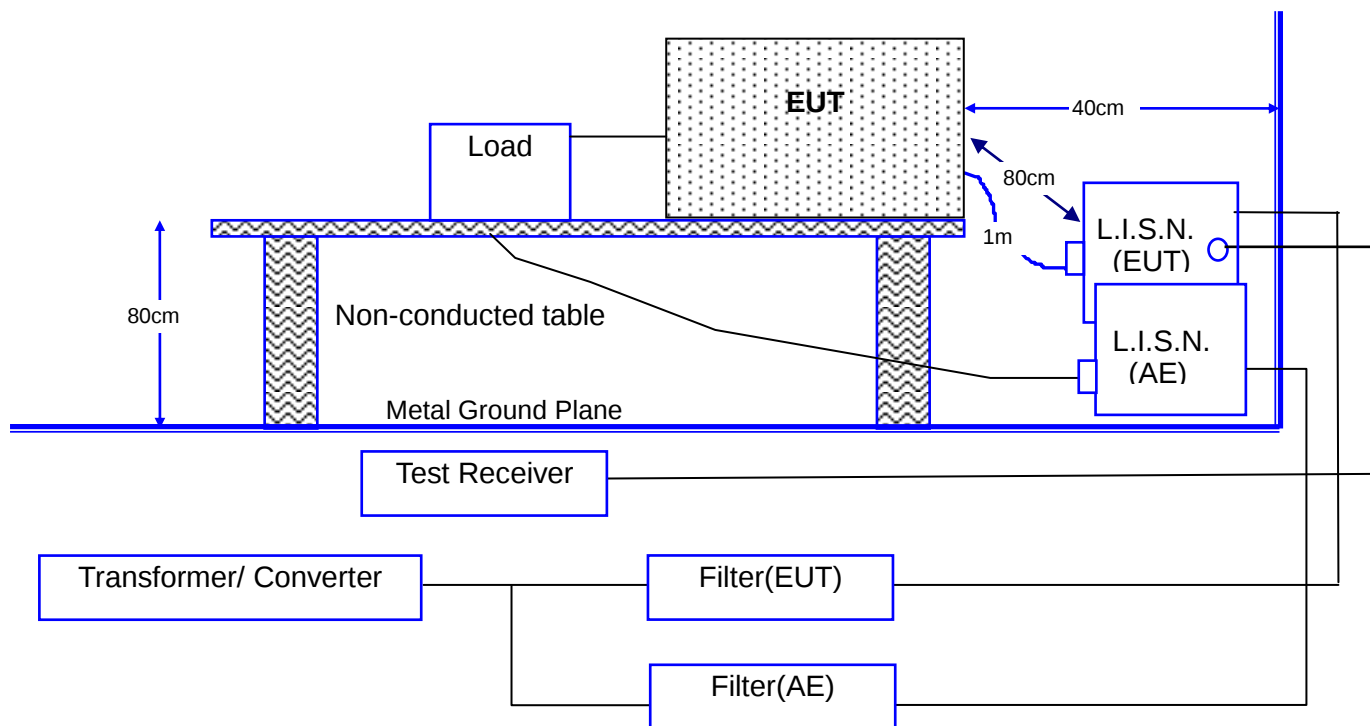
2. The test was performed in GTK Shielded Room A9.

4.2 TEST METHOD

According to EN55032: 2015

4.3 BLOCK DIAGRAM OF TEST SETUP

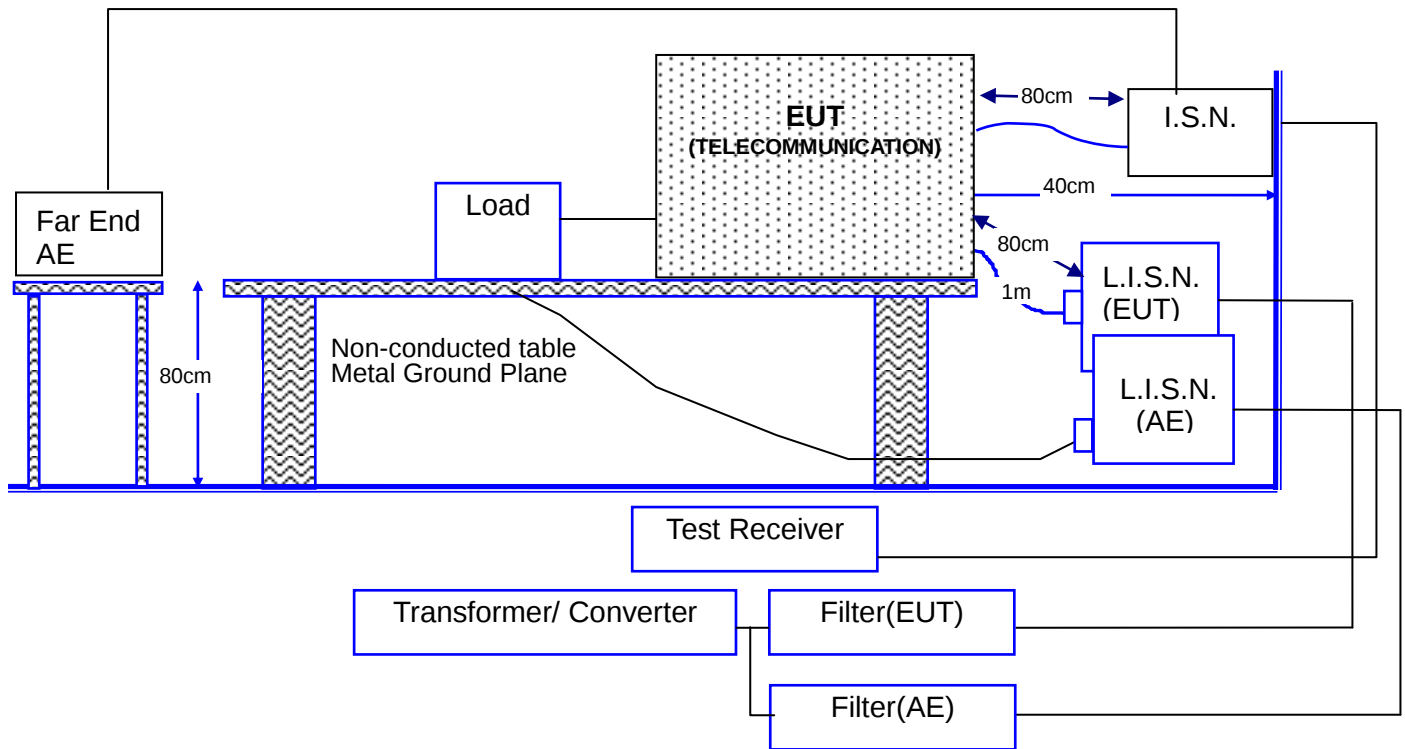
4.3.1 TEST SETUP FOR EMISSION MEASUREMENT AT MAINS TERMINAL



Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all others setup condition remain the same.

4.3.2 TEST SETUP FOR CONDUCTED EMISSION MEASUREMENT AT TELECOMMUNICATION PORTS



Note: This is a representative setup diagram for Table-top EUT.
For Floor-standing EUT, the table will be removed with all others setup condition remain the same.

4.4 CONDUCTED EMISSION LIMITS

4.4.1 Requirements for conducted emissions from the AC mains power ports

for class B equipment

Applicable to 1. AC mains power ports (3.1.1)				
Table clause	Frequency range MHz	Coupling device (see Table A.8)	Detector type / bandwidth	Class B limits dB(mV)
A10.1	0,15 to 0,5	AMN	Quasi Peak / 9 kHz	66 to 56
	0,5 to 5			56
	5 to 30			60
A10.2	0,15 to 0,5	AMN	Average / 9 kHz	56 to 46
	0,5 to 5			46
	5 to 30			50
Apply A10.1 and A10.2 across the entire frequency range.				

4.4.2 CONDUCTED EMISSION LIMITS (TELECOMMUNICATION PORTS)

Frequency	Voltage limits dB(μV)	
	Class B	
MHz	QUASI-PEAK	AVERAGE
0.15 to 0.50	84 to 74	74 to 64
0.50 to 30	74	64

Remarks :

1. In the Above Table, the tighter limit applies at the band edges.
2. Either the voltage limits or the current limits as applicable, shall be met.

4.5 TEST CONFIGURATION ON MEASUREMENT

The equipments, which are listed at 4.1, are installed on Conducted Emission Test to meet the Commission requirement and operating in a manner which tends to maximize its emission characteristics in a normal application.

The device under test, installed in a representative system as described in section 4.3.1, was placed on a non-conductive table whose total height equaled 80 cm. The EUT was powered through one L.I.S.N. whose the signal output was terminated to the receiver. The other peripherals were powered from another L.I.S.N. whose the signal output was terminated by 50 Ohms terminator.

4.6 CONDUCTED EMISSION MEASURED PROCEDURE AND DATA

4.6.1 CONDUCTED EMISSION (MAINS TERMINAL)

The measurement range of conducted emission, which is from 0.15 MHz to 30 MHz, was scan for peak emission curve of all the test modes. The worst mode is then measured using an average and/or quasi peak detector and record at least the disturbance levels and the frequencies of the six highest disturbances. The final measurement value is equal to the receiver reading plus the correction factor. If AMN insertion loss is more than 0.5dB, automatically the receiver will add the correction factor to the reading level.

4.6.2 CONDUCTED EMISSION LIMITS (TELECOMMUNICATION PORTS)

The measurement range of telecommunication port from 0.15 MHz to 30 MHz are been investigated. The measurement method prescribed should comply with the voltage limits; create a condition of LAN utilization in excess of 10% in order to emulate realistic types of data transmission. If the LAN maintains transmission during idle periods measurements shall also be made during idle periods. Connect an ISN to the test receiver during the measurement of voltage disturbance which should be corresponding to the number of line of the ISN. At the same time meet the common mode impedance of the telecommunication port under test.

The initial step is to scan all the test modes using a test receiver of the peak detector to find for the worst mode. The worst mode data are then measured based on RBW 10 KHz with an average and/or quasi peak detector and record at least the disturbance levels and the frequencies of the six highest disturbances.

4.7 OPERATING CONDITIONS OF THE EUT

The exercise program used during conducted emission measurement was designed to exercise the EUT in a manner similar to a typical use. The exercise sequence is listed as below:

1. Setup the EUT and simulators as shown on 4.3.
2. Turn on the power of all equipments.
3. Boot the P.C. from Hard Disk and setup the video to Windows XP, active all devices.
4. Connect the PC and run test program "test.bat".
5. The EUT exchange the information with the PC.
6. Adjust to appropriate video resolution.
7. Active other internal devices such as network function.
8. Run "EMC" test program under Windows XP.
9. P.C. sent "H" pattern to monitor, make the "H" pattern full in the screen.
10. P.C. sent "H" pattern to parallel and serial port.
11. Repeat above steps.

4.8 CONDUCTED EMISSION MEASUREMENT RESULTS

Date of Test	May 07, 2018	Temperature	25 °C
EUT	Power over Ethernet	Humidity	57 %
Test Mode	Mode 2	Display Pattern	H Pattern
Test Power Supply	AC 230V/50Hz		

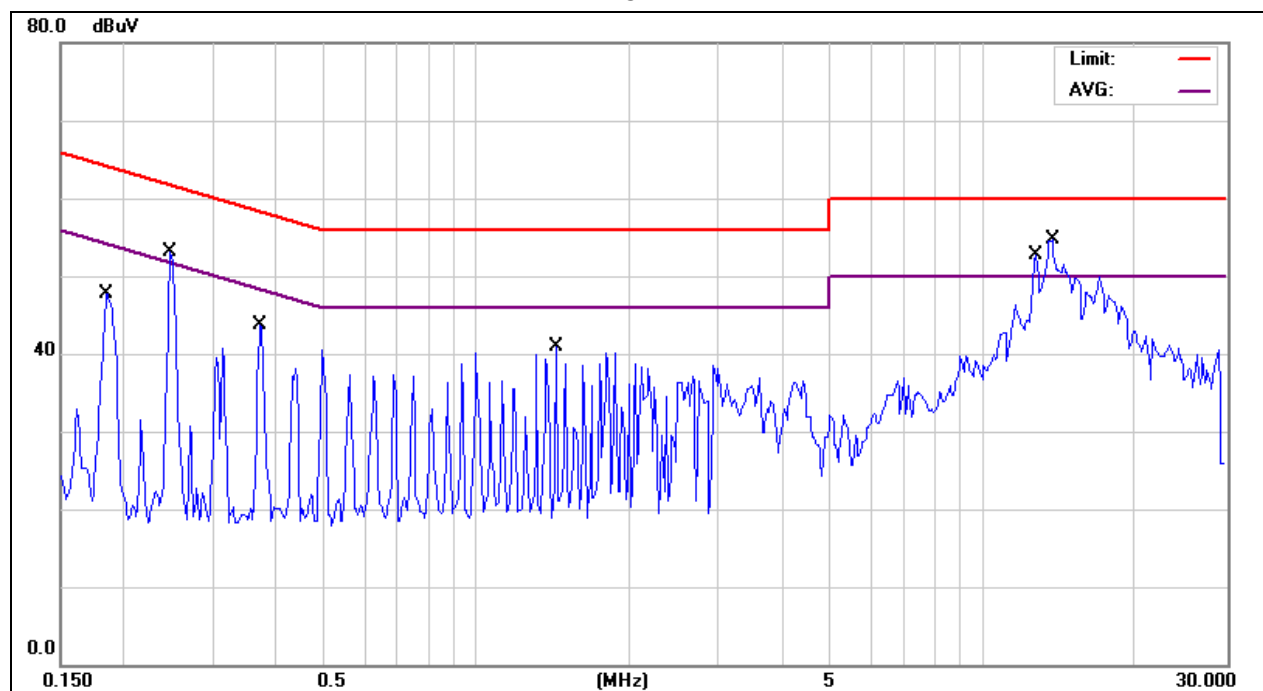
Line

No.	Frequency MHz	Reading Level dBμV	Factor dB	Measurement dBμV	Limit dBμV	Over Limit dB	Detector
1	0.1845	40.62	9.75	50.37	64.28	-13.91	QP
2	0.1845	36.01	9.75	45.76	54.28	-8.52	AVG
3	0.2494	43.58	9.76	53.34	61.78	-8.44	QP
4	★0.2494	37.26	9.76	47.02	51.78	-4.76	AVG
5	0.3717	36.34	9.79	46.13	58.46	-12.33	QP
6	0.3717	27.25	9.79	37.04	48.46	-11.42	AVG
7	1.4356	29.10	9.96	39.06	56.00	-16.94	QP
8	1.4356	27.05	9.96	37.01	46.00	-8.99	AVG
9	12.6530	39.16	10.49	49.65	60.00	-10.35	QP
10	12.6530	28.09	10.49	38.58	50.00	-11.42	AVG
11	13.6494	42.02	10.51	52.53	60.00	-7.47	QP
12	13.6494	33.84	10.51	44.35	50.00	-5.65	AVG

Remarks :

1. All readings are Quasi-peak and Average values.
2. Measurement = Reading + Factor (Could have ± 0.01 tolerance due to computer automatically round off calculation).
3. Over Limit (Margin Value)=Measurement level-Limit value.
4. Factor = L.I.S.N. insertion loss + cable loss
5. " ★ " means that this data is the worse case measurement level.
6. The measurement uncertainty is 4.40 dB.

Line



- Remark:
1. The Limit (The red line of the graph indicates the quasi-peak measurements).
 2. The AVG (The purple line of the graph indicates the average measurements).
 3. The scan curve indicates peak detector measurement.

Date of Test	May 07, 2018	Temperature	25 °C
EUT	Power over Ethernet	Humidity	57 %
Test Mode	Mode 2	Display Pattern	H Pattern
Test Power Supply	AC 230V/50Hz		

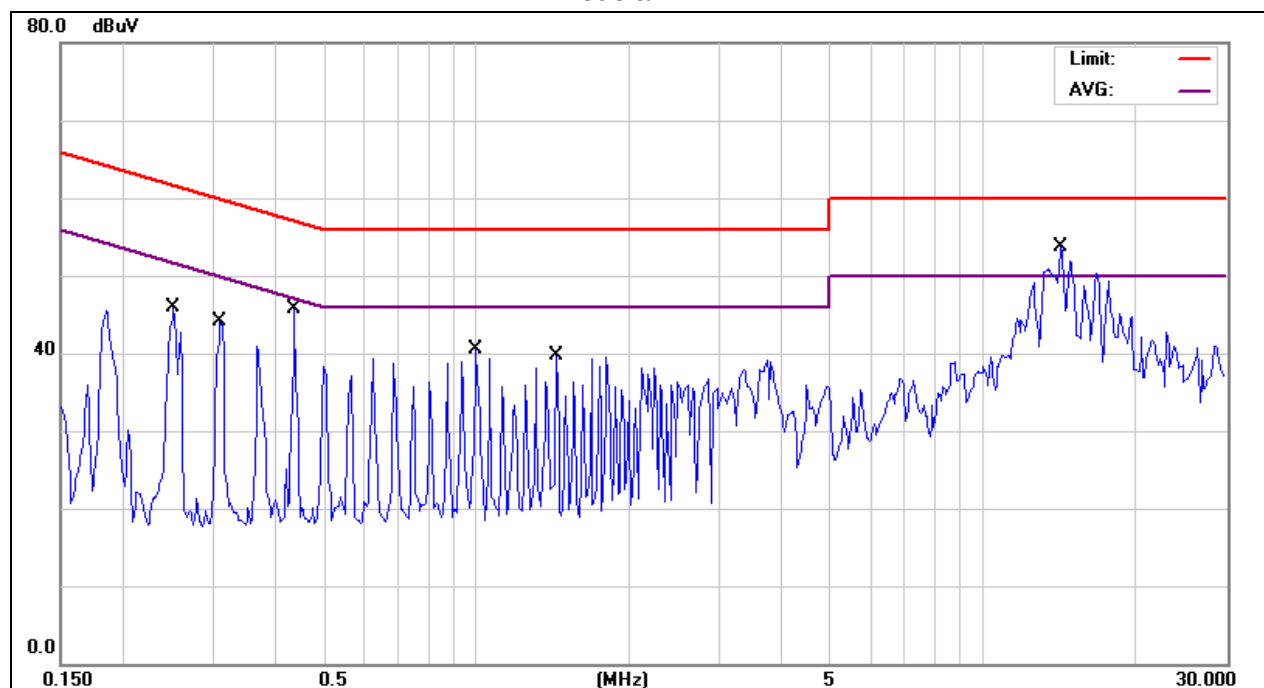
Neutral

No.	Frequency MHz	Reading Level dBμV	Factor dB	Measurement dBμV	Limit dBμV	Over Limit dB	Detector
1	0.2508	40.82	9.77	50.59	61.73	-11.14	QP
2	★0.2508	35.79	9.77	45.56	51.73	-6.17	AVG
3	0.3093	37.94	9.78	47.72	59.99	-12.27	QP
4	0.3093	28.00	9.78	37.78	49.99	-12.21	AVG
5	0.4352	34.54	9.80	44.34	57.15	-12.81	QP
6	0.4352	26.32	9.80	36.12	47.15	-11.03	AVG
7	0.9961	30.52	9.91	40.43	56.00	-15.57	QP
8	0.9961	28.77	9.91	38.68	46.00	-7.32	AVG
9	1.4326	30.22	9.96	40.18	56.00	-15.82	QP
10	1.4326	28.35	9.96	38.31	46.00	-7.69	AVG
11	14.2666	37.48	10.59	48.07	60.00	-11.93	QP
12	14.2666	29.70	10.59	40.29	50.00	-9.71	AVG

Remarks :

1. All readings are Quasi-peak and Average values.
2. Measurement = Reading + Factor (Could have ± 0.01 tolerance due to computer automatically round off calculation).
3. Over Limit (Margin Value)=Measurement level-Limit value.
4. Factor = L.I.S.N. insertion loss + cable loss
5. “ ★ ” means that this data is the worse case measurement level.
6. The measurement uncertainty is 4.40 dB.

Neutral



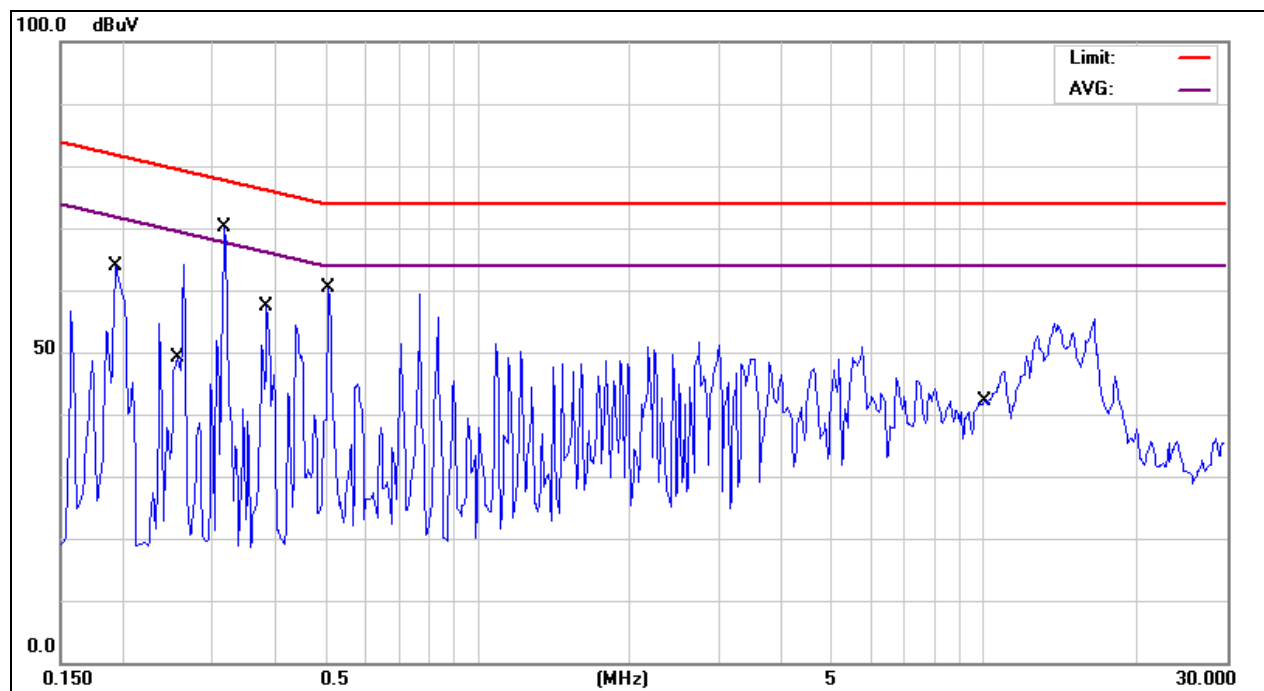
- Remark:
1. The Limit (The red line of the graph indicates the quasi-peak measurements).
 2. The AVG (The purple line of the graph indicates the average measurements).
 3. The scan curve indicates peak detector measurement.

Date of Test	May 09, 2018	Temperature	25 °C
EUT	Power over Ethernet	Humidity	57 %
Test Mode	ISN-LAN-10Mbps	Display Pattern	H Pattern
Test Power Supply	AC 230V/50Hz		

No.	Frequency MHz	Reading Level dBμV	Factor dB	Measurement dBμV	Limit dBμV	Over Limit dB	Detector
1	0.1930	69.14	10.08	79.22	81.91	-2.69	QP
2	★0.1930	61.01	10.08	71.09	71.91	-0.82	AVG
3	0.2573	67.64	10.02	77.66	79.52	-1.86	QP
4	0.2573	56.45	10.02	66.47	69.52	-3.05	AVG
5	0.3216	65.50	9.98	75.48	77.67	-2.19	QP
6	0.3216	50.72	9.98	60.70	67.67	-6.97	AVG
7	0.3852	64.14	9.95	74.09	76.17	-2.08	QP
8	0.3852	51.47	9.95	61.42	66.17	-4.75	AVG
9	0.5130	54.60	9.91	64.51	74.00	-9.49	QP
10	0.5130	43.82	9.91	53.73	64.00	-10.27	AVG
11	10.0000	61.02	10.27	71.29	74.00	-2.71	QP
12	10.0000	36.82	10.27	47.09	64.00	-16.91	AVG

Remarks :

1. All readings are Quasi-peak and Average values.
2. " ★ " means that this data is the worse case measurement level.
3. Measurement = Reading + Factor (Could have ±0.01 tolerance due to computer automatically round off calculation).
4. Factor = L.I.S.N. insertion loss + cable loss
5. The measurement uncertainty is 4.36 dB.



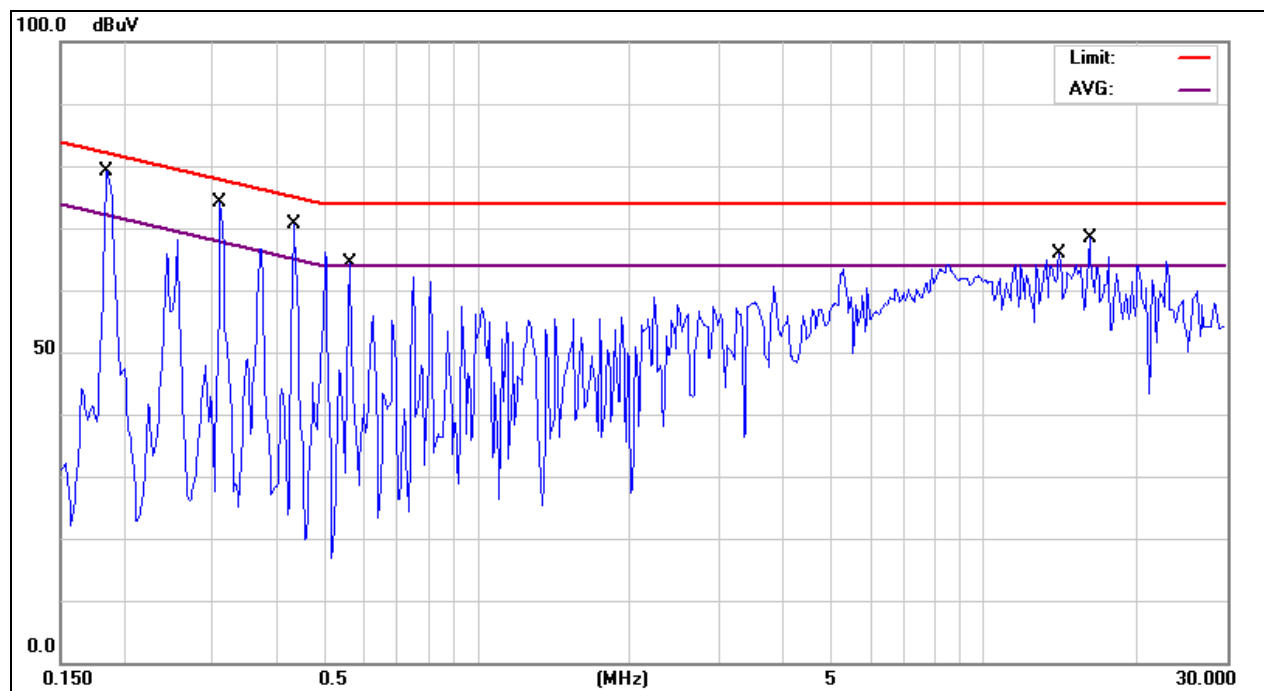
- Remark:
1. The Limit (The red line of the graph indicates the quasi-peak measurements).
 2. The AVG (The purple line of the graph indicates the average measurements).
 3. The scan curve indicates peak detector measurement.

Date of Test	May 09, 2018	Temperature	25 °C
EUT	Power over Ethernet	Humidity	57 %
Test Mode	ISN-LAN-100Mbps	Display Pattern	H Pattern
Test Power Supply	AC 230V/50Hz		

No.	Frequency MHz	Reading Level dBμV	Factor dB	Measurement dBμV	Limit dBμV	Over Limit dB	Detector
1	0.1862	69.24	10.09	79.33	82.20	-2.87	QP
2	★0.1862	61.10	10.09	71.19	72.20	-1.01	AVG
3	0.3123	64.80	9.97	74.77	77.91	-3.14	QP
4	0.3123	55.38	9.97	65.35	67.91	-2.56	AVG
5	0.4352	60.64	9.92	70.56	75.15	-4.59	QP
6	0.4352	48.20	9.92	58.12	65.15	-7.03	AVG
7	0.5602	54.58	9.90	64.48	74.00	-9.52	QP
8	0.5602	43.12	9.90	53.02	64.00	-10.98	AVG
9	14.1523	53.73	10.34	64.07	74.00	-9.93	QP
10	14.1523	51.32	10.34	61.66	64.00	-2.34	AVG
11	16.3498	48.39	10.38	58.77	74.00	-15.23	QP
12	16.3498	46.23	10.38	56.61	64.00	-7.39	AVG

Remarks :

1. All readings are Quasi-peak and Average values.
2. " ★ " means that this data is the worse case measurement level.
3. Measurement = Reading + Factor (Could have ±0.01 tolerance due to computer automatically round off calculation).
4. Factor = L.I.S.N. insertion loss + cable loss
5. The measurement uncertainty is 4.36 dB.



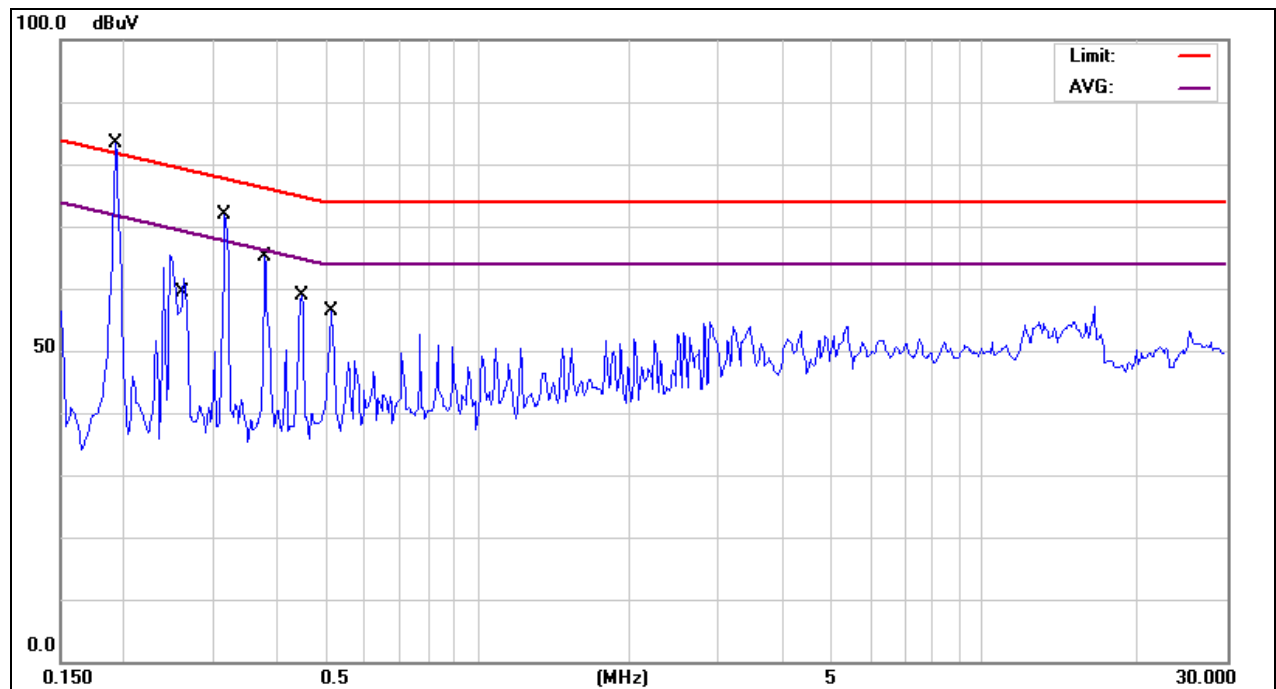
- Remark:
1. The Limit (The red line of the graph indicates the quasi-peak measurements).
 2. The AVG (The purple line of the graph indicates the average measurements).
 3. The scan curve indicates peak detector measurement.

Date of Test	May 09, 2018	Temperature	25 °C
EUT	Power over Ethernet	Humidity	57 %
Test Mode	ISN-LAN-1000Mbps	Display Pattern	H Pattern
Test Power Supply	AC 230V/50Hz		

No.	Frequency MHz	Reading Level dBμV	Factor dB	Measurement dBμV	Limit dBμV	Over Limit dB	Detector
1	0.1928	65.30	10.08	75.38	81.92	-6.54	QP
2	0.1928	58.40	10.08	68.48	71.92	-3.44	AVG
3	★0.2589	66.24	10.02	76.26	79.47	-3.21	QP
4	0.2589	54.59	10.02	64.61	69.47	-4.86	AVG
5	0.3210	61.28	9.98	71.26	77.68	-6.42	QP
6	0.3210	48.20	9.98	58.18	67.68	-9.50	AVG
7	0.3843	52.68	9.95	62.63	76.19	-13.56	QP
8	0.3843	44.84	9.95	54.79	66.19	-11.40	AVG
9	0.4488	48.18	9.93	58.11	74.90	-16.79	QP
10	0.4488	42.43	9.93	52.36	64.90	-12.54	AVG
11	0.5134	46.18	9.91	56.09	74.00	-17.91	QP
12	0.5134	41.47	9.91	51.38	64.00	-12.62	AVG

Remarks :

1. All readings are Quasi-peak and Average values.
2. " ★ " means that this data is the worse case measurement level.
3. Measurement = Reading + Factor (Could have ±0.01 tolerance due to computer automatically round off calculation).
4. Factor = L.I.S.N. insertion loss + cable loss
5. The measurement uncertainty is 4.36 dB.



- Remark:
1. The Limit (The red line of the graph indicates the quasi-peak measurements).
 2. The AVG (The purple line of the graph indicates the average measurements).
 3. The scan curve indicates peak detector measurement.

5. RADIATED EMISSION MEASUREMENT

5.1 TEST EQUIPMENT

The following test equipments are used during the radiated emission tests:

Item	Instrument	Manufacturer	Model	S/N or Version	Next Cal. Date
1	TEST RECEIVER	RS	ESCS30	100392	2019.03.14
2	SPECTRUM	RS	FSU26	200882	2018.08.03
3	PRE-AMPLIFIER	HP	87405A	3207A01713	2019.03.23
4	BILOG ANTENNA	SCHWARZBECK	VULB 9168	9168-251	2018.05.22
5	CABLE	GTK	N/A	GTK-E-A344-01	2019.04.06
6	Software	FARAD	EZ-EMC	2A1.1(USB)	N/A

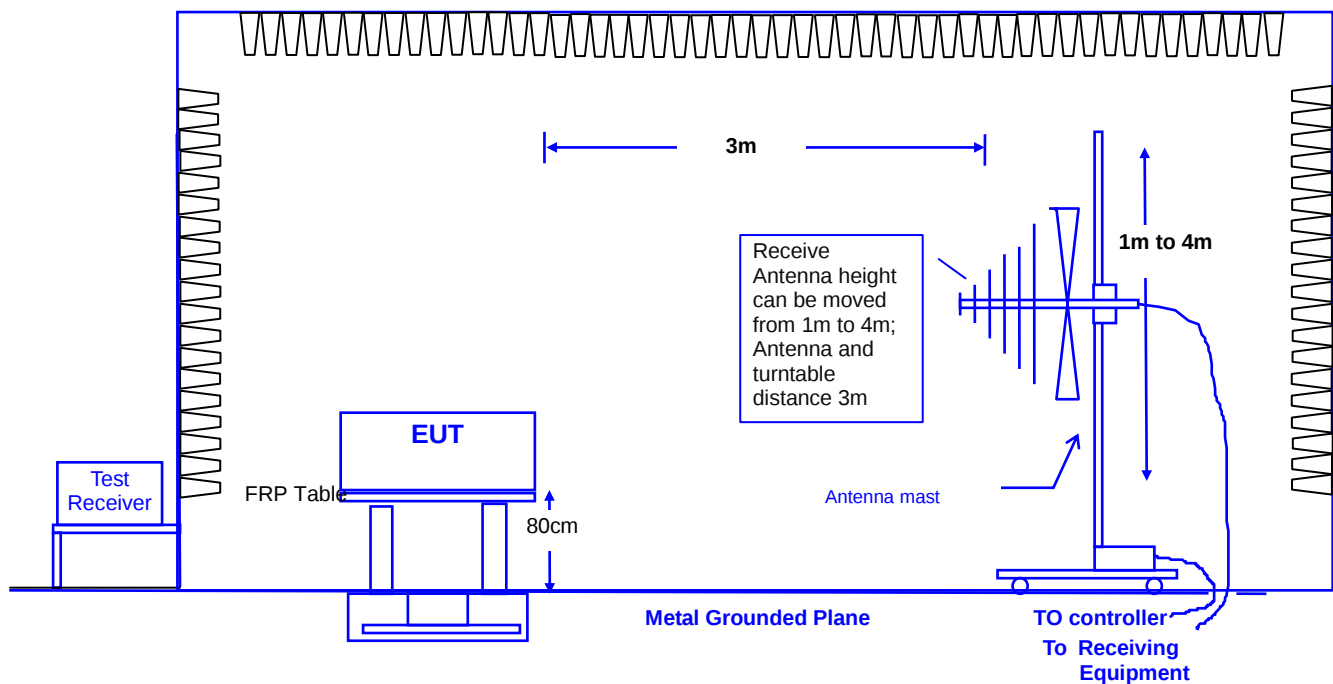
Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.

2. The test was performed at Chamber A6.

5.2 TEST METHOD

According to EN 55032: 2015

5.3 SEMI-ANECHOIC CHAMBER SETUP DIAGRAM



Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all the other setup conditions remain the same.

5.4 RADIATED EMISSION LIMITS

5.4.1 Requirements for radiated emissions at frequencies up to 1 GHz

for class B equipment

Table clause	Frequency range MHz	Measurement			Class B limits dB(mV/m)
		Facility (see Table A.1)	Distance m	Detector type /bandwidth	
A4.1	30 to 230	OATS/SAC	10	Quasi Peak / 120 kHz	30
	230 to 1 000				37
A4.2	30 to 230	OATS/SAC	3		40
	230 to 1 000				47
A4.3	30 to 230	FAR	10	Quasi Peak / 120 kHz	32 to 25
	230 to 1 000				32
A4.4	30 to 230	FAR	3		42 to 35
	230 to 1 000				42

Apply only table clause A4.1 or A4.2 or A4.3 or A4.4 across the entire frequency range.
These requirements are not applicable to the local oscillator and harmonics frequencies of equipment covered by Table A.6.

5.5 EUT CONFIGURATION

The EUT, which is listed at 3.4, was installed at the Radiated Emission Test site to meet the Commission requirements and operated in a manner, which tends to maximize its emission characteristics in a normal application.

The EUT, installed in a representative system as described in section 5.3, was placed on a non-conductive table whose total height equaled 80 cm. This table can be rotated 360 degrees.

5.5.1 30 MHz to 1 GHz

The measurement antenna was mounted to a non-conductive mast capable of moving the antenna vertically. Antenna height was varied from 1 m to 4 m and the system under test was rotated from 0 degree through 360 degrees relative to the antenna position and polarization (Horizontal and Vertical). Also the I/O cable positions were investigated to find the maximum emission condition.

5.6 OPERATING CONDITIONS OF THE EUT

Same as conducted emission measurement, which is listed in 4.7

5.7 RADIATED EMISSION DATA

According EN 55032: 2015 Section 8, 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 of the internal sources of the EUT (MHz)	Upper frequency of measurement rang (MHz)
<108	1000
108-500	2000
500-1000	5000
Above 1000	5 th harmonic of the highest frequency or 6 GHz, whichever is less

Remark: The highest tested frequency is generated by the 66kHz.
At least, the upper frequency of measurement range is 1GHz.

5.7.1 30 MHz to 1 GHz

The measurement range of radiated emission, which is from 30 MHz to 1 GHz, was investigated. All readings are quasi-peak values with a resolution bandwidth of 120 kHz. The initial step in collecting radiated emission data is a spectrum analyzer peak scans of the measurement range for all the test modes and then use test receiver for final measurement and record at least the disturbance levels and the frequencies of the six highest disturbances. Then the worst modes were reported the following data pages.

5.8 RADIATED EMISSIONS MEASUREMENT RESULTS

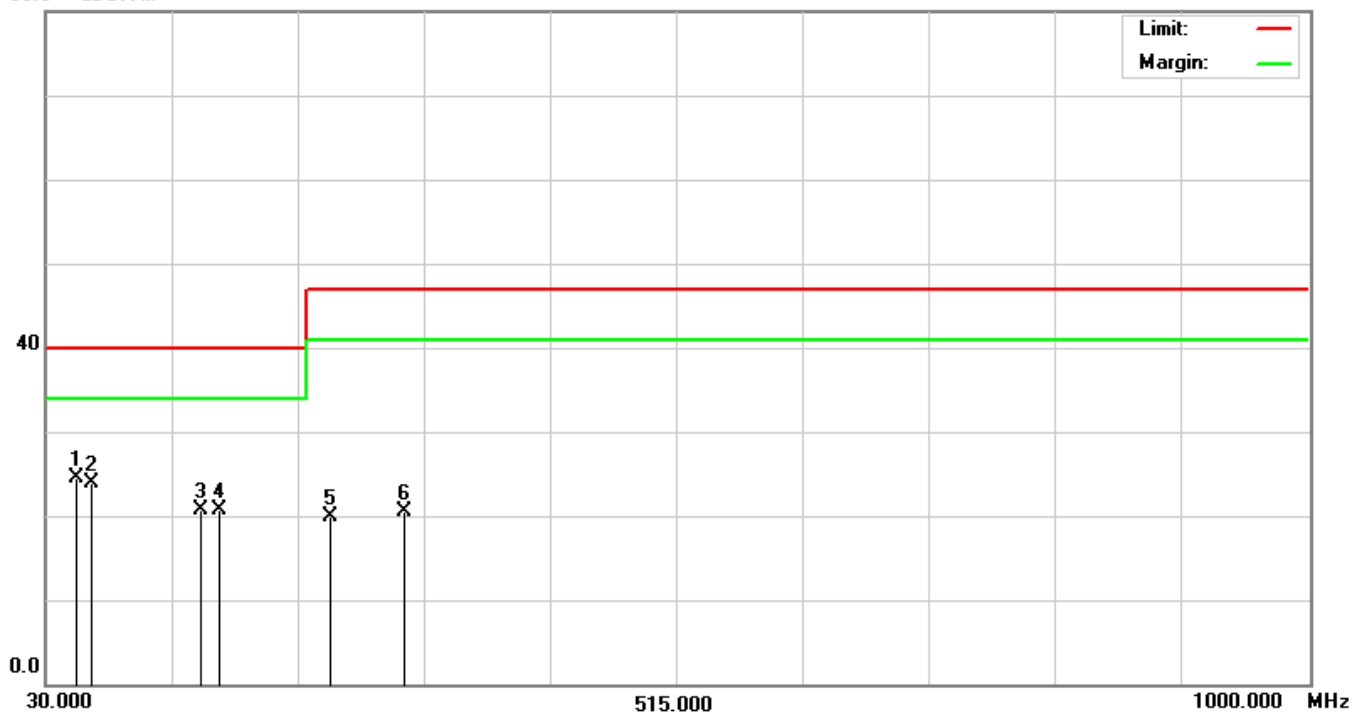
Date of Test	May 04, 2018	Temperature	20 deg/C
EUT	Power over Ethernet	Humidity	57 %RH
Working Cond.	Mode 2	Display Pattern	H Pattern
Antenna distance	3m at Horizontal	Frequency Range	30-1000MHz
Test Power Supply	AC 230V/50Hz		

No.	Frequency MHz	Reading Level dBμV	Factor dB	Measurement dBμV/m	Limit dBμV/m	Over Limit dB	Detector
1	★53.2800	32.15	-7.64	24.51	40.00	-15.49	QP
2	64.9200	32.96	-9.06	23.90	40.00	-16.10	QP
3	149.3100	28.99	-8.19	20.80	40.00	-19.20	QP
4	163.8600	28.66	-8.02	20.64	40.00	-19.36	QP
5	249.2200	28.43	-8.59	19.84	47.00	-27.16	QP
6	305.4800	27.57	-7.03	20.54	47.00	-26.46	QP

Remarks:

1. All Readings below 1GHz are Quasi-Peak.
2. Measurement = Reading + Factor (Could have ± 0.01 tolerance due to computer automatically round off calculation).
3. Over Limit (Margin Value)=Measurement level-Limit value.
4. Factor = antenna factor + cable loss – amplifier gain.
5. “ ★ ” means that this data is the worse case measurement level.
6. The antenna height could have ± 1 cm tolerance and the turn table degree could have $\pm 1^\circ$ tolerance.
7. The measurement uncertainty is 4.33 dB.

80.0 dBμV/m



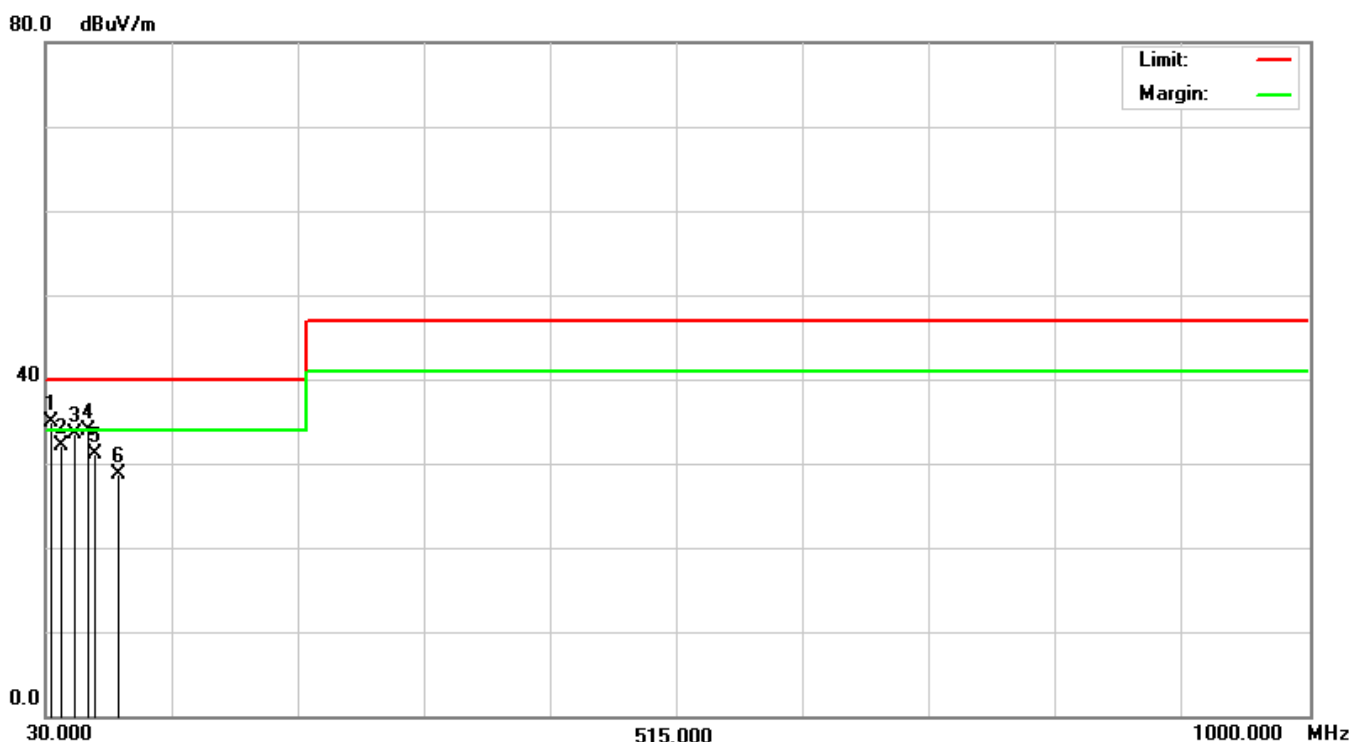
- Remark:
1. The Limit (The red line of the graph indicates the quasi -peak measurements).
 2. The Margin (The green line of the graph indicates the 6dB margin).

Date of Test	May 04, 2018	Temperature	20 deg/C
EUT	Power over Ethernet	Humidity	57 %RH
Working Cond.	Mode 2	Display Pattern	H Pattern
Antenna distance	3m at Vertical	Frequency Range	30-1000MHz
Test Power Supply	AC 230V/50Hz		

No.	Frequency MHz	Reading Level dBμV	Factor dB	Measurement dBμV/m	Limit dBμV/m	Over Limit dB	Detector
1	★33.8800	43.38	-8.51	34.87	40.00	-5.13	QP
2	42.6100	40.29	-8.09	32.20	40.00	-7.80	QP
3	52.3100	41.13	-7.56	33.57	40.00	-6.43	QP
4	62.9800	42.57	-8.72	33.85	40.00	-6.15	QP
5	67.8300	40.72	-9.58	31.14	40.00	-8.86	QP
6	86.2600	41.90	-13.25	28.65	40.00	-11.35	QP

Remarks:

1. All Readings below 1GHz are Quasi-Peak.
2. Measurement = Reading + Factor (Could have ± 0.01 tolerance due to computer automatically round off calculation).
3. Over Limit (Margin Value)=Measurement level-Limit value.
4. Factor = antenna factor + cable loss – amplifier gain.
5. “ ★ ” means that this data is the worse case measurement level.
6. The antenna height could have ± 1 cm tolerance and the turn table degree could have $\pm 1^\circ$ tolerance.
7. The measurement uncertainty is 4.33 dB.



- Remark:
1. The Limit (The red line of the graph indicates the quasi -peak measurements).
 2. The Margin (The green line of the graph indicates the 6dB margin).

6. HARMONIC CURRENT EMISSIONS, VOLTAGE FLUCTUATIONS AND FLICKER MEASUREMENT

6.1 TEST EQUIPMENT

Item	Instrument	Manufacturer	Model	S/N or Version	Next Cal. Date
1	EMC Emission Tester	EMC PARTNER	HAR1000-1P	HAR1000-1P 115V-0241	2018.07.30
2	AC Power Source	PACIFIC	345AMX/UPC32	270	N/A
3	Software	EMC PARTNER	HARCS	4.21	N/A

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.

2. The test was performed in GTK Shielded Room A9.

6.2 TEST METHOD

According to EN 61000-3-2: 2014

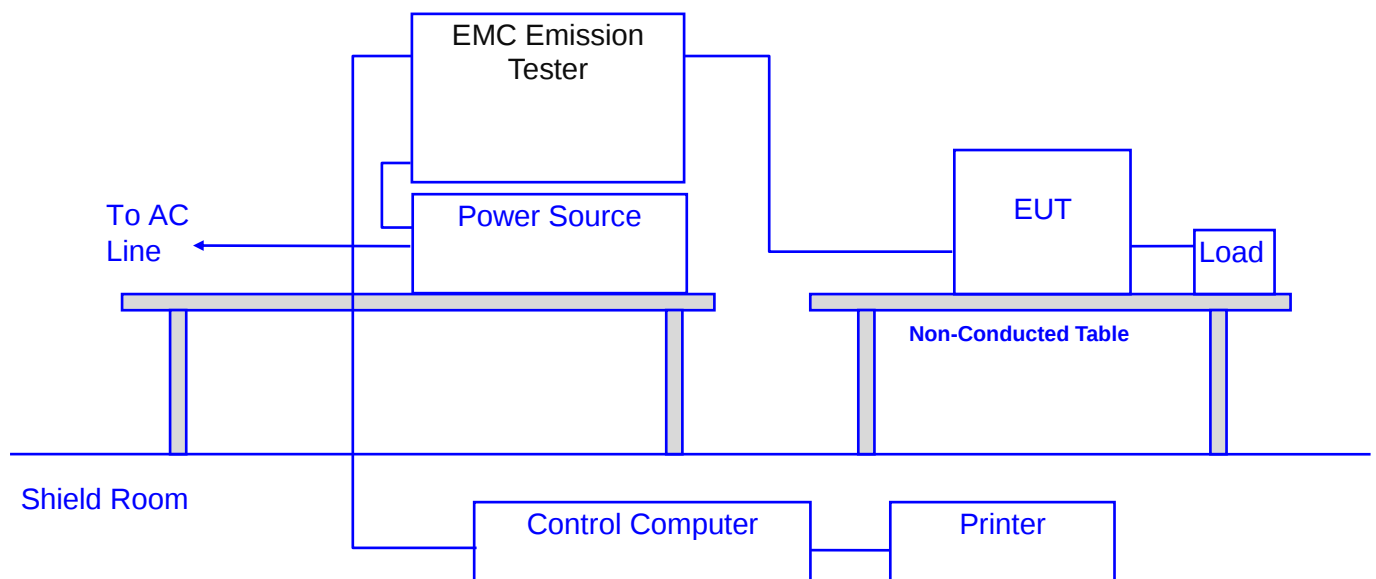
(Note: EUT power level is below 75 Watts and therefore has no defined limits)

EN 61000-3-3: 2013

6.3 BLOCK DIAGRAM OF TEST SETUP

Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all others setup condition remain the same.



6.4 LIMITS OF FLICKER MEASUREMENT

Flicker:

Limits	
P_{st}	1.0
P_{lt}	0.65
$d(t)$	3.3%
Time(ms)>dt	500ms
d_c	3.3%
d_{max}	4%

6.5 OPERATING CONDITIONS OF THE EUT

1. Setup the EUT and Test Equipment as shown on 6.3.
2. Power on the EUT. Acting performance checking program to allow EUT executing its usual operation mode during test.

6.6 TEST PROCEDURE

6.6.1 Flicker:

The test voltage supplied the EUT shall be maintained within $230V \pm 2\%$.

The frequency shall be $50Hz \pm 0.5\%$.

The observation period T_p :

-for P_{st} $T_p=10min$.

-for P_{lt} $T_p=2h$.

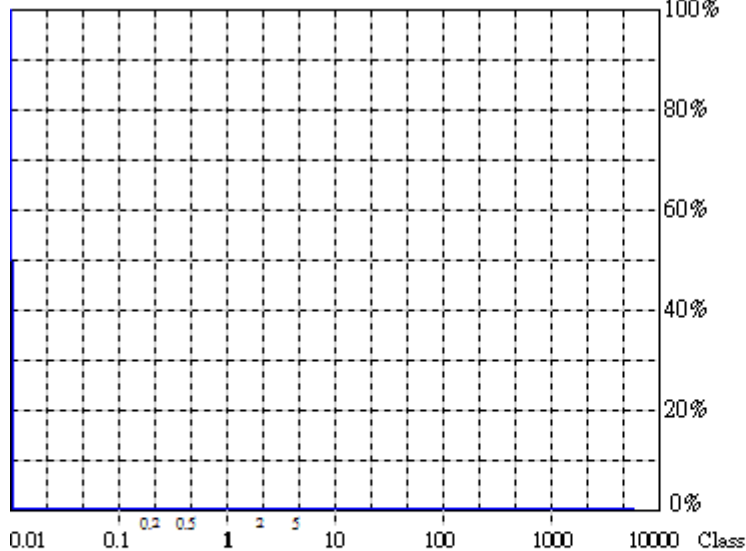
6.7 TEST RESULT

1. The measurement of the flicker, which test at the extremes of EUT's supply range was investigated, and the test result are reported the following data pages. The measurement limits were met, and the EUT passed the test.
2. The Flicker measurement uncertainty is 0.02 %.

Flicker Test Summary per EN/IEC61000-3-3 (Run time)

Comply: EN 61000-3-3: 2013 - IEC 61000-4-15 Ed.2
Operator Eric Tsai
Unit
Serial Number
Remarks

Flickermeter 1000-4-15 for 230V/50Hz



Actual Flicker (Fli): 0.00
Short-term Flicker (Pst): 0.07
Limit (Pst): 1.00
Long-term Flicker (Plt): 0.07
Limit (Plt): 0.65
Maximum Relative Volt. Change (dmax): 0.00%
Limit (dmax): 4.00 %
Relative Steady-state Voltage Change (dc): 0.00%
Limit (dc): 3.00 %
Maximum Interval exceeding 3.30 % (dt): 0.00ms
Limit (dt>Lim): 500ms

Flicker Emission - IEC 61000-3-3, EN 61000-3-3

2018/5/22 PM 04:43:3

Urms = 230.1 V P = 50.07 W
Irms = 0.465 A pf = 0.468

Range: 2 A
V-nom: 230 V
TestTime: 12 min (100%)

PCE

Test completed, Result: PASSED

MIT-09X-VVFF

HAR-1000 EMC-Printer

Full Bar : Actual Values
Empty Bar : Maximum Values
Circles : Average Values
Blue : Current , Green : Voltage , Red : Failed

Urms = 230.1V Freq = 50.000 Range: 2 A
Irms = 0.465A Ipk = 1.798A cf = 3.868
P = 50.07W S = 107.0VA pf = 0.468

Test - Time : 12 x 1min = 12min (100 %)

LIN (Line Impedance Network) : L: 0.24ohm +j0.15ohm N: 0.16ohm +j0.10ohm

Limits : Plt : 0.65 Pst : 1.00
dmax : 4.00 % dc : 3.00 %
dtLim: 3.30 % dt>Lim: 500ms

Test completed, Result: PASSED

7. ESD IMMUNITY TEST

7.1 TEST EQUIPMENT

Item	Instrument	Manufacturer	Model	S/N or Version	Next Cal. Date
1	ESD SIMULATOR SYSTEM	NoiseKen	ESS-B3011	ESS1367086	2018.05.24
2	Discharge Gun	NoiseKen	GT-30R	ESS1366788	2019.05.01

Note: 1. All equipments are calibrated and will be valid only for a period of 1 year.

2. The test was performed at GTK Shielded Room A3.

7.2 TEST METHOD

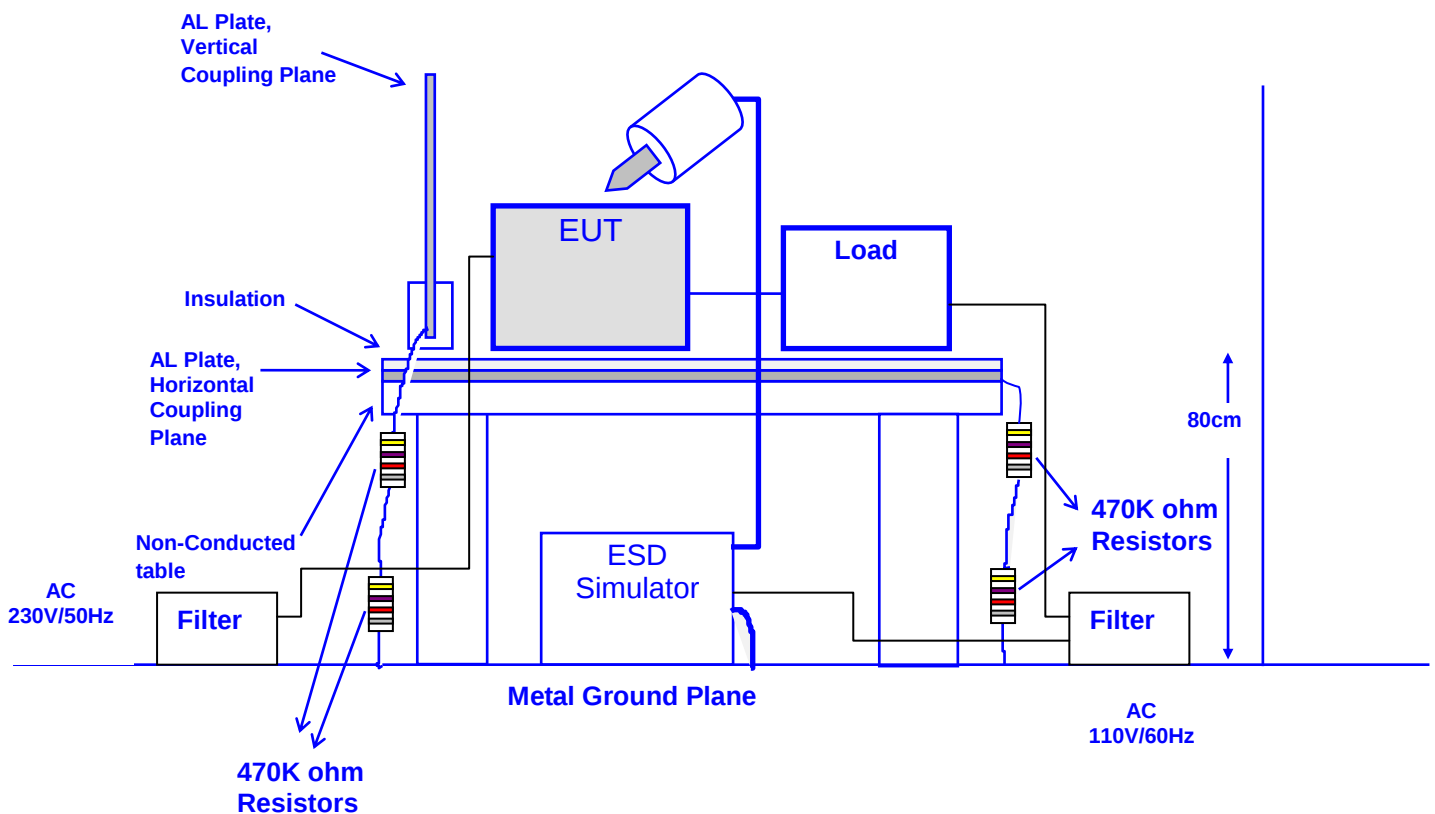
According to EN 55024: 2010+A1: 2015

IEC 61000-4-2:2008

7.3 BLOCK DIAGRAM OF TEST SETUP

Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all others setup condition remain the same.



7.4 SEVERITY LEVELS

Contact discharge		Air discharge	
Level	Test voltage kV	Level	Test voltage kV
1	2	1	2
2	4	2	4
3	6	3	8
4	8	4	15
X	Special	X	Special

Required Performance Criteria : B
Level : $\pm 8\text{kV}$ and lower levels (Air Discharge)
 $\pm 6\text{kV}$ and lower levels (Contact Discharge)

7.5 OPERATING CONDITIONS OF THE EUT

1. Setup the EUT and Test Equipment as shown on 7.3.
2. Power on the EUT. Acting performance checking program to allow EUT executing its usual operation mode during test.

7.6 TEST PROCEDURE

Air Discharge: discharge at slots and apertures and insulating surfaces:

This test was performed on non-conductive surfaces in accordance with IEC 61000-4-2:2008.
The selected test point shall be subjected to at least 10 positive & 10 negative discharges with >1 second interval.

Contact Discharge: discharge to the conductive surfaces and coupling planes:

The EUT shall be exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points.

Each one test point shall be subjected to at least 25 positive & 25 negative discharges with >1 second interval.

Horizontal Coupling Plane (HCP) under the EUT & Vertical Coupling Plane (VCP) beside the 4 sides of the EUT, with the sharp discharge electrode touching the coupling plane.

HCP discharge:

ESD was applied to the earth reference plane on each accessible side of the EUT.

VCP discharge:

Vertical Coupling Plane was positioned at a distance of 0.1m from the EUT.

7.7 TEST RESULT

Date of Test	May 06, 2018	Temperature	25 °C
Test Mode	Mode 2	Humidity	55 %
Test Power Supply	AC 230V/50Hz		

Item	Each Point of Discharge	Voltage	Required Criteria	Complied to Criteria (A, B, C)	Result
Air Direct Discharge	10	☒ +2kV ☒ +4kV ☒ +8kV	B	A	PASS
	10	☒ -2kV ☒ -4kV ☒ -8kV	B	A	PASS
Contact Direct Discharge	25	☒ +2kV ☒ +4kV ☒ +6kV	B	A	PASS
	25	☒ -2kV ☒ -4kV ☒ -6kV	B	A	PASS
Indirect Discharge (HCP)	25	☒ +2kV ☒ +4kV ☒ +6kV	B	A	PASS
	25	☒ -2kV ☒ -4kV ☒ -6kV	B	A	PASS
Indirect Discharge (VCP) (Front)	25	☒ +2kV ☒ +4kV ☒ +6kV	B	A	PASS
	25	☒ -2kV ☒ -4kV ☒ -6kV	B	A	PASS
Indirect Discharge (VCP) (Left)	25	☒ +2kV ☒ +4kV ☒ +6kV	B	A	PASS
	25	☒ -2kV ☒ -4kV ☒ -6kV	B	A	PASS
Indirect Discharge (VCP) (Back)	25	☒ +2kV ☒ +4kV ☒ +6kV	B	A	PASS
	25	☒ -2kV ☒ -4kV ☒ -6kV	B	A	PASS
Indirect Discharge (VCP) (Right)	25	☒ +2kV ☒ +4kV ☒ +6kV	B	A	PASS
	25	☒ -2kV ☒ -4kV ☒ -6kV	B	A	PASS

- ☒ Meet criteria A: Operate as intended during and after the test
 - ☐ Meet criteria B: Operate as intended after the test
 - ☐ Meet criteria C: Loss/Error of function
 - ☒ Additional Information
 - ☒ There was no observable degradation in performance.
 - ☒ No false alarms or other malfunctions were observed during or after the test.
- The acceptance criteria were met, and the EUT passed the test.
- ★ The green tag means the air discharge point (See the report page 51).
- ★ The red tag means the contact point (See the report page 51).

8. RF FIELD STRENGTH SUSCEPTIBILITY TEST

8.1 TEST EQUIPMENT

Item	Instrument	Manufacturer	Model	S/N or Version	Next Cal. Date
1	SIGNAL GENERATOR	RS	SMT03	838077/019	2019.04.09
2	AMPLIFIER	A & R	250W1000A	313023	N/A
3	Ultra Breitband Antenna	R & S	ULTRALOG HL562	100282	N/A
4	Software	AR	SW1006	1.13	N/A
5	CHAMBER	GTK	N/A	A5	2018.08.16

Note: 1. All equipments are calibrated and will be valid only for a period of 1 year.

2. The test was performed at GTK Chamber A5.

8.2 TEST METHOD

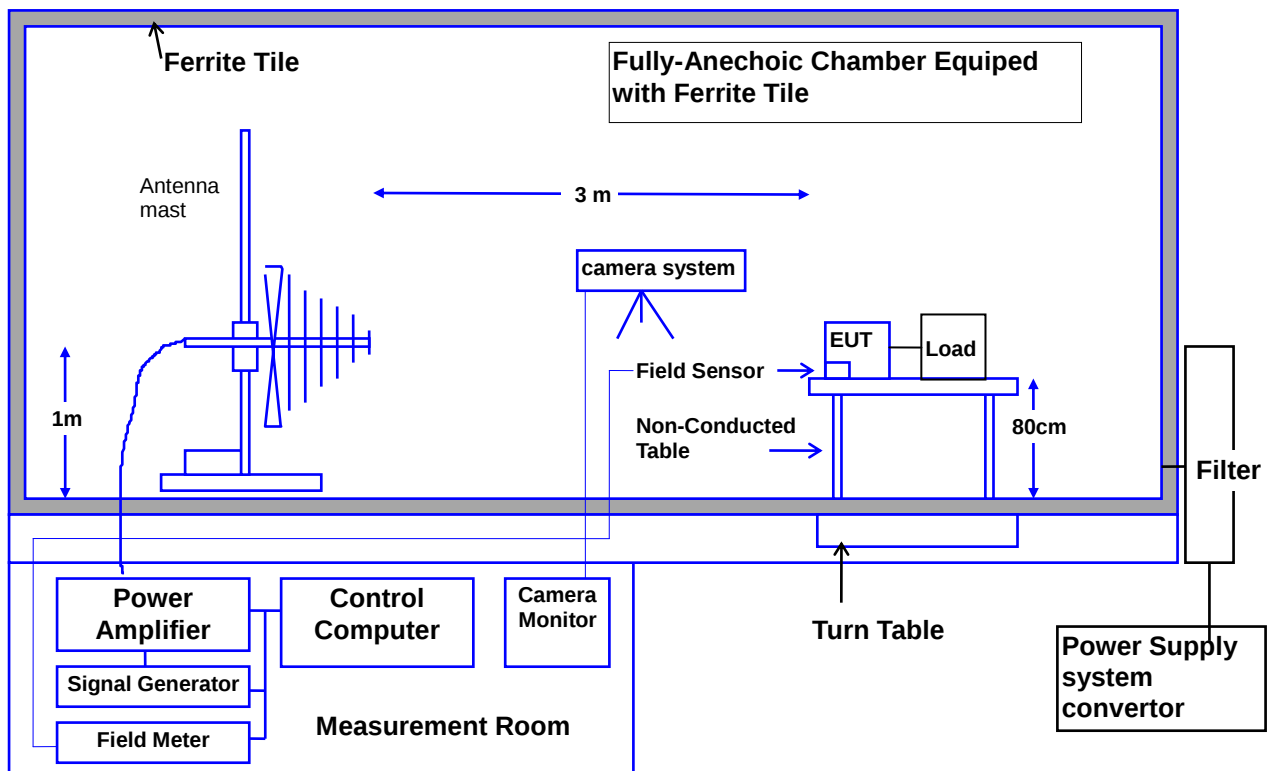
According to EN 55024: 2010+A1: 2015

IEC 61000-4-3:2006+A1:2007+A2:2010

8.3 BLOCK DIAGRAM OF TEST SETUP

Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all others setup condition remain the same.



8.4 SEVERITY LEVELS

Level	Test field strength V/m
1	1
2	3
3	10
4	30
X	Special

Required Performance Criteria : A
Level : 80~1000MHz(1kHz sinewave with 80% Amplitude Modulation: 10V/m)

According to EN 55024: 2010+A1: 2015, an additional functional test for telecommunications terminal equipment shall be carried out at The following frequencies: 80, 120, 160, 230, 434, 460, 600, 863 and 900(+/- 1%)MHz.

8.5 OPERATING CONDITIONS OF THE EUT

1. Setup the EUT and Test Equipment as shown on 8.3.
2. Power on the EUT. Acting performance checking program to allow EUT executing its usual operation mode during test.

8.6 TEST PROCEDURE

The EUT and load were placed on a table, which was 0.8 meters high. The field sensor was also placed on the same table to monitor field strength from transmitting antenna. EUT was set 3 meters away from the transmitting antenna. The transmitting antenna was fixed at 1 meter above ground. Both horizontal and vertical polarizations of the antenna were used during testing. In order to judge the EUT performance, a CCD camera was used to monitor the EUT screen.

All the scanning conditions are as follows:

Condition of Test	Remarks
Field Strength	10V/m
Radiated Signal	80MHz-1000MHz (1kHz sinewave with 80% Amplitude modulation)
Dwell Time	3 Seconds
Frequency step size	1 % of the present frequency

8.7 TEST RESULT

Date of Test	May 16, 2018	Temperature	25 °C
Test Mode	Mode 2	Humidity	55 %
Test Power Supply	AC 230V/50Hz		

Freq. Range (MHz)	Position (Angle)	Polarity (H or V)	Field Strength (V/m)	Performance Criteria Complied to	Results
☐ 26-80 MHz	0	H / V	3	A	PASS
☒ 80-1000 MHz	90	H / V	3	A	PASS
☐ 900 ± 5 MHz	180	H / V	3	A	PASS
	270	H / V	3	A	PASS

Additional comprehensive functional test selected frequencies are:

80, 120, 160, 230, 434, 460, 600, 863 and 900(+/- 1%)MHz.

Freq. Range (MHz)	Position (Angle)	Polarity (H or V)	Field Strength (V/m)	Performance Criteria Complied to	Results
80	0;90;180;270	H / V	3	A	PASS
120	0;90;180;270	H / V	3	A	PASS
160	0;90;180;270	H / V	3	A	PASS
230	0;90;180;270	H / V	3	A	PASS
434	0;90;180;270	H / V	3	A	PASS
460	0;90;180;270	H / V	3	A	PASS
600	0;90;180;270	H / V	3	A	PASS
863	0;90;180;270	H / V	3	A	PASS
900	0;90;180;270	H / V	3	A	PASS

☒ Meet criteria A: Operate as intended during and after the test

☐ Meet criteria B: Operate as intended after the test

☐ Meet criteria C: Loss/Error of function

☒ Additional Information

☒ There was no observable degradation in performance.

☒ No false alarms or other malfunctions were observed during or after the test. The acceptance criteria were met, and the EUT passed the test.

9. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

9.1 TEST EQUIPMENT

Item	Instrument	Manufacturer	Model	S/N or Version	Next Cal. Date
1	ULTRA COMPACT GENERATOR	EM TEST	UCS 500N5.1	P1310114655	2018.05.24
2	Software	EM TEST	ISMIEC	5.3.0	N/A

Note: 1. All equipments are calibrated and will be valid only for a period of 1 year.

2. The test was performed at GTK Shielded Room A4.

9.2 TEST METHOD

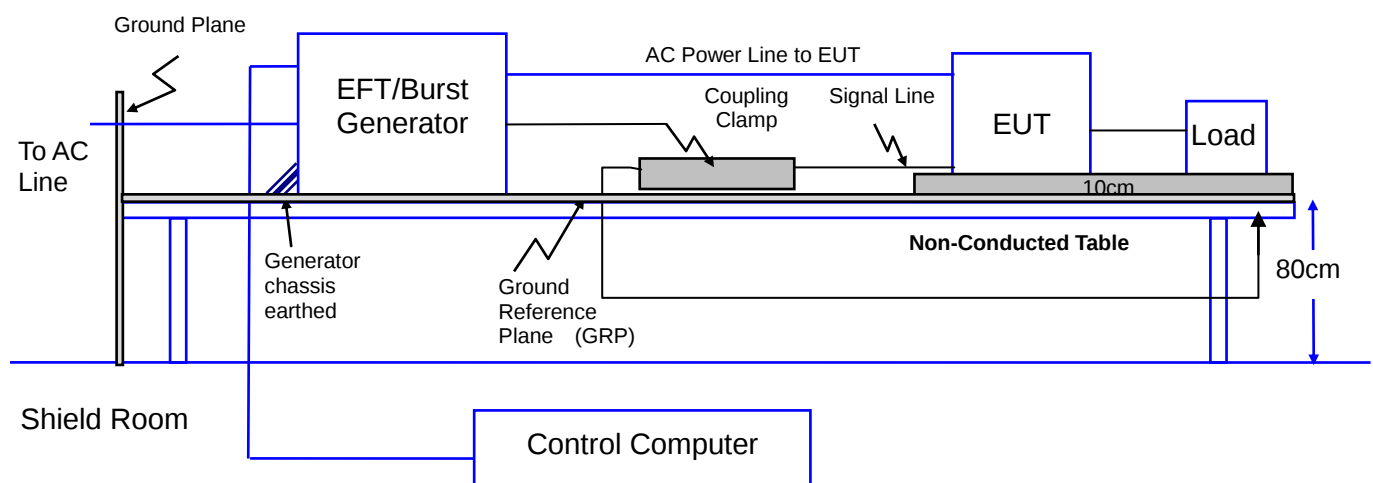
According to EN 55024: 2010+A1: 2015

IEC 61000-4-4: 2012

9.3 BLOCK DIAGRAM OF TEST SETUP

Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all others setup condition remain the same.



9.4 SEVERITY LEVELS

Open circuit output voltage and repetition frequency of the impulses				
Level	Power ports, earth port (PE)		Signal and control ports	
	Voltage peak kV	Repetition Frequency kHz	Voltage peak kV	Repetition Frequency kHz
1	0.5	5 or 100	0.25	5 or 100
2	1	5 or 100	0.5	5 or 100
3	2	5 or 100	1	5 or 100
4	4	5 or 100	2	5 or 100
X	Special	Special	Special	Special

Required Performance Criteria : B
Level : $\pm 0.5\text{kV}$, $\pm 1.0\text{kV}$ for Signal Lines and Control Lines
 $\pm 0.5\text{kV}$, $\pm 1.0\text{kV}$, $\pm 2.0\text{kV}$ for Power Lines and protective earth terminal

9.5 OPERATING CONDITIONS OF THE EUT

1. Setup the EUT and Test Equipment as shown on 9.3.
2. Power on the EUT. Acting performance checking program to allow EUT executing its usual operation mode during test.

The EUT and its load were placed on a table which was 0.8 meters above a metal ground plane measuring 2m by 2m and 0.65mm thick min, and projecting beyond the EUT by at least 0.1m on all sides. More than 0.5 meters separated the EUT from the walls of the shielded room.

Prior to the start of the test, a functional test was performed on the EUT to ensure proper operation. The EUT was also monitored during the test for any degradation of performance.

For AC Power lines test:

The EUT is connected to the power mains through a coupling/decoupling network that directly injected the transient energy. Bursts of pulse trains were injected onto the power line, in both positive and negative polarities. The test level was 0.5kV and 1.0kV. The Line, Neutral, and protective earth conductors were impressed with burst noise for one minute.

For Signal Lines and Control Lines test:

The EFT interference signal was looped through a capacitive coupling clamp device to the signal and control lines of the EUT. The clamp meets the requirements of IEC 61000-4-4: 2012. The clamp was placed on the ground plane, and the data lines were placed inside the clamp. Bursts of pulse trains were injected onto the data lines, in both positive and negative polarities. The test level was 0.5kV run for one minute for each polarity on each cable.

After completion of the test, a functional test was performed on the EUT to ensure proper operation.

9.6 TEST RESULT

Date of Test	May 17, 2018	Temperature	25 °C
Test Mode	Mode 2	Humidity	54 %
Test Power Supply	AC 230V/50Hz		

Inject Place: Power Supply Line							
Inject Line	Polarity	Voltage kV	Inject time (minute)	Inject Method	Required Criteria	Complied to Criteria	Result
L+N+PE	+	☒ 0.5	1	DIRECT	B	A	PASS
		☒ 1.0	1	DIRECT	B	A	PASS
L+N+PE	-	☒ 0.5	1	DIRECT	B	A	PASS
		☒ 1.0	1	DIRECT	B	A	PASS
Inject Place: I/O Cable (Capacitive Clamp Used)							
LAN	+	☒ 0.5	1	Clamp	B	A	PASS
LAN	-	☒ 0.5	1	Clamp	B	A	PASS

- ☒ Meet criteria A: Operate as intended during and after the test
- ☐ Meet criteria B: Operate as intended after the test
- ☐ Meet criteria C: Loss/Error of function
- ☒ Additional Information
- ☒ There was no observable degradation in performance.
 - ☒ No false alarms or other malfunctions were observed during or after the test. The acceptance criteria were met, and the EUT passed the test.

10. SURGE IMMUNITY TEST

10.1 TEST EQUIPMENT

Item	Instrument	Manufacturer	Model	S/N or Version	Next Cal. Date
1	ULTRA COMPACT GENERATOR	EM TEST	UCS 500N5.1	P1310114655	2018.05.24
2	Software	EM TEST	ISMIEC	5.3.0	N/A

Note: 1. All equipments are calibrated and will be valid only for a period of 1 year.

2. The test was performed at GTK Shielded Room A4.

10.2 TEST METHOD

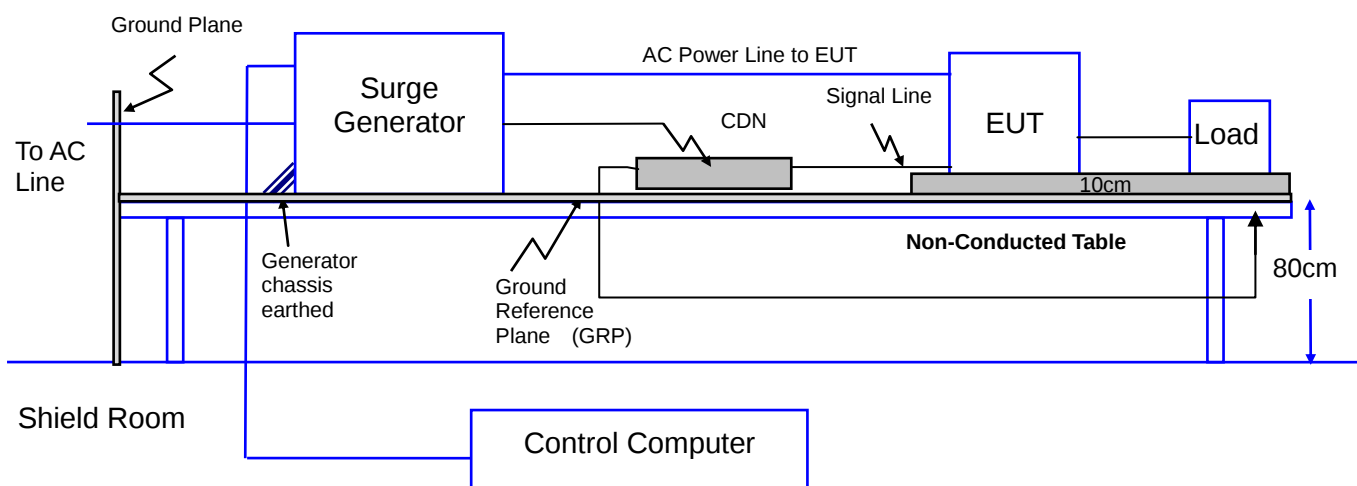
According to EN 55024: 2010+A1: 2015

IEC 61000-4-5: 2014

10.3 BLOCK DIAGRAM OF TEST SETUP

Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all others setup condition remain the same.



10.4 SEVERITY LEVELS

Open Circuit Output Test Voltage +/- 10%	
Level	On power supply lines
1	0.5kV
2	1kV
3	2kV
4	4kV
X	Special

10.5 OPERATING CONDITIONS OF THE EUT

1. Setup the EUT and Test Equipment as shown on 10.3.
2. Power on the EUT. Acting performance checking program to allow EUT executing its usual operation mode during test.

10.6 TEST PROCEDURE

A “combination wave” as specified in IEC 61000-4-5: 2014 was applied to the EUT. The amplitude was gradually increased using control software. Surges were initiated line synced. One surge per polarity and voltage level was applied in common and differential mode to the EUT at 0, 90, 180, 270, and 0 degree phase angles. The surges were applied at a rate of 1 surge per minute. The EUT was monitored for any degradation of performance. The AC test was conducted for differential mode at 0.5kV &1.0kV and common mode at 0.5kV &1.0kV & 2.0kV. All tests were run in both the positive and negative polarity for differential and common modes.

10.7 TEST RESULT

Date of Test	May 16, 2018	Temperature	25 °C
Test Mode	Mode 2	Humidity	54 %
Test Power Supply	AC 230V/50Hz		

AC Power line test								
Inject Line	Voltage kV	Repetition Rate (minute)	Phase Angle	Surge applied Method	Number of pulse	Required Criteria	Complied to Criteria	Result
L-N (Differential mode)	☒ +0.5 ☒ +1.0	1	0°	CDN	5	B	A	PASS
		1	90°	CDN	5	B	A	PASS
		1	180°	CDN	5	B	A	PASS
		1	270°	CDN	5	B	A	PASS
	☒ -0.5 ☒ -1.0	1	0°	CDN	5	B	A	PASS
		1	90°	CDN	5	B	A	PASS
		1	180°	CDN	5	B	A	PASS
		1	270°	CDN	5	B	A	PASS
L-PE (Common mode)	☒ +0.5 ☒ +1.0 ☒ +2.0	1	0°	CDN	5	B	A	PASS
		1	90°	CDN	5	B	A	PASS
		1	180°	CDN	5	B	A	PASS
		1	270°	CDN	5	B	A	PASS
	☒ -0.5 ☒ -1.0 ☒ -2.0	1	0°	CDN	5	B	A	PASS
		1	90°	CDN	5	B	A	PASS
		1	180°	CDN	5	B	A	PASS
		1	270°	CDN	5	B	A	PASS
N-PE (Common mode)	☒ +0.5 ☒ +1.0 ☒ +2.0	1	0°	CDN	5	B	A	PASS
		1	90°	CDN	5	B	A	PASS
		1	180°	CDN	5	B	A	PASS
		1	270°	CDN	5	B	A	PASS
	☒ -0.5 ☒ -1.0 ☒ -2.0	1	0°	CDN	5	B	A	PASS
		1	90°	CDN	5	B	A	PASS
		1	180°	CDN	5	B	A	PASS
		1	270°	CDN	5	B	A	PASS

- ☒ Meet criteria A: Operate as intended during and after the test
☐ Meet criteria B: Operate as intended after the test
☐ Meet criteria C: Loss/Error of function
☒ Additional Information
☒ There was no observable degradation in performance.
☒ No false alarms or other malfunctions were observed during or after the test. The acceptance criteria were met, and the EUT passed the test.

11. CONDUCTED DISTURBANCE SUSCEPTIBILITY TEST

11.1 TEST EQUIPMENT

Item	Instrument	Manufacturer	Model	S/N or Version	Next Cal. Date
1	Continuous Wave Simulator	EM TEST	CWS 500 A	1099-01	2019.03.15
2	Dual Directional Coupler	A & R	DC-2600	20193	N/A
3	VOLTMETER	BOONTON	9200C	361501AA	2018.11.05
4	Injection Clamp	LIITHI	EM101	35260	2019.04.15
5	ATTENUATOR	BNOS	AT50-6-250	521926	N/A
6	CDN (EUT)	LUTHI	CDN L-801 M2/M3	2627	2018.05.23
7	CDN (AE)	KNORR-BREMSE	M3	12184	N/A
8	SHIELDING ROOM	GTK	N/A	A4	2018.06.02

Note: 1. All equipments are calibrated and will be valid only for a period of 1 year.

2. The test was performed at GTK Shielded Room A4.

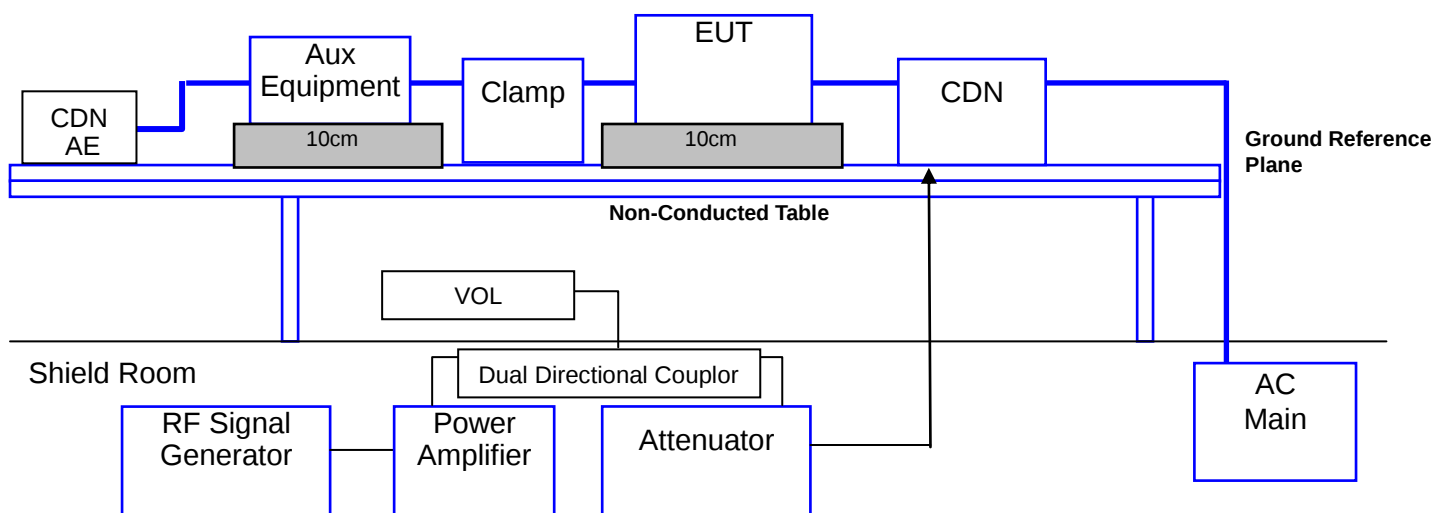
11.2 TEST METHOD

According to EN 55024: 2010+A1: 2015
IEC 61000-4-6:2013

11.3 BLOCK DIAGRAM OF TEST SETUP

Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all others setup condition remain the same.



11.4 SEVERITY LEVELS

Test specification

Required Performance Criteria : A

Level : 1kHz sine wave with 80% Amplitude Modulation: 3V

Frequency range : 0.15-80MHz

According to EN 55024: 2010+A1: 2015, an additional functional test for telecommunications terminal equipment shall be carried out at the following frequencies: 0.2, 1., 7.1, 13.56, 21.0, 27.12 and 40.68MHz. (+/- 1%)

11.5 OPERATING CONDITIONS OF THE EUT

1. Setup the EUT and Test Equipment as shown on 11.3.
2. Power on the EUT. Acting performance checking program to allow EUT executing its usual operation mode during test.

11.6 TEST PROCEDURE

The EUT and load were placed on a table, which was 0.1 meters high from a Ground reference plane. Prior to the start of the test, a functional test was performed on the EUT to ensure proper operation. The EUT was also monitored during the test for any degradation of performance. Also, prior to the start of the test, clamp injection (RF current probe) calibration measurements were performed as described in IEC 61000-4-6:2013.

For AC Power line test & For Signal Lines and Control Lines test:

The disturbance signal is through a coupling and decoupling networks (CDN) or EM-clamp device couples to the signal and control lines of the EUT.

After completion of the test, a functional test was performed on the EUT to ensure proper operation.

All the scanning conditions are as follows:

Condition of Test	Remarks
Field Strength	3V
Radiated Signal	0.15-80MHz (1kHz sinewave with 80% Amplitude modulation)
Dwell Time	3 Seconds
Frequency step size	1% of the present frequency

11.7 TEST RESULT

Date of Test	May 16, 2018	Temperature	25 °C
Test Mode	Mode 2	Humidity	55 %
Test Power Supply	AC 230V/50Hz		

Frequency Range (MHz)	Inject Line	Field Strength	Inject Method	Required Criteria	Performance Criteria Complied To	Result
0.15~80	AC Line	3V	CDN	A	A	PASS
0.15~80	LAN Cable	3V	CLAMP	A	A	PASS
Additional comprehensive functional test selected frequencies are: 0.2, 1., 7.1, 13.56, 21.0, 27.12 and 40.68MHz. (+/- 1%)						
Frequency Range (MHz)	Inject Line	Field Strength	Inject Method	Required Criteria	Performance Criteria Complied To	Remark
0.2	AC Line	3V	CDN	A	A	PASS
1	AC Line	3V	CDN	A	A	PASS
7.1	AC Line	3V	CDN	A	A	PASS
13.56	AC Line	3V	CDN	A	A	PASS
21	AC Line	3V	CDN	A	A	PASS
27.12	AC Line	3V	CDN	A	A	PASS
40.68	AC Line	3V	CDN	A	A	PASS
0.2	LAN Cable	3V	CLAMP	A	A	PASS
1	LAN Cable	3V	CLAMP	A	A	PASS
7.1	LAN Cable	3V	CLAMP	A	A	PASS
13.56	LAN Cable	3V	CLAMP	A	A	PASS
21	LAN Cable	3V	CLAMP	A	A	PASS
27.12	LAN Cable	3V	CLAMP	A	A	PASS
40.68	LAN Cable	3V	CLAMP	A	A	PASS

- ☒ Meet criteria A: Operate as intended during and after the test
- ☐ Meet criteria B: Operate as intended after the test
- ☐ Meet criteria C: Loss/Error of function
- ☒ Additional Information
 - ☒ There was no observable degradation in performance.
 - ☒ No false alarms or other malfunctions were observed during or after the test. The acceptance criteria were met, and the EUT passed the test.

12. MAGNETIC FIELD IMMUNITY MEASUREMENT

12.1 TEST EQUIPMENT

Item	Instrument	Manufacturer	Model	S/N or Version	Next Cal. Date
1	MAGNETIC FIELD ANTENNA	EM TEST	MS100	D3730	2018.05.24
2	ULTRA COMPACT GENERATOR	EM TEST	UCS 500N5.1	P1310114655	2018.05.24
3	Software	EM TEST	ISMIEC	5.3.0	N/A

Note: 1. All equipments are calibrated and will be valid only for a period of 1 year.

2. The test was performed at GTK Shielded Room B6.

12.2 TEST METHOD

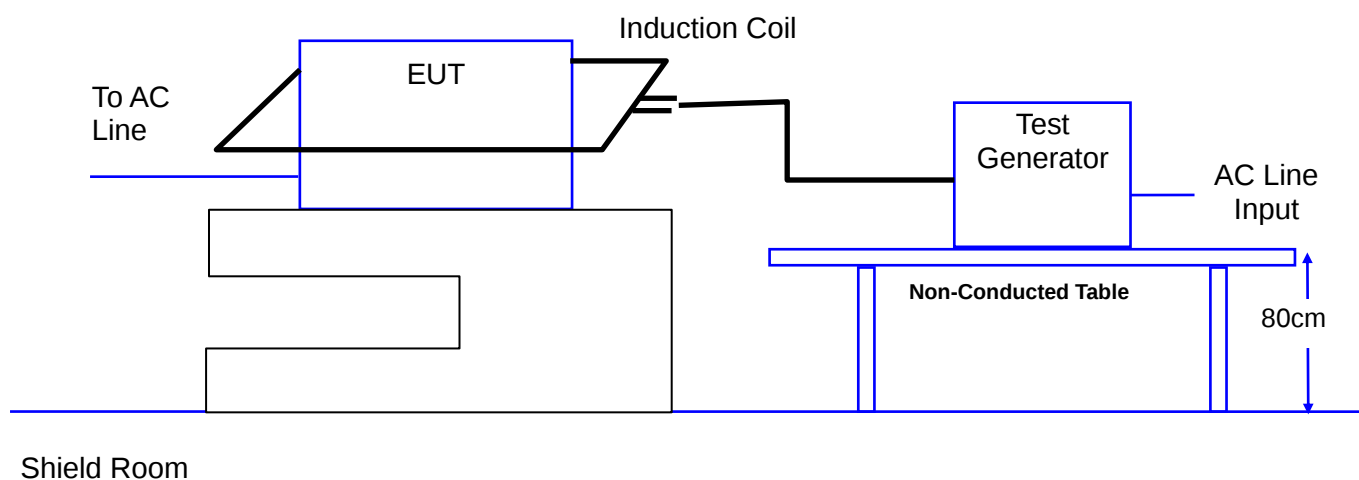
According to EN 55024: 2010+A1: 2015

IEC 61000-4-8:2009

12.3 BLOCK DIAGRAM OF TEST SETUP

Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all others setup condition remain the same.



12.4 SEVERITY LEVELS

Test level for continuous field		Test levels for short duration: 1to3s	
Level	Magnetic Field Strength A/m	Level	Magnetic Field Strength A/m
1	1	1	n.a.
2	3	2	n.a.
3	10	3	n.a.
4	30	4	300
5	100	5	1000
X	Special	X	Special
"X" is an open level.		"X" is an open level. n.a.= not application	
Test level	Required Performance Criteria	Test Duration	
1	A	Continued Field	

12.5 EUT OPERATION CONDITION

1. Setup the EUT and Test Equipment as shown on 12.3.
2. Power on. Active performance checking program to allow EUT execute its usual operation mode during test.

12.6 TEST PROCEDURE

The EUT and its load are placed on a table which is 0.8 meter above a metal ground plane measured at least 1m*1m min. The test magnetic Field shall be applied by the immersion method to the EUT, previously set-up as specified in 12.3. And 90 shall rotate the induction coil in order to expose the EUT to the test field with different orientation.

12.7 TEST RESULT

Date of Test	May 16, 2018	Temperature	25 °C
Test Mode	Mode 2	Humidity	51 %
Test Power Supply	AC 230V/50Hz		

Induction Coil Orientation	Testing Duration	Magnetic Field Strength	Performance Criteria Complied To	Test Result
X	60 sec.	1A/m, 50Hz	A	PASS
Y	60 sec.	1A/m, 50Hz	A	PASS
Z	60 sec.	1A/m, 50Hz	A	PASS

- ☒ Meet criteria A: Operate as intended during and after the test
 - ☐ Meet criteria B: Operate as intended after the test
 - ☐ Meet criteria C: Loss/Error of function
 - ☒ Additional Information
 - ☒ There was no observable degradation in performance.
 - ☒ No false alarms or other malfunctions were observed during or after the test.
- The acceptance criteria were met, and the EUT passed the test.

13. VOLTAGE DIPS AND SHORT INTERRUPTIONS TEST

13.1 TEST EQUIPMENT

Item	Instrument	Manufacturer	Model	S/N or Version	Next Cal. Date
1	ULTRA COMPACT GENERATOR	EM TEST	UCS 500N5.1	P1310114655	2018.05.24

Note: 1. All equipments are calibrated and will be valid only for a period of 1 year.

2. The test was performed at GTK Shielded Room A4.

13.2 TEST METHOD

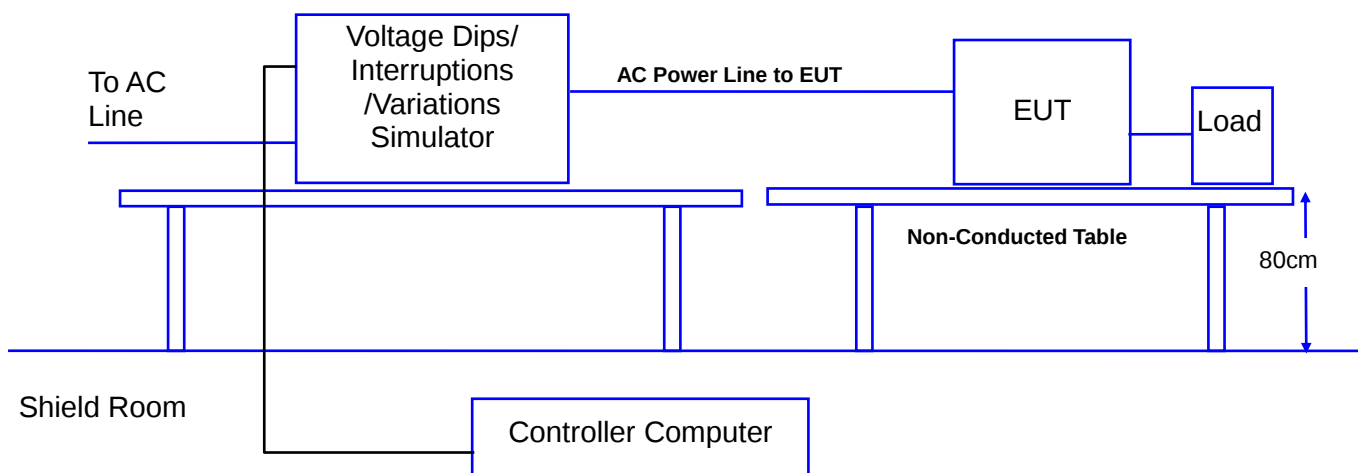
According to EN 55024: 2010+A1: 2015

IEC 61000-4-11: 2004

13.3 BLOCK DIAGRAM OF TEST SETUP

Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all others setup condition remain the same.



13.4 SEVERITY LEVELS

For 50Hz

Voltage Dips and Interruption Reduction(%)	Test Duration	Required Performance Criteria
>95	10 ms	B
30	500 ms	C
>95	5s	C

For 60Hz

Voltage Dips and Interruption Reduction(%)	Test Duration	Required Performance Criteria
>95	8.33 ms	B
30	500 ms	C
>95	5s	C

13.5 OPERATING CONDITIONS OF THE EUT

1. Setup the EUT and Test Equipment as shown on 13.3.
2. Power on the EUT. Acting performance checking program to allow EUT executing its usual operation mode during test.

13.6 TEST PROCEDURE

The EUT and its load were placed on a table which was 0.8 meters height.

For AC Power line test (For 50Hz):

The EUT was connected to the power mains through a coupling device that directly couples to the Voltage Dips and Interruption Generator.

Voltage dips of >95% for 10ms and 30% for 500ms were applied to the EUT three times with 10 sec intervals between dips. A power interruption of >95% for 5000ms (5 sec) was applied to the EUT three times with 60-second intervals between interruptions.

For AC Power line test (For 60Hz):

The EUT was connected to the power mains through a coupling device that directly couples to the Voltage Dips and Interruption Generator.

Voltage dips of >95% for 8.33ms and 30% for 500ms were applied to the EUT three times with 10 sec intervals between dips. A power interruption of >95% for 5000ms (5 sec) was applied to the EUT three times with 60-second intervals between interruptions.

13.7 TEST RESULT

Date of Test	May 16, 2018	Temperature	26 °C
Test Mode	Mode 2	Humidity	55 %
Test Power Supply	AC 100V/50Hz		

Item	Phase Angle	Reduction (%)	Test Duration (ms)	Required Criteria	Complied to Criteria	Result
Voltage Short Interruptions	☒ 0	>95	5000	C	B	PASS
Voltage Dips	☒ 0	>95	10	B	A	PASS
	☒ 0	30	500	C	B	PASS

- ☒ Meet criteria A: Operate as intended during and after the test
- ☒ Meet criteria B: Operate as intended after the test
- ☐ Meet criteria C: Loss of function, provided the function is self-recoverable, or can be restored by the operation of the controls
- ☒ Additional Information
 - ☒ There was no observable degradation in performance.
 - ☒ No false alarms or other malfunctions were observed during or after the test. The acceptance criteria were met, and the EUT passed the test.

Date of Test	May 16, 2018	Temperature	26 °C
Test Mode	Mode 2	Humidity	55 %
Test Power Supply	AC 100V/60Hz		

Item	Phase Angle	Reduction (%)	Test Duration (ms)	Required Criteria	Complied to Criteria	Result
Voltage Short Interruptions	☒ 0	>95	5000	C	B	PASS
Voltage Dips	☒ 0	>95	8.33	B	A	PASS
	☒ 0	30	500	C	B	PASS

- ☒ Meet criteria A: Operate as intended during and after the test
- ☐ Meet criteria B: Operate as intended after the test
- ☐ Meet criteria C: Loss of function, provided the function is self-recoverable, or can be restored by the operation of the controls
- ☒ Additional Information
 - ☒ There was no observable degradation in performance.
 - ☒ No false alarms or other malfunctions were observed during or after the test. The acceptance criteria were met, and the EUT passed the test.

Date of Test	May 16, 2018	Temperature	26 °C
Test Mode	Mode 2	Humidity	55 %
Test Power Supply	AC 240V/50Hz		

Item	Phase Angle	Reduction (%)	Test Duration (ms)	Required Criteria	Complied to Criteria	Result
Voltage Short Interruptions	☒ 0	>95	5000	C	B	PASS
Voltage Dips	☒ 0	>95	10	B	A	PASS
	☒ 0	30	500	C	A	PASS

- ☒ Meet criteria A: Operate as intended during and after the test
- ☒ Meet criteria B: Operate as intended after the test
- ☐ Meet criteria C: Loss of function, provided the function is self-recoverable, or can be restored by the operation of the controls
- ☒ Additional Information
 - ☒ There was no observable degradation in performance.
 - ☒ No false alarms or other malfunctions were observed during or after the test. The acceptance criteria were met, and the EUT passed the test.

Date of Test	May 16, 2018	Temperature	26 °C
Test Mode	Mode 2	Humidity	55 %
Test Power Supply	AC 240V/60Hz		

Item	Phase Angle	Reduction (%)	Test Duration (ms)	Required Criteria	Complied to Criteria	Result
Voltage Short Interruptions	☒ 0	>95	5000	C	B	PASS
Voltage Dips	☒ 0	>95	8.33	B	A	PASS
	☒ 0	30	500	C	A	PASS

- ☒ Meet criteria A: Operate as intended during and after the test
- ☒ Meet criteria B: Operate as intended after the test
- ☐ Meet criteria C: Loss of function, provided the function is self-recoverable, or can be restored by the operation of the controls
- ☒ Additional Information
 - ☒ There was no observable degradation in performance.
 - ☒ No false alarms or other malfunctions were observed during or after the test. The acceptance criteria were met, and the EUT passed the test.

14. PHOTOGRAPHS FOR TEST

14.1 TEST PHOTOGRAPHS FOR CONDUCTION

Mode 2



14.2 TEST PHOTOGRAPHS FOR RADIATED

Mode 2



14.3 TEST PHOTOGRAPHS FOR HARMONIC/FLICKER

Mode 2



14.4 TEST PHOTOGRAPHS FOR ESD

Mode 2



14.5 TEST PHOTOGRAPHS FOR ESD TEST POINTS



14.6 TEST PHOTOGRAPHS FOR RS

Mode 2



14.7 TEST PHOTOGRAPHS FOR EFT

Mode 2



14.8 TEST PHOTOGRAPHS FOR SURGE

Mode 2



14.9 TEST PHOTOGRAPHS FOR CS

Mode 2



14.10 TEST PHOTOGRAPHS FOR MAGNETIC

Mode 2



14.11 TEST PHOTOGRAPHS FOR DIPS

Mode 2



15. PHOTOGRAPHS FOR PRODUCT

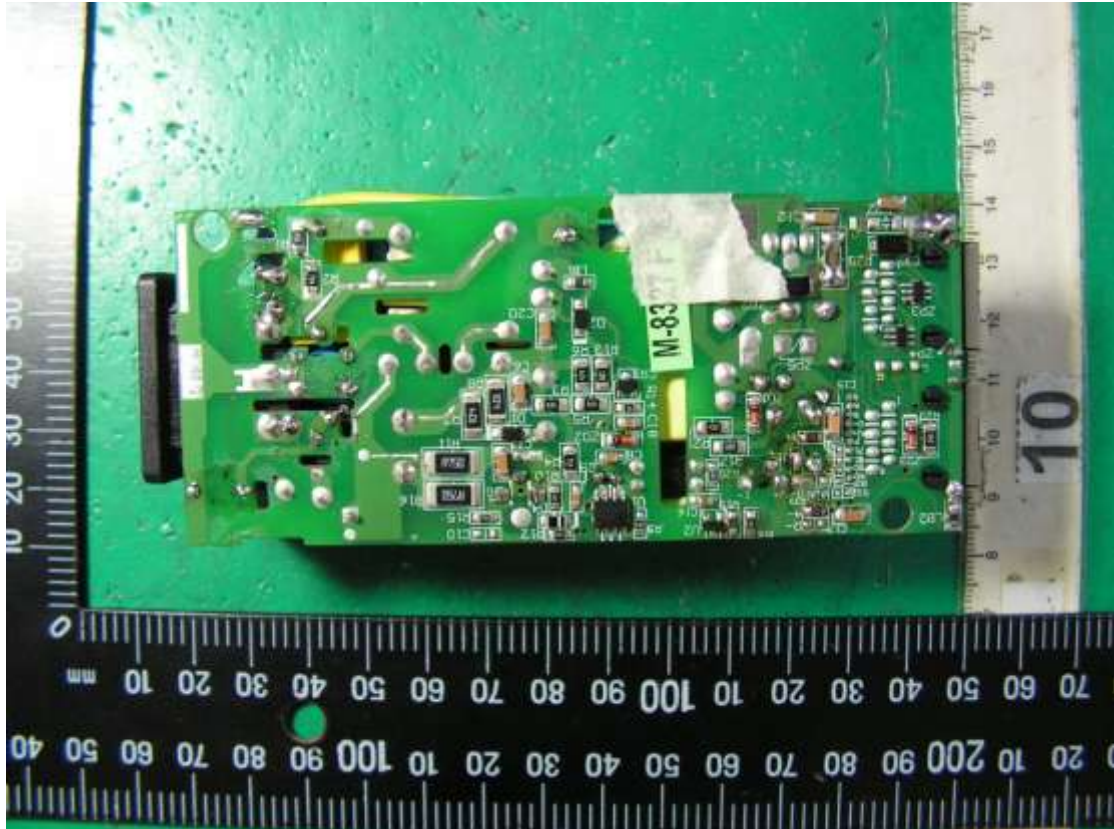
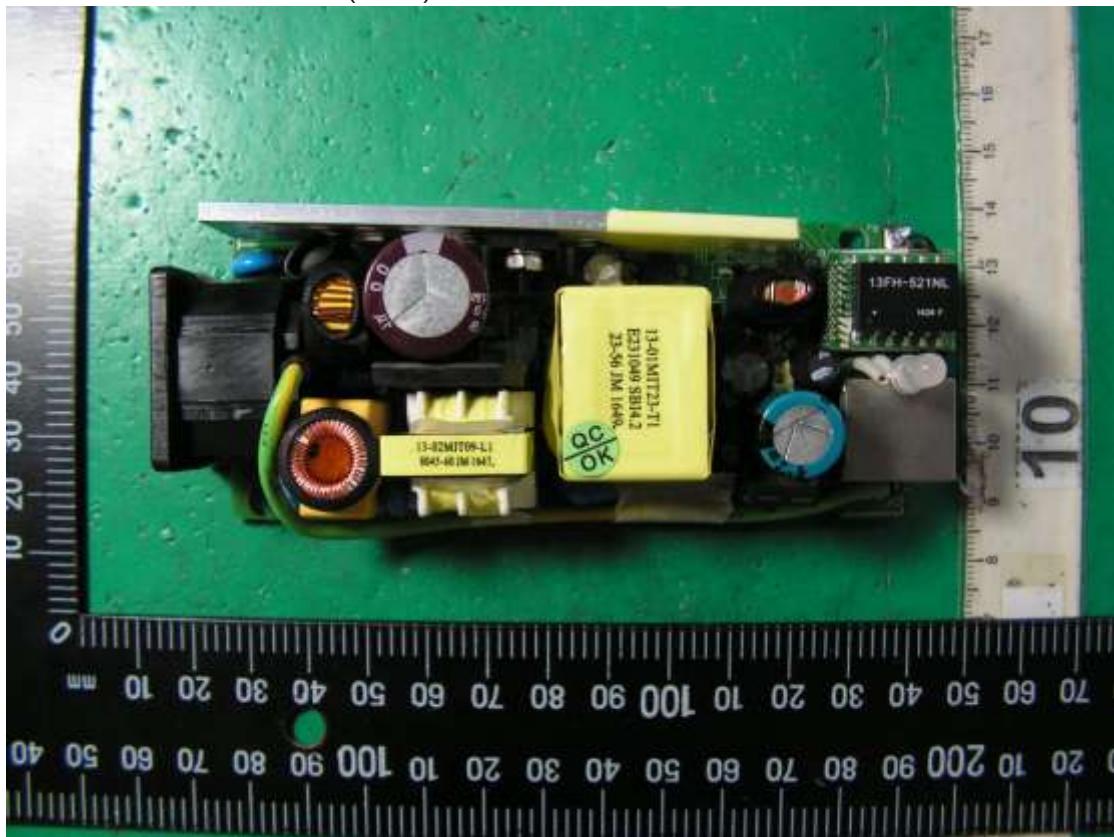
1. Front View of Power over Ethernet. (EUT)
2. Back View of Power over Ethernet. (EUT)



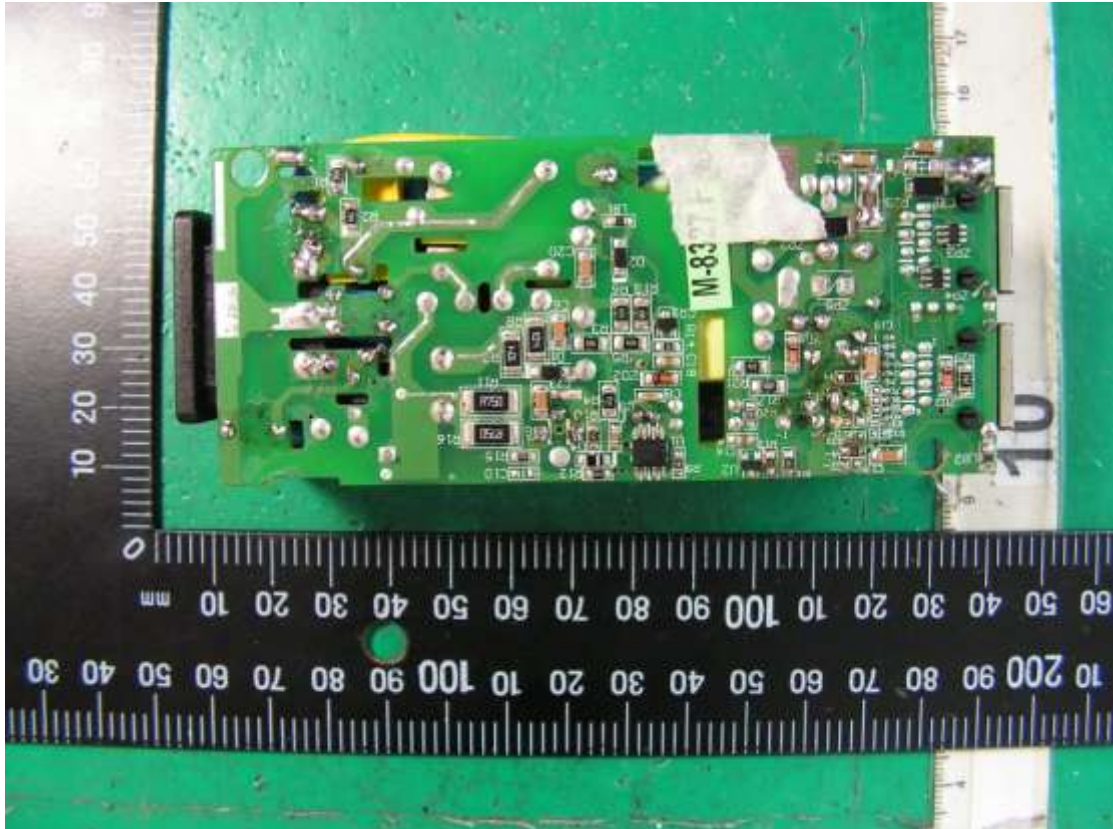
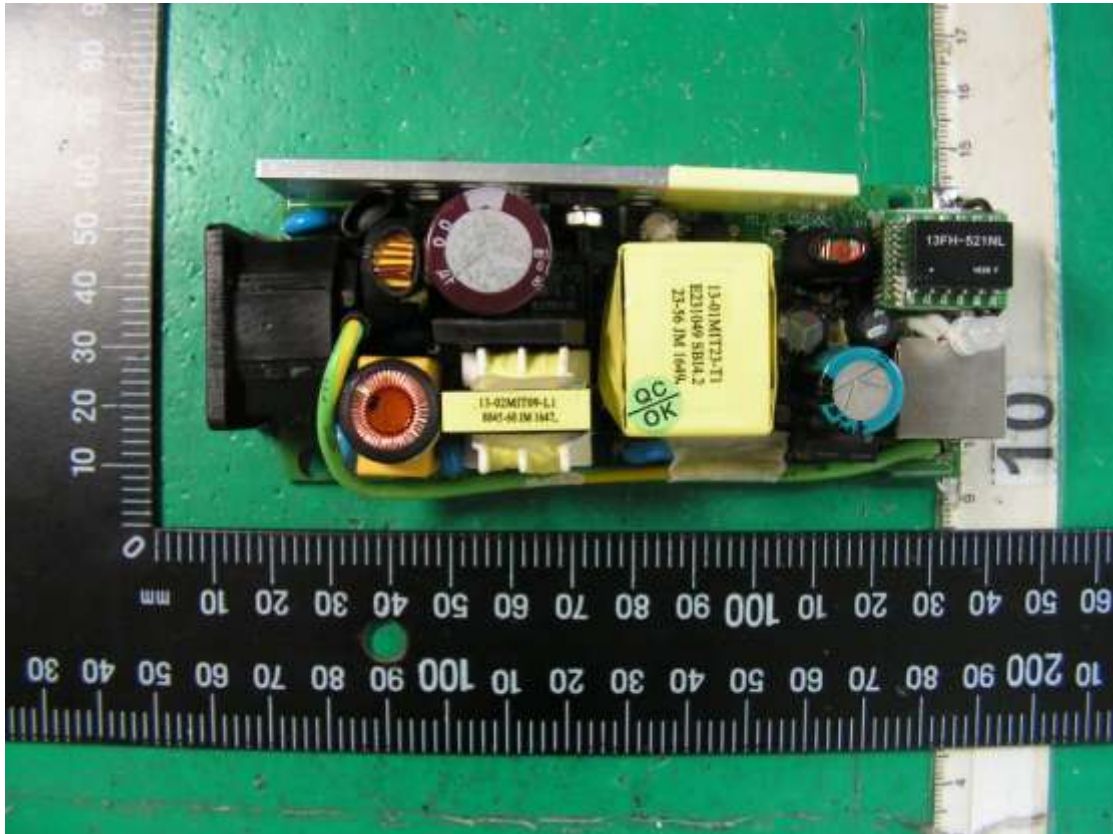
3. Inner View of Power over Ethernet. (EUT)



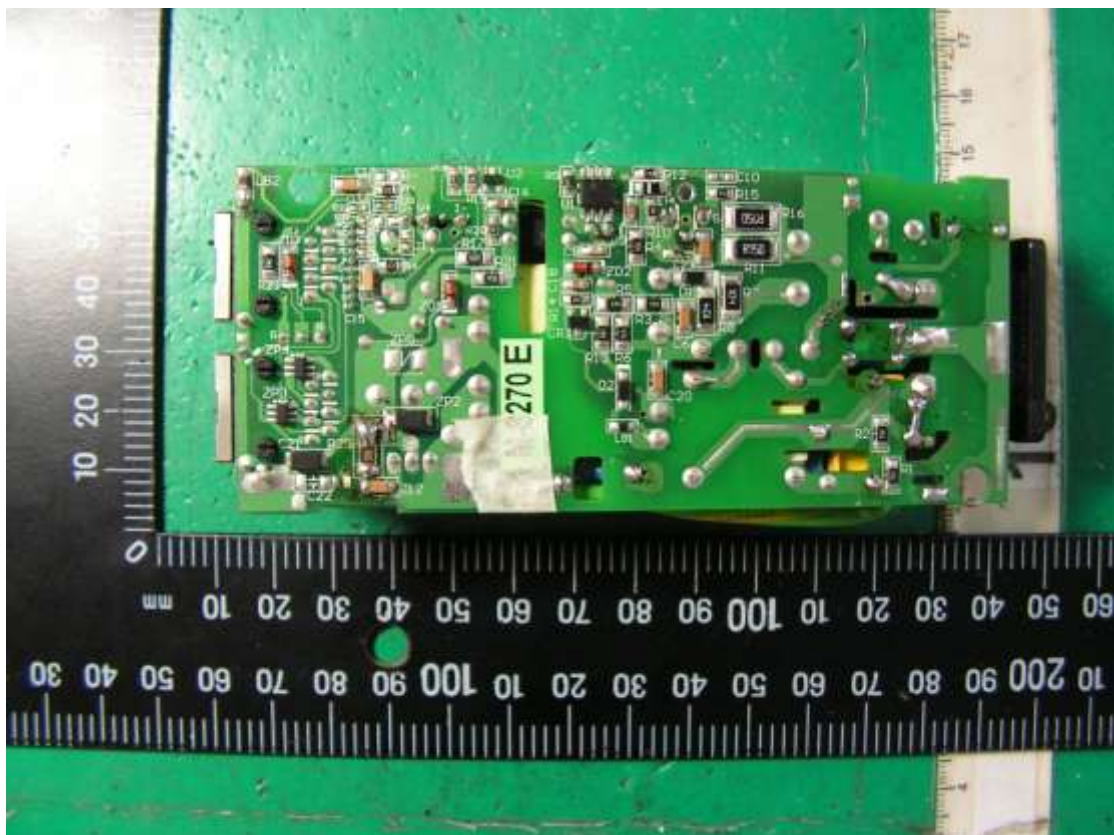
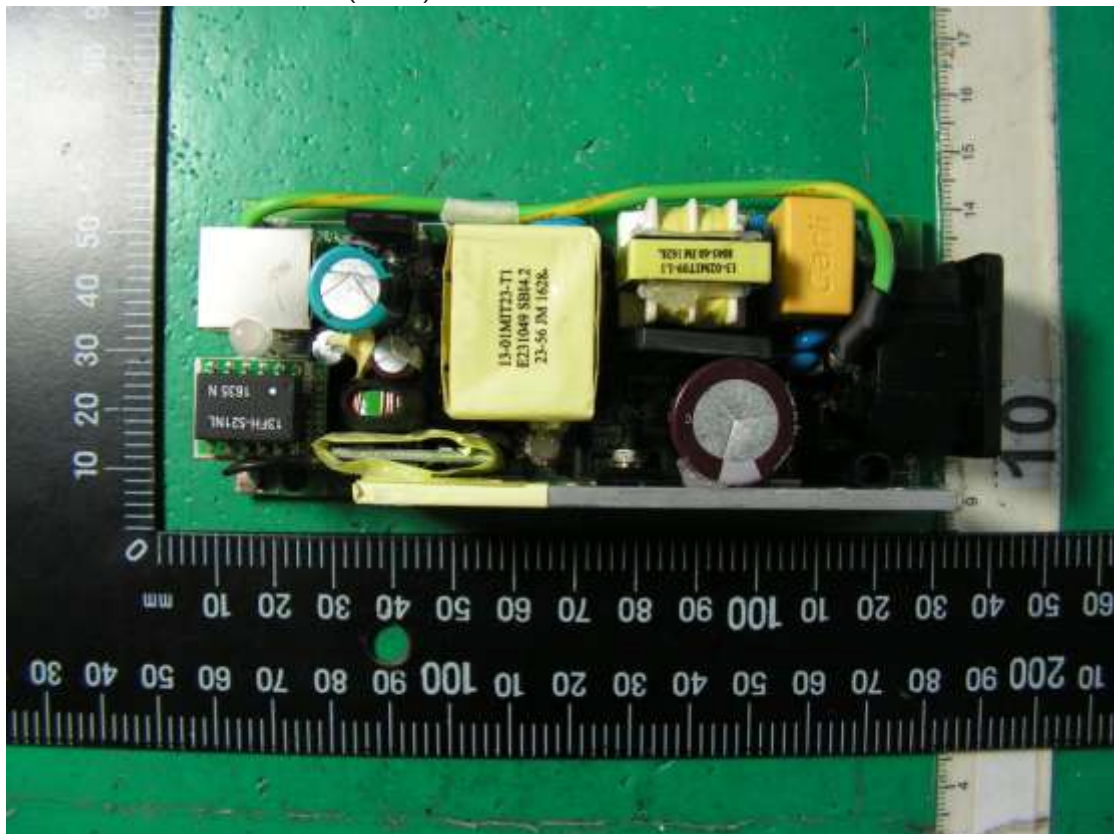
4. Component Side of Mother Board (24Vdc)
5. Solder Side of Mother Board (24Vdc)



6. Component Side of Mother Board (48Vdc)
7. Solder Side of Mother Board (48Vdc)



8. Component Side of Mother Board (56Vdc)
9. Solder Side of Mother Board (56Vdc)



16. EMI/EMS REDUCTION METHOD DURING COMPLIANCE TESTING

No modification was made during testing.