



MEASUREMENT REPORT

EMC Test Report

Applicant: Acnodes
Address: 14628 Central Ave., Chino, CA 91710
Product: Stainless Steel PCH8 Series Full IP67/IP69K Panel PC
Model No.: PCH-8150, PCH-8XXX (XXX= 1-9,a-z)
Trademark: N/A
Standards: EN 55032: 2015+A11:2020 (Class B)
EN 55024: 2010+A1 2015
Result: Complies
Received Date: February 3, 2021
Test Date: February 8 ~ March 10, 2021

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(Fran Chen)
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(Chenz Ker)



The test results only relate to the tested sample.

The test results shown in the test report are traceable to the national/international standards through the calibration of the equipment and evaluated measurement uncertainty herein.

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Revision History

Report No.	Version	Description	Issue Date
2106TW0202-E1	1.0	Original Report	2021-07-02

Note: This case is a copy report, the original report number is 2102TW0202-E1. Only change Applicant, Applicant Address, Manufacturer, Manufacturer Address, Product Name, Trademark and Model No..

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1. General Information

Applicant	Acnodes
Applicant Address	14628 Central Ave., Chino, CA 91710
Manufacturer	Acnodes
Manufacturer Address	14628 Central Ave., Chino, CA 91710
Test Site	MRT Technology (Taiwan) Co., Ltd
Test Site Address	No. 38, Fuxing Second Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C)

Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Fuxing Rd., Taoyuan, Taiwan (R.O.C)

- MRT facility is a FCC registered (Reg. No. 291082) test facility with the site description report on file and is designated by the FCC as an Accredited Test Firm.
- MRT facility is an IC registered (MRT Reg. No. 21723) test laboratory with the site description on file at Industry Canada.
- MRT Lab is accredited to ISO 17025 by the Taiwan Accreditation Foundation (TAF Cert. No. 3261) in EMC, Telecommunications and Radio testing for FCC (Designation Number: TW3261), Industry Taiwan, EU and TELEC Rules.

2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name	Stainless Steel PCH8 Series Full IP67/IP69K Panel PC
Trademark	N/A
Model No.	PCH-8150, PCH-8XXX (XXX= 1-9,a-z)
Highest Operating Frequency	1.86GHz
Test Power	DC 12V

Note:

1. Model Difference: The difference of models only for marketing different, the other hardware was the same. (declared by the manufacturer)
2. The test was performed base on PCH-8150.

2.2. Test Mode

Pre-Test Mode	
EMI & EMS Mode	Mode1: Normal Operation with DC 12V Input
Final Test Mode	
EMI & EMS Mode	Mode1: Normal Operation with DC 12V Input

EN 55032 Table B.1 – Methods of exercising displays and video ports

Complexity Level	Display image	Description	Examples of equipment
4 (Most)	Colour bars with moving picture element	Standard colour bar image with a small moving element. See a.	Digital television set, set-top box, personal computer, DVD equipment, video game console, standalone monitor.
3	Colour bars	Standard colour bar image. See a.	Analogue television set, display on camera, display on photo printer.
2	Text image	Where possible a pattern consisting of all H characters shall be displayed. The character size and number of characters per line shall be set so that typically the greatest number of characters per screen is displayed. If text scrolling is supported on the display, the text shall scroll	POS terminal, computer terminal without graphic capability.
1	Typical display	The most complex display that can be generated by the EUT.	An EUT with proprietary displays and/or not capable of displaying any of the above images, electronic music keyboard, telephone.

a: This display image is also valid for monochrome displays which will display grey scale bars. When there is more than one display or video port, each display/port shall be exercised appropriately subject to the provisions of B.2.2.

The display images may be modified, when necessary to exercise primary functions of the EUT.

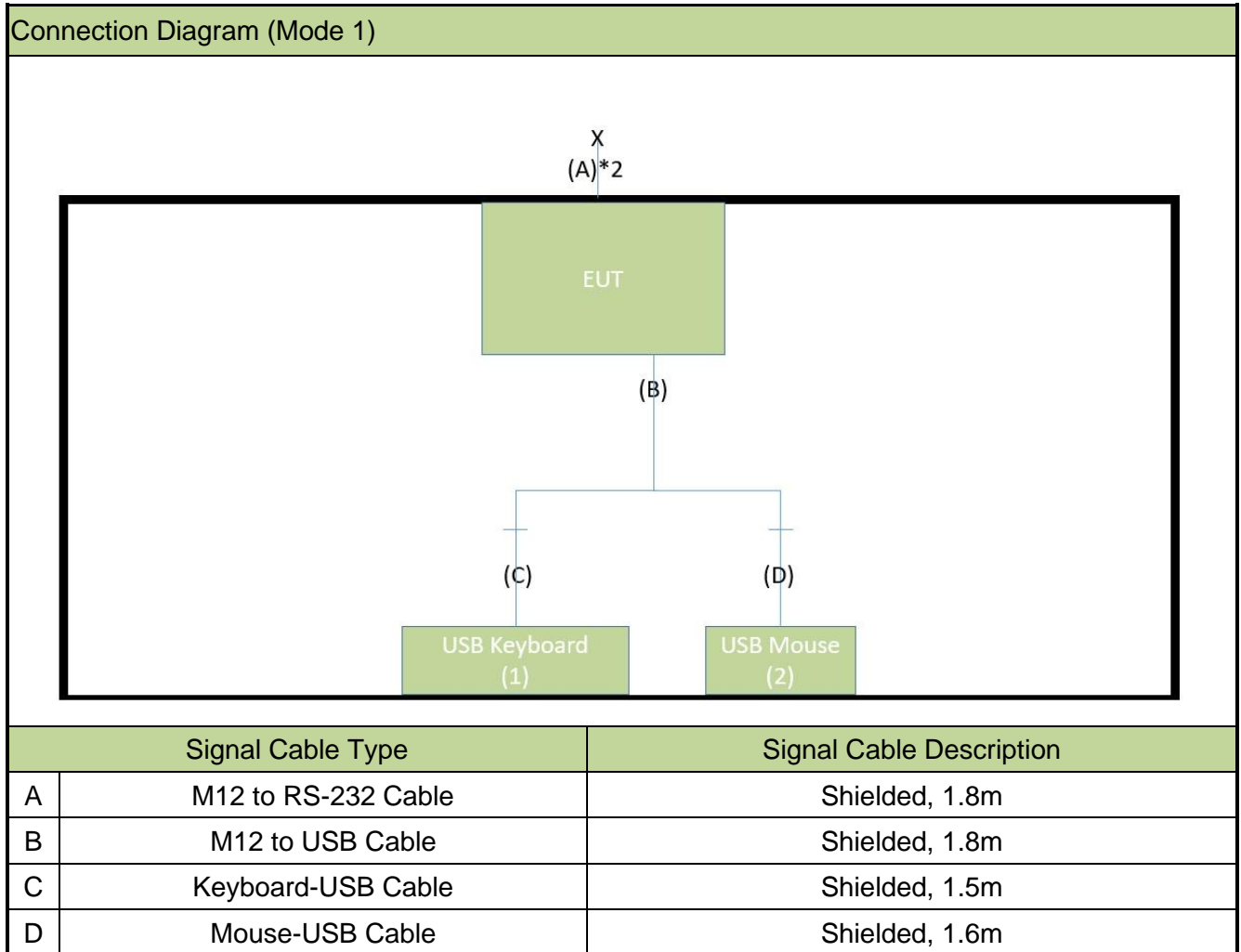
Where possible, these modifications should be restricted to the bottom or top half of the display area so that the image defined in the table fills the majority of the display.

For analogue television sets, only colour bars should be displayed, defined in complexity 3.

Examples of colour bars required in complexity 3 and 4 are 100/0/100/0 or 100/0/75/0 bars as specified in ITU-R Recommendation BT.471-1.

2.3. Configuration of Tested System

The EUT was tested per the guidance EN 55032, EN 55024 was used to reference the appropriate EUT setup for EMI testing and EMS conducted testing.



2.4. Test System Details

The types for all equipment, and descriptions of all cables used in the tested system (including inserted cards) are:

No.	Product	Manufacturer	Model No.	Serial No.	Power Cord
1	USB Keyboard	Lenovo	SK-8825	06151749	N/A
2	USB Mouse	Lenovo	M-U0025-O	HS427HA10SR	N/A

2.5. EUT Test Procedure

1.	Setup the EUT and simulators as shown on 2.3.
2.	Turn on the power of all equipment.
3.	Turn on the test software, make the EUT with full load.
4.	Start test.

2.6. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

3. DESCRIPTION OF TEST

3.1. Evaluation Procedure

The measurement procedures described in the Electromagnetic compatibility of multimedia equipment - Emission Requirements (EN 55032, EN 55024) was used in the measurement of the **Stainless Steel PCH8 Series Full IP67/IP69K Panel PC**

Deviation from measurement procedure.....None

3.2. EN 55024 Performance Criteria

Performance criterion A: During and after the test the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a minimum performance level specified by the manufacturer when the EUT is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the EUT if used as intended.

Performance criterion B: After the test, the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the EUT is used as intended. The performance level may be replaced by a permissible loss of performance.

During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test.

Performance criterion C: During and after testing, a temporary loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls or cycling of the power to the EUT by the user in accordance with the manufacturer's instructions.

3.3. Measurement Uncertainty

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$

EMI Measurement Uncertainty

AC Conducted Emission Measurement – SR2
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 0.15MHz~30MHz: $\pm 2.53\text{dB}$
Impedance Stabilization Network Measurement – SR2
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 0.15MHz~30MHz: $\pm 3.96\text{dB}$
Radiated disturbance Measurement – AC1
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 9kHz~30MHz: $\pm 3.92\text{dB}$ 30MHz~1GHz: $\pm 4.25\text{dB}$ 1GHz~18GHz: $\pm 4.40\text{dB}$ 18GHz~40GHz: $\pm 4.45\text{dB}$

EMS Measurement Uncertainty

Electrostatic discharge – SR4
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): Voltage: $\pm 0.09kV$, Timing: $\pm 0.02nS$.
Radio-frequency electromagnetic field – AC1
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 80MHz~6GHz: $\pm 4.34dB$.
Fast transients – SR3
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): Voltage: $\pm 6\%$, Timing: $\pm 5.1\%$.
Surges – SR3
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): Voltage: $\pm 5.6\%$, Current: $\pm 4.8\%$, Timing: $\pm 4.6\%$.
Radio-frequency continuous conducted – SR3
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): $\pm 2.15dB$ (CDN); $\pm 3.3dB$ (EM Clamp)
Power-frequency magnetic field – SR3
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): $\pm 1.0\%$

4. TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions and Impedance Stabilization Network - SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cal. Date
Two-Line V-Network	R&S	ENV216	MRTTWA00019	1 year	2021/3/26
Two-Line V-Network	R&S	ENV216	MRTTWA00020	1 year	2021/4/24
8-Wire ISN (T8)	R&S	ENY81	MRTTWA00018	1 year	2021/5/25
EMI Test Receiver	R&S	ESR3	MRTTWA00009	1 year	2021/3/25

Radiated Disturbance – AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cal. Date
Broadband TRILOG Antenna	Schwarzbeck	VULB 9162	MRTTWA00001	1 year	2021/10/5
Broadband Horn antenna	Schwarzbeck	BBHA 9120D	MRTTWA00003	1 year	2021/4/24
Broadband Preampfier	Schwarzbeck	BBV 9718	MRTTWA00005	1 year	2021/4/24
Signal Analyzer	R&S	FSV40	MRTTWA00007	1 year	2021/3/24
EMI Test Receiver	R&S	ESR3	MRTTWA00009	1 year	2021/3/25

EMI Test Software

Software	Manufacturer	Version No.
e3	Audix	9.160520a
EMI	Quietek	V3

Electrostatic Discharge-SR4

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cal. Date
ESD Simulator	TESEQ	NSG 435	MRTTWA00049	1 year	2021/11/23

Radio-Frequency Electromagnetic Field – AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EXA Analog Signal Generator	KEYSIGHT	N5173B	MRTTWA00072	1 year	2022/1/13
Power Sensor	KEYSIGHT	U2021XA	MRTTWA00014	1 year	2021/4/24
Broadband Antenna	SCHWARZBECK	STLP 9129	MRTTWA00075	N/A	N/A
Field Probe	narda	PMM EP601	MRTTWA00076	1 year	2021/12/9
Power Amplifier	rflight	NTWPA-00810300	MRTTWA00077	N/A	N/A
Power Amplifier	rflight	NTWPA-1060100P	MRTTWA00085	N/A	N/A

Fast Transients-SR3

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cal. Date
Compact Immunity Test System	3cTest	CCS 600	MRTTWA00056	1 year	2021/11/24
EFT Clamp	3cTest	EFTC	MRTTWA00060	1 year	2021/11/24

Surges-SR3

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cal. Date
Compact Immunity Test System	3cTest	CCS 600	MRTTWA00056	1 year	2021/11/24
Corrbination Wave Surge Simulator	3cTest	CWS 600T	MRTTWA00057	1 year	2021/11/23
CDN	3cTest	CDN 405T8A1	MRTTWA00081	1 year	2021/5/5

Radio-Frequency Continuous Conducted -SR3

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Date
Conducted Immunity Tester	Frankonia	CIT-10/75	MRTTWA00051	1 year	2021/11/10
CDN	Frankonia	CDN M2+M3	MRTTWA00052	1 year	2021/11/11
CDN	R&S	ENY81 CA6	MRTTWA00017	1 year	2021/11/10
CDN	TESE Q	CDN ST08AS	MRTTWA00083	1 year	2021/9/24
EM Clamp	Frankonia	EMCL-20	MRTTWA00055	1 year	2021/11/11

Power-Frequency Magnetic Field-SR3

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cal. Date
Compact Immunity Test System	3cTest	CCS 600	MRTTWA00056	1 year	2021/11/24
Dips Module	3cTest	VMT 2612S	MRTTWA00058	1 year	2021/11/24
PFM Antenna	3cTest	VMT 2612S	MRTTWA00059	1 year	2021/11/23

5. Test Summary

Clause	Test Item	Test Standard	Result (Pass/Fail)	Remark
Emission Measurements				
EN 55032 Annex A.3	Conducted Emission	EN 55032 (2015+A11:2020)	N/A	---
EN 55032 Annex A.3	Impedance Stabilization Network	EN 55032 (2015+A11:2020)	N/A	---
EN 55032 Annex A.3	Radiated Emission	EN 55032 (2015+A11:2020)	Pass	---
---	Harmonic current emissions	EN 61000-3-2 (2019)	N/A	---
---	Voltage fluctuations and flicker	EN 61000-3-3 (2013+A1:2019)	N/A	---
Immunity Measurements				
EN 55024 Clause 4.2.1	Electrostatic discharge	IEC 61000-4-2 (2008)	Pass	---
EN 55024 Clause 4.2.3.2	Radio-frequency electromagnetic field	IEC 61000-4-3 (2006+AMD1: 2007+AMD2:2010)	Pass	---
EN 55024 Clause 4.2.2	Fast transients, common mode	IEC 61000-4-4 (2012)	Pass	---
EN 55024 Clause 4.2.5	Surges	IEC 61000-4-5 (2014/AMD1:2017)	Pass	---
EN 55024 Clause 4.2.3.2	Radio-Frequency Continuous Conducted	IEC 61000-4-6 (2013/COR1:2015)	Pass	---
EN 55024 Clause 4.2.4	Power-frequency magnetic field	IEC 61000-4-8 (2009)	Pass	---
EN 55024 Clause 4.2.6	Voltage dips and interruptions	IEC 61000-4-11 (2020)	N/A	---

Note1: Determining compliance is based on the test results met the regulation limits or requirements declared by clients, and the test results don't take into account the value of measurement uncertainty.

Note2: The EUT Power Input DC 12V, so do not need to test Conducted Emissions and Harmonic current emissions / Voltage fluctuations and flicker, Voltage dips and interruptions.

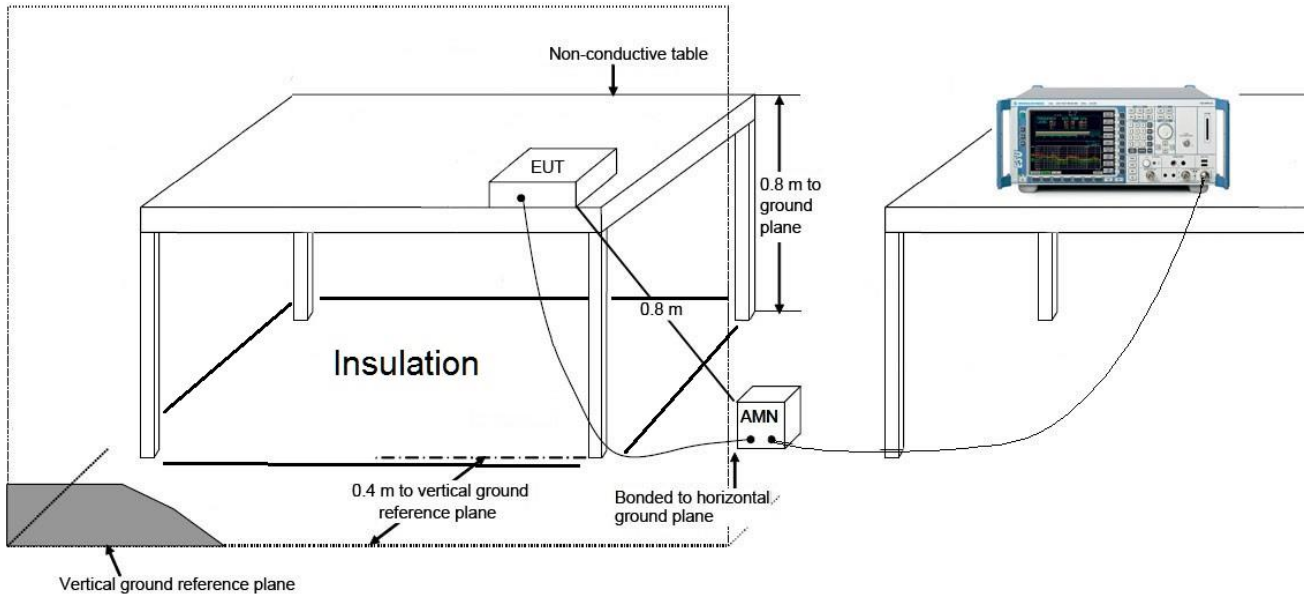
6. Conducted Emission and Impedance Stabilization Network Measurement

6.1. Test Limit

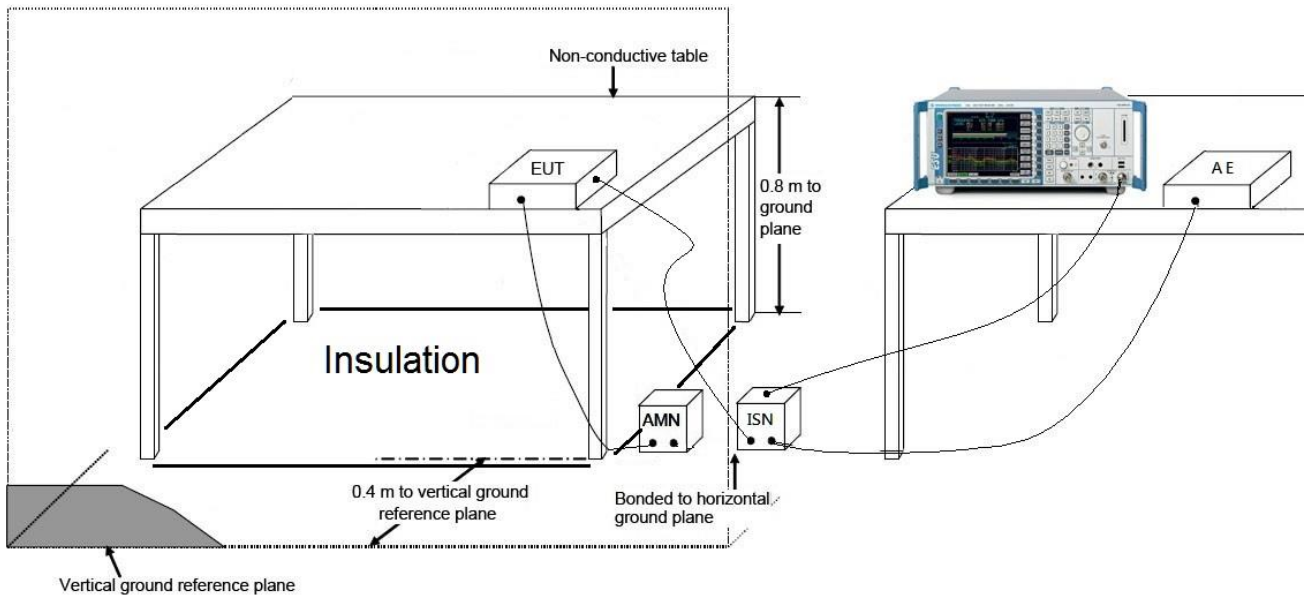
Limits of conducted emission for AC mains power input/output ports				
Frequency range MHz	Limits dB(μ V)			
	Class A			
	Quasi-peak		Average	
0.15 to 0.50	79		66	
0.50 to 30	73		60	
Frequency range MHz	Class B			
	Quasi-peak		Average	
	0.15 to 0.50	66 to 56		56 to 46
0.50 to 5	56		46	
5 to 30	60		50	
Limits of conducted emission for telecommunication ports				
Frequency range MHz	Limits dB(μ V)			
	Class A		Class B	
	Quasi-peak	Average	Quasi-peak	Average
	0.15 to 0.50	97 to 87	84 to 74	84 to 74
0.50 to 30	87	74	74	64
Note 1: The lower limit shall apply at the transition frequencies.				
Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.				

6.2. Test Setup

Conducted Emission Test Setup:



Impedance Stabilization Network Test Setup:



6.3. Test Procedure

The receiver or associated equipment under measurement and the artificial mains network are disposed as shown in 2.3. Measurements shall be carried out using a selective voltmeter having a quasi-peak detector for broadband measurements and an Average detector for arrow-band measurements in accordance with CISPR 16-2.

The mains lead shall be arranged to follow the shortest possible path between the receiver and artificial mains network on the ground. The mains lead in excess of 0,8 m separating the equipment under test from the artificial mains network shall be folded back and forth parallel to the lead so as to form a bundle with a length of 0,3 m to 0,4 m.

Earthing of the equipment under test if provided with a safety earth connection, shall be made to the earth terminal provided on the artificial mains network with the shortest possible lead.

If the equipment under test has a coaxial RF input connector, tests shall be performed with and without an earth connection made to the outer conductor screen of the coaxial RF input connector. When these tests are being carried out, no other earth connections shall be made to any additional earth terminal whatever.

If the equipment under test has no coaxial RF input connector and if it has an earth terminal, tests shall be performed with this terminal earthed.

6.4. Test Result

Note: The EUT Power Input DC 12V, so do not need to test Conducted Emissions.

7. Radiated Emission Measurement

7.1. Test Limit

Frequency range (MHz)	Quasi-peak limits dB(μ V/m)	
	Class A	Class B
30 to 230	50	40
230 to 1000	57	47

Note 1: The lower limit shall apply at the transition frequency.

Note 2: Additional provisions may be required for cases where interference occurs.

Frequency range GHz	Average limit dB(μ V/m)		Peak limit dB(μ V/m)	
	Class A	Class B	Class A	Class B
1 to 3	56	50	76	70
3 to 6	60	54	80	74

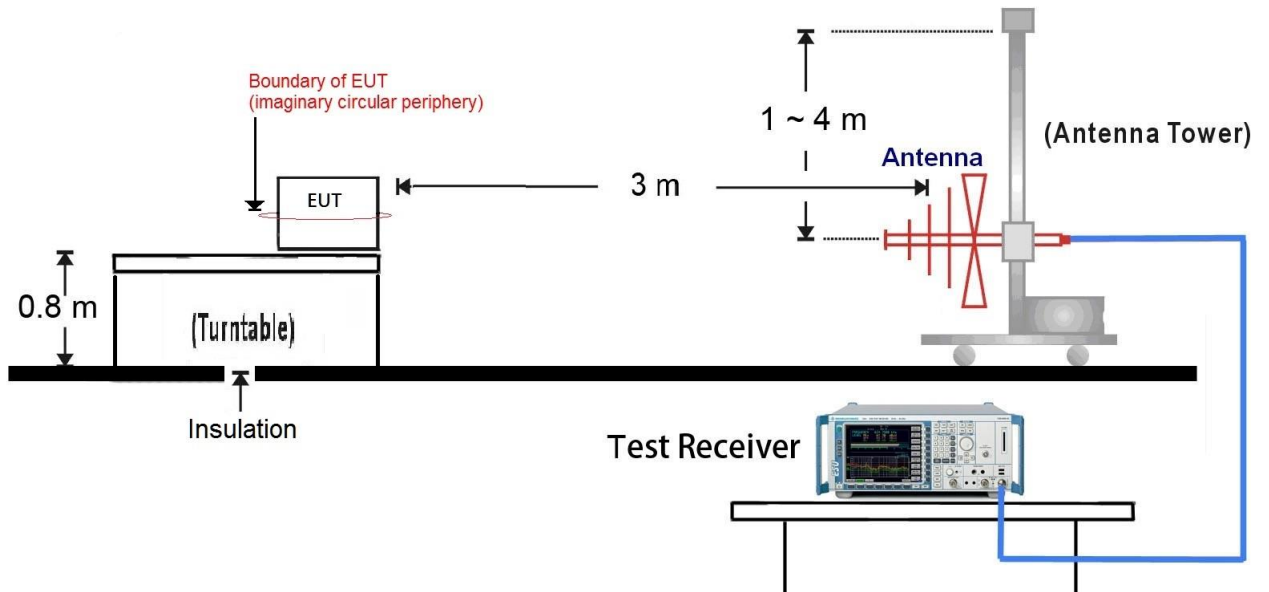
Note: The lower limit applies at the transition frequency.

Required highest frequency for radiated measurement	
Highest internal frequency (F_x)	Highest measured 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	$5 \times F_x$ up to a maximum of 6 GHz

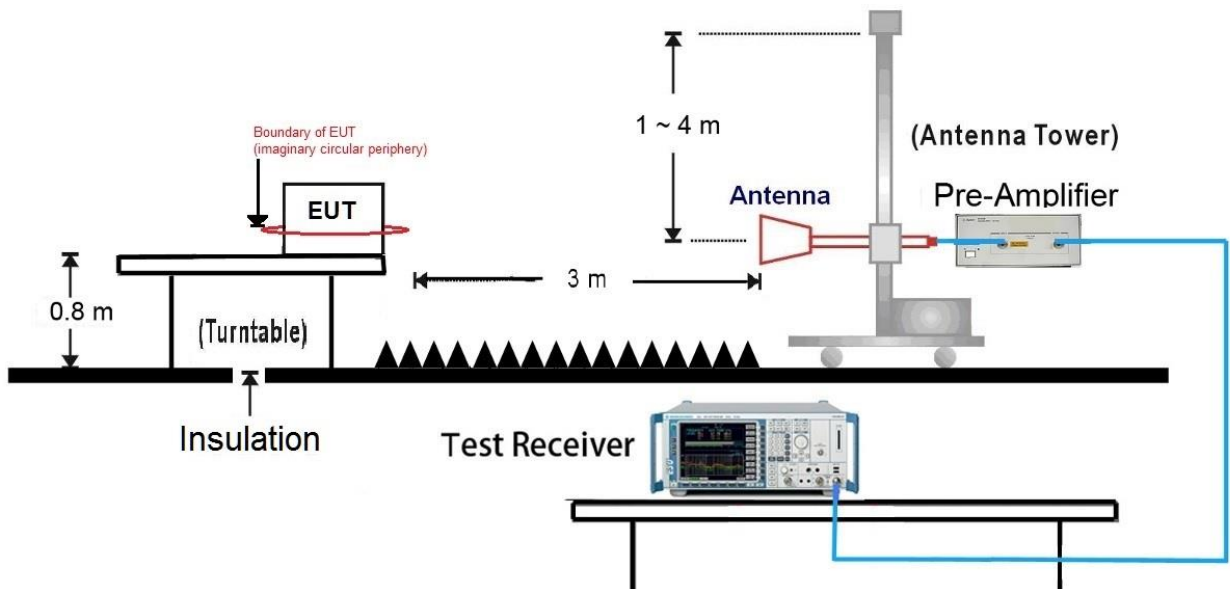
Note: Where F_x is unknown, the radiated emission measurements shall be performed up to 6 GHz

7.2. Test Setup

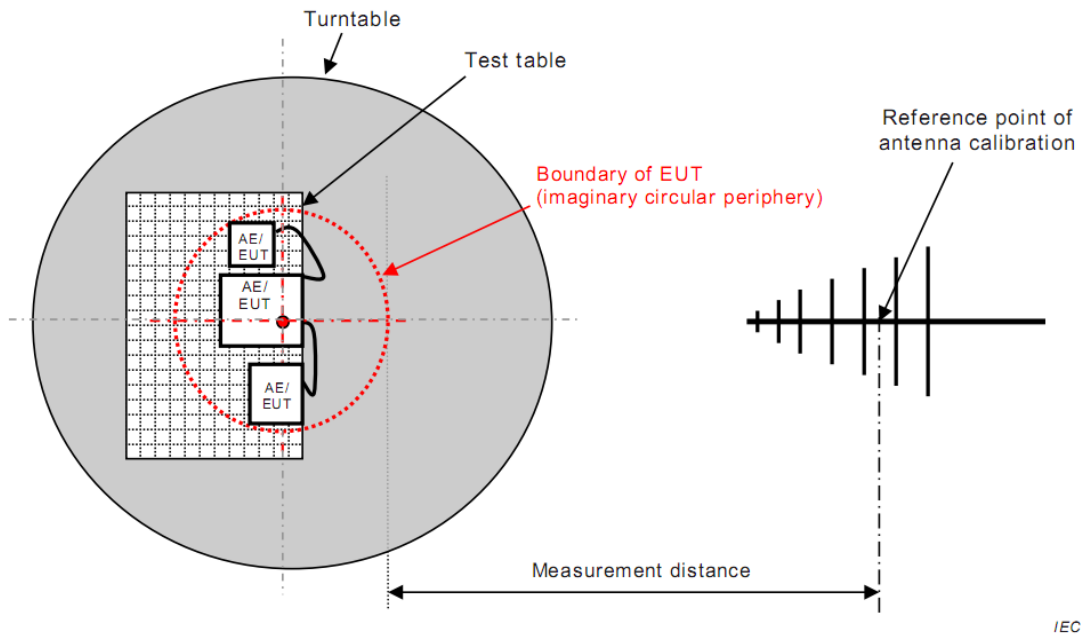
30MHz ~ 1GHz Test Setup:



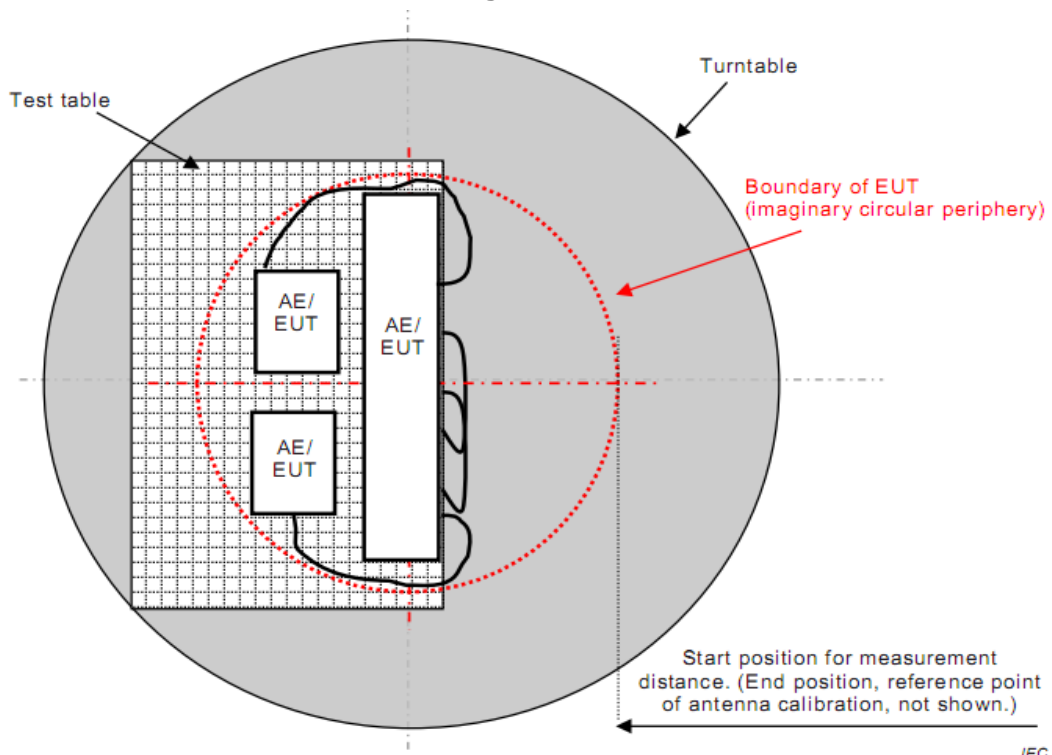
1GHz ~ 6GHz Test Setup:



Note: About the radiated test setup, the EUT and local AE shall be arranged in the most compact practical arrangement within the test volume, while respecting typical spacing and the requirements defined in EN55032 Annex D. The central point of the arrangement shall be positioned at the centre of the turntable. The measurement distance is the shortest horizontal distance between an imaginary circular periphery just encompassing this arrangement and the calibration point of the antenna. See below Figure 1 and Figure 2.



IEC

Figure 1


IEC

Figure 2

7.3. Test Procedure

Starting with the front of the receiver under test facing the measuring antenna, the measuring antenna is adjusted for horizontal polarization measurement and its height varied between 1 m and 4 m until the maximum reading is obtained.

The central point of the arrangement shall be positioned at the centre of the turntable and rotate the turntable until the maximum meter reading is obtained, after which the measuring antenna height is again varied between 1 m and 4 m and the maximum reading noted.

The procedure is repeated for vertical polarization of the measuring antenna.

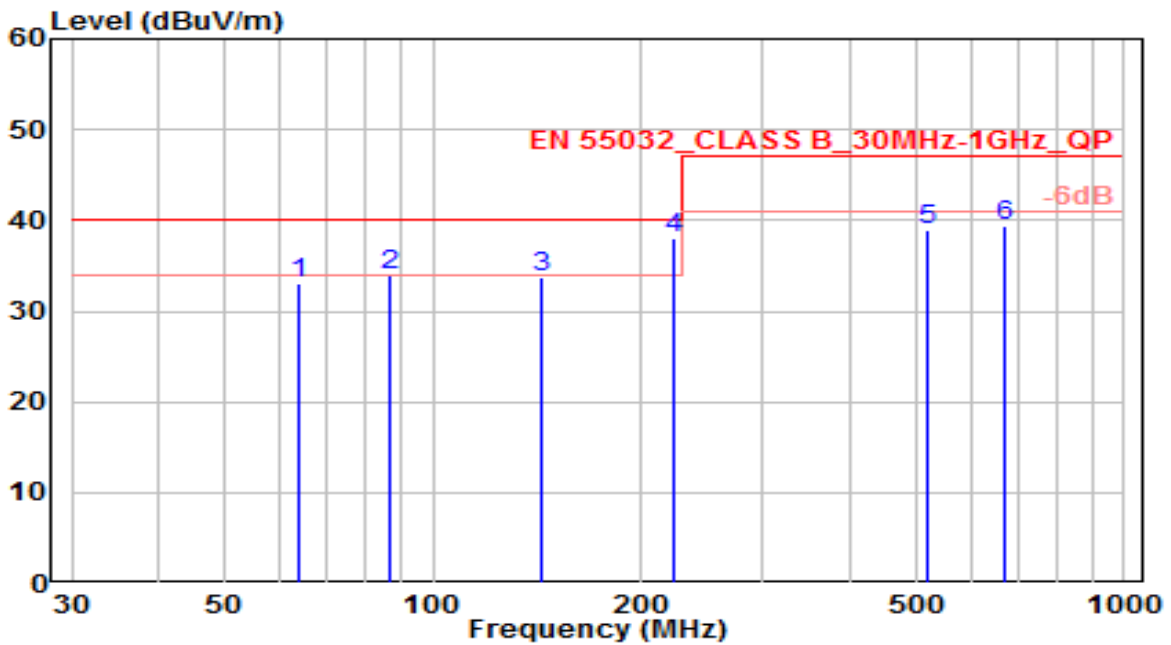
The highest value found, following this procedure, is defined as the radiation figure of the receiver.

If at certain frequencies the ambient signal field strength is high at the position of the receiving antenna, one of the following methods may be used to show compliance of the equipment under test.

- a) For small frequency bands with high ambient signals, the disturbance value may be interpolated from the adjacent values. The interpolated value shall lie on the curve describing a continuous function of the disturbance values adjacent to the ambient noise.
- b) Another possibility is to use the method described in annex A of CISPR 16-2-3.

7.4. Test Result

EUT	Stainless Steel PCH8 Series Full IP67/IP69K Panel PC	Date of Test	2021-02-20
Factor	VULB 9162	Temp. / Humidity	24°C /57%
Polarity	Horizontal	Site / Test Engineer	AC1 / Howard
Test Mode	Mode1	Test Voltage	DC 12V

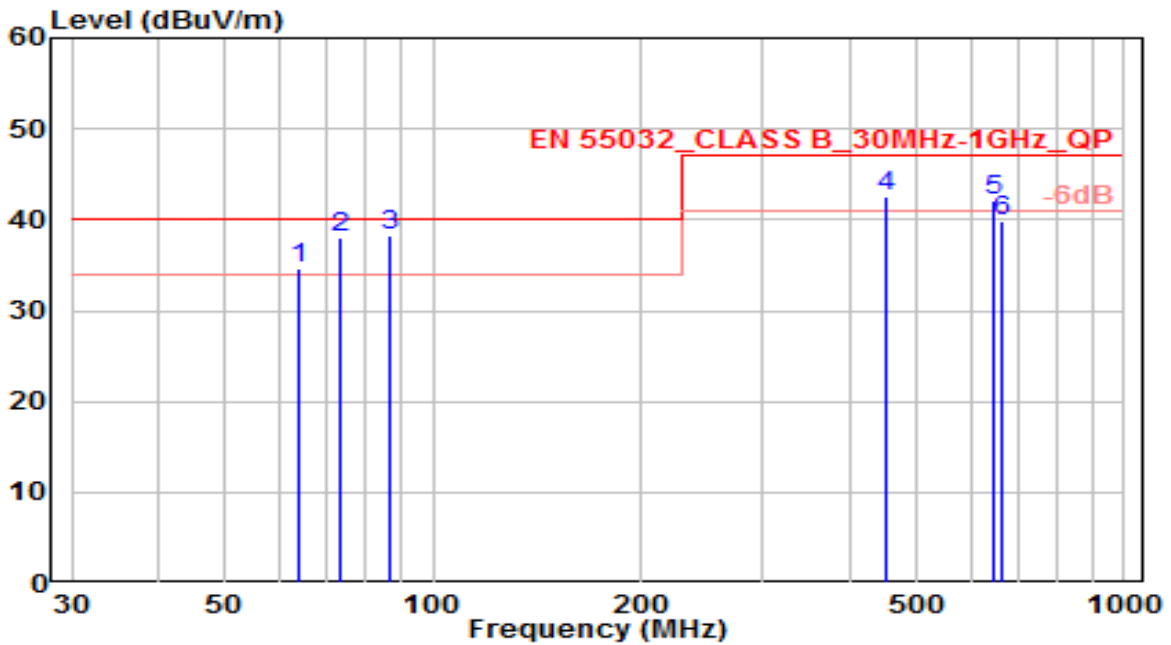


No	Frequency (MHz)	Reading (dBUV)	C.F (dB)	Measurement (dBUV/m)	Margin (dB)	Limit (dBUV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	63.950	14.22	18.93	33.15	-6.85	40.00	100	360	QP
2	86.260	17.92	15.94	33.86	-6.14	40.00	100	270	QP
3	143.490	17.76	16.01	33.77	-6.23	40.00	100	150	QP
4	* 224.000	18.70	19.40	38.10	-1.90	40.00	100	176	QP
5	517.910	12.50	26.43	38.93	-8.07	47.00	100	325	QP
6	669.230	10.60	28.88	39.48	-7.52	47.00	130	195	QP

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement (dBUV/m) = Reading(dBUV) + C.F (Correction Factor).
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	Stainless Steel PCH8 Series Full IP67/IP69K Panel PC	Date of Test	2021-02-20
Factor	VULB 9162	Temp. / Humidity	24°C /57%
Polarity	Vertical	Site / Test Engineer	AC1 / Howard
Test Mode	Mode1	Test Voltage	DC 12V

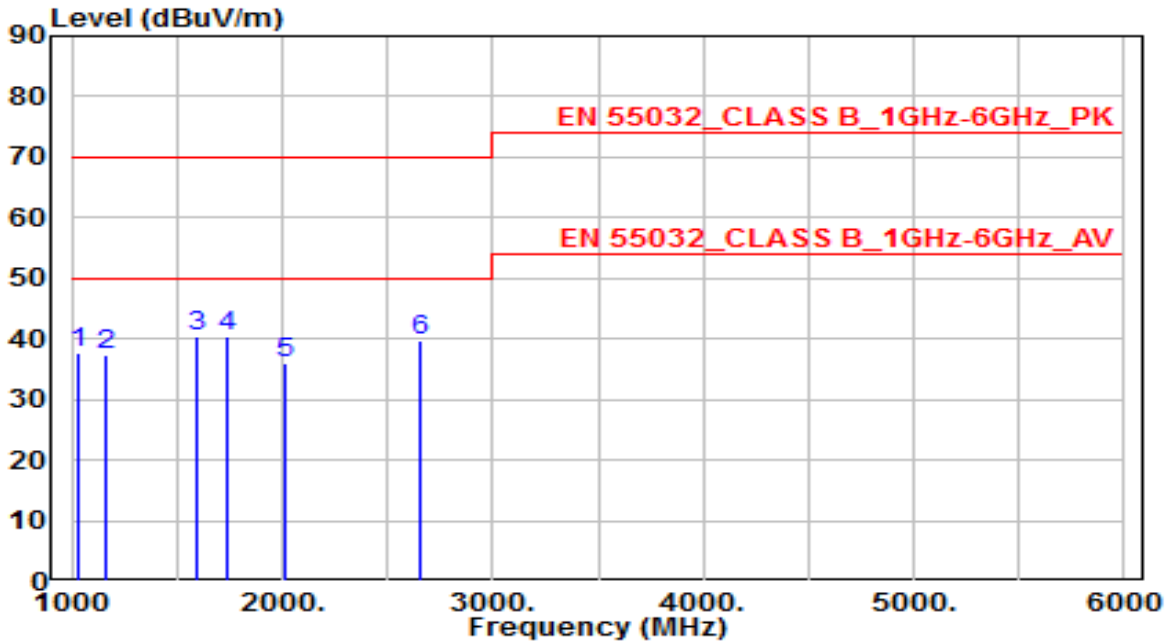


No	Frequency (MHz)	Reading (dBUV)	C.F (dB)	Measurement (dBUV/m)	Margin (dB)	Limit (dBUV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	63.950	15.60	18.93	34.53	-5.47	40.00	100	360	QP
2	73.650	22.00	16.01	38.01	-1.99	40.00	100	360	QP
3	* 86.260	22.30	15.94	38.24	-1.76	40.00	150	140	QP
4	453.890	17.50	24.99	42.49	-4.51	47.00	100	125	QP
5	647.890	13.50	28.58	42.08	-4.92	47.00	100	240	QP
6	667.290	10.90	28.86	39.76	-7.24	47.00	100	335	QP

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement (dBUV/m) = Reading(dBUV) + C.F (Correction Factor).
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	Stainless Steel PCH8 Series Full IP67/IP69K Panel PC	Date of Test	2021-02-17
Factor	BBHA 9120D	Temp. / Humidity	24°C /57%
Polarity	Horizontal	Site / Test Engineer	AC1 / Tim
Test Mode	Mode1	Test Voltage	DC 12V

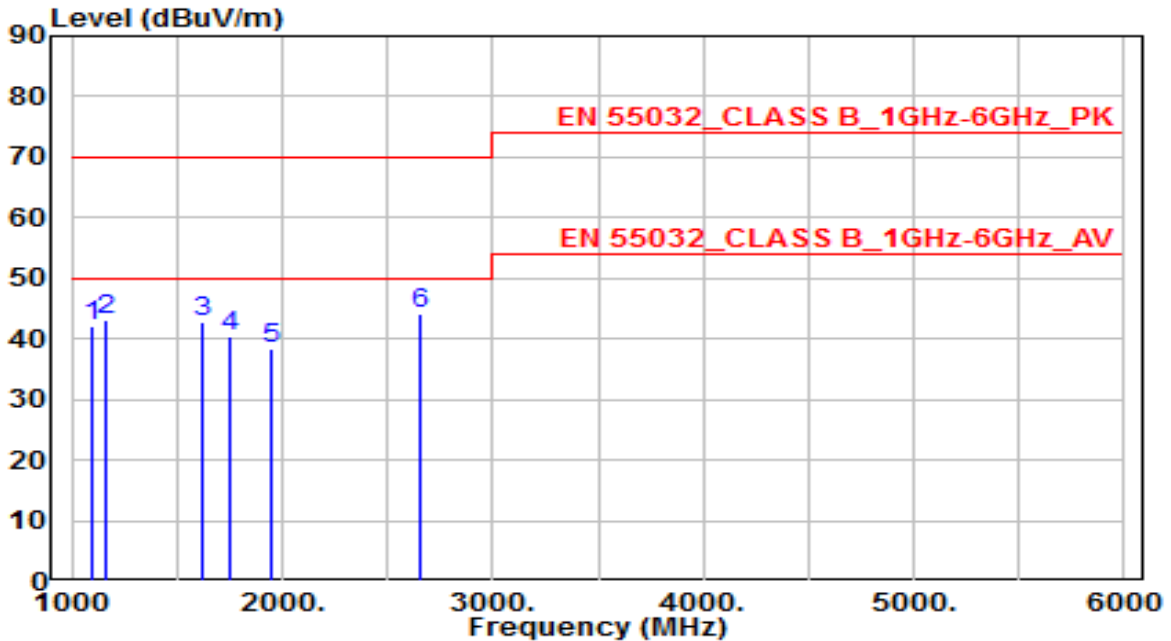


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	1031.094	45.43	-7.81	37.62	-32.38	70.00	150	0	Peak
2	1166.719	44.50	-7.21	37.29	-32.71	70.00	150	0	Peak
3	* 1598.281	45.97	-5.47	40.49	-29.51	70.00	150	0	Peak
4	1735.938	45.57	-5.11	40.46	-29.54	70.00	150	0	Peak
5	2007.500	40.41	-4.39	36.02	-33.98	70.00	150	0	Peak
6	2656.875	41.91	-2.32	39.59	-30.41	70.00	150	0	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB) – Preamplifier(dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	Stainless Steel PCH8 Series Full IP67/IP69K Panel PC	Date of Test	2021-02-17
Factor	BBHA 9120D	Temp. / Humidity	24°C /57%
Polarity	Vertical	Site / Test Engineer	AC1 / Tim
Test Mode	Mode1	Test Voltage	DC 12V



No	Frequency (MHz)	Reading (dBUV)	C.F (dB)	Measurement (dBUV/m)	Margin (dB)	Limit (dBUV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	1100.938	49.50	-7.50	41.99	-28.01	70.00	150	0	Peak
2	1166.094	50.39	-7.21	43.18	-26.82	70.00	150	0	Peak
3	1619.531	48.34	-5.42	42.92	-27.08	70.00	150	0	Peak
4	1749.219	45.66	-5.08	40.58	-29.42	70.00	150	0	Peak
5	1943.438	42.95	-4.57	38.38	-31.62	70.00	150	0	Peak
6	* 2656.719	46.57	-2.32	44.25	-25.75	70.00	150	0	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB) – Pre-amplifier(dB).
3. Measurement (dBUV/m) = Reading(dBUV) + C.F (Correction Factor).
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

7.5. Test Photo

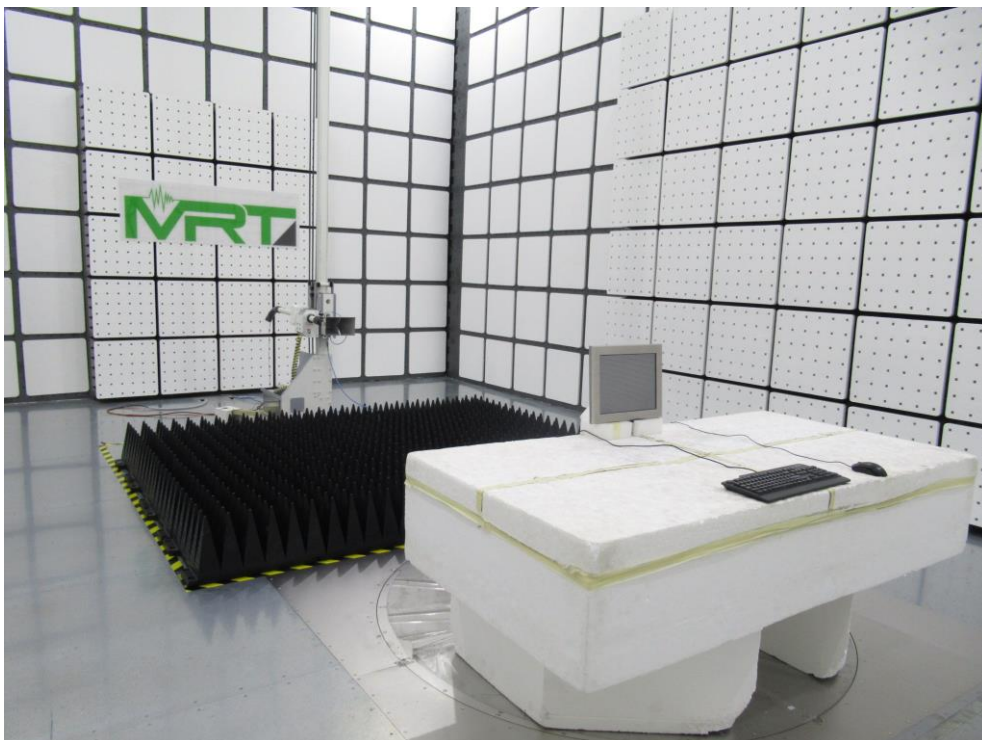
Test Mode: Mode1

Description: Radiated Disturbance Test Setup (30MHz ~ 1GHz)



Test Mode: Mode1

Description: Radiated Disturbance Test Setup (1GHz ~ 6GHz)



8. Harmonic Current Emissions

8.1. Limit of Harmonic Current Emissions

Limits of Class A Harmonics Currents

Harmonics Order n	Maximum Permissible harmonic current A	Harmonics Order n	Maximum Permissible harmonic current A
Odd harmonics		Even harmonics	
3	2.30	2	1.08
5	1.14	4	0.43
7	0.77	6	0.30
9	0.40	$8 \leq n \leq 40$	$0.23 \cdot 8/n$
11	0.33	--	--
13	0.21	--	--
$15 \leq n \leq 39$	$0.15 \cdot 15/n$	--	--

Limits of Class B Harmonics Currents

For Class B equipment, the harmonic of the input current shall not exceed the maximum permissible values given in table that is the limit of Class A multiplied by a factor of 1.5.

Limits of Class C Harmonics Currents

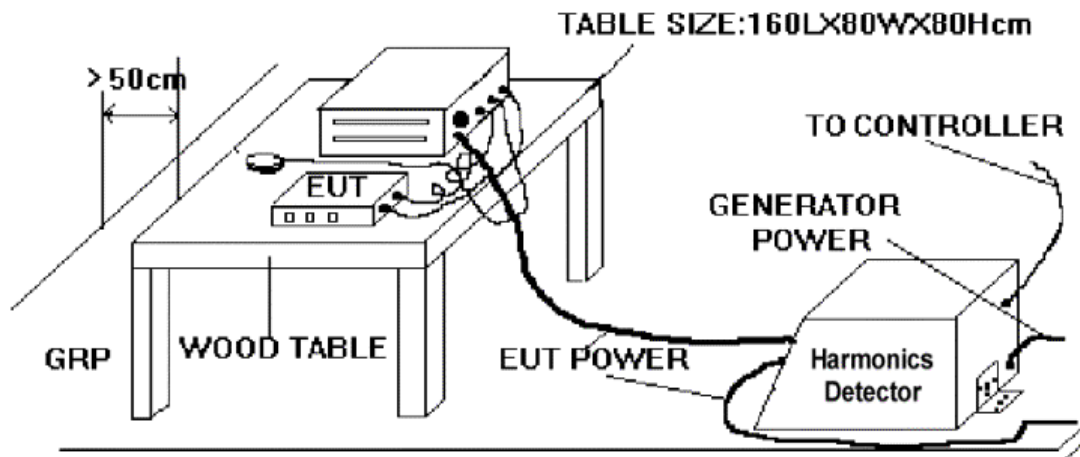
Harmonics Order n	Maximum Permissible harmonic current Expressed as a percentage of the input current at the fundamental frequency %
2	2
3	$30 \cdot \lambda^*$
5	10
7	7
9	5
$11 \leq n \leq 39$ (odd harmonics only)	3

* λ is the circuit power factor

Limits of Class D Harmonics Currents

Harmonics Order n	Maximum Permissible harmonic current per watt mA/W	Maximum Permissible harmonic current A
3	3.4	2.30
5	1.9	1.14
7	1.0	0.77
9	0.5	0.40
11	0.35	0.33
11 ≤ n ≤ 39 (odd harmonics only)	3.85/n	See limit of Class A

8.2. Test Setup



8.3. Test Procedure

The EUT is supplied in series with power analyzer from a power source having the same normal voltage and frequency as the rated supply voltage and the equipment under test. And the rated voltage at the supply voltage of EUT of 0.98 times and 1.02 times shall be performed.

With the exception of lighting equipment section 7 of the IEC61000-3-2 standard declares that no Harmonic current limits are specified for equipment with a rated power of 75W or less.

8.4. Test Result

Note: The EUT Power Input DC 12V, so do not need to test Harmonic Current Emissions.

9. Voltage Fluctuations and Flicker

9.1. Limit of Voltage Fluctuations and Flicker

The following limits apply:

- the value of P_{st} shall not be greater than 1.0;
- the value of P_{1t} shall not be greater than 0.65;
- the value of $d(t)$ during a voltage change shall not exceed 3.3% for more than 500ms;
- the relative steady-state voltage change, d_c , shall not exceed 3.3%;
- the maximum relative voltage change, d_{max} , shall not exceed;
 - a) 4% without additional conditions;
 - b) 6% for equipment which is:
 - switched manually, or
 - switched automatically more frequently than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds), or manual restart, after a power supply interruption.

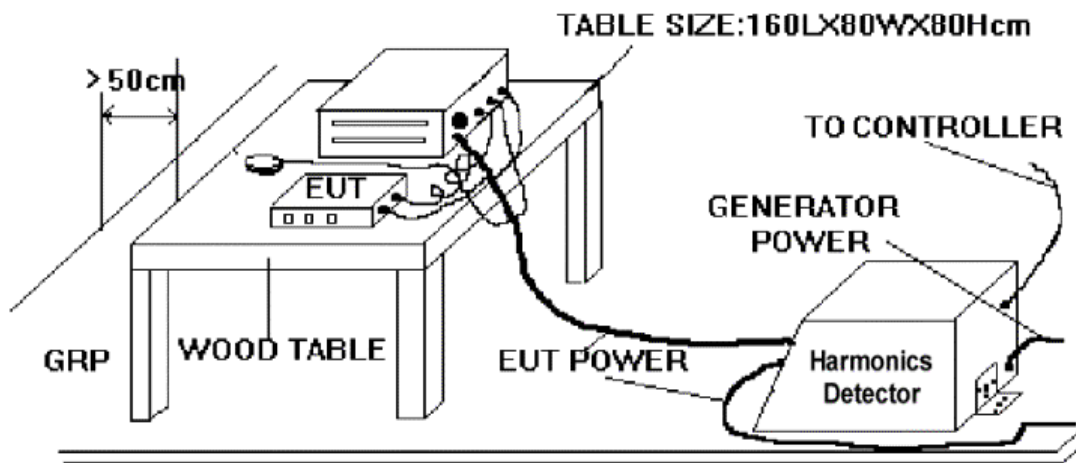
NOTE: The cycling frequency will be further limited by the P_{st} and P_{1t} limit.

For example: a d_{max} of 6% producing a rectangular voltage change characteristic twice per hour will give a P_{1t} of about 0.65.

- c) 7% for equipment which is:
 - attended whilst in use (for example: hair dryers, vacuum cleaners, kitchen equipment such as mixers, garden equipment such as lawn mowers, portable tools such as electric drills), or
 - switched on automatically, or is intended to be switched on manually, no more than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds) or manual restart, after a power supply interruption.

P_{st} and P_{1t} requirements shall not be applied to voltage changes caused by manual switching.

9.2. Test Setup



9.3. Test Procedure

The EUT is supplied in series with power analyzer from a power source having the same normal voltage and frequency as the rated supply voltage and the equipment under test. And the rated voltage at the supply voltage of EUT of 0.98 times and 1.02 times shall be performed.

9.4. Test Result

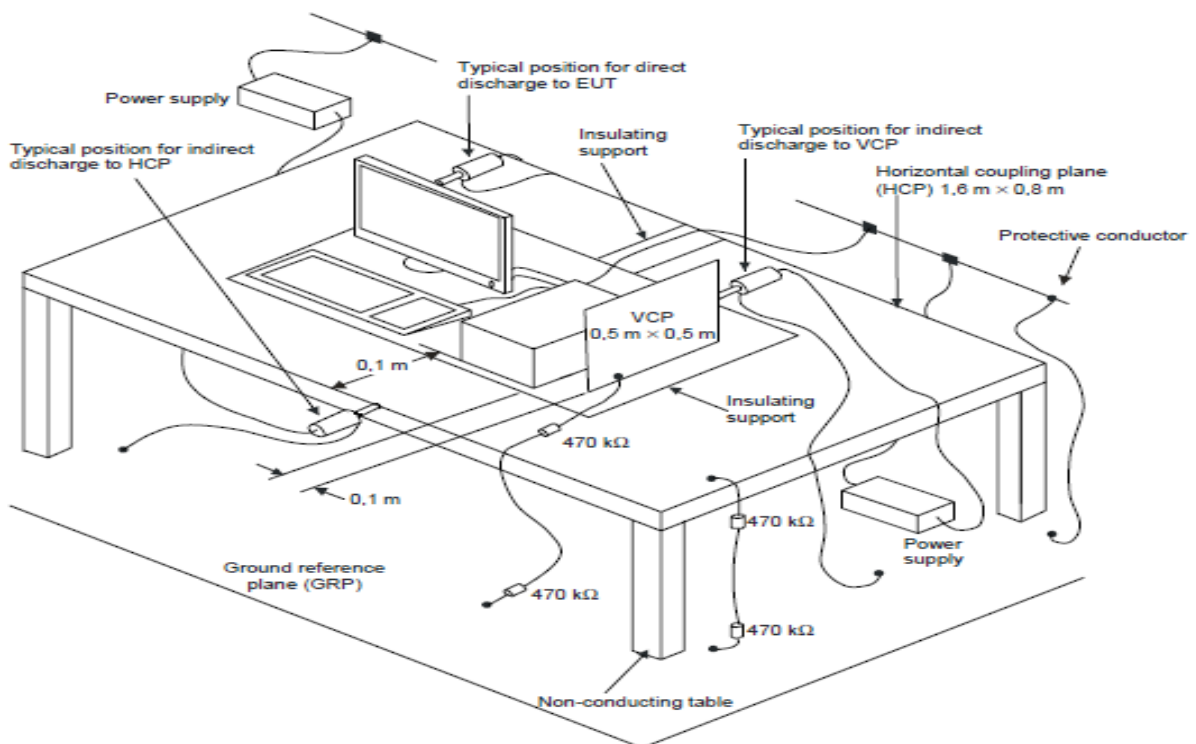
Note: The EUT Power Input DC 12V, so do not need to test Voltage Fluctuations and Flicker.

10. Electrostatic Discharge

10.1. Limit of Electrostatic Discharge

Environmental phenomenon	Test specification	Units	Performance criterion
Enclosure port			
Electrostatic discharge	± 4 (Contact discharge) ± 8 (Air discharge)	kV (Charge voltage) kV (Charge voltage)	B

10.2. Test Setup



10.3. Test Procedure

Direct application of discharges to the EUT:

Contact discharge was applied only to conductive surfaces of the EUT.

Air discharges were applied only to non-conductive surfaces of the EUT.

During the test, it was performed with single discharges. For the single discharge time between successive single discharges will be keep longer 1 second. It was at least twenty-five single discharges with positive and negative at the same selected point.

The selected point, which was performed with electrostatic discharge, was marked on the red label of the EUT.

Indirect application of discharges to the EUT:

Vertical Coupling Plane (VCP):

The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1m from the EUT, with the Discharge Electrode touching the coupling plane.

The four faces of the EUT will be performed with electrostatic discharge. It was at least twenty-five single discharges with positive and negative at the same selected point.

Horizontal Coupling Plane (HCP):

The coupling plane is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1m from the EUT, with the Discharge Electrode touching the coupling plane.

The four faces of the EUT will be performed with electrostatic discharge. It was at least twenty-five single discharges with positive and negative at the same selected point.

10.4. Test Result

EUT	Stainless Steel PCH8 Series Full IP67/IP69K Panel PC	Date of Test	2021/2/2
Site	SR4	Temp.	21°C
Test Engineer	Eric	Humidity	47%
Test Mode	Mode1	Test Voltage	DC 12V

Air Discharge (10 Discharges @ Per Test Point)					
Test Location	Test Level (kV) & Test Result criterion		Performance criterion	Result	Observation
	+8	-8			
1~22	A	A	B	Pass	Note1

Note1: There is no any degradation of performance and function, and the test result criterion was A.

Contact Discharge (25 Discharges @ Per Test Point)					
Test Location	Test Level (kV) & Test Result criterion		Performance criterion	Result	Observation
	+4	-4			
1~50	A	A	B	Pass	Note1

Note1: There is no any degradation of performance and function, and the test result criterion was A.

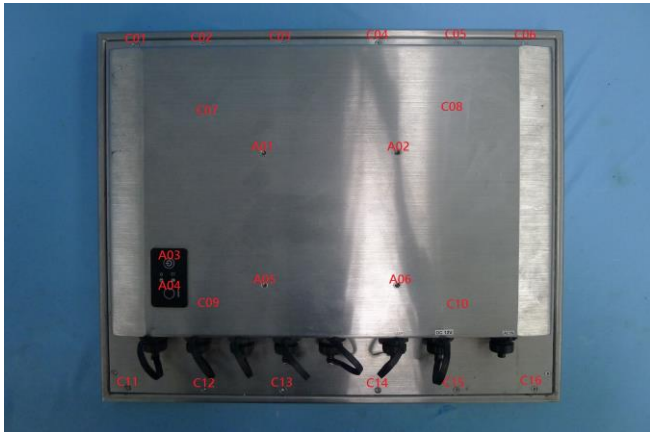





Horizontal Coupling (25 Discharges @ Per Test Point)					
Test Location	Test Level (kV) & Test Result criterion		Performance criterion	Result	Observation
	+4	-4			
Horizontal	B	B	B	Pass	Note1

Note1: When we discharge on the HCP, during the test, the EUT Monitor flicker, but will reply on its own, thus it is determined criteria B.

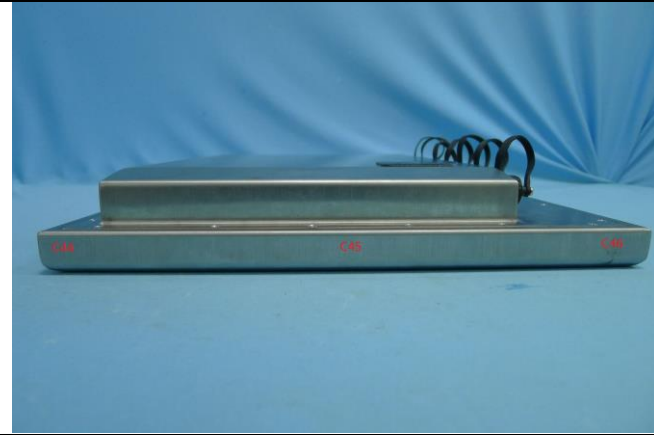
Vertical Coupling (25 Discharges @ Per Test Point)					
Test Location	Test Level (kV) & Test Result criterion		Performance criterion	Result	Observation
	+4	-4			
Front	B	B	B	Pass	Note1
Rear	B	B	B	Pass	Note1
Left	B	B	B	Pass	Note1
Right	B	B	B	Pass	Note1

Note1: When we discharge on the VCP, during the test, the EUT Monitor flicker, but will reply on its own, thus it is determined criteria B.

Electrostatic Discharge Test Location

Test Location Air 01~06 / Contact 01~16	Test Location Contact 17~22
 <p>Photograph of the ESD test chamber for locations 01-16. The chamber is a rectangular metal box with a blue background. Red labels A01 through A06 are placed on the top surface, and red labels C01 through C16 are placed around the perimeter of the chamber.</p>	 <p>Photograph of the ESD test chamber for locations 17-22. The chamber is a rectangular metal box with a blue background. Red labels C17 through C22 are placed along the bottom edge of the chamber.</p>
Test Location Contact 23~28	Test Location Air 07~14 / Contact 29~36
 <p>Photograph of the ESD test chamber for locations 23-28. The chamber is a rectangular metal box with a blue background. Red labels C23 through C28 are placed along the top edge of the chamber.</p>	 <p>Photograph of the ESD test chamber for locations 07-14 and 29-36. The chamber is a rectangular metal box with a blue background. Red labels A07 through A14 are placed on the top surface, and red labels C29 through C36 are placed around the perimeter of the chamber.</p>
Test Location Contact 37~39	Test Location Contact 40~43
 <p>Photograph of the ESD test chamber for locations 37-39. The chamber is a rectangular metal box with a blue background. Red labels C37, C38, and C39 are placed along the bottom edge of the chamber.</p>	 <p>Photograph of the ESD test chamber for locations 40-43. The chamber is a rectangular metal box with a blue background. Red labels C40, C41, C42, and C43 are placed along the bottom edge of the chamber.</p>

Test Location Contact 44~46



Test Location Air 15~22 / Contact 47~450



10.5. Test Photograph

Test Mode: Mode1

Description: Electrostatic Discharge Test Setup

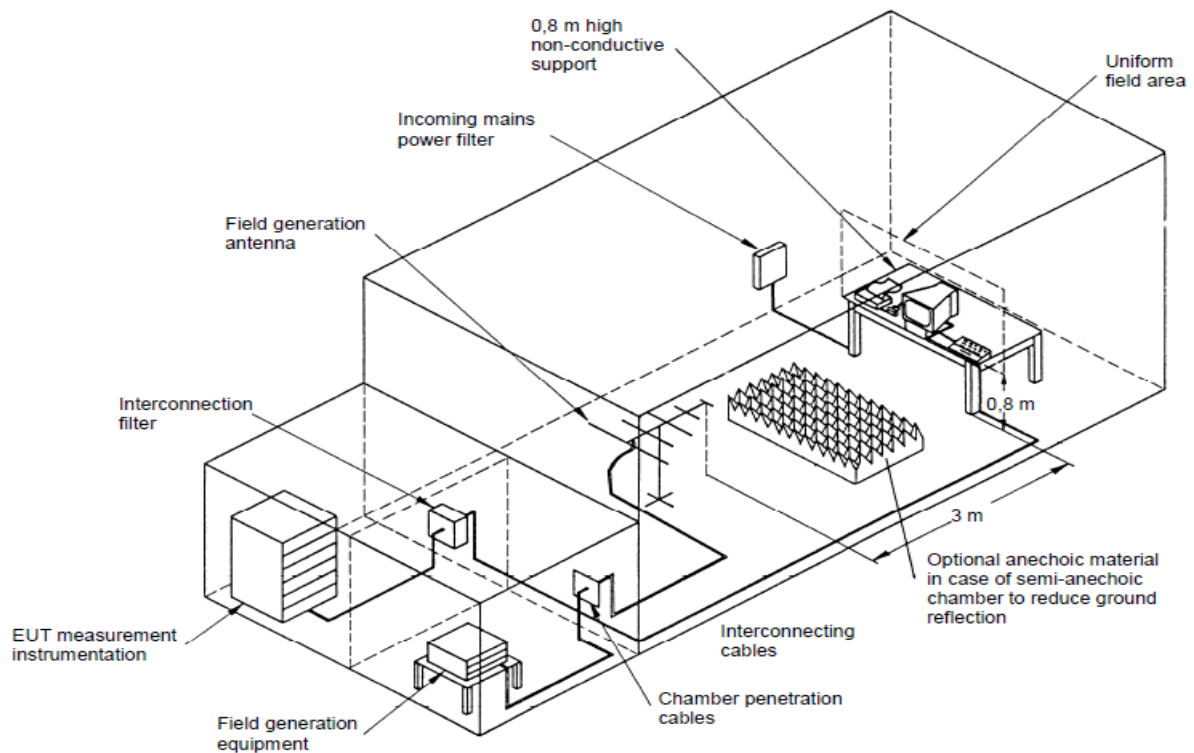


11. Radio-Frequency Electromagnetic Field

11.1. Limit of Radio-Frequency Electromagnetic Field

Environmental phenomenon	Test specification	Units	Performance criterion
Enclosure port			
Radio frequency electromagnetic field	80 - 1000	MHz	A
	3	V/m (unmodulated, r.m.s)	
	80	% AM (1kHz)	
Note 1: If the wanted signal is modulated at 1000Hz, then an audio signal of 400Hz shall be used. Note 2: The test shall be performed over the frequency range 80MHz to 1000MHz.			

11.2. Test Setup



11.3. Test Procedure

The EUT and load, which are placed on a table that is 0.8 meter above ground, are placed with one coincident with the calibration plane such that the distance from antenna to the EUT was 3 meters. Both horizontal and vertical polarization of the antenna and four sides of the EUT are set on measurement.

In order to judge the EUT performance, a CCD camera is used to monitor EUT screen.

All the scanning conditions are as follows:

	Condition of Test	Remarks
1.	Field Strength	3V/m
2.	Radiated Signal	AM 80% Modulated with 1kHz
3.	Scanning Frequency	80 - 1000MHz
4.	Dwell Time	3 Seconds
5.	Frequency Step Size Δf	1%

11.4. Test Result

EUT	Stainless Steel PCH8 Series Full IP67/IP69K Panel PC	Date of Test	2021/2/9
Site	AC1	Temp.	23°C
Test Engineer	Tim	Humidity	55%
Test Mode	Mode1	Test Voltage	DC 12V

Frequency (MHz)	Polarity	Test Position	Field Strength (V/m)	Test Result	Result
80-1000	Horizontal	Front	3	A	Pass
		Rear		A	Pass
		Left		A	Pass
		Right		A	Pass
80-1000	Vertical	Front	3	A	Pass
		Rear		A	Pass
		Left		A	Pass
		Right		A	Pass

Note: There is no any degradation of performance and function, and the test result criterion was A

11.5. Test Photograph

Test Mode: Mode 1

Description: Radio-Frequency Electromagnetic Field Test Setup

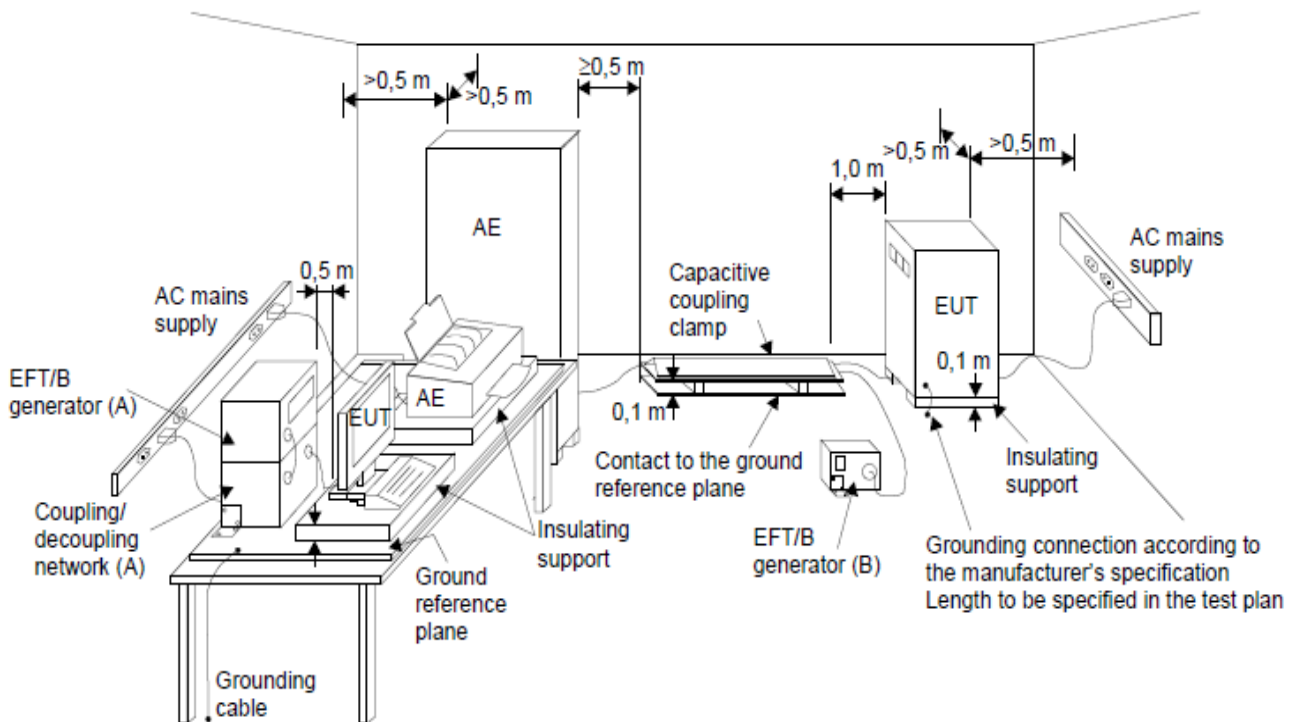


12. Electrical Fast Transients

12.1. Limit of Electrical Fast Transients

Environmental phenomenon	Test specification	Units	Performance criterion
Input AC Power Ports			
Electrical fast transients	± 1	kV (open circuit test voltage)	B
	5 / 50	Tr/Th (ns)	
	5	Repetition frequency (kHz)	
Input DC Power Port			
Electrical fast transients	± 0.5	kV (open circuit test voltage)	B
	5 / 50	Tr/Th (ns)	
	5	Repetition frequency (kHz)	
I/O and Communication Port			
Electrical fast transients	± 0.5	kV (open circuit test voltage)	B
	5 / 50	Tr/Th (ns)	
	5	Repetition frequency (kHz)	

12.2. Test Setup



12.3. Test Procedure

The EUT is placed on a table that is 0.8 meter height. A ground reference plane is placed on the table, and uses a 0.1m insulation between the EUT and ground reference plane.

The minimum area of the ground reference plane is 1m*1m, and 0.65mm thick min, and projected beyond the EUT by at least 0.1m on all sides.

Test on I/O and communication ports:

The EFT interference signal is through a coupling clamp device couples to the signal and control lines of the EUT with burst noise for 1minute.

Test on power supply ports:

The EUT is connected to the power mains through a coupling device that directly couples the EFT/B interference signal.

Each of the Line and Neutral conductors is impressed with burst noise for 1 minute.

The length of the signal and power lines between the coupling device and the EUT is 0.5m.

12.4. Test Result

EUT	Stainless Steel PCH8 Series Full IP67/IP69K Panel PC	Date of Test	2021/3/10
Site	SR3	Temp.	24.4°C
Test Engineer	Tim	Humidity	62%
Test Mode	Mode1	Test Voltage	DC 12V

Inject Line	Polarity	Test Level (kV)	Test Duration (second)	Inject Method	Test Result	Result
Pos	±	0.5	60	Direct	A	Pass
Neg	±	0.5	60	Direct	A	Pass
Pos-Neg	±	0.5	60	Direct	A	Pass

Note: There is no any degradation of performance and function, and the test result criterion was A.

12.5. Test Photograph

Test Mode: Mode1

Description: Electrical Fast Transients Test Setup



13. Surge

13.1. Limit of Surges

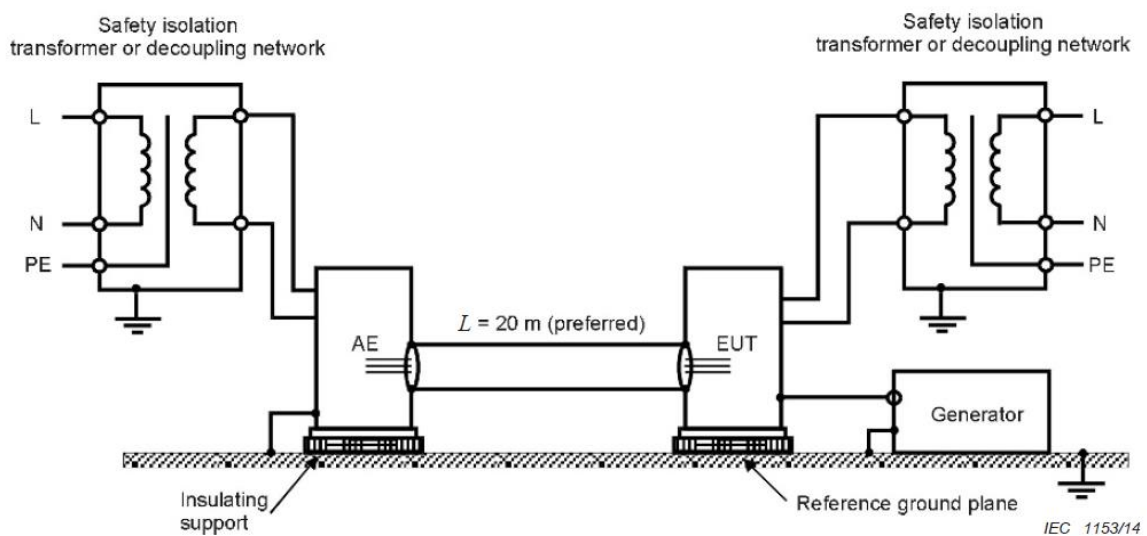
Environmental phenomenon	Test specification	Units	Performance criterion
Input AC Power Ports			
Surges	1.2/50 (8/20) ± 1 line to line ± 2 line to earth	Tr/Th (us) kV (open circuit test voltage) kV (open circuit test voltage)	B
Input DC Power Ports			
Surges	1.2/50 (8/20) ± 0.5 line to earth	Tr/Th (us) kV (open circuit test voltage)	B
Signal Ports and Telecommunication Port (See Note1 and Note2)			
Surges	10/700 ± 1 line to earth ± 4 line to earth	Tr/Th (us) kV (open circuit test voltage) kV (open circuit test voltage)	C

Notes:

Note1: For ports where primary protection is intended, surges are applied at voltages up to 4 kV with the primary protectors fitted. Otherwise the 1 kV test level is applied without primary protection in place.

Note2: Where the coupling network for the 10/700 μ s waveform affects the functioning of high speed data ports, the test shall be carried out using a 1,2/50 (8/20) μ s waveform and appropriate coupling network.

13.2. Test Setup



13.3. Test Procedure

The EUT is placed on a table that is 0.8 meter above a metal ground plane measured 1m*1m minimum and 0.65mm thick minimum and projected beyond the EUT by at least 0.1m on all sides. The length of power cord between the coupling device and the EUT shall be 2m or less.

For input AC / DC power ports

The EUT is connected to the power mains through a coupling device that directly couples the surge interference signal.

The surge noise shall be applied synchronized to the voltage phase at 0⁰, 90⁰, 180⁰, 270⁰ and the peak value of the AC voltage wave. (Positive and negative)

Each of Line to Earth and Line to Line is impressed with a sequence of five surge voltages with interval of 1 minute.

13.4. Test Result

EUT	Stainless Steel PCH8 Series Full IP67/IP69K Panel PC	Date of Test	2021/3/10
Site	SR3	Temp.	24.4°C
Test Engineer	Tim	Humidity	62%
Test Mode	Mode1	Test Voltage	DC 12V

Inject Line	Polarity	Angle (degree)	Test Level (kV)	Test Interval (second)	Test Result	Result
Line to Earth	±	--	0.5	60	A	Pass

Note: There is no any degradation of performance and function, and the test result criterion was A.

13.5. Test Photograph

Test Mode: Mode1

Description: Surge Test Setup



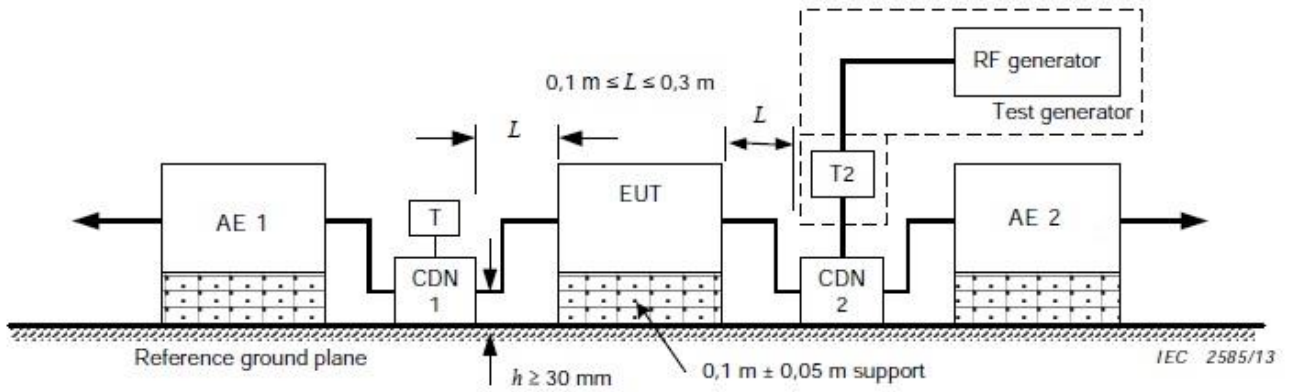
14. Radio-Frequency Continuous Conducted

14.1. Limit of Radio-Frequency Continuous Conducted

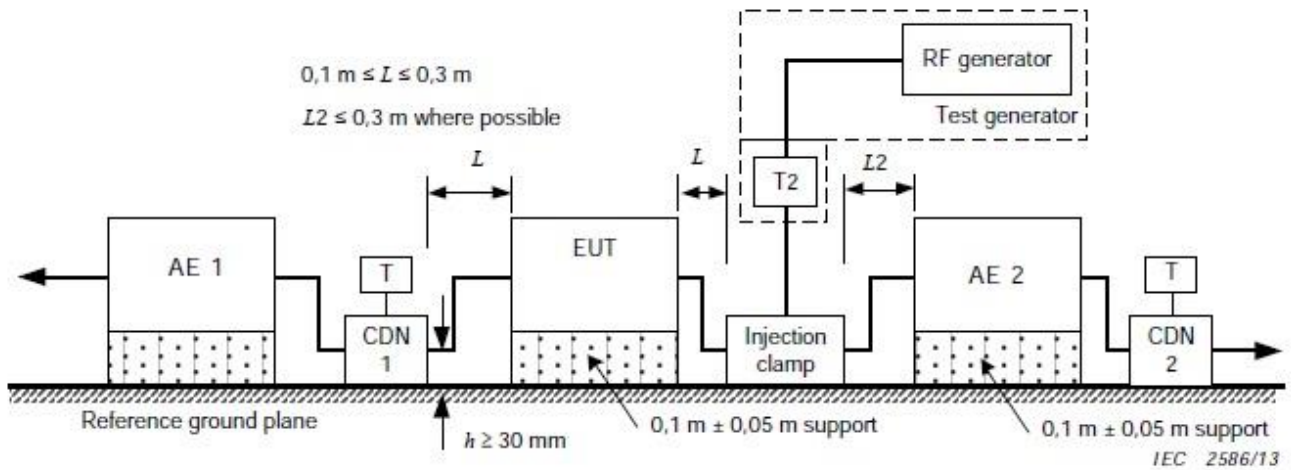
Environmental phenomenon	Test specification	Units	Performance criterion
Input AC Power Ports			
Radio-frequency continuous conducted	0.15 - 80	MHz	A
	3	V (unmodulated, r.m.s)	
	80	% AM (1kHz)	
	1	Frequency Step Size Δf %	
Input DC Power Ports			
Radio-frequency continuous conducted	0.15 - 80	MHz	A
	3	V (unmodulated, r.m.s)	
	80	% AM (1kHz)	
	1	Frequency Step Size Δf %	
Signal Ports and Telecommunication Ports			
Radio-frequency continuous conducted	0.15 - 80	MHz	A
	3	V (unmodulated, r.m.s)	
	80	% AM (1kHz)	
	1	Frequency Step Size Δf %	

14.2. Test Setup

CDN Test Setup



EM-Clamp Test Setup



14.3. Test Procedure

The EUT is placed on a table that is 0.8 meter height, and a ground reference plane on the table, EUT is placed upon table and use 0.1m insulation between the EUT and ground reference plane.

For Signal Ports and Telecommunication Ports

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

For Input DC and AC Power Ports

The EUT is connected to the power mains through a coupling and decoupling networks for power supply lines. And directly couples the disturbances signal into EUT.

Used CDN-M2 for two wires or CDN-M3 for three wires.

All the scanning conditions are as follows:

	Condition of Test	Remarks
1.	Field Strength	130dBuV(3V) Level 2
2.	Radiated Signal	AM 80% Modulated with 1kHz
3.	Scanning Frequency	0.15MHz – 80MHz
4.	Dwell Time	3 Seconds
5.	Frequency step size Δf :	1%
6.	The rate of Swept of Frequency	1.5×10^{-3} decades/s

14.4. Test Result

EUT	Stainless Steel PCH8 Series Full IP67/IP69K Panel PC	Date of Test	2021/2/2
Site	SR3	Temp.	23°C
Test Engineer	Eric	Humidity	54%
Test Mode	Mode1	Test Voltage	DC 12V

Frequency (MHz)	Inject Voltage (V)	Inject Ports	Inject Method	Test Result	Result
0.15-80	3	DC IN	CDN-M2	A	Pass

Note: There is no any degradation of performance and function, and the test result criterion was A.

14.5. Test Photograph

Test Mode: Mode1

Description: Radio-Frequency Common Mode Test Setup

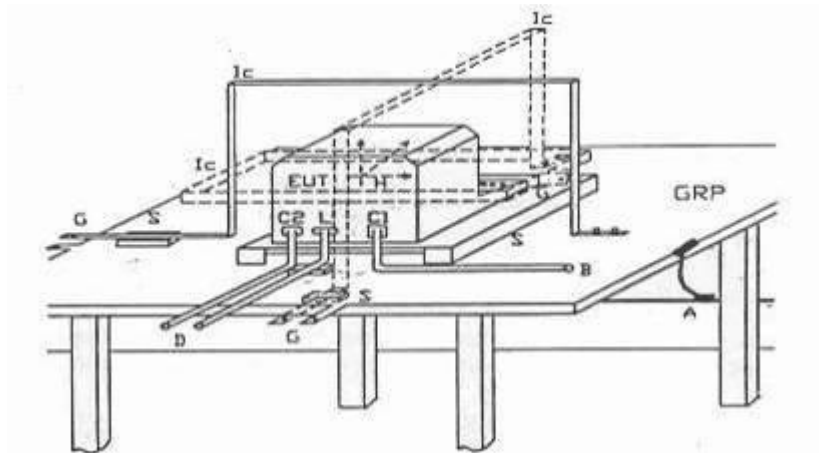


15. Power-Frequency Magnetic Field

15.1. Limit of Power-Frequency Magnetic Field

Environmental phenomenon	Test specification	Units	Performance criterion
Enclosure port			
Power-frequency magnetic field	50 or 60 1	Hz A/m	A

15.2. Test Setup



- | | |
|----------------------------------|---------------------------------------|
| GRP: Ground plane | C1: Power supply circuit |
| A: Safety earth | C2: Signal circuit |
| S: Insulating support | L: Communication line |
| EUT: Equipment under test | B: To power supply source |
| Lc: Induction coil | D: To signal source, simulator |
| E: Earth terminal | G: To the test generator |

15.3. Test Procedure

The EUT is placed on a table which is 0.8 meter above a metal ground plane measured at least 1m*1m minimum. The test magnetic field shall be placed at central of the induction coil.

The test magnetic Field shall be applied 10 minutes by the immersion method to the EUT, and the induction coil shall be rotated by 90° in order to expose the EUT to the test field with different orientation (X, Y, Z Orientations).

15.4. Test Result

EUT	Stainless Steel PCH8 Series Full IP67/IP69K Panel PC	Date of Test	2021/2/2
Site	SR3	Temp.	23°C
Test Engineer	Eric	Humidity	54%
Test Mode	Mode1	Test Voltage	DC 12V

Test Coil Position	Frequency (Hz)	Magnetic Strength (A/m)	Test Result	Result
X Axis	50 / 60	1	A	Pass
Y Axis	50 / 60	1	A	Pass
Z Axis	50 / 60	1	A	Pass

Note: There is no any degradation of performance and function, and the test result criterion was A.

15.5. Test Photograph

Test Mode: Mode1

Description: Power-Frequency Magnetic Field Test Setup

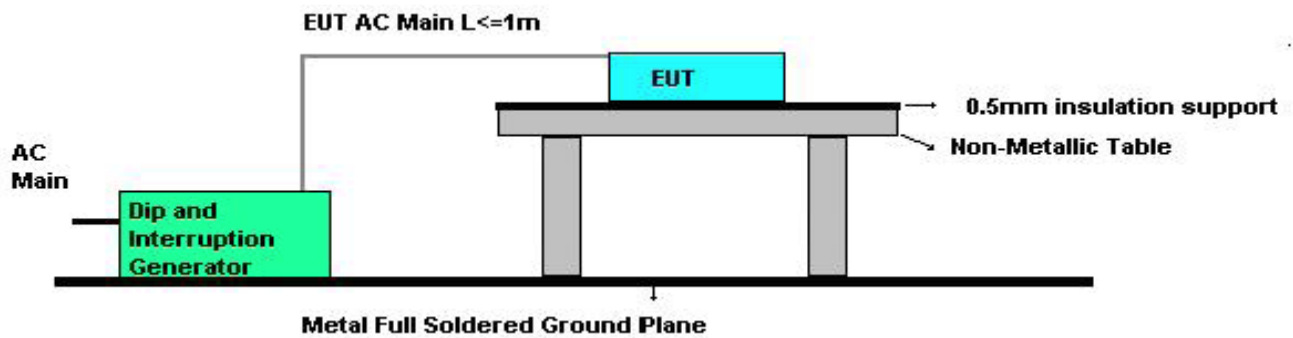


16. Voltage Dips and Interruptions

16.1. Limit of Voltage Dips and Interruptions

Environmental phenomenon	Test specification	Units	Performance criterion
Input AC power ports			
Voltage dips	70	% residual cycle	C
	25		
Voltage interruptions	0	% residual cycle	C
	250		

16.2. Test Setup



16.3. Test Procedure

The EUT is placed on a table which is 0.8 meter above a metal ground plane measured 1m*1m minimum, and 0.65mm thick minimum, and projected beyond the EUT by at least 0.1m on all sides. The power cord shall be used the shortest power cord as specified by the manufacturer.

For Voltage Dips/ Interruptions test:

The selection of test voltage is based on the rated power range. If the operation range is large than 20% of lower power range, both end of specified voltage shall be tested. Otherwise, the typical voltage specification is selected as test voltage.

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

The EUT shall be tested for 30% voltage dip of supplied voltage and duration 25 Periods, for 95% voltage dip of supplied voltage and duration 0.5 Periods with a sequence of three voltage dips with intervals of 10 seconds, and for 95% voltage interruption of supplied voltage and duration 250 Periods with a sequence of three voltage interruptions with intervals of 10 seconds. Voltage phase shifting are shall occur at 0° , 45° , 90° , 135° , 180° , 225° , 270° , 315° of the voltage.

16.4. Test Result

Note: The EUT Power Input DC 12V, so do not need to test Voltage Dips and Interruptions.

Appendix A - EUT Photograph

(1) EUT Photo



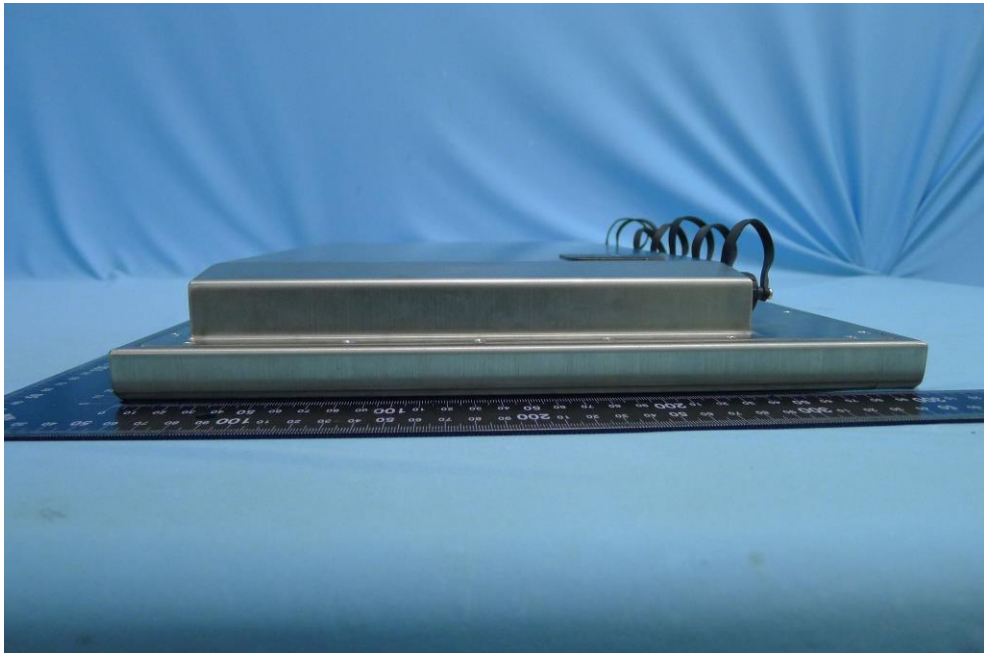
(2) EUT Photo



(3) EUT Photo



(4) EUT Photo



(5) EUT Photo



(6) EUT Photo



The End
