TEST REPORT

Report No.:	TWN2412680E
Applicant:	Mid Ocean Brands B.V.
Product:	USB HUB
Trademark:	N/A
Model No.:	MO8853
Test Standards:	EN 55032:2015+A11:2020+A1:2020 EN IEC 61000-3-2:2019 +A1:2021 EN 55035:2017+A11:2020 EN 61000-3-3:2013+A2:2021+AC:2022-01
Test Result:	The EMC testing has been performed on the submitted samples and found in compliance with council EMC Directive 2014/30/EU.

Approved By

Terry Tang

Manager

Dated: December 27, 2024

Results appearing herein relate only to the sample tested
The technical reports is issued errors and omissions exempt and is subject to withdrawal at

SHENZHEN TIMEWAY TESTING LABORATORIES

Zone C, 1st Floor, Block B, Jun Xiang Da Building, Zhongshan Park Road West, Tong Le Village, Nanshan District, Shenzhen, China
Tel (755) 83448688, Fax (755) 83442996, E-Mail:info@timeway-lab.com

Special Statement:

FCC-Registration No.: 744189

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 744189.

Industry Canada (IC) —Registration No.:5205A

The EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 5205A.

A2LA (Certification Number:5013.01)

The EMC Laboratory has been accredited by the American Association for Laboratory Accreditation (A2LA). Certification Number:5013.01

CAB identifier: CN0033

TABLE OF CONTENT

1.0 General Details

1.1 Test Lab Details

SHENZHEN TIMEWAY TESTING LABORATORIES
Zone C, 1st Floor, Block B, Jun Xiang Da Building, Zhongshan Park Road West, Tong Le Village, Nanshan District, Shenzhen, China
Tel: +86 755 83448688 Fax: +86 755 83442996

Test Location

All tests were performed at:

SHENZHEN TIMEWAY TESTING LABORATORIES
Zone C, 1st Floor, Block B, Jun Xiang Da Building, Zhongshan Park Road West, Tong Le Village, Nanshan District, Shenzhen, China
Tel: +86 755 83448688 Fax: +86 755 83442996

1.2 Applicant Details

Applicant:	Mid Ocean Brands B.V.
Address:	7/F., Kings Tower, 111 King Lam Street, Cheung Sha Wan, Kowloon, Hong Kong
Manufacturer:	Mid Ocean Brands B.V.
Address:	7/F., Kings Tower, 111 King Lam Street, Cheung Sha Wan, Kowloon, Hong Kong

1.3 Description of EUT

Product:	USB HUB
Trademark:	N/A
Model Number:	MO8853
Adding Trademark:	N/A
Adding Model Number:	N/A
Rating:	Input: DC5V

1.4 Submitted Sample(s)

1 Sample

1.5 Test Duration

Date of Receipt of Application: December 23, 2024
Date of Test: December 23, 2024 ~ December 27, 2024

1.6 Additional information of EUT

	Submitted	Not Available
User Manual	☒	☐
Part List	☐	☐
Circuit Diagram	☒	☐
Printed circuit board	☒	☐
[PCB] Layout		
Block Diagram	☐	☐

1.7 Test Engineer

The sample(s) tested by _____

Print Name: Leo Lau/ Engineer

This test report is not valid without personnel's signatures of SHENZHEN TIMEWAY TESTING LABORATORIES.

2.0 List of Measurement Equipment

2.1 Conducted Emission Test

Name	Model No.	Serial No.	Manufacturer	Calibration Date	Calibration Cycle
EMI Test Receiver	ESCS 30	834115/006	RS	2024.07.12	1Year
LISN	NNB42	00012	SCHAFFNER	2024.07.12	1Year

2.2 Radiated Disturbance Test

Name	Model No	Serial No.	Manufacturer	Calibration Date	Calibration Cycle
EMI Test Receiver	ESPI 3	100379	RS	2024.07.12	1Year
Spectrum Analyzer	E4407B	MY50441392	HP/Agilent	2024.07.12	1Year
Amplifier	BBV9743	#218	HP/Agilent	2024.07.12	1Year
Bilog Antenna	VULB9163	9163/340	Schwarebeck	2022.07.18	3Year
Horn Antenna	BBHA 9120D	9120D-631	RS	2022.07.18	3Year
Amplifier	8449B	3008A00160	HP/Agilent	2024.07.12	1Year

2.3 Harmonic & Flicker Test

Name	Model No.	Serial No.	Manufacturer	Calibration Date	Calibration Cycle
Harmonics Flicker Test System	PACS-1	72305	CI	2024.07.12	1Year
5K VA AC Power Source	5001iX	56060	CI	2024.07.12	N/A

2.4 ESD Test

Name	Model No.	Serial No.	Manufacturer	Calibration Date	Calibration Cycle
ESD Simulator	ESS-2002	ESS06Y6394	NoiseKen	2024.07.12	1Year

2.5 RF field Strength Susceptibility

Name	Model No.	Serial No.	Manufacturer	Calibration Date	Calibration Cycle
Signal Generator	SMT03	100059	RS	2024.07.12	1Year
Power Meter	NRVS	---	RS	2024.07.12	1Year
Voltage Probe	URV5-Z2	100012	RS	2024.07.12	1Year

Voltage Probe	URV5-Z2	100013	RS	2024.07.12	1Year
Power Amplifier	150W1000	300999	AR	2024.07.12	1Year
Power Amplifier	25S1G4AM1	305993	AR	2024.07.12	1Year
Field Probe	CBL6111C	2576	Holaday	2024.07.12	1Year
Bilog Antenna	MCDC	---	Chase	2024.07.12	1Year

2.6 Electrical Fast Transient/Burst (EFT/B) Immunity test

Name	Model No.	Serial No.	Manufacturer	Calibration Date	Calibration Cycle
EFT Generator	UCS 500 M4	0304-42	EM TEST	2024.07.12	1Year
Power Source	MV2616	0104-14	EM TEST	2024.07.12	1Year

2.7 Surge Test

Name	Model No.	Serial No.	Manufacturer	Calibration Date	Calibration Cycle
Ultra Compact Simulator	UCS 500 M4	0304-42	EM TEST	2024.07.12	1Year
Power Source	MV2616	0104-14	EM TEST	2024.07.12	1Year

2.8 Conducted Immunity Test

Name	Model No.	Serial No.	Manufacturer	Calibration Date	Calibration Cycle
Continuous Wave Simulator	CWS 500C	0407-05	EM TEST	2024.07.12	1 Year

2.9 Power-frequency Magnetic Field

Name	Model No.	Serial No.	Manufacturer	Calibration Date	Calibration Cycle
Continuous Wave Simulator	UCS 500 M4	0304-42	EM TEST	2024.07.12	1 Year
Power Source Network	MV 2616	0104-14	EM TEST	2024.07.12	1 Year
Current Transformer	MC2630	--	EM TEST	2024.07.12	1 Year
Magnetic Coil	MS100	0304-42	EM TEST	2024.07.12	1 Year

2.10 Voltage Dips/Interruption Immunity Test

Name	Model No.	Serial No.	Manufacturer	Calibration Date	Calibration Cycle
Ultra Compact Simulator	UCS 500 M4	0304-42	EM TEST	2024.07.12	1Year
Power Source	MV2616	0104-14	EM TEST	2024.07.12	1Year

3.0 Technical Details

3.1 Investigations Requested

Perform Electromagnetic Interference [EMI] & Electromagnetic Susceptibility [EMS] tests for CE Marking

3.2 Test Standards

Test Standards		
EN 55032:2015+A11:2020+A1:2020	Electromagnetic compatibility of multimedia equipment - Emission Requirements	
EN IEC 61000-3-2:2019+ A1:2021	Electromagnetic compatibility(EMC)- Part 3-2:Limits-Limits for harmonic current emissions(equipment input current ≤16A per phase)	
EN 61000-3-3:2013 +A2:2021+AC:2022-01	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 ≤ 16A per phase and not subject to conditional connection	
EN 55035:2017+A11:2020	Electromagnetic compatibility of multimedia equipment - Immunity requirements	
	EN 61000-4-2:2009	Electrostatic discharge
	EN IEC 61000-4-3:2020	RF electromagnetic field disturbances
	EN 61000-4-4:2012	Electrical Fast transients
	EN 61000-4-5:2014	Surge
	EN 61000-4-6:2014	Conducted susceptibility
	EN 61000-4-8:2010	Power-frequency Magnetic Field
	EN IEC 61000-4-11: 2020	Dips/Voltage Interruption Variation

3.3 Performance Criteria

Criterion	Description
A	No change in operational mode or degradation of performance outside of specification and no change in stored parameters.
B	Degradation of performance allowed during the test the EUT returning to intended operation after the test.
C	Loss of function allowed during the test, provided that function is self recoverable or can be recovered by operation of controls.

3.4 Test standards and Results Summary Tables

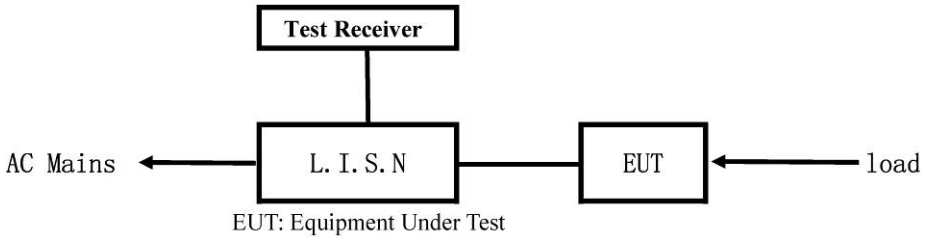
Test Condition	Test Requirement	Test Method	Test Result
EMISSION Results Summary			
Conducted Emission on AC Mains, 150kHz to 30MHz	EN 55032:2015 +A11:2020+A1:2020	EN 55032:2015 +A11:2020+A1:2020	Pass
Conducted Emission on at telecommunication ports, 150kHz to 30MHz	EN 55032:2015 +A11:2020+A1:2020	EN 55032:2015 +A11:2020+A1:2020	N/A
Radiated Emissions, 30MHz to 6GHz	EN 55032:2015 +A11:2020+A1:2020	EN 55032:2015 +A11:2020+A1:2020	Pass
Harmonic Emissions on AC supply	EN IEC 61000-3-2:2019 +A1:2021	EN IEC 61000-3-2:2019 +A1:2021	N/A
Voltage fluctuations on AC supply	EN 61000-3-3:2013 +A2:2021+AC:2022-01	EN 61000-3-3:2013 +A2:2021+AC:2022-01	N/A
IMMUNITY Results Summary			
Electrostatic Discharge	EN 55035:2017+A11:2020	EN 61000-4-2: 2009	Pass
Continuous RF electromagnetic field disturbances	EN 55035:2017+A11:2020	EN IEC 61000-4-3:2020	Pass
Continuous induced RF disturbances	EN 55035:2017+A11:2020	EN 61000-4-6:2014	Pass
Power frequency magnetic field	EN 55035:2017+A11:2020	EN 61000-4-8: 2010	N/A
Electrical fast transients/burst (EFT/B)	EN 55035:2017+A11:2020	EN 61000-4-4: 2012	Pass
Surges	EN 55035:2017+A11:2020	EN 61000-4-5: 2014	Pass
Voltage dips and interruptions	EN 55035:2017+A11:2020	EN IEC 61000-4-11: 2020	Pass
Broadband impulsive conducted disturbances	EN 55035:2017+A11:2020	EN 61000-4-6:2014	N/A

Note: N/A-Not applicable

4.0 Electromagnetic Interference Test results

4.1 Power line Conducted Emission Test

4.1.1 Schematics of the test

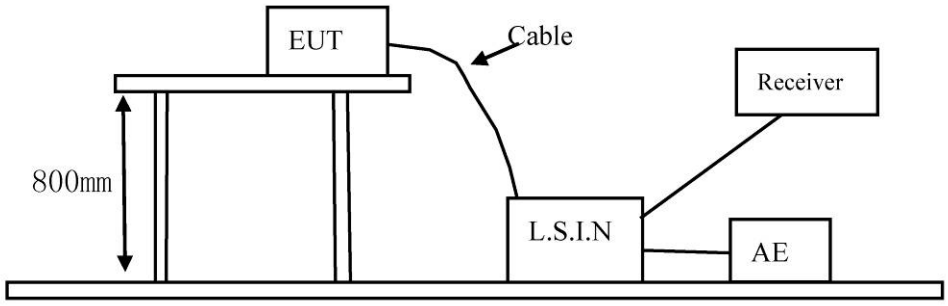


EUT: Equipment Under Test

4.1.2 Test Method:

The test was performed in accordance with EN 55032:2015+A11:2020+A1:2020

Block diagram of Test setup



4.1.3 Power line conducted Emission Limit

Frequency(MHz)	Limits dB(μ V)			
	Class A Equipment		Class B Equipment	
	Quasi-peak Level	Average Level	Quasi-peak Level	Average Level
0.15 ～ 0.50	79.0	66.0	66.0～56.0*	56.0～46.0*
0.50 ～ 5.00	73.0	60.0	56.0	46.0
5.00 ～ 30.00	73.0	60.0	60.0	50.0

Notes: 1. *decreasing linearly with logarithm of frequency.

2. The lower limit shall apply at the transition frequencies

4.1.4 Test Results

Limits for Conducted Emission test, please refer to limit line (Quasi-peak) and Average in the following diagram labelled as (QP)&AV

Remark: Calculated measurement uncertainty=3.6dB

A: Disturbance Voltage Limits at mains on Live terminals (150kHz to 30MHz)

EUT Operating Environment

Temperature: 25℃ Humidity: 65%RH Atmospheric Pressure: 101 kPa

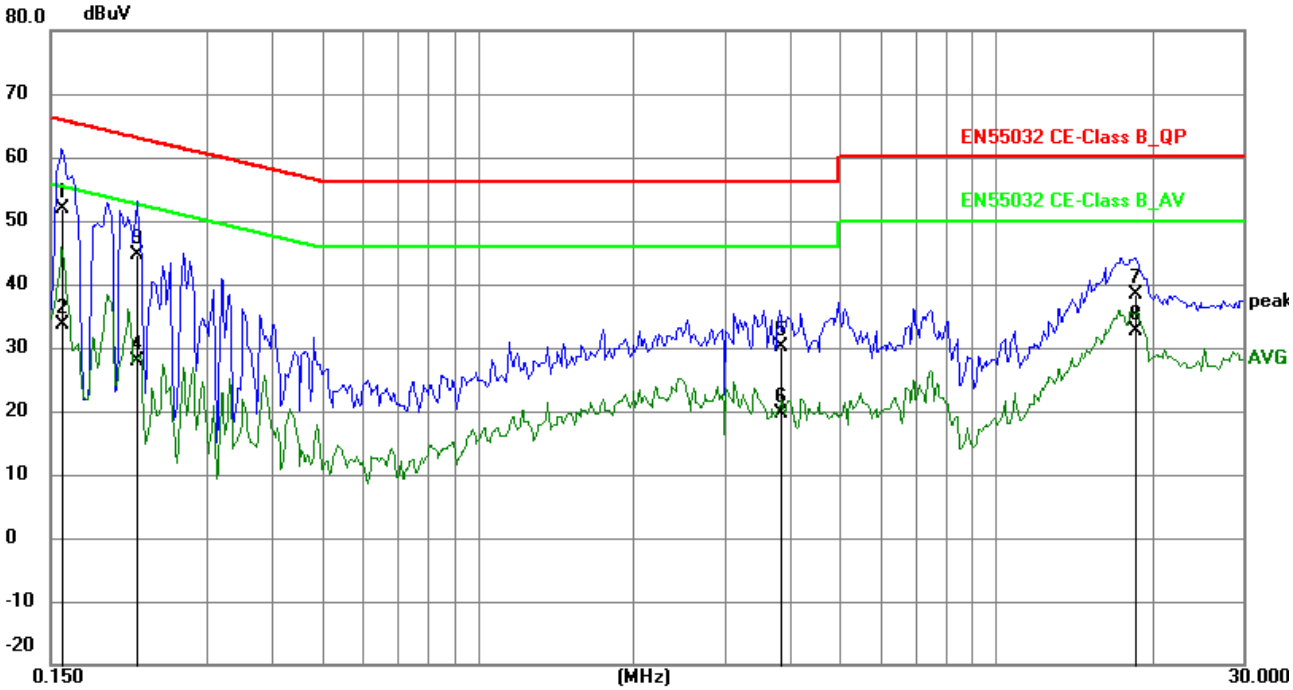
EUT set Condition: Data Transmission with PC (Max Load)

Power: AC230V/50Hz

Equipment Level: Class B

Results: Pass

Please refer to following diagram for individual



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1578	41.49	10.34	51.83	65.58	-13.75	QP	P
2	0.1578	23.26	10.34	33.60	55.58	-21.98	AVG	P
3	0.2202	34.19	10.33	44.52	62.81	-18.29	QP	P
4	0.2202	17.64	10.33	27.97	52.81	-24.84	AVG	P
5	3.8229	18.14	11.97	30.11	56.00	-25.89	QP	P
6	3.8229	7.54	11.97	19.51	46.00	-26.49	AVG	P
7	18.5961	22.43	16.07	38.50	60.00	-21.50	QP	P
8	18.5961	16.52	16.07	32.59	50.00	-17.41	AVG	P

B: Disturbance Voltage Limits at mains on Neutral terminals (150kHz to 30MHz)

EUT Operating Environment

Temperature: 25℃ Humidity: 65%RH Atmospheric Pressure: 101 kPa

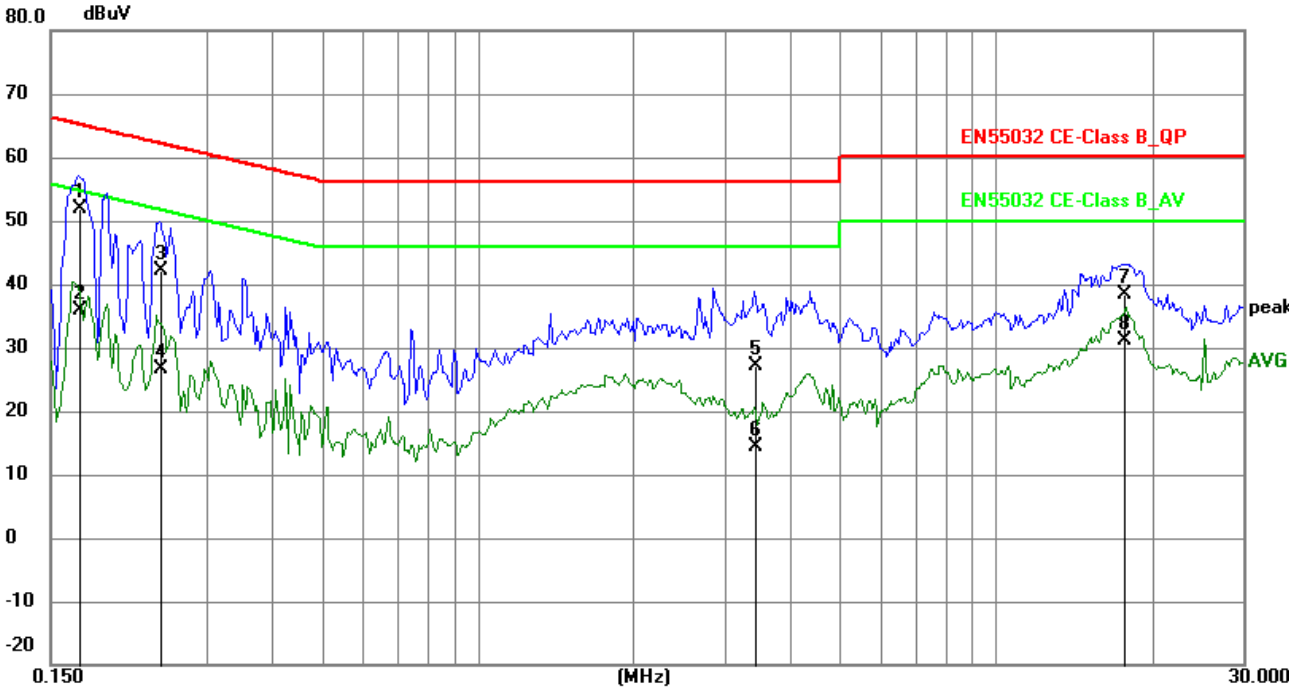
EUT set Condition: Data Transmission with PC (Max Load)

Power: AC230V/50Hz

Equipment Level: Class B

Results: Pass

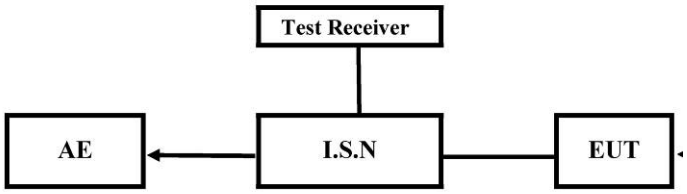
Please refer to following diagram for individual



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1695	41.64	10.33	51.97	64.98	-13.01	QP	P
2	0.1695	25.65	10.33	35.98	54.98	-19.00	AVG	P
3	0.2436	31.79	10.33	42.12	61.97	-19.85	QP	P
4	0.2436	16.24	10.33	26.57	51.97	-25.40	AVG	P
5	3.4212	15.40	11.82	27.22	56.00	-28.78	QP	P
6	3.4212	2.46	11.82	14.28	46.00	-31.72	AVG	P
7	17.5704	22.48	15.80	38.28	60.00	-21.72	QP	P
8	17.5704	15.39	15.80	31.19	50.00	-18.81	AVG	P

4.2 Telecommunication ports Conducted Emission Test

4.2.1 Schematics of the test

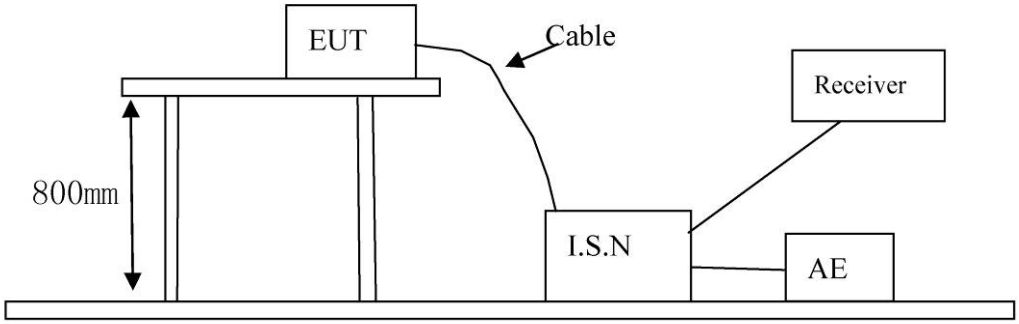


EUT: Equipment Under Test

4.2.2 Test Method:

The test was performed in accordance with EN 55032:2015+A11:2020+A1:2020

Block diagram of Test setup



4.2.3 Telecommunication ports conducted Emission Limit

Frequency (MHz)	Class A Limits				Class B Limits			
	Quasi-peak Level		Average Level		Quasi-peak Level		Average Level	
	Voltage dB(uV)	Current dB(uA)	Voltage dB(uV)	Current dB(uA)	Voltage dB(uV)	Current dB(uA)	Voltage dB(uV)	Current dB(uA)
0.15 ~ 0.50	97 to 87	53 to 43	87 to 74	40 to 30	84 to 74	40 to 30	74 to 64	30 to 20
0.50 ~ 30.00	87	43	74	30	74	30	64	20

Notes: 1.*decreasing linearly with logarithm of frequency.
2.The tighter limit shall apply at the transition frequencies

4.2.4 Test Results: N/A

Limits for Conducted Emission test, please refer to limit line (Quasi-peak) and Average in the following diagram labelled as (QP)&AV

Remark:

Calculated measurement uncertainty=1.9dB

A: Conducted Emission on Telecommunication port (150kHz to 30MHz)

EUT Operating Environment

Temperature: 25℃ Humidity: 75 %RH Atmospheric Pressure: 101 kPa

EUT set Condition: Normal operation mode

Equipment Level: Class B

Results: N/A

Please refer to following diagram for individual

Frequency (MHz)	Port	Reading(dBμV)		Limit(dBμV)	
		Quasi-peak	Average	Quasi-peak	Average

B: Conducted Emission on Telecommunication port (150kHz to 30MHz)

EUT Operating Environment

Temperature: 25℃ Humidity: 75 %RH Atmospheric Pressure: 101 kPa

EUT set Condition: Normal operation mode

Equipment Level: Class B

Results: N/A

Please refer to following diagram for individual

Frequency (MHz)	Port	Reading(dBμA)		Limit(dBμA)	
		Quasi-peak	Average	Quasi-peak	Average

Note: This test item is not applicable because there is no telecommunication port

4.3 Radiated Disturbance Test

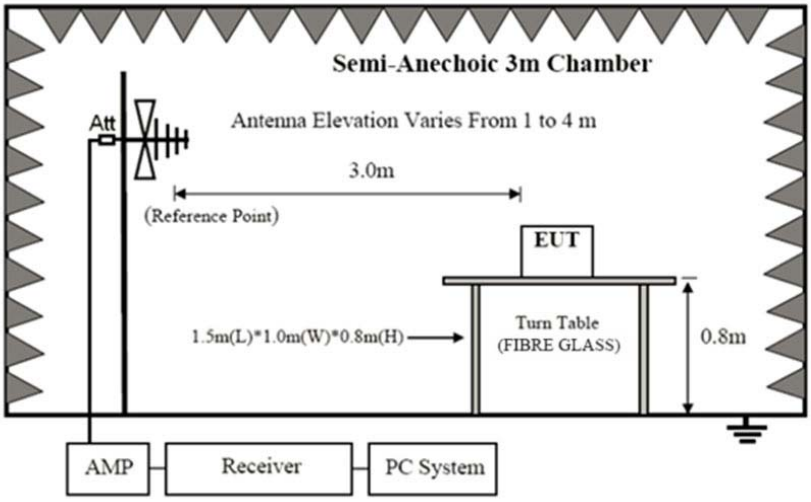
4.3.1 Schematics of the test

EUT: Equipment Under Test

4.3.2 Test Method:

The test was performed in accordance with EN 55032:2015+A11:2020+A1:2020

Block diagram of Test setup



4.3.3 Radiated Disturbance Test Limit

Frequency Range (MHz)	Quasi-Peak limits (dB μ V/m)	
	Class A Limits	Class B Limits
30-230	50.00	40.00
230-1000	57.00	47.00
1000-3000	56(AV)/76(PK)	50(AV)/70(PK)
3000-6000	60(AV)/80(PK)	54(AV)/74(PK)

Note: The lower limit shall apply at the transition frequencies

4.3.4 Test result

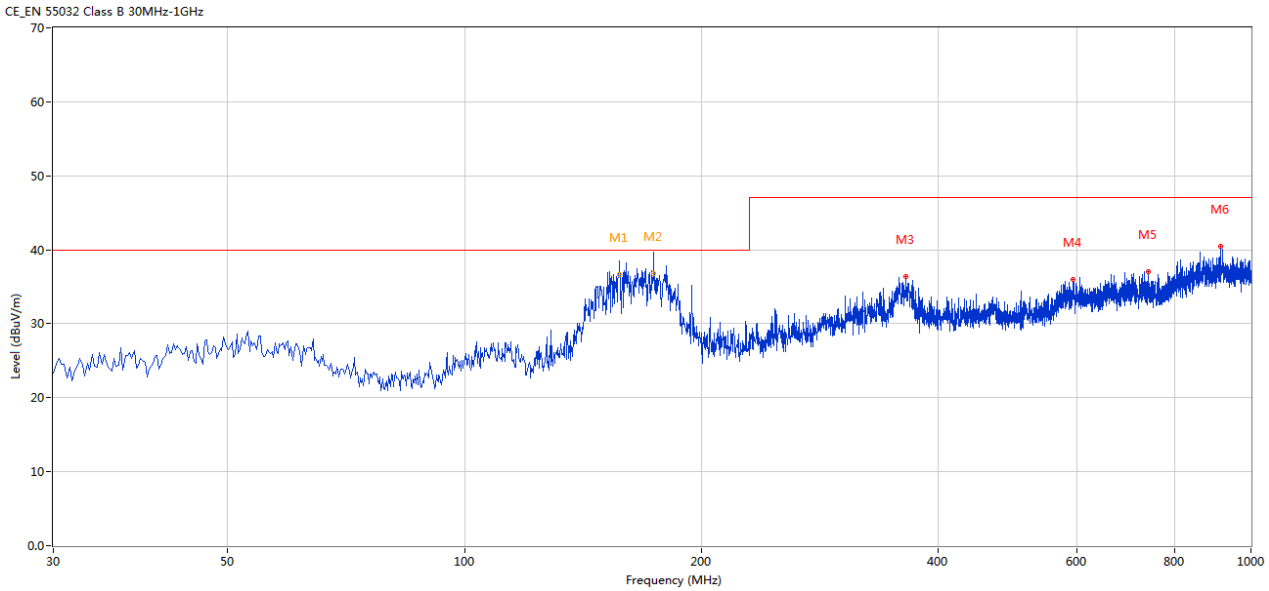
Limits for Radiated Disturbance test, please refer to limit line (Quasi-peak) in the following diagram labelled as (QP)

Remark:

Calculated measurement uncertainty=4.7dB

A: Radiated Disturbance (30MHz----1000MHz)

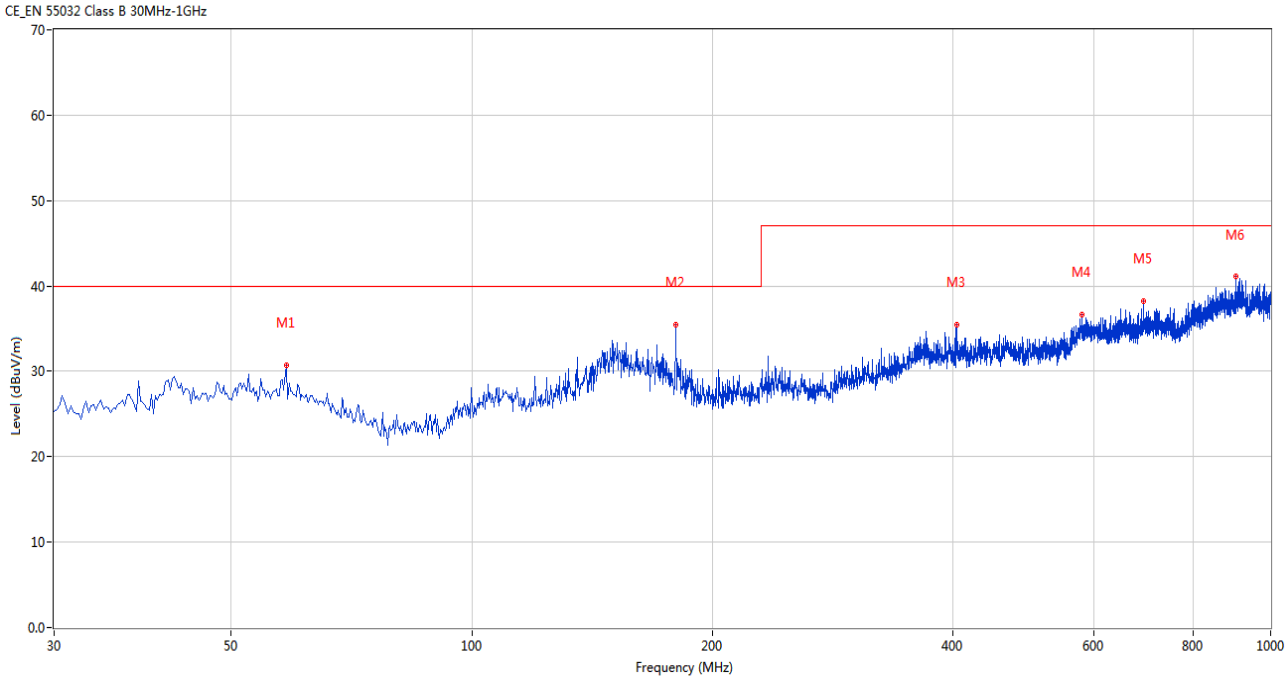
Project Number:	CASE3	Test Time:	2024-12-24_16.29.56
EUT Name:	USB HUB	Test Engineer:	BETTY
Manufacturer:	Mid Ocean Brands B.V.	Test Standard:	EN 55032
Model:	MO8853	Work Addition:	Data Transmission with PC (Max Load)
Temp.(℃):	25	Load:	
Hum.:	65%	Test Voltage:	230V/50Hz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1*	157.523	36.61	-9.63	40.0	3.39	QP	1.00	100	Horizontal	Pass
2*	174.009	36.72	-8.50	40.0	3.28	QP	11.00	100	Horizontal	Pass
3	364.324	36.33	-1.82	47.0	10.67	Peak	1.00	100	Horizontal	Pass
4	594.399	36.02	1.53	47.0	10.98	Peak	1.00	100	Horizontal	Pass
5	740.347	37.10	2.57	47.0	9.90	Peak	46.00	100	Horizontal	Pass
6	913.934	40.48	5.35	47.0	6.52	Peak	26.00	100	Horizontal	Pass

B: Radiated Disturbance (30MHz----1000MHz)

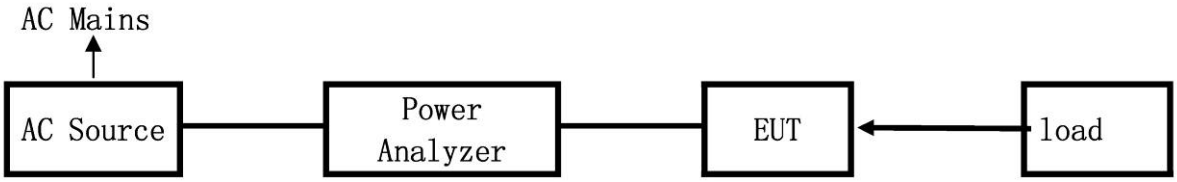
Project Number:	CASE3	Test Time:	2024-12-24_16.27.57
EUT Name:	USB HUB	Test Engineer:	BETTY
Manufacturer:	Mid Ocean Brands B.V.	Test Standard:	EN 55032
Model:	MO8853	Work Addition:	Data Transmission with PC (Max Load)
Temp.(℃):	25	Load:	
H m.:	65%	Test Voltage:	230V/50Hz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	58.608	30.70	-5.11	40.0	9.30	Peak	321.00	100	Vertical	Pass
2	180.070	35.45	-8.06	40.0	4.55	Peak	308.00	100	Vertical	Pass
3	405.296	35.44	-1.51	47.0	11.56	Peak	340.00	100	Vertical	Pass
4	580.580	36.61	1.65	47.0	10.39	Peak	276.00	100	Vertical	Pass
5	693.072	38.20	2.13	47.0	8.80	Peak	82.00	100	Vertical	Pass
6	904.479	41.07	4.91	47.0	5.93	Peak	180.00	100	Vertical	Pass

4.4 Harmonic Current Emission Test

4.4.1 Schematic of the test

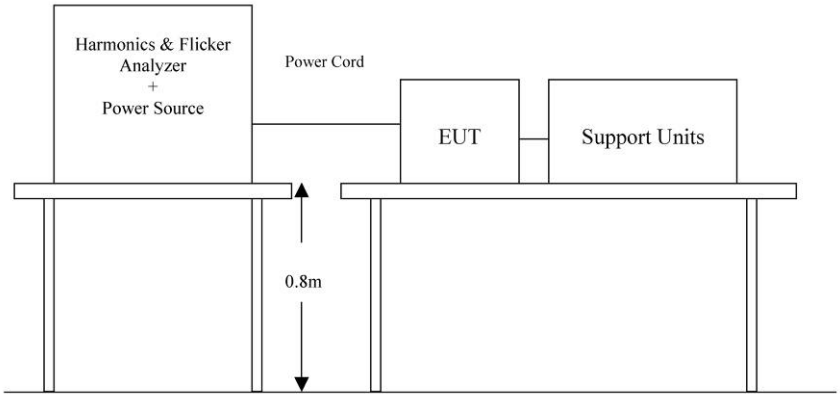


EUT: Equipment Under Test

4.4.2 Test Method:

The test was performed in accordance with EN IEC 61000-3-2:2019 +A1:2021

Block diagram of Test setup



4.4.3 Limits of Harmonic Current Emission For Class A

Harmonic order n	Maximum permissible harmonic current A
Odd harmonics	
3	2,30
5	1,14
7	0,77
9	0,40
11	0,33
13	0,21
$15 \leq n \leq 39$	$0,15 \frac{15}{n}$
Even harmonics	
2	1,08
4	0,43
6	0,30
$8 \leq n \leq 40$	$0,23 \frac{8}{n}$

4.4.4 Test Results

Please refer to the following pages

Harmonic Current Emission Test

EUT Operating Environment

Temperature: 25℃ Humidity: 53%RH Atmospheric Pressure: 101 kPa

EUT set Condition:

Results: N/A

N/A ---the input power less than 75W.

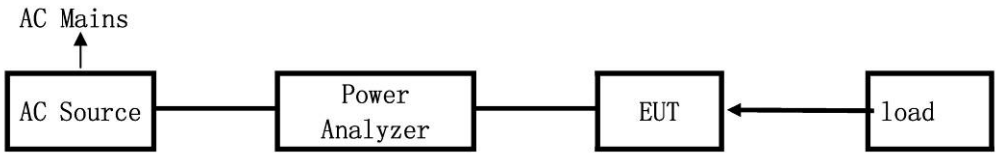
Please refer to following diagram for individual

Harmonic results as a% of the limits

No	(Test result/Limit) %	No	(Test result/Limit) %	No	(Test result/Limit) %	No	(Test result/Limit) %
1		11		21		31	
2		12		22		32	
3		13		23		33	
4		14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

4.5 Voltage Fluctuations &Flicker Test

4.5.1 Schematic of the test

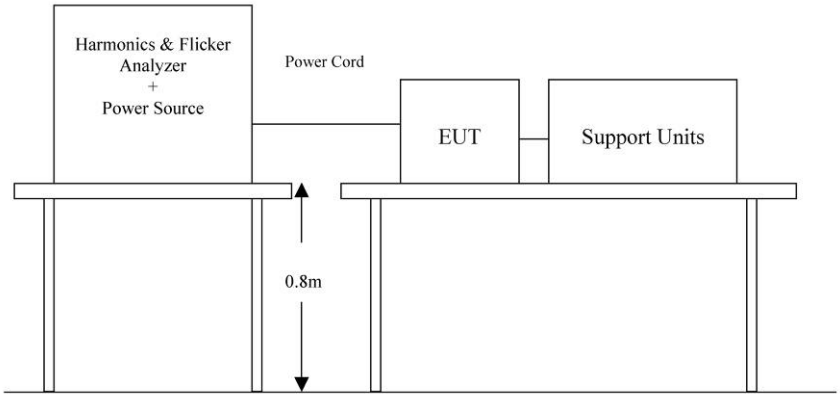


EUT: Equipment Under Test

4.5.2 Test Method:

The test was performed in accordance with EN 61000-3-3:2013+A2:2021+AC:2022-01

Block diagram of Test setup



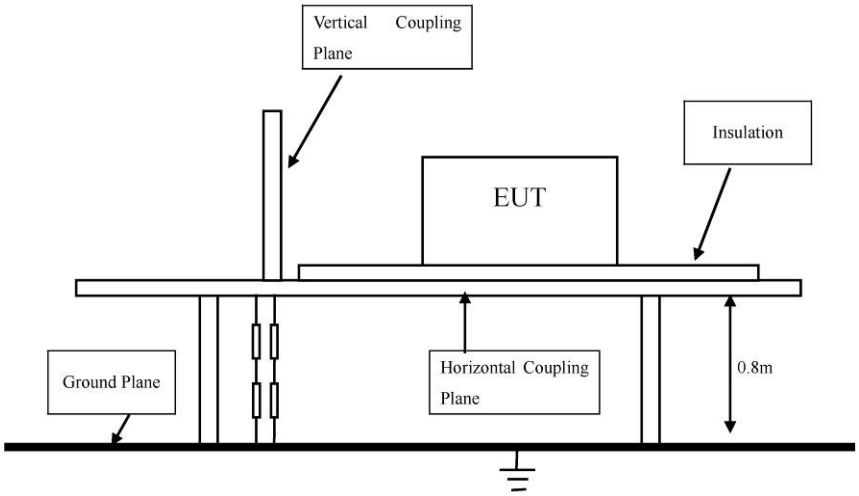
4.5.3 Test Results

Result: **N/A**

5.0 Immunity Test

5.1 Electrostatic Discharge

5.1.1 Schematic of the test



5.1.2 Test method

The test was performed in accordance with EN 61000-4-2: 2009

5.1.3 Test severity

±4kV for direct & in-direct Contact Discharge

±8kV for air Discharge

Performance Criterion Require: **B** (Please see following table)

5.1.4 Susceptibility performance Criteria and Severity level

Criterion	Description
A	No change in operational mode or degradation of performance outside of specification and no change in stored parameters.
B	Degradation of performance allowed during the test the EUT returning to intended operation after the test.
C	Loss of function allowed during the test, provided that function is self recoverable or can be recovered by operation of controls.

Severity Level

Level	Test Voltage Direct & in-direct contact Discharge (kV)	Test Voltage Air discharge(kV)
1	±2kV	±2kV
2	±4kV	±4kV
3	±6kV	±8kV
4	±8kV	±15kV

5.1.5 Test Result

EUT Operating Environment

Temperature: 25℃ Humidity: 53%RH Atmospheric Pressure: 101 kPa

Please refer to the following table for individual results.

Location	Discharge Method	Test Voltage	Results
HCP (Horizontal coupling plane)	In-Direct	±2kV,±4kV	Pass
VCP (Vertical Coupling Plane)	In-Direct	±2kV,±4kV	Pass
Type-C Port	Contact Discharge	±2kV,±4kV	Pass
Enclosure	Air Discharge	±2kV,±4kV,±8kV	Pass
Gaps	Air Discharge	±2kV,±4kV,±8kV	Pass

Remark: Calculated measurement uncertainty= 0.2kV

5.2 RF field strength susceptibility (80MHz-1000MHz, 1800MHz, 2600MHz, 3500MHz, 5000MHz)

5.2.1 Schematics of the test

EUT: Equipment Under Test

5.2.2 Test Method:

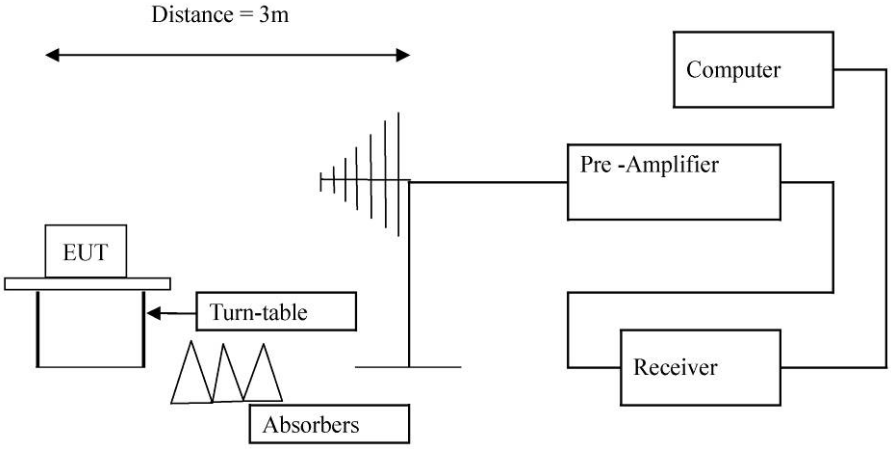
The test was performed in accordance with EN IEC 61000-4-3:2020

Severity: Level 2 (3V/m)

Modulation: 80% AM

Performance Criterion Require: A (Please see following table)

Block diagram of Test setup



5.2.3 Susceptibility performance Criteria and severity Level

Susceptibility performance Criteria

Criterion	Description
A	No change in operational mode or degradation of performance outside of specification and no change in stored parameters.
B	Degradation of performance allowed during the test the EUT returning to intended operation after the test.
C	Loss of function allowed during the test, provided that function is self recoverable or can be recovered by operation of controls.

Severity Level

Level	Field Strength (V/m)
1	1
2	3
3	10

5.2.4 Test Result:

EUT Operating Environment

Temperature: 25℃ Humidity: 75%RH Atmospheric Pressure: 101 kPa

Please refer to the following table for individual results.

Frequency (MHz)	Face	Polarity	Level (V/m)	Dwell Time(s)	Sweep Rate (%)	Results
80-1000	0°	Horizontal	3	1	1	Pas
80-1000	90°	Horizontal	3	1	1	Pass
80-1000	180°	Horizontal	3	1	1	Pass
80-1000	270°	Horizontal	3	1	1	Pass
80-1000	0°	Vertical	3	1	1	Pass
80-1000	90°	Vertical	3	1	1	Pass
80-1000	180°	Vertical	3	1	1	Pass
80-1000	270°	Vertical	3	1	1	Pass
1800, 2600, 3500, 5000	0°	Horizontal	3	1	1	Pass
	90°	Horizontal	3	1	1	Pass
	180°	Horizontal	3	1	1	Pass
	270°	Horizontal	3	1	1	Pass
1800, 2600, 3500, 5000	0°	Vertical	3	1	1	Pass
	90°	Vertical	3	1	1	Pass
	180°	Vertical	3	1	1	Pass
	270°	Vertical	3	1	1	Pass

5.3 Electrical Fast Transient/Burst (EFT/B) immunity test

5.3.1 Schematics of the test

EUT: Equipment Under Test

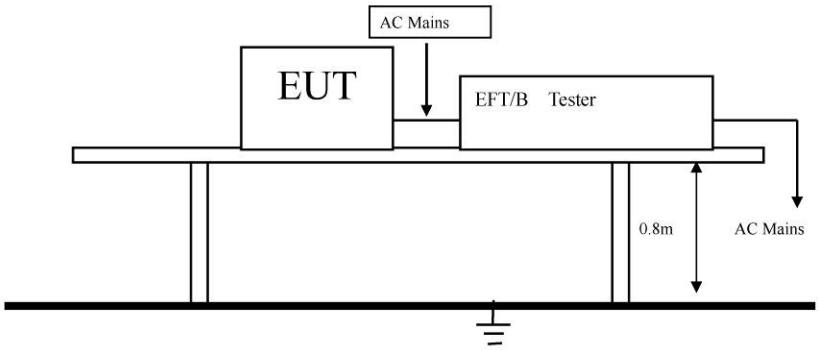
5.3.2 Test Method

The test was performed in accordance with EN 61000-4-4:2012

Severity: Level 2 (1kV)

Performance Criterion Require: **B** (Please see following table)

Block diagram of Test setup



5.3.3 Susceptibility performance Criteria and Severity Level

Criterion	Description
A	No change in operational mode or degradation of performance outside of specification and no change in stored parameters.
B	Degradation of performance allowed during the test the EUT returning to intended operation after the test.
C	Loss of function allowed during the test, provided that function is self recoverable or can be recovered by operation of controls.

Severity Level

Open Circuit output Test Voltage ±10%		
Level	On power Supply Lines	On I/O (Input/output) Signal data and control lines
1	0.5kV	0.5kV
2	1kV	1kV
3	2kV	2kV
4	4kV	4kV
X	Special	Special

5.3.4 Test Results

EUT Operating Environment

Temperature: 25℃ Humidity: 75%RH Atmospheric Pressure: 101 kPa

Please refer to the following table for individual results.

Inject location: AC mains

Inject Line	Voltage kV	Inject Times (s)	Method	Results
L	±1	120	Direct	Pass
N	±1	120	Direct	Pass
L-N	±1	120	Direct	Pass

5.4 Surge test

5.4.1 Schematics of the test

EUT: Equipment Under Test

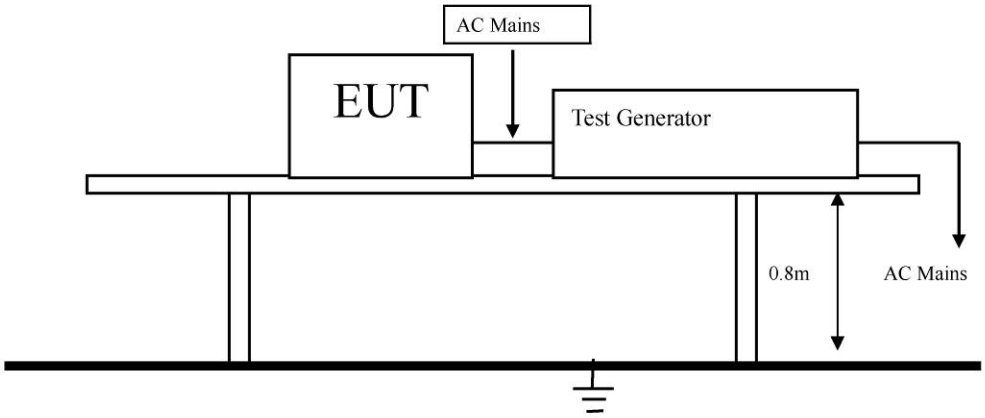
5.4.2 Test Method:

The test was performed in accordance with EN 61000-4-5:2014

Severity: Level 2 (Line to Neutral at 1kV)

Performance Criterion Require: B (Please see following table)

Block diagram of Test setup



5.4.3 Susceptibility performance Criteria and Severity Level

Susceptibility performance Criteria

Criterion	Description
A	No change in operational mode or degradation of performance outside of specification and no change in stored parameters.
B	Degradation of performance allowed during the test the EUT returning to intended operation after the test.
C	Loss of function allowed during the test, provided that function is self recoverable or can be recovered by operation of controls.

Severity Level

Severity Level	Open-Circuit Test Voltage kV
1	0.5
2	1.0
3	2.0
4	4.0
*	Special

5.4.4 Test Results

EUT Operating Environment

Temperature: 25℃ Humidity: 75%RH Atmospheric Pressure: 101 kPa

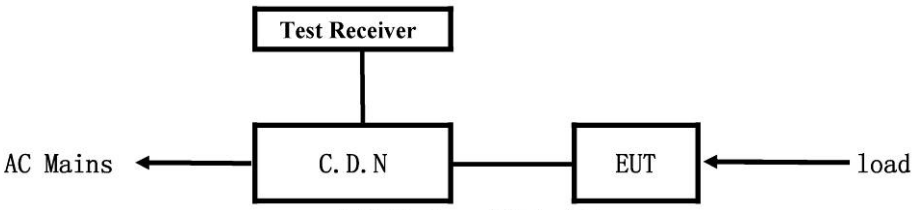
Please refer to the following table for individual results.

Test location:

Location	Polarity	Phase Angle	No of Pulse	Pulse Voltage(kV)	Results
L-N	+	90	5	1.0	Pass
	-	270	5	1.0	Pass

5.5 Conducted Immunity test

5.5.1 Schematics of the test



EUT: Equipment Under Test

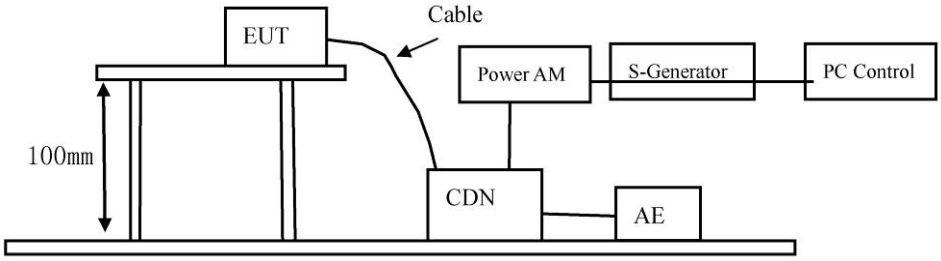
5.5.2 Test Method

The test was performed in accordance with EN 61000-4-6:2014

Severity: Level 2 (3 V rms),0.15MHz—80MHz

Performance Criterion Require: A (Please see following table)

Block diagram of Test setup



5.5.3 Susceptibility performance Criteria and Severity Level

Susceptibility performance Criteria

Criterion	Description
A	No change in operational mode or degradation of performance outside of specification and no change in stored parameters.
B	Degradation of performance allowed during the test the EUT returning to intended operation after the test.
C	Loss of function allowed during the test, provided that function is self recoverable or can be recovered by operation of controls.

Severity Level

Severity Level	Voltage Level (e.m.f) V
1	1
2	3
3	10
*	Special

5.5.4 Test Results:

EUT Operating Environment

Temperature: 25℃ Humidity: 75%RH Atmospheric Pressure: 101 KPa

Please refer to the following table for individual results.

Frequency Range (MHz)	Injected Position	Strength	Criterion	Result
0.15 - 10	AC Line	3V (rms)	A	Pass
10 - 30	AC Line	3 to 1V (rms)	A	Pass
30 - 80	AC Line	1V (rms)	A	Pass

Note: the amplitude of a test level varies over a given frequency range, it changes linearly with respect to the logarithm of the frequency

5.6 Power-Frequency magnetic field test

5.6.1 Schematics of the test

EUT: Equipment Under Test

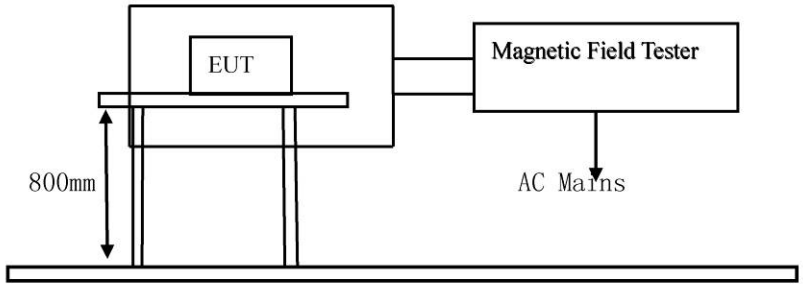
5.6.2 Test Method

The test was performed in accordance with EN 61000-4-8:2010

Severity: Level 1 (1A/m),

Performance Criterion Require: A (Please see following table)

Block diagram of Test setup



5.6.3 Susceptibility performance Criteria and Severity Level

Susceptibility performance Criteria

Criterion	Description
A	No change in operational mode or degradation of performance outside of specification and no change in stored parameters.
B	Degradation of performance allowed during the test the EUT returning to intended operation after the test.
C	Loss of function allowed during the test, provided that function is self recoverable or can be recovered by operation of controls.

Severity Level

Severity Level	Magnetic Field Strength A/m
1	1
2	3
3	10
4	30
5	100
*	Special

5.6.4 Test Results:

EUT Operating Environment

Temperature: 25℃ Humidity: 75%RH Atmospheric Pressure: 101 kPa

Please refer to the following table for individual results.

Test Level	Testing Duration	Coil Orientation	Criterion	Result
1A/m	5 Mins	X	A	N/A
1A/m	5 Mins	Y	A	N/A
1A/m	5 Mins	Z	A	N/A

5.7 Voltage Dips/Interruptions immunity test

5.7.1 Schematics of the test

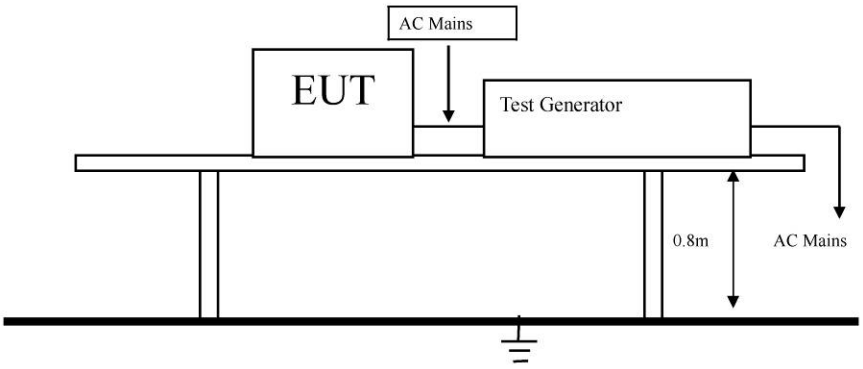
EUT: Equipment Under Test

5.7.2 Test Method:

The test was performed in accordance with EN IEC 61000-4-11: 2020

Performance Criterion Require: C&B (Please see following table)

Block diagram of Test setup



5.7.3 Susceptibility performance Criteria and Severity Level

Susceptibility performance Criteria

Criterion	Description
A	No change in operational mode or degradation of performance outside of specification and no change in stored parameters.
B	Degradation of performance allowed during the test the EUT returning to intended operation after the test.
C	Loss of function allowed during the test, provided that function is self recoverable or can be recovered by operation of controls.

Severity Level

Voltage Dip	Test Level %Ut	Reduction	Duration (Periods)	Performance Criteria
	<5	>95	0.5	B
	70	30	25	C
Voltage Interceptions	Test Level %Ut	Reduction	Duration (Periods)	Performance Criteria
	<5	>95	250	C

5.7.4 Test Result:

EUT Operating Environment

Temperature: 25℃ Humidity: 75%RH Atmospheric Pressure: 101 kPa

Please refer to the following table for individual results.

Voltage Dip:

Test Level % Ut	Reduction	Duration (periods)	Phase Angle	Meet Criterion	Result
0	100	0.5	0° - 360°	B	Pass
70	30	25	0° - 360°	C	Pass

Voltage Interceptions:

Test Level % Ut	Reduction	Duration (periods)	Phase Angle	Meet Criterion	Result
0	100	250	0° - 360°	C	Pass

6.0 Product Labelling

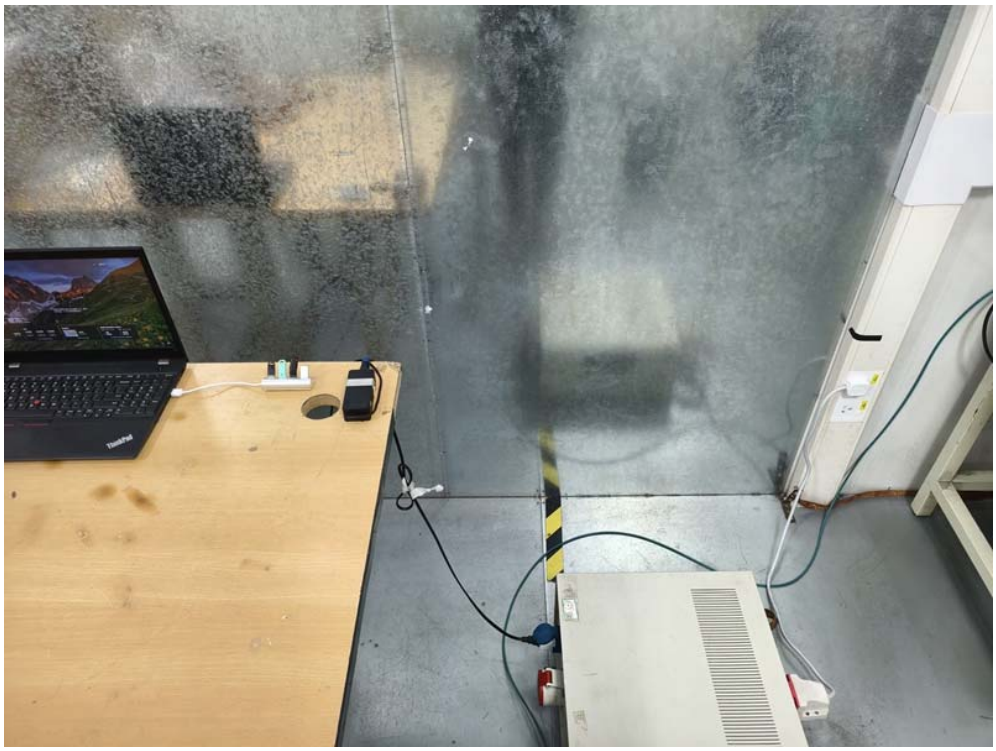
6.1 CE Mark label specification

Text of the mark is black or white in color and is left justified. Labels are printed in indelible ink on permanent adhesive backing and shall be affixed at a conspicuous location on the EUT or silk-screened onto the EUT.

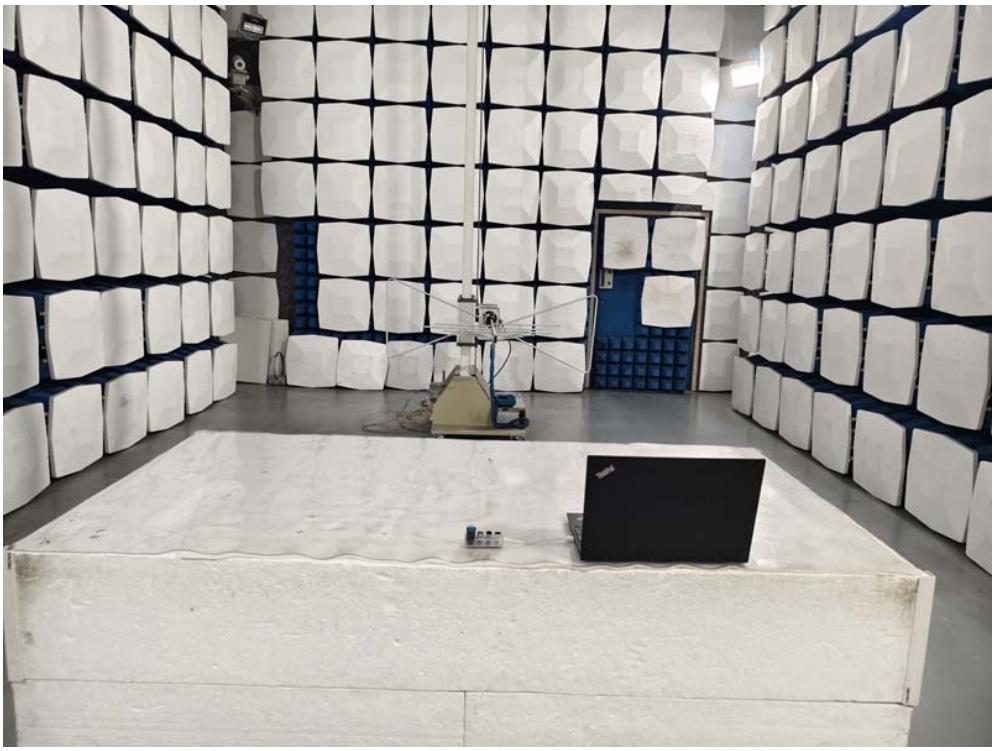
6.2 Mark Location: Rear enclosure

Appendix:

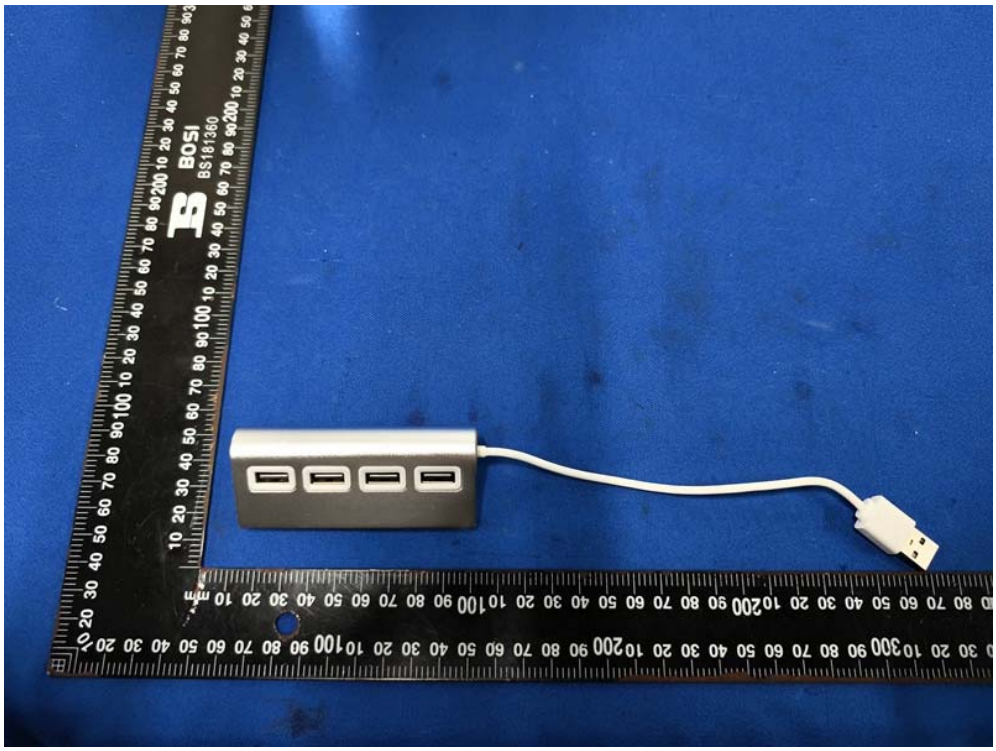
Conducted Emissions



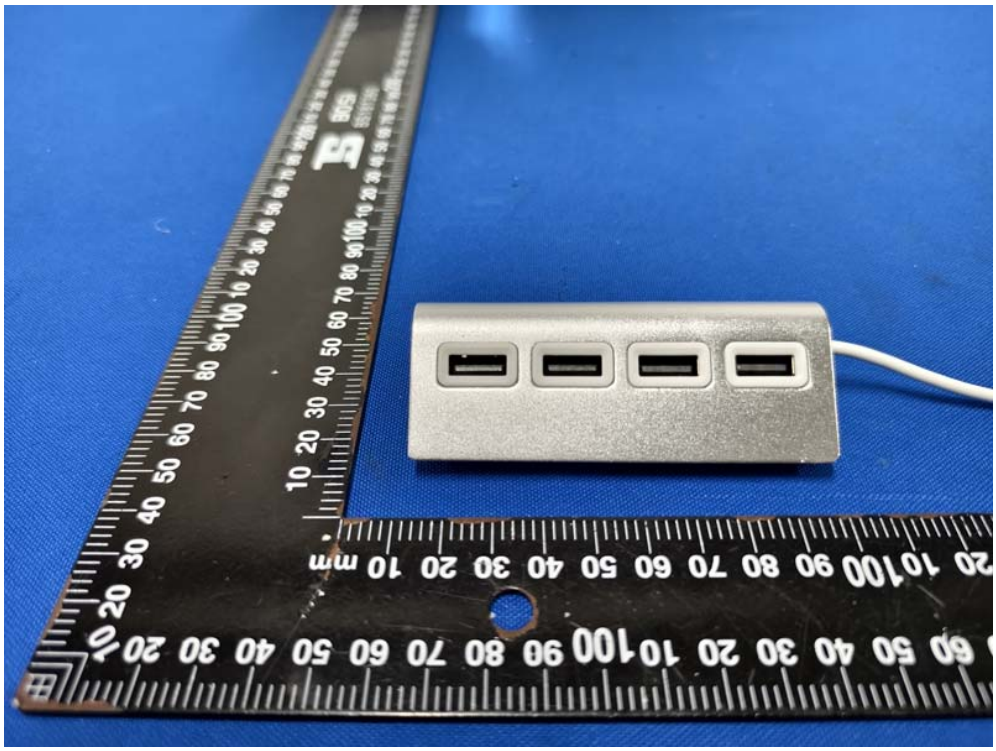
Radiated Emissions

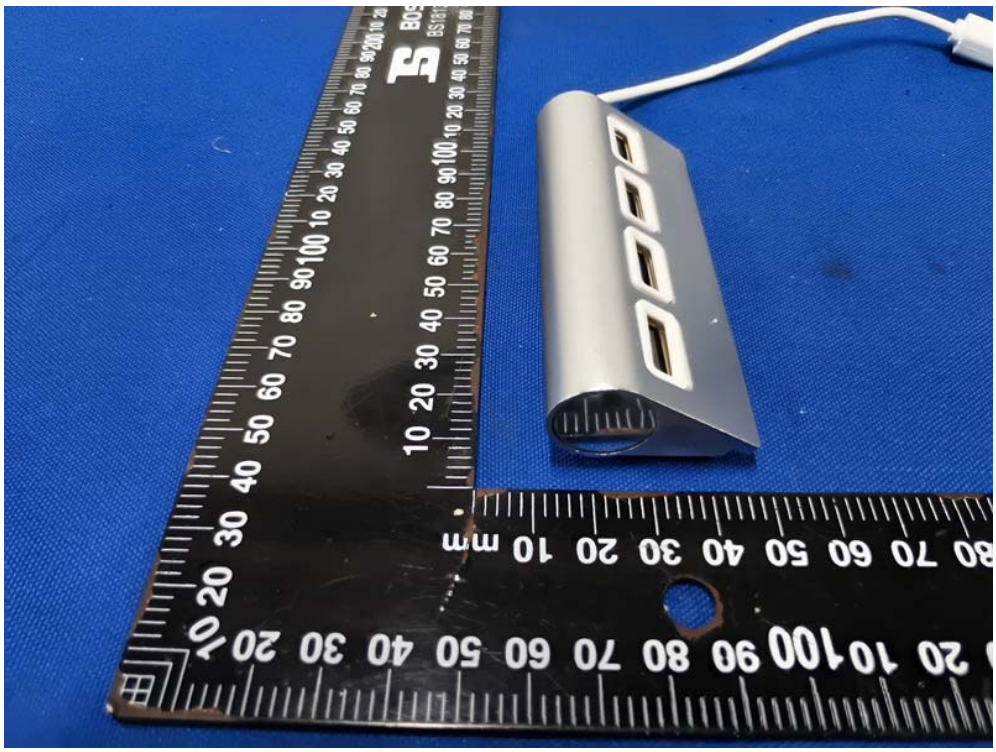


Photographs – EUT

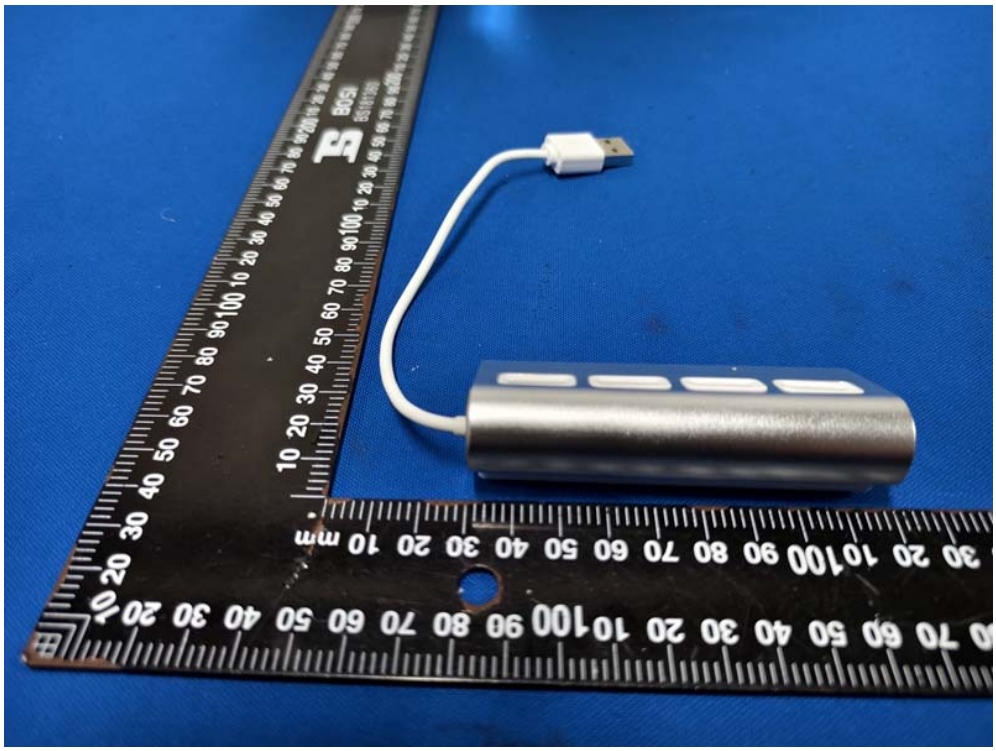


Photographs – EUT



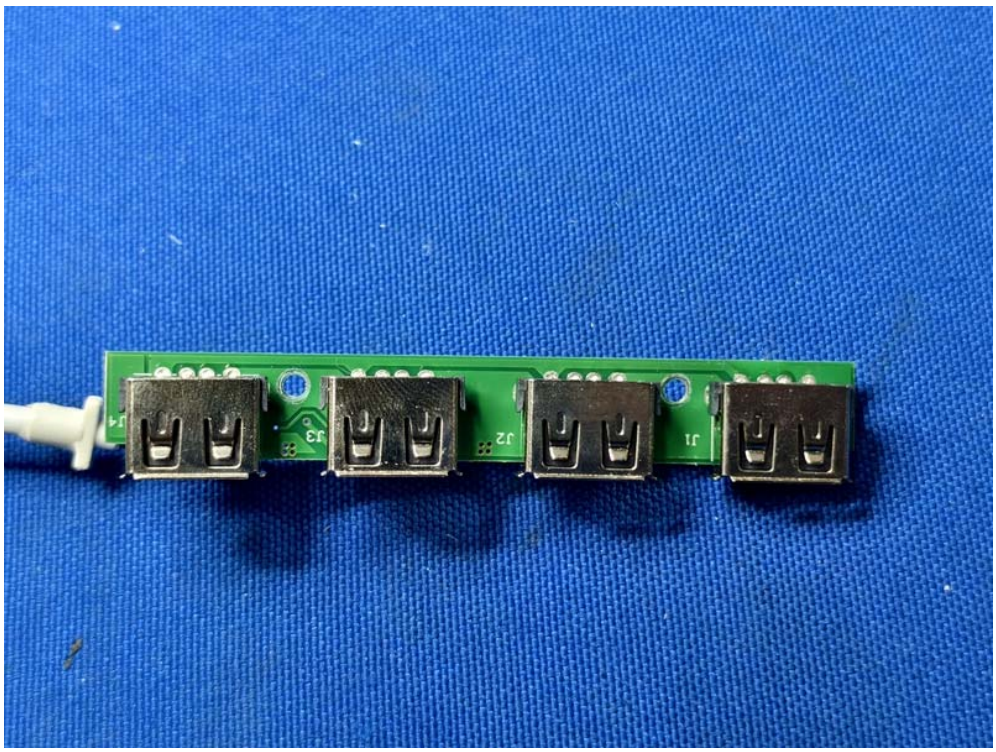


Photographs – EUT

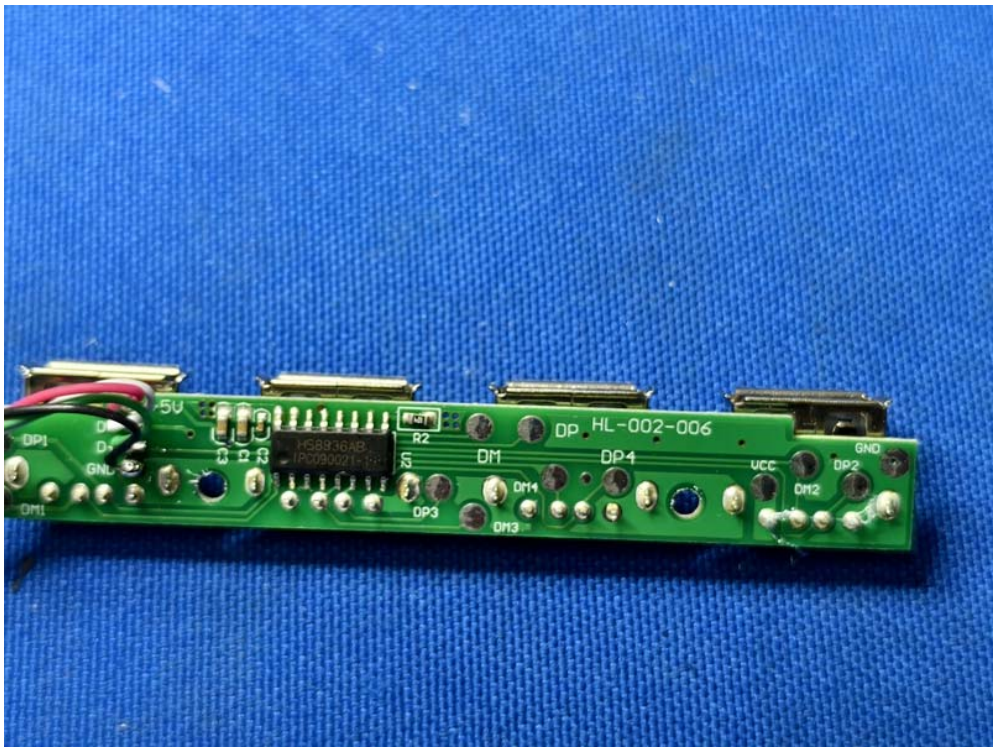


Photographs – EUT

Photographs – EUT



Photographs – EUT



--End of the Report--