EMC MEASUREMENT REPORT

HPE BATTERY CHARGE SYSTEM

for the purpose of EMC Measurement

Type Investigation	Project number	Compiled by	Signature	Reviewed by	Signature	Date of release	Revision	
							Version number	Date
EMC measurement	2021-1219-AD-03	S.Manchipalli		S.Malia	S.M	27/05/2025		

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Subject	EMC Retesting Assessment
Project number	2021-1219-AD-03
Pages	33

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1. INTRODUCTION

1.1 PURPOSE OF THE REPORT

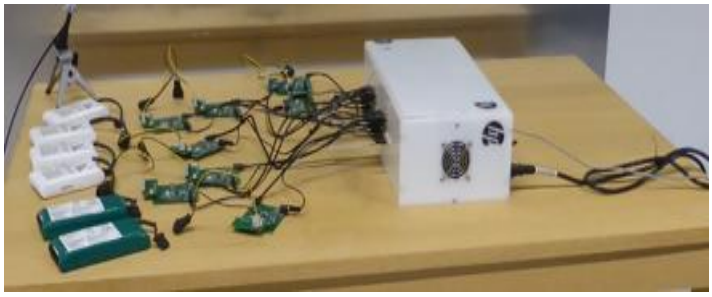
Certification Company was commissioned by **DHL Supply Chain (Netherlands) B.V.** (hereinafter referred to as the 'Client' and/or 'Manufacturer') to perform a conformity assessment procedure for the purpose of CE Certification on the **HPE Battery charge system device** (referred to as 'the Equipment').

The Certification company carried out the necessary testing on behalf of the applicant, in accordance with the EMC harmonised standards. This report specifically includes the test results for compliance with the applicable EMC standards, providing an overview of the Equipment's performance in relation to these requirements.

This chapter deals with identification (§ 1.2) and legal classification (§ 1.3) of the Product, the legal classification of the Applicant as an economic operator (§ 1.4) and provides an overview of compliance documentation submitted by the Applicant (§ 1.5).

1.2 PRODUCT IDENTIFICATION

For the purpose of this investigation the following Product has been taken into account:

#	PRODUCT NAME	INTENDED USE	PHOTOGRAPHIC EXAMPLE
1	HPE	Battery charger	
Remark: -			

1.3 PRODUCT CLASSIFICATION

The Product is primarily classified as an **electrical equipment** in accordance with the European Low Voltage Directive. According to article 1 of the European Low Voltage Directive electrical equipment means:

> *"a product which has been designed for use with a voltage rating of between 50 and 1 000 V for alternating current and between 75 and 1 500 V for direct current"*

- **Justification:** The product is designed for alternating current between 50 and 1000 V. Therefore, the Product is considered as electrical equipment and falls within the scope of the above mentioned applicable European Legislation

Remark: Besides the Low Voltage Directive, the Product also falls under the scope of the EMC and RoHS Directives, which means the Product has to conform to the relevant standards of those Directives as well.

1.4 ECONOMIC OPERATOR CLASSIFICATION

According to article 2, paragraph 7 of the Low Voltage Directive, there are four economic operators: the manufacturer, the authorized representative, the importer and the distributor.

The Applicant is classified as the **Manufacturer** in accordance with the European Low Voltage Directive. According to article 2, paragraph 3 of the Low Voltage Directive, a manufacturer means:

> *"any natural or legal person who manufactures electrical equipment or has electrical equipment designed or manufactured, and markets that equipment under his name or trade mark"*

- **Justification:** The Applicant is a legal person who has the electrical equipment designed and/or manufactured and wants to market that equipment under his name or trade mark. Therefore, the Applicant must be considered as the manufacturer of the electrical equipment within the scope of Low Voltage Directive.

1.5 OVERVIEW COMPLIANCE DOCUMENTATION

The Applicant provided the following compliance documentation as part of the EMC measuring assessment.

#	DOCUMENT NAME	DOCUMENT TYPE	INTERNAL REFERENCE NUMBER
1	TeraSci HPE Battery Process Work Instruction	User Manual	TD-03-03
2	HPE .pdf	Schematics	TD-02-02
3	10637 .pdf	Datasheet	TD-01-01
4	AP7361C .pdf	Datasheet	TD-01-02
5	bq24725 .pdf	Datasheet	TD-01-03
6	CDRH125 .pdf	Datasheet	TD-01-04
7	efm8bb3-datasheet. pdf	Datasheet	TD-01-05
8	KEM_R7002_EC2_EE2. pdf	Datasheet	TD-01-06
9	pj-002ª. pdf	Datasheet	TD-01-07
10	rcae3 .pdf	Datasheet	TD-01-08
11	RoHS-statement .pdf	Statement	TD-01-09
12	scls117e. pdf	Datasheet	TD-01-10
13	si4178dy. pdf	Datasheet	TD-01-11
14	sn74hc125 .pdf	Datasheet	TD-01-12
15	sn74ls06 .pdf	Datasheet	TD-01-13
16	TAJ .pdf	Datasheet	TD-01-14
17	THJ .pdf	Datasheet	TD-01-15
18	si4178dy.pdf	Datasheet	TD-01-16
19	Battery_BoM.xlsx	BoM	TD-01-17

Remark: the documentation made available and the results and / or conclusions resulting therefrom are assumed to be authentic. The internal reference numbers mentioned above will be used throughout this report as part of compliance evidence.

2 ASSESSMENT OF ESSENTIAL REQUIREMENTS (EMC)

EMC ESSENTIAL REQUIREMENTS CHECKLIST (In accordance with article 7(1) and Annex I of the EMC Directive)		
REQUIREMENTS	**LEGAL BASIS**	**ASSESSMENT**
1) Manufacturers shall ensure that the equipment is designed and manufactured in compliance with the requirements set out in Annex I.	Article 7(1) ~ Annex I	**IN COMPLIANCE** Please refer to **EMC Test Report** for detailed test results with respect to electromagnetic compatibility as set out in Directive 2014/30/EU.

3 EMC TEST REPORT

1. PRODUCT (EUT) DESCRIPTION

TECHNICAL INFORATION OF THE PRODUCT (EUT)

Item	Description
Name	HPE Battery charge system
Manufacturer	--
Brand name	--
Type or model no.	N/A
Serial no.	N/A
Rated voltage	230Vac
Rated current /power	N/A
Software version	N/A
Hardware version	Unknown
Dimensions	-
Protection Class	I
Environmental to be used	Domestic
Peripheral equipment	June 2022 / April 2025[1]
General remarks	None

[1]) radiated emission was retested only

1.2 CABLES AND ANCILLARY EQUIPMENT

Description	Port type	Type of cable	Cable length (cm)	Fixing shield	Load at port
AC input	AC	Unshielded	200	Not applicable	N/A

1.3 GENERAL DESCRIPTION

Photo 1 - Front View

1.4 MODES OF OPERATION AND PERFORMANCE CRITERIA

The modes of operation can be find in the table below:

Mode of operation	Description
Mode 1	Normal operational, charging 6 batteries. During immunity the charging process is checked with a clamp meter and via the PC test program

Performance criterion during the immunity test are verified according the information that is laid down in the table below:

Mode of operation	Performance criteria
Mode 1	**Performance criteria A**: During testing, normal performance within the specification of the EUT **Performance criteria B**: During testing, temporary degradation, or loss of function or performance is allowed if it is self-recovering. **Performance criteria C**: During testing, temporary degradation, or loss of function or performance is allowed which requires operator intervention or system reset.

1.5 STANDARDS AND MEASUREMENTS RESULTS

The following standard(s) are used to verify if the EUT is in compliance with the essential requirements of the EMC Directive 2014/30/EU.

Phenomena	Standard	Result
Emission	EN 55032-1:2015 +A11:2020	**PASS**
Immunity	EN 55035:2017+A11:2020	**PASS**

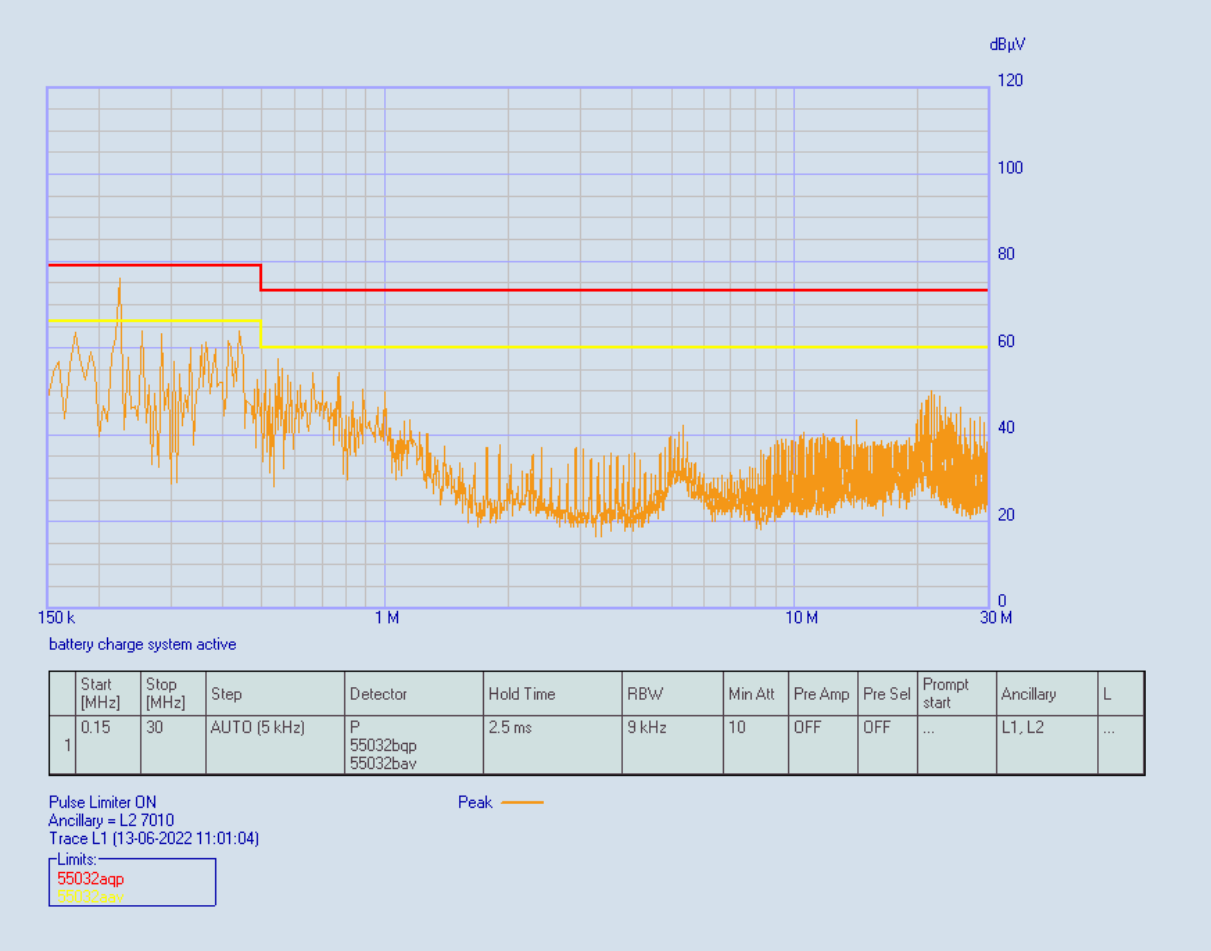
Detailed test information:

Test sequence	Test phenomena	Basic standard	Result (Pass/Fail)
1	Conducted emission (9 kHz – 30 MHz), Class A	EN 55032-1:2015 +A11:2020	**PASS**
2	Radiated emission (30 – 1000 MHz) Class A	EN 55032-1:2015 +A11:2020	**PASS**
3	Conducted immunity (0.15 – 80 MHz)	EN 61000-4-6:2014	**PASS**
4	Radiated immunity (80 – 1000 MHz)	EN 61000-4-3:2016/A1:2008	**PASS**
5	EFT tests	EN 61000-4-4:2012	**PASS**
6	Surge test	EN 61000-4-5:2014	**PASS**
7	ESD tests	EN 61000-4-2:2009	**PASS**
8	Voltage dips and interrupts	EN61000-4-11:2004/A1:2017	**PASS**
Remark			

2. CONDUCTED EMISSION RESULTS

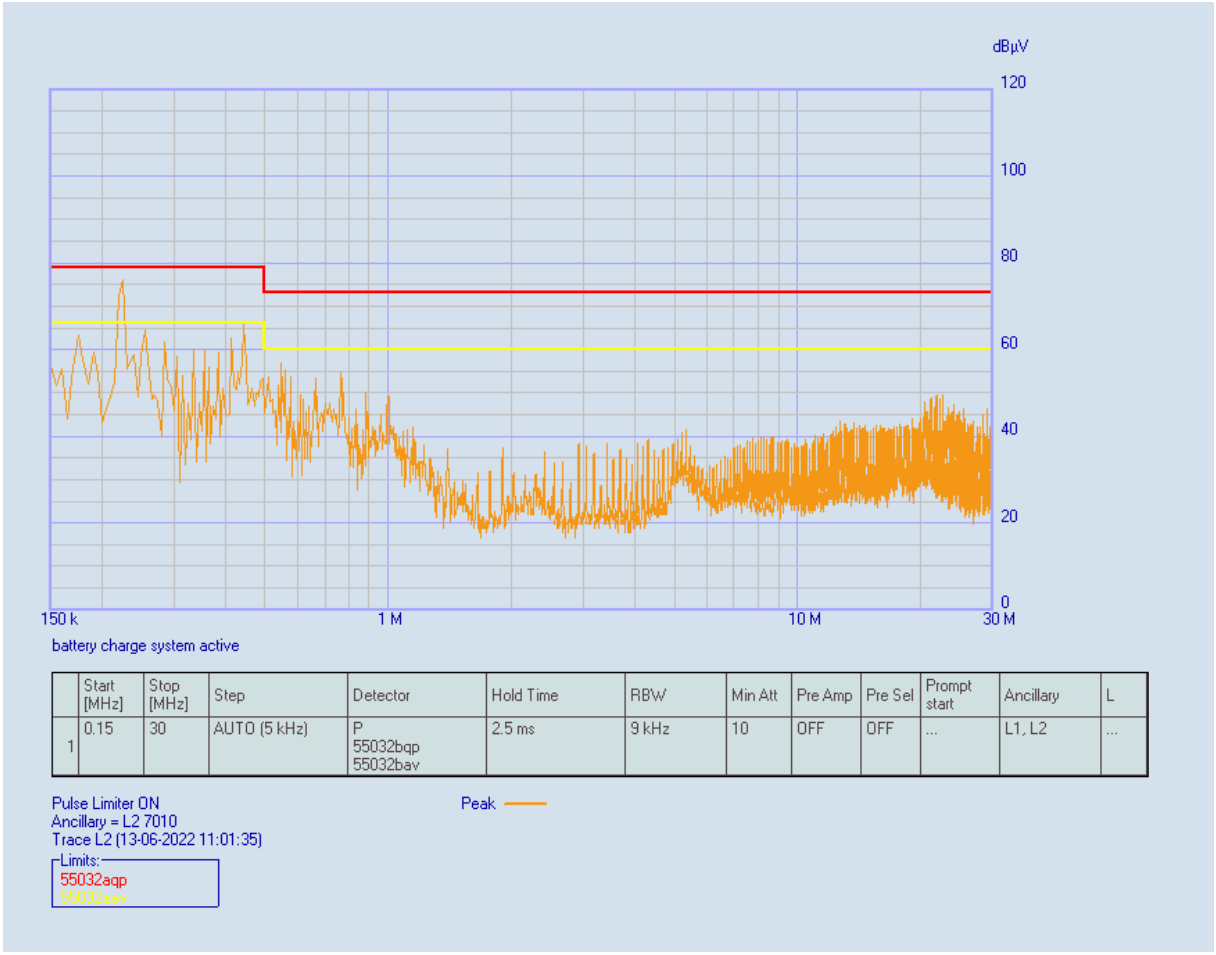
Temperature	21 °C	**Air pressure**	1014 hpa
Humidity	60 %	**Remarks**	EN 55032 Class A

Description	Description: 6) Setting: Frequency band From 150 kHz to 30 MHz
Note	Line



Detected Peaks Line									
Peak Number	**Frequency**	**Quasi-Peak**	**Quasi-Peak Limit**	**Quasi-Peak Delta**	**Average**	**Average Limit**	**Average Delta**		**Status**
1	0.175	62.14	79.00	-16.86	50.71	66.00	-15.29		**Pass**
2	0.225	75.47	79.00	-3.53	66.61	66.00	- 0.21		**Pass**
3	0.255	63.22	79.00	-15.78	55.20	66.00	-10.80		**Pass**
4	0.285	61.76	79.00	-17.24	54.96	66.00	-11.04		**Pass**
5	0.355	59.19	79.00	-19.81	50.49	66.00	-15.51		**Pass**
6	0.365	60.38	79.00	-18.62	48.59	66.00	-17.41		**Pass**
7	0.415	61.88	79.00	-17.12	55.25	66.00	-10.75		**Pass**
8	0.445	65.24	79.00	-13.76	58.08	66.00	-7.92		**Pass**
RESULT	**Pass**								

Description	Description: 8) Setting: Frequency band From 150 kHz to 30 MHz
Note	Neutral



	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary	L
1	0.15	30	AUTO (5 kHz)	P 55032bqp 55032bav	2.5 ms	9 kHz	10	OFF	OFF	...	L1, L2	...

Detected Peaks Neutral									
Peak Number	**Frequency**	**Quasi-Peak**	**Quasi-Peak Limit**	**Quasi-Peak Delta**	**Average**	**Average Limit**	**Average Delta**		**Status**
1	0.175	62.14	79.00	-16.86	50.79	66.00	-15.21		**Pass**
2	0.225	75.72	79.00	-3.28	66.81	66.00	- 0.31		**Pass**
3	0.255	63.63	79.00	-15.37	56.53	66.00	-9.47		**Pass**
4	0.285	61.16	79.00	-17.84	54.38	66.00	-11.62		**Pass**
5	0.355	58.55	79.00	-20.45	49.70	66.00	-16.30		**Pass**
6	0.365	60.07	79.00	-18.93	48.24	66.00	-17.76		**Pass**
7	0.415	61.55	79.00	-17.45	54.90	66.00	-11.10		**Pass**
8	0.445	64.87	79.00	-14.13	57.75	66.00	-8.25		**Pass**
RESULT	**Pass**								

Photo measurement set-up

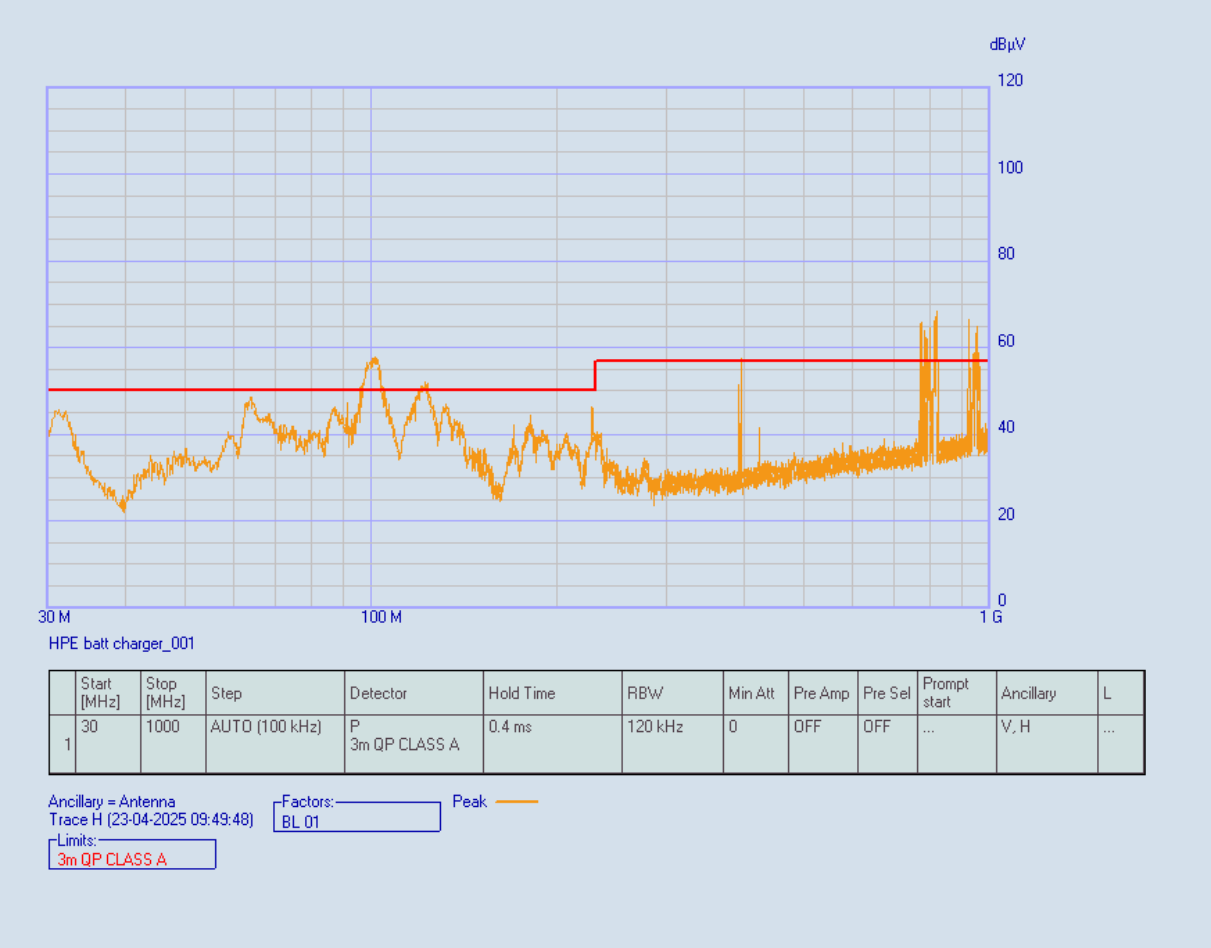
Photo 2 - Test set-up

Used	Description	Type	Manufacturer	ID
√	EMI Receiver	PMM7010	Narda	NC001

3. RADIATED EMISSION RESULTS

Temperature	21 °C	Air pressure	1014 hpa
Humidity	60 %	Frequency steps	
Remark(s):			

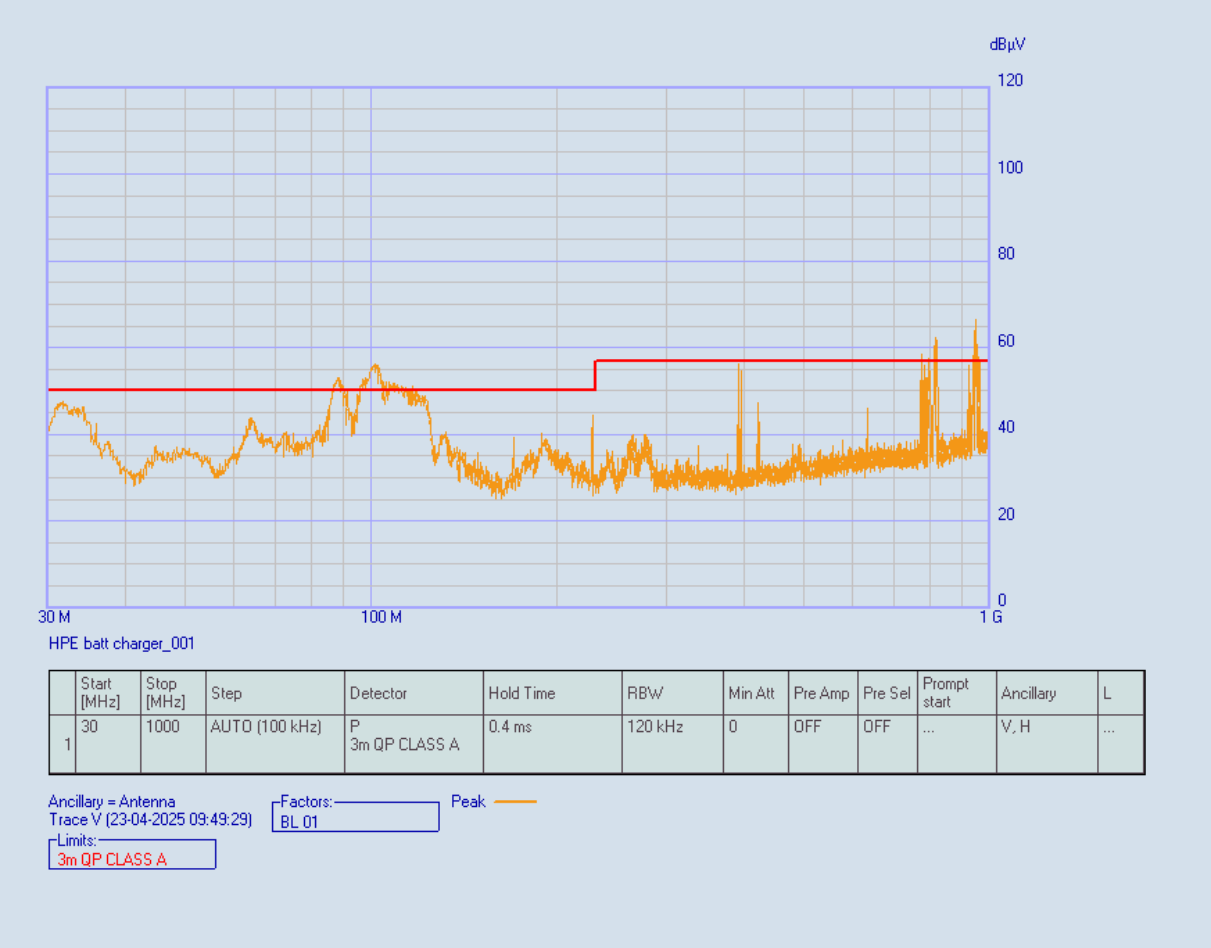
Description	Description: 9) Setting: Frequency band From 30 MHz to 1000 MHz, Class A
Note	Antenna Horizontal



Ambient noise due FM(100Mhz), C2000 (390MHz), ISM(420MHz) and GSM around 800Mhz and 900 MHz

Detected Peaks									
Peak Number	**Frequency**	**Quasi-Peak**	**Quasi-Peak Limit**	**Quasi-Peak Delta**					**Status**
1	63.7	47.46	50.00	-2.54					**Pass**
2	84.5	39.09	50.00	-10.91					**Pass**
3	88.4	45.02	50.00	-4.98					**Pass**
4	96.9	48.66	50.00	-1.34					**Pass**
5	101.2	49.45	50.00	-0.55					**Pass**
6	131.6	46.09	50.00	-3.91					**Pass**
7	167.5	34.85	50.00	-15.15					**Pass**
8	169.6	36.88	50.00	-13.12					**Pass**
9	180	41.15	50.00	-8.85					**Pass**
RESULT	**Pass**								

Description	Description: 9) Setting: Frequency band From 30 MHz to 1000 MHz, Class A
Note	Antenna Vertical

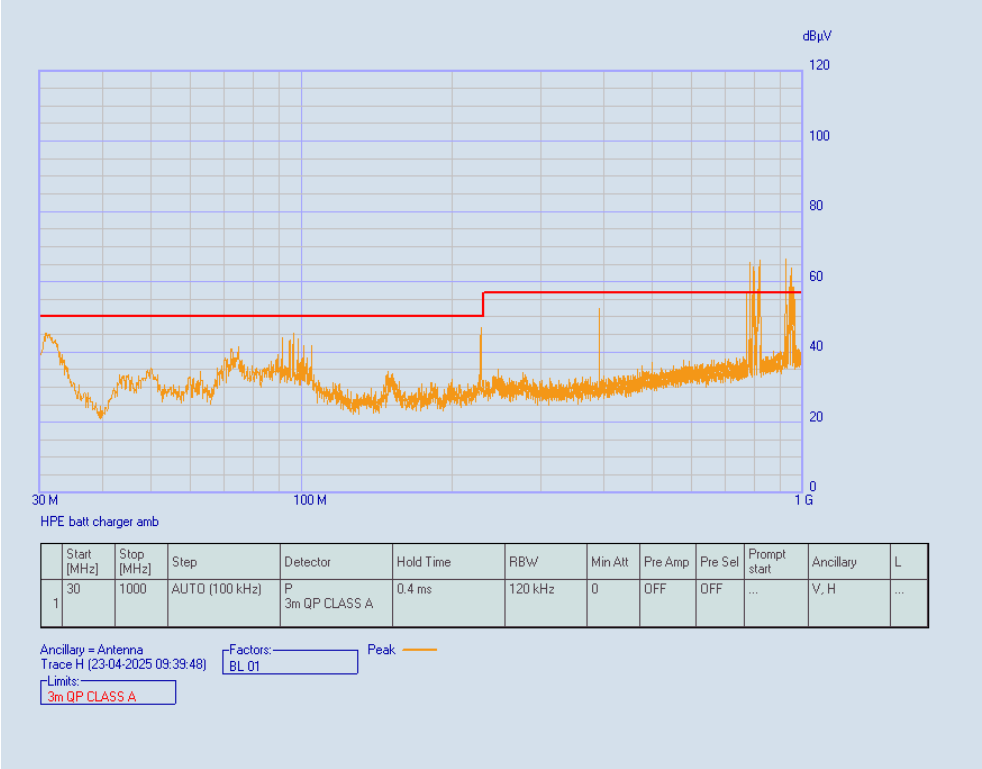


Ambient noise due FM(100Mhz), C2000 (390MHz), ISM(420MHz) and GSM around 800Mhz and 900 MHz

Detected Peaks									
Peak Number	**Frequency**	**Quasi-Peak**	**Quasi-Peak Limit**	**Quasi-Peak Delta**					**Status**
1	63.7	41.46	50.00	-8.54					**Pass**
2	84.5	41.54	50.00	-8.46					**Pass**
3	88.4	48.25	50.00	-1.75					**Pass**
4	96.9	47.13	50.00	-2.87					**Pass**
5	101.2	49.17	50.00	-0.83					**Pass**
6	131.6	38.74	50.00	-11.26					**Pass**
7	167.5	28.75	50.00	-21.25					**Pass**
8	169.6	39.06	50.00	-10.94					**Pass**
9	180	34.06	50.00	-15.94					**Pass**
RESULT	**Pass**								

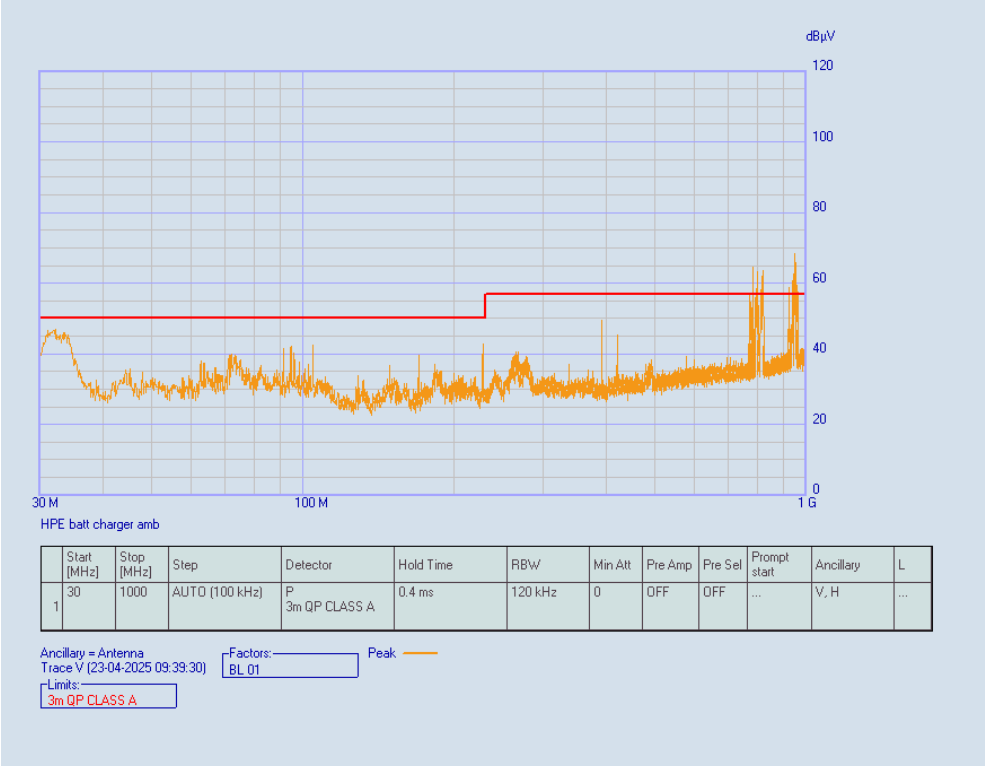
Ambient noise:

Horizontal



	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary	L
1	30	1000	AUTO (100 kHz)	P 3m QP CLASS A	0.4 ms	120 kHz	0	OFF	OFF	...	V, H	...

Vertical



	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary	L
1	30	1000	AUTO (100 kHz)	P 3m QP CLASS A	0.4 ms	120 kHz	0	OFF	OFF	...	V, H	...

Photo measurement set-up

Photo 3 - Test set-up

Used	Description	Type	Manufacturer	ID
√	EMI Receiver	PMM7010	Narda	NC001
√	Antenna	BL-01	Narda	NC002

4. RADIATED IMMUNITY RESULTS

Temperature	21 °C	**Air pressure**	1014 hpa
Humidity	45 %	**Frequency steps**	2 %
Modulation	1 kHz, 80 % AM	**Frequency range**	80 – 1000 MHz
Dwell time	2 sec.		

Performance criteria: A			
Antenna / EUT position	**Test Level**	**Remarks**	**Pass/Fail**
Horizontal / Vertical	3 V/m	No influence detected	**Pass**
Photo measurement set-up			

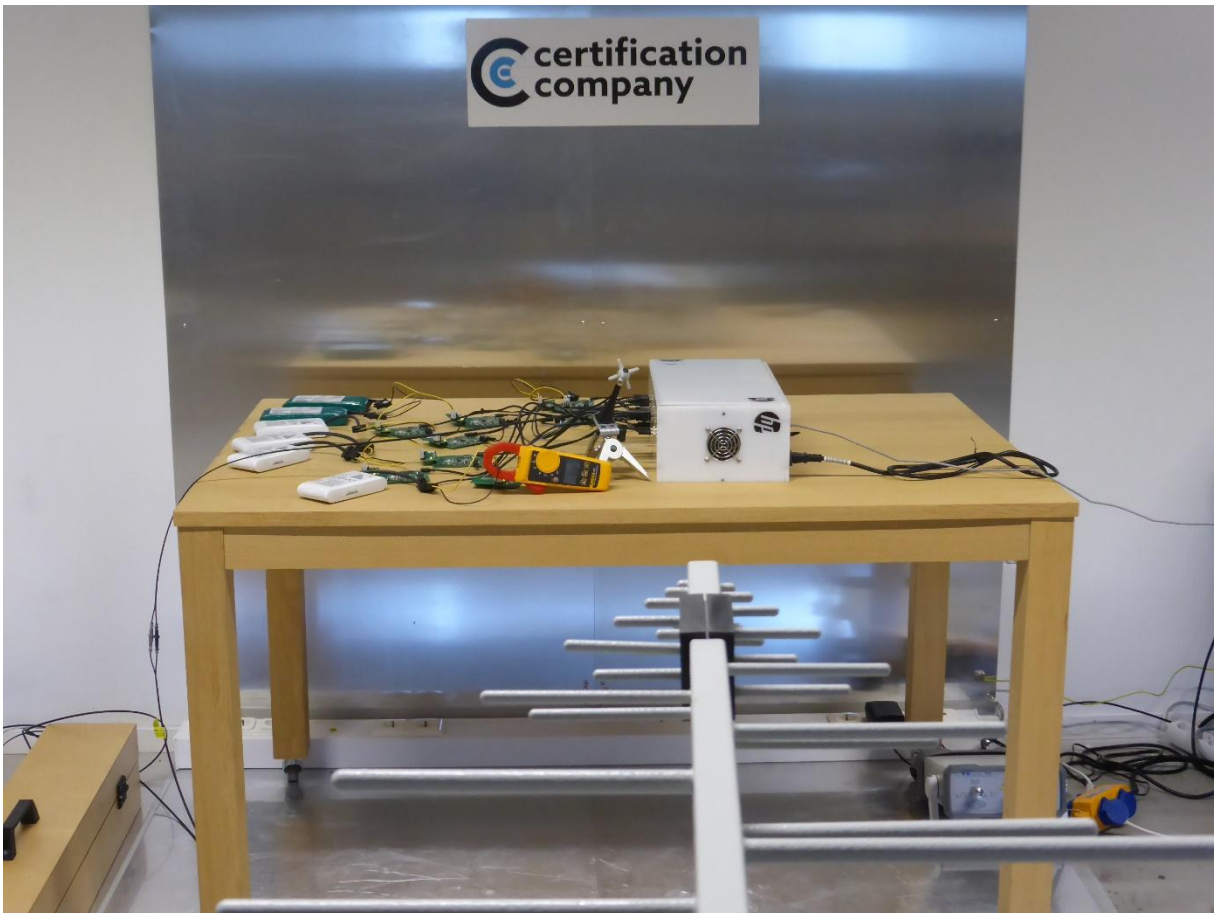


Photo 4 - Test set-up

Used	Description	Type	Manufacturer	ID
√	Signal generator	DSG815	Rigol	NC003
√	Amplifier	ZHL-20W-13	Mini Circuits	NC007
√	Antenna	BL-01	Narda	NC002

5. CONDUCTED IMMUNITY RESULTS

Temperature	21 °C	**Air pressure**	1014 hpa
Humidity	45 %	**Frequency steps**	2 %
Modulation	1 kHz, 80 % AM	**Frequency range**	0.15 – 80 MHz
Dwell time	2 sec.		

Performance criteria: A			
Tested port	**Test Level**	**Remarks**	**Pass/Fail**
AC mains	3 Vrms	No influence detected	**Pass**

Photo measurement set-up

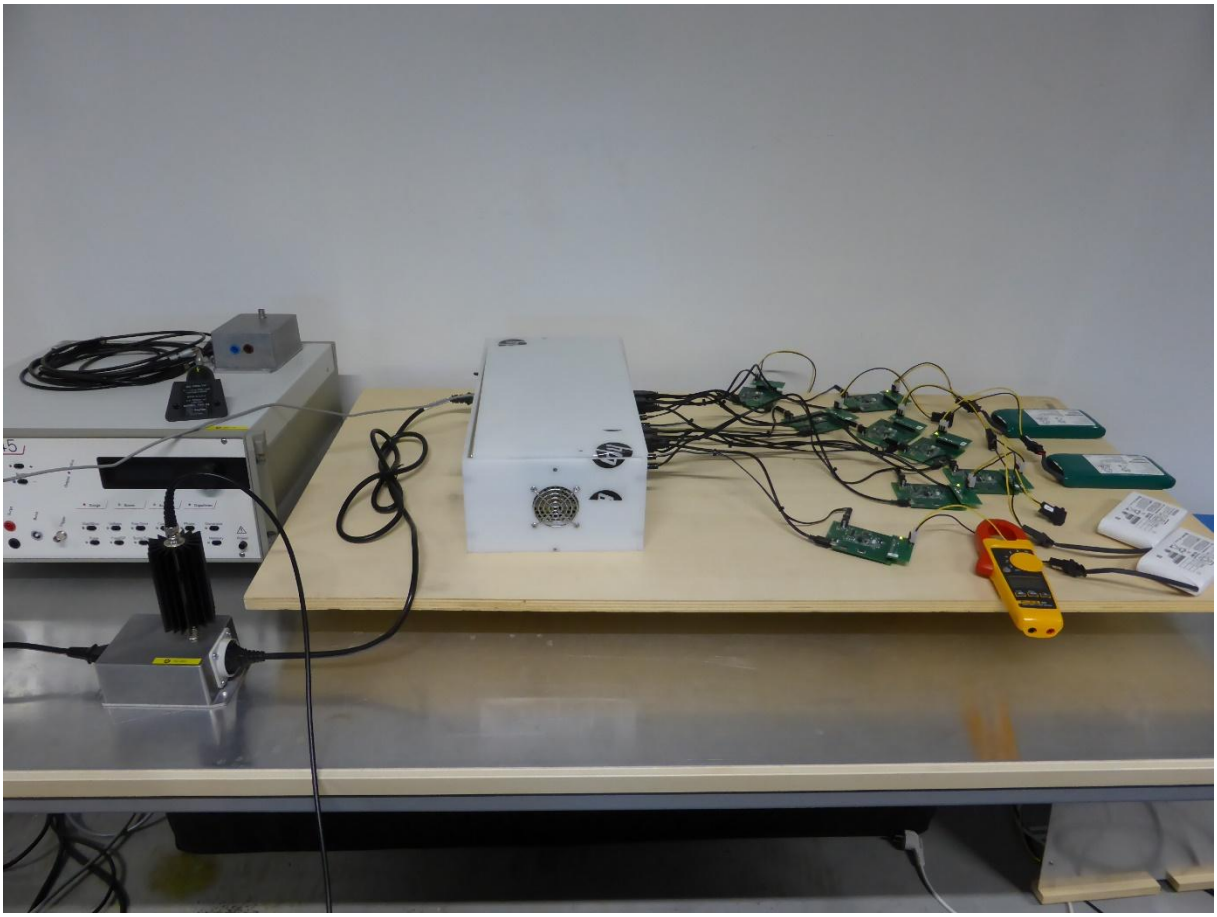


Photo 5 - Test set-up

Used	Description	Type	Manufacturer	ID
√	Signal generator	DSG815	Rigol	NC003
√	Amplifier	LZY-22	Mini Circuits	NC006
√	CDN	CDN-16A	EMCMCC	NC015

6. EFT RESULTS

Temperature	21 °C	**Air pressure**	1014 hpa
Humidity	60 %	**Repetition mode**	5 kHz
Burst duration	15 msec	**Burst period**	300 msec

Performance criteria B			
Tested I/O port	**Test level**	**Remarks**	**Pass/Fail**
AC mains	± 1kV L-L	No influence detected	Pass

Photo measurement set-up

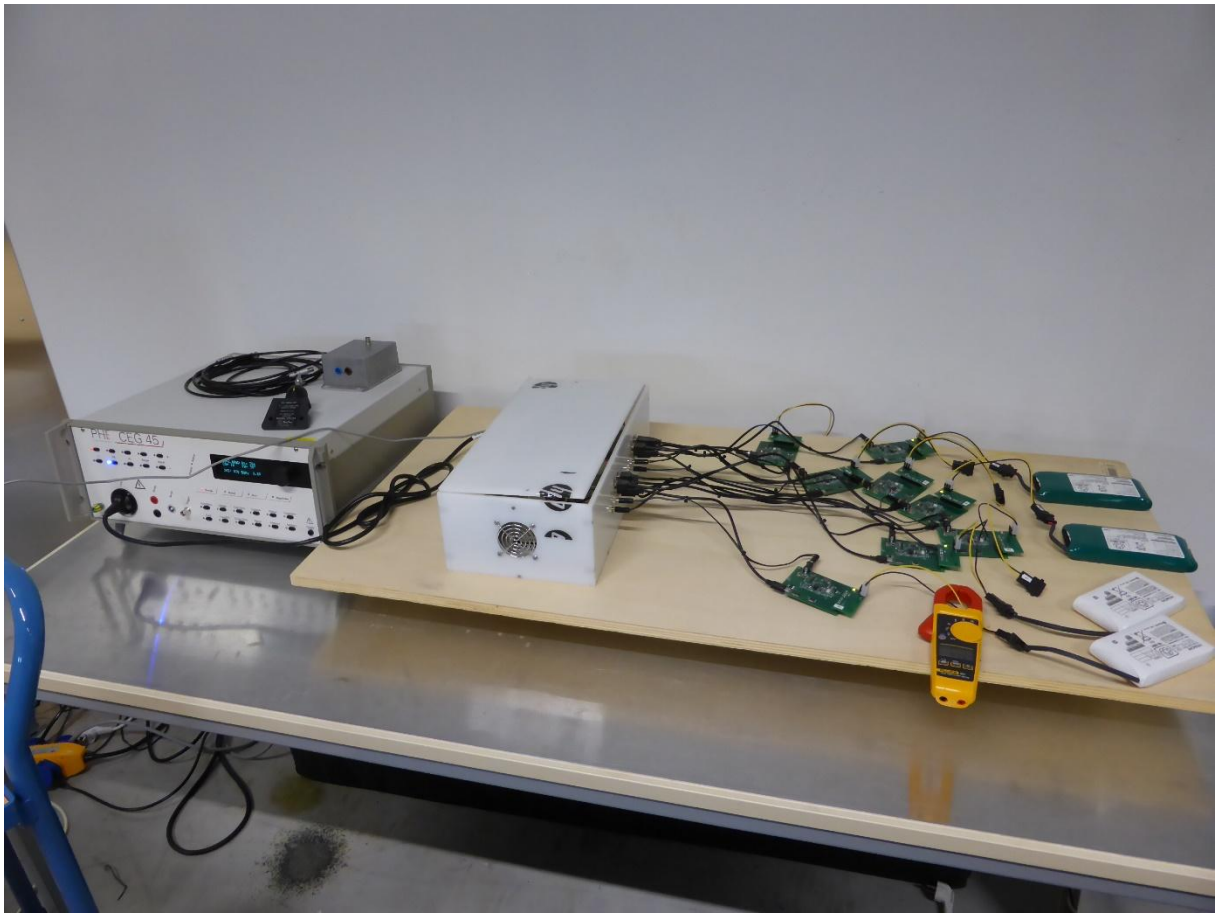


Photo 6 - Test set-up

Used	Description	Type	Manufacturer	ID
√	EFT generator	CEG4500	Hofbauer	NC004

7. ESD RESULTS

Temperature	21 °C	Air pressure	1014 hpa
Humidity	60 %	Remarks	---

Performance criteria B			
Indirect contact discharge			
Location of discharge	**Test level**	**Remarks**	**Pass/Fail**
Horizontal coupling plane	± 2-4 kV	No influence detected	**Pass**
Vertical coupling plane	± 2-4 kV	No influence detected	**Pass**
Contact discharge			
Metal parts enclosure (connectors)	± 2-4 kV	No influence detected	**Pass**
Air discharge			
Enclosure/non-conductive parts	± 6-8 kV	No influence detected	**Pass**

Photo measurement set-up

Photo 7 - Test set-up

Used	Description	Type	Manufacturer	ID
√	ESD generator	MiniZap MZ-15	KeyTek	NC-20
√	ESD table	--	--	--
√	Horizontal coupling plane	--	--	--
√	Vertical coupling plane	--	--	--

8. SURGE RESULTS

Temperature:	21 °C	**Air pressure:**	1014 hpa
Humidity:	60 %	**Remarks:**	N/A

Performance criteria B			
Tested I/O port	**Test level**	**Remarks**	**Pass/Fail**
AC mains	± 1kV L-L	No influences detected	**Pass**
AC mains	± 2kV L-PE	No influences detected	**Pass**

Photo measurement set-up

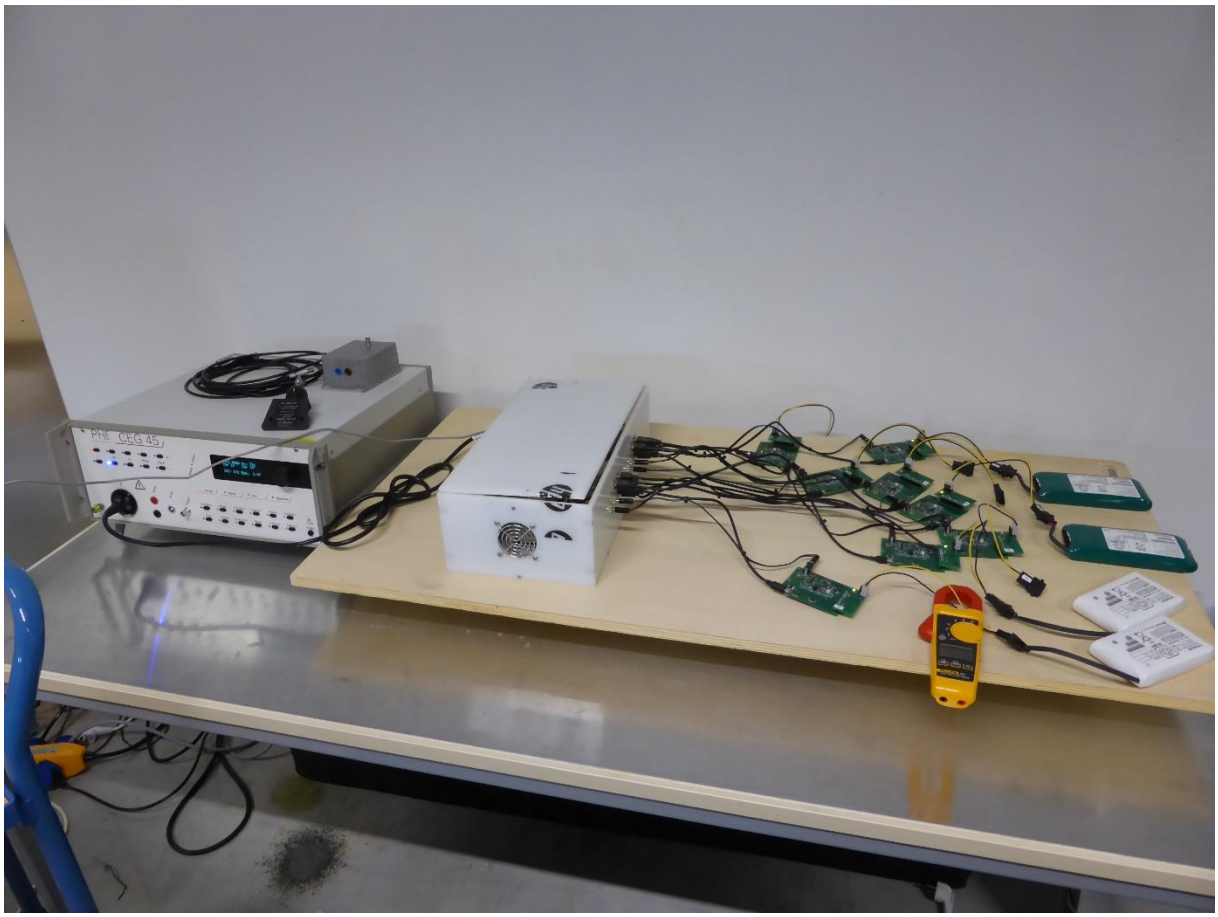


Photo 8 - Test set-up

Used	Description	Type	Manufacturer	ID
√	Surge generator	CEG4500	Hofbauer	NC004

6. Power dips /interrupts RESULTS

Temperature	21 °C	**Air pressure**	1014 hpa
Humidity	60 %	**Remarks:**	PASS

Performance criteria B		
Voltage dip to	**Remarks**	**Pass/Fail**
0%, 1 period	No influences detected	PASS
70%, 25 periods	No influences detected	PASS

Performance criteria C		
Voltage short interrupt	**Remarks**	**Pass/Fail**
0%, 250 periods	EUT restarts correctly after each interrupt, PC connection has to be started up after each interrupt	PASS

Photo measurement set-up

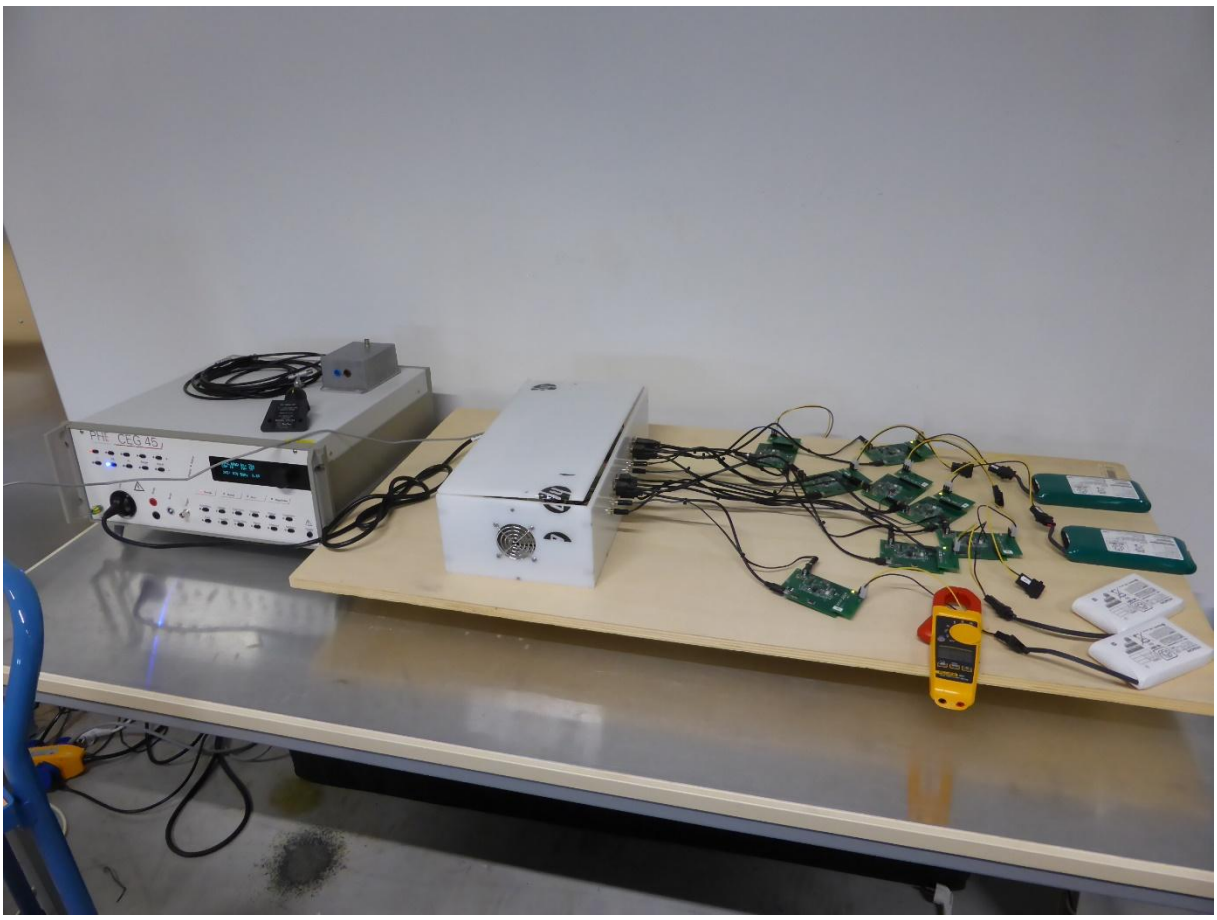


Photo 9 - Test set-up

Used	Description	Type	Manufacturer	ID
√	EFT Generator	CEG4500	Hofbauer	NC004

** **END OF EMC TEST REPORT** ***

4 CONCLUSION

Certification Company was commissioned by **DHL Supply Chain (Netherlands) B.V.** (hereinafter referred to as the 'Client' and/or 'Manufacturer') to perform a conformity assessment procedure for the purpose of CE Certification on the **HPE Battery charge system device** (referred to as 'the Equipment').

The Certification company carried out the necessary testing on behalf of the applicant, in accordance with the EMC harmonised standards. This report specifically includes the test results for compliance with the applicable EMC standards, providing an overview of the Equipment's performance in relation to these requirements.

The EMC tests gave rise to the following remarks:

Phenomena	Standard	Result
Emission	EN 55032:2015+A11:2020	**PASS**
Immunity	EN 55035:2017	**PASS**

Detailed test information:

Test sequence	Test phenomena	Basic standard	Result (Pass/Fail)
1	Conducted emission (150 kHz – 30 MHz) Class A	EN 55032:2015+A11:2020	**PASS**
2	Radiated emission (30 – 1000 MHz) Class A	EN 55032:2015+A11:2020	**PASS**
3	Conducted immunity (0.15 – 80 MHz)	EN 61000-4-6:2014	**PASS**
4	Radiated immunity (80 – 1000 MHz)	EN 61000-4-3:2016/A1:2008	**PASS**
5	EFT tests	EN 61000-4-4:2012	**PASS**
6	Surge test	EN 61000-4-5:2014	**PASS**
7	ESD tests	EN 61000-4-2:2009	**PASS**
8	Voltage dips and interrupts	EN61000-4-11:2004/A1:2017	**PASS**
Remark			

Almere, The Netherlands

27th of May 2025

CERTIFICATION COMPANY B.V.

*** **END REPORT** ***