

TEST REPORT

For EMC

Report No. : **CHTW24040032** Report verification: 

Project No. : **SHT2403069701W**

Applicant : **Anker Innovations Limited**

Address : Room 1318-19, Hollywood Plaza, 610 Nathan Road, Mongkok, Kowloon, Hong Kong

Product Name : **Anker SOLIX Smart Meter**

Trade Mark : ANKER

Model No. : A17X7

Listed Model(s) : -

Standard : **ETSI EN 301 489-1 V2.2.3**
ETSI EN 301 489-17 V3.2.4

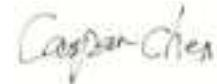
Date of receipt of test sample : Mar.25, 2024

Date of testing : Mar.26, 2024- Apr.12, 2024

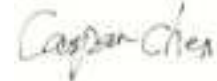
Date of issue : Apr.15, 2024

Result : **PASS**

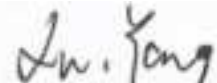
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Testing Laboratory Name : **Shenzhen Huatongwei International Inspection Co., Ltd.**

Address : Building 7, Baiwang Idea Factory, No.1051, Songbai Road, Yangguang Community, Xili Subdistrict, Nanshan District, Shenzhen, Guangdong, China

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The test report merely correspond to the test sample.

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1. TEST STANDARDS AND REPORT VERSION

1.1. Test standards

The tests were performed according to following standards:

[ETSI EN 301 489-1 V2.2.3](#)—ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for ElectroMagnetic Compatibility

[ETSI EN 301 489-17 V3.2.4](#)—ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard for ElectroMagnetic Compatibility

[EN 61000-3-2:2019/A1:2021](#)—Electromagnetic compatibility (EMC) -part 3-2 Limits- limits for harmonic current emissions (equipment input current < 16 A per phase)

[EN 61000-3-3:2013/A1:2019](#)—Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection

1.2. Report version information

Revision No.	Date of issue	Description
N/A	2024-04-15	Original

2. TEST DESCRIPTION

Section	Test Item	Standard requirement	Result	Test Engineer
Emission				
5.1.1	Radiated Emission	EN301 489-17 Clause 7.1	Pass	Yifan Wang
5.1.2.1	Conducted Emission (DC power ports)	EN301 489-1 Clause 8.3 EN301 489-17 Clause 7.1	N/A	-
5.1.2.2	Conducted Emission (AC mains ports)	EN301 489-17 Clause 7.1	Pass	Junman Wang
5.1.2.3	Conducted Emission (Wired network ports)	EN301 489-17 Clause 7.1	N/A	-
5.1.3	Harmonic Current Emissions	EN301 489-17 Clause 7.1 EN61000-3-2 Clause 7	Pass	Yifan Wang
5.1.4	Voltage Fluctuations and Flicker	EN301 489-17 Clause 7.1 EN61000-3-3 Clause 5	Pass	Yifan Wang
Immunity				
5.2.1	Electrostatic Discharge	EN301 489-17 Clause 7.2	Pass	Jian Li
5.2.2	Radio Frequency Electromagnetic Field	EN301 489-17 Clause 7.2	Pass	Jianjun.Liang
5.2.3	Fast Transients Common Mode	EN301 489-17 Clause 7.2	Pass	Jian Li
5.2.4	Surges	EN301 489-17 Clause 7.2	Pass	Jian Li
5.2.5	Radio Frequency Common Mode	EN301 489-17 Clause 7.2	Pass	Junxu.Lin
5.2.6	Voltage Dips and Interruptions	EN301 489-17 Clause 7.2	Pass	Yifan Wang
5.2.7	Vehicular Transients and Surges	EN301 489-17 Clause 7.2	N/A	-

Note:

The measurement uncertainty is not included in the test result.

N/A: Not Applicable.

3. SUMMARY

3.1. Client information

Applicant:	Anker Innovations Limited
Address:	Room 1318-19, Hollywood Plaza, 610 Nathan Road, Mongkok, Kowloon, Hong Kong
Manufacturer:	Anker Innovations Limited
Address:	Room 1318-19, Hollywood Plaza, 610 Nathan Road, Mongkok, Kowloon, Hong Kong

3.2. Product description

Main unit:	
Product Name:	Anker SOLIX Smart Meter
Trade Mark:	ANKER
Model No.:	A17X7
Listed Model(s):	-
Power supply:	3PH 400Vac 50Hz
Hardware version:	24-P008-HW1.0
Software version:	V1.0.0.0

3.3. Radio specification description ^{#1}

Bluetooth			
Supported type:	☒ LE-1Mbps		
WIFI-2.4GHz Band			
Supported type:	☒ 802.11b	☒ 802.11g	☒ 802.11n

Note

#1: Refer to RF report for detailed technical specifications

3.4. Testing laboratory information

Laboratory Name	Shenzhen Huatongwei International Inspection Co., Ltd.
Laboratory Location	Building 7, Baiwang Idea Factory, No.1051, Songbai Road, Yangguang Community, Xili Subdistrict, Nanshan District, Shenzhen, Guangdong, China
Contact information:	Tel: 86-755-26715499 E-mail: cs@szhtw.com.cn http://www.szhtw.com.cn

4. TEST CONFIGURATION

4.1. General Description

Classification of equipment:	☐ Class A	☒ Class B	
Applicability type:	☒ Fixed Use	☐ Vehicle Use	☐ Portable Use
Port type:	☒ AC Mains Port	☐ DC Power Port	☐ Wired Network Port
	☒ Signal / Control Port		

4.2. Descriptions of test mode

Test mode	BT	WIFI	Signal Cable	AC 400V
S1	■			■
S2		■		■
O1			■	■

- 1) #2: Contains these all support type in section 3.2
2) * is represent the following meaning in the test report

S*: S1, S2

Pre-scan above all test mode, found below test mode which it was worse case mode, so only show the test data for worse case mode on the test report.

Section	Test Item	Final test mode
5.1.1	Radiated Emission	S1
5.1.2.1	Conducted Emission (DC Power Port)	-
5.1.2.2	Conducted Emission (AC Mains Port)	S1
5.1.2.3	Conducted Emission (Wired Network Port)	-
5.1.3	Harmonic Current Emissions	S1
5.1.4	Voltage Fluctuations and Flicker	S1
5.2.1	Electrostatic Discharge	S*
5.2.2	Radio frequency electromagnetic field	S*
5.2.3	Fast Transients Common Mode	All mode
5.2.4	Surges	S*
5.2.5	Radio frequency common mode	All mode
5.2.6	Voltage Dips and Interruptions	S*
5.2.7	Transients and Surges in a vehicular environment	-

4.3. Support unit used in test configuration and system

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The following peripheral devices and interface cables were connected during the measurement:

Whether support unit is used?				
✓ No				
Item	Equipment	Trade Name	Model No.	Other
1				
2				

4.4. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	25°C
Lative Humidity	55 %
Air Pressure	989 hPa

4.5. Statement of the measurement uncertainty

Test Items	Measurement Uncertainty
Radiated emissions	4.54dB for 30MHz-1GHz 5.10dB for above 1GHz
Conducted emissions(power port)	3.21dB
Conducted emissions(signal port)	4.24dB
Harmonic current emissions	0.73%
Voltage fluctuations and flicker	Upst: 0.0093 Udc[%]: 0.0090 Udmax[%]: 0.0100 Udt[s]: 0.0090

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96

4.6. Equipments used during the test

● Conducted Emission

Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	EMI Test Receiver	R&S	HTWE0111	ESCI	101247	2023/8/22	2024/8/21
●	Artificial Mains	SCHWARZBECK	HTWE0113	NNLK 8121	573	2023/8/18	2024/8/17
●	Protection Network	SCHWARZBECK	HTWE0567	VTSD9561F N	00899	2023/8/18	2024/8/17
●	ISN	FCC	HTWE0148	FCC-TLISN-T2-02	20371	2023/8/18	2024/8/17
●	ISN	FCC	HTWE0150	FCC-TLISN-T8-02	20375	2023/8/18	2024/8/17
●	Test Software	R&S	N/A	EMC32	N/A	N/A	N/A

● Radiated Emission-30MHz~1GHz 3M

Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	HTWE0127	SAC-3m-02	C11121	2023/4/6	2026/4/5
●	EMI Test Receiver	R&S	HTWE0099	ESCI 7	100900	2023/08/22	2024/08/21
●	Ultra-Broadband Antenna	SCHWARZBECK	HTWE0119	VULB9163	546	2023/2/22	2026/2/21
●	Pre-Amplifier	SCHWARZBECK	HTWE0295	BBV 9742	/	2023/5/25	2024/5/24
●	Test Software	R&S	N/A	EMC32	N/A	N/A	N/A

● Radiated emission-Above 1GHz

Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	HTWE0122	SAC-3m-01	C11121	2023/4/17	2026/4/16
●	Spectrum Analyzer	R&S	HTWE0098	FSP40	100597	2023/08/22	2024/08/21
●	Horn Antenna	SCHWARZBECK	HTWE0126	BBHA 9120D	1011	2023/2/14	2026/2/13
●	Horn Antenna	SCHWARZBECK	HTWE0103	BBHA9170	BBHA9170472	2023/2/20	2026/2/19
●	Broadband Pre-amplifier	SCHWARZBECK	HTWE0201	BBV 9718	9718-248	2023/5/25	2024/5/24
●	Test Software	R&S	N/A	EMC32	N/A	N/A	N/A

● Electrostatic Discharge

Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	ESD Simulator	EM TEST	HTWE0500	esd NX30.1	11971	2023/5/26	2024/5/25

● Radio Frequency Electromagnetic Field

Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Anechoic Chamber	CRT	HTWE0418	8.0*5.0*4.0 m	CRTSAC845	2023/3/18	2028/3/17
●	Signal Generator	R&S	HTWE0276	SMB100A	114360	2023/5/23	2024/5/22
●	Amplifier	R&S	HTWE0277	BBA150-BC500	102664	2023/6/5	2024/6/4
●	Amplifier	R&S	HTWE0395	BBA150 D400	104197	2023/6/5	2024/6/4
●	Amplifier	R&S	HTWE0396	BBA150 E400	104198	2023/6/5	2024/6/4
●	Power Head	R&S	HTWE0278	NRP18A	101010	2023/5/23	2024/5/22
●	Power Head	R&S	HTWE0389	NRP18A	101386	2024/03/14	2025/03/13
●	Transmit Antenna	Schwarzbeck	HTWE0280	STLP9129	00044	2023/8/25	2024/8/24
●	Field Probe	ETS-LINDGREN	HTWE0321	HI-6153	00130812	2023/11/17	2024/11/16
●	Test Software	R&S	N/A	EMC32	N/A	N/A	N/A

● Electrical fast transient/burst immunity test

Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Transient immunity simulator	EM TEST	HTWE0512	compact NX5	P2125254008	2023/5/23	2024/5/22
●	3-Phase Coupling Network	EM TEST	HTWE0516	coupling NX5	P2128254484	2023/5/23	2024/5/22
○	Coupling Clamp	EM TEST	HTWE0513	CCI	P2125253835	2023/5/23	2024/5/22
●	Test Software	EM TEST	N/A	ISM IEC	N/A	N/A	N/A

● Surge immunity test

Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Transient immunity simulator	EM TEST	HTWE0512	compact NX5	P2125254008	2023/5/23	2024/5/22
●	3-Phase Coupling Network	EM TEST	HTWE0516	coupling NX5	P2128254484	2023/5/23	2024/5/22
○	4-Lines Coupling Network	EM TEST	HTWE0514	DCD 5 SR-4-1	P2128254471	2023/5/23	2024/5/22
○	8-Lines Coupling Network	EM TEST	HTWE0515	DCD 5 ST-4-1	P2128254472	2023/5/23	2024/5/22
●	Test Software	EM TEST	N/A	ISM IEC	N/A	N/A	N/A

● Radio frequency (common mode)

Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Signal Generator	IFR	HTWE0022	2023A	202304/060	2023/08/18	2024/08/17
●	Amplifier	AR	HTWE0023	75A250	302250	2023/08/18	2024/08/17
●	6db Attenuator	Bird	HTWE0025	ATT6/75	0010230A	2023/08/18	2024/08/17
●	CDN	EMTEST	HTWE0155	CDN M3/16A	0802-03	2023/08/18	2024/08/17
○	Bulk Current Injection Probe	FCC	HTWE0382	F-120-9A	193280	2023/08/18	2024/08/17
○	Em Clamp	LÜTHI	HTWE0028	EM101	35625	2023/08/18	2024/08/17
●	Test Software	AR	N/A	SW1004	N/A	N/A	N/A

Harmonic Current/ Voltage Fluctuation and Flicker/Dips

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1.	Precision Power Analyser	Newtons4th Ltd	5531(HC)	166-05780	2023/08/10	2024/08/09
2.	Impedance Network	Newtons4th Ltd	753	91G-13382	2023/08/10	2024/08/09
3.	PROGRAMMABLE AC POWER SOURCE	NF	DP105S	9309307	2023/08/10	2024/08/09
4.	PROGRAMMABLE AC POWER SOURCE	NF	DP105S	9309308	2023/08/10	2024/08/09
5.	PROGRAMMABLE AC POWER SOURCE	NF	DP105S	9309332	2023/08/10	2024/08/09

● Auxiliary Equipment

Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
○	Radio communication tester	R&S	HTWE0287	CMW500	137688-Lv	2023/08/25	2024/08/24
○	RF Communication Test Set	HP	HTWE0038	8920A	3813A10206	2023/08/22	2024/08/21
○	Digital intercom communication tester	Aeroflex	HTWE0255	3920B	1001682041	2023/08/22	2024/08/21
○	Audio analyzer	R&S	HTWE3008	UPV	101371	2023/09/29	2024/09/28

5. TEST CONDITIONS AND RESULTS

5.1. EMISSION

5.1.1. Radiated Emission

LIMIT

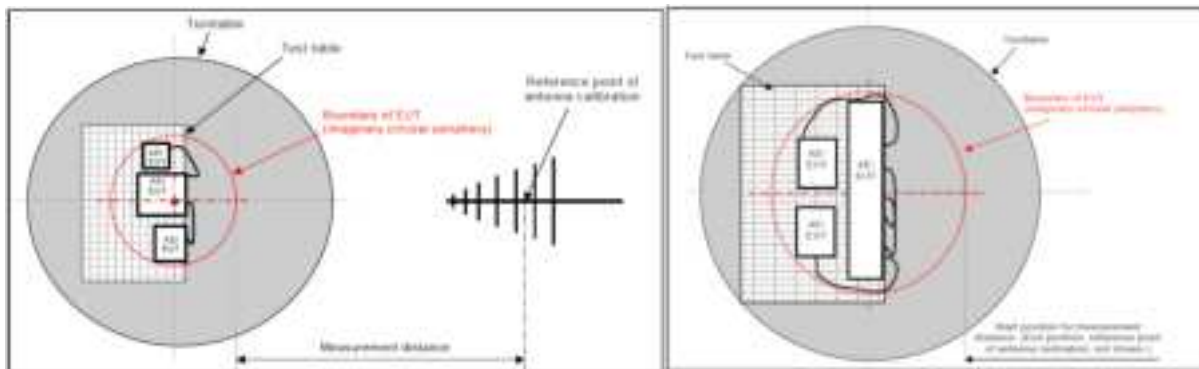
Refer to ETSI EN301489-1 Clause 8.2.3 and CENELEC EN 55032 Annex A Table A.4 & A.5

Frequency range (MHz)	Quasi-peak limitsdB μ V/m@3m
30~230	40
230~1000	47

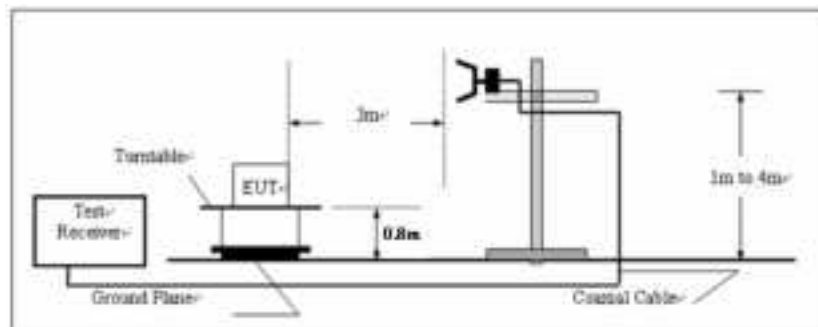
Frequency range (GHz)	Average limitsdB μ V/m@3m	Peak limitsdB μ V/m@3m
1 ~ 3	50	70
3 ~ 6	54	74

TEST CONFIGURATION

➤ below 1000MHz:



➤ Above 1000MHz



TEST PROCEDURE

Refer to ETSI EN 301 489-1 Clause 8.2.2 and CENELEC EN 55032 for the measurement methods

TEST MODE:

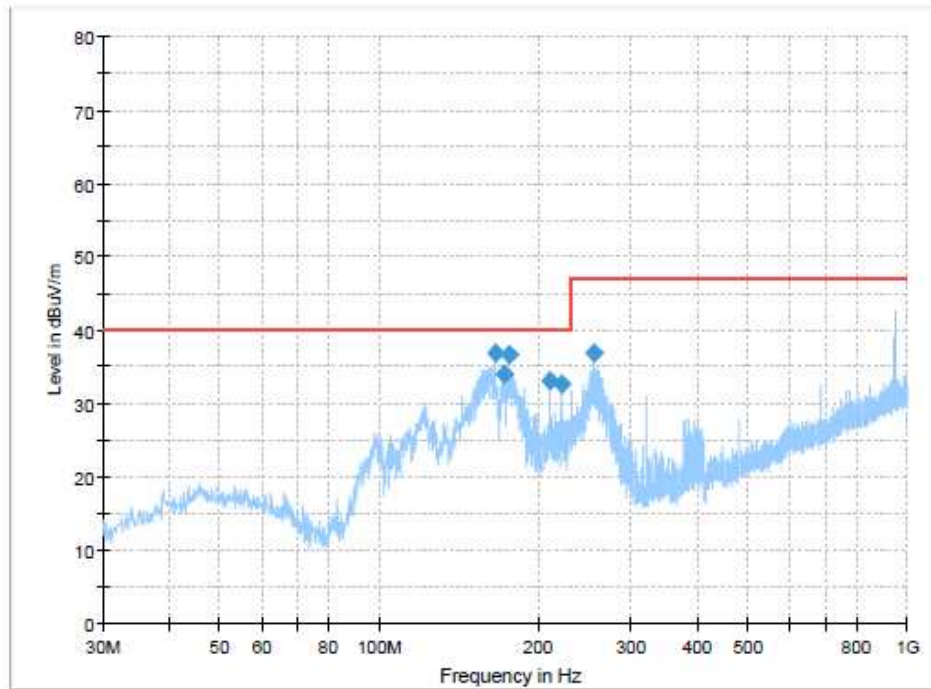
Refer to the section 4.2

TEST RESULTS

☒ Passed ☐ Not Applicable

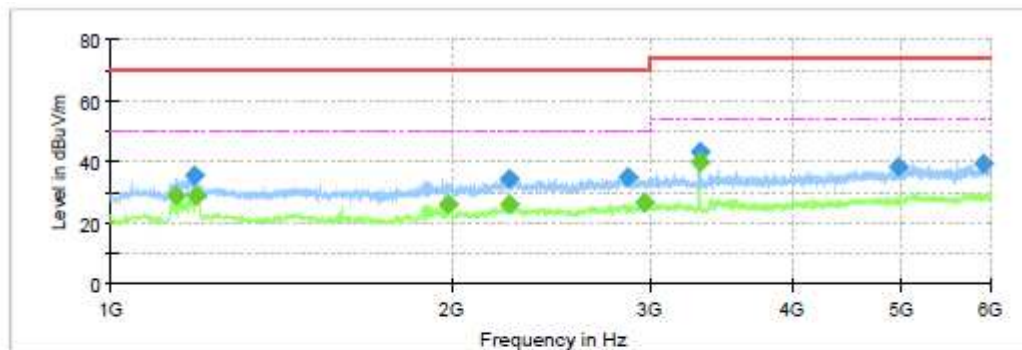
Polarization

Horizontal



Final Result

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
165.9213	36.89	40.00	3.11	100.0	H	290.0	-13.6
172.9538	34.03	40.00	5.97	300.0	H	307.0	-13.2
176.9550	36.66	40.00	3.34	100.0	H	133.0	-12.8
210.0563	32.97	40.00	7.03	100.0	H	335.0	-11.0
221.0900	32.60	40.00	7.40	100.0	H	133.0	-10.5
254.4338	36.86	47.00	10.14	100.0	H	335.0	-8.7

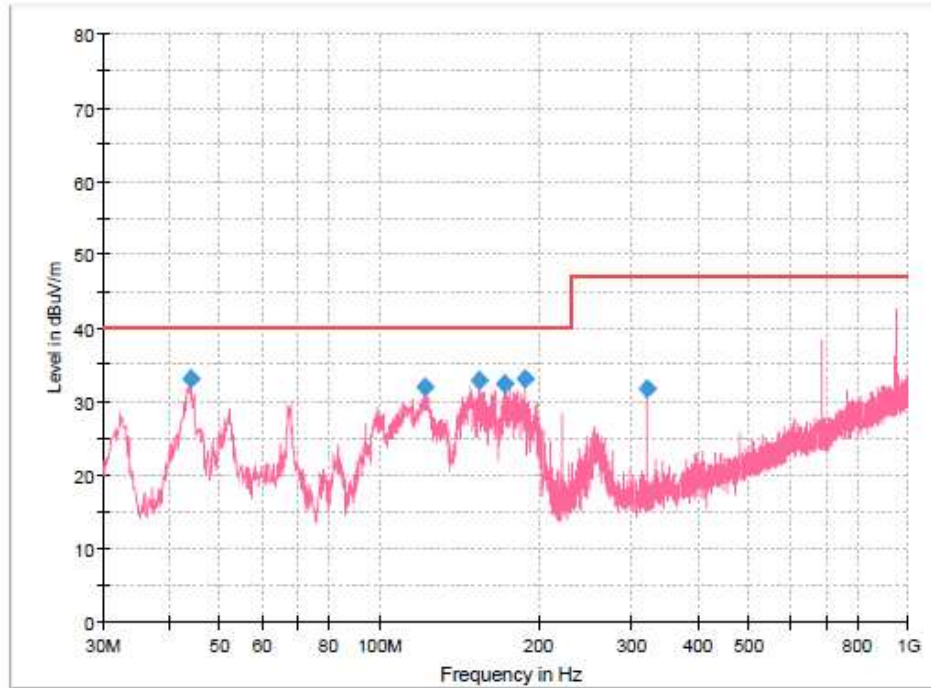


Final Result

Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1142.5000	---	28.73	50.00	21.27	150.0	H	324.0	-14.2
1186.8750	35.67	---	70.00	34.33	150.0	H	169.0	-14.0
1187.5000	---	29.14	50.00	20.86	150.0	H	151.0	-14.0
1983.1250	---	26.37	50.00	23.63	150.0	H	334.0	-12.2
2250.0000	---	26.38	50.00	23.62	150.0	H	151.0	-9.7
2250.0000	34.56	---	70.00	35.44	150.0	H	151.0	-9.7
2862.5000	34.80	---	70.00	35.20	150.0	H	188.0	-8.7
2963.7500	---	26.50	50.00	23.50	150.0	H	23.0	-8.5
3312.5000	---	40.09	54.00	13.91	150.0	H	224.0	-8.5
3312.5000	43.37	---	74.00	30.63	150.0	H	224.0	-8.5
4976.8750	38.59	---	74.00	35.41	150.0	H	179.0	-3.7
5919.3750	39.47	---	74.00	34.53	150.0	H	278.0	-1.5

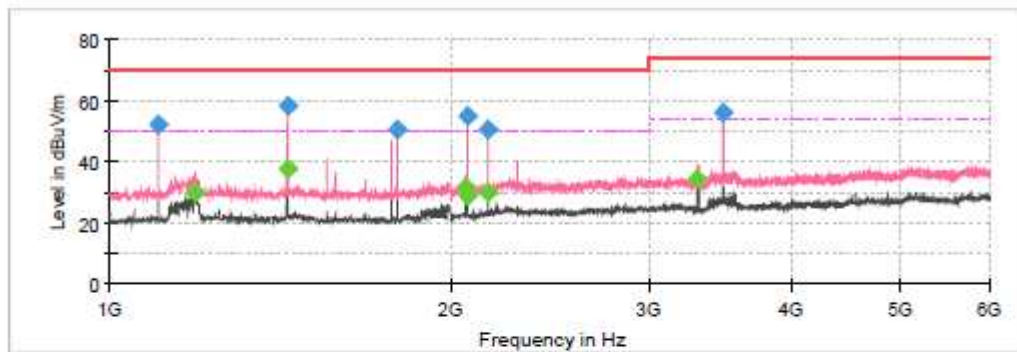
Polarization

Vertical



Final Result

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
43.9438	33.16	40.00	6.84	100.0	V	11.0	-9.0
121.6650	32.06	40.00	7.94	100.0	V	35.0	-13.0
154.7663	32.88	40.00	7.12	100.0	V	266.0	-13.9
172.5900	32.36	40.00	7.64	100.0	V	67.0	-13.2
187.9888	33.01	40.00	6.99	100.0	V	43.0	-11.5
320.0300	31.81	47.00	15.19	100.0	V	304.0	-7.0



Final Result

Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1102.5000	52.37	---	70.00	17.63	150.0	V	329.0	-14.6
1187.5000	---	29.82	50.00	20.18	150.0	V	0.0	-14.0
1433.7500	---	37.56	50.00	12.44	150.0	V	329.0	-13.1
1433.7500	58.52	---	70.00	11.48	150.0	V	329.0	-13.1
1794.3750	50.57	---	70.00	19.43	150.0	V	329.0	-13.3
2062.5000	---	31.48	50.00	18.52	150.0	V	348.0	-11.4
2068.7500	---	29.12	50.00	20.88	150.0	V	276.0	-11.3
2068.7500	54.90	---	70.00	15.10	150.0	V	276.0	-11.3
2160.0000	50.61	---	70.00	19.39	150.0	V	276.0	-10.2
2160.0000	---	30.05	50.00	19.95	150.0	V	276.0	-10.2
3311.8750	---	34.60	54.00	19.40	150.0	V	0.0	-8.5
3487.5000	55.99	---	74.00	18.01	150.0	V	294.0	-7.7

5.1.2. Conducted Emission

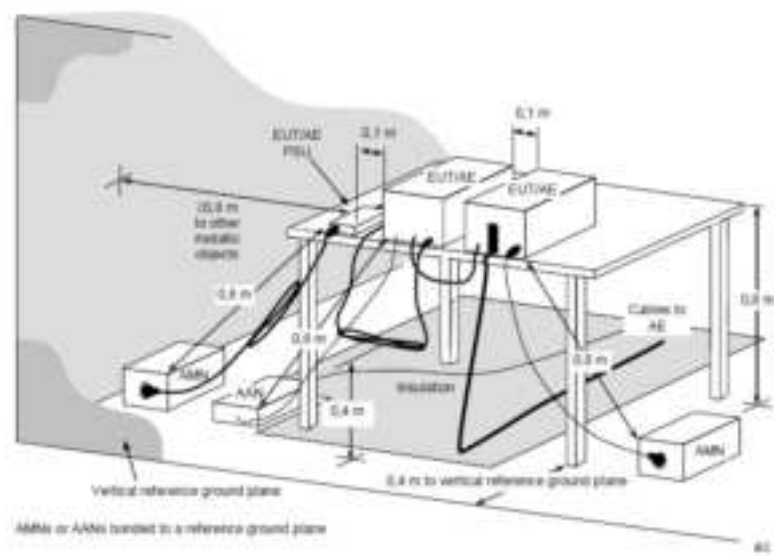
5.1.2.1. Conducted Emission (DC power ports)

LIMIT

ETSI EN 301 489-1 Clause 8.3.3, Table 5

Frequency range	Limit (quasi-peak) (dBµV)	Limit (average) (dBµV)
0,15 MHz to 0,5 MHz	79	66
0,5 MHz to 30 MHz	73	60

TEST CONFIGURATION



TEST PROCEDURE

Refer to ETSI EN 301 489-1 Clause 8.3.2 for the measurement methods

TEST MODE:

Refer to the section 4.2

TEST RESULTS

☐ Passed ☒ Not Applicable

5.1.2.2. Conducted Emission (AC Mains ports)

LIMIT

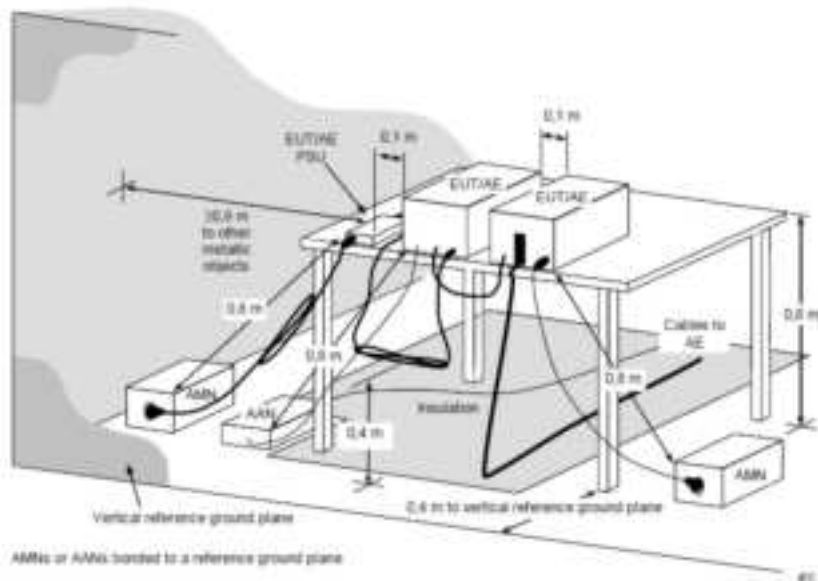
Refer to ETSI EN301489-1 Clause 8.4.3.2 and CENELEC EN 55032 Annex A.3 Table A.10

Frequency range MHz	Limits dB(μV)	
	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

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 0,15 MHz to 0,50 MHz.

TEST CONFIGURATION



TEST PROCEDURE

Refer to ETSI EN 301 489-1 Clause 8.4.2 and EN55032 Annex A.3 for the measurement methods

TEST MODE:

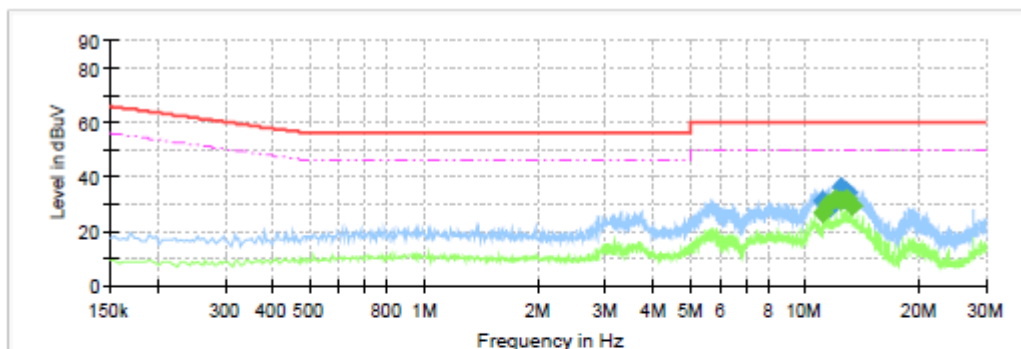
Refer to the section 4.2

TEST RESULTS

☒ Passed ☐ Not Applicable

Polarization

L1

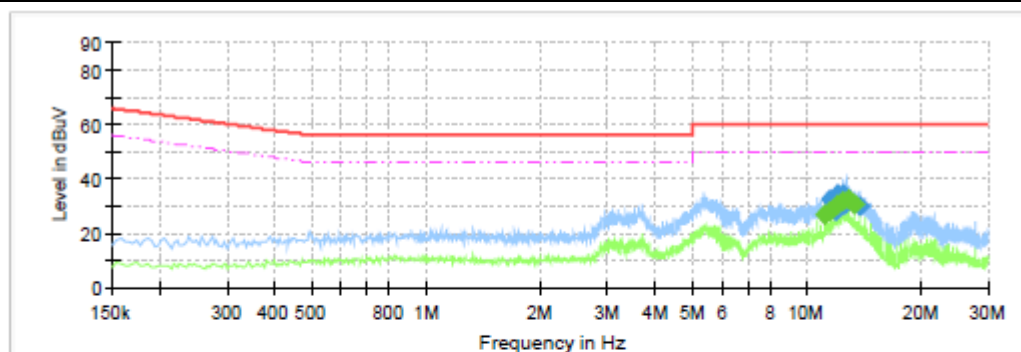


Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Corr. (dB)
11.1155	31.41	---	60.00	28.59	L1	11.2
11.1155	---	27.14	50.00	22.86	L1	11.2
11.5675	---	30.16	50.00	19.84	L1	11.2
11.6715	28.61	---	60.00	31.39	L1	11.2
12.0155	31.33	---	60.00	28.67	L1	11.2
12.0195	---	31.63	50.00	18.37	L1	11.2
12.4715	---	31.28	50.00	18.72	L1	11.2
12.4755	36.34	---	60.00	23.66	L1	11.2
12.7595	32.12	---	60.00	27.88	L1	11.3
12.9275	34.54	---	60.00	25.46	L1	11.3
12.9275	---	31.93	50.00	18.07	L1	11.3
13.3795	---	29.59	50.00	20.41	L1	11.3

Polarization

L2

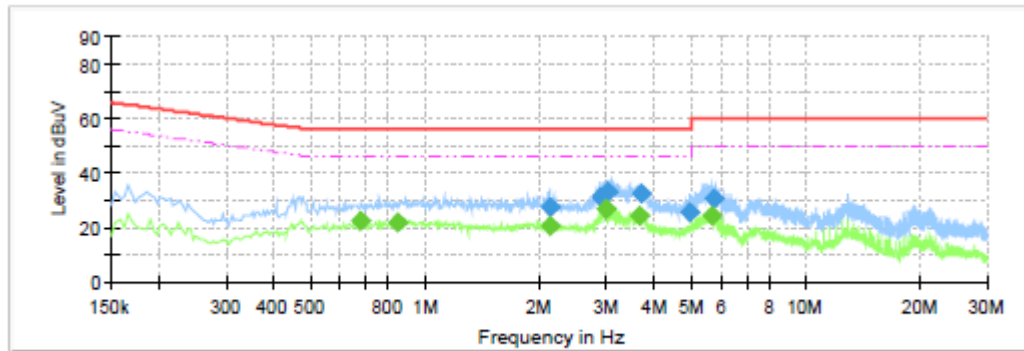


Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Corr. (dB)
11.0995	---	27.04	50.00	22.96	L2	11.2
11.5555	32.73	---	60.00	27.27	L2	11.2
11.5555	---	27.84	50.00	22.16	L2	11.2
11.8795	28.22	---	60.00	31.78	L2	11.2
12.0075	34.20	---	60.00	25.80	L2	11.2
12.0075	---	30.87	50.00	19.13	L2	11.2
12.4595	---	31.77	50.00	18.23	L2	11.2
12.4635	34.62	---	60.00	25.38	L2	11.2
12.6795	30.75	---	60.00	29.25	L2	11.2
12.9115	---	32.42	50.00	17.58	L2	11.2
13.3635	---	30.84	50.00	19.16	L2	11.2
13.8235	29.79	---	60.00	30.21	L2	11.2

Polarization

L3

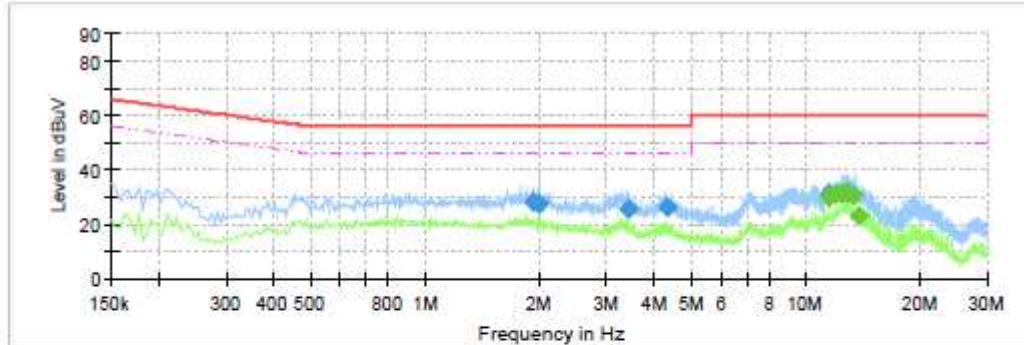


Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Corr. (dB)
0.6795	---	22.74	46.00	23.26	L3	10.7
0.8475	---	22.03	46.00	23.97	L3	10.7
2.1235	27.57	---	56.00	28.43	L3	10.7
2.1235	---	20.74	46.00	25.26	L3	10.7
2.8875	31.35	---	56.00	24.65	L3	10.7
2.9795	---	26.76	46.00	19.24	L3	10.7
3.0275	33.19	---	56.00	22.81	L3	10.7
3.6515	---	24.38	46.00	21.62	L3	10.7
3.7075	32.33	---	56.00	23.67	L3	10.7
4.9395	25.89	---	56.00	30.11	L3	10.8
5.6675	---	24.39	50.00	25.61	L3	10.8
5.7235	30.66	---	60.00	29.34	L3	10.8

Polarization

N



Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Corr. (dB)
1.9275	27.96	---	56.00	28.04	N	10.8
1.9875	27.59	---	56.00	28.41	N	10.8
3.4075	25.92	---	56.00	30.08	N	10.8
4.3115	26.24	---	56.00	29.76	N	10.8
11.5435	---	29.77	50.00	20.23	N	11.0
11.5475	31.45	---	60.00	28.55	N	11.0
11.9955	---	31.03	50.00	18.97	N	11.0
12.4515	---	31.48	50.00	18.52	N	11.0
12.9035	---	31.20	50.00	18.80	N	11.0
12.9235	31.98	---	60.00	28.02	N	11.0
13.3515	---	30.38	50.00	19.62	N	11.0
13.8115	---	22.82	50.00	27.18	N	11.0

5.1.2.3. Conducted Emission (Wired network ports)

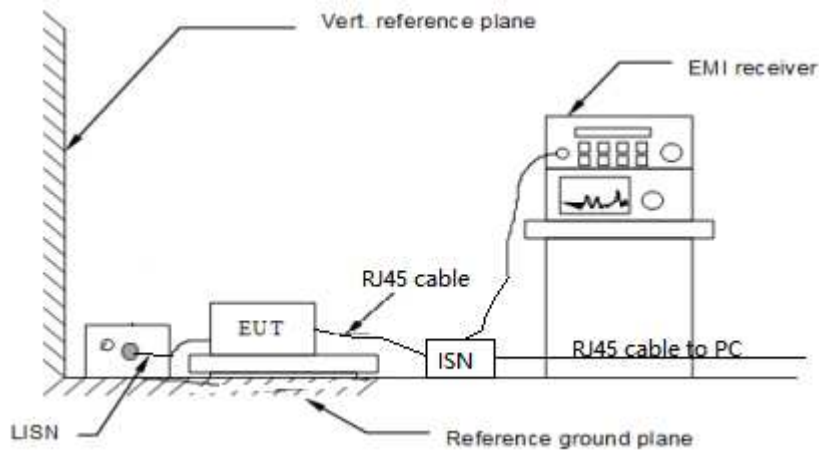
LIMIT

Refer to ETSI EN301489-1 Clause 8.7.3 and CENELEC EN 55032 Annex A.3 Table A.12

Frequency range (MHz)	Limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	84 to 74*	74 to 64*
0.5-30	74	64

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION



TEST PROCEDURE

Refer to ETSI EN 301 489-1 Clause 8.7.2 and EN 55032 Annex A.3 for the measurement methods

TEST MODE:

Refer to the section 4.2

TEST RESULTS

☐ Passed ☒ Not Applicable

5.1.3. Harmonic Current Emission

LIMIT

EN61000-3-2 Clause 7

➤ **Class A equipment**

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
$8 \leq n \leq 40$	$0,23 \frac{8}{n}$

➤ **Class B equipment**

not exceed the values given in Class A limit multiplied by a factor of 1,5

➤ **Class C equipment**

Active input power >25 W

Harmonic 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

Active input power ≤ 25 W

Harmonic 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
$13 \leq n \leq 39$ (odd harmonics only)	$\frac{3,85}{n}$	See Table 1

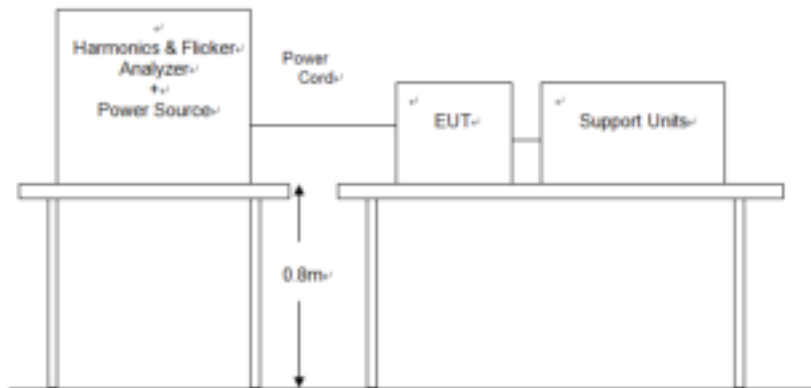
or

the third harmonic current, expressed as a percentage of the fundamental current, shall not exceed 86 % and the fifth harmonic current shall not exceed 61 %. Also, the waveform of the input current shall be such that it reaches the 5 % current threshold before or at 60°, has its peak value before or at 65° and does not fall below the 5 % current threshold before 90°, referenced to any zero crossing of the fundamental supply voltage. The current threshold is 5 % of the highest absolute peak value that occurs in the measurement window, and the phase angle measurements are made on the cycle that includes this absolute peak value

➤ **Class D equipment**

Harmonic 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
$13 \leq n \leq 39$ (odd harmonics only)	$\frac{3,85}{n}$	See Table 1

TEST CONFIGURATION



TEST PROCEDURE

Refer to EN61000-3-2 for the measurement methods.

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

Harmonics Results L1							
Harmonic	Status	Avg (A)	Avg L(A)	Avg %ofL	Peak (A)	Peak L(A)	Peak %ofL
1	PASS	0.0698705	No Limit	N/A	0.0731002	No Limit	N/A
2	PASS	0.0124272	1.08	1.15066	0.0141857	1.62	0.875659
3	PASS	0.0611583	2.3	2.65906	0.0639718	3.45	1.85425
4	PASS	0.0168818	0.43	3.92599	0.0188313	0.645	2.91959
5	PASS	0.0506672	1.14	4.4445	0.0532807	1.71	3.11583
6	PASS	0.0167137	0.3	5.57123	0.0188468	0.45	4.18817
7	PASS	0.038248	0.77	4.96727	0.0418943	1.155	3.62721
8	PASS	0.0168253	0.23	7.31534	0.0186931	0.345	5.41828
9	PASS	0.0269343	0.4	6.73357	0.0296206	0.6	4.93677
10	PASS	0.0166214	0.184	9.03338	0.0182375	0.276	6.60779
11	PASS	0.0219324	0.33	6.64619	0.0245297	0.495	4.95549
12	PASS	0.0166986	0.153333	10.8904	0.0183946	0.23	7.99767
13	PASS	0.0216702	0.21	10.3192	0.0238964	0.315	7.58616
14	PASS	0.0169129	0.131429	12.8685	0.0188886	0.197143	9.58117
15	PASS	0.0207657	0.15	13.8438	0.0232947	0.225	10.3532
16	PASS	0.0167846	0.115	14.5953	0.0185926	0.1725	10.7783
17	PASS	0.0199904	0.132353	15.1039	0.0222564	0.198529	11.2106
18	PASS	0.0166258	0.102222	16.2643	0.0183688	0.153333	11.9796
19	PASS	0.0187684	0.118421	15.8489	0.0206398	0.177632	11.6194
20	PASS	0.0167837	0.092	18.2431	0.0190072	0.138	13.7734
21	PASS	0.0180139	0.107143	16.813	0.0212157	0.160714	13.2009
22	PASS	0.016654	0.0836364	19.9124	0.0191533	0.125455	15.2671
23	PASS	0.0181216	0.0978261	18.5243	0.0201067	0.146739	13.7023
24	PASS	0.0167142	0.0766667	21.8011	0.0193133	0.115	16.7942
25	PASS	0.0181817	0.09	20.2019	0.0200262	0.135	14.8342
26	PASS	0.0167345	0.0707692	23.6466	0.0182948	0.106154	17.2343
27	PASS	0.0176308	0.0833333	21.157	0.0199826	0.125	15.9861
28	PASS	0.0167552	0.0657143	25.497	0.0190537	0.0985714	19.3299
29	PASS	0.0174908	0.0775862	22.5436	0.0200327	0.116379	17.2133
30	PASS	0.0166675	0.0613333	27.1752	0.0189592	0.092	20.6079
31	PASS	0.0173105	0.0725806	23.85	0.0192208	0.108871	17.6547
32	PASS	0.0166982	0.0575	29.0403	0.0184467	0.08625	21.3874
33	PASS	0.0172716	0.0681818	25.3316	0.0197032	0.102273	19.2654
34	PASS	0.0168743	0.0541176	31.1807	0.0186203	0.0811765	22.938
35	PASS	0.0171741	0.0642857	26.7153	0.0189205	0.0964286	19.6212
36	PASS	0.0167171	0.0511111	32.7074	0.0187008	0.0766667	24.3924
37	PASS	0.0170791	0.0608108	28.0856	0.018641	0.0912162	20.4361
38	PASS	0.0169279	0.0484211	34.9597	0.0186941	0.0726316	25.7383
39	PASS	0.0172685	0.0576923	29.9321	0.0193143	0.0865385	22.3187
40	PASS	0.0167648	0.046	36.4452	0.0186732	0.069	27.0626

Harmonics Results L2							
Harmonic	Status	Avg (A)	Avg L(A)	Avg %ofL	Peak (A)	Peak L(A)	Peak %ofL
1	PASS	0.17413	No Limit	N/A	0.176622	No Limit	N/A
2	PASS	0.00947423	1.08	0.877243	0.010909	1.62	0.673395
3	PASS	0.0131113	2.3	0.570057	0.0145581	3.45	0.421974
4	PASS	0.0129256	0.43	3.00595	0.0145653	0.645	2.25819
5	PASS	0.0127916	1.14	1.12207	0.0138167	1.71	0.807992
6	PASS	0.0127789	0.3	4.25963	0.0142449	0.45	3.16554
7	PASS	0.0128879	0.77	1.67375	0.0144171	1.155	1.24824
8	PASS	0.0129611	0.23	5.63526	0.0145759	0.345	4.22491
9	PASS	0.0127621	0.4	3.19052	0.0139372	0.6	2.32286
10	PASS	0.0128804	0.184	7.00024	0.0142096	0.276	5.14842
11	PASS	0.0128768	0.33	3.90205	0.0147982	0.495	2.98953
12	PASS	0.0127999	0.153333	8.34779	0.0143364	0.23	6.23323
13	PASS	0.0127932	0.21	6.09198	0.0147855	0.315	4.69382
14	PASS	0.0129583	0.131429	9.85959	0.0143373	0.197143	7.27257
15	PASS	0.0128834	0.15	8.58892	0.014243	0.225	6.33024
16	PASS	0.01286	0.115	11.1826	0.0144434	0.1725	8.37301
17	PASS	0.0128931	0.132353	9.74142	0.014166	0.198529	7.13547
18	PASS	0.0127448	0.102222	12.4677	0.0144337	0.153333	9.41328
19	PASS	0.0128328	0.118421	10.8365	0.0145423	0.177632	8.18678
20	PASS	0.0129282	0.092	14.0524	0.0144165	0.138	10.4468
21	PASS	0.012877	0.107143	12.0185	0.0144362	0.160714	8.98252
22	PASS	0.0127892	0.0836364	15.2914	0.0147985	0.125455	11.7959
23	PASS	0.0128846	0.0978261	13.171	0.0144741	0.146739	9.86384
24	PASS	0.0128277	0.0766667	16.7318	0.0142525	0.115	12.3935
25	PASS	0.0127839	0.09	14.2043	0.0139385	0.135	10.3248
26	PASS	0.0128867	0.0707692	18.2094	0.0145697	0.106154	13.7251
27	PASS	0.0127919	0.0833333	15.3503	0.0138688	0.125	11.0951
28	PASS	0.0127569	0.0657143	19.4127	0.01387	0.0985714	14.071
29	PASS	0.0128825	0.0775862	16.6041	0.0146539	0.116379	12.5915
30	PASS	0.0128657	0.0613333	20.9767	0.0147623	0.092	16.046
31	PASS	0.0129103	0.0725806	17.7875	0.0143615	0.108871	13.1913
32	PASS	0.0128002	0.0575	22.2612	0.0144944	0.08625	16.8051
33	PASS	0.0127926	0.0681818	18.7625	0.0140271	0.102273	13.7154
34	PASS	0.0129978	0.0541176	24.0177	0.0146087	0.0811765	17.9962
35	PASS	0.01296	0.0642857	20.16	0.014818	0.0964286	15.3668
36	PASS	0.0129345	0.0511111	25.3067	0.0145529	0.0766667	18.982
37	PASS	0.0128046	0.0608108	21.0565	0.0143267	0.0912162	15.7063
38	PASS	0.01283	0.0484211	26.4967	0.0141279	0.0726316	19.4514
39	PASS	0.0127539	0.0576923	22.1068	0.0143054	0.0865385	16.5307
40	PASS	0.0128406	0.046	27.9142	0.0142109	0.069	20.5955

Harmonics Results L3							
Harmonic	Status	Avg (A)	Avg L(A)	Avg %ofL	Peak (A)	Peak L(A)	Peak %ofL
1	PASS	0.0667833	No Limit	N/A	0.0695244	No Limit	N/A
2	PASS	0.00948889	1.08	0.878601	0.010914	1.62	0.673705
3	PASS	0.0592192	2.3	2.57475	0.0623544	3.45	1.80738
4	PASS	0.0128182	0.43	2.98098	0.0146361	0.645	2.26917
5	PASS	0.0480976	1.14	4.21909	0.0501013	1.71	2.9299
6	PASS	0.012867	0.3	4.28899	0.0148283	0.45	3.29518
7	PASS	0.0357059	0.77	4.63714	0.0380425	1.155	3.29372
8	PASS	0.0127378	0.23	5.53817	0.0140457	0.345	4.07122
9	PASS	0.0241484	0.4	6.03711	0.0259854	0.6	4.33089
10	PASS	0.0127359	0.184	6.92167	0.0146209	0.276	5.29743
11	PASS	0.0186359	0.33	5.64723	0.0204833	0.495	4.13804
12	PASS	0.0129551	0.153333	8.44897	0.0144402	0.23	6.27835
13	PASS	0.0186782	0.21	8.8944	0.0205747	0.315	6.53165
14	PASS	0.0129292	0.131429	9.83746	0.014839	0.197143	7.52702
15	PASS	0.017412	0.15	11.608	0.0194426	0.225	8.64114
16	PASS	0.0128002	0.115	11.1306	0.014549	0.1725	8.43419
17	PASS	0.0163629	0.132353	12.3631	0.0178878	0.198529	9.01015
18	PASS	0.0127455	0.102222	12.4684	0.0146308	0.153333	9.54185
19	PASS	0.0154489	0.118421	13.0458	0.0172597	0.177632	9.7166
20	PASS	0.0128974	0.092	14.0189	0.0142107	0.138	10.2976
21	PASS	0.0142649	0.107143	13.3139	0.0158844	0.160714	9.88365
22	PASS	0.0126936	0.0836364	15.1772	0.0142349	0.125455	11.3466
23	PASS	0.0143834	0.0978261	14.703	0.0159858	0.146739	10.894
24	PASS	0.0128584	0.0766667	16.7718	0.0143408	0.115	12.4703
25	PASS	0.0145337	0.09	16.1485	0.0167415	0.135	12.4011
26	PASS	0.012948	0.0707692	18.2961	0.01432	0.106154	13.4898
27	PASS	0.013825	0.0833333	16.59	0.0158685	0.125	12.6948
28	PASS	0.0127412	0.0657143	19.3887	0.0143604	0.0985714	14.5685
29	PASS	0.0136542	0.0775862	17.5988	0.01522	0.116379	13.0779
30	PASS	0.0126955	0.0613333	20.6992	0.0139359	0.092	15.1477
31	PASS	0.0134546	0.0725806	18.5374	0.0148921	0.108871	13.6787
32	PASS	0.012701	0.0575	22.0887	0.0142703	0.08625	16.5453
33	PASS	0.0133123	0.0681818	19.5247	0.0147832	0.102273	14.4546
34	PASS	0.0127678	0.0541176	23.5927	0.0140973	0.0811765	17.3663
35	PASS	0.0131878	0.0642857	20.5143	0.0146554	0.0964286	15.1982
36	PASS	0.0128812	0.0511111	25.2024	0.0141207	0.0766667	18.4183
37	PASS	0.0131342	0.0608108	21.5985	0.0145143	0.0912162	15.912
38	PASS	0.0128267	0.0484211	26.4899	0.0149417	0.0726316	20.572
39	PASS	0.0130696	0.0576923	22.654	0.0148625	0.0865385	17.1745
40	PASS	0.0127951	0.046	27.8155	0.0143613	0.069	20.8135

5.1.4. Voltage Fluctuation and Flicker

LIMIT

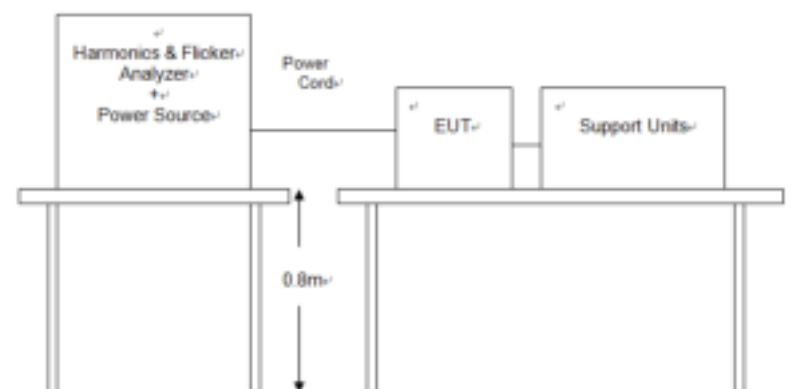
Refer to EN61000-3-3

- the value of Pst shall not be greater than 1,0;
- the value of Plt shall not be greater than 0,65;
- the value of d(t) during a voltage change shall not exceed 3,3 % for more than 500 ms;
- the relative steady-state voltage change, dc, shall not exceed 3,3 %;
- the maximum relative voltage change dmax, 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.
 - 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.

In the case of equipment having several separately controlled circuits in accordance with 6.6, limits b) and c) shall apply only if there is delayed or manual restart after a power supply interruption; for all equipment with automatic switching which is energised immediately on restoration of supply after a power supply interruption, limits a) shall apply; for all equipment with manual switching, limits b) or c) shall apply depending on the rate of switching.

Pst and Plt requirements shall not be applied to voltage changes caused by manual switching.

TEST CONFIGURATION



TEST PROCEDURE

Refer to EN61000-3-3 for the measurement methods.

TEST MODE:

Refer to the section 4.2

TEST RESULTS

☒ Passed ☐ Not Applicable

Flicker Test Results L1								
PST no.	Status	DC (%)	Dmax (%)	Tmax (s)	PST	PST Lim	PLT	PLT Lim
1	Phase1: PASS	0.0127	0.037003	0	0.08226	1	0.08226	N/A
2	Phase1: PASS	0.0127	0.042886	0	0.08226	1	0.08226	N/A
3	Phase1: PASS	0.0127	0.042886	0	0.08226	1	0.08226	N/A
4	Phase1: PASS	0.0127	0.049138	0	0.08226	1	0.08226	N/A
5	Phase1: PASS	0.0127	0.049138	0	0.08226	1	0.08226	N/A
6	Phase1: PASS	0.0127	0.049138	0	0.08226	1	0.08226	N/A
7	Phase1: PASS	0.0127	0.056136	0	0.08226	1	0.08226	N/A
8	Phase1: PASS	0.0127	0.056136	0	0.08226	1	0.08226	N/A
9	Phase1: PASS	0.0127	0.056136	0	0.08226	1	0.08226	N/A
10	Phase1: PASS	0.0127	0.056136	0	0.08226	1	0.08226	N/A
11	Phase1: PASS	0.0127	0.056136	0	0.08226	1	0.08226	N/A
12	Phase1: PASS	0.0127	0.056136	0	0.08226	1	0.08226	0.65

Flicker Test Results L2								
PST no.	Status	DC (%)	Dmax (%)	Tmax (s)	PST	PST Lim	PLT	PLT Lim
1	Phase2: PASS	0.00031	0.0561	0	0.08226	1	0.08226	N/A
2	Phase2: PASS	0.00031	0.0561	0	0.08226	1	0.08226	N/A
3	Phase2: PASS	0.00031	0.0561	0	0.08226	1	0.08226	N/A
4	Phase2: PASS	0.00031	0.0561	0	0.08226	1	0.08226	N/A
5	Phase2: PASS	0.00031	0.0561	0	0.08226	1	0.08226	N/A
6	Phase2: PASS	0.00031	0.099784	0	0.08226	1	0.08226	N/A
7	Phase2: PASS	0.00031	0.099784	0	0.08226	1	0.08226	N/A
8	Phase2: PASS	0.00031	0.099784	0	0.08226	1	0.08226	N/A
9	Phase2: PASS	0.00031	0.099784	0	0.08226	1	0.08226	N/A
10	Phase2: PASS	0.00031	0.099784	0	0.08226	1	0.08226	N/A
11	Phase2: PASS	0.00031	0.099784	0	0.08226	1	0.08226	N/A
12	Phase2: PASS	0.00031	0.099784	0	0.08226	1	0.08226	0.65

Flicker Test Results L3								
PST no.	Status	DC (%)	Dmax (%)	Tmax (s)	PST	PST Lim	PLT	PLT Lim
1	Phase3: PASS	0.01105	0.152051	0	0.08226	1	0.08226	N/A
2	Phase3: PASS	0.01105	0.152051	0	0.08226	1	0.08226	N/A
3	Phase3: PASS	0.01105	0.152051	0	0.08226	1	0.08226	N/A
4	Phase3: PASS	0.01105	0.152051	0	0.08226	1	0.08226	N/A
5	Phase3: PASS	0.01105	0.152051	0	0.08226	1	0.08226	N/A
6	Phase3: PASS	0.01105	0.194037	0	0.08226	1	0.08226	N/A
7	Phase3: PASS	0.01105	0.194037	0	0.08226	1	0.08226	N/A
8	Phase3: PASS	0.01105	0.194037	0	0.08226	1	0.08226	N/A
9	Phase3: PASS	0.01105	0.194037	0	0.08226	1	0.08226	N/A
10	Phase3: PASS	0.01105	0.194037	0	0.08226	1	0.08226	N/A
11	Phase3: PASS	0.01105	0.36217	0	0.087111	1	0.082725	N/A
12	Phase3: PASS	0.01105	0.36217	0	0.08226	1	0.082686	0.65

5.2. IMMUNITY

Standard	Performance criteria		
	Continuous phenomena*1	Transient phenomena *2	Transient phenomena*3
EN301 489-17	A	B	C

Note:

*1: test item include Radio frequency electromagnetic field, Radio frequency common mode

*2: test item include Electrostatic discharge, Fast transients common mode, Surge, Voltage dips

*3: test item include Voltage interruption

EN301489-17**General performance criteria**

- Performance criteria A for immunity tests with phenomena of a continuous nature;
- Performance criteria B for immunity tests with phenomena of a transient nature;
- Performance criteria C for immunity tests with power interruptions exceeding a certain time.

NOTE: Whether a phenomenon is considered transient, continuous or otherwise is indicated in the test procedures for the phenomenon in ETSI EN 301 489-1, clause 9.

Criteria	During test	After test
A	Shall operate as intended. (see note). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance. Shall be no loss of function. Shall be no loss of critical stored data.
B	May be loss of function.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no loss of critical stored data.
C	May be loss of function.	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no loss of critical stored data.
NOTE: For equipment that supports a PER or FER, the minimum performance level shall be a PER or FER less than or equal to 10 %. For equipment that does not support a PER or a FER, the minimum performance level shall be no loss of the wireless transmission function needed for the intended use of the equipment.		

Performance criteria for Continuous phenomena

The performance criteria A shall apply.

Where the EUT is a transmitter in standby mode, unintentional transmission shall not occur during the test.

Where the EUT is a transceiver in receive mode, unintentional transmission shall not occur during the test.

Performance criteria for Transient phenomena

The performance criteria B shall apply, except for voltage dips greater than or equal to 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply.

Where the EUT is a transmitter in standby mode, unintentional transmission shall not occur as a result of the application of the test.

Where the EUT is a transceiver in receive mode, unintentional transmission shall not occur as a result of the application of the test.

TEST RESULTS

☒ Passed ☐ Not Applicable

Test mode		S*			
Type	Type of discharge	Discharge voltage (kV)	Observations Performance	Criteria Level	Result
Direct	Contact discharge	±2	No degradation in performance of the EUT was observed (A)	B	Pass
		±4	A	B	
	Air discharge	±2	A	B	
		±4	A	B	
		±8	A	B	
Indirect	HCP (6 sides)	±2	A	B	Pass
		±4	A	B	
	VCP (4 sides)	±2	A	B	
		±4	A	B	

Contact discharge-Yellow, Air discharge-Red



5.2.2. Radio frequency electromagnetic field

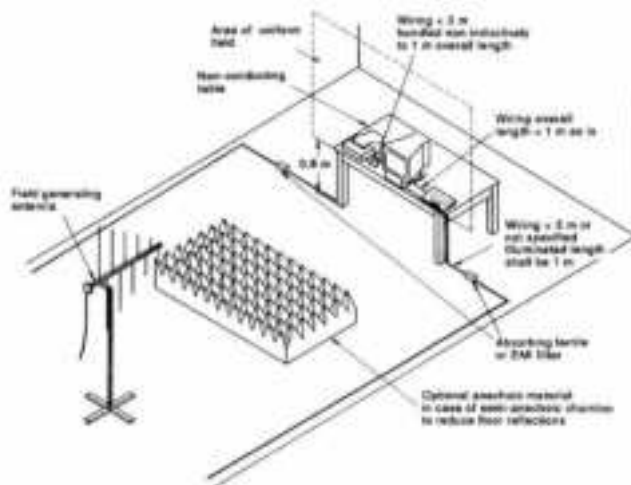
PERFORMANCE CRITERION

Refer to the Clause 5.2

TEST LEVEL

Level	3 V/m (measured unmodulated)
Frequency range	80MHz~6000MHz, 1% frequency increment, dwell time=3seconds
Modulation signal	1000Hz Sinusoidal audio signal, 80% Amplitude modulation, If the wanted signal is modulated at 1 000 Hz, then an audio signal of 400 Hz shall be used

TEST CONFIGURATION



TEST PROCEDURE

Refer to ETSI EN 301 489-1 Clause 9.2.2 and EN 61000-4-3 for the measurement methods.

TEST MODE

Refer to the section 4.2

TEST RESULTS

☒ Passed ☐ Not Applicable

Test mode:	S*		
Antenna Polarity	Observations (Performance Criterion)	Criteria Level	Result
Horizontal / Vertical	No degradation in performance of the EUT was observed (A)	A	Pass

5.2.3. Fast Transients Common Mode

PERFORMANCE CRITERION

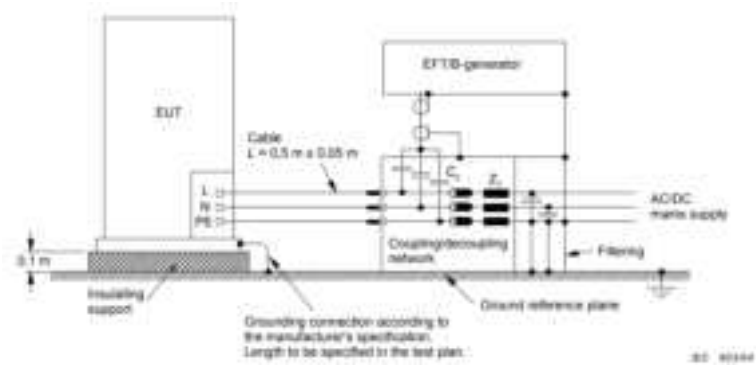
Refer to the Clause 5.2

TEST LEVEL

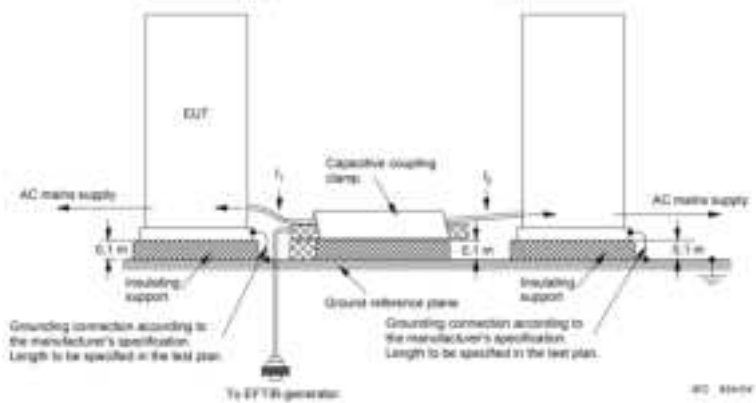
Level	AC Main power input port: 1kV DC power input port: 0.5kV Signal port, wired network port, control port: 0.5kV
Modulation signal	Repetition rate: 5kHz, Tr/Td: 5/50ns; Burst duration: 15ms; Burst period: 300ms

TEST CONFIGURATION

AC Main / DC power input port:



Telecommunication port:



TEST PROCEDURE

Refer to ETSI EN 301 489-1 Clause 9.4.2 and EN 61000-4-4 for the measurement methods.

TEST MODE

Refer to the section 4.2

TEST RESULTS

☒ Passed ☐ Not Applicable

Refer to the below test data:

Test mode:		All mode			
Port	Lead under Test	Coupling Direct / Clamp	Observations (Performance Criterion)	Criteria Level	Result
AC Power Port	L1	Direct	<i>No degradation in performance of the EUT was observed (A)</i>	B	Pass
	L2	Direct	# (A)	B	Pass
	L3	Direct	# (A)	B	Pass
	L1-PE	Direct	# (A)	B	Pass
	L2-PE	Direct	# (A)	B	Pass
	L3-PE	Direct	# (A)	B	Pass
	L1-L2-L3-PE	Direct	# (A)	B	Pass
Telecom port	Signal Cable	Clamp	# (A)	B	Pass

Note:

#: No degradation in performance of the EUT was observed

5.2.4. Surge

PERFORMANCE CRITERION

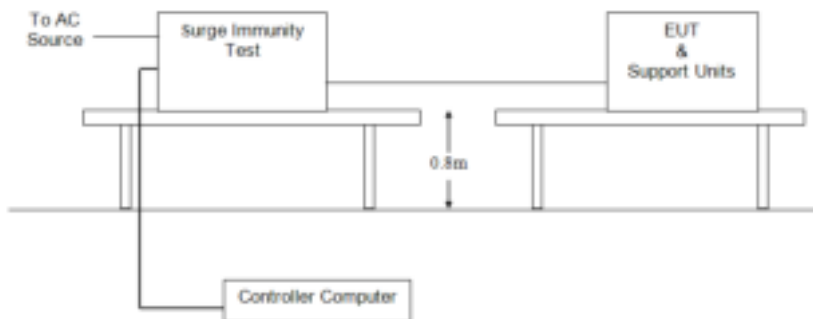
Refer to the Clause 5.2

TEST LEVEL

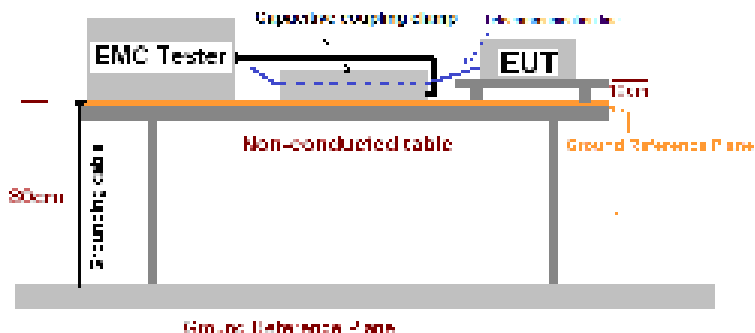
Level	AC Main power port: 1kV line to line, 2kV line to ground Wired network port: 0.5kV for indoor cable, 1kV for outdoor cable
Modulation signal	Tr/Th:1.2/50μs, Interval: 60 seconds, Phase: Sync

TEST CONFIGURATION

AC Main power input port:



Telecommunication port:



TEST PROCEDURE

Refer to ETSI EN 301 489-1 Clause 9.8.2 and EN 61000-4-5 for the measurement methods.

TEST MODE

Refer to the section 4.2

TEST RESULTS

☒ Passed ☐ Not Applicable

Refer to the below test data:

Test mode:		S*			
Port	Lead under Test	Phase	Observations (Performance Criterion)	Criteria Level	Result
AC Power Port	L1	0°	<i>No degradation in performance of the EUT was observed (A)</i>	B	Pass
		90°	# (A)	B	Pass
		180°	# (A)	B	Pass
		270°	# (A)	B	Pass
AC Power Port	L2	0°	# (A)	B	Pass
		90°	# (A)	B	Pass
		180°	# (A)	B	Pass
		270°	# (A)	B	Pass
AC Power Port	L3	0°	# (A)	B	Pass
		90°	# (A)	B	Pass
		180°	# (A)	B	Pass
		270°	# (A)	B	Pass
AC Power Port	L1-PE	0°	# (A)	B	Pass
		90°	# (A)	B	Pass
		180°	# (A)	B	Pass
		270°	# (A)	B	Pass
AC Power Port	L2-PE	0°	# (A)	B	Pass
		90°	# (A)	B	Pass
		180°	# (A)	B	Pass
		270°	# (A)	B	Pass
AC Power Port	L3-PE	0°	# (A)	B	Pass
		90°	# (A)	B	Pass
		180°	# (A)	B	Pass
		270°	# (A)	B	Pass

Note:

#: No degradation in performance of the EUT was observed

5.2.5. Radio frequency common mode

PERFORMANCE CRITERION

Refer to the Clause 5.2

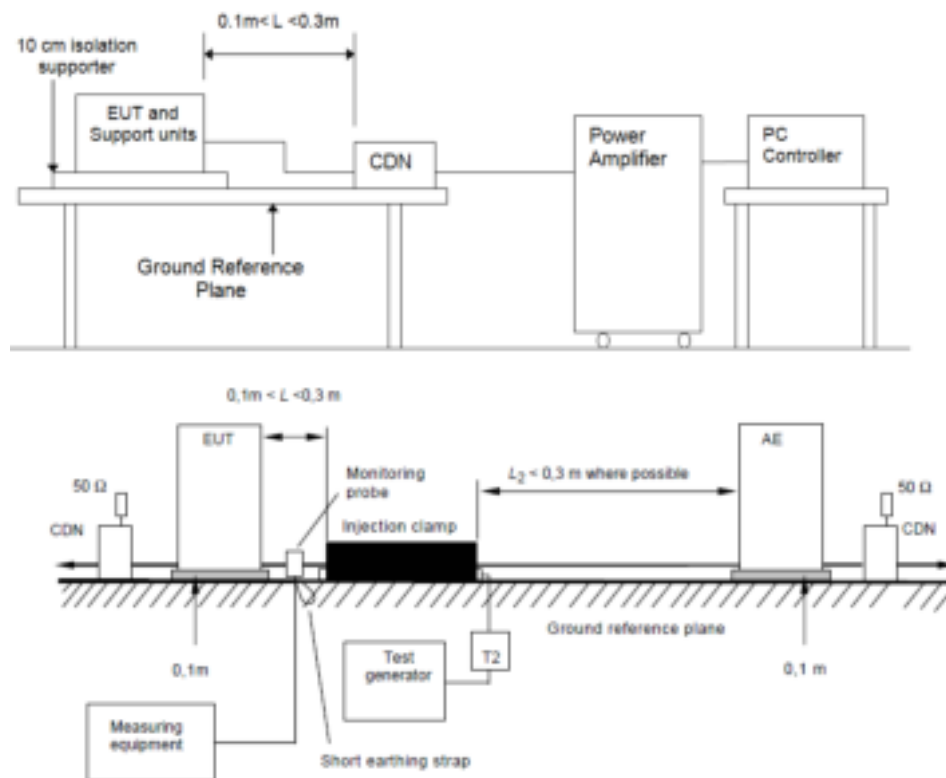
TEST LEVEL

Level	3Vrms
Frequency range	0.15MHz ~ 80MHz, 1% frequency increment, dwell time=3seconds
Modulation signal	1000Hz Sinusoidal audio signal, 80% Amplitude modulation, If the wanted signal is modulated at 1 000 Hz, then an audio signal of 400 Hz shall be used

EN55035

Level	150kHz to 10MHz: 3Vrms 10MHz to 30MHz: 3V to 1Vrms 30MHz to 80MHz: 1Vrms
Modulation signal specification	1kHz for AM modulation, 80% Amplitude modulation, 1% increment, dwell time=3seconds

TEST CONFIGURATION



TEST PROCEDURE

Refer to ETSI EN 301 489-1 Clause 9.5.2 and EN 61000-4-6 for the measurement methods.

TEST MODE

Refer to the section 4.2

TEST RESULTS

☒ Passed ☐ Not Applicable

Test mode:	All mode		
Injected Position	Observations (Performance Criterion)	Criteria Level	Result
AC Mains	<i>No degradation in performance of the EUT was observed. (A)</i>	A	Pass
Signal Cable	A	A	Pass

5.2.6. Voltage dips and interruptions

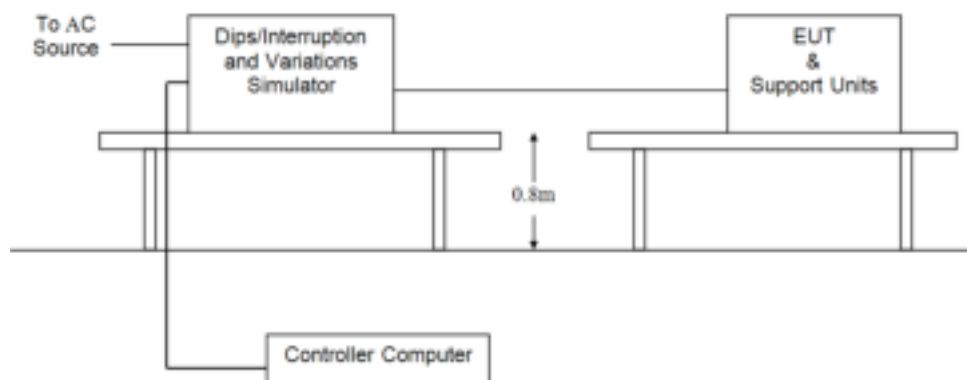
PERFORMANCE CRITERION

Refer to the Clause 5.2

TEST LEVEL

Level	0% of VT(Supply Voltage) for 0.5 period 0% of VT(Supply Voltage) for 1.0 period 70% of VT(Supply Voltage) for 25 period 0% of VT(Supply Voltage) for 250 period
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TEST CONFIGURATION



TEST PROCEDURE

Refer to ETSI EN 301 489-1 Clause 9.7.2 and EN 61000-4-11 for the measurement methods.

TEST MODE

Refer to the section 4.2

TEST RESULTS

☒ Passed ☐ Not Applicable

Test mode:		S*			
Test Voltage %	Duration periods	Phase angle	Observations (Performance Criterion)	Criteria Level	Result
0	0.5	0°, 90°, 180°, 270°	No degradation in performance of the EUT was observed. (A)	B	Pass
0	1.0	0°, 90°, 180°, 270°	During the testing process, the power was turned off, and after the experiment, the function can be manually restored to normal. (C)	C	Pass
70	25	0°, 90°, 180°, 270°	C	C	Pass
0	250	0°, 90°, 180°, 270°	C	C	Pass

5.2.7. Transients and Surges in Vehicular Environment

PERFORMANCE CRITERION

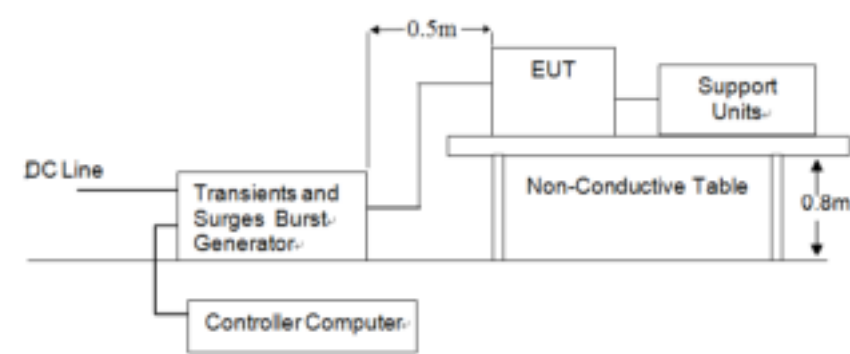
Standard	Performance criteria
EN301489-17	TT, TR for Pulses 1, 2a, 2b, 4; CT, CR for Pulses 3a, 3b

TEST LEVEL

Pulses 1	<table><tr><th colspan="3">Table 2 — Parameters for test pulse 1</th></tr><tr><th>Parameters</th><th>Nominal 12 V system</th><th>Nominal 24 V system</th></tr><tr><td>U_b</td><td>~75 V to ~150 V</td><td>~300 V to ~600 V</td></tr><tr><td>R_1</td><td>10 Ω</td><td>50 Ω</td></tr><tr><td>t_d</td><td>2 ms</td><td>1 ms</td></tr><tr><td>t_r</td><td>(1 $\frac{0}{-0.5}$) μs</td><td>(3 $\frac{0}{-1.5}$) μs</td></tr><tr><td>t_1^*</td><td colspan="2">≥ 0.5 s</td></tr><tr><td>t_2</td><td colspan="2">200 ms</td></tr><tr><td>t_3^*</td><td colspan="2">≤ 100 μs</td></tr></table>	Table 2 — Parameters for test pulse 1			Parameters	Nominal 12 V system	Nominal 24 V system	U_b	~75 V to ~150 V	~300 V to ~600 V	R_1	10 Ω	50 Ω	t_d	2 ms	1 ms	t_r	(1 $\frac{0}{-0.5}$) μ s	(3 $\frac{0}{-1.5}$) μ s	t_1^*	≥ 0.5 s		t_2	200 ms		t_3^*	≤ 100 μ s	
Table 2 — Parameters for test pulse 1																												
Parameters	Nominal 12 V system	Nominal 24 V system																										
U_b	~75 V to ~150 V	~300 V to ~600 V																										
R_1	10 Ω	50 Ω																										
t_d	2 ms	1 ms																										
t_r	(1 $\frac{0}{-0.5}$) μ s	(3 $\frac{0}{-1.5}$) μ s																										
t_1^*	≥ 0.5 s																											
t_2	200 ms																											
t_3^*	≤ 100 μ s																											
Pulses 2a	<table><tr><th colspan="2">Table 3 — Parameters for test pulse 2a</th></tr><tr><th>Parameters</th><th>Nominal 12 V and 24 V system</th></tr><tr><td>U_b</td><td>-37 V to +112 V</td></tr><tr><td>R_1</td><td>2 Ω</td></tr><tr><td>t_d</td><td>0,05 ms</td></tr><tr><td>t_r</td><td>(1 $\frac{0}{-0.5}$) μs</td></tr><tr><td>t_1^*</td><td>0,2 s to 5 s</td></tr></table>	Table 3 — Parameters for test pulse 2a		Parameters	Nominal 12 V and 24 V system	U_b	-37 V to +112 V	R_1	2 Ω	t_d	0,05 ms	t_r	(1 $\frac{0}{-0.5}$) μ s	t_1^*	0,2 s to 5 s													
Table 3 — Parameters for test pulse 2a																												
Parameters	Nominal 12 V and 24 V system																											
U_b	-37 V to +112 V																											
R_1	2 Ω																											
t_d	0,05 ms																											
t_r	(1 $\frac{0}{-0.5}$) μ s																											
t_1^*	0,2 s to 5 s																											
Pulses 2b	<table><tr><th colspan="3">Table 4 — Parameters for test pulse 2b</th></tr><tr><th>Parameters</th><th>Nominal 12 V system</th><th>Nominal 24 V system</th></tr><tr><td>U_b</td><td>10 V</td><td>20 V</td></tr><tr><td>R_1</td><td colspan="2">0 Ω to 0,05 Ω</td></tr><tr><td>t_d</td><td colspan="2">0,2 s to 2 s</td></tr><tr><td>t_{12}</td><td colspan="2">1 ms $\pm$ 0,5 ms</td></tr><tr><td>t_1</td><td colspan="2">1 ms $\pm$ 0,5 ms</td></tr><tr><td>t_3</td><td colspan="2">1 ms $\pm$ 0,5 ms</td></tr></table>	Table 4 — Parameters for test pulse 2b			Parameters	Nominal 12 V system	Nominal 24 V system	U_b	10 V	20 V	R_1	0 Ω to 0,05 Ω		t_d	0,2 s to 2 s		t_{12}	1 ms $\pm$ 0,5 ms		t_1	1 ms $\pm$ 0,5 ms		t_3	1 ms $\pm$ 0,5 ms				
Table 4 — Parameters for test pulse 2b																												
Parameters	Nominal 12 V system	Nominal 24 V system																										
U_b	10 V	20 V																										
R_1	0 Ω to 0,05 Ω																											
t_d	0,2 s to 2 s																											
t_{12}	1 ms $\pm$ 0,5 ms																											
t_1	1 ms $\pm$ 0,5 ms																											
t_3	1 ms $\pm$ 0,5 ms																											
Pulses 3a	<table><tr><th colspan="3">Table 5 — Parameters for test pulse 3a</th></tr><tr><th>Parameters</th><th>Nominal 12 V system</th><th>Nominal 24 V system</th></tr><tr><td>U_b</td><td>-112 V to -220 V</td><td>-150 V to -300 V</td></tr><tr><td>R_1</td><td colspan="2">50 Ω</td></tr><tr><td>t_d</td><td colspan="2">150 ns $\pm$ 45 ns</td></tr><tr><td>t_r</td><td colspan="2">5 ns $\pm$ 1,5 ns</td></tr><tr><td>t_1</td><td colspan="2">100 μs</td></tr><tr><td>t_3</td><td colspan="2">10 ms</td></tr><tr><td>t_5</td><td colspan="2">90 ms</td></tr></table>	Table 5 — Parameters for test pulse 3a			Parameters	Nominal 12 V system	Nominal 24 V system	U_b	-112 V to -220 V	-150 V to -300 V	R_1	50 Ω		t_d	150 ns $\pm$ 45 ns		t_r	5 ns $\pm$ 1,5 ns		t_1	100 μ s		t_3	10 ms		t_5	90 ms	
Table 5 — Parameters for test pulse 3a																												
Parameters	Nominal 12 V system	Nominal 24 V system																										
U_b	-112 V to -220 V	-150 V to -300 V																										
R_1	50 Ω																											
t_d	150 ns $\pm$ 45 ns																											
t_r	5 ns $\pm$ 1,5 ns																											
t_1	100 μ s																											
t_3	10 ms																											
t_5	90 ms																											

Pulses 3b	Table 6 — Parameters for test pulse 3b <table><tr><th>Parameters</th><th>Nominal 12 V system</th><th>Nominal 24 V system</th></tr><tr><td>U_a</td><td>+75 V to +150 V</td><td>+150 V to +300 V</td></tr><tr><td>R_1</td><td colspan="2">50 Ω</td></tr><tr><td>t_d</td><td colspan="2">150 ns $\pm$ 45 ns</td></tr><tr><td>t_b</td><td colspan="2">5 ns $\pm$ 1.5 ns</td></tr><tr><td>t_1</td><td colspan="2">100 μs</td></tr><tr><td>t_k</td><td colspan="2">10 ms</td></tr><tr><td>t_c</td><td colspan="2">90 ms</td></tr></table>	Parameters	Nominal 12 V system	Nominal 24 V system	U_a	+75 V to +150 V	+150 V to +300 V	R_1	50 Ω		t_d	150 ns $\pm$ 45 ns		t_b	5 ns $\pm$ 1.5 ns		t_1	100 μ s		t_k	10 ms		t_c	90 ms				
Parameters	Nominal 12 V system	Nominal 24 V system																										
U_a	+75 V to +150 V	+150 V to +300 V																										
R_1	50 Ω																											
t_d	150 ns $\pm$ 45 ns																											
t_b	5 ns $\pm$ 1.5 ns																											
t_1	100 μ s																											
t_k	10 ms																											
t_c	90 ms																											
Pulses 4	<table><tr><th>Parameter</th><th>12 V system</th><th>24 V system</th></tr><tr><td>U_a</td><td>- 8 V to - 7 V</td><td>- 12 V to - 16 V</td></tr><tr><td>U_b</td><td>- 2.5 V to - 6 V with $U_a \leq U_b$</td><td>- 8 V to - 12 V with $U_a \leq U_b$</td></tr><tr><td>R_1</td><td colspan="2">0 Ω to 0.02 Ω</td></tr><tr><td>t_a</td><td>15 ns to 60 ns *</td><td>20 ns to 100 ns *</td></tr><tr><td>t_b</td><td colspan="2">$\leq$ 50 ns</td></tr><tr><td>t_c</td><td colspan="2">0.5 μs to 20 μs *</td></tr><tr><td>t_d</td><td>5 ms</td><td>10 ms</td></tr><tr><td>t_k</td><td>5 ms to 100 ms *</td><td>10 ms to 100 ms *</td></tr></table>	Parameter	12 V system	24 V system	U_a	- 8 V to - 7 V	- 12 V to - 16 V	U_b	- 2.5 V to - 6 V with $ U_a \leq U_b $	- 8 V to - 12 V with $ U_a \leq U_b $	R_1	0 Ω to 0.02 Ω		t_a	15 ns to 60 ns *	20 ns to 100 ns *	t_b	$\leq$ 50 ns		t_c	0.5 μ s to 20 μ s *		t_d	5 ms	10 ms	t_k	5 ms to 100 ms *	10 ms to 100 ms *
Parameter	12 V system	24 V system																										
U_a	- 8 V to - 7 V	- 12 V to - 16 V																										
U_b	- 2.5 V to - 6 V with $ U_a \leq U_b $	- 8 V to - 12 V with $ U_a \leq U_b $																										
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t_a	15 ns to 60 ns *	20 ns to 100 ns *																										
t_b	$\leq$ 50 ns																											
t_c	0.5 μ s to 20 μ s *																											
t_d	5 ms	10 ms																										
t_k	5 ms to 100 ms *	10 ms to 100 ms *																										

TEST CONFIGURATION



TEST PROCEDURE

Refer to ETSI EN 301 489-1 Clause 9.6.2 and ISO 7637-2 for the measurement methods.

TEST MODE

Refer to the section 4.2

TEST RESULTS

☐ Passed ☒ Not Applicable

6. TEST SETUP PHOTOS OF THE EUT

Radiated Emission



Conducted Emission
(AC mains ports)



Harmonic Current
Emissions



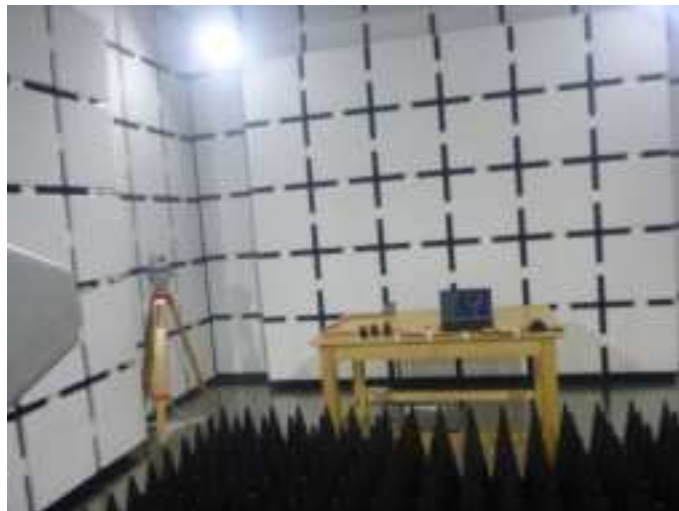
Voltage Fluctuations and Flicker



Electrostatic Discharge



Radio Frequency
Electromagnetic Field



Fast Transients Common
Mode



Surges



Radio Frequency
Common Mode



Voltage Dips and
Interruptions



7. EXTERNAL AND INTERNAL PHOTOS OF THE EUT

Refer to the test report No. CHTW24040030

-----*End of Report*-----