

RED-EMC Test Report

Client Name : EcoFlow Inc.

Client Address : Plant A202, Founder Technology Industrial
Park, Shiyan Sub-district, Bao'an District
Shenzhen, Guangdong 518000 China

Product Name : Portable Fridge

Report Date : Feb. 03, 2023

Shenzhen Anbotek Compliance Laboratory Limited



Shenzhen Anbotek Compliance Laboratory Limited

Address: 1/F., Building D, Sogood Science and Technology Park, Sanwei Community,
Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.
Tel: (86) 0755-26066440 Fax: (86) 0755-26014772 Email: service@anbotek.com

Code: AB-RF-05-b



Hotline

400-003-0500

www.anbotek.com.cn



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TEST REPORT

Applicant : EcoFlow Inc.
Manufacturer : EcoFlow Inc.
Product Name : Portable Fridge
Model No. : EFBX100
Trade Mark :  
Rating(s) : Please refer to page 11

Test Standard(s) : ETSI EN 301 489-1 V2.2.3 (2019-11)
ETSI EN 301 489-17 V3.2.4 (2020-09)

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the EN 301 489-1, EN 301 489-17 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Receipt

Jan. 04, 2023

Date of Test

Jan. 04 ~ 16, 2023

Prepared By



(Ella Liang)

Approved & Authorized Signer



(Kingkong Jin)



Revision History

Report Version	Description	Issued Date
R00	Original Issue.	Feb. 03, 2023





1. General Information

1.1. Client Information

Applicant	:	EcoFlow Inc.
Address	:	Plant A202, Founder Technology Industrial Park, Shiyan Sub-district, Bao'an District Shenzhen, Guangdong 518000 China
Manufacturer	:	EcoFlow Inc.
Address	:	Plant A202, Founder Technology Industrial Park, Shiyan Sub-district, Bao'an District Shenzhen, Guangdong 518000 China

1.2. Description of Device (EUT)

Product Name	:	Portable Fridge
Model No.	:	EFBX100
Trade Mark	:	 
Test Power Supply	:	AC 230V, 50Hz for Adapter/ DC 11-60V
Test Sample No.	:	1-2-1(Normal Sample)
Adapter	:	Model: KT180A2900620M2 Input: 100-240V~50/60Hz 2.5A Output: 29.0V= 6.2A 179.8W
WiFi		
Operation Band	:	<input checked="" type="checkbox"/> 2.4GHz band <input type="checkbox"/> 5GHz band
Operation Mode	:	<input type="checkbox"/> a <input checked="" type="checkbox"/> b <input checked="" type="checkbox"/> g <input checked="" type="checkbox"/> n(HT20)
	:	<input checked="" type="checkbox"/> n(HT40) <input type="checkbox"/> ac(VHT20) <input type="checkbox"/> ac(VHT40) <input type="checkbox"/> ac(VHT80)
	:	<input type="checkbox"/> ac(VHT160) <input type="checkbox"/> ax(HEW20) <input type="checkbox"/> ax(HEW40) <input type="checkbox"/> ax(HEW80)
	:	<input type="checkbox"/> ax(HEW160)
Modulation Type	:	<input type="checkbox"/> 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK) <input checked="" type="checkbox"/> 802.11b: DSSS (CCK, DQPSK, DBPSK) <input checked="" type="checkbox"/> 802.11g: OFDM (BPSK, QPSK, 16QAM, 64QAM) <input checked="" type="checkbox"/> 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM) <input type="checkbox"/> 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) <input type="checkbox"/> 802.11ax: OFDMA(BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
Bluetooth		
Operation Mode	:	<input type="checkbox"/> BT BDR <input type="checkbox"/> BT EDR <input checked="" type="checkbox"/> BLE 1M <input checked="" type="checkbox"/> BLE 2M
Modulation Type	:	<input checked="" type="checkbox"/> GFSK <input type="checkbox"/> π/4-DQPSK <input type="checkbox"/> 8-DPSK
Remark: 1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual. 2)The rated voltage of the product is DC 11-60V, only DC 12V/ DC 58V for Solar powered, DC 12V/ DC 24V for Car charger is selected for testing.		



1.3. Auxiliary Equipment Used During Test

Description	Rating(s)
--	--

1.4. Description of Test Modes

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned bellow was evaluated respectively.

Test Mode	Description	Test Standards
Mode 1	Adapter+Working+ice making+External battery+BT+WIFI Mode	EN 301489-17
Mode 2	Working+ice making+External battery+BT+WIFI Mode (DC 12V/ DC 58V Solar powered)	EN 301489-17
Mode 3	Working+ice making+External battery+BT+WIFI Mode (DC 12V/ DC 24V Car charger)	EN 301489-17
Mode 4	Adapter+Working+ice making+BT+WIFI Mode	EN 301489-17



1.5. Test Equipment List

☒ Power Line Conducted Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	Rohde & Schwarz	ENV216	100055	Oct. 23, 2022	1 Year
2.	Three Phase V-type Artificial Power Network	CYBERTEK	EM5040DT	E215040D T001	Jul. 05, 2022	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Oct. 13, 2022	1 Year
4.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Oct. 22, 2022	1 Year
5.	Software Name EZ-EMC	Ferrari Technology	ANB-03A	N/A	N/A	N/A

☐ Wired Network Ports Conducted Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ISN	Schwarzbeck	NTFM 8158	#172	Oct. 13, 2022	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Oct. 13, 2022	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Oct. 22, 2022	1 Year
4.	Software Name EZ-EMC	Ferrari Technology	ANB-03A	N/A	N/A	N/A
5.	Three Phase V-type Artificial Power Network	CYBERTEK	EM5040DT	E215040D T001	Jul. 05, 2022	1 Year

☒ Radiated Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESR26	101481	Oct. 23, 2022	1 Year
2.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Oct. 23, 2022	1 Year
3.	Pre-amplifier	SONOMA	310N	186860	Oct. 23, 2022	1 Year
4.	Software Name EZ-EMC	Ferrari Technology	ANB-03A	N/A	N/A	N/A
5.	EMI Preamplifier	SKET Electronic	LNPA-0118G- 45	SKET-PA-0 02	Oct. 13, 2022	1 Year
6.	Double Ridged Horn Antenna	SCHWARZBECK	BBHA 9120D	02555	Oct. 16, 2022	3 Year



☒ Harmonic and Flicker Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Programmable AC Power source	IVYTECH	APS-5005A	632734	Oct. 23, 2022	1 Year
2.	Harmonic and Flicker Analyzer	EMC-PARTNER	HMONICS 1000-1P	164	Oct. 23, 2022	1 Year
3.	Harmonics-1000	N/A	Ed.3.0+4.0	N.A	N/A	N/A

☒ Electrostatic Discharge Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ESD Simulators	emtest	ESD NX30.1	11936	Mar. 25, 2022	1 Year

☒ R/S Immunity Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Signal Generator	Agilent	N5182A	MY48180656	Oct. 13, 2022	1 Year
2.	Amplifier	Micotoop	MPA-80-1000-250	MPA1903096	Oct. 23, 2022	1 Year
3.	Amplifier	Micotoop	MPA-1000-6000-100	MPA1903122	Oct. 23, 2022	1 Year
4.	Log-Periodic Antenna	Schwarzbeck	VULP9118E	00992	N/A	N/A
5.	Double Ridged Horn Antenna	SCHWARZBECK	BBHA 9120D	02555	Oct. 16, 2022	3 Year
6.	Power Sensor	Agilent	E9301A	MY41498906	Oct. 23, 2022	1 Year
7.	Power Sensor	Agilent	E9301A	MY41498088	Oct. 23, 2022	1 Year
8.	Power Meter	Agilent	E4419B	GB40202909	Oct. 23, 2022	1 Year
9.	Electric field Probe	Narda	EP 601	811ZX10351	Oct. 23, 2022	1 Year
10.	RS Test software	EMtrace	EM 3	V1.1.7	N/A	N/A

☒ Surge Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Combined Wave Lightning Surge Simulator	3Ctest	CCS600	ES3771702	Jul. 05, 2022	1 Year
2.	Three Phase Power Coupling Network	3Ctest	SEPN69100T	ES0801757	Jul. 05, 2022	1 Year
3.	EFT-Clamp	PRIM	EFT-Clamp	/	Oct. 13, 2022	1 Year



☒ Electrical Fast Transient/Burst Immunity Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Surge Generator	TESEQ	NSG 3060	1480	Oct. 23, 2022	1 Year
2.	CDN	TESEQ	CDN 3061	1408	Oct. 23, 2022	1 Year
3.	EFT-Clamp	PRIMA	EFT-Clamp	/	Oct. 13, 2022	1 Year

☒ Injected Currents Susceptibility Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	C/S Conducted Immunity Test System	FRANKONIA	CIT-10	126A1196/2012	Oct. 23, 2022	1 Year
2.	CDN	FRANKONIA	CDN - M2+ M3	A2210178/2012	Oct. 23, 2022	1 Year
3.	6dB Attenuator	FRANKONIA	DAM 26W	1172202	Oct. 23, 2022	1 Year
4.	CIT-10	FRANKONIA	Version1.1.7	N/A	N/A	N/A
5.	EM-Clamp	FRANKONIA	EMCL-20	18101728-0103	May 17, 2022	1 Year

☒ Voltage Dips and Interruptions Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	CYCLE SAG Simulator	PRIMA	DRP61011AG	PR12046234	Oct. 23, 2022	1 Year



1.6. Description of Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration No.: 184111

Shenzhen Anbotek Compliance Laboratory Limited, 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. 184111.

ISED-Registration No.: 8058A

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A.

Test Location

Shenzhen Anbotek Compliance Laboratory Limited.

1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518102

1.7. Measurement Uncertainty

Radiation Uncertainty	:	Ur = 3.9 dB (Horizontal)
		Ur = 3.8 dB (Vertical)
Conduction Uncertainty	:	Uc = 3.4 dB

Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Rating(s):

EcoFlow Glacier

Portable Fridge/Mobiler Kühlschrank

Model/Modèle/Modell: EFBX100

Refrigerant/Amount/Kältemittel/Menge: R600a/30g

Adapter Input/Output/Netzadapter Eingang/Ausgang: 100-240V~ 50/60Hz 2.5A/29V=6.2A MAX

Solar Charging Input/Solarladeeingang: 11-60V=13A MAX 240W MAX


Climate Type/Klimaklasse: SN/NST/T

Foaming Agent/Dämmschaum: Cyclopentane/Cyclopentan


Noise Level/Geräuschpegel: <42dB

IP Rating/IP-Bewertung: IPX5

Weight/Gewicht: 23kg






EcoFlow APP



www.ecoflow.com

EcoFlow Inc. Made in China





2. Summary of Test Results

EMC Emission			
Test Items	Standard	Basic Standard	Results
Conducted Emission (Power Line)	ETSI EN 301 489-1 V2.2.3 Clause 8.3 & 8.4	EN 55032	PASS
Conducted Emission (Wired network ports)	ETSI EN 301 489-1 V2.2.3 Clause 8.7	EN 55032	N/A
Radiated Emission	ETSI EN 301 489-1 V2.2.3 Clause 8.2	EN 55032	PASS
Harmonic Current Emission	ETSI EN 301 489-1 V2.2.3 Clause 8.5	EN IEC 61000-3-2	PASS
Voltage Fluctuations&Flicker	ETSI EN 301 489-1 V2.2.3 Clause 8.6	EN 61000-3-3	PASS
EMC Immunity			
Test Items	Standard	Basic Standard	Results
Electrostatic Discharge	ETSI EN 301 489-1 V2.2.3 Clause 9.3	EN 61000-4-2	PASS
RF Electromagnetic Field	ETSI EN 301 489-1 V2.2.3 Clause 9.2	EN 61000-4-3	PASS
Fast transients, common mode	ETSI EN 301 489-1 V2.2.3 Clause 9.4	EN 61000-4-4	PASS
Surges	ETSI EN 301 489-1 V2.2.3 Clause 9.8	EN 61000-4-5	PASS
Radio frequency, common mode	ETSI EN 301 489-1 V2.2.3 Clause 9.5	EN 61000-4-6	PASS
Volt. Interruptions Volt. Dips	ETSI EN 301 489-1 V2.2.3 Clause 9.7	EN 61000-4-11	PASS
Transients and surges in the vehicular environment	ETSI EN 301 489-1 V2.2.3 Clause 9.6	ISO 7637-2	N/A
Note: (1) "N/A" denotes test is not applicable in this Test Report.			



3. Emission Test

3.1. Power Line Conducted Emission Test

3.1.1. Test Standard and Limit

Test Standard	ETSI EN 301 489-1 Clause 8.3 & 8.4
Basic Standard	EN 55032

☐ Limits for conducted emission at the AC mains power ports of Class A equipment

Frequency (MHz)	Limits (dB μ V)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	79.0	66.0
0.50 ~ 30.00	73.0	60.0

Remark: The lower limit shall apply at the transition frequencies.

☒ Limits for conducted emission at the AC mains power ports of Class B equipment

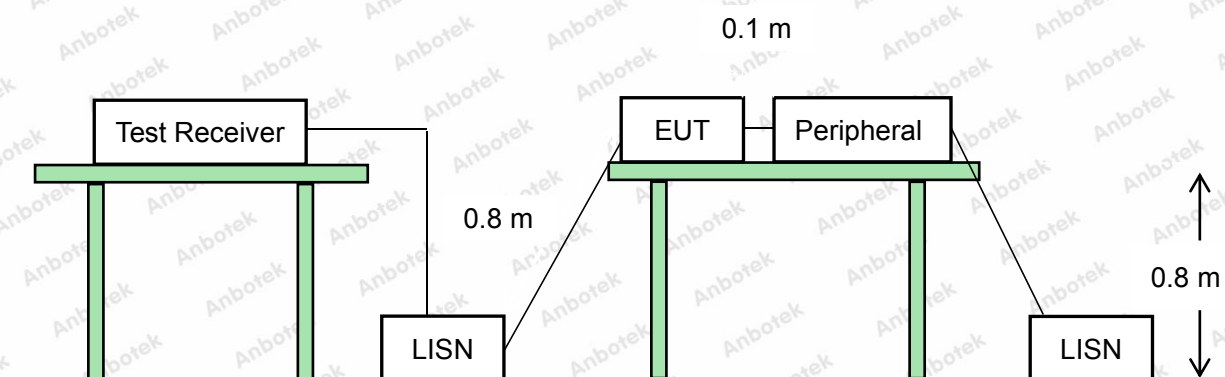
Frequency (MHz)	Limits (dB μ V)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66.0 ~ 56.0 *	56.0 ~ 46.0 *
0.50 ~ 5.00	56.0	46.0
5.00 ~ 30.00	60.0	50.0

Remark:

(1) The lower limit shall apply at the transition frequencies.

(2) The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

3.1.2. Test Setup



3.1.3. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ETSI EN 301 489-1 & EN55032 on Conducted Emission Measurement.

The bandwidth of test receiver (ESCI) set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

3.1.4. Test Data

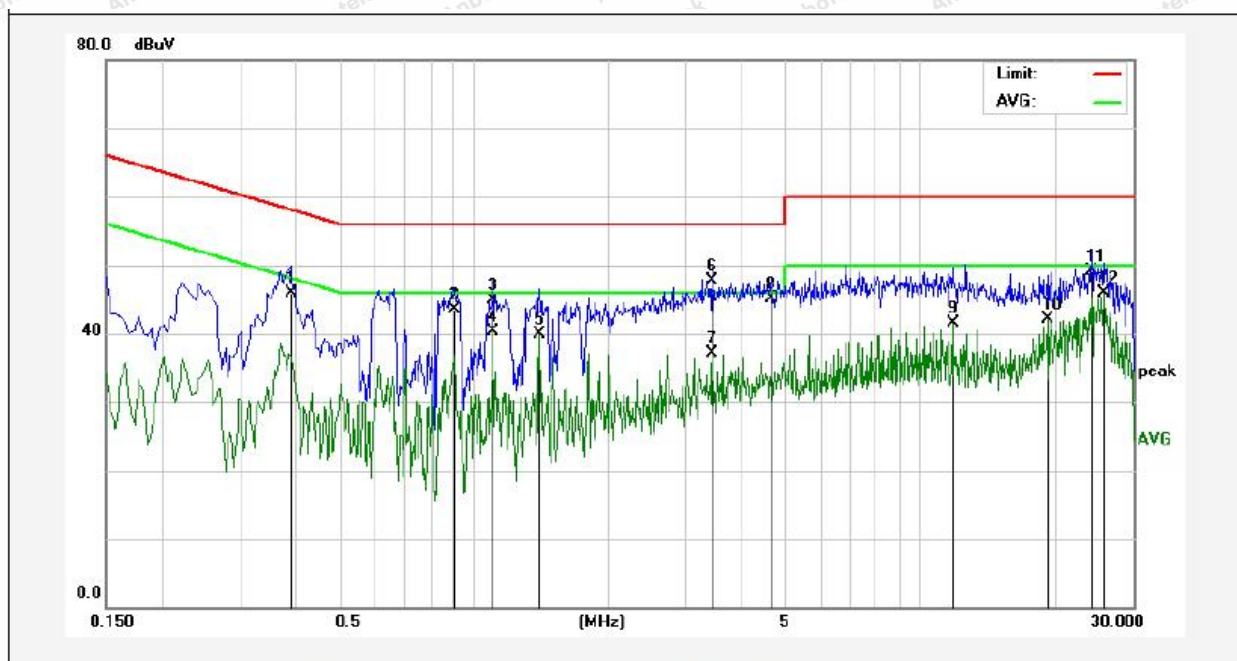
PASS

Only the worst case data was showed in the report, please to see the following pages.



Conducted Emission Test Data

Test Site: 1# Shielded Room
 Operating Condition: Mode 1
 Test Specification: AC 230V, 50Hz for adapter
 Comment: Live Line
 Temp.(°C)/Hum.(%RH): 22.1°C/51%RH



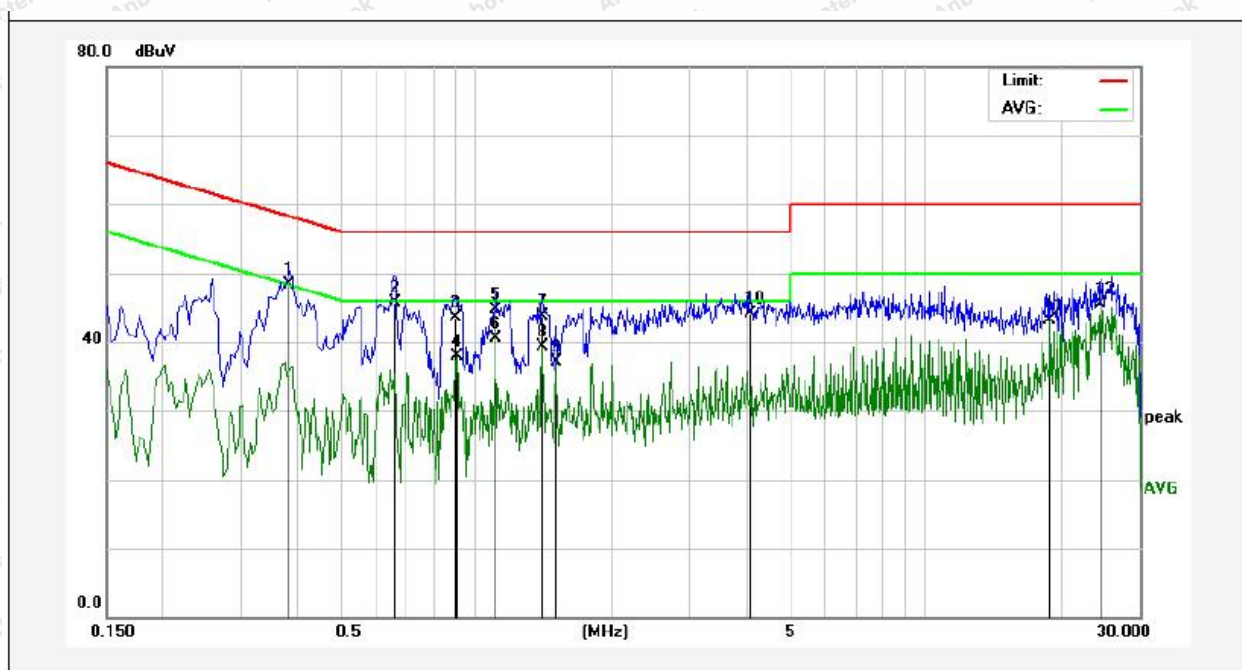
No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.3899	36.16	9.76	45.92	58.06	-12.14	QP	
2	0.9060	33.75	9.84	43.59	56.00	-12.41	QP	
3	1.1060	34.96	9.85	44.81	56.00	-11.19	QP	
4	1.1060	30.44	9.85	40.29	46.00	-5.71	AVG	
5	1.4060	29.99	9.85	39.84	46.00	-6.16	AVG	
6	3.4180	37.88	9.90	47.78	56.00	-8.22	QP	
7	3.4180	27.17	9.90	37.07	46.00	-8.93	AVG	
8	4.6260	35.25	9.80	45.05	56.00	-10.95	QP	
9	11.8580	31.57	9.88	41.45	50.00	-8.55	AVG	
10	19.2939	31.94	10.12	42.06	50.00	-7.94	AVG	
11	24.2180	38.95	10.10	49.05	60.00	-10.95	QP	
12	25.8260	35.76	10.12	45.88	50.00	-4.12	AVG	

Note: Result = Reading + Factor Over Limit = Result - Limit



Conducted Emission Test Data

Test Site: 1# Shielded Room
 Operating Condition: Mode 1
 Test Specification: AC 230V, 50Hz for adapter
 Comment: Neutral Line
 Temp.(°C)/Hum.(%RH): 22.1°C/51%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.3820	38.51	9.76	48.27	58.23	-9.96	QP	
2	0.6580	35.93	9.83	45.76	56.00	-10.24	QP	
3	0.9020	33.57	9.84	43.41	56.00	-12.59	QP	
4	0.9060	27.97	9.84	37.81	46.00	-8.19	AVG	
5	1.1060	34.85	9.85	44.70	56.00	-11.30	QP	
6	1.1060	30.69	9.85	40.54	46.00	-5.46	AVG	
7	1.4060	33.81	9.85	43.66	56.00	-12.34	QP	
8	1.4060	29.49	9.85	39.34	46.00	-6.66	AVG	
9	1.5060	27.33	9.84	37.17	46.00	-8.83	AVG	
10	4.0779	34.18	9.84	44.02	56.00	-11.98	QP	
11	18.9940	33.01	10.10	43.11	50.00	-6.89	AVG	
12	24.6220	35.44	10.10	45.54	50.00	-4.46	AVG	

Note: Result = Reading + Factor Over Limit = Result - Limit



3.2. Wired Network Ports Conducted Emission Test

3.2.1. Test Standard and Limit

Test Standard	ETSI EN 301 489-1 Clause 8.7
Basic Standard	EN 55032

☐ Limits for asymmetric mode conducted emissions of Class A equipment

Frequency (MHz)	Limits (dB μ V)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	97.0 ~ 87.0 *	87.0 ~ 74.0 *
0.50 ~ 30.00	87.0	74.0

Remark:

The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

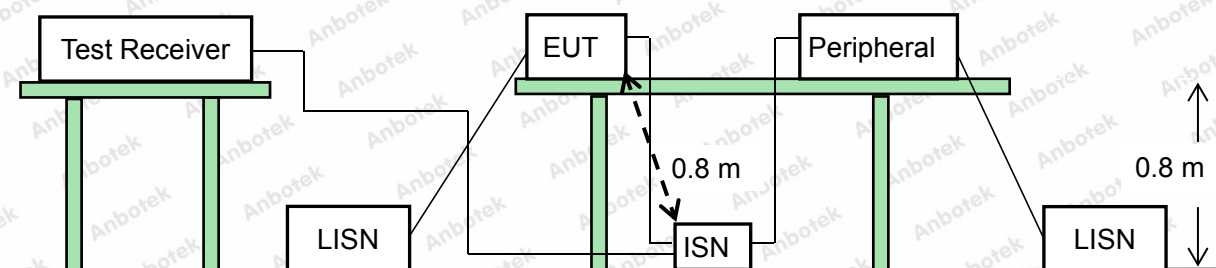
☐ Limits for asymmetric mode conducted emissions of Class B equipment

Frequency (MHz)	Limits (dB μ V)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	84.0 ~ 74.0 *	74.0 ~ 44.0 *
0.50 ~ 30.00	74.0	64.0

Remark:

The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

3.2.2. Test Setup



3.2.3. Test Procedure

The EUT is put on the plane 0.8 m high above the ground by insulating support and connected to the wired network ports through Impedance Stabilization Network(ISN). and it is investigated to find out the maximum conducted emission according to the EN55032 regulations during conducted emission measurement.

The bandwidth of test receiver (ESCI) set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

3.2.4. Test Results

Not applicable.



3.3. Radiated Emission Test

3.3.1. Test Standard and Limit

Test Standard	ETSI EN 301 489-1 Clause 8.2
Basic Standard	EN 55032

☐ Limit for radiated emissions at frequencies up to 1 GHz for class A equipment

Frequency (MHz)	Distance (Meters)	Limit (dB μ V/m)
30 ~ 230	3	50
230 ~ 1000	3	57
Remark: The lower limit shall apply at the transition frequencies.		

☐ Limit for radiated emissions at frequencies above 1 GHz for class A equipment

Frequency (MHz)	Distance (Meters)	Limit (dB μ V/m)	
		Peak	Average
1000 MHz -3000 MHz	3	76	56
3000 MHz -6000 MHz	3	80	60
Remark: The lower limit shall apply at the transition frequencies.			

☒ Limit for radiated emissions at frequencies up to 1 GHz for class B equipment

Frequency (MHz)	Distance (Meters)	Limit (dB μ V/m)
30 ~ 230	3	40
230 ~ 1000	3	47
Remark: The lower limit shall apply at the transition frequencies.		



☒ **Limit for radiated emissions at frequencies above 1 GHz for class B equipment**

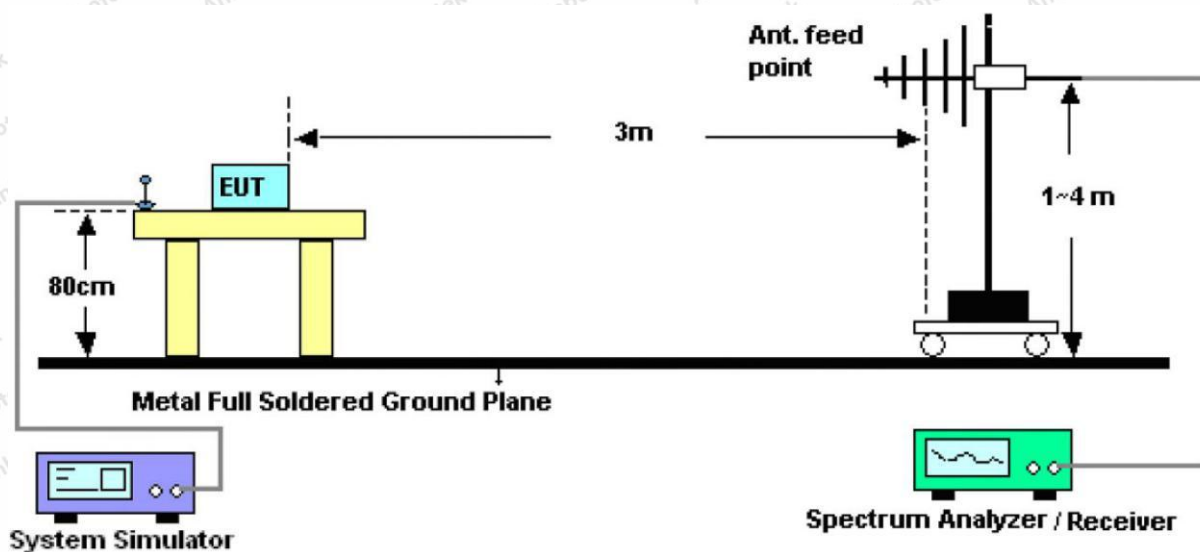
Frequency (MHz)	Distance (Meters)	Limit (dB μ V/m)	
		Peak	Average
1000 MHz -3000 MHz	1000 MHz -3000 MHz	70	50
3000 MHz -6000 MHz	3000 MHz -6000 MHz	74	54

Remark: The lower limit shall apply at the transition frequencies.

☐ **Radiated emission test limit for FM receivers**

Frequency (MHz)	Distance (Meters)	Limit (dB μ V/m)	
		Fundamental	Harmonics
30MHz~230MHz	3	60	52
230MHz~300MHz	3	60	52
300MHz~1000MHz	3	60	56

Remark: The lower limit shall apply at the transition frequency.

3.3.2. Test Setup

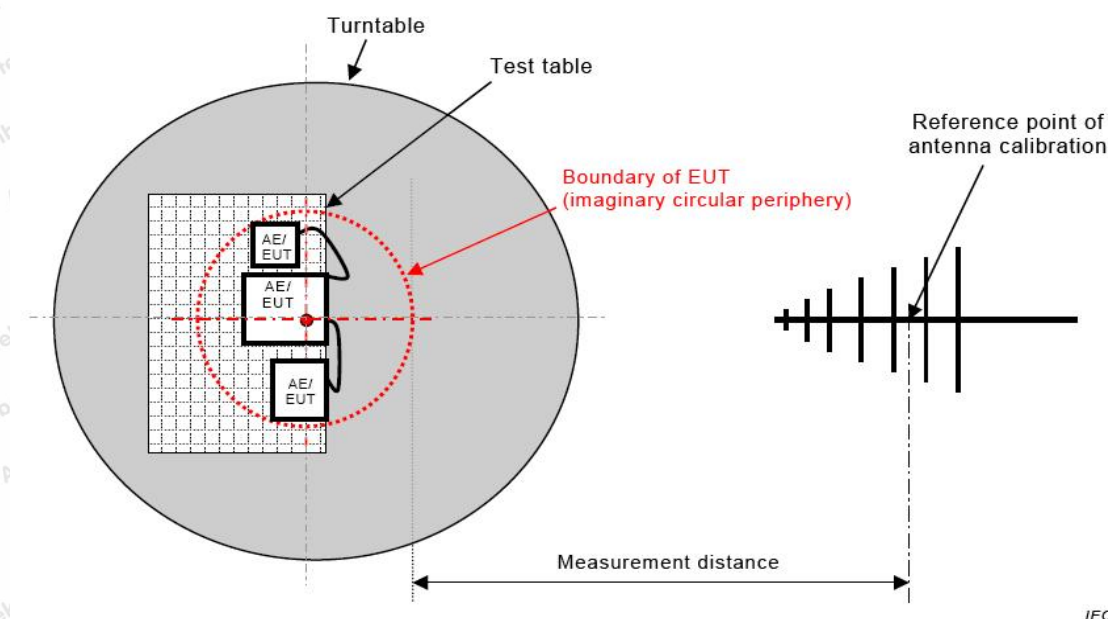
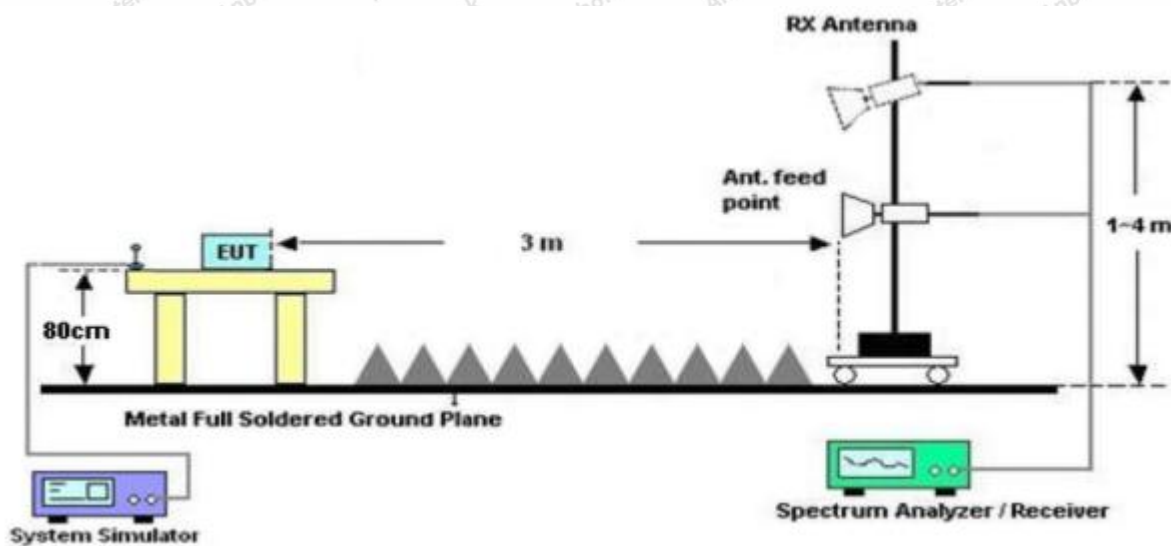


Figure C.1 – Measurement distance

30MHz to 1GHz



Above 1 GHz



3.3.3. Test Procedure

- 1) The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- 2) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- 3) The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 4) The initial step in collecting radiated emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- 5) The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1GHz.

The test receiver/spectrum was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1GHz.

Note:

The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.

The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak/ Average detection at frequency above 1GHz.

3.3.4. Test Data

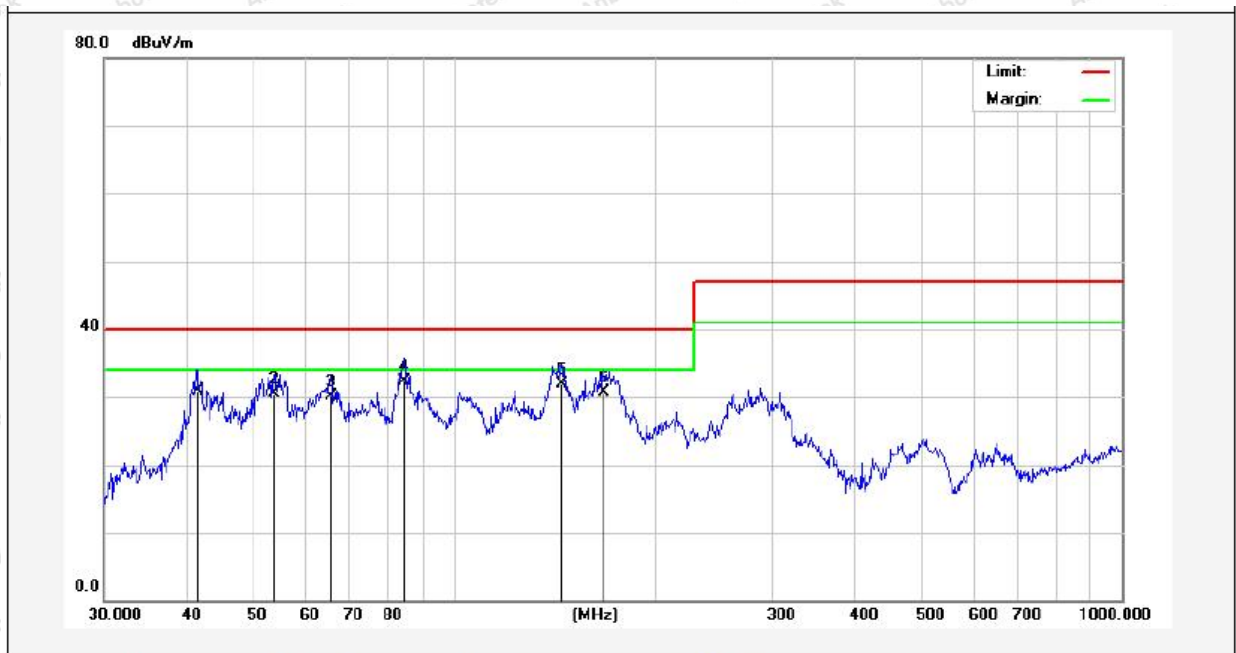
PASS

Only the worst case data was showed in the report, please to see the following pages.



Test Results (30~1000MHz)

Test Mode: Mode 1
Power Source: AC 230V, 50Hz for adapter
Polarization: Horizontal
Temp.(°C)/Hum.(%RH): 22.5°C/50%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	41.4215	46.69	-15.79	30.90	40.00	-9.10	QP			
2	53.8818	47.64	-17.21	30.43	40.00	-9.57	QP			
3	65.5727	49.82	-19.66	30.16	40.00	-9.84	QP			
4	84.4054	54.34	-22.12	32.22	40.00	-7.78	QP			
5	145.3506	54.82	-22.95	31.87	40.00	-8.13	QP			
6	167.8243	54.41	-23.69	30.72	40.00	-9.28	QP			

Note: Result = Reading + Factor Over Limit = Result - Limit



Test Results (30~1000MHz)

Test Mode: Mode 1
 Power Source: AC 230V, 50Hz for adapter
 Polarization: Vertical
 Temp.(°C)/Hum.(%RH): 22.5°C/50%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	41.1320	48.69	-14.66	34.03	40.00	-5.97	QP			
2	43.8119	47.72	-14.94	32.78	40.00	-7.22	QP			
3	53.1313	50.32	-16.93	33.39	40.00	-6.61	QP			
4	63.3132	51.96	-18.71	33.25	40.00	-6.75	QP			
5	71.0803	53.12	-19.95	33.17	40.00	-6.83	QP			
6	84.1100	50.88	-18.68	32.20	40.00	-7.80	QP			

Note: Result = Reading + Factor Over Limit = Result - Limit



Test Results (1GHz~6GHz)

Test Mode:		Mode 1					
Power Source:		AC 230V, 50Hz for adapter					
Temp.(℃)/Hum.(%RH):		22.5℃/50%RH					
Frequency (MHz)	Read Level (dBUV)	Factor (dB/m)	Level (dBUV/m)	Limit (dBUV/m)	Over Limit (dB)	Pol.	Detector
1557.94	47.64	-2.66	44.98	70.00	-25.02	H	PEAK
1848.61	50.43	-3.34	47.09	70.00	-22.91	H	PEAK
2152.57	45.10	-4.44	40.66	70.00	-29.34	H	PEAK
4173.96	53.48	-5.10	48.39	74.00	-25.61	H	PEAK
4527.68	54.32	-5.44	48.88	74.00	-25.12	H	PEAK
5031.26	53.80	-5.60	48.21	74.00	-25.79	H	PEAK
1557.94	37.25	-2.66	34.59	50.00	-15.41	H	AVG
1848.61	40.65	-3.34	37.31	50.00	-12.69	H	AVG
2152.57	40.18	-4.44	35.73	50.00	-14.27	H	AVG
4173.96	39.24	-5.10	34.14	54.00	-19.86	H	AVG
4527.68	42.85	-5.44	37.41	54.00	-16.59	H	AVG
5031.26	41.77	-5.60	36.17	54.00	-17.83	H	AVG
1573.90	46.34	-2.48	43.86	70.00	-26.14	V	PEAK
1901.96	49.33	-3.27	46.06	70.00	-23.94	V	PEAK
2279.92	46.54	-3.88	42.66	70.00	-27.34	V	PEAK
4159.82	45.52	-5.00	40.52	74.00	-33.48	V	PEAK
4342.47	55.53	-5.08	50.45	74.00	-23.55	V	PEAK
5173.14	50.94	-5.30	45.64	74.00	-28.36	V	PEAK
1573.90	38.59	-2.48	36.11	50.00	-13.89	V	AVG
1901.96	38.41	-3.27	35.14	50.00	-14.86	V	AVG
2279.92	38.11	-3.88	34.23	50.00	-15.77	V	AVG
4159.82	41.75	-5.00	36.75	54.00	-17.25	V	AVG
4342.47	39.17	-5.08	34.09	54.00	-19.91	V	AVG
5173.14	43.51	-5.30	38.21	54.00	-15.79	V	AVG
Remark:							
1. Level =Read Level + Factor; Over Limit=Level-Limit							

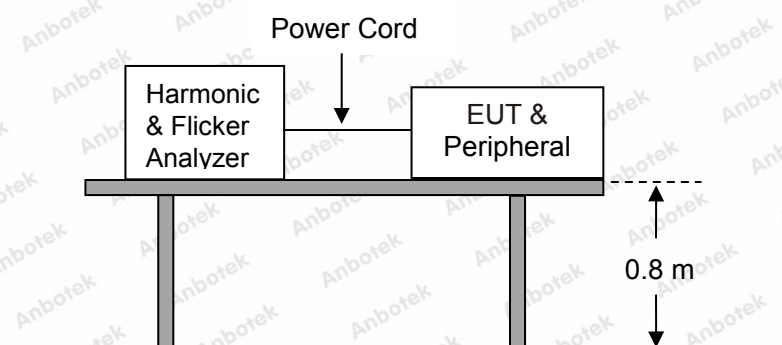


3.4. Harmonic Current Emissions

3.4.1. Test Standard and Limit

Test Standard	ETSI EN 301 489-1 Clause 8.5
Basic Standard	EN IEC 61000-3-2
Test Limit	Please to refer to the clause 7 of standard EN IEC 61000-3-2

3.4.2. Test Setup



3.4.3. Test Procedure

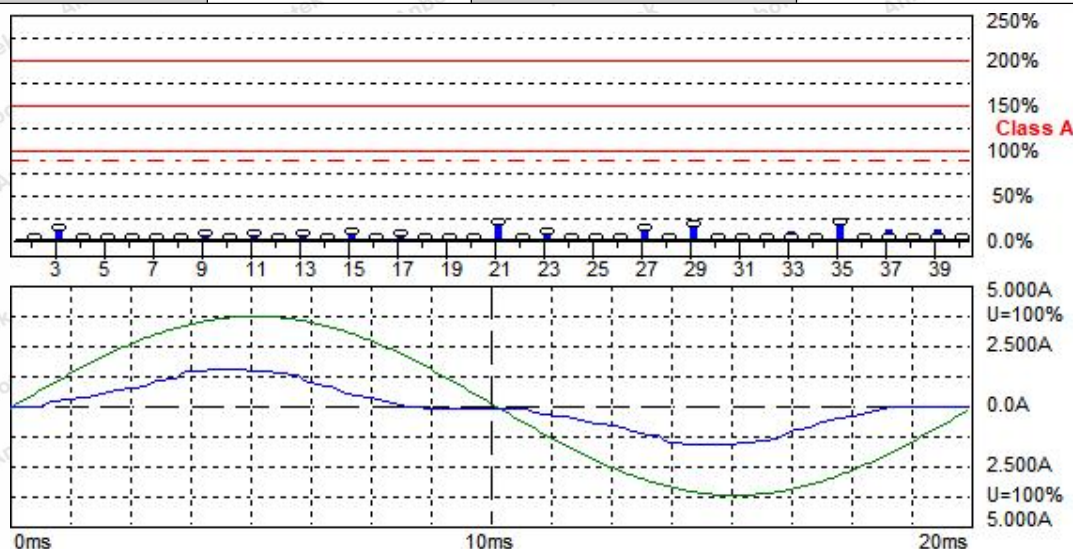
- 1) The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions.
- 2) The classification of EUT is according to section 5 of EN IEC 61000-3-2. The EUT is classified as follows:
Class A: Balanced three-phase equipment, Household appliances excluding equipment as Class D, Tools excluding portable tools, Dimmers for incandescent lamps, audio equipment, equipment not specified in one of the three other classes.
Class B: Portable tools; Arc welding equipment which is not professional equipment.
Class C: Lighting equipment.
Class D: Equipment having a specified power less than or equal to 600W of the following types:
Personal computers and personal computer monitors and television.
- 3) The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the time necessary for the EUT to be exercised.



3.4.4. Test Data

Pass

Standard:	EN IEC 61000-3-2	Temp.(°C)/Hum.(%RH):	24.3°C/55%RH
Test Mode:	Mode 1	Power Source:	AC 230V, 50Hz for adapter



Harmonic Emission - IEC 61000-3-2, EN 61000-3-2, (EN60555-2)

Urms = 229.5 V P = 192.4 W THC = 0.275 A Range: 5 A
 Irms = 0.894 A pf = 0.938 V-nom: 230 V

Test completed, Result: PASSED

HAR-1000 EMC-Partner

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

Urms = 229.5V Freq = 50.000 Range: 5 A
 Irms = 0.894A Ipk = 1.606A cf = 1.798
 P = 192.4WS = 205.1VA pf = 0.938
 THDi = 32.5 % THDu = 0.20 % Class A

Test - Time : 3min (100 %)

Test completed, Result: PASSED

Order	Freq.	Iavg	Iavg%L	Irms	Irms%	Irms%L	Imax	Imax%L	Limit
Status	[Hz]	[A]	[%]	[A]	[%]	[%]	[A]	[%]	[A]
1	50	0.8430	0.8487	94.980	0.8490				



2	1000.0000	0.0000	0.0018	0.2049	0.1695	0.0021	0.1978	1.0800
3	1500.2702	11.750	0.2704	30.260	11.756	0.2704	11.756	2.3000
4	2000.0000	0.0000	0.0006	0.0683	0.1419	0.0006	0.1419	0.4300
5	2500.0238	2.0913	0.0238	2.6639	2.0880	0.0241	2.1148	1.1400
6	3000.0000	0.0000	0.0003	0.0342	0.1017	0.0006	0.2035	0.3000
7	3500.0168	2.1783	0.0168	1.8784	2.1798	0.0168	2.1798	0.7700
8	4000.0000	0.0000	0.0003	0.0342	0.1327	0.0006	0.2654	0.2300
9	4500.0217	5.4169	0.0217	2.4249	5.4169	0.0217	5.4169	0.4000
10	5000.0000	0.0000	0.0003	0.0342	0.1659	0.0006	0.3317	0.1840
11	5500.0162	4.8962	0.0162	1.8101	4.9013	0.0162	4.9013	0.3300
12	6000.0000	0.0000	0.0003	0.0342	0.1990	0.0006	0.3981	0.1533
13	6500.0108	5.1372	0.0107	1.1954	5.0863	0.0110	5.2316	0.2100
14	7000.0000	0.0000	0.0003	0.0342	0.2322	0.0003	0.2322	0.1314
15	7500.0105	6.9751	0.0104	1.1612	6.9173	0.0107	7.1208	0.1500
16	8000.0000	0.0000	0.0003	0.0342	0.2654	0.0003	0.2654	0.1150
17	8500.0067	5.0500	0.0067	0.7514	5.0727	0.0067	5.0727	0.1324
18	9000.0000	0.0000	0.0003	0.0342	0.2985	0.0003	0.2985	0.1022
19	9500.0000	0.0000	0.0021	0.2391	1.8039	0.0021	1.8039	0.1184
20	1000	0.0000	0.0000	0.0003	0.0342	0.3317	0.0003	0.3317
21	1050	0.0174	16.235	0.0174	1.9467	16.235	0.0174	16.235
22	1100	0.0000	0.0000	0.0006	0.0683	0.7298	0.0006	0.7298
23	1150	0.0070	7.1750	0.0070	0.7855	7.1750	0.0070	7.1750
24	1200	0.0000	0.0000	0.0009	0.1025	1.1942	0.0012	1.5922
25	1250	0.0000	0.0000	0.0046	0.5123	5.0863	0.0046	5.0863
26	1300	0.0000	0.0000	0.0003	0.0342	0.4312	0.0006	0.8625
27	1350	0.0102	12.222	0.0101	1.1270	12.085	0.0104	12.451
28	1400	0.0000	0.0000	0.0003	0.0342	0.4644	0.0006	0.9288
29	1450	0.0118	15.220	0.0119	1.3320	15.340	0.0122	15.734
30	1500	0.0000	0.0000	0.0006	0.0683	0.9951	0.0006	0.9951
31	1550	0.0000	0.0000	0.0006	0.0683	0.8409	0.0009	1.2614
32	1600	0.0000	0.0000	0.0006	0.0683	1.0615	0.0006	1.0615
33	1650	0.0000	0.0000	0.0043	0.4781	6.2663	0.0046	6.7139
34	1700	0.0000	0.0000	0.0003	0.0342	0.5639	0.0006	1.1278
35	1750	0.0107	16.592	0.0107	1.1954	16.615	0.0113	17.565
36	1800	0.0000	0.0000	0.0006	0.0683	1.1942	0.0006	1.1942
37	1850	0.0000	0.0000	0.0043	0.4781	7.0258	0.0046	7.5277
38	1900	0.0000	0.0000	0.0006	0.0683	1.2605	0.0006	1.2605
39	1950	0.0000	0.0000	0.0043	0.4781	7.4056	0.0046	7.9346
40	2000	0.0000	0.0000	0.0003	0.0342	0.6634	0.0006	1.3269



Calculation of Individual Harmonic Limits

Fixed Limits for Class A:

Order Limits in Ampere

	90%	100%	150%	200%
2	0.9720	1.0800	1.6200	2.1600
3	2.0701	2.3001	3.4502	4.6002
4	0.3870	0.4300	0.6450	0.8600
5	1.0261	1.1401	1.7102	2.2803
6	0.2700	0.3000	0.4500	0.6000
7	0.6930	0.7700	1.1549	1.5399
8	0.2071	0.2301	0.3452	0.4602
9	0.3601	0.4001	0.6001	0.8002
10	0.1656	0.1840	0.2760	0.3680
11	0.2969	0.3299	0.4948	0.6598
12	0.1379	0.1532	0.2298	0.3064
13	0.1890	0.2100	0.3149	0.4199
14	0.1184	0.1315	0.1973	0.2631
15	0.1351	0.1501	0.2252	0.3003
16	0.1035	0.1151	0.1726	0.2301
17	0.1192	0.1324	0.1987	0.2649
18	0.0920	0.1022	0.1534	0.2045
19	0.1066	0.1184	0.1776	0.2368
20	0.0827	0.0919	0.1378	0.1837
21 *	0.0964	0.1071	0.1607	0.2142
22	0.0753	0.0836	0.1254	0.1672
23 *	0.0882	0.0980	0.1469	0.1959
24	0.0689	0.0766	0.1149	0.1532
25 *	0.0810	0.0900	0.1350	0.1801
26	0.0637	0.0708	0.1062	0.1416
27 *	0.0750	0.0833	0.1250	0.1666
28	0.0591	0.0656	0.0984	0.1312
29 *	0.0698	0.0775	0.1163	0.1550
30	0.0552	0.0613	0.0920	0.1227
31 *	0.0654	0.0726	0.1089	0.1453
32	0.0516	0.0574	0.0861	0.1147



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33 *	0.0612	0.0681	0.1021	0.1361
34	0.0486	0.0540	0.0810	0.1080
35 *	0.0580	0.0644	0.0966	0.1288
36	0.0459	0.0510	0.0764	0.1019
37 *	0.0547	0.0607	0.0911	0.1215
38	0.0437	0.0485	0.0728	0.0970
39 *	0.0519	0.0577	0.0865	0.1154
40	0.0415	0.0461	0.0691	0.0922



3.5. Voltage Fluctuations and Flicker

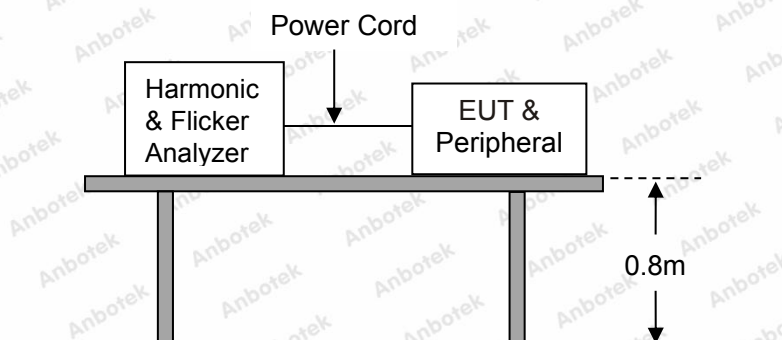
3.5.1. Test Standard and Limit

Test Standard	ETSI EN 301 489-1 Clause 8.6
Basic Standard	EN 61000-3-3

Voltage Fluctuation and Flicker Test Limit

Test Items	Limits
Pst	1.0
Plt	0.65
dc	3.3%
dmax	4.0%
dt	Not exceed 3.3% for 500ms

3.5.2. Test Setup



3.5.3. Test Procedure

- 1) Tests was performed according to the Test Conditions/Assessment of Voltage Fluctuations specified in Clause 5.0/6.0 of IEC555-3 and/or Clause 6.0/4.0 of IEC/EN 61000-3-3 depend on which standard adopted for compliance measurement.
- 2) All types of harmonic current and/or voltage fluctuation in this report are assessed by direct measurement using flicker-meter.

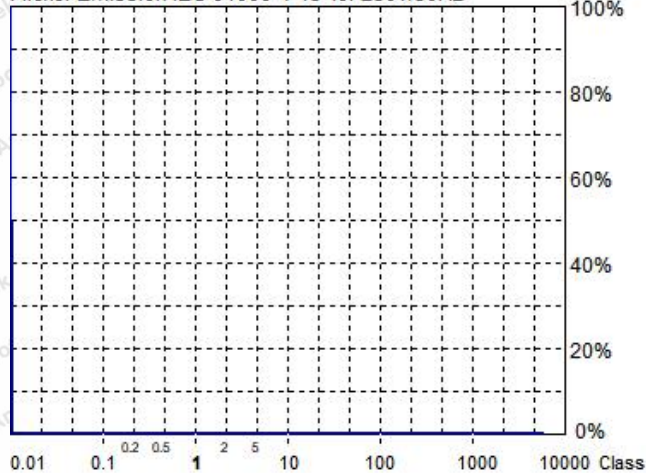


3.5.4. Test Data

Pass

Standard:	EN 61000-3-3	Temp.(°C)/Hum.(%RH):	24.3°C /55%RH
Test Mode:	Mode 1	Power Source:	AC 230V, 50Hz for adapter

Flicker Emission IEC 61000-4-15 for 230V/50Hz



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

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

Urms = 229.1 V P = 192.4 W
Irms = 0.894 A pf = 0.940

Range: 5 A
V-nom: 230 V

Test completed, Result: PASSED

IAR-1000 EMC-Partner

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

Urms = 229.3V Freq = 50.013 Range: 5 A
Irms = 0.894A Ipk = 1.606A cf = 1.798
P = 192.5WS = 204.9VA pf = 0.940

Test - Time : 10 x 1min = 10min (100 %)

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

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

Test running, Measurement within Limits

dmax dc dt>Lim
[%] [%] [ms]
1 0.000 0.010 0.000



4. Immunity Test

General Performance Criteria

Performance criteria for ETSI EN 301 489-17:

Table 2: Performance criteria

Criteria	During test	After test (i.e. as a result of the application of the 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: Operate as intended during the test allows a level of degradation in accordance with clause 6.2.2.



4.1.1. Test Standard and Specification

Test Standard	ETSI EN 301 489-1 Clause 9.3
Basic Standard	EN 61000-4-2
Discharge Impedance:	330 ohm / 150 pF
Performance Criterion:	B
Discharge Voltage:	Air Discharge: 2kV/4kV/8kV Contact Discharge: 2kV/4kV (Direct/Indirect)
Polarity:	Positive & Negative
Number of Discharge:	Air Discharge: min. 20 times at each test point Contact Discharge: min. 200 times in total
Discharge Mode:	Single Discharge
Discharge Period:	1 second minimum

Diagram illustrating the test setup for ESD immunity testing. The setup includes:

- Nearest Wall**: A vertical reference point.
- ESD Generator**: Two generators positioned 1m from the wall.
- Discharge Return Cable to GRP**: Cables connecting the ESD generators to the Ground Reference Plane (GRP).
- To AC Main**: A connection line from the EUT.
- EUT**: Equipment Under Test, placed on a **Non-Conductive Table**.
- Non-Conductive Table**: Height is 80cm.
- HCP**: Height of the table is 1.6m x 0.8m.
- (0.5 mm) Isolation Support**: A support for the table.
- VCP 50 cm x 50 cm**: A vertical conductive plane.
- 470K Ω** : Two resistors connected to the VCP and the GRP.
- Ground Reference Plane (GRP) Bonded to PE**: The reference ground plane.

The configuration consisted of a wooden table 0.8 meters high standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A Horizontal Coupling Plane (1.6m x 0.8m) was placed on the table and attached to the GRP by means of a cable with 940kohm total impedance. The equipment under test, was installed in a representative system as described in section 7 of IEC /EN 61000-4-2, and its cables were placed on the HCP and isolated by an insulating support of 0.5mm thickness. A distance of 1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.



FLOOR-STANDING EQUIPMENT:

The equipment under test was installed in a representative system as described in section 7 of IEC/EN 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.

4.1.3. Test Procedure

The test generator necessary to perform direct and indirect application of discharges to the EUT in the following manner:

- 1) Contact discharge was applied to conductive surfaces and coupling planes of the EUT.

During the test, it was performed with single discharges. For the single discharge time between successive single discharges was at least 1 second.

Vertical Coupling Plane (VCP):

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

The four faces of the EUT will be performed with electrostatic discharge.

Horizontal Coupling Plane (HCP):

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

The four faces of the EUT will be performed with electrostatic discharge.

- 2) Air discharges at insulation surfaces of the EUT.

It was at least ten single discharges with positive and negative at the same selected point.

4.1.4. Test Data

Pass

Please refer to the following page.



Electrostatic Discharge Test Results				
Test Mode:	Please refers to clause 1.4			
Temp.(°C)/Hum.(%RH):	Tem.: 23.7℃ Hum.: 54%			
Test mode for EN 301489-17 standard				
Test Voltage	Coupling	Observation	Perform. Criteria	Results
±2KV, ±4kV	Contact Discharge	A	B	PASS
±2KV, ±4kV, ±8kV	Air Discharge	B	B	PASS
±2KV, ±4kV	Indirect Discharge HCP	A	B	PASS
±2KV, ±4kV	Indirect Discharge VCP	A	B	PASS

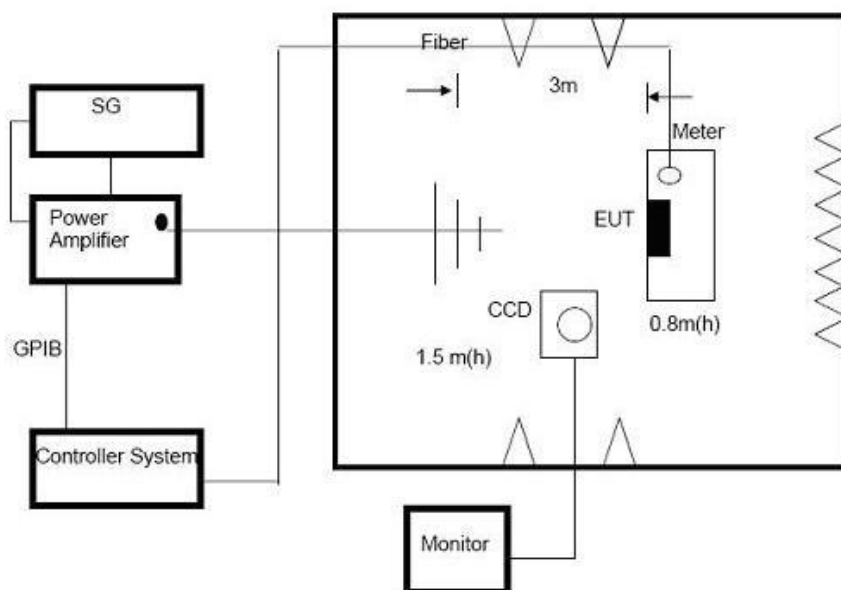


4.2. Radiated, RF Electromagnetic Fields Test

4.2.1. Test Standard and Specification

Test Standard	ETSI EN 301 489-1 Clause 9.2
Basic Standard	EN 61000-4-3
Required Performance	A
Frequency Range	80MHz to 6000MHz
Field Strength	3 V/m
Modulation	1kHz Sine Wave, 80%, AM Modulation
Frequency Step	1 % of preceding frequency value
Polarity of Antenna	Horizontal and Vertical
Test Distance	3 m
Antenna Height	1.5 m
Dwell Time	at least 0.5s

4.2.2. Test Setup



4.2.3. Test Procedure

The EUT and support equipment, which are placed on a table that is 0.8 meter above ground and the testing was performed in a fully-anechoic chamber. The testing distance from antenna to the EUT was 3 meters.

- 1) The field strength level was 3V/m
- 2) The frequency range is swept from 80 MHz to 6000 MHz with the signal 80%amplitude modulated with a 1kHz sine wave.



3) The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond, but shall in no case be less than 0.5s.

4) The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

4.2.4. Test Data

Pass

Please refer to the following page.

Radiated, RF Electromagnetic Fields Test Results						
Test Mode:		Please refers to clause 1.4				
Temp.(°C)/Hum.(%RH):		Tem.: 23.7℃ Hum.: 54%				
Test mode for EN 301489-17 standard						
Frequency Range (MHz)	RF Field Position	R.F. Field Strength	Azimuth	Observation	Perform. Criteria	Results
80~6000	H / V	3 V/m (rms) AM Modulated 1000Hz, 80%	Front	A	A	PASS
			Rear	A	A	PASS
			Left	A	A	PASS
			Right	A	A	PASS



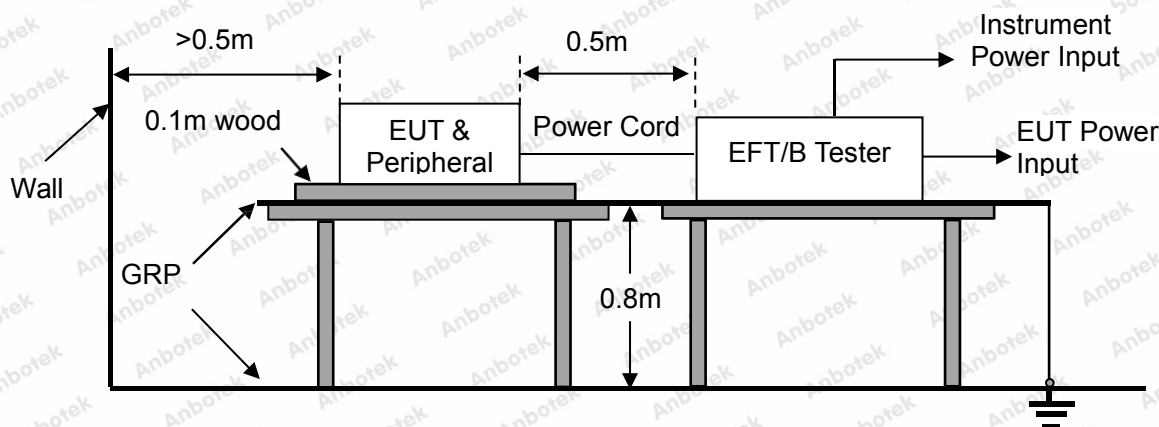
4.3. Fast Transients, Common Mode Test

4.3.1. Test Standard and Specification

Test Standard	ETSI EN 301 489-1 Clause 9.4
Basic Standard	EN 61000-4-4
Required Performance	B
Test Voltage:	<input checked="" type="checkbox"/> 1 kV, AC mains power ports <input type="checkbox"/> 0.5 kV, DC network power ports <input type="checkbox"/> 0.5 kV, Analogue/digital data ports
Polarity:	Positive & Negative
Impulse Frequency:	5 kHz
Impulse Wave shape :	Tr/Th 5/50 ns
Burst Duration:	15 ms for 5KHz Repetition Frequency 0.75 ms for 100KHz Repetition Frequency
Burst Period:	300 ms
Test Duration	1 min

4.3.2. Test Setup

AC mains power ports and DC network power ports:



4.3.3. Test Procedure

The table-top EUT is placed on a table that is 0.8 m height, a ground reference plane is placed on the table, and uses 0.1 m insulation between the EUT and ground reference plane. The floor-standing EUT is placed on a ground reference plane and insulated from it by an insulating support with a thickness of 0.1 m. This reference ground plane shall project beyond the EUT by at least 0.1 m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5 m.

All cables to the EUT shall be placed on the insulation support 0.1 m above the ground reference plane. Cables not subject to electrical fast transients shall be routed as far as possible from the cable under test to minimize the coupling between the cables.

4.3.4. Test Data

Pass

Please refer to the following page.



Fast Transients, Common Mode Test Results

Test Mode:	Please refers to clause 1.4
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Temp.(°C)/Hum.(%RH):	Tem.: 23.7°C Hum.: 54%
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Test mode for EN 301489-17 standard

Coupling Line		Test Voltage	Polarity	Observation	Criterion	Results
AC Line	L	1KV	±	A	B	PASS
	N	1KV	±	A	B	PASS
	L+N	1KV	±	A	B	PASS
	PE	/	/	/	/	/
	L+PE	/	/	/	/	/
	N+PE	/	/	/	/	/
	L+N+PE	/	/	/	/	/

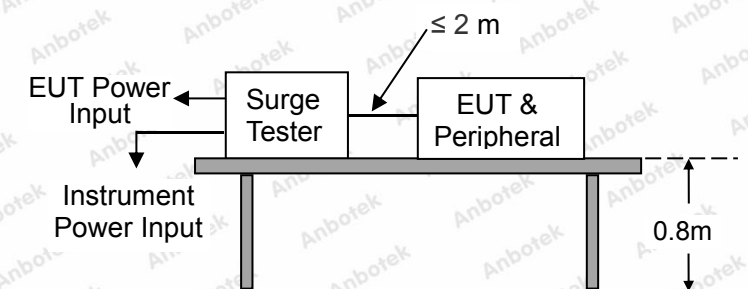


4.4. Surges Test

4.4.1. Test Standard and Specification

Test Standard		ETSI EN 301 489-1 V2.2.3 Clause 9.8
Basic Standard		EN 61000-4-5
Required Performance		B
Wave-Shape:		Combination Wave 1.2/50 us Open Circuit Voltage 8 /20 us Short Circuit Current
Test level	AC power port:	<input checked="" type="checkbox"/> 1kV, Line to Line <input type="checkbox"/> 2kV, Line to Earth
	DC network power port:	<input type="checkbox"/> 0.5kV, Line to Reference ground
	Coaxial or shielded port:	<input type="checkbox"/> 0.5kV, Shield to ground
Generator Source:		2 ohm between networks
Impedance:		12 ohm between network and ground
Polarity:		Positive/Negative
Phase Angle:		0°/90°/180°/270°
Pulse Repetition Rate:		1 time / min. (maximum)
Number of Tests:		5 positive and 5 negative at selected points

4.4.2. Test Setup



4.4.3. Test Procedure

Table-top EUT is placed on a table of 0.8 m heights above a metal ground reference plane. Floor standing EUT is placed on a ground reference plane and insulated from it by an insulating support with a thickness of 0.1 m. The length of the power cord between the EUT and the coupling/decoupling network is not more than 2 m, and the length of the interconnection line between the EUT and the coupling/decoupling network is not more than 2 m. The tests were done at repetition rate 1 per minute.

4.4.4. Test Data

Pass

Please refer to the following page.



Surges Test Results							
Test Mode:		Please refers to clause 1.4					
Temp.(°C)/Hum.(%RH):		Tem.: 23.7℃ Hum.: 54%					
Test mode for EN 301489-17 standard							
Coupling Line		Phase		Test Voltage	Observation	Criterion	Results
AC Line	L-N	+	0°, 90°, 180°, 270°	1KV	A	B	PASS
		-	0°, 90°, 180°, 270°	1KV	A	B	PASS
	L-PE	/	/	/	/	/	/
		/	/	/	/	/	/
	N-PE	/	/	/	/	/	/
		/	/	/	/	/	/



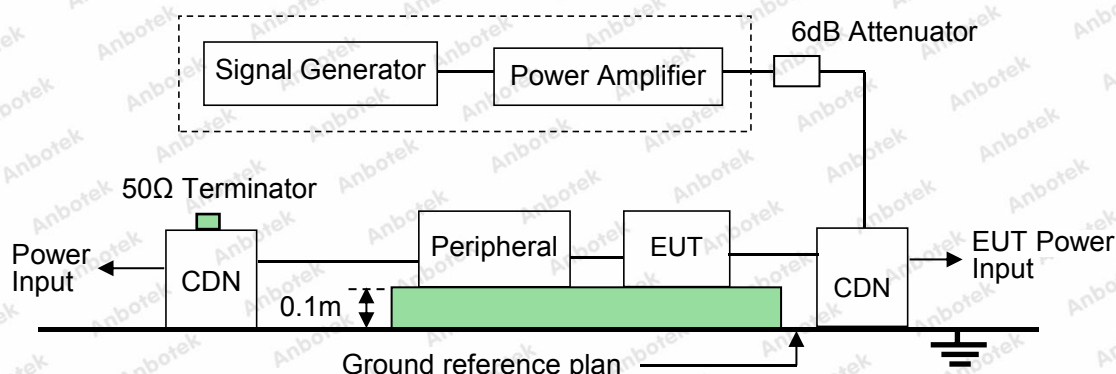
4.5. Radio Frequency, Common Mode Test

4.5.1. Test Standard and Specification

Test Standard	ETSI EN 301 489-1 Clause 9.5
Basic Standard	EN 61000-4-6
Required Performance	A
Frequency Range:	0.15 MHz - 80 MHz
Field Strength:	3 Vr.m.s.
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Dwell Time:	at least 3 seconds

4.5.2. Test Setup

CDN injection:



4.5.3. Test Procedure

- (1) The EUT and peripheral are placed on an insulating support of 0.1 m height above a ground reference plan. The distance between EUT and CDN is 0.1 m to 0.3 m. All cables exiting the EUT are supported at a height of at least 30 mm above the ground reference plan.
- (2) The frequency range is swept from 150 kHz to 80MHz, with the signal 80% amplitude modulated with a 1 kHz sine wave. The rate of sweep did not exceed 1.5×10^{-3} decade/s. The frequency range is swept incrementally. The step size was 1% of fundamental from 0.15MHz to 80MHz.
- (3) The dwell time at each frequency isn't less than the time necessary for the EUT to be able to respond.

4.5.4. Test Data

Pass

Please refer to the following page.



Radio Frequency, Common Mode Test Results

Test Mode:	Please refers to clause 1.4				
Temp.(°C)/Hum.(%RH):	Tem.: 23.7℃ Hum.: 54%				
Test mode for EN 301489-17 standard					
Test Frequency (MHz)	Voltage (V)	Injected Position	Observation	Perform. Criteria	Results
0.15 – 80	3	AC Mains	A	A	PASS

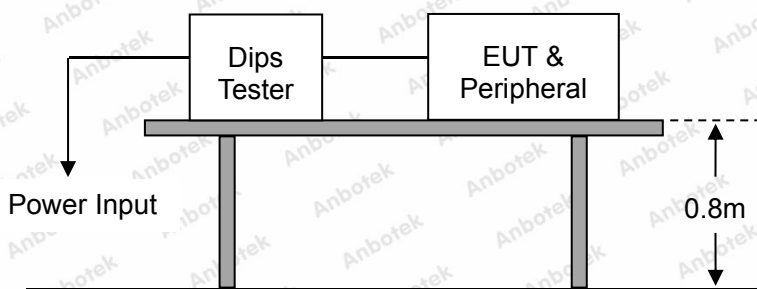


4.6. Voltage Dips and Interruptions Test

4.6.1. Test Standard and Specification

Test Standard	ETSI EN 301 489-1 Clause 9.7
Basic Standard	EN 61000-4-11
Voltage Dips:	0% reduction, 0.5 Cycle 0% reduction, 1.0 Cycle 70% reduction, 25 Cycles
Voltage Interruptions:	0% reduction, 250 Cycles
Interval between Event:	Minimum 10 seconds
Phase Angle:	0°/180°
Test Cycle:	3 times

4.6.2. Test Setup



4.6.3. Test Procedure

1. The EUT was placed on a ground reference plane (GRP) insulated by an insulating support 0.1 m thick and the GRP was placed on a 0.8m high wooden table for table-top equipment. For floor standing equipment, the EUT was placed on a 0.1m high wooden support above the GRP.
2. The test was performed with the EUT connected to the test generator with the shortest power supply cable as specified by the EUT manufacturer.
3. The EUT was tested for each selected combination of test level and duration with a sequence of three dips/interruptions with intervals of 10 s minimum. Each representative mode of operation was tested.
4. For EUT with more than one power cord, each power cord was tested individually.

4.6.4. Test Data

Pass

Please refer to the following page.



Voltage Dips and Interruptions Test Results

Test Mode: Please refers to clause 1.4

Temp.(°C)/Hum.(%RH): Tem.: 23.7°C Hum.: 54%

Test mode for EN 301489-17 standard

Test Level % UT	Voltage Dips & Short Interruptions % UT	Duration (in periods)	Observation	Criterion	Results
0	100	0.5P	A	B	PASS
0	100	1P	A	B	PASS
70	30	25P	A	B	PASS
0	100	250P	B	C	PASS



APPENDIX I -- TEST SETUP PHOTOGRAPH

Please refer to separated files Appendix I -- Test Setup Photograph_EMC

APPENDIX II -- EXTERNAL PHOTOGRAPH

Please refer to separated files Appendix II -- External Photograph

APPENDIX III -- INTERNAL PHOTOGRAPH

Please refer to separated files Appendix III -- Internal Photograph

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

