Test Verification of Conformity

Verification Number: EE-18021715

On the basis of the referenced test report(s), sample(s) tested of the below product have been found to comply with the standards harmonized with the directives listed on this verification at the time the tests were carried out. Other standards and Directives may be relevant to the product. This verification is part of the full test report(s) and should be read in conjunction with it <them>.

Once compliance with all product relevant CE mark directives are verified, including any relevant e.g. risk assessment and production control, the manufacturer may indicate compliance by signing a Declaration of Conformity themselves and applying the mark to products identical to the tested sample(s).

Applicant Name & Address:	Toshiba Carrier (Thailand) Co., Ltd. 144/9 Moo5 Bangkadi Industrial Park, Tivanon Rd. T. Bangkadi, A. Muang, Pathumthani 12000 THAILAND
Product Description:	Air conditioner
Ratings & Principle Characteristics:	220-240Va.c., 50Hz
Models/Type References:	See page 2/2
Brand Name(s):	Toshiba
Standard(s)/Directive(s):	EN 55014-1: 2006/AMD1: 2009/AMD2: 2011 EN 55014-2: 2015 EN 61000-3-2: 2014 EN 61000-3-3: 2013 Part of requirements as specified in 2014/30/EU, EMC Directives
Verification Issuing Office Name & Address:	Intertek Testing Services (Thailand) Ltd. 1285/5 Prachachuen Road, Wong-Sawang Sub-District, Bangsue District, Bangkok 10800
Test Report Number(s):	EE-18021715

Additional information in Appendix.

Signature

Name: Chairat Saeheng
Position: Reviewer
Date: 18 April 2018

APPENDIX: Test Verification of Conformity

This is an Appendix to Test Verification of Conformity Number: EE-18021715.

Model cover by this report

Model (Indoor/Outdoor)	Rated	Compressor model	Indoor PCB	Outdoor PCB	Market destination
RAS-10PKVPG-E / RAS-10PAVPG-E	220-240Vac 50Hz	KTN110D42UFZ	MCC-5088	WP-030	Europe
RAS-10PKVPG-NZ / RAS-10PAVPG-NZ					New Zealand
RAS-13PKVPG-E / RAS-13PAVPG-E		KTN150D42UFZ			Europe
RAS-13PKVPG-NZ / RAS-13PAVPG-NZ					New Zealand
RAS-16PKVPG-E / RAS-16PAVPG-E					Europe
RAS-16PKVPG-NZ / RAS-16PAVPG-NZ					New Zealand

Signature

Name: Chairat Saeheng
Position: Reviewer
Date: 18 April 2018

EMC TEST REPORT

Report No.	:	EE-18021715
Issue Date	:	18 April 2018
Client's Reference Number	:	00856609
Product Description	:	Air conditioner
Model/Type	:	Indoor unit / Outdoor unit RAS-16PKVPG-E / RAS-16PAVPG-E
Manufacturer	:	Toshiba Carrier (Thailand) Co., Ltd.
Address	:	144/9 Moo5 Bangkadi Industrial Park, Tivanon Rd. T. Bangkadi, A. Muang, Pathumthani 12000 THAILAND
Test Conclusion	:	☒ Comply ☐ Non-comply

SUMMARY

The equipment comply with the requirements according to the following standards:
EN 55014-1: 2006/AMD1: 2009/AMD2: 2011
CISPR 14-1: 2005/AMD1: 2008/ AMD2: 2011
AS/NZS CISPR 14-1: 2013
CISPR 14-1: 2011
EN 55014-2: 2015
CISPR 14-2: 2015
EN 61000-3-2: 2014
EN 61000-3-3: 2013

Prepared & Checked By:

Namo Laoprasert

Assist Engineer, EMC Laboratory

Approved By:

Chairat Saeheng

Reviewer

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Tel : +66 2 837 2888 Fax : +66 2 837 2889
www.intertek.com

CONTENT

1. GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

EUT : Air conditioner
Description of EUT:

RAS-16PKVPG-E / RAS-16PAVPG-E is set of 1 Phase Air conditioner, Wall -mount type air conditioners, Heat-pump unit.

Critical component in EUT:
- Compressor model: KTN150D42UFZ.
- Outdoor unit main PCB model: WP-030.
- Indoor unit PCB model: MCC-5088.

RAS-16PKVPG-E / RAS-16PAVPG-E has been selected as a representative model for test is due to the biggest capacity while components in terms of electrical, electronic and wiring are same.

The EMC compliance of EUT can be found in this report.
Model covered have been shown in shown in appendix III.

EUT Model/Type number	:	Indoor unit / Outdoor unit RAS-16PKVPG-E / RAS-16PAVPG-E
EUT Serial number	:	-
Rating	:	220-240Va.c., 50Hz, 10.45A
Main Lead	:	Fixed Appliance.
Clock Frequency	:	10.00 MHz for both set.
Data line	:	N/A
Control line	:	N/A

1.2 Description of Customer

Applicant	:	Toshiba Carrier (Thailand) Co.,Ltd.
Address	:	144/9 Moo5 Bangkadi Industrial Park, Tivanon Rd. T. Bangkadi, A. Muang, Pathumthani 12000 THAILAND
Manufacturer	:	same as applicant
Address	:	same as applicant

1.3 Description of Test Handling

Sample received date	:	20 February 2018
Test date	:	21 February - 28 March 2018
Test Facility	:	Intertek Testing Services (Thailand) Ltd. Electrical and Electronics Product Test Center (PTEC)
Tester	:	Namo Laoprasert
Remark	:	Following tests subcontract to ILAC accredited laboratory: Harmonic Current Emission Voltage Fluctuation and Flicker Test ESD Immunity Test EFT/Burst Immunity Test Surge Immunity Test Conducted Immunity Test Voltage Dips Test

2. TEST SPECIFICATIONS

2.1 Mode of operation during the test / Test peripherals used

Within this test report, EUT has been measured with the temperature controller setting at the lowest position when in cooling mode, and at the highest position when in heating mode (if any).

The ambient temperature is defined at the temperature of the air flow to the indoor unit. The ambient temperature for testing is 15 ± 5 °C when the EUT is operating in heating mode and 30 ± 5 °C when it is operating in cooling mode. If it is impractical to keep the ambient temperature within this range, another temperature is also permissible, provided that the equipment operates in a stable manner (shall lie within 15-35°C).

The operating condition shall maximize emission of the unit i.e.

- Determined by select the test voltage by check at 160 kHz and 50 MHz over 0.9 to 1.1 times of rated voltage defined (or at the upper and lower rate defined respectively) to check the voltage that cause maximum disturbance level. That's the test voltage selected.
- If EUT is 50/60Hz, check to find 1 represent frequency test as same as above i.e. at 160kHz and 50MHz.
- The mode which gave the worst condition from conducted emission after determined will be selected as a representative mode to do full test for the result in this report.

Refer to above, selected Test Supply: 264V, 50Hz.

No test peripherals used.

2.2 Test Instruments

	Equipment	Type/Model	Manu.	I.D.
☒	EMI Receiver	ESR7	Rodge and Schwarz	E5-026
☒	LISN	NNB42	Schaffner	E5-003
☒	Absorbing clamp	MDS 21B	TESEQ	E5-036
☒	Click Analyzer	DIA1512D	Schaffner	E5-002
☒	Voltage probe	TK 9420	Schwarzbeck	E5-025
☒	Signal Conditioning Unit	CCN1000-3	TESEQ	1347A01034
	AC-Power Source	NSG1007	TESEQ	1347A01034
☒	Three Phase Impedance Network	INA2197	TESEQ	1347A01034
☒	ESD Generator	NSG438	TESEQ	1226
☒	EMC Simulator	NSG 3040	TESEQ	1943
☒	EM clamp	KEMZ 801AS50	TESEQ	38662
☒	Compact immunity test system	NSG 4070B-30	TESEQ	39604
☒	Dual directional coupler	DCP 0100A	TESEQ	40093
☒	Power Amplifier	CBA400M-110	TESEQ	T44431
☒	Current injection probe	CIP 9136A	TESEQ	35442
☒	Coupling/Decoupling network	CDN M332S	TESEQ	37751
☒	PQF Simulator	INA 6501	TESEQ	223

☒ Test equipment applicable in this test report
☐ Test equipment not-applicable in this test report

2.3 Software

	Software	Manu.	Version
1	EMC Calculator	-	2015.09
2	DIS9966	Schaffner	2.5.0.0

2.4 Uncertainty Application

Uncertainty of Measurement applied according to CISPR 16-4-2. Reference U_{cispr} in the table as followed used as a reference value for the judgment.

Test Method	U_{cispr} (dB)	U_{Lab} (dB)
Conducted disturbance at mains port using AMN (150kHz to 30kHz)	3.4	4.25
Disturbance power (30MHz-300MHz)	4.5	3.46
Radiated disturbance (30MHz to 1000MHz)	6.3	S[1]

Compliance or non-compliance with a disturbance limit shall be determined in the following manner:

a) If U_{lab} is less than or equal to U_{cispr} in Table, then the test report may either state the value of U_{lab} or state that U_{lab} is less than U_{cispr}.
   – Compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
   – Non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

b) If U_{lab} exceeds U_{cispr} of Table, then the test report shall contain the value of U_{lab} (in dB) for the measurement instrumentation actually used for the measurements.
   – Compliance is deemed to occur if no measured disturbance level, increased by (U_{lab} – U_{cispr}), exceeds the disturbance limit;
   – Non-compliance is deemed to occur if any measured disturbance level, increased by (U_{lab} – U_{cispr}), exceeds the disturbance limit.

[1] Refer to subcontractor uncertainty of measurement, if applicable.

2.5 Test Summary

This report applies to tested sample only. This report shall not be reproduced in part without written approval of Intertek Testing Service (Thailand) Limited.

Reference standard	Frequency	Test Method		Test Verdict
CISPR 14-1 EN 55014-1	148,5 kHz to 30 MHz	☒	Mains terminal continuous disturbance voltage	Pass
		☒	Load terminal continuous disturbance voltage	Pass
		☒	Mains terminal discontinuous disturbance voltage/click	Pass
	30 MHz to 1 000 MHz	☒	Continuous disturbance power (30MHz-300MHz)	Pass
		☐	Radiated disturbance (30MHz-1000MHz)	Not Applicable (Note 1)
IEC/EN 61000-3-2		☒	Harmonic Current Emission	Pass
IEC/EN 61000-3-3		☒	Voltage Fluctuation and Flicker	Pass
CISPR 14-2 EN 55014-2		☒	ESD Immunity Test	Pass
		☒	EFT/Burst Immunity Test	Pass
		☒	Surge Immunity Test	Pass
		☒	Conducted Immunity Test	Pass
		☒	Voltage Dips Test	Pass

☒ Test topic applicable in this test report

☐ Test topic not-applicable in this test report

Remark:

Note 1: Not applicable due to EUT does not incorporate clock frequency between 30MHz – 1000MHz.

EMISSION TEST
EN 55014-1: 2006/AMD1: 2009/AMD2: 2011
CISPR 14-1: 2005/AMD1: 2008/AMD2: 2011
AS/NZS CISPR 14-1: 2013
CISPR 14-1: 2011

3. Mains/Load/Control Terminal Continuous Disturbance Voltage

Test conclusion: ☒ Pass ☐ Fail

Operating Condition EUT is warmed up at least 15 minutes before measurement. Lowest temperature setting, maximum fan speed.

3.1 Test Method

- ❑ Test equipment as shown in the table in topic 2.2 is connected as shown in figure 1 topic 3.1.1 to measurement terminal continuous disturbance voltage.
- ❑ EUT is configured by follow the particular requirement in the reference standards, if available. If the particular requirements are not specified, EUT shall be configured with appropriate load to maximize the disturbance signal.
- ❑ Mains terminal disturbance is measure at line to earth and neutral to earth.
- ❑ Pre-scan shall be done over the whole range of frequency as specified by the standard.
- ❑ At least 6 worst peaks which are closet to the limit(s) shall be selected to do the Final scan.
- ❑ Final scan shall be done by reduce the span zooming in to the selected peak and fine tune to the exact frequency which give the highest disturbance value. Re-measure at that frequency with peak detector and other detector according to the limit(s) applied.

3.1.1 Test Set up

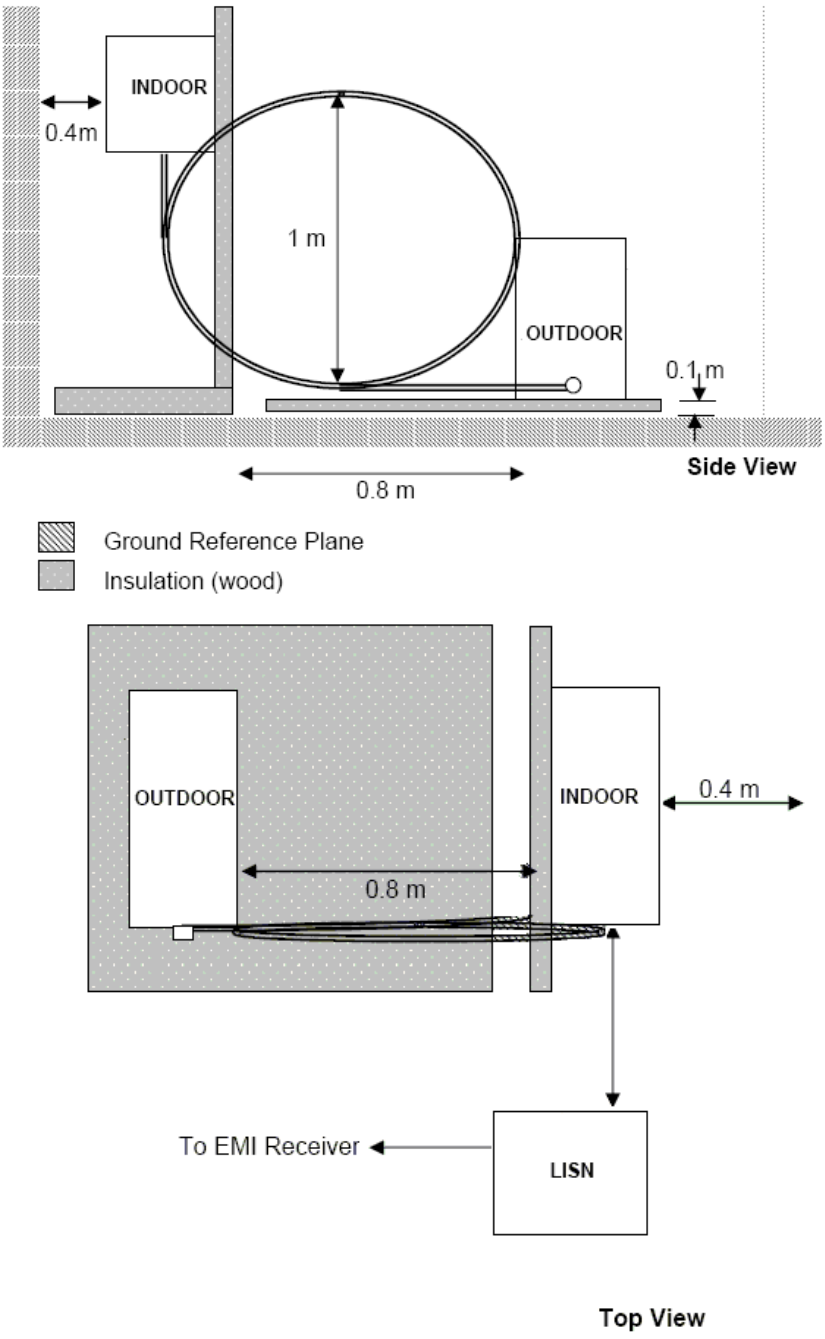

Figure 1-Drawing of Main Terminal Continuous Disturbance Voltage Measurement

3.1.2 Limit

Table 1 Limit for 50Ω/50μH LISN V-network

Frequency range	Main terminals Limits		Load terminals Limits	
(MHz)	*dB(uv)*		*dB(uv)*	
	Quasi-peak	Average	Quasi-peak	Average
0.15 ~ 0.5	66-56 *	59 - 46 *	80	70
0.5 ~ 5	56	46	74	64
5 ~ 30	60	50	74	64
Note:	1. * means the limit decreasing linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.			
	2. If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.			

3.2 Test result

3.2.1 Test Environment

Temperature: 26.0°C Humidity 54.0%RH

3.2.2 Test Port

Main terminal for Line to Ground and Neutral to Ground.

EUT cable has been fixed to 0.8 m in length for testing.

3.2.3 Scanning trace and Final measurement

Main Terminal:

Freq List (MHz)	QP Level (dBµV)	QP Limit (dBµV)	QP Margin (dB)	AV Level (dBµV)	AV Limit (dBµV)	AV Margin (dB)	Path
0.3980	49.60	57.89	-8.29	45.30	48.46	-3.16	L-PE
0.3980	49.00	57.89	-8.89	44.70	48.46	-3.76	N-PE
4.3940	42.90	56.00	-13.10	36.40	46.00	-9.60	L-PE
0.1700	56.80	64.96	-8.16	47.50	57.64	-10.14	L-PE
4.4420	42.30	56.00	-13.70	35.40	46.00	-10.60	N-PE
5.8580	44.00	60.00	-16.00	36.80	50.00	-13.20	N-PE

The test results shown are 6 worst measurement results and sort by average margin.
The scanning results of the emission spectrum are shown in Appendix I.

Load Terminal:

Freq List (MHz)	QP Level (dBµV)	QP Limit (dBµV)	QP Margin (dB)	AV Level (dBµV)	AV Limit (dBµV)	AV Margin (dB)	Path
0.1500	78.60	80.00	-1.40	67.90	70.00	-2.10	3-PE
0.1860	76.20	80.00	-3.80	66.60	70.00	-3.40	3-PE
1.8980	53.10	74.00	-20.90	46.30	64.00	-17.70	2-PE
5.5340	54.90	74.00	-19.10	46.10	64.00	-17.90	2-PE
5.8500	51.10	74.00	-22.90	42.90	64.00	-21.10	1-PE
1.9020	51.40	74.00	-22.60	42.60	64.00	-21.40	1-PE

The test results shown are 6 worst measurement results and sort by average margin.
The scanning results of the emission spectrum are shown in Appendix I.

4. Continuous Disturbance Power

Test conclusion: ☒ Pass ☐ Fail

Operating Condition EUT is warmed up at least 15 minutes before measurement. Lowest temperature setting, maximum fan speed.

4.1 Test Method

- ❑ Test equipment as shown in the table in topic 2.2 is connected as shown in figure 2 topic 4.1.1 to measurement continuous disturbance power.
- ❑ EUT is configured by follow the particular requirement in the reference standards, if available. If the particular requirements are not specified, EUT shall be configured with appropriate load to maximize the disturbance signal.
- ❑ Continuous disturbance power is measure over the 6 m length cable by pre-scan 2m a time. The pre-scan is done at ~0m (the closet to EUT), 3m and 5m.
- ❑ Pre-scan shall be done over the whole range of frequency as specified by the standard. One worst trace will be selected to report as a pre-scan trace.
- ❑ At least 6 worst peaks which are closet to the limit(s) shall be selected to do the Final scan. The selection will do base on the 3 scanning result as mention above. Different frequency will be selected.
- ❑ Final scan shall be done by reduce the span zooming in to the selected peak and fine tune to the exact frequency which give the highest disturbance value. Re-measure at that frequency with peak detector and other detector according to the limit(s) applied.

4.1.1 Test Set up

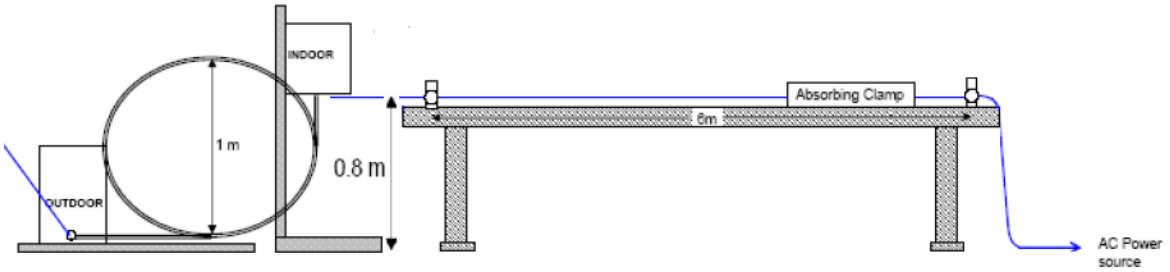

Figure 2-Drawing of Continuous Disturbance Power Measurement

4.1.2 Limit

Table 2-Allowable limit for noise power (continuous noise)

Frequency (MHz)	Quasi-peak dB(pW)	Average dB (pW)
30 to 300	45 to 55*	35 to 45*
Note: 1. * means the limit increasing linearly with the frequency. 2. If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement with the receiver with average detector need not be carried out.		

4.2 Test result

4.2.1 Test Environment

Temperature: 27.0°C Humidity 56.0%Rh

4.2.2 Test Port

Around the power cable which has been extended to 6m.

4.2.3 Scanning trace and Final measurement

Main Cable:

Freq List (MHz)	QP Level (dBpW)	QP Limit (dBpW)	QP Margin (dB)	AV Level (dBpW)	AV Limit (dBpW)	AV Margin (dB)	Sensor
52.6400	38.20	45.83	-7.63	22.60	35.83	-13.23	Inter-con, Indoor
71.1200	38.20	46.52	-8.32	18.80	36.52	-17.72	Inter-con, Indoor
53.1600	35.60	45.85	-10.25	20.70	35.85	-15.15	Main
32.8400	33.10	45.10	-12.00	23.00	35.10	-12.10	Inter-con, Outdoor
37.1200	28.90	45.26	-16.36	18.80	35.26	-16.46	Main
84.8800	30.20	47.03	-16.83	15.00	37.03	-22.03	Inter-con, Outdoor

The test results shown are 6 worst measurement results and sort by quasi-peak margin.
The scanning results of the emission spectrum are shown in Appendix I.

Remark:

Main = Clamp on Main Cable, sensor head to Main.
Inter-con, Outdoor = Clamp on Inter-connecting cable, sensor head to Outdoor.
Inter-con, Indoor = Clamp on Inter-connecting cable, sensor head to Indoor.

5. Main Terminal Discontinuous Disturbance Voltage

Test conclusion: ☒ Pass ☐ Fail

Operating Condition EUT is warmed up at least 15 minutes before measurement. Lowest temperature setting, maximum fan speed.

5.1 Test Method

- ❑ Test equipment as shown in the table in topic 2.2 is connected as shown in figure 3 topic 5.1.1 to measurement discontinuous disturbance at main terminal.
- ❑ EUT is configured by follow the particular requirement in the reference standards, if available. If the particular requirements are not specified, EUT shall be configured with appropriate load to maximize the disturbance signal.
- ❑ The observation time is based on the EUT (ensure that cycle of operation shall be fully complete) or 120 minutes.
- ❑ Main terminal discontinuous disturbance (click) is measured by discontinuous disturbance analyzer (DIA) with the limit specified in 5.1.2 for the defined observation time.
- ❑ Test and conclusion of test result shall be referred to the flow chart in CISPR 14-1.

5.1.1 Test Set up

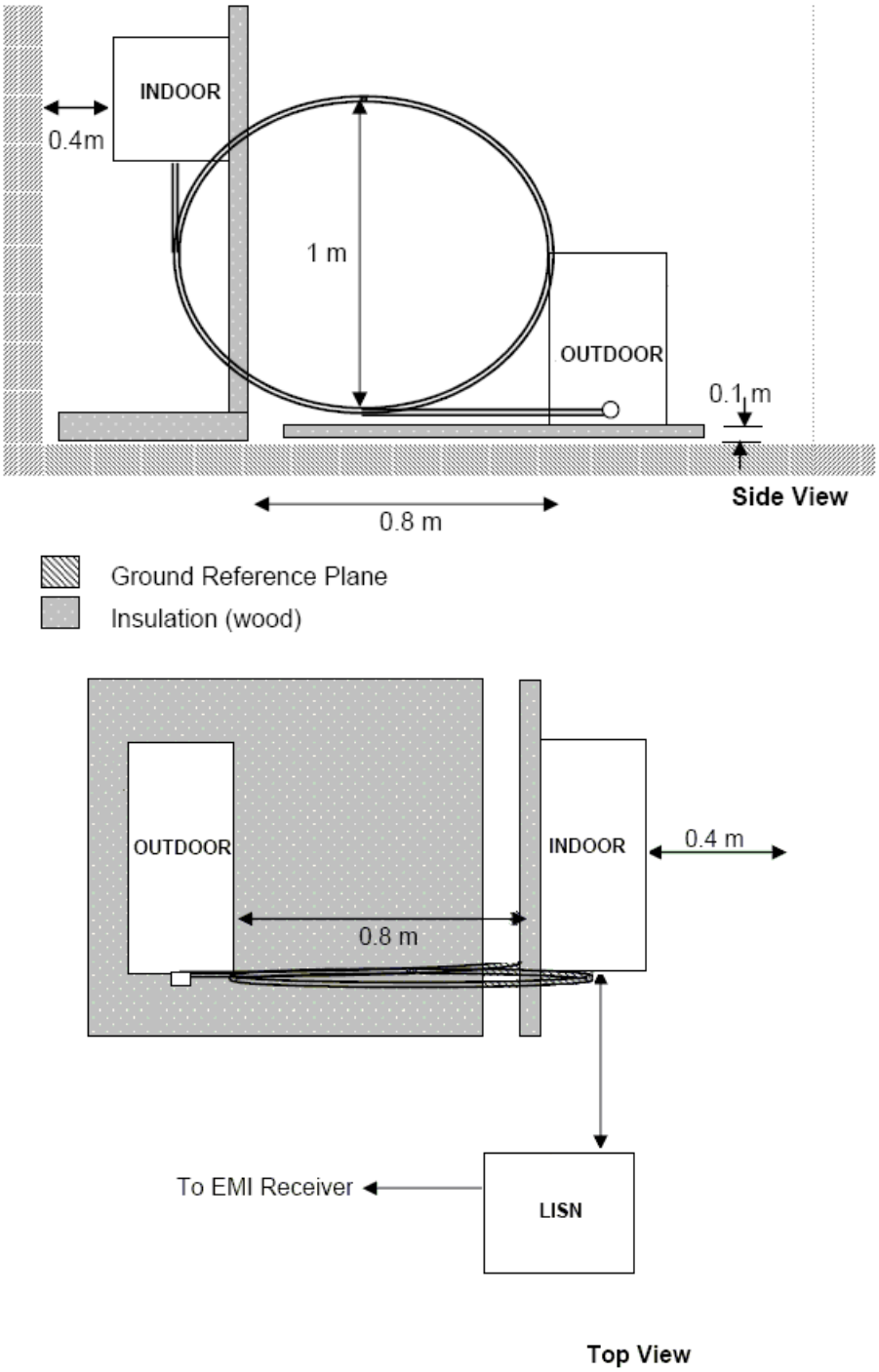

Figure 3-Drawing of Main Terminal Discontinuous Disturbance Voltage Measurement

5.1.2 Limit

The limits for discontinuous disturbance depend on the average number of clicks per minute, Click rate *N*. There are two methods for determining the click rate:

☒ by measuring the number of clicks or

☐ by counting the number of switching operations.

Run A limit refer to Main terminal disturbance voltage limit of CISPR14-1 as “L” as shown in table 3

Table 3-Allowable limits for discontinuous noise terminal voltage

Frequency range	0.15	0.5	1.4	30
Limit	66	56	56	60

Run B limit can be calculated based on click rate “N”

Range N	Limit
$N < 0.2$	L+44
$0.2 \le N \le 30$	$L + 20\log_{10}\frac{30}{N}$
N	N

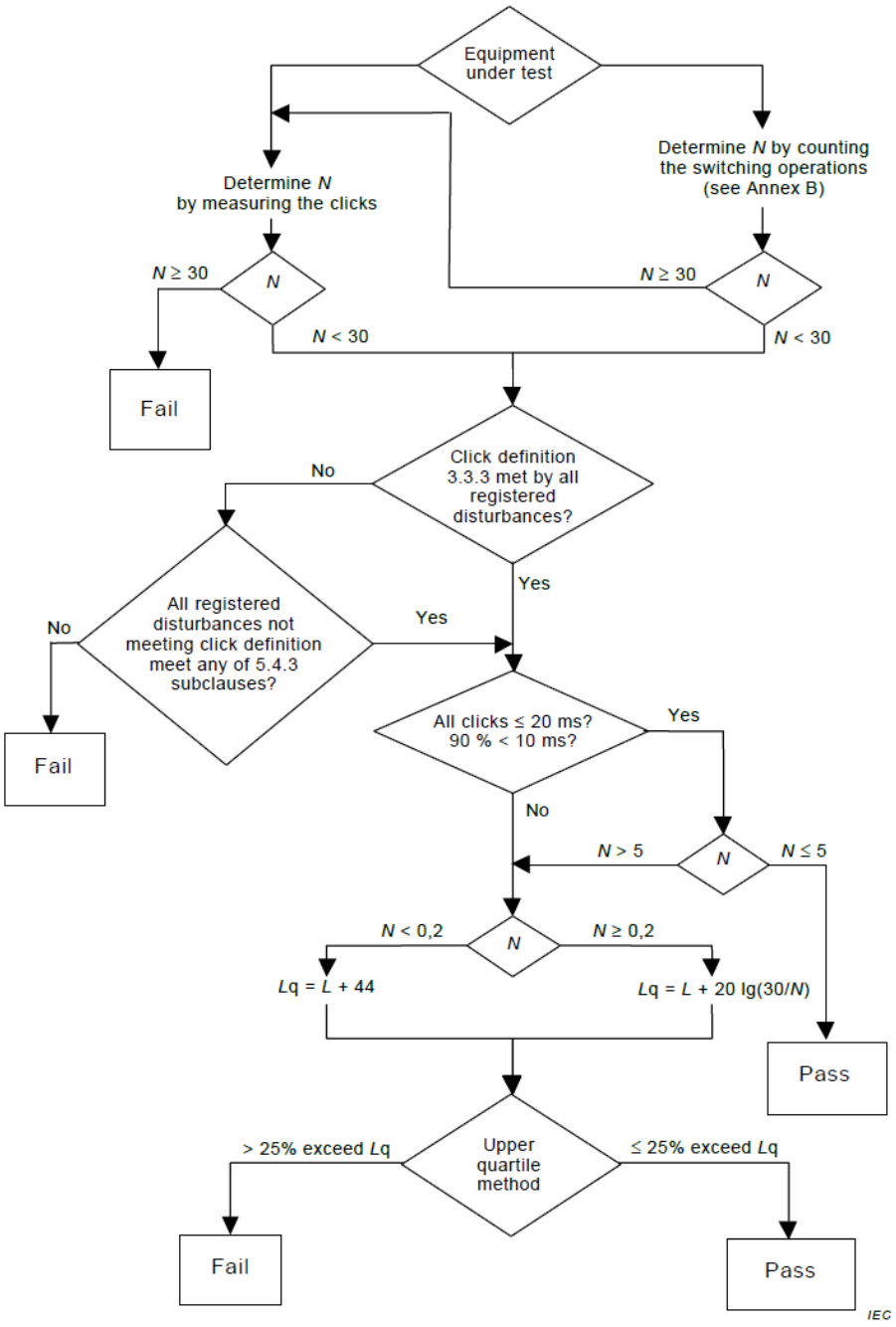

Figure 4-Flow Diagram for DIA (Refer EN 55014-1)

5.2 Test result

5.2.1 Test Environment

Temperature: 26.0°C Humidity 54.0%Rh

5.2.2 Test Port

Main terminal for Line to Ground.

5.2.3 Measurement result

EUT Operation mode:		Cooling, max fan speed		**EUT configuration:**		CISPR 14-1
EUT Interface:		Mains		**--**		--
Frequency (MHz)	**First measurement: Determine the limit L_q – Quasi-peak**					
	Limit *L* (dB(µV))	**Number of clicks – N1**	**Time of measurement *T* (min)**	**Click rate *N***	**Increasing ratio**	**Limit L_q (dB(µV))**
0.15	**66**	1	120	0.01	44dB	110
0.5	**56**	0	120	0.00	44dB	100
1.4	**56**	0	120	0.00	44dB	100
30	**60**	0	120	0.00	44dB	104

Second measurement with Limit = L_q (Upper quartile method):				
Frequency (MHz)	**Limit– Quasi-peak**			
	Limit Lq (dB(µV))	**Number of clicks – N2**	**Number of authorized clicks N2 ≤N1/4**	**Verdict**
0.15	110	0	0	Pass
0.5	100	0	0	Pass
1.4	100	0	0	Pass
30	104	0	0	Pass

Supplementary information:
N not more than 5 and no long click.

Harmonics Current Emission

EN 61000-3-2: 2014

6. Harmonics Current Emission

Test conclusion: ☒ Pass ☐ Fail
Operating Condition EUT is warmed up at least 15 minutes before measurement.
Lowest temperature setting, maximum fan speed.

6.1 Test set up drawing

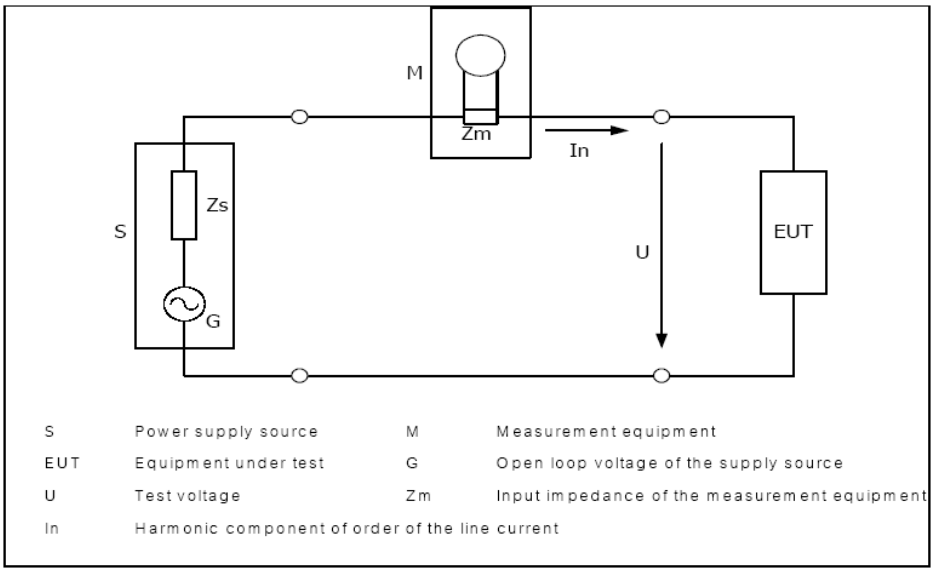

Figure 5-Harmonic current emission measurement system

6.2 Limits

EUT Classification
A

Harmonic Current Emission Limits (Class A equipment)	
Harmonic order (n)	Maximum permissible Harmonic current (A)
Odd harmonics	
3 5 7 9 11 13 15 ≤ n ≤ 39	2.30 1.14 0.77 0.40 0.33 0.21 $0.15 \frac{15}{n}$
Even harmonics	
2 4 6 8 ≤ n ≤ 40	1.08 0.43 0.30 $0.28 \frac{8}{n}$

6.3 Test result

Harmonic Current Emission

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit
2	0.003	1.080	N/A	0.005	1.620	N/A
3	1.514	2.300	65.8	1.529	3.450	44.3
4	0.001	0.430	N/A	0.002	0.645	N/A
5	0.376	1.140	33.0	0.386	1.710	22.6
6	0.001	0.300	N/A	0.002	0.450	N/A
7	0.267	0.770	34.6	0.277	1.155	24.0
8	0.001	0.230	N/A	0.001	0.345	N/A
9	0.175	0.400	43.9	0.181	0.600	30.2
10	0.001	0.184	N/A	0.001	0.276	N/A
11	0.036	0.330	10.9	0.038	0.495	7.7
12	0.001	0.153	N/A	0.001	0.230	N/A
13	0.102	0.210	48.7	0.107	0.315	33.9
14	0.001	0.131	N/A	0.001	0.197	N/A
15	0.051	0.150	34.3	0.053	0.225	23.7
16	0.001	0.115	N/A	0.001	0.173	N/A
17	0.027	0.132	20.7	0.030	0.198	15.0
18	0.000	0.102	N/A	0.001	0.153	N/A
19	0.047	0.118	39.5	0.048	0.178	27.3
20	0.001	0.092	N/A	0.001	0.138	N/A
21	0.014	0.107	13.1	0.015	0.161	9.2
22	0.000	0.084	N/A	0.001	0.125	N/A
23	0.023	0.098	24.0	0.025	0.147	16.7
24	0.001	0.077	N/A	0.001	0.115	N/A
25	0.010	0.090	11.5	0.013	0.135	9.3
26	0.001	0.071	N/A	0.001	0.107	N/A
27	0.021	0.083	24.7	0.023	0.125	18.6
28	0.000	0.066	N/A	0.001	0.099	N/A
29	0.013	0.078	16.5	0.013	0.116	11.5
30	0.001	0.061	N/A	0.001	0.092	N/A
31	0.009	0.073	11.9	0.010	0.109	9.0
32	0.000	0.058	N/A	0.001	0.086	N/A
33	0.016	0.068	22.9	0.016	0.102	15.6
34	0.000	0.054	N/A	0.000	0.081	N/A
35	0.006	0.064	9.2	0.007	0.096	6.9
36	0.001	0.051	N/A	0.001	0.077	N/A
37	0.008	0.061	13.4	0.009	0.091	9.5
38	0.000	0.048	N/A	0.000	0.073	N/A
39	0.007	0.058	12.4	0.008	0.087	9.6
40	0.000	0.046	N/A	0.000	0.069	N/A

Voltage Fluctuation and Flicker

EN 61000-3-3: 2013

7. Voltage Fluctuation and Flicker

Test conclusion: ☒ Pass ☐ Fail

Operating Condition EUT is warmed up at least 15 minutes before measurement. Lowest temperature setting, maximum fan speed.

7.1 Test set-up drawing

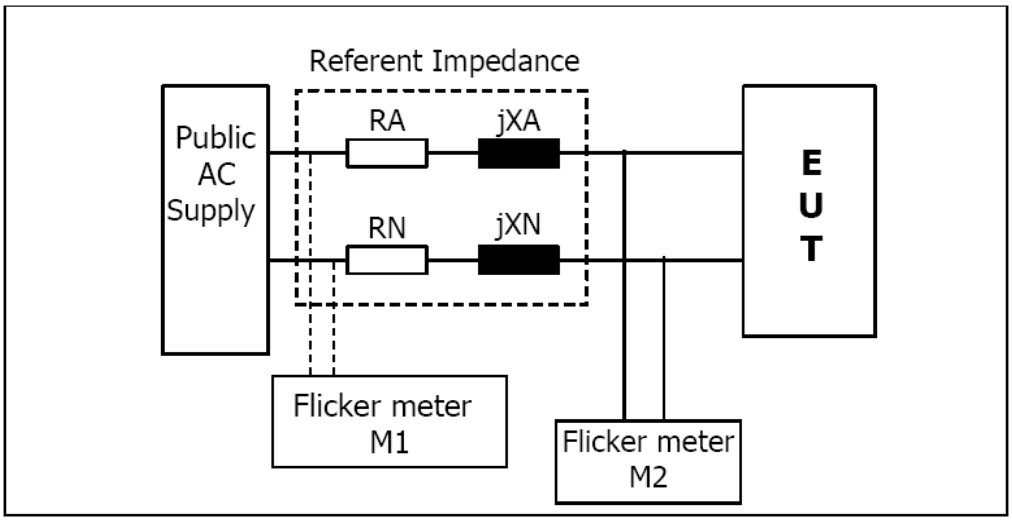

Figure 6- Drawing of Voltage Fluctuation-Flicker measurement

7.2 Test result

Measurement Description	Measurement Result	Limit
Pst	0.302	1.00
Plt	0.166	0.65
dc[%]	1.99	3.30%
dmax[%]	2.03	6.00%
T-max [ms]	0.0	500ms

Immunity Test

EN 55014-2: 2015
CISPR 14-2: 2015

Appliance Classification: Category II

Appliance shall fulfill the following immunity requirements

Test Description	Performance criteria required
Electrostatic discharge	B
Fast transient	B
Surge	B
Injected current up to 230MHz	A
Voltage dips	C

Performance criteria of test specification

Function	Criteria	During Test	After Test
Data storage	A	No loss or change of storage data	No loss or change of storage data
	B	loss or change of storage data can automatic recovered without operator resetting	No loss or change of storage data
	C	loss or change of storage data can recovered by operator resetting	No loss or change of storage data
Display	A	The display can show latest status	The display can show latest status
	B	The display cannot show latest status but can automatic recovered without operator resetting	The display can show latest status
	C	The display cannot show latest status recovered can be obtained by operator resetting	The display can show latest status

Test Verdict

Criterion A: Normal Performance within limits specified by the manufacturer, requestor or purchaser.

Criterion B: Continue to operate as intended after the test. No degradation of performance or loss of function. During the test degradation of performance is allowed, however no change of actual operating state or stored date.

Criterion C: Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

8. Electrostatic Discharge

Test conclusion: ☒ Pass ☐ Fail

Monitoring Condition: EUT and its display unit shall function appropriately as normal operation.

Test Requirement: B

8.1 Test set-up drawing

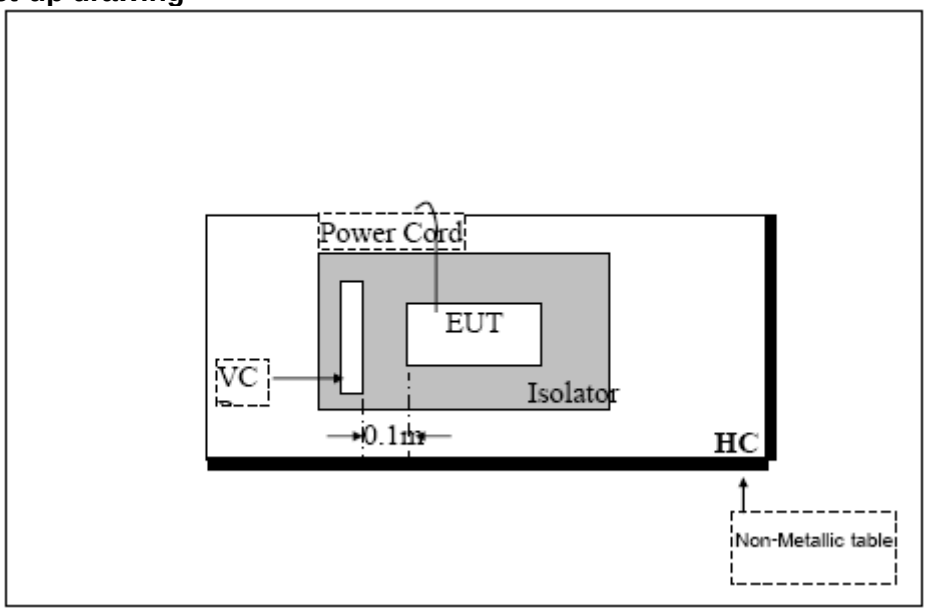

Figure 7- Drawing of ESD test set-up

8.2 Test Level

Port	Test Specification	Test set-up
Enclosure port	± 8kV Air Discharge	IEC/EN 61000-4-2
	± 4kV Contact Discharge	

8.3 Test results

Environmental condition: 25.0°C, 55.0%Rh

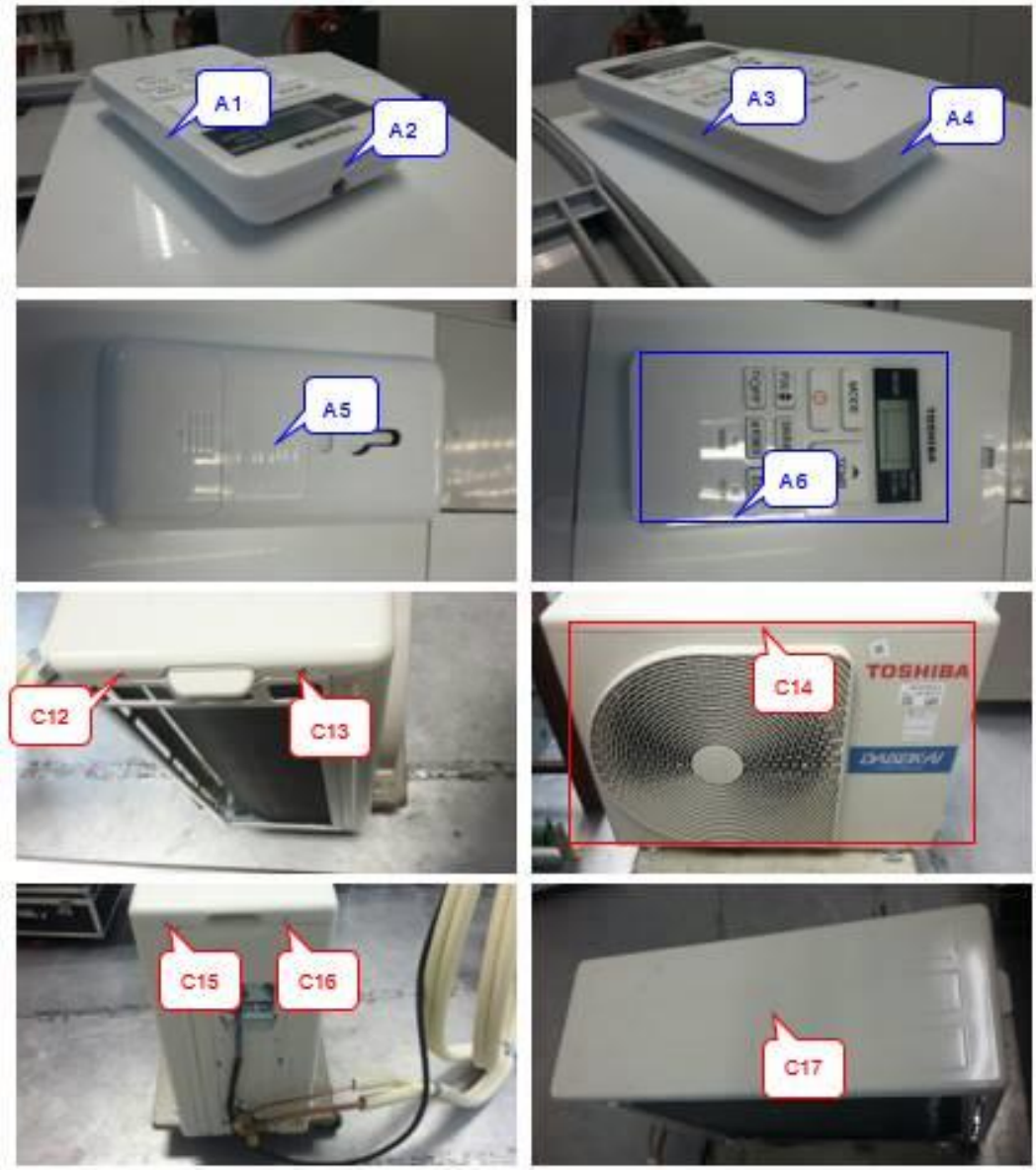

Figure 8-ESD test point

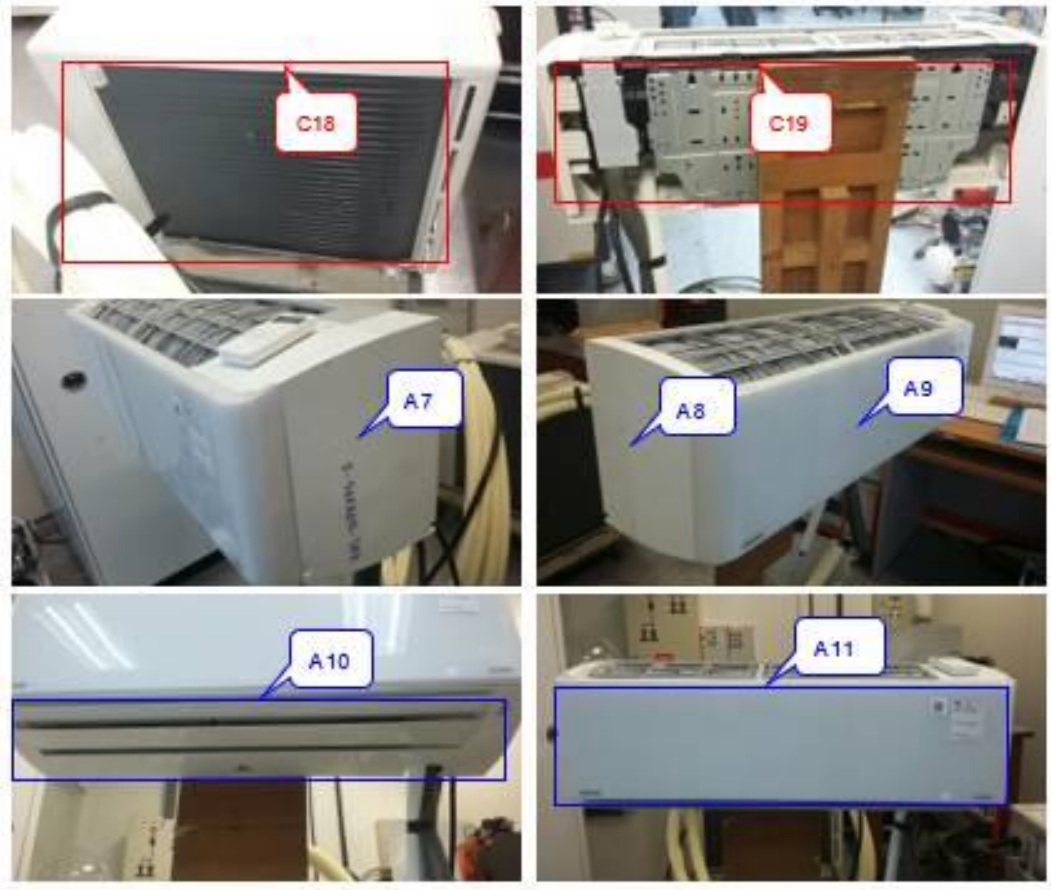

Figure 8-ESD test point (cont.)

Test point	Test voltage (kV)/No. of Discharge	Test type	Observation	Test Verdict
A1-A11	±8/10	Air	Normal	B
C10-C19	±4/10	Contact	Normal	B
Indirect	±4/10	Contact	Normal	B

9. Electrical Fast Transient / Burst

Test result: ☒ Pass ☐ Fail

Monitoring Condition: EUT and its display unit shall function appropriately as normal operation.

Test Requirement: B

9.1 Test set-up drawing

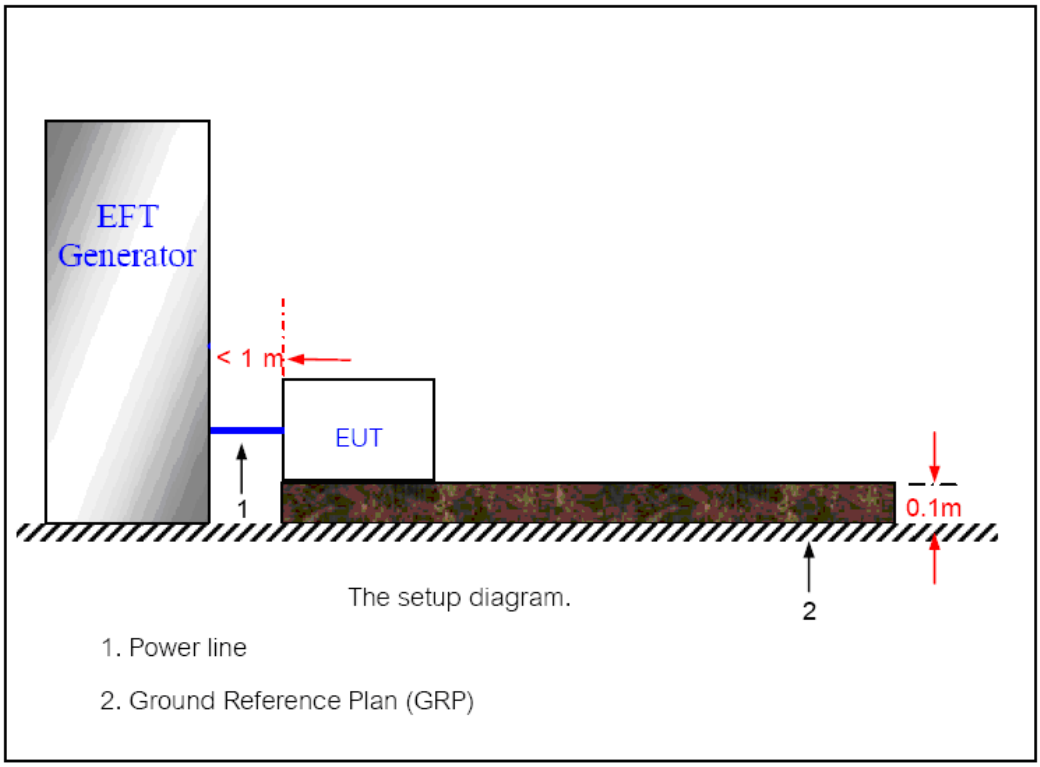

Figure 9- Drawing of EFT/Burst test set-up

9.2 Test level

Port	Test Specification		Test set-up
☐ Signal line & control line	0.5kV(peak)	5/50 ns (t_r/T_d) 5kHz repetition frequency	IEC/EN 61000-4-4
☐ Input & output dc power port			
☒ Input & output ac power port	1kV(peak)		

9.3 Test results

Environmental condition: 25.0 ^{O}C, 55.0%Rh

Coupling path	Test Specification	Observation	Test Verdict
L to G	1kV(peak)	Normal	B
N to G	1kV(peak)	Normal	B
PE to G	1kV(peak)	Normal	B
L, N, PE to G	1kV(peak)	Normal	B

10. Surge

Test result ☒ Pass ☐ Fail

Monitoring Condition EUT and its display unit shall function appropriately as normal operation.

Test Requirement: B

10.1 Test set-up drawing

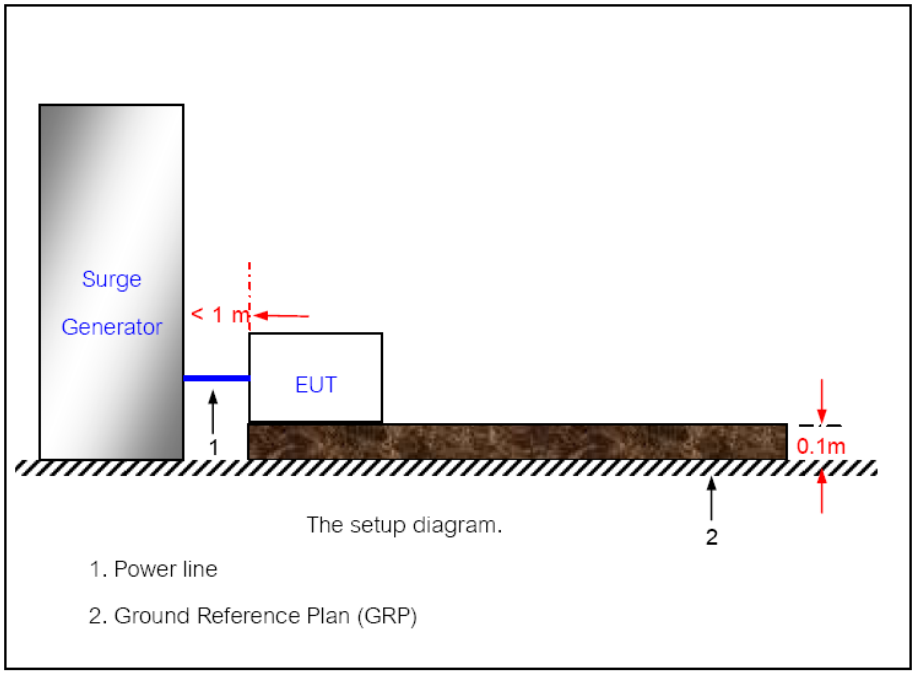

Figure 10- Drawing of Surge test set-up

10.2 Test level

Port	Test Specification		Test set-up
Input & output ac power port	1.2/50 (8/20) T_r/T_d µs		IEC/EN 61000-4-5
	Phase-Phase	± 1kV	
	Phase-Neutral	± 1kV	
	Phase-Earth	± 2kV	
	Neutral-Earth	± 2kV	

10.3 Test results

Environmental condition: 25.0^{O}C, 55.0 %Rh

Coupling path	Test Level	No. of surge/pole	Phase Angle	Observation	Test Verdict
L-N	± 1kV	5	0^{O},90^{O}, 180^{O}, 270^{O}	Normal	B
L-PE	± 2kV	5		Normal	B
N-PE	± 2kV	5		Normal	B

11. Injected current (0.15MHz - 230MHz)

Test result ☒ Pass ☐ Fail

Monitoring Condition EUT and its display unit shall function appropriately as normal operation.

Test Requirement: A

11.1 Test set-up drawing

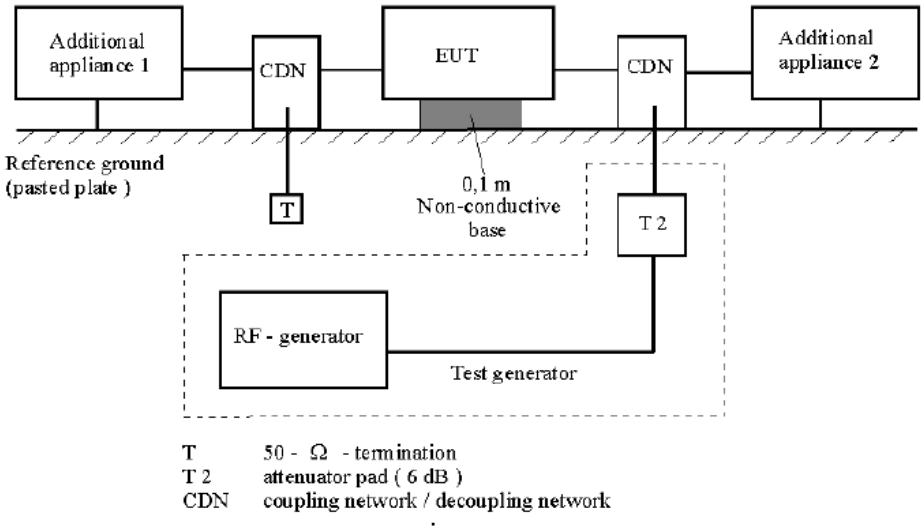

Figure 11- Drawing of Injected current test set-up

11.2 Test level

Environmental Phenomenon: RF current common mode 1kHz, 80%AM

Port	Test Specification	Test set-up
☐Signal line & control line	0.15MHz-230MHz 1V(r.m.s)(unmodulated) 150 Ω source impedance	IEC/EN 61000-4-6
☐ Input & output dc power port	0.15MHz-230MHz 1V(r.m.s)(unmodulated) 150 Ω source impedance	
☒ Input & output ac power port	0.15MHz-230MHz 3V(r.m.s)(unmodulated) 150 Ω source impedance	

11.3 Test result

Environmental condition: 25.0^{O}C, 55.0%Rh

Coupling path	Test Level	Frequency	Test specification	Observation	Test Verdict
Input AC power port	3V	0.15MHz-230MHz	1kHz, 80% AM	Normal	A

12. Voltage dips

Test result	☒ Pass	☐ Fail
Monitoring Condition	EUT and its display unit shall function appropriately as normal operation.	
Test Requirement:	C	

12.1 Test set-up drawing

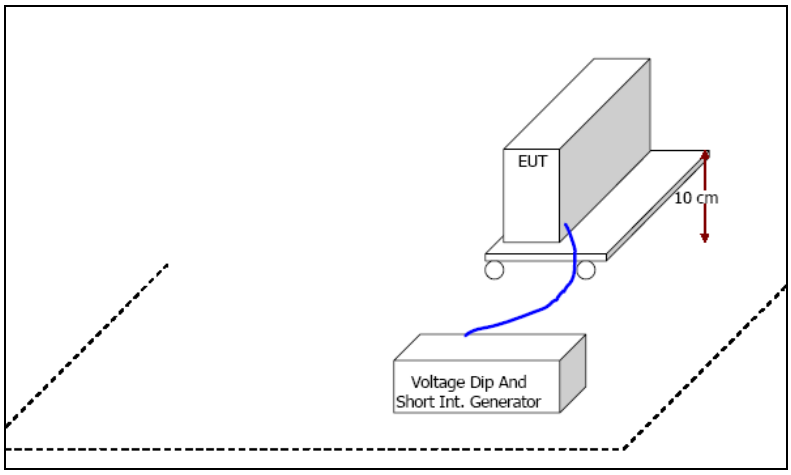

Figure 12- Drawing of voltage dips test set-up

12.2 Test level

Port	Phenomena		Test level in % V_T	Duration (in period of the rated frequency)	Test set-up
Input ac power port	Voltage dips in %V_T	100	0	0.5	IEC/EN 61000-4-11
		60	40	10	
		30	70	25	

12.3 Test result

Environmental condition: 25.0 ^{O}C, 55.0%rH

Port	Input voltage	Reduction (%)	Duration (ms)	Observation	Test Verdict
Input ac power port	230V 50Hz	100	10	Normal	C
		60	200	Normal	C
		30	500	Normal	C

APPENDIX I: EMISSION SPECTRUM

The following pages have shown the emission spectrum resulting from main terminal continuous disturbance voltage measurement and continuous power disturbance measurement.

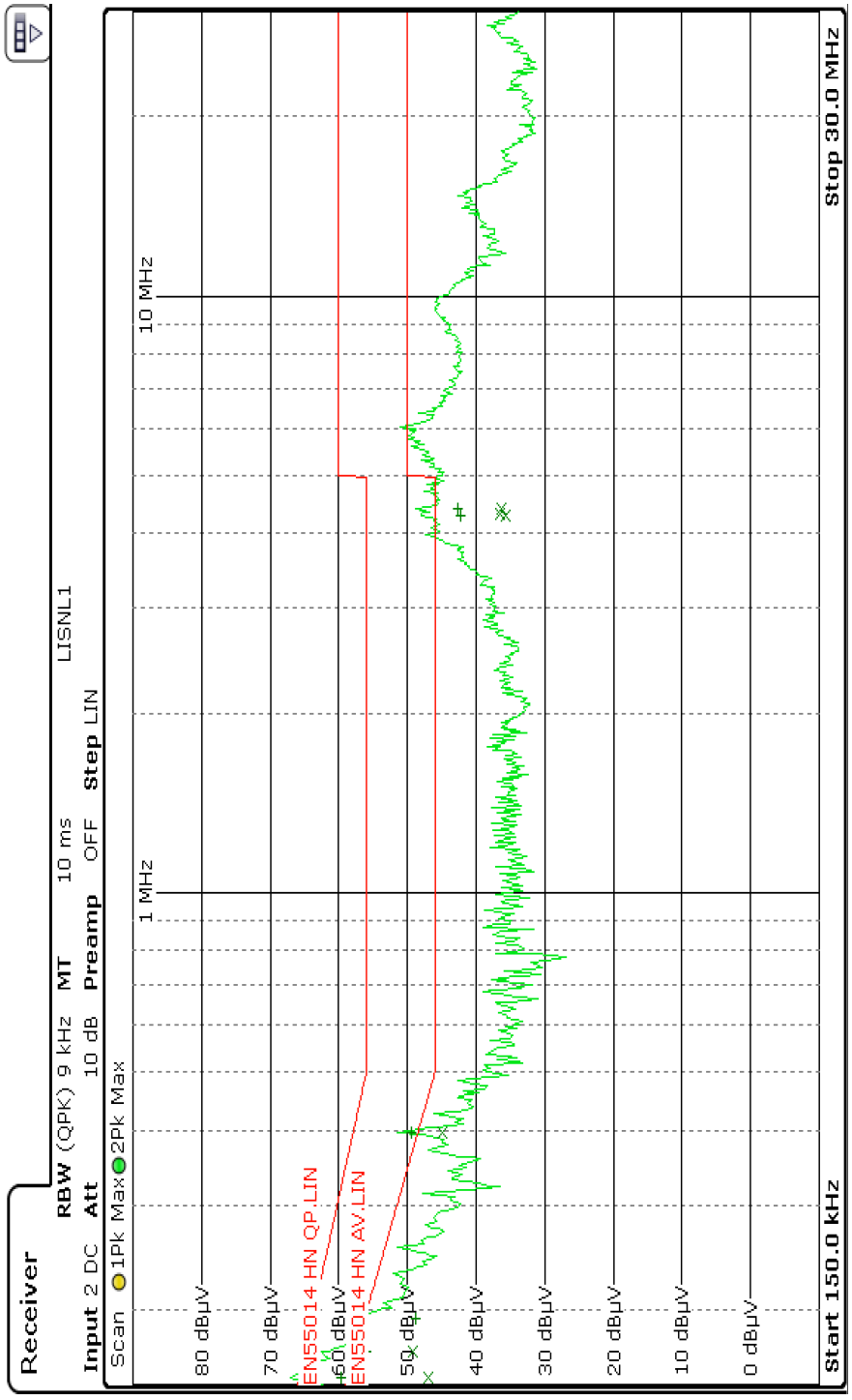

Figure AI.1:-Main terminal disturbance voltage, Line to Ground

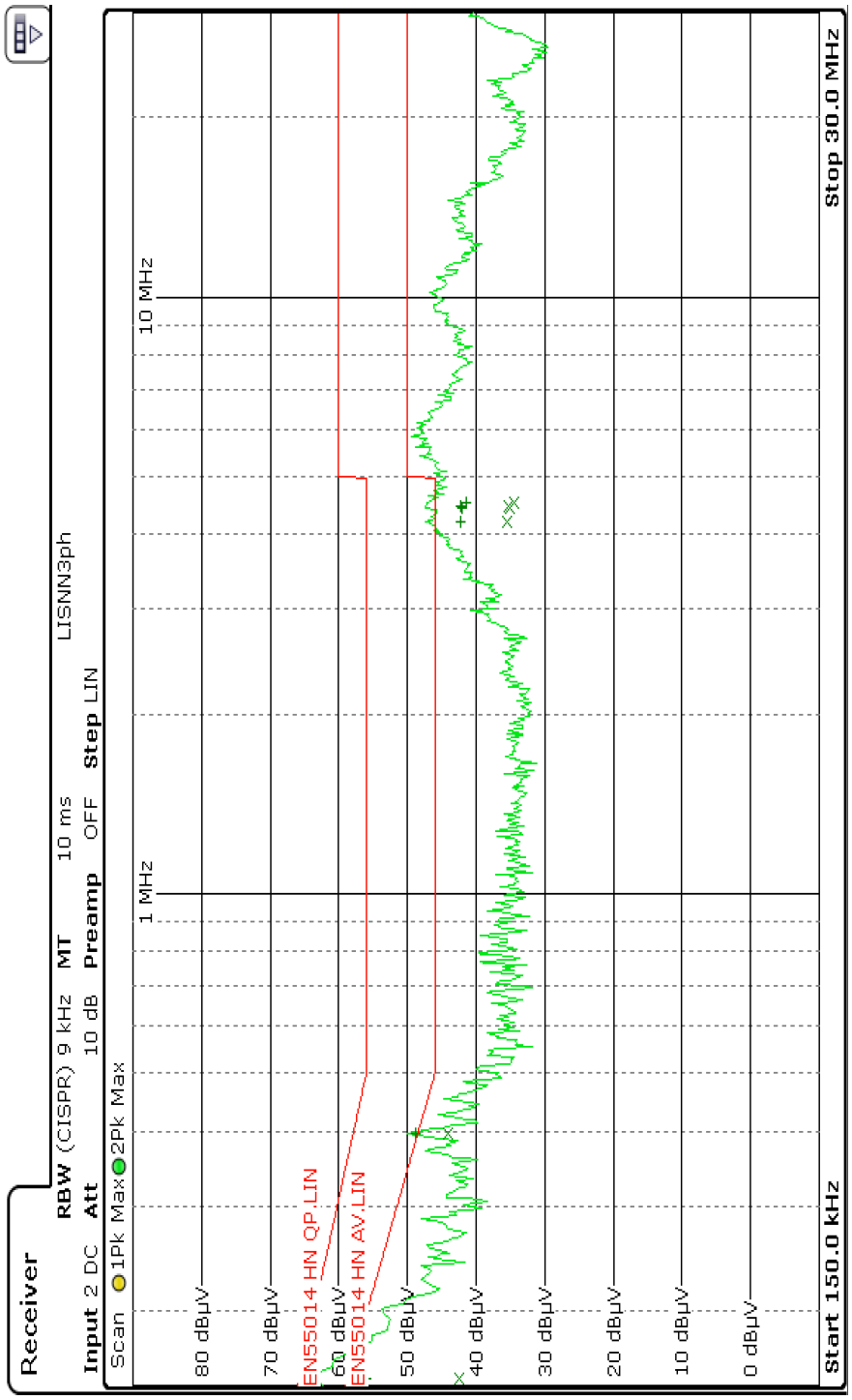

Figure AI.2:-Main terminal disturbance voltage, Neutral to Ground

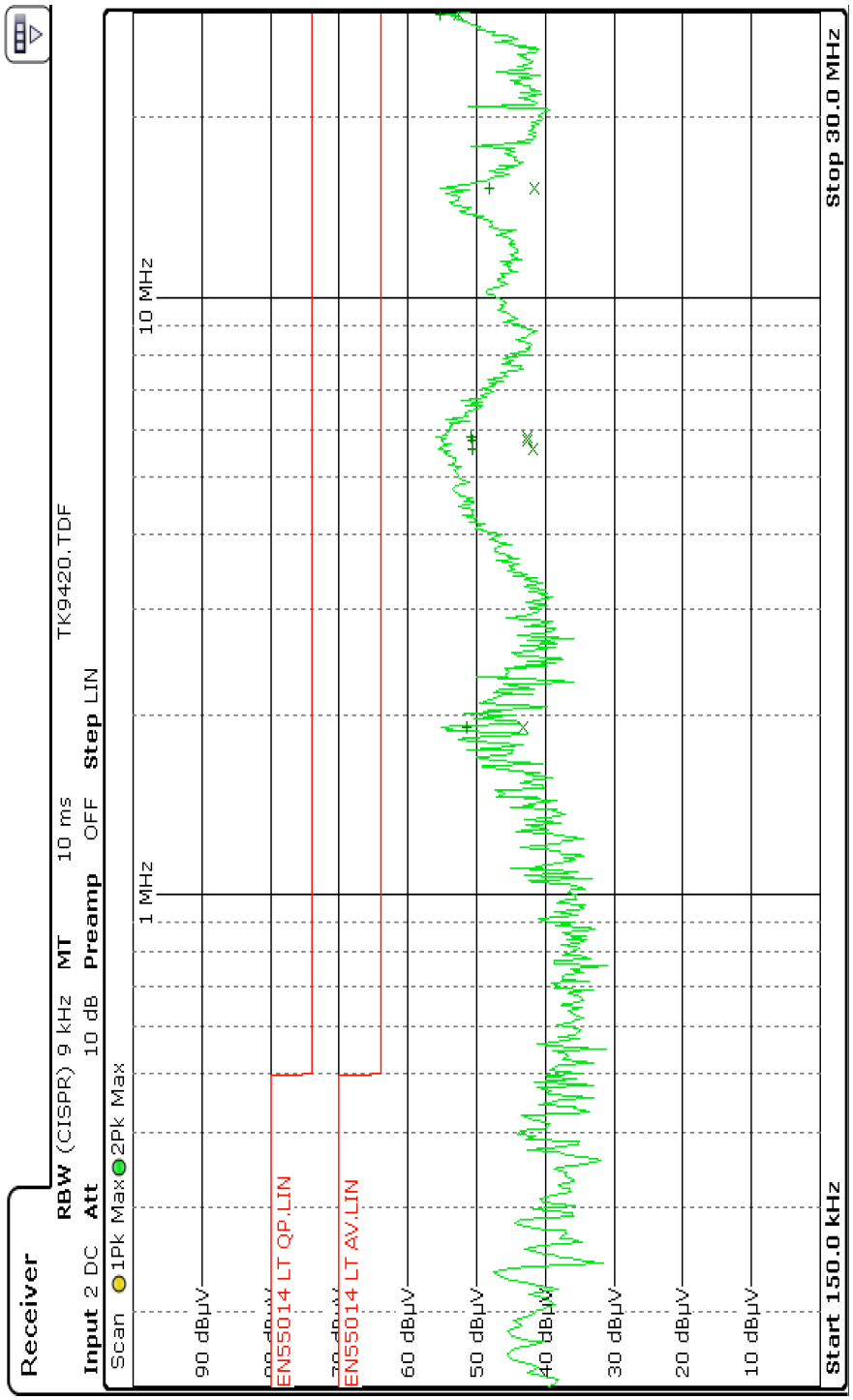

Figure AI.3:-Load terminal disturbance voltage, Terminal 1 to Ground

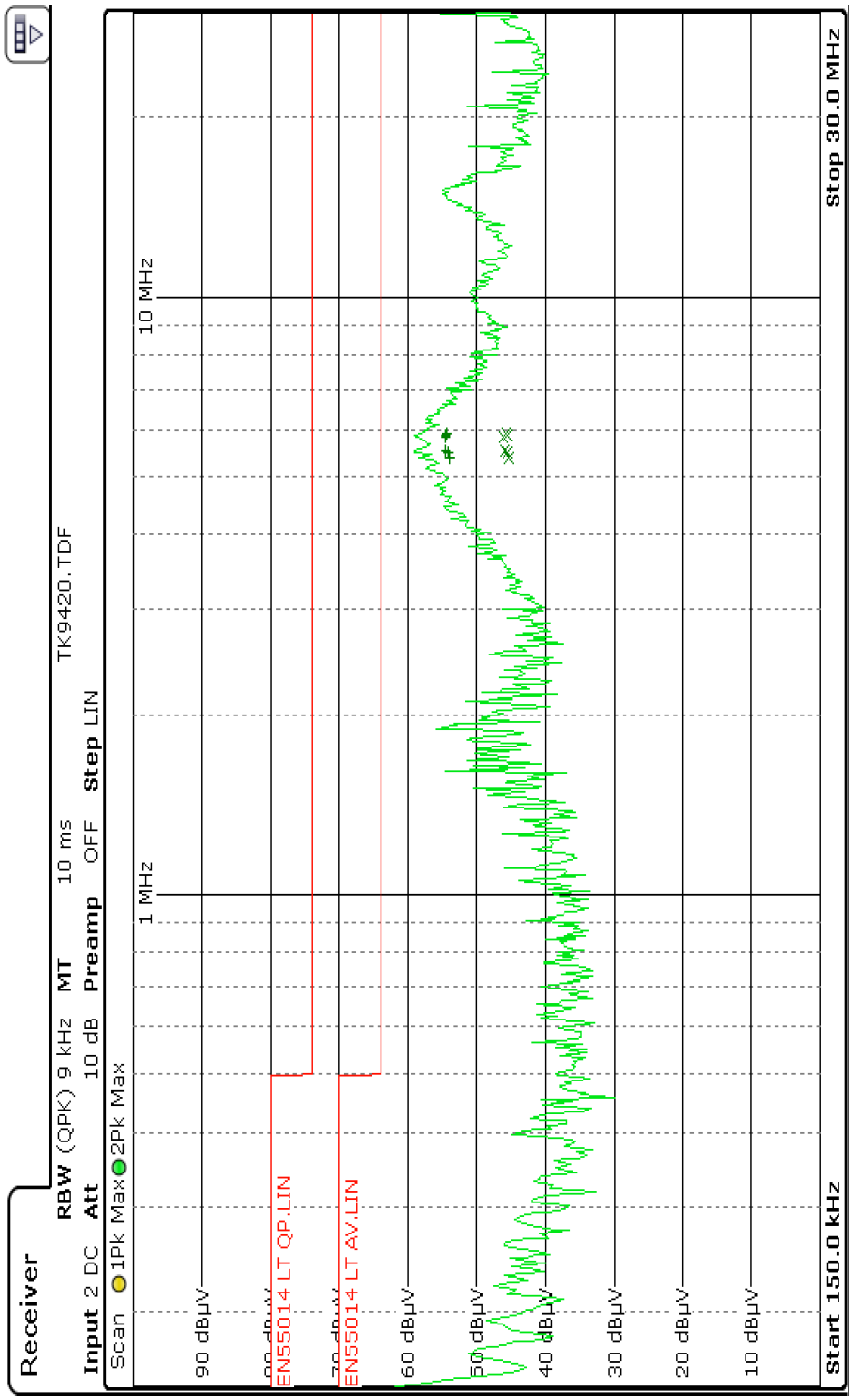

Figure AI.4:-Load terminal disturbance voltage, Terminal 2 to Ground

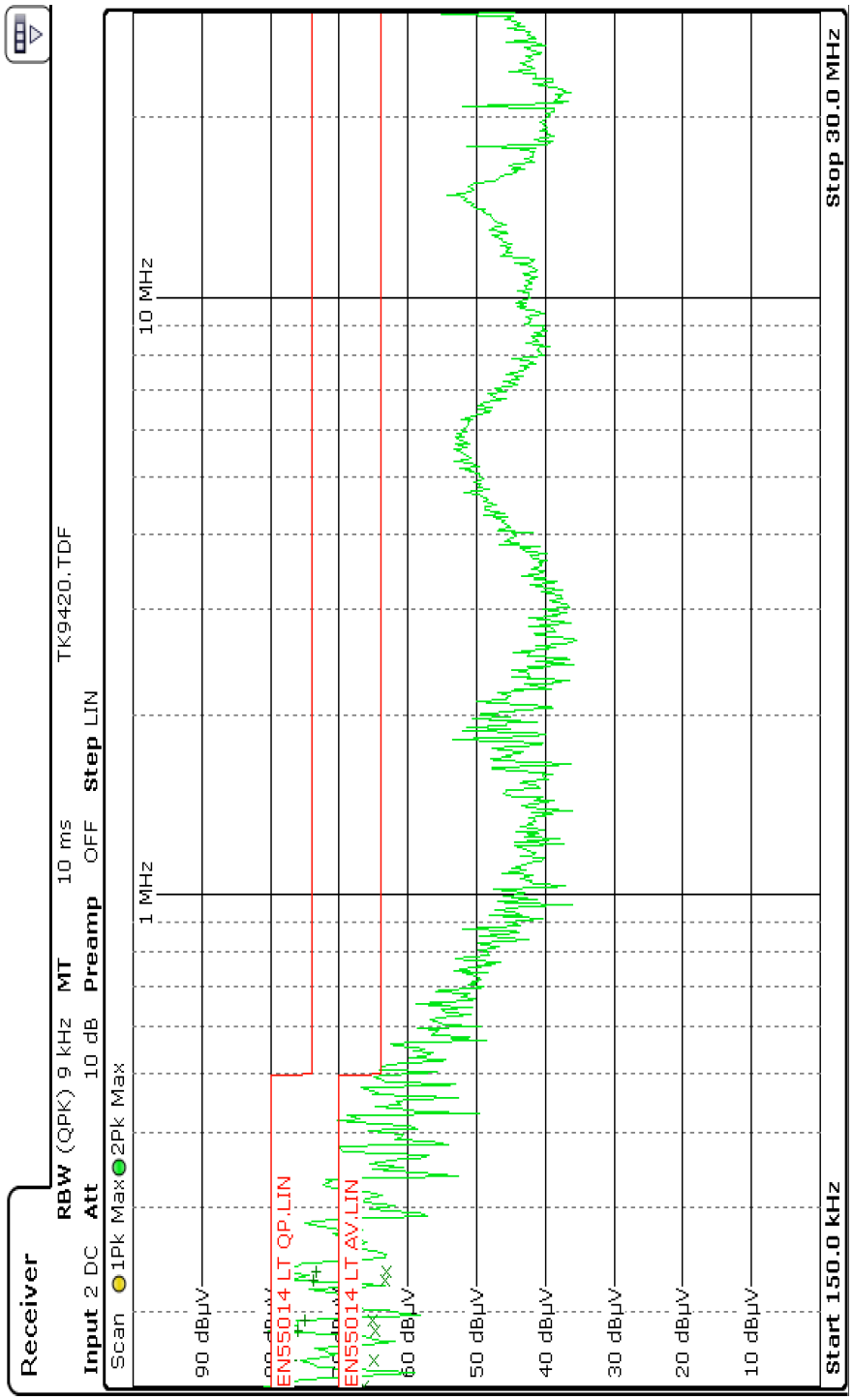

Figure AI.5:-Load terminal disturbance voltage, Terminal 3 to Ground

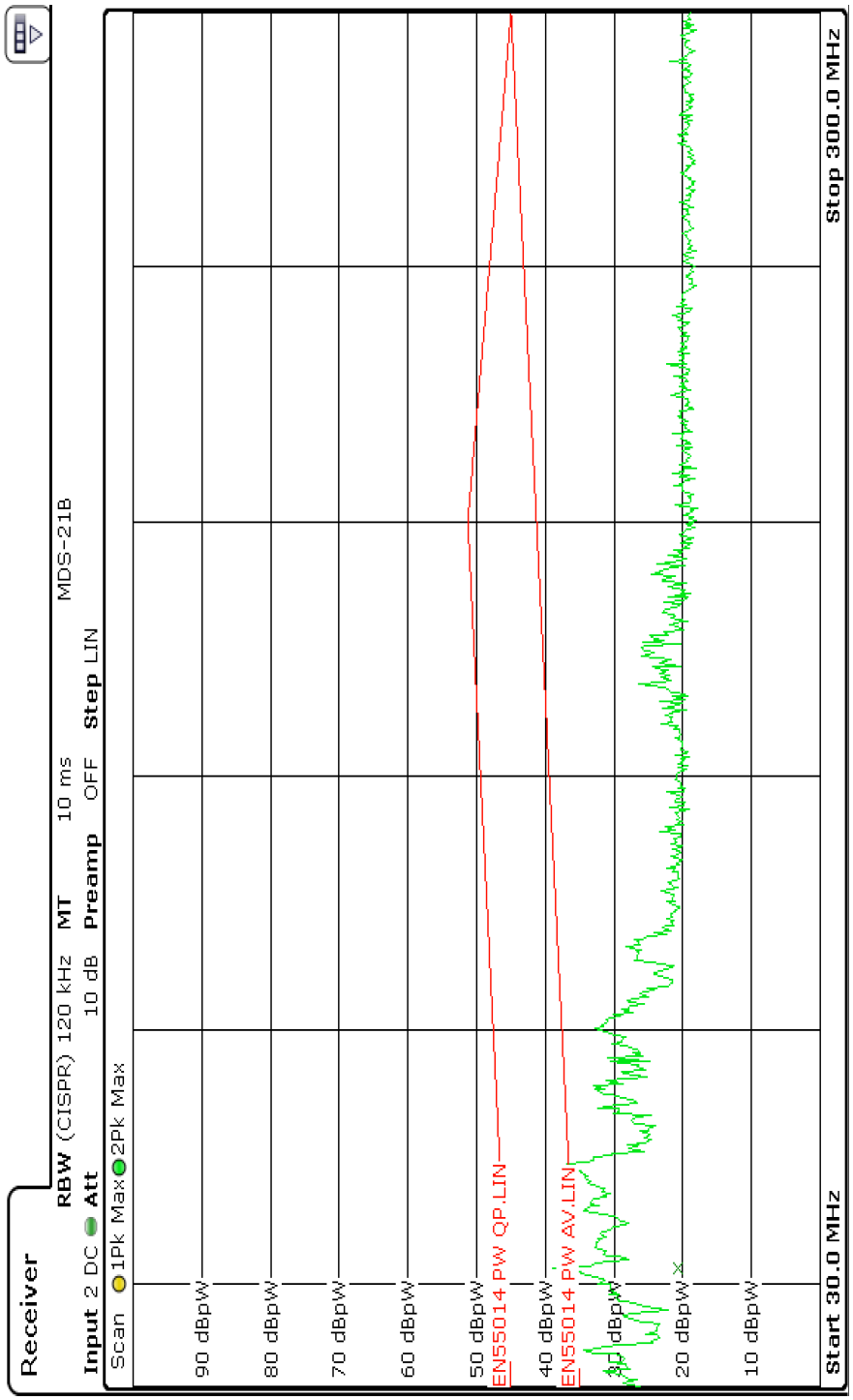

Figure AI.6:-Power disturbance measurement, Sensor to mains

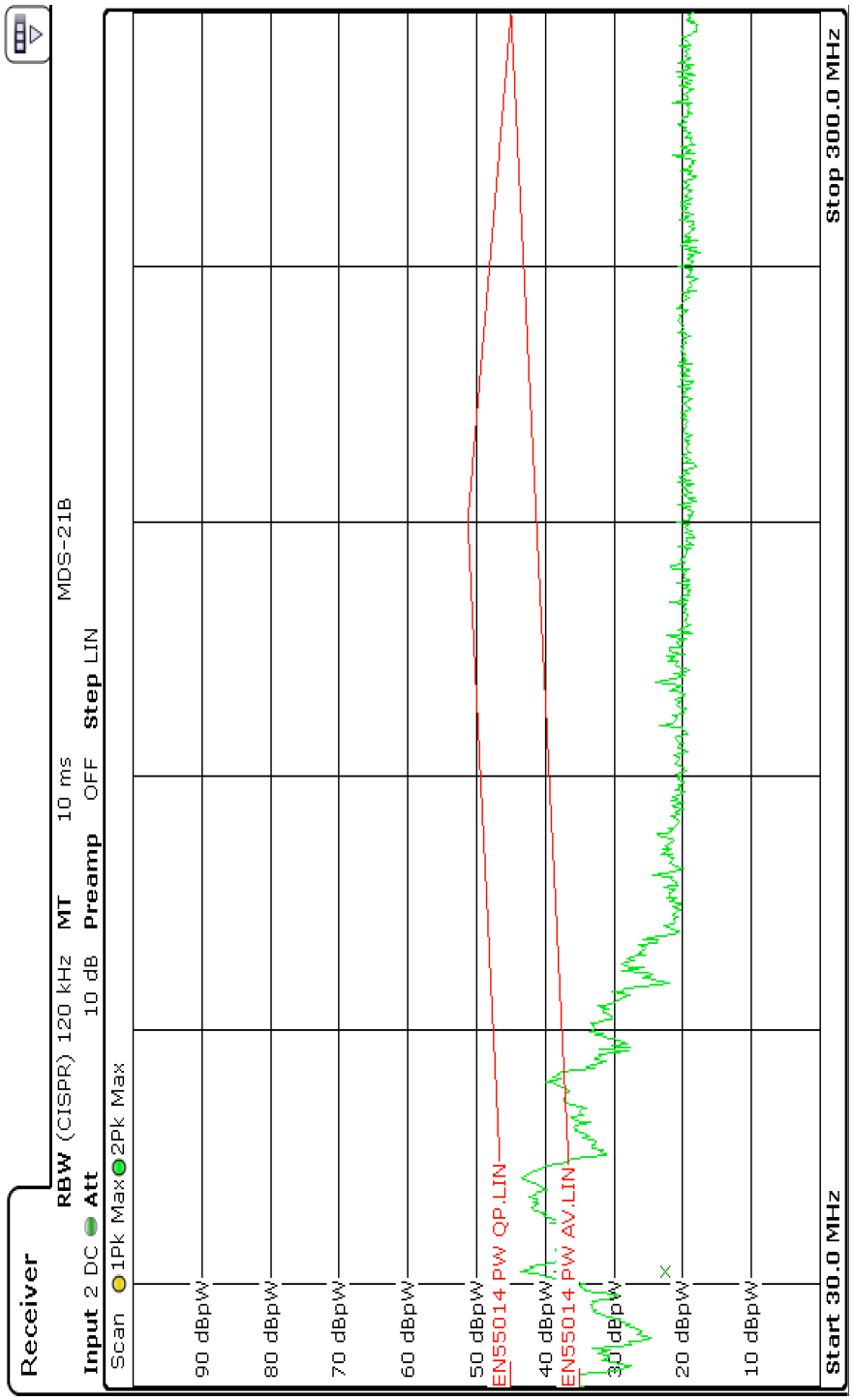

Figure AI.7:-Power disturbance measurement, Sensor to Indoor

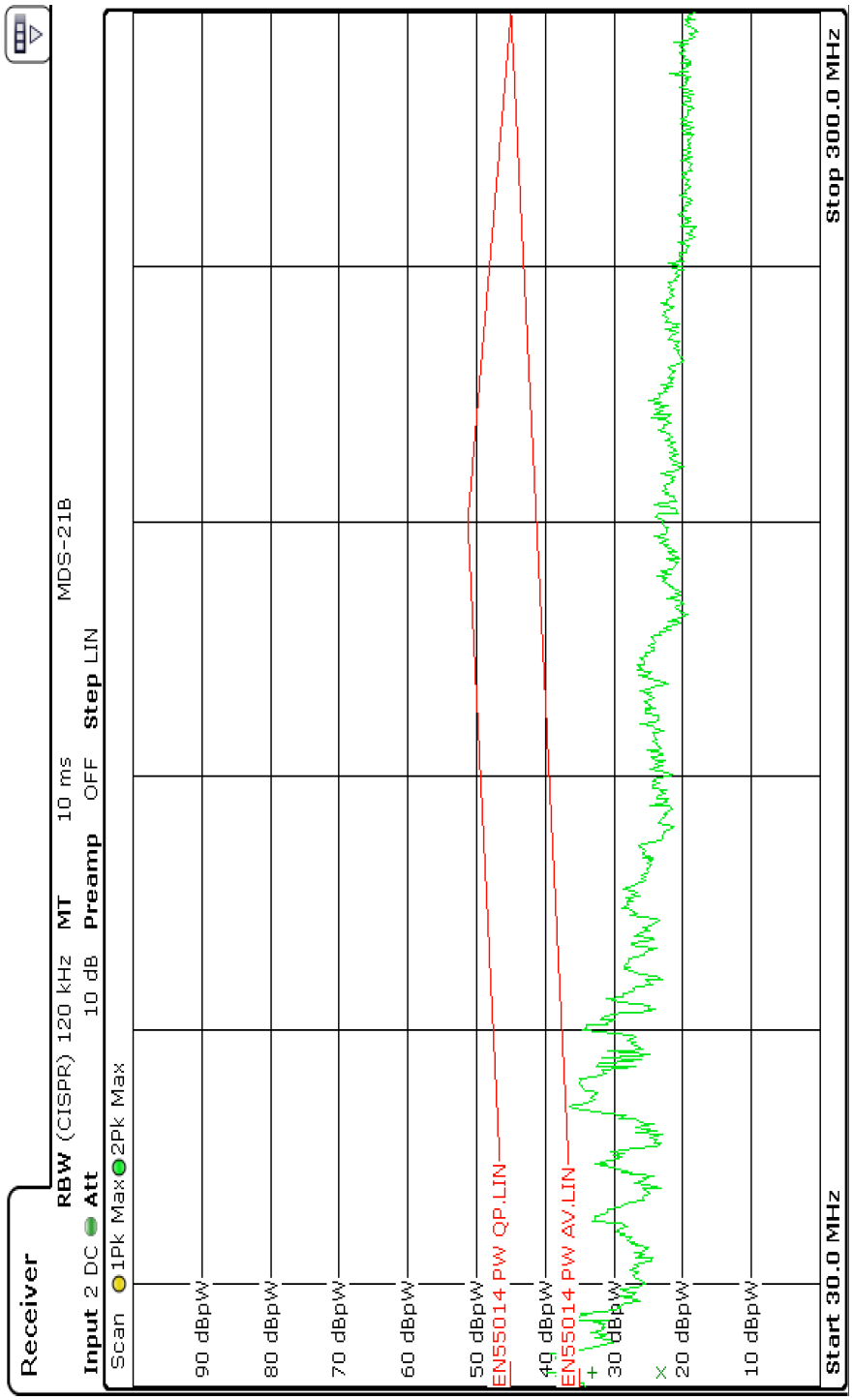

Figure AI.8:-Power disturbance measurement, Sensor to Outdoor

APPENDIX II: EUT PHOTOGRAPHS

Indoor unit: RAS-16PKVPG-E

Outdoor unit: RAS-16PAVPG-E

Figure AII.1-EUT Photos Model: RAS-16PKVPG-E / RAS-16PAVPG-E

APPENDIX III: MODELS INFORMATION

Model cover by this report

Model (Indoor/Outdoor)	Rated	Compressor model	Indoor PCB	Outdoor PCB	Market destination
RAS-10PKVPG-E / RAS-10PAVPG-E	220-240Vac 50Hz	KTN110D42UFZ	MCC-5088	WP-030	Europe
RAS-10PKVPG-NZ / RAS-10PAVPG-NZ					New Zealand
RAS-13PKVPG-E / RAS-13PAVPG-E		KTN150D42UFZ			Europe
RAS-13PKVPG-NZ / RAS-13PAVPG-NZ					New Zealand
RAS-16PKVPG-E / RAS-16PAVPG-E					Europe
RAS-16PKVPG-NZ / RAS-16PAVPG-NZ					New Zealand

Figure AIII.1-; Name plate RAS-16PKVPG-E

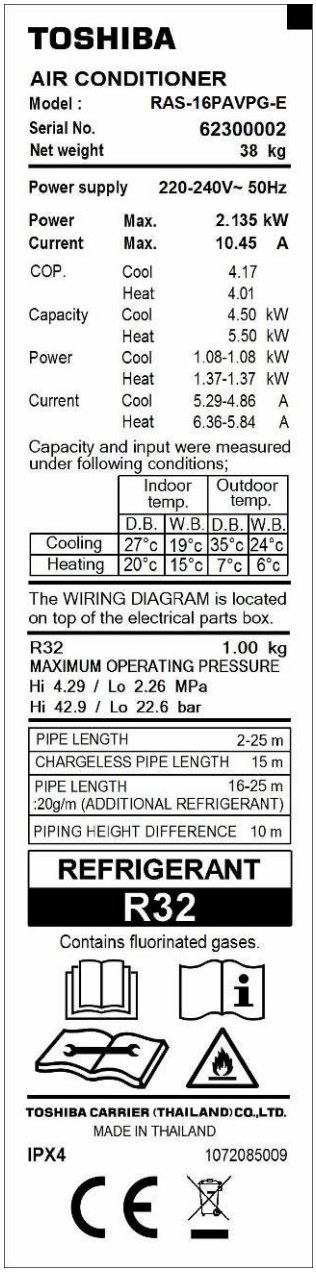

Figure AIII.2-; Name plate RAS-16PAVPG-E

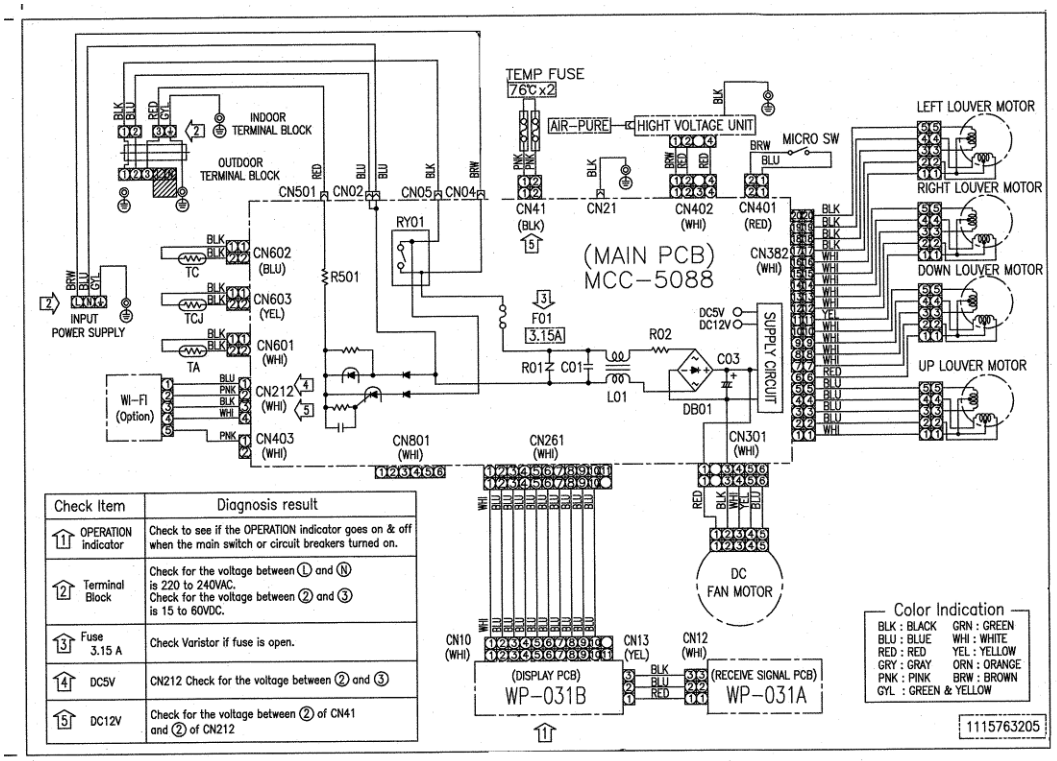

Figure AIII.3-; Wiring Diagram RAS-16PKVPG-E

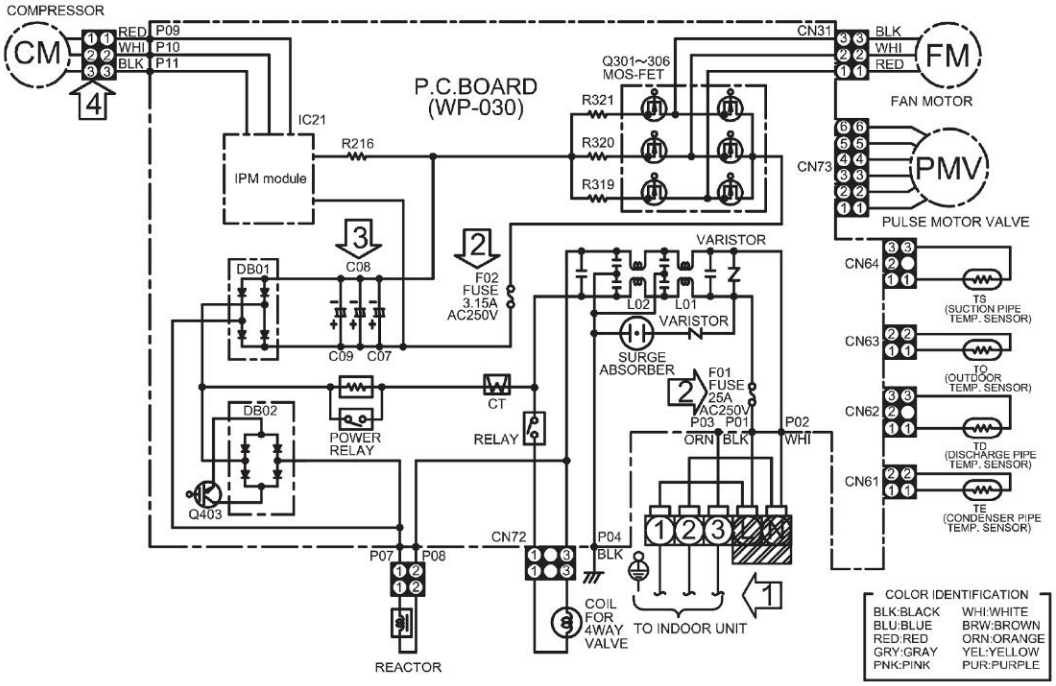

Figure AIII.4-; Wiring Diagram RAS-16PAVPG-E

APPENDIX IV: PHOTO OF TEST SET UP

Figure AIV.1- Mains Terminal Continuous/Discontinuous Disturbance Voltage set-up

Figure AIV.2- Continuous Disturbance Power test set-up

Figure AIV.3- Harmonic Current Emission and Voltage Fluctuation and Flicker test set-up

Figure AIV.4- ESD/Conducted Immunity test set-up

Figure AIV.5- EFT/Burst, Surge, Voltage dips test set-up