

CE&UKCA EMC Test Report

Project No. : 2106C129
Equipment : AV1000 Gigabit Passthrough Powerline Adapter
Brand Name : Tenda
Test Model : P6
Series Model : PH6
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Date of Receipt : Jun. 18, 2021
Date of Test : Jun. 21, 2021 ~ Jul. 13, 2021
Issued Date : Jul. 22, 2021
Report Version : R00
Test Sample : Engineering Sample No.: DG20210618157
Standard(s) : EN 50561-3:2016
 EN 50412-2-1:2005+AC:2009
 BS EN 50561-3:2016
 BS EN 50412-2-1:2005+AC:2009

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

Dave Hong

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TESTING CERT #5123.02

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Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.

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REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
R00	Original Issue.	Jul. 22, 2021

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

EMC Emission			
Ref standard(s)	Section(s)	Test Item	Judgment
EN 50561-3	5.1	Conducted disturbances at AC Mains power ports	PASS
	5.2	Conducted disturbances at telecommunication/network port	PASS
	6.3	Radiated emission Below 1 GHz	PASS
	6.3	Radiated emission Above 1 GHz	PASS
	7.2	Conducted disturbances frequency range above 30 MHz	PASS
	5.3	Conducted unsymmetrical disturbances	PASS
	5.3	Dynamic power control	PASS
	5.3	Dynamic frequency exclusion	PASS
	5.3	Conducted asymmetrical disturbances	PASS
EN IEC 61000-3-2		Harmonic current emissions	PASS
EN 61000-3-3		Voltage fluctuations and flicker	PASS

Immunity			
Standard(s)	Ref Standard(s)	Test Item	Judgment
EN 50412-2-1	IEC 61000-4-2:2008	ESD	PASS
	IEC 61000-4-3:2020	RS	PASS
	IEC 61000-4-4:2012	EFT	PASS
	IEC 61000-4-5:2014+AMD1:2017	Surge	PASS
	IEC 61000-4-6:2013	CS	PASS
	IEC 61000-4-8:2009	PFMF	PASS
	IEC 61000-4-11:2020	Dips	PASS

1.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No. 3 Jinshagang 1st Rd. Shixia, Dalang Town, Dongguan City, Guangdong, People's Republic of China.

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately **95%**.

The measurement instrumentation uncertainty considerations contained in CISPR 16-4-2.

The BTL measurement uncertainty is less than the CISPR 16-4-2 U_{CISPR} requirement.

A. Conducted emissions AC mains power port measurement:

Test Site	Method	Measurement Frequency Range	U , (dB)
DG-C01	CISPR	150kHz ~ 30MHz	3.18

B. Conducted telecommunication port measurement:

Test Site	Method	Test Item	U , (dB)
DG-C01	CISPR	AAN Cat.5 LCL = 65 ... 50 dB	4.26

C. Radiated emission measurement:

Test Site	Method	Measurement Frequency Range	Ant. H / V	U , (dB)
DG-CB08 (10m)	CISPR	30MHz ~ 200MHz	V	4.44
		30MHz ~ 200MHz	H	3.44
		200MHz ~ 1,000MHz	V	4.28
		200MHz ~ 1,000MHz	H	3.52

Test Site	Method	Measurement Frequency Range	U , (dB)
DG-CB08 (3m)	CISPR	1GHz ~ 6GHz	4.36

D. PLC Measurement:

Test Site	Method	Item	U , (dB)
DG-C01	CISPR	ISN 50561-3	3.2

E. Harmonic/ Flicker Measurement:

Test Site	Method	Item	U (%)
DG-C01	EN IEC 61000-3-2	Current	0.593
	EN 61000-3-3	Voltage	0.595

F. Immunity Measurement:

Test Site	Method	Item	U
DG-SR02	IEC 61000-4-2	Rise time tr	6.80%
		Peak current Ip	6.30%
		Current at 30 ns	6.50%
		Current at 60 ns	6.90%
DG-CB05	IEC 61000-4-3	Electromagnetic field immunity test	2.38dB
DG-SR05	IEC 61000-4-4	Peak voltage (V _P)	3.7%
		Rise time (tr)	4.4%
		Pulse width(tw)	4.1%
		Pulse Freq.(kHz)	0.8%
		Burst Duration(ms)	1.4%
		Burst Period(ms)	1.4%
		Peak voltage (V _P)-with clamp	3.7%
		Rise time (tr) -with clamp	5.0%
		Pulse width(tw) -with clamp	4.8%
DG-SR05	IEC 61000-4-5	Open-Circuit Output Voltage (1.2/50us)	3.8%
		Open circuit front time (1.2/50us)	6.3%
		Open circuit time of half value (1.2/50us)	4.6%
DG-CB06	IEC 61000-4-6	CDN	1.32dB
		EM clamp	3.16dB
DG-SR05	IEC 61000-4-8	Magnetic Field Strength	2.38%
DG-SR05	IEC 61000-4-11	DIP Amplitude	0.5%
		DIP Time Event	3%

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

1.3 TEST ENVIRONMENT CONDITIONS

Test Item	Temperature	Humidity	Tested By
Conducted emission at AC Mains power ports	25°C	53%	Gerry Zhao
Conducted telecommunication ports	25°C	53%	Gerry Zhao
Radiated emission Below 1 GHz	25°C	60%	Better Yan
Radiated emission Above 1 GHz	25°C	60%	Better Yan
Conducted disturbances frequency range above 30 MHz	25°C	53%	Gerry Zhao
Conducted unsymmetrical disturbances	25°C	53%	Gerry Zhao
Dynamic power control	25°C	53%	Gerry Zhao
Dynamic frequency exclusion	25°C	53%	Gerry Zhao
Conducted asymmetrical disturbances	25°C	53%	Gerry Zhao
Harmonic current emissions	25°C	55%	Gerry Zhao
Voltage fluctuations and flicker	25°C	55%	Gerry Zhao

Test Item	Temperature	Humidity	Pressure	Tested By
ESD	24°C	46%	1012hPa	Able Zhou
RS	23°C	46%	/	Hunter Xu
EFT	24°C	46%	/	Celina Lai
Surge	24°C	46%	/	Celina Lai
CS	23°C	45%	/	Promise Yin
PFMF	24°C	46%	/	Celina Lai
Dips	24°C	46%	/	Celina Lai

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	AV1000 Gigabit Passthrough Powerline Adapter
Brand Name	Tenda
Test Model	P6
Series Model	PH6
Model Difference(s)	Only differ in model name.
Power Source	AC Mains.
Power Rating	For EU plug: I/P: AC 100-240V~ 50/60Hz 16A(0.1A,product only) O/P: 16A Max.load For UK plug: I/P: AC 100-240V~ 50/60Hz 13A(0.1A,product only) O/P: 13A Max.load
Connecting I/O Port(s)	1* LAN port 1* AC port
Classification of EUT	Class B
Environment / Type of EUT	Class 1 environment / Type 2
Highest Internal Frequency(Fx)	400MHz

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

2.2 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 above was evaluated respectively.

Pretest Mode	Description
Mode 1	Operating
Mode 2	Standby
Mode 3	LAN 1Gbps
Mode 4	LAN 10Mbps

Conducted emission AC mains power port	
Final Test Mode	Description
Mode 2	Standby

Conducted telecommunication port	
Final Test Mode	Description
Mode 3	LAN 1Gbps
Mode 4	LAN 10Mbps

Radiated Below 1GHz	
Final Test Mode	Description
Mode 1	Operating

Radiated Above 1GHz	
Final Test Mode	Description
Mode 1	Operating

Conducted disturbances frequency range above 30 MHz	
Final Test Mode	Description
Mode 1	Operating

Conducted unsymmetrical disturbances	
Final Test Mode	Description
Mode 1	Operating

Dynamic power control	
Final Test Mode	Description
Mode 1	Operating

Dynamic frequency exclusion	
Final Test Mode	Description
Mode 1	Operating

Conducted asymmetrical disturbances	
Final Test Mode	Description
Mode 1	Operating

Harmonic current emissions & Voltage fluctuations and flicker	
Final Test Mode	Description
Mode 1	Operating

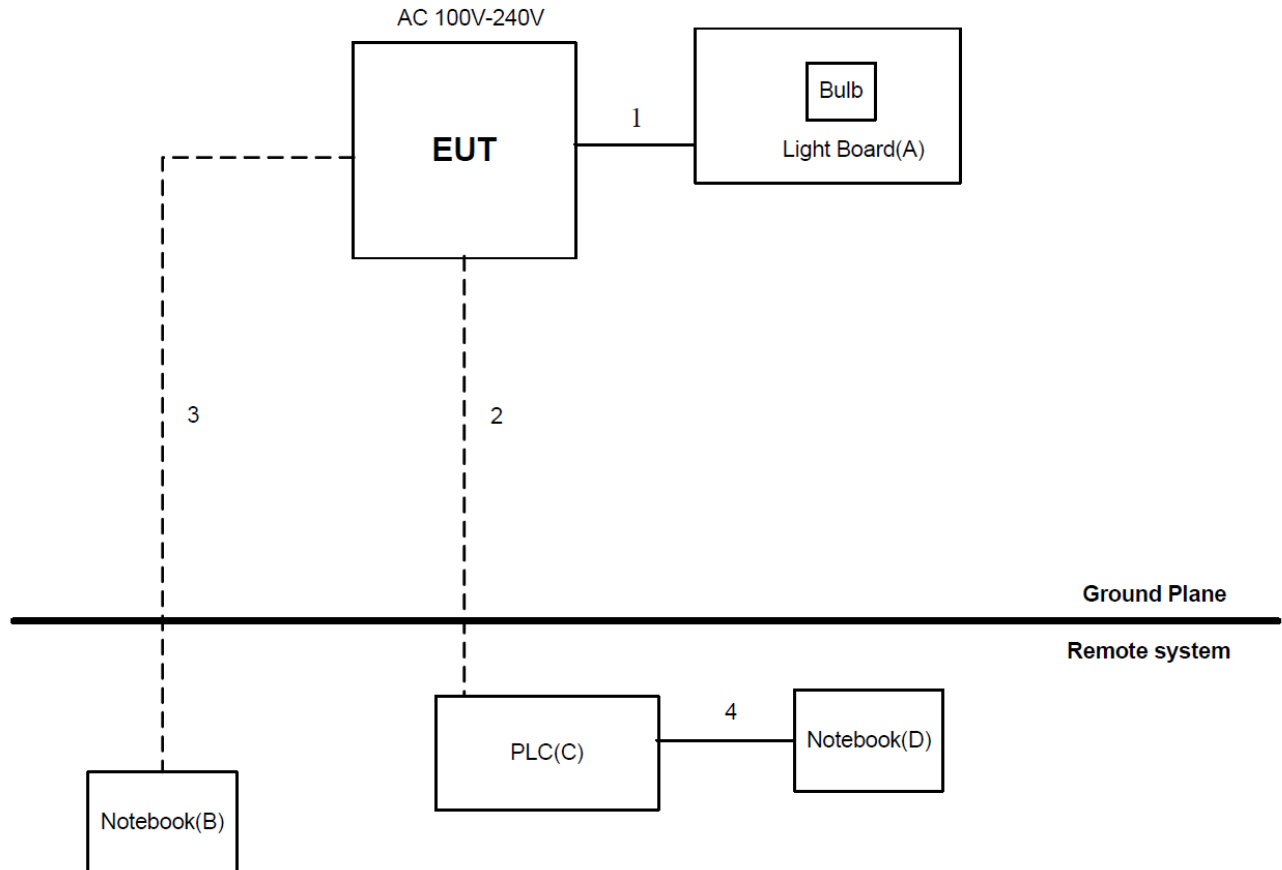
Immunity	
Final Test Mode	Description
Mode 1	Operating

2.3 EUT OPERATING CONDITIONS

The EUT exercise program used during radiated and/or conducted emission measurement was designed to exercise the various system components in a manner similar to a typical use. The standard test signals and output signal as following:

1. EUT connected to Light Board via AC Cable.
2. EUT connected to Notebook(B) via RJ45 Cable.
3. EUT connected to PLC via AC Cable.
4. PLC connected to Notebook (D) via RJ45 Cable.

2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



3.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.
A	Light Board	N/A	N/A	N/A
B	Notebook	Lenovo	E46L	EB21809870
C	PLC	Tenda	P6	N/A
D	Notebook	Lenovo	E445	MP-05Y56S

Item	Cable Type	Shielded Type	Ferrite Core	Length
1	AC Cable	NO	NO	1.5m
2	AC Cable	NO	NO	1m
3	RJ45 Cable	NO	NO	10m
4	RJ45 Cable	NO	NO	10m

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSIONS AT AC MAINS POWER PORT

3.1.1 LIMITS

Requirements for conducted emissions from AC mains power ports of Class B equipment

Frequency Range MHz	Coupling Device	Detector Type / bandwidth	Class B Limits (dB(μV))
0.15 - 0.5	AMN	Quasi Peak / 9 kHz	66-56
0.5 - 5			56
5 - 30			60
0.15 - 0.5	AMN	Average / 9 kHz	56-46
0.5 - 5			46
5 - 30			50

NOTE:

(1) The test result calculated as following:

Measurement Value = Reading Level + Correct Factor

Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor(if use)

Margin Level = Measurement Value – Limit Value

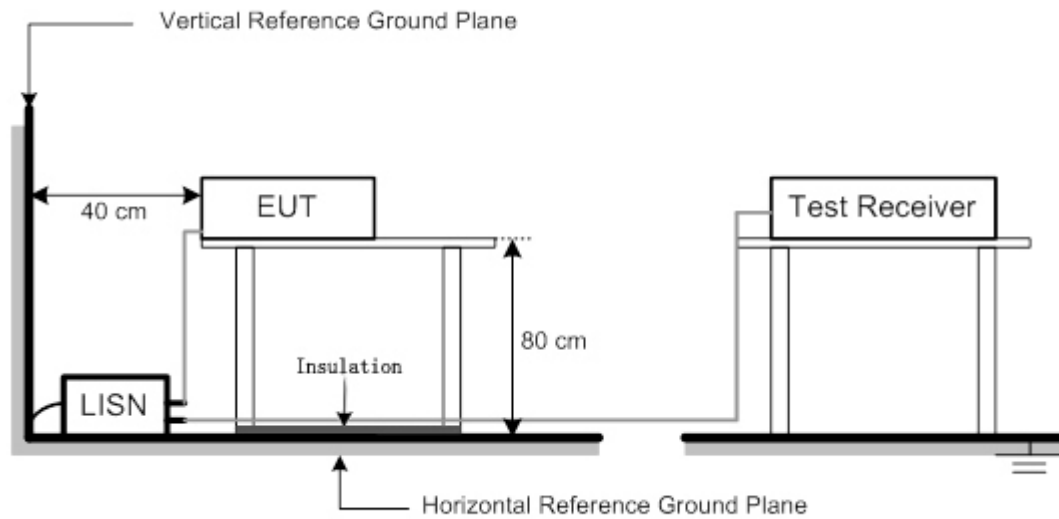
3.1.2 TEST PROCEDURE

- The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 DEVIATION FROM TEST STANDARD

No deviation

3.1.4 TEST SETUP



3.1.5 EUT OPERATING CONDITIONS

The EUT will be configured to operate in a typical fashion as normally used.

3.1.6 TEST RESULTS

Please refer to the APPENDIX A.

3.2 CONDUCTED EMISSION AT WIRED NETWORK PORT

3.2.1 LIMITS

Requirements for asymmetric mode conducted emissions from Class B equipment

Frequency Range MHz	Coupling device	Detector type / Bandwidth	Class B voltage limits dB(μV)	Class B current limits dB(μA)
0.15 - 0.5	AAN	Quasi Peak / 9 kHz	84 - 74	n/a
0.5 - 30			74	
0.15 - 0.5	AAN	Average / 9 kHz	74 - 64	
0.5 - 30			64	

NOTE:

(1) The test result calculated as following:

Measurement Value = Reading Level + Correct Factor

Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor(if use)

Margin Level = Measurement Value – Limit Value

3.2.2 TEST PROCEDURE

- The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.
- AAN** at least 80 cm from nearest part of EUT chassis.

NOTE:

- The communication function of EUT was executed and AAN was connected between EUT and associated equipment and the AAN was connected directly to reference ground plane.
Measure the voltage at the measurement port of the AAN
Correct the measured voltage by adding the AAN voltage division factor
Compare the corrected voltage with the limit.

3.2.3 DEVIATION FROM TEST STANDARD

No deviation

a) Cable Type: Balanced Unscreened, Screened or Coaxial



Ethernet connection was better than 10% utilization by Notebook.

Please refer to the APPENDIX B.

3.3 RADIATED EMISSION BELOW 1 GHZ

3.3.1 LIMITS

Class B equipment up to 1 GHz

Frequency Range MHz	Measurement			Class B limits dB(μV/m)
	Facility	Distance m	Detector type/ bandwidth	
30 - 230	SAC	10	Quasi peak / 120 kHz	30
230 - 1000				37

Notes:

- (1) The limit for radiated test was performed according to as following: EN 55032
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).
- (4) The test result calculated as following:
 Measurement Value = Reading Level + Correct Factor
 Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use)
 Margin Level = Measurement Value - Limit Value

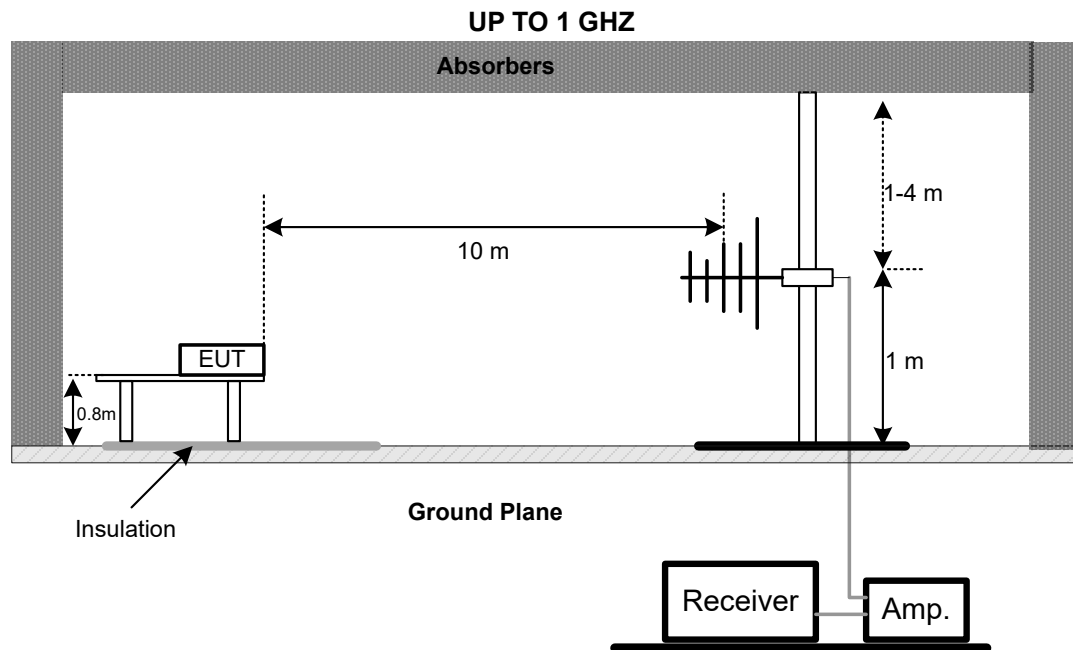
3.3.2 TEST PROCEDURE

- a. The measuring distance of 10 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. 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.
- c. The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- d. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.3.3 DEVIATION FROM TEST STANDARD

No deviation

3.3.4 TEST SETUP



3.3.5 MEASUREMENT DISTANCE

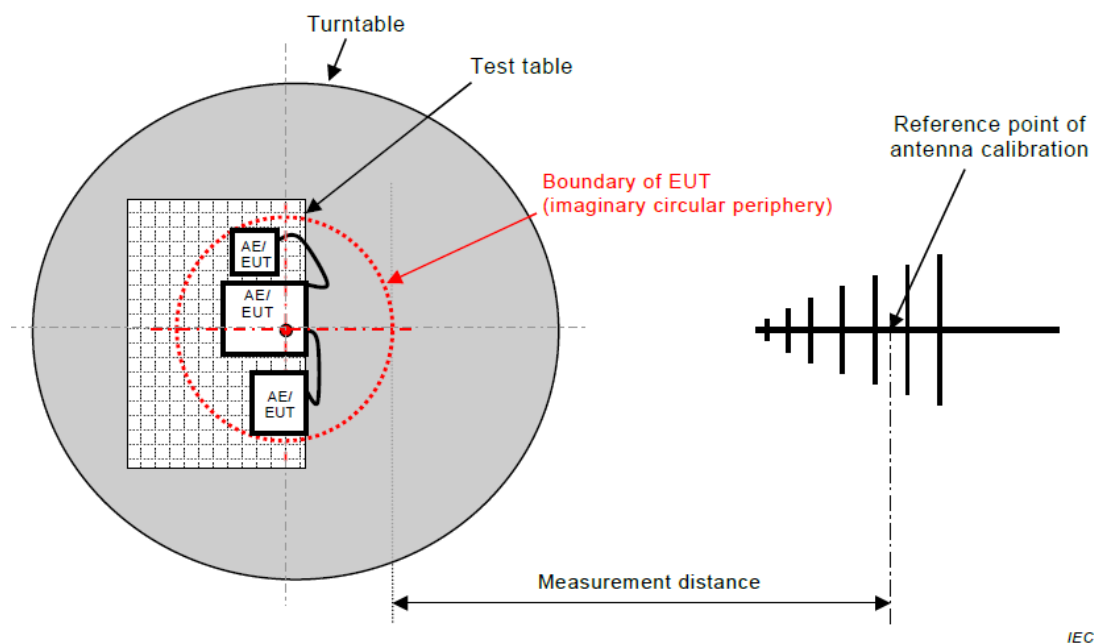


Figure C.1 – Measurement distance

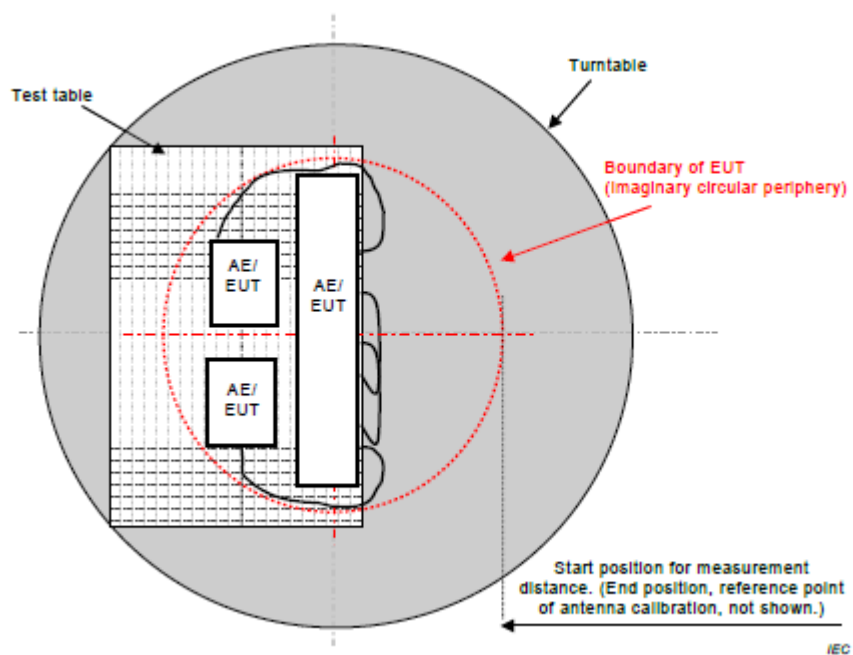


Figure C.2 – Boundary of EUT, Local AE and associated cabling

3.3.6 TEST RESULTS

Please refer to the APPENDIX C.

3.4 RADIATED EMISSIONS ABOVE 1 GHZ

3.4.1 LIMITS

Class B equipment above 1 GHz

Frequency Range MHz	Measurement			Class B limits dB(μV/m)
	Facility	Distance m	Detector type/bandwidth	
1000 - 3000	FSOATS	3	Average /	50
3000 - 6000			1 MHz	54
1000 - 3000			Peak /	70
3000 - 6000			1 MHz	74

Notes:

- (1) The limit for radiated test was performed according to as following: EN 55032
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).
- (4) The test result calculated as following:
 Measurement Value = Reading Level + Correct Factor
 Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use)
 Margin Level = Measurement Value - Limit Value

Required highest frequency for radiated measurement

Highest internal frequency (F _x)	Highest measured frequency
F _x ≤ 108 MHz	1 GHz
108 < F _x ≤ 500 MHz	2 GHz
500 < F _x ≤ 1000 MHz	5 GHz
F _x > 1 GHz	5 x F _x up to a maximum of 6 GHz

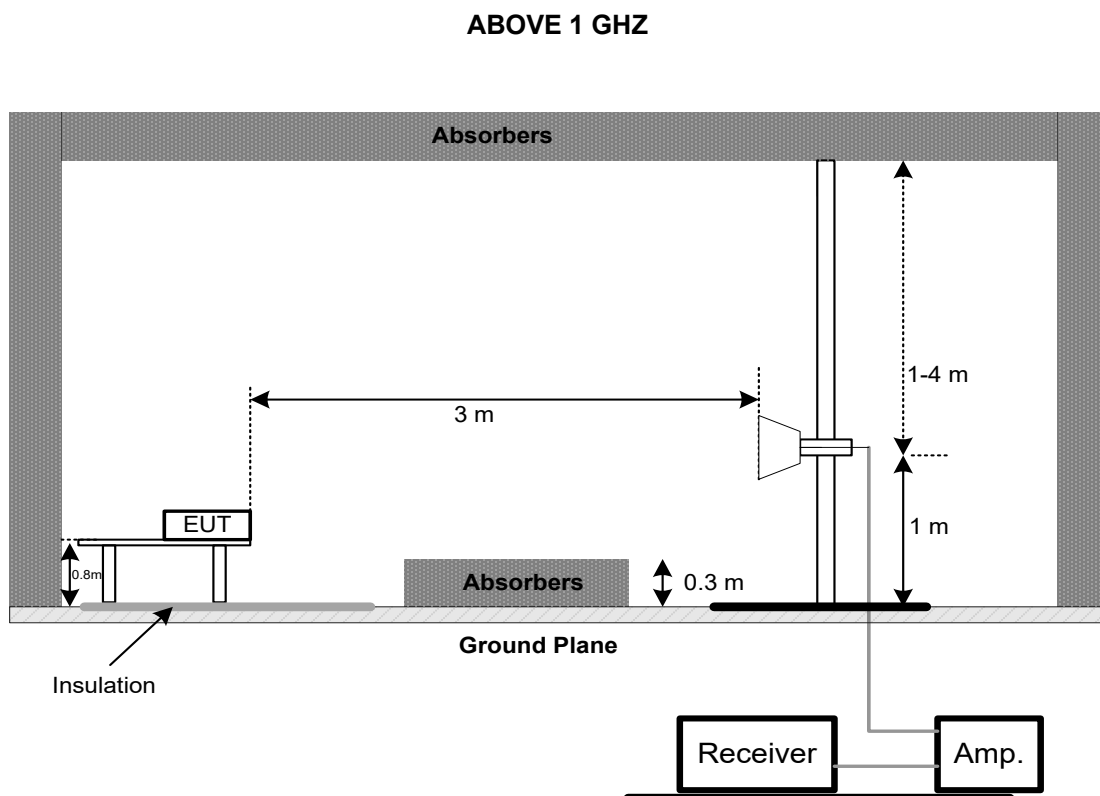
3.4.2 TEST PROCEDURE

- The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- 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.
- The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then AVG detector mode re-measured.
- All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn't perform.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.4.3 DEVIATION FROM TEST STANDARD

No deviation

3.4.4 TEST SETUP



3.4.5 MEASUREMENT DISTANCE

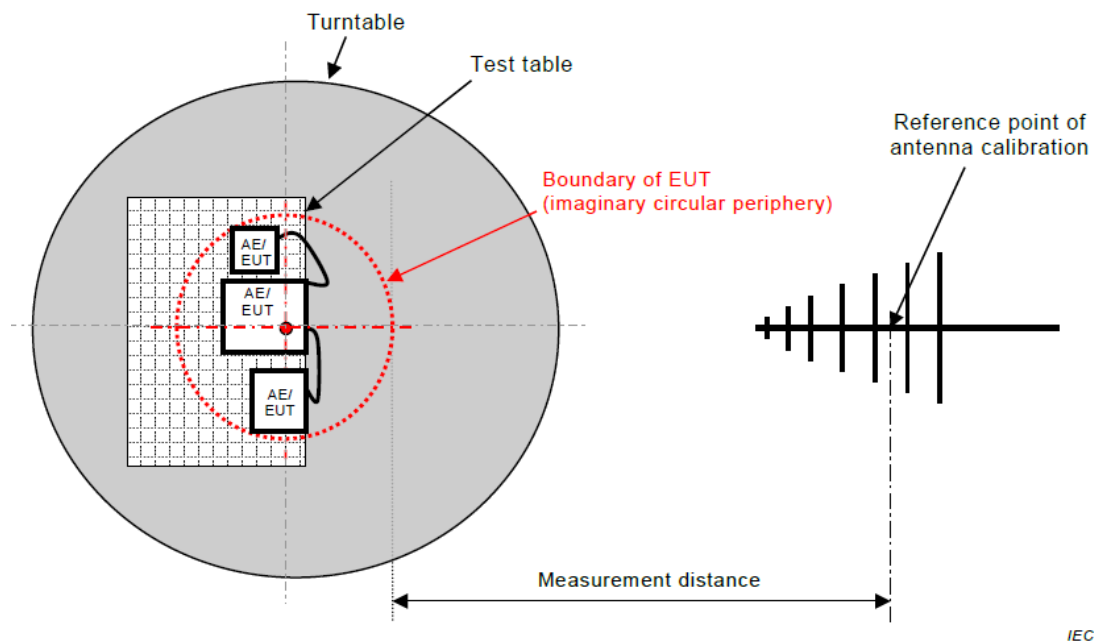


Figure C.1 – Measurement distance

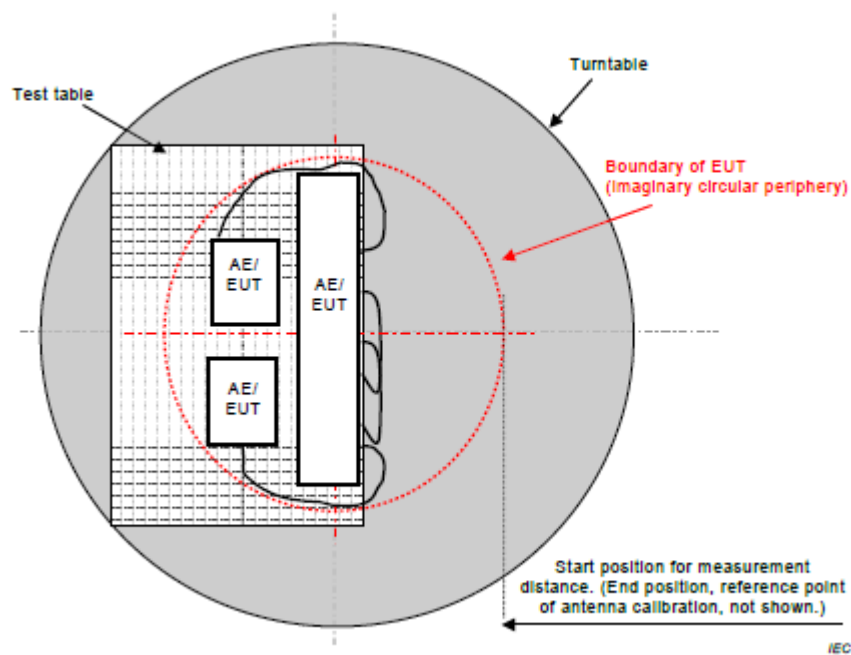


Figure C.2 – Boundary of EUT, Local AE and associated cabling

3.4.6 TEST RESULTS

Please refer to the APPENDIX D.

3.5 CONDUCTED DISTURBANCES FREQUENCY RANGE ABOVE 30 MHZ (SECTION 7.2)

3.5.1 LIMITS

Limits for conducted disturbances

Frequency Range (MHz)	Limits dB(μV)	Attenuation (dB)
	Peak	
30~80	85~80	40
80~87.5	80~60	
87.5~108	60	
108~118	55	

Excluded Band

Frequency Range (MHz)	Peak Limits dB(μV)
50~52	55
70~70.5	
74.8~75.2	

Description of Major test instruments

Test Receiver	Setting
Start Frequency	30 MHz
Stop Frequency	118 MHz
IF Bandwidth	120 kHz

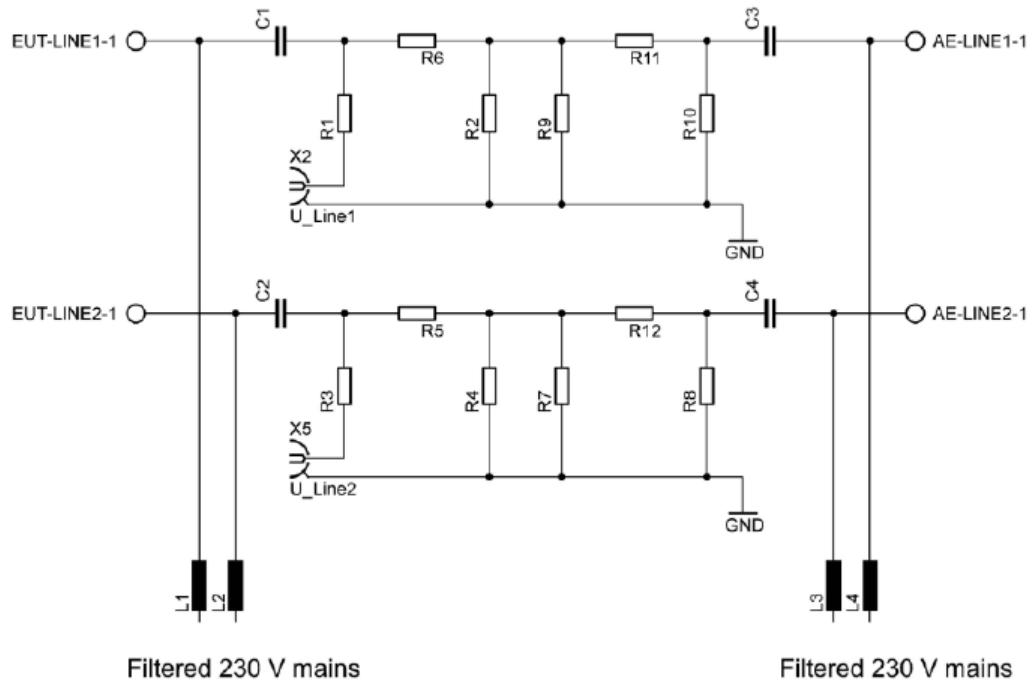
3.5.2 TEST PROCEDURE

- Determine the maximum possible data rate between the PLC ports of the EUT and AE in the test setup.
- Exercise the EUT PLC port to transmit user data at a rate in excess of 10% of the maximal possible data rate determined for the setup.
- As an example the transmission of a large data file or a software tool which creates arbitrary data streams could be used to exercise the port.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.5.3 DEVIATION FROM TEST STANDARD

No deviation.

3.5.4 TEST SETUP



3.5.5 TEST RESULTS

Please refer to the APPENDIX E.

3.6 CONDUCTED UNSYMMETRICAL DISTURBANCES FOR PLC PORTS (SECTION 5.3)

3.6.1 LIMITS

Limits for conducted disturbances

Frequency Range (MHz)	Limits dB(μV)	
	Quasi-peak	Average
0.15 -0.5	66 - 56	56 - 46
0.5 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

NOTE:

- (1) The lower limit applies at the transition frequencies.
- (2) The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz.

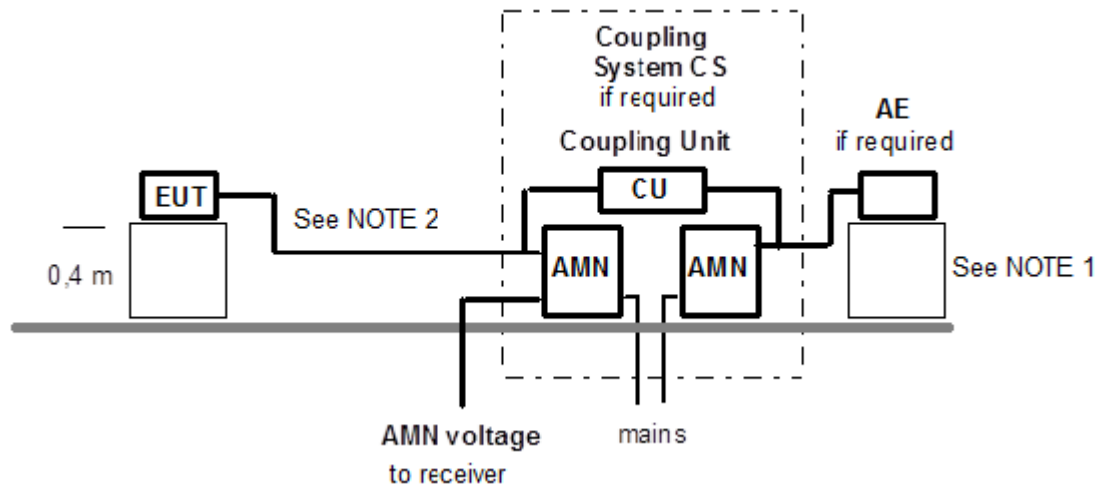
3.6.2 TEST PROCEDURE

- a. With the PLC modem function of the EUT active and communicating to an associated PLC apparatus (AE) exercised in accordance with Clause 8 of EN 50561-1, using its maximum transmit power the disturbance levels shall be measured in the frequency range from 150 kHz to 30 MHz. Above 1.6065 MHz only the disturbances within the appropriate excluded frequency ranges (Table A.1 of EN 50561-1) are compared with the limits.
- b. After completion of step 1, the exchange of user data exercising the EUT terminated. Without user data transmission, the disturbance levels shall be measured between 150 kHz – 30 MHz.
- c. The tests were performed using a computer-controlled Test - Set in order to control the test receiver. The EUT was placed on a wooden table in a distance of 0.4m to the vertical reference ground plane. The AMNs were connected to the reference ground plane.
- d. Only if the measured peak value is near or above the quasi-peak limit the detector function is changed to quasi-peak.

3.6.3 DEVIATION FROM TEST STANDARD

No deviation.

3.6.4 TEST SETUP



Note:

- 1) Distance from AE to the reference ground plane (vertical or horizontal) is not critical.
- 2) Cable length between EUT and CS is 0,8 m ($\pm 0,05$ m).

3.6.5 EUT OPERATING CONDITIONS

- a) allow the EUT to be exercised by the AE,
- b) have a sufficient loss to ensure signals from the AE do not influence the measurement result,
- c) ensure that the EUT can transmit at its maximum power level.

3.6.6 TEST RESULTS FOR UNSYMMETRICAL DISTURBANCES

Please refer to the APPENDIX F.

3.7 CONDUCTED SYMMETRICAL DISTURBANCES - DYNAMIC POWER CONTROL (SECTION 5.3)

3.7.1 LIMITS

Maximum PLC transmit signal level between 1,606 5 MHz and 30 MHz

Symmetrical mode insertion loss EUT to AE in dB	10	20	≥ 40
Maximum transmit signal level in dB(uV) (AV)	65	75	95
Maximum transmit signal level in dB(uV) (PK)	75	85	105

Note: The transmit power management function of an AE should operate in the same way as the EUT otherwise the signal of the AE may dominate and cause erroneous results during measurement.

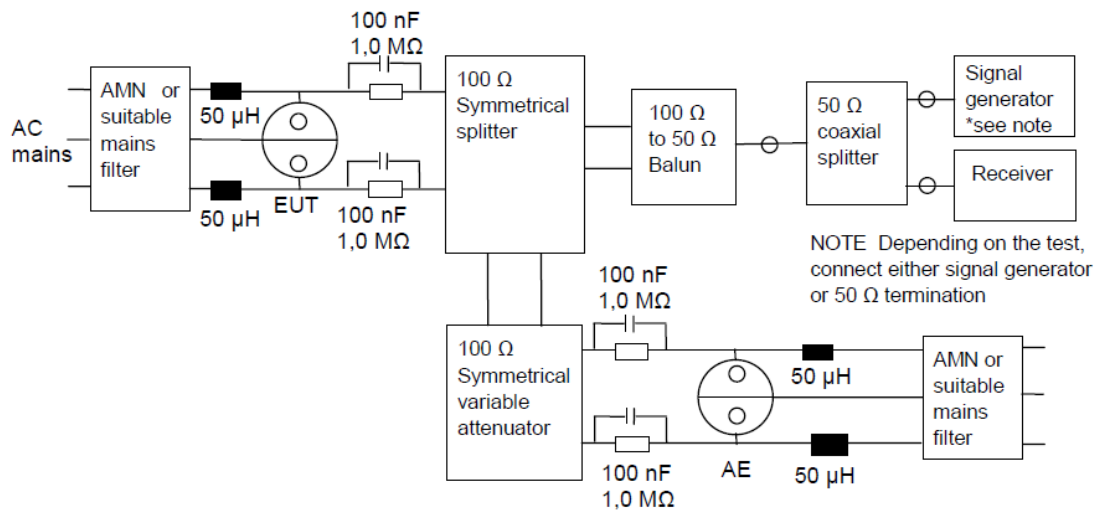
3.7.2 TEST PROCEDURE

- The transmitted symmetrical signal from the PLC port of the EUT shall be measured for frequencies between 1.606 5 MHz and 30 MHz in order to ensure
 - that the maximum transmit signal levels are not exceeded
 - the presence of a dynamic power control function.
- The PLC port shall be exercised in accordance with the operating conditions given in Clause 8 of EN 50561-1. The measurements shall be made using a peak and an average detector; the detectors shall be in accordance with the requirements of EN 55016-1-1 including the 9 kHz requirement for the 6 dB bandwidth. An example test arrangement is given in Figure 4 of EN 50561-1.
- The transmit signal level shall be measured at all PLC transmission frequencies, with a symmetrical insertion loss between EUT and AE of 10 dB, 20 dB, 40 dB and 50 dB.

3.7.3 DEVIATION FROM TEST STANDARD

No deviation.

3.7.4 TEST SETUP



Note:

- 1) The insertion power loss between the EUT and the AE is 10 dB to 50 dB adjustable in 10 dB steps.
- 2) The insertion power loss between the EUT and the measurement receiver is nominally 20 dB.
- 3) The insertion power loss between the signal generator and EUT is nominally 20 dB.
- 4) The insertion power loss between the signal generator and the measurement receiver is nominally 6 dB.
- 5) The above losses are determined as a part of the test equipment calibration; the actual figures should be used to correct the instrument readings to determine the levels that apply at the EUT terminals.

3.7.5 EUT OPERATING CONDITIONS

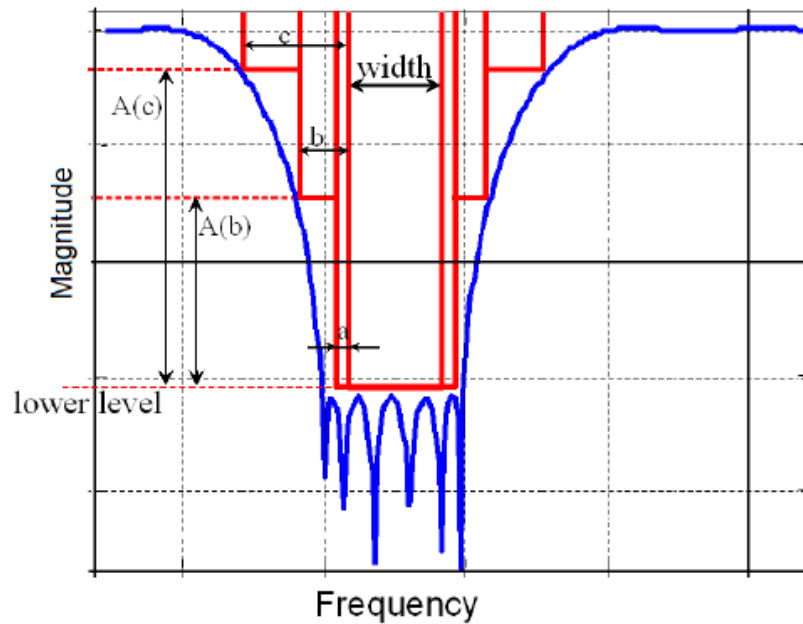
- a) allow the EUT to be exercised by the AE,
- b) have a sufficient loss to ensure signals from the AE do not influence the measurement result,
- c) ensure that the EUT can transmit at its maximum power level.

3.7.6 TEST RESULTS FOR DYNAMIC POWER CONTROL

Please refer to the APPENDIX G.

3.8 CONDUCTED SYMMETRICAL DISTURBANCES - COGNITIVE FREQUENCY EXCLUSION (SECTION 5.3)

3.8.1 DYNAMIC FREQUENCY NOTCH LIMIT



where

width ≥ 10 kHz, lower level = 56 dB(μ V) (AV, Resolution bandwidth 9 kHz) and

	Width increment on each side of the excluded frequency range kHz	Maximum level above the lower level of the notch ($A(x)$) dB
Step a	2	0
Step b	10	≤ 25
Step c	20	≤ 35

- Within 15 s of a 'valid' HF radio broadcast service being present within the excluded frequency band given in Table A.2, the transmitted PLC signal level shall not exceed a symmetrical voltage level of 56 dB(μ V) (AV) in a 9 kHz resolution bandwidth.
- The excluded frequency band shall remain excluded continuously for the entire duration that the 'valid' radio broadcast service is present. After the detection of a 'valid' radio broadcast service has ceased, the excluded frequency band shall remain excluded for at least 3 additional minutes.

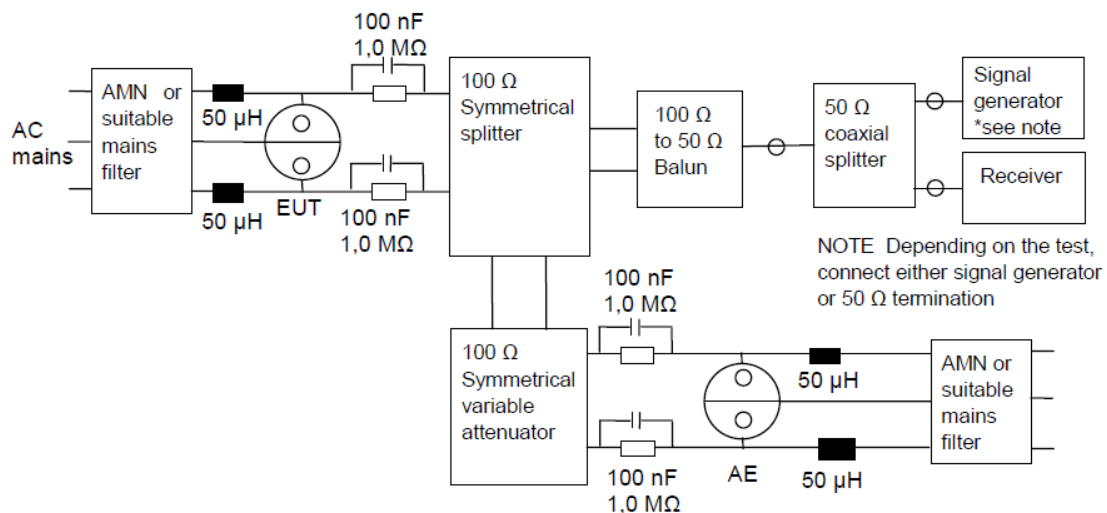
3.8.2 TEST PROCEDURE

- Prepare the artificial ingress signal with 20 individual signals within the frequency ranges defined in Table A.2 of EN 50561-1 and the communication spectrum of the EUT. The signal level of each individual ingress signal shall be as defined in EN 50561-1, C.3.4.1.
- Tune the spectrum analyzer to the centre frequency of the 1st artificial ingress signal.
- Switch the artificial signal ingress on.
- Monitor the spectrum analyzer to confirm that the PLC signal is excluded and measure the excluded frequency range to ensure it complies with the requirements defined in sect. 6.2 of EN 50561-1.
- Tune to all other frequencies where an artificial ingress signal is located.
- Switch the artificial ingress signal off and monitor the spectrum analyzer, to confirm that the PLC signal is not reused within the next 3 minutes.

3.8.3 DEVIATION FROM TEST STANDARD

No deviation.

3.8.4 TEST SETUP



Note:

- The insertion power loss between the EUT and the AE is 10 dB to 50 dB adjustable in 10 dB steps.
- The insertion power loss between the EUT and the measurement receiver is nominally 20 dB.
- The insertion power loss between the signal generator and EUT is nominally 20 dB.
- The insertion power loss between the signal generator and the measurement receiver is nominally 6 dB.
- The above losses are determined as a part of the test equipment calibration; the actual figures should be used to correct the instrument readings to determine the levels that apply at the EUT terminals.

3.8.5 EUT OPERATING CONDITIONS

- allow the EUT to be exercised by the AE,
- have a sufficient loss to ensure signals from the AE do not influence the measurement result,
- ensure that the EUT can transmit at its maximum power level.

3.8.6 TEST RESULTS FOR COGNITIVE FREQUENCY EXCLUSION

Please refer to the APPENDIX H.

3.9 CONDUCTED UNSYMMETRICAL DISTURBANCES FOR ASYMMETRICAL DISTURBANCES (SECTION 5.3)

3.9.1 LIMITS

Limits for conducted disturbances

Frequency Range (MHz)	Limits dB(μV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.5 - 5.0	56.00	46.00
5.0 - 30.0	60.00	50.00

NOTE:

- (1) The lower limit applies at the transition frequencies.
- (2) The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz.

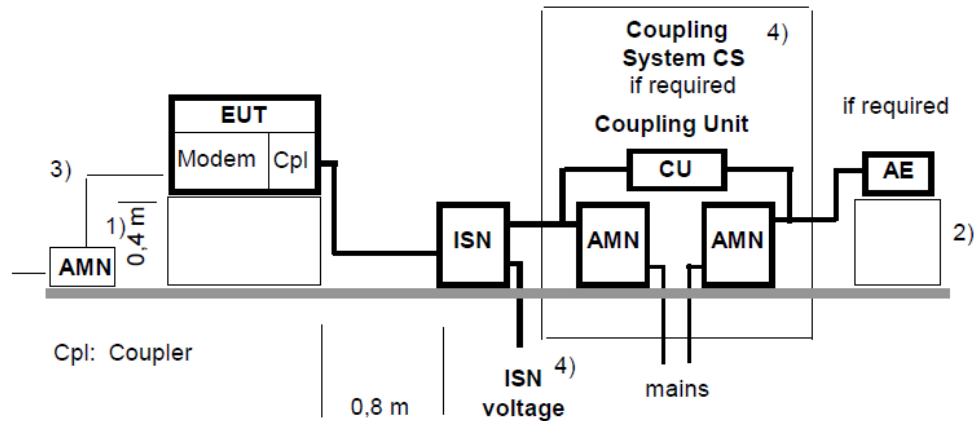
3.9.2 TEST PROCEDURE

- a. The tests are performed using a computer-controlled Test - Set in order to control the test receiver. The EUT is placed on a wooden table in a distance of 0.4m to the vertical reference ground plane. The AMNs and the ISN are connected to the reference ground plane.
- b. Only if the measured peak value is near or above the quasi-peak limit the detector function is changed to quasi-peak.

3.9.3 DEVIATION FROM TEST STANDARD

No deviation.

3.9.4 TEST SETUP



Note:

- 1) Distance from EUT to the reference ground plane (vertical or horizontal).
- 2) Distance from AE to the reference ground plane is not critical.
- 3) In case, the EUT has separate power connection to the mains.
- 4) Coupling system (see Figure 3 for details of coupling unit) is required for
 - providing a defined insertion loss between the EUT and AE,
 - stabilisation of the differential mode impedance,
 - attenuation of the differential mode signal of the AE,
 - isolation of the common mode signal of the AE
 - filtering of the differential- and common mode signal from the mains.

3.9.5 EUT OPERATING CONDITIONS

- a) allow the EUT to be exercised by the AE,
- b) have a sufficient loss to ensure signals from the AE do not influence the measurement result,
- c) ensure that the EUT can transmit at its maximum power level.

3.9.6 TEST RESULTS FOR ASYMMETRICAL DISTURBANCES

Please refer to the APPENDIX I.

3.10 HARMONIC CURRENT EMISSIONS TEST

3.10.1 LIMITS

EN IEC 61000-3-2		
Equipment Category	Harmonic Order	Max. Permissible Harmonic Current
	n	A
Class A	Odd Harmonics	
	3	2.30
	5	1.14
	7	0.77
	9	0.40
	11	0.33
	13	0.21
	$15 \leq n \leq 39$	$0.15 \times 15/n$
	Even Harmonics	
	2	1.08
	4	0.43
	6	0.30
	$8 \leq n \leq 40$	$0.23 \times 8/n$

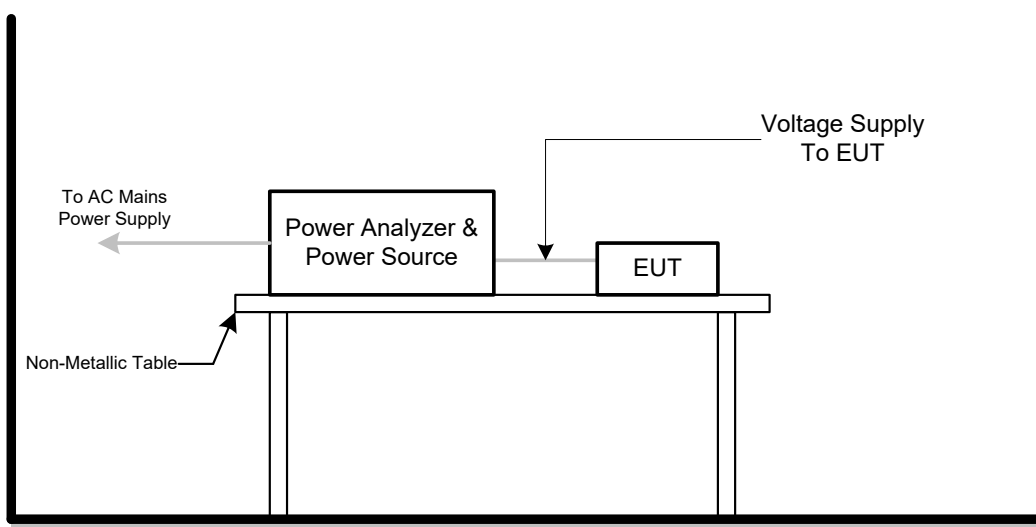
3.10.2 TEST PROCEDURE

- 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.
- The classification of EUT is according to of EN IEC 61000-3-2. The EUT is classified as Class A.
- 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.

3.10.3 DEVIATION FROM TEST STANDARD

No deviation.

3.10.4 TEST SETUP



3.10.5 TEST RESULTS FOR HARMONIC CURRENT EMISSIONS

Please refer to the APPENDIX J.

3.11 VOLTAGE FLUCTUATIONS AND FLICKER TEST

3.11.1 LIMITS

Tests	Limits	Descriptions
	EN 61000-3-3	
Pst	≤ 1.0 , $T_p=10$ min.	Short Term Flicker Indicator
Plt	≤ 0.65 , $T_p=2$ hr.	Long Term Flicker Indicator
dc	$\leq 3.3\%$	Relative Steady-State V-Chang
dmax	$\leq 4\%$	Maximum Relative V-change
d (t)	≤ 500 ms	Relative V-change characteristic

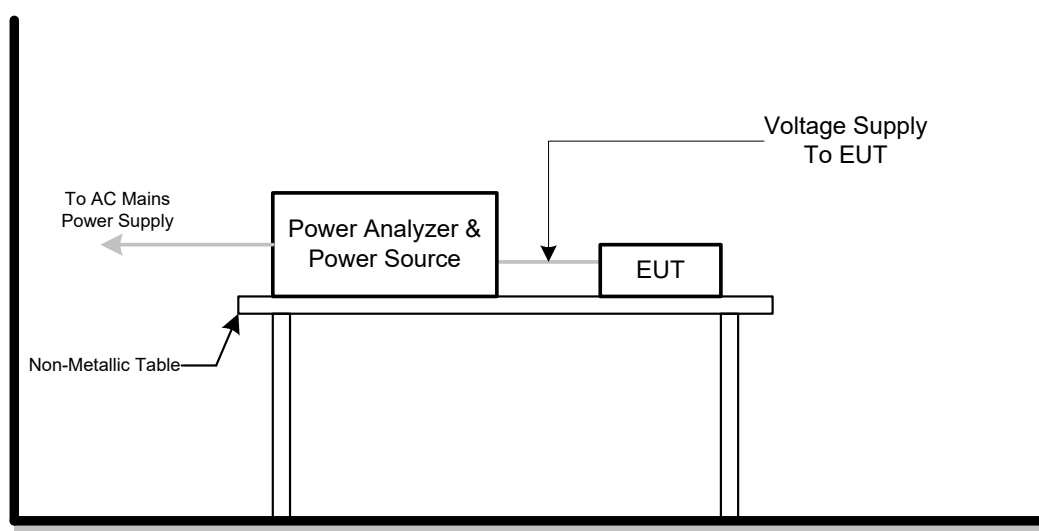
3.11.2 TEST PROCEDURE

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

3.11.3 DEVIATION FROM TEST STANDARD

No deviation.

3.11.4 TEST SETUP



3.11.5 TEST RESULTS FOR VOLTAGE FLUCTUATIONS (FLICKER)

Please refer to the APPENDIX K.

4. EMC IMMUNITY TEST

4.1 STANDARD COMPLIANCE/SEVERITY LEVEL/CRITERIA

Tests Standard No.	Test Specification Level / Test Mode	Test Ports	Criteria
			Type 2
Electrostatic discharge immunity IEC 61000-4-2 (ESD)	±8kV air discharge ±4kV contact discharge (Direct Mode)	Enclosure	B
	±4kV HCP discharge ±4kV VCP discharge (Indirect Mode)	Enclosure	B
Radiated, radio-frequency, electromagnetic field immunity IEC 61000-4-3 (RS)	80 MHz to 1000 MHz 3V/m(unmodulated, r.m.s), 80%,AM(1 kHz)	Enclosure	A
Electrical fast transient/burst immunity IEC 61000-4-4 (EFT/Burst)	±0.5kV(peak) 5/50ns Tr/Th 5kHz Repetition Frequency	Ports for signal and telecommunication (Only applicable to cable length>3 m)	B
	±0.5kV(peak) 5/50ns Tr/Th 5kHz Repetition Frequency	DC Power Ports (Only applicable to cable length>3 m)	B
	±1 kV(peak) 5/50ns Tr/Th 5kHz Repetition Frequency	AC Power Ports	B
Surge immunity IEC 61000-4-5 (Surges)	±0.5 kV(peak) 1.2/50(8/20) Tr/Th us (line to line) & (line to earth)	DC Power Ports (Only applicable to cable length>10 m)	B
	±1 kV(peak) 1.2/50(8/20) Tr/Th us (line to line)	AC Power Ports	B
	±2 kV(peak) 1.2/50(8/20) Tr/Th us (line to earth)		B

Tests Standard No.	Test Specification Level / Test Mode	Test Ports	Criteria
			Type 2
Immunity to conducted disturbances, induced by radio-frequency fields IEC 61000-4-6 (Injected Current)	0.15 MHz to 80 MHz 3V(rms), 1kHz 80%, AM Modulated 150Ω source impedance	Ports for signal and signal (Only applicable to cable length>3 m)	A
	0.15 MHz to 80 MHz 3V(rms), 1kHz 80%, AM Modulated 150Ω source impedance	DC Power Ports (Only applicable to cable length>3 m)	A
	0.15 MHz to 80 MHz 3V(rms), 1kHz 80%, AM Modulated 150Ω source impedance	AC Power Ports	A
Power frequency magnetic field immunity IEC 61000-4-8 (PFMF)	50 Hz, 3A/m(r.m.s)	Enclosure	A
Voltage dips, short interruptions and voltage variations immunity IEC 61000-4-11 (Voltage Interruption/Dips)	Voltage reduction 30% 10ms	AC Power Ports	B
	Voltage reduction 60% 100ms		C
	Voltage reduction >95% 5000ms		C

4.2 GENERAL PERFORMANCE CRITERIA

According to **EN50412-2-1** standard, the general performance criteria as following:

Criterion A	During and after the test, the EUT shall operate without - protocol failure, - loss of link, - any other loss of functions relevant to the user, - reduction in performance below that declared by the manufacturer. The manufacturer shall choose the most appropriate performance measurement criteria for their apparatus or system e.g.bit error rate, block error rate, throughput, re-transmissions etc.
Criterion B	Degradation of the performance beyond that as described in criterion A is permitted during the application of the test provided that the normal operation of the EUT is self-recoverable to the condition immediately before the application of the test.
Criterion C	Degradation of the performance beyond that as described in criterion A is permitted during the application of the test provided that the normal operation of the EUT is self recoverable to the condition immediately before the application of the test or can be restored after the test by the operator.

4.3 ESD TESTING

4.3.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-2
Discharge Impedance:	330 ohm / 150 pF
Required Performance	B
Discharge Voltage:	Air Discharge: $\pm 2\text{kV}$, $\pm 4\text{kV}$, $\pm 8\text{kV}$ Contact Discharge: $\pm 4\text{kV}$
Polarity:	Positive & Negative
Number of Discharge	20 times at each test point
Discharge Mode:	Single Discharge
Discharge Period:	1 second

4.3.2 TEST PROCEDURE

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

- a. The test shall be performed with single discharges. On each pre-selected point at least 10 single discharges (in the most sensitive polarity) shall be applied.

NOTE 1 The minimum number of discharges applied is depending on the EUT; for products with synchronized circuits the number of discharges should be larger.

For the time interval between successive single discharges an initial value of 1 s is recommended. Longer intervals may be necessary to determine whether a system failure has occurred.

NOTE 2 The points to which the discharges should be applied may be selected by means of an exploration carried out at a repetition rate of 20 discharges per second, or more.

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.

- b. Air discharges at insulation surfaces of the EUT.

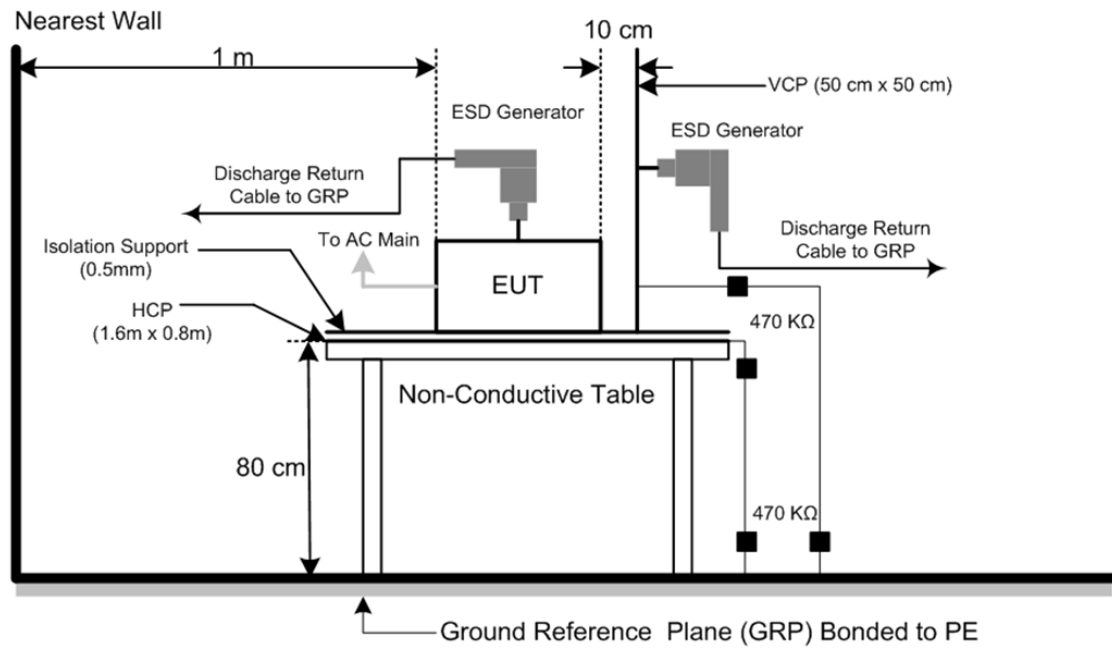
It was at least ten single discharges with positive and negative at the same selected point.

- c. 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 940k total impedance. The equipment under test was installed in a representative system as described in IEC 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.

4.3.3 DEVIATION FROM TEST STANDARD

No deviation

4.3.4 TEST SETUP



4.3.5 TEST RESULTS

Please refer to the APPENDIX L.

4.4 RS TESTING

4.4.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-3
Required Performance	A
Frequency Range:	80 MHz - 1000 MHz
Field Strength:	3 V/m
Modulation:	1kHz Sine Wave, 80%, AM unmodulation
Frequency Step:	1% of fundamental
Polarity of Antenna:	Horizontal and Vertical
Test Distance:	3 m
Antenna Height:	1.55 m
Dwell Time:	3 seconds

4.4.2 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.

The EUT installed in a representative system as described in IEC 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

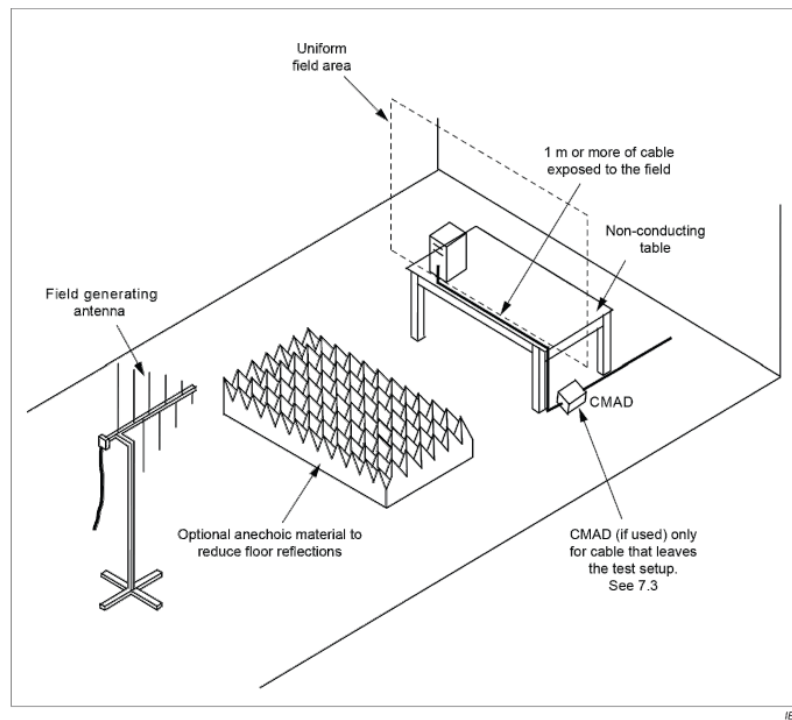
The other condition as following manner:

- The field strength level was 3V/m.
- The frequency range is swept from 80 MHz to 1000 MHz, with the signal 80% amplitude unmodulated with a 1kHz sine wave. Where the frequency range is swept incrementally, the step size was 1% of fundamental.
- The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
- The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

4.4.3 DEVIATION FROM TEST STANDARD

No deviation

4.4.4 TEST SETUP



4.4.5 TEST RESULTS

Please refer to the APPENDIX M.

4.5 EFT/BURST TESTING

4.5.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-4
Required Performance	B
Test Voltage :	AC Power Line: ± 1 kV Signal/Control Line: ± 0.5 kV
Polarity:	Positive & Negative
Impulse Frequency:	5 kHz
Impulse Wave shape :	5/50 ns
Burst Duration:	15 ms
Burst Period:	300 ms
Test Duration:	1 min.

4.5.2 TEST PROCEDURE

The configuration consisted of a wooden table (0.8m high) standing on the Ground Reference Plane and should be located 0.1 m+/- 0.01m above the Ground Reference Plane. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system. A minimum distance of 0.5m was provided between the EUT and the walls of the laboratory or any other metallic structure.

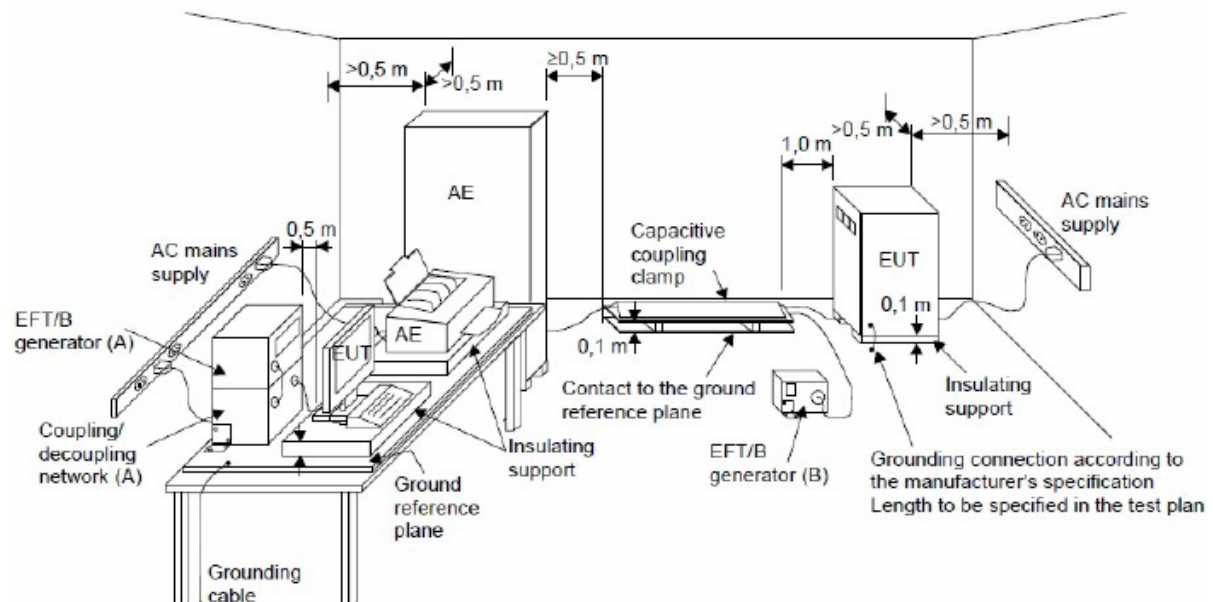
The other condition as following manner:

- Both positive and negative polarity discharges were applied.
- The duration time of each test sequential was 1 minute

4.5.3 DEVIATION FROM TEST STANDARD

No deviation

4.5.4 TEST SETUP



4.5.5 TEST RESULTS

Please refer to the APPENDIX N.

4.6 SURGE TESTING

4.6.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-5
Required Performance	B
Wave-Shape:	1.2/50(8/20) Tr/Th μ s combination wave
Test Voltage :	AC Power Line: ± 0.5 kV, ± 1 kV
Generator Source Impedance:	2 Ω of the low-voltage power supply network.
Phase Angle:	AC Port: 0°/90°/180°/270°
Pulse Repetition Rate:	1 time / min.

4.6.2 TEST PROCEDURE

a. For EUT power supply:

The surge is to be applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines, and to provide sufficient decoupling impedance to the surge wave. The power cord between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

b. For test applied to unshielded unsymmetrically operated interconnection lines of EUT:

The surge is applied to the lines via the capacitive coupling. The coupling /decoupling networks shall not influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

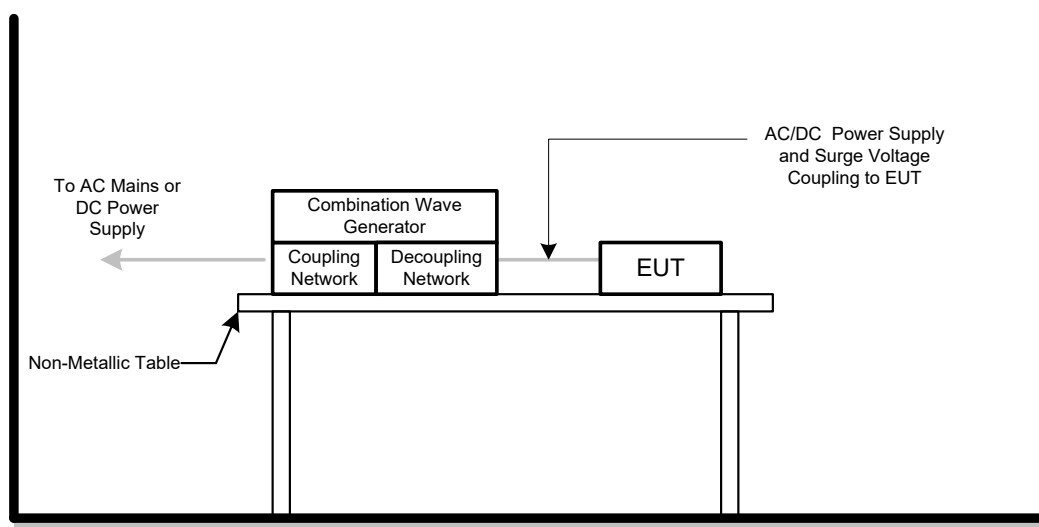
c. For test applied to unshielded symmetrically operated interconnection /telecommunication lines of EUT:

d The surge is applied to the lines via gas arrestors coupling. Test levels below the ignition point of the coupling arrestor cannot be specified. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

4.6.3 DEVIATION FROM TEST STANDARD

No deviation

4.6.4 TEST SETUP



4.6.5 TEST RESULTS

Please refer to the APPENDIX O.

4.7 INJECTION CURRENT TESTING

4.7.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-6
Required Performance	A
Frequency Range:	0.15 MHz - 80 MHz
Field Strength:	3V (unmodulated, r.m.s.)
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1% of fundamental
Dwell Time:	3 seconds

4.7.2 TEST PROCEDURE

The EUT and support equipment, are placed on a table that is 0.8 meter above a metal ground plane measured 1m*1m min. and 0.65mm thick min.

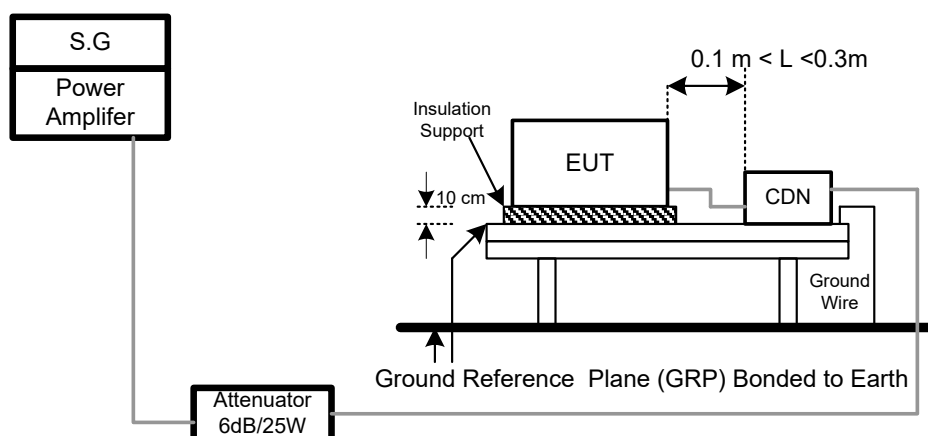
The other condition as following manner:

- The field strength level was 3V.
- The frequency range is swept from 150 kHz to 80 MHz, with the signal 80% amplitude modulated with a 1kHz sine wave. Where the frequency range is swept incrementally, the step size was 1% of fundamental.
- The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.

4.7.3 DEVIATION FROM TEST STANDARD

No deviation

4.7.4 TEST SETUP



4.7.5 TEST RESULTS

Please refer to the APPENDIX P.

4.8 POWER FREQUENCY MAGNETIC FIELD TESTING

4.8.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-8
Required Performance	A
Frequency Range:	50/60Hz
Field Strength:	1 A/m
Observation Time:	1 minute
Inductance Coil:	Rectangular type, 1mx1m

4.8.2 TEST PROCEDURE

The equipment shall be subjected to the test magnetic field by using the induction coil of standard dimension (1 m x 1 m). The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.

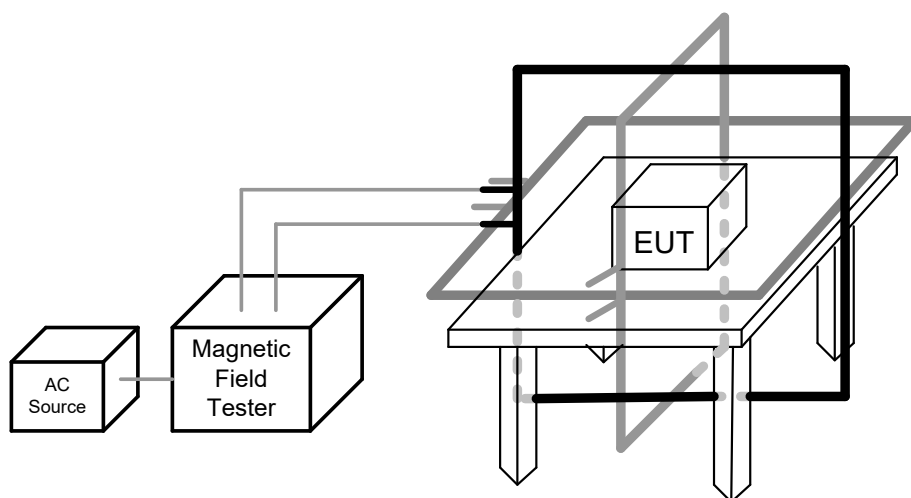
The other condition as following manner:

- The equipment cabinets shall be connected to the safety earth directly on the GRP via the earth terminal of the EUT.
- The cables supplied or recommended by the equipment manufacturer shall be used. 1 meter of all cables used shall be exposed to the magnetic field.

4.8.3 DEVIATION FROM TEST STANDARD

No deviation

4.8.4 TEST SETUP



4.8.5 TEST RESULTS

Please refer to the APPENDIX Q.

4.9 VOLTAGE INTERRUPTION/DIPS TESTING

4.9.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-11
Required Performance	B (For 30% Voltage reduction 10ms) C (For 60% Voltage reduction 100ms) C (For >95% Voltage reduction 5000ms)
Interval between Event:	Ten seconds
Phase Angle:	0°/180°
Test Cycle:	3 times

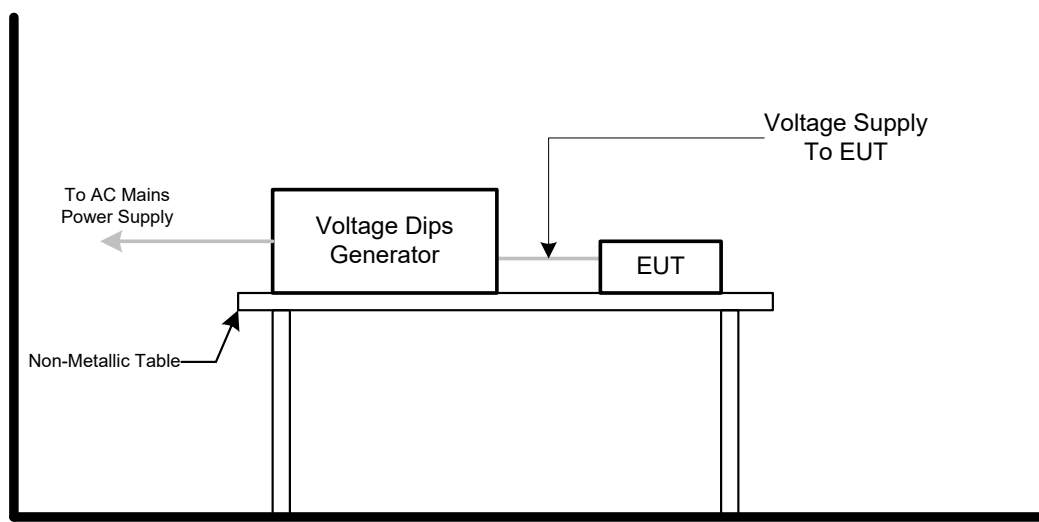
4.9.2 TEST PROCEDURE

The EUT shall be tested for each selected combination of test levels and duration with a sequence of three dips/interruptions with intervals of 10 s minimum (between each test event). Each representative mode of operation shall be tested. Abrupt changes in supply voltage shall occur at zero crossings of the voltage waveform.

4.9.3 DEVIATION FROM TEST STANDARD

No deviation

4.9.4 TEST SETUP



4.9.5 TEST RESULTS

Please refer to the APPENDIX R.

5. MEASUREMENT INSTRUMENTS LIST

Conducted disturbances at AC mains power ports					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	50Ω Terminator	SHX	TF2-3G-A	8122901	Feb. 27, 2022
2	TWO-LINE V-NETWORK	R&S	ENV216	100526	Nov. 04, 2021
3	EMI Test Receiver	R&S	ESR3	101862	Jul. 25, 2021
4	Artificial-Mains Network	SCHWARZBECK	NSLK 8127	8127685	Feb. 28, 2022
5	Cable	N/A	RG400	N/A(12m)	Mar. 09, 2022
6	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

Conducted disturbances telecommunication/network ports					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	50Ω Terminator	SHX	TF2-3G-A	8122901	Feb. 27, 2022
2	TWO-LINE V-NETWORK	R&S	ENV216	100526	Nov. 04, 2021
3	EMI Test Receiver	R&S	ESR3	101862	Jul. 25, 2021
4	Artificial-Mains Network	SCHWARZBECK	NSLK 8127	8127685	Feb. 28, 2022
5	Cable	N/A	RG400	N/A(12m)	Mar. 09, 2022
6	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
7	ISN	TESEQ	ISN T800	42838	Jul. 25, 2021

Radiated Emission Below 1GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Receiver	Keysight	N9038A	MY56400091	Feb. 27, 2022
2	MXE EMI Receiver	Agilent	N9038A	MY53220133	Feb. 28, 2022
3	Pre-Amplifier	EMC INSTRUMENT	EMC 9135	980284	Dec. 13, 2021
4	Pre-Amplifier	EMC INSTRUMENT	EMC 9135	980283	Dec. 13, 2021
5	Trilog-Broadband Antenna	Schwarzbeck	VULB9168	946	Oct. 16, 2021
6	Trilog-Broadband Antenna	Schwarzbeck	VULB9168	947	Nov. 09, 2021
7	Cable	emci	LMR-400(5m+8m+8m)	N/A	Jan. 06, 2022
8	Cable	emci	LMR-400(5m+8m+8m)	N/A	Jan. 06, 2022
9	Measurement Software	Farad	EZ-EMC Ver.BTL-2ANT-1	N/A	N/A
10	Multi-Device Controller	ETS-Lindgren	2090	N/A	N/A
11	Controller	MF	MF-7802	MF780208159	N/A
12	Attenuator	EMCI	EMCI-N-6-06	N0670	Nov. 09, 2021
13	Attenuator	EMCI	EMCI-N-6-06	N0671	Oct. 16, 2021

Radiated Emission Above 1GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Horn Antenna	EMCO	3115	9605-4803	May 26, 2022
2	Amplifier	Agilent	8449B	3008A02333	Feb. 28, 2022
3	MXE EMI Receiver	Agilent	N9038A	MY53220133	Feb. 28, 2022
4	Measurement Software	Farad	EZ-EMC Ver.BTL-2ANT-1	N/A	N/A
5	Multi-Device Controller	ETS-Lindgren	2090	N/A	N/A
6	Controller	MF	MF-7802	MF780208159	N/A
7	Cable	Micable	RWLP50-4.0A-SM SM-12M-KJ	20191107 002	Mar. 31, 2022

Conducted disturbances frequency range above 30 MHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	50Ω Terminator	SHX	TF2-3G-A	8122901	Feb. 27, 2022
2	TWO-LINE V-NETWORK	R&S	ENV216	100526	Nov. 04, 2021
3	EMI Test Receiver	R&S	ESR3	101862	Jul. 25, 2021
4	Artificial-Mains Network	SCHWARZBECK	NSLK 8127	8127685	Feb. 28, 2022
5	Cable	N/A	RG400	N/A(12m)	Mar. 09, 2022
6	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

Conducted unsymmetrical disturbances & Conducted asymmetric disturbances					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	TWO-LINE V-NETWORK	R&S	ENV216	100526	Nov. 04, 2021
2*	ISN	Teseq gmbh	ISN PLT-A	36240	May 09, 2023
3	EMI Test Receiver	R&S	ESR3	101862	Jul. 25, 2021
4	Artificial-Mains Network	SCHWARZBECK	NSLK 8127	8127685	Feb. 28, 2022
5	Cable	N/A	RG400	N/A(12m)	Mar. 09, 2022
6	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

Dynamic power control					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	TWO-LINE V-NETWORK	R&S	ENV216	100526	Nov. 04, 2021
2*	Power Line Communication Tester	Protronix	PLC 6001	202166	May 09, 2023
3	EMI Test Receiver	R&S	ESR3	101862	Jul. 25, 2021
4	Artificial-Mains Network	SCHWARZBECK	NSLK 8127	8127685	Feb. 28, 2022
5	Cable	N/A	RG400	N/A(12m)	Mar. 09, 2022
6	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

Cognitive frequency exclusion					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	TWO-LINE V-NETWORK	R&S	ENV216	100526	Nov. 04, 2021
2	MXG Analog Signal Generator	Agilent	N5181A	MY49060710	Jul. 25, 2021
3*	Power Line Communication Tester	Protronix	PLC 6001	202166	May 09, 2023
4	EMI Test Receiver	R&S	ESR3	101862	Jul. 25, 2021
5	Artificial-Mains Network	SCHWARZBECK	NSLK 8127	8127685	Feb. 28, 2022
6	Cable	N/A	RG400	N/A(12m)	Mar. 09, 2022
7	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

Harmonic current emissions & Voltage fluctuations and flicker					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Harmonics and Flicker Analyzer	California Instruments	PACS-1	72344	Jul. 25, 2021
2	3KVA AC Power source	California Instruments	3001ix	56309	Jul. 25, 2021
3	Measurement Software	California	CTS4.0 Version 4.23	N/A	N/A

ESD					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	ESD Generator	TESEQ AG	NSG 437	450	Dec. 03, 2021

RS					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	EMCO	3142C	66462	Mar. 26, 2022
2	Power amplifier	MILMEGA	80RF1000-250	1064833	Feb. 28, 2022
3	MXG Analog Signal Generator	Agilent	N5181A	MY49060710	Jul. 25, 2021
4	Measurement Software	Farad	EZ-RS (V2.0.1.3)	N/A	N/A

EFT					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Fast Transient Burst Simulator	Prima	EFT61004TA	PR190741004	Jul. 25, 2021

Surge					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Lightning Surge Generator	Prima	SUG61005TB	PR190854067	Jul. 25, 2021

CS					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	TEST SYSTEM FOR CONDUCTED AND RADIATED IMMUNITY	TESEQ	NSG 4070B	37513	Jul. 25, 2021
2	Power CDN	FCC	FCC-801-M2/M3-16A	100270	Feb. 27, 2022
3	Measurement Software	Farad	EZ-CS (V2.0.1.4)	N/A	N/A
4	Coupling Decoupling Network	Teseq GmbH	CDN T8-10	40373	Jul. 25, 2021

PMF					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Magnetic Field test Generator	FCC	F-1000-4-8-G-1 25A	4032	Feb. 28, 2022
2	Magnetic Field immunity loop	Thermo KeyTek	F-1000-4-8/9/10 -L-1M	4024	Feb. 28, 2022

DIPS					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Cycle Sag Simulator	Prima	DRP61011TA	PR19076452	Dec. 03, 2021

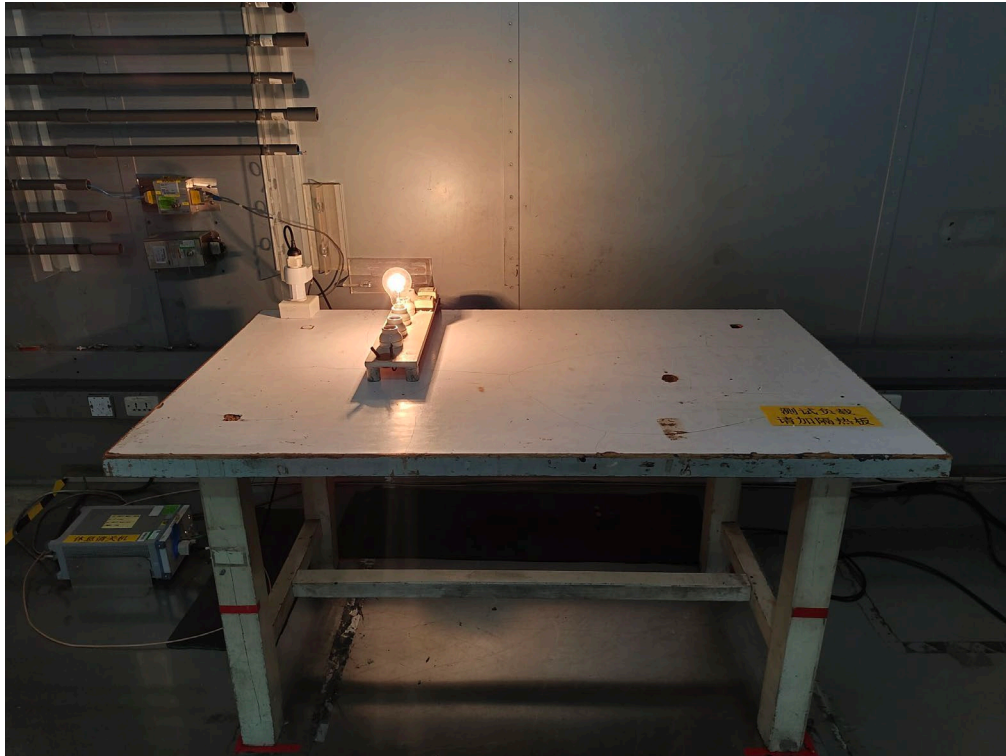
Remark: "N/A" denotes no model name, serial no. or calibration specified.

"**" calibration period of equipment list is three year.

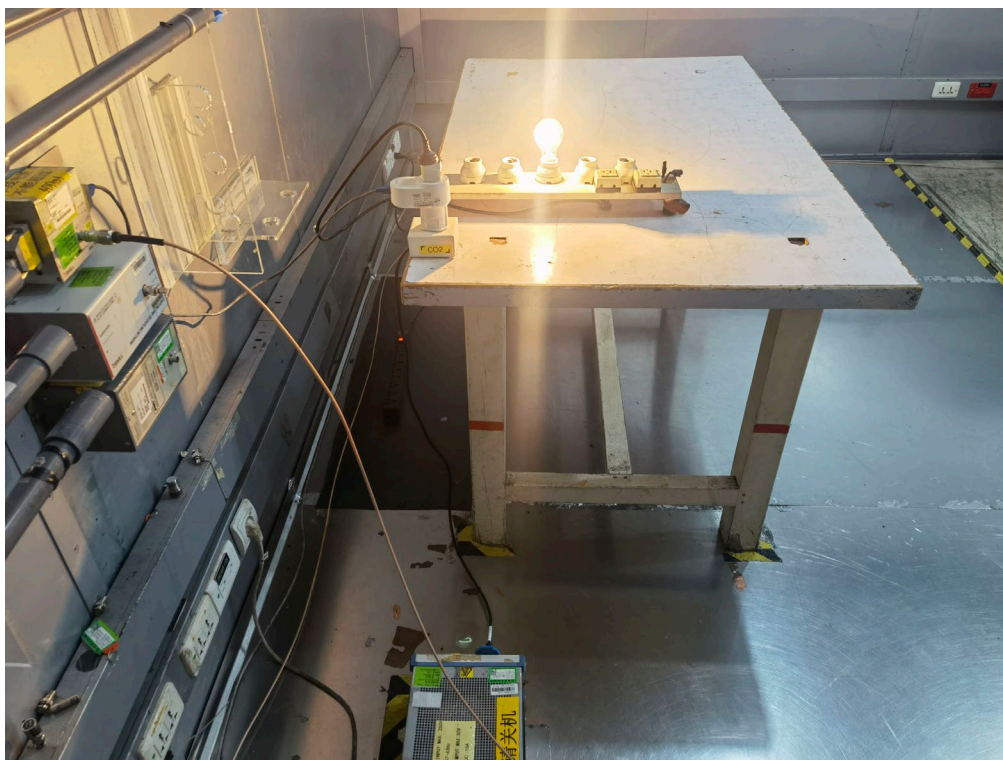
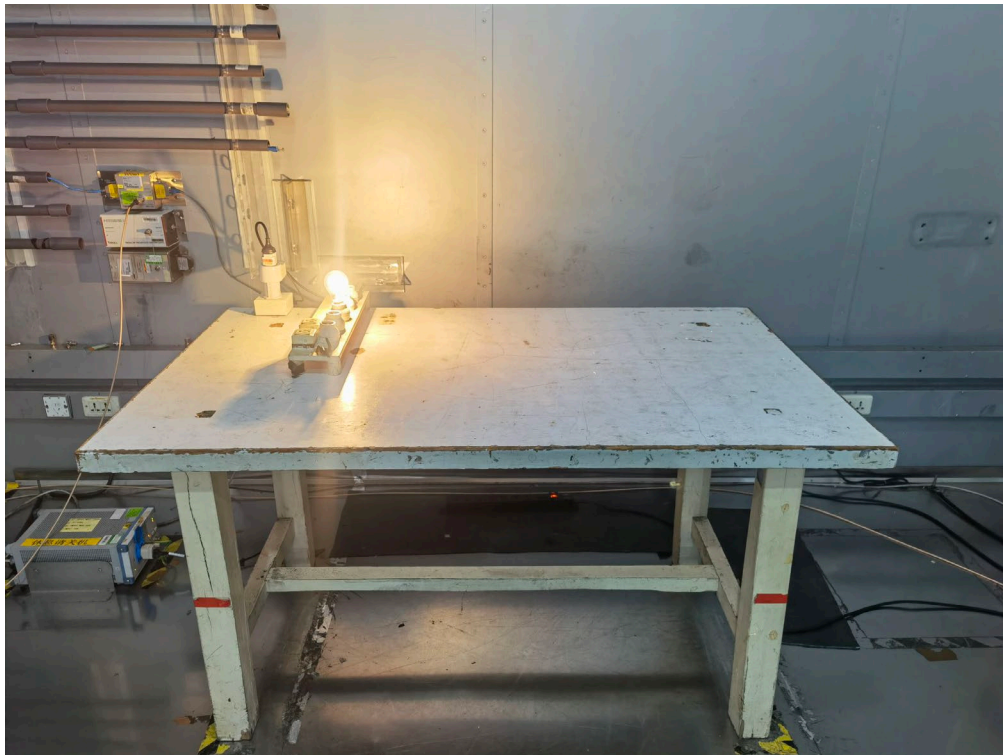
Except * item, all calibration period of equipment list is one year.

6.EUT TEST PHOTO

Conducted Measurement Photos

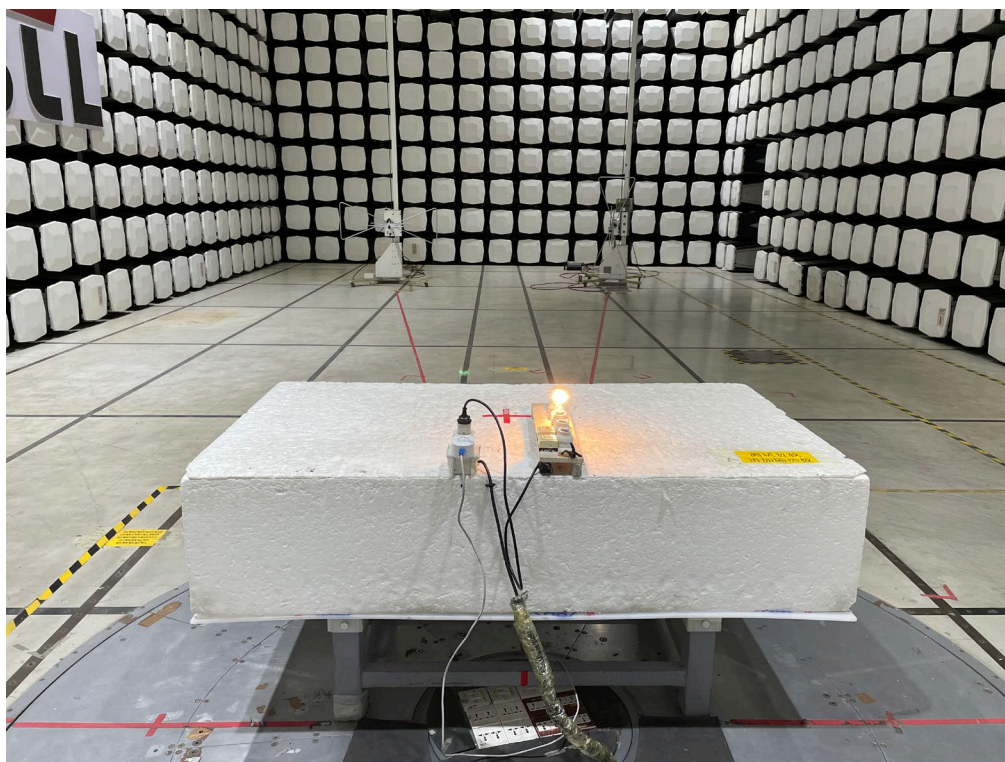
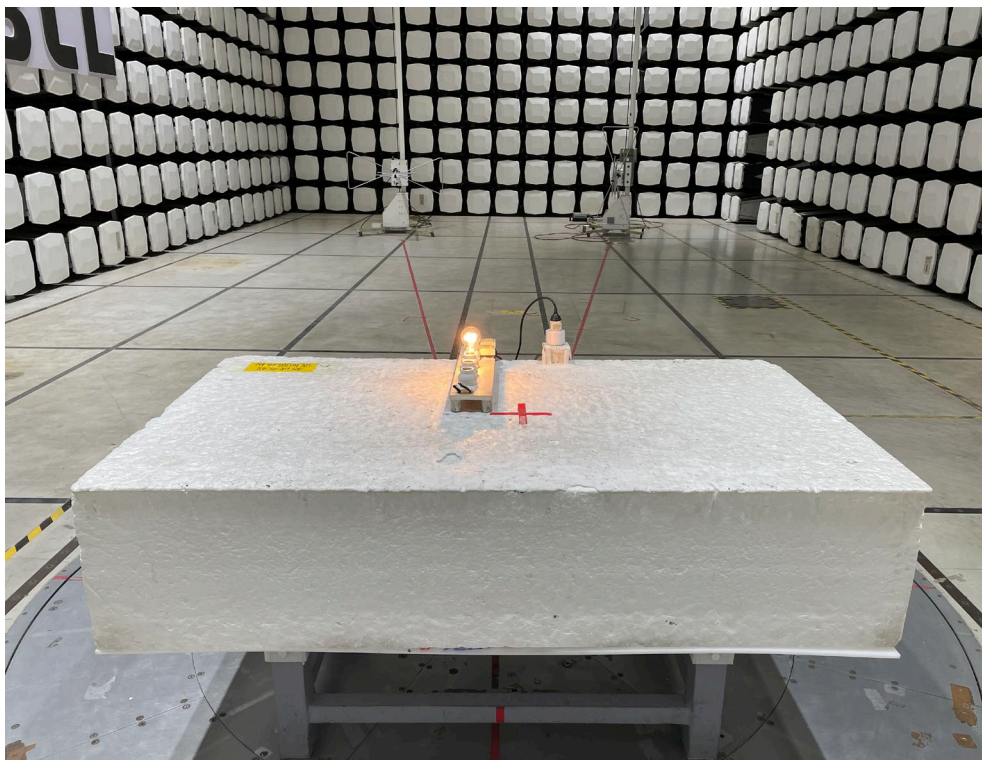


ISN Measurement Photos



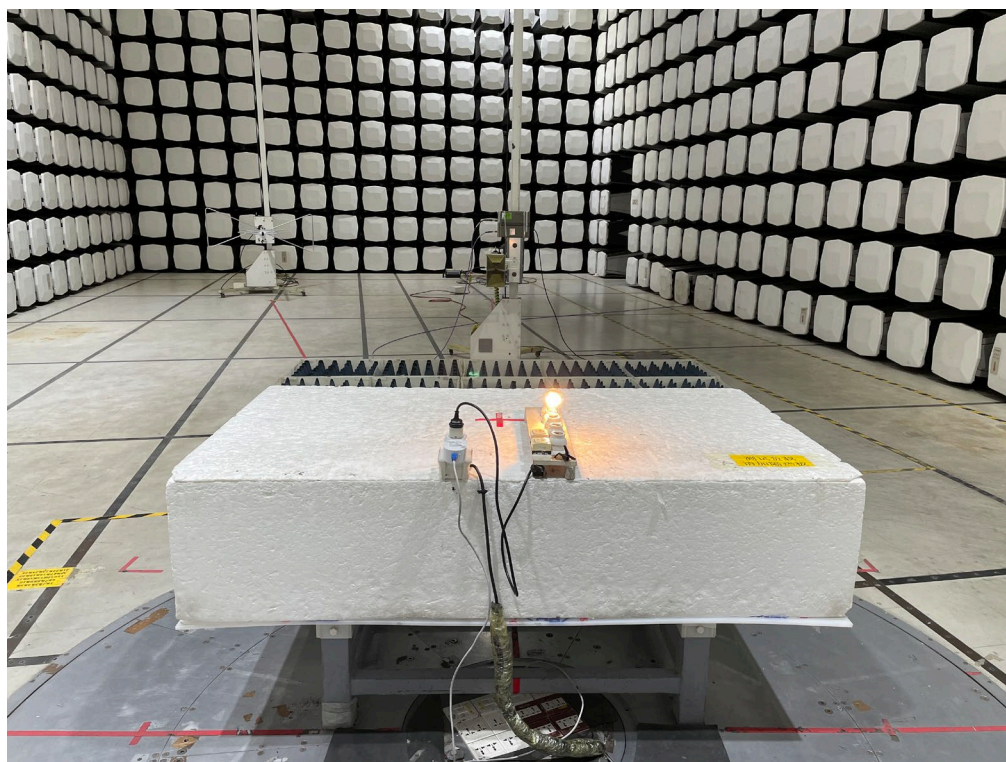
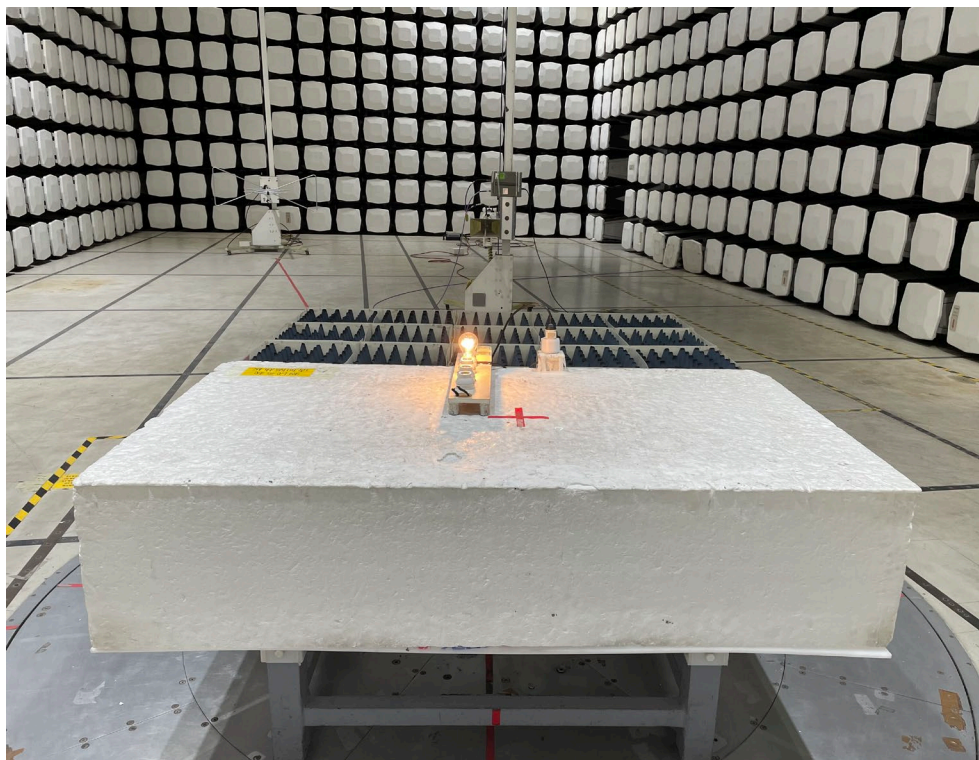
Radiated Measurement Photos

Below 1GHz

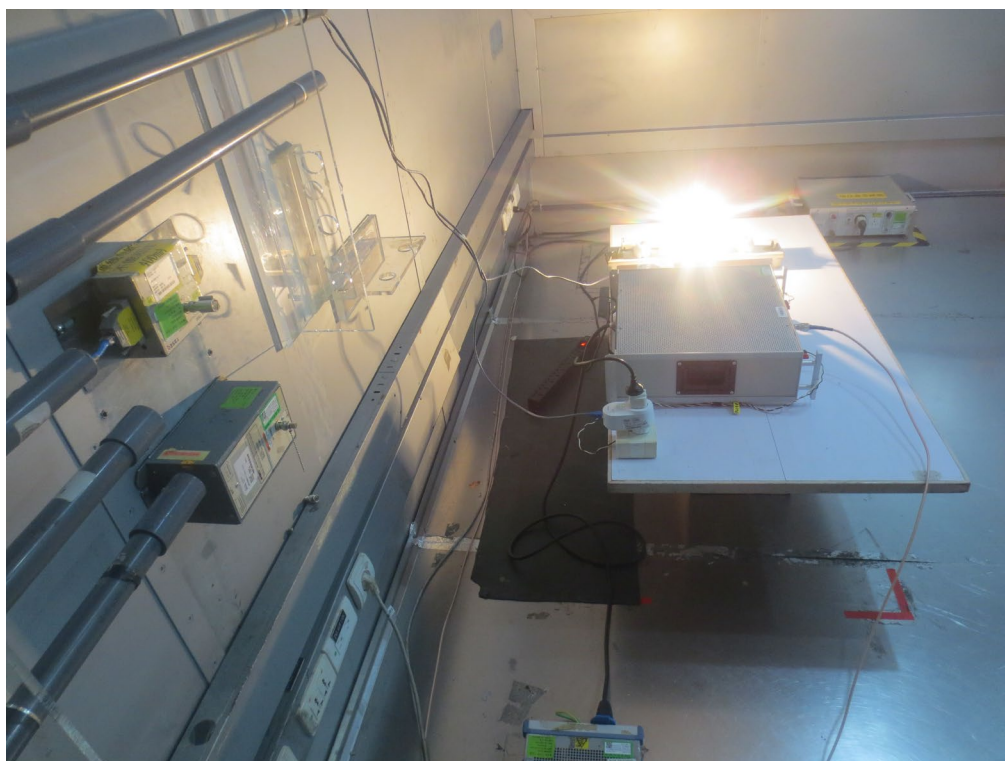
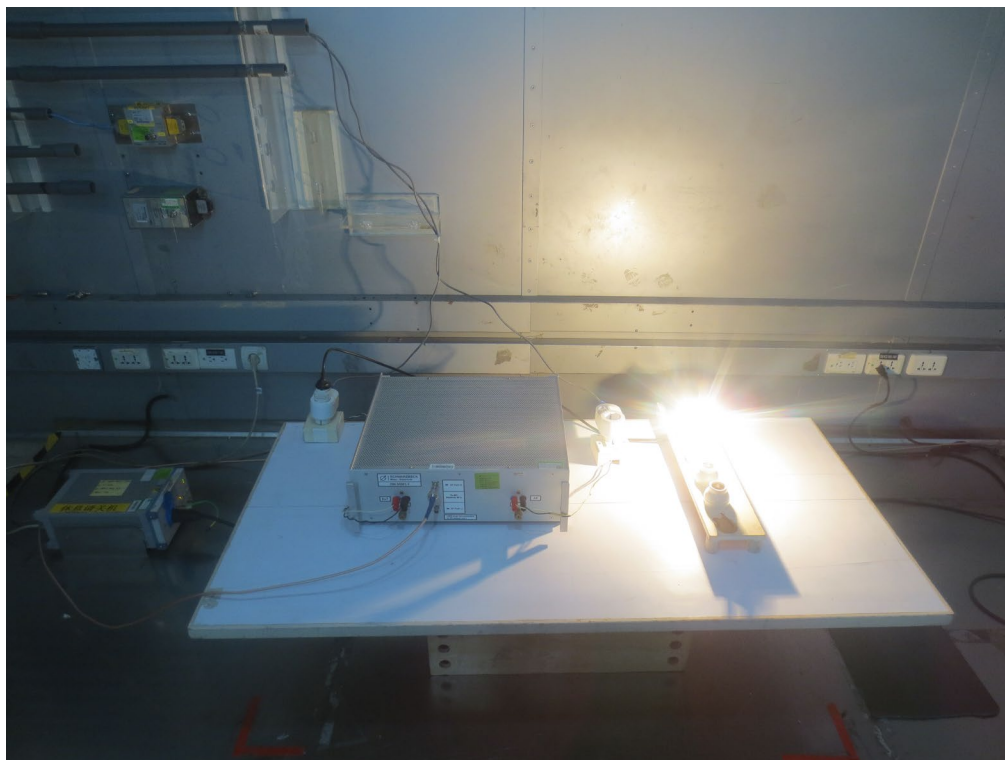


Radiated Measurement Photos

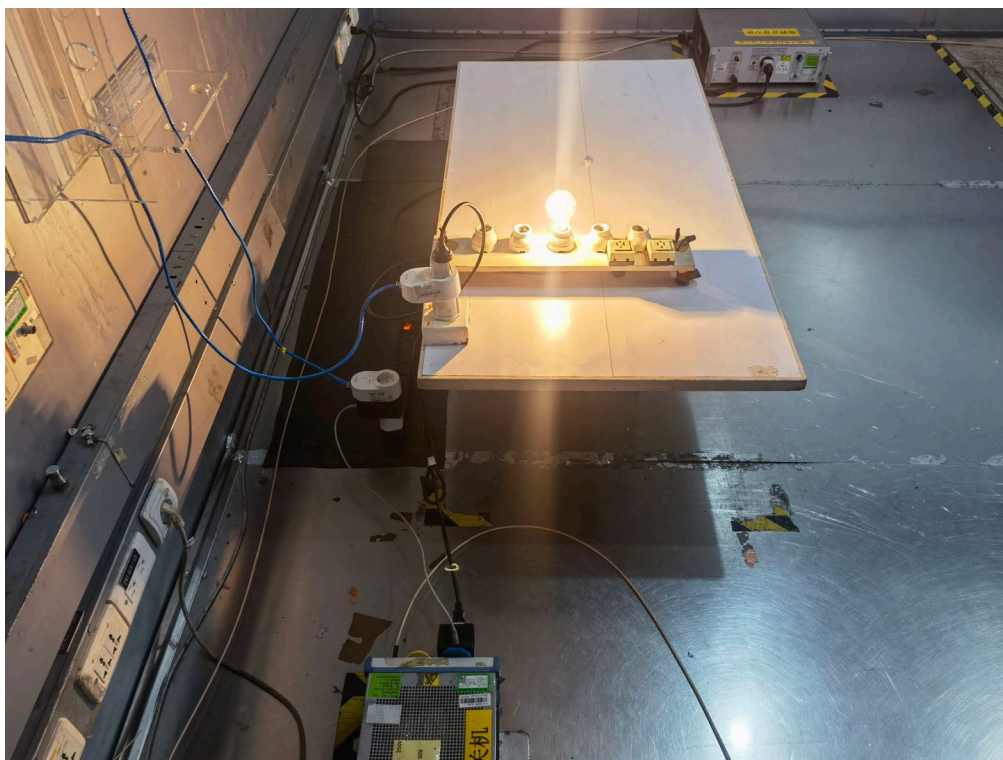
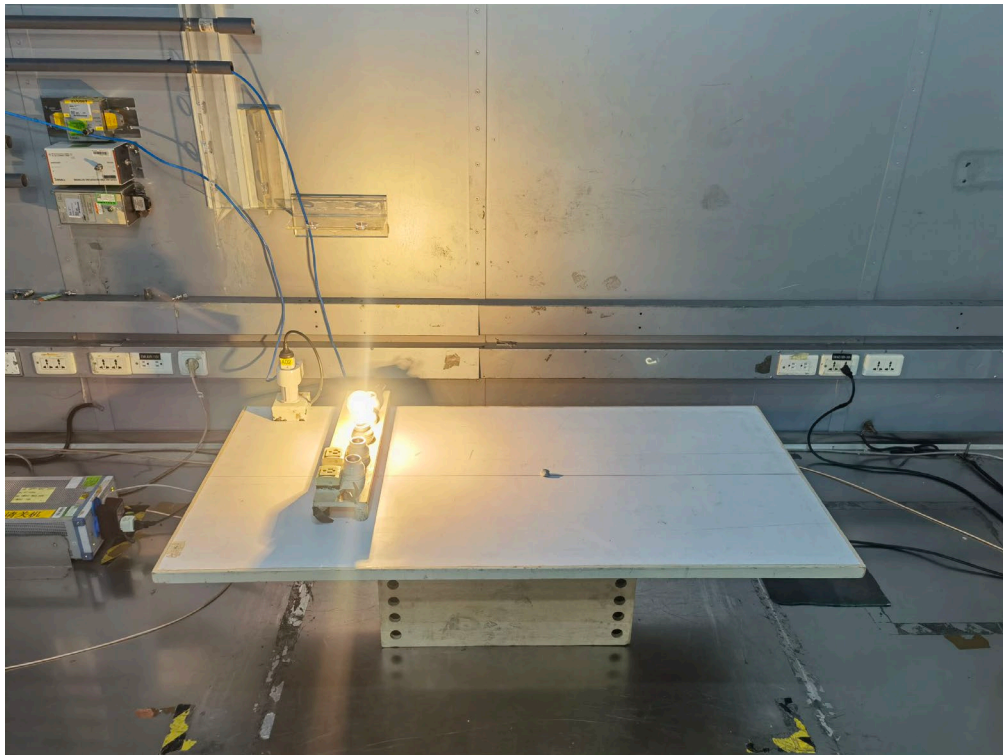
Above 1GHz



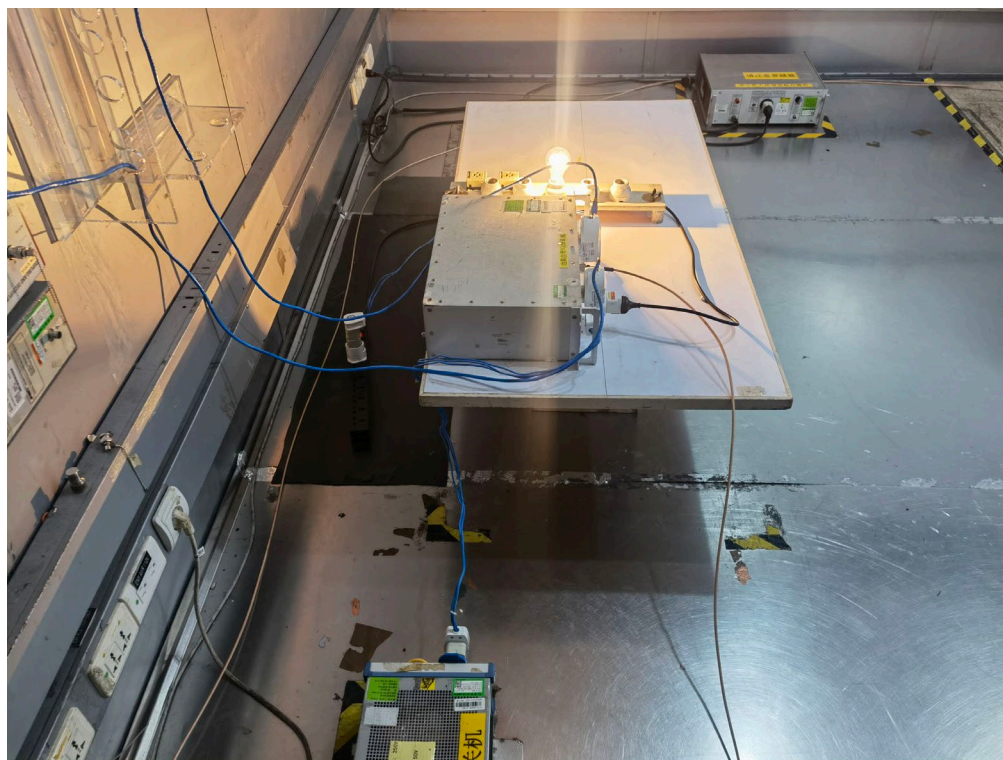
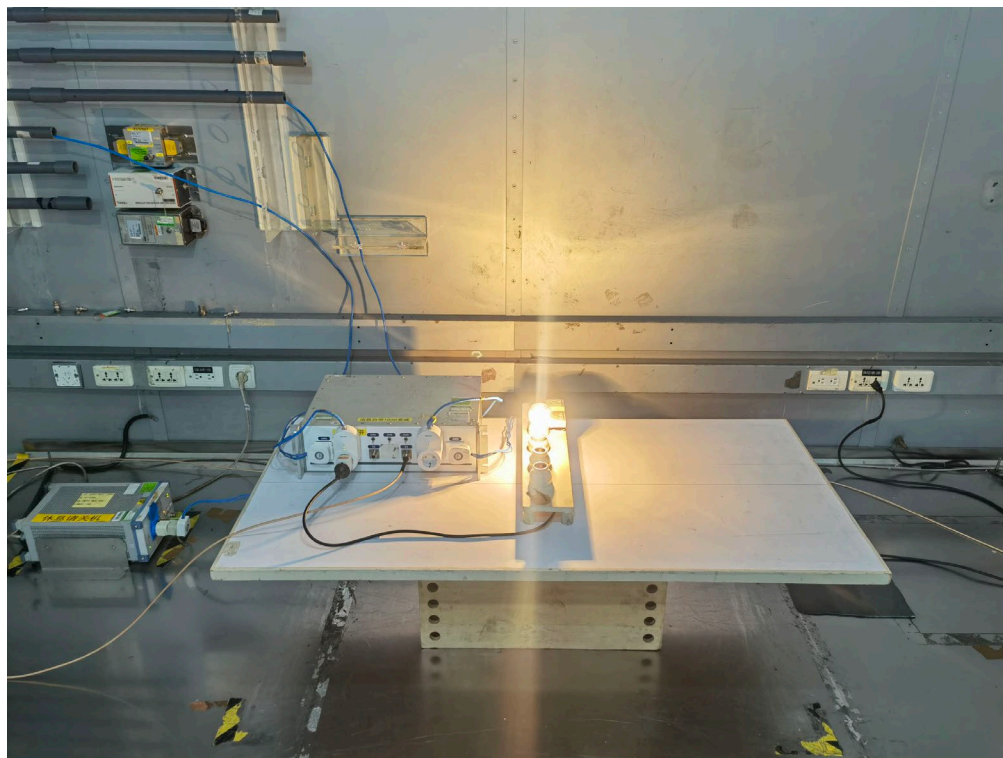
**Conducted disturbances frequency range above 30 MHz for PLC ports Measurement
Photos**



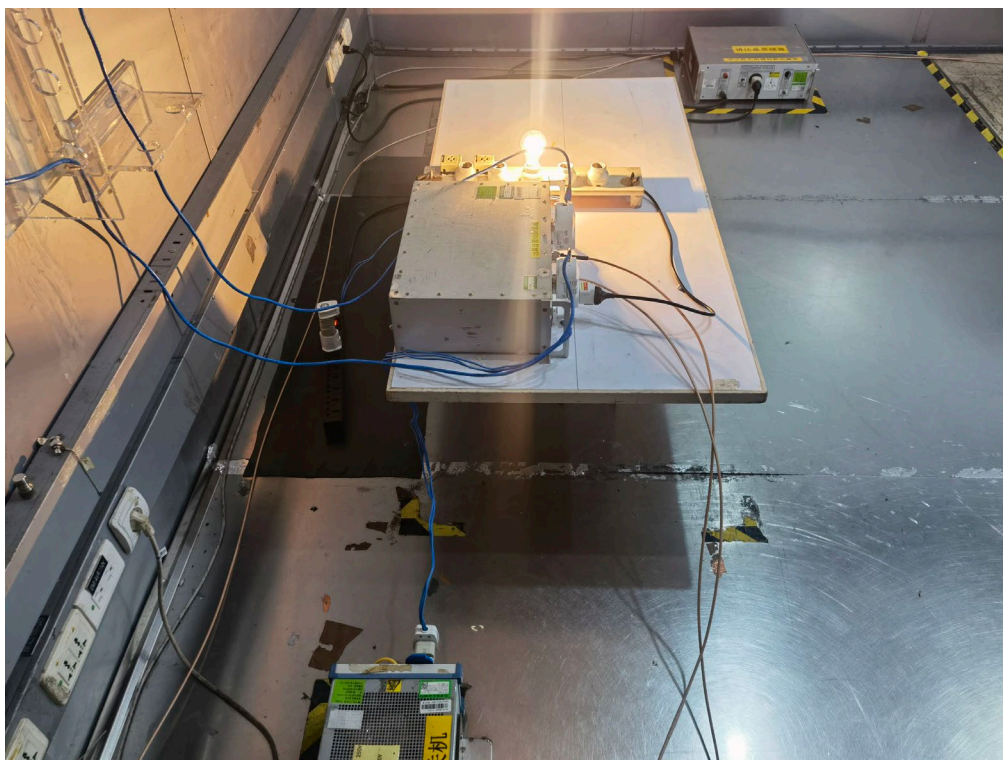
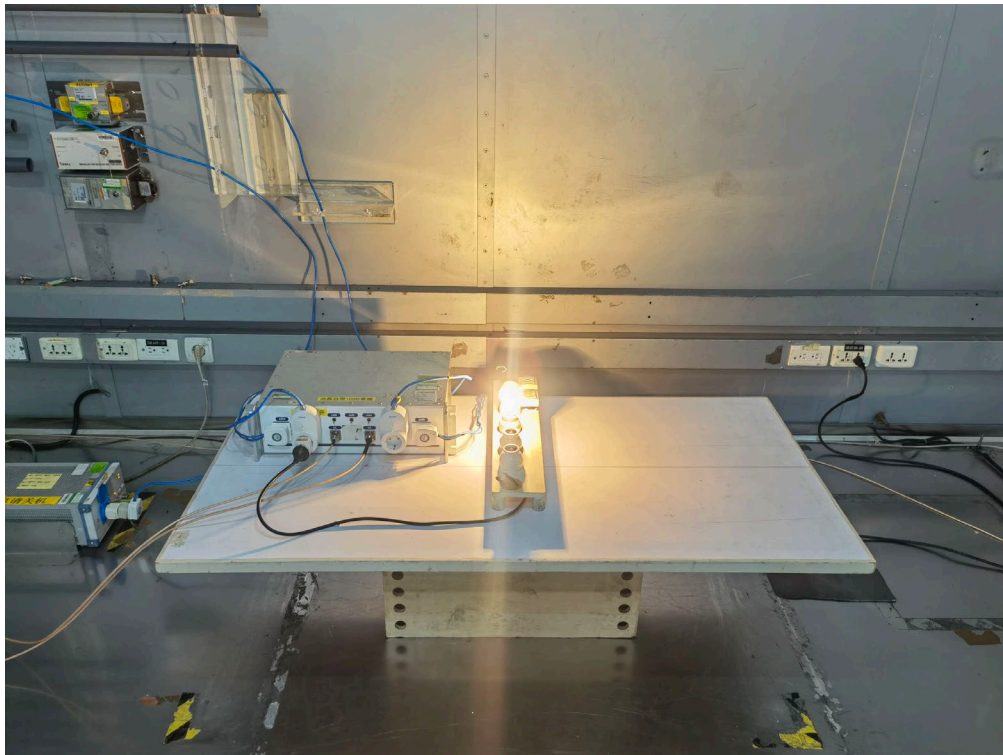
Conducted Unsymmetrical Disturbances For PLC ports Measurement Photos



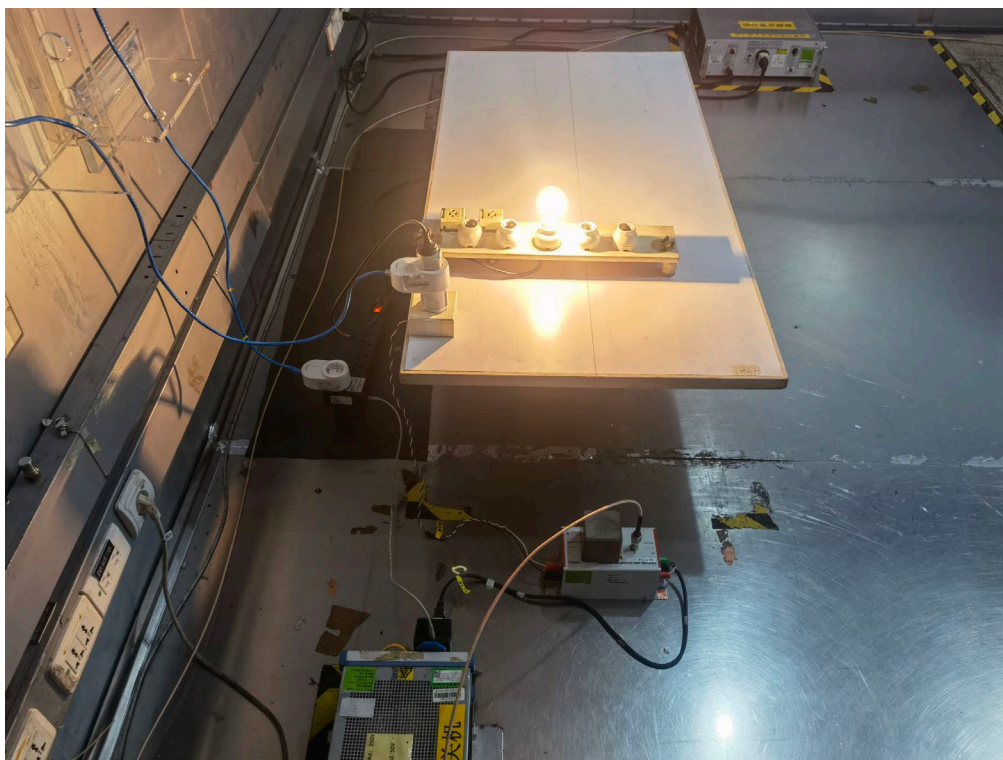
Conducted Dynamic Power Control for PLC Ports Measurement Photos



Conducted Cognitive Frequency Exclusion For PLC ports Measurement Photos



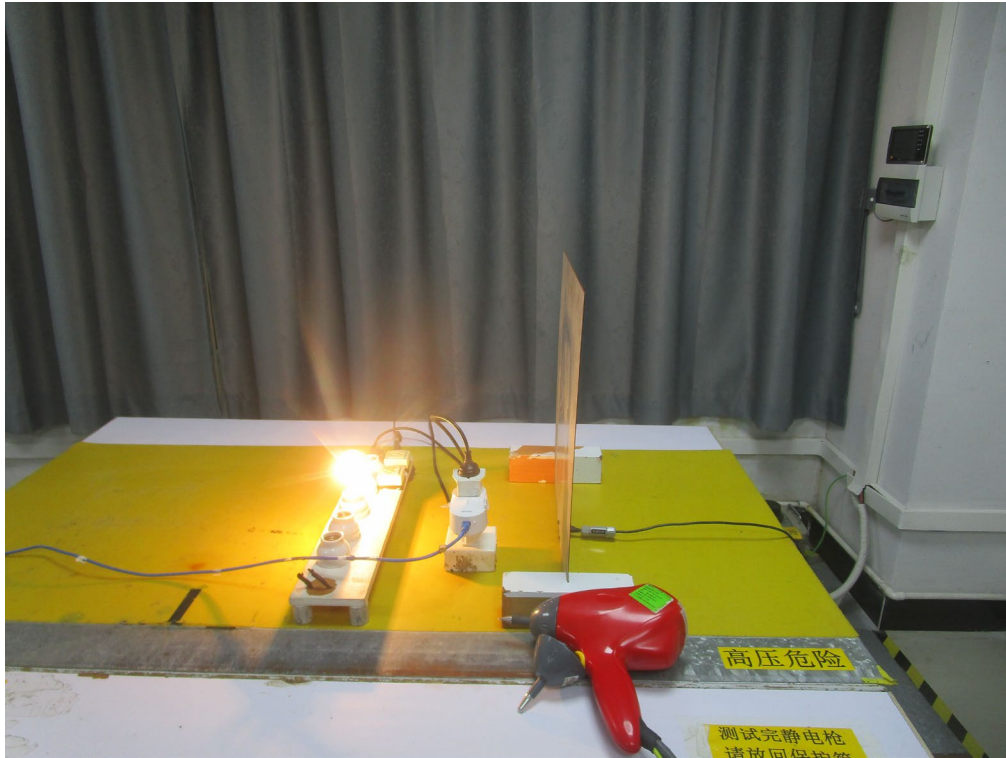
Conducted Asymmetrical Disturbances For PLC ports Measurement Photos



Harmonic current emissions & Voltage fluctuations and flicker



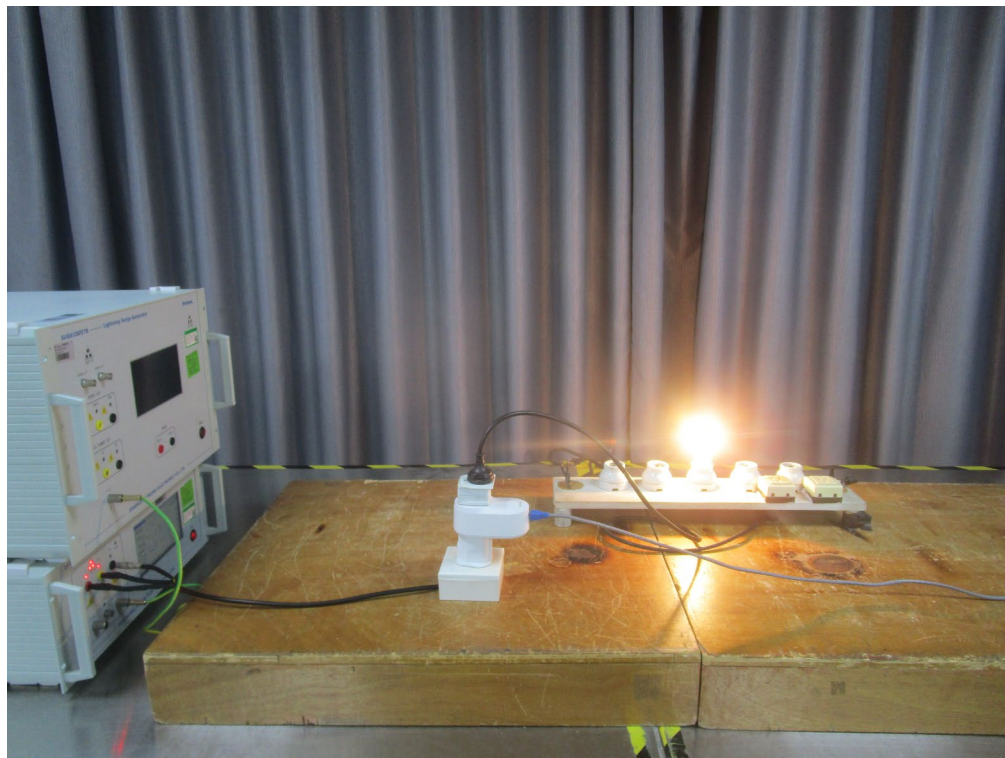
ESD



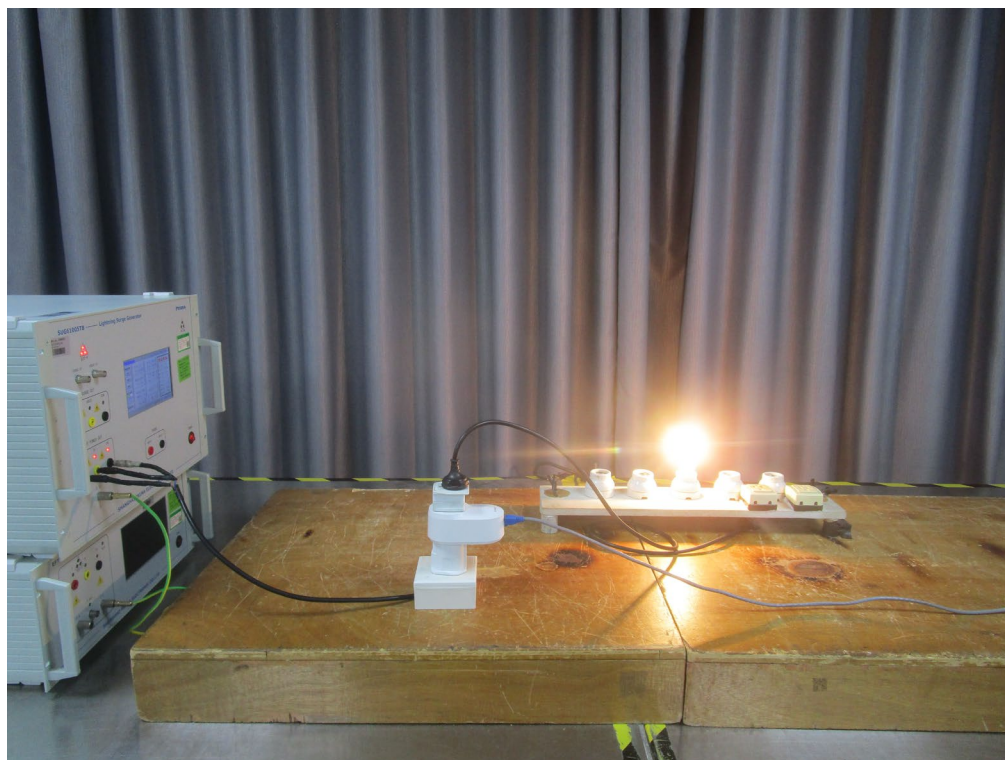
RS



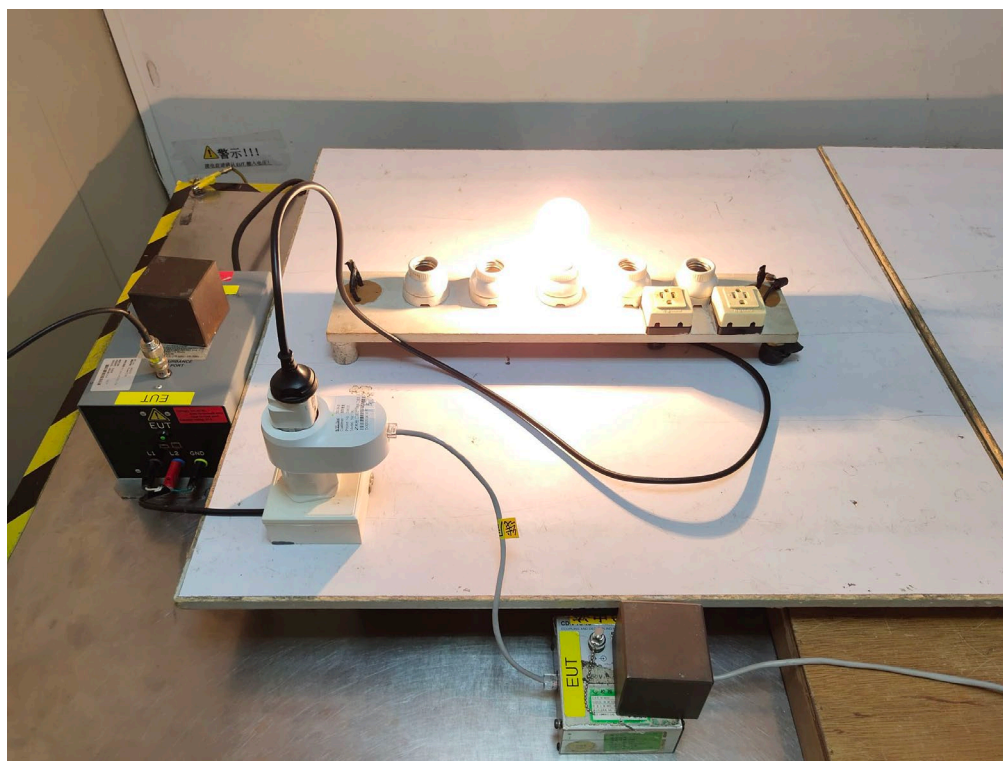
EFT/BURST



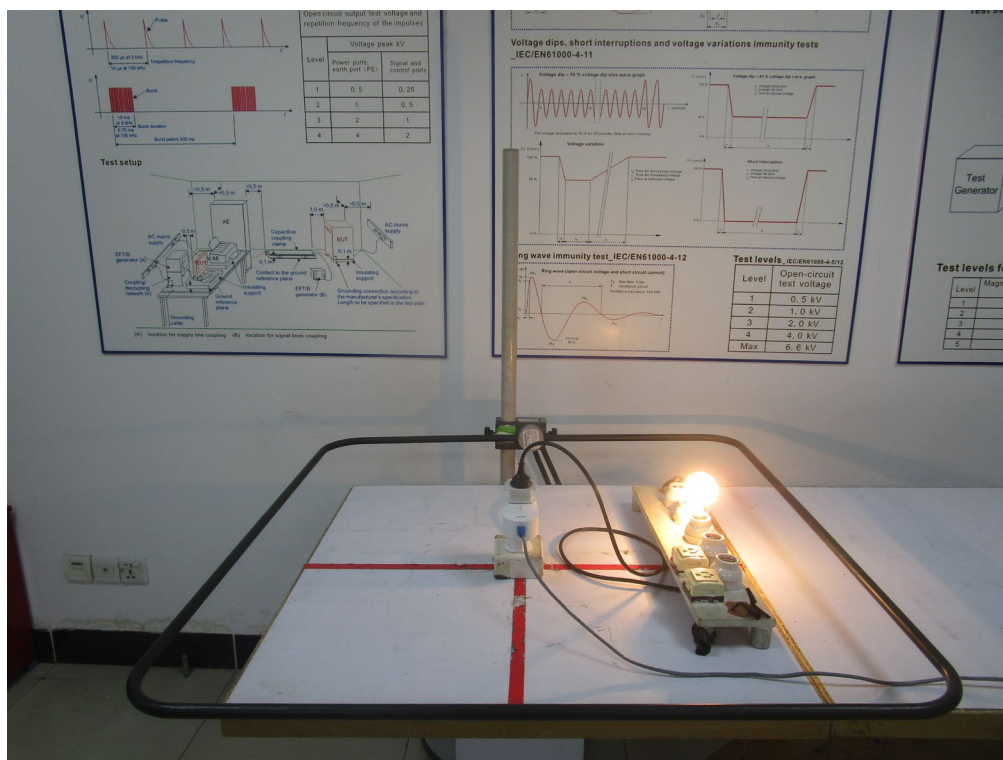
Surge

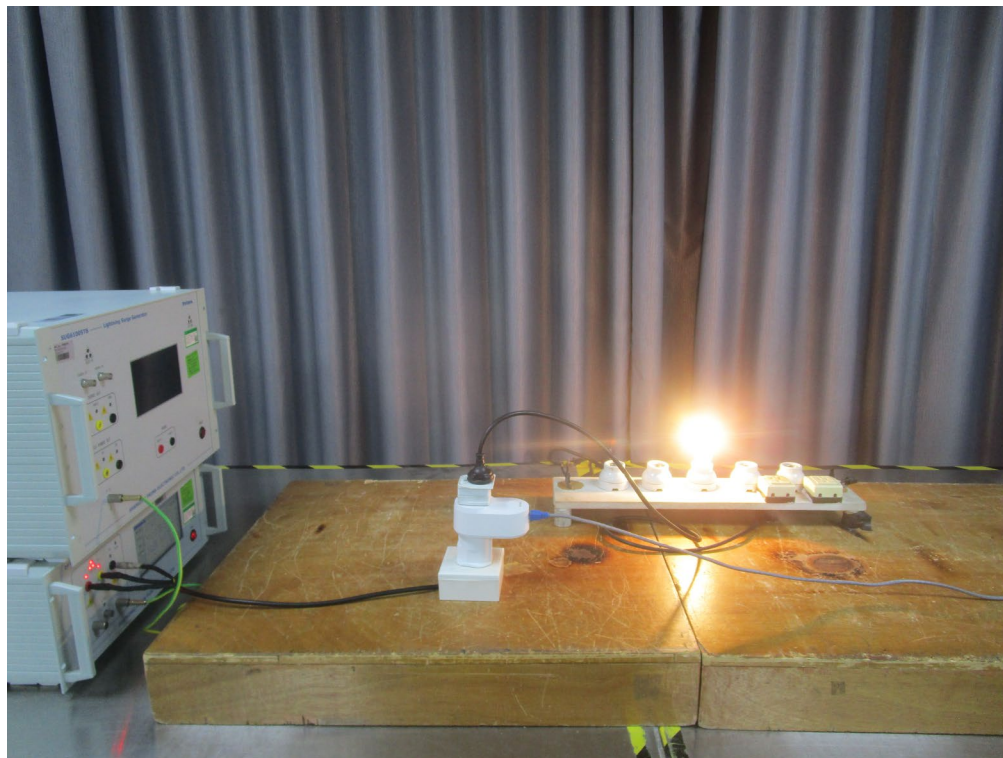


Injection Current



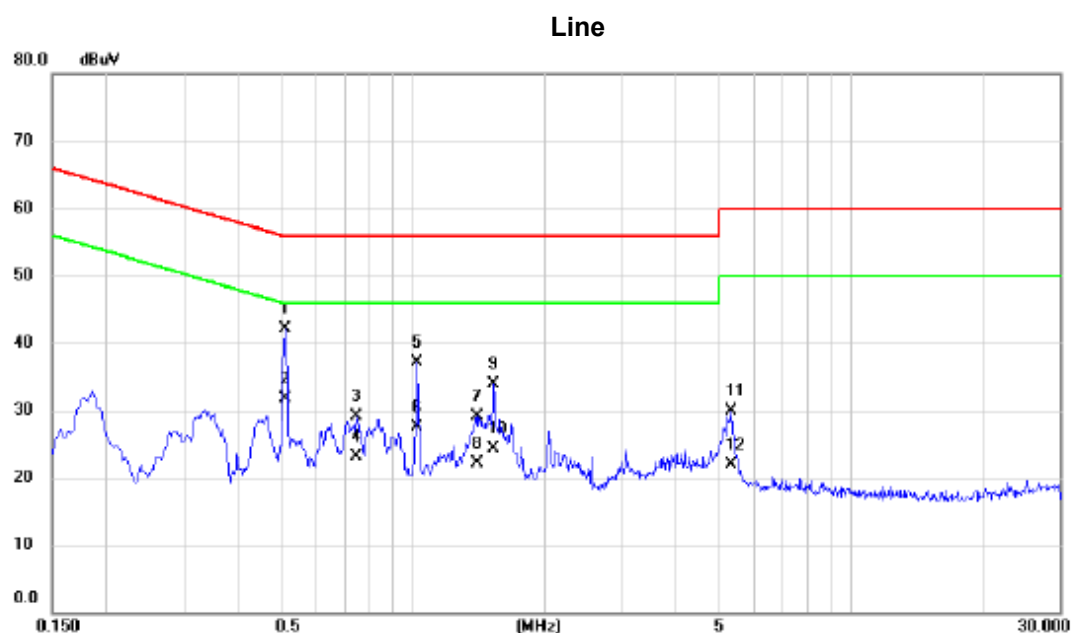
Power Frequency Magnetic Field



Voltage Interruption/Dips

APPENDIX A - CONDUCTED EMISSION

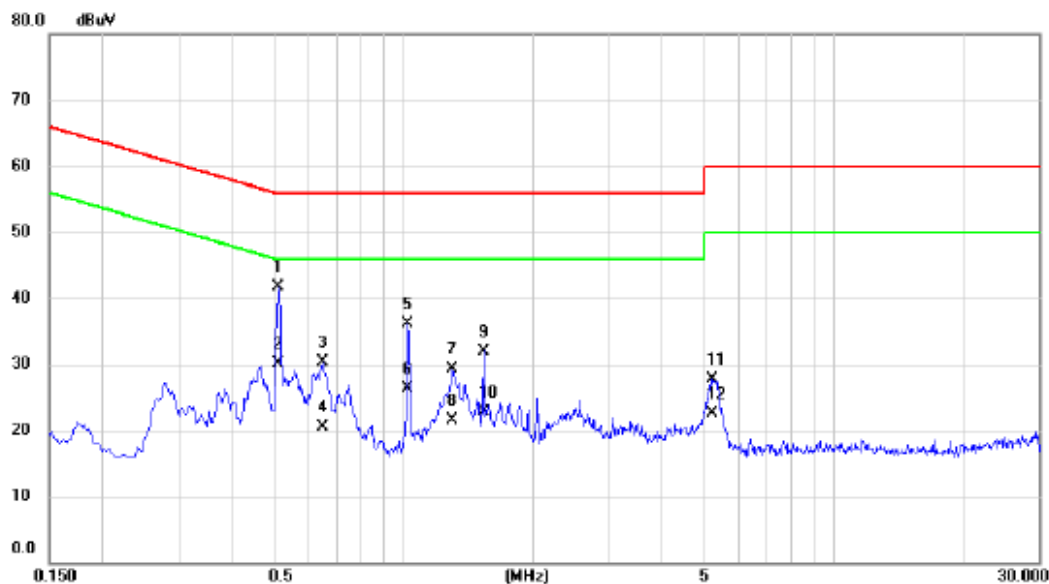
Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 2



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.5100	32.42	9.68	42.10	56.00	-13.90	QP	
2		0.5100	22.10	9.68	31.78	46.00	-14.22	AVG	
3		0.7440	19.46	9.70	29.16	56.00	-26.84	QP	
4		0.7440	13.50	9.70	23.20	46.00	-22.80	AVG	
5		1.0207	27.39	9.73	37.12	56.00	-18.88	QP	
6		1.0207	17.80	9.73	27.53	46.00	-18.47	AVG	
7		1.3988	19.35	9.76	29.11	56.00	-26.89	QP	
8		1.3988	12.40	9.76	22.16	46.00	-23.84	AVG	
9		1.5315	24.04	9.77	33.81	56.00	-22.19	QP	
10		1.5315	14.50	9.77	24.27	46.00	-21.73	AVG	
11		5.3408	19.94	10.01	29.95	60.00	-30.05	QP	
12		5.3408	11.90	10.01	21.91	50.00	-28.09	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 2

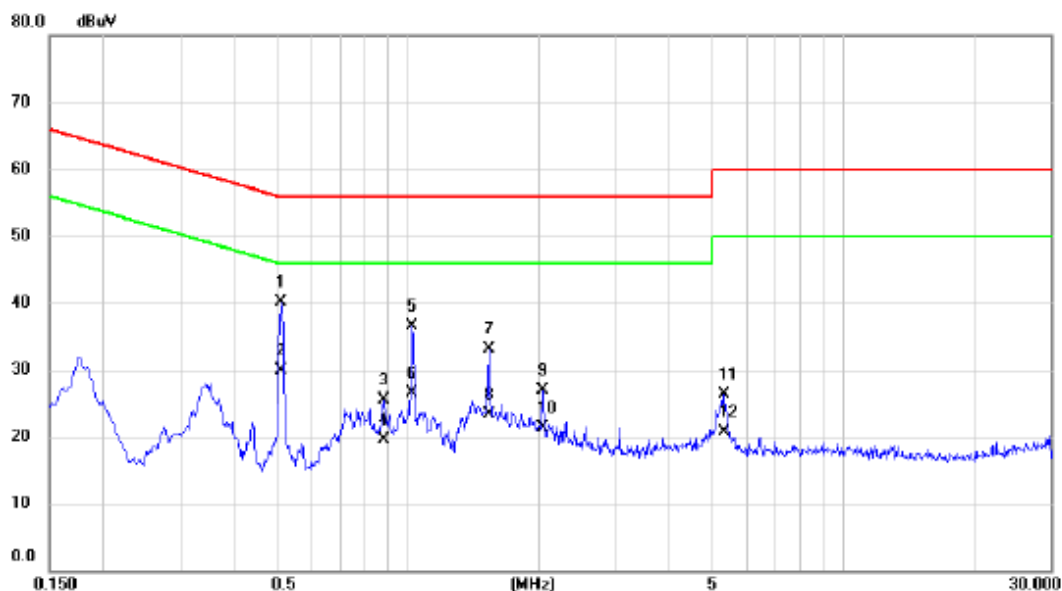
Neutral



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.5122	31.97	9.68	41.65	56.00	-14.35	QP	
2		0.5122	20.50	9.68	30.18	46.00	-15.82	AVG	
3		0.6495	20.66	9.70	30.36	56.00	-25.64	QP	
4		0.6495	10.80	9.70	20.50	46.00	-25.50	AVG	
5		1.0230	26.44	9.73	36.17	56.00	-19.83	QP	
6		1.0230	16.50	9.73	26.23	46.00	-19.77	AVG	
7		1.3020	19.64	9.75	29.39	56.00	-26.61	QP	
8		1.3020	11.70	9.75	21.45	46.00	-24.55	AVG	
9		1.5360	22.23	9.77	32.00	56.00	-24.00	QP	
10		1.5360	12.90	9.77	22.67	46.00	-23.33	AVG	
11		5.2305	17.80	10.00	27.80	60.00	-32.20	QP	
12		5.2305	12.50	10.00	22.50	50.00	-27.50	AVG	

Test Voltage:	AC 110V/60Hz
Test Mode:	Mode 2

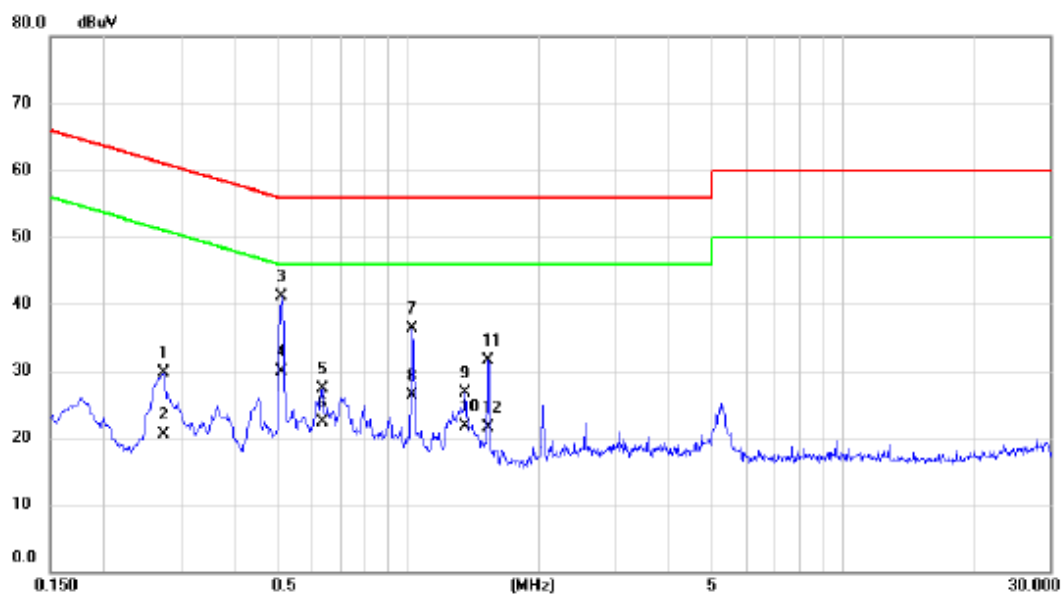
Line



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.5122	30.48	9.68	40.16	56.00	-15.84	QP	
2		0.5122	20.30	9.68	29.98	46.00	-16.02	AVG	
3		0.8790	15.78	9.72	25.50	56.00	-30.50	QP	
4		0.8790	9.80	9.72	19.52	46.00	-26.48	AVG	
5		1.0230	26.76	9.73	36.49	56.00	-19.51	QP	
6		1.0230	16.80	9.73	26.53	46.00	-19.47	AVG	
7		1.5338	23.25	9.77	33.02	56.00	-22.98	QP	
8		1.5338	13.50	9.77	23.27	46.00	-22.73	AVG	
9		2.0423	17.06	9.80	26.86	56.00	-29.14	QP	
10		2.0423	11.50	9.80	21.30	46.00	-24.70	AVG	
11		5.3520	16.27	10.01	26.28	60.00	-33.72	QP	
12		5.3520	10.70	10.01	20.71	50.00	-29.29	AVG	

Test Voltage:	AC 110V/60Hz
Test Mode:	Mode 2

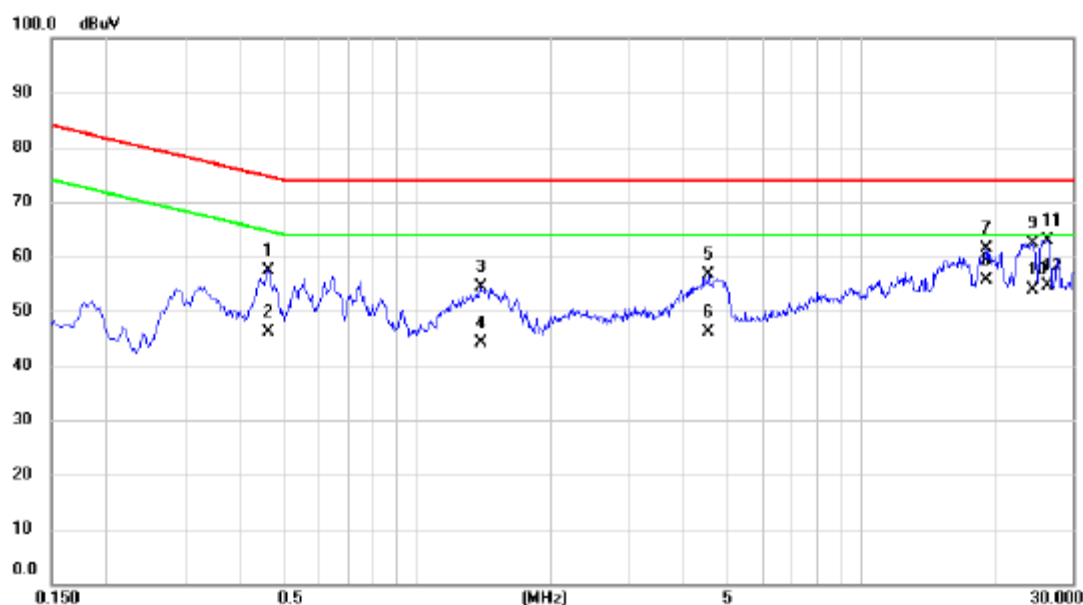
Neutral



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.2737	20.01	9.66	29.67	61.00	-31.33	QP	
2		0.2737	10.80	9.66	20.46	51.00	-30.54	AVG	
3	*	0.5122	31.50	9.68	41.18	56.00	-14.82	QP	
4		0.5122	20.30	9.68	29.98	46.00	-16.02	AVG	
5		0.6360	17.57	9.70	27.27	56.00	-28.73	QP	
6		0.6360	12.60	9.70	22.30	46.00	-23.70	AVG	
7		1.0230	26.57	9.73	36.30	56.00	-19.70	QP	
8		1.0230	16.50	9.73	26.23	46.00	-19.77	AVG	
9		1.3560	17.04	9.75	26.79	56.00	-29.21	QP	
10		1.3560	11.90	9.75	21.65	46.00	-24.35	AVG	
11		1.5315	21.67	9.77	31.44	56.00	-24.56	QP	
12		1.5315	11.70	9.77	21.47	46.00	-24.53	AVG	

APPENDIX B - ISN EMISSION

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 3



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.4627	47.60	9.85	57.45	74.64	-17.19	QP	
2		0.4627	36.25	9.85	46.10	64.64	-18.54	AVG	
3		1.3920	44.58	9.79	54.37	74.00	-19.63	QP	
4		1.3920	34.25	9.79	44.04	64.00	-19.96	AVG	
5		4.5488	46.85	9.89	56.74	74.00	-17.26	QP	
6		4.5488	36.35	9.89	46.24	64.00	-17.76	AVG	
7		19.1490	51.14	10.34	61.48	74.00	-12.52	QP	
8	*	19.1490	45.35	10.34	55.69	64.00	-8.31	AVG	
9		24.3960	51.72	10.67	62.39	74.00	-11.61	QP	
10		24.3960	43.15	10.67	53.82	64.00	-10.18	AVG	
11		26.3423	52.16	10.82	62.98	74.00	-11.02	QP	
12		26.3423	43.69	10.82	54.51	64.00	-9.49	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 4

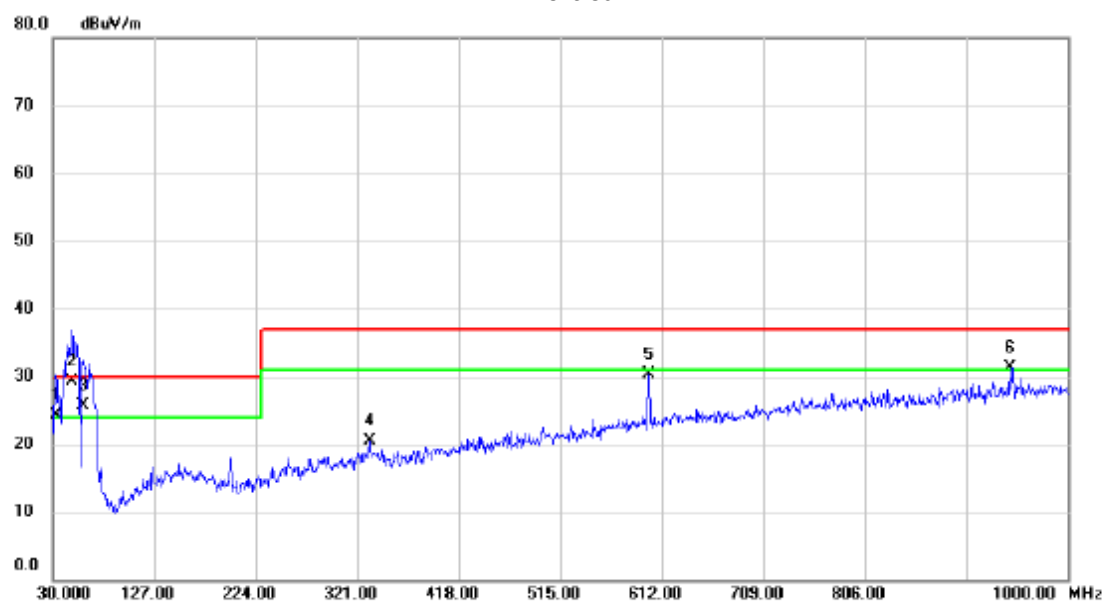


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		4.4723	47.97	9.89	57.86	74.00	-16.14	QP	
2		4.4723	35.26	9.89	45.15	64.00	-18.85	AVG	
3		10.0004	54.65	10.05	64.70	74.00	-9.30	QP	
4		10.0004	44.15	10.05	54.20	64.00	-9.80	AVG	
5		16.4017	51.09	10.24	61.33	74.00	-12.67	QP	
6		16.4017	43.26	10.24	53.50	64.00	-10.50	AVG	
7		18.9420	53.70	10.34	64.04	74.00	-9.96	QP	
8		18.9420	45.26	10.34	55.60	64.00	-8.40	AVG	
9		23.8290	56.31	10.63	66.94	74.00	-7.06	QP	
10		23.8290	42.16	10.63	52.79	64.00	-11.21	AVG	
11	*	25.9778	56.80	10.78	67.58	74.00	-6.42	QP	
12		25.9778	45.15	10.78	55.93	64.00	-8.07	AVG	

APPENDIX C - RADIATED EMISSION (BELOW 1GHZ)

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

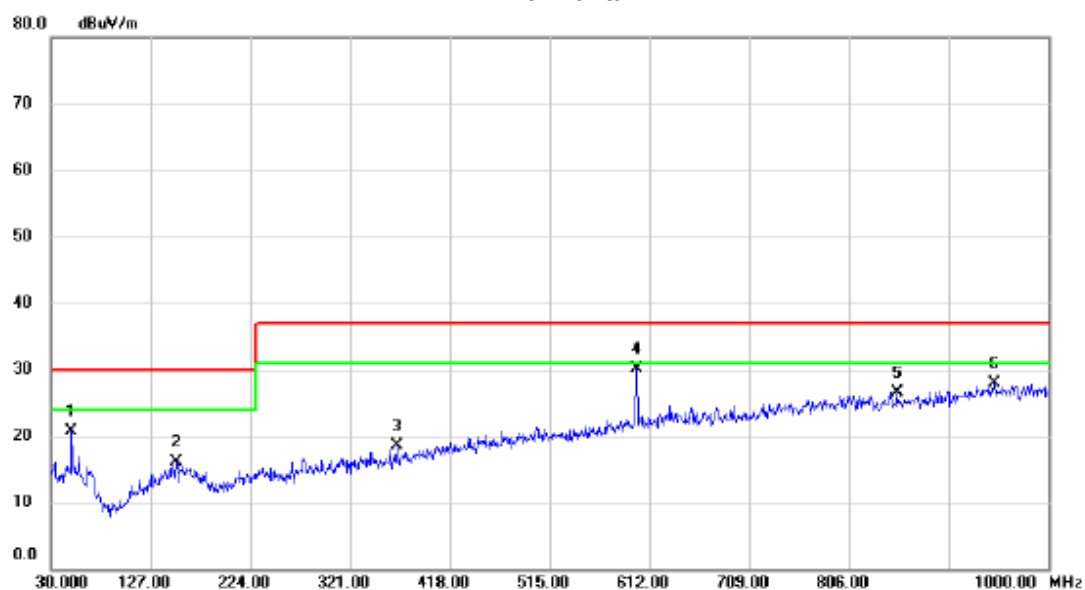
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	!	32.9100	43.22	-18.98	24.24	30.00	-5.76	QP	
2	*	48.4300	47.06	-17.79	29.27	30.00	-0.73	QP	
3	!	59.1000	43.56	-17.86	25.70	30.00	-4.30	QP	
4		332.6400	35.20	-14.61	20.59	37.00	-16.41	QP	
5		599.3900	39.24	-8.94	30.30	37.00	-6.70	QP	
6	!	944.7100	36.96	-5.60	31.36	37.00	-5.64	QP	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

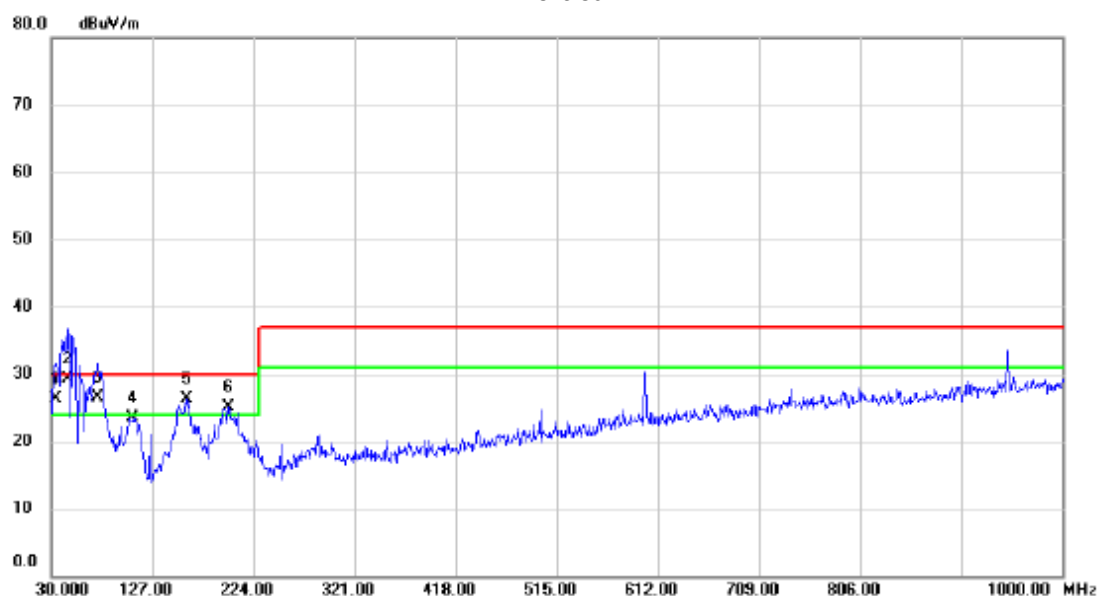
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		50.3700	38.38	-17.68	20.70	30.00	-9.30	QP	
2		152.7050	32.55	-16.42	16.13	30.00	-13.87	QP	
3		366.5900	31.90	-13.49	18.41	37.00	-18.59	QP	
4	*	599.3900	38.83	-8.69	30.14	37.00	-6.86	QP	
5		852.5600	33.05	-6.55	26.50	37.00	-10.50	QP	
6		947.6200	32.72	-4.79	27.93	37.00	-9.07	QP	

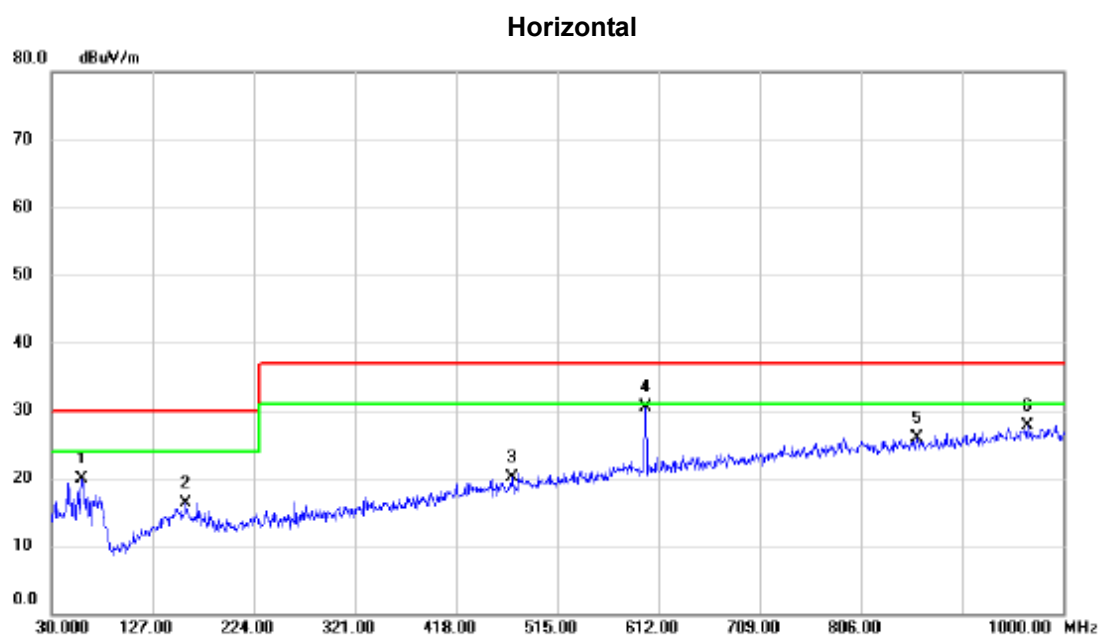
Test Voltage:	AC 110V/60Hz
Test Mode:	Mode 1

Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	!	33.8800	45.27	-18.93	26.34	30.00	-3.66	QP	
2	*	46.4900	47.11	-17.89	29.22	30.00	-0.78	QP	
3	!	74.6200	46.58	-20.07	26.51	30.00	-3.49	QP	
4		108.5700	44.16	-20.69	23.47	30.00	-6.53	QP	
5	!	159.9800	43.30	-16.96	26.34	30.00	-3.66	QP	
6	!	199.7500	44.45	-19.34	25.11	30.00	-4.89	QP	

Test Voltage:	AC 110V/60Hz
Test Mode:	Mode 1

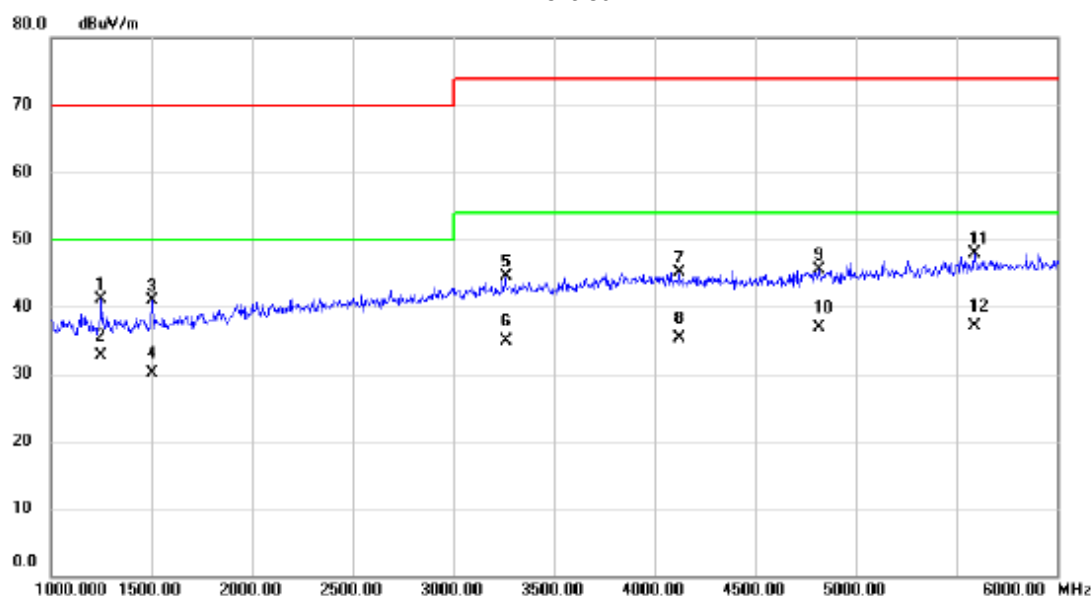


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		59.1000	37.96	-18.11	19.85	30.00	-10.15	QP	
2		159.0100	32.60	-16.26	16.34	30.00	-13.66	QP	
3		471.3500	30.94	-10.90	20.04	37.00	-16.96	QP	
4	*	599.3900	39.17	-8.69	30.48	37.00	-6.52	QP	
5		859.3500	32.44	-6.47	25.97	37.00	-11.03	QP	
6		965.0800	32.38	-4.67	27.71	37.00	-9.29	QP	

APPENDIX D - RADIATED EMISSION (ABOVE 1GHZ)

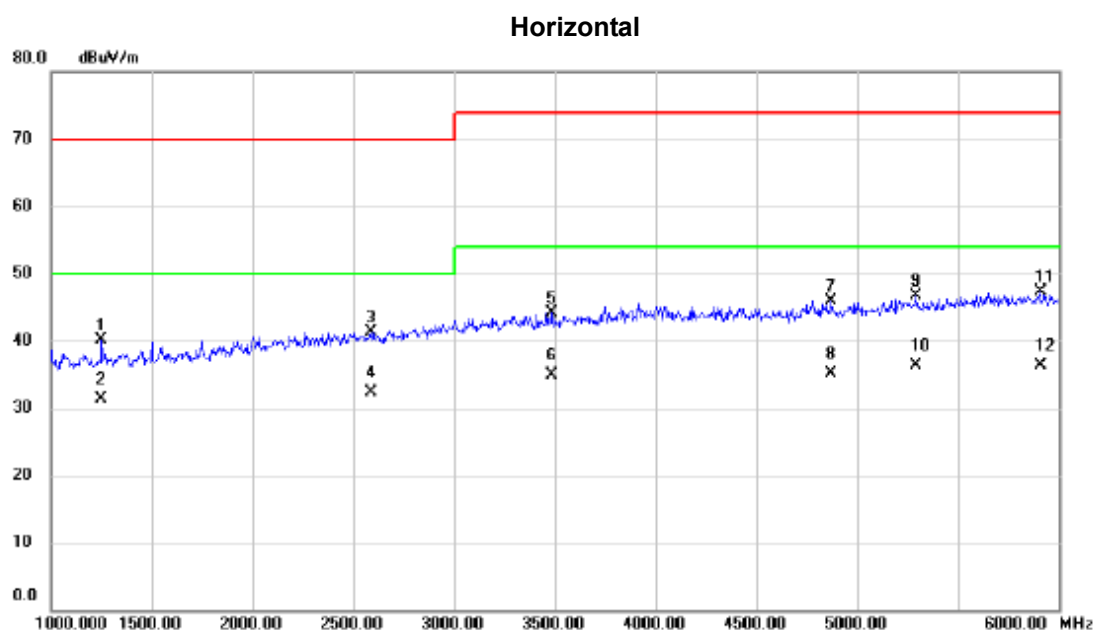
Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

Vertical



No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measurement dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	1250.000	45.23	-4.10	41.13	70.00	-28.87	peak	
2	1250.000	36.74	-4.10	32.64	50.00	-17.36	AVG	
3	1500.000	43.95	-3.12	40.83	70.00	-29.17	peak	
4	1500.000	33.27	-3.12	30.15	50.00	-19.85	AVG	
5	3262.500	39.45	5.00	44.45	74.00	-29.55	peak	
6	3262.500	29.87	5.00	34.87	54.00	-19.13	AVG	
7	4122.500	37.13	8.06	45.19	74.00	-28.81	peak	
8	4122.500	27.27	8.06	35.33	54.00	-18.67	AVG	
9	4817.500	36.41	9.16	45.57	74.00	-28.43	peak	
10	4817.500	27.81	9.16	36.97	54.00	-17.03	AVG	
11	5590.000	36.49	11.51	48.00	74.00	-26.00	peak	
12 *	5590.000	25.62	11.51	37.13	54.00	-16.87	AVG	

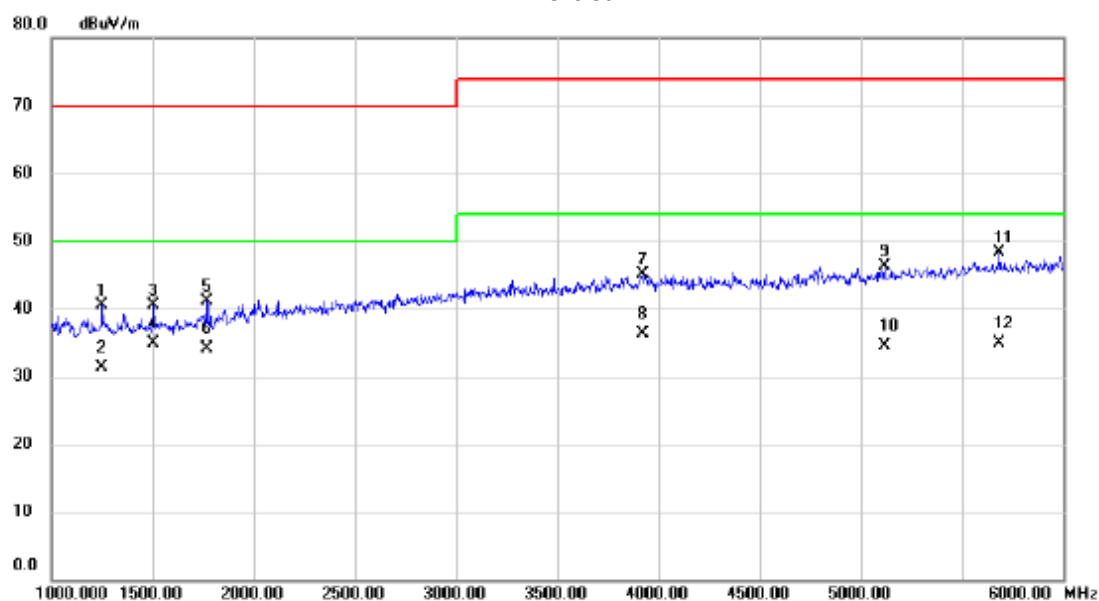
Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1



No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	1250.000	44.24	-4.10	40.14	70.00	-29.86	peak	
2	1250.000	35.36	-4.10	31.26	50.00	-18.74	AVG	
3	2587.500	39.08	2.31	41.39	70.00	-28.61	peak	
4	2587.500	29.98	2.31	32.29	50.00	-17.71	AVG	
5	3480.000	38.39	5.71	44.10	74.00	-29.90	peak	
6	3480.000	29.16	5.71	34.87	54.00	-19.13	AVG	
7	4870.000	36.67	9.28	45.95	74.00	-28.05	peak	
8	4870.000	25.75	9.28	35.03	54.00	-18.97	AVG	
9	5290.000	36.01	10.61	46.62	74.00	-27.38	peak	
10	5290.000	25.71	10.61	36.32	54.00	-17.68	AVG	
11	5907.500	35.11	12.12	47.23	74.00	-26.77	peak	
12 *	5907.500	24.24	12.12	36.36	54.00	-17.64	AVG	

Test Voltage:	AC 110V/60Hz
Test Mode:	Mode 1

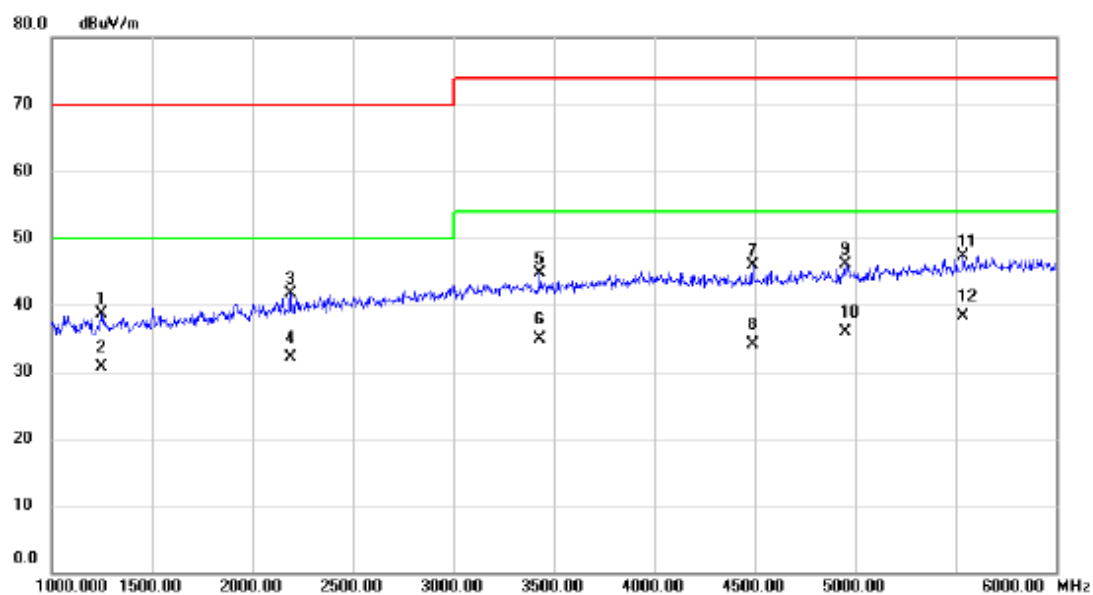
Vertical



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin		
		MHz	Level	Factor	ment			Detector	Comment
			dBuV	dB	dBuV/m	dBuV/m	dB		
1		1250.000	44.66	-4.10	40.56	70.00	-29.44	peak	
2		1250.000	35.36	-4.10	31.26	50.00	-18.74	AVG	
3		1500.000	43.54	-3.12	40.42	70.00	-29.58	peak	
4	*	1500.000	37.99	-3.12	34.87	50.00	-15.13	AVG	
5		1767.500	42.47	-1.41	41.06	70.00	-28.94	peak	
6		1767.500	35.47	-1.41	34.06	50.00	-15.94	AVG	
7		3920.000	37.42	7.60	45.02	74.00	-28.98	peak	
8		3920.000	28.77	7.60	36.37	54.00	-17.63	AVG	
9		5117.500	36.33	10.00	46.33	74.00	-27.67	peak	
10		5117.500	24.59	10.00	34.59	54.00	-19.41	AVG	
11		5685.000	36.52	11.69	48.21	74.00	-25.79	peak	
12		5685.000	23.20	11.69	34.89	54.00	-19.11	AVG	

Test Voltage:	AC 110V/60Hz
Test Mode:	Mode 1

Horizontal

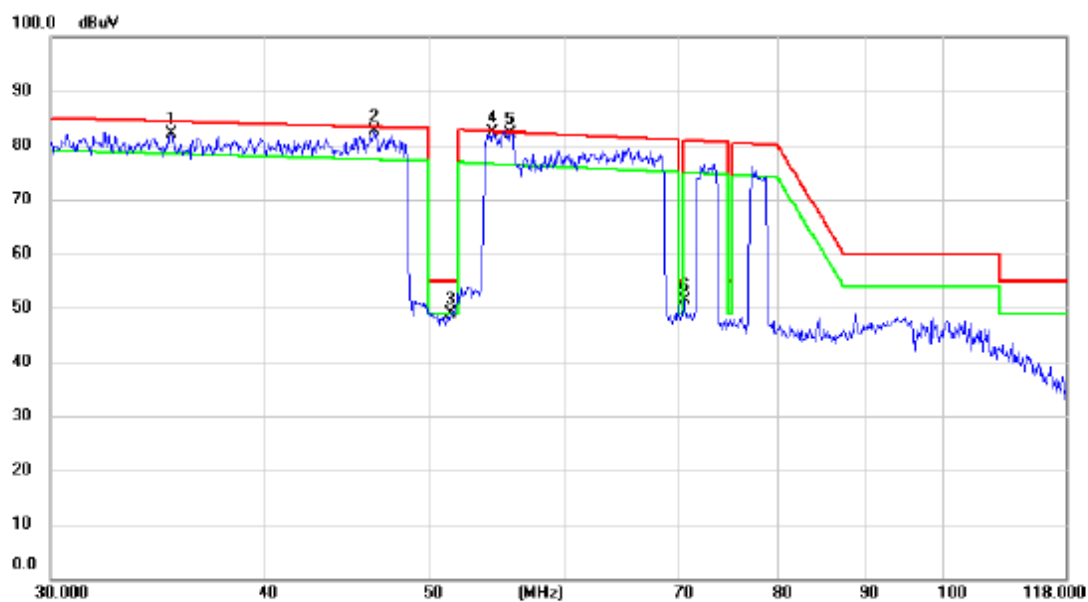


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		1250.000	42.79	-4.10	38.69	70.00	-31.31	peak	
2		1250.000	34.74	-4.10	30.64	50.00	-19.36	AVG	
3		2187.500	41.02	0.76	41.78	70.00	-28.22	peak	
4		2187.500	31.27	0.76	32.03	50.00	-17.97	AVG	
5		3430.000	39.22	5.54	44.76	74.00	-29.24	peak	
6		3430.000	29.39	5.54	34.93	54.00	-19.07	AVG	
7		4492.500	37.57	8.39	45.96	74.00	-28.04	peak	
8		4492.500	25.67	8.39	34.06	54.00	-19.94	AVG	
9		4952.500	36.58	9.48	46.06	74.00	-27.94	peak	
10		4952.500	26.39	9.48	35.87	54.00	-18.13	AVG	
11		5537.500	35.96	11.41	47.37	74.00	-26.63	peak	
12	*	5537.500	26.82	11.41	38.23	54.00	-15.77	AVG	

APPENDIX E - CONDUCTED DISTURBANCES FREQUENCY RANGE ABOVE 30 MHZ FOR PLC PORTS

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

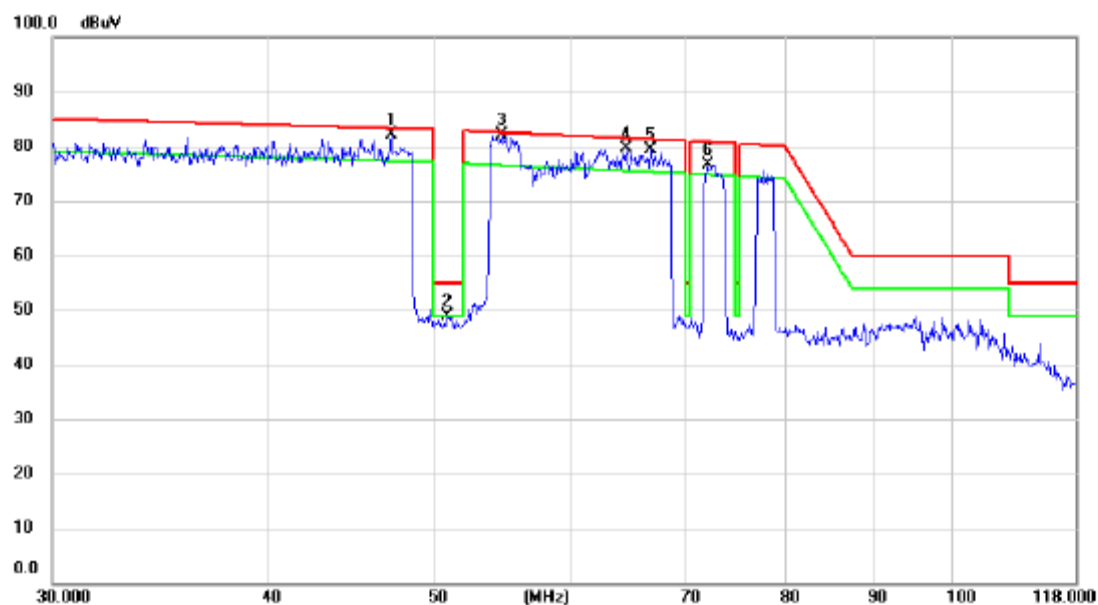
Line



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	!	35.3400	76.40	5.74	82.14	84.36	-2.22	peak	
2	!	46.4400	76.82	5.73	82.55	83.29	-0.74	peak	
3		51.4500	43.17	5.69	48.86	55.00	-6.14	peak	
4	*	54.4200	76.77	5.66	82.43	82.52	-0.09	peak	
5	!	55.8000	76.44	5.65	82.09	82.37	-0.28	peak	
6		70.5300	45.87	5.57	51.44	80.95	-29.51	peak	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

Neutral

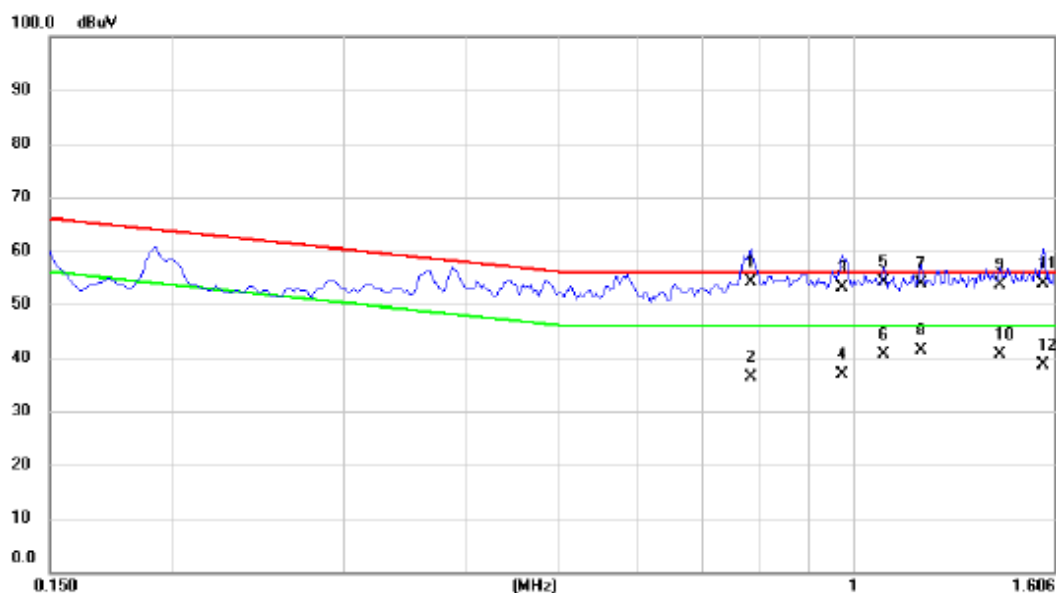


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	!	47.1900	76.36	5.70	82.06	83.23	-1.17	peak	
2		50.9100	43.16	5.67	48.83	55.00	-6.17	peak	
3	*	54.7500	76.44	5.64	82.08	82.49	-0.41	peak	
4	!	64.7100	74.03	5.59	79.62	81.48	-1.86	peak	
5	!	66.8400	73.79	5.59	79.38	81.28	-1.90	peak	
6	!	72.1200	71.13	5.56	76.69	80.78	-4.09	peak	

APPENDIX F - CONDUCTED UNSYMMETRICAL DISTURBANCES FOR PLC PORTS

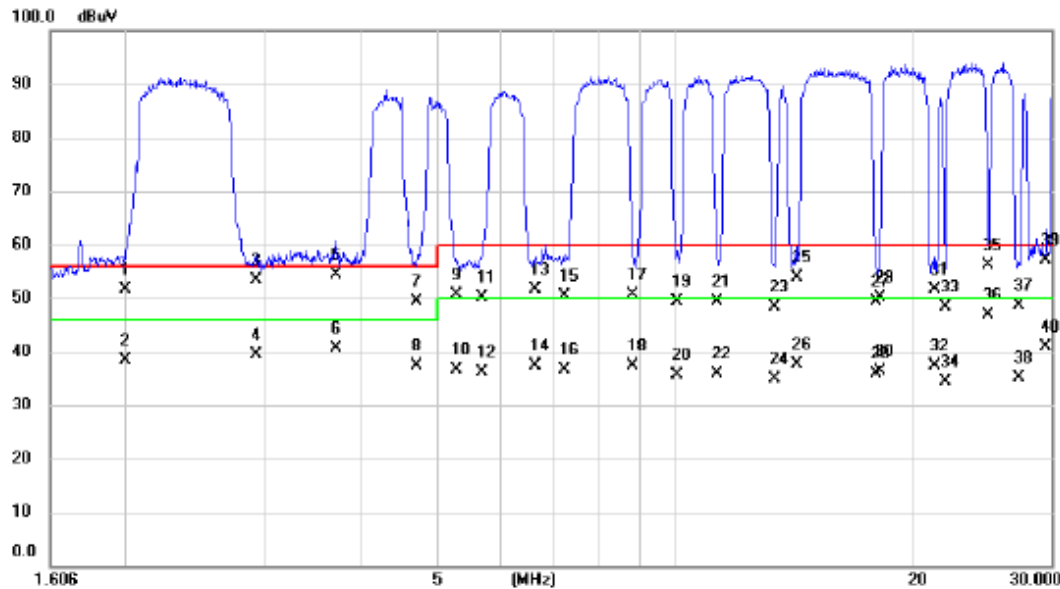
Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

Line



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.7845	44.30	9.71	54.01	56.00	-1.99	QP	
2		0.7845	26.70	9.71	36.41	46.00	-9.59	AVG	
3		0.9735	43.40	9.73	53.13	56.00	-2.87	QP	
4		0.9735	27.10	9.73	36.83	46.00	-9.17	AVG	
5		1.0747	44.27	9.74	54.01	56.00	-1.99	QP	
6		1.0747	30.82	9.74	40.56	46.00	-5.44	AVG	
7		1.1713	44.26	9.74	54.00	56.00	-2.00	QP	
8		1.1713	31.75	9.74	41.49	46.00	-4.51	AVG	
9		1.4144	43.75	9.76	53.51	56.00	-2.49	QP	
10		1.4144	30.96	9.76	40.72	46.00	-5.28	AVG	
11		1.5630	44.20	9.77	53.97	56.00	-2.03	QP	
12		1.5630	28.80	9.77	38.57	46.00	-7.43	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

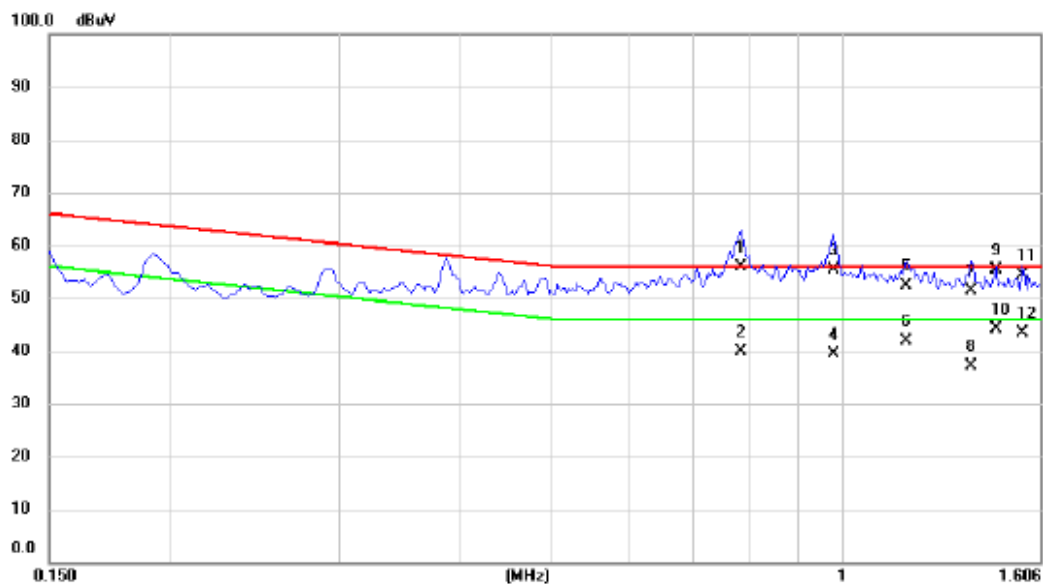


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		1.9998	41.94	9.80	51.74	56.00	-4.26	QP	
2		1.9998	28.70	9.80	38.50	46.00	-7.50	AVG	
3		2.9313	43.46	9.87	53.33	56.00	-2.67	QP	
4		2.9313	29.48	9.87	39.35	46.00	-6.65	AVG	
5	*	3.7030	44.54	9.92	54.46	56.00	-1.54	QP	
6		3.7030	30.79	9.92	40.71	46.00	-5.29	AVG	
7		4.6863	39.50	9.97	49.47	56.00	-6.53	QP	
8		4.6863	27.41	9.97	37.38	46.00	-8.62	AVG	
9		5.2735	40.70	10.00	50.70	60.00	-9.30	QP	
10		5.2735	26.58	10.00	36.58	50.00	-13.42	AVG	
11		5.6673	40.00	10.02	50.02	60.00	-9.98	QP	
12		5.6673	26.18	10.02	36.20	50.00	-13.80	AVG	
13		6.6438	41.62	10.06	51.68	60.00	-8.32	QP	

No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
14	6.6438	27.41	10.06	37.47	50.00	-12.53	AVG	
15	7.2288	40.17	10.09	50.26	60.00	-9.74	QP	
16	7.2288	26.59	10.09	36.68	50.00	-13.32	AVG	
17	8.8308	40.46	10.16	50.62	60.00	-9.38	QP	
18	8.8308	27.17	10.16	37.33	50.00	-12.67	AVG	
19	10.0570	39.21	10.21	49.42	60.00	-10.58	QP	
20	10.0570	25.42	10.21	35.63	50.00	-14.37	AVG	
21	11.3035	39.21	10.28	49.49	60.00	-10.51	QP	
22	11.3035	25.60	10.28	35.88	50.00	-14.12	AVG	
23	13.3263	38.09	10.37	48.46	60.00	-11.54	QP	
24	13.3263	24.49	10.37	34.86	50.00	-15.14	AVG	
25	14.2600	43.46	10.42	53.88	60.00	-6.12	QP	
26	14.2600	27.31	10.42	37.73	50.00	-12.27	AVG	
27	17.9658	38.70	10.64	49.34	60.00	-10.66	QP	
28	17.9658	25.14	10.64	35.78	50.00	-14.22	AVG	
29	18.1638	39.43	10.65	50.08	60.00	-9.92	QP	
30	18.1638	25.85	10.65	36.50	50.00	-13.50	AVG	
31	21.2890	40.85	10.80	51.65	60.00	-8.35	QP	
32	21.2890	26.49	10.80	37.29	50.00	-12.71	AVG	
33	21.9955	37.56	10.81	48.37	60.00	-11.63	QP	
34	21.9955	23.65	10.81	34.46	50.00	-15.54	AVG	
35	24.9200	45.26	10.85	56.11	60.00	-3.89	QP	
36	24.9200	36.06	10.85	46.91	50.00	-3.09	AVG	
37	27.2200	37.70	10.87	48.57	60.00	-11.43	QP	
38	27.2200	24.38	10.87	35.25	50.00	-14.75	AVG	
39	29.4970	46.25	10.88	57.13	60.00	-2.87	QP	
40	29.4970	30.01	10.88	40.89	50.00	-9.11	AVG	

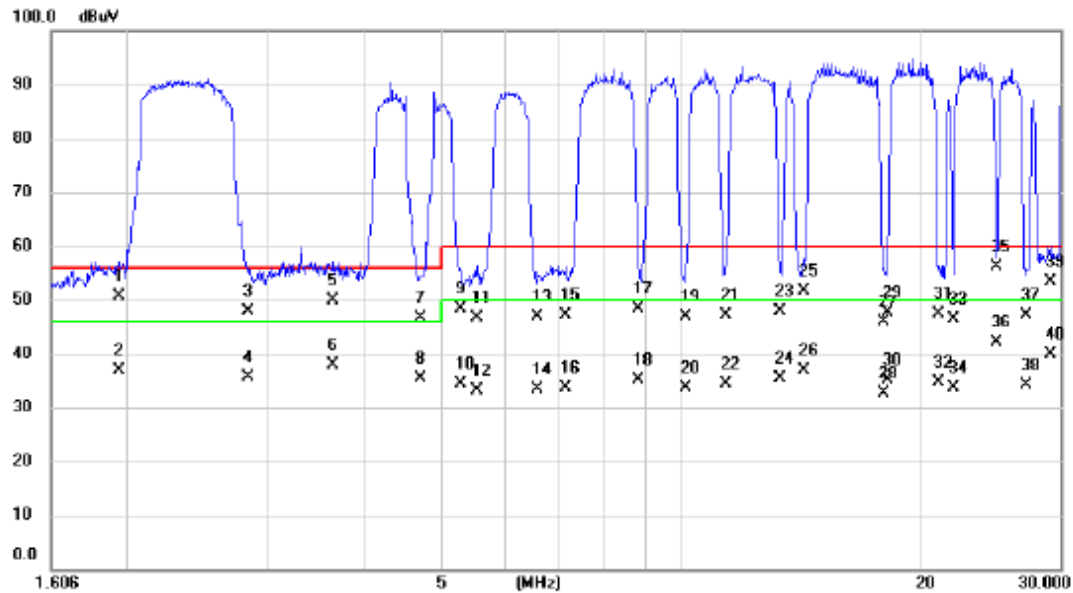
Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

Neutral



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.7845	46.05	9.71	55.76	56.00	-0.24	QP	
2		0.7845	30.20	9.71	39.91	46.00	-6.09	AVG	
3		0.9780	45.60	9.73	55.33	56.00	-0.67	QP	
4		0.9780	29.70	9.73	39.43	46.00	-6.57	AVG	
5		1.1647	42.64	9.74	52.38	56.00	-3.62	QP	
6		1.1647	32.16	9.74	41.90	46.00	-4.10	AVG	
7		1.3605	41.50	9.76	51.26	56.00	-4.74	QP	
8		1.3605	27.40	9.76	37.16	46.00	-8.84	AVG	
9		1.4437	45.61	9.76	55.37	56.00	-0.63	QP	
10		1.4437	34.25	9.76	44.01	46.00	-1.99	AVG	
11		1.5405	44.61	9.77	54.38	56.00	-1.62	QP	
12		1.5405	33.61	9.77	43.38	46.00	-2.62	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1



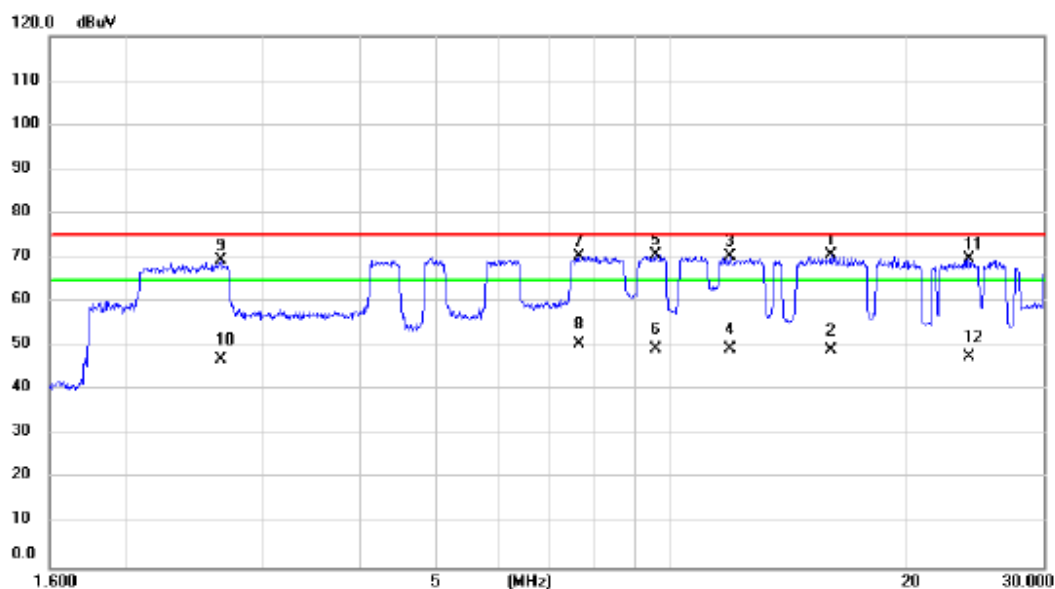
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		1.9525	40.74	9.80	50.54	56.00	-5.46	QP	
2		1.9525	27.19	9.80	36.99	46.00	-9.01	AVG	
3		2.8503	37.97	9.86	47.83	56.00	-8.17	QP	
4		2.8503	25.84	9.86	35.70	46.00	-10.30	AVG	
5		3.6355	39.98	9.91	49.89	56.00	-6.11	QP	
6		3.6355	27.90	9.91	37.81	46.00	-8.19	AVG	
7		4.6908	36.69	9.97	46.66	56.00	-9.34	QP	
8		4.6908	25.38	9.97	35.35	46.00	-10.65	AVG	
9		5.2780	38.48	10.01	48.49	60.00	-11.51	QP	
10		5.2780	24.39	10.01	34.40	50.00	-15.60	AVG	
11		5.5143	36.61	10.02	46.63	60.00	-13.37	QP	
12		5.5143	23.15	10.02	33.17	50.00	-16.83	AVG	
13		6.5943	36.74	10.07	46.81	60.00	-13.19	QP	

No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
14	6.5943	23.39	10.07	33.46	50.00	-16.54	AVG	
15	7.1478	37.13	10.09	47.22	60.00	-12.78	QP	
16	7.1478	23.52	10.09	33.61	50.00	-16.39	AVG	
17	8.8375	38.19	10.18	48.37	60.00	-11.63	QP	
18	8.8375	24.89	10.18	35.07	50.00	-14.93	AVG	
19	10.1088	36.65	10.24	46.89	60.00	-13.11	QP	
20	10.1088	23.42	10.24	33.66	50.00	-16.34	AVG	
21	11.3508	36.73	10.31	47.04	60.00	-12.96	QP	
22	11.3508	23.97	10.31	34.28	50.00	-15.72	AVG	
23	13.2858	37.48	10.42	47.90	60.00	-12.10	QP	
24	13.2858	24.95	10.42	35.37	50.00	-14.63	AVG	
25	14.2510	41.16	10.47	51.63	60.00	-8.37	QP	
26	14.2510	26.34	10.47	36.81	50.00	-13.19	AVG	
27	17.9433	35.23	10.68	45.91	60.00	-14.09	QP	
28	17.9433	21.96	10.68	32.64	50.00	-17.36	AVG	
29	18.1638	36.85	10.69	47.54	60.00	-12.46	QP	
30	18.1638	24.33	10.69	35.02	50.00	-14.98	AVG	
31	21.0955	36.54	10.84	47.38	60.00	-12.62	QP	
32	21.0955	23.71	10.84	34.55	50.00	-15.45	AVG	
33	21.9708	35.56	10.86	46.42	60.00	-13.58	QP	
34	21.9708	22.67	10.86	33.53	50.00	-16.47	AVG	
35 *	24.9200	45.28	10.94	56.22	60.00	-3.78	QP	
36	24.9200	31.26	10.94	42.20	50.00	-7.80	AVG	
37	27.1525	36.18	10.98	47.16	60.00	-12.84	QP	
38	27.1525	23.15	10.98	34.13	50.00	-15.87	AVG	
39	29.1010	42.37	11.02	53.39	60.00	-6.61	QP	
40	29.1010	28.98	11.02	40.00	50.00	-10.00	AVG	

APPENDIX G - DYNAMIC POWER CONTROL FOR PLC PORTS

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

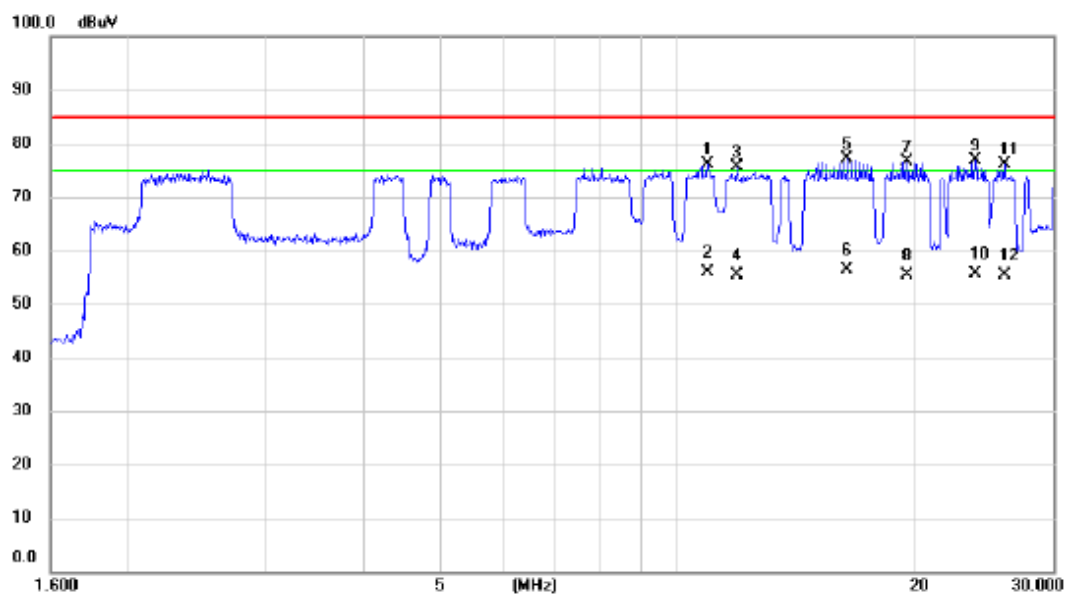
Table 2 10dB-Max level



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	16.0090	49.17	21.47	70.64	75.00	-4.36	peak	
2		16.0090	27.70	21.47	49.17	65.00	-15.83	AVG	
3		11.9208	48.89	21.39	70.28	75.00	-4.72	peak	
4		11.9208	27.90	21.39	49.29	65.00	-15.71	AVG	
5		9.5785	49.25	21.30	70.55	75.00	-4.45	peak	
6		9.5785	28.20	21.30	49.50	65.00	-15.50	AVG	
7		7.6188	49.43	21.06	70.49	75.00	-4.51	peak	
8		7.6188	29.50	21.06	50.56	65.00	-14.44	AVG	
9		2.6575	49.03	20.35	69.38	75.00	-5.62	peak	
10		2.6575	26.60	20.35	46.95	65.00	-18.05	AVG	
11		24.0213	48.01	21.63	69.64	75.00	-5.36	peak	
12		24.0213	26.00	21.63	47.63	65.00	-17.37	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

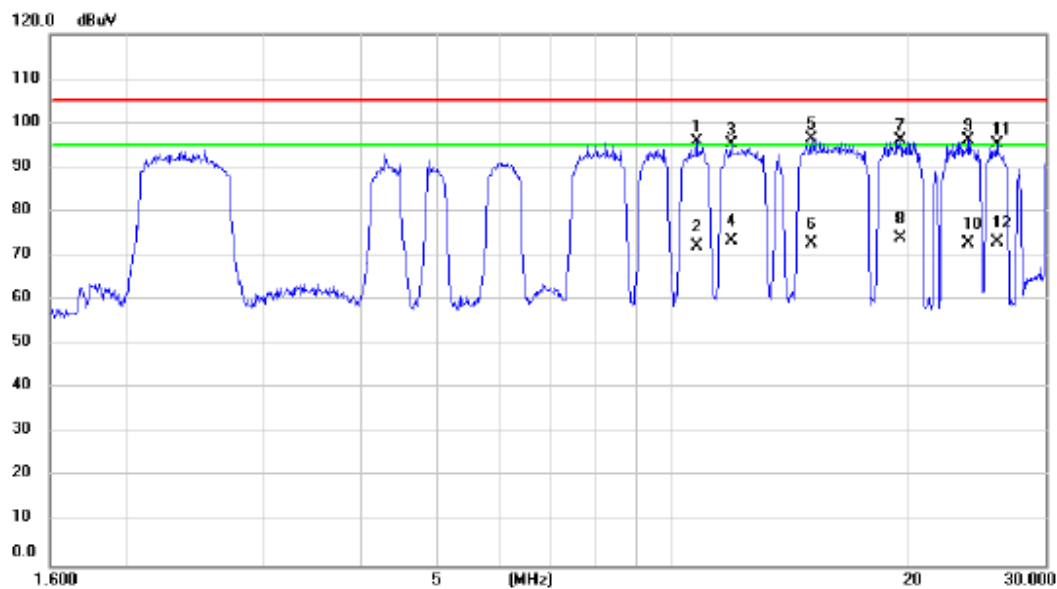
Table 2 20dB-Max level



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		10.9375	54.80	21.37	76.17	85.00	-8.83	peak	
2		10.9375	34.60	21.37	55.97	75.00	-19.03	AVG	
3		11.9184	54.27	21.39	75.66	85.00	-9.34	peak	
4		11.9184	34.00	21.39	55.39	75.00	-19.61	AVG	
5	*	16.4050	55.60	21.48	77.08	85.00	-7.92	peak	
6		16.4050	34.80	21.48	56.28	75.00	-18.72	AVG	
7		19.5280	55.19	21.52	76.71	85.00	-8.29	peak	
8		19.5280	33.80	21.52	55.32	75.00	-19.68	AVG	
9		23.8255	55.15	21.63	76.78	85.00	-8.22	peak	
10		23.8255	34.10	21.63	55.73	75.00	-19.27	AVG	
11		25.9788	54.48	21.67	76.15	85.00	-8.85	peak	
12		25.9788	33.60	21.67	55.27	75.00	-19.73	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

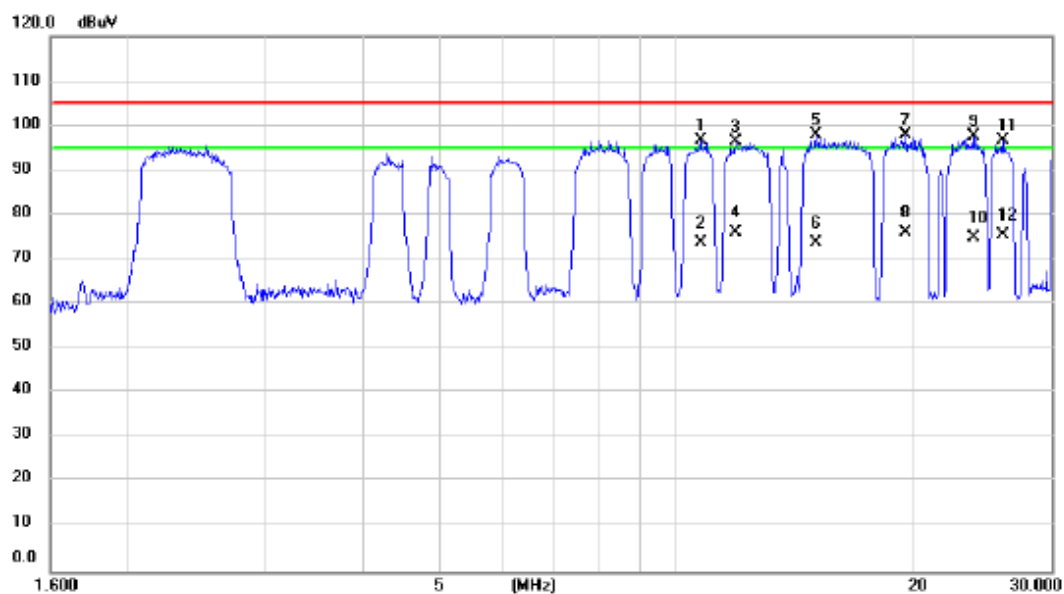
Table 2 40dB-Max level (Attenuation 40dB)



No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	10.7418	74.57	21.36	95.93	105.00	-9.07	peak	
2	10.7418	50.70	21.36	72.06	95.00	-22.94	AVG	
3	11.9118	73.95	21.39	95.34	105.00	-9.66	peak	
4	11.9118	51.90	21.39	73.29	95.00	-21.71	AVG	
5 *	15.0370	74.91	21.46	96.37	105.00	-8.63	peak	
6	15.0370	51.40	21.46	72.86	95.00	-22.14	AVG	
7	19.5280	74.66	21.52	96.18	105.00	-8.82	peak	
8	19.5280	52.40	21.52	73.92	95.00	-21.08	AVG	
9	23.8278	74.54	21.63	96.17	105.00	-8.83	peak	
10	23.8278	51.00	21.63	72.63	95.00	-22.37	AVG	
11	25.9765	73.61	21.67	95.28	105.00	-9.72	peak	
12	25.9765	51.30	21.67	72.97	95.00	-22.03	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

Table 2 40dB-Max level (Attenuation 50dB)

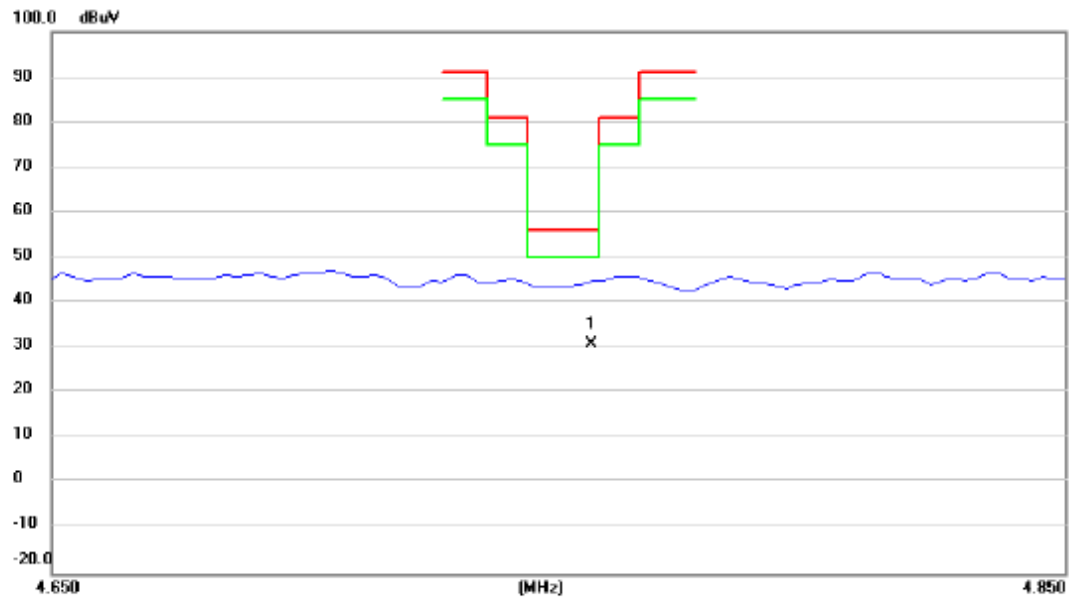


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		10.7418	75.47	21.36	96.83	105.00	-8.17	peak	
2		10.7418	52.30	21.36	73.66	95.00	-21.34	AVG	
3		11.9118	75.20	21.39	96.59	105.00	-8.41	peak	
4		11.9118	54.60	21.39	75.99	95.00	-19.01	AVG	
5		15.0370	76.40	21.46	97.86	105.00	-7.14	peak	
6		15.0370	52.20	21.46	73.66	95.00	-21.34	AVG	
7	*	19.5303	76.38	21.52	97.90	105.00	-7.10	peak	
8		19.5303	54.60	21.52	76.12	95.00	-18.88	AVG	
9		23.8278	76.08	21.63	97.71	105.00	-7.29	peak	
10		23.8278	53.10	21.63	74.73	95.00	-20.27	AVG	
11		25.9743	75.03	21.67	96.70	105.00	-8.30	peak	
12		25.9743	53.90	21.67	75.57	95.00	-19.43	AVG	

APPENDIX H - COGNITIVE FREQUENCY EXCLUSION FOR PLC PORTS

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

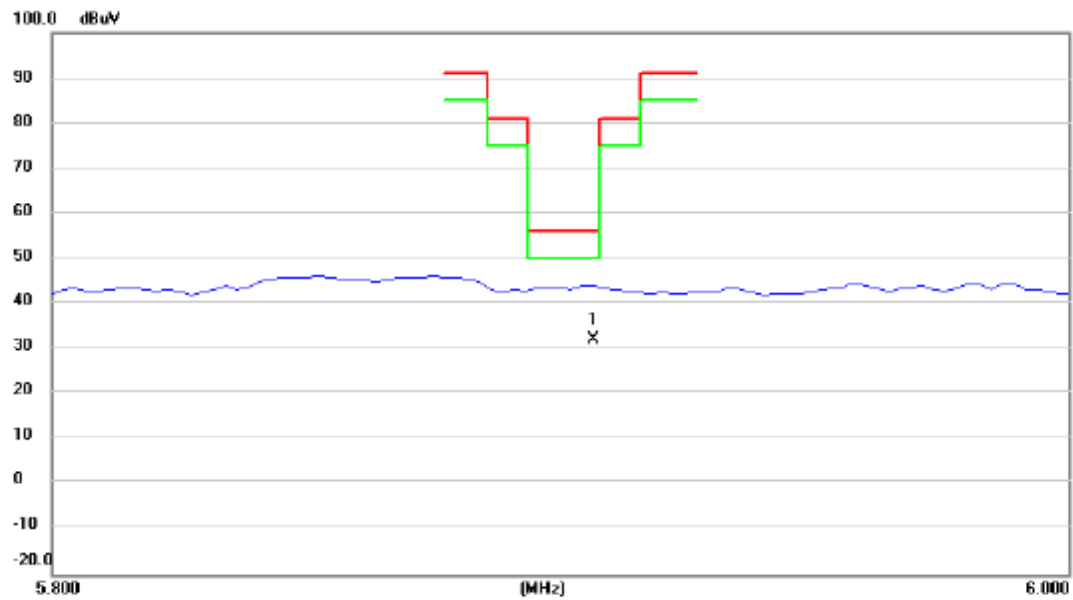
Table A.2 (AM 30% 4.75MHz)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	4.7556	10.10	20.68	30.78	56.00	-25.22	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

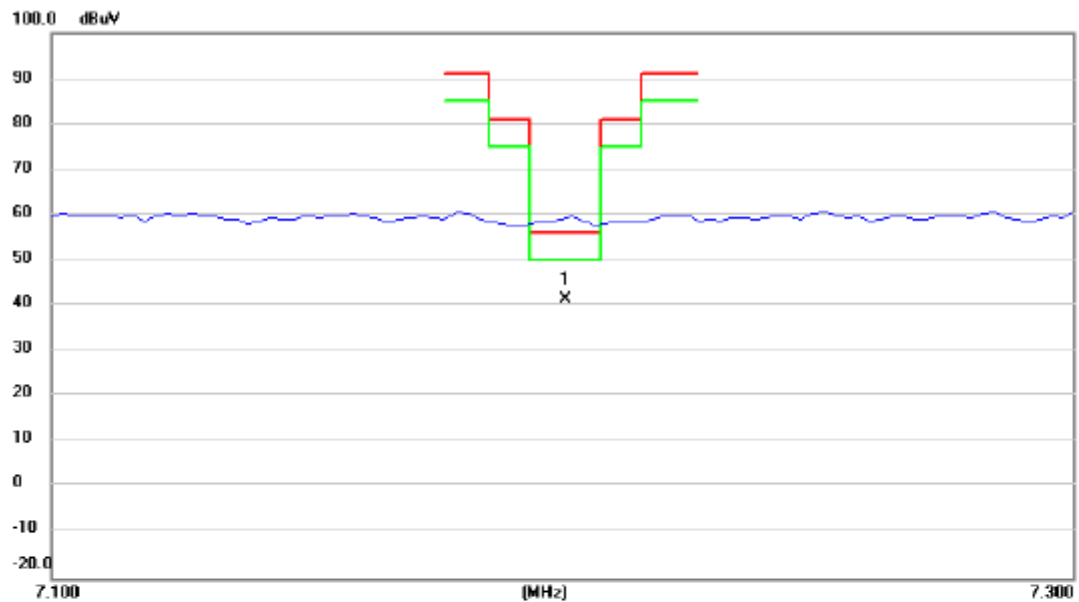
Table A.2 (AM 30% 5.9MHz)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	5.9057	11.32	20.84	32.16	56.00	-23.84	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

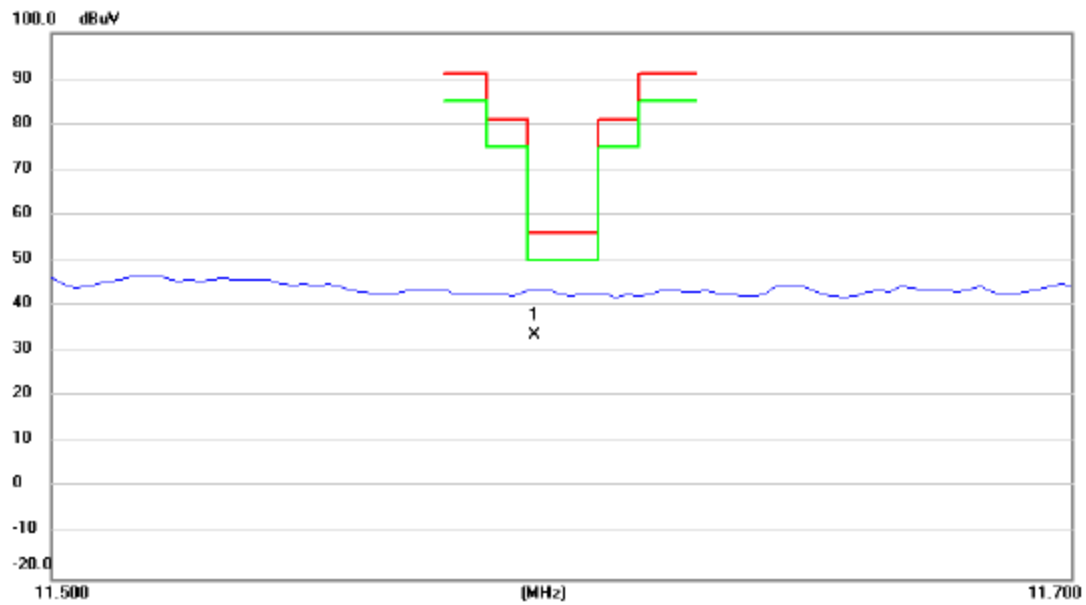
Table A.2 (AM 30% 7.2MHz)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	7.2001	20.20	21.01	41.21	56.00	-14.79	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

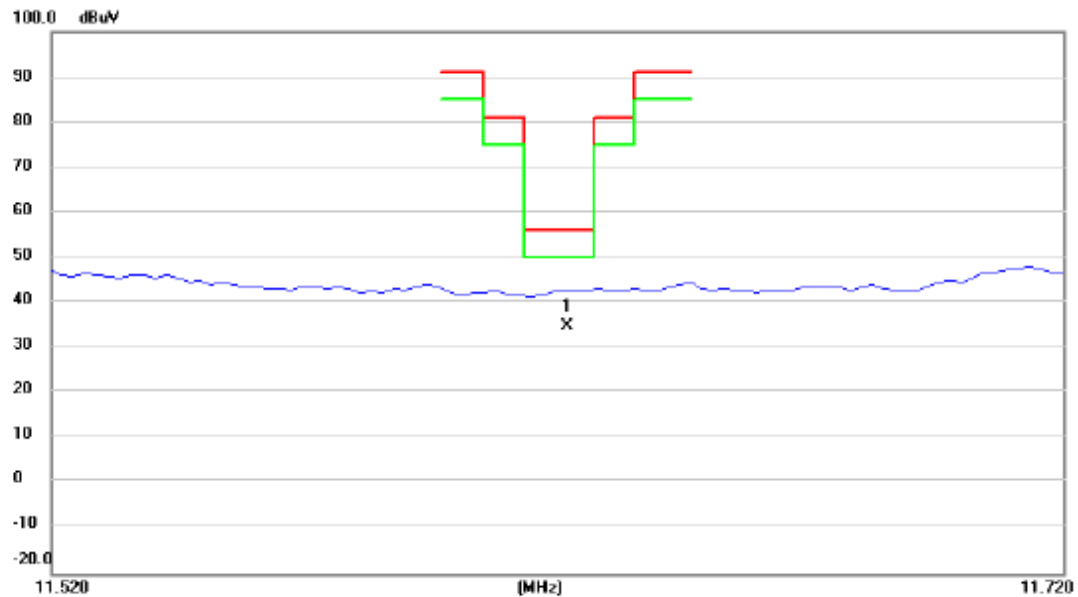
Table A.2 (AM 30% 11.6MHz)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	11.5945	12.30	21.38	33.68	56.00	-22.32	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

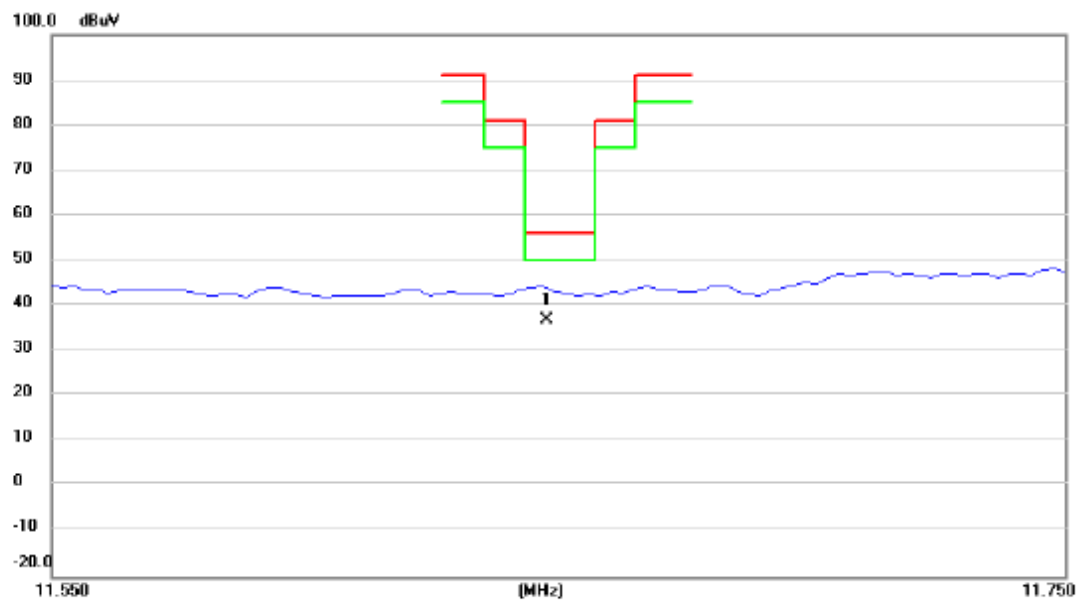
Table A.2 (AM 30% 11.62MHz)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	11.6217	13.26	21.38	34.64	56.00	-21.36	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

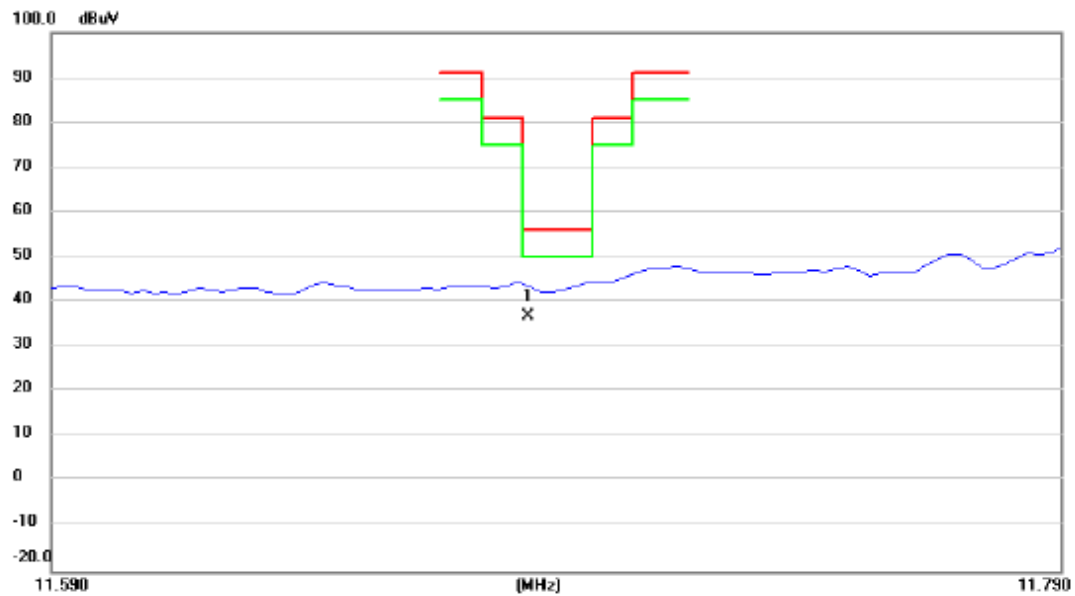
Table A.2 (AM 30% 11.65MHz)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	11.6472	15.36	21.38	36.74	56.00	-19.26	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

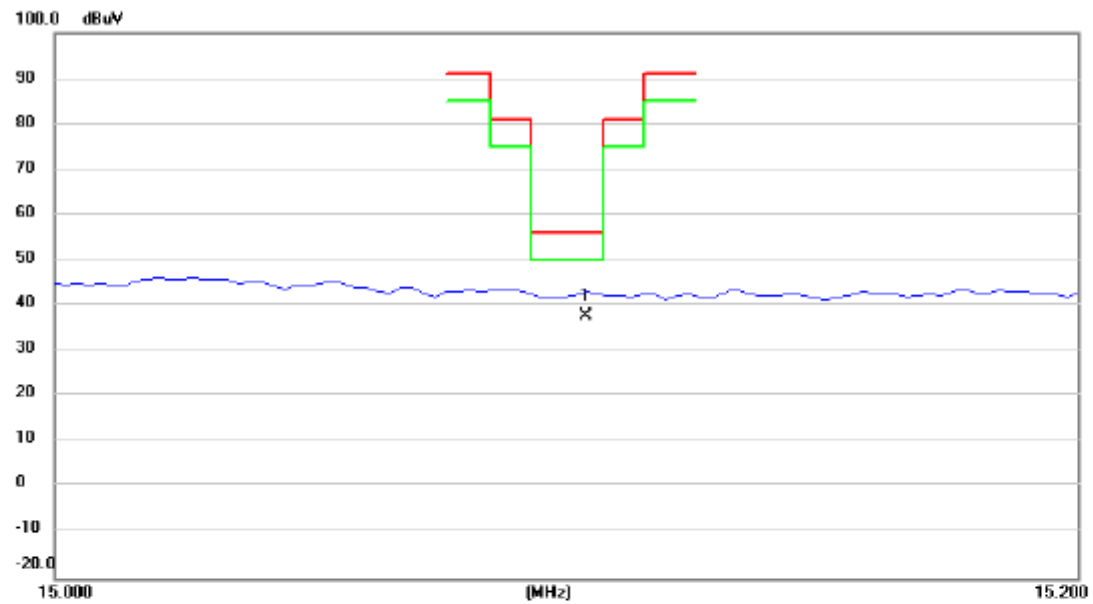
Table A.2 (AM 30% 11.69MHz)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	11.6840	15.47	21.38	36.85	56.00	-19.15	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

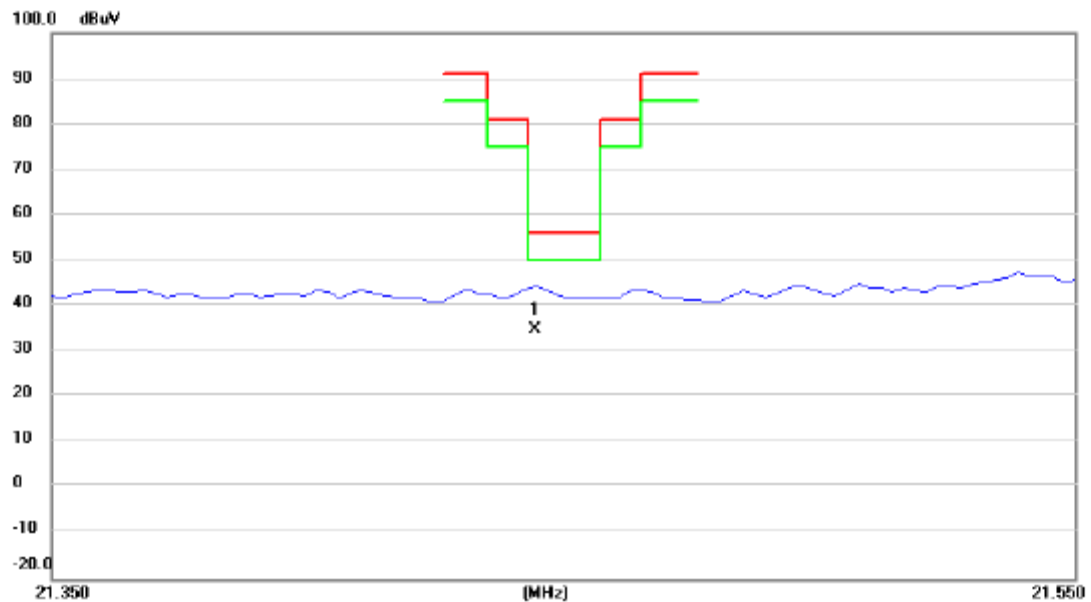
Table A.2 (AM 30% 15.1MHz)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBμV	dB	dBμV	dBμV	dB	Detector	Comment
1	*	15.1035	16.35	21.46	37.81	56.00	-18.19	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

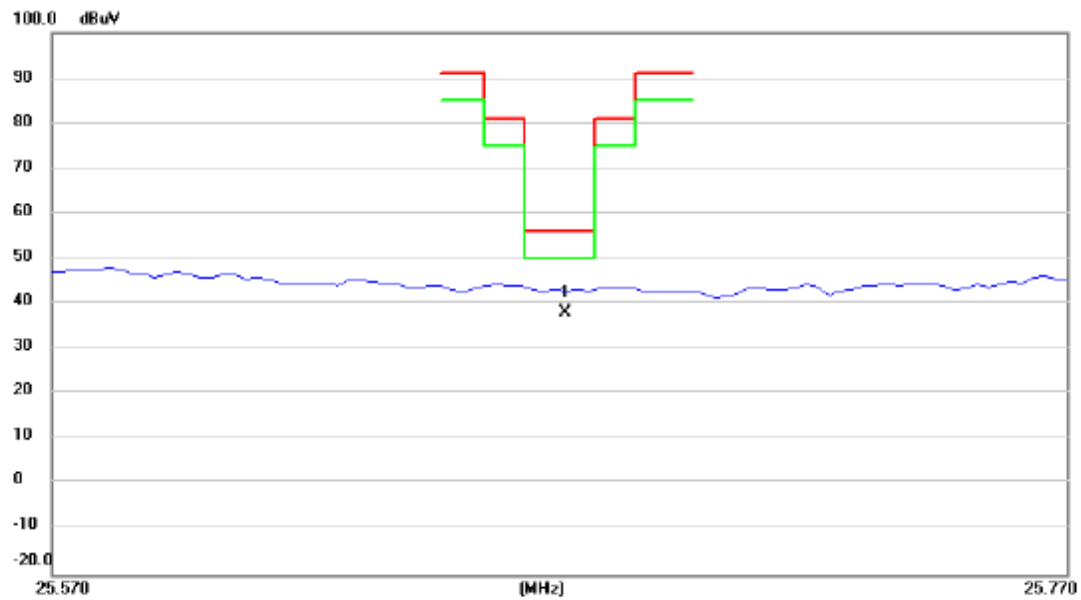
Table A.2 (AM 30% 21.45MHz)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	21.4444	13.27	21.57	34.84	56.00	-21.16	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

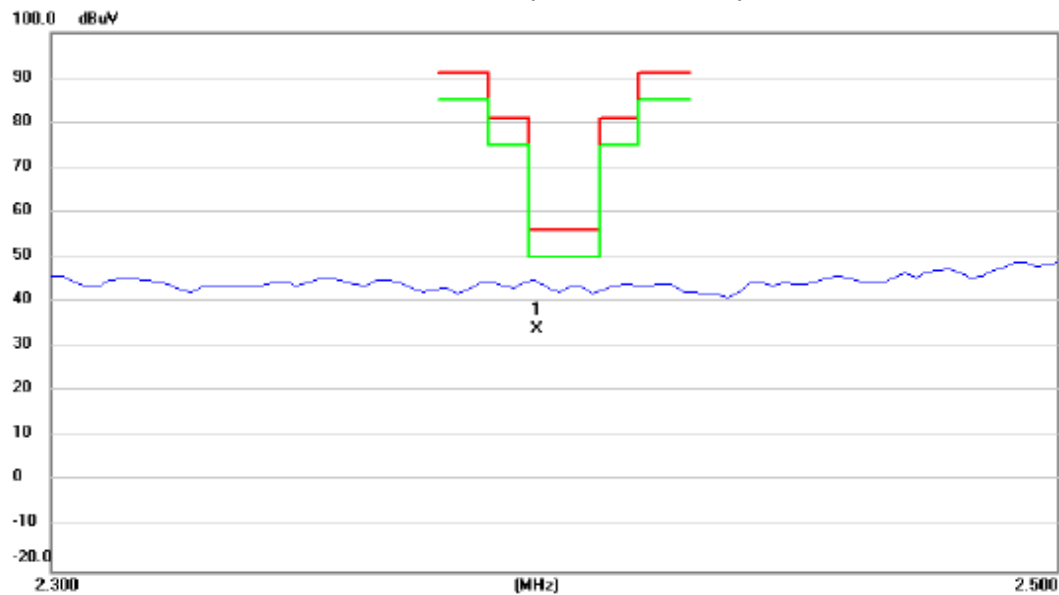
Table A.2 (AM 30% 25.67MHz)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	25.6710	16.35	21.67	38.02	56.00	-17.98	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

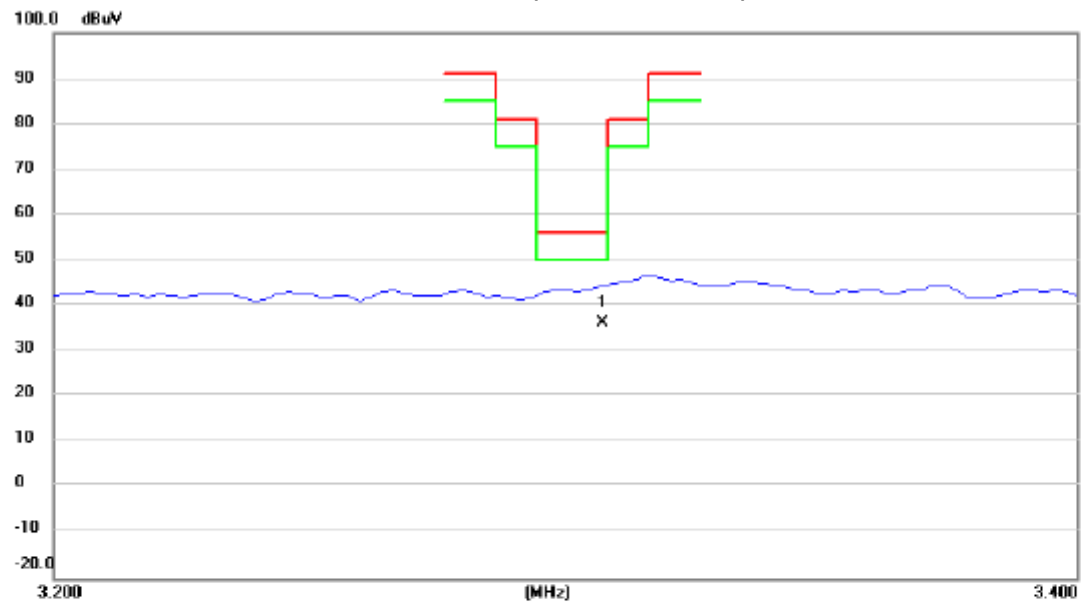
Table A.2 (AM 30% 2.4MHz)



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin		
		MHz	Level	Factor	ment			Detector	Comment
			dBuV	dB	dBuV	dBuV	dB		
1	*	2.3945	13.66	20.30	33.96	56.00	-22.04	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

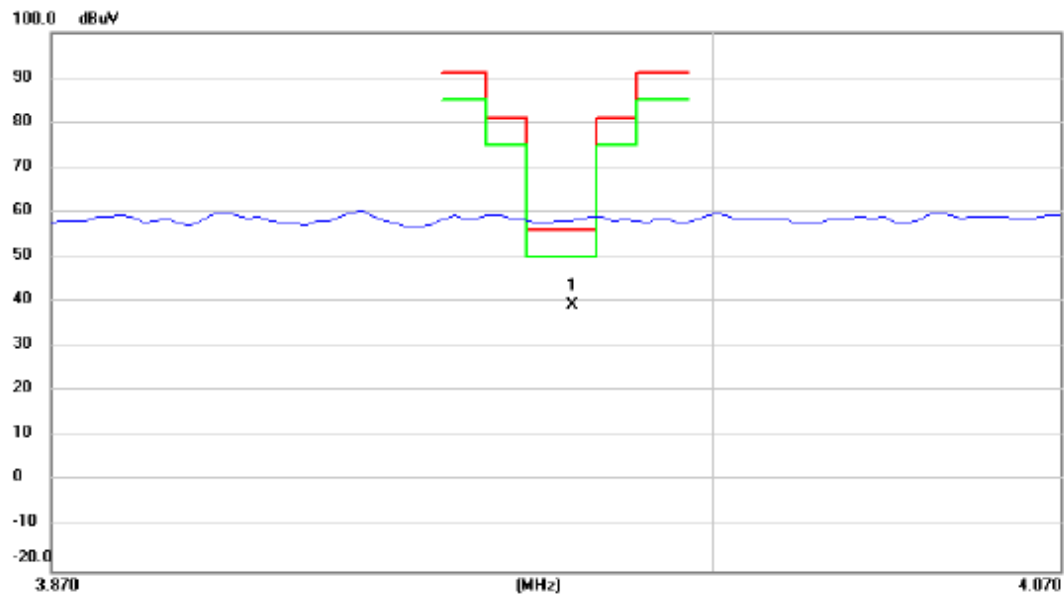
Table A.2 (AM 30% 3.3MHz)



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	3.3058	15.69	20.46	36.15	56.00	-19.85	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

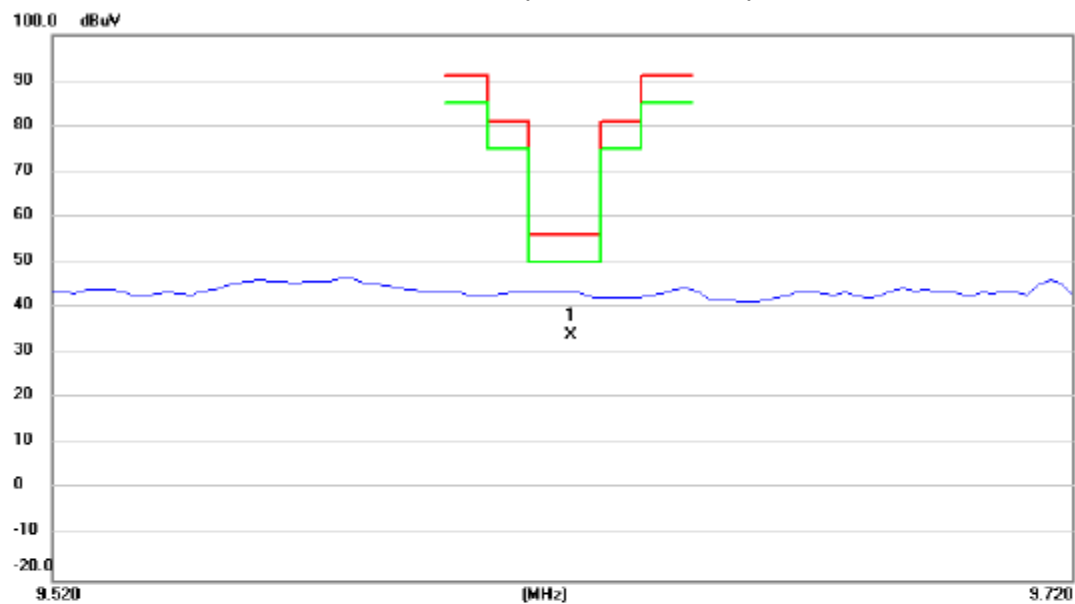
Table A.2 (AM 30% 3.97MHz)



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	3.9722	18.60	20.57	39.17	56.00	-16.83	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

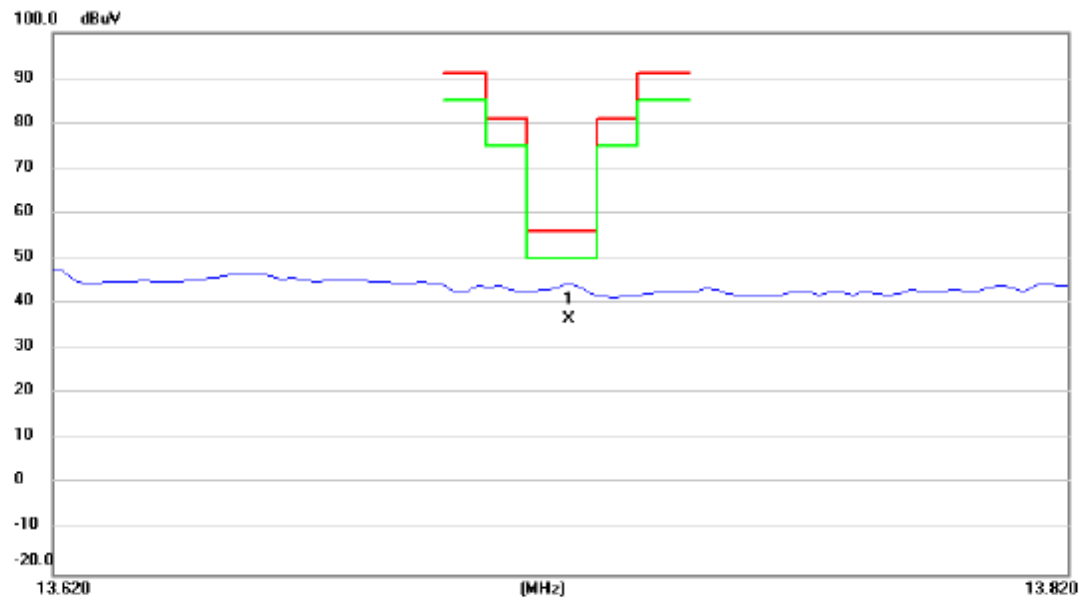
Table A.2 (AM 30% 9.62MHz)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	9.6213	12.64	21.30	33.94	56.00	-22.06	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

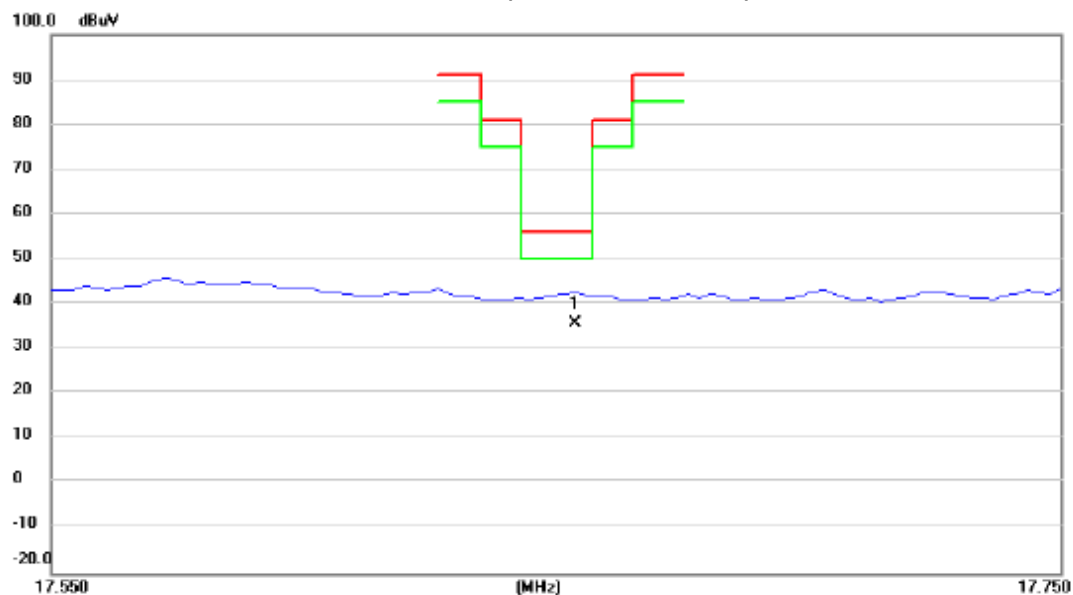
Table A.2 (AM 30% 13.72MHz)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	13.7213	15.22	21.42	36.64	56.00	-19.36	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

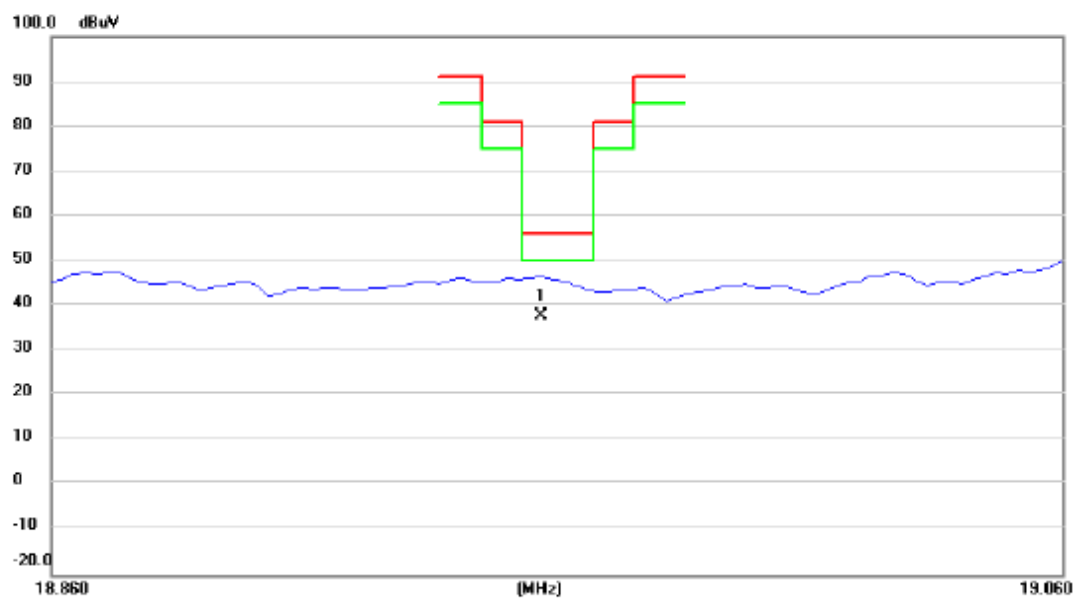
Table A.2 (AM 30% 17.65MHz)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	17.6535	14.29	21.50	35.79	56.00	-20.21	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

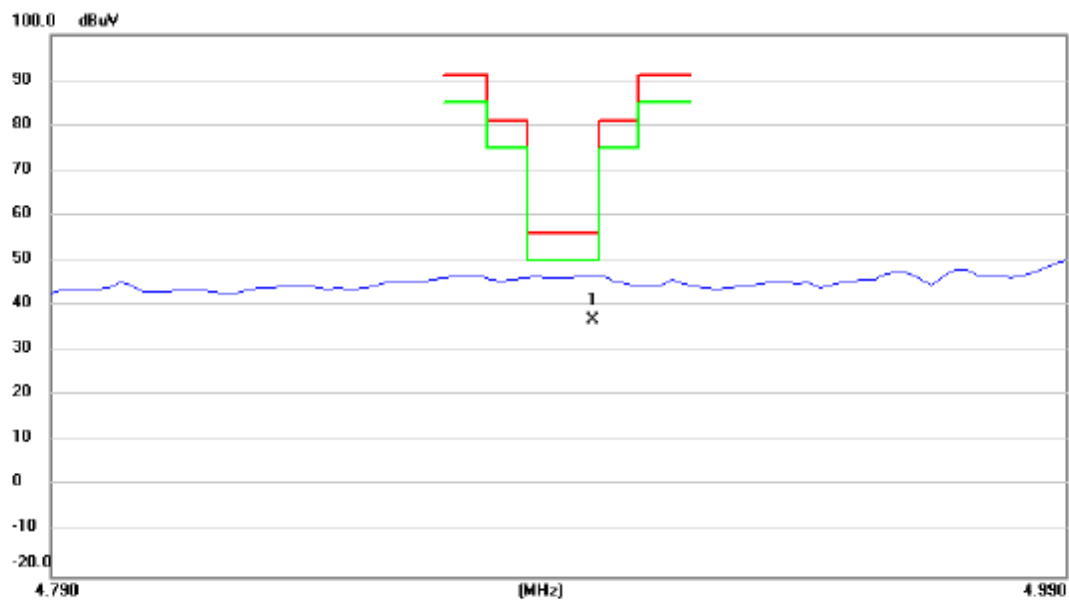
Table A.2 (AM 30% 18.96MHz)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	18.9568	16.38	21.52	37.90	56.00	-18.10	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

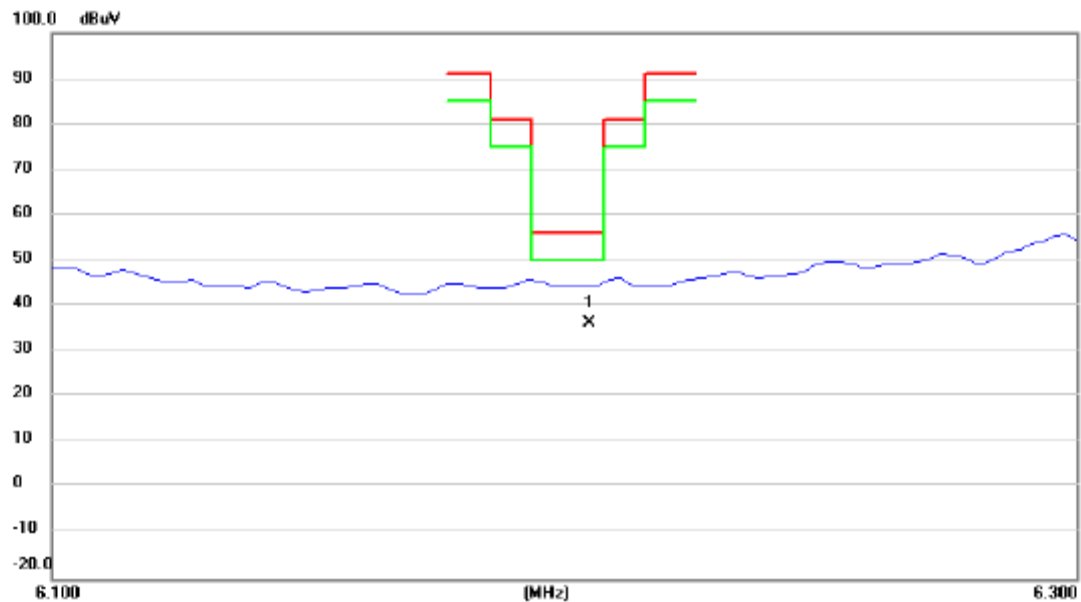
Table A.2 (DRM 4.89MHz)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	4.8958	16.24	20.71	36.95	56.00	-19.05	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

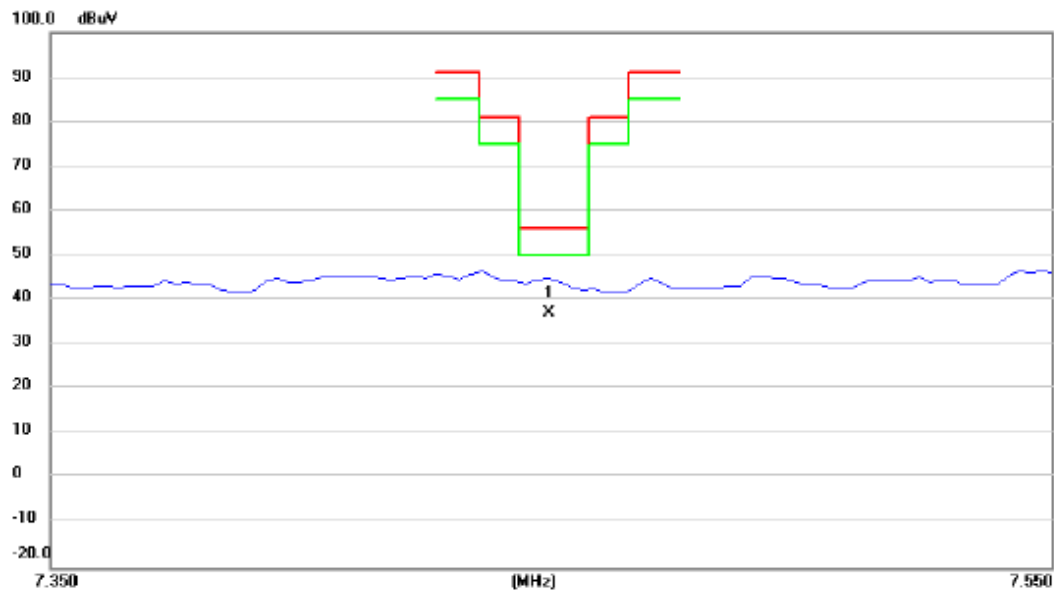
Table A.2 (DRM 6.2MHz)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	6.2040	15.33	20.88	36.21	56.00	-19.79	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

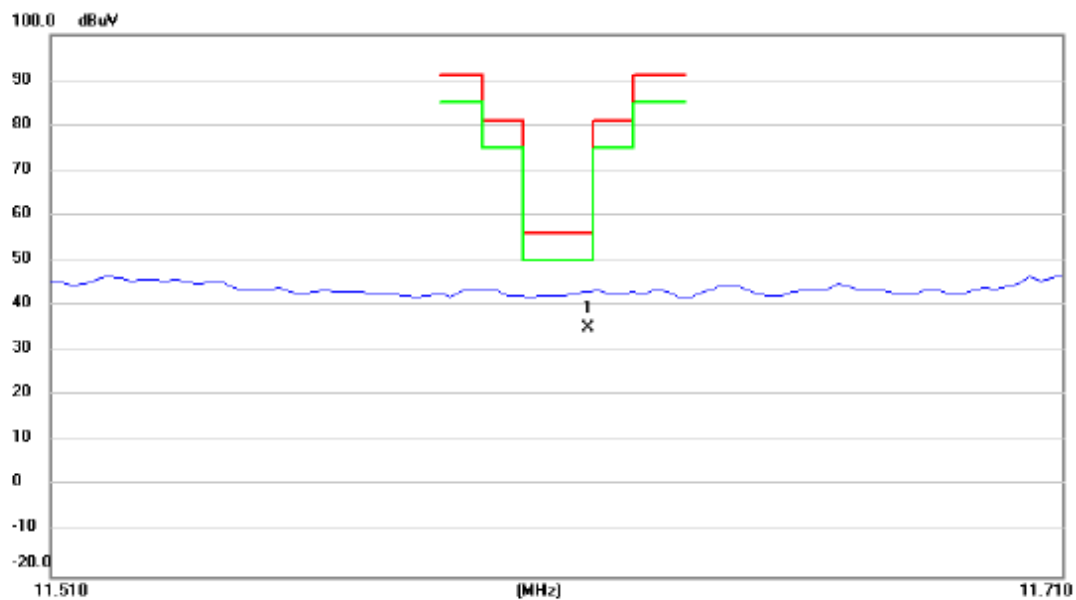
Table A.2 (DRM 7.45MHz)



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	7.4490	16.25	21.03	37.28	56.00	-18.72	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

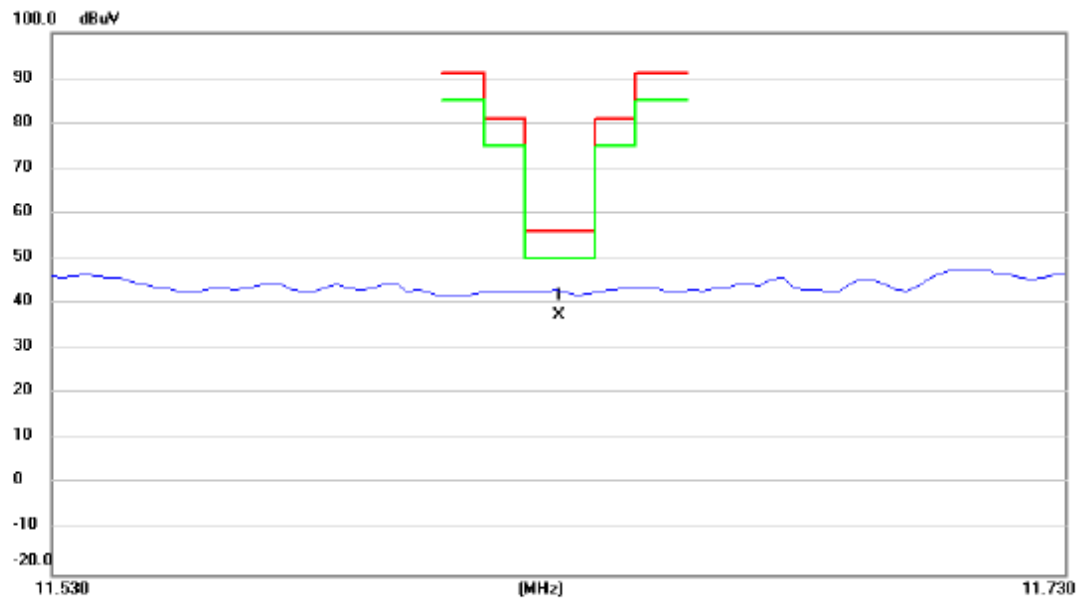
Table A.2 (DRM 11.61MHz)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	11.6158	13.57	21.38	34.95	56.00	-21.05	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

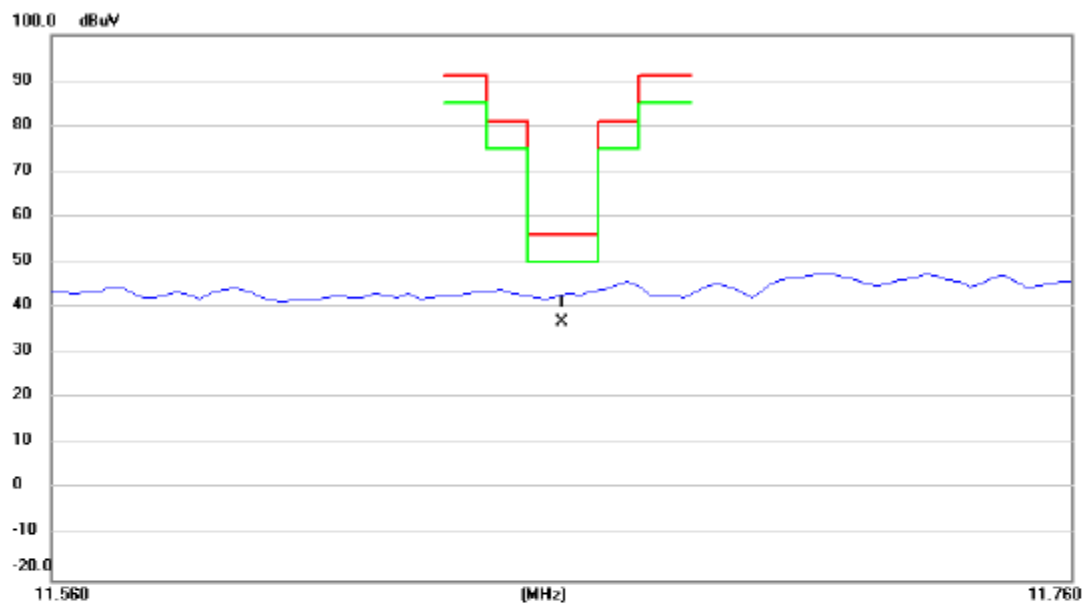
Table A.2 (DRM 11.63MHz)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	11.6296	16.22	21.38	37.60	56.00	-18.40	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

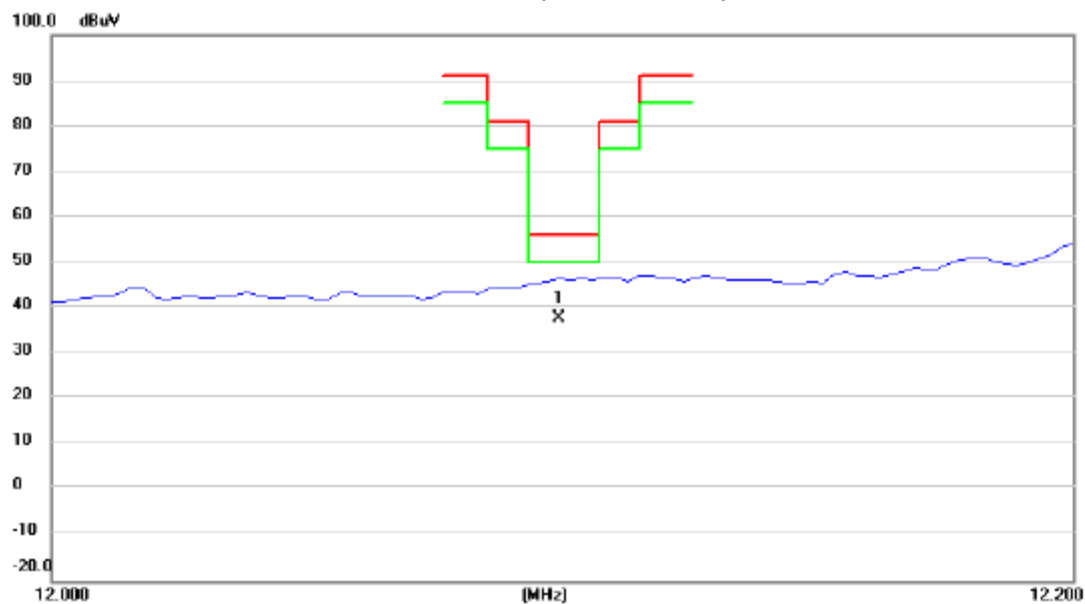
Table A.2 (DRM 11.66MHz)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	11.6598	15.47	21.38	36.85	56.00	-19.15	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

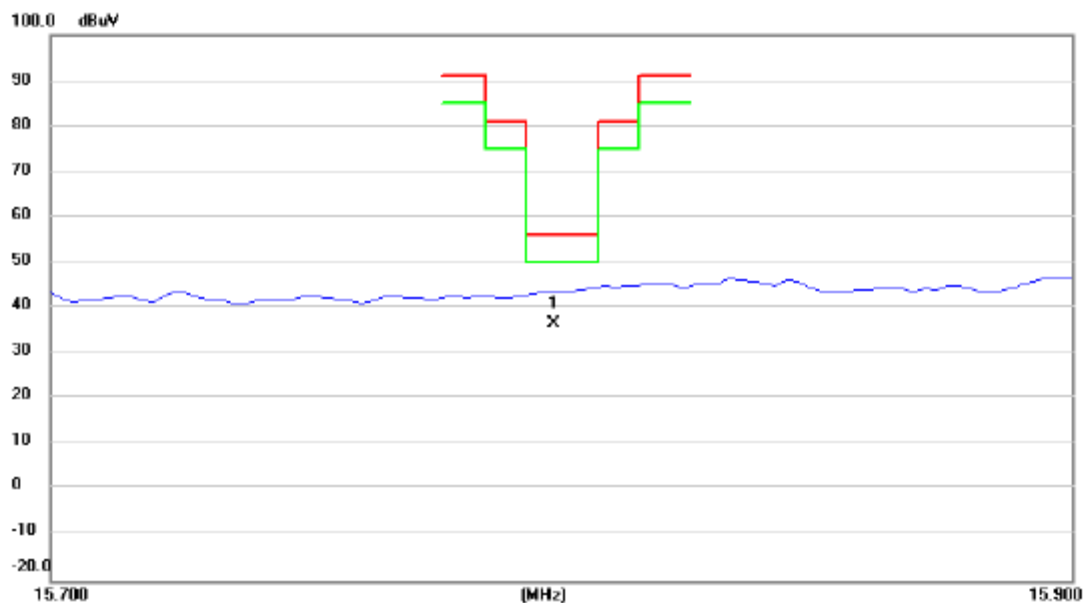
Table A.2 (DRM 12.1MHz)



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	12.0990	16.44	21.39	37.83	56.00	-18.17	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

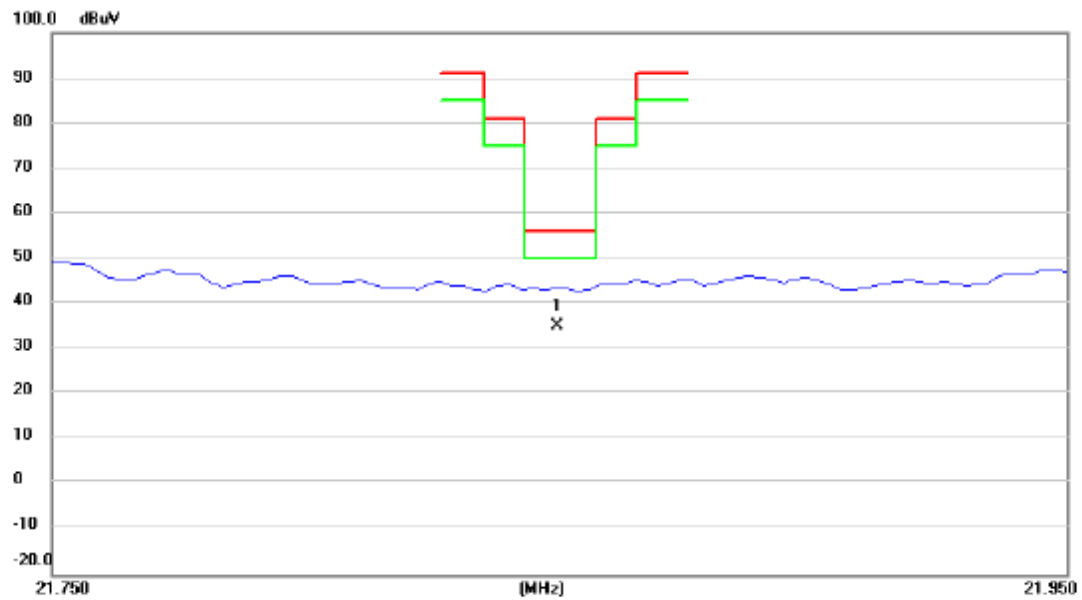
Table A.2 (DRM 15.8MHz)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	15.7983	15.17	21.47	36.64	56.00	-19.36	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

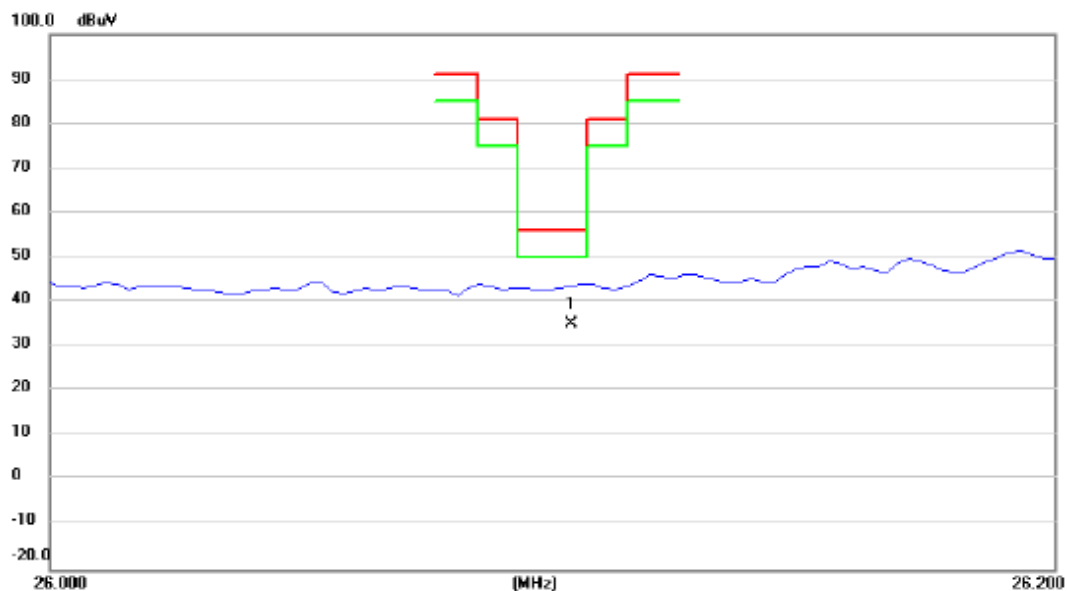
Table A.2 (DRM 21.85MHz)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	21.8495	13.41	21.58	34.99	56.00	-21.01	AVG	

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

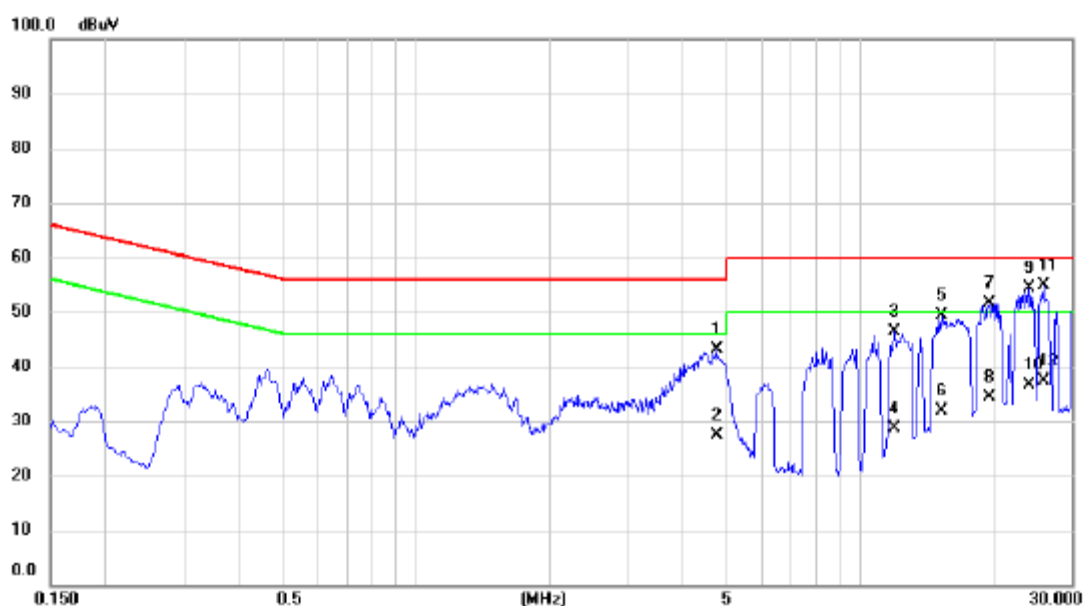
Table A.2 (DRM 26.1MHz)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1	*	26.1038	13.25	21.68	34.93	56.00	-21.07	AVG	

APPENDIX I - CONDUCTED ASYMMETRICAL DISTURBANCES FOR PLC PORTS

Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1

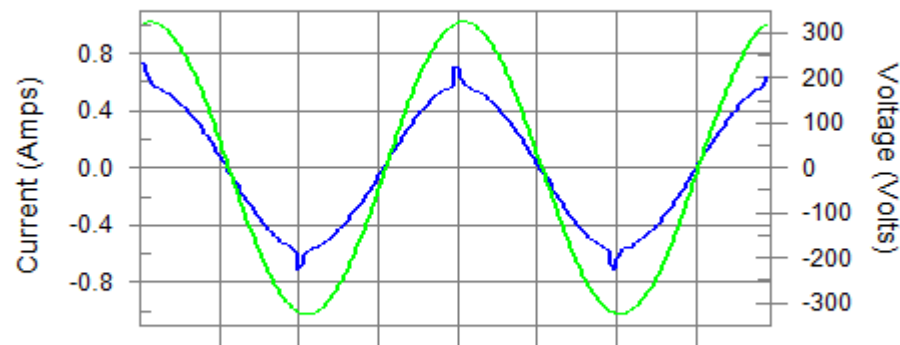


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		4.7715	41.92	1.14	43.06	56.00	-12.94	QP	
2		4.7715	26.20	1.14	27.34	46.00	-18.66	AVG	
3		11.9130	45.09	1.39	46.48	60.00	-13.52	QP	
4		11.9130	27.30	1.39	28.69	50.00	-21.31	AVG	
5		15.2363	47.93	1.48	49.41	60.00	-10.59	QP	
6		15.2363	30.40	1.48	31.88	50.00	-18.12	AVG	
7		19.5315	50.05	1.57	51.62	60.00	-8.38	QP	
8		19.5315	32.70	1.57	34.27	50.00	-15.73	AVG	
9		24.0224	52.82	1.68	54.50	60.00	-5.50	QP	
10		24.0224	35.00	1.68	36.68	50.00	-13.32	AVG	
11	*	25.9778	53.17	1.72	54.89	60.00	-5.11	QP	
12		25.9778	35.70	1.72	37.42	50.00	-12.58	AVG	

APPENDIX J - HARMONIC CURRENT EMISSION

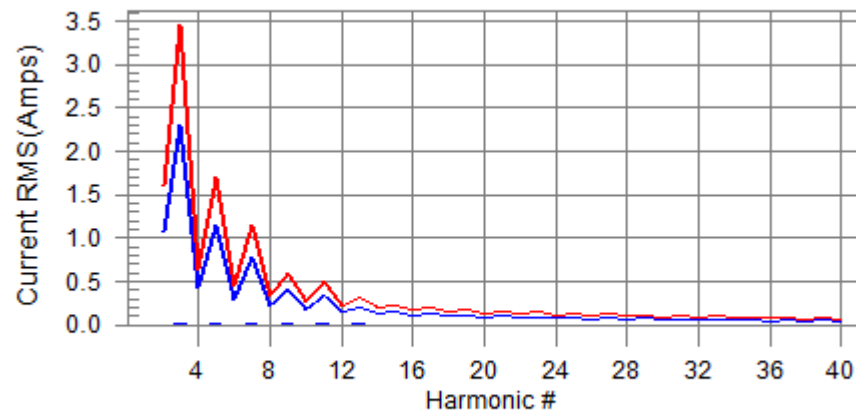
Harmonics - Class A	
Test Voltage	AC 230V/50Hz
Test Mode	Mode 1

Current & voltage waveforms



Harmonics and Class A limit line

European Limits



Test result: Pass Worst harmonics H17-2.8% of 150% limit, H17-4.1% of 100% limit

Current Test Result Summary (Run time)	
Test Voltage	AC 230V/50Hz
Test Mode	Mode 1

Highest parameter values during test:

V_RMS (Volts):	229.98	Frequency(Hz):	50.00
I_Peak (Amps):	0.731	I_RMS (Amps):	0.414
I_Fund (Amps):	0.413	Crest Factor:	1.771
Power (Watts):	94.8	Power Factor:	0.998

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.001	1.080	N/A	0.002	1.620	N/A	Pass
3	0.009	2.300	0.4	0.010	3.450	0.3	Pass
4	0.001	0.430	N/A	0.001	0.645	N/A	Pass
5	0.008	1.140	0.7	0.008	1.710	0.5	Pass
6	0.000	0.300	N/A	0.000	0.450	N/A	Pass
7	0.008	0.770	1.0	0.008	1.155	0.7	Pass
8	0.000	0.230	N/A	0.000	0.345	N/A	Pass
9	0.007	0.400	1.8	0.007	0.600	1.2	Pass
10	0.000	0.184	N/A	0.000	0.276	N/A	Pass
11	0.007	0.330	2.1	0.007	0.495	1.4	Pass
12	0.000	0.153	N/A	0.000	0.230	N/A	Pass
13	0.006	0.210	3.0	0.006	0.315	2.0	Pass
14	0.000	0.131	N/A	0.000	0.197	N/A	Pass
15	0.006	0.150	3.9	0.006	0.225	2.7	Pass
16	0.000	0.115	N/A	0.000	0.173	N/A	Pass
17	0.005	0.132	4.1	0.005	0.198	2.8	Pass
18	0.000	0.102	N/A	0.000	0.153	N/A	Pass
19	0.005	0.118	N/A	0.005	0.178	N/A	Pass
20	0.000	0.092	N/A	0.000	0.138	N/A	Pass
21	0.004	0.107	N/A	0.004	0.161	N/A	Pass
22	0.000	0.084	N/A	0.000	0.125	N/A	Pass
23	0.004	0.098	N/A	0.004	0.147	N/A	Pass
24	0.000	0.077	N/A	0.000	0.115	N/A	Pass
25	0.004	0.090	N/A	0.004	0.135	N/A	Pass
26	0.000	0.071	N/A	0.000	0.107	N/A	Pass
27	0.003	0.083	N/A	0.003	0.125	N/A	Pass
28	0.000	0.066	N/A	0.000	0.099	N/A	Pass
29	0.003	0.078	N/A	0.003	0.116	N/A	Pass
30	0.000	0.061	N/A	0.000	0.092	N/A	Pass
31	0.002	0.073	N/A	0.002	0.109	N/A	Pass
32	0.000	0.058	N/A	0.000	0.086	N/A	Pass
33	0.002	0.068	N/A	0.002	0.102	N/A	Pass
34	0.000	0.054	N/A	0.000	0.081	N/A	Pass
35	0.002	0.064	N/A	0.002	0.096	N/A	Pass
36	0.000	0.051	N/A	0.000	0.077	N/A	Pass
37	0.002	0.061	N/A	0.002	0.091	N/A	Pass
38	0.000	0.048	N/A	0.000	0.073	N/A	Pass
39	0.002	0.058	N/A	0.002	0.087	N/A	Pass
40	0.000	0.046	N/A	0.000	0.069	N/A	Pass

Voltage Source Verification Data (Run time)	
Test Voltage	AC 230V/50Hz
Test Mode	Mode 1

Highest parameter values during test:

Voltage (Vrms):	229.98	Frequency(Hz):	50.00
I_Peak (Amps):	0.731	I_RMS (Amps):	0.414
I_Fund (Amps):	0.413	Crest Factor:	1.771
Power (Watts):	94.8	Power Factor:	0.998

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.125	0.460	27.20	OK
3	0.535	2.069	25.84	OK
4	0.073	0.460	15.84	OK
5	0.056	0.920	6.09	OK
6	0.033	0.460	7.13	OK
7	0.030	0.690	4.30	OK
8	0.022	0.460	4.86	OK
9	0.046	0.460	9.96	OK
10	0.021	0.460	4.52	OK
11	0.022	0.230	9.75	OK
12	0.019	0.230	8.23	OK
13	0.015	0.230	6.46	OK
14	0.017	0.230	7.55	OK
15	0.024	0.230	10.55	OK
16	0.015	0.230	6.32	OK
17	0.015	0.230	6.45	OK
18	0.011	0.230	5.00	OK
19	0.016	0.230	6.78	OK
20	0.017	0.230	7.25	OK
21	0.012	0.230	5.15	OK
22	0.014	0.230	5.94	OK
23	0.008	0.230	3.68	OK
24	0.008	0.230	3.31	OK
25	0.009	0.230	3.85	OK
26	0.010	0.230	4.31	OK
27	0.014	0.230	6.28	OK
28	0.009	0.230	4.10	OK
29	0.011	0.230	4.92	OK
30	0.006	0.230	2.69	OK
31	0.007	0.230	2.87	OK
32	0.008	0.230	3.46	OK
33	0.007	0.230	3.07	OK
34	0.003	0.230	1.52	OK
35	0.007	0.230	2.95	OK
36	0.005	0.230	1.96	OK
37	0.009	0.230	3.88	OK
38	0.004	0.230	1.59	OK
39	0.006	0.230	2.68	OK
40	0.007	0.230	2.85	OK

APPENDIX K - VOLTAGE FLUCTUATIONS AND FLICKER

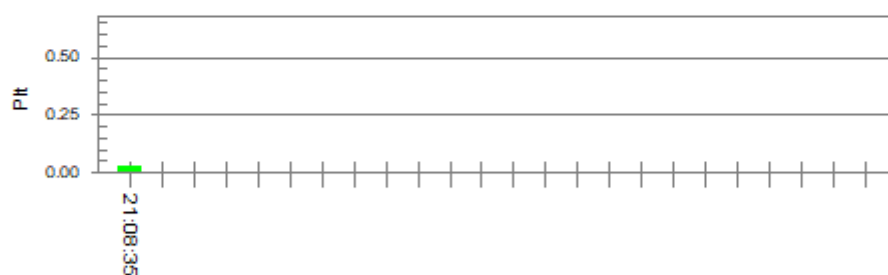
Test Voltage	AC 230V/50Hz
Test Mode	Mode 1

Pst and limit line

European Limits



Plt and limit line



Parameter values recorded during the test:

Vrms at the end of test (Volt):	229.82		
T-max (mS):	0	Test limit (mS):	500.0 Pass
Highest dc (%):	0.00	Test limit (%):	3.30 Pass
Highest dmax (%):	0.00	Test limit (%):	4.00 Pass
Highest Pst (10 min. period):	0.064	Test limit:	1.000 Pass
Highest Plt (2 hr. period):	0.028	Test limit:	0.650 Pass

APPENDIX L - ESD

Test Voltage	AC 230V/50Hz
Test Mode	Mode 1

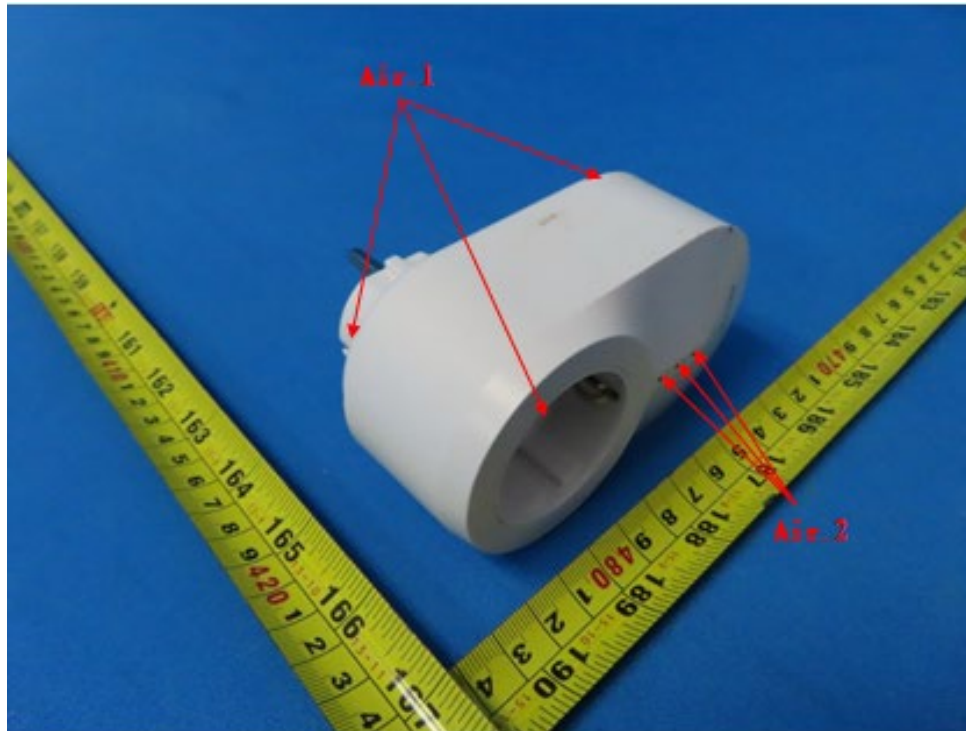
Mode	Air Discharge								Contact Discharge					
Test Level	2kV		4kV		8kV		- kV		4kV		- kV		- kV	
Location	P	N	P	N	P	N	P	N	P	N	P	N	P	N
1	A	A	A	A	A	A	-	-	-	-	-	-	-	-
2	A	A	A	A	A	A	-	-	-	-	-	-	-	-
3	A	A	A	A	A	A	-	-	-	-	-	-	-	-
4	A	A	A	A	B	B	-	-	-	-	-	-	-	-
Criteria	B								B					
Result	B								N/A					

Mode	HCP Contact Discharge						VCP Contact Discharge					
Test Level	4kV		- kV		- kV		4kV		- kV		- kV	
Location	P	N	P	N	P	N	P	N	P	N	P	N
Left side	A	A	-	-	-	-	A	A	-	-	-	-
Right side	A	A	-	-	-	-	A	A	-	-	-	-
Front side	A	A	-	-	-	-	A	A	-	-	-	-
Rear side	A	A	-	-	-	-	A	A	-	-	-	-
Criteria	B						B					
Result	A						A					

Note:

- 1) P/N denotes the Positive/Negative polarity of the output voltage.
- 2) N/A - denotes test is not applicable in this test report

PHOTO(S) SHOWN THE LOCATION(S) OF ESD EVALUATED



APPENDIX M - RS

Test Voltage :	AC 230V/50Hz
Test Mode :	Mode 1

Frequency Range (MHz)	RF Field Position	R.F. Field Strength	Modulation	Azimuth	Criterion	Result
80 - 1000	H / V	3V/m	AM Modulated 1000Hz, 80%	0	A	A
				90		
				180		
				270		

APPENDIX N - EFT/BURST

Test Voltage :	AC 230V/50Hz
Test Mode :	Mode 1

EUT Ports Tested		Polarity	Repetition Frequency	Test Level 1kV	Criterion	Result
AC Power Port	Line (L)	+	5 kHz	A	B	A
		-	5 kHz	A		
	Neutral (N)	+	5 kHz	A	B	A
		-	5 kHz	A		
	L+N	+	5 kHz	A	B	A
		-	5 kHz	A		

EUT Ports Tested		Polarity	Repetition Frequency	Test Level 0.5 kV	Criterion	Result
Signal/Data/ Control Port	LAN	+	5 kHz	B	B	B
		-	5 kHz	B		

APPENDIX O - SURGE

Test Voltage :	AC 230V/50Hz
Test Mode :	Mode 1

Wave Form EUT Ports Tested		1.2/50(8/20)Tr/Th μs						Criterion	Result
		Polarity	Phase	Voltage					
				0.5kV	1kV	-- kV	-- kV		
AC	L – N	+/-	0°	A	A	-	-	B	A
		+/-	90°	A	A	-	-		
		+/-	180°	A	A	-	-		
		+/-	270°	A	A	-	-		

APPENDIX P - INJECTION CURRENT

Test Voltage :	AC 230V/50Hz
Test Mode :	Mode 1

Test Ports (Mode)	Frequency Range (MHz)	Field Strength	Modulation	Criteria	Results
Input/ Output AC. Power Port	0.15 ---80	3V	AM Modulated 1000Hz, 80%	A	A
Signal Port (LAN)	0.15 --- 80			A	A

APPENDIX Q - POWER FREQUENCY MAGNETIC FIELD

Test Voltage :	AC 230V/50Hz
Test Mode :	Mode 1

50Hz

Test Mode	Test Level	Antenna aspect	Duration (s)	Criteria	Results
Enclosure	3 A/m	X	60	A	A
Enclosure	3 A/m	Y	60	A	A
Enclosure	3 A/m	Z	60	A	A

APPENDIX R - VOLTAGE INTERRUPTION/DIPS

Test Voltage :	AC 100V/50Hz, AC 230V/50Hz, AC 240V/50Hz
Test Mode :	Mode 1

AC 100V/50Hz				
Item	Reduction	Period(ms)	Criteria	Results
Voltage dips	30%	10	B	A
Voltage dips	60%	100	C	A
Voltage Interruption	>95%	5000	C	C

AC 230V/50Hz				
Item	Reduction	Period(ms)	Criteria	Results
Voltage dips	30%	10	B	A
Voltage dips	60%	100	C	A
Voltage Interruption	>95%	5000	C	C

AC 240V/50Hz				
Item	Reduction	Period(ms)	Criteria	Results
Voltage dips	30%	10	B	A
Voltage dips	60%	100	C	A
Voltage Interruption	>95%	5000	C	C

End of Test Report