

TEST REPORT

Report No.: CQASZ20221202223E
Applicant: Shenzhen Longan Technology Co., Ltd.
Address of Applicant: Room 1211, Unit C, No. 37 Baoshi West Road, Shiyan Street, Baoan District, Shenzhen, Guangdong, China
Equipment Under Test (EUT):
EUT Name: Serial CAN-BUS Module based on MCP2551 and MCP2515
Model No.: 1030001
Test model No.: 1030001
Brand Name: Longan Labs
Standards: EN 55032:2015/A11:2020
EN 55035:2017/A11:2020
EN IEC 61000-3-2:2019
EN 61000-3-3:2013/A1:2019
Date of Receipt: 2022-12-28
Date of Test: 2022-12-28 to 2022-12-30
Date of Issue:
Test Result: **PASS***
***In the configuration tested, the EUT complied with the standards specified above**

Tested By: _____
(Joe Wang)

Reviewed By: _____
(Timo Lei)

Approved By: _____
(Jack Ai)



1 Version

Revision History of Report

Report No.	Version	Description	Issue Date
CQASZ20221202223E	Rev.01	Initial report	

DRAFT

2 Test Summary

Electromagnetic Compatibility (EMC) Part				
Electromagnetic Interference (EMI)				
Test item	Test Requirement	Test Method	Class / Severity	Result
Radiated Emission (30MHz to 6GHz)	EN 55032:2015/A11:2020	EN 55032:2015/A11:2020	Class B	PASS
Conducted Emission (150kHz to 30MHz)	EN 55032:2015/A11:2020	EN 55032:2015/A11:2020	Class B	PASS
Harmonic Emission on AC, 50Hz	EN IEC 61000-3-2:2019	EN IEC 61000-3-2:2019	Table 1 of EN IEC 61000-3-2	N/A ²⁾
Flicker Emission on AC	EN 61000-3-3:2013/A1:2019	EN 61000-3-3:2013/A1:2019	Clause 5 of EN 61000-3-3	PASS
Electromagnetic Susceptibility (EMS)				
Electrostatic discharges (ESD)	EN 55035:2017/A11:2020	EN 61000-4-2:2009	Clause 5	PASS
Radiated Immunity	EN 55035:2017/A11:2020	EN 61000-4-3:2006 /A2:2010	Clause 5	PASS
Power frequency magnetic field	EN 55035:2017/A11:2020	EN 61000-4-8:2010	Clause 5	N/A ¹⁾
Electrical Fast Transients (EFT)	EN 55035:2017/A11:2020	EN 61000-4-4:2012	Clause 5	PASS
Surge Immunity	EN 55035:2017/A11:2020	EN 61000-4-5:2014	Clause 5	PASS
Injected Currents, 150kHz to 80MHz	EN 55035:2017/A11:2020	EN 61000-4-6:2014	Clause 5	PASS
Voltage Dips and Interruptions	EN 55035:2017/A11:2020	EN 61000-4-11:2004	Clause 5	PASS

Remark:

§ If the highest frequency of the internal sources of the EUT is less than 108 MHz, the measurement shall only be made up to 1 GHz. (Refer to EN 55032:2015/A11:2020 Clause 8 table 1 Conditional testing procedure)

§ If the highest frequency of the internal sources of the EUT is between 108 MHz and 500 MHz, the measurement shall only be made up to 2 GHz. (Refer to EN 55032:2015/A11:2020 Clause 8 table 1 Conditional testing procedure)

§ If the highest frequency of the internal sources of the EUT is between 500 MHz and 1 GHz, the measurement shall only be made up to 5 GHz. (Refer to EN 55032:2015/A11:2020 Clause 8 table 1 Conditional testing procedure)

§ If the highest frequency of the internal sources of the EUT is above 1 GHz, the measurement shall be made up to 5 times the highest frequency or 6 GHz, whichever is less. (Refer to EN 55032:2015/A11:2020 Clause 8 table 1 Conditional testing procedure)

N/A¹⁾: Because this test EUT is not belonging to apparatus containing devices susceptible to magnetic fields, therefore, it is not applicable.

N/A²⁾: Because the rated power of this product is less than 75W.

3 Contents

	Page
1 VERSION	2
2 TEST SUMMARY	3
3 CONTENTS	4
4 GENERAL INFORMATION	5
4.1 CLIENT INFORMATION	5
4.2 GENERAL DESCRIPTION OF EUT	5
4.3 DESCRIPTION OF SUPPORT UNITS	6
4.4 TEST LOCATION	6
4.5 DEVIATION FROM STANDARDS	6
4.6 ABNORMALITIES FROM STANDARD CONDITIONS	6
4.7 OTHER INFORMATION REQUESTED BY THE CUSTOMER	6
4.8 MEASUREMENT UNCERTAINTY (95% CONFIDENCE LEVELS, K=2)	6
5 EQUIPMENT LIST	7
6 EMISSION TEST RESULTS	9
6.1 RADIATED EMISSIONS	9
6.2 CONDUCTED EMISSION	12
6.3 HARMONICS TEST RESULTS	15
6.4 FLICKER TEST RESULTS	16
7 IMMUNITY TEST RESULTS	18
7.1 RADIATED IMMUNITY	19
7.2 ESD	21
7.3 RF COMMON MODE 0.15MHZ TO 80MHZ	23
7.4 ELECTRICAL FAST TRANSIENTS (EFT)	25
7.5 SURGE	27
7.6 VOLTAGE DIPS AND INTERRUPTIONS	29
APPENDIX 1 PHOTOGRAPHS OF TEST SETUP	31
APPENDIX 2 PHOTOGRAPHS OF EUT	34

4 General Information

4.1 Client Information

Applicant:	Shenzhen Longan Technology Co., Ltd.
Address of Applicant:	Room 1211, Unit C, No. 37 Baoshi West Road, Shiyan Street, Baoan District, Shenzhen, Guangdong, China
Manufacturer:	Shenzhen Longan Technology Co., Ltd.
Address of Manufacturer:	Room 1211, Unit C, No. 37 Baoshi West Road, Shiyan Street, Baoan District, Shenzhen, Guangdong, China
Factory:	Shenzhen Longan Technology Co., Ltd.
Address of Factory:	Room 1211, Unit C, No. 37 Baoshi West Road, Shiyan Street, Baoan District, Shenzhen, Guangdong, China

4.2 General Description of EUT

Product Name:	Serial CAN-BUS Module based on MCP2551 and MCP2515
Model No.:	1030001
Test model No.:	1030001
Trade Mark:	Longan Labs
Power Supply:	DC 5V, 1A
Test Mode:	
Normal working	Keep the EUT in Normal working

4.3 Description of Support Units

The EUT has been tested with associated equipment below.

1) support equipment

Description	Manufacturer	Model No.	Certification	Supplied by
Adapter	XIAOMI	MDY-08-EF	/	CQA

4.4 Test Location

Shenzhen Huaxia Testing Technology Co., Ltd.

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

4.5 Deviation from Standards

None.

4.6 Abnormalities from Standard Conditions

None.

4.7 Other Information Requested by the Customer

None.

4.8 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Conduction emission	3.74dB (9kHz to 150kHz)
		3.34dB (150kHz to 30MHz)
2	Radiated emission	5.12dB (30MHz-1GHz)
		4.60dB (1GHz-6GHz)
3	Radiated Immunity	1.61dB
4	Conducted Immunity	0.92dB
5	Temperature test	0.8°C
6	Humidity test	2.0%
7	DC power test	0.5 %

5 Equipment List

Conducted Emissions (150kHz-30MHz)					
Equipment	Manufacturer	Model No	Inventory No.	Cal Date	Cal Due Date
EMI Test Receiver	R&S	ESPI3	CQA-013	2022/9/9	2023/9/8
LISN	R&S	ENV216	CQA-003	2022/9/9	2023/9/8
Coaxial cable (9KHz~300MHz)	CQA	N/A	C021	2022/9/9	2023/9/8

Radiated Emissions					
Equipment	Manufacturer	Model No	Inventory No.	Cal Date	Cal Due Date
Loop antenna	SCHWARZBECK	FMZB 1516	CQA-060	2021/9/16	2024/9/15
Horn Antenna	R&S	BBHA 9170	CQA-088	2021/9/16	2024/9/15
Horn Antenna	R&S	HF906	CQA-012	2021/9/16	2024/9/15
Bilog Antenna	R&S	HL562	CQA-011	2021/9/16	2024/9/15
EMI Test Receiver	R&S	ESR7	CQA-005	2022/9/9	2023/9/8
Spectrum analyzer	R&S	FSU26	CQA-038	2022/9/9	2023/9/8
Preamplifier	MITEQ	AMF-6D- 02001800- 29-20P	CQA-036	2022/9/9	2023/9/8
Coaxial cable (1GHz~40GHz)	CQA	N/A	C007	2022/9/9	2023/9/8
Coaxial cable (9KHz~1GHz)	CQA	N/A	C013	2022/9/9	2023/9/8

Harmonic Current & Voltage Fluctuation and Flicker					
Equipment	Manufacturer	Model No	Inventory No.	Cal Date	Cal Due Date
Harmonic And Flicker Analyzer	CI	PACS-3	CQA-021	2022/9/9	2023/9/8
AC Power Supply	CI	5001 ix	CQA-073	2022/9/9	2023/9/8

Electrostatic Discharge					
Equipment	Manufacturer	Model No	Inventory No.	Cal Date	Cal Due Date
ESD Simulator	EM TEST	DITO	CQA-001	2022/9/9	2023/9/8

Electrical Fast Transients/Burst & Surge & Voltage Dips and Interruptions at Power Port					
Equipment	Manufacturer	Model No	Inventory No.	Cal Date	Cal Due Date
EMS test system	HTEC	ECOMPACT 7	CQA-002	2022/9/9	2023/9/8
Communications surge generator	HTEC	HTSG 70	CQA-063	2022/9/9	2023/9/8
Capacitive Coupling Clamp	HTC	H3C	CQA-018	2022/9/9	2023/9/8

Conducted Immunity (150kHz-80MHz)					
Equipment	Manufacturer	Model No	Inventory No.	Cal Date	Cal Due Date
RF-Generator	EM TEST	CWS 500	CQA-016	2022/9/9	2023/9/8
6db Attenuator	EM TEST	ATT6/75	CQA-049	2022/9/9	2023/9/8
CDN	SCHWARZBECK	CDN M2/M3PE	CQA-050	2022/9/9	2023/9/8

Radiated Immunity (80MHz-6GHz)					
Equipment	Manufacturer	Model No	Inventory No.	Cal Date	Cal Due Date
3m Anechoic Chamber	Albatross	APC13102-SAC	Z-064	2021/9/11	2024/10/10
Signal Generator	R&S	SMB100A	Z-063-01	2022/9/9	2023/9/8
Power amplifier	R&S	BBA150-BC1000	Z-140	2022/9/9	2023/9/8
Power amplifier	R&S	BBA150-D200+E200	Z-144	2022/9/9	2023/9/8
log-periodic antenna	R&S	HL046E	Z-063-18	2021/9/16	2024/9/15
Stacked Double Log-periodic Antenna	Schwarzbeck	STLP 9149	Z-063-19	2021/9/16	2024/9/15
Power Meter	R&S	NRP2	Z-063-06	2022/9/9	2023/9/8
Audio mouth	BK	BK-4227	Z-063-23	2022/9/9	2023/9/8
Audio Box	BK	ACO-B0X	Z-063-24	2022/9/9	2023/9/8
Audio analyzer	R&S	UPL	Z-063-76	2022/9/9	2023/9/8

6 Emission Test Results

6.1 Radiated Emissions

Test Requirement: EN 55032

Test Method: EN 55032

Measurement Distance: 3m

Ambient: Temp.:25.5°C

Humid.: 53%

Press.: 1009mbar

Test Mode: Normal working

Receive Setup:

Frequency range (MHz)	Detector	RBW	VBW
30-1000	Quasi-peak	120kHz	300kHz
Above 1000	Peak	1MHz	3MHz

Table 1: Requirements for radiated emissions for Class B equipment

Limit:

Frequency	Limit(@3m)	Detector
30MHz-230MHz	40dBμV/m	QP
230MHz-1GHz	47dBμV/m	QP
1GHz-3GHz	50dBμV/m	Average
	70dBμV/m	PK
3GHz-6GHz	54dBμV/m	Average
	74dBμV/m	PK

Test Setup:

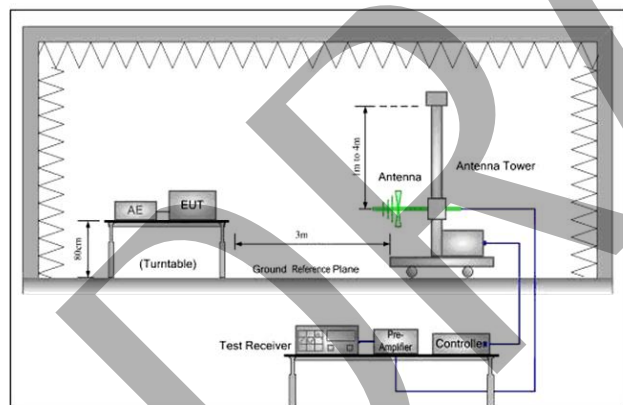


Figure 1. 30MHz to 1GHz

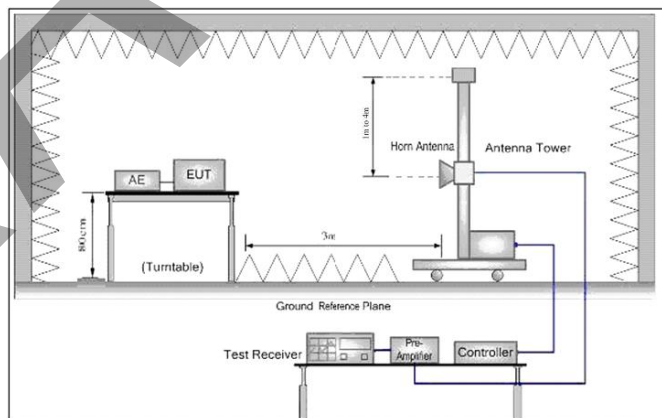


Figure 2. Above 1 GHz

1. From 30 MHz to 1GHz test procedure as below:

- 1) The radiated emissions were tested in a semi-anechoic chamber.
- 2) The EUT is placed on a turntable, which is 0.8m above ground plane.
- 3) The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
- 4) EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
- 5) Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 6) And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 7) Repeat above procedures until the measurements for all frequencies are complete.

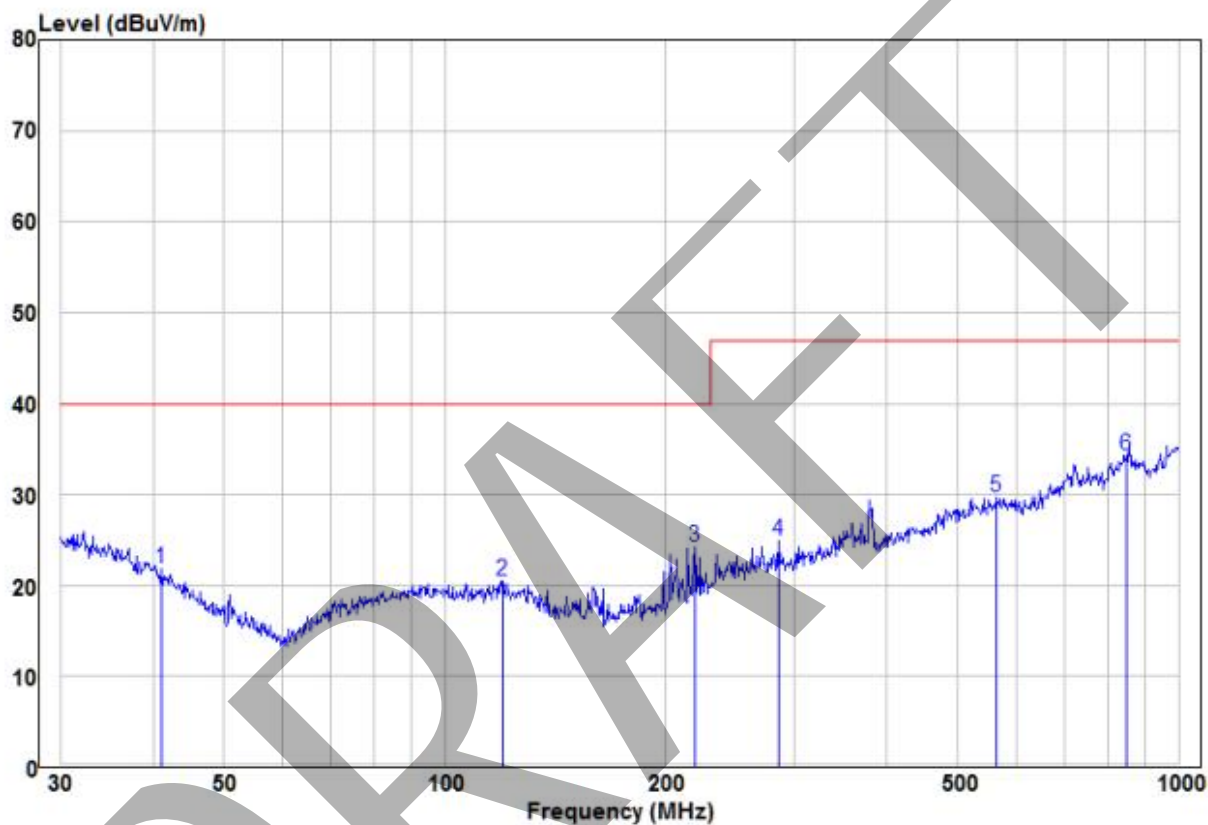
Test Procedure:

2. Above 1GHz test procedure as below:

- 1) Different between above is the test site, change from Semi- Anechoic Chamber

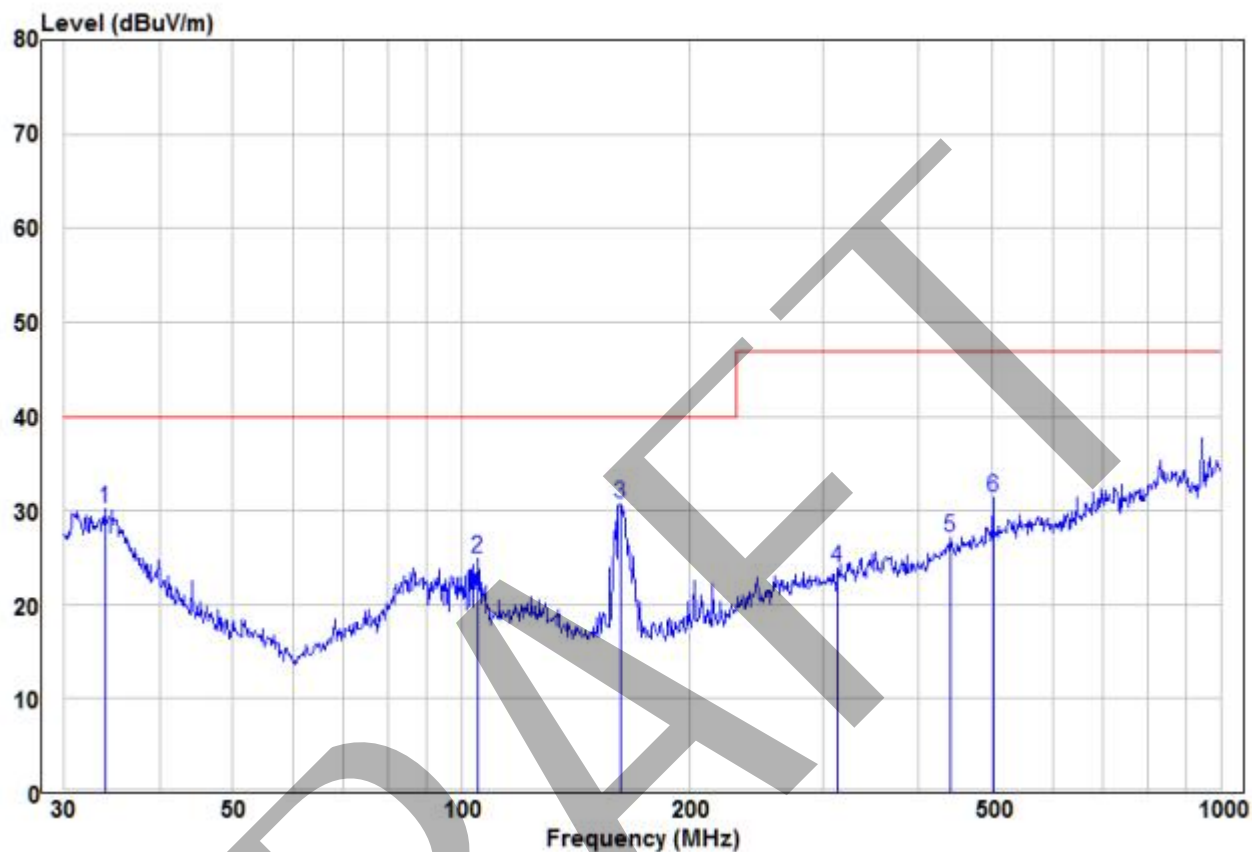
Equipment Used: to fully Anechoic Chamber
Refer to section 5 for details.
Test result: PASS

Measurement Data:
Below 1GHz:
Horizontal:



	Freq	Read	Factor	Level	Limit	Over	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	41.13	9.61	12.26	21.87	40.00	-18.13	Peak	HORIZONTAL
2	119.86	9.78	10.69	20.47	40.00	-19.53	Peak	HORIZONTAL
3	219.08	15.19	9.10	24.29	40.00	-15.71	Peak	HORIZONTAL
4	284.98	11.72	13.23	24.95	47.00	-22.05	Peak	HORIZONTAL
5	562.66	10.82	18.92	29.74	47.00	-17.26	Peak	HORIZONTAL
6 pp	848.06	10.27	24.06	34.33	47.00	-12.67	Peak	HORIZONTAL

Vertical:



	Freq	Read	Factor	Level	Limit	Over	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	33.92	15.30	14.89	30.19	40.00	-9.81	Peak	VERTICAL
2	105.27	14.44	10.40	24.84	40.00	-15.16	Peak	VERTICAL
3 pp	162.04	22.89	7.76	30.65	40.00	-9.35	Peak	VERTICAL
4	313.28	9.85	14.06	23.91	47.00	-23.09	Peak	VERTICAL
5	440.20	10.64	16.42	27.06	47.00	-19.94	Peak	VERTICAL
6	501.18	13.12	18.29	31.41	47.00	-15.59	Peak	VERTICAL

6.2 Conducted Emission

For AC Main Port

Test Requirement: EN 55032

Test Method: EN 55032

Detector: Peak for pre-scan (9kHz Resolution Bandwidth)
 Quasi-Peak if maximized peak within 6dB of Quasi-Peak limit

Ambient: Temp.:25.5°C Humid.: 55% Press.: 1009mbar

Test Mode: Normal working

Equipment Used: Refer to section 5 for details.

Limits for conducted disturbance at the mains ports of class B

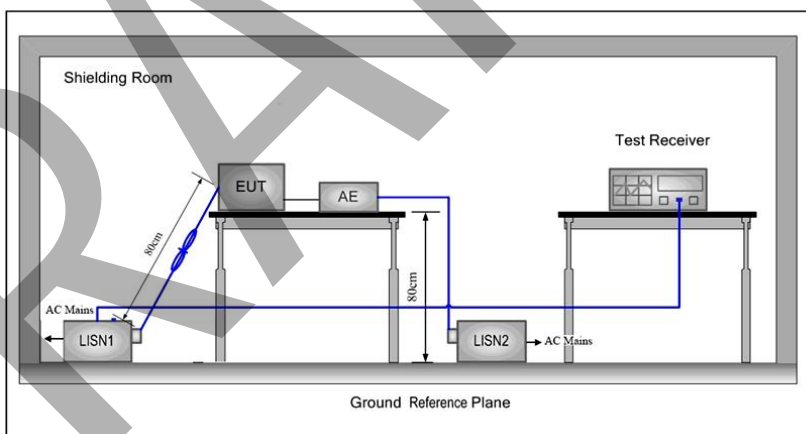
Frequency Range (MHz)	Class B Limit (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Limit:

NOTE 1: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

NOTE 2: The lower limit is applicable at the transition frequency.

Test Setup:



Test Procedure:

- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane.
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.

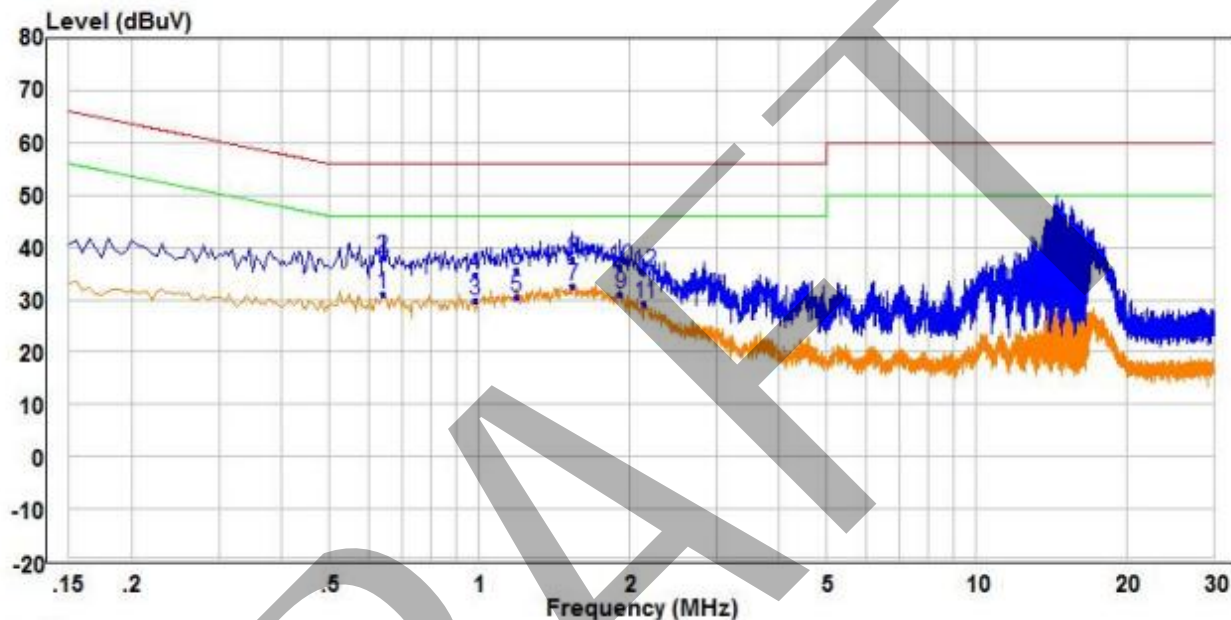
Test result: PASS

Measurement Data:

An initial pre-scan was performed on the live and neutral lines with peak detector.

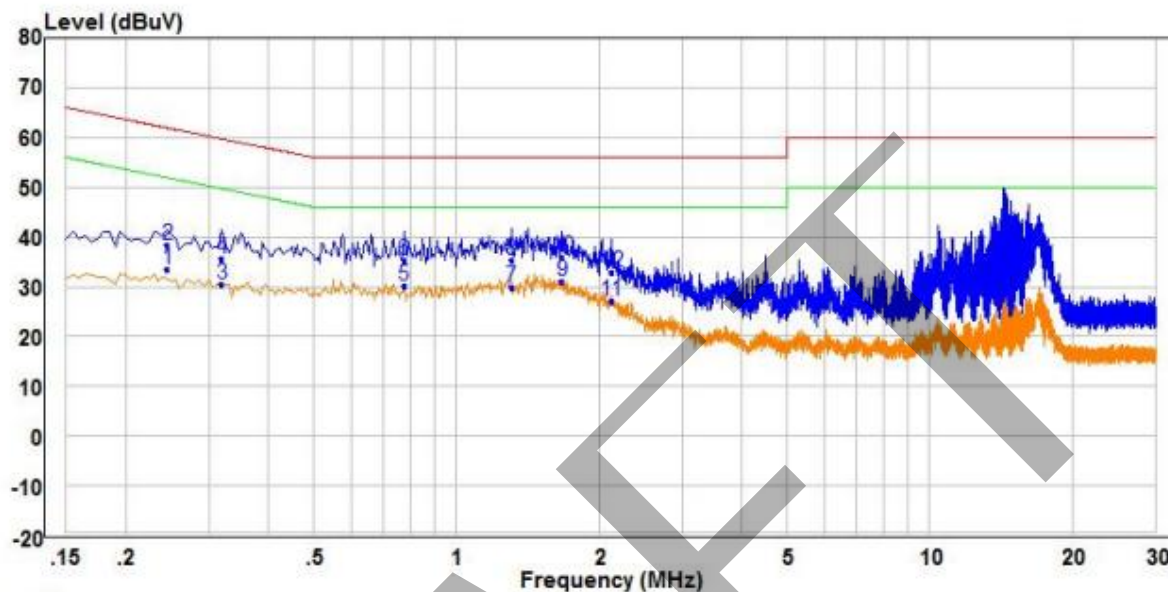
Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Live Line:



	Freq	Read	Factor	Level	Limit	Over	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB		
1	0.640	21.18	9.84	31.02	46.00	-14.98	Average	Line
2 QP	0.640	28.12	9.84	37.96	56.00	-18.04	QP	Line
3	0.980	20.10	9.71	29.81	46.00	-16.19	Average	Line
4	0.980	25.06	9.71	34.77	56.00	-21.23	QP	Line
5	1.190	20.20	10.19	30.39	46.00	-15.61	Average	Line
6	1.190	25.51	10.19	35.70	56.00	-20.30	QP	Line
7 PP	1.540	21.61	10.91	32.52	46.00	-13.48	Average	Line
8	1.540	26.90	10.91	37.81	56.00	-18.19	QP	Line
9	1.920	19.62	11.54	31.16	46.00	-14.84	Average	Line
10	1.920	24.84	11.54	36.38	56.00	-19.62	QP	Line
11	2.150	17.76	11.50	29.26	46.00	-16.74	Average	Line
12	2.150	23.76	11.50	35.26	56.00	-20.74	QP	Line

Neutral Line:



	Freq	Read	Factor	Level	Limit	Over	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB		
1	0.245	23.97	9.54	33.51	51.92	-18.41	Average	Neutral
2	0.245	28.76	9.54	38.30	61.92	-23.62	QP	Neutral
3	0.320	20.93	9.51	30.44	49.71	-19.27	Average	Neutral
4	0.320	26.19	9.51	35.70	59.71	-24.01	QP	Neutral
5	0.775	20.24	9.85	30.09	46.00	-15.91	Average	Neutral
6	0.775	25.38	9.85	35.23	56.00	-20.77	QP	Neutral
7	1.305	20.17	9.72	29.89	46.00	-16.11	Average	Neutral
8	1.305	25.52	9.72	35.24	56.00	-20.76	QP	Neutral
9 PP	1.675	21.37	9.73	31.10	46.00	-14.90	Average	Neutral
10 QP	1.675	26.11	9.73	35.84	56.00	-20.16	QP	Neutral
11	2.125	17.33	9.75	27.08	46.00	-18.92	Average	Neutral
12	2.125	23.05	9.75	32.80	56.00	-23.20	QP	Neutral

6.3 Harmonics Test Results

Test Requirement: EN IEC 61000-3-2

Test Method: EN IEC 61000-3-2

Measurement Time: 3 mins

Classification: Class D

Remark:

There is no need for Harmonics test to be performed on this product (rated power is less than 75W) in accordance with EN IEC 61000-3-2.

For further details, please refer to Clause 7 of EN IEC 61000-3-2 which states:

“For the following categories of equipment, limits are not specified in this standard.

- equipment with a rated power of 75W or less, other than lighting equipment.”

6.4 Flicker Test Results

Test Requirement: EN 61000-3-3

Test Method: EN 61000-3-3

Measurement Time: 10 mins

Limit: EN 61000-3-3 Clause 5

Operating Environment:

Ambient: Temp.:25.5°C

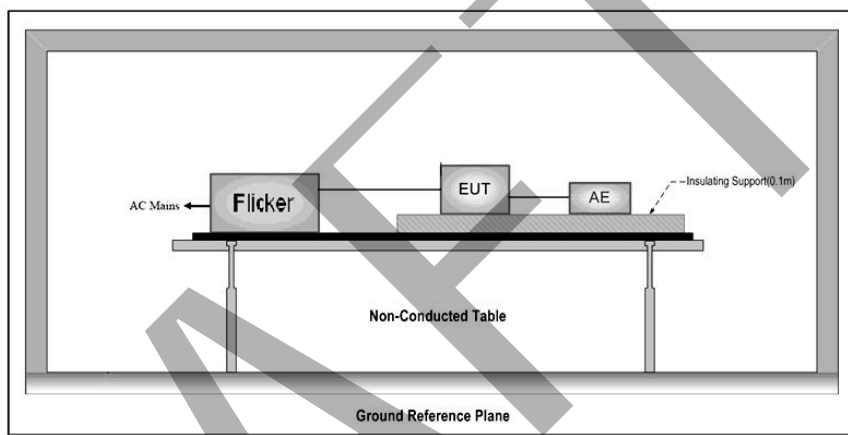
Humid.: 55%

Press.:1009mbar

Test Mode: Normal working

Equipment Used: Refer to section 5 for details.

Test Setup:

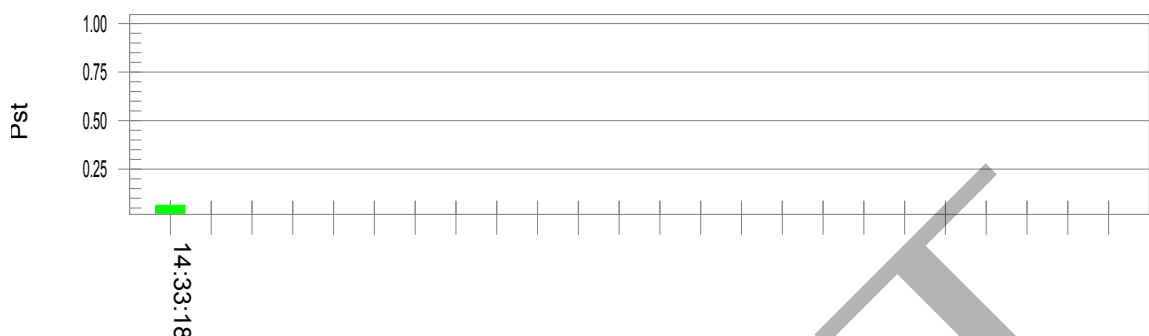


Test result: PASS

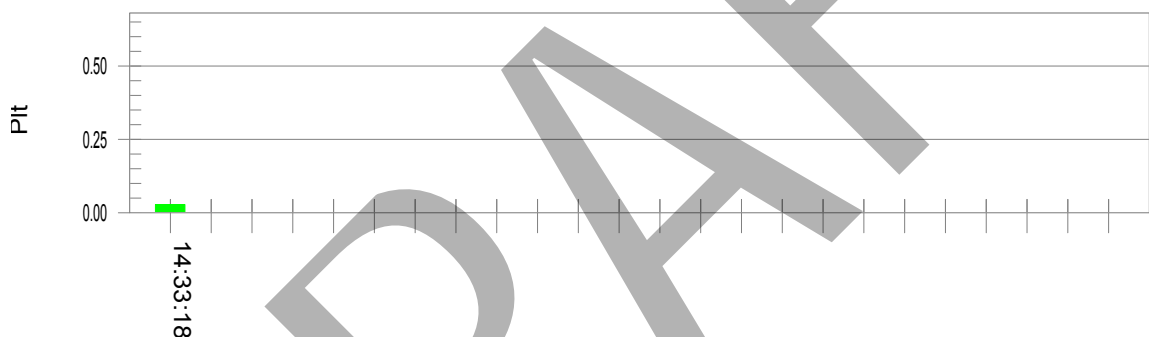
Measurement Date:

Pst_i and limit line

European Limits



Plt and limit line



Parameter values recorded during the test:

Vrms at the end of test (Volt): 229.85

T-max (mS): 0

Highest dc (%): 0.00

Highest dmax (%): 0.00

Highest Pst (10 min. period): 0.064

Highest Plt (2 hr. period): 0.028

Test limit (mS): 500.0 Pass

Test limit (%): 3.30 Pass

Test limit (%): 4.00 Pass

Test limit: 1.000 Pass

Test limit: 0.650 Pass

7 Immunity Test Results

Performance Criteria Description in Clause 8 of EN 55035

Criterion A:

The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function or change of operation state is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

During the test application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test.

Criterion B:

After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.

If the minimum performance level (or the permissible performance loss), or recovery time, is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Criterion C:

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed.

Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

7.1 Radiated Immunity

Test Requirement: EN 55035

Test Method: EN 61000-4-3

EUT Operation:

Ambient: Temp.:25.5°C

Humid.: 55%

Press.: 1009mbar

Test Mode: Normal working

Criterion Required: A

Equipment Used: Refer to section 5 for details.

Test Setup:

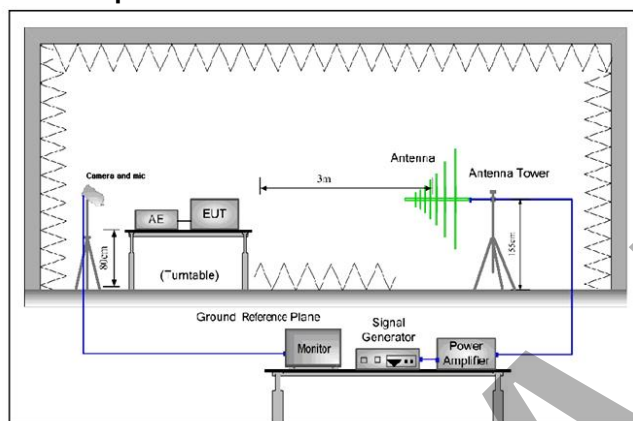


Figure 1. 80MHz to 1GHz

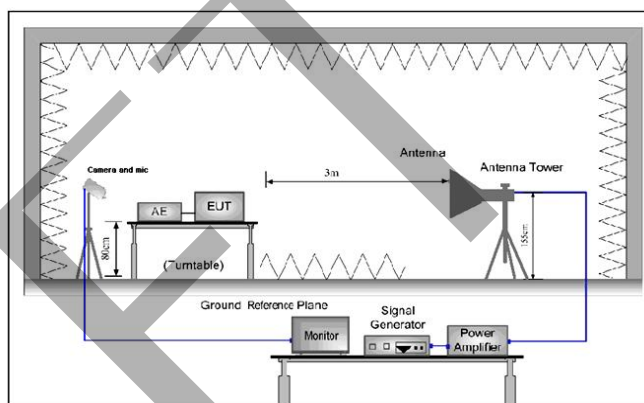


Figure 2. 1GHz to 6GHz

Test Procedure:

- 1) For table-top equipment, the EUT was placed in the chamber on a non-conductive table 0.8m high. For arrangement of floor-standing equipment, the EUT was mounted on a non-conductive support 0.1m above the supporting plane. For human body-mounted equipment, the EUT may be tested in the same manner as table top items.
- 2) If possible, a minimum of 1 m of cable is exposed to the electromagnetic field. Excess length of cables interconnecting units of the EUT shall be bundled low-inductively in the approximate center of the cable to form a bundle 30 cm to 40 cm in length.
- 3) The EUT was initially placed with one face coincident with the calibration plane. The EUT face being illuminated was contained within the UFA (Uniform Field Area).
- 4) The frequency ranges to be considered were swept with the signal modulated and pausing to adjust the RF signal level or to switch oscillators and antennas as necessary. Where the frequency range was swept incrementally, the step size was not exceed 1 % of the preceding frequency value.
- 5) The dwell time of the amplitude modulated carrier at each frequency was not be less than the time necessary for the EUT to be exercised and to respond, and was not less than 0.5 s.
- 6) The test normally was performed with the generating antenna facing each side of the EUT.
- 7) The polarization of the field generated by each antenna necessitates testing each selected side twice, once with the antenna positioned vertically and again with the antenna positioned horizontally.
- 8) The EUT was performed in a configuration to actual installation conditions, a video camera and/or an audio monitor were used to monitor the performance of the EUT.

Test result: PASS

Test result:

Frequency	Level	Modulation	EUT Face	Antenna Polaxis	Result / Observations
80MHz-1GHz, 1800MHz 2600MHz 3500MHz 5000MHz	3V/m	1kHz, 80% Amp. Mod, 1% increment Dwell time: 3 seconds	Front	V	A
				H	A
			Back	V	A
				H	A
			Left	V	A
				H	A
			Right	V	A
				H	A
			Top	V	A
				H	A
			Under	V	A
				H	A

Remarks:

A: No performance degradation during test.

round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT.

- 6) After each discharge, the ESD generator was removed from the EUT, the generator was then retriggered for a new single discharge. For ungrounded product, a discharge cable with two resistances was used after each discharge to remove remnant electrostatic voltage. 10 times of each polarity single discharge were applied to HCP and VCP.

Test result: PASS

Test data:

Observations:

Test Point:

1. All insulated enclosure and seams.
2. All accessible metal parts of the enclosure.

Direct Application Test Results				
Direct Application			Test Results	
Discharge Level (kV)	Pulse No.	Test Point	Contact Discharge	Air Discharge
± 8	10 for every level	1	N/A	A
± 4	10 for every level	2	A	N/A
Indirect Application for tabletop equipment Test Results				
Indirect Application			Test Results	
Discharge Level (kV)	Pulse No.		Horizontal Coupling	Vertical Coupling
± 4	10 for every level		A	A

Remark:

A: No performance degradation during test.

N/A: Not applicable

Test data:

Frequency	Line	Test Level	Modulation	Step Size	Dwell Time	Observation (Performance Criterion)
150kHz to 10MHz	AC port (2 Line)	3Vrms	80%, 1kHz Amp. Mod.	1%	2 S	A
10MHz to 30MHz		3 to 1Vrms	80%, 1kHz Amp. Mod.	1%	2 S	A
30MHz to 80MHz		1Vrms	80%, 1kHz Amp. Mod.	1%	2 S	A

Remark:

A: No performance degradation during test.

7.4 Electrical Fast Transients (EFT)

Test Requirement:	EN 55035
Test Method:	EN 61000-4-4
Test Level:	$\pm 1.0\text{kV}$ 5/50 ns 5 kHz on AC port.
Polarity:	Positive & Negative
Criterion Required:	A
Repetition Frequency:	5kHz (For CPE xDSL ports repetition frequency is 100kHz)
Burst Period:	300ms
Test Duration:	2 minute per level & polarity
EUT Operation:	
Ambient:	Temp.:25.5°C Humid.: 55% Press.: 1009mbar
Test Mode:	Normal working
Equipment Used:	Refer to section 5 for details.
Test Setup:	

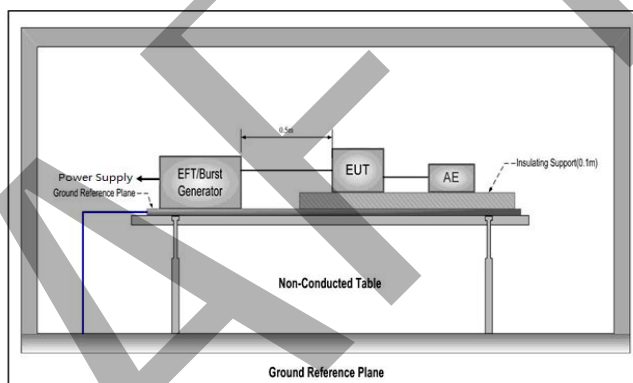


Figure 1. For AC port

Test Procedure:

- 1) The EUT was placed on a ground reference plane (GRP) insulated by an insulating support 0.1 m thick and the GRP was placed on a 0.8m high wooden table for table-top equipment. For floor standing equipment, the EUT was placed on a 0.1m high wooden support above the GRP.
- 2) The GRP shall project beyond the EUT and the clamp by at least 0.1m on all sides. The distance between the EUT and any other of the metallic surface except the GRP was greater than 0.5m. All cables to the EUT were placed on the insulation support 0.1m above GRP. A cable not subject to EFT was routed as far as possible from cable under test to minimize the coupling between the cables.
- 3) The length of signal and power cable between the EUT and EFT generator was 0.5m. If the cable is a non-detachable supply cable more than 0.5m, the excess length of this cable shall be folded to avoid a flat coil and situated at a distance of 0.1m above the GRP.
- 4) The EUT was conducted the below specified test voltages for line and neutral or line, neutral and earth simultaneously (for telecommunication, single, control and DC port line with capacitive coupling clamp), 120 seconds duration. If the equipment contains identical ports, only one was tested; multicomputer cables, such as a 50-pair telecommunication cable, were tested as a single cable. Cables did not be split or divided into groups of conductors for this test; interface ports, which were intended by the manufacturer to be connected to data cables not longer than 3 m, did not be tested.

Test result: PASS

Test data:

Lead under Test	Level (kV)	Coupling Direct/Clamp	Observations (Performance Criterion)
Live	± 1.0	Direct	A
Neutral	± 1.0	Direct	A
Live, Neutral	± 1.0	Direct	A

Remark:

A: No performance degradation during test.

DRAFT

7.5 Surge

Test Requirement: EN 55035

Test Method: EN 61000-4-5

Test Level: For AC port

- 1) 1kV 1.2/50(8/20) μ s Live to Neutral
- 2) 2kV 1.2/50(8/20) μ s Live, Neutral to Earth

Criterion Required: for AC mains power ports: B

Polarity: Positive & Negative

Interval: 60s between each surge

EUT Operation:

Ambient: Temp.:25.5°C

Humid.: 55%

Press.: 1009mbar

Test Mode: Normal working

Equipment Used: Refer to section 5 for details.

Test Setup:

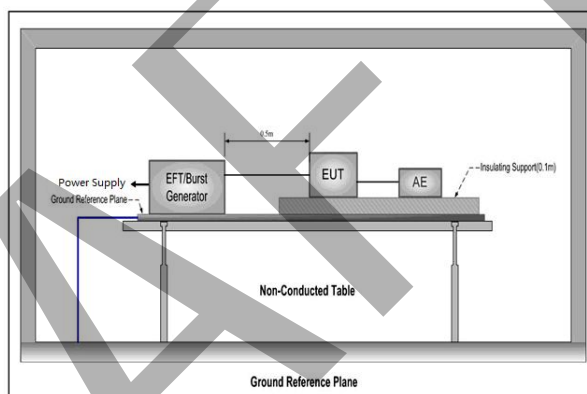


Figure 1. For AC port

Test Procedure:

- 1) The EUT was placed on a ground reference plane (GRP) insulated by an insulating support 0.1 m thick and the GRP was placed on a 0.8m high wooden table for table-top equipment. For floor standing equipment, the EUT was placed on a 0.1m high wooden support above the GRP.
- 2) The 1.2/50 μ s surge was to be applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks were 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 so that the specified wave may be applied on the lines under test.
- 3) The power cord between the EUT and the coupling/decoupling network was not exceed 2 m in length. The interconnection line between the EUT and the coupling/decoupling network shall not exceed 2 m in length.
- 4) The EUT was conducted 1 kV test voltage for line to line and line to neutral and conducted 2 kV test voltage for line to earth and neutral to earth, five positive pulses and five negative pulses each at 90° and 270° for a.c. power ports and five positive pulses and five negative surge pulses for d.c. power ports (for analogue/digital data ports (unshielded symmetrical) port, It was 1 kV and 4kV for cable longer than 3m line to ground, for analogue/digital data ports (coaxial or shielded), It was 0.5 kV for cable longer than 3m line to ground, five positive pulses and five negative surge pulses), for DC network power ports (outdoor cables, cable lengths greater than 3m), It was 0.5 kV for cable longer than 3m line to reference ground, The test levels were applied on the EUT with a 2 Ω generator source impedance for power supply terminals and 40 Ω output impedance for interconnection lines. The tests were done at repetition rate one per minute.,

Test Results: PASS

Test Data:

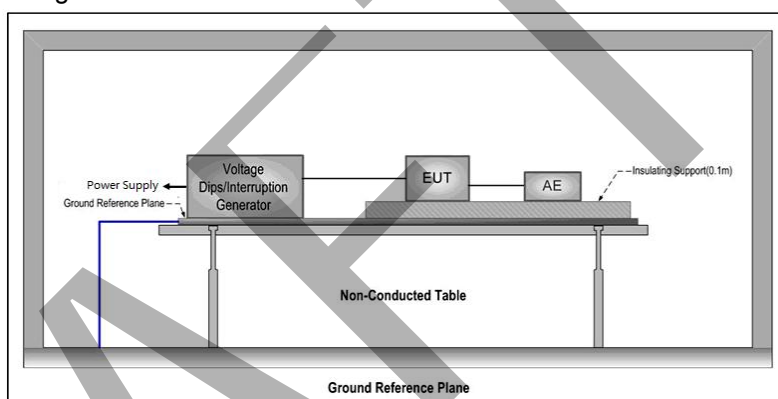
For AC port (3 line)					
Pulse No	Line-Line	Level (kV)	Surge interval	phase (deg)	Observation (Performance Criterion)
1-5	L-N	+1	60s	90°	A
6-10	L-N	-1	60s	270°	A

Remark:

A: No performance degradation during test.

7.6 Voltage Dips and Interruptions

Test Requirement: EN 55035
Test Method: EN 61000-4-11
 Voltage dip: >95% reduction voltage for 0.5 period; B
Test Level: Voltage dip: 30 % reduction voltage for 25 cycles,50Hz and 30 cycles,60Hz; C
 Voltage interruption: >95% reduction voltage for 250 cycles,50Hz and 300 cycles,60Hz; C
No. of Dips / Interruptions: 3 per Level
EUT Operation:
Ambient: Temp.:25.5°C Humid.: 55% Press.: 1009mbar
Test Mode: Normal working
Test Setup:



Test Procedure:

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

Equipment Used:

Test result: Refer to section 5 for details.

PASS

Test data:

EUT operating mode	% U _T	Phase	Duration of dropout in Periods	No. of dropout	Time between dropout	Observations (Performance Criterion)
Above modes	0	0° & 90°&270	0.5 cycles (50Hz&60Hz)	3	10s	A
Above modes	70	0° & 90°&270	25 cycles for 50Hz 30 cycles for 60Hz	3	10s	A
Above modes	0	0° & 90°&270	250 cycles for 50Hz 300 cycles for 60Hz	3	10s	C

Remark:

A: No performance degradation during test.

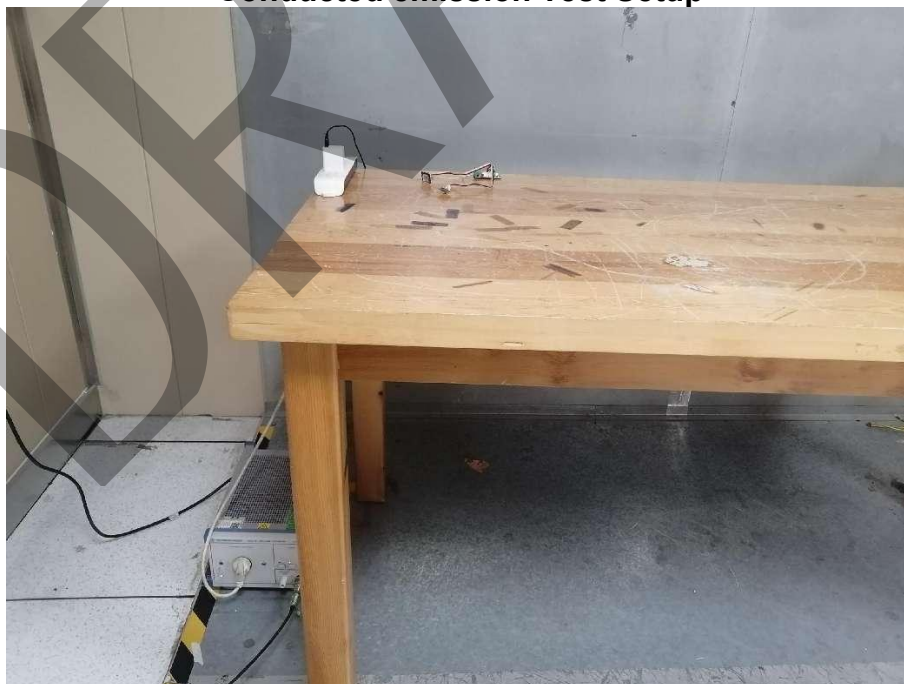
C: During the test, the EUT shut down, after the test, it reset by user.

APPENDIX 1 PHOTOGRAPHS OF TEST SETUP

Radiated emission Test Setup (30MHz~1GHz)



Conducted emission Test Setup



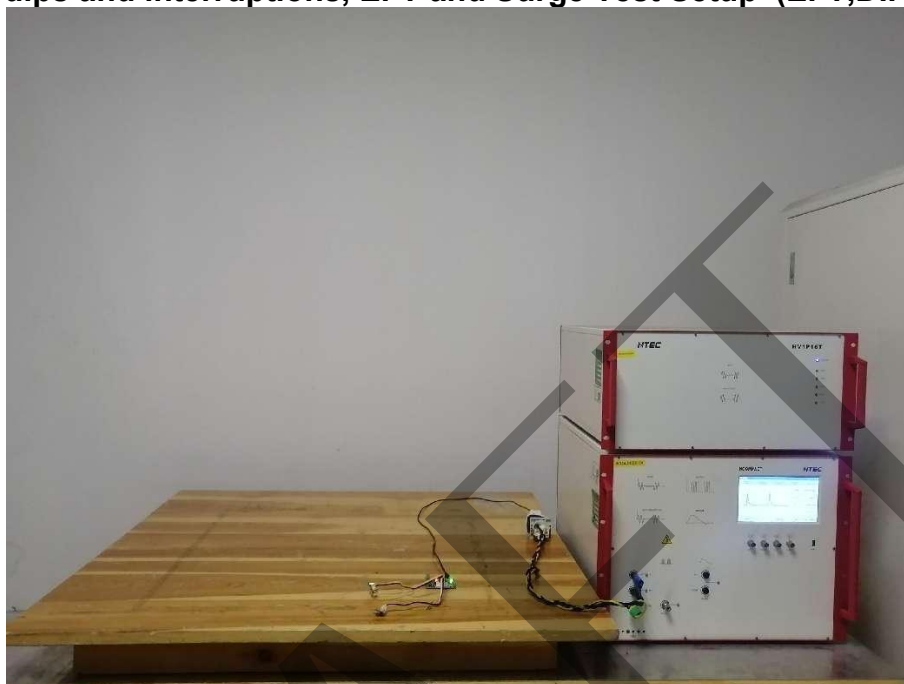
Voltage fluctuations and flicker Test Setup(Flicker)



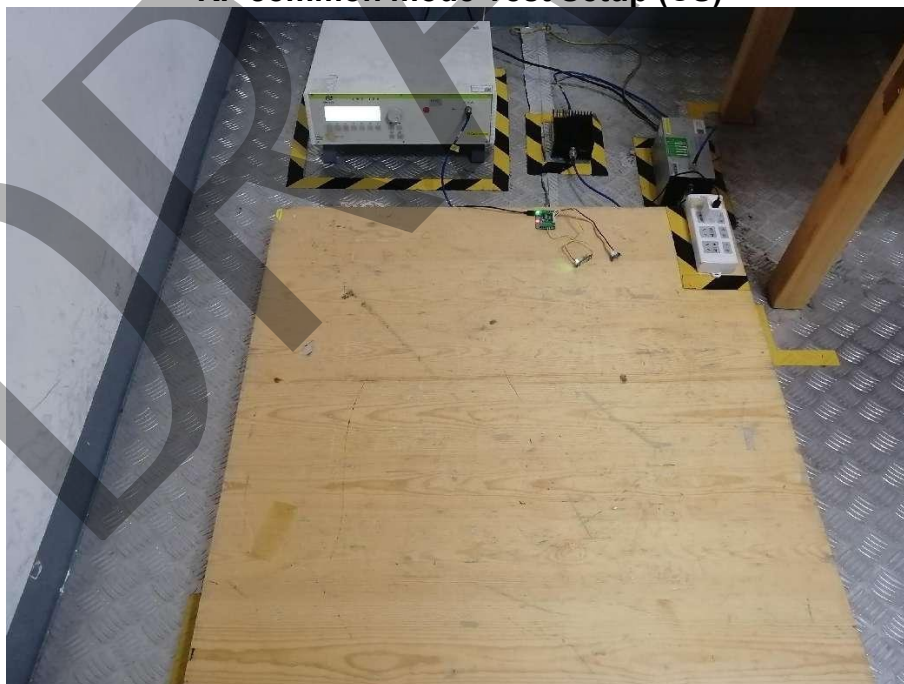
Electrostatic discharge Test Setup(ESD)



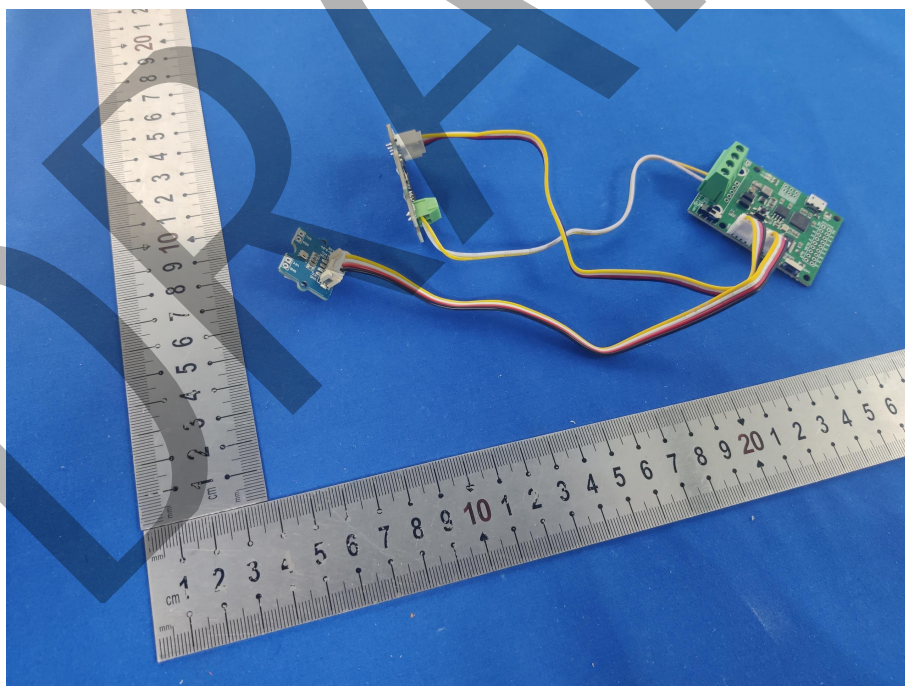
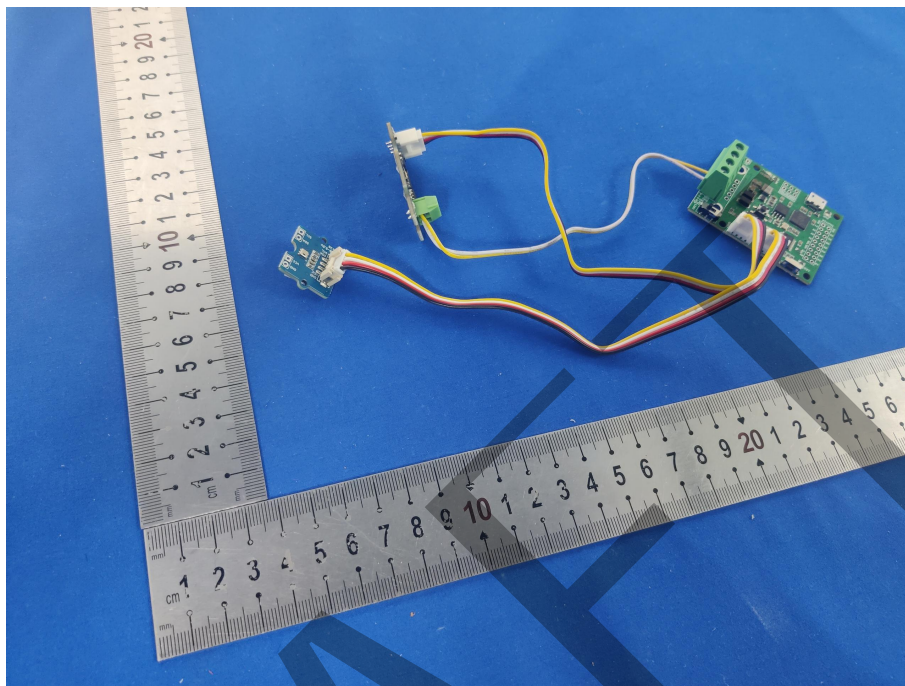
Voltage dips and interruptions, EFT and Surge Test Setup (EFT,DIPS,Surge)

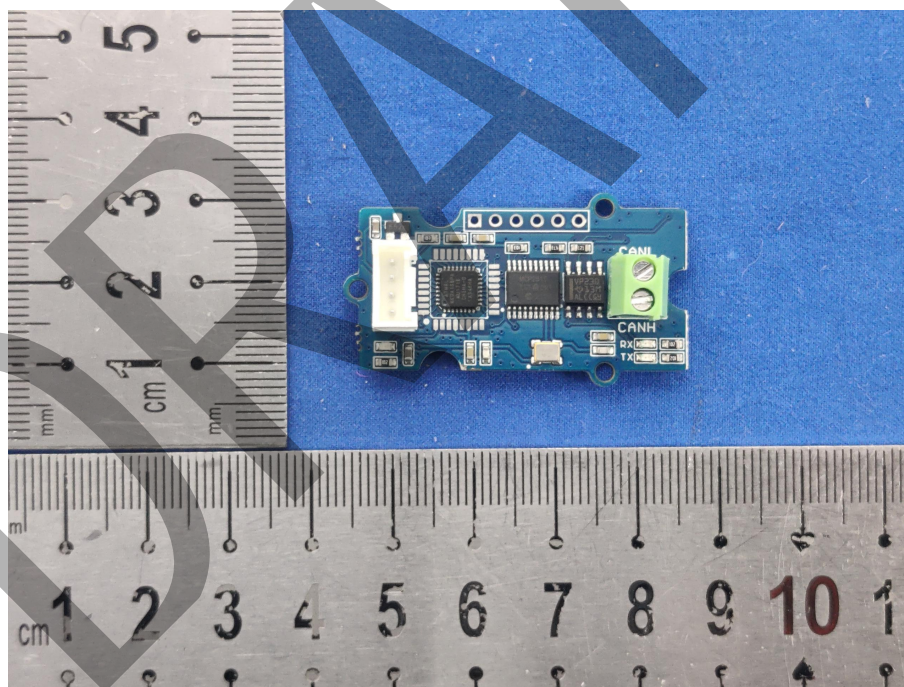
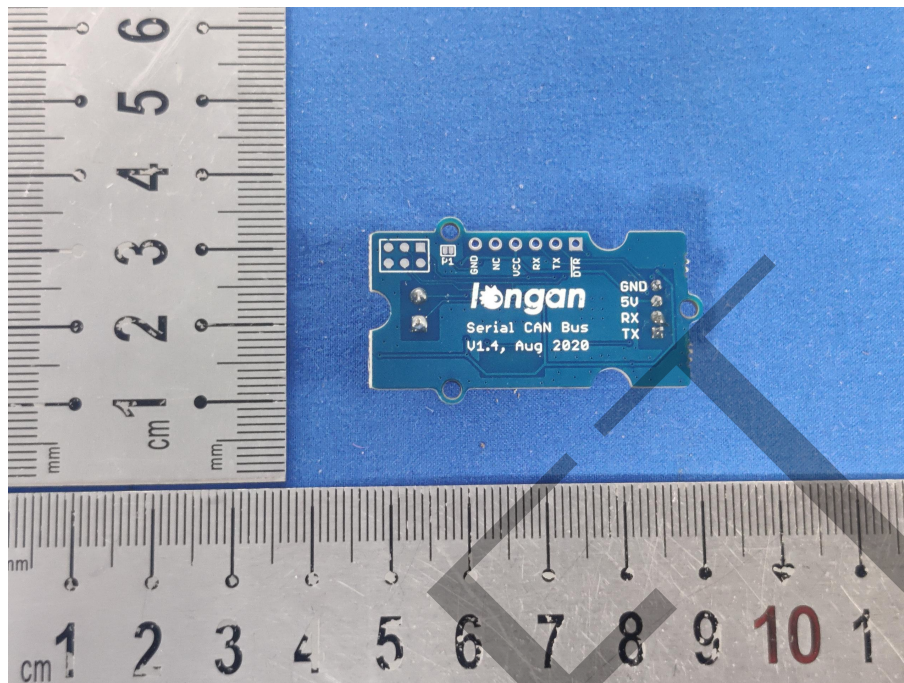


RF common mode Test Setup (CS)



APPENDIX 2 PHOTOGRAPHS OF EUT





*** END OF REPORT ***