



# **CE&UKCA EMC Test Report**

Project No.	:	2409C069C
Equipment	:	LCD Monitor
Brand Name	:	N/A
Model Name	:	25G4S
Series Model	:	**25G4******, **CS25****** (*=0-9,A-Z,a-z,+,-,/,\ or blank), 25G4SRE
Applicant	:	TPV Electronics (Fujian) Co., Ltd.
Address	:	Rongqiao Economic and Technological Development Zone, Fuqing City,
		Fujian Province, P.R. China
Date of Receipt	:	Apr. 02, 2025
Date of Test	:	Apr. 02, 2025 ~ Apr. 23, 2025
Issued Date	:	Apr. 28, 2025
<b>Report Version</b>	:	R00
Test Sample	:	Engineering Sample No.: DG20250402108
Standard(s)	:	Please refer to Page 2.

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

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Standard(s)	:	EN 55032:2015
		EN 55032:2015+A11:2020
		EN 55032:2015+A1:2020
		CISPR 32:2015+AMD1:2019
		AS/NZS CISPR 32:2015+AMD1:2020
		EN 61000-3-2:2014
		EN IEC 61000-3-2:2019+A1:2021
		EN 61000-3-3:2013
		EN 61000-3-3:2013+A1:2019
		EN 61000-3-3:2013+A2:2021
		EN 55035:2017/CISPR 35:2016
		EN 55035:2017+A11:2020
		BS EN 55032:2015
		BS EN 55032:2015+A11:2020
		BS EN 55032:2015+A1:2020
		BS EN 61000-3-2:2014
		BS EN IEC 61000-3-2:2019+A1:2021
		BS EN 61000-3-3:2013
		BS EN 61000-3-3:2013+A1:2019
		BS EN 61000-3-3:2013+A2:2021
		BS EN 55035:2017
		BS EN 55035:2017+A11:2020



### Declaration

**BTL** represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

**BTL**'s reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. BTL assumes no responsibility for the data provided by the customer, any statements, inferences or generalizations drawn by the customer or others from the reports issued by BTL.

The report must not be used by the client to claim product certification, approval, or endorsement by A2LA or any agency of the U.S. Government.

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**BTL**'s laboratory quality assurance procedures are in compliance with the ISO/IEC 17025: 2017 requirements, and accredited by the conformity assessment authorities listed in this test report.

**BTL** is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer which may affect the validity of results, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements of applied standards and in all the possible configurations as representative of its intended use.

#### 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**

Report No.	Version	Description	Issued Date	Note
BTL-EMC-1-2409C069C	R00	This is a supplementary report to the original test report (BTL-EMC-1-2409C069B). 1. Added series model. 2. Added a base. So the radiated emissions, ESD, RS and PFMF are retested and recorded. The other test results please refer to original report.	Apr. 28, 2025	Valid

# **1. SUMMARY OF TEST RESULTS**

Test procedures according to the technical standards:

Emission				
Standard(s)	Test Item		Result	
	Radiated emissions up to 1 GHz		PASS	
EN 55032:2015	Radiated emissions above 1 GHz		PASS	
EN 55032:2015+A11:2020	Radiated emissions from FM receivers		N/A	
EN 55032:2015+A1:2020 CISPR 32:2015+AMD1:2019	Conducted emissions AC mains power port		PASS (Note 3)	
AS/NZS CISPR 32:2015+AMD1:2020 BS EN 55032:2015	Asymmetric mode	AAN	N/A	
BS EN 55032:2015+A11:2020	conducted	Current Probe	N/A	
BS EN 55032:2015+A1:2020	emissions	CP+CVP	N/A	
	Conducted differe	ntial voltage emissions	N/A	

Standard(s)	Test Item	Result
EN 61000-3-2:2014 EN IEC 61000-3-2:2019+A1:2021 BS EN 61000-3-2:2014 BS EN IEC 61000-3-2:2019+A1:2021	Harmonic current	PASS (Note 3)
EN 61000-3-3:2013 EN 61000-3-3:2013+A1:2019 EN 61000-3-3:2013+A2:2021 BS EN 61000-3-3:2013 BS EN 61000-3-3:2013+A1:2019 BS EN 61000-3-3:2013+A2:2021	Voltage fluctuations (Flicker)	PASS (Note 3)

Immunity				
Standard(s)	Ref Standard(s)	Test Item	Result	
	IEC 61000-4-2:2008 EN 61000-4-2:2009	ESD	PASS	
	IEC 61000-4-3:2020 EN IEC 61000-4-3:2020	RS	PASS	
EN 55035:2017/CISPR 35:2016	IEC 61000-4-4:2012 EN 61000-4-4:2012	EFT	PASS (Note 3)	
EN 55035:2017+A11:2020 BS EN 55035:2017	IEC 61000-4-5:2014+AMD1:2017 EN 61000-4-5:2014+A1:2017	Surge	PASS (Note 3)	
BS EN 55035:2017+A11:2020	IEC 61000-4-6:2013 EN 61000-4-6:2014+AC:2015	CS	PASS (Note 3)	
	IEC 61000-4-8:2009 EN 61000-4-8:2010	PFMF	PASS	
	IEC 61000-4-11:2020 EN IEC 61000-4-11:2020	Dips	PASS (Note 3)	



Standard(s)	Section	Test Item	Result
EN 55035:2017/CISPR 35:2016 EN 55035:2017+A11:2020	4.2.7	BIN-R	N/A
EN 55035:2017+A11:2020 BS EN 55035:2017 BS EN 55035:2017+A11:2020	4.2.7	BIN-I	N/A

NOTE:

- "N/A" denotes test is not applicable to this device. This supplementary report does not affect the standards: EN 55032:2015 & BS EN 55032:2015, (1) (2) the test results please refer to the original report: BTL-EMC-1-2409C069B.
- (3) The test results please refer to original report: BTL-EMC-1-2409C069B.



### 1.1 TEST FACILITY

The test facilities used to collect the test data in this report No.3, Jinshagang 1st Road, Dalang, Dongguan, Guangdong People's Republic of China.

### **1.2 MEASUREMENT UNCERTAINTY**

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2, The BTL measurement uncertainty is less than the CISPR 16-4-2  $U_{cispr}$  requirement.

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

A. Radiated emissions up to 1 GHz measurement:

Test Site	Method	Measurement Frequency Range	Ant. H / V	<i>U</i> ,(dB)
DG-CB08 (10m)		30MHz ~ 200MHz	V	4.48
	CISPR	30MHz ~ 200MHz	Н	4.50
		200MHz ~ 1,000MHz		4.60
		200MHz ~ 1,000MHz	Н	4.84

B. Radiated emissions above 1 GHz measurement:

Test Site	Method	Measurement Frequency Range	<i>U</i> ,(dB)
DG-CB08 (3m)	CISPR	1GHz ~ 6GHz	4.24

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	Test Date
Radiated emissions up to 1 GHz	22°C	52%	Zinco Chen	Apr. 16, 2025
Radiated emissions above 1 GHz	22°C	52%	Zinco Chen	Apr. 16, 2025

Test Item	Temperature	Humidity	Pressure	Tested By	Test Date
ESD	22°C	46%	1015hPa	Paul Li	Apr. 15, 2025
RS	25°C	50%	/	Hunter Xu	Apr. 22, 2025
PFMF	29°C	52%	/	Sean Wan	Apr. 21, 2025



# 2. GENERAL INFORMATION

# 2.1 GENERAL DESCRIPTION OF EUT

Equipment	LCD Monitor
Brand Name	N/A
Model Name	25G4S
Series Model	**25G4*****, **CS25****** (*=0-9,A-Z,a-z,+,-,/,\ or blank), 25G4SRE
Model Difference(s)	Only differ in model name due to marketing purpose.
Identification No. of EUT(S/N)	N/A
Dimensions and mass	56cm x 32.5cm x 5cm
Component unit of EUT	⊠Single unit ⊡Multiple unit
Sample Status	⊠Engineering sample □Final shipment prototype
Power Source	AC Mains.
Power Rating	100-240V~ 50/60Hz 1.5A
Connecting I/O Port(s)	1* AC port 2* HDMI port 1* DP port 1* Earphone port
Classification of EUT	Class B
Highest Internal Frequency(Fx)	571MHz

Cable Type	Shielded Type	Ferrite Core	Length(m)	Note
AC Power Cord	Non-shielded	NO	1.8/1.5/1.2	-
HDMI	Shielded	YES	1.8/1.5/1.2	Bonded two Ferrite Cores
DP	Shielded	NO	1.8/1.5/1.2	-

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	HDMI1 1920*1080/240Hz PC 1.8m
Mode 2	HDMI2 1920*1080/240Hz PC 1.8m
Mode 3	DP 1920*1080/310Hz PC 1.8m
Mode 4	HDMI1 1080P DVD 1.8m
Mode 5	HDMI1 1920*1080/240Hz PC 1.5m
Mode 6	HDMI2 1920*1080/240Hz PC 1.5m
Mode 7	DP 1920*1080/310Hz PC 1.5m
Mode 8	HDMI1 1920*1080/240Hz PC 1.2m
Mode 9	HDMI2 1920*1080/240Hz PC PC 1.2m
Mode 10	DP 1920*1080/310Hz PC 1.2m

Radiated emissions up to 1 GHz Test				
Final Test Mode Description				
Mode 1 HDMI1 1920*1080/240Hz PC 1.8m				

Radiated emissions Above 1 GHz Test					
Final Test Mode	Final Test Mode Description				
Mode 1 HDMI1 1920*1080/240Hz PC 1.8m					



	Immunity Test					
Final Test Mode	Description					
Mode 1	HDMI1 1920*1080/240Hz PC 1.8m					
Mode 2	HDMI2 1920*1080/240Hz PC 1.8m					
Mode 3	DP 1920*1080/310Hz PC 1.8m					
Mode 4	HDMI1 1080P DVD 1.8m					
Mode 5	HDMI1 1920*1080/240Hz PC 1.5m					
Mode 6	HDMI2 1920*1080/240Hz PC 1.5m					
Mode 7	DP 1920*1080/310Hz PC 1.5m					
Mode 8	HDMI1 1920*1080/240Hz PC 1.2m					
Mode 9	HDMI2 1920*1080/240Hz PC PC 1.2m					
Mode 10	DP 1920*1080/310Hz PC 1.2m					

Note:

1. RS: The Front, Rear, Left and Right were evaluated. The worst placement direction is Front and recorded in this report.

2. The audio output function of CS/RS is recorded the worst mode.



# 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 Earphone via Earphone Cable.
- 2. EUT connected to PC via HDMI & DP Cable.
- 3. Mouse and Keyboard connected to PC via USB Cable.

### 2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



### 2.5 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.
А	Earphone	Apple	N/A	N/A
В	PC	DELL	8920-D16N8S	GZS91L2
С	Keyboard	DELL	KB212-B	CN0HTXH97158125004DXA01
D	Mouse	DELL	MS111-P	CN011D3V71581279OLOT

ltem	Cable Type	Shielded Type	Ferrite Core	Length
1	AC Cable	NO	NO	1.8/1.5/1.2m
2	Earphone Cable	NO	NO	1.2m
3	HDMI Cable	YES	YES	1.8/1.5/1.2m
4	HDMI Cable	YES	YES	1.8/1.5/1.2m
5	DP Cable	YES	NO	1.8/1.5/1.2m
6	USB Cable	YES	NO	1.8m
7	USB Cable	YES	NO	1.8m



# **3. EMC EMISSION TEST**

# 3.1 RADIATED EMISSIONS UP TO 1 GHZ

# 3.1.1 LIMITS

Class B equipment up to 1 GHz

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

### 3.1.2 MEASUREMENT INSTRUMENTS LIST

14			T N	0	
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Receiver	Keysight	N9038A	MY54450004	Jun. 01, 2025
2	MXE EMI Receiver	Agilent	N9038A	MY53220133	Jun. 01, 2025
3	Pre-Amplifier	EMC INSTRUMENT	EMC 9135	980284	May 31, 2025
4	Pre-Amplifier	EMC INSTRUMENT	EMC 9135	980283	May 31, 2025
5	Trilog-Broadband Antenna	Schwarzbeck	VULB9168	947	Nov. 06, 2025
6	Attenuator	EMCI	EMCI-N-6-06	AT-N0670	Nov. 06, 2025
7	Trilog-Broadband Antenna	Schwarzbeck	VULB9168	1461	Nov. 27, 2025
8	Attenuator	EMC INSTRUMENT	EMCI-N-6-06	AT-06010	Nov. 27, 2025
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	Cable	RW	LMR400-NMNM-10M	N/A	Dec. 01, 2025
13	Cable	RW	LMR400-NMNM-7M	N/A	Dec. 01, 2025
14	Cable	RW	LMR400-NMNM-3.5M	N/A	Dec. 01, 2025
15	Cable	RW	LMR400-NMNM-8M	N/A	Apr. 02, 2026
16	Cable	RW	LMR400-NMNM-3.5M	N/A	Apr. 02, 2026
17	Cable	RW	LMR400-NMNM-14M	N/A	Apr. 02, 2026

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

All calibration period of equipment list is one year.



# 3.1.3 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.

# 3.1.4 DEVIATION FROM TEST STANDARD

No deviation

# 3.1.5 TEST SETUP









# 3.1.7 TEST RESULTS



















2

3

4

5 ! 6 \* 344.2800

421.8800

539.2500

784.6600

999.5150

39.94

42.36

37.45

38.95

37.57

-14.73

-12.60

-10.64

-7.59

-5.23



37.00

37.00

37.00

37.00

37.00

-11.79

-7.24

-10.19

-5.64

-4.66

QP

QP

QP

QP

QP

25.21

29.76

26.81

31.36

32.34

# 3.2 RADIATED EMISSIONS ABOVE 1 GHZ

# 3.2.1 LIMITS

Class B equipment above 1 GHz

	quency		Class B limits		
	/Hz	Facility	Distance m	Detector type/bandwidth	dB(µV/m)
1000	- 3000			Average /	50
3000	- 6000	FROATS	2	1 MHz	54
1000	- 3000	FSOATS	3	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 <sub>x</sub> )	Highest measured frequency
F <sub>x</sub> ≤ 108 MHz	1 GHz
108 < F <sub>x</sub> ≤ 500 MHz	2 GHz
500 < F <sub>x</sub> ≤ 1000 MHz	5 GHz
F <sub>x</sub> > 1 GHz	5 x $F_x$ up to a maximum of 6 GHz

# 3.2.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Horn Antenna	ETS	3115	9605-4803	Jul. 07, 2025
2	MXE EMI Receiver	Agilent	N9038A	MY53220133	Jun. 01, 2025
3	Preamplifier	EMC INSTRUMENT	EMC118A45SE	981003	Oct. 29, 2025
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	RegalWay	RWLP50-4.0A-S MSM-9M	N/A	Sep. 02, 2025
8	Cable RW		RWLP50-4.0A-N MRASM-1M	N/A	Sep. 02, 2025
9	Cable	RW	RWLP50-4.0A-N MRASM-4M	N/A	Sep. 02, 2025

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

All calibration period of equipment list is one year.



# 3.2.3 TEST PROCEDURE

- a. 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.
- 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 AVG detector mode re-measured.
- d. 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.
- e. For the actual test configuration, please refer to the related Item EUT Test Photos.

# 3.2.4 DEVIATION FROM TEST STANDARD

The limit of the EN 55032:2015+A1:2020&AS/NZS CISPR 32:2015+AMD1:2020&CISPR 32:2015 +AMD1:2019 standard deviates from the requirements, but the limit of the EN 55032:2015+A11:2020 standard is more stringent and can be covered, so the test data meets the EN 55032:2015+A1:2020 &AS/NZS CISPR 32:2015+AMD1:2020&CISPR 32:2015+AMD1:2019 standard.

# 3.2.5 TEST SETUP











# 3.2.7 TEST RESULTS



No.	Mk.	Freq.	Level	Factor	ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		1213.926	48.19	-5.32	42.87	70.00	-27.13	peak	
2		1213.926	37.37	-5.32	32.05	50.00	-17.95	AVG	
3		1718.913	46.62	-3.68	42.94	70.00	-27.06	peak	
4		1718.913	37.46	-3.68	33.78	50.00	-16.22	AVG	
5		2517.848	45.43	-1.27	44.16	70.00	-25.84	peak	
6		2517.848	37.25	-1.27	35.98	50.00	-14.02	AVG	
7		2834.407	45.59	-0.15	45.44	70.00	-24.56	peak	
8		2834.407	36.73	-0.15	36.58	50.00	-13.42	AVG	
9		3590.632	40.56	1.80	42.36	74.00	-31.64	peak	
10		3590.632	30.26	1.80	32.06	54.00	-21.94	AVG	
11		5389.493	50.42	4.08	54.50	74.00	-19.50	peak	
12	*	5389.493	41.01	4.08	45.09	54.00	-8.91	AVG	





No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		1198.851	48.50	-5.37	43.13	70.00	-26.87	peak	
2		1198.851	41.15	-5.37	35.78	50.00	-14.22	AVG	
3		1819.408	47.59	-3.28	44.31	70.00	-25.69	peak	
4		1819.408	40.26	-3.28	36.98	50.00	-13.02	AVG	
5	:	2502.774	45.46	-1.33	44.13	70.00	-25.87	peak	
6	:	2502.774	37.31	-1.33	35.98	50.00	-14.02	AVG	
7	:	2774.110	48.92	-0.36	48.56	70.00	-21.44	peak	
8	:	2774.110	40.14	-0.36	39.78	50.00	-10.22	AVG	
9	;	3643.392	42.67	1.94	44.61	74.00	-29.39	peak	
10	;	3643.392	32.14	1.94	34.08	54.00	-19.92	AVG	
11		5389.493	54.60	4.08	58.68	74.00	-15.32	peak	
12	*	5389.493	44.48	4.08	48.56	54.00	-5.44	AVG	







No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		1296.834	44.57	-5.10	39.47	70.00	-30.53	peak	
2		1296.834	35.88	-5.10	30.78	50.00	-19.22	AVG	
3		1633.492	42.48	-4.02	38.46	70.00	-31.54	peak	
4		1633.492	34.58	-4.02	30.56	50.00	-19.44	AVG	
5		2284.197	41.20	-1.86	39.34	70.00	-30.66	peak	
6		2284.197	34.84	-1.86	32.98	50.00	-17.02	AVG	
7		2721.351	43.56	-0.55	43.01	70.00	-26.99	peak	
8		2721.351	33.62	-0.55	33.07	50.00	-16.93	AVG	
9		4010.199	38.98	2.88	41.86	74.00	-32.14	peak	
10		4010.199	28.20	2.88	31.08	54.00	-22.92	AVG	
11		5399.542	50.72	4.10	54.82	74.00	-19.18	peak	
12	*	5399.542	42.88	4.10	46.98	54.00	-7.02	AVG	







No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		1198.851	48.84	-5.37	43.47	70.00	-26.53	peak	
2		1198.851	42.15	-5.37	36.78	50.00	-13.22	AVG	
3		1814.383	47.39	-3.29	44.10	70.00	-25.90	peak	
4		1814.383	40.27	-3.29	36.98	50.00	-13.02	AVG	
5	:	2791.697	48.72	-0.30	48.42	70.00	-21.58	peak	
6	:	2791.697	38.35	-0.30	38.05	50.00	-11.95	AVG	
7	;	3356.981	42.73	1.24	43.97	74.00	-30.03	peak	
8	;	3356.981	31.82	1.24	33.06	54.00	-20.94	AVG	
9	:	3922.266	41.55	2.67	44.22	74.00	-29.78	peak	
10	;	3922.266	33.11	2.67	35.78	54.00	-18.22	AVG	
11		5399.542	54.49	4.10	58.59	74.00	-15.41	peak	
12	*	5399.542	40.96	4.10	45.06	54.00	-8.94	AVG	



# 4. EMC IMMUNITY TEST

# 4.1 STANDARD COMPLIANCE/SEVERITY LEVEL/CRITERIA

Tests Standard No.	Test Specification Level / Test Mode	Test Ports	Criteria
Electrostatic discharge	±8kV air discharge ±4kV contact discharge (Direct Mode)	Enclosure	В
IEC 61000-4-2 (ESD)	±4kV HCP discharge ±4kV VCP discharge (Indirect Mode)	Enclosure	В
Continuous RF electromagnetic field disturbances,swept test IEC 61000-4-3 (RS)	80 MHz to 1000 MHz 3V/m(unmodulated, r.m.s), 1 kHz, 80%, AM modulated	Enclosure	A
Continuous RF electromagnetic field disturbances,spot test IEC 61000-4-3 (RS)	1800 MHz, 2600MHz, 3500 MHz, 5000MHz(±1 %) 3V/m(unmodulated, r.m.s), 1 kHz, 80%, AM modulated	Enclosure	A
Electrical fast transient/burst	±0.5kV(peak) 5/50ns Tr/Th 5kHz Repetition Frequency (100kHz Repetition Frequency for xDSL port)	Analogue/digital data ports (NOTE 2)	В
immunity IEC 61000-4-4 (EFT)	±0.5kV(peak) 5/50ns Tr/Th 5kHz Repetition Frequency	DC network power ports (NOTE 2)	В
	±1 kV(peak) 5/50ns Tr/Th 5kHz Repetition Frequency	AC mains power ports	В



	Port Type: unshielded symmetrical				
	Apply: lines to ground	· · ·			
	Primary protection is Intended				
	±1 kV and ±4 kV		С		
	10/700(5/320)Tr/Th μs	Analogue/digital data ports			
	Primary protection is not Intended	(NOTE 1) & (NOTE 2)			
	±1 kV		С		
	10/700(5/320) Tr/Th µs				
	Port type: coaxial or shielded				
	Apply: shield to ground				
Surge immunity IEC 61000-4-5	±0.5 kV	Analogue/digital data ports	Б		
(Surge)	1.2/50(8/20) Tr/Th μs	(NOTE 1) & (NOTE 2)	В		
	line to reference ground for each				
	individual line:	DC network power ports	в		
	±0.5 kV(peak)	(NOTE 2)			
	1.2/50(8/20) Tr/Th μs				
	±1 kV(peak)				
	1.2/50(8/20) Tr/Th µs				
	(line to line)				
	±2 kV(peak)	2 kV(peak) AC mains power ports			
	1.2/50(8/20) Tr/Th µs				
	(line to earth or ground)				
	0.15 MHz to 10 MHz				
	3V(unmodulated, r.m.s),				
	10 MHz to 30 MHz				
	3V to 1V(unmodulated, r.m.s),	Analogue/digital data ports			
	30 MHz to 80 MHz	(NOTE 2)	Α		
	1V(unmodulated, r.m.s),				
	1kHz 80%, AM				
	$150\Omega$ source impedance				
	0.15 MHz to 10 MHz				
	3V(unmodulated, r.m.s),				
Continuous induced RF	10 MHz to 30 MHz				
disturbances	3V to 1V(unmodulated, r.m.s),	DC network power ports			
IEC 61000-4-6	30 MHz to 80 MHz	(NOTE 2)	А		
(CS)	1V(unmodulated, r.m.s),	(110122)			
<b>、</b> ,	1kHz 80%, AM				
	$150\Omega$ source impedance				
	0.15 MHz to 10 MHz				
	3V(unmodulated, r.m.s),				
	10 MHz to 30 MHz				
	3V to 1V(unmodulated, r.m.s),		А		
	30 MHz to 80 MHz	AC mains power ports			
	1V(unmodulated, r.m.s),				
	1kHz 80%, AM				
	150Ω source impedance				
	10022 Source Impedance				



Power frequency magnetic field immunity IEC 61000-4-8 (PFMF)	50 Hz or 60Hz, 1A/m(r.m.s)	Enclosure	A
Voltage dips, short interruptions and voltage variations immunity IEC 61000-4-11 (Dips)	Voltage dips: Residual voltage<5% 0.5 cycle Residual voltage<70% 25 cycle(50Hz), 30 cycle (60Hz) Voltage interruptions:	AC Power Ports	B C C
	Residual voltage<5% 250 cycle (50Hz), 300 cycle (60Hz)		
Broadband impulse noise disturbances,repetitive (BIN-R)	0.15 MHz to 0.5 MHz 107 dBuV 0.5 MHz to 10 MHz 107 dBuV to 36 dBuV 10 MHz to 30 MHz 36 dBuV to 30 dBuV	Analogue/digital data ports (Applicable only to CPE xDSL ports)	A
	0.70 ms 8.3 ms(for 60Hz) 10 ms(for 50Hz)	Analogue/digital data ports (Apply period based on the AC mains frequency)	A
Broadband impulse noise disturbances,isolated	0.15 MHz to 30 MHz 110 dBuV	Analogue/digital data ports (Applicable only to CPE xDSL ports)	В
(BIN-I)	0.24 ms 10 ms 300 ms	Analogue/digital data ports (Apply all burst durations)	В

Note.

1) Applicable only to ports which, according to the manufacturer's specification, may connect directly to outdoor cables.

2) Applicable only to ports which, according to the manufacturer's specification, support cable lengths greater than 3 m.



# 4.2 GENERAL PERFORMANCE CRITERIA

According to EN 55035 standards, the general performance criteria as following:

Criterion A	The equipment shall continue to operate as intended without operator intervention. No degradation of performance, loss of function or change of operating 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.
Criterion B	During the 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. 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.



# 4.3 ANNEX D (NORMATIVE) - DISPLAY AND DISPLAY OUTPUT FUNCTION

# 4.3.1 PERFORMANCE CRITERIA

#### Performance criterion A

#### for continuous radiated and conducted disturbances tests:

Apply criterion A as defined in GENERAL PERFORMANCE CRITERIA. Additionally, an increase in any degradation greater than

just perceptible by observation of the image shall not occur as a consequence of the application of the test. Examples of such degradations are:

- superimposed patterning;
- positional disturbances due to synchronisation errors;
- geometric distortion;
- change of contrast or brightness;
- picture artefacts;
- freezing or disturbance of motion;
- image loss;
- video data or decoding errors.

#### Performance criterion A

#### for the power frequency magnetic field tests:

Alternative 1: A continuous magnetic field of 1 A/m:

The jitter (in mm) shall not exceed the value

 $\frac{(\text{character height in mm} + 0,3) \times 2,5}{33,3}$ 

Performance criterion B:

Apply criterion B as defined in GENERAL PERFORMANCE CRITERIA.

### **Performance criterion C:**

Apply criterion C as defined in GENERAL PERFORMANCE CRITERIA.



# 4.4 ANNEX G (NORMATIVE) - AUDIO OUTPUT FUNCTION

### 4.4.1 PERFORMANCE CRITERIA

### **Performance criterion A:**

For devices that support telephony functions the limits of Table G.3 shall apply. With respect to Table G.3:

- the interference ratio (electrical or acoustic) shall meet the limits in column 3; or,
- the acoustic level of the demodulated audio shall be less than the limits in column 4; or,
- the digitally coded level of demodulated audio shall be less than limits in column 5; or,
- the analogue level of the demodulated audio shall be less than the limits in column 6.

### Table G.3 – Performance criterion A – Limits for devices supporting telephony

Type of	Frequency range	Acoustic or electrical	Equivalent direct measurement			
immunity test	MHz	interference ratio	dB (SPL)	Digital dBm0	Analogue dBm	
Conducted	0,15 to 30	-20 dB	55	-50	-50	
Conducted	30 to 80	-10 dB	65	-40	-40	
Radiated	80 to 1000	0 dB	75	-30	-30	
	5	network ports (such as E n a remote AE, ideally of			nts of the	

For all other devices:

The measured acoustic interference ratio and/or the measured electrical interference ratio during the test shall be –20 dB or better.

### Performance criterion B:

Use the general performance criterion B. See GENERAL PERFORMANCE CRITERIA.

### **Performance criterion C:**

Use the general performance criterion C. See GENERAL PERFORMANCE CRITERIA.



# 4.5 ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD)

### 4.5.1 TEST SPECIFICATION

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

### 4.5.2 MEASUREMENT INSTRUMENTS

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	ESD Generator	TESEQ AG	NSG 437	450	Nov. 13, 2025

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

All calibration period of equipment list is one year.

### 4.5.3 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 10single 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 explor ation 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. For TABLE-TOP equipment:

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 of1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.



# 4.5.4 DEVIATION FROM TEST STANDARD

No deviation

# 4.5.5 TEST SETUP





# 4.5.6 TEST RESULTS

Test Voltage	AC 230V/50Hz
Test Mode	Mode 1-10

Mode		Air Discharge								Contact Discharge						
	2kV		4kV		8kV		- kV		2kV		4kV		- kV			
Location	Ρ	Ν	Р	Ν	Р	Ν	Р	Ν	Р	Ν	Р	Ν	Р	Ν		
1	Α	Α	Α	Α	Α	Α	-	-	Α	Α	В	В	-	-		
2	А	А	Α	Α	Α	Α	-	-	-	-	-	-	-	-		
3	А	А	Α	Α	В	В	-	-	-	-	-	-	-	-		
4	А	А	Α	Α	Α	Α	-	-	-	-	-	-	-	-		
Criteria	B							-	В			-				
Result	В							-	В					-		

Mode		HCF	<sup>o</sup> Conta	ct Discha	arge		VCP Contact Discharge						
	2kV		4kV		- kV		2kV		4kV		- kV		
Location	Р	Ν	Р	N	Р	Ν	Р	Ν	Р	Ν	Р	Ν	
Left side	А	Α	Α	Α	-	-	Α	Α	Α	А	-	-	
Right side	А	Α	Α	Α	-	-	Α	Α	Α	А	-	-	
Front side	А	А	Α	Α	-	-	А	А	А	А	-	-	
Rear side	А	Α	Α	Α	-	-	Α	Α	Α	А	-	-	
Criteria			В		-			E	-				
Result			A			-		ŀ	-				

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










## 4.6 RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY TEST (RS)

#### 4.6.1 TEST SPECIFICATION

Basic Standard	IEC 61000-4-3
Required Performance	A
Frequency Range	80 MHz - 1000 MHz,
	1800 MHz, 2600 MHz, 3500 MHz, 5000MHz (±1 %)
Field Strength	3 V/m(unmodulated, r.m.s)
Modulation	1 kHz Sine Wave, 80%, AM Modulation
Frequency Step	1% of the preceding frequency.
Polarity of Antenna	Horizontal and Vertical
Test Distance	3 m
Antenna Height	1.55 m
Dwell Time	3 seconds

#### 4.6.2 MEASUREMENT INSTRUMENTS

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	ETS	3142B	00026419	N/A
2	Amplifier	AR	50S1G4A	326720	Dec. 06, 2025
3	MXG Analog Signal Generator	Agilent	N5181A	MY49060710	May 31, 2025
4	Power amplifier	MILMEGA	AS1860-50	1064834	Dec. 06, 2025
5	Microwave LogPer. Antenna	Schwarzbeck	STLP 9149	9149-277	N/A
6	Power amplifier	MILMEGA	80RF1000-250	1064833	Dec. 06, 2025
7	Measurement Software	Farad	(EZ-RS )V2.0.1.3	N/A	N/A
8	UPV Audio Analyzer	R&S	UPV	104259	Dec. 06, 2025

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

All calibration period of equipment list is one year.

#### 4.6.3 TEST PROCEDURE

The EUT and support equipment are in a fully-anechoic chamber.

The testing distance from antenna to the EUT was 3 meters.

For TABLE-TOP equipment:

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.

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



For Display and display output functions:

- a. The display quality evaluated by direct observation.
- b. For display output function evaluation, a suitable display device shall be connected. This device shall meet the immunity requirements for displays specified in this document. The screen size shall be typical for the display output the diagonal screen size shall be at least 0,50 m.
- c. The display shall be observed under normal viewing conditions including viewing distance using a reduced ambient light level preferably in the range 15 lx to 20 lx. The viewing distance or settings of the video camera monitoring system shall be sufficient to provide visibility of the whole display. In the case of direct observation the selected viewing distance shall be recorded in the test report.

For Acoustic measurements:

- a. Apply an appropriate input signal to the EUT so that a sine wave (tone) at the frequency that will be used to modulate the applied disturbance (typically 1 kHz) is generated from the port under test at a level equal to the acoustic reference level.
- b. Record the resulting dB (SPL) level (or other appropriate dB unit) as the value of  $L_0$ . (BTL lab uses the software to take Lo as the referecne value and make it return to zero.)
- c. Change the input to the EUT so that the port under test is silent, or represents silence. This change shall not alter the terminating impedance at the EUT's input.
- d. Apply the RF disturbance to the applicable port of the EUT and record the resulting demodulated audio level in dB (SPL) (or other dB unit used in step d)) as the value of L<sub>1</sub>.
- e. Ensure that non-linear processing does not impact the measurements.

f. Calculate the acoustic interference ratio using the following formula:

Acoustic interference ratio =  $L_1 - L_0$ .

(For step e-f, BTL lab proceeds the test with software and calculate Acoustic interference ratio =  $L_1 - L_0$ ).

## 4.6.4 DEVIATION FROM TEST STANDARD

No deviation

# 4.6.5 TEST SETUP

a) For Continuous induced RF disturbances









# 4.6.6 TEST RESULTS

Test Voltage AC 230V/50Hz						
Test Mode Mode 1-10						
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 90 180 270	A	A
1800, 2600, 3500, 5000 (±1%)	H/V	3V/m	AM Modulated 1000Hz, 80%	0 90 180 270	A	A



## For Audio output function









## 4.7 POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST (PFMF)

## 4.7.1TEST 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

#### 4.7.2 MEASUREMENT INSTRUMENTS

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Magnetic Field test Generator	FCC	F-1000-4-8- G-125A	04032	Dec. 06, 2025
2	Magnetic Field immunity loop	Thermo KeyTek	F-1000-4-8/9 /10-L-1M	04024	Dec. 06, 2025

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

All calibration period of equipment list is one year.

#### 4.7.3 TEST PROCEDURE

For TABLE-TOP equipment:

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:

- a. The equipment cabinets shall be connected to the safety earth directly on the GRP via the earth terminal of the EUT.
- b. 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.

#### 4.7.4 DEVIATION FROM TEST STANDARD

No deviation



# 4.7.5 TEST SETUP





# 4.7.6 TEST RESULTS

Test Voltage	AC 230V/50Hz
Test Mode	Mode 1-10

#### 50Hz

Test Mode	Test Level	Antenna aspect	Duration	Criteria	Results
Enclosure	1 A/m	Х	60s	A	A
Enclosure	1 A/m	Y	60s	A	А
Enclosure	1 A/m	Z	60s	A	A

#### 60Hz

Test Mode	Test Level	Antenna aspect	Duration	Criteria	Results
Enclosure	1 A/m	х	60s	A	А
Enclosure	1 A/m	Y	60s	A	A
Enclosure	1 A/m	Z	60s	A	A



# 5. EUT TEST PHOTO



Radiated emissions up to 1 GHz





Radiated emissions above 1 GHz







Electrostatic discharge immunity



Radiated, radio-frequency, electromagnetic field immunity - Up to 1GHz





Radiated, radio-frequency, electromagnetic field immunity – Above 1GHz

Power frequency magnetic field immunity



**End of Test Report**