Shenzhen Global Test Service Co.,Ltd.
No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

TEST REPORT

ETSI EN 301 489-1 V2.2.3 (2019-11)
ETSI EN 301 489-3 V2.3.2 (2023-01)
ETSI EN 301 489-17 V3.2.4 (2020-09)
EN 55032:2015+A11:2020+A1:2020/ EN 55035:2017+A11:2020

Report Reference No. ..... :	**GTS20240426022-1-14**
Compiled by (position+printed name+signature) . :	File administrators Peter Xiao
Supervised by (position+printed name+signature) . :	Test Engineer Evan Ouyang
Approved by (position+printed name+signature) . :	Manager Jason Hu
Date of issue ..... :	Jun.21, 2024
Representative Laboratory Name. :	**Shenzhen Global Test Service Co.,Ltd.**
Address ..... :	No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong
Applicant's name ..... :	**Shenzhen Techtion Smart Electronics Co., Ltd**
Address ..... :	Room 902, 8th Floor, Unit 1, Building No. 2, Xintianxia Chengyun Factory District, Vanke City Community, Bantian Street, Longgang District, Shenzhen, China
Test specification..... **:**	
Standard..... :	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-3 V2.3.2 (2023-01) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55032:2015+A11:2020+A1:2020/EN 55035:2017+A11:2020
TRF Originator ..... :	Shenzhen Global Test Service Co.,Ltd.
Master TRF ..... :	Dated 2014-12

Test item description ..... :	**Outdoor Reflective Display Terminal**
Trade Mark..... :	N/A
Manufacturer ..... :	Shenzhen Techtion Smart Electronics Co., Ltd
Model/Type reference ..... :	TS-156PHD
List Model..... :	TS-780PHD, TS-101PHD, TS-105PHD, TS-133PHD, TS-215PHD, TS-286THD, TS-298THD, TS-280THD, TS-320PHD, TS-362THD, TS-401THD, TS-430PHD, TS-434THD, TS-500THD, TS-550PHD, TS-650THD, TS-750THD, TS-850THD, TS-860THD, TS-980THD, TS-XXXPHD, TS-XXXTHD(X=0-9,X=A-Z)
Ratings ..... :	DC12.0V/4.0A by Adapter
Result ..... :	**PASS**

T E S T R E P O R T

Test Report No. :	**GTS20240426022-1-14**	Jun. 21, 2024 Date of issue

Equipment under Test	:	Outdoor Reflective Display Terminal
Model /Type	:	TS-156PHD
Listed model	:	TS-780PHD, TS-101PHD, TS-105PHD, TS-133PHD, TS-215PHD, TS-286THD, TS-298THD, TS-280THD, TS-320PHD, TS-362THD, TS-401THD, TS-430PHD, TS-434THD, TS-500THD, TS-550PHD, TS-650THD, TS-750THD, TS-850THD, TS-860THD, TS-980THD, TS-XXXPHD, TS-XXXTHD(X=0-9,X=A-Z)
Applicant	:	**Shenzhen Techtion Smart Electronics Co., Ltd**
Address	:	Room 902, 8th Floor, Unit 1, Building No. 2, Xintianxia Chengyun Factory District, Vanke City Community, Bantian Street, Longgang District, Shenzhen, China
Manufacturer	:	**Shenzhen Techtion Smart Electronics Co., Ltd**
Address	:	Room 902, 8th Floor, Unit 1, Building No. 2, Xintianxia Chengyun Factory District, Vanke City Community, Bantian Street, Longgang District, Shenzhen, China

Test Result	**PASS**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Contents

1. TEST STANDARDS

The tests were performed according to following standards:
ETSI EN 301 489-1 V2.2.3 (2019-11)–ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for ElectroMagnetic Compatibility
ETSI EN 301 489-3 V2.3.2 (2023-01)–ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz; Harmonised Standard for ElectroMagnetic Compatibility
ETSI EN 301 489-17 V3.2.4 (2020-09)–ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard for ElectroMagnetic Compatibility
EN 55032:2015+A11:2020+A1:2020 Electromagnetic compatibility of multimedia equipment - Emission Requirements
EN 55035:2017+A11:2020 Electromagnetic compatibility of multimedia equipment - Immunity requirements
EN IEC 61000-3-2:2019+A1:2021 Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤16 A per phase)
EN 61000-3-3:2013+A2:2021 Electromagnetic compatibility (EMC) -- Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection

2. SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	May. 10, 2024
Testing commenced on	:	May. 10, 2024
Testing concluded on	:	Jun. 20, 2024

2.2. Product Description

Product Name:	Outdoor Reflective Display Terminal
Trade Mark:	N/A
Model/Type reference:	TS-156PHD
List Model:	TS-780PHD, TS-101PHD, TS-105PHD, TS-133PHD, TS-215PHD, TS-286THD, TS-298THD, TS-280THD, TS-320PHD, TS-362THD, TS-401THD, TS-430PHD, TS-434THD, TS-500THD, TS-550PHD, TS-650THD, TS-750THD, TS-850THD, TS-860THD, TS-980THD, TS-XXXPHD, TS-XXXTHD(X=0-9,X=A-Z)
Model Declaration	PCB board, structure and internal of these model(s) are the same, Only the model name different , So no additional models were tested.
Power supply:	DC 12.0V/4.0A by Adapter
Hardware Version	N/A
Software Version	N/A
Bluetooth	
Frequency Range	2402MHz ~ 2480MHz
Channel Number	79 channels for Bluetooth (DSS) 40 channels for Bluetooth (DTS)
Channel Spacing	1MHz for Bluetooth (DSS) 2MHz for Bluetooth (DTS)
Modulation Type	GFSK, π/4-DQPSK, 8-DPSK for Bluetooth (DSS) GFSK for Bluetooth (DTS)
2.4GWLAN	
WLAN CE Operation frequency	IEEE 802.11b:2412-2472MHz IEEE 802.11g:2412-2472MHz IEEE 802.11n HT20:2412-2472MHz IEEE 802.11n HT40:2422-2462MHz
WLAN CE Modulation Type	IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK,BPSK) IEEE 802.11n HT40: OFDM (64QAM, 16QAM, QPSK,BPSK)
Channel number:	13 Channel for IEEE 802.11b/g/n (HT20) 9 Channel for IEEE 802.11n (HT40)
Channel separation:	5MHz
WIFI (5G Band)	
WLAN CE Operation frequency	5180-5240MHz
WLAN CE Modulation Type	802.11a/n/ac: OFDM
Channel number:	4 Channels for 20MHz bandwidth(5180-5240MHz) 2 channels for 40MHz bandwidth(5190~5230MHz) 1 channels for 80MHz bandwidth(5210MHz)
SRD (5.8G Band)	
WLAN CE Operation frequency	5745-5825MHz

WLAN CE Modulation Type	802.11a/n/ac: OFDM
Channel Number	5 channels for 20MHz bandwidth(5745-5825MHz) 2 channels for 40MHz bandwidth(5755~5795MHz) 1 channels for 80MHz bandwidth(5775MHz)
Antenna Description	Two External antenna respectively. WLAN not support 2*2MIMO technology. ANT0 used for WIFI TX/RX, 2.0 dBi(Max.) for 2.4GWLAN; ANT1 used for BT&WIFI TX/RX, 2.0 dBi(Max.) for BT and 2.0dBi (Max.) for 5GWLAN;

2.3. EUT operation mode

Test mode	BT	WLAN	USB	HDMI	VGA	LAN	LINE	MIC	DC IN
1	■	■	■	■	■	■	■	■	■
2	■								■
3		■							■
4			■						■
5				■					■
6					■				■
7						■			■
8							■		■
9								■	■
10									■

Note:
1. ■ is operation mode.
Pre-scan above all test mode, found below test mode which it was worse case mode. Test results reported represents the worst case simultaneous transmission condition.
Pre-test conducted emission and radiated emission at both voltage AC 120V/60Hz and AC 230V/50Hz, recorded worst case.

Test item	Test mode (Worse case mode)
Conducted emission	Mode 1
Radiated emission	Mode 1
EMS	All Mode

2.4. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer
○ - supplied by the lab

●	Adapter	M/N:	ADP-48D12
		Manufacturer:	Hunan Dajing Technology Co., Ltd
○	PC	M/N:	DESKYOP-EUIVCNR
		Manufacturer:	LENOVO
○	Display	M/N:	LE23CW-D
		Manufacturer:	THTF
○	Keyboard	M/N:	T460S
		Manufacturer:	LENOVO
○	Mouse	M/N:	Howard
		Manufacturer:	LENOVO
○	Earphone	M/N:	MDR-XB550AP
		Manufacturer:	SONY
○	USB flash disk	M/N:	U330
		Manufacturer:	aigo

2.5. Modifications

No modifications were implemented to meet testing criteria.

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen Global Test Service Co.,Ltd.
No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

3.2. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:
CNAS (No. CNAS L8169)
Shenzhen Global Test Service Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2019 General Requirements) for the Competence of Testing and Calibration Laboratories.
A2LA (Certificate No. 4758.01)
Shenzhen Global Test Service Co., Ltd. has been assessed by the American Association for Laboratory Accreditation (A2LA). Certificate No. 4758.01.
Industry Canada Registration Number. is 24189.
FCC Designation Number is CN1234.
FCC Registered Test Site Number is165725.

3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	15-35 ° C
Lative Humidity	30-60 %
Air Pressure	950-1050mbar

3.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“and is documented in the Shenzhen Global Test Service Co.,Ltd. acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.
Hereafter the best measurement capability for Shenzhen GTS laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.10 dB	(1)
Radiated Emission	1~18GHz	4.32 dB	(1)
Conducted Disturbance	0.15~30MHz	3.12 dB	(1)

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

3.5. Test Description

Emission Measurement		
Radiated Emission	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-3 V2.3.2 (2023-01) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55032:2015+A11:2020+A1:2020	PASS
Conducted Emission	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-3 V2.3.2 (2023-01) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55032:2015+A11:2020+A1:2020	PASS
Harmonic Current Emissions	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-3 V2.3.2 (2023-01) ETSI EN 301 489-17 V3.2.4 (2020-09) EN IEC 61000-3-2:2019+A1:2021	N/A
Voltage Fluctuations and Flicker	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-3 V2.3.2 (2023-01) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 61000-3-3:2013+A2:2021	PASS
Immunity Measurement		
Electrostatic Discharge	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-3 V2.3.2 (2023-01) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55035:2017+A11:2020	PASS
RF Electromagnetic Field	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-3 V2.3.2 (2023-01) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55035:2017+A11:2020	PASS
Fast Transients Common Mode	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-3 V2.3.2 (2023-01) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55035:2017+A11:2020	PASS
RF Common Mode 0,15 MHz to 80 MHz	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-3 V2.3.2 (2023-01) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55035:2017+A11:2020	PASS
Voltage Dips and Interruptions	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-3 V2.3.2 (2023-01) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55035:2017+A11:2020	PASS
Surges	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-3 V2.3.2 (2023-01) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55035:2017+A11:2020	PASS

Remark: The measurement uncertainty is not included in the test result.

3.6. Equipments Used during the Test

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Calibration Due Date
1	EMI Test Receiver	R&S	ESPI 3	101841-cd	2023/07/13	2024/07/12
2	Artificial Mains	ROHDE & SCHWARZ	ESH2-Z5	893606/008	2023/07/13	2024/07/12
3	Pulse Limiter	Agilent	EM5010A	3107A04120	2023/07/13	2024/07/12
4	EMI Test Receiver	ROHDE & SCHWARZ	ESCI 7	101102	2023/09/08	2024/09/07
5	Spectrum Analyzer	Agilent	N9020A	MY48010425	2023/09/08	2024/09/07
6	Spectrum Analyzer	R&S	FSV40	100019	2023/07/13	2024/07/12
7	Active Loop Antenna	Beijing Da Ze Technology Co.,Ltd.	ZN30900C	15006	2023/09/08	2024/09/07
8	By-log Antenna	SCHWARZBECK	VULB9163	000976	2023/07/13	2024/07/12
9	Double Ridged Horn Antenna (1~18GHz)	SCHWARZBECK	BBHA 9120D	01622	2023/09/08	2024/09/07
10	Horn Antenna (18GHz~40GHz)	Schwarzbeck	BBHA9170	791	2023/09/08	2024/09/07
11	Amplifier (30MHz~1GHz)	Schwarzbeck	BBV 9743	#202	2023/07/13	2024/07/12
12	Amplifier (1GHz~18GHz)	Taiwan Chengyi	EMC051845B	980355	2023/07/13	2024/07/12
13	Amplifier (26.5GHz~40GHz)	Schwarzbeck	BBV9179	9719-025	2023/07/13	2024/07/12
14	ESD Simulators	EMC Partner	ESD3000	ESD3000-1680	2023/09/08	2024/09/07
15	RF POWER AMPLIFIER	OPHIR	5225R	1079	2023/09/08	2024/09/07
16	RF POWER AMPLIFIER	OPHIR	5273F	1025	2023/09/08	2024/09/07
17	RF POWER AMPLIFIER	SKET	HAP_03G06G-50W	--	2023/09/08	2024/09/07
18	Stacked Broadband Log Periodic Antenna	SCHWARZBECK	STLP 9128	9128ES-112	2023/09/08	2024/09/07
19	Stacked Mikrowellen Log.-Per Antenna	SCHWARZBECK	STLP 9149	9149-594	2023/09/08	2024/09/07
20	Electric field probe	Narda S.TS./PMM	EP601	611WX90121	2023/09/08	2024/09/07
21	ESG Vector Signal Generator	Agilent	MY49072627	E4594C	2023/09/08	2024/09/07
22	Power meter	Agilent	MY45104493	E4602B	2023/09/08	2024/09/07
23	Power sensor	Agilent	MY41495234	E7201H	2023/09/08	2024/09/07
24	Ultra Compact Simulator	EMC Partner	TRANSIENT3000	TRA3000 F5-S-D-V-1527	2023/09/08	2024/09/07

25	Coupling Clamp	EMC Partner	CN-EFT1000	CN-EFT1000-1574	2023/09/08	2024/09/07
26	Signal Line Coupling Network	EMC Partner	CN-R40C05	CN-R40C05-1513	2023/09/08	2024/09/07
27	CS Test system	Frankonia	CIT-10-75	126B1333	2023/09/08	2024/09/07
28	6dB Attenuator	Frankonia	75-A-FFN-06	1509	2023/09/08	2024/09/07
29	CDN	Frankonia	M2+M3	A2210239	2023/09/08	2024/09/07
30	Power Clamp	Frankonia	EMCL-20	132A1216	2023/09/08	2024/09/07
31	Harmonic and Flicker Analyzer	EMC Partner	HAR1000-1P	HAR1000-1P 230V-0221	2023/09/08	2024/09/07
32	RF Cable	HUBER+SUHNER	RG214	N/A	2023/09/08	2024/09/07
33	ISN	Schwarzbeck	CAT5 8158	121	2023/09/08	2024/09/07
34	Radio Communication Tester	Rohde&Schwarz	CMW500	115406	2023/07/13	2024/07/12
35	Sound Level meter	BK Precision	735	735008731001020	2023/09/08	2024/09/07
36	Audio Analyzer	R&S	UPV	1146.2003K02-101721-UW	2023/09/08	2024/09/07
37	Mouse Simulation	Bruel & Kjaer	4227	A0304216	2023/09/08	2024/09/07
38	Ear Simulation and supply	Bruel & Kjaer	2669.4182.5935	A0305284	2023/09/08	2024/09/07
39	Acoustical Calibrators	Bruel & Kjaer	4231	A0304215	2023/09/08	2024/09/07
40	Conducted Emission	Tonscend	JS32-CE	Ver 2.5	/	/
41	Radiated Emission	Tonscend	JS32-RE	Ver 2.5.1.8	/	/

The calibration interval is 1 year.

4. TEST CONDITIONS AND RESULTS

4.1. EMISSION

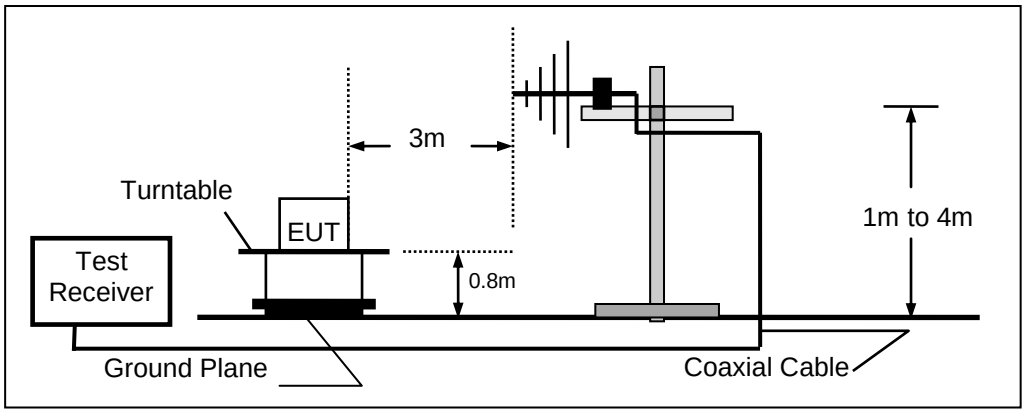
4.1.1. Radiated Emission

LIMIT

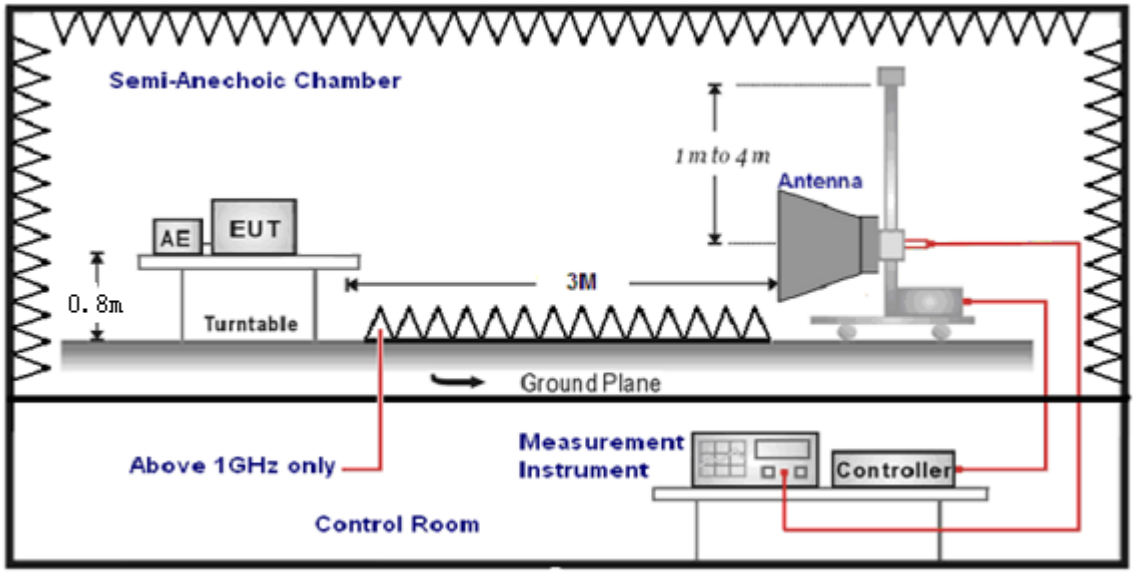
Please refer to ETSI EN301489-1 Clause 8.2.3, Table 4 and EN55032 Annex A, Table A.4,A.5, and Class B

TEST CONFIGURATION

a) Radiated emission test set-up, frequency below 1000MHz:



b) Radiated emission test set-up, frequency above 1000MHz



TEST PROCEDURE

Please refer to ETSI EN 301 489-1 Clause 8.2.3 for the measurement methods

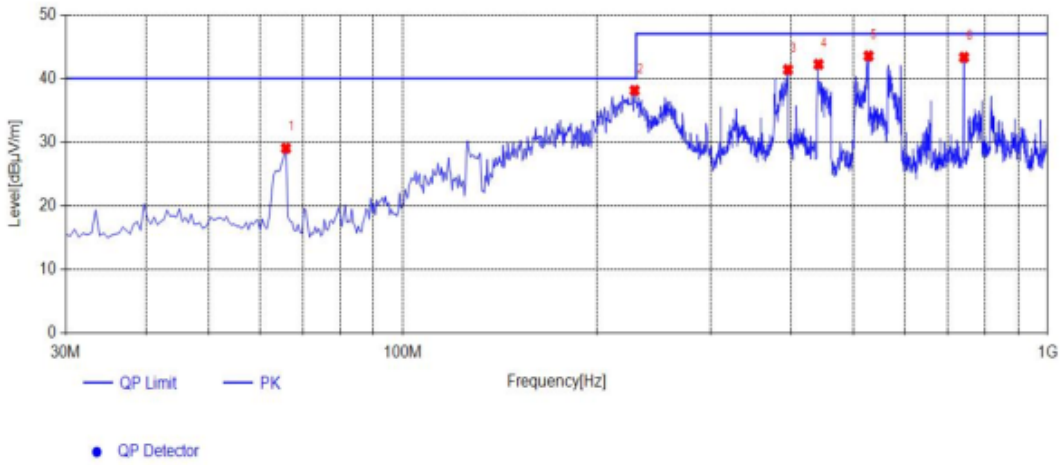
TEST RESULTS

Passed

Please refer to the below test data:

Test mode:	Mode 1	Polarization	Horizontal

Test Graph



Suspected List

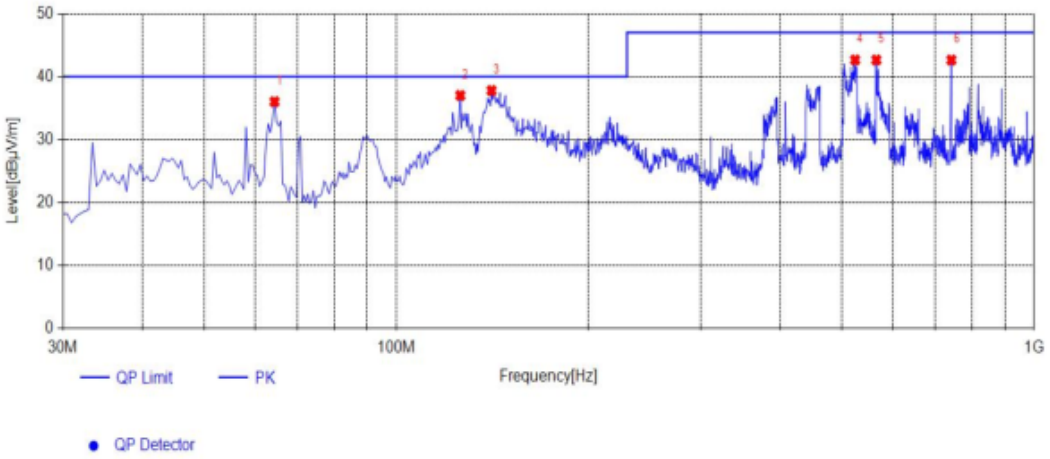
NO.	Frequency [MHz]	Reading [dBµV/m]	Factor [dB]	Result [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity	Remark
1	65.89	41.93	-12.92	29.01	40.00	10.99	100	119	PK	Horizonta	PASS
2	228.85	47.44	-9.34	38.10	40.00	1.90	100	103	PK	Horizonta	PASS
3	395.69	46.79	-5.42	41.37	47.00	5.63	100	149	PK	Horizonta	PASS
4	441.28	46.21	-4.01	42.20	47.00	4.80	100	207	PK	Horizonta	PASS
5	527.61	45.60	-2.08	43.52	47.00	3.48	100	51	PK	Horizonta	PASS
6	741.98	42.19	1.12	43.31	47.00	3.69	100	358	PK	Horizonta	PASS

Note:1. Result (dBµV/m) = Reading(dBµV/m) + Factor (dB) .

2. Factor (dB) = Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB).

Test mode:	Mode 1	Polarization	Vertical

Test Graph



Suspected List

NO.	Frequency [MHz]	Reading [dBµV/m]	Factor [dB]	Result [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity	Remark
1	64.435	48.48	-12.48	36.00	40.00	4.00	100	52	PK	Vertical	PASS
2	126.03	50.30	-13.31	36.99	40.00	3.01	100	137	PK	Vertical	PASS
3	141.065	52.10	-14.33	37.77	40.00	2.23	100	137	PK	Vertical	PASS
4	524.215	44.82	-2.18	42.64	47.00	4.36	100	82	PK	Vertical	PASS
5	565.925	43.74	-1.10	42.64	47.00	4.36	100	108	PK	Vertical	PASS
6	741.98	41.51	1.12	42.63	47.00	4.37	100	300	PK	Vertical	PASS

Note:1. Result (dBµV/m) = Reading(dBµV/m) + Factor (dB) .

2. Factor (dB) = Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB).

Note: All the modes have been tested and recorded worst mode in the report.

Test Mode: AV1 4K(above 1GHz)	Test Distance: 3m
Test voltage: AC230V	Test Results: Passed
Detector Function: Peak+AV	/

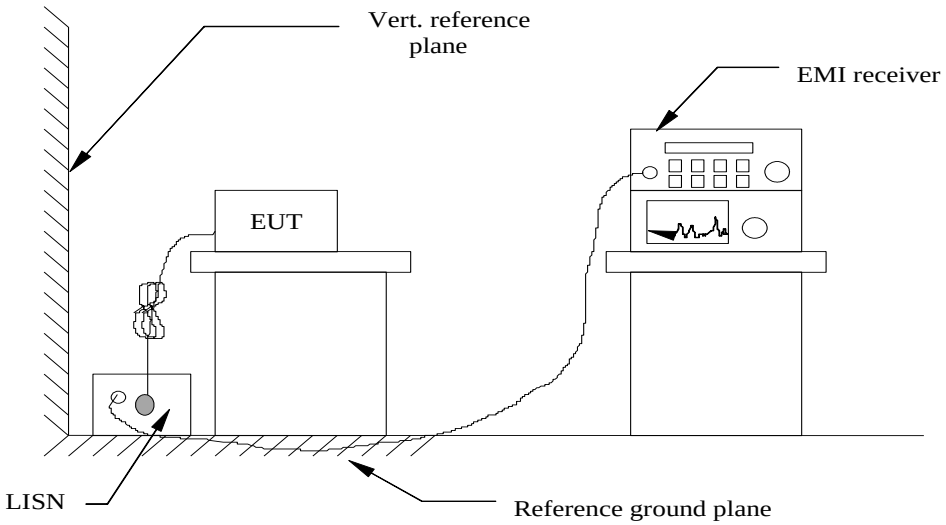
Frequency MHz	Emission Level dBμV/m		Limits dBμV/m		Margin dBμV/m		Polarization
	Peak	AV	Peak	AV	Peak	AV	
1286.44	54.57	38.06	74.00	54.00	-19.43	-15.94	H
1831.77	56.92	32.55	74.00	54.00	-17.08	-21.45	H
2157.36	53.50	36.49	74.00	54.00	-20.50	-17.51	H
3251.53	54.36	40.14	74.00	54.00	-19.64	-13.86	H
4479.38	52.45	34.58	74.00	54.00	-21.55	-19.42	H
5701.33	52.29	33.49	74.00	54.00	-21.71	-20.51	H
1288.24	54.73	37.88	74.00	54.00	-19.27	-16.12	V
1832.71	57.61	32.33	74.00	54.00	-16.39	-21.67	V
2161.11	53.48	37.28	74.00	54.00	-20.52	-16.72	V
3254.34	53.33	40.22	74.00	54.00	-20.67	-13.78	V
4477.38	53.04	34.72	74.00	54.00	-20.96	-19.28	V
5702.19	52.86	33.63	74.00	54.00	-21.14	-20.37	V

4.1.2. Conducted Emission (AC Mains)

LIMIT

Please refer to ETSI EN301489-1 Clause 8.4.3, Table 8 and EN55032 Annex A, Table A.9, A.11

TEST CONFIGURATION



TEST PROCEDURE

Please refer to ETSI EN 301 489-1 Clause 8.4.3 for the measurement methods

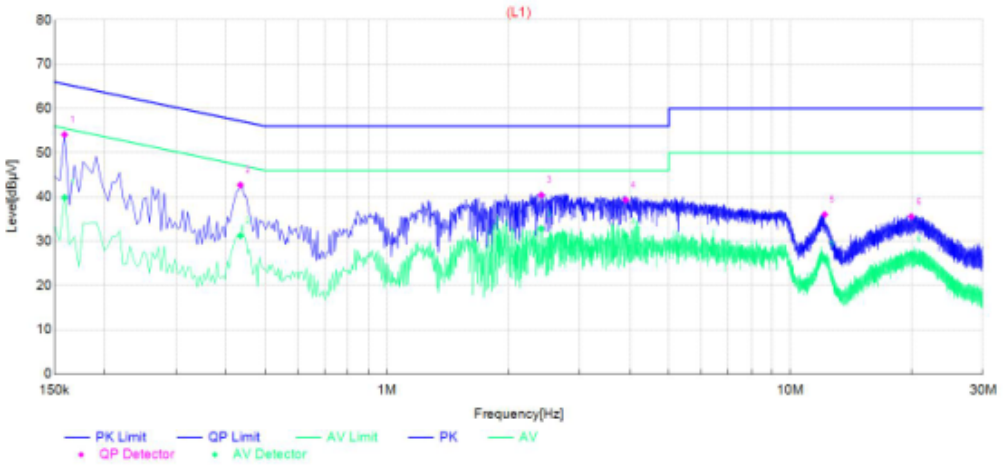
TEST RESULTS

Passed

Please refer to the below test data:

Test mode:	Mode 1	Polarization	L

Test Graph



Final Data List

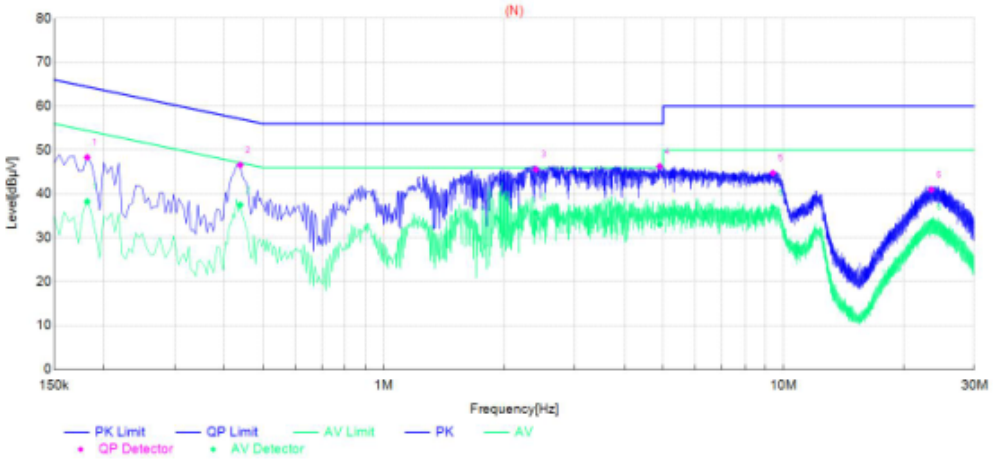
NO.	Frequency	QP Reading	AVG. Reading	Factor	QP Result	AVG. Result	QP Limit	AVG. Limit	QP Margin	AVG. Margin	Line	Remark
1	0.159	43.78	29.59	10.31	54.09	39.90	65.52	55.52	11.43	15.62	L1	PASS
2	0.4335	32.52	21.05	10.20	42.72	31.25	57.19	47.19	14.47	15.94	L1	PASS
3	2.4135	30.16	22.58	10.30	40.46	32.88	56.00	46.00	15.54	13.12	L1	PASS
4	3.9075	28.97	20.73	10.37	39.34	31.10	56.00	46.00	16.66	14.90	L1	PASS
5	12.1605	25.22	15.13	10.83	36.05	25.96	60.00	50.00	23.95	24.04	L1	PASS
6	19.941	24.08	15.58	11.51	35.59	27.09	60.00	50.00	24.41	22.91	L1	PASS

Note:1. Result (dBµV) = Reading (dBµV) + Factor (dB).

2. Factor (dB) = Cable loss (dB) + LISN Factor (dB).

Test mode:	Mode1	Polarization	N

Test Graph



Final Data List

NO.	Frequency	QP Reading	AVG. Reading	Factor	QP Result	AVG. Result	QP Limit	AVG. Limit	QP Margin	AVG. Margin	Line	Remark
1	0.1815	38.15	28.04	10.20	48.35	38.24	64.42	54.42	16.07	16.18	N	PASS
2	0.438	36.40	27.30	10.20	46.60	37.50	57.10	47.10	10.50	9.60	N	PASS
3	2.4045	35.28	25.36	10.30	45.58	35.66	56.00	46.00	10.42	10.34	N	PASS
4	4.902	35.92	22.70	10.35	46.27	33.05	56.00	46.00	9.73	12.95	N	PASS
5	9.402	34.19	26.26	10.56	44.75	36.82	60.00	50.00	15.25	13.18	N	PASS
6	23.4195	29.46	22.10	11.49	40.95	33.59	60.00	50.00	19.05	16.41	N	PASS

Note:1. Result (dBµV) = Reading (dBµV) + Factor (dB).

2. Factor (dB) = Cable loss (dB) + LISN Factor (dB).

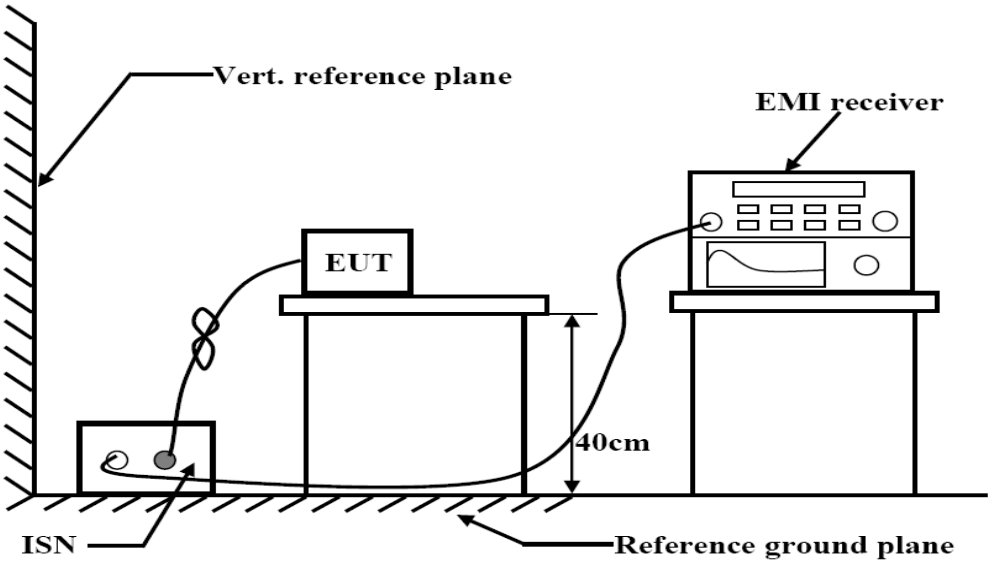
Note: All the modes have been tested and recorded worst mode in the report.

4.1.3. CONDUCTED EMISSION (WIRED NETWORK PORT)

Conducted Emission Limit(Wired Network Port)

Limits for asymmetric mode conducted emissions				
Frequency (MHz)	Class B voltage limits (dBμV)		Class B current limits (dBμA)	
	Quasi-peak Level	Average Level	Quasi-peak Level	Average Level
0.15 ~ 0.50	84.0~74.0	74.0~64.0	40.0~30.0	30.0~20.0
0.50 ~ 30.00	74.0	64.0	30.0	20.0
NOTE 1-The limits decrease linearly with the logarithm of the frequency in the range 0,15 MHz to 0,5 MHz. NOTE 2-The current and voltage disturbance limits are derived for use with an impedance stabilization network (ISN) which presents a common mode (asymmetric mode) impedance of 150Ω to the telecommunication port under test (conversion factor is 20 log10 150 / l = 44 dB).				

Test Configuration



EMI Test Receiver Setup

During the conducted emission test, the EMI test receiver was set with the following configurations:

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	150KHz ~ 30MHz
(IF)RBW	9kHz

All data was recorded in the Quasi-peak and average detection mode.

Test Procedure

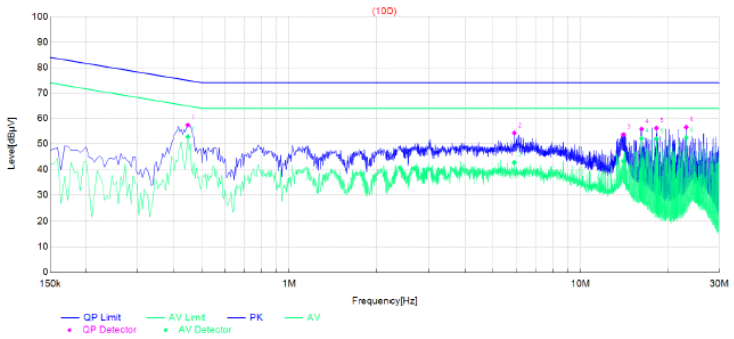
Please refer to ETSI EN 301 489-1 Clause 8.7.2 and EN 55032 Clause 6 for the measurement methods.

Test Data

PASS

Test mode:	Mode 1	Polarization	RJ45

Test Graph



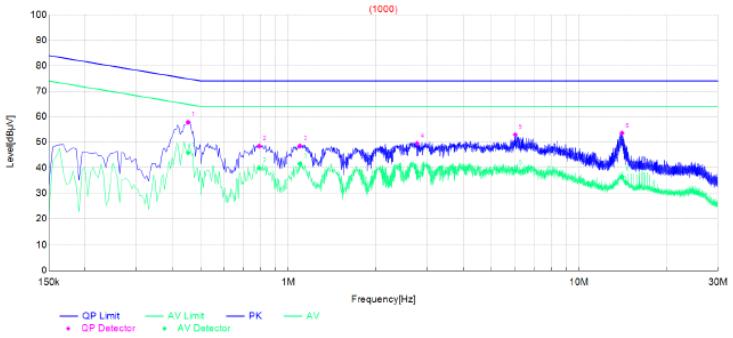
Final Data List												
NO.	Frequency	QP Reading	AVG. Reading	Factor	QP Result	AVG. Result	QP Limit	AVG. Limit	QP Margin	AVG. Margin	Line	Remark
1	0.447	41.53	36.89	15.92	57.45	52.81	74.93	64.93	17.48	12.12	100	PASS
2	5.91	38.37	26.74	15.92	54.29	42.66	74.00	64.00	19.71	21.34	100	PASS
3	14.028	37.62	27.23	16.00	53.62	43.23	74.00	64.00	20.38	20.77	100	PASS
4	16.2285	39.81	36.13	16.01	55.82	52.14	74.00	64.00	18.18	11.86	100	PASS
5	18.2445	40.17	36.05	16.01	56.18	52.06	74.00	64.00	17.82	11.94	100	PASS
6	23.1315	40.59	36.46	15.94	56.53	52.40	74.00	64.00	17.47	11.60	100	PASS

Note: 1. Result (dBµV) = Reading (dBµV) + Factor (dB).

2. Factor (dB) = Cable loss (dB) + LISN Factor (dB).

Test mode:	Mode 1	Polarization	RJ45

Test Graph



Final Data List												
NO.	Frequency	QP Reading	AVG. Reading	Factor	QP Result	AVG. Result	QP Limit	AVG. Limit	QP Margin	AVG. Margin	Line	Remark
1	0.4515	41.90	29.91	15.91	57.81	45.82	74.85	64.85	17.04	19.03	1000	PASS
2	0.7935	32.59	23.98	15.79	48.38	39.77	74.00	64.00	25.62	24.23	1000	PASS
3	1.095	32.68	25.73	15.76	48.44	41.49	74.00	64.00	25.56	22.51	1000	PASS
4	2.769	33.56	22.22	15.92	49.48	38.14	74.00	64.00	24.52	25.86	1000	PASS
5	6.027	37.02	22.98	15.93	52.95	38.91	74.00	64.00	21.05	25.09	1000	PASS
6	14.0415	37.52	20.43	16.00	53.52	36.43	74.00	64.00	20.48	27.57	1000	PASS

Note: 1. Result (dBµV) = Reading (dBµV) + Factor (dB).

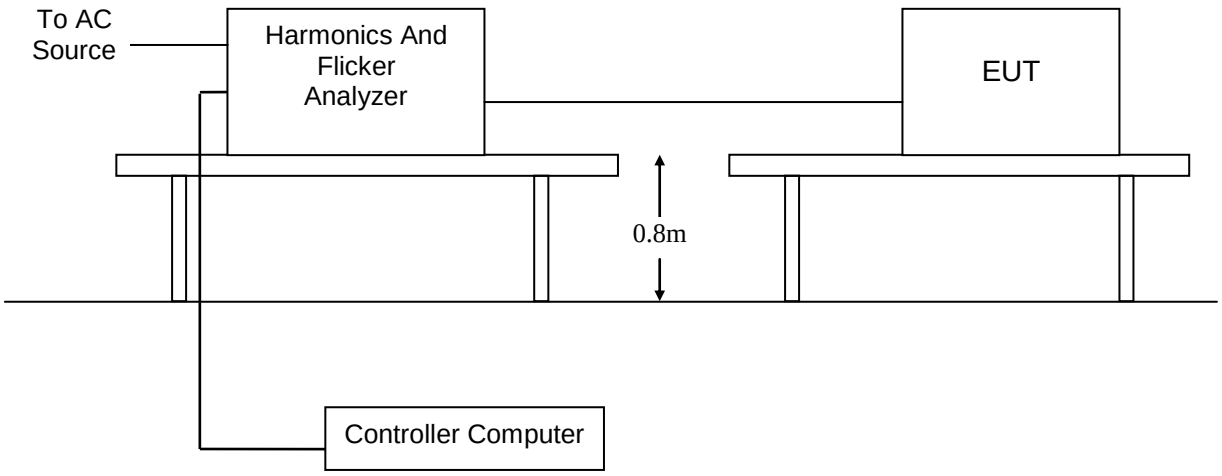
2. Factor (dB) = Cable loss (dB) + LISN Factor (dB).

4.1.4. Harmonic Current Emission

LIMIT

Please refer to EN 61000-3-2

TEST CONFIGURATION



TEST PROCEDURE

Please refer to EN 61000-3-2 for the measurement methods.

TEST RESULTS

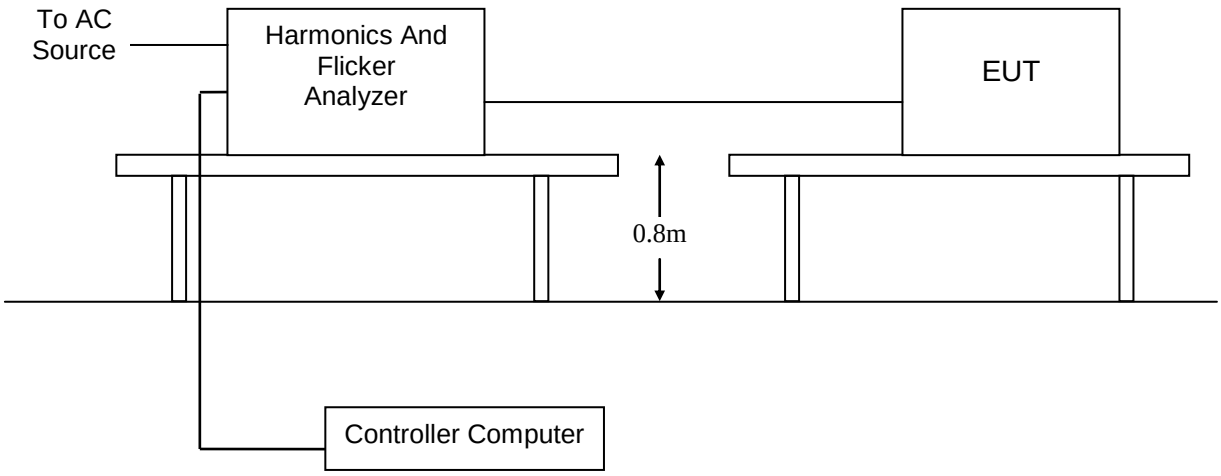
Not applicable to this device (The product without test since the rating power of EUT is less than 75W).

4.1.5. Voltage Fluctuation and Flicker

LIMIT

Please refer to EN 61000-3-3

TEST CONFIGURATION



TEST PROCEDURE

Please refer to EN 61000-3-3 for the measurement methods.

TEST RESULTS

Maximum Flicker results

	EUT values	Limit	Result
Pst	0.241	1.00	PASS
Plt	0.085	0.65	PASS
dc [%]	0.411	3.30	PASS
dmax [%]	0.529	4.00	PASS
dt [s]	0.036	0.50	PASS

4.2. IMMUNITY

4.2.1. Performance criteria

■ **ETSI EN301489-3**

General performance criteria

• performance criterion A applies for immunity tests with phenomena of a continuous nature;

• performance criterion B applies for immunity tests with phenomena of a transient nature.

•The equipment shall meet the minimum performance criteria as specified in the following.

Criteria	During test	After test
A	Operate as intended No loss of function No unintentional responses	Operate as intended No loss of function No degradation of performance No loss of stored data or user programmable functions
B	May show loss of function No unintentional responses	Operate as intended Lost function(s) shall be self-recoverable No degradation of performance No loss of stored data or user programmable functions
NOTE: Where "operate as intended" or "no loss of function" is specified, the EUT shall demonstrate correct functioning as described in clause 5.		

■ **ETSI EN301489-17**

General performance criteria

• Performance criteria A for immunity tests with phenomena of a continuous nature;

• Performance criteria B for immunity tests with phenomena of a transient nature;

• Performance criteria C for immunity tests with power interruptions exceeding a certain time.

The equipment shall meet the minimum performance criteria as specified in the following.

Criteria	During test	After test
A	Shall operate as intended. (See note). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance. Shall be no loss of function. Shall be no loss of critical stored data.
B	May be loss of function.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no loss of critical stored data.
C	May be loss of function.	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no loss of critical stored data.
NOTE: Operate as intended during the test allows a level of degradation in accordance with clause 6.2.2.		

Performance criteria for Continuous phenomena

For equipment that supports a PER or FER, the minimum performance level shall be a PER or FER less than or equal to 10 %.

For equipment that does not support a PER or a FER, the minimum performance level shall be no loss of the wireless transmission function needed for the intended use of the equipment.

Performance criteria for Continuous phenomena

The performance criteria A shall apply.

Where the EUT is a transmitter in standby mode, unintentional transmission shall not occur during the test.

Where the EUT is a transceiver in receive mode, unintentional transmission shall not occur during the test.

Performance criteria for Transient phenomena

The performance criteria B shall apply, except for voltage dips greater than or equal to 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply.

Where the EUT is a transmitter in standby mode, unintentional transmission shall not occur as a result of the application of the test.

Where the EUT is a transceiver in receive mode, unintentional transmission shall not occur as a result of the application of the test.

4.2.2. Monitoring EUT in Immunity Test

4.2.2.1 Monitoring for Continuous Phenomena Applied to the EUT

- **BT Mode**

At the start of the test, establish a wireless link between the EUT and CMW500(integrate BT protocol Analyzer);

During the test, observe whether the EUT operate as intended, no loss of function and no unintentional transmissions. Monitoring PER and shall exeed 10%

After the test, Check the function and critical stored date of the EUT with no degration.

In addition, when EUT working in Idle /Receiver mode, monitor whether the transmitter unintentionally operates.

- **2.4G/5G WIFI Mode**

At the start of the test, establish a wireless link between the EUT and CMW500(integrate WIFI protocol Analyzer);

During the test, observe whether the EUT operate as intended, no loss of function and no unintentional transmissions. Monitoring PER and shall exeed 10%

After the test, Check the function and critical stored data of the EUT with no degration.

In addition, when EUT working in Idle /Receiver mode, monitor whether the transmitter unintentionally operates.

- **other Mode**

During and after the test, observe the Screen status by eyes or monitor to see whether there is degration of performance

4.2.2.2 Monitoring for Transient Phenomena Applied to the EUT

- **BT Mode**

At the start of the test, establish a wireless link between the EUT and CMW500(integrate BT protocol Analyzer);

After the test, Check the function and critical stored date of the EUT with no degration.

In addition, when EUT working in Idle /Receiver mode, monitor whether the transmitter unintentionally operates.

- **2.4G/5G WIFI Mode**

At the start of the test, establish a wireless link between the EUT and CMW500(integrate WIFI protocol Analyzer);

After the test, Check the function and critical stored data of the EUT with no degration.

In addition, when EUT working in Idle /Receiver mode, monitor whether the transmitter unintentionally operates.

- **other Mode**

After the test, observe the Screen status by eyes or monitor to see whether there is degration of performance

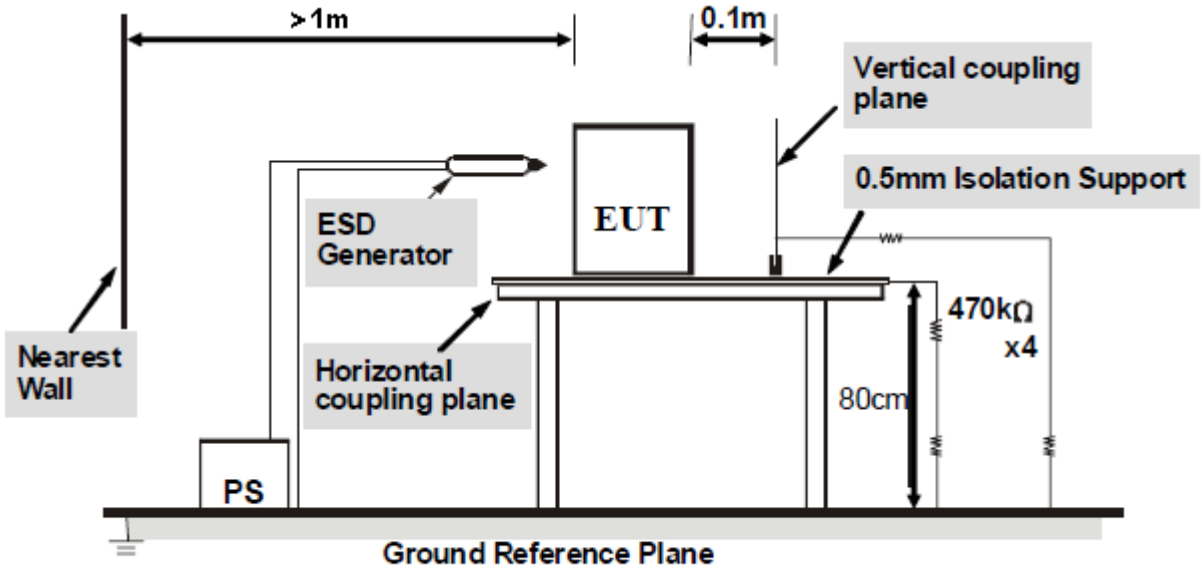
4.2.3. Electrostatic Discharge

LIMIT

SEVERITY LEVELS OF ELECTROSTATIC DISCHARGE

Test level: Contact Discharge at ±2KV, ±4KV Air Discharge at ±2KV, ±4KV, ±8KV

TEST CONFIGURATION



TEST PROCEDURE

Please refer to ETSI EN 301 489-1 Clause 9.3.2 and EN 61000-4-2 for the measurement methods.

Contact Discharge:

The ESD generator is held perpendicular to the surface to which the discharge is applied and the tip of the discharge electrode touch the surface of EUT. Then turn the discharge switch. The generator is then re-triggered for a new single discharge and repeated at least 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

Air Discharge:

Air discharge is used where contact discharge can't be applied. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated at least 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

Indirect discharge for horizontal coupling plane:

At least 10 single discharges shall be applied to the horizontal coupling plane, at points on each side of the EUT.

Indirect discharge for vertical coupling plane:

At least 10 single discharges shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

TEST MODE

Please reference to the section 2.3

TEST RESULTS

Direct discharge				
Type of discharge	Discharge voltage (KV)	Observations Performance	Criteria Level	Result
Contact discharge	±2	No degradation in performance of the EUT was observed (A)	B	Pass
	±4	A	B	
Air discharge	±2	A	B	
	±4	A	B	
	±8	A	B	
Indirect discharge				
Type of discharge	Discharge voltage (KV)	Observations Performance	Criteria Level	Result
HCP (6 sides)	±2	A	B	Pass
	±4	A	B	
VCP (4 sides)	±2	A	B	
	±4	A	B	

Remark: The ancillary equipment's specification for an acceptable level of performance or degradation of performance during and/or after the ESD tests.

4.2.4. RF Electromagnetic Field

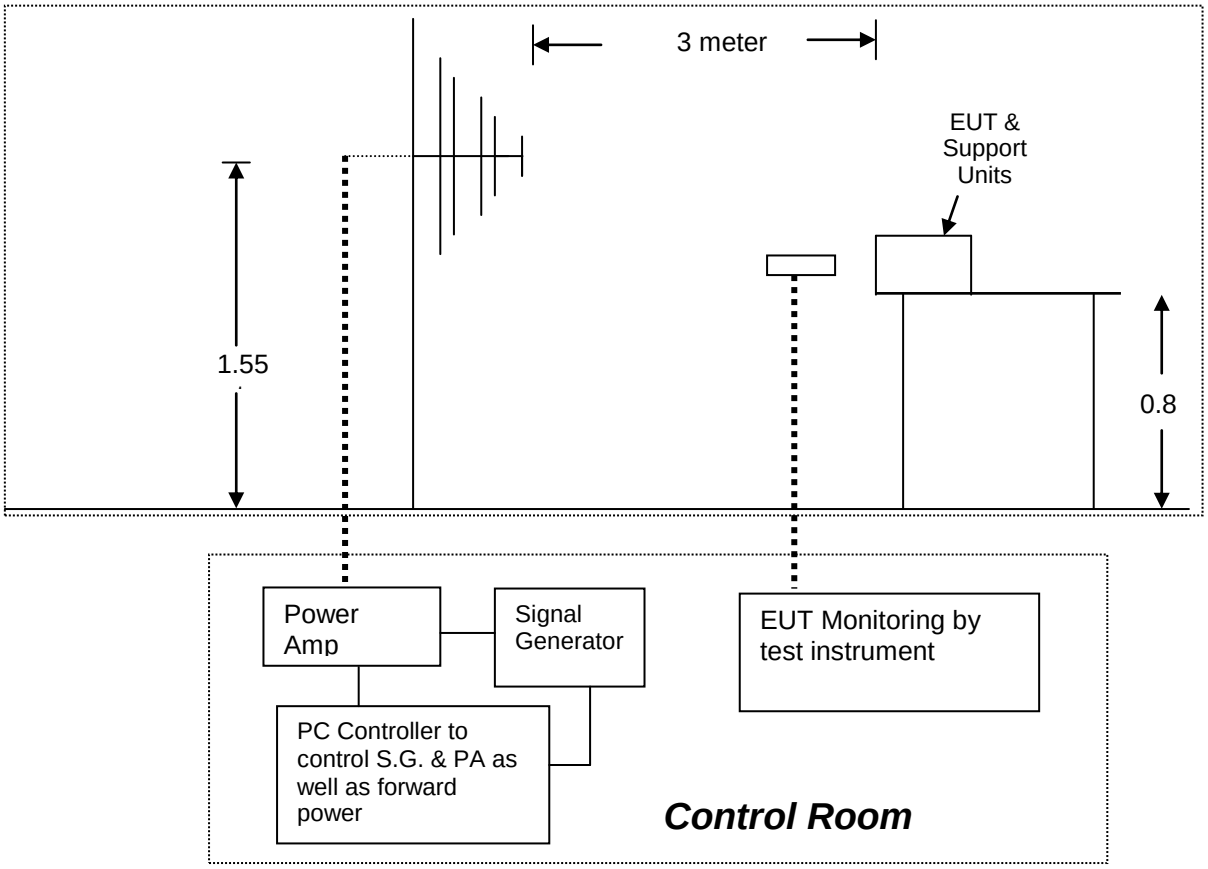
PERFORMANCE CRITERION

Criteria A

TEST LEVEL

3V/m (80%, 1kHz Amplitude Modulation)

TEST CONFIGURATION



TEST PROCEDURE

Please refer to ETSI EN 301 489-1 Clause 9.2.2 and EN 61000-4-3 for the measurement methods.

TEST MODE

Please reference to the section 2.3

TEST RESULTS

Frequency	Level	Modulation	Antenna Polarization	EUT Face	Observations (Performance Criterion)	Result
80 MHz-6 GHz	3 V/m	1 kHz, 80 % Amp. Mod, 1 % increment, dwell time=3seconds	V	Front	A	Pass
			H		A	Pass
			V	Rear	A	Pass
			H		A	Pass
			V	Left	A	Pass
			H		A	Pass
			V	Right	A	Pass
			H		A	Pass
			V	Top	A	Pass
			H		A	Pass
			V	Bottom	A	Pass
			H		A	Pass

WIFI Test Result:

EUT Working Mode	Antenna Polarity	Frequency (MHz)	Fielded Strength (V/m)	Observation	Position	Conclusion
Operating Mode	Vertical	80-6000	3	CT, CR	Front, Right, Left, Back	Pass
	Horizontal	80-6000	3	CT, CR	Front, Right, Left, Back	Pass

Bluetooth Test Result:

EUT Working Mode	Antenna Polarity	Frequency (MHz)	Fielded Strength (V/m)	Observation	Position	Conclusion
Operating Mode	Vertical	80-6000	3	CT, CR	Front, Right, Left, Back	Pass
	Horizontal	80-6000	3	CT, CR	Front, Right, Left, Back	Pass

Special conditions for EMC immunity tests

EUT operating Mode	PER during test(Worst)	PER Limit	Conclusion
WIFI 2.4G	6.2%	10%	Pass
WIFI 5G	5.3%	10%	Pass
Bluetooth	4.0%	10%	Pass

4.2.5. Surges

PERFORMANCE CRITERION

Criteria B

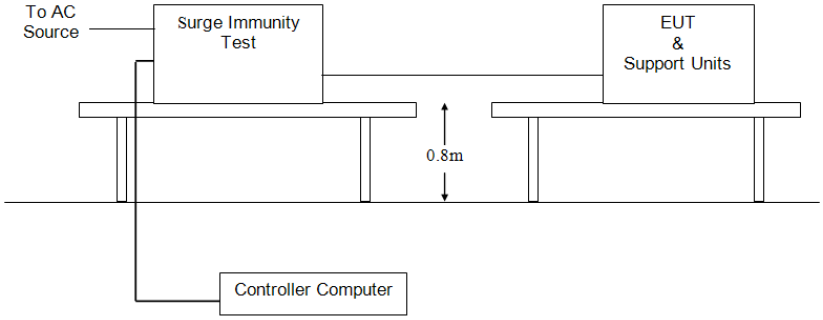
TEST LEVEL

1kV Line to Line: Differential mode

2kV Line to Ground: Common mode

(Voltage Waveform: 1.2/50 us; Current Waveform: 8/20 us)

TEST CONFIGURATION



TEST PROCEDURE

Please refer to ETSI EN 301 489-1 Clause 9.8.2 and EN 61000-4-5 for the measurement methods.

TEST MODE

Please reference to the section 2.3

TEST RESULTS

Location	Level(kV)	Pulse No	Surge Interval	Phase(deg)	Observations (Performance Criterion)	Result
L-N	± 1	5	60s	0°	A	Pass
				90°	A	Pass
				180°	A	Pass
				270°	A	Pass
RJ45	± 0.5	5	60s	/	A	Pass

Remark: A: No degradation in performance of the EUT was observed.

4.2.6. RF- Common Mode 0.15MHz to 80MHz

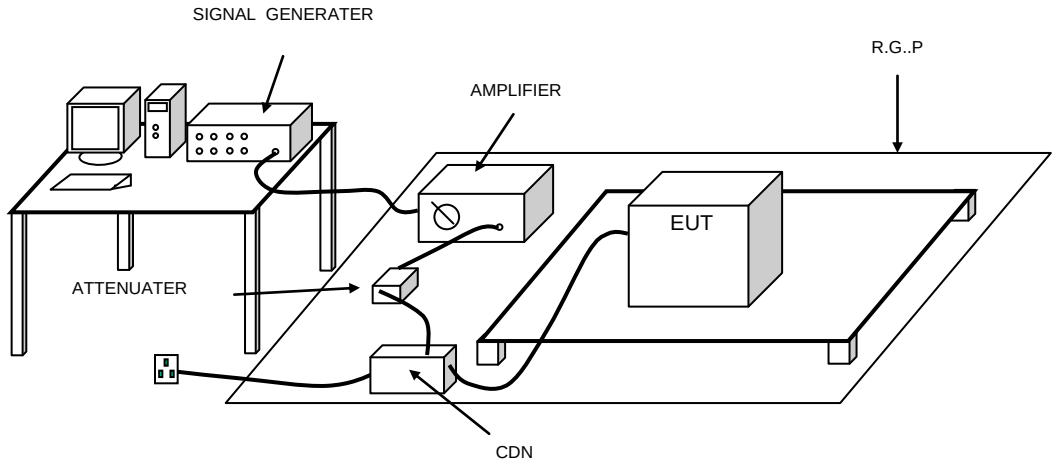
PERFORMANCE CRITERION

Criteria A

TEST LEVEL

3Vrms on AC main port (80%, 1kHz Amplitude Modulation)

TEST CONFIGURATION



TEST PROCEDURE

Please refer to ETSI EN 301 489-1 Clause 9.5.2 and EN 61000-4-6 for the measurement methods.

TEST MODE

Please reference to the section 2.3

TEST RESULTS

Frequency	Injected Position	Level	Modulation	Observations (Performance Criterion)	Result
150kHz to 80MHz	AC Mains	3Vrms	1 kHz, 80 % Amp. Mod, 1 % increment, dwell time=3seconds	A	Pass
150kHz to 80MHz	RJ45	3Vrms	1 kHz, 80 % Amp. Mod, 1 % increment, dwell time=3seconds	A	Pass

Special conditions for EMC immunity tests

EUT operating Mode	PER during test(Worst)	PER Limit	Conclusion
WIFI 2.4G	6.2%	10%	Pass
WIFI 5G	5.3%	10%	Pass
Bluetooth	4.0%	10%	Pass

4.2.7. Fast Transients Common Mode

PERFORMANCE CRITERION

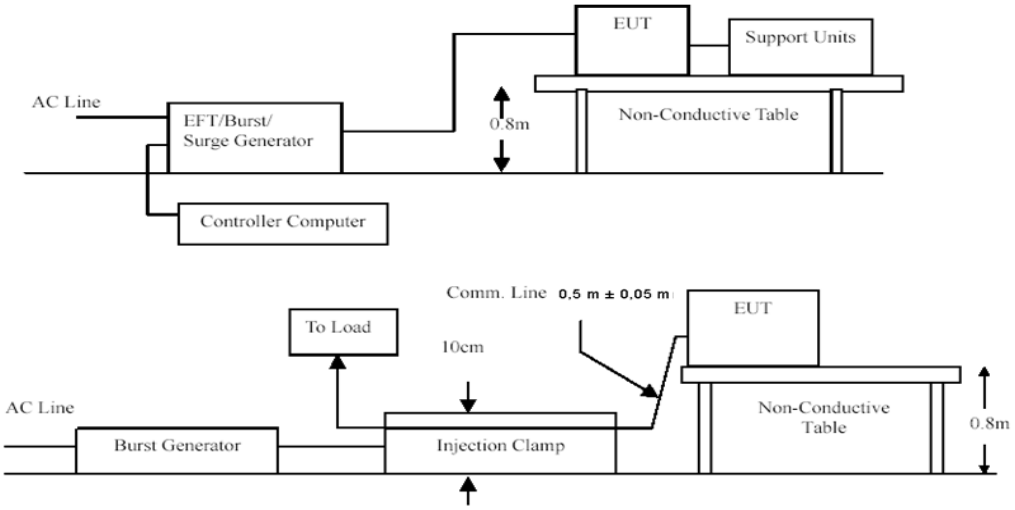
Criteria B

TEST LEVEL

1KV for AC main port

(Impulse Frequency: 5 kHz; Tr/Th: 5/50ns; Burst Duration: 15ms; Burst Period: 3Hz)

TEST CONFIGURATION



TEST PROCEDURE

Please refer to ETSI EN 301 489-1 Clause 9.4.2 and EN 61000-4-4 for the measurement methods.

TEST MODE

Please reference to the section 2.3

TEST RESULTS

Lead under Test	Level (±kV)	Coupling Direct/Clamp	Observations (Performance Criterion)	Result
L	±1	Direct	A	Pass
N	±1	Direct	A	Pass
L-N	±1	Direct	A	Pass
RJ45	±0.5	Direct	A	Pass

Remark: A: No degradation in performance of the EUT was observed.

4.2.8. Voltage Dips and Interruptions

PERFORMANCE CRITERION

>95% VD, 0.5 period----Performance criterion: B

>95% VD, 1.0 period----Performance criterion: B

30% VD, 25 period----Performance criterion: C

>95% VI, 250 period----Performance criterion: C

TEST LEVEL

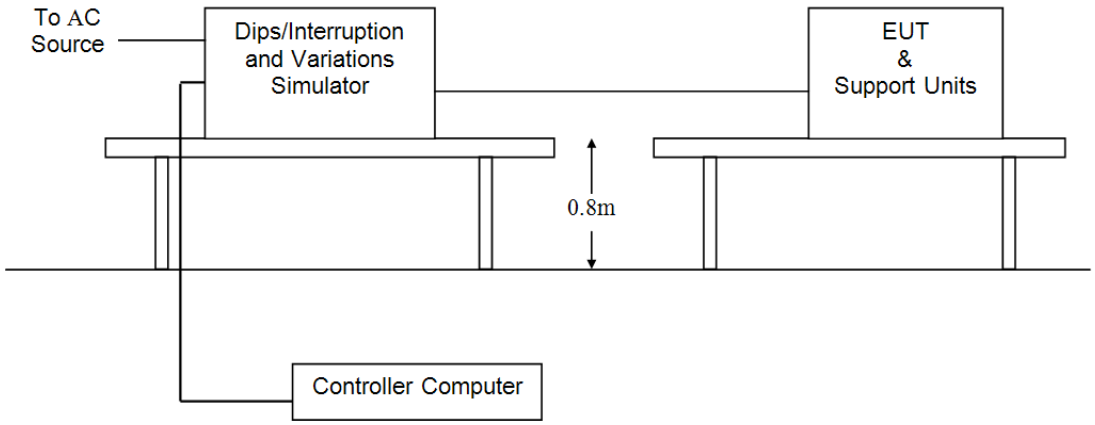
0% of VT(Supply Voltage) for 0.5 period

0% of VT(Supply Voltage) for 1.0 period

70% of VT(Supply Voltage) for 25 period

0% of VT(Supply Voltage) for 250 period

TEST CONFIGURATION



TEST PROCEDURE

Please refer to ETSI EN 301 489-1 Clause 9.7.2 and EN 61000-4-11 for the measurement methods.

TEST MODE

Please reference to the section 2.3

TEST RESULTS

Test Level % UT	Duration (Periods)	Phase angle	No. of drop out	Time between dropout	Observations (Performance Criterion)	Result
0	0.5	0°, 90°, 180°, 270°	3	10s	A	Pass
0	1.0	0°, 90°, 180°, 270°	3	10s	A	Pass
70	25	0°, 90°, 180°, 270°	3	10s	A	Pass
0	250	0°, 90°, 180°, 270°	3	10s	C	Pass

Remark :
A: No degradation in performance of the EUT was observed.
B: During the test, the power shut down, after the experiment, the function can automatically return to normal.

5. TEST SETUP PHOTOS OF THE EUT

Photo of Radiated Emissions Measurement

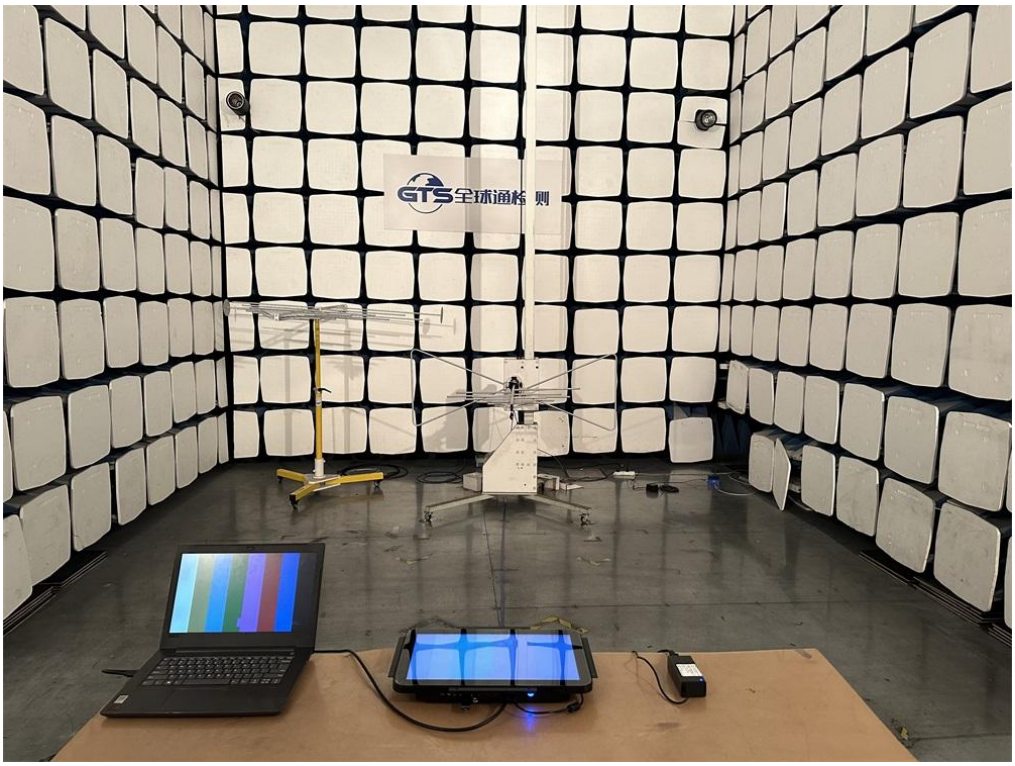


Fig. 1

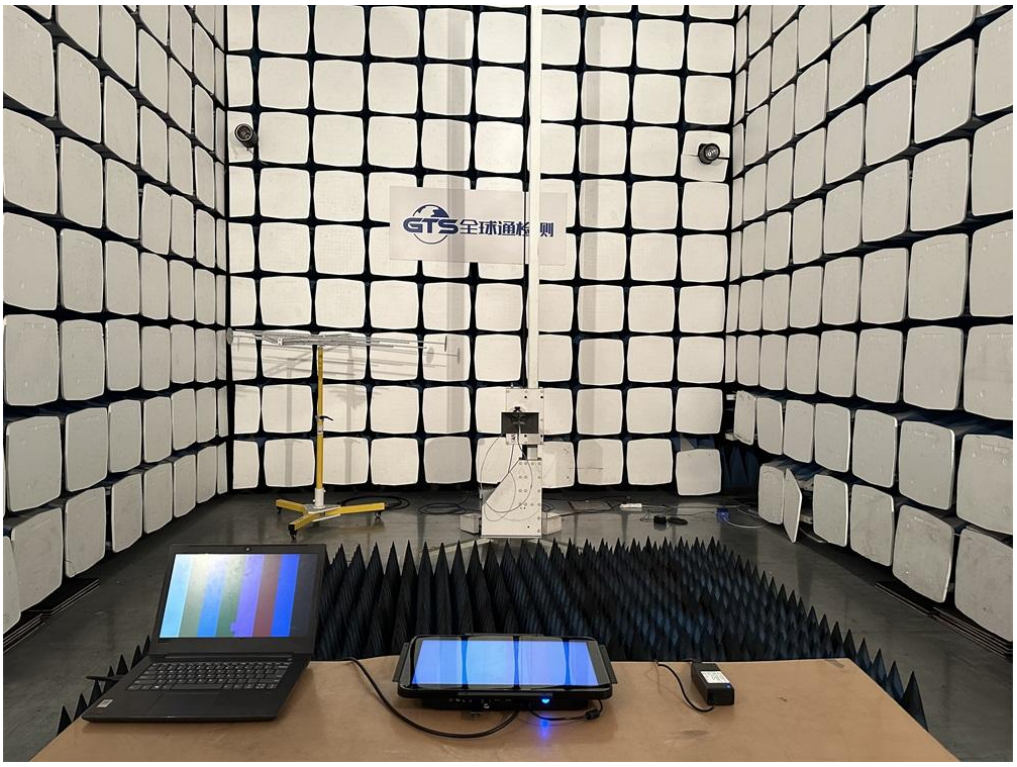


Fig. 2

Conducted Emission

Fig. 3

Electrostatic Discharge

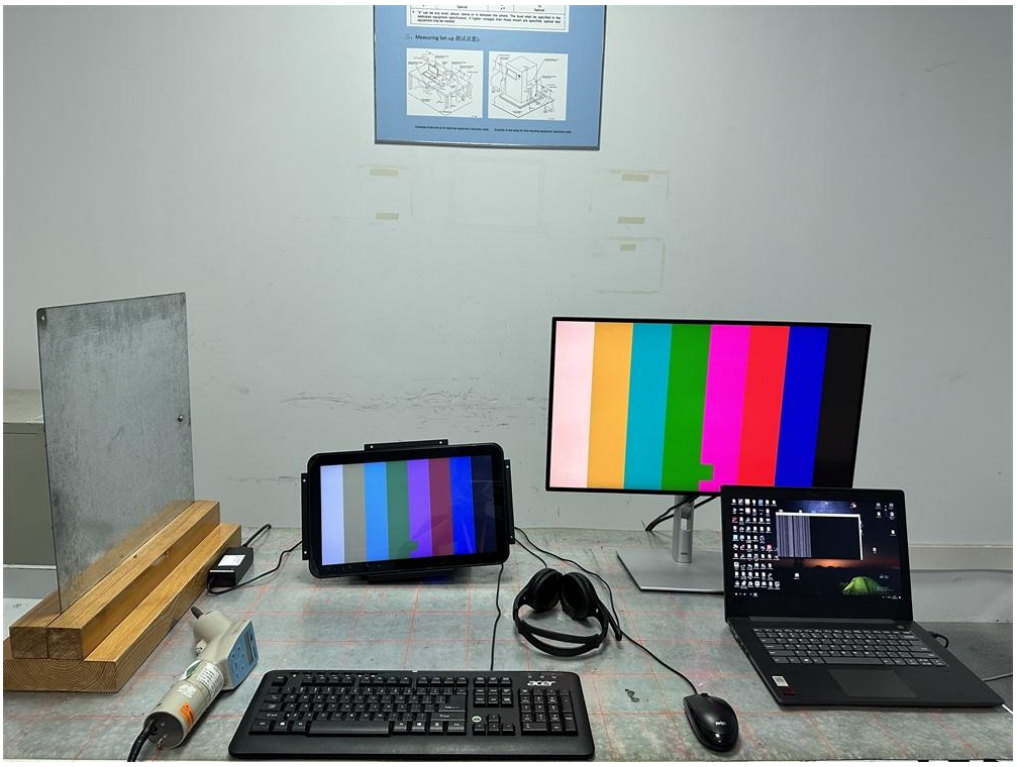


Fig. 4

RF Field Strength Susceptibility

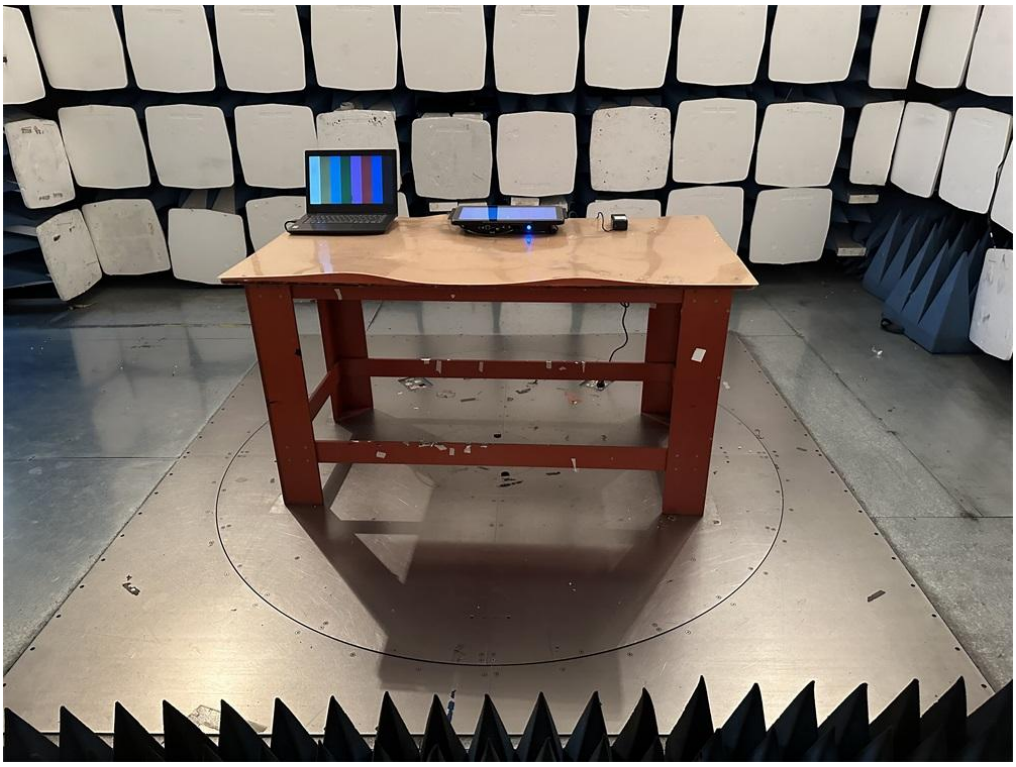


Fig. 5

Electrical fast transients / Burst

Fig. 6

Surge/Voltage Dips and Interruptions

Fig. 7

Conducted disturbances induced by radio-frequency fields

Fig. 8

Harmonic Current & Voltage Fluctuation and Flicker

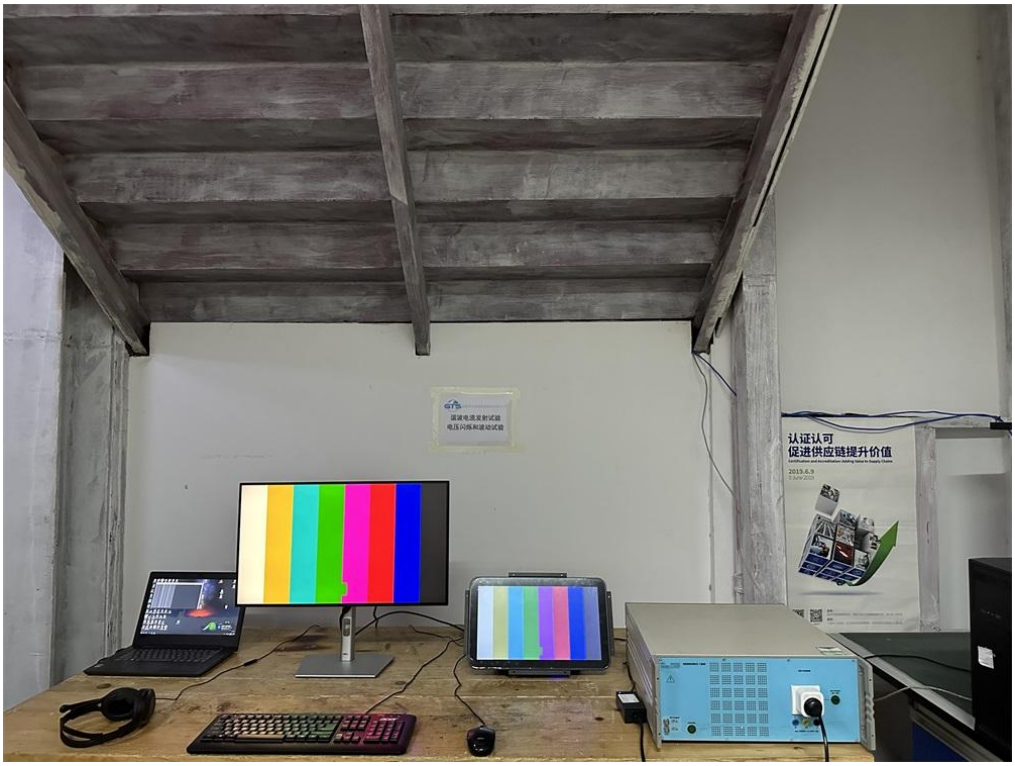


Fig. 9

6. EXTERNAL AND INTERNAL PHOTOS OF THE EUT

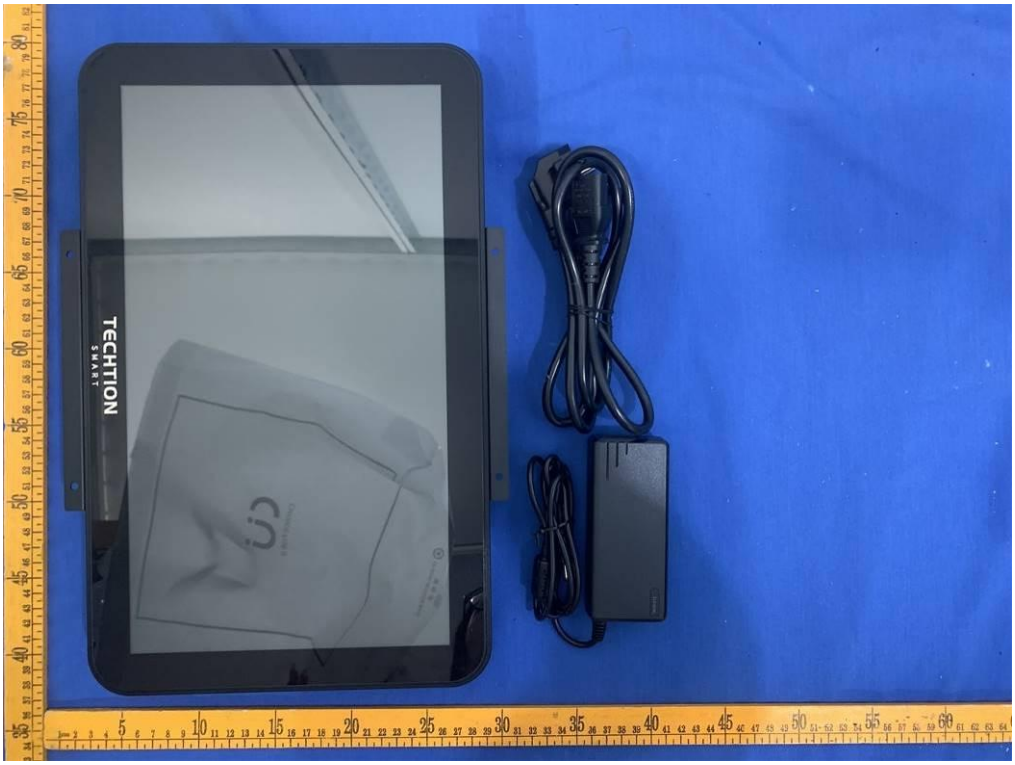


Fig. 1

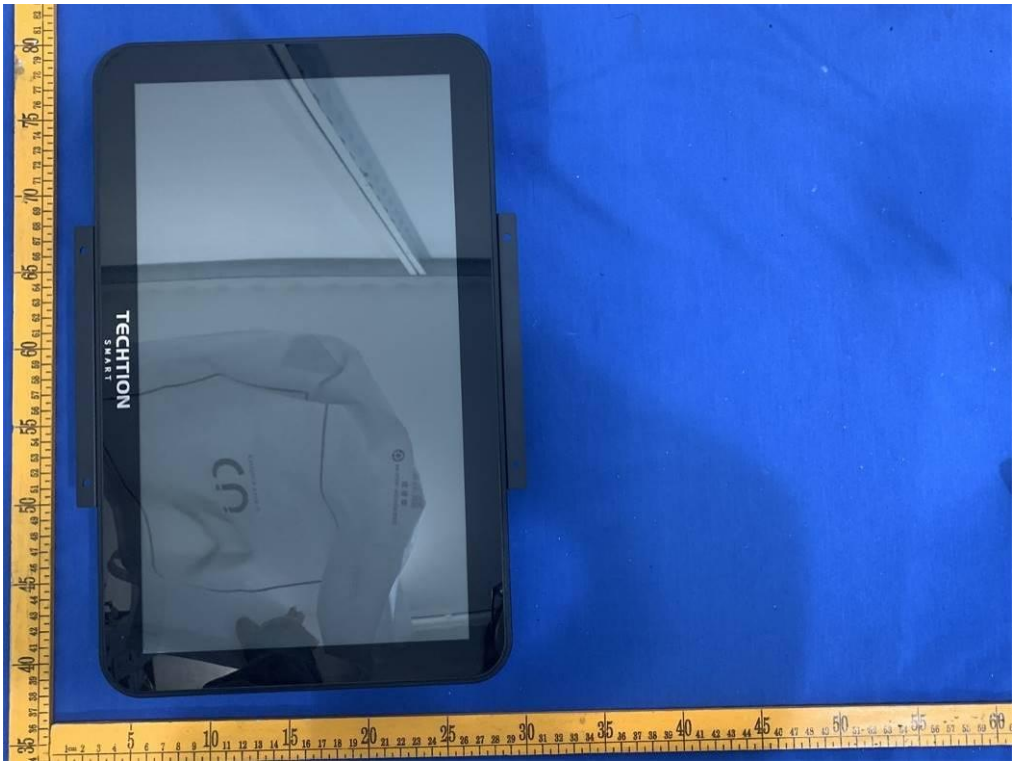


Fig. 2

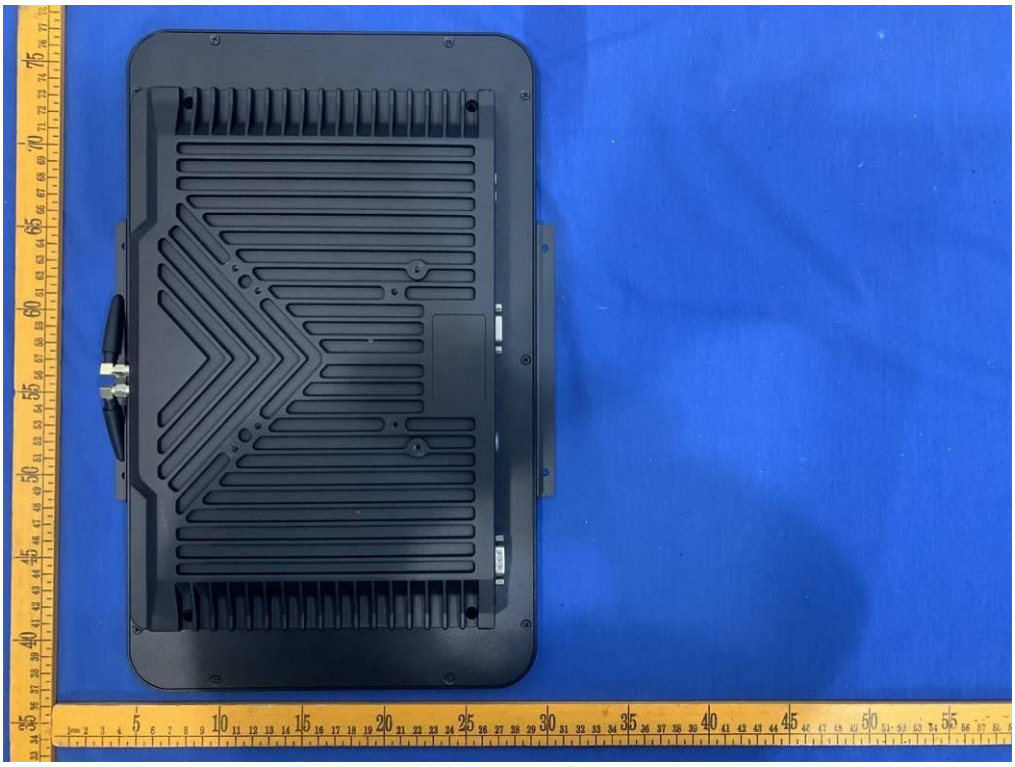


Fig. 3

Fig. 4

Fig. 5

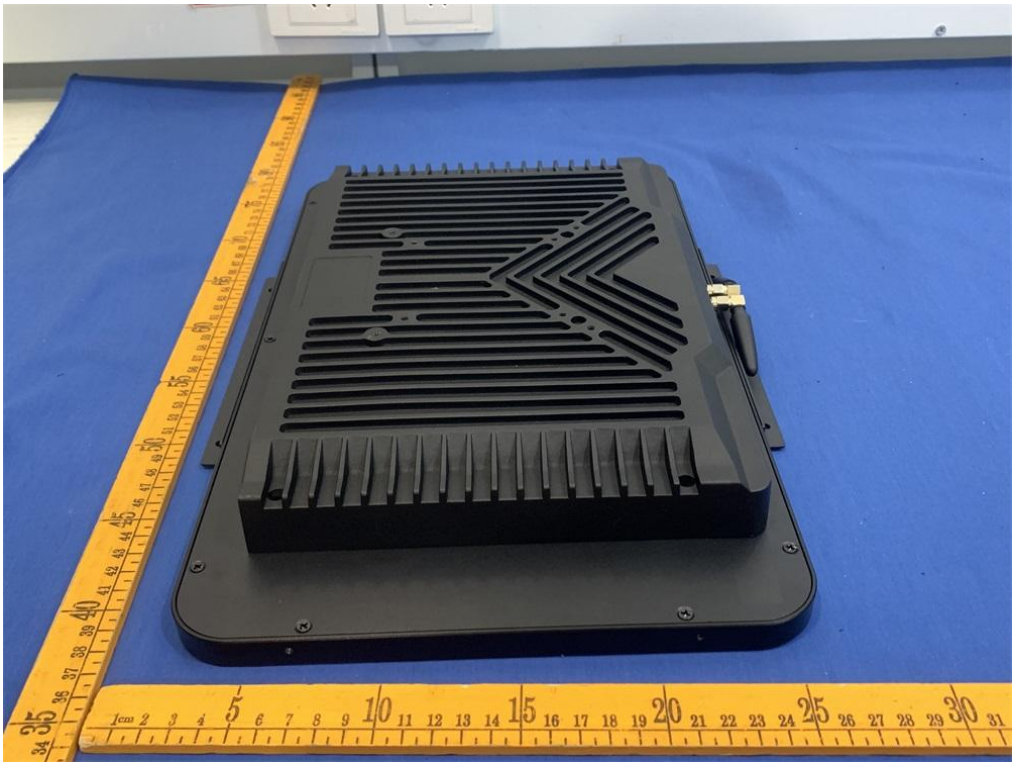


Fig. 6

Fig. 7


DAJING 大井
AC ADAPTER/电源适配器
型号 Model : ADP-48D12
输入 Input : 100-240V~ 50/60Hz 1.5A MAX
输出 Output : +12V ⎓ 4A
警告：非专业人员请勿自行开启此盖。
WARNING : Non-professional personnel should not open this cover by themselves.
湖南大井电源技术有限公司
Hunan Dajing Power Technology Co.,Ltd.
中国制造 /Made in China
2024052107

Fig. 8

Fig. 9

Fig. 10

Fig. 11

Fig. 12

Fig. 13

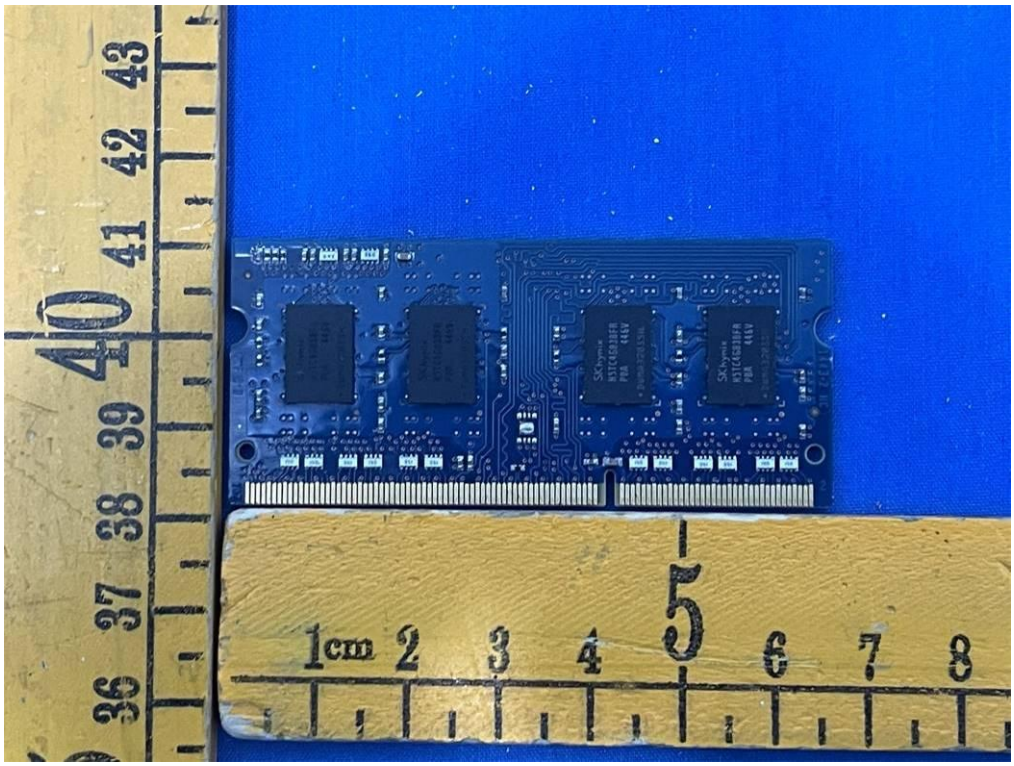


Fig. 14

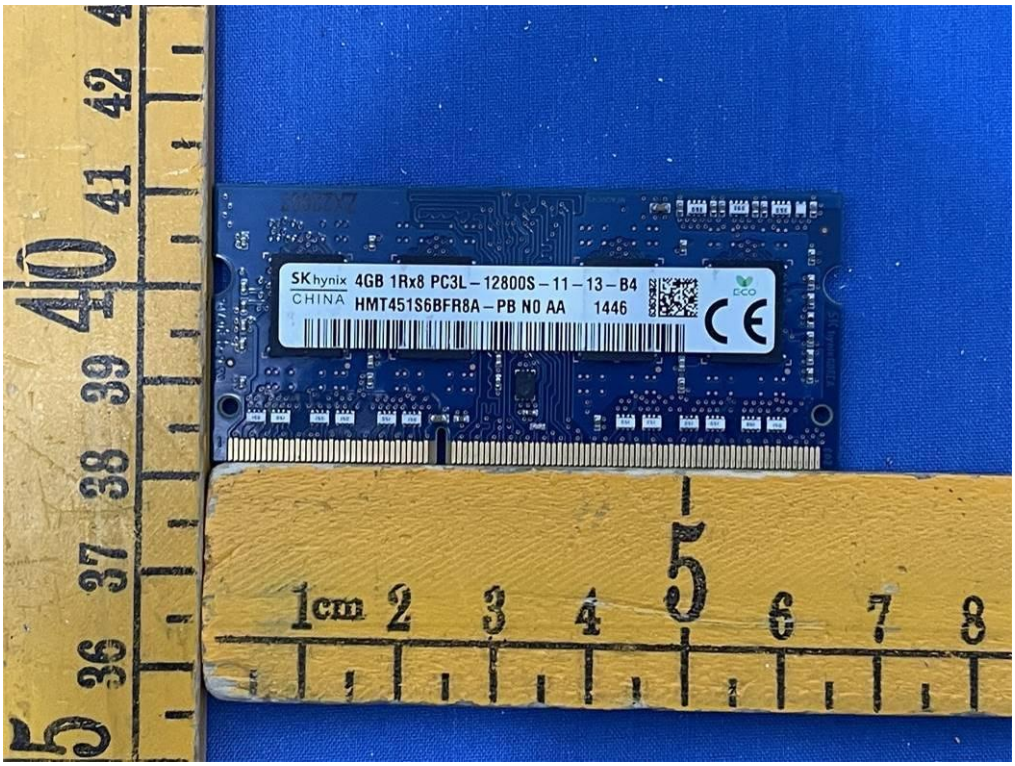

SKhynix
CHINA
4GB 1Rx8 PC3L-12800S-11-13-B4
HMT451S6BFR8A-PB N0 AA 1446

Fig. 15

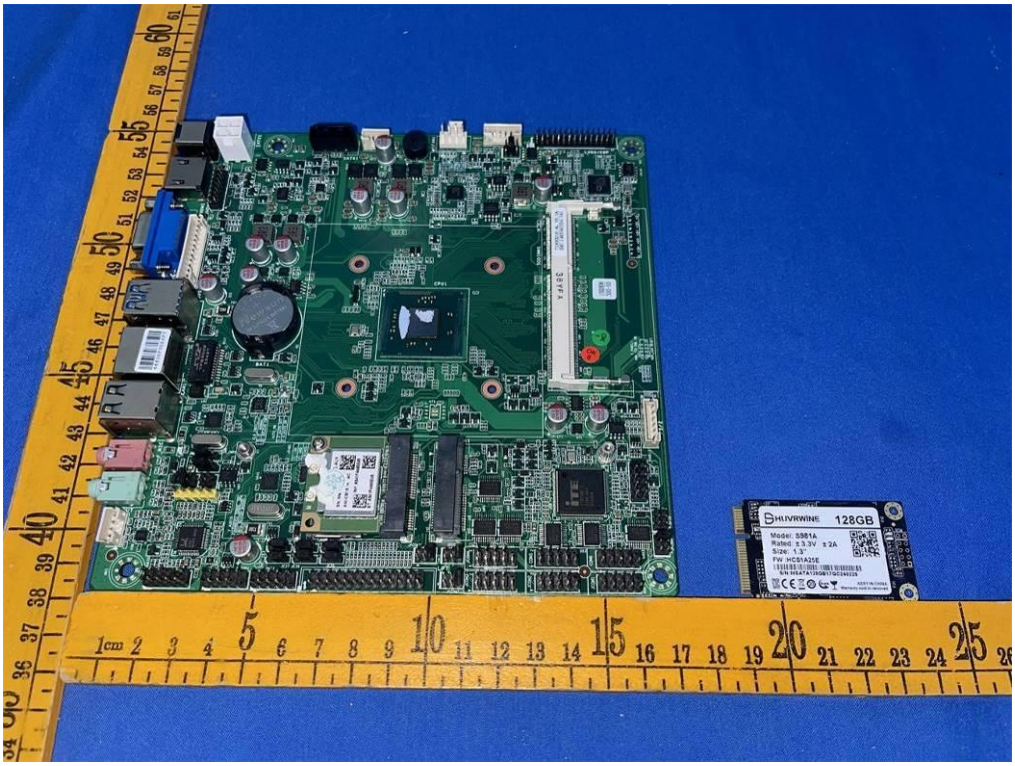

SHUVWINE 128GB

Fig. 16

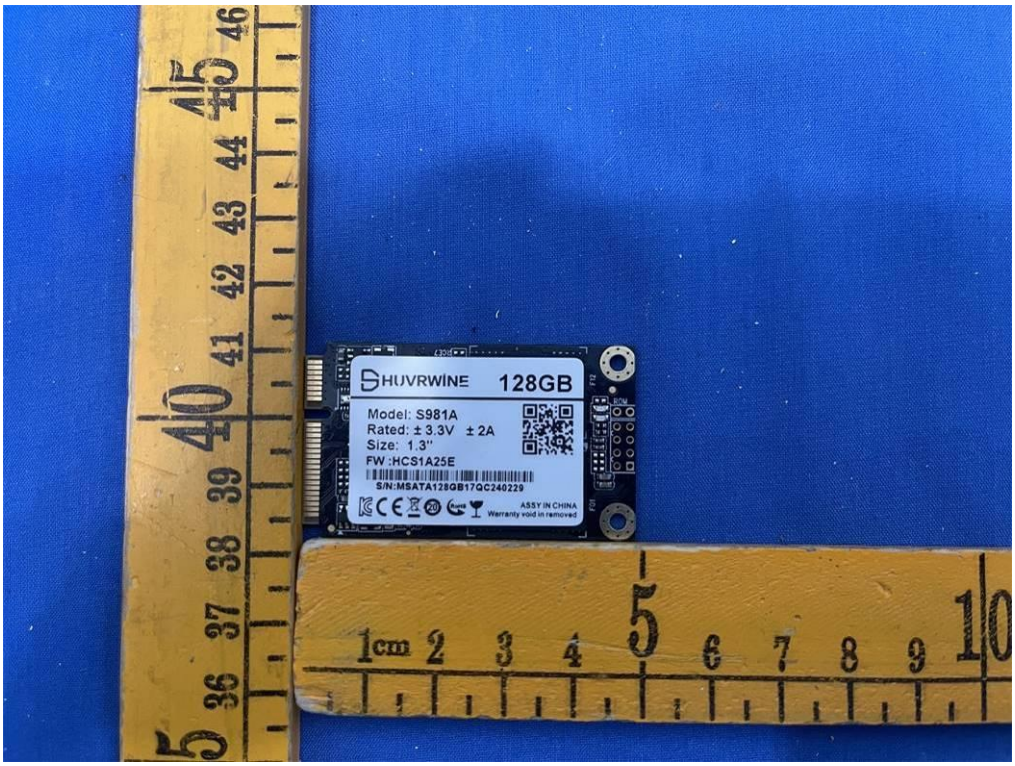

SHUVRWINE 128GB
Model: S981A
Rated: ± 3.3V ± 2A
Size: 1.3"
FW:HCS1A25E
S/N:MSATA128GB17QC240229
ASSY IN CHINA
Warranty void in removed

Fig. 17

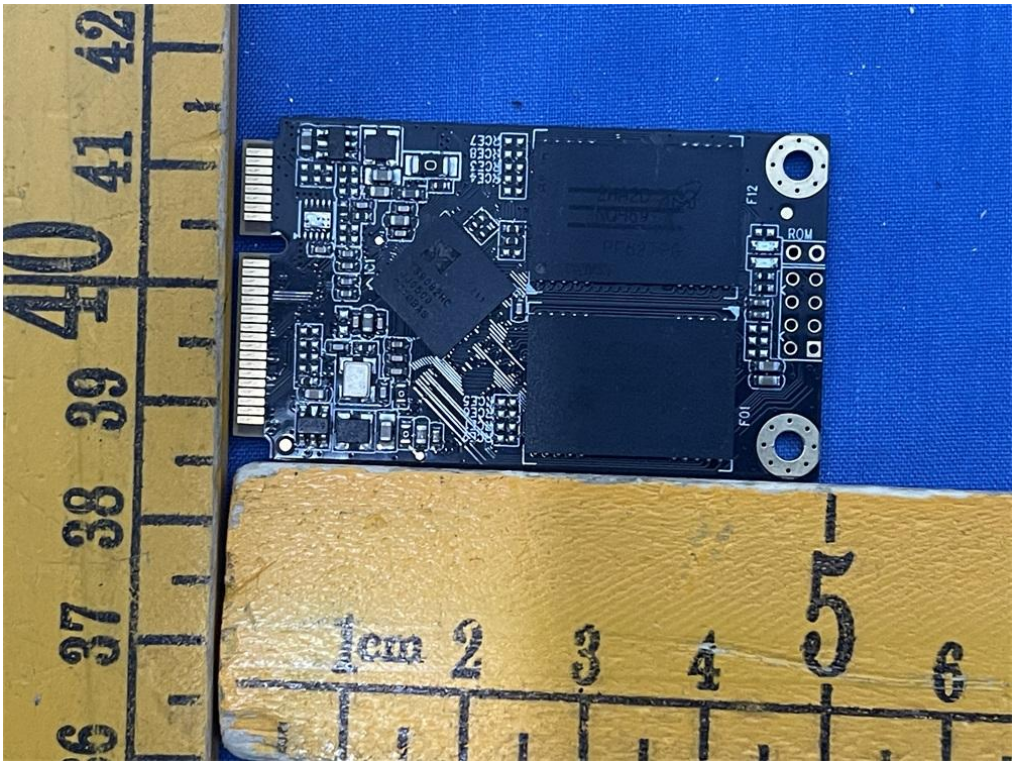

ROM

Fig. 18

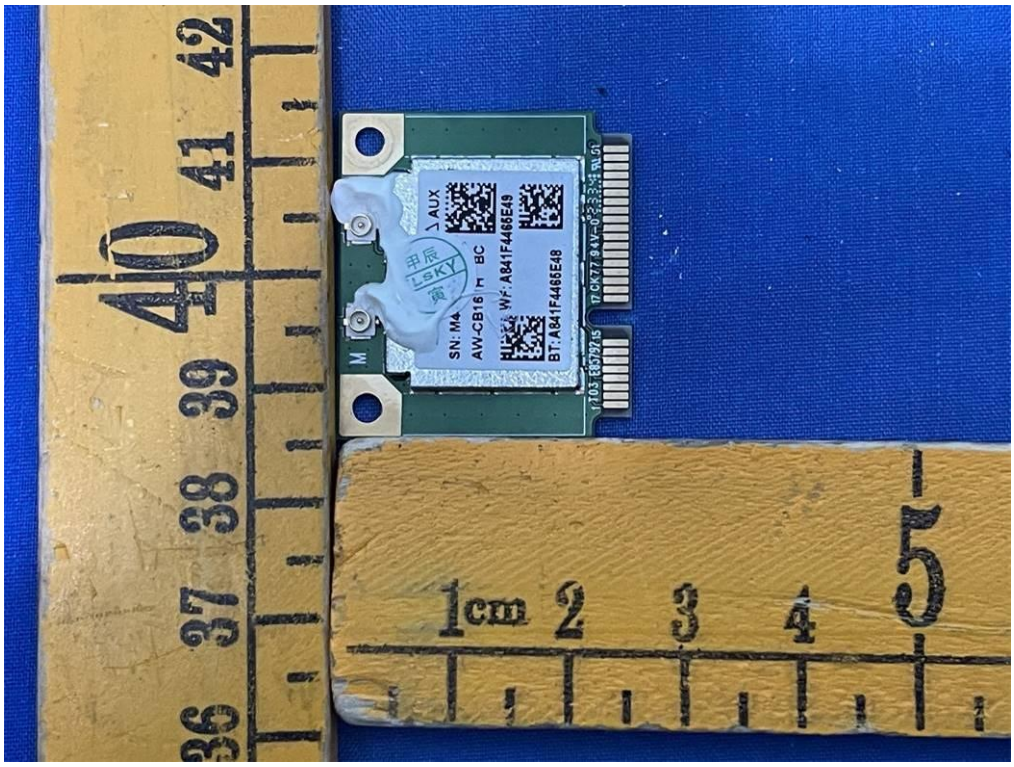

AUX
SN: M4
AW-CB161H
BT:A841F4465E48
Wi-Fi:A841F4465E49
LSKY
1cm 2 3 4 5

Fig. 19


AzureWave
AW-CB161H
RoHS
Compliies with
1cm 2 3 4 5

Fig. 20

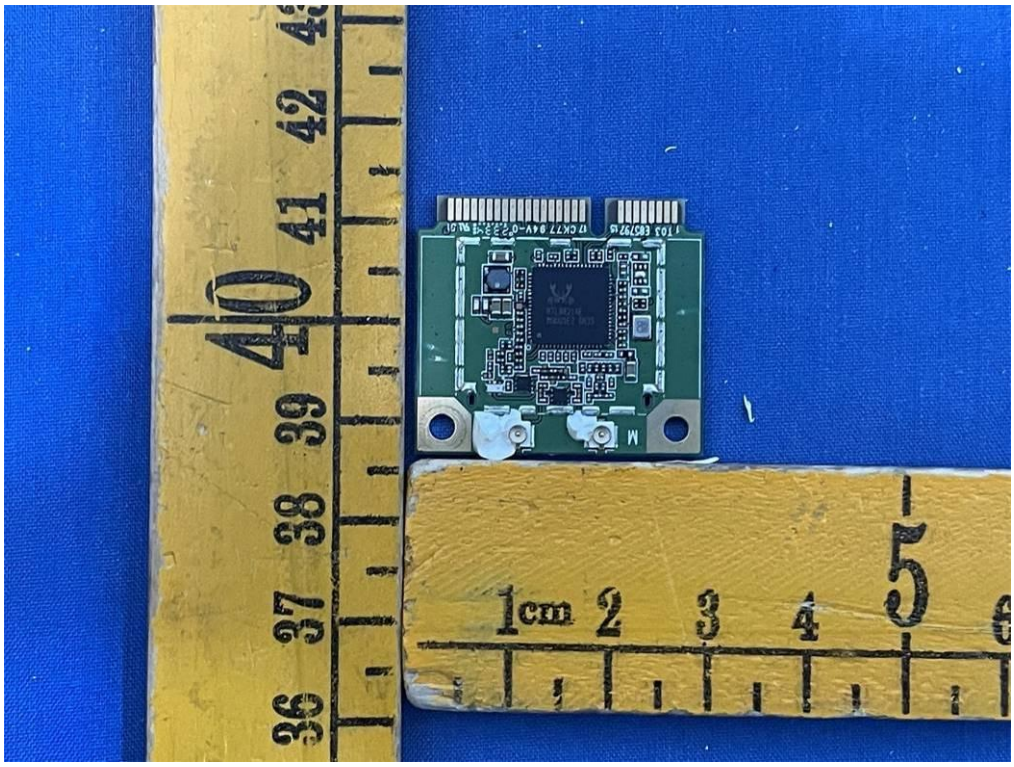


Fig. 21

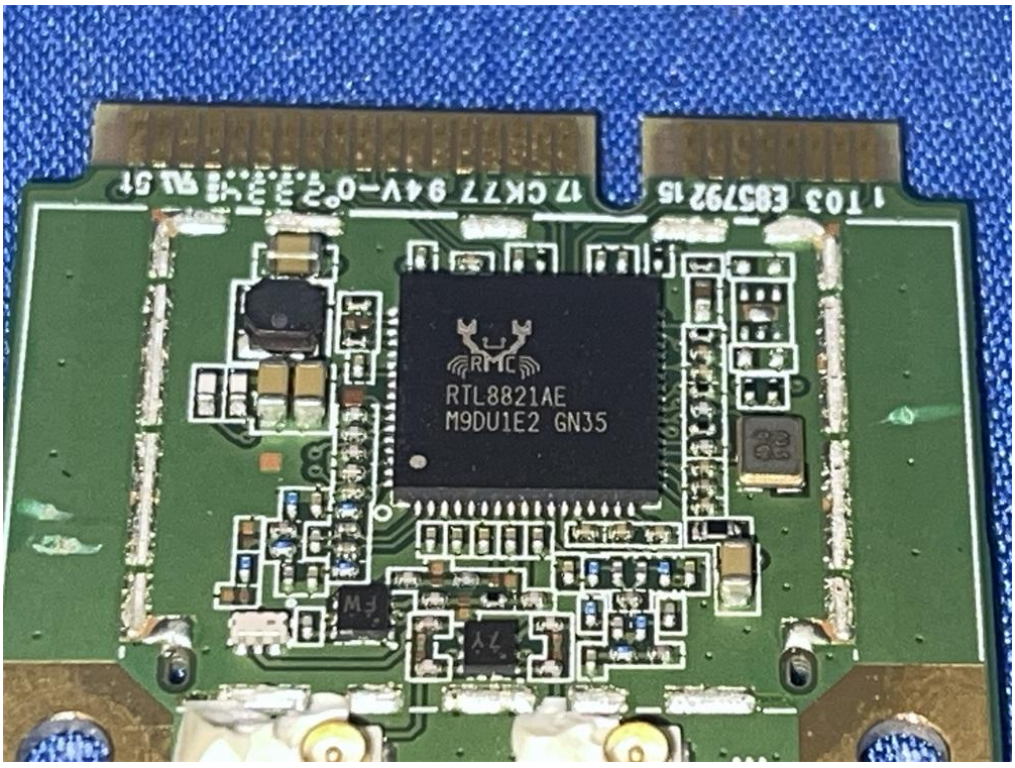


Fig. 22

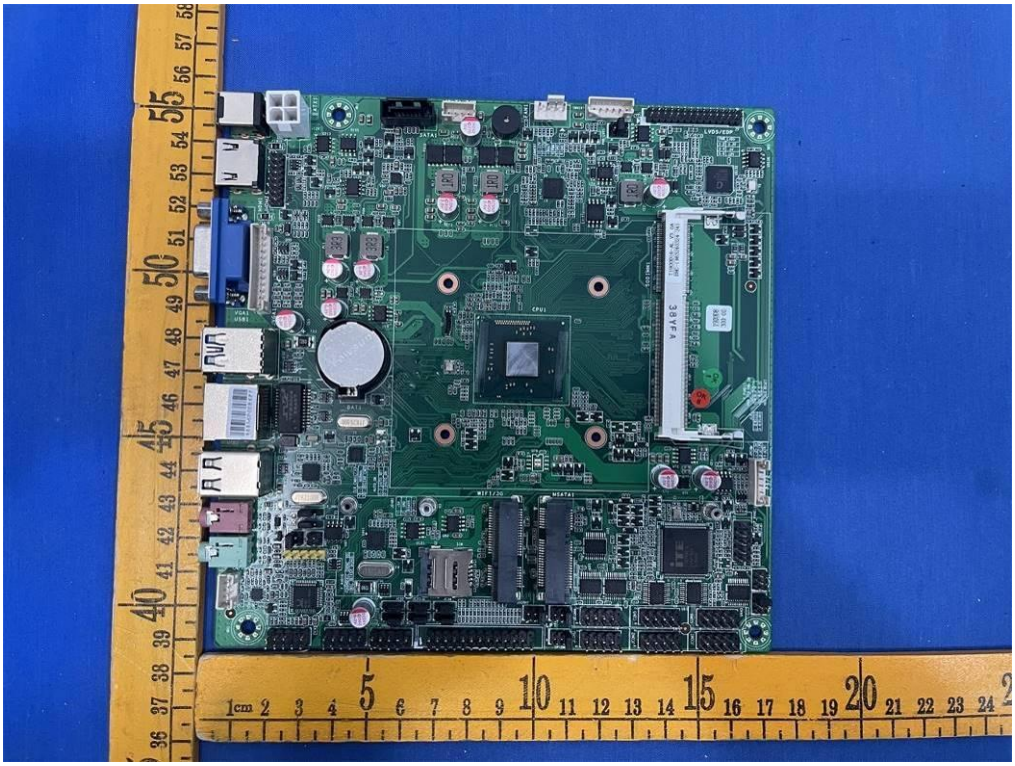


Fig. 23

Fig. 24

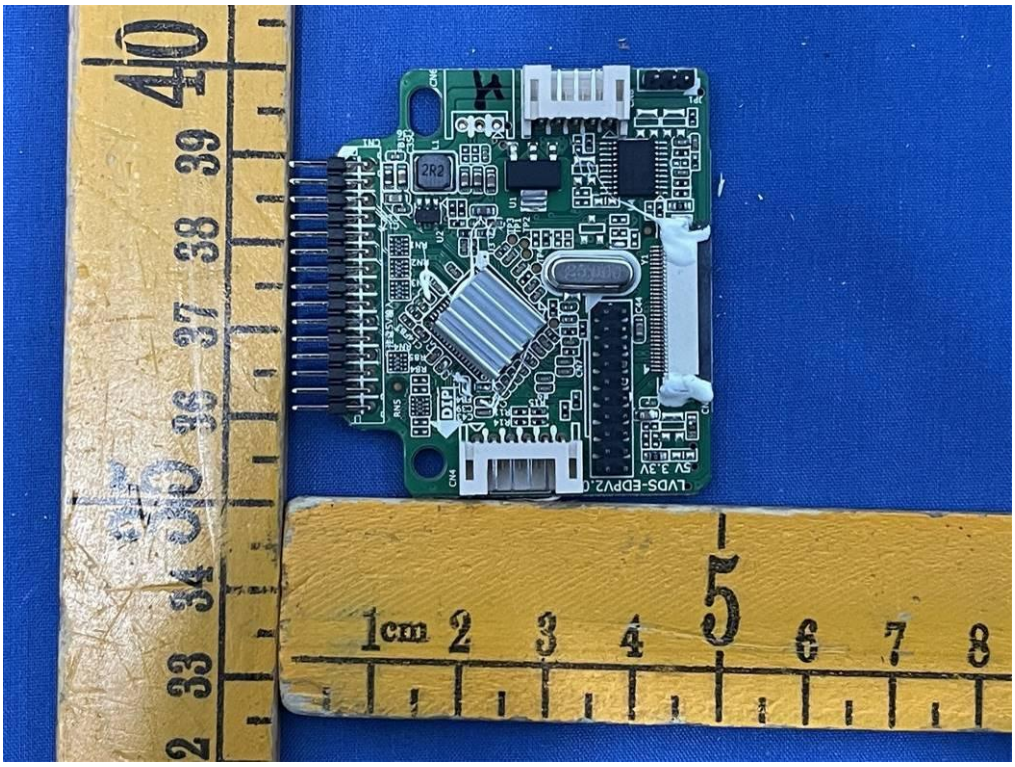

LVDS-EDPV2.0
5V 3.3V
1cm 2 3 4 5 6 7 8

Fig. 25

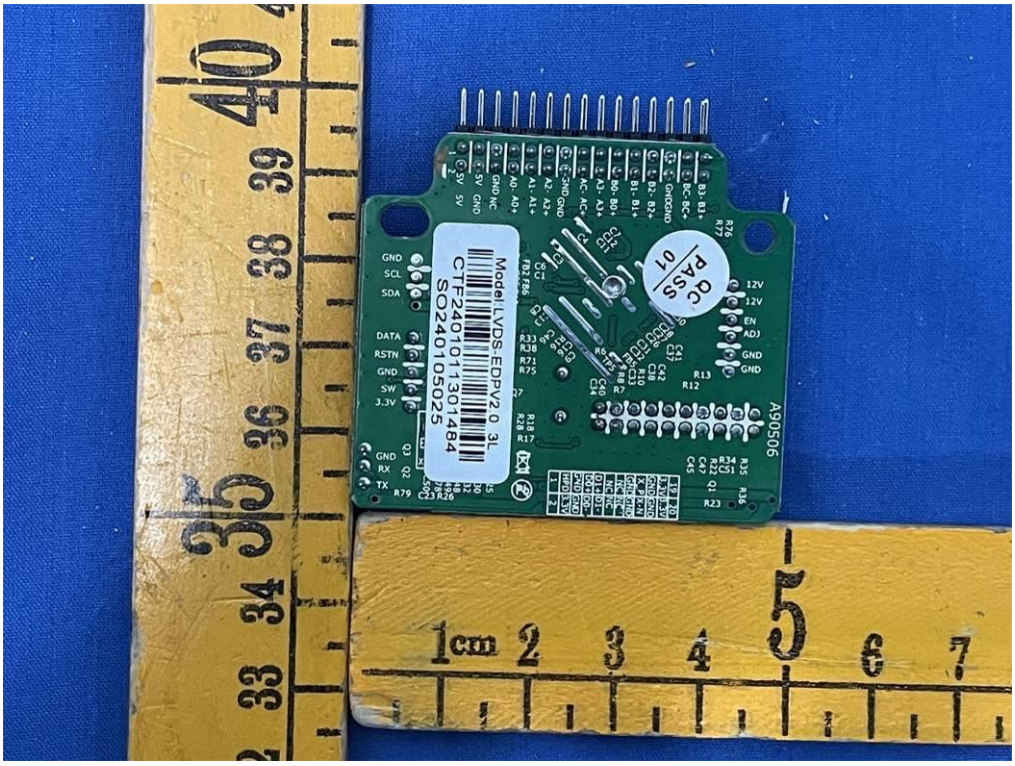

Model:LVDS-EDPV2.0_3L
CTF2401011301484
SO240105025
QC PASS 01
A90506
1cm 2 3 4 5 6 7

Fig. 26

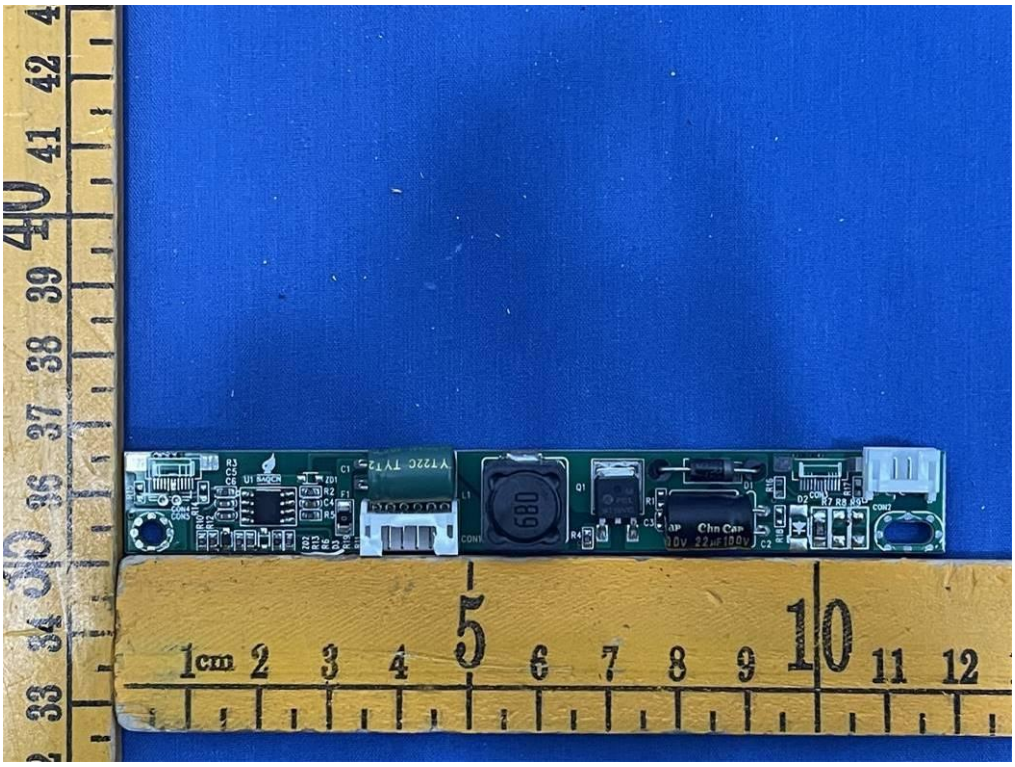


Fig. 27

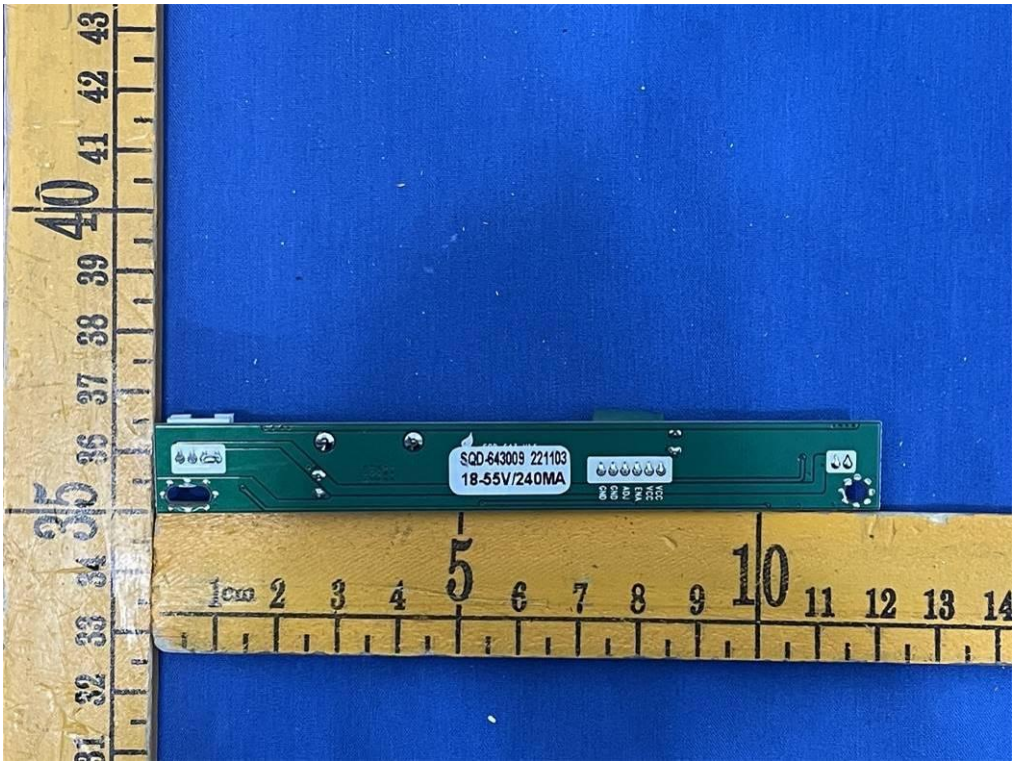


Fig. 28

.....End of Report.....