

TEST REPORT

Application No.: SHEM2204002434TX
Applicant: Qualfiber Technology Co., Ltd.
Address of Applicant: No. 55 building, Zhangkeng Industrial Park, Minzhi, Longhua District, Shenzhen, Guangdong Province, China
Manufacturer: Qualfiber Technology Co., Ltd.
Address of Manufacturer: No. 55 building, Zhangkeng Industrial Park, Minzhi, Longhua District, Shenzhen, Guangdong Province, China
Factory: Qualfiber Technology Co., Ltd.
Address of Factory: No. 55 building, Zhangkeng Industrial Park, Minzhi, Longhua District, Shenzhen, Guangdong Province, China
Equipment Under Test (EUT):
EUT Name: EDFA (Erbium-Doped Fiber Amplifier) /EYDFA (Erbium Yterbium Doped Fiber Amplifier)
Model No.: QF-HA5820-64W2I, QF-HA5820-32W2I, QF-HA5820-32W1I, QF-HA5820-16W2I, QF-HA5820-16W1I, QF-HA5820-8W2I, QF-HA5820-8W1I; ♣
 ♣ Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.
Standard(s) : EN 50083-2:2012+A1:2015
Date of Receipt: 2022-04-02
Date of Test: 2022-05-21 to 2022-05-22
Date of Issue: 2022-05-30

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

Parlam Zhan

Parlam Zhan
Laboratory Manager



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Revision Record			
Version	Description	Date	Remark
00	Original	2022-05-30	/

Authorized for issue by:			
		<i>Evan Yan</i>	
		Evan Yan/Project Engineer	
		<i>Bruce Tang</i>	
		Bruce Tang/Reviewer	



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2 Test Summary

Emission Part				
Item	Standard	Method	Requirement	Result
Conducted Emissions at Mains Power Port (150kHz-30MHz)	EN 50083-2:2012+A1:2015	ETSI EN 300 386 V2.2.0	Class A	Pass
Asymmetric Mode Conducted Emissions(150kHz-30MHz)		ETSI EN 300 386 V2.2.0	Class A	Pass
Radiated Emissions (30MHz-1GHz)		ETSI EN 300 386 V2.2.0	Class A	Pass
Radiated Emissions (Above 1GHz)		ETSI EN 300 386 V2.2.0	Class A	Pass
Harmonic Current Emission	EN 50083-2:2012+A1:2015	EN IEC 61000-3-2:2019+A1:2021	Class A	Pass
Voltage Fluctuations and Flicker	EN 50083-2:2012+A1:2015	EN 61000-3-3:2013+A2:2021	Clause 5	Pass



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Immunity Part				
Item	Standard	Method	Requirement	Result
Electrostatic Discharge	EN 50083-2:2012+A1:2015	ETSI EN 300 386 V2.2.0	Air discharges, ±2/4/8 kV Contact discharges, ±2/4/6kV	Pass
Radiated Immunity (80MHz-1GHz,1800MHz,2600MHz,3500MHz,5000MHz)		ETSI EN 300 386 V2.2.0	80%, 1kHz sinusoidal Amp. Mod 80 MHz – 690MHz, AM, 3 V/m 690MHz – 6 GHz, AM, 10 V/m.	Pass
Electrical Fast Transients & Burst at AC Power Port		ETSI EN 300 386 V2.2.0	1kV; 5/50ns Tr/Td; 5kHz Repetition Frequency	Pass
Electrical Fast Transients & Burst at Signal Port		ETSI EN 300 386 V2.2.0	0.5kV; 5/50ns Tr/Td; 5kHz Repetition Frequency	Pass
Surge at AC Power Port		ETSI EN 300 386 V2.2.0	1.2/50µs Tr/Td 1kV Line to Line 2kV Line to Ground	Pass
Surge at Signal Port		ETSI EN 300 386 V2.2.0	1.2/50µs Tr/Td 1kV Line to Ground	Pass
Conducted Immunity at AC Power Port (150kHz-80MHz)		ETSI EN 300 386 V2.2.0	0,15 to 10MHz 3Vrms (emf), 10 to 30MHz 3V to 1Vrms(emf), 30 to 80MHz 1Vrms(emf), 80%,1kHz Amp. Mod.	Pass
Conducted Immunity at Signal Port (150kHz-80MHz)		ETSI EN 300 386 V2.2.0	3 Vrms: 0.15MHz - 80MHz 80%,1kHz Amp. Mod.	Pass
Voltage Dips and Interruptions		ETSI EN 300 386 V2.2.0	0% residual voltage for 1 periods: B 70% residual voltage for 25 periods: B 0% residual voltage for 250 periods: C	Pass

Note: There are series models mentioned in this report and they are the similar in electrical and electronic characters. Only the model QF-HA5820-64W21 was tested since their differences were the model number, trade name and appearance.



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9 EUT CONSTRUCTIONAL DETAILS (EUT PHOTOS)55



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4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. E&E Lab
588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China
Tel: +86 21 6191 5666 Fax: +86 21 6191 5678

No tests were sub-contracted.

4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **CNAS (No. CNAS L0599)**

CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **A2LA (Certificate No. 6332.01)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. is accredited by the American Association for Laboratory Accreditation(A2LA).

- **FCC (Designation Number: CN1301)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been recognized as an accredited testing laboratory.

- **ISED (CAB Identifier: CN0020)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. EMC Laboratory has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory.
Company Number: 8617A

- **VCCI (Member No.: 3061)**

The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-13868, C-14336, T-12221, G-10830 respectively.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

4.8 EMS Monitor

Visual: working status



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5 Equipment List

Conducted Emissions at Mains Power Port (150kHz-30MHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EMI test receiver	Rohde & Schwarz	ESR7	SHEM162-1	2021/12/20	2022/12/19
Line impedance stabilization network	SCHWARZBECK	NSLK8127	SHEM061-1	2021/12/20	2022/12/19
Line impedance stabilization network	EMCO	3816_2	SHEM019-1	2021/12/20	2022/12/19
Pulse limiter	Rohde & Schwarz	ESH3-Z2	SHEM029-1	2021/12/20	2022/12/19
Shielding Room	ZHONGYU	8*4*3M	SHEM079-2	2020/12/20	2023/12/19
CE test Cable	/	/	SHEM172-1	2022/1/7	2023/1/6
Test Software	ESE	e3	Version: 6.111221a	N/A	N/A

Asymmetric Mode Conducted Emissions(150kHz-30MHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EMI test receiver	Rohde & Schwarz	ESR7	SHEM162-1	2021/12/20	2022/12/19
Line impedance stabilization network	SCHWARZBECK	NSLK8127	SHEM061-1	2021/12/20	2022/12/19
Line impedance stabilization network	EMCO	3816_2	SHEM019-1	2021/12/20	2022/12/19
Pulse limiter	Rohde & Schwarz	ESH3-Z2	SHEM029-1	2021/12/20	2022/12/19
Shielding Room	ZHONGYU	8*4*3M	SHEM079-2	2020/12/20	2023/12/19
CE test Cable	/	/	SHEM172-1	2022/1/7	2023/1/6
8-wire ISN cat 5	SCHWARZBECK	CAT5 8158	SHEM137-1	2021/12/20	2022/12/19
8-wire ISN cat 3	SCHWARZBECK	CAT3 8158	SHEM137-2	2021/12/20	2022/12/19
8-wire ISN cat 6	SCHWARZBECK	NTFM8158	SHEM137-3	2021/12/20	2022/12/19
2-wire ISN	SCHWARZBECK	NTFM 8131	SHEM139-1	2021/12/20	2022/12/19
Passive Voltage probe	Rohde & Schwarz	ESH2-Z3	SHEM028-1	2021/8/13	2022/8/12
Capacitive Voltage Probe	SCHWARZBECK	CVP9222 B	SHEM169-1	2021/4/15	2023/4/14
Current Probe	SCHWARZBECK	SW9605	SHEM170-1	2021/4/15	2023/4/14
Test Software	ESE	e3	Version: 6.111221a	N/A	N/A

Radiated Emissions (30MHz-1GHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EMI test receiver	Rohde & Schwarz	ESU40	SHEM051-1	2021/12/20	2022/12/19
EMI test receiver	Rohde & Schwarz	ESR7	SHEM201-1	2021/4/15	2023/4/14
CONTROLLER	INNCO	CO2000	SHEM047-1	N/A	N/A
ANTENNA MAST	INNCO	MA400-EP	SHEM047-2	N/A	N/A



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TURN DEVICE	INNCO	DE 3600-RH	SHEM047-3	N/A	N/A
Broadband UHF-VHF ANTENNA	SCHWARZBECK	VULB9168	SHEM048-1	2021/9/21	2023/9/20
Broadband UHF-VHF ANTENNA	SCHWARZBECK	VULB9168	SHEM202-1	2021/5/7	2023/5/6
Semi/Fully Anechoic	ST	11*6*6M	SHEM078-2	2020/5/25	2023/5/24
Pre-amplifier	HP	8447D	SHEM236-1	2021/5/27	2023/5/26
Pre-amplifier	HP	8447D	SHEM143-1	2021/12/20	2022/12/19
RE test Cable	/	/	SHEM173-1&SHEM174-1	2022/1/7	2023/1/6
Test Software	ESE	e3	Version: 6.111221a	N/A	N/A

Radiated Emissions (Above 1GHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EMI test receiver	Rohde & Schwarz	ESU40	SHEM051-1	2021/12/20	2022/12/19
EMI test receiver	Rohde & Schwarz	ESR7	SHEM201-1	2021/4/15	2023/4/14
CONTROLLER	INNCO	CO2000	SHEM047-1	N/A	N/A
ANTENNA MAST	INNCO	MA400-EP	SHEM047-2	N/A	N/A
TURN DEVICE	INNCO	DE 3600-RH	SHEM047-3	N/A	N/A
Horn Antenna (1-18GHz)	Schwarzbeck	BBHA9120D	SHEM050-1	2021/9/18	2023/9/17
Pre-amplifier (1-18GHz)	Schwarzbeck	SCU-F0118-G40-BZ4-CSS(F)	SHEM050-2	2021/12/20	2022/12/19
Horn Antenna (1-18GHz)	Schwarzbeck	HF906	SHEM009-1	2020/6/9	2023/6/8
Semi/Fully Anechoic	ST	11*6*6M	SHEM078-2	2020/5/25	2023/5/24
RE test Cable	/	/	SHEM173-1&SHEM174-1	2022/1/7	2023/1/6
Test Software	ESE	e3	Version: 6.111221a	N/A	N/A

Harmonic Current Emission					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Harmonic&Flicker analyzer	AMETEK	PACS-1	SHEM024-2	2021/5/27	2023/5/26
AC Power Source 5KVA	AMETEK	5001iX	SHEM025-2	2021/5/27	2023/5/26
Test Software	AMETEK	CTS4	Version: 4.24.0	N/A	N/A
Harmonic&Flicker analyzer	EM TEST	DPA500	SHEM024-1	2021/8/13	2022/8/12
AC Power Source 6KVA	EM TEST	ACS500	SHEM025-1	2021/8/13	2022/8/12
Test Software	EM TEST	DPA	Version: 5.4.8.0	N/A	N/A



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Voltage Fluctuations and Flicker					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date

Electrostatic Discharge					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Electrostatic Discharge Simulator	TESEQ	NSG 437	SHEM041-2	2021/8/13	2022/8/12
Electrostatic Discharge Simulator	3CTEST	EDS20H	SHEM199-1	2021/9/29	2022/9/28

Radiated Immunity (80MHz-6GHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Signal generator	Rohde & Schwarz	SMB100A	SHEM194-1	2021/12/20	2022/12/19
Power Meter	Rohde & Schwarz	NRP	SHEM057-1	2021/4/15	2023/4/14
Power meter sensor	Rohde & Schwarz	NRP-Z91	SHEM057-2	2021/4/15	2023/4/14
Antenna	SCHWARZBECK	STLP9128D	SHEM130-1	N/A	N/A
Antenna	SCHWARZBECK	STLP9149	SHEM131-1	N/A	N/A
Amplifier	MILMEGA	AS0840-55-55	SHEM133-1	2021/12/20	2022/12/19
Amplifier	MILMEGA	80RF1000-250	SHEM132-1	2021/12/20	2022/12/19
Amplifier	Rohde & Schwarz	BBA150-E60	SHEM171-1	2021/12/20	2022/12/19
Power meter sensor	Rohde & Schwarz	NRP-Z22	SHEM136-1	2021/4/15	2023/4/14
ElectroMagnetic Field Probe	ETS-Lindgren	HI-6105	SHEM134-1	2021/8/6	2022/8/5
Semi/Fully Anechoic	ST	11*6*6M	SHEM078-2	2020/5/25	2023/5/24
Test Software	Rohde & Schwarz	EMC32	Version: 10.20.01	N/A	N/A

Electrical Fast Transients & Burst at AC Power Port					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Immunity Test System	EMC PARTNER	TRA3000 F-S-D-V	SHEM163-1	2021/12/20	2022/12/19
Test Software	EMC-PARTNER	GENECS	Version: 3.29	N/A	N/A
Immunity Test System	TESEQ	NSG 3060	SHEM224-1	2021/4/15	2023/4/14
Coupling / Decoupling Network (CDN)	TESEQ	CDN 3061	SHEM224-3	2021/4/15	2023/4/14
EFT & Surge Generator	PRIMA	PRM61045TB	SHEM200-1	2021/8/13	2022/8/12
CDN for EFT & Surge	PRIMA	PRM-CDN	SHEM200-2	2021/8/13	2022/8/12



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Electrical Fast Transients & Burst at Signal Port					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Immunity Test System	EMC PARTNER	TRA3000 F-S-D-V	SHEM163-1	2021/12/20	2022/12/19
Test Software	EMC-PARTNER	GENECS	Version: 3.29	N/A	N/A
Immunity Test System	TESEQ	NSG 3060	SHEM224-1	2021/4/15	2023/4/14
Coupling / Decoupling Network (CDN)	TESEQ	CDN 3061	SHEM224-3	2021/4/15	2023/4/14
Capacitive Coupling Clamp	EM TEST	HFK	SHEM026-2	2021/12/20	2022/12/19
EFT & Surge Generator	PRIMA	PRM61045TB	SHEM200-1	2021/8/13	2022/8/12
CDN for EFT & Surge	PRIMA	PRM-CDN	SHEM200-2	2021/8/13	2022/8/12
Capacitive coupling clamp	PRIMA	EFT-CLAMP	SHEM200-4	2021/9/29	2022/9/28

Surge at AC Power Port					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Immunity Test System	EMC PARTNER	TRA3000 F-S-D-V	SHEM163-1	2021/12/20	2022/12/19
Test Software	EMC-PARTNER	GENECS	Version: 3.29	N/A	N/A
Immunity Test System	TESEQ	NSG 3060	SHEM224-1	2021/4/15	2023/4/14
Coupling / Decoupling Network (CDN)	TESEQ	CDN 3061	SHEM224-3	2021/4/15	2023/4/14
EFT & Surge Generator	PRIMA	PRM61045TB	SHEM200-1	2021/8/13	2022/8/12
CDN for EFT & Surge	PRIMA	PRM-CDN	SHEM200-2	2021/8/13	2022/8/12

Surge at Signal Port					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Immunity Test System	EMC PARTNER	TRA3000 F-S-D-V	SHEM163-1	2021/12/20	2022/12/19
Test Software	EMC-PARTNER	GENECS	Version: 3.29	N/A	N/A
Immunity Test System	TESEQ	NSG 3060	SHEM224-1	2021/4/15	2023/4/14
Coupling / Decoupling Network (CDN)	TESEQ	CDN 3061	SHEM224-3	2021/4/15	2023/4/14
EFT & Surge Generator	PRIMA	PRM61045TB	SHEM200-1	2021/8/13	2022/8/12
CDN for EFT & Surge	PRIMA	PRM-CDN	SHEM200-2	2021/8/13	2022/8/12
Data coupling network 4 line	EM TEST	CNV 504	SHEM026-3	2021/12/20	2022/12/19
Telecom surge (10 / 700us) extension unit	TESEQ	NSG 3060-TS-EXT	SHEM224-2	2021/4/15	2023/4/14
CDN for unsymmetrical interconnection lines	SCHAFFNER	CDN 117	SHEM224-5	2021/4/15	2023/4/14



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(1.2/50us)					
CDN for symmetric datalines & Resistor network (Surge 1.2/50 or 10/700 us)	SCHAFFNER	CDN 118 & INA172	SHEM224-6 & SHEM224-7	2021/4/15	2023/4/14

Conducted Immunity at AC Power Port (150kHz-80MHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Signal generator	Rohde & Schwarz	SMB100A	SHEM194-1	2021/12/20	2022/12/19
Power Amplifier	HAEFFLY	PAMP250	SHEM023-1	2021/12/20	2022/12/19
6dB Attenuator	HUAXIANG	DTS50-6dB-1G-A	SHEM123-2	2021/12/20	2022/12/19
Power Meter	Rohde & Schwarz	NRP	SHEM057-1	2021/4/15	2023/4/14
Power meter sensor	Rohde & Schwarz	NRP-Z91	SHEM057-2	2021/4/15	2023/4/14
Coupling and Decoupling Network (CDN)	LUTHI	L-801 M1	SHEM023-5	2021/12/20	2022/12/19
Coupling and Decoupling Network (CDN)	LUTHI	L-801 M2/M3	SHEM023-6	2021/12/20	2022/12/19
Shielding Room	ZHONGYU	5*3*3M	SHEM079-6	2021/12/20	2024/12/19
Coupling and Decoupling Network	Teseq	CDN M016	SHEM168-1	2021/8/13	2022/8/12
RF Generator	SCHAFFNER	NSG 2070	SHEM221-1	2021/5/27	2023/5/26
Test Software	Rohde & Schwarz	EMC32	Version: 10.20.01	N/A	N/A



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Conducted Immunity at Signal Port (150kHz-80MHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Signal generator	Rohde & Schwarz	SMB100A	SHEM194-1	2021/12/20	2022/12/19
Power Amplifier	HAEFFLY	PAMP250	SHEM023-1	2021/12/20	2022/12/19
6dB Attenuator	HUAXIANG	DTS50-6dB-1G-A	SHEM123-2	2021/12/20	2022/12/19
Coupling clamp	LUTHI	EM 101	SHEM027-1	2021/12/20	2022/12/19
Power Meter	Rohde & Schwarz	NRP	SHEM057-1	2021/4/15	2023/4/14
Power meter sensor	Rohde & Schwarz	NRP-Z91	SHEM057-2	2021/4/15	2023/4/14
Coupling and Decoupling Network (CDN)	LUTHI	L-801 M1	SHEM023-5	2021/12/20	2022/12/19
Coupling and Decoupling Network (CDN)	LUTHI	L-801 M2/M3	SHEM023-6	2021/12/20	2022/12/19
Shielding Room	ZHONGYU	5*3*3M	SHEM079-6	2021/12/20	2024/12/19
Coupling and Decoupling Network	Teseq	CDN M016	SHEM168-1	2021/8/13	2022/8/12
RF Generator	SCHAFFNER	NSG 2070	SHEM221-1	2021/5/27	2023/5/26
Test Software	Rohde & Schwarz	EMC32	Version: 10.20.01	N/A	N/A

Voltage Dips and Interruptions					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Immunity Test System	EMC PARTNER	TRA3000 F-S-D-V	SHEM163-1	2021/12/20	2022/12/19
Test Software	EMC-PARTNER	GENECS	Version: 3.29	N/A	N/A
Immunity Test System	TESEQ	NSG 3060	SHEM224-1	2021/4/15	2023/4/14
Coupling / Decoupling Network (CDN)	TESEQ	CDN 3061	SHEM224-3	2021/4/15	2023/4/14
Manual step transformer	TESEQ	INA 6501	SHEM224-4	2021/4/15	2023/4/14

General used equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Digital pressure meter	YONGZHI	DYM3-01	SHEM082-1	2021-01-22	2024-01-21
Temperature&humidity recorder	ShangHai weather meter work	ZJ 1-2B	SHEM042-1~6	2021-09-07	2022-09-06
Digital Multimeter	FLUKE	17B	SHEM043-3	2021-09-04	2022-09-03
Autofomer regulator	Guangzhou bao de	TDGC2-5KVA	SHEM150-1	N/A	N/A
Multi-purpose tong tester	FLUKE	316	SHEM001-1	2021-12-20	2022-12-19



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6 Emission Test Results

6.1 Conducted Emissions at Mains Power Port (150kHz-30MHz)

Test Requirement: EN 50083-2:2012+A1:2015

Test Method: ETSI EN 300 386 V2.2.0

Limit:

0.15MHz-0.5MHz 79dB(μV) quasi-peak, 66dB(μV) average

0.5MHz-30MHz 73dB(μV) quasi-peak, 60dB(μV) average

Detector: Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz

6.1.1 E.U.T. Operation

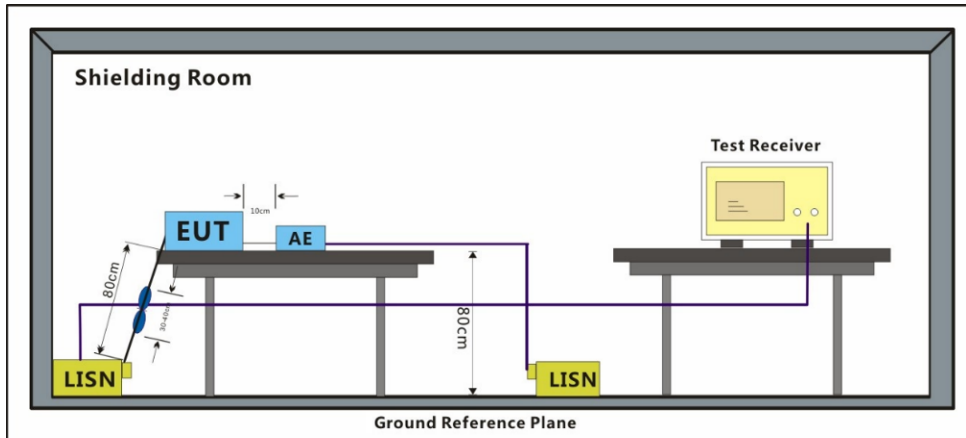
Operating Environment:

Temperature: 22 °C Humidity: 51 % RH Atmospheric Pressure: 1010 mbar

6.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Normal Working_Keep EUT normal working continuously.

6.1.3 Test Setup Diagram



6.1.4 Measurement Procedure and Data

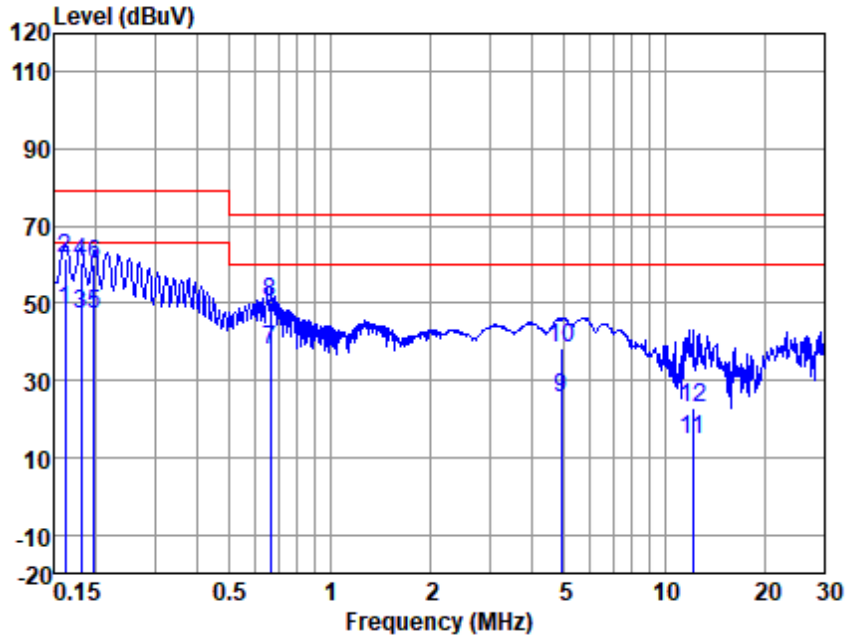
An initial pre-scan was performed with peak detector. Quasi-Peak or Average measurement were performed at the frequencies with maximized peak emission were detected.

Remark: Level= Read Level+ Cable Loss+ LISN Factor



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Test Mode: 00; Line: Live line



LISN : LINE
 EUT/Project No : 02434TX
 Test Mode : 00

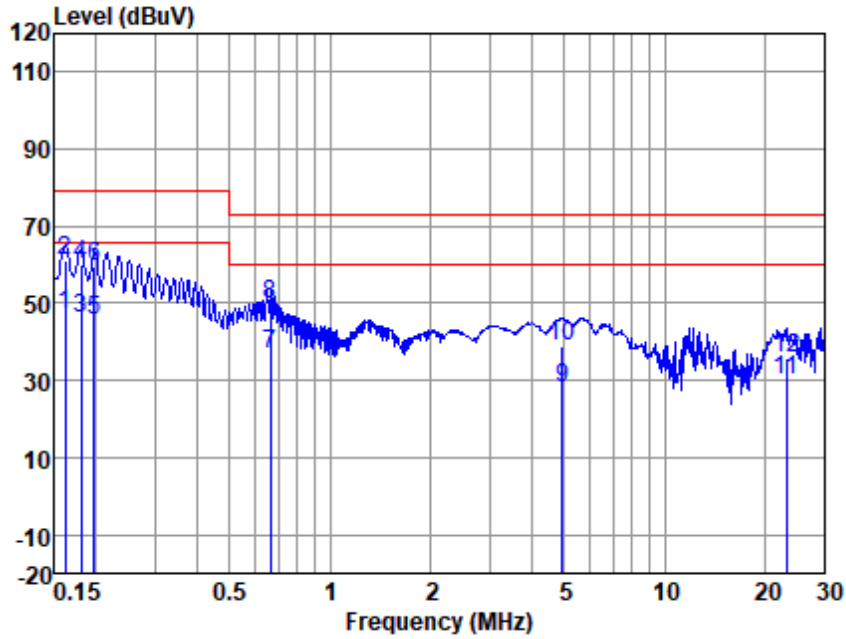
	Freq (MHz)	Read level (dBuV)	LISN Factor (dB)	Cable Loss (dB)	Emission Level (dBuV)	Limit (dBuV)	Over Limit (dB)	Remark
1	0.16	38.01	0.10	10.02	48.13	66.00	-17.87	Average
2	0.16	51.49	0.10	10.02	61.61	79.00	-17.39	QP
3	0.18	37.14	0.10	10.02	47.26	66.00	-18.74	Average
4	0.18	50.40	0.10	10.02	60.52	79.00	-18.48	QP
5	0.20	36.90	0.10	10.03	47.03	66.00	-18.97	Average
6	0.20	49.91	0.10	10.03	60.04	79.00	-18.96	QP
7	0.66	27.79	0.10	10.09	37.98	60.00	-22.02	Average
8	0.66	40.04	0.10	10.09	50.23	73.00	-22.77	QP
9	4.93	15.27	0.10	10.23	25.60	60.00	-34.40	Average
10	4.93	27.96	0.10	10.23	38.29	73.00	-34.71	QP
11	12.19	4.06	0.30	10.33	14.69	60.00	-45.31	Average
12	12.19	12.18	0.30	10.33	22.81	73.00	-50.19	QP

Notes: Emission Level = Read Level + LISN Factor + Cable loss



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Test Mode: 00; Line: Neutral Line



LISN : NEUTRAL
EUT/Project No : 02434TX
Test Mode : 00

	Freq (MHz)	Read level (dBuV)	LISN Factor (dB)	Cable Loss (dB)	Emission Level (dBuV)	Limit (dBuV)	Over Limit (dB)	Remark
1	0.16	36.76	0.13	10.02	46.91	66.00	-19.09	Average
2	0.16	51.14	0.13	10.02	61.29	79.00	-17.71	QP
3	0.18	35.94	0.12	10.02	46.08	66.00	-19.92	Average
4	0.18	50.07	0.12	10.02	60.21	79.00	-18.79	QP
5	0.20	35.66	0.10	10.03	45.79	66.00	-20.21	Average
6	0.20	49.55	0.10	10.03	59.68	79.00	-19.32	QP
7	0.66	26.61	0.10	10.09	36.80	60.00	-23.20	Average
8	0.66	39.59	0.10	10.09	49.78	73.00	-23.22	QP
9	4.95	17.57	0.20	10.23	28.00	60.00	-32.00	Average
10	4.95	28.59	0.20	10.23	39.02	73.00	-33.98	QP
11	23.14	18.97	0.86	10.39	30.22	60.00	-29.78	Average
12	23.14	24.43	0.86	10.39	35.68	73.00	-37.32	QP

Notes: Emission Level = Read Level + LISN Factor + Cable loss



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6.2 Asymmetric Mode Conducted Emissions(150kHz-30MHz)

Test Requirement: EN 50083-2:2012+A1:2015

Test Method: ETSI EN 300 386 V2.2.0

Limit:

0.15MHz – 0.5MHz 97dB(μV)-87dB(μV) quasi-peak, 84(μV)-74dB(μV) average

0.5MHz – 30MHz 87dB(μV) quasi-peak, 74dB(μV) average

Detector: Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz

6.2.1 E.U.T. Operation

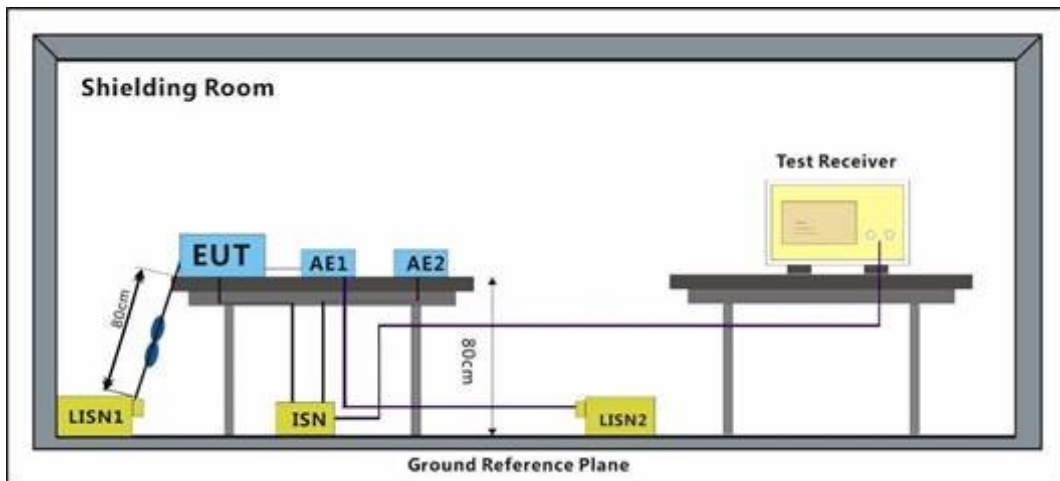
Operating Environment:

Temperature: 22 °C Humidity: 51 % RH Atmospheric Pressure: 1010 mbar

6.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Normal Working_Keep EUT normal working continuously.

6.2.3 Test Setup Diagram



6.2.4 Measurement Procedure and Data

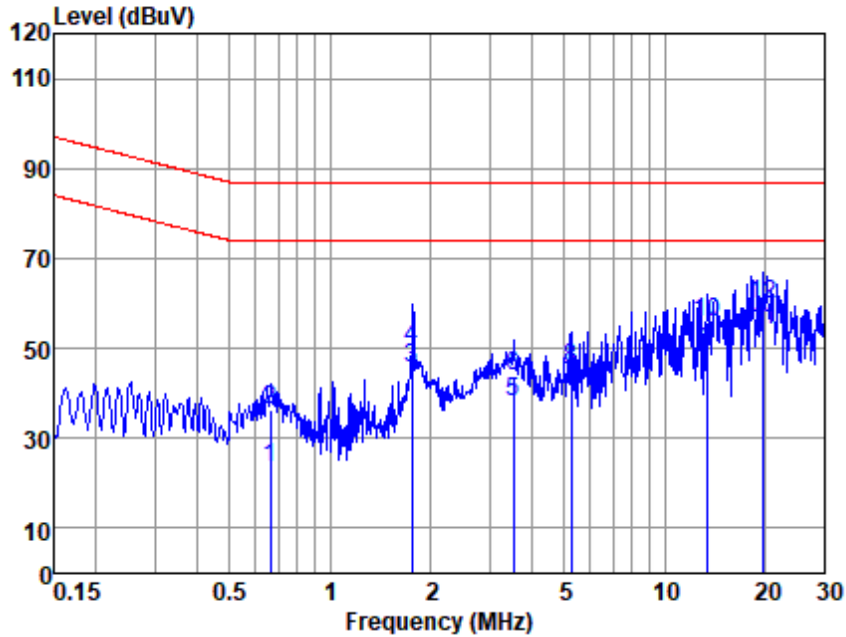
An initial pre-scan was performed with peak detector. Quasi-Peak or Average measurement were performed at the frequencies with maximized peak emission were detected.

Remark: Level= Read Level+ Cable Loss+ LISN Factor



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Test Mode: 00



ISN : CAT5-2021
EUT/Project No : 02434TX
Test Mode : 00

	Freq (MHz)	Read level (dBuV)	ISN Factor (dB)	Cable Loss (dB)	Emission Level (dBuV)	Limit (dBuV)	Over Limit (dB)	Remark
1	0.66	3.89	9.70	10.09	23.68	74.00	-50.32	Average
2	0.66	16.30	9.70	10.09	36.09	87.00	-50.91	QP
3	1.76	26.06	9.60	10.16	45.82	74.00	-28.18	Average
4	1.76	30.34	9.60	10.16	50.10	87.00	-36.90	QP
5	3.55	18.18	9.60	10.21	37.99	74.00	-36.01	Average
6	3.55	24.08	9.60	10.21	43.89	87.00	-43.11	QP
7	5.25	21.83	9.60	10.24	41.67	74.00	-32.33	Average
8	5.25	25.99	9.60	10.24	45.83	87.00	-41.17	QP
9	13.41	29.37	9.60	10.33	49.30	74.00	-24.70	Average
10	13.41	35.69	9.60	10.33	55.62	87.00	-31.38	QP
11	19.74	33.83	9.70	10.36	53.89	74.00	-20.11	Average
12	19.74	39.68	9.70	10.36	59.74	87.00	-27.26	QP

Notes: Emission Level = Read Level + ISN Factor + Cable loss



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6.3 Radiated Emissions (30MHz-1GHz)

Test Requirement: EN 50083-2:2012+A1:2015

Test Method: ETSI EN 300 386 V2.2.0

Limit:

Test Distance: 3m
 30MHz-230MHz: 50 dB(μV/m) quasi-peak
 230MHz-1GHz: 57 dB(μV/m) quasi-peak
 Detector: Peak for pre-scan (120kHz resolution bandwidth) 30M to 1000MHz

Test Distance: 10m
 30MHz-230MHz: 40 dB(μV/m) quasi-peak
 230MHz-1GHz: 47 dB(μV/m) quasi-peak
 Detector: Peak for pre-scan (120kHz resolution bandwidth) 30M to 1000MHz

Highest internal frequency (Fx): $F_x \leq 108\text{MHz}$

Highest measured frequency: 1GHz

6.3.1 E.U.T. Operation

Operating Environment:

Temperature: 26.3 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar

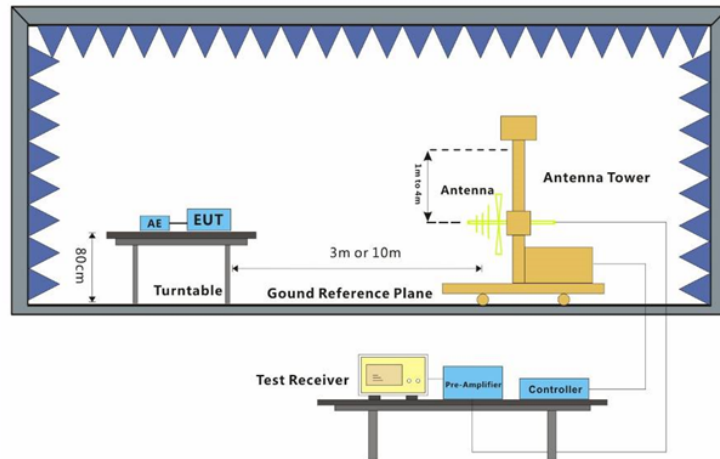
6.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Normal Working_Keep EUT normal working continuously.



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6.3.3 Test Setup Diagram



6.3.4 Measurement Procedure and Data

Frequency range: 30MHz-1GHz

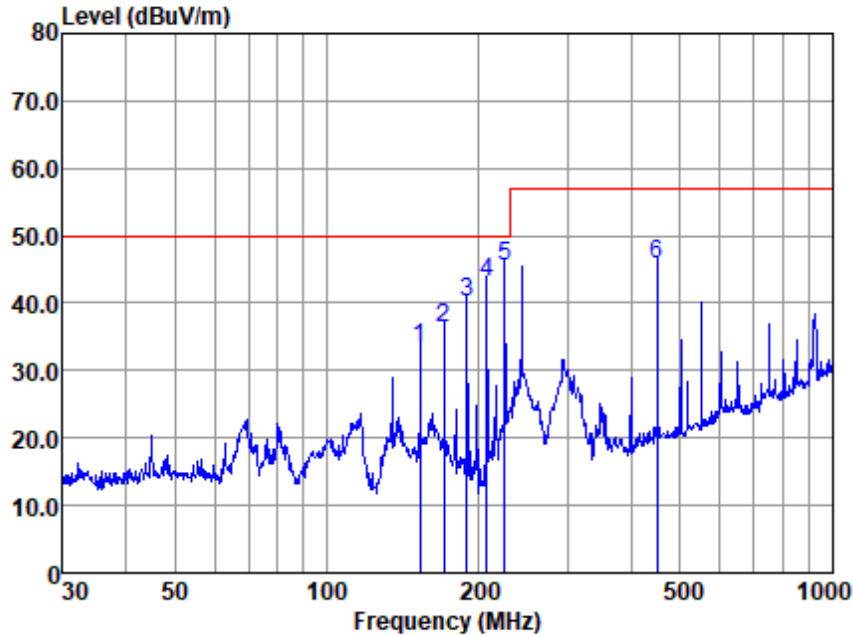
An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by BiConiLog antenna with 2 orthogonal polarities.

The red line show in graphic is the limit in standard used in this section.

Level=Read Level + Antenna Factor + Cable Loss - Preamp Factor



Test Mode: 00; Polarity: Horizontal



Antenna Polarity :HORIZONTAL
EUT/Project :2434TX
Test mode :00

	Read	Antenna	Cable	Preamp	Emission	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	153.200	45.14	13.27	2.13	27.08	33.46	50.00	-16.54 QP
2	170.793	48.19	12.87	2.30	26.94	36.42	50.00	-13.58 QP
3	189.074	53.79	10.81	2.35	26.75	40.20	50.00	-9.80 QP
4	207.123	57.50	9.85	2.50	26.72	43.13	50.00	-6.87 QP
5	225.308	59.55	9.99	2.66	26.81	45.39	50.00	-4.61 QP
6	451.135	51.67	17.10	3.66	26.53	45.90	57.00	-11.10 QP

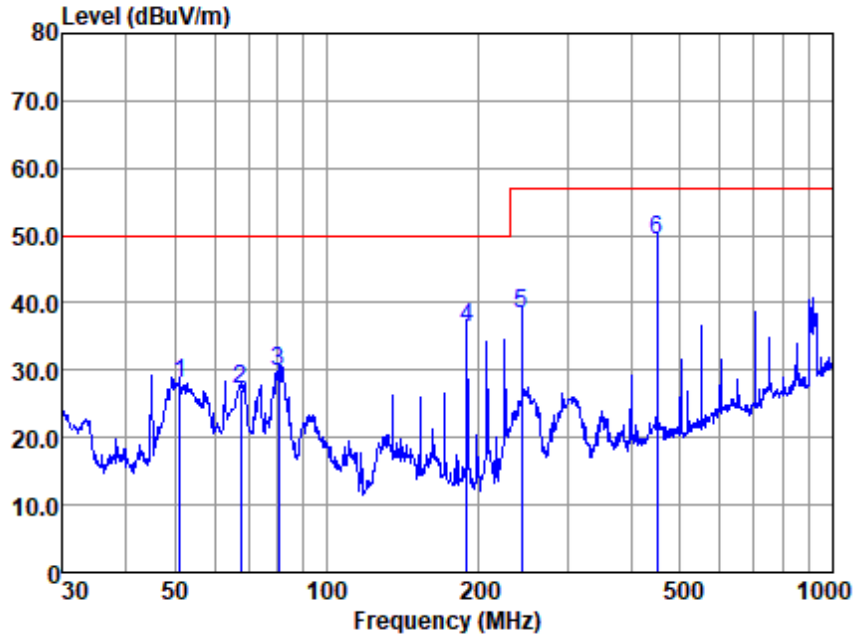
Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



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Test Mode: 00; Polarity: Vertical



Antenna Polarity : VERTICAL
EUT/Project : 2434TX
Test mode : 00

	Read	Antenna	Cable	Preamp	Emission	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	51.301	39.20	13.81	1.25	26.20	28.06	50.00	-21.94 QP
2	67.438	39.62	12.19	1.40	26.12	27.09	50.00	-22.91 QP
3	80.081	44.96	9.36	1.57	26.10	29.79	50.00	-20.21 QP
4	189.074	49.95	10.81	2.35	26.75	36.36	50.00	-13.64 QP
5	243.377	51.04	11.69	2.67	26.89	38.51	57.00	-18.49 QP
6	451.135	55.00	17.10	3.66	26.53	49.23	57.00	-7.77 QP

Note: Emission Level = Read Level + Antenna Factor + Cable loss - Preamp Factor



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6.4 Radiated Emissions (Above 1GHz)

Test Requirement: EN 50083-2:2012+A1:2015

Test Method: ETSI EN 300 386 V2.2.0

Limit:

1000MHz-6000MHz: 80 dB(μV/m) peak; 60 dB(μV/m) average

Detector: Peak for pre-scan (1000kHz resolution bandwidth) 1000MHz to 6000MHz

Highest internal frequency (Fx): Highest measured frequency:

Fx ≤ 108MHz 1GHz

108MHz < Fx ≤ 500MHz 2GHz

500MHz < Fx ≤ 1GHz 5GHz

Fx > 1GHz 5 × Fx up to a maximum of 6GHz

6.4.1 E.U.T. Operation

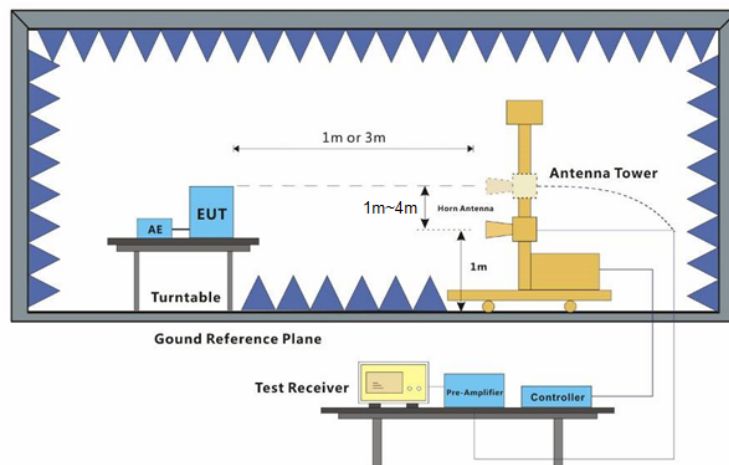
Operating Environment:

Temperature: 26.3 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar

6.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Normal Working_Keep EUT normal working continuously.

6.4.3 Test Setup Diagram



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6.4.4 Measurement Procedure and Data

Frequency range: Above 1GHz

An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Average measurements were conducted based on the peak sweep graph. The EUT was measured by Horn antenna with 2 orthogonal polarities.

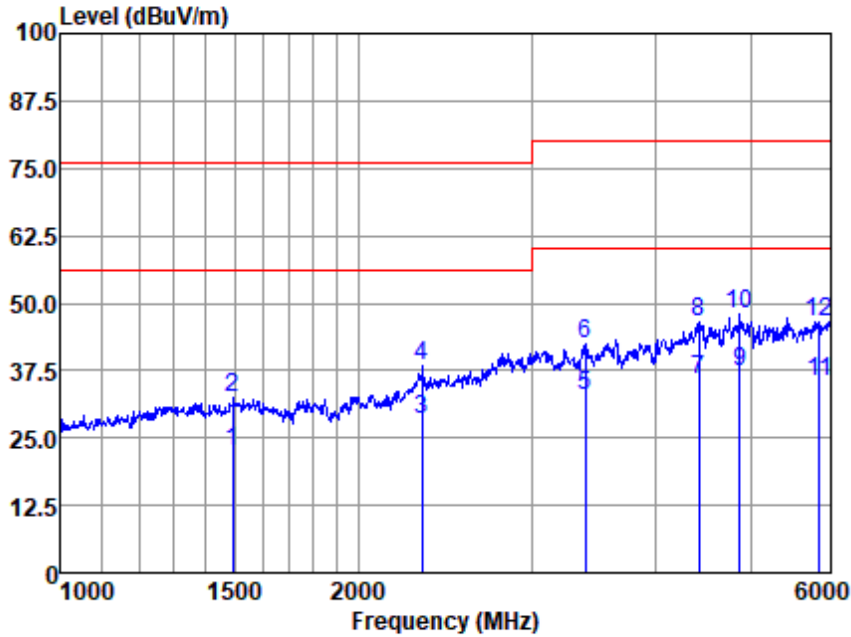
The red line show in graphic is the limit in standard used in this section.

Level=Read Level + Antenna Factor + Cable Loss - Preamp Factor



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Test Mode: 00; Polarity: Horizontal



Antenna Polarity :HORIZONTAL
EUT/Project :2434TX
Test mode :00

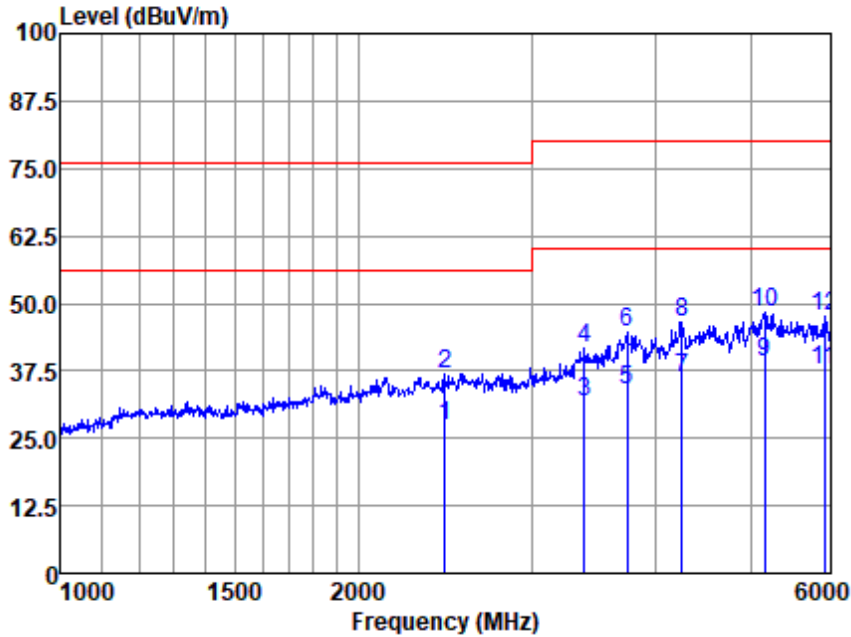
	Read	Antenna	Cable	Preamp	Emission	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1493.846	31.61	25.09	7.01	41.20	22.51	56.00	-33.49 Average
2	1493.846	41.53	25.09	7.01	41.20	32.43	76.00	-43.57 Peak
3	2321.299	34.26	26.99	9.22	42.19	28.28	56.00	-27.72 Average
4	2321.299	44.39	26.99	9.22	42.19	38.41	76.00	-37.59 Peak
5	3393.901	34.93	28.60	11.75	42.40	32.88	60.00	-27.12 Average
6	3393.901	44.43	28.60	11.75	42.40	42.38	80.00	-37.62 Peak
7	4416.593	34.28	30.47	13.36	42.40	35.71	60.00	-24.29 Average
8	4416.593	44.93	30.47	13.36	42.40	46.36	80.00	-33.64 Peak
9	4865.277	34.77	31.33	13.73	42.40	37.43	60.00	-22.57 Average
10	4865.277	45.45	31.33	13.73	42.40	48.11	80.00	-31.89 Peak
11	5851.364	30.64	32.53	14.86	42.50	35.53	60.00	-24.47 Average
12	5851.364	41.66	32.53	14.86	42.50	46.55	80.00	-33.45 Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



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Test Mode: 00; Polarity: Vertical



Antenna Polarity :VERTICAL
EUT/Project :2434TX
Test mode :00

	Read	Antenna	Cable	Preamp	Emission	Limit	Over		
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark	
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2445.105	32.92	27.41	9.23	42.40	27.16	56.00	-28.84	Average
2	2445.105	42.76	27.41	9.23	42.40	37.00	76.00	-39.00	Peak
3	3387.825	33.82	28.60	11.75	42.40	31.77	60.00	-28.23	Average
4	3387.825	43.80	28.60	11.75	42.40	41.75	80.00	-38.25	Peak
5	3738.689	34.86	29.14	12.45	42.40	34.05	60.00	-25.95	Average
6	3738.689	45.28	29.14	12.45	42.40	44.47	80.00	-35.53	Peak
7	4253.498	35.26	30.17	13.10	42.40	36.13	60.00	-23.87	Average
8	4253.498	45.76	30.17	13.10	42.40	46.63	80.00	-33.37	Peak
9	5152.386	36.15	31.69	13.68	42.43	39.09	60.00	-20.91	Average
10	5152.386	45.57	31.69	13.68	42.43	48.51	80.00	-31.49	Peak
11	5925.216	32.59	32.68	14.86	42.50	37.63	60.00	-22.37	Average
12	5925.216	42.73	32.68	14.86	42.50	47.77	80.00	-32.23	Peak

Note: Emission Level = Read Level + Antenna Factor + Cable loss - Preamp Factor



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6.5 Harmonic Current Emission

Test Requirement: EN 50083-2:2012+A1:2015
 Test Method: EN IEC 61000-3-2: 2019+A1:2021

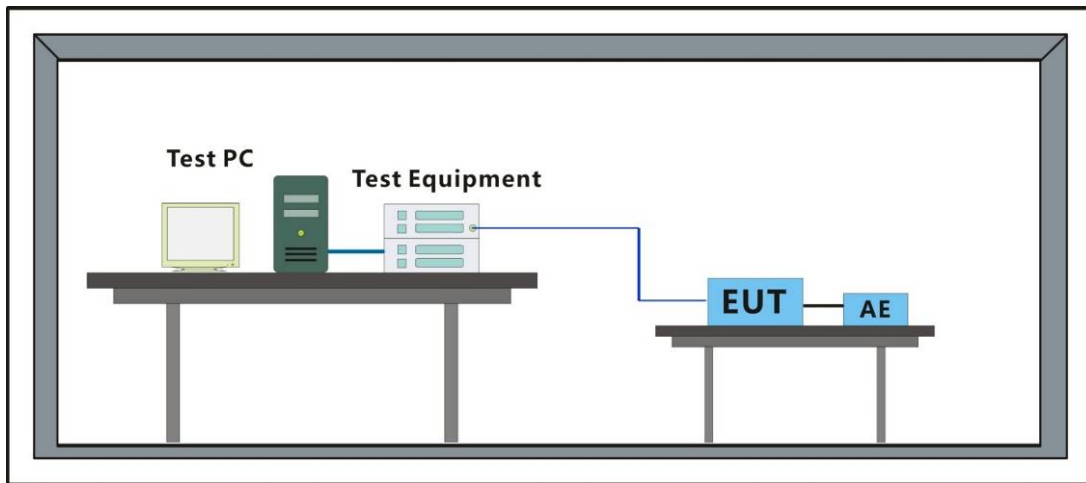
6.5.1 E.U.T. Operation

Operating Environment:
 Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar

6.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Normal Working_Keep EUT normal working continuously.

6.5.3 Test Setup Diagram



6.5.4 Measurement Procedure and Data

Frequency Range: 100Hz to 2kHz



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Test Mode:00

Highest parameter values during test:

V _{RMS} (Volts):	230.35	Frequency(Hz):	50.00
I _{Peak} (Amps):	0.610	I _{RMS} (Amps):	0.139
I _{Fund} (Amps):	0.076	Crest Factor:	4.483
Power (Watts):	8.0	Power Factor:	0.254

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.002	1.080	N/A	0.003	1.620	N/A	Pass
3	0.030	2.300	1.3	0.034	3.450	1.0	Pass
4	0.002	0.430	N/A	0.003	0.645	N/A	Pass
5	0.029	1.140	2.5	0.032	1.710	1.9	Pass
6	0.002	0.300	N/A	0.003	0.450	N/A	Pass
7	0.028	0.770	3.6	0.031	1.155	2.7	Pass
8	0.002	0.230	N/A	0.002	0.345	N/A	Pass
9	0.026	0.400	6.6	0.029	0.600	4.9	Pass
10	0.002	0.184	N/A	0.002	0.276	N/A	Pass
11	0.025	0.330	7.5	0.027	0.495	5.5	Pass
12	0.002	0.153	N/A	0.002	0.230	N/A	Pass
13	0.023	0.210	10.8	0.025	0.315	7.9	Pass
14	0.001	0.131	N/A	0.002	0.197	N/A	Pass
15	0.021	0.150	13.7	0.022	0.225	10.0	Pass
16	0.001	0.115	N/A	0.001	0.173	N/A	Pass
17	0.018	0.132	13.9	0.020	0.198	10.1	Pass
18	0.001	0.102	N/A	0.001	0.153	N/A	Pass
19	0.016	0.118	13.6	0.017	0.178	9.8	Pass
20	0.001	0.092	N/A	0.001	0.138	N/A	Pass
21	0.014	0.107	12.9	0.015	0.161	9.2	Pass
22	0.001	0.084	N/A	0.001	0.125	N/A	Pass
23	0.012	0.098	11.9	0.012	0.147	8.4	Pass
24	0.000	0.077	N/A	0.001	0.115	N/A	Pass
25	0.010	0.090	10.6	0.010	0.135	7.7	Pass
26	0.000	0.071	N/A	0.000	0.107	N/A	Pass
27	0.008	0.083	9.0	0.008	0.125	6.2	Pass
28	0.000	0.066	N/A	0.000	0.099	N/A	Pass
29	0.006	0.078	7.4	0.006	0.116	5.1	Pass
30	0.000	0.061	N/A	0.001	0.092	N/A	Pass
31	0.004	0.073	N/A	0.005	0.109	N/A	Pass
32	0.000	0.058	N/A	0.000	0.086	N/A	Pass
33	0.003	0.068	N/A	0.003	0.102	N/A	Pass
34	0.000	0.054	N/A	0.000	0.081	N/A	Pass
35	0.002	0.064	N/A	0.002	0.096	N/A	Pass
36	0.000	0.051	N/A	0.000	0.077	N/A	Pass
37	0.001	0.061	N/A	0.001	0.091	N/A	Pass
38	0.000	0.048	N/A	0.000	0.073	N/A	Pass
39	0.000	0.058	N/A	0.001	0.087	N/A	Pass
40	0.000	0.046	N/A	0.000	0.069	N/A	Pass



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Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.075	0.461	16.26	OK
3	0.431	2.073	20.79	OK
4	0.048	0.461	10.51	OK
5	0.040	0.921	4.37	OK
6	0.022	0.461	4.82	OK
7	0.039	0.691	5.70	OK
8	0.010	0.461	2.26	OK
9	0.026	0.461	5.64	OK
10	0.011	0.461	2.32	OK
11	0.017	0.230	7.54	OK
12	0.015	0.230	6.33	OK
13	0.018	0.230	7.91	OK
14	0.008	0.230	3.31	OK
15	0.017	0.230	7.18	OK
16	0.004	0.230	1.86	OK
17	0.015	0.230	6.69	OK
18	0.006	0.230	2.82	OK
19	0.016	0.230	6.96	OK
20	0.014	0.230	6.02	OK
21	0.016	0.230	6.90	OK
22	0.004	0.230	1.94	OK
23	0.013	0.230	5.81	OK
24	0.004	0.230	1.65	OK
25	0.013	0.230	5.80	OK
26	0.004	0.230	1.62	OK
27	0.013	0.230	5.62	OK
28	0.004	0.230	1.81	OK
29	0.012	0.230	5.21	OK
30	0.004	0.230	1.66	OK
31	0.009	0.230	3.84	OK
32	0.004	0.230	1.75	OK
33	0.007	0.230	3.19	OK
34	0.004	0.230	1.56	OK
35	0.006	0.230	2.71	OK
36	0.004	0.230	1.64	OK
37	0.004	0.230	1.86	OK
38	0.004	0.230	1.68	OK
39	0.005	0.230	2.08	OK
40	0.008	0.230	3.45	OK



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6.6 Voltage Fluctuations and Flicker

Test Requirement: EN 50083-2:2012+A1:2015
 Test Method: EN 61000-3-3:2013+A2:2021

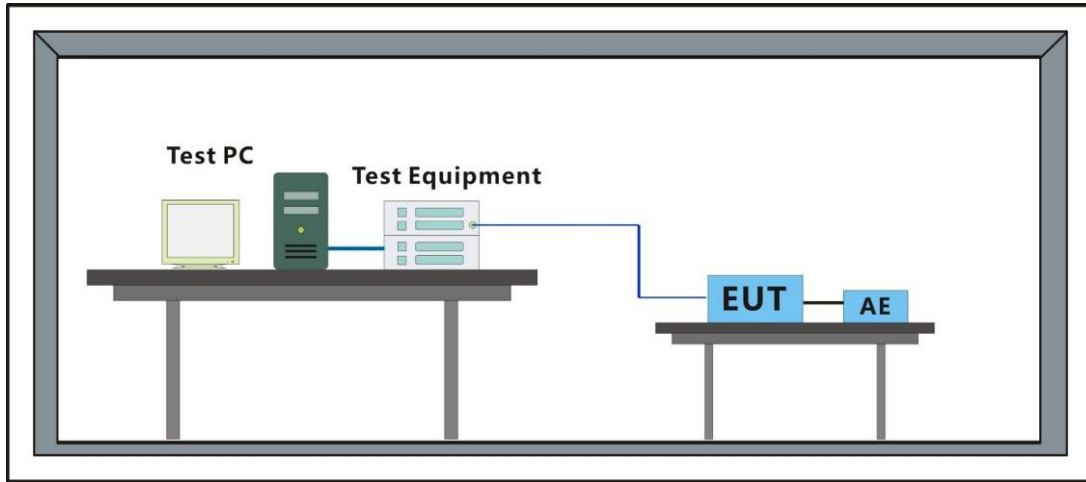
6.6.1 E.U.T. Operation

Operating Environment:
 Temperature: 26.7 °C Humidity: 51.6 % RH Atmospheric Pressure: 1010 mbar

6.6.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Normal Working_Keep EUT normal working continuously.

6.6.3 Test Setup Diagram



6.6.4 Measurement Procedure and Data

Test Mode:00

Parameter values recorded during the test:

Vrms at the end of test (Volt):	230.16		
Highest dt (%):		Test limit (%):	
T-max (mS):	0	Test limit (mS):	500.0 Pass
Highest dc (%):	0.00	Test limit (%):	3.30 Pass
Highest dmax (%):	0.00	Test limit (%):	4.00 Pass
Highest Pst (10 min. period):	0.215	Test limit:	1.000 Pass
Highest Plt (2 hr. period):	0.094	Test limit:	0.650 Pass



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7 Immunity Test Results

General Performance Criteria Description in EN 50083-2:2012+A1:2015

- Criterion A** 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 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** After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena 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.
- During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test.
- 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 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.
- Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.



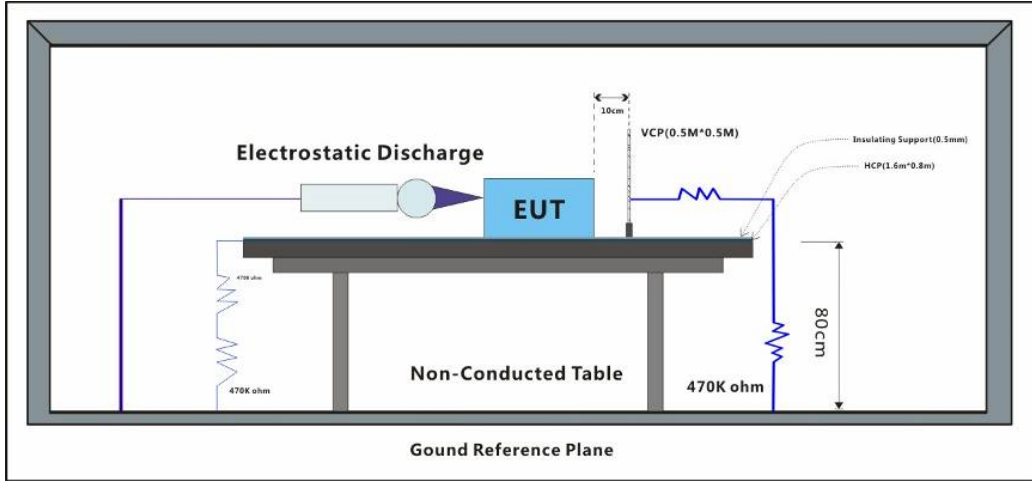
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7.1 Electrostatic Discharge

Test Requirement: EN 50083-2:2012+A1:2015
 Test Method: ETSI EN 300 386 V2.2.0

7.1.1 Test Setup Diagram



7.1.2 E.U.T. Operation

Operating Environment:
 Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar

7.1.3 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Normal Working_Keep EUT normal working continuously.

7.1.4 Test Condition and Results:

- Performance Criterion: B
- Discharge Impedance: 330Ω/150pF
- Number of Discharge: Minimum 10 times at each test point
- Discharge Mode: Single Discharge
- Discharge Period: 1 second minimum
- Test Point 1: All insulated enclosure & seams.
- Test Point 2: All accessible metal parts of the enclosure.
- Test Point 3: All sides.



Discharge type	Level (kV)	Polarity	Test Point	Result / Observations
Air Discharge	2,4,8	+	1	A
Air Discharge	2,4,8	-	1	A
Contact Discharge	2,4,6	+	2	A
Contact Discharge	2,4,6	-	2	A
Horizontal Coupling	2,4,6	+	3	A
Horizontal Coupling	2,4,6	-	3	A
Vertical Coupling	2,4,6	+	3	A
Vertical Coupling	2,4,6	-	3	A

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



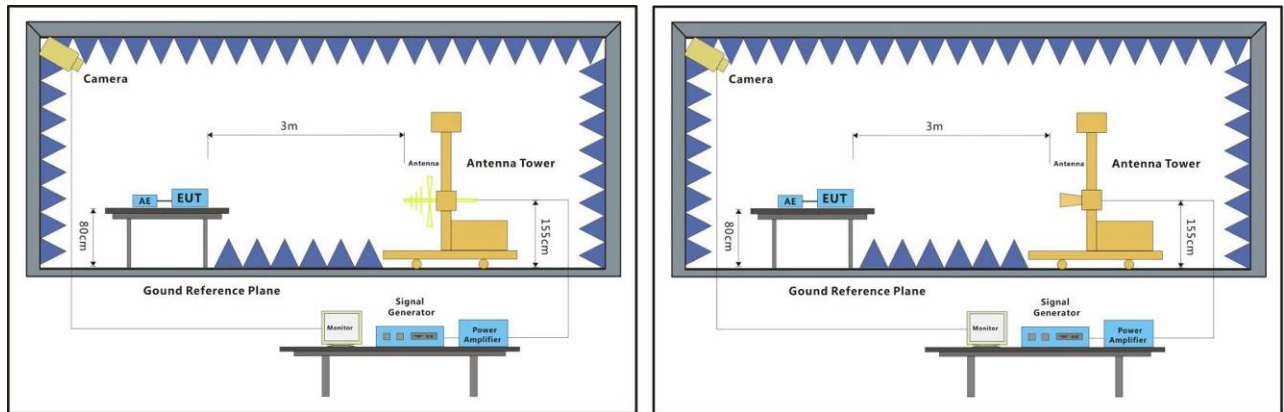
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7.2 Radiated Immunity (80MHz-6GHz)

Test Requirement: EN 50083-2:2012+A1:2015

Test Method: ETSI EN 300 386 V2.2.0

7.2.1 Test Setup Diagram



7.2.2 E.U.T. Operation

Operating Environment:

Temperature: 26.3 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar

7.2.3 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Normal Working_Keep EUT normal working continuously.

7.2.4 Test Condition and Results:

Performance Criterion: A

Frequency Range: 80MHz to 690MHz, 690MHz to 6GH

Antenna Polarisation: Vertical and Horizontal

Modulation: 1kHz,80% Amp. Mod,1% increment

Test Distance:3m



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Frequency	Level (V/m)	EUT Face	Dwell time	Result / Observations
80MHz-690MHz	3	Front	3s	A
80MHz-690MHz	3	Back	3s	A
80MHz-690MHz	3	Left	3s	A
80MHz-690MHz	3	Right	3s	A
80MHz-690MHz	3	Top	3s	A
80MHz-690MHz	3	Underside	3s	A
690MHz-6GHz	10	Front	3s	A
690MHz-6GHz	10	Back	3s	A
690MHz-6GHz	10	Left	3s	A
690MHz-6GHz	10	Right	3s	A
690MHz-6GHz	10	Top	3s	A
690MHz-6GHz	10	Underside	3s	A

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



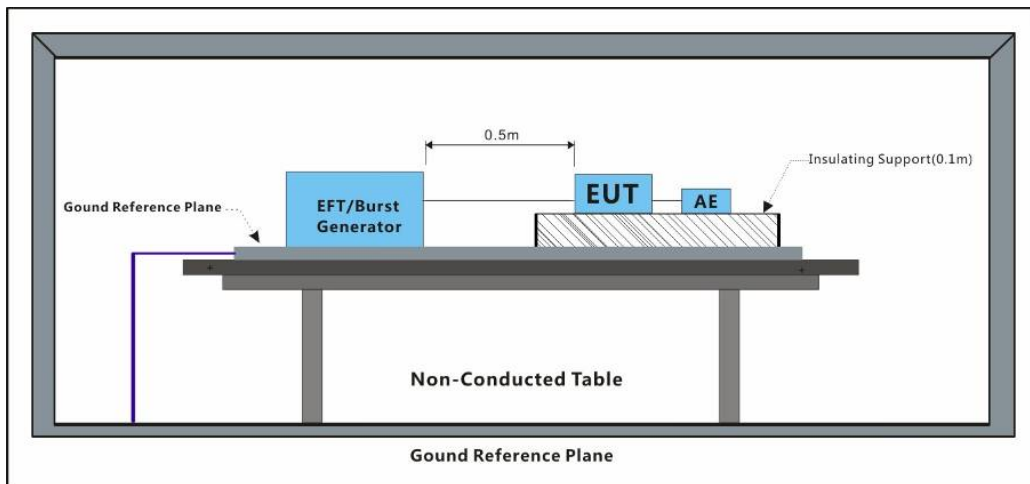
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7.3 Electrical Fast Transients & Burst at AC Power Port

Test Requirement: EN 50083-2:2012+A1:2015

Test Method: ETSI EN 300 386 V2.2.0

7.3.1 Test Setup Diagram



7.3.2 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar

7.3.3 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Normal Working_Keep EUT normal working continuously.

7.3.4 Test Condition and Results:

Performance Criterion: B

Repetition Frequency: 5kHz

Burst Period: 300ms

Test Duration: 2 minute per level & polarity

Test Line	Level (kV)	Polarity	CDN/Clamp	Result / Observations
AC power port	1	+	CDN	A
AC power port	1	-	CDN	A

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



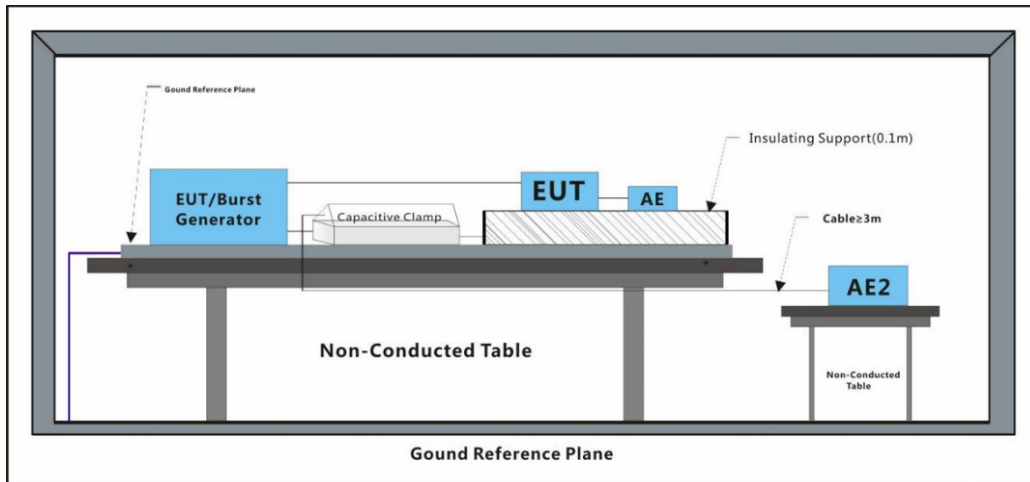
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7.4 Electrical Fast Transients & Burst at Signal Port

Test Requirement: EN 50083-2:2012+A1:2015

Test Method: ETSI EN 300 386 V2.2.0

7.4.1 Test Setup Diagram



7.4.2 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar

7.4.3 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Normal Working_Keep EUT normal working continuously.

7.4.4 Test Condition and Results:

Performance Criterion: B

Repetition Frequency: 5kHz

Burst Period: 300ms

Test Duration: 2 minute per level & polarity

Port	Level (kV)	Polarity	CDN/Clamp	Result / Observations
Signal port	0.5	+	Clamp	A
Signal port	0.5	-	Clamp	A

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



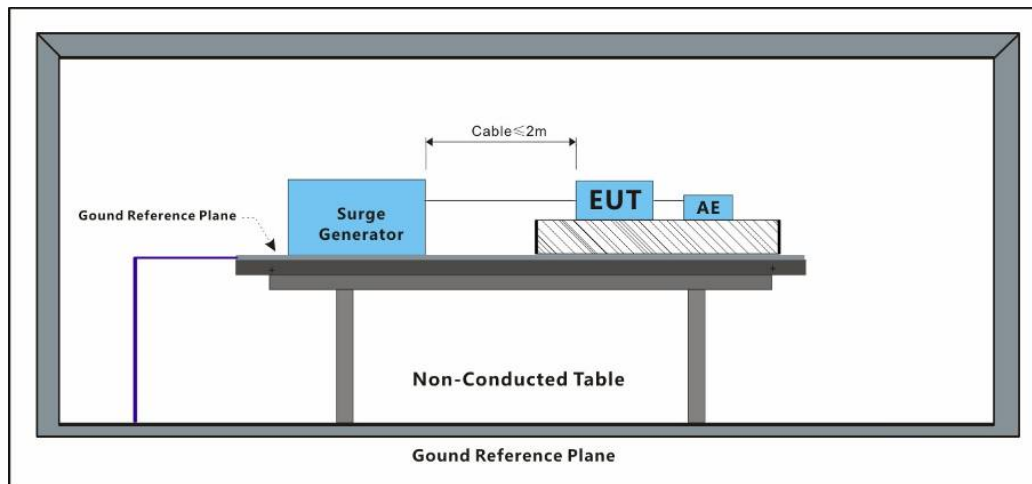
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7.5 Surge at AC Power Port

Test Requirement: EN 50083-2:2012+A1:2015

Test Method: ETSI EN 300 386 V2.2.0

7.5.1 Test Setup Diagram



7.5.2 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar

7.5.3 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Normal Working_Keep EUT normal working continuously.

7.5.4 Test Condition and Results:

Performance Criterion: B

Interval: 60s between each surge

Generator source impedance: 2Ω

CDN coupling impedance(Line-to-ground):10Ω

No. of surges: 5 positive at 90°, 5 negative at 270°.



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Test Line	Level (kV)	Polarity	Phase (deg)	Result / Observations
L-N	1	+	0°	A
L-N	1	-	0°	A
L-N	1	+	90°	A
L-N	1	-	90°	A
L-N	1	+	180°	A
L-N	1	-	180°	A
L-N	1	+	270°	A
L-N	1	-	270°	A
L-PE	2	+	0°	A
L-PE	2	-	0°	A
L-PE	2	+	90°	A
L-PE	2	-	90°	A
L-PE	2	+	180°	A
L-PE	2	-	180°	A
L-PE	2	+	270°	A
L-PE	2	-	270°	A
N-PE	2	+	0°	A
N-PE	2	-	0°	A
N-PE	2	+	90°	A
N-PE	2	-	90°	A
N-PE	2	+	180°	A
N-PE	2	-	180°	A
N-PE	2	+	270°	A
N-PE	2	-	270°	A

Results:

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



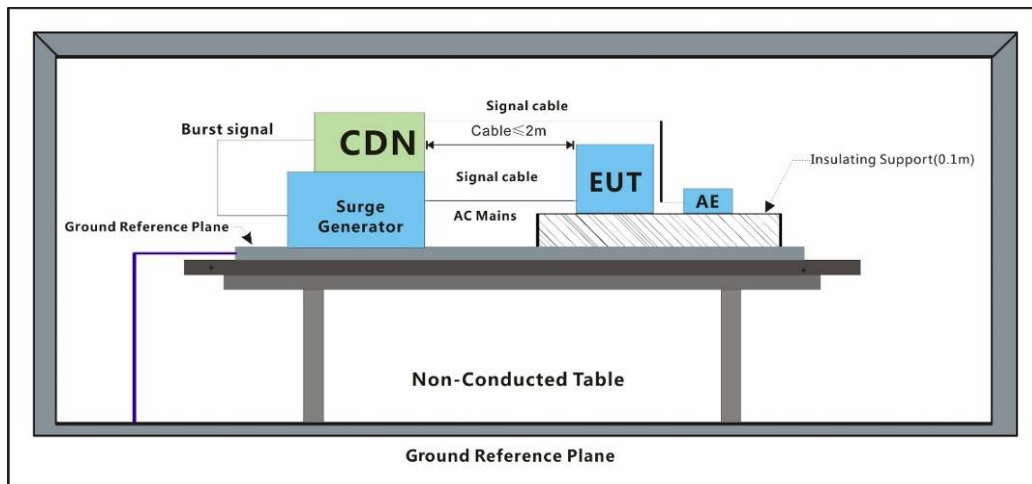
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7.6 Surge at Signal Port

Test Requirement: EN 50083-2:2012+A1:2015

Test Method: ETSI EN 300 386 V2.2.0

7.6.1 Test Setup Diagram



7.6.2 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar

7.6.3 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Normal Working_Keep EUT normal working continuously.

7.6.4 Test Condition and Results:

Performance Criterion: B

Interval: 60s between each surge

Generator source impedance: 2Ω

Port	Line	Waveform(μs)	Level (kV)	Polarity	Result / Observations
Signal port	Line-Ground	1,2/50 (8/20)	0.5, 1	+	A
Signal port	Line-Ground	1,2/50 (8/20)	0.5, 1	-	A

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



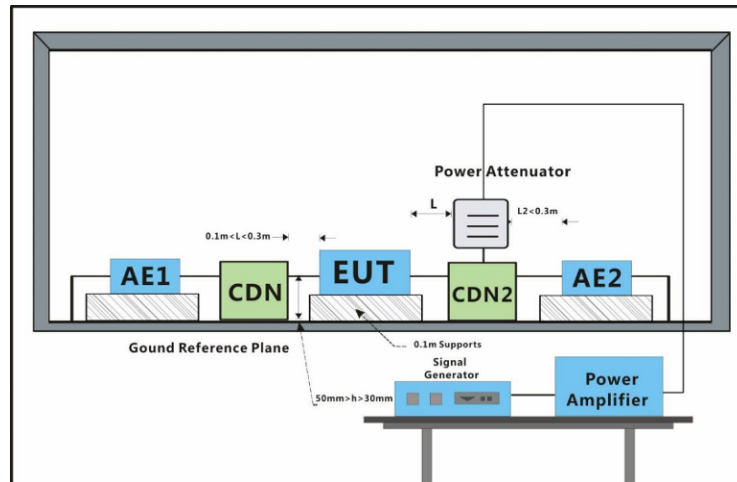
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7.7 Conducted Immunity at AC Power Port (150kHz-80MHz)

Test Requirement: EN 50083-2:2012+A1:2015

Test Method: ETSI EN 300 386 V2.2.0

7.7.1 Test Setup Diagram



7.7.2 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1020 mbar

7.7.3 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Normal Working_Keep EUT normal working continuously.

7.7.4 Test Condition and Results:

Performance Criterion: A

Frequency Range: 0.15MHz to 80MHz

Modulation: 80%, 1kHz Amplitude Modulation

Step Size: 1%

Cable port	Level (Vrms)	CDN/Clamp	Dwell time	Result / Observations
AC power port	3(0.15MHz-10MHz)	CDN	3s	A
AC power port	3 to 1(10MHz-30MHz, Lines)	CDN	3s	A
AC power port	1(30MHz-80MHz)	CDN	3s	A

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



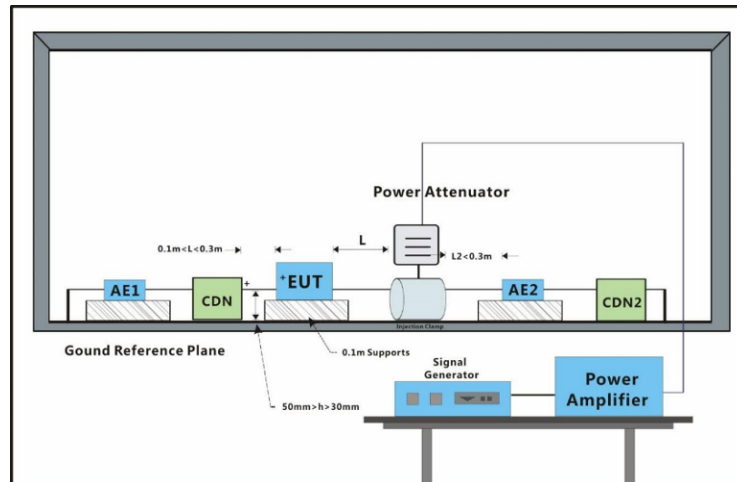
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7.8 Conducted Immunity at Signal Port (150kHz-80MHz)

Test Requirement: EN 50083-2:2012+A1:2015

Test Method: ETSI EN 300 386 V2.2.0

7.8.1 Test Setup Diagram



7.8.2 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1020 mbar

7.8.3 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Normal Working_Keep EUT normal working continuously.

7.8.4 Test Condition and Results:

Performance Criterion: A

Frequency Range: 0.15MHz to 80MHz

Modulation: 80%, 1kHz Amplitude Modulation

Step Size: 1%

Port	Level (Vrms)	CDN/Clamp	Dwell time	Result / Observations
Signal port	3(0.15MHz-80MHz)	Clamp	3s	A

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



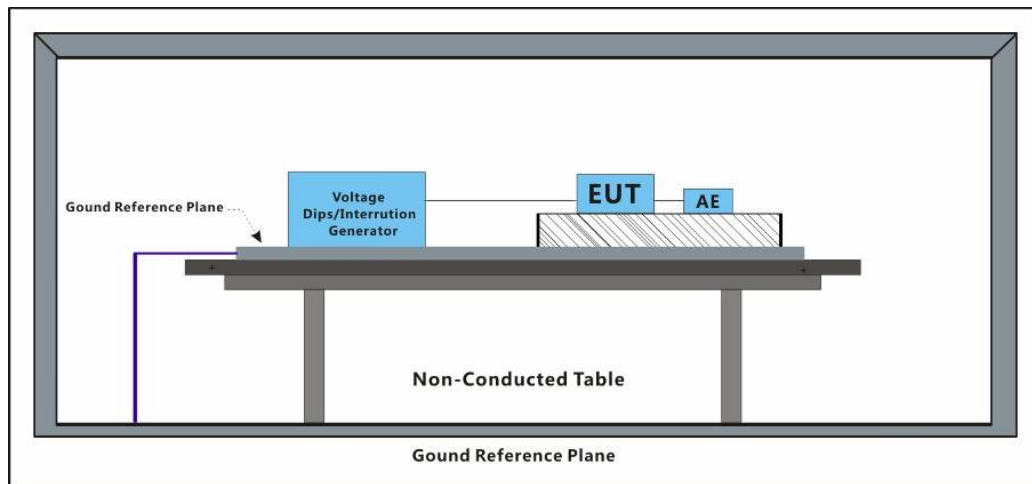
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7.9 Voltage Dips and Interruptions

Test Requirement: EN 50083-2:2012+A1:2015

Test Method: ETSI EN 300 386 V2.2.0

7.9.1 Test Setup Diagram



7.9.2 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar

7.9.3 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Normal Working_Keep EUT normal working continuously.

7.9.4 Test Condition and Results:

Performance Criterion:

<5% residual voltage for 0.5 Cycle: B

70% residual voltage for 25 Cycles: C

<5% residual voltage for 250 Cycles: C

No. of Dips / Interruptions: 3 per Level

Time between dropout: 10s



Level % UT	Phase (deg)	Duration	No. of Dips / Interruptions	Result / Observations
0	0°	1 Cycles	3	A
0	0°	250 Cycles	3	C
70	0°	25 Cycles	3	A

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

C: During the test EUT stop working when power supply drop, ;After the test by manual operation can work normally.



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8 Test Setup Photo

Conducted Emissions at Mains Power Port (150kHz-30MHz)



Asymmetric Mode Conducted Emissions(150kHz-30MHz)



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Radiated Emissions (30MHz-1GHz)



Radiated Emissions (Above 1GHz)



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Harmonic Current Emission



Voltage Fluctuations and Flicker



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Electrostatic Discharge



Radiated Immunity (80MHz-6GHz)



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Electrical Fast Transients & Burst at AC Power Port



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Electrical Fast Transients & Burst at Signal Port



Surge at AC Power Port



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Surge at Signal Port



Conducted Immunity at AC Power Port (150kHz-80MHz)



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Conducted Immunity at Signal Port (150kHz-80MHz)



Voltage Dips and Interruptions

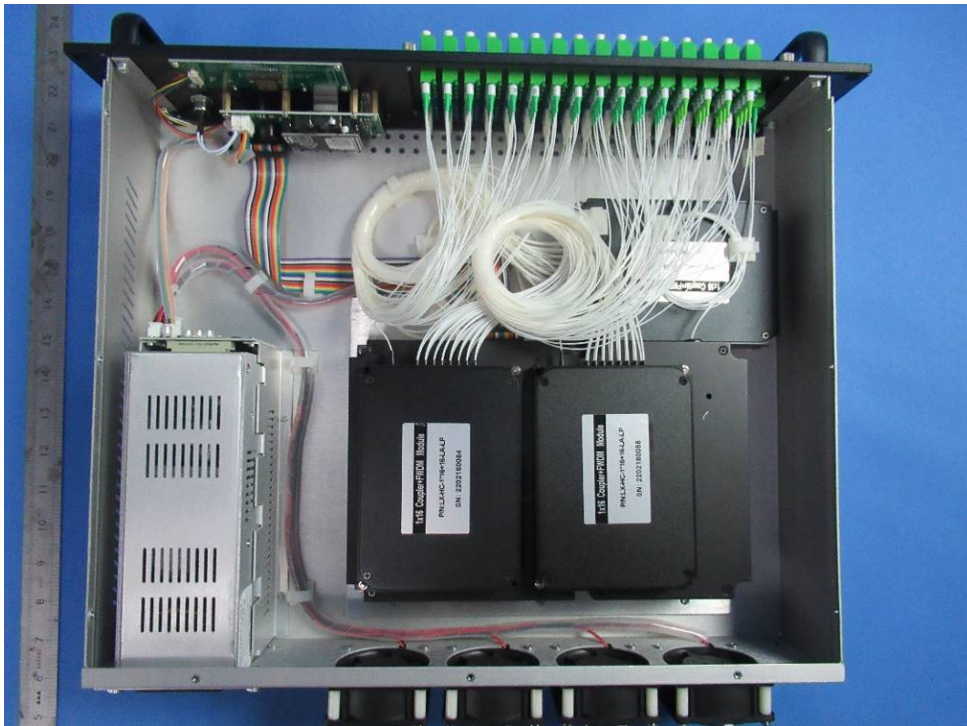


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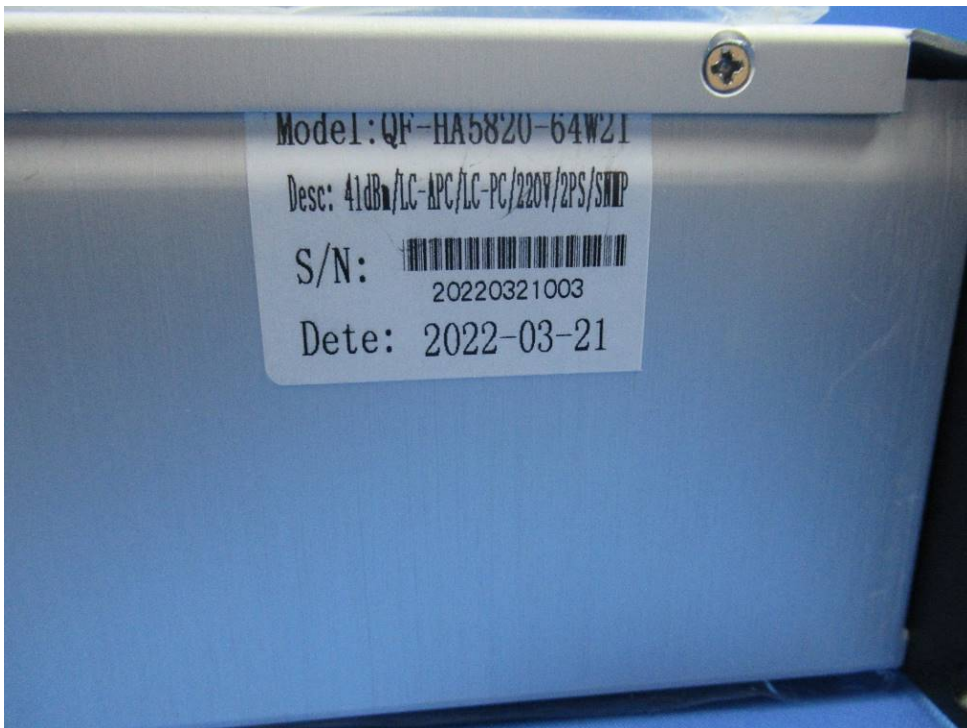
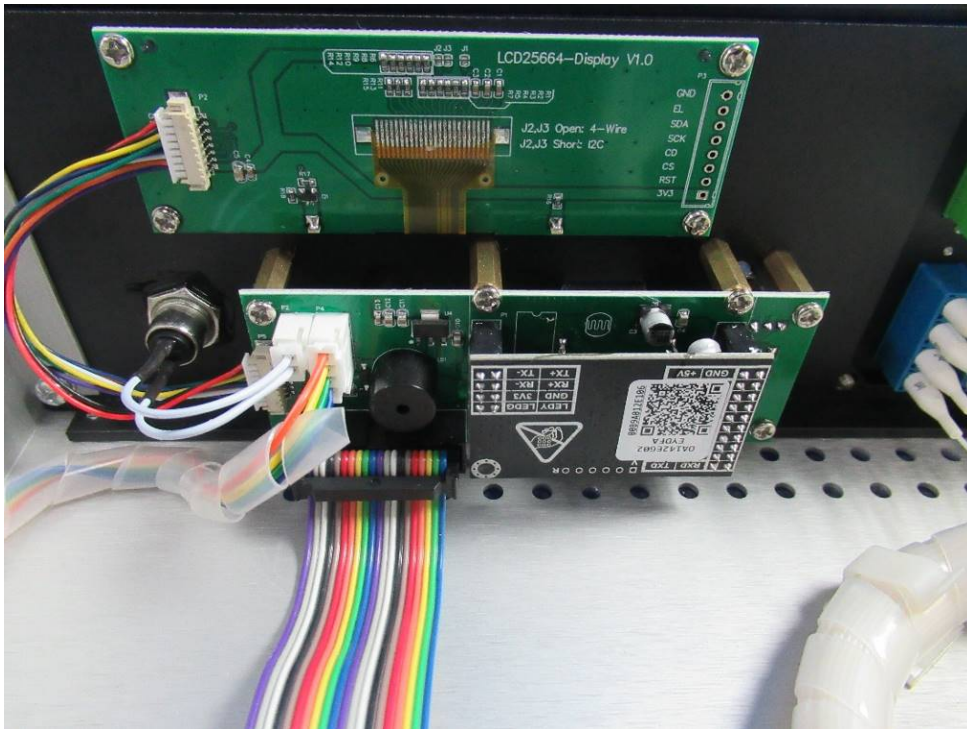
9 EUT Constructional Details (EUT Photos)



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