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Report No.: CQASZ151201302E
Report Version: V01

MEASUREMENT REPORT
EMC Test Report

Applicant:	Shanghai Terabit Technology Co., Ltd
Address of Applicant:	#513, 38th Building, No. 2049 Pujin Road, Pujiang Town, Minhang District, 201112, Shanghai.
Manufacturer:	Shanghai Terabit Technology Co., Ltd
Address of Manufacturer:	#513, 38th Building, No. 2049 Pujin Road, Pujiang Town, Minhang District, 201112, Shanghai.

Equipment Under Test (EUT):

Product:	Solid State Drive
Model No.:	T25S3ETMLC-064G
Brand Name:	Terabit
Standards:	EN 55022 : 2010 EN 55024 : 2010 EN 61000-3-2 : 2014 EN 61000-3-3 : 2013
Date of Test:	2015-12-03 to 2015-12-07
Date of Issue:	2015-12-07
Test Result :	**Pass**

Reviewed By: _____
(Aaron Ma)

Approved By: _____
(Owen Zhou)

Shenzhen Centre Quality Accreditation Technology Co., Ltd.

CE

The CE mark as shown below can be used, under the responsibility of the manufacturer, after completion of an EC Declaration of Conformity and compliance with all relevant EC Directives. The protection requirements with respect to electromagnetic compatibility contained in Directive 2004/108/EC are considered.

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ151201302E	Rev.01	Initial report	2015-12-07

2 Test Summary

Test	Test Requirement	Test Method	Class / Severity	Result
Radiated Emission, (30MHz to 1GHz)	EN 55022 : 2010	EN 55022 : 2010	Class B	PASS
Conducted Emission (150K to 30MHz)	EN 55022 : 2010	EN 55022 : 2010	Class B	PASS
Harmonic Emission on AC, 50Hz to 2kHz	EN 61000-3-2: 2014	EN 61000-3-2: 2014	Class A	N/A
Flicker Emission on AC	EN 61000-3-3: 2013	EN 61000-3-3 :2013	Clause 5 of EN61000-3-3	N/A
ESD	EN 55024: 2010	EN 61000-4-2 :2009	Contact ±4 kV Air ±2,4,8 kV	PASS
Radiated Immunity, 80MHz to 1 GHz	EN 55024: 2010	EN 61000-4-3 :2006 +A1:2008+A2:2010	3V/m 80%, 1kHz, AM	PASS
Electrical Fast Transients (EFT) on AC	EN 55024: 2010	EN 61000-4-4 : 2012	AC ± 1.0kV	PASS
Surge Immunity on AC	EN 55024: 2010	EN 61000-4-5 :2006	1.2/50μs Tr/Th ±1kV Line to Line ±2kV Line to Ground	PASS
Injected Currents on AC, 150kHz to 80MHz	EN 55024: 2010	EN 61000-4-6 :2009	3Vrms (emf), 80%, 1kHz Amp. Mod.	PASS
Voltage Dips and Interruptions on AC	EN 55024: 2010	EN 61000-4-11 :2004	0 % U_T* for 0.5per 0 % U_T* for 250per 70 % U_T* for 25per	PASS

Remark:

* U_T is the nominal supply voltage.

§ If the highest frequency of the internal sources of the EUT is less than 108 MHz, the measurement shall only be made up to 1 GHz. (Refer to EN55022:2010 clause 6.2 Conditional testing procedure)

§ If the highest frequency of the internal sources of the EUT is between 108 MHz and 500 MHz, the measurement shall only be made up to 2 GHz. (Refer to EN55022:2010 clause 6.2 Conditional testing procedure)

§ If the highest frequency of the internal sources of the EUT is between 500 MHz and 1 GHz, the measurement shall only be made up to 5 GHz. (Refer to EN55022:2010 clause 6.2 Conditional testing procedure)

§ If the highest frequency of the internal sources of the EUT is above 1 GHz, the measurement shall be made up to 5 times the highest frequency or 6 GHz, whichever is less. (Refer to EN55022:2010 clause 6.2 Conditional testing procedure)

3 Contents

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4 General Information

4.1 Details of E.U.T.

Power Supply: DC5.0V 2.03W

4.2 Description of Support Units

Description	Manufacturer	Model No.
PC	HP	/
Displayer	HP	/
Mouse	Dell	/
Keyboard	Dell	/

4.3 Standards Applicable for Testing

The customer requested EMC tests for a industrial equipment.

The standards used were EN 55022, EN 61000-3-2, EN 61000-3-3 and EN 55024.

Table 1 : Tests Carried Out Under EN 55022 :2010

Standard		Status
EN 55022 : 2010	Radiated Emissions	√
EN 55022 : 2010	Conducted Emissions on AC	√
EN 55022 : 2010	Conducted Emissions on Telecommunication Ports	×

× Indicates that the test is not applicable
√ Indicates that the test is applicable

Table 2: Tests Carried Out Under EN61000-3-2:2014 & EN61000-3-3:2013

Standard		Status
EN 61000-3-2: 2014	Harmonic Emissions on AC	×
EN 61000-3-3: 2013	Flicker Emissions on AC	×

× Indicates that the test is not applicable
√ Indicates that the test is applicable

Table 3: Tests Carried Out Under EN 55024: 2010

Standard		Status
EN61000-4-2: 2009	Electrostatic discharge immunity test	√
EN 61000-4-3: 2006+A1:2008 +A2:2010	Radiated, radio-frequency electromagnetic field electromagnetic field immunity test	√
EN 61000-4-4: 2012	Electrical fast transients/burst immunity test	√
EN 61000-4-5: 2006	Surge immunity test	√
EN 61000-4-6 :2009	Immunity to conducted disturbances, induced by radio-frequency fields	√
EN 61000-4-8: 2010	Power-frequency magnetic field immunity test	×
EN 61000-4-11: 2004	Voltage dips, short interruptions and voltage variations immunity tests	√

× Indicates that the test is not applicable
√ Indicates that the test is applicable
Note:The EUT does not contain any component which is susceptible from the magnetic field.

4.4 Test Location

All tests were performed at:

Shenzhen CTL Testing Technology Co., Ltd., Shenzhen EMC Laboratory,

1/F.-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, Guangdong, China

All tests were sub-contracted.

4.5 Test Facility

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

CNAS – Registration No.: L7497

Shenzhen CTL Testing Technology Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L7497.

FCC – Registration No.: 970318

Shenzhen CTL Testing Technology Co., Ltd. has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 970318

4.6 Deviation from Standards

None.

4.7 Abnormalities from Standard Conditions

None.

4.8 Monitoring of EUT for All Immunity Test

Visual: None

Audio: None

5 Equipments Used during Test

Radiated Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Due Data
1	ULTRA-BROADBAND ANTENNA	ROHDE & SCHWARZ	HL562	100015	2016/04
2	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESI26	100009	2016/04
3	RF TEST PANEL	ROHDE & SCHWARZ	TS/RSP	335015/ 0017	2016/04
4	TURNTABLE	ETS	2088	2149	2016/04
5	ANTENNA MAST	ETS	2075	2346	2016/04
6	EMI TEST SOFTWARE	ROHDE & SCHWARZ	ESK1	N/A	2016/04

Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Due Data
1	EMI Test Receiver	ROHDE & SCHWARZ	ESCS30	100038	2016/04
2	Artificial Mains	ROHDE & SCHWARZ	ESH2-Z5	100028	2016/04
3	Pulse Limiter	ROHDE & SCHWARZ	ESHSZ2	100044	2016/04
4	EMI Test Software	ROHDE & SCHWARZ	ESK1	N/A	2016/04

Harmonic Current & Voltage Fluctuation and Flicker					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Due Data
1	Purified Power Source	CALIFORNIA INSTRUMENTS	HFS500	54513	2016/04
2	Harmonic And Flicker Analyzer	EM TEST	DPA503S1	0500-10	2016/04

Electrostatic Discharge					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Due Data
1	ESD Simulator	EM TEST	DITOC0103Z	0301-04	2016/04

RF Field Strength Susceptibility					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Due Data
1	SIGNAL GENERATOR	IFR	2032	203002/100	2016/04
2	AMPLIFIER	AR	150W1000	301584	2016/04
3	DUAL DIRECTIONAL COUPLER	AR	DC6080	301508	2016/04
4	POWER HEAD	AR	PH2000	301193	2016/04
5	POWER METER	AR	PM2002	302799	2016/04

Electrical Fast Transient/Burst & Surge					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Due Data
1	ULTRA COMPACT SIMULATOR	EM TEST	UCS500M6	0500-19	2016/04

Conducted Susceptibility					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Due Data
1	Signal Generator	IFR	2023A	202304/060	2016/04
2	Amplifier	AR	75A250	302205	2016/04
3	Dual Directional Coupler	AR	DC2600	302389	2016/04
4	6db Attenuator	EM TEST	ATT6/75	0010230A	2016/04
5	EM CLAMP	LUTHI	EM101	335625	2016/04
6	CDN	EM TEST	CDN M3	0802-03	2016/04

Power Frequency Magnetic Field Susceptibility					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Due Data.
1	ULTRA COMPACT SIMULATOR	EM TEST	UCS500M6	202304/060	2016/04
2	MOTOR DRIVEN VOLTAGE TRANSFORMER	EM TEST	MV2616	302205	2016/04
3	CURRENT TRANSFORMER	EM TEST	MC2630	302389	2016/04
4	MAGNETIC COIL	EM TEST	MS100	0010230A	2016/04

Voltage Dips and Interruptions					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Due Data
1	ULTRA COMPACT SIMULATOR	EM TEST	UCS500M6	0500-19	2016/04
2	Motor Driven Voltage Transformer	EM TEST	MV2616	0301-11	2016/04

6 Emission Test Results

6.1 Radiated Emissions, 30MHz to 1GHz

Test Requirement: EN 55022

Test Method: EN 55022

Frequency Range: 30MHz to 1GHz

Measurement Distance: 3m

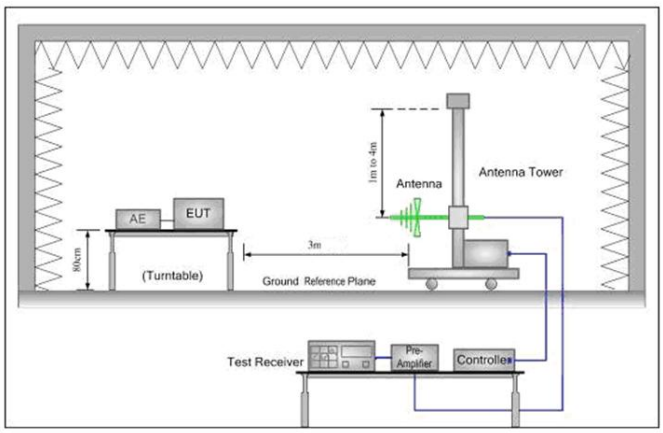
Class: Class B

Limit: 40.0 dBμV/m between 30MHz & 230MHz

47.0 dBμV/m between 230MHz & 1000MHz

Equipment Used: Refer to section 5 for details.

Test Setup:



Test Procedure:

1. From 30 MHz to1GHz test procedure as below:

1) The radiated emissions were tested in a semi-anechoic chamber.

2) The EUT is placed on a turntable, which is 0.8m above ground plane.

3) The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

4) EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.

5) Maximum procedure was performed on the six highest emissions to ensure EUT compliance.

6) And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

7) Repeat above procedures until the measurements for all frequencies are complete.

Detector: Peak for pre-scan (120kHz resolution bandwidth)

Quasi-Peak if maximised peak within 6dB of limit

6.1.1 E.U.T. Operation

Operating Environment:

Temperature: 24.0 °C Humidity: 52 % RH Atmospheric Pressure: 1012 mbar

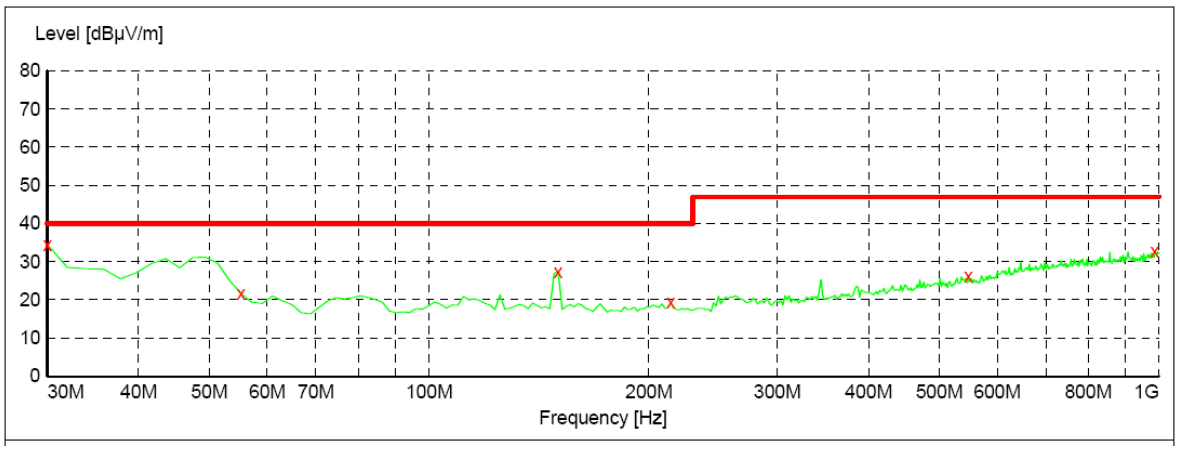
EUT Operation: On mode

Test Status: Pretest the EUT at different test mode and found the normal mode which is worst case, the test worst case mode is recorded in the report.

6.1.2 Measurement Data

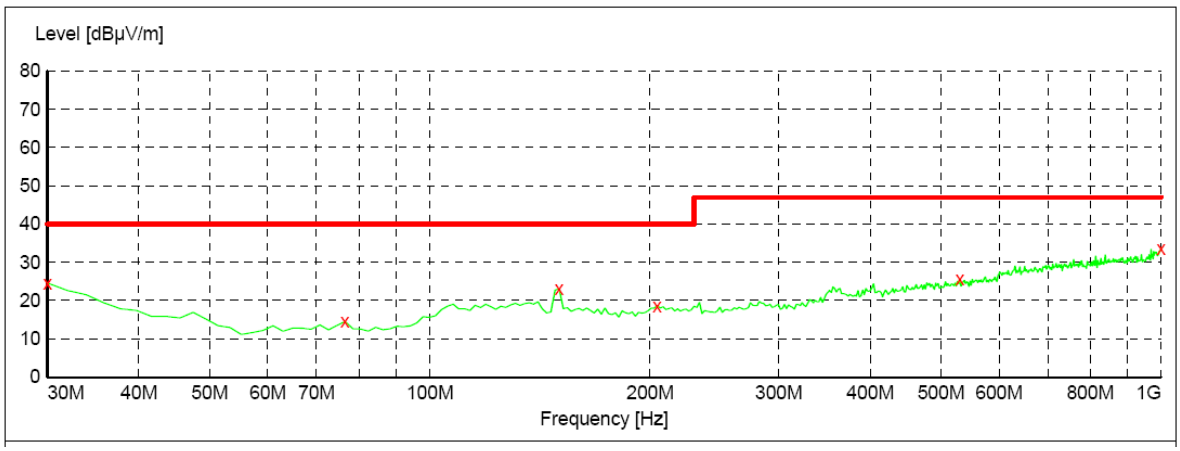
An initial pre-scan was performed in the 3m chamber using the spectrum analyser in peak detection mode. The EUT was measured by Bilog antenna with 2 orthogonal polarities and quasi-peak emissions from the EUT were detected within 6dB of the class B limit line.

Vertical:



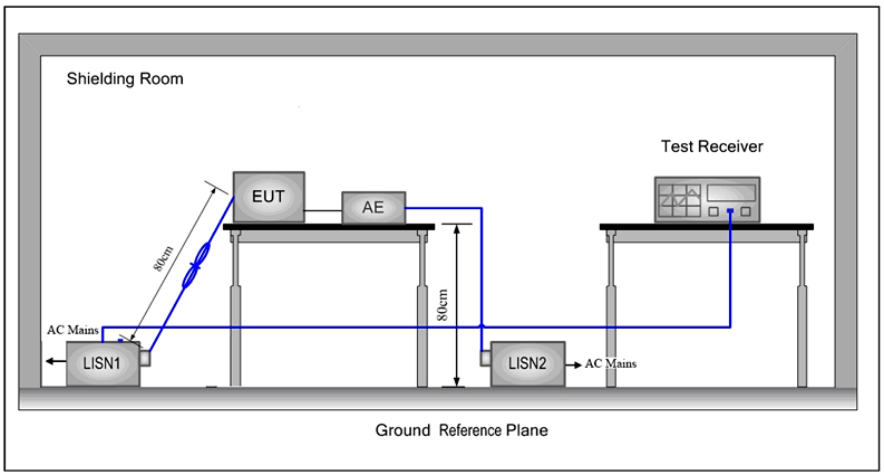
Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	34.50	20.8	40.0	5.5	---	0.0	0.00	VERTICAL
55.220000	21.70	8.0	40.0	18.3	---	0.0	0.00	VERTICAL
150.280000	27.50	13.8	40.0	12.5	---	0.0	0.00	VERTICAL
214.300000	19.30	14.0	40.0	20.7	---	0.0	0.00	VERTICAL
547.980000	26.20	20.9	47.0	20.8	---	0.0	0.00	VERTICAL
986.420000	32.70	27.0	47.0	14.3	---	0.0	0.00	VERTICAL

Horizontal:



Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	24.60	20.8	40.0	15.4	---	0.0	0.00	HORIZONTAL
76.560000	14.50	8.3	40.0	25.5	---	0.0	0.00	HORIZONTAL
150.280000	23.10	13.8	40.0	16.9	---	0.0	0.00	HORIZONTAL
204.600000	18.70	14.1	40.0	21.3	---	0.0	0.00	HORIZONTAL
530.520000	25.70	20.4	47.0	21.3	---	0.0	0.00	HORIZONTAL
1000.000000	33.60	27.2	47.0	13.4	---	0.0	0.00	HORIZONTAL

6.2 Conducted Emissions Mains Terminals, 150kHz to 30MHz

Test Requirement:	EN 55022
Test Method:	EN 55022
Frequency Range:	150KHz to 30MHz
Class / Severity:	Class B
Limit:	
0.15M-0.5MHz	66dB(dBμV)-56dB(dBμV) quasi-peak, 56dB(dBμV)-46dB(dBμV) average
0.5M-5MHz	56dB(dBμV) quasi-peak, 46dB(dBμV) average
5M-30MHz	60dB(dBμV) quasi-peak, 50dB(dBμV) average
Equipment Used:	Refer to section 5 for details.
Test Setup:	

Test Procedure:

1) The mains terminal disturbance voltage test was conducted in a shielded room.

2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,

4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.

Detector: Peak for pre-scan (9kHz Resolution Bandwidth)

Quasi-Peak if maximised peak within 6dB of Quasi-Peak limit

6.2.1 E.U.T. Operation

Operating Environment:

Temperature:	24.0 °C	Humidity:	52 % RH	Atmospheric Pressure:	1012	Mbar

EUT Operation: On mode

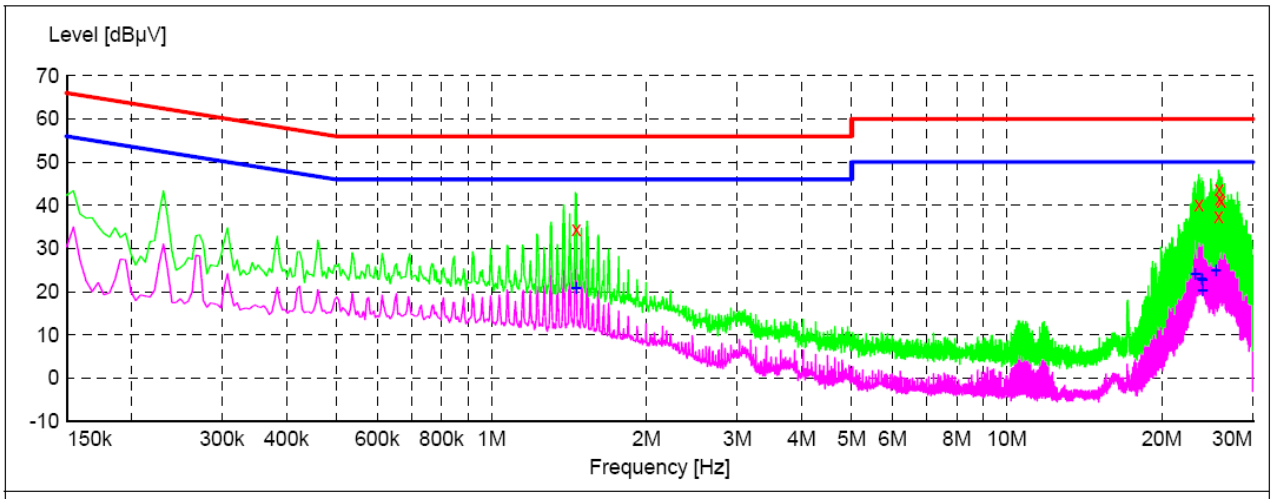
Test Status: Pretest the EUT at different test mode and found the normal mode which is worst case, the test worst case mode is recorded in the report.

6.2.2 Measurement Data

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

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

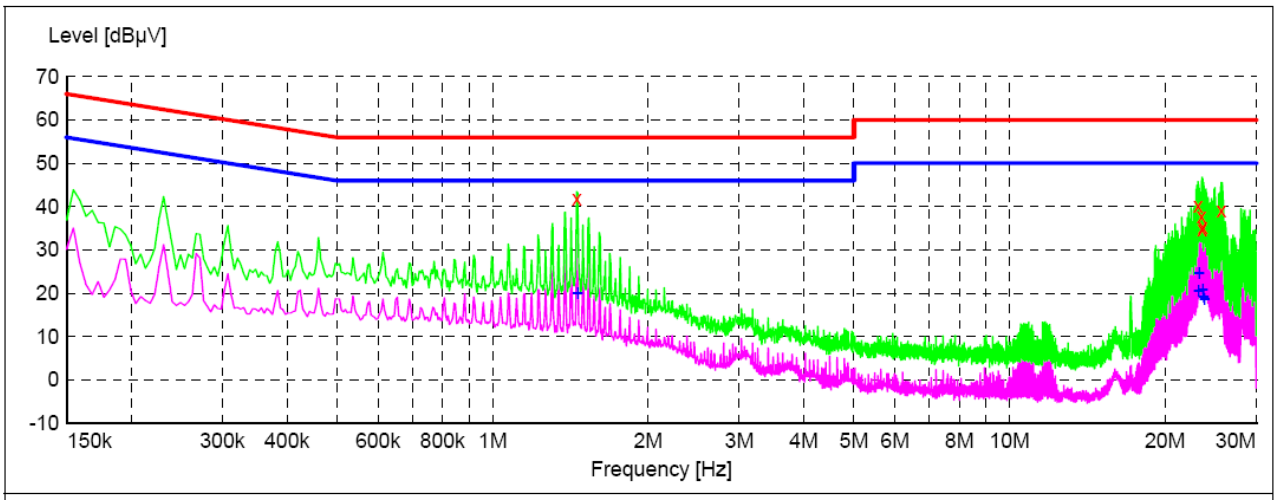
Live Line:



Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
1.459501	34.60	10.3	56	21.4	QP	L1	GND
23.586001	40.20	11.1	60	19.8	QP	L1	GND
25.750501	37.40	11.1	60	22.6	QP	L1	GND
25.809001	43.60	11.1	60	16.4	QP	L1	GND
25.872001	41.50	11.1	60	18.5	QP	L1	GND
26.052001	41.00	11.2	60	19.0	QP	L1	GND

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
1.459501	20.90	10.3	46	25.1	AV	L1	GND
23.221501	24.20	11.1	50	25.8	AV	L1	GND
23.883001	23.00	11.1	50	27.0	AV	L1	GND
23.946001	22.80	11.1	50	27.2	AV	L1	GND
24.004501	20.30	11.1	50	29.7	AV	L1	GND
25.449001	25.00	11.1	50	25.0	AV	L1	GND

Neutral Line:



Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
1.455001	41.70	10.3	56	14.3	QP	N	GND
23.163001	40.20	11.1	60	19.8	QP	N	GND
23.523001	37.70	11.1	60	22.3	QP	N	GND
23.586001	34.70	11.1	60	25.3	QP	N	GND
23.644501	35.30	11.1	60	24.7	QP	N	GND
25.692001	39.10	11.1	60	20.9	QP	N	GND

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
1.459501	19.90	10.3	46	26.1	AV	N	GND
23.226001	20.50	11.1	50	29.5	AV	N	GND
23.284501	24.60	11.1	50	25.4	AV	N	GND
23.644501	20.80	11.1	50	29.2	AV	N	GND
23.766001	19.10	11.1	50	30.9	AV	N	GND
23.824501	18.70	11.1	50	31.3	AV	N	GND

6.3 Harmonics Test Results

The EUT was DC power supply, not applicable.

6.4 Flicker Test Result

The EUT was DC power supply, not applicable.

7 Immunity Test Results

7.1 Performance Criteria Description in Clause 7 of EN 55024

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.

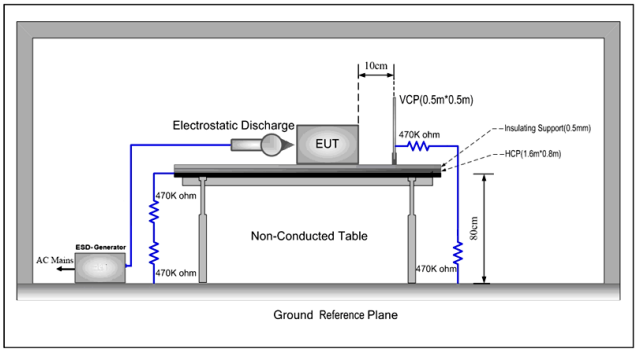
If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

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.

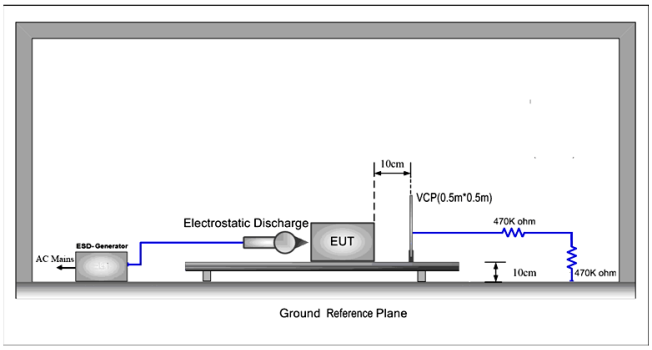
Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

7.2 ESD

Test Requirement:	EN 55024	
Test Method:	EN 61000-4-2	
Performance Criterion:	B	
Discharge Impedance:	330 Ω / 150 pF	
Discharge Voltage:	Air Discharge:	2,4,8 kV
	Contact Discharge:	4kV
	VCP, HCP:	4 kV
Polarity:	Positive & Negative	
Number of Discharge:	Minimum of four test points (a minimum of 50 discharges at each point)	
Discharge Mode:	Single Discharge	
Discharge Period:	1 second minimum	
Equipment Used:	Refer to section 5 for details.	
Test Setup:		



Test set-up for tabletop equipment



Test set-up for floor standing equipment

Test Procedure:

1) Contact discharges to the conductive surfaces and to coupling planes:

The EUT was exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points (a minimum of 50 discharges at each point). One of the test points was subjected to at least 50 indirect discharges (contact) to the centre of the front edge of the horizontal coupling plane. The remaining three test points shall each receive at least 50 direct contact discharges. If no direct contact test points were available, then at least 200 indirect discharges were applied in the indirect mode. Tests were performed at a maximum repetition rate of one discharge per second.

Air discharge at slots and apertures, and insulating surfaces:

On those parts of the EUT where it was not possible to perform contact discharge testing, the equipment was investigated to identify user accessible points where breakdown may occur. This investigation was restricted to those areas normally handled by the user. A minimum of 10 single air discharges were applied to the selected test point for each such area.

The application of electrostatic discharges to the contacts of open connectors was not required by this standard.

2) The EUT was put on a 0.8m high wooden table for table-top equipment or 0.1m high for floor standing equipment standing on the ground reference plane(GRP).

3) A horizontal coupling plane(HCP) 1.6m by 0.8m in size was placed on the table, and the EUT with its cables were isolated from the HCP by an insulating support thick than 0.5mm. The VCP 0.5m by 0.5m in size & HCP were constructed from the same material type & thinkmess as that of the GRP, and connected to the GRP via a 470kΩ resistor at each end. The distance between EUT and any of the other metallic surface excepted the GRP, HCP and VCP was greater than 1m.

4) During the contact discharges, the tip of the discharge electrode was touch the EUT before the discharge switch is operated. During the air discharges, the round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT.

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

7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 24.0 °C Humidity: 48 % RH Atmospheric Pressure: 1012 mbar

EUT Operation: On mode

7.2.2 Test Results

Direct Application Test Results

Observations: Test Point:

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

Direct Application			Test Results	
Discharge Level (kV)	**Polarity (+/-)**	**Test Point**	**Contact Discharge**	**Air Discharge**
2,4,8	+/-	1	N/A	A
4	+/-	2	A	N/A

Indirect Application Test Results

Observations: Test Point: 1. All sides.

Test points:

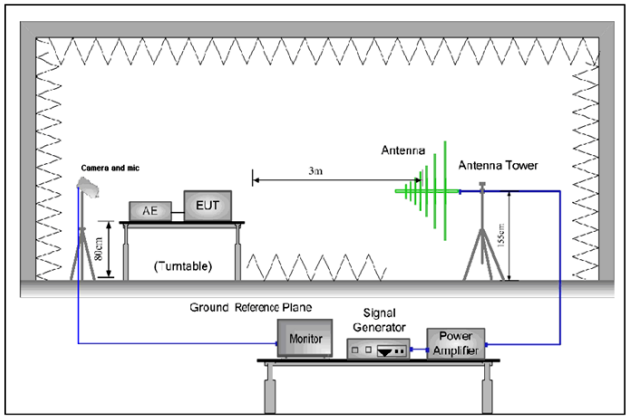
Indirect Application			Test Results	
Discharge Level (kV)	**Polarity (+/-)**	**Test Point**	**Horizontal Coupling**	**Vertical Coupling**
4	+/-	1	A	A

Results:

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

N/A: Not applicable (floor mounted EUT or not requested by Standard)

7.3 Radiated Immunity

Test Requirement:	EN 55024
Test Method:	EN 61000-4-3
Performance Criterion:	A
Frequency Range:	80MHz to 1GHz
Face under Test:	Three Orthogonal Faces
Severity:	3V/m 80%, 1kHz Amplitude Modulated
Equipment Used:	Refer to section 5 for details.
Test Setup:	

Test Procedure:

1) For table-top equipment, the EUT was placed in the chamber on a non-conductive table 0.8m high. For arrangement of floor-standing equipment, the EUT was mounted on a non-conductive support 0.1m above the supporting plane. For human body-mounted equipment, the EUT may be tested in the same manner as table top items.
2) If possible, a minimum of 1 m of cable is exposed to the electromagnetic field. Excess length of cables interconnecting units of the EUT shall be bundled low-inductively in the approximate center of the cable to form a bundle 30 cm to 40 cm in length.
3) The EUT was initially placed with one face coincident with the calibration plane. The EUT face being illuminated was contained within the UFA (Uniform Field Area).
4) The frequency ranges to be considered were swept with the signal modulated and pausing to adjust the RF signal level or to switch oscillators and antennas as necessary. Where the frequency range was swept incrementally, the step size was not exceed 10 % of the preceding frequency value.
5) The dwell time of the amplitude modulated carrier at each frequency was not be less than the time necessary for the EUT to be exercised and to respond, and was not less than 0.5 s.
6) The test normally was performed with the generating antenna facing each side of the EUT.
7) The polarization of the field generated by each antenna necessitates testing each selected side twice, once with the antenna positioned vertically and again with the antenna positioned horizontally.
8) The EUT was performed in a configuration to actual installation conditions, a video camera and/or an audio monitor were used to monitor the performance of the EUT.

7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 24.0 °C Humidity: 68 % RH Atmospheric Pressure: 1012 mbar

EUT Operation: On mode

7.3.2 Test Results

Frequency	Level	Modulation	EUT Face	Result / Observations
80MHz-1GHz	3V/m	1kHz, 80% Amp. Mod, 1% increment	Front/ Back	A
			Right/ Left	A
			Top/ Underside	A

Remarks:

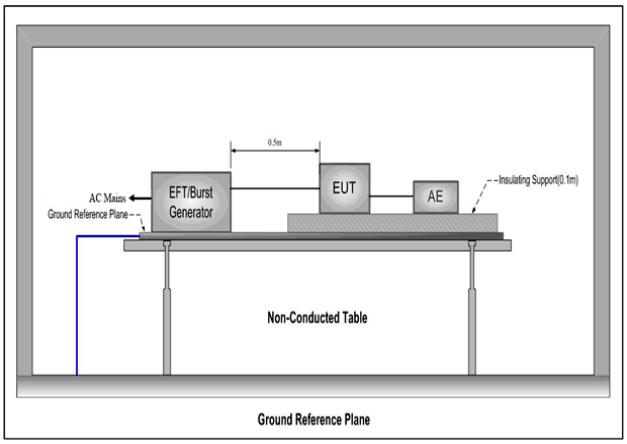
Front: EUT as per photograph in section 8.5 of this report.

A: No degradation in the performance of the E.U.T. was observed.

7.4 Electrical Fast Transients (EFT)

Test Requirement:	EN 55024
Test Method:	EN 61000-4-4
Performance Criterion:	B
Test Level:	0.5, 1.0kV on AC
Polarity:	Positive & Negative
Repetition Frequency:	5kHz
Burst Duration:	300ms
Test Duration:	2 minute per level & polarity
Equipment Used:	Refer to section 5 for details.

Test Setup:



Test Procedure:

1) The EUT was placed on a ground reference plane(GRP) insulated by an insulating support 0.1 m thick and the GRP was placed on a 0.8m high wooden table for table-top equipment. For floor standing equipment, the EUT was placed on a 0.1m high wooden support above the GRP.

2) The GRP shall project beyond the EUT and the clamp by at least 0.1m on all sides. The distance between the EUT and any other of the metallic surface except the GRP was greater than 0.5m. All cables to the EUT was placed on the insulation support 0.1m above GRP. A cable not subject to EFT was routed as far as possible from cable under test to minimize the coupling between the cables.

3) The length of signal and power cable between the EUT and EFT generator was 0.5m. If the cable is a non-detachable supply cable more than 0.5m, the excess length of this cable shall be folded to avoid a flat coil and situated at a distance of 0.1m above the GRP.

4) The EUT was conducted the below specified test voltages for line and neutral or line, neutral and earth simultaneously (for telecommunication, single, control and DC port line with capacitive coupling clamp), 120 seconds duration. If the equipment contains identical ports, only one was tested; multicomputer cables, such as a 50-pair telecommunication cable, were tested as a single cable. Cables did not be split or divided into groups of conductors for this test; interface ports, which were intended by the manufacturer to be connected to data cables not longer than 3 m, did not be tested.

7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 24.0 °C Humidity: 52% RH Atmospheric Pressure: 1012 mbar

EUT Operation: On mode

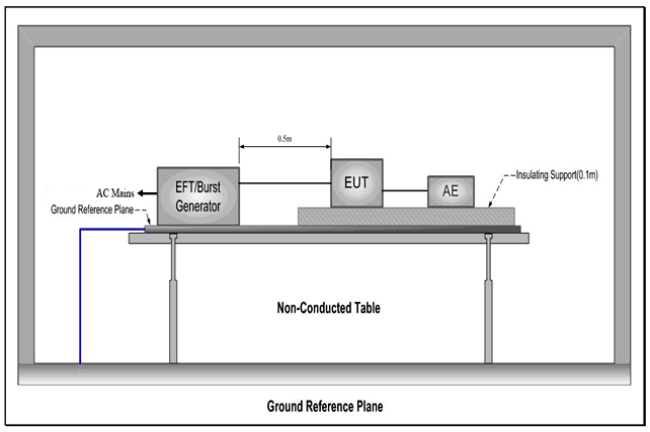
7.4.2 Test Results On AC Supply:

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

A: No loss of function was observed.

7.5 Surge

Test Requirement:	EN 55024
Test Method:	EN 61000-4-5
Performance Criterion:	B
Test Level:	±1kV Live to Neutral,
Polarity:	Positive & Negative
Generator source impedance:	2Ω
Trigger Mode:	Internal
No. of surges:	5 positive, 5 negative at 0°, 90°, 180°, 270°.
Equipment Used:	Refer to section 5 for details.
Test Setup:	



Test Procedure:

1) The EUT was placed on a ground reference plane(GRP) insulated by an insulating support 0.1 m thick and the GRP was placed on a 0.8m high wooden table for table-top equipment. For floor standing equipment, the EUT was placed on a 0.1m high wooden support above the GRP.

2) The 1.2/50μ s surge was to be applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks were required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines and to provide sufficient decoupling impedance to the surge wave so that the specified wave may be applied on the lines under test.

3) The power cord between the EUT and the coupling/decoupling network was not exceed 2 m in length. The interconnection line between the EUT and the coupling/ decoupling network shall not exceed 2 m in length.

4) The EUT was conducted 0.5kV and 1kV test voltage for line to line and line to neutral and conducted 0.5kV, 1kV and 2kV test voltage for line to earth and neutral to earth, five positive pulses and five negative pulses each at 0°, 90°, 180° and 270° for a.c. power ports and five positive pulses and five negative surge pulses for d.c. power ports (for telecommunication port, It was 0.5kV for indoor cable longer than 10m line to ground and 0.5kV, 1kV test voltage for outdoor cable line to ground, five positive pulses and five negative surge pulses), The test levels were applied on the EUT with a 2 Ω generator source impedance for power supply terminals and 40Ω output impedance for interconnection lines. The tests were done at repetition rate one per minute.

7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 24.0 °C Humidity: 52 % RH Atmospheric Pressure: 1012 mbar

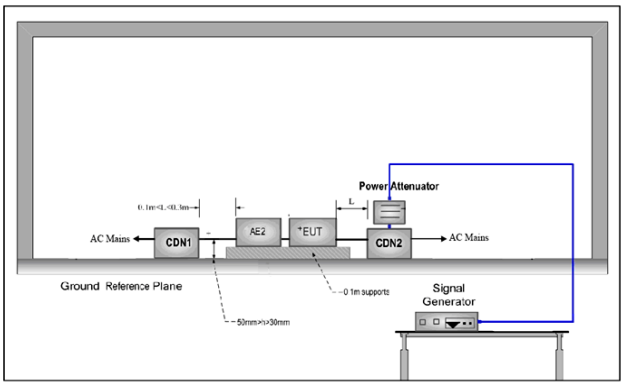
EUT Operation: On mode

7.5.2 Test Results:

Pulse No	Test Line	Level (kV)	Surge Interval	Phase (deg)	Observation (Performance Criterion)
1–5	L-N	+1	60s	0°	A
6–10	L-N	-1	60s	0°	A
11–15	L-GND	+2	60s	0°	A
16–20	L-GND	-2	60s	0°	A
21–25	N-GND	+2	60s	0°	A
26–30	N-GND	-2	60s	0°	A
31–35	L-N	+1	60s	90°	A
36–40	L-N	-1	60s	90°	A
41–45	L-GND	+2	60s	90°	A
46–50	L-GND	-2	60s	90°	A
51–55	N-GND	+2	60s	90°	A
56–60	N-GND	-2	60s	90°	A
61–65	L-N	+1	60s	180°	A
66–70	L-N	-1	60s	180°	A
71–75	L-GND	+2	60s	180°	A
76–80	L-GND	-2	60s	180°	A
81–85	N-GND	+2	60s	180°	A
86–90	N-GND	-2	60s	180°	A
91–95	L-N	+1	60s	270°	A
96–100	L-N	-1	60s	270°	A
101–105	L-GND	+2	60s	270°	A
106–110	L-GND	-2	60s	270°	A
111–115	N-GND	+2	60s	270°	A
116–120	N-GND	-2	60s	270°	A

A: No loss of performance.

7.6 Conducted Immunity 0.15MHz to 80MHz

Test Requirement:	EN 55024
Test Method:	EN 61000-4-6
Performance Criterion:	A
Frequency Range:	0.15MHz to 80MHz
Test level:	3V rms on AC Ports (unmodulated emf into 150 Ω)
Modulation:	80%, 1kHz Amplitude Modulation
Equipment Used:	Refer to section 5 for details.
Test Setup:	

Test Procedure:

1) The EUT was placed on an insulating support of 0.1m height above a ground reference Plane, arranged and connected to satisfy its functional requirement. All cables exiting the EUT was supported at a height of at least 30 mm above the ground reference plane.

2) The coupling and decoupling devices were required, they were located between 0.1 m and 0.3 m from the EUT. This distance was to be measured horizontally from the projection of the EUT on to the ground reference plane to the coupling and decoupling device.

3) Each AE, used with clamp injection, shall be placed on an insulating support 0.1 m above the ground reference plane. A decoupling network shall be installed on each cable between the EUT and AE except the cable under test. All cables connected to each AE, other than those being connected to the EUT, shall be provided with decoupling networks. The decoupling networks connected to each AE (except those on cables between the EUT and AE) shall be applied no further than 0.3 m from the AE. The cable(s) between the AE and the decoupling network (s) or in between the AE and the injection clamp shall not be bundled nor wrapped and shall be kept between 30 mm and 50 mm above the ground reference plane

4) The frequency range was swept from 150 kHz to 80 MHz, using the signal levels established during the setting process, and with the disturbance signal 80 % amplitude modulated with a 1kHz sine wave, pausing to adjust the RF signal level or to change coupling devices as necessary. Where the frequency was swept incrementally, the step size does not exceed 1 % of the preceding frequency value. The dwell time of the amplitude modulated carrier at each frequency was not less than the time necessary for the EUT to be exercised and to respond, and was not less than 0.5 s.

7.6.1 E.U.T. Operation

Operating Environment:

Temperature: 24.0 °C Humidity: 52 % RH Atmospheric Pressure: 1012 mbar

EUT Operation: On mode

7.6.2 Test Results:

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

A: No loss of performance.

7.7 Voltage Dips and Interruptions

Test Requirement: EN 55024

Test Method: EN 61000-4-11

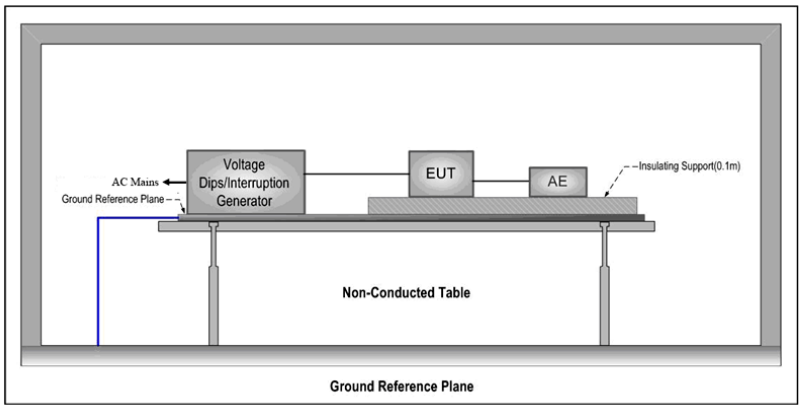
Performance Criterion: >95%VD,0.5period: B; >95%VI,250periods: C;
30%VD, 25periods: C

Test Level: 0% of U_T (Supply Voltage) for 0.5 Periods
0% of U_T (Supply Voltage) for 250 Periods
70 % of U_T (Supply Voltage) for 25 Periods

No. of Dips / Interruptions: 3 per Level

Equipment Used: Refer to section 5 for details.

Test Setup:



Test Procedure:

1) The EUT was placed on a ground reference plane(GRP) insulated by an insulating support 0.1 m thick and the GRP was placed on a 0.8m high wooden table for table-top equipment. For floor standing equipment, the EUT was placed on a 0.1m high wooden support above the GRP.

2) The test was performed with the EUT connected to the test generator with the shortest power supply cable as specified by the EUT manufacturer.

3) The EUT was tested for each selected combination of test level and duration with a sequence of three dips /interruptions with intervals of 10 s minimum. Each representative mode of operation was tested.

4) For EUT with more than one power cord, each power cord was tested individually.

7.7.1 E.U.T. Operation

Operating Environment:

Temperature: 24.0 °C Humidity: 52 % RH Atmospheric Pressure: 1012 mbar

EUT Operation: On mode

7.7.2 Test Results:

EUT operating mode	Test Level % U_T	Phase	Duration of dropout in Periods	No of dropout	Time between dropout	Observations (Performance Criterion)
On mode	0	0°	0.5	3	10s	No Loss of Function (A)
On mode	0	0°	250	3	10s	EUT off (C)
On mode	70	0°	25	3	10s	No Loss of Function (A)

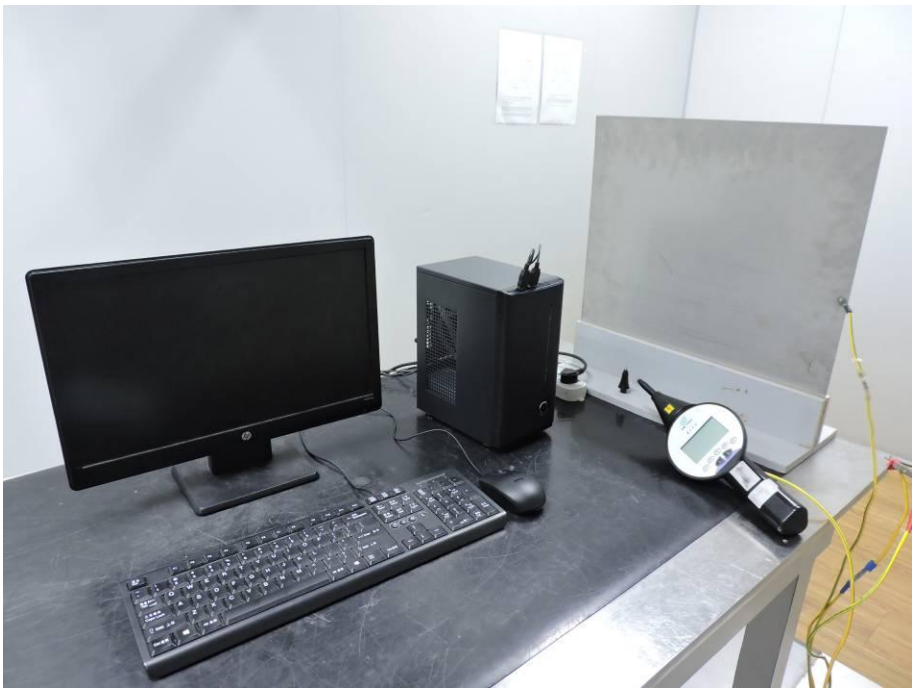
Performance C is within the acceptable criterion for Voltage Dips and Interruption test.

8 Photographs

8.1 Radiated Emission Test Setup

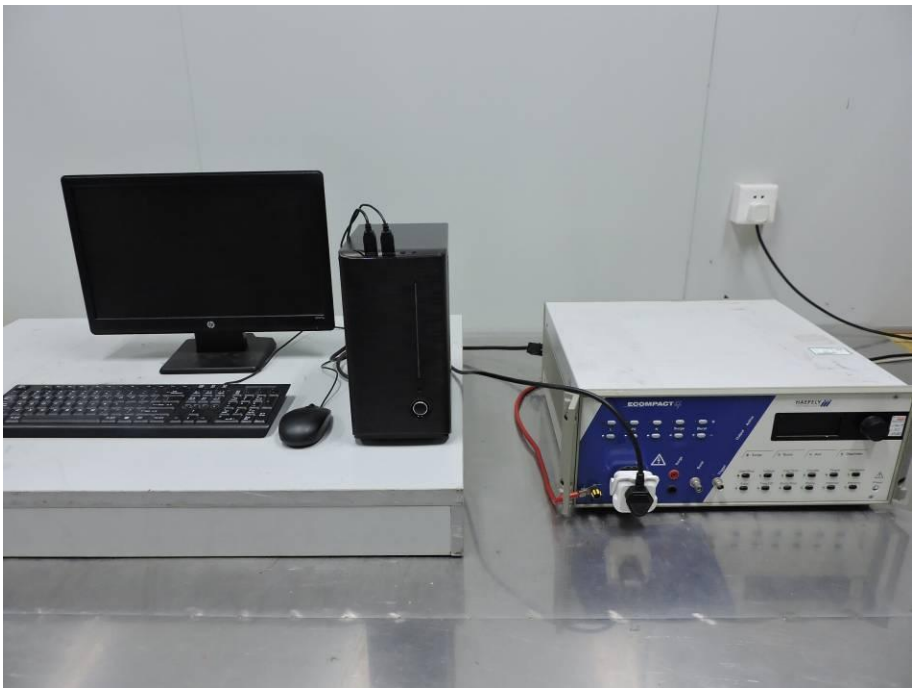
8.2 Conducted Emission Test Setup

8.3 ESD Test Setup



8.4 Radiated Immunity Test Setup

8.5 EFT, Surge, VD & Interruption Test Setup

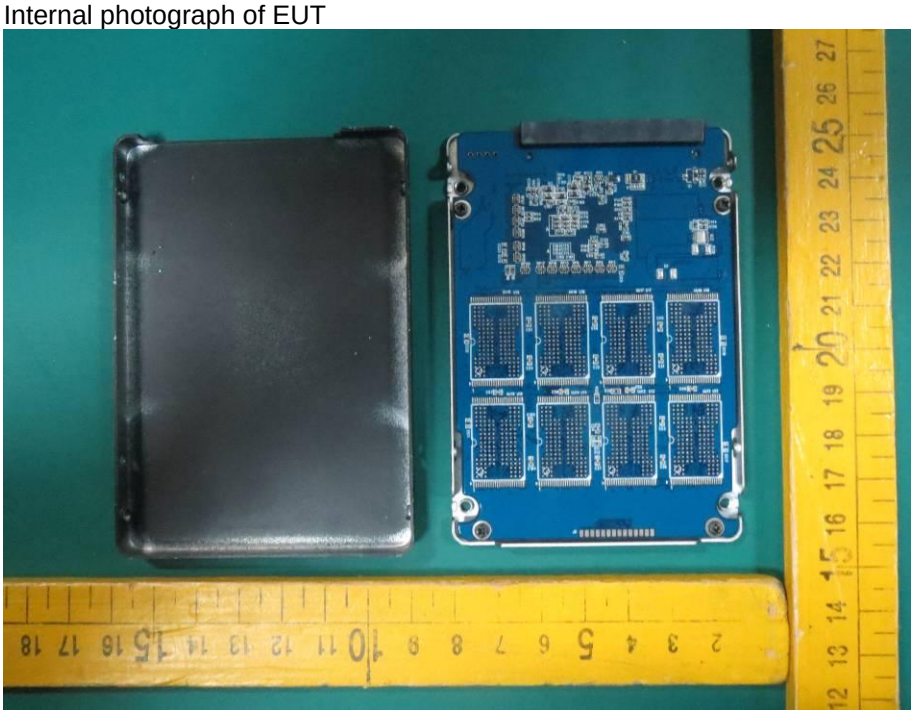


8.6 EUT Constructional Details

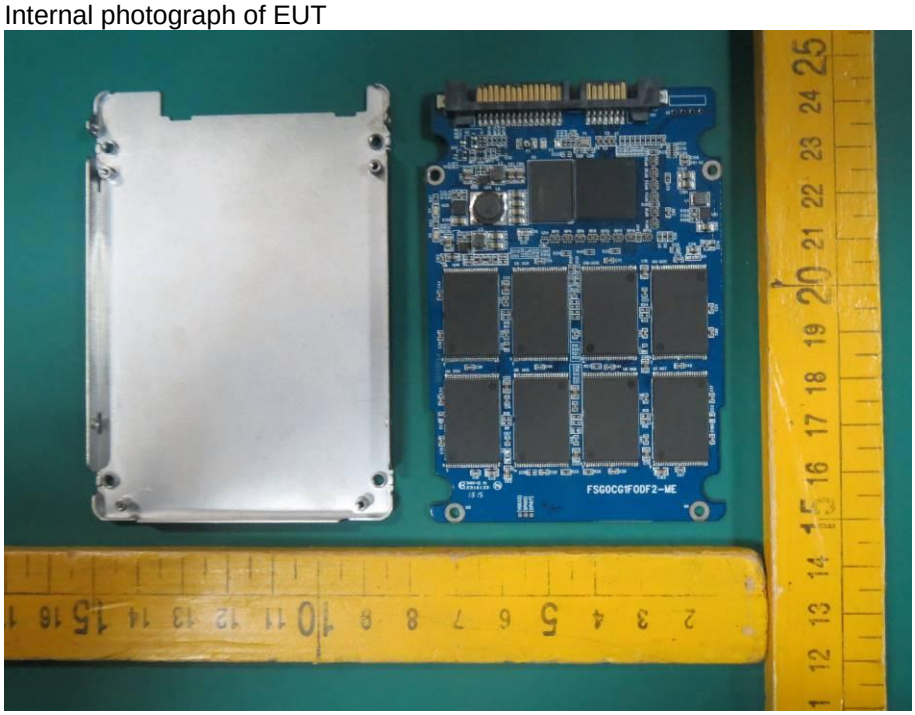
Appearance photograph of EUT

Appearance photograph of EUT

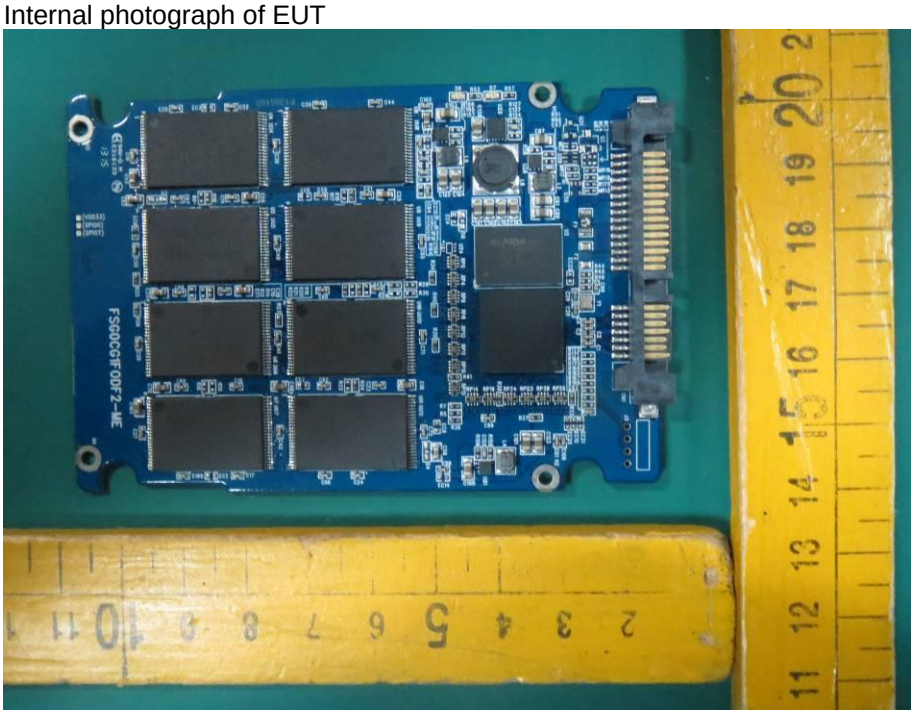
Internal photograph of EUT



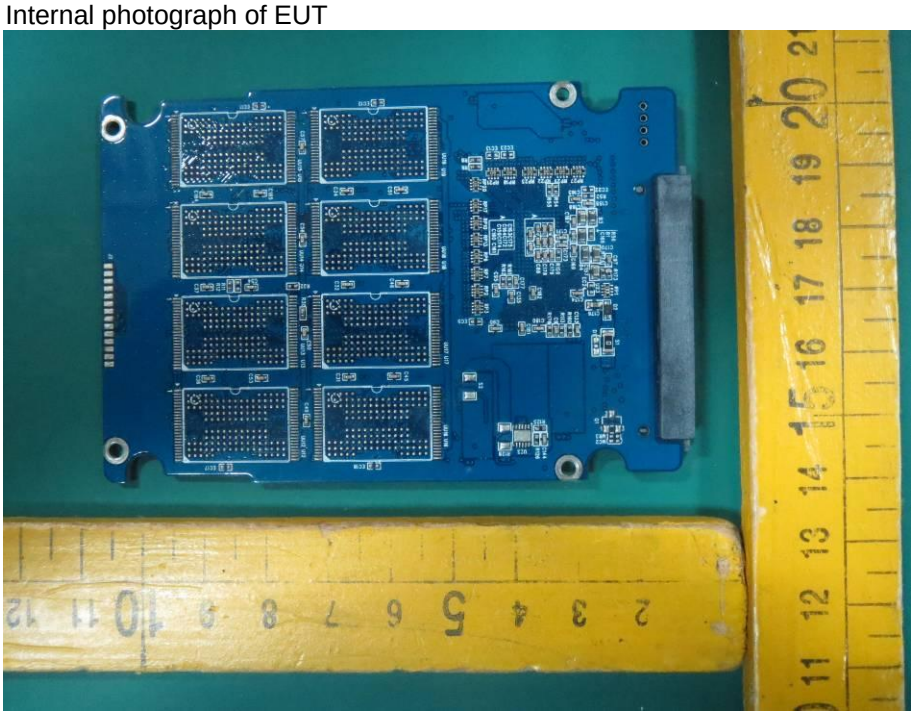
Internal photograph of EUT



Internal photograph of EUT



Internal photograph of EUT



END OF THE REPORT