Verification

Issue Date: March 3, 2020
Ref. Report No. ISL-20LE166CE50155-MA

Product Name : TEQ 75/100/160/200WIR Series
Model(s) : TEQ 200-7215WIR; TEQ 75-2412WIR; TEQ 75-2415WIR; TEQ 75-2416WIR; TEQ 75-2418WIR; TEQ 75-4812WIR; TEQ 75-4815WIR; TEQ 75-4816WIR; TEQ 75-4818WIR; TEQ 75-7212WIR; TEQ 75-7215WIR; TEQ 75-7216WIR; TEQ 75-7218WIR; TEQ 100-2412WIR; TEQ 100-2415WIR; TEQ 100-2416WIR; TEQ 100-2418WIR; TEQ 100-4812WIR; TEQ 100-4815WIR; TEQ 100-4816WIR; TEQ 100-4818WIR; TEQ 100-7212WIR; TEQ 100-7215WIR; TEQ 100-7216WIR; TEQ 100-7218WIR; TEQ 160-4812WIR; TEQ 160-4815WIR; TEQ 160-4816WIR; TEQ 160-4818WIR; TEQ 160-7212WIR; TEQ 160-7215WIR; TEQ 160-7216WIR; TEQ 160-7218WIR; TEQ 200-4812WIR; TEQ 200-4815WIR; TEQ 200-4816WIR; TEQ 200-4818WIR; TEQ 200-7212WIR; TEQ 200-7216WIR; TEQ 200-7218WIR
Applicant : TRACO ELECTRONIC AG
Brand : TRACO POWER
Address : Sihlbruggstrasse 111 CH-6340 Baar Switzerland

We, **International Standards Laboratory Corp.**, hereby certify that:

The device bearing the trade name and model specified above has been shown to comply with the applicable technical standards as indicated in the measurement report. And Our laboratories is the accredited laboratories and are approved according to ISO/IEC 17025. The device was passed the test performed according to:

Standards:
EN 50155:2017 for EMC, Environmental and Characteristic
EN 50121-3-2:2016+A1:2019 for EMC
EN 60068-2-1:2007 for Environmental
EN 60068-2-2:2007 for Environmental
EN 60068-2-30:2005 for Environmental
EN 61373:2010 for Environmental

I attest to the accuracy of data and all measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.
The determination of the test results is determined by customer agreement, regulations or standard document specifications.
The Laboratory evaluates measurement inaccuracies based on regulatory or standard document specifications and is listed in the report for reference. The quantitative project part judges the conformity of the test results based on the evaluation results of the standard cited uncertainty, and the qualitative project does not temporarily evaluate the measurement uncertainty.

Angus Chu

Angus Chu / Director

International Standards Laboratory Corp.
☐ **LT Lab.:**
No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist., Tao Yuan City 325, Taiwan
Tel: 886-3-407-1718; Fax: 886-3-4 07-1738

TEST REPORT

of

EN 50155
(EMC, Characteristic, Environmental Test)

Product : **TEQ 75/100/160/200WIR Series**

Model: **TEQ 200-7215WIR**

(more serial models listed on1.3 of this test report)

Brand: **TRACO POWER**

Applicant: **TRACO ELECTRONIC AG**

Address: **Sihlbruggstrasse 111 CH-6340 Baar Switzerland**

Test Performed by:

International Standards Laboratory Corp.
<LT Lab.>
*Address:
No. 120, Lane 180, Hsin Ho Rd.,
Lung-Tan Dist., Tao Yuan City 325, Taiwan
*Tel: 886-3-407-1718; Fax: 886-3-407-1738

Report No.:**ISL-20LE166CE50155-MA**
Issue Date :**March 3, 2020**

This report totally contains 86 pages including this cover page and contents page.

Contents of Report

1. General

1.1 Certification of Accuracy of Test Data

Standards:	Please refer to 1.2
Equipment Tested:	TEQ 75/100/160/200WIR Series
Model:	TEQ 200-7215WIR (more serial models listed on1.3 of this test report)
Brand:	TRACO POWER
Applicant:	TRACO ELECTRONIC AG
Sample received Date:	December 24, 2019
Final test Date:	EMI: refer to the date of test data EMS: January 8, 2020
Test Site:	Chamber 12; Chamber 14; Conduction 03; Immunity02
Test Distance:	10M (EMI test)
Temperature:	refer to each site test data
Humidity:	refer to each site test data
Input power:	Conduction input power: DC 110V Radiation input power: DC 110V Immunity input power: DC 110V
Test Result:	**PASS**
Report Engineer:	Cheryl Tung
Test Engineer:	Sawyer chiang Sawyer Chiang
Approved By:	Benson Chen Benson Chen / Associate Director

1.2 Test Standards

The tests which this report describes were conducted by an independent electromagnetic compatibility consultant, International Standards Laboratory Corp. in accordance with the following

☒EN 50155: 2017 for EMC, Environmental and Characteristic
☒EN 50121-3-2: 2016+A1:2019 for EMC
☒EN 60068-2-1: 2007 for Environmental
☒EN 60068-2-2: 2007 for Environmental
☒EN 60068-2-30: 2005 for Environmental
☒EN 61373: 2010 for Environmental

Characteristic Test					
Report Clause	Performed Item	EN 50155 Reference Clause(s)	Reference Standard	Result	Location of Test
2.1	Visual Inspection and Performance test	13.4.1 13.4.2	-	PASS	ISL LAB
2.2	Power Supply Test (Supply variations and Temporary supply dips)	13.4.3.2 13.4.3.3 5.1.1.2 5.1.1.3	-	PASS	ISL LAB
2.3	Power Supply Test (Interruptions of voltage supply)	13.4.3.4 5.1.1.4		PASS	ISL LAB
2.4	Power Supply Test (Supply charge-over)	13.4.3.5 5.1.3	-	PASS	ISL LAB
2.5	Insulation Test	13.4.9	-	PASS	ISL LAB

Electromagnetic Compatibility (EMC)					
Report Clause	Performed Item	EN 50155 Reference Clause(s)	Reference Standard	Result	Location of Test
3.1	Power Line Conducted Emission Measurement	13.4.8	EN 50121-3-2 EN 61000-6-4	PASS	ISL LAB
3.2	Radiated Emission Measurement	13.4.8	EN 50121-3-2 EN 61000-6-4	PASS	ISL LAB
3.3	Electrostatic Discharge Susceptibility Test	13.4.8	EN 50121-3-2 EN 61000-4-2	PASS	ISL LAB
3.4	Radio- Frequency interference (RFI) susceptibility Test	13.4.8	EN 50121-3-2 EN 61000-4-3	PASS	ISL LAB
3.5	Transient Burst Susceptibility Test	13.4.8	EN 50121-3-2 EN 61000-4-4	PASS	ISL LAB
3.6	Surges Test	13.4.8	EN 50121-3-2 EN 61000-4-5	PASS	ISL LAB
3.7	Radio- Frequency, Conducted Disturbances Immunity Test	13.4.8	EN 50121-3-2 EN 61000-4-6	PASS	ISL LAB
3.8	Power Frequency Magnetic Field	13.4.8	EN 61000-4-8	PASS	ISL LAB

Environmental Tests					
Report Clause	Performed Item	EN 50155 Reference Clause(s)	Reference Standard	Result	Location of Test
4.1	Low temperature star-up test	13.4.4	EN 60068-2-1	PASS	ISL LAB
4.2	Dry Heat Test	13.4.5	EN 60068-2-2	PASS	ISL LAB
4.3	Cyclic Damp Heat Test	13.4.7	EN 60068-2-30	PASS	ISL LAB
4.4	Random Vibration Test	13.4.11	EN 61373	PASS	GTTI LAB
4.5	Increased Random Vibration Test	13.4.11	EN 61373	PASS	GTTI LAB
4.6	Shock Test	13.4.11	EN 61373	PASS	GTTI LAB

GTTI LAB= GOLDEN-TECH TECHNOLOGIES INC.

1.2.1 Performance Criteria for Compliance

Performance criterion A:

The apparatus shall continue to operate as intended during and after the test/event. No degradation of performance or loss of function is allowed.
Changes of actual operating state or stored data are not allowed.
If agreed between the involved parties, the normal performance level (all functions are working as specified) can be replaced by a minimum performance level.

Performance criterion B:

The apparatus shall continue to operate as intended after the test/event.
During the test/event, degradation of performance is however allowed.
Changes of actual operating state or stored data are not allowed.

Performance criterion C:

During the test/event temporary loss of function is allowed. The equipment could:

- automatically restart. The normal performance shall be obtained within a maximum defined time.
  After this time the equipment shall retain the previous operating state and shall work as intended.
  The loss of significant data is not allowed; or
- manually restart or process controlled restart. In this case this shall be agreed between user and supplier and/or clearly defined in the user manual. In this case the user manual shall be available to the user at the tender stage.

NOTE Significant stored data are application dependent and stated into the Performance specifications.

1.2.2 Performance Criteria for Compliance: EN 50121-1 (only for EMC)

Performance criterion A: The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus 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, either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Performance criterion B: The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data are allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Performance criterion C: Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

1.3 Model Number Definition

There are more than one model number for this product, please refer the details listed below:

TEQ 200-7215WIR; TEQ 75-2412WIR; TEQ 75-2415WIR; TEQ 75-2416WIR;
TEQ 75-2418WIR; TEQ 75-4812WIR; TEQ 75-4815WIR; TEQ 75-4816WIR; TEQ 75-4818WIR;
TEQ 75-7212WIR; TEQ 75-7215WIR; TEQ 75-7216WIR; TEQ 75-7218WIR;
TEQ 100-2412WIR; TEQ 100-2415WIR; TEQ 100-2416WIR; TEQ 100-2418WIR;
TEQ 100-4812WIR; TEQ 100-4815WIR; TEQ 100-4816WIR; TEQ 100-4818WIR;
TEQ 100-7212WIR; TEQ 100-7215WIR; TEQ 100-7216WIR; TEQ 100-7218WIR;
TEQ 160-4812WIR; TEQ 160-4815WIR; TEQ 160-4816WIR; TEQ 160-4818WIR;
TEQ 160-7212WIR; TEQ 160-7215WIR; TEQ 160-7216WIR; TEQ 160-7218WIR;
TEQ 200-4812WIR; TEQ 200-4815WIR; TEQ 200-4816WIR; TEQ 200-4818WIR;
TEQ 200-7212WIR; TEQ 200-7216WIR; TEQ 200-7218WIR

1.4 Description of EUT

EUT

This report test data using the report number 20LE166CE50155

Description	TEQ 75/100/160/200WIR Series
Condition	Pre-Production
Model	TEQ 200-7215WIR (more serial models listed on1.3 of this test report)
Test Model	TEQ 200-7215WIR
Serial Number	N/A
Highest working frequency:	330kHz

Test configuration:

Configuration	Model Name	Input VDC	Output Voltage VDC	Output Current A
1	TEQ 200-7215WIR	110	24	10

For EMI & EMS test mode

Configuration	Model Name	Input VDC	Output Voltage VDC	Output Current A
1	TEQ 200-7215WIR	110	24	10

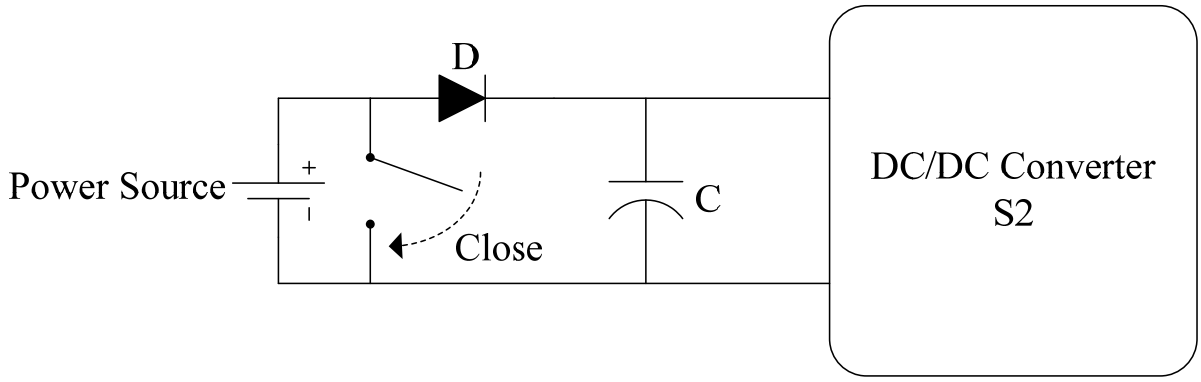
Different Model list:

Model Name	Input Range (VDC)	Output Voltage (VDC)	Output Current@Full Load (A)
TEQ 75-2412WIR	10 ~ 36	12	6.3
TEQ 75-2415WIR	10 ~ 36	24	3.2
TEQ 75-2416WIR	10 ~ 36	28	2.7
TEQ 75-2418WIR	10 ~ 36	48	1.6
TEQ 75-4812WIR	19 ~ 75	12	6.3
TEQ 75-4815WIR	19 ~ 75	24	3.2
TEQ 75-4816WIR	19 ~ 75	28	2.7
TEQ 75-4818WIR	19 ~ 75	48	1.6
TEQ 75-7212WIR	43 ~ 160	12	6.3
TEQ 75-7215WIR	43 ~ 160	24	3.2
TEQ 75-7216WIR	43 ~ 160	28	2.7
TEQ 75-7218WIR	43 ~ 160	48	1.6

Model Name	Input Range (VDC)	Output Voltage (VDC)	Output Current@Full Load (A)
TEQ 100-2412WIR	10 ~ 36	12	8.4
TEQ 100-2415WIR	10 ~ 36	24	4.2
TEQ 100-2416WIR	10 ~ 36	28	3.6
TEQ 100-2418WIR	10 ~ 36	48	2.1
TEQ 100-4812WIR	19 ~ 75	12	8.4
TEQ 100-4815WIR	19 ~ 75	24	4.2
TEQ 100-4816WIR	19 ~ 75	28	3.6
TEQ 100-4818WIR	19 ~ 75	48	2.1
TEQ 100-7212WIR	43 ~ 160	12	8.4
TEQ 100-7215WIR	43 ~ 160	24	4.2
TEQ 100-7216WIR	43 ~ 160	28	3.6
TEQ 100-7218WIR	43 ~ 160	48	2.1
TEQ 160-4812WIR	19 ~ 75	12	13
TEQ 160-4815WIR	19 ~ 75	24	6.5
TEQ 160-4816WIR	19 ~ 75	28	5.5
TEQ 160-4818WIR	19 ~ 75	48	3.2
TEQ 160-7212WIR	43 ~ 160	12	15
TEQ 160-7215WIR	43 ~ 160	24	7.5
TEQ 160-7216WIR	43 ~ 160	28	6.5
TEQ 160-7218WIR	43 ~ 160	48	3.8
TEQ 200-4812WIR	19 ~ 75	12	18
TEQ 200-4815WIR	19 ~ 75	24	9
TEQ 200-4816WIR	19 ~ 75	28	7.5
TEQ 200-4818WIR	19 ~ 75	48	4.5
TEQ 200-7212WIR	43 ~ 160	12	20
TEQ 200-7215WIR	43 ~ 160	24	10
TEQ 200-7216WIR	43 ~ 160	28	8.5
TEQ 200-7218WIR	43 ~ 160	48	5

For Interruption voltage supply classes & supply change-over classes test requirements

Recommended external components for Interruptions of voltage supply Class S2



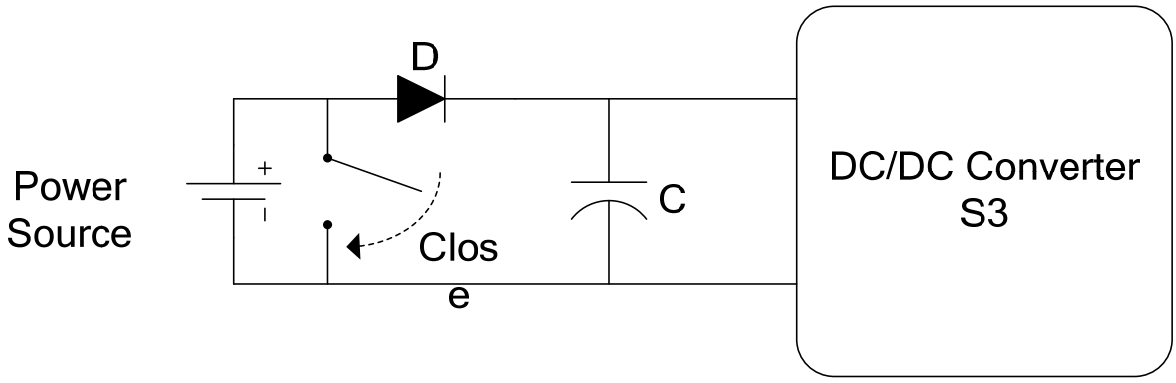
Model Reference	D1	Cin
TEQ 75-24□□WIR	C30T06Q (60V/30A)	5300μF /50V
TEQ 75-48□□WIR	VB20100C (100V/20A)	1300μF /100V
TEQ 75-72□□WIR	MBRB10200C (200V/10A)	240μF /200V

Model Reference	D1	Cin
TEQ 100-24□□WIR	C30T06Q (60V/30A)	6600μF/50V
TEQ 100-48□□WIR	VB20100C (100V/20A)	1600μF/100V
TEQ 100-72□□WIR	MBRB10200C (200V/10A)	330μF /200V

Model Reference	D1	Cin
TEQ 160-48□□WIR	VB40100C (100V/40A)	2500μF /100V
TEQ 160-72□□WIR	VB30200C (200V/30A)	590μF /200V

Model Reference	D1	Cin
TEQ 200-48□□WIR	VB40100C (100V/40A)	3500μF /100V
TEQ 200-72□□WIR	VB30200C (200V/30A)	750μF /200V

Recommended external components for Interruptions of voltage supply Class S3



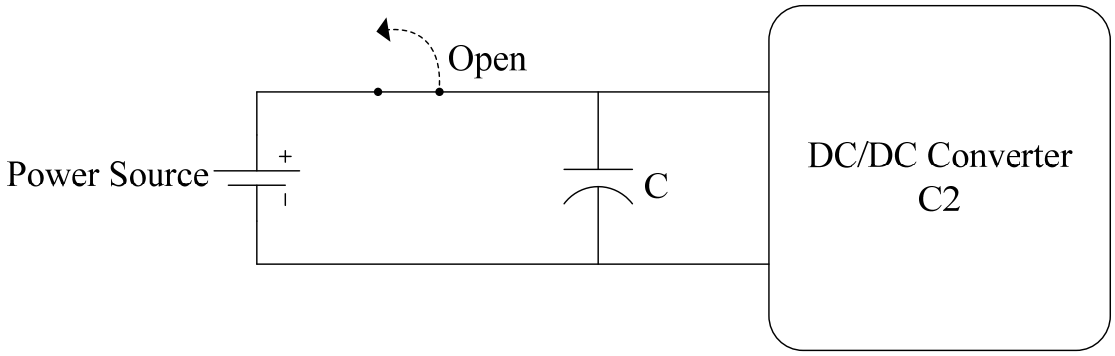
Model Reference	D1	Cin
TEQ 75-24□□WIR	C30T06Q (60V/30A)	10700μF / 50V
TEQ 75-48□□WIR	VB20100C (100V/20A)	2600μF / 100V
TEQ 75-72□□WIR	MBRB10200C (200V/10A)	480μF / 200V

Model Reference	D1	Cin
TEQ 100-24□□WIR	C30T06Q (60V/30A)	13300μF/50V
TEQ 100-48□□WIR	VB20100C (100V/20A)	3300μF/100V
TEQ 100-72□□WIR	MBRB10200C (200V/10A)	660μF/200V

Model Reference	D1	Cin
TEQ 160-48□□WIR	VB40100C (100V/40A)	5000μF/100V
TEQ 160-72□□WIR	VB30200C (200V/30A)	1100μF/200V

Model Reference	D1	Cin
TEQ 200-48□□WIR	VB40100C (100V/40A)	7000μF /100V
TEQ 200-72□□WIR	VB30200C (200V/30A)	1350μF /200V

Recommended external components for supply change-over Class C2



Model Reference	Cin
TEQ 75-24□□WIR	16000μF/50V
TEQ 75-48□□WIR	4000μF/100V
TEQ 75-72□□WIR	720μF/200V

Model Reference	Cin
TEQ 100-24□□WIR	20000μF/50V
TEQ 100-48□□WIR	4900μF/100V
TEQ 100-72□□WIR	990μF/200V

Model Reference	Cin
TEQ 160-48□□WIR	7600μF/100V
TEQ 160-72□□WIR	1700μF/200V

Model Reference	Cin
TEQ 200-48□□WIR	10600μF /100V
TEQ 200-72□□WIR	2400μF /200V

EMI Noise Source:
Please refer to the technical documents.
EMI Solution:
Please refer to the technical documents.

1.5 Description of Support Equipment

No	Unit	Model Serial No.	Brand	Power Cord	FCC ID
1	DC Power Source	GPD-4050D S/N: N/A	GW INSTEK	Non-shielded	FCC DOC
2	Dummy Load	N/A S/N: N/A	N/A	N/A	N/A

2. Characteristic Test

2.1 Visual Inspection and Performance test

2.1.1 Requirement:

The visual inspection shall be carried out to ensure that the equipment construction meets its specified requirements.

The performance test verifies the functional requirements of the Electronic Equipment. The performance test is carried out according to the Performance test specification and Performance test procedure written by the supplier either for type test or for routine test.

2.1.2 Test Procedure

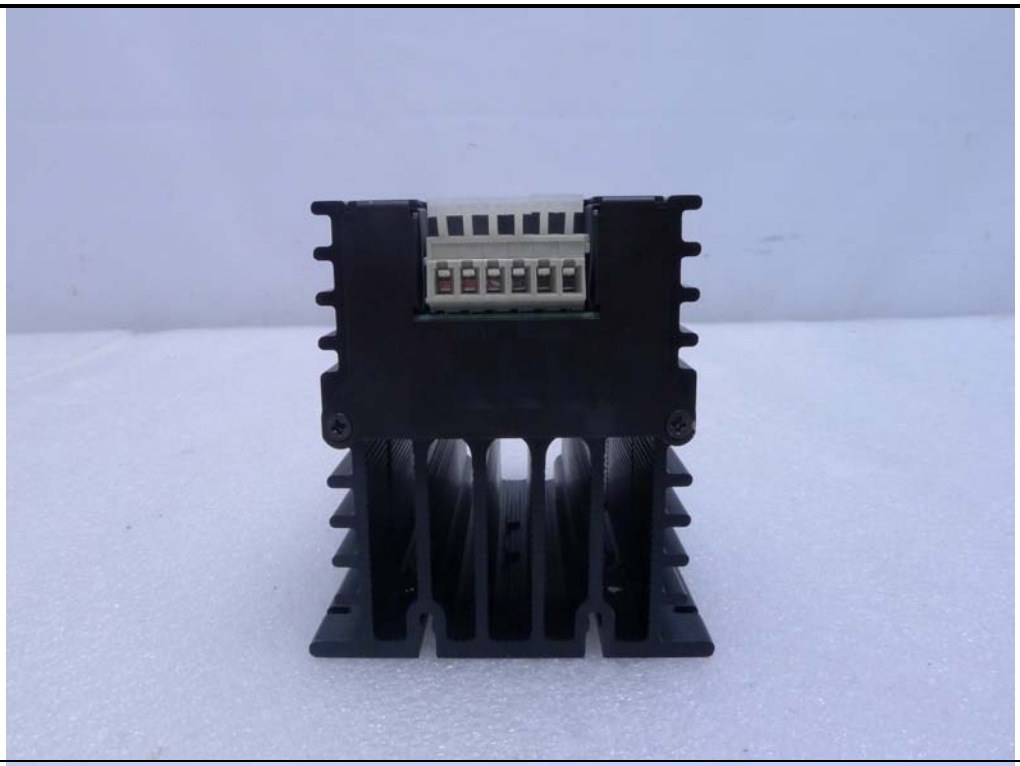
Test Procedures were referred to EN 50155 sub-clause 13.4.1

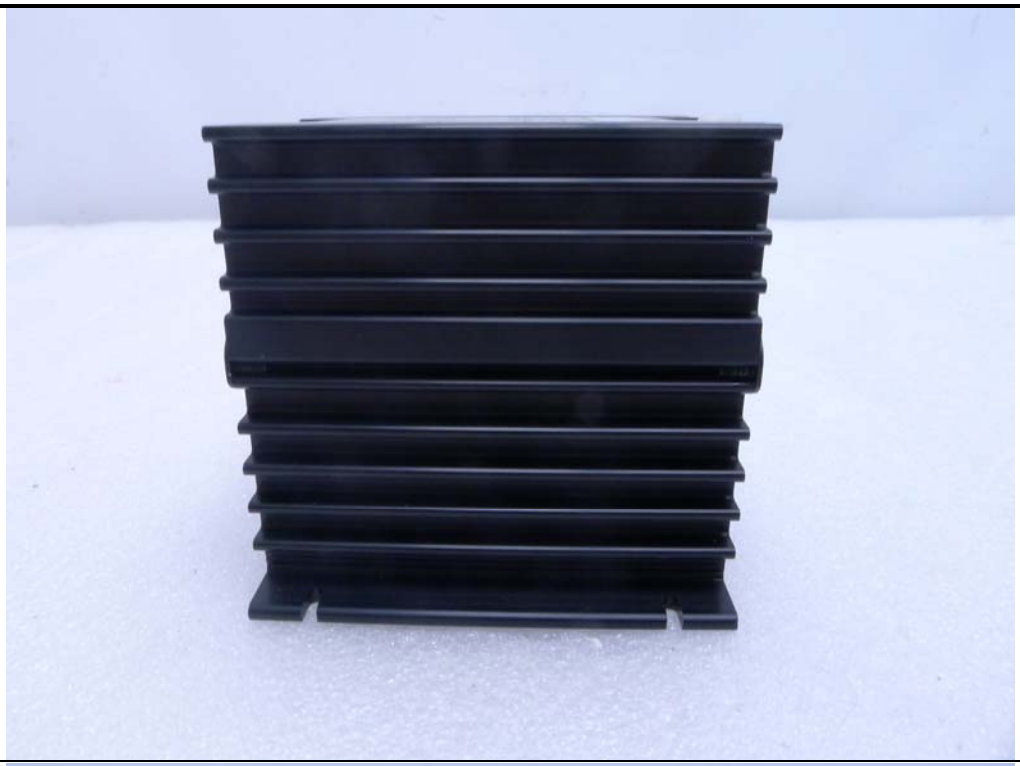
2.1.3 Test Result

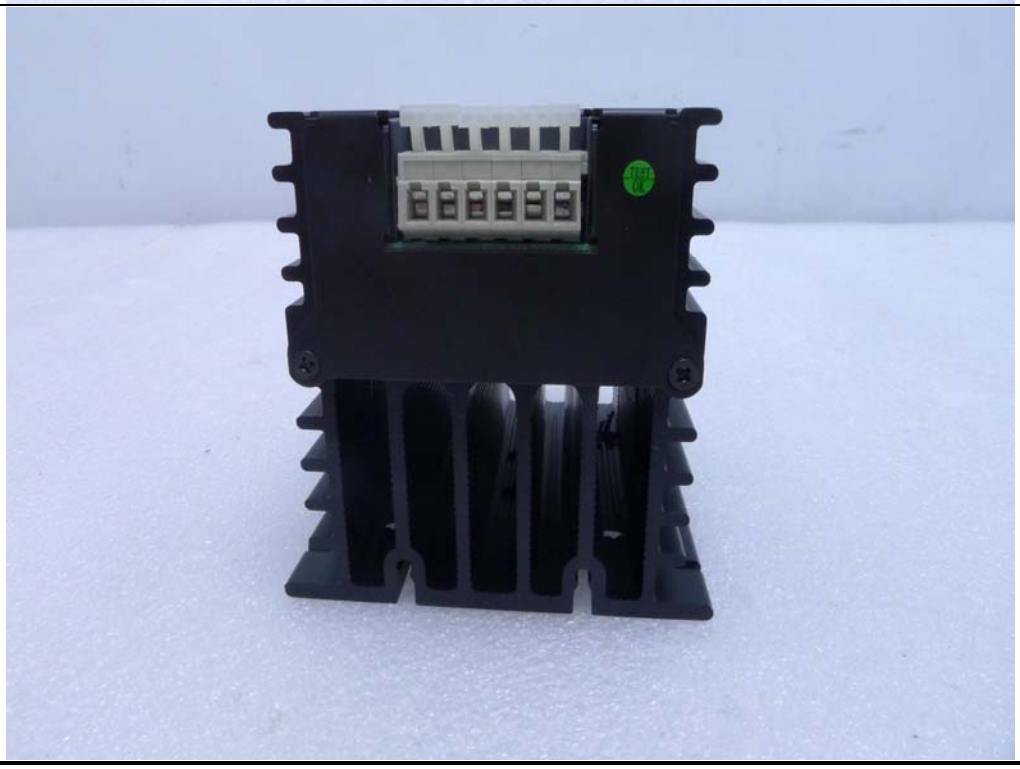
Date : 2019/12/24	Temperature : 22 ℃	Engineer : SAWYER
EUT Model Name : TEQ 200-7215WIR	Humidity : 51 %	Barometer Pressure: 99.2 kPa
		Standard: EN 50155
Voltage/Freq: 110Vdc		
Visual inspection requirement:		
The visual inspection shall be carried out to ensure that the equipment is of sound construction and, so far as can be ascertained, meets its specified requirements. A visual inspection shall also be carried out after a type test has been performed to check whether any damage or deterioration has occurred resulting from the tests.		

Inspection item	Result
EUT outside	OK
EUT function	OK

Before test：Ok



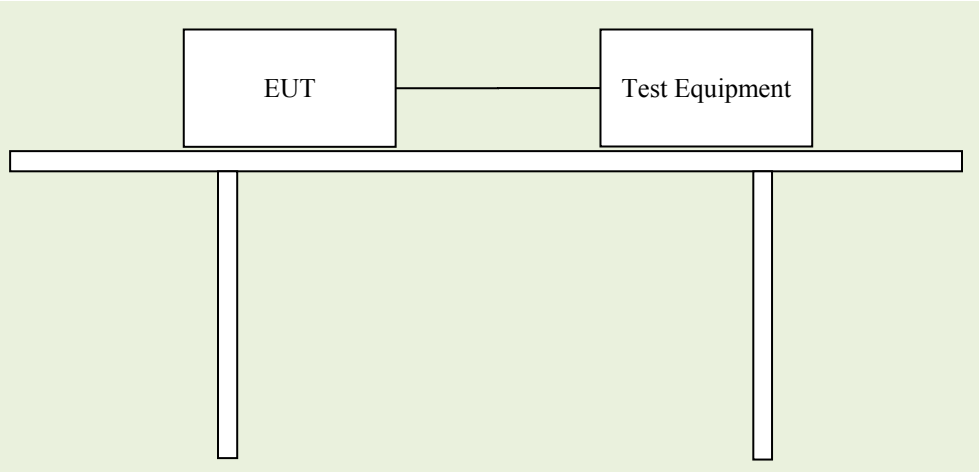





-Vo -Vo -S +S +Vo +Vo
DC OK
Vo ADJ
WARNING
Hot surface.
Do not touch.
TRACO POWER
IN : 43 - 160 VDC
OUT : 24 VDC / 10 A
UL508 rated input: 43-150 VDC
TEQ 200-7215WIR
LISTED
IND.CONT.EQ.
46YZ
-Vin -Vin NC Ctrl +Vin +Vin

2.2 Power supply test (Supply variation and temporary supply dips)

2.2.1 Test Setup



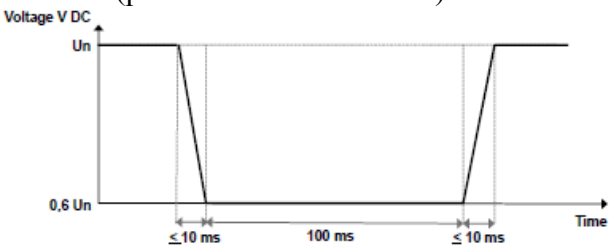
2.2.2 Test Procedure

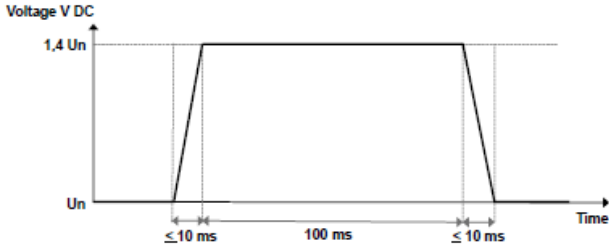
Test Procedures were referred to EN 50155 sub-clause 13.4.3.2, 13.4.3.3, 5.1.1.2 & 5.1.1.3

2.2.3 Test Requirement

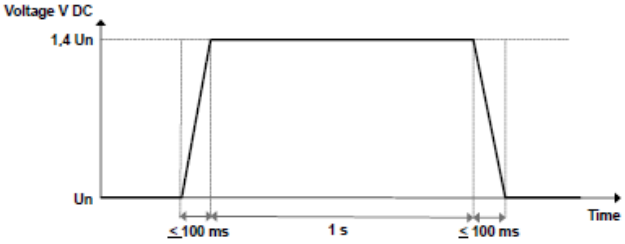
☒D.C. supplied equipment:
Test performed to prove correct functioning at nominal supply voltage and at the upper and lower limits of specified voltage as defined below:
Minimum Continuous voltage: 0.7 *Un* Maximum Continuous voltage: 1.25 *Un*

Voltage fluctuations (e.g. during start-up of auxiliary equipment or voltage oscillations of battery chargers) lying between 0.6 *Un* and 1.4 *Un* and not exceeding 0.1 s shall not cause deviation of function (performance criterion A).





For temporary supply over voltages up to 1,4 *Un* lasting no more than 1 s the equipment shall fulfil performance criterion B.



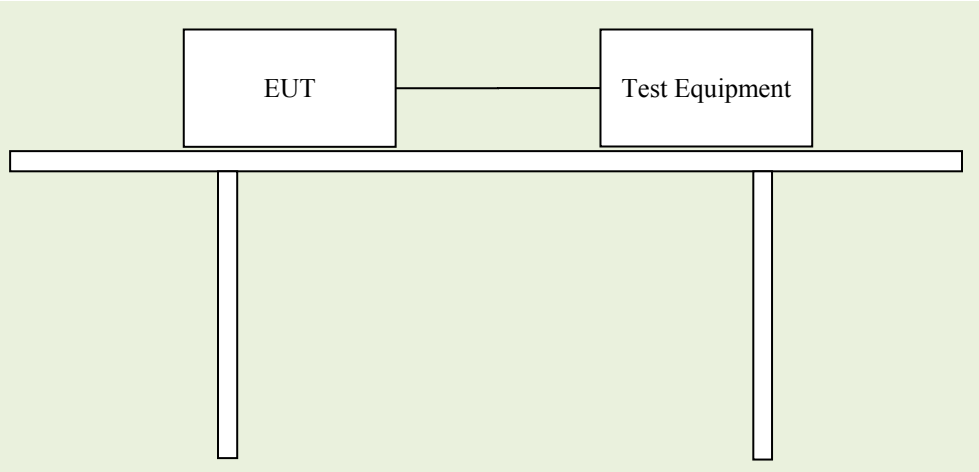
☐A.C. supplied equipment:
Test performed to prove correct functioning at:
Nominal voltage and frequency;
The upper and lower limits of voltage and frequency are in all combinations.

2.2.4 Test Result

Date : 2020/01/13		Temperature : 21 ℃		Engineer : Hasan Yu	
EUT Model Name : TEQ 200-7215WIR		Humidity : 51 %		Barometer Pressure: 99.5 kPa	
Test mode: Full load				Standard: EN 50155	
Voltage/Freq: 110Vdc					
Variations of Voltage supply	Level	Voltage	Test Time	EUT Status	Comments
Minimum voltage	0.7 Un	77Vdc	10 min	Pass	
Nominal voltage	Un	110Vdc	10 min	Pass	
Maximum voltage	1.25 Un	137.5Vdc	10 min	Pass	
Voltage fluctuations	Level	Voltage	Test Time	EUT Status	Comments
High voltage	1.4 Un	154Vdc	0.1 s	Pass	
Low voltage	0.6 Un	66Vdc	0.1 s	Pass	
High voltage	1.4 Un	154Vdc	1 s	Pass	

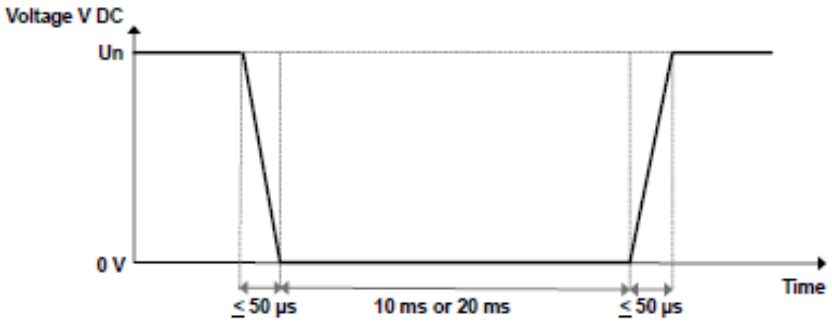
2.3 Power supply test (Supply Interruption)

2.3.1 Test Setup



2.3.2 Test Procedure

Test Procedures were referred to EN 50155 sub-clause 13.4.3.4 & 5.1.1.2



2.3.3 Test Requirement

Interruptions of input voltage as defined below:

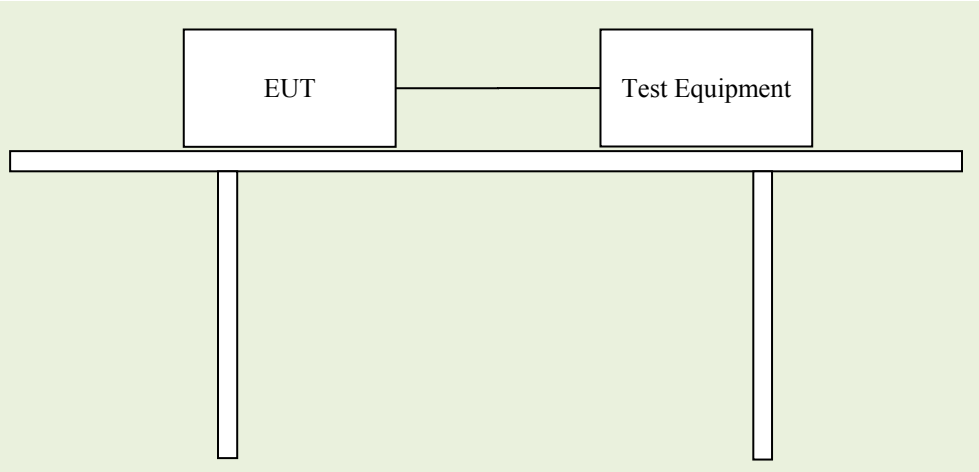
Class	Requirements	Duration of the interruption time Tint
S1	No performance criterion is requested but the equipment shall continue to operate as specified after the voltage interruption.	This test is not required.
S2	The equipment shall behave according performance criterion A.	10 ms
S3	The equipment shall behave according performance criterion A.	20 ms

2.3.4 Test Result

Date : 2020/01/27		Temperature : 23 ℃		Engineer : Hasan Yu	
EUT Model Name : TEQ 200-7215WIR		Humidity : 56 %		Barometer Pressure: 99.2 kPa Standard: EN 50155	
Voltage/Freq: 110Vdc					
Interruptions of voltage supply	Level	Voltage	INT time	EUT Status	Comments
Class S1:Voltage interruptions	Un	110Vdc	0 s	Pass	
Class S2:Voltage interruptions	0 Un	0Vdc	10ms	Pass	Note1
Class S3:Voltage interruptions	0 Un	0Vdc	20ms	Pass	Note2
Note1: Add aluminum electrolytic capacitor test (Nippon Chemi-con KY series, 750μF /200V)					
Note2: Add aluminum electrolytic capacitor test (Nippon Chemi-con KY series, 1350μF /200V)					
The following photos					

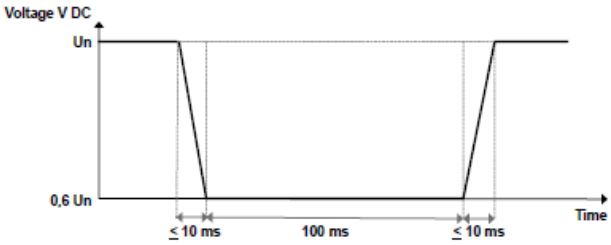
2.4 Power supply test (Supply Change Over)

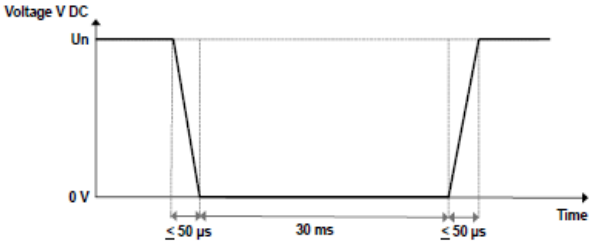
2.4.1 Test Setup



2.4.2 Test Procedure

Test Procedures were referred to EN 50155 sub-clause 13.4.3.5 & 5.1.3





2.4.3 Test Requirement

- Class C1 at 0.6 *Un* during 100ms (without interruptions) **Performance criterion A;**
- Class C2: during a supply break of 30 ms starting at *Un* **Performance criterion B.**

2.4.4 Test Result

Date : 2020/01/27		Temperature : 22 ℃		Engineer : Hasan Yu	
EUT Model Name : TEQ 200-7215WIR		Humidity : 53 %		Barometer Pressure: 102.2 kPa	
				Standard: EN 50155 12.2.2	
Voltage/Freq: 110Vdc					
Supply change over	Level	Voltage	INT time	EUT Status	Comments
Class C1:60% residual voltage	0.6 Un	66Vdc	100ms	Pass	
Class C2:0% residual voltage	0 Un	0Vdc	30ms	Pass	Note1
Note1: Add aluminum electrolytic capacitor test (Nippon Chemi-con KY series, 2400μF /200V)					
The following photos					

2.5 Insulation Test

2.5.1 Test Procedure

Test Procedures were referred to EN 50155 sub-clause 13.4.9

2.5.2 Test Requirement

☒**Insulation measurement Test: 500VDC**
The insulation resistance test carried out at 500 VDC and the values recorded.
The test repeated after the voltage withstand test.
Test acceptance requirements:
There shall be no fundamental deterioration from the initial measurement.

☒**Voltage withstand test:**

Nominal battery voltages and/or I/O voltage	Test Voltage
＜ 72Vdc or 50Vac $_{rms}$	500Vac or 750Vdc
72Vdc ≦ Vdc ＜ 125Vdc or from 50 to 90 Vac $_{rms}$	1000Vac or 1500Vdc
125Vdc ≦ Vdc ＜ 315Vdc or from 90 to 225 Vac $_{rms}$	1500Vac or 2200Vdc

Test acceptance requirements:
Neither disruptive discharge nor flashover shall occur.

2.5.3 Test Result

Date : 2020/01/16	Temperature : 20.5 ℃	Engineer : Jimmy Wen
EUT Model Name : TEQ 200-7215WIR	Humidity : 58.2 %	Equipment: SE 7452, TH110-POSE,
Power :	Barometer Pressure: 99.2 kPa	Standard: EN 50155 insulation test
Support Unit :	Test mode:	

Insulation Test Requirement:

1.Insulation measurement Test :

The insulation resistance test shall be carried out at 500 Vdc and the values recorded.
The test shall then be repeated after the voltage withstand test.
There shall be no fundamental deterioration from the initial measurement.

Test item	Test Time	Insulation measurement test		Comments
		before withstand	after withstand	
Primary side to secondary side	1 min	50GΩ	50GΩ	Pass

2.Voltage Withstand test

500Vac or 750Vdc for nominal battery voltages below 72 Vdc (or 50 Vac).
1000Vac or 1500Vdc for nominal battery voltage from 72Vdc up to 125Vdc, (or from 50 to 90 Vac), and
1500Vac or 2200Vdc for nominal battery voltage above 125Vdc and up to 315Vdc, (or from 90 to 225 Vac).
Neither disruptive discharge nor flashover shall occur

Test item	Test Voltage	Test Time	Result	Comments
Primary side to secondary side	1500Vac	1 min	4.57mA	Pass
Primary side to secondary side	2250Vdc	1 min	0.1mA	Pass

Date : 2020/01/16	Temperature :21.3 ℃	Engineer : Jimmy Wen
EUT Model Name : TEQ 200-7215WIR	Humidity : 60.2 %	Equipment: N-396T, THS-B4T-150, TH110-POSE,SE 7452
Power :	Barometer Pressure: 99.2 kPa	Standard: EN 50155 insulation test
Support Unit :	Test mode:	

Insulation Test Requirement before first run:

1.Insulation measurement Test :

The insulation resistance test shall be carried out at 500 Vdc and the values recorded.
The test shall then be repeated after the voltage withstand test.
There shall be no fundamental deterioration from the initial measurement.

Test item	Test Time	Insulation measurement test		Comments
		before withstand	after withstand	
Primary side to secondary side	1 min	50GΩ	50GΩ	Pass

2.Voltage Withstand test

500Vac or 750Vdc for nominal battery voltages below 72 Vdc (or 50 Vac).
1000Vac or 1500Vdc for nominal battery voltage from 72Vdc up to 125Vdc, (or from 50 to 90 Vac), and
1500Vac or 2200Vdc for nominal battery voltage above 125Vdc and up to 315Vdc, (or from 90 to 225 Vac).
Neither disruptive discharge nor flashover shall occur

Test item	Test Voltage	Test Time	Result	Comments
Primary side to secondary side	1500Vac	1 min	4.55mA	Pass

Date : 2020/01/20	Temperature :212 ℃	Engineer : Jimmy Wen
EUT Model Name : TEQ 200-7215WIR	Humidity : 59.5 %	Equipment: N-396T, THS-B4T-150, TH110-POSE,SE 7452
Power :	Barometer Pressure: 99.2 kPa	Standard: EN 50155 insulation test
Support Unit :	Test mode:	

Insulation Test Requirement after second run:

1.Insulation measurement Test :

The insulation resistance test shall be carried out at 500 Vdc and the values recorded.
The test shall then be repeated after the voltage withstand test.
There shall be no fundamental deterioration from the initial measurement.

Test item	Test Time	Insulation measurement test		Comments
		before withstand	after withstand	
Primary side to secondary side	1 min	50GΩ	50GΩ	Pass

2.Voltage Withstand test

500Vac or 750Vdc for nominal battery voltages below 72 Vdc (or 50 Vac).
1000Vac or 1500Vdc for nominal battery voltage from 72Vdc up to 125Vdc, (or from 50 to 90 Vac), and
1500Vac or 2200Vdc for nominal battery voltage above 125Vdc and up to 315Vdc, (or from 90 to 225 Vac).
Neither disruptive discharge nor flashover shall occur

Test item	Test Voltage	Test Time	Result	Comments
Primary side to secondary side	1500Vac	1 min	4.67mA	Pass

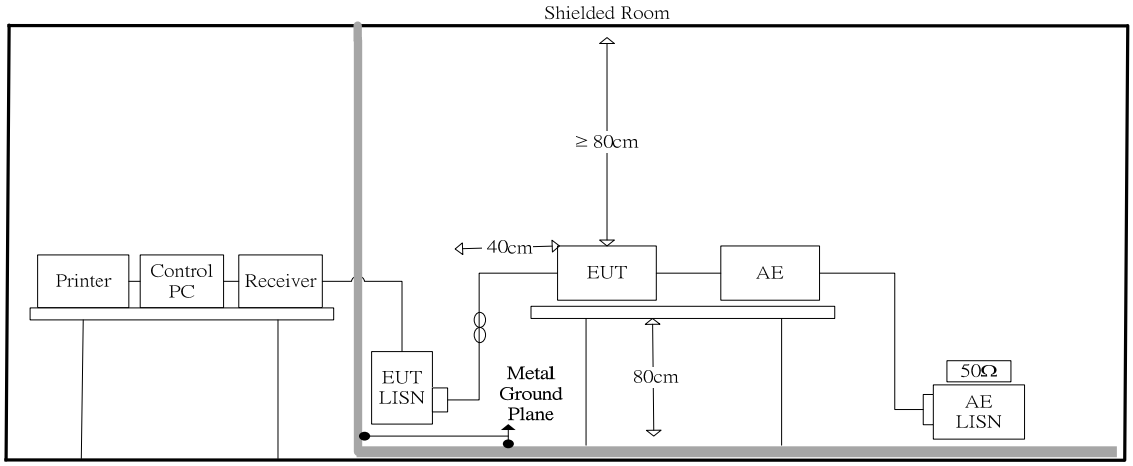
3. Electromagnetic Compatibility (EMC)

Test Procedures were referred to EN 50155 sub-clause 13.4.8.
All EMC tests of the electronic equipment shall be carried out according EN 50121-3-2.

3.1 Power Main Port Conducted Emissions

3.1.1 Test Setup and Procedure

3.1.2 Test Setup



3.1.3 Test Procedure

The measurements are performed in a shielded room site; The EUT was placed on non-conduction 1.0m x 1.5m table, which is 0.8 meters above an earth-grounded.

Power to the EUT was provided through the LISN which has the Impedance (50ohm/50uH) vs. Frequency Characteristic in accordance with the standard. Powers to the LISNs were filtered to eliminate ambient signal interference and these filters were bonded to the ground plane. Peripheral equipment required to provide a functional system (support equipment) for EUT testing was powered from the second LISN through a ganged, metal power outlet box which is bonded to the ground plane at the LISN.

The interconnecting cables were arranged and moved to get the maximum measurement. Both the line of power cord, hot and neutral, were measured. All of the interface cables were manipulated according to EN 55016-2-1 / CISPR 16-2-1 requirements.

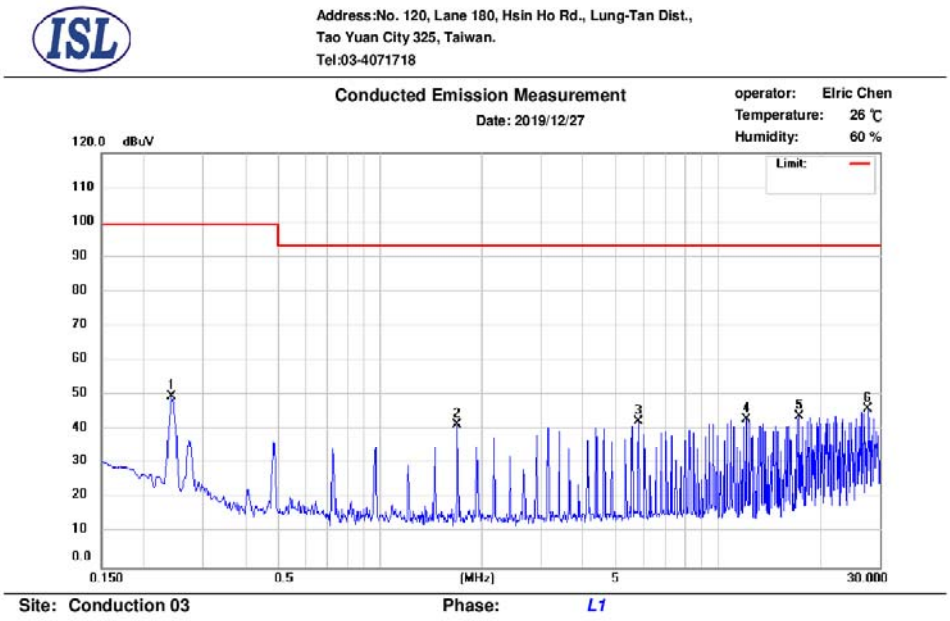
The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

3.1.4 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range:	150KHz--30MHz
Detector Function:	Quasi-Peak Mode
Resolution Bandwidth:	9KHz

3.2 *Conduction Test Data: Configuration 1*

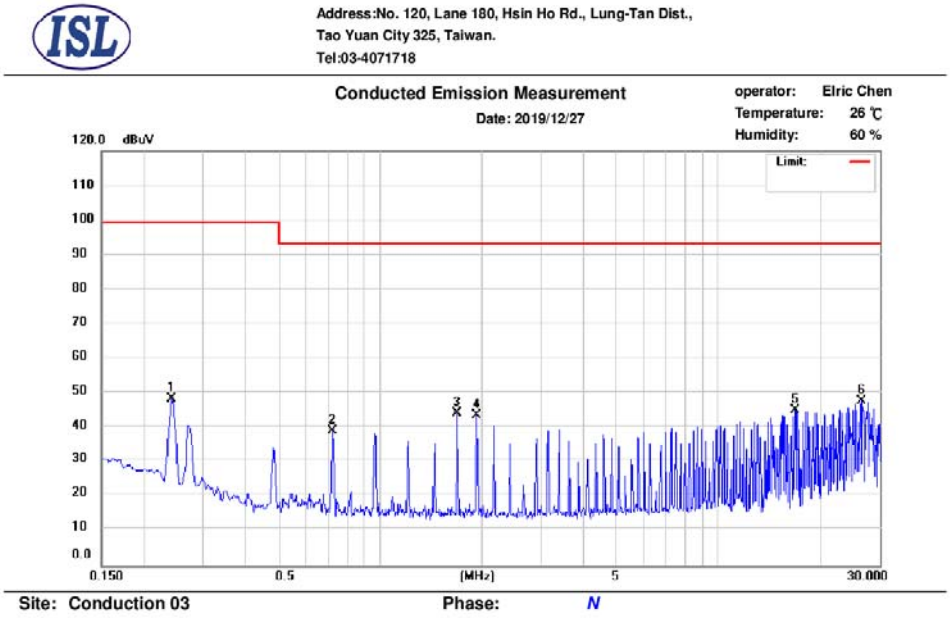
-Live



No.	Frequency (MHz)	QP_R (dBuV)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)
1	0.242	37.90	10.13	48.03	99.00	-50.97
2	1.694	30.33	10.17	40.50	93.00	-52.50
3	5.810	30.26	10.25	40.51	93.00	-52.49
4	12.102	30.27	10.33	40.60	93.00	-52.40
5	17.426	31.40	10.37	41.77	93.00	-51.23
6	27.838	19.63	10.45	30.08	93.00	-62.92

Note:
Margin = QP/AVG Emission - Limit
QP/AVG Emission = QP_R/AVG_R + Correct Factor
Correct Factor = LISN Loss + Cable Loss

- Neutral



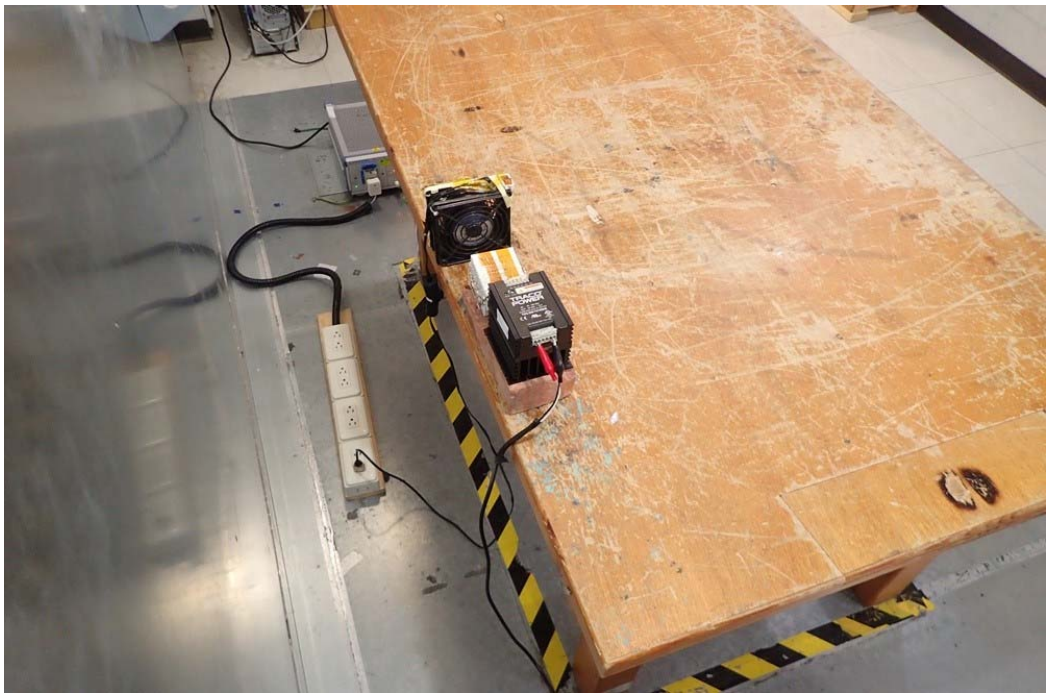
No.	Frequency (MHz)	QP_R (dBuV)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)
1	0.242	37.07	10.13	47.20	99.00	-51.80
2	0.726	28.25	10.15	38.40	93.00	-54.60
3	1.694	32.78	10.17	42.95	93.00	-50.05
4	1.934	33.02	10.18	43.20	93.00	-49.80
5	16.926	32.74	10.37	43.11	93.00	-49.89
6	26.598	34.07	10.44	44.51	93.00	-48.49

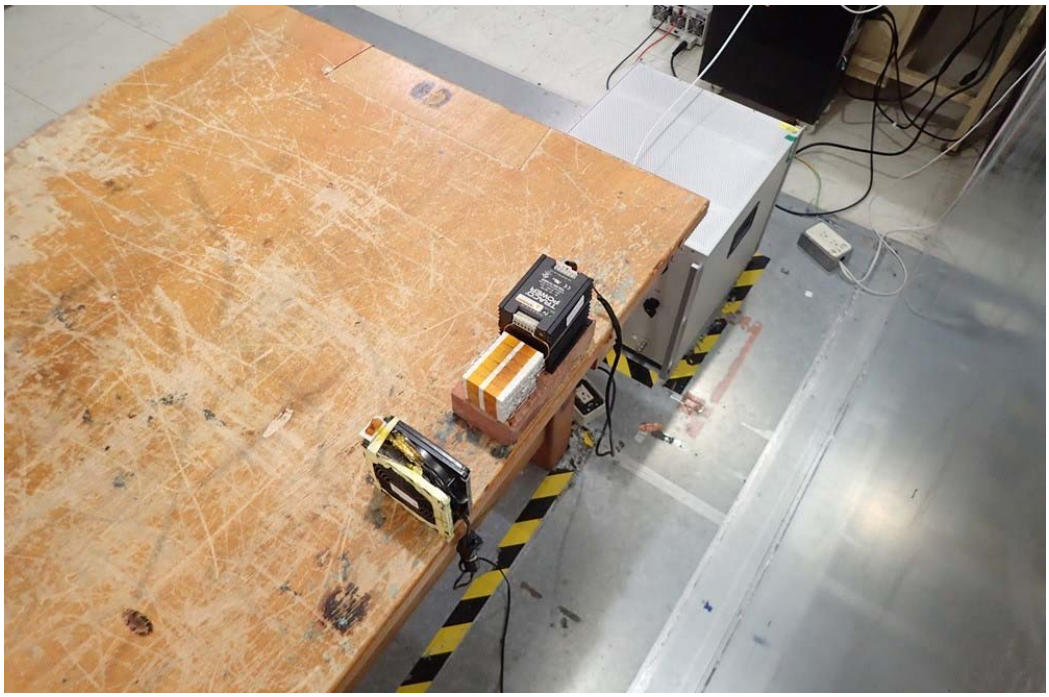
Note:
Margin = QP/AVG Emission - Limit
QP/AVG Emission = QP_R/AVG_R + Correct Factor
Correct Factor = LISN Loss + Cable Loss

3.2.1 Test Setup Photo

Front View

Back View

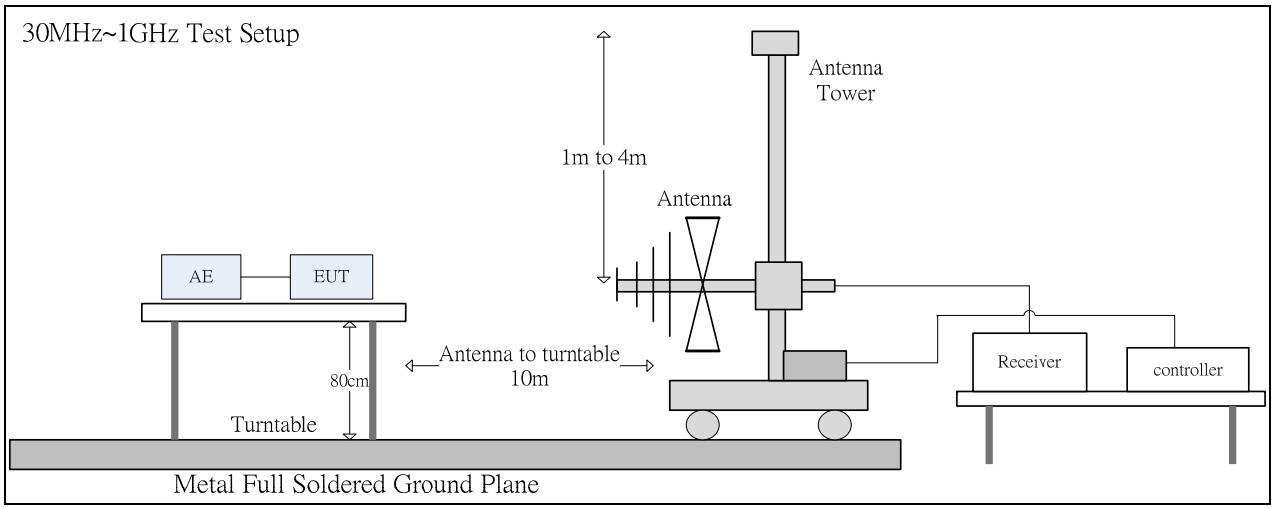


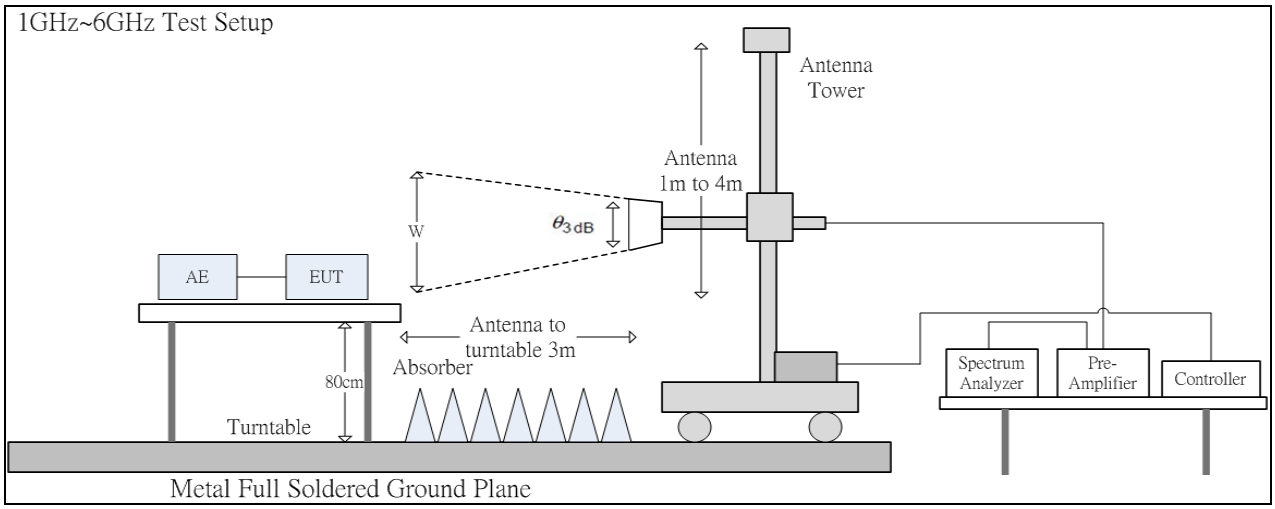


3.3 Radiated Disturbance Emissions

3.3.1 Test Setup and Procedure

3.3.2 Test Setup





The 3dB beam width of the horn antenna used for the test is as shown in the table below.

Frequency (GHz)	E-plane	H-plane	θ_{3dB} (min)	d= 3 m
				w (m)
1	88°	147°	88°	5.79
2	68°	119°	68°	4.04
3	73°	92°	73°	4.44
4	70°	89°	70°	4.20
5	55°	60°	55°	3.12
6	63°	62°	62°	3.60

3.3.3 Test Procedure

The radiated emissions test will then be repeated on the open site or chamber to measure the amplitudes accurately and without the multiple reflections existing in the shielded room. The EUT and support equipment are set up on the turntable of one of 10 meter open field sites or 10 meter chamber. Desktop EUT are set up on a wooden stand 0.8 meter above the ground or floor-standing arrangement shall be placed on the horizontal ground reference plane. The test volume for a height of up to 30 cm may be obstructed by absorber placed on the ground plane.

For the initial measurements, the receiving antenna is varied from 1-4 meter height and is changed in the vertical plane from vertical to horizontal polarization at each frequency. The highest emissions between 30 MHz to 1000 MHz were analyzed in details by operating the spectrum analyzer and/or EMI receiver in quasi-peak mode to determine the precise amplitude of the emissions. The highest emissions between 1 GHz to 6 GHz were analyzed in details by operating the spectrum analyzer in peak and average mode to determine the precise amplitude of the emissions.

At the highest amplitudes observed, the EUT is rotated in the horizontal plane while changing the antenna polarization in the vertical plane to maximize the reading. The interconnecting cables were arranged and moved to get the maximum measurement. Once the maximum reading is obtained, the antenna elevation and polarization will be varied between specified limits to maximize the readings. All of the interface cables were manipulated according to EN 61000-6-4 requirements.

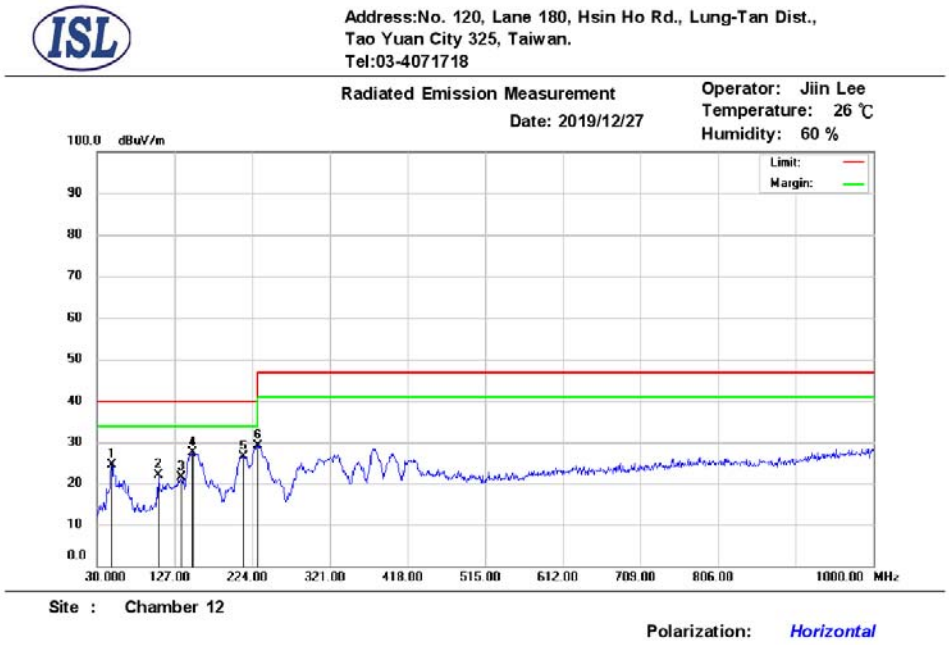
The highest internal source of an EUT is defined as the highest frequency generated or used within the EUT or on which the EUT operates or tunes. If the highest frequency of the internal sources of the EUT is less than 108 MHz, the measurement shall only be made up to 1 GHz. If the highest frequency of the internal sources of the EUT is between 108 MHz and 500 MHz, the measurement shall only be made up to 2 GHz. 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. 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.

3.3.4 Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range:	30MHz--1000MHz
Detector Function:	Quasi-Peak Mode
Resolution Bandwidth:	120KHz

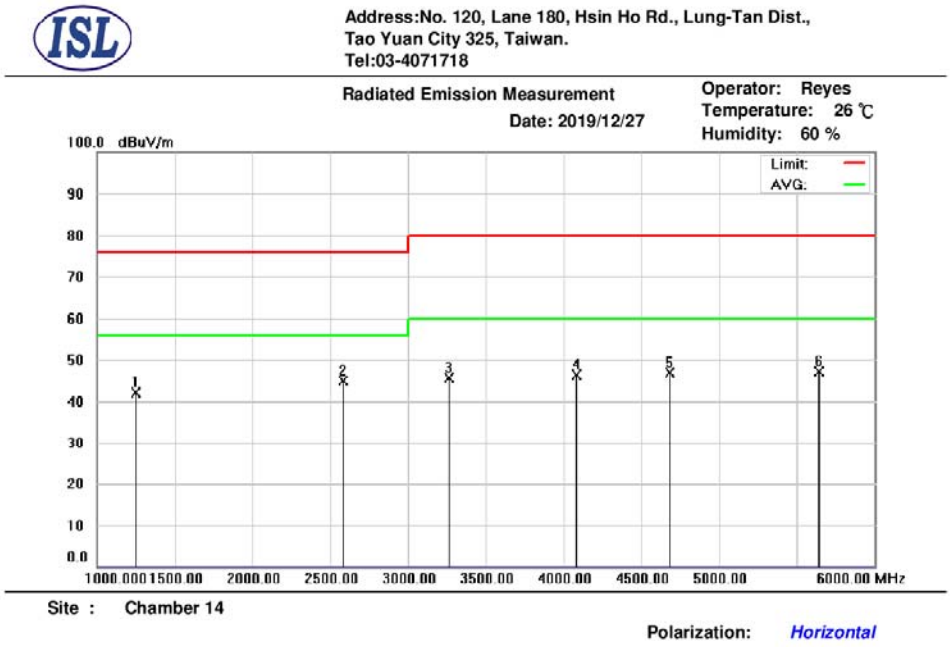
Frequency Range:	Above 1 GHz to 6 GHz
Detector Function:	Peak / Average Mode
Resolution Bandwidth:	1MHz

3.4 *Radiation Test Data: Configuration 1*
- Radiated Emissions (Horizontal)



Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	48.43	40.99	-16.68	24.31	40.00	-15.69	200	280	peak
2	106.63	41.57	-19.78	21.79	40.00	-18.21	400	0	peak
3	134.76	38.18	-16.81	21.37	40.00	-18.63	400	326	peak
4	149.31	43.23	-15.91	27.32	40.00	-12.68	350	344	peak
5	213.33	45.00	-18.56	26.44	40.00	-13.56	301	0	peak
6	230.79	47.09	-17.92	29.17	47.00	-17.83	400	7	peak

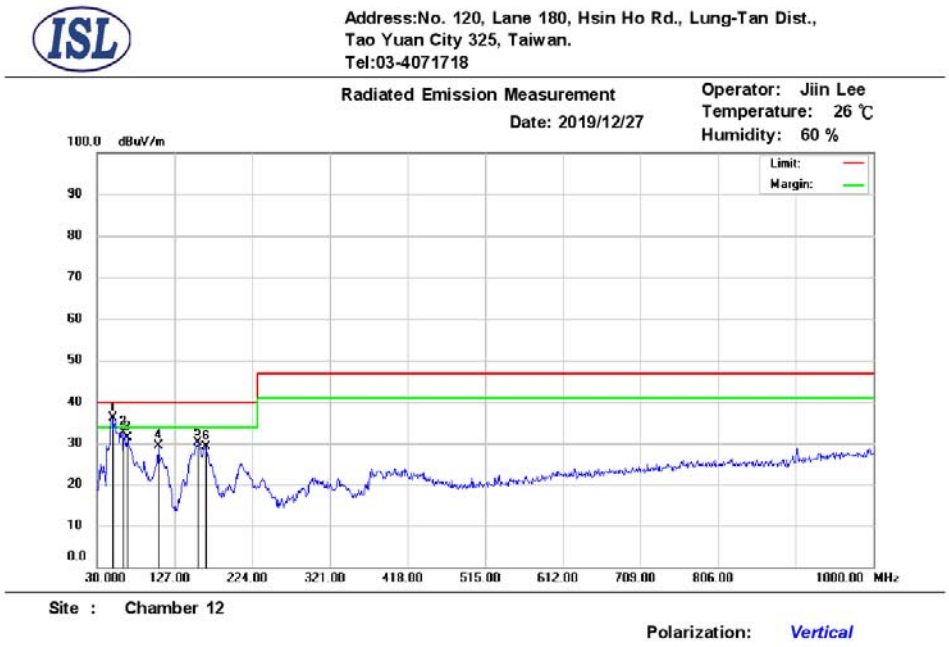
* Note:
Margin = Emission – Limit
Emission = Radiated Amplitude + Correct Factor
Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain
Antenna Distance: 10 meters



Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	1250.00	58.11	-15.98	42.13	76.00	-33.87	100	167	peak
2	2585.00	56.65	-11.88	44.77	76.00	-31.23	100	212	peak
3	3265.00	56.45	-10.73	45.72	80.00	-34.28	200	23	peak
4	4085.00	56.60	-10.13	46.47	80.00	-33.53	200	356	peak
5	4685.00	56.45	-9.69	46.76	80.00	-33.24	100	0	peak
6	5640.00	55.79	-8.67	47.12	80.00	-32.88	100	177	peak

* Note:
Margin = Emission – Limit
Emission = Radiated Amplitude + Correct Factor
Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain
A margin of -8dB means that the emission is 8dB below the limit
Antenna Distance: 3 meters
Above 1GHz test, if the peak measured value meets the average limit, it is unnecessary to perform the average measurement.

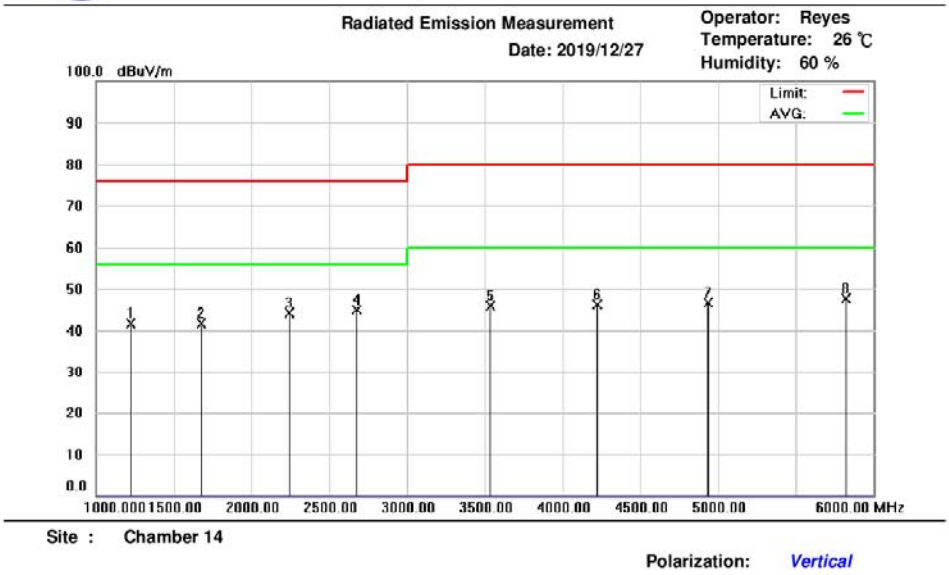
-Radiated Emissions (Vertical)



Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	49.40	52.75	-16.64	36.11	40.00	-3.89	100	313	peak
2	62.98	50.15	-17.64	32.51	40.00	-7.49	150	185	peak
3	67.83	49.64	-18.16	31.48	40.00	-8.52	100	185	peak
4	106.63	49.21	-19.78	29.43	40.00	-10.57	100	185	peak
5	156.10	45.67	-15.62	30.05	40.00	-9.95	100	30	peak
6	165.80	44.91	-15.89	29.02	40.00	-10.98	100	182	peak

* Note:
Margin = Emission – Limit
Emission = Radiated Amplitude + Correct Factor
Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain
Antenna Distance: 10 meters

Address:No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist.,
Tao Yuan City 325, Taiwan.
Tel:03-4071718



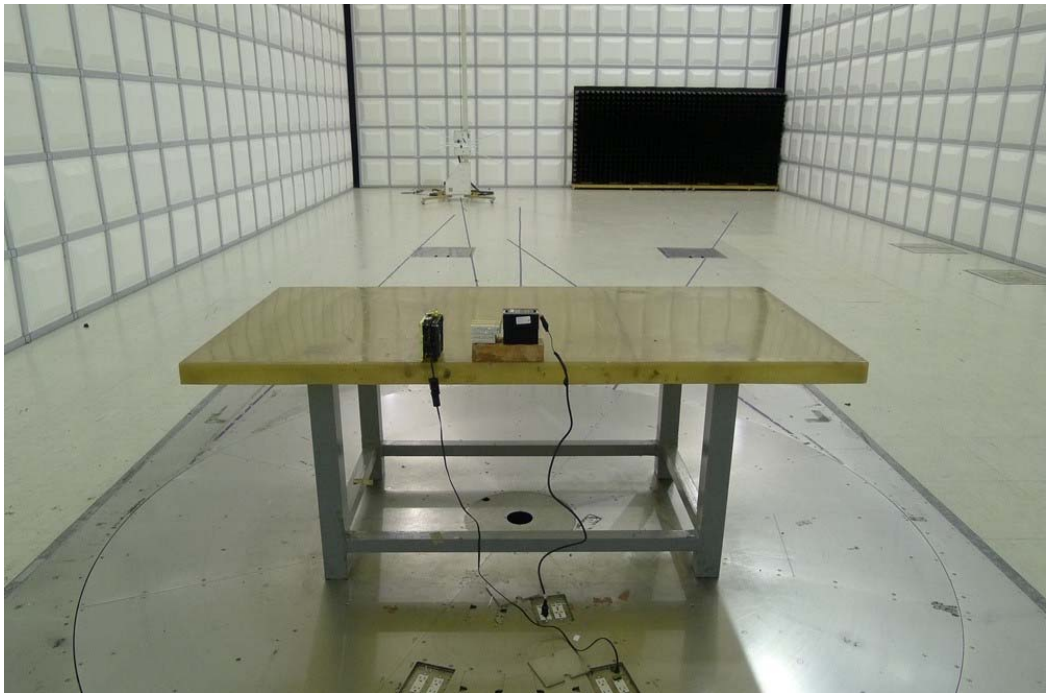
Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	1220.00	57.64	-16.04	41.60	76.00	-34.40	200	311	peak
2	1675.00	57.04	-15.40	41.64	76.00	-34.36	200	194	peak
3	2245.00	57.02	-12.98	44.04	76.00	-31.96	100	39	peak
4	2675.00	56.50	-11.67	44.83	76.00	-31.17	110	0	peak
5	3535.00	56.00	-10.01	45.99	80.00	-34.01	100	161	peak
6	4220.00	56.26	-10.06	46.20	80.00	-33.80	203	360	peak
7	4935.00	55.97	-9.38	46.59	80.00	-33.41	100	135	peak
8	5825.00	55.85	-8.21	47.64	80.00	-32.36	100	108	peak

* Note:
Margin = Emission – Limit
Emission = Radiated Amplitude + Correct Factor
Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain
A margin of -8dB means that the emission is 8dB below the limit
Antenna Distance: 3 meters
Above 1GHz test, if the peak measured value meets the average limit, it is unnecessary to perform the average measurement.

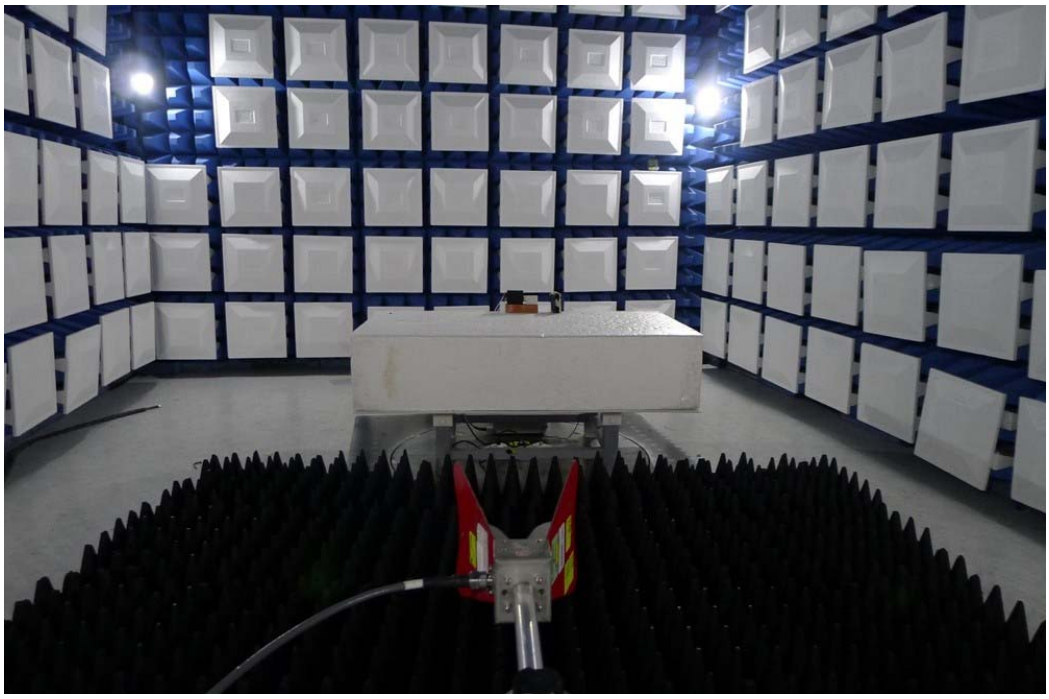
3.4.1 Test Setup Photo

Front View (30MHz~1GHz)

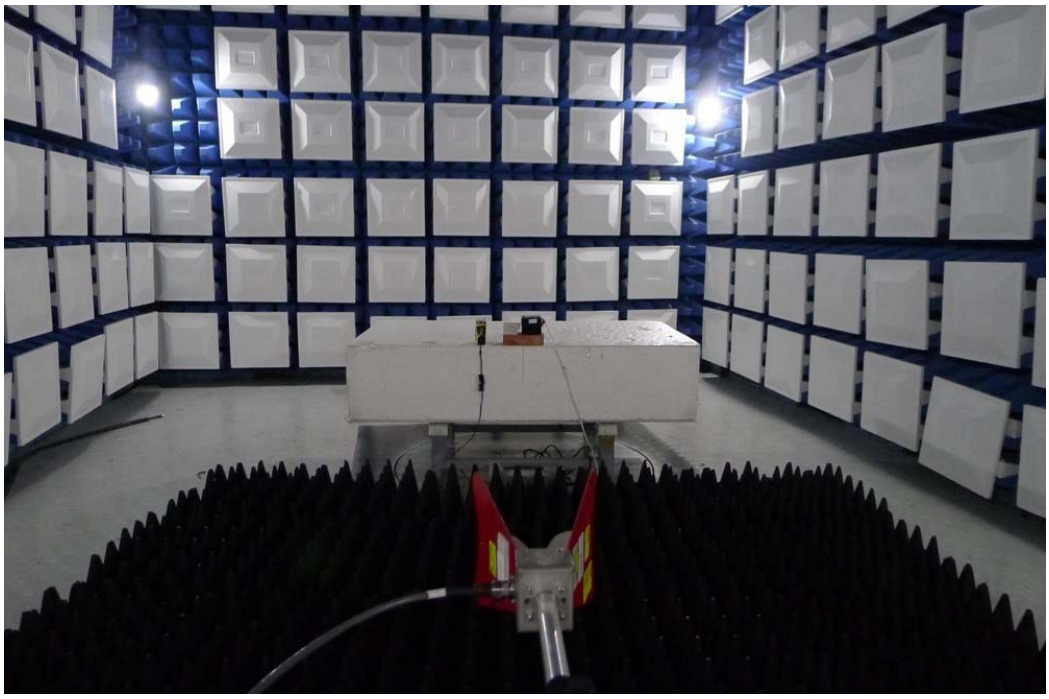
Back View (30MHz~1GHz)



Front View (above 1GHz)



Back View (above 1GHz)



3.5 Electrostatic discharge (ESD) immunity

3.5.1 Test Specification

Port:	Enclosure
Basic Standard:	EN 61000-4-2/ IEC EN61000-4-2 (details referred to Sec 1.2)
Test Level:	Air +/- 2 kV, +/- 4 kV, +/- 6 kV, +/- 8 kV Contact +/- 4 kV, +/- 6 kV
Criteria:	B
Test Procedure	refer to ISL QA -T4-E-S7

Selected Test Point

Air: discharges were applied to slots, aperture or insulating surfaces. 10 single air discharges were applied to each selected points.

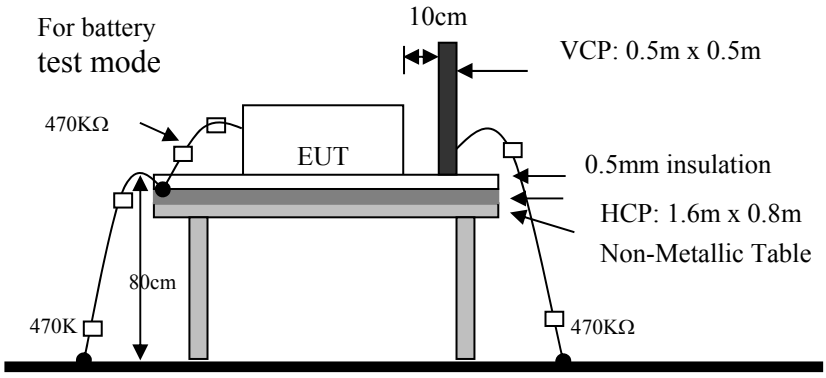
Contact: 10 discharges to the selected contact points.

Indirect Contact Points: 10 discharges were applied to center of one edge of VCP and each EUT side of HCP with 10 cm away from EUT.

Energy-Storage Capacitor:150 pF; Discharge Resistor:330 Ω

3.5.2 Test Setup

EUT is 1m from the wall and other metallic structure. When Battery test mode is needed, a cable with one 470KΩ resister at two rare ends is connected from metallic part of EUT and screwed to HCP.



Ground reference Plane

3.5.3 Test Result

Performance of EUT complies with the given specification.

3.5.4 Test Data:Configuration1

Basic Standard	EN 61000-4-2		Date
EUT Model Name	TEQ 200-7215WIR		2020-01-08
			Engineer
Barometer Pressure	98.2kPa		Eddie Peng
Temperature	25℃		Equipment & Test Site
Humidity	40%		EM TEST(Model: Dito)
Voltage/Freq.	110 Vdc		ESD 1F

A=criteria A, B=criteria B, C=criteria C

→Blue arrow represent Air discharge point
→Red arrow represent Contact discharge point
ND=No Discharge; Meets criteria but unable to obtain an electrostatic discharge (ESD) at this test point.
X=EUT DOES NOT meet the acceptance criteria
A=criteria A, B=criteria B, C=criteria C

Contact Discharge	Voltage kV 25 Discharge @ 1 PPS										
Test Location	+4	-4	+6	-6							Comments
1	A	A	A	A							
2	A	A	A	A							
3	A	A	A	A							
4	A	A	A	A							
Air Discharge	Voltage kV 10 Discharge @ 1 PPS										
Test Location	+2	-2	+4	-4	+8	-8					Comments
1	ND	ND	ND	ND	A	A					
2	ND	ND	A	A	A	A					
3	ND	ND	A	A	A	A					
4	ND	ND	A	A	A	A					
5	ND	ND	A	A	A	A					
6	ND	ND	A	A	A	A					
7	ND	ND	A	A	A	A					
8	ND	ND	A	A	A	A					
9	ND	ND	A	A	A	A					
10	ND	ND	A	A	A	A					
11	ND	ND	A	A	A	A					
12	ND	ND	A	A	A	A					
13	ND	ND	ND	ND	A	A					
14	ND	ND	A	A	A	A					
15	ND	ND	A	A	A	A					
16	ND	ND	A	A	A	A					
17	ND	ND	A	A	A	A					
18	ND	ND	A	A	A	A					
19	ND	ND	A	A	A	A					
Indirect Discharge	Voltage kV 25 Discharge @ 1 PPS										
Test Location	+4	-4	+6	-6							Comments
VCP Front	A	A	A	A							
VCP Right	A	A	A	A							
VCP Left	A	A	A	A							
VCP Back	A	A	A	A							
Test Location	+4	-4	+6	-6							Comments
HCP Front	A	A	A	A							
HCP Right	A	A	A	A							
HCP Left	A	A	A	A							
HCP Back	A	A	A	A							

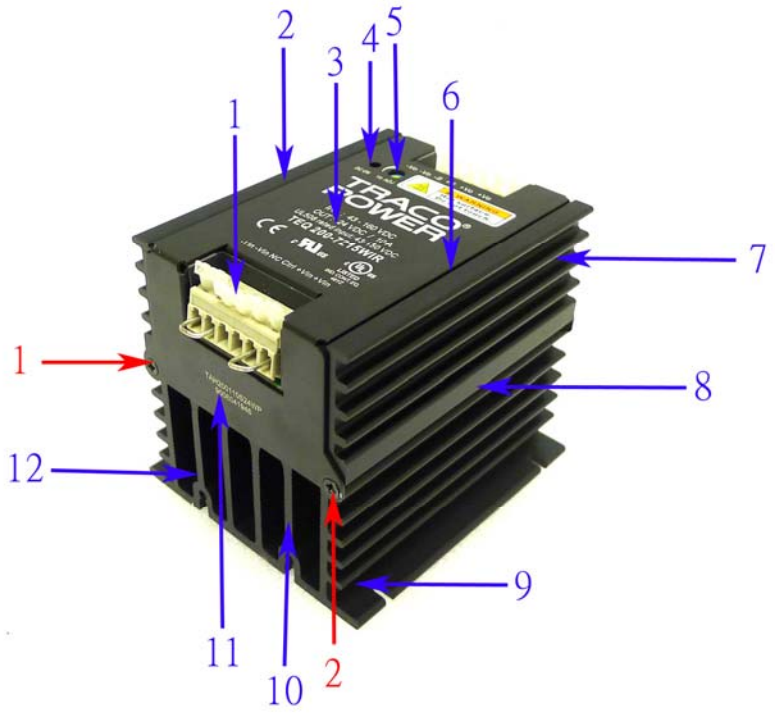
Additional Notes: A=criteria A, B=criteria B, C=criteria C

Test plan according to customer requirements.

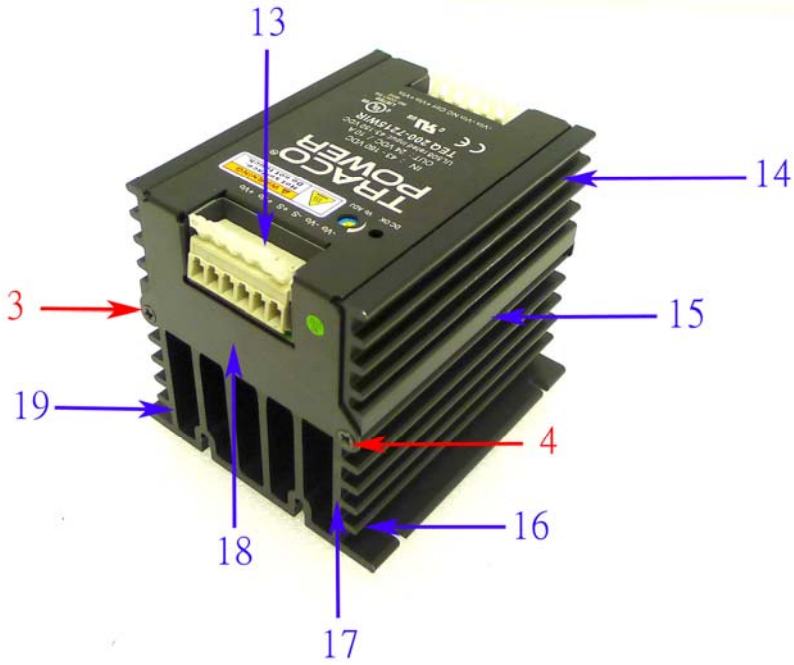
3.5.5 Test Point

Red arrow lines indicate the contact points, and blue arrow lines indicate the air points.

EUT-1. Test Point Assignments Discharge:



EUT-2. Test Point Assignments Discharge:



3.5.6 Test Setup Photo

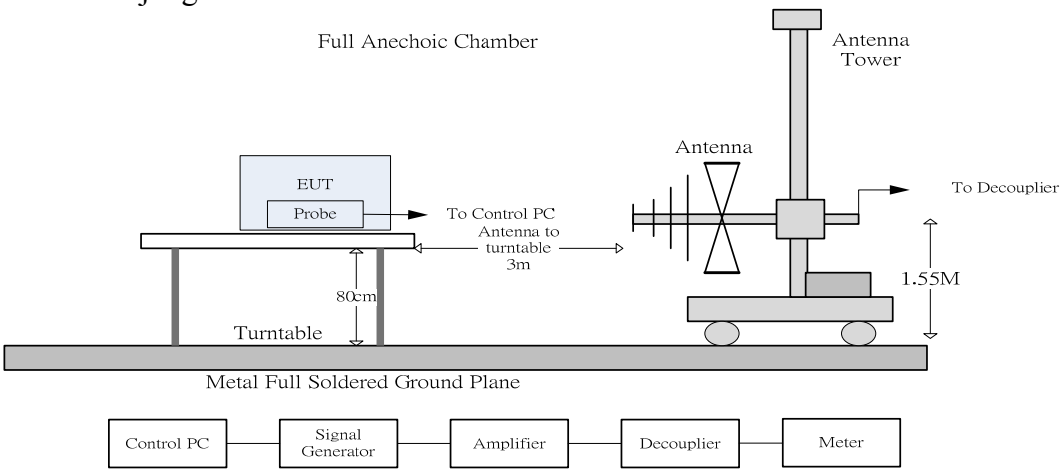
3.6 Radio-Frequency, Electromagnetic Field immunity

3.6.1 Test Specification

Port:	Enclosure
Basic Standard:	EN 61000-4-3/ IEC EN61000-4-3 (details referred to Sec 1.2)
Frequency range/Test Level:	80 MHz to 1000 MHz: 20 V/m 1400 MHz to 2000 MHz: 10 V/m 2000 MHz to 2700 MHz: 5 V/m 5100 MHz to 6000 MHz: 3 V/m
Modulation:	AM 1KHz 80%
Frequency Step:	1% of last step frequency
Dwell time:	3s
Polarization:	Vertical and Horizontal
EUT Azimuth Angle	☒0° ☒90° ☒180° ☒270°
Criteria:	A
Test Procedure	refer to ISL QA -T4-E-S8

3.6.2 Test Setup

The field sensor is placed at one calibration grid point to check the intensity of the established fields on both polarizations. EUT is adjusted to have each side of EUT face coincident with the calibration plane. A CCD camera and speakers are used to monitor the condition of EUT for the performance judgment.



3.6.3 Test Result

Performance of EUT complies with the given specification.

3.6.4 Test Data:Configuration1

Basic Standard	EN 61000-4-3	Date
EUT Model Name	TEQ 200-7215WIR	2020-01-06
		Engineer
Barometer Pressure	101.3kPa	SAWYER
Temperature	21℃	Equipment & Test Site
Humidity	53%	Chamber 04
Voltage/Freq.	110 Vdc	

A=criteria A, B=criteria B, C=criteria C

EUT Angle	Frequency		Dwell time	Modulation	Level (V/m)	Antenna Polarization	EUT Status	Comments
	Range (MHz)	Steps %						
0° (front)	80-1000	1	3s	80% @ 1KHz	20	Vertical	A	
90° (left)	80-1000	1	3s	80% @ 1KHz	20	Vertical	A	
180° (back)	80-1000	1	3s	80% @ 1KHz	20	Vertical	A	
270° (right)	80-1000	1	3s	80% @ 1KHz	20	Vertical	A	
0° (front)	80-1000	1	3s	80% @ 1KHz	20	Horizontal	A	
90° (left)	80-1000	1	3s	80% @ 1KHz	20	Horizontal	A	
180° (back)	80-1000	1	3s	80% @ 1KHz	20	Horizontal	A	
270° (right)	80-1000	1	3s	80% @ 1KHz	20	Horizontal	A	

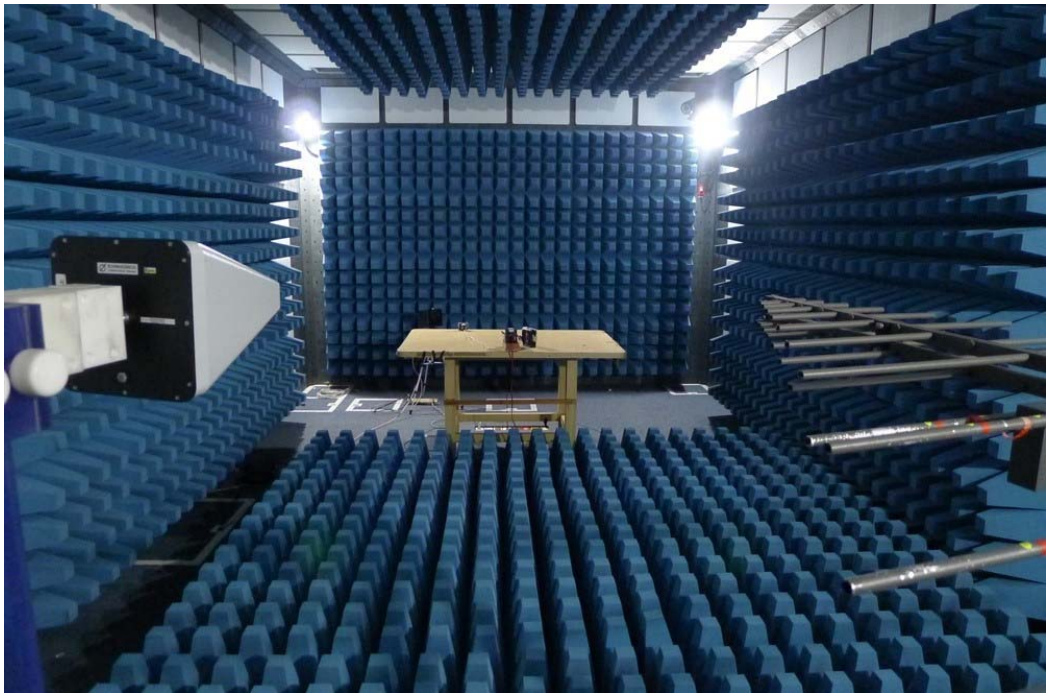
EUT Angle	Frequency		Dwell time	Modulation	Level (V/m)	Antenna Polarization	EUT Status	Comments
	Range (MHz)	Steps %						
0° (front)	1400-2100	1	3s	80% @ 1KHz	10	Vertical	A	
90° (left)	1400-2100	1	3s	80% @ 1KHz	10	Vertical	A	
180° (back)	1400-2100	1	3s	80% @ 1KHz	10	Vertical	A	
270° (right)	1400-2100	1	3s	80% @ 1KHz	10	Vertical	A	
0° (front)	1400-2100	1	3s	80% @ 1KHz	10	Horizontal	A	
90° (left)	1400-2100	1	3s	80% @ 1KHz	10	Horizontal	A	
180° (back)	1400-2100	1	3s	80% @ 1KHz	10	Horizontal	A	
270° (right)	1400-2100	1	3s	80% @ 1KHz	10	Horizontal	A	

EUT Angle	Frequency		Dwell time	Modulation	Level (V/m)	Antenna Polarization	EUT Status	Comments
	Range (MHz)	Steps %						
0° (front)	2000-2700	1	3s	80% @ 1KHz	5	Vertical	A	
90° (left)	2000-2700	1	3s	80% @ 1KHz	5	Vertical	A	
180° (back)	2000-2700	1	3s	80% @ 1KHz	5	Vertical	A	
270° (right)	2000-2700	1	3s	80% @ 1KHz	5	Vertical	A	
0° (front)	2000-2700	1	3s	80% @ 1KHz	5	Horizontal	A	
90° (left)	2000-2700	1	3s	80% @ 1KHz	5	Horizontal	A	
180° (back)	2000-2700	1	3s	80% @ 1KHz	5	Horizontal	A	
270° (right)	2000-2700	1	3s	80% @ 1KHz	5	Horizontal	A	

EUT Angle	Frequency		Dwell time	Modulation	Level (V/m)	Antenna Polarization	EUT Status	Comments
	Range (MHz)	Steps %						
0° (front)	5100-6000	1	3s	80% @ 1KHz	3	Vertical	A	
90° (left)	5100-6000	1	3s	80% @ 1KHz	3	Vertical	A	
180° (back)	5100-6000	1	3s	80% @ 1KHz	3	Vertical	A	
270° (right)	5100-6000	1	3s	80% @ 1KHz	3	Vertical	A	
0° (front)	5100-6000	1	3s	80% @ 1KHz	3	Horizontal	A	
90° (left)	5100-6000	1	3s	80% @ 1KHz	3	Horizontal	A	
180° (back)	5100-6000	1	3s	80% @ 1KHz	3	Horizontal	A	
270° (right)	5100-6000	1	3s	80% @ 1KHz	3	Horizontal	A	

Additional Notes: A=criteria A, B=criteria B, C=criteria C

3.6.5 Test Setup Photo



3.7 Electrical Fast transients/burst immunity

3.7.1 Test Specification

Basic Standard:	EN 61000-4-4/ IEC EN61000-4-4 (details referred to Sec 1.2)
Signal & communication, process measurement & control ports Test Level:	+/- 2 kV
Battery referenced ports (except at the output of energy sources) Auxiliary a.c. power input ports (rated voltage ≤ 400 V rms)	+/- 2 kV
Rise Time:	5ns
Hold Time:	50ns
Repetition Frequency:	5KHz
Criteria:	A
Test Procedure	refer to ISL QA -T4-E-S9

Test Procedure

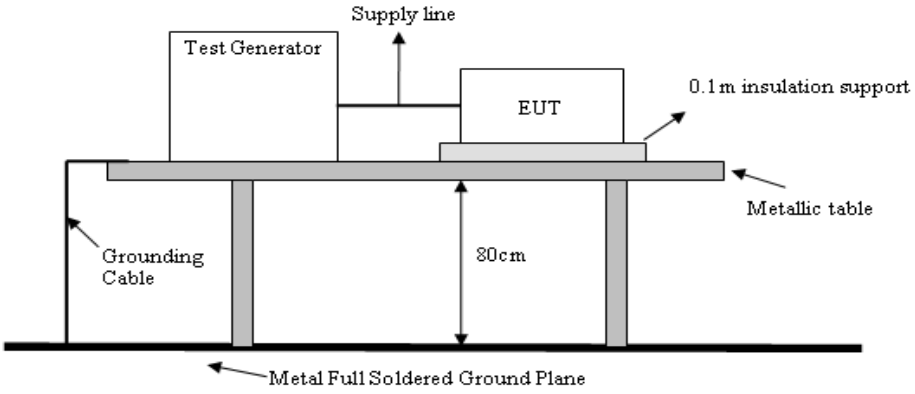
The EUT was setup on a nonconductive table 0.1 m above a reference ground plane.

Test Points	Polarity	Result	Comment
Line	+	N	60 sec
	-	N	60 sec
Neutral	+	N	60 sec
	-	N	60 sec
Line to Neutral	+	N	60 sec
	-	N	60 sec

Note: 'N' means normal, the EUT function is correct during the test.

3.7.2 Test Setup

EUT is at least 50cm from the conductive structure.



3.7.3 Test Result

Performance of EUT complies with the given specification.

3.7.4 Test Data:Configuration1

Basic Standard	EN 61000-4-4	Date
EUT Model Name	TEQ 200-7215WIR	2020-01-02
		Engineer
Barometer Pressure	102.2kPa	SAWYER
Temperature	22℃	Equipment & Test Site
Humidity	57%	EM TEST (Model: UCS-500 M6B)
Voltage/Freq.	110 Vdc	

A=criteria A, B=criteria B, C=criteria C

AC Power Port: ☐	DC Power Port: ☑	LAN Port: ☐	Telephone Port: ☐

DC Power Port

Line Under Test	Voltage Level	Severity Level	Pulse Polarity	Burst Repetition Rate	Test Duration	EUT Status	Comments
Line	2.0kV	3	+	300ms / 5.0kHz	1 Minutes	A	
Line	2.0kV	3	-	300ms / 5.0kHz	1 Minutes	A	
Neutral	2.0kV	3	+	300ms / 5.0kHz	1 Minutes	A	
Neutral	2.0kV	3	-	300ms / 5.0kHz	1 Minutes	A	
Line- Neutral	2.0kV	3	+	300ms / 5.0kHz	1 Minutes	A	
Line- Neutral	2.0kV	3	-	300ms / 5.0kHz	1 Minutes	A	

Additional Notes: A=criteria A, B=criteria B, C=criteria C

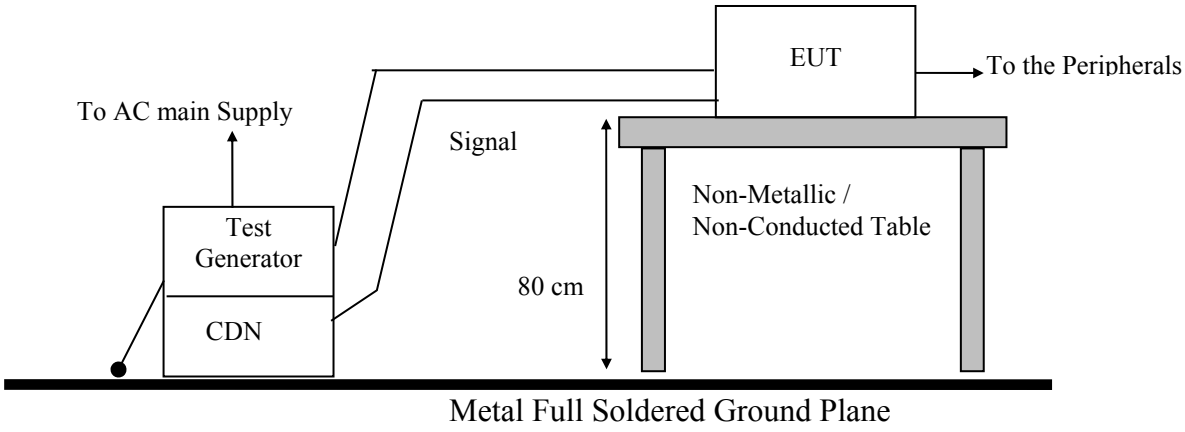
3.7.5 Test Setup Photo

3.8 Surge Immunity

3.8.1 Test Specification

Basic Standard:	EN 61000-4-5/ IEC EN61000-4-5 (details referred to Sec 1.2)
Battery referenced ports (except at the output of energy sources) Auxiliary a.c. power input ports (rated voltage ≤ 400 V rms)	Line to Line: 42 Ω, 0.5 μF +/- 0.5 kV, +/- 1 kV,+/- 2 kV
Rise Time:	1.2us
Hold Time:	50us
Repetition Rate:	60 seconds, 5 time/each condition
Angle:	☒0° ☒90° ☒180° ☒270°
Criteria:	B
Test Procedure:	refer to ISL QA -T4-E-S10

3.8.2 Test Setup



3.8.3 Test Result

Performance of EUT complies with the given specification.

3.8.4 Test Data:Configuration1

Basic Standard	EN 61000-4-5						Date	
EUT Model Name	TEQ 200-7215WIR						2020-01-03	
							Engineer	
Barometer Pressure	102.2kPa						SAWYER	
Temperature	22℃						Equipment & Test Site	
Humidity	53%						EMC PARTNER (Model: IMU3000)	
Voltage/Freq.	110 Vdc							
A=criteria A, B=criteria B, C=criteria C								
AC Power Port: ☐	DC Power Port: ☑		LAN Port: ☐		Telephone Port: ☐			
DC Power Port								
Line Under Test	Voltage	Level	Polarity	Repetition Rate	Cycle	Pulse Position	EUT Status	Comments
Line-Neutral	＋0.5kV	1	42Ω	60 sec	5		A	
Line-Neutral	－0.5kV	1	42Ω	60 sec	5		A	
Line- Neutral	＋1.0kV	2	42Ω	60 sec	5		A	
Line- Neutral	－1.0kV	2	42Ω	60 sec	5		A	
Line- Neutral	＋2.0kV	2	42Ω	60 sec	5		A	
Line- Neutral	－2.0kV	2	42Ω	60 sec	5		A	
Additional Notes: A=criteria A, B=criteria B, C=criteria C								

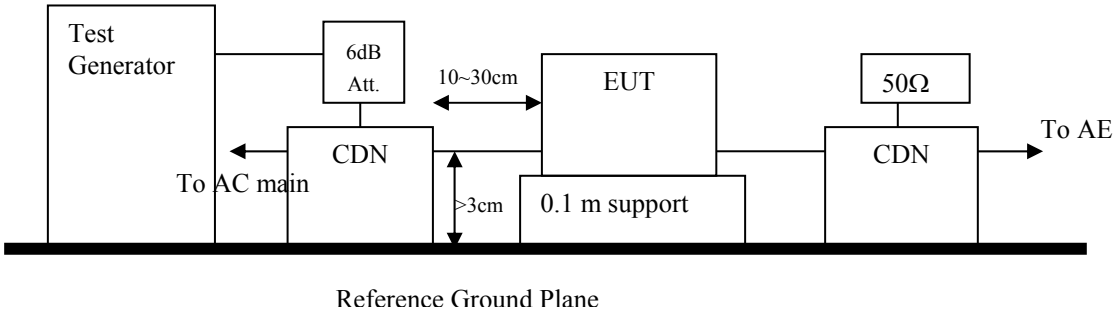
3.8.5 Test Setup Photo

3.9 Immunity to Conductive Disturbance

3.9.1 Test Specification

Basic Standard:	EN 61000-4-6/ IEC EN61000-4-6 (details referred to Sec 1.2)
Battery referenced ports (except at the output of energy sources) Auxiliary a.c. power input ports (rated voltage ≤ 400 V rms)Test Level:	10 V
Signal & communication, process measurement & control ports Test Level:	10 V
Modulation:	AM 1KHz 80%
Frequency range:	0.15 MHz - 80MHz
Frequency Step:	1% of last Frequency
Dwell time:	3s
Criteria:	A
CDN Type:	CDN M2+M3
Test Procedure	refer to ISL QA -T4-E-S11

3.9.2 Test Setup



Reference Ground Plane

3.9.3 Test Result

Performance of EUT complies with the given specification.

3.9.4 Test Data:Configuration1

Basic Standard	EN 61000-4-6				Date		
EUT Model Name	TEQ 200-7215WIR				2020-01-02		
					Engineer		
Barometer Pressure	102.2kPa				SAWYER		
Temperature	25℃				Equipment & Test Site		
Humidity	56%				FRANKONIA (Model: CIT-10/75)		
Voltage/Freq.	110 Vdc						
A=criteria A, B=criteria B, C=criteria C							
DC Power Port							
Line Under Test	Frequency		Level	Modulation	Dwell time	EUT Status	Comments
	Range (MHz)	Steps %					
DC Power Port	0.15 to 80	1	10V	80% @ 1kHz	3s	A	
Additional Notes: A=criteria A, B=criteria B, C=criteria C							

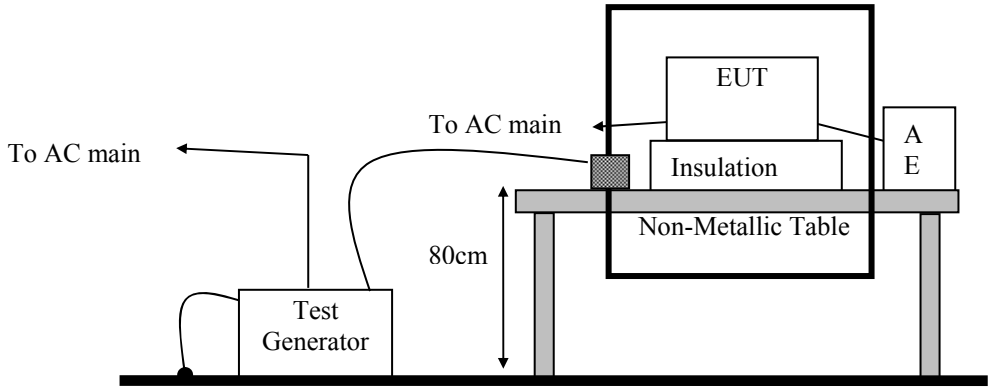
3.9.5 Test Setup Photo

3.10 Power Frequency Magnetic Field immunity

3.10.1 Test Specification

Port:	Enclosure
Basic Standard:	EN 61000-4-8/ IEC 61000-4-8 (details referred to Sec 1.2)
D.C. systems Test Level:	100A/m(continuous),1000A/m(1s)
Polarization:	X, Y, Z
Criteria:	A
Test Procedure	refer to ISL QA -T4-E-S12

3.10.2 Test Setup



3.10.3 Test Result

Performance of EUT complies with the given specification.

3.10.4 Test Data:Configuration1

Basic Standard	EN 61000-4-8	Date
EUT Model Name	TEQ 200-7215WIR	2020-01-06
		Engineer
Barometer Pressure	102.3kPa	SAWYER
Temperature	22℃	Equipment & Test Site
Humidity	51%	Magnetic Field Immunity Loop Brand: Pic Model:PMF1000 & Magnetic Field Test AC Power Source Brand: Pic Model: AC Power Source
Voltage/Freq.	110Vdc	

A=criteria A, B=criteria B, C=criteria C

Antenna Polarization	Frequency (Hz)	Test Level	Test Duration	EUT Status	Comment
X	0	100 A/m	1 Minutes	A	
Y	0	100 A/m	1 Minutes	A	
Z	0	100 A/m	1 Minutes	A	
X	0	1000 A/m	1 Second	A	
Y	0	1000 A/m	1 Second	A	
Z	0	1000 A/m	1 Second	A	

Additional Notes: A=criteria A, B=criteria B, C=criteria C

3.10.5 Test Setup Photo

4. Environmental Tests

4.1 Low temperature start-up test

4.1.1 Test Ambience

Temperature:21℃ ± 2℃
Humidity: 53% ± 6%

4.1.2 Test Procedure

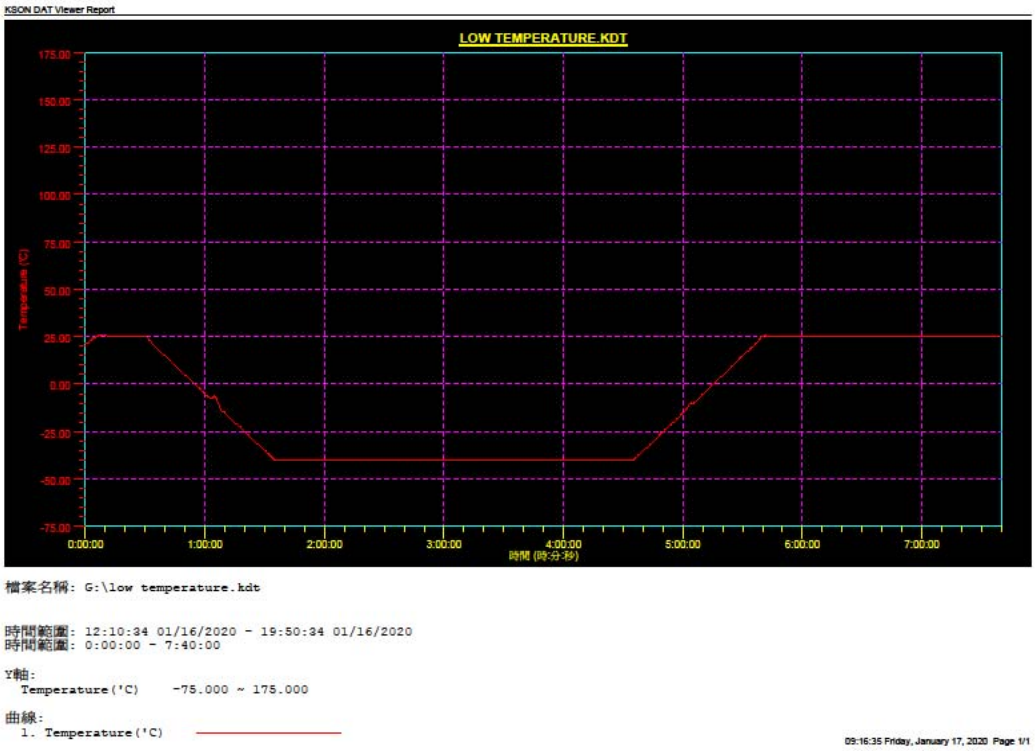
Test Procedures were referred to EN 50155 sub-clause 13.4.4

4.1.3 Test Condition

Temperature: -40℃, test 2 hours.
Performance Check: The performance check was carried out before and after the cooling test.

4.1.4 Test Result

A. Photo of test Setup was shown in 4.1.5
B. Testing data were shown as below
C. Test specimen was visually inspected after test. No physical damage occurred.
D. The function of specimen was normal during and after the cooling test.
E. According to test result, the specimen passed the EN 50155 sub-clause 13.4.4 Low temperature start-up test.



4.1.5 Test Setup Photo

4.2 Dry Heat Test

4.2.1 Test Ambience

Temperature:21℃ ± 2℃
Humidity: 53% ± 6%

4.2.2 Test Procedure

Test Procedures were referred to EN 50155 sub-clause 13.4.5

4.2.3 Test Condition

Temperature: 70℃ at 6 hours and 70℃ at 6 hours + 85℃(70℃+15℃) at 10min
6 hours at 70℃ and rises 15 °C 10 min after 6 hours at 70℃.
Performance Check:
The performance check was carried out before, during and after the Dry Heat Test.

4.2.4 Test Result

A. Photo of test Setup was shown in 4.1.5.
B. The testing data were shown in Figure 1.
C. The testing data were shown in Figure 2.
D. Test specimen was visually inspected after test. No physical damage occurred.
E. The function of specimen was normal during and after the Dry heat test.
F. According to test result, the specimen passed the EN 50155 sub-clause 13.4.5 Dry heat test.

Figure 1: Dry Heat Test Record

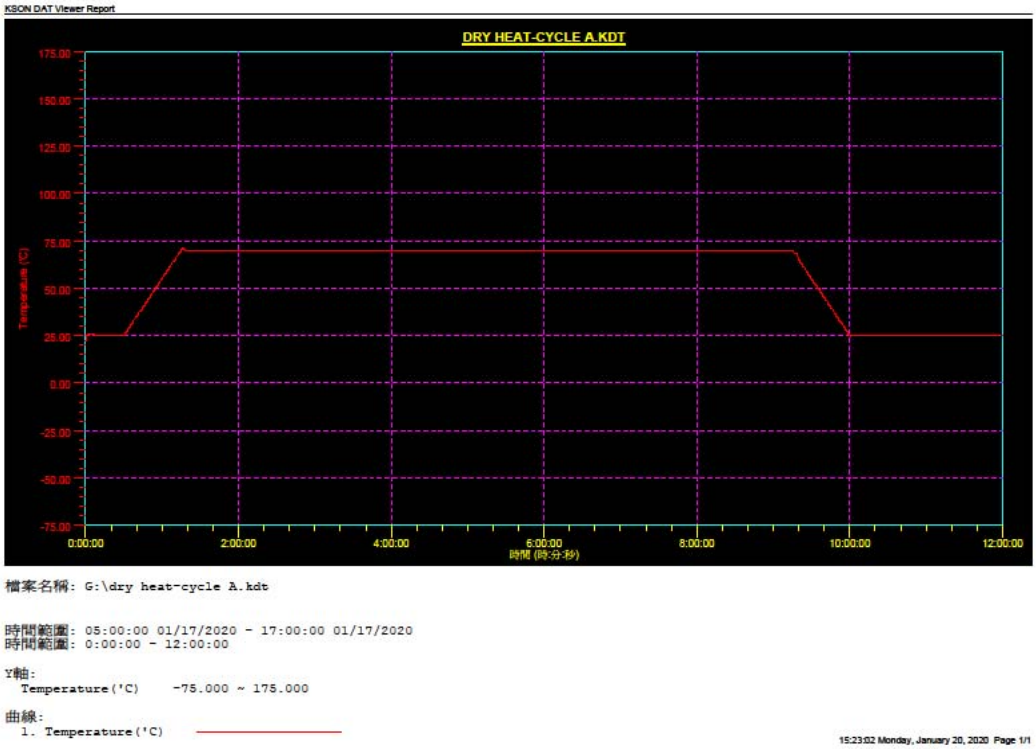


Figure 2: Dry Heat Test Record

4.3 Damp Heat Test

4.3.1 Test Ambience

Temperature: 21℃ ± 2℃
Humidity: 53% ± 6%

4.3.2 Test Procedure

Test Procedures were referred to EN 50155 sub-clause 13.4.7

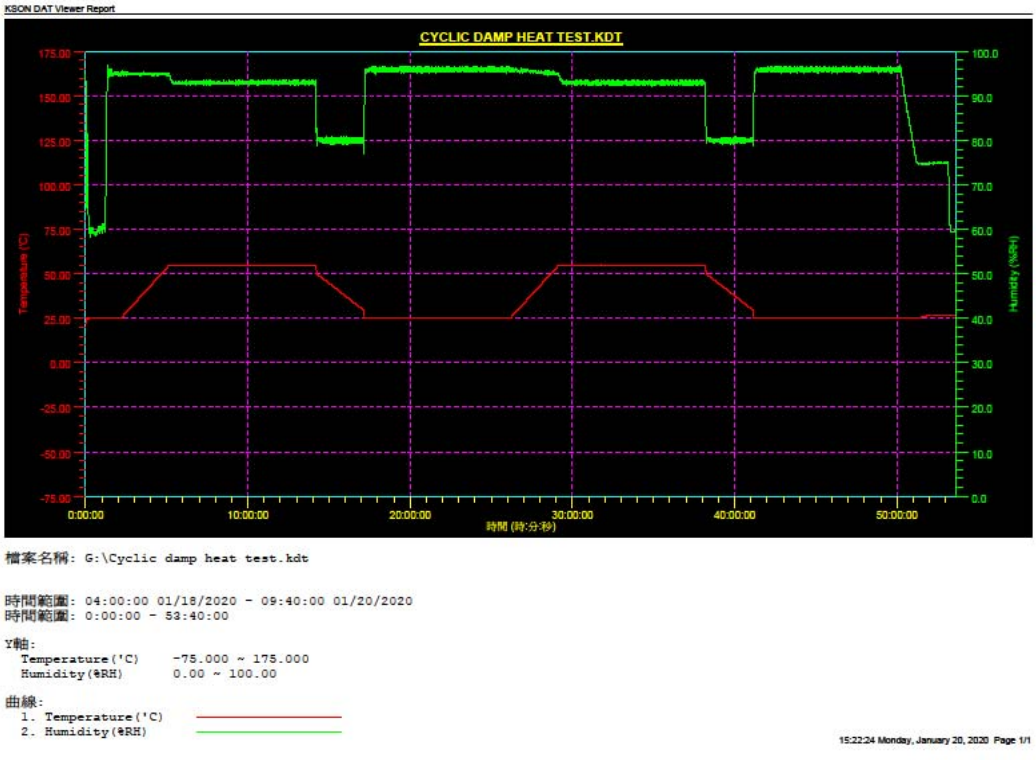
4.3.3 Test Condition

Temperature / Humidity:
55℃ and 25℃, 95%±5%RH without condensation, 48 hours.
Performance Check:
The performance check was carried out before and after the Damp Heat Test.

4.3.4 Test Result

A. Photo of test Setup was shown in 4.1.5.
B. The testing data were shown as below.
C. Test specimen was visually inspected after test. No physical damage occurred.
D. The function of specimen was normal during and after the Damp heat test.
E. According to test result, the specimen passed the EN 50155 ch.13.4.7 Dry heat test.

Dry Heat Test Record



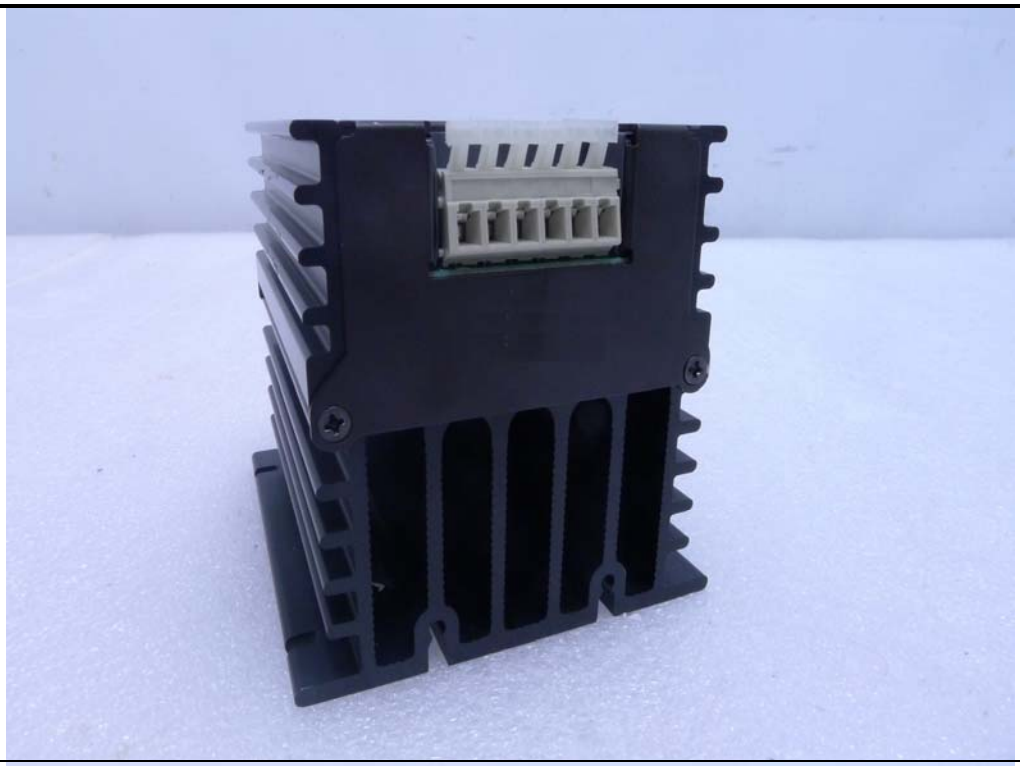
Date : 2020/02/17	Temperature : 21 ℃	Engineer : SAWYER
EUT Model Name : TEQ 200-7215WIR	Humidity : 53 %	Barometer Pressure: 102.2 kPa
		Standard: EN 50155
Voltage/Freq: 110Vdc		

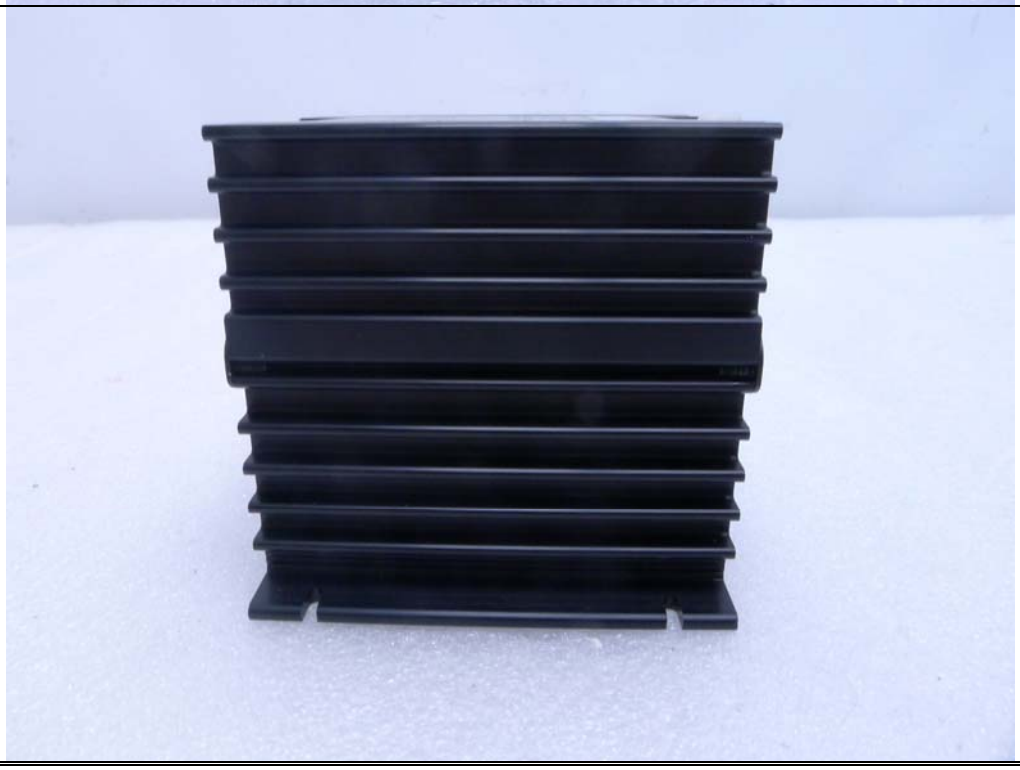
Visual inspection requirement(12.2.1):

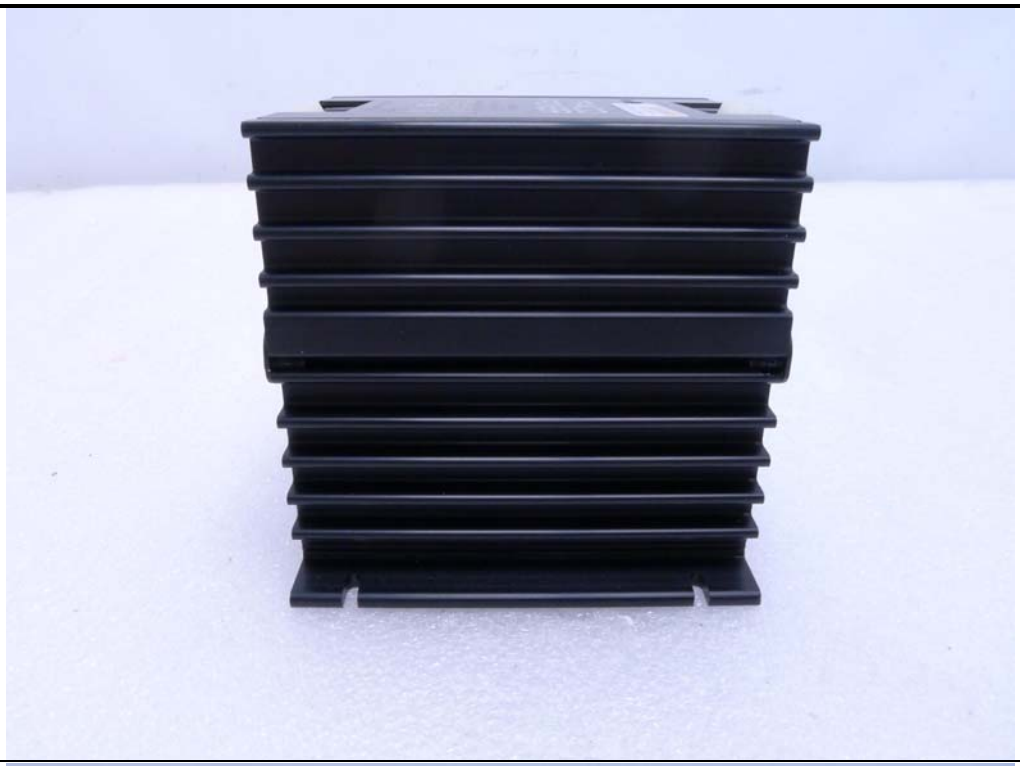
The visual inspection shall be carried out to ensure that the equipment is of sound construction and, so far as can be ascertained, meets its specified requirements.
A visual inspection shall also be carried out after a type test has been performed to check whether any damage or deterioration has occurred resulting from the tests.

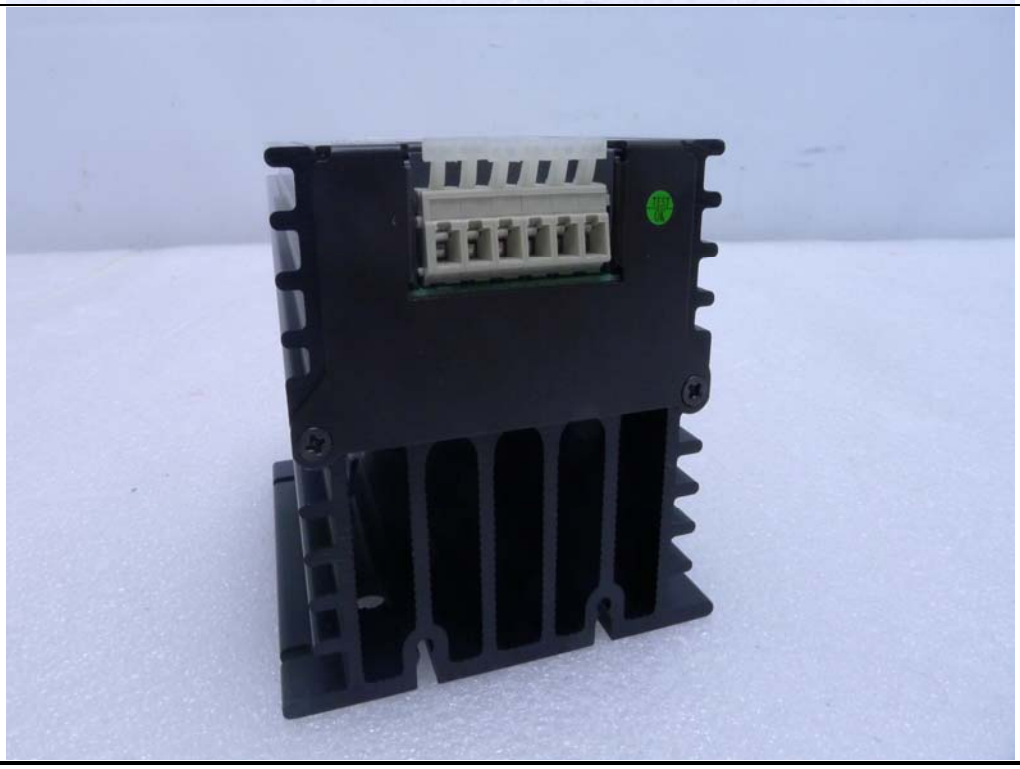
Inspection item	Result
EUT outside	OK
EUT function	OK

After test：










-Vo -Vo -S +S +Vo +Vo
DC OK
Vo ADJ
WARNING
Hot surface.
Do not touch.
TRACO POWER
IN : 43 - 160 VDC
OUT : 24 VDC / 10 A
UL508 rated input: 43-150 VDC
TEQ 200-7215WIR
LISTED
IND. CONT. EQ.
46YZ
-Vin -Vin NC Ctrl +Vin +Vin

4.4 Functional random Vibration Test

4.4.1 Test Specification and / or standard:

EN 61373:2010

4.4.2 Testing Equipment:

Vibration & Shock Environmental Equipment KD-9363EM-1000F2K-50N250
Max. force：1000 kgf-peak / 250 kgw Loading
Max. displacement：50 mm p-p
Max. acceleration：55 g
Frequency range：2 to 2000 Hz
Calibrate trace code：VS-CV-050930-02

4.4.3 Test Condition and procedure:

Test Condition:

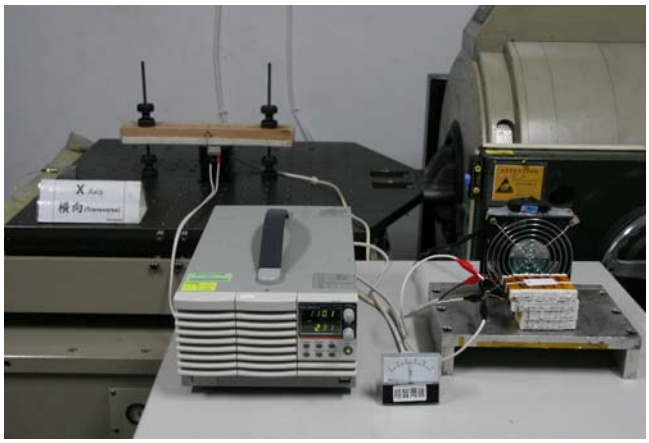
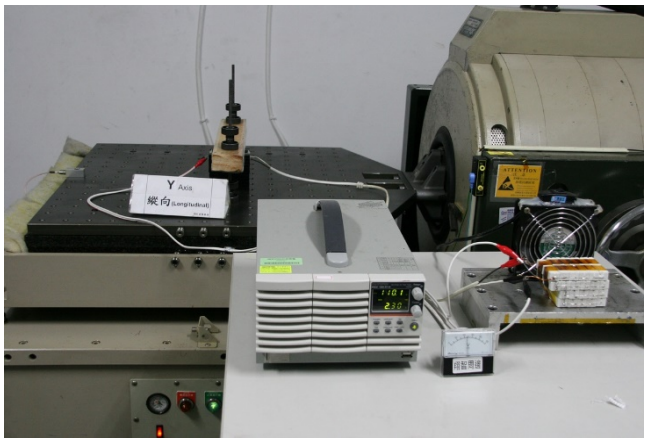
	Category	Orientation	RMS m/s^2
☐	1 Class A Body mounted	Vertical Transverse Longitudinal	0.75 0.37 0.5
☒	1 Class B Body mounted	Vertical Transverse Longitudinal	1.01 0.45 0.7
☐	2 Bogie mounted	Vertical Transverse Longitudinal	5.4 4.7 2.5
☐	3 Axle mounted	Vertical Transverse Longitudinal	38.0 34.0 17.0

Test Procedure:
A. Check out samples.
B. Place the test samples on the vibration table in its normal operating orientation and configuration.
C. Set test conditions and start to test.
D. Finish testing, check out samples and prepare final report.

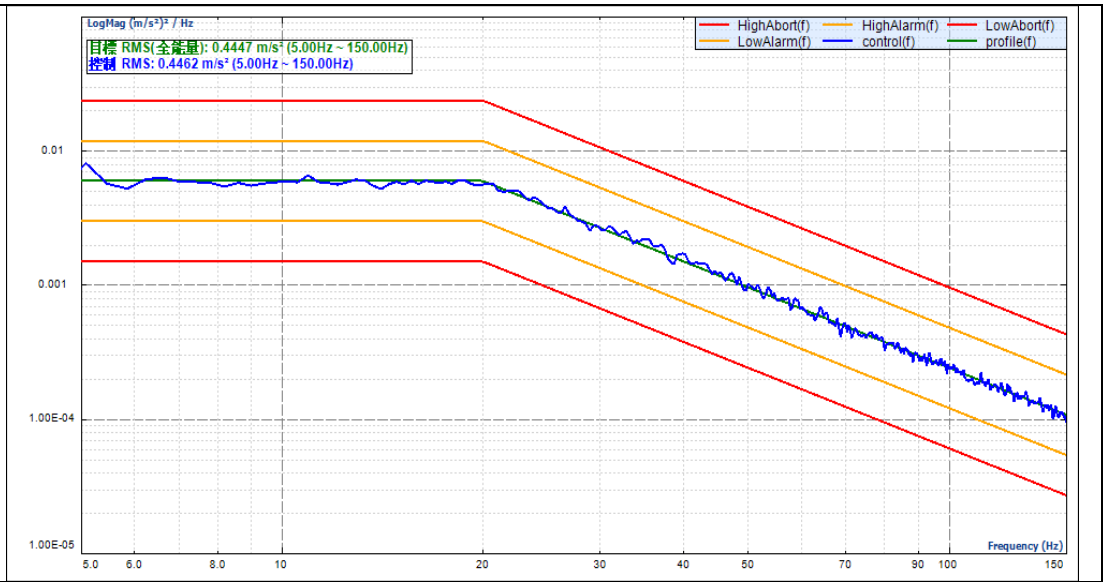
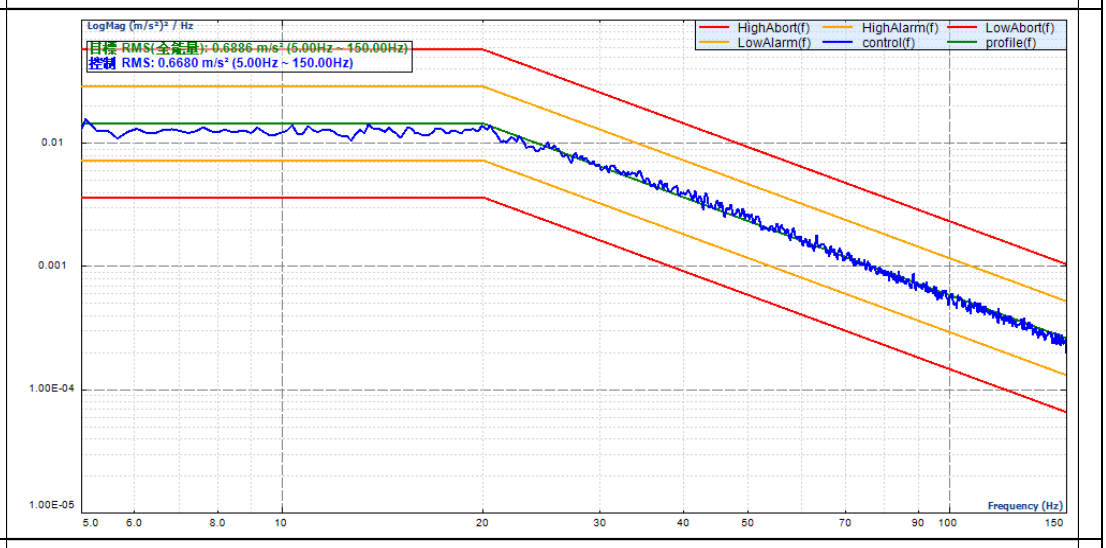
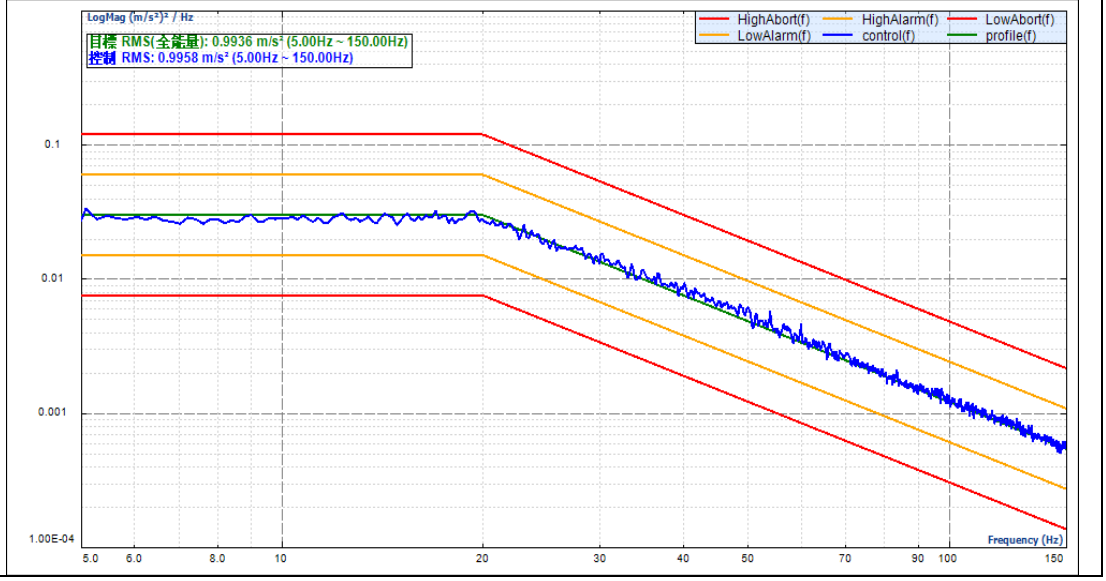
4.4.4 Test Result

Inspection item	Result
EUT	Pass

4.4.5 Test Setup Photo

Transverse X Axis	Longitudinal Y Axis
	
Vertical **Z Axis**	
	

4.4.6 Test Profile:

X Axis	
Y Axis	
Z Axis	

4.5 Simulated long-life testing at increased Random Vibration Test

4.5.1 Test Specification and/or standard:

EN 61373:2010

4.5.2 Testing Equipment:

Vibration & Shock Environmental Equipment KD-9363EM-1000F2K-50N250
Max. force: 1000 kgf-peak / 250 kgw Loading
Max. displacement: 50 mm p-p
Max. acceleration: 55 g
Frequency range: 2 to 2000 Hz
Calibrate trace code：VS-CV-050930-02

4.5.3 Test Condition and procedure:

Test Condition:

	Category	Orientation	RMS 5 h test period m/s^2
☐	1 Class A Body mounted	Vertical Transverse Longitudinal	4.25 2.09 2.83
☒	1 Class B Body mounted	Vertical Transverse Longitudinal	5.72 2.55 3.96
☐	2 Bogie mounted	Vertical Transverse Longitudinal	30.6 26.6 14.2
☐	3 Axle mounted	Vertical Transverse Longitudinal	144 129 64.3

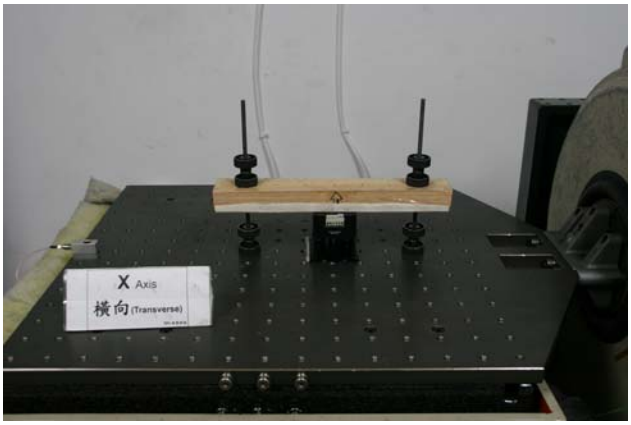
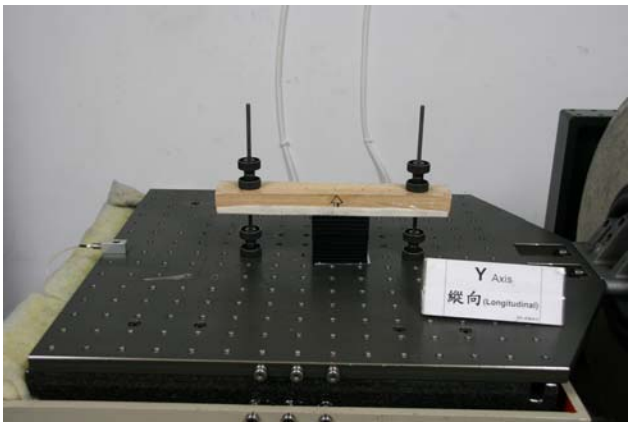
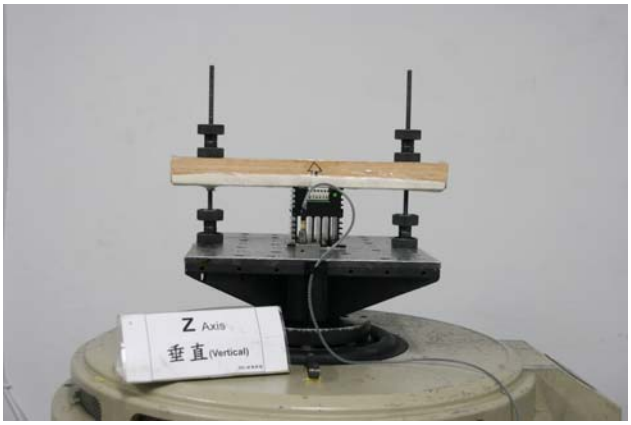
Test Procedure:

A. Check out samples.
B. Place the test samples on the vibration table in its normal operating orientation and configuration.
C. Set test conditions and start to test.
D. Finish testing, check out samples and prepare final report.

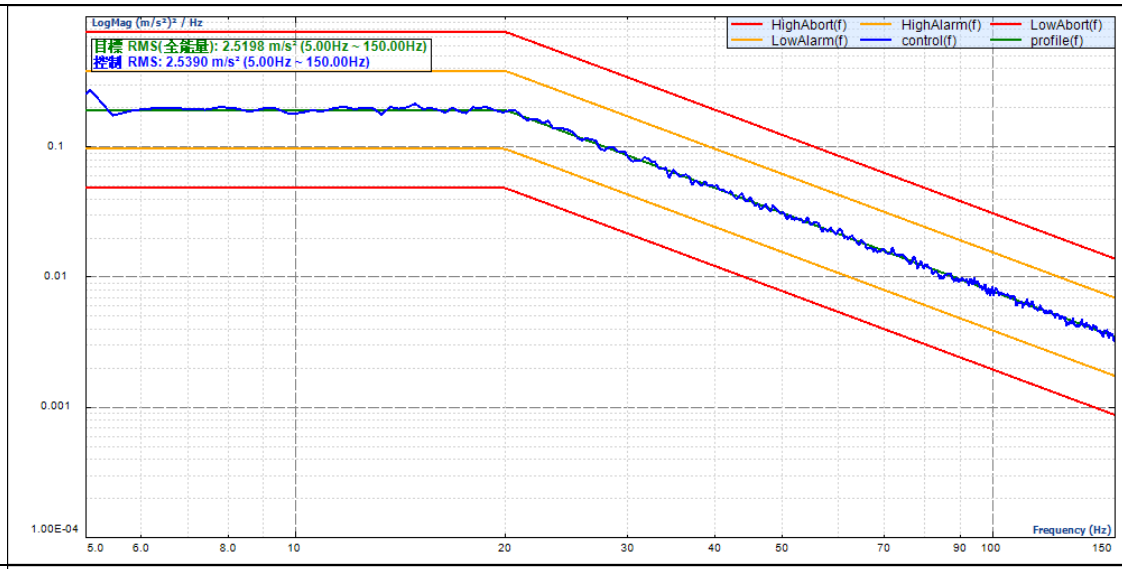
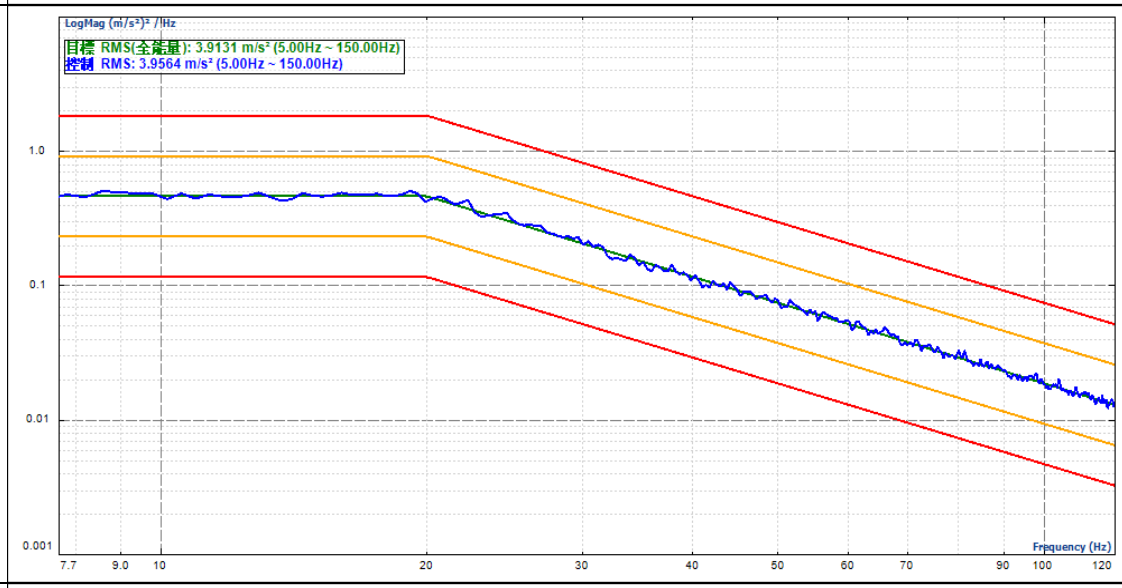
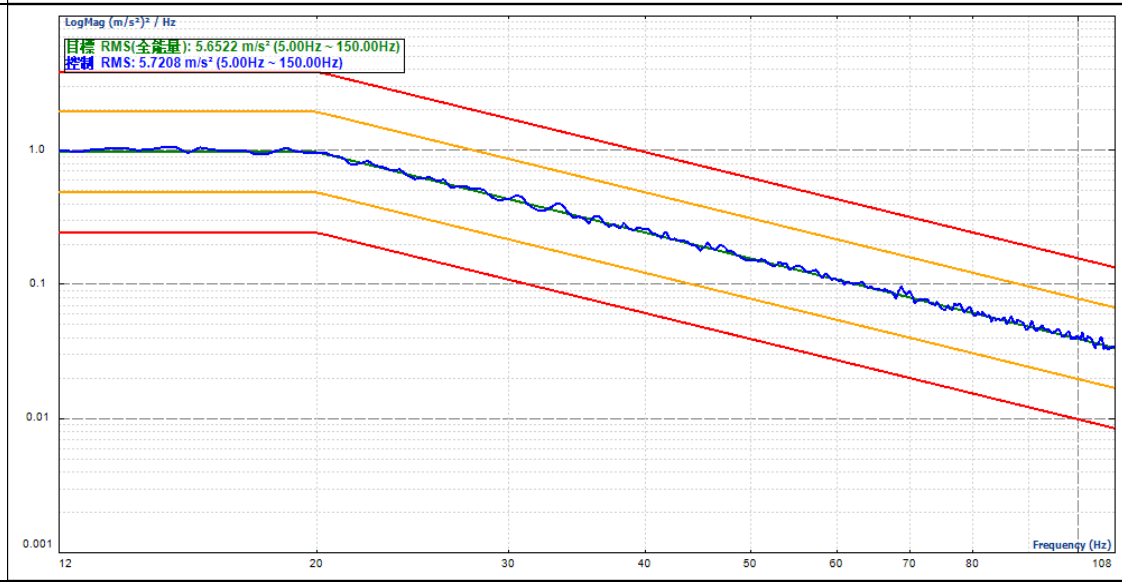
4.5.4 Test Result

Inspection item	Result
EUT	Pass

4.5.5 Test Setup Photo

Transverse **X Axis**	
Longitudinal **Y Axis**	
Vertical **Z Axis**	

4.5.6 Test Profile:

X Axis	
Y Axis	
Z Axis	

4.6 Shock Test

4.6.1 Test Specification and/or standard:

EN 61373:2010

4.6.2 Testing Equipment:

Vibration & Shock Environmental Equipment KD-9363EM-1000F2K-50N250
Max. force：1000 kgf-peak / 250 kgw Loading
Max. displacement：50 mm p-p
Max. acceleration：55 g
Frequency range：2 to 2000 Hz
Calibrate trace code：VS-CV-050930-02

4.6.3 Test Condition and procedure:

Test Condition:

	Category	Orientation	Peak acceleration A m/s^2	Nominal duration D ms
☒	1 Class A and Class B Body mounted	Vertical Transverse Longitudinal	30 30 50	30 30 30
☐	2 Bogie mounted	Vertical Transverse Longitudinal	300	18
☐	3 Axle mounted	Vertical Transverse Longitudinal	1000	6

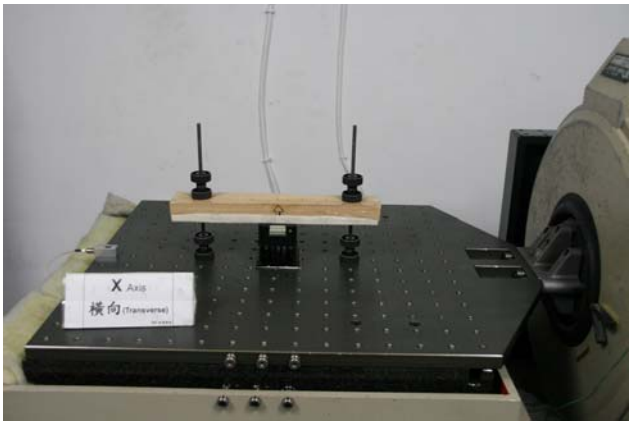
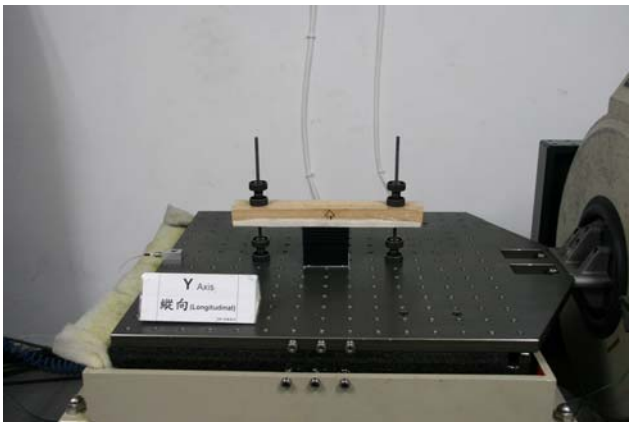
Test Procedure:

A. Check out samples.
B. Place the test samples on the vibration table in its normal operating Orientation and configuration.
C. Set test conditions and start to test.
D. Finish testing, check out samples and prepare final report.

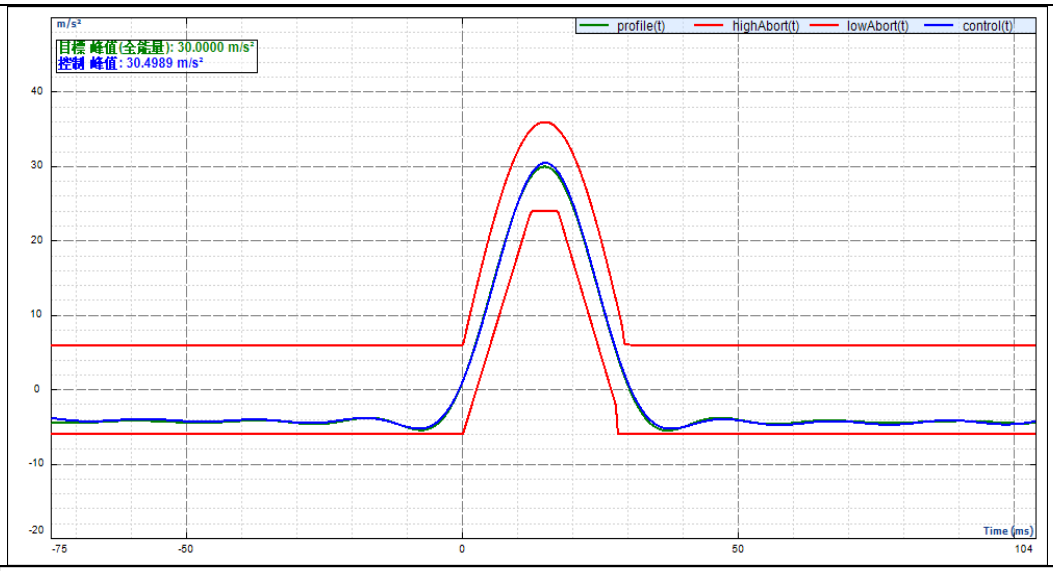
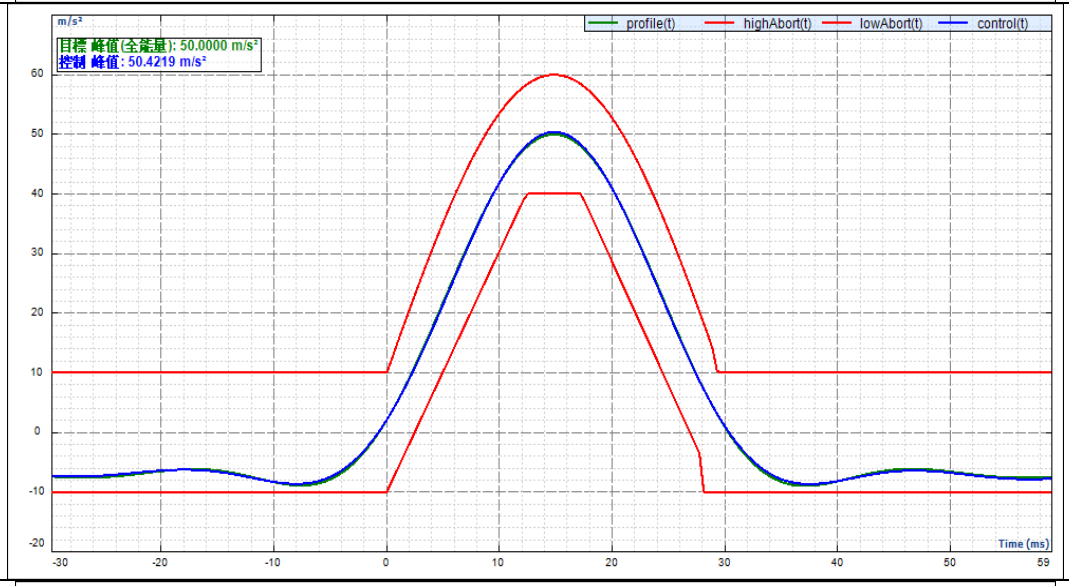
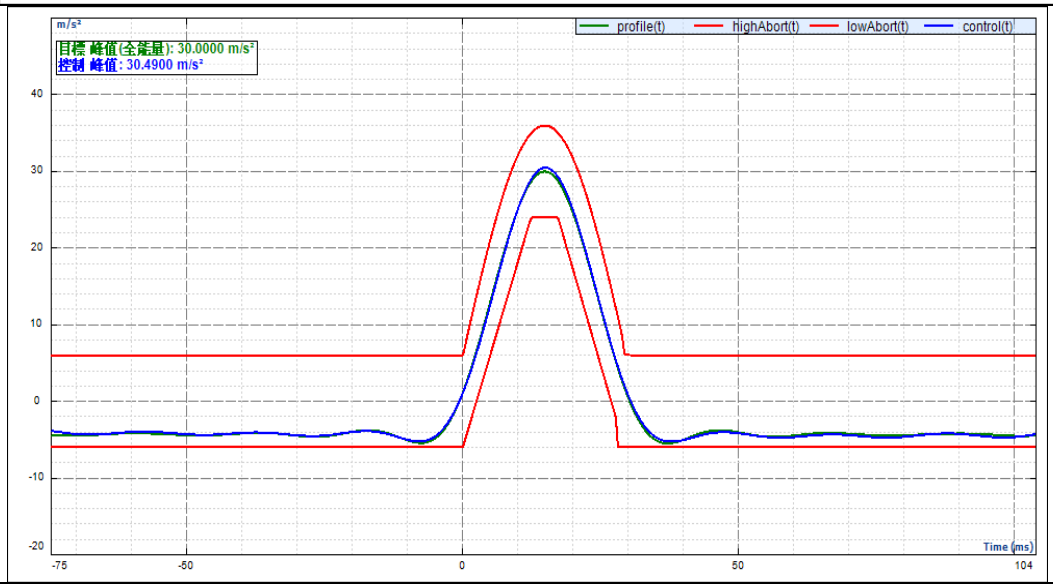
4.6.4 Test Result

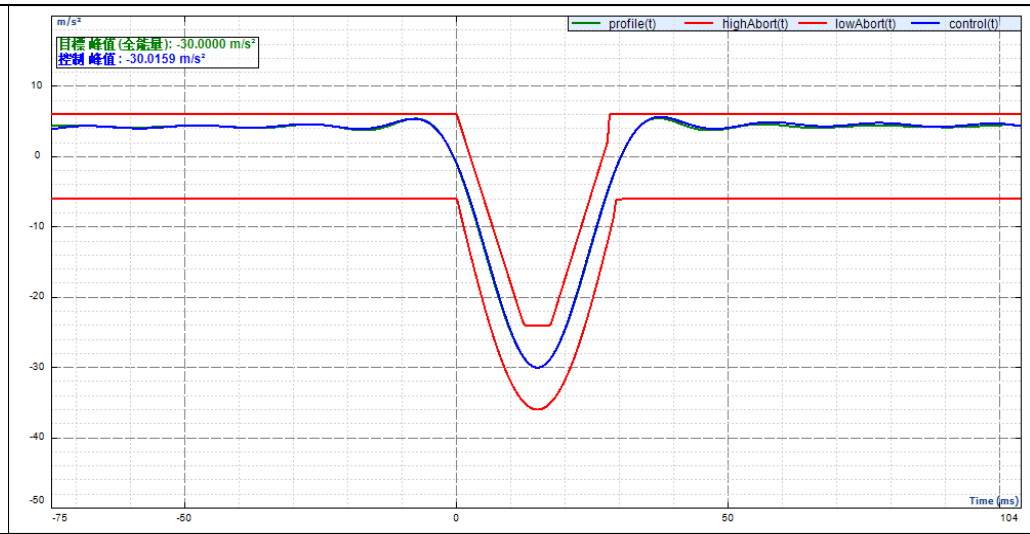
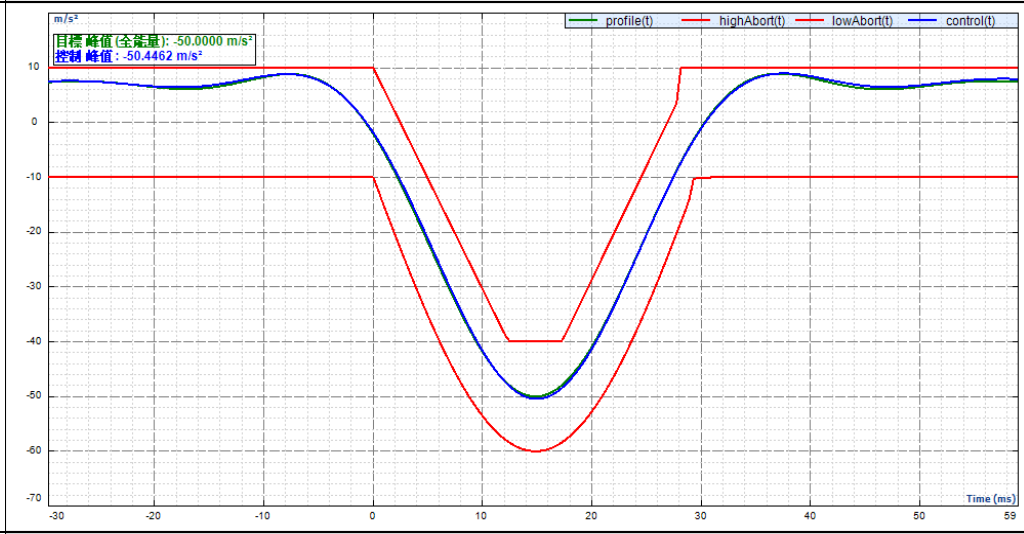
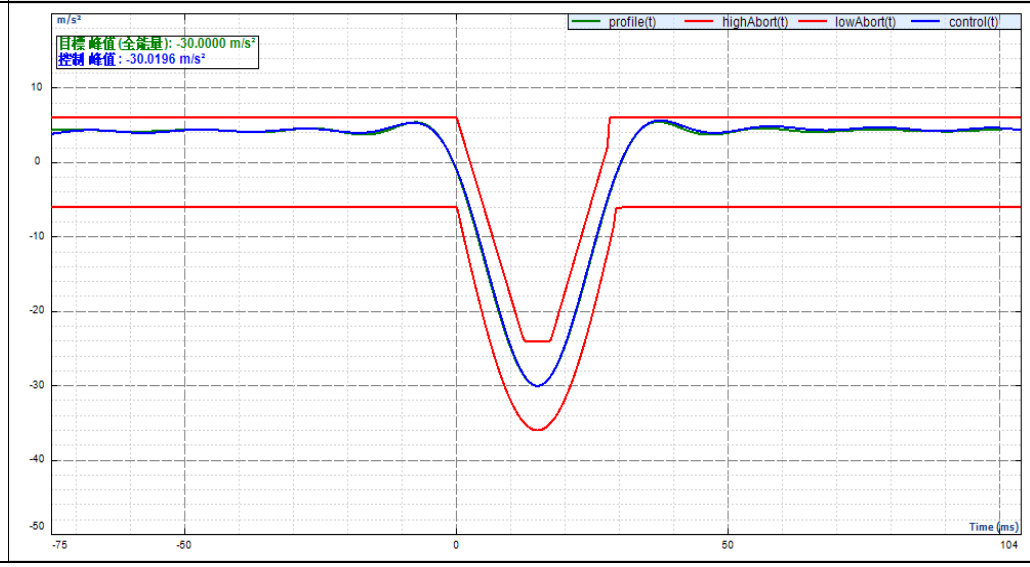
Inspection item	Result
EUT	Pass

4.6.5 Test Setup Photo

Transverse **+ X Axis**	
Longitudinal **+ Y Axis**	
Vertical **+ Z Axis**	

4.6.6 Test Profile

+X	
+Y	
+Z	

-X	 m/s² 目標 峰值(全能量): -30.0000 m/s² 控制 峰值 : -30.0159 m/s² profile(t) highAbort(t) lowAbort(t) control(t) 10 0 -10 -20 -30 -40 -50 -75 -50 0 50 104 Time (ms)
-Y	 m/s² 目標 峰值(全能量): -50.0000 m/s² 控制 峰值 : -50.4462 m/s² profile(t) highAbort(t) lowAbort(t) control(t) 10 0 -10 -20 -30 -40 -50 -60 -70 -30 -20 -10 0 10 20 30 40 50 59 Time (ms)
-Z	 m/s² 目標 峰值(全能量): -30.0000 m/s² 控制 峰值 : -30.0196 m/s² profile(t) highAbort(t) lowAbort(t) control(t) 10 0 -10 -20 -30 -40 -50 -75 -50 0 50 104 Time (ms)

5. Appendix

5.1 Appendix A: Test Equipment

5.1.1 Test Equipment List

Equipment	Model	Manufacturer	Serial No.	Equipment Range	Last Cal. Date	Next Cal. Date
Electrical safety analyzer	SE 7452	Extech Electronics.	1713353	AC 5kV/100mA, DC 6kV/10mA Insulation: 10M ohm ~ 10G ohm	06/20/2019	06/20/2020
Chamber	THS-B4T-150	King San Technology Co. Ltd.	5290K	"Temperature -40~150°C Humidity 10~95%"	11/18/2019	11/18/2020
Temperature & Humidity Record	TH110-POSE	KIMO	1F130907473	Temperature10°C~35°C Humidity 20%~95%	05/08/2019	05/08/2020
Digital Timer - Alarm Clock	N-396T	AVDr.AV	ISL-LT006	Timer (Full Range)	03/15/2019	03/15/2020

Location Con03	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Conduction 03	EMI Receiver 13	ROHDE & SCHWARZ	ESCI	101015	07/25/2019	07/25/2020
Conduction 03	LISN 15	R&S	ENV216	101335	12/12/2019	12/12/2020
Conduction 03	LISN 22	R&S	ENV216	101478	08/13/2019	08/13/2020
Conduction 03	Chamber05 -1 Cable	WOKEN	CFD 300-NL	Chamber05 -1 Cable	08/29/2019	08/29/2020

Location Chmb12	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Radiation (Chamber12)	BILOG Antenna 18	Schwarzbeck	Schwarzbeck VULB 9168+EMCI-N-6-05	646	01/29/2019	01/29/2020
Radiation (Chamber12)	Preamplifier 26	EMCI	EMC9135	980297	01/23/2019	01/23/2020
Radiation (Chamber12)	Coaxial Cable Chmb 12-10M-01	PEWC	CFD400-NL	Chmb 12-10M-01	09/16/2019	09/16/2020
Radiation (Chamber12)	EMI Receiver 18	ROHDE & SCHWARZ	ESCI	101392	06/14/2019	06/14/2020

Location Chmb14	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Rad. Above 1GHz	Spectrum Analyzer 25	R&S	FSV 40	101499	11/01/2019	11/01/2020
Rad. Above 1GHz	Horn Antenna 13	ETS-Lindgren	3117	0161229	09/09/2019	09/09/2020
Rad. Above 1GHz	Preamplifier 20	EMC INSTRUMENT	EMC051845/EMCI-S-18-06	980084/AT-S 18001	03/21/2019	03/21/2020
Rad. Above 1GHz	Microwave Cable 35	WOKEN	WCBA-WCA04NM.SM6	Chamber 14-1	01/30/2019	01/30/2020
Rad. Above 1GHz	Microwave Cable 36	WOKEN	WCBA-WCA04NM.SM0.8	Chamber 14-2	01/30/2019	01/30/2020

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
EN61K-4-2	ESD Gun 12	EM TEST	Dito	P1650188689	05/07/2019	05/07/2020
EN61K-4-3	Broadband Log-Periodic Antenna	AR	AT1080	310698	N/A	N/A
EN61K-4-3	Horn Antenna RF-01	AR	ATS700M11G	0335864	N/A	N/A
EN61K-4-3	Amplifier 80Mz~1GHz 750W	AR	750W1000A	0344168	N/A	N/A
EN61K-4-3	Amplifier 800MHz~4.2GHz 50W	AR	50S1G4M1	312762	N/A	N/A
EN61K-4-3	Amplifier 4.0~8.0GHz 35W	AR	35S4G8AM1	0335752	N/A	N/A
EN61K-4-3	Broadband Coupler 80M~1GHz	Amplifier Research	DC6180A	0341805	N/A	N/A
EN61K-4-3	Coaxial Cable	INSULATED	NPS-4806-2360-NP3	108599.003.01.03	N/A	N/A
EN61K-4-3	Broadband Coupler 0.8G~4.26GHz	AR	DC7144A	0335226	N/A	N/A
EN61K-4-3	Broadband Coupler 4G~8GHz	AR	DC7350A	0335817	N/A	N/A
EN61K-4-3	Signal Generator 07	ROHDE& SCHWARZ	SMB100A	107780	12/04/2019	12/04/2020
EN61K-4-4	EFT and SURGE Test System	EM TEST	UCS-500 M6B	V0728102674	02/14/2019	02/14/2020
EN61K-4-4	Capacitive Coupling Clamp	EM TEST	HFK	0907-106	02/14/2019	02/14/2020
EN61K-4-5	CDN-UTP8 ED3	EMC-PARTNER	CDN-UTP8	1509	04/02/2019	04/02/2020
EN61K-4-5	SURGE-TESTER	EMC Partner	IMU3000	1547	08/10/2019	08/10/2020
EN61K-4-6	CDN M2+M3 04	TESEQ	CDN M016	43257	09/10/2019	09/10/2020
EN61K-4-6	Coaxial Cable 4-6 02-1			4-6 02-1	N/A	N/A
EN61K-4-6	Conducted Immunity Test System 02	Frankonia	CIT-10-75-DC	126B1301/2014	03/25/2019	03/25/2020
EN61K-4-8	Magnetic Field Test Generator 02	PIC	PMF-1000	ANT150701	05/08/2019	05/08/2020

PS: N/A => The equipment does not need calibration.

****Software for Controlling Spectrum/Receiver and Calculating Test Data**

Test Item	Filename	Version
EN61000-4-2	N/A	2.0
EN61000-4-3	i2	4.130102k
EN61000-4-4	EMC TEST	4.10
EN61000-4-5	EMC Partner	1.69
EN61000-4-6	FRANKONIA CD-LAB	V5.221
EN61000-4-8	N/A	

Site	Filename	Version	Issue Date
Conduction/Radiation	EZ EMC	ISL-03A2	3/6/2013

5.2 Appendix B: Uncertainty of Measurement

The laboratory measurement uncertainty accordance with refers to CISPR 16-4-2. If Ulab is less than or equal to Ucispr in Table 1, then the test report may either state the value of Ulab or state that Ulab is less than Ucispr.
The coverage factor k = 2 yields approximately a 95 % level of confidence.

<Conduction 03>
AMN: ±2.90dB

<Chamber 12 (10M)>
Horizontal
30MHz~200MHz: ±4.14dB
200MHz~1000MHz: ±4.12dB
Vertical
30MHz~200MHz: ±4.30dB
200MHz~1000MHz: ±4.45dB

<Chamber 14 (3M)>
1GHz~6GHz: ±4.93dB

<Immunity 02>

Test item	Uncertainty	Test item	Uncertainty
EN 61000-4-2 (ESD)		EN 61000-4-6 (CS)	
Rise time tr	≦ 9.81%	CDN	± 1.74dB
Peak current Ip	≦ 5.54%	EM Clamp	± 3.36dB
current at 30 ns	≦ 5.55%	EN 61000-4-8 (Magnetic)	± 6.53%
current at 60 ns	≦ 5.55%		
EN 61000-4-3 (RS)	± 1.89dB		
EN 61000-4-4 (EFT)			
voltage rise time (tr)	± 5.1%		
peak voltage value (VP)	± 6.39%		
voltage pulse width (tw)	± 5.0%		
EN 61000-4-5 (Surge)			
open-circuit voltage front time	±13.5%		
open-circuit voltage peak value	±6.6%		
open-circuit voltage duration (Td)	53.33μs		

5.3 Appendix C: Photographs of EUT

Please refer to the File of ***ISL-20LE166P-MA***