

TEST REPORT

of

EN 55032 / CISPR 32 / BS EN 55032 AS/NZS CISPR 32 Class B EN 55035 / CISPR 35 / BS EN 55035 IMMUNITY

Product: **TEN 40UIR Series&TEN 30UIR Series**
Main Model: **TEN 40-7213UIR-B2**
Series Model: **more serial models listed on 1.3 of this test report**
Brand:



Applicant: **TRACO ELECTRONIC AG**
Address: **Sihlbruggstrasse 111, CH-6340 Baar**
Manufacturer: **TRACO ELECTRONIC AG**
Address: **Sihlbruggstrasse 111, CH-6340 Baar**

Test Performed by:



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Report No.: **ISL-24LE0210CE35-MA**
Issue Date : **May 6, 2024**



Test results given in this report apply only to the specific sample(s) tested and are traceable to national or international standard through calibration of the equipment and evaluating measurement uncertainty herein. According to customer agreement, the laboratory issues test reports based on the regulations or standards specifications, the measurement uncertainty is not considered in conformity decision rules. This test report shall not be reproduced except in full, without the written approval of International Standards Laboratory Corp.

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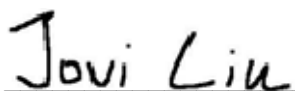

1. General

1.1 Certification of Accuracy of Test Data

Standards: Please refer to 1.2
Equipment Tested: TEN 40UIR Series&TEN 30UIR Series
Main Model: TEN 40-7213UIR-B2
Series Model: more serial models listed on 1.3 of this test report

Brand:



Applicant: TRACO ELECTRONIC AG
Manufacturer: TRACO ELECTRONIC AG
Sample received Date: December 28, 2023
Final test Date: EMI: refer to the date of test data
EMS: April 2, 2024
Test Site: Chamber 02; Conduction 03; Immunity 02
Test Distance: 10m; 3m (above 1GHz) (EMI test)
Temperature: refer to each site test data
Humidity: refer to each site test data
Atmospheric Pressure: 86 kPa to 106 kPa
Input power: Conduction input power: DC 36 V; DC 72 V
Radiation input power: DC 36 V; DC 72 V
Immunity input power: DC 72 V
Test Result: PASS
Report Engineer: Cheryl Tung
Test Engineer: 
Jovi Liu
Approved By: 
Angus Chu / Sr. Manager

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 55032:2015+A11:2020 and EN 55032:2015+A1:2020 and CISPR 32:2015+A1:2019 and BS EN 55032:2015+A11:2020 and BS EN 55032:2015+A1:2020 Class B Electromagnetic compatibility of multimedia equipment - Emission requirements.

AS/NZS CISPR 32:2015+A1:2020 Class B Electromagnetic compatibility of multimedia equipment- Emission requirements

Performed Item	Test Performed	Deviation	Result
Conducted emissions from the AC mains power ports	Yes	No	PASS
Telecommunication Port Conducted Emissions (asymmetric mode)	N/A	N/A	N/A
Radiated emissions at frequencies below 1 GHz	Yes	No	PASS
Radiated emissions at frequencies above 1 GHz	N/A	N/A	N/A
Radiated emissions from FM receivers	N/A	N/A	N/A
Voltage Disturbance Emissions at Antenna Terminals	N/A	N/A	N/A
Differential voltage emissions	N/A	N/A	N/A
Outdoor units of home satellite receiving systems	N/A	N/A	N/A

EN 55035:2017+A11:2020 and CISPR 35:2016 modified and BS EN 55035: 2017+A11:2020 Electromagnetic compatibility of multimedia equipment - Immunity requirements.

Standard	Description	Results	Criteria
EN 61000-4-2:2009 IEC 61000-4-2:2008 BS EN 61000-4-2:2009	Electrostatic discharge immunity	Pass	B
EN IEC 61000-4-3:2020 IEC 61000-4-3:2020 BS EN IEC 61000-4-3:2020	Radiated, radio-frequency, electromagnetic field immunity	Pass	A
EN 61000-4-4:2012 IEC 61000-4-4:2012 BS EN 61000-4-4:2012	Electrical fast transient/burst immunity	Pass	B
EN 61000-4-5:2014+A1:2017 IEC 61000-4-5:2014+A1:2017 BS EN 61000-4-5:2014+A1:2017	Surge immunity	Pass	B
EN 61000-4-6:2014+AC:2015 IEC 61000-4-6:2013 BS EN 61000-4-6:2014	Immunity to conducted disturbances	Pass	A
EN 61000-4-8:2010 IEC 61000-4-8:2009 BS EN 61000-4-8:2010	Power frequency magnetic field immunity	Pass	A

1.2.1 Performance Criteria for Compliance: EN 55035 and BS EN 55035

Performance criterion A

The equipment shall continue to operate as intended without operator intervention. No degradation of performance, loss of function or change of operating state is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion B

During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test.

After the test, the equipment shall continue to operate as intended without operator intervention; no degradation of performance or loss of function is allowed, below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.

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

Performance criterion C

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed.

Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

1.3 Model Number Definition

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

TEN 40-3611BUIR-xyz(a); TEN 40-3611UIR-xyz(a); TEN 40-3612UIR-xyz(a);
TEN 40-3613UIR-xyz(a); TEN 40-3615UIR-xyz(a); TEN 40-3622UIR-xyz(a);
TEN 40-3623UIR-xyz(a); TEN 40-7211BUIR-xyz(a); TEN 40-7211UIR-xyz(a);
TEN 40-7212UIR-xyz(a); TEN 40-7213UIR-xyz(a); TEN 40-7215UIR-xyz(a);
TEN 40-7222UIR-xyz(a); TEN 40-7223UIR-xyz(a); TEN 30-3611BUIR-xyz(a);
TEN 30-3611UIR-xyz(a); TEN 30-3612UIR-xyz(a); TEN 30-3613UIR-xyz(a);
TEN 30-3615UIR-xyz(a); TEN 30-3622UIR-xyz(a); TEN 30-3623UIR-xyz(a);
TEN 30-7211BUIR-xyz(a); TEN 30-7211UIR-xyz(a); TEN 30-7212UIR-xyz(a);
TEN 30-7213UIR-xyz(a); TEN 30-7215UIR-xyz(a); TEN 30-7222UIR-xyz(a);
TEN 30-7223UIR-xyz(a)

"-" can be optional.

"x" can be B1, A1 or blank; When x= B1 represents None. When x= A1 represents with UVP adj.
When x= blank represents with Bus.

"y" can be N or blank; When y= N represents Negative logic. When y= blank represents Positive logic.


"z" can be B2, HS, HS8, HS9, HS10 or blank; When z= B2 represents without Heatsink for TEN 40UIR Series. When z= HS represents with Heatsink for TEN 30UIR Series. When z= HS8, HS9 and HS10 represent with Heatsink for Both Series. When z= blank represents with Heatsink for TEN 40UIR Series, and represents without Heatsink for TEN 30UIR Series.

"(a)" can be six variables, each variable may be A through Z, 0 through 9, dash, any punctuation marks or blank.

1.4 Description of EUT

EUT

This report test data using the report number **ISL-24LE0210CE35**

Description	TEN 40UIR Series&TEN 30UIR Series
Condition	Pre-Production
Main Model	TEN 40-7213UIR-B2
Serial Model	<p>TEN 40-3611BUIR-xyz(a); TEN 40-3611UIR-xyz(a); TEN 40-3612UIR-xyz(a); TEN 40-3613UIR-xyz(a); TEN 40-3615UIR-xyz(a); TEN 40-3622UIR-xyz(a); TEN 40-3623UIR-xyz(a); TEN 40-7211BUIR-xyz(a); TEN 40-7211UIR-xyz(a); TEN 40-7212UIR-xyz(a); TEN 40-7213UIR-xyz(a); TEN 40-7215UIR-xyz(a); TEN 40-7222UIR-xyz(a); TEN 40-7223UIR-xyz(a); TEN 30-3611BUIR-xyz(a); TEN 30-3611UIR-xyz(a); TEN 30-3612UIR-xyz(a); TEN 30-3613UIR-xyz(a); TEN 30-3615UIR-xyz(a); TEN 30-3622UIR-xyz(a); TEN 30-3623UIR-xyz(a); TEN 30-7211BUIR-xyz(a); TEN 30-7211UIR-xyz(a); TEN 30-7212UIR-xyz(a); TEN 30-7213UIR-xyz(a); TEN 30-7215UIR-xyz(a); TEN 30-7222UIR-xyz(a); TEN 30-7223UIR-xyz(a)</p> <p>"-" can be optional. "x" can be B1, A1 or blank; When x= B1 represents None. When x= A1 represents with UVP adj. When x= blank represents with Bus. "y" can be N or blank; When y= N represents Negative logic. When y= blank represents Positive logic. "z" can be B2, HS, HS8, HS9, HS10 or blank; When z= B2 represents without Heatsink for TEN 40UIR Series. When z= HS represents with Heatsink for TEN 30UIR Series. When z= HS8, HS9 and HS10 represent with Heatsink for Both Series. When z= blank represents with Heatsink for TEN 40UIR Series, and represents without Heatsink for TEN 30UIR Series. "(a)" can be six variables, each variable may be A through Z, 0 through 9, dash, any punctuation marks or blank.</p>
Brand	
Serial Number	N/A
Highest working frequency	Less than 108MHz
The radiation test should be tested till	1GHz

For EMI test configurations:

Configuration	Model Name	Input VDC	Output Voltage VDC
1	TEN 40-3615UIR-B2	36	24
2	TEN 40-7213UIR-B2	72	15

For EMS (Not Include Electrical Fast transients/burst immunity & Surge Immunity) test mode

Configuration	Model Name	Input VDC	Output Voltage VDC	With an aluminum electrolytic capacitor test board
1	TEN 40-7213UIR-B2	72	15	No

For Electrical Fast transients/burst immunity & Surge Immunity test mode

Configuration	Model Name	Input VDC	Output Voltage VDC	With an aluminum electrolytic capacitor test board
1	TEN 40-7213UIR-B2	72	15	Yes

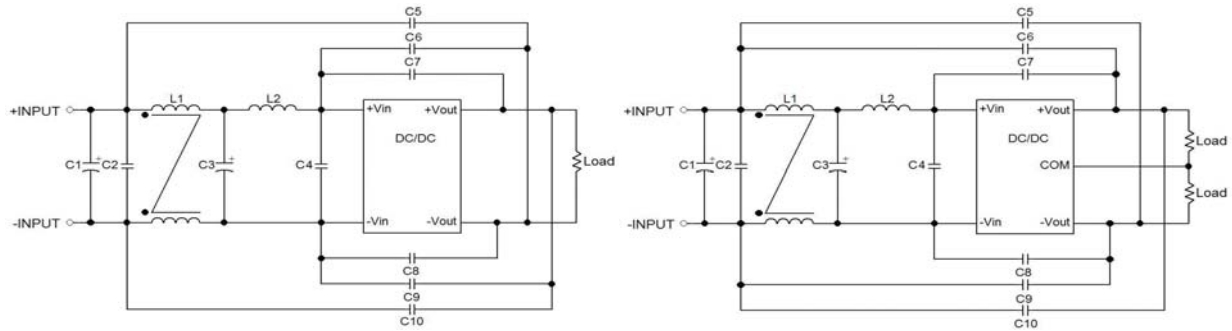
Different Model list:

Model Name	Input Range (VDC)	Output Voltage (VDC)
TEN 40-3611BUIR-xyz(a)	9 ~ 75	5
TEN 40-3611UIR-xyz(a)	9 ~ 75	5.1
TEN 40-3612UIR-xyz(a)	9 ~ 75	12
TEN 40-3613UIR-xyz(a)	9 ~ 75	15
TEN 40-3615UIR-xyz(a)	9 ~ 75	24
TEN 40-3622UIR-xyz(a)	9 ~ 75	±12
TEN 40-3623UIR-xyz(a)	9 ~ 75	±15
TEN 40-7211BUIR-xyz(a)	14 ~ 160	5
TEN 40-7211UIR-xyz(a)	14 ~ 160	5.1
TEN 40-7212UIR-xyz(a)	14 ~ 160	12
TEN 40-7213UIR-xyz(a)	14 ~ 160	15
TEN 40-7215UIR-xyz(a)	14 ~ 160	24
TEN 40-7222UIR-xyz(a)	14 ~ 160	±12
TEN 40-7223UIR-xyz(a)	14 ~ 160	±15

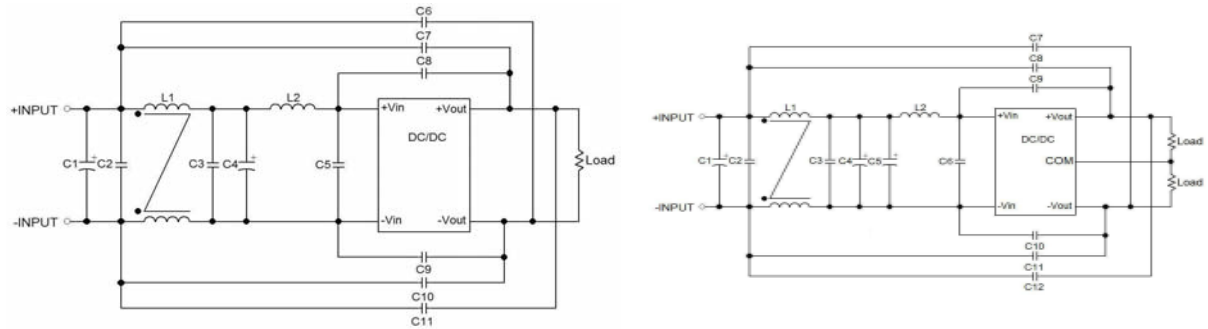
Model Name	Input Range (VDC)	Output Voltage (VDC)
TEN 30-3611BUIR-xyz(a)	9 ~ 75	5
TEN 30-3611UIR-xyz(a)	9 ~ 75	5.1
TEN 30-3612UIR-xyz(a)	9 ~ 75	12
TEN 30-3613UIR-xyz(a)	9 ~ 75	15
TEN 30-3615UIR-xyz(a)	9 ~ 75	24
TEN 30-3622UIR-xyz(a)	9 ~ 75	±12
TEN 30-3623UIR-xyz(a)	9 ~ 75	±15
TEN 30-7211BUIR-xyz(a)	14 ~ 160	5
TEN 30-7211UIR-xyz(a)	14 ~ 160	5.1
TEN 30-7212UIR-xyz(a)	14 ~ 160	12
TEN 30-7213UIR-xyz(a)	14 ~ 160	15
TEN 30-7215UIR-xyz(a)	14 ~ 160	24
TEN 30-7222UIR-xyz(a)	14 ~ 160	±12
TEN 30-7223UIR-xyz(a)	14 ~ 160	±15
<p>"-" can be optional.</p> <p>"x" can be B1, A1 or blank; When x= B1 represents None. When x= A1 represents with UVP adj. When x= blank represents with Bus.</p> <p>"y" can be N or blank; When y= N represents Negative logic. When y= blank represents Positive logic.</p> <p>"z" can be B2, HS, HS8, HS9, HS10 or blank; When z= B2 represents without Heatsink for TEN 40UIR Series. When z= HS represents with Heatsink for TEN 30UIR Series. When z= HS8, HS9 and HS10 represent with Heatsink for Both Series. When z= blank represents with Heatsink for TEN 40UIR Series, and represents without Heatsink for TEN 30UIR Series.</p> <p>"(a)" can be six variables, each variable may be A through Z, 0 through 9, dash, any punctuation marks or blank.</p>		

EMI Noise Source:

For EMI test requirements/Class B



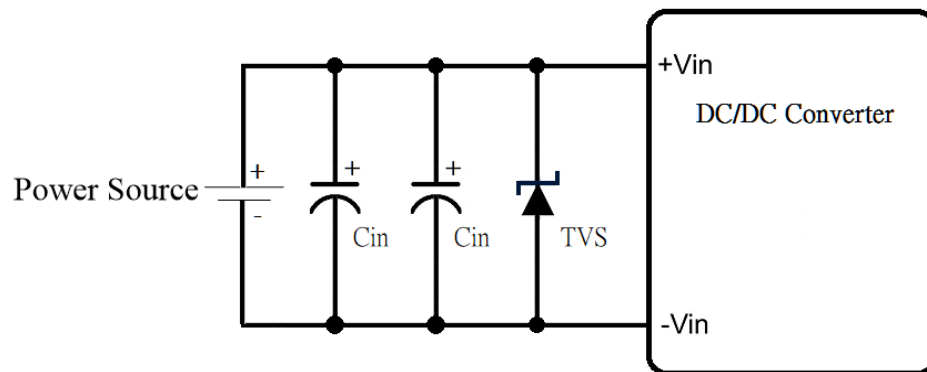
Model	C1、C3	C2、C4	C5、C10	C6、C9	C7、C8	L1	L2
TEN 40UIR-36 Vin TEN 30UIR-36 Vin	220μF/ 100V	2.2μF/ 100V	220pF/ 3kV	1000pF/ 3kV	150pF/ 3kV	285uH	2.2uH



Model	C1	C4	C2、C3、C5	C6、C11	C7、C10	C8、C9	L1	L2
TEN 40UIR-72 Vin Single Output TEN 30UIR-72 Vin Single Output	150μF/ 200V	47μF/ 200V	1μF/ 250V	2200pF/ 3kV	220pF/ 3kV	330pF/ 3kV	620uH	22uH

Model	C1	C4、C5	C2、C3、C6	C7、C8、C11、C12	C9、C10	L1	L2
TEN 40UIR-72 Vin Dual Output TEN 30UIR-72 Vin Dual Output	150μF/ 200V	47μF/ 200V	0.47μF/ 250V	220pF/ 3kV	330pF/ 3kV	620uH	22uH

For Electrical Fast transient & Surge Immunity test requirements



Model Reference	Increase countermeasure components
TEN 40UIR-36Vin TEN 30UIR-36Vin	With an external input filter Cin : 220μF/100V * 2PCS TVS : 120V/3000W
TEN 40UIR-72Vin TEN 30UIR-72Vin	With an external input filter Cin : 150μF/200V * 2PCS TVS : 170V/3000W

1.5 Description of Support Equipment

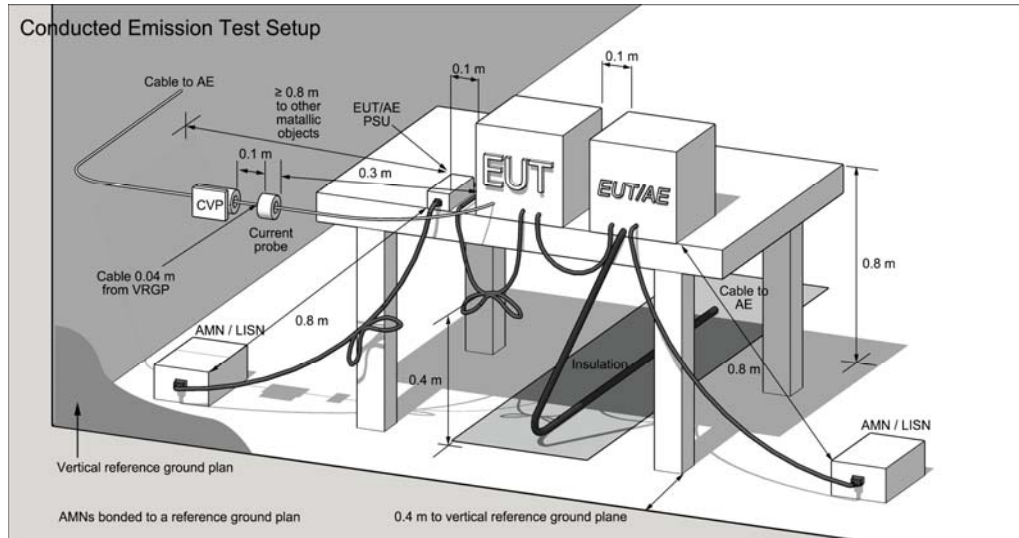
For EMI test Configuration Support unit: 1~2

For EMS test Configuration Support unit: 1~3

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
3	DC Voltage meter	BN-670 S/N: N/A	Bonny	N/A	N/A

2.1 Test Setup and Procedure

2.1.1 Test Setup



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

The interconnecting cables were arranged and moved to get the maximum measurement. Both the line of power cord, live and neutral, were measured. All of the interface cables were manipulated according to EN 55032 / BS EN 55032 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.

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

Frequency Range: 150kHz--30MHz
 Detector Function: Quasi-Peak / Average Mode
 Resolution Bandwidth: 9kHz

2.1.4 Limit

Conducted emissions from the AC mains power ports of Class_A equipment:

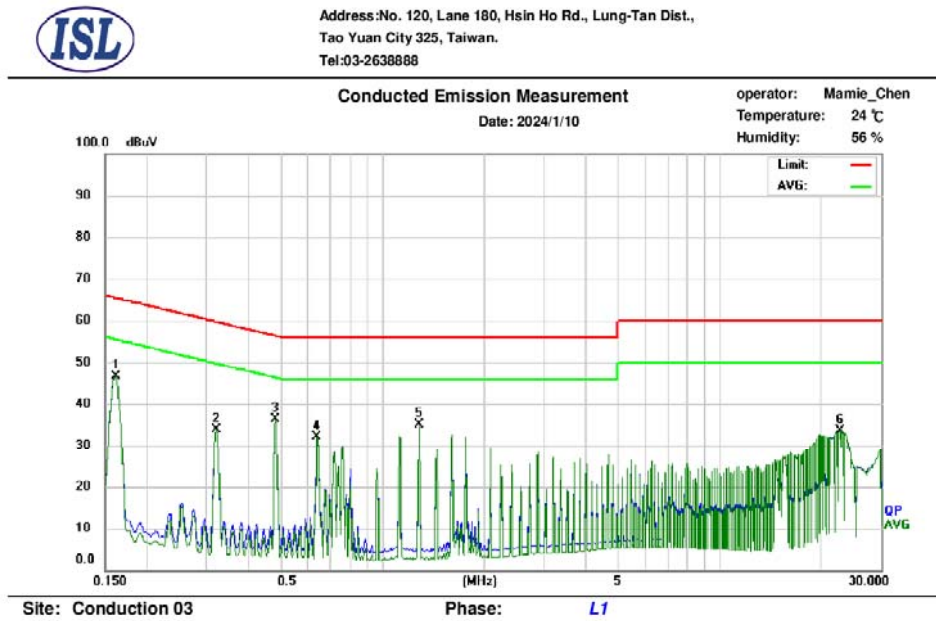
Frequency	QP	AV
MHz	dB(μ V)	dB(μ V)
0.15-0.50	79	66
0.50-30	73	60
Note: The lower limit shall apply at the transition frequencies		

Conducted emissions from the AC mains power ports of Class_B equipment:

Frequency	QP	AV
MHz	dB(μ V)	dB(μ V)
0.15-0.50	66-56	56-46
0.50-5.0	56	46
5.0-30	60	50
Note: The lower limit shall apply at the transition frequencies		

2.2 Conduction Test Data: Configuration 1

-Live



No.	Frequency (MHz)	QP_R (dBuV)	AVG_R (dBuV)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)
1*	0.161	36.76	36.84	9.77	46.53	65.40	-18.87	46.61	55.40	-8.79
2	0.321	24.12	24.17	9.76	33.88	59.68	-25.80	33.93	49.68	-15.75
3	0.481	26.57	26.65	9.76	36.33	56.33	-20.00	36.41	46.33	-9.92
4	0.640	22.25	22.36	9.77	32.02	56.00	-23.98	32.13	46.00	-13.87
5	1.282	25.30	25.40	9.81	35.11	56.00	-20.89	35.21	46.00	-10.79
6	22.771	23.03	23.09	10.50	33.53	60.00	-26.47	33.59	50.00	-16.41

Note:

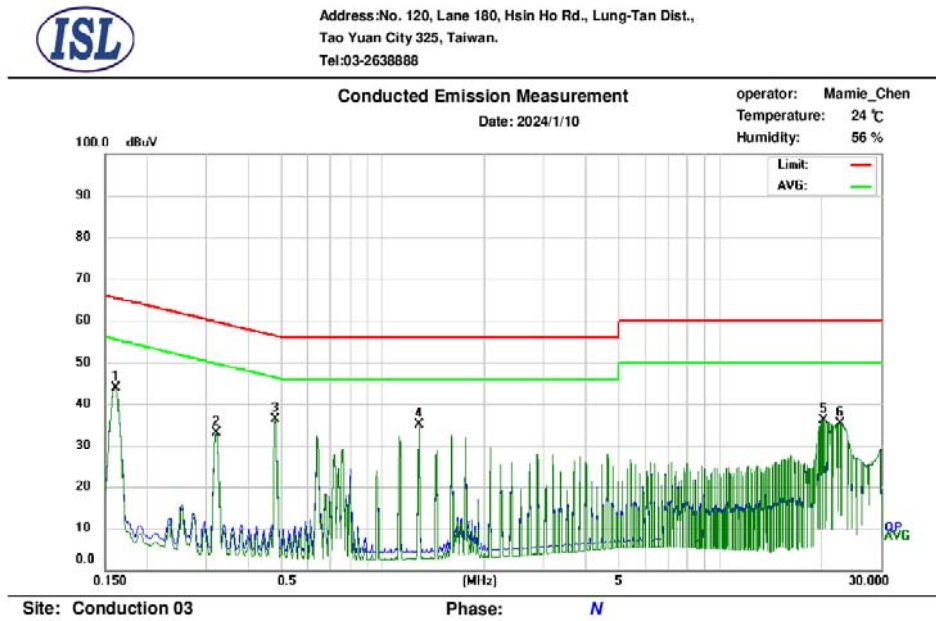
Margin = QP/AVG Emission - Limit

QP/AVG Emission = QP_R/AVG_R + Correct Factor

Correct Factor = LISN Loss + Cable Loss

A margin of -8dB means that the emission is 8dB below the limit

- Neutral



No.	Frequency (MHz)	QP_R (dBuV)	AVG_R (dBuV)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)
1	0.161	34.11	34.21	9.77	43.88	65.40	-21.52	43.98	55.40	-11.42
2	0.321	23.47	23.53	9.77	33.24	59.68	-26.44	33.30	49.68	-16.38
3*	0.481	26.70	26.79	9.77	36.47	56.33	-19.86	36.56	46.33	-9.77
4	1.282	25.40	25.52	9.83	35.23	56.00	-20.77	35.35	46.00	-10.65
5	20.344	25.69	25.76	10.51	36.20	60.00	-23.80	36.27	50.00	-13.73
6	22.747	24.88	24.94	10.59	35.47	60.00	-24.53	35.53	50.00	-14.47

Note:

Margin = QP/AVG Emission - Limit

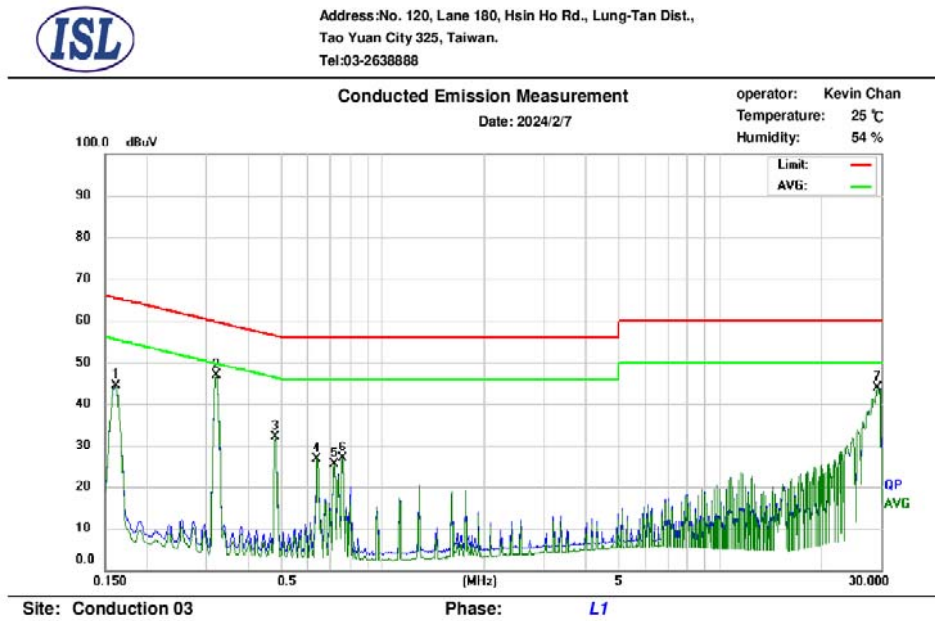
QP/AVG Emission = QP_R/AVG_R + Correct Factor

Correct Factor = LISN Loss + Cable Loss

A margin of -8dB means that the emission is 8dB below the limit

2.3 Conduction Test Data: Configuration 2

-Live



No.	Frequency (MHz)	QP_R (dBuV)	AVG_R (dBuV)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)
1	0.161	34.61	34.71	9.77	44.38	65.40	-21.02	44.48	55.40	-10.92
2*	0.321	36.80	36.86	9.76	46.56	59.68	-13.12	46.62	49.68	-3.06
3	0.481	22.46	22.56	9.76	32.22	56.33	-24.11	32.32	46.33	-14.01
4	0.640	16.96	17.06	9.77	26.73	56.00	-29.27	26.83	46.00	-19.17
5	0.717	15.65	15.60	9.78	25.43	56.00	-30.57	25.38	46.00	-20.62
6	0.760	16.99	17.03	9.78	26.77	56.00	-29.23	26.81	46.00	-19.19
7	29.339	33.20	33.16	10.68	43.88	60.00	-16.12	43.84	50.00	-6.16

Note:

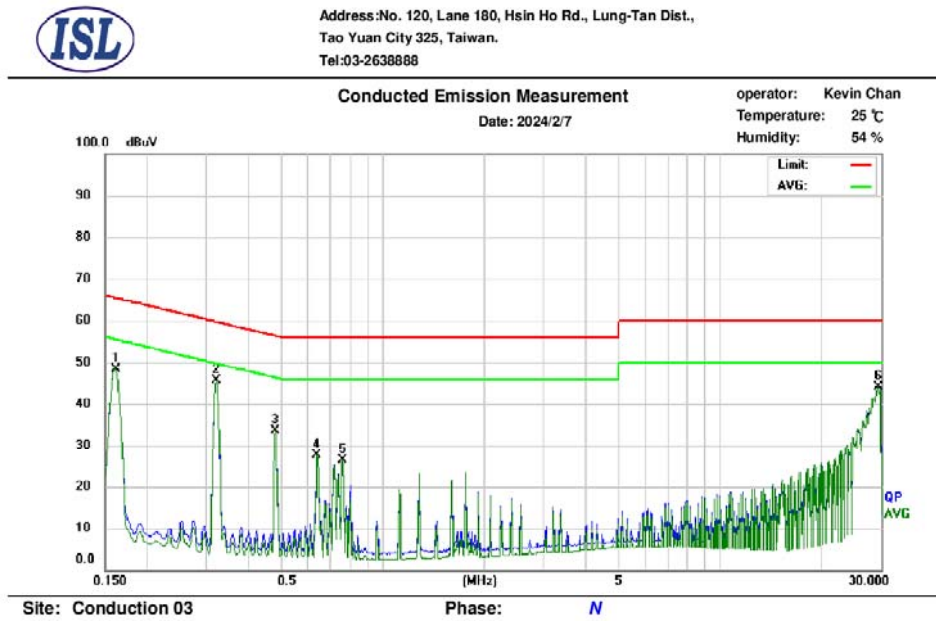
Margin = QP/AVG Emission - Limit

QP/AVG Emission = QP_R/AVG_R + Correct Factor

Correct Factor = LISN Loss + Cable Loss

A margin of -8dB means that the emission is 8dB below the limit

- Neutral



No.	Frequency (MHz)	QP_R (dBuV)	AVG_R (dBuV)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)
1	0.161	38.59	38.66	9.79	48.38	65.40	-17.02	48.45	55.40	-6.95
2*	0.321	35.73	35.79	9.78	45.51	59.68	-14.17	45.57	49.68	-4.11
3	0.481	23.82	23.92	9.78	33.60	56.33	-22.73	33.70	46.33	-12.63
4	0.640	17.75	17.85	9.79	27.54	56.00	-28.46	27.64	46.00	-18.36
5	0.760	16.66	16.70	9.80	26.46	56.00	-29.54	26.50	46.00	-19.50
6	29.485	33.44	33.33	10.65	44.09	60.00	-15.91	43.98	50.00	-6.02

Note:
Margin = QP/AVG Emission - Limit
QP/AVG Emission = QP_R/AVG_R + Correct Factor
Correct Factor = LISN Loss + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit

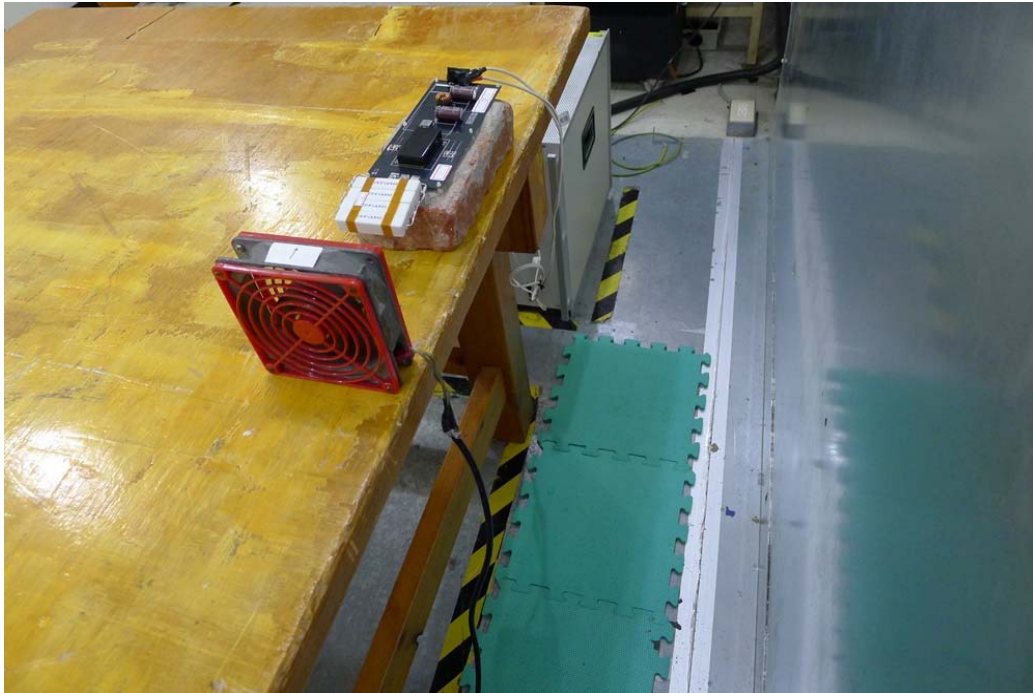
2.4 Test Setup Photo

Configuration 1

Front View



Back View

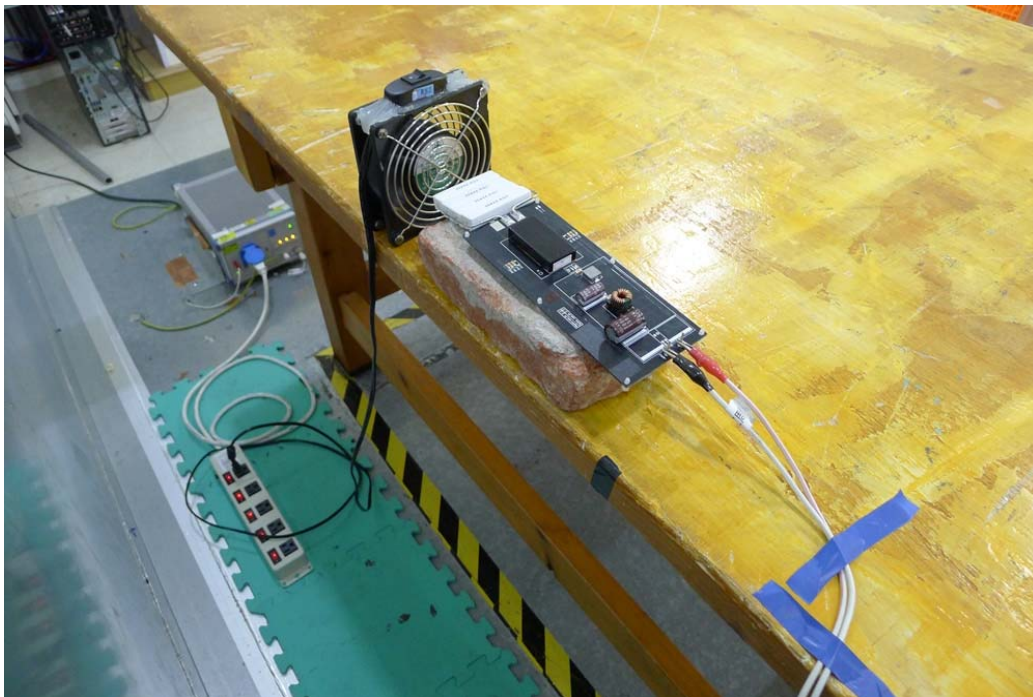
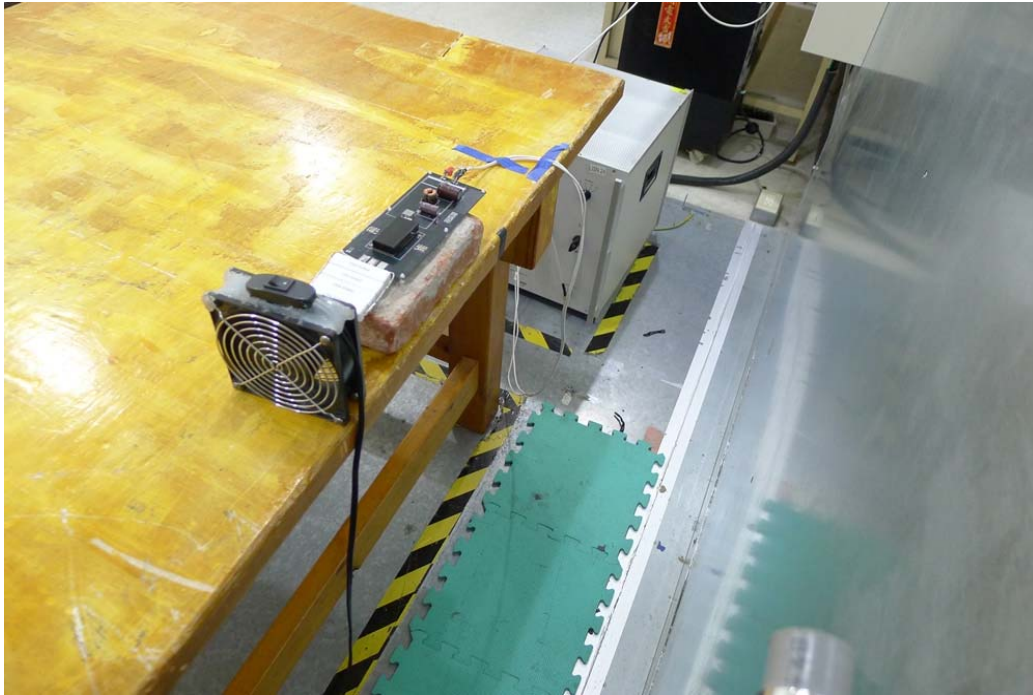


Configuration 2

Front View



Back View



3.1 Test Setup and Procedure

The diagram illustrates a conducted emission test setup. Key components and dimensions include:

- EUT/AE PSU**: The device under test, with a width of 0.3 m .
- CVP**: Common Voltage Probe, connected to the PSU.
- Current probe**: Positioned around the cable between the CVP and the PSU, with a distance of 0.1 m from the CVP.
- Vertical reference ground plane**: A plane at the base of the setup.
- AMNs bonded to a reference ground plane**: Auxiliary Magnetic Nuts, with a distance of 0.4 m to the vertical reference ground plane.
- Insulation**: A layer between the ground planes.
- Dimensions**:
 - Distance from the PSU to the vertical reference ground plane: $\geq 0.8\text{ m}$ to other metallic objects.
 - Distance from the PSU to the current probe: 0.1 m .
 - Distance from the current probe to the CVP: 0.1 m .
 - Distance from the CVP to the vertical reference ground plane: 0.04 m from VRGP.
 - Distance from the PSU to the AMN / LISN: 0.8 m .
 - Distance from the AMN / LISN to the vertical reference ground plane: 0.4 m .
 - Distance from the PSU to the vertical reference ground plane: 0.8 m .
 - Distance from the AMN / LISN to the vertical reference ground plane: 0.8 m .

Frequency Range: 150kHz--30MHz
 Detector Function: Quasi-Peak / Average Mode
 Resolution Bandwidth: 9kHz

3.1.4 Limit

Asymmetric mode conducted emissions from Class_A equipment:

Applicable to

1. wired network ports.
2. optical fiber ports with metallic shield or tension members.
3. antenna ports.

Frequency range MHz	Coupling device	Detector type / bandwidth	Class_A voltage limits dB(μV)	Class_A current limits dB(μA)
0.15-0.5	AAN	Quasi Peak / 9 kHz	97-87	n/a
0.5-30			87	
0.15-0.5	AAN	Average / 9 kHz	84-74	
0.5-30			74	
0.15-0.5	CVP and current probe	Quasi Peak / 9 kHz	97-87	53-43
0.5-30			87	43
0.15-0.5	CVP and current probe	Average / 9 kHz	84-74	40-30
0.5-30			74	30
0.15-0.5	Current Probe	Quasi Peak / 9 kHz	n/a	53-43
0.5-30				43
0.15-0.5	Current Probe	Average / 9 kHz		40-30
0.5-30				30

Asymmetric mode conducted emissions from Class_B equipment:

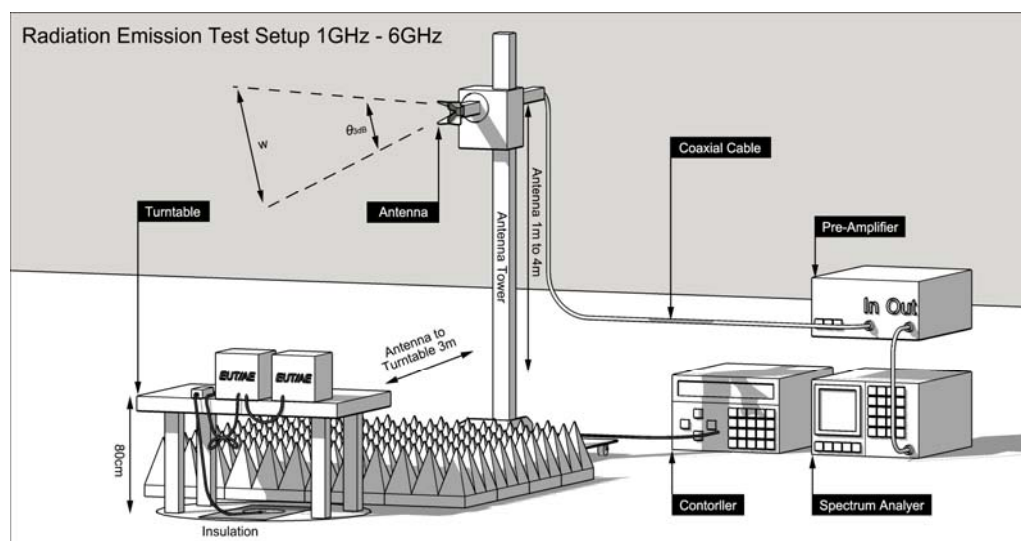
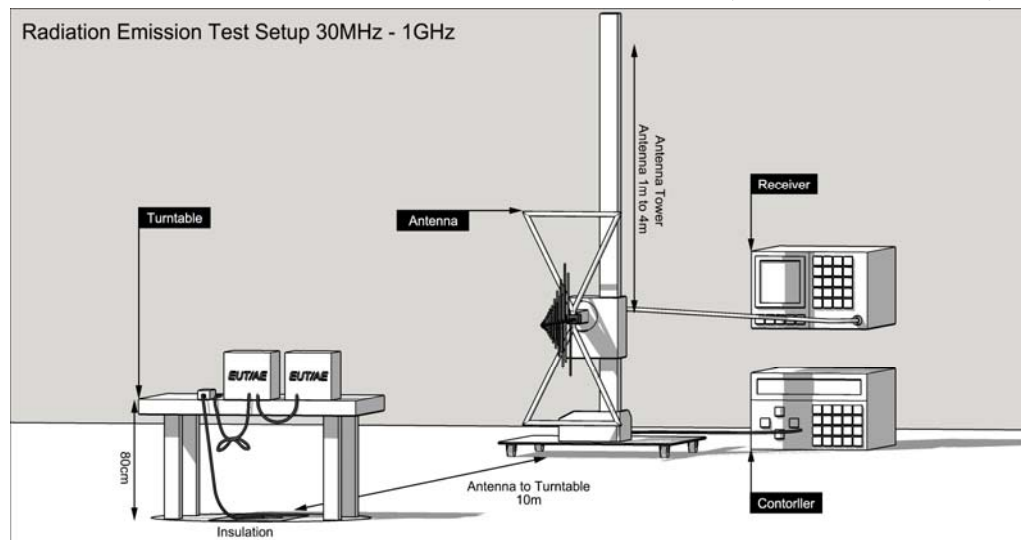
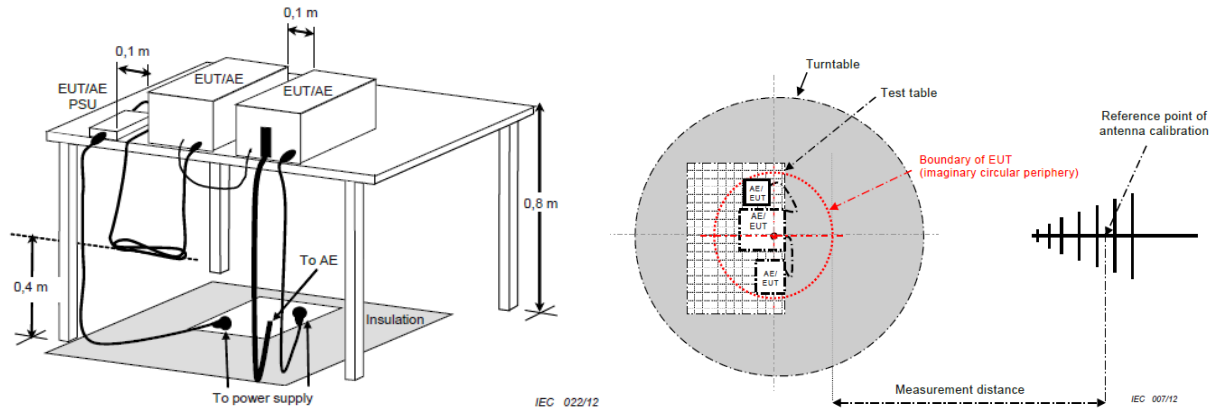
Applicable to:

1. wired network ports.
2. optical fiber ports with metallic shield or tension members.
3. broadcast receiver tuner ports.
4. antenna ports.

Frequency range MHz	Coupling device	Detector type / bandwidth	Class_B voltage limits dB(μV)	Class_B current limits dB(μA)
0.15-0.5	AAN	Quasi Peak / 9 kHz	84-74	n/a
0.5-30			74	
0.15-0.5	AAN	Average / 9 kHz	74-64	
0.5-30			64	
0.15-0.5	CVP and current probe	Quasi Peak / 9 kHz	84-74	40-30
0.5-30			74	30
0.15-0.5	CVP and current probe	Average / 9 kHz	74-64	30-20
0.5-30			64	20
0.15-0.5	Current Probe	Quasi Peak / 9 kHz	n/a	40-30
0.5-30				30
0.15-0.5	Current Probe	Average / 9 kHz		30-20
0.5-30				20

****Remarks: It is not necessary to be tested on this item.**

4.1.1 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	$\theta_{3dB}(\text{min})$	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

4.1.2 Test Procedure

The radiated emissions test will then be repeated on the 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 chamber. Desktop EUT are set up on a FRP stand 0.8 meter above the ground or floor-standing arrangement shall be placed on the horizontal ground reference 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. The test volume for a height of up to 30 cm may be obstructed by absorber placed on the ground plane.

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 55032 / BS EN 55032 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.

4.1.3 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

4.2 Limit

Radiated emissions at frequencies up to 1 GHz for Class_A equipment:

Radiated emissions at frequencies up to 1 GHz for Class_A equipment:			
Frequency range MHz	Measurement		Class_A limits dB(μV/m)
	Distance m	Detector type / bandwidth	OATS/SAC
30-230	10	Quasi Peak / 120 kHz	40
230-1000			47
30-230	3		50
230-1000			57

Radiated emissions at frequencies above 1 GHz for Class_A equipment of the EN 55032:2015+A11:2020:

Frequency range MHz	Measurement		Class_A limits dB(μ V/m)
	Distance m	Detector type / bandwidth	FSOATS
1000-3000	3	Average / 1MHz	56
3000-6000			60
1000-3000		Peak / 1MHz	76
3000-6000			80

Radiated emissions at frequencies above 1 GHz for Class_A equipment of the EN 55032:2015+A1:2020:

Frequency range MHz	Measurement		Class_A limits dB(μ V/m)
	Distance m	Detector type / bandwidth	FSOATS
1000-6000	3	Average / 1MHz	60
1000-6000		Peak / 1MHz	80

Note 1: The radiated emissions at frequencies above 1 GHz test limit in this report is based on EN 55032:2015+A11:2020.

Note 2: Test data in this report has been taken against the EN 55032:2015+A11:2020 limit as it is the most stringent limit. By complying with the more restrictive EN 55032:2015+A11:2020 limit compliance with the EN 55032:2015+A1:2020 limit is also demonstrated.

Radiated emissions at frequencies up to 1 GHz for Class_B equipment:

Frequency range MHz	Measurement		Class_ B limits dB(μV/m)
	Distance m	Detector type / bandwidth	OATS/SAC
30-230	10	Quasi Peak / 120 kHz	30
230-1000			37
30-230	3		40
230-1000			47

**Radiated emissions at frequencies above 1 GHz for Class_B equipment of the
EN 55032:2015+A11:2020:**

Frequency range MHz	Measurement		Class_B limits dB(μ V/m)
	Distance m	Detector type / bandwidth	FSOATS
1000-3000	3	Average / 1MHz	50
3000-6000			54
1000-3000		Peak / 1MHz	70
3000-6000			74

**Radiated emissions at frequencies above 1 GHz for Class_B equipment of the
EN 55032:2015+A1:2020:**

Frequency range MHz	Measurement		Class_B limits dB(μ V/m)
	Distance m	Detector type / bandwidth	FSOATS
1000-6000	3	Average / 1MHz	54
1000-6000		Peak / 1MHz	74

Note 1: The radiated emissions at frequencies above 1 GHz test limit in this report is based on EN 55032:2015+A11:2020.

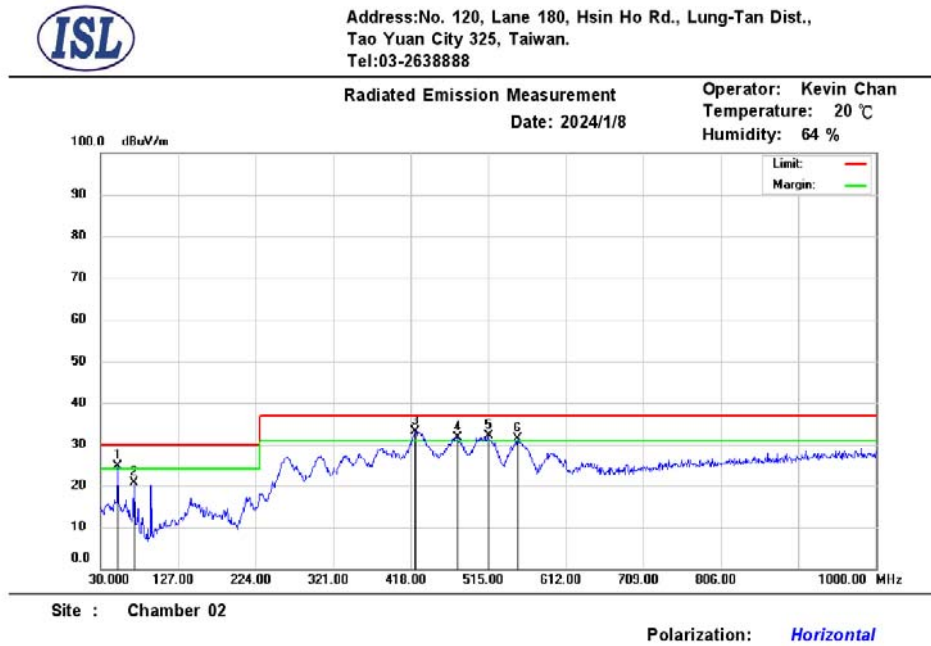
Note 2: Test data in this report has been taken against the EN 55032:2015+A11:2020 limit as it is the most stringent limit. By complying with the more restrictive EN 55032:2015+A11:2020 limit compliance with the EN 55032:2015+A1:2020 limit is also demonstrated.

Radiated emissions from FM receivers:

Frequency range MHz	Measurement		Class_B limits dB(μV/m)	
	Distance m	Detector type / bandwidth	Fundamental	Harmonics
			OATS/SAC	OATS/SAC
30-230	10	Quasi Peak / 120 kHz	50	42
230-300				42
300-1000				46
30-230	3		60	52
230-300				52
300-1000				56

4.3 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!	51.34	41.18	-16.63	24.55	30.00	-5.45	393	360	peak
2	71.71	39.74	-19.16	20.58	30.00	-9.42	100	3	peak
3*	423.82	43.45	-10.25	33.20	37.00	-3.80	200	331	peak
4!	476.20	40.67	-8.97	31.70	37.00	-5.30	200	358	peak
5!	515.00	40.11	-8.06	32.05	37.00	-4.95	153	360	peak
6!	551.86	38.82	-7.44	31.38	37.00	-5.62	200	164	peak

* Note:

Margin = Emission – Limit

Emission = Radiated Amplitude + Correct Factor

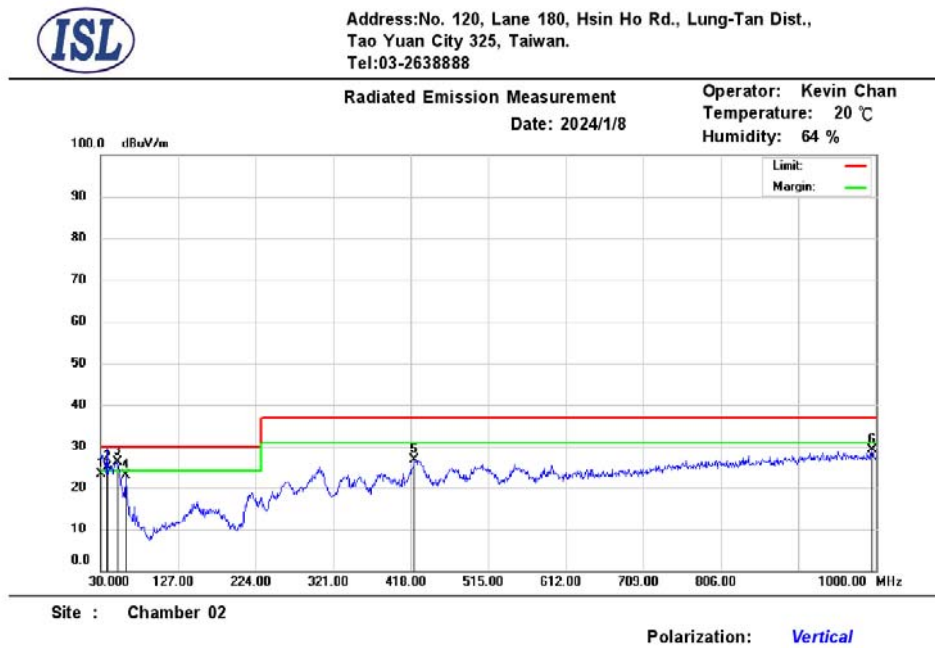
Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit

Antenna Distance: 10 meters

If the peak measured value meets the QP limit, The QP value is inherently compliant.

- 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	30.00	41.02	-17.96	23.06	30.00	-6.94	100	105	peak
21	37.76	42.27	-17.51	24.76	30.00	-5.24	397	360	QP
3*	51.34	42.87	-16.63	26.24	30.00	-3.76	100	289	peak
4	61.04	40.18	-17.25	22.93	30.00	-7.07	200	237	peak
5	422.85	36.82	-10.29	26.53	37.00	-10.47	100	317	peak
6	995.15	29.38	-0.17	29.21	37.00	-7.79	300	336	peak

* Note:

Margin = Emission – Limit

Emission = Radiated Amplitude + Correct Factor

Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain

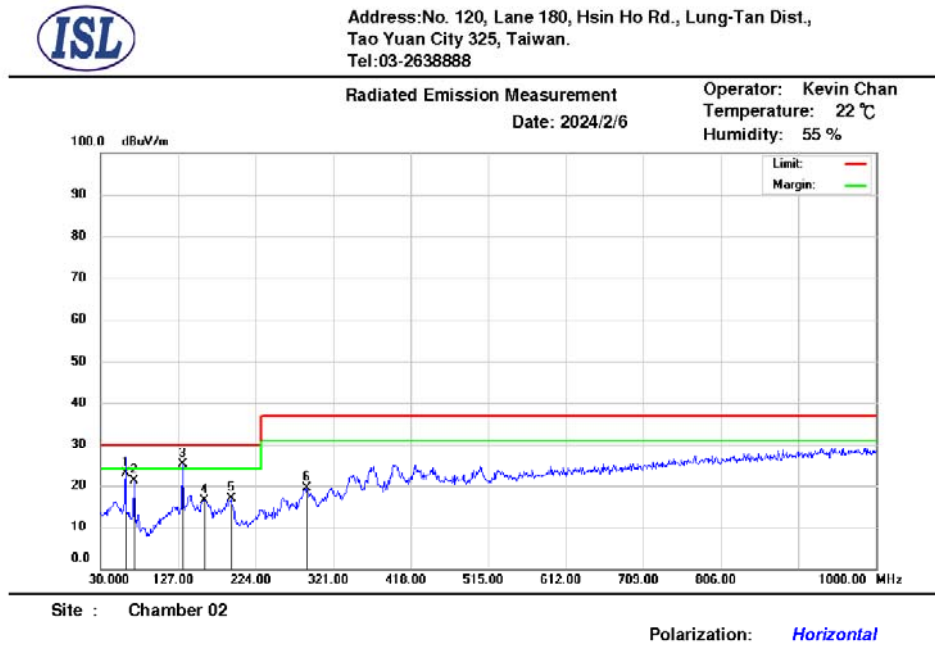
A margin of -8dB means that the emission is 8dB below the limit

Antenna Distance: 10 meters

If the peak measured value meets the QP limit, The QP value is inherently compliant.

4.4 Radiation Test Data: Configuration 2

- 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	61.04	40.23	-17.25	22.98	30.00	-7.02	382	0	peak
2	71.71	40.30	-19.16	21.14	30.00	-8.86	100	354	peak
3	132.82	42.31	-17.24	25.07	30.00	-4.93	393	0	peak
4	159.98	31.92	-15.47	16.45	30.00	-13.55	350	198	peak
5	192.96	34.93	-18.10	16.83	30.00	-13.17	399	0	peak
6	288.02	33.46	-14.08	19.38	37.00	-17.62	400	34	peak

* Note:

Margin = Emission – Limit

Emission = Radiated Amplitude + Correct Factor

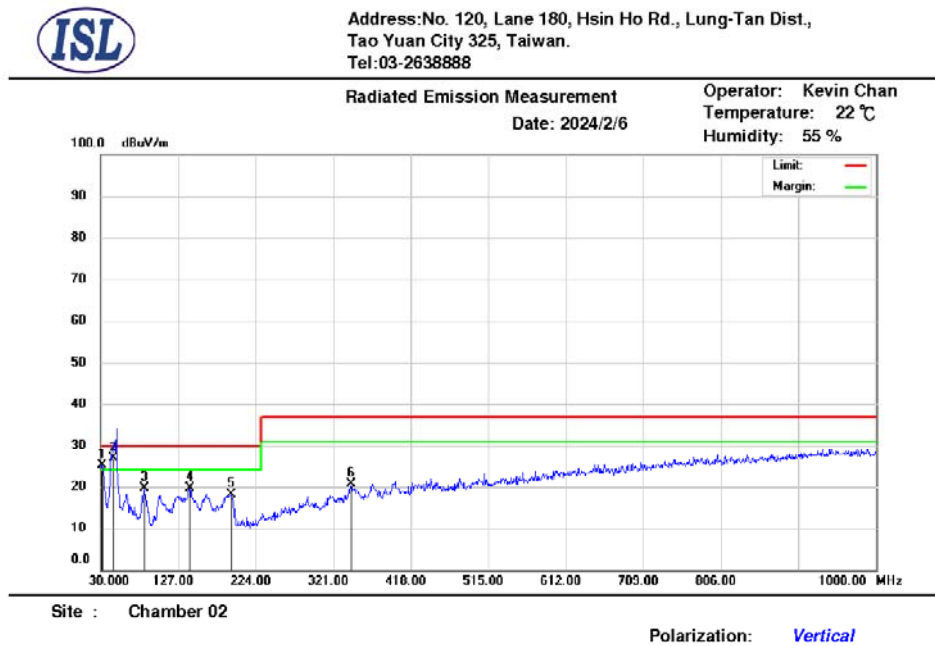
Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit

Antenna Distance: 10 meters

If the peak measured value meets the QP limit, The QP value is inherently compliant.

- 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	31.94	43.43	-18.40	25.03	30.00	-4.97	100	105	peak
2	47.38	43.75	-16.91	26.84	30.00	-3.16	100	355	QP
3	84.32	41.89	-22.16	19.53	30.00	-10.47	150	81	peak
4	141.55	35.67	-16.05	19.62	30.00	-10.38	100	9	peak
5	192.96	36.22	-18.10	18.12	30.00	-11.88	100	0	peak
6	343.31	33.02	-12.51	20.51	37.00	-16.49	100	331	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: 10 meters

If the peak measured value meets the QP limit, The QP value is inherently compliant.

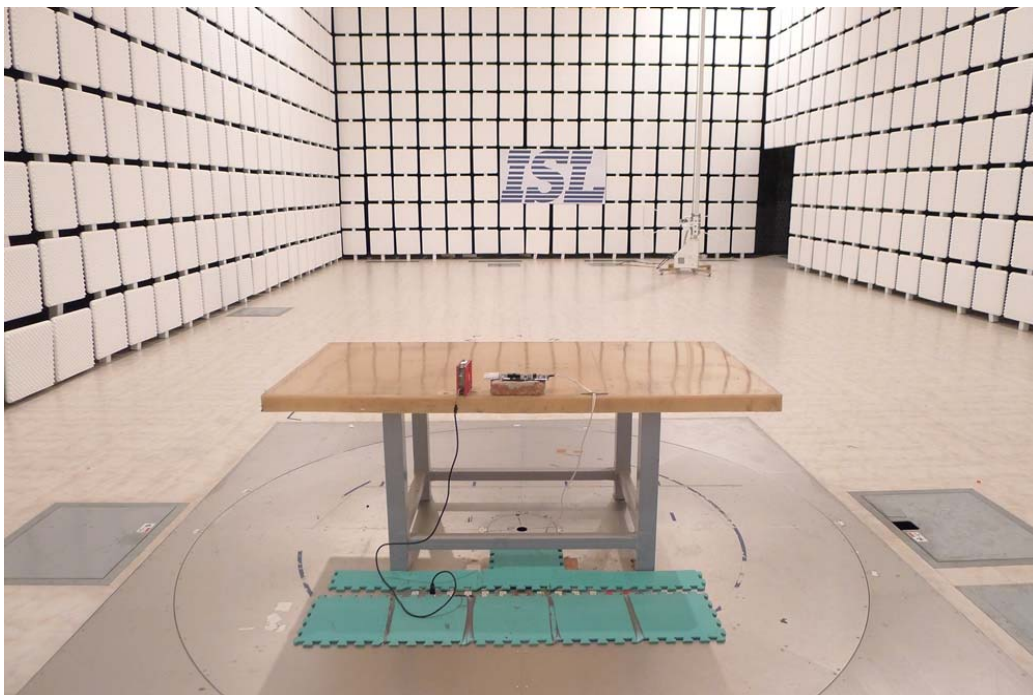
4.5 Test Setup Photo

Configuration 1

Front View (30MHz~1GHz)



Back View (30MHz~1GHz)

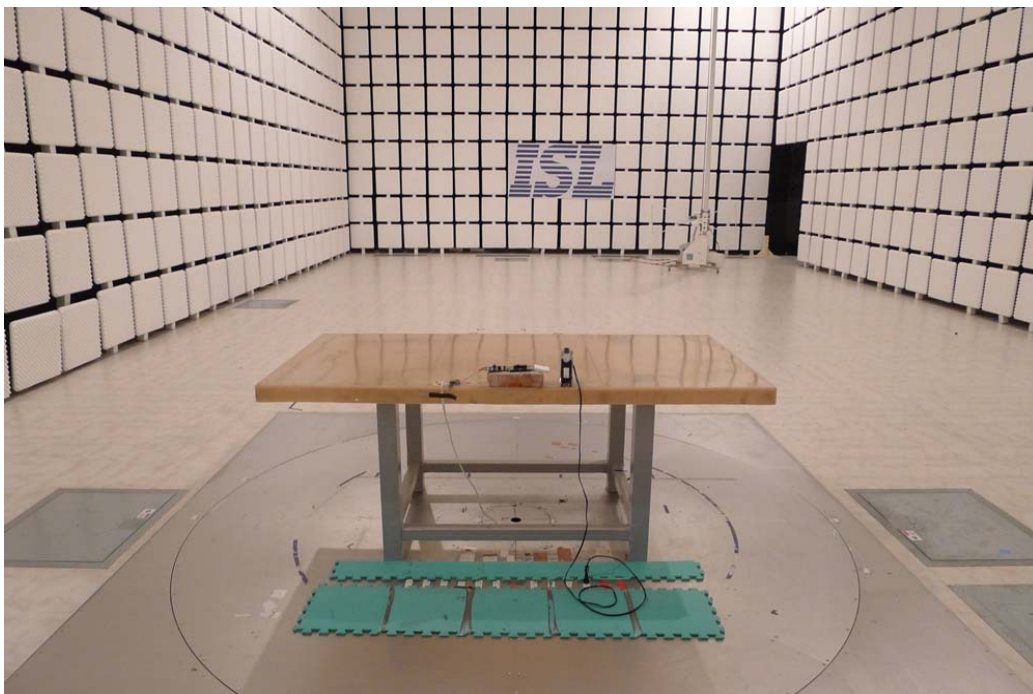


Configuration 2

Front View (30MHz~1GHz)



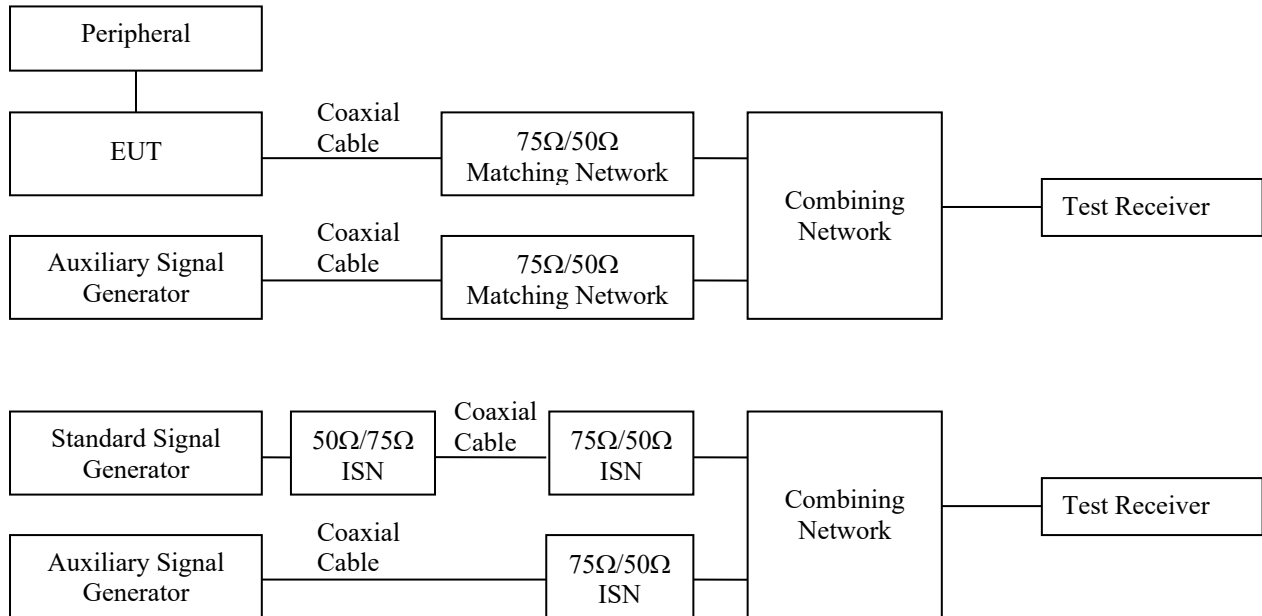
Back View (30MHz~1GHz)



5. Voltage Disturbance Emissions at Antenna Terminals

5.1 Test Setup and Procedure

5.1.1 Test Setup



5.1.2 Test Procedure

The output level of the auxiliary signal generator was set to 70dB μ V at the EUT antenna terminal with 75 ohms impedance with an un-modulated carrier.

The highest emissions 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 power of EUT was switched off to make sure the emission was not contributed by the auxiliary signal generator. While doing so, the interconnecting cables and major parts of the system were moved around to maximize the emission.

5.1.3 EMI Receiver Configuration (for the frequencies tested)

Frequency Range:	30MHz-2150MHz
Detector Function:	Quasi-Peak Mode
Resolution Bandwidth:	120kHz

5.1.4 Limit

Applicable to:

1. TV broadcast receiver tuner ports with an accessible connector.
2. RF modulator output ports.
3. FM broadcast receiver tuner ports with an accessible connector.

Applicable to

1. TV broadcast receiver tuner ports (3.1.8) with an accessible connector

2. RF modulator output ports (3.1.29)

3. FM broadcast receiver tuner ports (3.1.8) with an accessible connector

Table clause	Frequency range MHz	Detector type/ bandwidth	Class B limits dB(μV) 75 Ω			Applicability
			Other	Local Oscillator Fundamental	Local Oscillator Harmonics	
A13.1	30 to 950	For frequencies ≤1 GHz	46	46	46	See ^a
	950 to 2 150		46	54	54	
A13.2	950 to 2 150	Quasi Peak/ 120 kHz	46	54	54	See ^b
A13.3	30 to 300	For frequencies ≥1 GHz	46	54	50	See ^c
	300 to 1 000				52	
A13.4	30 to 300	Peak/ 1 MHz	46	66	59	See ^d
	300 to 1 000				52	
A13.5	30 to 950	Peak/ 1 MHz	46	76	46	See ^e
	950 to 2 150			n/a	54	

^a Television receivers (analogue or digital), video recorders and PC TV broadcast receiver tuner cards working in channels between 30 MHz and 1 GHz, and digital audio receivers.

^b Tuner units (not the LNB) for satellite signal reception.

^c Frequency modulation audio receivers and PC tuner cards.

^d Frequency modulation car radios.

^e Applicable to EUTs with RF modulator output ports (for example DVD equipment, video recorders, camcorders and decoders etc.) designed to connect to TV broadcast receiver tuner ports. Limits specified for the LO are for the RF modulator carrier signal and harmonics.

The term 'other' refers to all emissions other than the fundamental and the harmonics of the LO.

The measurement shall cover the entire frequency range.

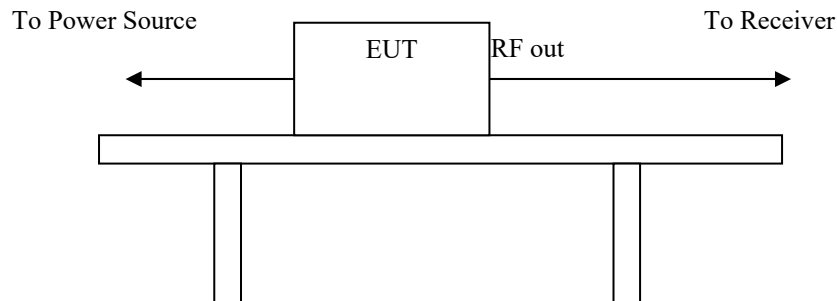
The EUT shall be tuned in accordance with Table B.3 and clause C.4.2.1.

****Remarks: It is not necessary to be tested on this item.**

6. Differential Voltage Emissions

6.1 Test Setup and Procedure

6.1.1 Test Setup



6.1.2 Test Procedure

The output level of the auxiliary signal generator was set to 70dB μ V at the EUT antenna terminal with 75 ohms impedance with an un-modulated carrier.

The highest emissions 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 power of EUT was switched off to make sure the emission was not contributed by the auxiliary signal generator. While doing so, the interconnecting cables and major parts of the system were moved around to maximize the emission.

6.1.3 EMI Receiver Configuration (for the frequencies tested)

Frequency Range:	30MHz-2150MHz
Detector Function:	Quasi-Peak Mode
Resolution Bandwidth:	120kHz

6.1.4 Limit

Applicable to:

1. TV broadcast receiver tuner ports with an accessible connector.
2. RF modulator output ports.
3. FM broadcast receiver tuner ports with an accessible connector.

Applicable to

1. TV broadcast receiver tuner ports (3.1.8) with an accessible connector

2. RF modulator output ports (3.1.29)

3. FM broadcast receiver tuner ports (3.1.8) with an accessible connector

Table clause	Frequency range MHz	Detector type/ bandwidth	Class B limits dB(μV) 75 Ω			Applicability
			Other	Local Oscillator Fundamental	Local Oscillator Harmonics	
A13.1	30 to 950	For frequencies ≤1 GHz	46	46	46	See ^a
	950 to 2 150		46	54	54	
A13.2	950 to 2 150	Quasi Peak/ 120 kHz	46	54	54	See ^b
A13.3	30 to 300		46	54	50	See ^c
	300 to 1 000			52		
A13.4	30 to 300	For frequencies ≥1 GHz	46	66	59	See ^d
	300 to 1 000				52	
A13.5	30 to 950	Peak/ 1 MHz	46	76	46	See ^e
	950 to 2 150			n/a	54	

^a Television receivers (analogue or digital), video recorders and PC TV broadcast receiver tuner cards working in channels between 30 MHz and 1 GHz, and digital audio receivers.

^b Tuner units (not the LNB) for satellite signal reception.

^c Frequency modulation audio receivers and PC tuner cards.

^d Frequency modulation car radios.

^e Applicable to EUTs with RF modulator output ports (for example DVD equipment, video recorders, camcorders and decoders etc.) designed to connect to TV broadcast receiver tuner ports. Limits specified for the LO are for the RF modulator carrier signal and harmonics.

The term 'other' refers to all emissions other than the fundamental and the harmonics of the LO.

The measurement shall cover the entire frequency range.

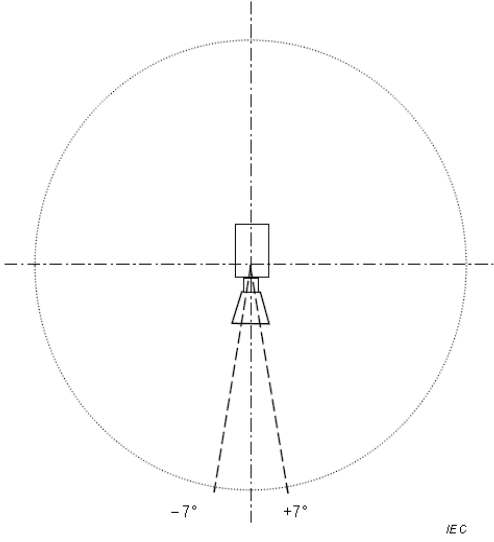
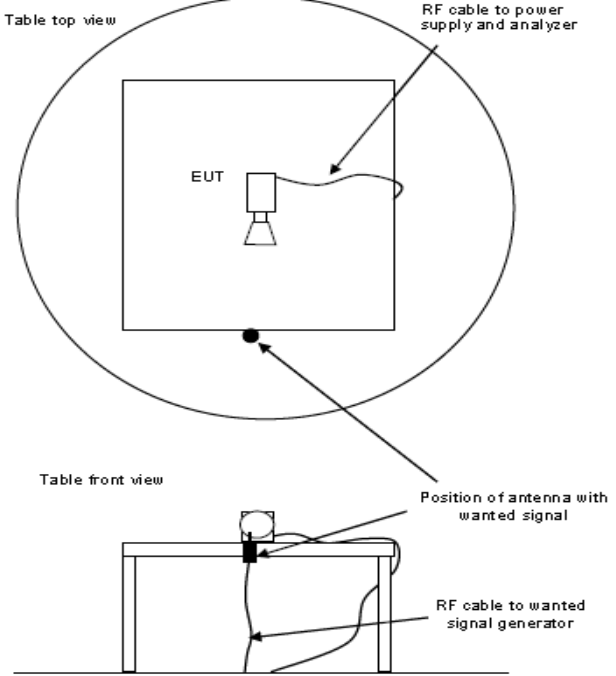
The EUT shall be tuned in accordance with Table B.3 and clause C.4.2.1.

****Remarks: It is not necessary to be tested on this item.**

7. Outdoor units of home satellite receiving systems

7.1 Test Setup and Procedure

7.1.1 Test Setup

	
Description of $\pm 7^\circ$ of the main beam axis of the EUT	Measurement arrangements of transmit antenna for the wanted signal

7.1.2 Test Procedure

The input signal shall be adjusted to get the maximum rated output level from the EUT. For the measurement in the frequency range from 30 MHz to 18 GHz the input signal shall be adjusted so that the output frequency is within this frequency range. For the measurement in the frequency range above 1 GHz, the frequency of the input signal shall be adjusted in such a way that the EUT is measured, as a minimum, at the lowest, middle and highest rated output frequency within the measured frequency range.

7.1.3 Spectrum Analyzer Configuration (for the frequencies tested)

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

Frequency Range: Above 1000MHz
 Detector Function: Peak/Average Mode
 Resolution Bandwidth: 1MHz

7.1.4 Limit

EN 55032:2015+A11:2020

Table Clause	Frequency Range MHz	Measurement			Class B Limits	Applicable to
		Facility (see Table A.1)	Distance m	Detector type / Bandwidth		
A7.1	30 to 1 000	SAC / OATS / FAR	See Table A.4	Quasi Peak / 120 kHz	See Table A.4	
A7.2	1 000 to 2 500	FSOATS	3	Average / 1 MHz	50 dB(μV/m)	LO leakage and spurious radiated emissions from the EUT, in the region outside ±7° of the main beam axis. See Figure H.1
	2 500 to 18 000				64 dB(μV/m)	
A7.3	1 000 to 18 000	FSOATS	3	Average / 1 MHz	37 dB(μV/m)	LO leakage from the EUT, in the region within ±7° of the main beam axis. See Figure H.1
A7.4	1 000 to 18 000	Conducted (Clause H.4)	n/a	Average / 1 MHz	30 dBpW	

For details of the EUT configuration, see Annex H.

For radiated emissions measurements at frequencies up to 1 GHz, the requirements defined in Table A.4 shall be satisfied.

Apply the appropriate limits across the entire frequency range.

Apply the limits defined in table Clause A7.1 and A7.2. Also apply the limits defined in either table Clause A7.3 or A7.4.

EN 55032:2015+A1:2020

Table Clause	Frequency Range MHz	Measurement			Class B Limits	Notes
		Facility (see Table A.1)	Distance m	Detector type / Bandwidth		
A7.1	30 to 1 000	SAC / OATS / FAR	See Table A.4	Quasi Peak / 120 kHz	See Table A.4	See Annex H
A7.2	1 000 to 2 500	FSOATS	3	Average / 1 MHz	50 dB(μV/m)	LO leakage and spurious radiated emissions from the EUT, in the region outside ±7° azimuth of the main beam axis. See Annex H
	2 500 to 18 000				64 dB(μV/m)	
A7.3	1 000 to 18 000	FSOATS	3	Average / 1 MHz	70 dB(μV/m)	LO leakage from the EUT, in the region within ±7° azimuth of the main beam axis. See Annex H
A7.4	1 000 to 18 000	Conducted (Clause H.4)	n/a	Average / 1 MHz	63 dBpW	

Apply the limits defined in table Clause A7.1 and A7.2. Also apply the limits defined in either table Clause A7.3 or A7.4.

For details of the EUT configuration, see Annex H.

For radiated emissions measurements at frequencies up to 1 GHz, the requirements defined in Table A.4 shall be satisfied.

Apply the appropriate limits across the entire frequency range.

Note 1: The test limit in this report is based on EN 55032:2015+A11:2020.

Note 2: Test data in this report has been taken against the EN 55032:2015+A11:2020 limit as it is the most stringent limit. By complying with the more restrictive EN 5032:2015+A11:2020 limit compliance with the EN 55032:2015+A1:2020 limit is also demonstrated.

****Remarks: It is not necessary to be tested on this item.**

8. Electrostatic discharge immunity

8.1 Test Specification and Setup

8.1.1 Test Specification

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

Selected Test Point

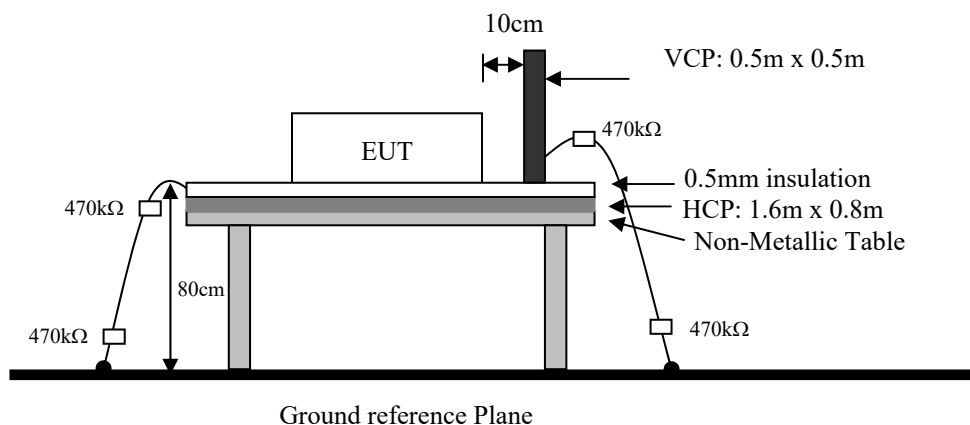
Air: discharges were applied to slots, aperture or insulating surfaces. 10 single air discharges were applied to each selected points.

Contact: 10 discharges minimum were 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.

8.1.2 Test Setup

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



8.1.3 Test Result

Performance of EUT complies with the given specification.

8.2 Test Data: Configuration 1

Basic Standard	EN 61000-4-2	Date									
EUT Model Name	TEN 40-7213UIR-B2	2024-03-25									
Barometer Pressure	97.6kPa	Engineer									
Temperature	22°C	Leo Zhan									
Humidity	40%	Equipment & Test Site									
Voltage/Freq.	72Vdc	EM TEST(Model: Dito)									
ESD GUN 14 & ESD 2F											
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 10 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							
5	A	A	A	A							
Air Discharge	Voltage kV 10 Discharge @ 1 PPS										
Test Location	+2	-2	+4	-4	+8	-8					Comments
1	A	A	A	A	A	A					
2	A	A	A	A	A	A					
3	A	A	A	A	A	A					
4	A	A	A	A	A	A					
5	A	A	A	A	A	A					
Indirect Discharge	Voltage kV 10 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											

8.3 Test Point

Red arrow lines indicate the contact points, and blue arrow lines indicate the air points.
Figure 1 : Test Point Assignments Discharge:

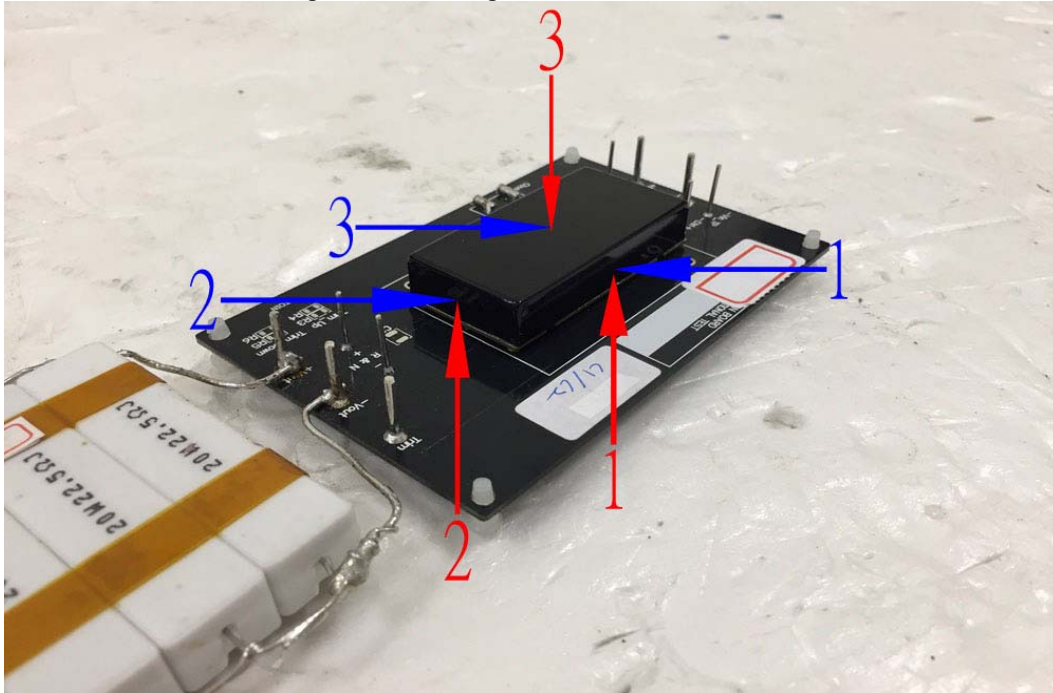
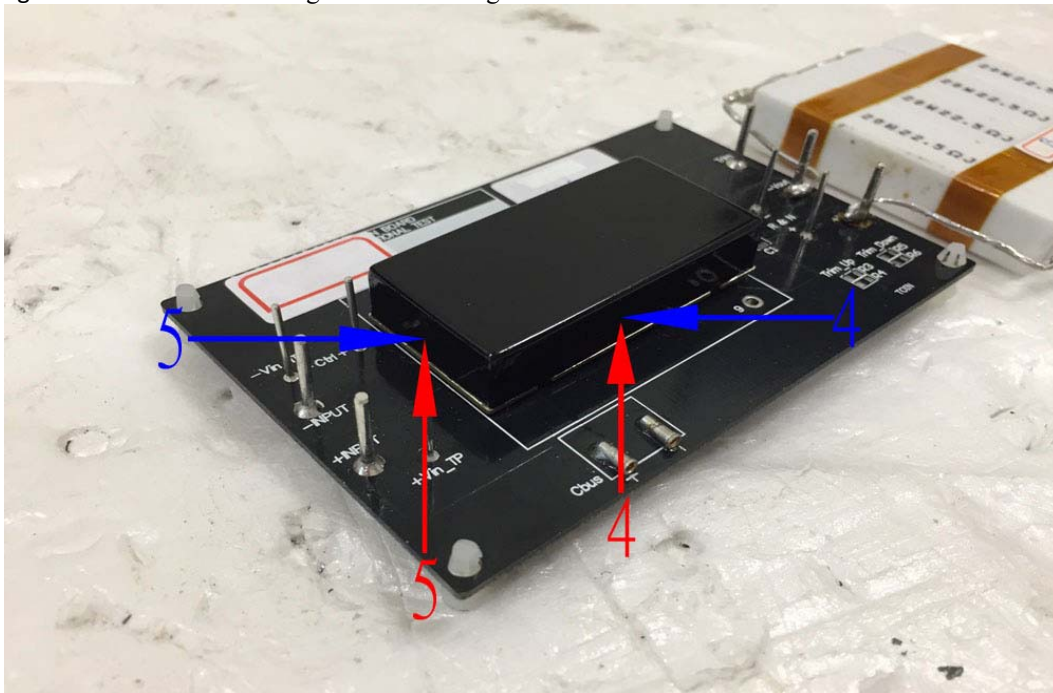
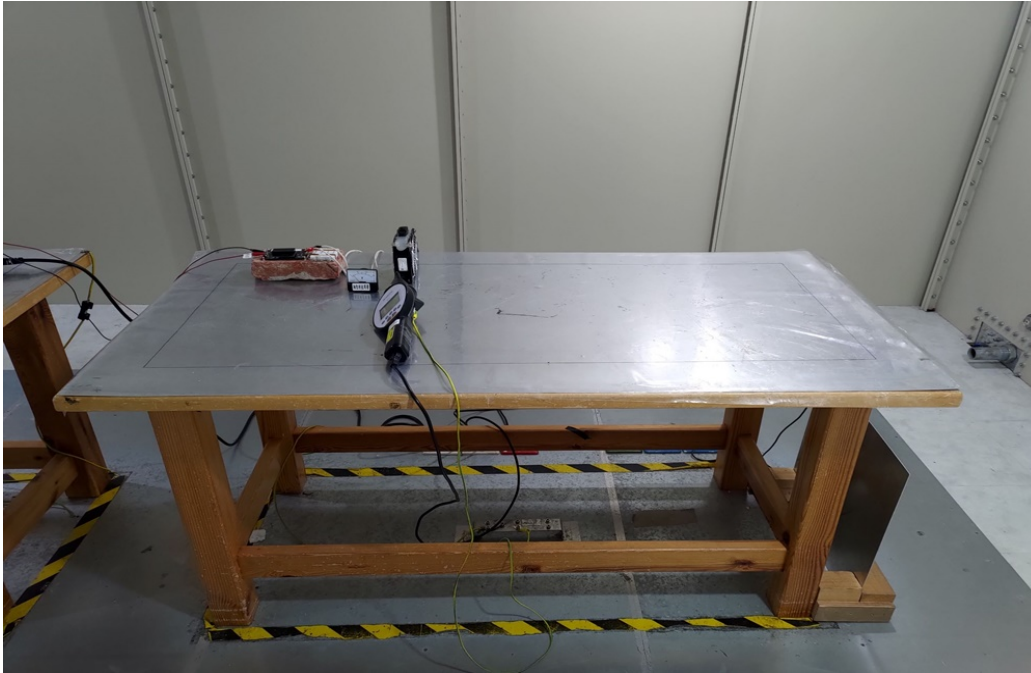


Figure 2 : Test Point Assignments Discharge:



8.4 Test Setup Photo



9. Radiated, radio-frequency, electromagnetic field immunity

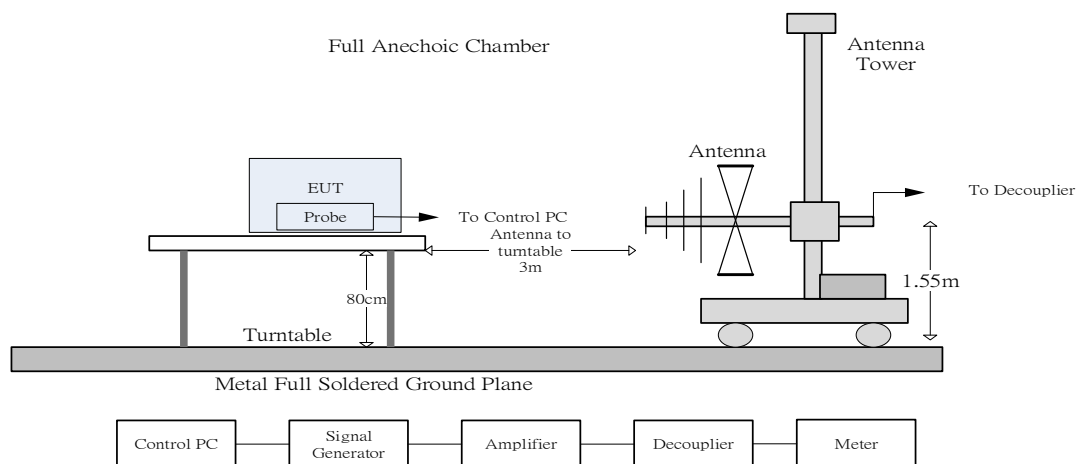
9.1 Test Specification and Setup

9.1.1 Test Specification

Port:	Enclosure
Basic Standard:	EN IEC 61000-4-3 / IEC 61000-4-3 / BS EN IEC 61000-4-3 (details referred to Sec 1.2)
Test Level: (By manufacture reference)	20 V/m 10 V/m, 10 V/m, 10 V/m, 10 V/m
Modulation:	AM 1kHz 80%
Frequency range:	80 MHz~1 GHz 1800MHz, 2600MHz, 3500MHz, 5000MHz
Frequency Step:	1% of last step frequency
Dwell time:	2s
Polarization:	Vertical and Horizontal
EUT Azimuth Angle	☒0° ☒90° ☒180° ☒270°
Criteria:	A
Test Procedure:	refer to ISL QA -T4-E-S8
Temperature:	See attached data
Humidity:	See attached data

9.1.2 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.



9.1.3 Test Result

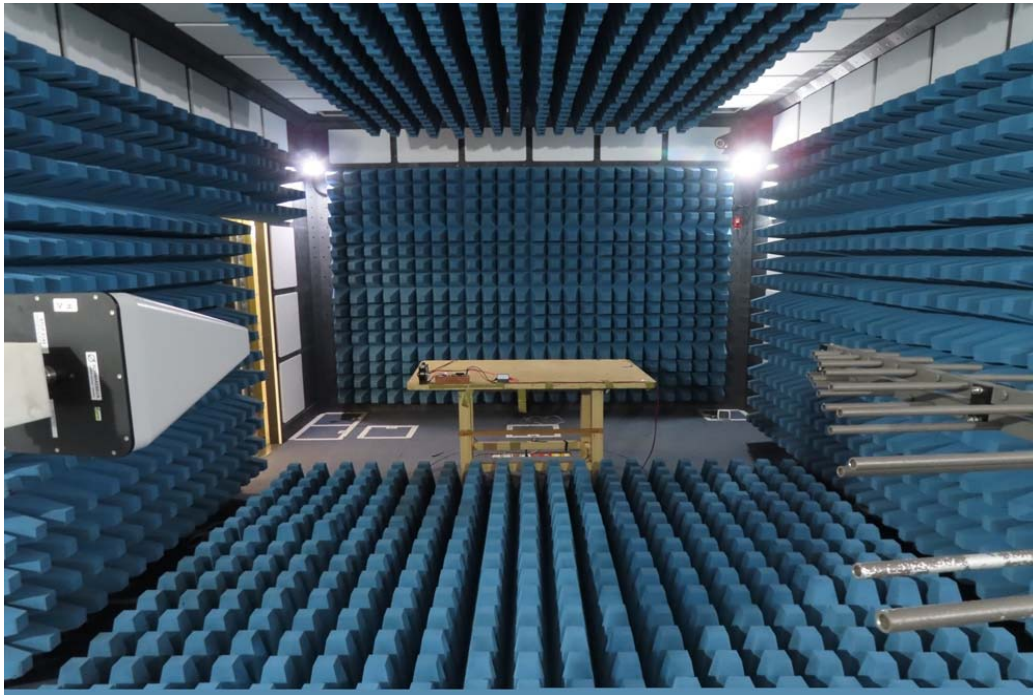
Performance of EUT complies with the given specification.

9.2 Test Data: Configuration 1

Basic Standard	EN 61000-4-3					Date		
EUT Model Name	TEN 40-7213UIR-B2					2024-04-02		
						Engineer		
Barometer Pressure	97.6kPa					SAWYER		
Temperature	23°C					Equipment & Test Site		
Humidity	55%					Chamber 15		
Voltage/Freq.	72 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	2s	80% @ 1kHz	20	Vertical	A	
90°(left)	80-1000	1	2s	80% @ 1kHz	20	Vertical	A	
180°(back)	80-1000	1	2s	80% @ 1kHz	20	Vertical	A	
270°(right)	80-1000	1	2s	80% @ 1kHz	20	Vertical	A	
0°(front)	80-1000	1	2s	80% @ 1kHz	20	Horizontal	A	
90°(left)	80-1000	1	2s	80% @ 1kHz	20	Horizontal	A	
180°(back)	80-1000	1	2s	80% @ 1kHz	20	Horizontal	A	
270°(right)	80-1000	1	2s	80% @ 1kHz	20	Horizontal	A	
0°(front)	1800	1	2s	80% @ 1kHz	10	Vertical	A	
90°(left)	1800	1	2s	80% @ 1kHz	10	Vertical	A	
180°(back)	1800	1	2s	80% @ 1kHz	10	Vertical	A	
270°(right)	1800	1	2s	80% @ 1kHz	10	Vertical	A	
0°(front)	1800	1	2s	80% @ 1kHz	10	Horizontal	A	
90°(left)	1800	1	2s	80% @ 1kHz	10	Horizontal	A	
180°(back)	1800	1	2s	80% @ 1kHz	10	Horizontal	A	
270°(right)	1800	1	2s	80% @ 1kHz	10	Horizontal	A	
0°(front)	2600	1	2s	80% @ 1kHz	10	Vertical	A	
90°(left)	2600	1	2s	80% @ 1kHz	10	Vertical	A	
180°(back)	2600	1	2s	80% @ 1kHz	10	Vertical	A	
270°(right)	2600	1	2s	80% @ 1kHz	10	Vertical	A	

EUT Angle	Frequency		Dwell time	Modulation	Level (V/m)	Antenna Polarization	EUT Status	Comments
	Range (MHz)	Steps %						
0°(front)	2600	1	2s	80% @ 1kHz	10	Horizontal	A	
90°(left)	2600	1	2s	80% @ 1kHz	10	Horizontal	A	
180°(back)	2600	1	2s	80% @ 1kHz	10	Horizontal	A	
270°(right)	2600	1	2s	80% @ 1kHz	10	Horizontal	A	
0°(front)	3500	1	2s	80% @ 1kHz	10	Vertical	A	
90°(left)	3500	1	2s	80% @ 1kHz	10	Vertical	A	
180°(back)	3500	1	2s	80% @ 1kHz	10	Vertical	A	
270°(right)	3500	1	2s	80% @ 1kHz	10	Vertical	A	
0°(front)	3500	1	2s	80% @ 1kHz	10	Horizontal	A	
90°(left)	3500	1	2s	80% @ 1kHz	10	Horizontal	A	
180°(back)	3500	1	2s	80% @ 1kHz	10	Horizontal	A	
270°(right)	3500	1	2s	80% @ 1kHz	10	Horizontal	A	
0°(front)	5000	1	2s	80% @ 1kHz	10	Vertical	A	
90°(left)	5000	1	2s	80% @ 1kHz	10	Vertical	A	
180°(back)	5000	1	2s	80% @ 1kHz	10	Vertical	A	
270°(right)	5000	1	2s	80% @ 1kHz	10	Vertical	A	
0°(front)	5000	1	2s	80% @ 1kHz	10	Horizontal	A	
90°(left)	5000	1	2s	80% @ 1kHz	10	Horizontal	A	
180°(back)	5000	1	2s	80% @ 1kHz	10	Horizontal	A	
270°(right)	5000	1	2s	80% @ 1kHz	10	Horizontal	A	
Additional Notes: A=criteria A, B=criteria B, C=criteria C								

9.3 Test Setup Photo



10. Electrical fast transient/burst immunity

10.1 Test Specification and Setup

10.1.1 Test Specification

Port:	DC mains
Basic Standard:	EN 61000-4-4 / IEC 61000-4-4 / BS EN 61000-4-4 (details referred to Sec 1.2)
Test Level: (By manufacture reference)	DC Power Port: +/- 2 kV
Rise Time:	5ns
Hold Time:	50ns
Burst Period:	300ms
Repetition Frequency:	5kHz
Criteria:	B
Test Procedure:	refer to ISL QA -T4-E-S9
Temperature:	See attached data
Humidity:	See attached data

Test Procedure

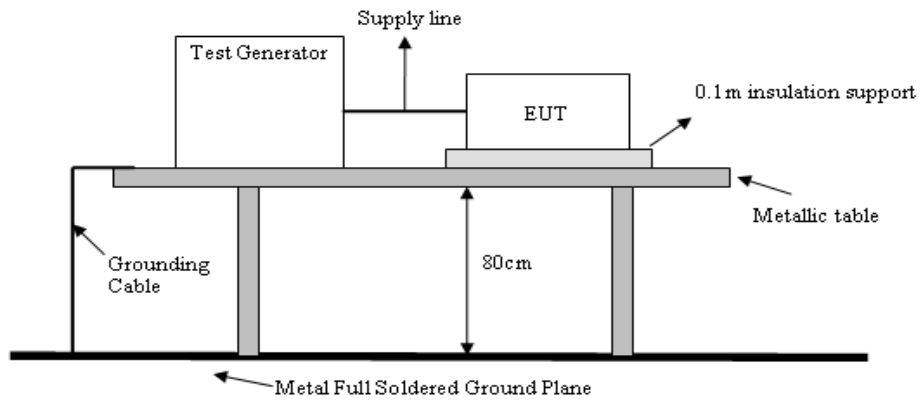
The EUT was setup on a nonconductive table 0.1 m above a reference ground plane.

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

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

10.1.2 Test Setup

EUT is at least 50cm from the conductive structure.

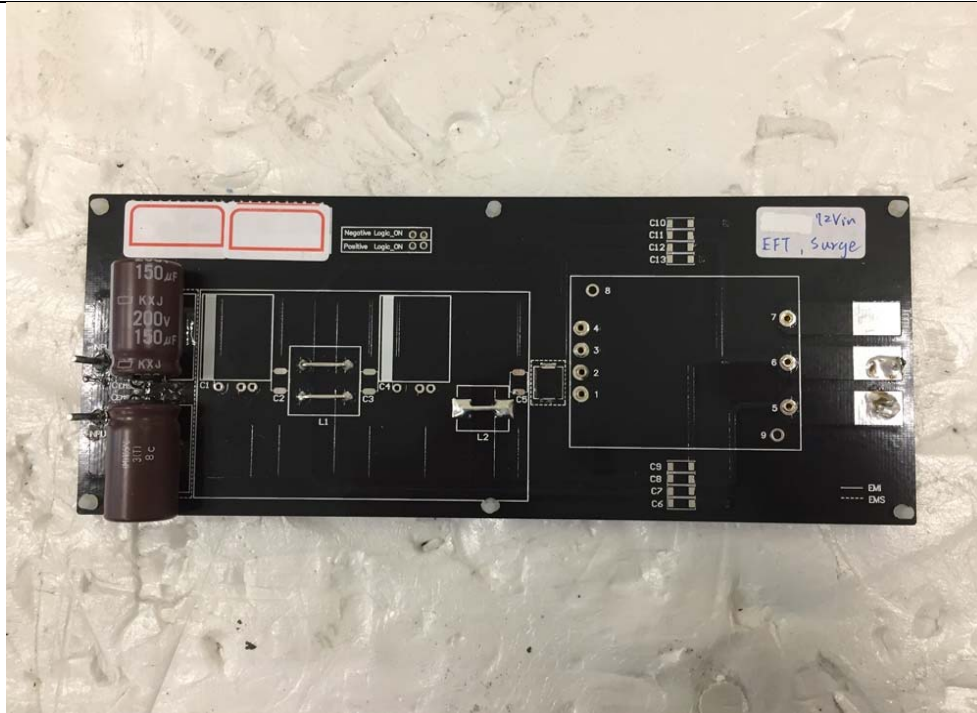


10.1.3 Test Result

Performance of EUT complies with the given specification.

10.2 Test Data: Configuration 1

Basic Standard	EN 61000-4-4		Date				
EUT Model Name	TEN 40-7213UIR-B2		2024-04-02				
Barometer Pressure	97.6kPa		Engineer				
Temperature	24°C		SAWYER				
Humidity	52%		Equipment & Test Site				
Voltage/Freq.	72 Vdc		EMC-PARTNER (Model: IMU3000)				
A=criteria A, B=criteria B, C=criteria C							
AC Power Port: <input type="checkbox"/>		DC Power Port: <input checked="" type="checkbox"/>		LAN Port: <input type="checkbox"/> Telephone Port: <input type="checkbox"/>			
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							
NOTE: For the countermeasure components, please refer to Solution:” For Electrical Fast transient & Surge Immunity test requirements”							



10.3 Test Setup Photo



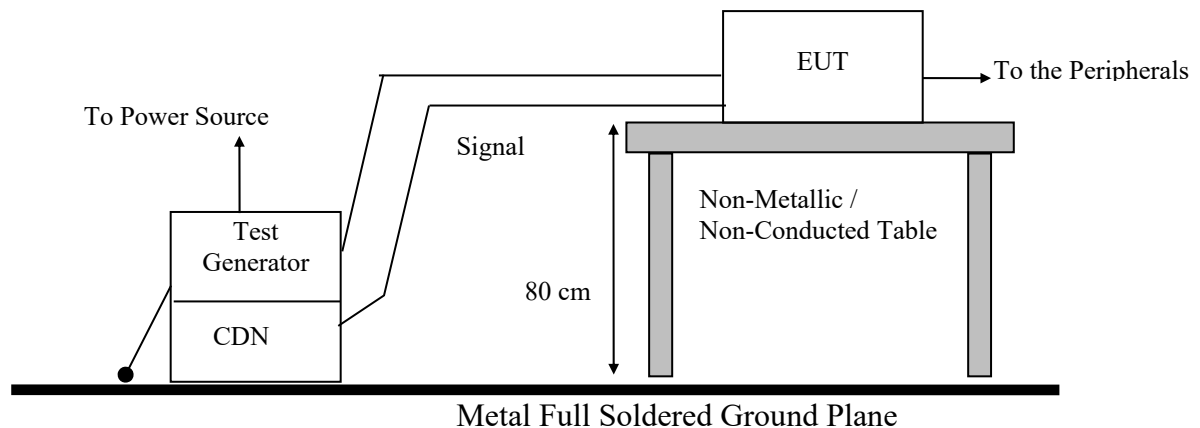
11. Surge immunity

11.1 Test Specification and Setup

11.1.1 Test Specification

Port:	DC mains
Basic Standard:	EN 61000-4-5 / IEC 61000-4-5 / BS EN 61000-4-5 (details referred to Sec 1.2)
Test Level: (By manufacture reference)	Line to Line: +/- 0.5 kV, +/- 1 kV, +/- 2 kV
Rise Time:	1.2us
Hold Time:	50us
Repetition Rate:	60 seconds
Angle:	<input type="checkbox"/> 0° <input type="checkbox"/> 90° <input type="checkbox"/> 180° <input type="checkbox"/> 270°
Criteria:	B
Test Procedure:	refer to ISL QA -T4-E-S10
Temperature:	See attached data
Humidity:	See attached data

11.1.2 Test Setup



11.1.3 Test Result

Performance of EUT complies with the given specification.

11.2 Test Data: Configuration 1

Basic Standard	EN 61000-4-5	Date						
EUT Model Name	TEN 40-7213UIR-B2	2024-04-02						
Barometer Pressure	97.6kPa	Engineer	SAWYER					
Temperature	24°C	Equipment & Test Site						
Humidity	52%	EMC-PARTNER (Model:	IMU3000)					
Voltage/Freq.	72 Vdc							
A=criteria A, B=criteria B, C=criteria C								
AC Power Port: <input type="checkbox"/>	DC Power Port: <input checked="" type="checkbox"/>	LAN Port: <input type="checkbox"/>	Telephone Port: <input type="checkbox"/>					
DC Power Port								
Line Under Test	Voltage	Level	Polarity	Repetition Rate	Cycle	Pulse Position	EUT Status	Comments
Line-Neutral	0.5kV	1	+	60 sec	5		A	
Line-Neutral	0.5kV	1	-	60 sec	5		A	
Line- Neutral	1.0kV	2	+	60 sec	5		A	
Line- Neutral	1.0kV	2	-	60 sec	5		A	
Line- Neutral	2.0kV	2	+	60 sec	5		A	
Line- Neutral	2.0kV	2	-	60 sec	5		A	
Additional Notes: A=criteria A, B=criteria B, C=criteria C								
NOTE: For the countermeasure components, please refer to Solution:” For Electrical Fast transient & Surge Immunity test requirements”								



11.3 Test Setup Photo



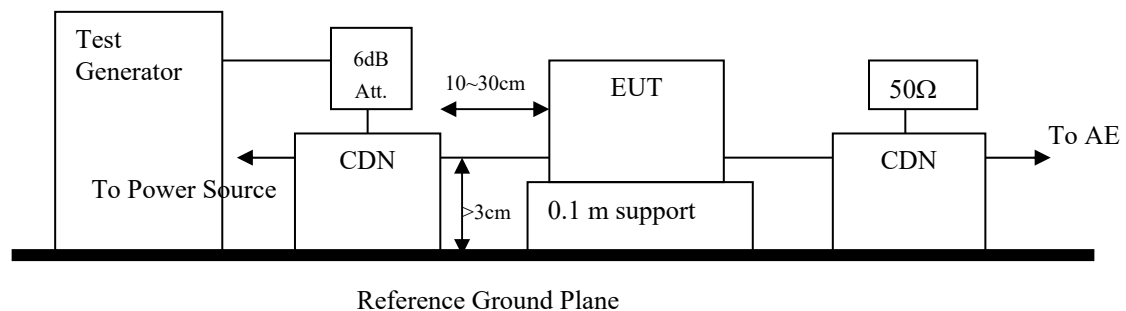
12. Immunity to conducted disturbances

12.1 Test Specification and Setup

12.1.1 Test Specification

Port:	DC mains
Basic Standard:	EN 61000-4-6 / IEC 61000-4-6 / BS EN 61000-4-6 (details referred to Sec 1.2)
Test Level: (By manufacture reference)	0.15MHz to 80MHz: 10 Vrms
Modulation:	AM 1kHz 80%
Frequency Step:	1% of last Frequency
Dwell time:	2s
Criteria:	A
CDN Type:	CDN M2+M3
Test Procedure:	refer to ISL QA -T4-E-S11
Temperature:	See attached data
Humidity:	See attached data

12.1.2 Test Setup



12.1.3 Test Result

Performance of EUT complies with the given specification.

12.2 Test Data: Configuration 1

Basic Standard	EN 61000-4-6			Date			
EUT Model Name	TEN 40-7213UIR-B2			2024-04-02			
				Engineer			
Barometer Pressure	97.6kPa			SAWYER			
Temperature	24°C			Equipment & Test Site			
Humidity	57%			FRANKONIA (Model: CIT-10/75)			
Voltage/Freq.	72 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	2s	A	
Additional Notes: A=criteria A, B=criteria B, C=criteria C							

12.3 Test Setup Photo



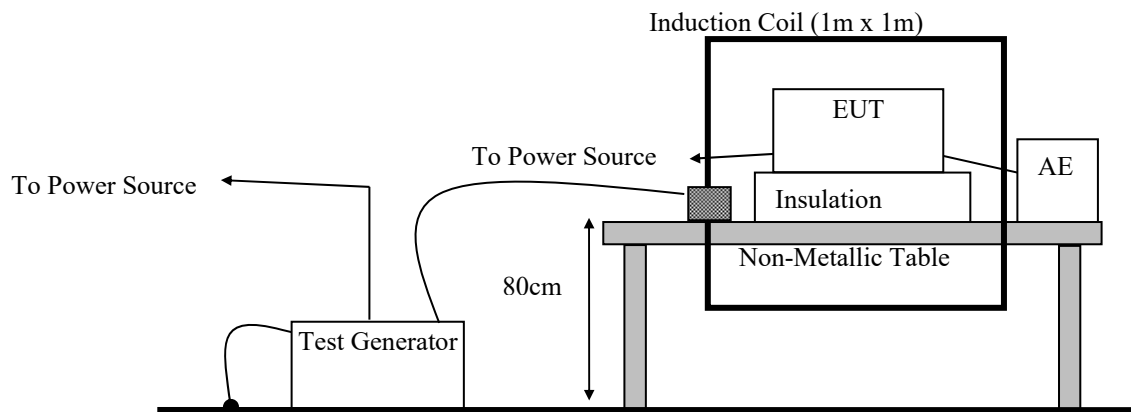
13. Power frequency magnetic field immunity

13.1 Test Specification and Setup

13.1.1 Test Specification

Port:	Enclosure
Basic Standard:	EN 61000-4-8 / IEC 61000-4-8 / BS EN 61000-4-8 (details referred to Sec 1.2)
Test Level: (By manufacture reference)	100 A/m, 1000 A/m
Polarization:	X, Y, Z
Criteria:	A
Test Procedure:	refer to ISL QA -T4-E-S12
Temperature:	See attached data
Humidity:	See attached data

13.1.2 Test Setup



13.1.3 Test Result

Performance of EUT complies with the given specification.

13.2 Test Data: Configuration 1

Basic Standard		EN 61000-4-8		Date	
EUT Model Name		TEN 40-7213UIR-B2		2024-04-02	
				Engineer	
Barometer Pressure		97.6kPa		SAWYER	
Temperature		24°C		Equipment & Test Site	
Humidity		55%		Magnetic Field Immunity Loop Brand: Pic Model:PMF1000 & Magnetic Field Test AC Power Source Brand: Pic Model: AC Power Source	
Voltage/Freq.		72Vdc			
A=criteria A, B=criteria B, C=criteria C					
Antenna Polarization	Test Level		Test Duration	EUT Status	Comment
X	100 A/m		1 Minutes	A	
Y	100 A/m		1 Minutes	A	
Z	100 A/m		1 Minutes	A	
X	1000 A/m		1 Second	A	
Y	1000 A/m		1 Second	A	
Z	1000 A/m		1 Second	A	
Additional Notes: A=criteria A, B=criteria B, C=criteria C					

13.3 Test Setup Photo



14. Appendix

14.1 Appendix A: Test Equipment

14.1.1 Test Equipment List

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Conduction 03	EMI Receiver 20	R&S	ESR7	101326	05/25/2023	05/25/2024
Conduction 03	Chamber05-1 Cable	WOKEN	CFD 300-NL	Chamber05-1 Cable	08/25/2023	08/25/2024
Conduction 03	LISN 22	ROHDE & SCHWARZ	ENV216	101478	11/01/2023	11/01/2024
Conduction 03 (>16A)	LISN 24	SCHWARZBECK	NNLK 8121	8121-829	07/27/2023	07/27/2024

Location Chamber02	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Radiation	BILOG Antenna 17 (30MHz~1GHz)	SCHWARZBECK	VULB 9168+EMCI-N-6-05	645	11/16/2023	11/16/2024
Radiation	Preamplifier 25	EMCI	EMC9135	980295	03/24/2023	03/24/2024
Radiation	Coaxial Cable Chmb 02-10M-02	EMC	RG214U	Chmb 02-10M-02	10/04/2023	10/04/2024
Radiation	EMI Receiver 14	R&S	ESCI	100887	05/19/2023	05/19/2024

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
EN61K-4-2	ESD Gun 12	EM TEST	Dito	P1650188689	04/10/2023	04/10/2024
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 250W	AR	250W1000C	358877	N/A	N/A
EN61K-4-3	Amplifier 0.7~6GHz 60W	AR	60S1G6	358973	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 1-6GHz	Woken	STI07-0005-40	N/A	N/A	N/A
EN61K-4-3	Signal Generator 07	R&S	SMB100A	107780	12/26/2023	12/26/2024
EN61K-4-4 EN61K-4-5	Signal Generator 10	EMC Partner	IMU3000	1547	09/07/2023	09/07/2024
EN61K-4-6	CDN M2+M3 05	FRANKONIA	CDN M2+M3	A2210235/2013	08/30/2023	08/30/2024
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	03/15/2024	03/15/2025
EN61K-4-8	Magnetic Field Test Generator 02	PIC	PMF-1000	ANT150701	09/06/2023	09/06/2024

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

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

Test Item	Filename	Version
EN 61000-4-2	N/A	2.0
EN IEC 61000-4-3	i2	529b
EN 61000-4-4	TEM A3000	v4.6.1
EN 61000-4-5	TEM A3000	v4.6.1
EN 61000-4-6	i2	529b
EN 61000-4-8	N/A	

Site	Filename	Version
Conduction/Radiation	EZ EMC	ISL-03A2

14.2 Appendix B: Uncertainty of Measurement

The laboratory measurement uncertainty accordance with refers to CISPR 16-4-2. If U_{lab} is less than or equal to U_{cisp} in Table 1, then the test report may either state the value of U_{lab} or state that U_{lab} is less than U_{cisp} .

The coverage factor $k = 2$ yields approximately a 95 % level of confidence.

<Conduction 03>

AMN: ± 2.9 dB

<Chamber 02 (10m)>

Horizontal

30MHz~200MHz: ± 4.5 dB

200MHz~1000MHz: ± 4.3 dB

Vertical

30MHz~200MHz: ± 4.9 dB

200MHz~1000MHz: ± 4.7 dB

<Immunity 02>

Test item	Uncertainty	Test item	Uncertainty
EN 61000-4-2 (ESD)		EN 61000-4-6 (CS)	
Rise time t_r	$\leq 11\%$	CDN	1.9 dB
Peak current I_p	$\leq 5.9\%$	EM Clamp	3.4 dB
current at 30 ns	$\leq 6.0\%$	EN 61000-4-8 (Magnetic)	5.6 %
current at 60 ns	$\leq 5.9\%$		
EN IEC 61000-4-3 (RS)	2.7 dB		
EN 61000-4-4 (EFT)			
voltage rise time (t_r)	7.2 %		
peak voltage value (VP)	6.3 %		
voltage pulse width (t_w)	5.1 %		
EN 61000-4-5 (Surge)			
open-circuit voltage front time	12 %		
open-circuit voltage peak value	8.7 %		
open-circuit voltage duration (T_d)	0.55%		

14.3 Appendix C: Photographs of EUT

Please refer to the File of **ISL-24LE0210P-MA**

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