Test Report

Report No.:	CEBCAE-WTW-P21090241
Test Model:	TEL 15-1211N-HS, TEL 15-2411N-HS, TEL 15-4811N-HS, TEL 15-1223N-HS, TEL 15-2423N-HS, TEL 15-2411WIN-HS, TEL 15-4811WIN-HS, TEL 15-2412WIN-HS, TEL 15-2423WIN-HS, TEL 15-4823WIN-HS
Series Model:	TEL 15-2411WIN ***- Multiple listing see item 3.1***
Received Date:	2021/7/12
Test Date:	2021/7/17 ~ 2021/9/15
Issued Date:	2021/12/1
Applicant:	TRACO ELECTRONIC AG
Address:	SIHLBRUGGSTRASS 111 CH-6340 BAAR, SWITZERLAND
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location (1):	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location (2):	No. 49, Lane 206, Wende Rd., Chiung Lin Township,Hsinchu County, Taiwan

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Release Control Record

Issue No.	Description	Date Issued
CEBCAE-WTW-P21090241	Original release.	2021/12/1

1 Certificate of Conformity

Product:	DC to DC power module 15W
Brand:	TRACO POWER
Test Model:	TEL 15-1211N-HS, TEL 15-2411N-HS, TEL 15-4811N-HS, TEL 15-1223N-HS, TEL 15-2423N-HS, TEL 15-2411WIN-HS, TEL 15-4811WIN-HS, TEL 15-2412WIN-HS, TEL 15-2423WIN-HS, TEL 15-4823WIN-HS
Series Model:	TEL 15-2411WIN ***- Multiple listing see item 3.1***
Sample Status:	Engineering sample
Applicant:	TRACO ELECTRONIC AG
Test Date:	2021/7/17 ~ 2021/9/15
Standards:	**EN 55032:2015 +A11:2020, Class A** **EN 61000-3-2:2014 (Not applicable)** **EN 61000-3-3:2013 (Not applicable)** **EN 55024:2010 / EN 55024:2010 +A1:2015** EN 61000-4-2:2009 / IEC 61000-4-2:2008 ED. 2.0 EN 61000-4-3:2006 +A1:2008 +A2:2010 / IEC 61000-4-3:2010 ED. 3.2 EN 61000-4-4:2012 / IEC 61000-4-4:2012 ED. 3.0 EN 61000-4-5:2014 +A1:2017 / IEC 61000-4-5:2014 +A1:2017 ED. 3.0 EN 61000-4-6:2014 +AC:2015 / IEC 61000-4-6:2013 ED. 4.0 EN 61000-4-8:2010 / IEC 61000-4-8:2009 ED. 2.0 EN 61000-4-11:2004 +A1:2017 / IEC 61000-4-11:2004 +A1:2017 ED. 2.0 (Not applicable) **EN55035:2017 +A11:2020** EN 61000-4-2:2009 / IEC 61000-4-2:2008 ED. 2.0 EN 61000-4-3:2006 +A1:2008 +A2:2010 / IEC 61000-4-3:2010 ED. 3.2 EN 61000-4-4:2012 / IEC 61000-4-4:2012 ED. 3.0 EN 61000-4-5:2014 +A1:2017 / IEC 61000-4-5:2014 +A1:2017 ED. 3.0 EN 61000-4-6:2014 +AC:2015 / IEC 61000-4-6:2013 ED. 4.0 EN 61000-4-8:2010 / IEC 61000-4-8:2009 ED. 2.0 EN 61000-4-11:2004 +A1:2017 / IEC 61000-4-11:2004 +A1:2017 ED. 2.0 (Not applicable) Broadband impulse noise disturbances (Not applicable)

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report

Prepared by : _____ , **Date:** 2021/12/1

Vivian Chen / Senior Specialist

Approved by : _____ , **Date:** 2021/12/1

Jim Hsiang / Associate Technical Manager

2 Summary of Test Results

Emission			
Standard	Test Item	Result/Remarks	Verdict
EN 55032:2015 +A11:2020	Conducted emission from the AC mains power port	Minimum passing Class A margin is -3.49 dB at 23.13690 MHz	Pass
	Asymmetric mode conducted emission at telecommunication ports	Without telecom port of the EUT.	N/A
	Radiated emission 30-1000 MHz	Minimum passing Class A margin is -3.27 dB at 154.85 MHz	Pass
	Radiated emission above 1GHz	Not applicable because the EUT's highest frequency is below 108MHz.	N/A
	Conducted differential voltage emissions	Without tuner port of the EUT.	N/A
EN 61000-3-2:2014	Harmonic current emissions	Test not applicable because port does not exist.	N/A
EN 61000-3-3:2013	Voltage fluctuations and flicker	Test not applicable because port does not exist.	N/A

Immunity				
EN 55024 Clause	Basic standard	Test Item	Result/Remarks	Verdict
4.2.1	EN 61000-4-2:2009 / IEC 61000-4-2:2008 ED. 2.0	Electrostatic discharge (ESD)	Performance Criterion A	Pass
4.2.3.2	EN 61000-4-3:2006 +A1:2008 +A2:2010 / IEC 61000-4-3:2010 ED. 3.2	Continuous radiated disturbances (RS)	Performance Criterion A	Pass
4.2.2	EN 61000-4-4:2012 / IEC 61000-4-4:2012 ED. 3.0	Electrical fast transients (EFT)	Performance Criterion A	Pass
4.2.5	EN 61000-4-5:2014 +A1:2017 / IEC 61000-4-5:2014 +A1:2017 ED. 3.0	Surges	Performance Criterion A	Pass
4.2.3.3	EN 61000-4-6:2014 +AC:2015 / IEC 61000-4-6:2013 ED. 4.0	Continuous conducted disturbances (CS)	Performance Criterion A	Pass
4.2.4	EN 61000-4-8:2010 / IEC 61000-4-8:2009 ED. 2.0	Power-frequency magnetic fields (PFMF)	Performance Criterion A	Pass
4.2.6	EN 61000-4-11:2004 +A1:2017 / IEC 61000-4-11:2004 +A1:2017 ED. 2.0	Voltage dips and interruptions	Test not applicable because AC power port does not exist.	N/A

Immunity				
EN 55035 Clause	Basic standard	Test Item	Result/Remarks	Verdict
4.2.1	EN 61000-4-2:2009 / IEC 61000-4-2:2008 ED. 2.0	Electrostatic discharge (ESD)	Performance Criterion A	Pass
4.2.2.2	EN 61000-4-3:2006 +A1:2008 +A2:2010 / IEC 61000-4-3:2010 ED. 3.2	Continuous radiated disturbances (RS)	Performance Criterion A	Pass
4.2.4	EN 61000-4-4:2012 / IEC 61000-4-4:2012 ED. 3.0	Electrical fast transients (EFT)	Performance Criterion A	Pass
4.2.5	EN 61000-4-5:2014 +A1:2017 / IEC 61000-4-5:2014 +A1:2017 ED. 3.0	Surges	Performance Criterion A	Pass
4.2.2.3	EN 61000-4-6:2014 +AC:2015 / IEC 61000-4-6:2013 ED. 4.0	Continuous conducted disturbances (CS)	Performance Criterion A	Pass
4.2.3	EN 61000-4-8:2010 / IEC 61000-4-8:2009 ED. 2.0	Power-frequency magnetic fields (PFMF)	Performance Criterion A	Pass
4.2.6	EN 61000-4-11:2004 +A1:2017 / IEC 61000-4-11:2004 +A1:2017 ED. 2.0	Voltage dips and interruptions	Test not applicable because AC power port does not exist.	N/A
4.2.7	-	Broadband impulse noise disturbances, **Repetitive** (Applicable only to xDSL ports.)	Without CPE xDSL port of the EUT.	N/A
4.2.7	-	Broadband impulse noise disturbances, **Isolated** (Applicable only to xDSL ports.)	Without CPE xDSL port of the EUT.	N/A

Note:

1. There is no deviation to the applied test methods and requirements covered by the scope of this report.
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
3. The above EN/IEC basic standards are applied with latest version if customer has no special requirement.
4. N/A: Not Applicable.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Expanded Uncertainty (k=2) (±)	Maximum allowable uncertainty (±)
Conducted disturbance at mains port using AMN, 150kHz ~ 30MHz	3.00 dB	3.4 dB (U_{cispr})
Radiated disturbance, 30MHz ~ 1GHz	4.08 dB	6.3 dB (U_{cispr})

The other instruments specified are routine verified to remain within the calibrated levels, no measurement uncertainty is required to be calculated.

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 Description of EUT

Product	DC to DC power module 15W
Brand	TRACO POWER
Test Model	TEL 15-1211N-HS, TEL 15-2411N-HS, TEL 15-4811N-HS, TEL 15-1223N-HS, TEL 15-2423N-HS, TEL 15-2411WIN-HS, TEL 15-4811WIN-HS, TEL 15-2412WIN-HS, TEL 15-2423WIN-HS, TEL 15-4823WIN-HS
Series Model	TEL 15-2411WIN ***- Multiple listing see below***
Model Difference	Refer to note as below
Sample Status	Engineering sample
Operating Software	N/A
Power Supply Rating	Refer to note as below
Accessory Device	N/A
Data Cable Supplied	N/A

Note:

1. This report is issued as a duplicate report of BV CPS report no.: CEBCAE-WTW-P21070392. The difference compared with original report are changing applicant,brand and models for marketing purpose; therefore all test data was copied from the original test report.
2. The EUT is an DC to DC power module 15W, the specifications of standard models were listed as below:

Model Number		Input Voltage (Range)	Output Voltage
Standard	With heatsink	VDC	VDC
TEL 15-2411WIN	TEL 15-2411WIN-HS	24 (9 ~ 36)	5.1
TEL 15-2412WIN	TEL 15-2412WIN-HS		12
TEL 15-2413WIN	TEL 15-2413WIN-HS		15
TEL 15-2415WIN	TEL 15-2415WIN-HS		24
TEL 15-2422WIN	TEL 15-2422WIN-HS		±12
TEL 15-2423WIN	TEL 15-2423WIN-HS		±15
TEL 15-4811WIN	TEL 15-4811WIN-HS	48 (18 ~ 75)	5.1
TEL 15-4812WIN	TEL 15-4812WIN-HS		12
TEL 15-4813WIN	TEL 15-4813WIN-HS		15
TEL 15-4815WIN	TEL 15-4815WIN-HS		24
TEL 15-4822WIN	TEL 15-4822WIN-HS		±12
TEL 15-4823WIN	TEL 15-4823WIN-HS		±15
TEL 15-1211N	TEL 15-1211N-HS	12 (9 ~ 18)	5.1
TEL 15-1212N	TEL 15-1212N-HS		12
TEL 15-1213N	TEL 15-1213N-HS		15
TEL 15-1215N	TEL 15-1215N-HS		24
TEL 15-1222N	TEL 15-1222N-HS		±12
TEL 15-1223N	TEL 15-1223N-HS		±15
TEL 15-2411N	TEL 15-2411N-HS	24 (18 ~ 36)	5.1
TEL 15-2412N	TEL 15-2412N-HS		12
TEL 15-2413N	TEL 15-2413N-HS		15
TEL 15-2415N	TEL 15-2415N-HS		24
TEL 15-2422N	TEL 15-2422N-HS		±12
TEL 15-2423N	TEL 15-2423N-HS		±15
TEL 15-4811N	TEL 15-4811N-HS	48 (36 ~ 75)	5.1
TEL 15-4812N	TEL 15-4812N-HS		12
TEL 15-4813N	TEL 15-4813N-HS		15
TEL 15-4815N	TEL 15-4815N-HS		24
TEL 15-4822N	TEL 15-4822N-HS		±12
TEL 15-4823N	TEL 15-4823N-HS		±15

During the test, the **Model No.: TEL 15-1211N-HS, TEL 15-2411N-HS, TEL 15-4811N-HS, TEL 15-1223N-HS, TEL 15-2423N-HS, TEL 15-2411WIN-HS, TEL 15-4811WIN-HS, TEL 15-2412WIN-HS, TEL 15-2423WIN-HS, TEL 15-4823WIN-HS** were selected as the representative models for the test and therefore only their test data were recorded in this report.

3.2 Features of EUT

The tests reported herein were performed according to the method specified by TRACO ELECTRONIC AG, for detailed feature description, please refer to the manufacturer's specifications or user's manual.

3.3 Operating Modes of EUT and Determination of Worst Case Operating Mode

1. The EUT was pre-tested under operating and standby condition and the worst emission level was found under **operating condition**.

2. As client's requirement, test modes are presented in the report as below.

Mode	Model No.	Input Voltage	Output Voltage	Test Condition
Conducted emission test				
1	TEL 15-1211N-HS	12Vdc	5.1	Full Load without Solution Fixed Board
2	TEL 15-2411N-HS	24Vdc	5.1	
3	TEL 15-4811N-HS	48Vdc	5.1	
4	TEL 15-1223N-HS	12Vdc	±15	
5	TEL 15-2423N-HS	24Vdc	±15	
6	TEL 15-2411WIN-HS	24Vdc	5.1	
7	TEL 15-4811WIN-HS	48Vdc	5.1	
8	TEL 15-2412WIN-HS	24Vdc	12	
9	TEL 15-2423WIN-HS	24Vdc	±15	
10	TEL 15-4823WIN-HS	48Vdc	±15	
Radiated emission, EFT & Surge tests				
1	TEL 15-1211N-HS	12Vdc	5.1	Full Load with Solution Fixed Board
2	TEL 15-2411N-HS	24Vdc	5.1	
3	TEL 15-4811N-HS	48Vdc	5.1	
4	TEL 15-1223N-HS	12Vdc	±15	
5	TEL 15-2423N-HS	24Vdc	±15	
6	TEL 15-2411WIN-HS	24Vdc	5.1	
7	TEL 15-4811WIN-HS	48Vdc	5.1	
8	TEL 15-2412WIN-HS	24Vdc	12	
9	TEL 15-2423WIN-HS	24Vdc	±15	
10	TEL 15-4823WIN-HS	48Vdc	±15	
ESD, RS, CS, Magnetic tests				
1	TEL 15-1211N-HS	12Vdc	5.1	Full Load without Solution Fixed Board
6	TEL 15-2411WIN-HS	24Vdc	5.1	

3.4 Test Program Used and Operation Descriptions

- **For Conducted & Radiated tests:**
  Set the EUT under full load.
- **For Immunity tests:**
  Connected a resistor load to DC output port of EUT to make EUT have maximum power consumption and a multimeter was used to monitor voltage of output.

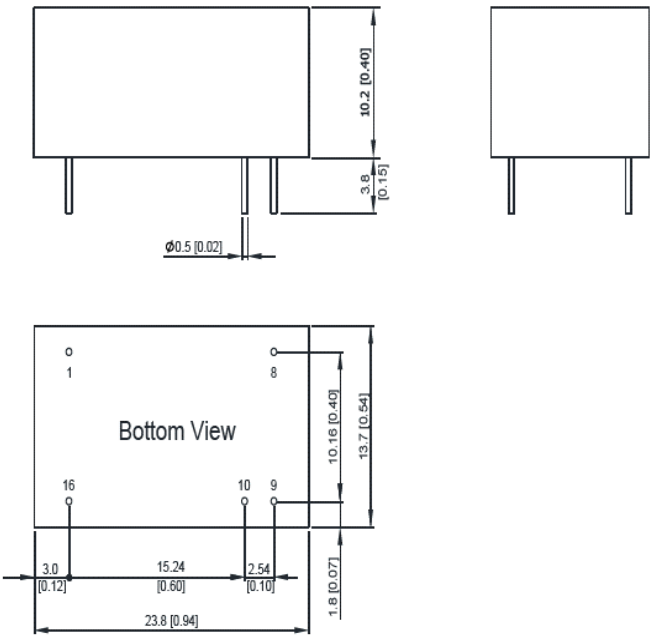
3.5 Primary Clock Frequencies of Internal Source

The highest frequency generated or used within the EUT or on which the EUT operates or tunes is 480kHz, provided by TRACO ELECTRONIC AG, for detailed internal source, please refer to the manufacturer's specifications.

3.6 Package Specifications by Manufacturer

Package Specifications

Mechanical Dimensions



Pin Connections

Pin	Single Output	Dual Output
1	-Vin	-Vin
8	NC	Common
9	+Vout	+Vout
10	-Vout	-Vout
16	+Vin	+Vin

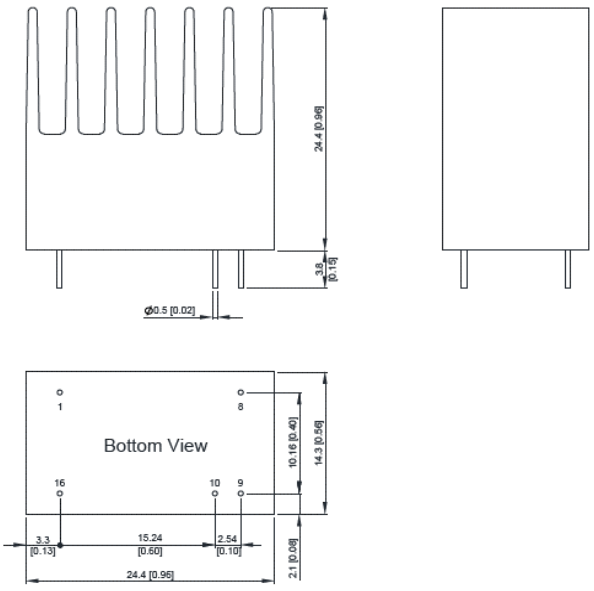
NC: No Connection

- All dimensions in mm (inches)
- Tolerance: X.X±0.5 (X.XX±0.02)
  X.XX±0.25 (X.XXX±0.01)
- Pin diameter ⇔ 0.5 ±0.05 (0.02±0.002)

Physical Characteristics

Case Size	:	23.8x13.7x10.2 mm (0.94x0.54x0.40 inches)
Case Material	:	Aluminium Alloy, Black Anodized Coating
Pin Material	:	Copper Alloy with Tin Plate Over Nickel Subplate
Weight	:	8.77g

Heatsink (Option –HC7)

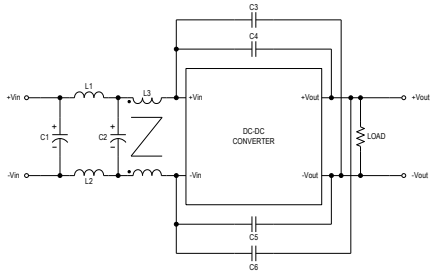


Physical Characteristics

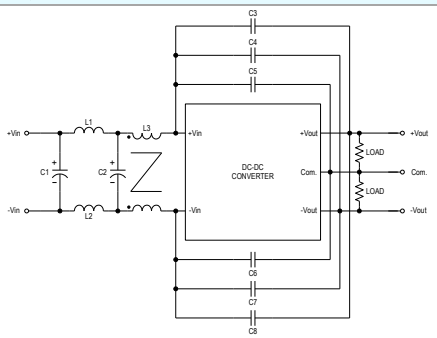
Heatsink Material	:	Aluminum
Finish	:	Black Anodized Coating
Weight	:	14.2g

➢ For TEL 15N Series

External Filter meets Total solution (for EFT & Surge & Radiation) EN 55032, class A



Single Output

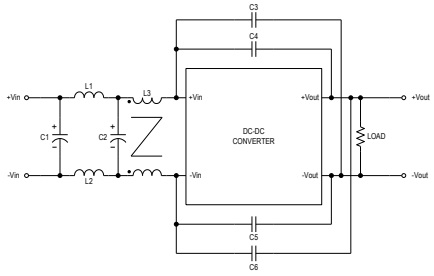


Dual Output

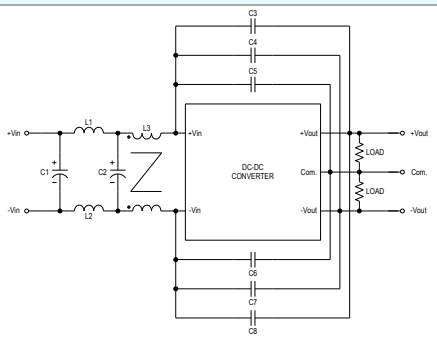
Model	C1, C2	L1, L2	L3	C3	C4	C5	C6	C7	C8
TEL 15-121XN	820µF/25V CHEMI-CON KY Series	10µH/2.2A/ 78mΩ 74477410	---	---	1000pF/2kV 1808 X7R	1000pF/2kV 1808 X7R	---	---	---
TEL 15-122XN	820µF/25V CHEMI-CON KY Series	10µH/2.2A/ 78mΩ 74477410	---	---	1000pF/2kV 1808 X7R	680pF/2kV 1808 X7R	680pF/2kV 1808 X7R	---	1000pF/2kV 1808 X7R
TEL 15-241XN	470µF/50V CHEMI-CON KY Series	10µH/2.2A/ 78mΩ 74477410	---	---	1000pF/2kV 1808 X7R	1000pF/2kV 1808 X7R	---	---	---
TEL 15-242XN	470µF/50V CHEMI-CON KY Series	10µH/2.2A/ 78mΩ 74477410	---	---	1000pF/2kV 1808 X7R	---	---	---	1000pF/2kV 1808 X7R
TEL 15-481XN	220µF/100V CHEMI-CON KY Series	10µH/2.2A/ 78mΩ 74477410	744273222	1000pF/2kV 1808 X7R	680pF/2kV 1808 X7R	1000pF/2kV 1808 X7R	---	680pF/2kV 1808 X7R	---
TEL 15-482XN	220µF/100V CHEMI-CON KY Series	10µH/2.2A/ 78mΩ 74477410	744273222	1500pF/2kV 1808 X7R	1500pF/2kV 1808 X7R	1800pF/2kV 1808 X7R	1800pF/2kV 1808 X7R	1500pF/2kV 1808 X7R	1500pF/2kV 1808 X7R

➢ For TEL 15WIN Series

External Filter meets Total solution (for EFT & Surge & Radiation) EN 55032, class A



Single Output



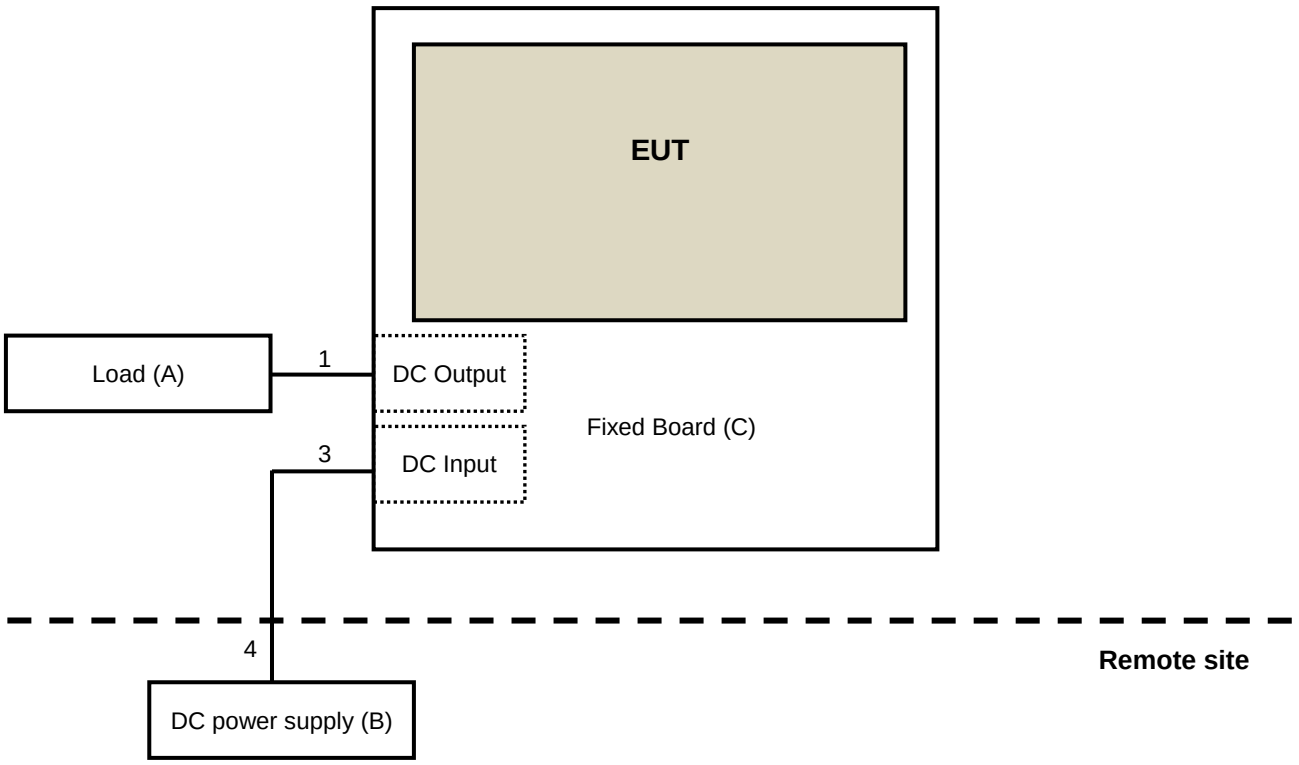
Dual Output

Model	C1, C2	L1, L2	L3	C3	C4	C5	C6	C7	C8
TEL 15-241XWIN	470μF/50V CHEMI-CON KY Series	10μH/2.2A/ 78mΩ 74477410	---	---	1000pF/2kV 1808 X7R	1000pF/2kV 1808 X7R	---	---	---
TEL 15-242XWIN	470μF/50V CHEMI-CON KY Series	10μH/2.2A/ 78mΩ 74477410	---	---	1000pF/2kV 1808 X7R	---	---	---	1000pF/2kV 1808 X7R
TEL 15-481XWIN	220μF/100V CHEMI-CON KY Series	10μH/2.2A/ 78mΩ 74477410	744273222	1000pF/2kV 1808 X7R	680pF/2kV 1808 X7R	1000pF/2kV 1808 X7R	---	680pF/2kV 1808 X7R	---
TEL 15-482XWIN	220μF/100V CHEMI-CON KY Series	10μH/2.2A/ 78mΩ 74477410	744273222	1500pF/2kV 1808 X7R	1500pF/2kV 1808 X7R	1800pF/2kV 1808 X7R	1800pF/2kV 1808 X7R	1500pF/2kV 1808 X7R	1500pF/2kV 1808 X7R

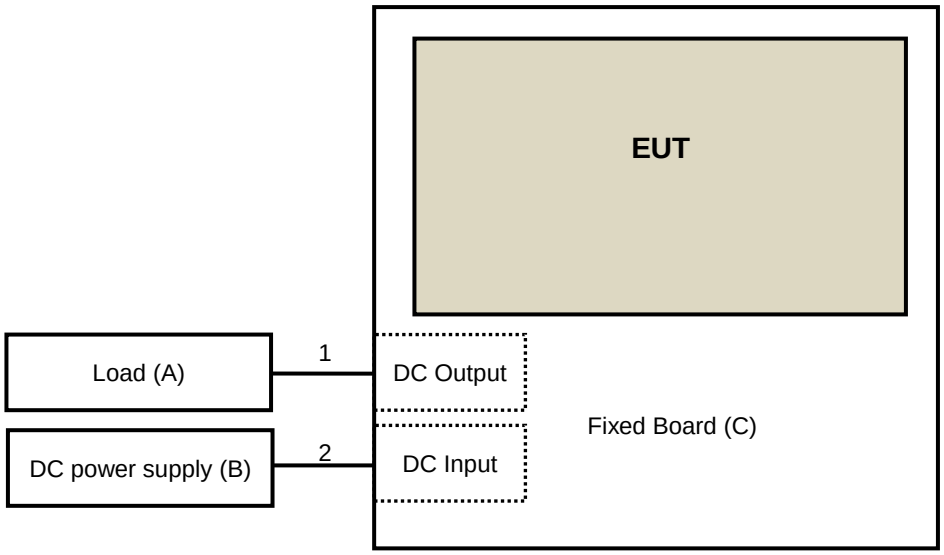
4 Configuration and Connections with EUT

4.1 Connection Diagram of EUT and Peripheral Devices

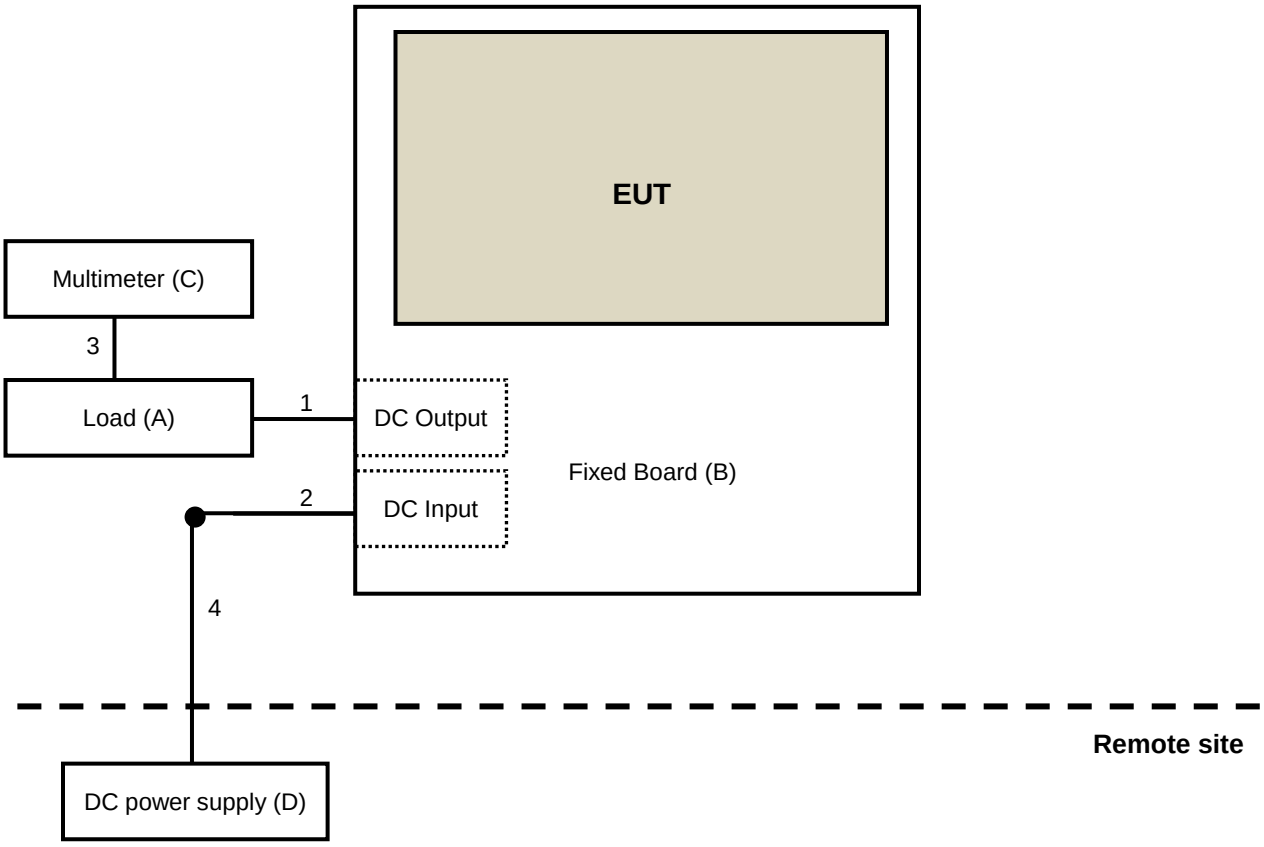
For Conducted emission test



For Radiated emission



Immunity tests:



4.2 Configuration of Peripheral Devices and Cable Connections

Emission tests:

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Load	N/A	N/A	N/A	N/A	Supplied by client
B.	DC Power Supply	GWINSTEK	GPC-6030D	N/A	N/A	Supplied by client
C.	Fixed Board	N/A	N/A	N/A	N/A	Supplied by client

Note: All power cords of the above support units are non-shielded (1.8m).

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC power cable	1	0.03	N	0	Supplied by client
2.	DC power cable	1	0.3	N	0	Supplied by client
3.	DC power cable	1	1.0	N	0	Provided by Lab
4.	DC power cable	1	10	N	0	Provided by Lab

Note: The core(s) is(are) originally attached to the cable(s).

Immunity tests:

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Load	N/A	N/A	N/A	N/A	Supplied by client
B.	Fixed Board	N/A	N/A	N/A	N/A	Supplied by client
C.	Multimeter	YFE	YF-370A	N/A	N/A	Provided by Lab
D.	DC Power Supply	CHROMA	62150H-600S	62150EC00672	N/A	Supplied by client

Note: All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC power cable	1	0.03	N	0	Supplied by client
2.	DC power cable	1	0.3	N	0	Supplied by client
3.	Data cable	1	1.0	N	0	Provided by Lab
4.	DC power cable	1	10	N	0	Provided by Lab

Note: The core(s) is(are) originally attached to the cable(s).

5 Conducted Emission from the Mains Power Port

5.1 Limits

Class A			
Frequency range (MHz)	Coupling device	Detector type / bandwidth	Limits (dBuV)
0.15 - 0.5	AMN	Quasi-peak / 9kHz	79
0.5 - 30.0			73
0.15 - 0.5		Average / 9kHz	66
0.5 - 30.0			60
Class B			
Frequency range (MHz)	Coupling device	Detector type / bandwidth	Limits (dBuV)
0.15 - 0.5	AMN	Quasi-peak / 9kHz	66 - 56
0.5 - 5			56
5 - 30.0			60
0.15 - 0.5		Average / 9kHz	56 - 46
0.5 - 5			46
5 - 30.0			50

Notes: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

5.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
ROHDE &SCHWARZ TEST RECEIVER	ESCS 30	838251/021	Nov. 3, 2020	Nov. 2, 2021
ROHDE & SCHWARZ Artificial Mains Network (For EUT)	ENV216	101195	May 25, 2021	May 24, 2022
LISN With Adapter(for EUT)	101195	N/A	May 25, 2021	May 24, 2022
EMCO L.I.S.N. (For peripherals)	3825/2	9504-2359	Jul. 28, 2020	Jul. 27, 2021
SCHWARZBECK Artificial Mains Network (For EUT)	NNLK8129	8129229	May 20, 2021	May 19, 2022
SCHWARZBECK Artificial Mains Network (for EUT)	NNLK 8121	8121-808	Apr. 18, 2021	Apr. 17, 2022
Software	Cond_V7.3.7.4	NA	NA	NA
RF cable (JYEBAO) With10dB PAD	5D-FB	Cable-C03-01	Sep. 16, 2020	Sep. 15, 2021
LYNICS Terminator (For EMCO LISN)	0900510	E1-01-300	Jan. 27, 2021	Jan. 26, 2022
LYNICS Terminator (For EMCO LISN)	0900510	E1-01-301	Jan. 27, 2021	Jan. 26, 2022

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. 3. (Conduction 3)
3. The VCCI Site Registration No. C-10274.
4. Tested Date: 2021/7/17

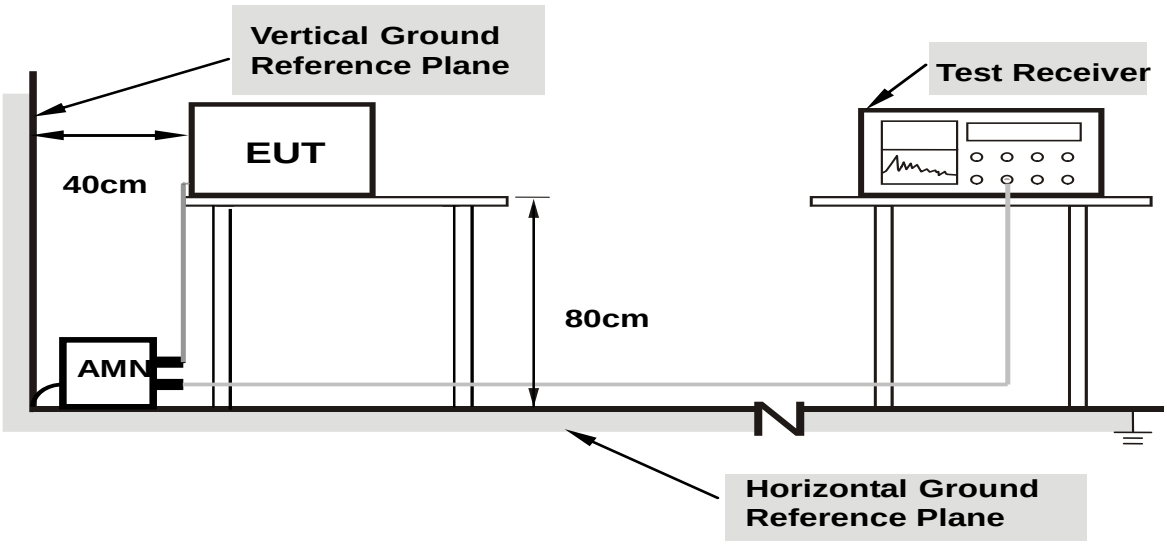
5.3 Test Arrangement

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through an Artificial Mains Network (AMN). Other support units were connected to the power mains through another AMN. The two AMNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

c. The test results of conducted emissions at mains ports are recorded of six worst margins for quasi-peak (mandatory) [and average (if necessary)] values against the limits at frequencies of interest unless the margin is 20 dB or greater.

Note: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.



Note: 1. Support units were connected to second AMN.
2. The distance specified between EUT/AE and other metallic objects is ≥ 0.8 m in the measurement arrangement for table-top EUT.
3. Cable on the RGP must to be insulated.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

5.4 Test Results

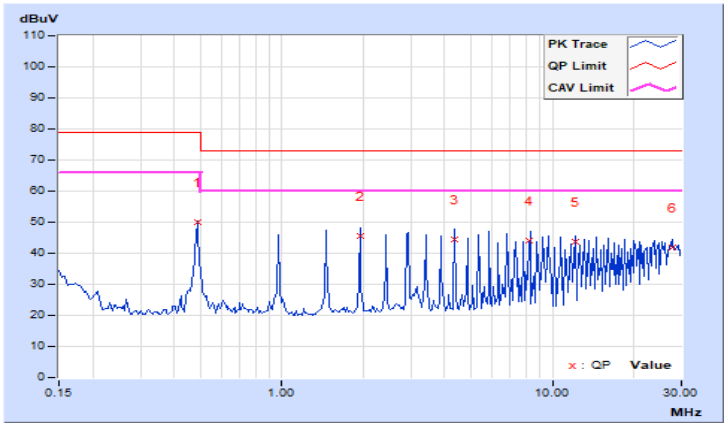
Mode 1

Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	12Vdc	**Environmental Conditions**	25 °C, 75% RH, 1000 mbar
Tested by	Paul Chen		

Phase Of Power : Positive (+)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.48594	10.04	39.92	38.87	49.96	48.91	79.00	66.00	-29.04	-17.09
2	1.94531	10.12	35.44	29.81	45.56	39.93	73.00	60.00	-27.44	-20.07
3	4.37500	10.21	34.20	27.77	44.41	37.98	73.00	60.00	-28.59	-22.02
4	8.25672	10.28	33.81	27.49	44.09	37.77	73.00	60.00	-28.91	-22.23
5	12.13582	10.35	33.20	27.10	43.55	37.45	73.00	60.00	-29.45	-22.55
6	27.66078	10.55	31.18	24.82	41.73	35.37	73.00	60.00	-31.27	-24.63

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

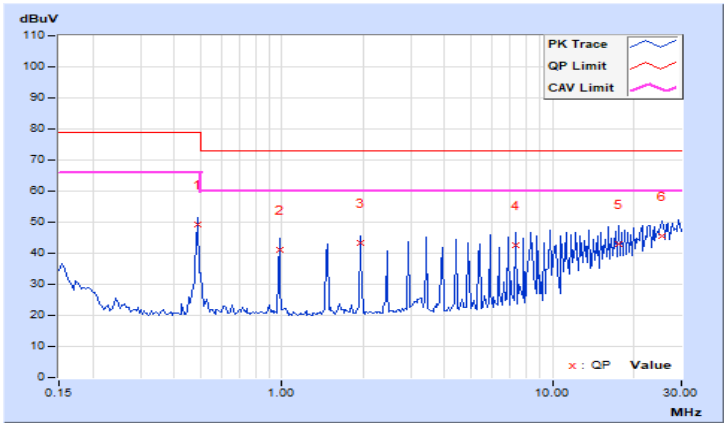


Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	12Vdc	**Environmental Conditions**	25 °C, 75% RH, 1000 mbar
Tested by	Paul Chen		

Phase Of Power : Negative (-)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.48984	10.03	39.21	35.94	49.24	45.97	79.00	66.00	-29.76	-20.03
2	0.97813	10.06	30.88	23.62	40.94	33.68	73.00	60.00	-32.06	-26.32
3	1.95194	10.11	33.32	27.08	43.43	37.19	73.00	60.00	-29.57	-22.81
4	7.30891	10.26	32.47	27.11	42.73	37.37	73.00	60.00	-30.27	-22.63
5	17.56444	10.45	32.62	25.88	43.07	36.33	73.00	60.00	-29.93	-23.67
6	25.31739	10.55	34.99	27.18	45.54	37.73	73.00	60.00	-27.46	-22.27

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



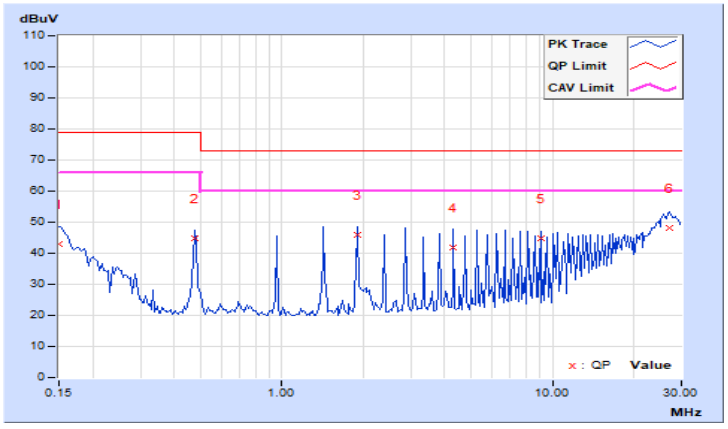
Mode 2

Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	24Vdc	**Environmental Conditions**	25 °C, 75% RH, 1000 mbar
Tested by	Paul Chen		

Phase Of Power : Positive (+)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.15000	10.03	33.06	13.85	43.09	23.88	79.00	66.00	-35.91	-42.12
2	0.47813	10.04	34.89	34.20	44.93	44.24	79.00	66.00	-34.07	-21.76
3	1.91016	10.12	35.66	31.60	45.78	41.72	73.00	60.00	-27.22	-18.28
4	4.29688	10.21	31.70	27.44	41.91	37.65	73.00	60.00	-31.09	-22.35
5	9.06014	10.29	34.61	31.54	44.90	41.83	73.00	60.00	-28.10	-18.17
6	27.12822	10.54	37.61	28.76	48.15	39.30	73.00	60.00	-24.85	-20.70

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

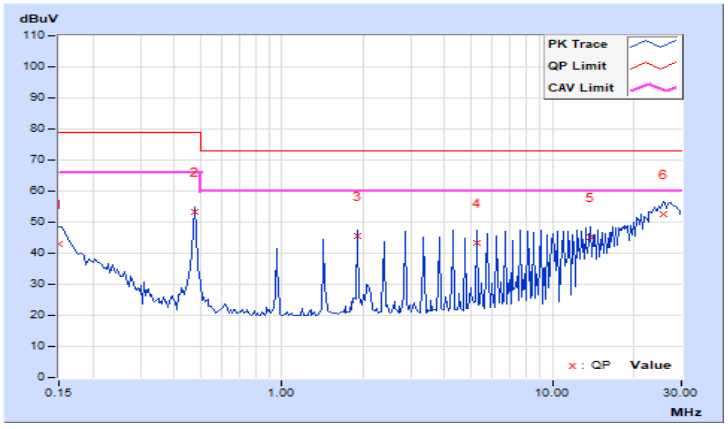


Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	24Vdc	**Environmental Conditions**	25 °C, 75% RH, 1000 mbar
Tested by	Paul Chen		

Phase Of Power : Negative (-)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.15000	10.03	32.90	14.07	42.93	24.10	79.00	66.00	-36.07	-41.90
2	0.47422	10.03	43.39	41.76	53.42	51.79	79.00	66.00	-25.58	-14.21
3	1.90625	10.11	35.30	30.81	45.41	40.92	73.00	60.00	-27.59	-19.08
4	5.24219	10.22	32.94	27.95	43.16	38.17	73.00	60.00	-29.84	-21.83
5	13.80844	10.38	34.96	31.69	45.34	42.07	73.00	60.00	-27.66	-17.93
6	25.66275	10.56	42.20	33.67	52.76	44.23	73.00	60.00	-20.24	-15.77

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



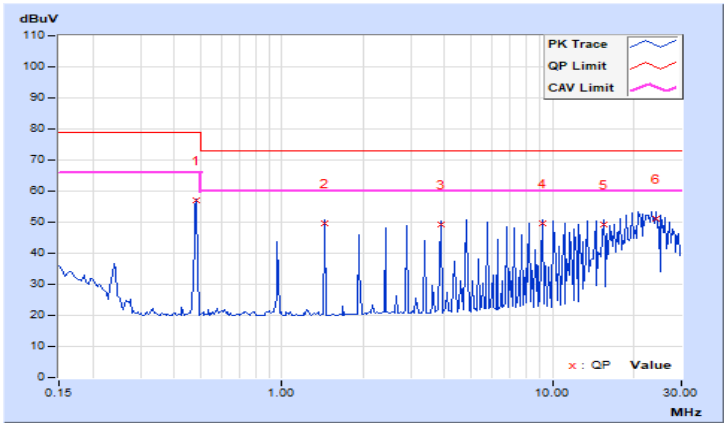
Mode 3

Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	48Vdc	**Environmental Conditions**	25 °C, 75% RH, 1000 mbar
Tested by	Paul Chen		

Phase Of Power : Positive (+)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.48203	10.04	46.82	46.53	56.86	56.57	79.00	66.00	-22.14	-9.43
2	1.44531	10.09	39.39	39.08	49.48	49.17	73.00	60.00	-23.52	-10.83
3	3.85547	10.19	39.10	38.77	49.29	48.96	73.00	60.00	-23.71	-11.04
4	9.15625	10.29	39.23	38.86	49.52	49.15	73.00	60.00	-23.48	-10.85
5	15.42188	10.41	38.94	38.20	49.35	48.61	73.00	60.00	-23.65	-11.39
6	24.09766	10.52	40.76	39.11	51.28	49.63	73.00	60.00	-21.72	-10.37

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

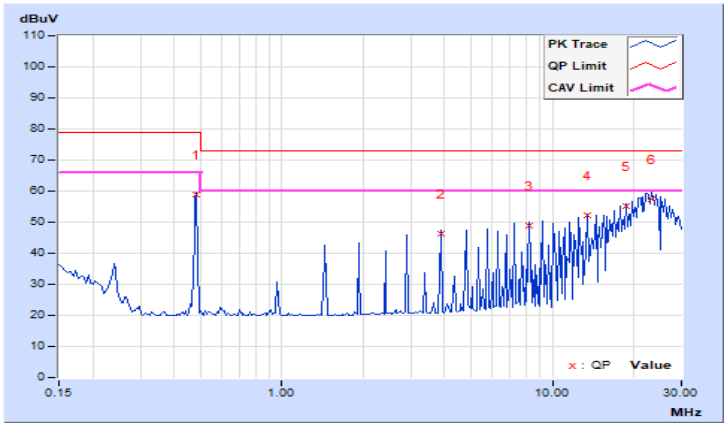


Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	48Vdc	**Environmental Conditions**	25 °C, 75% RH, 1000 mbar
Tested by	Paul Chen		

Phase Of Power : Negative (-)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.48203	10.03	48.83	48.54	58.86	58.57	79.00	66.00	-20.14	-7.43
2	3.85547	10.19	36.22	35.87	46.41	46.06	73.00	60.00	-26.59	-13.94
3	8.19531	10.28	38.49	37.86	48.77	48.14	73.00	60.00	-24.23	-11.86
4	13.49609	10.38	41.89	41.40	52.27	51.78	73.00	60.00	-20.73	-8.22
5	18.80078	10.48	44.71	44.67	55.19	55.15	73.00	60.00	-17.81	-4.85
6	**23.13690**	**10.53**	**46.96**	**45.98**	**57.49**	**56.51**	**73.00**	**60.00**	**-15.51**	**-3.49**

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



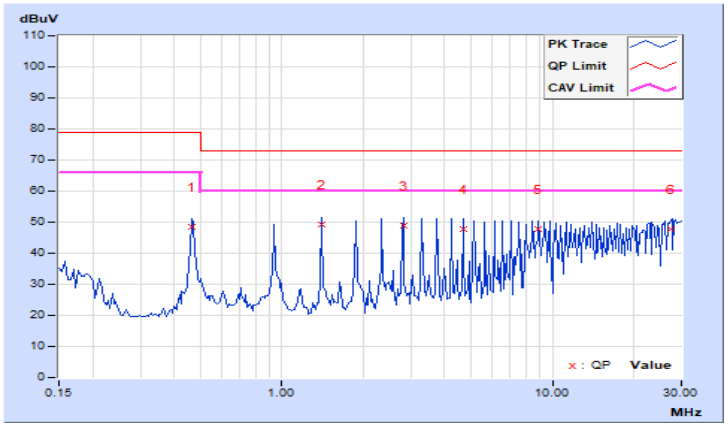
Mode 4

Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	12Vdc	**Environmental Conditions**	25 °C, 75% RH, 1000 mbar
Tested by	Paul Chen		

Phase Of Power : Positive (+)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.46641	10.03	38.64	37.15	48.67	47.18	79.00	66.00	-30.33	-18.82
2	1.40625	10.09	39.22	36.55	49.31	46.64	73.00	60.00	-23.69	-13.36
3	2.80859	10.15	38.84	35.16	48.99	45.31	73.00	60.00	-24.01	-14.69
4	4.68359	10.21	37.64	32.78	47.85	42.99	73.00	60.00	-25.15	-17.01
5	8.89217	10.29	37.32	32.58	47.61	42.87	73.00	60.00	-25.39	-17.13
6	27.61328	10.55	37.14	34.09	47.69	44.64	73.00	60.00	-25.31	-15.36

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

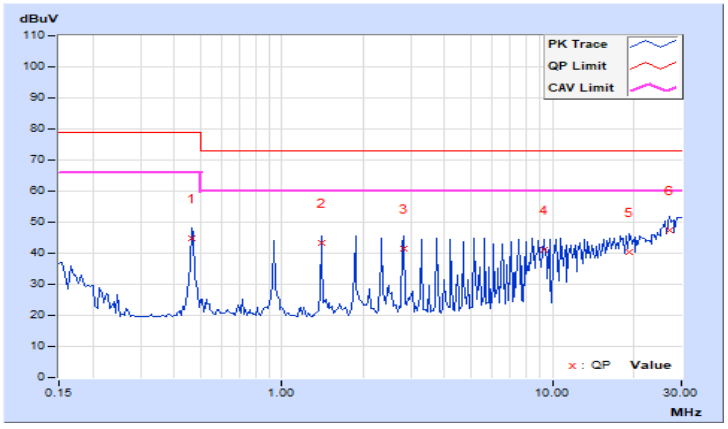


Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	12Vdc	**Environmental Conditions**	25 °C, 75% RH, 1000 mbar
Tested by	Paul Chen		

Phase Of Power : Negative (-)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.46641	10.03	34.84	29.64	44.87	39.67	79.00	66.00	-34.13	-26.33
2	1.40234	10.08	33.34	30.82	43.42	40.90	73.00	60.00	-29.58	-19.10
3	2.80859	10.15	31.38	26.70	41.53	36.85	73.00	60.00	-31.47	-23.15
4	9.35156	10.30	30.87	24.79	41.17	35.09	73.00	60.00	-31.83	-24.91
5	19.17969	10.48	29.73	22.01	40.21	32.49	73.00	60.00	-32.79	-27.51
6	27.11859	10.57	36.81	32.68	47.38	43.25	73.00	60.00	-25.62	-16.75

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



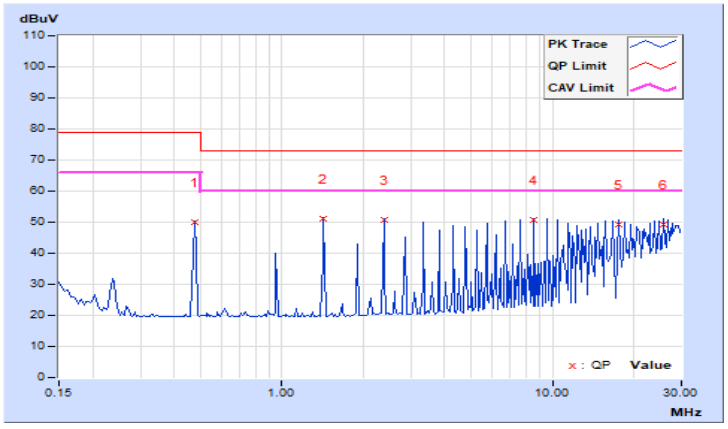
Mode 5

Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	24Vdc	**Environmental Conditions**	25 °C, 75% RH, 1000 mbar
Tested by	Paul Chen		

Phase Of Power : Positive (+)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.47813	10.04	39.80	39.71	49.84	49.75	79.00	66.00	-29.16	-16.25
2	1.42969	10.09	41.16	40.85	51.25	50.94	73.00	60.00	-21.75	-9.06
3	2.38281	10.14	40.68	40.35	50.82	50.49	73.00	60.00	-22.18	-9.51
4	8.57429	10.28	40.57	40.06	50.85	50.34	73.00	60.00	-22.15	-9.66
5	17.62319	10.45	38.92	38.72	49.37	49.17	73.00	60.00	-23.63	-10.83
6	25.71509	10.53	38.58	38.02	49.11	48.55	73.00	60.00	-23.89	-11.45

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

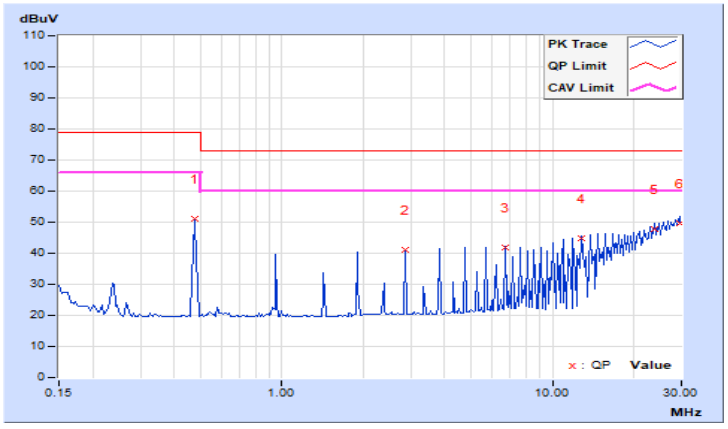


Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	24Vdc	**Environmental Conditions**	25 °C, 75% RH, 1000 mbar
Tested by	Paul Chen		

Phase Of Power : Negative (-)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.47422	10.03	40.97	40.67	51.00	50.70	79.00	66.00	-28.00	-15.30
2	2.85547	10.15	30.88	30.59	41.03	40.74	73.00	60.00	-31.97	-19.26
3	6.66406	10.25	31.69	31.34	41.94	41.59	73.00	60.00	-31.06	-18.41
4	12.85165	10.36	34.40	34.16	44.76	44.52	73.00	60.00	-28.24	-15.48
5	23.79578	10.54	37.34	37.24	47.88	47.78	73.00	60.00	-25.12	-12.22
6	29.50272	10.59	38.90	38.45	49.49	49.04	73.00	60.00	-23.51	-10.96

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



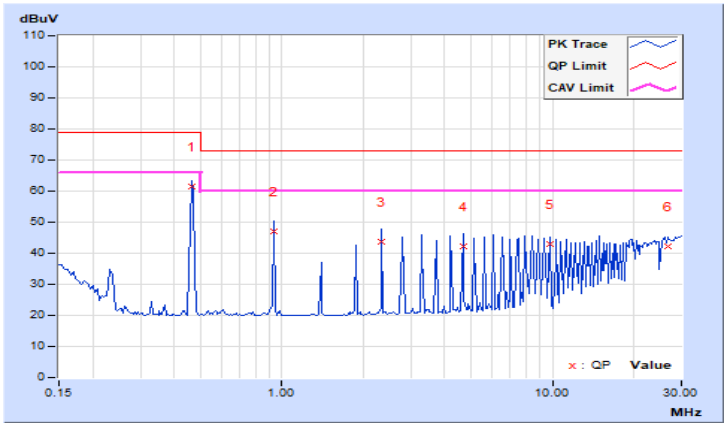
Mode 6

Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	24Vdc	**Environmental Conditions**	25 °C, 75% RH, 1000 mbar
Tested by	Paul Chen		

Phase Of Power : Positive (+)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.46641	10.03	51.53	50.03	61.56	60.06	79.00	66.00	-17.44	-5.94
2	0.93516	10.07	37.13	35.23	47.20	45.30	73.00	60.00	-25.80	-14.70
3	2.33594	10.13	33.63	31.25	43.76	41.38	73.00	60.00	-29.24	-18.62
4	4.67188	10.21	32.01	28.63	42.22	38.84	73.00	60.00	-30.78	-21.16
5	9.80742	10.31	32.72	30.32	43.03	40.63	73.00	60.00	-29.97	-19.37
6	26.61759	10.54	31.75	29.49	42.29	40.03	73.00	60.00	-30.71	-19.97

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

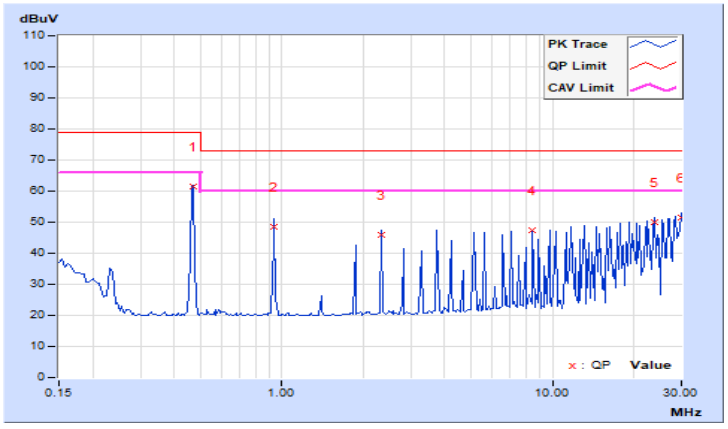


Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	24Vdc	**Environmental Conditions**	25 °C, 75% RH, 1000 mbar
Tested by	Paul Chen		

Phase Of Power : Negative (-)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.47031	10.03	51.27	51.14	61.30	61.17	79.00	66.00	-17.70	-4.83
2	0.93906	10.06	38.63	38.06	48.69	48.12	73.00	60.00	-24.31	-11.88
3	2.34375	10.13	35.86	35.39	45.99	45.52	73.00	60.00	-27.01	-14.48
4	8.42596	10.28	37.06	36.71	47.34	46.99	73.00	60.00	-25.66	-13.01
5	23.86880	10.54	39.46	38.42	50.00	48.96	73.00	60.00	-23.00	-11.04
6	29.94089	10.59	40.83	39.22	51.42	49.81	73.00	60.00	-21.58	-10.19

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



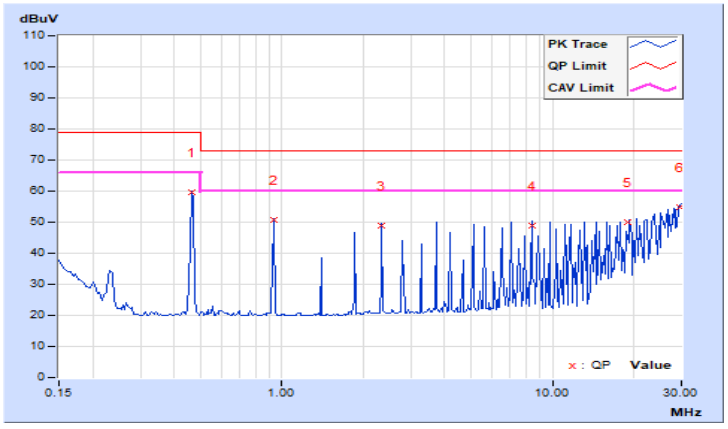
Mode 7

Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	48Vdc	**Environmental Conditions**	25 °C, 75% RH, 1000 mbar
Tested by	Paul Chen		

Phase Of Power : Positive (+)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.46641	10.03	49.68	49.38	59.71	59.41	79.00	66.00	-19.29	-6.59
2	0.93261	10.07	40.85	40.54	50.92	50.61	73.00	60.00	-22.08	-9.39
3	2.33085	10.13	38.93	38.62	49.06	48.75	73.00	60.00	-23.94	-11.25
4	8.37972	10.28	38.55	37.69	48.83	47.97	73.00	60.00	-24.17	-12.03
5	19.06994	10.47	39.68	38.84	50.15	49.31	73.00	60.00	-22.85	-10.69
6	29.74809	10.56	44.34	42.44	54.90	53.00	73.00	60.00	-18.10	-7.00

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

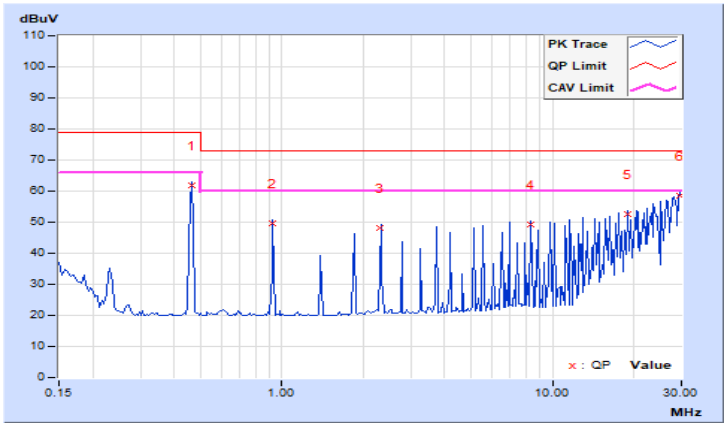


Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	48Vdc	**Environmental Conditions**	25 °C, 75% RH, 1000 mbar
Tested by	Paul Chen		

Phase Of Power : Negative (-)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.46250	10.03	51.70	51.43	61.73	61.46	79.00	66.00	-17.27	-4.54
2	0.92734	10.06	39.54	39.19	49.60	49.25	73.00	60.00	-23.40	-10.75
3	2.31649	10.12	37.99	37.74	48.11	47.86	73.00	60.00	-24.89	-12.14
4	8.34106	10.28	38.94	38.61	49.22	48.89	73.00	60.00	-23.78	-11.11
5	18.96144	10.48	42.12	41.67	52.60	52.15	73.00	60.00	-20.40	-7.85
6	29.64775	10.59	48.07	44.68	58.66	55.27	73.00	60.00	-14.34	-4.73

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



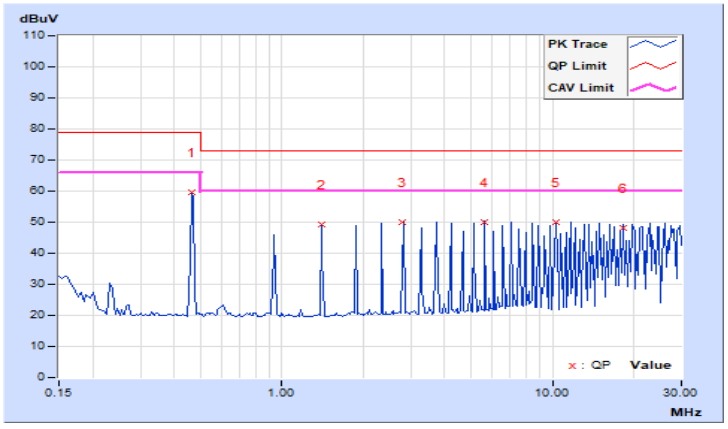
Mode 8

Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	24Vdc	**Environmental Conditions**	25 °C, 75% RH, 1000 mbar
Tested by	Paul Chen		

Phase Of Power : Positive (+)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.46641	10.03	49.64	49.35	59.67	59.38	79.00	66.00	-19.33	-6.62
2	1.39989	10.09	39.30	39.11	49.39	49.20	73.00	60.00	-23.61	-10.80
3	2.80477	10.15	39.80	39.49	49.95	49.64	73.00	60.00	-23.05	-10.36
4	5.60956	10.23	39.91	39.35	50.14	49.58	73.00	60.00	-22.86	-10.42
5	10.28000	10.32	39.55	39.16	49.87	49.48	73.00	60.00	-23.13	-10.52
6	18.21886	10.46	37.64	36.43	48.10	46.89	73.00	60.00	-24.90	-13.11

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

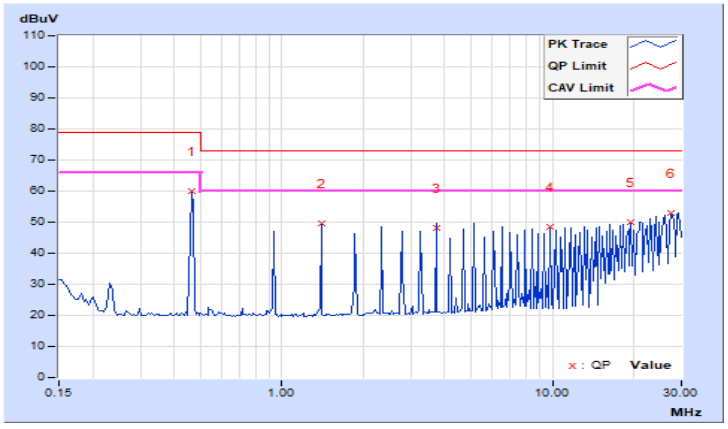


Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	24Vdc	**Environmental Conditions**	25 °C, 75% RH, 1000 mbar
Tested by	Paul Chen		

Phase Of Power : Negative (-)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.46641	10.03	50.10	49.81	60.13	59.84	79.00	66.00	-18.87	-6.16
2	1.39844	10.08	39.55	39.28	49.63	49.36	73.00	60.00	-23.37	-10.64
3	3.73047	10.19	37.83	37.16	48.02	47.35	73.00	60.00	-24.98	-12.65
4	9.78280	10.31	38.19	37.78	48.50	48.09	73.00	60.00	-24.50	-11.91
5	19.56341	10.49	39.57	38.94	50.06	49.43	73.00	60.00	-22.94	-10.57
6	27.47389	10.57	42.28	41.71	52.85	52.28	73.00	60.00	-20.15	-7.72

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



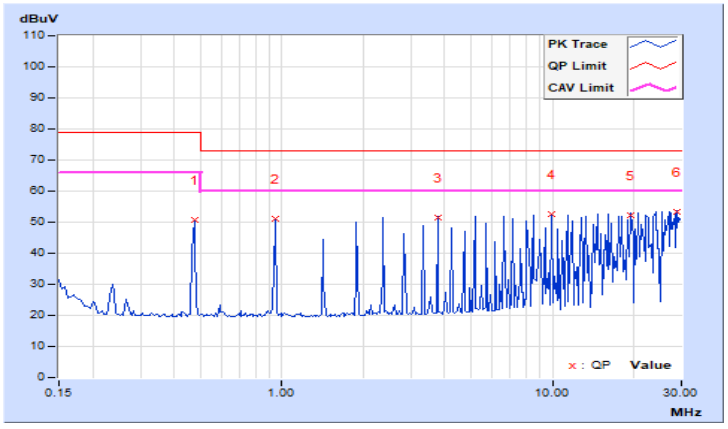
Mode 9

Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	24Vdc	**Environmental Conditions**	25 °C, 75% RH, 1000 mbar
Tested by	Paul Chen		

Phase Of Power : Positive (+)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.47422	10.03	40.61	40.30	50.64	50.33	79.00	66.00	-28.36	-15.67
2	0.94688	10.07	40.92	40.59	50.99	50.66	73.00	60.00	-22.01	-9.34
3	3.78516	10.19	41.27	40.82	51.46	51.01	73.00	60.00	-21.54	-8.99
4	9.92987	10.31	42.15	41.80	52.46	52.11	73.00	60.00	-20.54	-7.89
5	19.38700	10.48	41.61	41.48	52.09	51.96	73.00	60.00	-20.91	-8.04
6	28.84000	10.55	42.89	42.29	53.44	52.84	73.00	60.00	-19.56	-7.16

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

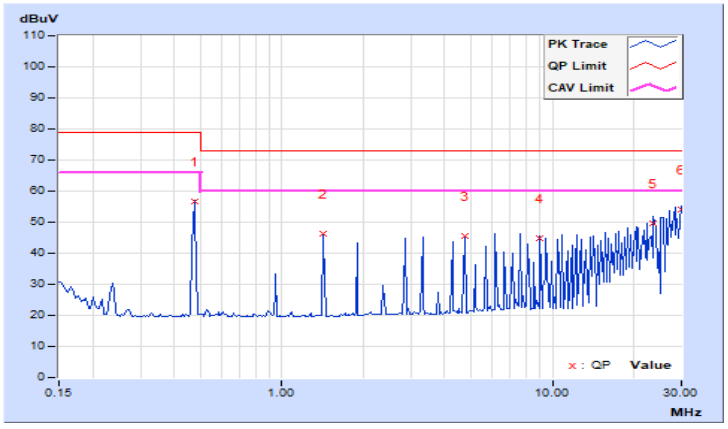


Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	24Vdc	**Environmental Conditions**	25 °C, 75% RH, 1000 mbar
Tested by	Paul Chen		

Phase Of Power : Negative (-)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.47422	10.03	46.82	46.52	56.85	56.55	79.00	66.00	-22.15	-9.45
2	1.42188	10.08	36.08	35.77	46.16	45.85	73.00	60.00	-26.84	-14.15
3	4.73839	10.21	35.42	34.97	45.63	45.18	73.00	60.00	-27.37	-14.82
4	9.00018	10.29	34.66	34.36	44.95	44.65	73.00	60.00	-28.05	-15.35
5	23.67961	10.54	39.19	36.00	49.73	46.54	73.00	60.00	-23.27	-13.46
6	29.82488	10.59	43.61	43.41	54.20	54.00	73.00	60.00	-18.80	-6.00

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



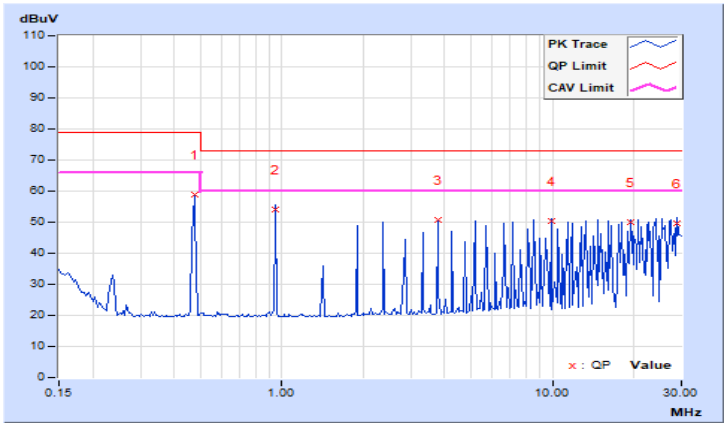
Mode 10

Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	48Vdc	**Environmental Conditions**	25 °C, 75% RH, 1000 mbar
Tested by	Paul Chen		

Phase Of Power : Positive (+)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.47422	10.03	48.82	48.55	58.85	58.58	79.00	66.00	-20.15	-7.42
2	0.94688	10.07	43.95	43.56	54.02	53.63	73.00	60.00	-18.98	-6.37
3	3.78906	10.19	40.55	40.26	50.74	50.45	73.00	60.00	-22.26	-9.55
4	9.94676	10.31	40.24	39.87	50.55	50.18	73.00	60.00	-22.45	-9.82
5	19.41719	10.48	39.64	39.36	50.12	49.84	73.00	60.00	-22.88	-10.16
6	28.88400	10.55	39.10	38.86	49.65	49.41	73.00	60.00	-23.35	-10.59

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

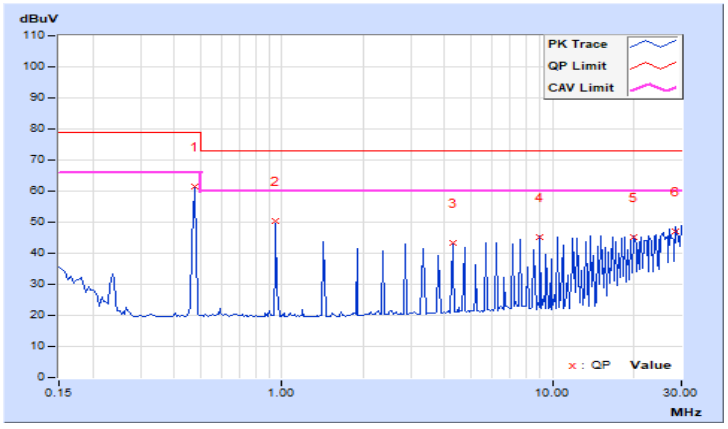


Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	48Vdc	**Environmental Conditions**	25 °C, 75% RH, 1000 mbar
Tested by	Paul Chen		

Phase Of Power : Negative (-)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.47422	10.03	51.34	51.00	61.37	61.03	79.00	66.00	-17.63	-4.97
2	0.95078	10.06	40.20	40.08	50.26	50.14	73.00	60.00	-22.74	-9.86
3	4.27205	10.20	33.21	32.80	43.41	43.00	73.00	60.00	-29.59	-17.00
4	9.01835	10.29	34.86	34.51	45.15	44.80	73.00	60.00	-27.85	-15.20
5	19.92434	10.50	34.62	34.36	45.12	44.86	73.00	60.00	-27.88	-15.14
6	28.45650	10.58	36.48	36.00	47.06	46.58	73.00	60.00	-25.94	-13.42

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



6 Radiated Emission at Frequencies up to 1GHz

6.1 Limits

<table>
<tr><td colspan="4">Class A</td></tr>
<tr><td>Frequency range
(MHz)</td><td colspan="2">Distance
(m)</td><td>Limits
(dBuV/m)</td></tr>
<tr><td>30 - 230</td><td colspan="2" rowspan="2">10</td><td>40</td></tr>
<tr><td>230 - 1000</td><td>47</td></tr>
<tr><td>30 - 230</td><td colspan="2" rowspan="2">3</td><td>50</td></tr>
<tr><td>230 - 1000</td><td>57</td></tr>
<tr><td colspan="4">Class B</td></tr>
<tr><td>Frequency range
(MHz)</td><td colspan="2">Distance
(m)</td><td>Limits
(dBuV/m)</td></tr>
<tr><td>30 - 230</td><td colspan="2" rowspan="2">10</td><td>30</td></tr>
<tr><td>230 - 1000</td><td>37</td></tr>
<tr><td>30 - 230</td><td colspan="2" rowspan="2">3</td><td>40</td></tr>
<tr><td>230 - 1000</td><td>47</td></tr>
<tr><td colspan="4">FM Receivers</td></tr>
<tr><td rowspan="2">Frequency range
(MHz)</td><td colspan="2" rowspan="2">Distance
(m)</td><td colspan="2">Class B limits
(dBuV/m)</td></tr>
<tr><td>Fundamental</td><td>Harmonics</td></tr>
<tr><td>30 - 230</td><td colspan="2" rowspan="3">10</td><td rowspan="3">50</td><td>42</td></tr>
<tr><td>230 - 300</td><td>42</td></tr>
<tr><td>300 - 1000</td><td>46</td></tr>
<tr><td>30 - 230</td><td colspan="2" rowspan="3">3</td><td rowspan="3">60</td><td>52</td></tr>
<tr><td>230 - 300</td><td>52</td></tr>
<tr><td>300 - 1000</td><td>56</td></tr>
<tr><td colspan="5">These relaxed limits apply only to emissions at the fundamental and harmonic frequencies of the local oscillator. Signals at all other frequencies shall be compliant with the limits given in Table A.4 of EN 55032.</td></tr>
</table>

Note: The lower limit shall apply at the transition frequencies.

6.2 Test Instruments

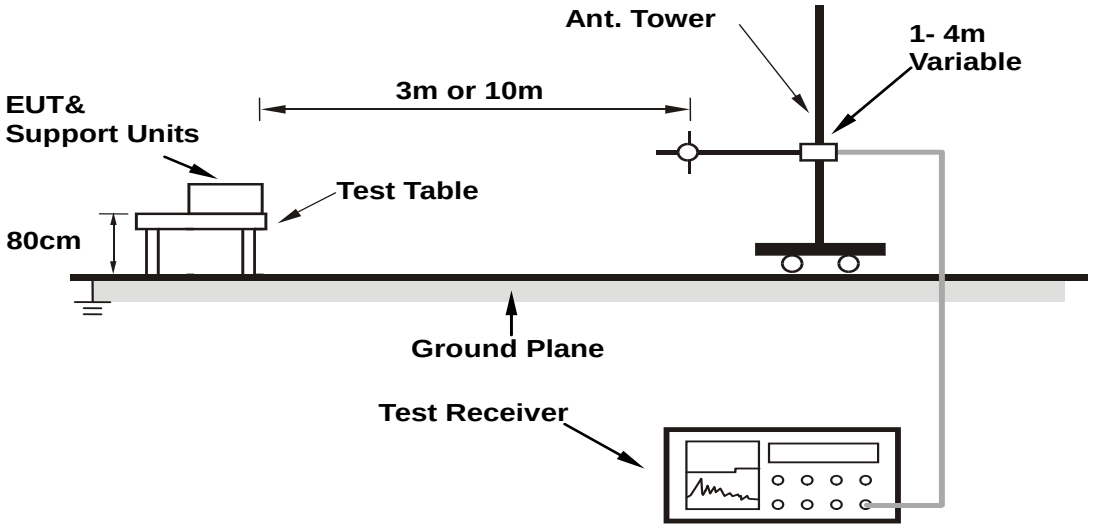
Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
EMCI Preamplifier	EMC9135	980326	Feb. 18, 2021	Feb. 17, 2022
EMCI Preamplifier	EMC9135	980327	Feb. 18, 2021	Feb. 17, 2022
Agilent Test Receiver	N9038A	MY50010135	May 28, 2021	May 27, 2022
Agilent Test Receiver	N9038A	MY51210114	Jan. 22, 2021	Jan. 21, 2022
Schwarzbeck Antenna	VULB9168	9168-316	Nov. 6, 2020	Nov. 5, 2021
Schwarzbeck Antenna	VULB9168	9168-317	Nov. 6, 2020	Nov. 5, 2021
Max Full. Turn Table & Tower	MF7802	MF7802121	NA	NA
Max Full. Tower	MF7802	MF780208105	NA	NA
Software	Radiated_V8.7.08	NA	NA	NA
JYEBAO RF cable With 5dB PAD	LMR-600	CABLE-CH8-01.V	Sep. 25, 2020	Sep. 24, 2021
JYEBAO RF cable With 5dB PAD	LMR-600	CABLE-CH8-02.H	Nov. 13, 2020	Nov. 12, 2021
WOKEN RF cable With 5dB PAD	8D	CABLE-CH8-03.3M	Sep. 25, 2020	Sep. 24, 2021

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Chamber No. 8.
3. The VCCI Site Registration No. R-12946.
4. Tested Date: 2021/7/17

6.3 Test Arrangement

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at an accredited test facility. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is up to 1 GHz.

Note:
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for quasi-peak detection (QP) at frequency up to 1GHz.
2. The measurement distance is the shortest horizontal distance between an imaginary circular periphery just encompassing this arrangement and the calibration point of the antenna.



Note: Cable on the RGP must to be insulated.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

6.4 Test Results

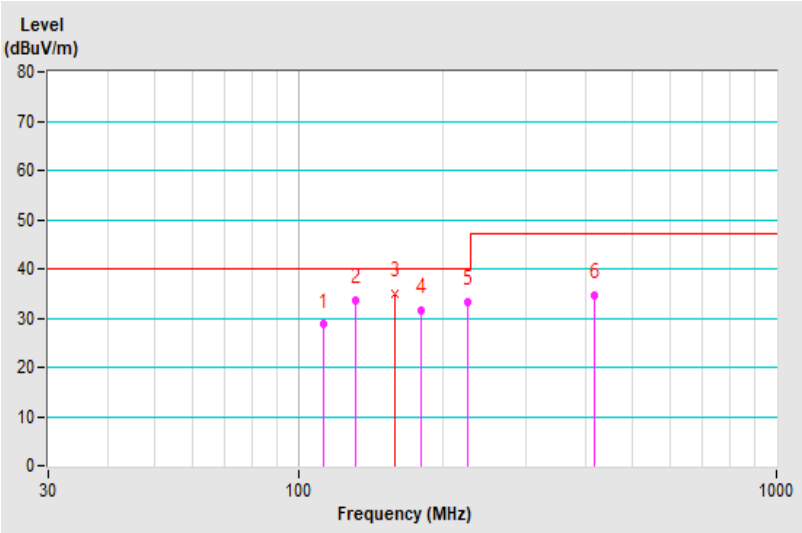
Mode 1

Frequency Range	30MHz ~ 1GHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP), 120kHz
Input Power	12Vdc	**Environmental Conditions**	26 °C, 60% RH, 1000 mbar
Tested By	Paul Chen		

Antenna Polarity & Test Distance : Horizontal at 10 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	113.20	28.68 QP	40.00	-11.32	4.00 H	22	48.09	-19.41
2	131.85	33.49 QP	40.00	-6.51	4.00 H	193	51.16	-17.67
3	159.06	34.94 QP	40.00	-5.06	4.00 H	187	51.00	-16.06
4	180.86	31.67 QP	40.00	-8.33	4.00 H	19	49.43	-17.76
5	226.18	33.31 QP	40.00	-6.69	4.00 H	28	52.48	-19.17
6	417.64	34.60 QP	47.00	-12.40	3.87 H	184	47.34	-12.74

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

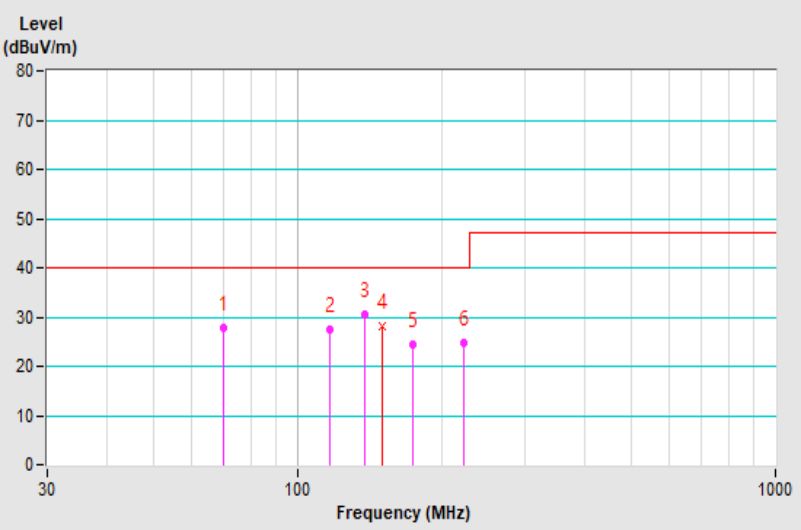


Frequency Range	30MHz ~ 1GHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP), 120kHz
Input Power	12Vdc	**Environmental Conditions**	26 °C, 60% RH, 1000 mbar
Tested By	Paul Chen		

Antenna Polarity & Test Distance : Vertical at 10 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	70.11	27.89 QP	40.00	-12.11	2.13 V	22	47.45	-19.56
2	116.79	27.44 QP	40.00	-12.56	1.00 V	75	46.59	-19.15
3	138.69	30.67 QP	40.00	-9.33	1.00 V	349	47.80	-17.13
4	150.29	28.06 QP	40.00	-11.94	1.00 V	12	44.55	-16.49
5	174.12	24.55 QP	40.00	-15.45	1.82 V	332	41.62	-17.07
6	223.68	24.73 QP	40.00	-15.27	1.00 V	2	44.07	-19.34

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



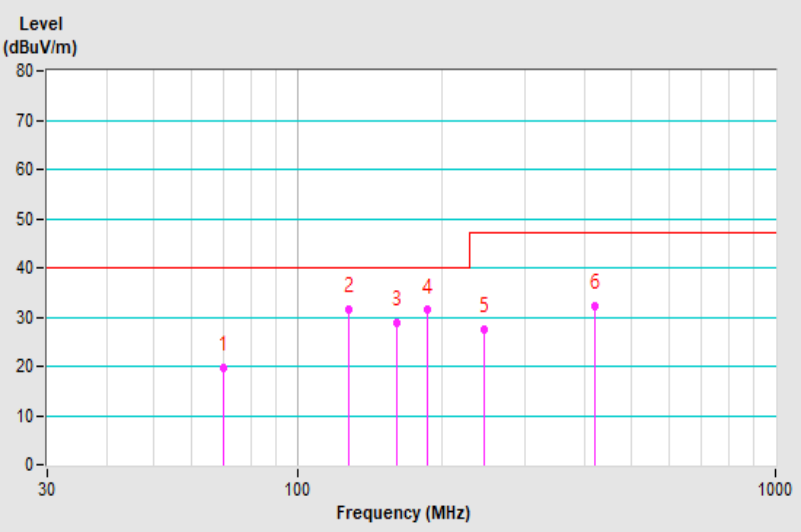
Mode 2

Frequency Range	30MHz ~ 1GHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP), 120kHz
Input Power	24Vdc	**Environmental Conditions**	26 °C, 60% RH, 1000 mbar
Tested By	Paul Chen		

Antenna Polarity & Test Distance : Horizontal at 10 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	69.94	19.61 QP	40.00	-20.39	4.00 H	277	39.02	-19.41
2	128.53	31.65 QP	40.00	-8.35	4.00 H	194	49.63	-17.98
3	160.97	28.81 QP	40.00	-11.19	4.00 H	191	45.06	-16.25
4	186.53	31.41 QP	40.00	-8.59	4.00 H	33	49.93	-18.52
5	246.29	27.45 QP	47.00	-19.55	3.61 H	56	44.89	-17.44
6	419.89	32.34 QP	47.00	-14.66	2.29 H	200	44.96	-12.62

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

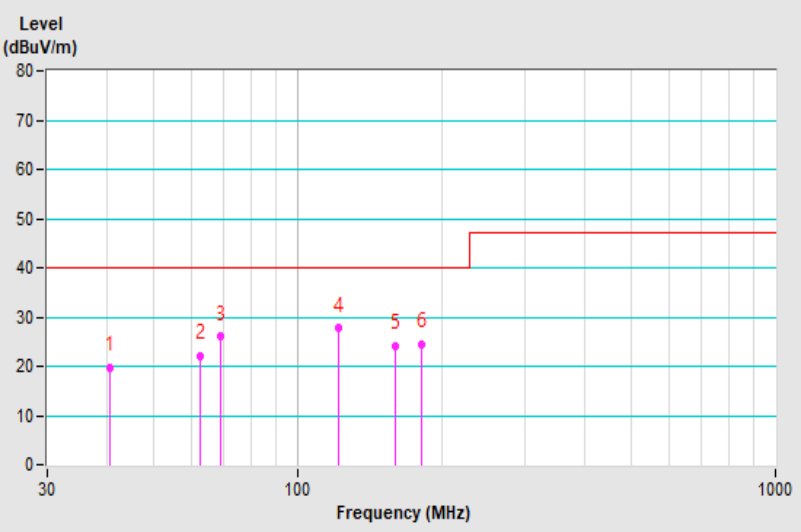


Frequency Range	30MHz ~ 1GHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP), 120kHz
Input Power	24Vdc	**Environmental Conditions**	26 °C, 60% RH, 1000 mbar
Tested By	Paul Chen		

Antenna Polarity & Test Distance : Vertical at 10 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	40.45	19.69 QP	40.00	-20.31	1.26 V	318	37.92	-18.23
2	62.86	22.10 QP	40.00	-17.90	2.11 V	239	40.29	-18.19
3	69.19	25.95 QP	40.00	-14.05	1.82 V	12	45.55	-19.60
4	122.13	27.63 QP	40.00	-12.37	1.00 V	327	46.30	-18.67
5	160.63	24.19 QP	40.00	-15.81	1.00 V	25	40.61	-16.42
6	182.02	24.51 QP	40.00	-15.49	1.00 V	10	42.67	-18.16

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



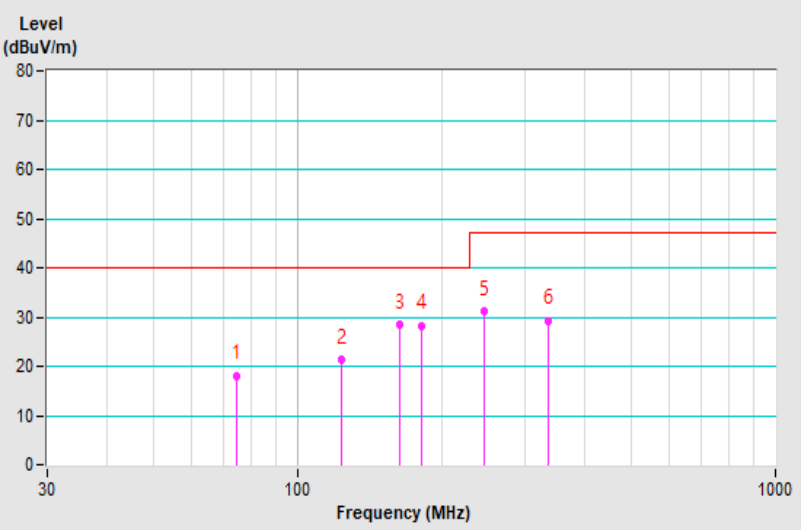
Mode 3

Frequency Range	30MHz ~ 1GHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP), 120kHz
Input Power	48Vdc	**Environmental Conditions**	26 °C, 60% RH, 1000 mbar
Tested By	Paul Chen		

Antenna Polarity & Test Distance : Horizontal at 10 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	74.74	18.04 QP	40.00	-21.96	4.00 H	248	38.48	-20.44
2	123.58	21.25 QP	40.00	-18.75	4.00 H	205	39.71	-18.46
3	164.20	28.36 QP	40.00	-11.64	4.00 H	194	44.62	-16.26
4	181.97	28.28 QP	40.00	-11.72	4.00 H	18	46.22	-17.94
5	246.60	31.02 QP	47.00	-15.98	4.00 H	25	48.45	-17.43
6	335.50	29.17 QP	47.00	-17.83	3.61 H	3	43.76	-14.59

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

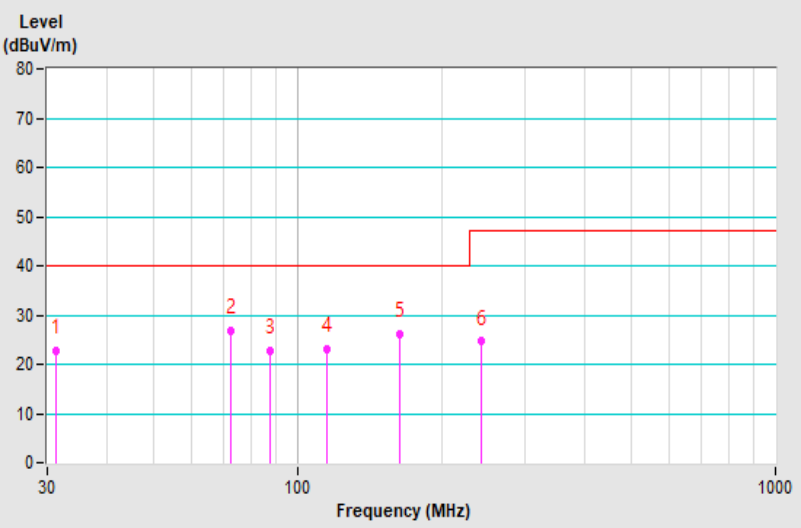


Frequency Range	30MHz ~ 1GHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP), 120kHz
Input Power	48Vdc	**Environmental Conditions**	26 °C, 60% RH, 1000 mbar
Tested By	Paul Chen		

Antenna Polarity & Test Distance : Vertical at 10 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	31.33	22.70 QP	40.00	-17.30	1.72 V	159	42.23	-19.53
2	72.46	26.79 QP	40.00	-13.21	1.64 V	35	46.93	-20.14
3	87.98	22.85 QP	40.00	-17.15	2.12 V	116	45.74	-22.89
4	115.19	22.98 QP	40.00	-17.02	1.00 V	335	42.38	-19.40
5	163.62	26.03 QP	40.00	-13.97	1.00 V	0	42.49	-16.46
6	242.19	24.61 QP	47.00	-22.39	1.00 V	70	42.36	-17.75

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



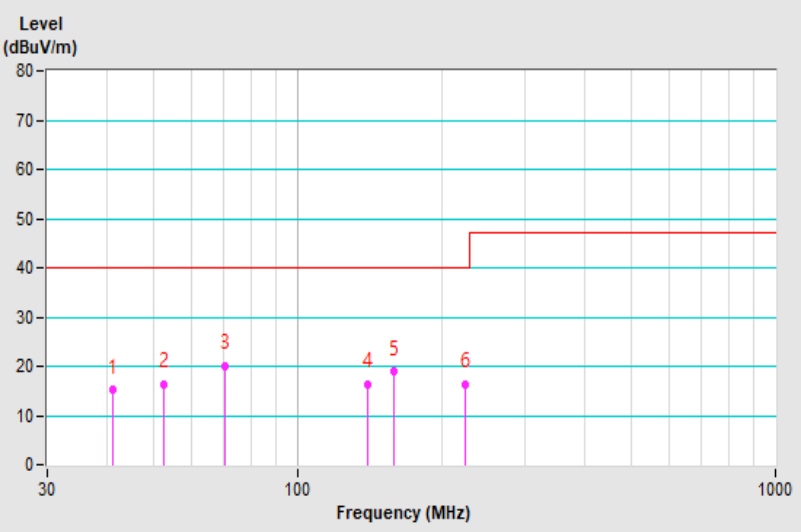
Mode 4

Frequency Range	30MHz ~ 1GHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP), 120kHz
Input Power	12Vdc	**Environmental Conditions**	26 °C, 60% RH, 1000 mbar
Tested By	Paul Chen		

Antenna Polarity & Test Distance : Horizontal at 10 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	41.16	15.13 QP	40.00	-24.87	4.00 H	177	32.90	-17.77
2	52.58	16.30 QP	40.00	-23.70	4.00 H	309	33.65	-17.35
3	70.79	20.08 QP	40.00	-19.92	4.00 H	229	39.61	-19.53
4	140.12	16.22 QP	40.00	-23.78	4.00 H	18	33.16	-16.94
5	158.67	18.84 QP	40.00	-21.16	4.00 H	33	34.96	-16.12
6	224.56	16.32 QP	40.00	-23.68	4.00 H	18	35.59	-19.27

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

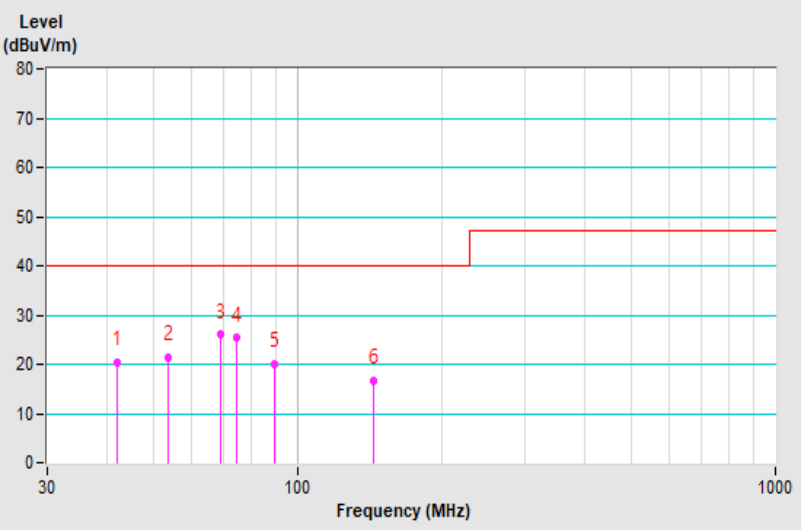


Frequency Range	30MHz ~ 1GHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP), 120kHz
Input Power	12Vdc	**Environmental Conditions**	26 °C, 60% RH, 1000 mbar
Tested By	Paul Chen		

Antenna Polarity & Test Distance : Vertical at 10 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	42.15	20.36 QP	40.00	-19.64	1.84 V	334	38.32	-17.96
2	53.55	21.43 QP	40.00	-18.57	2.22 V	312	39.09	-17.66
3	68.99	26.00 QP	40.00	-14.00	1.36 V	245	45.62	-19.62
4	74.69	25.32 QP	40.00	-14.68	1.93 V	77	45.90	-20.58
5	89.39	20.06 QP	40.00	-19.94	1.00 V	96	42.91	-22.85
6	144.24	16.53 QP	40.00	-23.47	1.00 V	351	33.31	-16.78

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



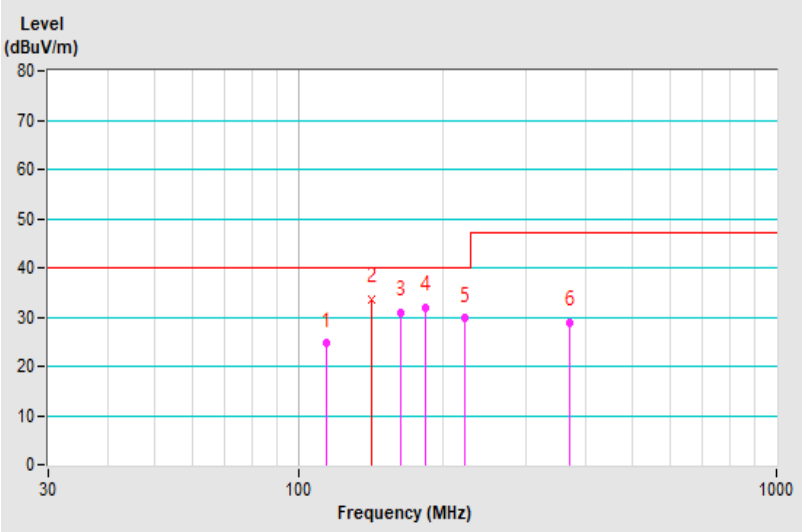
Mode 5

Frequency Range	30MHz ~ 1GHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP), 120kHz
Input Power	24Vdc	**Environmental Conditions**	26 °C, 60% RH, 1000 mbar
Tested By	Paul Chen		

Antenna Polarity & Test Distance : Horizontal at 10 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	114.71	24.66 QP	40.00	-15.34	4.00 H	32	43.92	-19.26
2	142.50	33.70 QP	40.00	-6.30	4.00 H	29	50.43	-16.73
3	163.45	30.85 QP	40.00	-9.15	4.00 H	186	47.15	-16.30
4	183.96	31.95 QP	40.00	-8.05	4.00 H	38	50.11	-18.16
5	222.23	29.67 QP	40.00	-10.33	3.67 H	74	48.93	-19.26
6	370.11	28.79 QP	47.00	-18.21	3.18 H	3	42.55	-13.76

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

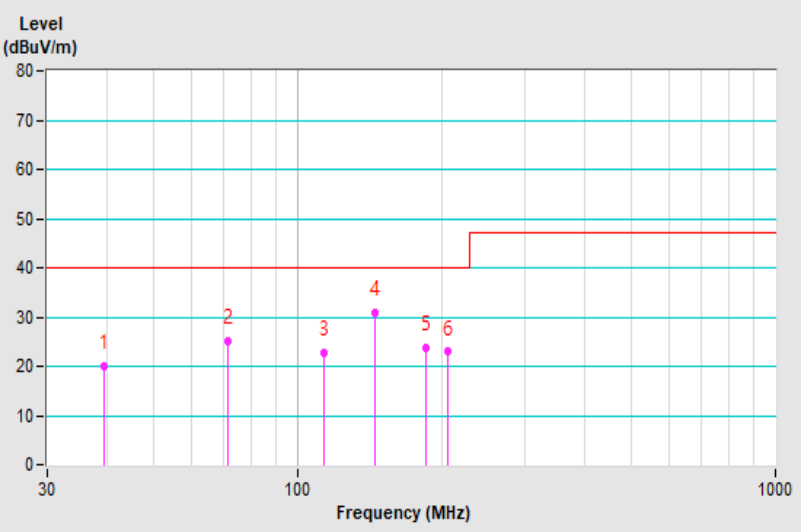


Frequency Range	30MHz ~ 1GHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP), 120kHz
Input Power	24Vdc	**Environmental Conditions**	26 °C, 60% RH, 1000 mbar
Tested By	Paul Chen		

Antenna Polarity & Test Distance : Vertical at 10 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	39.55	20.10 QP	40.00	-19.90	1.28 V	332	38.45	-18.35
2	71.73	25.13 QP	40.00	-14.87	1.69 V	6	45.08	-19.95
3	113.37	22.75 QP	40.00	-17.25	1.00 V	344	42.33	-19.58
4	145.07	30.85 QP	40.00	-9.15	1.00 V	356	47.57	-16.72
5	185.98	23.77 QP	40.00	-16.23	1.00 V	18	42.44	-18.67
6	207.07	22.95 QP	40.00	-17.05	1.00 V	1	42.60	-19.65

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



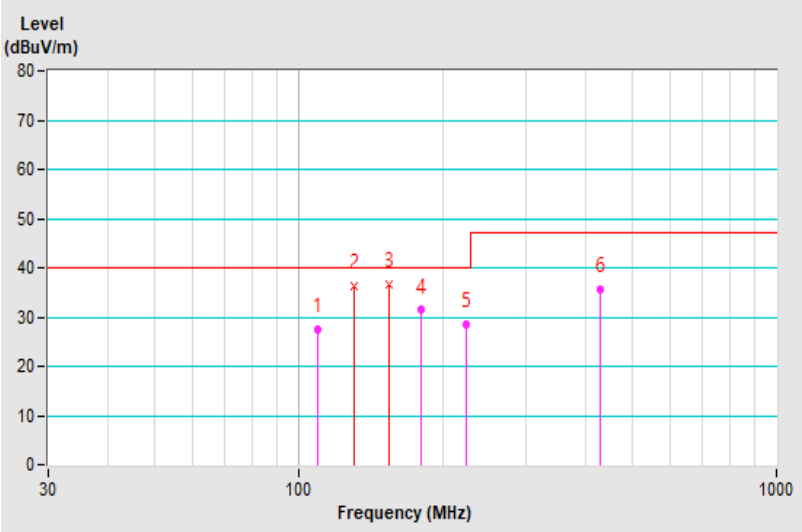
Mode 6

Frequency Range	30MHz ~ 1GHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP), 120kHz
Input Power	24Vdc	**Environmental Conditions**	26 °C, 60% RH, 1000 mbar
Tested By	Paul Chen		

Antenna Polarity & Test Distance : Horizontal at 10 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	109.52	27.41 QP	40.00	-12.59	4.00 H	22	47.16	-19.75
2	130.62	36.42 QP	40.00	-3.58	4.00 H	198	54.15	-17.73
3	**154.85**	**36.73 QP**	**40.00**	**-3.27**	**4.00 H**	**219**	**52.94**	**-16.21**
4	180.71	31.40 QP	40.00	-8.60	4.00 H	24	49.14	-17.74
5	224.15	28.62 QP	40.00	-11.38	4.00 H	45	47.88	-19.26
6	428.19	35.63 QP	47.00	-11.37	2.19 H	202	47.89	-12.26

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

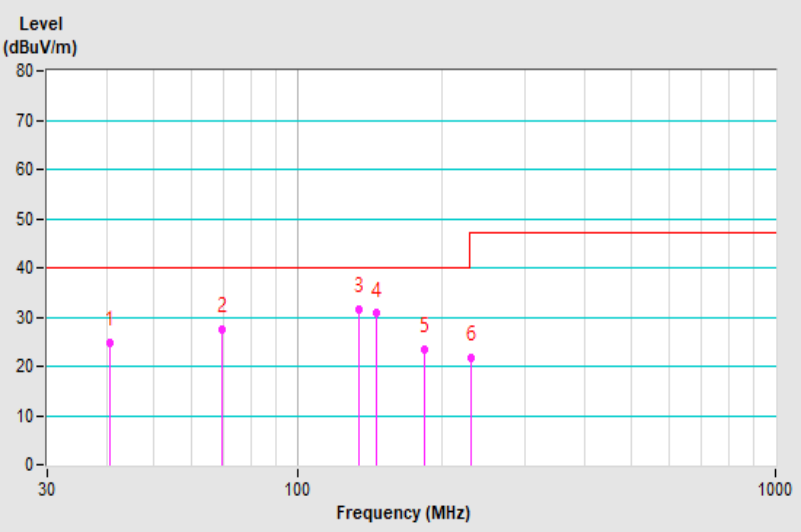


Frequency Range	30MHz ~ 1GHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP), 120kHz
Input Power	24Vdc	**Environmental Conditions**	26 °C, 60% RH, 1000 mbar
Tested By	Paul Chen		

Antenna Polarity & Test Distance : Vertical at 10 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	40.65	24.86 QP	40.00	-15.14	1.91 V	332	43.03	-18.17
2	69.43	27.45 QP	40.00	-12.55	1.64 V	251	47.02	-19.57
3	134.28	31.60 QP	40.00	-8.40	1.00 V	327	49.06	-17.46
4	146.45	30.73 QP	40.00	-9.27	1.00 V	350	47.34	-16.61
5	184.18	23.50 QP	40.00	-16.50	1.00 V	332	41.94	-18.44
6	230.26	21.63 QP	47.00	-25.37	1.00 V	42	40.31	-18.68

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



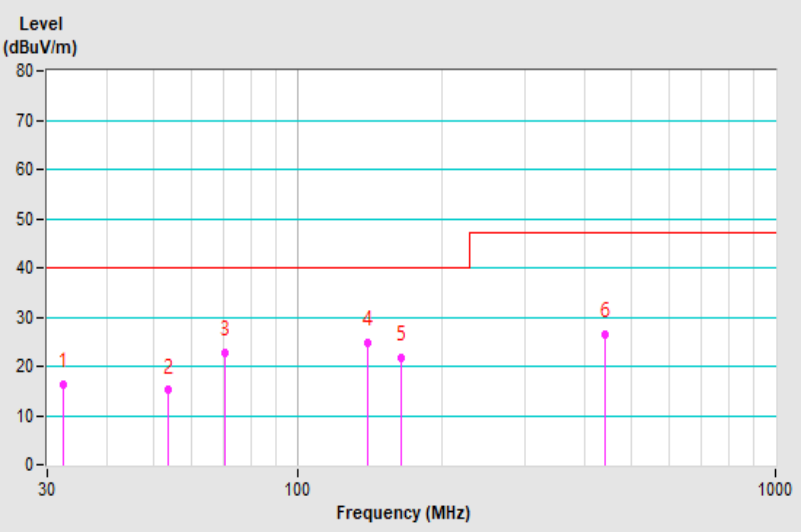
Mode 7

Frequency Range	30MHz ~ 1GHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP), 120kHz
Input Power	48Vdc	**Environmental Conditions**	26 °C, 60% RH, 1000 mbar
Tested By	Paul Chen		

Antenna Polarity & Test Distance : Horizontal at 10 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	32.45	16.20 QP	40.00	-23.80	4.00 H	7	35.21	-19.01
2	53.69	15.11 QP	40.00	-24.89	4.00 H	292	32.60	-17.49
3	70.62	22.65 QP	40.00	-17.35	4.00 H	250	42.15	-19.50
4	140.77	24.87 QP	40.00	-15.13	4.00 H	31	41.81	-16.94
5	164.90	21.65 QP	40.00	-18.35	4.00 H	4	38.03	-16.38
6	440.21	26.51 QP	47.00	-20.49	2.39 H	334	38.37	-11.86

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

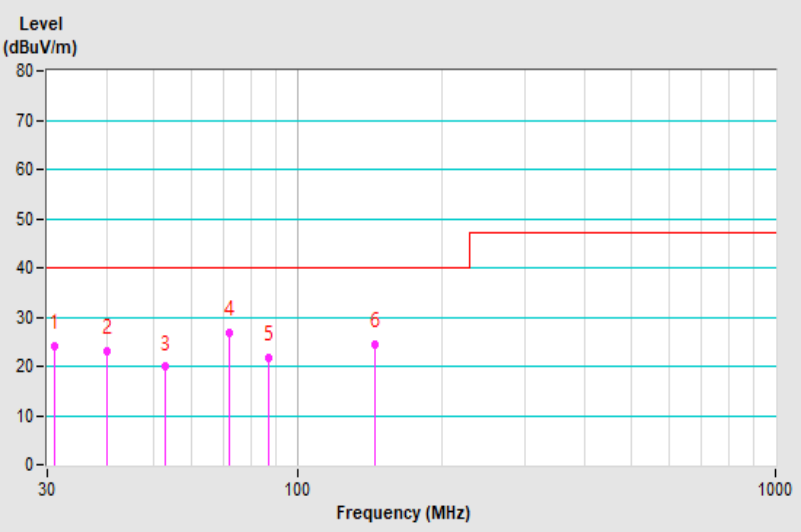


Frequency Range	30MHz ~ 1GHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP), 120kHz
Input Power	48Vdc	**Environmental Conditions**	26 °C, 60% RH, 1000 mbar
Tested By	Paul Chen		

Antenna Polarity & Test Distance : Vertical at 10 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	31.12	24.17 QP	40.00	-15.83	1.33 V	123	43.74	-19.57
2	39.87	23.04 QP	40.00	-16.96	2.28 V	140	41.39	-18.35
3	52.89	19.86 QP	40.00	-20.14	1.54 V	313	37.35	-17.49
4	72.17	26.91 QP	40.00	-13.09	1.00 V	44	46.98	-20.07
5	87.30	21.71 QP	40.00	-18.29	1.00 V	190	44.58	-22.87
6	144.99	24.45 QP	40.00	-15.55	1.00 V	348	41.19	-16.74

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



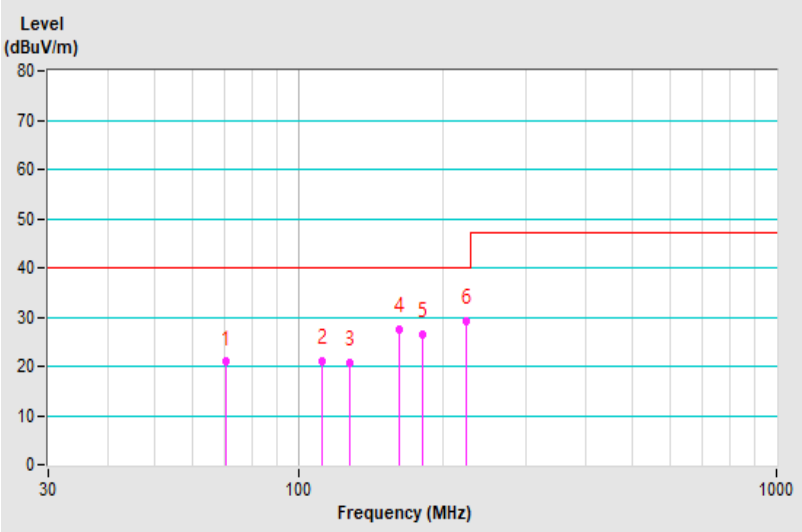
Mode 8

Frequency Range	30MHz ~ 1GHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP), 120kHz
Input Power	24Vdc	**Environmental Conditions**	26 °C, 60% RH, 1000 mbar
Tested By	Paul Chen		

Antenna Polarity & Test Distance : Horizontal at 10 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	70.57	20.89 QP	40.00	-19.11	4.00 H	258	40.39	-19.50
2	112.06	21.10 QP	40.00	-18.90	4.00 H	29	40.60	-19.50
3	128.02	20.79 QP	40.00	-19.21	4.00 H	202	38.80	-18.01
4	162.48	27.56 QP	40.00	-12.44	4.00 H	171	43.81	-16.25
5	181.51	26.44 QP	40.00	-13.56	4.00 H	20	44.30	-17.86
6	225.24	29.30 QP	40.00	-10.70	4.00 H	38	48.54	-19.24

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

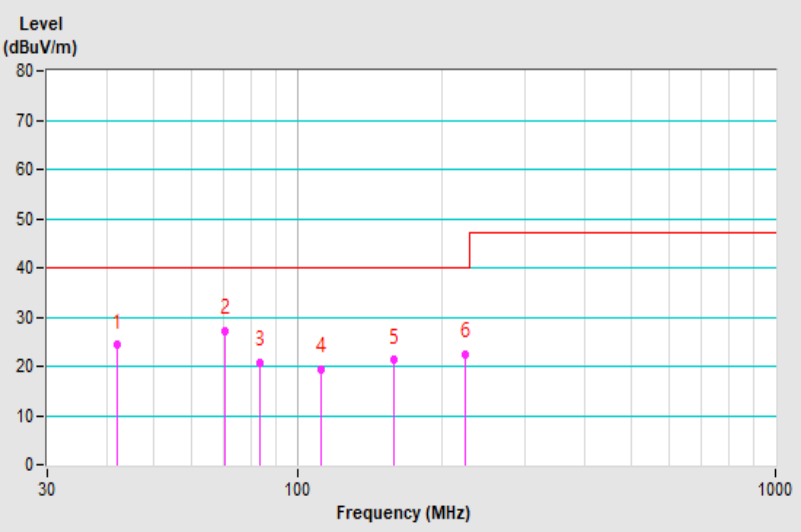


Frequency Range	30MHz ~ 1GHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP), 120kHz
Input Power	24Vdc	**Environmental Conditions**	26 °C, 60% RH, 1000 mbar
Tested By	Paul Chen		

Antenna Polarity & Test Distance : Vertical at 10 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	41.93	24.29 QP	40.00	-15.71	1.64 V	328	42.26	-17.97
2	70.52	27.24 QP	40.00	-12.76	1.33 V	48	46.89	-19.65
3	83.42	20.84 QP	40.00	-19.16	1.00 V	164	43.37	-22.53
4	112.30	19.46 QP	40.00	-20.54	1.00 V	339	39.15	-19.69
5	159.45	21.22 QP	40.00	-18.78	1.00 V	3	37.55	-16.33
6	224.36	22.36 QP	40.00	-17.64	1.00 V	19	41.67	-19.31

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



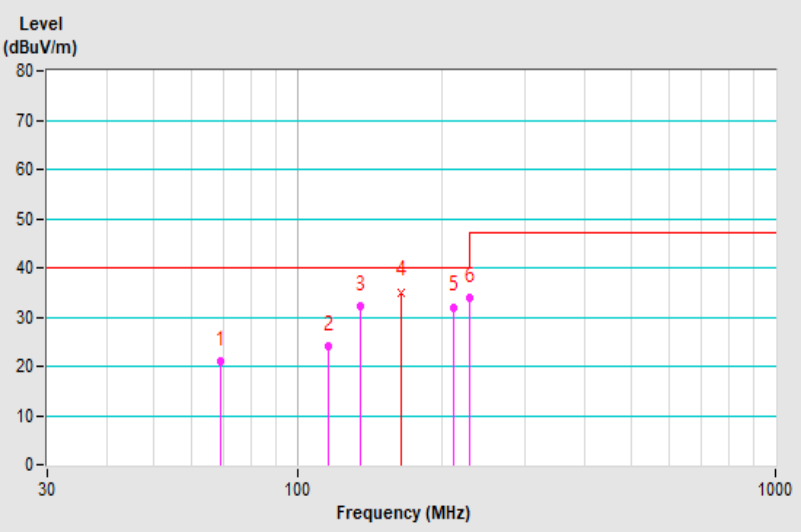
Mode 9

Frequency Range	30MHz ~ 1GHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP), 120kHz
Input Power	24Vdc	**Environmental Conditions**	26 °C, 60% RH, 1000 mbar
Tested By	Paul Chen		

Antenna Polarity & Test Distance : Horizontal at 10 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	69.24	20.86 QP	40.00	-19.14	4.00 H	237	40.28	-19.42
2	116.33	23.94 QP	40.00	-16.06	4.00 H	20	43.00	-19.06
3	135.29	32.06 QP	40.00	-7.94	4.00 H	45	49.35	-17.29
4	165.05	34.92 QP	40.00	-5.08	4.00 H	222	51.32	-16.40
5	211.78	31.98 QP	40.00	-8.02	4.00 H	74	51.40	-19.42
6	228.83	33.79 QP	40.00	-6.21	4.00 H	74	52.75	-18.96

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

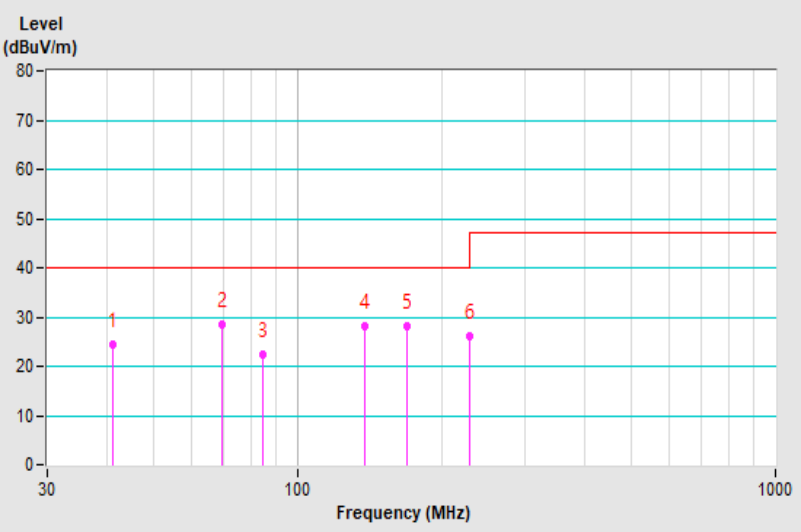


Frequency Range	30MHz ~ 1GHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP), 120kHz
Input Power	24Vdc	**Environmental Conditions**	26 °C, 60% RH, 1000 mbar
Tested By	Paul Chen		

Antenna Polarity & Test Distance : Vertical at 10 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	41.18	24.57 QP	40.00	-15.43	1.88 V	294	42.61	-18.04
2	69.72	28.58 QP	40.00	-11.42	1.62 V	232	48.14	-19.56
3	84.90	22.48 QP	40.00	-17.52	1.74 V	97	45.19	-22.71
4	138.35	28.21 QP	40.00	-11.79	1.00 V	356	45.34	-17.13
5	170.07	28.07 QP	40.00	-11.93	1.00 V	354	44.83	-16.76
6	228.63	26.13 QP	40.00	-13.87	1.00 V	30	45.00	-18.87

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



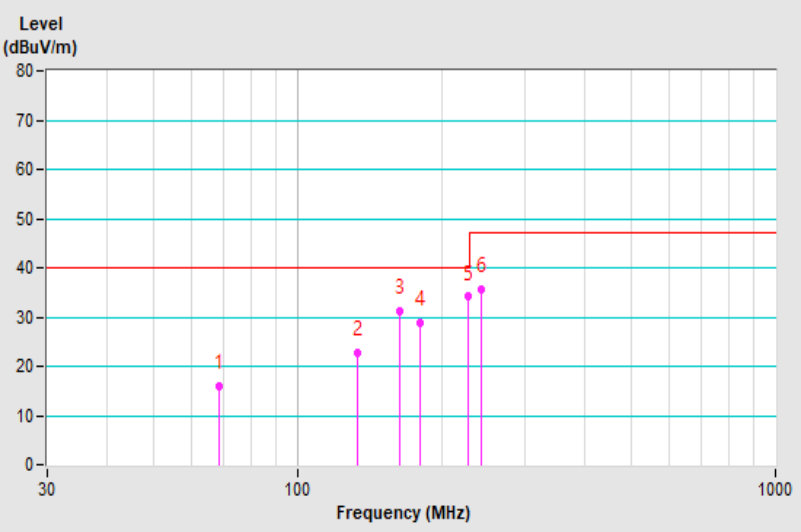
Mode 10

Frequency Range	30MHz ~ 1GHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP), 120kHz
Input Power	48Vdc	**Environmental Conditions**	26 °C, 60% RH, 1000 mbar
Tested By	Paul Chen		

Antenna Polarity & Test Distance : Horizontal at 10 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	68.73	15.91 QP	40.00	-24.09	3.79 H	250	35.23	-19.32
2	133.94	22.77 QP	40.00	-17.23	4.00 H	40	40.16	-17.39
3	163.54	31.17 QP	40.00	-8.83	4.00 H	359	47.46	-16.29
4	180.88	28.94 QP	40.00	-11.06	4.00 H	27	46.70	-17.76
5	227.35	34.12 QP	40.00	-5.88	4.00 H	36	53.20	-19.08
6	241.94	35.66 QP	47.00	-11.34	4.00 H	19	53.32	-17.66

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

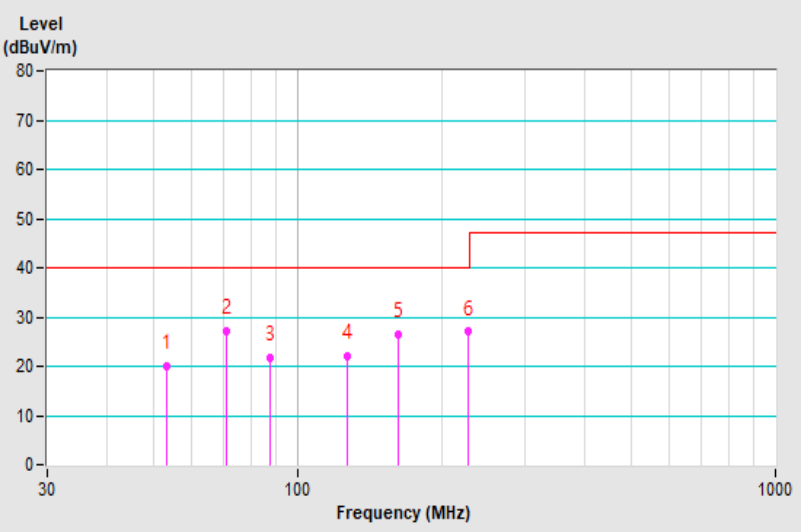


Frequency Range	30MHz ~ 1GHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP), 120kHz
Input Power	48Vdc	**Environmental Conditions**	26 °C, 60% RH, 1000 mbar
Tested By	Paul Chen		

Antenna Polarity & Test Distance : Vertical at 10 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	53.30	19.99 QP	40.00	-20.01	1.33 V	209	37.57	-17.58
2	71.18	27.19 QP	40.00	-12.81	1.72 V	29	46.98	-19.79
3	87.74	21.73 QP	40.00	-18.27	1.98 V	227	44.63	-22.90
4	127.65	22.17 QP	40.00	-17.83	1.00 V	332	40.27	-18.10
5	162.24	26.39 QP	40.00	-13.61	1.00 V	344	42.79	-16.40
6	227.32	27.02 QP	40.00	-12.98	1.00 V	30	46.05	-19.03

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



7 General Immunity Requirements

EN 55024:2010/ EN 55024:2010 +A1:2015, Immunity requirements				
Clause	Reference standard	Table	Test specification	Performance Criterion
4.2.1	EN/IEC 61000-4-2 ESD	1.3	Enclosure port: ±8kV Air discharge, ±4kV Contact discharge	B
4.2.3.2	EN/IEC 61000-4-3 RS	1.2	Enclosure port: 80-1000 MHz, 3V/m, 80% AM (1kHz)	A
4.2.2	EN/IEC 61000-4-4 EFT	2.3	Signal ports and telecommunication ports: xDSL equipment: ±0.5kV, 5/50 (t_r/t_w) ns, 100kHz others: ±0.5kV, 5/50 (t_r/t_w) ns, 5kHz	B
		3.3	Input DC power port: ±0.5kV, 5/50 (t_r/t_w) ns, 5kHz	
		4.5	Input AC Power ports: ±1kV, 5/50 (t_r/t_w) ns, 5kHz	
4.2.5	EN/IEC 61000-4-5 Surge	2.2	Signal and telecommunication ports (direct to outdoor cables): 10/700 (5/320) (T_f/T_d) μs w/o primary protectors: ±1kV, or with primary protectors fitted: ±4kV	C
		3.2	Input DC power port (direct to outdoor cables): 1.2/50 (8/20) (T_f/T_d) μs Line to earth: ±0.5kV	B
		4.4	Input AC Power ports: 1.2/50 (8/20) (T_f/T_d) μs, Line to line: ±1kV Line to earth: ±2kV	
4.2.3.3	EN/IEC 61000-4-6 CS	2.1	Signal and telecommunication ports(cable length > 3m): 0.15-80 MHz, 3V, 80% AM (1kHz)	A
		3.1	Input DC power port: 0.15-80 MHz, 3V, 80% AM (1kHz)	
		4.1	Input AC Power ports: 0.15-80 MHz, 3V, 80% AM (1kHz)	
4.2.4	EN/IEC 61000-4-8 PFMF	1.1	Enclosure port: 50 or 60 Hz, 1A/m	A

EN55035:2017 +A11:2020, Immunity requirements		
Reference standard	Test specification	Performance Criterion
EN/IEC 61000-4-2 ESD	Enclosure port: ±8kV Air discharge, ±4kV Contact discharge	B
EN/IEC 61000-4-3 RS	Enclosure port: Swept freq. test : 80-1000 MHz, 3V/m, 80% AM (1kHz), Spot freq. test : 1800, 2600, 3500, 5000 MHz (±1 %), 3V/m, 80% AM (1kHz)	A
EN/IEC 61000-4-4 EFT	Analogue/digital data ports (cable length > 3m): xDSL equipment: ±0.5kV, 5/50 (t_r/t_w) ns, 100kHz others: ±0.5kV, 5/50 (t_r/t_w) ns, 5kHz	B
	DC network power port(cable length > 3m): ±0.5kV, 5/50 (t_r/t_w) ns, 5kHz	
	AC mains power ports: ±1.0kV, 5/50 (t_r/t_w) ns, 5kHz	
EN/IEC 61000-4-5 Surge	Analogue/digital data ports (direct to outdoor cables): Port type: unshielded symmetrical 10/700(5/320) (T_f/T_d) μs, w/o primary protectors (line to ground): ±1.0kV, or with primary protectors (line to ground): ±1.0kV, ±4.0kV Port type: coaxial or shielded 1.2/50 (8/20) (T_f/T_d) μs, shield to ground: ±0.5kV	C
	DC network power port (direct to outdoor cables): 1.2/50(8/20) (T_f/T_d) μs, Line to ground: ±0.5kV	B
	AC mains power ports: 1.2/50(8/20) (T_f/T_d) μs, Line to line: ±1kV, Line to ground: ±2kV	B
EN/IEC 61000-4-6 CS	Analogue/digital data ports (cable length > 3m) ; DC network power ports (cable length > 3m) ; AC mains power ports 0.15-10 MHz, 3V, 80% AM (1kHz), 10-30 MHz, 3V-1V, 80% AM (1kHz), 30-80 MHz, 1V, 80% AM (1kHz)	A
EN/IEC 61000-4-8 PFMF	Enclosure port: 50 or 60 Hz, 1A/m	A

7.1 Specific Immunity Requirements by Manufacturer

Reference standard	Test specification	Performance Criterion
EN/IEC 61000-4-2 ESD	Enclosure port: ±6kV Contact discharge	A
EN/IEC 61000-4-3 RS	Enclosure port: 80-1000 MHz,20V/m, 80% AM (1kHz), Spot freq. test : 1800, 2600, 3500, 5000 MHz (±1 %), 20V/m, 80% AM (1kHz)	A
EN/IEC 61000-4-4 EFT	DC network power port(cable length > 3m): ±2kV, 5/50 (t_r/t_w) ns, 5kHz	A
EN/IEC 61000-4-5 Surge	DC network power port (direct to outdoor cables): 1.2/50(8/20) (T_f/T_d) μs, Line to ground: ±2kV	A
EN/IEC 61000-4-6 CS	DC network power ports (cable length > 3m) 0.15-80 MHz, 10V, 80% AM (1kHz)	A
EN/IEC 61000-4-8 PFMF	Enclosure port: 50Hz, 100A/m & 1000A/m	A

7.2 Performance Criteria

General Performance Criteria

Performance criterion A

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

Performance criterion B

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

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

Product Specific Performance Criteria

The particular performance criteria which are specified in the normative annexes of EN 55024 & EN 55035 take precedence over the corresponding parts of the general performance criteria. Where particular performance criteria for specific functions are not given, then the general performance criteria shall apply.

8 Electrostatic Discharge Immunity Test (ESD)

8.1 Test Specification

Product Standard:	EN 55024
Basic Standard:	EN/IEC 61000-4-2
Discharge Impedance:	330 ohm / 150 pF
Discharge Voltage:	Air Discharge: ±2, ±4, ±8kV (Direct) Contact Discharge: ±2, ±4, ±6kV (Indirect/ Direct)
Number of Discharge:	Air – Direct: 10 discharges per location (each polarity) Contact – Direct & Indirect: 25 discharges per location (each polarity) and min. 200 times in total
Discharge Mode:	Single Discharge
Discharge Period:	1-second minimum

Product Standard:	EN 55035
Basic Standard:	EN/IEC 61000-4-2
Discharge Impedance:	330 ohm / 150 pF
Discharge Voltage:	Air Discharge: N/A Contact Discharge: ±2, ±4, ±6kV (Indirect/ Direct)
Number of Discharge:	Air – Direct: 10 discharges per location (each polarity) Contact – Direct & Indirect: 10 discharges per location (each polarity)
Discharge Mode:	Single Discharge
Discharge Period:	1-second minimum

8.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
ESD Simulator KeyTek	MZ15/EC	0504259	2020/11/6	2021/11/5
ESD Simulator KeyTek	MZ-15/EC	0401299	2020/10/7	2021/10/6
ESD Simulator TESEQ	NSG 438	1364	2020/12/11	2021/12/10
Electronic Discharge Simulator Noiseken	ESS-2000	ESS0382041	2020/10/7	2021/10/6
ESD Generator EM Test	Dito//DM-150/330// DM-150/330-rfci	P1315117252/P1317117852	2021/7/9	2022/7/8

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Linkou ESD 02.
3. Tested Date: 2021/9/6

8.3 Test Arrangement

The discharges shall be applied in two ways: (For EN 55024 only)

a. Contact discharges to the conductive surfaces and coupling planes:

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

b. Air discharges at slots and apertures and insulating surfaces:

   On those parts of the EUT where it is not possible to perform contact discharge testing, the equipment should be investigated to identify user accessible points where breakdown may occur. Such points are tested using the air discharge method. This investigation should be restricted to those area normally handled by the user. A minimum of 10 single air discharges shall be applied to the selected test point for each such area.

The basic test procedure was in accordance with EN/IEC 61000-4-2:

a. Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation.

b. The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.

c. The time interval between two successive single discharges was at least 1 second.

d. The ESD generator was held perpendicularly to the surface to which the discharge was applied and the return cable was at least 0.2 meters from the EUT.

e. Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.

f. Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were complete.

g. At least ten single discharges (in the most sensitive polarity) were applied to the **H**orizontal **C**oupling **P**lane at points on each side of the EUT. The ESD generator was positioned at a distance of 0.1 meters from the EUT with the discharge electrode touching the **HCP.**

h. At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the **V**ertical **C**oupling **P**lane in sufficiently different positions that the four faces of the EUT were completely illuminated. The **VCP** (dimensions 0.5m x 0.5m) was placed vertically to and 0.1 meters from the EUT.

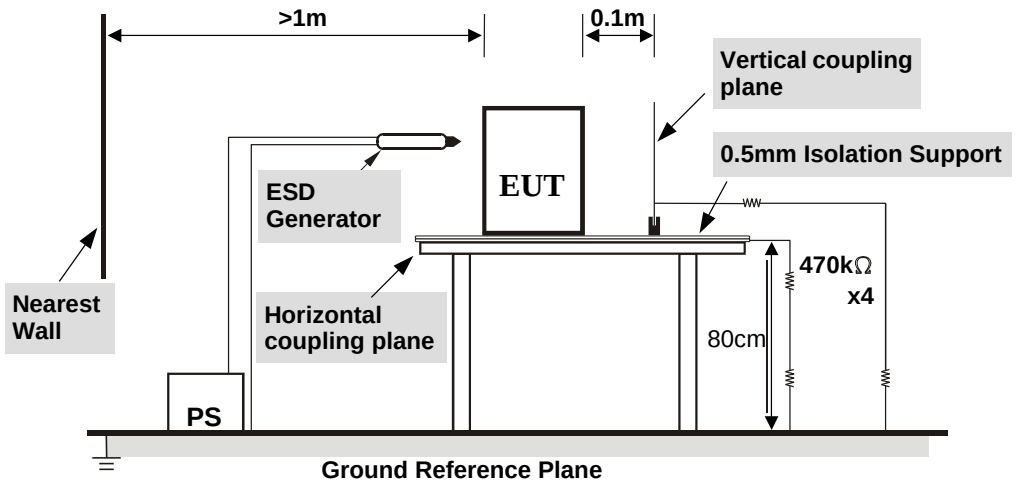


TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the **G**round **R**eference **P**lane. The **GRP** consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A **H**orizontal **C**oupling **P**lane (1.6m x 0.8m) was placed on the table and attached to the **GRP** by means of a cable with 940kΩ total impedance. The equipment under test, was installed in a representative system as described in section 7 of EN/IEC 61000-4-2, and its cables were placed on the **HCP** and isolated by an insulating support of 0.5mm thickness. A distance of 1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

8.4 Supplementary Information

The requirement followed by the client's specification. (Refer to item 7.1)

8.5 Test Results

For EN 55024 & EN 55035

Input Voltage	12Vdc	Tested by	Michael Cheng
Environmental Conditions	23 °C, 48% RH 995mbar	Test mode	Mode 1

Test Results of Direct Application					
Discharge Level (kV)	Polarity (+/-)	Test Point	Contact Discharge	Air Discharge	Performance Criterion
2, 4, 6	+/-	1	Note	NA	A
2, 4, 8	+/-	2	NA	Note	A

Description of test points of direct application: Please refer to following page for representative mark only.

Test Results of Indirect Application					
Discharge Level (kV)	Polarity (+/-)	Test Point	Horizontal Coupling Plane	Vertical Coupling Plane	Performance Criterion
2, 4, 6	+/-	Four Sides	Note	Note	A

Description of test points of indirect application:

1. Front side 2. Rear side 3. Right side 4. Left side

Note: The EUT function was correct during the test.

Input Voltage	24Vdc	Tested by	Michael Cheng
Environmental Conditions	23 °C, 48% RH 995mbar	Test mode	Mode 6

Test Results of Direct Application					
Discharge Level (kV)	Polarity (+/-)	Test Point	Contact Discharge	Air Discharge	Performance Criterion
2, 4, 6	+/-	1	Note	NA	A
2, 4, 8	+/-	2	NA	Note	A

Description of test points of direct application: Please refer to following page for representative mark only.

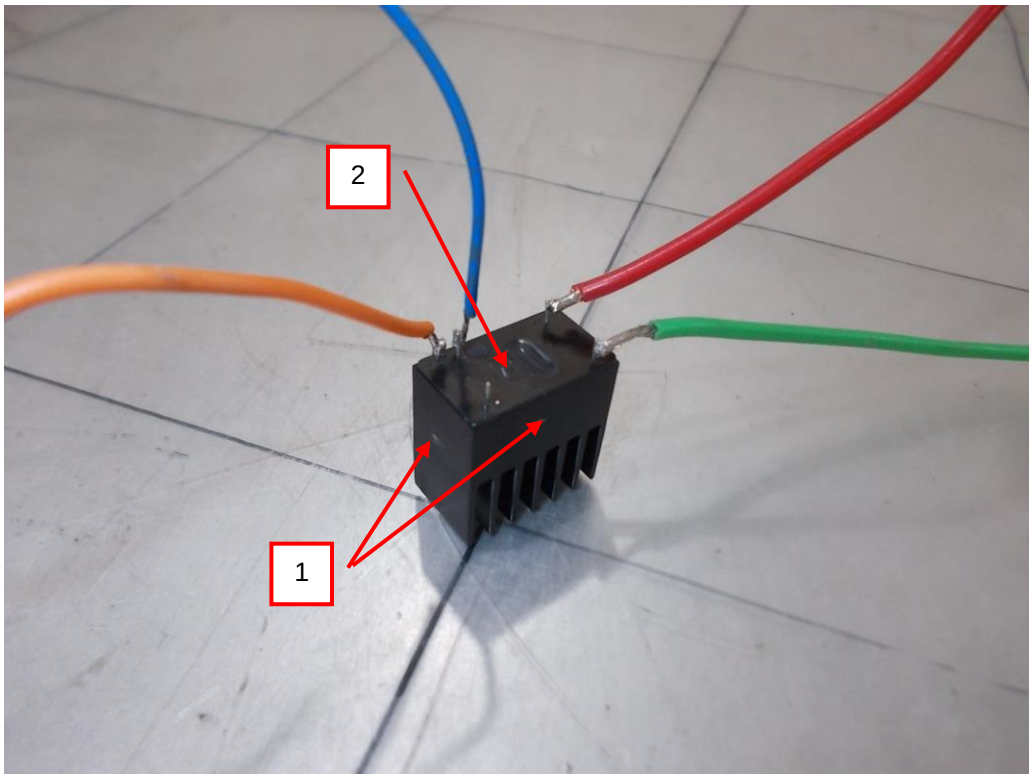
Test Results of Indirect Application					
Discharge Level (kV)	Polarity (+/-)	Test Point	Horizontal Coupling Plane	Vertical Coupling Plane	Performance Criterion
2, 4, 6	+/-	Four Sides	Note	Note	A

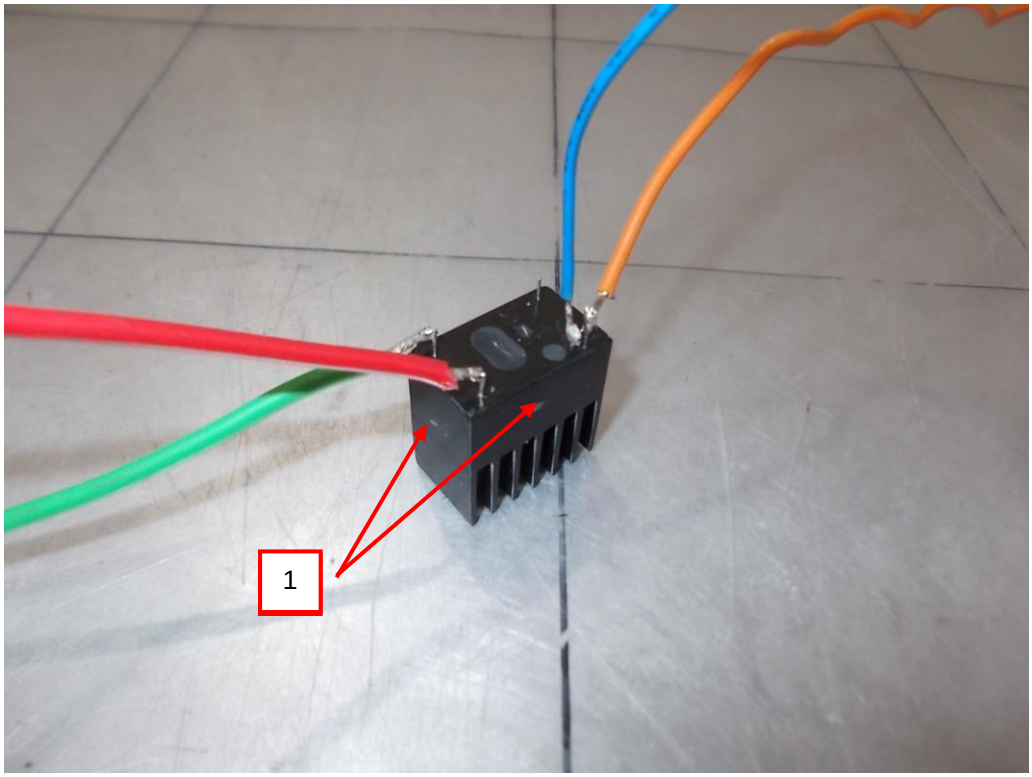
Description of test points of indirect application:

1. Front side 2. Rear side 3. Right side 4. Left side

Note: The EUT function was correct during the test.

Description of Test Points





9 Radiated, Radio-frequency, Electromagnetic Field Immunity Test (RS)

9.1 Test Specification

Product Standard:	EN 55024
Basic Standard:	EN/IEC 61000-4-3
Frequency Range:	80 MHz - 1000 MHz
Field Strength:	3 V/m, 20 V/m,
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of preceding frequency value
Polarity of Antenna:	Horizontal and Vertical
Antenna Height:	1.5m
Dwell Time:	3 seconds

Product Standard:	EN 55035
Basic Standard:	EN/IEC 61000-4-3
Swept Frequency Range:	80 MHz - 1000 MHz
Spot Frequencies:	1800, 2600, 3500, 5000 MHz (±1 %)
Field Strength:	3 V/m, 20 V/m
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of preceding frequency value
Polarity of Antenna:	Horizontal and Vertical
Antenna Height:	1.5m
Dwell Time:	3 seconds

9.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Signal Generator Agilent	E8257D	MY48050465	2021/6/22	2022/6/21
Amplifier BONN	BSA 0125-800	1912556	NA	NA
Amplifier TESTQ	CBA 1G-275	T44344	NA	NA
Power Amplifier AR	35S4G8AM4	0326094	NA	NA
Power Amplifier AR	100S1G4M3	0329249	NA	NA
Controller AR	SC1000M3	305910	NA	NA
Log-Periodic Antenna AR	AT6080	0329465	NA	NA
RF Power meter BOONTON	4232A	10180	2021/5/24	2022/5/23
Power sensor BOONTON	51011-EMC	34152	2021/5/24	2022/5/23
Power sensor BOONTON	51011-EMC	34153	2021/5/24	2022/5/23
BiconiLog Antenna EMCO	3141	1001	NA	NA
High Gain Horn Antenna AR	AT4010	0329800	NA	NA
LOG ANTENNA Schwarzbeck	Schwarzbeck Stlp 9149	9149-260	NA	NA
CHANCE MOST Full Anechoic Chamber (9x5x3m)	Chance Most	RS-002	2021/2/4	2022/2/3
Software BVADT	RS_V7.6	NA	NA	NA
Pressure-field Microphone B&K	4192	3190854	2021/1/7	2022/1/6
Two channel microphone conditioning amplifier B&K	2690 A OS2	2645274	2021/5/16	2022/5/15
Ear Simulator Telephonometry B&K	4185	2553594	NA	NA
Audio analyzer R&S	UPV	104565	2021/5/18	2022/5/17
POWER AMPLIFIER B&K	2716C	2610979	NA	NA
Mouth Simulator B&K	4227	2630632	NA	NA
Software	ABMS_ V7.4.3	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Linkou RS 02.
3. Tested Date: 2021/9/7

9.3 Test Arrangement

The test procedure was in accordance with EN/IEC 61000-4-3.

a. The testing was performed in a fully anechoic chamber.

b. The frequency range is swept from 80 MHz to 1000 MHz, with the signal 80% amplitude modulated with a 1kHz sine wave. **(For EN 55024)**

c. The swept frequency range is from 80 MHz to 1000 MHz and the spot frequencies are 1800, 2600, 3500, 5000 MHz (±1 %), with the signal 80% amplitude modulated with a 1kHz sine wave. **(For EN 55035)**

d. The dwell time of the amplitude modulated carrier was applied in 3 s at each of the frequencies during the scan. The sensitive frequencies (e.g. clock frequencies or frequencies identified by the manufacturer or obtained as outcome of the test) shall be analyzed in addition to the stepped frequencies. **(For EN 55035)**

e. The field strength level was 3 V/m, 20 V/m.

f. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

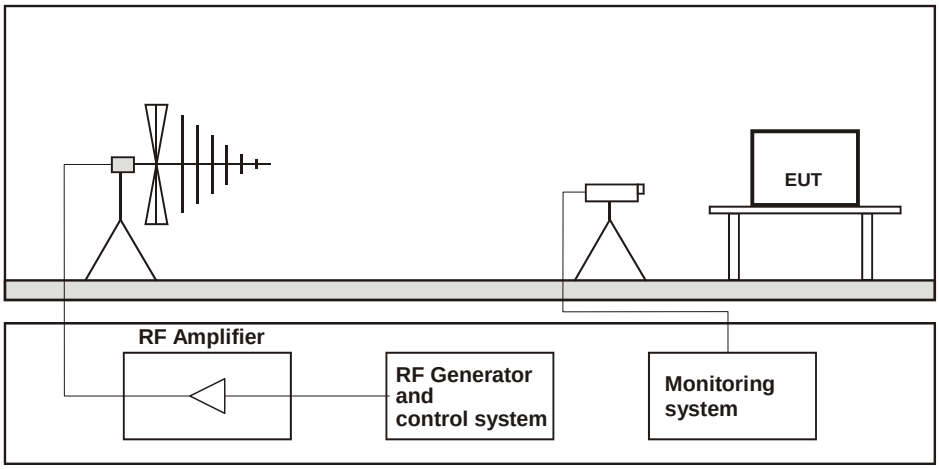


Table-top Equipment

The EUT installed in a representative system as described in section 7 of EN/IEC 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

9.4 Supplementary Information

The requirement followed by the client's specification. (Refer to item 7.1)

9.5 Test Results

For EN 55024

Input Voltage	12Vdc	Tested by	Aga Lin
Environmental Conditions	26 °C, 66% RH	Test mode	Mode 1

Frequency (MHz)	Polarity	Azimuth (°)	Applied Field Strength		Test Distance (m)	Observation	Performance Criterion
			(V/m)	Modulation			
80 -1000	V&H	0	3	80% AM (1kHz)	3	Note	A
80 -1000	V&H	90	3	80% AM (1kHz)	3	Note	A
80 -1000	V&H	180	3	80% AM (1kHz)	3	Note	A
80 -1000	V&H	270	3	80% AM (1kHz)	3	Note	A
80 -1000	V&H	0	20	80% AM (1kHz)	1.5	Note	A
80 -1000	V&H	90	20	80% AM (1kHz)	1.5	Note	A
80 -1000	V&H	180	20	80% AM (1kHz)	1.5	Note	A
80 -1000	V&H	270	20	80% AM (1kHz)	1.5	Note	A

Note: The EUT function was correct during the test.

Input Voltage	24Vdc	Tested by	Aga Lin
Environmental Conditions	26 °C, 66% RH	Test mode	Mode 6

Frequency (MHz)	Polarity	Azimuth (°)	Applied Field Strength		Test Distance (m)	Observation	Performance Criterion
			(V/m)	Modulation			
80 -1000	V&H	0	3	80% AM (1kHz)	3	Note	A
80 -1000	V&H	90	3	80% AM (1kHz)	3	Note	A
80 -1000	V&H	180	3	80% AM (1kHz)	3	Note	A
80 -1000	V&H	270	3	80% AM (1kHz)	3	Note	A
80 -1000	V&H	0	20	80% AM (1kHz)	1.5	Note	A
80 -1000	V&H	90	20	80% AM (1kHz)	1.5	Note	A
80 -1000	V&H	180	20	80% AM (1kHz)	1.5	Note	A
80 -1000	V&H	270	20	80% AM (1kHz)	1.5	Note	A

Note: The EUT function was correct during the test.

For EN 55035

Input Voltage	12Vdc	Tested by	Aga Lin
Environmental Conditions	26 °C, 66% RH	Test mode	Mode 1

Frequency (MHz)	Polarity	Azimuth(°)	Applied Field Strength		Test Distance (m)	Observation	Performance Criterion
			(V/m)	Modulation			
80 - 1000	V&H	0	3	80% AM (1kHz)	3	Note	A
		90	3	80% AM (1kHz)	3	Note	A
		180	3	80% AM (1kHz)	3	Note	A
		270	3	80% AM (1kHz)	3	Note	A
1800, 2600, 3500, 5000 MHz (±1 %)	V&H	0	3	80% AM (1kHz)	3	Note	A
		90	3	80% AM (1kHz)	3	Note	A
		180	3	80% AM (1kHz)	3	Note	A
		270	3	80% AM (1kHz)	3	Note	A
80 - 1000	V&H	0	20	80% AM (1kHz)	1.5	Note	A
		90	20	80% AM (1kHz)	1.5	Note	A
		180	20	80% AM (1kHz)	1.5	Note	A
		270	20	80% AM (1kHz)	1.5	Note	A
1800, 2600, 3500, 5000 MHz (±1 %)	V&H	0	20	80% AM (1kHz)	1.5	Note	A
		90	20	80% AM (1kHz)	1.5	Note	A
		180	20	80% AM (1kHz)	1.5	Note	A
		270	20	80% AM (1kHz)	1.5	Note	A

Note: The EUT function was correct during the test.

Input Voltage	24Vdc	Tested by	Aga Lin
Environmental Conditions	26 °C, 66% RH	Test mode	Mode 6

Frequency (MHz)	Polarity	Azimuth(°)	Applied Field Strength		Test Distance (m)	Observation	Performance Criterion
			(V/m)	Modulation			
80 - 1000	V&H	0	3	80% AM (1kHz)	3	Note	A
		90	3	80% AM (1kHz)	3	Note	A
		180	3	80% AM (1kHz)	3	Note	A
		270	3	80% AM (1kHz)	3	Note	A
1800, 2600, 3500, 5000 MHz (±1 %)	V&H	0	3	80% AM (1kHz)	3	Note	A
		90	3	80% AM (1kHz)	3	Note	A
		180	3	80% AM (1kHz)	3	Note	A
		270	3	80% AM (1kHz)	3	Note	A
80 - 1000	V&H	0	20	80% AM (1kHz)	1.5	Note	A
		90	20	80% AM (1kHz)	1.5	Note	A
		180	20	80% AM (1kHz)	1.5	Note	A
		270	20	80% AM (1kHz)	1.5	Note	A
1800, 2600, 3500, 5000 MHz (±1 %)	V&H	0	20	80% AM (1kHz)	1.5	Note	A
		90	20	80% AM (1kHz)	1.5	Note	A
		180	20	80% AM (1kHz)	1.5	Note	A
		270	20	80% AM (1kHz)	1.5	Note	A

Note: The EUT function was correct during the test.

10 Electrical Fast Transient/Burst Immunity Test (EFT)

10.1 Test Specification

Product Standard:	EN 55024
Basic Standard:	EN/IEC 61000-4-4
Test Voltage:	Signal / telecommunication port: N/A Input DC power port: ±0.5kV, ±1kV, ±2kV Input AC power port: N/A
Impulse Repetition Frequency:	xDSL telecommunication port: 100kHz others: 5kHz
Impulse Wave Shape:	5/50 ns
Burst Duration:	0.75 ms for 100kHz Repetition Frequency 15 ms for 5kHz Repetition Frequency
Burst Period:	300 ms
Test Duration:	1 min.

Product Standard:	EN 55035
Basic Standard:	EN/IEC 61000-4-4
Test Voltage:	Analogue/digital data port (cable length > 3m): N/A DC network power port (cable length > 3m): ±0.5kV, ±1kV, ±2kV AC mains power port: N/A
Impulse Repetition Frequency:	100kHz : applicable only to xDSL port 5kHz : others
Impulse Wave Shape :	5/50 ns
Burst Duration:	0.75 ms for 100kHz Repetition Frequency 15 ms for 5kHz Repetition Frequency,
Burst Period:	300 ms
Test Duration:	1 min.

10.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Surge&EFT Generators TESEQ	NSG 3060	1572	2021/4/24	2022/4/23
Burst generator Haefely	PEFT 4010	154954	2021/4/7	2022/4/6

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in EFT EMS 02.
3. Tested Date: 2021/7/19

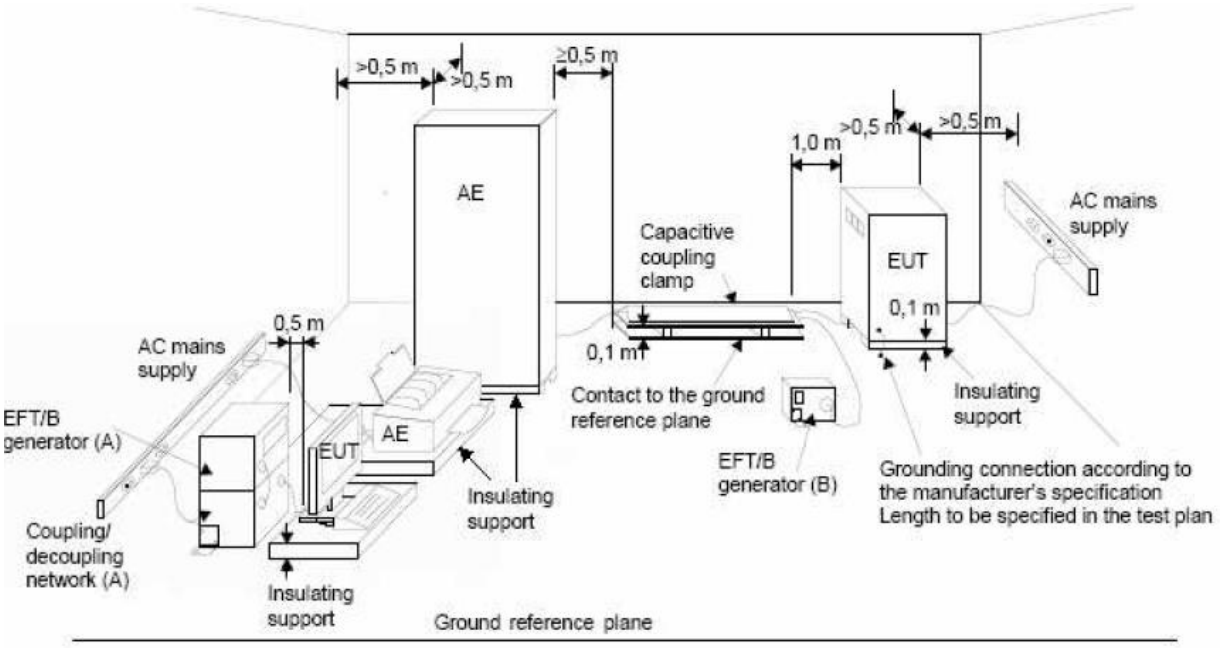
10.3 Test Arrangement

a. Both positive and negative polarity discharges were applied.

b. The distance between any coupling devices and the EUT should be (0.5 − 0/+0.1) m for table-top equipment testing, and (1.0 ± 0.1) m for floor standing equipment.

c. The duration time of each test sequential was 1 minute.

d. The transient/burst waveform was in accordance with EN/IEC 61000-4-4, 5/50 ns.



NOTE:
(A) location for supply line coupling
(B) location for signal lines coupling

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

10.4 Supplementary Information

The requirement followed by the client's specification. (Refer to item 7.1)

10.5 Test Results

For EN 55024 & EN 55035

Input Voltage	12Vdc	Tested by	Sean Chou
Environmental Conditions	25 °C, 67% RH	Test mode	Mode 1 & Mode 4

Input DC power port

Voltage (kV)	Test Point	Polarity (+/-)	Observation	Performance Criterion
0.5, 1, 2	(+)	+/-	Note	A
0.5, 1, 2	(-)	+/-	Note	A
0.5, 1, 2	(+)-(-)	+/-	Note	A

Note: The EUT function was correct during the test.

Input Voltage	24Vdc	Tested by	Sean Chou
Environmental Conditions	25 °C, 67% RH	Test mode	Mode 2 & Mode 5 & Mode 6 & Mode 8 & Mode 9

Input DC power port

Voltage (kV)	Test Point	Polarity (+/-)	Observation	Performance Criterion
0.5, 1, 2	(+)	+/-	Note	A
0.5, 1, 2	(-)	+/-	Note	A
0.5, 1, 2	(+)-(-)	+/-	Note	A

Note: The EUT function was correct during the test.

Input Voltage	48Vdc	Tested by	Sean Chou
Environmental Conditions	25 °C, 67% RH	Test mode	Mode 3 & Mode 7 & Mode 10

Input DC power port

Voltage (kV)	Test Point	Polarity (+/-)	Observation	Performance Criterion
0.5, 1, 2	(+)	+/-	Note	A
0.5, 1, 2	(-)	+/-	Note	A
0.5, 1, 2	(+)-(-)	+/-	Note	A

Note: The EUT function was correct during the test.

11 Surge Immunity Test

11.1 Test Specification

Product Standard:	EN 55024
Basic Standard:	EN/IEC 61000-4-5
Wave-Shape:	Signal / telecommunication port (direct to outdoor cables*): 10/700 µs Open Circuit Voltage 5/320 µs Short Circuit Current Input DC power port (direct to outdoor cables*): 1.2/50 µs Open Circuit Voltage 8/20 µs Short Circuit Current Input AC power port: 1.2/50 µs Open Circuit Voltage 8/20 µs Short Circuit Current
Test Voltage:	Signal and telecommunication ports**: w/o primary protectors: N/A with primary protectors fitted: N/A Input DC power port: Line to earth or ground: ±0.5kV, ±1kV, ±2kV Input AC power ports: Line to line: N/A Line to earth or ground: N/A
AC Phase Angle (degree):	0°, 90°, 180°, 270°
Pulse Repetition Rate:	1 time / 20 sec.
Number of Tests:	5 positive and 5 negative at selected points

* This test is only applicable only to ports, which according to the manufacturer's specification, may connect directly to outdoor cables.

** For ports where primary protection is intended, surges are applied at voltages up to 4 kV with the primary protectors fitted. Otherwise the 1 kV test level is applied without primary protection in place.

Product Standard:	EN 55035
Basic Standard:	EN/IEC 61000-4-5
Wave-Shape:	Analogue/digital data ports (direct to outdoor cables*): Port type: unshielded symmetrical 10/700 µs Open Circuit Voltage 5/320 µs Short Circuit Current Port type: coaxial or shielded 1.2/50 µs Open Circuit Voltage 8/20 µs Short Circuit Current DC network power port (direct to outdoor cables*): 1.2/50 µs Open Circuit Voltage 8/20 µs Short Circuit Current AC mains power port: 1.2/50 µs Open Circuit Voltage 8/20 µs Short Circuit Current
Test Voltage:	Analogue/digital data ports: Port type: unshielded symmetrical** w/o primary protectors (line to ground): N/A with primary protectors (line to ground): N/A Port type: coaxial or shielded shield to ground: N/A DC network power port: ±0.5kV, ±1kV, ±2kV AC mains power ports: Line to line : N/A Line to ground : N/A
AC Phase Angle (degree):	90° / 270°
Pulse Repetition Rate:	1 time / 20 sec.
Number of Tests:	5 positive and 5 negative at selected points

* This test is only applicable only to ports, which according to the manufacturer's specification, may connect directly to outdoor cables.

** For ports where primary protection is intended, surges are applied at voltages up to 4 kV with the primary protectors. Otherwise the 1 kV test level is applied without primary protection in place.

11.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Surge&EFT Generators TESEQ	NSG 3060	1572	2021/4/24	2022/4/23
Coupling Decoupling Network EMC-Partner	CDN-UTP8	045	NA	NA
Coupling Decoupling Network TESEQ	CDN HSS-2	41009	NA	NA
Surge Coupling Decoupling Network TESEQ	CDN 118-T8	40386	2020/9/8	2021/9/7
CDN for Unshielded Unsymmetrical Signal & Data Lines TESEQ	CDN117	40144	2020/9/8	2021/9/7

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Linkou EMS 02.
3. Tested Date: 2021/7/19

11.3 Test Arrangement

a. EUT Power ports:

The surge shall be applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines and to provide sufficient decoupling impedance to the surge wave. The power cord between the EUT and the coupling network shall not exceed 2 meters in length.

For double-insulated products without PE or external earth connections, the test shall be done in a similar way as for grounded products but without adding any additional external grounded connections. If there are no other possible connections to earth, line-to-ground tests may be omitted.

b. Analogue/digital data ports:

- Unshielded unsymmetrical interconnection lines:

The coupling / decoupling networks shall not influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling network shall not exceed 2 meters in length.

- Unshielded symmetrical interconnection lines:

For symmetrical interconnection lines and high-speed interconnection lines, the CDN shall be selected to match the number of lines/pairs existing in the cable. If coupling arrestors are use, test levels below the ignition point of the coupling arrestor cannot be specified.

The interconnection line between the EUT and the coupling/decoupling networks shall not exceed 2 meters in length.

In order to avoid the coupling and decoupling capacitors having a filtering effect on the data transfer, a balanced high frequency design associating the coupling capacitors with coupling chokes is required. Where normal functioning of high speed communications lines cannot be achieved because of the impact of the CDN on the EUT, product committees should specify appropriate operation or that no surge immunity test is required.

- Shielded lines:

The EUT is isolated from ground and the surge is applied to its metallic enclosure; the termination (or auxiliary equipment) at the port(s) under test is grounded. This test applies to equipment with one or more shielded cables.

The length of the cable between the port(s) under test and the device attached to the other end of the cable shall be:

- 20 m (preferred length) or,
- the shortest length over 10 m, where the manufacturer provides pre-assembled cables used in actual installations.

No test shall be required for cables which according to the manufacturer's specification are ≤ 10 m.

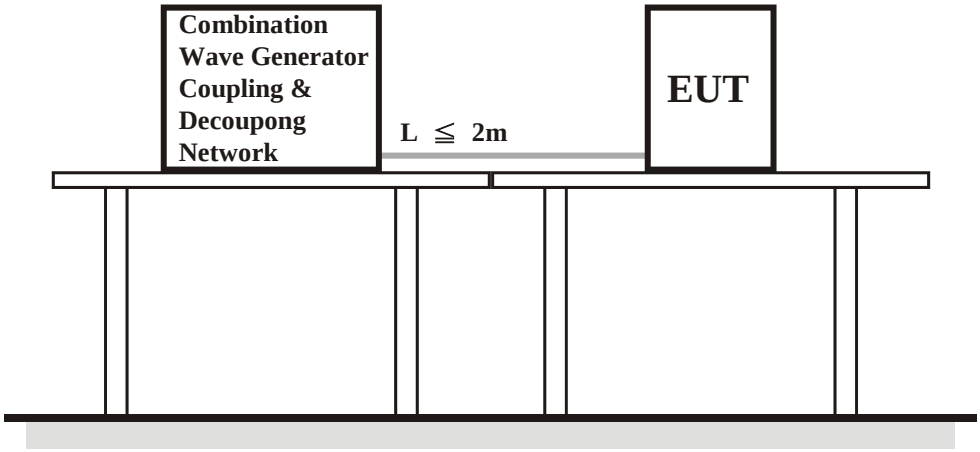
Rules for application of the surge to shielded lines:

a) Shields grounded at both ends:
- the test shall be carried out.

The test level is applied on shields with a 2 Ω generator source impedance and with the 18 μF capacitor.

b) Shields grounded at one end:
- the test shall be carried out according to unshielded unsymmetrical interconnection lines or unshielded symmetrical interconnection lines because the shield does not provide any protection against surges induced by magnetic fields.

For EUTs which do not have metallic enclosures, the surge is applied directly to the shielded cable at the EUT side.



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

11.4 Supplementary Information

The requirement followed by the client's specification. (Refer to item 7.1)

11.5 Test Results

For EN 55024 & EN 55035

Input Voltage	12Vdc	Tested by	Sean Chou
Environmental Conditions	25 °C, 67% RH	Test mode	Mode 1 & Mode 4

Input DC power port

Voltage (kV)	Test Point	Polarity (+/-)	Observation	Performance Criterion
0.5, 1, 2	(+)-(-)	+/-	Note	A

Note: The EUT function was correct during the test.

Input Voltage	24Vdc	Tested by	Sean Chou
Environmental Conditions	25 °C, 67% RH	Test mode	Mode 2 & Mode 5 & Mode 6 & Mode 8 & Mode 9

Input DC power port

Voltage (kV)	Test Point	Polarity (+/-)	Observation	Performance Criterion
0.5, 1, 2	(+)-(-)	+/-	Note	A

Note: The EUT function was correct during the test.

Input Voltage	48Vdc	Tested by	Sean Chou
Environmental Conditions	25 °C, 67% RH	Test mode	Mode 3 & Mode 7 & Mode 10

Input DC power port

Voltage (kV)	Test Point	Polarity (+/-)	Observation	Performance Criterion
0.5, 1, 2	(+)-(-)	+/-	Note	A

Note: The EUT function was correct during the test.

12 Immunity to Conducted Disturbances Induced by RF Fields (CS)

12.1 Test Specification

Product Standard:	EN 55024
Basic Standard:	EN/IEC 61000-4-6
Frequency Range:	0.15 MHz - 80 MHz
Voltage Level:	3 V, 10 V
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of preceding frequency value
Dwell Time	3 seconds

Product Standard:	EN 55035
Basic Standard:	EN/IEC 61000-4-6
Frequency Range:	0.15 MHz - 80 MHz
Voltage Level:	0.15 MHz - 80 MHz: 10V 0.15 MHz - 10 MHz: 3V 10 MHz - 30 MHz: 3-1 V 30 MHz - 80 MHz: 1V
Additional Test:	0.15 MHz - 80 MHz: 10V
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of preceding frequency value
Dwell Time	3 seconds

12.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
R&S SML03 S.G R&S	SML03	101801	2021/1/13	2022/1/12
Digital Sweep Function Generator Topward	8120	984801	NA	NA
Amplifier AR	75A250AM1	306331	NA	NA
CDN M2-16Amp FCC	FCC-801-M2-16A	01047	2021/6/17	2022/6/16
FCC EM Injection Clamp FCC	F-203I-23mm	455	NA	NA
Current Clamp FCC	F-120-9A	361	2021/8/8	2022/8/7
Ear Simulator Telephonometry B&K	4185	2553594	NA	NA
Coupling/Dcoupling Network EM TEST	CDN M1/32A	306508	2021/6/17	2022/6/16
Coupling Decoupling Network TESEQ	CDN T800	34428	2021/6/17	2022/6/16
CDN Calibration Kit TESEQ	CDN T8S	29459	2021/6/17	2022/6/16
Coupling Decoupling Network TESEQ	CDN T8-230	56641	2021/2/25	2022/2/24
Coupling Decoupling Network TESEQ	CDN T8-230	56642	2021/2/25	2022/2/24
Power Sensor R & S	NRV-Z5	837878/039	2020/11/10	2021/11/9
Power Meter R & S	NRVD	837794/040	2020/11/10	2021/11/9
Coupling/Dcoupling Network TESEQ	CDN M232	37702	2021/6/17	2022/6/16
Coupling/Dcoupling Network TESEQ	CDN M332	41258	2021/6/17	2022/6/16
Coupling/Dcoupling Network TESEQ	CDN M332	41256	2021/6/17	2022/6/16
Coupling Decoupling Network TESEQ	CDN T8-10	40376	2021/6/17	2022/6/16
Coupling Decoupling Network TESEQ	CDN T8-230	56643	2021/2/25	2022/2/24
CDN TESEQ	CDN S200	53490	2021/5/26	2022/5/25
CDN TESEQ	CDN S400	52115	2021/6/17	2022/6/16
Coupling Decoupling Network TESEQ	CDN T400A	49918	2021/2/25	2022/2/24
CDN FCC	FCC-801-M5-50A	100018	2021/1/19	2022/1/18
Coupling Decoupling Network TESEQ	CDN T2A-10	54942	2021/2/25	2022/2/24
Coupling Decoupling Network TESEQ	CDN S751A	56435	2021/2/25	2022/2/24
Coupling Decoupling Network TESEQ	CDN ST08A	56527	2021/2/25	2022/2/24
Coupling Decoupling Network TESEQ	CDN ST08A	56525	2021/2/25	2022/2/24

Coupling Decoupling Network TESEQ	CDN M432S	56519	2021/2/25	2022/2/24
Coupling Decoupling Network TESEQ	CDN S751A	56436	2021/2/25	2022/2/24
Pressure-field Microphone B&K	4192	3073928	2020/8/26	2021/8/25
Two channel microphone conditioning amplifier B&K	2690 OS2	3001996	2020/11/25	2021/11/24
Audio analyzer R&S	UPV	104565	2021/5/18	2022/5/17
POWER AMPLIFIER B&K	2716C	2610979	NA	NA
Mouth Simulator B&K	4227	2630632	NA	NA
Software BVADT	CS_V7.4.2	NA	NA	NA
Software BVADT	ABMS_ V7.4.3	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Linkou CS 01.
3. Tested Date: 2021/9/7

12.3 Test Arrangement

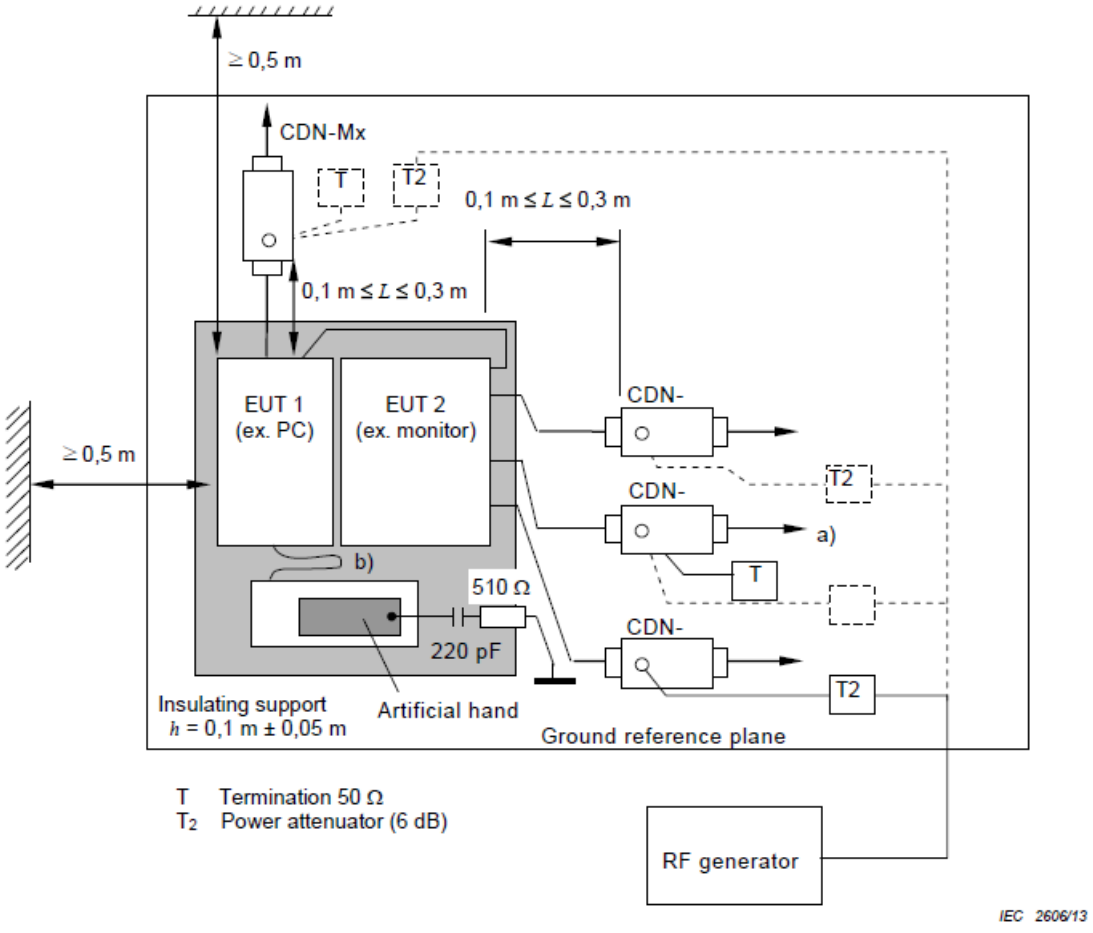
a. The EUT shall be tested within its intended operating and climatic conditions.

b. An artificial hand was placed on the hand-held accessory and connected to the ground reference plane.

c. One of the CDNs not used for injection was terminated with 50 ohm, providing only one return path. All other CDNs were coupled as decoupling networks.

d. The frequency range is swept from 150 kHz to 80 MHz, using the signal level established during the setting process and with a disturbance signal of 80 % amplitude. The signal is modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or the switch coupling devices as necessary. Where the frequency is swept incrementally, the step size shall not exceed 1 % of the preceding frequency value.

e. Attempts should be made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility.



Note: 1.The EUT clearance from any metallic obstacles shall be at least 0,5 m.
2. Interconnecting cables (≦1 m) belonging to the EUT shall remain on the insulating support.
3. The equipment to be tested is placed on an insulating support of 0.1 meters height above a ground reference plane. All relevant cables shall be provided with the appropriate coupling and decoupling devices at a distance between 0.1 meters and 0.3 meters from the projected geometry of the EUT on the ground reference plane.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

12.4 Supplementary Information

The requirement followed by the client's specification. (Refer to item 7.1)

12.5 Test Results

For EN 55024

Input Voltage	12Vdc	Tested by	Todd Chang
Environmental Conditions	26 °C, 68% RH	Test mode	Mode 1

Frequency (MHz)	Level (Vrms)	Tested Line	Injection Method	Return Path	Observation	Performance Criterion
0.15 – 80	3, 10	DC power	CDN-M2	N/A	Note	A

Note: The EUT function was correct during the test.

Input Voltage	24Vdc	Tested by	Todd Chang
Environmental Conditions	26 °C, 68% RH	Test mode	Mode 6

Frequency (MHz)	Level (Vrms)	Tested Line	Injection Method	Return Path	Observation	Performance Criterion
0.15 – 80	3, 10	DC power	CDN-M2	N/A	Note	A

Note: The EUT function was correct during the test.

For EN 55035

Input Voltage	12Vdc	Tested by	Todd Chang
Environmental Conditions	26 °C, 68% RH	Test mode	Mode 1

Frequency (MHz)	Level (Vrms)	Tested Line	Injection Method	Return Path	Observation	Performance Criterion
0.15 – 80	10	DC power	CDN-M2	N/A	Note	A
0.15 – 10	3	DC power	CDN-M2	N/A	Note	A
10 – 30	3 – 1	DC power	CDN-M2	N/A	Note	A
30 – 80	1	DC power	CDN-M2	N/A	Note	A

Note: The EUT function was correct during the test.

Input Voltage	24Vdc	Tested by	Todd Chang
Environmental Conditions	26 °C, 68% RH	Test mode	Mode 6

Frequency (MHz)	Level (Vrms)	Tested Line	Injection Method	Return Path	Observation	Performance Criterion
0.15 – 80	10	DC power	CDN-M2	N/A	Note	A
0.15 – 10	3	DC power	CDN-M2	N/A	Note	A
10 – 30	3 – 1	DC power	CDN-M2	N/A	Note	A
30 – 80	1	DC power	CDN-M2	N/A	Note	A

Note: The EUT function was correct during the test.

13 Power Frequency Magnetic Field Immunity Test

13.1 Test Specification

Product Standard:	EN 55024
Basic Standard:	EN/IEC 61000-4-8
Frequency Range:	50Hz
Field Strength:	1A/m, 30A/m, 100A/m, 1000A/m
Observation Time:	1 minute for Field Strength 1A/m, 30A/m 1 second for Field Strength 100A/m, 1000A/m
Inductance Coil:	Rectangular type, 1 m x 1 m

Product Standard:	EN 55035
Basic Standard:	EN/IEC 61000-4-8
Frequency Range:	50Hz
Field Strength:	1A/m, 30A/m, 100A/m, 1000A/m
Observation Time:	1 minute for Field Strength 1A/m, 30A/m 1 second for Field Strength 100A/m, 1000A/m
Inductance Coil:	Rectangular type, 1 m x 1 m

13.2 Test Instruments

For Field Strength: 1A/m, 30A/m

Description & Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Magnetic Field Test System Haefely Trench AG	MAG 100	083794-06	NA	NA
F.W.BELL 4190 Gaussmeter F.W. Bell	4190	0743043	2021/4/8	2022/4/7

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Linkou EMS 01.
3. Tested Date: 2021/9/6

For Field Strength: 100A/m, 1000A/m

Description & Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Triaxial Elf Magnetic Field Meter BELL	4090	NA	2021/4/12	2022/4/11
Power frequency magnetic filed coil 3ctest	TCX30	EC1281401	2021/4/15	2022/4/14
Power frequency magnetic filed generator 3ctest	PFMF-1200G	EC0111401	2021/4/15	2022/4/14

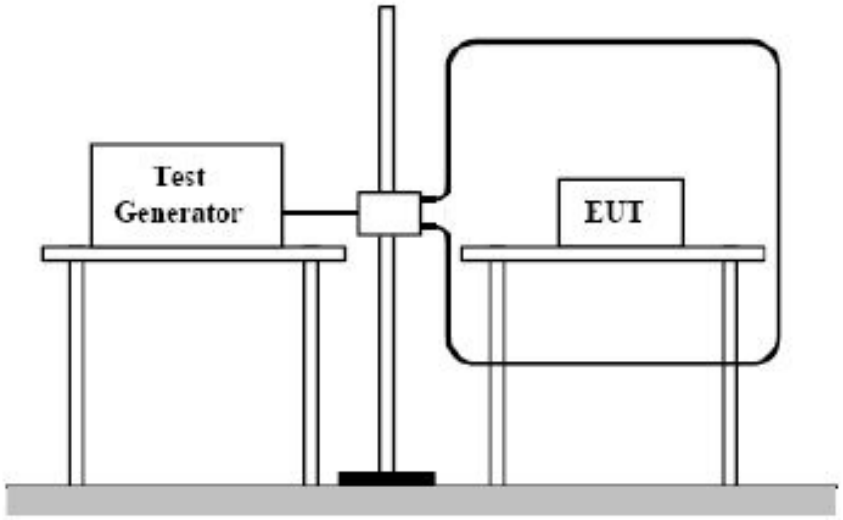
Notes: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in EMS-1 room. (TAF No.: 2022)
3. Tested Date: 2021/9/15

13.3 Test Arrangement

a. The equipment is configured and connected to satisfy its functional requirements.

b. The power supply, input and output circuits shall be connected to the sources of power supply, control and signal.

c. The cables supplied or recommended by the equipment manufacturer shall be used. 1 meter of all cables used shall be exposed to the magnetic field.



TABLETOP EQUIPMENT

The equipment shall be subjected to the test magnetic field by using the induction coil of standard dimension (1 m x 1 m). The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

13.4 Supplementary Information

The requirement followed by the client's specification. (Refer to item 7.1)

13.5 Test Results

For EN 55024 & EN 55035

Input Voltage	12Vdc	Tested by	Michael Cheng
Environmental Conditions	25 °C, 67% RH	Test mode	Mode 1

Field Strength: 1A/m					
Application	Frequency (Hz)	Test Duration	Field Strength (A/m)	Observation	Performance Criterion
X - Axis	50	1 min.	1, 30	Note	A
Y - Axis	50	1 min.	1, 30	Note	A
Z - Axis	50	1 min.	1, 30	Note	A

Note: The EUT function was correct during the test.

Input Voltage	12Vdc	Tested by	Allen Qin
Environmental Conditions	26 °C, 52% RH	Test mode	Mode 1

Field Strength: 100A/m, 1000A/m					
Application	Frequency (Hz)	Test Duration	Field Strength (A/m)	Observation	Performance Criterion
X - Axis	50	1 sec.	100, 1000	Note	A
Y - Axis	50	1 sec.	100, 1000	Note	A
Z - Axis	50	1 sec.	100, 1000	Note	A

Note: The EUT function was correct during the test.

Remark: The test, calibration and test results are compliance with the TAF (TAF code: 2022).

Input Voltage	24Vdc	Tested by	Michael Cheng
Environmental Conditions	25 °C, 67% RH	Test mode	Mode 1

Field Strength: 1A/m					
Application	Frequency (Hz)	Test Duration	Field Strength (A/m)	Observation	Performance Criterion
X - Axis	50	1 min.	1, 30	Note	A
Y - Axis	50	1 min.	1, 30	Note	A
Z - Axis	50	1 min.	1, 30	Note	A

Note: The EUT function was correct during the test.

Input Voltage	24Vdc	Tested by	Allen Qin
Environmental Conditions	26 °C, 52% RH	Test mode	Mode 1

Field Strength: 100A/m, 1000A/m					
Application	Frequency (Hz)	Test Duration	Field Strength (A/m)	Observation	Performance Criterion
X - Axis	50	1 sec.	100, 1000	Note	A
Y - Axis	50	1 sec.	100, 1000	Note	A
Z - Axis	50	1 sec.	100, 1000	Note	A

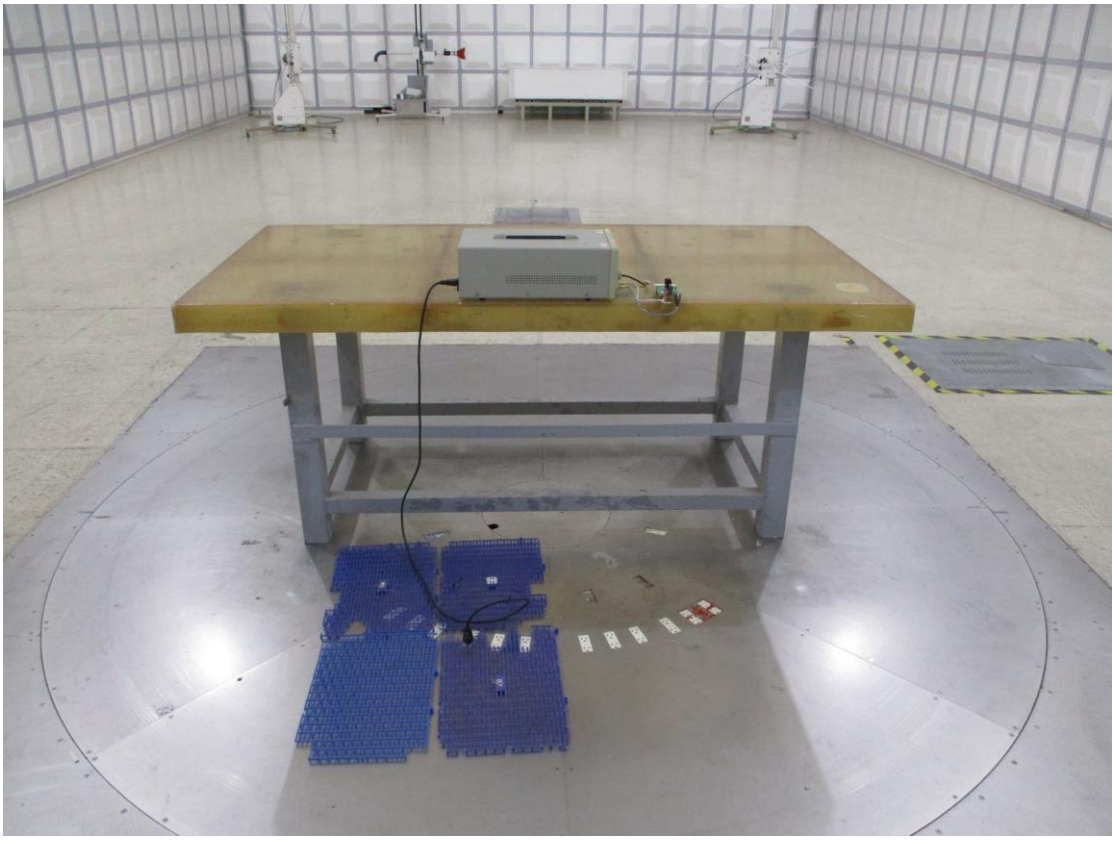
Note: The EUT function was correct during the test.

Remark: The test, calibration and test results are compliance with the TAF (TAF code: 2022).

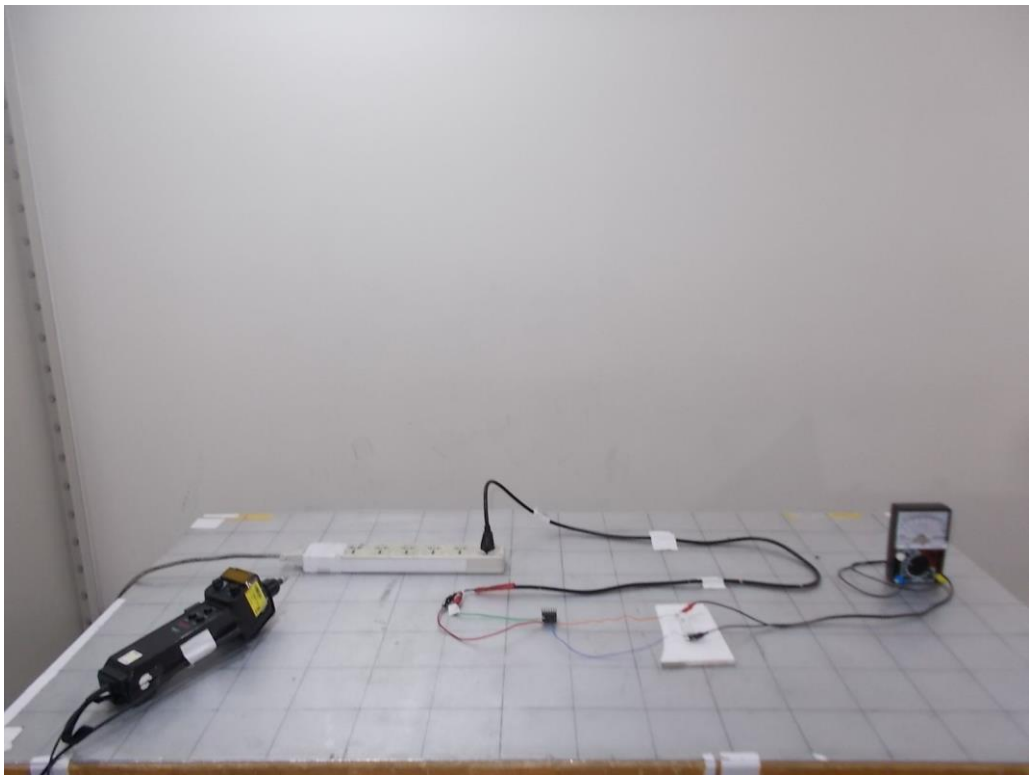
14 Pictures of Test Arrangements

14.1 Conducted Emission from the Mains Power Port

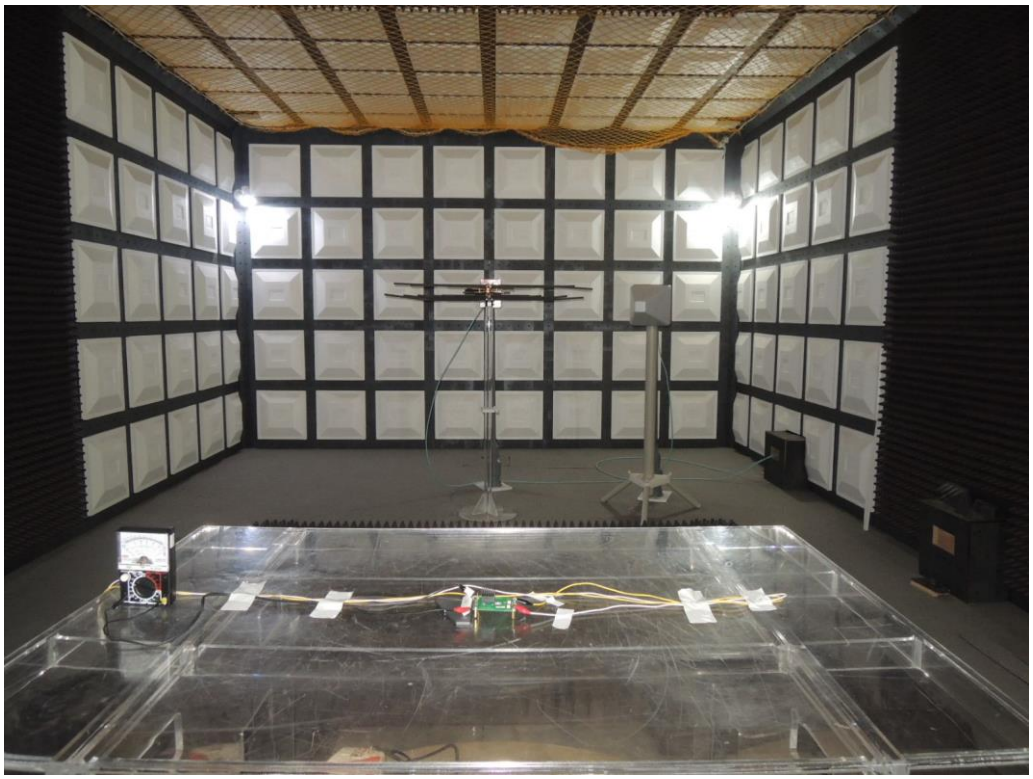
14.2 Radiated Emission at Frequencies up to 1GHz

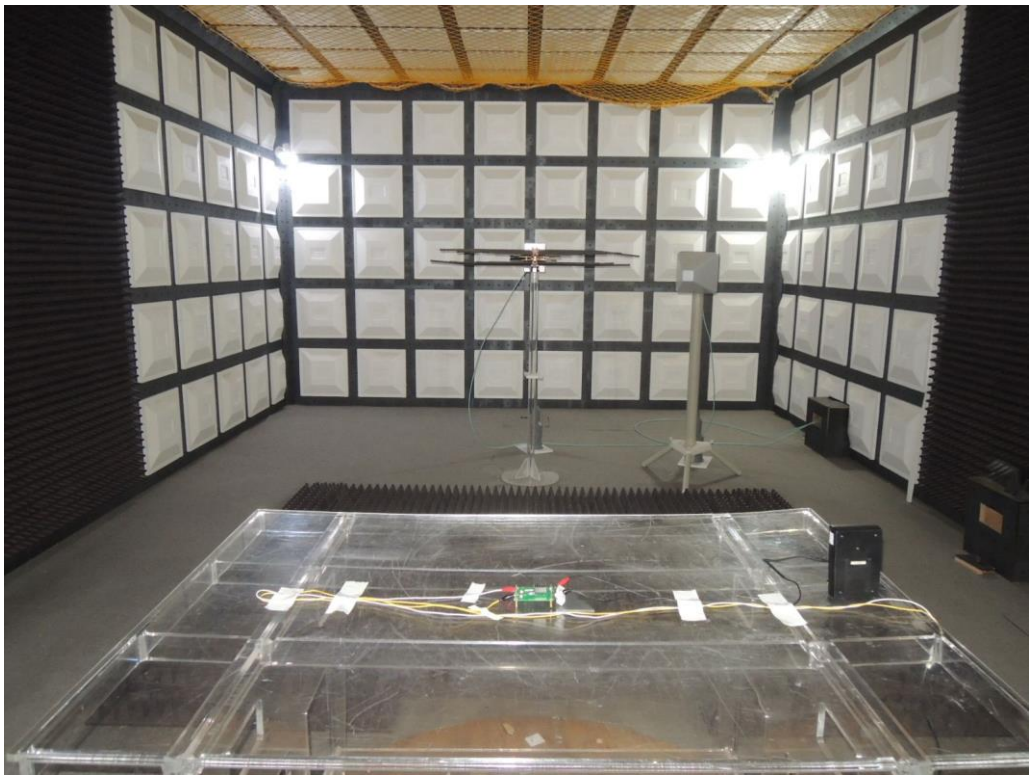


14.3 Electrostatic Discharge Immunity Test (ESD)

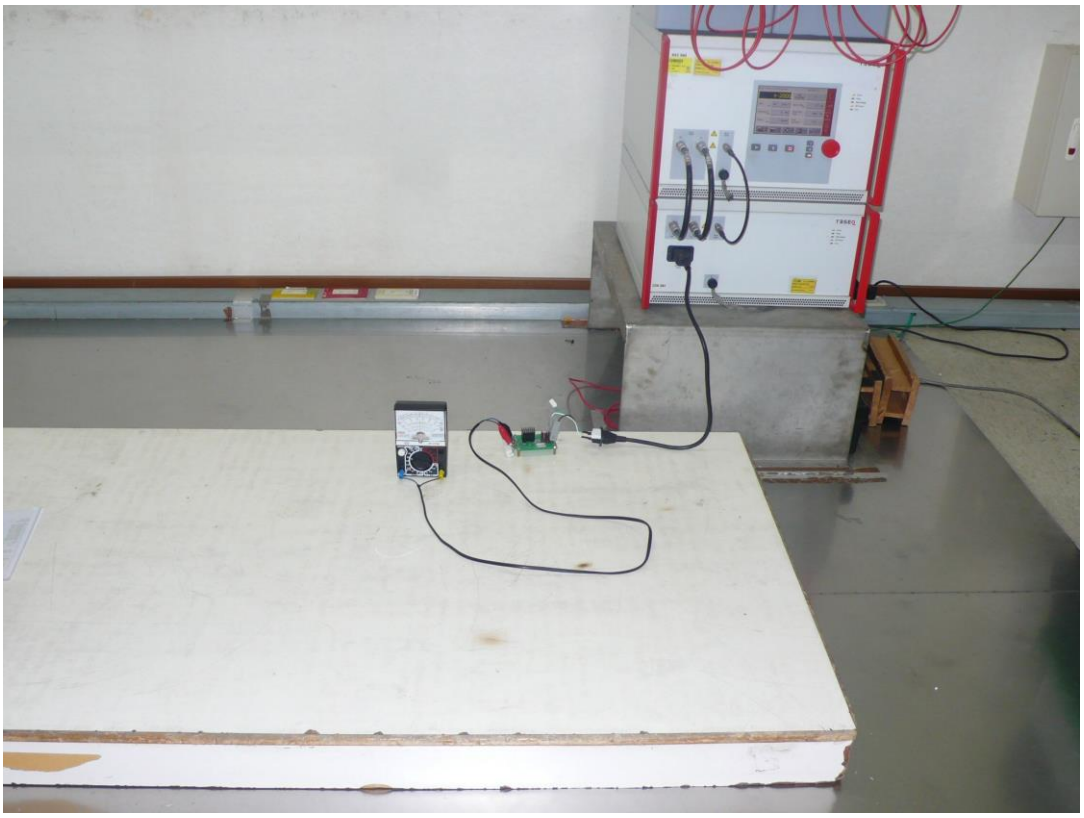


14.4 Radio-frequency, Electromagnetic Field Immunity Test (RS)



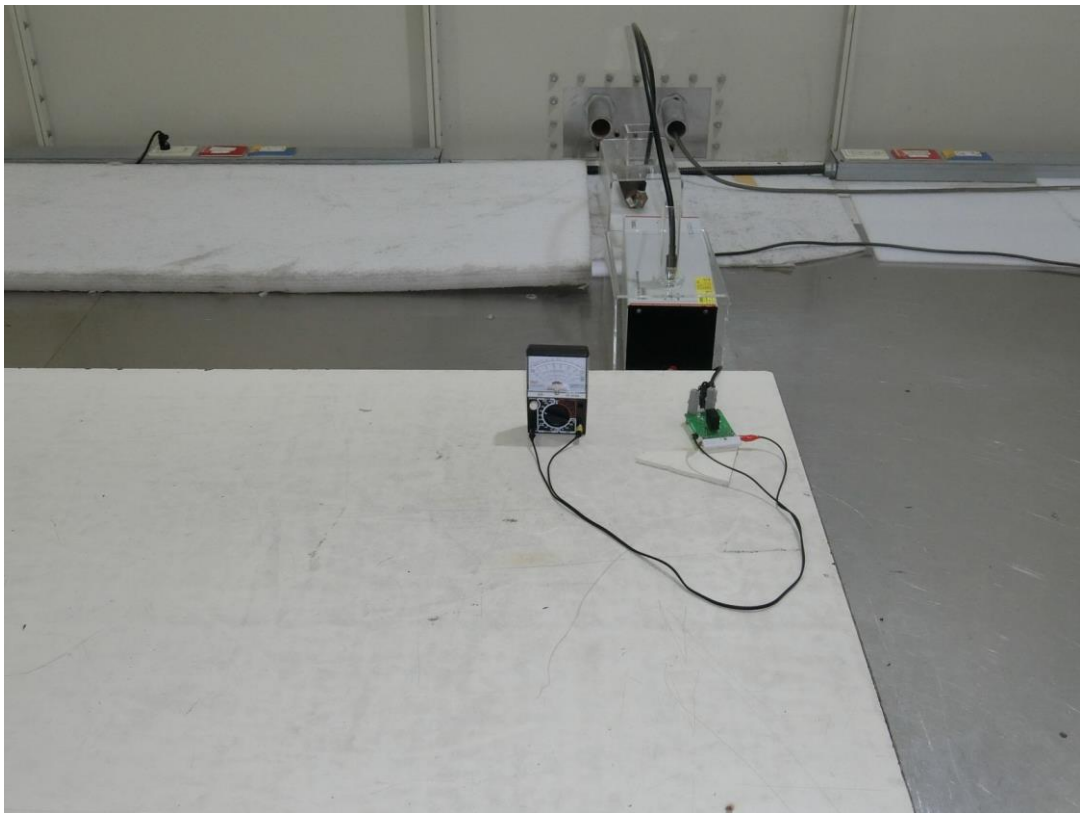


14.5 Electrical Fast Transient/Burst Immunity Test (EFT)



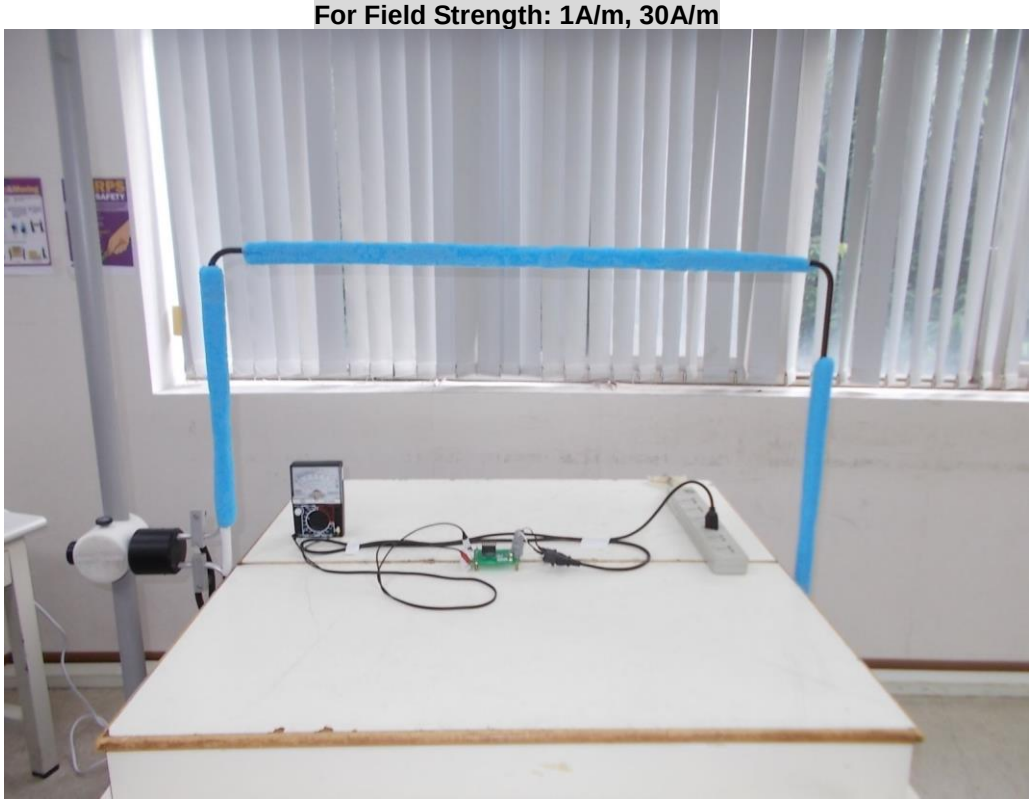
14.6 Surge Immunity Test

14.7 Conducted Disturbances Induced by RF Fields (CS)

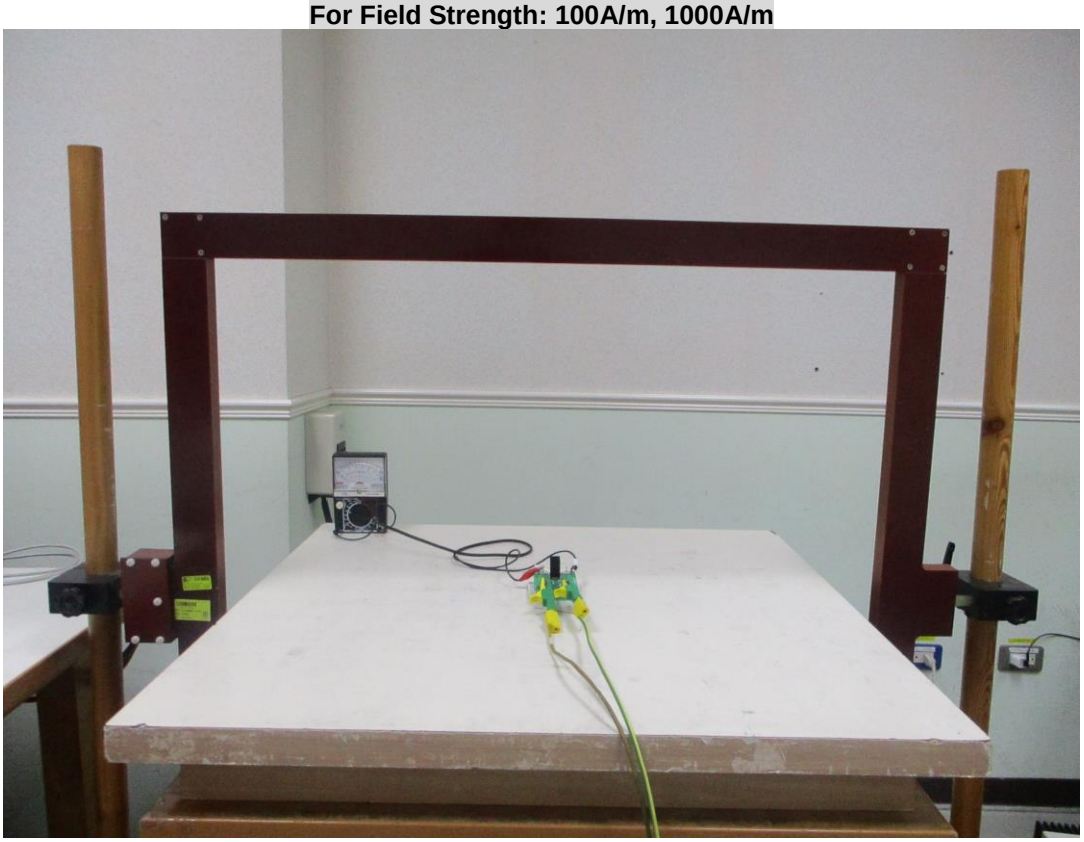


14.8 Power Frequency Magnetic Field Immunity Test (PFMF)

For Field Strength: 1A/m, 30A/m



For Field Strength: 100A/m, 1000A/m



Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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The address and road map of all our labs can be found in our web site also.

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