

TEST REPORT

CERTIFICATE OF CONFORMITY

Standard: VCCI-CISPR 32: 2016, Class A
Report No.: VBDBO-WTW-P25110052
Product: QEC
Brand: ICOP
Model No.: QEC-R11CFFG-N
Series Model: XX C XXX - X (X=0~9, A~Z, (,), /, - or Blank)
Received Date: 2025/11/7
Test Date: 2025/11/19 ~ 2025/11/20
Issued Date: 2025/12/15
Applicant: ICOP Technology Inc.
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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lin Kou Laboratories
Lab. VCCI Member No: 395
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Test Location: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

Approved by:


Jim Hsiang / Associate Technical Manager

, Date:

2025/12/15

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Prepared by : Jessica Cheng / Senior Specialist

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Table of Contents

Release Control Record	3
1 Certificate.....	4
2 Summary of Test Results	5
2.1 Measurement Uncertainty	5
2.2 Supplementary Information	5
3 General Information	6
3.1 Description of EUT	6
3.2 Primary Clock Frequencies of Internal Source.....	6
3.3 Features of EUT	6
3.4 Operating Modes of EUT and Determination of Worst Case Operating Mode	7
3.5 Test Program Used and Operation Descriptions	8
3.6 Connection Diagram of EUT and Peripheral Devices	8
3.7 Configuration of Peripheral Devices and Cable Connections	9
4 Test Instruments	10
4.1 Conducted Emissions from Power Ports.....	10
4.2 Conducted Emissions from Wired Network Ports	11
4.3 Radiated Emissions up to 1 GHz	12
4.4 Radiated Emissions above 1 GHz.....	13
5 Limits of Test Items.....	14
5.1 Conducted Emissions from Power Ports.....	14
5.2 Conducted Emissions from Wired Network Ports	14
5.3 Radiated Emissions up to 1 GHz	14
5.4 Radiated Emissions above 1 GHz.....	15
6 Test Arrangements.....	16
6.1 Conducted Emissions from Power Ports.....	16
6.2 Conducted Emissions from Wired Network Ports	17
6.3 Radiated Emissions up to 1 GHz	20
6.4 Radiated Emissions above 1 GHz.....	21
7 Test Results of Test Item	22
7.1 Conducted Emissions from Power Ports.....	22
7.2 Conducted Emissions from Wired Network Ports	24
7.3 Radiated Emissions up to 1 GHz	26
7.4 Radiated Emissions above 1 GHz.....	28
8 Pictures of Test Arrangements	30
8.1 Conducted Emissions from Power Ports.....	30
8.2 Conducted Emissions from Wired Network Ports	31
8.3 Radiated Emissions up to 1 GHz	33
8.4 Radiated Emissions above 1 GHz.....	34
9 Information of the Testing Laboratories	35

Release Control Record

Issue No.	Description	Date Issued
VBDBO-WTW-P25110052	Original release.	2025/12/15

1 Certificate

Product: QEC

Brand: iCOP

Test Model: QEC-R11CFFG-N

Series Model: XX C XXX - X (X=0~9, A~Z, (,), /, - or Blank)

Sample Status: Engineering sample

Applicant: ICOP Technology Inc.

Test Date: 2025/11/19 ~ 2025/11/20

Standard: VCCI-CISPR 32: 2016, Class A

Measurement procedure: CISPR 32: 2015 (Edition 2.0)

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.

2 Summary of Test Results

The test items that the EUT need to perform in accordance with its interfaces, evaluated functions, are as follows:

Standard	Test Item	Result	Remark
VCCI-CISPR 32	Conducted Emissions from Power Ports	Pass	Minimum passing Class A margin is -11.16 dB at 0.27207 MHz
VCCI-CISPR 32	Conducted Emissions from Wired Network Ports	Pass	Minimum passing Class A margin is -14.83 dB at 26.48703 MHz
VCCI-CISPR 32	Radiated Emissions up to 1 GHz	Pass	Minimum passing Class A margin is -7.16 dB at 216.03 MHz
VCCI-CISPR 32	Radiated Emissions above 1 GHz	Pass	Minimum passing Class A margin is -20.27 dB at 2928.52 MHz

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

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	Specification	Expanded Uncertainty (k=2) (±)	Maximum allowable uncertainty (±)
Conducted Emissions from Power Ports	9 kHz ~ 30 MHz	2.9 dB	3.4 dB (U_{CISPR})
Conducted Emissions from Wired Network Ports	150 kHz ~ 30 MHz	ISN Cat3 : 3.0 dB ISN Cat5 : 3.0 dB ISN Cat6 : 3.0 dB Current Probe : 1.56 dB Voltage Probe : 2.90 dB Coaxial : 2.34 dB	5.0 dB (U_{CISPR}) using AAN 2.9 dB (U_{CISPR}) using CP 3.9 dB (U_{CISPR}) using CVP
Radiated Emissions up to 1 GHz	30 MHz ~ 1 GHz	3m : 5.54 dB 10m : 4.16 dB	6.3 dB (U_{CISPR})
Radiated Emissions above 1 GHz	1 GHz ~ 6 GHz	4.64 dB	5.2 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 Supplementary Information

There is not any deviation from the test standards for the test method, and no modifications required for compliance.

3 General Information

3.1 Description of EUT

Product	QEC
Brand	iCOP
Test Model	QEC-R11CFFG-N
Series Model	XX C XXX - X (X=0~9, A~Z, (,), /, - or Blank)
Sample Status	Engineering sample
Power Supply Rating	+19 to +50VDC power Input (Typ. +24VDC)

3.2 Primary Clock Frequencies of Internal Source

The highest frequency generated or used within the EUT or on which the EUT operates or tunes is 533 MHz, provided by ICOP Technology Inc., for detailed internal source, please refer to the manufacturer's specifications.

3.3 Features of EUT

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

Please refer to appendix of the report if the applicant has provided additional descriptions of the EUT.

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

The EUT has been pre-tested under following test modes.

Test Condition	
Mode	Radiated Emissions up to 1 GHz
1	Operating mode,Lan 1Gbps ping + Input Power(24 Vdc)
Note: There are both standby mode and normal mode to be pre-tested then normal mode has the highest emission value.	

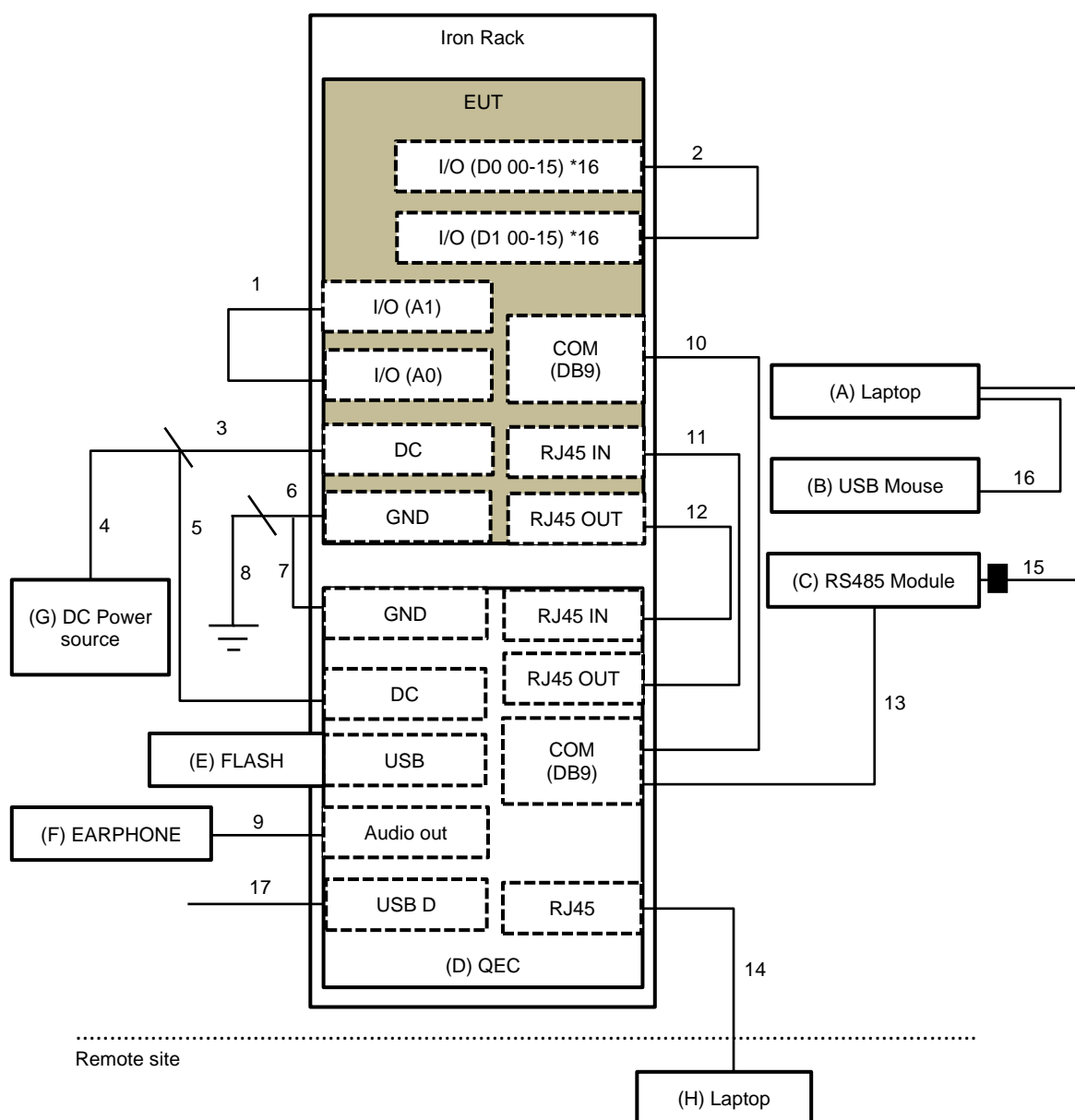
Test modes are presented in the report as below.

Test Condition	
Mode	Conducted Emissions from Power Ports
A	Operating mode,Lan 1Gbps ping + Input Power(24 Vdc)
Mode	Conducted Emissions from Wired Network Ports
A	Operating mode,Lan 1Gbps ping + For Lan In 1Gbps link test + Input Power(24 Vdc)
B	Operating mode,Lan 1Gbps ping + For Lan Out 1Gbps link test + Input Power(24 Vdc)
Mode	Radiated Emissions up to 1 GHz
A	Operating mode,Lan 1Gbps ping + Input Power(24 Vdc)
Mode	Radiated Emissions above 1 GHz
A	Operating mode,Lan 1Gbps ping + Input Power(24 Vdc)

3.5 Test Program Used and Operation Descriptions

- Turned on the power of all equipment.
- Laptop sent and received message to/ from EUT via RS485 Module.
- Laptop sent and received messages to/ from EUT via LAN cable.
- EUT sent and received messages to/ from another QEC via wire cable.
- EUT sent audio messages to speaker.
- Laptop sent (ITU-R BT 471-1) messages to panel, and then displayed messages on its screen.

3.6 Connection Diagram of EUT and Peripheral Devices



3.7 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Laptop	Lenovo	TP00050A	N/A	N/A	Supplied by applicant
B	USB Mouse	DELL	MOCZUL	CN-049TWY- PRC00-77B-007R	N/A	Provided by Lab
C	RS485 Module	SOYAL	AR-321CM	N/A	N/A	Supplied by applicant
D	QEC	iCOP	QEC-M-01	N/A	N/A	Supplied by applicant
E	FLASH	HP	v222w	N/A	N/A	Supplied by applicant
F	EARPHONE	PHILIPS	SBC HL145	N/A	N/A	Provided by Lab
G	DC Power source	Hila	DP-6010	2216AP041904059	N/A	Provided by Lab
H	Laptop	LENOVO	T480	PF1EK03U	N/A	Provided by Lab

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	Data	2	0.02	N	0	Supplied by applicant
2	Data	16	0.05	N	0	Supplied by applicant
3	Power	1	0.5	N	0	Supplied by applicant
4	Power	1	1	N	0	Provided by Lab
5	Power	1	0.5	N	0	Supplied by applicant
6	GND (PE)	1	0.5	N	0	Supplied by applicant
7	GND (PE)	1	0.3	N	0	Supplied by applicant
8	GND (PE)	1	1.5	N	0	Provided by Lab
9	Audio	1	1	N	0	Provided by Lab
10	Data	1	0.6	N	0	Supplied by applicant
11	Cat. 5e	1	0.9	N	0	Supplied by applicant
12	Cat. 5e	1	0.9	N	0	Supplied by applicant
13	Data	1	0.8	N	0	Supplied by applicant
14	Cat. 5e	1	10	N	0	Provided by Lab
15	USB	1	0.8	Y	1	Supplied by applicant
16	USB	1	1.8	Y	0	Provided by Lab
17	Type C	1	1	Y	0	Supplied by applicant

4 Test Instruments

The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.1 Conducted Emissions from Power Ports

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
50 ohm terminal resistance LYNICS	0900510	E1-01-300	2025/2/5	2026/2/4
		E1-01-301	2025/2/5	2026/2/4
		E1-011284	2025/9/18	2026/9/17
DC LISN R&S	ESH3-Z6	100219	2025/7/10	2026/7/9
		844950/018	2025/7/10	2026/7/9
Diode Pulse Limiter Schwarzbeck	VTSD 9561 F-N	01422	2025/5/2	2026/5/1
EMI Test Receiver R&S	ESR3	102413	2025/1/22	2026/1/21
		102414	2024/12/11	2025/12/10
Fixed Attenuator EMEC	EM- ATT30002602NN	N/A	2025/3/21	2026/3/20
High Pass Filter EMCI	150HPF-ME	114005	2025/5/2	2026/5/1
		114006	2025/5/2	2026/5/1
	150HPF-MF	113009	2025/5/2	2026/5/1
High Voltage Probe Schwarzbeck	TK9420	00982	2024/12/6	2025/12/5
LISN R&S	ENV216	101195	2025/7/18	2026/7/17
		101196	2025/5/19	2026/5/18
		101197	2025/7/4	2026/7/3
	ESH3-Z5	100220	2024/11/21	2025/11/20
LISN Schwarzbeck	NNLK 8121	8121-731	2025/6/10	2026/6/9
		8121-00759	2025/8/12	2026/8/11
		8121-808	2025/4/23	2026/4/22
	NNLK 8129	00624	2025/10/9	2026/10/8
		8129229	2025/10/14	2026/10/13
RF Coaxial Cable PEWC	5D-FB	Cable-CO3-01	2025/9/11	2026/9/10
Software BVADT	Cond_V7.4.1.0	N/A	N/A	N/A

Notes:

1. The test was performed in Linkou Conduction 3.
2. The VCCI Site Registration No. C-10274.
3. Tested Date: 2025/11/20

4.2 Conducted Emissions from Wired Network Ports

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
50 ohm terminal resistance LYNICS	0900510	E1-01-300	2025/2/5	2026/2/4
		E1-01-301	2025/2/5	2026/2/4
		E1-011284	2025/9/18	2026/9/17
Capacitive Voltage Probe FCC	F-CVP-1	94	2025/4/9	2026/4/8
DC LISN R&S	ESH3-Z6	100219	2025/7/10	2026/7/9
		844950/018	2025/7/10	2026/7/9
EMI Test Receiver R&S	ESR3	102413	2025/1/22	2026/1/21
		102414	2024/12/11	2025/12/10
Impedance Stabilization Network FCC	F-071115- 1057-1	20651	2025/3/12	2026/3/11
		20652	2025/1/2	2026/1/1
Impedance Stabilization Network TESEQ	ISN S751	40599	2025/7/30	2026/7/29
	ISN ST08	66557	2025/2/23	2026/2/22
	ISN T8_Cat.6	53159	2025/6/10	2026/6/9
LISN R&S	ENV216	101195	2025/7/18	2026/7/17
		101196	2025/5/19	2026/5/18
		101197	2025/7/4	2026/7/3
	ESH3-Z5	100220	2024/11/21	2025/11/20
LISN Schwarzbeck	NNLK 8121	8121-731	2025/6/10	2026/6/9
		8121-00759	2025/8/12	2026/8/11
		8121-808	2025/4/23	2026/4/22
	NNLK 8129	00624	2025/10/9	2026/10/8
		8129229	2025/10/14	2026/10/13
Matching Pad EMCI	EMCI- 3PDSM75BF	N/A	2024/12/17	2025/12/16
RF Coaxial Cable PEWC	5D-FB	Cable-CO3-01	2025/9/11	2026/9/10
RF Current Probe FCC	F-33-4	56	2025/8/4	2026/8/3
Software BVADT	ISN_V7.4.1.0	N/A	N/A	N/A

Notes:

1. The test was performed inLinkou Conduction 3 (ISN 3).
2. The VCCI Site Registration No. T-11651.
3. Tested Date: 2025/11/20

4.3 Radiated Emissions up to 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
ADT. Tower	AT100	0205	N/A	N/A
ADT. Turn Table	TT100	0205	N/A	N/A
Bi_Log Antenna schaffner	CBL 6111D	22270	2025/9/19	2026/9/18
Coupling / Decoupling Network Schwarzbeck	CDNE-M2	00097	2025/5/28	2026/5/27
	CDNE-M3	00091	2025/3/20	2026/3/19
EMI Test Receiver R&S	ESCS 30	100276	2025/4/18	2026/4/17
		100292	2025/9/24	2026/9/23
Fixed Attenuator Mini-Circuits	UNAT-5+	PAD-ST2-01	2025/10/16	2026/10/15
Preamplifier HP	8447D	2727A05786	2025/2/14	2026/2/13
RF Coaxial Cable Pacific	8D-FB	Cable-ST2-01	2025/10/16	2026/10/15
Software BVADT	Radiated_V8.8.09	N/A	N/A	N/A

Notes:

1. The test was performed in Linkou Open Site2 , The test site validated date: 2025/7/12 (NSA)
2. The VCCI Site Registration No. R-10237.
3. Tested Date: 2025/11/19

4.4 Radiated Emissions above 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Fix tool for Boresight antenna tower BV	BAF-01	9	N/A	N/A
Fixed Attenuator Mini-Circuits	BW-K3-2W44+	PAD-CH7-03	2025/7/4	2026/7/3
	BW-N4W5+	PAD-CH10-02	2025/7/4	2026/7/3
Horn Antenna EMCO	3115	6714	2025/11/9	2026/11/8
Horn Antenna ETS-Lindgren	3117-PA	00215857	2025/11/9	2026/11/8
Horn Antenna Schwarzbeck	BBHA 9170	BBHA9170190	2025/11/9	2026/11/8
MXA Signal Analyzer Keysight	N9020B	MY60110438	2024/12/5	2025/12/4
		MY60112260	2025/5/26	2026/5/25
Notch Filter Micro-Tronics	BRC50703-01	010	2025/5/22	2026/5/21
	BRM17690	005	2025/5/22	2026/5/21
Preamplifier EMCI	EMC0126545	980076	2025/2/14	2026/2/13
	EMC184045B	980235	2025/2/14	2026/2/13
Preamplifier HP	8449B	3008A01292	2025/2/14	2026/2/13
RF Coaxial Cable EMEC	EM102-KMKM-100	02	2025/7/4	2026/7/3
	EM102-KMKM-350	01	2025/7/4	2026/7/3
Software BVADT	Radiated_V8.8.09	N/A	N/A	N/A
Turn Table & Tower Max Full	MF7802	MF780208216	N/A	N/A

Notes:

1. The test was performed in Linkou 966 Chamber 3 (CH 10).
2. The VCCI Site Registration No. G-10427.
3. Tested Date: 2025/11/20

5 Limits of Test Items

5.1 Conducted Emissions from Power Ports

Frequency (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	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 Conducted Emissions from Wired Network Ports

Frequency (MHz)	Coupling Device	Class A				Class B			
		Voltage Limit (dBuV)		Current limits (dBuA)		Voltage Limit (dBuV)		Current limits (dBuA)	
		Quasi-peak	Average	Quasi-peak	Average	Quasi-peak	Average	Quasi-peak	Average
0.15-0.5	Using AAN	97-87	84-74	-	-	84-74	74-64	-	-
0.5-30		87	74	-	-	74	64	-	-
0.15-0.5	Using CVP and Current probe	97-87	84-74	53-43	40-30	84-74	74-64	40-30	30-20
0.5-30		87	74	43	30	74	64	30	20
0.15-0.5	Current probe	-	-	53-43	40-30	-	-	40-30	30-20
0.5-30		-	-	43	30	-	-	30	20

Note: The limits decrease linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

5.3 Radiated Emissions up to 1 GHz

Frequency (MHz)	Class A Quasi-peak (dBuV/m)		Class B Quasi-peak (dBuV/m)	
	at 3m	at 10m	at 3m	at 10m
30 - 230	50	40	40	30
230 - 1000	57	47	47	37

For radiated emissions from FM receivers only (Measurement Facility: OATS/SAC)

Frequency (MHz)	Fundamental (dBuV/m)		Harmonics (dBuV/m)	
	at 3m	at 10m	at 3m	at 10m
30 - 230	60	50	52	42
230 - 300	60	50	52	42
300 - 1000	60	50	56	46

Notes: 1. The lower limit shall apply at the transition frequencies.

2. Emission level (dBuV/m) = 20 log Emission level (uV/m).

3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

5.4 Radiated Emissions above 1 GHz

Frequency (GHz)	Class A (dBuV/m) (at 3m)		Class B (dBuV/m) (at 3m)	
	Average	Peak	Average	Peak
1 to 3	56	76	50	70
3 to 6	60	80	54	74

- Notes: 1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

Frequency Range of Radiated Measurement (For unintentional radiators)

Highest internal frequency (F_x)	Highest measurement frequency (F_m) (GHz)
$F_x \leq 108 \text{ MHz}$	1
$108 \text{ MHz} < F_x \leq 500 \text{ MHz}$	2
$500 \text{ MHz} < F_x \leq 1 \text{ GHz}$	5
$F_x > 1 \text{ GHz}$	5 x F_x up to a maximum of 6 GHz

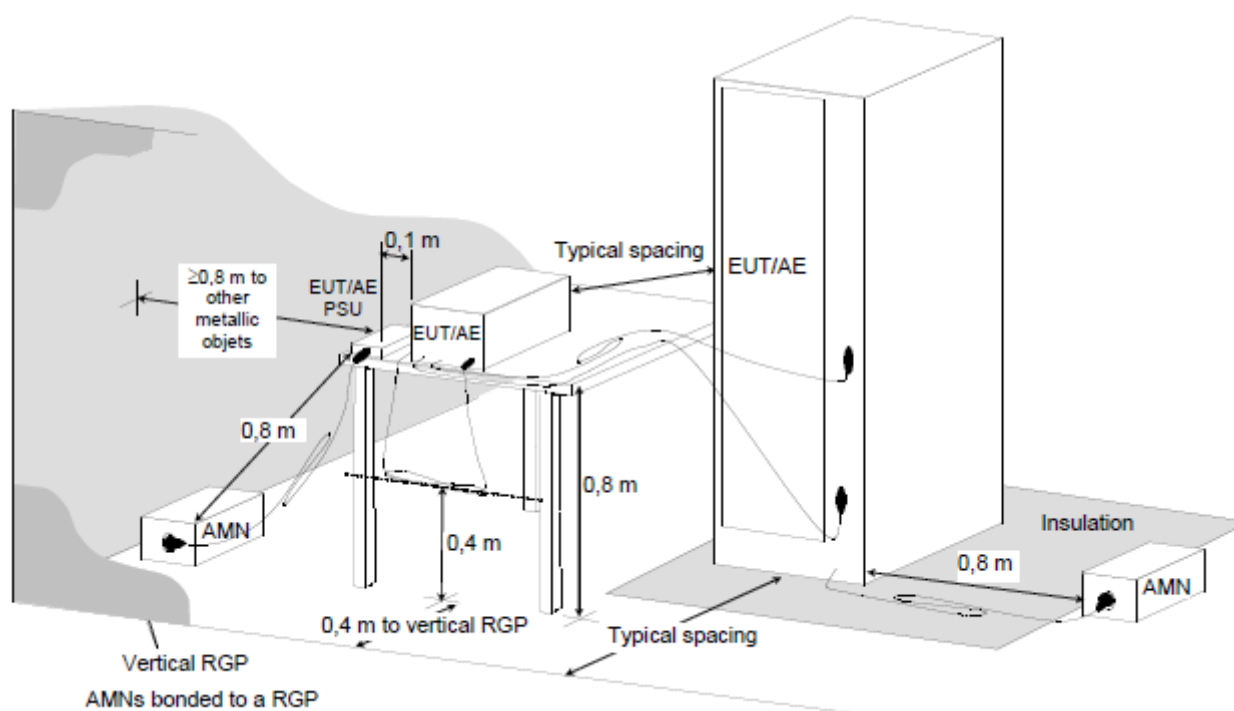
F_x is the highest fundamental frequency generated and/or used in the ITE or digital apparatus under test.

6 Test Arrangements

6.1 Conducted Emissions from Power Ports

- a. The EUT is placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN), or an Artificial Network (AN) as specified in CISPR 25 if used in a vehicle. Other support units are connected to the power mains through another LISN and/or AN. They provide 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 9 kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15 MHz-30 MHz.



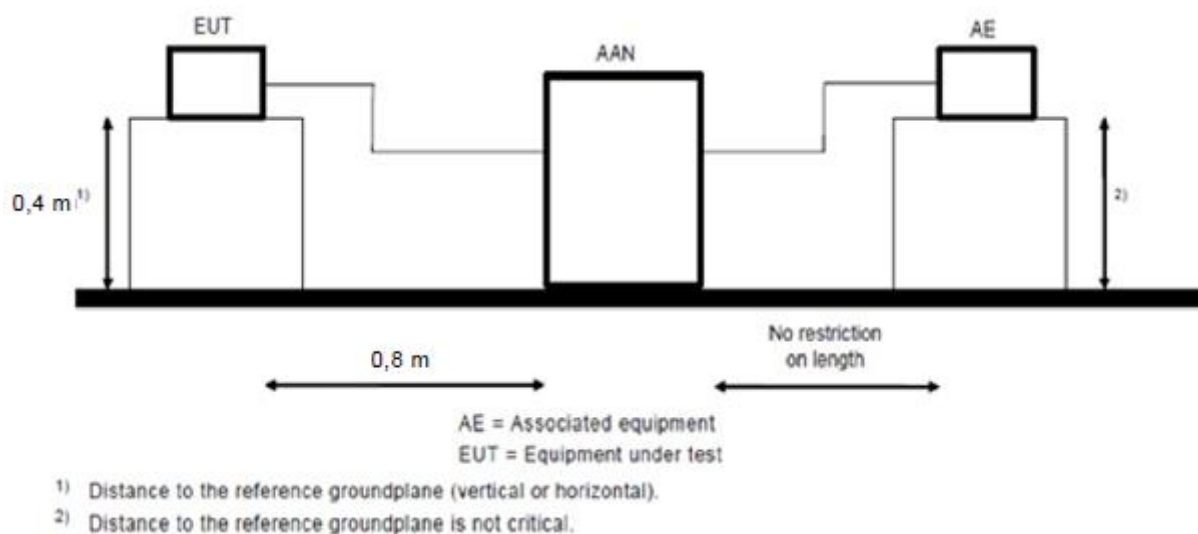
For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

6.2 Conducted Emissions from Wired Network Ports

Method of Using AANs:

- The EUT is placed 0.4 meters from the conducting wall of the shielded room and connected to AAN directly to reference ground plane.
- If voltage measurement is used, measure voltage at the measurement port of the AAN, correct the reading by adding the AAN voltage division factor, and compare to the voltage limit.
- It is not necessary to apply the current limit if a AAN is used.
- The test results of disturbance at telecommunication 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 9 kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15 MHz-30 MHz.

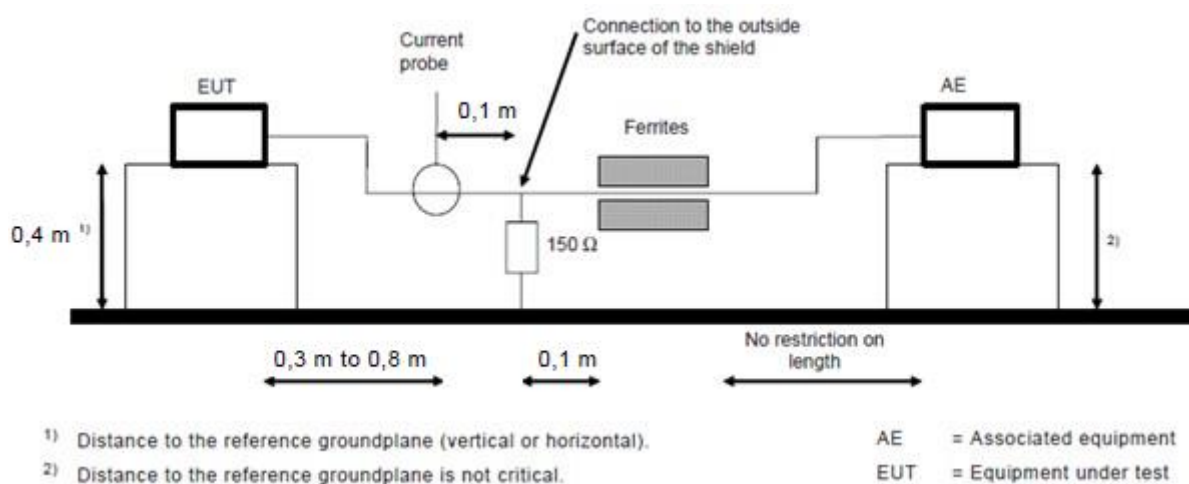


For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

Method of Using a combination of Current Probe and 150 Ω load to the outside surface of the shielding cable:

- Breaks the external protective insulation (exposing the shield) and connect a 150 Ω resistor from the outside surface of the shield to ground.
- A current probe shall be placed at 0.1 m from the 150 Ω resistor. The current probe to EUT horizontal distance is between 0.3 m to 0.8 m.
- If current measurement is used, measure current at the measurement port of the current probe, correct the reading by adding the current probe division factor, and compare to the current limit.
- It is not necessary to apply the voltage limit if a current probe is used.
- The test results of disturbance at telecommunication 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 9 kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15 MHz-30 MHz.

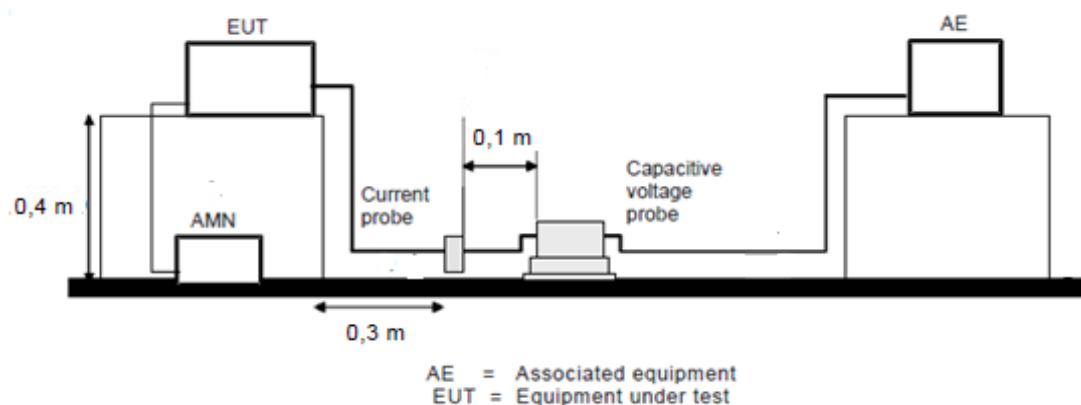


For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

Method of Using a combination of current probe and capacitive voltage probe:

- a. Measure current with a current probe.
- b. Compare the measured current with the applicable current limit.
- c. Measure voltage with a capacitive voltage probe as specified in 5.2.2 of CISPR 16-1-2.
- d. Adjust the measured voltage as follows:
 - current margin ≤ 6 dB – subtract the actual current margin from measured voltage;
 - current margin > 6 dB – subtract 6 dB from measured voltage.
- e. Compare adjusted voltage with the applicable voltage limit
- f. Both the measured current and the adjusted voltage shall be below the applicable
- g. The test results of disturbance at telecommunication 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 9 kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15 MHz-30 MHz.

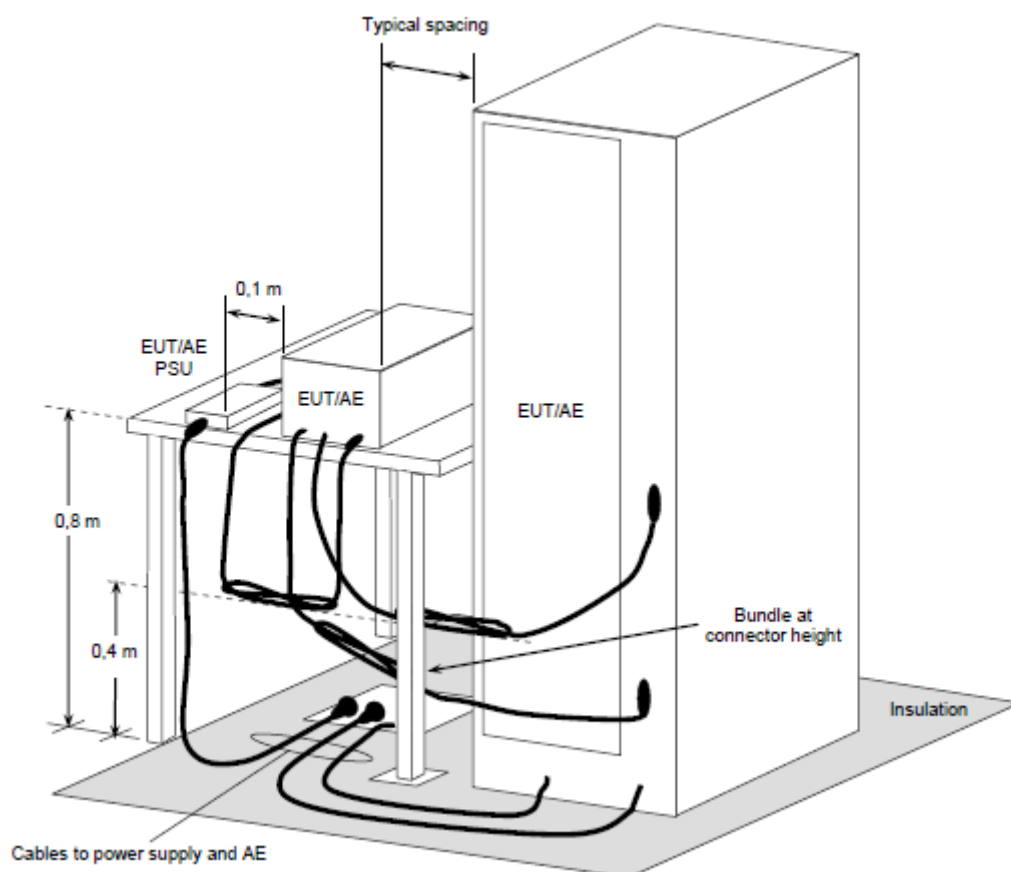


For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

6.3 Radiated Emissions up to 1 GHz

- For the table-top EUT is placed on a 0.8 meter to the top of rotating table; for the floor standing EUT shall be insulated (by insulation of maximum thickness of 150 mm) from the horizontal reference ground plane. The rotating table is rotated 360 degrees to determine the position of the highest radiation. If the equipment requires a dedicated ground connection, this shall be provided and bonded to the RGP.
- The EUT is set 10 meters away from the interference-receiving antenna, which is mounted on the top of a variable-height antenna tower.
- 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.
- For each suspected emission, the EUT is arranged to its worst case and then the antenna is tuned to heights from 1 m to 4 m and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system is set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is up to 1 GHz.

Note: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for quasi-peak detection (QP) at frequency up to 1 GHz.

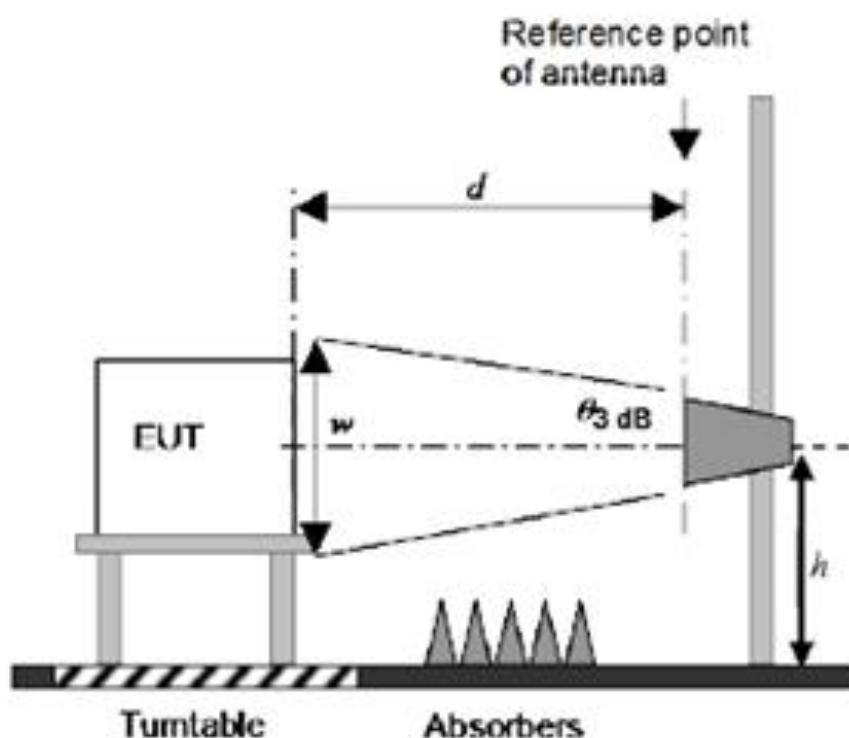


For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

6.4 Radiated Emissions above 1 GHz

- For the table-top EUT is placed on a 0.8 meter to the top of rotating table; for the floor standing EUT shall be insulated (by insulation of maximum thickness of 150 mm) from the horizontal reference ground plane. The rotating table is rotated 360 degrees to determine the position of the highest radiation. If the equipment requires a dedicated ground connection, this shall be provided and bonded to the RGP.
- The EUT was set $d = 3$ meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The height of antenna can be varied from one meter to four meters, the height of adjustment depends on the EUT height and the antenna 3 dB beamwidth both, to detect the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The spectrum analyzer system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

Note: The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1 GHz.



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

7 Test Results of Test Item

7.1 Conducted Emissions from Power Ports

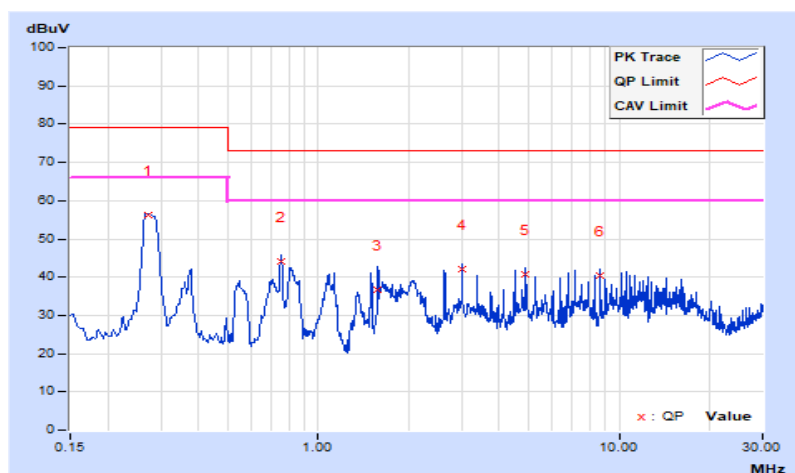
Mode A

Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	24 Vdc	Environmental Conditions	21 °C, 60% RH, 1000 mbar
Tested by	Perry Yang		

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	0.27207	11.10	45.12	43.74	56.22	54.84	79.00	66.00	-22.78	-11.16
2	0.75238	10.51	33.73	30.23	44.24	40.74	73.00	60.00	-28.76	-19.26
3	1.58335	10.44	26.11	21.86	36.55	32.30	73.00	60.00	-36.45	-27.70
4	3.00928	10.45	31.48	28.39	41.93	38.84	73.00	60.00	-31.07	-21.16
5	4.89053	10.47	30.34	28.33	40.81	38.80	73.00	60.00	-32.19	-21.20
6	8.65180	10.53	29.82	28.70	40.35	39.23	73.00	60.00	-32.65	-20.77

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

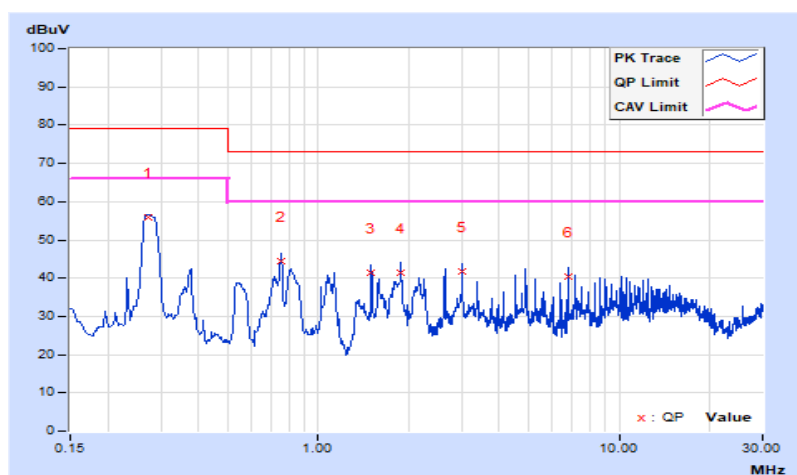


Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	24 Vdc	Environmental Conditions	21 °C, 60% RH, 1000 mbar
Tested by	Perry Yang		

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	0.27169	11.23	44.80	43.47	56.03	54.70	79.00	66.00	-22.97	-11.30
2	0.75245	10.64	33.91	30.29	44.55	40.93	73.00	60.00	-28.45	-19.07
3	1.50473	10.57	30.98	29.69	41.55	40.26	73.00	60.00	-31.45	-19.74
4	1.88144	10.57	30.73	25.65	41.30	36.22	73.00	60.00	-31.70	-23.78
5	3.00956	10.58	31.10	28.06	41.68	38.64	73.00	60.00	-31.32	-21.36
6	6.77142	10.63	29.94	28.50	40.57	39.13	73.00	60.00	-32.43	-20.87

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



7.2 Conducted Emissions from Wired Network Ports

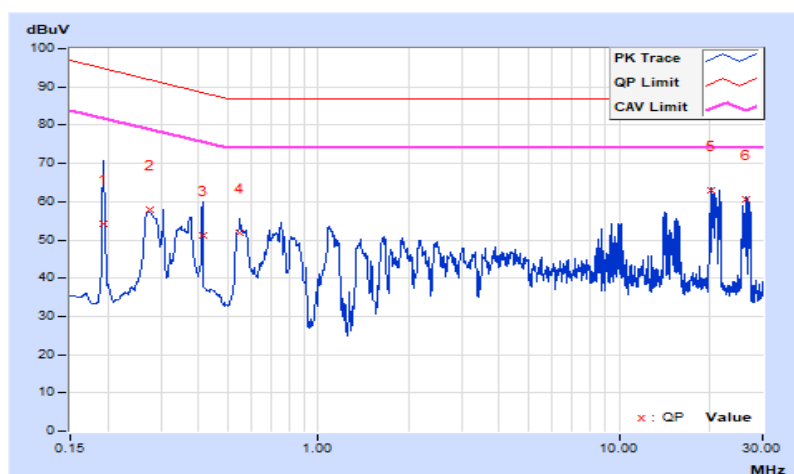
Mode A

Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	24 Vdc	Environmental Conditions	21 °C, 60% RH, 1000 mbar
Tested by	Perry Yang		

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	0.19302	9.71	44.51	22.38	54.22	32.09	94.91	81.91	-40.69	-49.82
2	0.27469	9.61	48.18	44.90	57.79	54.51	91.97	78.97	-34.18	-24.46
3	0.41204	9.49	41.75	21.56	51.24	31.05	88.61	75.61	-37.37	-44.56
4	0.54958	9.42	42.59	38.65	52.01	48.07	87.00	74.00	-34.99	-25.93
5	20.25861	9.84	53.28	49.27	63.12	59.11	87.00	74.00	-23.88	-14.89
6	26.48703	10.20	50.38	48.97	60.58	59.17	87.00	74.00	-26.42	-14.83

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



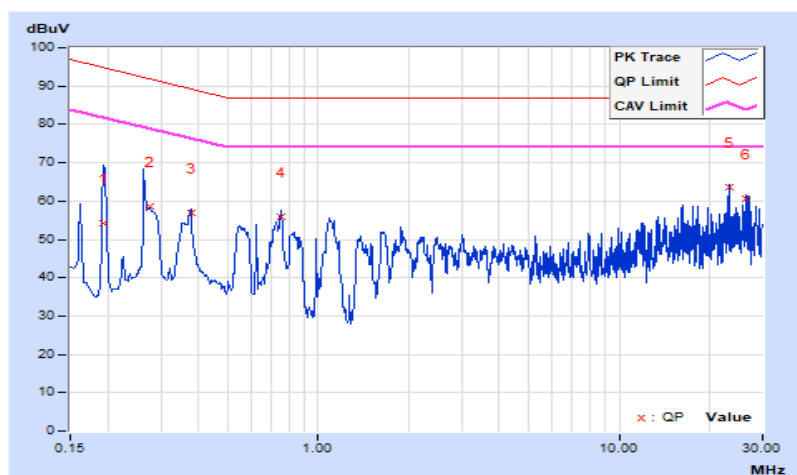
Mode B

Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	24 Vdc	Environmental Conditions	21 °C, 60% RH, 1000 mbar
Tested by	Perry Yang		

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	0.19302	9.71	44.50	21.66	54.21	31.37	94.91	81.91	-40.70	-50.54
2	0.27520	9.61	48.85	45.57	58.46	55.18	91.96	78.96	-33.50	-23.78
3	0.37684	9.52	47.29	41.90	56.81	51.42	89.35	76.35	-32.54	-24.93
4	0.75389	9.36	46.61	41.34	55.97	50.70	87.00	74.00	-31.03	-23.30
5	23.12814	10.00	53.74	48.50	63.74	58.50	87.00	74.00	-23.26	-15.50
6	26.48703	10.20	50.42	45.71	60.62	55.91	87.00	74.00	-26.38	-18.09

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



7.3 Radiated Emissions up to 1 GHz

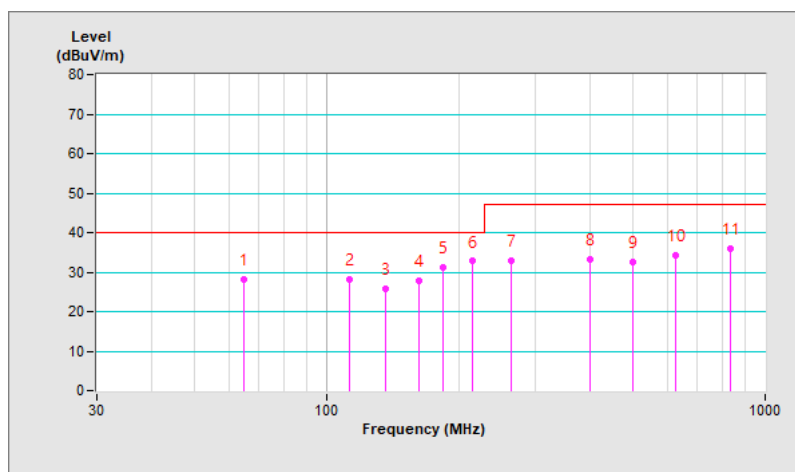
Mode A

Frequency Range	30 MHz ~ 1 GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120 kHz
Input Power	24 Vdc	Environmental Conditions	20 °C, 67% 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	64.80	28.27 QP	40.00	-11.73	4.00 H	240	43.55	-15.28
2	112.90	28.12 QP	40.00	-11.88	4.00 H	161	37.25	-9.13
3	136.34	25.92 QP	40.00	-14.08	4.00 H	45	34.53	-8.61
4	162.16	27.82 QP	40.00	-12.18	4.00 H	66	37.51	-9.69
5	184.32	31.34 QP	40.00	-8.66	4.00 H	198	42.19	-10.85
6	216.00	32.79 QP	40.00	-7.21	4.00 H	284	43.01	-10.22
7	264.12	32.96 QP	47.00	-14.04	3.74 H	154	38.56	-5.60
8	400.01	33.24 QP	47.00	-13.76	3.23 H	212	36.10	-2.86
9	499.99	32.59 QP	47.00	-14.41	1.92 H	283	33.73	-1.14
10	624.94	34.18 QP	47.00	-12.82	1.46 H	210	31.95	2.23
11	832.83	35.99 QP	47.00	-11.01	1.00 H	260	29.81	6.18

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. Margin value = Emission level – Limit value
4. The other emission levels were very low against the limit.

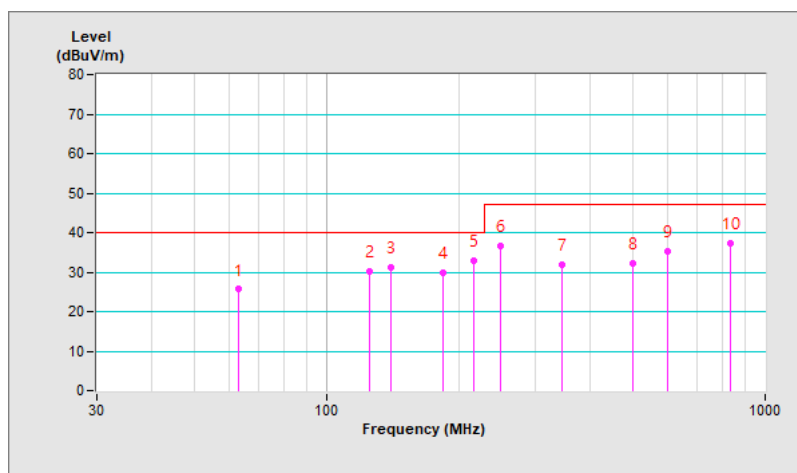


Frequency Range	30 MHz ~ 1 GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120 kHz
Input Power	24 Vdc	Environmental Conditions	20 °C, 67% RH, 1000 mbar
Tested By	Paul Chen		

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	63.06	25.66 QP	40.00	-14.34	1.59 V	62	40.81	-15.15
2	125.01	30.26 QP	40.00	-9.74	1.00 V	116	39.18	-8.92
3	140.24	31.30 QP	40.00	-8.70	1.00 V	336	39.83	-8.53
4	184.26	29.83 QP	40.00	-10.17	1.00 V	360	40.68	-10.85
5	216.03	32.84 QP	40.00	-7.16	1.00 V	311	43.06	-10.22
6	250.01	36.75 QP	47.00	-10.25	1.00 V	121	43.01	-6.26
7	343.84	31.94 QP	47.00	-15.06	1.00 V	223	36.26	-4.32
8	500.01	32.29 QP	47.00	-14.71	1.00 V	90	33.43	-1.14
9	600.01	35.41 QP	47.00	-11.59	3.27 V	267	33.81	1.60
10	832.75	37.44 QP	47.00	-9.56	2.48 V	116	31.26	6.18

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. Margin value = Emission level – Limit value
4. The other emission levels were very low against the limit.



7.4 Radiated Emissions above 1 GHz

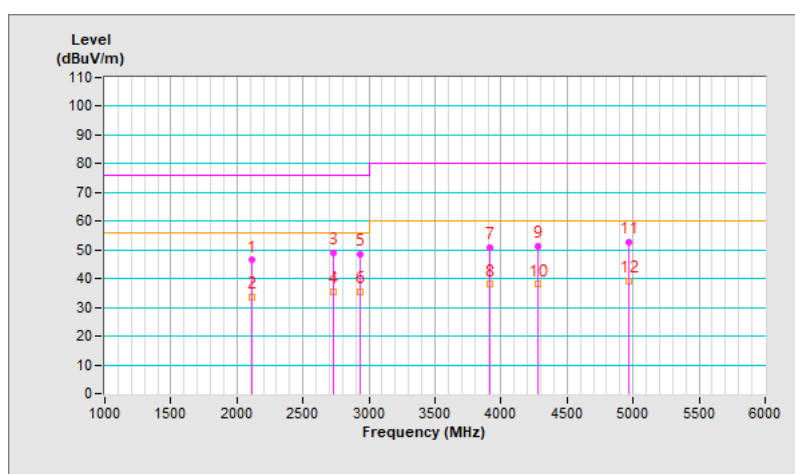
Mode A

Frequency Range	1 GHz ~ 5 GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1 MHz
Input Power	24 Vdc	Environmental Conditions	19 °C, 61% RH, 1000 mbar
Tested By	Desmond Chen		

Antenna Polarity & Test Distance : Horizontal at 3 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	2112.93	46.41 PK	76.00	-29.59	1.29 H	20	46.03	0.38
2	2112.93	33.49 AV	56.00	-22.51	1.29 H	20	33.11	0.38
3	2733.17	49.03 PK	76.00	-26.97	1.58 H	267	46.66	2.37
4	2733.17	35.43 AV	56.00	-20.57	1.58 H	267	33.06	2.37
5	2928.66	48.62 PK	76.00	-27.38	1.75 H	162	45.59	3.03
6	2928.66	35.62 AV	56.00	-20.38	1.75 H	162	32.59	3.03
7	3916.74	51.03 PK	80.00	-28.97	1.07 H	2	44.66	6.37
8	3916.74	38.05 AV	60.00	-21.95	1.07 H	2	31.68	6.37
9	4277.39	51.28 PK	80.00	-28.72	1.13 H	271	44.86	6.42
10	4277.39	38.11 AV	60.00	-21.89	1.13 H	271	31.69	6.42
11	4972.52	52.79 PK	80.00	-27.21	1.47 H	63	45.07	7.72
12	4972.52	39.37 AV	60.00	-20.63	1.47 H	63	31.65	7.72

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. Margin value = Emission level – Limit value
4. The other emission levels were very low against the limit.

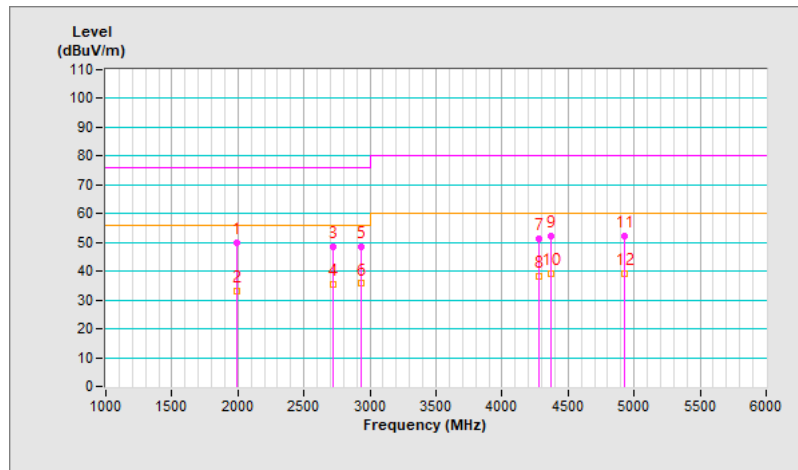


Frequency Range	1 GHz ~ 5 GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1 MHz
Input Power	24 Vdc	Environmental Conditions	19 °C, 61% RH, 1000 mbar
Tested By	Desmond Chen		

Antenna Polarity & Test Distance : Vertical at 3 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	1996.69	50.08 PK	76.00	-25.92	1.00 V	289	50.23	-0.15
2	1996.69	33.16 AV	56.00	-22.84	1.16 V	289	33.31	-0.15
3	2719.37	48.58 PK	76.00	-27.42	1.05 V	0	46.15	2.43
4	2719.37	35.46 AV	56.00	-20.54	1.05 V	0	33.03	2.43
5	2928.52	48.58 PK	76.00	-27.42	1.24 V	134	45.55	3.03
6	2928.52	35.73 AV	56.00	-20.27	1.24 V	134	32.70	3.03
7	4278.56	51.31 PK	80.00	-28.69	1.47 V	318	44.90	6.41
8	4278.56	38.21 AV	60.00	-21.79	1.47 V	318	31.80	6.41
9	4370.47	52.41 PK	80.00	-27.59	1.64 V	43	46.14	6.27
10	4370.47	39.36 AV	60.00	-20.64	1.64 V	43	33.09	6.27
11	4927.68	52.34 PK	80.00	-27.66	1.32 V	53	44.99	7.35
12	4927.68	39.22 AV	60.00	-20.78	1.32 V	53	31.87	7.35

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. Margin value = Emission level – Limit value
4. The other emission levels were very low against the limit.



8 Pictures of Test Arrangements

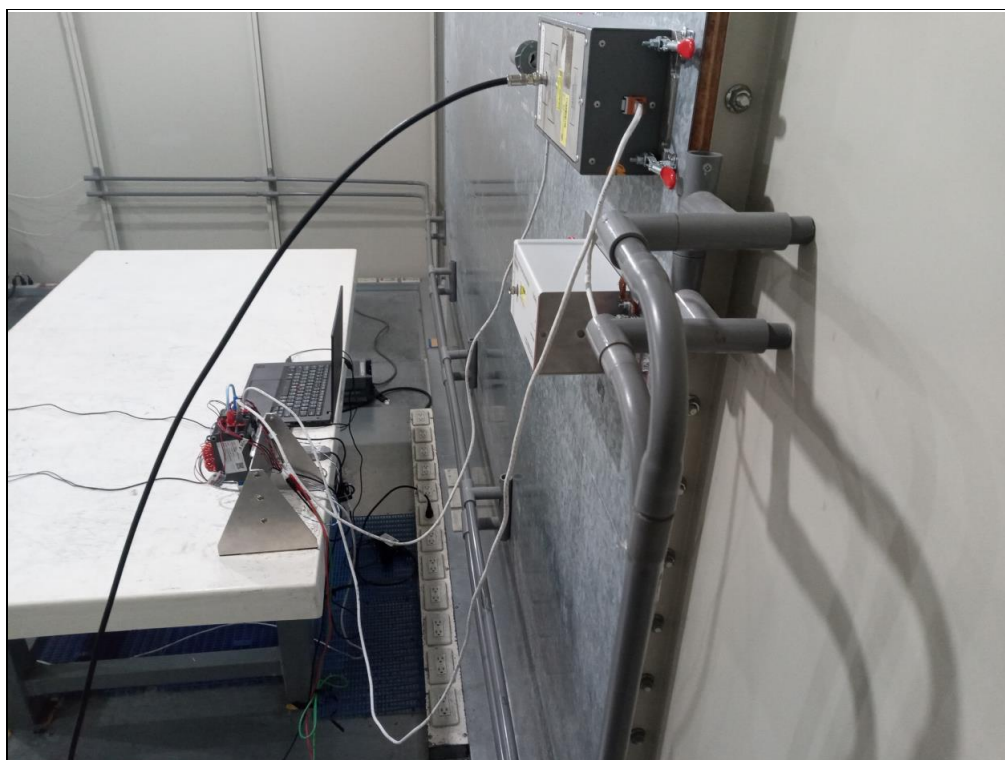
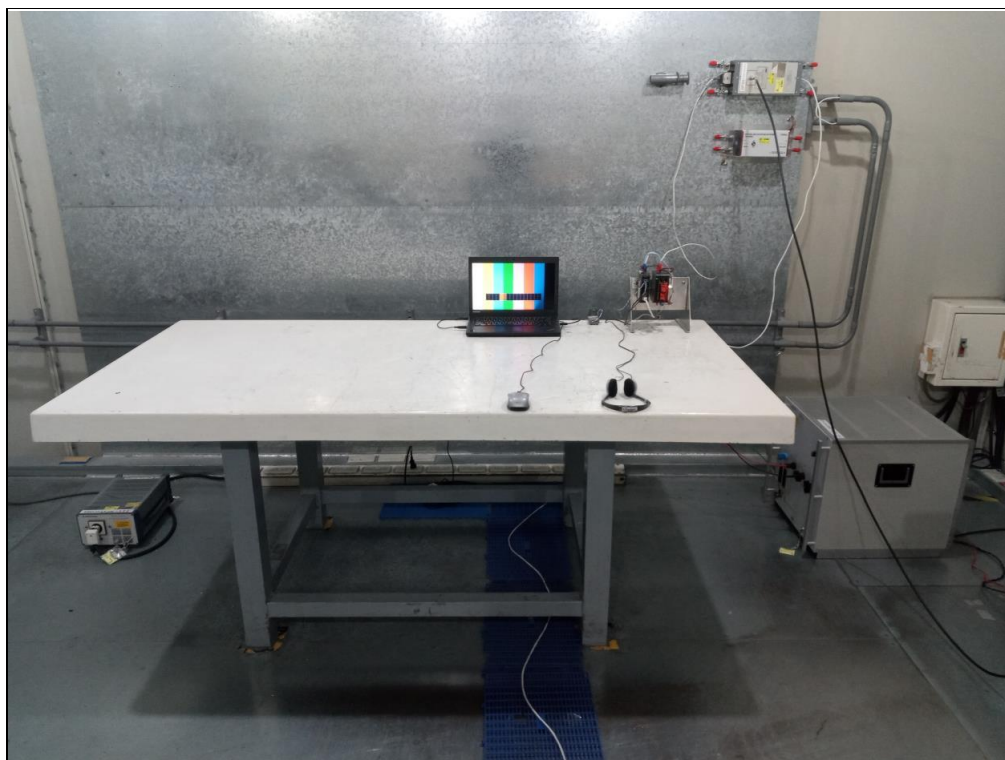
8.1 Conducted Emissions from Power Ports

Mode A

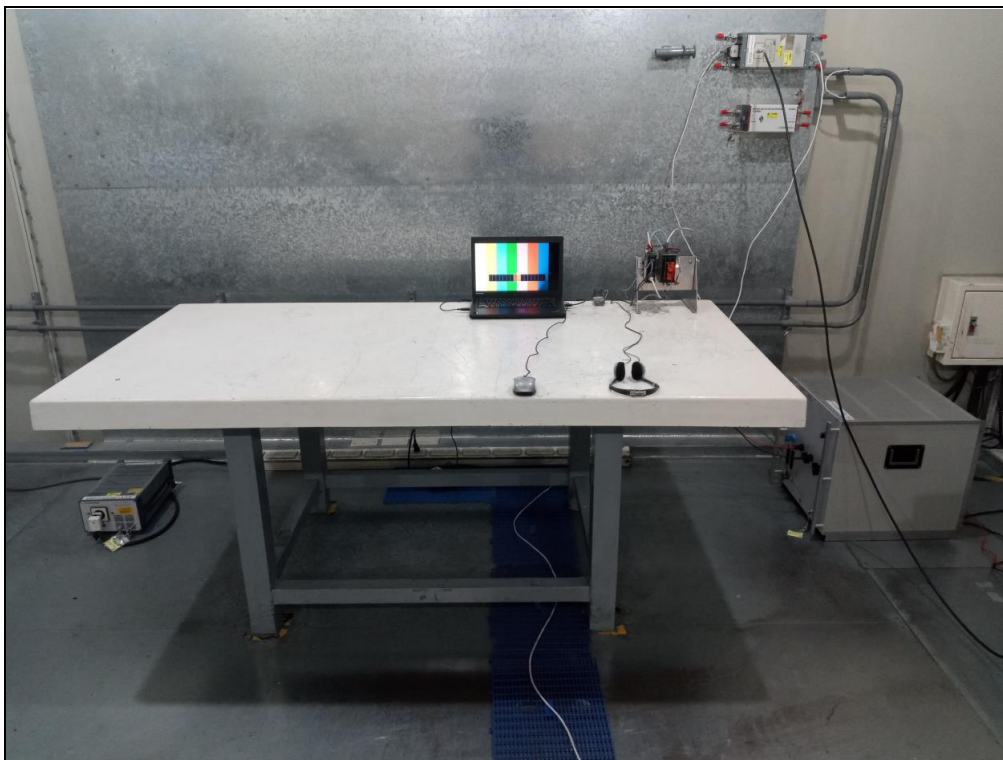


8.2 Conducted Emissions from Wired Network Ports

Mode A



Mode B



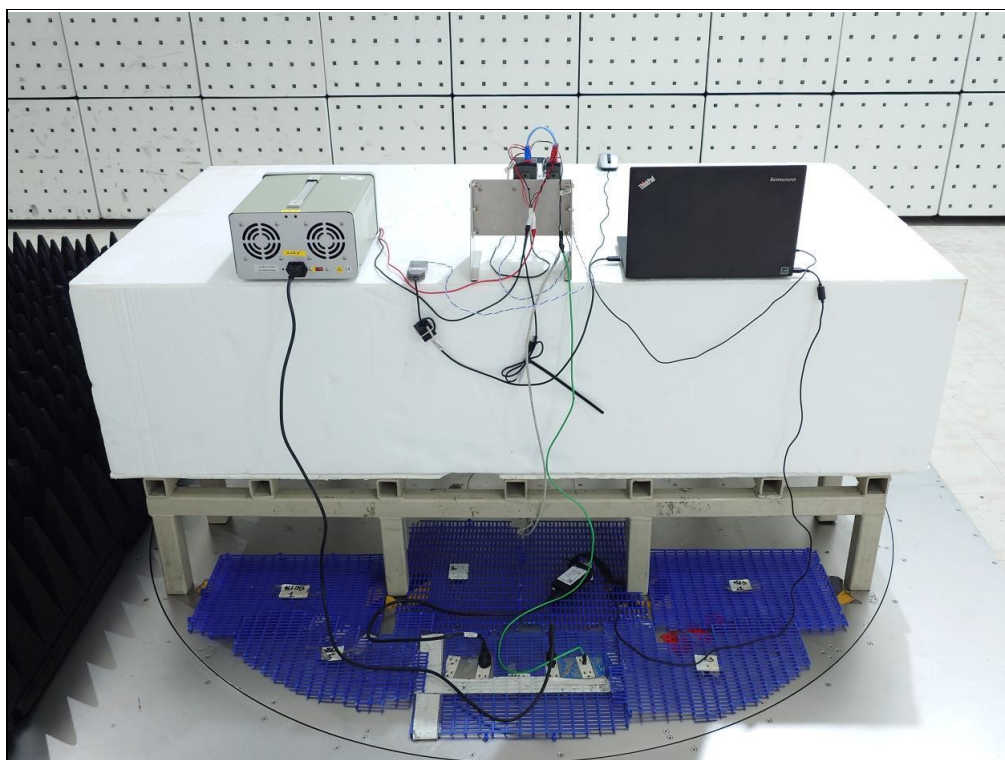
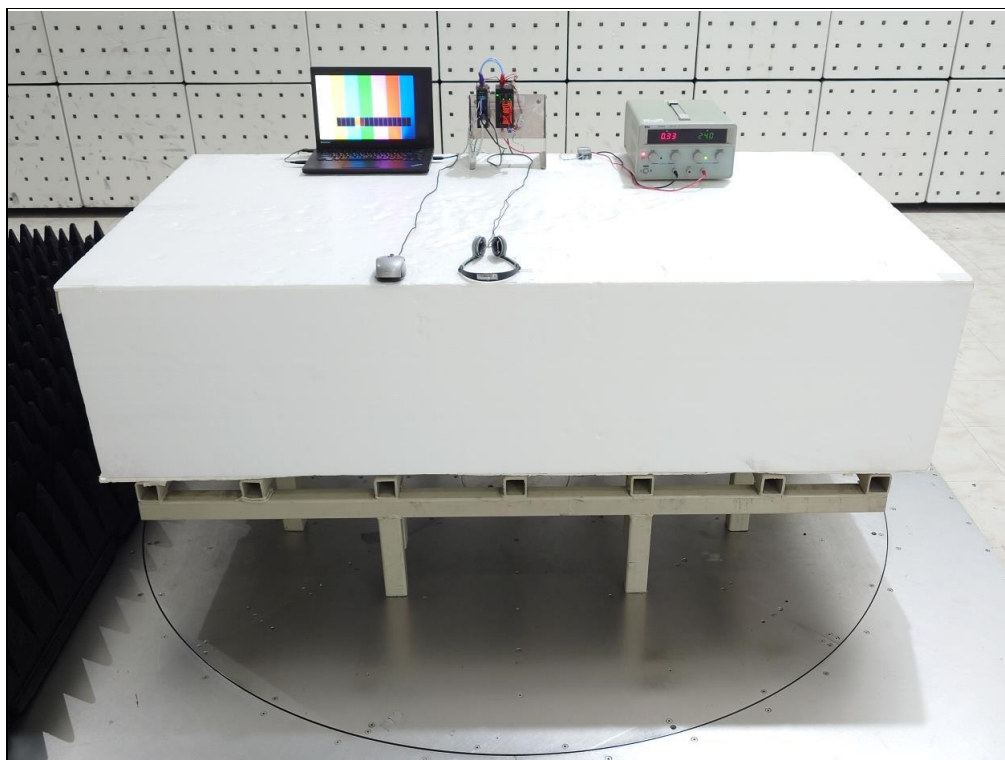
8.3 Radiated Emissions up to 1 GHz

Mode A



8.4 Radiated Emissions above 1 GHz

Mode A



9 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 FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

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

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Email: service.adt@bureauveritas.com

Web Site: <http://ee.bureauveritas.com.tw>

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

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