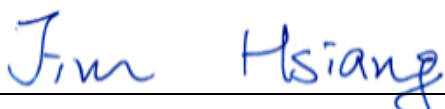


TEST REPORT

CERTIFICATE OF CONFORMITY

Standard: VCCI-CISPR 32: 2016, Class A
Report No.: VBDBO-WTW-P23060658
Product: QEC
Brand: ICOP
Model No.: R
Series Model: QEC-RXXJTXS-X (X=0~9, A~Z, (,), /, - or Blank)
Received Date: 2023/6/28
Test Date: 2023/11/16 ~ 2023/11/17
Issued Date: 2023/12/15
Applicant: ICOP TECHNOLOGY INC.
Address: NO.15, Wugong 5th Rd., Xinzhuang Dist., New Taipei City 24890, Taiwan (R.O.C)
Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lin Kou Laboratories
Lab. VCCI Member No: 395
Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
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: 2023/12/15

This test report consists of 20 pages in total. It may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The test results in the report only apply to the tested sample. The test results in this report are traceable to the national or international standards.

Prepared by : Ivy Lin / Specialist



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Release Control Record

Issue No.	Description	Date Issued
VBDBO-WTW-P23060658	Original release.	2023/12/15

1 Certificate

Product: QEC

Brand: iCOP

Test Model: R

Series Model: QEC-RXXJTXS-X (X=0~9, A~Z, (,), /, - or Blank)

Sample Status: Engineering sample

Applicant: ICOP TECHNOLOGY INC.

Test Date: 2023/11/16 ~ 2023/11/17

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 -2.73 dB at 0.29884 MHz
VCCI-CISPR 32	Radiated Emissions up to 1 GHz	Pass	Minimum passing Class A margin is -2.32 dB at 125.00 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})
Radiated Emissions up to 1 GHz	30 MHz ~ 1 GHz	3m : 5.62 dB 10m : 4.26 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 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	R
Series Model	QEC-RXXJTXS-X (X=0~9, A~Z, (,), /, - or Blank)
Model Difference	Marketing Differentiation
Sample Status	Engineering sample
Operating Software	N/A
Power Supply Rating	24Vdc
Accessory Device	N/A

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 100 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 + 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.	

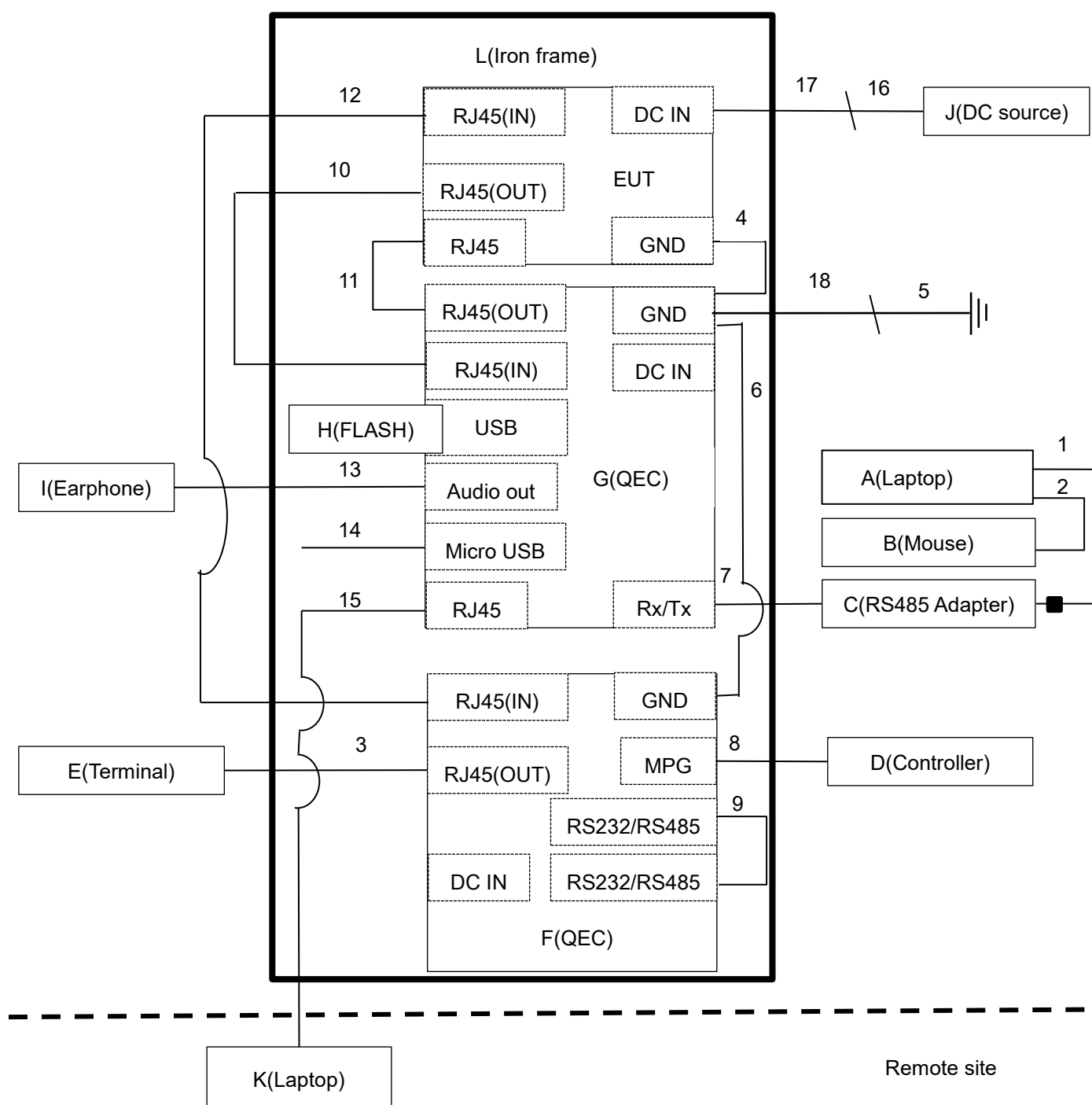
Test modes are presented in the report as below.

Test Condition	
Mode	Conducted Emissions from Power Ports
A	operating mode + Input Power(24 Vdc)
Mode	Radiated Emissions up to 1 GHz
A	operating mode + Input Power(24 Vdc)

3.5 Test Program Used and Operation Descriptions

- Turned on the power of all equipment.
- EUT ran a test program to enable all functions.
- Laptop (kept at remote site) sent and received message to/ from EUT via QEC with RJ45 cable.
- Laptop sent "ITU-R 471-1" messages to panel. Then it displayed messages on its screen.
- EUT sent "audio signal" to earphone.
- Steps c-e were repeated.

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 Adapter	SOYAL	AR-321CM	N/A	N/A	Supplied by applicant
D	Controller	SAH	TM1474-100B-5L- Z6	N/A	N/A	Supplied by applicant
E	Terminal	N/A	N/A	N/A	N/A	Provided by Lab
F	QEC	QEC	QEC-11HU4S-N	N/A	N/A	Supplied by applicant
G	QEC	QEC	QEC-M-01	N/A	N/A	Supplied by applicant
H	FLASH	HP	V222W	N/A	N/A	Supplied by applicant
I	EARPHONE	PHILIPS	SBC HL145	N/A	N/A	Provided by Lab
J	DC Power Supply	HILA	DP-6010	2216AP041904059	N/A	Provided by Lab
K	Laptop	LENOVO	T480	PF1EK03U	N/A	Provided by Lab
L	Iron frame	N/A	N/A	N/A	N/A	Supplied by applicant

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	USB cable	1	0.9	Yes	1	Supplied by applicant
2	USB cable	1	1.8	Yes	0	Provided by Lab
3	RJ45 (Cat. 5e) cable	1	1.5	No	0	Provided by Lab
4	GND (PE) cable	1	0.1	No	0	Supplied by applicant
5	GND (PE) cable	1	1.6	No	0	Provided by Lab
6	GND (PE) cable	1	0.1	No	0	Supplied by applicant
7	Data cable	1	0.5	No	0	Supplied by applicant
8	MPG cable	1	2	Yes	0	Supplied by applicant
9	RS232 cable	1	0.1	Yes	0	Supplied by applicant
10	RJ45 (Cat. 5e) cable	1	0.1	No	0	Supplied by applicant
11	RJ45 (Cat. 5e) cable	1	0.2	No	0	Supplied by applicant
12	RJ45 (Cat. 5e) cable	1	0.1	No	0	Supplied by applicant
13	Audio (3.5") cable	1	1	No	0	Provided by Lab
14	USB (Micro) cable	1	1	Yes	0	Provided by Lab
15	RJ45 (Cat. 5e) cable	1	10	No	0	Provided by Lab
16	DC power cable	1	1.5	No	0	Provided by Lab
17	DC power cable	1	0.1	No	0	Supplied by applicant
18	GND (PE) cable	1	0.1	No	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	E1-01-305	2023/2/13	2024/2/12
		E1-011285	2023/9/21	2024/9/20
		E1-011286	2023/9/21	2024/9/20
Coupling / Decoupling Network TESEQ	CDN A201A	44601	2022/12/14	2023/12/13
EMI Test Receiver R&S	ESCS 30	100276	2023/4/20	2024/4/19
	ESR3	102413	2023/2/7	2024/2/6
Fixed Attenuator EMEC	EM-ATT30002602NN	N/A	2023/3/24	2024/3/23
Fixed Attenuator STI	STI02-2200-10	NO.3	2023/10/20	2024/10/19
High Voltage Probe Schwarzbeck	TK9420	00982	2022/12/14	2023/12/13
LISN R&S	ENV216	101195	2023/7/25	2024/7/24
		101196	2023/5/22	2024/5/21
		101197	2023/7/12	2024/7/11
LISN Schwarzbeck	NNLK 8121	8121-731	2023/6/9	2024/6/8
		8121-00759	2023/8/21	2024/8/20
		8121-808	2023/5/2	2024/5/1
	NNLK 8129	8129229	2023/6/27	2024/6/26
RF Coaxial Cable PEWC	5D-FB	Cable-CO3-01	2023/9/13	2024/9/12
Software BVADT	Cond_V7.3.7.4	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: 2023/11/16

4.2 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 Schwarzbeck	VULB 9168	9168-303	2023/10/17	2024/10/16
Coupling / Decoupling Network Schwarzbeck	CDNE-M2	00097	2023/5/25	2024/5/24
	CDNE-M3	00091	2023/5/25	2024/5/24
EMI Test Receiver R&S	ESCS 30	100276	2023/4/20	2024/4/19
		100292	2023/9/7	2024/9/6
Fixed Attenuator Mini-Circuits	UNAT-5+	PAD-ST2-01	2023/10/20	2024/10/19
Preamplifier Agilent	8447D	2944A11062	2023/2/15	2024/2/14
Preamplifier EMCI	EMC9135	980711	2023/3/12	2024/3/11
Preamplifier HP	8447D	2944A08313	2023/2/15	2024/2/14
RF Coaxial Cable Pacific	8D-FB	Cable-ST2-01	2023/11/7	2024/11/6
Software BVADT	Radiated_V7.6.15.9.5	N/A	N/A	N/A

Notes:

1. The test was performed in Linkou Open Site 2. The test site validated date: 2023/7/15 (NSA).
2. The VCCI Site Registration No. R-10237.
3. Tested Date: 2023/11/17

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 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)

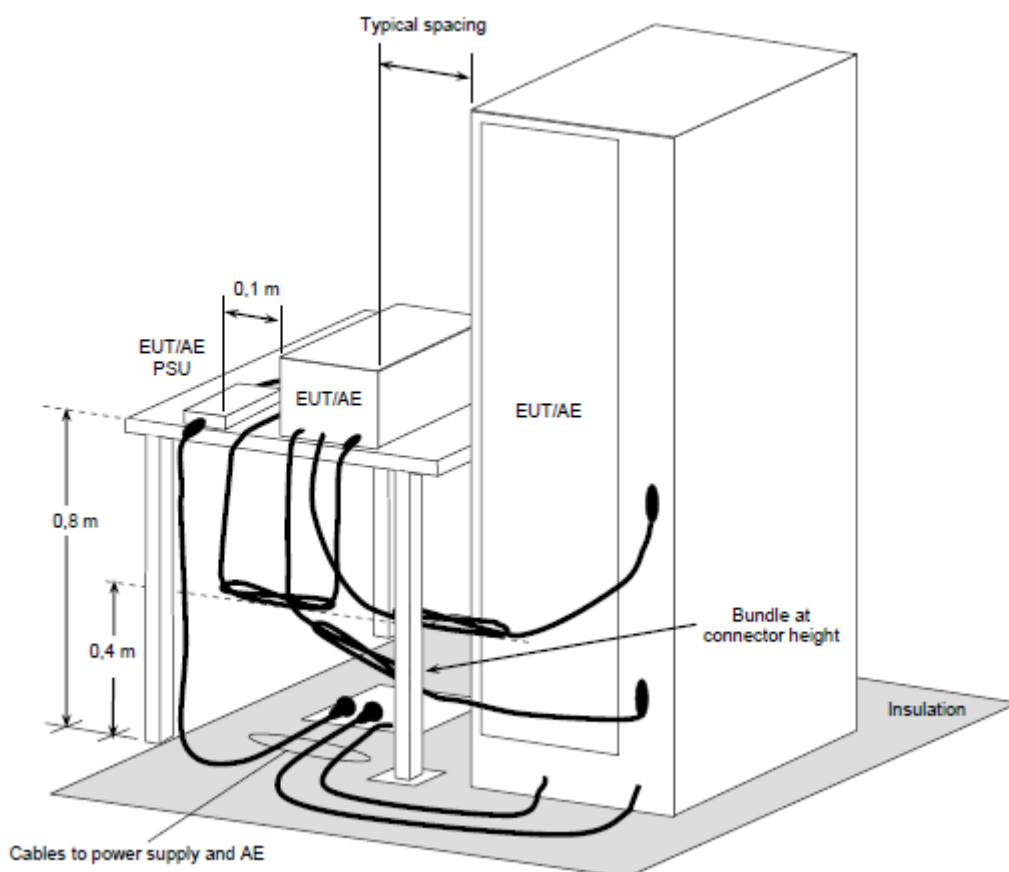
Frequency (MHz)	Fundamental (dBuV/m)		Harmonics (dBuV/m)	
	at 3m	at 10m	at 3m	at 10m
30 - 230	60	50	52	42
230 - 300	60	50	52	42
300 - 1000	60	50	56	46

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.

6.2 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.

7 Test Results of Test Item

7.1 Conducted Emissions from Power Ports

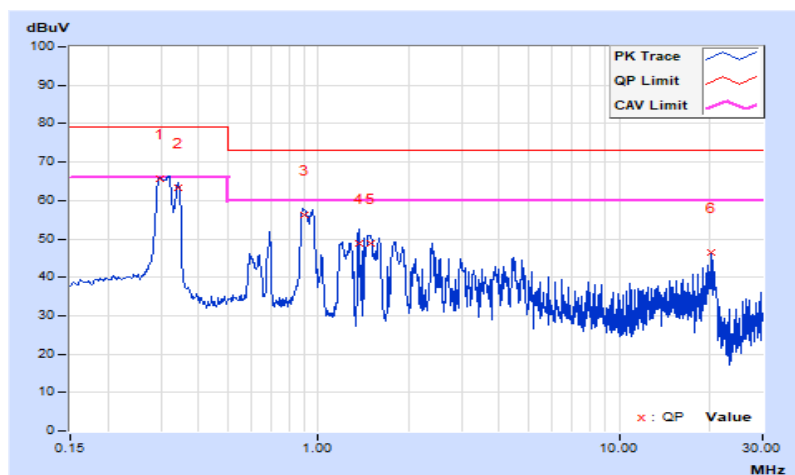
Mode A

Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	24 Vdc	Environmental Conditions	23°C, 76% RH
Tested by	Kenny Chang		

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	0.29884	9.94	55.55	53.33	65.49	63.27	79.00	66.00	-13.51	-2.73
2	0.34164	9.94	53.33	49.95	63.27	59.89	79.00	66.00	-15.73	-6.11
3	0.89566	9.96	46.39	41.03	56.35	50.99	73.00	60.00	-16.65	-9.01
4	1.36278	9.98	38.73	32.86	48.71	42.84	73.00	60.00	-24.29	-17.16
5	1.48774	9.98	38.75	31.42	48.73	41.40	73.00	60.00	-24.27	-18.60
6	20.25821	10.41	36.00	30.83	46.41	41.24	73.00	60.00	-26.59	-18.76

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

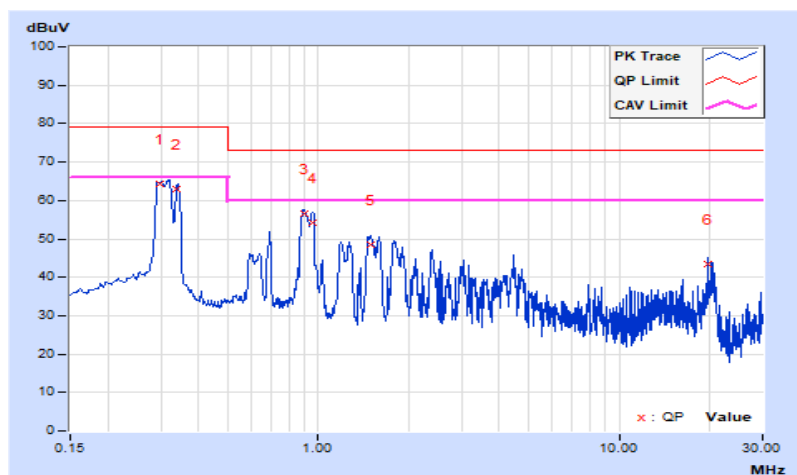


Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	24 Vdc	Environmental Conditions	23°C, 76% RH
Tested by	Kenny Chang		

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	0.29928	9.95	54.30	52.16	64.25	62.11	79.00	66.00	-14.75	-3.89
2	0.34036	9.95	53.12	50.45	63.07	60.40	79.00	66.00	-15.93	-5.60
3	0.89659	9.97	46.52	41.51	56.49	51.48	73.00	60.00	-16.51	-8.52
4	0.95312	9.97	44.28	26.93	54.25	36.90	73.00	60.00	-18.75	-23.10
5	1.49167	9.99	38.63	31.66	48.62	41.65	73.00	60.00	-24.38	-18.35
6	19.70927	10.44	33.03	27.73	43.47	38.17	73.00	60.00	-29.53	-21.83

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



7.2 Radiated Emissions up to 1 GHz

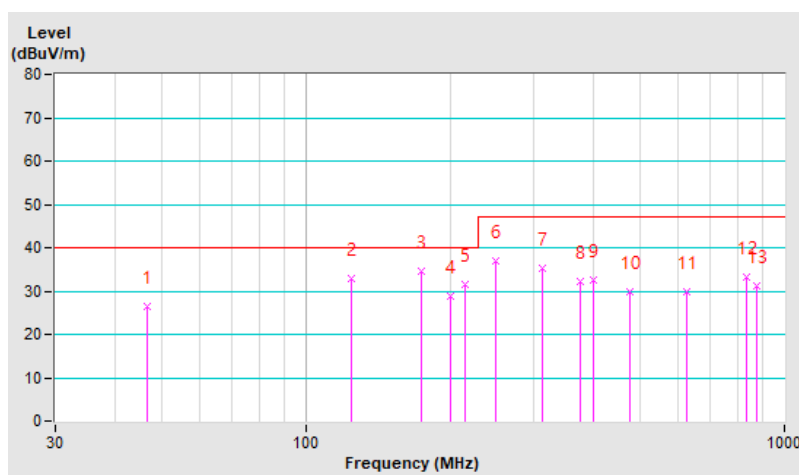
Mode A

Frequency Range	30 MHz ~ 1 GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120 kHz
Input Power	24 Vdc	Environmental Conditions	22°C, 76% RH
Tested By	Kobe Lu		

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	46.82	26.40 QP	40.00	-13.60	4.00 H	337	34.85	-8.45
2	125.00	33.00 QP	40.00	-7.00	4.00 H	245	42.58	-9.58
3	175.00	34.52 QP	40.00	-5.48	4.00 H	195	42.95	-8.43
4	200.00	28.86 QP	40.00	-11.14	4.00 H	6	39.75	-10.89
5	216.00	31.68 QP	40.00	-8.32	4.00 H	227	42.12	-10.44
6	250.12	36.89 QP	47.00	-10.11	4.00 H	314	45.09	-8.20
7	312.69	35.38 QP	47.00	-11.62	4.00 H	213	41.20	-5.82
8	375.25	32.32 QP	47.00	-14.68	3.12 H	40	37.09	-4.77
9	400.25	32.48 QP	47.00	-14.52	2.45 H	66	36.90	-4.42
10	475.00	29.82 QP	47.00	-17.18	2.21 H	325	32.74	-2.92
11	625.00	29.97 QP	47.00	-17.03	1.00 H	112	29.76	0.21
12	832.70	33.16 QP	47.00	-13.84	1.00 H	157	29.05	4.11
13	875.00	31.29 QP	47.00	-15.71	1.00 H	299	26.48	4.81

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.

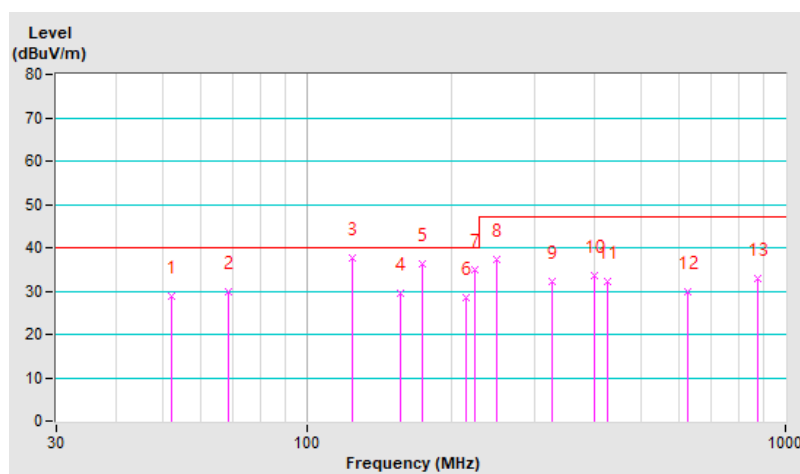


Frequency Range	30 MHz ~ 1 GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120 kHz
Input Power	24 Vdc	Environmental Conditions	22°C, 76% RH
Tested By	Kobe Lu		

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	52.04	28.87 QP	40.00	-11.13	1.00 V	358	37.25	-8.38
2	68.86	29.82 QP	40.00	-10.18	1.00 V	239	40.37	-10.55
3	125.00	37.68 QP	40.00	-2.32	1.00 V	142	47.25	-9.57
4	157.51	29.45 QP	40.00	-10.55	1.00 V	231	37.02	-7.57
5	175.00	36.36 QP	40.00	-3.64	1.00 V	186	44.78	-8.42
6	216.00	28.61 QP	40.00	-11.39	1.00 V	85	39.05	-10.44
7	225.00	35.05 QP	40.00	-4.95	1.00 V	200	45.20	-10.15
8	250.12	37.32 QP	47.00	-9.68	1.00 V	17	45.52	-8.20
9	324.94	32.10 QP	47.00	-14.90	1.00 V	259	37.61	-5.51
10	400.19	33.71 QP	47.00	-13.29	1.00 V	329	38.13	-4.42
11	425.45	32.23 QP	47.00	-14.77	1.98 V	122	35.90	-3.67
12	624.92	29.91 QP	47.00	-17.09	2.85 V	0	29.72	0.19
13	875.01	33.04 QP	47.00	-13.96	1.66 V	299	28.23	4.81

Remarks:

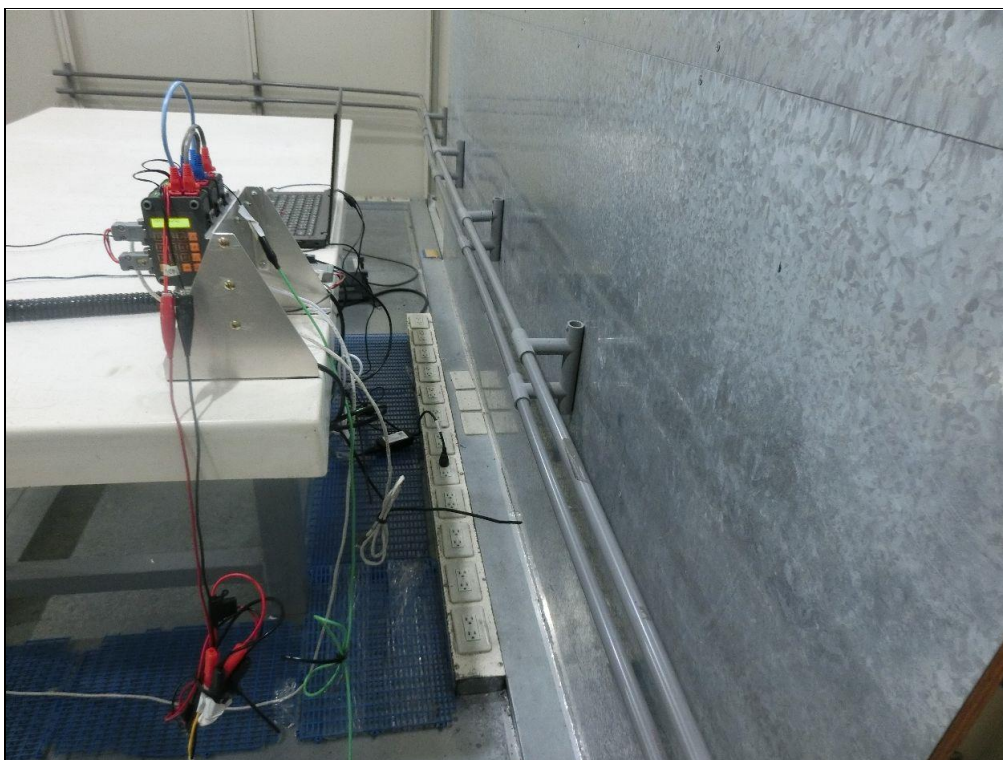
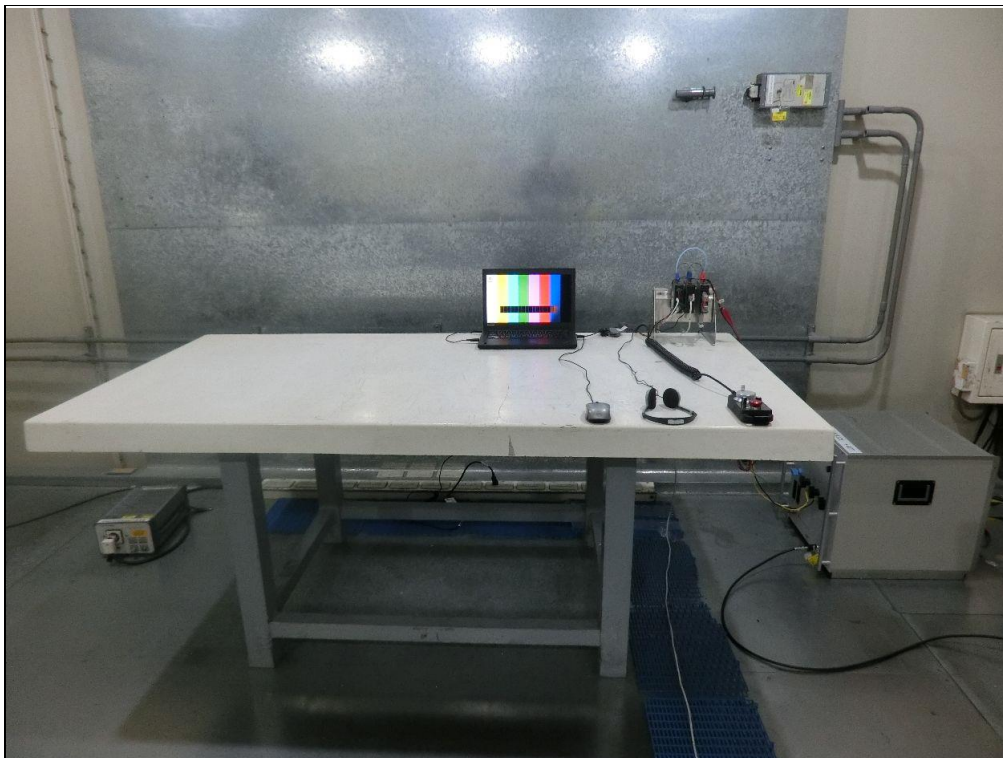
1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier Factor (dB)
3. Margin value = Emission level – Limit value
4. The other emission levels were very low against the limit.



8 Pictures of Test Arrangements

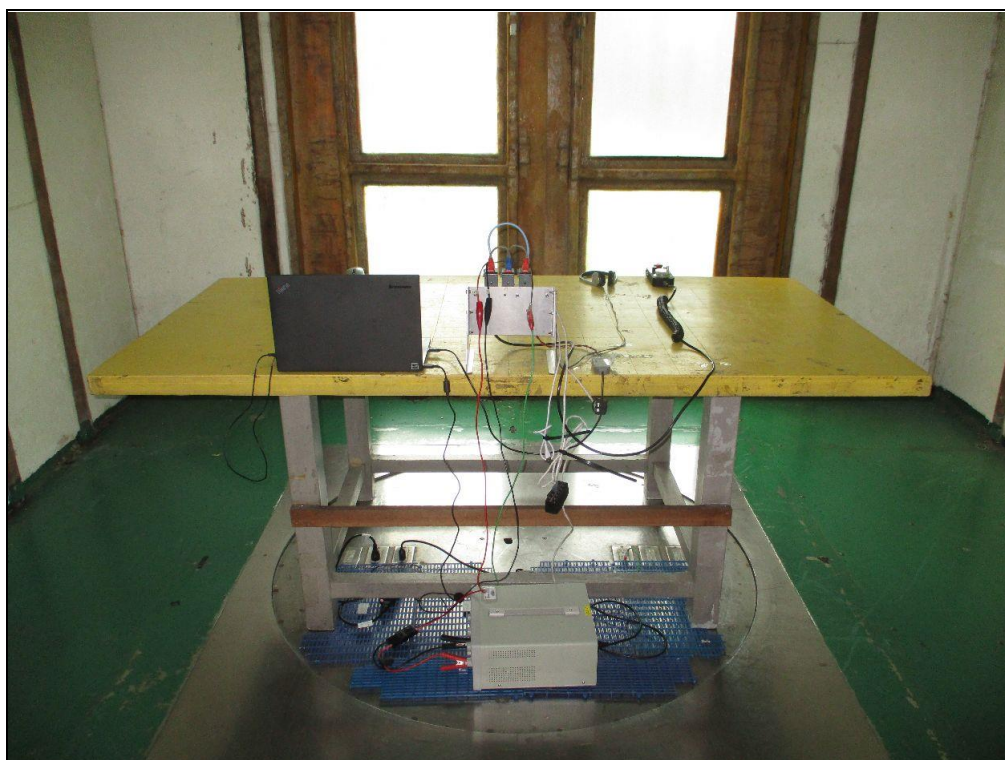
8.1 Conducted Emissions from Power Ports

Mode A



8.2 Radiated Emissions up to 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:

Lin Kou EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

Fax: 886-3-3270892

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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