CONFORMANCE TEST REPORT
FOR
EN 50155 & EN 50121-3-2

Report No.: 13-12-RBO-024

According to:

- ■ **Electromagnetic Compatibility Directive: 2004/108/EC**
- ☐ **Low Voltage Directive: 2006/95/EC**
- ☐ **Radio Equipment and Telecommunications Terminal Equipment: 1999/5/EC**
- ☐ **Machinery Directives: 98/37/EC**

Client:	Vecow
Product:	Embedded Computing System
Model No.:	Vecow ECS Series; ECS-XXXX; ECS-7XXX; ECS-5XXX; ECS-5600-3R510EW4
Comment Issues:	N/A
Manufacturer/supplier:	Vecow
Date test item received:	2013/12/10
Date test campaign completed:	2014/02/05
Date of issue	2014/02/10

Total number of pages of this test report: 24 pages

Total number of pages of this test photos: 11 pages

Test Engineer	Checked By	Approved By
Andy Chang	Licher Chen	Anderson Ku

ELECTRONICS TESTING CENTER, TAIWAN
NO. 34. LIN 5. DINGFU, LINKOU DIST., NEW TAIPEI CITY, TAIWAN, 24442, R.O.C.

TEL: (02) 26023052
INT: +886-2-26023052
FAX: (02) 26010910
INT: +886-2-26010910

Laboratory Introduction: Electronics Testing Center, Taiwan is recognized, filed and mutual recognition arrangement as following:

❶ ISO9001: TüV Product Service
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❹ MRA: Australia, Hong Kong, New Zealand, Singapore, USA, Japan, Korea, China, APLAC through CNLA
❺ FCC Registration Number: 90588, 91094, 91095

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1 TEST REPORT CERTIFICATION

Client	:	Vecow
Address	:	12F., No. 111, Zhongcheng Rd., Tucheng Dist., New Taipei City 23674 Taiwan (R. O. C.)
Manufacturer	:	Vecow
Address	:	12F., No. 111, Zhongcheng Rd., Tucheng Dist., New Taipei City 23674 Taiwan (R. O. C.)
EUT	:	Embedded Computing System
Trade Name	:	Vecow
Model No.	:	Vecow ECS Series; ECS-XXXX; ECS-7XXX; ECS-5XXX; ECS-5600-3R510EW4
Comment Issues	:	N/A

Test Standard : EN 50121-3-2:2006

Emissions	Immunity
EN 50155:2007	EN 61000-4-2:2009
CISPR11:2009/A1：2010	EN 61000-4-3:2006/A1:2008
	EN 61000-4-4:2004/A1:2010/A:2012
	EN 61000-4-5:2006
	EN 61000-4-6:2009

The testing described in this report has been carried out to the best of our knowledge and ability, and our responsibility is limited to the exercise of reasonable care. This certification is not intended to believe the sellers from their legal and/or contractual obligations.

2 GENERAL INFORMATIONS

2.1 Description of EUT:

Embedded Computing System
DRAM: Vecow Wide-Temp DDR3 4GB RAM M340S-W28M1

2.2 Related Information of EUT:

Power Supply : DC 24V
Power Line : ☐ Nonshielded ☐ Shielded ■ None , length: _____ m
Signal Line : ☐ Nonshielded ☐ Shielded ■ None , length: _____ m
Control Line : ☐ Nonshielded ☐ Shielded ■ None , length: _____ m
* For more detailed features, please refer to *User's Manual*.

2.3 Tested Configuration:

The EUT connected with the following peripheral devices.

Following peripheral devices and interface cables were connected during the measurement:

Product	Manufacturer	Model No.	Power/Line
Embedded Computing System	Vecow	Vecow ECS Series; ECS-XXXX; ECS-7XXX; ECS-5XXX; ECS-5600-3R510E W4	----

2.4 Deviation Record:

(If any deviation from additions to or exclusions from test method must be stated)
N/A

2.5 Modification Record:

No modifications were required. (That is the EUT complied with the requirement as tested.)

2.6 Note:

Implementation of the EN 50121-3-2 tests, This Product is no Ground Line.

2.7 Measurement Uncertainty

Electromagnetic Interference		
Measurement	Frequency	Uncertainty
Conducted emissions	150kHz ~ 30MHz	±2.5dB(Mains)
Conducted emission at telecommunication ports	150kHz ~ 30MHz	±2.22dB(Voltage)
		±2.88dB(Current)
Magnetic emissions	9kHz ~ 30MHz	±2.5dB
Radiated emissions	30MHz ~ 1GHz	±3.90dB(30MHz≦f≦300MHz)
		±3.95dB(300MHz＜f≦1GHz)
	Above 1GHz	±4.42dB(1GHz≦f≦18GHz)
		±4.86dB(18GHz≦f≦40GHz)
Electromagnetic Susceptibility		
Measurement	Item	Uncertainty
Electrostatic Discharges (ESD)	---	±0.22(A)、58.67(V)
Radiated RF electromagnetic Fields	---	±1.2(dBμV)
Electrical Fast Transients and bursts	---	±2.95(V)
Surges	---	±2.95(V)
Conducted Disturbances, induced by RF fields	---	±0.7(dB)
Power-frequency Magnetic Field	---	±1.49(dB)
Voltage Dips, Interruptions, and variations	---	±4.18(V)

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3 SUMMARY OF TEST RESULTS

3.1 Emissions:

3.1.1 Conducted Emissions

■ **–PASS(Negative)**

EMI value to the limit: -17.5 dB at 2.4480 MHz

■ **–PASS(Positive)**

EMI value to the limit: -19.1 dB at 2.4480 MHz

3.1.2 Radiated Emissions

(30MHz to 1GHz)

■ **–PASS(Horizontal)**

EMI value to the limit: -3.90 dB at 164.8300 MHz

■ **–PASS(Vertical)**

EMI value to the limit: -9.00 dB at 112.4500 MHz

Notes: The measured value lies in the limited range that is the limit plus or minus estimated measurement uncertainty. The judgment between pass or fail is decided by buyers.

3.2 Immunity:

3.2.1 Immunity Criteria:

The results of all of the immunity tests performed on the EUT were evaluated according to the following criteria, and according to the manufacturer's specifications for the EUT:

Performance criterion A: The EUT continued to operate as intended. No degradation of performance or loss of function was allowed below a performance level specified by the manufacturer, when the EUT was used as intended.

Performance criterion B: The EUT continued to operate as intended after the test. No degradation of performance or loss of function was allowed below a performance level specified by the manufacturer, when the EUT was used as intended. During the test, degradation of performance was however allowed. No change of actual operating state or stored data was allowed.

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

3.2.2 Electrostatic Discharge Immunity:

Requirement: Criterion B (or better)

■ - No Degradation of Function	- Satisfies Criterion A
□ - Distortion of Function	- Satisfies Criterion B
□ - Error of Function	- Satisfies Criterion C

3.2.3 RF Radiated Fields Immunity:

Requirement: Criterion A

■ - No Degradation of Function	- Satisfies Criterion A
□ - Distortion of Function	- Satisfies Criterion B
□ - Error of Function	- Satisfies Criterion C

3.2.4 EFT/Burst Immunity:

Requirement: Criterion A

■ - No Degradation of Function	- Satisfies Criterion A
□ - Distortion of Function	- Satisfies Criterion B
□ - Error of Function	- Satisfies Criterion C

3.2.5 Surge Immunity:

Requirement: Criterion B (or better)

■ - No Degradation of Function	- Satisfies Criterion A
□ - Distortion of Function	- Satisfies Criterion B
□ - Error of Function	- Satisfies Criterion C

3.2.6 RF Common Mode Immunity:

Requirement: Criterion A

■ - No Degradation of Function	- Satisfies Criterion A
□ - Distortion of Function	- Satisfies Criterion B
□ - Error of Function	- Satisfies Criterion C

4 TEST DATA & RELATED INFORMATIONS

4.1 Emissions:

4.1.1 Conducted Emissions Test:

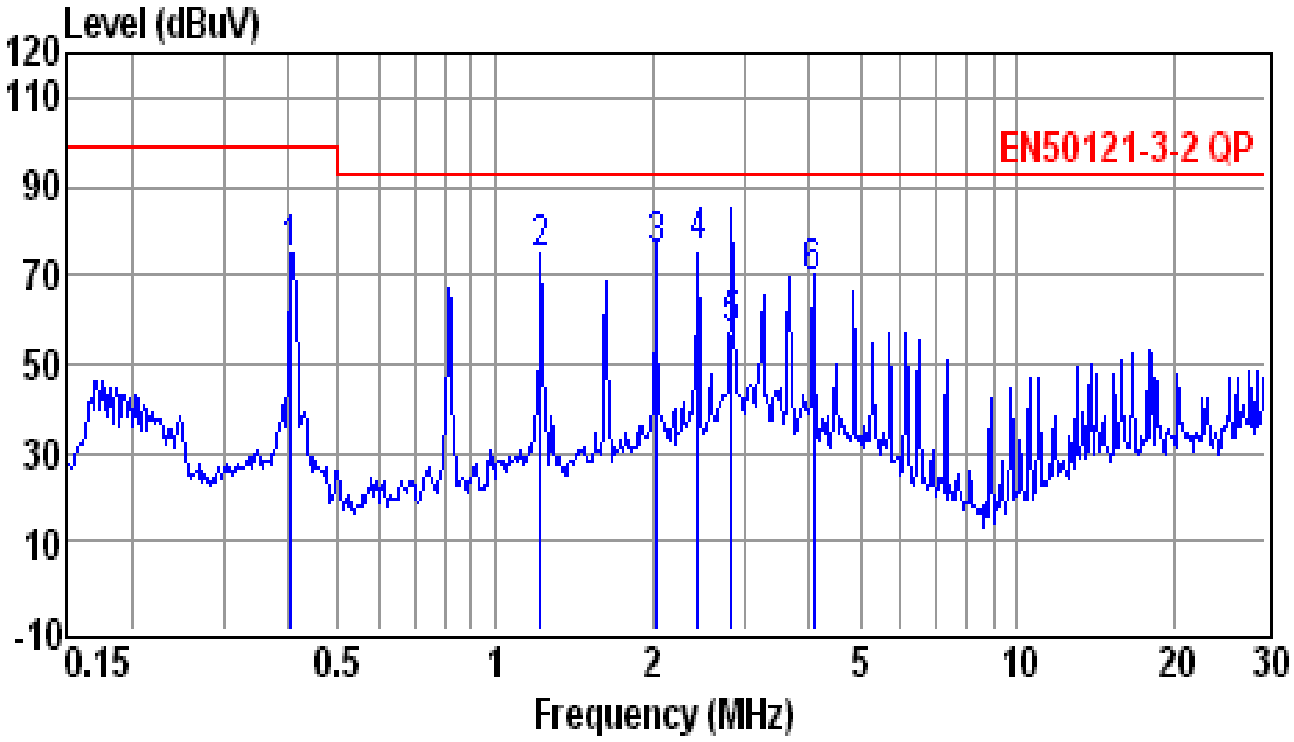
4.1.1.1 Conducted Emissions Test Data:

A. Operating Conditions of the EUT: Operation

Test Date: Dec.17,2013

Test Specification	EN 50155 (CISPR11)
Climatic Condition	Ambient Temperature: 23℃ Relative Humidity: 52 % RH
Power Supply System	DC Power: 24 Vdc

Test data see the next pages.

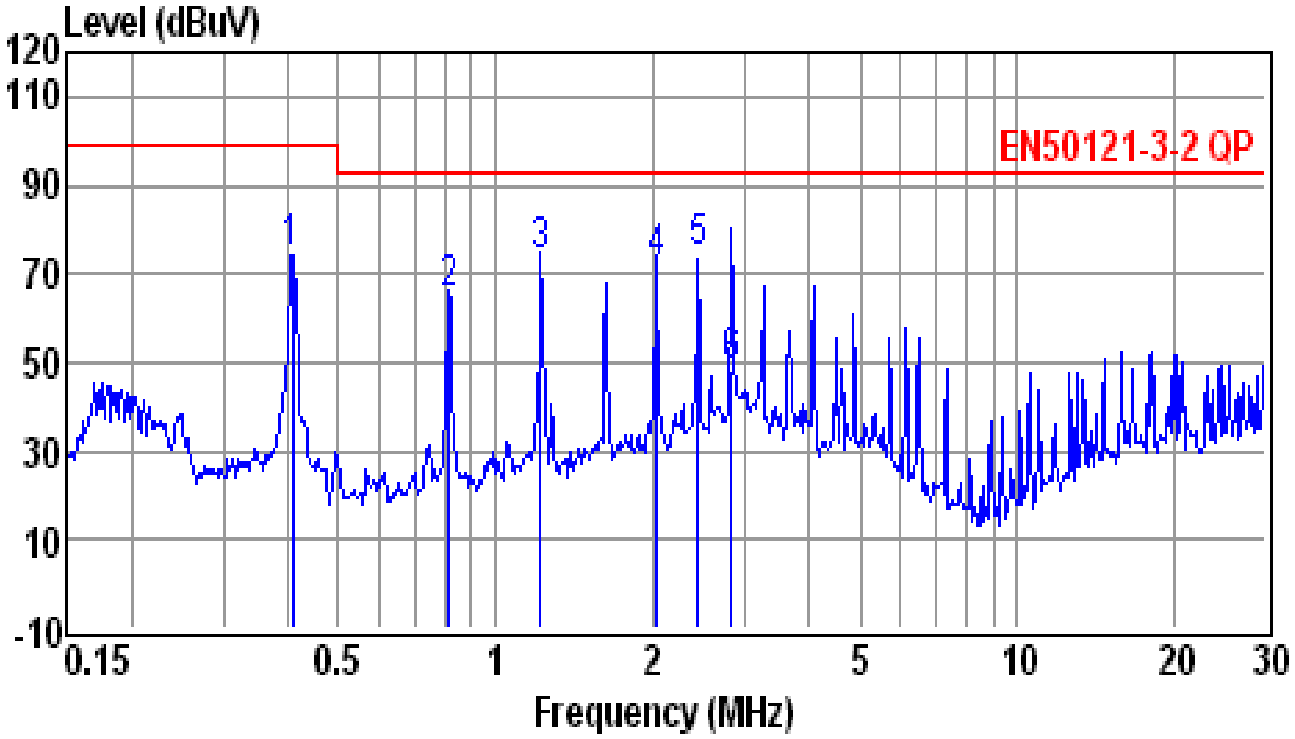


Site	: conducted #1	Date	: 12-17-2013
Condition	: EN50121-3-2 QP	LISN	: NEUTRAL
Tem / Hum	: 23 ℃ / 52%	Test Mode	: Operation Mode
EUT	: Embedded Computing System	Power Rating	: DC24V
Memo	:	Memo	:

Freq (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV)	Limit Line (dBuV)	Over Limit (dB)	Remark
0.4062	63.7	10.3	74.0	99.0	-25.0	QP
1.2230	63.8	10.5	74.3	93.0	-18.7	QP
2.0330	64.6	10.5	75.1	93.0	-17.9	QP
2.4480	65.0	10.5	75.5	93.0	-17.5	QP
2.8390	46.2	10.5	56.7	93.0	-36.3	QP
4.0700	58.3	10.5	68.8	93.0	-24.2	QP

Note :

1. Result = Reading + Factor
2. Factor = LISN Factor + Cable Loss



Site	: conducted #1	Date	: 12-17-2013
Condition	: EN50121-3-2 QP	LISN	: LINE
Tem / Hum	: 23 ℃ / 52%	Test Mode	: Operation Mode
EUT	: Embedded Computing System	Power Rating	: DC24V
Memo	:	Memo	:

Freq (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV)	Limit Line (dBuV)	Over Limit (dB)	Remark
0.4083	63.9	10.3	74.2	99.0	-24.8	QP
0.8131	54.5	10.3	64.8	93.0	-28.2	QP
1.2230	62.7	10.4	73.1	93.0	-19.9	QP
2.0330	61.3	10.5	71.8	93.0	-21.2	QP
2.4480	63.4	10.5	73.9	93.0	-19.1	QP
2.8390	38.1	10.5	48.6	93.0	-44.4	QP

Note :

1. Result = Reading + Factor
2. Factor = LISN Factor + Cable Loss

4.1.2 Radiated Emissions Test:

4.1.2.1 Radiated Emissions Test Data:

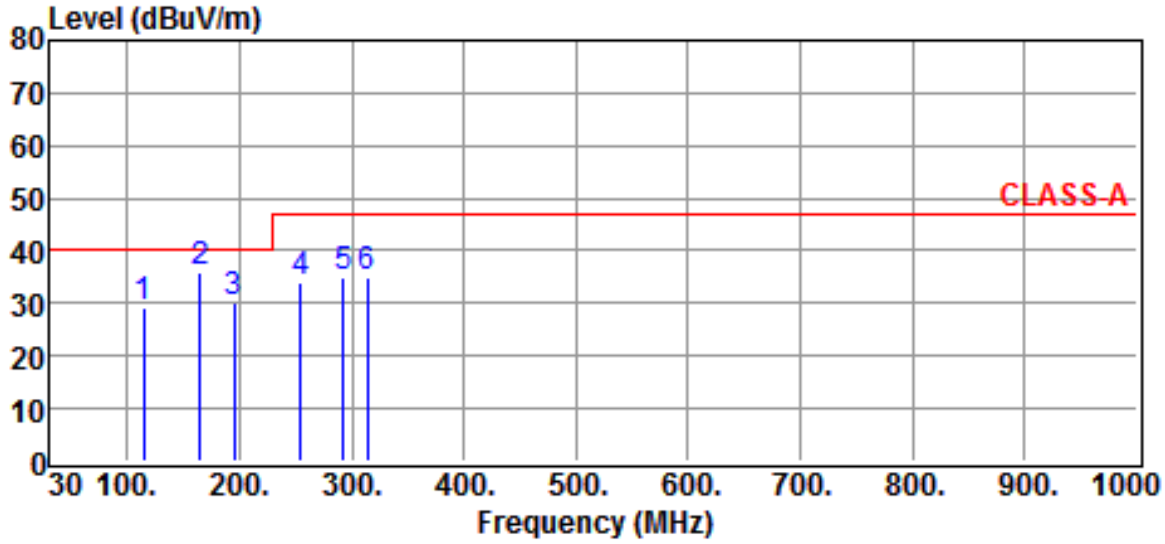
A. Operating Conditions of The EUT: Operation Mode

Test Date: Dec. 18, 2013

Test Specification	EN 50155 (CISPR11)
Climatic Condition	Ambient Temperature: 23℃ Relative Humidity: 56 % RH
Power Supply System	DC Power: 24 Vdc

Test data see the next pages.

(30MHz to 1GHz)

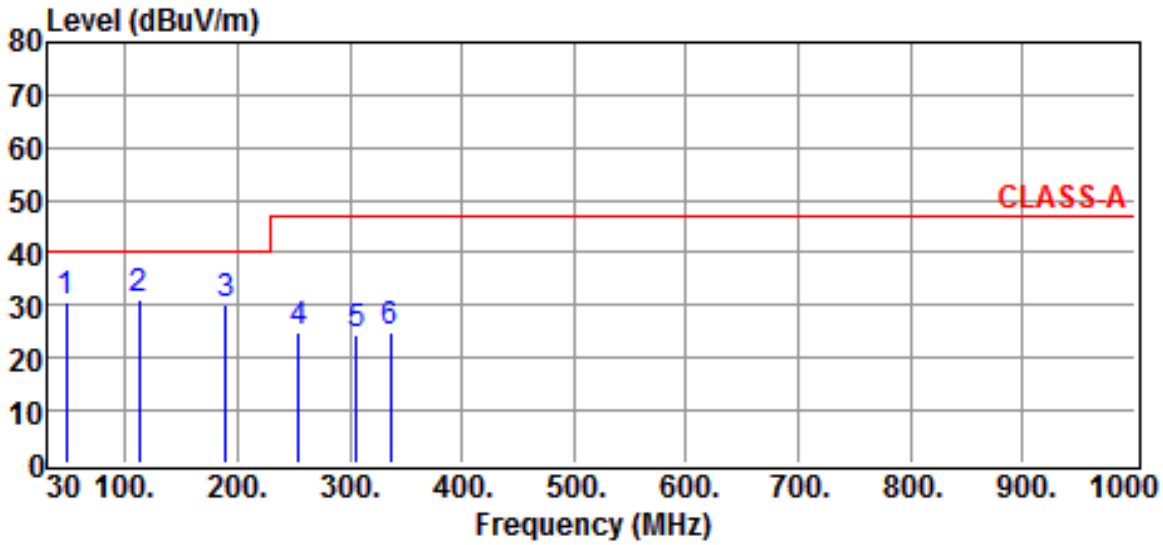


Site	:Open site #2	Date	:2013-12-18
EUT	:Embedded Computing System	Ant. Pol.	:HORIZONTAL
Model	:Vecow ECS Series ECS-5600-3R510EW4	Detector	:QP
Power Rating	:DC24V	Engineer	:Andy.chang
Limit	:CLASS-A	Temp.	:23 ˚C
Memo	:	Humi.	:56 %

Freq MHz	Reading dBuV	Correction Factor dB	Result dBuV/m	Limits dBuV/m	Over limit dB
114.3900	15.91	13.19	29.10	40.00	-10.90
164.8300	22.75	13.35	36.10	40.00	-3.90
194.9000	15.81	14.29	30.10	40.00	-9.90
255.0400	18.15	16.05	34.20	47.00	-12.80
292.8700	16.64	18.26	34.90	47.00	-12.10
314.2100	16.39	18.51	34.90	47.00	-12.10

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit - Result



Site	:Open site #2	Date	:2013-12-18
EUT	:Embedded Computing System	Ant. Pol.	:VERTICAL
Model	:Vecow ECS Series ECS-5600-3R510EW4	Detector	:QP
Power Rating	:DC24V	Engineer	:Andy.chang
Limit	:CLASS-A	Temp.	:23 ˚C
Memo	:	Humi.	:56 %

Freq MHz	Reading dBuV	Correction Factor dB	Result dBuV/m	Limits dBuV/m	Over limit dB
47.4600	19.61	11.19	30.80	40.00	-9.20
112.4500	17.97	13.03	31.00	40.00	-9.00
190.0500	17.00	13.00	30.00	40.00	-10.00
255.0400	8.95	16.05	25.00	47.00	-22.00
306.4500	6.06	18.44	24.50	47.00	-22.50
336.5200	6.39	18.71	25.10	47.00	-21.90

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit - Result

4.2 Immunity:

4.2.1 Electrostatic Discharge Immunity Test:

4.2.1.1 Electrostatic Discharge Immunity Test Data:

A. Operating Conditions of the EUT: Operation Mode

Test Date: Feb. 23, 2014

Test Specification	EN 61000-4-2
Climatic Condition	Ambient Temperature: 23 ℃ Relative Humidity: 52 % RH Atmospheric Pressure: 990 mbar
Power Supply System	DC Power: 24 Vdc

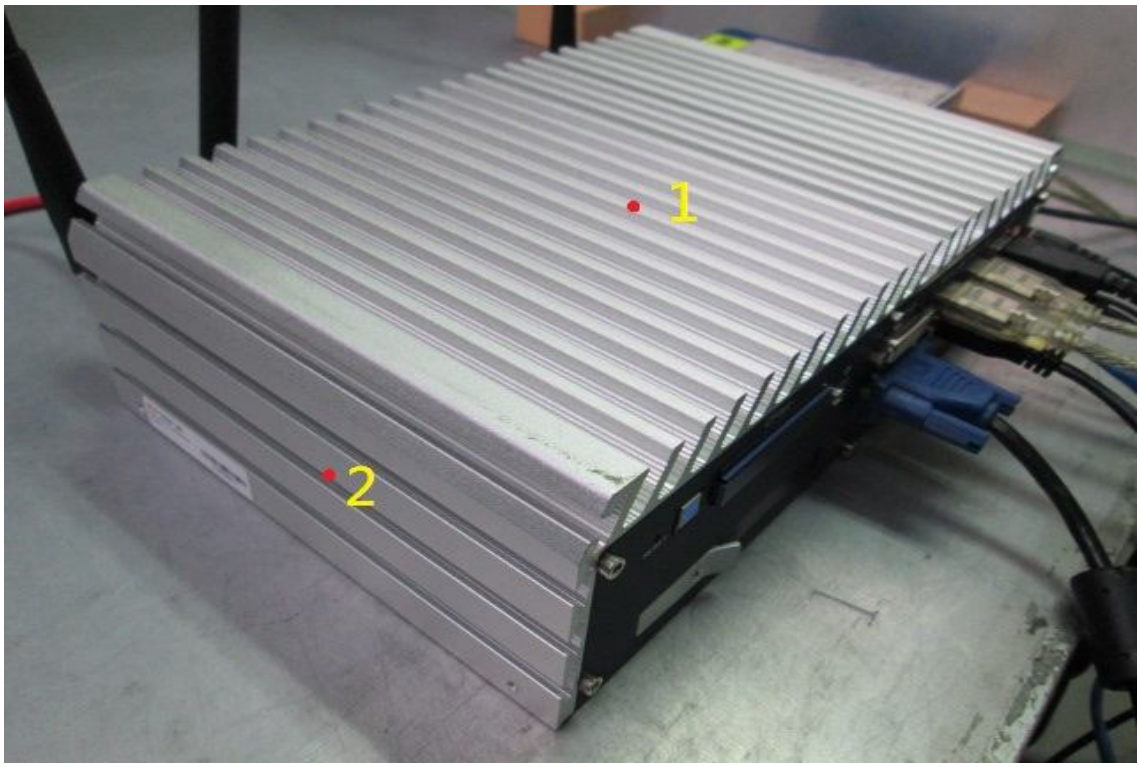
Energy-Storage Capacitor	: 150 pF	Contact Discharge Times	: 25 times/each condition
Discharge Resistor	: 330 Ω	Air Discharge Times	: 10 times/each condition

\ Discharge Mode	Contact Discharge								Air Discharge							
\ESD Voltage	2 kV		4 kV		6 kV		___ kV		2 kV		4 kV		8 kV		___ kV	
\Points\Result\Polarity	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−
VCP	A	A	A	A	A	A	---	---	---	---	---	---	---	---	---	---
HCP	A	A	A	A	A	A	---	---	---	---	---	---	---	---	---	---
P1 ~ P8 , P12 ~ P13	A	A	A	A	A	A	---	---	---	---	---	---	---	---	---	---
P9 ~ P11 , P14 ~ P18	---	---	---	---	---	---	---	---	A	A	A	A	A	A	---	---

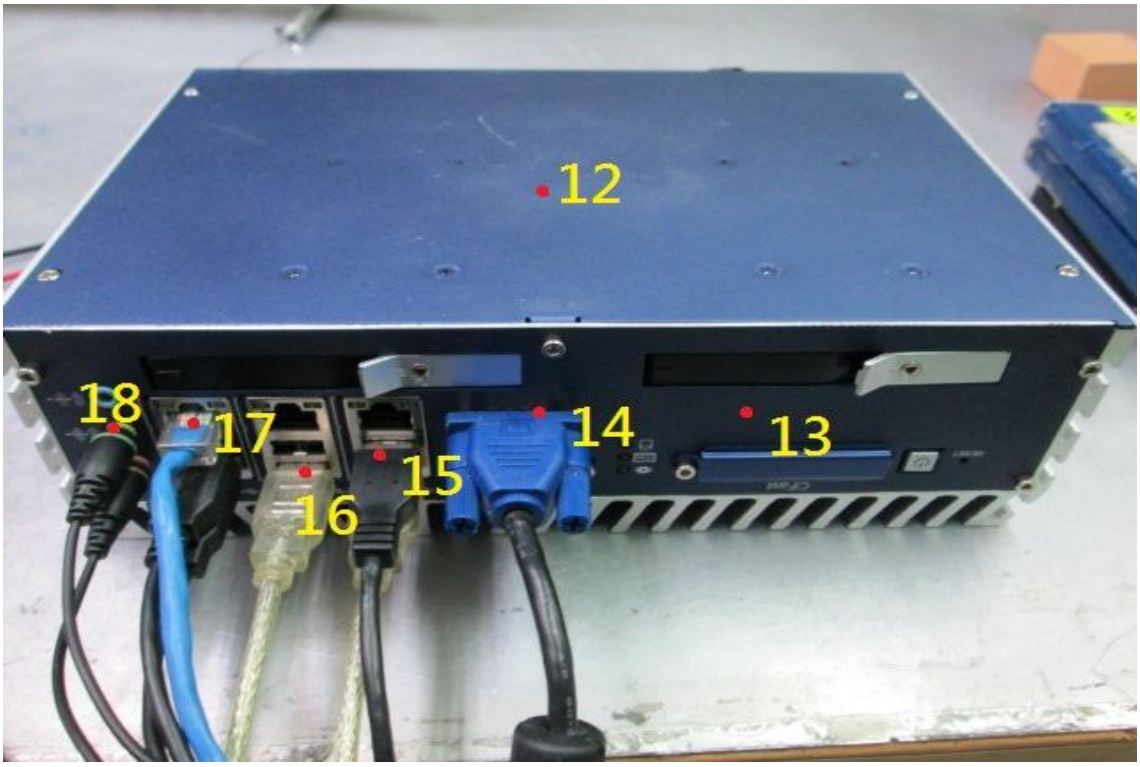
Result:	■ Complied	□ Does not comply	
Criterion Required:	B	Criterion Met:	A

Note: "**A**" means the EUT continued to operate as intended. No degradation of performance or loss of function was allowed below a performance level specified by the manufacturer, when the EUT was used as intended.

TEST POINTS



TEST POINTS



4.2.2 RF Radiated Fields Immunity Test:

4.2.2.1 RF Radiated Fields Immunity Test Data:

A. Operating Conditions of the EUT: Operation Mode

Test Date: Feb. 23, 2014

Test Specification	EN 61000-4-3
Climatic Condition	Ambient Temperature: 22 ℃ Relative Humidity: 52 RH
Power Supply System	DC Power: 24 Vdc

Frequency Range 80 MHz ~ 1000 MHz		Field Strength 20 V/m	Modulation (AM 1kHz 80%)
Sweep Rate : ≦1.5×10^{-3} ecades/s	Step Size : ≦1 % of preceding frequency value		Dwell Time : 3 s
Frequency Range (MHz)	Polarization of Device	Directing of Device	Test Result
80 MHz ~ 1000 MHz	Horizontal	Front	A
		Rear	A
		Left	A
		Right	A
80 MHz ~ 1000 MHz	Vertical	Front	A
		Rear	A
		Left	A
		Right	A

Frequency Range 1400 MHz ~ 2100 MHz		Field Strength 10 V/m	Modulation (AM 1kHz 80%)
Sweep Rate : ≦1.5×10^{-3} ecades/s	Step Size : ≦1 % of preceding frequency value		Dwell Time : 3 s
Frequency Range (MHz)	Polarization of Device	Directing of Device	Test Result
1400 MHz ~ 2100 MHz	Horizontal	Front	A
		Rear	A
		Left	A
		Right	A
1400 MHz ~ 2100 MHz	Vertical	Front	A
		Rear	A
		Left	A
		Right	A

Frequency Range 2100 MHz ~ 2500 MHz		Field Strength 5 V/m		Modulation (AM 1kHz 80%)
Sweep Rate ：≦1.5×10^{-3} ecades/s	Step Size ：≦1 % of preceding frequency value			Dwell Time ： 3 s
Frequency Range (MHz)	Polarization of Device	Directing of Device	Test Result	
2100 MHz ~ 2500 MHz	Horizontal	Front	A	
		Rear	A	
		Left	A	
		Right	A	
2100 MHz ~ 2500 MHz	Vertical	Front	A	
		Rear	A	
		Left	A	
		Right	A	

Result:	■ Complied	□ Does not comply	
Criterion Required:	A	Criterion Met:	A

Note: "**A**" means the EUT continued to operate as intended. No degradation of performance or loss of function was allowed below a performance level specified by the manufacturer, when the EUT was used as intended.

4.2.3 EFT/Burst Immunity Test:

4.2.3.1 EFT/Burst Immunity Test Data:

A. Operating Conditions of the EUT: Operation Mode

Test Date : Dec. 23, 2013

Test Specification	EN 61000-4-4
Climatic Condition	Ambient Temperature: 22 °C Relative Humidity: 52 %RH
	Atmospheric Pressure: 990 mbar
Power Supply System	DC Power: 24 Vdc

Pulse : 5 /50ns Burst : 15ms /300ms		Repetition Rate : 5kHz	Test time : 1 min/each condition
Voltage\Polarity\Test Point\Mode\Result		2.0 kV	
		+	-
Power Line	**PV+ to PV-**	A	A
Signal Line	**LAN Cable**	A	A

Result:	■ Complied	□ Does not comply	
Criterion Required:	B	Criterion Met:	A

Note: "**A**" means the EUT continued to operate as intended. No degradation of performance or loss of function was allowed below a performance level specified by the manufacturer, when the EUT was used as intended.

4.2.4 Surge Immunity Test:

4.2.4.1 Surge Immunity Test Data:

A. Operating Conditions of the EUT: Operation Mode

Test Date : Feb. 23, 2014

Test Specification	EN 61000-4-5
Climatic Condition	Ambient Temperature: 22 °C Relative Humidity: 52 %RH
	Atmospheric Pressure: 990 mbar
Power Supply System	DC Power : POWER OFF

Waveform : 1.2/50μs(8/20μs)		Repetition rate : 60 sec	Times : POWER 5 time/each condition
Phase\Voltage \Mode \Polarity \Result			
1kV	**PV+ to PV-**	+	A
		–	A

Result:	■ Complied	□ Does not comply	
Criterion Required:	B	Criterion Met:	A

Note: "**A**" means the EUT continued to operate as intended. No degradation of performance or loss of function was allowed below a performance level specified by the manufacturer, when the EUT was used as intended.

4.2.5 RF Common Mode Immunity Test:

4.2.5.1 RF Common Mode Immunity Test Data:

A. Operating Conditions of the EUT: Operation Mode

Test Date : Dec.23,2013

Test Specification	EN 61000-4-6
Climatic Condition	Ambient Temperature: 22 °C Relative Humidity: 52 %RH
Power Supply System	DC Power: 24 Vdc

Frequency Range	0.15MHz ~80MHz	Test Level	10Vrms	Modulation (AM 1kHz 80%)
Sweep Rate	: ≤ 1.5×10^{-3} decades/s	Step Size	: ≤ 1 % of preceding frequency value	Dwell Time : 3 s

Frequency Range (MHz)	Tested Line	Test Result
0.15MHz ~80MHz	CDN-M2	A
0.15MHz ~80MHz	CDN-RJ45	A

Result:	■ Complied	□ Does not comply	
Criterion Required:	A	Criterion Met:	A

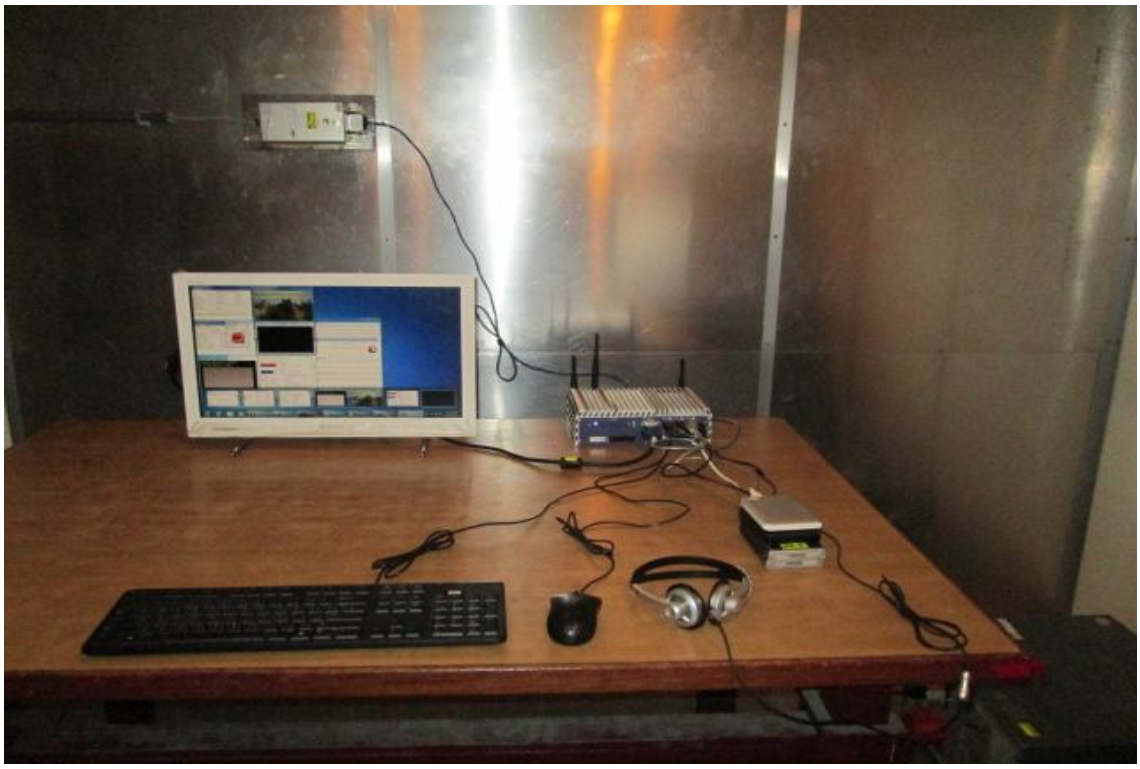
Note: "**A**" means the EUT continued to operate as intended. No degradation of performance or loss of function was allowed below a performance level specified by the manufacturer, when the EUT was used as intended.

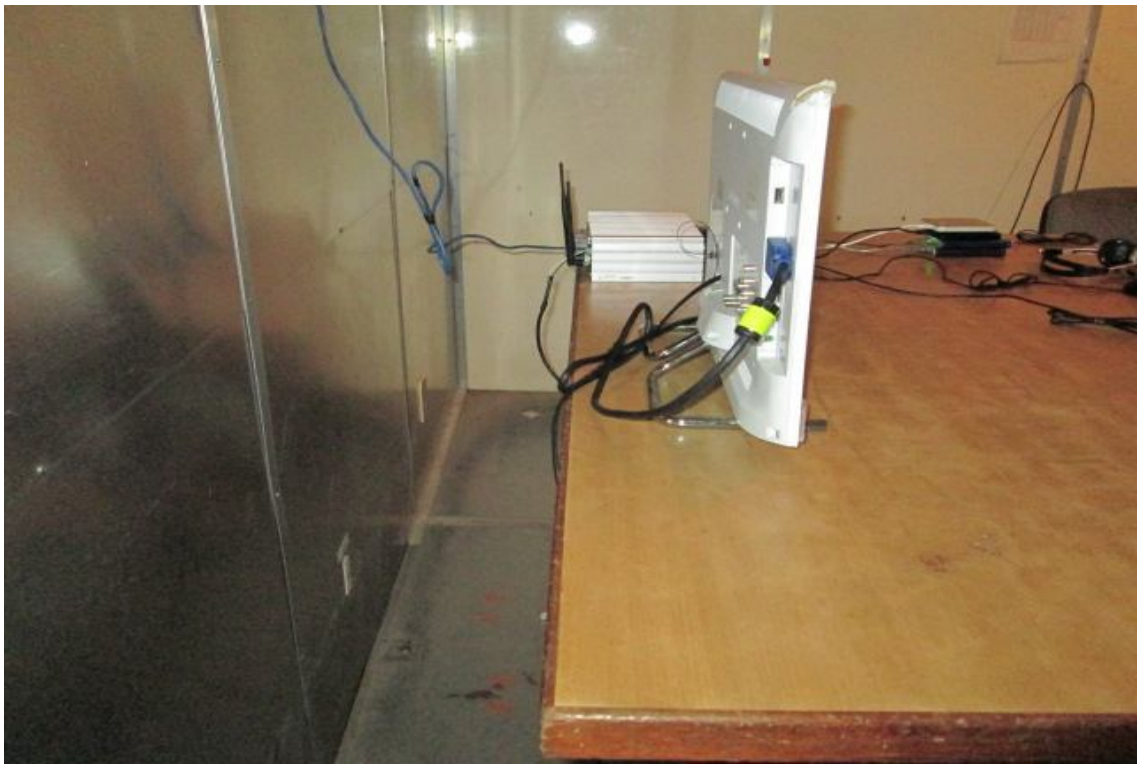
5 EQUIPMENTS LIST FOR TESTING

Item	Name	Manufacturer	Model	Calibration Date	Recommended Recal. Date
1	EMI Test Receiver	Rohde & Schwarz	ESCI	2013/08/02	2014/08/01
2	LISN	EMCO	3625/2	2013/05/07	2014/05/06
3	LISN	Rohde & Schwarz	ESH2-Z5	2013/04/12	2014/04/11
4	Current Probe	Rohde & Schwarz	ESH2-Z1	2013/08/06	2014/08/05
5	ISN	FCC	FCC-TLISN-T2-02	2013/10/05	2014/10/04
6	ISN	FCC	FCC-TLISN-T4-02	2013/09/20	2014/09/19
7	Test Receiver	Rohde & Schwarz	ESVS30	2013/05/06	2014/05/05
8	Amplifier	HP	8447D	2013/08/08	2014/08/07
9	EMI Test Receiver	Rohde & Schwarz	ESL	2013/09/11	2014/09/10
10	Bi-Log Antenna	ETC	MCTD 2756	2014/01/03	2015//01/02
11	Test Receiver	Rohde & Schwarz	ESU40	2013/09/24	2014/09/23
12	Amplifier	HP	8449B	2014/01/15	2015/01/14
13	Horn Antenna	EMCO	3115	2013/08/02	2014/08/01
14	ESD Simulator	NoiseKen	ESS-2002	2013/07/30	2014/07/29
15	Antenna	Sunal Sciences	JB6	N/A	N/A
16	signal Generator	Aglient	EMC330	2013/3/13	2014/3/12
17	Amplifier	Ophir	5172	N/A	N/A
18	Amplifier	Ophir	5127	N/A	N/A
19	POWER METER	Booton	4232A	2013/9/27	2014/9/26
20	EMC Immunity tester	EMC-PARTNER	Harmonics-2000	2013/08/07	2014/08/06
21	CS TESTER	FRANKONIA	CIT-10	2013/05/06	2014/05/05
22	CDN-M2/M3	FRANKONIA	M2/M3	2013/05/10	2014/05/09
23	SCHAFFUER	CS-CLAMP	KEMZ801	2013/05/11	2014/05/10

ANNEX A: PHOTOS

1. Conducted Emissions Test Setup Photos

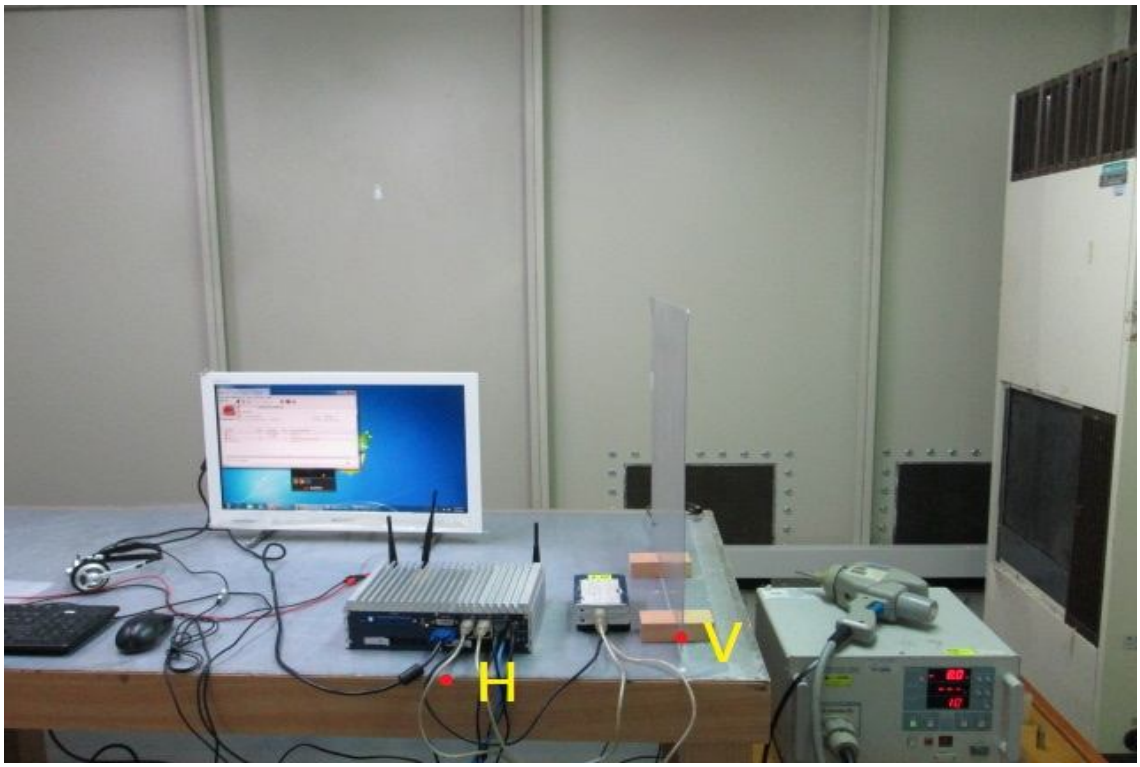




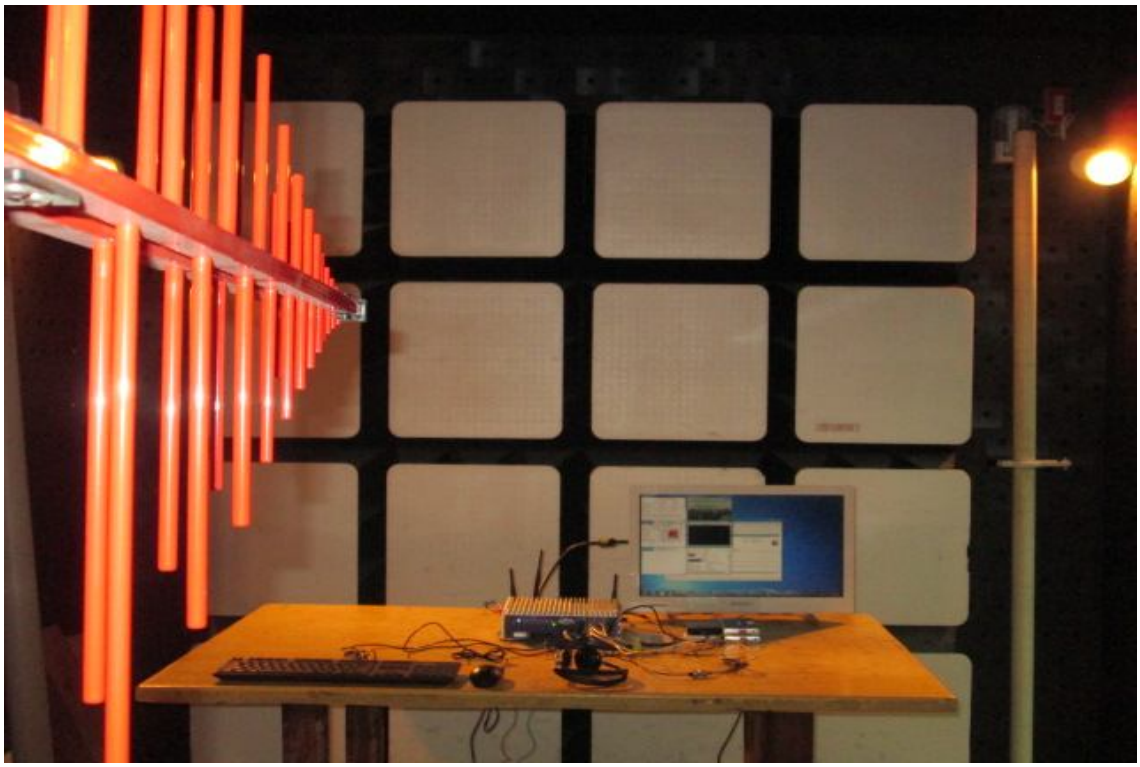
2. Radiated Emissions Test Setup Photos

(30MHz to 1GHz)

3. **Electrostatic Discharge Immunity Test Setup Photo**



4. RF Radiated Fields Immunity Test Setup Photo

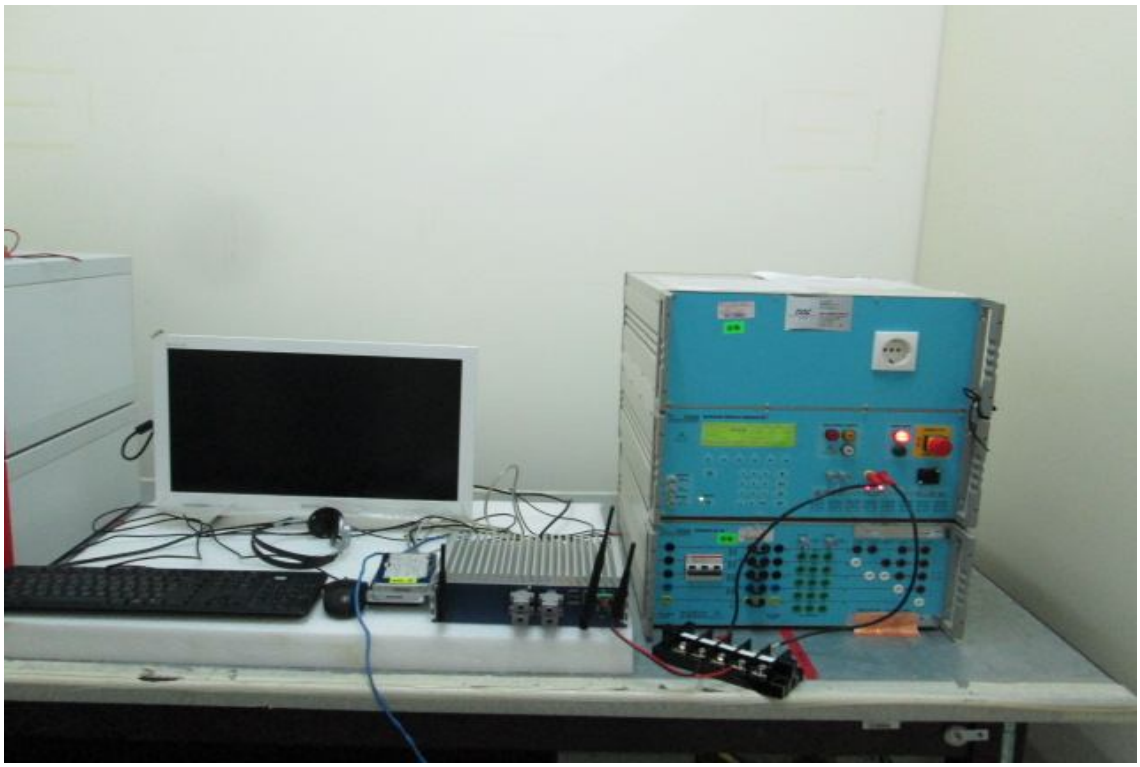


5. EFT/Burst Immunity Test Setup Photo

TEST MODE: DC

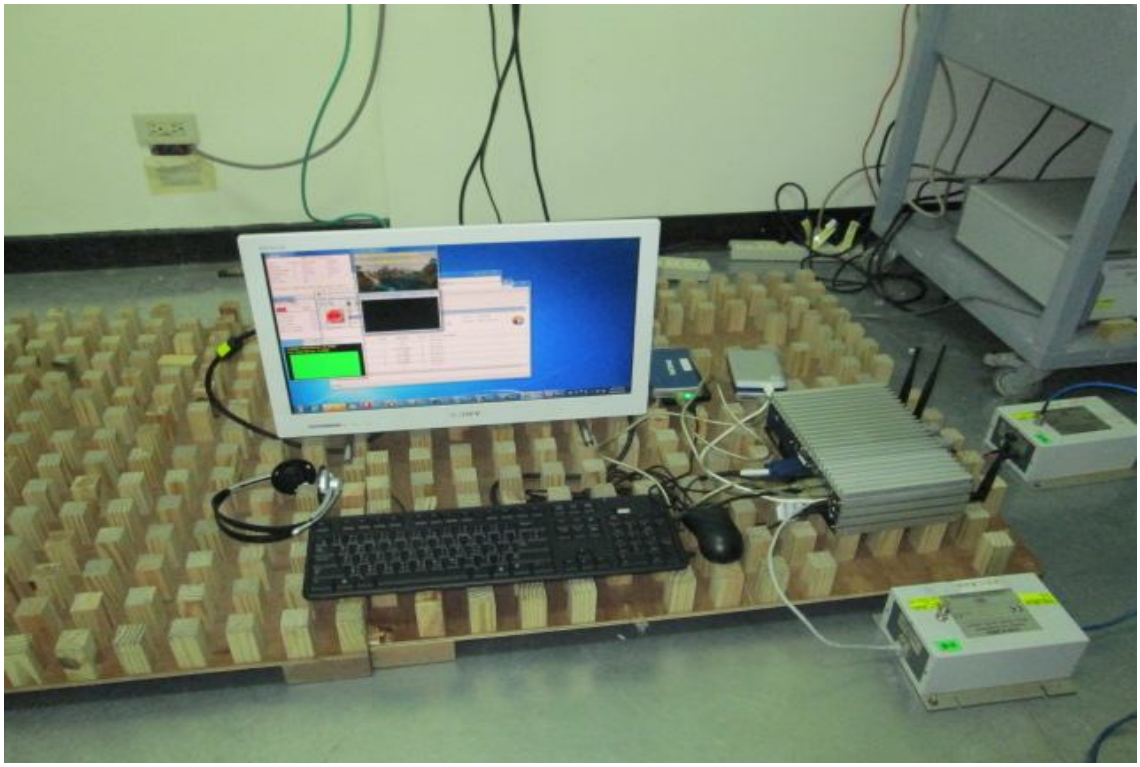
TEST MODE: LAN

6. Surge Immunity Test Setup Photo



7. RF Common Mode Immunity Test Setup Photo

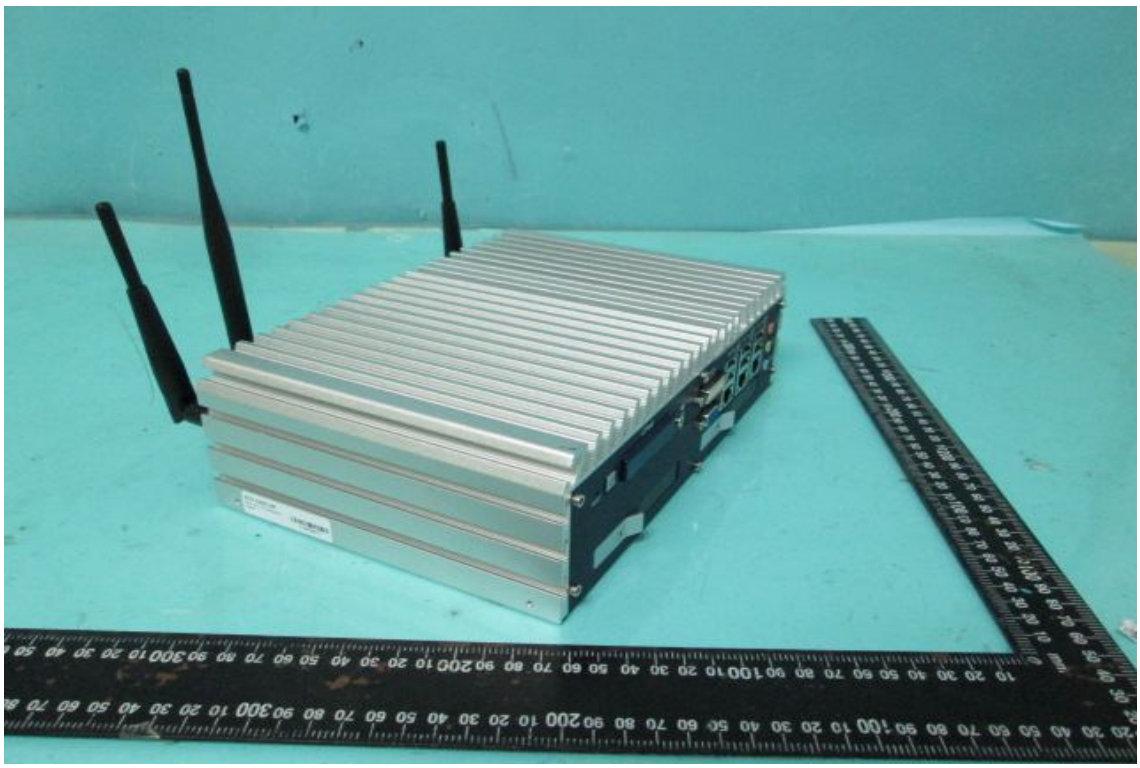
TEST MODE:DC



TEST MODE:LAN

8. Outside view 1 of EUT

9. Outside view 2 of EUT

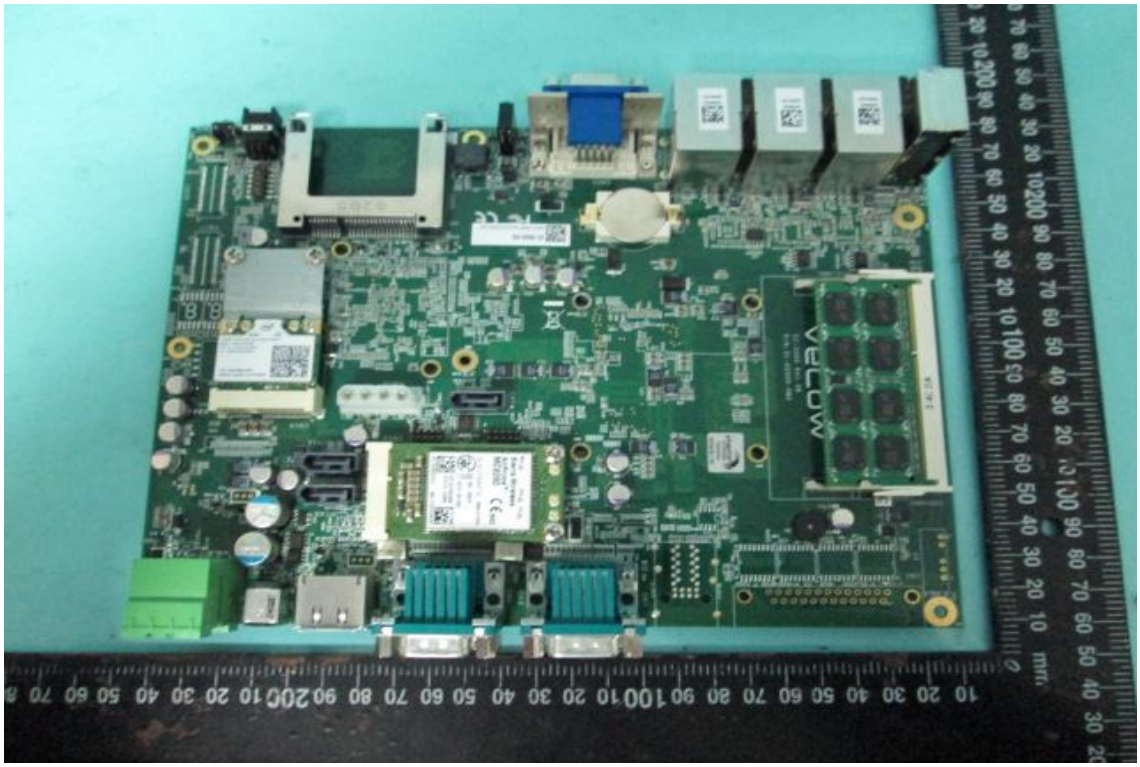


10. Outside view 3 of EUT

11. Inside view 1 of EUT

12. Inside view 2 of EUT

13. Front view of PCB 1



14. Rear view of PCB 1