PSDC EMC LABORATORY

SHARED SERVICES CENTRE

EMC TEST REPORT

Test Report Number:	EMC-0757
Date of Issue:	8-January-2014
Applicant Name:	Kontron Europe GmbH
Contact Name:	Günther Dumsky
Product Name:	KBox A-101
Model Number:	2-AOCR-2xxx
Test Standard:	EN 55022:2010, EN 61000-6-2:2005

1, Jalan Sultan Azlan Shah, Bandar Bayan Baru, Bayan Lepas, 11900 Penang, Malaysia.
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RELEASE CONTROL RECORDS

For any necessary material amendments or modifications to a test report after issue, it will be made only in the form of a new revision of test report. The latest revision of test report replaces all former test reports issued. The former test reports are no longer valid.

It will be uniquely identified with a new revision number and be clearly recorded in the table below, including the change description and a reference to the original test report that it replaces.

Revision	Description
1.0	Original Test Report.

1. REPORT APPROVAL

The results of tests performed at PSDC EMC Laboratory are reported accurately, clearly, unambiguously and objectively, in accordance with instructions in the test methods as per the applicable test standards. The test standards used are listed in Section 3.1 of this test report.

The test report includes all information requested by the applicant and necessary for the interpretation of the test results, and all information required by the test methods used. All requirements of the latest revision of ISO/IEC17025 standard are met.

This test report is only valid in its original form.

The test results herein pertain only to the tested sample(s). PSDC EMC Laboratory is not responsible for any generalizations or conclusions drawn from these test results that concern further samples.

PREPARED BY: _____ **DATE:** 8-January-2014

Name: Cheng See See
Position: EMC Engineer

APPROVED BY: _____ **DATE:** 8-January-2014

Name: Chee Lay Heng
Position: Laboratory Technical Manager

ISSUED BY: PSDC EMC Laboratory

2. GENERAL INFORMATION

2.1 TEST LABORATORY

2.1.1 LOCATION

Laboratory Name: PSDC EMC Laboratory
Laboratory Address: 1, Jalan Sultan Azlan Shah, Bandar Bayan Baru, 11900 Bayan Lepas, Penang, Malaysia.
Telephone: +604-6437909 ext 536
Email: emc@psdc.org.my

Note: Test Location is the same with address of the laboratory.

2.1.2 LABORATORY ACCREDITATION STATUS

PSDC EMC Laboratory is an accredited test facility. It is accredited by the following accreditation body in accordance with ISO/IEC 17025.

AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION (A2LA)
TESTING CERTIFICATE NO. 3185.01

2.1.3 RESPONSIBLE STAFF

Responsible Engineer: Cheng See See
Test Personnel: Anuarudin Kamarudin, Akmal Hamzah

2.2 APPLICANT

2.2.1 DETAILS OF APPLICANT

Company Name: Kontron Europe GmbH
Address: Niederlassung /Office : Eching, Oskar-von-Millerstr. 1, 85386 Eching, Germany.
Contact Name: Günther Dumsky
Telephone: +49 8165 77 266
Email: Guenther.Dumsky@kontron.com

2.3 TEST ITEM

2.3.1 DESCRIPTION OF TEST ITEM

The following information was provided by the test applicant. Refer to manufacturer's data sheet, user manual or operating manual for further information.

Product Name	KBox A-101
Model Number	2-AOCR-2xxx
Serial Number	UUT1, UUT3, UUT4
Quantity	1 unit (different test sample was used for different test)
Manufacturer	Kontron Asia Pacific Design Sdn. Bhd.
Product Group	Not Applicable
Product Classification	A
Operating Position	Table-top
Firmware Version	Refer to manufacturer
Rated Supply Voltage / Frequency / Current	DC : 12 - 24 V / 3.5 – 1.8 A
Test Input Supply Voltage / Frequency	DC : 24 V
Highest frequency of internal sources of EUT	1.86 GHz
Operating Temperature Range	-10 °C – +60 °C
Operating Humidity Range	50 %RH - 95 %RH
Weight	Approximately 2 kg
Dimensions (W x H x D)	210.0 mm x 70.0 mm x 140.0 mm
Build State	Pilot
Product Intended Function	Automation, POS/POI

Note:

1. The above EUT information was declared by the manufacturer. For more detailed feature description, please refer to manufacturer's specifications or user's manual.

2.3.2 DESCRIPTION OF AUXILIARY / SUPPORTING EQUIPMENT

The EUT has been tested together with the following auxiliary / supporting equipment and cables. The following equipment was used to form a representative test configuration during the tests. For the actual test configuration, refer to Photographs of Test Setup.

AUXILIARY / SUPPORTING EQUIPMENT:

No.	Product Name	Brand	Model No.	Serial No.	Quantity	Remarks
1	DELL Laptop	Dell	E6430	CJX9RY1	1	N/A
2	Logitech Wireless Mouse	Logitech	M-R0038	1332LZ0EHLE8	1	N/A
3	Sensonic Mouse	Sensonic	N/A	N/A	1	N/A
4	Logitech Mouse	Logitech	M-UAG96B	LZ939AC	1	N/A
5	Sensonic Keyboard	Sensonic	KX320	N/A	2	N/A
6	Logitech Keyboard	Logitech	Y-U0009	HEO23D1	1	N/A
7	DELL Monitor	DELL	U24A	N/A	2	N/A
8	Agilent DC Power Supply	Agilent	E3634A	MY51420117	1	N/A
				MY40013687	1	N/A
9	FSP DC Power Suply	FSP	FSP-DBAB2	H00000460	1	N/A
10	PassMark USB 2.0 Loopback Dongle	PassMark	PMUSB 02	N/A	4	N/A
11	PassMark USB 3.0 Loopback Dongle	PassMark	PMUSB 03	N/A	2	N/A
12	PassMark Serial Port Loopback Dongle	PassMark	E119932-T	N/A	2	N/A

CABLES:

No.	Product Name	Brand	Model No.	Serial No.	Quantity	Remarks
1	Ethernet Cable, 2m	N/A	N/A	N/A	4	N/A
2	USB 3.0 Cable, 0.4m	N/A	N/A	N/A	2	N/A
3	USB 2.0 Cable, 0.8m	N/A	N/A	N/A	2	N/A
4	USB 2.0 Cable, 1.5m	N/A	N/A	N/A	1	N/A
5	USB 2.0 Cable, 3m	N/A	N/A	N/A	1	N/A
6	DP Port Video Cable	Bizlink Technology	N/A	N/A	2	N/A
7	LAN Cable, 4.2m	N/A	N/A	N/A	1	N/A

2.3.3 DATES OF TEST ITEM RECEIPT / TESTED

Date of Receipt of Application: 26-November-2013

Date of Receipt of Test Item: 11-December-2013

Date of Test: 11-December-2013 to 12-December-2013

2.4 TEST ENVIRONMENTAL CONDITIONS

2.4.1 GENERAL TEST ENVIRONMENTAL CONDITIONS

All tests were performed within the environmental conditions ranges as stated in the following table.

Test Type	Temperature	Relative Humidity	Atmospheric Pressure
Radiated Emission	15 °C – 35 °C	20 %RH – 75 %RH	N/A
Conducted emission at mains terminal	15 °C – 35 °C	20 %RH – 75 %RH	N/A
Electrostatic discharge	15 °C – 35 °C	30% RH – 60% RH	860 mbar - 1060 mbar
Radiated, radio-frequency, electromagnetic field	15 °C – 35 °C	20% RH – 75% RH	N/A
Electrical fast transient / burst	15 °C – 35 °C	20 %RH – 75 %RH	N/A
Surge	15 °C – 35 °C	20 %RH – 75 %RH	N/A
Immunity to conducted disturbances, induced by radio-frequency fields	15 °C – 35 °C	20 %RH – 75 %RH	N/A
Voltage dips and short interruptions	15 °C – 35 °C	20 %RH – 75 %RH	N/A

2.5 ABBREVIATIONS

For the purpose of this test report, the following abbreviations apply:

1. EUT = Equipment Under Test
2. RF = Radio Frequency
3. PK = Peak
4. QP = Quasi-Peak
5. AVG = Average
6. CDN = Coupling / Decoupling Network
7. LISN = Line Impedance Stabilization Network
8. RE = Radiated Emission
9. RI = Radiated Immunity
10. CE = Conducted Emission
11. CI = Conducted Immunity
12. EM = Electromagnetic
13. Perf. = Performance
14. N/A = Not Applicable
15. N/R = Not Requested

3. TEST SUMMARY

3.1 RESULTS SUMMARY

The results shown below are a summary of all tests performed in accordance with the requirements of the applicable test standards.

EMISSION			
Product Standard	**Reference / Basic Standard**	**Test Type**	**Result**
EN 55022:2010	EN 55022:2010	Radiated emission	PASS
		Conducted emission at mains terminals and telecommunication ports	PASS

IMMUNITY			
Product Standard	**Reference / Basic Standard**	**Test Type**	**Result**
EN 61000-6-2:2005	EN 61000-4-2:1995	Electrostatic discharge	PASS
	EN 61000-4-3:2002	Radiated, radio-frequency, electromagnetic field	PASS
	EN 61000-4-4:2004	Electrical fast transient / burst (Note 2)	PASS
	EN 61000-4-5:1995	Surge	PASS
	EN 61000-4-6:2009	Immunity to conducted disturbances, induced by radio-frequency fields	PASS

Note:

1. **Modification on EUT**: No modification on EUT were made.
2. **Deviation from Test Standard**: As per manufacturer's requirement, the test level of ±1kV was used for Electrical Fast Transient at DC Power Port, instead of ±2kV as per EN 61000-6-2:2005 standard requirement.

3.2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in the latest revision of ISO “Guide to the Expression of Uncertainty in Measurement” and CISPR 16-4-2:

These uncertainties represent expanded uncertainties expressed at approximately the 95.45% confidence level using a coverage factor of k = 2.

Measurement	Frequency	Uncertainty
Radiated emission	30 MHz – 1 GHz	4.04 dB
Conducted emission	150 kHz – 30 MHz	3.45 dB

4. TEST RESULTS – EMISSION

4.1 RADIATED EMISSION

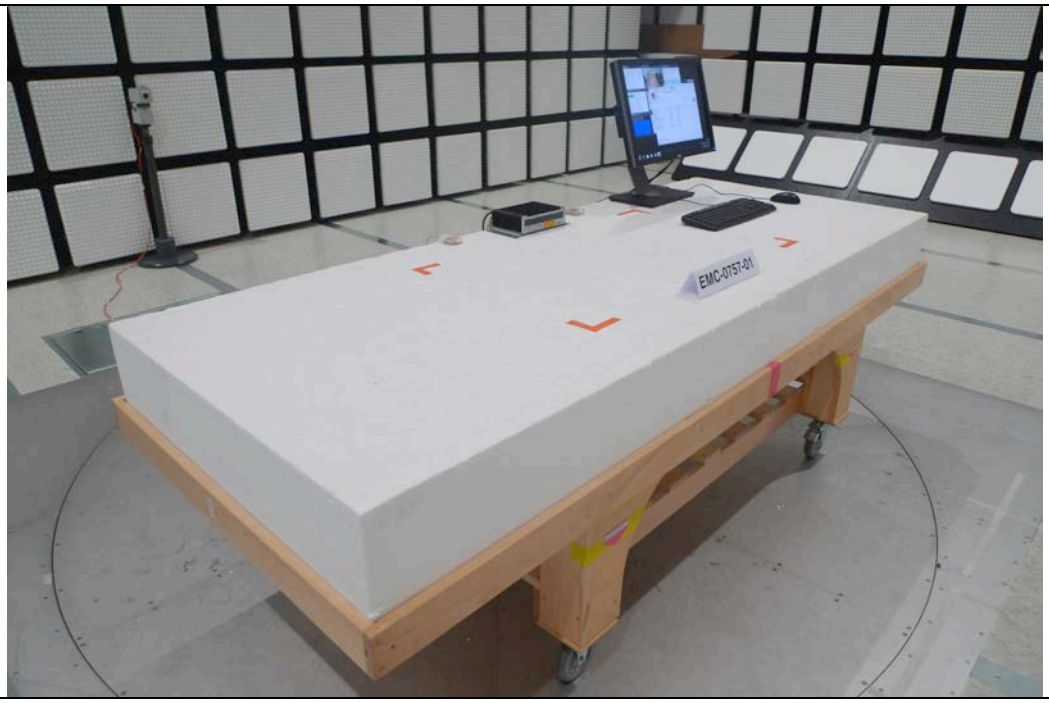
4.1.1 TEST SPECIFICATIONS

The test was performed in accordance with the test standards indicated below. The EUT was set up in typical installation conditions according to the manufacturer's installation instructions and set to operate at the EUT operating conditions stated in the following table.

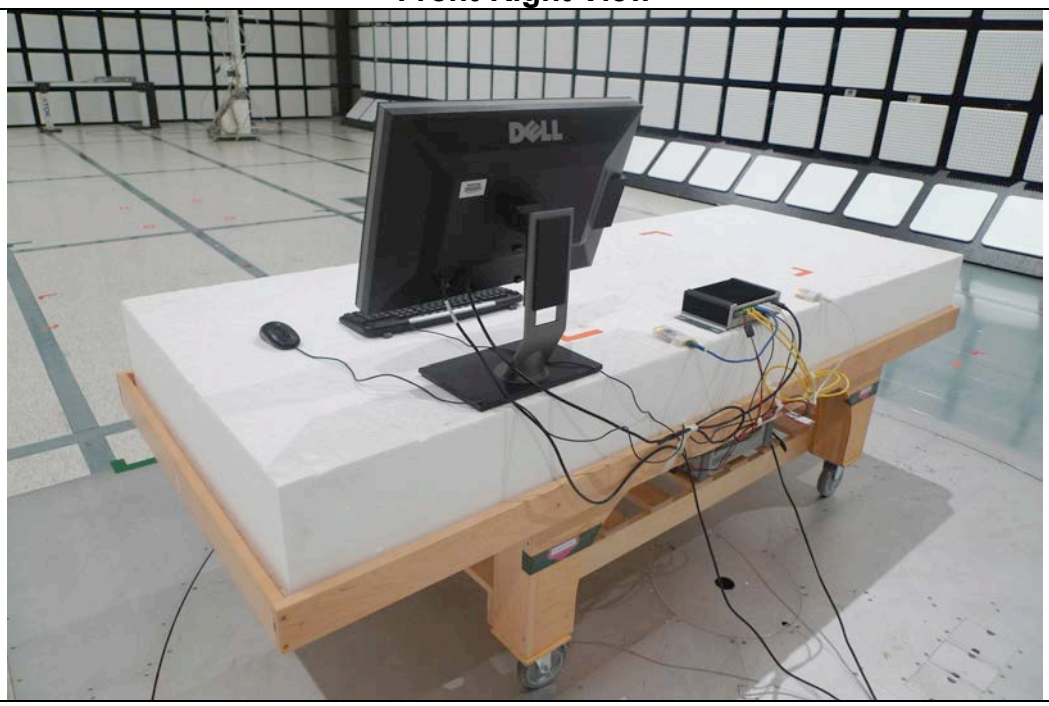
Test Standard		EN 55022:2010	
Limit		EN 55022:2010	
Distance	Antenna Reference Point – EUT	10 m	
	Floor – EUT Table	0.8 m	
	Floor – Antenna	1 m - 4 m	
Detector	30 MHz – 1 GHz	Preliminary Scan	Peak
		Final Measurement	Quasi-Peak
	1 GHz – 6 GHz	Preliminary Scan	Peak
		Final Measurement	Peak and Average
Antenna Polarization		Horizontal and Vertical	
Turntable Angle		0° – 360°	
Frequency Range		30 MHz – 6 GHz	
Resolution Bandwidth	30 MHz – 1 GHz	120 kHz	
	1 GHz – 6 GHz	1 MHz	
Video Bandwidth	30 MHz – 1 GHz	300 kHz	
	1 GHz – 6 GHz	3 MHz	
EUT Operating Condition		• The EUT was tested in a fully configured and functionally completed system with all ports connected to appropriate peripheral devices. • The EUT continuously exercised "Burn-in" test program during all tests. • This test program represented worst case use and able to produce system stress for the highest disturbance. • EUT was set to operate at its intended operating conditions under normal test condition.	

4.1.2 TEST SETUP

I. 30 MHz – 1 GHz:



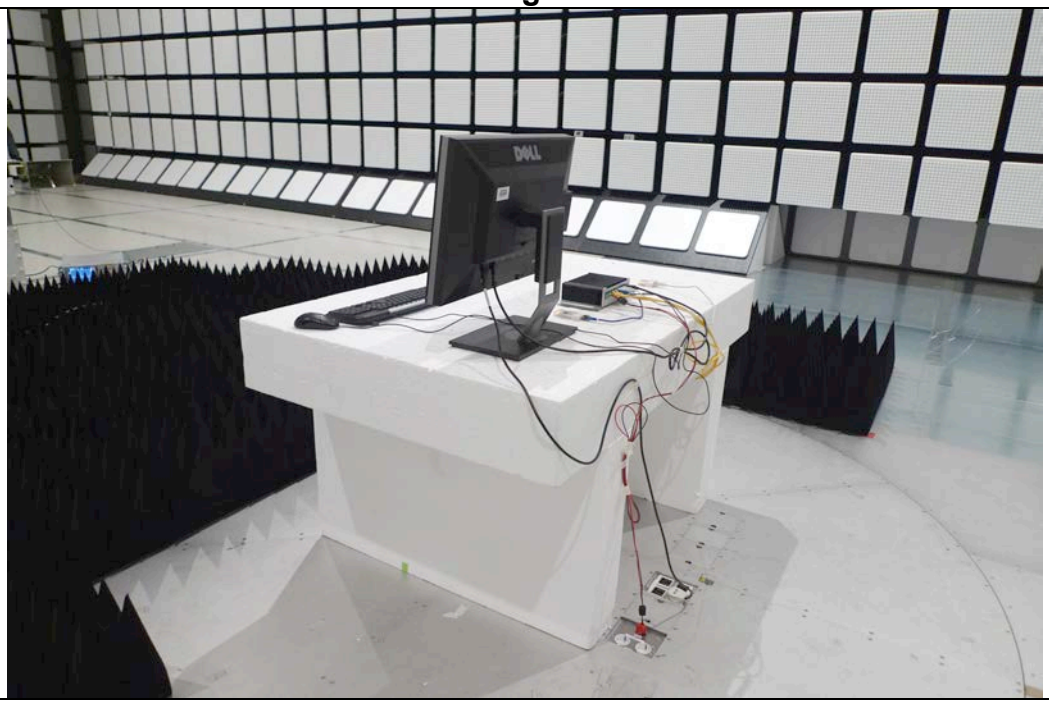
Front-Right View



Rear-Left View

II. 1 GHz – 6 GHz:

Front-Right View



Rear-Left View

4.1.3 TEST EQUIPMENT

Description	Model No.	Serial No.	Calibration Due Date
R&S EMI Test Receiver, 20Hz - 40GHz	ESU40	100195	23-Jan-14
TDK Preamplifier, 10kHz - 1GHz	PA-02-001-1000	0121009	Cal Not Required
TDK Preamplifier, 1GHz - 18GHz	PA-02-118	0121012	Cal Not Required
TDK Compact Hybrid Log Periodic Antenna, 30MHz - 3GHz	HLP-3003	130598	21-Jan-14
TDK Double Ridge Horn Antenna, 1GHz - 18GHz	HRN-0118	130583	17-Jan-14
Chaintek Programming Controller	3000	005641	Cal Not Required
Dickson Temperature / Humidity Data Logger	TM320	12361211	20-May-14

Note:
1. Test was performed in 10 m semi-anechoic chamber.

4.1.4 TEST RESULTS

I. 30 MHz – 1 GHz:

EUT Model / Serial No.	2-AOCR-2xxx / UUT1	**Test Mode**	Continuously exercised "Burn-in" test program
Environmental Conditions	23.2 °C, 59.6 %RH	**Test Input Supply**	24 V DC
Tested By	Akmal Hamzah	**Test Date**	11-December-2013

No.	Frequency	Emission Level	Turntable Angle	Antenna Height	Antenna Pol.	Limit	Margin
		QP				QP	QP
	MHz	dBµV/m	degree	cm	H/V	dBµV/m	dB
1	90.24	33.41	75.10	226.10	V	40.00	-6.59
2	96.27	30.56	131.10	227.90	V	40.00	-9.44
3	107.99	33.01	70.30	140.50	V	40.00	-6.99
4	155.99	32.74	63.90	179.90	V	40.00	-7.26
5	204.00	31.54	357.70	374.50	H	40.00	-8.46
6	228.01	33.05	288.40	128.00	V	40.00	-6.95

II. 1 GHz – 6 GHz:

EUT Model / Serial No.	2-AOCR-2xxx / UUT1	**Test Mode**	Continuously exercised "Burn-in" test program
Environmental Conditions	23.2 °C, 59.6 %RH	**Test Input Supply**	24 V DC
Tested By	Akmal Hamzah	**Test Date**	11-December-2013

No.	Frequency	Emission Level	Turntable Angle	Antenna Height	Antenna Pol.	Limit	Margin
		PEAK				PEAK	PEAK
	MHz	dBµV/m	degree	cm	H/V	dBµV/m	dB
1	1597.15	56.93	173.60	141.30	V	76.00	-19.07
2	2495.69	55.47	155.00	120.80	H	76.00	-20.53
3	2675.79	54.69	172.20	203.00	H	76.00	-21.31
4	2680.10	53.68	172.00	191.80	H	76.00	-22.32
5	2970.96	54.41	139.00	117.90	H	76.00	-21.59
6	2980.84	53.95	138.10	101.10	H	76.00	-22.05

No.	Frequency	Emission Level	Turntable Angle	Antenna Height	Antenna Pol.	Limit	Margin
		AVG				AVG	AVG
	MHz	dBµV/m	degree	cm	H/V	dBµV/m	dB
1	1597.15	35.56	173.60	141.30	V	56.00	-20.44
2	2495.69	41.26	155.00	120.80	H	56.00	-14.74
3	2675.79	42.20	172.20	203.00	H	56.00	-13.80
4	2680.10	41.39	172.00	191.80	H	56.00	-14.61
5	2970.96	41.27	139.00	117.90	H	56.00	-14.73
6	2980.84	41.52	138.10	101.10	H	56.00	-14.48

Note:

1. Margin (dB) = Emission Level (dBµV/m) – Limit (dBµV/m)
2. Of those emissions above (*L* – 20dB), where *L* is the limit level in logarithmic units, at least the disturbance levels and the frequencies of the 6 highest disturbances in each observed frequency band will be reported.
3. A negative Margin value indicates a PASS result as it refers to the margin presents below the limit line at the particular frequency.
4. A positive Margin value indicates a FAIL result as it refers to the margin presents above the limit line at the particular frequency. It is indicated in red colour font.

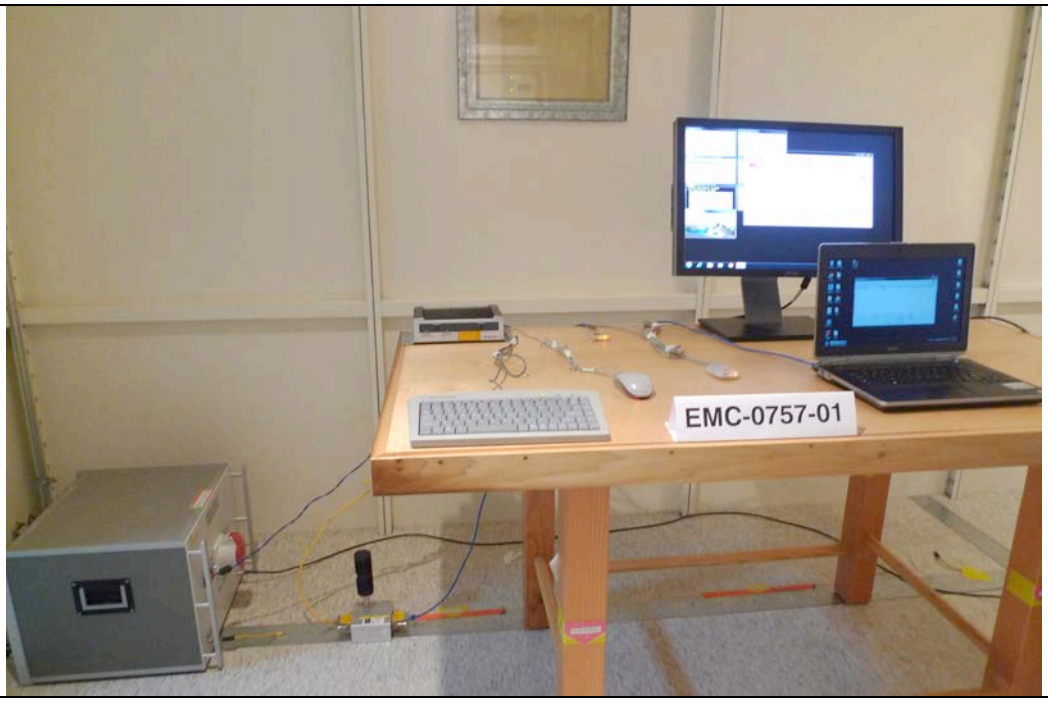
4.2 CONDUCTED EMISSION AT MAINS TERMINALS AND TELECOMMUNICATION PORTS

4.2.1 TEST SPECIFICATIONS

The test was performed in accordance with the test standards indicated below. The EUT was set up in typical installation conditions according to the manufacturer's installation instructions and set to operate at the EUT operating conditions stated in the following table.

Test Method		EN 55022:2010
Limit		EN 55022:2010
Distance	EUT – LISN	0.8 m
	EUT – Any other metal surface	Minimum 0.8 m
Detector	Preliminary Scan	Peak
	Final Measurement	Quasi-Peak and Average
Frequency Range		150 kHz – 30 MHz
Resolution Bandwidth		9 kHz
Video Bandwidth		30 kHz
Ports Tested	DC Power Port	Supply and Return
	Telecommunication Port	LAN
EUT Operating Condition		• The EUT was tested in a fully configured and functionally completed system with all ports connected to appropriate peripheral devices. • The EUT continuously exercised "Burn-in" test program during all tests. • This test program represented worst case use and able to produce system stress for the highest disturbance. • EUT was set to operate at its intended operating conditions under normal test condition.

4.2.2 TEST SETUP



Front View

Side View

4.2.3 TEST EQUIPMENT

Description	Model No.	Serial No.	Calibration Due Date
R&S EMI Test Receiver, 20Hz – 8GHz	ESU8	100268	13-Mar-14
R&S Pulse Limiter, 0-30MHz	ESH3-Z2	101124	Cal Not Required
Schwarzbeck CISPR 22, 3-Phase 4 x 32A V-LISN (50µH + 5Ω||50Ω)	NSLK 8128	8128-282	18-Jan-14
Teseq 8 Wire ISN (4 pair unshielded balanced CISPR 22 including adapters for RJ11 and RJ45)	T800	30324	02-Jan-14
Dickson Temperature/ Humidity Data Logger	TM320	11146170	27-Dec-13

Note:
1. Test was performed in shielded enclosure.

4.2.4 TEST RESULTS

EUT Model / Serial No.	2-AOCR-2xxx / UUT4	**Test Mode**	Continuously exercised "Burn-in" test program
Environmental Conditions	23.2 °C, 57.4 %RH	**Test Input Supply**	24 V DC
Tested By	Anuarudin Kamarudin	**Test Date**	11-December-2013
Test Port	DC Power Port : Supply		

No.	Frequency	Emission Level (dBµV)		Limit (dBµV)		Margin (dB)	
	MHz	AVG	QP	AVG	QP	AVG	QP
1	0.30	47.56	48.30	66.00	79.00	-18.44	-30.70
2	0.60	36.00	38.30	60.00	73.00	-24.00	-34.70
3	1.42	30.73	43.16	60.00	73.00	-29.27	-29.84
4	6.00	30.60	31.97	60.00	73.00	-29.40	-41.03
5	12.00	33.89	35.33	60.00	73.00	-26.11	-37.67
6	24.00	34.85	36.89	60.00	73.00	-25.15	-36.11

EUT Model / Serial No.	2-AOCR-2xxx / UUT4	**Test Mode**	Continuously exercised "Burn-in" test program
Environmental Conditions	23.2 °C, 57.4 %RH	**Test Input Supply**	24 V DC
Tested By	Anuarudin Kamarudin	**Test Date**	11-December-2013
Test Port	DC Power Port : Return		

No.	Frequency	Emission Level (dBµV)		Limit (dBµV)		Margin (dB)	
	MHz	AVG	QP	AVG	QP	AVG	QP
1	0.30	47.48	48.41	66.00	79.00	-18.52	-30.59
2	0.60	36.09	38.30	60.00	73.00	-23.91	-34.70
3	1.41	29.55	40.90	60.00	73.00	-30.45	-32.10
4	6.00	30.89	32.20	60.00	73.00	-29.11	-40.80
5	12.00	33.72	35.17	60.00	73.00	-26.28	-37.83
6	24.00	34.76	36.11	60.00	73.00	-25.24	-36.89

EUT Model / Serial No.	2-AOCR-2xxx / UUT4	**Test Mode**	Continuously exercised "Burn-in" test program
Environmental Conditions	23.2 °C, 57.4 %RH	**Test Input Supply**	24 V DC
Tested By	Anuarudin Kamarudin	**Test Date**	11-December-2013
Test Port	LAN Port : Ethernet 1		

No.	Frequency	Emission Level (dBµV)		Limit (dBµV)		Margin (dB)	
	MHz	AVG	QP	AVG	QP	AVG	QP
1	0.53	34.16	45.60	74.00	87.00	-39.84	-41.40
2	0.59	33.70	44.45	74.00	87.00	-40.30	-42.55
3	1.40	33.46	44.99	74.00	87.00	-40.54	-42.01
4	1.51	31.60	42.96	74.00	87.00	-42.40	-44.04
5	12.00	51.67	53.36	74.00	87.00	-22.33	-33.64
6	24.00	55.68	57.09	74.00	87.00	-18.32	-29.91

EUT Model / Serial No.	2-AOCR-2xxx / UUT4	**Test Mode**	Continuously exercised "Burn-in" test program
Environmental Conditions	23.2 °C, 57.4 %RH	**Test Input Supply**	24 V DC
Tested By	Anuarudin Kamarudin	**Test Date**	11-December-2013
Test Port	LAN Port : Ethernet 2		

No.	Frequency	Emission Level (dBµV)		Limit (dBµV)		Margin (dB)	
	MHz	AVG	QP	AVG	QP	AVG	QP
1	0.53	34.05	44.57	74.00	87.00	-39.95	-42.43
2	0.59	33.81	44.67	74.00	87.00	-40.19	-42.33
3	1.41	33.77	43.90	74.00	87.00	-40.23	-43.10
4	1.51	31.30	41.81	74.00	87.00	-42.70	-45.19
5	12.00	50.40	52.32	74.00	87.00	-23.60	-34.68
6	24.00	55.42	56.83	74.00	87.00	-18.58	-30.17

Note:

1. Margin (dB) = Emission Level (dBµV) – Limit (dBµV)
2. Of those emissions above (*L* – 20dB), where *L* is the limit level in logarithmic units, at least the disturbance levels and the frequencies of the 6 highest disturbances in each observed frequency band will be reported.
3. A negative Margin value indicates a PASS result as it refers to the margin presents below the limit line at the particular frequency.
4. A positive Margin value indicates a FAIL result as it refers to the margin presents above the limit line at the particular frequency. It is indicated in red colour font.

5. TEST RESULTS – IMMUNITY

5.1 ELECTROSTATIC DISCHARGE

5.1.1 TEST SPECIFICATIONS

The test was performed in accordance with the test standards indicated below. The EUT was set up in typical installation conditions according to the manufacturer's installation instructions and set to operate at the EUT operating conditions stated in the following table.

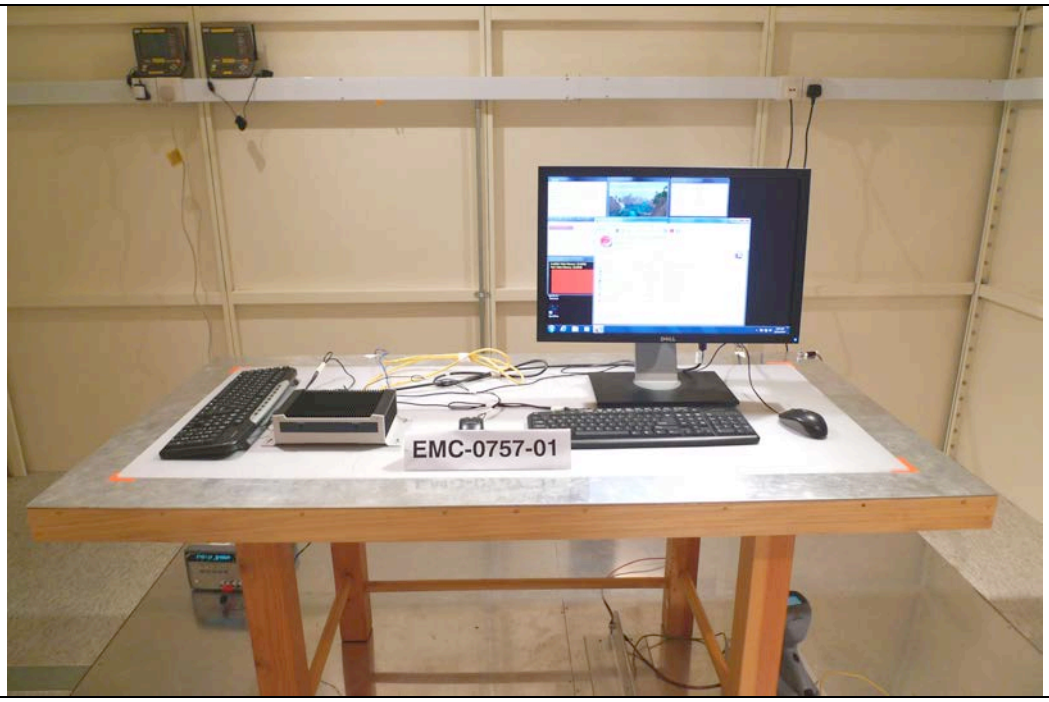
Test Method		EN 61000-4-2:1995
Distance	Floor – EUT Table	0.8 m
	EUT – Wall / Other Metal Surface	Minimum 1 m
	EUT – All Sides of HCP	0.1 m
	EUT – VCP	0.1 m
	Insulating Support	0.5 mm
Discharge Voltage	Air Discharge (Direct)	± 2, ±4, ±6, ±8 kV
	Contact Discharge (Direct / Indirect)	± 2, ±4 kV
Polarity		Positive and Negative
Number of Discharge (per Discharge Voltage and Polarity)		10 times at each test point
Discharge Mode		Single Discharge
Discharge Period		Minimum 1 second
Discharge Impedance		150 pF / 330 Ohm
EUT Operating Condition		• The EUT was tested in a fully configured and functionally completed system with all ports connected to appropriate peripheral devices. • The EUT continuously exercised "Burn-in" test program during all tests. • This test program represented worst case use and able to produce system stress for the highest disturbance. • EUT was set to operate at its intended operating conditions under normal test condition.

EUT Monitoring Method		To observe visually if there is any EUT pinging / ponging disruption, EUT functionality related error message appears at the desktop monitor, or any EUT hang / reset / shut down happens.
Performance Criteria	Standard	EN 61000-6-2:2005
	B	During testing, temporary degradation, or loss of function or performance which is self-recovering.
Performance Criteria	Manufacturer's Specification	**Pass/Fail Criteria:** The EUT shall run the "Burn-in" test program throughout the test. This test program shall ping / pong data to and from the EUT and its all external connected peripheral devices. If pinging/ ponging is disrupted as seen/indicated by the EUT monitor, or there is loss of functionality, this may considered as a failure.

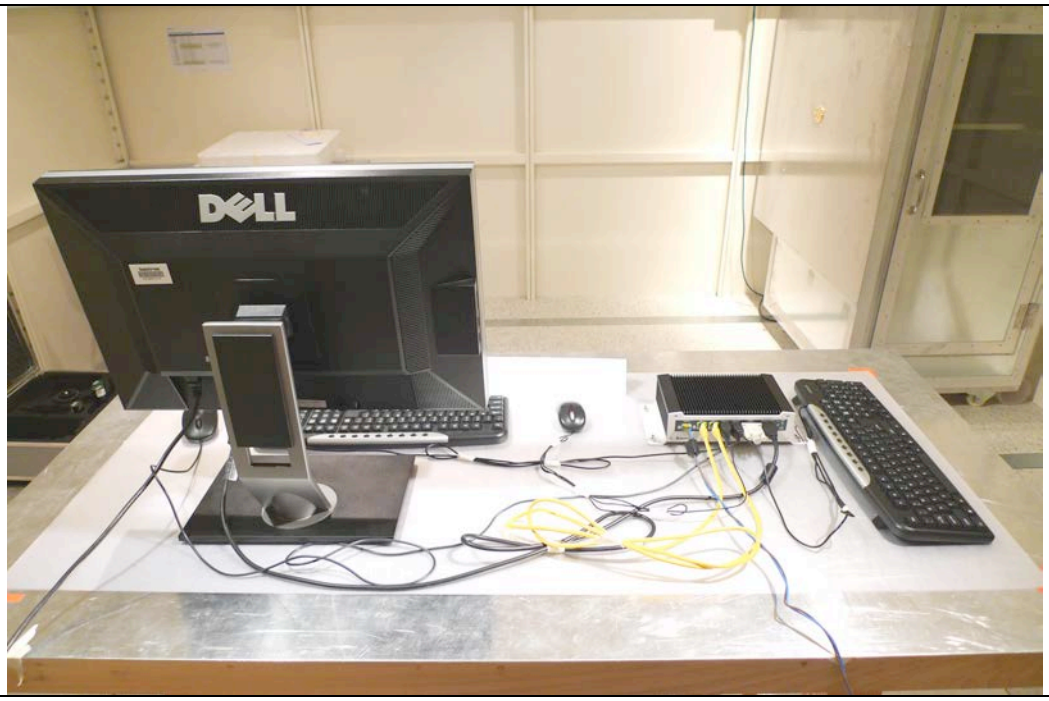
Note:

1. Manufacturer's specification for Pass/Fail criteria was provided by the test applicant.
2. **Test Observation:**
   - **Normal:** EUT operated as intended with no degradation of performance below the manufacturer's specification or loss of function observed during the test. During testing, normal performance within the specification limits.

5.1.2 TEST SETUP



Front View



Rear View

5.1.3 TEST EQUIPMENT

Description	Model No.	Serial No.	Calibration Due Date
Teseq ESD Simulator	NSG438	1140	06-May14
Davis Instruments Vantage Vue Weather Station	6351UK	MB130214005	09-May-14

Note:
1. Test was performed in ESD shielded enclosure.

5.1.4 TEST RESULTS

EUT Model / Serial No.	2-AOCR-2xxx / UUT3	**Test Mode**	Continuously exercised "Burn-in" test program
Environmental Conditions	24.0 °C, 51.0 %RH, 1011.3 mbar	**Test Input Supply**	24 V DC
Tested By	Akmal Hamzah	**Test Date**	12-December-2013

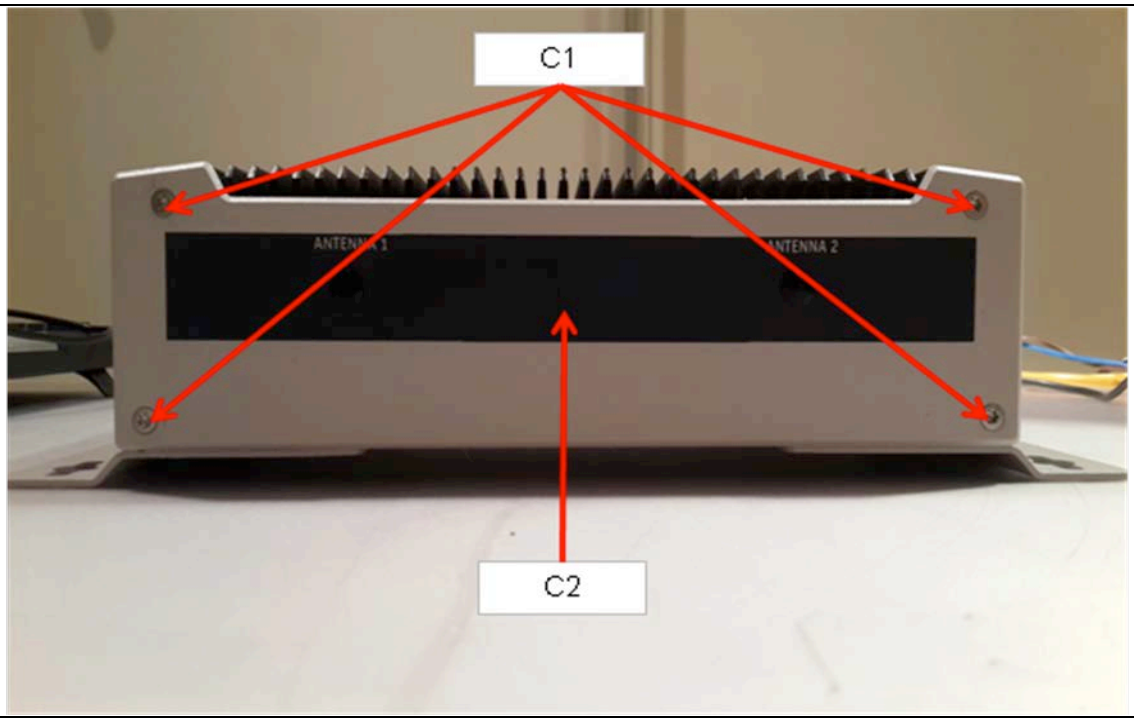
DIRECT APPLICATION						
Test Location	**Discharge Type**	**Discharge Voltage**	**Test Points**	**Observation**	**Perf. Criteria**	**Result**
Front, Rear, Right, Left, Top, Bottom	Contact	±2 to 4 kV	C1 – C9	Normal	A	PASS

INDIRECT APPLICATION						
Test Location	**Discharge Type**	**Discharge Voltage**	**Test Points**	**Observation**	**Perf. Criteria**	**Result**
Front, Rear, Right, Left	Contact	±2 to 4 kV	HCP	Normal	A	PASS
			VCP	Normal	A	PASS

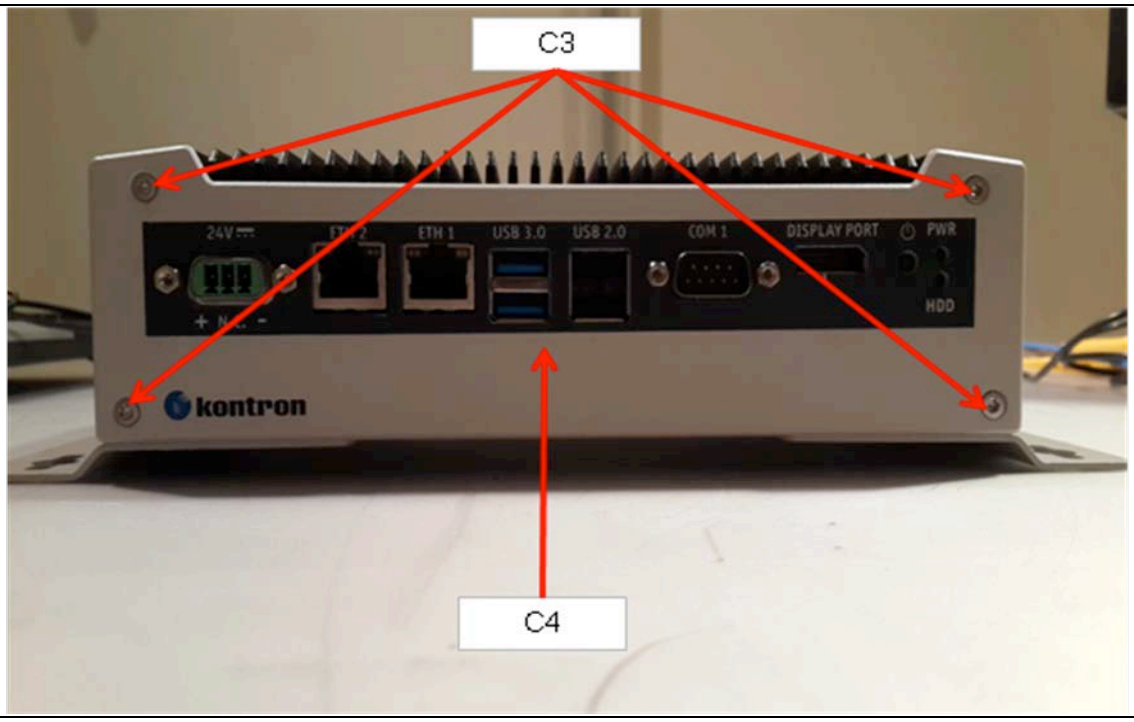
Description of test point: Please refer to the following photos.

Note:
1. No abnormality observed.

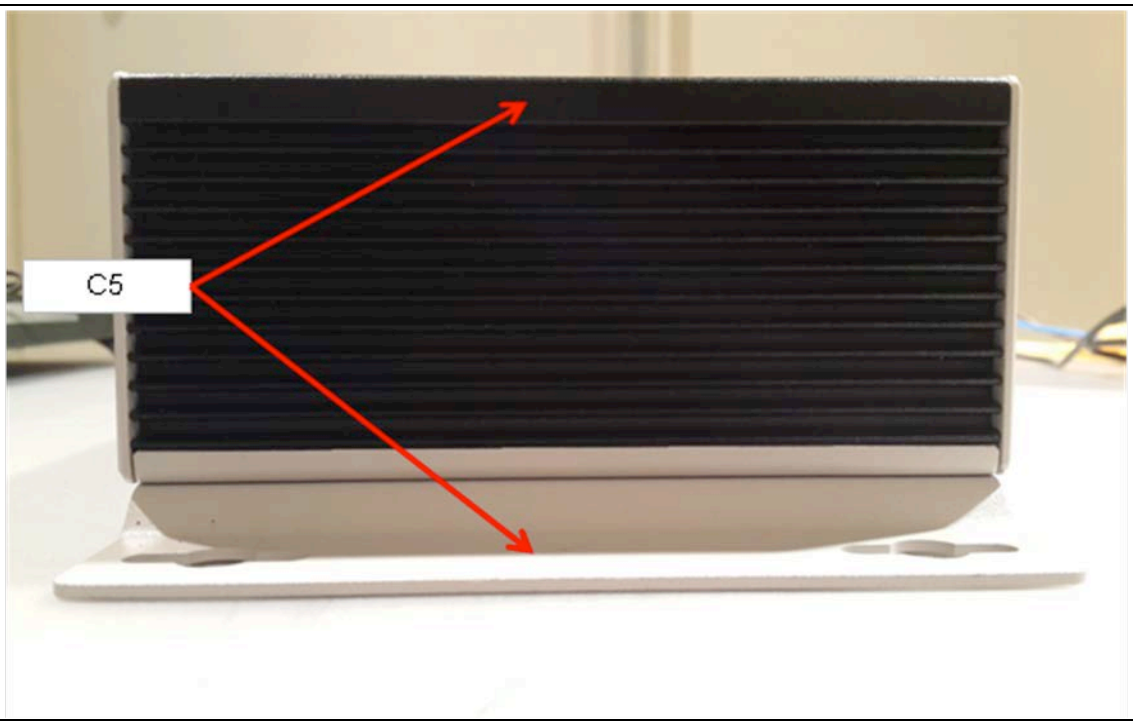
Electrostatic Discharge Test Points:



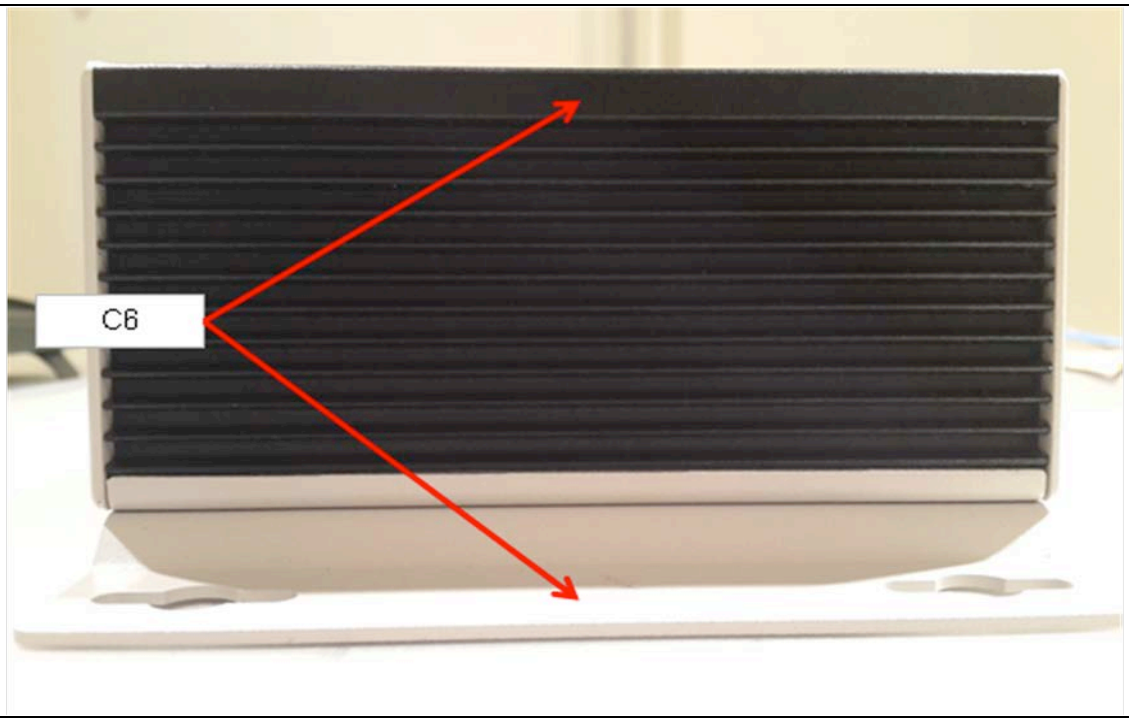
Front Side



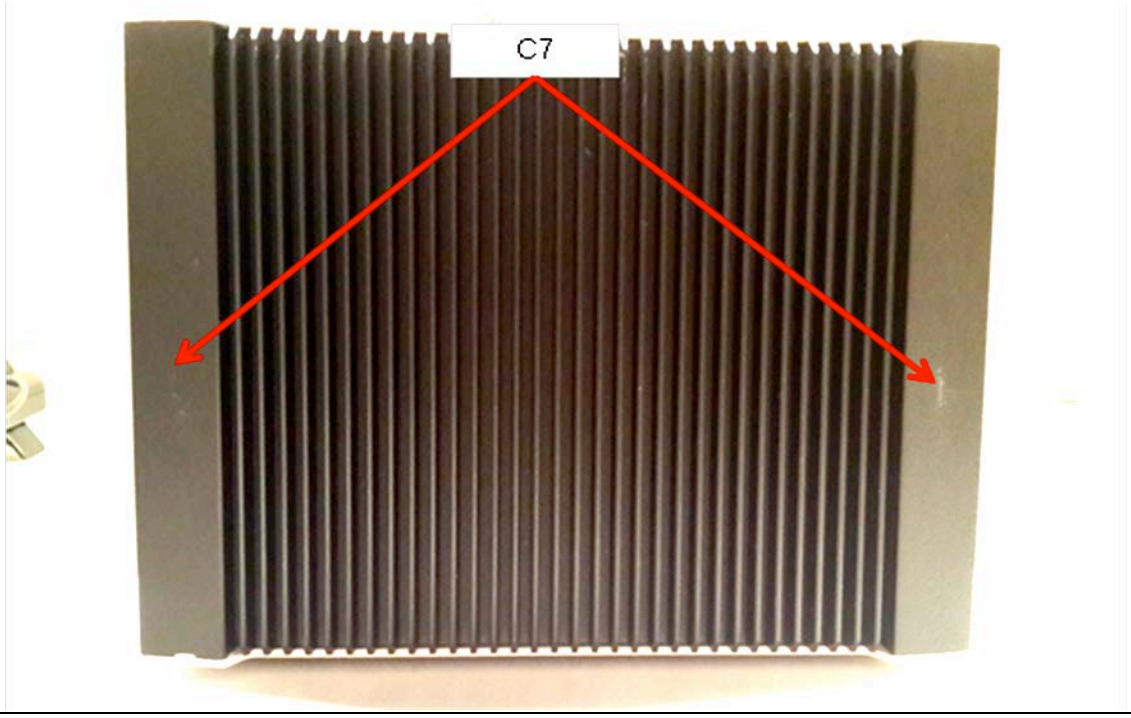
Rear Side



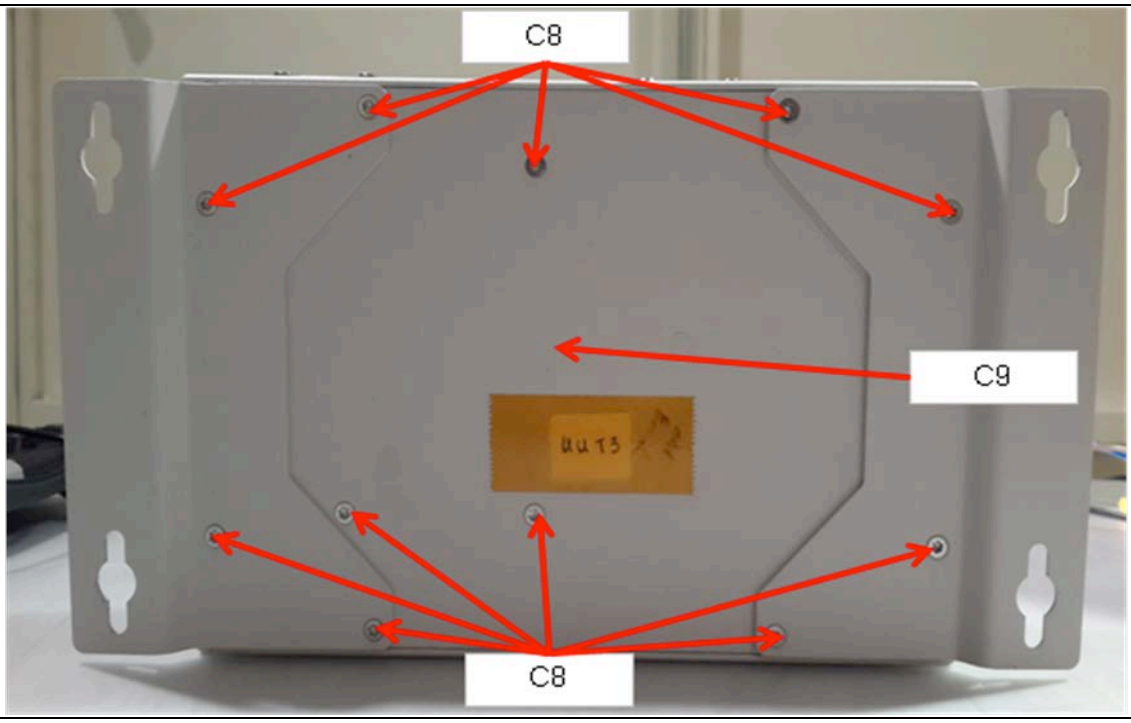
Right Side



Left Side



Top Side



Bottom Side

5.2 RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD

5.2.1 TEST SPECIFICATIONS

The test was performed in accordance with the test standards indicated below. The EUT was set up in typical installation conditions according to the manufacturer's installation instructions and set to operate at the EUT operating conditions stated in the following table.

Measurement Standard		EN 61000-4-3:2002
Distance	Antenna Tip - EUT	3 m
	Floor – EUT Table	0.8 m
	Floor – Antenna	1.55 m
Test Level	80 MHz – 1 GHz	10 V/m
	1.4 GHz – 2 GHz	3 V/m
	2 GHz – 2.7 GHz	1 V/m
Antenna Polarization		Horizontal and Vertical
Modulation		80% AM Modulation, 1 kHz Sine Wave
Frequency Step		1% of preceding frequency
Dwell Time		2 seconds
EUT Illumination Side		Front
EUT Operating Condition		• The EUT was tested in a fully configured and functionally completed system with all ports connected to appropriate peripheral devices. • The EUT continuously exercised "Burn-in" test program during all tests. • This test program represented worst case use and able to produce system stress for the highest disturbance. • EUT was set to operate at its intended operating conditions under normal test condition.

EUT Monitoring Method		To observe visually if there is any EUT pinging / ponging disruption, EUT functionality related error message appears at the desktop monitor, or any EUT hang / reset / shut down happens.
Performance Criteria	Standard	EN 61000-6-2:2005
	A	During testing, normal performance within the specification limits
	Manufacturer's Specification	**Pass/Fail Criteria:** The EUT shall run the "Burn-in" test program throughout the test. This test program shall ping / pong data to and from the EUT and its all external connected peripheral devices. If pinging/ ponging is disrupted as seen/indicated by the EUT monitor, or there is loss of functionality, this may considered as a failure.

Note:

1. Manufacturer's specification for Pass/Fail criteria was provided by the test applicant.
2. **Test Observation:**
   - **Normal:** EUT operated as intended with no degradation of performance below the manufacturer's specification or loss of function observed during the test. During testing, normal performance within the specification limits.
3. EUT was tested only at Front side due to EUT dimension is shorter than 30 cm.

5.2.2 TEST SETUP

Front-Right View

Rear-Left View

5.2.3 TEST EQUIPMENT

Description	Model No.	Serial No.	Calibration Due Date
Agilent MXG RF Analog Signal Generator, 100kHz - 6GHz	N5181A	MY50140164	22-Nov-14
Agilent EPM-Series Dual Channel Average Power Meter, 9kHz - 110GHz	N1914A	MY50000265	26-Apr-14
Agilent E-Series Power Sensor, 9kHz - 6GHz	E9304A	MY50170028	26-Apr-14
Agilent E-Series Power Sensor, 9kHz - 6GHz	E9304A	MY50170029	26-Apr-14
Amplifier Research Laser Powered Field Probe, 100kHz - 6GHz	FL7006	334521	24-Jan-14
Amplifier Research Laser Probe Interface	FL7000	0334346	Cal Not Required
TDK System Interface Controller	SI-300	41678	Cal Not Required
40dB Werlatone Dual Directional Coupler	C5982-10	99028	Cal Not Required
Teseq Broadband Power Amplifier, 80MHz - 1GHz, 275W	CBA 1G-275	T44228	Cal Not Required
Milmega Dual Band Broadband Solid State Amplifier	AS0860-75/45	1037143	Cal Not Required
Werlatone 30dB Bi-Directional Coupler, 600 MHz – 6GHz	C8000-102	2058	Cal Not Required
TDK Compact Hybrid Log Periodic Antenna, 30MHz - 3GHz	HLP-3003	130519	Cal Not Required
Chaintek Programming Controller	3000	005643	Cal Not Required
TDK Video Camera	VC-04	201015-P	Cal Not Required
TDK System Camera Controller	SI-300CC	170074	Cal Not Required
Dickson Temperature / Humidity Data Logger	TM 320	11146171	27-Dec-13

Note:
1. Test was performed in 3m compact full anechoic chamber.

5.2.4 TEST RESULTS

EUT Model / Serial No.	2-AOCR-2xxx / UUT1	**Test Mode**	Continuously exercised "Burn-in" test program
Environmental Conditions	21.1 °C, 67.8 %RH	**Test Input Supply**	24 V DC
Tested By	Anuarudin Kamarudin	**Test Date**	12-December-2013

Frequency	**Antenna Pol.**	**Test Level**	**EUT Side**	**Observation**	**Perf. Criteria**	**Result**
MHz	**H/V**	**V/m**				
80 – 1000	H & V	10	Front	Normal	A	PASS
1400 – 2000	H & V	3	Front	Normal	A	PASS
2000 – 2700	H & V	1	Front	Normal	A	PASS

Note:
1. No abnormality observed.

5.3 ELECTRICAL FAST TRANSIENT / BURST

5.3.1 TEST SPECIFICATIONS

The test was performed in accordance with the test standards indicated below. The EUT was set up in typical installation conditions according to the manufacturer's installation instructions and set to operate at the EUT operating conditions stated in the following table.

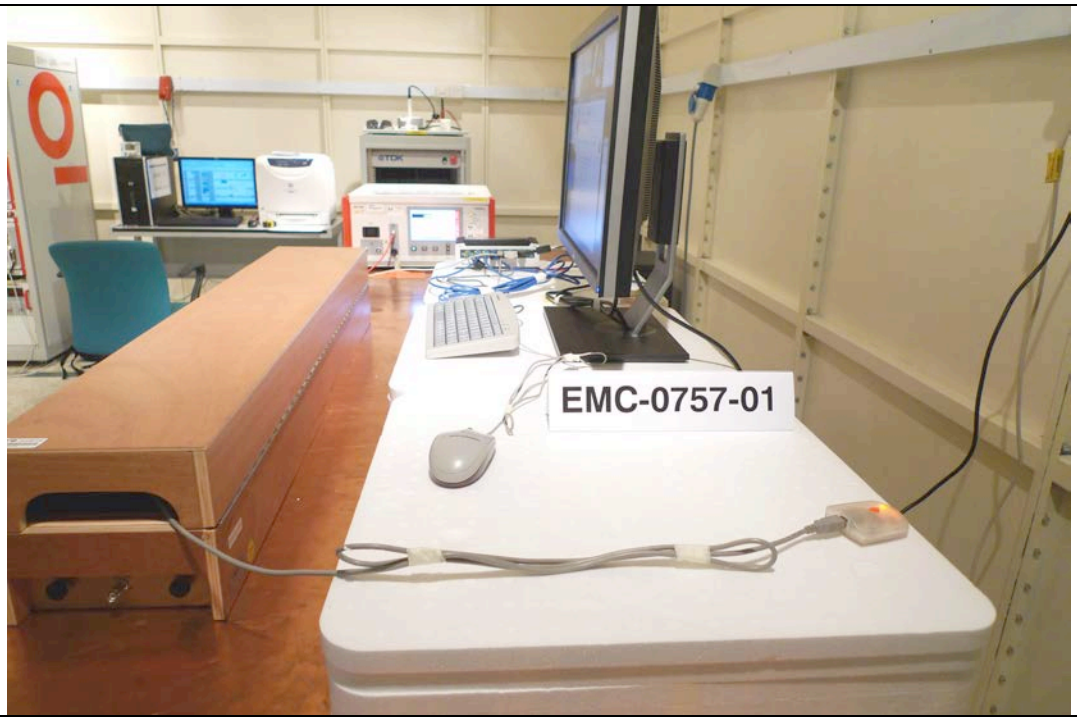
Test Method		EN 61000-4-4:2004
Distance	EUT – CDN	0.5 m
	EUT – Any metallic objects	> 0.5 m
	Insulating Support	0.1 m
Test Voltage	DC Power Port	± 1 kV
	Signal Ports	± 1 kV (Only in the case of lines > 3m)
Rise Time / Hold Time		5 / 50 ns
Repetition Rate		5 kHz
Burst Duration		15 ms
Burst Period		300 ms
Test Duration		2 minutes
EUT Operating Condition		• The EUT was tested in a fully configured and functionally completed system with all ports connected to appropriate peripheral devices. • The EUT continuously exercised "Burn-in" test program during all tests. • This test program represented worst case use and able to produce system stress for the highest disturbance. • EUT was set to operate at its intended operating conditions under normal test condition.

EUT Monitoring Method		To observe visually if there is any EUT pinging / ponging disruption, EUT functionality related error message appears at the desktop monitor, or any EUT hang / reset / shut down happens.
Performance Criteria	Standard	EN 61000-6-2:2005
	B	During testing, temporary degradation, or loss of function or performance which is self-recovering.
	Manufacturer's Specification	**Pass/Fail Criteria:** The EUT shall run the "Burn-in" test program throughout the test. This test program shall ping / pong data to and from the EUT and its all external connected peripheral devices. If pinging/ ponging is disrupted as seen/indicated by the EUT monitor, or there is loss of functionality, this may considered as a failure.

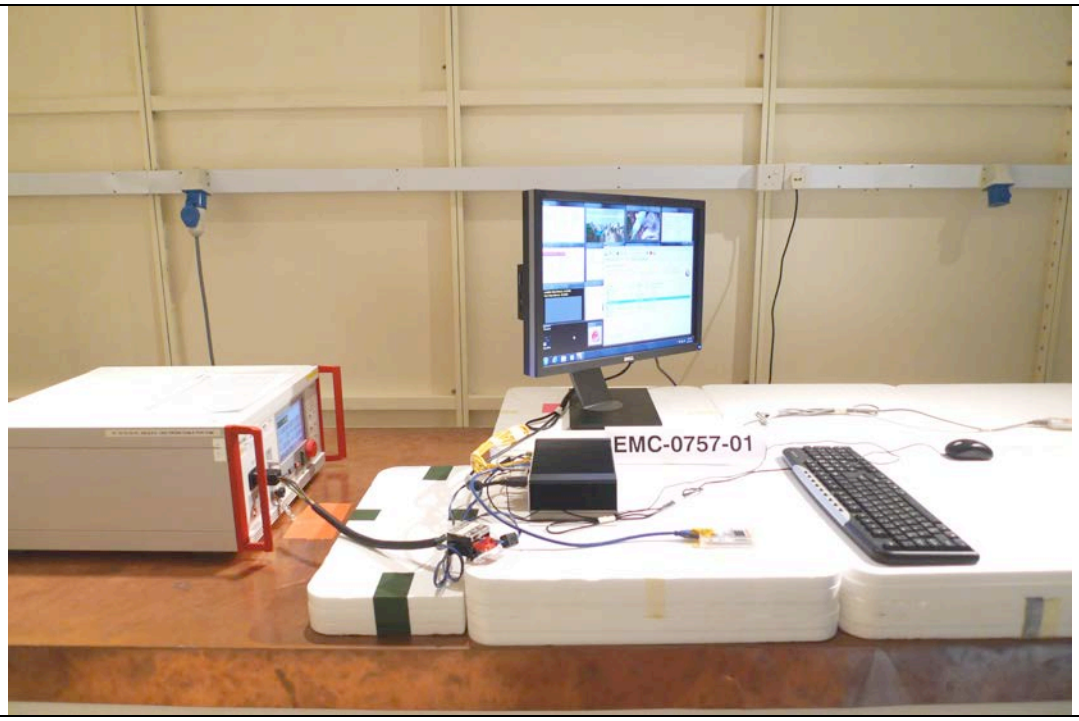
Note:

1. Manufacturer's specification for Pass/Fail criteria was provided by the test applicant.
2. **Deviation from Test Standard:** As per manufacturer's requirement, the test level of ±1kV was used for Electrical Fast Transient at DC Power Port, instead of ±2kV as per EN 61000-6-2:2005 standard requirement.
3. **Test Observation:**
    - **Normal:** EUT operated as intended with no degradation of performance below the manufacturer's specification or loss of function observed during the test. During testing, normal performance within the specification limits.

5.3.2 TEST SETUP



Front View



Side View

5.3.3 TEST EQUIPMENT

Description	Model No.	Serial No.	Calibration Due Date
Teseq Multifunction Transient Generator	NSG 3040	1718	6-Jun-14
Teseq Capacitive Coupling Clamp	CDN 8014	29191	Cal Not Required
Manual Step Transformer	INA 6501-S	103	Cal Not Required
Dickson Temperature/ Humidity Data Logger	TM320	11146170	27-Dec-13

Note:
1. Test was performed in shielded enclosure.

5.3.4 TEST RESULTS

EUT Model / Serial No.	2-AOCR-2xxx / UUT3	**Test Mode**	Continuously exercised "Burn-in" test program
Environmental Conditions	23.1 °C, 57.6 %RH	**Test Input Supply**	24 V DC
Tested By	Anuarudin Kamarudin	**Test Date**	11-December-2013

Test Port	Teat Point	Test Level kV	Observation	Perf. Criteria	Result
DC Power	Supply, Return	± 0.5, ± 1.0	Normal	A	PASS
I/O Signal / Control	USB, LAN	± 0.5, ± 1.0	Note 1	B	PASS

Note:

1. At +0.5 kV: During testing, mouse and keyboard was found to be malfunction (freezed). After the test, mouse and keyboard self recovered back to normal.

5.4 SURGE

5.4.1 TEST SPECIFICATIONS

The test was performed in accordance with the test standards indicated below. The EUT was set up in typical installation conditions according to the manufacturer's installation instructions and set to operate at the EUT operating conditions stated in the following table.

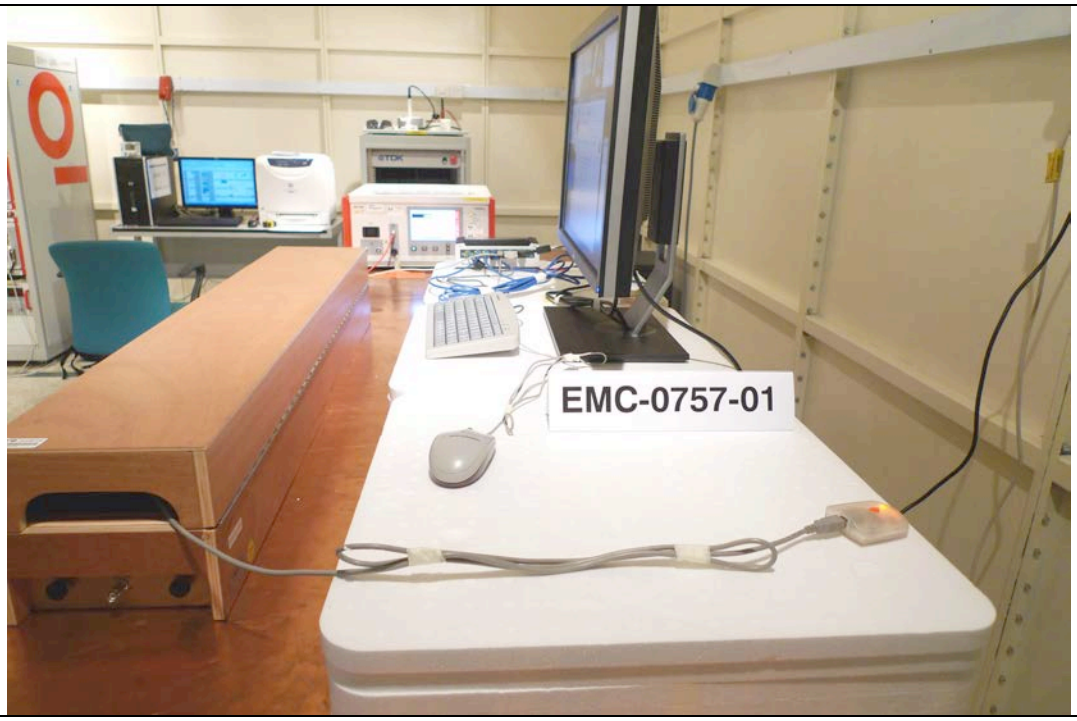
Test Method		EN 61000-4-5:1995	
Distance	EUT – CDN	≤ 2.0 m	
	EUT – Any metallic objects	> 0.5 m	
	Insulating Support	0.1 m	
Test Voltage	DC Power Port	Line - Line	± 0.5 kV
		Line - Ground	± 0.5 kV
Source Impedance	Line - Line	2 Ω	
	Line - Ground	12 Ω	
Phase Angle		0°	
Repetition Rate		60 s	
Test Duration		10 Pulses (5 positive polarity, 5 negative polarity)	
EUT Operating Condition		• The EUT was tested in a fully configured and functionally completed system with all ports connected to appropriate peripheral devices. • The EUT continuously exercised "Burn-in" test program during all tests. • This test program represented worst case use and able to produce system stress for the highest disturbance. • EUT was set to operate at its intended operating conditions under normal test condition.	

EUT Monitoring Method		To observe visually if there is any EUT pinging / ponging disruption, EUT functionality related error message appears at the desktop monitor, or any EUT hang / reset / shut down happens.
Performance Criteria	Standard	EN 61000-6-2:2005
	B	During testing, temporary degradation, or loss of function or performance which is self-recovering.
	Manufacturer's Specification	**Pass/Fail Criteria:** The EUT shall run the "Burn-in" test program throughout the test. This test program shall ping / pong data to and from the EUT and its all external connected peripheral devices. If pinging/ ponging is disrupted as seen/indicated by the EUT monitor, or there is loss of functionality, this may considered as a failure. **Permissible loss of performance:** Operator intervention is required to restart "Burn-in" test program after test.

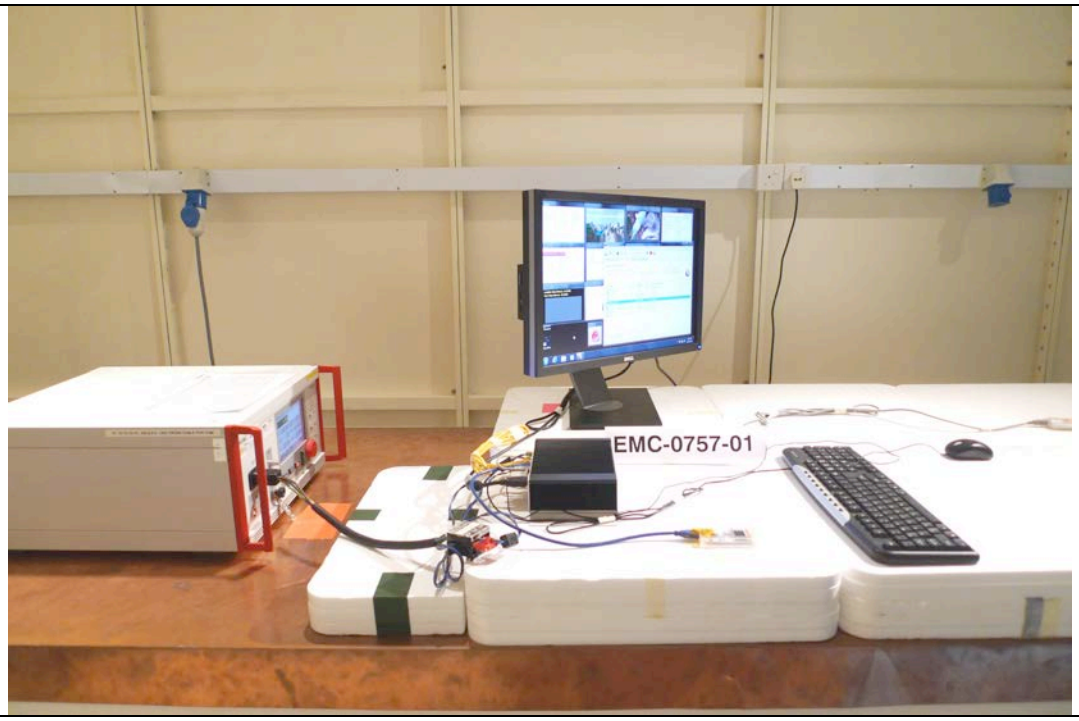
Note:

1. Manufacturer's specification for Pass/Fail criteria was provided by the test applicant.
2. **Test Observation:**
   - **Normal:** EUT operated as intended with no degradation of performance below the manufacturer's specification or loss of function observed during the test. During testing, normal performance within the specification limits.

5.4.2 TEST SETUP



Front View



Side View

5.4.3 TEST EQUIPMENT

Description	Model No.	Serial No.	Calibration Due Date
Teseq Multifunction Transient Generator	NSG 3040	1718	6-Jun-14
Manual Step Transformer	INA 6501-S	103	Cal Not Required
Dickson Temperature/ Humidity Data Logger	TM320	11146170	27-Dec-13

Note:
1. Test was performed in shielded enclosure.

5.4.4 TEST RESULTS

EUT Model / Serial No.	2-AOCR-2xxx / UUT3	**Test Mode**	Continuously exercised "Burn-in" test program
Environmental Conditions	23.1 °C, 57.6 %RH	**Test Input Supply**	24 V DC
Tested By	Anuarudin Kamarudin	**Test Date**	11-December-2013

Test Port	Test Point	Test Level	Phase Angle	Observation	Perf. Criteria	Result
		kV	°			
DC Power	Supply - Return	± 0.5	0	Note 1	B	PASS

Note:

1. At +0.5 kV: During testing, EUT shut down and restarted. After the test, windows software application self recovered back to normal, however, “Burn-in” test program required operator intervention to restart the test program. Operator intervention to restart “Burn-in” test program is declared as a permissible loss of performance by the manufacturer. All ports connecting ancillary equipments continued to function as intended after the test.

5.5 IMMUNITY TO CONDUCTED DISTURBANCES, INDUCED BY RADIO-FREQUENCY FIELDS

5.5.1 TEST SPECIFICATIONS

The test was performed in accordance with the test standards indicated below. The EUT was set up in typical installation conditions according to the manufacturer's installation instructions and set to operate at the EUT operating conditions stated in the following table.

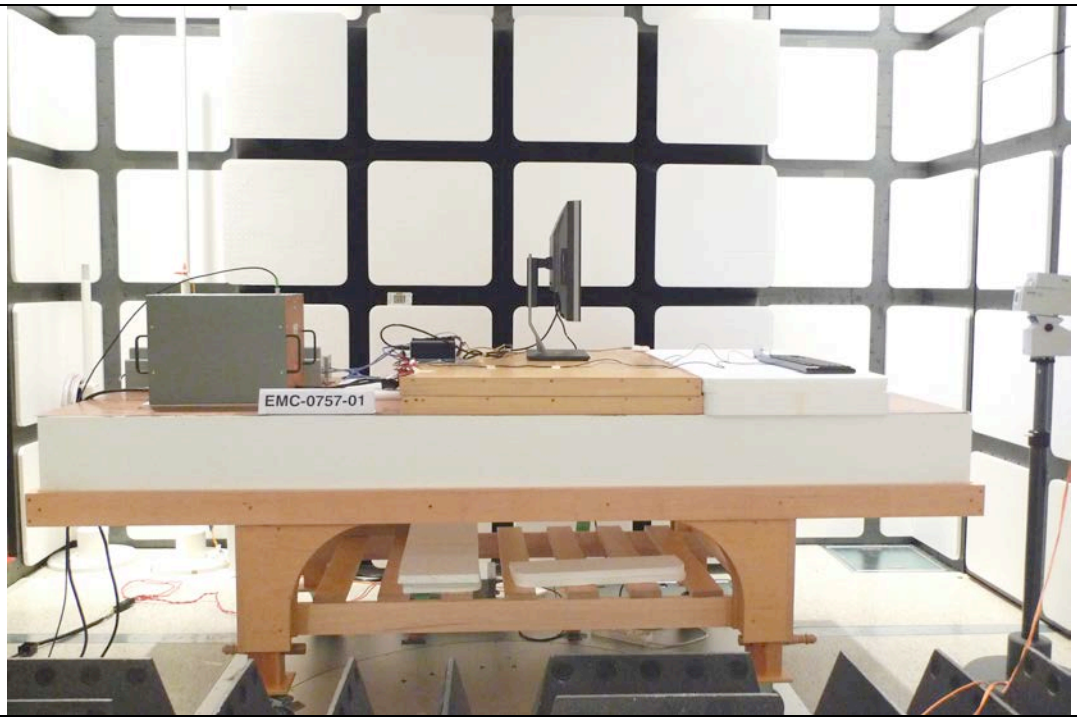
Test Method		EN 61000-4-6:2009
Distance	EUT – CDN	0.1 m – 0.3 m
	EUT – Any metallic objects	> 0.5 m
	Cables between CDN & EUT – Ground Reference Plane	0.3 m – 0.5 m
	Insulating Support	0.1 m
Frequency Range		150 kHz – 80 MHz
Test Level		$10V_{r.m.s,}$ Unmodulated
Modulation		80% AM Modulation, 1 kHz Sine Wave
Dwell Time		2 seconds
Step Size		1% frequency increment of preceding frequency value
EUT Operating Condition		• The EUT was tested in a fully configured and functionally completed system with all ports connected to appropriate peripheral devices. • The EUT continuously exercised "Burn-in" test program during all tests. • This test program represented worst case use and able to produce system stress for the highest disturbance. • EUT was set to operate at its intended operating conditions under normal test condition.

EUT Monitoring Method		To observe visually if there is any EUT pinging / ponging disruption, EUT functionality related error message appears at the desktop monitor, or any EUT hang / reset / shut down happens.
Performance Criteria	Standard	EN 61000-6-2:2005
	A	During testing, normal performance within the specification limits
Performance Criteria	Manufacturer's Specification	**Pass/Fail Criteria:** The EUT shall run the "Burn-in" test program throughout the test. This test program shall ping / pong data to and from the EUT and its all external connected peripheral devices. If pinging/ ponging is disrupted as seen/indicated by the EUT monitor, or there is loss of functionality, this may considered as a failure.

Note:

1. Manufacturer's specification for Pass/Fail criteria was provided by the test applicant.
2. **Test Observation:**
   - **Normal:** EUT operated as intended with no degradation of performance below the manufacturer's specification or loss of function observed during the test. During testing, normal performance within the specification limits.

5.5.2 TEST SETUP



Side View

Rear-Left View

5.5.3 TEST EQUIPMENT

Description	Model No.	Serial No.	Calibration Due Date
Agilent MXG RF Analog Signal Generator, 100kHz - 6GHz	N5181A	MY50140164	22-May-14
Agilent EPM-Series Dual Channel Average Power Meter, 9kHz - 110GHz	N1914A	MY50000265	26-Apr-14
Agilent E-Series Power Sensor, 9kHz - 6GHz	E9304A	MY50170028	26-Apr-14
Agilent E-Series Power Sensor, 9kHz - 6GHz	E9304A	MY50170029	26-Apr-14
AR Amplifier, 10KHz - 400MHz	75A400M1	0333614	Cal Not Required
40dB AR Dual Directional Coupler,10kHz - 400MHz, 250 W	DC3400A	0332796	Cal Not Required
FCC Power Line Coupling Decoupling Network (CDN), 150kHz - 80MHz	FCC-801-M2-100A	100251	Cal Not Required
FCC Electromagnetic (EM) Injection Clamp, 23mm, 10kH - 1GHz	F-203I-23mm	100390	Cal Not Required
FCC Decoupling Network, 100kHz - 1GHz	F-203I-23mm DCN	100391	Cal Not Required
Dickson Temperature/ Humidity Data Logger	TM320	11146170	27-Dec-13

Note:

1. Test was performed in 3m compact full anechoic chamber.

5.5.4 TEST RESULTS

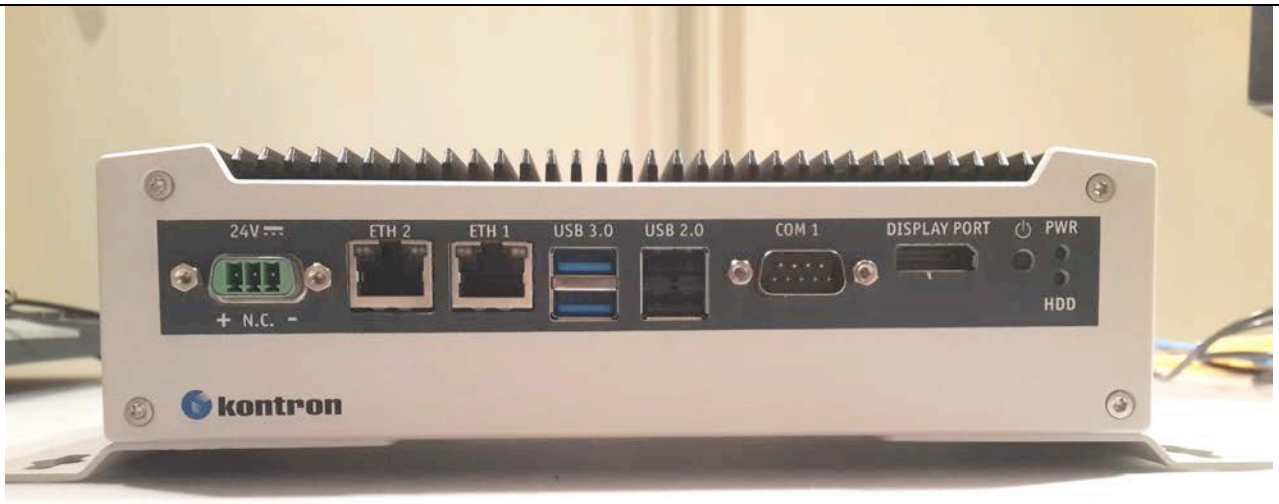
EUT Model / Serial No.	2-AOCR-2xxx / UUT1	**Test Mode**	Continuously exercised "Burn-in" test program
Environmental Conditions	17.5 °C, 74.1 %RH	**Test Input Supply**	24 V DC
Tested By	Anuarudin Kamarudin	**Test Date**	12-December-2013

Test Port / Tested Line	**Injection Method**	**Frequency**	**Test Level**	**Observation**	**Perf. Criteria**	**Result**
		MHz	**Vrms**			
DC Power Port	CDN	0.15 – 80	10	Normal	A	PASS
USB Cable, LAN Cable	EM Clamp	0.15 – 80	10	Normal	A	PASS

Note:
1. No abnormality observed.

ANNEX A PHOTOGRAPHS – EUT

Front View



Rear View