

Test report

279276-2TRFEMC

Date of issue: June 4, 2015

Applicant:

Kontron Canada Inc

Product:

Carrier Grade Rack Mount System

Model:

CG2300

Specification:

EN 55024: 2010

Information technology equipment

Immunity characteristics

Limits and methods of measurement




Nemko Canada Inc., a testing laboratory, is accredited by the Standards Council of Canada. The tests included in this report are within the scope of this accreditation

EN 55024 (2010).docx; Date: March 2014

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Review date	June 4, 2015
Reviewer signature	

Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

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Section 1 Report summary

1.1 Test specifications

EN 55024: 2010	Information technology equipment Immunity characteristics Limits and methods of measurement
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1.2 Exclusions

None

1.3 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing was completed against all relevant requirements of the test standard. Results obtained indicate that the product under test complies in full with the requirements tested. The test results relate only to the items tested.

See “Summary of test results” for full details.

1.4 Test report revision history

Table 1.4-1: Test report revision history

Revision #	Details of changes made to test report
TRF	Original report issued

Section 2 Summary of test results

2.1 Test results

Table 2.1-1: Immunity, enclosure results

Environmental phenomenon	Test specification	Units	Performance criteria	Basic standard	Verdict
Power-frequency magnetic field ¹	50	Hz	A ²	EN 61000-4-8	Not applicable
	1	A/m _{RMS}			
Radio-frequency electromagnetic field amplitude modulated ³	80–1000	MHz	A	EN 61000-4-3	Pass
	3	V/m _{RMS} (unmodulated)			
Electrostatic discharge (ESD)	80	% AM (1 kHz)	B	EN 61000-4-2	Pass
	4 (Contact discharge)	kV (charge voltage)			
	8 (Air discharge)	kV (charge voltage)			

Notes: ¹ Applicable only to EUT containing devices susceptible to magnetic fields, such as CRT monitors, Hall elements, electrodynamic microphones, magnetic field sensors, etc.
² See Annex B (EN 55024: 2010) as appropriate.
³ The frequency range is scanned as specified. However, when specified in Annex A (EN 55024: 2010), an additional comprehensive functional test shall be carried out at a limited number of frequencies. The selected frequencies are: 80, 120, 160, 230, 434, 460, 600, 863 and 900 MHz (±1 %).

Table 2.1-2: Immunity, signal ports and telecommunication ports

Environmental phenomenon	Test specification	Units	Performance criteria	Basic standard	Verdict
Radio-frequency continuous conducted ^{1 and 3}	0.15–80	MHz	A	EN 61000-4-6	Pass
	3	V _{RMS} (unmodulated)			
Surge (line to ground) ^{2, 4, 5, and 7}	80	% AM (1 kHz)	C	EN 61000-4-5	Not applicable
	1 or 4	kV (peak)			
Fast transients ^{3, 5, and 6}	10/700	Tr/Th μs	B	EN 61000-4-4	Pass
	0.5	kV (peak)			
	5/50	Tr/Th ns			
	5	kHz (repetition rate)			

Notes: ¹ The frequency range is scanned as specified. However, when specified in Annex A (EN 55024: 2010), an additional comprehensive functional test shall be carried out at a limited number of frequencies. The selected frequencies for conducted tests are: 0.2, 1, 7.1, 13.56, 21, 27.12 and 40.68 MHz (±1 %).
² Applicable only to ports which according to the manufacturer's specification may connect directly to outdoor cables.
³ Applicable only to cables which according to the manufacturer's specification supports communication on cable lengths greater than 3 m.
⁴ For ports where primary protection is intended, surges are applied at voltages up to 4 kV with the primary protectors fitted. Otherwise the 1 kV test level is applied without primary protection in place.
⁵ Test applied to all lines simultaneously to earth (ground).
⁶ For xDSL equipment, the repetition frequency for EFT testing shall be 100 kHz (See EN 55024: 2010 Annex H).
⁷ Where the coupling network for the 10/700 μs waveform affects the functioning of high speed data ports, the test shall be carried out using a 1,2/50 (8/20) μs waveform and appropriate coupling network.

2.1 Test results, continued

Table 2.1-3: Immunity, input DC power port (excluding equipment marketed with an a.c./d.c. power converter)

Environmental phenomenon	Test specification	Units	Performance criteria	Basic standard	Verdict
Radio-frequency continuous conducted ¹	0.15–80	MHz	A	EN 61000-4-6	Not applicable
	3	V _{RMS} (unmodulated)			
	80	% AM (1 kHz)			
Surge (line to ground) ²	1.2/50 (8/20)	Tr/Th μs	B	EN 61000-4-5	Not applicable
	0.5	kV (peak)			
Fast transients	0.5	kV (peak)	B	EN 61000-4-4	Not applicable
	5/50	Tr/Th ns			
	5	kHz (repetition rate)			

Notes: If d.c. power is fed on conductors included in a signal cable, then the requirements of EN 55024: 2010 Table 2 only apply to this cable.

¹The frequency range is scanned as specified. However, when specified in EN 55024: 2010 Annex A, an additional comprehensive functional test shall be carried out at a limited number of frequencies. The selected frequencies for conducted test are: 0.2, 1, 7.1, 13.56, 21, 27.12 and 40.68 MHz (±1 %).

²Applicable only to ports which according to the manufacturer's specification may connect directly to outdoor cables.

Table 2.1-4: Immunity, input AC power ports (including equipment marketed with a separate a.c./d.c power converter)

Environmental phenomenon	Test specification	Units	Performance criteria	Basic standard	Verdict
Radio-frequency continuous conducted ¹	0.15–80	MHz	A	EN 61000-4-6	Pass
	3	V _{RMS} (unmodulated)			
	80	% AM (1 kHz)			
Voltage dip ²	100	% reduction	B	EN 61000-4-11	Pass
	0.5	period	C		
	30	% reduction			
Voltage interruptions ²	25	periods	C	EN 61000-4-11	Pass
	100	% reduction			
Surge ³	250	periods	B	EN 61000-4-5	Pass
	1.2/50 (8/20)	Tr/Th μs			
	1 (line to line)	kV (peak)			
Fast transients	2 (line to ground)	kV (peak)	B	EN 61000-4-4	Pass
	1	kV (peak)			
	5/50	Tr/Th ns			
	5	kHz (repetition rate)			

Notes: ¹The frequency range is scanned as specified. However, when specified in Annex A (EN 55024: 2010), an additional comprehensive functional test shall be carried out at a limited number of frequencies. The selected frequencies for conducted test are: 0.2, 1, 7.1, 13.56, 21, 27.12 and 40.68 MHz (±1 %).

²Changes to occur at 0 degree crossover point of the voltage waveform.

³When the manufacturer specifies protection measures and it is impractical to simulate these measures during the tests, then the applied test levels shall be reduced to 0.5 kV (line to line) and 1 kV (line to earth (ground)).

Section 3 Equipment under test (EUT) details

3.1 Applicant

Company name	Kontron Canada Inc
Address	4555 Ambroise-Lafortune
City	Boisbriand
Province/State	Quebec
Postal/Zip code	J7H 0A4
Country	Canada

3.2 Manufacturer

Company name	Kontron Canada Inc
Address	4555 Ambroise-Lafortune
City	Boisbriand
Province/State	Quebec
Postal/Zip code	J7H 0A4
Country	Canada

3.3 Sample information

Receipt date	March 24, 2015
Nemko sample ID number	133-000142; 133-000143

3.4 EUT information

Product name	Carrier Grade Rack Mount System
Model	CG2300
Serial number	CG23437000, CG23449013 used for surge retesting
Part number	CG2300A-APP
Power requirements	120/230Vac, 1200W
Description/theory of operation	The Kontron CG2300 is a carrier grade communication rack mount server supporting the Dual Intel® Xeon® E5-2600 v3 16-Core Series (32C, 64T per 2S E5 system). Features include: 16 slot, 8 channel support of DDR4 RDIMM/LRDIMM; Supports 2048GB maximum (with 128GB DIMM) Optimized for PCI-E IO card implementation with PCI-E riser and LP card support; Hot-Swap 2.5" SAS HDDs / SATA SSDs Hot swap, redundant fans Integrated BMC (iBMC) with advanced options Front panel: 1 serial, 1 USB 2.0 Rear panel: 2 USB 2.0, 2x USB 3.0, 1 onboard management NIC port Dual rear GbE NIC ports
Operational frequencies	32.768 kHz, 25 MHz, 33.33 MHz, 48 MHz, 50 MHz, 100 MHz, 125 MHz, 240 MHz, 625 MHz, 1.5 GHz, 1.5625 GHz, 2.5 GHz, 3 GHz, 4 GHz, 4.8 GHz, 5.15625 GHz and 6 GHz
Software details	Linux Centos

3.5 EUT exercise and monitoring details

lperf3 generates and monitors traffic, and Burnin exercises and monitors all modules in the system.

3.6 EUT setup details

Table 3.6-1: EUT sub assemblies

Description	Brand name	Model/Part number	Serial number	Rev.
Network Interface Card 4 port GbE	Intel	I350T4	LAB03383	--
AC-DC Power Supply	3Y	YM-2851VA01R	SA000N871504000028	A00
AC-DC Power Supply for surge retest	3Y	YM-2851VA01R	SA000N871504000033	A01

Table 3.6-2: EUT interface ports

Description	Qty.
RJ-45 GbE	2
RJ-45 GbE Management	1
DB15 RS-232	1
USB2	2
USB3	2
VGA	1

Table 3.6-3: Support equipment

Description	Brand name	Model/Part number	Serial number	Rev.
CG2300	Kontron	CG2300-BPP	CG23449013	--
AC-DC Power supply	3Y	YM-2651RA02R	SB000G831440004326	
Network Interface Card 4 port GbE	Intel	I350T4	3585822246	--
LCD Monitor	Dell	E173FPI	CN-0D5428-72872-588-9R65	A02
USB Keyboard	Viewsonic	VSACC27936-1M	GA1053107436	--
USB Mouse	Logitech	M-BJ58	CA34929092	--

Table 3.6-4: Inter-connection cables

Cable description	From	To	Length (m)
CATS UTP	Ethernet Port 1 EUT	Ethernet Port 1 Support Equip.	7
CATS UTP	Ethernet Port 2 EUT	Ethernet Port 2 Support Equip.	7
CATS UTP	Server Adapter Port 1 EUT	Server Adapter Port 1 Support	7
CATS UTP	Server Adapter Port 2 EUT	Server Adapter Port 2 Support	7
CATS UTP	Server Adapter Port 3 EUT	Server Adapter Port 3 Support	7
CATS UTP	Server Adapter Port 4 EUT	Server Adapter Port 4 Support	7
VGA Video Cable Shielded with ferrites both ends	VGA Port EUT	Monitor	2
AC Power Cable (unshielded)	Power Supply 1	AC Power Supply	2
AC Power Cable (unshielded)	Power Supply 2	AC Power Supply	2

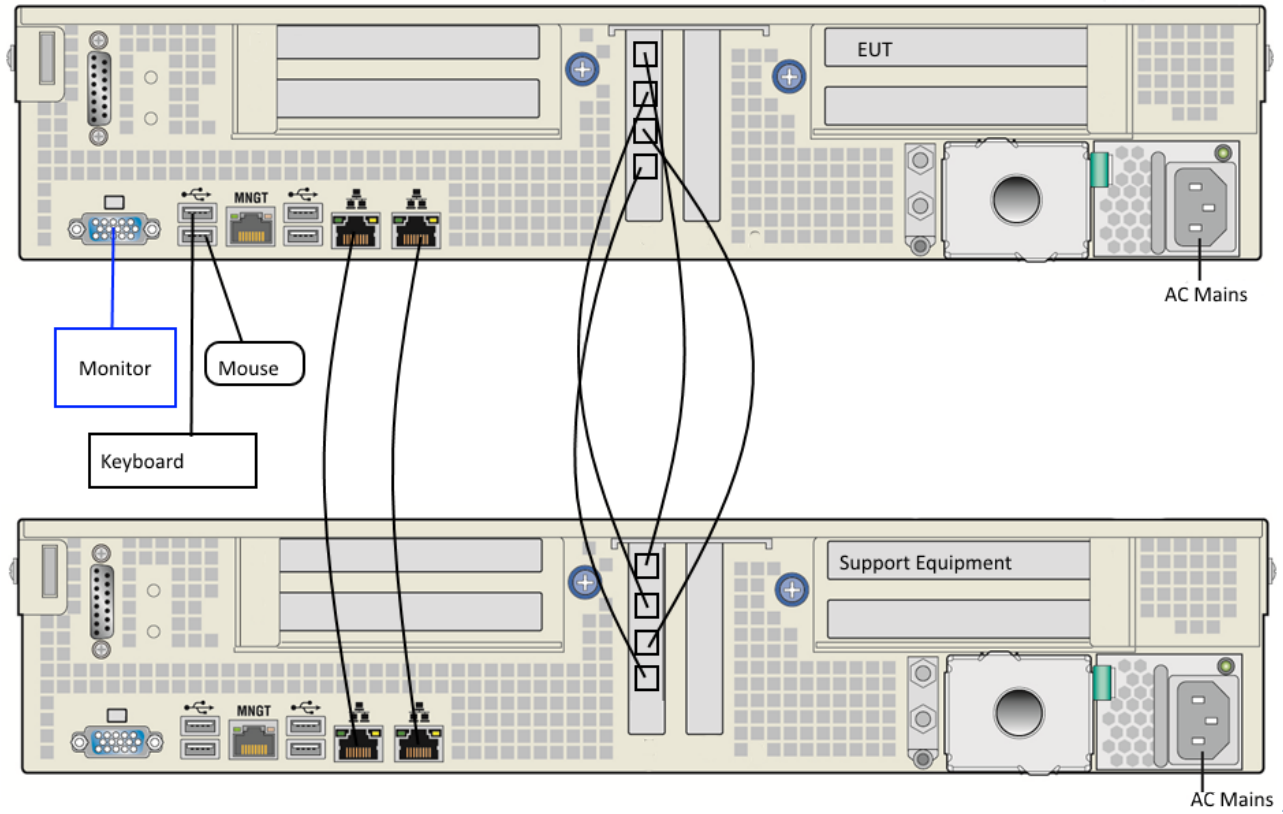


Figure 3.6-1: Setup diagram

Section 4 Engineering considerations

4.1 Modifications incorporated in the EUT

The following modifications were performed by client:

Surge absorbers DSP11, DSP12 across 1st common mode choke, changed from DSPL-301N-A21F to DSPL-201M-A21F, rated 300A, 200V.

Surge absorbers DSP13 and DSP14 across 2nd common mode choke, changed from DSPL-201M-A21F to rated 500A, 140V

Added C596 2200 pF between R739 and GND

Changed C525 from 0.1 uF to 1 uF between 3V3 VDO pin of controller and GND

Added C550 0.1uF between pin 57 of U503 and GND.

The power supply changes revision from A00 to A01 with these changes.

4.2 Technical judgment

None

4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

Section 5 Test conditions

5.1 Atmospheric conditions

Temperature	15–30 °C
Relative humidity	20–75 %
Air pressure	86–106 kPa

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

5.2 Power supply range

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages $\pm 5\%$, for which the equipment was designed.

Section 6 Measurement uncertainty

6.1 Uncertainty of measurement

Nemko Canada Inc. has calculated measurement uncertainty and is documented in EMC/MUC/001 "Uncertainty in EMC measurements." Measurement uncertainty was calculated using the methods described in CISPR 16-4 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC measurements; as well as described in UKAS LAB34: The expression of Uncertainty in EMC Testing. Measurement uncertainty calculations assume a coverage factor of $K=2$ with 95% certainty.

Section 7 Terms and definitions

7.1 Performance terms and definitions

<p>General performance criteria, Reference Clause 7.1 of EN 55024: 2010</p>	<p>The manufacturer has the obligation to express the performance criteria in terms which relate to the performance of his specific product when used as intended.</p> <p>The following performance criteria are applicable, and shall only be evaluated when the functions referred to are implemented.</p> <p>Examples of functions defined by the manufacturer to be evaluated during testing include, but are not limited to, the following:</p> <ul style="list-style-type: none"> – Essential operational modes and states; – Tests of all peripheral access (hard disks, floppy disks, printers, keyboard, mouse, etc.); – Quality of software execution; – Quality of data display and transmission; – Quality of speech transmission.
<p>Performance criterion A, Reference Clause 7.2 of EN 55024: 2010</p>	<p>During and after the test the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a minimum performance level specified by the manufacturer when the EUT is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the EUT if used as intended.</p>
<p>Performance criterion B, Reference Clause 7.3 of EN 55024: 2010</p>	<p>After the test, the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the EUT is used as intended. The performance level may be replaced by a permissible loss of performance.</p> <p>During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test.</p> <p>If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the EUT if used as intended.</p>
<p>Performance criterion C, Reference Clause 7.4 of EN 55024: 2010</p>	<p>During and after testing, a temporary loss of function is allowed, provided the function is selfrecoverable, or can be restored by the operation of the controls or cycling of the power to the EUT by the user in accordance with the manufacturer's instructions.</p> <p>Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.</p>

7.2 General definitions

7.2.1 EN 61000-4-2 (Electrostatic discharge)

Electrostatic discharge; ESD	A transfer of electric charge between bodies of different electrostatic potential in proximity or through direct contact.
Contact discharge method	A method of testing, in which the electrode of the test generator is held in contact with the EUT, and the discharge actuated by the discharge switch within the generator.
Air discharge method	A method of testing, in which the charged electrode of the test generator is brought close to the EUT, and the discharge actuated by a spark to the EUT.
Direct application	Application of the discharge directly to the EUT.
Indirect application	Application of the discharge to a coupling plane in the vicinity of the EUT, and simulation of personnel discharge to objects, which are adjacent to the EUT.
Coupling plane	A metal sheet or plate, to which discharges are applied to simulate electrostatic discharge to objects adjacent to the EUT. HCP: Horizontal Coupling Plane; VCP: Vertical Coupling Plane.

7.2.2 EN 61000-4-3: (Radiated, radio-frequency, electromagnetic field)

Continuous waves (CW)	Electromagnetic waves, the successive oscillations of which are identical under steady-state conditions, which can be interrupted or modulated to convey information.
Electromagnetic (EM) wave	Radiant energy produced by the oscillation of an electric charge characterized by oscillation of the electric and magnetic fields.
Field strength	The term "field strength" is applied only to measurements made in the far field. The measurement may be of either the electric or the magnetic component of the field and may be expressed as V/m, A/m or W/m ² ; any one of these may be converted into the others.
Sweep	Continuous or incremental traverse over a range of frequencies.

7.2.3 EN 61000-4-4 (Electrical fast transient/burst)

Burst	Sequence of a limited number of distinct pulses or an oscillation of limited duration.
Common mode (coupling)	Simultaneous coupling to all lines versus the ground reference plane.
Ground reference plane	Flat conductive surface whose potential is used as a common reference.
Coupling clamp	Device of defined dimensions and characteristics for common mode coupling of the disturbance signal to the circuit under test without any galvanic connection to it.
Transient	Pertaining to or designating a phenomenon or a quantity which varies between two consecutive steady states during a time interval which is short compared with the time-scale of interest.

7.2 General definitions, continued

7.2.4 EN 61000-4-5 (Surge)

Surge	Transient wave of electrical current, voltage, or power propagating along a line or a circuit and characterized by a rapid increase followed by a slower decrease.
Ground (reference)	Part of the Earth considered as conductive, the electrical potential of which is conventionally taken as zero, being outside the zone of influence of any earthing (grounding) arrangement.

7.2.5 EN 61000-4-6 (Immunity to conducted disturbances, induced by radio-frequency fields)

Clamp injection	Clamp injection is obtained by means of a clamp-on “current” injecting device on the cable.
Coupling/decoupling network CDN	Electrical circuit incorporating the functions of both the coupling and decoupling networks.
Sweep	Continuous or incremental traverse over a range of frequencies.

7.2.6 EN 61000-4-8 (Power frequency magnetic field)

Induction coil	Conductor loop of defined shape and dimensions, in which flows a current, generating a magnetic field of defined constancy in its plane and in the enclosed volume.
Immersion method	Method of application of the magnetic field to the EUT, which is placed in the centre of an induction coil.
Proximity method	Method of application of the magnetic field to the EUT, where a small induction coil is moved along the side of the EUT in order to detect particularly sensitive areas.
Ground	A flat conductive surface whose potential is used as a common reference for the magnetic field generator and the auxiliary equipment (the ground plane can be used to close the loop of the induction coil).

7.2.7 EN 61000-4-11 (Voltage dips, short interruptions and voltage variations)

Voltage dip	A sudden reduction of the voltage at a particular point of an electricity supply system below a specified dip threshold followed by its recovery after a brief interval.
Short interruption	A sudden reduction of the voltage on all phases at a particular point of an electric supply system below a specified interruption threshold followed by its restoration after a brief interval.

Section 8 Testing data

8.1 Radio-frequency electromagnetic field amplitude modulated

8.1.1 References

EN 61000-4-3: 2006 + A1: 2008 + A2: 2010

8.1.2 Test summary

Verdict	Pass		
Test date	February 24, 2015	Temperature	24 °C
Test engineer	Avul Nzenza	Air pressure	1009 mbar
Test location	Montreal	Relative humidity	34 %

8.1.3 Notes

None

8.1.4 Setup details

Table 8.1-1: Radio-frequency electromagnetic field amplitude modulated equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
3 m EMI test chamber	TDK	SAC-3	FA002532	1 year	Sept. 16/15
Biconical Antenna	Electro-mechanics co	3109	FA000805	1 year	Feb 13, 16
Bilog Antenna	Electro-mechanics co	3146	FA001455	1 year	Feb 13, 16
Signal generator	Rhode & Schwarz	SMC100A	FA002483	1 year	May 22/15
Starprobe (0.1–6000 MHz)	AR	FL7006	FA002054	1 year	June 5/15
Laser probe interface	AR	FI7000	FA002054	—	NCR
Directional coupler (80–1000 MHz)	AR	DC6180	FA001659	1 year	July 9/15
Power meter	Rhode & Schwarz	NRP	FA002485	1 year	June 5/15
Power sensor	Rhode & Schwarz	NRP-Z91	FA002488	1 year	June 5/15
Amplifier (80–1000 MHz, 250 W)	AR	250W1000A	FA002088	—	NCR

Notes: NCR - no calibration required

Table 8.1-2: Radio-frequency electromagnetic field amplitude modulated test software details

Manufacturer of Software	Details
Rhode & Schwarz	EMC32, Software for EMC Measurements, Version 8.53.0

Notes: None

8.1.5 Test data

Table 8.1-3: Swept frequency – Radio-frequency electromagnetic field amplitude modulated results

Step size increment	1 %
Dwell time¹	3 s
Antenna polarization	Vertical and Horizontal
Modulation	CW signal amplitude modulated (AM) with 80 % depth with a 1 kHz sine wave
EUT setup configuration	Floor standing
EUT position facing antenna	Front side, back side, left side and right side

Frequency range, MHz		Test level, V/m	Comments
80	1000	3	No degradation

Notes: ¹The dwell time at each frequency was not less than the time necessary for the EUT to be exercised and to be able to respond. The time to exercise the EUT is not interpreted as a total time of a program or a cycle but related to the reaction time in case of failure of the EUT.

8.1.6 Setup photo

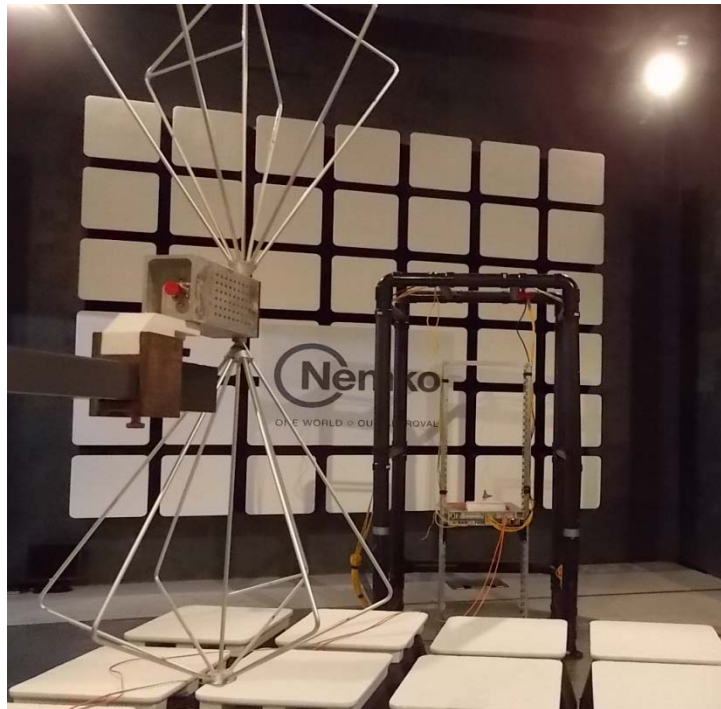


Figure 8.1-1: Radio-frequency electromagnetic field amplitude modulated setup photo



Figure 8.1-2: Radio-frequency electromagnetic field amplitude modulated setup photo

8.2 Radio-frequency continuous conducted

8.2.1 References

EN 61000-4-6: 2009

8.2.2 Test summary

Verdict	Pass		
Test date	March 24, 2015 and May 26, 2015	Temperature	24 °C
Test engineer	Avul Nzenza and Daniel Hynes	Air pressure	1009 mbar
Test location	Montreal	Relative humidity	34 %

8.2.3 Notes

None

8.2.4 Setup details

Table 8.2-1: Radio-frequency continuous conducted equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
Amplifier	AR	150A220	FA001744	—	NCR
Signal generator	Rhode & Schwarz	SMC100A	FA002484	1 year	July 10/15
6 dB attenuator	Inmet	2N200W-06	FA002482	1 year	July 10/15
CDN-M3	FCC	FCC-801-M3-16A	FA002065	1 year	July 14/15
CDN-M3	FCC	FCC-801-M3-16	FA001776	1 year	June 5/15
EM injection clamp	FCC	F-2031-23MM	FA002491	1 year	June 9/15
Directional coupler (0.01–250 MHz)	AR	DC2600A	FA001856	1 year	July 9/15
Power meter	Rhode & Schwarz	NRP	FA002486	1 year	June 27/15
Power sensor	Rhode & Schwarz	NRP-Z91	FA002489	1 year	June 27/15

Notes: NCR - no calibration required

Table 8.2-2: Radio-frequency continuous conducted test software details

Manufacturer of Software	Details
Rhode & Schwarz	EMC32, Software for EMC Measurements, Version 8.53.0

Notes: None

8.2.5 Test data

Table 8.2-3: Swept frequency – Radio-frequency continuous conducted results

Frequency range:	0.15–80 MHz		
Step size increment:	1 %		
Dwell time¹:	3 s		
Signal level:	3 V _{RMS}		
Modulation:	CW signal amplitude modulated (AM) with 80 % depth with a 1 kHz sine wave		
Ports investigated	Coupling method	50 Ω termination point	Comments
AC Mains	CDN – M3	CDN-M3 (AE)	No degradation
CAT5 UTP (Server Adapter port1)	EM injection clamp	CDN-M3 (AE)	No degradation
CAT5 UTP (Ethernet Port 1 EUT)	EM injection clamp	CDN-M3 (AE)	No degradation

Notes: ¹The dwell time at each frequency was not less than the time necessary for the EUT to be exercised and to be able to respond. The time to exercise the EUT is not interpreted as a total time of a program or a cycle but related to the reaction time in case of failure of the EUT.

8.2.6 Setup photo

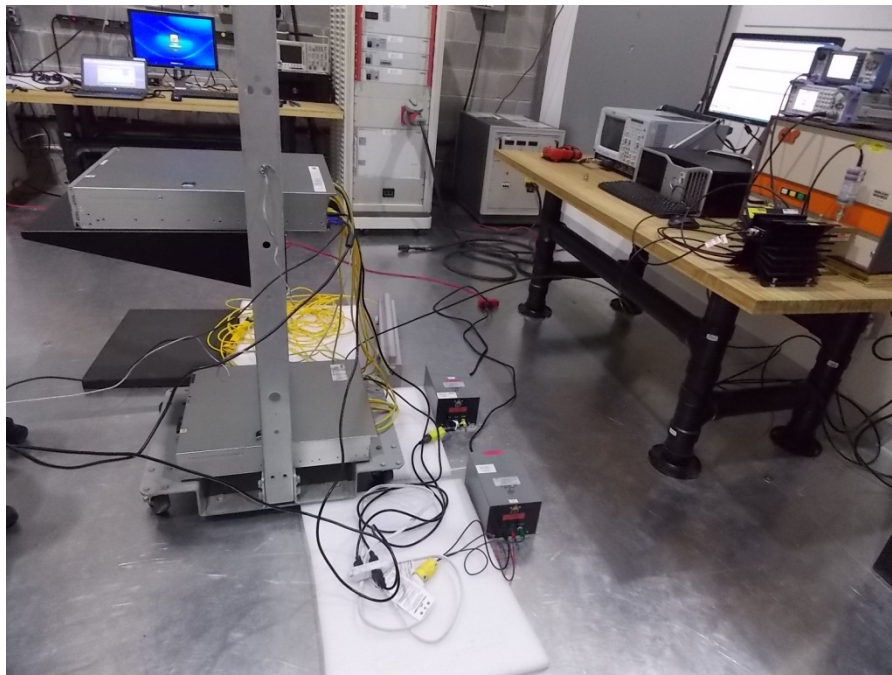


Figure 8.2-1: Radio-frequency continuous conducted setup photo

8.3 Electrostatic discharge

8.3.1 References

EN 61000-4-2: 2009

8.3.2 Test summary

Verdict	Pass		
Test date	February 26, 2015	Temperature	23 °C
Test engineer	Avul Nzenza	Air pressure	1015 mbar
Test location	Montreal	Relative humidity	33 %

8.3.3 Notes

None

8.3.4 Setup details

Table 8.3-1: Electrostatic discharge equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
ESD gun	Keytek	MZ-15/EC	FA001983	1 year	March 6/15

Notes: None

8.3.5 Test data

Table 8.3-2: Electrostatic discharge results

EUT setup configuration:	Floor standing		
ESD repetition rate:	1 pulse per second		
Discharges:	25 contact discharges and 10 air discharges at each polarity		
Contact discharge^{1 and 2}	Test voltage (±kV)	Comments	
Please refer to "Electrostatic discharge test location points" photos of this section	4	No degradation	
Indirect discharge^{1 and 2}	Test voltage (±kV)	Comments	
HCP (all sides)	4	No degradation	
VCP (all sides)	4	No degradation	
Air discharge	Test voltage (±kV)	Comments	
Please refer to "Electrostatic discharge test location points" photos of this section	2, 4, 8	No degradation	

Notes: ¹For contact discharge, the requirement to apply ESD discharges at lower levels, as defined in Clause 5 of IEC 61000-4-2, is not applicable.

²The EUT was exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points. For table-top equipment one of the test points was the centre front edge of the horizontal coupling plane, which was subjected to at least 50 indirect discharges (25 of each polarity). All other test points received at least 50 direct contact discharges (25 of each polarity). If no direct contact test points were available, then at least 200 indirect discharges were applied in the indirect mode.

Electrostatic discharges were applied only to those points and surfaces of the EUT which are expected to be touched during usual operation, including user access, as specified in the user manual, for example cleaning or adding consumables when the EUT is powered.

8.3.5 Test data, continued

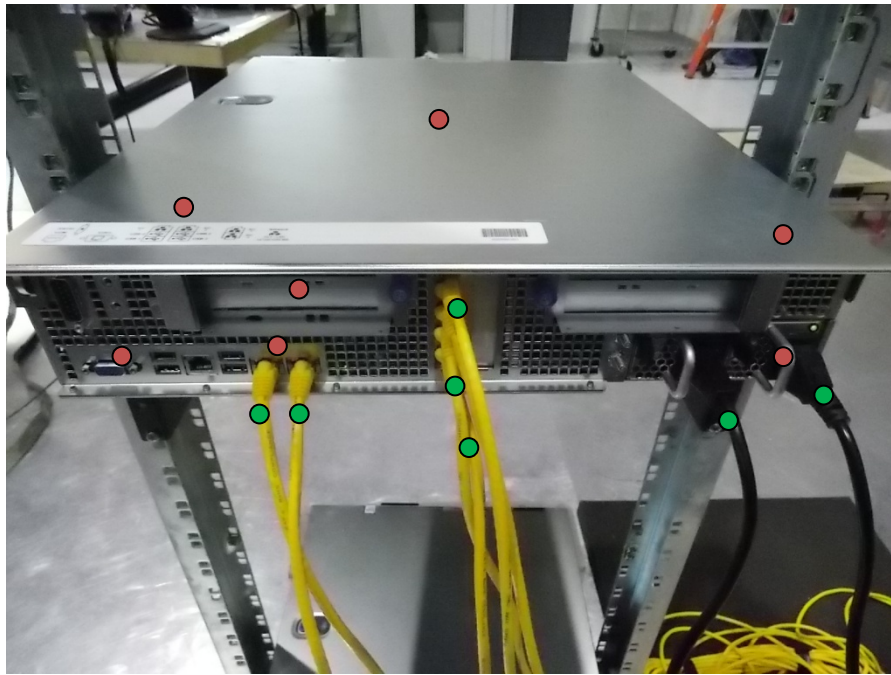


Figure 8.3-1: Electrostatic discharge test location point's photo

Red points = contact discharge
Green points = air discharge

8.3.5 Test data, continued



Figure 8.3-2: Electrostatic discharge test location point's photo

Red points = contact discharge
Green points = air discharge

8.3.6 Setup photo



Figure 8.3-3: Electrostatic discharge setup photo

8.4 Surge

8.4.1 References

EN 61000-4-5: 2006

8.4.2 Test summary

Verdict	Pass		
Test date	May 25, 2015	Temperature	23.7 °C
Test engineer	Daniel Hynes	Air pressure	1014.7 mbar
Test location	Montreal	Relative humidity	49.8 %

8.4.3 Notes

None

8.4.4 Setup details

Table 8.4-1: Surge equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
Surge/EFT generator	TESEQ	NSG 3060	FA002495	1 year	Oct. 9/15
Surge/EFT coupler/decoupler	TESEQ	NSG 3063	FA002497	1 year	Oct. 9/15

Notes: None

Table 8.4-2: Surge test software details

Manufacturer of Software	Details
Teseq	NSG300, Version 1.2.0

Notes: None

8.4.5 Test data

Table 8.4-3: Surge at AC power ports results

Open circuit voltage (T₁ / T₂):	1.2/50 μs (T ₁ = front time, T ₂ = time to half value)		
Short circuit current (T₁ / T₂):	8/20 μs (T ₁ = front time, T ₂ = time to half value)		
Surge pulse interval:	30 s (Phase to Neutral) and 60 s (Phase to ground / Neutral to ground)		
Number of pulses:	5 positive and 5 negative		
Test port	Coupling	Test voltage (±kV)	Comments
AC Mains Input	Phase to Neutral	0.5, 1	No degradation
	Phase to ground	0.5, 1, 2	No degradation
	Neutral to ground	0.5, 1, 2	No degradation

Notes:

- **Phase to neutral coupling** : Surge applied with generator output impedance set to 2 Ω
- **Phase/neutral to ground coupling** : Surge applied with generator output impedance set to 12 Ω
- Surge applied synchronous (relation to power supply): 0, 90, 180, and 270°

8.4.6 Setup photo



Figure 8.4-1: Surge setup photo

8.5 Fast transients

8.5.1 References

EN 61000-4-4: 2004 + A1: 2010

Special Note: A more relevant publication of EN 61000-4-4 has been applied for this assessment.

8.5.2 Test summary

Verdict	Pass		
Test date	February 26, 2015 and May 25, 2015	Temperature	23 °C
Test engineer	Avul Nzenza and Daniel Hynes	Air pressure	1015 mbar
Test location	Montreal	Relative humidity	33 %

8.5.3 Notes

None

8.5.4 Setup details

Table 8.5-1: Fast transients equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
Surge/EFT generator	TESEQ	NSG 3060	FA002495	1 year	Oct. 9/15
Surge/EFT coupler/decoupler	TESEQ	NSG 3063	FA002497	1 year	Oct. 9/15

Notes: NCR - no calibration required

Table 8.5-2: Fast transients test software details

Manufacturer of Software	Details
Teseq	NSG300, Version 1.2.0

Notes: None

8.5.5 Test data

Table 8.5-3: Fast transients results

Wave shape (Tr / Td):	5/50 ns (Tr = rise time, Td= duration time)	
Repetition frequency⁴:	5 kHz	
Burst duration:	15 ms	
Burst period:	300 ms	
Test duration:	60 s	
Test port	Test voltage (±kV)	Comments
AC input ¹	0.5, 1	No degradation
CATS UTP (Server Adapter port1)	0.5	No degradation
CATS UTP (Ethernet Port 1 EUT)	0.5	No degradation

- Notes:
- ¹Transient applied asynchronous (relation to power supply)
 - ²The test voltage was applied simultaneously between a ground reference plane and all of the power supply terminals and the protective or functional earth port on the EUT cabinet
 - ³The test voltage was applied via capacitive coupling clamp
 - ⁴ For xDSL equipment, the repetition frequency for EFT testing was 100 kHz
- If the EUT contained several ports with the same particular interface, only one was tested
 - Multiconductor cables, such as a 50-pair telecommunication cable, were tested as a single cable.

8.5.6 Setup photos



Figure 8.5-1: Fast transients setup photo

8.6 Voltage dips and voltage interruptions

8.6.1 References

EN 61000-4-11: 2004

8.6.2 Test summary

Verdict	Pass		
Test date	May 25, 2015	Temperature	23.7 °C
Test engineer	Daniel Hynes	Air pressure	1014.7 mbar
Test location	Montreal	Relative humidity	49.8 %

8.6.3 Notes

None

8.6.4 Setup details

Table 8.6-1: Voltage dips and voltage interruptions equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
Three phase power system	TESEQ	ProfLine 2115-400	FA002516	1 year	June 7/15

Notes: None

Table 8.6-2: Voltage dips and voltage interruptions test software details

Manufacturer of Software	Details
TESEQ	WIN2110SII, P/N CIC924, Version 2.2.0.8, July 15, 2010

Notes: None

8.6.5 Test data

Table 8.6-3: Voltage dips results

Variation/dip repetition:	Sequence of three dips/interruptions with an interval of 10 seconds between each test		
Test port	Voltage reduction (%)	Periods	Comments
AC Mains	100	0.5	No degradation
	30	25	No degradation

Notes: Changes occurred at the 0 crossings of the voltage waveform

Table 8.6-4: Voltage interruptions results

Variation/dip repetition:	Sequence of three dips/interruptions with an interval of 10 seconds between each test		
Test port	Voltage reduction (%)	Periods	Comments
AC Mains	100	250	EUT power cycled

Notes: Changes occurred at the 0 crossings of the voltage waveform

8.6.6 Setup photo



Figure 8.6-1: *Voltage dips and voltage interruptions setup photo*

Section 9 EUT photos

9.1 External photos



Figure 9.1-1: Front view photo



Figure 9.1-2: Rear view photo



Figure 9.1-3: Side view photo

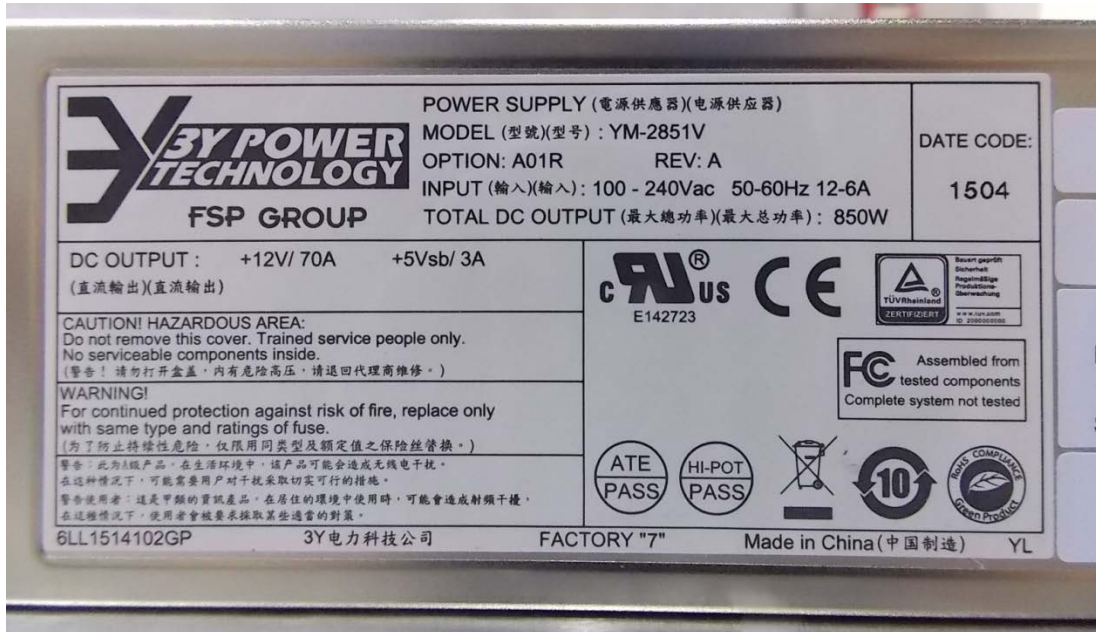


Figure 9.1-4: Other Photo



Figure 9.1-5: Other Photo