



Descriptive Report and Test Results

MASTER CONTRACT: 251006

REPORT: 2345690

PROJECT: 70024647

Edition 1: October 15, 2010; Project 2345690 - Toronto
Issued by A. Yeung, P. Eng.

Contents: Certificate of Compliance – Pages 1 of 2
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Edition 2: April 24, 2012; Project 2502294 - Toronto
Issued by A. Yeung, P. Eng.

Report re-issued (to cover alternate power supply H1U-6250P of EMACS)

Labels added: Att. 1-3 to 1-6

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Edition 3: February 27, 2013; Project 2605834 - Toronto
Issued by A. Yeung, P. Eng.

Report re-issued
(to update F1=0 Ω ; F2=Littelfuse P/N 1812L050 and Power Supply P/N to IS-350R2UP)
Schematic replaced: Att. 3-67, 3-68
Component Specifications added: Att. 6-53, 5-54

Contents: Certificate of Compliance – Pages 1 of 2
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Label – Att. 1-1 to 1-6
Photos – Att. 2-1 to 2-48
Schematics – Att. 3-1 to 3-86
Constructions – Att. 4-1 to 4-30
User Manual – Att. 5-1 to 5-86
Components Specification – Att. 6-1 to 6-54

Edition 4: February 13, 2015; Project 70020527 – Toronto
Issued by: Anthony Yeung, P.Eng.

Report re-issued:
– To add alternative fan module and power supply to model TMG800 and TMP800
– Change rating of TMG800 and TMP800 to 1.1A at 100-240 Vac
Photos pages added: Att. 2-49 to 2-58
Components Specification pages added: Att. 6-55 to 6-81

Contents: Certificate of Compliance – Pages 1 of 2
Supplement to Certificate of Compliance – Page 1
Description and Tests – Pages 1 to 55
Label – Att. 1-1 to 1-6
Photos – Att. 2-1 to 2-58
Schematics – Att. 3-1 to 3-86
Constructions – Att. 4-1 to 4-30
User Manual – Att. 5-1 to 5-86
Components Specification – Att. 6-1 to 6-81

Edition 5: April 10, 2015; Project 70024647 – Toronto
Issued by: Anthony Yeung, P. Eng.

Report re-issued:

- To add alternative AC and DC power supply to TMG800/TMP800
- Photographs added: Att. 2- 59 to 2-63
- Schematics added Att. 3-87 to 3-94
- Constructions added: Att. 4-31, 4-36

Contents: Certificate of Compliance – Pages 1 of 2
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Photos – Att. 2-1 to 2-63
Schematics – Att. 3-1 to 3-96
Constructions – Att. 4-1 to 4-36
User Manual – Att. 5-1 to 5-86
Components Specification – Att. 6-1 to 6-81

PRODUCTS

CLASS 3862 13 – Information Technology Equipment

CLASS 3862 93 - Information Technology Equipment - CERTIFIED TO U.S. STANDARDS

Part A:

Tmedia Media Gateway Series; TMG800 (1U BOX), Rated:100-240 Vac, 47-63 Hz, 1.1 A or -46 to -65Vdc, 1.5A

Tmedia Media Gateway Series; TMP800 (1U BOX), Rated:100-240 Vac, 47-63 Hz, 1.1 A or -46 to -65Vdc, 1.5A

Part B:

Tmedia Media Gateway Series; TMG3200 (1U BOX), Rated: -46 to -65Vdc, 2.8A

TMP6400 (1U BOX), Rated: -46 to -65Vdc, 2.6A

Tmedia Media Gateway Series; TMG3200 (2U BOX), Rated: 100-240Vac, 47-63Hz, 1.1A or -46 to -65Vdc, 2.8A

Tmedia Media Gateway Series; TMP6400 (2U BOX), Rated: 100-240Vac, 47-63Hz, 1.0A or -46 to -65Vdc, 2.6A

Part C:

Tmedia Media Gateway Series; TMG5800 (2U BOX), Rated: 100-240Vac, 47-63Hz, 2.8A

Tmedia Media Gateway Series; TMP5900 (2U BOX), Rated: 100-240Vac, 47-63Hz, 2.8A

Note: The above systems are rated at 25°C ambient temperature.

APPLICABLE REQUIREMENTS

CAN/CSA-C22.2 No. 60950-1-07 (Second Edition), Amendment 1: 2011 (MOD) – Information Technology Equipment – Safety – Part 1: General Requirements

ANSI/UL Std No. 60950-1-2011 (Second Edition) – Information Technology Equipment – Safety – Part 1: General Requirements

MARKINGS

The manufacturer is required to apply the following markings:

- Products shall be marked with the markings specified by the particular product standard.
- Products certified for Canada shall have all Caution and Warning markings in both English and French.

Additional bilingual markings not covered by the product standard(s) may be required by the Authorities Having Jurisdiction. It is the responsibility of the manufacturer to provide and apply these additional markings, where applicable, in accordance with the requirements of those authorities.

ALTERATIONS

Markings as above appear on each unit.

FACTORY TESTS

See Design Manual for details of test required.

For voltage rated at 30 Vrms or 42.4 to 60 V peak and below - Not applicable.

- (a) Production-Line Dielectric Voltage-Withstand Test: As described in the Design Manual for grounded units up to 250V ac and for safety isolation transformers in power supplies.
- (b) Production-Line Earthing-Continuity Test: As described in Design Manual.

Equipment: The equipment at the conclusion of manufacture, before shipment shall withstand for one second, without breakdown, the application of 1500Vac between live parts and exposed non-current-carrying metal parts. The factory test may be made at existing room temperature.

As an alternative, the equivalent dc voltage (2121V) may be used.

Warning: The factory test(s) specified may present a hazard of injury to personnel and/or property and should only be performed by persons knowledgeable of such hazards and under conditions designed to minimize the possibility of injury.

SPECIAL INSTRUCTIONS FOR FIELD SERVICES

Component descriptions marked with either the “(INT)” or “(INT*)” identifiers may be substituted with other components providing the requirements specified under the notes in the “Description” are complied with.

COMPONENT SPECIAL PICKUP

Component descriptions marked with the identifier “(CT)” are subject to annual pickup and Conformity Testing.

DESCRIPTION

Notes:

1. Component Substitution
 - a) Critical components (those identified by mfr name, cat no), which are NOT identified with either “INT” or “INT*” are not eligible for substitution without evaluation and report updating.
 - b) The term “INT” means a “Certified” and/or “Listed” (or a “Recognized” and/or “Accepted”) component may be replaced by one “Certified” and/or “Listed” by an organization (accredited by OSHA/SCC), for the same application; providing the applicable country identifiers are included and requirements in item “d” below are complied with.
 - c) The term “INT*” means a “Recognized” and/or “Accepted” component may be replaced by one “Recognized” and/or “Accepted” by an organization (accredited by OSHA/SCC), for the same application, providing the applicable country identifiers are included, the component is **also** CSA Certified, the requirements in item “d” below are complied with and any “conditions of suitability” for the component (as recorded in this descriptive report) are complied with.
 - d) Components which have been substituted, must be of an equivalent rating, configuration (size, orientation, mounting) and the applicable minimum creepage and clearance distances are to be maintained from live parts to bonded metal parts and secondary parts.
 - e) Substitution of a “Certified” and/or “Listed” component with a component that is “Recognized” or “Accepted” is not permitted without evaluation and report updating.

The TelcoBridges Tmedia Media Gateway Series is carrier-grade media gateway that meets the needs of service providers looking to drive convergence between TDM and IP networks, consolidating multiple devices for signaling, connectivity and IVR with a single device.

The Tmedia Media Gateway Series consists of three groups, Low Density, High Density and High Density with PC Server. The High Density can come in 1U or 2U form factors. The Low Density has only 1U form factory and the High Density with PC Server has only 2U form factors.

The High Density 2U Series has two power supply slots that it can be configured with one or two AC or DC power supplies. Each power supply has an independent power input source. The second power supply is redundant to provide a backup and load sharing purpose.

The Tmedia Media Gateway Series models are:

- Low Density – TMG800 (1U BOX)
- High Density – TMG3200/TMP6400 (1U BOX) and TMG3200/TMP6400 (2U BOX)
- High Density with PC Server – TMG5800/TMP5900 (2U BOX)

Note: The main difference between the TMG and TMP versions is that the TMP has not software installed.

The differences between 1U and 2U versions are the chassis, power supply and the fan module.

The Tmedia Media Gateway Series normal configurations are:

- Low Density – 8x Trunk E1/T1, 3x 10/100/1G Ethernet ports, DSP Processing, 1 Voip Module
- High Density – 16x E1/T1, 4x 10/100/1G Ethernet, MBL port, Linux host processor, Dual Voip Module
- High Density with PC Server – Same as High Density with Intel dual quad core Xeon cpu and special software

The following power assembly configurations are possible:

- Two redundant AC power assemblies (TMP800/TMG800 (1U BOX), TMG3200/TMP6400 (2U BOX) and TMG5800/TMP5900 (2U BOX))
- Two redundant DC power assemblies (TMG3200/TMP6400 (2U BOX) and TMG5800/TMP5900 (2U BOX))
- One DC power assembly (TMG800 (1U BOX) and TMG3200/TMP6400 (1U BOX))

There are no direct connections to a Telecommunication Network (TNV).

The equipment is rated for a maximum ambient temperature of 55°C.

Part A: Model: TMG800/TMP800 (1U BOX) – AC/DC

Object/part No.	Manufacturer/ trademark	type/model	Technical data	mark(s) of conformity ¹⁾
+ Chassis / assembly	TelcoBridges	Dimension: approx. 11 (D) by 17.4 (W) by 1.8 (H) inch Part#: 2000-90063	Material: Metal sheet; various thickness; Finish: 0.9mm Satin Coat; Secured with screws	See Att. 2-1 to 2-4; Att. 4-1 to 4-7
+ 3 Fan holder	Various	Dimension: approx. 0.5 (D) by 5.8 (W) by 1.6 (H) inch Part#: 2000-90062	Material: Metal sheet; various thickness; Finish: 0.9mm Satin Coat; Secured with screws	See Att. 2-4 and 2-7; Att. 4-8
Power supply, DC	SunPower	DC-DC, Switching power supply Part#: SDX-6250-48	Rating: 40-65V; 9Amax; Various output voltages; Total: 250WMax	UL, E129733 TUV, CE See Att. 2-14; Att. 6-1 to 6-3
Alternate AC power Supply for AC input option	EMACS	Part#: H1U-6250P	Rating: 100-240 Vac, 47~63 Hz, 4.0A-2.0A, 250 Watts (max.)	cULus
Alternate (Ed. 4) AC power Supply for AC input option (x2)	ETASIS Electronics	EFRP-S207	Input: 100-240 Vac, 47~63 Hz, 3.0A-1.5A, 200 Watts (max.) Output: 12Vdc/16A, -12Vdc/0.5, 5Vsb/2A	cURus (E176239) TUV.
Alternate (Ed. 5) AC power Supply for AC input option (x2)	ETASIS Electronics	EFRP-S2207-H	Input: 100-240 Vac, 47~63 Hz, 3.0A-1.5A, 200 Watts (max.) Output: 12Vdc/16A, -12Vdc/0.5A, 5Vsb/2A; +3.3V/20A; 5Vdc, 20A	cURus TUV.
Alternate (Ed.5) AC power Supply for AC input option	Brick	TP-AC300-12	Input: 85 to 264 Vac, 250 W. max Output 12Vdc, 25Amp max, no fan.	cURus
Fan (x3)	Sunon	GM Series High Speed 40mm 17 CFM Vapo Bearing 8 Motor Pole Fan; Part#: GM1204PQV1-8A	Rating: 12 VDC; Dimensions: 40 x 40 x 28 mm	UL See Att. 2-7
Fan (x3) Alternate (Ed. 4)	Sunon	SG40281B1-000U-S99	Rating: 12 Vdc, 520mA, 6.24W; 25.6 CFM, 1.45Inch-H ₂ O Dimensions: 40 x 40 x 28 mm	cURus (E77551)

Object/part No.	Manufacturer/ trademark	type/model	Technical data	mark(s) of conformity ¹⁾
+ Motherboard	Various	Material: FR-4; Measured 10.9 by 8.7 by 0.06 inch thick approx.; 6-layer Part#: 1700-00063	94V-0	UL94 V-0 See Att. 2-5 and 2-6
+ Connector; J2	Molex	4.2mm pitch mini-fit Jr. Header, Dual row, vertical, 20 circuits; Part#: 39-29-9202	Housing: PA Polyamide Nylon 6/6; 94V-2	UL, E29179; CSA, LR19980; TUV, R72081037 See Att. 6-4 to 6-5
+ Connector; J4	Bel Stewart	EMI-RFI shielded, ESD grounded, 2 port PCB Harmonica CAT 5 Jack, Non-flange Part#: SS-7188S-A-PGA-BA	Housing; Thermoplastic; 94V-0	UL See Att. 6-6
+ Connector; J5, J6	Amphenol	High speed RJ45, modular jack, 8 position, 8 contacts, shielded with LEDs; 1 port or 2 ports Part#: RJHS-5381 and RJHSE-5381-02	Housing: Thermoplastic, PA 4/6; 94V0	UL See Att. 6-7 to 6-8
+ Connector; J10, J13	Amphenol	4 ports, high speed, modular jack, 8 position, 8 contacts, shielded with LEDs. Part#: RJHSE-5381-04	Housing: Thermoplastic, PA 4/6; 94V0	UL See Att. 6-9
+ DC-DC convertors; PS1-PS7	Texas Instruments	PTH series DC/DC convertor, Input non-isolated wide output adjust power module; Part#: PTV05020W, PTH05050W, PTV03020W, PTH03050W;	Meets 94V-0	SELV UL, CSA, VDE
+ Heatsink	Radian Heatsinks	Black ICE Series; Full Bricks Dimensions: 4.6'' x 2.4'' x 0.45'' Part#: HS1596EB	Material: Fin Aluminum with black anodize plating	Evaluated with product; See Att. 2-5
+ Protection device; F2-F33	Tyco	PolySwitch, PTC Device Part#: TRF250-145U	Rating: 60Vdc, 3A; Fault voltage: 250Vrms	UL, CSA, TUV; See Att. 2-5 and Att. 6-10

Part B:

Model: TMG3200 / TMP6400 (1U BOX) - DC

Object/part No.	Manufacturer/ trademark	type/model	Technical data	mark(s) of conformity ¹⁾
+ Chassis / assembly (1U BOX)	TelcoBridges	Dimension: approx. 15.9 (D) by 16.8 (W) by 1.7 (H) inch Part#: 2000-90033	Material: Metal sheet; various thickness; Finish: 0.9mm Satin Coat; Secured with screws	See Att. 2-10 to 2-13; Att. 4-9 to 4-14
+ 4 Fan holder	Various	Dimension: approx. 0.5 (D) by 5.8 (W) by 1.6 (H) inch Part#: 2000-90035	Material: Metal sheet; various thickness; Finish: 0.9mm Satin Coat; Secured with screws	See Att. 2-13 and 2-17; Att. 4-14
Power supply, DC	SunPower	DC-DC, Switching power supply Part#: SDX-6250-48	Rating: 40-65V; 9Amax; Various output voltages; Total: 250WMax	UL, E129733 TUV, CE See Att. 2-14; Att. 6-1 to 6-3
Fan (x4)	Sunon	GM Series High Speed 40mm 17 CFM Vapo Bearing 8 Motor Pole Fan; Part#: GM1204PQV1-8A	Rating: 12 VDC; Dimensions: 40 x 40 x 28 mm	UL See Att. 2-17
+ Motherboard	Various	Material: FR-4; Measured 13.6 by 11.8 by 1.6mm thick approx.; 14-layer Part#: 1700-00039	94V-0	UL94 V-0 See Att. 2-15 and 2-16
Fuse F1	Various	0 ohm	-	See Att. 3-68
Fuse F2	Littelfuse	Resettable PTC 1812L050 series	0.41 A holding current	CSA, UL See Att. 3-67; Att. 6-53; 6-54
+ Connector; J2	Molex	4.2mm pitch mini-fit Jr. Header, Dual row, vertical, 20 circuits; Part#: 39-29-9202	Housing: PA Polyamide Nylon 6/6; 94V-2	UL, E29179; CSA, LR19980; TUV, R72081037 See Att. 6-4 to 6-5
+ Connector; J4	Bel Stewart	EMI-RFI shielded, ESD grounded, 2 port PCB Harmonica CAT 5 Jack, Non-flange Part#: SS-718802S	Housing; Thermoplastic; 94V- 0	UL See Att. 6-6

Object/part No.	Manufacturer/ trademark	type/model	Technical data	mark(s) of conformity ¹⁾
+ Connector; J7	Amphenol	4 ports, high speed, modular jack, 8 position, 8 contacts, shielded with LEDs. Part#: RJHSE-5381-04	Housing: Thermoplastic, PA 4/6; 94V0	UL See Att. 6-9
+ DC-DC convertors; PS1, PS7, PS8	Texas Instruments	PTH series DC/DC convertor, Input non-isolated wide output adjust power module; Part#: PTH05050W,	Meets 94V-0	SELV UL, CSA, VDE
+ DC-DC convertors; PS3, PS4	Texas Instruments	PTV series DC/DC convertor, Input non-isolated wide output adjust power module; Part#: PTV03020W	Meets 94V-0	SELV UL, CSA, VDE
+ DC-DC convertors; PS5, PS6	Texas Instruments	ATH series DC/DC convertor, Input non-isolated wide output adjust power module; Part#: ATH030A0X3	Meets 94V-0	SELV UL, CSA, VDE
+ Heatsink	Radian Heatsinks	Black ICE Series; Full Bricks Dimensions: 4.6'' x 2.4'' x 0.45'' Part#: HS1596EB	Material: Fin Aluminum with black anodize plating	Evaluated with product; See Att. 2-5
+ Display card PCB	Various	Material: FR-4; Measured 7.5 by 1.5 by 0.06 inch thick approx.; 14-layer Part#: 1700-00043	94V-0	UL94 V-0 See Att. 2-24 and 2-25
+ 16T1/E1 card PCB	Various	Material: FR-4; Measured 63 by 6.5 by 0.06 inch thick approx.; 6-layer Part#: 1700-00044	94V-0	UL94 V-0 See Att. 2-20 and 2-21
+ Protection device; F1-F64	Tyco	PolySwitch, PTC Device Part#: TRF250-145U	Rating: 60Vdc, 3A; Fault voltage: 250Vrms	UL, CSA, TUV; See Att. 2-20 and Att. 6-10
+ Connector; J1	Molex	High speed RJ45, Stacked modular jack, 2x8 position, shielded with LEDs; Part#: 44520-0003	Housing: Polyester (PBT); 94V0	UL See Att. 6-11 to 6-12

TMG3200 / TMP6400 (2U BOX) - DC/AC

Object/part No.	Manufacturer/ trademark	type/model	Technical data	mark(s) of conformity ¹⁾
+ Chassis / assembly (2U BOX)	TelcoBridges	Dimension: approx. 15.9 (D) by 16.8 (W) by 3.5 (H) inch Part#: 2000-90037	Material: Metal sheet; various thickness; Finish: 0.9mm Satin Coat; Secured with screws	See Att. 2-26 to 2-28; Att. 4-15 to 4-20
+ 2 Fan holder	Various	Dimension: approx. 0.45 (D) by 6.7 (W) by 3.1 (H) inch Part#: 2000-90039	Material: Metal sheet; various thickness; Finish: 0.9mm Satin Coat; Secured with screws	See Att. 2-33; Att. 4-21
Power supply, DC	Zippy Technology	Redundancy DC-DC, Switching power supply Part#: DR2G-6350F	Rating: -36 to - 72Vdc; 35Amax; Various output voltages; Total: 350WMax	UL, E143756 TUV, CE See Att. 2-28 and 2-29; Att. 6-13 to 6-14
Power supply, AC (Alternate)	iStarUSA	Redundancy AC-DC, Switching power supply Part#: IS-350R2UP	Rating: 100-240Vac; 35Amax; Various output voltages; Total: 350WMax	UL, E155314 TUV, CB, CE See Att. 2-30 to 2-32; Att. 6-15 to 6-20
Fan (x2)	Delta	Ball Bearing type, High Speed 80mm 67 CFM Part#: FFB0812SH	Rating: 12 VDC; Dimensions: 80 x 80 x 25.4 mm; 94V-0	UL, CSA See Att. 2-33 Att. 6-21
+ Motherboard	Various	Material: FR-4; Measured 13.6 by 11.8 by 1.6mm thick approx.; 14- layer Part#: 1700-00039	94V-0	UL94 V-0 See Att. 2-15 and 2-16
+ Connector; J2	Molex	4.2mm pitch mini-fit Jr. Header, Dual row, vertical, 20 circuits; Part#: 39-29-9202	Housing: PA Polyamide Nylon 6/6; 94V-2	UL, E29179; CSA, LR19980; TUV, R72081037 See Att. 6-4 to 6-5
+ Connector; J4	Bel Stewart	EMI-RFI shielded, ESD grounded, 2 port PCB Harmonica CAT 5 Jack, Non-flange Part#: SS-718802S	Housing; Thermoplastic; 94V-0	UL See Att. 6-6
+ Connector; J7	Amphenol	4 ports, high speed, modular jack, 8 position, 8 contacts, shielded with LEDs. Part#: RJHSE-5381-04	Housing: Thermoplastic, PA 4/6; 94V0	UL See Att. 6-9

Object/part No.	Manufacturer/ trademark	type/model	Technical data	mark(s) of conformity ¹⁾
+ DC-DC convertors; PS1, PS7, PS8	Texas Instruments	PTH series DC/DC convertor, Input non-isolated wide output adjust power module; Part#: PTH05050W,	Meets 94V-0	SELV UL, CSA, VDE
+ DC-DC convertors; PS3, PS4	Texas Instruments	PTV series DC/DC convertor, Input non-isolated wide output adjust power module; Part#: PTV03020W	Meets 94V-0	SELV UL, CSA, VDE
+ DC-DC convertors; PS5, PS6	Texas Instruments	ATH series DC/DC convertor, Input non-isolated wide output adjust power module; Part#: ATH030A0X3	Meets 94V-0	SELV UL, CSA, VDE
+ Heatsink	Radian Heatsinks	Black ICE Series; Full Bricks Dimensions: 4.6'' x 2.4'' x 0.45'' Part#: HS1596EB	Material: Fin Aluminum with black anodize plating	Evaluated with product; See Att. 2-5
+ Display card PCB	Various	Material: FR-4; Measured 7.5 by 1.5 by 0.06 inch thick approx.; 14-layer Part#: 1700-00043	94V-0	UL94 V-0 See Att. 2-24 and 2-25
+ 16T1/E1 card PCB	Various	Material: FR-4; Measured 63 by 6.5 by 0.06 inch thick approx.; 6- layer Part#: 1700-00044	94V-0	UL94 V-0 See Att. 2-20 and 2-21
+ Protection device; F1- F64	Tyco	PolySwitch, PTC Device Part#: TRF250-145U	Rating: 60Vdc, 3A; Fault voltage: 250Vrms	UL, CSA, TUV; See Att. 2-20 and Att. 6-10
+ Connector; J1	Molex	High speed RJ45, Stacked modular jack, 2x8 position, shielded with LEDs; Part#: 44520-0003	Housing: Polyester (PBT); 94V0	UL See Att. 6-11 to 6-12

Part C: Model: TMG5800 / TMP5900 (2U BOX) - AC

Object/part No.	Manufacturer/ trademark	type/model	Technical data	mark(s) of conformity ¹⁾
+ Chassis / assembly (2U BOX)	TelcoBridges	Dimension: approx. 15.9 (D) by 16.8 (W) by 3.5 (H) inch Part#: 2000-90069	Material: Metal sheet; various thickness; Finish: 0.9mm Satin Coat; Secured with screws	See Att. 2-35 to 2-38; Att. 4-22 to 4-29
+ 8 Fan holder	Various	Dimension: approx. 0.45 (D) by 6.7 (W) by 3.2 (H) inch Part#: 2000-90039	Material: Metal sheet; various thickness; Finish: 0.9mm Satin Coat; Secured with screws	See Att. 2-40; Att. 4-30
Power supply, AC	iStarUSA	Redundant AC-DC, Switching power supply; 20+4 pin Part#: IS-500R2UP	Rating: 100- 240Vac; Various output voltages; Total: 500WMax	UL, E311876 TUV, CE See Att. 2-38 to 2-39; Att. 6-22 to 6-35
Fan (x8)	Sunon	GM Series High Speed 40mm 17 CFM Vapo Bearing 8 Motor Pole Fan; Part#: GM1204PQV1-8A	Rating: 12 VDC; Dimensions: 40 x 40 x 28 mm	UL See Att. 2-40
+ Motherboard	Various	Material: FR-4; Measured 13.6 by 11.8 by 1.6mm thick approx.; 14-layer Part#: 1700-00039	94V-0	UL94 V-0 See Att. 2-15 and 2-16
+ Connector; J2	Molex	4.2mm pitch mini-fit Jr. Header, Dual row, vertical, 20 circuits; Part#: 39-29-9202	Housing: PA Polyamide Nylon 6/6; 94V-2	UL, E29179; CSA, LR19980; TUV, R72081037 See Att. 6-4 to 6-5
+ Connector; J4	Bel Stewart	EMI-RFI shielded, ESD grounded, 2 port PCB Harmonica CAT 5 Jack, Non-flange Part#: SS-718802S	Housing; Thermoplastic; 94V-0	UL See Att. 6-6
+ Connector; J7	Amphenol	4 ports, high speed, modular jack, 8 position, 8 contacts, shielded with LEDs. Part#: RJHSE-5381-04	Housing: Thermoplastic, PA 4/6; 94V0	UL See Att. 6-9

Object/part No.	Manufacturer/ trademark	type/model	Technical data	mark(s) of conformity1)
+ DC-DC converters; PS1, PS7, PS8	Texas Instruments	PTH series DC/DC convertor, Input non-isolated wide output adjust power module; Part#: PTH05050W,	Meets 94V-0	SELV UL, CSA, VDE
+ DC-DC converters; PS3, PS4	Texas Instruments	PTV series DC/DC convertor, Input non-isolated wide output adjust power module; Part#: PTV03020W	Meets 94V-0	SELV UL, CSA, VDE
+ DC-DC converters; PS5, PS6	Texas Instruments	ATH series DC/DC convertor, Input non-isolated wide output adjust power module; Part#: ATH030A0X3	Meets 94V-0	SELV UL, CSA, VDE
+ Heatsink	Radian Heatsinks	Black ICE Series; Full Bricks Dimensions: 4.6'' x 2.4'' x 0.45'' Part#: HS1596EB	Material: Fin Aluminum with black anodize plating	Evaluated with product; See Att. 2-5
+ Display card PCB	Various	Material: FR-4; Measured 7.5 by 1.5 by 0.06 inch thick approx.; 14-layer Part#: 1700-00043	94V-0	UL94 V-0 See Att. 2-24 and 2-25
+ 16T1/E1 card PCB	Various	Material: FR-4; Measured 63 by 6.5 by 0.06 inch thick approx.; 6- layer Part#: 1700-00044	94V-0	UL94 V-0 See Att. 2-20 and 2-21
+ Protection device; F1- F64	Tyco	PolySwitch, PTC Device Part#: TRF250-145U	Rating: 60Vdc, 3A; Fault voltage: 250Vrms	UL, CSA, TUV; See Att. 2-20 and Att. 6-10
+ Connector; J1	Molex	High speed RJ45, Stacked modular jack, 2x8 position, shielded with LEDs; Part#: 44520-0003	Housing: Polyester (PBT); 94V0	UL See Att. 6-11 to 6-12
+ ATX Adaptor PCB	Various	Material: FR-4; Measured 4.6 by 2.6 by 0.06 inch thick approx.; 4- layer Part#: 1700-00068	94V-0	UL94 V-0 See Att. 2-47 and 2-48

Object/part No.	Manufacturer/ trademark	type/model	Technical data	mark(s) of conformity1)
+ Connector; J3	Amphenol	Single-ports, high speed, modular jack, 8 positions, 8 contacts, shielded with LEDs. Part#: RJHSE-3380	Housing: Thermoplastic, PA 4/6; 94V0	UL See Att. 6-36 and 6-37
+ Connector; J2	Molex	Disk drive power connector; R/A Horizontal Header, right angle; 4 circuits Part#: 53109-0410	Housing: Polyamide Nylon; 94V0	UL See Att. 6-38
+ PCI Express Adaptor PCB	Various	Material: FR-4; Measured 1.55 by 0.8 by 0.06 inch thick approx.; 4-layer Part#: 1700-00069	94V-0	UL94 V-0 See Att. 2-47 and 2-48
Server motherboard	Intel	Computer server board. Part#: S3420gp	94V-0	SELV, Evaluated with product See Att. 2-20 and Att. 6-10

TEST:

Project 251006 (Edition 1)

Part A:

Device Tested: **TMG800 (1U BOX) – DC version**

The Clauses evaluated as per CAN/CSA C22.2 No 60950-1-03 and ANSI/UL 60950-1 1st ed as follows:

Power Interface (Input) Test		Clause	CSA/UL 60950-1	IEC 60950-1
			1.6.2	1.6.2
<u>Acceptance Criteria (or Maximum Allowable Limits):</u> Maximum 10% Deviation				
Compliance: Yes (x) No () → See "X"				
Test No	Input			
	Volts	Hz	Amps	Watts
1	-46Vdc	NA	-1.16	53.4
2	-48Vdc	NA	-1.12	53.8
3	-52Vdc	NA	-1.04	54.1
4	-63Vdc	NA	-0.89	55.9
5	-65Vdc	NA	-0.87	56.6
Test Conditions				
1-5	DC input current measured with TMG800 (1U BOX) - DC unit operated with external computer, hubs and loop back cable to simulate worst power consumption.			

Heating Test		CSA/UL 60950-1		IEC 60950-1	
		4.5.1		4.5.1	
Clause					
Acceptance Criteria (or Maximum Allowable Limits): Model: TMG800 (1 U BOX) - DC					
Table 4B for allowed temperature limits					
Compliance: Yes (x) No () →See "X"					
<u>Rated Voltage or Voltage Range:</u> -46 to -65Vdc					
<u>Rated Supply Frequency:</u> NA					
<u>Upper Limit (+0%):</u> (x 1)V = -46 V					
<u>Lower Limit (-0%):</u> (x 1)V = -65V					
<u>Note:</u> For other input voltage tolerance, refer to Cl 1.4.5 and/or manufacturer specifications.					
<u>Duty Cycle/Operating Condition:</u> Continuous					
<u>Rated Ambient:</u> 55 °C					
T.C. Locations	Max Temp Measured (Deg °C) *				Max Temp Allowed (Deg °C)
	NA Hz, -46Vdc; Normal	NA Hz, -48Vdc; Normal	NA Hz, -65Vdc; Normal	#1 NA Hz, -65Vdc; Abnormal Blocked Front Air vents	
J6	58.4	58.4	58.4	61	85
J10	58.8	58.8	58.8	60.7	85
Big heatsink left, rear view	58.2	58.2	58.1	65.8	NA
Big heatsink right, rear view	57.7	57.8	57.7	65.1	NA
Fan module, Mid fan rotor	62.9	62.5	63	71	70
Heatsink on plug in module 1	56.4	56.4	56.4	57	NA
Mid main PCB	63.5	63.4	63.5	70.7	105
J2	59.6	59.6	59.7	63.8	105
Power supply, DC Top	58.6	58.6	58.6	61.6	70
Power supply, DC bottom	58.8	58.8	58.9	62.2	70
T2	59.6	59.6	59.6	64.6	70
T3	60	60	60.1	63.5	85
Inside ambient	61.7	61.7	61.7	66.8	NA
Top chassis	56.9	56.9	56.9	59.4	NA
Chamber Ambient	55.7	55.8	55.7	56.3	NA

Electric Strength Test (After Heating)	Clause	CSA/UL 60950-1	IEC 60950-1
		5.2	5.2
Acceptance Criteria (or Maximum Allowable Limits): No insulation breakdown during test. See Table 5B for required test voltage			
Compliance: Yes (x) No () →See "X"			
Location		Test Voltage	Result
(A) ON COMPLETE SYSTEM:			
Primary DC input terminals and earth (chassis) – GND terminal		1000Vdc	Pass
Primary DC input terminals and earth (chassis) – Ethernet #1		1000Vdc	Pass
Primary DC input terminals and earth (chassis) – Telco #1		1000Vdc	Pass
5 V secondary, Ethernet and earth (chassis)		707Vdc	Pass
5 V secondary, Telco and earth (chassis)		707Vdc	Pass
Comments:			
TMG800 (1 U BOX) - DC tested after the abnormal Heating tests, No insulation breaks down.			

Abnormal - Component Failure (System) (1/2)		Clause	CSA/UL 60950-1	IEC 60950-1		
			5.3	5.3		
<u>Acceptance Criteria (or Maximum Allowable Limits):</u>						
<ul style="list-style-type: none"> If a fire occurs it shall not propagate beyond the equipment. The equipment shall not emit molten metal. Enclosure shall not deform in such a way as to cause non-compliance with 2.1.1, 2.6.1, 2.10.3 and 4.4.1 No overheating during tests of 5.3.6(c). Max 125K for Class A; Max 150K for Class B; Max 140K for Class E; Max 165K for Class F; Max 185K for Class H. No exposure to hazardous voltages/energies, a max temp of 300C is acceptable. No conclusive test results on simulated circuits but conclusive test results are obtained with tests repeated in the equipment. No breakdown when electric strength test of 5.2 as applicable is applied (without allowing the equipment under test to cool down). In case of doubt, the tests are to be conducted with the equipment placed on a white tissue-paper-covered softwood surface. A single layer of cheesecloth is to be draped loosely over part of the equipment showing emission of flame or molten metal. The equipment is determined not to comply if the cheesecloth or the tissue paper glows of flames (CSA and UL). If a wire or a printed wiring board trace opens, the gap it to be electrically shorted and the test continued until ultimate results occur. This applies to each occurrence (CSA and UL). If the circuit is interrupted by the opening of a component, the test is to be repeated twice (three times total), using new components as necessary (CSA and UL). Where there is 10,000 Ω or more of additional series impedance in a circuit in which the voltage is 125V or less, the circuit needs not be subjected to the test. (CSA and UL). Where there is 20,000 Ω or more of additional series impedance in a circuit in which the voltage is greater than 125V but is not greater than 250V, the circuit needs not be subjected to the test. (CSA and UL). 						
Compliance: Yes (x) No () →See "X"						
Fuse Installed	Model/Type:					
	Characteristic (Check ✓)	F: Quick-Acting	H: High Breaking Capacity			
		T: Time-Lag	L: Low Breaking Capacity			
Fault #	Component	Short/Open	Electric Strength			
	Blocked front intake air vents		From	To	Voltage	P/F
F/A	Temperature	Elapsed Time	Primary	Ground		
			Primary	Secondary		
1	See Clause 4.5.1 #1 Abnormal, Blocked front air vents result table	1.5 hour				P
2	Reversed Input voltage, +65Vdc	10 min				P
Observations						
#1. Tested on TMG800 (1 U BOX) – DC version system and test stop after temperature stabilized. No safety hazard condition observed and the test stopped when temperature reached stabilization.						
#2. NO safety hazard condition was observed. EUT operated.						
Ambient <u>55</u> °C						

Part B:

Device Tested: **Model: TMG3200 / TMP6400 (1U BOX) and TMG3200 / TMP6400 (2U BOX)**

The Clauses evaluated as per CAN/CSA C22.2 No 60950-1-03 and ANSI/UL 60950-1 1st ed as follows:

1) TMG3200 / TMP6400 (1U BOX) – DC version

Power Interface (Input) Test		Clause	CSA/UL 60950-1	IEC 60950-1
			1.6.2	1.6.2
Acceptance Criteria (or Maximum Allowable Limits): Maximum 10% Deviation				
Compliance: Yes (x) No () → See "X"				
Test No	Input			
	Volts	Hz	Amps	Watts
1	-46Vdc	NA	-1.45	66.7
2	-48Vdc	NA	-1.4	67.2
3	-52Vdc	NA	-1.31	68.1
4	-65Vdc	NA	-1.07	69.6
	Test Conditions			
1-4	DC input current measured with TMG3200 / TMP6400 (1U BOX) - DC unit operated with external computer, hubs and loop back cable to simulate worst power consumption.			

Heating Test	Clause	CSA/UL 60950-1	IEC 60950-1	
		4.5.1	4.5.1	
Acceptance Criteria (or Maximum Allowable Limits): Model: TMG3200 / TMP6400 (1U BOX) - DC				
Table 4B for allowed temperature limits				
Compliance: Yes (x) No () →See "X"				
<u>Rated Voltage or Voltage Range:</u> -48 - -65Vdc				
<u>Rated Supply Frequency:</u> NA				
<u>Upper Limit (+0%):</u> = - 48Vdc				
<u>Lower Limit (-0%):</u> = - 65Vdc				
<u>Note:</u> For other input voltage tolerance, refer to Cl 1.4.5 and/or manufacturer specifications.				
<u>Duty Cycle/Operating Condition:</u> Continuous				
<u>Rated Ambient:</u> 55 °C				
T.C. Locations	Max Temp Measured (Deg °C) *			Max Temp Allowed (Deg °C)
	NA Hz, -46Vdc; Normal	NA Hz, -48Vdc; Normal	NA Hz, -65Vdc; Normal	
PCB by U2 (DSP board)	64.4	64.1	64.2	105
Big Heatsink leftside, rear view	58.8	58.7	58.8	NA
Big Heatsink rightside, rear view	62.8	62.7	62.8	NA
PCB, mid (Main board)	63.7	63.4	63.5	105
PCB by U21 (Telecom board)	66.1	66	66	105
TMS 1-2 connector (Main board)	58.6	58.7	58.7	80
ETH 1-4 connector (Main board)	58.9	59	59	80
T1 (Main board)	59.8	59.8	59.8	70
J1 (Telecom board)	56.9	56.9	56.9	85
T1 (Telecom board)	57.8	57.9	57.9	85
Fan, mid on rotor	65.5	64.4	64.5	70
PCB, Display board by U1	57.9	58	58	105
J2 connector (Main board)	58.2	58.3	58.3	105
PCB, big Heatsink board	62.5	62.5	62.6	105
Internal ambient, mid	58.4	58.3	58.4	NA
PSU, Top chassis	58.9	58.8	58.9	70
PSU, side chassis	59.3	59.3	59.4	70
Top chassis	56.2	56	56	NA
Bottom chassis	58.8	59.1	59.1	NA
Chamber ambient	55.6	55.6	55.7	NA

Heating Test	Clause	CSA/UL 60950-1	IEC 60950-1
		4.5.1	4.5.1
Acceptance Criteria (or Maximum Allowable Limits): Model: TMG3200 / TMP6400 (1U BOX) - DC			
Table 4B for allowed temperature limits			
Compliance: Yes (x) No () →See "X"			
<u>Rated Voltage or Voltage Range:</u> -48 - -65Vdc			
<u>Rated Supply Frequency:</u> NA			
<u>Upper Limit (+0%):</u> = - 48Vdc			
<u>Lower Limit (-0%):</u> = - 65Vdc			
<u>Note:</u> For other input voltage tolerance, refer to Cl 1.4.5 and/or manufacturer specifications.			
<u>Duty Cycle/Operating Condition:</u> Continuous			
<u>Rated Ambient:</u> 55 °C			
T.C. Locations	Max Temp Measured (Deg °C) *		Max Temp Allowed (Deg °C)
	#1 NA Hz, -65Vdc; Abnormal, Blocked front vents	#2 NA Hz, -65Vdc; Abnormal, Locked fan rotor	
PCB by U2 (DSP board)	73.9	64.6	105
Big Heatsink leftside, rear view	75.9	60.4	NA
Big Heatsink rightside, rear view	79.6	63.8	NA
PCB, mid (Main board)	74.7	64	105
PCB by U21 (Telecom board)	75.6	65	105
TMS 1-2 connector (Main board)	60.3	59.1	80
ETH 1-4 connector (Main board)	62.4	59.5	80
T1 (Main board)	65.2	61.1	70
J1 (Telecom board)	58.2	56.8	85
T1 (Telecom board)	64.2	59.1	85
Fan, mid on rotor	70.2	64.4	70
PCB, Display board by U1	60.8	59	105
J2 connector (Main board)	63.3	59.6	105
PCB, big Heatsink board	86.3	65.7	105
Internal ambient, mid	67.7	58.8	NA
PSU, Top chassis	62.2	59.4	70
PSU, side chassis	63	59.8	70
Top chassis	58.8	56.3	NA
Bottom chassis	66.3	59.8	NA
Chamber ambient	56.5	55.6	NA

Electric Strength Test (After Heating)	Clause	CSA/UL 60950-1	IEC 60950-1
		5.2	5.2
Acceptance Criteria (or Maximum Allowable Limits): No insulation breakdown during test. See Table 5B for required test voltage			
Compliance: Yes (x) No () →See "X"			
Location		Test Voltage	Result
(A) ON COMPLETE SYSTEM:			
Primary DC input terminals and earth (chassis) – GND terminal		1000Vdc	Pass
Primary DC input terminals and earth (chassis) – Ethernet #1		1000Vdc	Pass
Primary DC input terminals and earth (chassis) – Telco #1		1000Vdc	Pass
5 V secondary, Ethernet and earth (chassis)		707Vdc	Pass
5 V secondary, Telco and earth (chassis)		707Vdc	Pass
Comments:			
TMG3200 / TMP6400 (1U BOX) - DC tested after the abnormal Heating tests, No insulation breaks down.			

Abnormal - Component Failure (System) (1/2)		Clause	CSA/UL 60950-1	IEC 60950-1		
			5.3	5.3		
Acceptance Criteria (or Maximum Allowable Limits):						
<ul style="list-style-type: none"> If a fire occurs it shall not propagate beyond the equipment. The equipment shall not emit molten metal. Enclosure shall not deform in such a way as to cause non-compliance with 2.1.1, 2.6.1, 2.10.3 and 4.4.1 No overheating during tests of 5.3.6(c). Max 125K for Class A; Max 150K for Class B; Max 140K for Class E; Max 165K for Class F; Max 185K for Class H. No exposure to hazardous voltages/energies, a max temp of 300C is acceptable. No conclusive test results on simulated circuits but conclusive test results are obtained with tests repeated in the equipment. No breakdown when electric strength test of 5.2 as applicable is applied (without allowing the equipment under test to cool down). In case of doubt, the tests are to be conducted with the equipment placed on a white tissue-paper-covered softwood surface. A single layer of cheesecloth is to be draped loosely over part of the equipment showing emission of flame or molten metal. The equipment is determined not to comply if the cheesecloth or the tissue paper glows of flames (CSA and UL). If a wire or a printed wiring board trace opens, the gap it to be electrically shorted and the test continued until ultimate results occur. This applies to each occurrence (CSA and UL). If the circuit is interrupted by the opening of a component, the test is to be repeated twice (three times total), using new components as necessary (CSA and UL). Where there is 10,000 Ω or more of additional series impedance in a circuit in which the voltage is 125V or less, the circuit needs not be subjected to the test. (CSA and UL). Where there is 20,000 Ω or more of additional series impedance in a circuit in which the voltage is greater than 125V but is not greater than 250V, the circuit needs not be subjected to the test. (CSA and UL). 						
Compliance: Yes (x) No () →See "X"						
Fuse Installed	Model/Type:					
	Characteristic (Check ✓)	F: Quick-Acting		H: High Breaking Capacity		
		T: Time-Lag		L: Low Breaking Capacity		
Fault #	Component	Short/Open	Electric Strength			
	Blocked front intake air vents		From	To	Voltage	P/F
F/A	Temperature	Elapsed Time	Primary	Ground		
			Primary	Secondary		
1	See Clause 4.5.1 #1 Abnormal result table	1.8 hour				P
2	See Clause 4.5.1 #2 Abnormal result table	1.2 hour				P
3	Reversed Input voltage, +65Vdc	5 min				P
Observations						
#1. Tested on TMG3200 / TMP6400 (1U BOX) – DC version system and test stop after temperature stabilized. No safety hazard condition observed and the test stopped when temperature reached stabilization.						
#2. Tested on TMG3200 / TMP6400 (1U BOX) – DC version system and test stop after temperature stabilized. No safety hazard condition observed and the test stopped when temperature reached stabilization.						
#3. NO safety hazard condition was observed, EUT operated.						
Ambient <u>55</u> °C						

2) **TMG3200 / TMP6400 (2U BOX) – DC version**

Power Interface (Input) Test		Clause	CSA/UL 60950-1 1.6.2	IEC 60950-1 1.6.2
Acceptance Criteria (or Maximum Allowable Limits): Maximum 10% Deviation				
Compliance: Yes (x) No () → See "X"				
Test No	Input			
	Volts	Hz	Amps	Watts
1	-46Vdc	NA	-2.25	103.5
2	-48Vdc	NA	-2.16	103.7
3	-52Vdc	NA	-2.02	105
4	-65Vdc	NA	-1.68	109
	Test Conditions			
1-4	DC input current measured with TMG3200 / TMP6400 (2U BOX) – DC unit operated with external computer, hubs and loop back cable to simulate worst power consumption.			

Heating Test	Clause	CSA/UL 60950-1	IEC 60950-1	
		4.5.1	4.5.1	
Acceptance Criteria (or Maximum Allowable Limits): Model: TMG3200 / TMP6400 (2U BOX) - DC				
Table 4B for allowed temperature limits				
Compliance: Yes (x) No () →See "X"				
<u>Rated Voltage or Voltage Range:</u> -48 - -65Vdc				
<u>Rated Supply Frequency:</u> NA				
<u>Upper Limit (+0%):</u> = - 48Vdc				
<u>Lower Limit (-0%):</u> = - 65Vdc				
<u>Note:</u> For other input voltage tolerance, refer to Cl 1.4.5 and/or manufacturer specifications.				
<u>Duty Cycle/Operating Condition:</u> Continuous				
<u>Rated Ambient:</u> 55 °C				
T.C. Locations	Max Temp Measured (Deg °C) *			Max Temp Allowed (Deg °C)
	NA Hz, -46Vdc; Normal	NA Hz, -52Vdc; Normal	NA Hz, -65Vdc; Normal	
PCB by U2 (DSP board)	61.8	61.1	61.1	105
Big Heatsink leftside, rear view	58.6	57.9	57.8	NA
Big Heatsink rightside, rear view	60.1	59.4	59.2	NA
PCB, mid (Main board)	62.6	62.0	61.8	105
PCB by U21 (Telecom board)	62.4	61.7	61.6	105
TMS 1-2 connector (Main board)	57.6	57.0	56.8	80
ETH 1-4 connector (Main board)	58.5	57.8	57.7	80
T1 (Main board)	60.3	59.7	59.6	70
J1 (Telecom board)	56.1	55.4	55.3	85
T1 (Telecom board)	58.2	57.6	57.4	85
Fan, mid on rotor	62.9	62.2	62.1	70
PCB, Display board by U1	58.2	57.5	57.4	105
J2 connector (Main board)	58.0	57.4	57.2	105
PCB, big Heatsink board	64.7	64.0	63.9	105
Internal ambient, mid	57.6	57.0	56.9	NA
PSU, Top chassis	57.2	56.6	56.5	50 *
PSU, side chassis	57.1	56.5	56.4	50 *
Top chassis	55.9	55.2	55.0	NA
Bottom chassis	57.0	56.4	56.2	NA
Chamber ambient	55.3	54.6	54.5	NA

Note: * - Power supply recommended operating ambient temperature and can be increase with decrease output power. Power supply tested with the equipment and no safety hazard condition observed.

Heating Test	Clause	CSA/UL 60950-1	IEC 60950-1
		4.5.1	4.5.1
Acceptance Criteria (or Maximum Allowable Limits): Model: TMG3200 / TMP6400 (2U BOX) - DC			
Table 4B for allowed temperature limits			
Compliance: Yes (x) No () →See "X"			
<u>Rated Voltage or Voltage Range:</u> -48 - -65Vdc			
<u>Rated Supply Frequency:</u> NA			
<u>Upper Limit (+0%):</u> = - 48Vdc			
<u>Lower Limit (-0%):</u> = - 65Vdc			
<u>Note:</u> For other input voltage tolerance, refer to Cl 1.4.5 and/or manufacturer specifications.			
<u>Duty Cycle/Operating Condition:</u> Continuous			
<u>Rated Ambient:</u> 55 °C			
T.C. Locations	Max Temp Measured (Deg °C) *		Max Temp Allowed (Deg °C)
	#1 NA Hz, -65Vdc; Abnormal, Blocked front vents	#2 NA Hz, -65Vdc; Abnormal, Locked fan rotor	
PCB by U2 (DSP board)	69.6	62.5	105
Big Heatsink leftside, rear view	69.4	62.2	NA
Big Heatsink rightside, rear view	73.0	63.3	NA
PCB, mid (Main board)	70.9	63.0	105
PCB by U21 (Telecom board)	74.9	63.6	105
TMS 1-2 connector (Main board)	60.3	57.9	80
ETH 1-4 connector (Main board)	62.9	59.4	80
T1 (Main board)	65.7	60.3	70
J1 (Telecom board)	57.1	56.4	85
T1 (Telecom board)	64.3	57.9	85
Fan, mid on rotor	64.8	60.5	70
PCB, Display board by U1	61.8	59.0	105
J2 connector (Main board)	62.0	59.5	105
PCB, big Heatsink board	82.6	72.4	105
Internal ambient, mid	60.5	58.8	NA
PSU, Top chassis	60.5	58.6	50 *
PSU, side chassis	60.9	58.7	50 *
Top chassis	58.3	56.9	NA
Bottom chassis	60.5	56.9	NA
Chamber ambient	55.9	55.2	NA

Note: * - Power supply recommended operating ambient temperature and can be increase with decrease output power. Power supply tested with the equipment and no safety hazard condition observed.

Electric Strength Test (After Heating)	Clause	CSA/UL 60950-1	IEC 60950-1
		5.2	5.2
<u>Acceptance Criteria (or Maximum Allowable Limits):</u> No insulation breakdown during test. See Table 5B for required test voltage			
Compliance: Yes (x) No () →See "X"			
Location		Test Voltage	Result
(A) ON COMPLETE SYSTEM:			
Primary DC input terminals and earth (chassis) – GND terminal		1000Vdc	Pass
Primary DC input terminals and earth (chassis) – Ethernet #1		1000Vdc	Pass
Primary DC input terminals and earth (chassis) – Telco #1		1000Vdc	Pass
5 V secondary, Ethernet and earth (chassis)		707Vdc	Pass
5 V secondary, Telco and earth (chassis)		707Vdc	Pass
Comments:			
TMG3200 / TMP6400 (2U BOX) - DC tested after the abnormal Heating tests, No insulation breaks down.			

Abnormal - Component Failure (System) (1/2)		Clause	CSA/UL 60950-1	IEC 60950-1		
			5.3	5.3		
Acceptance Criteria (or Maximum Allowable Limits):						
<ul style="list-style-type: none"> If a fire occurs it shall not propagate beyond the equipment. The equipment shall not emit molten metal. Enclosure shall not deform in such a way as to cause non-compliance with 2.1.1, 2.6.1, 2.10.3 and 4.4.1 No overheating during tests of 5.3.6(c). Max 125K for Class A; Max 150K for Class B; Max 140K for Class E; Max 165K for Class F; Max 185K for Class H. No exposure to hazardous voltages/energies, a max temp of 300C is acceptable. No conclusive test results on simulated circuits but conclusive test results are obtained with tests repeated in the equipment. No breakdown when electric strength test of 5.2 as applicable is applied (without allowing the equipment under test to cool down). In case of doubt, the tests are to be conducted with the equipment placed on a white tissue-paper-covered softwood surface. A single layer of cheesecloth is to be draped loosely over part of the equipment showing emission of flame or molten metal. The equipment is determined not to comply if the cheesecloth or the tissue paper glows of flames (CSA and UL). If a wire or a printed wiring board trace opens, the gap it to be electrically shorted and the test continued until ultimate results occur. This applies to each occurrence (CSA and UL). If the circuit is interrupted by the opening of a component, the test is to be repeated twice (three times total), using new components as necessary (CSA and UL). Where there is 10,000 Ω or more of additional series impedance in a circuit in which the voltage is 125V or less, the circuit needs not be subjected to the test. (CSA and UL). Where there is 20,000 Ω or more of additional series impedance in a circuit in which the voltage is greater than 125V but is not greater than 250V, the circuit needs not be subjected to the test. (CSA and UL). 						
Compliance: Yes (x) No () →See "X"						
Fuse Installed	Model/Type:					
	Characteristic (Check ✓)	F: Quick-Acting		H: High Breaking Capacity		
		T: Time-Lag		L: Low Breaking Capacity		
Fault #	Component	Short/Open	Electric Strength			
	Blocked front intake air vents		From	To	Voltage	P/F
F/A	Temperature	Elapsed Time	Primary	Ground		
			Primary	Secondary		
1	See Clause 4.5.1 #1 Abnormal result table, Blocked Front vents	4 hour				P
2	See Clause 4.5.1 #2 Abnormal result table, Locked Fan rotor	1 hour				P
3	Reversed Input voltage, +65Vdc	10 min				P
Observations						
#1. Tested on TMG3200 / TMP6400 (2U BOX) – DC version system and test stop after temperature stabilized. No safety hazard condition observed and the test stopped when temperature reached stabilization.						
#2. Tested on TMG3200 / TMP6400 (2U BOX) – DC version system and test stop after temperature stabilized. No safety hazard condition observed and the test stopped when temperature reached stabilization.						
#3. NO safety hazard condition was observed, EUT operated.						
Ambient <u>55</u> °C						

TMG3200 / TMP6400 (2U BOX) – AC version

Power Interface (Input) Test		Clause	CSA/UL 60950-1 1.6.2	IEC 60950-1 1.6.2
Acceptance Criteria (or Maximum Allowable Limits): Maximum 10% Deviation				
Compliance: Yes (x) No () → See "X"				
Test No	Input			
	Volts	Hz	Amps	Watts
1	90	60	1.03	92.7
2	100	60	0.92	92
3	120	60	0.77	92.4
4	132	60	0.72	95.0
5	198	50	0.52	103.0
6	220	50	0.50	110
7	240	50	0.48	115.2
8	264	50	0.53	139.9
	Test Conditions			
1-8	AC input current measured with TMG3200 / TMP6400 (2U BOX) – AC unit operated with external computer, hubs and loop back cable to simulate worst power consumption.			

Heating Test	Clause	CSA/UL 60950-1	IEC 60950-1	
		4.5.1	4.5.1	
Acceptance Criteria (or Maximum Allowable Limits): Model: TMG3200 / TMP6400 (2U BOX) - AC				
Table 4B for allowed temperature limits				
Compliance: Yes (x) No () →See "X"				
<u>Rated Voltage or Voltage Range:</u> 100 - 240Vac				
<u>Rated Supply Frequency:</u> NA				
<u>Upper Limit (+10%):</u> = 90Vac				
<u>Lower Limit (-10%):</u> = 246Vac				
<u>Note:</u> For other input voltage tolerance, refer to Cl 1.4.5 and/or manufacturer specifications.				
<u>Duty Cycle/Operating Condition:</u> Continuous				
<u>Rated Ambient:</u> 55 °C				
T.C. Locations	Max Temp Measured (Deg °C) *			Max Temp Allowed (Deg °C)
	60 Hz, 90Vac; Normal	60 Hz, 132Vac; Normal	60 Hz, 132Vac; Normal; Redundancy	
PCB by U2 (DSP board)	60.5	60.5	60.6	105
Big Heatsink leftside, rear view	57.7	57.6	57.8	NA
Big Heatsink rightside, rear view	58.9	58.8	59.1	NA
PCB, mid (Main board)	61.4	61.3	61.4	105
PCB by U21 (Telecom board)	61.5	61.5	61.5	105
TMS 1-2 connector (Main board)	56.7	56.6	56.7	80
ETH 1-4 connector (Main board)	57.8	57.7	57.9	80
T1 (Main board)	59.3	59.3	59.3	70
J1 (Telecom board)	55.4	55.4	55.5	85
T1 (Telecom board)	57.5	57.5	57.7	85
Fan, mid on rotor	63.5	63.5	63.7	70
PCB, Display board by U1	57.6	57.6	57.6	105
J2 connector (Main board)	57.5	57.4	57.8	105
PCB, big Heatsink board	63.5	63.3	63.9	105
Internal ambient, mid	56.0	55.9	56.0	NA
PSU, Top chassis	56.4	56.3	56.7	50 *
PSU, side chassis	55.8	55.8	56.1	50 *
Top chassis	55.2	55.1	55.3	NA
Bottom chassis	55.3	55.3	55.4	NA
Chamber ambient	54.9	54.8	54.9	NA

Note:

Redundancy test was operated with only one power supply module and the other was installed without AC power applied.

* - Power supply recommended operating ambient temperature and can be increase with decrease output power. Power supply tested with the equipment and no safety hazard condition observed.

Heating Test	Clause	CSA/UL 60950-1	IEC 60950-1
		4.5.1	4.5.1
Acceptance Criteria (or Maximum Allowable Limits): Model: TMG3200 / TMP6400 (2U BOX) - AC			
Table 4B for allowed temperature limits			
Compliance: Yes (x) No () →See "X"			
<u>Rated Voltage or Voltage Range:</u> 100 - 240Vac			
<u>Rated Supply Frequency:</u> NA			
<u>Upper Limit (+10%):</u> = 90Vac			
<u>Lower Limit (-10%):</u> = 246Vac			
<u>Note:</u> For other input voltage tolerance, refer to Cl 1.4.5 and/or manufacturer specifications.			
<u>Duty Cycle/Operating Condition:</u> Continuous			
<u>Rated Ambient:</u> 55 °C			
T.C. Locations	Max Temp Measured (Deg °C) *		Max Temp Allowed (Deg °C)
	50 Hz, 198Vac; Normal	50 Hz, 264Vac; Normal	

PCB by U2 (DSP board)	60.5	60.3	105
Big Heatsink leftside, rear view	57.7	57.6	NA
Big Heatsink rightside, rear view	58.9	58.7	NA
PCB, mid (Main board)	61.4	61.3	105
PCB by U21 (Telecom board)	61.5	61.2	105
TMS 1-2 connector (Main board)	56.7	56.5	80
ETH 1-4 connector (Main board)	57.8	57.7	80
T1 (Main board)	59.3	59.2	70
J1 (Telecom board)	55.4	55.3	85
T1 (Telecom board)	57.5	57.5	85
Fan, mid on rotor	63.6	63.7	70
PCB, Display board by U1	57.6	57.5	105
J2 connector (Main board)	57.5	57.4	105
PCB, big Heatsink board	63.5	63.7	105
Internal ambient, mid	56.3	56.1	NA
PSU, Top chassis	56.4	56.3	50 *
PSU, side chassis	55.8	55.8	50 *
Top chassis	55.2	55.2	NA
Bottom chassis	55.4	55.3	NA
Chamber ambient	55.0	54.8	NA

Note: * - Power supply recommended operating ambient temperature and can be increase with decrease output power. Power supply tested with the equipment and no safety hazard condition observed.

Heating Test	Clause	CSA/UL 60950-1	IEC 60950-1
		4.5.1	4.5.1
Acceptance Criteria (or Maximum Allowable Limits): Model: TMG3200 / TMP6400 (2U BOX) - AC			
Table 4B for allowed temperature limits			
Compliance: Yes (x) No () →See "X"			
<u>Rated Voltage or Voltage Range:</u> 100 - 240Vac			
<u>Rated Supply Frequency:</u> NA			
<u>Upper Limit (+10%):</u> = 90Vac			
<u>Lower Limit (-10%):</u> = 246Vac			
<u>Note:</u> For other input voltage tolerance, refer to Cl 1.4.5 and/or manufacturer specifications.			
<u>Duty Cycle/Operating Condition:</u> Continuous			
<u>Rated Ambient:</u> 55 °C			
T.C. Locations	Max Temp Measured (Deg °C) *		Max Temp Allowed (Deg °C)
	#1 60 Hz, 132Vac; Abnormal, Blocked front vents	#2 60 Hz, 132Vac; Abnormal, Locked fan rotor	
PCB by U2 (DSP board)	69.2	61.8	105
Big Heatsink leftside, rear view	69.5	61.4	NA
Big Heatsink rightside, rear view	73.0	62.8	NA
PCB, mid (Main board)	70.3	62.0	105
PCB by U21 (Telecom board)	72.8	63.1	105
TMS 1-2 connector (Main board)	59.0	57.6	80
ETH 1-4 connector (Main board)	61.9	59.0	80
T1 (Main board)	64.1	59.8	70
J1 (Telecom board)	56.3	56.1	85
T1 (Telecom board)	63.3	57.4	85
Fan, mid on rotor	70.1	60.5	70
PCB, Display board by U1	60.7	58.3	105
J2 connector (Main board)	62.0	59.0	105
PCB, big Heatsink board	81.0	71.8	105
Internal ambient, mid	57.6	57.9	NA
PSU, Top chassis	58.8	57.6	50 *
PSU, side chassis	58.8	57.4	50 *
Top chassis	57.2	56.4	NA
Bottom chassis	56.7	55.7	NA
Chamber ambient	55.0	55.2	NA

Note: * - Power supply recommended operating ambient temperature and can be increase with decrease output power. Power supply tested with the equipment and no safety hazard condition observed.

Electric Strength Test (After Heating)	Clause	CSA/UL 60950-1 5.2	IEC 60950-1 5.2
<u>Acceptance Criteria (or Maximum Allowable Limits):</u> No insulation breakdown during test. See Table 5B for required test voltage			
Compliance: Yes (x) No () →See "X"			
Location		Test Voltage	Result
(A) ON COMPLETE SYSTEM:			
Primary AC input terminals and earth (chassis)		2121Vdc	Pass
Primary AC input terminals and earth (chassis) – ETH-1		2121Vdc	Pass
Primary AC input terminals and earth (chassis) – Telco #1		2121Vdc	Pass
Primary AC input terminals and earth (chassis) – ETH -3		2121Vdc	Pass
Primary AC input terminals and earth (chassis) – MBL - 1		2121Vdc	Pass
5 V secondary, ETH -1 and earth (chassis)		707Vdc	Pass
5 V secondary, Telco #1 and earth (chassis)		707Vdc	Pass
5 V secondary, ETH-3 and earth (chassis)		707Vdc	Pass
Comments:			
TMG3200 / TMP6400 (2U BOX) – AC version tested after the abnormal Heating tests, No insulation breaks down.			

Abnormal - Component Failure (System) (1/2)		Clause	CSA/UL 60950-1	IEC 60950-1		
			5.3	5.3		
Acceptance Criteria (or Maximum Allowable Limits):						
<ul style="list-style-type: none"> If a fire occurs it shall not propagate beyond the equipment. The equipment shall not emit molten metal. Enclosure shall not deform in such a way as to cause non-compliance with 2.1.1, 2.6.1, 2.10.3 and 4.4.1 No overheating during tests of 5.3.6(c). Max 125K for Class A; Max 150K for Class B; Max 140K for Class E; Max 165K for Class F; Max 185K for Class H. No exposure to hazardous voltages/energies, a max temp of 300C is acceptable. No conclusive test results on simulated circuits but conclusive test results are obtained with tests repeated in the equipment. No breakdown when electric strength test of 5.2 as applicable is applied (without allowing the equipment under test to cool down). In case of doubt, the tests are to be conducted with the equipment placed on a white tissue-paper-covered softwood surface. A single layer of cheesecloth is to be draped loosely over part of the equipment showing emission of flame or molten metal. The equipment is determined not to comply if the cheesecloth or the tissue paper glows of flames (CSA and UL). If a wire or a printed wiring board trace opens, the gap it to be electrically shorted and the test continued until ultimate results occur. This applies to each occurrence (CSA and UL). If the circuit is interrupted by the opening of a component, the test is to be repeated twice (three times total), using new components as necessary (CSA and UL). Where there is 10,000 Ω or more of additional series impedance in a circuit in which the voltage is 125V or less, the circuit needs not be subjected to the test. (CSA and UL). Where there is 20,000 Ω or more of additional series impedance in a circuit in which the voltage is greater than 125V but is not greater than 250V, the circuit needs not be subjected to the test. (CSA and UL). 						
Compliance: Yes (x) No () →See "X"						
Fuse Installed	Model/Type:					
	Characteristic (Check ✓)		F: Quick-Acting		H: High Breaking Capacity	
			T: Time-Lag		L: Low Breaking Capacity	
Fault #	Component	Short/Open	Electric Strength			
	Blocked front intake air vents		From	To	Voltage	P/F
F/A	Temperature	Elapsed Time	Primary	Ground		
			Primary	Secondary		
1	See Clause 4.5.1 #1 Abnormal result table, Blocked Front vents	1 hour				P
2	See Clause 4.5.1 #2 Abnormal result table, Locked Fan rotor	1 hour				P
Observations						
#1. Tested on TMG3200 / TMP6400 (2U BOX) – AC version system and test stop after temperature stabilized. No safety hazard condition observed and the test stopped when temperature reached stabilization.						
#2. Tested on TMG3200 / TMP6400 (2U BOX) – AC version system and test stop after temperature stabilized. No safety hazard condition observed and the test stopped when temperature reached stabilization.						
Ambient <u>55</u> °C						

Touch and Protective Conductor Current Measurement (2/2)				Clause	CSA/UL 60950-1	IEC 60950-1
					5.1	5.1
Compliance: Yes (x) No () →See "X"						
No.	Leakage (mA)	Input Volt/Hz	Measured Volt(U ₂ #)	Location	Primary Power Switch*	Comments (eg:Filter Name/Type)
1	1.53	264Vac / 50 Hz		Line to Earth, Forward	NA	Note 1
2	0.84	264Vac / 50 Hz		Neutral to Earth, Forward	NA	Note 1
3	1.54	264Vac / 50 Hz		Line to Earth, Reverse	NA	Note 1
4	0.82	264Vac / 50 Hz		Neutral to Earth, Reverse	NA	Note 1
Notes:						
1	U ₂ refers to voltage measured as per Annex D.					
2	Unit under test with:					
	i. <u>Single-Pole Primary Power Switch</u> : Take four measurements (combination of two mains polarities and two primary power switch positions).					
	ii. <u>Double-Pole Primary Power Switch</u> : Take two measurements (for two possible mains polarities).					
3	Normal and reverse refer to input power polarity (switch P1 of Fig 5A & 5B).					
4	Accessible non-conductive parts is tested using a 10 cm x 2 cm metal foil in contact with the parts of the surface.					
5	For 3ph equipment, EMC components connected between line and earth are disconnected one at a time.					
6	Switch 'e' is opened for equipment with protective earthing or functional earthing.					
7	For IT equipment, the test is conducted using circuit from Fig 9, 10, 12 of IEC 60990.					
Comments:						
Note 1: Leakage current tested on TMG3200 / TMP6400 (2U BOX) - AC version with both power supplies operated.						

Resistance of Earthing Conductors	Clause	CSA/UL 60950-1	IEC 60950-1												
		2.6.3.4	2.6.3.4												
<u>Acceptance Criteria (or Maximum Allowable Limits):</u>															
IEC:															
If the circuit rating of the circuit is 16A or less, the test current is 1.5 times the current rating of the circuit for 60s and the resistance calculated shall not exceed 0.1 ohm.															
If the current rating of the circuit exceeds 16A, the test current is 2 times the current rating of the circuit for 120s and the voltage drop across the protective bonding shall not exceed 2.5V.															
North America:															
If the current rating of the circuit is 16A or less, the test current is 2 times the current rating of the circuit for 120s and the resistance calculated shall not exceed 0.1 ohm.															
If the current rating of the circuit exceeds 16A, the test current is 2 times the current rating of the circuit (to a maximum 500A) and the voltage drop across the protective bonding shall not exceed 2.5V and the test time is:															
<table border="1"> <thead> <tr> <th>Current rating of circuit</th> <th>Time, minutes</th> </tr> </thead> <tbody> <tr> <td>≤ 30</td> <td>2</td> </tr> <tr> <td>>30 and ≤60</td> <td>4</td> </tr> <tr> <td>>60 and ≤100</td> <td>5</td> </tr> <tr> <td>>100 and ≤200</td> <td>8</td> </tr> <tr> <td>>200</td> <td>10</td> </tr> </tbody> </table>				Current rating of circuit	Time, minutes	≤ 30	2	>30 and ≤60	4	>60 and ≤100	5	>100 and ≤200	8	>200	10
Current rating of circuit	Time, minutes														
≤ 30	2														
>30 and ≤60	4														
>60 and ≤100	5														
>100 and ≤200	8														
>200	10														
Ref: CSA C22.2 No 0.4															
Compliance: Yes (X) No () → See "X"															
<u>Earth Path Resistance Measurements:</u>															
Test Current* (A)	Max volt Drop (V)	Test Time ** (min)	Calculated Resistance (ohm)	From	To										
40.3	0.523	4	0.01	Chassis Input earth terminal	Front chassis bottom right corner										
	(Max allowable 4V)		(max allowable 0.1 ohm)												
Comments:															
Tested on TMG3200 / TMP6400 (2U BOX) - AC version chassis with both power supplies installed.															

Part C:

Device Tested: **TMG5800 / TMP5900 (2U BOX) – AC version**

The Clauses evaluated as per CAN/CSA C22.2 No 60950-1-03 and ANSI/UL 60950-1 1st ed as follows:

Power Interface (Input) Test		Clause	CSA/UL 60950-1	IEC 60950-1
			1.6.2	1.6.2
<u>Acceptance Criteria (or Maximum Allowable Limits):</u> Maximum 10% Deviation				
Compliance: Yes (x) No () → See "X"				
Test No	Input			
	Volts	Hz	Amps	Watts
1	90	60	1.92	172.8
2	100	60	1.73	173
3	120	60	1.45	174
4	132	60	1.33	175.6
5	189	50	0.96	181.4
6	220	50	0.86	189.2
7	240	50	0.82	196.8
8	264	50	1.27	335.3
Test Conditions				
1-8	The AC input current measurements were conducted on the TMG5800 / TMP5900 (2U BOX) – AC version product that operated with both AC power supply modules. An external computer, hubs and loop back cables were used to simulate the normal maximum operation condition.			

Heating Test	Clause	CSA/UL 60950-1	IEC 60950-1	
		4.5.1	4.5.1	
Acceptance Criteria (or Maximum Allowable Limits): TMG5800 / TMP5900 (2U BOX) – AC version				
Table 4B for allowed temperature limits				
Compliance: Yes (x) No () →See "X"				
<u>Rated Voltage or Voltage Range:</u> 100-240 Vac				
<u>Rated Supply Frequency:</u> 50/60				
<u>Upper Limit (+10%):</u> (240 x 1.1)V = <u>264V</u>				
<u>Lower Limit (-10%):</u> (100x 0.90)V = <u>90V</u>				
<u>Note:</u> For other input voltage tolerance, refer to Cl 1.4.5 and/or manufacturer specifications.				
<u>Duty Cycle/Operating Condition:</u> Continuous				
<u>Rated Ambient:</u> 55 °C				
T.C. Locations	Max Temp Measured (Deg °C) *			Max Temp Allowed (Deg °C)
	60 Hz, 90Vac; Normal	60 Hz, 120Vac; Normal	60 Hz, 132Vac; Normal	
PCB DSP board, by U2	66.2	65.9	66.3	105
Big Heatsink, CPU board	60.7	60.8	60.8	NA
PCB CPU board, by C24	65.3	65.3	65.4	105
PCB Power Interface board, by C14	68.2	68.2	68.2	105
PCB Telco board, by U21	65.3	65.4	65.5	105
T1, Telco board	58.6	58.7	58.6	85
J1, Telco board	57.5	57.5	57.5	85
T1, Main board	61.2	61.2	61.3	70
Port 1, Main board	59.7	59.8	59.8	80
Port 2, Main board	61.4	61.3	61.5	80
PCB Main board, by U57	60.7	60.9	60.8	105
Inside ambient, Mid center	57.3	57.4	57.4	NA
Fan rotor, 2nd bottom right	62.4	62.4	62.5	70
PCB Display board, by U1	66	66	66.1	105
J2 power connector, Main board	60.1	60	60.1	105
CPU Heatsink, Mother board	60.9	62.7	61	NA
PCB Mother board, Mid	58.9	59.3	59	105
PCB Desktop adaptor	64	64.3	64.1	105
Power supply top chassis	59.7	59.8	59.8	50 *
Power supply side chassis	57.8	57.8	57.8	50 *
Inside top Mother board ambient	59.6	60.2	59.8	NA
Fan rotor, 2nd top right	63.8	63.7	63.9	70
Power supply module bottom chassis	62	62	62	50 *
EUT top chassis	55.9	56	56	NA
Chamber ambient	55.6	55.6	55.7	NA

Note: * - Power supply recommended operating ambient temperature and can be increase with decrease output power. Power supply tested with the equipment and no safety hazard condition observed.

Heating Test	Clause	CSA/UL 60950-1	IEC 60950-1
		4.5.1	4.5.1
Acceptance Criteria (or Maximum Allowable Limits): TMG5800 / TMP5900 (2U BOX) – AC version			
Table 4B for allowed temperature limits			
Compliance: Yes (x) No () →See "X"			
<u>Rated Voltage or Voltage Range:</u> 100-240 Vac			
<u>Rated Supply Frequency:</u> 50/60			
<u>Upper Limit (+10%):</u> (240 x 1.1)V = <u>264V</u>			
<u>Lower Limit (-10%):</u> (100x 0.90)V = <u>90V</u>			
<u>Note:</u> For other input voltage tolerance, refer to Cl 1.4.5 and/or manufacturer specifications.			
<u>Duty Cycle/Operating Condition:</u> Continuous			
<u>Rated Ambient:</u> 55 °C			
T.C. Locations	Max Temp Measured (Deg °C) *		
	50 Hz, 189Vac; Normal	50 Hz, 264Vac; Normal	50 Hz, 264Vac; Normal, Redundancy
PCB DSP board, by U2	66.3	66.2	66.4
Big Heatsink, CPU board	60.8	60.7	60.9
PCB CPU board, by C24	65.4	65.3	65.5
PCB Power Interface board, by C14	68.2	68.2	68.6
PCB Telco board, by U21	65.4	65.8	65.5
T1, Telco board	58.6	58.6	58.7
J1, Telco board	57.5	57.5	57.6
T1, Main board	61.2	61.1	61.4
Port 1, Main board	59.8	59.7	59.9
Port 2, Main board	61.5	61.3	61.7
PCB Main board, by U57	60.8	60.7	60.9
Inside ambient, Mid center	57.4	57.3	57.4
Fan rotor, 2nd bottom right	62.5	62.5	62.7
PCB Display board, by U1	66.1	66	66.2
J2 power connector, Main board	60.1	60	60.3
CPU Heatsink, Mother board	61	61.3	61.2
PCB Mother board, Mid	59	59.1	59
PCB Desktop adaptor	64.1	64.4	64.2
Power supply top chassis	59.7	59.5	56.7
Power supply side chassis	57.8	57.7	56.4
Inside top Mother board ambient	59.7	60	59.9
Fan rotor, 2nd top right	63.8	64.7	63.8
Power supply module bottom chassis	61.9	61.6	61
EUT top chassis	56	56.1	56
Chamber ambient	55.6	55.6	55.6

Note: Redundancy was operated with only one power supply module and the other had no power applied.

* - Power supply recommended operating ambient temperature and can be increase with decrease output power. Power supply tested with the equipment and no safety hazard condition observed.

Heating Test	Clause	CSA/UL 60950-1	IEC 60950-1
		4.5.1	4.5.1
Acceptance Criteria (or Maximum Allowable Limits): TMG5800 / TMP5900 (2U BOX) – AC version			
Table 4B for allowed temperature limits			
Compliance: Yes (x) No () →See "X"			
<u>Rated Voltage or Voltage Range:</u> 100-240 Vac			
<u>Rated Supply Frequency:</u> 50/60			
<u>Upper Limit (+10%):</u> (240 x 1.1)V = <u>264V</u>			
<u>Lower Limit (-10%):</u> (100x 0.90)V = <u>90V</u>			
<u>Note:</u> For other input voltage tolerance, refer to Cl 1.4.5 and/or manufacturer specifications.			
<u>Duty Cycle/Operating Condition:</u> Continuous			
<u>Rated Ambient:</u> 55 °C			

T.C. Locations	Max Temp Measured (Deg °C) *	
	#1 50 Hz, 264Vac; Abnormal, Blocked front vents	#2 50 Hz, 256Vac; Abnormal, Locked bottom fan rotor
PCB DSP board, by U2	71.2	67.3
Big Heatsink, CPU board	75	62.8
PCB CPU board, by C24	84.6	68.1
PCB Power Interface board, by C14	91.5	68.5
PCB Telco board, by U21	74.6	65
T1, Telco board	67.8	60.6
J1, Telco board	58.1	57.3
T1, Main board	63.1	62.6
Port 1, Main board	60.8	61.2
Port 2, Main board	60.2	62.5
PCB Main board, by U57	72.7	62.2
Inside ambient, Mid center	69.4	58.7
Fan rotor, 2nd bottom right	85.1	63.8
PCB Display board, by U1	71.3	67.3
J2 power connector, Main board	75.8	61.1
CPU Heatsink, Mother board	68.2	61.2
PCB Mother board, Mid	68.3	59.4
PCB Desktop adaptor	74.2	64.5
Power supply top chassis	65.3	59.8
Power supply side chassis	66.4	58
Inside top Mother board ambient	68.6	59.7
Fan rotor, 2nd top right	74.1	63.8
Power supply module bottom chassis	66.5	62.1
EUT top chassis	60.8	56.1
Chamber ambient	56.2	55.6

Note: * - Power supply recommended operating ambient temperature and can be increase with decrease output power. Power supply tested with the equipment and no safety hazard condition observed.

Electric Strength Test (After Heating)	Clause	CSA/UL 60950-1	IEC 60950-1
		5.2	5.2
Acceptance Criteria (or Maximum Allowable Limits): No insulation breakdown during test. See Table 5B for required test voltage			
Compliance: Yes (x) No () →See "X"			
Location		Test Voltage	Result
(A) ON COMPLETE SYSTEM:			
Primary AC input terminals and earth (chassis)		2121Vdc	Pass
Primary AC input terminals and earth (chassis) – ETH #1		2121Vdc	Pass
Primary AC input terminals and earth (chassis) – Telco #1		2121Vdc	Pass
Primary AC input terminals and earth (chassis) – Ethernet		2121Vdc	Pass
Primary AC input terminals and earth (chassis) – MBL - 1		2121Vdc	Pass
5 V secondary, ETH #1 and earth (chassis)		707Vdc	Pass
5 V secondary, Telco #1 and earth (chassis)		707Vdc	Pass
5 V secondary, Ethernet and earth (chassis)		707Vdc	Pass
5 V secondary, MBL and earth (chassis)		707Vdc	Pass
Comments:			
TMG5800 / TMP5900 (2U BOX) – AC version tested after the abnormal Heating tests, No insulation breaks down.			

Abnormal - Component Failure (System) (1/2)		Clause	CSA/UL 60950-1	IEC 60950-1	
			5.3	5.3	
Acceptance Criteria (or Maximum Allowable Limits): <ul style="list-style-type: none"> If a fire occurs it shall not propagate beyond the equipment. The equipment shall not emit molten metal. Enclosure shall not deform in such a way as to cause non-compliance with 2.1.1, 2.6.1, 2.10.3 and 4.4.1 No overheating during tests of 5.3.6(c). Max 125K for Class A; Max 150K for Class B; Max 140K for Class E; Max 165K for Class F; Max 185K for Class H. No exposure to hazardous voltages/energies, a max temp of 300C is acceptable. No conclusive test results on simulated circuits but conclusive test results are obtained with tests repeated in the equipment. No breakdown when electric strength test of 5.2 as applicable is applied (without allowing the equipment under test to cool down). In case of doubt, the tests are to be conducted with the equipment placed on a white tissue-paper-covered softwood surface. A single layer of cheesecloth is to be draped loosely over part of the equipment showing emission of flame or molten metal. The equipment is determined not to comply if the cheesecloth or the tissue paper glows of flames (CSA and UL). If a wire or a printed wiring board trace opens, the gap it to be electrically shorted and the test continued until ultimate results occur. This applies to each occurrence (CSA and UL). If the circuit is interrupted by the opening of a component, the test is to be repeated twice (three times total), using new components as necessary (CSA and UL). Where there is 10,000 Ω or more of additional series impedance in a circuit in which the voltage is 125V or less, the circuit needs not be subjected to the test. (CSA and UL). Where there is 20,000 Ω or more of additional series impedance in a circuit in which the voltage is greater than 125V but is not greater than 250V, the circuit needs not be subjected to the test. (CSA and UL). 					
Compliance: Yes (x) No () →See "X"					
Fuse Installed	Model/Type:				
	Characteristic (Check ✓)	F: Quick-Acting	H: High Breaking Capacity		
		T: Time-Lag	L: Low Breaking Capacity		
Fault #	Component	Short/Open	Electric Strength		
	Blocked front intake air vents		From	To	P/F
F/A	Temperature	Elapsed Time	Primary	Ground	
			Primary	Secondary	
1	See Clause 4.5.1 #1 Abnormal, Blocked front vents result table	1.2 hour			P
2	See Clause 4.5.1 #2 Abnormal, Locked bottom fan rotor result table	1.2 hour			P
Observations					
#1. Tested on TMG5800 / TMP5900 (2U BOX) – AC version system and test stop after temperature stabilized. No safety hazard condition observed and the test stopped when temperature reached stabilization.					
#2. Tested on TMG5800 / TMP5900 (2U BOX) – AC version system and test stop after temperature stabilized. No safety hazard condition observed and the test stopped when temperature reached stabilization.					
Ambient <u>55</u> °C					

Touch and Protective Conductor Current Measurement (2/2)				Clause	CSA/UL 60950-1	IEC 60950-1
					5.1	5.1
Compliance: Yes (x) No () →See "X"						
No.	Leakage (mA)	Input Volt/Hz	Measured Volt(U ₂ #)	Location	Primary Power Switch*	Comments (eg:Filter Name/Type)
1	0.79	264Vac / 50 Hz		Line to Earth, Forward	OFF	Note 1
2	0.73	264Vac / 50 Hz		Neutral to Earth, Forward	OFF	Note 1
3	0.63	264Vac / 50 Hz		Ground to Earth, Forward	OFF	Note 1
4	0.79	264Vac / 50 Hz		Line to Earth, Reverse	OFF	Note 1
5	0.73	264Vac / 50 Hz		Neutral to Earth, Reverse	OFF	Note 1
6	0.63	264Vac / 50 Hz		Ground to Earth, Reverse	OFF	Note 1
7	0.79	264Vac / 50 Hz		Line to Earth, Forward	ON	Note 2
8	0.74	264Vac / 50 Hz		Neutral to Earth, Forward	ON	Note 2
9	0.64	264Vac / 50 Hz		Ground to Earth, Forward	ON	Note 2
10	0.79	264Vac / 50 Hz		Line to Earth, Reverse	ON	Note 2
11	0.74	264Vac / 50 Hz		Neutral to Earth, Reverse	ON	Note 2
12	0.64	264Vac / 50 Hz		Ground to Earth, Reverse	ON	Note 2
Notes:						
1 U ₂ refers to voltage measured as per Annex D.						
2 Unit under test with:						
i. <u>Single-Pole Primary Power Switch</u> : Take four measurements (combination of two mains polarities and two primary power switch positions).						
ii. <u>Double-Pole Primary Power Switch</u> : Take two measurements (for two possible mains polarities).						
3 Normal and reverse refer to input power polarity (switch P1 of Fig 5A & 5B).						
4 Accessible non-conductive parts is tested using a 10 cm x 2 cm metal foil in contact with the parts of the surface.						
8 For 3ph equipment, EMC components connected between line and earth are disconnected one at a time.						
9 Switch 'e' is opened for equipment with protective earthing or functional earthing.						
10 For IT equipment, the test is conducted using circuit from Fig 9, 10, 12 of IEC 60990.						
Comments:						
Note 1: Leakage current tested on TMG5800 / TMP5900 (2U BOX) – AC version with both power supplies operated and switch was OFF.						
Note 2: Leakage current tested on TMG5800 / TMP5900 (2U BOX) – AC version with both power supplies operated and switch was ON.						

Resistance of Earthing Conductors	Clause	CSA/UL 60950-1	IEC 60950-1												
		2.6.3.4	2.6.3.4												
Acceptance Criteria (or Maximum Allowable Limits):															
<p>IEC:</p> <p>If the circuit rating of the circuit is 16A or less, the test current is 1.5 times the current rating of the circuit for 60s and the resistance calculated shall not exceed 0.1 ohm.</p> <p>If the current rating of the circuit exceeds 16A, the test current is 2 times the current rating of the circuit for 120s and the voltage drop across the protective bonding shall not exceed 2.5V.</p> <p>North America:</p> <p>If the current rating of the circuit is 16A or less, the test current is 2 times the current rating of the circuit for 120s and the resistance calculated shall not exceed 0.1 ohm.</p> <p>If the current rating of the circuit exceeds 16A, the test current is 2 times the current rating of the circuit (to a maximum 500A) and the voltage drop across the protective bonding shall not exceed 2.5V and the test time is:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Current rating of circuit</th> <th>Time, minutes</th> </tr> </thead> <tbody> <tr> <td>≤ 30</td> <td>2</td> </tr> <tr> <td>>30 and ≤60</td> <td>4</td> </tr> <tr> <td>>60 and ≤100</td> <td>5</td> </tr> <tr> <td>>100 and ≤200</td> <td>8</td> </tr> <tr> <td>>200</td> <td>10</td> </tr> </tbody> </table> <p style="text-align: center;">Ref: CSA C22.2 No 0.4</p>				Current rating of circuit	Time, minutes	≤ 30	2	>30 and ≤60	4	>60 and ≤100	5	>100 and ≤200	8	>200	10
Current rating of circuit	Time, minutes														
≤ 30	2														
>30 and ≤60	4														
>60 and ≤100	5														
>100 and ≤200	8														
>200	10														
Compliance: Yes (X) No () → See "X"															
Earth Path Resistance Measurements:															
Test Current* (A)	Max volt Drop (V)	Test Time ** (min)	Calculated Resistance (ohm)	From	To										
39.9	0.448	4	0.01	Chassis Input earth terminal	Front chassis bottom right corner										
	(Max allowable 4V)		(max allowable 0.1 ohm)												
Comments:															
Tested on TMG5800 / TMP5900 (2U BOX) – AC version chassis with both power supplies installed.															

Marking Durability	Clause	CSA/UL 60950-1	IEC 60950-1
		1.7.13	1.7.13
<u>Acceptance Criteria (or Maximum Allowable Limits):</u>			
<p>After the rubbing tests, the marking shall be legible; it shall not be possible to remove marking plates easily and they shall show no curling.</p> <p>* CSA 60950/UL 60950: Label securement shall meet the Adhesion requirements of CSA C22.2 No. 0.15 or UL 969. Having a CSA approved label and marking system is considered to comply with this test.</p>			
Compliance: Yes (x) No () See "X"			
<u>TESTS:</u> Compliance is checked by inspection and rubbing the marking by hand for 15 sec with a piece of cloth soaked with water and again for 15 sec with a piece of cloth soaked with petroleum spirit.			
TESTS		PASS (✓)	FAIL (X)
1. Rubbed for 15 seconds with water			
2. Rubbed for 15 seconds with petroleum spirit			
Comments:			
All products label is printed by UL/CSA recognize printing system.			

Project 2502294: (Edition 2)

Update report to cover alternate power supply, Part No. HIU-6250P by EMACS

TMG800 Single Supply Serial No. TB007831

1.6.2		TABLE: Electrical data (in normal conditions)					P
U (V)	I (mA)	Irated (A)	P (W)	Fuse #	Ifuse (A)	Condition/status	
90	869		62.2	NA	NA		
100	858		60.4	NA	NA		
240	389		54.0	NA	NA		
264	400		57.2	NA	NA		
Supplementary information: Operated at full load conditions							

TMP800 Dual Supply Serial No. TB007830

1.6.2		TABLE: Electrical data (in normal conditions)					P
U (V)	I (mA)	Irated (A)	P (W)	Fuse #	Ifuse (A)	Condition/status	
90	897		66.8	NA	NA		
100	839		73.9	NA	NA		
240	488		65.0	NA	NA		
264	453		62.8	NA	NA		
Supplementary information: Operated under full load conditions							

TMG800 Single Supply Serial No. TB007831

5.2	TABLE: Electric strength tests, impulse tests and voltage surge tests			P
Test voltage applied between:	Voltage shape (AC, DC, impulse, surge)	Test voltage (V)	Breakdown Yes / No	
Functional:				
NA				
Basic/supplementary:				
L/N to G	AC	1500	No	
Reinforced:				
NA				
Supplementary information: Performed after heating test				

TMG800 Dual Supply Serial No. TB007827

5.2	TABLE: Electric strength tests, impulse tests and voltage surge tests			P
Test voltage applied between:	Voltage shape (AC, DC, impulse, surge)	Test voltage (V)	Breakdown Yes / No	
Functional:				
Basic/supplementary:				
L/N to G	AC	1500	No	
Supplementary information: Performed after heating test				

5.3	TABLE: Fault condition tests					P
	Ambient temperature (°C)					—
	Power source for EUT: Manufacturer, model/type, output rating					—
Component No.	Fault	Supply voltage (V)	Test time	Fuse #	Fuse current (A)	Observation
TMG800 Single Supply	Blocked Vents	240	1hr	NA	NA	No charring of cheese cloth or tissue paper.
TMG800 Dual Supply	Blocked Vents	240	1hr	NA	NA	No charring of cheese cloth or tissue paper.
TMG800 Single Supply	Locked Rotor	240	1hr	NA	NA	No charring of cheese cloth or tissue paper.
TMG800 Dual Supply	Locked Rotor	240	1hr	NA	NA	No charring of cheese cloth or tissue paper.
Supplementary information: Tested under full load conditions						

TMG800 Single Supply Serial No. TB007831

5.1	TABLE: touch current measurement			P
Measured between:	Measured (mA)	Limit (mA)	Comments/conditions	
Normally Open	.60	3.5		
Reverse Open	.59	3.5		
Open Neutral	0	3.5		
Off	.02	3.5		
Normally Closed	0	3.5		
Reverse Closed	0	3.5		
supplementary information:				

TMP800 Dual Supply Serial No. TB007830

5.1	TABLE: touch current measurement			P
Measured between:	Measured (mA)	Limit (mA)	Comments/conditions	
Normally Open	.24	3.5		
Reverse Open	.24	3.5		
Open Neutral	0	3.5		
Off	.01	3.5		
Normally Closed	0	3.5		
Reverse Closed	0	3.5		
supplementary information:				

TMP800 Single Supply Serial No. TB007835

5.1	TABLE: touch current measurement			P
Measured between:	Measured (mA)	Limit (mA)	Comments/conditions	
Normally Open	.6	3.5		
Reverse Open	.6	3.5		
Open Neutral	0	3.5		
Off	.02	3.5		
Normally Closed	0	3.5		
Reverse Closed	0	3.5		
supplementary information:				

TMG800 Dual Supply Serial No. TB007827

5.1	TABLE: touch current measurement			P
Measured between:	Measured (mA)	Limit (mA)	Comments/conditions	
Normally Open	.26	3.5		
Reverse Open	.26	3.5		
Open Neutral	.01	3.5		
Off	0	3.5		
Normally Closed	0	3.5		
Reverse Closed	0	3.5		
supplementary information:				

4.5	TABLE: Thermal requirements – Configuration 1 – TMP800 (w/ Single P/S)							
	Supply voltage (V)	264 V						—
	Ambient T _{min} (°C)	24.24						—
	Ambient T _{max} (°C)							—
Maximum measured temperature T of part/at::		T (°C)					Allowed T _{max} (°C)	
L1 on P/S		57.36		90.28				
T1 on P/S		51.21		78.18				
T3 on P/S		47.27		70.30				
C1 on P/S		40.76		57.28				
Battery- Main Unit		43.13		62.02				
Fuse- Main Unit		28.59		32.94				
PCB Near Heat Sink- Main Unit		25.39		26.54				
Enclosure		32.81		41.38				
Supplementary information:								
Temperature T of winding:		t ₁ (°C)	R ₁ (Ω)	t ₂ (°C)	R ₂ (Ω)	T (°C)	Allowed T _{max} (°C)	Insulation class
Supplementary information:Hi-Pot Testing was performed between L/N – G at a value of 2125VDC for a period of 1 minute with passing results.								

4.5	TABLE: Thermal requirements – Configuration 1 – TMG800 (w/ Dual P/S)							
	Supply voltage (V) 264 V..... :							—
	Ambient T _{min} (°C) 24.24							—
	Ambient T _{max} (°C)							—
Maximum measured temperature T of part/at::		T (°C)						Allowed T _{max} (°C)
L1 on P/S								
L2 on P/S		35.50		46.76				
C1 on P/S		41.61		58.98				
T1 on P/S		43.05		61.86				
T2 on P/S		45.34		66.44				
PCB Back End P/S		35.99		47.74				
Battery- Main Unit		25.85		27.46				
Hard Drive		25.56		26.88				
PCB Near Heat Sink		34.66		45.08				
PCB 1 Fuse		24.76		25.28				
PCB2 Near Heat Sink		28.63		33.02				
Cooling Fan Motor		30.31		36.38				
Enclosure		28.21		32.18				
Supplementary information:								
Temperature T of winding:		t ₁ (°C)	R ₁ (Ω)	t ₂ (°C)	R ₂ (Ω)	T (°C)	Allowed T _{max} (°C)	Insulation class
Supplementary information: Supplementary information:Hi-Pot Testing was performed between L/N – G at a value of 2125VDC for a period of 1 minute with passing results.								

4.5	TABLE: Thermal requirements – Configuration 2 – TMP800 (w/ Dual P/S)							
	Supply voltage (V) 264 V..... :							—
	Ambient T _{min} (°C) 22.8							—
	Ambient T _{max} (°C)							—
Maximum measured temperature T of part/at::		T (°C)						Allowed T _{max} (°C)
L1 on P/S	38.26		53.72					
L2 on P/S	34.53		46.26					
C1 on P/S	40.24		57.68					
T1 on P/S	40.94		59.08					
T2 on P/S	43.98		65.16					
PCB Back End P/S	32.36		41.92					
Battery- Main Unit	27.25		31.7					
Fuse- Main Unit	24.18		25.56					
PCB Near Heat Sink- Main Unit	34.26		45.72					
Enclosure	26.85		30.9					
Supplementary information:								
Temperature T of winding:	t ₁ (°C)	R ₁ (Ω)	t ₂ (°C)	R ₂ (Ω)	T (°C)	Allowed T _{max} (°C)	Insulation class	
Supplementary information: Supplementary information:Hi-Pot Testing was performed between L/N – G at a value of 2125VDC for a period of 1 minute with passing results.								

4.5	TABLE: Thermal requirements – Configuration 2 – TMG800 (w/ Single P/S)							
	Supply voltage (V) 264 V..... :							—
	Ambient T _{min} (°C) 22.8							—
	Ambient T _{max} (°C)							—
Maximum measured temperature T of part/at::		T (°C)						Allowed T _{max} (°C)
L1 on P/S	45.39		67.98					
T1 on P/S	39.59		56.38					
T3 on P/S	31.61		40.42					
C1 on P/S	38.93		55.06					
Battery- Main Unit	27.14		31.48					
Hard Drive	25.12		27.44					
PCB Near Heat Sink	34.54		46.28					
PCB 1 Fuse	24.29		25.78					
PCB2 Near Heat Sink	28.74		34.68					
Cooling Fan Motor	30.22		37.64					
Enclosure	24.80		26.8					
Supplementary information:								
Temperature T of winding:	t ₁ (°C)	R ₁ (Ω)	t ₂ (°C)	R ₂ (Ω)	T (°C)	Allowed T _{max} (°C)	Insulation class	
Supplementary information: Supplementary information:Hi-Pot Testing was performed between L/N – G at a value of 2125VDC for a period of 1 minute with passing results.								

Project 2605834: (Edition 3)

Update F1=0 Ω ; F2=Littelfuse P/N 1812L050 and Power Supply P/N to IS-350R2UP. No tests are deemed necessary.

Project 70020527: (Edition 4)

Add alternative fan module and power supply to model TMG800 and TMP800. Change rating of TMG800 and TMP800 to 1.1A. Test results are filed in CSA archiving database (Documentum) in the Test Data folder under project number 251006-2345690(-70020527).

Unit Tested:

Model: TMG800

S/N: TB014357

Feed: AC (Two Power Supplies, model: EFRP-S207)

Summary of Tests:

Clause	Test Description
1.6.2	Input Current Test
2.1.1.7	Discharge of Capacitors in Equipment Test
2.6.3.4	Resistance of Earthing Conductor Test
4.5.2	Temperature Test
5.1	Touch Current and Protective Conductor Current Test
5.2	Electric Strength Test
5.3	Abnormal Test– Component Failure (System)

Project 70024647: (Edition 5)

To add alternative AC and DC power supply to model TMG800 and TMP800, in the Test Data folder under project number 251006-2345690(-70024647).

Summary of Tests: Tested system with Brick AC power supply:

Clause	Test Description
1.6.2	Input Current Test
2.1.1.7	Discharge of Capacitors in Equipment Test
2.6.3.4	Resistance of Earthing Conductor Test
4.5.2	Temperature Test
5.1	Touch Current and Protective Conductor Current Test
5.2	Electric Strength Test