UL TEST REPORT AND PROCEDURE

Standard:	UL 60950-1, 2nd Edition, 2019-05-09 (Information Technology Equipment - Safety - Part 1: General Requirements) CAN/CSA C22.2 No. 60950-1-07, 2nd Edition, 2014-10 (Information Technology Equipment - Safety - Part 1: General Requirements)
Certification Type:	Component Recognition
CCN:	QQGQ2, QQGQ8 (Power Supplies for Information Technology Equipment Including Electrical Business Equipment)
Complementary CCN:	QQJQ2, QQJQ8 (Power Supplies for Use in Audio/Video, Information and Communication Technology Equipment)
Product:	Switching power supply
Model:	RWS1500B-12, RWS1500B-15, RWS1500B-24, RWS1500B-36, RWS1500B-48 Maybe followed by suffix "abcde" (a is /, b is R or S, c is CO2, d is FO, e is RF, and "a", "b", "c", "d", and "e" may be blank) CME1500A-12, CME1500A-15, CME1500A-24, CME1500A-36, CME1500A-48, CUS1500M-12, CUS1500M-15, CUS1500M-24, CUS1500M-36, CUS1500M-48, may be followed by suffix "vwxy" (v is /, w is CO2, x is RF, y is SF; and "v", "w", "x", "y" may be blank)
Rating:	100-240 Vac, 50-60 Hz, 19.0 A
Applicant Name and Address:	TDK-LAMBDA CORP NAGAOKA TECHNICAL CENTER R&D DIV 2704-1 SETTAYA-MACHI NAGAOKA-SHI NIIGATA 940-1195 JAPAN

This is to certify that representative samples of the products covered by this Test Report have been investigated in accordance with the above referenced Standards. The products have been found to comply with the requirements covering the category and the products are judged to be eligible for Follow-Up Service under the indicated Test Procedure. The manufacturer is authorized to use the UL Mark on such products which comply with this Test Report and any other applicable requirements of UL LLC ('UL') in accordance with the Follow-Up Service Agreement. Only those products which properly bear the UL Mark are considered as being covered by UL's Follow-Up Service under the indicated Test Procedure.

Prepared By: Tomoko Takahashi / Project Handler

Reviewed By: Toshiyuki Suzuki / Reviewer

Supporting Documentation

The following documents located at the beginning of this Procedure supplement the requirements of this Test Report:

A. Authorization - The Authorization page may include additional Factory Identification Code markings.

B. Generic Inspection Instructions -

i. Part AC details important information which may be applicable to products covered by this Procedure. Products described in this Test Report must comply with any applicable items listed unless otherwise stated in the body of this Test Report.

ii. Part AE details any requirements which may be applicable to all products covered by this Procedure. Products described in this Test Report must comply with any applicable items listed unless otherwise stated in the body of each Test Report.

iii. Part AF details the requirements for the UL Certification Mark which is not controlled by the technical standard used to investigate these products. Products are permitted to bear only the Certification Mark(s) corresponding to the countries for which it is certified, as indicated in each Test Report.

Product Description

The product covered in this Test Report is building-in type switching power supply.

Output:

- 12 Vdc (10.2 Vdc - 14.4 Vdc), maximum 125 A (maximum 1500 W) (for RWS1500B-12, CME1500A-12, CUS1500M-12)
- 15 Vdc (12.75 Vdc - 18.0 Vdc), maximum 100 A (maximum 1500 W) (for RWS1500B-15, CME1500A-15, CUS1500M-15)
- 24 Vdc (20.4 Vdc - 28.8 Vdc), maximum 63 A (maximum 1512 W) (for RWS1500B-24, CME1500A-24, CUS1500M-24)
- 36 Vdc (30.6 Vdc - 43.2 Vdc), maximum 42 A (maximum 1512 W) (for RWS1500B-36,CME1500A-36, CUS1500M-36)
- 48 Vdc (40.8 Vdc - 57.6 Vdc), maximum 32 A (maximum 1536 W) (for RWS1500B-48, CME1500A-48, CUS1500M-48)
- AUX output: 5 Vdc, 1 A

Model Differences

All RWS1500B model are identical, except for model designation, output rating, secondary winding and internal construction of Transformer (T3), and secondary components.

All CME1500A (or CUS1500M) models are identical except for model designation, output rating, T3 secondary windings and plates (material, thickness, turns), T3 internal construction (related to secondary windings and plates), secondary components, and primary to earth capacitor (C15) capacitance (for CME1500A only).

CME1500A and CUS1500M series are identical except for model designation, primary to earth capacitor (C15), and secondary to earth capacitor (C61).

For CME1500A-12 and -15, C15 capacitance is various from maximum 680 pF to no mount.

For CME1500A-12, -15, -24, -36, -48, C61 capacitance is maximum 0.01 µF.

CME1500A (and/or CUS1500M) series are similar to RWS1500B series except for :

- Addition of AUX output with 5 Vdc, 1 A. This made changes to circuit diagram, silk/pattern trace layouts with additional transformer (T401) and insulation sheet to keep adequate spacing.

- Specification of noise filter coil (L1, 2), type DN-DL3651-2,
- Speed-controllable fan motor, type 9G0612H4,
- Addition of fuse (F4),
- Addition of suffix "SF" (for the additional models) meaning fuse (F4) is bypassed.
- Change of shape of fan flow barrier for 12 V and 15 V output with suffix "RF" *)
- No fan flow barrier provided to 24 V, 36 V, 48 V output with suffix "RF"
- There is speed control in cooling fans for CME1500A and CUS1500M series.

*) Fan flow barrier is not provided for standard models in RWS1500B, CME1500A, and CUS1500M series.

RWS1500B Series maybe followed by suffix "abcde" (a is /, b is R or S, c is CO2, d is FO, e is RF; and "a", "b", "c", "d" and "e" may be blank)

1. S: Model with AUX output and ON/OFF control function.
2. R: Model with optional ON/OFF control function.
3. CO2: Model with optional thin coating (QMJU2) on both sides of PWB.
4. FO: Model with Remote Sensing, Parallel operation, Low output voltage alarm.
5. RF: Model with opposite direction and air flow of Fan and different Output Derating Curve.

CME1500A and CUS1500M Series maybe followed by suffix "vwxy" (v is /, w is CO2, x is RF, y is SF; and "v", "w", "x", "y" may be blank)

1. CO2: thin coating (QMJU2) on both sides of printed wiring board to prevent unintentional objectives from adhering,
2. RF: DC fan with opposite direction and air flow, and different derating curve,
3. SF: F4 is bypassed, and F1 only left

Test Item Particulars	
Mass of equipment (kg)	2.7
Equipment mobility	for building-in
Connection to the mains	permanent connection
Operating condition	continuous
Access location	N/A (for building-in)
Over voltage category (OVC)	OVC II
Mains supply tolerance (%) or absolute mains supply values	+10%, -10%
Tested for IT power systems	No
IT testing, phase-phase voltage (V)	N/A
Class of equipment	Class I (earthed)
Considered current rating of protective device as part of the building installation (A)	30 A
Pollution degree (PD)	PD 2
IP protection class	IP X0
Altitude of operation (m)	Up to 5000 m
Altitude of test laboratory (m)	approximately 10 to 20 m

Technical Considerations

- The product was submitted and evaluated for use at the maximum ambient temperature (Tma) permitted by the manufacturer's specification of : See Enclosure #7-01, 7-04, 7-05 and 7-06.
- The product is intended for use on the following power systems : TN

Engineering Conditions of Acceptability

For use only in or with complete equipment where the acceptability of the combination is determined by UL LLC. When installed in an end-product, consideration must be given to the following:

- The end-product Electric Strength Test is to be based upon a maximum working voltage of : Model RWS1500B-12: Primary-SELV: 241 Vrms, 462 Vpk, Primary-Earthed Dead Metal: 240 Vrms, 422 Vpk, , Model RWS1500B-15: Primary-SELV: 240 Vrms, 472 Vpk, Primary-Earthed Dead Metal: 240 Vrms, 446 Vpk, , Model RWS1500B-24: Primary-SELV: 254 Vrms, 488 Vpk, Primary-Earthed Dead Metal: 240 Vrms, 414 Vpk, , Model RWS1500B-36: Primary-SELV: 271 Vrms, 636 Vpk, Primary-Earthed Dead Metal: 240 Vrms, 412 Vpk, , Model RWS1500B-48: Primary-SELV: 282 Vrms, 700 Vpk, Primary-Earthed Dead Metal: 240 Vrms, 408 Vpk, , Suffix "/S" Model: Primary-SELV: 390 Vrms, 584 Vpk, Primary-Earthed Dead Metal: 390 Vrms, 584 Vpk
- The following secondary output circuits are SELV : Output of all models
- The following secondary output circuits are at hazardous energy levels : Output of Models RWS1500B, CME1500A and CUS1500M Series
- The power supply terminals and/or connectors are : Suitable for factory wiring only
- The maximum investigated branch circuit rating is : 30 A
- The investigated Pollution Degree is : 2
- Proper bonding to the end-product main protective earthing termination is : Required
- An investigation of the protective bonding terminals has : Not been conducted
- The following magnetic devices (e.g. transformers or inductor) are provided with an OBJY2 insulation system with the indicated rating greater than Class A (105°C) : T1 (Class 130 (B)), T2 (Class 130 (B)), T3 (Class 155 (F)), T401 for A27452x (Class 130 (B)), T401 for A27450x (Class 155 (F))
- The following end-product enclosures are required : Mechanical,Electrical, Fire
- The following secondary output circuits are at non-hazardous energy levels : AUX output (Suffix "/S" Model), AXU output of Models CME1500A and CUS1500M Series
- Line to Line Capacitor C1 has maximum 3.3 uF for capacitance and C2 has maximum 1.0 uF for capacitance. C1: 3.3 uF and C2: 1.0 uF were used in test. Therefore, consideration shall be given to conducting Capacitance Discharge Test in the end-product with respect to the variation in C1 and C2.
- Line to ground Capacitors C3, C4, C5 and C6 has maximum 3300pF for Total capacitance of (C3+C5, C4+C6). Primary to ground Capacitors C15, C20 has maximum 2200pF for capacitance. Secondary to ground capacitors C51, C52 has maximum 1000pF for capacitance, C60 have maximum 0.022uF for capacitance and C61 have maximum 0.01uF for capacitance. (C3+C5), (C4+C6): 3300pF, C15, C20: 2200pF, C51, C52:1000pF, C60: 0.022uF and C61 0.01uF were used in test. Therefore, consideration shall be given in conducting Touch Current Test in the end product application with respect to the variation in C3, C4, C5, C6, C15, C20, C51, C52, C60 and C61.
- The following output circuits are at ES1 energy levels : Output of all models
- The following output circuits are at PS3 energy levels : Output of Models RWS1500B, CME1500A and CUS1500M Series
- Humidity conditioning has been conducted by tropical condition.
- Classification of PIS has not been conducted. Therefore, all electrical components and conductors including printed wirings were assumed to be arcing/resistive PIS.
- This component has been evaluated in 'control of fire spread' method assuming appropriate fire enclosure is provided in end product. Unless the fire enclosure is made of non-combustible or V-0 material, the separation from the PIS shall be considered.

Additional Information

The Clearances and Creepage Distances have additionally been assessed for suitability up to 5000 m elevation.

Additional Standards

The product fulfills the requirements of: The product fulfills the requirements of: UL 62368-1, 2nd Edition, 2014-12-01, CAN/CSA C22.2 No. 62368-1-14, 2nd Edition, 2014-12.

Markings and Instructions

Clause Title	Marking or Instruction Details
Power rating - Ratings	Ratings (voltage, frequency/dc, current)
Power rating - Company identification	Listee’s or Recognized companys name, Trade Name, Trademark or File Number
Power rating - Model	Model Number
Fuses - Rating	Rated current and voltage and type located on or adjacent to fuse or fuseholder.