



Test Report issued under
the responsibility of:



TEST REPORT
IEC 60950-1
Information technology equipment - Safety -
Part 1: General requirements

Report Reference No : E135494-A111-CB-1
Date of issue : 2016-10-27
Total number of pages : 128

CB Testing Laboratory : UL International Polska Sp. z o.o.
Address : Aleja Krakowska 81, 05-090 Sekocin Nowy, Poland

Applicant's name : TDK-LAMBDA UK LTD
KINGSLEY AVENUE
Address : ILFRACOMBE
DEVON
EX34 8ES, UNITED KINGDOM

Test specification:

Standard : IEC 60950-1:2005 (Second Edition); Am1:2009 + Am2:2013
Test procedure : CB Scheme
Non-standard test method : N/A

Test Report Form No. : IEC60950_1F
Test Report Form originator : SGS Fimko Ltd
Master TRF : Dated 2014-02

Copyright © 2014 Worldwide System for Conformity Testing and Certification of Electrotechnical Equipment and Components (IECEE), Geneva, Switzerland. All rights reserved.


This publication may be reproduced in whole or in part for non-commercial purposes as long as the IECEE is acknowledged as copyright owner and source of the material. IECEE takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

If this test Report is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.

This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

General disclaimer

The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Test item description	Switch Mode Power Supply
Trade Mark	TDK-Lambda 
Manufacturer	TDK-LAMBDA UK LTD KINGSLEY AVENUE ILFRACOMBE DEVON EX34 8ES, UNITED KINGDOM
Model/Type reference	QM5 or QS5, QM7 or QS7, QM8 and KQM5001V-x switch mode power supplies (followed by alphanumeric characters - see Test Report model differences for details of models and nomenclature)
Ratings	QM5 or QS5 (700W): 100-240Vac nom, 47-440Hz, 11A rms max QM5 or QS5 (1200W): 200-240Vac nom, 47-440Hz, 9A rms max QM7 or QS7 (1200W): 100-240Vac nom, 47-440Hz, 19A rms max QM7 or QS7 (1500W): 166.7-240Vac, 47-440Hz, 14A rms max QM8 (1200W): 100-240Vac nom, 47-440Hz, 19A rms max QM8 (1500W): 166.7-240Vac nom, 47-440Hz, 14A rms max KQM5001V-x: 100-240Vac, 47-63Hz, 12Arms max (see Test Report model differences for details of models and nomenclature)

Testing procedure and testing location:	
<input type="checkbox"/>	CB Testing Laboratory Testing location / address
<input type="checkbox"/>	Associated CB Test Laboratory Testing location / address Tested by (name + signature) Approved by (name + signature).....
<input type="checkbox"/>	Testing Procedure: TMP/CTF Stage 1 Testing location / address Tested by (name + signature) Approved by (name + signature).....
<input type="checkbox"/>	Testing Procedure: WMT/CTF Stage 2 Testing location / address Tested by (name + signature) Witnessed by (name + signature) .. Approved by (name + signature).....
<input checked="" type="checkbox"/>	Testing Procedure: SMT/CTF Stage 3 or 4 Testing location / address: TDK-Lambda UK, Kingsley Avenue, Ilfracombe, EX34 8ES, United Kingdom Tested by (name + signature): Tracy Burgess, Nick Marsh, Steve Hirstwood - Testers Approved by (name + signature).....: Dennis Butcher, Reviewer Supervised by (name + signature) .: Dennis Butcher, Reviewer
<input type="checkbox"/>	Testing Procedure: RMT Testing location / address Tested by (name + signature) Approved by (name + signature)..... Supervised by (name + signature) .:

List of Attachments	
National Differences (2 pages)	
Enclosures (307 pages)	
Summary Of Testing	
Unless otherwise indicated, all tests were conducted at TDK-Lambda UK, Kingsley Avenue, Ilfracombe, EX34 8ES, United Kingdom.	
Tests performed (name of test and test clause)	Testing location / Comments

Guide Information Page - Maximum Output Voltage, Current, and Volt Ampere Measurement (1.2.2.1)
Input: Single-Phase (1.6.2)
Energy Hazard Measurements (2.1.1.5, 2.1.2, 1.2.8.10)
Capacitance Discharge (2.1.1.7)
SELV Reliability Test Including Hazardous Voltage Measurements (2.2.2, 2.2.3, 2.2.4, Part 22 6.1)
Limited Short-Circuit (2.6.3.4)
Protective Bonding II (2.6.3.4, 2.6.1)
Humidity (2.9.1, 2.9.2, 5.2.2)
Determination of Working Voltage; Working Voltage Measurement (2.10.2)
Heating (4.5.1, 1.4.12, 1.4.13)
Touch Current (Single-Phase; TN/TT System) (5.1, Annex D)
Electric Strength (5.2.2)
Component Failure (5.3.1, 5.3.4, 5.3.7)
Transformer Abnormal Operation (5.3.3, 5.3.7b, Annex C.1)
Power Supply Output Short-Circuit/Overload (5.3.7)

Summary of Compliance with National Differences:

Countries outside the CB Scheme membership may also accept this report.

List of countries addressed: AR, AT, AU, BE, BG, BY, CA, CH, CN, CS, CZ, DE, DK, ES, EU, FI, FR, GB, GR, HU, IE, IL, IN, IT, JP, KR, MY, NL, NO, NZ, PL, PT, RO, SA, SE, SI, SK, UA, US, ZA

The product fulfills the requirements of: The product fulfills the requirements of: UL60950-1, 2nd Edition, 2014-10-14, CSA C22.2 No. 60950-1-07, 2nd Edition, 2014-10, EN 60950-1:2006 + A1:2010 + A11:2009 + A12:2011 + A2:2013

Copy of Marking Plate - Refer to Enclosure titled Marking Plate for copy.

Test item particulars :	
Equipment mobility	for building-in
Connection to the mains	Connection to mains via host equipment or via appliance inlet for QM5 option I only
Operating condition	continuous
Access location	For building in
Over voltage category (OVC)	OVC II
Mains supply tolerance (%) or absolute mains supply values	+10%, -10%
Tested for IT power systems	Yes, Norway only
IT testing, phase-phase voltage (V)	230Vac
Class of equipment	Class I (earthed)
Considered current rating of protective device as part of the building installation (A)	20A branch circuit
Pollution degree (PD)	PD 2
IP protection class	IP X0
Altitude of operation (m)	5000m
Altitude of test laboratory (m)	64m
Mass of equipment (kg)	3.5kg QM8 (3kg for QM7) (2kg for QM5 and KQM5001V-x)
Possible test case verdicts:	
- test case does not apply to the test object	N / A
- test object does meet the requirement	P(Pass)
- test object does not meet the requirement	F(Fail)
Testing:	
Date(s) of receipt of test item	2016-05-11 to 2017-10-11
Date(s) of Performance of tests	2017-05-16 to 2017-10-11
General remarks:	
<p>"(see Enclosure #)" refers to additional information appended to the report. "(see appended table)" refers to a table appended to the report.</p> <p>Throughout this report a point is used as the decimal separator.</p>	
Manufacturer's Declaration per Sub Clause 4.2.5 of IECEE 02:	
<p>The application for obtaining a CB Test Certificate includes more than one factory and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided</p> <p>When differences exist, they shall be identified in the General Product Information section.</p>	
Name and address of Factory(ies):	TDK-LAMBDA UK LTD KINGSLEY AVE ILFRACOMBE EX34 8ES UNITED KINGDOM

PANYU TRIO MICROTRONICS CO LTD
SHIJI INDUSTRIAL ESTATE
DONGYONG
NANSHA
GUANGZHOU
GUANGDONG CHINA

GENERAL PRODUCT INFORMATION:

Report Summary

The original report was modified on 2017-12-01 to include the following changes/additions:
This report is the 2nd amendment to CB Test Report No: E135494-111-CB-1 dated 2016/10/27 with CB Test Certificate No: DK-58984-UL.

Based on conducted testing and the review of the product technical documentation including photos, schematics, wiring diagrams and similar, it has been determined that the product continues to comply with the standard.

The original report was modified to include the following changes/additions:

1. Addition of QM8 model (8 slots)
2. Addition of the following modules: 8.1V, 18V, 20V and 48V SB Modules. 30V and 48V SC Modules. 12/15V, 15/15V, 15/24V and 27/27V DH Modules. 17/8V DM Modules.
3. Addition of 12V High Power Global Option
4. Added reverse air, customer air for QM5 or QS5 and QM8
5. Updates to CCL
6. Update of marking plates
7. Update of model differences nomenclature
8. Ratings revised
9. Enclosures added and updated where necessary

Product Description

The QM or QS series of switch mode power supply consists of:

Main board

1. Input filter, consisting of the input fuse(s), X and Y capacitors, common mode chokes up to the bridge.
2. PFC (boost circuit), consisting of the boost choke and associated switching FETs/circuitry.
3. Low power Standby circuit and Fan outputs consisting of the fly-back transformer and switching IC/circuitry supplying the Low Power Standby option and Fan outputs.
4. Secondary circuits (SELV), consisting of supply to the Low Power Standby output and fan supply.

Modules

5. Forward converter situated on the module, consisting of the main transformer and switching FETs/circuitry.
6. Secondary circuits (SELV), consisting of Module output, CH1/2 good and inhibit/enable.

Standby options

7. High power Standby circuit, consisting of the standby transformer and switching IC/circuitry supplying the High Power standby output.
8. Low power Standby circuit, supplied from the Main board.
9. Secondary circuits (SELV), consisting of High Power Standby output, Low Power Standby output, fan supply, AC fail and inhibit/enable.

(See Model Differences for details of nomenclature)

Model Differences

This report covers the QM and QS series of switch mode power supplies. The QS is identical to the QM series but allows for only one output made up from modules either in series or in parallel. The QM and QS series consists of 5 slot models (QM5/QS5), 7 slot models (QM7/QS7) and 8 slot models (QM8) with each slot capable of fitting single or dual modules (SC module requires two slots) and a non-standard model KQM5001V-x, see "Non-standard models" below for details. The QM5 or QS5 are available as 700W or 1200W and the QM7, QM8 or QS7 are available as 1200W or 1500W depending on the input voltage. High power or Low power Standby Options may also be fitted.

Units may be marked with a Product Code: KQMxy or KQSxy where x is the number of available slots and y may be any number of characters.

Unit configuration Code (Description): may be prefixed with NS # followed by / or - (where # may be any number of characters indicating non-safety related model differences).

Nomenclature

QMshabcdefklm for modular configurations

Where	s	=	5 for QM5 and KQM5001V-x Non-standard model only 7 for QM7 models 8 for QM8 models
	h	=	Hold Up Option Blank for none fitted H for extended hold up
	a	=	Cooling: C for customer air (not applicable to QM5 IEC Models) F for variable speed forward air fan R for variable speed, reverse air
	b	=	Input connector: Blank or S for screw F for faston I for IEC connector (QM5 only)
	c	=	Input fuse: D for dual AC fuses E for single AC fuse in the Live line
	d	=	Leakage option: S for 3.5mA L for 300µA R for 150µA T for 60µA
	e	=	Primary option: blank for none fitted (must also have no accessible standby) E for global enable T for global inhibit P for PMBus
	f	=	Standby supply: Blank for none fitted

5H for 5V/2A
5L for 5V/0.25A
12H for 12V/1A
13.5H for 13.5V/0.6A (KQM5001V-x model only)

May be followed by:

Single Output modules

vMcd

Where	v	=	output voltage
	M	=	module name (SB or SC)
	c	=	S for screw terminal output 'F' for faston
	d	=	'N' for no signals, omit for standard signals

Optionally followed by '-Dxxx' where xxx is the number of mV of droop

Dual output modules

v1/v2DHcd

Where	v1	=	CH1 output voltage
	v2	=	CH2 output voltage
	DH	=	module name (DH)
	c	=	'S' for screw terminal output, 'F' for faston
	d	=	'N' for no signals, omit for standard signals

v1/v2DMcd

Where	v1	=	CH1 output voltage
	v2	=	CH2 output voltage
	DM	=	module name (DM)
	c	=	'S' for screw terminal output, 'F' for faston
	d	=	'N' for no signals, omit for standard signals

Blanking plates

B/S

Where	B/S	=	Blanking plate
-------	-----	---	----------------

Parallel combinations

vZxcd

Where	v	=	output voltage
	Z	=	Paralleled output module comprising SB or SC modules
	x	=	Number of slots. See table below.
	c	=	'S' for screw terminal output, 'F' for faston
	d	=	'N' for no signals, omit for standard signals

Optionally followed by '-Dxxx' where xxx is the number of mV of droop

Series connected modules

vYxcd

Where	v	=	output voltage
	Y	=	Series output module comprising SB, SC or DH modules
	x	=	Number of slots. See tables below
	c	=	'S' for screw terminal output, 'F' for faston
	d	=	'N' for no signals, omit for standard signals

Optionally followed by '-Dxxx' where xxx is the number of mV of droop

Series connected Paralleled modules

vHxcd

Where	v	=	output voltage
	H	=	Series connected parallel SB and/or SC modules
	x	=	Number of slots. See tables below
	c	=	'S' for screw terminal output, 'F' for faston
	d	=	'N' for no signals, omit for standard signals

Optionally followed by '-Dxxx' where xxx is the number of mV of droop

Combined DM modules - seriesed Channel 1 only

vMxcd

Where	v	=	output voltage
	M	=	Series CH1 output comprising DM modules
	x	=	Number of slots. See tables below
	c	=	'S' for screw terminal output, 'F' for faston
	d	=	'N' for no signals, omit for standard signals

Optionally followed by '-Dxxx' where xxx is the number of mV of droop

Unit options

klm

Where	klm	=	Blank for standard output settings, may be three numbers from 0 to 9 (Preceded by -) which denotes various output voltage/current settings within the specified ranges of each output for a particular unit. (May define non-safety related parameters/features,e.g reduced primary current limit, reduced OVP)
-------	-----	---	--

QSsh-vg-ef-abcdh-klm for single output only

Where	s	=	5-xxxx (where 5 represents the number of available slots and xxxx can be any number or blank to represent the available output power) 7-xxxx (where 7 represents the number of available slots and xxxx can be any number or blank to represent the available output power)
-------	---	---	--

h	=	Hold Up Option Blank for none fitted H for extended hold up
a	=	Cooling: Blank or F for variable speed forward air fan R for variable speed, reverse air C for customer air (not applicable to QM5 IEC Models)
b	=	Input connector: Blank or S for screw F for faston I for IEC connector QM5 only
c	=	Input fuse: Blank or D for dual AC fuses E for single AC fuse in the Live line
d	=	Leakage option: S for 3.5mA Blank or L for 300µA R for 150µA T for 60µA
e	=	Primary option: blank for none fitted (must also have no accessible standby) E for global enable T for global inhibit P for PMBus
f	=	Standby supply: Blank for none fitted 5H for 5V/2A 5L for 5V/0.25A 12H for 12V/1A
v	=	Output voltage from within the allowable Vout range in the QS Output Parameters table
g	=	Blank for Screw terminal F for Faston terminal

Unit Options

klm

Where

klm	=	Blank for standard output settings, may be three numbers from 0 to 9 (Preceded by -) which denotes various output voltage/current settings within the specified ranges of each output for a particular unit. (May define non-safety related parameters/features, e.g reduced primary current limit, reduced OVP)
-----	---	---

May be followed by:

Blanking plates

B/S

Where B/S = Blanking plate

Parallel and Series combinations Table

Series connection number of slots.

Qty of modules	SB		SC		DH	
	Name	Slots	Name	Slots	Name	Slots
1	SB	1	SC	2	YB	1
2	YC	2	YF	4	YP	2
3	YD	3	YM	6	YQ	3
4	YG	4	YN	8	YR	4
5	YH	5	-	-	YS	5
6	YJ	6	-	-	YT	6
7	YK	7	-	-	YV	7
8	YL	8	-	-	YW	8

Series connection of parallel connected modules

Module	Qty	Slots	Name
ZC	2	4	HC
ZD	2	6	HD
ZF	2	8	HF
ZT	2	6	HT
ZV	2	8	HV
ZC	3	6	HW
ZC	4	8	HX

Parallel connection number of slots

slots	Number of modules in parallel		Name
	SB	SC	
2	2	0	ZC
3	1	1	ZD
4	0	2	ZF
5	1	2	ZG
6	0	3	ZH
7	1	3	ZJ
8	0	4	ZK
3	3	0	ZT
4	4	0	ZV
5	5	0	ZW
6	6	0	ZX
7	7	0	ZY
8	8	0	ZZ

DH outputs in series but split to create extra outputs.

Qty of modules	Split after output x (first output is 1)	Name
2	1	CB
2	3	CD
3	1	FB
3	3	FD
3	5	FG
4	1	GB
4	3	GD
4	5	GG
4	7	GJ
5	1	JB
5	3	JD
5	5	JG
5	7	JJ
5	9	JL
6	1	KB
6	3	KD
6	5	KG
6	7	KJ
6	9	KL
6	11	KN
7	1	LB
7	3	LD
7	5	LG
7	7	LJ
7	9	LL
7	11	LN
7	13	LQ
8	1	MB
8	3	MD
8	5	MG
8	7	MJ
8	9	ML
8	11	MN
8	13	MQ
8	15	MS

Combined DM modules - seriesed Channel 1 only.

Number of modules	outputs	Nomenclature
2	3	v1/v2/v3MC
3	4	v1/v2/v3/v4MD
4	5	v1/v2/v3/v4/v5MF
5	6	v1/v2/v3/v4/v5/v6MG
6	7	v1/v2/v3/v4/v5/v6/v7MH
7	8	v1/v2/v3/v4/v5/v6/v7/v8MJ
8	9	v1/v2/v3/v4/v5/v6/v7/v8/v9MK

Input Parameters

QM5

input voltage 100 - 240 Vac (200 - 240 Vac)*
 Input voltage range 90 - 264 Vac (180 - 264 Vac)*
 Input frequency range 47 - 440 Hz (47 - 63Hz for KQM5001V-x)
 Maximum input current 11A rms (9Arms for 1200W model) 12A rms for model KQM5001V-x

* Input for 1200W models.

Maximum ambient 70°C, (65°C for option I) total output power and module output power de-rated by 2.5% per °C above 50°C

QM7

input voltage 100 - 240 Vac (166.7 - 240 Vac)*
 Input voltage range 90 - 264 Vac (150 - 264 Vac)*
 Input frequency range 47 - 440 Hz
 Maximum input current 19A rms (14Arms for 1500W model)

* Input for 1500W models.

Maximum ambient 70°C, total output power and module output power de-rated by 2.5% per °C above 50°C

QM8

input voltage 100 - 240 Vac (166.7 - 240 Vac)*
 Input voltage range 90 - 264 Vac (150 - 264 Vac)*
 Input frequency range 47 - 440 Hz
 Maximum input current 19A rms (14A rms for 1500W model)

* Input for 1500W models.

Maximum ambient 70°C, total output power and module output power de-rated by 2.5% per °C above 50°C

QM5, QM7 and QM8 Output parameters

Module output ratings are in accordance with the following table.

Module	Note	Number of slots	Output Channel	Vout nom	Adjustment range (V)	Output Current (A)	Output Power (W)	Hazardous Energy
DM	5,8	1	CH1	12	11.9 to 16.1	10	120	Yes
DM	2	1	CH1	17	16 to 21.6	7.5	120	Yes
DM	4,5	1	CH1	24	20.8 to 28.2	5	120	Yes
DM	-	1	CH2	3.3	2.8 to 3.8	10	33	No
DM	-	1	CH2	5	4.25 to 5.75	10	50	No
DM	-	1	CH2	8	7 to 9.5	10	95	No
DM	3,8	1	CH2	14	11.9 to 16.1	8.3	100	No
DM	3	1	CH2	24	23.5 to 24.5	4.16	100	No
DH	1	1	CH1	12	10.2 to 13.8	10	120	Yes
DH	1	1	CH1	15	12.75 to 17.25	8	120	Yes
DH	1	1	CH1	24	20.4 to 27.6	5	120	Yes
DH	1	1	CH1	27	23 to 31	4.4	120	Yes
DH	2	1	CH2	12	10.2 to 13.8	10	120	Yes
DH	2	1	CH2	15	12.75 to 17.25	8	120	Yes
DH	2	1	CH2	24	20.4 to 27.6	5	120	Yes
DH	2	1	CH2	27	23 to 31	4.4	120	Yes
SB	-	1	CH1	3.3	3.3 to 3.63	37	122	No
SB	7	1	CH1	3.4	3.2 to 3.6	37	126	No
SB	-	1	CH1	5	5 to 5.5	30	150	No

SB	-	1	CH1	8.1	8 to 8.8	25	200	Yes
SB	-	1	CH1	12	12 to 13.2	25	300	Yes
SB	-	1	CH1	15	15 to 16.5	20	300	Yes
SB	-	1	CH1	18	18 to 19.8	16.7	300	Yes
SB	-	1	CH1	20	20 to 22	15	300	Yes
SB	-	1	CH1	48	48 to 52.8	6.25	300	Yes
SB	-	1	CH1	24	24 to 26.4	12.5	300	Yes
SB	-	1	CH1	28	28 to 30.8	10.7	300	Yes
SC	6	2	CH1	5	5 to 5.5	60	300	Yes
SC	-	2	CH1	12	12 to 13.2	50	600	Yes
SC	-	2	CH1	24	24 to 26.4	25	600	Yes
SC	-	2	CH1	30	30 to 33	20	600	Yes
SC	-	2	CH1	48	48 to 52.8	12.5	600	Yes
HF	-	8	CH1	10	10 to 10.6	110	1100	Yes
YB	-	1	CH1	24	20.4 to 27.6	9.8	200	Yes
YB	-	1	CH1	48	40.8 to 55.2	4.9	200	Yes
YC	-	2	CH1	10	10 to 11	30	300	Yes
YC	-	2	CH1	48	48 to 52.8	12.5	600	Yes
YF	6	4	CH1	10	10 to 11	60	600	Yes
YF	-	4	CH1	24	24 to 26.4	50	1200	Yes
YF	-	4	CH1	48	48 to 52.8	25	1200	Yes
YM	6	6	CH1	15	15 to 15.9	60	1200	Yes
YM	6	8	CH1	20	20 to 41.2	60	1200	Yes
ZD	-	3	CH1	5	5 to 5.3	80	400	Yes
ZD	-	3	CH1	12	12 to 12.8	65	780	Yes
ZD	-	3	CH1	24	24 to 25.6	30	720	Yes
ZF	6	4	CH1	5	5 to 5.3	110	550	Yes
ZF	-	4	CH1	12	12 to 12.8	90	1080	Yes

QS Output Parameters

Model	Note	Power (max)	Vout (range)	Current (max)	Hazardous Energy	Modules used
QM5	6	550	5-5.5V	110A	Yes	1 x ZF Module
-	-	600	12-13.2V	50A	Yes	1 x SC Module
-	-	600	24-26.4V	25A	Yes	1 x SC Module
-	-	600	30-33V	20A	Yes	1 x YC Module
-	-	600	48-52.8V	12.5A	Yes	1 x SC Module
-	-	600	56-61.6V	10.7A	Yes	1 x YC Module
-	-	600	95-105.6V	6.25A	Yes	1 x YC Module
-	-	1080	12-12.8V	90A	Yes	1 x ZF Module
-	-	1200	24-26.4V	50A	Yes	1 x YF Module
-	-	1200	48-52.8V	25A	Yes	1 x YF Module
QM7	-	1080	12-12.8V	90A	Yes	1 x ZF Module
-	-	1200	24-26.4V	50A	Yes	1 x YF Module
-	-	1200	48-52.8V	25A	Yes	1 x YF Module
-	-	1200	96-105.6V	12.5A	Yes	1 x YF Module

Note 1: CH1 limited to 80W when CH2 at 120W. Maximum of 200W across module.

Note 2: CH2 Limited to 80W when CH1 at 120W. Maximum of 200W across module.

Note 3: CH2 has a maximum of 100W. Maximum of 200W across the module.

Note 4: CH1 (24V) has a reduced adjustment range when CH2 is 24V. Reduced adjustment range is 21.6V to 28.8V.

Note 5: CH1 limited to 100W when CH2 at 100W. Maximum of 200W across module. Achievable if the

ambient temperature is reduced to 40°C.
 Note 6: Please see Further De-ratings Table below
 Note 7: KQM5001V-x model only
 Note 8. 12/12DM Module limited to 180W in slot 2 or 45°C ambient.

Further De-ratings Table

Converter Module	40°C Ambient	45°C Ambient	50°C Ambient	Global Option	Comments (applicable to 50°C ambient only) fitted
QM5 SC	60A	-	50A	N/A	-
- YF	60A	-	50A	N/A	-
- ZF	110A	-	90A	N/A	-
QM8 SC	-	60A	50A	Yes	Fitted in slots 1+2
- SC	-	60A	60A	No	Fitted in slots 1+2
- SC	-	60A	55A	No	Fitted in slots 3+4
- SC	-	60A	60A	Yes	Fitted in slots 3+4
- SC	-	60A	55A	N/A	Fitted in slots 7+8
- YF	-	60A	50A	Yes	Limited by SC Module in slots 1+2
- YF	-	60A	55A	No	Limited by SC Module in slots 1+2
- YM & YN	-	60A	55A	No	-
- YM & YN	-	60A	50A	Yes	-
- HF	-	110A	90A	Yes	-
- ZF	-	110A	90A	Yes	Fitted in slots 1 to 4
- ZF	-	110A	100A	Yes	Fitted in slots 3 to 8

Cooling options QM5

Cooling option	Input voltage (Vnom)	Output power (W)	Ambient (°C)
F (Forward air, variable speed)	100-240	700	50
	200-240	1200	50
C (Customer air*)	100-240	700	50
	200-240	1200	50
R (Reverse air, variable speed fan)	100-240	700	35
	200-240	1200	30

Cooling options QM7

Cooling option	Input voltage (Vnom)	Output power (W)	Ambient (°C)
F (Forward air, variable speed)	100-240	1200	50
	166.7-240	1500	50
C (Customer air)	100-240	1200	50
	166.7-240	1500	50
R (Reverse air, variable speed fan)	100-240	1200	40

Cooling options QM8

Cooling option	Input voltage (Vnom)	Output power (W)	Ambient (°C)
F (Forward air, variable speed)	100-240	1200	50
	166.7-240	1500	50
C (Customer air)	100-240	1200	50
	166.7-240	1500	50

R (Reverse air, variable speed fan) 100-240 1000 45

Non-standard models:

KQM5001V-x (where x may be any letter for non-safety differences)

The KQM5001V-x is a 5 slot, 815W non-standard QM5 model:
 QM5CSDLE13.5H 3.4SBS 12.2SBS 5.2SBS-D100 5.2SCS-D100
 Input rating: 100-240Vac, 12Arms max
 Max output power: 815W
 Max ambient 50°C
 Customer air

Additional Information

For best thermal performance and to ensure safety requirements are met at full load conditions, products are configured with modules starting from slot 1 in the following order:

1. Highest power SC modules
2. Lower power SC modules
3. Any other modules

Consult TDK-Lambda UK Ltd if a non-standard configuration is required.

Cooling for unit

Component temperatures for customer air cooled models, must be monitored in the end use application described in the "Cooling for Unit Temperature Table" below:

The following method must be used for determining the safe operation of PSUs.

The components listed in the following table must not exceed the temperatures given. To determine the component temperatures the heating tests must be conducted in accordance with the requirements of the standard in question. Consideration should also be given to the requirements of other safety standards. Test requirements include: PSU to be fitted in its end-use equipment and operated under the most adverse conditions permitted in the end-use equipment handbook/specification and which will result in the highest temperatures in the PSU. To determine the most adverse conditions consideration should be given to the end use equipment maximum operating ambient, the PSU loading and input voltage, ventilation, end use equipment orientation, the position of doors & covers, etc. Temperatures should be monitored using type K fine wire thermocouples (secured with cyanoacrylate adhesive, or similar) placed on the hottest part of the component (out of any direct airflow) and the equipment should be run until all temperatures have stabilised.

Cooling for unit temperature table (see layout drawings in handbook):

Cooling for unit temperature table:

Circuit Ref: ++	Description	Max. Temperature (°C)+
PFC	-	-
L2	Common Mode Choke	115 (140)
L3	Boost Choke	(125)
C2, C10	Electrolytic Capacitors	66 (105)
C7	Electrolytic Capacitors	64 (105)
C11	Electrolytic Capacitors	73 (105)
C3, C14	X Capacitors	(100)
C12	Y Capacitor	(105)

TX1	Flyback Transformer	(120)
D1	Diode bridge	116 (130)
D3	PFC Diode	(130)
U4	Opto-Coupler	(100)
U3	Voltage Regulator	93 (130)
Q2	Boost FETs	(130)
Options		
Low Power		
U6	Opto-Coupler	(100)
High Power		
C6	Electrolytic Capacitor	73 (105)
XU3	Opto-Couplers	(100)
TX1	Transformer Class F	(130)
Modules		
DM/DH Modules		
C206	Y Capacitor	(105)
C207	Electrolytic Capacitor	84 (105)
U8	Opto-Coupler	(100)
Q1	Primary FET	120 (130)
D201	Output Diode	124 (130)
TX1	Transformer Class B	(110)
SC Modules		
C206	Electrolytic Capacitor	83 (105)
C209	Y Capacitor	(105)
U1	Opto-Coupler	(100)
TX1 (5, 24, 30 and 48V)	Transformer Class B	(110)
TX1 (12V)	Transformer Class F	(130)
Q1	Primary FET	127 (130)
Q203	Secondary FET	(130)
SB Modules		
C206	Electrolytic Capacitor	83 (105)
C209	Y Capacitor	(105)
U1	Opto-Coupler	(100)
TX1	Transformer Class B	(110)
Q1	Primary FET	127 (130)
Q203	Secondary FET	(130)

Higher temperature limits (in brackets) may be used but product life may be reduced.

Amendment 2

The original CB Test Report No: E135494-111-CB-1 dated 2016/10/27 with CB Test Certificate No: DK-58984-UL was modified to include the following changes/additions:

1. Addition of QM8 model (8 slots)
2. Addition of the following modules: 8.1V, 18V, 20V and 48V SB Modules. 30V and 48V SC Modules. 12/15V, 15/15V, 15/24V and 27/27V DH Modules. 17/8V DM Modules.
3. Addition of 12V High Power Global Option
4. Added reverse air, customer air for QM5 or QS5 and QM8
5. Updates to CCL

6. Update of marking plate
7. Update of model differences nomenclature
8. Ratings revised
9. Enclosures added and updated where necessary

Based on conducted testing and the review of the product technical documentation including photos, schematics, wiring diagrams and similar, it has been determined that the product continues to comply with the standard.

Technical Considerations

- The product was submitted and evaluated for use at the maximum ambient temperature (T_{ma}) permitted by the manufacturer's specification of: 70° C, (65° C for QM5 option I), total output power and module output power de-rated 2.5% per °C above 50° C
- The product is intended for use on the following power systems: TN, TT, IT (Norway Only)
- The equipment disconnect device is considered to be: provided by the end equipment
- The product was investigated to the following additional standards: EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + A2:2013 (which includes all European national differences, including those specified in this test report).
- The following were investigated as part of the protective earthing/bonding: Printed wiring board trace (refer to Enclosure 5 Schematics + PWB for layouts)
- The following are available from the Applicant upon request: Installation (Safety) Instructions / Manual
- Multi-layer PWBs accepted under CTR ref. No. E349607-A23 dated 2014-07-31 and letter report in Enclosure 8-06 --

Engineering Conditions of Acceptability

When installed in an end-product, consideration must be given to the following:

- The following Production-Line tests are conducted for this product: Electric Strength, Earthing Continuity
- The end-product Electric Strength Test is to be based upon a maximum working voltage of: Primary-SELV: 457Vrms, 635Vpk, Primary-Earthed Dead Metal: 373Vrms, 680Vpk
- The following secondary output circuits are SELV: All
- The following secondary output circuits are at hazardous energy levels: SC (all models), YB, YC and YF (all models), ZD and ZF (all models), SB (8.1, 12, 15, 18, 20, 24, 28 and 48V models), DH (all models), DM (CH1 12, 17 and 24 models)
- The following secondary output circuits are at non-hazardous energy levels: 5V, 12V Standby outputs, SB (3.3V, 3.4V, 5V modules), DM (CH2: 3.3, 5, 8, 12 and 24 modules)
- The following output terminals were referenced to earth during performance testing: all outputs and their return lines individually referenced to earth to obtain maximum working voltage
- The power supply terminals and/or connectors are: Not investigated for field wiring
- The maximum investigated branch circuit rating is: 20 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: 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): PFC : TX1 Class B or F, MODULES: TX1 Class B or F except 12V SC Module TX1 Class F. GLOBAL OPTIONS/PMBUS: TX1 Class F. See table 1.5.1 for details of insulation systems used.

- The following end-product enclosures are required: Mechanical, Fire, Electrical (excluding QM5 option I, non-customer air version, front end)
- Fans: The fan provided in this sub-assembly is not intended for operator access.,
- All models require component temperatures to be monitored as detailed in the additional information --
- The product was tested for use at the maximum ambient temperature (TMA) 50°C in normal conditions permitted by the manufacturer, see additional information for details --
- The power supply was additionally tested according to the standard IEC 61010-1:2010 and EN 61010-1:2010 and fulfills the requirements of these standards (except KQM5001V-x) --
- Model KQM5001V-x is a customer air model and due consideration to the cooling in end equipment as described in the Additional Information section must be applied. --

Abbreviations used in the report:

- normal condition	N.C.	- single fault condition	S.F.C
- operational insulation	OP	- basic insulation	BI
- basic insulation between parts of opposite polarity:	BOP	- supplementary insulation	SI
- double insulation	DI	- reinforced insulation	RI

Indicate used abbreviations (if any)