CERTIFICATE OF COMPLIANCE

Certificate Number	20170930-E135493
Report Reference	E135493-A28-UL
Issue Date	2017-September-30
Issued to:	VICOR CORP 25 FRONTAGE RD ANDOVER MA 01810
This is to certify that representative samples of	COMPONENT - POWER SUPPLIES, INFORMATION TECHNOLOGY EQUIPMENT INCLUDING ELECTRICAL BUSINESS EQUIPMENT DC-DC Converter High Voltage VIA BCM Series, Ultra High Voltage VIA BCM Series
	Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.
Standard(s) for Safety:	UL 60950-1 Information Technology Equipment - Safety CAN/CSA C22.2 No. 60950-1-07 Information Technology Equipment - Safety
Additional Information:	See the UL Online Certifications Directory at www.ul.com/database for additional information

Only those products bearing the UL Certification Mark should be considered as being covered by UL's Certification and Follow-Up Service.

Recognized components are incomplete in certain constructional features or restricted in performance capabilities and are intended for use as components of complete equipment submitted for investigation rather than for direct separate installation in the field. The final acceptance of the component is dependent upon its installation and use in complete equipment submitted to UL LLC.

Look for the UL Certification Mark on the product.

Bruce Mahrenholz, Director North American Certification Program

UL LLC

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)
Product:	DC-DC Converter
Model:	High Voltage VIA BCM Series Ultra High Voltage VIA BCM Series See Miscellaneous Enclosure for model details.
Rating:	HV Input Voltage: 400 Vdc, (260-410) UHV Input Voltage: 544 Vdc (400-700) HV Output Voltage: 50 Vdc, (32.5-51.3) UHV Output Voltage: 34 Vdc, (25.0-43.75) HV Output Power: 1750 W Max UHV Output Power: 1750 W Max HV Output Current: 125 A Max UHV Output Current: 40 A Max See Miscellaneous Enclosure for model details.
Applicant Name and Address:	VICOR CORP 25 FRONTAGE RD ANDOVER MA 01810-5424 UNITED STATES

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.

The applicant is authorized to reproduce the referenced Test Report provided it is reproduced in its entirety.

UL authorizes the applicant to reproduce the latest pages of the referenced Test Report consisting of the first page of the Specific Technical Criteria through to the end of the Conditions of Acceptability.

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL.

Prepared by: Timothy Scott Reviewed by: William E. Platts

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 High Voltage and Ultra High Voltage VIA BCM Modules are unregulated isolating DC-DC Converters that provide a SELV output. The output voltage is not regulated and is proportional to the input voltage based on a fixed turns ratio. The VIA BCM operates over a wide input range and provides a maximum output rating of 125 A.

Model Differences

See Miscellaneous Enclosure for model nomenclature.

Technical Considerations

- Equipment mobility : for building-in
- Connection to the mains : not directly connected to the mains
- Operating condition : continuous
- Access location : for building-in
- Over voltage category (OVC) : OVC II
- Mains supply tolerance (%) or absolute mains supply values : HV Models: 260-410 Vdc; UHV Models: 400-700 Vdc and 500-800 Vdc
- Tested for IT power systems : -
- 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) : N/A
- Pollution degree (PD) : PD 2
- IP protection class : IP X0
- Altitude of operation (m) : Up to 5000 meters
- Altitude of test laboratory (m) : less than 2000 meters
- Mass of equipment (kg) : 0.157
- The product was submitted and evaluated for use at the maximum ambient temperature (Tma) permitted by the manufacturer’s specification of: the max allowable case temperature (90°C) shall be a consideration in the end product.,

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 following secondary output circuits are SELV: All
- The following secondary output circuits are at hazardous energy levels: All
- The investigated Pollution Degree is: 2
- The following end-product enclosures are required: Mechanical, Fire, Electrical. ,
- The output is separated from the input internally by reinforced insulation.
- See de-rating curve for maximum output current vs. case temperature. Max case temperature assumes only single sided cooling with either top or bottom side maintained at or below max temp.
- The housing of the VIA BCM Series is required to be connected to protective earth in the end application.
- The High Voltage VIA BCM Series was evaluated with fast acting external fuse rated 10A (Littelfuse 487 series or Littelfuse 505). Fuse may be provided in optional wiring harness.
- The output is considered SELV for all models.
- Outputs above 240W are considered to be at a hazardous energy level.
- The SELV output (-LO) of the high current models (62.5A and 125A) is internally connected to the housing to create an earthed SELV circuit in the end use product.
- The consequences of the circuit possibly being earthed at a second point should be considered in the end application per clause 2.9.4.
- A dielectric withstand test for Reinforced Insulation cannot be performed on the final HV VIA assembly. See isolation drawings for construction details. A dielectric withstand test for Reinforced Insulation can be performed on the final UHV VIA assembly. See isolation drawings for construction details.
- The Ultra High Voltage VIA BCMs with Vin up to 800V were evaluated with an external fuse rated 5A, Littelfuse SPF series rated 1000Vdc.
- The UHV VIA BCM may be used with a Vicor AC-DC TPM (Three Phase VIA AIM) input module. This configuration was evaluated with a 600Vac / 5A Littelfuse KTK fuse placed on each of the 3 input phases. The KTK fuses on the input module can be used in place of the SPF fuse on the VIA BCM module.
- An external insulator or gap pad may be necessary to maintain the required Creepage and Clearance distances when the UHV VIA is attached to a conductive surface (chassis mounting or a heat sink).
- Input capacitor discharge test to be evaluated as part of the end product.

Additional Information

May be provided with an optional Cable Assembly, please see Critical Components Table for specifics.

Testing of the High Voltage and Ultra High Voltage VIA BCM Modules was not considered necessary based upon previous evaluation under the CB scheme. The CB Scheme Test Certificate DE 3 - 502556, Report Ref. No. 72130438-000 dated 2017-08-11 and CB Scheme Test Certificate DE 3 - 503353, Report Ref. No. 72130438-100 dated 2019-07-15 were prepared by TÜV SUD Product Service GmbH, Ridlerstr. 65, 80339 Munich, Germany. As a result, the clause verdicts and test results for this report were noted as N/A and have been referred to the TUV CB Reports for details.

Markings and instructions	
Clause Title	Marking or Instruction Details
Power rating - Company identification	Listee's or Recognized company's name, Trade Name, Trademark or File Number
Power rating - Model	Model Number
Special Instructions to UL Representative	
Optional - UR logo may appear on packaging.	

High Voltage and Ultra High Voltage VIA BCM Model Matrix: BCMaaaabccdwwxxyzz

Example: BCM4414VD1E5135T00

BCM = Constant

Product Function	
BCM	Bus Converter Module

aaaa = 4414

Package Size (Length x Width)	
4414	4.4 in x 1.4 in
4914	4.9 in x 1.4 in

b = V

Package Type	
V	Chassis mount
B	Board mount

cc = D1

Max Input Voltage (range)		Max Output current
D1	410 Vdc (260-410)	125A
G0	700 Vdc (400-700)	40A
H0	800 Vdc (500-800)	35A

d = E

Range Ratio (Vin high / Vin low), used to define low line Vin	
E	1.6
F	1.8

ww = 51

Maximum Output Voltage (range)			
13	13 Vdc (8.1 - 12.8)	50	50 Vdc (31.2 - 50.0)
26	26 Vdc (16.3 - 25.6)	51	51 Vdc (32.5 - 51.3)
44	44 Vdc (25.0 – 43.75)		

xx = 35

Maximum Output Current			
35	35A	62 / 63	62.5A
40	40A	A2 / A3	125A

y = T

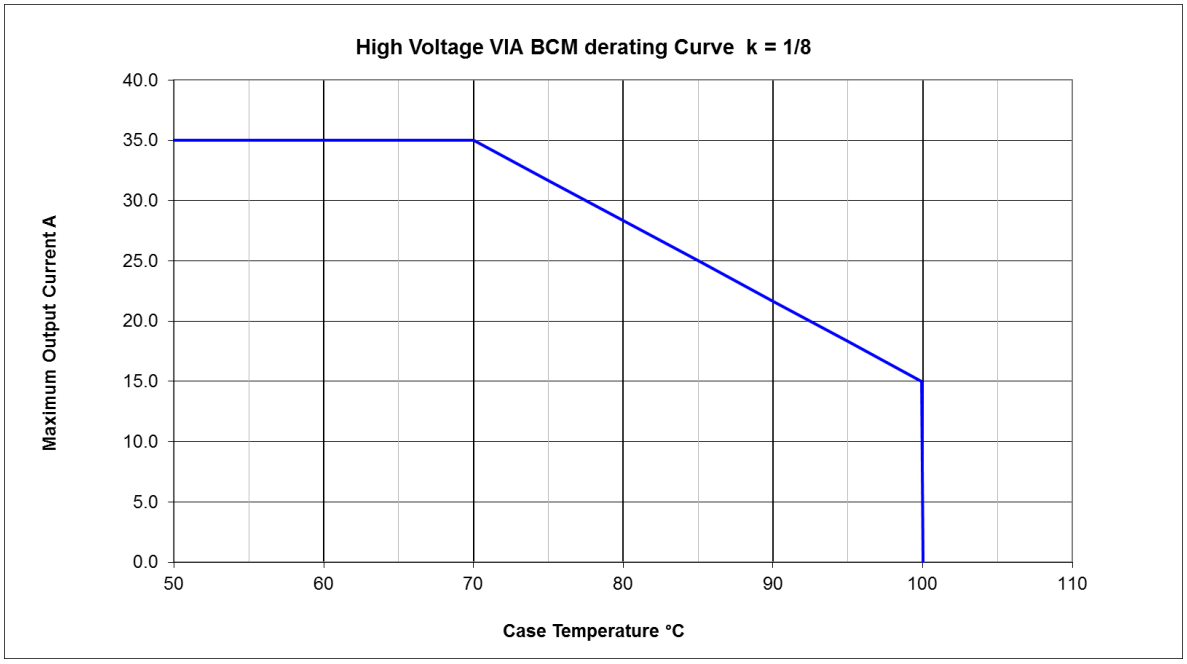
Product Grade					
C	-20 to 100°C	T	-40 to 100°C	M	-55 to 100°C

zz = 00

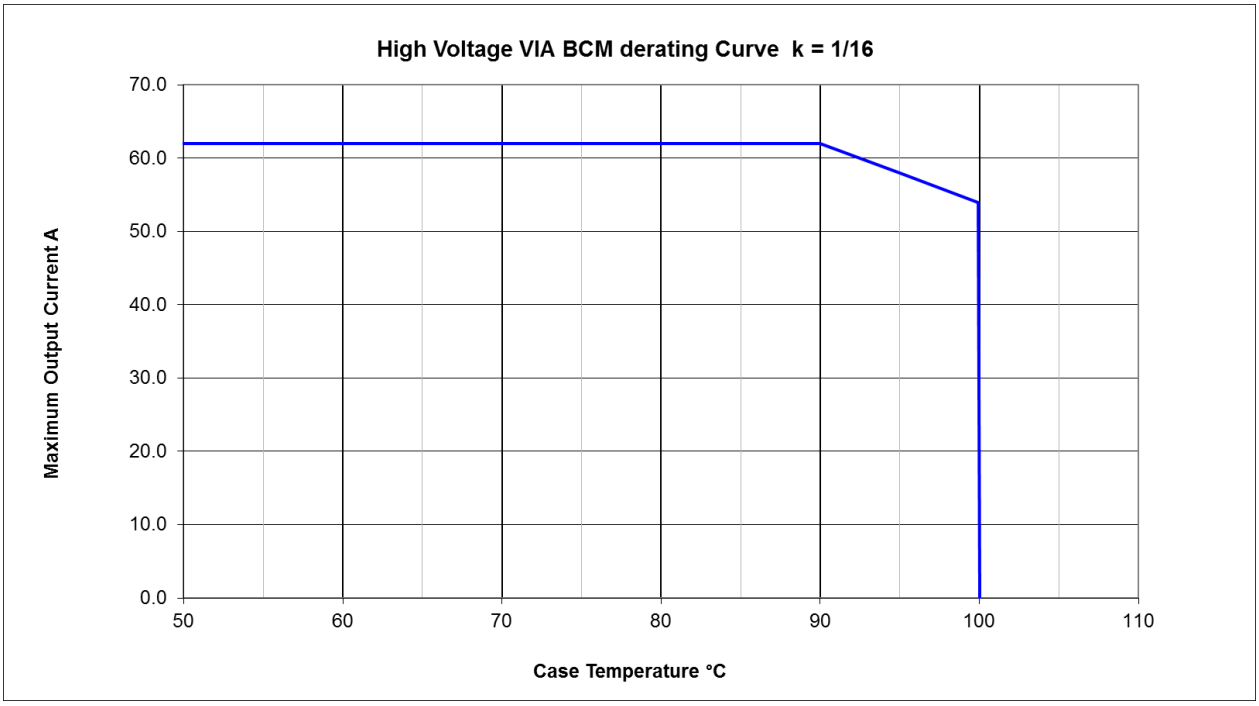
Customer Options, Communication type and pin type for PCB mount models (any alphanumeric, non-safety related, non-inclusive list of examples)			
00	No options	09	Analog communication, long pins
01	Analog communication	10	Digital communication, long pins
02	Digital communication	13	Analog communication, extra-long pins
05	Analog communication, short pins	14	Digital communication, extra-long pins
06	Digital communication, short pins	AD	Digital communication, extra-long socket pins
		AE	Digital communication, extra-long socket pins

Customer Special Part Number	Equivalent Standard Part Number
BCA400B500C1K8A31	BCM4914VD1E5135C02
BCA400B500T1K8A31	BCM4914VD1E5135T02
BCA400C500C1K8A31	BCM4914BD1E5135C06
BCA400C500T1K8A31	BCM4914BD1E5135T06
BCA400G500C1K8A31	BCM4914BD1E5135C10
BCA400G500T1K8A31	BCM4914BD1E5135T10

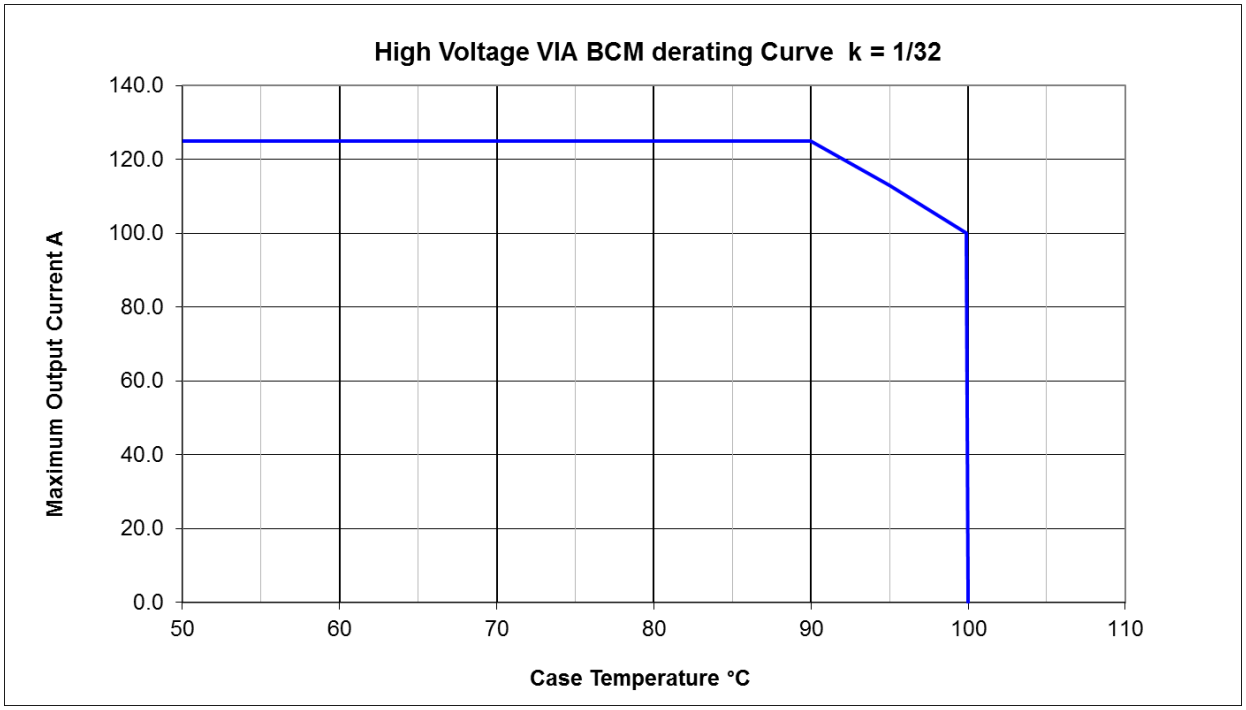
HV VIA BCM k = 1/8	
Model Number: BCM4w14xD1E5135yzz	
Vin = 384V (260-410)	Pout = 1750W max
Vout = 47.5V (32.5-51.3)	Iout = 35A max



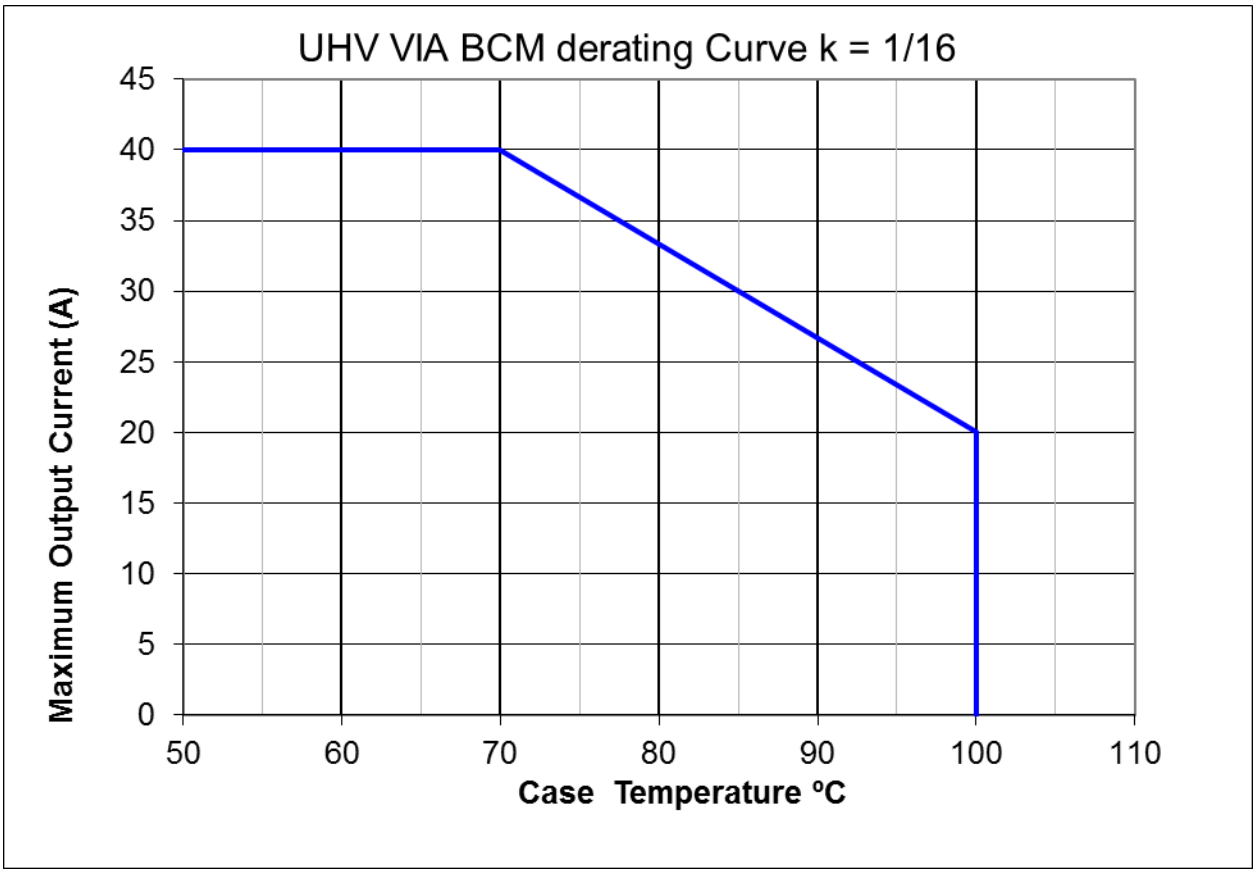
HV VIA BCM k = 1/16	
Model Number: BCM4w14xD1E2662yzz BCM4w14xD1E2663yzz	
Vin = 384V (260-410)	Pout = 1500W max
Vout = 24.0V (16.3-25.6)	Iout = 62.5A max



HV VIA BCM k = 1/32	
Model Number: BCM4w14xD1E13A2yzz BCM4w14xD1E13A3yzz	
Vin = 384V (260-410)	Pout = 1500W max
Vout = 12.0V (8.1-12.8)	Iout = 125A max



UHV VIA BCM k = 1/16	
Model Number: BCM4w14xG0F4440yzz	
Vin = 544V (400-700)	Pout = 1750W max
Vout = 34V (25-43.75)	Iout = 40A max



UHV VIA BCM k = 1/16	
Model Number: BCM4w14xH0E5035yzz	
Vin = 650V (500-800)	Pout = 1750W max
Vout = 40V (31.2-50)	Iout = 35A max