

## UL TEST REPORT AND PROCEDURE

<b>Standard:</b>	UL 60950-1, 2nd Edition, 2007-03-27 (Information Technology Equipment - Safety - Part 1: General Requirements) CSA C22.2 No. 60950-1-07, 2nd Edition, 2007-03 (Information Technology Equipment - Safety - Part 1: General Requirements)
<b>Certification Type:</b>	Power Supplies for Information Technology Equipment Including Electrical Business Equipment
<b>CCN:</b>	QQGQ2, QQGQ8
<b>Product:</b>	DC/DC Power Supply
<b>Model:</b>	Vi Chip Half VTM and BCM model: Vii01wwxHyz  VI Chip Half VTM2 and BCM2 model: AAAbbbcdddefffxzz
<b>Rating:</b>	See Miscellaneous Enclosure for Family Tree. Rated Input: 48 Vdc  Rated Output: 12Vdc max. 50A max. 120W max.  See Miscellaneous Enclosure for model matrix
<b>Applicant Name and Address:</b>	VICOR CORP 25 FRONTAGE RD ANDOVER MA 01810 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 Underwriters Laboratories Inc. ('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.

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Prepared by: Gerard Soprych  
Underwriters Laboratories Inc.



Reviewed by: David Keen  
Underwriters Laboratories Inc.



### **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 half size VI Chip BCM / VTM series of DC-DC converters are designed for Building-in. Both the BCM and VTM provide an isolated but non-regulated output that is determined by a fixed turns ratio. The VTM output can be regulated when used with a VI Chip PRM (Pre-regulator Module). The BCM is a standalone device. The input to the half size BCM / VTM series of DC-DC converters is intended to be supplied from a TNV-2 or other secondary circuit. Basic Insulation is provided from input to output with a dielectric rating of 2250Vdc.

The VIB0101THJ / VIV0101THJ are the highest rated output power half size BCM / VTM modules and were tested to represent the half size BCM / VTM family of converters.

The half size BCM's output is rated in terms of maximum power in Watts while the half size VTM's output is rated in terms of maximum current in Amps.

Added Half VTM2 and BCM2 model numbers which have identical construction to the original products but utilize a new controller IC. No additional testing was required.

### **Model Differences**

See Model Matrix

### Technical Considerations

- Equipment mobility : for building-in
- Connection to the mains : N/A
- Operating condition : continuous
- Access location : building-in
- Over voltage category (OVC) : OVC II
- Mains supply tolerance (%) or absolute mains supply values : 38-55Vdc
- Tested for IT power systems : No
- IT testing, phase-phase voltage (V) : N/A
- Class of equipment : Class III (supplied by SELV)
- Considered current rating (A) : -
- Pollution degree (PD) : PD 2
- IP protection class : IP X0
- Altitude of operation (m) : 2000
- Altitude of test laboratory (m) : 150
- Mass of equipment (kg) : 0.0125
- The product was submitted and tested for use at the maximum case temperature permitted by the manufacturer's specification of 125°C.

### **Engineering Conditions of Acceptability**

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

- Input Voltage: Both a nominal input voltage and an input voltage range are specified. Operation over the entire range was evaluated.
- Max Temperature: Keep the maximum semiconductor junction temperature of the VI Chip at 125degC or less. There are two methods to demonstrate compliance. Method1 Keep Tcasemax < 100C under all conditions where Tcasemax is the maximum case temp of the VI Chip Method 2 Keep Tcasemax < 125C – (Pdissmax X 3.0) under all conditions where Pdissmax = Pinput\_max – Poutput\_max. Pdissmax is the amount of power in Watts dissipated within the device. The thermal resistance of the half size VI Chip from the internal semiconductor junction to the case is 3.0 degC / Watt.
- Fusing Requirements: The half size BCM / VTM modules were evaluated with a 3.15A Littelfuse Nano<sup>2</sup>Fuse. If the VTM module is used with a VI Chip PRM then the VTM does not require individual fusing since the PRM requires it's own fuse and provides a current limited source to the VTM input. A worst case scenario of a half size VTM powered by a PRM fused with a 10A Littelfuse Nano<sup>2</sup>Fuse was evaluated. Refer to the PRM safety approvals for complete PRM model numbers and fusing requirements.
- The input to the half size VI Chip is intended to be supplied from a TNV-2 or other secondary circuit. The output is considered to be SELV.
- The half size BCM and VTM provide 2250 Vdc of isolation from input to output and from the input to the molded case.
- The output is separated from the input by Basic insulation.
- The following Production-Line tests are conducted for this product: Electric Strength
- The following secondary output circuits are SELV: All
- The power supply terminals and/or connectors are: Not investigated for field wiring
- The investigated Pollution Degree is: 2
- The following end-product enclosures are required: Mechanical , Fire , Electrical
- The end-product Electric Strength Test is to be based upon a maximum working voltage of: Primary-SELV: 55 Vpk
- The following secondary output circuits are at non-hazardous energy levels: All

**VI Chip Half VIC Family Tree Model Vii01wwxHyz**

V = Constant	ii =	Product Type	01 = Constant
	IB	BCM	
	IV	VTM	
	MV	Military VTM	

ww = 00-99, defines electrical ratings, Product Type (ii) dependent				
Model	Vin Nom (range)	Vout (nom)	Iout (VTM)	Pout (BCM)
VIB0101	48 Vdc (38-55)	12.0 Vdc		120 W
VIB0102	48 Vdc (38-55)	1.2 Vdc		75 W
VIB0103	48 Vdc (38-55)	1.8 Vdc		80 W
VIB0104	48 Vdc (38-55)	3.3 Vdc		100 W
VIB0105	48 Vdc (38-55)	5.0 Vdc		100 W
VIB0106	48 Vdc (38-55)	6.0 Vdc		100 W
VIB0107	48 Vdc (38-55)	8.0 Vdc		100 W
VIB0108	48 Vdc (38-55)	9.6 Vdc		100 W
VIV0101	48 Vdc (26-55)	12 Vdc	10 A	
VIV0102	40 Vdc (26-55)	1.2 Vdc	50 A	
VIV0103	40 Vdc (26-55)	1.8 Vdc	40 A	
VIV0104	40 Vdc (26-55)	3.3 Vdc	25 A	
VIV0105	40 Vdc (26-55)	5.0 Vdc	20 A	
VIV0106	40 Vdc (26-55)	6.0 Vdc	17 A	
VIV0107	48 Vdc (26-55)	8.0 Vdc	12 A	
VIV0108	48 Vdc (26-55)	9.6 Vdc	10 A	
VMV0105	36 Vdc (26-50)	4.5 Vdc	15 A	
VMV0106	36 Vdc (26-50)	12.0 Vdc	6 A	

x =	Product Grade	Temp Range
C	Commercial	0 - 100 C
T	Telecom	-40 - 100 C
M	Military	-55 - 100 C

H = Half VIC Package Size

y =	Lead Designator
J	J-Lead
G	Gull-Wing
T	Through-Hole

z =	Revision Designator, any alpha-numeric character (optional, non-safety related)
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**VI Chip Half BCM2 and VTM2 Family Tree Model: AAAbbbcddefffxzz**

Example: BCM48BH120T120A00

**AAA = BCM**

BCM Family (Buss Converter Module)	
BCM	Standard version
MBCM	Mil-COTS version

**AAA = VTM**

VTM Family (Voltage Transformation Module)	
VTM	Standard version
MVTM	Mil-COTS version

**bbb = 48B**

Input Voltage	Nominal (range)
48B	48 Vdc (38-55)
48E	48 Vdc (26-55)

**c = H**

Package Size / Lead Designator	
H	Half VI Chip J-Lead

**ddd = 120**

Output Voltage Designator (range)			
015	1.5 Vdc	060	6.0 Vdc
020	2.0 Vdc	080	8.0 Vdc
040	4.0 Vdc	120	12.0 Vdc

**e = T**

Product Grade	
T	-40 to 125C
M	-55 to 125C

**fff = 120**

Output Power / Current Designator			
BCM - (Watt)		VTM - (Amp)	
075	75W	006	6A
080	80W	010	10A
100	100W	020	20A
120	120W	025	25A
		040	40A
		050	50A

**x = A**

Revision (non-safety related)	
x	Any alphanumeric character

**zz = 00**

Customer reference (non-safety related)	
zz	Any alphanumeric character