

## 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>	Component Recognition
<b>CCN:</b>	QQGQ2, QQGQ8 (Power Supplies for Information Technology Equipment Including Electrical Business Equipment)
<b>Product:</b>	DC-DC Converter
<b>Model:</b>	HV BCM Series HV BCM2 Series
<b>Rating:</b>	Input: 230-400 Vdc Output: 48 Vdc max, 375 W max  See Enclosure Miscellaneous for model details.
<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 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.

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### **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 products described in this report are DC-DC Converters that provide an isolated intermediate bus voltage.

### **Model Differences**

See Enclosure Miscellaneous for model details.

### **Technical Considerations**

- Equipment mobility : for building-in
- Connection to the mains : building-in
- Operating condition : continuous
- Access location : building-in
- Over voltage category (OVC) : OVC II
- Mains supply tolerance (%) or absolute mains supply values : N/A
- Tested for IT power systems : No
- IT testing, phase-phase voltage (V) : N/A
- Class of equipment : Class II (double insulated)
- 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
- Input Voltage: Nameplate rating is a nominal input voltage. The highest voltage BCM was evaluated over the entire specified voltage range.

#### **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 components require special consideration during end-product Thermal (Heating) tests; Keep the maximum semiconductor junction temperature 125°C or less. This can be achieved in one of two ways. , Keep  $T_{casemax} < 100C$  under all conditions where  $T_{casemax}$  is the maximum case temp of the VI Chip, or , Keep  $T_{casemax} < 125C - (P_{dissmax} \times 1.5)$  under all conditions ,  $P_{dissmax}$  is the maximum power dissipation of the module at temperature, defined by  $P_{Input\_max} - P_{Output\_max}$  where  $P_{Output\_max}$  is defined as the maximum output power in the application. Method three: Maintain the internal semiconductor junction temperature at  $T_j = 125$  degrees C or less. This can be achieved by measuring the dc voltage at the TM (temperature monitor) lead and converting the voltage to temperature. The TM has a nominal +27C set point of 3.0 Vdc and a nominal gain of 10mV / degrees C. Example;  $TM = 3.4$  Vdc,  $T_j = (27 + 40) 67$  degrees C. ,
- Fusing Requirements: To meet safety requirements, the input of the BCM module requires a Bussmann PC-Tron fuse rated 2.5 A or less or an SOC type 36CFA rated 3.15A or less.
- Input is intended to be supplied from a non-isolated offline circuit.
- The output is considered to be SELV
- Outputs above 240 Watts are considered to be at a hazardous energy level.
- The output is separated from the input by reinforced insulation.

**VI Chip High Voltage BCM Model Number: Baaacdddeff** Example: B384F120T24

**B = B**

<b>BCM (Buss Converter Module)</b>	
B =	Constant

**aaa = 384**

<b>Input Voltage</b>	<b>Nominal (range)</b>
<b>270</b>	270 Vdc (240-330)
<b>352</b>	352 Vdc (330-365)
<b>384</b>	384 Vdc (360-400)

**c = F**

<b>Package Size</b>	<b>In Board BGA</b>	<b>On Board J-Lead</b>	<b>Through Hole</b>
Full VIC	K	F	T

**ddd = 120**

<b>Output Voltage Designator</b>			
110	11 Vdc	340	34 Vdc
120	12 Vdc	440	44 Vdc
125	12.5 Vdc	480	48 Vdc
137	13.7 Vdc		

**e = T**

<b>Product Grade</b>	
<b>T</b>	-40 to 125C
<b>M</b>	-55 to 125C

**ff = 24**

<b>Output Power Designator</b>			
24	240 W	35	350 W
30	300 W	37	375 W
33	330 W		

**Customer Special Model Numbers**

<b>Customer Special Model Numbers</b>	<b>Equivalent Standard Model Numbers</b>
B352F110T30x	B352F110T30
VIZ0002, VIZ0002x	B352F110T30
VIZ0020, VIZ0020x	B352F440T37
VIZ0048, VIZ0048x	B352F110T30
VIZ0070, VIZ0070x	B352F440T37
VIB0001TFJ, VIB0001TFJx	B352F110T30
VIB0002TFJ, VIB0002TFJx	B384F480T33
VIB0003TFJ, VIB0003TFJx	B352F440T35
VIB0004TFJ, VIB0004TFJx	B270F340T24
VMB0004MFJ, VMB0004MFJx	B270F340M24
VIB0010TFJ, VIB0010TFJx	B352F125T33
VIB0011TFJ, VIB0011TFJx	B384F137T30

<b>Special Model Options</b>
VIB may be replaced by VMB for Military Designation
T may be replaced by M for Grade Designation
J may be replaced by T for Thru-Hole
x = revision, any letter A through Z, non-safety related

**Example # 1: B384F120T30**

BCM, 384 Vin, J Lead, 12 Vout, T Grade, 300W

**Example # 2: B352F110T30**

BCM, 352 Vin, J Lead, 11 Vout, T Grade, 300W

**Example # 3: VIB0001TFJ**

BCM, 352 Vin, J Lead, 11 Vout, T Grade, 300W

**Example # 4: VMB0004MFT**

BCM, 270 Vin, Thru-Hole, 34 Vout, M Grade, 240W

**Example #5: VIZ0020**

BCM, 352 Vin, J Lead, 44 Vout, T Grade, 375W

**VI Chip High Voltage BCM2 Model Number: BCMbbbcdddefffxzz**

Example: BCM384F120T300A00

**BCM = Constant**

<b>BCM Family (Buss Converter Module)</b>	
<b>BCM</b>	Standard version
<b>MBCM</b>	Mil-COTS version

**bbb = 384**

<b>Input Voltage</b>	<b>Nominal (range)</b>
<b>270</b>	270 Vdc (230-330)
<b>352</b>	352 Vdc (330-365)
<b>384</b>	384 Vdc (360-400)

**c = F**

<b>Package Size and Lead Designator</b>	
<b>F</b>	Full VI Chip J-Lead
<b>T</b>	Full VI Chip Though-hole

**ddd = 120**

<b>Output Voltage Designator (can be any three digits from 110 to 480)</b>			
<b>Vout = (designator / 10), non-inclusive list of examples below</b>			
110	11 Vdc	338	33.8 Vdc
120	12 Vdc	340	34 Vdc
125	12.5 Vdc	450	45 Vdc
137	13.7 Vdc	480	48 Vdc

**e = T**

<b>Product Grade</b>	
<b>T</b>	-40 to 125C
<b>M</b>	-55 to 125C

**fff = 300**

<b>Output Power Designator (can be any three digits from 200 to 375)</b>			
<b>non-inclusive list of examples below</b>			
200	200 W	300	300 W
235	235 W	330	330 W
240	240 W	350	350 W
270	270 W	375	375 W

**x = A**

<b>Revision (non-safety related)</b>	
x	Any alphanumeric character

**zz = 00**

<b>Customer reference (non-safety related)</b>	
zz	Any alphanumeric character

<b>Customer Special Model Numbers</b>	<b>Equivalent Standard Model Numbers</b>
VIZ0089, VIZ0089x	BCM352F110T300A00
x = revision, any letter A through Z, non-safety related	