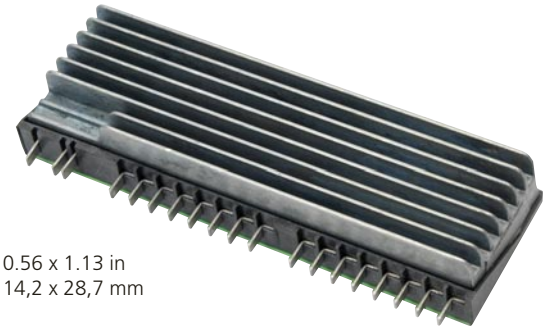
BCM Array™
BC384R120T060VM-00

Features

- 384 V to 12 V VI BRICK™ BCM Array
- 600 Watt (900 Watt for 1 ms)
- Vertical mount package reduces footprint
- Integrated heat sink simplifies thermal management
- High density – up to 268 W/in^3
- Small footprint – 303 W/in^2
- Low weight – 3.2 oz (92 g)
- ZVS / ZCS isolated sine amplitude converter
- Typical efficiency 95%
- <1 µs transient response
- >1.8 million hours MTBF
- Internal fuse and filter
- No output filtering required

Vin = 360 – 400 V
Vout = 11.3 – 12.5 V
Iout = 50 A
K = 1/32
Rout = 10.0 mΩ max



Size:
3.54 x 0.56 x 1.13 in
89,9 x 14,2 x 28,7 mm

Product Description

The BC384R120T060VM-00 contains two high efficiency, narrow input range Sine Amplitude Converter (SAC) converters operating from a 360 to 400 Vdc primary bus to deliver an isolated low voltage secondary. The module provides an isolated 11.3 -12.5 V distribution bus and is packaged in a thermally efficient VI BRICK BCM Array package. Due to the fast response time and low noise, the need for limited life aluminum electrolytic or tantalum capacitors at the input of POL converters is reduced—or eliminated—resulting in savings of board area, materials and total system cost.

The BC384R120T060VM-00 achieves a power density of 268 W/in^3 in a VI BRICK BCM Array package utilizing an integrated heat sink. Owing to its high conversion efficiency and safe operating temperature range, the VI BRICK BCM Array does not require additional heat sinking or high airflow velocities. Low junction-to-heat sink thermal impedance assures low junction temperatures and long life in the harshest environments.

Absolute Maximum Ratings

Parameter	Values	Unit	Notes
+In to -In	-1.0 to 440	Vdc	
+In to -In	500	Vdc	For 100 ms
PC to -In	-0.3 to 7.0	Vdc	
+Out to -Out	-0.5 to 16.0	Vdc	
Isolation voltage	4242	Vdc	Input to Output
Output current	55.4	A	Continuous
Peak output current	75.0	A	For 1 ms
Output power	600	W	Continuous
Peak output power	900	W	For 1 ms
Operating junction temperature(1)	-40 to 125	°C	T-Grade
Storage temperature	-40 to 125	°C	T-Grade

Note:
(1) The referenced junction is defined as the semiconductor having the highest temperature. This temperature is monitored by a shutdown comparator.

Input Specifications *(Conditions are at 384 Vin, full load, and 25°C ambient unless otherwise specified)*

Parameter	Min	Typ	Max	Unit	Note
Input voltage range	360	384	400	Vdc	
Input dV/dt			1	V/µs	
Input undervoltage turn-on			320	Vdc	
Input undervoltage turn-off	280			Vdc	
Input overvoltage turn-on	400			Vdc	
Input overvoltage turn-off			440	Vdc	
Input quiescent current		2.2		mA	PC low
Input current			1.7	Adc	
No load power dissipation		11.6	16.6	W	
Internal input capacitance		0.4		µF	
Internal input inductance		2.5		µH	

Output Specifications *(Conditions are at 384 Vin, full load, and 25°C ambient unless otherwise specified)*

Parameter	Min	Typ	Max	Unit	Note
Output voltage	11.3		12.5	Vdc	No load; 360 – 400 V_{IN}
	10.8		12.0	Vdc	Full load; 360 – 400 V_{IN}
Output power	0		600	W	360 - 400 V_{IN} ; 100°C heat sink max. temp.
Rated DC current	0		55.4	Adc	$P_{OUT} \leq 600$ W
Peak repetitive power			900	W	Max pulse width 1ms, max duty cycle 10%, baseline power 50%
Current share accuracy		5	10	%	
Efficiency					
Half load	94.1	95.2		%	
Full load	94.2	95.3		%	
Internal output inductance		0.6		nH	
Internal output capacitance		62.0		µF	Effective value
Load capacitance			2,000	µF	
Output overvoltage setpoint	12.5			Vdc	
Output ripple voltage					
No external bypass		222	450	mV p-p	
Short circuit protection set point	56.4			Adc	Module will shut down
Average short circuit current		0.46		A	
Effective switching frequency	3.3	3.4	3.5	MHz	Fixed, 1.7 MHz per phase per each BCM
Line regulation					
K	0.0309	1/32	0.0316		VOUT = K•V_{IN} at no load
Load regulation					
R_{OUT}		7.5	10.0	mΩ	
Output overshoot					
Input turn-on		50		mV	No output filter
PC enable		50		mV	No output filter
Output turn-on delay					
From application of power		1180		ms	No output filter
From release of PC pin		240		ms	No output filter

General

Parameter	Min	Typ	Max	Unit	Note
MTBF					
MIL-HDBK-217F		1.8		Mhrs	25°C, GB
Isolation specifications					
Voltage	4242			Vdc	Input to Output
Capacitance		1000		pF	Input to Output
Resistance	5			MΩ	Input to Output
Agency approvals		cTÜVus			Safty agency approvals pending
		CE Mark			Low Voltage Directive
Mechanical					See Mechanical Drawings
Weight		3.2/92		oz/g	
Dimensions					
Length		3.54/89,9	3.55/90,1	in/mm	
Width		0.56/14,2	0.57/14,6	in/mm	
Height		1.13/28,7	1.18/30,0	in/mm	
Thermal					
Over temperature shutdown	125	130	135	°C	Junction temperature
Operating temperature - heatsink			100	°C	See thermal curve, Figure 1
Junction-to-heatsink thermal impedance ($R_{\theta JC}$)		0.50	0.65	°C/W	Heatsink temperature measured in location shown in Figure 2
Heatsink to ambient thermal impedance ($R_{\theta HA}$)		5.95	6.10	°C/W	http://www.vicorpower.com/technical_library/calculators/calc_t~1.xls

Auxiliary Pins *(Conditions are at 384 Vin, full load, and 25°C ambient unless otherwise specified)*

Parameter	Min	Typ	Max	Unit	Note
Enable / Disable (CNTRL)					
DC voltage	4.8	5.0	5.2	Vdc	
Module disable voltage	2.4	2.5		Vdc	
Module enable voltage		2.5	2.6	Vdc	
Current limit	4.8	5.0	5.8	mA	Source only
Enable delay time		240		ms	
Disable delay time		40		µs	Time from PC low to output low

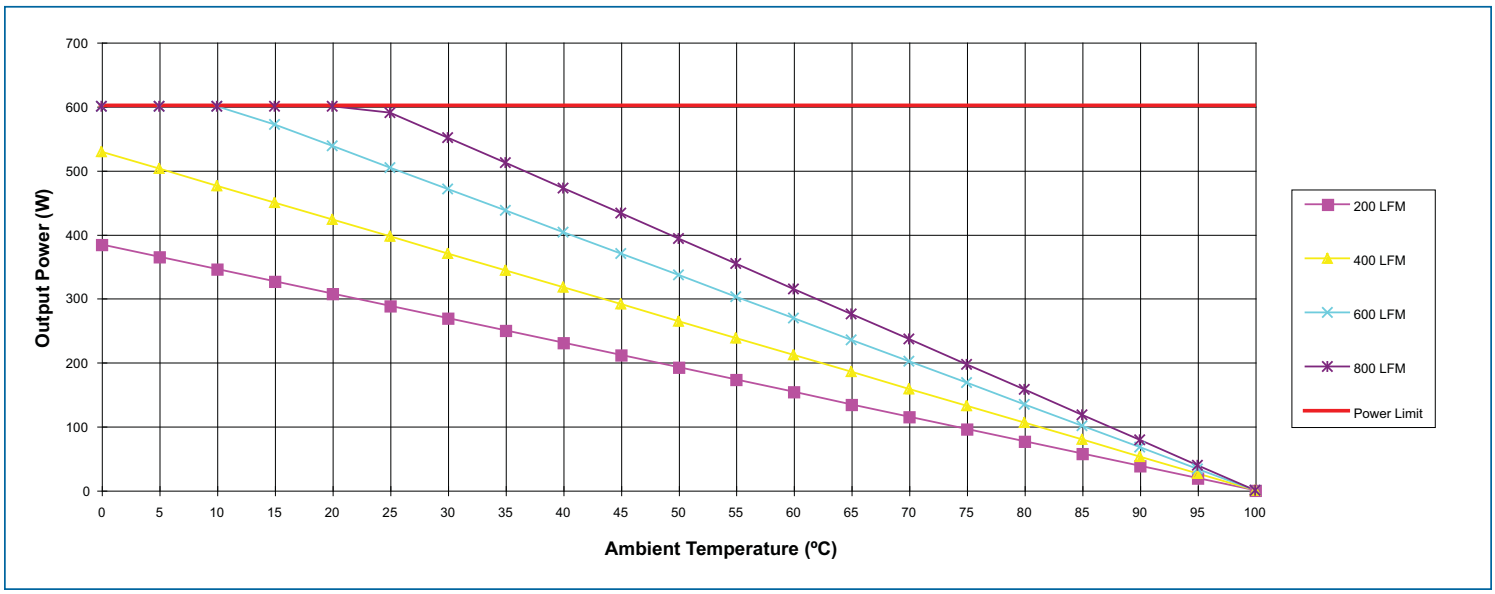


Figure 1 *– Typical thermal curve – verify all thermal management systems experimentally.*

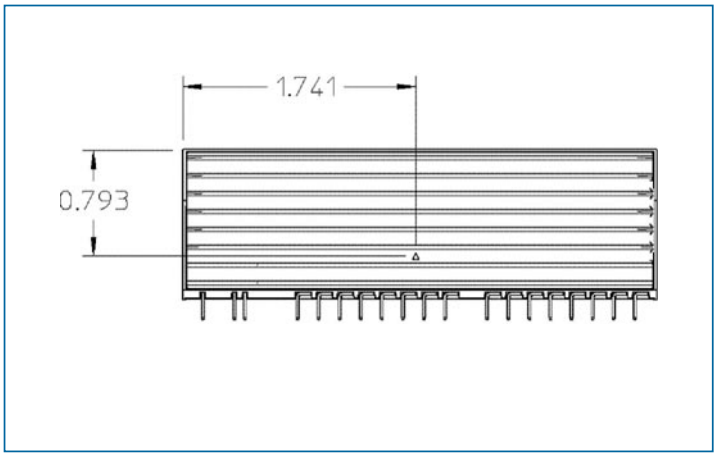


Figure 2 *— Temp measurement location*

+In / -In – DC Voltage Input Ports

The BCM Array input voltage range should not be exceeded. An internal under / over voltage lockout-function prevents operation outside of the normal operating input range. The module turns on within an input voltage window bounded by the "Input under-voltage turn-on" and "Input over-voltage turn-off" levels, as specified. The module may be protected against accidental application of a reverse input voltage by the addition of a rectifier in series with the positive input, or a reverse rectifier in shunt with the positive input located on the load side of the input fuse.

CNTRL – Enable / Disable

The Enable / Disable signal is a multifunction node that provides the following functions:

Enable / Disable – If CNTRL is left floating, the module output is enabled. Once this port is pulled lower than 2.4 Vdc with respect to –In, the output is disabled. This action can be realized by employing a relay, opto-coupler, or open collector transistor. This signal should not be toggled at a rate higher than 1 Hz. CNTRL should also not be driven by or pulled up to an external voltage source.

Primary Auxiliary Supply – CNTRL can source up to 2.4 mA at 5.0 Vdc. CNTRL should never be used to sink current.

Alarm – The module contains circuitry that monitors output overload, input over voltage or under voltage, and internal junction temperatures. In response to an abnormal condition in any of the monitored parameters, CNTRL will toggle.

+Out / -Out – DC Voltage Output Ports

Multiple pins are provided for the +Out and –Out connections. They must be connected in parallel with low interconnect resistance.

reduces or eliminates the need for limited life aluminum electrolytic or tantalum capacitors at the input of POL converters.

Total load capacitance at the output of the device should not exceed the specified maximum. Owing to the wide bandwidth and low output impedance of the BCM Array, low frequency bypass capacitance and significant energy storage may be more densely and efficiently provided by adding capacitance at the input.

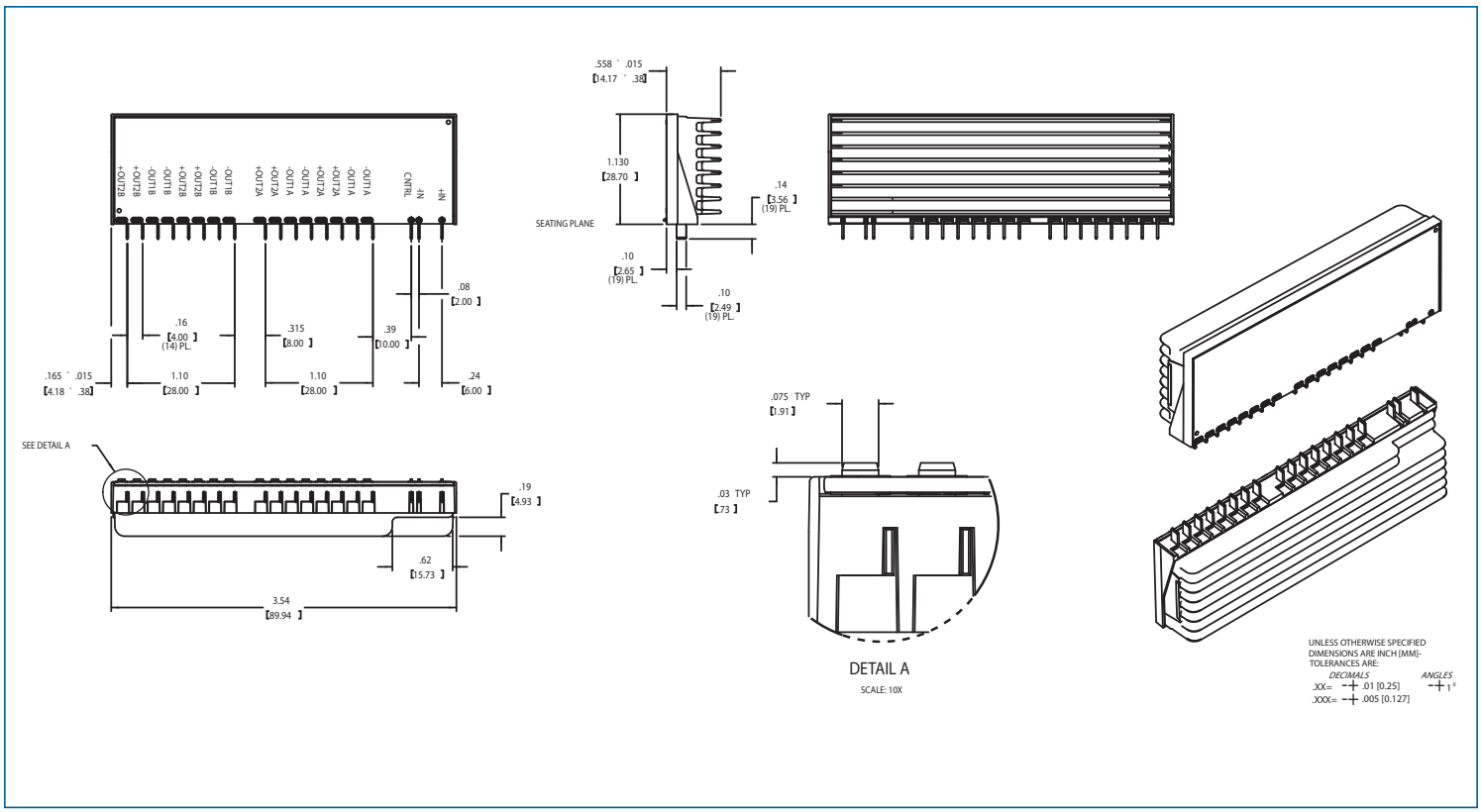


Figure 3 *– BC384R120T060VM-00 mechanical outline*

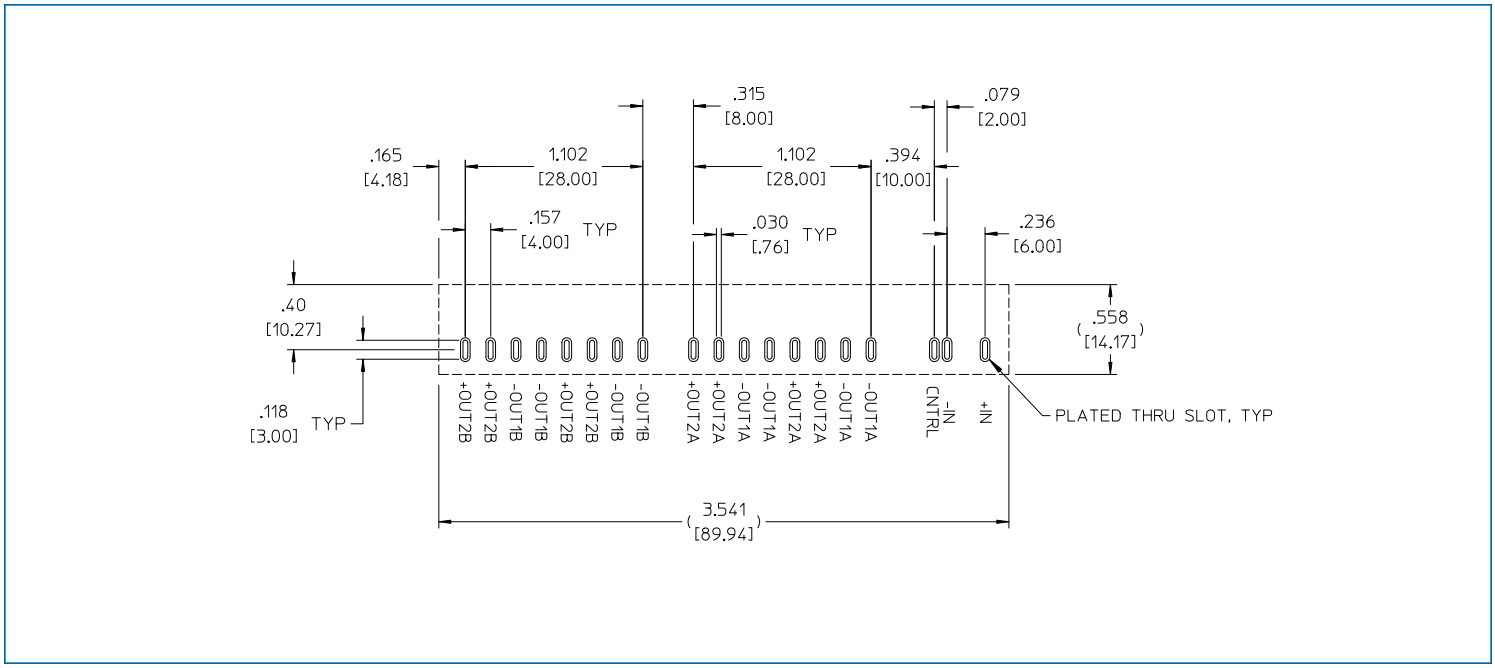


Figure 4 *– BC384R120T060VM-00 footprint*

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