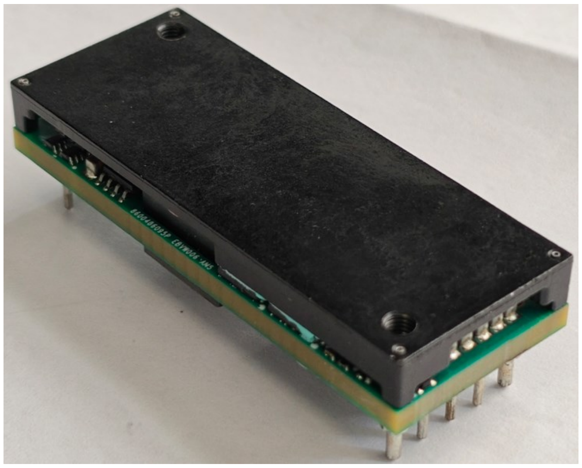
EBVW006A0U Orca* Series; DC-DC Converter Power Modules

36-72V_{DC} Input; 50.0V_{DC}, 6.0A, 300W Output



The OmniOn Power™ EBVW006A0U ORCA series of dc-dc converters are a new generation of DC/DC power modules. EBVW006A0U series operate from an input voltage range of 36 to 72V_{DC}, and provide up to 6A output current at output voltages from 25V_{DC} to 55V_{DC}, and 300W output power in a DOSA standard eighth brick. The converter incorporates synchronous rectification technology, and innovative packaging techniques to achieve efficiency reaching 95.8% peak at 50V_{DC} output. This leads to lower power dissipations such that for many applications a heat sink is not required. Standard features include on/off control, output overcurrent and over voltage protection, over temperature protection, input under and over voltage lockout.

The output is fully isolated from the input, allowing versatile polarity configurations and grounding connections. Built-in filtering for both input and output minimizes the need for external filtering.

Applications

- Distributed power architectures
- Intermediate bus voltage applications
- Telecommunications equipment
- Wireless Base stations
- Industrial equipment
- LANs/WANs
- Enterprise Networks
- Latest generation IC's (DSP, FPGA, ASIC) and Microprocessor powered applications

Features

- Compliant to RoHS EU Directive 2011/65/EU and amended Directive (EU) 2015/863. (-Z versions)
- Compliant to REACH Directive (EC) No 1907/2006
- Wide input voltage range: 36 to 72V_{DC}
- Low output ripple and noise
- Monotonic start-up into pre-bias output
- Remote On/Off (Positive logic)
- Remote Sense
- Small size and low profile: 58.4 x 22.8 x 12.7 mm (2.30 x 0.9 x 0.50 in) with base plate
- Constant switching frequency
- Wide operating temperature range (-40°C to 85°C)
- Over current and Over temperature protection (non- latching)
- ANSI/UL* 62368-1 and CAN/CSA† C22.2 No. 62368-1 Recognized, TUV (EN IEC62368-1:2020+A11)
- ISO** 9001 and ISO 14001 certified manufacturing facilities

Options

- Negative Remote On/Off logic (1=option code, factory preferred)
- Auto-restart after fault shutdown (4=option code, factory preferred)
- Remote Sense and Output Voltage Trim (9=option code)
- Base plate option (-H=option code)

Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only, functional operation of the device is not implied at these or any other conditions in excess of those given in the operations sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect the device reliability.

Parameter	Device	Symbol	Min	Max	Unit
Input Voltage*					
Continuous		V_{IN}	-0.3	72	V_{DC}
Operating transient ≤ 100ms				80	V_{DC}
Operating Ambient Temperature (See Thermal Considerations section)	All	T_A	-40	85	°C
Storage Temperature	All	T_{stg}	-55	125	°C
I/O Isolation Voltage (100% factory Hi-Pot tested)	All	-	-	2250	V_{DC}

Electrical Specifications

Unless otherwise indicated, specifications apply over all operating input voltage, resistive load, and temperature conditions.

Parameter	Device	Symbol	Min	Typ	Max	Unit
Operating Input Voltage		V_{IN}	36	48	72	V_{DC}
Maximum Input Current (V_{IN} = 36Vdc, $I_O = I_{O, max}$)		$I_{IN, max}$	-		9	A_{DC}
Input No Load Current ($V_{IN} = V_{IN, nom}$, I_O = 0, module enabled)	All	$I_{IN, No load}$		100		mA
Input Stand-by Current ($V_{IN} = V_{IN, nom}$, module disabled)	All	$I_{IN, Stand-by}$		10		mA
External Input Capacitance	All		220	-		µF
Inrush Transient	All	I^2t	-	-	1	A^2s
Input Reflected Ripple Current, peak-to-peak (5Hz to 20MHz, 12µH source impedance; V_{IN} = 48V, $I_O = I_{Omax}$; see Figure 10)	All		-	24	-	mA_{p-p}
Input Ripple Rejection (120Hz)	All		-	50	-	dB

CAUTION: This power module is not internally fused. An input line fuse must always be used.

This power module can be used in a wide variety of applications, ranging from simple standalone operation to an integrated part of sophisticated power architecture. To preserve maximum flexibility, internal fusing is not included, however, to achieve maximum safety and system protection, always use an input line fuse. The safety agencies require a fast-acting fuse with a maximum rating of 20 A (see Safety Considerations section). Based on the information provided in this Data Sheet on inrush energy and maximum dc input current, the same type of fuse with a lower rating can be used. Refer to the fuse manufacturer's Data Sheet for further information.

§ This product is intended for integration into end-user equipment . All of the required procedures of end-use equipment should be followed.

Electrical Specifications (continued)

Parameter	Device	Symbol	Min	Typ	Max	Unit
Output Voltage Set-point (V_{IN} = $V_{IN, nom}$, I_O = 6A, T_A =25°C)	All	$V_{O, set}$	49.25	50.00	50.75	V_{DC}
Output Voltage (Over all operating input voltage(36V to 72V), resistive load, and temperature conditions until end of life)	All	V_O	48.5	-	51.5	V_{DC}
Output Regulation ($V_{IN, min}$= 40V) Line (V_{IN} = $V_{IN, min}$ to $V_{IN, max}$) Load (I_O = $I_{O, min}$ to $I_{O, max}$) Temperature (T_A = -40°C to +85°C)	 All All All		 - - -	 0.3 0.3 1	 - - -	% $V_{O, set}$
Output Ripple and Noise on nominal output (V_{IN} = $V_{IN, nom}$ and I_O=$I_{O, min}$ to $I_{O, max}$, tested with a 50 µF ceramic, 200µF Oscon) RMS (5Hz to 20MHz bandwidth) Peak-to-Peak (5Hz to 20MHz bandwidth)	 All All		 - -	 60 300	 - -	 mV_{rms} mV_{P-P}
External Output Capacitance (At least 50µF ceramic)	All	C_O	220	-	1500	µF
Output Current	All	Io	0		6	A_{DC}
Output Current Limit Inception (hiccup mode)	All	$I_{o,min}$		8	-	A_{DC}
Efficiency (V_{IN} = $V_{IN, nom}$, T_A = 25°C, V_O= $V_{O, set}$) I_O=100% $I_{O, max}$	All	η		95.3		%
Switching Frequency (primary MOSFETs) (Output Ripple 2X switching frequency)		f_{sw}		200		kHz
Dynamic Load Response (Co=50µF,ceramic+200µF, tantalum, dI_O/dt=1A/µs; V_{IN} = 48V) Load Change from I_O= 50% to 75% or 25% to 50% of $I_{O, max}$ Load Change from I_O = 50% to 75% of $I_{O,max}$: Peak Deviation Settling Time (V_O <10% peak deviation) Load Change from I_O = 75% to 50% of $I_{O,max}$: Peak Deviation Settling Time (V_O <10% peak deviation)	 All All	 V_{pk} t_s V_{pk} t_s	 - - - -	 600 1 600 1	 - - - -	 mV_{pk} ms mV_{pk} ms

Isolation Specifications

Parameter	Symbol	Min	Typ	Max	Unit
Isolation Capacitance	C_{iso}	-	4700	-	pF
Isolation Resistance	R_{iso}	10	-	-	MΩ

General Specifications

Parameter	Device	Symbol	Typ	Unit
Calculated Reliability based upon Telcordia SR-332 (I_O = 80%$I_{O, max}$, T_A= 40°C, Airflow = 200 lfm), 90% confidence Issue 4: Method I, Case 3	All	MTBF FIT	12632304 79.2	Hours 10^9/Hours
Weight – with Baseplate option			41	g (oz.)

Feature Specifications

Unless otherwise indicated, specifications apply over all operating input voltage, resistive load, and temperature conditions. See Feature Descriptions for additional information.

Parameter	Device	Symbol	Min	Typ	Max	Unit
Remote On/Off Signal Interface (V_{IN}=$V_{IN, min}$ to $V_{IN, max}$, Signal referenced to V_{IN}- terminal) Negative Logic: device code suffix "1" Logic Low = module On, Logic High = module Off Positive Logic: No device code suffix required Logic Low = module Off, Logic High = module On Logic Low Specification On/Off Thresholds: Remote On/Off Current Logic Low – On/Off Voltage Logic High Voltage – (Typ = Open Collector) Logic High maximum allowable leakage current (Von/off = 2.0V) Maximum voltage allowed on On/Off pin	All All All All All	$I_{on/off}$ $V_{on/off}$ $V_{on/off}$ $I_{on/off}$ $V_{on/off}$	280 -0.3 2.5 - -	- - - - -	310 0.8 10 10 10	µA V_{DC} V_{DC} µA V_{DC}
Turn-on Delay and Rise Time (I_O=$I_{O, max}$, V_{IN}=$V_{IN, nom}$, T_A = 25°C) Case 1: Input power is applied for at least 1 second, and then the On/Off input is set from OFF to ON (T_{delay} = on/off pin transition until V_O = 10% of $V_{O, set}$) Case 2: On/Off input is set to Module ON, and then input power is applied (T_{delay} = V_{IN} reaches $V_{IN, min}$ until V_O = 10% of $V_{O, set}$)	All All	T_{delay} T_{delay}	- -	5 5	- -	ms ms
Output voltage Rise time T_{rise}=Time for V_O to rise from 10% to 90% of $V_{O, set}$	All	T_{rise}	-	20	-	ms
Output Voltage Adjustment range*	All	$V_{O, set}$	25	50	55	V_{DC}
Output Overvoltage Protection (hiccup mode)	All	$V_{O, limit}$		60		V_{DC}
Hotspot temperature for reliable operation	All	TH_Z			115	°C
Overtemperature Protection (See Feature Descriptions)	All	T_{ref}	-	130	-	°C
Input Undervoltage Lockout Turn-on Threshold Turn-off Threshold Hysterisis			 33 31 	 34 32 2	 35.5 34 	 V_{DC} V_{DC}

* Output voltage trim up range maybe limited at V_{IN}<40V.

Characteristic Curves

The following figures provide typical characteristics for the EBVW006A0U (50V, 6A) at 25°C. The figures are identical for either positive or negative Remote On/Off logic.

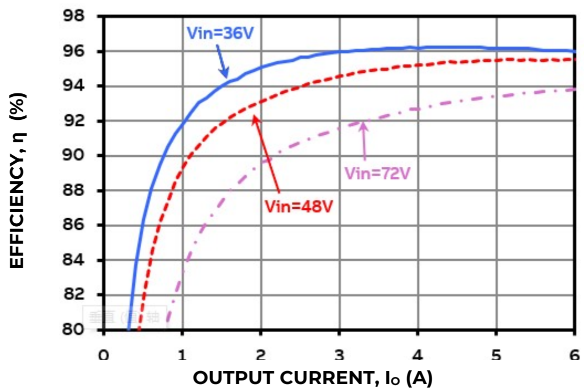


Figure 1. Typical Converter Efficiency Vs. Output current

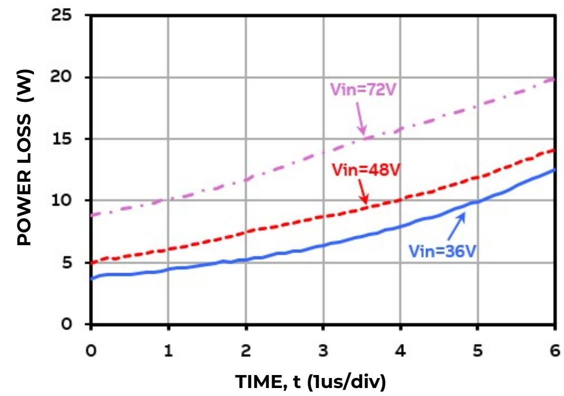


Figure 2. Typical Output Ripple and Noise at 48V Input

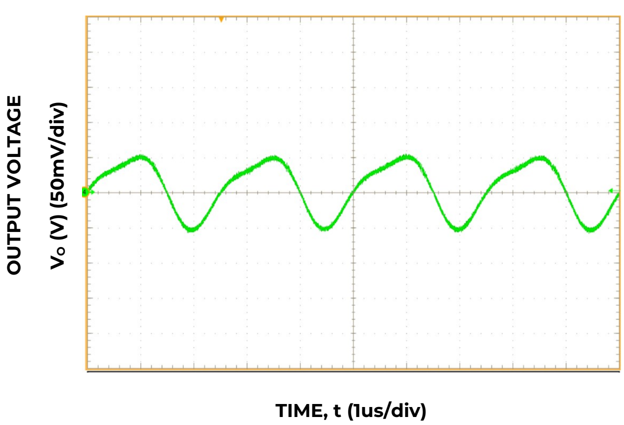


Figure 3. Typical Output Ripple and Noise at 48V Input

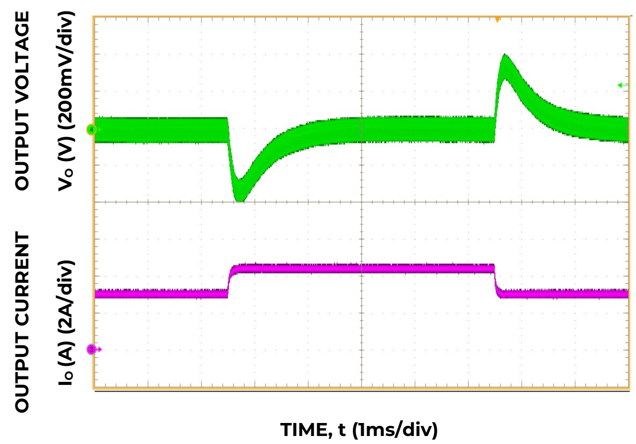


Figure 4. Typical Transient Response to Step change in Load from 75% to 50% to 75% of Full Load at 48 V_{DC} Input

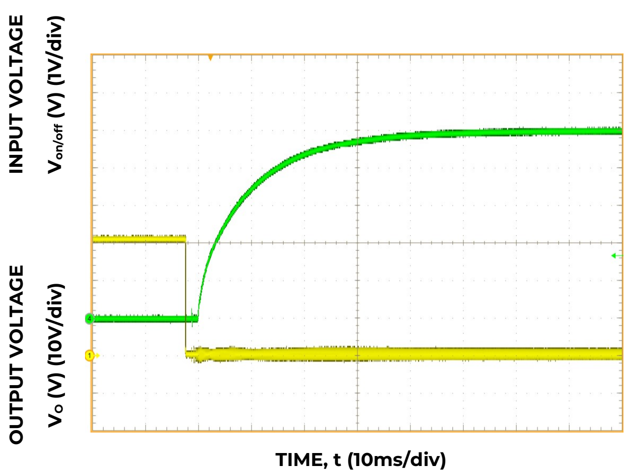


Figure 5. Typical Start-Up Using V_{IN} with Remote On/Off enabled, negative logic version shown

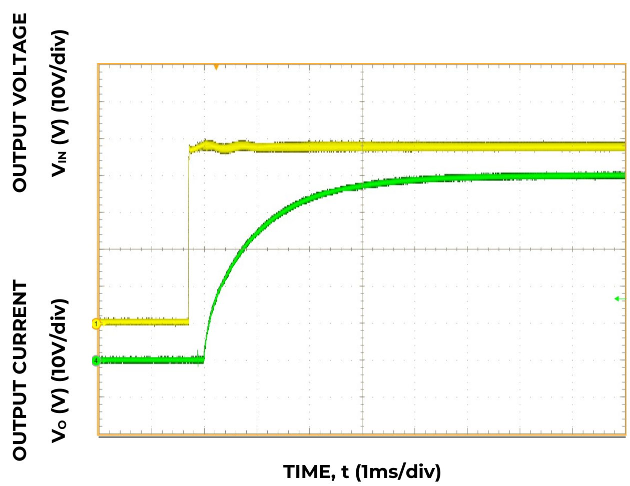


Figure 6. Typical Start-up Using Input Voltage at 48 V_{DC} Input

Characteristic Curves (Continued)

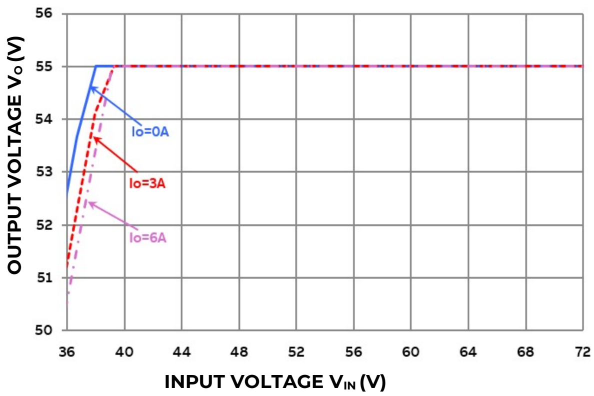


Figure 7. Trim Up Output Voltage Regulation Vs. Input Voltage

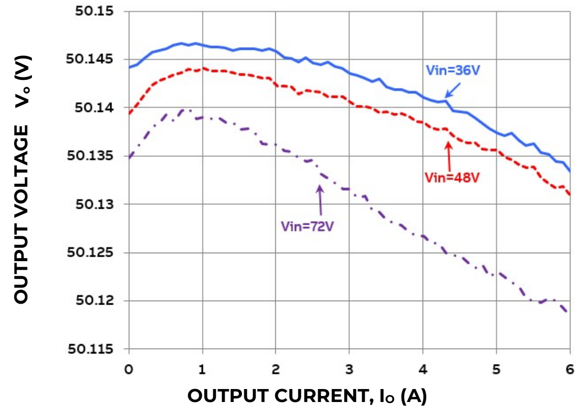


Figure 8. Typical Output Voltage Regulation vs. Output Current at Room Temperature

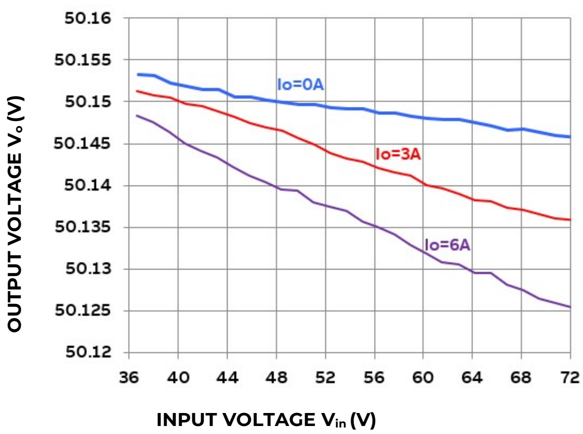


Figure 9. Typical Output Voltage Regulation vs. Input Voltage at Room Temperature

Test Considerations

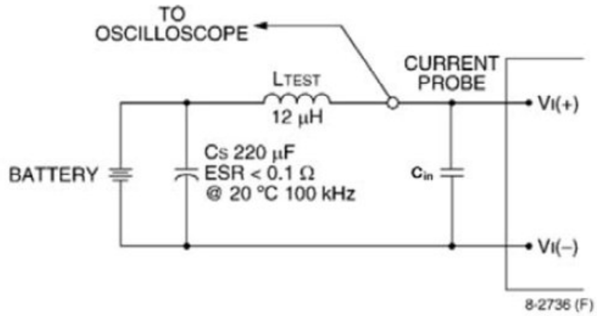


Figure 10. Input Reflected Ripple Current Test Setup

Note: Measure input reflected-ripple current with a simulated source inductance (LTEST) of 12μH. Capacitor C_S offsets possible battery impedance. Measure current as shown above.

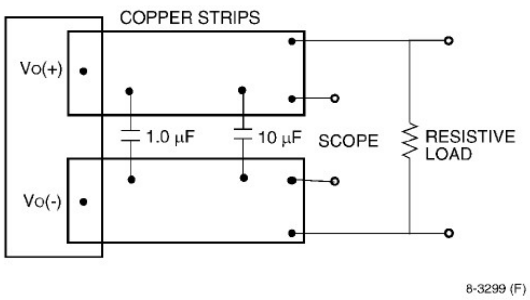


Figure 11. Output Ripple and Noise Test Setup

Note: Use a 1.0 μF ceramic capacitor and a 10 μF aluminum or tantalum capacitor. Scope measurement should be made using a BNC socket. Position the load between 51 mm and 76 mm (2 in. and 3 in.) from the module.

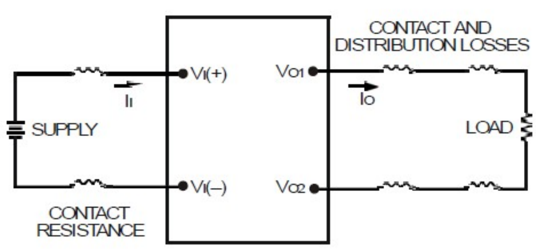


Figure 12. Output Voltage and Efficiency Test Setup

Note: All measurements are taken at the module terminals. When socketing, place Kelvin connections at module terminals to avoid measurement errors due to socket contact resistance.

$$\eta = \left(\frac{[V_O(+) - V_O(-)]\ I_O}{[V_I(+) - V_I(-)]\ I_I} \right) X\ 100$$

Design Considerations

Input Source Impedance

The power module should be connected to a low ac-impedance source. A highly inductive source impedance can affect the stability of the power module. For the test configuration in Figure 10, a 220μF electrolytic capacitor, C_{in}, (ESR<0.7Ω at 100kHz), mounted close to the power module helps ensure the stability of the unit. If the module is subjected to rapid on/off cycles, a 330μF input capacitor is required. Consult the factory for further application guidelines.

Safety Considerations

For safety agency approval the power module must be installed in compliance with the spacing and separation requirements of the end-use safety agency standards, i.e., UL ANSI/UL* 62368-1 and CAN/CSA+ C22.2 No. 62368-1 Recognized, TUV (EN IEC62368-1:2020+A11).

If the input source is non-SELV (ELV or a hazardous voltage greater than 60 V_{dc} and less than or equal to 75V_{dc}), for the module's output to be considered as meeting the requirements for safety extra-low voltage (SELV) or ES1, all of the following must be true:

- The input source is to be provided with reinforced insulation from any other hazardous voltages, including the ac mains.
- One V_{IN} pin and one V_{OUT} pin are to be grounded, or both the input and output pins are to be kept floating.
- The input pins of the module are not operator accessible.
- Another SELV or ES1 reliability test is conducted on the whole system (combination of supply source and subject module), as required by the safety agencies, to verify that under a single fault, hazardous voltages do not appear at the module's output.

Note: Do not ground either of the input pins of the module without grounding one of the output pins. This may allow a non-SELV/ES1 voltage to appear between the output pins and ground.

The power module has safety extra-low voltage (SELV) or ES1 outputs when all inputs are SELV or ES1.

The input to these units is to be provided with a maximum 20 A fast-acting (or time-delay) fuse in the unearthed lead.

The power module has internally generated voltages exceeding safety extra-low voltage. Consideration should be taken to restrict operator accessibility.

Feature Description

Overcurrent Protection

To provide protection in a fault output overload condition, the module is equipped with internal current-limiting circuitry and can endure current limiting continuously. If the output overload condition still exists when the module restarts, it will shut down again. This operation will continue indefinitely until the overcurrent condition is corrected.
An auto-restart feature continually attempts to restore the operation until fault condition is cleared.

Pre-Bias Startup

The module starts up monotonically into pre-biased load from 0.0V_{dc} up to 90%V_{out}.

Remote On/Off

The module contains a standard on/off control circuit reference to the V_{IN}(-) terminal. Two factory configured remote on/off logic options are available. Positive logic remote on/off turns the module on during a logic-high voltage on the ON/OFF pin, and off during a logic low. Negative logic remote on/off turns the module off during a logic high, and on during a logic low. Negative logic, device code suffix "1," is the factory-preferred configuration.

The On/Off circuit is powered from an internal bias supply, derived from the input voltage terminals. To turn the power module on and off, the user must supply a switch to control the voltage between the On/Off terminal and the V_{IN}(-) terminal ($V_{on/off}$). The switch can be an open collector or equivalent (see Figure 13). A logic low is $V_{on/off}$ = -0.3V to 0.8V. The typical Ion/off during a logic low (V_{in}=48V, On/Off Terminal=0.3V) is 147μA. The switch should maintain a logic- low voltage while sinking 310μA. During a logic high, the maximum Von/off generated by the power module is 5V. The maximum allowable leakage current of the switch at $V_{on/off}$ = 2.0V is 10μA.

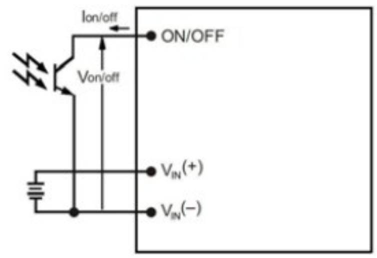


Figure 13. Remote On/Off Implementation.

If using an external voltage source, the maximum voltage $V_{on/off}$ on the pin is 10V with respect to the V_{IN} (-) terminal.

If not using the remote on/off feature, perform one of the following to turn the unit on:

For negative logic, short ON/OFF pin to V_{IN}(-).

For positive logic: leave ON/OFF pin open.

Output Overvoltage Protection

The module contains circuitry to detect and respond to output overvoltage conditions. If the overvoltage condition causes the output voltage to rise above the limit in the Specifications, the module will shut down. An auto-restart feature continually attempts to restore the operation until fault condition is cleared.

A factory configured latches option (with overtemperature protection and overvoltage latch option managed as a group) is also available. Cycling the on/off pin or input voltage resets the latching protection feature.

Overtemperature Protection

These modules feature an overtemperature protection circuit to safeguard against thermal damage. The circuit shuts down the module when the maximum device reference temperature is exceeded. The module will automatically restart once the reference temperature cools by 115°C.

A factory configured latches option (with overtemperature protection and overvoltage latch option managed as a group) is also available. Cycling the on/off pin or input voltage resets the latching protection feature.

Input Under/Over voltage Lockout

At input voltages above or below the input under/over voltage lockout limits, module operation is disabled. The module will begin to operate when the input voltage level changes to within the under and overvoltage lockout limits.

Feature Description (continued)

Remote Sense ("9" Option Code)

Remote sense minimizes the effects of distribution losses by regulating the voltage at the remote-sense connections (See Figure 14). The voltage between the remote-sense pins and the output terminals must not exceed the output voltage sense range given in the Feature Specifications table:

[VO(+) – VO(–)] – [SENSE(+) – SENSE(–)] ≤ 0.5 V

The amount of power delivered by the module is defined as the voltage at the output terminals multiplied by the output current. When using remote sense and trim, the output voltage of the module can be increased, which at the same output current would increase the power output of the module. Care should be taken to ensure that the maximum output power of the module remains at or below the maximum rated power (Maximum rated power = $V_{o,set}$ x $I_{o,max}$).

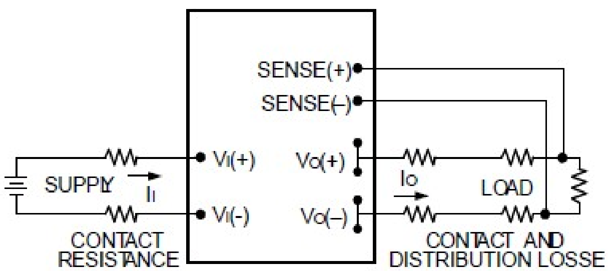


Figure 14. Circuit Configuration for remote sense.

Trim, Output Voltage Programming ("9" Option Code)

Trimming allows the output voltage set point to be increased or decreased; this is accomplished by connecting an external resistor between the TRIM pin and either the V_O(+) pin or the V_O(-) pin.

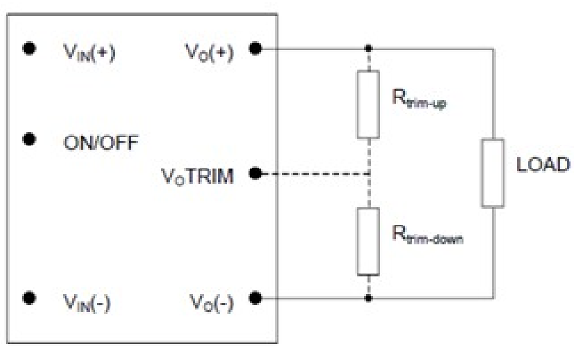


Figure 15. Circuit Configuration to Trim Output Voltage

Connecting an external resistor ($R_{trim-down}$) between the TRIM pin and the Vo(-) (or Sense(-)) pin decreases the output voltage set point. To maintain set point accuracy, the trim resistor tolerance should be ±1.0%.

The following equation determines the required external resistor value to obtain a percentage output voltage change of Δ%

$$R_{trim-down} = \left[\frac{511}{\Delta\%} - 10.22\right]$$

Where

$$\Delta\% = \left(\frac{V_{o,set} - V_{desired}}{V_{o,set}}\right) X\ 100$$

For example, to trim-down the output voltage of the module by 8% to 46V, $R_{trim-down}$ is calculated as follows:

$$R_{trim-down} = \left[\frac{511}{\Delta\%} - 10.22\right] = 53.655\ K\Omega$$

Connecting an external resistor ($R_{trim-up}$) between the TRIM pin and the VO(+) (or Sense (+)) pin increases the output voltage set point. The following equations determine the required external resistor value to obtain a percentage output voltage change of

$$R_{trim-up} = \left[\frac{511\ x\ V_{o,set}\ x\ (100+\Delta\%)}{1.225\ x\ \Delta\%} - \frac{511}{\Delta\%} - 10.22\right] K\Omega$$

Where

$$\Delta\% = \left(\frac{V_{o,set} - V_{desired}}{V_{o,set}}\right) X\ 100$$

For example, to trim-up the output voltage of the module by 5% to 52.5V, $R_{trim-up}$ is calculated is as follows:

$$R_{trim-up} = \left[\frac{511\ x\ V_{o,set}\ x\ (100+5)}{1.225\ x\ 5} - \frac{511}{5} - 10.22\right] K\Omega$$

$$= 4267.58\ K\Omega$$

The voltage between the Vo(+) and Vo(–) terminals must not exceed the minimum output overvoltage protection value shown in the Feature Specifications table. This limit includes any increase in voltage due to remote-sense compensation and output voltage set-point adjustment trim.

Feature Description (continued)

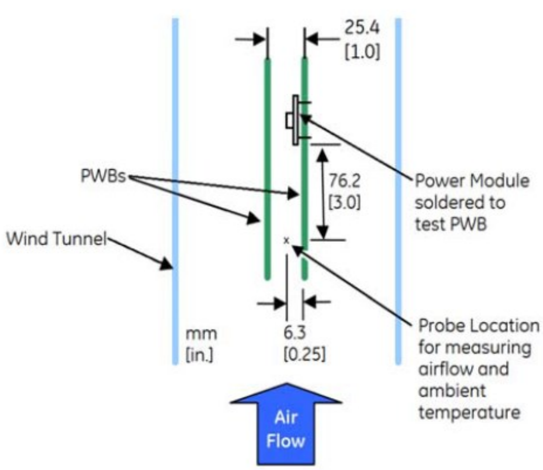
Although the output voltage can be increased by both the remote sense and by the trim, the maximum increase for the output voltage is not the sum of both. The maximum increase is the larger of either the remote sense or the trim. The amount of power delivered by the module is defined as the voltage at the output terminals multiplied by the output current. When using remote sense and trim, the output voltage of the module can be increased, which at the same output current would increase the power output of the module. Care should be taken to ensure that the maximum output power of the module remains at or below the maximum rated power (Maximum rated power = $V_{O,set}$ x $I_{O,max}$). Modules with"9" option cannot include the –P option.

Thermal Considerations

The power modules operate in a variety of thermal environments and sufficient cooling should be provided to help ensure reliable operation.

Thermal considerations include ambient temperature, airflow, module power dissipation, and the need for increased reliability. A reduction in the operating temperature of the module will result in an increase in reliability.

The thermal data presented here is based on physical measurements taken in a wind tunnel, using automated thermo-couple instrumentation to monitor key component temperatures: FETs, diodes, control ICs, magnetic cores, ceramic capacitors, opto-isolators, and module pwb conductors, while controlling the ambient airflow rate and temperature. For a given airflow and ambient temperature, the module output power is increased, until one (or more) of the components reaches its maximum derated operating temperature, as defined in IPC-9592. This procedure is then repeated for a different airflow or ambient temperature until a family of module output derating curves is obtained.



Heat-dissipating components are mounted on the top side of Heat-dissipating components are mounted on the top side of the module. Heat is removed by conduction, convection and radiation to the surrounding environment. Proper cooling can be verified by measuring the thermal reference temperature (TH_x). Peak temperature (TH_x) occurs at the position indicated in Figure 16. For reliable operation this temperature should not exceed the listed temperature threshold.

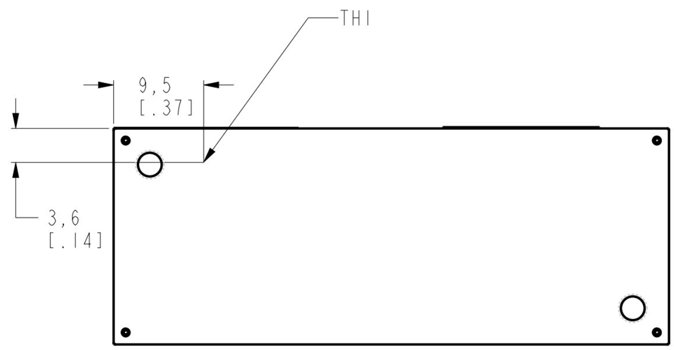


Figure 16. Location of the thermal reference temperature TH_2

The output power of the module should not exceed the rated power for the module as listed in the Ordering Information table.

Although the maximum temperature of the power modules is THx, you can limit this temperature to a lower value for extremely high reliability.

Please refer to the Application Note "Thermal Characterization Process For Open-Frame Board-Mounted Power Modules" for a detailed discussion of thermal aspects including maximum device temperatures.

Feature Description (continued)

Heat Transfer via Convection

Increased airflow over the module enhances the heat transfer via convection. The thermal derating of figures 17 show the maximum output current that can be delivered by each module in the indicated orientation without exceeding the maximum TH_x temperature versus local ambient temperature (T_A) for air flows of, Natural Convection, 1 m/s (200 LFM), 2 m/s (400 LFM).

The use of Figures 17 is shown in the following example:

Example:

What is the minimum airflow necessary for a EBVW006A0B operating at V_I = 48 V, an output current of 5A, and a maximum ambient temperature of 70 °C in transverse orientation.

Solution:

Given: V_{in}= 48V, I_O = 5A, T_A = 70°C

Determine required airflow (V) (Use Figure 17):

V = 100LFM or greater.

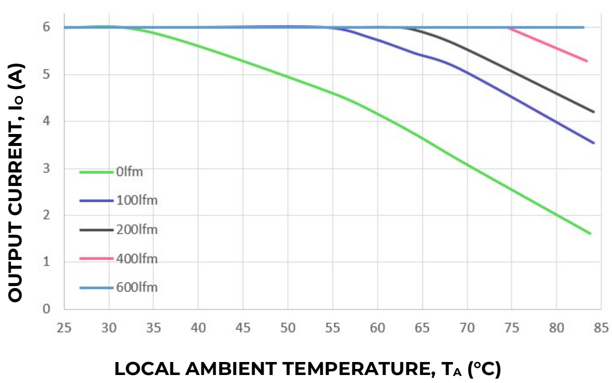


Figure 17. Output Current Derating for the Base Plate EBVW006A0Bxx-H in the Transverse Orientation; Airflow Direction from V_{IN}(-) to V_{IN}(+); V_{IN} = 48V

Layout Considerations

The EBVW006 power module series are low profile in order to be used in fine pitch system card architectures. As such, component clearance between the bottom of the power module and the mounting board is limited. Avoid placing copper areas on the outer layer directly underneath the power module. Also avoid placing via interconnects underneath the power module.

Through-Hole Lead-Free Soldering Information

The RoHS-compliant, Z version, through-hole products use the SAC (Sn/Ag/Cu) Pb-free solder and RoHS-compliant components. The non-Z version products use lead-tin (Pb/Sn) solder and RoHS-compliant components. Both version modules are designed to be processed through single or dual wave soldering machines. The pins have an RoHS-compliant, pure tin finish that is compatible with both Pb and Pb-free wave soldering processes. A maximum preheat rate of 3°C/s is suggested. The wave preheat process should be such that the temperature of the power module board is kept below 210°C. For Pb solder, the recommended pot temperature is 260°C, while the Pb-free solder pot is 270°C max. Not all RoHS- compliant through-hole products can be processed with paste-through-hole Pb or Pb-free reflow process. If additional information is needed, please consult with your OmniOn Power™ representative for more details.

Reflow Lead-Free Soldering Information

The RoHS-compliant through-hole products can be processed with the following paste-through-hole Pb or Pb-free reflow process.

Max. sustain temperature :

245°C (J-STD-020C Table 4-2: Packaging Thickness>=2.5mm / Volume > 2000mm^3),

Peak temperature over 245°C is not suggested due to the potential reliability risk of components under continuous high- temperature.

Min. sustain duration above 217°C : 90 seconds Min. sustain duration above 180°C : 150 seconds Max. heat up rate: 3°C/sec

Max. cool down rate: 4°C/sec

In compliance with JEDEC J-STD-020C spec for 2 times reflow requirement.

MSL Rating

The EBVW006A0U modules have a MSL rating as indicated in the Device Codes table, last page of this document.

Pb-free Reflow Profile

BMP module will comply with J-STD-020 Rev. C (Moisture/Reflow Sensitivity Classification for Nonhermetic Solid State Surface Mount Devices) for both Pb- free solder profiles and MSL classification procedures. BMP will comply with JEDEC J-STD-020C specification for 3 times reflow requirement. The suggested Pb-free solder paste is Sn/Ag/Cu (SAC). The recommended linear reflow profile using Sn/Ag/Cu solder is shown in Figure 18.

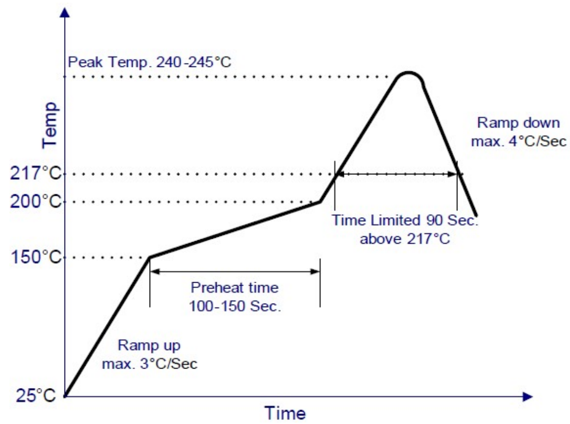


Figure 18. Recommended linear reflow profile using Sn/Ag/Cu solder.

Storage and Handling

The recommended storage environment and handling procedures for moisture-sensitive surface mount packages is detailed in J-STD-033 Rev. A (Handling, Packing, Shipping and Use of Moisture/ Reflow Sensitive Surface Mount Devices).

Moisture barrier bags (MBB) with desiccant are required for MSL ratings of 2 or greater. These sealed packages should not be broken until time of use. Once the original package is broken, the floor life of the product at conditions of ≤30°C and 60% relative humidity varies according to the MSL rating (see J-STD-025A). The shelf life for dry packed SMT packages will be a minimum of 12 months from the bag seal date, when stored at the following conditions: <40° C, < 90% relative humidity.

Post Solder Cleaning and Drying Considerations

Post solder cleaning is usually the final circuit-board assembly process prior to electrical board testing. The result of inadequate cleaning and drying can affect both the reliability of a power module and the testability of the finished circuit-board assembly. For guidance on appropriate soldering, cleaning and drying procedures, refer to OmniOn Power™ Board Mounted Power Modules: Soldering and Cleaning Application Note (AP01-056EPS).

EMC Considerations

The circuit and plots in Figure 19 shows a suggested configuration to meet the conducted emission limits of EN55022 Class A.

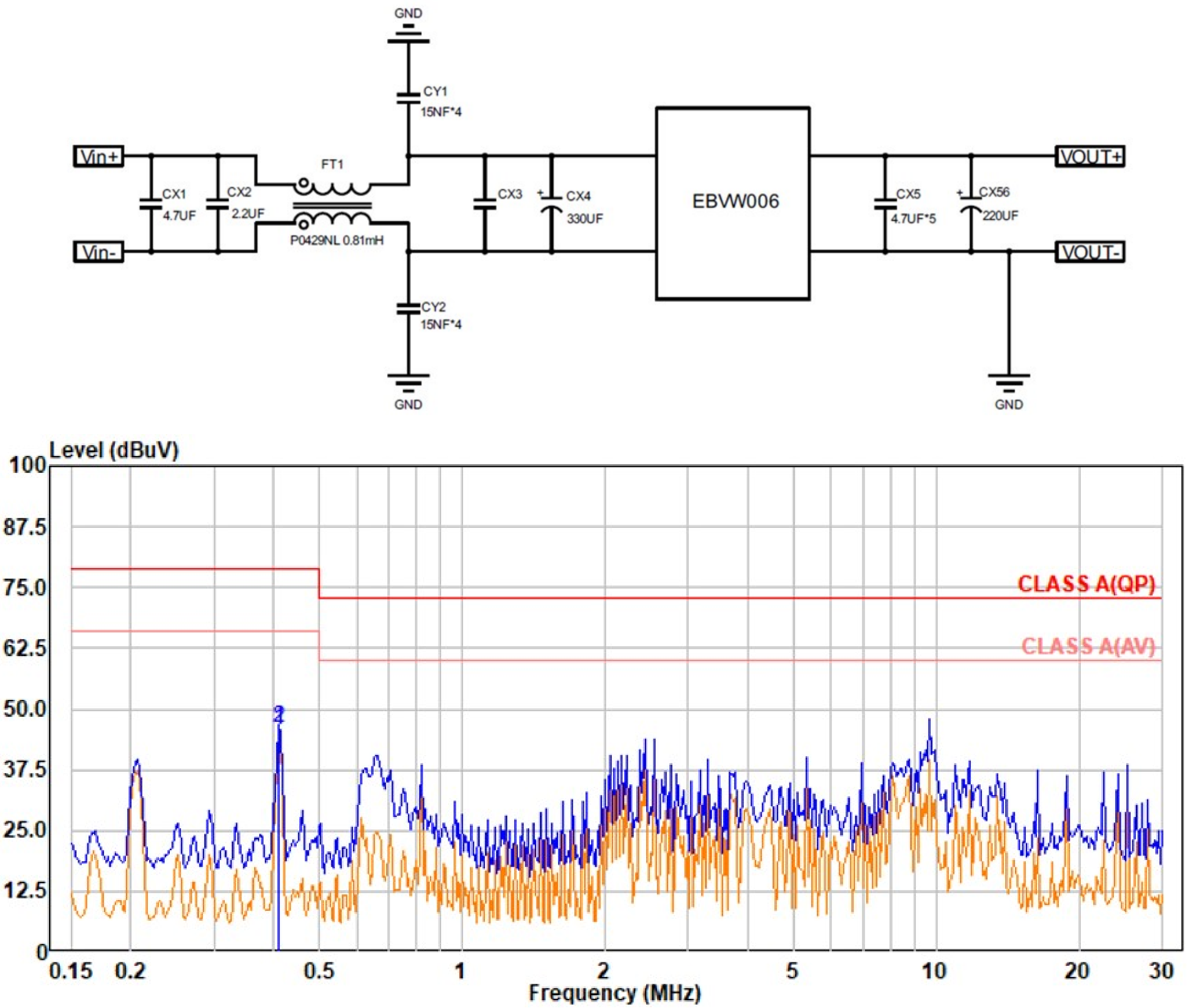


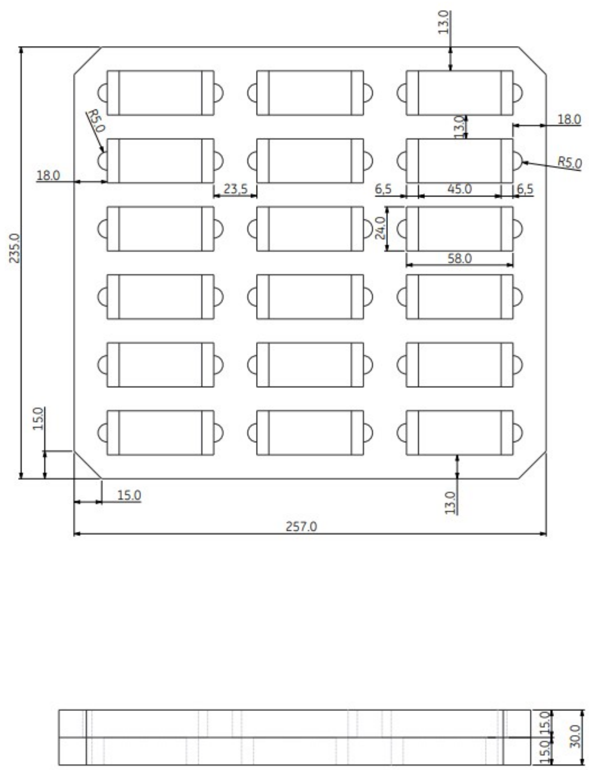
Figure 19. EMC Considerations

Packaging Details

All versions of the EBVW006A0U are supplied as standard in the EPE FOAM shown in Figure 20. Each tray contains a total of 18 power modules. The trays are self-stacking and each shipping box for the EBVW006A0B module contains 3full trays plus one empty hold-down tray giving a total number of 54power modules.

Tray Specification

Material	ANTI-STATIC EPE FOAM 27KG/CUBIC METER
Max surface resistivity	10^9 -10^{11}Ω/Color PINK
Capacity	18 power modules
Min order quantity	54 pcs (1 box of 3 full trays + 1 empty top tray)



Base Plate Module Package

Figure 20. EBVW006 Packaging

Mechanical Outline for EBVW006A0U941– HZ (Baseplate version)

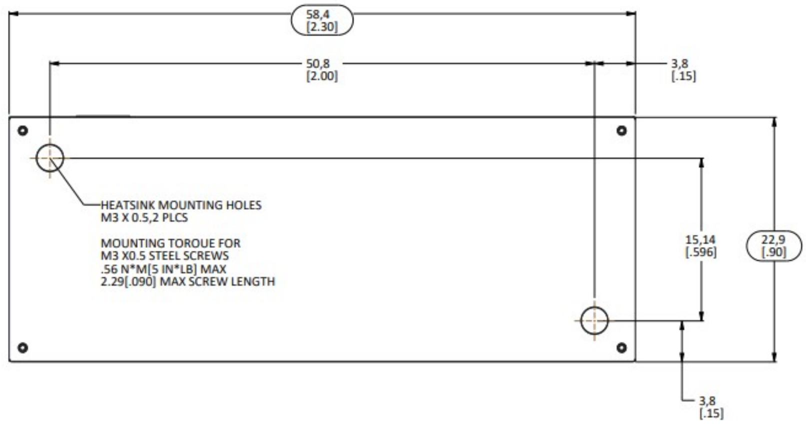
Through-hole Module

Dimensions are in millimeters and (inches).

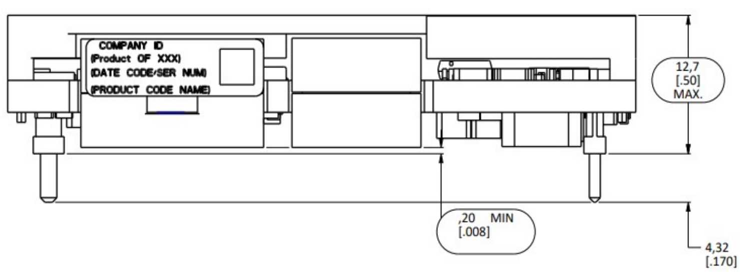
Tolerances: x.x mm ±0.5 mm (x.xx in. ± 0.02 in.) [Unless otherwise indicated]

x.xx mm ± 0.25 mm (x.xxx in ± 0.010 in.)

Top View*

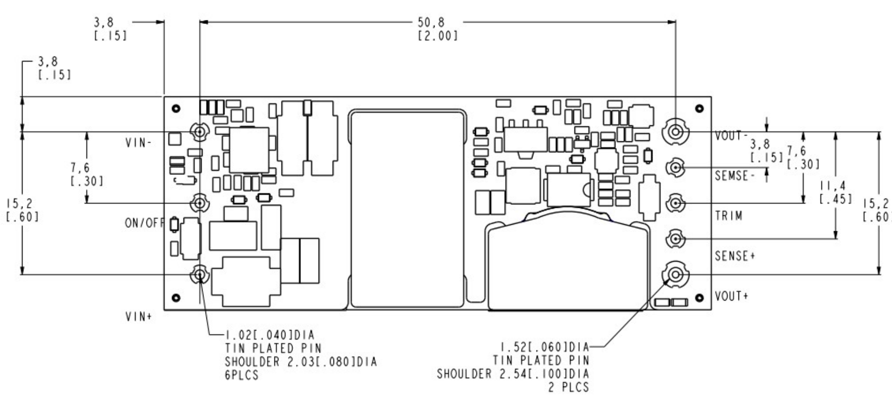


Side View



*side view label includes OmniOn Power™ name, product designation and date code.

Bottom View



Pin	Function
1	$V_{IN}(+)$
2	ON/OFF
3	$V_{IN}(-)$
4	$V_{OUT}(-)$
5†	SENSE(-)
6†	TRIM
7†	SENSE(+)
8	$V_{OUT}(+)$

† - Optional Pins, when including “9” Option, See Table 2

EBVW006A0U Mechanical Specifications (Continued)

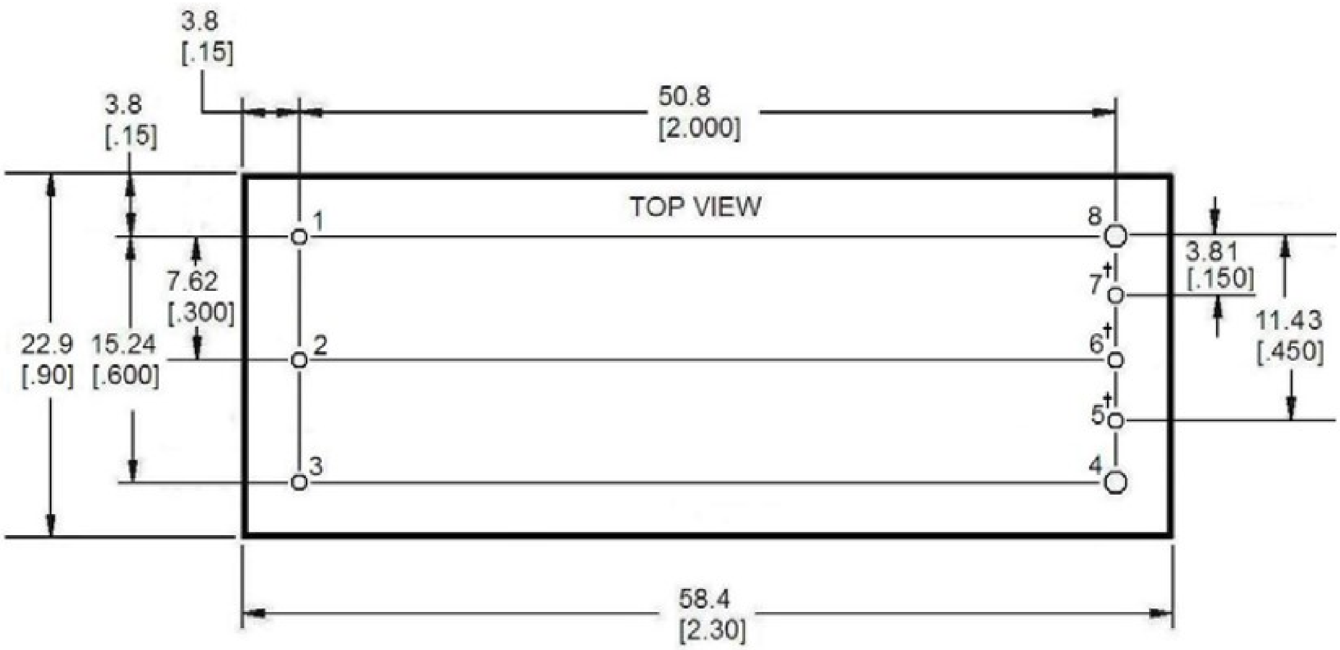
Recommended Pad Layouts

Dimensions are in millimeters and (inches).

Tolerances: x.x mm ±0.5 mm (x.xx in. ± 0.02 in.) [Unless otherwise indicated]

x.xx mm ± 0.25 mm (x.xxx in ± 0.010 in.)

Through-Hole Module



Hole and Pad diameter recommendations:

Pin Number	Hole Dia mm [in]	Pad Dia mm [in]
1, 2, 3, 5, 6, 7	1.02[.040]	2.0 [.080]
4, 8	1.52[.060]	2.54 [.100]

Pin	Function
1*	V_{IN}(+)
2*	ON/OFF
3*	V_{IN}(-)
4*	V_{OUT}(-)
5†	SENSE(-)
6†	TRIM
7†	SENSE(+)
8*	V_{OUT}(+)

† - Optional Pins, See Table 2

EBVW006A0U Ordering Information

Please contact your OmniOn Power™ Sales Representative for pricing, availability and optional features.

Table 1. Device Codes

Product Code	Input Voltage	Output Voltage	Output Current	Efficiency	Connector Type	MSL Rating	Ordering codes
EBVW006A0U941-HZ	48V (36-72V_{DC})	50V	6A	95.5%	Through hole	2A	1600484428A
EBVW006A0U9841-HZ	48V (36-72V_{DC})	50V	6A	95.5%	Through hole	2A	1600487929A
EBVW006A0U941-62DHZ (*	48V (36-72V_{DC})	50V	6A	95.5%	Through hole	2A	1600488811A

*) Please contact your OmniOn Power™ Sales Representative for optional features.

Table 2. Device Coding Scheme and Options

	Characteristic	Character and position	Definition
Ratings	Form Factor	E	E = Eight Brick
	Family Designator	BV	BV = ORCA Series, without PMBus interface
	Input Voltage	W	W = Wide Range, 36V-75V
	Output Current	006A0	006AO = 6.0 Amps Maximum Output Current
	Output Voltage	U	U = 50.0V nominal
Options	Trim and Remote Sense Pins	9	Omit = Exclude Trim & Sense Feature and Pins 9 = Include Trim and Sense Feature and Pins (not avail. w/ P option)
	Pin Length	8 6	Omit = Default Pin Length shown in mechanical Outline Figures 8 = Pin Length: 2.79 mm ±0.25mm (0.110 in. ± 0.010 in.) 6 = Pin Length: 3.68 mm ±0.25mm (0.145 in. ± 0.010 in.)
	Action following Protective Shutdown	4	Omit = Latching Mode 4 = Auto – restart following shutdown (Overcurrent/Overvoltage)
	On/Off Logic	1	Omit = Positive Logic 1 = Negative Logic
	–		
	Customer Specific	XY	XY = Customer Specific Modified Code, Omit for Standard Code
	Optional Features	P H D	Omit = Standard open Frame Module P = Forced Droop Output for use in parallel applications (not avail. w/ 9 option) H= Heat plate, for use with heat sinks or cold-walls D= Polyurethane Conformal coating on both sides. Not compatible with paste-in-hole reflow soldering.
	RoHS	Z	Omit = RoHS 5/6 Lead Based Solder Used Z = RoHS Compliant

Contact Us

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+1-972-244-9288 (Int'l)

Change History (excludes grammar & clarifications)

Revision	Date	Description of the change
1.0		Initial release
1.1	7/11/2025	Added conformally coated version
1.2	7/24/2025	Add ordering code to P.18
1.3	8/18/2025	Corrected family name from Barracuda to Orca
1.4	9/26/2025	Updated product image.

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