As the most powerful member of Glary’s new E-Generation power module, the E08 provides three outputs including 12V, 5V and 3.3V from 18–36V or 36–75V input ranges with industry standard 1/8-Brick pin assignment. The efficient converter core is designed with patented “Buck-Reset Forward” topology, which cooperates with special designed “Partial-Resonant-Synchronous-Rectifier” stages at 450kHz switching frequency to efficiently deliver more power, achieving 94% of conversion efficiency and 360W/in³ power density.

A proprietary ultra-fast current limiting circuit is also embedded in the E08 series to eliminate the so called “Short-Circuit-Current-Runaway”, which is a destructive high output current driven by the minimum output voltage caused by non-zero propagation delay of the current limiting loop of the PWM converter. With this technology, the E08 can largely cut the delay time from 350us to 60nS, effectively shifting the current limit set point to be higher than that of conventional converters without reliability impact, providing superior driving capability to motors and capacitive loads. To provide higher power and improve the system reliability, the E08 series utilizes a proprietary wide-band “Drop Current Sharing” control circuit, which allows directly connecting the outputs of modules without a noise sensitive current share bus. System built by paralleling multiple E08 modules is capable to respond full scale step load within 20μS without evident overshot and ringing. The E08 modules are also built with “Anti-Back-Driving” circuit to prevent the reversed current and further reduce the power loss.

All the power semiconductor chips of E08 are attached onto the inner surface of a low profile six-sided metallic case to spread heat to the outer surface homogeneously, and further result in lower thermal resistance for better cooling. The package is designed to allow external cooling means to be attached on its top or bottom sides by using four M2 screws, which provide sufficient mechanical strength to install the module on applications of vehicles for resisting harsh vibration. The cavity of E08 metal case is vacuum potted with high thermal conductivity silicone, which helps the heat transfer and maintains hydrostatic pressure balance in the high strength metallic case to withstand pressure range from 1mBar to 100Bar. E08 can effectively simplify the system power design of deep water probes, high altitude instruments and other equipments that its conventional cousins cannot.

### MODEL NAME SYSTEM

<table>
<thead>
<tr>
<th>E08</th>
<th>48</th>
<th>120</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>XXXX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series</td>
<td>VIN</td>
<td>VOUT</td>
<td>Startup / Shutdown</td>
<td>Enable</td>
<td>Pin Length</td>
<td>Standoff</td>
<td>Suffix</td>
</tr>
<tr>
<td>E08</td>
<td>24:18V~36V</td>
<td>120=12V 050=5.0V</td>
<td>I: -40ºC / +110ºC A: -60ºC / +130ºC</td>
<td>P: Positive N: Negative</td>
<td>0; 0.12” 1; 0.16”</td>
<td>0; 0.02”</td>
<td>Classification only if used</td>
</tr>
</tbody>
</table>

The selected option codes for the “abcd” section in the model number determine various options for the user. For example, the E08241201N10 module is configured to has negative enable logic, 0.16” pin length, 0.02” standoff height with -40ºC ~ +110ºC of Startup / Shutdown setting.

### MODEL LIST (Contact to factory for special specifications)

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Maximum Input</th>
<th>Maximum Output</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>E0824120</td>
<td>18V~36V</td>
<td>325W</td>
<td>93%</td>
</tr>
<tr>
<td>E0824050</td>
<td>18V~36V</td>
<td>305W</td>
<td>92%</td>
</tr>
<tr>
<td>E0824033</td>
<td>18V~36V</td>
<td>250W</td>
<td>90%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Maximum Input</th>
<th>Maximum Output</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>E0848120</td>
<td>36V~75V</td>
<td>385W</td>
<td>94%</td>
</tr>
<tr>
<td>E0848050</td>
<td>36V~75V</td>
<td>330W</td>
<td>92%</td>
</tr>
<tr>
<td>E0848033</td>
<td>36V~75V</td>
<td>260W</td>
<td>90%</td>
</tr>
</tbody>
</table>

Since the E08 modules are designed to fulfill some critical mechanical and environmental requirements, which cannot be managed by just few digits of model name. Please contact Glary or our local distributors to obtain an additional Part Code for purchasing of the specific E08 part.

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COMMON SPECIFICATIONS

Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Storage</th>
<th>-55°C to +125°C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Transient (100mS): 48V Models 24V Models</td>
<td>-0.5V to +80Vdc -0.5V to +40Vdc 100V Maximum 50V Maximum</td>
</tr>
<tr>
<td>Isolation Voltage</td>
<td>Input to Output</td>
<td>2.0kV Minimum</td>
</tr>
<tr>
<td></td>
<td>Input to Case</td>
<td>1.0kV Minimum</td>
</tr>
<tr>
<td></td>
<td>Output to Case</td>
<td>1.0kV Minimum</td>
</tr>
<tr>
<td>Remote Control</td>
<td></td>
<td>-0.5V to +12Vdc</td>
</tr>
</tbody>
</table>

General Parameters

<table>
<thead>
<tr>
<th>MTBF</th>
<th>Bellcore TR-332 issue 6</th>
<th>4.50×10^6 hrs @GB/25°C (E0848120abcd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTP</td>
<td>T&lt;sub&gt;C&lt;/sub&gt;</td>
<td>See Startup / Shutdown</td>
</tr>
<tr>
<td>Weight</td>
<td>Metal Enclosed</td>
<td>32g</td>
</tr>
</tbody>
</table>

Control Functions

<table>
<thead>
<tr>
<th>Remote Control</th>
<th>Logic High</th>
<th>Logic Low</th>
<th>+3.0V to +6.5V 0V to +1.0V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Current of Remote Control Pin</td>
<td></td>
<td></td>
<td>-0.5mA ~ +1.5mA</td>
</tr>
</tbody>
</table>

Input

<table>
<thead>
<tr>
<th>Operation Voltage Range</th>
<th>48V Models 24V Models</th>
<th>+36V to +75Vdc +18V to +36Vdc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power ON Voltage Ranges</td>
<td>48V Models 24V Models</td>
<td>+34.0V to +36.0Vdc +17.0V to +18.0Vdc</td>
</tr>
<tr>
<td>Power OFF Voltage Ranges</td>
<td>48V Models 24V Models</td>
<td>+31.2V to +33.2Vdc +15.6V to +18.8Vdc</td>
</tr>
<tr>
<td>Off State Input Current</td>
<td>V&lt;sub&gt;NO&lt;/sub&gt;</td>
<td>6mA Max</td>
</tr>
<tr>
<td>Latch-State Input Current</td>
<td>V&lt;sub&gt;ON&lt;/sub&gt;</td>
<td>8mA Max</td>
</tr>
<tr>
<td>Input Capacitance</td>
<td>48V Models 24V Models</td>
<td>20.0μF Max</td>
</tr>
</tbody>
</table>

Output Limitations

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Capacitive Load C&lt;sub&gt;C&lt;/sub&gt;</th>
<th>Pre-biased Voltage V&lt;sub&gt;B&lt;/sub&gt;</th>
<th>Reverse Current I&lt;sub&gt;s&lt;/sub&gt;</th>
<th>Short Circuit Output Current I&lt;sub&gt;S&lt;/sub&gt;</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>E0824033</td>
<td>&lt;47000μF @ 51mΩ Load</td>
<td>&lt;3.1V</td>
<td>&lt;1000mA @ V&lt;sub&gt;B&lt;/sub&gt;</td>
<td>&lt;150A @ 2mΩ Load</td>
<td></td>
</tr>
<tr>
<td>E0824050</td>
<td>&lt;22000μF @ 90mΩ Load</td>
<td>&lt;4.75V</td>
<td>&lt;1000mA @ V&lt;sub&gt;B&lt;/sub&gt;</td>
<td>&lt;140A @ 2mΩ Load</td>
<td></td>
</tr>
<tr>
<td>E0824120</td>
<td>&lt;2200μF @ 480μmΩ Load</td>
<td>&lt;11.4V</td>
<td>&lt;500mA @ V&lt;sub&gt;B&lt;/sub&gt;</td>
<td>&lt;75A @ 2mΩ Load</td>
<td></td>
</tr>
<tr>
<td>E0848033</td>
<td>&lt;47000μF @ 42mΩ Load</td>
<td>&lt;3.1V</td>
<td>&lt;1500mA @ V&lt;sub&gt;B&lt;/sub&gt;</td>
<td>&lt;200A @ 2mΩ Load</td>
<td></td>
</tr>
<tr>
<td>E0848050</td>
<td>&lt;2200μF @ 72mΩ Load</td>
<td>&lt;4.75V</td>
<td>&lt;1500mA @ V&lt;sub&gt;B&lt;/sub&gt;</td>
<td>&lt;180A @ 2mΩ Load</td>
<td></td>
</tr>
<tr>
<td>E0848120</td>
<td>&lt;2200μF @ 364mΩ Load</td>
<td>&lt;11.4V</td>
<td>&lt;800mA @ V&lt;sub&gt;B&lt;/sub&gt;</td>
<td>&lt;100A @ 2mΩ Load</td>
<td></td>
</tr>
</tbody>
</table>

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Model Number: E0848120

MODEL PARAMETERS

General

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conversion Efficiency</td>
<td>Typical</td>
</tr>
<tr>
<td>Switching Frequency</td>
<td>Typical 450kHz</td>
</tr>
</tbody>
</table>

Input/Output

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reflected Input Ripple Current</td>
<td>$L_{EXT} = 10\mu H$</td>
</tr>
<tr>
<td>Input Ripple Rejection (&lt;1kHz)</td>
<td>$V_{NOMA}$, Full Load</td>
</tr>
<tr>
<td>Voltage Accuracy</td>
<td>Typical</td>
</tr>
<tr>
<td>Line Regulation</td>
<td>Full Input Range</td>
</tr>
<tr>
<td>Load Regulation</td>
<td>0%~100%</td>
</tr>
<tr>
<td>Temperature Drift</td>
<td>-40°C~100°C</td>
</tr>
<tr>
<td>Output Tolerance Band</td>
<td>All Conditions</td>
</tr>
<tr>
<td>Ripple &amp; Noise (20MHz)</td>
<td>Peak-Peak (RMS)</td>
</tr>
<tr>
<td>Over Voltage Protection</td>
<td>$V_{NOMA}$, 10% Load</td>
</tr>
<tr>
<td>Output Current Limits</td>
<td>$V_{NOMA}$</td>
</tr>
<tr>
<td>Voltage Trim</td>
<td>$V_{NOMA}$, 10% Load</td>
</tr>
<tr>
<td>Step Load (2.5A/μS)</td>
<td>50%~75% Load</td>
</tr>
<tr>
<td>Start-Up Delay Time</td>
<td>$V_{NOMA}$, Full Load</td>
</tr>
</tbody>
</table>

Typical Waves and Curves

- Start-up waveform of E0848120 ($V_{IN}$: 48V, Load: 33A)
- Transient response of E0848120 ($V_{IN}$: 48V, Load: 22.5A/15A@2.5A/μS)
- Input/Output ripples of E0848120 ($V_{IN}$: 48V, Load: 33A, $L_{EXT}=10\mu H$)

Efficiency plot of E0848120

Power loss curves of E0848120

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**Model Number: E0848120**

**DERATING CURVES**

![Graph 1](image1.png)  ![Graph 2](image2.png)

Calculated derating of E0848120I  Calculated derating of E0848120A

**VOLTAGE DROP COMPENSATION**

The resistors $R_{OUT}$ and $R_{OUT}$ on the right-hand side circuit represent the impedances of the power distribution bus contributing voltage drops $V_{BUS}$ and $V_{BUS}$ respectively. The voltage drop $V_{BUS}$ can be eliminated by connecting the +S to the positive node of the load. The -S pin functions differently as it can disable the droop current sharing, compensate the voltage drop $V_{BUS}$, manipulate the load regulation of droop current sharing function or enhance the step load performance.

By connecting a resistor $R_S$ between the -S pin and the negative node of the voltage on the load can be regulated. The values of $R_S$ for eliminating different $V_{BUS}$ and droop current sharing regulation at full load condition are listed in table below, which can be calculated from the equation right-hand below by letting $I_O = I_{RATED}$ and $V_O = V_{RATED}$. Precision resistor with less than 1% of tolerance is recommended for $R_S$.

<table>
<thead>
<tr>
<th>Voltage Drop (mV)</th>
<th>60mV</th>
<th>120mV</th>
<th>180mV</th>
<th>240mV</th>
<th>300mV</th>
<th>360mV</th>
<th>420mV</th>
<th>480mV</th>
<th>540mV</th>
<th>600mV</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R_S$ (Ω)</td>
<td>13.15</td>
<td>21.37</td>
<td>27.00</td>
<td>31.09</td>
<td>34.20</td>
<td>36.64</td>
<td>38.61</td>
<td>40.24</td>
<td>41.59</td>
<td>42.75</td>
</tr>
</tbody>
</table>

* Please consult Glary Power for manipulating load sharing and dynamic performance.

**TRIM AND TRIM TABLE**

The output of the E0848120 power module can be adjusted for higher or lower than the rated voltage level by connecting the TRIM pin through a resistor to the pins of -S or +S respectively as shown as on the right hand side. The resistor for trimming output voltage higher or lower are denoted as $R_U$ and $R_D$, which have different resistances for each different output voltage level. The resistance table for trimming the output voltage with 1% of step are listed as below for reference.

<table>
<thead>
<tr>
<th>Trim Up</th>
<th>+1%</th>
<th>+2%</th>
<th>+3%</th>
<th>+4%</th>
<th>+5%</th>
<th>+6%</th>
<th>+7%</th>
<th>+8%</th>
<th>+9%</th>
<th>+10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R_U$ (KΩ)</td>
<td>324.2</td>
<td>162.1</td>
<td>108.1</td>
<td>81.04</td>
<td>64.83</td>
<td>54.03</td>
<td>46.31</td>
<td>40.52</td>
<td>36.02</td>
<td>32.42</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Trim Down</th>
<th>-1%</th>
<th>-2%</th>
<th>-3%</th>
<th>-4%</th>
<th>-5%</th>
<th>-6%</th>
<th>-7%</th>
<th>-8%</th>
<th>-9%</th>
<th>-10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R_D$ (KΩ)</td>
<td>78.12</td>
<td>37.03</td>
<td>23.33</td>
<td>16.48</td>
<td>12.37</td>
<td>9.63</td>
<td>7.68</td>
<td>6.21</td>
<td>5.07</td>
<td>4.19</td>
</tr>
</tbody>
</table>

* Please contact Glary Power if a trim range beyond ±10% is needed.
DROOP CURRENT SHARING

Fig. 1 shows schematic of the droop current sharing connection by using E-Generation modules. The droop current sharing function allows directly connecting outputs of multiple modules in parallel without current sharing bus. The reliable current sharing is achieved not only by minimizing the output voltage error but also the balancing the impedance of distribution bus. The output voltage error between modules determines the output current error constantly as show in Fig. 2. However, as shown in Fig. 3, the ratio of the shared current error for each module is gradually approaching to zero while the total output current increases.

The bandwidth of the droop current sharing loop is comparable to that of the voltage loop, which can respond to high current slew rate load transient without high current peak deviation. Fig. 4 shows waveforms of two E-series modules in current sharing responding to a 0A to 20A step load, the maximum current slew rate is 2.5A/μS limited by the used electrical load for testing. The waveform shows that the current error of two paralleled modules in the time period of 0A load is relatively large due to a significantly output voltage error, which has been reduced with a very short of settling time in the time period of the 20A load current.

NOTE:
1. It is recommended that the input should be protected by fuses or other protection devices.
2. Specifications are subject to change without notice.
3. Printed or downloaded datasheets are not subject to Glary document control.
4. Product labels shown, including safety agency certificates, may vary based on the date of manufacture.
5. Information provided in this documentation is for ordering purposes only.
6. This product is not designed for use in critical life support systems, nuclear control systems or other such applications, which necessitate specific safety and regulatory standards other than the ones listed in this datasheet.

IMPORTANT
※ In order to secure effective usage of converter and the validity of Glary’s service and warranty coverage, please refer to the application notes for general usage.
For needs of usage beyond the application notes, please contact to Glary headquarter or our regional sales representative office for help.
Dimensions and Pin Connections

<table>
<thead>
<tr>
<th>Designation</th>
<th>Function Description</th>
<th>Pin #</th>
</tr>
</thead>
<tbody>
<tr>
<td>-IN</td>
<td>Negative input</td>
<td>1</td>
</tr>
<tr>
<td>PC</td>
<td>Remote control. To turn-on and turn-off output.</td>
<td>2</td>
</tr>
<tr>
<td>+IN</td>
<td>Positive input</td>
<td>3</td>
</tr>
<tr>
<td>+Vo</td>
<td>Positive output</td>
<td>4</td>
</tr>
<tr>
<td>+S</td>
<td>Positive remote sense</td>
<td>5</td>
</tr>
<tr>
<td>TRIM</td>
<td>Output voltage adjust</td>
<td>6</td>
</tr>
<tr>
<td>-S</td>
<td>Negative remote sense</td>
<td>7</td>
</tr>
<tr>
<td>-Vo</td>
<td>Negative output</td>
<td>8</td>
</tr>
</tbody>
</table>

**Dimensions:** inches (mm)

**Tolerances:**
- \( .xxx \pm 0.02 \) (\( .x \pm 0.5 \))
- \( .xxx \pm 0.01 \) (\( .x \pm 0.25 \))

**Weight:** 32g

**Base plate:** Anode oxide aluminum alloy

**Mounting inserts:** M2 or through-hole

**Maximum torque:** 1.3in-lb (0.15Nm)

**Pin material:** Copper alloy or Brass

**Pin plating:** Golden over Nickel