



**Features**

- Industry-standard package
- 100°C case operation
- Optional trim and enable
- Wide-range input voltage
- 1500V isolation
- Short-circuit protection

**Description**

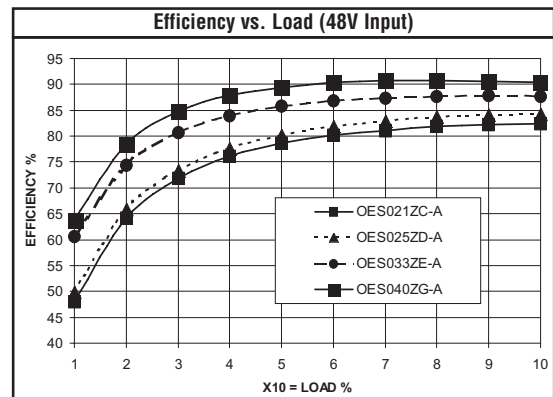
QES single output dc-dc converters provide up to 66 watts of output power in an industry-standard, quarter-brick package. The QES converters feature open-frame packaging, along with planar magnetics and a high efficiency topology to provide maximum useable power with minimal thermal constraints. The QES is suited to telecom, networking, and industrial applications, and is fully compatible with production board washing processes.

**Technical Specifications**

| Input                       |             |
|-----------------------------|-------------|
| Voltage Range               |             |
| 24 VDC Nominal              | 18 - 36 VDC |
| 48 VDC Nominal              | 36 - 75 VDC |
| Input Reverse Input Current | Shunt Diode |

| Output   |                           |
|--|---------------------------|
| Setpoint Accuracy  | ±1%                       |
| Line Regulation $V_{in}$ Min. - $V_{in}$ Max., $I_{out}$ Rated | 0.2% $V_{out}$            |
| Load Regulation $I_{out}$ Min. - $I_{out}$ Max., $V_{in}$ Nom. | 0.5% $V_{out}$            |
| Remote Sense Headroom  | 0.5 VDC                   |
| Minimum Output Current   | 10 % $I_{out}$ Rated      |
| Dynamic Regulation, Loadstep 25% $I_{out}$                     |                           |
| Pk Deviation   | 4% $V_{out}$              |
| Settling Time  | 500 $\mu$ s               |
| Voltage Trim Range   | ±10%                      |
| Short Circuit And Overcurrent Protection                       | Shutdown                  |
| Short Circuit Current Limit                                    | 200% $I_{out}$            |
| Current Limit Threshold Range, % of $I_{out}$ Rated            | 110 - 140%                |
| OVP Trip Range   | 115 - 140% $V_{out}$ Nom. |
| UVP Trip Range   | 70 - 90% $V_{out}$ Nom.   |
| OVP/UVP Type   | Latching                  |

| General                                    |                            |
|--|----------------------------|
| Turn-On Time                               | 30 ms                      |
| Remote Shutdown                            | Positive or Negative Logic |
| Remote Shutdown Reference                  | $V_{in}$ Negative          |
| Switching Frequency                        | 300 kHz                    |
| Isolation                                  |                            |
| Input - Output                             | 1500 VDC                   |
| Input - Case                               | 1050 VDC                   |
| Output - Case                              | 1050 VDC                   |
| Temperature Coefficient                    | ±0.02%/°C                  |
| Case Temperature                           |                            |
| Operating Range                            | -40 To +100°C              |
| Storage Range                              | -40 To +125°C              |
| Thermal Shutdown Range                     | 105 to 115°C               |
| Vibration, 3 Axes, 5 Min Each              | 5 g, 10 - 55 Hz            |
| MTBF <sup>†</sup> (Bellcore TR-NWT-000332) | 2.5 X 10 <sup>6</sup> hrs  |
| Safety                                     | UL, cUL, TUV               |
| Weight (Approx.)                           | 1.7 oz                     |



| Notes  |
|--|
| † MTBF predictions may vary slightly from model to model.  |
| Specifications typically at 25°C, normal line, and full load, unless otherwise stated.                               |
| Soldering Conditions: I/O pins, 260°C, ten seconds; fully compatible with commercial wave-soldering equipment.       |
| Safety: Agency approvals may vary from model to model. Please consult factory for specific model information.        |
| Units are water-washable and fully compatible with commercial spray or immersion post wave-solder washing equipment. |

**Model Selection**

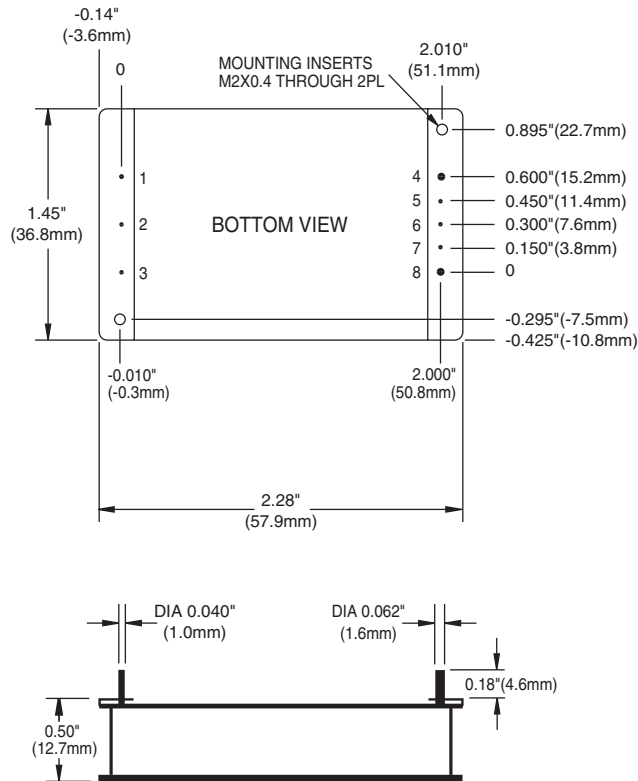
| MODEL      | INPUT VOLTAGE (VOLTS) | INPUT VOLTAGE RANGE (VOLTS) | MAXIMUM INPUT CURRENT (AMPS)* | OUTPUT VOLTAGE (VOLTS) | RATED OUTPUT CURRENT (AMPS) | RIPPLE & NOISE pk-pk (mV) | TYPICAL EFFICIENCY** |
|------------|-----------------------|-----------------------------|-------------------------------|------------------------|-----------------------------|---------------------------|----------------------|
| QES050YE-A | 24                    | 18-36                       | 3.3                           | 3.3                    | 15                          | 100                       | 85%                  |
| QES066YE-A | 24                    | 18-36                       | 4.4                           | 3.3                    | 20                          | 100                       | 85%                  |
| QES036ZB-A | 48                    | 36-75                       | 1.4                           | 1.8                    | 20                          | 75                        | 76%                  |
| QES038ZD-A | 48                    | 36-75                       | 1.4                           | 2.5                    | 15                          | 100                       | 85%                  |
| QES050ZD-A | 48                    | 36-75                       | 1.8                           | 2.5                    | 20                          | 100                       | 83%                  |
| QES050ZE-A | 48                    | 36-75                       | 1.6                           | 3.3                    | 15                          | 100                       | 86%                  |
| QES066ZE-A | 48                    | 36-75                       | 2.2                           | 3.3                    | 20                          | 100                       | 86%                  |

**NOTES:**

- \* Maximum input current at minimum input voltage, maximum rated output power.
- \*\* At nominal  $V_{in}$ , rated output.

Model numbers highlighted in yellow or shaded are not recommended for new designs.

**Mechanical Drawing**



| Thermal Impedance  |           |
|--------------------|-----------|
| Natural Convection | 10.1 °C/W |
| 100 LFM            | 8.0 °C/W  |
| 200 LFM            | 5.4 °C/W  |
| 300 LFM            | 4.4 °C/W  |
| 400 LFM            | 3.4 °C/W  |

Note:  
Thermal impedance data is dependent on many environmental factors. The exact thermal performance should be validated for specific application.

| Pin | Function          | Pin Diameter |
|-----|-------------------|--------------|
| 1   | -V <sub>in</sub>  | 0.040"       |
| 2   | On/Off            | 0.040"       |
| 3   | +V <sub>in</sub>  | 0.040"       |
| 4   | -V <sub>out</sub> | 0.062"       |
| 5   | -Sense            | 0.040"       |
| 6   | Trim              | 0.040"       |
| 7   | +Sense            | 0.040"       |
| 8   | +V <sub>out</sub> | 0.062"       |

| Tolerances   |               |
|--|---------------|
| Inches:  | (Millimeters) |
| .XX ± 0.020  | .X ± 0.5      |
| .XXX ± 0.010                                       | .XX ± 0.25    |
| Pin:   |               |
| ± 0.002  | ± 0.05        |
| (Dimensions as listed unless otherwise specified.) |               |

This page is offered as a reference. Consult factory for actual availability of options. When ordering equipment options, use the following suffix information. Select preferred option(s) and add the suffix to the model number. Ordering option examples are located below the options table.

| OPTION                                 | SUFFIX | APPLICABLE SERIES   | REMARKS  |
|--|--------|---|--|
| Negative Logic                         | N      | HAS, HBD, HBS, HES, HLS, HLD, LES, QBS, QES, QLS, TES, TQD  | TTL "Low" Turns Module ON<br>TTL "High" Turns Module OFF |
| Lucent-Compatible Trim                 | T      | HAS, HBD, HBS, HES, HLS, QBS, QES, QLS  |  |
| Trim                                   | 1      | IAS, LES  |  |
| Enable                                 | 2      | IAD, IAS, LES, SMS  |  |
| Trim and Enable                        | 3      | IAS, LES  |  |
| <b>Pin Length and Heatsink Options</b> |        |   | Standard Pin Length is 0.180" (4.6mm)                    |
| 0.110" (2.8mm) Pin Length              | 8      | All Leaded Models   |  |
| 0.150" (3.8mm) Pin Length              | 9      | All Leaded Models   |  |
| 0.24" (6.1mm) Horizontal Heatsink      | 1H     | All 1/4-Bricks, 1/2-Bricks, 3/4-Bricks, Full-Bricks (Except HLS, HLD, QLS, TLD, and TKD Packages) | Includes Thermal Pad                                     |
| 0.24" (6.1mm) Vertical Heatsink        | 1V     | All 1/4-Bricks, 1/2-Bricks, 3/4-Bricks, Full-Bricks (Except HLS, HLD, QLS, TLD, and TKD Packages) | Includes Thermal Pad                                     |
| 0.45" (11.4mm) Horizontal Heatsink     | 2H     | All 1/4-Bricks, 1/2-Bricks, 3/4-Bricks, Full-Bricks (Except HLS, HLD, QLS, TLD, and TKD Packages) | Includes Thermal Pad                                     |
| 0.45" (11.4mm) Vertical Heatsink       | 2V     | All 1/4-Bricks, 1/2-Bricks, 3/4-Bricks, Full-Bricks (Except HLS, HLD, QLS, TLD, and TKD Packages) | Includes Thermal Pad                                     |
| 0.95" (24.1mm) Horizontal Heatsink     | 3H     | All 1/4-Bricks, 1/2-Bricks, 3/4-Bricks, Full-Bricks (Except HLS, HLD, QLS, TLD, and TKD Packages) | Includes Thermal Pad                                     |
| 0.95" (24.1mm) Vertical Heatsink       | 3V     | All 1/4-Bricks, 1/2-Bricks, 3/4-Bricks, Full-Bricks (Except HLS, HLD, QLS, TLD, and TKD Packages) | Includes Thermal Pad                                     |

**Example Options:**

HBS050ZG-ANT3V = HBS050ZG-A with negative logic, Lucent-compatible trim, and 0.95" vertical heatsink.

LES015YJ-3N = LES015YJ with optional trim and enable, negative logic.

QBS066ZG-AT8 = QBS066ZG-A with Lucent-compatible trim and 0.110" pin length.

NUCLEAR AND MEDICAL APPLICATIONS - Power-One products are not designed, intended for use in, or authorized for use as critical components in life support systems, equipment used in hazardous environments, or nuclear control systems without the express written consent of the respective divisional president of Power-One, Inc.

TECHNICAL REVISIONS - The appearance of products, including safety agency certifications pictured on labels, may change depending on the date manufactured. Specifications are subject to change without notice.