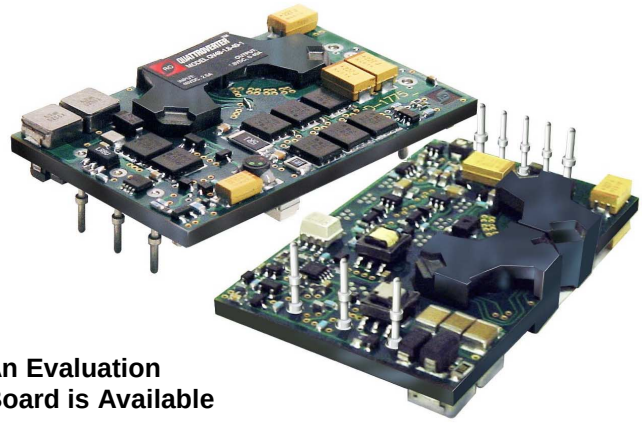
# QUATTROVERTER®

# 40A DC-DC CONVERTER
# MODEL: QV24-1.8-40-1
# ADVANCE DATA SHEET

- INPUT: 18 – 36VDC
- OUTPUT: 1.8VDC @ 40A

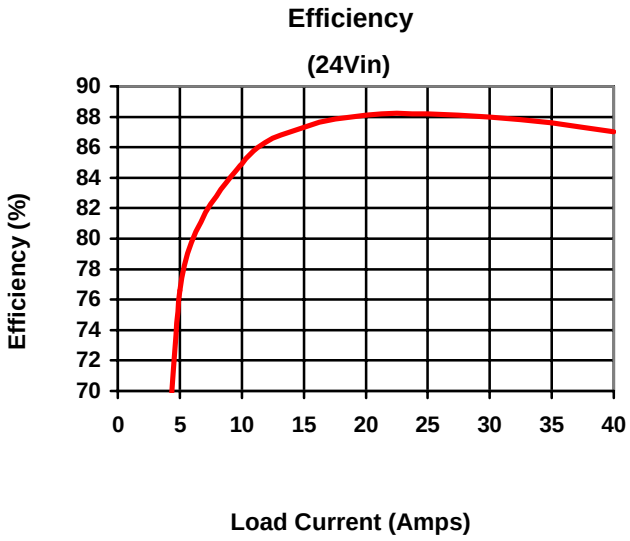


**An Evaluation Board is Available**

## FEATURES

- 40A Output Current
- Standard Quarter Brick Package
- Ultra-High Efficiency: 88%
- Fast Transient Response
- Extended Thermal Performance – No Heat Sink Required
- Light Weight – SMT Version Available
- Recovers Automatically from all Protection Modes
- Trim Range: 80 to 110%
- Remote Sense
- Constant Frequency
- Meets Basic Insulation Requirements of EN60950

See Last Page for Available Options




## DESCRIPTION

The QUATTROVERTER QV24-1.8-40-1 is a member of RO's second generation of quarter-brick modules. This improved series of converters pushes the performance envelope to ultra-high levels, with this model producing 40A of 1.8V power at an astonishing 87% efficiency. The minimal power loss performance is maintained across the load range and is complimented by advanced thermal management and packaging techniques. This combination of performance and packaging makes reliable operation at high currents possible without the use of a heat sink. The QUATTROVERTER family of modules is available in both thru-hole and surface mount versions.

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# *QUATTROVERTER*® DC-DC Converters
## *MODEL: QV24-1.8-40-1*

### ABSOLUTE MAXIMUM RATINGS

*Exceeding absolute maximum ratings may cause permanent damage and may reduce reliability*

| PARAMETER | MIN | MAX | UNITS | CONDITIONS |
|---|---|---|---|---|
| Continuous Input Voltage (+In to –In) | -0.3 | 36 | Vdc | |
| Transient Input Voltage (+In to –In) | -0.3 | 40 | Vdc | Up to 100ms |
| On/Off Voltage (On/Off to –In) | -0.3 | 40 | Vdc | |
| Storage Temperature | -40 | +125 | °C | |
| Operating Temperature | -40 | +85 | °C | Ambient |
| Soldering Temperature (Wave Solder) | | +260 | °C | < 5 sec. |

### SPECIFICATIONS

Specifications apply with 24Vin, full load, 25°C unless indicated otherwise.

| INPUT PARAMETERS | MIN | TYP | MAX | UNITS | CONDITIONS |
|---|---|---|---|---|---|
| Input Voltage | 18 | 24 | 36 | Vdc | |
| Startup Voltage | 15.5 | 16 | 16.5 | Vdc | |
| Shut Down Voltage | 14 | 14.5 | 15 | Vdc | |
| Maximum Input Current | | | TBD | A | $V_{in}$ = 18V |

| OUTPUT PARAMETERS | MIN | TYP | MAX | UNITS | CONDITIONS |
|---|---|---|---|---|---|
| Voltage Set Point | 1.77 | 1.8 | 1.83 | Vdc | 24$V_{in}$, Full Load |
| Load Regulation | | 1 | 4 | mV | 0 A to Full Load, at any $V_{in}$ within range |
| Line Regulation | | 1 | 4 | mV | Over $V_{in}$ range |
| Voltage Drift w/Temperature | | | 0.02 | %/°C | -40 to +100 °C |
| Ripple | | 75 | 150 | mV p-p | 5Hz to 20 MHz, at any $V_{in}$ within range, $C_{ext}$ = 10µF tantalum + 1µF ceramic |
| Rated Current | 0 | | 40 | A | |
| Current Limit Inception | 110 | 120 | 133 | % F.L. | $V_{out}$ = 95% $V_{out}$ nominal |
| Short Circuit Current | | | 170 | % F.L. | $V_{out}$ = 250mV |
| Transient Response<br>Peak Deviation<br>Settling Time | | <br>90<br>100 | | <br>mV<br>µsec | Load change from 50% to 75% full load<br>Slew rate = 1A/µsec<br>$V_{out}$ within 1% $V_{out}$ nominal |
| External Load Capacitance | 0 | | 30,000 | µF | |
| Efficiency (See Curve) | | 88 | | % | 24$V_{in}$, 3/4 Load |

# *QUATTROVERTER*® DC-DC Converters
## *MODEL: QV24-1.8-40-1*

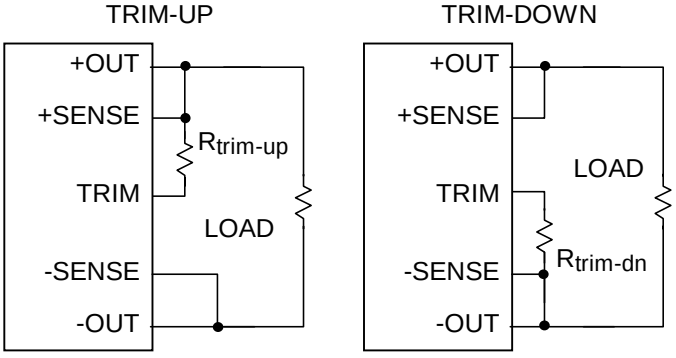
**SPECIFICATIONS (continued)**

| ISOLATION PARAMETERS | MIN | TYP | MAX | UNITS | CONDITIONS |
|---|---|---|---|---|---|
| Input/Output Isolation | | | 1500 | Vdc | |
| Input-to-Output Capacitance | | 50 | | pF | |
| Input-to-Output Resistance | 10 | | | M Ohms | |

| MECHANICAL PARAMETERS | MIN | TYP | MAX | UNITS | CONDITIONS |
|---|---|---|---|---|---|
| Weight | | 35 (1.24) | | g (oz.) | |
| Size | | 2.3 x 1.45 x 0.42 | | Inches | |

| FEATURE PARAMETERS | MIN | TYP | MAX | UNITS | CONDITIONS |
|---|---|---|---|---|---|
| Trim Range | -20 | | +10 | % | |
| Over Voltage Protection (Non-Shutdown, Auto. Recovery) | 115 | 120 | 140 | % $V_{out}$ (nom) | OVP threshold does not change when Vo is trimmed |
| Over Temperature Shut-down (Automatic Recovery) | | 120 | | °C | PCB temperature |
| Turn-On Time | | 12 | 20 | msec | 80% F.L., $V_{out}$ within 1% |
| Logic On/Off | | | | | |
| Logic Low | 0.5 | | | V | $V_{out}$ = 0 |
| On/Off Source Current | | 2 | | mA | @$V_{on/off}$ < 0.5V |
| Logic High | | | 15 | V | |
| On/Off Sink Current | | | 50 | µA | @$V_{on/off}$ = 15V |
| Logic Turn-On Time | | 2 | | msec | 80% F.L., $V_{out}$ settled within 1% |

**TRIM CIRCUIT CONFIGURATIONS**




**TRIM RESISTOR CALCULATIONS**

(Standard Trim)

$$R_{trim-up} = \left( \frac{5.11 \cdot V_o \cdot (100 + \Delta\%)}{1.225 \cdot \Delta\%} - \frac{511}{\Delta\%} - 10.2 \right) \cdot k\Omega$$

$$R_{trim-dn} = \left( \frac{511}{\Delta\%} - 10.2 \right) \cdot k\Omega$$

Where:

**Vo** = The nominal output voltage of the module with no trimming.

**Δ% =** The desired percentage change in the output (**Δ%** is always a positive number).

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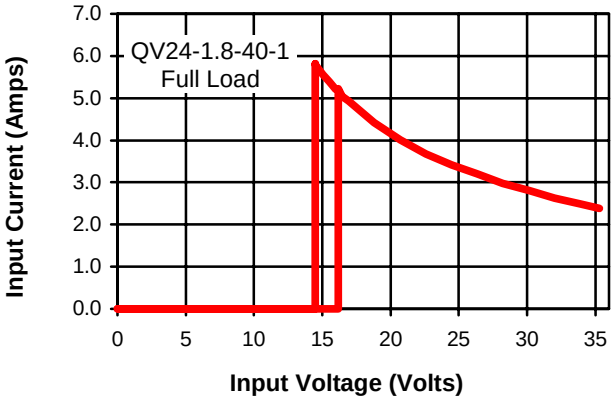
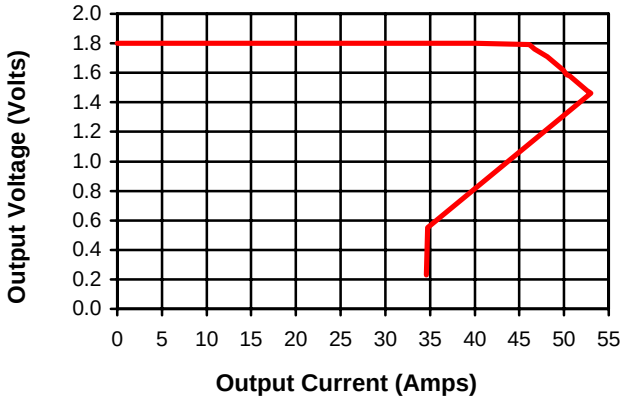
## *MODEL: QV24-1.8-40-1*

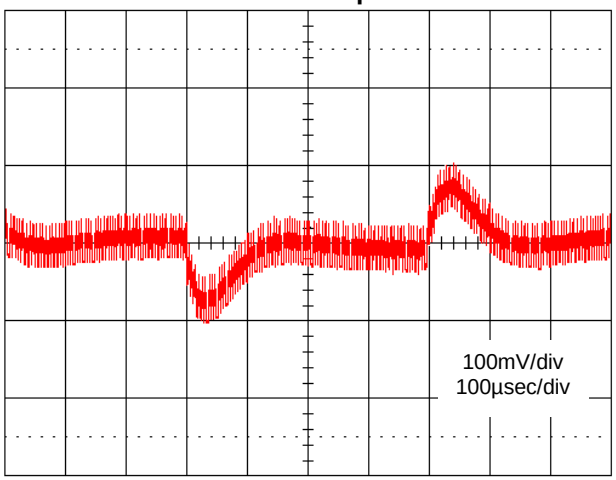
### Input Characteristics




### Output Characteristics

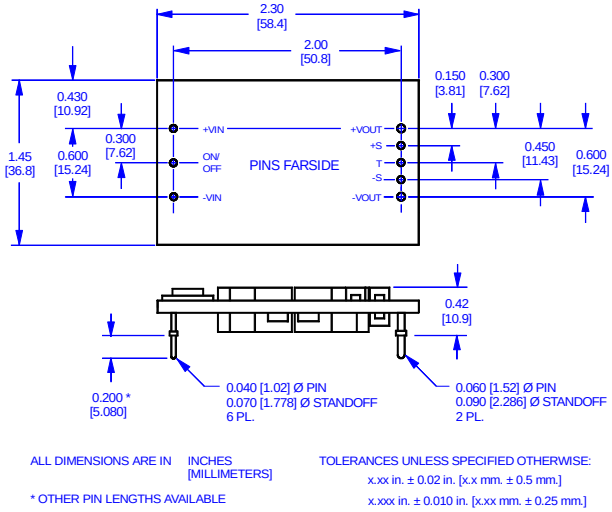



### Transient Response




**Iout = 20A – 30A –20A**
**Current Slew Rate = 1A/us**

### Outline Drawing




ALL DIMENSIONS ARE IN INCHES [MILLIMETERS]

* OTHER PIN LENGTHS AVAILABLE

TOLERANCES UNLESS SPECIFIED OTHERWISE:
x.xx in. ± 0.02 in. [x.x mm. ± 0.5 mm.]
x.xxx in. ± 0.010 in. [x.xx mm. ± 0.25 mm.]

### Part Numbering Scheme

| Converter Family | $V_{in}$ (nom) | | $V_{out}$ (nom) | | $I_o$ (rated) | | Logic options | Pin options |
|---|---|---|---|---|---|---|---|---|
| **QV** | **24** | - | **1.8** | - | **40** | - | **1** | |
| QuattroVerter Series | 24V nom. 18V - 36V | | 1.8V output | | 40A rating | | blank = pos. logic<br>1 = neg. logic (std.) | Blank = 0.200 PTH (std.)<br>6 = 0.145 PTH<br>8 = 0.110 PTH<br>SMT = SMT Option |

### Available Options

**Negative Logic** – The On/Off pin must be low to turn the module on. If it's left floating, the module turns off. This is the standard logic configuration.

**Positive Logic** – The On/Off pin must be high to turn the module on. If it's left floating, the module turns on.

**Alternate Pin Lengths** – In addition to the 0.200" standard thru-hole pins, RO offers 0.145", and 0.110" thru-hole pin lengths.

**SMT Mounting** – The module is mounted to the target PCB using a surface-mount interface. Contact the factory for further information.

**Alternate Trim** –Other industry standard trim options are available. Contact the factory for further information.

(minimum quantities and extended lead-times may apply to orders of non-standard options)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