



# EA60016

## 80W SINGLE DC/DC CONVERTER

16–36V<sub>IN</sub>, 26V<sub>OUT</sub>@3A  
US Patents 6,262,901 B1 & 6,473,317 B1

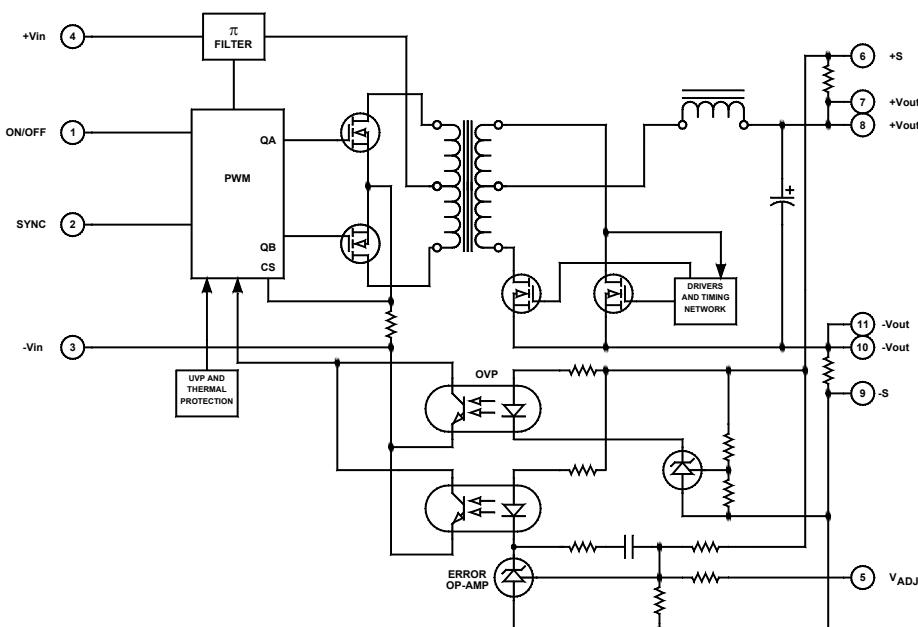
### Key Features

- 88% efficiency
- Output overvoltage protection (OVP)
- Wide input voltage range > (2:1)
- Six-sided shielding
- Soft start
- 1500Vdc input-to-output isolation
- Short circuit and thermal protection
- Adjustable output
- 300µA off state current
- Output synchronous rectification
- Input undervoltage protection



### Functional Description

The EA60016 is an isolated 80W single output DC/DC converter that accepts 16V<sub>IN</sub> to 36V<sub>IN</sub> and provides 26V<sub>OUT</sub>@3A. The converter is designed to synchronize with a 50% duty cycle, 200kHz, AC-coupled, TTL sync input. Push-pull topology and output synchronous rectification allow for continuous operation even at low input voltages with maximum efficiency. Six-sided shielding with external synchronization minimizes EMI and RFI. Protection features allow the converters to operate in harsh environments.



Typical Block Diagram

## Electrical Specifications

### INPUT SPECIFICATIONS

Unless otherwise specified, all parameters are given under typical  
+25°C with nominal input voltage and under full output load conditions.

| PARAMETER                             | CONDITION / NOTE                               | MIN  | TYP  | MAX | UNIT              |
|---------------------------------------|--|------|------|-----|-------------------|
| Input Voltage Range                   |  | 16   | 24   | 36  | Vdc               |
| Input Filter                          | LC   |      |      |     |                   |
| Reverse Polarity Input Current        |  |      |      | 12  | A                 |
| Input Surge Current (20µS Spike)      |  |      |      | 10  | A                 |
| No Load Input Current                 |  |      | 90   |     | mA                |
| Full Load Input Current               |  |      | 3780 |     | mA                |
| Short Circuit Current Limit           |  |      | 180  |     | % I <sub>IN</sub> |
| Undervoltage Shutdown                 |  | 12   |      |     | Vdc               |
| Off State Current                     |  |      | 300  |     | µA                |
| Remote ON/OFF Control, Sync Reference | To -V  |      |      |     |                   |
| Converter ON                          | Open (Open circuit voltage at Pin 1: 10V Max.) |      |      |     |                   |
| Converter OFF                         |  | -0.6 | 0    | 0.2 | Vdc               |
| Logic Input Reference                 | -Input   |      |      |     |                   |
| Logic Compatibility                   | TTL Open Collector or CMOS Open Drain          |      |      |     |                   |
| Sync Input                            | TTL  | 2.5  |      | 5   | Vdc               |
| Sync Input Minimum Pulse Width        |  | 200  |      |     | nS                |

### OUTPUT SPECIFICATIONS

| PARAMETER   | CONDITION / NOTE                                   | MIN | TYP  | MAX  | UNIT              |
|---|--|-----|------|------|-------------------|
| Output Voltage  |  |     | 26   |      | Vdc               |
| Output Current  |  |     | 3    |      | A                 |
| Output Voltage Accuracy                                     |  |     | ±1   | ±1.5 | %                 |
| Output Voltage Adjustment                                   |  |     | 3    | ±5   | %                 |
| Minimum Load  |  | 10  |      |      | % of FL           |
| Ripple & Noise  |  |     | 1    | 2    | % <sub>PP</sub>   |
| Line Regulation   | Minimum V <sub>IN</sub> to maximum V <sub>IN</sub> |     | ±1   | ±2   | %                 |
| Load Regulation   | 10% of FL to FL                                    |     | ±1   | ±2   | %                 |
| Temperature Coefficient @ FL                                |  |     | 0.02 |      | %/ <sup>o</sup> C |
| Transient Response Time (to within 1% of V <sub>OUT</sub> ) | 50% FL to FL to 50% FL, See Figure 3               |     | 50   |      | µS                |
| Short Circuit Protection                                    | By input current limiting                          |     |      |      |                   |

### GENERAL SPECIFICATIONS

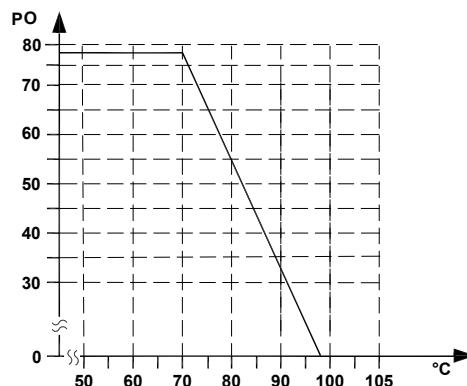
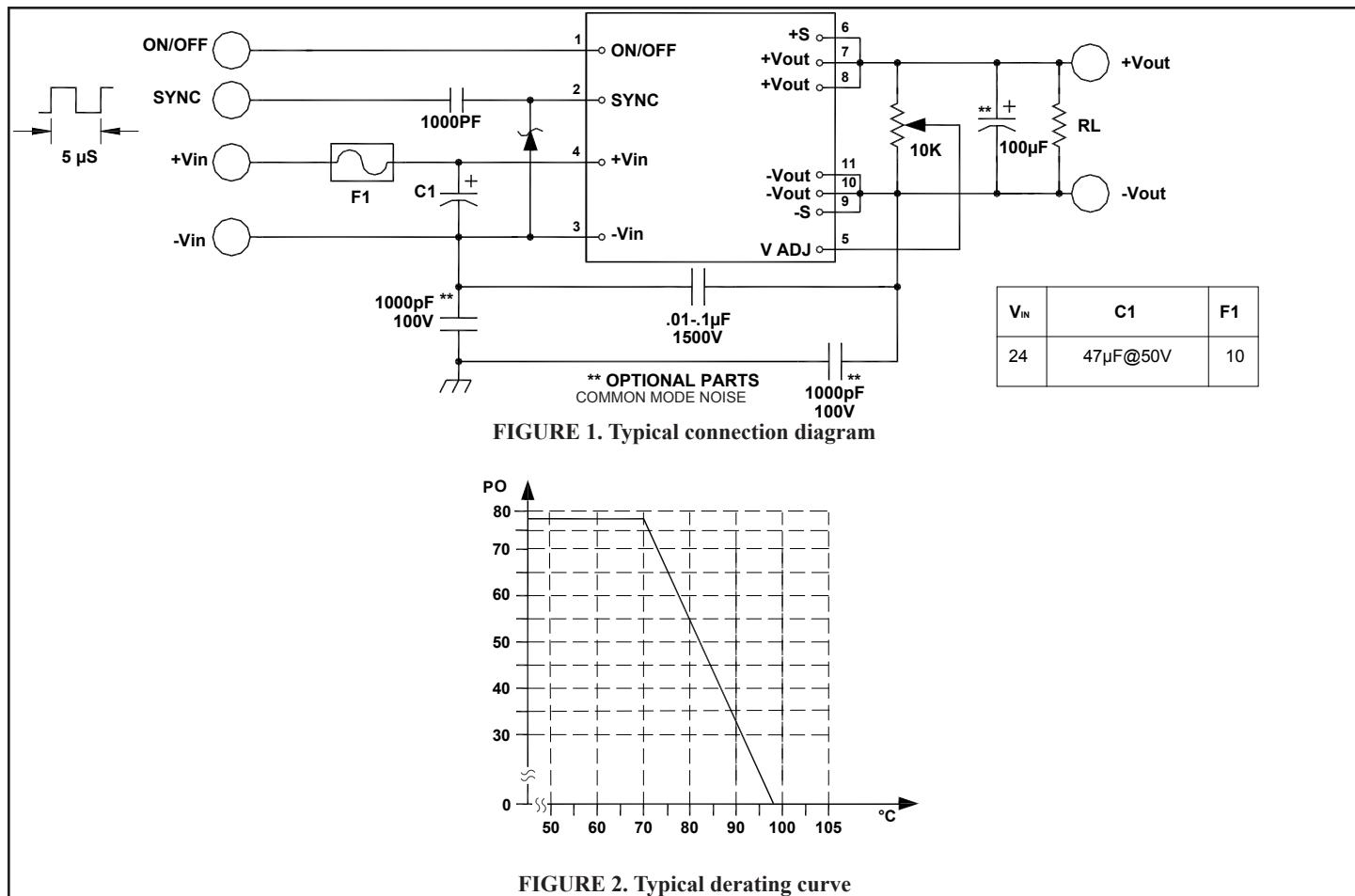
| PARAMETER                     | CONDITION / NOTE                | MIN | TYP             | MAX | UNIT |
|-------------------------------|---------------------------------|-----|-----------------|-----|------|
| Efficiency                    |                                 |     | 88              |     | %    |
| Isolation Voltage (1 min.)    |                                 |     | 1500            |     | Vdc  |
| Isolation Resistance          |                                 |     | 10 <sup>9</sup> |     | Ω    |
| Isolation Capacitance         |                                 |     | 80              |     | pF   |
| Switching Frequency           |                                 |     | 80              |     | kHz  |
| External Sync Frequency (F e) | F <sub>e</sub> > F <sub>c</sub> | 180 | 200             | 220 | kHZ  |

### ENVIRONMENTAL SPECIFICATIONS

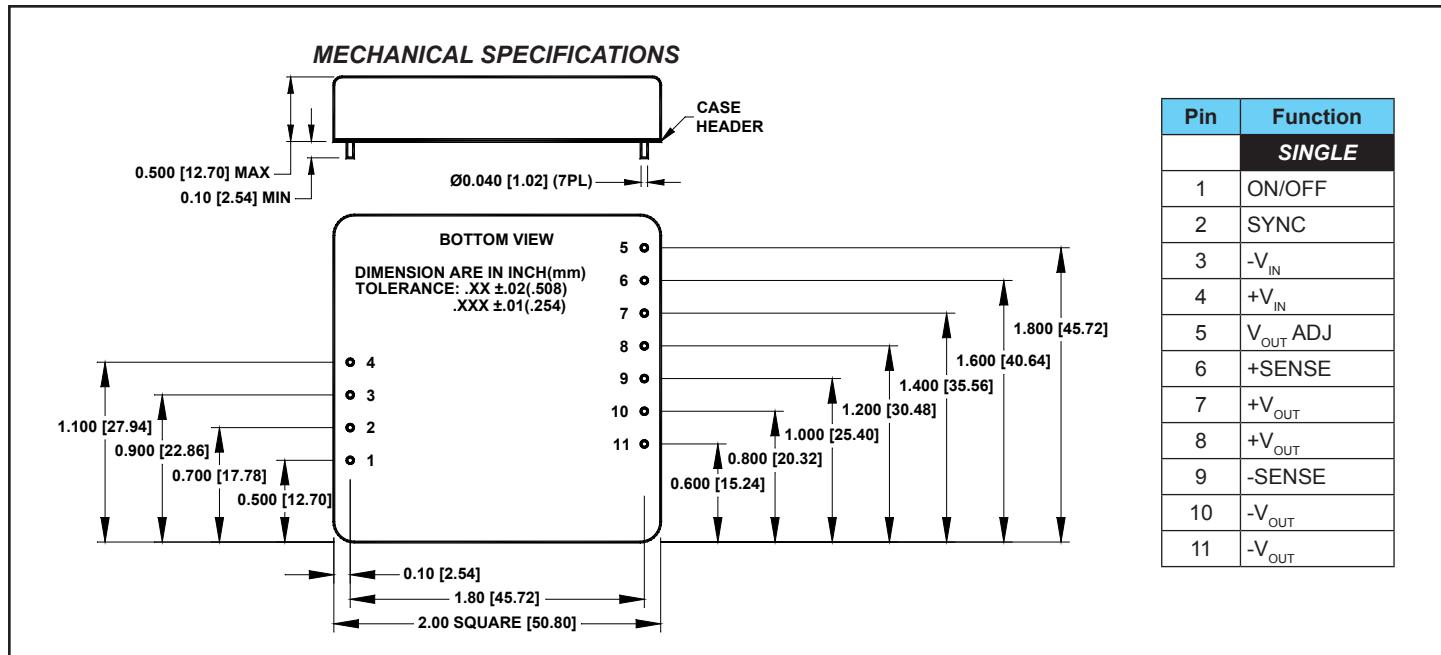
| PARAMETER                                   | CONDITION / NOTE                         | MIN | TYP | MAX  | UNIT                 |
|---|--|-----|-----|------|----------------------|
| Operating Temperature, Industrial (Ambient) | See Figure 2                             | -40 |     | +71  | °C                   |
| Storage Temperature Range                   |  | -55 |     | +125 | °C                   |
| Thermal Resistance                          |  |     | 3   |      | °C/W <sub>DISS</sub> |
| Maximum Operating Case Temperature          |  |     | 85  |      | °C                   |
| Thermal Turn Off, Case Temperature          |  | 80  | 90  | 100  | °C                   |
| Thermal Hysteresis                          |  |     | 10  |      | °C                   |
| Derating                                    | See Figure 2                             |     |     |      |                      |
| Humidity                                    | Up to 95% non-condensing                 |     |     |      |                      |
| Cooling                                     | Free-air convection                      |     |     |      |                      |
| EMI/RFI                                     | Six-sided continuous shielded metal case |     |     |      |                      |

## **PHYSICAL CHARACTERISTICS**

| Physical Characteristics |  |     |      |     |      |  |
|--------------------------|--|-----|------|-----|------|--|
| Parameter                | Condition / Note                         | Min | Type | Max | Unit |  |
| Dimensions (L×W×H)       | 2.00×2.00×0.50 in. (50.80×50.80×12.70mm) |     |      |     |      |  |
| Weight                   | 2.78 oz. (79g)                           |     |      |     |      |  |
| Case Material            | Coated metal                             |     |      |     |      |  |
| Shielding Connection     | -V <sub>IN</sub> (Pin 3)                 |     |      |     |      |  |



**FIGURE 2.** Typical derating curve



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## EXTERNAL SYNCHRONIZATION

The converter can be synchronized to an external clock by driving the SYNC pin (pin 2) directly. The driving signal frequency must be >200kHz. When the external clock with 50% duty cycle is AC-coupled to the SYNC pin of the converter through a 1000pF ceramic capacitor, connect a signal Schotky diode with the cathode

connected to the SYNC pin and the anode to  $-V_{IN}$  (See Figure 1). AC coupling reduces the power required for driving multiple converters and allows for continuous operation of the other synchronized converters in case the driving signal is missing or a short circuit develops at one of the sync inputs.

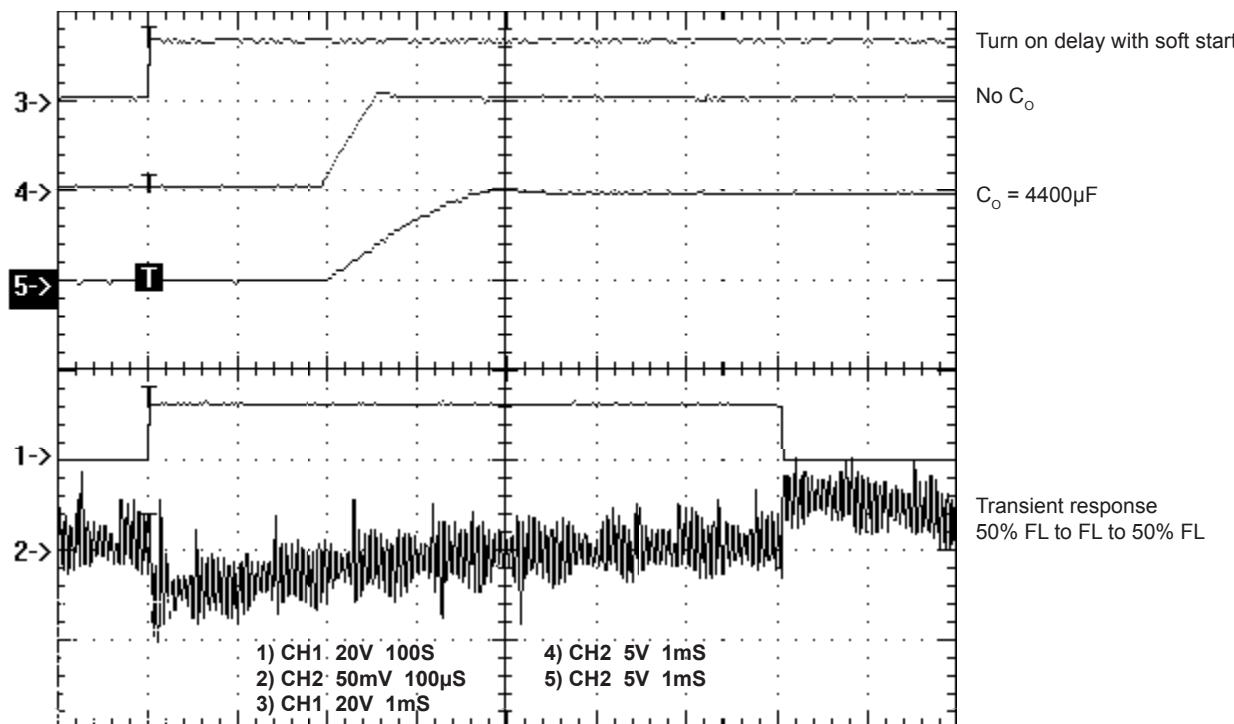


FIGURE 3. Turn on delay with soft start and transient response