

# 15 Watt XC Single Series DC/DC Converters

## Features

- Extra Wide 3:1 Input Voltage Range (9-27, 24-72)
- Low Noise, Highly Regulated Single Outputs
- No Derating to 80°C Case Temperature
- Six-Sided Shielded Low Thermal Gradient Copper Case
- 500 VDC Minimum Input to Output Isolation
- Overvoltage Protected Input and Outputs
- Pulse by Pulse Digital Current Limiting
- Direct Output Parallel for More Power
- 5 Year Warranty

## Description

These single output converters are designed for wide input range, low noise, telecommunications, medical, industrial and instrument applications. The extra wide input range (3:1) is ideal for battery or unregulated input applications.

These converters are state-of-the-art 70kHz MOSFET based designs that provide outstanding line and load regulation.

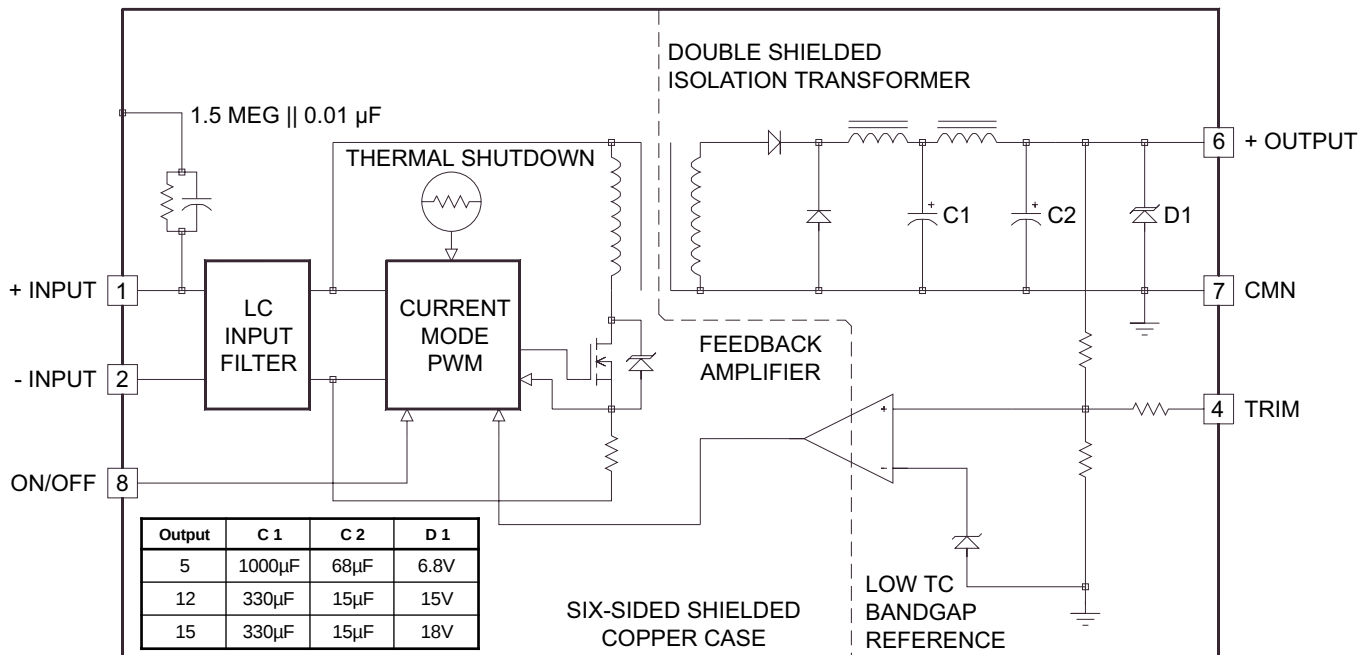
The single outputs are regulated with a high loop gain current mode control method that provides linear regulator type performance with a true, high efficiency switching DC/DC topology. The large amount of loop gain insures excellent input ripple rejection and line transient response.

A logic shutdown pin to control converter operation is included. The XC Single Series is protected from output shorts to common by a high speed, pulse by pulse digital, current limit circuit.

**Selection Chart**

| Model        | Input Range VDC |      | Output VDC | Output mA |
|--------------|-----------------|------|------------|-----------|
|              | MIN             | MAX  |            |           |
| 12S5.3000XC  | 9.0             | 27.0 | 5.0        | 3000      |
| 12S12.1250XC | 9.0             | 27.0 | 12.0       | 1250      |
| 12S15.1000XC | 9.0             | 27.0 | 15.0       | 1000      |
| 48S5.3000XC  | 24.0            | 72.0 | 5.0        | 3000      |
| 48S12.1250XC | 24.0            | 72.0 | 12.0       | 1250      |
| 48S15.1000XC | 24.0            | 72.0 | 15.0       | 1000      |

**15 Watt XC Single Series Block Diagram**



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| Input Parameters*                                |     |             |              |              |             |              |              |        |
|--------------------------------------------------|-----|-------------|--------------|--------------|-------------|--------------|--------------|--------|
| Model                                            |     | 12S5.3000XC | 12S12.1250XC | 12S15.1000XC | 48S5.3000XC | 48S12.1250XC | 48S15.1000XC | Units  |
| Voltage Range                                    | MIN | 9.0         |              |              | 24.0        |              |              | VDC    |
|                                                  | MAX | 27.0        |              |              | 72.0        |              |              |        |
| Reflected Ripple,<br>0-20MHz bw                  | TYP | 100         |              |              | 50          |              |              | mA P-P |
|                                                  | MAX | 200         |              |              | 100         |              |              |        |
| Input Current Full Load<br>No Load               | TYP | 1600        | 1540         | 1520         | 395         | 390          | 380          | mA     |
|                                                  | TYP | 20          | 30           | 30           | 15          | 20           | 20           |        |
| Efficiency                                       | TYP | 789         | 81           | 82           | 79          | 80           | 82           | %      |
| Switching Frequency                              | TYP | 70          |              |              |             |              |              | kHz    |
| Maximum Input<br>Overvoltage,<br>100ms No Damage | MAX | 32          |              |              | 85          |              |              | VDC    |
| Undervoltage Lockout                             |     | 8.5         |              |              | 17          |              |              | VDC    |
| Turn-on Time,<br>1% Output Error                 | TYP | 15          |              |              |             |              |              | ms     |
| Recommended Fuse                                 |     | (2)         |              |              |             |              |              |        |

| Output Parameters*                                    |     |                                                                 |                              |                              |         |
|-------------------------------------------------------|-----|-----------------------------------------------------------------|------------------------------|------------------------------|---------|
| Model                                                 |     | 12S5.3000XC<br>48S5.3000XC                                      | 12S12.1250XC<br>48S12.1250XC | 12S15.1000XC<br>48S15.1000XC | Units   |
| Output Voltage                                        |     | 5                                                               | 12                           | 15                           | VDC     |
| Rated Current (3)                                     | MIN | 0                                                               | 0                            | 0                            | mA      |
|                                                       | MAX | 3000                                                            | 1250                         | 1000                         |         |
| Voltage Range<br>100% Load                            | MIN | 4.95                                                            | 11.90                        | 14.90                        | VDC     |
|                                                       | TYP | 5.00                                                            | 12.00                        | 15.00                        |         |
|                                                       | MAX | 5.05                                                            | 12.10                        | 15.10                        |         |
| Load Regulation 0-100% Load                           | TYP | 0.1                                                             |                              |                              | %       |
|                                                       | MAX | 0.5                                                             |                              |                              |         |
| Line Regulation<br>Vin = Min-Max VDC                  | TYP | 0.05                                                            |                              |                              | %       |
|                                                       | MAX | 0.2                                                             |                              |                              |         |
| Short Term Stability (4)                              | TYP | 0.02                                                            |                              |                              | %       |
| Long Term Stability                                   | TYP | 0.2                                                             |                              |                              | %/kHrs  |
| Transient Response (5)                                | TYP | 30                                                              | 40                           | 40                           | μs      |
| Dynamic Response (6)                                  | TYP | 130                                                             | 250                          | 175                          | mV peak |
| Input Ripple Rejection (7)                            | TYP | 60                                                              |                              |                              | dB      |
| Noise, 0-20MHz bw                                     | TYP | 20                                                              |                              |                              | mV P-P  |
|                                                       | MAX | 50                                                              |                              |                              |         |
| Temperature Coefficient                               | TYP | 50                                                              |                              |                              | ppm/°C  |
|                                                       | MAX | 150                                                             |                              |                              |         |
| Overvoltage Clamp (8)                                 | TYP | 6.8                                                             | 15                           | 18                           | VDC     |
| Short Circuit Protection to<br>Common for all Outputs |     | Continuous, 8 Hours Minimum Current Limnit and Thermal Overload |                              |                              |         |

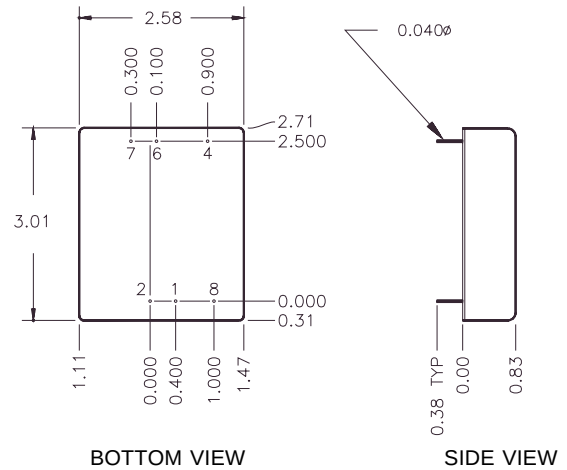
## NOTES

- \* **All Parameters measured at Tc=25°C, nominal input voltage and full rated load unless otherwise noted. Refer to the CALEX Application Notes for the definition of terms, measurement circuits and other information.**
- (2) Determine the correct fuse size by calculating the maximum DC current drain at low line input, maximum load then adding 20 to 25 percent. Slow blow type recommended.
- (3) No minimum load required.
- (4) Short term stability is specified after a 30 minute warm-up at full load, and with constant line, load and ambient conditions.
- (5) The transient response is specified as the time required to settle from 50 to 75% step load change (rise time of step = 2μSec.) to a 1% error band.
- (6) Dynamic response is the peak overshoot voltage during the transient response time defined in note 5 above.
- (7) The input ripple rejection is specified for DC to 120Hz ripple with a modulation amplitude of 1% Vin.
- (8) For module protection only, also see note 2.
- (9) The logic shutdown pin is Open Collector TTL, CMOS, and relay compatible. The input to this pin is referenced to input minus and is protected to +100VDC.
- (10) The functional temperature range is intended to give an additional data point for use in evaluating this power supply. At the low functional temperature the power supply will function with no side effects, however, sustained operation at the high functional temperature will reduce expected operational life. The data sheet specifications are not guaranteed over the functional temperature range.
- (11) The case thermal impedance is specified as the case temperature rise over ambient per package watt dissipated.



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| General Specifications*                      |     |     |         |
|----------------------------------------------|-----|-----|---------|
| All Models                                   |     |     | Units   |
| Logic Shutdown (9)                           |     |     |         |
| ON Logic Level<br>or Leave Pin open          | MIN | 5.5 | VDC     |
| OFF Logic Level                              | MAX | 1.5 | VDC     |
| Input Resistance                             | TYP | 10  | kohms   |
| Converter Idle Current,<br>Shut Down Pin Low | TYP | 3   | mA      |
| Isolation                                    |     |     |         |
| Isolation Voltage                            | MIN | 500 | VDC     |
| Input-Output                                 | MIN | 250 |         |
| Input-Case                                   |     |     |         |
| 10µA Leakage                                 |     |     |         |
| Input to Output<br>Capacitance               | TYP | 160 | pF      |
| Output Trim Function                         |     |     |         |
| Input Resistance                             | TYP | 15  | kohms   |
| Programming Range                            | MIN | ±10 | %       |
| Environmental                                |     |     |         |
| Case Operating Range                         | MIN | -25 | °C      |
| No Derating                                  | MAX | 80  |         |
| Case Functional Range (10)                   | MIN | -40 | °C      |
|                                              | MAX | 90  |         |
| Storage Range                                | MIN | -55 | °C      |
|                                              | MAX | 100 |         |
| Thermal Impedance (11)                       | TYP | 4.4 | °C/Watt |
| Thermal Shutdown                             | TYP | 90  | °C      |
| Case Temperature                             |     |     |         |
| General                                      |     |     |         |
| Unit Weight                                  | TYP | 7.0 | oz      |
| Mounting Kit                                 |     | MS9 |         |



Mechanical tolerances unless otherwise noted:

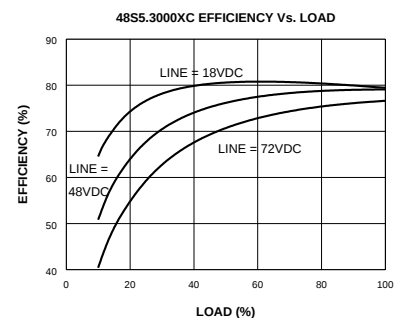
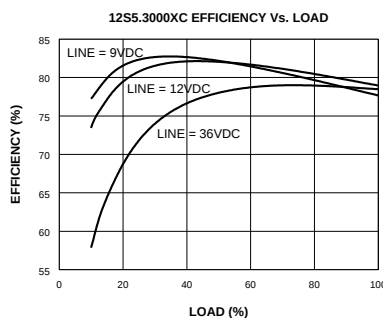
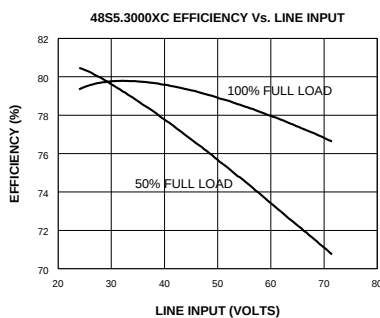
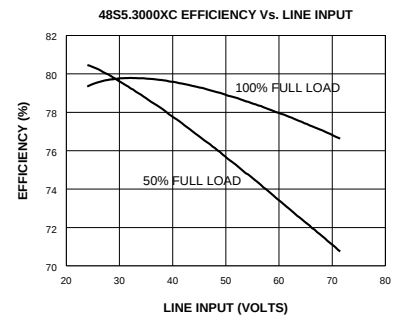
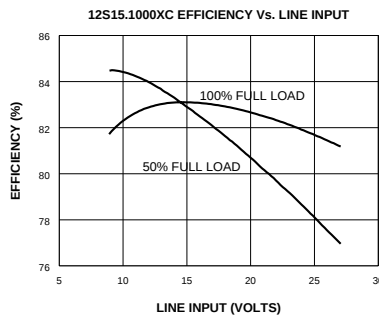
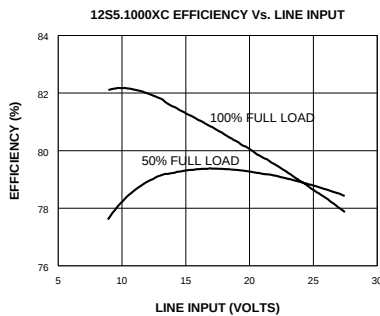
X.XX dimensions:  $\pm 0.020$  inches

X.XXX dimensions:  $\pm 0.005$  inches

Seal around terminals is not hermetic. Do not immerse units in any liquid.

| Pin | Function    |
|-----|-------------|
| 1   | +INPUT      |
| 2   | -INPUT      |
| 4   | OUTPUT TRIM |
| 6   | +OUTPUT     |
| 7   | CMN         |
| 8   | ON/OFF      |

Typical Performance ( $T_c=25^{\circ}$ C,  $V_{in}=\text{Nom VDC}$ , Rated Load).



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