

# 10 Watt Single Output DC/DC Converters

3355 Vincent Road, Pleasant Hill, CA 94523-4389 800-542-3355 Telephone (415)932-3911 FAX: (415)932-6017



## FEATURES

T-57-11

- Extra Wide 3:1 Input Voltage Range, 20-60 VDC
- Low Noise, Highly Regulated Single Outputs
- Efficiency 75% for All Line Conditions
- 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
- Overtemperature Protection Circuit
- 5 Year Warranty

## SELECTION CHART

MODEL	INPUT RANGE VDC		OUTPUTS VDC	OUTPUTS mA	CASE
	MIN	MAX			
48S5.2000TC	20	60	5.0	2000	J
48S12.850TC	20	60	12.0	850	J
48S15.700TC	20	60	15.0	700	J

## DESCRIPTION

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

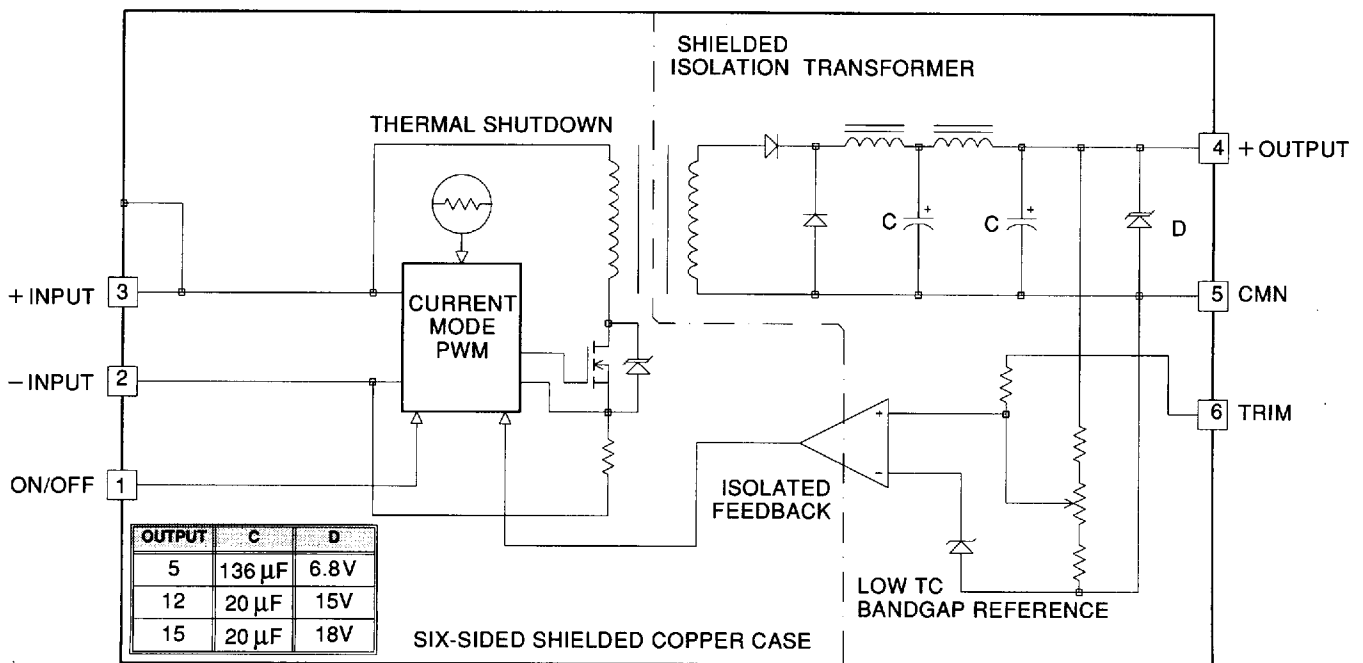
These converters are state-of-the-art 120kHz MOSFET based designs that provide outstanding line and load regulation.

The single outputs are regulated with a high loop gain current mode control method that provides linear regulator type performance.

Also included is an open collector TTL/CMOS compatible logic shutdown pin to control converter operation.

The TC Single Series is protected from output shorts to common by a high speed, pulse by pulse digital, current limit circuit and a thermal overload sensing circuit.

TC SINGLE SERIES BLOCK DIAGRAM



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INPUT PARAMETERS(1)						
MODEL		48S5.2000TC	48S12.850TC	48S15.700TC	UNITS	
Voltage Range	MIN		20.0	T-57-11	VDC	
	TYP		48.0			
	MAX		60.0			
Reflected Ripple (2) (3), 0-20MHz BW	TYP		700		mA RMS	
Input Current	Full Load	TYP	265	265	273	mA
	No Load	TYP	10	10	10	
Efficiency	TYP	78	80	80	%	
Switching Frequency	TYP		120		kHz	
Maximum Input Over Voltage, 100mS No Damage	MAX		75		VDC	
Turn-on Time	TYP		10		mSec	
Recommended Fusing			(4)			

OUTPUT PARAMETERS(1)					
MODEL		48S5.2000TC	48S12.850TC	48S15.700TC	UNITS
Output Voltage		5	12	15	VDC
Rated Load (5)	MIN	0	0	0	mA
	MAX	2000	850	700	
Voltage Range 100% Load	MIN	4.950	11.900	14.900	VDC
	TYP	5.000	12.000	15.000	
	MAX	5.050	12.100	15.100	
Load Regulation 0-100% Full Load	TYP	0.1	0.05	0.04	%
	MAX	0.3	0.1	0.1	
Line Regulation Vin = Min-Max VDC	TYP	0.01	0.01	0.01	%
	MAX	0.15	0.1	0.1	
Short Term Stability (6)	TYP	0.02	0.02	0.02	%
Long Term Stability	TYP	0.2	0.2	0.2	%/kHrs
Transient Response (7)	TYP	50	100	150	μSec
Dynamic Response (8)	TYP	55	100	110	mV peak
Input Ripple Rejection (9)	TYP	60	60	60	dB
Noise, 0-20MHz BW	TYP	35	20	20	mV p-p
	MAX	75	50	50	
Temperature Coefficient	TYP	50	50	50	ppm/°C
	MAX	150	150	150	
Overvoltage Clamp (10)	TYP	6.8	15	18	VDC
Short Circuit Protection to Common for all Outputs		Continuous, 8 Hours Minimum Current Limit and Thermal Overload			

## NOTES:

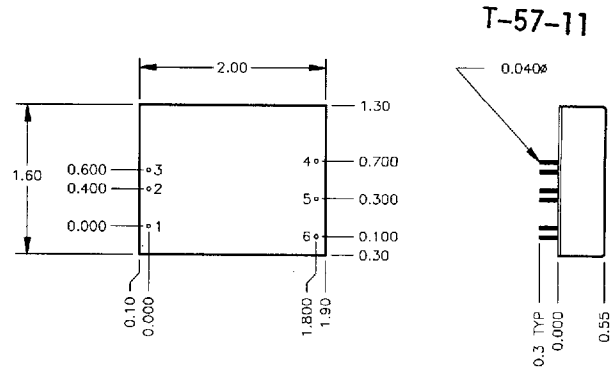
- All parameters measured at 25 °C, nominal input voltage and full rated load unless otherwise noted. Refer to the CALEX Application Notes for the definition of terms, measurement circuits and other information.
- Noise is measured per CALEX Application Notes.
- An external capacitor capable of withstanding at least 700mA RMS of 120kHz ripple current must be connected directly across the + and - inputs. Suggested capacitors are:  
Sprague Electric: 672D68H100DM3C, 68 μF, 100V  
672d127H100ET3C, 120 μF, 100V  
Panasonic: ECEA2AFE101, 100 μF, 100V  
ECEA2AFE121, 120 μF, 100V  
United Chemi-con: SXE100VB120M12.5X25LL, 120 μF, 100V  
SXE100VB180M12.5X30LL, 180 μF, 100V  
SXE100VB220M12.5X35LL, 220 μF, 100V  
Note: All of the above capacitors are 105 °C rated. Multiple smaller sized capacitors may be used in parallel as long as their total 700mA RMS (see IRR curve)
- 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.
- No minimum load required.
- Short term stability is specified after a 30 minute warm-up at full load, and with constant line, load and ambient conditions.
- The transient response is specified as the time required to settle from 50 to 75% step load change (rise time of step = 2 μSec.) to a 50 mV error band.
- Dynamic response is the peak overshoot voltage during the transient response time defined in note 7 above.
- The input ripple rejection is specified for DC to 120Hz ripple with a modulation amplitude of 1% Vin.
- For module protection only, see also note 4.
- The logic shutdown pin is Open Collector TTL, CMOS, and relay compatible. The input to this pin is referenced to Pin 2, -Input and is protected to +100 VDC.
- Case is tied to Pin 3, +Input.
- 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.
- The case thermal impedance is specified as the case temperature rise over ambient per package watt dissipated.

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GENERAL SPECIFICATIONS			
MODEL		ALL MODELS	UNITS
<b>LOGIC SHUTDOWN (11)</b>			
On Logic Level or leave pin open	MIN	8.0	VDC
OFF Logic Level	MAX	2.0	VDC
Input Resistance	TYP	100	kOhms
Converter Idle Current, Shut Down Pin Low	TYP	1	mA
<b>ISOLATION</b>			
Isolation Voltage (12) 10mA Leakage Input-Output	MIN	500	VDC
Input to Output Capacitance	TYP	70	pF
<b>OUTPUT TRIM FUNCTION</b>			
Input Resistance	TYP	20	kOhms
Programming Range	MIN	±10	%
<b>ENVIRONMENTAL</b>			
Case Operating Range, No Derating	MIN MAX	-25 80	°C
Case Functional Range (13)	MIN MAX	-40 90	°C
Storage Range	MIN MAX	-55 105	°C
Thermal Impedance (14)	TYP	11	°C/Watt
Thermal Shutdown Case Temperature	TYP	90	°C
Unit Weight	TYP	1.9	oz
Case		J	



BOTTOM VIEW

SIDE VIEW

Mechanical tolerances unless otherwise noted:

X.XX dimensions: ± 0.020 inches

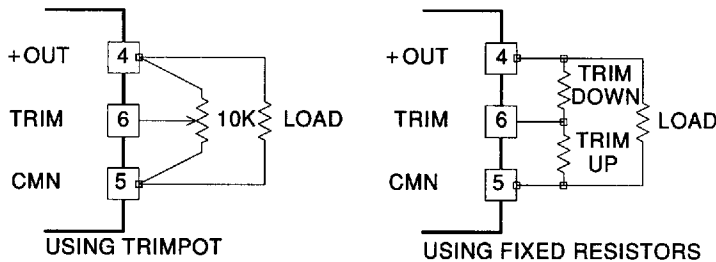
X.XXX dimensions: ± 0.005 inches

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

PIN	FUNCTION
1	ON/OFF
2	-INPUT
3	+INPUT
4	+OUTPUT
5	CMN
6	TRIM

### CONNECTIONS FOR OUTPUT TRIM

Use one resistor for either trim up or trim down. The values can range from infinity to zero ohms with zero ohms giving the most trim.



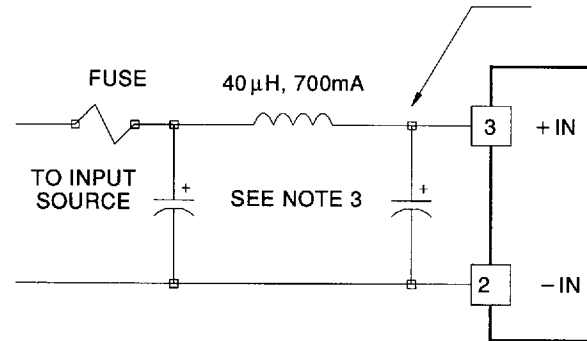
### LOW NOISE INPUT CIRCUIT

The circuit shown below will reduce reflected ripple to 50mA p-p. Keep all components as close to the converter as possible.

The inductor is 35 turns on a Micro-Metals T50-26 Iron Powder Core.

See note 3 for capacitor recommendations and note 4 for fuse sizing.

THIS CAPACITOR IS REQUIRED FOR PROPER OPERATION



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Typical Performance ( $T_c=25^\circ\text{C}$ ;  $V_{in}=48\text{VDC}$ , Full Rated Load).

T-57-11

