

75 Watt HE Triple Series DC/DC Converters



Description

The Standard Triple HE DC/DC converter provides three regulated low voltage DC outputs at high efficiency and low cost. The unit has feedback from the +5Vdc or +23Vdc output. The auxiliary outputs are cross regulated to the main feedback loop (reference the block diagram). The Standard Triple HE meets rigorous requirements in an industry standard case size and is well suited for most telecommunication applications.

The Standard Triple HE includes primary remote on/off control plus threaded-through holes to allow easy mounting or the addition of a heat sink for high temperature use.

Features

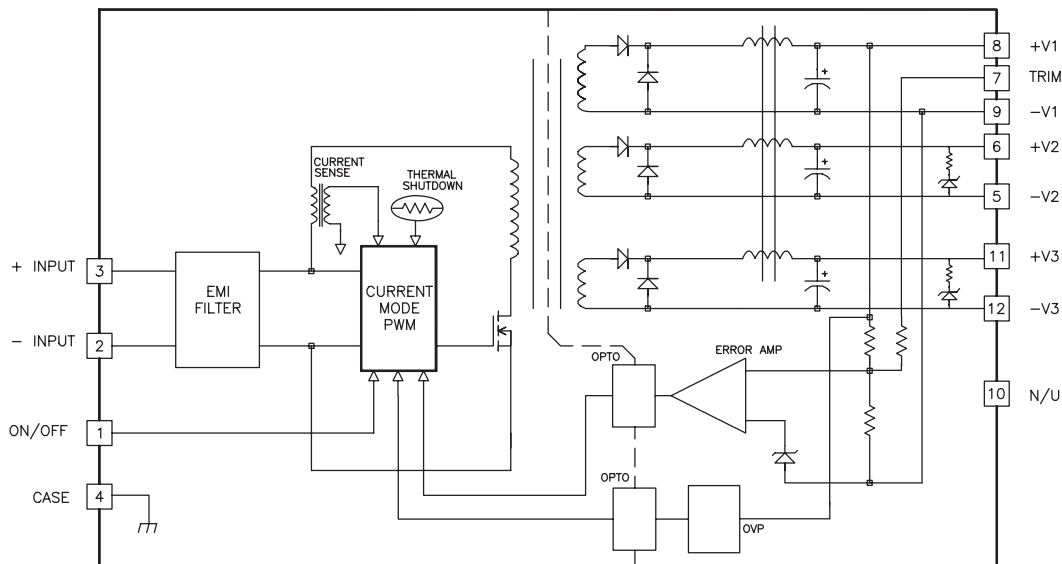
- Small size, 2.4"x2.28"x0.53" half-brick package
- Excellent thermal performance with metal baseplate
- High Efficiency
- Volt-seconds clamp and fast over voltage protection
- Pulse-by-pulse current limiting, short circuit frequency foldback
- Over-temperature protection
- Auto-softstart
- Low noise
- Constant frequency for normal operation.
- 2:1 input voltage range
- Positive logic primary remote ON/OFF
- Negative logic primary shutdown as an option
- Very low temperature coefficient
- Water Washable
- Trimmable output voltage
- Low cost
- 5 Year Warranty

Selection Chart

Model	Input Range VDC		I in ADC @ nom	V out VDC	I out ADC
	Min	Max	Typ		
24T3.12HE	18	36	3.81	3.3, ± 12	20, ± 2.0
24T3.15HE	18	36	3.76	3.3, ± 15	20, ± 2.0
24T5.12HE	18	36	3.63	5, ± 12	15, ± 2.0
24T5.15HE	18	36	3.60	5, ± 15	15, ± 2.0
48T3.12HE	36	75	1.88	3.3, ± 12	20, ± 2.0
48T3.15HE	36	75	1.86	3.3, ± 15	20, ± 2.0
48T5.12HE	36	75	1.80	5, ± 12	15, ± 2.0
48T5.15HE	36	75	1.79	5, ± 15	15, ± 2.0
48T5.17HE	36	75	1.78	5, ± 17	15, ± 2.0

The output currents are the maximum ratings of each of the outputs. It is up to the user to ensure that the total power output is below 75 Watts.

74 Watt HE Triple Series Block Diagram



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Unless otherwise stated, these specifications apply for ambient temperature $T_A=23 \pm 2^\circ\text{C}$, nominal input voltage, and rated full load. (1)

Input Parameters						
Model		24T3.12HE	24T3.15HE	24T5.12HE	24T5.15HE	Units
Voltage Range	MIN	18				VDC
	TYP	24				
	MAX	36				
Input Overvoltage 100 mSec	MAX	50				VDC
Input Ripple Rejection (120Hz)	TYP	50				dB
Undervoltage Lockout		Yes				
Input Reverse Voltage Protection		Yes				
Input Current No Load 100% Load	TYP	12				mA
	TYP	3.6				A
Inrush Current	MAX	0.5				A ² S
Reflected Ripple, 12μH Source Impedance (3)	TYP	20				mA P-P
Efficiency	TYP	82	83	86	87	%
Switching Frequency	TYP	325				kHz
Recommended Fuse		(2)				AMPS

Input Parameters							
Model		48T3.12HE	48T3.15HE	48T5.12HE	48T5.15HE	48T5.17HE	Units
Voltage Range	MIN TYP MAX	36 48 75					VDC
Input Overvoltage 100 mSec	MAX	85					VDC
Input Ripple Rejection (120Hz)	TYP	50					dB
Undervoltage Lockout		Yes					
Input Reverse Voltage Protection		Yes					
Input Current No Load 100% Load	TYP TYP	12 1.8					mA A
Inrush Current	MAX	0.5					A²S
Reflected Ripple, 12µH Source Impedance (3)	TYP	20					mA P-P
Efficiency	TYP	83	84	87	88	88	%
Switching Frequency	TYP	325					kHz
Recommended Fuse		(2)					AMPS

NOTES:

- Refer to the CALEX Application Notes for the definition of terms, measurement circuits, and other information.
- These units are not fused and need to be fused by the user. Refer to the CALEX Application Notes for information on fusing. For inrush current, refer to the specifications above.
- 33 μ F capacitor connected to two "Input" pins. Then place current sensor in series with 12 μ H inductor between 33 μ F and the source. The reflected ripple current is measured over 5 Hz to 20 MHz bandwidth. Noise should be minimized in the measurement.
- Noise is measured per the CALEX Application Notes. Output noise is measured with a 10 μ F tantalum capacitor in parallel with a 0.1 μ F ceramic capacitor connected across the output to CMN. Measurement bandwidth is 0-20 MHz.
- Optimum performance is obtained when this power supply is operated within the minimum to maximum load specifications. No damage to module will occur, when the output is operated at less than minimum load, but the output voltage may contain a low frequency component that may exceed output noise specifications. Total output power should not exceed 75W.
- Load Transient Recovery Time is defined as the time for the output to settle from a 50 to 75% or 25% step load change to a 1% error band of output voltage(rise time of step = 2 μ Sec).
- Load Transient Overshoot is defined as the peak overshoot during a transient as defined in the Note 6 above.
- Load regulation is defined as the output voltage change when changing load current from maximum to minimum. The voltage is measured at the output pin.
- Cross regulation is defined as the change in one output (set at 70% of maximum load) when only one of the other outputs is changed from 70% of maximum to 20% of maximum load.
- Most switches would be suitable for logic On/Off control, in case there is a problem, you can make following estimation and then leave some margin.
When open collector is used for logic high, "Open Circuit Voltage at On/Off Pin", "Output Resistance" and "External Leakage Current Allowed for Logic High" are used to estimate the high impedance requirement of open collector.
When switch is used for logic low, "Open Circuit Voltage at On/Off Pin", "Output Resistance" and "LOW Logic Level" are used to estimate the low impedance requirement of switch.

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Output Parameters (VO1)						
Model		24T3.12HE 24T3.15HE	48T3.12HE 48T3.15HE	24T5.12HE 24T5.15HE	48T5.12HE 48T5.15HE 48T5.17HE	Units
Output Voltage		3.3		5		VDC
Output Voltage Setpoint Accuracy	MAX	±1				%
Turn On Overshoot	TYP	0				%
Temperature Coefficient	TYP	0.003				% / °C
	MAX	0.01				
Noise & Ripple RMS (4)	TYP	66		100		mV P-P
	TYP	33		50		
Load Current (5) (12)	MIN	2		1.5		A
	MAX	20		15		
Load Transient Overshoot (7)	TYP	4				%
Load Transient Recovery Time(6)	TYP	200				µSec
Load Regulation (8) Min-Max Load	TYP	0.05				%
	MAX	0.4				
Line Regulation Vin = Min-Max	TYP	0.01				%
	MAX	0.1				
Overvoltage Protection (OVP) Threshold OVP Type - Non-latching Open Loop Overvoltage Clamp	TYP	130				%
Output Current Limit V out=90% of V out-nom	TYP	120				%
Output Short Circuit Current V out = 0.25 V	MAX	175				%

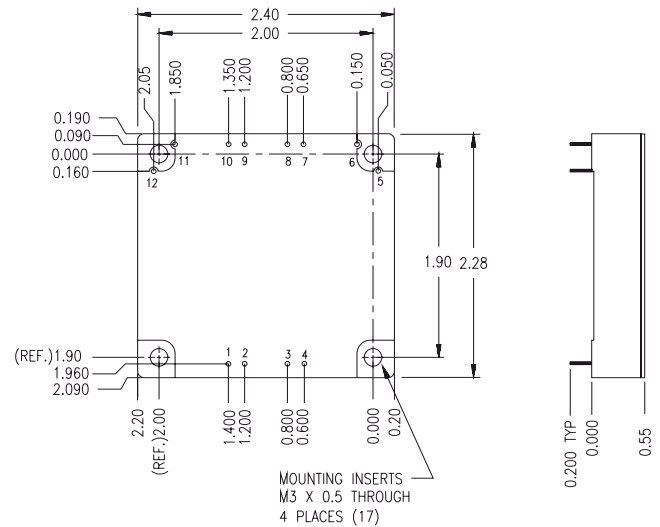
Output Parameters (VO2, VO3)							
Model		24T3.12HE 24T5.12HE	48T3.12HE 48T5.12HE	24T3.15HE 24T5.15HE	48T3.15HE 48T5.15HE	48T5.17HE	Units
Output Voltage		±12		±15		±17	VDC
Output Voltage Setpoint Accuracy	MAX	±2.5					%
Turn On Overshoot	TYP	0					%
Temperature Coefficient	TYP MAX	0.02 0.05					%/°C
Noise & Ripple RMS (4)	TYP TYP	150 100	150 100	200 150	200 150	200 150	mV P-P
Load Current (5) (12)	MIN MAX	0.2 2					A
Load Transient Overshoot (7)	TYP	4					%
Load Regulation (8)	TYP	2					%
Min-Max Load	MAX	4					%
Line Regulation	TYP	0.5					%
Vin = Min-Max	MAX	1					%
Cross Regulation (9)	TYP	4					%
Absolute Regulation	TYP	8					%
Output Voltage Protection Open Loop Overvoltage Clamp		Yes (Volt-Seconds Clamp)					

- (11) Thermal impedance is tested with the converter mounted vertically and facing another printed circuit board 1/2 inch away. If converter is mounted horizontally with no obstructions, thermal impedance is approximately 7°C/W .
- (12) Minimum load is defined as 10% of maximum load. Calex Mfg. Co. Inc. does not guarantee performance for loads less than the minimum. Loads less than the minimum shall not damage the unit.
- (13) The unit can be configured with negative logic for Remote ON/OFF.
- (14) When an external On/Off switch is used, such as open collector switch, logic high requires the switch to be high-impedance. Switch leakage currents greater than 10 μA may be sufficient to trigger the ON/Off to the logic-low state.

- (15) When using the trim function, the user should remember that all three voltages will go up or down at the same time.
- (16) Water Washability - Calex DC/DC converters are designed to withstand most solder/wash processes. Careful attention should be used when assessing the applicability in your specific manufacturing process. Converters are not hermetically sealed.
- (17) Torque fasteners into threaded mounting inserts at 12 in. oz. or less. Greater torque may result in damage to unit and void the warranty.

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General Specifications			
All Models			Units
Primary Remote ON/OFF Function			
HIGH Logic Level for ON	MAX	3.0	VDC
External Leakage Current Allowed for Logic High (14)	MAX	10	µA
Input Diode Protection Voltage	MAX	50	VDC
LOW Logic Level or Tie ON/OFF Pin to -Input	TYP	1.0	VDC
Sinking Current for Primary Logic Level	MAX	500	µA
Open Circuit Voltage at Primary On/Off Pin (10)			
Positive Logic	TYP	2.3	VDC
Negative Logic	TYP	1.5	VDC
Output Resistance (10)	TYP	3	k Ohm
Idle Current (Module is OFF)	TYP	2	mADC
Turn-on Time to 1% error	TYP	20	mSec
Remote ON/OFF Logic (13)	HIGH - Module ON LOW - Module OFF		
Output Voltage Trim			
Trim Range	MIN MAX	±10	% of Vout
Input Resistance	TYP	10	k Ohm
Open Circuit Voltage	TYP	2.5	V
Trim Limit			
Maximum Output Voltage	MAX	110	% of Vout
Isolation			
Input to Output Isolation			
10µA Leakage			
Vnom = 24V	MAX	700	VDC
Vnom = 48V	MAX	1544	VDC
Input to Output Resistance	MIN	10	Mohm
Input to Output Capacitance	TYP	1800	PF
Environmental			
Calculated MTBF, Bellcore Method 1, Case 1		>1,000,000	Hr
Baseplate Operating Temperature Range	MIN MAX	-40 100	°C
Storage Temperature	MIN MAX	-40 120	°C
Thermal Impedance (11)	TYP	7	°C/W
Thermal Shutdown Baseplate Temperature (Auto Restart)	TYP	110	°C
General			
Unit Weight	TYP	4/114	oz/g
Chassis Mounting Kit	MS25		
Case Dimension	2.4" x 2.28" x 0.53"		
Agency Approvals	UL60950 pending		
Torque on Mounting Inserts	MAX	12 in. oz.	



Mechanical tolerances unless otherwise noted:

X.XX dimensions: ±0.020 inches

X.XXX dimensions: ±0.005 inches

Pin	Function	Pin	Function
1	Primary ON/OFF	7	TRIM
2	- V IN	8	+ V1
3	+ V IN	9	- V1
4	Case	10	N/U
5	- V2	11	+ V3
6	+ V2	12	- V3