

5 to 7.5 Watt FW Single Series DC/DC Converters

Features

- Low noise outputs, 70 mV P-P maximum
- Very low reflected ripple, 50 mA P-P maximum
- Excellent regulation from no load to full load 0.2% maximum
- Excellent line regulation, 0.1% maximum
- Efficiencies to 82%
- Six-sided shielded low thermal gradient copper case
- Five Year Warranty

Description

The low voltage FW single output converters are designed for ultra wide input range, low noise industrial and instrument applications requiring low input operating voltages. The wide input range (3:1) is ideal for battery or unregulated input applications.

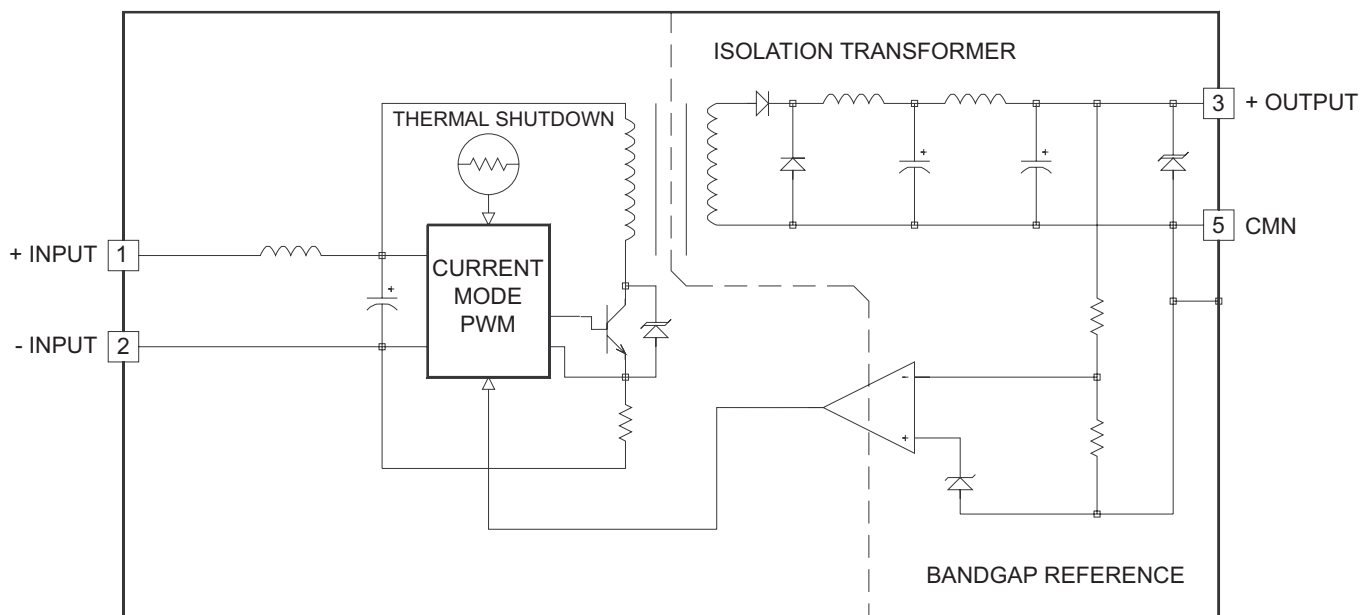
These converters are state-of-the-art 100 kHz designs that provide outstanding line and load regulation with efficiencies approaching 82%.

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 also insures excellent input ripple rejection and line transient response.

All converters in this series are protected from output short circuit, thermal overload and overvoltage transients on the input and output.

Selection Chart				
Model	Input Range VDC		Output VDC	Output mA
	MIN	MAX		
12S5.1500FW	9	27	5	1500
12S12.625FW	9	27	12	625
12S15.500FW	9	27	15	500

7.5 Watt FW Single Series Block Diagram



5 to 7.5 Watt FW Single Series DC/DC Converters

Input Parameters*					
Model		12S5.1500FW	12S12.625FW	12S15.500FW	Units
Voltage Range	MIN	9.0			VDC
	MAX	27.0			
Reflected Ripple (2)	TYP	25	23	22	mA P-P
	MAX	50	50	50	
Input Current Full Load	TYP	815	775	765	mA
	No Load	12	14	16	
Efficiency	TYP	77	81	82	%
Switching Frequency	TYP	100			kHz
Maximum Input Overvoltage 100ms No Damage	MAX	48			VDC
Turn-on Time, 1% Output Error	TYP	10			ms
Recommended Fuse		(3)			AMPS

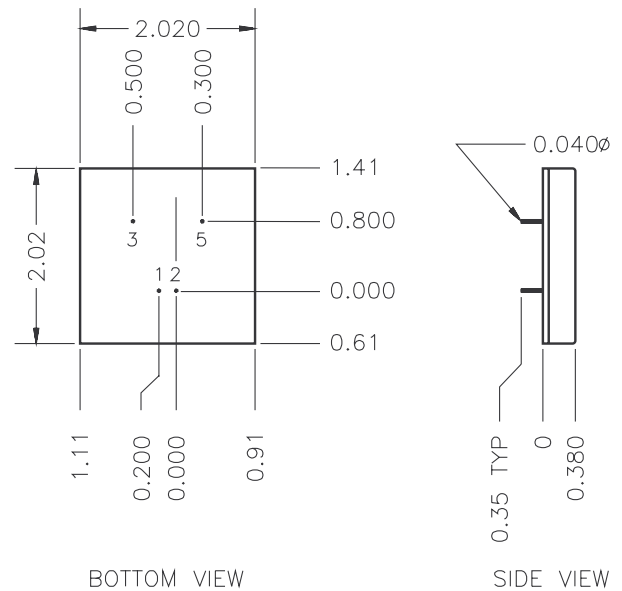
Output Parameters*					
Model		12S5.1500FW	12S12.625FW	12S15.500FW	Units
Output Voltage		5	12	15	VDC
Rated Current	MIN	0.0	0.0	0.0	mA
	MAX	1500	625	500	
Voltage Range	MIN	4.950	11.900	14.900	VDC
	TYP	5.000	12.000	15.000	
	MAX	5.050	12.100	15.100	
Load Regulation 0-100% Full Load	TYP	0.08	0.02	0.02	%
	MAX	0.2	0.1	0.1	
Line Regulation Vin = Min-Max VDC	TYP	0.02	0.01	0.01	%
	MAX	0.1	0.1	0.1	
Short Term Stability (5)	TYP	0.05	0.02	0.02	%/24Hrs
Long Term Stability	TYP	<0.2			%/kHrs
Transient Response (6)	TYP	200	300	200	μs
Dynamic Response (7)	TYP	200	270	210	mV peak
Input Ripple Rejection (8)	TYP	37	25	25	dB
Noise, 0-20MHz bw (2)	TYP	35			mV P-P
	MAX	70			
Temperature Coefficient	TYP	50			ppm/°C
	MAX	150			
Overvoltage Clamp (9)	TYP	6.8	15	18	VDC
Short Circuit Protection to Common for all Outputs		Provides minimum of 8 hours continous protection with current limiting and thermal overload techniques			

NOTES:

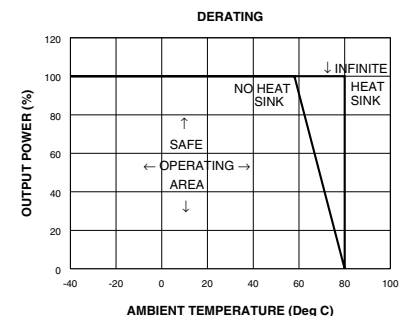
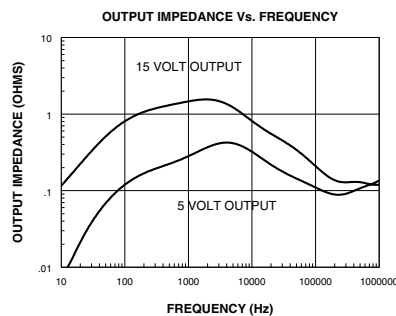
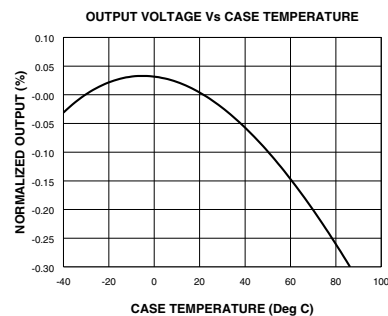
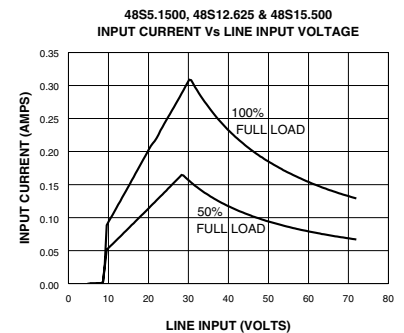
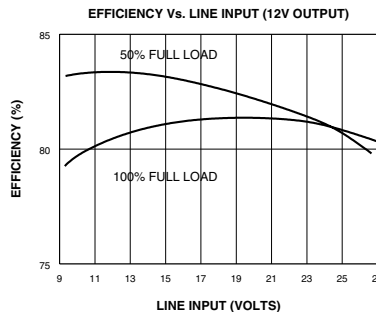
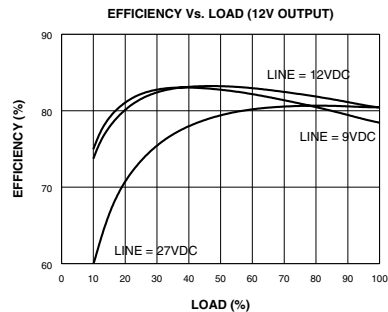
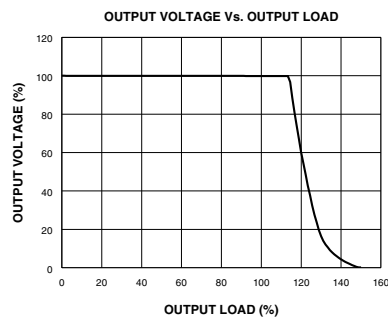
- * **All Parameters measured at Tc=25°C, nominal input voltage and full rated load unless otherwise noted. Refer to the CALEX Application Notes for the definition of terms, measurement circuits and other information.**
- (2) Noise is measured per CALEX Application Notes. Measurement bandwidth is 0-20 MHz.
- (3) Determine the correct fuse size by referring to CALEX Application Notes.
- (4) Case is tied to Pin 5, - Output.
- (5) Short term stability is specified after a 30 minute warmup at full load, constant line and recording the drift over a 24 hour period.
- (6) The transient response is specified as the time required to settle from a 50 to 75 % step load change (rise time of step = 2 μSec) to a 1% error band.
- (7) Dynamic response is the peak overshoot during a transient as defined in note 6.
- (8) The input ripple rejection is specified for DC to 120 Hz ripple with a modulation amplitude of 1% of Vin.
- (9) For module protection only, see note 3.
- (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.
- (12) 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.

5 to 7.5 Watt FW Single Series DC/DC Converters

General Specifications*			
All Models			Units
Isolation (4)			
Breakdown Voltage	MIN	700	VDC
Input-Output 10 μ A Leakage			
Input to Output Capacitance	TYP	340	pF
Environmental			
Case Operating Range No Derating	MIN MAX	-25 85	°C
Case Functional Range (10)	MIN MAX	-40 95	°C
Storage Range	MIN MAX	-55 105	°C
Thermal Impedance (11)	TYP	10	°C/Watt
Thermal Shutdown Case Temperature	TYP	100	°C
General			
Unit Weight	TYP	1.7	oz
Mounting Kits		MS15 & MS6	



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



Mechanical tolerances unless otherwise noted:

X.XX dimensions: ± 0.010 inches

X.XXX dimensions: ± 0.005 inches

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

Pin	Function
1	+INPUT
2	-INPUT
3	+OUTPUT
5	CMN

5 to 7.5 Watt FW Single Series DC/DC Converters

Features

Improved Second Source Benefits:

- Low noise outputs, 50 mV p-p maximum
- Very low reflected ripple, 15 mA p-p maximum
- Excellent regulation, 0.3% maximum
- Improved line regulation, 0.1% maximum
- Efficiencies to 84%
- Reverse voltage protected input
- Five Year Warranty

Selection Chart

Model	Input Range VDC		Output VDC	Output mA
	MIN	MAX		
48S5.1000FW *	20	60	5	1000
48S5.1500FW *	36	72	5	1500
48S12.625FW *	36	72	12	625
48S15.500FW *	36	72	15	500

* These units are Recognized to UL 1459-2

Description

These single output converters are designed for low noise, telecommunications, industrial and instrument applications. Their wide input range (2:1) makes them ideal for battery or unregulated input applications.

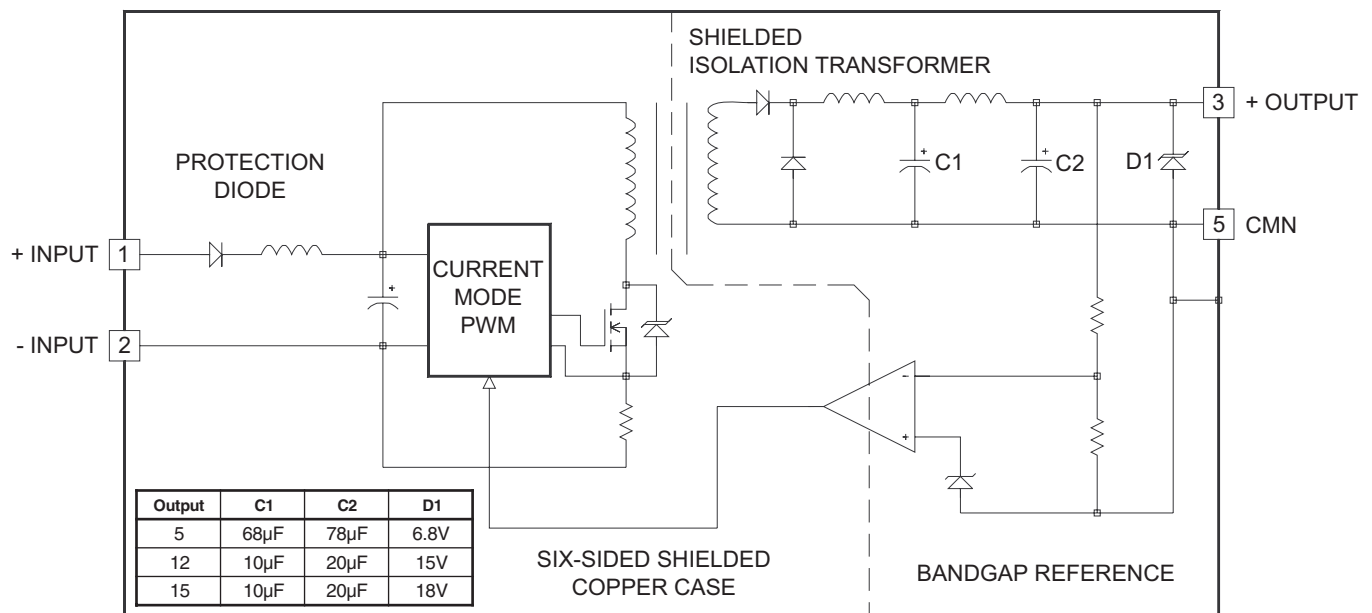
These converters are state-of-the-art 120 KHz MOSFET based designs that provide outstanding line and load regulation with efficiencies approaching 85%.

The outputs are regulated by 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 also insures excellent input ripple rejection and line transient response.

The FW Single converters are protected from output shorts to common by a high speed, pulse-by-pulse, digital, current limit circuit.

The input and output are overvoltage protected with transient suppressor diodes. UL recognition under specification numbers 1459 and 1012 is currently pending.

5 - 7.5 Watt FW Single Series Block Diagram



5 to 7.5 Watt FW Single Series DC/DC Converters

Input Parameters*						
Model		48S5.1000FW	48S5.1500FW (13)	48S12.625FW (13)	48S15.500FW (13)	Units
Voltage Range	MIN MAX	20.0 60.0	36.0 72.0	36.0 72.0	36.0 72.0	VDC
Reflected Ripple (2), 0-20MHz bw	TYP MAX	4 15				mA P-P
Input Current Full Load	TYP	139	195	190	185	mA
No Load	TYP	5	3	4	4	
Efficiency	TYP	75	80	82	85	%
Switching Frequency	TYP	120				kHz
Maximum Input Overvoltage 100ms No Damage	MAX	80				VDC
Turn-on Time, 1% Output Error	TYP	10				ms
Recommended Fuse		(3)				
Reverse Polarity		70				VDC

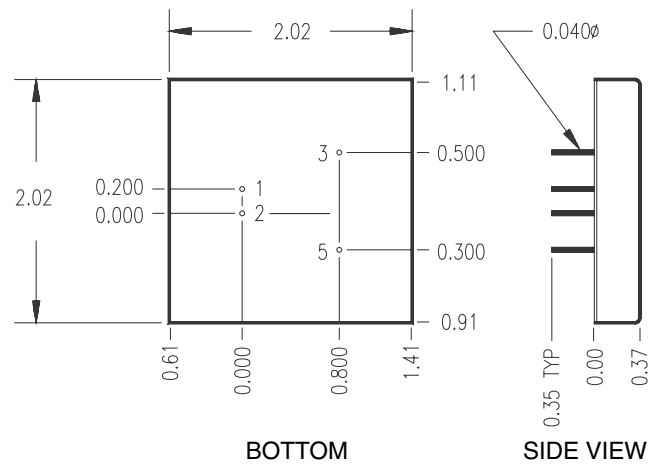
Output Parameters*							
Model		48S5.1000FW	48S5.1500FW	48S12.625FW	48S15.500FW	Units	
Output Voltage		5	5	12	15	VDC	
Rated Current(4)	MIN	0.0	0.0	0.0	0.0	mA	
	MAX	1000	1500	625	500		
Voltage Range 100% Load	MIN	4.950	4.950	11.900	14.900	VDC	
	TYP	5.000	5.000	12.000	15.000		
	MAX	5.050	5.050	12.100	15.100		
Load Regulation 0-100%	TYP	0.1		0.05		%	
	MAX	0.3		0.1			
Line Regulation Vin = Min-Max VDC	TYP	0.01			%		
	MAX	0.1					
Short Term Stability (5)	TYP	0.05		0.02		%/24Hrs	
		0.05		0.02			
Long Term Stability	TYP	< 0.2				%/kHrs	
Transient Response (6)	TYP	50	125	200	150	µs	
Dynamic Response (7)	TYP	100	180	200	170	mV peak	
Input Ripple Rejection (8)	TYP	38				dB	
Noise, 0-20MHz bw (2) with 0.1µF External Capacitor	TYP	10				mV P-P	
	MAX						50
	TYP						40
	MAX						100
Temperature Coefficient	TYP	50				ppm/°C	
	MAX	150					
Overvoltage Clamp (9)	TYP	6.8	6.8	15	18	VDC	
Short Circuit Protection to Common for all Outputs		Provides minimum of 8 hours continous protection with current limiting and thermal overload techniques					

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) Noise is measured per CALEX Application Notes. The output noise is measured with a 0.1µF, 50V, ceramic capacitor connected directly across the output pins. Measurement bandwidth is 0-20 MHz.
- (3) Determine the correct fuse size by calculating the maximum DC current drain at low line input, maximum load and then adding 20 to 25% to get the desired fuse size. A slow blow type fuse is recommended.
- (4) No minimum load required.
- (5) Short term stability is specified after a 30 minute warm-up at full load, constant line and recording the drift over a 24 hour period.
- (6) The transient response is specified as the time required to settle from a 50 to 75 % step load change (rise time of step = 2µ Sec) to a 1% error band.
- (7) Dynamic response is the peak overshoot during a transient as defined in note 6 above.
- (8) The input ripple rejection is specified for DC to 120 Hz ripple with a modulation amplitude of 1% of Vin.
- (9) For module protection only, see also note 3.
- (10) Case is tied to Pin 5, CMN.
- (11) 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.
- (12) The case thermal impedance is specified as the case temperature rise over ambient per package watt dissipated.
- (13) These products are UL Recognized for an input voltage range of 36 to 60 VDC.

5 to 7.5 Watt FW Single Series DC/DC Converters

General Specifications			
All Models			Units
Isolation			
Isolation Voltage	MIN	1544	VDC
Input-Output	MIN	1544	
Input-Case			
10 μ A Leakage			
Input to Output Capacitance	TYP	45	pF
Environmental			
Case Operating Range	MIN	-25	°C
No Derating	MAX	80	
Case Functional Range (11)	MIN	-40	°C
	MAX	90	
Storage Range	MIN	-55	°C
	MAX	105	
Thermal Impedance (10)	TYP	10	°C/Watt
General			
Unit Weight	TYP	1.7	oz
Mounting Kits		MS6 & MS15	



Mechanical tolerances unless otherwise noted:

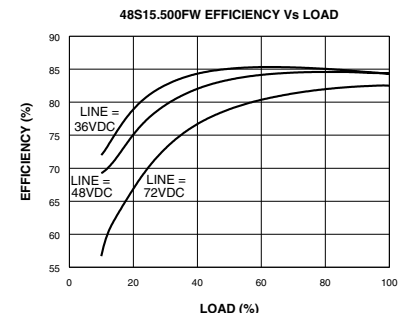
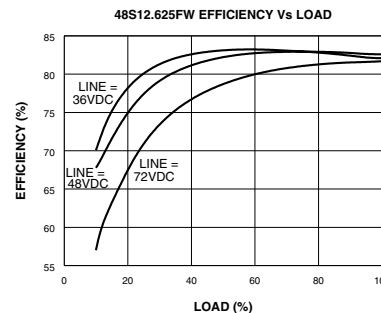
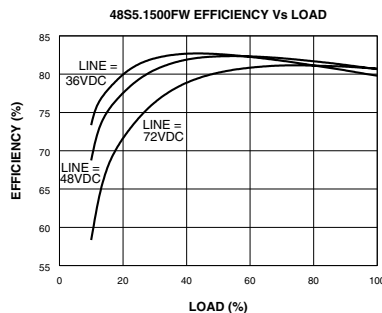
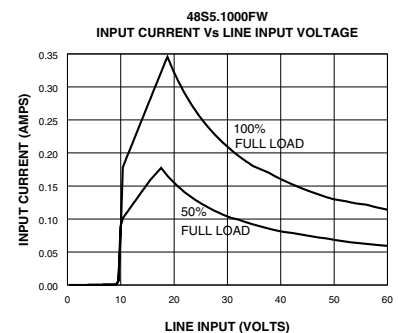
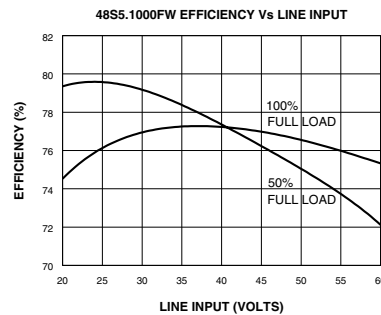
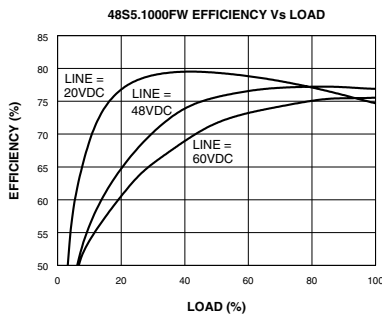
X.XX dimensions: ± 0.020 inches

X.XXX dimensions: ± 0.005 inches

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

Pin	Function
1	+INPUT
2	-INPUT
3	+OUTPUT
5	CMN

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



5 to 7.5 Watt FW Single Series DC/DC Converters

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

