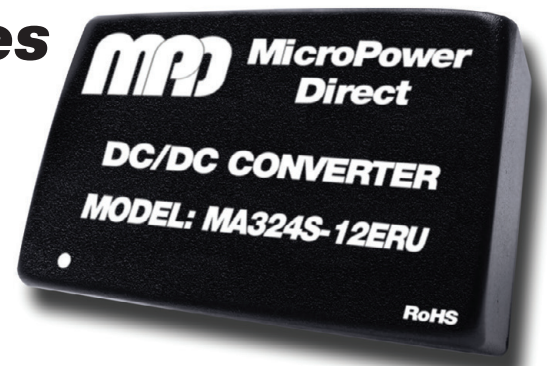


MA300ERU Series



Wide 4:1 Input, 3W Single Output DIP DC/DC Converters

Key Features:

- 3W Output Power
- 4:1 Input Voltage Range
- 1,500 VDC Isolation
- 12 Standard Models
- Efficiency to 83%
- Compact DIP Case
- -40°C to +85°C Operation
- Industry Standard Pin-Out
- Low Cost

RoHS



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Electrical Specifications

Specifications typical @ +25°C, nominal input voltage & rated output current, unless otherwise noted. Specifications subject to change without notice.

Input						
Parameter	Conditions	Min.	Typ.	Max.	Units	
Input Voltage Range	24 VDC Input	9.0	24.0	36.0	VDC	
	48 VDC Input	18.0	48.0	75.0		
Input Start Voltage	24 VDC Input	4.5	7.0	9.0	VDC	
	48 VDC Input	11.0	16.0	18.0		
Input Filter	π (Pi) Filter					
No Load Input Power			0.2	0.5	W	

Output		Min.	Typ.	Max.	Units
Parameter	Conditions				
Output Voltage Accuracy	I _{OUT} = 5% to 100%		±1.0	±3.0	%
No Load Output Voltage Accuracy	V _{IN} = Min to Max		±1.5	±5.0	%
Line Regulation	V _{IN} = Min to Max		±0.2	±0.5	%
Load Regulation	I _{OUT} = 5% to 100%		±0.2	±1.0	%
Ripple (20 MHz)	See Note 1		30	45	mV P - P
Noise (20 MHz)			35	85	
Transient Recovery Time, See Note 2	25% Load Step Change		0.5	3.0	mSec
Transient Response Deviation			±2.0	±5.0	%
Temperature Coefficient			±0.02	±0.03	%/°C
Output Over Voltage Protection		110			%
Output Short Circuit, See Note 3	Continuous (Autorecovery)				

General						
Parameter	Conditions	Min.	Typ.	Max.	Units	
Isolation Voltage	60 Seconds	1,500			VDC	
Isolation Resistance	500 VDC	1,000			M Ω	
Isolation Capacitance	100 kHz/0.1V		120		pF	
Switching Frequency			250		kHz	

EMI Characteristics						
Parameter	Standard			Level		
Radiated Emissions	See Note 4	EN 55022		Class A		
Conducted Emissions	See Note 4	EN 55022		Class A		
ESD		EN 61000-4-2		Criteria B; ±4 kV Contact		
RS		EN 61000-4-3		Criteria A; 10V/m		
EFT	See Note 5	EN 61000-4-4		Criteria B; ±2 kV		
Surge	See Note 6	EN 61000-4-5		Criteria B; ±2 kV		
CS		EN 61000-4-6		Criteria A; 3 Vrms		
Voltage Dips		EN 61000-4-29		Criteria B; 0% - 70%		

Environmental						
Parameter	Conditions	Min.	Typ.	Max.	Units	
Operating Temperature Range	Ambient	-40	+25	+85	°C	
Storage Temperature Range		-55		+125	°C	
Cooling	Free Air Convection					
Humidity	RH, Non-condensing			95	%	

Physical						
Case Size	See Mechanical Diagram (Page 4)					
Case Material	Aluminum Alloy					
Weight	0.49 Oz (15g)					

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	1.0			MHours

Absolute Maximum Ratings

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Voltage Surge (1 Sec)	24 VDC Input	-0.7		50.0	VDC
	48 VDC Input	-0.7		100.0	
Lead Temperature	1.5 mm From Case for 10 Sec			300	°C

Caution: Exceeding Absolute Maximum Ratings may damage the module. These are not continuous operating ratings.

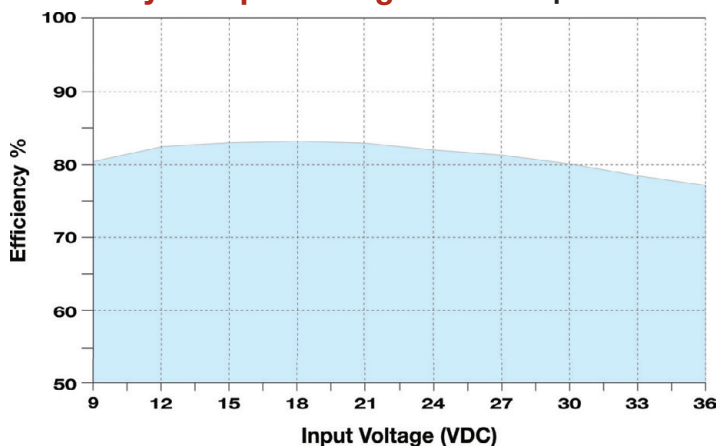
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Model Number	Input				Output			Efficiency (% Typ)	Reflected Ripple Current (mA Typ)	Capacitive Load (μF, Max)	Fuse Rating Slow-Blow (mA)
	Voltage (VDC)		Current (mA)		Voltage (VDC)	Current (mA, Max)	Current (mA, Min)				
	Nominal	Range	Full-Load	No-Load							
MA324S-03ERU	24	9.0 - 36.0	166	10	3.3	909	45	75	30.0	2,700	300
MA324S-05ERU	24	9.0 - 36.0	156	10	5.0	600	30	80	30.0	2,200	300
MA324S-09ERU	24	9.0 - 36.0	156	10	9.0	333	17	80	30.0	1,000	300
MA324S-12ERU	24	9.0 - 36.0	154	10	12.0	250	13	81	30.0	680	300
MA324S-15ERU	24	9.0 - 36.0	152	10	15.0	200	10	82	30.0	680	300
MA324S-24ERU	24	9.0 - 36.0	152	10	24.0	125	6	82	30.0	470	300
MA348S-03ERU	48	18.0 - 75.0	82	8	12.0	909	45	76	30.0	2,700	150
MA348S-05ERU	48	18.0 - 75.0	79	8	5.0	600	30	79	30.0	2,200	150
MA348S-09ERU	48	18.0 - 75.0	77	8	9.0	333	17	81	30.0	1,000	150
MA348S-12ERU	48	18.0 - 75.0	76	8	12.0	250	13	82	30.0	680	150
MA348S-15ERU	48	18.0 - 75.0	75	8	15.0	200	10	83	30.0	680	150
MA348S-24ERU	48	18.0 - 75.0	77	8	24.0	125	6	81	30.0	470	150

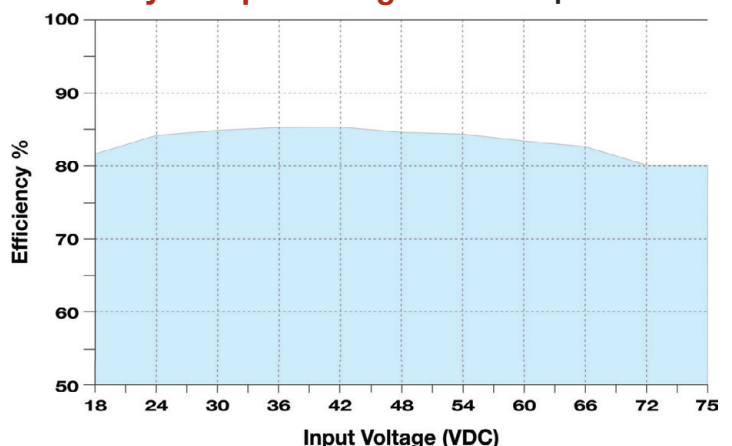
Notes:

- When measuring output ripple & noise, it is recommended that an external capacitor (1 μ F to 10 μ F) be placed from the +Vout to the -Vout pins.
- Transient recovery is measured to within a 1% error band for a load step change of 25%.
- Short circuit protection is provided by a "hiccup mode" circuit.
- All units are rated for EN 55022 (CE/RE) class A without external components. They will meet class B with the addition of the discrete filter circuit as shown on page 3. Contact the factory for more information.
- To meet the requirements of EN 61000-4-4 (± 2 kV), external components are needed, as shown on page 3. Contact the factory for more information.
- To meet the requirements of EN 61000-4-5 (± 2 kV), external components are needed. This can be done discretely as shown on page 3. Contact the factory for more information.
- These units should not be operated with a load under 5% of full load. Operation at no-load will not damage the unit, but they may not meet all specifications.
- It is recommended that a fuse be used on the input of a power supply for protection. See the Model Selection table above for the correct rating.

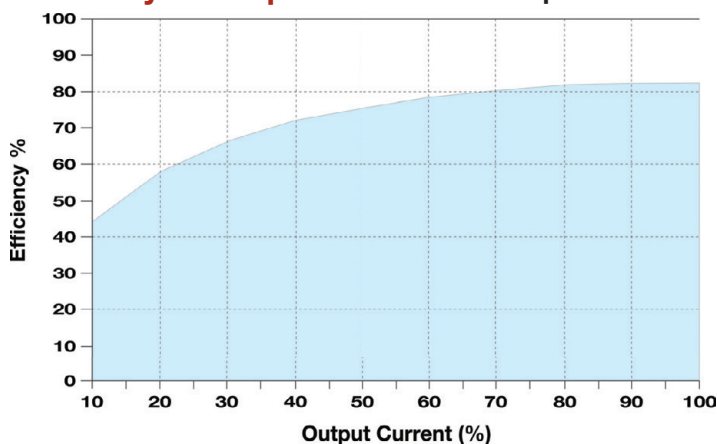
Efficiency vs Input Voltage 24 VDC Input



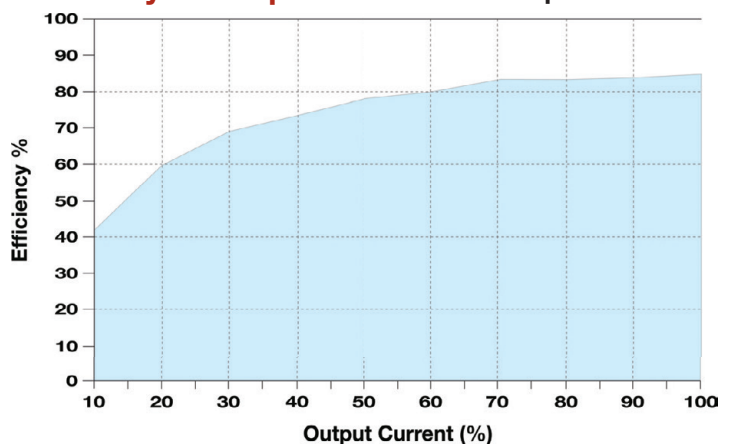
Efficiency vs Input Voltage 48 VDC Input



Efficiency vs Output Load 24 VDC Input



Efficiency vs Output Load 48 VDC Input



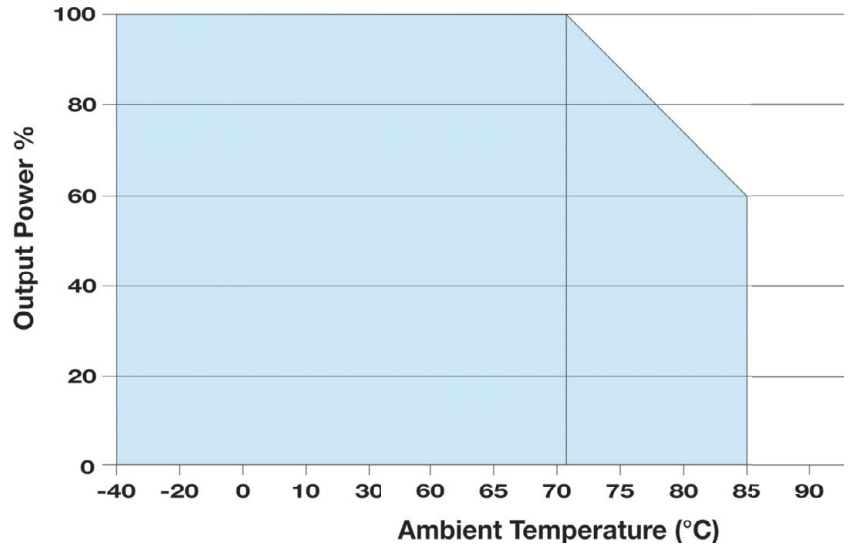
The diagram below illustrates a typical connection of the **MA300SERU** series for applications that require meeting EMC standards. The units do not require external components to operate as specified. Some notes on this diagram (starting with the input circuit) are:

1. It is recommended that an external fuse be used. The recommended fuse is shown in the model chart on page 2.
2. An external MOV is recommended on the input to protect the unit in the event of a surge. A recommended value is given in the table at below.
3. The output filtering capacitor (C4) is a low ESR electrolytic capacitor. Care must be taken in choosing this capacitor not to exceed the capacitive load specification for the unit. Voltage derating of capacitors should be 80% or above.
4. Recommended values for components are:

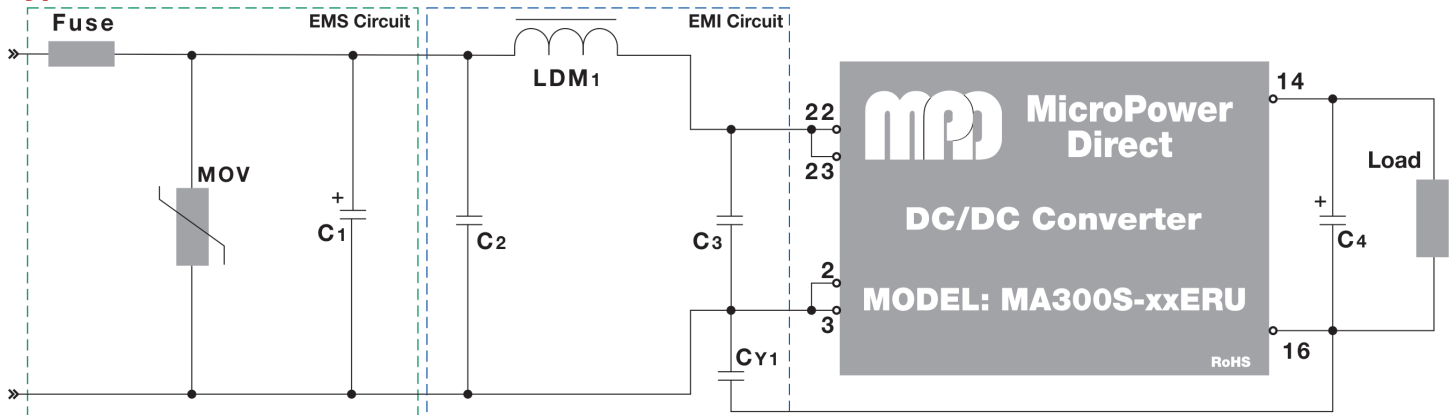
Component	24 V _{IN}	48 V _{IN}
MOV	S14K35	S14K60
C1	330 μ F/50V	330 μ F/100V
C2	4.7 μ F/50V	4.7 μ F/100V
LDM1	12 μ H	12 μ H
C3	4.7 μ F/50V	4.7 μ F/100V
CY1	1.0 nF/2 kV	1.0 nF/2 kV
C4	10 μ F	10 μ F

5. The "Typical Board Layout" drawing shows a suggested board layout for the EMC/EMI circuit. Filtering capacitor (C4) is a low ESR resistance electrolytic capacitor. Care must be taken in choosing this capacitor not to exceed the capacitive load specification for the unit.
6. In many applications simply adding input/output capacitors will enhance the input surge protection and reduce output ripple sufficiently. Typically, the value of the input capacitor should be 10 μ F to 47 μ F. The recommended output capacitor would be 10 μ F. A typical board layout for this connection is shown at the bottom of this page.

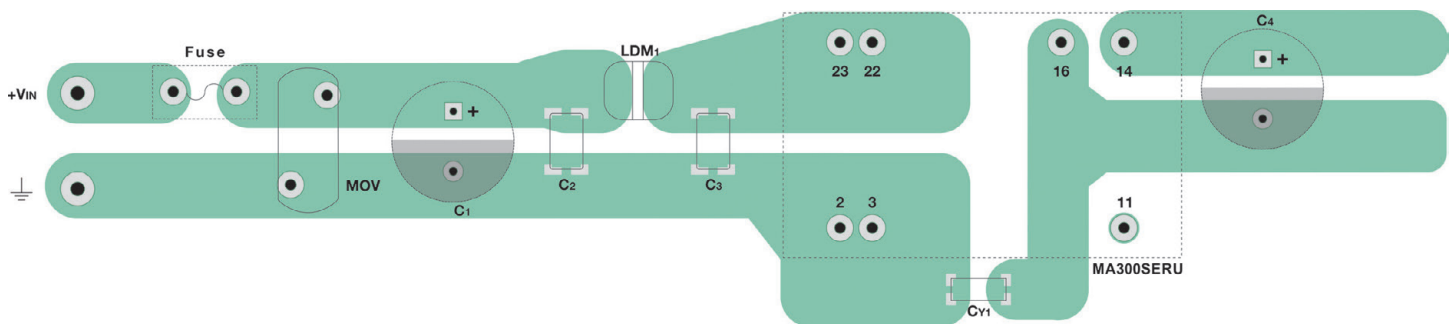
Derating Curve



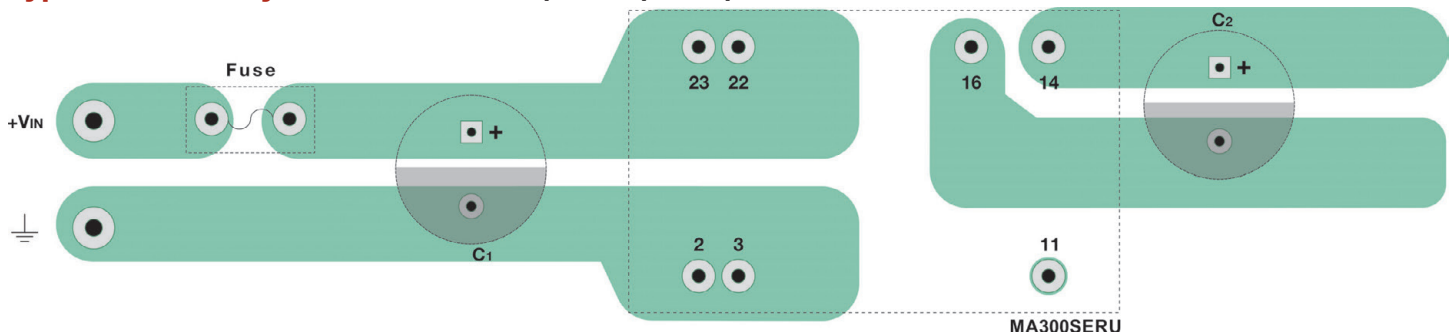
Typical Connection



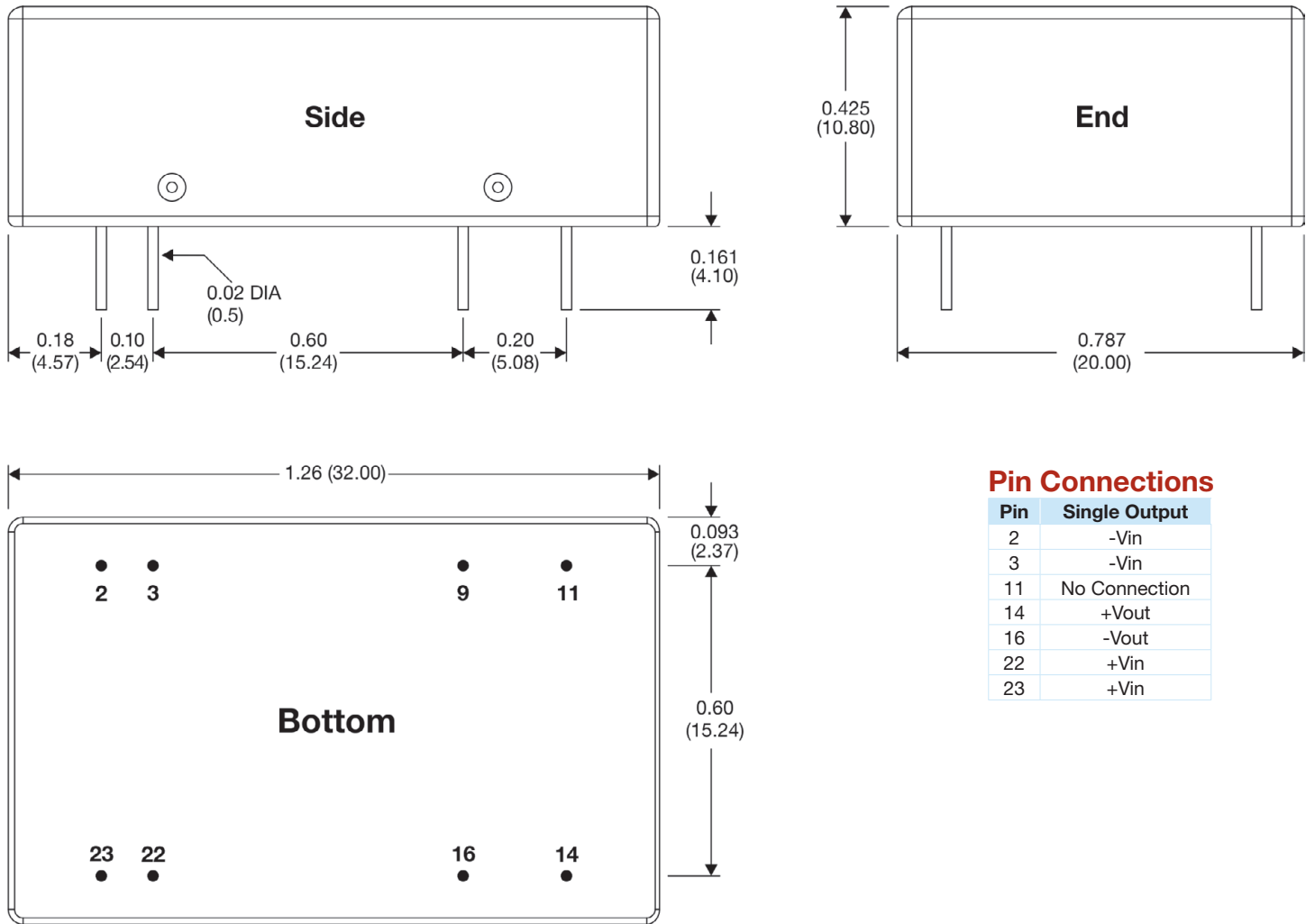
Typical Board Layout: With External Filter/Surge Components



Typical Board Layout: With External Input/Output Capacitors



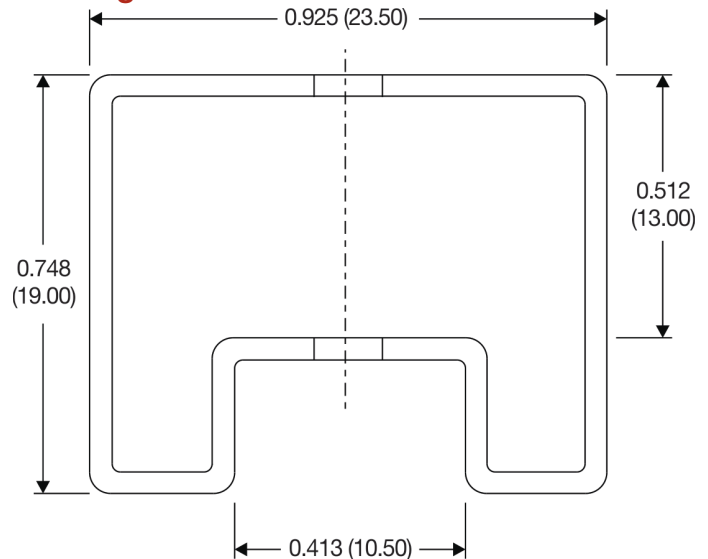
Mechanical Dimensions



Pin Connections

Pin	Single Output
2	-Vin
3	-Vin
11	No Connection
14	+Vout
16	-Vout
22	+Vin
23	+Vin

Packing Tube Dimensions



Notes:

- Tube length equals 20.866 (530), unit quantity equals 15 pcs.
- Tube length equals 8.661 (220), unit quantity equals 6 pcs.
- All dimensions are typical in inches (mm)
- Tolerance x.xx = ± 0.02 (± 0.50)



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