

## 500W DCDC Converter

The latest isolated DC/DC converter from Turntide boasts 500W output power in the same package size as existing 300W converters; this is achieved by utilizing a high efficiency topology which boasts >91% efficiency at a typical operating load of 75%. The 500W DCDC converter is designed to operate in the standard industrial temperature range of -40°C to +85°C and has many protection features such as input UVLO, input OVLO, input reverse polarity, inrush current, output short circuit and over temperature. Parallel connection of multiple units without using a diode on the output is another feature of converter. The mechanical construction is based on the previous 300W rugged DCDC converter.



## Features

- 500W Output power
- Rugged design and highly reliable
- Small footprint
- Wide input range
- Output voltage options 12 – 14V
- High efficiency >91% at 75% load
- Parallel connection of multiple units
- Output Enable pin Max
- Input UVLO/OVLO
- Input Reverse Polarity protection
- Output Short Circuit protection
- Over Temperature protection
- Limited Inrush Current
- 1500VDC isolation
- IP66 rating
- EMC compliant - EN12895, EN55022
- CE marked

## Applications



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Details are correct at time of publishing

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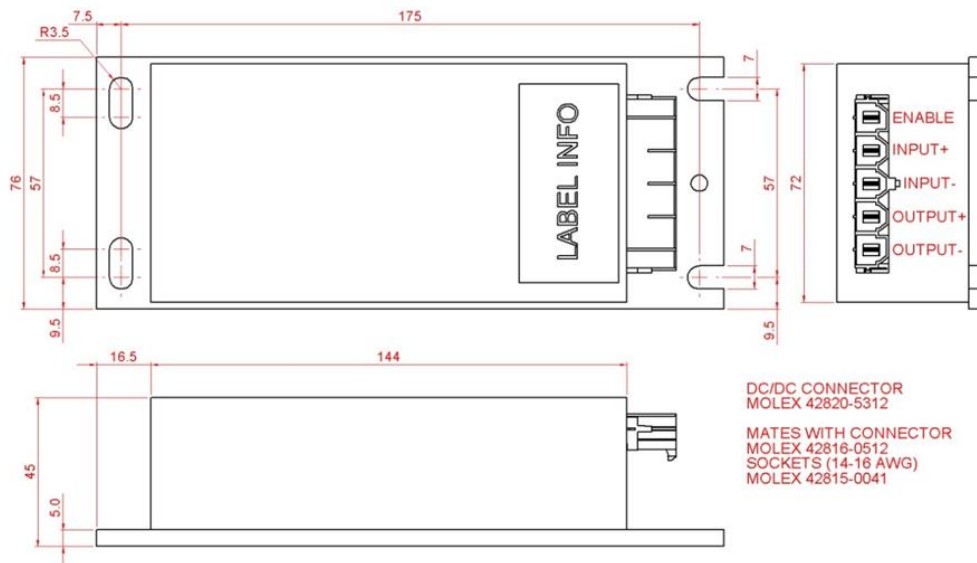
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TTD-MAN-008  
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# Specification

Key Features							
Input Characteristics							
	Min	Typical	Max		Min	Typical	Max
Input voltage range (V <sub>DC</sub> )	30	48	70	Zero load input current (mA <sub>DC</sub> )	-	75	100
Input UVLO, turn-on (V <sub>DC</sub> )	24.7	25.5	26.2		I <sub>OUT MIN</sub>		
Input UVLO, turn-off (V <sub>DC</sub> )	24.4	25.1	25.9	Max off state input current (μA <sub>DC</sub> )	-	100	-
Input OVLO, turn-on (V <sub>DC</sub> )	76.2	78.5	80.9		V <sub>IN MAX</sub> , Enable floating		
Input OVLO, turn-off (V <sub>DC</sub> )	77.3	79.6	82	Max inrush current < 10μs (APK)	-	10	-
Enable input ON threshold (V <sub>DC</sub> )	30	-	70	Max inrush current (APK)	V <sub>IN MAX</sub>		
	Enable is referenced to VIN-ve				V <sub>IN MAX</sub>		
	Max input current (A <sub>DC</sub> )	-	19	-	Reflected input ripple (APK-PK)	-	-
V <sub>IN MAX</sub> , Enable floating			V <sub>IN MAX</sub>				
Reverse polarity input Voltage (V <sub>DC</sub> )	-	-	90		-	-	0.5
Output Characteristics							
	Min	Typical	Max		Min	Typical	Max
Output current range (A <sub>DC</sub> )	0	-	37.3	Efficiency @ 50% load (%)	-	93	-
Output voltage set point (V <sub>DC</sub> )	13.27*	13.4*	13.5*	Efficiency @ 75% load (%)	-	91	-
	Factory set at 50% load			Efficiency @ 100% load (%)	-	90	-
Output voltage regulation (V <sub>DC</sub> )	12.73	13.4	14.07	Output ripple and noise (mV)	-	-	250
	From V <sub>OUT</sub> set point, 0% to 100% load				20MHz BW, 100% load		
Output voltage transient regulation (%)	-	+/- 8	-	Current share accuracy (%)	-	5	10
	From V <sub>OUT</sub> set point, V <sub>IN</sub> typ, 10-20A dynamic, 0.1A/μs				15 to 100% load		
Output overshoot (%)	-	-	3				
* Please contact Turntide if a different set point between 12-14V is required.							
Other Characteristics							
Isolation voltage (V <sub>DC</sub> )	-	-	1500	Switching frequency (kHz)	-	100	-
	Input to output, Input to baseplate & Output to baseplate						
Environmental							
Storage temperature (°C)	-40 to +85			Operating temperature (°C)	-40 to +85		
Humidity (condensing) (%RH)	0 to 90			IP	IP66*		
Vibration	6G rms, 0-1000Hz, 3 planes			Shock	50G, 3 planes		
* Excluding connector							
Mass, Dimensions and Drawings							
Weight (g)	-	900	-	Width (mm)	76		
Length (mm)	175			Height (mm)	45		



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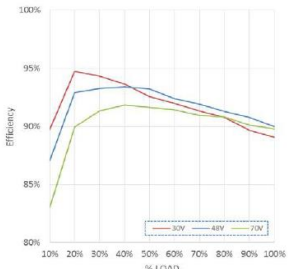
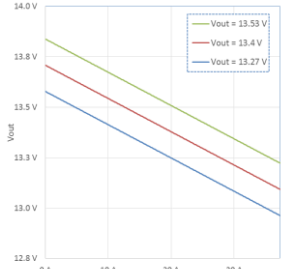
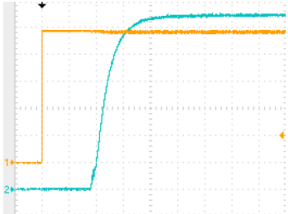
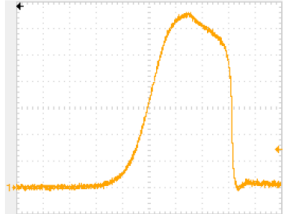
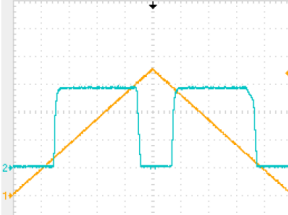
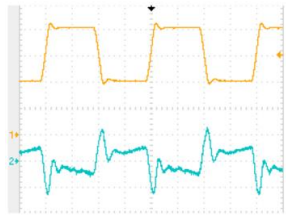
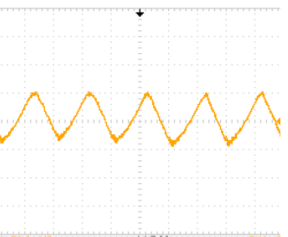
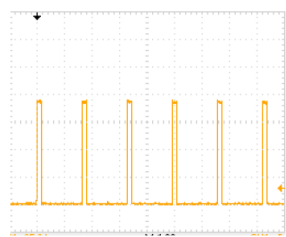
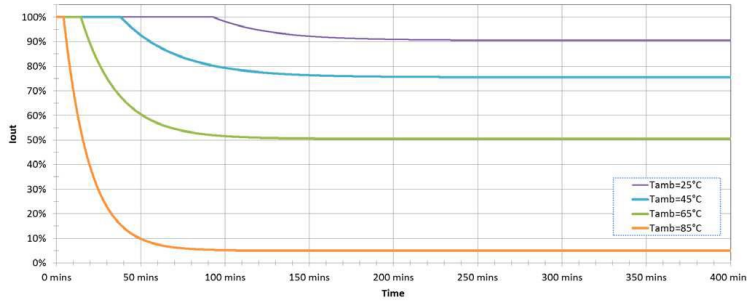
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Safety and Compliance			
EMC Emissions	<ul style="list-style-type: none"> <li>EN12895</li> </ul>	EMC Immunity	<ul style="list-style-type: none"> <li>EN12895</li> </ul>
ESD	<ul style="list-style-type: none"> <li>EN12895</li> </ul> <p><math>\pm 4kV</math> contact, <math>\pm 15kV</math> air</p>	CE	<p>The CE mark applies only to the provisions of the low voltage directive. It is the responsibility of the installer to take any precautions necessary to ensure that the assembled equipment is EMC compliant</p> 
Performance Data			
Efficiency vs. Output Load			
Vout vs Output load			
Start-up waveform	<p><math>V_{IN} = 48V, I_{OUT\ Max}</math></p> <p>CH1: <math>V_{IN}</math> 10V/div 100ms/div</p> <p>CH2: <math>V_{OUT}</math> 2V/div 100ms/div</p> 		
Inrush current	<p><math>V_{IN} = 48V, I_{OUT\ Max}</math></p> <p>CH1: <math>I_{IN}</math> 100mA/div 10ms/div</p> 		
OVP and UVP Protection	<p><math>V_{IN} = 0V-90V, I_{OUT} = 10A</math></p> <p>CH1: <math>V_{IN}</math> 20V/div 1s/div</p> <p>CH2: <math>V_{OUT}</math> 5V/div 1s/div</p> 		
Control Loop Dynamic response	<p><math>V_{IN} = 48V, I_{OUT} = 10-20A, 0.1A/\mu s</math></p> <p>CH1: <math>I_{OUT}</math> 5A/div 250μs/div</p> <p>CH2: <math>V_{OUT}</math> 50mV/div 250μs/div</p> 		
Output ripple and noise	<p><math>V_{IN} = 48V, I_{OUT\ Max}, 20MHz\ BW</math></p> <p>CH1: <math>V_{OUT}</math> 50mV/div 5μs/div</p> 		
Output short circuit current	<p><math>V_{IN} = 48V</math></p> <p>CH1: <math>I_{OUT}</math> 25A/div 1s/div</p> 		
Thermal de-rating ( $R_{th\_hs-a} = 1.4^{\circ}C/W$ )	 <p>The DCDC converter should be tested in the end application to ensure suitable thermal performance. The following graphs should be used as a guide.</p>		

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<b>Additional Information</b>	
<b>Enable Input</b>	
The DCDC converter output is enabled when the enable input is pulled higher than VIN MIN. The enable circuitry should be referenced to the negative input terminal. Negative voltages down to -100Vdc can be applied to the enable input without any damage. If the enable function is not required then the enable input should be hard wired to VIN +ve externally.	
<b>Output voltage set point</b>	
The output voltage set point is factory set to 13.4V. Please contact Turntide if a different set point between 12V-14V is required.	
<b>Parallel connection of multiple units</b>	
The DCDC converter includes an active droop circuit for paralleling of multiple units; therefore external sharing diodes are not required. When this function is required, care should be taken to wire the outputs of the units together using matched cable lengths.	
<b>Input under / over voltage lock out (UVLO / OVLO)</b>	
The DCDC converter incorporates protection circuitry to disable the output when the input voltage is outside its specified operating range; hysteresis is included to ensure clean start-up and shutdown.	
<b>Reverse input protection</b>	
In the event that the input is wired incorrectly the DCDC converter will self-protect.	
<b>Output short circuit protection</b>	
In the event that the output is shorted, the DCDC converter will protect itself from excessive stress. The converter will continue to try and power-up, however, if the short is still applied the output will shut down. Once the fault is removed the converter will power-up.	
<b>Thermal considerations</b>	
To protect the DCDC converter from excessive temperatures the baseplate should be connected to a suitable heatsink using the 4 fixing holes; thermal grease is recommended. If the converter is subjected to excessive temperatures, an over temperature protection circuit will operate. This protection circuit operates in two stages; stage 1 will reduce the output voltage to 50% of its initial set point, if the temperature keeps rising then stage 2 will shut down the output. The output will recover when the over temperature condition is removed.	
<b>Fusing</b>	
Input and output fusing is not provided. A suitable fuse should be installed in the end application.	

For more information on this product or Turntide's range of inverters, motors, batteries, pumps and fans, please visit our website or contact our team of experts at [electrificationsales@turntide.com](mailto:electrificationsales@turntide.com).

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