

TINY DC-DC Power Module, Input 8-28V DC, Output 5V DC 1Amp

This tiny power module is an easy-to-use integrated power solution that combines a 3A DC/DC converter chip with inbuilt power MOSFETs, an inductor, and passives into a 3-pin, through-hole package. The standard TO-220 pin-out allows a much-improved replacement of linear regulators packaged in this industry-standard footprint. The circuit provides much higher efficiency and output current without the need for a heatsink. This is an easy replacement of the LM7805 linear regulator with higher input voltage and output current than LM7805. Operating supply 8-28V DC, output 5V DC at 1A. The project is built using the TPS54302 chip from Texas instruments.

The **TPS54302** is a 4.5-V to 28-V input voltage range, 3-A synchronous buck converter. The device includes two integrated switching FETs, internal loop compensation and 5-ms internal soft start to reduce component count. By integrating the MOSFETs and employing the SOT- 23 package, the TPS54302 achieves the high-power density and offers a small footprint on the PCB. Advanced Eco-mode implementation maximizes the light load efficiency and reduces power loss. In the TPS54302, the frequency spread-spectrum operation is introduced for EMI reduction. Cycle-by-cycle current limit in both high-side MOSFET protects the converter in an overload condition and is enhanced by a low-side MOSFET freewheeling current limit which prevents current runaway. Hiccup mode protection is triggered if the overcurrent condition has persisted for longer than the present time.

Output: The circuit provides a fixed 5V DC and this can be changed. The output voltage is set with a resistor divider from the output node to the FB pin. It is recommended to use divider resistors with 1% tolerance or better. Start with 100 k Ω for the upper resistor divider and use Equation 3 to calculate the output voltage. To improve efficiency at light loads consider using large value resistors but keep in mind that if the values are too high the regulator is more susceptible to noise and voltage errors from the FB input current are noticeable.

Features

Direct Replacement to linear regulator Lm7805 Input Supply 8-28V DC Output 5V @ 1A Maximum More Than 90% Efficiency 400Khz Switching Frequency Over Current Protection Over Voltage Protection Thermal Shutdown Frequency Spread Spectrum to Reduce EMI PCB Dimension's 16.03MM X 15.40MM





























BOM					
QNTY.	REF.	DESC.	MANUFACTURER	SUPPLIER	SUPPLIER PART NO
1	CN1	3 PIN MALE HEADER RIGHT ANGLE 2.54MM PITCH	WURTH	DIGIKEY	732-5316-ND
1	C1	10uF/35V	TDK	DIGIKEY	445-172484-1-ND
2	C2,C3	0.1uF	MURATA/YAGEO	DIGIKEY	
1	C4	47uF/16V	MURATA	DIGIKEY	490-6538-1-ND
2	C5, C6	10uF/10V SMD SIZE 0805	YAGEO	DIGIKEY	311-1865-1-ND
1	C7	100PF/50V SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
1	L1	10uH/2.5A, 6MMX6MM	BOURNS INC	DIGIKEY	SRN6045-100MCT-ND
1	R1	49.9E 1% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
1	R2	100K 1% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
1	R3	13K 1% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
1	U1	TPS54302	TI	MOUSER	595-TPS54302DDCR
	QNTY. 1 1 2 1 2 1 1 1 1 1 1 1 1	QNTY. REF. 1 CN1 1 C1 2 C2,C3 1 C4 2 C5,C6 1 C7 1 L1 1 R1 1 R2 1 U1	ONTY. REF. DESC. 1 CN1 3 PIN MALE HEADER RIGHT ANGLE 2.54MM PITCH 1 C1 10uF/35V 2 C2,C3 0.1uF 1 C4 47uF/16V 2 C5,C6 10uF/35V SMD SIZE 0805 1 C7 100PF/50V SMD SIZE 0805 1 L1 10uH/2.5A, 6MMX6MM 1 R1 49.9E 1% SMD SIZE 0805 1 R2 100K 1% SMD SIZE 0805 1 R3 13K 1% SMD SIZE 0805 1 U1 TPS54302	ONTY. REF. DESC. MANUFACTURER 1 CN1 3 PIN MALE HEADER RIGHT ANGLE 2.54MM PITCH WURTH 1 C1 3 PIN MALE HEADER RIGHT ANGLE 2.54MM PITCH WURTH 1 C1 10uF/35V TDK 2 C2,C3 0.1uF MURATA/YAGEO 1 C4 47uF/16V MURATA 2 C5,C6 10uF/10V SMD SIZE 0805 YAGEO 1 C7 100PF/50V SMD SIZE 0805 MURATA/YAGEO 1 L1 10uH/2.5A, 6MIMX6MM BOURNS INC 1 R1 49.9E 1% SMD SIZE 0805 MURATA/YAGEO 1 R2 100K 1% SMD SIZE 0805 MURATA/YAGEO 1 R2 100K 1% SMD SIZE 0805 MURATA/YAGEO 1 R3 13K 1% SMD SIZE 0805 MURATA/YAGEO 1 U1 TPS54302 TI	BOMQNTY.REF.DESC.MANUFACTURERSUPPLIER1CN13 PIN MALE HEADER RIGHT ANGLE 2.54MM PITCHWURTHDIGIKEY1C110uF/35VTDKDIGIKEY2C2,C30.1uFMURATA/YAGE0DIGIKEY1C447uF/16VMURATADIGIKEY2C5,C610uF/10V SMD SIZE 0805YAGE0DIGIKEY1C7100PF/50V SMD SIZE 0805MURATA/YAGE0DIGIKEY1L110uH/2.5A, 6MMX6MMBOURNS INCDIGIKEY1R149.9E 1% SMD SIZE 0805MURATA/YAGE0DIGIKEY1R2100K 1% SMD SIZE 0805MURATA/YAGE0DIGIKEY1R313K 1% SMD SIZE 0805MURATA/YAGE0DIGIKEY1U1TPS54302TIMOUSER



