



SRAD20000

20W ADJUSTABLE STEP-UP

SWITCHING REGULATOR
Adjustable output from V_{IN} to $250V_{OUT}$

Key Features

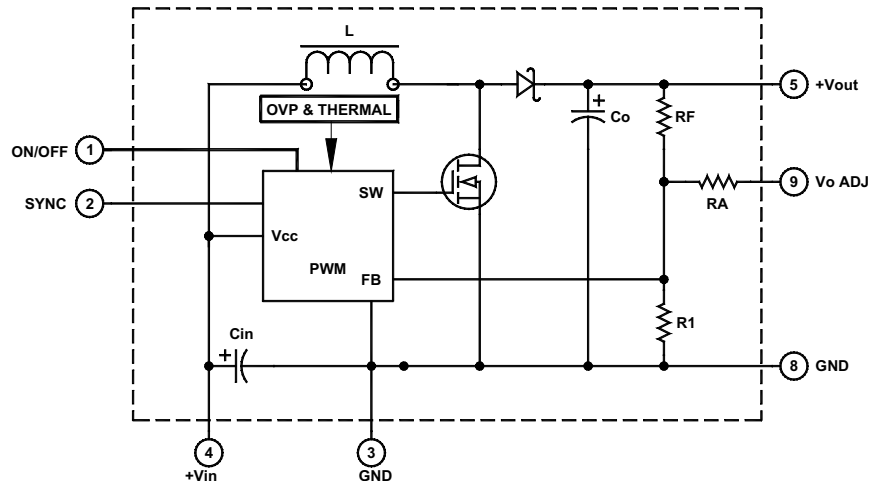
- Efficiency up to 88%
- Wide input range (9–18V)
- Input under/overvoltage protection
- Output overvoltage protection
- 150kHz constant frequency
- 50W/in³ power density
- Six-sided shielding
- Thermal protection
- External synchronization



Functional Description

The SRAD20000 is a 20W constant frequency, current mode step-up switching regulators with excellent line and load regulation that accepts an input voltage from $9V_{IN}$ to $18V_{IN}$ and provides an adjustable output voltage from V_{IN} to $250V_{OUT}$. High switching frequency and SMD technology makes achieving high power density, low cost and high reliability possible. The converters require a low impedance power source or minimum 1000 μ F input and output capacitors for proper operation. The converters come in a 2 \times 1 \times 0.39-inch package size. NOTE: Please see Application Notes SR-003 and SR-004.

NOTE: These converters DO NOT feature short circuit protection, you must use an external fuse to provide short circuit protection.



Typical Block Diagram

Electrical Specifications

INPUT SPECIFICATIONS

Unless otherwise specified, all parameters are given under typical +25°C with nominal input voltage and under full output load conditions.

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Input Voltage Range		9	12	15	Vdc
Input Current					mA
Input Reflected Ripple	With 1000µF, See Figure 3		20		mA _{PP}
Turn On Delay	Including Soft Start, See Figure 2		5	8	mS
Overvoltage Lockout, 10V		18	19		Vdc
Undervoltage Lockout, 10V		8			Vdc
Remote ON/OFF Control, SYNC					
Logic Input Reference	-Input for ON/OFF and SYNC				
Logic Compatibility	TTL Open Collector or CMOS Open Drain				
SYNC Frequency		170	180	200	kHz
Converter ON	Open (Open circuit voltage at Pin 1: 10V Max.)				
Converter OFF	Pin 1 < 0.6V, V _{ADJ} 2V				

OUTPUT SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Output Voltage		V _{IN}		250	Vdc
Output Voltage Accuracy			0.5	1	%
Output Current		80		1000	mA
Line Regulation			±1	±2	% of V _{OUT}
Load Regulation			±1	±2	% of V _{OUT}
Ripple and Noise	See Figure 3		1	2	_{OUTPP}
Temperature Coefficient			0.01	0.02	%
Transient Response	See Figure 1		5		mS
Short Circuit Protection	None, Input Fuse is required				
V Adjust Range	V _{ADJ} = 2V to 0V	V _{IN}		250	Vdc
Output Overvoltage Limit	None				

GENERAL SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Efficiency			88		%
Switching Frequency	Fixed	150		170	kHz
Isolation	None				
Thermal Resistance			5		°C/W
Thermal Hysteresis			10		°C
Thermal Turn Off Temperature ³	Case Temperature	80	90	95	°C
MTBF	per MIL-HNBK-217F (Ground benign, +25°C)		1.9×10 ⁶		hours

ENVIRONMENTAL SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Humidity	Non-condensing			95	%
Storage Temperature		-55		+125	°C
Operating Temperature, Commercial		-40		+70	°C

PHYSICAL CHARACTERISTICS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Dimensions (L×W×H)	2.00×1.00×0.39 in. (50.80×25.40×9.90mm)				
Weight	1.09 oz. (31g)				
Shielding Connection	-V/-V, Pin 3				

¹ Measured with 1000µF input capacitor.

² The off state output voltage is equal to V_{IN} minus 1 diode drop.

³ After thermal turn off, V_{OUT} ≅ V_{IN} - 0.7V.

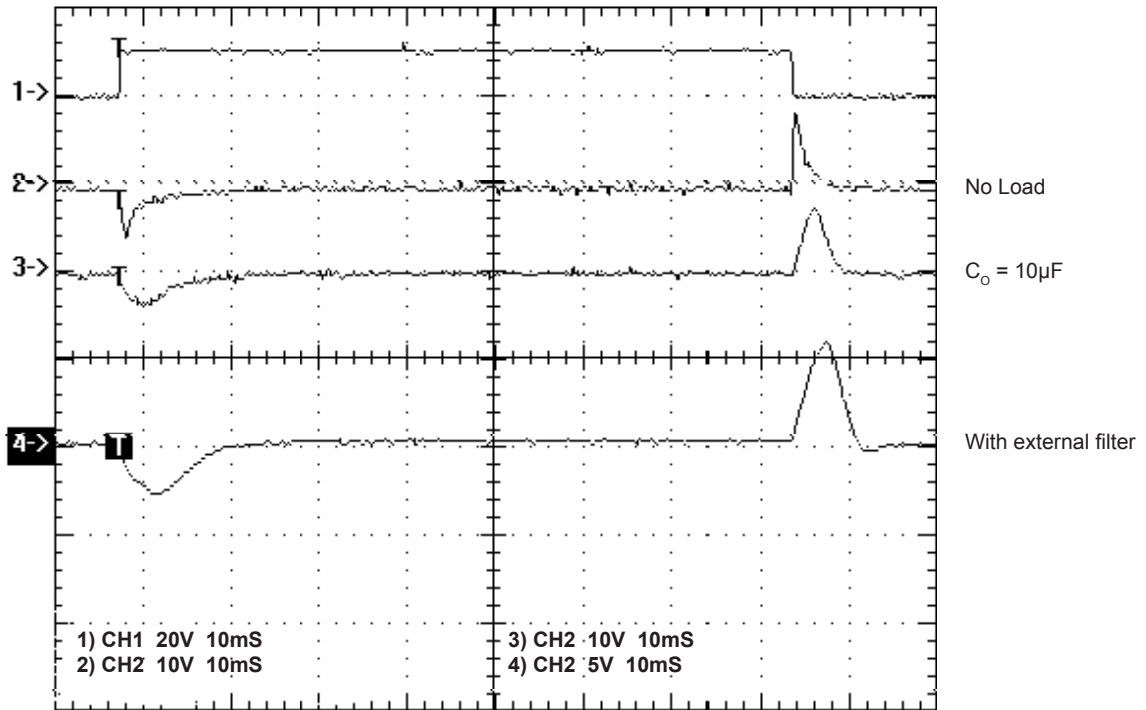


FIGURE 1. Transient response

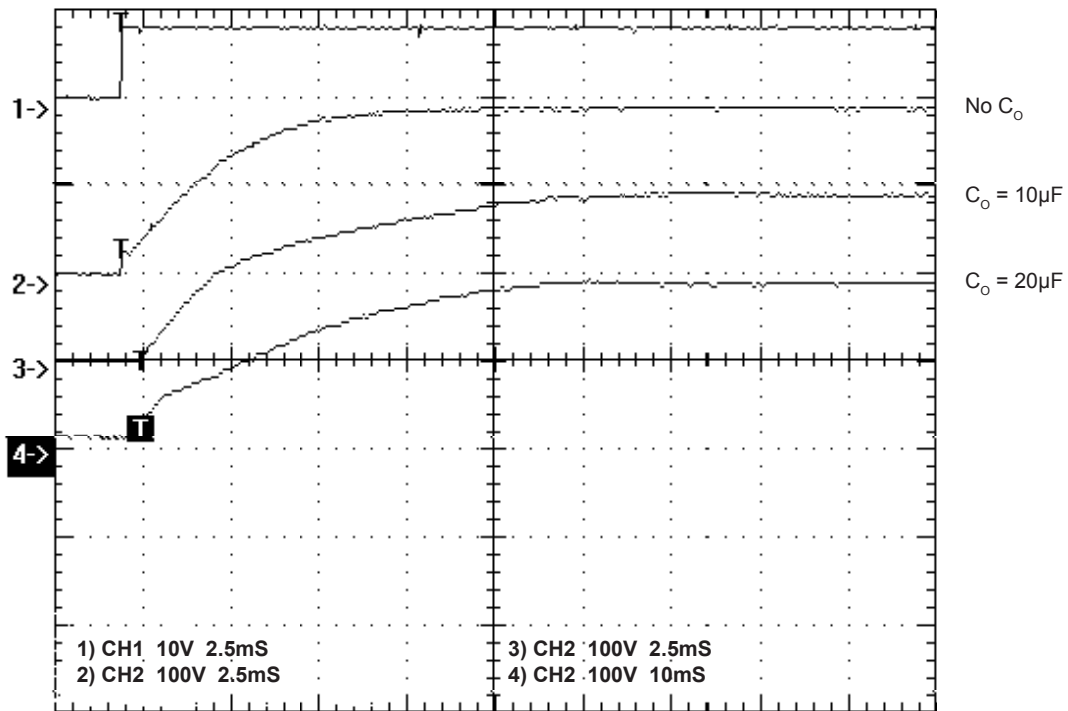


FIGURE 2. Turn on delay with soft start
(No additional C_o , $C_o = 10\mu\text{F}$, $C_o = 20\mu\text{F}$)

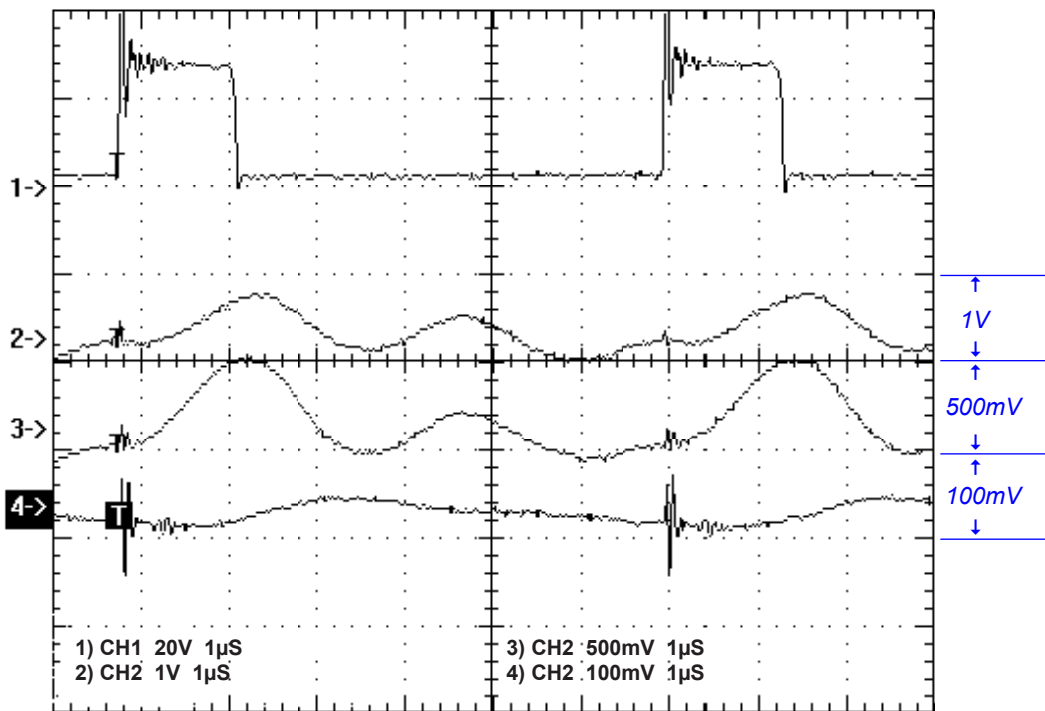


FIGURE 3. Output ripple of SRAD20S200/5

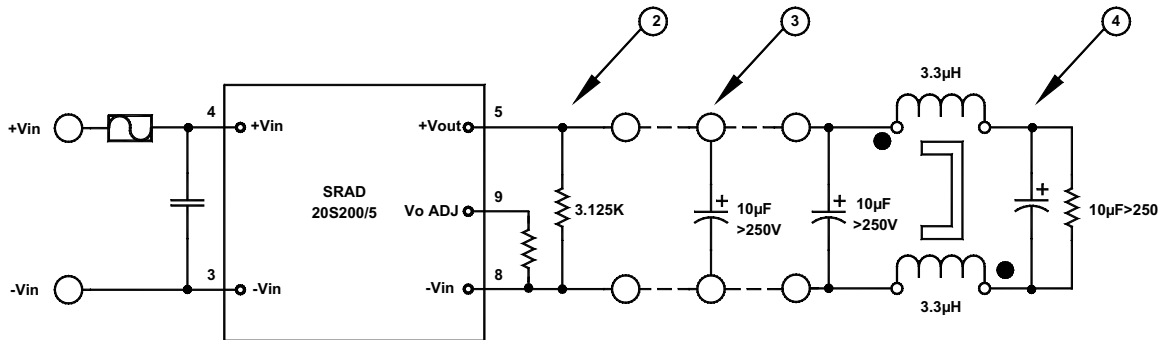
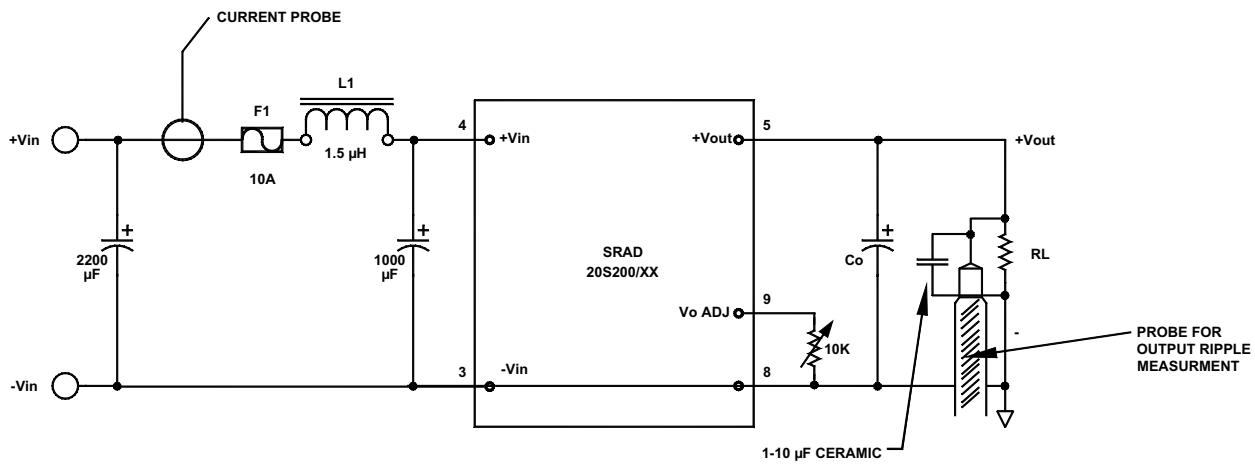


FIGURE 4. Circuit components used to obtain waveform in Figure 3 (See Figure 3)



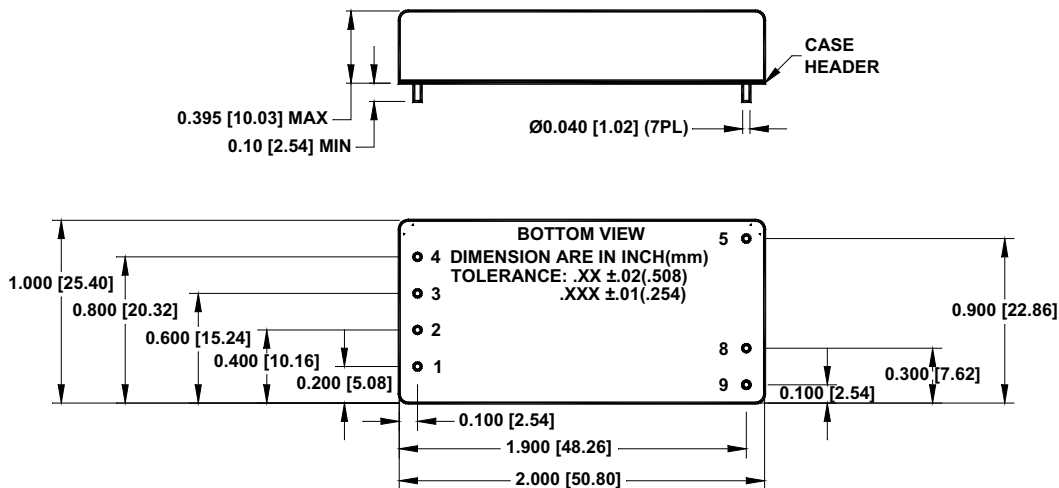
* OPTIONAL (INCREASES THE SOFT SHORT TIME)

FIGURE 5. Connection diagram for input reflected ripple and output voltage ripple measurements

V_{IN}	F1
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5V	Adjusting V_o by	R_x in K Ω : $V_o \cong 2 \left(1 + \frac{909}{7.5+R_x} \right)$	$R_x = \frac{909}{(V_o/2) - 1} - 7.5$ in K Ω
12V	Adjusting V_o by	an external voltage source: $V_o \cong 244.4 - 121.2 \cdot V_{IN}$ or $V_{IN} = (244.4 - V_o)/121.2$	

MECHANICAL SPECIFICATIONS



Pin	Function
1	ON/OFF
2	SYNC
3	$-V_{IN}$ (INPUT GND)*
4	$+V_{IN}$
5	$+V_{OUT}$
6	No Pin
7	No Pin
8	GND*
9	V_o ADJ

* Input Ground (Pin 3) and Output Ground (Pin 8) are internally connected