



# SR20 & SRA40

## 20W & 40W STEP-UP SWITCHING REGULATORS

$5V_{IN}$  to  $17V_{IN}$

### Key Features

- Efficiency up to 96%
- Wide input range (5–17V)
- Input under/overvoltage protection
- Output overvoltage protection
- 300kHz constant frequency
- 50W/in<sup>3</sup> power density
- Six-sided shielding
- Thermal protection



Beta Dyne is protected under various patents, including but not limited to U.S. Patent numbers: 5,777,519; 6,188,276; 6,262,901; 6,452,818; 6,473,3171.

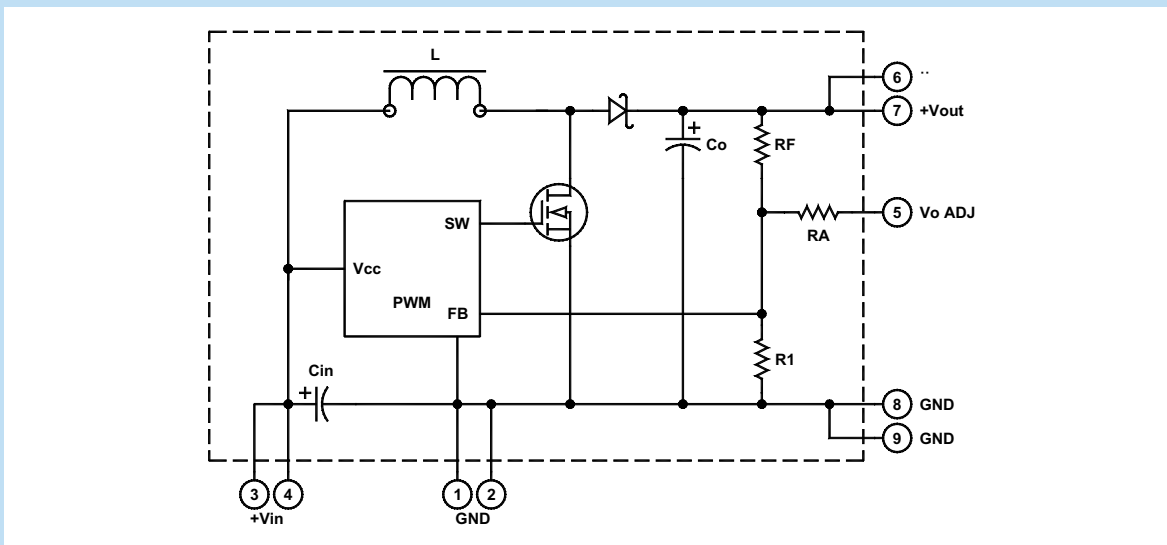
### Applications

- Battery Chargers/Backup
- External Modems
- xDSL Power Supply
- Telecom Hardware
- LAN and Network Systems
- Point-of-Sale (POS) Systems

### Functional Description

The SR20 & SRA40 are 20W and 40W constant frequency, current mode step-up switching regulators with excellent line and load regulation that accept  $5V_{IN}$  to  $17V_{IN}$  and provide 9, 12, 15, 18 and  $24V_{OUT}$ . High switching frequency and SMD technology makes achieving high power density, low cost and high reliability possible. The SR20 & SRA40 require a low impedance power source or minimum 1000 $\mu$ F input and output capacitors for proper operation. Both models come in a 2x1x0.39-inch package size.

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



Typical Block Diagram of SR20 & SRA40

## 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	See Model Selection Guide				Vdc
Input Current	NL, See Model Selection Guide				mA
Input Reflected Ripple	With 2000µF, See Figure 1		20		mA <sub>pp</sub>
Turn On Delay	Including Soft Start, See Figure 2		5	8	mS
Undervoltage Lockout, 5V		4	4.5		Vdc
Undervoltage Lockout, 10V		8			Vdc

### OUTPUT SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Output Voltage	See Model Selection Guide				Vdc
Output Voltage Accuracy			0.5	1.5	%
Line Regulation			±1	±2	% of V <sub>OUT</sub>
Load Regulation			±1	±2	% of V <sub>OUT</sub>
Ripple and Noise	With C=1000µF minimum, See Figure 1		1	2	OUTPP
Temperature Coefficient			0.01	0.02	%
Transient Response	See Figures 3 & 4		100		µS
Short Circuit Current	Input Fuse				
V Adjust Range			5	10	%

### GENERAL SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Efficiency	See Model Selection Guide				
Switching Frequency	Fixed	300	330	360	kHz
Isolation	None				
Thermal Resistance			5		°C/W
Thermal Hysteresis			10		°C
Thermal Turn Off Temperature <sup>1</sup>	Case Temperature	105	110	115	°C
MTBF	per MIL-HNBK-217F (Ground benign, +25°C)		2.1×10 <sup>6</sup>		hours

### ENVIRONMENTAL / PHYSICAL SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Humidity	Non-condensing			95	%
Storage Temperature		-55		+125	°C
Operating Temperature, Commercial	(Contact factory for -40°C)	-25		+70	°C
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				

### Model Selection Guide

MODEL NUMBER	INPUT				Reflected Ripple <sup>2</sup> (mA <sub>pp</sub> )	OUTPUT		
	Voltage (Vdc)		Current (mA)			Voltage (Vdc)	Current (mA)	Efficiency Full Load (%)
	Nominal	Range	No Load	Full Load				
SR20S9/5	5	5–8	10	4301	30	9	2222	93
SR20S12/5	5	5–8	30	4301	30	12	1666	93
SR20S15/5	5	5–8	30	4301	30	15	1333	93
SR20S18/5	5	5–8	30	4301	30	18	1111	93
SR20S24/5	5	5–8	50	4444	30	24	833	90
SRA40S15/12	12	10–14	10	3472	20	15	2666	96
SRA40S18/12	12	10–17	10	3508	20	18	2222	95
SRA40S24/12	12	10–17	10	3584	20	24	1666	93

<sup>1</sup> After thermal turn off, V<sub>OUT</sub> ≅ V<sub>IN</sub> – 0.7V.

<sup>2</sup> Measured with 1000µF input capacitor. See C<sub>IN</sub> in Figure 6.

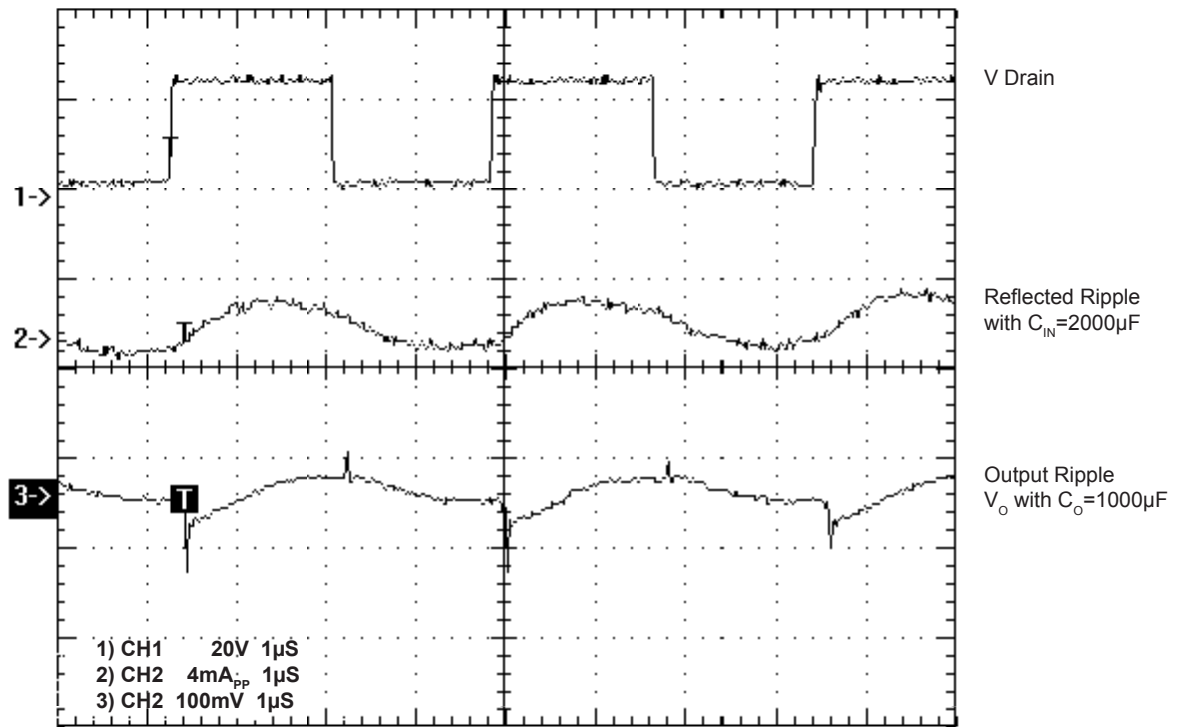


FIGURE 1. Reflected ripple and output ripple

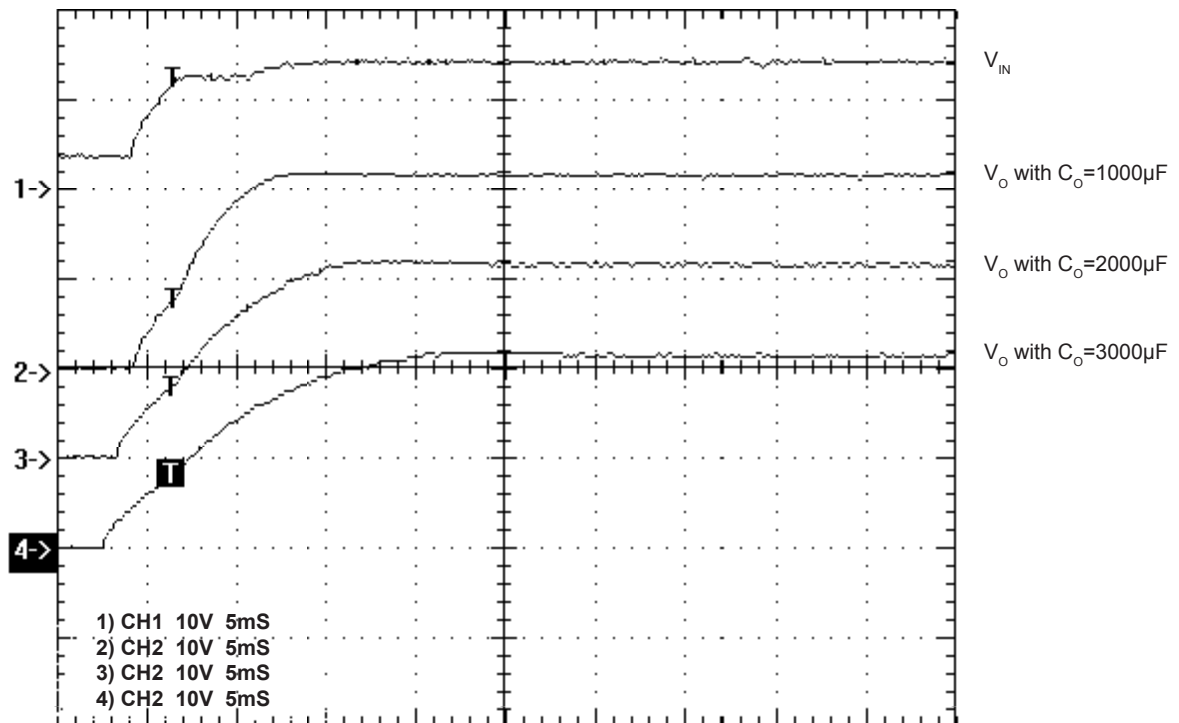


FIGURE 2. Soft start (SRA40S24/12)

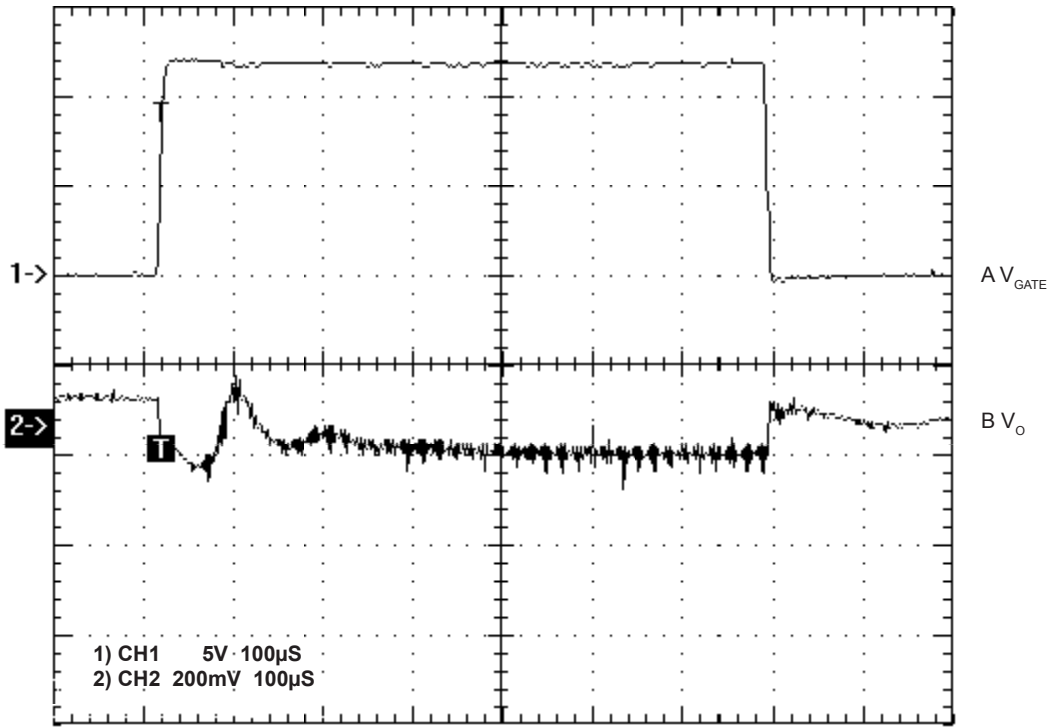


FIGURE 3. Transient response (SRA40S24/12),  $V_{IN}=12V$ , 40%FL to 80% FL to 40%FL,  $C_{IN}=1000\mu F$

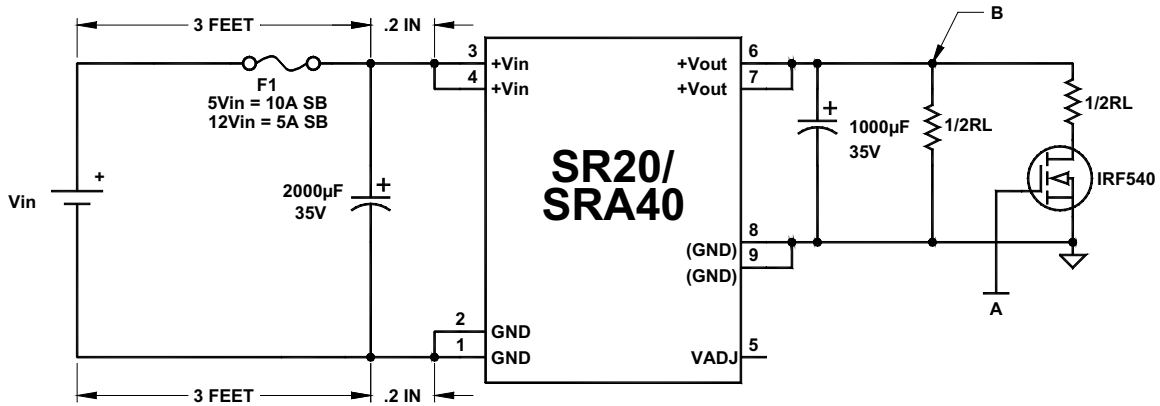


FIGURE 4. Transient response setup

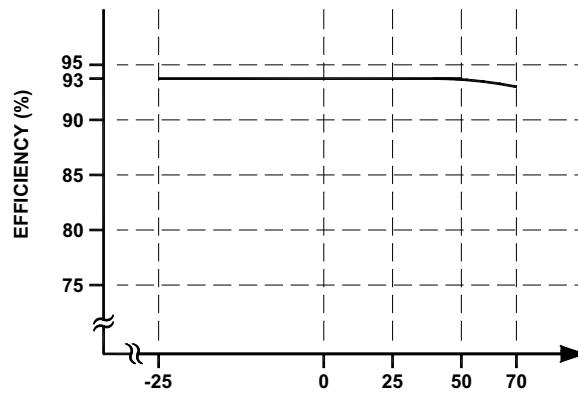


FIGURE 5. Efficiency vs. Temperature

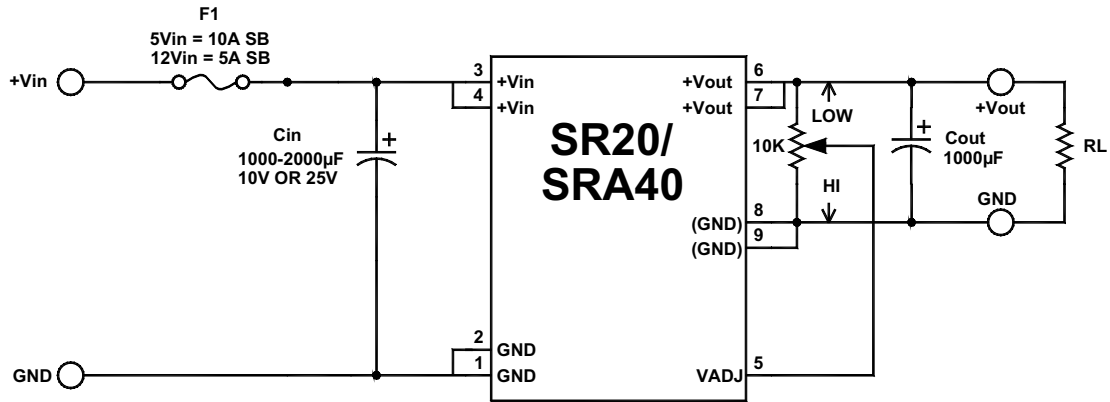
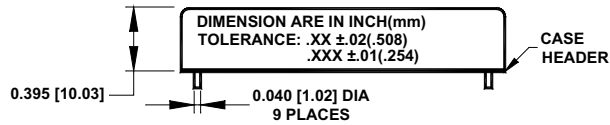


FIGURE 6. Typical connection diagram

### MECHANICAL SPECIFICATIONS



Pin	Function
1	GND (INPUT)
2	GND (INPUT)
3	+V <sub>IN</sub>
4	+V <sub>IN</sub>
5	V <sub>ADJ</sub>
6	+V <sub>OUT</sub>
7	+V <sub>OUT</sub>
8	GND (OUTPUT)
9	GND (OUTPUT)

