



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/in³ 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.

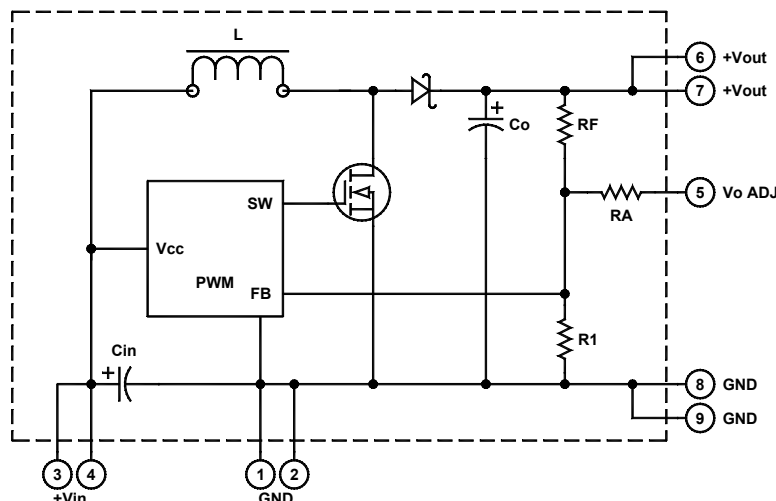
Applications

- 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 μ 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 _{pp} |
| 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 _{OUT} |
| Load Regulation | | | ±1 | ±2 | % of V _{OUT} |
| 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 ¹ | Case Temperature | 105 | 110 | 115 | °C |
| MTBF | per MIL-HNBK-217F (Ground benign, +25°C) | | 2.1×10 ⁶ | | 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 ² (mA _{pp}) | 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 |

¹ After thermal turn off, V_{OUT} ≅ V_{IN} – 0.7V.

² Measured with 1000µF input capacitor. See C_{IN} in Figure 6.

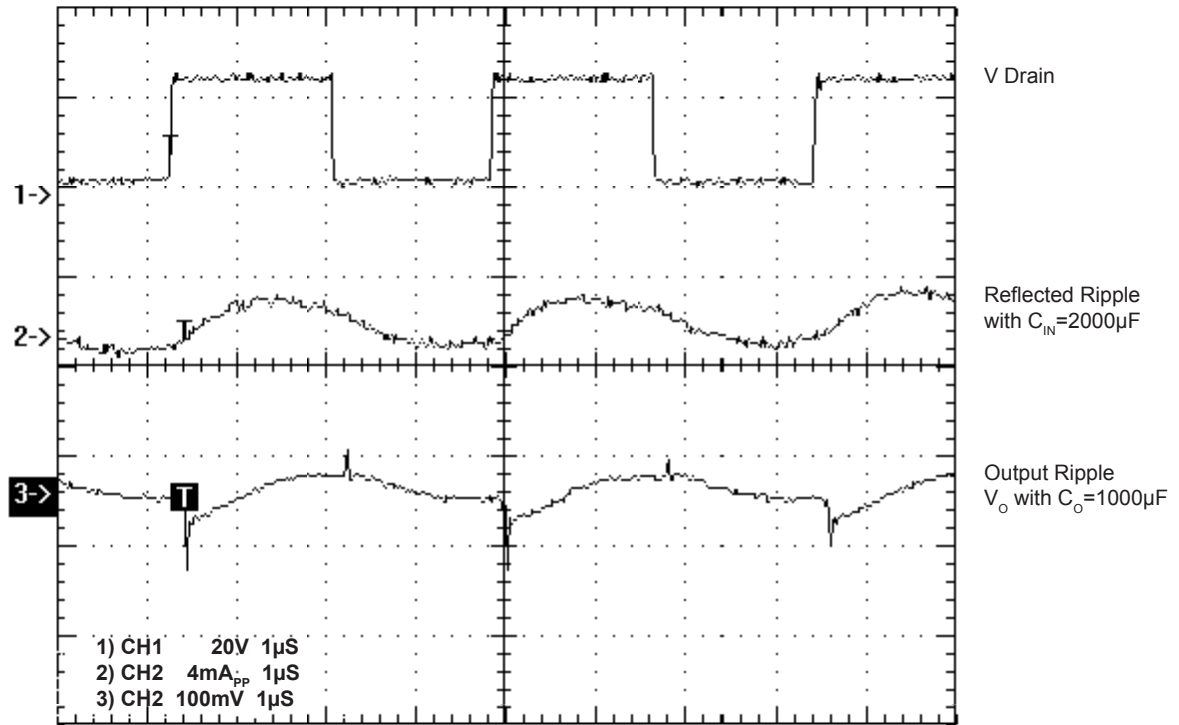


FIGURE 1. Reflected ripple and output ripple

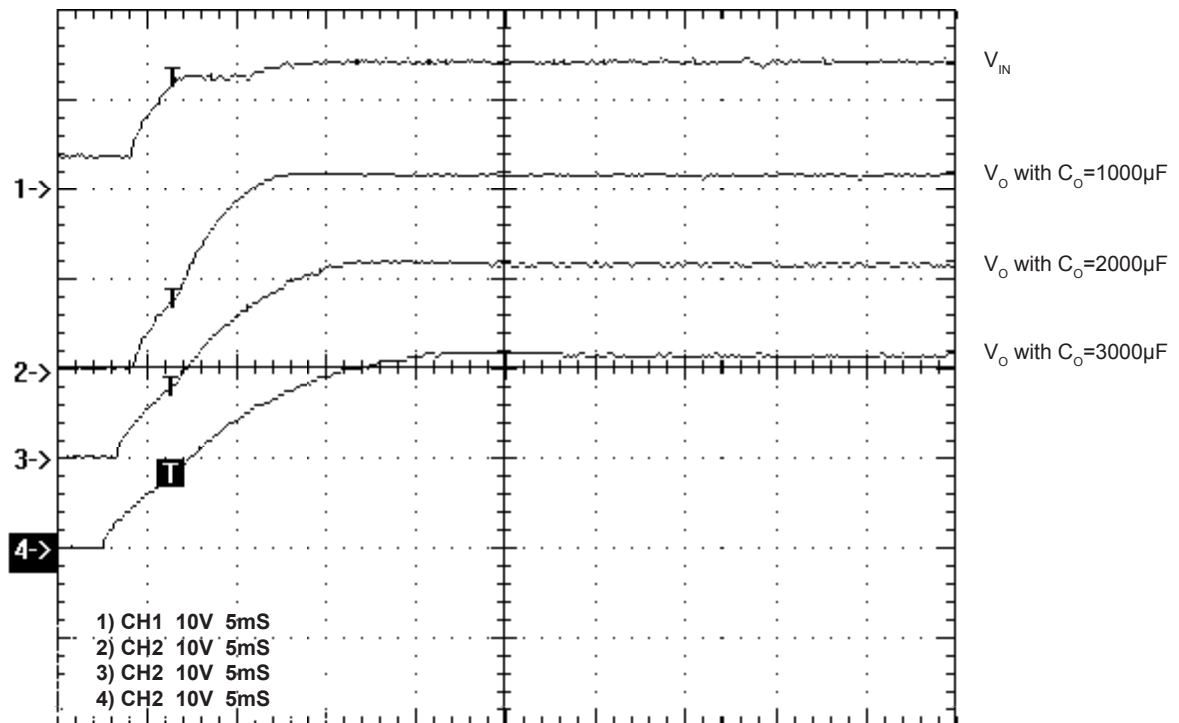


FIGURE 2. Soft start (SRA40S24/12)

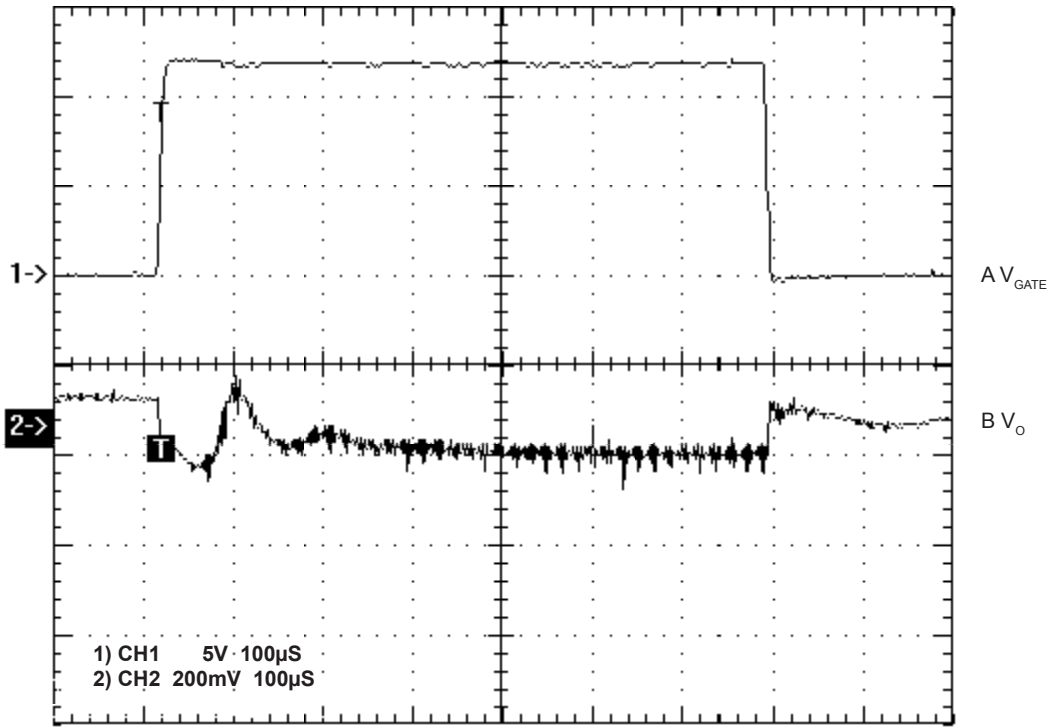


FIGURE 3. Transient response (SRA40S24/12), $V_{IN}=12V$, 40%FL to 80% FL to 40%FL, $C_{IN}=1000\mu F$

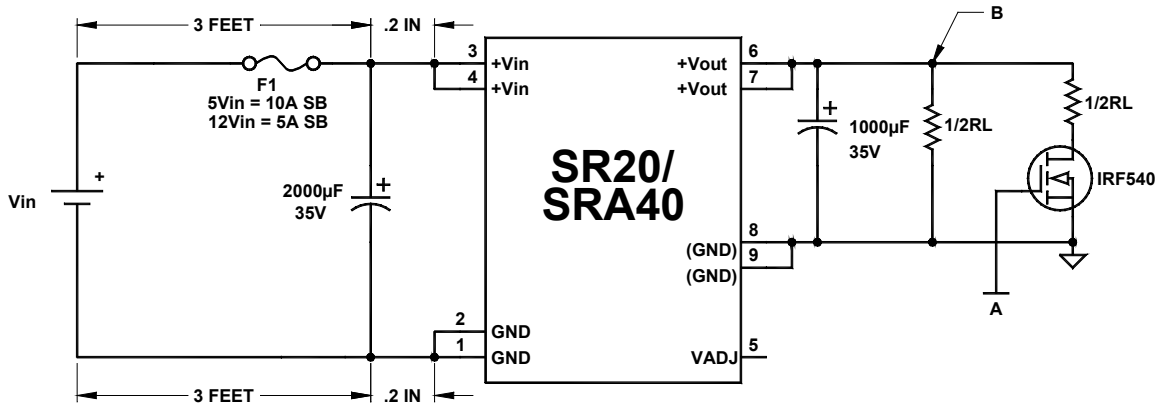


FIGURE 4. Transient response setup

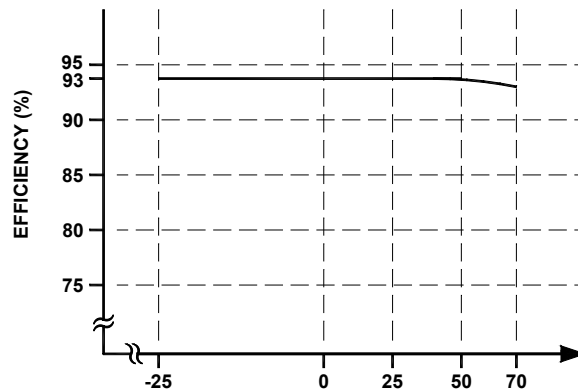


FIGURE 5. Efficiency vs. Temperature

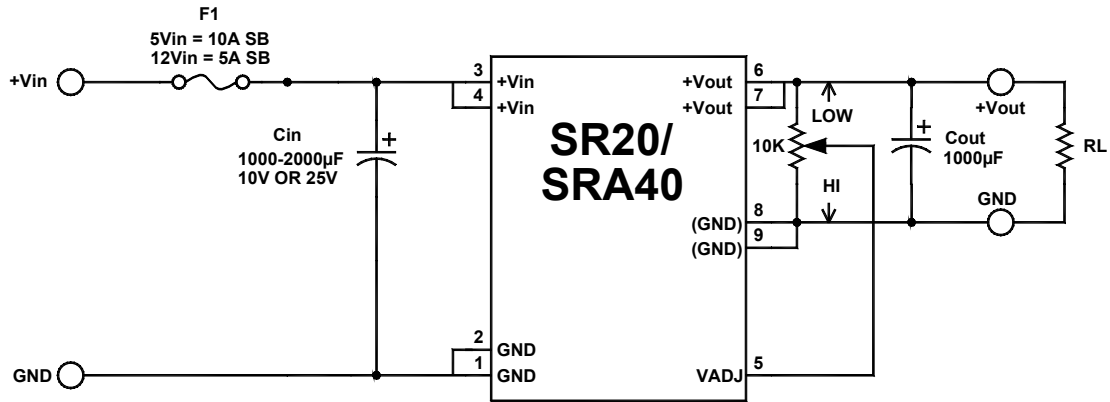
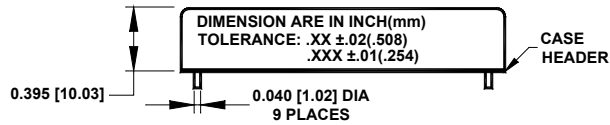


FIGURE 6. Typical connection diagram

MECHANICAL SPECIFICATIONS



| Pin | Function |
|-----|-------------------|
| 1 | GND (INPUT) |
| 2 | GND (INPUT) |
| 3 | +V _{IN} |
| 4 | +V _{IN} |
| 5 | V _{ADJ} |
| 6 | +V _{OUT} |
| 7 | +V _{OUT} |
| 8 | GND (OUTPUT) |
| 9 | GND (OUTPUT) |

