



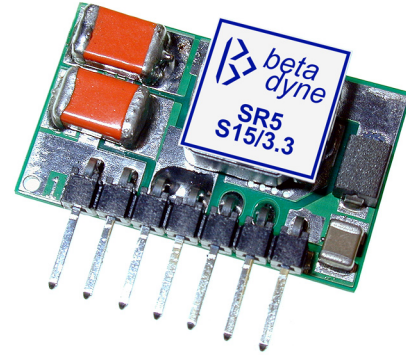
SR5

5W STEP-UP SWITCHING REGULATOR

2.5V_{IN} to 5V_{IN} Range

Key Features

- High efficiency up to 94%
- Wide input voltage range (2:1)
- 300µA off state current
- Input current limit
- Undervoltage protection
- 550kHz constant frequency
- Burst mode operation
- 30W/in³ power density



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

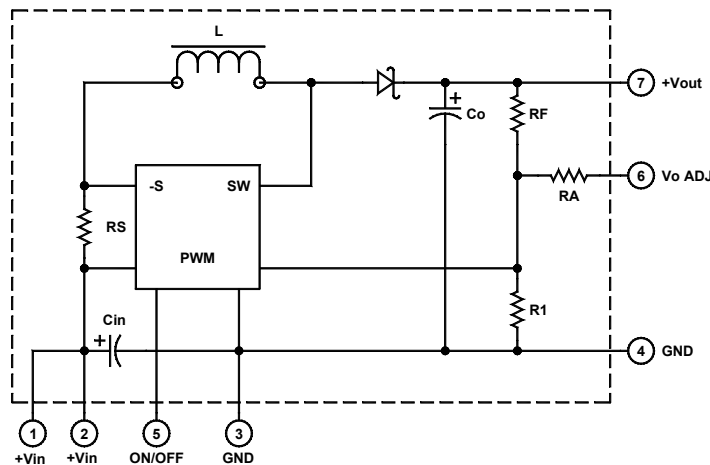
Distributed Power

Computers

Portable Equipment

Functional Description

The SR5 is a constant frequency, current mode step-up switching regulator with excellent line and load regulation. Burst mode operation improves efficiency at light loads, while high switching frequency and SMD technology makes achieving high power density, low cost and high reliability possible. Comes in a 1×0.6×0.28-inch 7-pin SIP package.



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	See Model Selection Guide				
Input Reflected Ripple	See Figure 2		50		mA _{PP}
Off State Input Current			300		μA
Remote On/Off Control	Reference to GND, Open = ON, Short = OFF				
Turn On Delay	Including Soft Start, See Figure 3		5	8	mS
Undervoltage Lockout		1.5	2	2.4	Vdc

OUTPUT SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Output Voltage Accuracy			0.5	2	%
Line Regulation			1	2	% of V _{OUT}
Load Regulation	V = 3.3V, NL to FL		1	2	% of V _{OUT}
Ripple and Noise	See Figure 2		30	50	mV
Temperature Coefficient			0.01	0.02	%
Transient Response	See Figure 4		100		μS
Short Circuit Current	Input Current Limit, Input Fuse				
V Adjust Range			5	10	%

GENERAL SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Efficiency	See Model Selection Guide, Figures 5 & 6				
Switching Frequency	Fixed	500	550	650	kHz
Isolation	None				
Thermal Resistance	Internally dissipated		0.3	0.4	°C/W
MTBF	per MIL-HNBK-217F (Ground benign, +25°C)		2.9x10 ⁶		hours

ENVIRONMENTAL SPECIFICATIONS

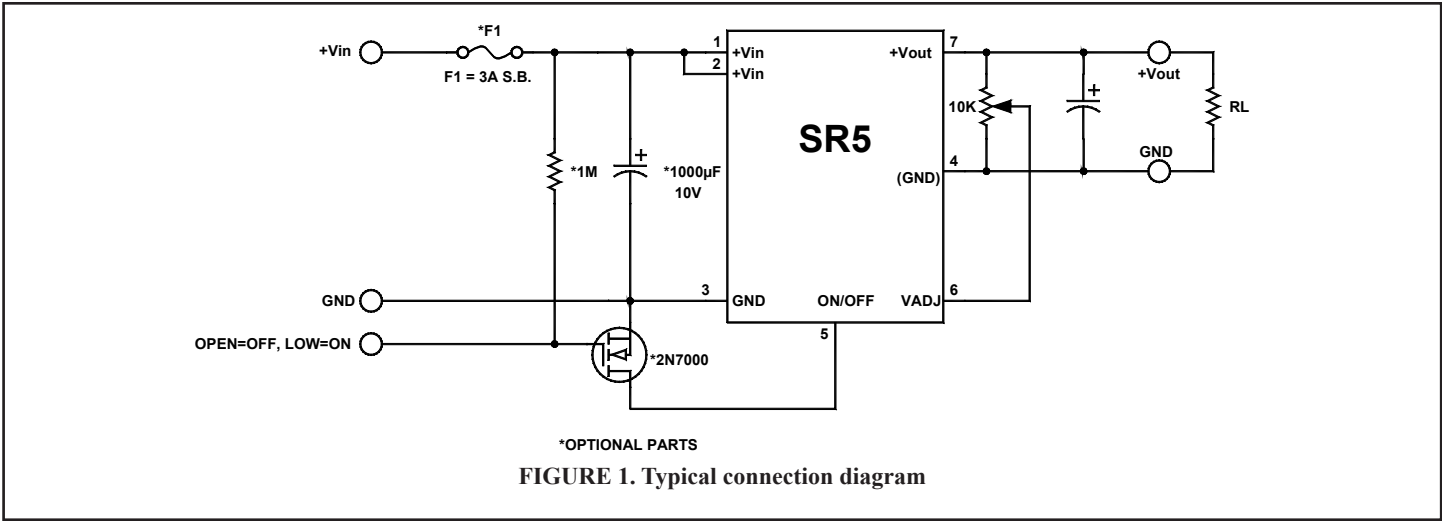
PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Humidity	Non-condensing			95	%
Storage Temperature		-60		+125	°C
Operating Temperature, Commercial		-40		+71	°C

PHYSICAL CHARACTERISTICS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Dimensions (L×W×H)	1.00×0.60×0.28 in. (25.40×15.24×7.11mm)				
Weight	0.17 oz. (4.7g)				

Model Selection Guide

MODEL NUMBER	INPUT				Reflected Ripple (mA _{PP})	OUTPUT		
	Voltage (Vdc)		Current (mA)			Voltage (Vdc)	Current (mA)	Efficiency Full Load (%)
	Nominal	Range	No Load	Full Load				
SR5S5/3.3	3.3	2.5–4	0.3	1720	15	5	1000	88
SR5S9/3.3	3.3	2.5–5	0.3	1684	15	9	560	90
SR5S12/3.3	3.3	2.5–5	0.3	1720	15	12	420	88
SR5S15/3.3	3.3	2.5–5	0.3	1720	15	15	330	88
<i>Contact factory for custom input and output voltage combinations</i>								



BURST MODE OPERATION

At loads of less than 50% of full load (FL), the converter operates in Burst Mode. Burst Mode Operation saves energy by reducing the switching frequency of the converter down to 25kHz. Operation at frequencies lower than 500kHz results in higher output ripple,

which can be 3–5 times higher than that at full load. In applications where higher output ripple cannot be accepted, a capacitor from 220µF to 4700µF can be used to reduce the Burst Mode Operation ripple down to acceptable levels.

SHORT CIRCUIT PROTECTION

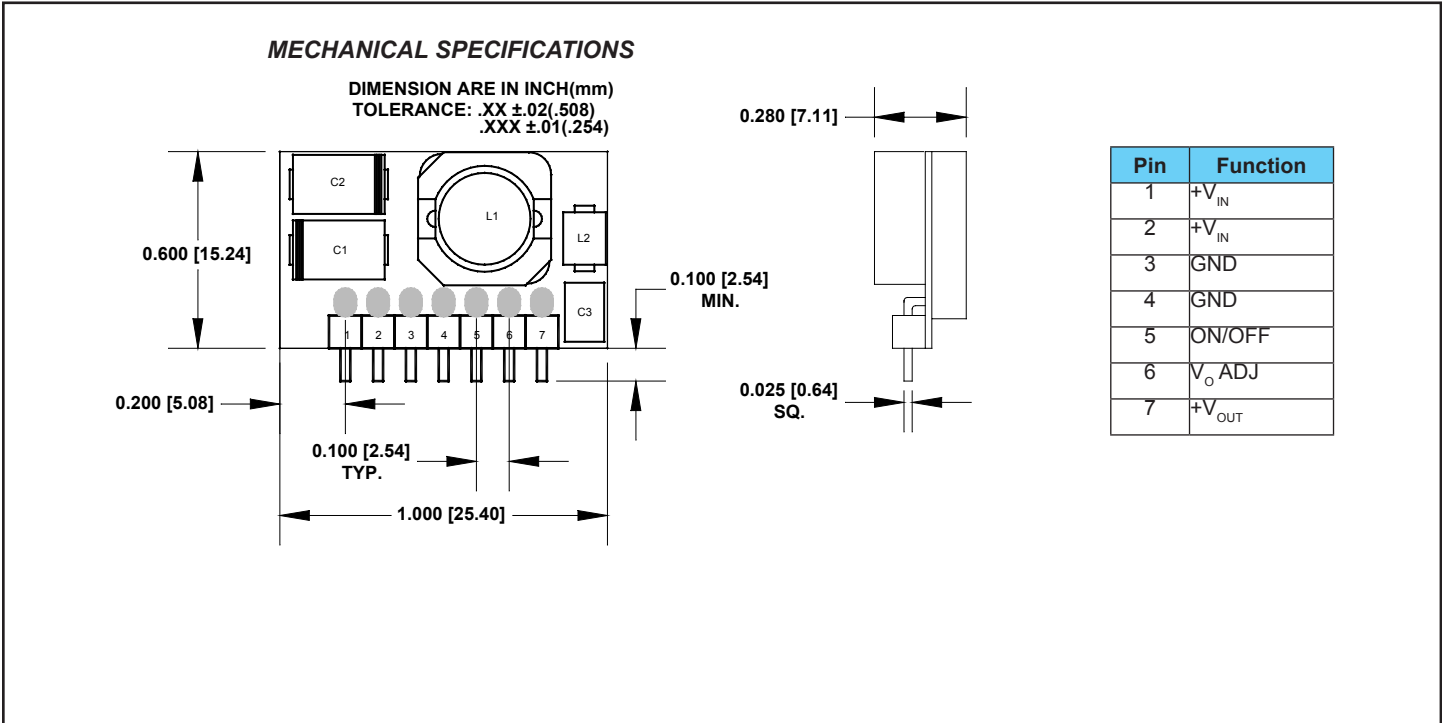
The SR5 series of converters feature input current limit protection. The maximum input current limit is set at $-V_{IN}$ minimum (2.5V) for I_o FL+20% typical at room temperature. When I_o exceeds its maximum output value, the output voltage starts to drop until $V_o \leq V_{IN} - V_{FB}$. At this point, the input is connected through the series inductor and diode to the output load. The input fuse will open when a direct

short is placed between V_o and ground (GND). A slow blow fuse is recommended to allow enough time to charge any input and/or output capacitance. When a resettable fuse is used, make sure it will operate over the temperature range of the converter.

ON/OFF

The converter can be turned ON/OFF through Pin 5. When Pin 5 is left open, the converter is ON. When Pin 5 is pulled low, $V_{PIN5} \leq 0.35V$, the converter will turn OFF. Use a low $R_{DS(ON)}$ MOSFET

(see Figure 1) for switching.



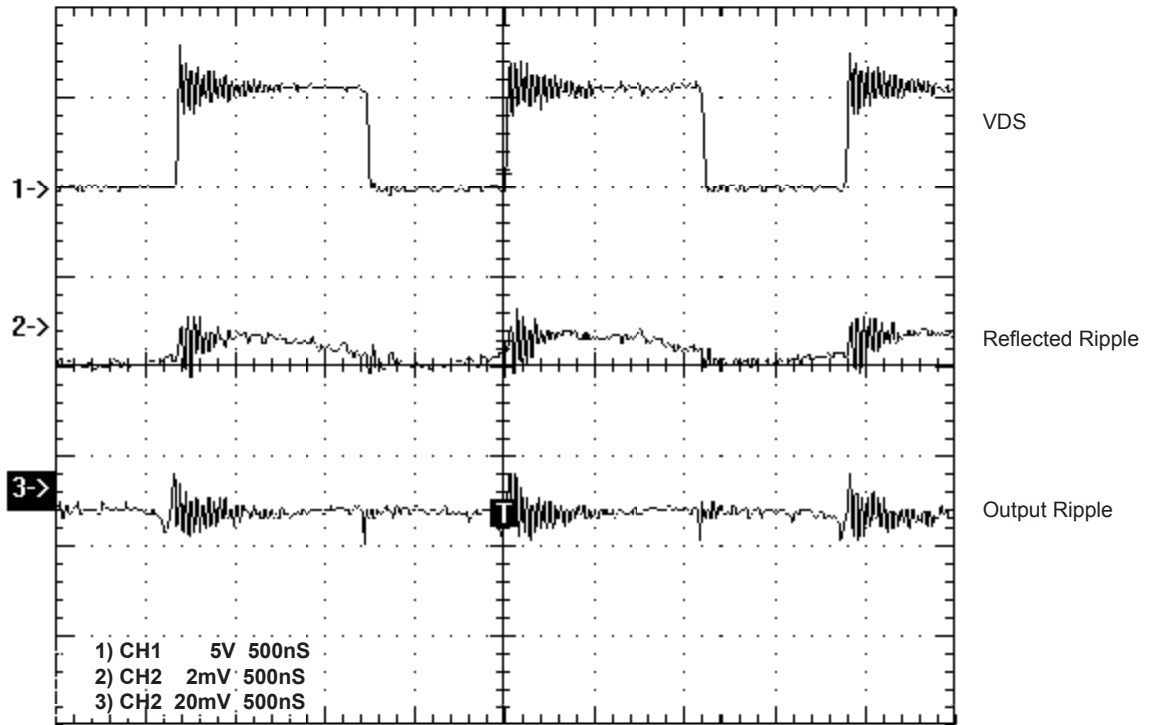


FIGURE 2. Input reflected ripple/output ripple

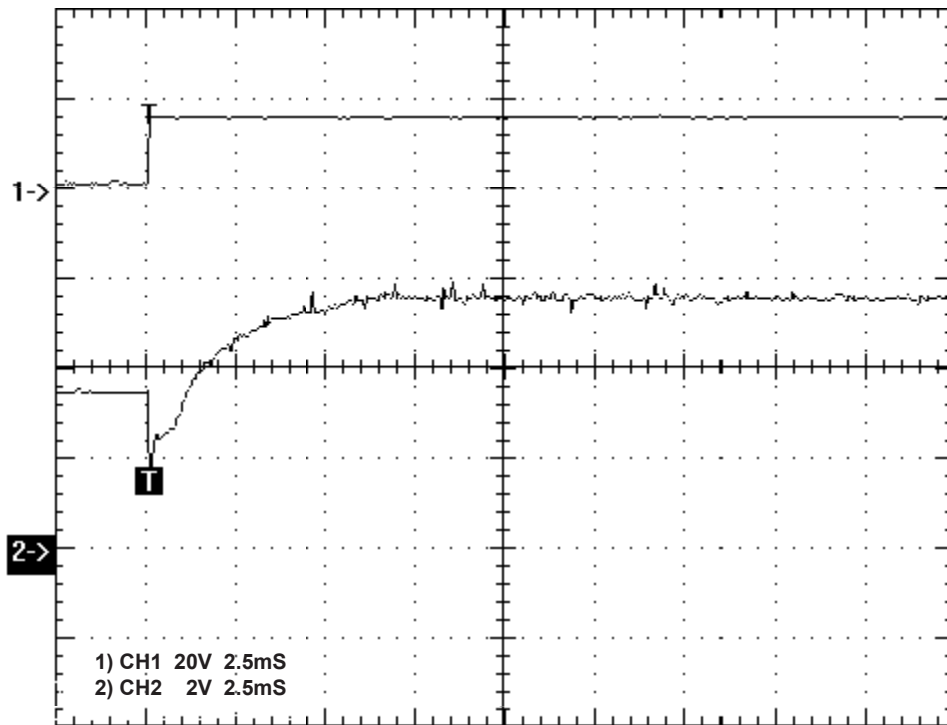


FIGURE 3. Turn on delay, V_o fully loaded (5S5/3.3)

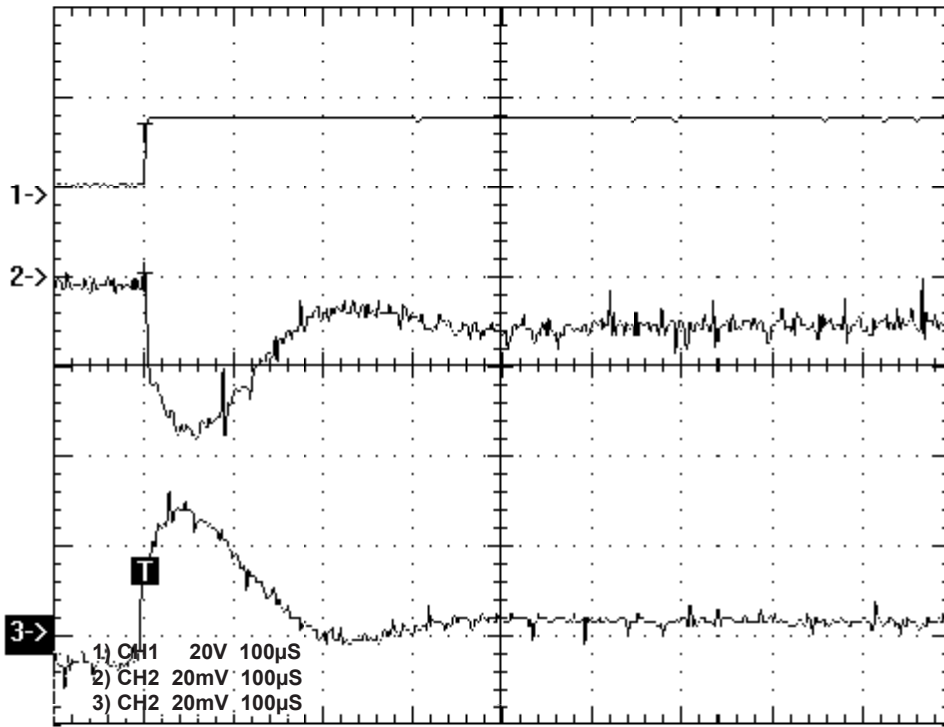


FIGURE 4. Transient response 50%FL to FL to 50%FL

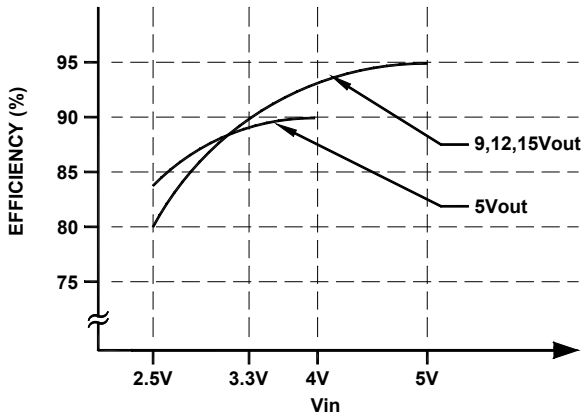


FIGURE 5. Efficiency vs. Input Voltage

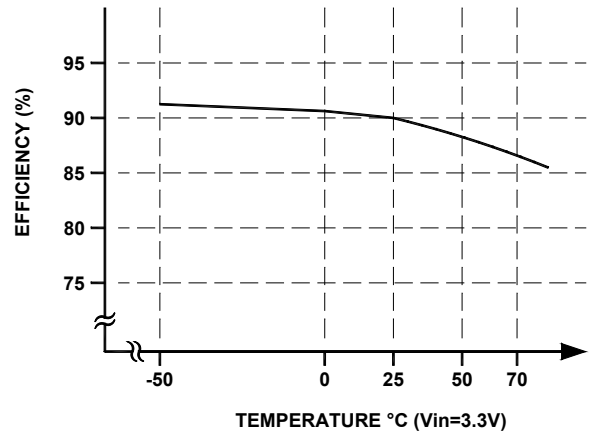


FIGURE 6. Efficiency vs. Temperature