



SP2307

3A/24V SYNCHRONOUS STEP-DOWN DC/DC CONVERTER

DESCRIPTION

The SP2307 is a 350KHz pulse-width-modulated, DC-DC step-down converter. Its operation ranges from 4.75V to 24V. The output is adjustable from 0.925V to 20V with the output current up to 3A. The integrated two MOSFET switches have the R_{dson} at 85mOhm. With power pad SOP8 package, it provides good heat dissipation. SP2307 has cycle to cycle over current protection with fast transient protection. Adjustable soft start prevents in-rush current at turn on.

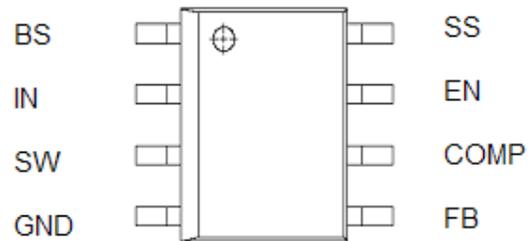
APPLICATIONS

- Notebook
- Green Electronic and Appliance
- DSP, ASIC Power supplies
- Network System

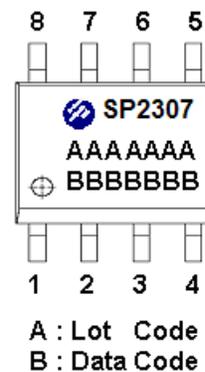
FEATURES

- 350KHz switching and synchronization
- Dynamic output-voltage adjustment from 0.925V to 20V
- 3A Output Current
- 95% Efficiency
- No Schottky Diode Required
- Programmable Soft Start
- Over Current/Temperature Protection
- Shutdown Current at 1uA typical
- 8-pin PSOP Power Package

PIN CONFIGURATION (SOP-8 Power Pad)



PART MARKING

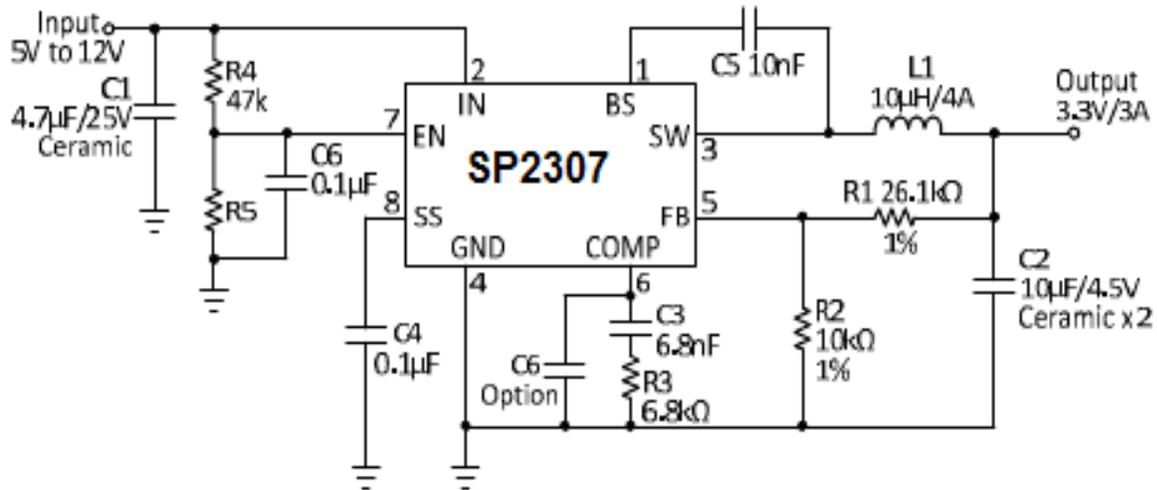




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TYPICAL APPLICATION CIRCUIT



PIN DESCRIPTION & ELECTRICAL CHARACTERISTICS

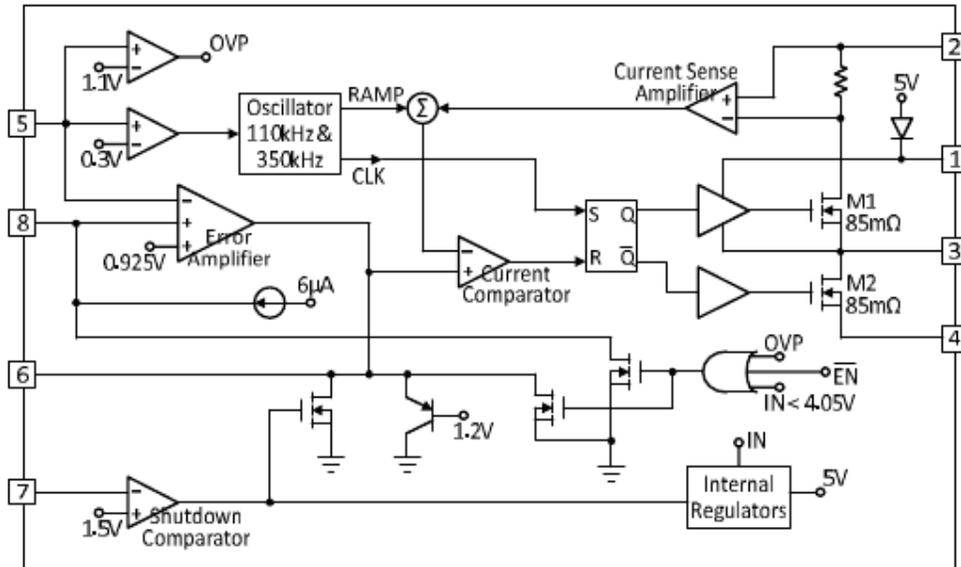
Pin	Symbol	Description	Operating Rating			
			Min.	Typ.	Max.	Unit
1	BS	High-side Gate Drive Boost Input	$V_{sw}-0.3$		$V_{sw}+6$	V
2	IN	Power Input	-0.3		26	V
3	SW	Power Switching Output	-1		$V_{IN}+0.3$	V
4	GND	Ground				
5	FB	Feedback Input	-0.3		6	V
6	COMP	Compensation Node	-0.3		6	V
7	EN	Enable	-0.3		$V_{IN}+0.3$	V
8	SS	Soft Start Control	-0.3		6	V



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BLOCK DIAGRAM



ORDERING INFORMATION

Part Number	Package	Part Marking
SP2307SP8RGB	SOP-8 (Power Pad)	SP2307
SP2307SP8TGB	SOP-8 (Power Pad)	SP2307

※ SP2307SP8RGB : 7" Tape Reel; Pb – Free, Halogen-Free

※ SP2307SP8TGB : Tube; Pb – Free, Halogen-Free

ABSOLUTE MAXIMUM RATINGS (TA=25°C, unless otherwise specified.)

The following ratings designate persistent limits beyond which damage to the device may occur.

Symbol	Parameter	Value	Unit
V _{IN}	DC Supply Voltage	-0.3 ~ 26	V
I _{OUT}	Output Current, Source or Sink	3	A
T _J	Operating Junction Temperature Range	150	°C
T _{STG}	Storage Temperature Range	-65 to 150	°C
T _{LEAD}	Lead Soldering Temperature for 5 sec.	260	°C
Tope	Operation Temperature Range	-40 ~ 85	°C
R _{ΘJC}	Thermal Resistance Junction – Case (*)	10	°C/W



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ELECTRICAL CHARACTERISTICS

(Unless otherwise stated, these specifications apply $T_A=25^{\circ}\text{C}$; $V_{IN}=+12$)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
SUPPLY						
V_{IN}	Supply Voltage		4.75		24	V
I_{IN}	Supply Current	$V_{EN} = 2V, V_{FB} = 1V$		1.3	1.5	mA
I_{SD}	Shutdown Supply Current	$V_{EN} = 0V$		0.3	3.0	uA
UVLO	Under Voltage Lockout Threshold		3.8	4.05	4.4	V
A_{EA}	Error Amplifier Voltage Gain*			400		V/V
G_{EA}	Error Amplifier Transconductance	$\Delta I_c = +/-10\mu A$		820		uA/A
GCS	COMP to Current Sense Transconductance			5.2		A/V
FEEDBACK						
V_{FB}	Feedback Voltage	$4.75V \leq V_{IN} \leq 24V$	0.9	0.925	0.95	V
$V_{FB(TH)}$	Feedback Overvoltage Threshold			1.1		V
ENABLE						
V_{EN}	Enable Shutdown Voltage		1.1	1.5	2.0	V
$V_{EN(HY)}$	Enable Shutdown Voltage Hysteresis			220		mV
	Enable Lockout Voltage		2.2	2.5	2.7	V
	Enable Lockout Hysteresis			210		mV
SOFT START						
I_{SS}	Soft-Start Current	$V_{SS} = 0V$		6		uA
T_{SS}	Soft-Start Period	$C_{SS} = 0.1\mu F$		15		mS
SWITCHING REGULATOR						
V_{OUT}	Adjustable Output Voltage		0.925		24	V
f_{sw}	Switching Frequency		300	350	400	KHz
f_{SHORT}	Short Circuit Oscillation Frequency	$V_{FB} = 0V$		110		KHz
D_{MAX}	Maximum Duty Cycle	$V_{FB} = 1V$		90		%
T_{ON}	Minimum ON Time*			220		nS
$R_{DS(ON)}$	Drain to Source on-State Resistance*			85		mΩ
$I_{LEAKAGE}$	High Side Switch Leakage Current	$V_{EN} = 0V, V_{SW} = 0V$			10	uA
I_U	Upper Switch Current Limit	Minimum Duty Cycle	3.8	5.3		A
I_L	Lower Switch Current Limit	Drain to Source		0.9		A

*Guaranteed by design



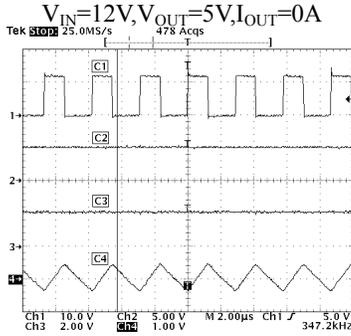
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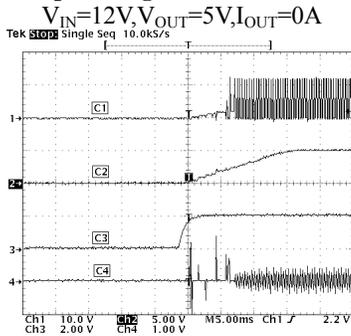
TYPICAL PERFORMANCE CHARACTERISTICS

C1=10uF + 0.1uF, C2=2 x 10uF + 0.1uF, L=10uH, C_{SS} = 0.1uF, T_A= +25°C; unless otherwise noted.

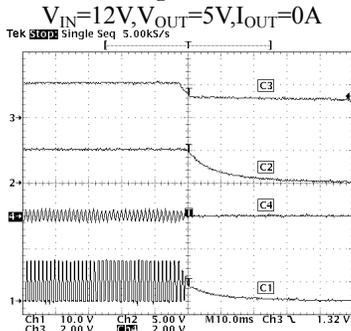
Steady State Test Waveforms



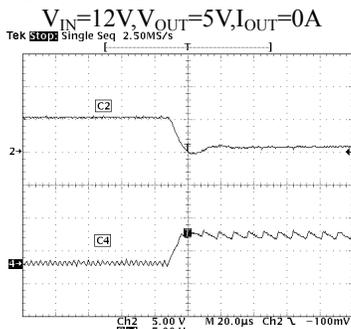
Startup Through Enable Waveforms



Shutdown Through Enable Waveforms

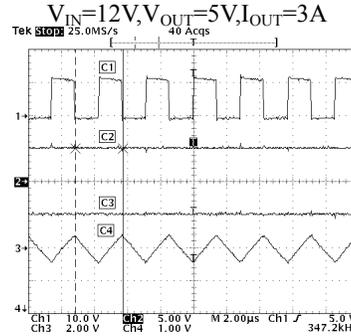


Short Circuit Test Waveforms

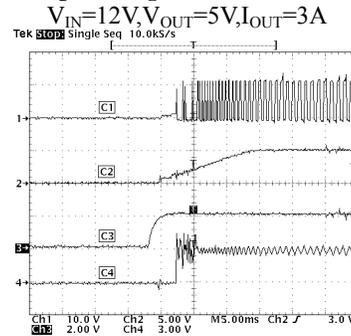


CH1 : V_{SW} , CH2 : V_{OUT} , CH3 : V_{EN} , CH4 : I_L

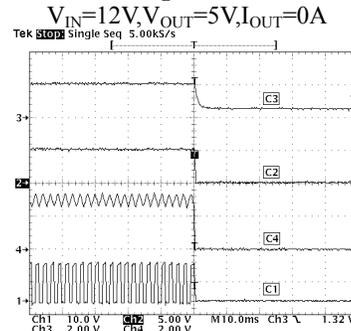
Steady State Test Waveforms



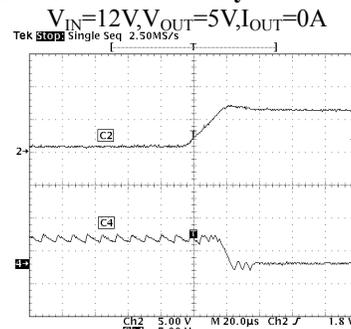
Startup Through Enable Waveforms



Shutdown Through Enable Waveforms



Short Circuit Recovery Waveforms

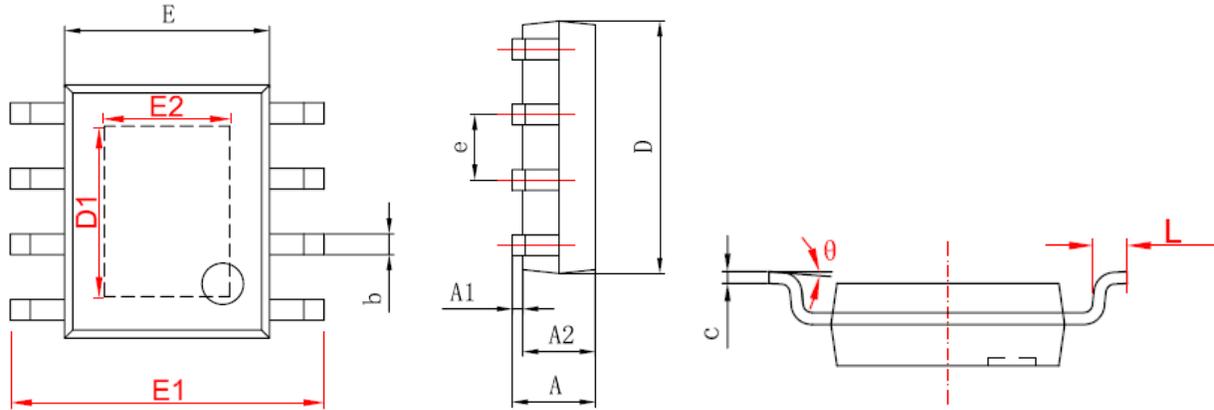




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SOP- 8 Power Pad PACKAGE OUTLINE



SYMBOLS	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.050	0.150	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
D1	3.202	3.402	0.126	0.134
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
E2	2.313	2.513	0.091	0.099
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



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