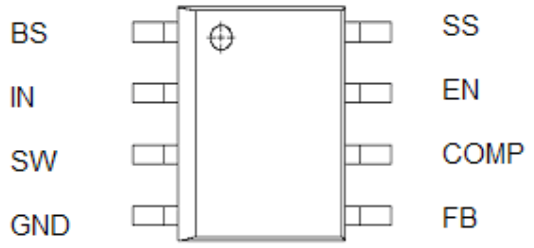
SP2306
2A/24V SYNCHRONOUS STEP-DOWN DC/DC CONVERTER

DESCRIPTION
The SP2306 is a 350KHz pulse-width-modulated, DC-DC step-down converter. Its operation ranges from 4.75V to 24V. The output is adjustable from 0.923V to 18V with the output current up to 2A. The integrated two MOSFET switches have the Rdson at 130mOhm. SP2306 has cycle to cycle over current protection with fast transient protection. Adjustable soft start prevents in-rush current at turn on. Typical shutdown current is 1 uA.

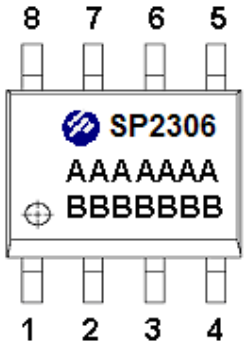
APPLICATIONS
- Notebook
- Green Electronic and Appliance
- DSP, ASIC Power supplies
- Network System

FEATURES
- 4.75Vto 24V input voltage
- 350KHz switching and synchronization
- Dynamic output-voltage adjustment from 0.925V to 18V
- 2A Output Current
- 93% Efficiency
- No Schottky Diode Required
- Programmable Soft Start
- Over Current/Temperature Protection
- Shutdown Current at 1uA typical
- 8-pin SOP Power Package

PIN CONFIGURATION (SOP-8 Power Pad)

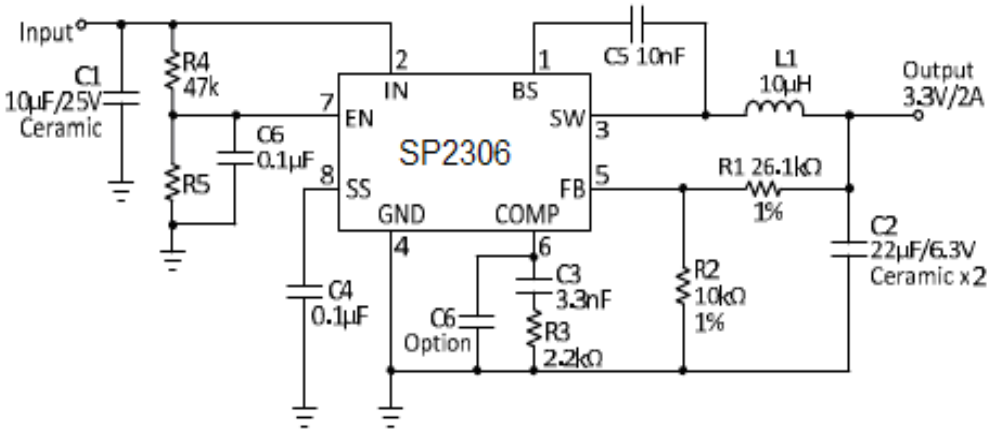


PART MARKING



A : Lot Code
B : Data Code

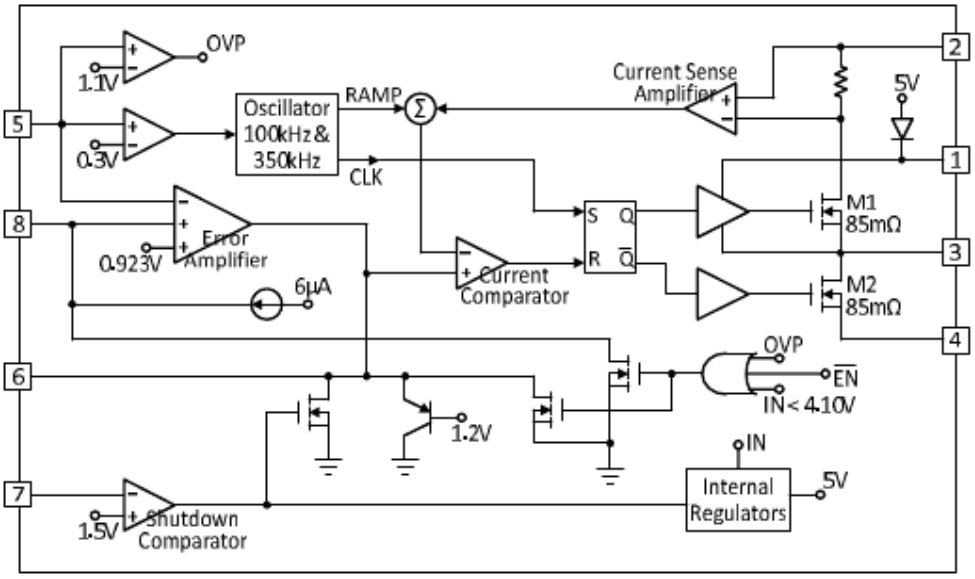
TYPICAL APPLCATION CIRCUIT



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}0+6	V
2	IN	Power Input	-0.3		26	V
3	SW	Power Switching Output	-0.3		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

BLOCK DIAGRAM



ORDERING INFORMATION

Part Number	Package	Part Marking
SP2306SP8RGB	SOP-8	SP2306
SP2306SP8TGB	SOP-8	SP2306

※ SP2306SP8RGB : 7" Tape Reel; Pb – Free, Halogen-Free

※ SP2306SP8TGB : Tube; Pb – Free, Halogen-Free

ABSOULTE MAXIMUM RATINGS (TA=25℃, unless otherwise specified.)

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

Symbol	Parameter	Value	Unit
VIN	DC Supply Voltage	-0.3 ~ 26	V
I_{OUT}	Output Current, Source or Sink	2	A
T_J	Operating Junction Temperature Range	150	℃
T_{STG}	Storage Temperature Range	-65 to 150	℃
T_{LEAD}	Lead Soldering Temperature for 5 sec.	260	℃
Tope	Operation Temperature Range	-40 ~ 85	℃
RΘJC	Thermal Resistance Junction – Case (*)	10	℃/W

ELECTRICAL CHARACTERISTICS

(Unless otherwise stated, these specifications apply T_A=25°C; VIN=+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	4.10	4.4	V
A_{EA}	Error Amplifier Voltage Gain*			400		V/V
G_{EA}	Error Amplifier Transconductance	ΔI_C = +/-10uA		800		uA/A
G_{CS}	COMP to Current Sense Transconductance			3.5		A/V
FEEDBACK						
V_{FB}	Feedback Voltage	4.75V≦V_{IN}≦24V	0.9	0.923	0.946	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			210		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} = 0.1uF		15		mS
SWITCHING REGULATOR						
V_{OUT}	Adjustable Output Voltage		0.923		18	V
fsw	Switching Frequency			350		KHz
f_{SHORT}	Short Circuit Oscillation Frequency	V_{FB} = 0V		100		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*			130		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	3.4		A
I_L	Lower Switch Current Limit	Drain to Source		1.1		A

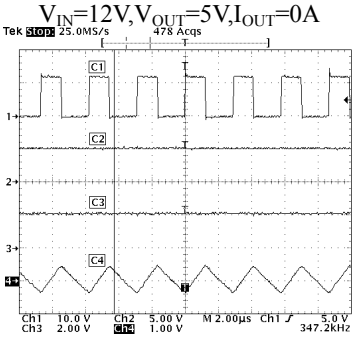
*Guaranteed by design

TYPICAL PERFORMANCE CHARACTERISTICS

C1=10uF + 0.1uF , C2=2 x 10uF + 0.1uF , L=10uH , Css = 0.1uF , T_A= +25℃; unless otherwise noted.

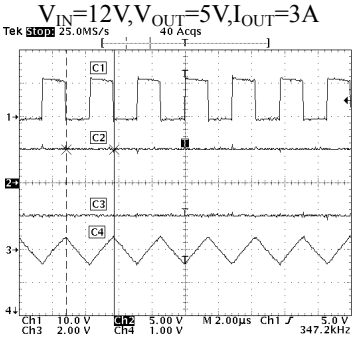
Steady State Test Waveforms

V_{IN}=12V,V_{OUT}=5V,I_{OUT}=0A



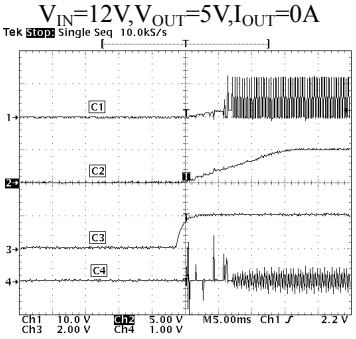
Steady State Test Waveforms

V_{IN}=12V,V_{OUT}=5V,I_{OUT}=3A



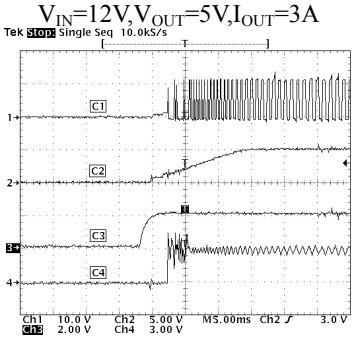
Startup Through Enable Waveforms

V_{IN}=12V,V_{OUT}=5V,I_{OUT}=0A



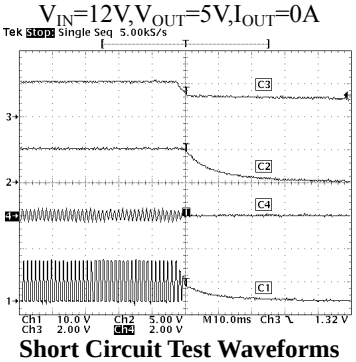
Startup Through Enable Waveforms

V_{IN}=12V,V_{OUT}=5V,I_{OUT}=3A



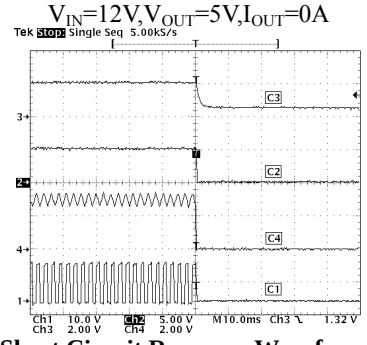
Shutdown Through Enable Waveforms

V_{IN}=12V,V_{OUT}=5V,I_{OUT}=0A



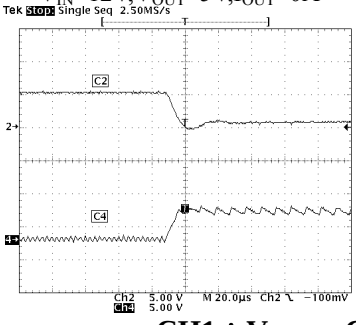
Shutdown Through Enable Waveforms

V_{IN}=12V,V_{OUT}=5V,I_{OUT}=0A



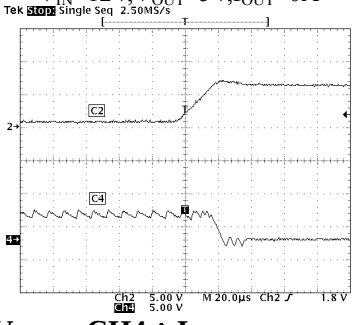
Short Circuit Test Waveforms

V_{IN}=12V,V_{OUT}=5V,I_{OUT}=0A



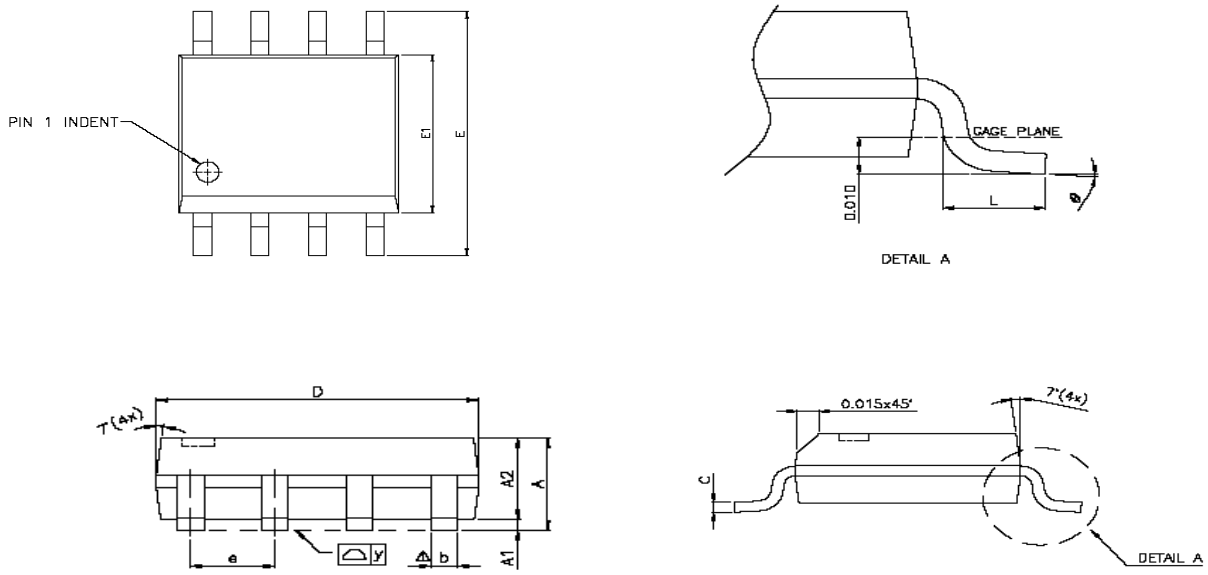
Short Circuit Recovery Waveforms

V_{IN}=12V,V_{OUT}=5V,I_{OUT}=0A



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

SOP- 8 PACKAGE OUTLINE



SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.47	1.60	1.73	0.058	0.063	0.068
A1	0.10	——	0.25	0.004	——	0.010
A2	——	1.45	——	——	0.057	——
b	0.33	0.41	0.51	0.013	0.016	0.020
C	0.19	0.20	0.25	0.0075	0.008	0.0098
D	4.80	4.85	4.95	0.189	0.191	0.195
E	5.80	6.00	6.20	0.228	0.236	0.244
E1	3.80	3.90	4.00	0.150	0.154	0.157
e	——	1.27	——	——	0.050	——
L	0.38	0.71	1.27	0.015	0.028	0.050
② y	——	——	0.076	——	——	0.003
θ	0°	——	8°	0°	——	8°

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