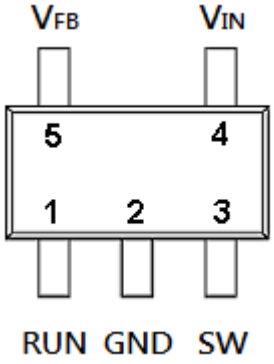
SP3406
600mA Buck Converter

DESCRIPTION
SP3406 is a high efficiency monolithic synchronous buck regulator using a constant frequency, current mode architecture. The device is available in an adjustable version and fixed output voltages, such as 1.5V,1.8V,etc. Supply current with no load is 30uA and drops to <1uA in shutdown. The 2.5 to 6.5V input voltage range makes the SP3406 ideally suitable for single Li-Ion, two to four AA battery-powered applications. In low dropout operation mode, the duty cycle can reach to 100%, extending battery life in portable systems. PWM pulse skipping mode operation provides very low output ripple voltage for noise sensitive applications. Switching frequency is internally set at 1.5MHz, allowing the use of small surface mount inductors and capacitors. The internal synchronous switch increases efficiency and eliminates the need for an external Schottky diode. Low output voltages are easily supported with the 0.6V feedback reference voltage. The SP 3406 is available in a small SOT-23-5 package.

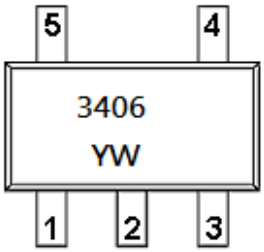
APPLICATIONS
- Digital Camera
- PDA
- Hand Held Communication Equipment
- Wireless and DSL Modems
- Portable instrument
- Microprocessor and DSP Core Supplies
- MID or UPMC

FEATURES
- High Efficiency: Up to 96%;
- 1.5MHz Constant Switching Frequency;
- 600mA Output Current at Vin=3V;
- Integrated Main Switch and Synchronous Rectifier, No Schottky Diode Required;
- 2.5 to 6.5V input voltage;
- Output Voltage as Low as 0.6V;
- 100% Duty Cycle in Dropout;
- Quiescent Current: 30uA(input<4.2V);
- Slope Compensated Current Mode Control for Excellent Line and Load Transient Response;
- Short Circuit Protection and Thermal Fault Protection;
- <1uA Shutdown Current;
- Soft Start;

PIN CONFIGURATION (SOT-23-5L)



PART MARKING



Y : Year Code
W : Week Code

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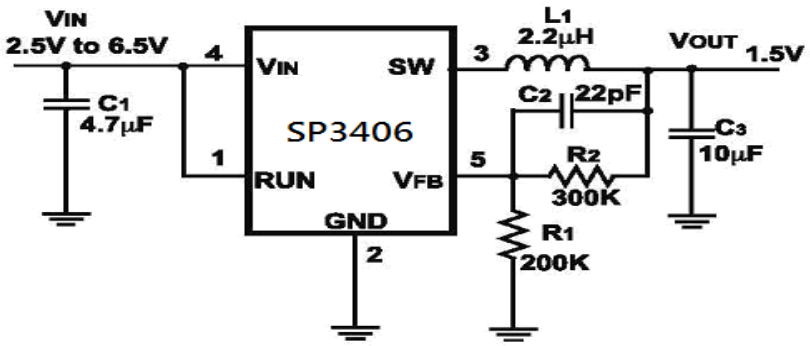
TYPICAL APPLICATION CIRCUIT

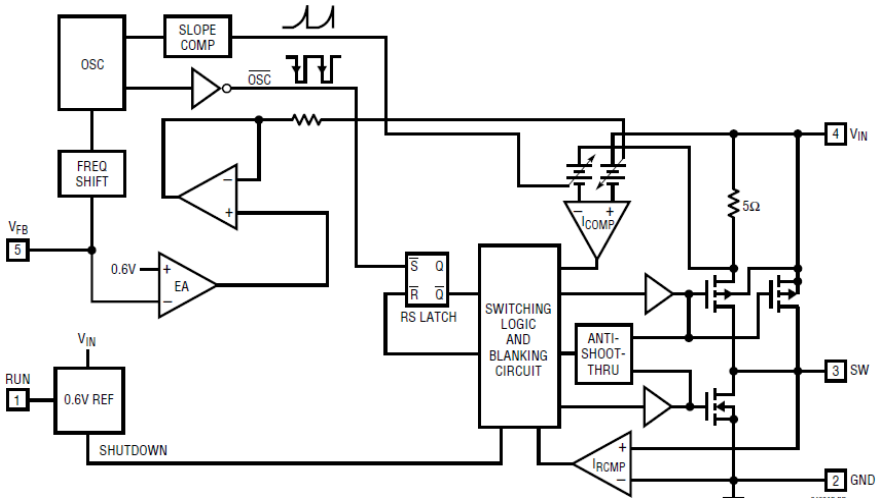


$$Vout = 0.6 \times (1 + \frac{R2}{R1})$$

PIN DESCRIPTION & ELECTRICAL CHARACTERISTICS

Pin	Symbol	Description	Operating Rating			
			Min.	Typ.	Max.	Unit
1	RUN	Control Input	-0.3		VIN	V
2	GND	Ground	-0.3		VIN+0.3	V
3	SW	Switch Node Connect to Inductor	-0.3		VIN+0.3	V
4	VIN	Supply Voltage	-0.3		6.5	V
5	VFB	Feedback	-0.3		VIN	V

BLOCK DIAGRAM



ORDERING INFORMATION

Part Number	Package	Part Marking
SP3406S25RGB	SOT-23-5L	3406

※ SP3406S25RGB : 7” Tape Reel; 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
V_{IN}	DC Supply Voltage	-0.3 ~ 6.5	V
I_{OUT}	SW Current, Source or Sink	1.3	A
T_J	Operating Junction Temperature Range	125	℃
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 (*)	250	℃/W

ELECTRICAL CHARACTERISTICS

(Unless otherwise stated, these specifications apply T_A=25°C; V_{IN}=3.6V)

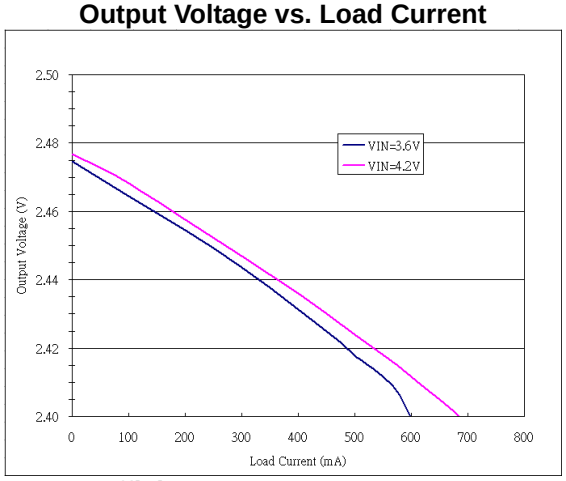
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
SUPPLY						
V_{IN}	Supply Voltage		2.5		6.5	V
I_{IN}	Input DC Bias Current Active mode	V_{FB} = 0.5V or V_{OUT} = 90%, I_{LOAD} = 0A		300	400	uA
	Input DC Bias Current Sleep Mode	V_{FB} = 0.62V or V_{OUT} = 103%, I_{LOAD} = 0A		20	35	uA
	Input DC Bias Current Shutdown Mode	V_{RUN} <0V, V_{IN} = 4.2V		0.1	1	uA
V_{RUN}	RUN Threshold		0.3	1	1.5	V
I_{RUN}	RUN Leakage Current			0.01	1	uA
FEEDBACK						
V_{FB}	Regulated Feedback Voltage		0.588	0.6	0.612	V
$\triangle V_{FB}$	Reference Voltage Line Regulation	V_{IN} = 2.5V to 5.5V		0.04	0.4	%/V
I_{FB}	Feedback Current				30	nA
$V_{LOADREG}$	Output Voltage Load Regulation			0.5		%
I_{PEAK}	Peak Induct Current	V_{IN} = 3V, V_{FB} = 0.5V, Duty Cycle < 35%	0.75	1	1.25	A
SWITCHING REGULATOR						
R_{PMOS} *	$R_{DS(on)}$ for P MOSFET	I_{SW} = 100mA		400	500	mΩ
R_{NMOS} *	$R_{DS(on)}$ for N MOSFET	I_{SW} = 100mA		350	450	mΩ
I_{LSW}	SW Leakage Current	V_{RUN} = 0V, V_{IN} = 5V, V_{SW} = 0V or 5V		0.01	1	uA
f_{OSC}	Oscillator Frequency	V_{FB} = 0V or V_{OUT} = 0V V_{FB}=0.6V or V_{OUT}=100%	1.2	1.5	1.8	MHz

* Guaranteed by Design

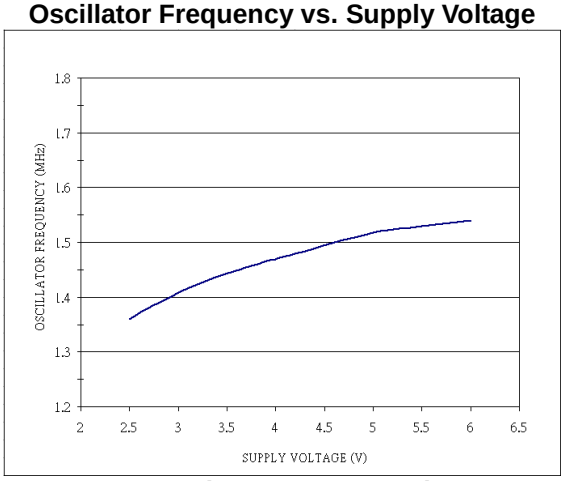
TYPICAL PERFORMANCE CHARACTERISTICS

(T_A= +25℃; unless otherwise noted.)

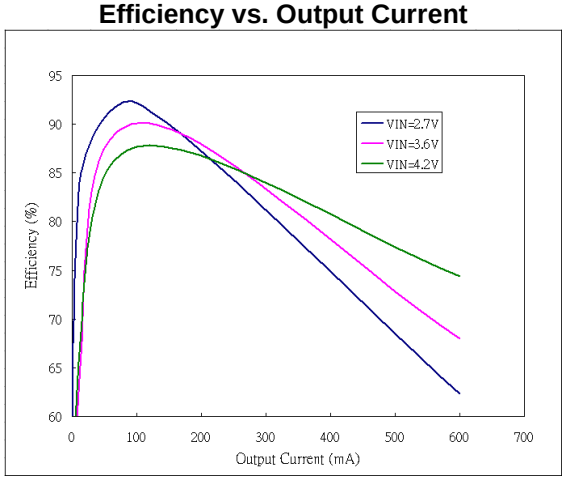
Output Voltage vs. Load Current



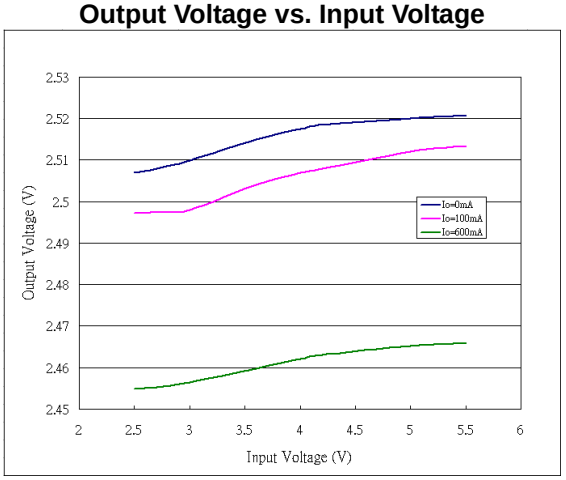
Oscillator Frequency vs. Supply Voltage



Efficiency vs. Output Current

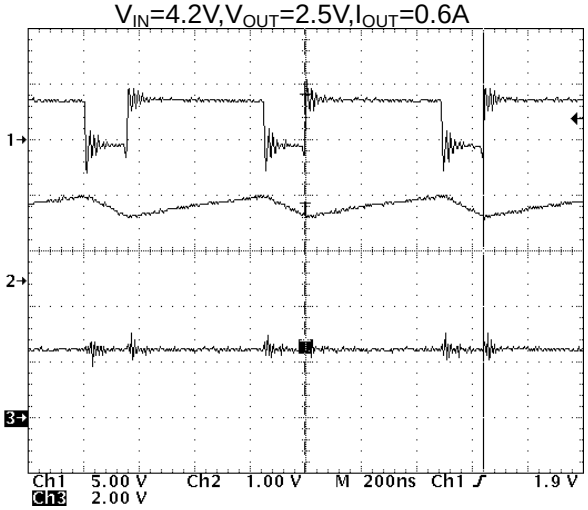


Output Voltage vs. Input Voltage



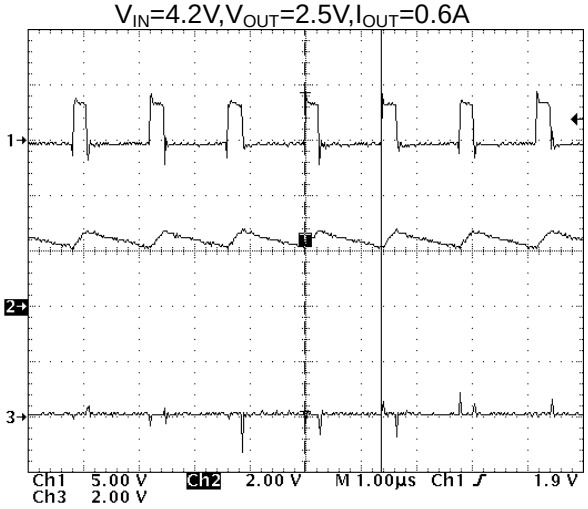
Normal Operating Waveforms

V_{IN}=4.2V,V_{OUT}=2.5V,I_{OUT}=0.6A



Short Circuit Protection Waveforms

V_{IN}=4.2V,V_{OUT}=2.5V,I_{OUT}=0.6A



CH1：V_{SW} ，CH2：I_L ，CH3：V_{out}

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