

Synchronous Step-Down Regulator JZ3406

General Description

The JZ3406 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 of 1.5V and 1.8V. Supply current during operation is only 20 μ A and drops to $\leq 1 \mu$ A in shutdown. The 2.5V to 5.5V input voltage range makes the JZ3406 ideally suited for single Li-Ion battery-powered applications. 100% duty cycle provides low dropout operation, extending battery life in portable systems. Automatic Burst Mode operation increases efficiency at light loads, further extending battery life. 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 JZ3406 is available in a low profile (1mm) Thin SOT package.

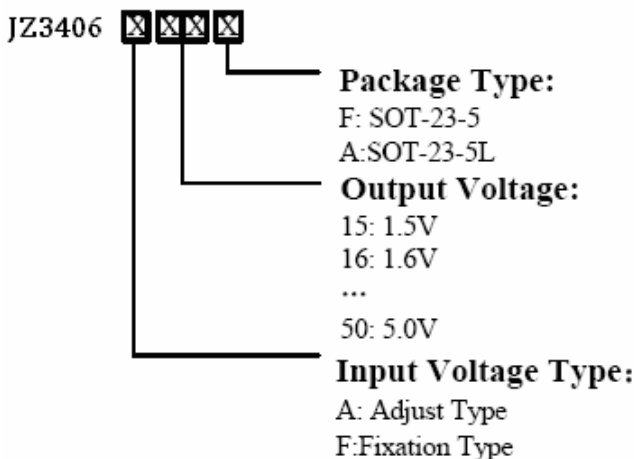
Features

- High Efficiency: Up to 96%
- Very Low Quiescent Current: Only 20 μ A During Operation
- 600mA Output Current
- 2.5V to 5.5V Input Voltage Range
- 1.5MHz Constant Frequency Operation
- No Schottky Diode required
- Low Dropout Operation: 100% Duty Cycle
- 0.6V Reference allows low output voltages
- Shutdown mode draws $\leq 1 \mu$ A supply current
- Current mode operation for excellent line and load transient response
- Over temperature protected
- Low profile (1mm) Thin SOT package.

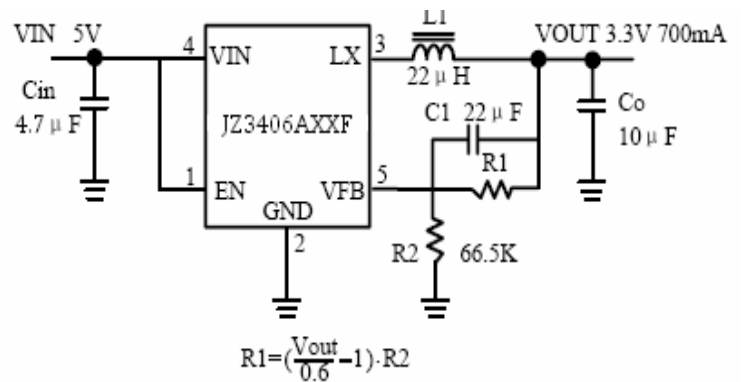
Applications

- Cellular telephones
- Personal information appliances
- Wireless and DSL modems
- Digital still cameras
- MP3 players
- Portable instruments

Ordering Information

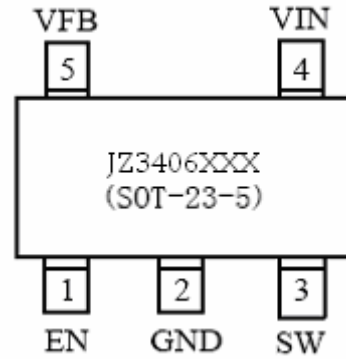


Typical Applications



Pin Assignment

JZ3406XXX	Pin name	Function
1	EN	ON/OFF Control(High Enable)
2	GND	Ground
3	SW	Switch Output
4	VIN	Input
5	VFB	Feedback voltage



Absolute Maximum Ratings

Input Supply Voltage.....-0.3V to 6V
 RUN.VFB Voltages.....-0.3V to VIN
 SW Voltage..... -0.3V to(VIN+0.3V)
 P-Channel Switch Source Current(DC).....800mA
 N-Channel Sink Source Current(DC).....800mA

Peak SW Sink and Source Current.....1.3A
 Operating Temperature Range.....-40°C to -85°C
 Junction Temperature(Note3)..... 30°C
 Storage Temperature Rang..... -65°C to 150°C
 Lead Temperature(Soldering,10sec).....300°C

Electronic Characteristics

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
V_{OUT}	Output Voltage	$I_{OUT} = 100mA$	1.75	1.80	1.85	V
V_{IN}	Input Voltage Range		2.5		5.5	V
V_{FB}	Regulated Voltage	$T_A = 25^\circ C$	0.5880	0.6	0.6120	V
		$0^\circ C \leq T_A \leq 85^\circ C$	0.5865	0.6	0.6135	V
		$-40^\circ C \leq T_A \leq 85^\circ C$	0.5850	0.6	0.6150	V
I_{FB}	Feedback Current				± 30	nA
ΔV_{FB}	V_{REF}	$V_{IN} = 2.5V \sim 5.5V$		0.04	0.4	%/V
F_{OSC}	Oscillator Frequency	$V_{FB} = 0.6V$ or $V_{OUT} = 100\%$	1.2	1.5	1.8	MHz
I_Q	Quiescent Current	$V_{FB} = 0.5V$ or $V_{OUT} = 90\%$, $I_{LOAD} = 0A$		230	300	μA
I_S	Shutdown Current	$V_{EN} = 0V$, $V_{IN} = 4.2V$		0.1	1	μA
I_{PK}	Peak Inductor Current	$V_{IN} = 3V$, $V_{FB} = 0.5V$ or $V_{OUT} = 90\%$, Duty Cycle < 35%	0.75	1	1.25	A
R_{PFET}	$R_{DS(ON)}$ of P-Channel FET	$I_{SW} = 100mA$		0.4	0.5	Ω
R_{NFET}	$R_{DS(ON)}$ of N-Channel FET	$I_{SW} = -100mA$		0.35	0.45	Ω
EFFI	Efficiency	When connected to ext. components $V_{IN} = EN = 3.0V, I_{OUT} = 100mA$		92		%
ΔV_{OUT}	V_{OUT} Line Regulation	$V_{IN} = 2.5V \sim 5.5V$		0.04	0.4	%/V
$V_{LOADREG}$	V_{OUT} Load Regulation			0.5		%

Pin Functions

RUN (Pin 1): Run Control Input. Forcing this pin above 1.5V enables the part. Forcing this pin below 0.3V shuts down the device. In shutdown, all functions are disabled drawing $<1\mu\text{A}$ supply current. Do not leave RUN floating.

GND (Pin 2): Ground Pin.

SW (Pin 3): Switch Node Connection to Inductor. This pin connects to the drains of the internal main and synchronous power MOSFET switches.

VIN (Pin 4): Main Supply Pin. Must be closely

decoupled to GND, Pin 2, with a $2.2\mu\text{F}$ or greater ceramic capacitor.

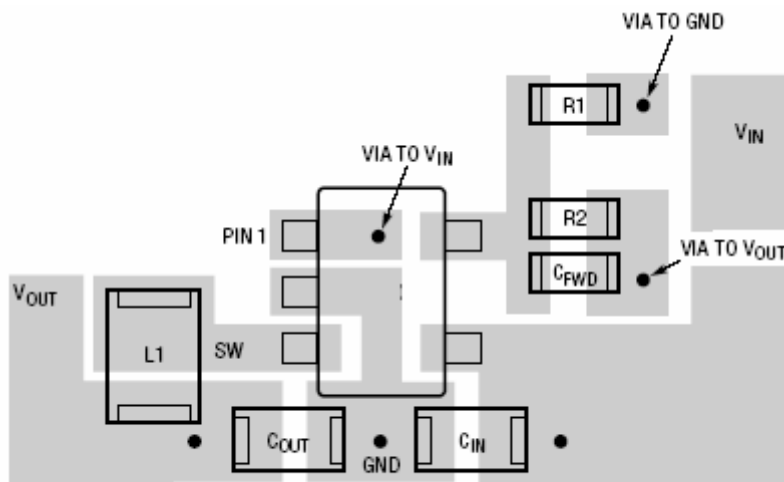
VFB (Pin 5) (JZ3406): Feedback Pin. Receives the feedback voltage from an external resistive divider across the output.

VOU(Pin 5) (JZ3406-1.5/JZ3406-1.8): Output Voltage Feedback Pin. An internal resistive divider divides the output voltage down for comparison to the internal reference voltage.

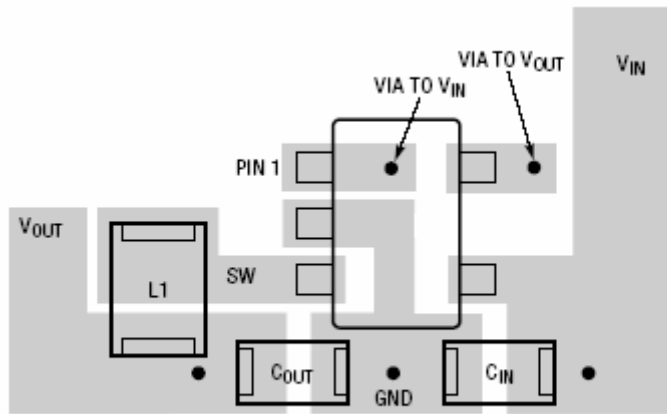
PCB Layout

When laying out the printed circuit board, the following checklist should be used to ensure proper operation of the JZ3406. Check the following in your layout:

1. The power traces, consisting of the GND trace, the SW trace and the VIN trace should be kept short, direct and wide.
2. Does the VFB pin connect directly to the feedback resistors? The resistive divider R1/R2 must be connected between the (+) plate of COU and ground.
3. Does the (+) plate of CIN connect to VIN as closely as possible? This capacitor provides the AC current to the internal power MOSFETs.
4. Keep the switching node, SW, away from the sensitive VFB node.
5. Keep the (-) plates of CIN and COU as close as possible.

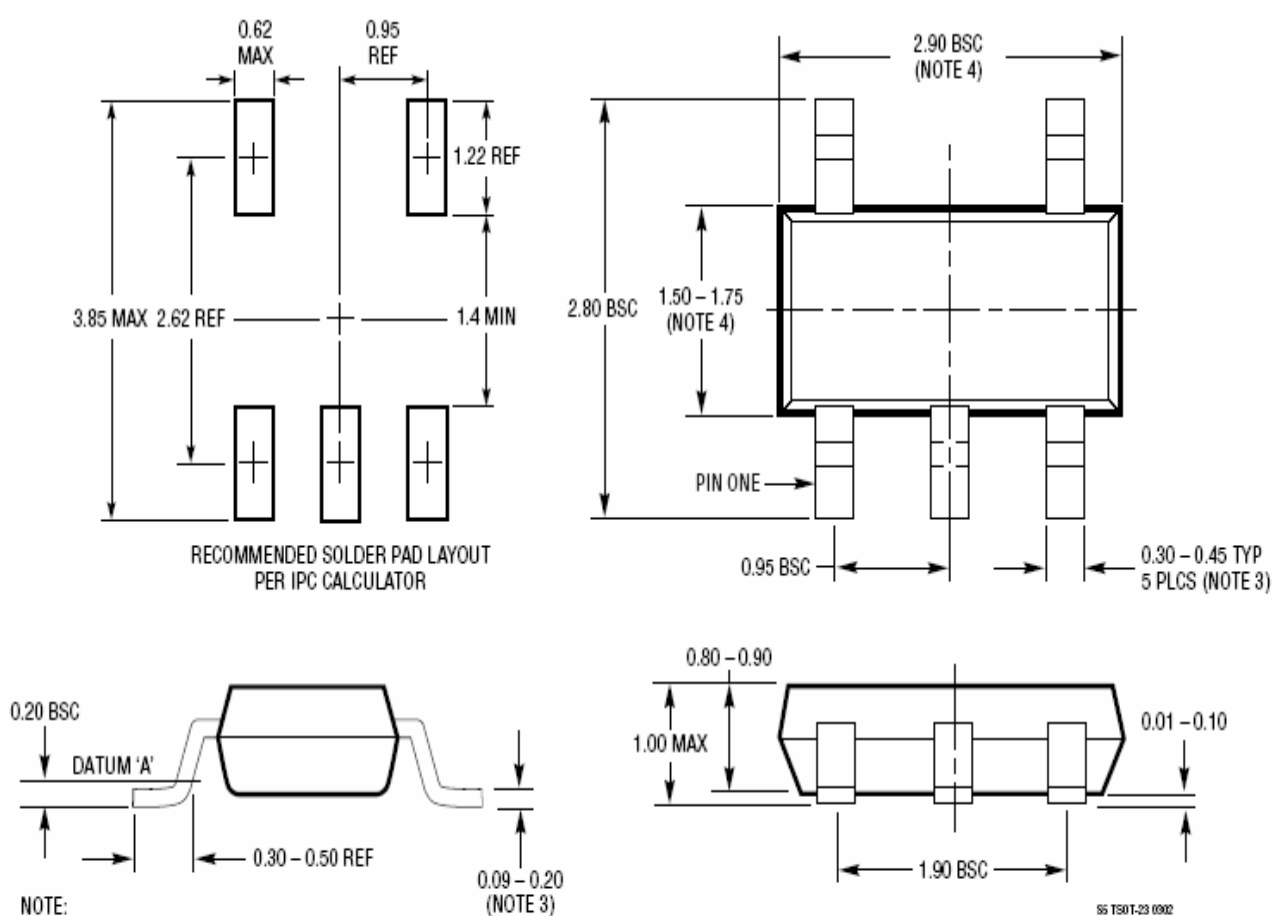


JZ3406 Suggested Layout



JZ3406-1.8 Suggested Layout

Package Information



NOTE:

1. DIMENSIONS ARE IN MILLIMETERS
2. DRAWING NOT TO SCALE
3. DIMENSIONS ARE INCLUSIVE OF PLATING
4. DIMENSIONS ARE EXCLUSIVE OF MOLD FLASH AND METAL BURR
5. MOLD FLASH SHALL NOT EXCEED 0.254mm
6. JEDEC PACKAGE REFERENCE IS MO-193