G2116

Sync. Rectifier Step Up Converter

Features

- **Up to 92% Efficiency at V_{OUT} = 5V from 3.3V Input**
- **Low 80μA Quiescent Current**
- **Guaranteed 1.2A Output Current at V_{OUT} = 5V from 3.3V Input**
- **1MHz PWM Switching Frequency**
- **Synchronous and Embedded Power Mosfets; No Schottky Diode Required**
- **Internal Soft-Start to Limit Inrush Current**
- **Adjustable Output**
- **Adjustable Output Current Limit in SOP-8 (FD)**
- **Output turn off true shutdown function**
- **Current Mode Operation with Internal Compensation for Excellent Line and Load Transient Response**
- **Overload/Short-Circuit Protection with hiccup control**
- **Shutdown Current <1μA**
- **Thermal Shutdown**
- **Compact 8 pin,SOP-8 (FD)**

General Description

The G2116 is a compact, high-efficiency, synchronous step-up converter with power Mosfets embedded and with output turn off true shutdown function and adjustable output current limiting with foldback for a single-cell Li-ion/polymer battery. The G2116 uses only 80μA (typ) quiescent current and allows the converter to switch only when needed at no load and light loads, and when load is higher than 100mA, it uses fixed-frequency PWM technique at 1MHz. It features a current mode control for fast transient response with internal compensation. The G2116 includes cycle-by-cycle current limit to maximum inductor current and over-temperature protection circuit. The G2116 is suitable for iPad-like computers, smart phones and portable handheld devices.

The G2116 is available in SOP-8 (FD) package. The operating temperature range is from -45°C to +85°C.

Application

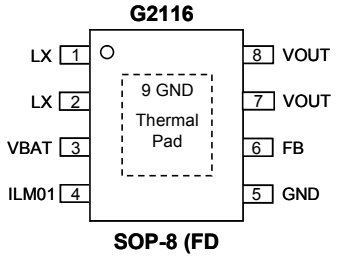
- **iPad-like computers, smart phones and portable handheld devices.**

Ordering Information

ORDER NUMBER	MARKING	TEMP. RANGE	PACKAGE (Green)
G2116F11U	G2116	0°C to +85°C	SOP-8 (FD)

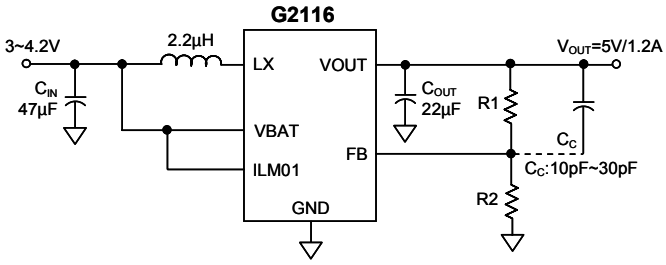
Note: F1:SOP-8 (FD)
1: Bonding Code
U: Tape & Reel

Pin Configuration



Note: Recommend connecting the Thermal Pad to the Ground for excellent power dissipation.

Typical Application Circuit



VOUT=VREF*(1+R1/R2), where VREF typical is 1.23V

Absolute Maximum Ratings

VOUT to GND . . . . . -0.3V to 6V
LX to GND . . . . . -0.3V to 6V
ILIM0 to GND . . . . . -0.3V to 6V
ILIM1 to GND . . . . . -0.3V to 6V
FB to GND . . . . . -0.3V to 6V
BAT to GND . . . . . -0.3V to 6V

Thermal Resistance of Junction to Ambient (θ_{JA})
SOP-8 (FD) . . . . . .TBD
Continuous Power Dissipation (T_A = +25°C)
SOP-8 (FD) . . . . . .TBD
Storage Temperature . . . . . -55~150°C
Operation Temperature. . . . . -40~85°C

Electrical Characteristics

(V_{OUT} = 5V, V_{BAT} = 3.6V, L = 2.2µH, C_{IN} = 47µF, C_{OUT} = 22µF, T_A = 25°C)

The device is not guaranteed to function outside its operating conditions. Parameters with MIN and/or MAX limits are 100% tested at +25°C, unless otherwise specified.

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
General						
Input operation voltage	V_{BAT}		2.5	---	5.5	V
Output voltage	V_{OUT}	Line and Load Regulation in CCM (IL>100mA) V_{BAT}=2.5~4.5	4.925	5	5.075	V
Input Quiescent current	I_{BAT}	V_{BAT} =3.6 FB>1.3 No load, no switching (exclude input current from ILM01)	---	80	100	µA
Shutdown supply current	I_{BAT}	ILM01=0	---	0.1	1	µA
Oscillator& Protection						
Switching Frequency	Fosc		0.75	1.0	1.25	MHz
Precharge and Soft-Start Interval	T_{SS}		5	7	9	ms
FB Regulation Voltage	V_{FB}		1.208	1.227	1.246	V
FB Input Current	I_{FB}	FB=1.0V	---	---	100	nA
Restart time in SCP	T_scp_restart		---	64	---	ms
short-Circuit Response Time	T_short_response	V_{OUT} < V_{OUT} X25%,	---	Tosc	---	µs
Current Limit Response Time	T_oc_response		---	Tosc	---	µs
Maximum Duty Cycle	D_{max}	FB=0.95V	86	93	96	%
DC-DC Switches						
VOUT Leakage Current	I_{PVOUT_LK}	ILM01=0 V_{OUT}=5V	---	1	5	µA
LX Leakage Current	I_{LX_LK}	ILM01=0 V_{OUT}=5V	---	1	5	µA
Switch ON Resistance	R_{ON}-N		---	70	91	mΩ
	R_{ON}-P		---	80	104	
Peak Current Limit	I_LIM	ILM01=1	3.2	---	---	A
Efficiency		ILM01=1 V_{BAT}=3.3V, V_{OUT}=5V, I_{OUT}=1A	---	92	---	%

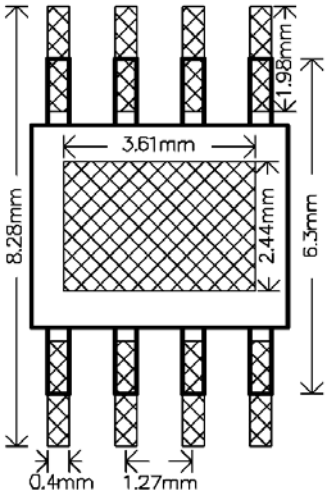
Electrical Characteristics (Continued)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Protection Block						
VOUT Short-Circuit Threshold	V_{SCP}	Falling Edge	---	V_{OUT}(1- 0.27)	---	V
VOUT Short-Circuit Threshold	V_{SCP}	Ring Edge	---	V_{OUT}(1- 0.19)	---	V
VBAT UVLO Threshold	V_{UVLO}	Falling Edge	1.7	1.9	2.2	V
VBAT UVLO Threshold	V_{UVLO}	Rling Edge	2	2.2	2.5	V
Thermal Shutdown Threshold		Rising Edge, 20°C hysteresis	---	150	---	°C
Control Block						
ILIM01, Input High Level	Vih_ilm		1.5	---	5.5	V
ILIM01, Input Low Level	Vil_ilm		0	---	0.5	V
ILIM01, Internal Pull-Low Resistance	Rin_ilm		400	500	600	KΩ

*note1: If ILM01 connect to Vbat, IT will consume current I_ilim01=Vbat/500k

Minimum Footprint PCB Layout Section

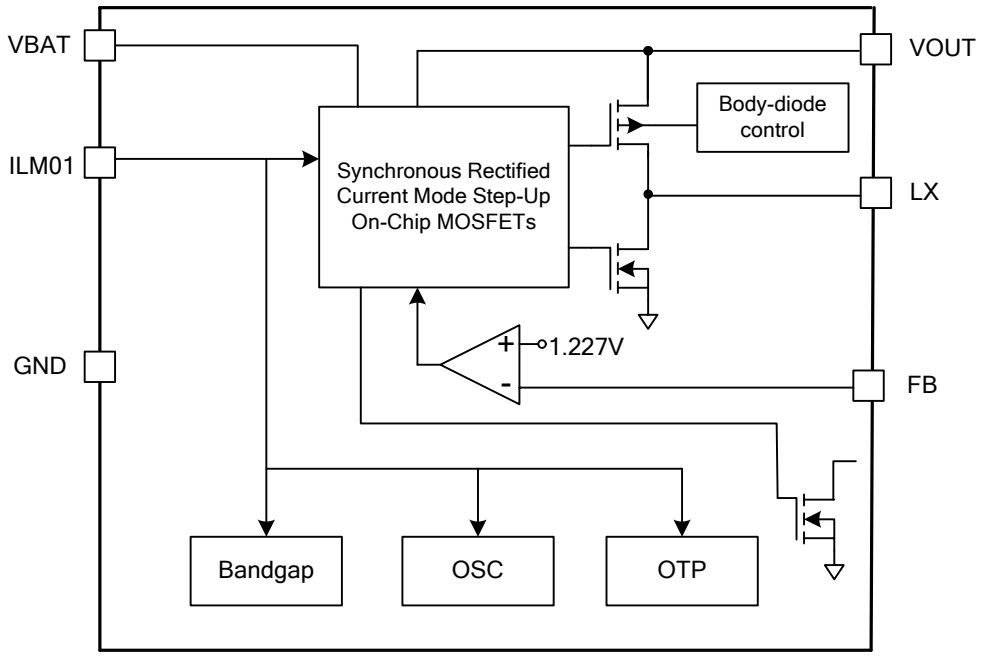
SOP-8 (FD)



Pin Description

PIN	NAME	FUNCTION
1,2	LX	Inductor Node.
3	VBAT	IC Power Supply Input.
4	ILIM01	Output Current Limit Setting, and On/Off Control.
5	GND	IC Analog Ground.
6	FB	Converter Feedback Input.
7,8	VOUT	Converter Output.
	EP	Exposed Paddle. Connect to the ground plane to optimize thermal performance. EP is internally connected to GND. EP must be connected to GND at a single point with a star ground connection.

Block Diagram



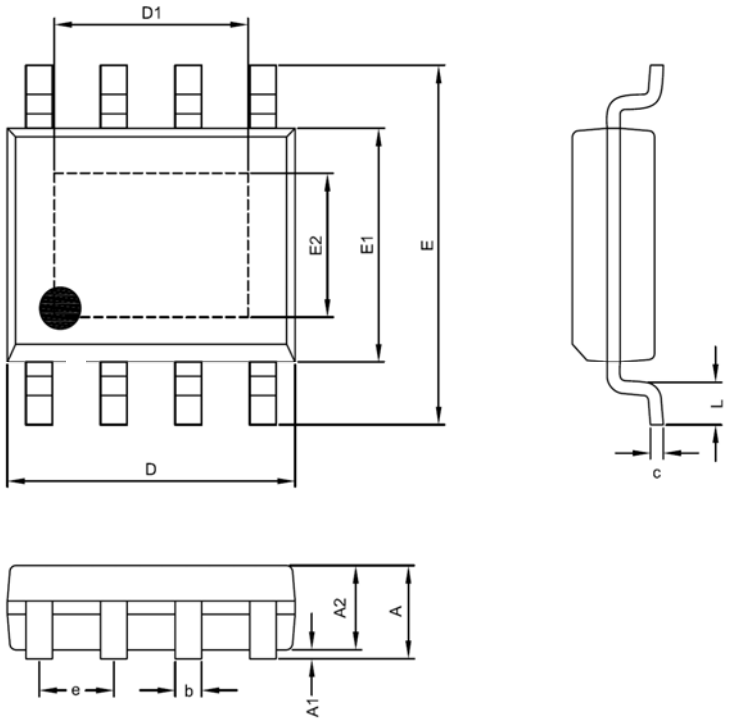
Function Description

The G2116 current-mode step-up DC-DC switching converter uses a fixed-frequency PWM architecture with output shutdown. In light-load mode, the converter switches when needed, consuming only 80μA of quiescent current. In heavy-load mode of higher than 100mA, the converter switches every cycle at a constant frequency as fixed-PWM, thus enabling noise filtering. The G2116 is highly efficient, with internal and synchronous switches. Shutdown reduces the quiescent current to less than 1μA. Low quiescent current and high efficiency make this device ideal for portable equipment.

The G2116 step-up DC-DC switching converter typically generates a 5V output voltage from a single-cell battery input voltage. The minimum output peak current limit is 3.2A. When an over-current, short-circuit or thermal shutdown condition is encountered. The converter will turn off until the over-current or over-temperature condition is removed, and during the state of short-circuit after precharge is end, the converter will turn off 64ms first and then turn on 1ms cycle by cycle to protect converter under short circuit operation. Internal soft-start limits the inrush current to less than 500mA under no-load conditions during startup. The G2116 is adjustable by 2 external resistors with calculating the value for R1 as R1 = R2 (VOUT/VFB - 1).

The G2116 switches at a 1MHz frequency, allowing for tiny external components. The G2116 is optimized for use in portable handheld devices and other applications requiring low quiescent current for maximum battery life.

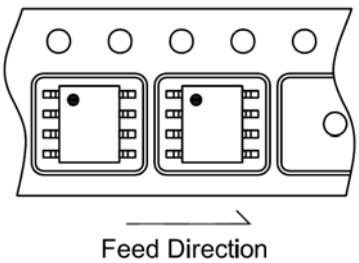
Package Information



SOP- 8 (FD) Package

Symble	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	1.35	1.55	1.65	0.053	0.061	0.065
A1	0.00	---	0.15	0.000	---	0.006
A2	1.15	1.35	1.50	0.045	0.053	0.059
D	4.80	4.90	5.00	0.189	0.192	0.197
D1	2.29	---	3.71	0.090	---	0.146
E	5.80	6.00	6.20	0.228	0.236	0.244
E1	3.80	3.90	4.00	0.150	0.153	0.157
E2	2.29	---	2.64	0.090	---	0.104
c	0.19	0.23	0.27	0.007	0.009	0.011
b	0.33	0.43	0.53	0.013	0.017	0.021
e	1.27 BSC			0.050 BSC		
L	0.40	0.70	1.00	0.016	0.028	0.039

Taping Specification



PACKAGE	Q'TY/REEL
SOP-8 (FD)	2,500 ea