G2118

Sync. Rectifier Step Up Converter

Features

- **Up to 92% Efficiency at V_{OUT} = 5V from 3.3V Input**
- **Low Quiescent Current 100μA**
- **Guaranteed 3A Output Current at V_{OUT} = 5V from 3.3V Input**
- **520KHz PWM Switching Frequency**
- **Synchronous and Embedded Power Mosfets; No Schottky Diode Required**
- **Internal Soft-Start to Limit Inrush Current**
- **Adjustable Output**
- **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 <20μA**
- **Thermal Shutdown**
- **Available in SOP-8 (FD) , TSSOP-20 (FD)**

General Description

The G2118is 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 G2118 uses only 100μA (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 500KHz. It features a current mode control for fast transient response with internal compensation. The G2118 includes cycle-by-cycle current limit to maximum inductor current and over-temperature protection circuit. The G2118 is suitable for iPad-like computers, smart phones and portable handheld devices.

The G2118 is available in a SOP-8 (FD) and TSSOP-20 (FD) . The operating temperature range is from -40°C to +85°C.

Application

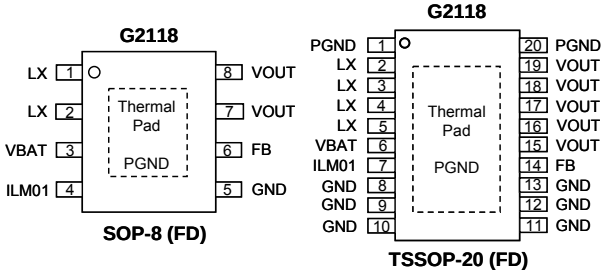
- **iPad-like computers, smart phones and portable handheld devices.**

Ordering Information

ORDER NUMBER	MARKING	TEMP. RANGE	PACKAGE (Green)
G2118F11U	G2118	-40°C to +85°C	SOP-8 (FD)
G2118F21U	G2118	-40°C to +85°C	TSSOP-20 (FD)

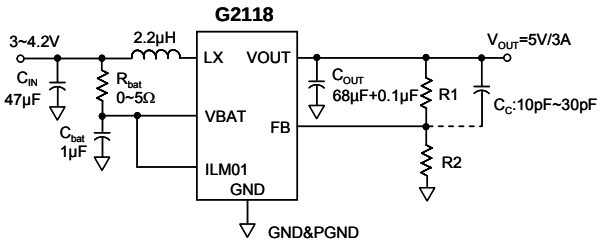
Note: F1:SOP-8 (FD), F2:TSSOP-20 (FD),
1: Bonding Code
U: Tape & Reel
Green : Lead Free / Halogen Free.

Pin Configuration



Note: Recommend connection the Thermal Pad to the PGND 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 8.5V<10nS
ILM01 to GND . . . . . -0.3V to 6V
OC to GND . . . . . -0.3V to 6V
FB to GND . . . . . .-0.3V to 6V
VBAT to GND . . . . . .-0.3V to 6V
Thermal Resistance of Junction to Ambient (θ_{JA})
SOP-8 (FD) . . . . . 132°C/W
TSSOP-20 (FD). . . . . .60°C/W

Continuous Power Dissipation (T_A = +25°C)
SOP-8 (FD) 0.9W
TSSOP-20 (FD). 2.1W

Storage Temperature . . . . . -55~150°C
Operation Temperature. . . . . -40~85°C

Electrical Characteristics

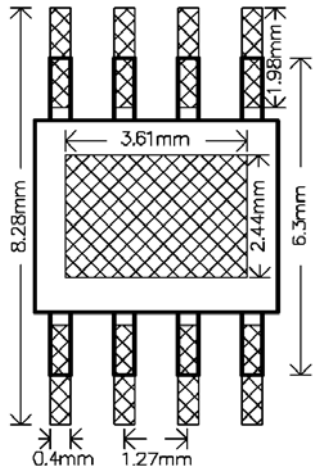
(V_{OUT} = 5V, V_{BAT} = 3.6V, L = 2.2µH, C_{IN} = 47µF, C_{OUT} = 68µF+0.1µF, T_A = 25°C)

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.

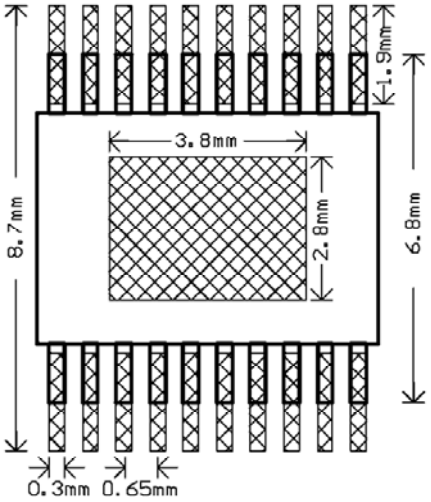
DESCRIPTION	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
General						
Input operation voltage	V_{BAT}		2.7	---	4.5	V
Output voltage	V_{OUT}	Iload=3A Vbat=3.3V	---	---	5.3	V
Input Quiescent current	I_{BAT}	V_{BAT} =3.6 FB>1.25 No load, no switching (exclude input current from ILM0&ILM1)	---	100	150	µA
Shutdown supply current	I_{BAT}	ILM01=0	---	10	20u	µA
Oscillator& Protection						
Switching Frequency	Fosc		360	520	680	KHz
Soft-Start Interval	SS		---	4	---	ms
FB Regulation Voltage	V_{FB}		1.208	1.227	1.246	V
FB Input Current	I_{FB}	FB=1.23V	---	---	100	nA
OC De-Glitch	T_deglitch	OC flag from 1 to 0	---	4	---	ms
Startup into a short-Circuit	T_precharge+ T_deglitch	OC flag from 1 to 0	---	10	---	ms
Restart time in SCP	T_scp_restart	OC flag keep 0	---	64	---	ms
Current Limit Response Time	T_oc_response		---	Tosc	---	µs
Maximum Duty Cycle	D_{max}	FB=1.2V	82	86	92	%
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		---	30	---	mΩ
	R_{ON}-P		---	40	---	
Peak Current Limit	I_LIM	ILM01=1 at V_{BAT}=4.2V	5	---	---	A
		ILM01=1 at V_{BAT}=3V	7	---	---	
Efficiency		ILM01=1, V_{BAT}=3.3V, V_{OUT}=5V, I_{OUT}=3A	---	92	---	%
Protection Block						
VOUT Short-Circuit Threshold	V_{SCP}	Falling Edge	---	V_{OUT} (1-0.25)	---	V
VOUT Short-Circuit Threshold	V_{SCP}	Ring Edge	---	V_{OUT} (1-0.9)	---	V
VBAT UVLO Threshold	V_{UVLO}	Falling Edge	--	2.58	--	V
VBAT UVLO Threshold	V_{UVLO}	Rling Edge	--	2.66	--	V
Thermal Shutdown Threshold		Rising Edge, 10°C hysteresis	---	145	---	°C
Control Block						
ILM01 Input High Level	Vih_ilm		1.5	---	5.5	V
ILM01 Input Low Level	Vil_ilm		0	---	0.5	V
ILM01 Internal Pull-Low Resistance	Rin_ilm		440	550	660	KΩ

Minimum Footprint PCB Layout Section

SOP-8 (FD)



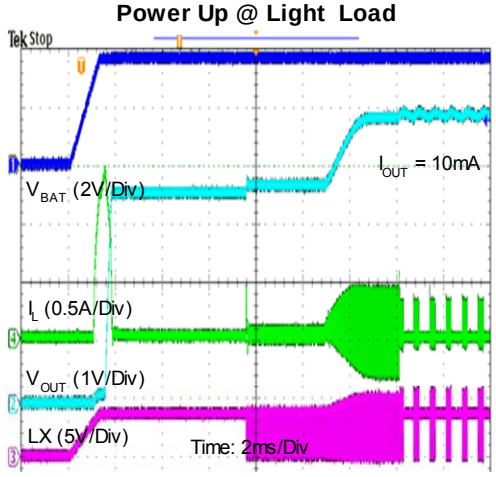
TSSOP-20 (FD)



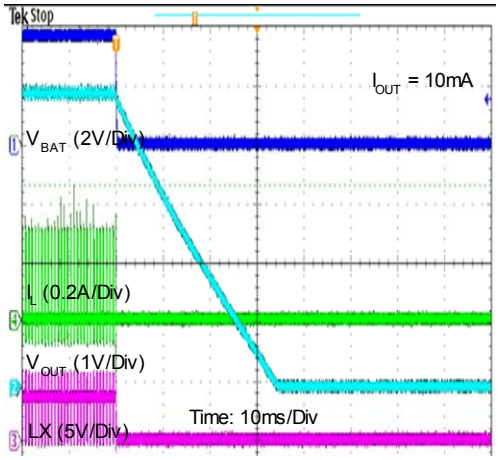
Typical Performance Characteristics (FOR SOP-8 (FD) Package)

(V_{BAT} = 3.6V, V_{OUT} = 5V, C_{IN} = 47µF, C_{OUT} = 68µF, L = 2.2µH, T_A=25℃, unless otherwise noted.)

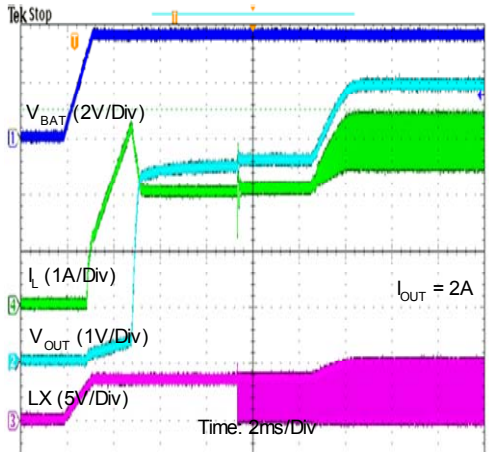
Power Up @ Light Load



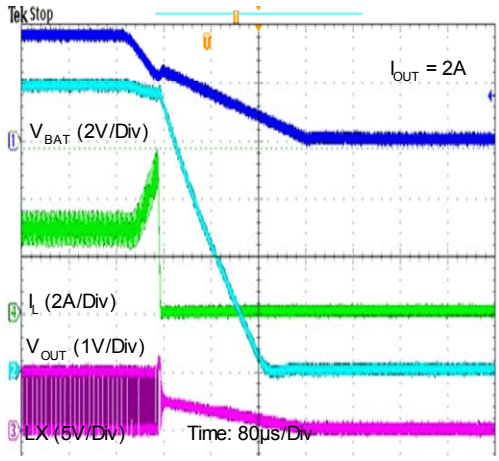
Power Down @ Light Load



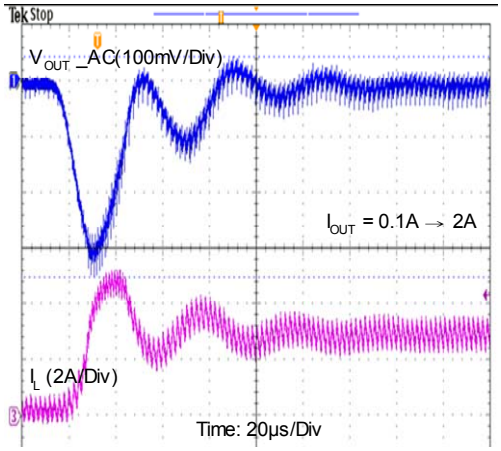
Power Up @ Heavy Laod



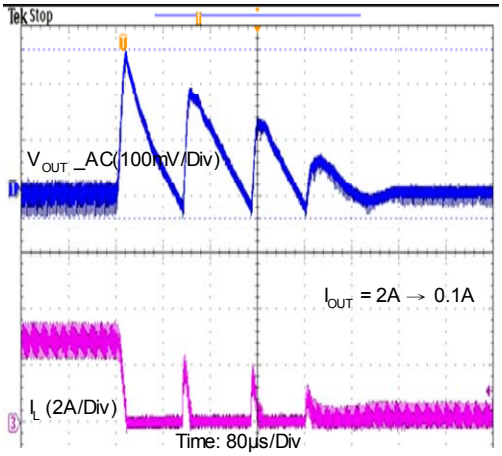
Power Down @ Heavy Load



Load Transient Response

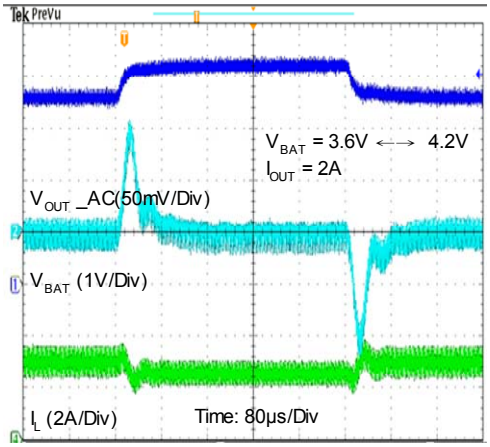


Load Transient Response

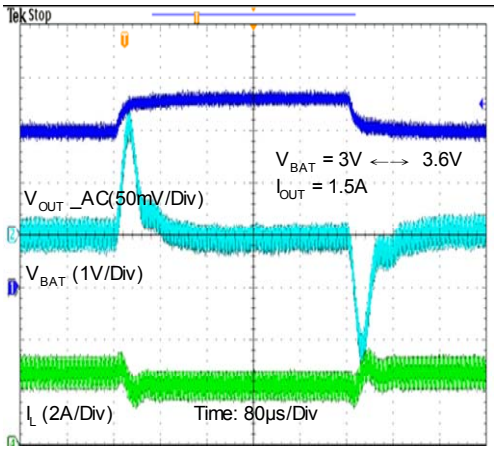


Typical Performance Characteristics (continued)

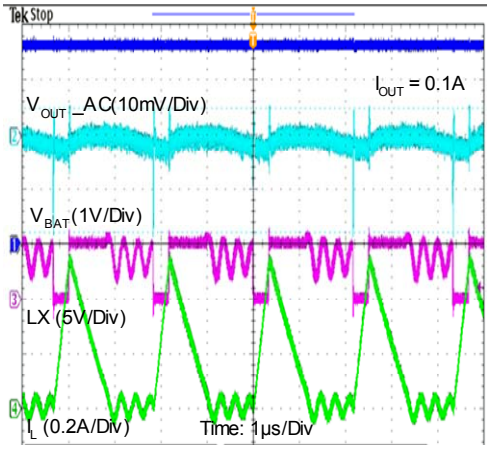
Line Transient Response



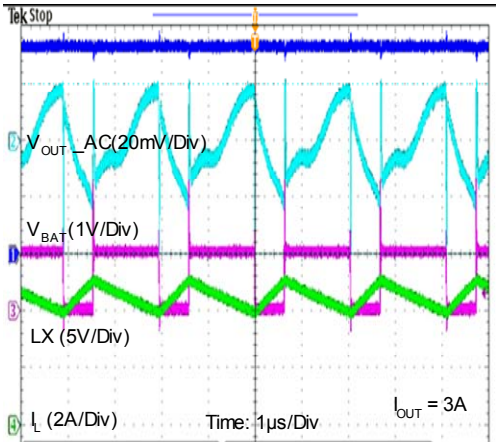
Line Transient Response



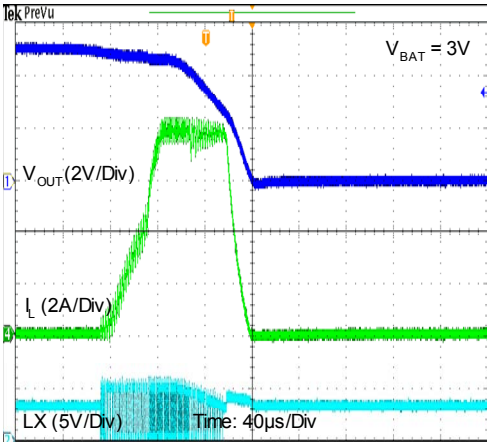
Steady State Response



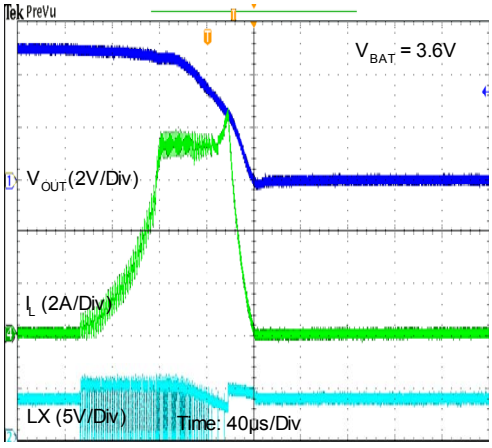
Steady State Response



Peak Current Limit

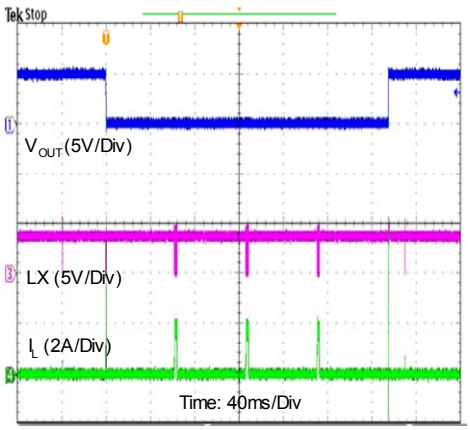


Peak Current Limit

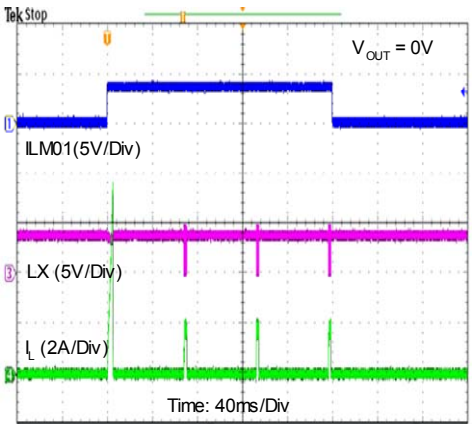


Typical Performance Characteristics (continued)

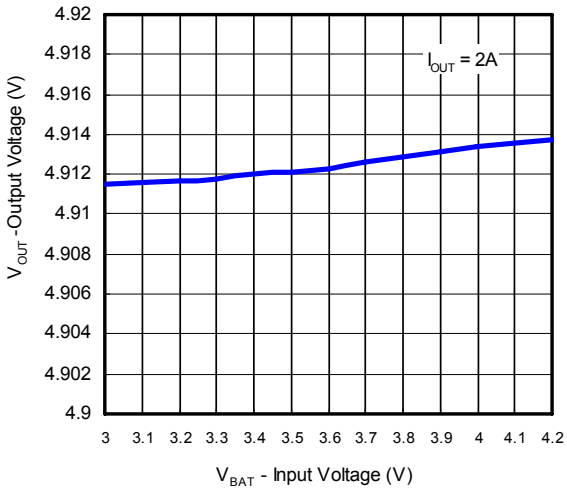
Output Short Circuit and Recovery



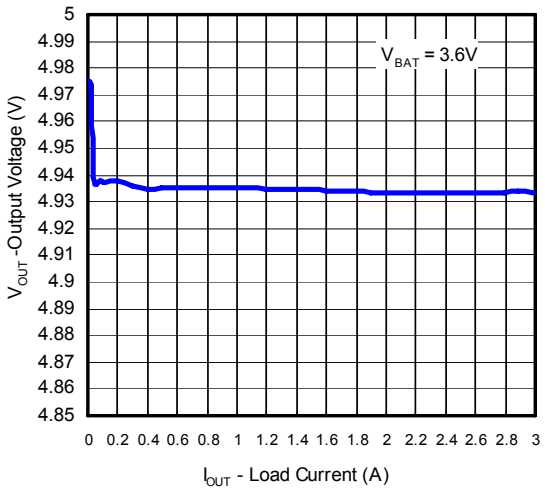
Turn on into a short circuit



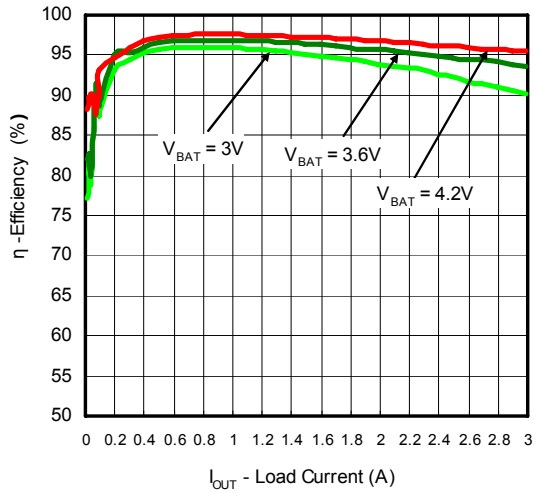
Line Regulation



Load Regulation



Efficiency V.S Load Current



Pin Description

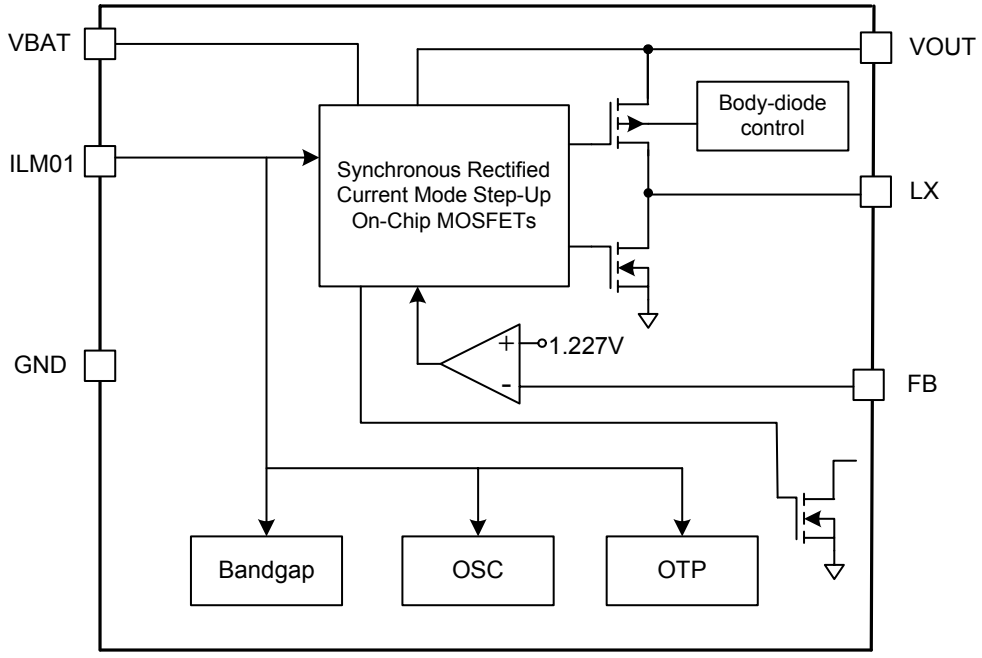
SOP-8 (FD)

PIN	NAME	FUNCTION
1,2	LX	Inductor Node.
3	VBAT	IC Power Supply Input.
4	ILM01	On/Off Control (input voltage of ILM01 can't be over 1V than VBAT)
5	GND	IC Analog Ground.
6	FB	Converter Feedback Input.
7,8	VOUT	Converter Output.
Thermal Pad	PGND	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 ground connection.

TSSOP-20 (FD)

PIN	NAME	FUNCTION
2,3,4,5	LX	Inductor Node.
6	VBAT	IC Power Supply Input.
7	ILM01	On/Off Control (input voltage of ILM01 can't be over 1V than VBAT)
8,9,10,11,12,13	GND	IC Analog Ground.
14	FB	Converter Feedback Input.
15,16,17,18,19	VOUT	Converter Output.
1,20, Thermal Pad	PGND	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 ground connection.

Block Diagram



Function Description

The G2118 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 100μA of quiescent current. In heavy-load mode of higher than 300mA, the converter switches every cycle at a constant frequency as fixed-PWM, thus enabling noise filtering. The G2118 is highly efficient, with internal and synchronous switches. Shutdown reduces the quiescent current to less than 10μA. Low quiescent current and high efficiency make this device ideal for portable equipment.

The G2118 step-up DC-DC switching converter typically generates a 5V output voltage from a single-cell battery input voltage. The output peak current limit is internal adjustable respectively by VBAT input voltage, as Table 1 and during the state of short-circuit after precharge is end, the converter will turn off 64ms first and then turn on 2ms 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 G2118 is adjustable by 2 external resistors with calculating the value for R1 as R1 = R2 (VOUT/VFB - 1).

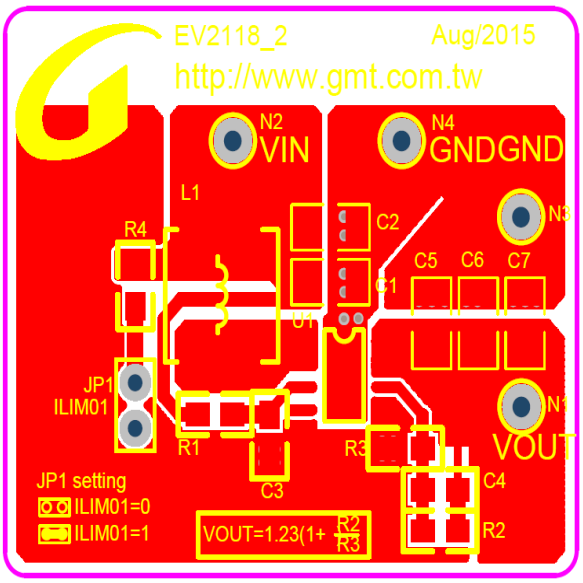
The G2118 switches at a 520KHz frequency, allowing for tiny external components. The G2118 is optimized for use in iPad-like computers, smart phones, portable handheld devices and other applications requiring low quiescent current for maximum battery life.

PCB layout guidelines

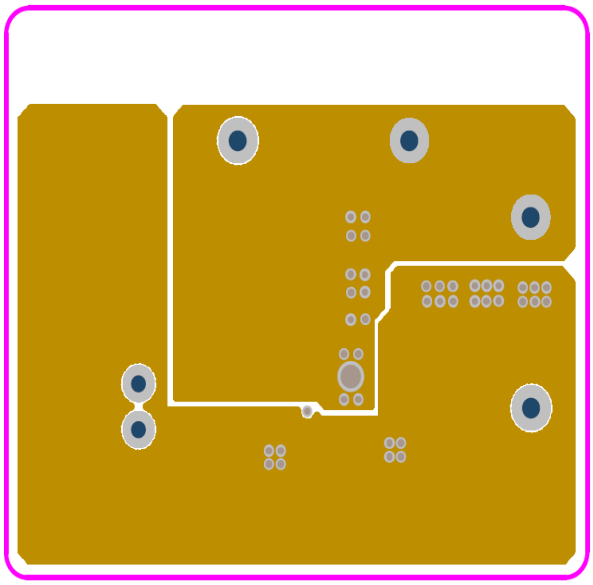
1. It is required to place the following components as close to the G2118 as possible: CIN, COUT, L, R2 and R3, for the best efficiency and minimum noise problems.
2. For better heatsink, 4-layers board is highly recommended; if it is allowed a whole ground plane is the best option.
3. For stable and fixed reference potential, Analog GND and Power GND must be clearly isolated, star topology is recommended.
4. To avoid noise interference, voltage divider (R2 and R3), and the trace connecting to the FB pin must not be adjacent to the LX net.
5. This package incorporates an exposed thermal pad that is designed to be attached directly to an external heatsink. Solder the thermal pad to a ground plane to provide a low thermal resistance to ground for better heat dissipation.

EV Board PCB Layout Section

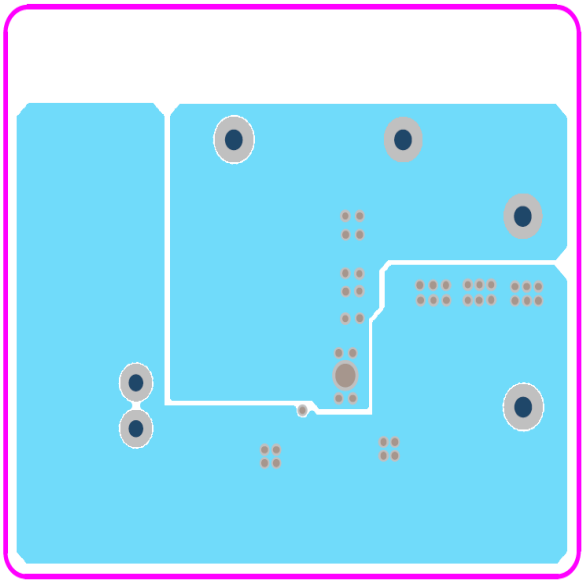
Top Layer



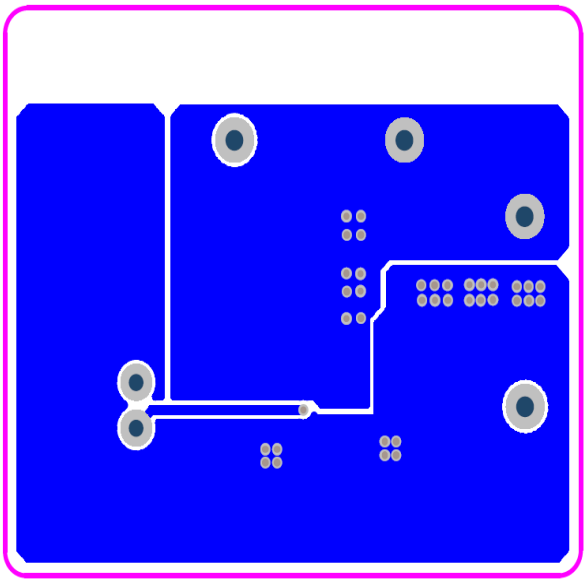
Mid Layer 1



Mid Layer 2

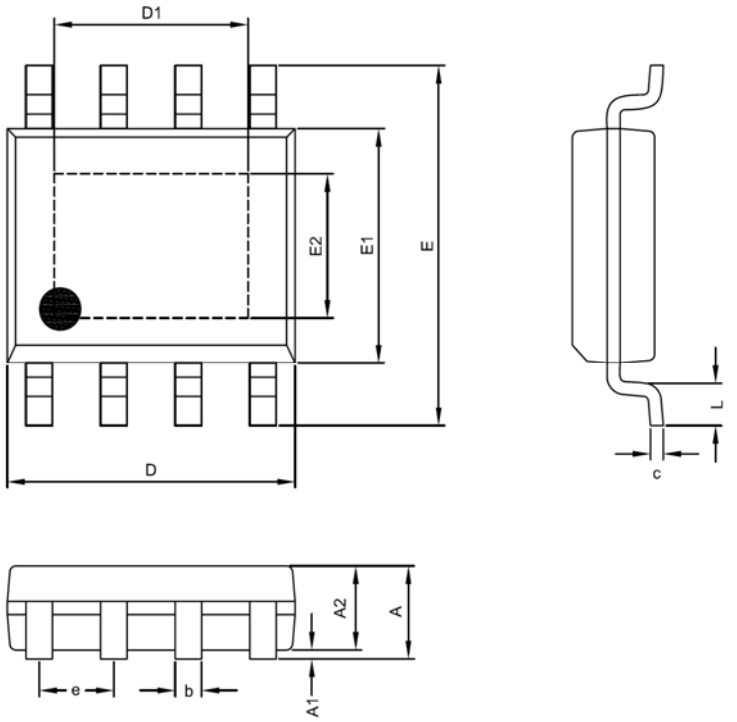


Bottom Layer



EV2118 PCB	Information
Board Material	FR4
Size	37 x 32 mm^2
Board Thickness	1.6mm
Layers	4
Copper Thickness	2 oz.

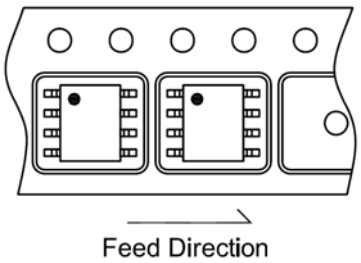
Package Information



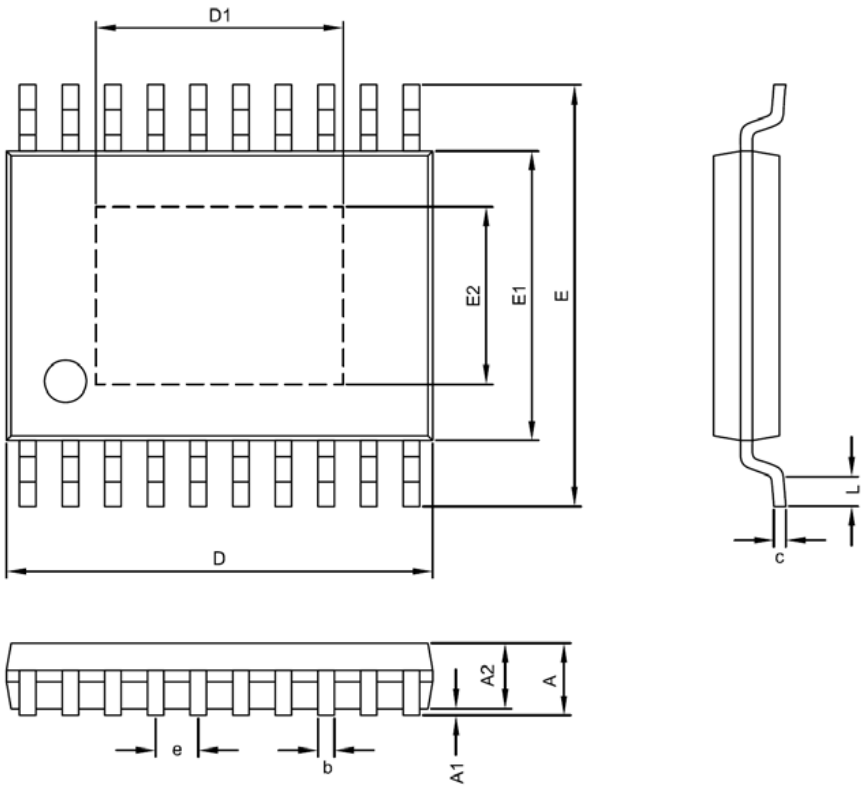
SOP- 8 (FD) Package

Symble	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	1.35	1.55	1.60	0.053	0.061	0.063
A1	0.00	---	0.10	0.000	---	0.004
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



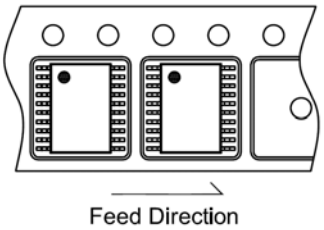
PACKAGE	Q'TY/REEL
SOP-8 (FD)	2,500 ea



TSSOP-20 (FD) Package

Symble	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	---	---	1.20	---	---	0.048
A1	0.00	---	0.15	0.000	---	0.006
A2	0.85	1.00	1.05	0.033	0.039	0.041
D	6.40	6.50	6.60	0.252	0.256	0.260
D1		3.80 TYP.			0.150 TYP.	
E	6.20	6.40	6.60	0.244	0.252	0.260
E1	4.30	4.40	4.50	0.169	0.173	0.177
E2		2.80 TYP.			0.110 TYP.	
c	0.09	---	0.20	0.004	---	0.008
b	0.19	0.22	0.30	0.008	0.009	0.012
e		0.65 TYP.			0.026 TYP.	
L	0.45	0.60	0.75	0.018	0.024	0.030

Taping Specification



PACKAGE	Q'TY/REEL
TSSOP-20 (FD)	3,000 ea