

## Mini PMU with 12V Boost Converter and 12V/150mA LDO for Backup Power

### DESCRIPTION

ETA1067 is a two-channel PMU that includes a 12V high efficiency step-up converter and an 12V LDO. The boost converter is capable of providing up to 12V output with 2A input current from a single cell of two-cell series Li-ion battery. Once it's started up, the internal circuitry is powered from the LDO output. Therefore, even when the input voltage drops to a very low level, the output still maintains stable regulation down to 0.5V input. The LDO is powered from an independent pin LDOIN and is capable of delivering up to 150mA output current. Independent of the boost enable control, the LDO is still operates even when the boost is turned off, as the power comes from input through the external Schottky diode.

With all the features, the ETA1067 is available in a QFN2x2-8L package

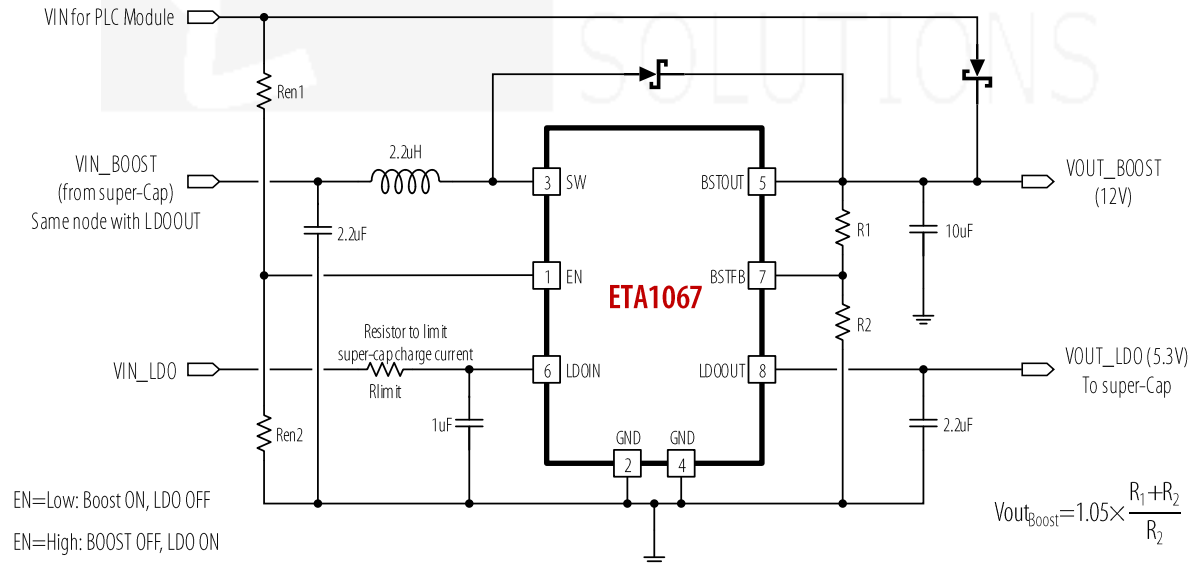
### FEATURES

- ◆ Wide startup input range: Input as low as 1.8V to 13V
- ◆ Maintain output when input voltage falling down to 0.5V
- ◆ 13.7V Max output voltage
- ◆ 2A input current limit for 12V Boost
- ◆ Up to 90% Efficiency
- ◆ Integrated LDO up to 150mA
- ◆ 6µA low Iq LDO
- ◆ Current Mode control boost
- ◆ Independent Logic Control Shutdown for boost
- ◆ Thermal shutdown

### APPLICATIONS

- ◆ PLC module
- ◆ Backup Power
- ◆ Toy

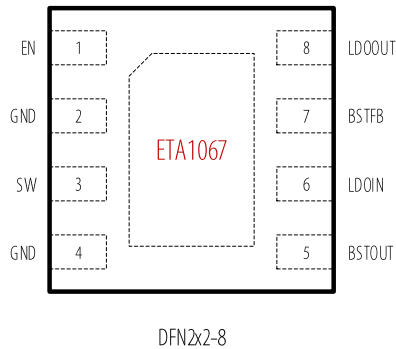
### TYPICAL APPLICATION



### ORDERING INFORMATION

PART No.	PACKAGE	TOP MARK	Pcs/Reel
ETA1067D2I	DFN2x2-8	GnYW	3000

## PIN CONFIGURATION



## ABSOLUTE MAXIMUM RATINGS

(Note: Exceeding these limits may damage the device. Exposure to absolute maximum rating conditions for long periods may affect device reliability.)

BSTOUT, LDOIN, SW Voltage .....	-0.3V to 16V
All other pin Voltage .....	-0.3V to 6V
SW to ground current .....	Internally limited
Operating Temperature Range .....	-40°C to 85°C
Storage Temperature Range .....	-55°C to 150°C
Thermal Resistance	$\theta_{JA}$ $\theta_{JC}$
DFN2x2-8L .....	75      20      °C/W
Lead Temperature (Soldering, 10sec) .....	260°C
ESD HBM (Human Body Mode) .....	2KV
ESD MM (Machine Mode) .....	200V

## ELECTRICAL CHARACTERISTICS

( $V_{in} = 3.6V$ , unless otherwise specified. Typical values are at  $T_A = 25^\circ C$ .)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
<b>BOOST</b>					
VIN_BOOST Voltage Range		1.8		12	V
Boost VIN_UVLO	The voltage applied on VOUTLDO		2.7		V
FB Feedback Voltage			1.05		V
FB Input Current				1	$\mu A$
Output Voltage Range		3		13	V
Output OVP voltage			13		V
VINLDO UVLO (REFOK)	Rising		1.6		V
Boost Supply Current ( $I_{sw}$ )	$V_{sw}=3.6V$ , $BSTOUT=12V$ , no load		180		$\mu A$
LDOIN supply current ( $I_{q\_LDO}$ )	$V_{LDOIN}=6V$ , $EN=High$		6		$\mu A$
	$V_{LDOIN}=12V$ , $EN=High$		9		$\mu A$
Switching Frequency			0.9		MHz
Maximum Duty Cycle		95			%
NMOS Switch On Resistance	$I_{SW} = 100mA$		0.16		$\Omega$
NMOS Switch Current Limit			2.2		A
SW Leakage Current	$V_{SW}=0$ or $12V$ , $BSTEN=GND$			10	$\mu A$
<b>LDO</b>					
LDO output voltage (1% accuracy)	Default	5.2	5.3	5.4	V
	Option 1		3.0		
	Option 2		3.3		
	Option 3		2.65		

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
LDO Dropout Resistance	V_LDOIN=5		15		$\Omega$
LDO current limit	V_LDOIN=12V		180		mA
	V_LDOIN=9V		180		mA
LDO output foldback current	V_LDOIN=6V		70		mA
LDO output foldback current threshold	V_LDOIN=6V		0.6		V
LDO Quiescent current	V_LDOIN=6V,		6		$\mu$ A

### Logic Input EN

Input Current			0	1	$\mu$ A
Input Low Voltage	Rising		1.12		V
Input High Voltage	Falling		1.05		V

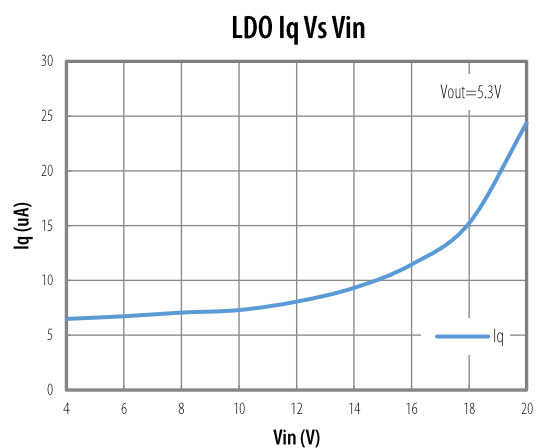
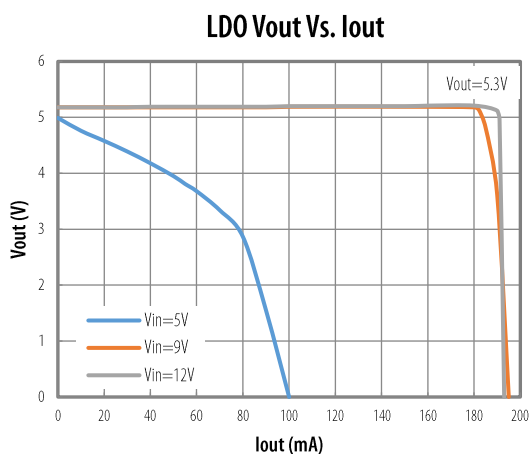
### Thermal Protection

Thermal Shutdown	Rising, Hysteresis=45 $^{\circ}$ C		165		$^{\circ}$ C
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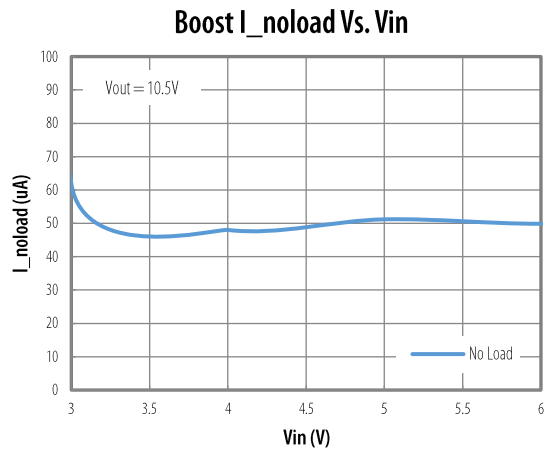
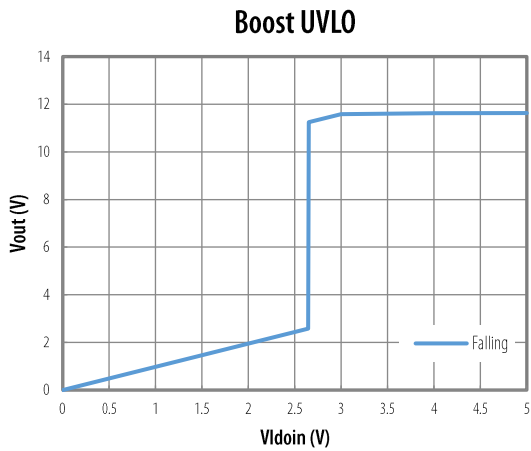
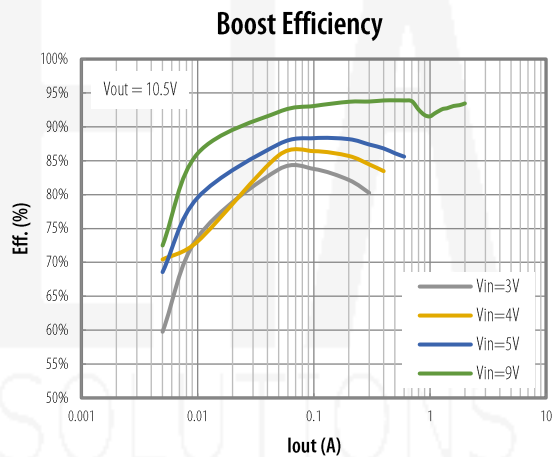
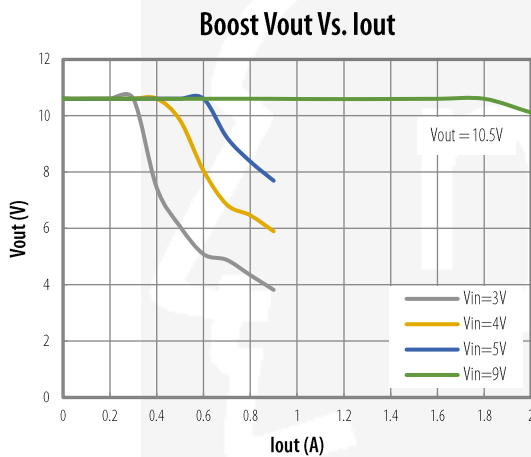
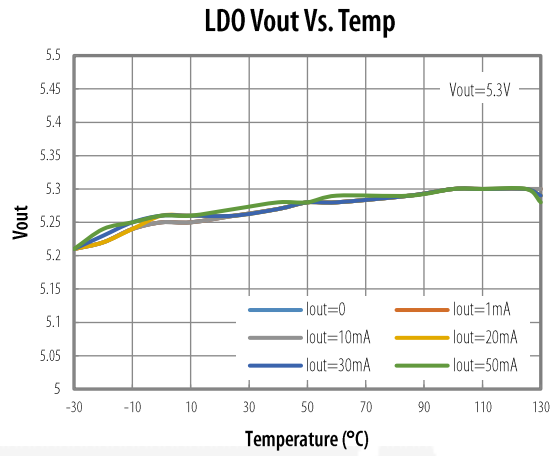
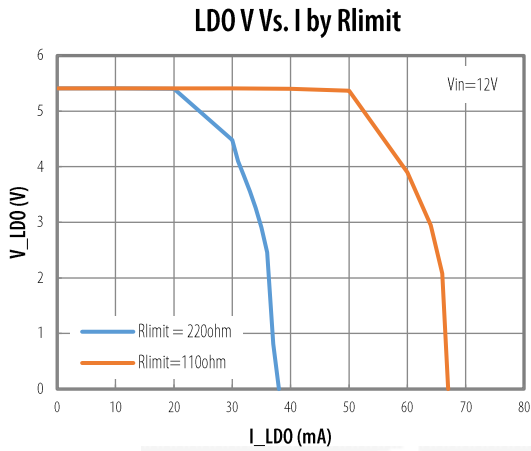
## PIN DESCRIPTION

PIN NAME	PIN #	DESCRIPTION
EN	1	EN=high : Turn OFF Boost and turn ON LDO; EN=low: Turn ON Boost and turn OFF LDO
GND	2, 4, Exposed Pad	Ground Pin, Exposed pad connected to GND for heat dissipation
SW	3	Switching pin, Connect 2.2uH inductor between this pin and Vin
BSTOUT	5	Boost output pin
LDOIN	6	Power supply pin for LDO
BSTFB	7	Boost feedback pin, connect resistor divider from VOUTBST pin to set Boost's Vout
LDOOUT	8	LDO output Pin

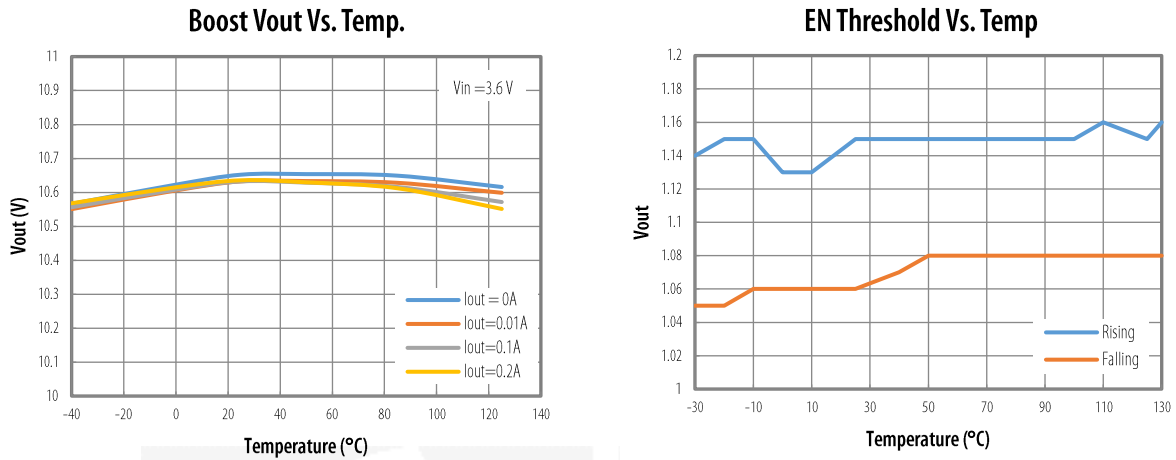
## TYPICAL PERFORMANCE CHARACTERISTICS



TYPICAL PERFORMANCE CHARACTERISTICS (cont')



## TYPICAL PERFORMANCE CHARACTERISTICS (cont')



## FUNCTION DESCRIPTION

*Enable and Disable Condition*

LDO is enabled when all following conditions are occurred:

- V\_LDOIN voltage is greater than VINLDO UVLO
- Thermal Shutdown is invalid
- EN pin is High

BOOST is enabled when all following conditions are occurred:

- VLDOOUT is greater than Boost VIN\_UVLO (LDOOUT is used to power the Boost converter)
- Thermal Shutdown is invalid
- EN pin is Low

*Protection*

LDO output current is limited at 150mA (typically at 12V input) to protect against output short. Anyway, when VINLDO is high, and VOUTLDO is low, the power loss inside IC will be too much, and makes the part is very hot. IC will shut down when junction temperature hit Thermal Shutdown Threshold. BOOST low side NMOS current is limited at 2.2A.

*BOOST Output Voltage Configuration*

ETA1067 VOUTBST voltage is determined by FB net resistor divider. Where FB voltage is regulated to 1.05V.

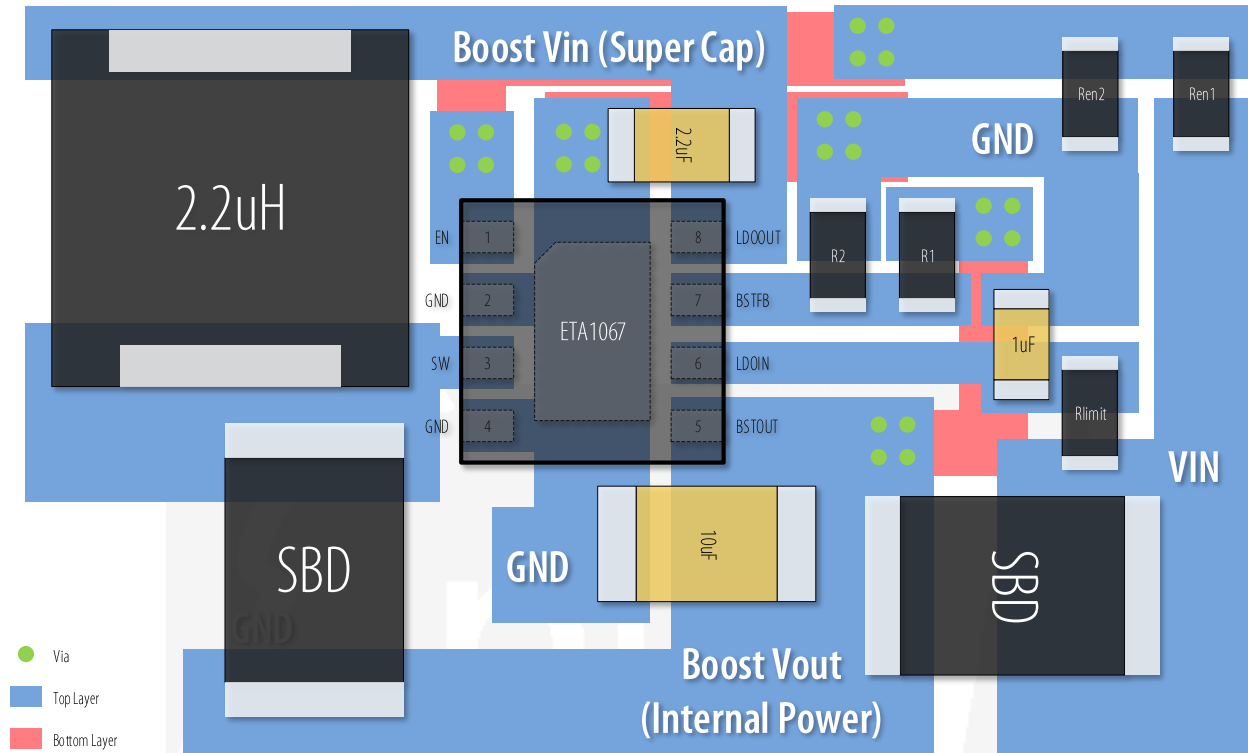
$$V_{out_{boost}} = \frac{R1+R2}{R2} \times 1.05V$$

*LDO Output Voltage Configuration*

LDO output voltage is internally set and available for 3.3V, 3.0V, 2.65V and 5.3V among which 5.3V is the default output voltage.

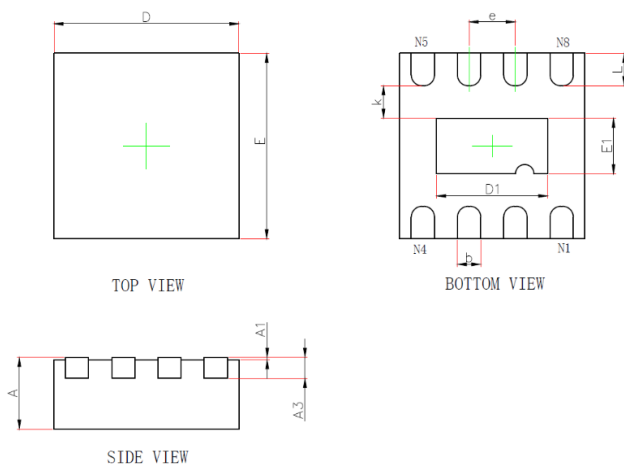
## PCB DESIGN GUIDELINE

Following illustration shows the recommended PCB layout for the typical application circuit shown on page 1.



## PACKAGE OUTLINE

DFN2x2-8L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.700/0.800	0.800/0.900	0.028/0.031	0.031/0.035
A1	0.000	0.050	0.000	0.002
A3	0.203REF.		0.008REF.	
D	1.924	2.076	0.076	0.082
E	1.924	2.076	0.076	0.082
D1	1.100	1.300	0.043	0.051
E1	0.500	0.700	0.020	0.028
k	0.200MIN.		0.008MIN.	
b	0.200	0.300	0.008	0.012
e	0.500TYP.		0.020TYP.	
L	0.274	0.426	0.011	0.017