

Mini PMU with 12V Boost Converter and 12V/150mA LDO

DESCRIPTION

ETA1066 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 2.2A 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 ETA1066 is available in a QFN2x2-8L package

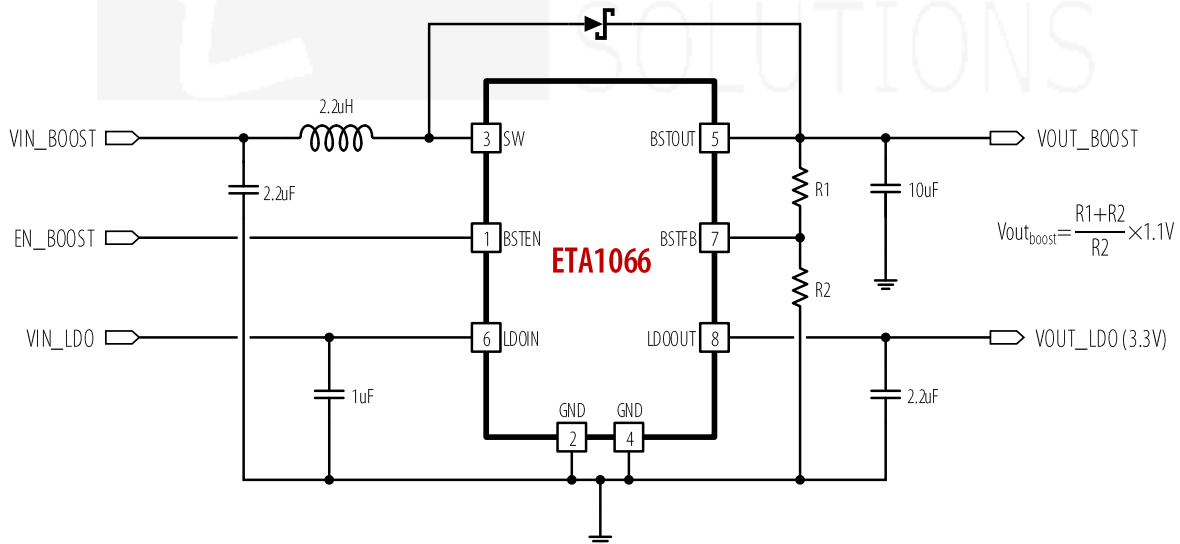
FEATURES

- ◆ 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
- ◆ 2.2A 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

- ◆ E-Cigarette
- ◆ Backup Power
- ◆ Toy

TYPICAL APPLICATION

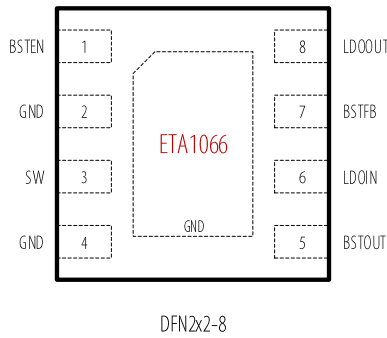


Typical application circuit

ORDERING INFORMATION

PART No.	PACKAGE	TOP MARK	Pcs/Reel
ETA1066D2I	DFN2x2-8	GaYW	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	θ_{JA} θ_{JC}
DFN2x2-8L	75 20 °C/W
Lead Temperature (Soldering, 10ssec)	260°C
ESD HBM (Human Body Mode)	2KV
ESD MM (Machine Mode)	200V

ELECTRICAL CHARACTERISTICS

(Vin = 3.6V, unless otherwise specified. Typical values are at TA = 25°C.)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
BOOST					
VIN_BOOST Voltage Range		1.8		12	V
Input Start up voltage	The voltage applied on LDOIN		1.8		V
FB Feedback Voltage		1.02	1.045	1.07	V
FB Input Current				1	uA
Output Voltage Range		3		13	V
Output OVP voltage			13		V
VINLDO UVLO (REFOK)	Rising, HYS=200mV		1.6		V
Supply Current at VIN_BOOST	VIN_BOOST=3.6V, BSTOUT=12V, noload		180		uA
Shutdown Supply Current at VIN_BOOST	VIN_BOOST=3.6V, BSTEN=GND		6		uA
	VIN_BOOST=12V, BSTEN=GND		9		uA
Switching Frequency		0.6	0.9	1.2	MHz
Maximum Duty Cycle		95			%
NMOS Switch On Resistance	ISW =100mA		0.16		Ω
NMOS Switch Current Limit			2.2		A
SW Leakage Current	VSW=0 or 12V, BSTEN=GND			10	uA
LDO					
LDO output voltage (1% accuracy)	Default	3.27	3.3	3.33	V
	Option 1		3.0		
	Option 2		5.0		
	Option 3		2.65		

LDO Dropout Resistance	V_LDOIN=3.3V, V_LDOOUT=3.3V	26	Ω
LDO current limit	V_LDOIN=12V	150	mA
	V_LDOIN=6V	100	
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=3.6V,	6	μ A

Logic Input EN

Input Current	0.1	1	μ A
Input Low Voltage		0.4	V
Input High Voltage	1.1		V

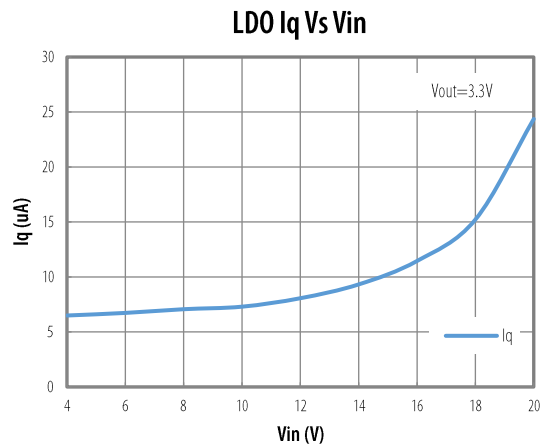
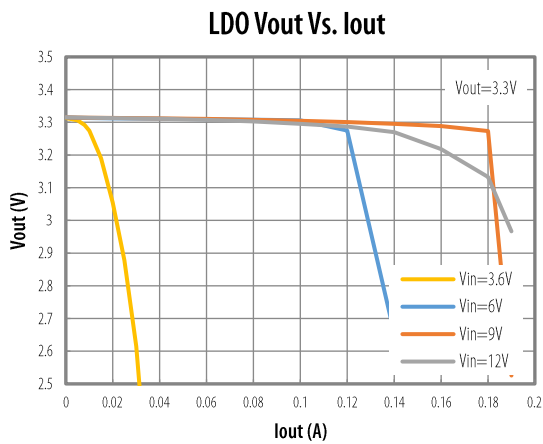
Thermal Protection

Thermal Shutdown	Rising, Hysteresis=45°C	165	°C
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PIN DESCRIPTION

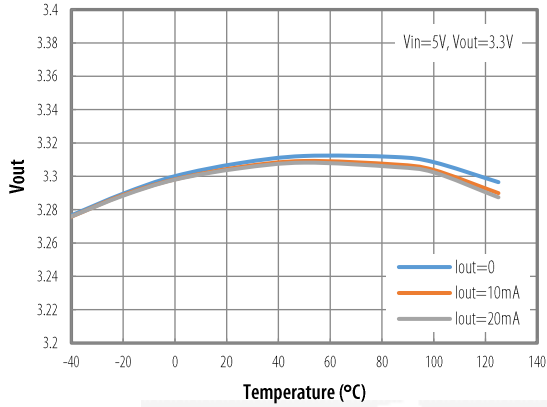
PIN NAME	PIN #	DESCRIPTION
BSTEN	1	Boost enable pin: BSTEN=1: Turn on Boost mode; BSTEN=0: Turn off Boost
GND	2, 4	Ground Pin
SW	3	Switching pin, Connect 2.2uH inductor between this pin and Vin
BSTOUT	5	Boost output pin
LDOIN	6	Power supply pin for LDO
BSTFB	7	Boost feedback pin, connect resistor divider from VOUTBST pin to set Boost's Vout
LDOOUT	8	LDO output Pin
GND	Exposed Pad	Ground

TYPICAL PERFORMANCE CHARACTERISTICS

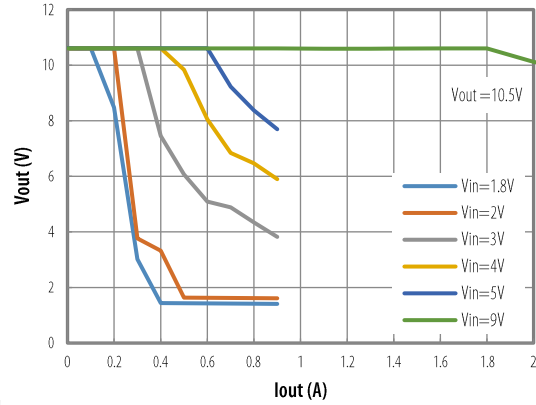


TYPICAL PERFORMANCE CHARACTERISTICS (cont')

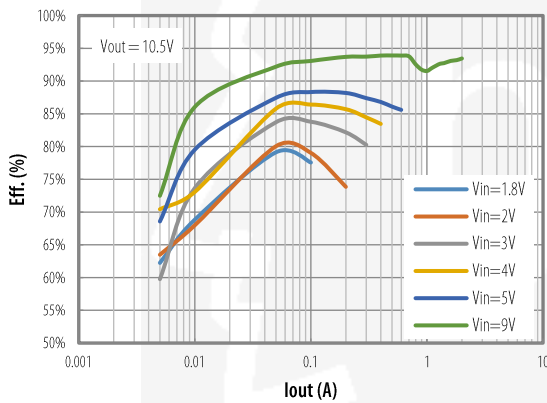
LDO Vout Vs. Temp



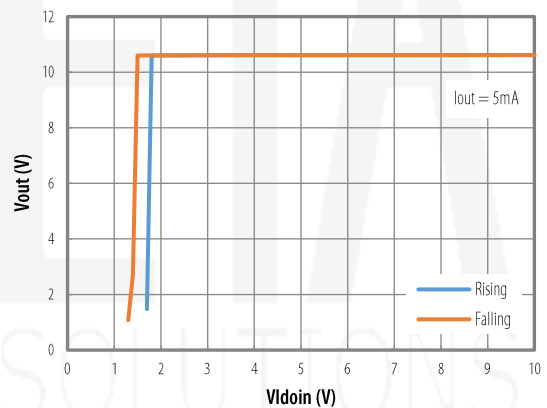
Boost Vout Vs. Iout



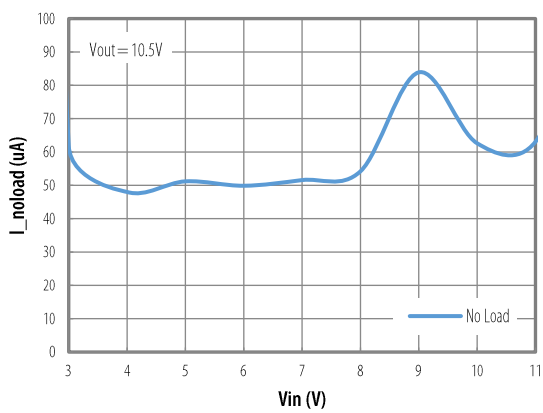
Boost Efficiency



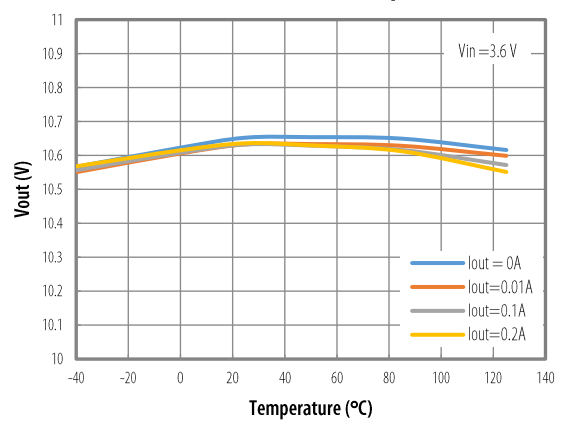
Boost UVLO



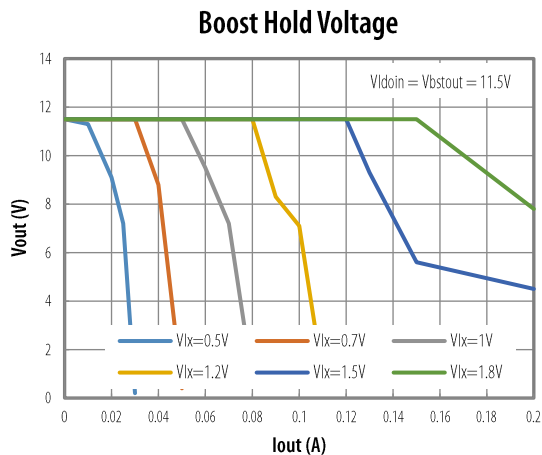
Boost I_noload Vs. Vin



Boost Vout Vs. Temp



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 UVLO
- Thermal Shutdown is invalid

BOOST is enabled when all following conditions are occurred:

- LDO is enabled (LDOOUT is used to power the Boost converter)
- EN pin is held at logic High.

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

ETA1065 Boost Output voltage is regulated to 12V internally without external FB setting. ETA1066 VINLDO voltage is determined by FB net resistor divider. Where FB voltage is regulated to 1.1V.

$$V_{out_{boost}} = \frac{R1+R2}{R2} \times 1.1V$$

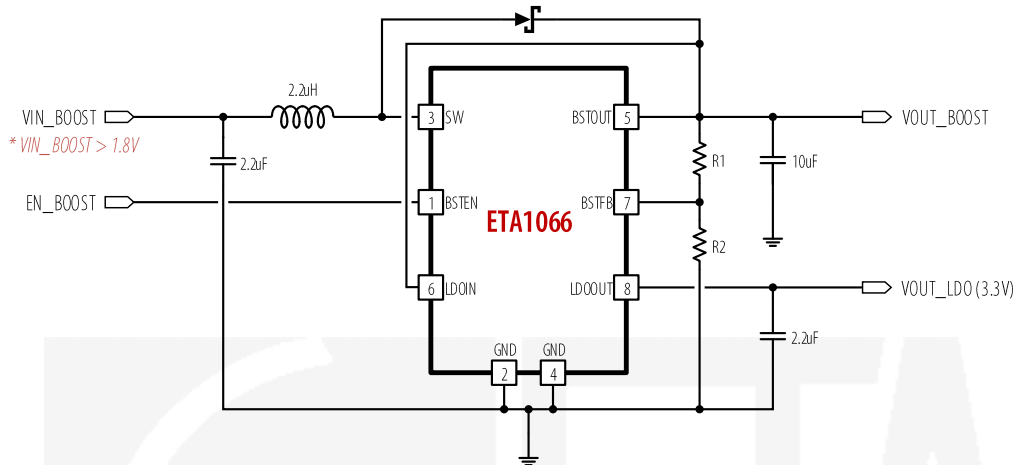
LDO Output Voltage Configuration

LDO output voltage is internally set and available for 3.3V, 3.0V, 2.65V and 5.0V among which 3.3V is the default output voltage.

APPLICATION INFORMATION

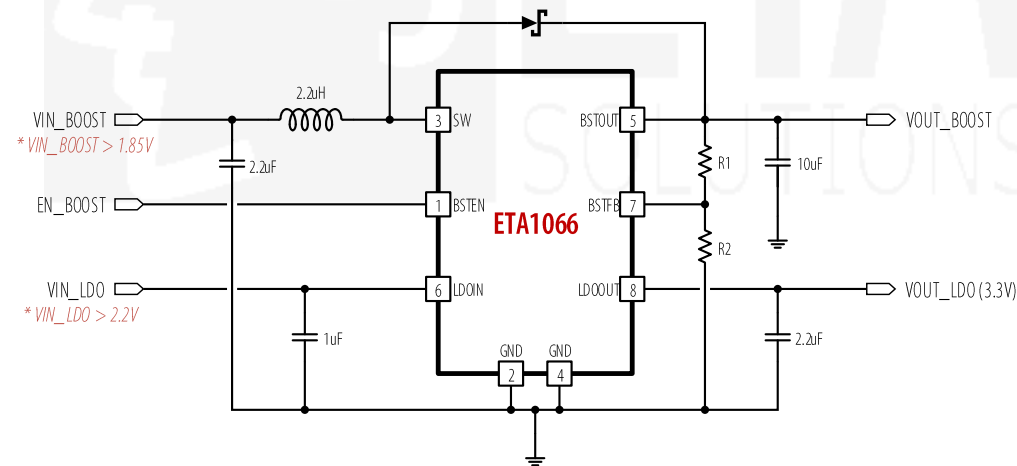
LDOIN powered by BSTOUT

If the system only has one voltage that needed to be boosted up to a higher voltage, one must tie the LDOIN to BSTOUT, and then the input startup voltage has to be 1.8V or higher. The application circuit is shown as following:



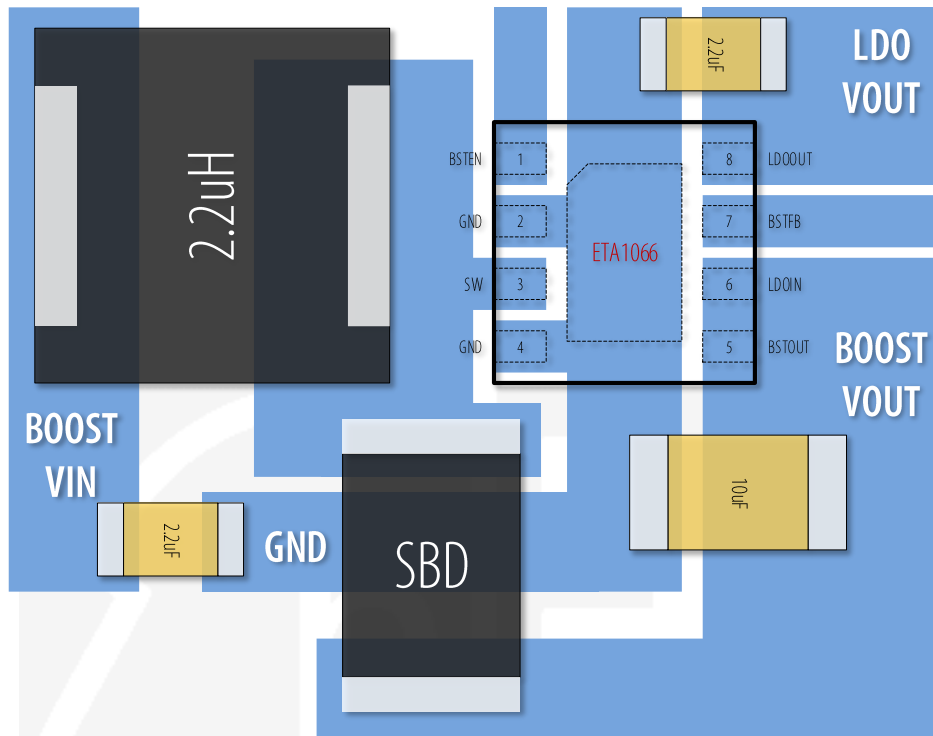
LDOIN powered by independent source

ETA1066 can also be powered from LDOIN by an independent power source greater than 2.2V, and the Boost converter will start to work with VIN_boost larger than 1.85V. The application circuit is shown as following:



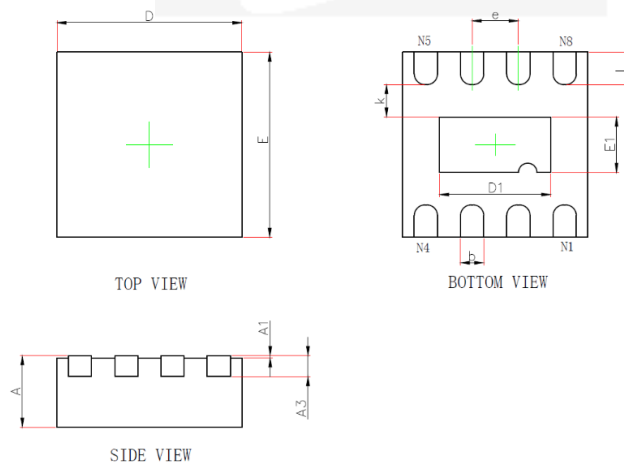
PCB DESIGN GUIDELINE

Following illustration shows the recommended PCB layout for the case of LDOIN tied to BSTOUT.



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