ETA6082

Single Inductor, 3A Switch Mode Battery Charger, 2.1A USB OTG, and Fuel Gauge All-in-One Solution

DESCRIPTION

ETA6082 is a switching Li-Ion battery charger capable of delivering up to 3A of charging current to the battery and also capable of delivering up to 2.1A in boost OTG operation. It also includes an externally programmable fuel gauge system for power indication. For charging, it uses a proprietary control scheme that eliminates the current sense resistor for constant current control, thereby improving efficiency and reducing costs. It can also output a 5V voltage in the reversed direction by boosting from the battery. Therefore, it only needs a single inductor to provide power bi-directionally. Together with the build-in Micro-controller functions, such as push-button, auto load detection, and fuel gauging features, ETA6082 is truly an ideal all-in-one solution for battery charging and discharge applications, such as power banks, smart phones, and tablets with only one USB port that can be used for both charging battery and USB OTG function.

ETA6082 is in QFN4x4-32 package.

FEATURES

- Bi-Directional Power conversion with Single Inductor
- Switching Charger
- 5V Synchronous Boost
- Up to 95% Efficiency
- Up to 3A Max charging current and 2.1A discharging
- No-Battery detection
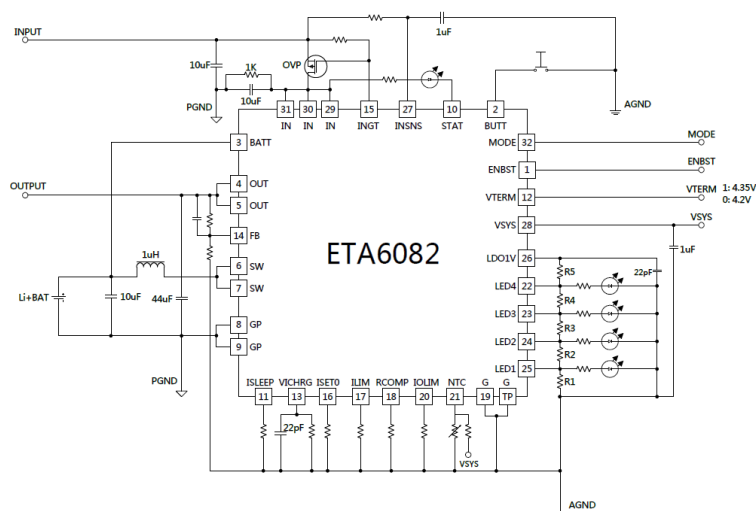- No External Sense resistor
- NTC thermistor input
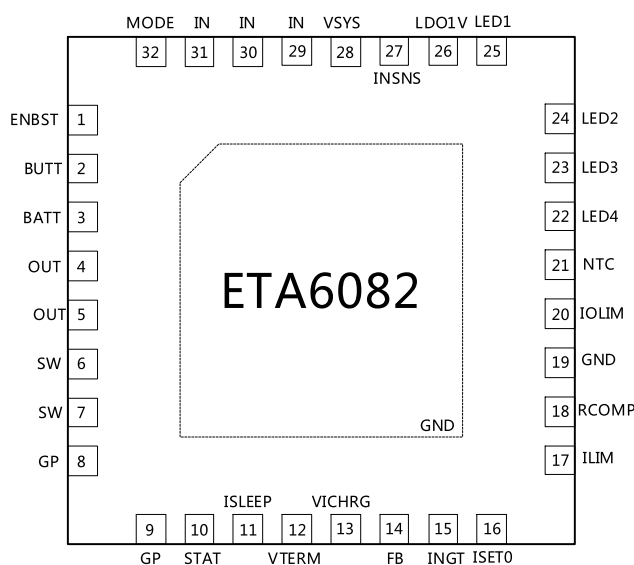
APPLICATIONS

- Tablet, MID
- Smart Phone
- Power Bank

ORDERING INFORMATION

PART	PACKAGE	TOP MARK
ETA6082Q47	QFN4x4-32	ETA6082 YWW2L

TYPICAL APPLICATION

PIN CONFIGURATION

QFN4x4-32

ABSOLUTE MAXIMUM RATINGS

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

IN,OUT Voltage ....−0.3V to 6V

INGT Voltage ....−0.3V to 20V

All Other Pin Voltage ....V_{IN}−0.3V to V_{IN}+0.3

SW,IN,OUT to ground current......Internally limited

Operating Temperature Range ....−40ºC to 85ºC

Storage Temperature Range ....−55ºC to 150ºC

Thermal Resistance θ$_{JA}$

QFN4X4-32.......................................30 ....ºC/W

Lead Temperature (Soldering, 10ssec) 260ºC

ESD HBM (Human Body Mode) 2KV

ESD MM (Machine Mode) 200V

ELECTRICAL CHARACTERISTICS

(V_{IN} = 5V, unless otherwise specified. Typical values are at TA = 25oC.)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
BUCK MODE					
IN Range		4.5		5.5	V
IN UVLO Voltage	Rising, Hys=500mV		4.5		V
IN to OUT MOSFET RDSON			40		mΩ
IN to OUT Input current limit	R$_{ILIMIT}$=11K		5		A
IN to OUT Input current limit Range		0.5		6	A
IN to OUT Hiccup threshold when OUT Short		10			A
INSNS Clamp Voltage			6.4		V
INSNS OVP Voltage	Hys=450mV		6.05		V
INGT Output driving capability	I(INGT)=1mA		0.065	0.2	V
OUT to IN reversed leakage current			10		µA
OUT to IN reversed Voltage threshold			150		mV
IN Quiescent current (Without BUCK)			50		µA
OUT Operating Current as BUCK	Switcher Enable, Switching		5		mA
	Switcher Enable, No Switching		500		µA
BATTERY CHARGER					
Battery CV Voltage	VTERM=0, I$_{BAT}$ =0mA, default	4.16	4.2	4.24	V
	VTERM=IN, I$_{BAT}$ =0mA, default	4.3	4.35	4.4	V
Charger Restart Threshold	From DONE to Fast Charge		-200		mV

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Battery Pre-Condition Voltage	V_{BAT} Rising Hys=200mV		3		V
Pre-Condition Charge Current			200		mA
Fast Charge Current	R_{ISET} =60KΩ		3		A
Charge Termination Current	R_{VICHRG}=100K,C_{VICHRG}=22pF		200		mA
Charge Termination Blanking time			50		S
Pre-Condition Timer			1		hour
Fast-Charge Timer			24		hour
BOOST MODE					
BATT Ok Threshold	Rising, HYS=0.5 V		3.2		V
Output Voltage Range		5.0	5.05	5.1	V
Quiescent Current At BATT	Auto mode,2S ON, 2S OFF		130		µA
Shutdown Supply Current At BATT			10	15	µA
Switching Frequency	VIN<4.3V	0.8	1.0	1.2	MHz
Inductor Current Limit	R_{IOLIM}=200K		4		A
Maximum Duty Cycle			90		%
Highside Pmos Rdson	I_{SW} =500mA		50		mΩ
Lowside Nmos Rdson	I_{SW} =500mA		50		mΩ
Short Circuit Hiccup Current			3.5		A
Short Circuit Hiccup Timer	On Time		5		ms
	Off Time		200		
Load Auto Detect timer	On Time		2		S
	Off time		2		
Load current threshold into sleep mode	R_{ISEEP}=100K		50		mA
LEDs , STAT					
STAT Output Low Voltage	I_{STAT}=10mA			0.2	V
LED_ Flash Frequency			1		Hz
ILIM, IOLIM, ISET					
ILIM Voltage			0.8		V
IOLIM Voltage			0.8		V
ISET Voltage			0.8		V
VSYS					
VSYS Voltage	VIN=5V (Isys=10mA)		3.2		V
	VIN not connected, VBATT=3.6V (Isys=10mA)		3.54		V
VSYS Max Iout	When Short to GND		50	100	mA
			50	100	mA
VSYS Reversed Leakage Current			0	10	uA
NTC THERMISTOR MONITOR					
NTC Threshold, Cold	Charger Suspended		52		%V_{sys}

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
NTC Threshold, Hot	Charger Suspended		13		%V_{sys}
NTC Threshold Hysteresis			2		%V_{sys}
NTC Disable Threshold	Tie NTC to VSYS				
NTC Input Leakage			0	5	µA
LOGIC INPUT,MODE, ENBST, VTERM, BUTT					
Logic Input High		2			V
Logic Input Low				0.6	V
THERMAL PROTECTION					
Charging Thermal Regulation threshold			85		ºC
Thermal Shutdown	Rising, Hys=30ºC		160		ºC

PIN DESCRIPTION

| PIN #	NAME	DESCRIPTION
1	ENBST	Manual Force Boost operation pin. This function is enabled when MODE pin is forced high. When MODE=1, ENBST=1, force Boost Operation. When MODE=1, ENBST=0, Boost Operation is disabled. When MODE=0, this pin is inactive.
2	BUTT	Push Button pin. This pin is only active when MODE=1 and ENBST=0. When the push button is pushed, and there is no input present to charge, Boost operation is activated. Depending on the loading at OUT, the boost may continue to supply an output voltage or go into sleep mode.
3	BATT	Battery Voltage sense pin. Connect to the battery positive terminal with a separate sensing wire to avoid voltage drop to achieve accurate battery CV charging
4,5	OUT	USB 5V output during boost and Current limited input pin during charging. This is a power pin, by pass with 2x22uF ceranmic caps closed to the pin and PGND.
6,7	SW	Switching Pin. Connect with an inductor between this pin and BATT.
8,9	GP	Power Ground pin
10	STAT	Status pin. It can be used to singal status during charging, Connect a LED between this pin and IN. It has a internal pull-down up to 10mA.
11	ISLEEP	Boost load auto detect threshold pin. This pin sets the output current level when Boost goes into sleep mode. Connect a resistor from this pin to Analog Ground.
12	VTERM	Battery termination voltage select. VTERM=0, Battery CV voltage=4.2V, VTERM=INOUT, Battery CV voltage=4.35V. Internally pulled down to AGND
13	VICHRG	Battery EOC current threshold pin. This pin sets the current threshold when charging enters into EOC stage. Connect a resistor from this pin to Analog Ground.
14	FB	Input V_{HOLD} Voltage setting pin. This pin sets when IN goes to V_{HOLD} sequencing when the BUCK starts to reduce output current in order to maintain Input at a reasonable level. Connect a resistor divder ladder to this pin and IN and analog ground.

| PIN #	NAME	DESCRIPTION
15	INGT	External high voltage OVP MOSFET gate drive pin. This pin can be used to control an external MOSFET for OVP purpose. This pin can sustain Voltage up to 20V.
16	ISET0	Buck Charging current setting pin. Connect a resistor between this pin and analog ground to set the current level.
17	ILIM	Input current limit setting pin in BUCK mode. Connect a resistor between this pin and analog ground to set the current level.
18	RCOMP	Charge Termination Voltage adjust pin for Battery impedance compensation. Connect a resistor between this pin and analog ground to set the amount of voltage compensation. When floating, adjustment voltage is 0mV.
19	GND	Analog Ground pin.
20	IOLIM	Boost inductor current limit setting pin. Connect a resistor between this pin and analog ground to set the current level.
21	NTC	Battery Temperature Monitoring input pin. It sets the valid temperature operating range for both battery charging and discharging.
22	LED4	Fuel gauge LED4 connection pin
23	LED3	Fuel gauge LED3 connection pin
24	LED2	Fuel gauge LED2 connection pin
25	LED1	Fuel gauge LED1 connection pin
26	LDO1V	Fuel Gauge 1V LDO output pin. Bypass with a 1uF capacitor to Analog ground.
27	INSNS	Input sense pin. Internally clamped to 6.4V.Connect a resistor from INSNS to IN, and 1uF cap to Analog ground.
28	VSYS	System voltage supply pin. It can supply up to 30mA. It gets power from IN when IN is present and from BATT when there is no IN power connected.
29,30,31	IN	DC input pins. Bypass with a 22uF capacitor from this pin to ground.
32	MODE	Mode select pin. When tied high, it enables Button and ENBST functions; when tied low, it enables auto mode. Default for this pin is low.
TP	GND	Thermal pad. Connect to analog ground

TYPICAL CHARACTERISTICS
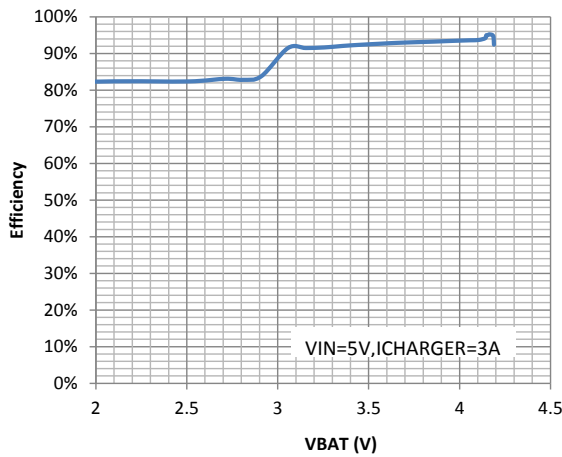
(Vin=5V, T_A=25^{0}C, unless otherwise specified)

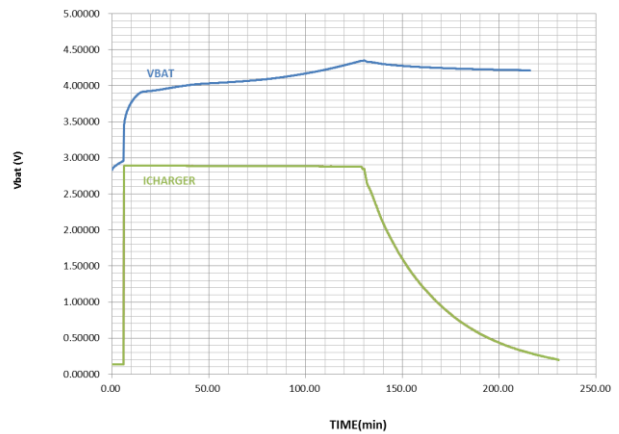### Output current in Boost mode

Vout Vs. Iout
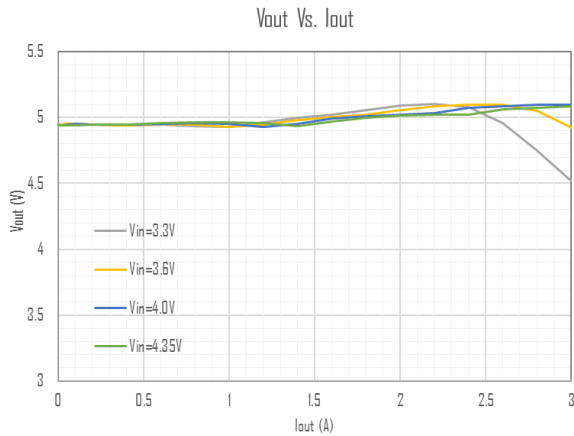
Efficiency in Boost mode

Efficiency Vs. Iout
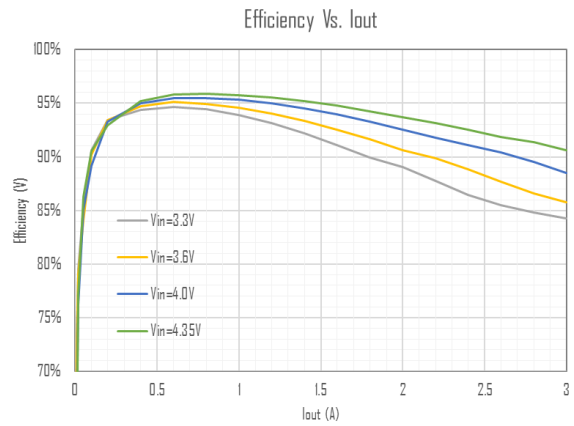
3A Charging Efficiency
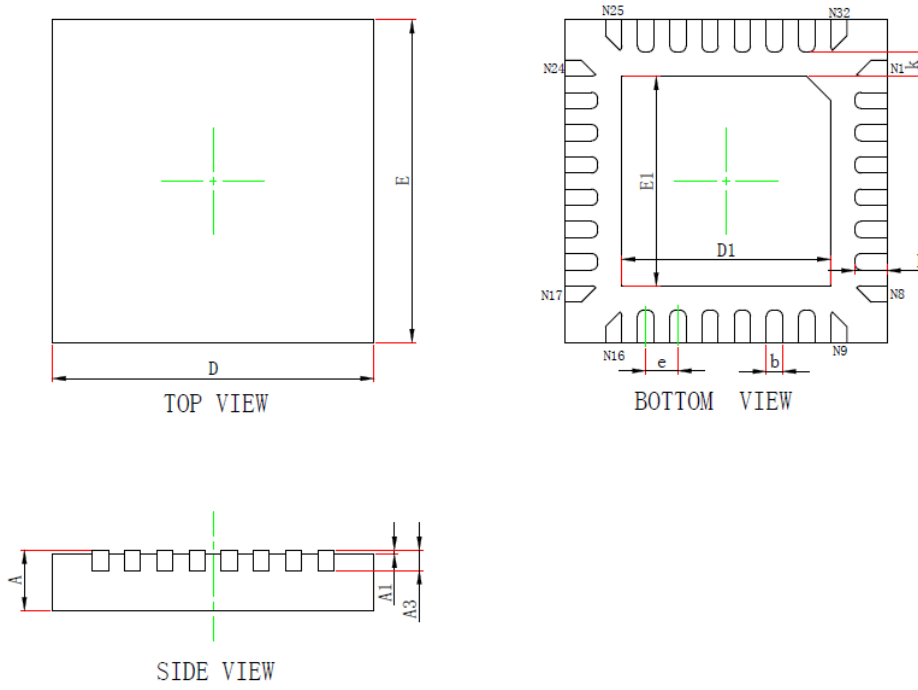
8000mAH Battery Charging Characteristics

Application Support

Please contact local distributor or ETA solutions for detail engineering support.

Package Outline

Package: QFN4x4-32

TOP VIEW

BOTTOM VIEW

SIDE VIEW

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	3.924	4.076	0.154	0.160
E	3.924	4.076	0.154	0.160
D1	2.500	2.700	0.098	0.106
E1	2.500	2.700	0.098	0.106
k	0.200MIN.		0.008MIN.	
b	0.150	0.250	0.006	0.010
e	0.400TYP.		0.016TYP.	
L	0.324	0.476	0.013	0.019