

2A Switch Mode Battery Charger and 1.5A OTG with Automatic Mode Switching

DESCRIPTION

ETA6094 is a switching Li-Ion battery charger capable of delivering up to 2A of charging current to the battery and also capable of delivering up to 1.5A in boost OTG operation, with high efficiency in both charging mode and OTG mode. For charging, it uses a proprietary control scheme that eliminates the current sense resistor for conventional constant current control, maximizing efficiency, reducing charging time and reducing costs. It can also output a 5V voltage in the reversed direction by boosting from the battery. It only needs a single inductor to provide power bi-directionally with a proprietary automatic mode detect and switch scheme. ETA6094 is 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.

ETA6094 is suitable for charging a 4.2V Li-ion battery. And ETA6094 is in DFN2x3-8 and ESOP8 package.

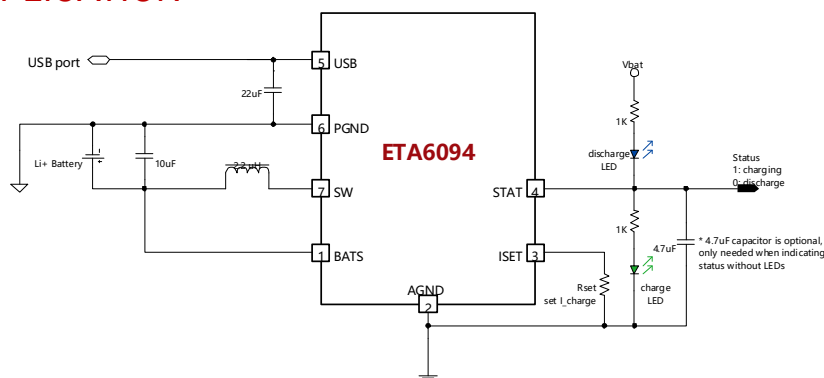
FEATURES

- ◆ Bi-Directional Power conversion with Single Inductor
- ◆ Automatic Mode Switching
- ◆ Switching Charger
- ◆ 5V Synchronous Boost
- ◆ Up to 95% Efficiency
- ◆ Up to 2A Max charging current and 1.5A discharging
- ◆ No-Battery detection
- ◆ No External Sense resistor

APPLICATIONS

- ◆ Tablet, MID
- ◆ Smart Phone
- ◆ Power Bank

TYPICAL APPLICATION

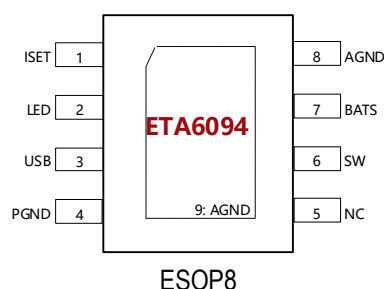
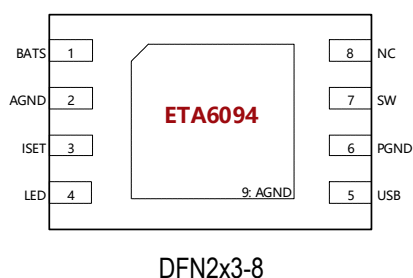


ORDERING

INFORMATION

PART No.	PACKAGE	TOP MARK	Pcs/Reel
ETA6094E8A	ESOP-8	ETA6094 YWW2L	4000
ETA6094D6I	DFN2x3-8	J8YW	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.)

USB Voltage	-0.3V to 6V
All Other Pin Voltage	$V_{USB}-0.3V$ to $V_{USB}+0.3V$
SW,USB to ground current.....	Internally limited
Operating Temperature Range	-40°C to 85°C
Storage Temperature Range	-55°C to 150°C
Thermal Resistance θ_{JC} θ_{JA}	
QFN2X3-8.....	20.....70 °C/W
ESOP-8.....	15.....60 °C/W
Lead Temperature (Soldering, 10sec)	260°C
ESD HBM (Human Body Mode)	2KV
ESD MM (Machine Mode)	200V

ELECTRICAL CHARACTERISTICS

(V_{IN} = 5V, unless otherwise specified. Typical values are at T_A = 25°C.)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
BUCK MODE					
USB Range		4.5		5.5	V
USB UVLO Voltage	Rising, Hys=500mV		4.5		V
USB Operating Current as BUCK	Switcher Enable, Switching		5		mA
	Switcher Enable, No Switching		800		μ A
BATTERY CHARGER					
Battery CV Voltage	I_{BAT} =0mA, default	4.17	4.21	4.25	V
Charger Restart Threshold	From DONE to Fast Charge		-160		mV
Battery Pre-Condition Voltage	V_{BAT} Rising Hys=250mV		2.9		V
Pre-Condition Charge Current			200		mA
Fast Charge Current	R_{ISET} =82K Ω		2		A
	R_{ISET} =150K Ω		1.2		A
Charge Termination Current			100		mA
Charge Termination Blanking time			16		S
BOOST MODE					
BATT Ok Threshold	Rising, HYS=0.6 V		3.1		V
Output Voltage Range		5.0	5.05	5.1	V
Quiescent Current At BATT	V_{bat} =3.6V		80		μ A

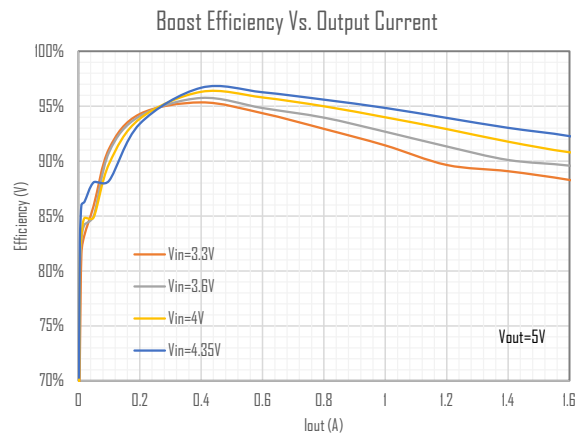
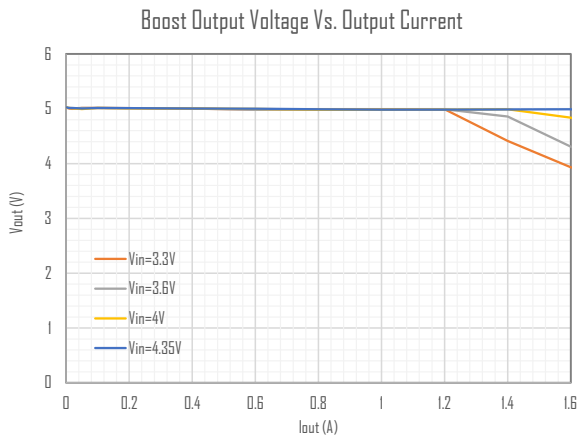
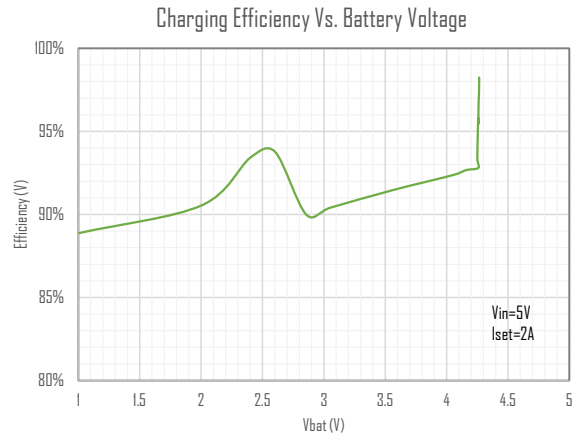
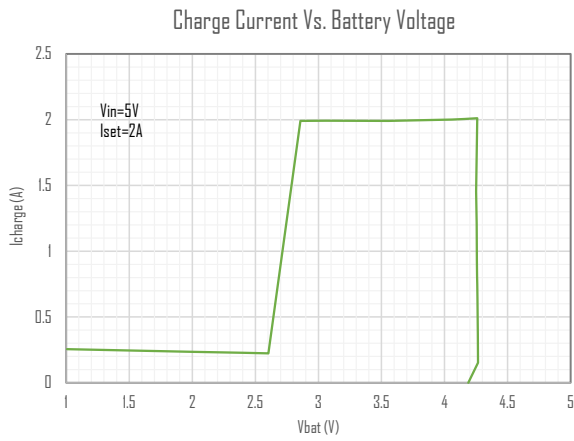
PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Switching Frequency	VIN<4.3V	0.9	1.2	1.5	MHz
Inductor Peak Current Limit	R _{IOLIM} =200K		2.4		A
Maximum Duty Cycle			90		%
Highside Pmos Rdson	I _{SW} =500mA		120		mΩ
Lowside Nmos Rdson	I _{SW} =500mA		100		mΩ
Short Circuit Hiccup Current			1.8		A
Short Circuit Hiccup Timer	On Time		62.5		ms
	Off Time		2000		
ISET					
ISET Voltage			0.8		V
THERMAL PROTECTION					
Charging Thermal Regulation threshold			85		°C
Thermal Shutdown	Rising, Hys=20°C		150		°C

PIN DESCRIPTION

DFN2x3-8 PIN #	ESOP8 PIN #	NAME	DESCRIPTION
1	7	BATS	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
2	8	AGND	Analog Ground. Connect to USB Cap separately
3	1	ISET	Buck Charging current setting pin. Connect a resistor (Rset) between this pin and analog ground to set the current level.
4	2	LED	Charge status indication by LEDs. A green LED is connected to ground, it blinks at 1Hz when charging and is continuously on when charge completed; a blue LED is connected to the pin sourced by the battery, and it turns on when discharging. Simply connecting a 4.7uF capacitor to this pin without those LEDs, make the pin an indicator of the status whether in charging or discharging.
5	3	USB	USB 5V output during boost and Adaptive input current limited pin during charging. This is a power pin, by pass with 2x22uF ceramic caps closed to the pin and PGND.
6	4	PGND	Power Ground pin
7	6	SW	Switching Pin. Connect with an inductor between this pin and positive terminal of battery
8	5	NC	Not connected

TYPICAL CHARACTERISTICS

($V_{in}=5V$, $T_A=25^{\circ}C$, unless otherwise specified)

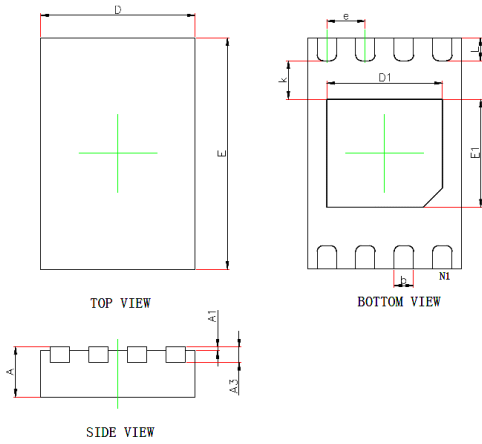


APPLICATION SUPPORT

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

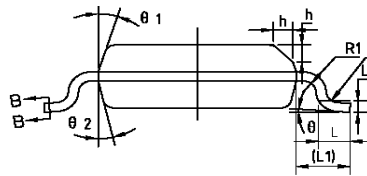
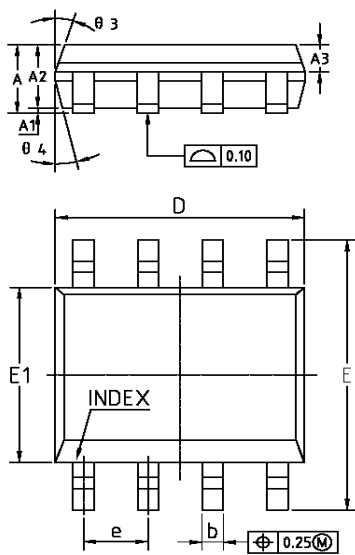
PACKAGE OUTLINE

DFN2x3-8



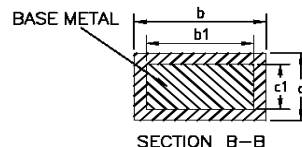
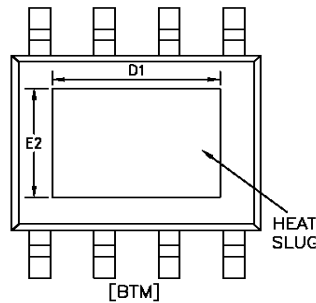
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.450	0.550	0.018	0.022
A1	0.000	0.050	0.000	0.002
A3	0.152REF.		0.006REF.	
D	1.924	2.076	0.076	0.082
E	2.924	3.076	0.115	0.121
D1	1.400	1.600	0.055	0.063
E1	1.300	1.500	0.051	0.059
k	0.200MIN.		0.008MIN.	
b	0.200	0.300	0.008	0.012
e	0.500TYP.		0.020TYP.	
L	0.224	0.376	0.009	0.015

ESOP-8



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	1.35	1.55	1.75
A1	0	0.10	0.15
A2	1.25	1.40	1.65
A3	0.50	0.80	0.70
b	0.38	-	0.51
b1	0.37	0.42	0.47
c	0.17	-	0.25
c1	0.17	0.20	0.23
D	4.80	4.90	5.00
D1	3.10	3.30	3.50
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
E2	2.20	2.40	2.60
e	-	1.27BSC	-
L	0.45	0.60	0.80
L1	-	1.04REF	-
L2	-	0.25BSC	-
R	0.07	-	-
R1	0.07	-	-
h	0.30	0.40	0.50
theta	0°	-	8°
theta 1	15°	17°	19°
theta 2	11°	13°	15°
theta 3	15°	17°	19°
theta 4	11°	13°	15°



NOTES:
ALL DIMENSIONS REFER TO JEDEC STANDARD MS-012 AA
DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.