3A Switching Charger, 2.4A Boost and Fuel Gauge in One ESOP8 with Single Inductor

DESCRIPTION

HM5907 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 5V/2.4A in boost operation, with high efficiency in both charging mode and boost mode. It also includes a fuel gauge system for power indication. 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. HM5907 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 charging battery function.

HM5907 is suitable for charging a 4.2V Li-ion battery. And HM5907 is in ESOP8 package.

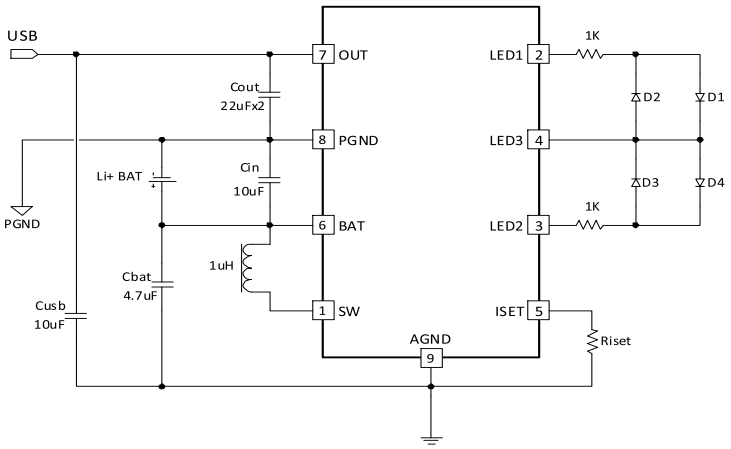
FEATURES

- Bi-Directional Power conversion with Single Inductor
- Automatic Mode Switching
- Switching Charger
- 5V Synchronous Boost
- Up to 96% Efficiency
- Up to 3A Max charging current and 2.4A discharging
- No-Battery detection
- No External Sense resistor
- 4 LEDs Fuel gauge

APPLICATIONS

- Tablet, MID
- Smart Phone
- Power Bank

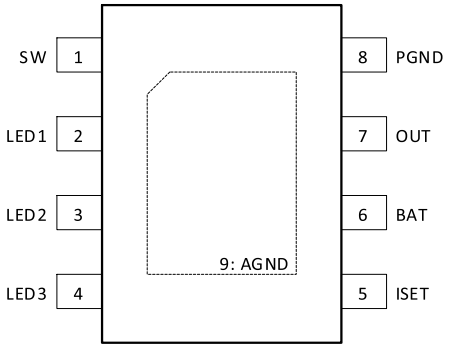
TYPICAL APPLICATION



ORDERING INFORMATION

PART No.	PACKAGE	TOP MARK	Pcs/Reel
HM5907	ESOP8	HM5907	2500

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.)

OUT, SW Voltage .....–0.3V to 6V
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}	
ESOP8	10	50	°C/W

Lead Temperature (Soldering, 10ssec) .....260°C
ESD HBM (Human Body Mode) 2KV
ESD MM (Machine Mode) 200V

ELECTRICAL CHACRACTERISTICS

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

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		μA
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		2.8		V
Pre-Condition Charge Current			200		mA
Fast Charge Current	Riset=56K		3		A
	Riset=91K		2		A
Charge Termination Current			200		mA
Charge Termination Blanking time			16		S
BOOST MODE					
BATT Ok Threshold	Rising, HYS=0.4 V		3.2		V
Output Voltage Range	Iout=0	5.05	5.1	5.15	V
Quiescent Current At BATT	Vbat=3.6V		80		μA
Switching Frequency	VIN<4.3V	550	650	750	KHz
Inductor Peak Current Limit			5.0		A
Maximum Duty Cycle			90		%
High side Pmos Rdson	I_{SW} =500mA		75		mΩ

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Low side Nmos Rdson	I_{SW} =500mA		70		mΩ
Short Circuit Hiccup Current			3.8		A
Short Circuit Hiccup Timer	On Time		45		ms
	Off Time		2000		
Charging Thermal Regulation threshold			85		°C
Thermal Shutdown	Rising, Hys=20°C		150		°C

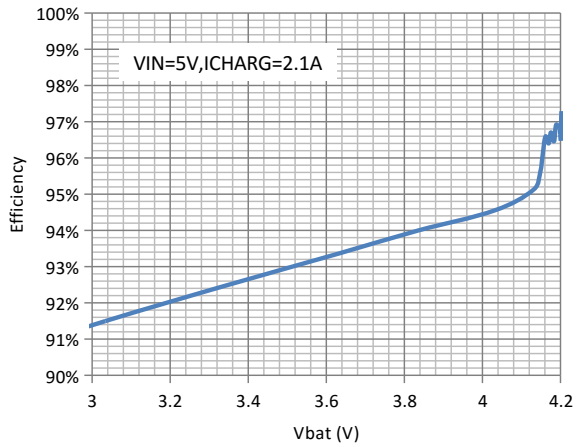
PIN DESCRIPTION

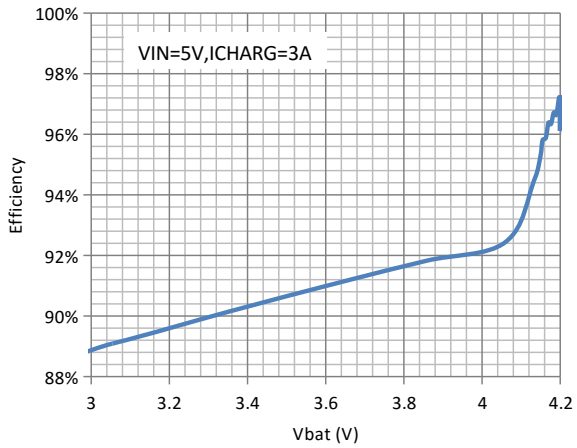
PIN #	NAME	DESCRIPTION
1	SW	Inductor Connection. Connect an inductor Between SW and the regulator output
2	LED1	Fuel gauge LED1, LED2 connection pin
3	LED2	Fuel gauge LED3, LED4 connection pin
4	LED3	Fuel gauge LED1, LED2, LED3, LED4 connection pin
5	ISET	Buck Charging current setting pin. Connect a resistor between this pin and analog ground to set the current level.
6	BAT	Battery pin. Connect a Battery to this pin, and with a bypass capacitor 10uF.
7	OUT	Output pin. Bypass with a 22uF or larger ceramic capacitor closely between this pin and GND
8	PGND	Power Ground Pin
9 / Exposed Pad	AGND	Analog Ground Pin

TYPICAL CHARACTERISTICS

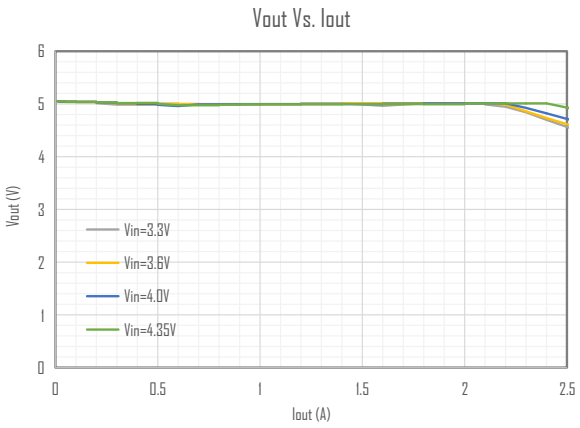
(Vin=5V, T_A=25°C, unless otherwise specified)

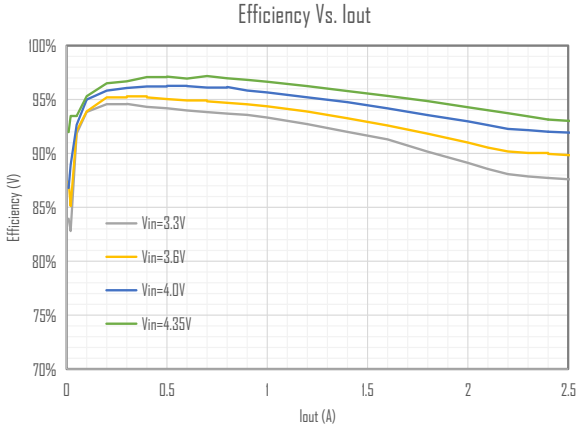
In CHARGE MODE, Efficiency Vs Vbat at 2.1A and 3A charge current





In BOOST MODE

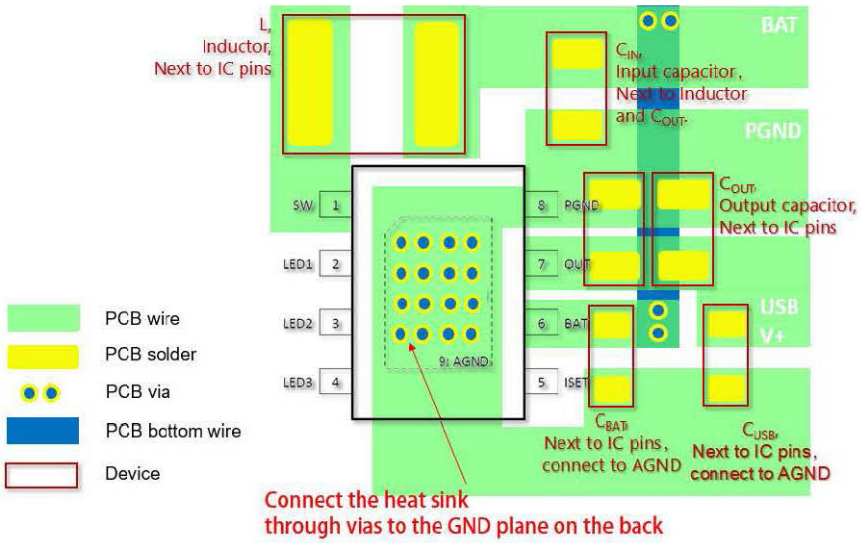




APPLICATION SUPPORT

Please contact local distributor or H&M SEMI sales representatives for technical support.

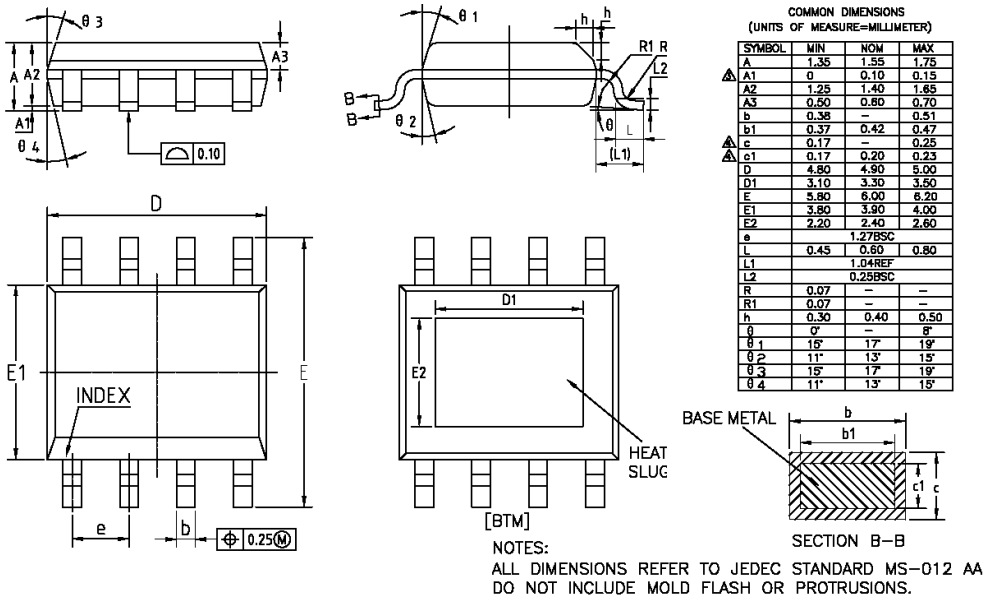
PCB GUIDELINES



Please have C_{IN}, C_{OUT}, and L placed just next to the IC pins so that the power traces are kept to the shortest to achieve a good performance of HM5907 and good EMI.

PACKAGE OUTLINE

Package: 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	0.60	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
θ	0°	–	8°
θ1	15°	17°	19°
θ2	11°	13°	15°
θ3	15°	17°	19°
θ4	11°	13°	15°

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