# 3A Switching Charger, 2.4A Boost and 3 LED-indicators for battery level, charge/discharge status in One ESOP8 with Single Inductor

## DESCRIPTION

HM5907B 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. HM5907B 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.

HM5907B is suitable for charging a 4.2V Li-ion battery. And HM5907B is in ESOP8 package.

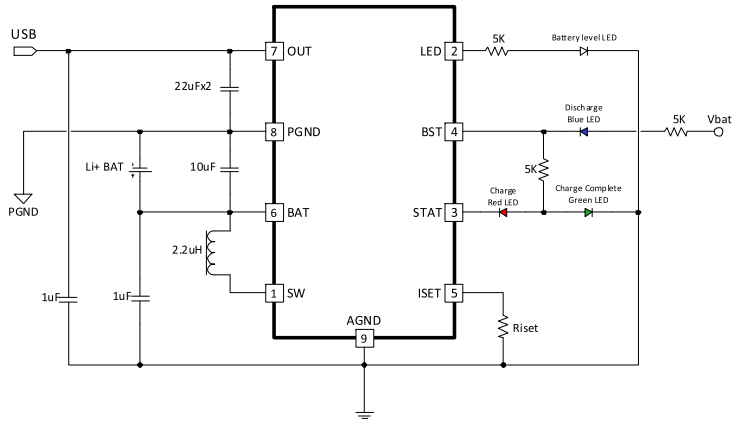
## FEATURES

- 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
- LEDs for battery level indication and charge/discharge status indication

## APPLICATIONS

- Tablet, MID
- Smart Phone
- Power Bank

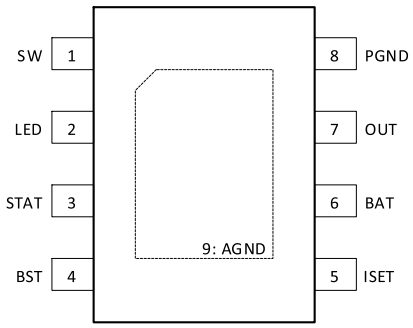
## TYPICAL APPLICATION




## ORDERING INFORMATION

| PART No. | PACKAGE | TOP MARK | Pcs/Reel |
|---|---|---|---|
| HM5907B | ESOP8 | HM5907B | 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 | $\theta_{JA}$ | $\theta_{Jc}$ | |
|---|---|---|---|
| ESOP8 | 10 | 50 | °C/W |

Lead Temperature (Soldering, 10sec) .....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 |

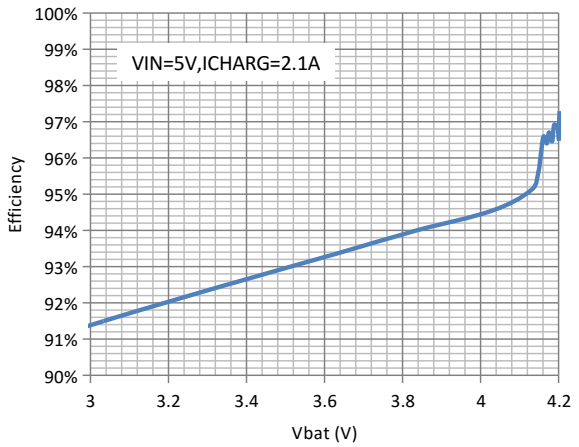
## PIN DESCRIPTION

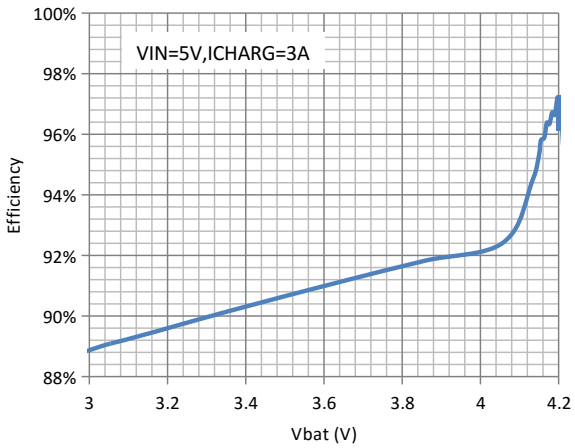
| PIN # | NAME | DESCRIPTION |
|---|---|---|
| 1 | SW | Inductor Connection. Connect an inductor Between SW and the regulator output |
| 2 | LED | Battery level indication LED connection pin. |
| 3 | STAT | Charge status indication. When charging, the STAT is pulled low. When charge is completed the STAT is in high impedance state. |
| 4 | BST | Boost status indication. BST is pulled low when boost, pulled high when charging, and in high impedance if entering into no load condition. |
| 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

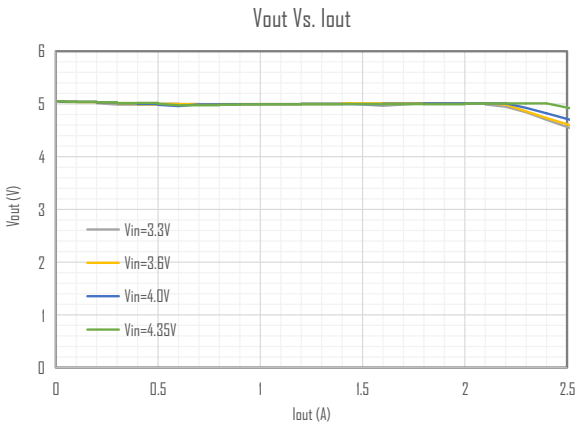
(Vin=5V, $T_A$=25°C, unless otherwise specified)

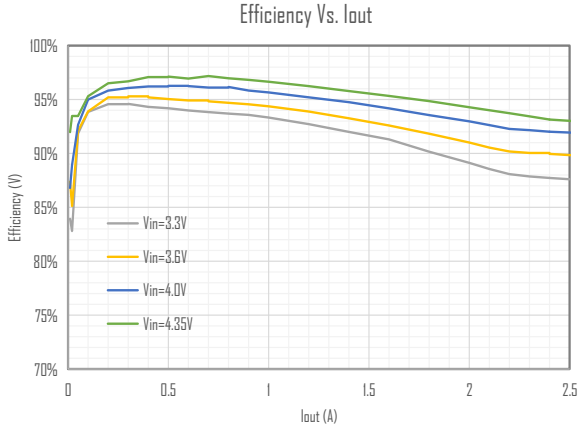
In CHARGE MODE, Efficiency Vs Vbat at 2.1A and 3A charge current



In BOOST MODE

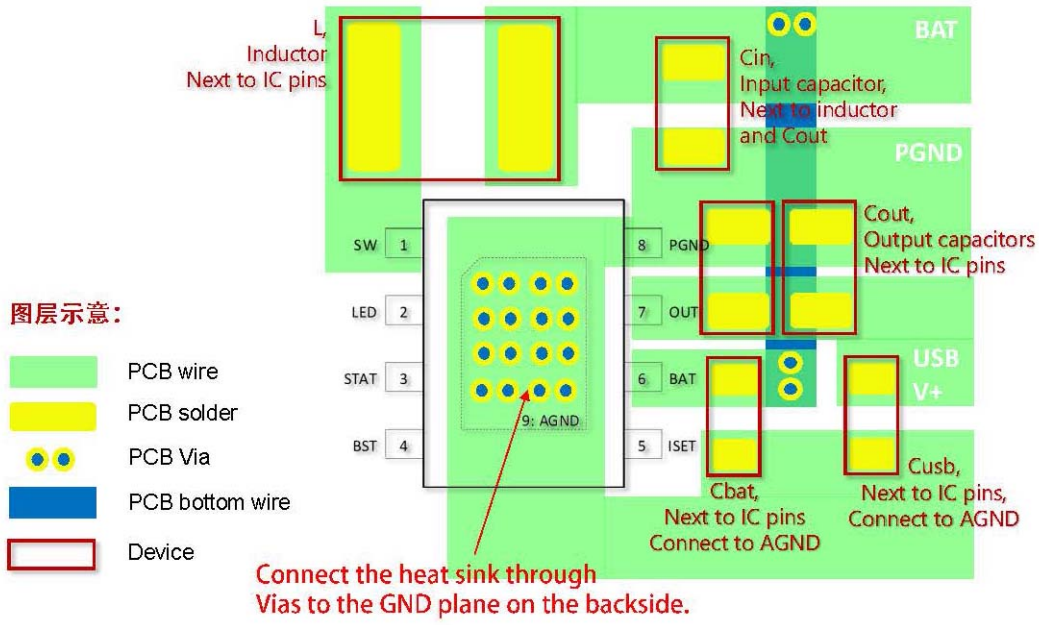



## APPLICATION SUPPORT

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

## PCB GUIDELINES

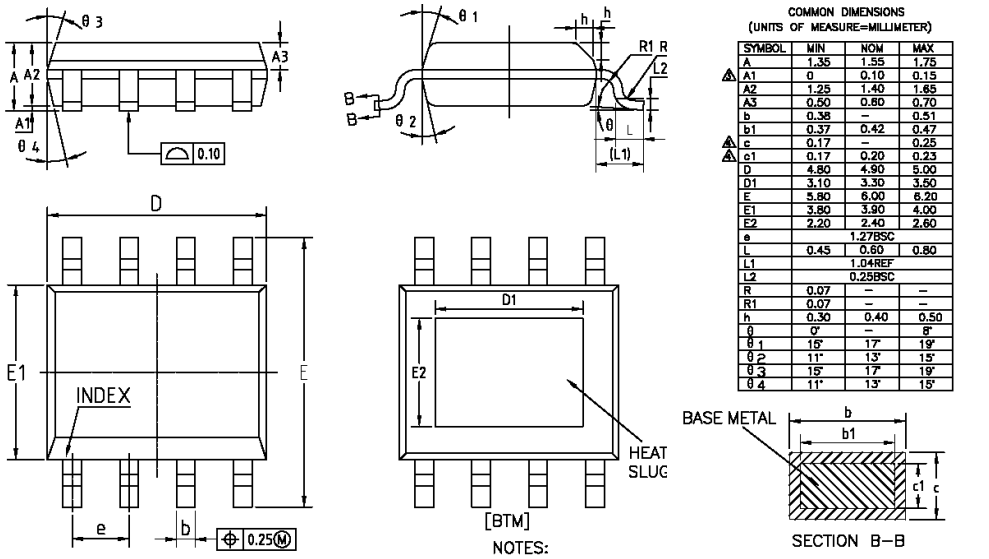



Please have $C_{IN}$, $C_{OUT}$, and L placed just next to the IC pins so that the power traces are kept to the shortest to achieve a good performance of HM5907B and good EMI.

Have $C_{BAT}$ and $C_{USB}$ placed close to the IC pins and connected to AGND to ensure a clean AGND.

# 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.