

## 1.2A Switching Charger and 1.2A Boost in One Sot23-5 with Single Inductor

### DESCRIPTION

HM5909 is a switching Li-Ion battery charger capable of delivering up to 1.2A of charging current to the battery and also capable of delivering up to 5V/1.2A in boost operation, with high efficiency in both charging mode and boost 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. HM5909 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.

HM5909 is suitable for charging a 4.2V Li-ion battery. And HM5909 is in SOT23-5 package.

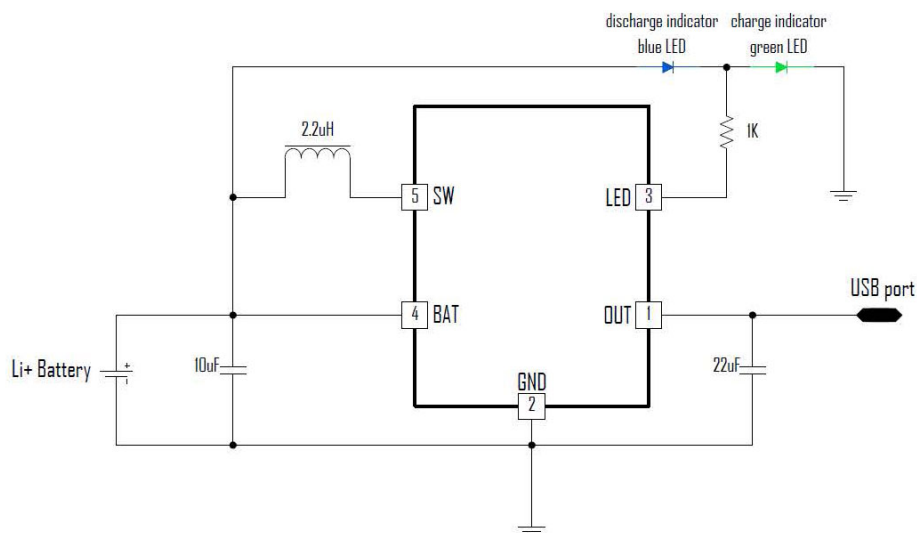
### FEATURES

- ◆ Bi-Directional Power conversion with Single Inductor
- ◆ Automatic Mode Switching
- ◆ Switching Charger
- ◆ 5V Synchronous Boost
- ◆ Up to 95% Efficiency
- ◆ Up to 1.2A Max charging current and 1.2A discharging
- ◆ No-Battery detection
- ◆ No External Sense resistor

### APPLICATIONS

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

### TYPICAL APPLICATION



### ORDERING INFORMATION

**PART No.**

HM5909

**PACKAGE**

SOT23-5

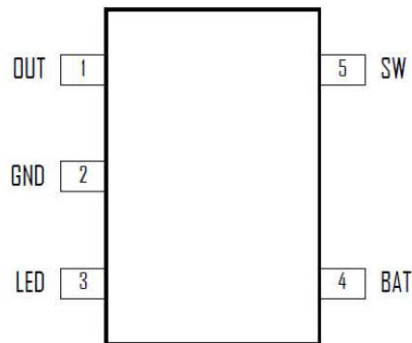
**TOP MARK**

JNYW

**Pcs/Reel**

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.)

|                                      |                             |                    |
|--------------------------------------|-----------------------------|--------------------|
| 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                   | $\theta_{JA}$ $\theta_{JC}$ |                    |
| SOT23-5                              | .....190.....110.....       | °C/W               |
| Lead Temperature (Soldering, 10ssec) | .....                       | 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 |
|----------------------------------|-------------------------------|------|------|------|-------|
| <b>BUCK MODE</b>                 |                               |      |      |      |       |
| 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    |
| <b>BATTERY CHARGER</b>           |                               |      |      |      |       |
| 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              |                               |      | 1.2  |      | A     |
| Charge Termination Current       |                               |      | 100  |      | mA    |
| Charge Termination Blanking time |                               |      | 16   |      | S     |
| <b>BOOST MODE</b>                |                               |      |      |      |       |
| BATT Ok Threshold                | Rising, HYS=0.6 V             |      | 3.1  |      | V     |
| Output Voltage Range             | $I_{out}$ = 0                 | 5.05 | 5.1  | 5.15 | V     |
| Quiescent Current At BATT        | $V_{bat}$ = 3.6V              |      | 80   |      | µA    |
| Switching Frequency              | $V_{IN}$ < 4.3V               | 675  | 900  | 1125 | KHz   |
| Inductor Peak Current Limit      |                               |      | 2.4  |      | A     |
| Maximum Duty Cycle               |                               |      | 90   |      | %     |
| Highside Pmos Rdson              | $I_{SW}$ = 500mA              |      | 120  |      | mΩ    |
| Lowside Nmos Rdson               | $I_{SW}$ = 500mA              |      | 100  |      | mΩ    |

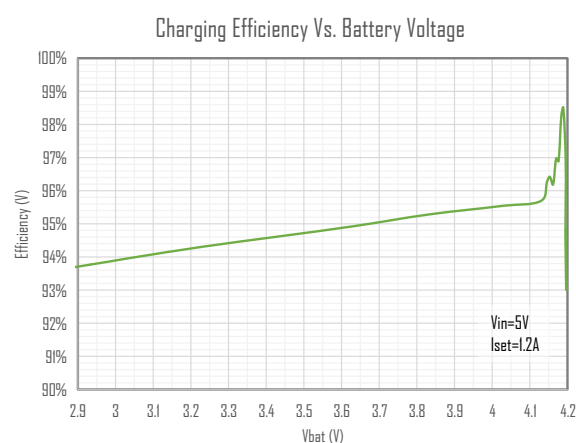
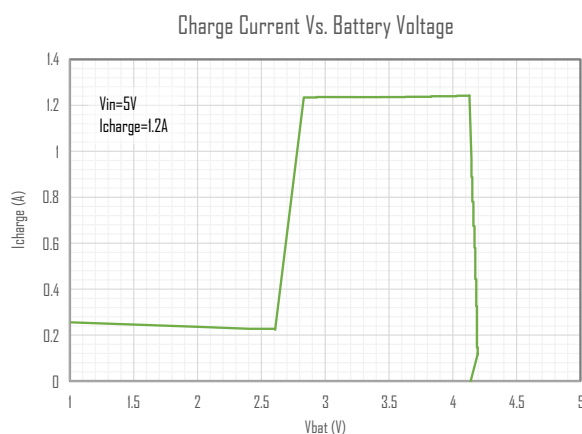
| PARAMETER                             | CONDITIONS       | MIN | TYP  | MAX | UNITS |
|---------------------------------------|------------------|-----|------|-----|-------|
| Short Circuit Hiccup Current          |                  |     | 1.8  |     | A     |
| Short Circuit Hiccup Timer            | On Time          |     | 62.5 |     | ms    |
|                                       | Off Time         |     | 2000 |     |       |
| Charging Thermal Regulation threshold |                  |     | 85   |     | °C    |
| Thermal Shutdown                      | Rising, Hys=20°C |     | 150  |     | °C    |

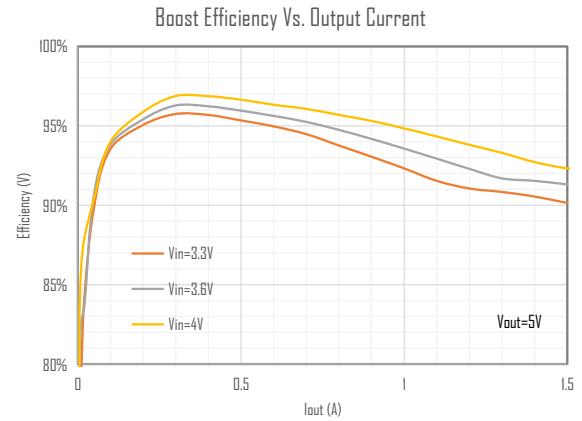
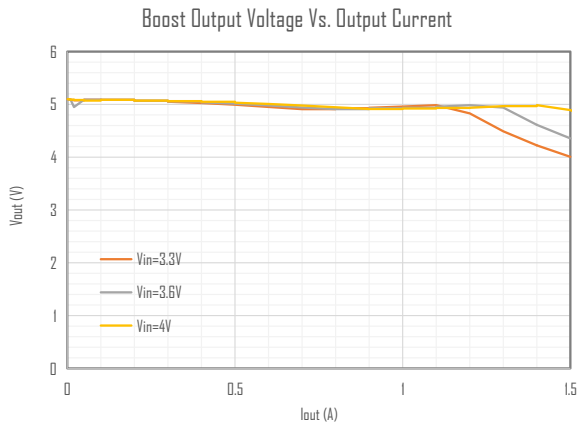
## PIN DESCRIPTION

| PIN # | NAME | DESCRIPTION   |
|-------|------|---|
| 1     | OUT  | Output pin. Bypass with a 22uF or larger ceramic capacitor closely between this pin and GND |
| 2     | GND  | Ground Pin  |
| 3     | LED  | LED indication pin  |
| 4     | BAT  | Battery pin. Connect a Battery to this pin, and with a bypass capacitor 10uF.               |
| 5     | SW   | Inductor Connection. Connect an inductor Between SW and the regulator output                |

## TYPICAL CHARACTERISTICS

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

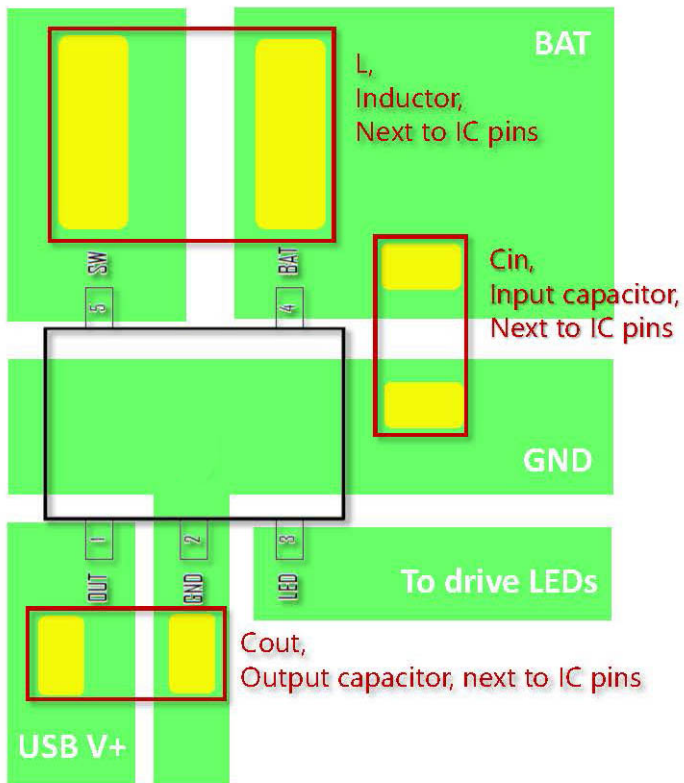




## APPLICATION SUPPORT

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

## PCB GUIDELINES

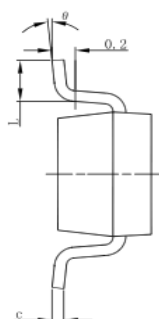
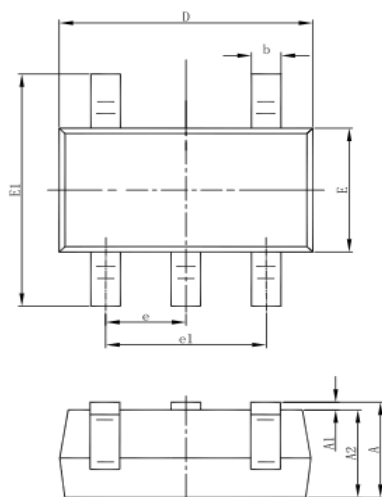


Please have the power devices placed just next to the IC pins so that the power traces are kept the shortest way to achieve a good performance of HM5909.

- PCB wire
- PCB Solder
- Device

## PACKAGE OUTLINE

### SOT23-5



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 1.050                     | 1.250 | 0.041                | 0.049 |
| A1     | 0.000                     | 0.100 | 0.000                | 0.004 |
| A2     | 1.050                     | 1.150 | 0.041                | 0.045 |
| b      | 0.300                     | 0.500 | 0.012                | 0.020 |
| c      | 0.100                     | 0.200 | 0.004                | 0.008 |
| D      | 2.820                     | 3.020 | 0.111                | 0.119 |
| E      | 1.500                     | 1.700 | 0.059                | 0.067 |
| E1     | 2.650                     | 2.950 | 0.104                | 0.116 |
| e      | 0.950(BSC)                |       | 0.037(BSC)           |       |
| e1     | 1.800                     | 2.000 | 0.071                | 0.079 |
| L      | 0.300                     | 0.600 | 0.012                | 0.024 |
| θ      | 0°                        | 8°    | 0°                   | 8°    |