20V Standoff, 2.4A Charger with 2.4A OTG for Power Bank All-in-One Solution

DESCRIPTION

HM5911 is a switching Li-Ion battery charger capable of delivering up to 2.4A of charging current to the battery and also capable of delivering up to 2.4A in boost OTG operation. HM5911 includes a power path from Vin to Vout, a Buck charger, a 5V Boost converter, and a fuel gauge for power indication. The Buck charger guarantee a 93.5% average efficiency at 2.4A charge current and the Boost converter achieved 92% efficiency at 2.4A output when battery voltage is as low as 3.3V. It greatly increases the effective battery capacity for a battery powered system, such as power bank. With all these features, HM5911 is an ideal all-in-one solution for Li^+ battery charging, discharging applications.

HM5911 is available in ESOP8 package.

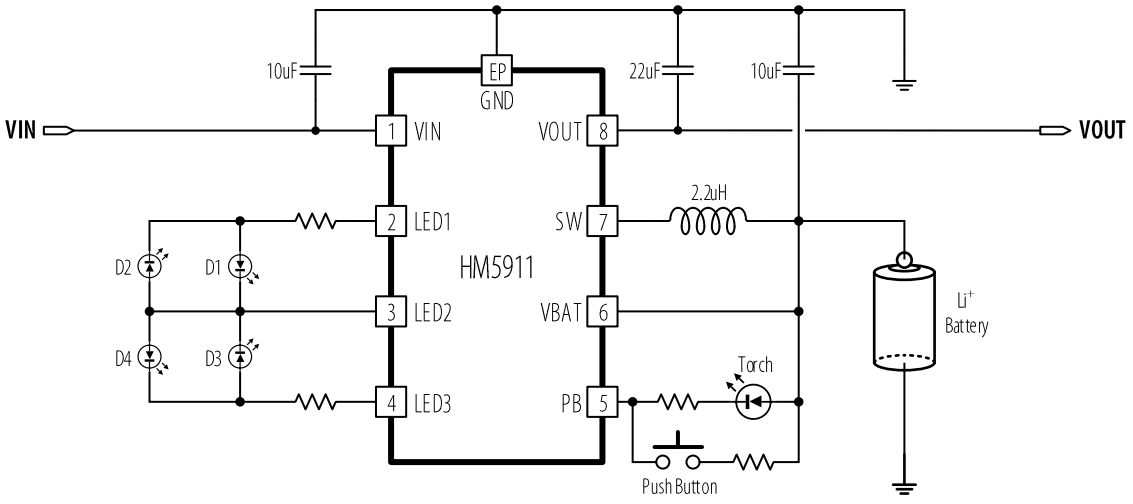
FEATURES

- Input Standoff Voltage higher than 20V
- Bi-Directional Power conversion with Single Inductor
- Power Path from Vin to Vout
- Automatic Mode Switching
- Switching Charger
- 5V Synchronous Boost
- Up to 96% Efficiency
- No External Sense resistor
- LEDs for battery level indication and charge/discharge status indication

APPLICATIONS

- Power Bank
- Li^+ Battery Powered System

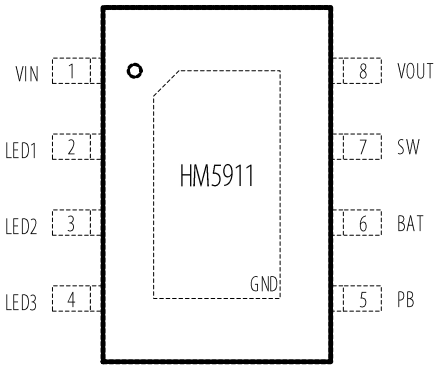
TYPICAL APPLICATION



ORDERING INFORMATION

PART No.	PACKAGE	TOP MARK	Pcs/Reel
HM5911	ESOP8	HM5911 YYWW	4000

PIN CONFIGURATION



ESOP-8

ABSOLUTEMAXIMUM RATINGS

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

IN Voltage.....–0.3V to 20V

OUT Voltage .....–0.3V to 6V

All Other Pin Voltage.....V_{OUT}–0.3V to V_{OUT}+0.3V

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

Operating Temperature Range.....–40℃ to 85℃

Storage Temperature Range.....–55℃ to 150℃

Thermal Resistance	θ_{JC}	θ_{JA}
ESOP8	10	50 ℃/W

Lead Temperature (Soldering, 10ssec) .....260℃

ESD HBM (Human Body Mode) 2KV

ESD MM (Machine Mode) 200V

ELECTRICAL CHACRACTERISTICS

(V_{IN} = 5V, V_{BAT}=3.8V, L=1μH unless otherwise specified. Typical values are at TA = 25℃.)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
BUCK MODE					
IN Standoff Voltage			20		V
IN Range		4.5		6	V
IN UVLO Voltage	Rising, Hys=500mV		4.5		V
IN to OUT RDSON			60		mΩ
IN to OUT Input current limit			5		A
IN to OUT Hiccup threshold Voltage	Falling. Vin-Vout>500mV Rising, Hys=100mV		500		mV
Hiccup on time			7		mS
Hiccup off time			200		mS
IN OVP Voltage	Hys=500mV		6.1		V
IN Operating Current as BUCK	Switcher Enable, Switching		5		mA
	Switcher Enable, No Switching		500		μA
BATTERY CHARGER					
Battery CV Voltage	Default , I_{BAT} =0mA	4.16	4.2	4.24	V
	C_{LED3}=1nF , I_{BAT} =0mA	4.3	4.35	4.4	V
Charger Restart Threshold			-170		mV
Battery Pre-Condition Voltage	V_{BAT} Rising Hys=200mV		3		V
Pre-Condition Charge Current			200		mA
Fast Charge Current		2.16	2.4	2.64	A
Charge Termination Current			230		mA
Charge Termination Blanking time			12		S
BOOST MODE					

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
BAT OK Threshold	Rising within time 100ms		3.2		V
	Rising exceed 100ms		3.52		V
Output Voltage Range	IOUT=0A	4.95	5.05	5.15	V
Output cord compensation	I_{OUT}=2.4A		150		mV
Quiescent Current At BATT	Boost On		250		μA
Shutdown Supply Current At BATT	Idle Mode		65		μA
Switching Frequency	VBATT<4.4V		0.5		MHz
Iout Current Limit	VBATT=3.8V	2.4	2.6	2.9	A
Maximum Duty Cycle			95		%
Highside Pmos Rdson	I_{SW} =500mA		36		mΩ
Lowside Nmos Rdson	I_{SW} =500mA		26		mΩ
Short Circuit Hiccup Current			3		A
Over Current Detect Time			1		S
From Short to reboot time			60		S
Load current threshold into sleep mode			20		mA
LEDS					
LED Flash Frequency			1		Hz
LOGIC INPUT: BUTT					
Logic Input High		V_{BAT} -0.3			V
Logic Input Low				V_{BAT} -1.2 or Floating	V
THERMAL PROTECTION					
Charging Thermal Regulation threshold			110		°C
Thermal Shutdown	Rising, Hys=30°C		160		°C

PIN DESCRIPTION

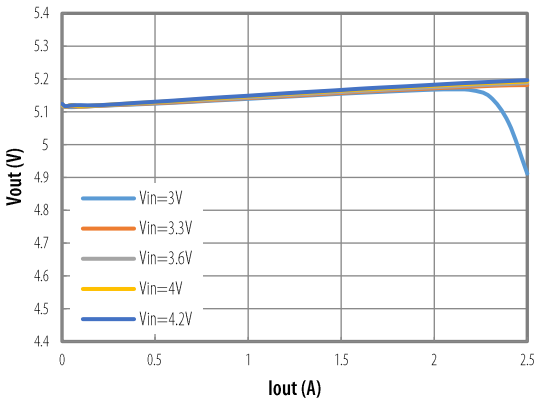
PIN #	NAME	DESCRIPTION
1	VIN	DC Input pins. Bypass with a 10uF capacitor from this pin to GND
2	LED1	Fuel gauge LED1 connection pin
3	LED2	Fuel gauge LED2 connection pin
4	LED3	Fuel gauge LED3 connection pin
5	PB	Push Button pin. When the push button is pushed, and input is not present, boost operation is activated. Depending on the loading at OUT, the boost may continue to supply an output voltage or go into sleep mode. When push this button sustain 0.8S, it will turn on or turn off the flashlight alternatively. Beside Push Button feature, this pin also works as Flashlight pin. An internal open drain will turn on Flashlight when this feature is ON.
6	BAT	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
7	SW	Switching Pin. Connect with an inductor between this pin and BATT.

PIN #	NAME	DESCRIPTION
8	VOUT	USB 5.15V output during boost and charging input pin during charging. This is a power pin, bypass with 22uF MLCC caps to the pin and PGND as close as possible.
9 /EP	GND	The substrate of the chip, connected to GND, and large area of ground trace for good thermal dissipation.

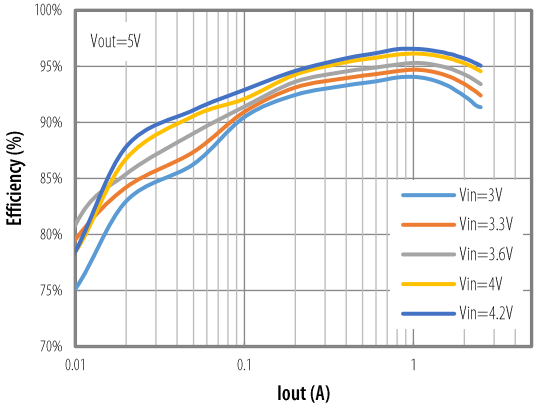
TYPICAL CHARACTERISTICS

(Typical values are at T_A = 25℃ unless otherwise specified.)

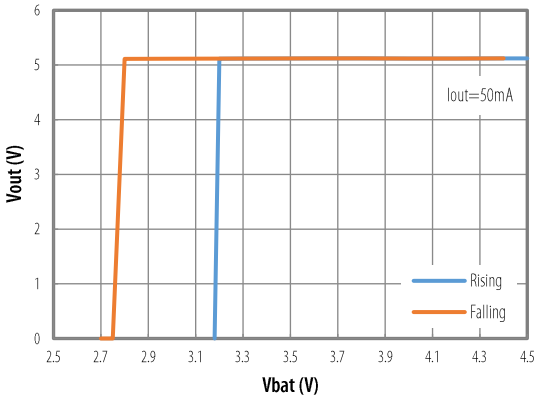
Boost Vout Vs. Iout



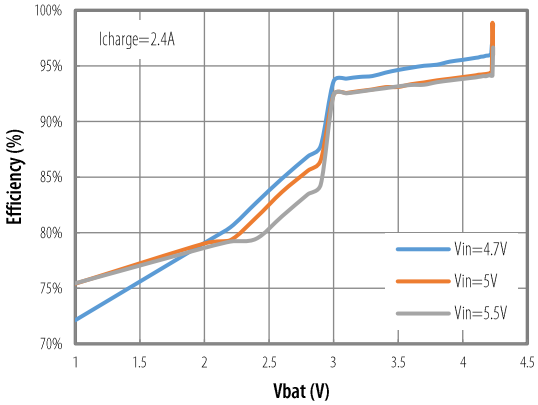
Boost Eff Vs. Iout



Boost UVLO

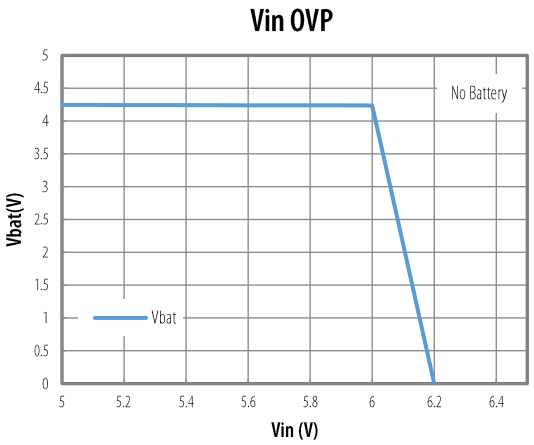


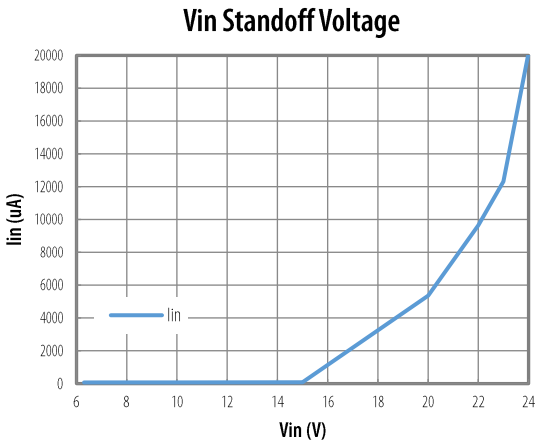
Charger Eff Vs. Vbat



TYPICAL CHARACTERISTICS cont'

(Typical values are at T_A = 25℃ unless otherwise specified.)



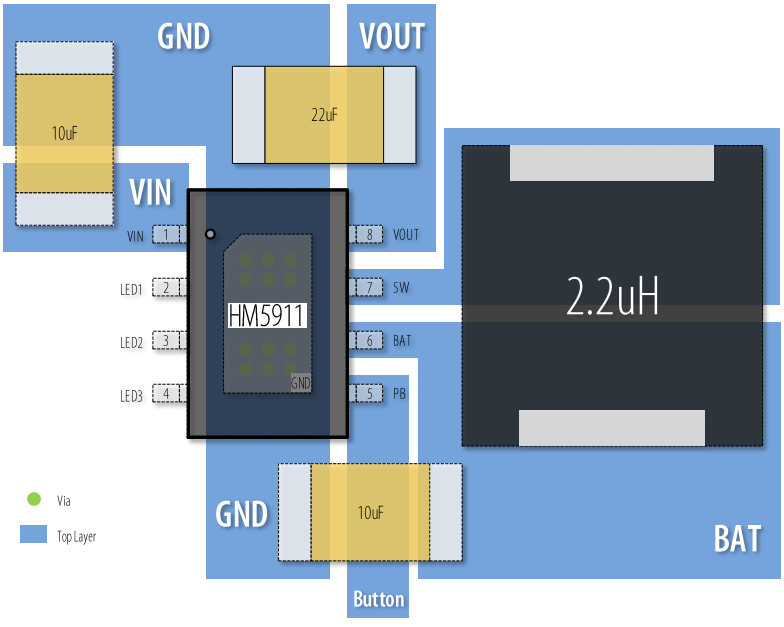


APPLICATION NOTE

Setting for 4.35V battery

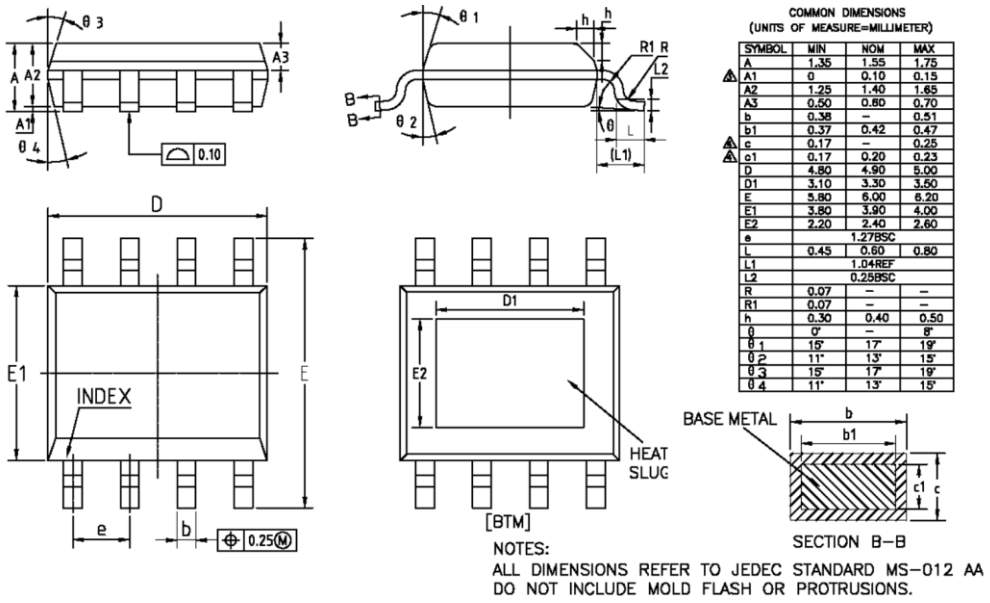
If the LED3 pin (pin #4) is connected by a 1nF capacitor (or larger) to GND, the HM5911 will take the battery as a 4.35V battery, otherwise 4.2V battery if the pin is found having no such capacitor to GND.

PCB GUIDELINE



PACKAGE OUTLINE

Package: ESOP8



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.