

HM5803- Battery Charger+ Battery Protection SOC

GENERAL DESCRIPTION

HM5803 is one SOC that it integrates Li-Battery Protection and one High precision & tiny current battery charger in only DFN3x3-10 package. This SOC can set fast charging current from 50mA~700mA with 4.2V battery full voltage. It also has the whole battery protection function include V_{cu} 、 V_{dl} 、 I_{ov} 、short protection. It only need few components and can reduce the BOM area and BOM cost.

FEATURES

- Constant-Current/Constant-Voltage Operation with Thermal Regulation to Maximize Charge Rate Without Risk of Overheating
- Preset 4.2V Charge Voltage with $\pm 1\%$ Accuracy
- Charge state pairs of output, no battery and fault status display
- C/10 Charge Termination
- 50uA Supply Current in Shutdown
- 2.9V Trickle Charge Threshold
- Li Protection OCU-4.3V ODU-2.4V
- Li Protection OCP-3A
- Have UVLO、OTP、Short protection
- Operating Temperature: -40°C to $+85^{\circ}\text{C}$
- Available in very tiny DFN3X3-10L Package
- RoHS Compliant and 100% Lead(Pb)-Free
- 4.5V to 6.5V Charger Input Range
- 700mA charging Capability

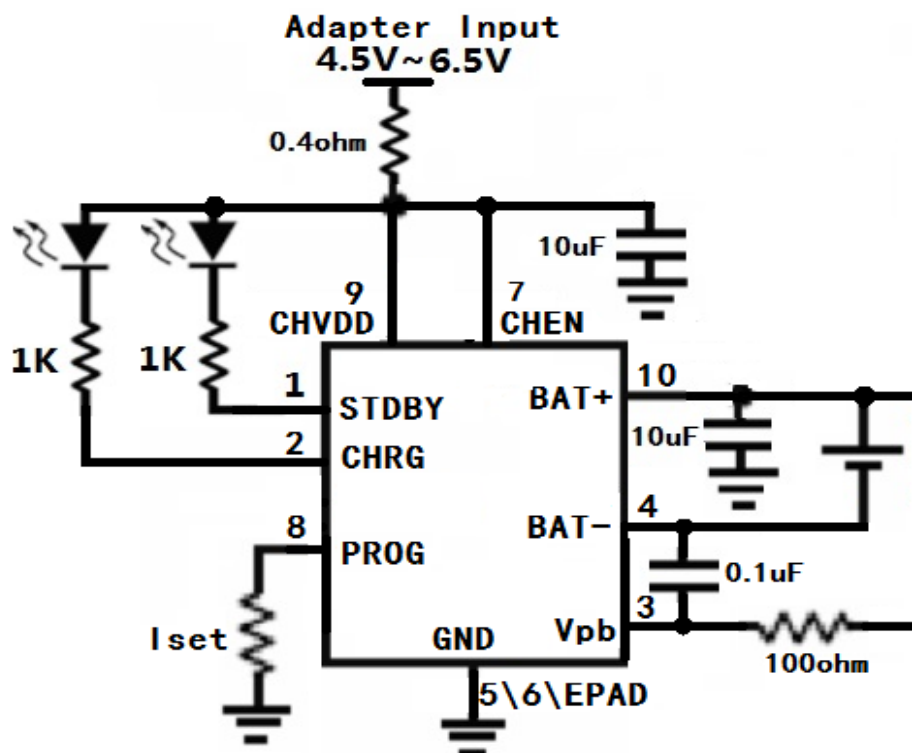


Figure1 . Typical Application Circuit

ORDERING INFORMATION

PART NUMBER	VIN	VBAT	CHARGE CURRENT	V _{CU}	V _{DU}	I _{OC}	PACKAGE	MARK
HM5803	4.5~6V	4.2V	0.7A	4.3V	2.4V	3A	DFN3*3-10	HM5803 YW

PIN CONFIGURATION

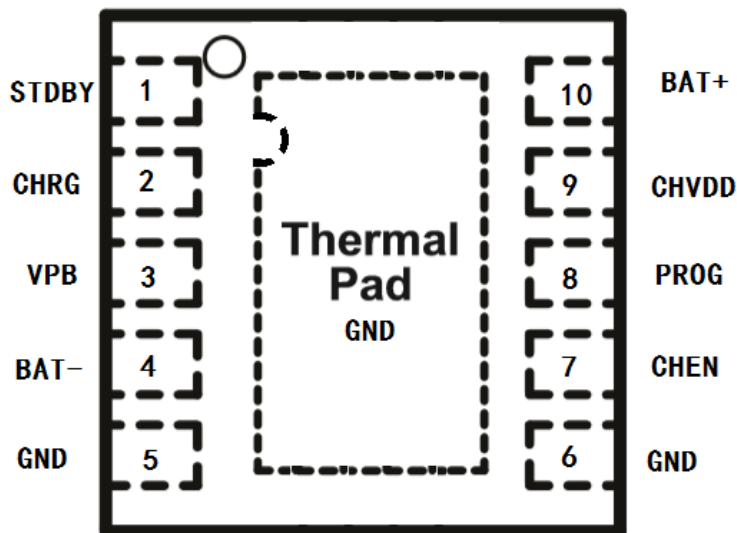


Figure 2. PIN Configuration

PIN DESCRIPTION

PIN NUMBER	PIN NAME	PIN DESCRIPTION
1,	/STDBY	The completion of battery charging instructions side.
2	/CHRG	Open-Drain Charge Status Output.
3	VPB	Power supply of battery protection
4	BAT-	The negative pole of Li-Battery
7	CHEN	The enable pin of battery charger
8	PROG	Charge Current Program, Charge Current Monitor and Shutdown Pin.
9	CHVDD	The Adapter input
10	BAT+	The positive pole of Li-Battery
5、6、EPAD	GND	Ground & Thermal PAD , Please connect with mass metal

ABSOLUTE MAXIMUM RATINGS

(Note: Do not exceed these limits to prevent damage to the device. Exposure to absolute maximum rating conditions for long periods may affect device reliability.)

PARAMETER	VALUE	UNIT
Input Supply Voltage VDD、VPB	VSS-0.3 ~ VSS+7	V
PROG pin Voltage Vprog	VSS-0.3 ~ Vcc+0.3	V
BAT pin Voltage Vbat	Vss-0.3 ~ 7	V
CHAG pin Voltage Vchrg	VSS-0.3 ~ VSS+7	V
BAT pin Current Ibat	1	A
PROG pin Current Iprog	10	mA
Operating Ambient Temperature	-40 to 85	°C
Maximum Junction Temperature	150	°C
Storage Temperature	-55 to 150	°C
Lead Temperature (Soldering, 10 sec)	260	°C

ELECTRICAL CHARACTERISTICS

(VIN = 3.6V, TA= 25°C unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Voltage Range	VCC		4.25		6.5	V
Input supply current	Icc	Charge mode, RPROG =10K		350	2000	uA
		Standby mode		150	500	uA
		Shutdown mode(RPROG not connected,Vcc<Vbat or Vcc<Vuv)		50	100	uA
BAT pin Current Input supply current	Ibat Icc	RPROG =2k,Current mode	450	500	550	mA
		RPROG =10k,Current mode	93	100	107	mA
		Standby mode,Vbat=4.2V	0	-2.5	-6	uA
		Shutdown mode		1	2.5	uA
		Sleep mode,Vcc=0V		0.3	2.5	uA
		Charge mode, RPROG =10K		350	2000	uA
Regulated Charge Voltage	Vfloat	0°C≤TA≤85°C, Icharge = 40mA	4.158	4.2	4.242	V
PROG pin Voltage	Vprog	RPROG =10k, Current mode	0.93	1.0	1.07	V
Trickle charge current	Itrikl	Vbat<Vtrikl,Rprog=2k	20	50	70	mA

Trickle charge Threshold Voltage	V _{trikl}	R _{PROG} =10K , V _{bat} Rising	2.8	2.9	3.0	V
Trickle voltage hysteresis voltage	V _{trhys}	R _{PROG} =10K	60	80	110	mV
Recharge Battery threshold Voltage	ΔV _{recg}	V _{Float} - V _{RECHRG}		150	300	mV
CHRG pin Output low voltage	V _{chrg}	I _{chrg} =5mA		0.35	0.6	V
STBY pin Output low voltage	V _{stby}	I _{stby} =5mA		0.35	0.6	V
Overcharge Detection Voltage	V _{CU}		4.25	4.30	4.35	V
Overcharge Release Voltage	V _{CL}		4.05	4.10	4.15	V
Overdischarge Detection Voltage	V _{DL}		2.3	2.4	2.5	V
Overdischarge Release Voltage	V _{DR}		2.9	3.0	3.1	V
Charger Detection Voltage	V _{CHA}			-0.06		V
Overdischarge Current1 Detection	I _{IOV1}	V _{bat} =3.5V		3		A
Load Short-Circuiting Detection	I _{SHORT}	V _{bat} =3.5V		20		A
Equivalent FET on Resistance	R _{DS(ON)}	V _{bat} =3.6V I _{vm} =1.0A	40	45	55	mΩ
Overcharge Voltage Detection Delay Time	t _{CU}			130		mS
Overdischarge Voltage Detection Delay Time	t _{DL}			40		mS
Overdischarge Current Detection Delay Time	t _{IOV}	V _{bat} =3.5V		10		mS
Load Short-Circuiting Detection Delay Time	t _{SHORT}	V _{bat} =3.5V		75		uS

PIN FUNCTION DISCREPTION

STDBY (PIN 1): The completion of battery charging instructions side.

When the battery charge is complete, STDBY pulled low by internal switches, indicating the completion of charging. In addition, STDBY pin will be in a high-impedance state.

CHRG (PIN 2): Open-Drain Charge Status Output.

When the battery is charging, the CHRG pin is pulled low by an internal N-channel MOSFET. When the charge cycle is completed, CHRG pin will be in a high-impedance state.

VPB(PIN3): Power supply of battery protection

100ohm Resistor & 0.1uF capacitor should be placed as close as possible to VPB pin & BAT-.

BAT-(PIN4): The negative pole of Li-Battery

Please ensure that the trace widths is adequate

GND (PIN 5,6,EPAD): Ground.

Please connect these three pins with mass metal.

CHEN (PIN7): Charger enable input.

High input level will make the charger in normal working condition; low input level so that the charger is prohibited charging status. CE pin can be TTL or CMOS level-level driver.

PROG (PIN 8): Charge Current Program, Charge Current Monitor and Shutdown Pin.

The charge current is programmed by connecting a 1% resistor, RPROG, to ground. When charging in constant-current mode, this pin serves to 1V. In all modes, the voltage on this pin can be used to measure the charge current using the following formula:

$$IBAT = (VPROG/RPROG) \times 1000.$$

The PROG pin can also be used to shut down the charger. Disconnecting the program resistor from ground allows a 3uA current to pull the PROG pin high. When it reaches the 1.21V shutdown threshold voltage, the charger enters shutdown mode, charging stops and the input supply current drops to 50uA. This pin is also clamped to approximately 2.4V. Driving this pin to voltages beyond the clamp voltage will draw currents as high as 1.5mA. Reconnecting RPROG to ground will return the charger to normal operation.

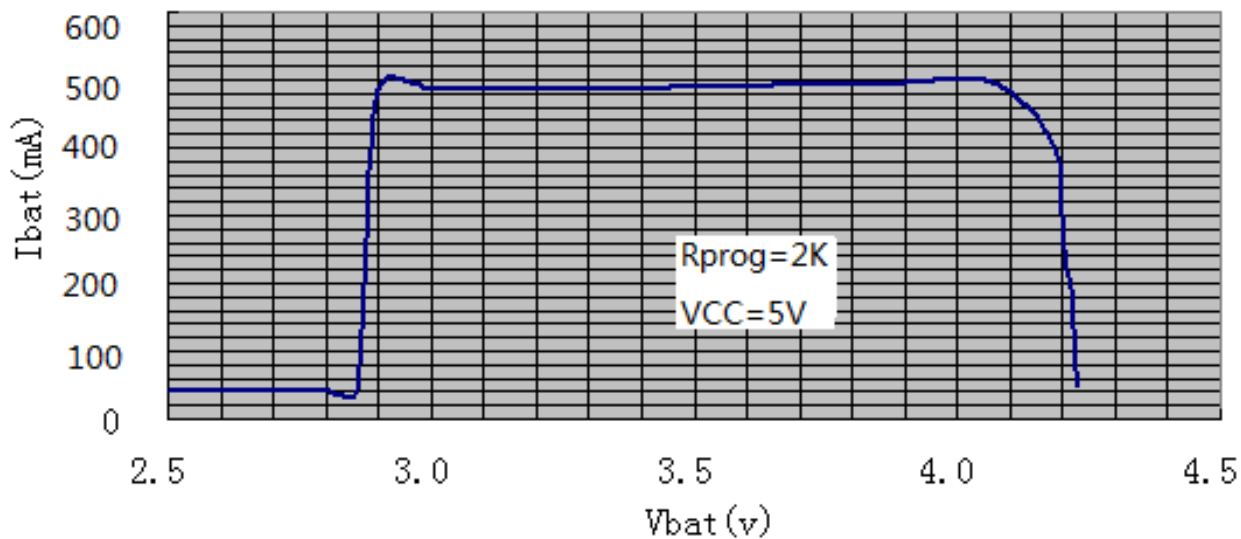
CHVDD (PIN 9): Positive Input Supply Voltage. of charger

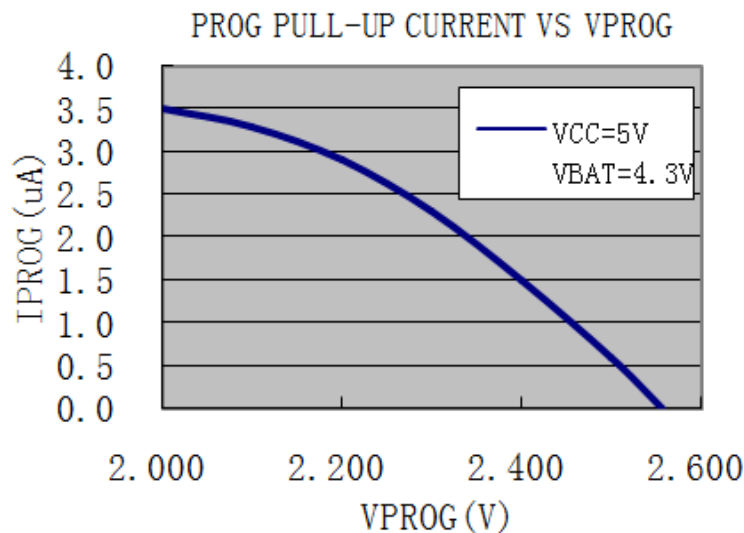
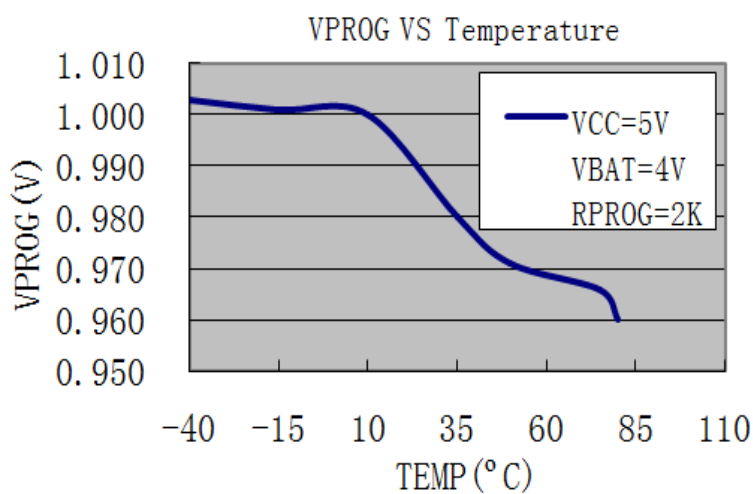
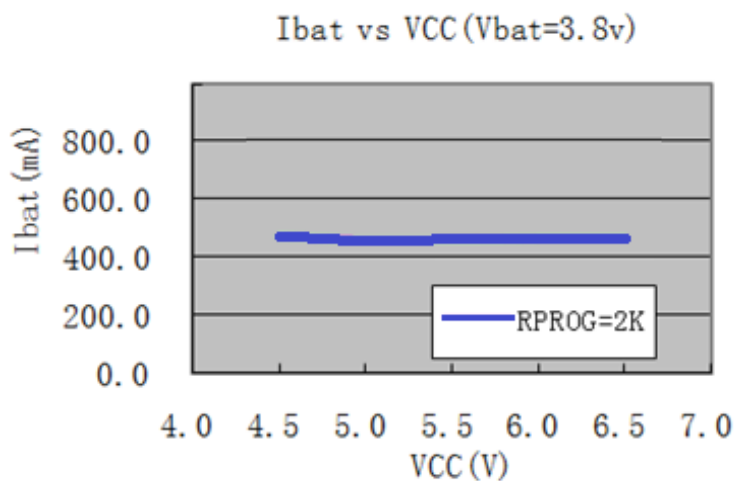
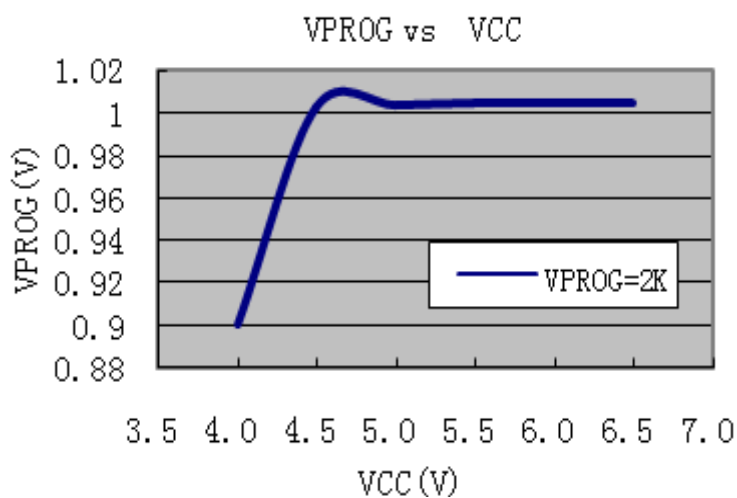
Provides power to the charger, VCC can range from 4.25V to 6.5V and should be bypassed with at least a 10uF capacitor. When VCC drops to within 30mV of the BAT pin voltage, the charger enters shutdown mode, dropping IBAT to less than 2uA.

BAT+ (PIN 10): Charge Current Output.

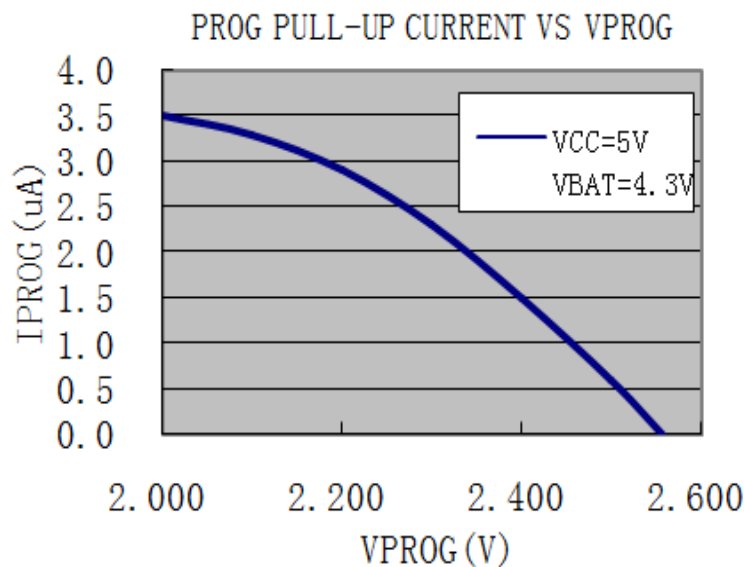
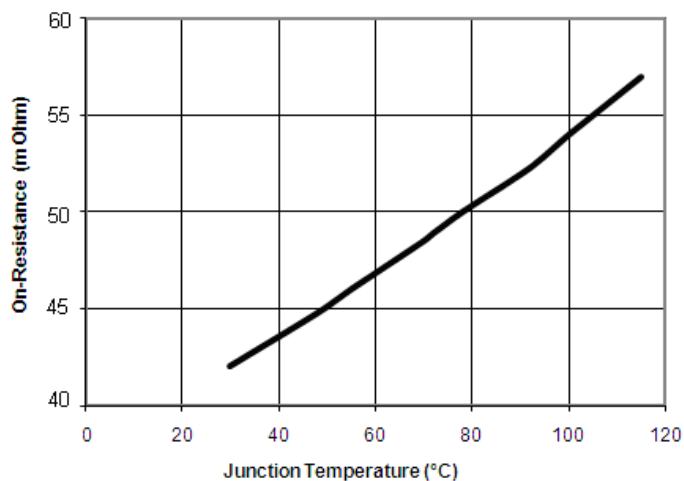
Provides charge current to the battery and regulates the final float voltage to 4.2V. An internal precision resistor divider from this pin sets the float voltage which is disconnected in shutdown mode.

TYPICAL PERFORMANCE CHARACTERISTICS

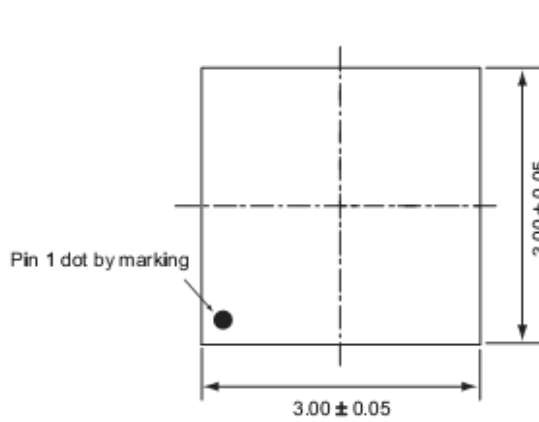




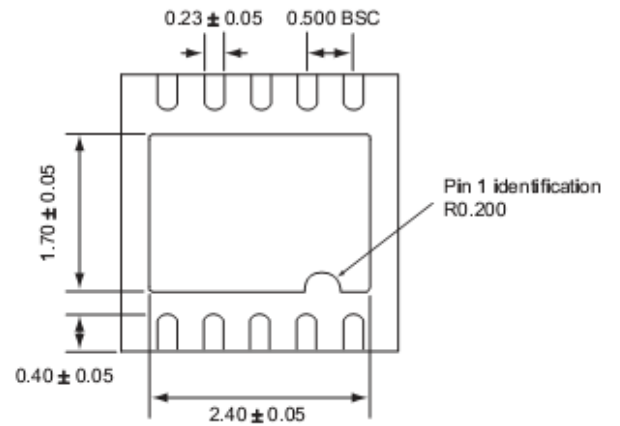
Li-Protection section internal FET Rdson vs. Temp



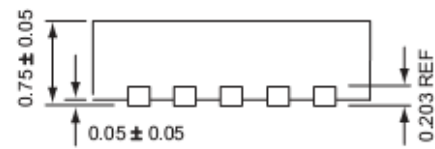
PACKAGE OUTLINE



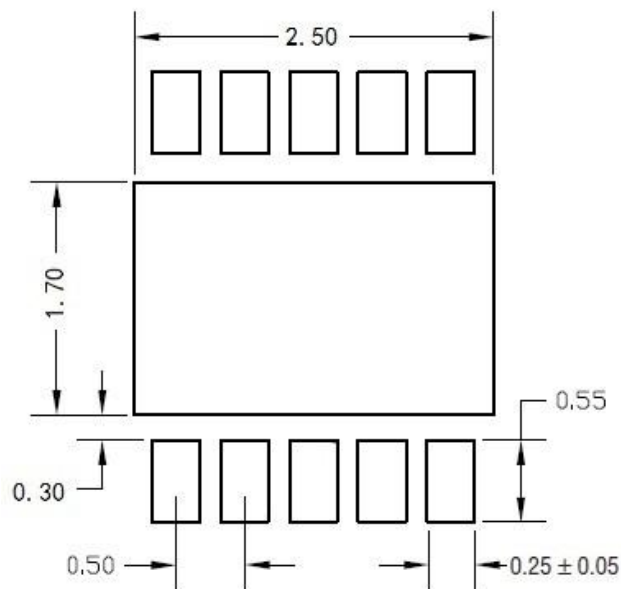
Top View



Bottom View



Side View



Recommended Solder Pitch and Dimensions