MicrOne 微盟电子

ME4057-N

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1A lithium battery charging management chip series

describe

ME4057-N is a complete single-cell lithium-ion battery constant voltage and constant current charger. Power management chip. It adopts SOP8 package with heat dissipation PAD, plus a lot of Few external components make it ideal for portable applications. Usually applicable In USB power or adapter power.

ME4057-N does not require a current sense resistor or an external isolation diode The tube realizes anti-backflow applications. It has an internal thermal feedback circuit that can correct the charge during the charging process. The chip temperature is controlled. The charging cut-off voltage is fixed at 4.2V/4.35V, The charging current can be adjusted by an external resistor. When the charging current reaches the constant current At 1/10, ME4057-N will terminate charging.

When the input voltage (adapter or USB) is removed, the ME4057-N enters sleep mode. The charging path is automatically turned off inside the chip, and the input voltage becomes low. At this time, the battery leakage current is reduced to less than 2uA. When ME4057-N has power and the battery When removed, the chip current is reduced to 55uA to reduce system losses.

ME4057-N also has battery temperature detection, input under-voltage lockout, automatic reset charging and two charging indicator pins.

Features

- Maximum working voltage up to 9V
- Anti-battery reverse connection protection function
- Programmable charging current up to 1A
- No MOSFET, sense resistor or isolation diode required
- Single-cell complete linear charger in ESOP8 package
- Constant current and constant voltage switching, internal thermal feedback protection function
- 4.2V / 4.35V fixed charge cut-off voltage with accuracy up to ±1% **Typical charge cycle (1000mAh battery)**
- Auto recharge function
- Dual output of charging status, no battery and fault status display
- C/10 terminates charging
- Standby current 55ÿA
- 2.9V trickle switching threshold
- Soft start limits inrush current
- Battery temperature monitoring function

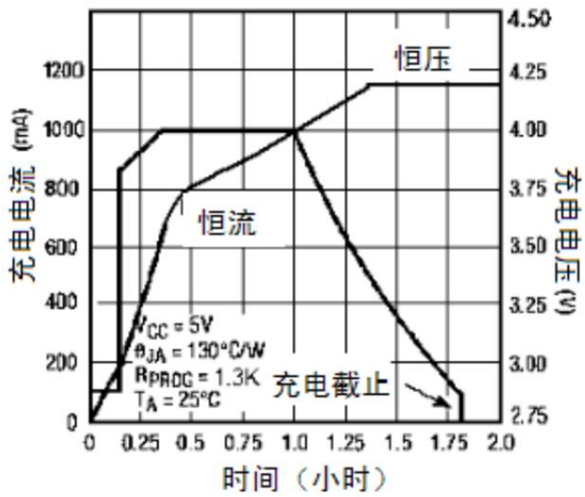
Application occasions

- Mobile phone
- Digital camera
- MP3, MP4 player
- Bluetooth application
- Portable devices
- USB power supply, adapter

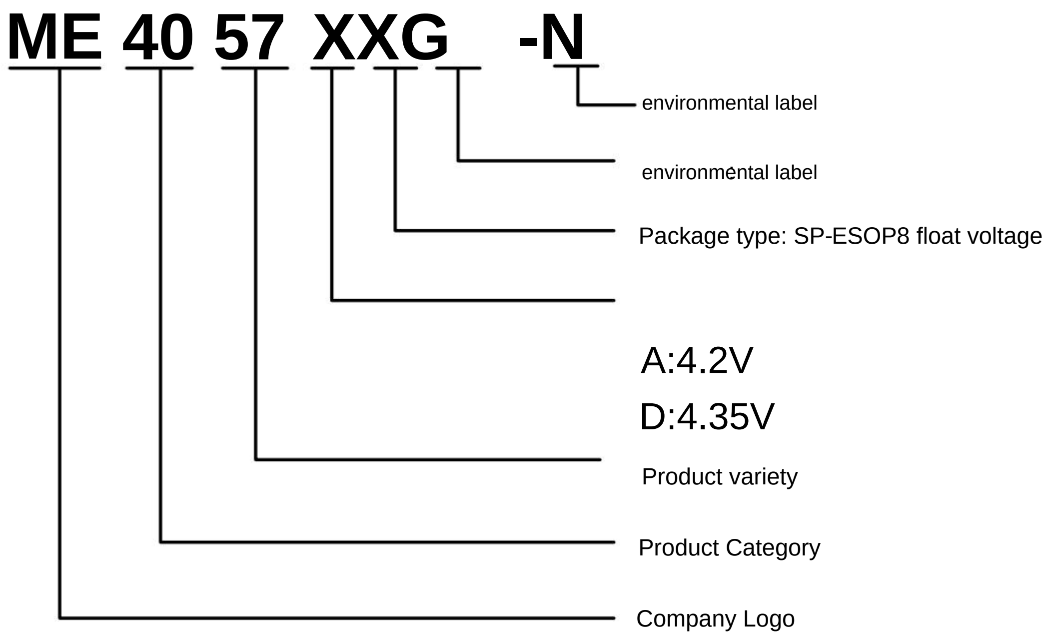
Package form

- 8-pin ESOP8

Typical charging cycle diagram **(1000mAh** battery)

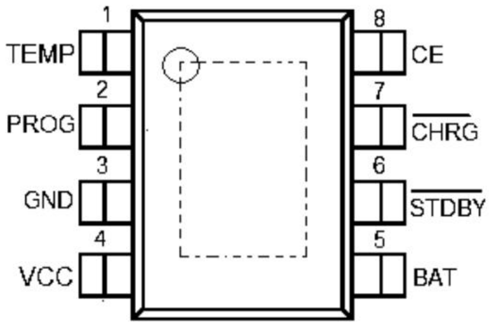


Buying Guide



Product number	Product Description
ME4057ASPG-N	VFLOAT =4.2V
ME4057DSPG-N	VFLOAT =4.35V

Product pin diagram

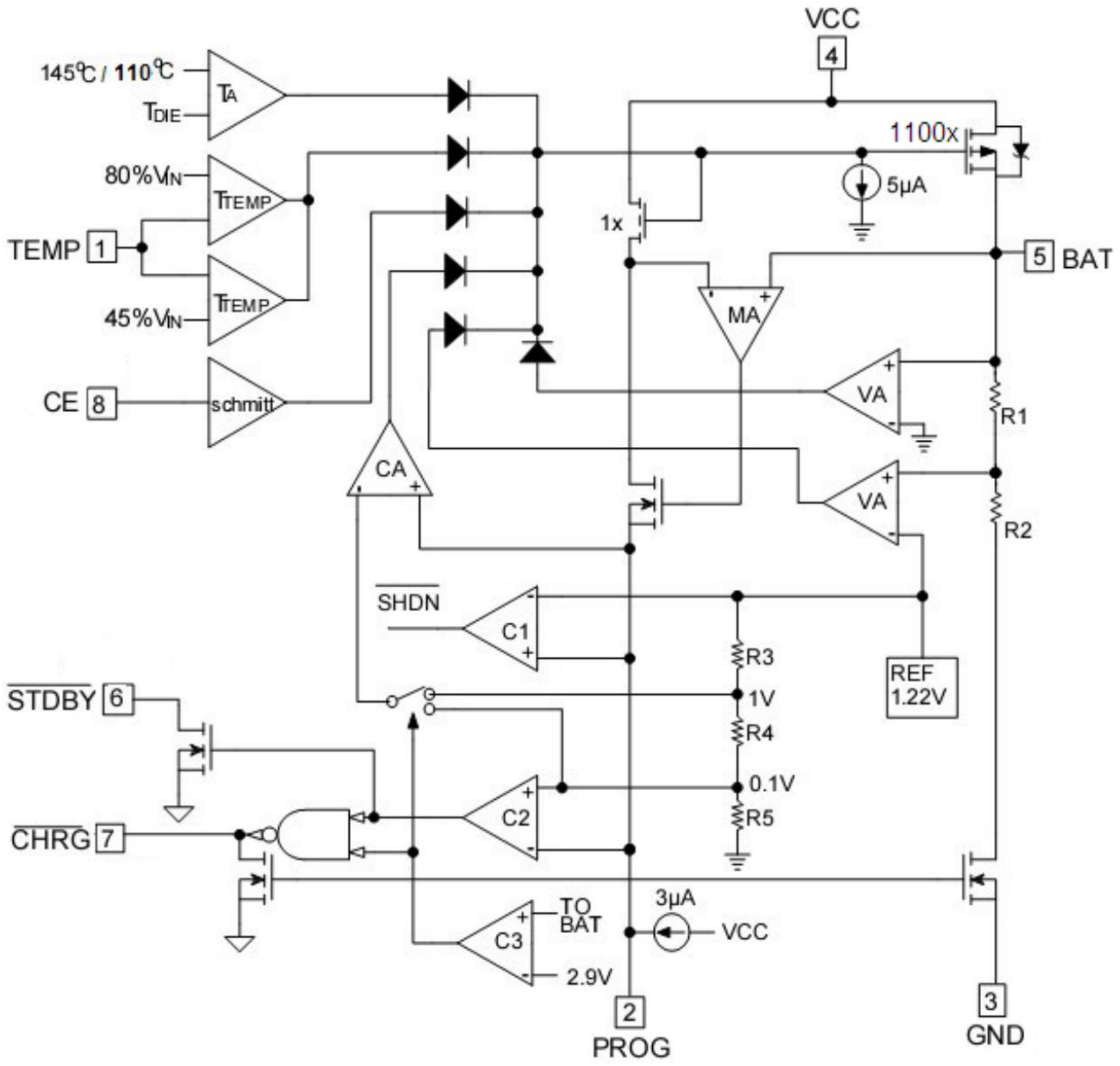


Package form: ESOP8

Pin position description

Serial number	name	achievement able
1	**TEMP**	Battery temperature detection TEMP is externally connected to a temperature detection resistor to monitor battery temperature. When the TEMP pin voltage is low When the VCC voltage is 45% or higher than 80%, it means that the battery temperature is too low or too high and charging stops. When there is no need to warm the outside When using the detection function, TEMP can be directly connected to GND.
2	**PROG**	The charging current of the constant current setting and charging current monitoring pin can be connected to the ground through an external resistor RPROG . to set recharging current. Charging current formula: $I_{BAT} = \frac{V_{PROG}}{R_{PROG}} * 1100$
3	**GND**	ground
4	**VCC**	The input pin of the chip provides power to the internal circuit. When the power supply is lower than the BAT voltage to within 80mV, the chip internally shuts down. off and enters sleep mode, the battery leakage current is as low as 2ÿA.
5	**BAT**	battery connection pin Connect the battery to the BAT pin. The charging cut-off voltage of the BAT pin is 4.2V/4.34V.
6	$\overline{STDBY}$	The charge cutoff status indicates that the $\overline{STDBY}$ internal switch is pulled down when charge cutoff is detected. In other states, this pin is high impedance state.
7	$\overline{CHRG}$	Open-drain charging status indication When the battery is detected to be charging, the internal $\overline{CHRG}$ switch of the pin is pulled down. In other states, this pin is pulled down. The foot is in high resistance state.
8	**CE**	When the chip enable pin is pulled high, the chip starts to work normally; when the pin is pulled low, the chip stops working. The CE pin can be TTL Or CMOS logic circuit driver.

Chip function diagram



absolute maximum ratings

parameter	scope	unit
Input voltage: VCC	-0.3ÿ10	V
PROG pin voltage	-0.3ÿVCC+0.3	V
BAT pin voltage	-0.3ÿ10	V
TEMP pin voltage	-0.3ÿ10	V
$\overline{STDBY}$ pin voltage	-0.3ÿ10	V
$\overline{CHRG}$ pin voltage	-0.3ÿ10	V
CE pin voltage	-0.3ÿ10	V
BAT pin voltage	1200	mA
PROG pin current	1200	ÿA
maximum junction temperature	145	ÿ
Maximum working ambient temperature range Topa	-40ÿ85	ÿ
Storage temperature range Tstr	-65ÿ125	ÿ
Pin temperature and time	+260ÿ10Sÿ	ÿ

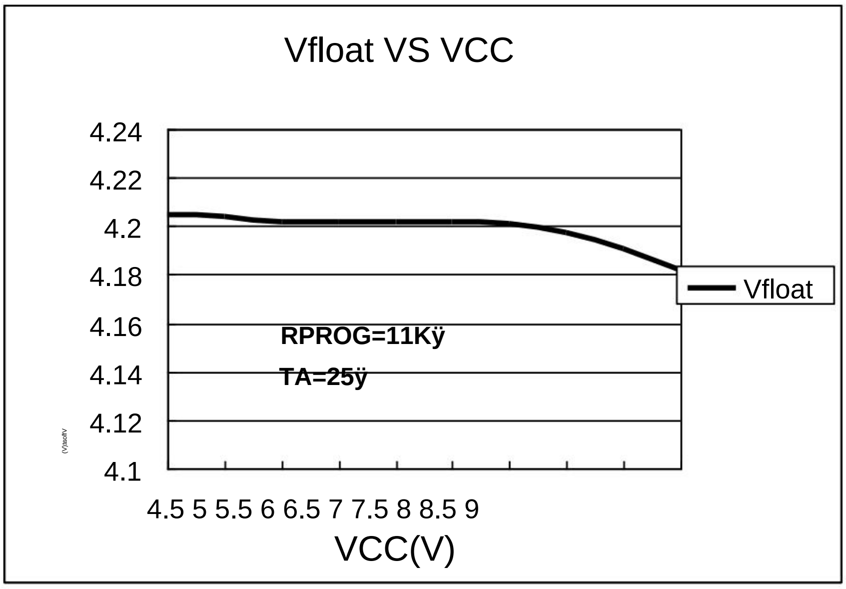
Note: The absolute maximum rating is the maximum physical damage limit that this product can withstand. Please do not exceed this rating under any circumstances.

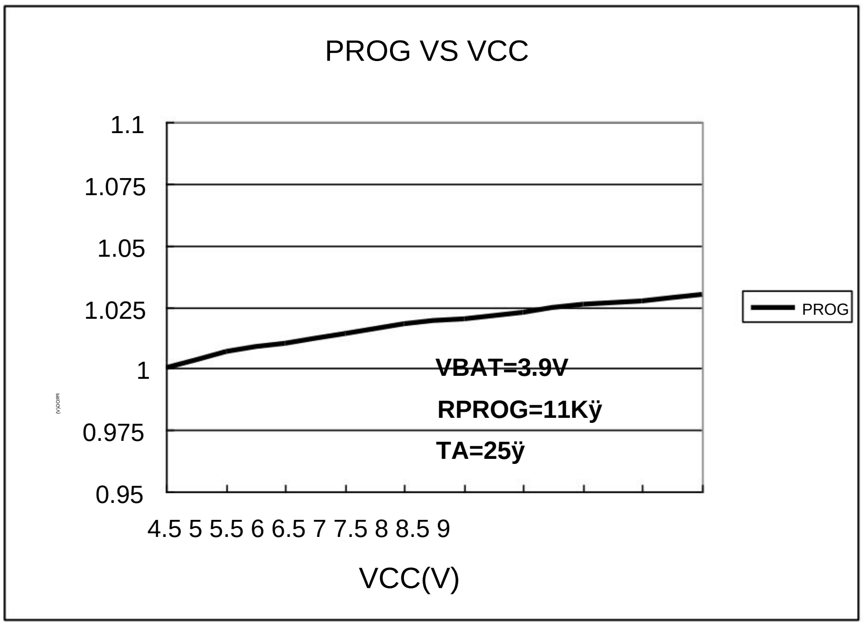
Electrical parameters

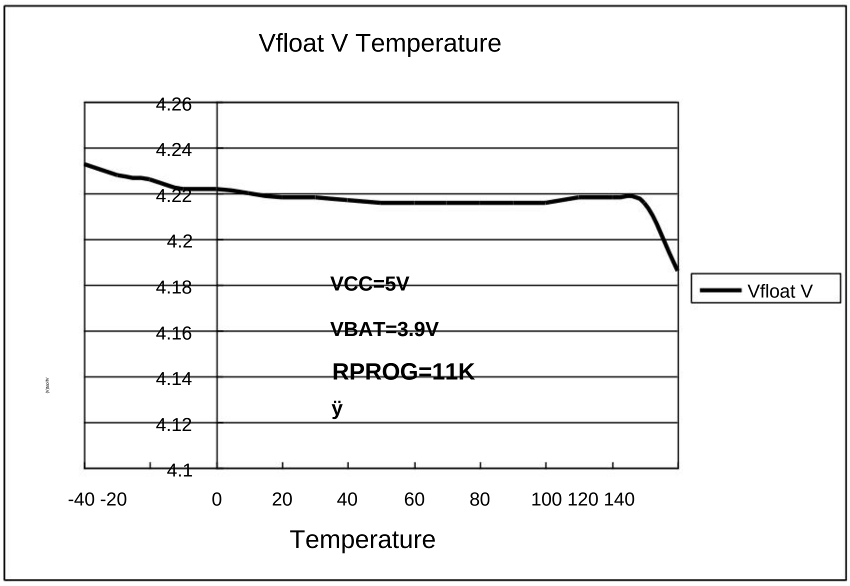
symbol	parameter	condition	Minimum value	Typical value	Maximum value	Unit
VCC	input voltage	•	4.0	5.0	9.0	V
ICC -IBAT	quiescent current	•Charging mode, RPROG=1.1Kÿ	-	150	500	ÿA
		•Standby mode (charge	-	55	100	ÿA
		completed) •Shutdown mode (RPROG is not connected, VCC<VBAT, or VCC<VUV)	-	55	100	ÿA
VFLOAL	charging cut-off voltage	0ÿÿTAÿ85ÿ ME4057ASPG-N	4.158	4.2	4.242	V
		ME4057DSPG-N	4.307	4.35	4.393	V
IBAT	Charging current (current mode VBAT=3.9V)	•RPROG=2.2Kÿ, current mode	450	500	550	mA
		•RPROG=1.1Kÿ, current mode	950	1000	1050	mA
		•Standby mode VBAT=4.2V/4.35V	-6	-2.5	0	ÿA
		RPROG	-	±1	±2	ÿA
		floating sleep mode, VCC=0V	-	-1	-2	ÿA
ITRIKL	trickle charging current	•VBAT<VTRIKL, RPROG=1.1Kÿ	120	130	140	mA
VTRIKL	Trickle Switching Threshold	RPROG=1.1Kÿ, VBAT rises	2.8	2.9	3.0	V
VTRHYS	trickle switching threshold hysteresis	RPROG=1.1Kÿ	350	400	450	mV
VUV	VCC undervoltage lockout	• VCC from low to high	3.5	3.7	3.9	V
VUVHYS	VCC undervoltage lockout hysteresis	•	150	200	300	mV
VASD	VCC-VBAT lock threshold voltage	VCC from low to high	100	140	180	mV
		VCC from high to low	50	80	110	mV
ITERM	C/10 charge termination current	•RPROG=2.2Kÿ	60	70	80	mA
		•RPROG=1.1Kÿ	120	130	140	mA
VPROG	PROG pin voltage	•RPROG=1.1Kÿ, current mode	0.9	1.0	1.1	V
VCHRG	$\overline{CHRG}$ Pin output low voltage	$I_{\overline{CHRG}}$ =5mA	-	0.3	0.6	V
VSTDBY	$\overline{STDBY}$ Pin output low voltage	$I_{\overline{STDBY}}$ =5mA	-	0.3	0.6	V
VTEMP-H	temperature rise detection threshold		-	80	83	%VCC
VTEMP-L	temperature reduction detection threshold		42	45	-	%VCC
ÿVRECHRG	recharge threshold	VFLOAT -VRECHRG	70	150	240	mV
TLIM	temperature protection threshold		-	145	-	ÿ
RON	P-MOSFET on-resistance		-	650	-	mÿ
tSS	Soft start time	IBAT=0 to IBAT=1100V/RPROG	-	20	-	ÿS
tRECHARGE	recharge delay time	VBAT from low to high	0.8	1.8	4	mS
tTERM	charge cut-off delay time	IBAT below ICHG/10	0.8	1.8	4	mS
IPROG	PROG pin pull-up current		-	2.0	-	ÿA

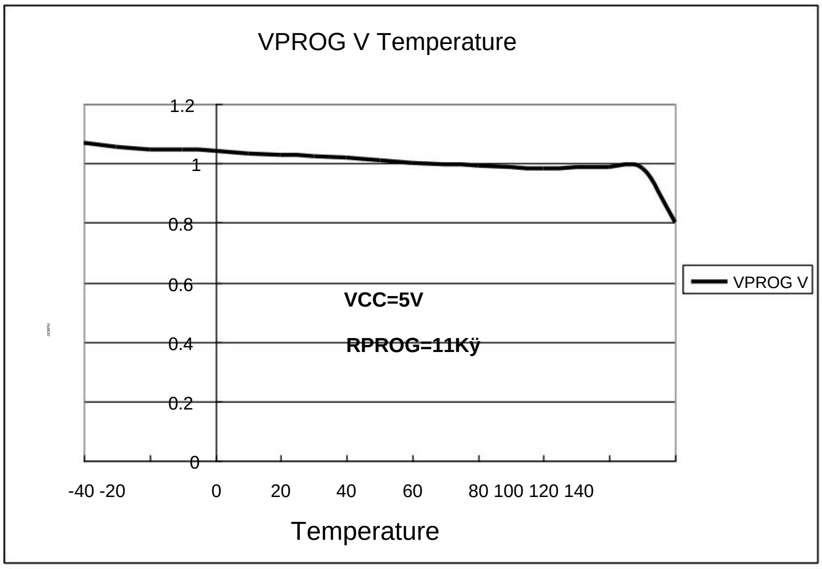
Note: If marked •, it means that the indicator is suitable for the entire operating temperature range, otherwise it means TA=25ÿ, VCC=5V, unless otherwise specified.

Typical performance characteristics









Principle description

ME4057-N is a single-cell lithium battery charge management chip with constant voltage and constant current charging characteristics. The maximum charging current can reach 1A without the need for additional diodes and batteries. current sense resistor. ME4057-N contains two open-drain output status indication terminals: charging status indication CHRG and battery fault status indication output STDBY.

The thermal feedback circuit inside the chip automatically reduces the charging current when the temperature exceeds 145°C. This feature allows users to maximize the use of the chip's power processing capabilities force. There is no need to worry about chip overheating and damage to the chip or external devices, ensuring the reliability of the chip to the greatest extent.

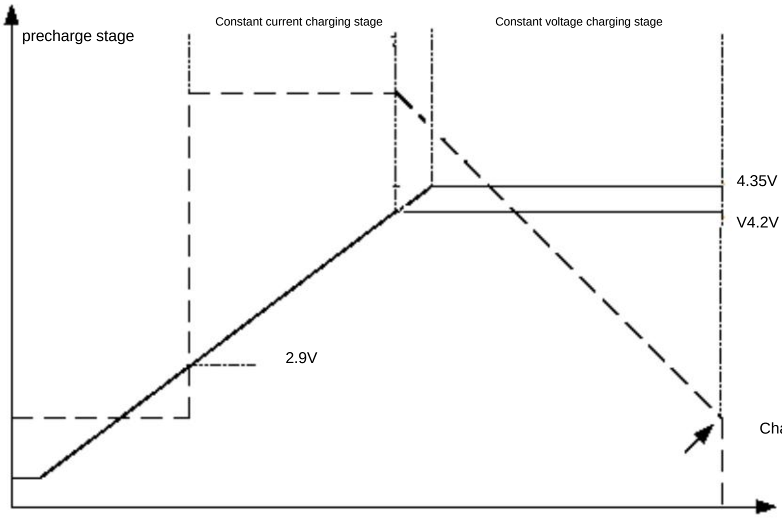
When the input voltage is greater than the undervoltage protection threshold and the enable terminal is connected to high level, ME4057-N starts to charge the battery, CHRG and the pin outputs low level. Indicates that charging is in progress. If the battery voltage is lower than 2.9V, the charger will precharge the battery with a small current. When the battery voltage exceeds 2.9V, switch to constant The battery is charged in flow mode, and the charging current is determined by the resistor between the PROG pin and GND. When the battery voltage approaches 4.2V, the charging current gradually decreases. when When the current decreases to the charging end threshold (1/10 of the constant current), the charging cycle ends, the terminal CHRG outputs a high resistance state, and the terminal STDBY outputs a low potential.

When the battery voltage drops below the recharge threshold, a new charging cycle automatically begins. High-precision voltage reference source, error amplifier and resistor inside the chip The voltage dividing network ensures that the battery terminal modulation voltage accuracy is within 1%. Meets the requirements of lithium-ion batteries and lithium-polymer batteries. When the input voltage is powered off or the input voltage

Below the battery voltage, the charger enters sleep mode. The battery terminal leakage current is as low as 2uA, thus increasing the standby time. If the enable terminal is connected to low level, the chip

Charging will stop.

The schematic diagram of the charging process is as follows::



Charging current setting

The charging current is set using a resistor connected from the PROG pin to ground. The calculation formula for setting the resistor and charging current is as follows:

$$R_{PROG} = \frac{1100}{I_{BAT}} (\text{error} \pm 10\%)$$

Charging terminated

The charging cycle is terminated when the charging current reaches 1/10 of the set value after reaching the final float voltage. This condition is achieved by employing an internal filter ratio

The comparator monitors the PROG pin to detect it. When the PROG pin voltage drops below 100mV for more than Ttemp (usually 1.8ms), charging

was terminated. The charging current is blocked and ME4057-N enters standby mode. At this time, the input power current will reach 55uA. (Note: C/10 terminates at trickle charge and thermal limit

disabled in control mode).

During charging, the transient load on the BAT pin will cause the PROG pin voltage to briefly fall below 100mV when the DC charging current reaches 1/10 of the set value.

The 1.8ms filter time Ttemp on the termination comparator ensures that load transients of this nature do not cause premature termination of the charge cycle. Once the average charging current reaches the set

Below 1/10 of the value, the ME4057-N terminates charging and stops providing any current through the BAT pin. In this state, all loads on the BAT pin are driven by

Battery to power.

In standby mode, ME4057-N continuously monitors the BAT pin voltage. If the voltage on this pin drops below the recharge threshold of 4.02V, the other

A charging cycle begins to supply current to the battery again.

Charging status indication

ME4057-N has two open-drain status indication output terminals, $\overline{CHRG}$ and $\overline{STDBY}$. When the charger is in charging state, $\overline{CHRG}$ is pulled low,

It is in high impedance state in other states. When the battery temperature is outside the temperature range, both the $\overline{CHRG}$ and $\overline{STDBY}$ pins output a high impedance state.

When the typical hair extension on the TEMP terminal cannot be used, and when the battery is not charged, it indicates a fault state: and the $\overline{CHRG}$ $\overline{STDBY}$ pins both output a high impedance state.

When the TEMP terminal is grounded, the battery temperature detection does not work. When the battery is not connected to the charger, $\overline{CHRG}$ a pulse signal is output, indicating that no battery is installed. when

When the external capacitor on the BAT pin of the battery connection is 10uF, the $\overline{CHRG}$ flashing frequency is about 1-4 seconds. When the status indication function is not used, input the unused status indication

The input terminal is connected to ground.

charging	red light $\overline{CHRG}$	green light $\overline{STDBY}$
In the charging state, the	Bright	destroy
battery is fully charged and	destroy	Bright
under voltage, the battery temperature is too high, too low and other fault conditions, or there is no battery access. (TEMP use)	destroy	destroy
BAT terminal is connected to 10uF capacitor, no battery (TEMP=GND)	Green light is on, red light is flashing F=1-4 S (At this time, if the battery is connected reversely, neither the red light nor the green light will light up. This is normal. Phenomenon, when the battery is connected or the power is turned on again, the green light turns on again. flashing red light)	

thermal limit

If the chip temperature rises above a preset value of approximately 140°C, an internal thermal feedback loop reduces the programmed charging current. This feature prevents ME4057-N overheats and allows the user to increase the upper limit of a given board's power handling capabilities without the risk of damaging the ME4057-N. It is guaranteed that the charger will be in the most The charging current can be set based on typical (rather than worst-case) ambient temperatures, while automatically reducing current under worst-case conditions.

In order to prevent damage to the battery caused by too high or too low temperature, ME4057-N integrates a battery temperature detection circuit. The battery temperature test passes This is achieved by measuring the voltage of the TEMP pin. The voltage of the TEMP pin is realized by the NTC thermistor in the battery and a resistor voltage dividing network, as shown in Figure 1. ME4057-N compares the voltage of the TEMP pin with the two internal thresholds VLOW and VHIGN of the chip to confirm whether the battery temperature exceeds the normal range. Inside the ME4057-N, VLOW is fixed at 45% X Vcc, and VHIGN is fixed at 80% X Vcc. If the TEMP pin voltage VTEMP<VLOW Or VTEMP>VHIGN, it means that the temperature of the battery is too high or too low, and the charging process will be suspended; if the TEMP pin voltage is between VLOW and VHIGN in between, the charging cycle continues. If TEMP is connected to ground, the battery temperature detection function will be disabled.

Select **R1** and **R2**

The values of R1 and R2 should be determined according to the temperature detection range of the battery and the resistance of the thermistor. Examples are as follows:

Assume that the set battery temperature range is TL ~ TH, (where TL < TH); the battery uses a negative temperature coefficient thermistor (NTC), and RTL is its temperature range.

The resistance value at TL, RTH is at TH, then RTL>RTH, then the voltage at the TEMP terminal of the first pin at the temperature TH is:

$$V_{TEMPH} = \frac{R2 \| R_{TH}}{R1 + R2 \| R_{TH}} \times VIN$$

Then the voltage at the TEMP terminal of the first pin at the temperature TL is:

$$V_{TEMPL} = \frac{R2 \| R_{TL}}{R1 + R2 \| R_{TL}} \times VIN$$

Then, from VTEMPL=VHIGH=K2×Vcc (K2=0.8); VTEMPH=VLOW=K1×Vcc (K1=0.45) we can get:

$$R1 = \frac{R_{TL} R_{TH}(K_2 - K_1)}{(R_{TL} - R_{TH})K_1K_2} \qquad R2 = \frac{R_{TL}R_{TH}(K2 - K1)}{R_{TL}(K1 - K1K2) - R_{TH}(K2 - K1K2)}$$

For example, NCP03YS110, the operating temperature range is -40ÿ to 125ÿ. If the ambient temperature range is -25ÿ to 125ÿ, then RT is The resistance of NCP03YS110 at -25ÿ is approximately equal to 66.148ÿ; RTH is the resistance of NCP03YS110 at 125ÿ, which is approximately 1.077ÿ.

In the same way, if the battery has a positive temperature coefficient (PTC) resistance, then RTH>RTL, we can calculate:

$$R1 = \frac{R_{TL}R_{TH}(K2-K1)}{(R_{TH}-R_{TL})K1K2} \qquad R2 = \frac{R_{TL}R_{TH}(K2-K1)}{R_{TH}(K1-K1K2)-R_{TL}(K2-K1K2)}$$

It can be seen from the above derivation that the temperature range to be set has nothing to do with the power supply voltage Vcc, but is only related to R1, R2, RTL and RTH. R2 and R1 can be obtained by consulting relevant batteries or through experimental testing.

Undervoltage lockout **(UVLO)**

An internal undervoltage lockout circuit monitors the input voltage and keeps the charger in shutdown mode until VCC rises above the undervoltage lockout threshold. if If the UVLO comparator trips, the charger will not exit shutdown mode until VCC rises 100mV above the battery voltage.

Manual shutdown

The ME4057 can be put into shutdown state at any time during the charging cycle by setting the CE terminal low or removing Rprog. This causes the battery leakage current to to less than 2uA, the power supply current will be less than 55uA. Resetting the CE terminal to high level or connecting the setting resistor can start a new charging cycle.

If the ME4057 is in under-voltage lockout mode, both the $\overline{CHRG}$ and $\overline{STDBY}$ pins are in a high impedance state;

automatic restart

Once the charge cycle is terminated, the ME4057-N uses a comparator with a 1.8ms filter time to continuously monitor the voltage on the BAT pin. control. When the battery voltage reaches 4.02V (4.16V for ME4057D), which roughly corresponds to less than 80% to 90% of the battery capacity, the charging cycle starts again. this This ensures that the battery is maintained at (or close to) a fully charged state and eliminates the need for periodic charging cycle activation. During the recharge cycle, $\overline{CHRG}$ The pin enters a strong pull-down state.

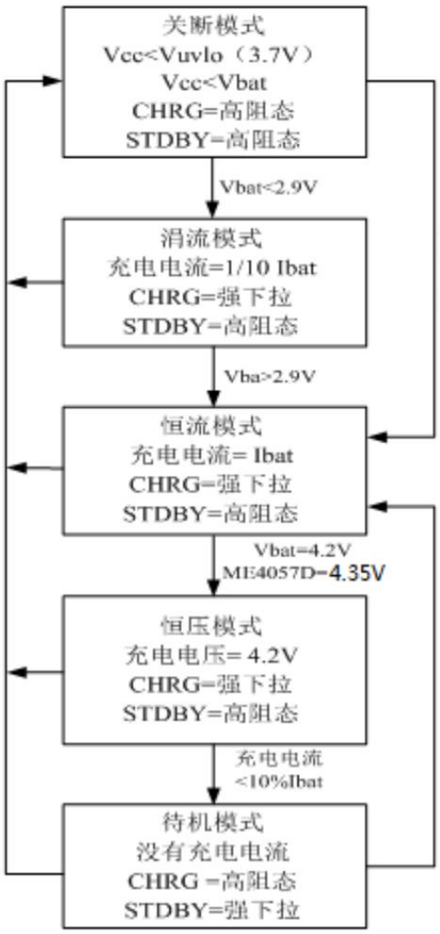


Figure 1: A typical charging cycle status diagram

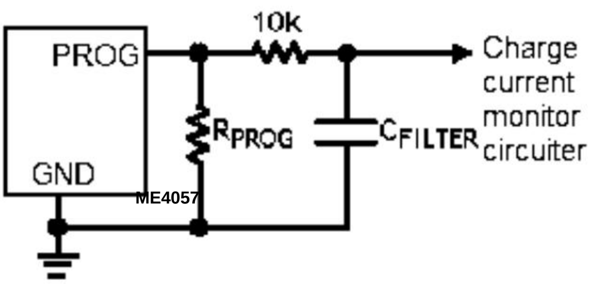


Figure 2: Capacitive load and filter circuit on isolated **PROG** pin

Stability considerations

In constant current mode, it is the PROG pin that is in the feedback loop, not the battery. Constant current mode stability is limited by the PROG pin impedance

Influence. When there is no additional capacitor on the PROG pin, it will reduce the maximum allowable resistance of the set resistor. The pole frequency on the PROG pin should be maintained at Cprog, then

Use the following formula to calculate the maximum resistance value of Rprog:

$$R_{PROG} \le \frac{1}{2\pi \bullet 10^5 \bullet C_{PROG}}$$

For users, they may be more interested in charging current rather than transient current. For example, if a switching power supply running in low current mode

In parallel with the battery, the average current flowing out of the BAT pin is usually more important than the transient current pulse. In this case, a

Simple RC filter to measure average battery current (shown in Figure 2). A 10k resistor is added between the PROG pin and the filter capacitor to ensure stable

Qualitative.

Power loss

The conditions under which the ME4057-N reduces the charging current due to thermal feedback can be estimated from the power loss in the IC. Almost all of this power loss is caused by

Generated by the internal MOSFET, it can be approximated by the following formula: PD=(VCC-VBAT) XI BAT

PD in the formula is the dissipated power, VCC is the input power supply voltage, VBAT is the battery voltage, and IBAT is the charging current. When

When thermal feedback begins to protect the IC, the ambient temperature is approximately:

TA ÿÿ145ÿC ÿÿPDÿJA ; TA ÿÿ145ÿC ÿÿ(VCC ÿÿVBAT) X IBAT

Example: Program a ME4057 that obtains operating power from a 5V power supply to provide 800mA current to a lithium battery with a 3.75V voltage discharge point. Fake

Assuming ÿJA is 150°C/W (see board layout considerations), when the ME4057 starts to reduce the charging current, the ambient temperature is approximately:

TA ÿÿ145ÿC ÿÿ(5Vÿÿ3.75V) X (800mA) ÿ150ÿC / W TA ÿ145ÿC ÿ

0.5W X 150ÿC / W ÿ145ÿC ÿÿ75ÿC TA = 65ÿC

ME4057-N can be used at ambient temperatures above 65°C, but the charging current will be reduced to below 800mA. For a given ambient temperature,

The charging current can be approximated by the following formula:

$$I_{BAT} = \frac{145°C - T_A}{(V_{CC} - V_{BAT}) \bullet \theta_{JA}}$$

As discussed in the Theory of Operation section, when thermal feedback causes the charging current to decrease, the voltage on the PROG pin will decrease proportionally. Remember not to

The worst thermal conditions should be considered in the ME4057-N application design because the chip will automatically reduce power consumption when the junction

temperature

reaches 145°C. Thermal Considerations Due to the small form factor of the ESOP8, a thermally well-designed PC board layout is required to maximize the usable charging current. use

The heat dissipation path used to dissipate the heat generated by the IC runs from the chip to the lead frame and through the bottom heat sink to the PC copper surface. The copper surface of the PC board is the heat sink. heat sink

The connected copper area should be as wide as possible and extend outward into the larger copper area to allow heat to be dissipated into the surrounding environment. to internal or back copper

Vias in the circuit layer are also useful in improving the overall thermal performance of the charger. When designing the PC board layout, other components on the circuit board that are not related to the charger

Heat sources must be taken into account, so they will have an impact on the overall temperature rise and the maximum charging current.

Increase thermal regulation current

Reducing the voltage drop across the internal MOSFET can significantly reduce losses in the chip. During thermal regulation this has the effect of increasing the current delivered. OK

Part of the power dissipated is dissipated through an external component, a resistor or diode (as shown in Figure 3).

Example: Program a charging current of 800mA from a 5V AC adapter. Assume that JA is 125ÿ/W, and the ambient temperature is 25ÿ.

, the charging current is approximately 768mA calculated by the following formula:

$$I_{BAT} = \frac{145^{\circ}C - 25^{\circ}C}{(V_S - I_{BAT}R_{CC} - V_{BAT}) \bullet \theta_{JA}}$$

When Rcc is added, Ibat-948mA can be calculated through the following formula. The results show that this structure can input 800mA full-scale current at a higher ambient temperature.

$$I_{BAT} = \frac{(V_S - V_{BAT}) - \sqrt{(V_S - V_{BAT})^2 - \frac{4R_{CC}(145^{\circ}C - T_A)}{\theta_{JA}}}}{2R_{CC}}$$

While this application can deliver more power to the battery and lock out charging time in thermal regulation mode, in voltage mode if VCC becomes low enough

By placing the ME4057-N in a low voltage state, it is possible to extend the charging time. Figure 4 shows how the circuit causes the voltage to drop as Rcc becomes larger.

This technology works best when Rcc is minimized in order to keep the component size small and avoid voltage drop. Please remember to choose a

rate handling capability of the resistor.

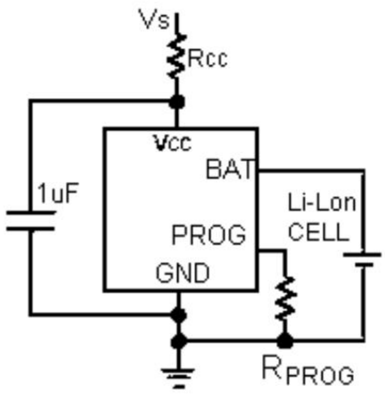


Figure 3: A circuit to increase charging current in thermal regulation mode

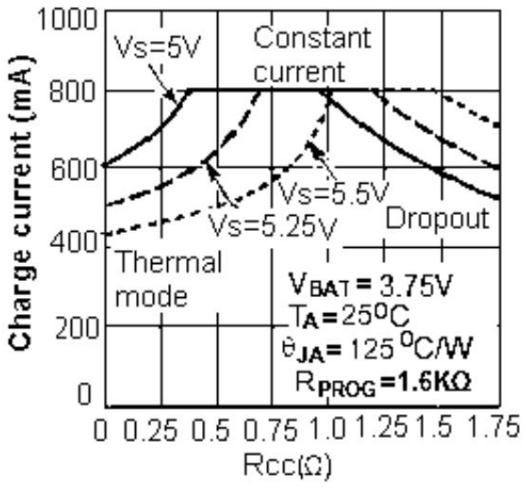


Figure 4: Charging current vs. Rcc relationship curve

VCC bypass capacitor

Several types of capacitors can be used for the input bypass capacitor. However, caution must be used when using multilayer ceramic capacitors. Since some types of ceramic capacitors

It has self-resonance and high Q characteristics, so under certain starting conditions (for example, the charger input is connected to a working power supply) it is possible to generate high voltage.

voltage transient signal. Adding a 1.5ÿ resistor in series with the X5R ceramic capacitor will minimize the startup voltage transient.

Charging current soft start

The ME4057-N includes a soft-start circuit to minimize inrush current at the beginning of the charge cycle. When a charging cycle is initiated, the charge

The electrical current will rise from 0 to full current in about 20us. This minimizes the transient current load on the power supply during startup.

role.

USB and AC adapter power

The ME4057-N allows charging from an AC adapter or a USB port. As shown in Figure 5, how to connect the AC adapter and USB power input

Examples of combinations. A PMOSFET (MP1) is used to prevent signals from flowing backward into the USB port when the AC adapter is plugged in, and a Schottky diode (D1)

It is used to prevent USB power from being lost when passing through the 1k pull-down resistor.

Generally speaking, an AC adapter is capable of delivering much more current than a 500mA USB port. Therefore, when the AC adapter is plugged in, it can

Use an NMOSFET (MN1) and an additional 10k set resistor to increase the charge current to 600mA.

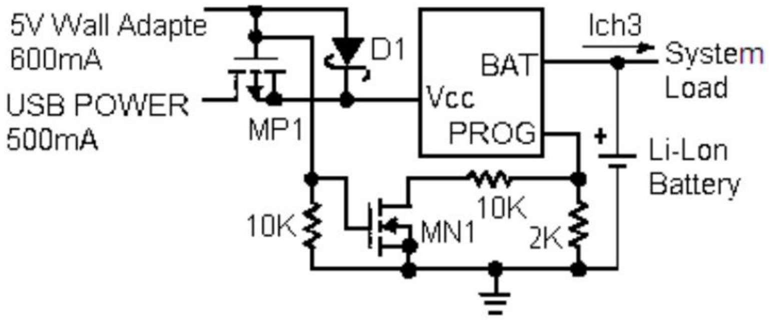
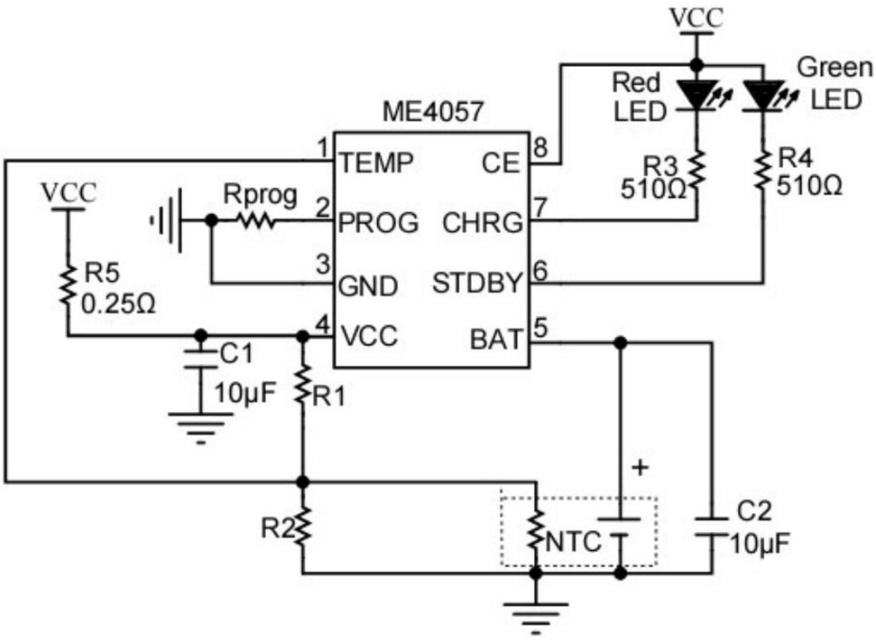


Figure 5: AC adapter and **USB** power supply combination

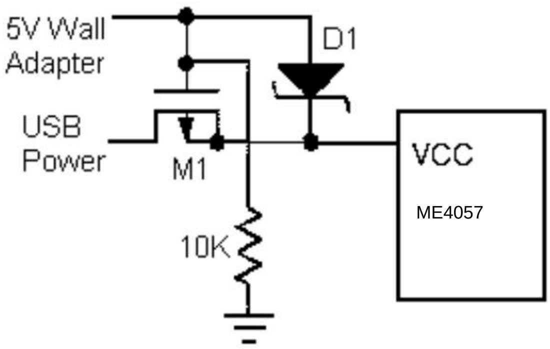
Typical application diagram

Mainly used in mobile phones, MP3, MP4 players, digital cameras, electronic dictionaries, GPS, removable devices and various chargers.

1. Suitable for applications that require battery temperature detection to monitor battery temperature status.

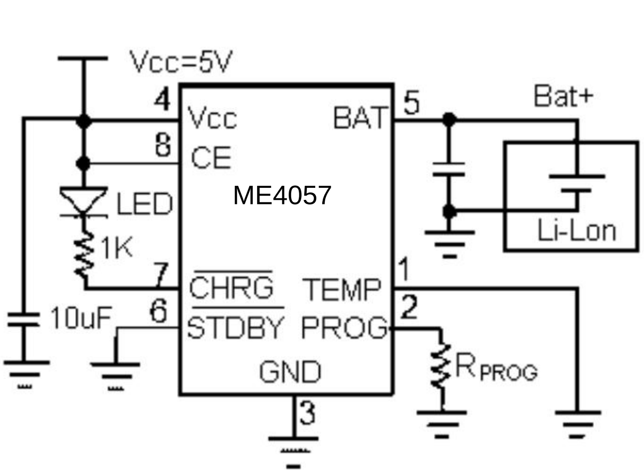


2. Suitable for 5V adapter and USB hybrid applications.



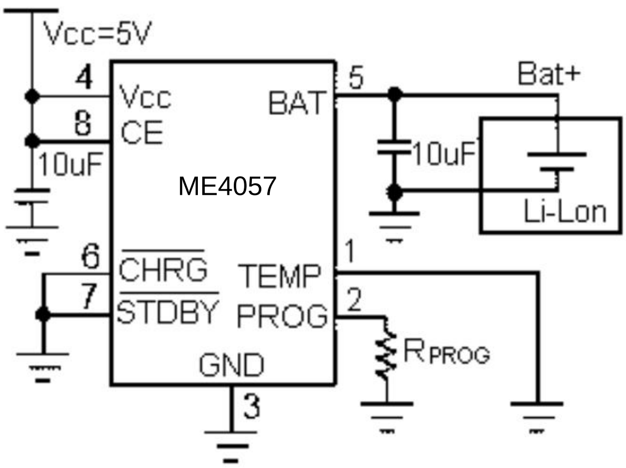
3. Suitable for charging status detection, but does not detect battery temperature.

Used.

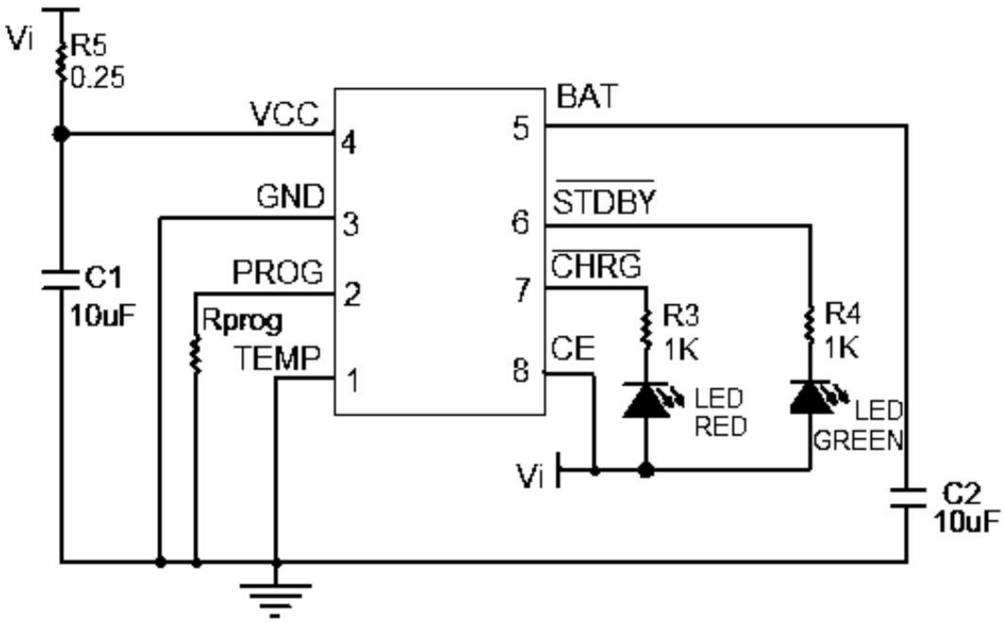


4. Suitable for applications that do not require charging status detection or battery

In temperature detection applications.



5. Add a power resistor to the input end to reduce chip power loss. When the red light is on, it means it is charging, and when the green light is on, it means the charging is stopped.



PCB layout considerations

• The RPROG resistor and the capacitor connected to the PROG pin should be as close as possible to the PROG pin.

• The capacitors of VCC and BAT pins should be as close as possible to the chip pins.

• During the charging process, the temperature of ME4057 may be very high. When using NTC resistor, the resistor should be kept as far away from the ME4057 chip as possible and the energy

Close to the battery.

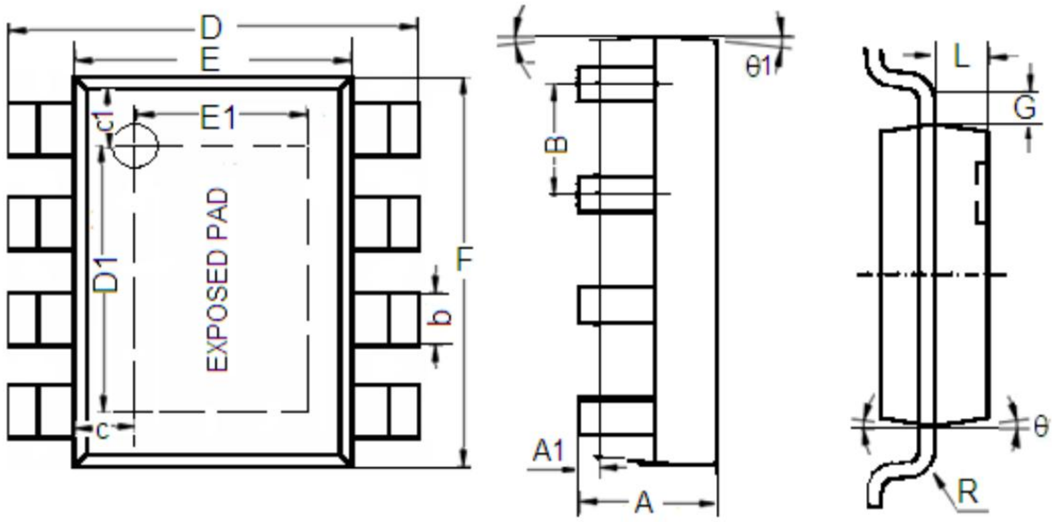
• It is very important to consider the heat dissipation of the chip during PCB layout. The heat dissipation path is the copper pour from the chip pins (especially the GND pin and heat dissipation PAD) to the PCB.

In order to increase the heat dissipation path of the chip as much as possible, firstly, the copper foil connecting the GND pin of the chip should be as wide as possible and have a large area. Secondly, the copper foil connecting the chip's GND pin should be

The copper foil of the thermal PAD should be drilled with as many through holes as possible to the back of the PCB, and heat can be dissipated through a large amount of copper foil on the back, so that more heat can be dissipated through the heat dissipation path.

Go in the environment. Under the same conditions, PCB board solutions with good heat dissipation tend to have larger charging current than poor solutions.

• **Package form: ESOP8**



parameter	Dimensions **(mm)**		Size **(Inch)**	
	minimum value	maximum value	minimum value	maximum value
A	1.350	1.700	0.053	0.067
A1	0.000	0.120	0.000	0.0047
B	1.27(Typ.)		0.05(Typ.)	
b	0.330	0.510	0.013	0.020
c	0.9(Typ.)		0.035(Typ.)	
c1	1.0(Typ.)		0.039(Typ.)	
D	5.8	6.2	0.228	0.244
D1	3.202	3.402	0.126	0.134
E	3.800	4.000	0.150	0.157
E1	2.313	2.513	0.091	0.099
F	4.7	5.1	0.185	0.201
L	0.675	0.725	0.027	0.029
G	0.32(Typ.)		0.013(Typ.)	
R	0.15(Typ.)		0.006(Typ.)	
ÿ1	0°	7°	0°	7°
ÿ	0°	8°	0°	8°

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