



## DESCRIPTION

A4057 series is a double lithium battery charge management chip. The chip includes a charge state detection, the charging process, temperature detection and so on. The chip also integrates a high-precision reference voltage module in it.

A4057 charge contains three modes: precharge, constant current charging, constant voltage charging. Constant current charging current is five times the pre-charge current; when the voltage is lower than 6.5V into the precharge mode; when the voltage is above 6.5V into the constant current charge mode, the charging current is five times as the precharge, the charging current is determined by an external resistor.

The A4057 is available in SOP8 package.

## ORDERING INFORMATION

Package Type	Part Number	
SOP8	M8	A4057M8R-XX
		A4057M8VR-XX
Note	XX: Output Voltage 84=8.4V V: Halogen free Package R: Tape & Reel SPQ: 3,000pcs/Reel	
AiT provides all RoHS products Suffix " V " means Halogen free Package		

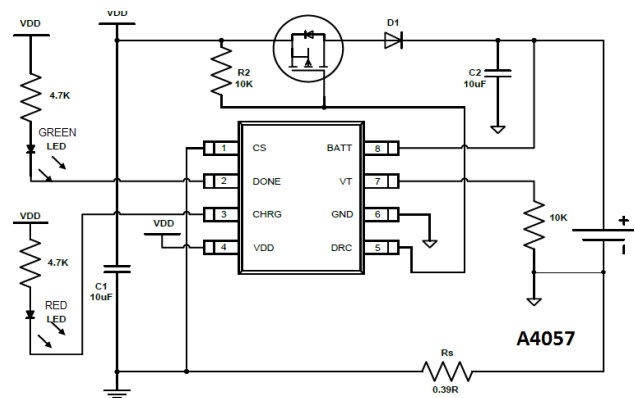
## FEATURES

- Double lithium battery charge management
- Only need a few external components
- Pre-charge, constant current charging , constant voltage charging mode
- Temperature detection
- Two charging status
- Available in SOP8 Package

## APPLICATION

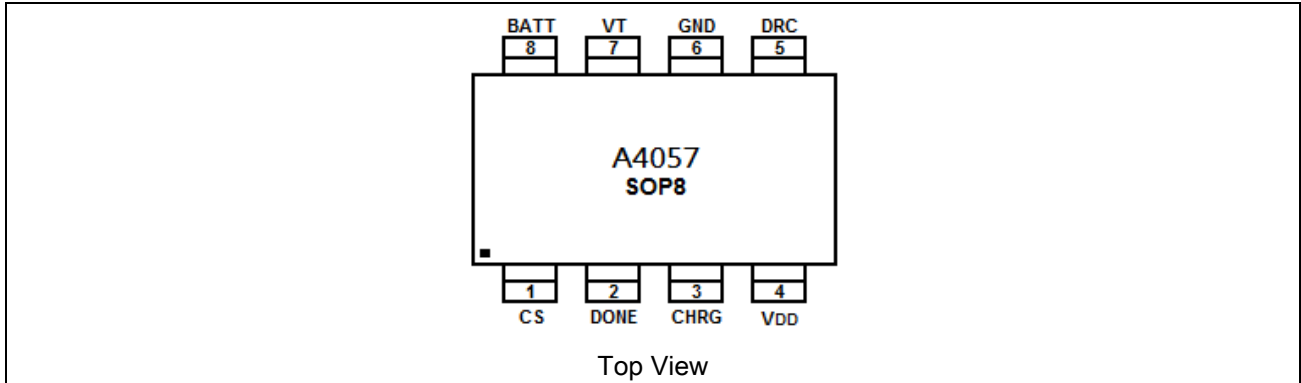
- Digital camera
- PDAS
- The phone lithium battery

## TYPICAL APPLICATION





## PIN DESCRIPTION



Pin #	Symbol	Function
1	CS	Overcharge detection pin
2	DONE	Charge status pin1
3	CHRG	Charge status pin2
4	V <sub>DD</sub>	Power input
5	DRC	External MOS or PNP control pin
6	GND	Ground
7	VT	Battery temperature detection pin
8	BATT	Battery voltage detection



## ABSOLUTE MAXIMUM RATINGS

V <sub>DD</sub> , Input Supply Voltage	V <sub>SS</sub> -0.3V~V <sub>SS</sub> +18V
V <sub>DRC</sub> , DRC pin Voltage	V <sub>SS</sub> -0.3V~V <sub>CC</sub> +18V
V <sub>BAT</sub> , BAT pin Voltage	V <sub>SS</sub> -0.3V~12V
V <sub>CS</sub> , CS pin Voltage	V <sub>SS</sub> -0.3V~6V
V <sub>CHRG</sub> , CHAG pin Voltage	V <sub>SS</sub> -0.3V~18V
V <sub>DONE</sub> , DONE pin Voltage	V <sub>SS</sub> -0.3V~18V
V <sub>NTC</sub> , NTC pin Voltage	V <sub>SS</sub> -0.3V~6V
T <sub>OPA</sub> , Operating Ambient Temperature	-40°C~+85°C
T <sub>STR</sub> , Storage Temperature	-65°C~+125°C

Stress beyond above listed "Absolute Maximum Ratings" may lead permanent damage to the device. These are stress ratings only and operations of the device at these or any other conditions beyond those indicated in the operational sections of the specifications are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

## ELECTRICAL CHARACTERISTICS

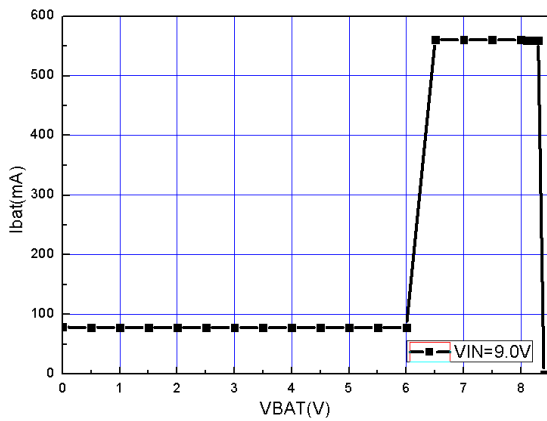
T<sub>A</sub>=25°C, unless specified

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Operating Current 1	I <sub>DD</sub> (OPE)	9V<V <sub>DD</sub> <20V			350	μA
Input Current 2	I <sub>DD</sub> (SLP)	V <sub>DD</sub> <7.5			20	μA
VBATT Pin Voltage	V <sub>BATT</sub>		8.27	8.36	8.45	V
Constant Current Charging Current	I <sub>const</sub>		90/R <sub>s</sub>	100/R <sub>s</sub>	110/R <sub>s</sub>	mA
Trickle Charge Current	I <sub>pre</sub>		18/R <sub>s</sub>	20/R <sub>s</sub>	22/R <sub>s</sub>	mA
Precharge Threshold Voltage	V <sub>O</sub> (min)		6.2	6.5	6.8	V
Recharge Threshold Voltage	V <sub>O</sub> (RCH)			-400		mV
VT High Temperature Shutdown Voltage	VT-hot		45	50	55	mV
VT Low Temperature Shutdown Voltage	VT-cold		1800	2000	2200	mV
Low Power Lockout Threshold Voltage	V <sub>UVLO</sub>			7.5		V



## TYPICAL PERFORMANCE CHARACTERISTICS

Charging process description



## DETAILED INFORMATION

When the input voltage  $V_{DD}$  is below the UVLO level, the chip will enter into the SLEEP MODE, the chip power consumption will down to  $20\mu A$ ; When the  $V_{DD}$  pin voltage rises above the UVLO voltage or more, the chip will into the CHRG the MODE, a charge cycle begins, early in the charge cycle, if the battery voltage is lower than the trickle charge threshold voltage (6.5V) the charger goes into trickle charge mode. The trickle charge current is internally set to 20% of the maximum charging current. When the battery voltage exceeds the trickle charge threshold, the charger enters constant current charging mode, the charging current from the internal 100mV baseline and the external sense resistor to a decision.

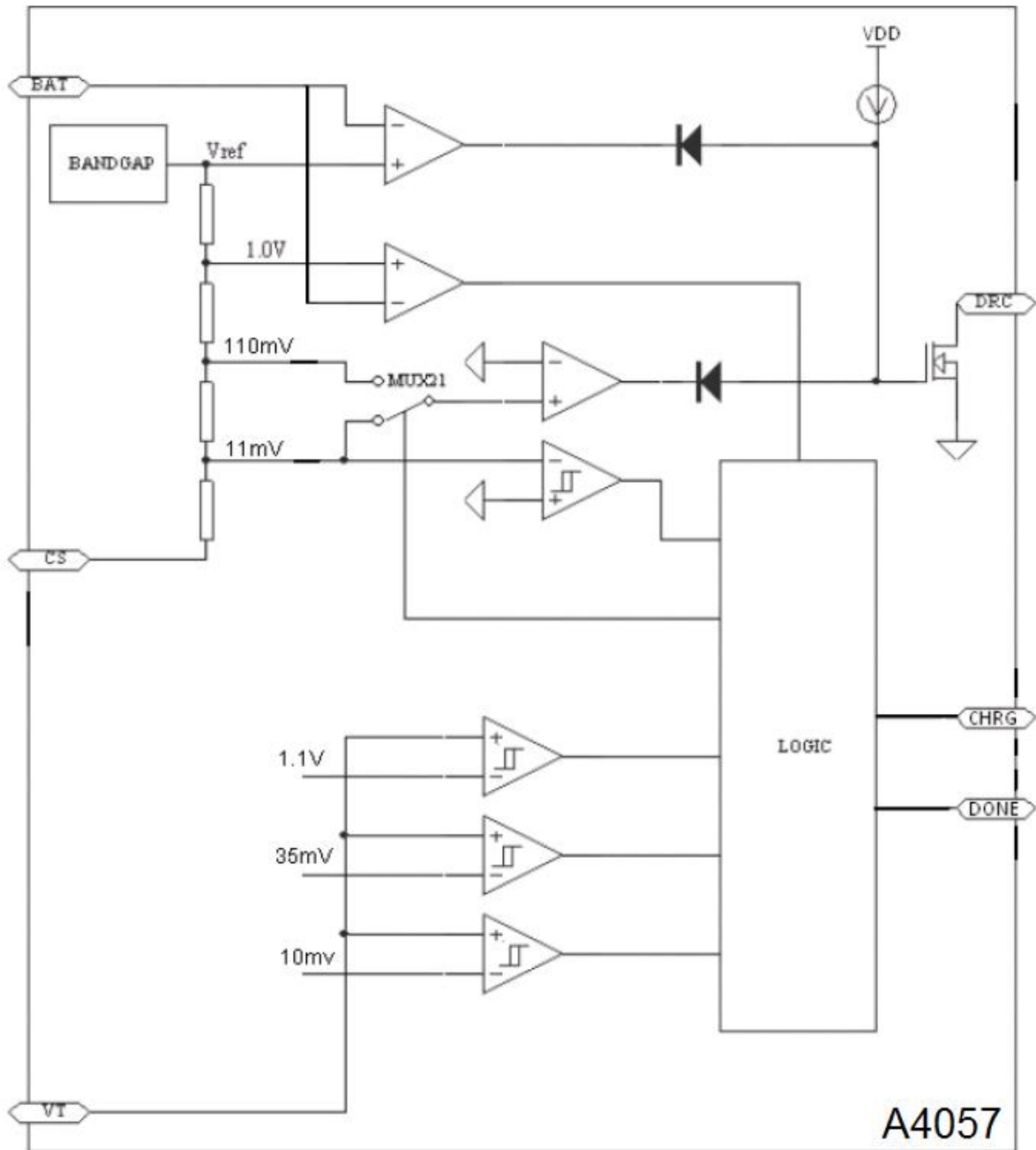
$$I_{BATT} = \frac{100mV}{R_s}$$

The chip also with battery temperature detection function, this function through the VT side, and in VT termination of a negative temperature coefficient 10K $\Omega$  thermistor, as the temperature rises to 80 degrees, the pin voltage is 50mV for low temperature to reach -30 degrees, the point voltage of 2V, only there voltage in the range of the two voltage values, the chip in order to work properly, otherwise the charge is stopped, the LED is not lit, this pin can be directly connected to shield of the temperature detection. Charging status display in the table below:

	No-load	Trickle charge	High current charging	Fully charged	NTC is not in the scope of state
Done ( Green )	Flicker	Off	Off	On	Off
Charge ( Red )	Off	On	On	Off	Off



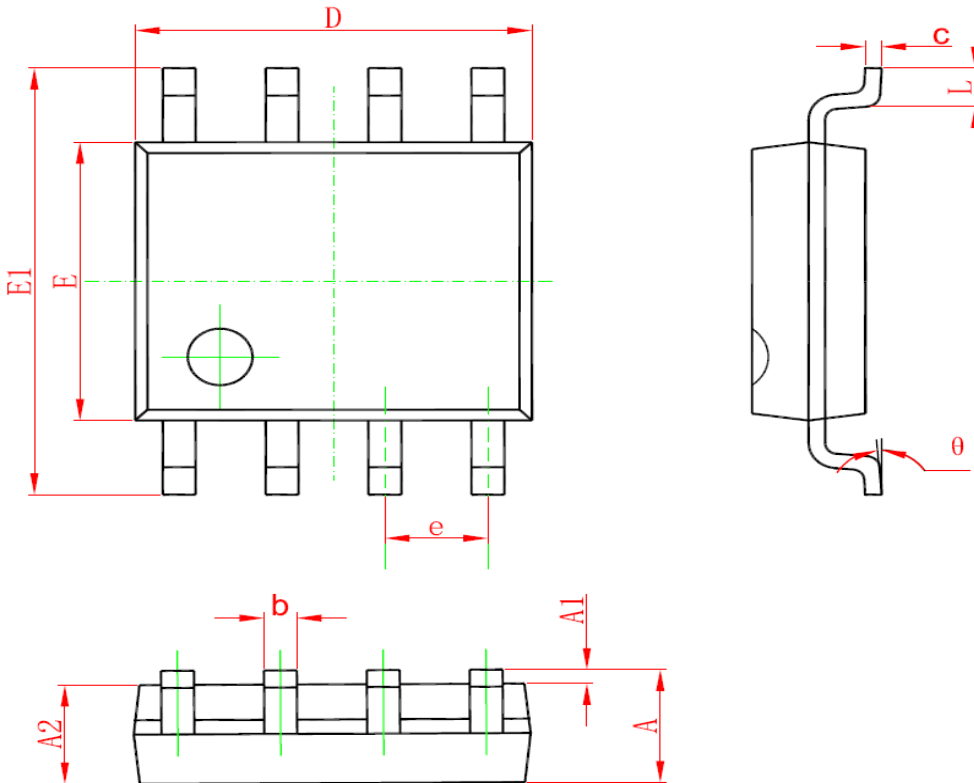
**BLOCK DIAGRAM**





## PACKAGE INFORMATION

Dimension in SOP8 (Unit: mm)



Symbol	Min	Max
A	1.350	1.750
A1	0.100	0.250
A2	1.350	1.550
b	0.330	0.510
c	0.170	0.250
D	4.700	5.100
E	3.800	4.000
E1	5.800	6.200
e	1.270(BSC)	
L	0.400	1.270
$\theta$	0°	8°



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