■ FUCTION

◆ Adopt to high exactitude 1mV(12 bit) parse analogy data switch(or Analogy Data Conversion, ADC), it can be judge that li battery full charge status, namely battery voltage high precision 4.2V(1%),it charge many batteries.

◆ The wise logic line, it can be make judgement that each voltage point of battery, and provide corresponding charge current for battery's activation which them after discharge .(Protect IC activation)

◆ After full charge is happened(namely single of battery is 4.2V), and just now, the charge current will be dropped slowly . When the current arrive a special postion, The chip will be shut down charge, until the battery is taked out.

◆ Fixed current charge model: Check and adjust charge current automatically to be define as fixed current model, it's accord with industry field's standard to li battery, exterior can adjust.

◆ Discharge voltage protection---Battery is discharge, it can adjust to small current charge automatically to active charge(arrive to pre-charge) , in order to save battery life.

◆ Safe Pre-Charge Terminate Time Protection(TCP) set a limit Pre-Charge process proper time automatically.

◆ Big and small current charge: Input battery with big current charge(CC), under no load status; Charge current is become small current(1/3CC) when the load is available, thereby can be make sure using rate of input power.

◆ Double color LED charge status shows: The Power turn on/Battery abnormal/Charge/ Full Charge.

◆ Working Voltage: 3.3 Volt

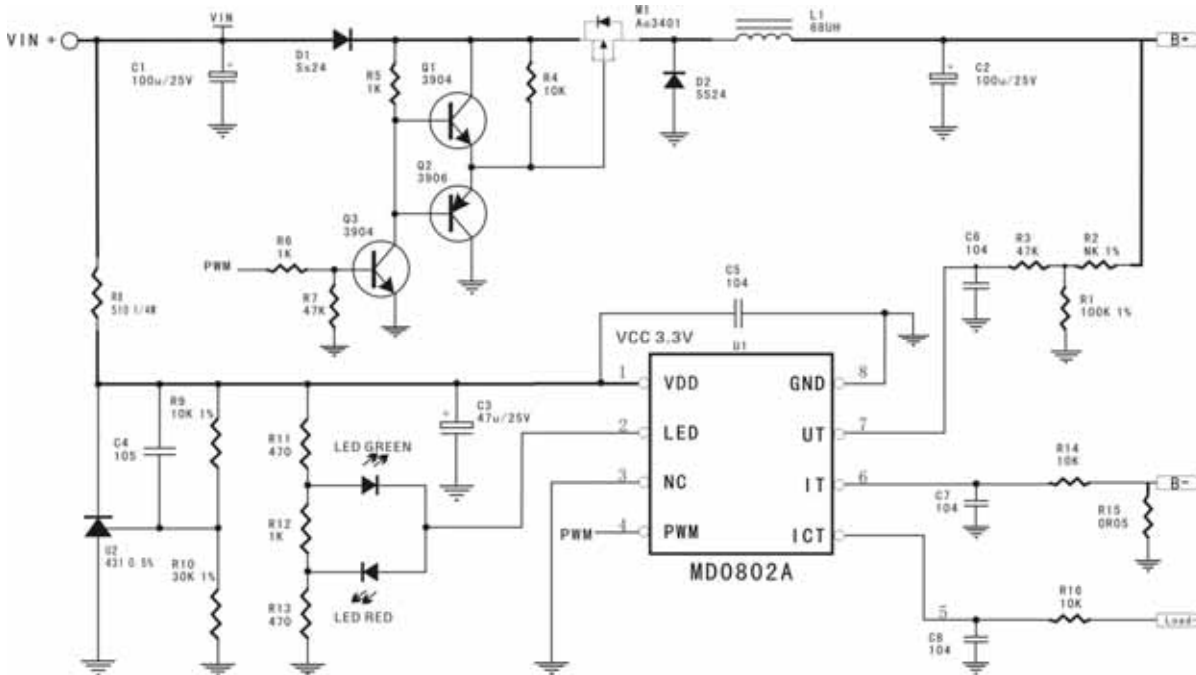◆ Plastic: DIP/SOP

■ APPLICATIONS:

A. Many li battery Charger
B. E-Tools
c. Portables Productions
d. Industry Productions
e. Portability Equipment

■ Typical Reference circuit：

■ ORDERING INFORMATION:

MD0802A

- PACKING TYPE
  TR:TAPE R REEL
  TB:TUBE

- PACKAGE TYPE
  N:PLASTIC DIP
  S:SMALL OUTLINE

ORDER NUMBER	PIN Configuration
MD0802A (PLASTIC DIP)	TOP VIEW
MD0802A (PLASTIC SOP)	

■ PIN Descriptions:

PIN	NAME	FUNCTION	PIN	NAME	FUNCTION
1	VDD	Power supply at 3.3V ±0.5~1%	5	ICT	Big and small current checks
2	LED	LED charge indicator	6	IT	Current checks impute
3	NC	high-tension/ low- eletricity	7	UT	Voltage checks impute
4	PWM	PWM drive output	8	GND	Power ground

■ LED light show fashion:

| Status	Indicator
1. Power Supply startup	Red Lighter lighten
2. No Battery	Red&Green lighter are all crush out
3. Fast charge	Red lighter is keeping lighten
4. Charge full (Fast Charge)	Green Lighter lighten
5. Pre-Charge	Red lighter is keeping lighten
6. Battery voltage over high	Red&Green lighter are all crush out
7. Battery on the contrary join	Red&Green lighter are all crush out

■ PIN FUNCTIONS EXPLAIN:

◆ VDD: IC work voltage 3.3V。

◆ LED：Charge having directions

◆ PWM：PWM drive output：

Bases current sampling's big and small and We needful current fixed value (50mV) that Comparative difference value and that ceaselessly tune up output pulse, thereby arrive at Pre-Charge、Fast Charge and Trickle Charge charged action。
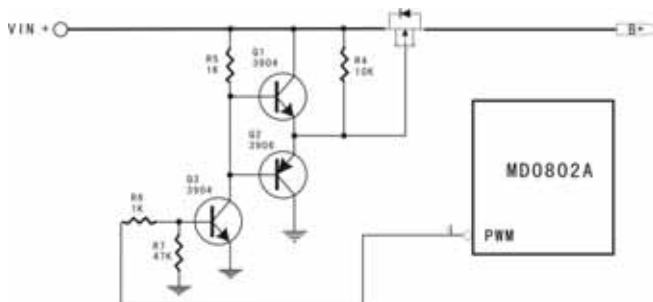
◆ UT：Voltage checks imput,IC's inside according to single Bat's voltage by way of standard voltage (Abut 2.1V)，So exterior circuit needs cent voltage as follows of charge many cell:
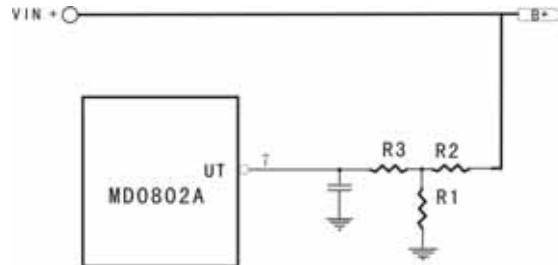
Voltage of UT for single Bat's voltage (about 2.1V),If charge many cell, must after according to R1 and R2 cent voltage receive UT(single cell's voltage).analysis as follows:

Quantity of Batteries using "n" account.　R1=10K.　UT=2.1V.　　R2=?

Expressions I as following:

$$4.2V×n/(R1+R2) ×R1=2.1V*2$$

For example: charge 2cell li battery (n=2)batteries，calculate as following:

$$2×4.2V/(10K+ R2) ×10K=2.1V *2　R2=30K$$

Advice R3 uses 47K, C1 use 104.

◆ IT: Charge current checking points, set up comparative voltage as 0.05V(50mV)in the MD0802A inside, it is play a huge effect to reduce temperature, resistance power, cost. Electro circuit as following:
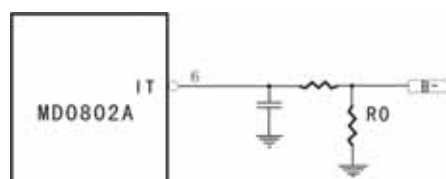
Charge current compute expressions as following:

Charge current=0.05V/R0

For example: charge current fixed value is 1A, the compute as following：

1A=0.05V/0.05Ω

R0 power compute expressions as following:

$W=U \times I=R \times I^2$

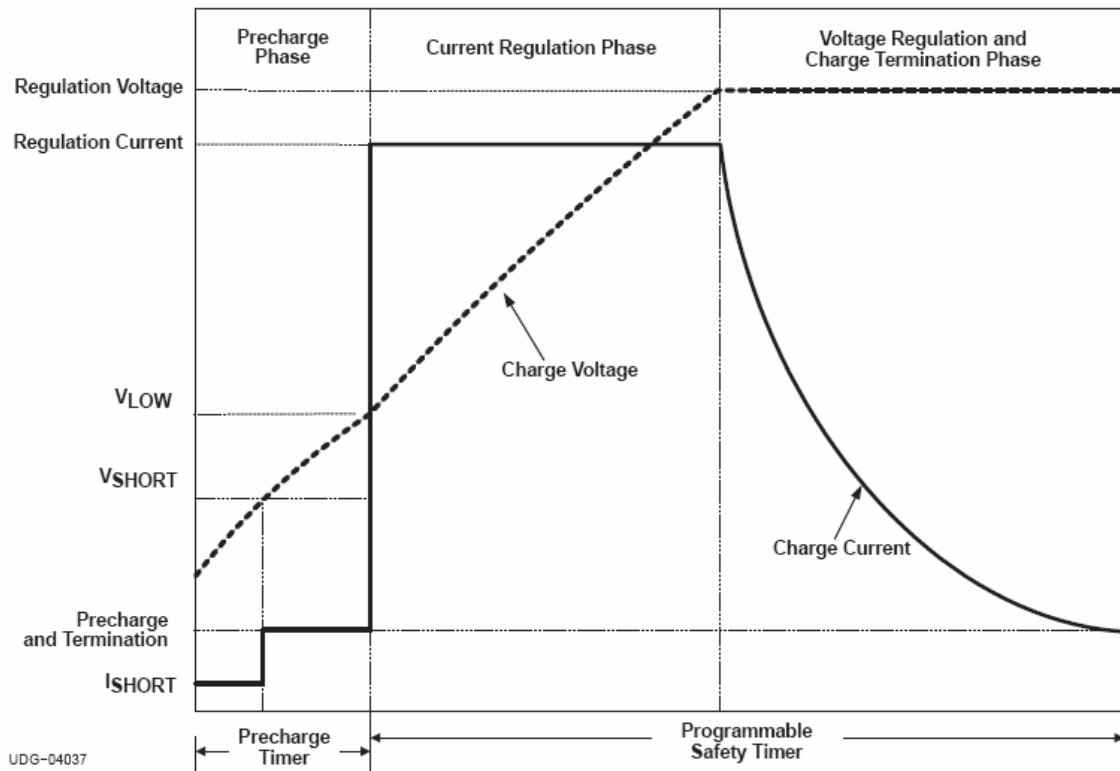**For example: charge current =1A,UR0=0.05V(voltage drop),compute as following:**
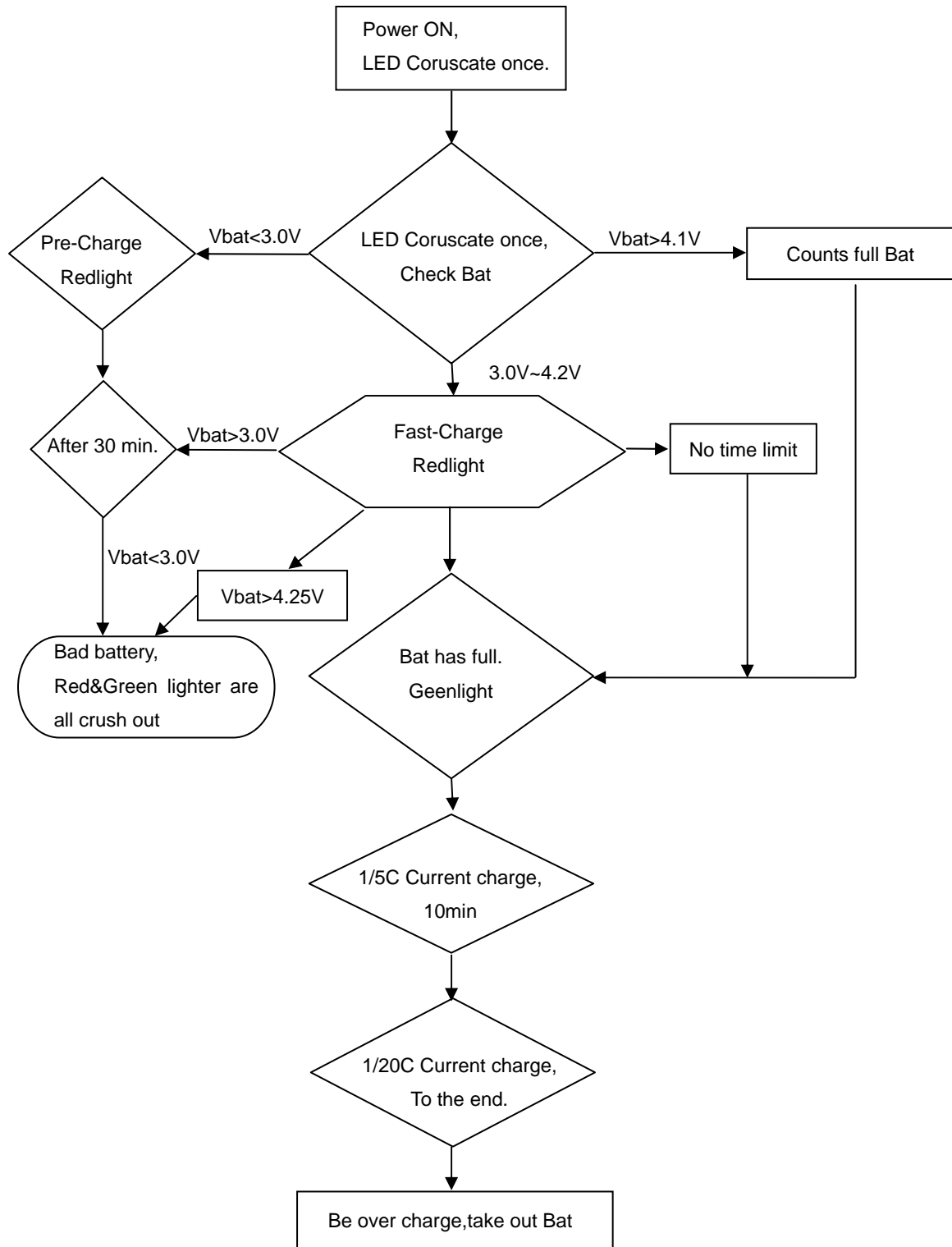
$0.05 \times 1A=0.05Ω \times 1A^2=0.05W=1/20W$

■ The Chip function Introduction:

◆ LED red& green light is coruscated one time with 2HZ speed, the charge will be started when the battery are available.

◆ No Battery: PWM will output pulse automatically, until the battery are available, PWM will output normally.

◆ Pre-Charge: When the battery voltage(single Pcs)is under 3.0V, in order to protect battery performance and life, PWM will output 2/5C charge current to battery for Pre-charge.

◆ Pre-Charge Time out: When the Pre-Charge is running after 30 minutes and at the same time, the battery voltage is not bigger than 3.0V, PWM will stop output automatically, it can be judge as abnormal.

◆ Fast Charge: The chip will be charged according to scheduled current value when battery voltage is bigger than 3.0V. (The fast charge parameter is "C")

◆ Trickle Charge: When the battery voltage reaches full charge status(4.2V is displayed), charge current will be descending. The green light will be enlightened when current dropped a special degree. At the same time, charge with less time-sharing ways, in order to increase battery self waste power and saturation.

◆ The battery startup Charge Function: IC will be return as "Zoro" and restart, charge battery once more, when the battery is full charge, and its voltage is dropped to Vsartup again.

◆ Big/Small current Control(VICT): With load, IC will be distinguished with small current charge automatically. Ensure input electrical source's power, thereby reduce cost.

◆ **IC protection function:**
   a、Over charge protection
   b、Over current protection
   c、Short protection

◆ Li Battery's charge curves as follows:

■ Function Flow Chart of MD0802A:

```
                            Power ON,
                            LED Coruscate once.
                                  │
                                  ▼
   Pre-Charge        Vbat<3.0V   LED Coruscate once,    Vbat>4.1V    Counts full Bat
   Redlight     ◄───────────     Check Bat          ───────────►
        │                              │
        │                        3.0V~4.2V
        ▼                              ▼
   After 30 min.  Vbat>3.0V    Fast-Charge     ───────►  No time limit
              ◄───────────     Redlight
        │                              │
    Vbat<3.0V                          │
        │         Vbat>4.25V           ▼
        ▼                        Bat has full.
   Bad battery,                  Geenlight
   Red&Green lighter are
   all crush out
                                       │
                                       ▼
                                1/5C Current charge,
                                10min
                                       │
                                       ▼
                                1/20C Current charge,
                                To the end.
                                       │
                                       ▼
                                Be over charge,take out Bat
```

■ **ABSOLUTE MAXIMUM RATING Supply voltage**

(Vdd)…………………………………… 3.3V
Input in voltage (Vin)………………………Vss – 0.2V ~ Vdd + 0.2V
Operating ambient temperature (Topr) ………………………-10°C ~ + 70°C
Storage temperature (Tstor)…………………………………-30°C ~ +125°C

■ **DC ELECTRICAL CHARACTERISTICS**

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	RNITS
Input Voltage	VDD	Operatin 25°C		3.3		v
Input Offset Current		Operatin 25°C Input Voltage			500	uA
OUT Drive Current	IU			5	10	mA
Charge regulation Voltage	Vfull	Cell BATT	4.18	4.2	4.22	V
VICT	Vs/m	VDD=3.3V	18	20		mV
Vstartup		Cell BATT		4.1		V
Pre-Voltage	Vlow	Cell BATT		<3.0		V
Fast Charge Voltage	CC	Cell BATT		>3.0		V
-Delta judge Voltage	CV	Cell BATT		4.2		V
Fast TrickleVoltage	PV	Cell BATT		4.2		V
VMAX	MV	Cell BATT		4.25		V
PWM Active High Sinking Current	IPWMH	VDD=3.3V		5	10	mA
Test Charge Current Voltage	IT	VDD=3.3V		50		mV
Pre-Timer		Posting BATT				min
TrickleVoltage Timer		Posting BATT		10		min
All Charge Timer		Posting BATT		8		hr

■ **PHYSICAL DIMENSIONS：**

MD0802A
8 LEAD PLASITIC SOP(Unit:mm)
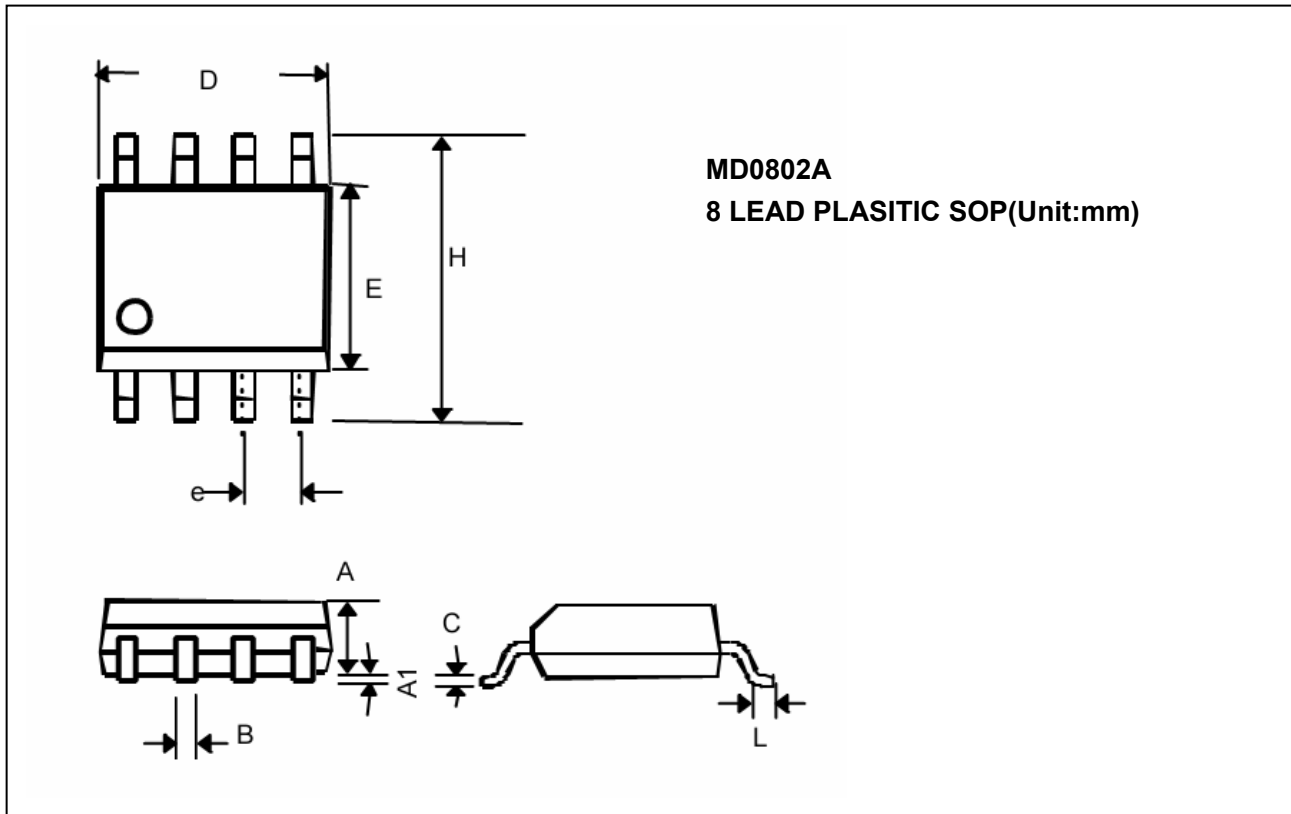
SYMBOLS	MIN	NOR	MAX	MIN	NOR	MAX
	(inch)			(mm)		
A	0.058	0.064	0.068	1.4732	1.6256	1.7272
A1	0.004	-	0.010	0.1016	-	0.254
B	0.013	0.016	0.020	0.3302	0.4064	0.508
C	0.0075	0.008	0.0098	0.1905	0.2032	0.2490
D	0.336	0.341	0.344	4.8	4.852	5.0
E	0.150	0.154	0.157	3.81	3.9116	3.9878
e	-	0.050	-	-	1.27	-
H	0.228	0.236	0.244	5.7912	5.9944	6.1976
L	0.015	0.025	0.050	0.381	0.635	1.27
θ°	0°	-	8°	0°	-	8°