



## NEXCELL BATTERY CO., LTD

### Lithium Ion Battery Specification


Battery Type: Li Ion Battery

Customer		Model	K079
Issue Date	2013-10-05	File No.	K079-1309131
Edition	S/2	Page	Page 16
Customer P/N			
Prepared	Checked	Re-checked	Approved
Customer Confirmation			
Checked		Approved(Customer Seal)	

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Version history	Change	Date
S/0	/	2013.09.10
S/1	Change dimension and assembly diagram; Update the PCM	2013.09.26
S/2	Increase the minimum capacity of the battery.	2013.10.05

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## 1. Application scope

The specification described something about the product; include nominal parameters, electric performance, safety behavior, environment adoption ability and accordingly the test and judgment, operation instructions and safety protocol, quality valuing, packing, marks, storage, shipping, etc.

Apply to the lithium ion rechargeable battery pack supplied by NEXcell BATTERY CO., LTD.

## 2. Criteria referenced by

GB/T 18287—2000 General norm for mobile phone Li-ion battery in China.


## 3. Kind of Products specified

3.1 Name                   lithium-ion rechargeable battery pack

3.2 Cell Type            ICR18650NQ

## 4. Basic parameters

4.1.1	Nominal voltage	3.7V	
4.1.2	Limited voltage	4.20V±0.03V	
4.1.3	Capacity	Nominal 2600mAh	0.2C <sub>5</sub> A discharge
		Minimal 2500mAh	
4.1.4	Inner resistance	≤250mΩ	
4.1.5	Standard Charge (0.5C <sub>5</sub> A)	I =1300mA, Vc=4.20V	25℃±2℃, CC/CV
4.1.6	Fast Charge (1.0C <sub>5</sub> A)	I =2600mA, Vc=4.20V	25℃±2℃
4.1.7	Max Charge Current(1.0C <sub>5</sub> A)	2600mA	
4.1.8	Standard Discharge(0.2C <sub>5</sub> A)	520mA	25℃±2℃
4.1.9	Fast Discharge (1.0C <sub>5</sub> A)	2600mA	25℃±2℃
4.1.10	Max Discharge Current(1.0C <sub>5</sub> A)	2600mA	
4.1.11	Cycle life	≥300Cycles	1C <sub>5</sub> A
4.1.12	Weight	About 52.0g	
4.1.13	Storage temperature(Capacity recovery rate should be more than 80% under the shipment status) Humidity:45%~75%,barometric Pressure:70 kPa~106kPa)	1 Month	-20℃~60℃
		3 Month	-20℃~45℃
		1 Year	-20℃~35℃
4.1.14	Shape and physical dimensions	In accordance to the attached drawing	

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## 5. Standard electric performance and the test process and judgment

### 5.1 Standard conditions


Standard test temperature	25℃±2℃
Relative humidity	60%±15%
Barometric pressure	86kPa ~106kPa

### 5.2 Requirements for instruments

Voltage meter	precision<0.5%, inner resistance>10 KΩ/V
Current meter	precision<0.5%
Hour-meter	Precision<0.1%
Thermometer	precision<±0.5℃
Current source	precision<±1%
Voltage source	Precision<±0.5%


### 5.3 Charge mode and discharge mode

Item	Method
Standard charge	Charge at 0.5C <sub>5</sub> A until the voltage reaches 4.20V, then charge under a constant4.20V voltage, until the current <0.01C <sub>5</sub> A.
Fast charge	Charge at 1C <sub>5</sub> A until the voltage reaches 4.20V, then charge under a constant4.20V voltage, until the current <0.01C <sub>5</sub> A.
Standard discharge	After standard charge, then rest of 0.5h-1h, then discharge at 0.2C <sub>5</sub> A until the voltage drops to 3.0V
Fast discharge	After standard charge, then rest of 0.5h-1h, then discharge at 1C <sub>5</sub> A until the voltage drops to 3.0V

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#### 5.4 Test method of electric performance and judgment rules

Items	Test method	Rule
5.4.1 Standard capacity	After standard charge, then stay the battery alone for 0.5h-1h, in the end discharge it at 0.2C <sub>5</sub> A until the voltage drops to 3.0V with the environment temperature 25℃±2℃.	The test may be repeated 5 times, if the discharge time ≥294min in one test, then the capacity of the battery is this.
5.4.2 1C <sub>5</sub> A capacity	After standard charge the battery, stay it alone for 0.5h-1h, at last discharge it at 1C <sub>5</sub> A under 25℃±2℃ until the voltage drops to 3.0V	The discharge time must ≥54min
5.4.3 Capacity test in high temperature	Standard charges the battery under 25℃±2℃, stay it under 55±2℃ for 2h, discharge it at 1C <sub>5</sub> A, then observe its appearance.	The discharge time must ≥51min, and the battery must have no distortion, no leakage, and no explosion.
5.4.4 Capacity test in low temperature	Standard charges the battery under 25℃±2℃, stay it under -20±2℃ for 16h-24h, discharge it at 0.2C <sub>5</sub> A then observe the appearance.	The discharge time must ≥180min, and the battery must has no distortion, no leakage, no explosion.
5.4.5 Cycle life	Charge the battery at 1C <sub>5</sub> A under 25℃±2℃ until the battery voltage reaches 8.40V, and then charge it under the constant voltage until the current ≤20mA. Stay it for 0.5h-1h, and then discharge it at 1C <sub>5</sub> A, until the voltage drops to 3.0V. Stay for 0.5h -1h again. Then another charge-discharge cycle again.	After 300 cycles, the capacity remains≥80% of standard capacity.
5.4.6 Internal resistance	Using a AC 1KHZ meter whose precision must be less than 0.5%, detect the resistance between the battery's positive and negative terminals. The result value can not include any external conductor's resistance. The maximum and the minimum need be recorded.	The internal resistance ≤250mΩ and the difference between the maximum and the minimum ≤30mΩ. After 300 cycles ≤338mΩ.
5.4.7 Storage	After standard charge the battery, store the battery at 25℃±2℃, store 28d later	Discharge at 0.2C <sub>5</sub> A. The discharge time must ≥255min.

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## 6. Environmental Mechanical Characteristics

Items	Test method	Rule
6.1 Humidity test	The battery which is fully charged with constant-current-constant-voltage method will be subjected to $40\pm 2^{\circ}\text{C}$ at 90%-95% relative humidity for 48h .Then rest of 3h at $25^{\circ}\text{C}\pm 2^{\circ}\text{C}$ , observe the battery. Then discharge at $1\text{C}_5\text{A}$ until the voltage drops to 3.0V and record the discharge time.	The battery has no distortion, no leakage, no explosion, no fire, no smoking. And the discharge time > 36min.
6.2 Vibration	Fix the fully charged battery on the vibration table. Adjust the instrument as follows. There are 3 directions: X, Y, and Z. In each direction, the battery should be vibrated for 30min from 10Hz to 55Hz. Frequency sweeping rate: 1OCT/min Frequency range:10Hz-30H,Amplitude: 0.38mm Frequency range:30Hz-55Hz,Amplitude:0.19mm	The battery has no distortion, no leakage, no explosion, no fire, no smoking. And the OCV shall great than3.60V. The battery should be still mechanically good and the voltage shall >3.60V.
6.3 Mechanical shock	After finishing test 6.2, the batteries should be averagely divided into 3 directions. Adjust the unit as follow to do the test. Pulse peak acceleration: $100\text{m/s}^2$ Frequency : 40-80 (1/min) Pulse duty: 16ms Times: $1000\pm 10$	The battery has no distortion, no leakage, no explosion, no fire, no smoking. And the OCV shall great than 3.60V. The battery should be still mechanically good and the voltage shall >3.60V.
6.4 Drop test	After finishing test 6.3, the battery is dropped from a high 1.0m away from a 18mm~20mm thick hard board onto the board onto each side of the six. Then discharge the battery at $1\text{C}_5\text{A}$ until 3.0V. Then repeat charge and discharge at fast rate until the discharge time $\geq 1$ min.	The battery has no distortion, no leakage, no explosion, no fire, no smoking. The battery should be still mechanically operable.

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## 7. Safety performance and test, valuing rules

All tests are done under standard condition.

Item	Conditions and others	Rule
7.1 Over charge	The battery should be charged at $2C_5A$ , 7.4V for 8 hours. The over charge protection function should be started. After the test, observe the battery's appearance.	The battery has no distortion, no leakage, no explosion, no fire, no smoking.
7.2 Over Discharge	The battery discharged to 3.0V should be connected positive and negative terminals with a resistance about $60\Omega$ for 24hours. After test, observe the battery's appearance.	The battery has no distortion, no leakage, no explosion, no fire, no smoking.
7.3 Over current protection	After full charged the battery, discharging it through a $0.1\Omega$ resistance for 8h. Then charge at $1C_5A$ for 5s, at last observe the battery's appearance.	The battery has no distortion, no leakage, no explosion, no fire, no smoking. And the voltage of the battery should be $\geq 3.60V$ .
7.4 ESD Behavior	The battery is required to pass ESD test, Contact discharge: $\pm 8KV$ ; Air discharge: $\pm 15KV$	After testing, all the protection functions must not fail

## 8. Requirement for appearance

The battery has clean surfaces, no serious mechanical scar. There shall be the product's mark on the surface. The battery shall mate with the equipment.

## 9. Shipping

For shipping, batteries shall 50%~ 60% standard capacities charged. Strong vibration, shock, and extrusion are prohibited. Prevent from exposition to sun and rain. Automobile, train, ship, airplane and so on are applicable

## 10. Storage


Refer to item 4.1.13. The storeroom shall be ventilated, clean. Keep off caustic matter, fire, and heat. Please recharge the batteries every 6 months.

## 11. Marks and packing

### 11.1 Packing (Note the attached pack drawing)

### 11.2 Mark

On the battery, there shall be marks as follows: product name, model, nominal voltage, nominal capacity, terminal name, trademark and warning message, manufacture date, batch No., manufacturer name, (or corresponding serial No.).

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## 12. Operation instruction and safety protocol

### 12.1 Recommendation

- 12.1.1 Read the specification and the signs on the product before operation
- 12.1.2 The product shall operation at 0℃~45℃ ( charge ) and -20℃~60℃ ( discharge ) at 60%±15% humidity.
- 12.1.3 Keep off fire, high voltage. Children using alone & being beat are prohibited
- 12.1.4 Only applicable to specified charger and the charging time shall within 24h.
- 12.1.5 Short circuit is prohibited. Don't disassemble the product. Keep off humidity.
- 12.1.6 If the battery is out of use, please charge the battery to half-charged and place it in dry and shade, packed with insulating material.
- 12.1.7 The battery which is used up shall be treated pertinently. Plunged into fire is prohibited.

### 12.2 Safety warning

- 12.2.1 Don't disassembly the product
 

There is protection circuit in the battery to guard the battery from danger. Improper disassembly will damage the circuit.
- 12.2.2 Don't let the battery become short.
 

Short circuit is prohibited, or the battery will produce great current, and is damaged.
- 12.2.3 Don't heat and fire the battery
 

Heating or firing the battery will melts the preserves, which damages the protection functions and burns the electrolyte. This will rise to burning or explosion.
- 12.2.4 Don't be near heat
 

Don't use the battery near fire, oven or any other environment whose temperature is above 60℃.
- 12.2.5 Don't dampen the battery
 


Don't dampen the battery, specially don't plunge it into water, or the battery will be damaged, even bring danger.
- 12.2.6 A charging battery shall be kept off fire, and exposal to sunlight, or the battery will be damaged even bring danger.
- 12.2.7 Don't use charger which is not specified
 

Using improper charger will damage the battery and bring danger.
- 12.2.8 Don't destroy the battery
 

Don't chip, hit or beat the battery, or the battery will produce heat, smoke, distort or burn and bring danger.
- 12.2.9 Soldering the battery is prohibited.
 

The high temperature will damage the preserves of the battery and give rise to danger.



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12.2.10 Connect the battery directly to the mains power or any other improper power supplies is prohibited.

High voltage, heavy current will damage the battery or bring danger.

12.2.11 Don't use the battery in any other units

Improper usage will damage the battery, even bring danger.

12.2.12 Don't touch any leakage liquid.

Leakage electrolyte is dangerous. If any electrolytes into eyes immediately clean off with water and go to hospital for curing.

### 12.3 Warnings

12.3.1 Don't get along with other batteries

The batteries can't get along with any other type of batteries, or there may be dangerous.

12.3.2 The battery shall be placed out of children's reach to prevent the children from danger.

12.3.3 Don't keep charging for along time.

If the charge time lasts longer than specified time, charge shall be stopped, or there likely be danger

12.3.4 Don't near to a micro-wave oven or any other pressure vessel.

Once momentary heated, leakage, or smells unpleasant, please stop using the battery or there maybe a danger.

### 12.4 Notes

12.4.1 Note

Don't be exposed to sunlight, or the battery will produce heat, distort, etc., and the life will be decreased.

12.4.2 Preventing from ESD

12.4.3 Charge temperature:

Recommended temperature is 0°C~45°C. The battery's performance will decline.

12.4.4 Carefully read the usage manual before using the battery, and it's whenever required

12.4.5 Charge method

Please use specified charger and charge mode.

12.4.6 The first use

If the battery is not natty or smells unpleasant at the first use, please stop using the battery.


12.4.7 Children user

Children user shall under the parents' direction, and monitored by the parents.

12.4.8 Keep children from the product

The product shall be placed where is out of children's reach. Keep children from operating the product.

12.4.9 Please keep your body from battery leakage liquid. Clean the leakage liquid, if even a little.

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#### 12.4.10 Consultation

Please acquire the contacting methods in case of requisition for consultation.

#### 12.4.11 Expiration date

The expiration date is 1 year from the date the product leaves factory. If the product is used improperly and is damaged during expiration date, the manufacturer will not replace the damaged product with a new free one.

#### 12.4.12 Safety for use

If the product is used otherwise, please contact the provider.


### 13. This product is according to demand of HSF.

### 14. Quality valuing protocol




Quality inspection contains accreditation and consistency. The former be taken placed during designing, designing change and producing. Sampling method, items inspected, orders and rules for judging are determined by the provider together with the client. Quality consistency contains inspecting batch by batch and inspecting periodically to judge that if the products' quality is stable consistently. GB2828—1987 is referenced by. The inspection items shall contain: appearance, internal resistance, rating capacity, 1C<sub>5</sub>A discharge capacity, etc.


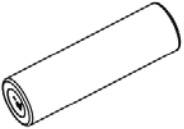
### 15. Other declaration

Mentioned above is regarded as agreement on the product between the manufacturer and the client. It keep works, unless there is new agreement comes as a replacement.

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## 16. Battery Dimension Diagram



  

  


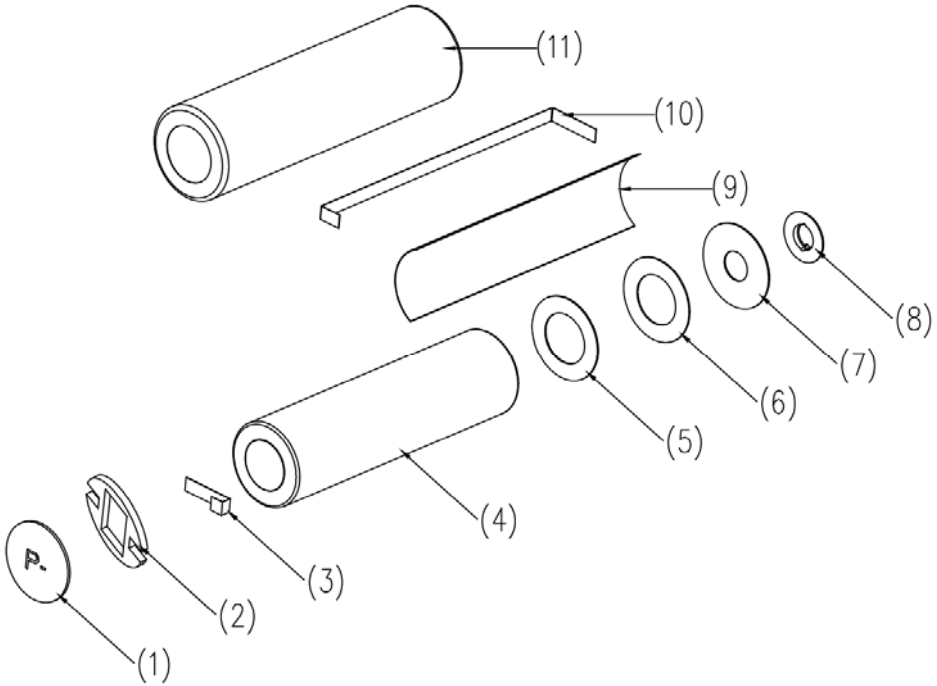
Remark:

Finished voltage:3.70V  
Finished current:2600mAh  
Finished resistance≤250mΩ


FACILITIES		ITEM		WORKSHOP		VERSION	
c				NAME: K079 PACK_DRAWING			
b							
a							
DENOTATION	CHANGES	SIGNATURE	DATE	2> - <10	±0.08	DRAWING NUMBER	
DESIGNER		2013-09-26		10> - <50	±0.10		
CHECKER				50> - <100	±0.15	QTY	UNIT
RECHECKER				100> - <200	±0.20	mm	
APPROVER				200> -	±0.30	NO SCALE	
						TOTAL PAGE	THE PAGE


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### 17. Battery Assembly Diagram (Include Parts List)



11	PET casing	PET: T0.10mm	1	/
10	kapton tape	L65.0*W10.0*T0.06	1	/
9	Nickel patch-2	L88.0*W3.0*T0.10	1	/
8	Hat	∅10.50*T0.30	1	/
7	Gasket-3	∅17.80*T0.30	1	/
6	Gasket-2	∅17.80*T0.60	1	/
5	Gasket-1	∅17.80*T0.30	1	/
4	Cell	ICR18650NQ (2600mAh)	1	/
3	Nickel patch-1	L18.0*W3.0*T0.10	1	/
2	Foam	∅17.80*T1.30	1	/
1	PCM	HYB-K079-A	1	/
NO.	NAME	SPEC	QTY	REMARK
FACILITIES	ITEM	WORKSHOP	VERSION	


C				TOLERANCE UNNOTED		NAME: K079 EXP_DRAWING	DRAWING NUMBER			
b				DIMENSION	TOLERANCE					
a				0> - <2	±0.05					
DENOTATION	CHANGES	SIGNATURE	DATE	2> - <10	±0.08	MATERIAL:	QTY		UNIT	SCALE
DESIGNER		2013-09-26		10> - <50	±0.10					
CHECKER				50> - <100	±0.15					
RECHECKER				100> - <200	±0.20	TREATMENT:	mm		NO SCALE	
APPROVER				200> -	±0.30					
							TOTAL PAGE		THE	PAGE

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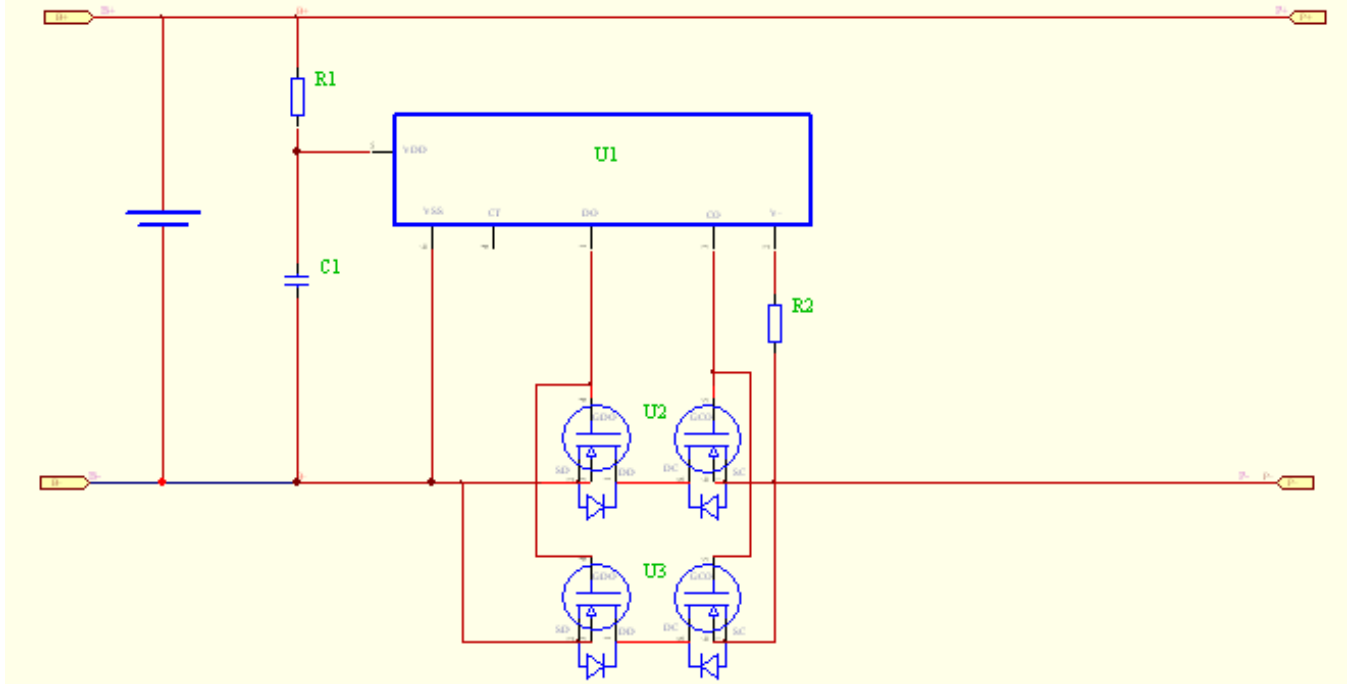
## PCB SPEC

### 1. Electronic Characteristics (25℃)

Item	Symbol	Content	Criterion
Over charge Protection	$V_{DET1}$	Over charge detection voltage	4.280±0.025V
	$tV_{DET1}$	Over charge detection delay time	0.92-1.4s
	$V_{REL1}$	Over charge release voltage	4.080±0.025V
Over discharge protection	$V_{DET2}$	Over discharge detection voltage	2.800±0.050V
	$tV_{DET2}$	Over discharge detection delay time	115-173ms
	$V_{REL2}$	Over discharge release voltage	2.800±0.050V
Over current protection	$V_{DET3}$	Over current detection voltage	0.100±0.015V
	$I_{DP}$	Over current detection current	5.0~9.0A
		Release condition	Cut load
		Over current detection delay time	7.2-11.0ms
Short protection		Detection condition	Exterior short circuit
		Release condition	Cut short circuit
		Detection delay time	220-360us
Interior resistance	$R_{DS}$	Main loop electrify resistance	$V_C=4.2V, R_{DS} \leq 45m\Omega$
Current consumption	$I_{DD}$	Current consume in normal operation	3μA Type 6.0μA Max


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## 2. Circuit Diagram



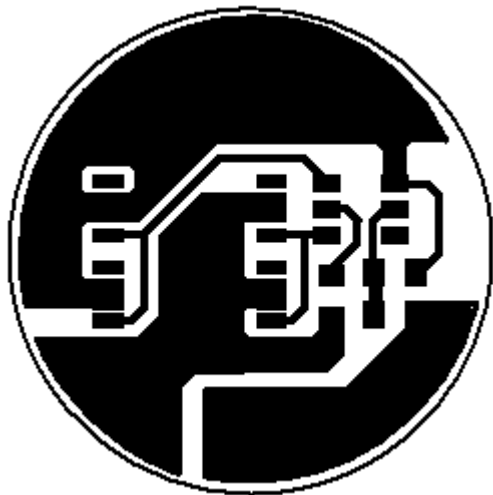
## 3. PCB Parts List

Item	Part Name	Description	QTY	Footprint	Supplier	Remarks
1	U1	S-8261-G3M	1pcs	SOT-23-6	SEIKO	
2	U2,U3	AO8810	2pcs	TSSOP-8	AOS	
3	R1	SMD 470R, $\pm 5\%$	1pcs	0603	YAGEO	
4	R2	SMD 2K, $\pm 5\%$	1pcs	0805	YAGEO	
5	C1	SMD 0.1 $\mu$ F, $\pm 5\%$ , 50V	1pcs	0603	YAGEO	
6	B+ B-	3.0*3.0*0.3 mm	2pcs		FUJIADA	
7	PCB	$\phi$ 17.8 $\times$ 1.0mm	1pcs	K079-A	MEIYADI	FR4 2 Layer

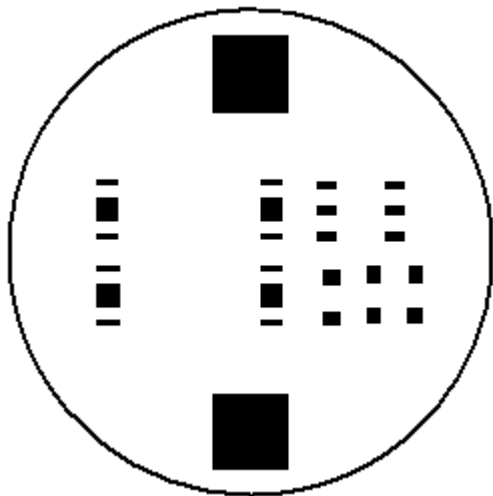
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4. PCB Layout

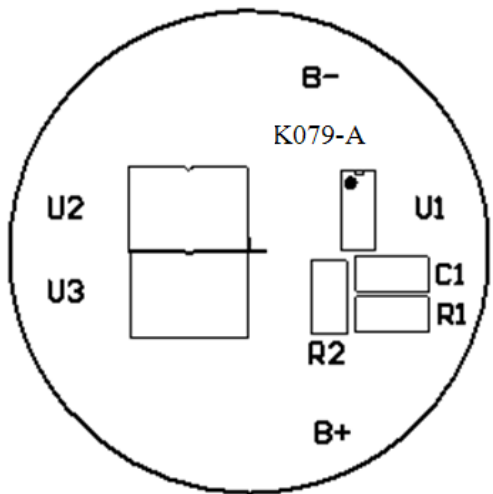
4.1 Top Layer




4.2 Top Solder

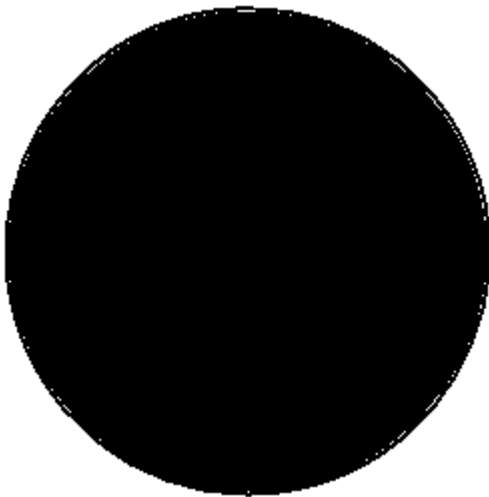


4.3 Top Overlay



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4.4 Bottom Layer



5. PCM Assemble Mechanical Drawing  
PCB Outline   Uni t: mm

