



Specification Approval Sheet

Name: **Tenergy Smart Universal Charger for NiMH/NiCD Battery**

Model: **01005**

SPECS: **7.2V - 12V**

Approved By	Checkup	Make

Customer Confirmation	Signature	Date
	Company Name:	
	Stamp:	

436 Kato Terrace, Fremont, CA 94539 U.S.A.

Tel: 510.687.0388 Fax: 510.687.0328

www.Tenergy.com



Features:

- It's a safe smart charger for NiMH battery packs controlled by MCU with $-\Delta V$ and temperature detection.
- Suitable for 6-10S NiMH battery packs
- Two charging current selection (0.9A, 1.8A) for 500-5000mAh applicable battery packs. Charging current 0.9A for battery packs with capacity from 500-3000mAh. Charging current 1.8A for battery packs with capacity from 3000-5000mAh.
- Constant current charging with $-\Delta V$ detection ensure rapid charge and saturation level of batteries $\geq 80\%$.
- Safety timer: 5 hours
- Automatic detection helps distinguish good and bad cells. Charging will be stopped if other loads out of batteries are detected.
- Wake-up function - When battery voltage is lower than normal value, it will charge the battery with 22mA charging current.
- Connect the output terminals of the charger appropriately with the positive and negative side of the battery packs and plug in AC power supply when charging; Easy to use.
- With reverse protection to ensure it won't cause damages to battery and charger when misoperation (reversely connected). DO NOT connect the battery reversely to the charger for a long time period.
- Hardware watchdog can ensure batteries be protected from overcharge when the hardware circuit performs abnormally or software is out of control.
- Temperature sensor protection - To attach the thermostat to the surface of the battery pack can assure the temperature of the battery pack lower than 60°C .
- Two-color LED indicates charging status.
- Universal AC input 100-240VAC 50/60Hz for worldwide use.

Notice: DO NOT use it to charge inapplicable batteries or battery packs. All batteries mentioned in this specification sheet refers to 6-10S battery packs.

1 Electrical Characteristics

1.1 Input Characteristics

1.1.1 Input Voltage

100-240VAC 50/60Hz

1.1.2 Input Current

Rated input current: $I_{in} \leq 1\text{A}$ Efficiency η : $\geq 75\%$ when full load

1.2 Output Characteristics

1.2.1 Output Voltage

No-load Voltage: $23\text{V} \pm 2\text{V}$

1.2.2 Charging Voltage Range

7.2V-16V

1.2.3 Rated Charging Current (Normal operating)

Charging current: (when charge 6V-12V NiMH battery packs)

$0.9\text{A} \pm 10\%$

$1.8\text{A} \pm 10\%$

1.2.4 Trickle Current (Normal operating)

90mA Mean, (0.9A Mode) (duty cycle =10%)

180mA Mean, (1.8A Mode) (duty cycle =10%)

1.2.5 Short circuit Current

Short-circuit Current: 30 ± 10 mA Red flash

1.2.6 Reverse Protection

≤ 100 mA

1.2.7 Output Leakage Current

≤ 1 mA (No AC input)

1.2.8 Application

The charger is applicable for 6-10S Nimh batteries.

2 Instructions & LED Indication

2.1 Charge Mode & Detection

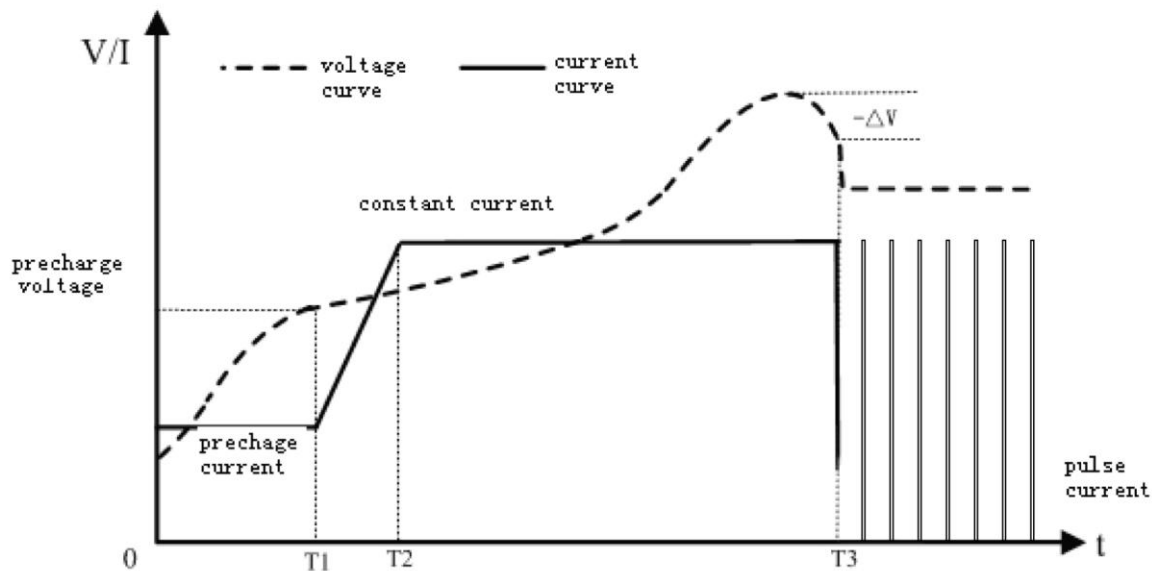
Constant current charging, $-\Delta V$ and temperature detection

$-\Delta V$ occurs when the battery is full charged. When $-\Delta V$ value is between 10-30mV and the temperature of battery pack $\geq 58^\circ\text{C}$, it turns into trickle charge.

When charging time reaches 5 hours, it turns into trickle charge.

When the battery voltage is higher than 18V, charging stops.

2.2 Output Characteristics Figure



T0-T1: Wake up stage. When the voltage of the battery is lower than 5V, the charger will use pre-charge current $30\text{mA} \pm 15\text{mA}$ to charge the battery.

T1-T2: Current ramp up stage. When the voltage reach 5V, charge current will ramp up from wake up current, and at the end of this stage, the current will ramp up to constant charging current $0.9\text{A} \pm 10\%$ (@0.9A Mode) or $1.8\text{A} \pm 10\%$ (@1.8A Mode).

T2-T3: Constant current stage. Charge battery with constant current until the $-\Delta V$ reaches 10-30mV, constant



current stage ends and battery is full charged. LED turns from red to green. It enters trickle charge stage. T3- : Trickle charge stage. The charger will use supplementary current to charge the battery (duty cycle: 5%) to balance the loss of self- discharge of the battery. Trickle current average value is $90\text{ mA} \pm 10\%$ (@0.9A charge mode) and $180\text{mA} \pm 10\%$ (@1.8A charge mode).

2.3 LED Indication

No batteries	LED —— Green flash
Charging	LED —— Red
Full charge	LED —— Green
Short Circuit	LED —— Red flash
Battery Reversed	LED —— Red flash
Primary battery	LED —— Red flash

3 Short Circuit Protection & Reverse Protection

3.1 Short Circuit Protection

Red LED flashes when the output is short.

The charger will automatically enter charging status when short circuit is removed.

3.2 Reverse Protection

When the output end is short circuited, the charger wouldn't deliver charging current and the LED displays red constantly.

The charger will automatically enter charging status when reverse connection is removed.

4 Environment

4.1 Operating Temperature:

0~+40°C

When operating temperature exceeds 35°C, it may affect the battery performance and life.

Recommended to be used at room temperature lower than 35°C.

Battery may get warm during charging. Please rest assured that use.

4.2 Operating Humidity

RH ≤90% (Non-condensing) ;

5 Storage Environment

5.1 Storage Temperature

-20~+80°C

5.2 Storage Humidity

RH ≤85%

5.3 Atmospheric Pressure

70~106KPa

6 Safety

6.1 Dielectric Strength

Withstand Voltage from primary to secondary $\geq 3000\text{VAC}$ 50HZ/60HZ

Held at the virtual value of sine wave for 1min without breakdown or flashover.

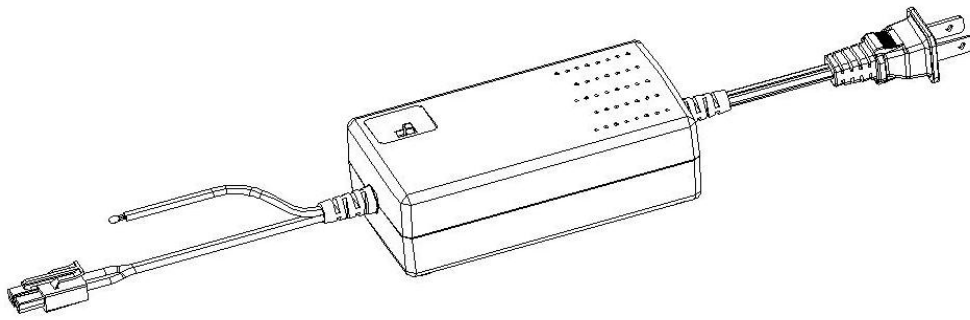
Leakage current $\leq 10\text{ mA}$

6.2 Insulation Resistance

$\geq 10\text{M}\Omega$ (Under DC500V)

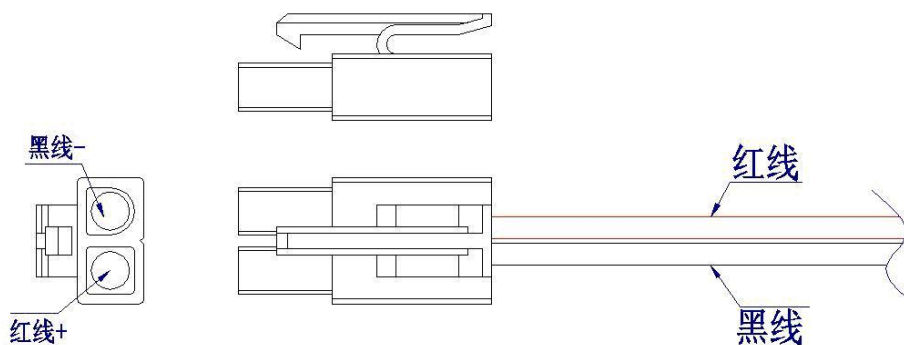
7 Mechanical

7.2 Structural Drawing



Shell color: Blue

7.3 Output Connector





7.4 Nameplate & Label



8 Cosmetic Requirements

8.2 Appearance

Smooth surface without any scratches, flashes or other mechanical damages; Intact and clear silk-screen printings; No corrosion on exposed metal parts.

8.3 Drop Test

Free fall to a hard wood ground from the most adverse directions at the height of 1.0m for 6 times and should cause no damages to the charger.

9 Volume & Weight

9.2 Volume

L*W*H: 119*60*37mm³

9.3 Weight

Net Weight: 109g approximate