# Specification Approval Sheet

**Name:** Tenergy Smart Universal Charger for NiMH/NiCD Battery  
**Model:** 01005  
**SPECS:** 7.2V - 12V

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<tr>
<th>Customer Confirmation</th>
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## History

<table>
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<tr>
<th>Edition</th>
<th>Issue Date</th>
<th>Prepared by</th>
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<tr>
<td>00</td>
<td>2010-5-11</td>
<td>Han Wu</td>
<td>First Edition</td>
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Features:

- It’s a safe smart charger for NiMH battery packs controlled by MCU with -△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 -△V detection ensure rapid charge and saturation level of batteries ≥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℃.
- 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: lin≤1A Efficiency η: ≥75% when full load

1.2 Output Characteristics

1.2.1 Output Voltage

No-load Voltage: 23V±2V

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)

0.9A ±10%

1.8A±10%

1.2.4 Trickle Current (Normal operating)

90mA Mean. (0.9A Mode) (duty cycle =10%)
1.2.5 Short circuit Current
   Short-circuit Current: 30±10 mA  Red flash

1.2.6 Reverse Protection
   ≤100mA

1.2.7 Output Leakage Current
   ≤1mA  (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, -△V and temperature detection
   -△V occurs when the battery is full charged. When -△V value is between 10-30mV and the temperature of battery pack ≥58℃, 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 30mA±15mA 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 0.9A ±10% (@0.9A Mode) or 1.8A ±10% (@1.8A Mode).
   T2-T3: Constant current stage. Charge battery with constant current until the -△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 mA ± 10% (@0.9A charge mode) and 180mA ± 10% (@1.8A charge mode).

2.3 LED Indication

<table>
<thead>
<tr>
<th>Condition</th>
<th>LED Description</th>
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<tr>
<td>No batteries</td>
<td>Green flash</td>
</tr>
<tr>
<td>Charging</td>
<td>Red</td>
</tr>
<tr>
<td>Full charge</td>
<td>Green</td>
</tr>
<tr>
<td>Short Circuit</td>
<td>Red flash</td>
</tr>
<tr>
<td>Battery Reversed</td>
<td>Red flash</td>
</tr>
<tr>
<td>Primary battery</td>
<td>Red</td>
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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 ≥3000VAC 50HZ/60HZ
Held at the virtual value of sine wave for 1min without breakdown or flashover.
Leakage current ≤10 mA

6.2 Insulation Resistance
≥10MΩ(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