

NiMH

1.2V-  
36VDC

3A max.

50W

## Turtle Charger (50W) - NiMH

### Pre-programmed Battery Charger for Nickel Metal Hydride



### GENERAL SPECIFICATIONS

|                     |  |
|---------------------|--|
| Input Voltage       | 10-75VDC   |
| Input Connector     | 2.1mm DC jack (enclosure)  |
| Output Voltage      | 1.2V-36V for battery packs up to:<br>– 30 cells in series (NiMH) |
| Output Current      | 3A max.  |
| Voltage Accuracy    | <1%  |
| Voltage Limit       | 1.55V $\pm$ 1% p/cell  |
| Current Accuracy    | <5%  |
| Tolerance on Timing | $\pm$ 5%   |
| Temp. Accuracy      | Internal: <1°C<br>External: <1%, resolution 0.01°C               |
| Dimensions          | L112mm x W66mm x H40mm<br>(enclosure)                            |
| Weight              | 140 grams (enclosure)  |

### LED PATTERNS - ROUTINE

|                                   |  |
|-----------------------------------|--|
| Traffic light (red-orange-green): | System reset. Occurs at power on and battery connection.   |
| Slow orange blink:                | System waiting. Battery disconnected.                      |
| Solid orange:                     | Constant current phase. (inc. pre-condition if programmed) |
| Orange with green blink:          | Constant voltage phase                                     |
| Solid green                       | Charge Complete. Float Charge continues (if programmed)    |

### LED PATTERNS - EXCEPTIONS

|   |  |
|---|--|
| Three red flashes:                          | Charge suspended. Battery volts too low.                                 |
| Two red flashes:                            | Charge suspended. Battery volts too high.                                |
| Slow red blinking:<br>(1 flash every 5 sec) | Charge suspended. Battery or PCB too hot<br>(PCB self protected to 75°C) |
| Fast red blinking:                          | Thermistor Error. (Needs Power Reset)                                    |
| Orange blinking:<br>(1 flash every ½ sec)   | Timeout. Time limit is customisable on request                           |
| Solid red:                                  | Fault. (Needs Power Reset)   |

### DESCRIPTION

The TSB002-NMH series offer a wide range of single output DC chargers up to 50 Watts.

It is custom programmed by our engineers to fit specific design requirements for NICKEL METAL HYDRIDE.

Pre-programming includes functions setting, charging current and charging voltage, constant current, constant voltage, pre-conditioning, float charging, charge termination methods and setting. Input and output cabling and connector options for all international markets are available upon request.

#### Features:

- Choice of 50 different models.
- Wide input voltage range.
- Single voltage output up to 50W.
- Constant current limiting overload.
- Proven field reliability and performance.
- Status LED indicator.
- High operating temperature +71°C.

#### MOUNTING OPTIONS:

Modules available as options below:

**PCB:** PCB stand-alone charger.

**ENCLOSURE:** Housed enclosure for environmental protection.

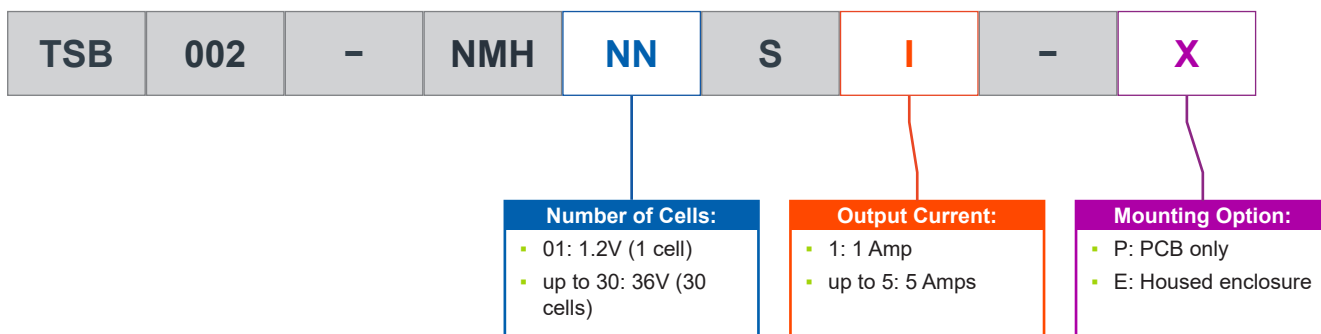
#### PCB



#### ENCLOSURE



### PART NUMBER SELECTION KEY



\*Termination of choice available.

### SELECTION TABLE

| Part Number    | Chemistry | Battery Pack Voltage | Input Voltage | Output Current | Mounting Option                  |
|----------------|-----------|----------------------|---------------|----------------|----------------------------------|
| TSB002-NMH01S1 | NiMH      | 1.2VDC (1 cell)      | 10-75VDC      | 1A (1.55W)     | <i>Select from options above</i> |
| TSB002-NMH01S2 | NiMH      | 1.2VDC (1 cell)      | 10-75VDC      | 2A (3.1W)      |                                  |
| TSB002-NMH01S3 | NiMH      | 1.2VDC (1 cell)      | 10-75VDC      | 3A (4.65W)     |                                  |
| TSB002-NMH02S1 | NiMH      | 2.4VDC (2 cells)     | 10-75VDC      | 1A (3.1W)      |                                  |
| TSB002-NMH02S2 | NiMH      | 2.4VDC (2 cells)     | 10-75VDC      | 2A (6.2W)      |                                  |
| TSB002-NMH02S3 | NiMH      | 2.4VDC (2 cells)     | 10-75VDC      | 3A (9.3W)      |                                  |
| TSB002-NMH03S1 | NiMH      | 3.6VDC (3 cells)     | 10-75VDC      | 1A (4.65W)     |                                  |
| TSB002-NMH03S2 | NiMH      | 3.6VDC (3 cells)     | 10-75VDC      | 2A (9.3W)      |                                  |
| TSB002-NMH03S3 | NiMH      | 3.6VDC (3 cells)     | 10-75VDC      | 3A (13.95W)    |                                  |
| TSB002-NMH04S1 | NiMH      | 4.8VDC (4 cells)     | 10-75VDC      | 1A (6.2W)      |                                  |
| TSB002-NMH04S2 | NiMH      | 4.8VDC (4 cells)     | 10-75VDC      | 2A (12.4W)     |                                  |
| TSB002-NMH04S3 | NiMH      | 4.8VDC (4 cells)     | 10-75VDC      | 3A (18.6W)     |                                  |
| TSB002-NMH05S1 | NiMH      | 6VDC (5 cells)       | 10-75VDC      | 1A (7.75W)     |                                  |
| TSB002-NMH05S2 | NiMH      | 6VDC (5 cells)       | 10-75VDC      | 2A (15.5W)     |                                  |
| TSB002-NMH05S3 | NiMH      | 6VDC (5 cells)       | 10-75VDC      | 3A (23.25W)    |                                  |
| TSB002-NMH06S1 | NiMH      | 7.2VDC (6 cells)     | 10-75VDC      | 1A (9.3W)      |                                  |
| TSB002-NMH06S2 | NiMH      | 7.2VDC (6 cells)     | 10-75VDC      | 2A (18.6W)     |                                  |
| TSB002-NMH06S3 | NiMH      | 7.2VDC (6 cells)     | 10-75VDC      | 3A (27.9W)     |                                  |
| TSB002-NMH07S1 | NiMH      | 8.4VDC (7 cells)     | 10-75VDC      | 1A (10.85W)    |                                  |
| TSB002-NMH07S2 | NiMH      | 8.4VDC (7 cells)     | 10-75VDC      | 2A (21.7W)     |                                  |
| TSB002-NMH07S3 | NiMH      | 8.4VDC (7 cells)     | 10-75VDC      | 3A (32.55W)    |                                  |
| TSB002-NMH08S1 | NiMH      | 9.6VDC (8 cells)     | 10-75VDC      | 1A (12.4W)     |                                  |
| TSB002-NMH08S2 | NiMH      | 9.6VDC (8 cells)     | 10-75VDC      | 2A (24.8W)     |                                  |
| TSB002-NMH08S3 | NiMH      | 9.6VDC (8 cells)     | 10-75VDC      | 3A (37.2W)     |                                  |
| TSB002-NMH09S1 | NiMH      | 10.8VDC (9 cells)    | 10-75VDC      | 1A (13.95W)    |                                  |
| TSB002-NMH09S2 | NiMH      | 10.8VDC (9 cells)    | 10-75VDC      | 2A (27.9W)     |                                  |
| TSB002-NMH09S3 | NiMH      | 10.8VDC (9 cells)    | 10-75VDC      | 3A (41.85W)    |                                  |

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| Part Number    | Chemistry | Battery Pack Voltage | Input Voltage | Output Current   | Mounting Option                  |
|----------------|-----------|----------------------|---------------|------------------|----------------------------------|
| TSB002-NMH10S1 | NiMH      | 12VDC (10 cells)     | 10-75VDC      | 1A (15.5W)       | <i>Select from options above</i> |
| TSB002-NMH10S2 | NiMH      | 12VDC (10 cells)     | 10-75VDC      | 2A (31W)         |                                  |
| TSB002-NMH10S3 | NiMH      | 12VDC (10 cells)     | 10-75VDC      | 3A (46.5W)       |                                  |
| TSB002-NMH11S1 | NiMH      | 13.2VDC (11 cells)   | 10-75VDC      | 1A (17.05W)      |                                  |
| TSB002-NMH11S2 | NiMH      | 13.2VDC (11 cells)   | 10-75VDC      | 2A (34.1W)       |                                  |
| TSB002-NMH11S3 | NiMH      | 13.2VDC (11 cells)   | 10-75VDC      | 2.93A (50W max.) |                                  |
| TSB002-NMH12S1 | NiMH      | 14.4VDC (12 cells)   | 10-75VDC      | 1A (18.6W)       |                                  |
| TSB002-NMH12S2 | NiMH      | 14.4VDC (12 cells)   | 10-75VDC      | 2A (37.2W)       |                                  |
| TSB002-NMH12S3 | NiMH      | 14.4VDC (12 cells)   | 10-75VDC      | 2.69A (50W max.) |                                  |
| TSB002-NMH13S1 | NiMH      | 15.6VDC (13 cells)   | 10-75VDC      | 1A (20.15W)      |                                  |
| TSB002-NMH13S2 | NiMH      | 15.6VDC (13 cells)   | 10-75VDC      | 2A (40.3W)       |                                  |
| TSB002-NMH13S3 | NiMH      | 15.6VDC (13 cells)   | 10-75VDC      | 2.48A (50W max.) |                                  |
| TSB002-NMH14S1 | NiMH      | 16.8VDC (14 cells)   | 10-75VDC      | 1A (21.7W)       |                                  |
| TSB002-NMH14S2 | NiMH      | 16.8VDC (14 cells)   | 10-75VDC      | 2A (43.4W)       |                                  |
| TSB002-NMH14S3 | NiMH      | 16.8VDC (14 cells)   | 10-75VDC      | 2.3A (50W max.)  |                                  |
| TSB002-NMH15S1 | NiMH      | 18VDC (15 cells)     | 10-75VDC      | 1A (23.25W)      |                                  |
| TSB002-NMH15S2 | NiMH      | 18VDC (15 cells)     | 10-75VDC      | 2A (46.5W)       |                                  |
| TSB002-NMH15S3 | NiMH      | 18VDC (15 cells)     | 10-75VDC      | 2.15A (50W max.) |                                  |
| TSB002-NMH16S1 | NiMH      | 19.2VDC (16 cells)   | 10-75VDC      | 1A (24.8W)       |                                  |
| TSB002-NMH16S2 | NiMH      | 19.2VDC (16 cells)   | 10-75VDC      | 2A (49.6W)       |                                  |
| TSB002-NMH16S3 | NiMH      | 19.2VDC (16 cells)   | 10-75VDC      | 2.02A (50W max.) |                                  |
| TSB002-NMH17S1 | NiMH      | 20.4VDC (17 cells)   | 10-75VDC      | 1A (26.35W)      |                                  |
| TSB002-NMH17S2 | NiMH      | 20.4VDC (17 cells)   | 10-75VDC      | 1.9A (50W max.)  |                                  |
| TSB002-NMH18S1 | NiMH      | 21.6VDC (18 cells)   | 10-75VDC      | 1A (27.9W)       |                                  |
| TSB002-NMH18S2 | NiMH      | 21.6VDC (18 cells)   | 10-75VDC      | 1.79A (50W max.) |                                  |
| TSB002-NMH19S1 | NiMH      | 22.8VDC (19 cells)   | 10-75VDC      | 1A (29.45W)      |                                  |
| TSB002-NMH19S2 | NiMH      | 22.8VDC (19 cells)   | 10-75VDC      | 1.7A (50W max.)  |                                  |
| TSB002-NMH20S1 | NiMH      | 24VDC (20 cells)     | 10-75VDC      | 1A (31W)         |                                  |
| TSB002-NMH20S2 | NiMH      | 24VDC (20 cells)     | 10-75VDC      | 1.61A (50W max.) |                                  |
| TSB002-NMH21S1 | NiMH      | 25.2VDC (21 cells)   | 10-75VDC      | 1A (32.55W)      |                                  |
| TSB002-NMH21S2 | NiMH      | 25.2VDC (21 cells)   | 10-75VDC      | 1.54A (50W max.) |                                  |
| TSB002-NMH22S1 | NiMH      | 26.4VDC (22 cells)   | 10-75VDC      | 1A (34.1W)       |                                  |
| TSB002-NMH22S2 | NiMH      | 26.4VDC (22 cells)   | 10-75VDC      | 1.47A (50W max.) |                                  |
| TSB002-NMH23S1 | NiMH      | 27.6VDC (23 cells)   | 10-75VDC      | 1A (35.65W)      |                                  |
| TSB002-NMH23S2 | NiMH      | 27.6VDC (23 cells)   | 10-75VDC      | 1.4A (50W max.)  |                                  |
| TSB002-NMH24S1 | NiMH      | 28.8VDC (24 cells)   | 10-75VDC      | 1A (37.2W)       |                                  |
| TSB002-NMH24S2 | NiMH      | 28.8VDC (24 cells)   | 10-75VDC      | 1.34A (50W max.) |                                  |
| TSB002-NMH25S1 | NiMH      | 30VDC (25 cells)     | 10-75VDC      | 1A (38.75W)      |                                  |
| TSB002-NMH25S2 | NiMH      | 30VDC (25 cells)     | 10-75VDC      | 1.29A (50W max.) |                                  |
| TSB002-NMH26S1 | NiMH      | 31.2VDC (26 cells)   | 10-75VDC      | 1A (40.3W)       |                                  |
| TSB002-NMH26S2 | NiMH      | 31.2VDC (26 cells)   | 10-75VDC      | 1.24A (50W max.) |                                  |
| TSB002-NMH27S1 | NiMH      | 32.4VDC (27 cells)   | 10-75VDC      | 1A (41.85W)      |                                  |
| TSB002-NMH27S2 | NiMH      | 32.4VDC (27 cells)   | 10-75VDC      | 1.19A (50W max.) |                                  |
| TSB002-NMH28S1 | NiMH      | 33.6VDC (28 cells)   | 10-75VDC      | 1A (43.4W)       |                                  |

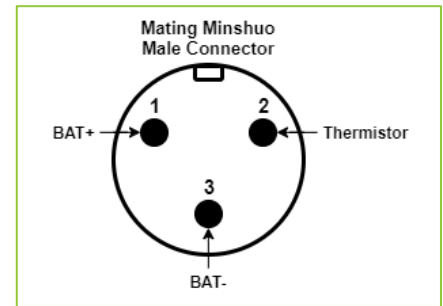
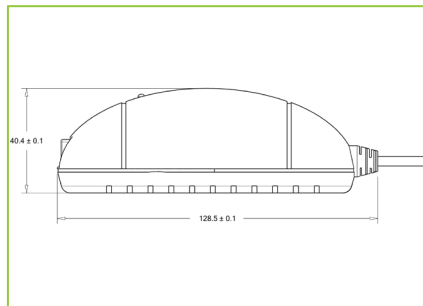
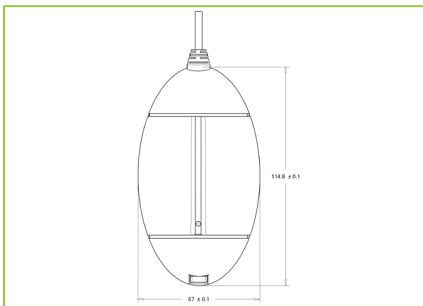
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| Part Number    | Chemistry | Battery Pack Voltage | Input Voltage | Output Current   | Mounting Option           |
|----------------|-----------|----------------------|---------------|------------------|---------------------------|
| TSB002-NMH28S2 | NiMH      | 33.6VDC (28 cells)   | 10-75VDC      | 1.15A (50W max.) | Select from options above |
| TSB002-NMH29S1 | NiMH      | 34.8VDC (29 cells)   | 10-75VDC      | 1A (44.95W)      |                           |
| TSB002-NMH29S2 | NiMH      | 34.8VDC (29 cells)   | 10-75VDC      | 1.11A (50W max.) |                           |
| TSB002-NMH30S1 | NiMH      | 36VDC (30 cells)     | 10-75VDC      | 1A (46.5W)       |                           |
| TSB002-NMH30S2 | NiMH      | 36VDC (30 cells)     | 10-75VDC      | 1.08A (50W max.) |                           |

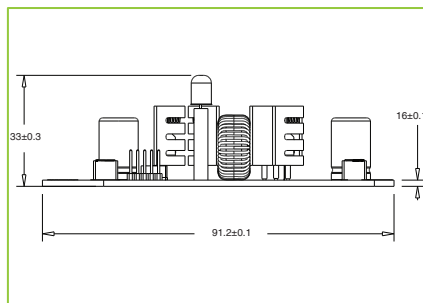
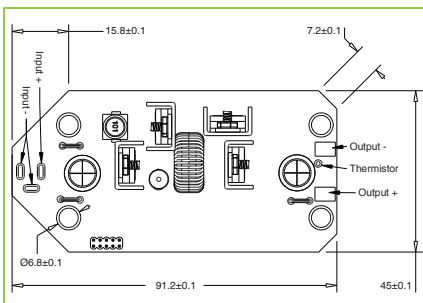
**\*\*\*IMPORTANT:** The Part Number must have the mounting option code (-P, or -E) your project requires.

## TECHNICAL DIAGRAMS (2D)

### ENCLOSURE



### PCB



All dimensions in millimeters (mm).

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