

## Fast Charge Development System

### Control of LM317 Linear Regulator

### Features

- bq2002/T fast-charge control evaluation and development
- Charge current sourced from an on-board linear regulator (up to 1.5A)
- Fast charge of 4, 5, 6, 8, and 10 NiCd or NiMH cells (contact Benchmark for other cell counts)
- Fast-charge termination by negative delta voltage ( $-\Delta V$ ) or peak voltage detect (bq2002) or  $\Delta T/\Delta t$  (bq2002T)
- Maximum temperature and maximum time safety terminations
- $-\Delta V$ /peak voltage detect, hold-off, top-off, maximum time, and number of cells are jumper-configurable
- Inhibit fast charge by a logic-level input



### General Description

The DV2002L2/TL2 Development System provides a development environment for the bq2002 and bq2002T Fast-Charge ICs. The DV2002L2/TL2 incorporates a bq2002/T and a linear regulator to provide fast charge control for 4 to 10 NiCd or NiMH cells.

The fast charge is terminated by any of the following:  $\Delta T/\Delta t$ , maximum temperature, maximum time, or an inhibit command for the bq2002T; or  $-\Delta V$ /peak voltage, maximum temperature, maximum time, and inhibit command for the bq2002. Jumper settings select the top-off and maximum time limits.

The user provides a power supply and batteries. The user configures the DV2002L2/TL2 for the number of cells and maximum charge time (with or without top-off).

Please review the bq2002T or bq2002 data sheet before using the DV2002L2/TL2 board.

### Connection Descriptions

JP4		
	THERM	Thermistor connection
	BAT-	Battery ground
	BAT+	Positive battery terminal
	GND	Ground from charger supply
	DC	DC input from charger supply
JP3	NOC	Select number of cells
JP2	INH	Inhibit input
JP1	TM	Timer, etc. Setting

# DV2002L2/TL2

## Fixed Configuration

The DV2002L2/TL2 board has the following fixed characteristics:

$V_{CC}$  (4.75–5.25V) is regulated on-board from the supply at connector JP4 (DC:GND).

$\overline{LED}$  indicates charge status.

Charge initiates on the later application of the battery or DC, which provides  $V_{CC}$  to the bq2002/T.

**Table 1. Lookup Table for R7 Selection**

Input Voltage	Current	Resistance	Wattage
to 25V	1A	1.25Ω	2W
	1.5A	0.83Ω	2W

As shipped from Benchmarq, the DV2002L2/TL2 linear regulator is configured to a charging current of 1.25A. This current level is controlled by the value of sense resistor  $R_7$  by the relationship:

$$I_{CHG} = \frac{1.25V}{R_7}$$

The value of  $R_7$  at shipment is 1Ω. This resistor can be changed depending on the application.

The suggested maximum  $I_{CHG}$  for the DV2002L2/TL2 board is 1.5A. ***U2 must be mounted to an appropriate heat sink.***

The maximum cell voltage (MCV) is scaled to 2V/cell.

With the provided NTC thermistor connected between THERM and BAT–, TCO = 50°C.

The thermistor is identified by the serial number suffix as follows:

Identifier	Thermistor
K1	Keystone RL0703-5744-103-S1
(blank)	Philips 2322-640-63103
F1	Fenwal Type 16, 197-103LA6-A01
O1	Ozhumi 150-108-00(4)
S1	Semetic 103AT-2

Rev. C Board

## Jumper-Selectable Configuration

The DV2002L2/TL2 must be configured as described below.

**INH (JP2):** Enables/disables charge inhibit (see bq2002/T data sheet).

Jumper Setting	Pin State
[ 1 2 ] 3	Disabled (high)
1 [ 2 3 ]	Enabled (low)

**TM (JP1):** Selects fast charge safety time/top-off (see bq2002/T data sheet).

Jumper Setting	Pin State
[ 1 2 ] 3	High
1 [ 2 3 ]	Low
1 2 3	Float

**Number of Cells (JP3):** A resistor-divider network is provided to select 4 to 10 cells (the resulting resistor value equals  $N - 1$  cells). RB1 is a 100KΩ resistor, and RB2 (RB20–RB25) is jumper-selected.

Closed Jumper	Number of Cells
R13	10
R12	8
R11	6
R10	5
R9	4

**Temperature Disable:** Connecting a 10KΩ resistor between THERM and BAT– disables temperature control.

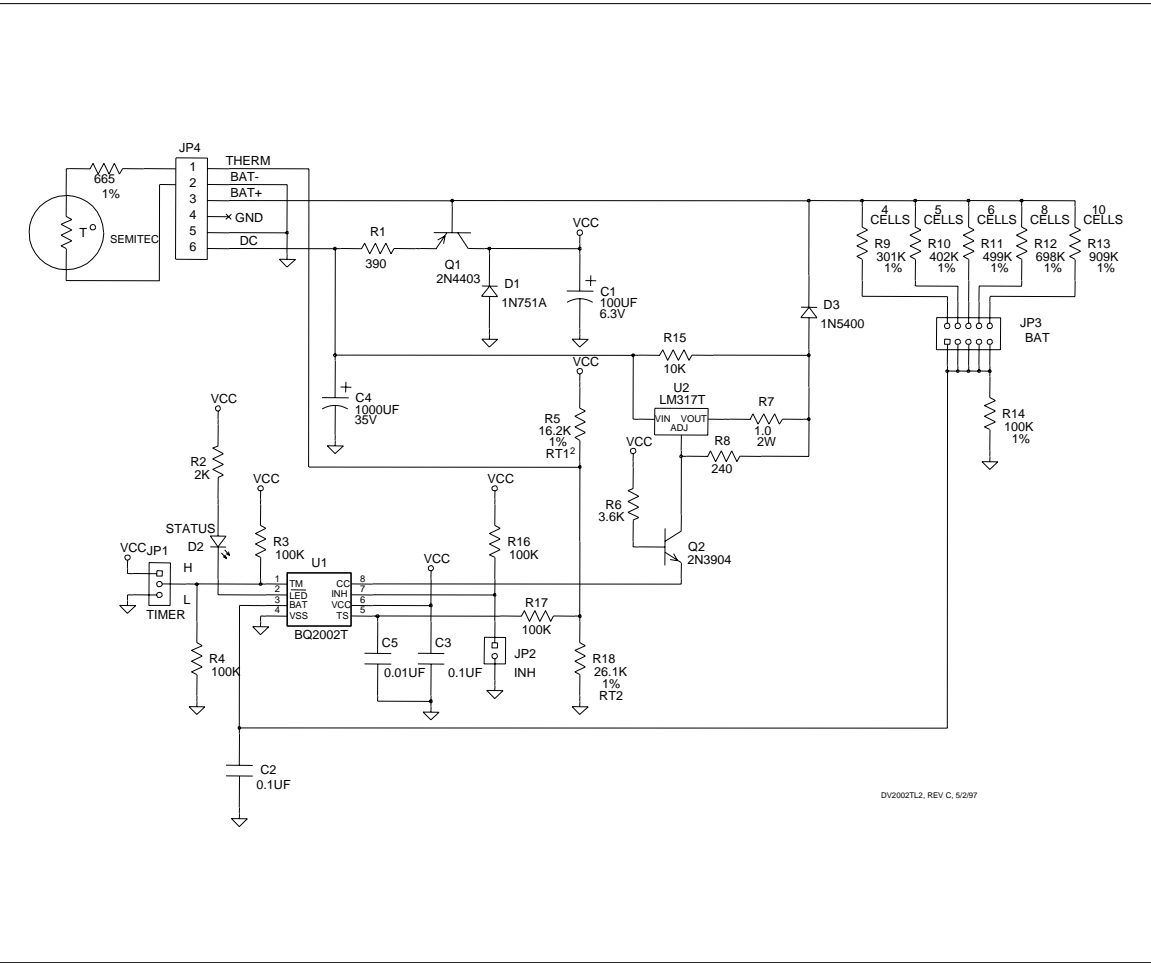
## Setup Procedure

1. Configure TM, INH, and number-of-cells (NOC) jumpers.
2. Connect the provided thermistor or a 10KΩ resistor between THERM and BAT–.
3. Attach the battery pack to BAT+ and BAT–. For temperature control, the thermistor must contact the cells.
4. Attach DC current source to DC (+) and GND (–) connections in JP4.

Recommended DC Operating Conditions

Symbol	Description	Minimum	Typical	Maximum	Unit
I <sub>DC</sub>	Maximum input current	-	-	1.5	A
V <sub>DC</sub>	Maximum input voltage	4.0 + V <sub>BAT</sub> or 10	-	18 + V <sub>BAT</sub> or 25	V
V <sub>BAT</sub>	BAT input voltage	-	-	24	V
V <sub>TH</sub>	THERM input voltage	0.5	-	5	V

DV2002L2/TL2 Board Schematic



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