

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-, $TCO = 50^\circ C$.

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.

DV2002L2/TL2

Symbol	Description	Minimum	Typical	Maximum	Unit
I_{DC}	Maximum input current	-	-	1.5	A
V_{DC}	Maximum input voltage	$4.0 + V_{BAT}$ or 10	-	$18 + V_{BAT}$ or 25	V
V_{BAT}	BAT input voltage	-	-	24	V
V_{TH}	THERM input voltage	0.5	-	5	V

DV2002L2/TL2 Board Schematic

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