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Specifications Li-Ion universal charger module LCM413

The LCM413 is a universal and compact Li-Ion charger module with a sophisticated charging algorithm for Li-Ion battery packs of 1 – 4 cells in series and a charging current of up to 2A with a DC input voltage.

Please refer to the typical charge sequence diagram in the appendix.

This module can easily be integrated into an existing battery pack or into the target device where the battery pack is used.

An optional NTC can sense the battery pack temperature and interrupt fast charging if the temperature is outside the allowed temperature window. 4 LED (mount on module or connected externally) can be optionally installed and indicate the charging status (Fast charge, Full, Fault, No Battery/Charging stopped).

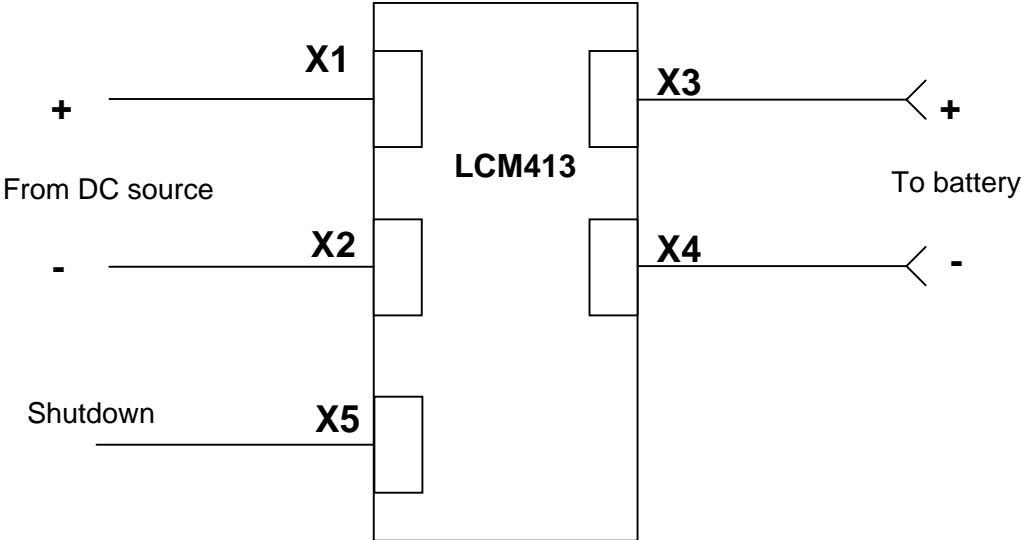
Additional features are built-in safety timer to terminate automatically fast charging once the adjustable time limit has been reached as well as a timer for precharging deep discharged cells at 1/20 of the fast charge current.

The module provides also a shutdown input, which is low active to stop charging by an external signal (open collector/drain/switch input, pull to Ground to stop charging, do not apply any voltage).

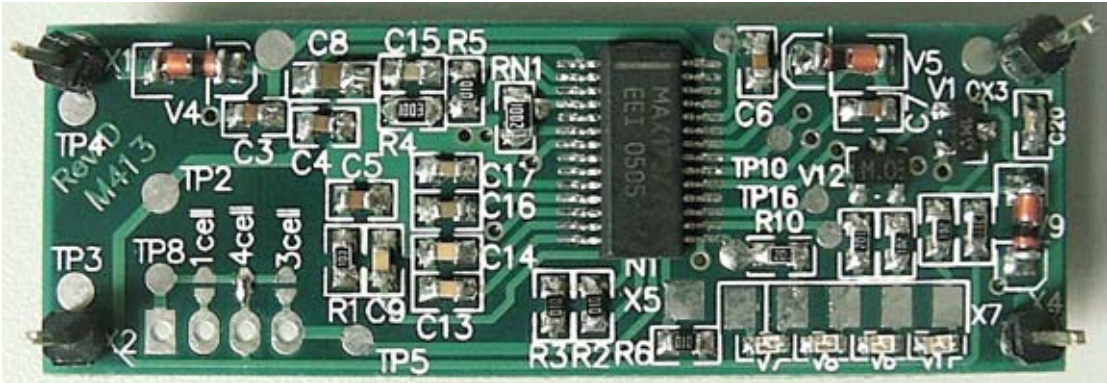
Main specifications:

- DC input voltage range 6...20V (absolute max. under any given condition including spikes 23V)
- Minimum DC input voltage charging voltage + 1V
- Adjustable cell voltage 4.0...4.4V, tolerance $\leq 1\%$, default 4.2V
- Fast charging current range 0...2A (for higher values refer to LCM415)
- Fast charge timer 90min standard (range 20...500 min)
- Overvoltage threshold 4.55...4.8V
- Recharge voltage threshold about 95% of charging voltage
- Precharge timer 7min standard (range 2...40min)
- Precharge current 1/20 * fast charge current
- Deep discharge voltage threshold 2.5 \pm 0.1V
- NTC HOT threshold about 3.9kOhm
- NTC COLD threshold about 28.7kOhm
- Standard LED colours
 - FAULT red
 - FAST charge yellow
 - FULL green
 - CHARGE END, no battery amber
- Efficiency (3 cell, 20VDC in, 1A) about 95% with synchronous rectifier
- Max. dimension 50.5mm x 17.5mm x 9mm (LxWxH) (lower profile versions for lower currents possible, please contact us)

Application diagram:



Module Pictures:



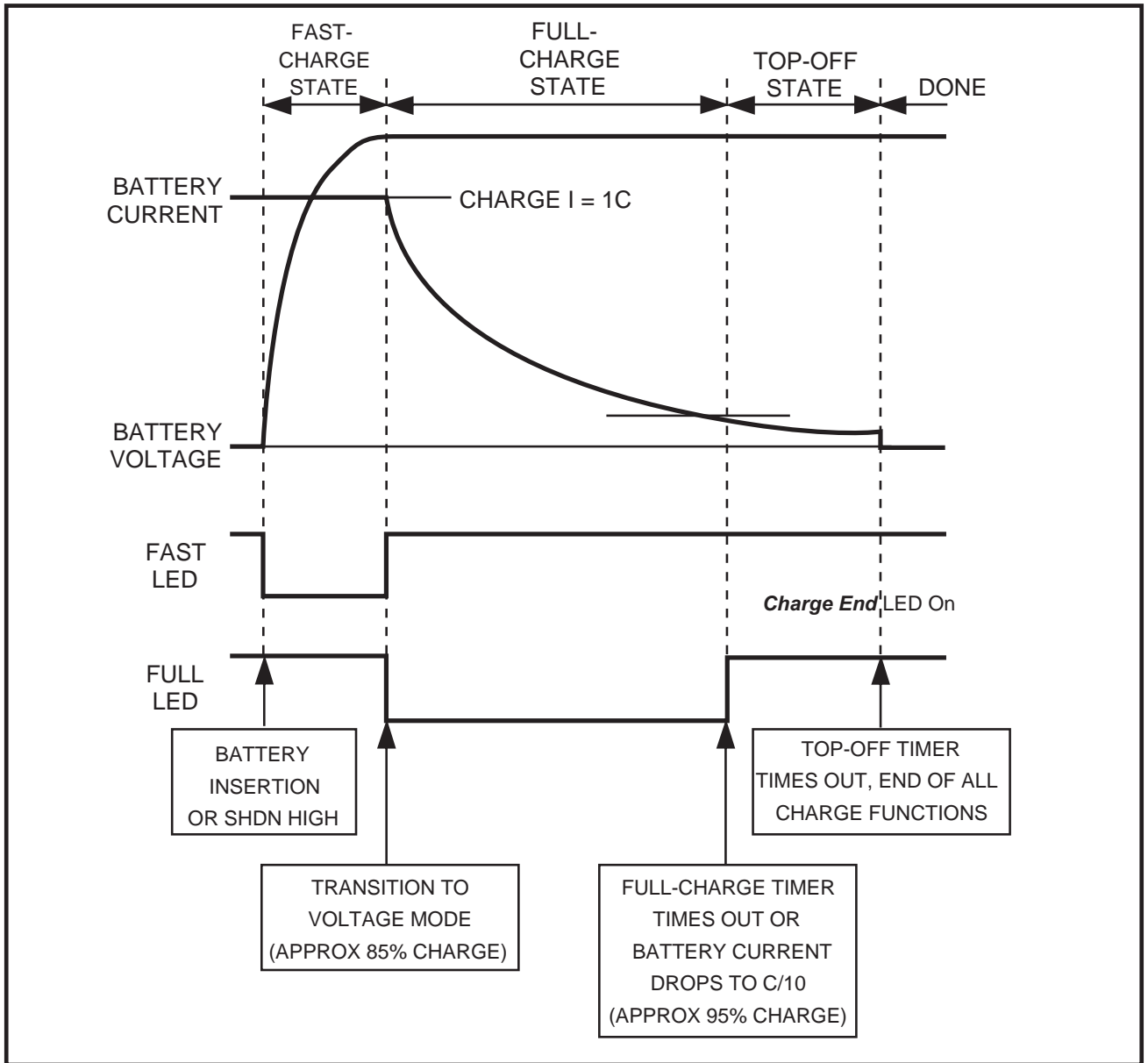


Figure 1. Charge State and Indicator Output Timing for a Typical Charging Sequence

Customer modifiable settings:

1.) Number of cells

# of cells	Position jumper X6
1	Close "1 cell"
2	Open
3	Close "3 cell"
4	Close "4 cell"

Never close two of the jumpers at the same time! A slide switch or similar can be connected to X6 to select the cell number in case it is intended to be used in an universal charger.

2.) Charging current

The charging current can be adjusted by changing the current sense resistor Rs1.

The formulae to calculate the necessary charging resistor is as follows:

$$Rs1 = 100mV/I_{charge}$$

3.) Charging Voltage/Timer/Charging current

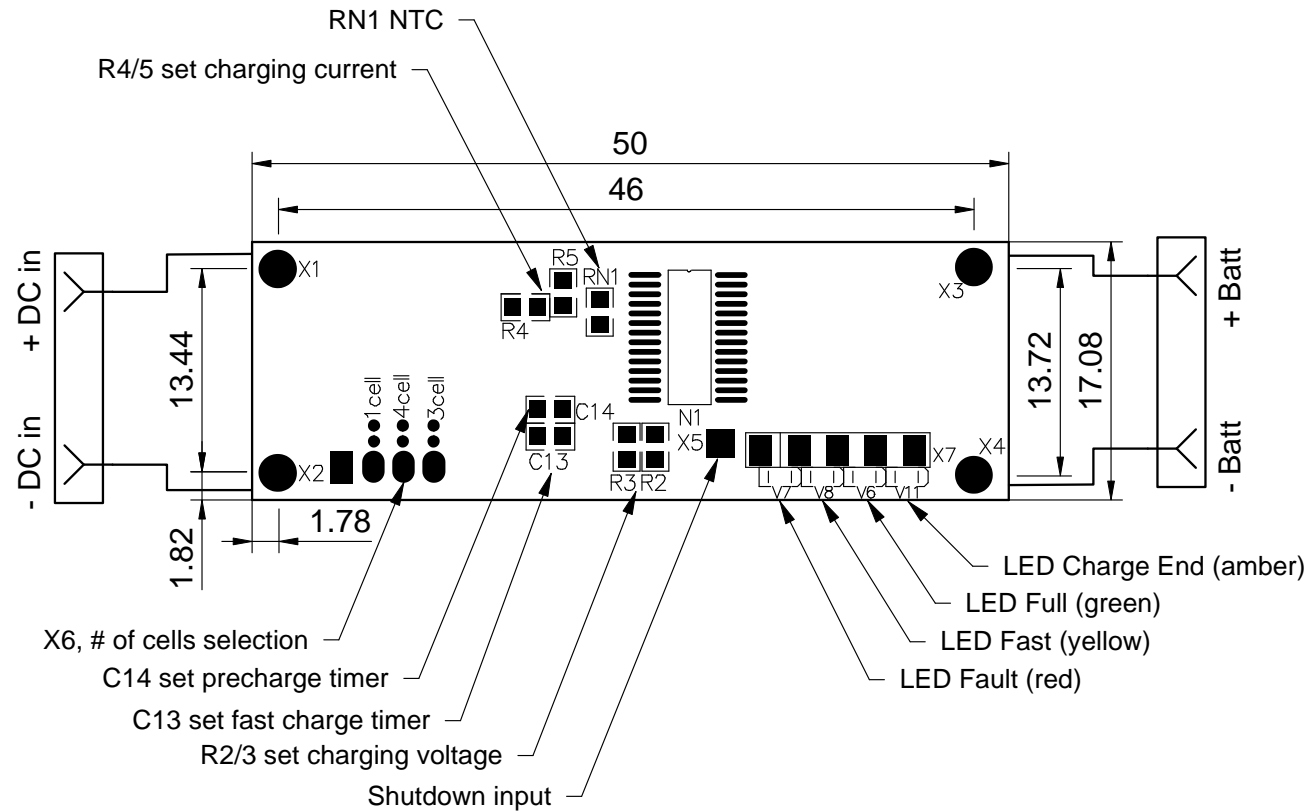
These parameters should be set during production, but can be set by changing the components according to the following table.

Parameter	Components
Charging voltage	R2/3
Charging current	R4/5
Fast Charge timer	C14
Precondition timer	C13

Please contact callisto electronics Ltd. for details.

Questionnaire LCM413 custom design

Parameter	Unit	Value
Number of cell		
Charging voltage	V	
Charging current	A	
Pack capacity	Ah	
DC input voltage	V	
LEDs necessary?	Yes/No	
Temperature supervision	Yes/No	
NTC specifications (length/size, etc.)		



				unspecified tolerances according ISO 2768m	all dimensions in mm		
					scale 2:1	<i>callisto electronics Ltd.</i>	
rev.	comment	date	sign.	date	sign.	drawing name LCM413/5 connection diagram and mechanical outline	
B	added pin positions	15.12.07	LS	drawn 08.11.2005	LS		
				check.			
				appr.			
				material	various	drawing number	MOD.LCM413.1
						page	1
						of	1
						replaced by	replacement date