

Dual-Level Float-Cum-Boost Charger with Pre-Charge for 12V, 3 to 6Ah Sealed Lead Acid (SLA) Batteries

This SLA Battery charger project is the right choice if you want to obtain maximum battery service life and capacity, along with acceptable recharge time and economy, constant current, constant voltage, and even charge a deeply discharged battery. The project contains all the necessary circuitry to optimally control the charging of valve-regulated lead-acid batteries. The circuit controls the charging current as well as the charging voltage to safely and efficiently charge the battery, maximizing battery capacity and life. The circuit is configured as a simple dual-voltage float-cum-boost charge controller. It is configured for charging 3 to 6Ah, 12V SLA batteries with dual-level float-cum-boost charger with pre-charge function and provides 500mA current output. The circuit also helps to charge deeply discharged batteries with pre-charge function. In this function Pin 12 (CE) detects the battery voltage, if the voltage at pin12 (CE) is bellow V-ref (2.3V), enable comparator permits a pre-charge current IPRE to flow from the PRE-CHG pin through Resistor R7 into the battery. Once the battery voltage rises above a safe threshold, the comparator disables the pre-charge function and IC performs the dual-level charging operations. Connector CN1 provided for supply input, CN2 battery, D3, D2 operation indictor, Jumper J1 connected to GND. Transistor Q1 requires an appropriate heatsink.

Note: The project is configured to charge 12V, 3- 6Ah batteries, but the circuit can charge higher (Ah) current and voltage batteries with few changes, carefully refer to the datasheet of the IC for various options and configurations.

The project is built using BQ24450 IC from Texas instruments, which has built-in precision voltage reference that is especially temperature-compensated to track the characteristics of lead-acid cells, and maintains optimum charging voltage over an extended temperature range without using any external components. The ICs low current consumption allows for accurate temperature monitoring by minimizing self-heating effects. The project is configured to charge a 3-5Ah battery with dual-level float-cum-boost charge with pre-charge, but IC can support a wide range of battery capacities and charging currents, limited only by the selection of the external pass transistor. The versatile driver for the external pass transistor supports both NPN and PNP types and provides at least 25mA of base drive. In addition to the voltage- and current-regulating amplifiers, the IC features comparators that monitor the charging voltage and current. These comparators feed into an internal state machine that sequences the charge cycle. Some of these comparator outputs are made available as status signals at external pins of the IC. These status and control pins can be connected to a processor, or they can be connected up in flexible ways for standalone applications.

Charging LED1, LED2

STAT1 ON (LED D3-ON), STAT 2 OFF (LED D2- OFF) >> **Bulk Charge Condition** STAT1 ON (LED D3-ON), STAT 2 ON (LED D2-ON) >> **Boost Mode Condition** STAT1 OFF (LED D3-OFF), STAT 2 OFF (LED D2-OFF) >> **Float Mode Condition**

Features

- Operating Power Supply 16V to 18V DC, 1Amp
- Load Battery 12V DC 3Ah to 6Ah
- Maximum Current Output 500mA
- Float Voltage 13.8V, Boost Voltage 14.7V
- Pre-Charge Current 10Ma
- PCB Dimensions 63.98 x 39.85 mm















ВОМ						
<i>NO</i> .	QNTY.	REF.	DESC	MANUFACTURER	SUPPLIER	SUPPLIER PART NO
1	2	CN1,CN2	2 PIN SCREW TERMINALS 5.08MM PITCH	POENIX	DIGIKEY	277-1247-ND
2	1	C1	1uF/25V SMD SIZE 1206 OR 10uF/50V ELECTROLYTIC	MURATA/YAGEO	DIGIKEY	
3	1	C2	0.1uF/50V SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
4	4	R2,C3,R5,R14	DNP		DIGIKEY	OMIT
5	1	D1	MBRS360	ON SEMI	DIGIKEY	MBRS360T3GOSCT-ND
6	2	D2,D3	LED SMD SIZE 0805	OSRAM	DIGIKEY	475-1415-1-ND
7	1	J1	JUMPER/SHUNT	SULINS	DIGIKEY	S9001-ND
8	1	Q1	TIP32G TO220	ON SEMI	DIGIKEY	TIP32GOS-ND
9	3	Q2,Q3,Q5	BC847 SMD SOT23-3	NEXPERIA	DIGIKEY	1727-2924-1-ND
10	1	Q4	FDN327N SOT23-3	ON SEMI	ELEMENT14	1471048
11	1	R1	0.5E /2W SMD 2512	STAKEPOLE	DIGIKEY	CSRN2512FKR500CT-ND
12	1	R3	DNP			OMIT
13	1	R4	215K 1% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
14	6	R6,R9,R12,R19,R20,R23	OE SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
15	1	R7	187E 1% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
16	2	R8,R17	330K 1% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
17	1	R10	715E 1% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
18	1	R11	16.9K 1% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
19	1	R13	590K 1% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
20	1	R15	46.4K 1% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
21	2	R16,R21	270K 1% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
22	2	R18,R22	1.5K 5% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
23	1	U1	BQ24450DWTR	TI	DIGIKEY	296-24367-1-ND











