



EV2659-Q-02A

36V Switching Charger

For Battery Pack with 3-Cell to 6-Cell In Series

DESCRIPTION

The EV2659-Q-02A is an evaluation board for the MP2659, a highly integrated switching charger designed for portable devices with 3-cell to 6-cell series Li-ion or Li-polymer battery pack. It is able to achieve up to 3A charge current and support variety of battery chemistry types with different battery full voltage.

The MP2659 can operate under maximum 36V DC input voltage and hold-off up to 40V. When input power supply is present, the MP2659 charges the battery with three phases: pre-charge, constant-current charge and constant-voltage charge.

To guarantee safe operation, the MP2659 has robust protection function including: battery short circuit protection, battery over-voltage protection, battery temperature sensing and protection, thermal shutdown, and charging safety timer.

ELECTRICAL SPECIFICATION

Parameter	Symbol	Value	Units
Input Voltage	V _{IN}	15-36	V
Battery Charge Voltage Regulation	V _{BATT_REG}	3.6 - 4.35 Selectable	V
Fast Charge Current	I _{CC}	Up to 3	A

FEATURES

- Up to 36V Operation Input Voltage
- 40V max sustainable voltage when not switching
- Up to 3A Charge Current
- 3 to 6 Cell Series with 3.6V/4.2V/4.35V/4.15V Charge Regulation Voltage of Each Cell
- Support LiFePO4 Battery
- 0.5% Battery Regulation Voltage Accuracy
- Input Current Limit Regulation
- Minimum Input Voltage Regulation
- Charge Operation Indicator
- Dead Battery Pack Recovery
- Battery Over-voltage Protection
- Safety Timer
- Battery NTC thermal monitor

APPLICATIONS

- Industrial Medical Equipment
- Power Tools
- Robot and Portable Vacuum Cleaners
- Wireless Speakers

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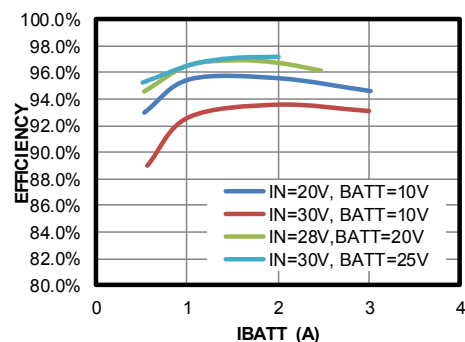
EV2659-Q-02A EVALUATION BOARD



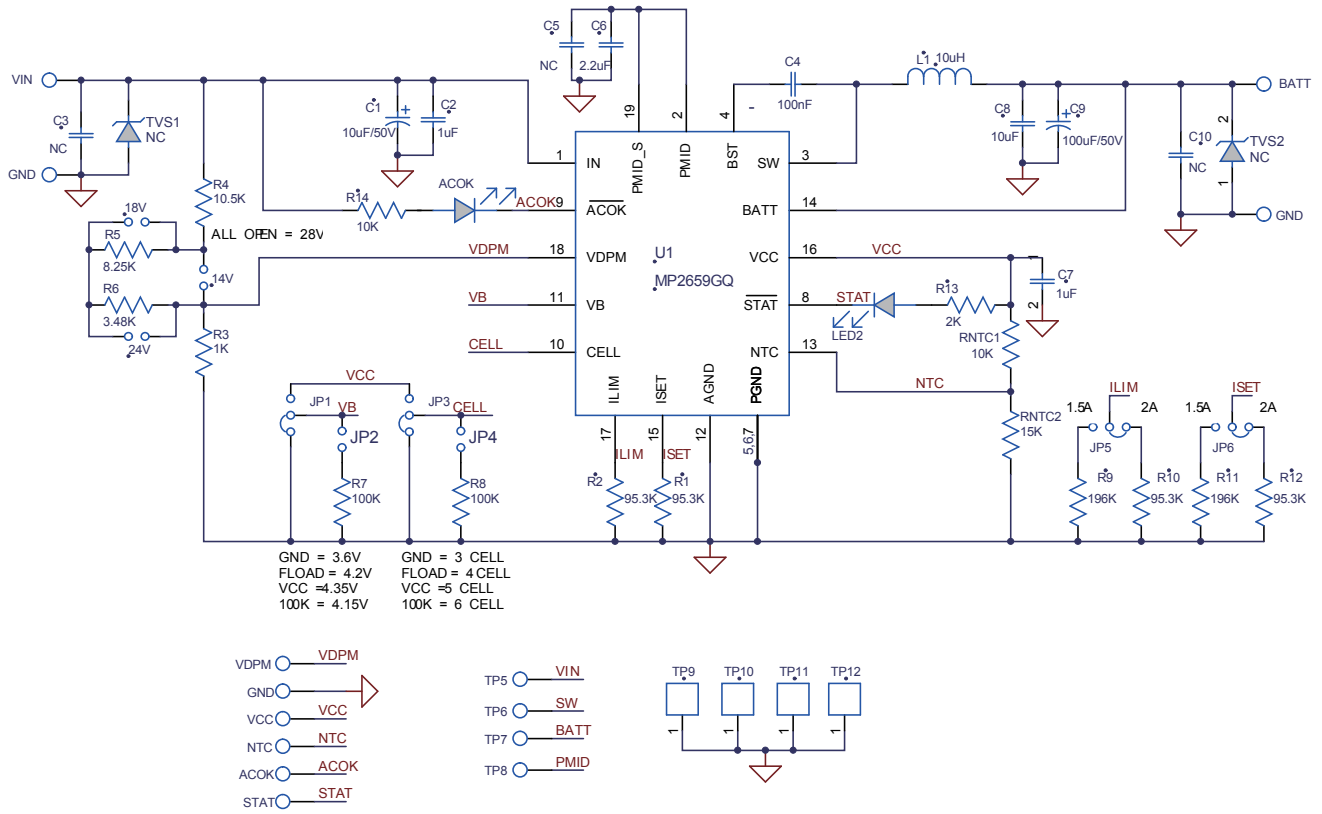
(L × W × H) 6.1cm x 5.1cm x 1.3cm

Board Number	MPS IC Number
EV2659-Q-02A	MP2659GQ-0000

Efficiency vs. Charge Current



EVALUATION BOARD SCHEMATIC



EV2659-Q-02A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
	C1	10 μ F	Electrolytic,Capacitor; 50V;	DIP	Jianghai	CD287-50V10
1	C2	1 μ F	Ceramic Capacitor; 50V;X7R 1206;	1206	muRata	GRM31MR71H105KA88L
1	C4	100nF	Ceramic Capacitor; 50V;X7R;0603;	0603	muRata	GRM188R71H104KA93D
1	C6	2.2 μ F	Ceramic Capacitor; 50V;X7R;1206;	1206	muRata	GRM31CR71H225KA88L
1	C7	1 μ F	Ceramic Capacitor; 25V;X7R;0805;	0805	muRata	GRM188R71E105KA12D
1	C8	10 μ F	Ceramic Capacitor;50V;X5R	1206	muRata	GRM31CR61H106KA12L
1	C9	100 μ F	Electrolytic Capacitor; 50V;100uF	DIP	Rubycon	50YXF100MEFC
4	JP1, JP3, JP5, JP6		Connector	DIP		
5	JP2, JP4, JP7, JP8, JP9		Connector	DIP		60900213421
1	L1	10 μ H	Inductor;10 μ H;35m;4A	SMD	Würth	744066100
1	ACOK	Red	LED Red	0805	BRIGHT LED	F3D02R-4A
1	STAT	Green	LED Green	0805	BRIGHT LED	F3D02HG-1A
4	R1, R2, R10, R12	95.3k Ω	Film Resistor;1%;	0603	Yageo	RC0603FR-0795K3L
1	RNTC1	10k Ω	Film Resistor;1%;	0603	Yageo	RC0603FR-0710KL
1	R3	1k Ω	Film Resistor;1%;	0603	Yageo	RC0603FR-071KL
1	R4	10.5k Ω	Film Resistor;1%	0603	Yageo	RC0603FR-0710K5L
1	R5	8.25k Ω	Film Resistor;1%	0603	Yageo	RC0603FR-078K25L
1	R6	3.48k Ω	Film Resistor;1%	0603	Yageo	RC0603FR-073K48L
2	R7, R8	100k Ω	Film Resistor;5%;	0603	Yageo	RC0603JR-07100KL
2	R9, R11	196k Ω	Film Resistor;1%	0603	Yageo	RC0603FR-07196KL
1	R13	2k Ω	Film Resistor;1%;	0603	Yageo	RC0603FR-072KL
1	R14	10k Ω	Film Resistor;5%;	0603	Yageo	RC0603JR-0710K
1	RNTC2	15k Ω	Film Resistor;1%;	0603	Yageo	RC0603FR-0715KL
4	VIN, GND, GND, BATT,		Connector	DIP		
4	TP5, TP6, TP7, TP8		test point	DIP		
4	TP9, TP10, TP11, TP12		ground test point			
6	VDPM, GND, VCC, NTC, ACOK, STAT		Connector			
1	U1	MP2659		QFN-19 (3mmx3mm)	MPS	MP2659GQ-xxxx

PRINTED CIRCUIT BOARD LAYOUT

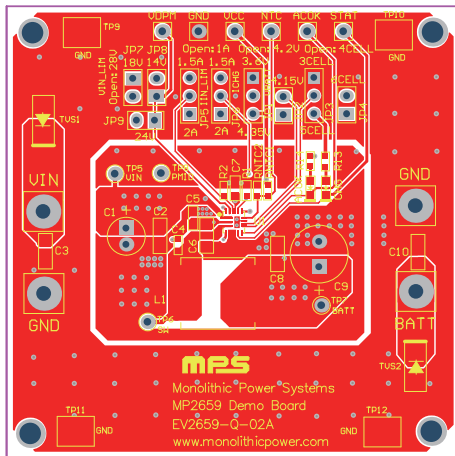


Figure 1: Top Layer

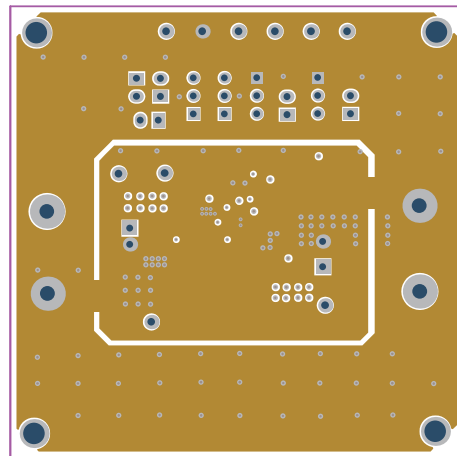


Figure 2: Inner 1 Layer

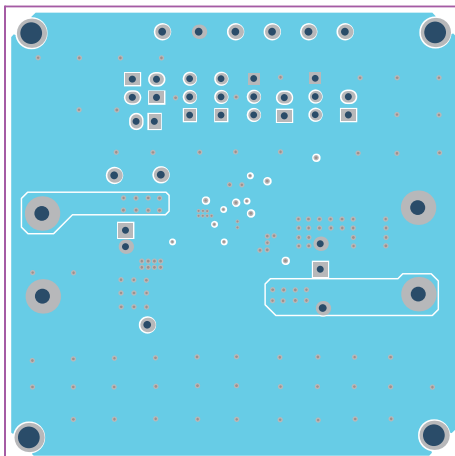


Figure 3: Inner 2 Layer

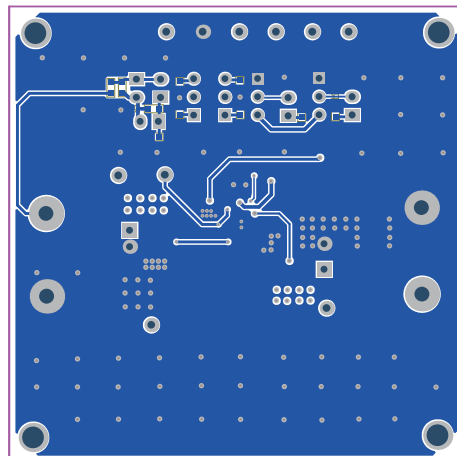


Figure 4: Bottom Layer

CONNECTIONS:

Table 1: Connectors

Connectors	Description
TP1/VIN	Connect to input source positive terminal
TP2/GND	Connect to input source negative terminal
TP3/BATT	Connect to battery pack positive terminal
TP4/GND	Connect to battery pack negative terminal
TP5/VIN	Test point of VIN
TP6/SW	Test point of switching node
TP7/BATT	Test point of BATT
TP8/PMID	Test point of PMID
TP9,TP10,TP11,TP12	Test point of ground
VDPM, VCC, NTC, ACOK, STAT	Test connection for related signals.

Table 2: Jumpers and Shunts

Jumpers	Description	Default	All Open
JP1, JP2	Select battery regulation voltage for each cell	4.35V	4.2V
JP3, JP4	Select battery cell numbers	3 cells	4 cells
JP5	Select input current limit	2A	1A
JP6	Select CC charge current	2A	1A
JP7,JP8,JP9	Select input voltage minimum limit	14V	28V

QUICK START GUIDE

This board is designed for MP2659 which is a highly integrated switching charger for 3-cell to 6-cell Li-Ion/Li-Polymer batteries in series. And layout accommodates most commonly used capacitors.

- 1, Connect the battery pack to BATT and GND connectors, take care of that the battery positive/negative terminal must not be reverse connected.
- 2, If using a battery emulator, preset the battery emulator to proper voltage and turn off the emulator, connect to BATT and GND, then turn on the emulator output.
- 3, Preset an input power source to proper voltage and turn off the power source, connect the power source to VIN and GND, then turn on the power source. The EVB would start charging the battery.
- 4, Please take care of the hot plugging-in of the input source. The parasitic inductance of the cable together with the on-board input capacitor will induce a voltage spike on the VIN pin, it hence may damage the IC. Generally, a voltage source higher than 28V is not allowed for hot plugging-in.
- 5, To modify the charging parameters, the EVB offers multiple options to be configured by the jumpers. The charge current and input current limit can be selected among 1A/1.5A/2A. The cell numbers can be selected among 3s/4s/5s/6s. The battery regulation voltage of each cell can be selected among 3.6V/4.2V/4.35V/4.15V. The input voltage minimum limit can be selected among 14V/18V/24V/28V.
- 6, Please note that MP2659 utilizes Dead Battery Pack Recovery function when battery voltage is lower than 1.5V/cell. In this battery voltage range the charging operation is a 20ms pulse with suspend time of 1.4s.

Notes

For the other detailed description on the operation of this part, please contact local FAE to apply the latest datasheet.

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