

EV2660-C-01A Evaluation Board of 500mA Linear Charger with PPM for SingleCell Li-ion Battery

The Future of Analog IC Technology

DESCRIPTION

The EV2660-C-01A is an evaluation board for the MP2660, a highly-integrated single-cell Li-Ion/Li-Polymer battery charger with system power path management, targeted at space limited portable applications.

Through the I2C connector on EV2660-C-01A, the customer can program the charging parameters, such as: input current limit, input voltage regulation limit, charging current, battery regulation voltage, and battery UVLO.

Parameter	Symbol	Value	Units
Input Voltage	V _{IN}	4.35 - 5.50	V
Battery Voltage	V _{BATT_REG}	3.60 - 4.545 (Default: 4.20)	V
Input Current Limit	I _{IN_LIMIT}	85 - 455 (Default: 455)	mA
V _{IN} Regulation Voltage ⁽¹⁾	$V_{\text{IN}_{\text{REG}}}$	3.88-5.08 (Default: 4.60)	V
Charge Current	I _{CHG}	8 - 535 (Default: 246)	mA
Discharge Current Limit	I _{BATT_MAX}	100 - 1600 (Default: 1000)	mA

ELECTRICAL SPECIFICATION

Note: (1) suggest V_{IN_REG} is 400mV higher than V_{BATT} .

FEATURES

- Fully Autonomous Charging a Single-Cell Li-Ion/Polymer Batteries
- Current Limit for USB Port
- Complete Power Path Management for Simultaneously Powering the System and Charging the Battery
- 0.5% Charging Voltage Accuracy
- 13V Maximum Voltage for the Input Source
- I²C Interface for Setting charging Parameters and Status Reporting
- Robust Charging Protection Including Battery Temperature Monitor and Programmable Timer
- Battery Disconnection Function when battery UVLO or system short circuit

APPLICATIONS

- Wearable devices
- Smart Handheld Devices
- Fitness Accessories
- Smart Watches

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EV2660-C-01A EVALUATION BOARD



(L x W x H) 2.5" x2.5"x 0.063" (6.35cm x 6.35cm x 0.16cm)

Board Number	MPS IC Number
EV2660-C-01A	MP2660GC-xxxx*

*: "xxxx" is the register setting option. The factory default is "0000". This content can be viewed in I²C register map. For customer options, please contact an MPS FAE to obtain an "XXXX" value.



EVALUATION BOARD SCHEMATIC

EV2660-C-01A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacture	Manufacture_PN
1	C1	1µF	Ceramic Capacitor; 25V;X7R;0603;	0603	muRata	GRM188R71E105KA12D
1	C5	2.2µF	Ceramic Capacitor; 25V;X7R;0805;	0805	muRata	GRM21BR71E225KA73L
1	C9	10µF	Capacitor;10V;X7R	0805	TDK	C2012X7R1A106K
1	C4	100nF	Ceramic Capacitor; 100V;X7R;0805	0805	TDK	C2012X7R2A104K
2	C2, C6	NC	Ceramic Capacitor; 25V;X7R;0805;	0805	muRata	GRM21BR71E225KA73L
5	C3, C7, C8, C10, C11	NC	Ceramic Capacitor;25V;X7R;1206	1206	muRata	GRM31CR71E475KA88L
1	P1		Header, 5-Pin, Dual row			
1	R1	100k	Film Resistor;1%;	0603	Yageo	RC0603FR-07100KL
2	RT1, RT2	10k	Film Resistor;1%;	0603	Yageo	RC0603FR-0710KL
1	SW1	Push Switching button	Button;SM 4x10mm; 1.5mm Height			
1	U2		Micro-B USB connector;			
1	U1	IC	WCSP 1.55mm*1.55mm		MPS	MP2660GC-xxxx

PRINTED CIRCUIT BOARD LAYOUT



QUICK START GUIDE

This board is designed for MP2660 which is a highly-integrated single-cell Li-Ion/Li-Polymer battery charger with system power path management function. And layout accommodates most commonly used capacitors. The default function of this board is preset for charger mode and the charge full voltage is preset to 4.200V for 1 cell Li-Ion battery.

Evaluation Platform Preparation:

1) USB-to-I²C Communication Kit



Figure4 USB-to-I²C Communication Kit

2) Software - Double-click on the MP2660_R1.6.EXE file and open the software. The software supports the Windows® XP operating systems.



3) A computer with at least one USB port and a USB cable. The MP2660 evaluation software must be properly installed.

4) Original Test Setup for MP2660 in Figure 5.



Figure5 Test Setup for MP2660

5) Turn on the computer. Launch the MP2660 evaluation software. The main window of the software is shown in Figure 6.

MP2660 Evaluation Kit		
File REG control OTP Help		
LDO FET © ON © OFF © CHG ON	BATT FET C CHG OFF T DSG OFF	I2C Watchdog Timer Watchdog Disable Timer ▼
Charge Operation Control	Constant Current Charge Timer Setting	Watchdog Reset Rate
Input Current Limit (lin_LIM) 455mA	Enable 2X extened safety timer Other Control Thremal Regulation Threshold 120oC	Register monitoring Auto monitor Register Read all Register Register
Charge Current (ICHG) 246mA Battery UVLO Threshold(VUV_BAT) 2.8V	Fault Reporting	Register
Trickle Current (ITC) 20mA	Input Source Power_On Config Charrie Current	7 6 5 4 3 2 1 0 Control (0X00) 0 1 0 1 1 1 1 juration (0X01) 0 0 R R 0 1 0 0 Control (0X02) 0 R R 0 1 1 1 0
Battery Regulation Voltage(Vbatt_REG) 4.200V Trickle Charge Threshold (VBATT_Iow) 3.0V	PRE/8F Charge Voltage Timer	Current (0X03) R I 0 I I 0 Control (0X03) R I 0 0 I R 1 0 Control (0X04) I 0 I 0 0 1 1 Control (0X05) R I 0 0 1 0 1 0
Battery Recharge Threshold(Vrech) VBAT_full-300mV 💌	System Status Reporting Miscellaneous System	Control (0X06) R 0 0 1 1 1 n Status(0X07) 0<
Discharge Current Limit(IDCH) 1000mA		
EN_BF TERM_TMR	Write All	Register Reset
EVPMBUS: Connected. MP2660 Demo board:	Connected. I2C 400kHz	www.monolithicpower.com

Figure6 MP2660evaluation software

Procedure

-1-

Make sure all the connections are normal -- the EVPMBUS connected and EV2660-C-01A connected. It is ready to run the program!

EV2660-C-01A – LINEAR CHARGER WITH POWER PATH MANAGEMENT EVAL BOARD

Charger Function



1. Set Input Voltage Regulation at 4.60 V (the range is 3.88 - 5.08V, which is recommended 400mV higher than the Battery Regulation Voltage)

Input Regulation Voltage (Vin_REG)	4.60V ·	·
	4.60V	
	4.68V	-
	4.76V	
	4.84V	
	4.92V	
	5.00V	
	5.08V 💽	1

Input Current Limit (lin_LIM)	455mA	•
	130mA	~
	175mA	
	220mA	
	265mA	=
	310mA	-
	355mA	
	455mA	~

2. Set Input Current Limit to 455 mA (the range is 85 – 455mA)

The input current limit can be set to be a little bit lower than the max current rating of the input source. When input current hits the limit the charge current will be decreased to keep the input current constant at this limit, in order to power the system firstly.

3. Set Constant Charge Current, ICHG to 246 mA (the range is 8 – 535mA)

Charge Current (ICHG)	246mA	•
	195mA	~
	212mA	
	229mA	
	246mA	
	263mA	
	280mA	≣
	297mA	
	314mA	
	331mA	
	348mA	
	365mA	*

4. Set BATT UVLO threshold to 2.8V (the range is 2.4 – 3.1V)

Battery UVLO Threshold(VUV_BATT)	2.8V	•
	2.7V	^
	2.8V	
	2.9V	
	3.0V	
	3.1V	~

5. Set Trickle Current to 20 mA (the range is 6 – 27mA)

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6. Set Charge Full Voltage to 4.200 V (the range is 3.600 - 4.545V)

Battery Regulation Voltage(Vbatt_REG)	4.200V	•
	4.125V	~
	4.140V	
	4.155V	
	4.170V	
	4.185V	
	4.200V	
	4.215V	
	4.230V	
	4.245V	
	4.260V	
	4.275V	~

7. Set Trickle - Charge to CC Charge Threshold Voltage to 3.0 V (the range is 2.8 - 3.0V)

Trickle Charge Threshold (VBATT_low)	3.0V 💌
	2.8V
	3.0V

8. Set Battery auto recharge Voltage to VBATT_Full - 300mV (the range is 150mV or 300mV)

Battery Recharge Threshold(Vrech)	VBAT_full-300mV	•
	VBAT_full-150mV	
	VBAT_full-300mV	

9. Set battery discharge current limit to 1000mA (the range is 100mA to 1600mA):

Discharge Current Limit(IDCH)	1000mA	•
	800mA	~
	900mA	
	1000mA	
	1100mA	
	1200mA	~

10. Termination Function Select

EN_BF TERM_TMR

	After IBATT hit IBF in CV mode					
IERM_IMR	Operation	Charge Status				
х	Keep CV Charge	Charge				
	Charge Done	Charge Done				
2	Keep CV Charge	Charge Done				

Table 1 Termination Function Selection Table



Others

1. LDO FET Control:



This bit only controls the on/off of the LDO FET.

2. Battery FET Control:



CHG ON and CHG OFF only control the on/off of the Battery FET in charge mode.

DSG OFF selected could turn off the Battery FET at both charge and discharge mode.

DSG OFF unselected could not turn on Battery FET; pull INT to low by push button could turn on Battery FET when it's turned off by DSG OFF.

3. Other Control.

Other Conti	rol ———	
Thremal Regulation Threshold	120oC	•
Enable NTC		

4. Safety Timer Setting



5. I²C Watchdog Timer

I2C Watchdog Timer				
Watchdog Disable Timer 💌				
Watchdog AUTO Reset				
Watchdog	Rate			
Reset	04s 💌			



6. Resistor Auto Monitor

R	egister monitoring
Read all	T Auto monitor Register
Register	Rate

7. Content of the Registers:

Register								
	7	6	5	4	3	2	1	0
Input Source Control (0X00)	0	1	0	0	0	1	1	1
Power_On Configuration (0X01)	0	0	R	R	0	1	0	0
Charge Current Control (0X02)	R	R	R	0	1	1	1	0
PRE/BF Current (0X03)	R	1	0	0	1	R	1	0
Charge Voltage Control (0X04)	1	0	1	0	0	0	1	1
Timer Control (0X05)	R	1	0	0	1	0	1	0
Miscellaneous Control (0X06)	R	0	0	0	1	0	1	1
System Status(0X07)	0	0	0	0	0	0	0	0
Fault (0X08)	0	0	0	0	0	0	0	0

8. Monitor the MP2660 operation status and Fault report





Notes

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

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