#### Dual Input, Power Path, 3A Switching Mode Charger with FG

#### **General Description**

The MAX77818 evaluation system (EV system) consists of a MAX77818 evaluation kit (EV kit) and a companion Maxim MINIQUSB interface board.

The MAX77818 EV kit is an assembled and tested PC board that demonstrates the MAX77818. The IC contains 12V input and 3A output switching mode charger.

The Maxim MINIQUSB interface board allows an IBMcompatible PC to use its USB port to emulate an I<sup>2</sup>C 2-wire interface. Windows XP<sup>®</sup>/Windows<sup>®</sup> 7 software provides a user-friendly interface to exercise the features of the MAX77818. The menu-driven program offers a graphical user interface with control buttons.

#### **Applications**

- Smartphones and Tablets
- Other Handheld Devices

#### **Benefits and Features**

- Demonstrates 12V<sub>CHGIN</sub>, 3A Charge
- Demonstrates MG5 Fuel Gauge Performance
- Demonstrates Dual Input Charge
- Demonstrates OTG Mode
- Evaluates MAX77818 Detail Performances

#### Ordering Information appears at end of data sheet.

Windows and Windows XP are registered trademarks of Microsoft Corp.

#### **Required Equipment**

- IBM PC-compatible computer capable of running Windows XP/Windows 7
- PC with an unused USB port
- Standard mini-USB cable to connect the computer's USB port to the Maxim MINIQUSB interface board
- DC power supply capable of supplying 15.0V/3A

#### **Initial Test Setup**

## Do not turn on the DC power supplies until all connections are made.

- Carefully connect the boards by aligning the 20-pin connector of the MAX77818 EV kit with the 20-pin header of the MINIQUSB interface board. Gently press them together. The two boards should be flush against each other.
- Connect a cable from the computer's USB port to the MINIQUSB interface board. Use the USB cable that MAXIM provides.
- Install the MAXIM MINIQUSB driver when PC prompts USB device detection.
- 4) Connect a single cell Li-Ion battery to the pads labeled BATT+ and BATT-.
- Connect the DC power supply capable of supplying 15V ±0.2V/3A to the pads labeled VBUS and GND on the MAX77818 EV board.
- 6) Turn on the 5V DC power supply.
- 7) Start the MAX77818 program by opening its icon in the Start Menu. The MAX77818.EXE software program can be run from the hard drive using Windows. If desired, use the INSTALL.EXE program to copy the files and create icons for them in the Windows XP/Window 7 Start Menu. An uninstall program is included with the software. Click on the UNINSTALL icon to remove the EV kit software from the hard drive.
- Observe as the program automatically detects the address of the MAX77818 and starts the main program.



## Dual Input, Power Path, 3A Switching Mode Charger with FG

#### **Detailed Description of Software**

The software provides an easy-to-use, point-and-click method to exercise all of the features of the MAX77818.

The voltages of the regulators are easily adjusted as well as toggled on or off. The Audio outputs can be adjusted or shut down. The software can control most of function blocks of the MAX77818.

#### **Main Display**

The charger current, top-off current level, and all other charger related functions can be programmed in **Charger** section list boxes. All FG section parameters can be programmed in separate FG GUI.

#### Simple 2-Wire Interface Commands

There are methods for communicating the MAX77818 through either the main display or the simple 2-wire interface commands available by using the **Advanced Tab and 2-Wire Interface** window. A display pops up to allow 2-wire interface protocols, such as read byte and write byte to be individually executed. When using the 2-wire interface general commands, uncheck **Device-Present Checking** to prevent any errors from occurring. The general command dialog boxes accept numeric data in binary, decimal, or hexadecimal. Hexadecimal numbers should be prefixed by \$ or 0x. Binary numbers must be exactly 8 bits.



Figure 1. MAX77818 EV Kit GUI Screen

### Dual Input, Power Path, 3A Switching Mode Charger with FG

MAX77818 Fuel Gauge Evaluation Kit 0.6.2					
x0     60       x0     50C_REP       99,77.%     4.312 V       Load Custom Model     C:\Users\Jay.kim\D       Register Snapshot     Save Data Log     View	Currer -1 mA -1 mA -1 mA -1 mA -1 mA	AX178238	26.3 °C 23.04 °C 277818(CL23)\1233_NormalCurrent	Time to Full: AtRate Time to Full: AtRate Time to Full: Time to Empty: AtRate Time to Empty: _SmartCharger_1_092613_1x_m3config_Stan	N/A N/A 1.78 h N/A dard.ini
Custom Model Chart Status Configuration	Smart Charg	ing JETT/	A Time To Alerts All Registe	ers I <sup>2</sup> C Log Help	
Addr Cmd Name	Bits	Hex	Meaning	Description	-
6C BA HibCFG		090C			
.EnHib	15	0		Enable Hibernate	
.HibEnterTime	12:14	0	5.63 s		
.HibThreshold	8:11	9			
.HibExitTime	3:4	1			
.HibScalar	0:2	4	2.81 s		
6C 1D CONFIG		0A10			
.FCFE	15	0		FCCHGFAIL interrupt drives INTB pin	
.55	14	0	not sticky	SOC ALRT Sticky	
.Ts	13	0	not sticky	Temperature ALRT Sticky	
.Vs	12	0	not sticky	Voltage ALRT Sticky	
.FGCC	11	1	FG controls charger	Fuel-gauge controlled charging	
. AINSH	10	0	J.I	AIN pin shutdown	
.Ten	9		enabled Enable Temperature Channel		
.Tex	8	0	temperature measured at AIN pin	Temperature External	<b>_</b>
		IC is lo	aded with a custom model		
Reading				Periodical	ly Read Regsters 🔽

Figure 2. MAX77818 EV Kit Fuel Gauge GUI Screen

#### **Detailed Description of Hardware**

#### **Battery Charger Test Setup**

- 1) When using the DC power supply, adjust its voltage and current limit to 5.0V with 3.0A current limited.
- Connect a single cell Li-Ion battery between BATT+ and BATT-.
- Connect the 5.0V/3A current limited DC power supply between VBUS and GND.
- Monitor the DC power supply current meter if the current reading is the same as the fast charge current that is set.

- 5) Open software screen and program the charger settings adequate to your system.
- Use data log equipment to log charge current and VBATT profile while charging a fully discharged single cell Li+ battery.

#### Table 1. Jumper Settings

JUMPER	DEFAULT	FUNCTION	PCB
NO.	POSITION		SILKSCREEN
JU8	Open between JU2: 1-2	VIO from external or VSYS	VIO

## Dual Input, Power Path, 3A Switching Mode Charger with FG

#### **Fuel Gauge Test Setup**

- 1) Close MAX77818 EV kit GUI. Fuel gauge uses a separate GUI.
- 2) Open FG section software screen and see if FG reads proper OCV and SOC while charging.
- 3) Open FG section software screen and see if FG reads proper OCV and SOC while discharging.



Figure 3. Schematic Diagram

## Dual Input, Power Path, 3A Switching Mode Charger with FG

#### MAX77818 EV System Component List

PART	QTY	DESCRIPTION
MAX77818EVKIT	1	MAX77818 evaluation kit
MAXIM MINIQUSB	1	MINIQUSB interface board

## MAX77818 EV Kit Component List

DESIGNATION	QTY	DESCRIPTION	
C1	1	0.1µF, 35V or 50V, 0402 ceramic capacitor Taiyo Yuden GMK105BJ104MV	
C2, C4	2	2.2µF, 16V, 0603, ceramic capacitor Taiyo Yuden EMK107BJ225MA	
C3	1	4.7µF, 10V, 0603, ceramic capacitor Taiyo Yuden LMK107BJ475MA	
C5, C6	2	1µF, 10V, X5R, 0402, ceramic capacitor Taiyo Yuden LMK105BJ105MV	
C8, C12–C14	4	10μF, 10V, X5R, 0603, ceramic capacitor Taiyo Yuden LMK107BBJ106MAL	
C9, C10	2	10μF, 16V, X5R, 0603, ceramic capacitor Taiyo Yuden EMK107BBJ106MAL	
C11, C15	2	0.1µF, 16V or higher, X5R, 0402, ceramic capacitor Taiyo Yuden EMK105BJ104MP	
C16	1	N.C.	
C17	1	10nF, 6.3V or higher, X5R, 0402 Taiyo Yuden TMK105BJ103MP	
L1	1	0.47μH, 2016, TOKO DFE201610P-H-R47M 1μH, 2520, TOKO, DFE252012C 1239AS-H-1R0M	
CON1	1	2x 10 right-angle female receptacle	
VBUS, CHGIN, WCIN, VSYS, BATT, BATTGND, CHGPG, GND	11	MAXIM LOOP	

DESIGNATION	QTY	DESCRIPTION	
BYPS, ENB, VBUS_DET, SYSS, BATTS, SCL, SDA, INOKB, INTB, WCINOKB, SAFEOUT1, SAFEOUT2, TP1, CHGINS, WCINS, CHGPGS, CHGLXS, DETBATB, THM, VIO	20	Test point, small	
R1	1	100kΩ, 1%, resistor, 0402	
R2, R7	2	10kΩ, 1%, resistor, 0402	
R3, R5, R6, R14	4	0Ω, 0402	
R12, R13	2	2.2kΩ, 5%, resistor, 0402	
R15–R17	3	200kΩ, 5%, resistor, 0402	
R9	1	470kΩ, 5%, resistor, 0402	
R10	1	47kΩ, 5%, resistor, 0402	
R4, R11	2	N.C.	
U1	1	MAX77818EWZ+ 72-bump WLP, 0.4mm pitch	
U2	1	MAX14681	
THM	1	10Ω, 1%, NTC, 0402	
JU1	1	Two-pin header	
JU2–JU11 (socket board only)	10	Two-pin header	
J7	1	Micro B receptacle SMD type Panasonic, AXJ53312G	

Note: All resistors are 0402 size.

#### Dual Input, Power Path, 3A Switching Mode Charger with FG

## PCB Layout Guide



Figure 4. PCB Layout



Figure 5. PCB Layout—Top Layer



Figure 6. PCB Layout—Inner Layer 2



Figure 7. PCB Layout—Inner Layer 3



Figure 8. PCB Layout—Bottom Layer



Figure 9. PCB Layout—Assembly Top

# Dual Input, Power Path, 3A Switching Mode Charger with FG

#### **Ordering Information**

PART	MINIQUSB INTERFACE TYPE
MAX77818EVKIT#	Not included
MAX77818EVSYS#	MINIQUSB board

#Denotes RoHS compliant.

**Note:** The MAX77818 EV kit software is provided with the MAX77818 EV kit. However, the MAXIM MINIQUSB board is required to interface the MAX77818 EV kit to the computer when using the software.

#### Dual Input, Power Path, 3A Switching Mode Charger with FG

#### **Revision History**

REVISION	REVISION	DESCRIPTION	PAGES
NUMBER	DATE		CHANGED
0	6/15	Initial release	—

For pricing, delivery, and ordering information, please contact Maxim Direct at 1-888-629-4642, or visit Maxim Integrated's website at www.maximintegrated.com.

Maxim Integrated cannot assume responsibility for use of any circuitry other than circuitry entirely embodied in a Maxim Integrated product. No circuit patent licenses are implied. Maxim Integrated reserves the right to change the circuitry and specifications without notice at any time.



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный) **Факс:** 8 (812) 320-02-42 **Электронная почта:** <u>org@eplast1.ru</u> **Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.