XRP6840 Exarizer

4.3A Supercapacitor Flash LED Driver with I2C

March 2011 Rev. 1.0.0

EVALUATION BOARD MANUAL

GENERAL DESCRIPTION

The XRP6840 is a controlled-current dual-cell supercapacitor charger and high power LED driver. Operating from a standard lithium-ion battery, the XRP6840 provides up to 4.3A of programmable Flash LED current and up to 600mA and 5.6V of programmable supercapacitor charging current and voltage.

The XRP6840EVB2, Exar's XRP6840 Exarizer Evaluation Board, is fitted by default with the XRP6840A supporting three channels.

With 1x, 1.5x and 2x charge pump operating modes, XRP6840EVB can provide a stable drive current for up to 3 1.5A, 4W Luxeon Flash LEDs. The evaluation board is a completely assembled and tested surface mount board which provides easy probe access points to all XRP6840 inputs and outputs for easy connection and measuring.

The XRP6840 is available in a lead-free, "green"/halogen free 20-pin TQFN package.

The Evaluation Board schematic diagram is shown in Figure 1.

FEATURES

- **Programmable 4.3A Flash LED Driver**
  - Torch and Flash Modes
- **Programmable Supercapacitor Charger**
  - 600mA Adjustable Charging Current
  - Programmable Supercapacitor Voltage
  - Active Voltage Balance Control
- **Tri-mode Charge Pump Architecture**
  - 1x, 1.5x, 2x Operation Modes
  - 2.4MHz Switching Frequency
- **I²C Serial Interface**

EVALUATION BOARD SCHEMATIC

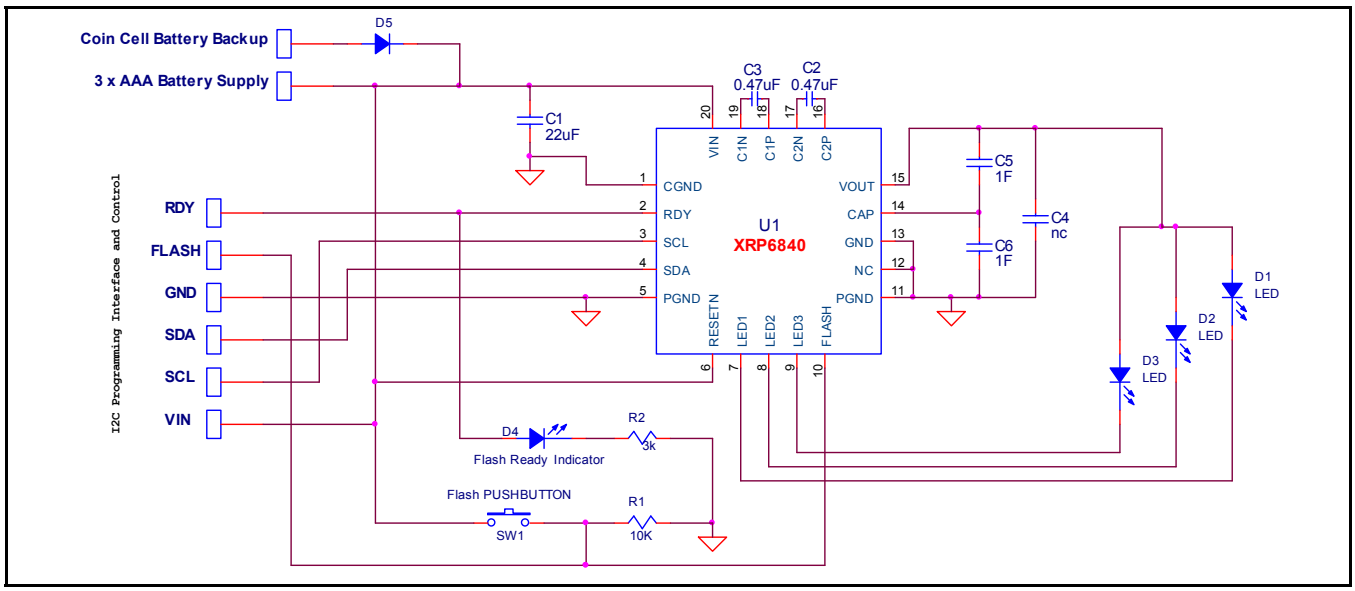
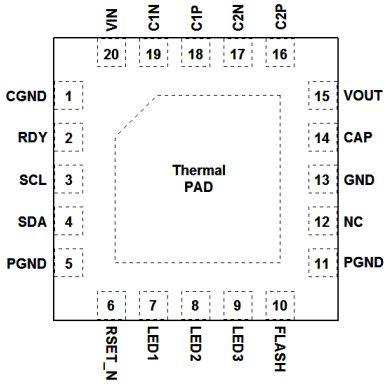


Fig. 1: XRP6840 Exarizer Evaluation Board Schematic

PIN ASSIGNMENT



XRP6840A – 3 Channel Version

Fig. 2: XRP6840 Pin Assignment

PIN DESCRIPTION

Name	Pin Number	Description
C_{GND}	1	Charge pump ground pin.
RDY	2	Active high push-pull output. RDY is high when V_{OUT} reached to 100mV below its V_{OUT_LIMIT} voltage. The V_{OUT_LIMIT} for Flash mode is determined by STATUS2 register [B7 B6 B5]. The V_{OUT_LIMIT} for Torch mode is 4.50V.
SCL, SDA	3, 4	The SDA and SCL pins connect to the I^2C bus. Multiple functions can be programmed through his interface. They can also be used for read-back.
P_{GND}	5, 11	Power ground pin. The Source of internal NMOS is connected to this pin.
RESET_N	6	Active Low input pin. If RESET_N = 0, then XRP6840 is in Shut-down mode If RESET_N = 0 and STATUS1 register [B5] = 0, then reset all registers to logic low. If RESET_N = 0 and STATUS1 register [B5] = 1, then all bits of all registers will be saved.
LED_1, LED_2, LED_3 (XRP6840A)	7, 8, 9	LED_1, LED_2, LED_3 connect to the drain of the internal NMOS which are current sources for LED current. These current sources are controlled by LEDFLASH or LEDTORCH registers which is programmed through I^2C to provide the Torch and Flash current for the LEDs. LED_1, LED_2, LED_3 pins can be connected together to provide higher LED current. If a pin is not used connect it to V_{OUT}. The XRP6840 incorporates a short LED protection circuit which shut-down LED current if LED voltage approaches to V_{OUT_LIMIT}.
FLASH	10	Digital Input pin. Active high. If STATUS1 register [B7 B6] = 11 and FLASH = 1 then LEDs are ON for one Flash timeout duration. Flash Timeout duration is controlled by STATUS1 register [B1 B0].
NC	12	No connection. This pin can be connected to P_{GND} pin for heat sink.
GND	13	Ground pin. This ground pin doesn't carry high internal current.
CAP	14	This pin is the output of an internal Op-Amp which is powered by V_{OUT}. The output voltage is half of V_{OUT}, output resistance is 470Ω. The sink and source current is limited by 470Ω output resistance. This provides active balancing between two internal sections of the super cap.
V_{OUT}	15	Output voltage. Connect positive terminal of SuperCap here. Connect the LEDs between this pin and the corresponding internal current source. Decouple with 10µF ceramic capacitor close to the pins of the IC.
C_{2P}, C_{2N}	16, 17	Connect C_2 external flying capacitor between these pins.
C_{1P}, C_{2P}	18, 19	Connect C_1 external flying capacitor between these pins.
V_{IN}	20	Power supply input. Decouple with 10µF ceramic capacitor close to the pins of the IC.
Thermal Pad	-	Connect thermal pad to P_{GND} pins.

ORDERING INFORMATION

Refer to XRP6840's datasheet and/or www.exar.com for exact and up to date ordering information.

USING THE EVALUATION BOARD

POWERING UP THE XRP6840 CIRCUIT

The XRP6840 Exarizer Evaluation Board can be powered using three standard AAA batteries in series to add up to about 4.5V. The Evaluation board provides cell holders for this purpose. Additionally, a standard lithium coin battery can be used as a supply backup to maintain the XRP6840 programming while AAA batteries are replaced. The board comes with the RESET_N connected to VIN. The I^2C can be programmed through SCL, SDA pins at the jumper.

GETTING STARTED ON XRP6840EVB2

1. Insert three standard AAA batteries in the two AAA cell holders.
2. Insert a 3V lithium coin battery in the coin cell holder.
3. Connect I^2C Interface pins: SDA, SCL, and GND.
4. Program Torch or Flash Mode and the desired operating current through I^2C.
5. For Flash Mode, the push button can be used to power LEDs after each Flash Duration Timeout.

The I^2C Interface and the available Registers are described in XRP6840 datasheet in detail. The datasheet also explains the procedure for programming the registers in the different operating modes.

PROGRAMMING EXAMPLE

XRP6840 4.3A Flash Configuration

By default the XRP6840EVB Exarizer is configured as following:

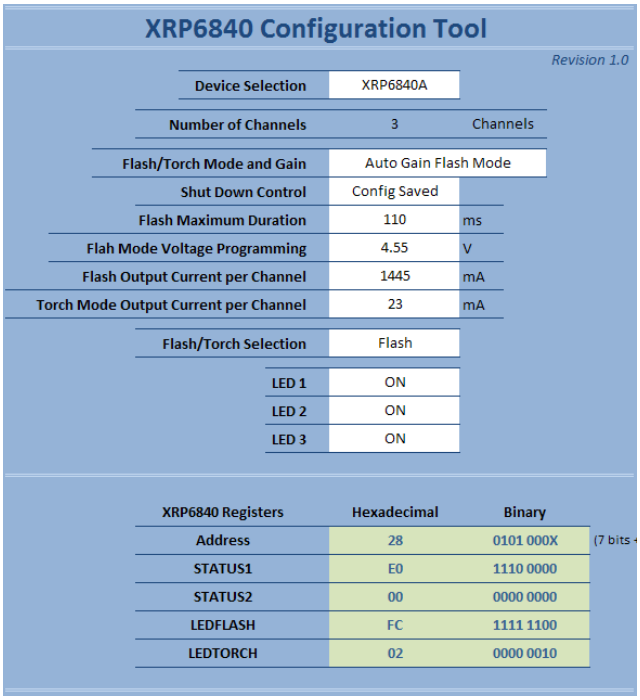
Address: 0x28

Status1: E0

Status2: 00

LEDFLASH: FC

LEDTORCH: 02



This configuration tool is available on the XRP6840 product page at www.exar.com.

EVALUATION BOARD LAYOUT

Fig. 3: Components Placement – Top side

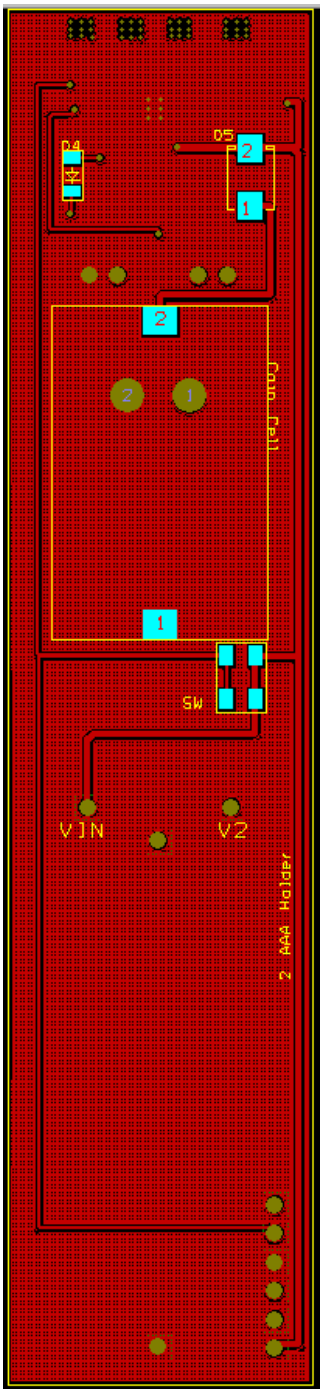


Fig. 4: Bottom side layout

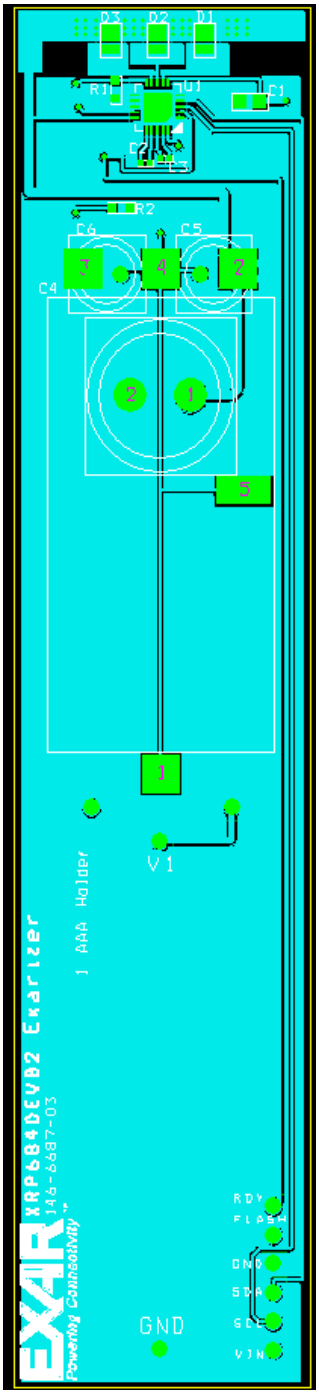


Fig. 5: Top side layout

BILL OF MATERIAL

Ref.	Qty	Manufacturer	Part Number	Size	Component
EVAL BD	1	Exar Corp	146-6687-03	4.8”x1.06”	XRP6840EVB2 Evaluation Board
U1	1	Exar Corp	XRP6840AILB-F	TQFN-20L	4.3A Supercapacitor Flash LED Driver with I^2C
C1	1	Taiyo Yuden	LMK212BJ226MG-T	0805	Ceramic 22µF 10V X5R
C2, C3	2	Murata	GRM155B31A474KE14B	0402	Ceramic 0.47µF 10V X5R
C5, C6	2	Rubycon	2.7DMA1M	6.5x30mm	1F, 2.7V
D1, D2, D3	3	Lumileds	LXCL-PWF4W-0001	2.04x1.64x0.75mm	1.5A Luxeon Flash LED
D4	1	Panasonic	LNJ311G83RA	1206	Green Color Mini LED
D5	1	Central Semiconductor	CMSH2-20L	SMB	Schottky Diode, 20V, 2A
R1	1	Rohm Semiconductor	MCR03EZPFX1002	0603	10KΩ Resistor, 0.1W, 1%
R2	1	Panasonic	ERJ3EKF3011V	0603	3.01KΩ Resistor, 0.1W, 1%
SW1	1	Bourn Inc.	7914J-1-000	4.8x5.0 mm	Push Button Switch
AAA – 1 Cell Holder	1	Keystone Electronics	2466	50x13x12.7mm	Battery Holder – 1 Cell AAA
AAA – 2 Cell Holder	1	Keystone Electronics	2468	53x24.6x12.7mm	Battery Holder – 2 Cell AAA
Coin cell Holder	1	Memory Protection Devices	BH600SM-G	19.05x23.37x8.38mm	Coin Cell Holder
Test Point VIN, SCL, SDA, GND, FLASH, RDY	6	Mill-Max	0300-115-01-4727100	0.042” diameter	Test Point Female Pin

REVISION HISTORY

Revision	Date	Description
1.0.0	03/24/2011	Initial release of document

FOR FURTHER ASSISTANCE

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Exar Technical Documentation: http://www.exar.com/TechDoc/default.aspx?

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