## General Description

The MAX77829 is a high-performance companion PMIC for the latest 3G/4G smartphones and tablets. The PMIC includes a single input 2.0A switched-mode charger with reverse boost capability and adapter input protection up to 22V (DC) for one-cell lithium ion (Li+) battery, a safeout LDO, and WLED backlight driver supporting up to 25mA/string, 35V output voltage. It also features a dual-channel 1.5A (combined, 750mA/ch) flash LED driver (with torch mode included).

The MAX77829 evaluation kit (EV kit) is a fully assembled and tested printed circuit board that demonstrates the functionality and performance of MAX77829. The EV kit allows for easy evaluation of each block and feature. In the package, one set of MINIQUSB from Maxim (serves as an I$^2$C to USB interface) is provided with the MAX77829 EV kit for easy testing.

Windows®-based software provides a user-friendly interface to exercise the features of the MAX77829. This software offers a graphical user interface (GUI) as well as a register-based interface.

## Benefits and Features

- EV Kit Includes All the Necessary Components for Device Operation in Addition to Many Components for Added Flexibility and Ease of Use
- Easy-to-Use Pushbutton Interface for On/Off Control
- Assembled and Tested
- Test Points Allowing Convenient Access to Nodes of Interest
- Lead-Free and RoHS Compliant
- Jumper Headers Acting as Both Test Points and Shunts

*Ordering Information appears at end of data sheet.*

## Quick Start

### Hardware and Jumper Configuration

Following the jumper configuration as listed in Table 1 and Figure 1:

## Table 1. MAX77829 Evaluation Kit Jumper Configuration

| JUMPER | TYPE | FUNCTION | DEFAULT CONDITION |
|---|---|---|---|
| JU1 | 2-pin | Connecting WLED1, LED String 1 | Install |
| JU2 | 2-pin | Connecting WLED2, LED String 2 | Install |
| JU3 | 2-pin | Connecting THM potentiometer | Install |
| JU4, JU13 | 3-pin | Short 1 or 2 LEDs in LED String 1 and 2, respectively | Open |
| JU12, JU14 | 2-pin | Connecting THM Potentiometer | Open |
| JU5, JU15 | 2-pin | Connecting IN_FLED1 and IN_FLED2 pins and the flash LEDs, respectively | Install |
| JU6 | 2-pin | Connecting THM Potentiometer | Install |
| JU7–JU11 | 2-pin | Connecting THM Potentiometer | Open |
| JU16 | 2-pin | Connecting THM Potentiometer | Install |
| JU17 | 2-pin | Connecting THM Potentiometer | Install |
| JU18 | 2-pin | Connecting THM Potentiometer | Open |

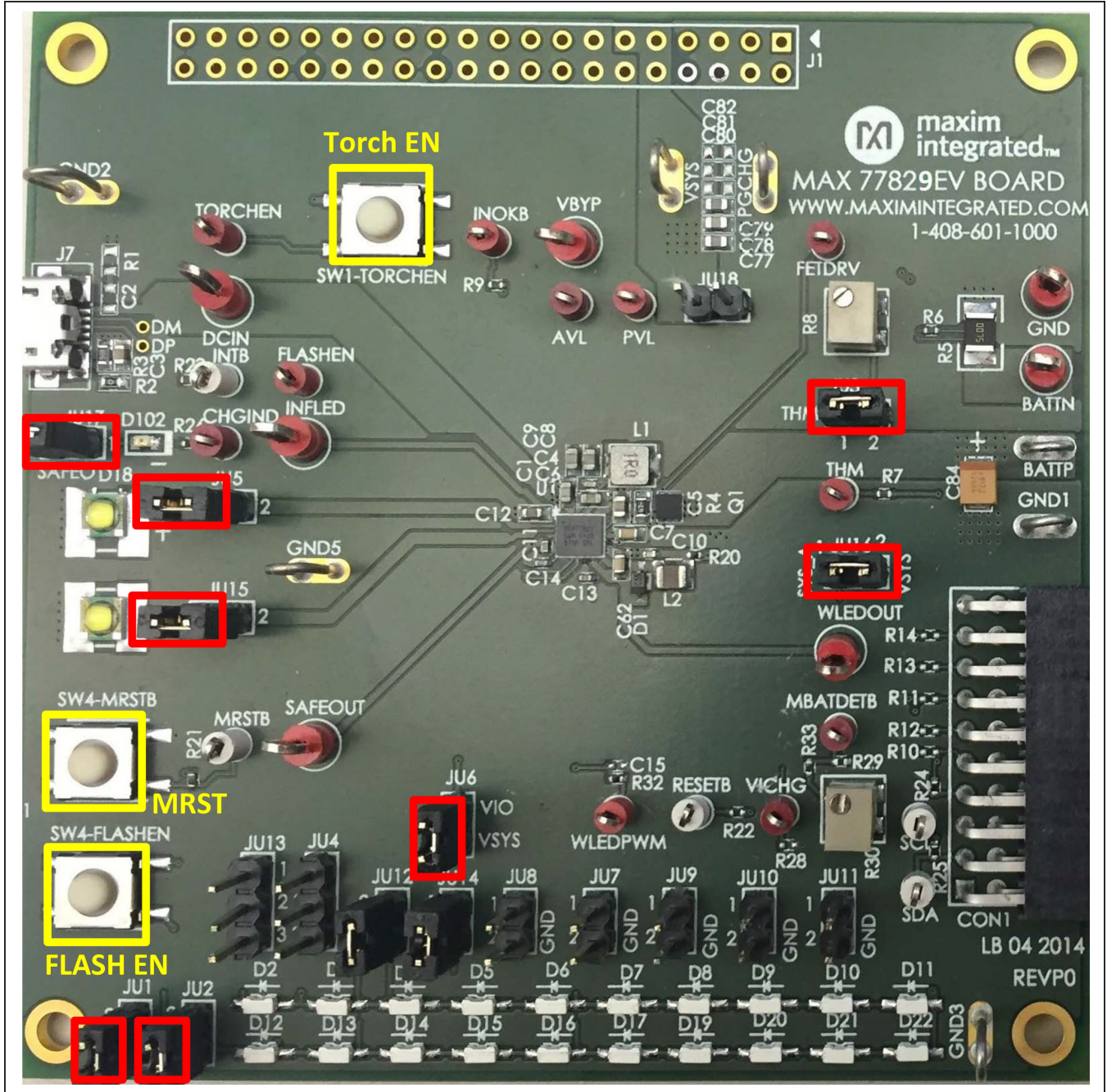*Windows is a registered trademark and service mark of Microsoft Corporation.*

Figure 1. MAX77829 Evaluation Kit Jumper Header Configuration

## GUI Software Installation Procedure

Use the following procedure to connect to the EV kit with the GUI:

1) Ensure the USB-I2C interface module (MINIQUSB) firmware has been correctly installed on your computer. For more information with regarding to MINIQUSB, visit: **http://www.maximintegrated. com/datasheet/index.mvp/id/5311**

2) Unzip it and run the provided MAX77829 EV kit GUI execution file. Follow the prompts on screen.

3) For the connection among PC, MINIQUSB, and the MAX77829 EV kit, see Figure 2. MINIQUSB is connected to the MAX77829 EV Kit through the 20-pin connector.

4) Connect a suitable DC power supply between DCIN and ground on the EV kit, or plug in the J7 Micro-USB port with a connected USB cable.

5) Launch the MAX77829 GUI. The GUI automatically detects the MINIQUSB interface and the MAX77829.

6) If connection is successful, the full set of registers in the MAX77829 can now be accessed through the GUI.
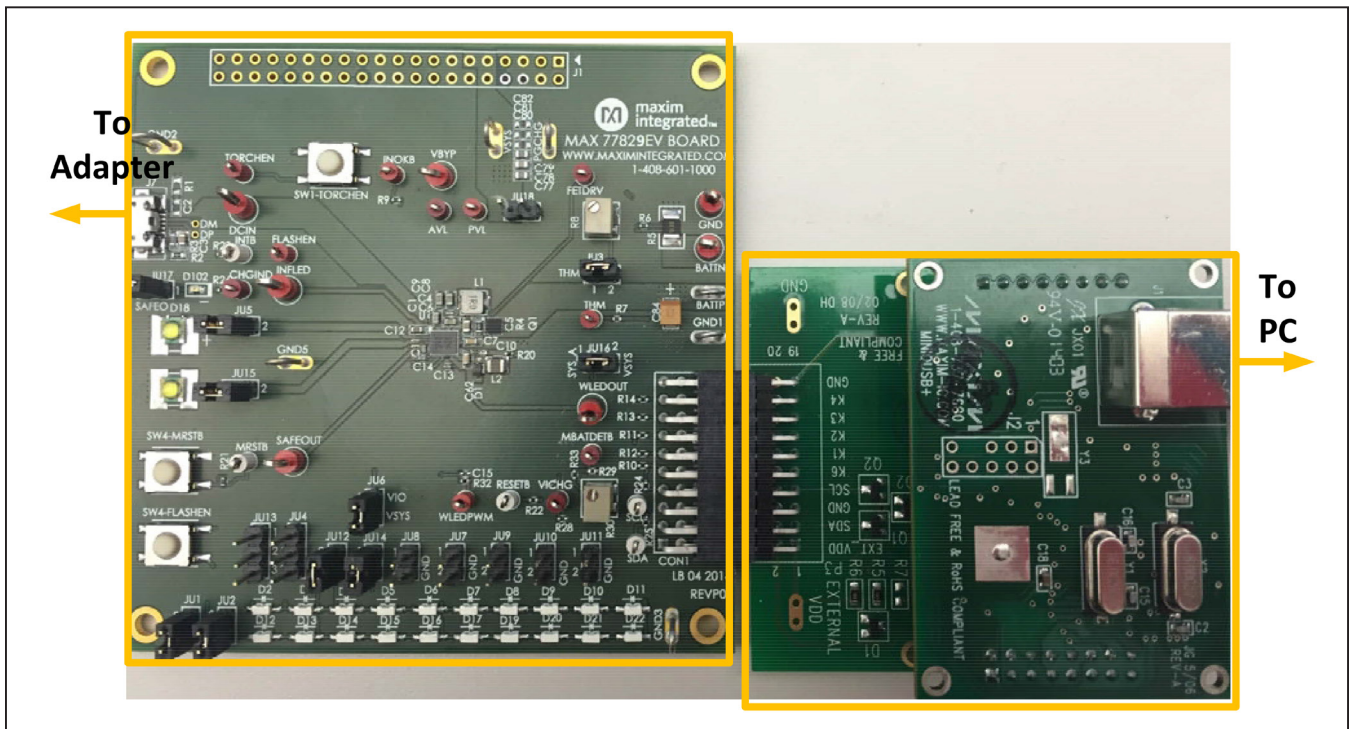


Figure 2. MAX77829 Evaluation Kit and MINIQUSB Connection

## Start Guide

Before proceeding to the start guide, it is highly recommended to read the MAX77829 data sheet and other related document to get familiar with its functions, registers, and settings.

Upon finishing the connection as mentioned in previous section, launch the GUI, and the following screen appears:

The GUI groups the related functions to several tabs. For example, charger configuration related functions are grouped in tabs such as CHG_CNFG(1), CHG_CNFG(2), and CHG_CNFG(3), etc. Top-level interrupt related functions are grouped into tab INTSRC & PMIC ID, and INT (TOPSYS/FLASH), etc.
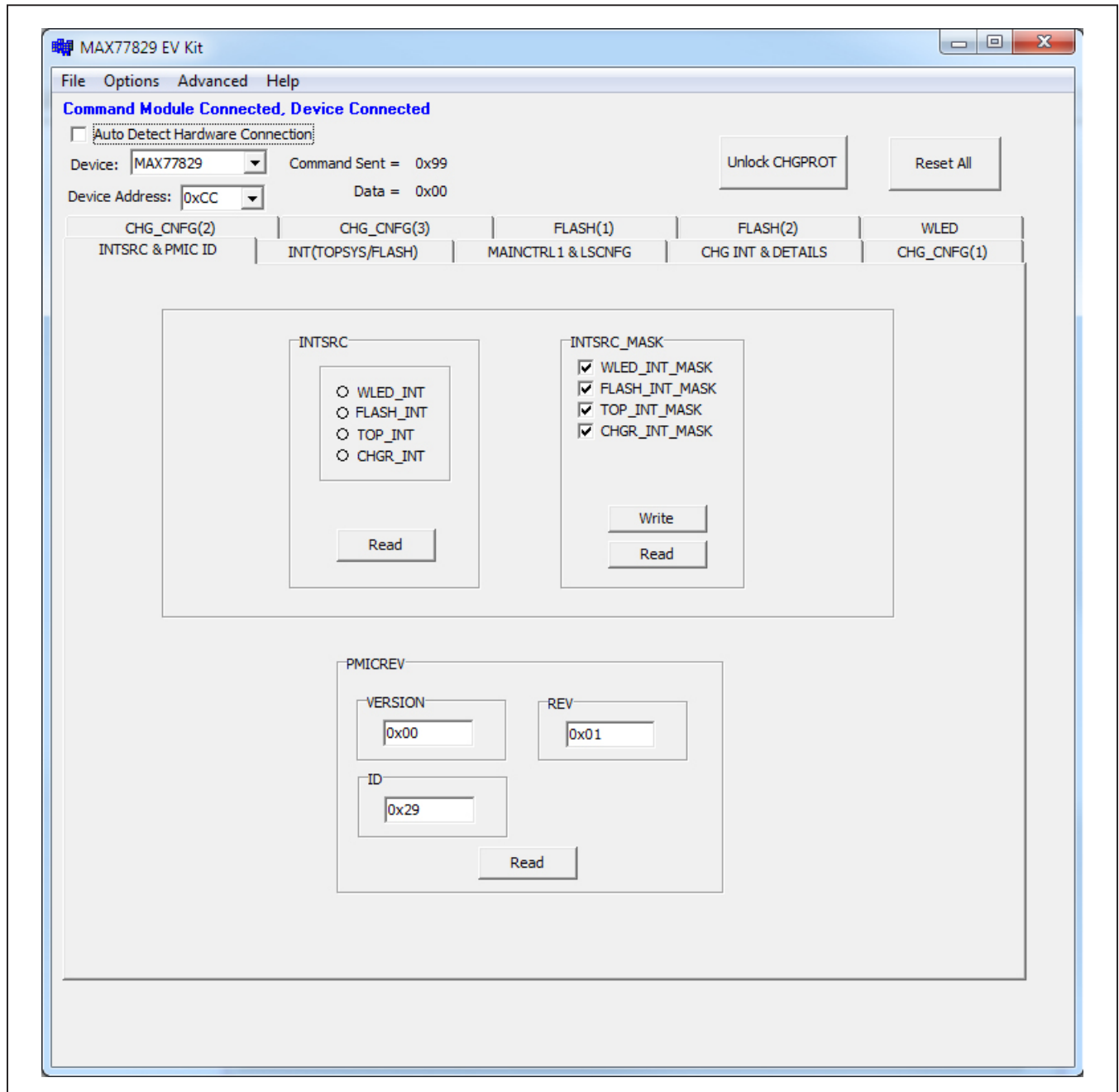


*Figure 3. MAX77829 GUI*

**Charger-Related Registers**

Charger-related registers are mainly grouped to the follow tabs: CHG_CNFG(1), CHG_CNFG(2), CHG_CNFG(3), and CHG INT & DETAILS.

Several critical charger-related settings are protected in the registers, these registers can be programmed after being unlocked. It can be done by clicking **Unlock CHGPROT** or selecting the correct setting of CHGPROT bits, as shown in Figure 4.

To quickly check the charger function, use the following procedure:

1) Ensure the EV kit is properly connected and powered. Go to tab CHG_CNFG(1), as shown in Figure 5, and set up the related the settings for the charger settings. A quick setting guide for related

registers is provided below; other different settings are available.

CHGCTL1→CHGPROT → by 11 = unlocked

2) Go to tab CHG_CNFG(2).
3) Set the registers as follows:
   - DCCRNT → DCILMT → No Limit
   - CHGCTL2 → Enable DCILIM_EN
   - CHGCTL2 → Enable CEN
4) With a battery connected between BATTP and GND, the indicating LED (D102) starts blinking, meaning the charging has started.
5) Charging status can be monitored through registers in tab **CHG INT AND DETAILS**. Clicking **Read All**, CHG_DTLS → CHG_DTLS gives the charging status that the battery is currently involved in, as indicated in Figure 8.
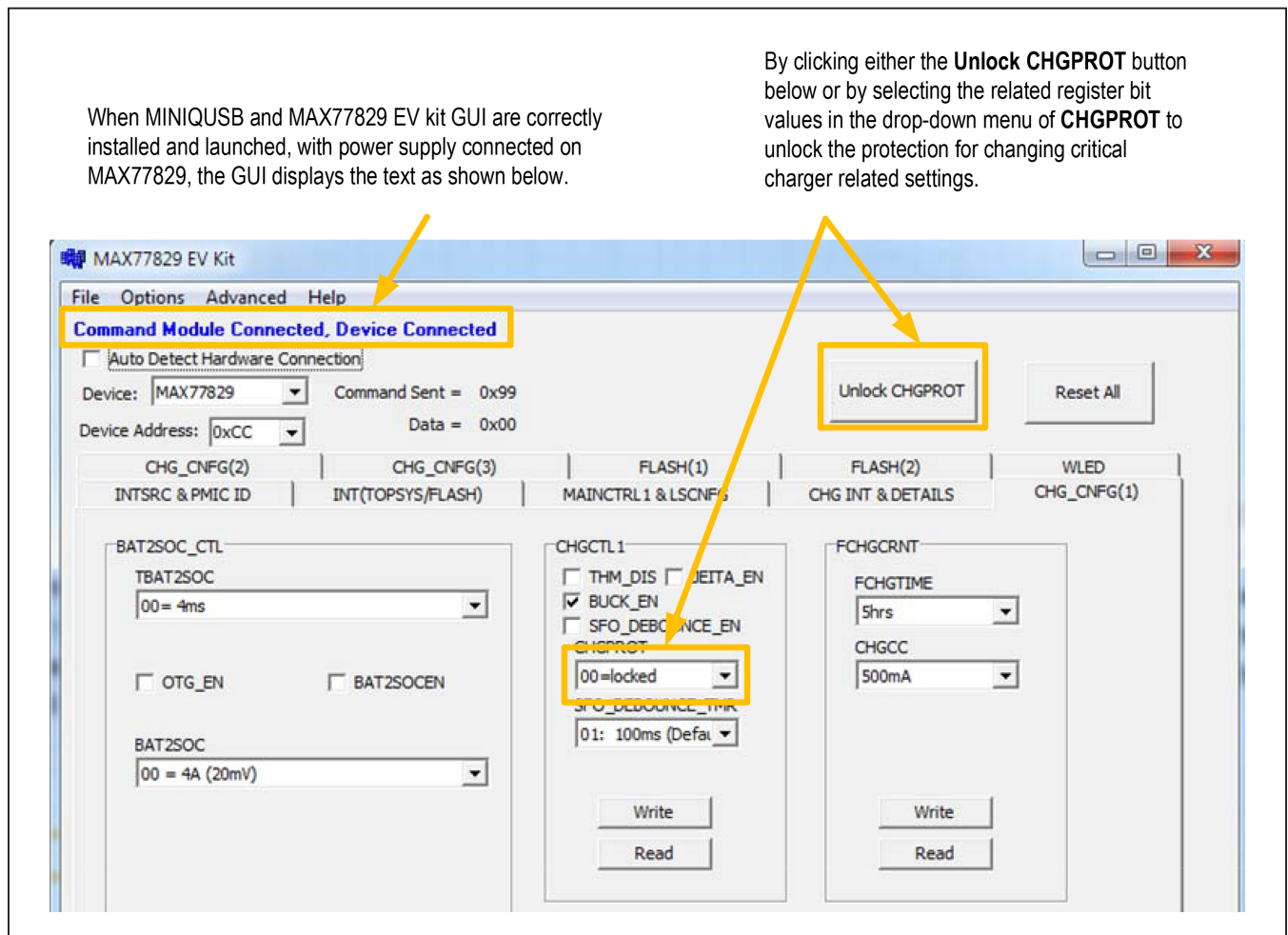


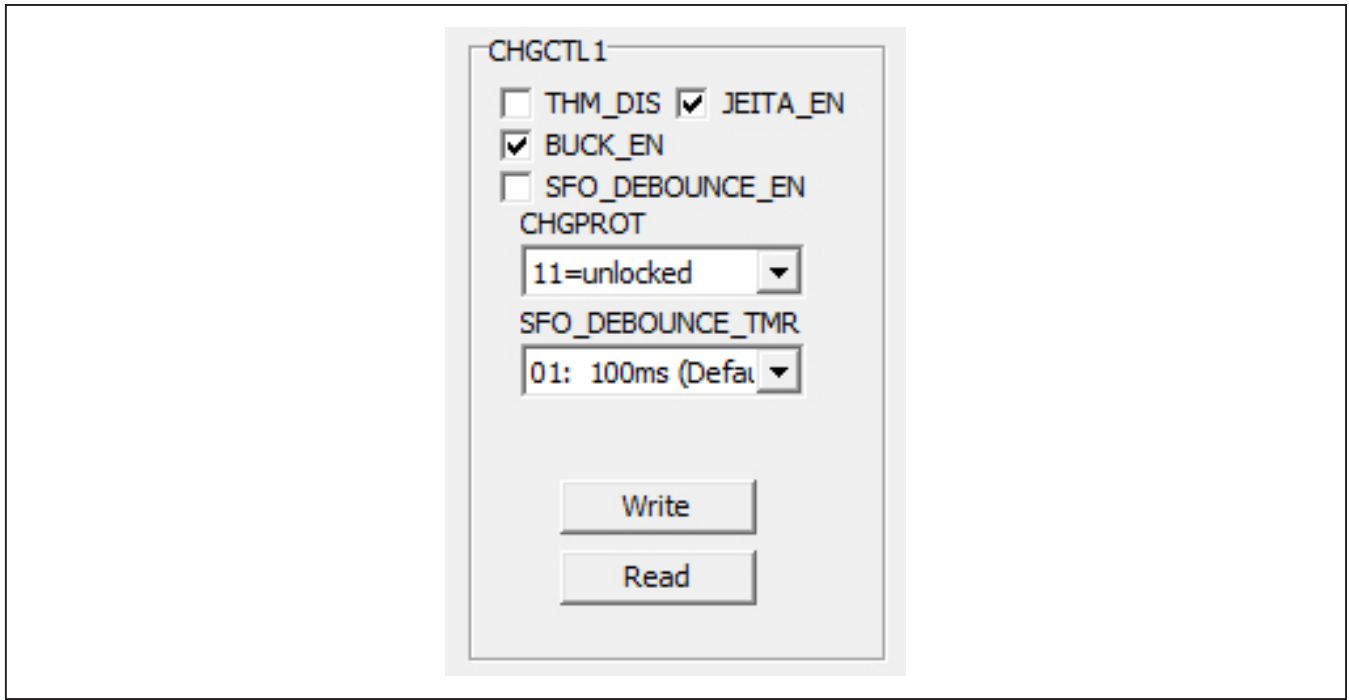Figure 4. MAX77829 GUI—Unlock CHGPROT

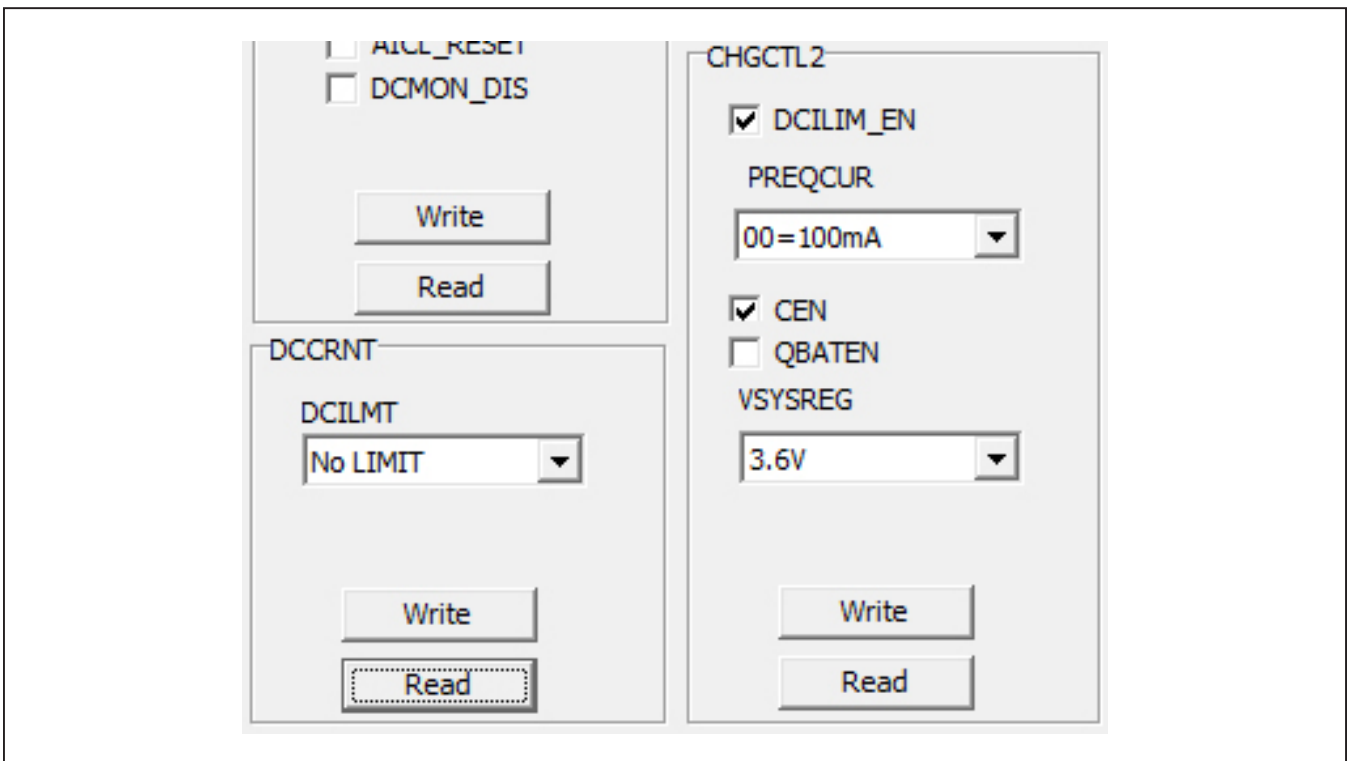*Figure 5. MAX77829 GUI—Charger Configuration 1*



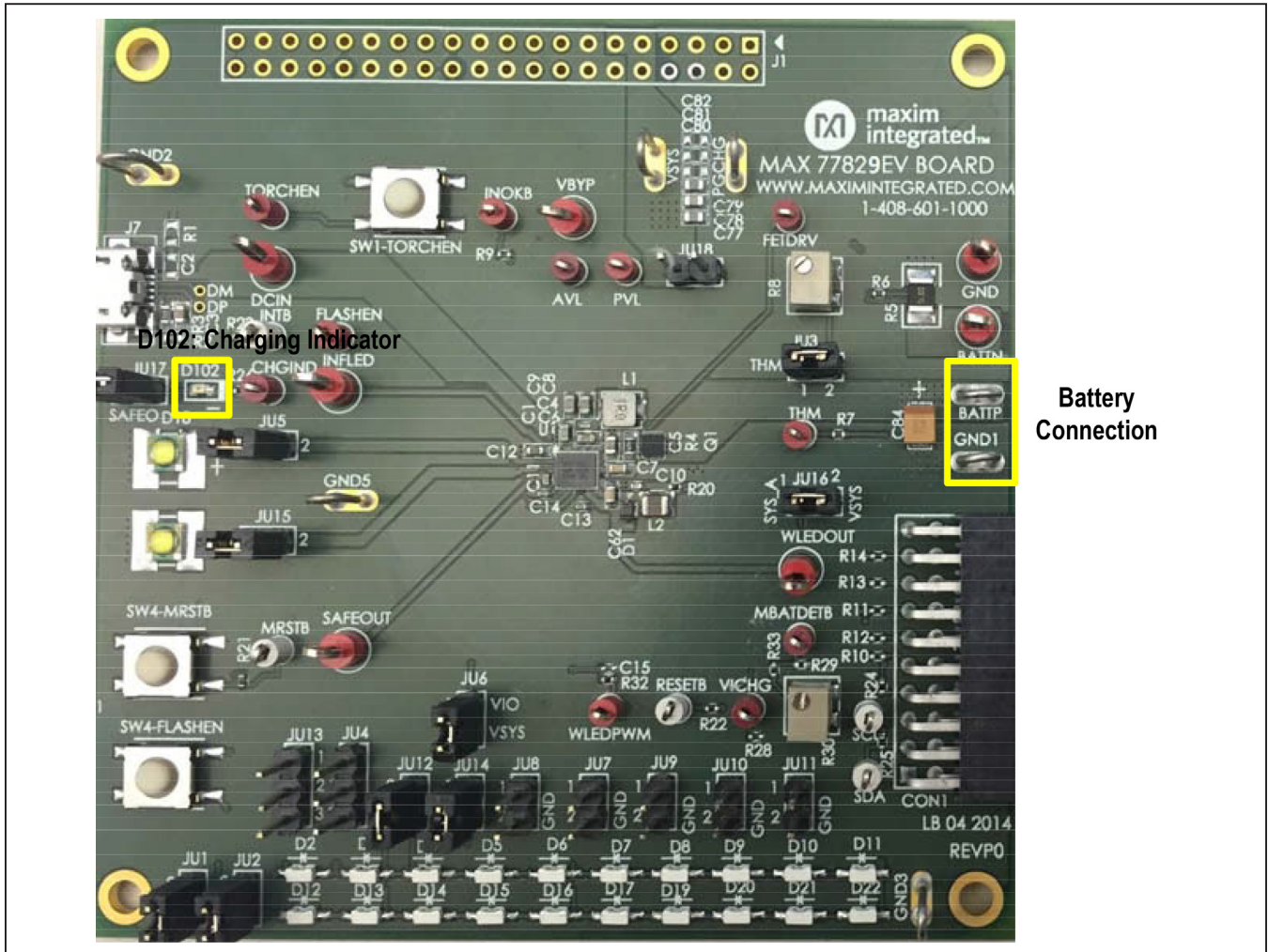*Figure 6. MAX77829 GUI—Charger Configuration 2*

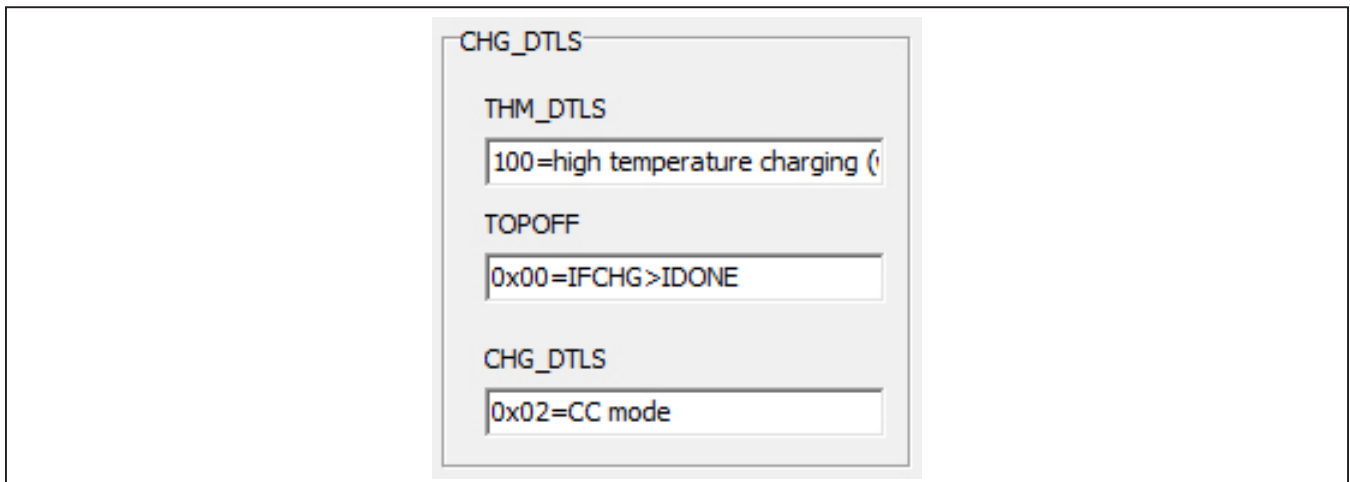*Figure 7. Battery Connection and Charging Indication LED*



*Figure 8. Charger Details*

6) To verify the reverse boost function of MAX77829's charger, disconnect the power from DCIN, and remove the
battery. Connect power to VSYS, go to tab CHG_CNFG(2), and set the registers as follows:
- RBOOST_CTL1 → Enable RBOOSTEN
- RBOOST_CTL2 → Set VBYPSET to a voltage level higher than your VSYS input

Measure the voltage between BYP to GND, the value is set by VBYPSET mentioned in step 6. In addition, for the USB OTG mode, check the OTG_EN bit as shown in Figure 10. In such condition, the switch between BYP and DCIN is turned on so that the same voltage level on BYP is now applied on DCIN node.
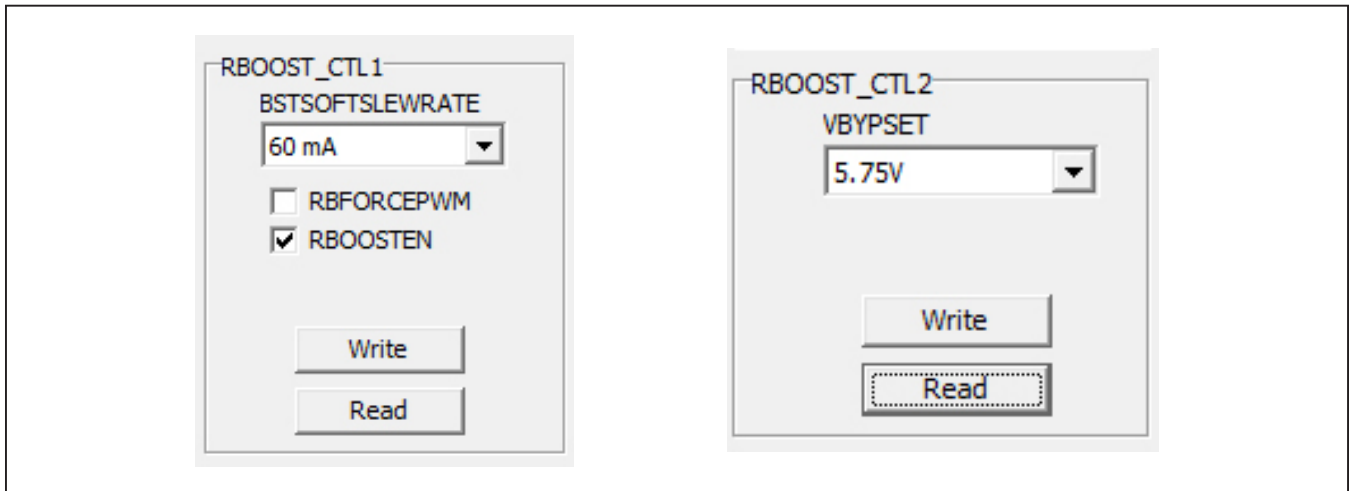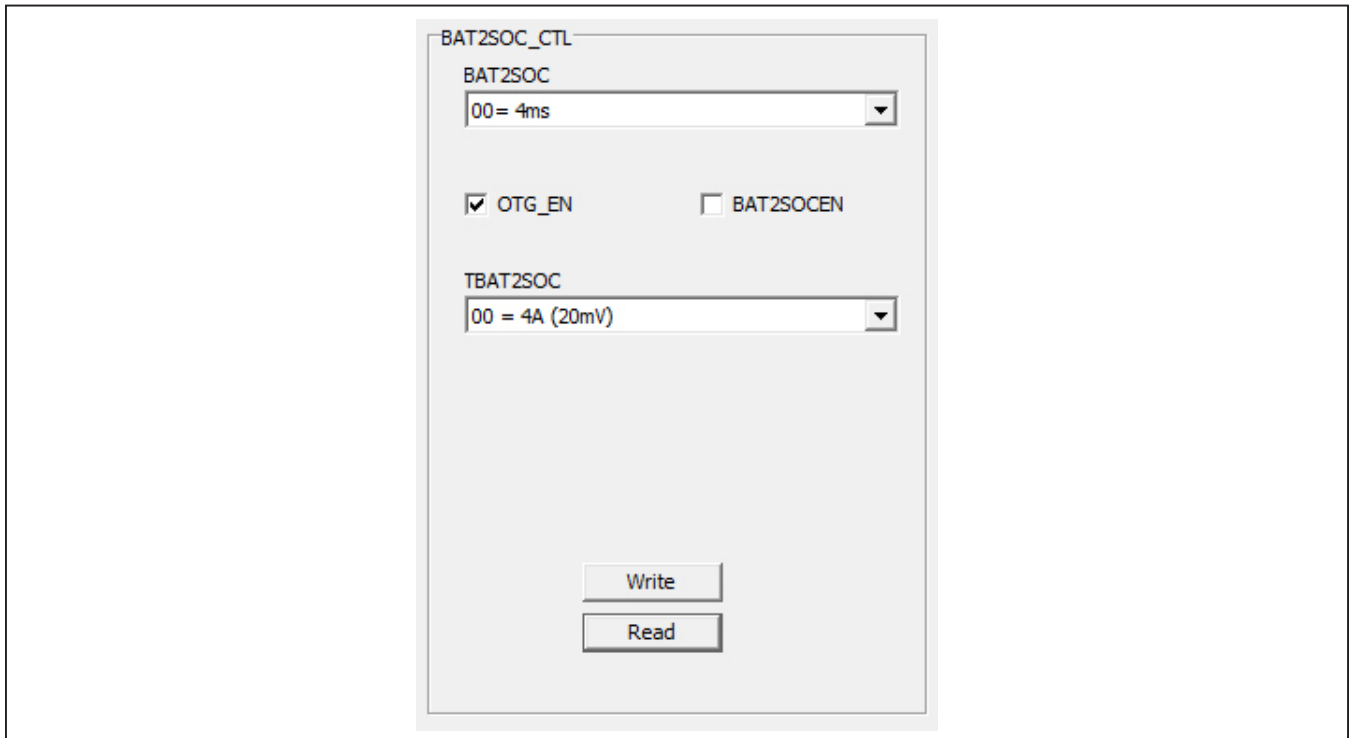


Figure 9. Reverse Boost Mode



Figure 10. Enable OTG Mode

**Flash/Torch-Related Registers**

To check the flash/torch function, use the following procedure:

1) Go to tab **FLASH(1)**, and set up the related the settings for the flash or torch settings:
   - FLASH_FLED1_EN → by FLASHEN
   - TORCH_FLED2_EN → by FLASHEN
   - FLASH_TMR_DUR and TORCH_TMR_DUR → to preferred time duration
   - FLASH_I and TORCH_I → to preferred current level

2) Go to tab **FLASH(2)**, for VOUT_CNTL. In the drop-down menu for **BOOST_FLASH_MODE**, select **FLED1 in adaptive**.

3) Press the **Flash EN** pushbutton on the board, the flash function is enabled. The torch mode can be set in a similar way.

**WLED Backlight-Related Registers**

For the WLED backlight-related registers, see Figure 11. Set the register WLEDBSTCNTL control for desirable WLED related register settings.
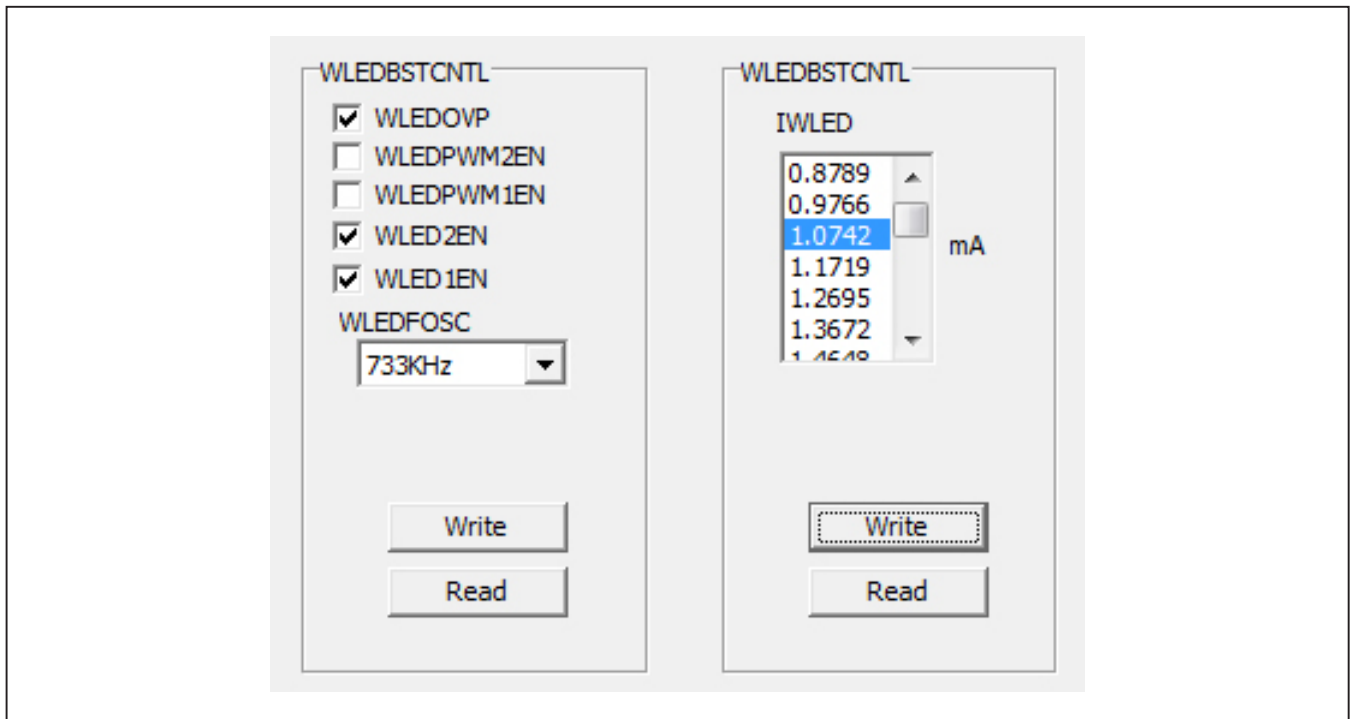


Figure 11. WLED Related Register Setting

## Component List, Schematic List, and PCB Layout

See the folllowing links for component list, schematics, and PCB layout:

- MAX77829 EVKIT BOM
- MAX77829 EVKIT schematics
- MAX77829 EVKIT PCB

## Ordering Information

| PART | TYPE |
| --- | --- |
| MAX77829EVKIT# | EV kit |

*#Denotes RoHS compliant.*

## Revision History

| REVISION NUMBER | REVISION DATE | DESCRIPTION | PAGES CHANGED |
|---|---|---|---|
| 0 | 12/15 | Initial release | — |

**MAX77829 BILL OF MATERIALS (BOM), Rev 0; 11/15**

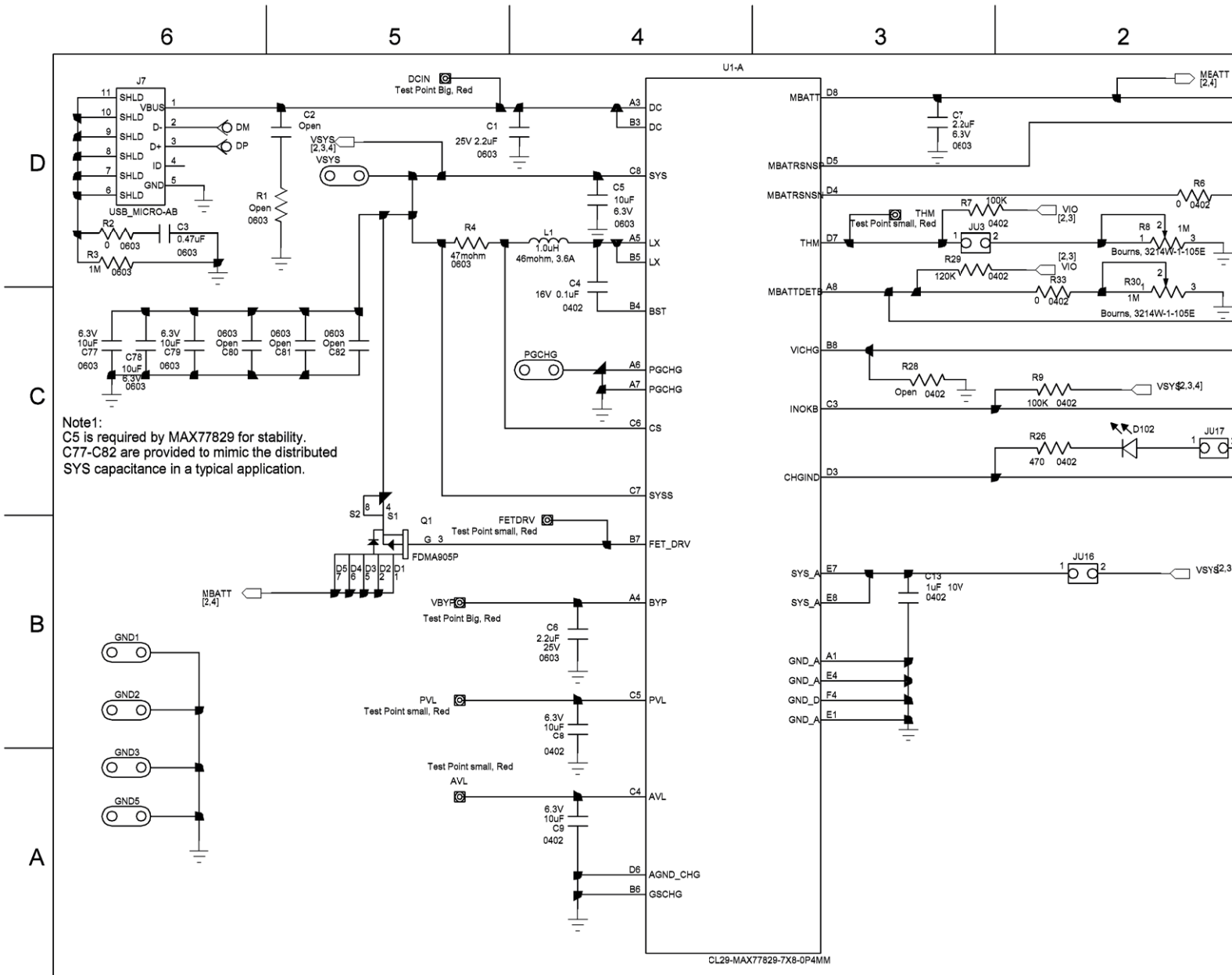| Item | Qty | Reference Designator | Description | Part Name | Assembly |
|------|-----|----------------------|-------------|-----------|----------|
| 1 | 1 | C4 | 0.1µF ±10%, 16V X7R ceramic capacitor 0402 | Murata, GRM155R71C104K | |
| 2 | 1 | C3 | 0.47µF ±10%, 6.3V X7R ceramic capacitor 0603 | Taiyo Yuden, JMK107BJ474KA-T | |
| 3 | 6 | C5 C8-9 C77-79 | 10µF, 6.3V, X5R, ±10% Ceramic Capacitor 0603 | Taiyo Yuden, JMK107ABJ106MA-L | |
| 4 | 3 | C11, C13-14 | 1µF, 10V, X5R, ±20%, Ceramic Capacitor, 0402 | Taiyo-Yuden, LMK105BJ105MA | |
| 5 | 1 | C62 | 1.0µF, 50V, X5R, ±10% Ceramic Capacitor 0603 | Murata, GRM188R61H105MAALD | |
| 6 | 2 | C1 C6 | 2.2µF 25V X5R Ceramic Capacitor, 0603 | TDK, C1608X5R1E225M | |
| 7 | 1 | C7 | 2.2µF 6.3V X5R Ceramic Capacitor 0603 | Murata, GRM188R60J225ME19D | |
| 8 | 1 | C10 | 2.2µF 6.3V X5R Ceramic Capacitor 0402 | Murata, GRM155R60J225ME19D | |
| 9 | 1 | C12 | 4.7µF 6.3V X5R Ceramic Capacitor 0603 | Taiyo Yuden, JMK107BJ475KA-T | |
| 10 | 4 | C2 C80-82 | Open Ceramic Capacitor, 0603 | | NP |
| 11 | 1 | C15 | Open Ceramic Capacitor 0402 | | NP |
| 12 | 1 | C84 | 100µF, 6.3V, Tantalum Capacitor, 1210 | AVX, TCJB107M006R0070 | |
| 13 | 1 | U1 | PMIC, 0.4MM PITCH, 7X8 WLP | Maxim, MAX77821 | NP |
| 14 | 1 | J1 | CONNECTOR, THROUGH HOLE, .100" x .100" LATCH/EJECTOR HEADER, MALE, STRAIGHT ANGLE, 4 WALL, 40 PIN, FOR .094" TO .125" [2.39mm TO 3.18mm] THICK BOARD, Ic=1A, -55°C TO +105°C | 3M, 3432-6303 | NP |
| 15 | 1 | CON1 | 2X10 right angle female receptacle SMBUS | | |
| 16 | 1 | D102 | LED, Green 0603 | LITE-ON LTST-C190GKT | |
| 17 | 1 | Q1 | Single P-Ch Power Trench MOSFET, uFET 2X2 | Fairchild, FDMA905P | |
| 18 | 2 | JU4 JU13 | 3 Pin Header, 0.1" | Cut to size | |
| 19 | 1 | L1 | 1µH, +/-30%, 46mohm typ, 3600mA ISAT | Cyntec, PIME031B-1R0MS | |
| 20 | 1 | L2 | 4.7µH, 216 mohm typ, 1.6A, 2520 | Toko, 1239AS-H 4R7N | |
| 21 | 16 | JU1-3 JU5-12 JU14-18 | 2 Pin Header, 0.1" | Cut to size | |
| 22 | 20 | D2-17 D19-22 | WHITE LIGHT EMITTING DIODE | OSRAM, LW-Y1SG | |
| 23 | 2 | D18 D23 | Flash LED White | OSRAM, LED_LW_F65G or OSRAM, LUW FQ6N | |
| 24 | 7 | BATTP GND1-3 GND5 PGCHG VSYS | Maxim Loop | | |
| 25 | 4 | M1-4 | Mounting Hole | Do not mount | NP |
| 26 | 1 | R2 | 0Ω SMT Resistor, 0603 | | |
| 27 | 4 | R6 R20 R32-33 | 0Ω SMT Resistor, 0402 | | |
| 28 | 1 | R3 | 1MΩ SMT Resistor, 0603 | | |
| 29 | 1 | R4 | 47mΩ SMT Resistor, 0603 | | |
| 30 | 1 | R1 | Open SMT Resistor, 0603 | | NP |
| 31 | 3 | R21-23 | 100kΩ, SMT Resistor, 0402 | | |
| 32 | 2 | R7 R9 | 100kΩ, SMT Resistor, 0402 | | |
| 33 | 1 | R29 | 40kΩ SMT Resistor, 0402 | | |
| 34 | 2 | R24-25 | 2.2kΩ, SMT Resistor, 0402 | | |
| 35 | 1 | R26 | 470 SMT Resistor, 0402 | | |
| 36 | 1 | R5 | 5mΩ SMT Resistor, 1210 | | |
| 37 | 6 | R10-14 R28 | Open SMT Resistor, 0402 | | NP |
| 38 | 2 | R8 R30 | 1MΩ Trimmer, SMD | Bourns, 3214W-1-105E | |
| 39 | 1 | D1 | 40V, 1A Schottky diode, SOD323 | Central Semi, CMDSH05-4 | |
| 40 | 3 | SW1-TORCHEN SW4-FLASHEN SW4-MRSTB | Momentary switch | Pansonic, EVQ-PHV03T | |
| 41 | 11 | AVL CHGIND FETDRV FLASHEN INOKB MBATDETB PVL THM TORCHEN VICHG WLEDPWM | Test Point small, Red | Keystone, 5000 | |
| 42 | 5 | MRSTB RESETB SCL SDA INTB | Test Point small, White | Keystone, 5002 | |
| 43 | 7 | SAFEOUT INFLED VBYP WLEDOUT GND BATTN DCIN | Test Point Big, Red | Keystone, 5010 | |
| 45 | 2 | DM DP | Test Point | PCB Test Point | |
| 46 | 1 | J7 | Micro AB receptacle SMD type, Bottom Mount | Hirose, ZX62-AB-5PA | |

U1-A

J7
11 SHLD
10 SHLD
9 SHLD
8 SHLD
7 SHLD
6 SHLD
1 VBUS
2 D-
3 D+
4 ID
5 GND
USB_MICRO-AB

DM
DP

DCIN
Test Point Big, Red

C2
Open

C1
25V 2.2uF
0603

VSYS
[2,3,4]
VSYS

R1
Open
0603

R2
0 0603
R3
1M 0603

C3
0.47uF
0603

A3 DC
B3 DC

C8 SYS

C5
10uF
6.3V
0603

MBATT   D8

C7
2.2uF
6.3V
0603

MEATT
[2,4]

MBATRSNS   D5
MBATRSNS   D4

THM   D7

MBATTDET   A8

R7 100K
Test Point small, Red
JU3 0402

VIO
[2,3]

R8 1M
Bourns, 3214W-1-105E

R29
120K 0402

VIO [2,3]

R33
0 0402

R30
1M
Bourns, 3214W-1-105E

R6
0 0402

R4
47mohm
0603

L1
1.0uH
46mohm, 3.6A

A5 LX
B5 LX

C4
16V 0.1uF
0402

B4 BST

PGCHG

A6 PGCHG
A7 PGCHG

C6 CS

VICHG   B8

R28
Open 0402

INOKB   C3

R9
100K 0402

VSYS[2,3,4]

CHGIND   D3

R26
470 0402

D102

JU17

6.3V 10uF C77 0603
6.3V 10uF C78 0603
6.3V 10uF C79 0603
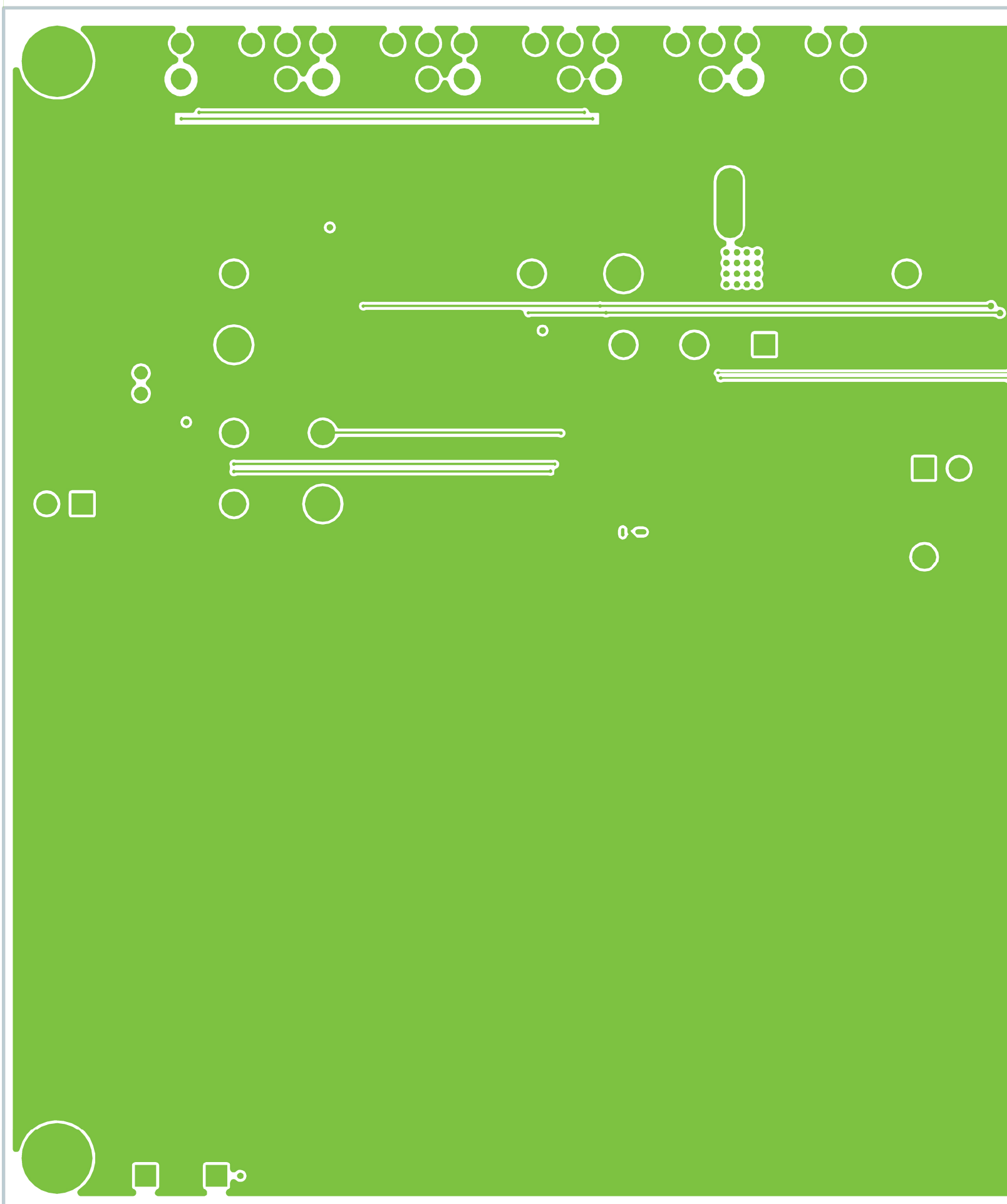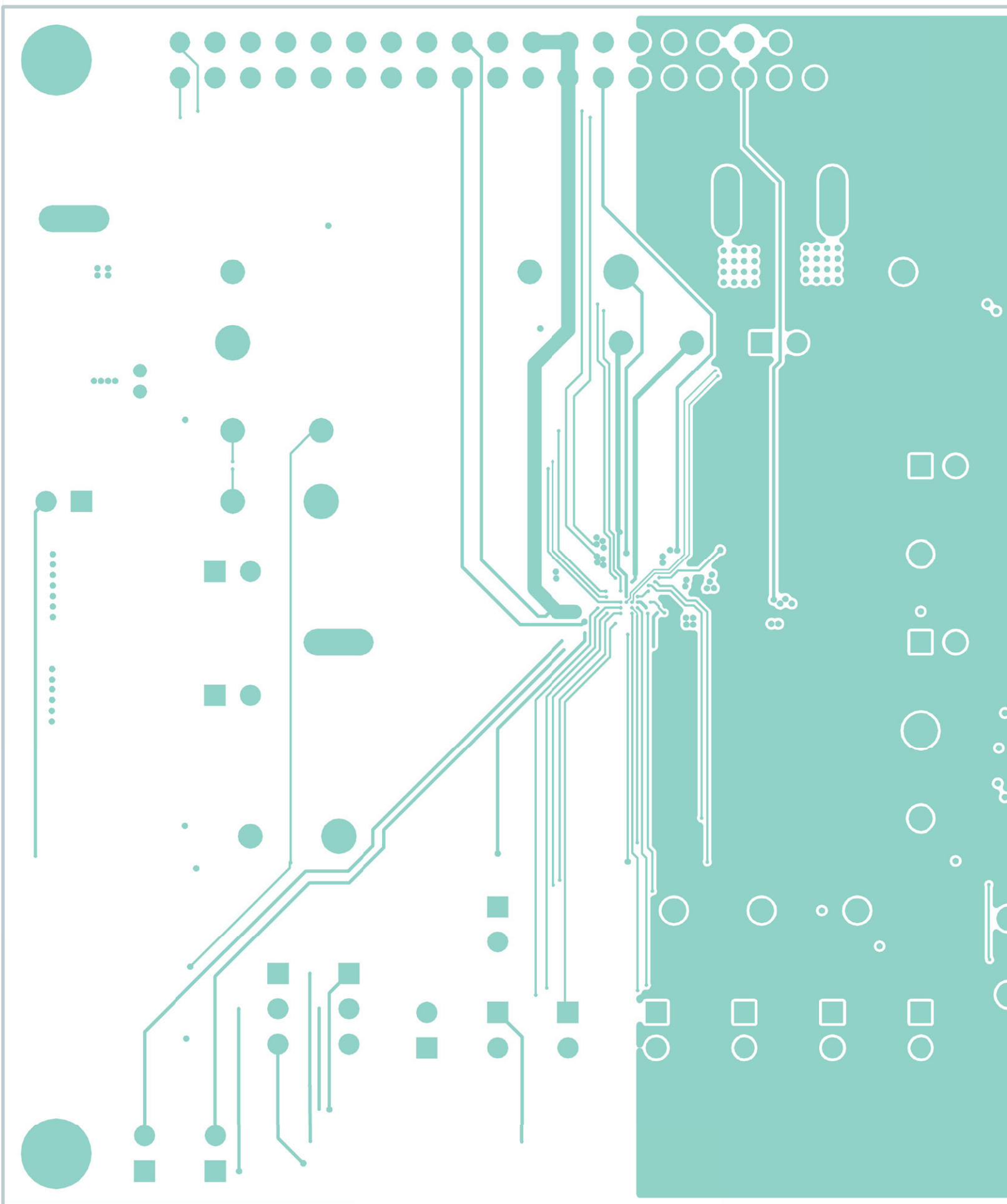0603 Open C80
0603 Open C81
0603 Open C82

Note1:
C5 is required by MAX77829 for stability.
C77-C82 are provided to mimic the distributed
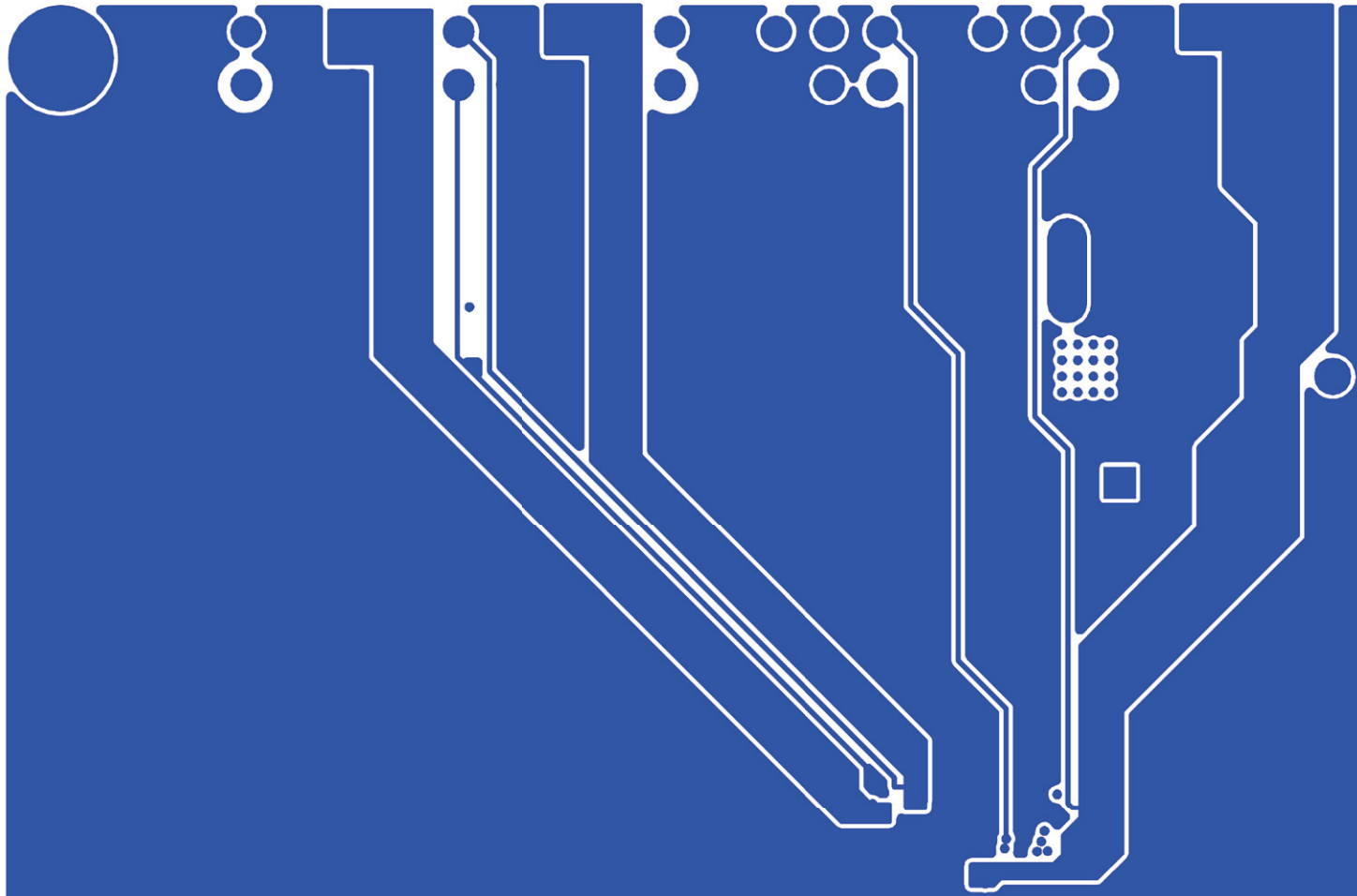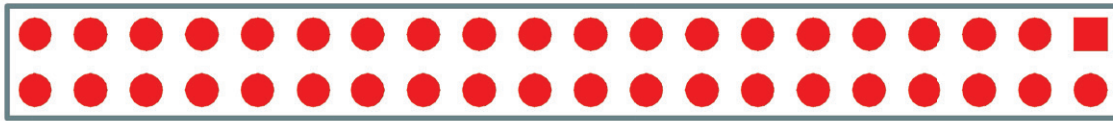SYS capacitance in a typical application.

C7 SYSS

S2 8   4 S1
Q1
G 3
FDMA905P

D5 D4 D3 D2 D1
7 6 5 2 1

MBATT
[2,4]

FETDRV
Test Point small, Red

B7 FET_DRV

VBYF
Test Point Big, Red

A4 BYP

C6
2.2uF
25V
0603

SYS_A   E7
SYS_A   E8

JU16

C13
1uF 10V
0402

VSYS[2,3]

GND_A   A1
GND_A   E4
GND_D   F4
GND_A   E1

PVL
Test Point small, Red

C5 PVL

6.3V
10uF
C8
0402

Test Point small, Red
AVL

C4 AVL

6.3V
10uF
C9
0402

D6 AGND_CHG
B6 GSCHG

GND1
GND2
GND3
GND5

CL29-MAX77829-7X8-0P4MM

J1

GND2

TORCHEN

SW1-TORCHEN

INOKB

R9

VBYP

AVL    PVL

JU18

C82
C81
C80
VSYS
PGCHG
C79
C78
C77

FETDRV

R8

MAX 77829
WWW.MAXIMIN
1-4

J7    R1
C2
DM
DP
R3  DCIN
C3  INTB
R2  R23

FLASHEN

INFLED

JU3
THM
1    2

THM    R7

JU17    D102    R26    CHGIND
2  ●  ■ 1    ■ ●
SAFEO    D18

JU5
1  ■ ● 2

+

GND5

C1 C9
C8
C4
C6
U1
C12    C11
C14
C13
C62
D1

L1

C5 R4 Q1
C7 C10
R20
L2

SYS_A  1  JU16  2  VSYS

WLEDOUT

R14
R13

JU15
+ 1  ■ ● 2

SW4-MRSTB

R21    MRSTB    SAFEOUT

MBATDETB    R11

R33    R12
R29    R10

C15
R32    RESETB    VICHG

R22

WLEDPWM    R28

R24

R30

SCL

SDA

SW4-FLASHEN

1

JU13    JU4
1 1
2 2
3 3

JU6
1  VIO
VSYS

JU12
2  ●
1  ■

JU14
1  ■
2  ●

JU8
1  ■
2  ●  GND

JU7
1  ■
2  ●  GND

JU9
1  ■
2  ●  GND

JU10
1  ■
2  ●  GND

JU11
1  ■
2  ●  GND

JU1    JU2
2  ●  2  ●
1  ■  1  ■

D2    D3    D4    D5    D6    D7    D8    D9    D10    D11
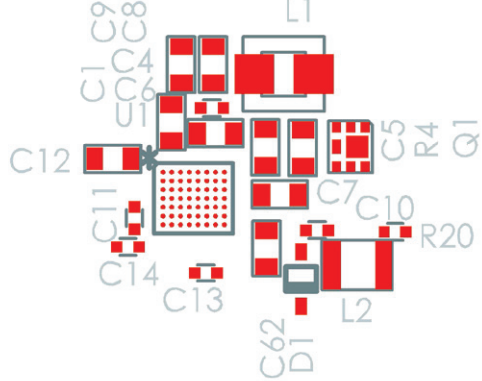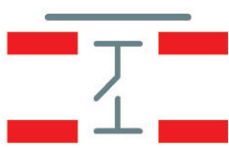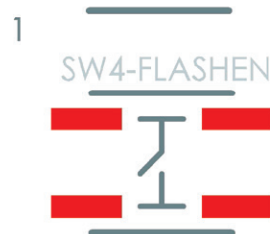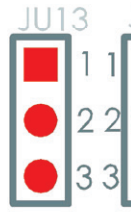
D12    D13    D14    D15    D16    D17    D19    D20    D21    D22

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