EVM User's Guide: LP5814DRLEVM, LP5815DRLEVM, LP5814YCHEVM and LP5815YCHEVM

LP581x 3-Channel and 4-Channel I²C RGB LED Driver Evaluation Module

Description

The LP5814DRLEVM and LP5814YCHEVM evaluation module (EVM) helps designers evaluate the functions of the LP5814, LP5814I and LP5816. The LP5815DRLEVM and LP5815YCHEVM helps designers evaluate the functions of the LP5815 and LP5817. The LP581x_RUKA Graphical User Interface (GUI) is provided to control all the family devices LP5814, LP5814I, LP5815, LP5816, and LP5817 through the USB2ANY interface adapter.

Get Started

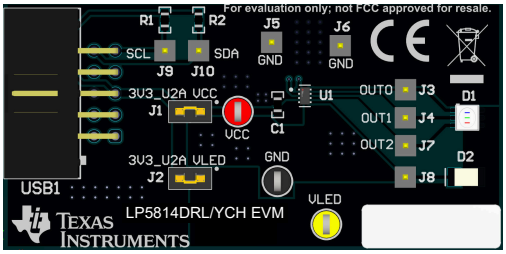
1. Request the LP5814DRLEVM and LP5814YCHEVM or LP5815DRLEVM and LP5815YCHEVM from ti.com .
2. Download the LP5814, LP5815, LP5816, LP5817 or LP5814I data sheet from ti.com.
3. Download the LP581x_RUKA GUI from ti.com.

Features

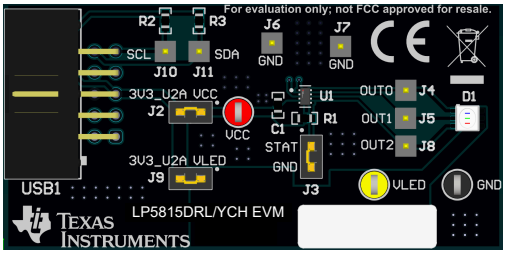
- LP5814: four-channel I²C interface RGBW LED driver with auto animation control
- LP5815: three-channel I²C interface RGB LED driver with instant blinking and auto animation control
- LP5814I: four-channel I²C interface RGBW LED driver with instant blinking and auto animation control
- I²C signal and 3.3V power input from USB2ANY interface adapter
- LP581x_RUKA GUI is used to control the EVM

Applications

- Portable and wearable electronics: e-cigarette, earbuds and charging case
- Gaming and home entertainment: smart speaker, RGB mouse, video doorbell
- Industrial HMI: EV charger, factory automation



LP5814DRLEVM and LP5814YCHEVM



LP5815DRLEVM and LP5815YCHEVM

1 Evaluation Module Overview

1.1 Introduction

The LP5814DRLEVM and LP5814YCHEVM can be converted for testing the LP5816 or the LP5814I by replacing the factory-installed device (U1) with the LP5816 or the LP5814I device.

LP5815DRLEVM and LP5815YCHEVM can be converted for testing the LP5817 by replacing the factory-installed device (U1) with the LP5817 device.

This user's guide describes the LP5814DRLEVM and LP5814YCHEVM and LP5815DRLEVM and LP5815YCHEVM evaluation modules. This user's guide is used as a reference for engineering evaluation. Included in this user's guide are hardware setup instructions, Graphical User Interface (GUI) installation, GUI guidance, schematic diagrams, print board (PCB) layout and bill of materials (BOM).

1.2 Kit Contents

The LP5814EVM and LP5815EVM kit includes the following materials and is illustrated in Figure 1-1.

- LP5814 or LP5815 evaluation module
- USB2ANY interface adapter with ribbon cables and USB cable

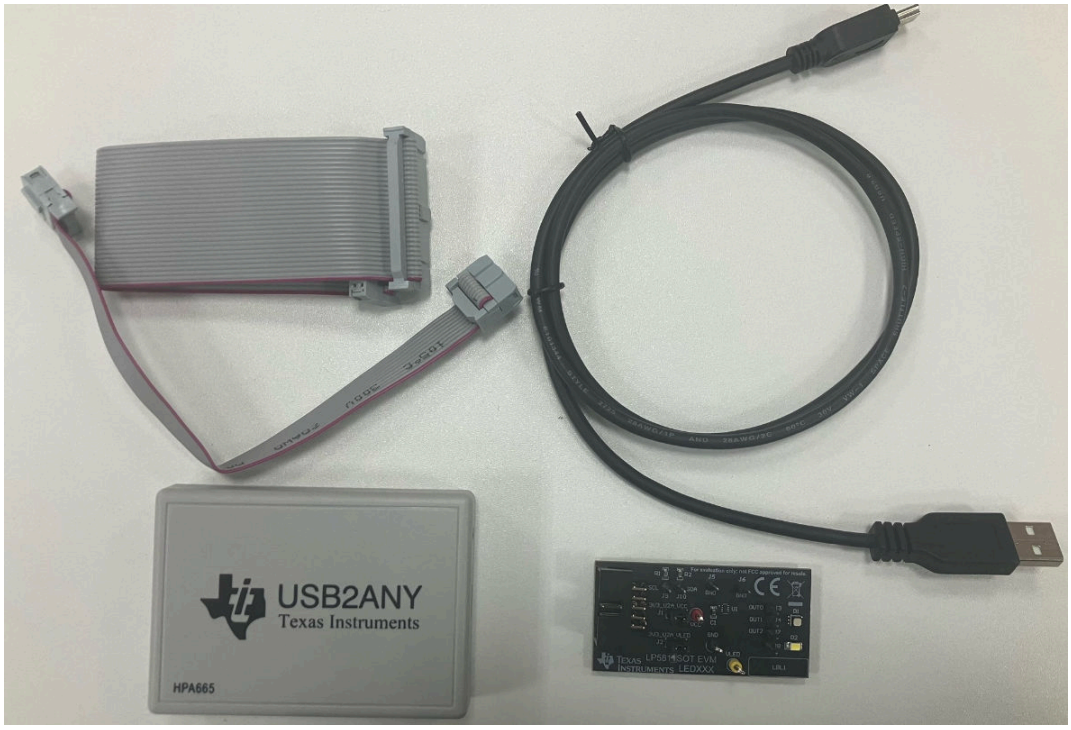


Figure 1-1. LP5814EVM and LP5815EVM Kit

1.3 Device Information

The following devices can be used with the EVM for evaluation:

- LP5814 : 4-channel I^2C interface RGBW LED driver with auto animation control.
- LP5815 : 3-channel I^2C interface RGB LED driver with instant blinking and auto animation control.
- LP5814I : 4-channel I^2C interface RGBW LED driver with auto animation control and instant blinking.
- LP5816 : 4-channel I^2C interface RGBW LED driver.
- LP5817 : 3-channel I2C interface RGB LED driver.

2 Hardware

2.1 Setup

This section describes how to set up the LP5814DRLEVM, LP5814YCHEVM, LP5815DRLEVM and LP5815YCHEVM properly. Items from the following list are required to begin the evaluation.

- Computer
- LP5814DRLEVM, LP5814YCHEVM, LP5815DRLEVM or LP5815YCHEVM
- USB2ANY interface adapter

In the default jumper setting, the board can be evaluated by USB2ANY power directly and does not need an external power supply. Setup connection is demonstrated in Figure 2-1. The setup procedure is as follows:

1. Connect the USB2ANY with the LP5814DRLEVM, LP5814YCHEVM, LP5815DRLEVM, or LP5815YCHEVM through the ribbon cable.
2. Make sure all jumpers are properly set under the appropriate operating conditions. See more details in Jumper Information.
3. Plug the USB cable into the USB port on the computer.

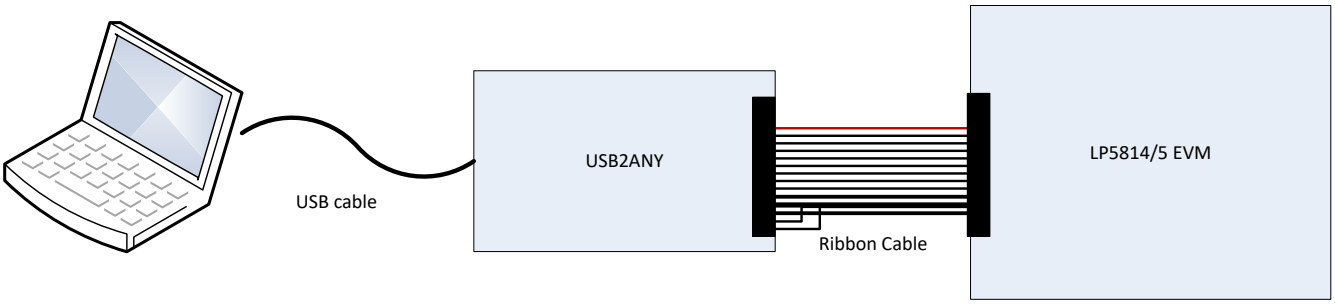


Figure 2-1. Hardware Connection

2.2 Jumper Information

1. For the LP5814DRLEVM and LP5814YCHEVM, the LP5814 is under the conditions below with the default jumpers setting.
   - The *VCC* of LP5814 is connected to the 3.3V of USB2ANY through *J1*.
   - The *VLED*, which provides the power supply for the RGB LED D1 and White LED D2, is connected to the 3.3V of USB2ANY through *J2*.

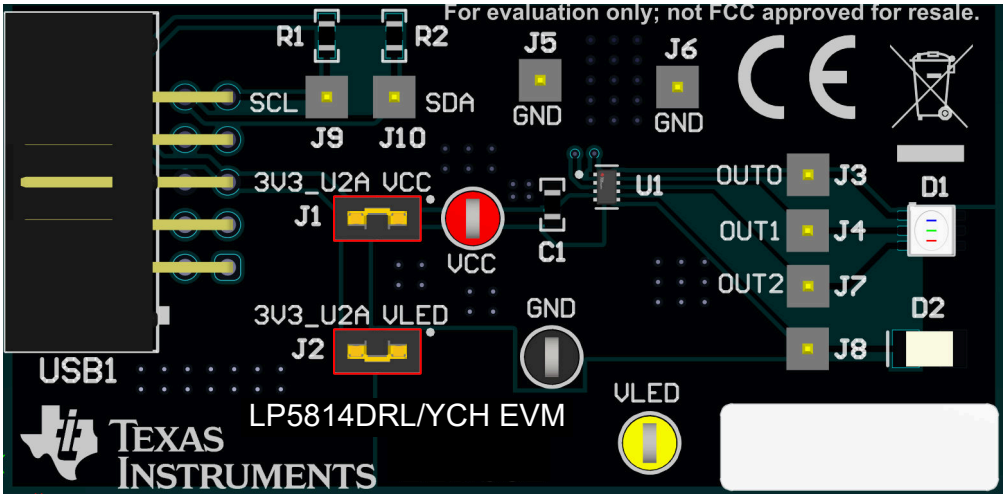


Figure 2-2. LP5814DRLEVM and LP5814YCHEVM Default Jumpers Setting

2. For the LP5815DRLEVM and LP5815YCHEVM, the LP5815 is under the conditions below with the default jumpers setting.

Make sure the jumper *J3* is populated while using the LP5815DRLEVM or LP5815YCH EVM board to evaluate the LP5817.

- The *VCC* of LP5815 is connected to the 3.3V of USB2ANY through the jumper *J2*.
- The *STAT* of LP5815 is connected to GND through the jumper *J3*.
- The *VLED*, which provides the power supply for the RGB LED D1, is connected to the 3.3V of USB2ANY through the jumper *J9*.

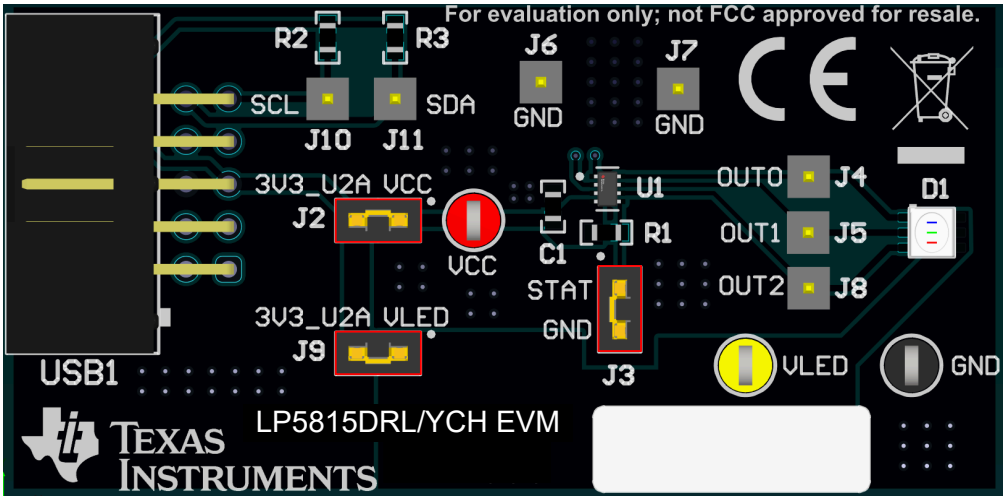


Figure 2-3. LP5815DRLEVM and LP5815YCHEVM Default Jumpers Setting

3 Software

3.1 Software Description

This section describes how to install the GUI and control the EVM through the GUI. Items from the following list are required to begin evaluating the EVMs.

- LP581x_RUKA GUI software

3.2 Graphical User Interface (GUI) Installation

The LP581x_RUKA GUI software is downloaded from the link: LP581x_RUKA GUI.

On the Gallery page as shown in Figure 3-1, click the blank part of the panel to open the online version or click the *Download* button and select the platform to install the *offline version* to the user's computer.

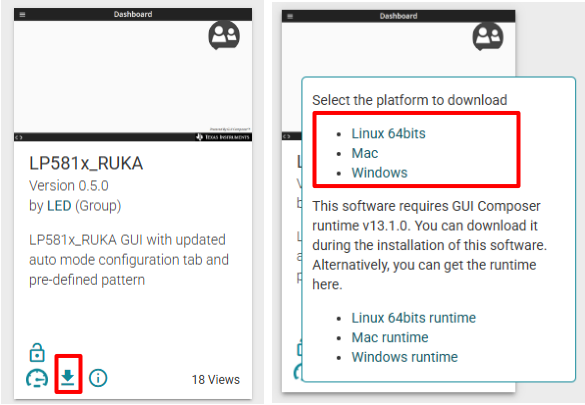


Figure 3-1. GUI Download Page

For the offline version, after the download completed, extract the file and double click the exe application file to start the installation. Then follow the setup wizard to complete the installation, during which the license has to be accepted and all the default settings are kept. The installation takes about several ten minutes depends on the network speed.

Figure 3-2 appears to prompt that the offline version is installed successfully. Click the *Finish* button to start the GUI evaluation.

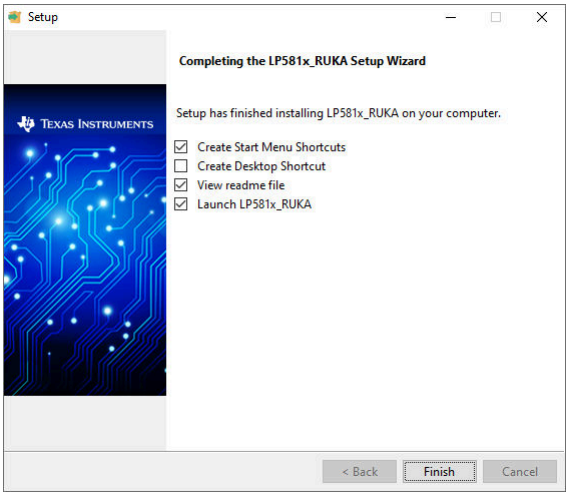


Figure 3-2. Last Step of Installing GUI Successfully

3.3 Graphical User Interface (GUI) Guidance

The LP581x_RUKA GUI is a convenient tool to control and evaluate all functions of LP581x(4/4I/5/6/7) family.

3.3.1 Hardware Connection

Open the GUI software and plug the USB cable into the USB port of the computer. The *Hardware Connection Status Bar* on the left down corner of the GUI illustrates the hardware connection status.

Click the connection button to initiate the software connection to the EVM board through the USB2ANY. The connection status shows the connection result of the GUI and EVM board.

- *Hardware Connected* indicates the EVM is connected to the GUI successfully
- *Hardware not Connected* indicates the EVM is not connected to the GUI successfully

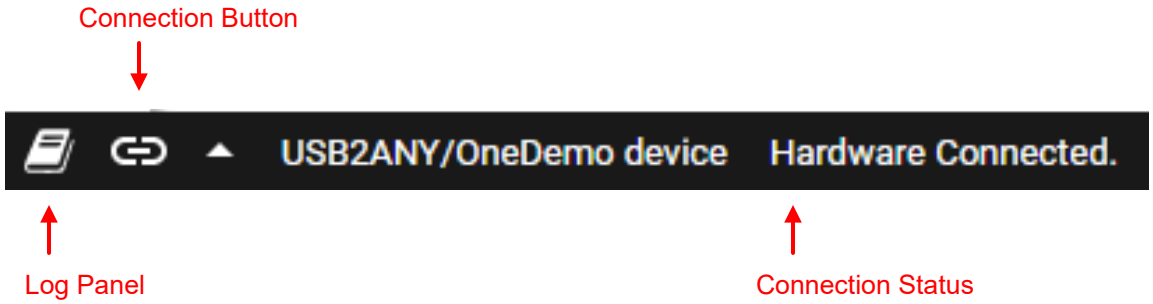


Figure 3-3. Hardware Connection Status Bar

In case the USB2ANY tool has been used to evaluate other EVMs and updated to other firmware version (such as, 2.8.2.0), the firmware version is required to updated to the mapping version of the LP581x_RUKA GUI. After clicking the connection button, the firmware update window appears as shown in Figure 3-4. Follow the steps to complete the firmware update.

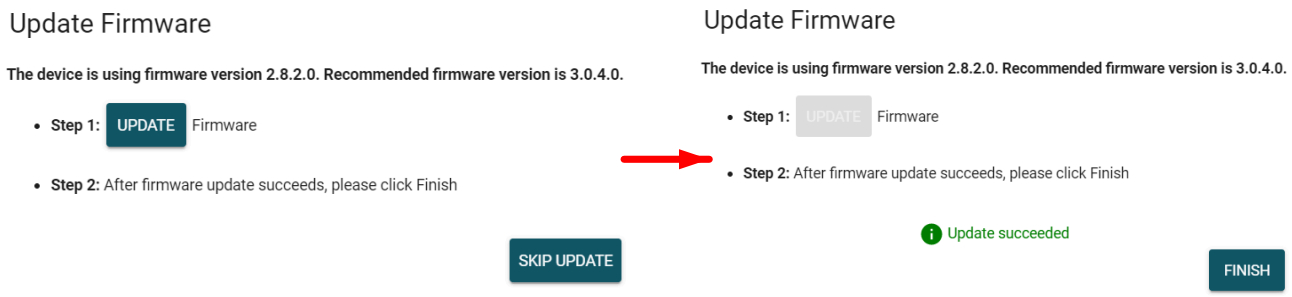


Figure 3-4. Firmware Update

In case the USB2ANY tool has never been used to evaluate any EVM, the following steps is needed before clicking the UPDATE button to update the firmware version of the USB2ANY to the mapping version of the GUI after clicking the connection button.

1. Unplug the USB cable (do not click the *UPDATE* button).
2. Press the BSL button inside USB2ANY, then plug in the USB cable.
3. Click *UPDATE* button.

3.3.2 Start Page

The Figure 3-5 is shown after opening the GUI, on which different device variants can be selected. The LP5814 is chosen by default. Choose the device that is mounted on the EVM connected to the GUI. Then click the *EXPLORE* button to start the evaluation.

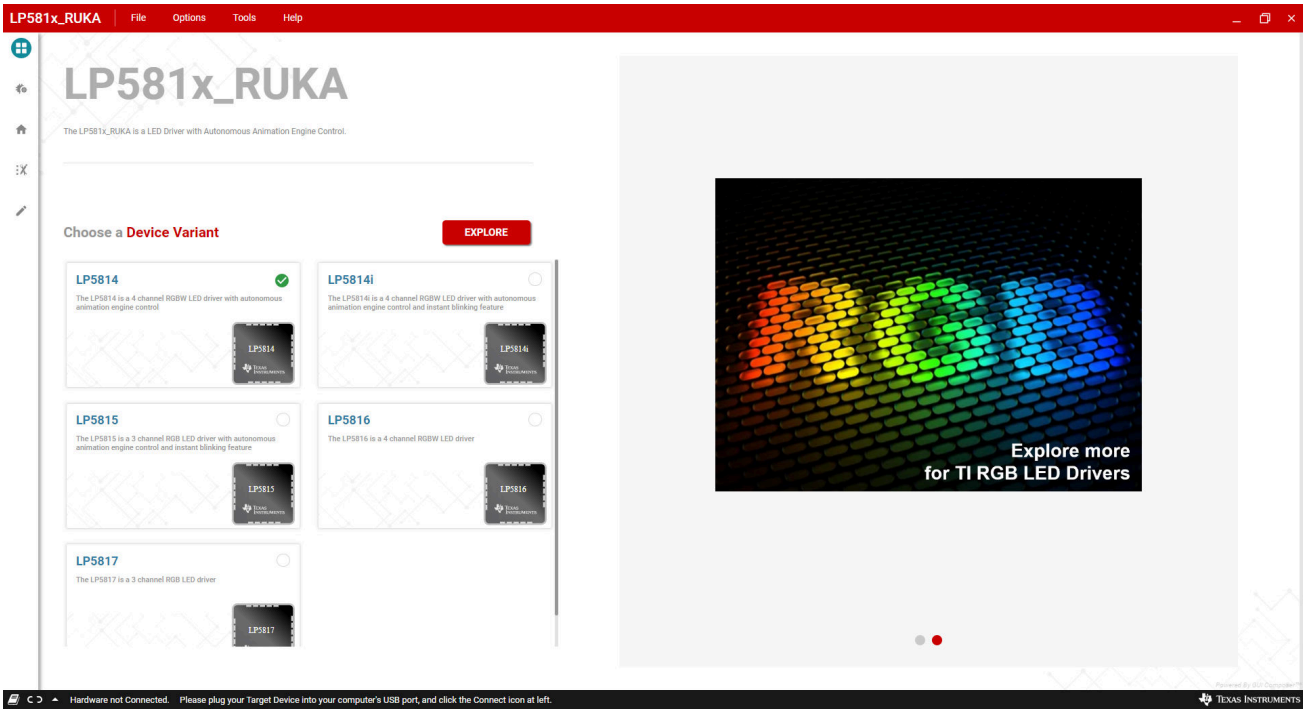


Figure 3-5. Start Page

When LP5814, LP5816 or LP5817 is chosen on the *Start Page*, after clicking the *EXPLORE* button, the GUI jumps to the *Home Page*.

When LP5815 or LP5814I is chosen on the Start Page, after clicking the *EXPLORE* button, the instant blinking disable prompt window appears as shown in Figure 3-6.

- Click *YES* to set the INSTABLINK_DIS bit as 1.
- Click *NO* to keep the INSTABLINK_DIS bit as 0.

As for the LP5815, the STAT is shorted to the GND by default through the jumper *J3*. The instant blinking function is disabled even though the INSTABLINK_DIS bit is 0. To have the instant blinking on the OUT0, remove jumper *J3*.

Either click *Yes* or *No* so the GUI jumps to *Home Page*.

Figure 3-6. Instant Blinking Disable

3.3.3 Hardware Setup Page

There are two tabs shown on the Figure 3-7.

- *Connect the EVM to Your PC* shows the cable connections between computer and USB2ANY tool and the EVM.
- *Connect the Jumpers* shows the default jumpers setting for the EVM.

Click *FINISH* to jump to the *Home Page*.

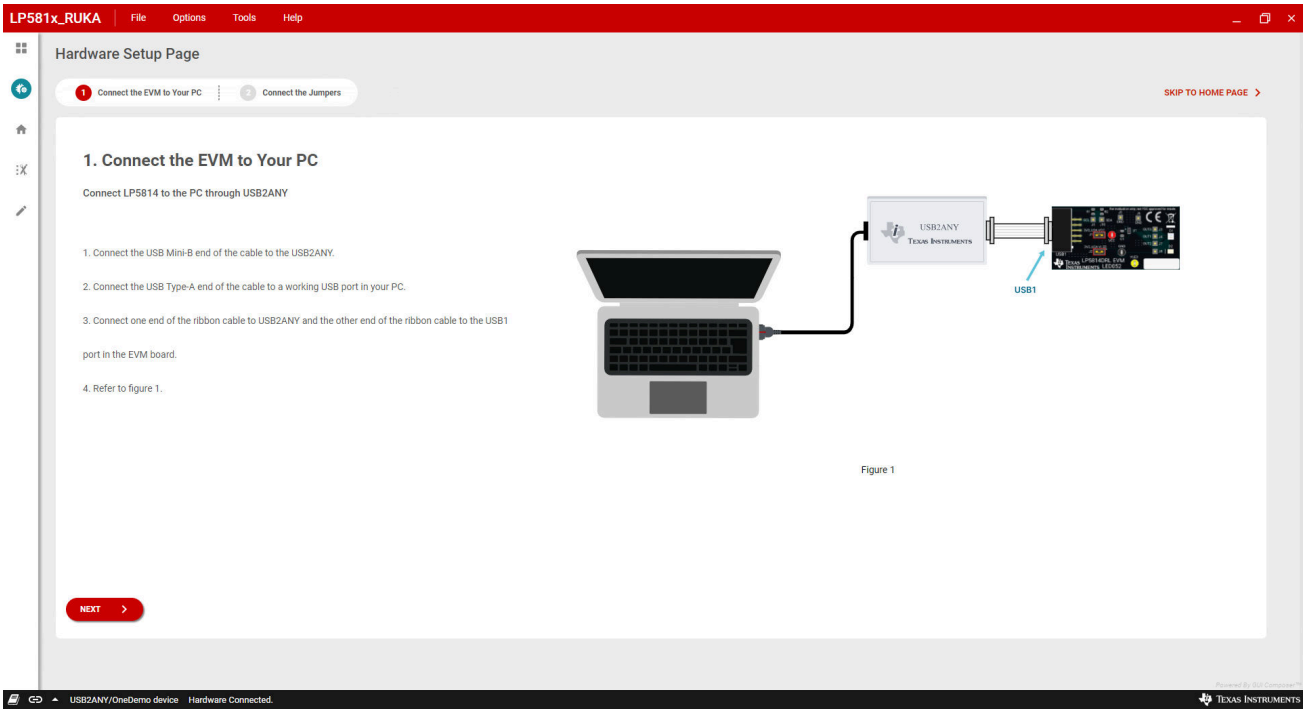


Figure 3-7. Hardware Setup Page

3.3.4 Home Page

On the left side of the Figure 3-8, there is the *Hardware Setup* control. The I^2C broadcast communication mode is selected by default. After clicking the *CONFIGURE & EDIT* button, the *Mode* selection control is enabled for input and the hardware is disconnected. *Independent* mode can be selected from the *Mode* pulldown menu. Then click *CONFIGURE & CONNECT* to initiate the hardware connection through the independent I^2C communication mode.

On the right side of the Figure 3-8, there are two shortcuts that navigate to *LED Control Page* and *Register Map Page* through clicking the corresponding *START* button.

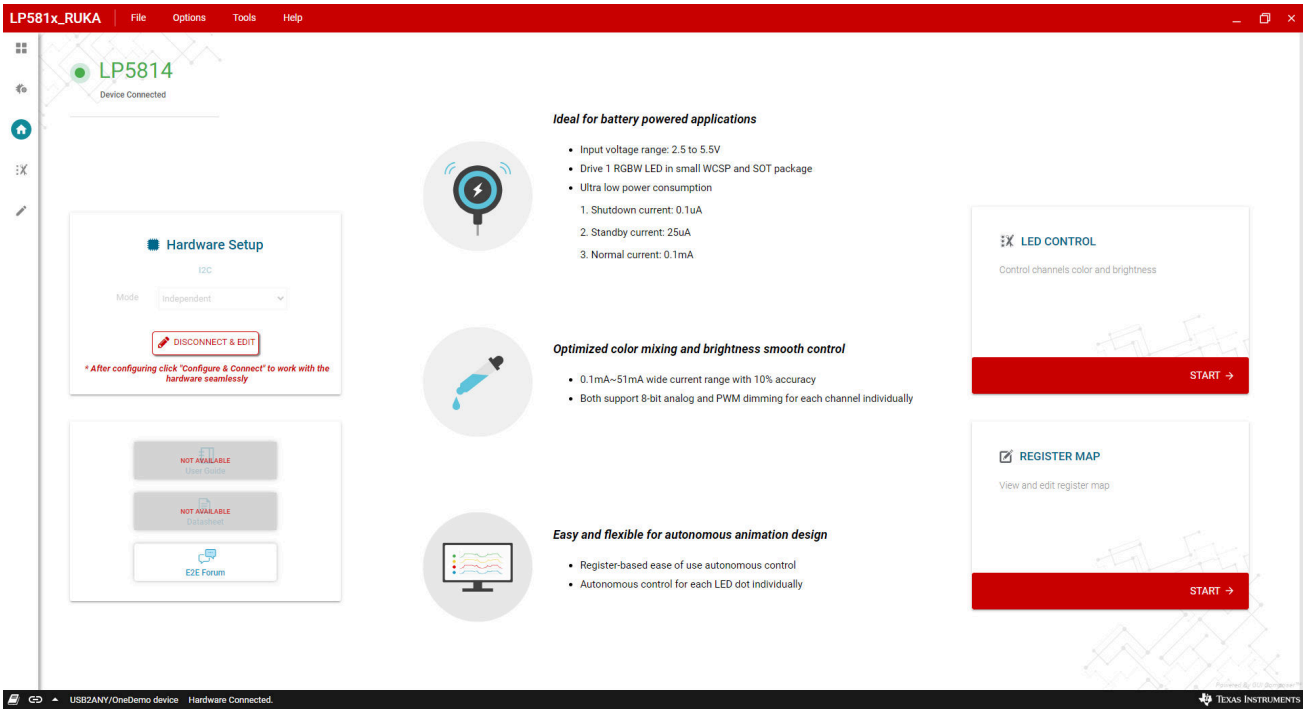


Figure 3-8. Home Page

3.3.5 LED Control Page

Figure 3-9 provides controls for all the functions of the device. Following sections describe how to use the GUI to turn on the LED in manual mode and autonomous animation mode based on the LP5814DRLEVM or LP5814YCHEVM.

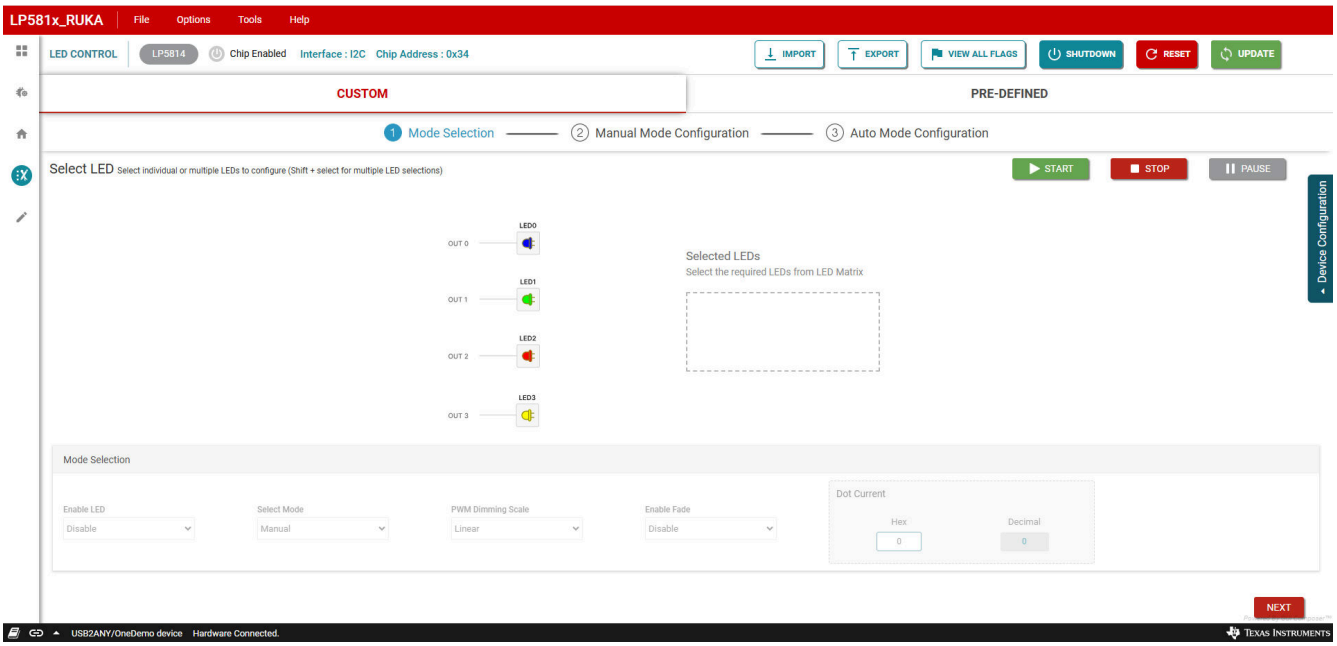


Figure 3-9. LED Control Page

3.3.5.1 Turn ON LED in Manual Mode

This section shows the steps to turn on the blue (OUT0) and green (OUT1) LEDs in manual mode.

1. Enable chip through clicking *Chip Enabled* button as shown in Figure 3-10.

2. Select the blue LED (OUT0) and green LED (OUT1) to do the configuration through clicking the blue LED and green LED with *Shift* keyboard button pushed.
3. Enable the selected blue LED and green LED through selecting the *Enable* item from the *Enable LED* pulldown menu. Set the selected blue LED and green LED in manual mode through selecting the *Manual* item from the *Select Mode* pulldown menu.

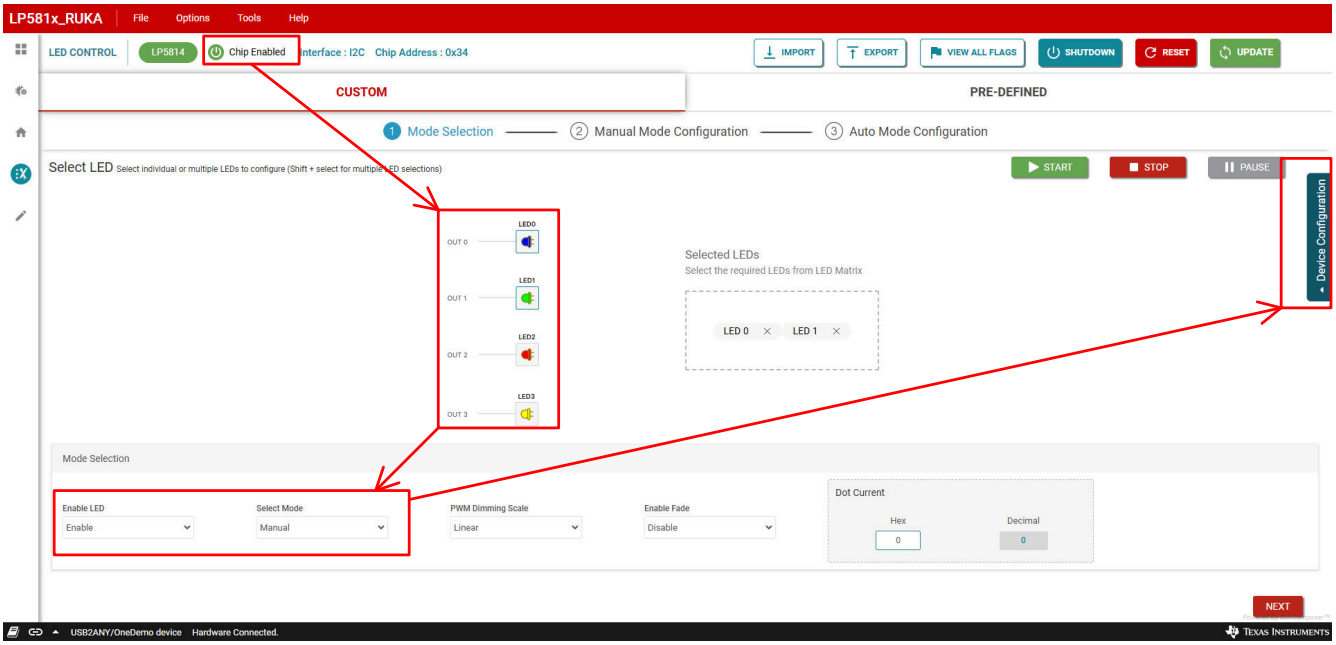


Figure 3-10. Chip Enable and Manual Mode Set

4. Click the *Device Configuration* button on the right side of the *LED Control* page to open the maximum current configure panel as shown in Figure 3-11. Set the MC (Maximum Current) for the selected blue LED and green LED through selecting the *25.5mA* or *51mA* item from the *Maximum Current* pulldown menu.
5. **Click *UPDATE* button on the top right corner to make the configurations in above step 3 and step 4 take effect**.

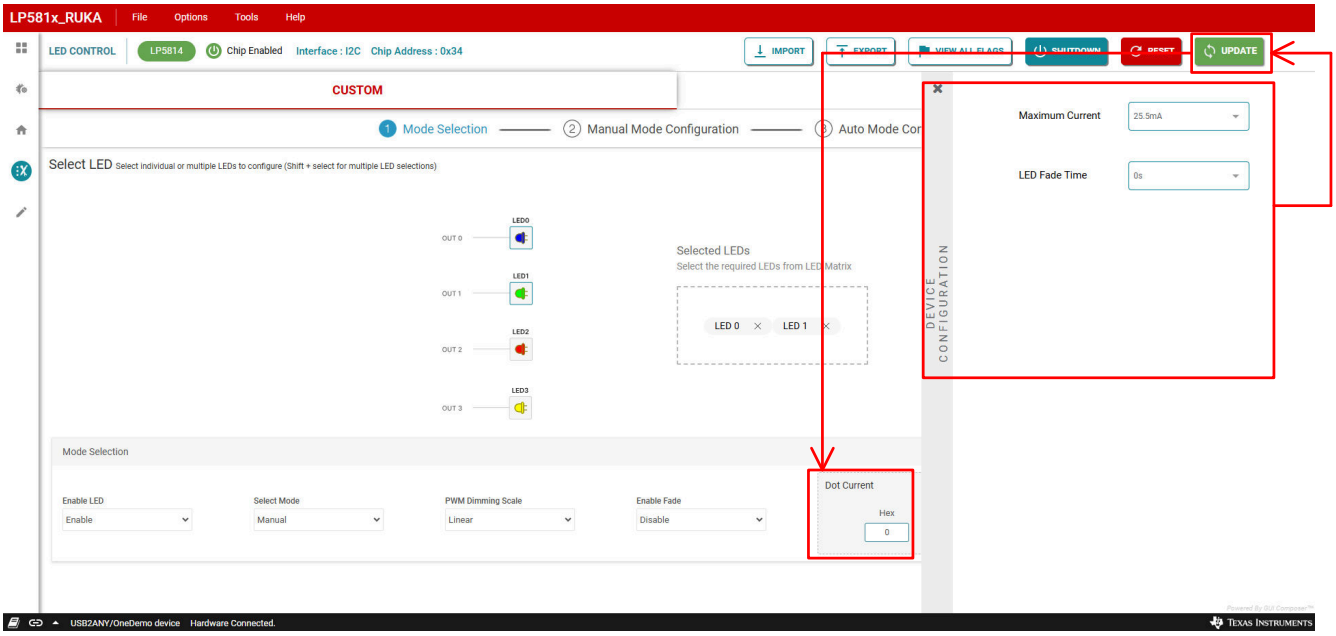


Figure 3-11. Current Set and Update Command Send in Manual Mode

6. Set DC (Dot Current) value for the selected blue LED and green LED through entering the data in the *Dot Current* control as shown in Figure 3-11.

7. Click the *Manual Mode Configuration* tab to open the manual PWM setting panel as shown in Figure 3-12. Set manual PWM value for the selected blue LED and green LED through entering the data in the *Manual PWM* control.

   The selected blue LED and green LED are turned on after entering the PWM value.

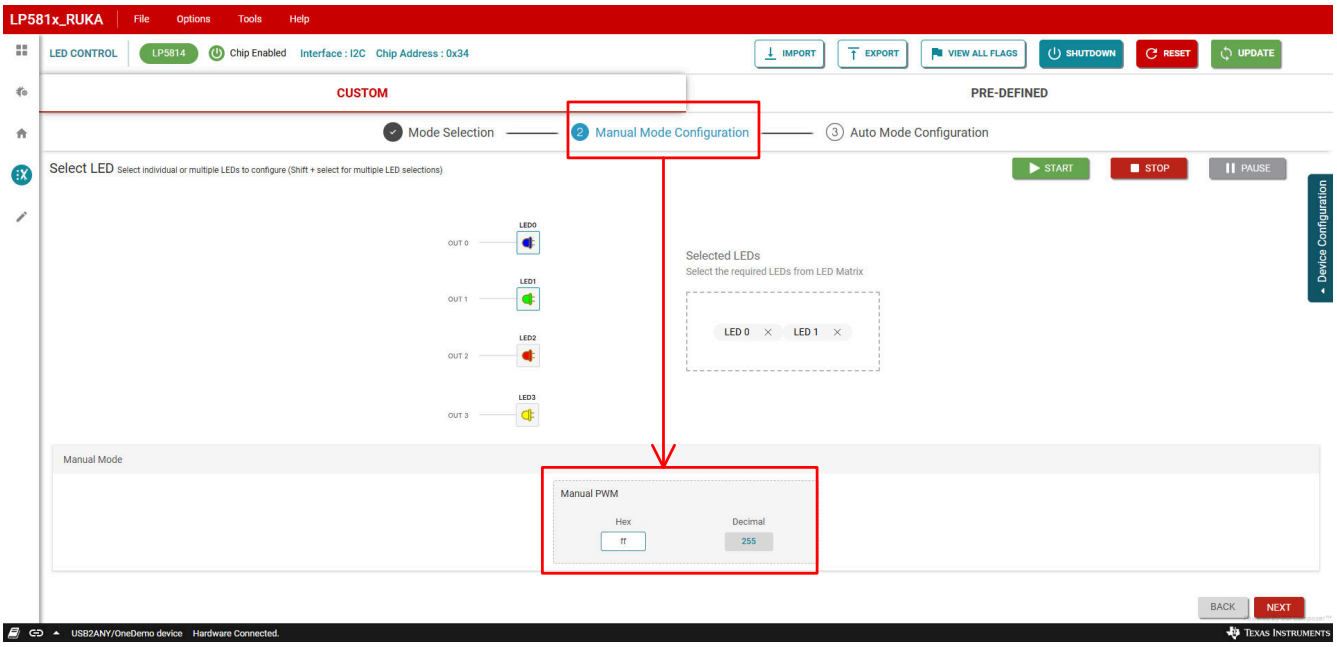


Figure 3-12. Manual PWM Set

3.3.5.2 Turn On LED in Autonomous Mode

This section shows the steps to turn on the red LED (OUT2) and white LED (OUT3) LEDs in autonomous animation mode with the patterns as shown in Table 3-1 and .

Table 3-1. Design Parameters

LED	PATTERNS
Red LED (OUT2)	Animation Mode, Blinking with 5Hz Frequency
White LED (OUT3)	Animation Mode, Breathing with 1s Exponential Ramping Up and 1s Exponential Ramping Down

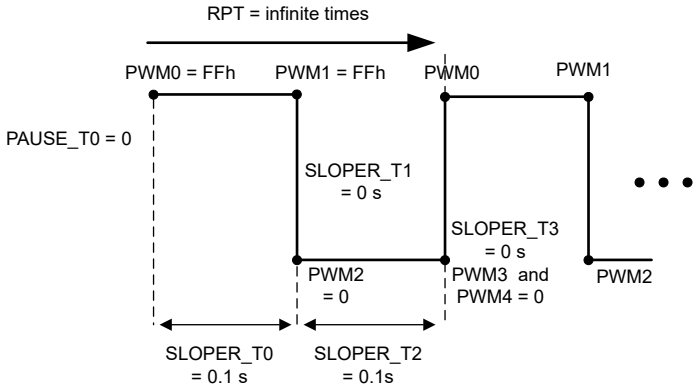


Figure 3-13. Blinking Pattern

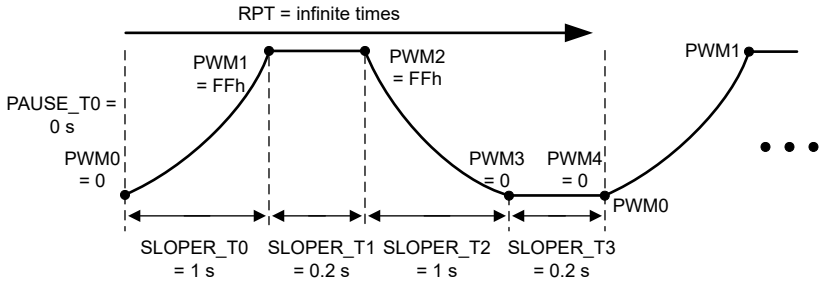


Figure 3-14. Breathing Pattern

1. Enable chip through clicking *Chip Enabled* button as shown in Figure 3-15.
2. Select the red LED (OUT2) and white LED (OUT3) to do the configuration through clicking the red LED and white LED with *Shift* keyboard button pushed.
3. Enable the selected red LED and white LED through selecting the *Enable* item from the *Enable LED* pulldown menu.

   Set the selected red LED and white LED in autonomous animation mode through selecting the *Auto* item from the *Select Mode* pulldown menu.

   Enable exponential PWM dimming for the selected red LED and white LED through selecting the *Exponential* item from the *PWM Dimming Scale* pulldown menu.

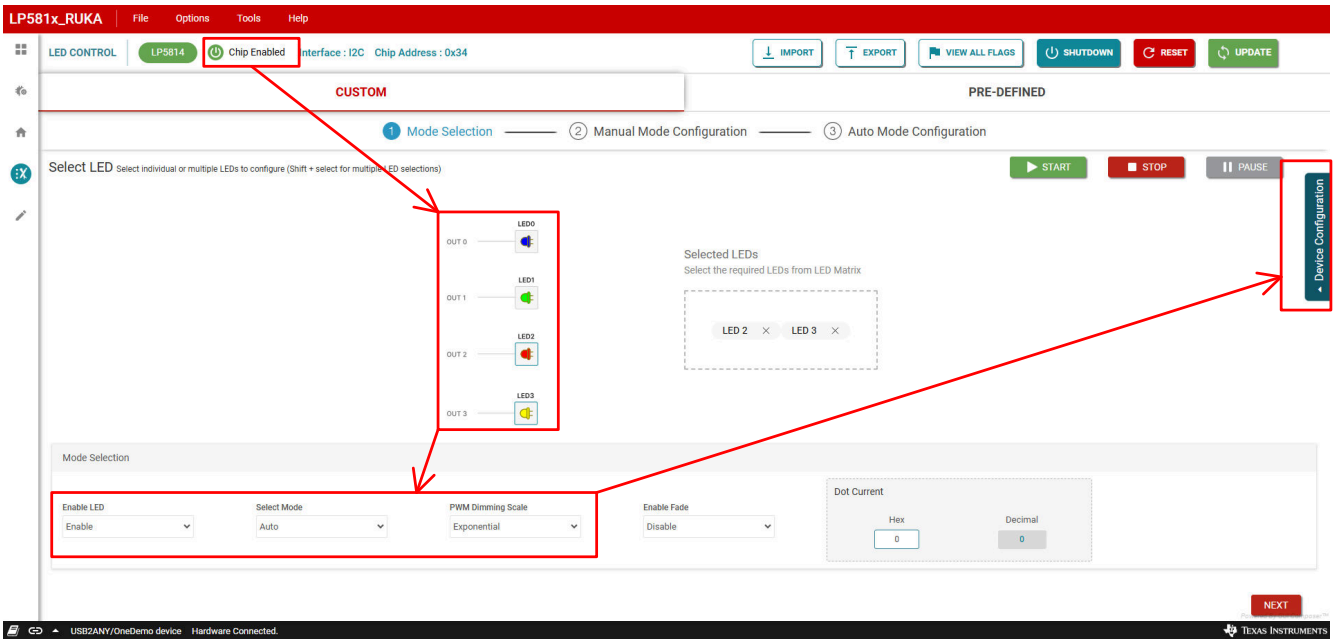


Figure 3-15. Chip Enable and Auto Mode Set

4. Click the *Device Configuration* button on the right side of the *LED Control* page to open the maximum current configure panel as shown in Figure 3-16. Set the MC (Maximum Current) for the selected red LED and white LED through selecting the *25.5mA* or *51mA* item from the *Maximum Current* pulldown menu.
5. Click *UPDATE* button on the top right corner to make the configurations in above step 3 and step 4 take effect.
6. Set DC (Dot Current) value for the selected blue LED and green LED through entering the data in the *Dot Current* control as shown in Figure 3-16.

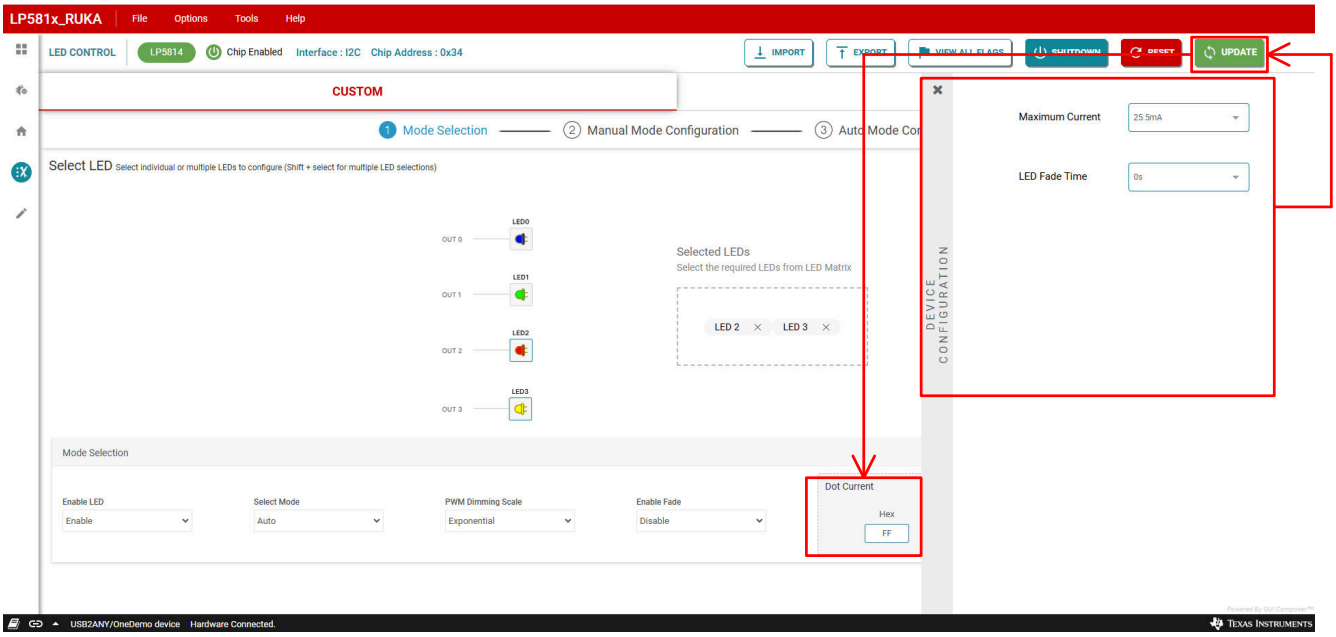


Figure 3-16. Current Set and Update Command Send in Auto Mode

7. Click the *Auto Mode Configuration* tab to open the patterns setting panel as shown in Figure 3-17.

   Select engine 0 for selected red LED (OUT2) through selecting the *Engine0 is selected* item from the *OUT2 Engine Channel* pulldown menu.

   Select engine 1 for selected white LED (OUT3) through selecting the *Engine1 is selected* item from the *OUT3 Engine Channel* pulldown menu

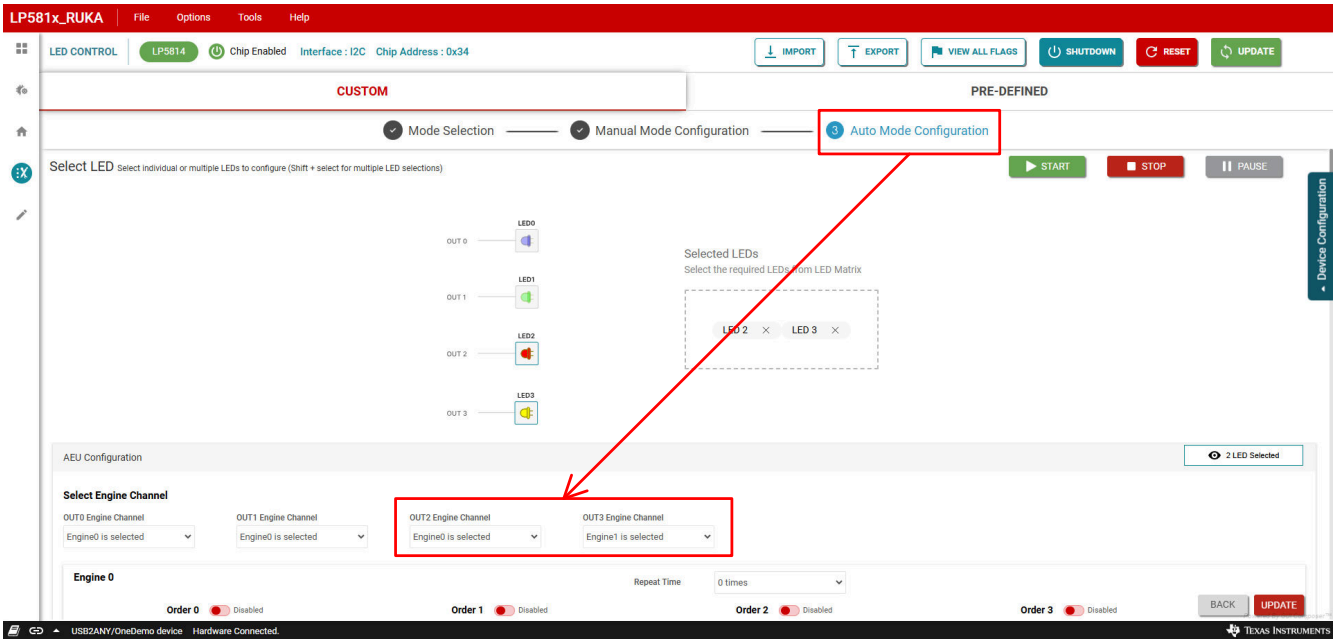


Figure 3-17. Engine Select

8. Enable engine 0 order 0 through clicking the toggle button besides the *Order 0* under *Engine 0* control panel. Select pattern 0 for engine 0 order 0 through selecting the *Pattern0 is selected* item from the pulldown menu under the *Order 0* as shown in Figure 3-18.

   Enable engine 1 order 0 through clicking the toggle button besides the *Order 0* under *Engine 1* control panel. Select pattern 1 for engine 1 order 0 through selecting the *Pattern1 is selected* item from the pulldown menu under the *Order 0* as shown in Figure 3-18.

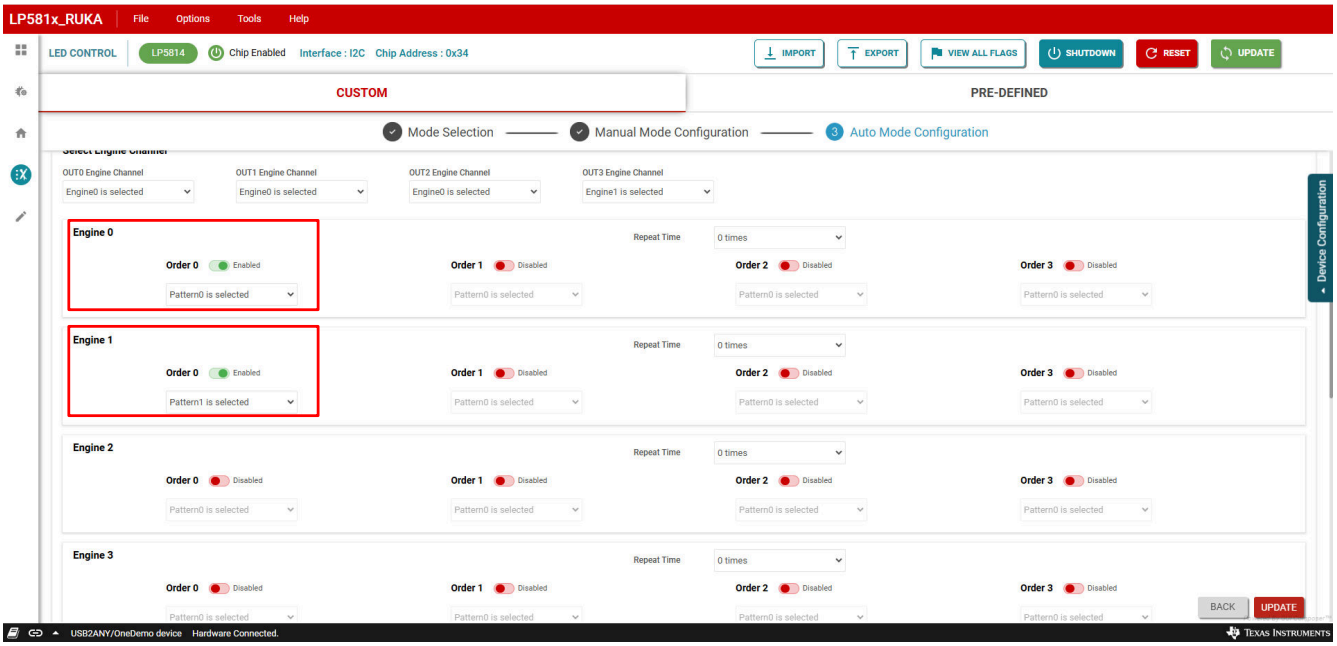


Figure 3-18. Engine Order Enable

9. Set the parameters of pattern 0 as the value shown in the Table 3-2 table.

   Set the parameters of pattern 1 as the value shown in the Table 3-3 table.

   Enter the values under the *PATTERN 0* and *PATTERN 1* control panels as shown in Figure 3-19.

Table 3-2. PATTERN0 5Hz Blinking Parameters

Address	Register	Set Value	Description
1Ch	PATTERN0_PAUSE_TIME	00h	No pause time
1Dh	PATTERN0_REPEAT_TIME	0Fh	Infinite repeat times
1Eh	PATTERN0_PWM0	FFh	PATTERN0_PWM0 = FFh
1Fh	PATTERN0_PWM1	FFh	PATTERN0_PWM1 = FFh
20h	PATTERN0_PWM2	00h	PATTERN0_PWM2 = 0
21h	PATTERN0_PWM3	00h	PATTERN0_PWM3 = 0
22h	PATTERN0_PWM4	00h	PATTERN0_PWM4 = 0
23h	PATTERN0_SLOPER_TIME1	02h	PATTERN0_SLOPER_T1 = 0, PATTERN0_SLOPER_T0 = 0.1s
24h	PATTERN0_SLOPER_TIME2	02h	PATTERN0_SLOPER_T3 = 0, PATTERN0_SLOPER_T2 = 0.1s

Table 3-3. PATTERN1 Breathing Parameters

Address	Register	Set Value	Description
25h	PATTERN1_PAUSE_TIME	00h	No pause time
26h	PATTERN1_REPEAT_TIME	0Fh	Infinite repeat times
27h	PATTERN1_PWM0	00h	PATTERN1_PWM0 = 0
28h	PATTERN1_PWM1	FFh	PATTERN1_PWM1 = FFh
29h	PATTERN1_PWM2	FFh	PATTERN1_PWM2 = FFh
2Ah	PATTERN1_PWM3	00h	PATTERN1_PWM3 = 0
2Bh	PATTERN1_PWM4	00h	PATTERN1_PWM4 = 0

Table 3-3. PATTERN1 Breathing Parameters (continued)

Address	Register	Set Value	Description
2Ch	PATTERN1_SLOPER_TIME1	4Bh	PATTERN1_SLOPER_T1 = 0.2s, PATTERN1_SLOPER_T0 = 1s
2Dh	PATTERN1_SLOPER_TIME2	4Bh	PATTERN1_SLOPER_T3 = 0.2s, PATTERN1_SLOPER_T2 = 1s

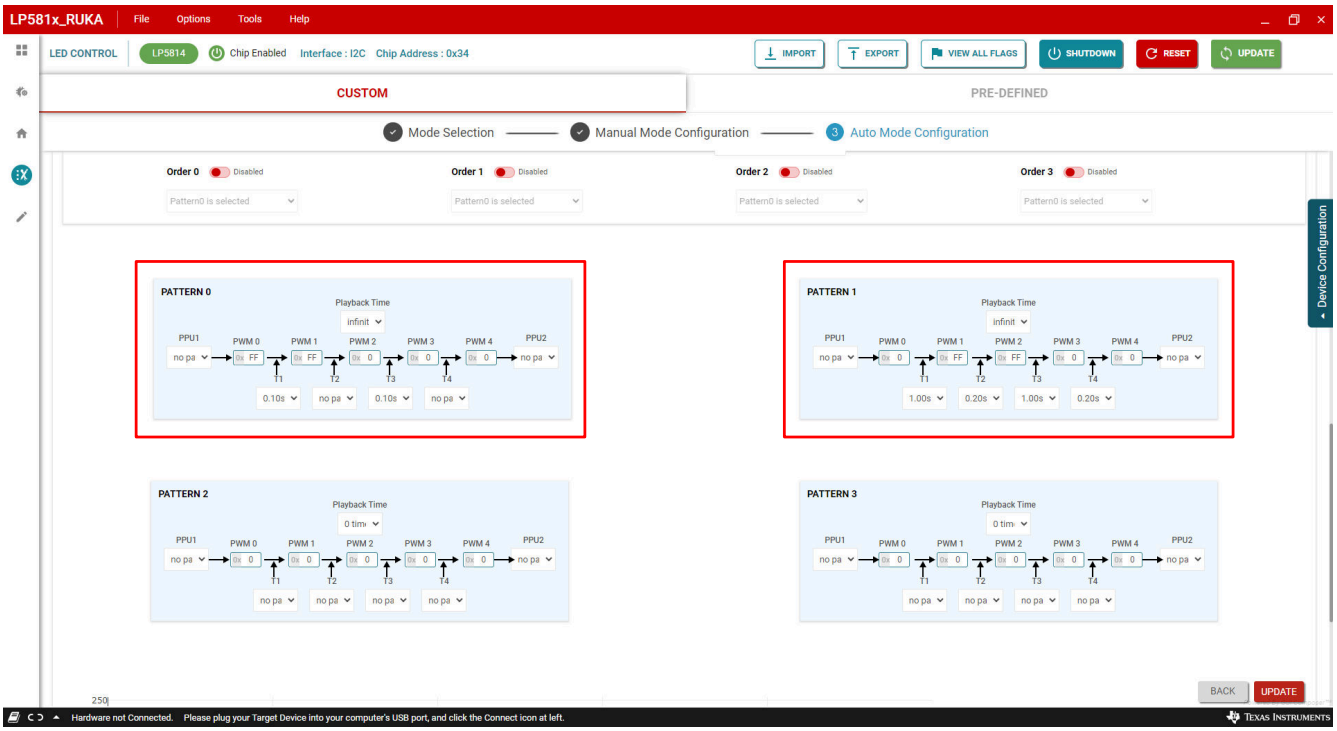


Figure 3-19. Pattern Parameters Set

10. Finally, send start command to start the configured patterns running on the red LED (OUT2) and white LED (OUT3) through clicking the START button as shown in Figure 3-20.

    The selected red LED starts blinking in 5Hz frequency and selected white LED starts breathing up and down after sending start command.

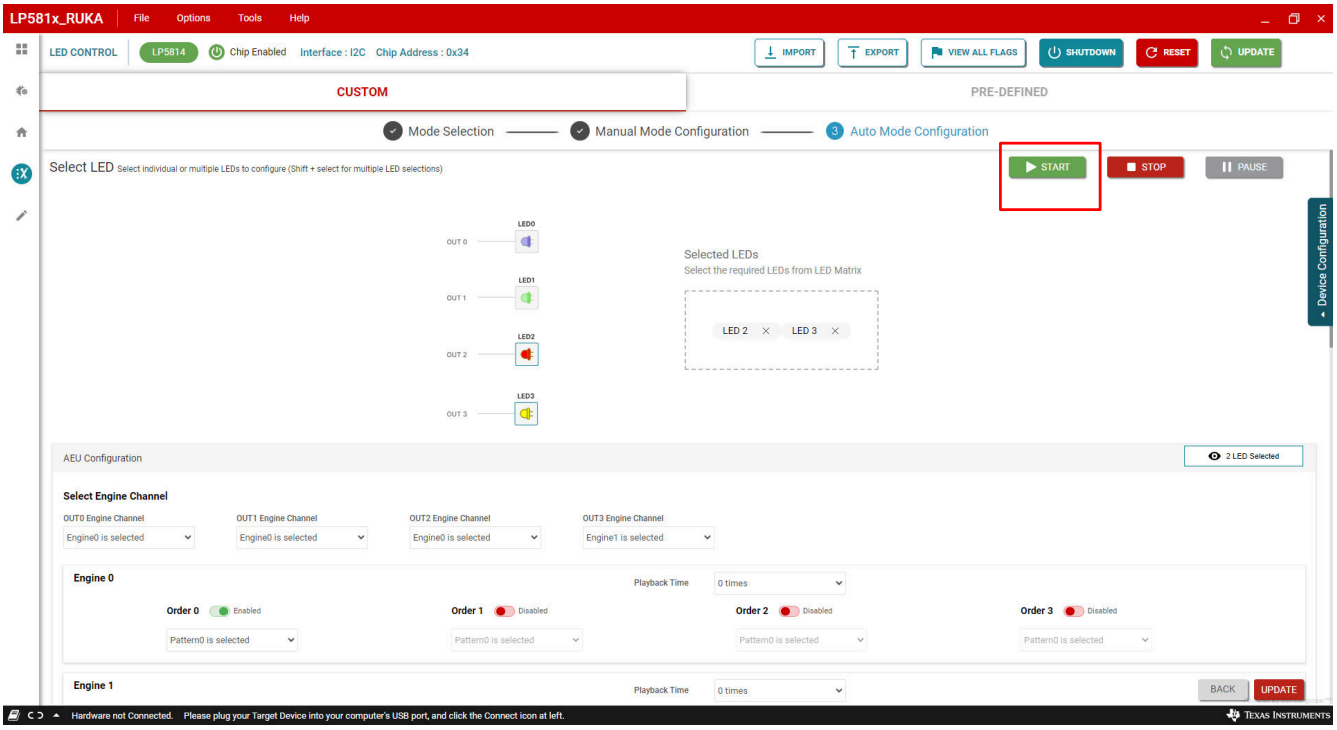


Figure 3-20. Start Command Send

3.3.6 Enter and Exit Shutdown Mode

This section describes how to use the GUI to control the device enter and exit shutdown mode.

Click the *SHUTDOWN* button on the top right corner of the *LED Control Page* to open the *Shutdown Controls* panel as shown in Figure 3-21. There are two pairs of methods to control the device enter and exit shutdown mode as described in the device data sheet.

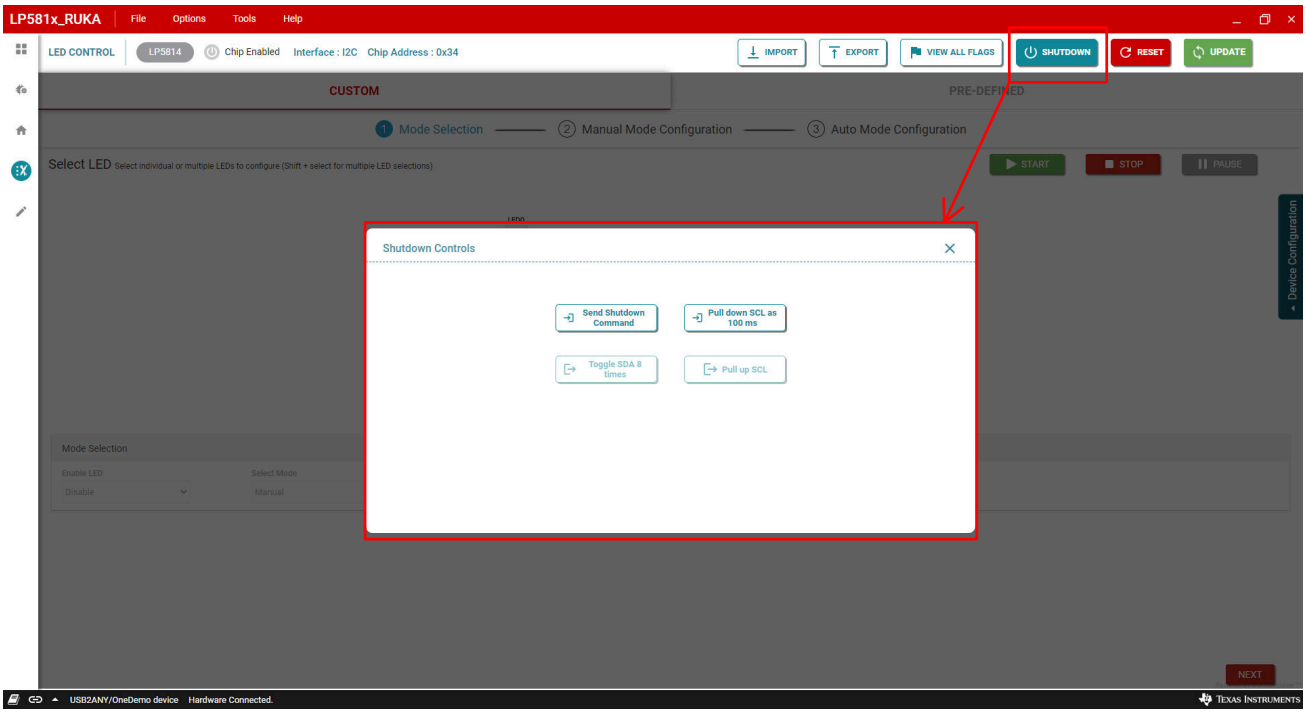


Figure 3-21. Shutdown Controls Open

1. **Enter shutdown mode**

   Click the *Send Shutdown Command* button or *Pull down SCL as 100ms* button as shown in Figure 3-22 to make the device enter shutdown mode. After that, the clicked button is hidden for clicking protection and the button below is enabled for clicking. The hardware connection status, as shown in Figure 3-3, shows the *Hardware not Connected* as the I^{2}C of the device is inactive in shutdown mode.

   As for LP5815, STAT pin is required to be pulled down through populating the jumper J3 to make the device enter shutdown mode. The LP5815 exits shutdown mode once the STAT is pulled up through removing the jumper J3.

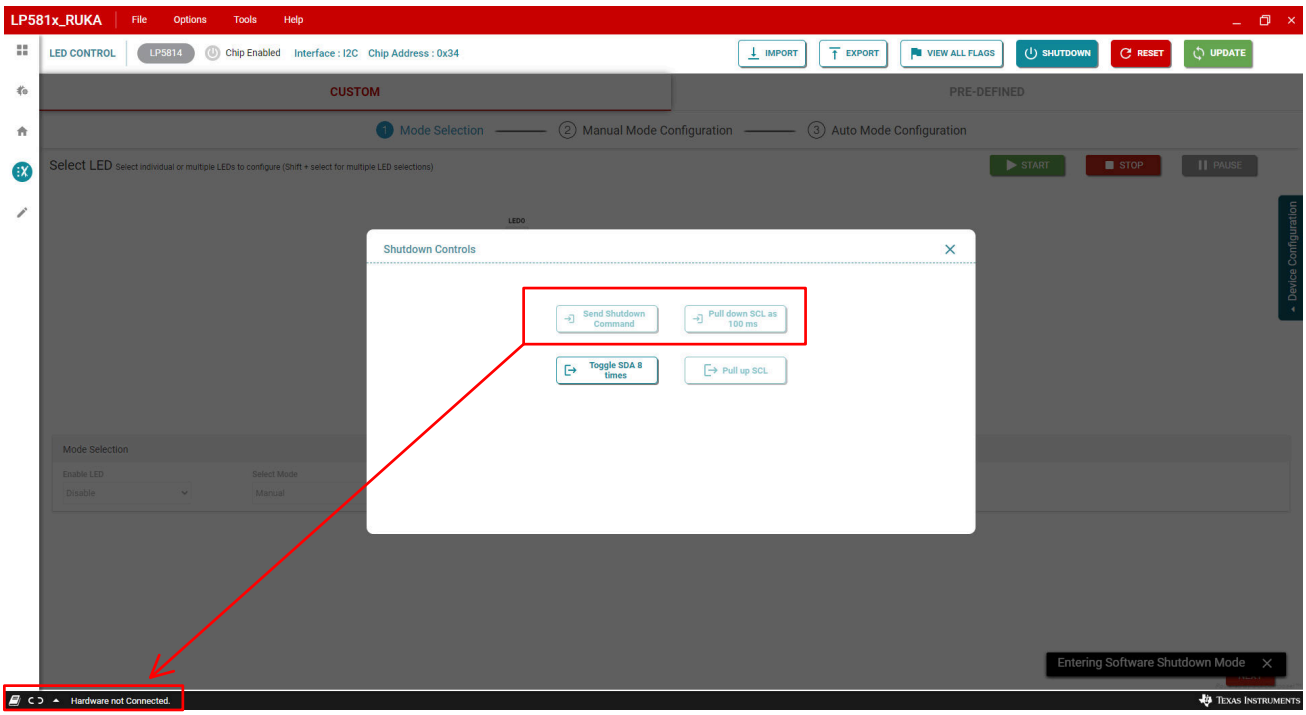


Figure 3-22. Enter Shutdown

2. **Exit shutdown mode**

   Click the *Toggle SDA 8 times* button if *Send Shutdown Command* button is clicked in the step1 or Click the *Pull up SCL* button if *Pull down SCL as 100ms* button is clicked in the step1 as shown in Figure 3-23 to make the device exit shutdown mode. After clicking exit shutdown button, the GUI tries to connect to the device and shows the status on the hardware connection status bar.

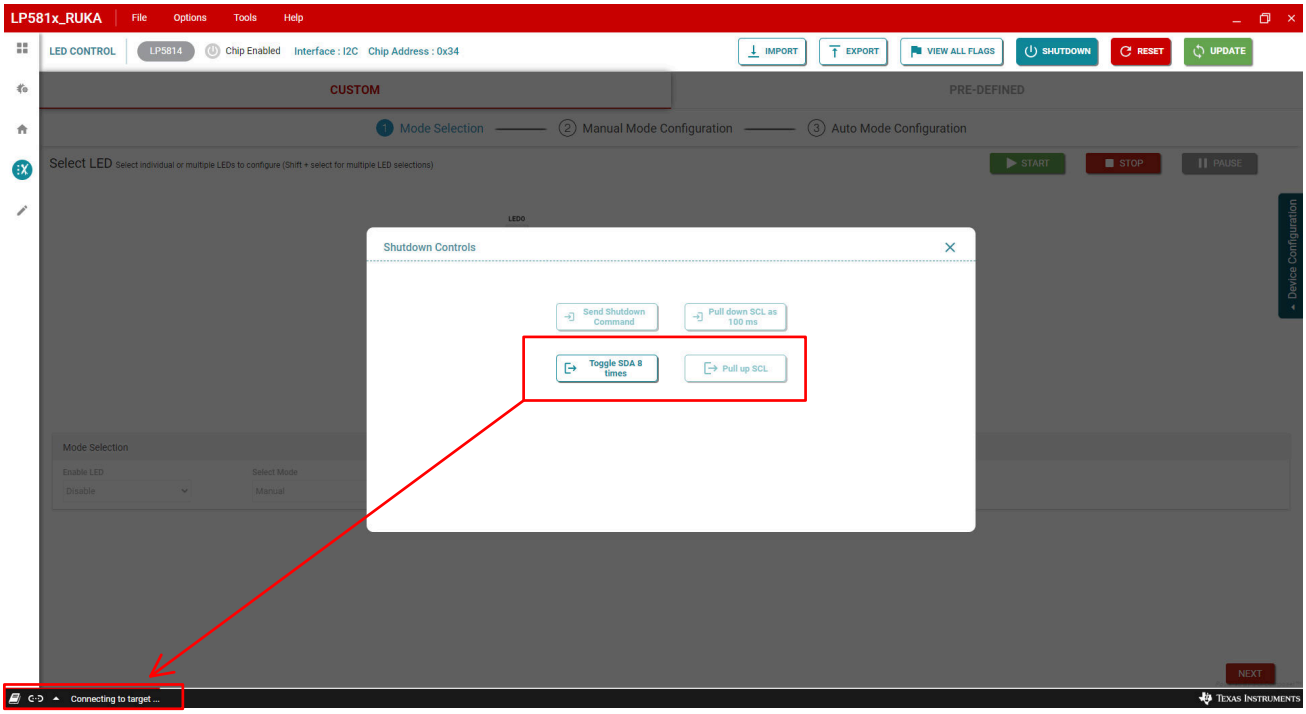


Figure 3-23. Exit Shutdown

3.3.7 Read Flags

Click the *VIEW ALL FLAGS* button on the top right corner of the *LED Control Page* as shown in Figure 3-24 to open the *Flag Registers* panel, on which all the flags are shown. When chip is enabled, click *Clear TSD* button to clear TSD flag and click *Clear POR* button to clear POR flag.

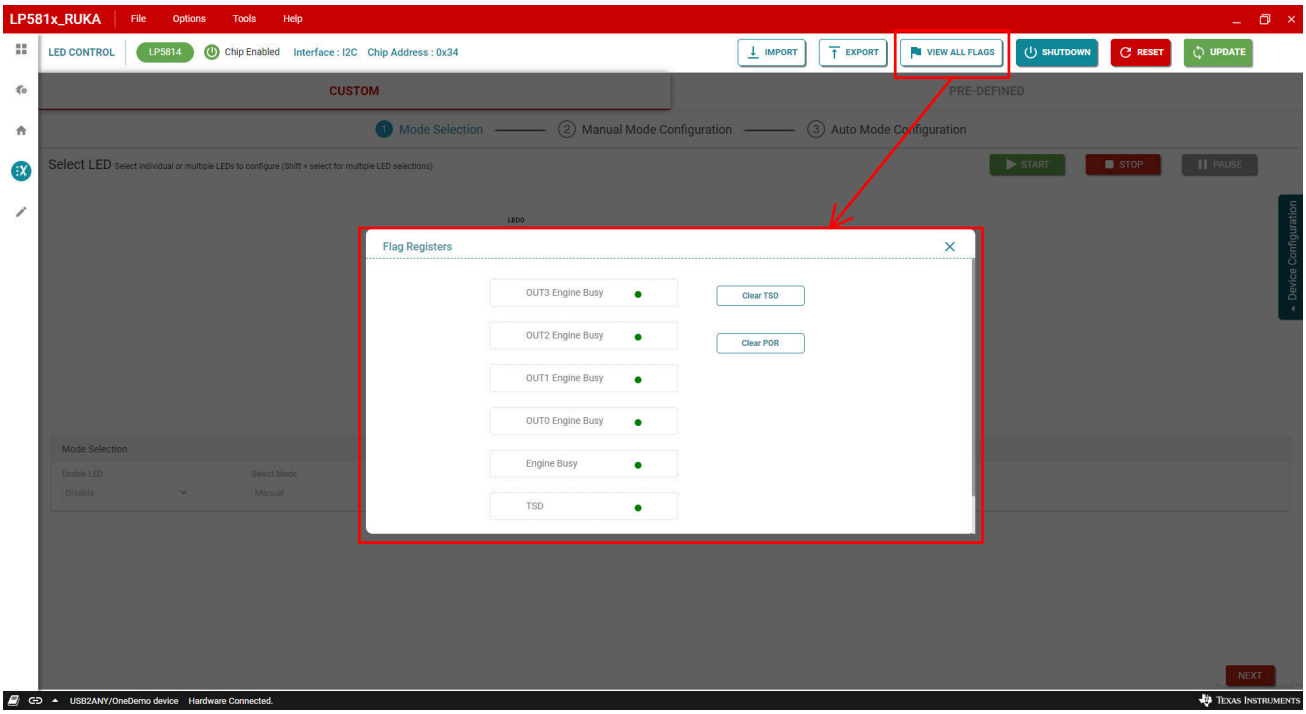


Figure 3-24. Read Flags

4 Hardware Design Files

4.1 Schematics

LP5814DRLEVM and LP5814YCHEVM schematic is shown in Figure 4-1.

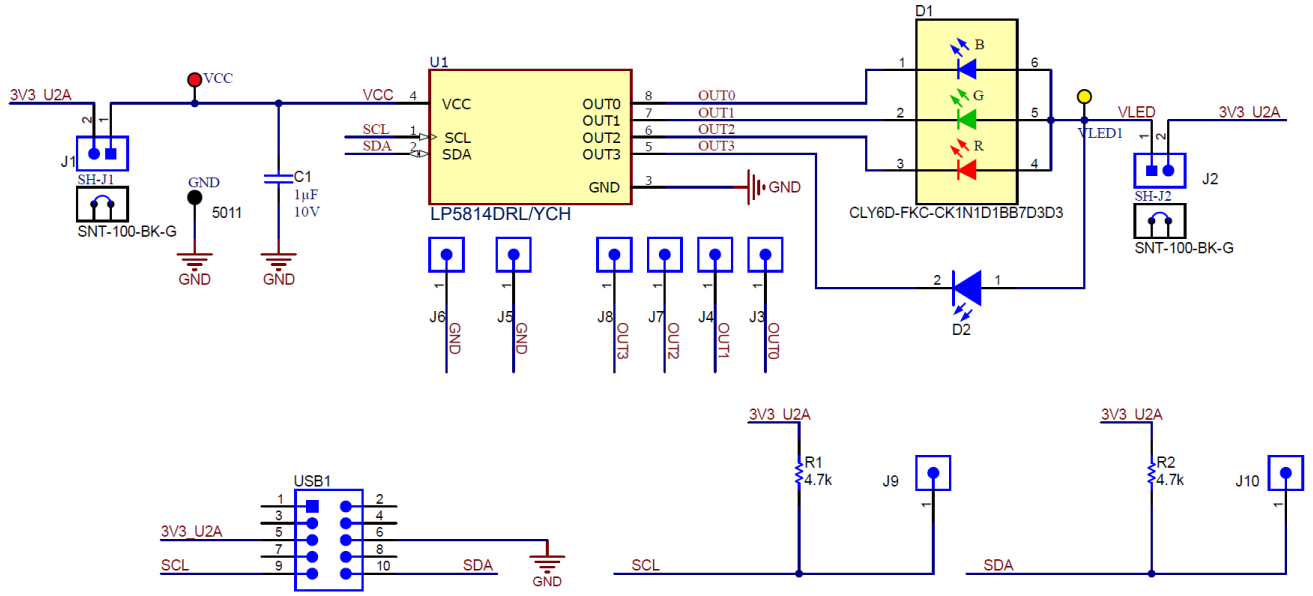


Figure 4-1. LP5814DRLEVM and LP5814YCHEVM Schematic

LP5815DRLEVM and LP5815YCHEVM schematic is shown in Figure 4-2.

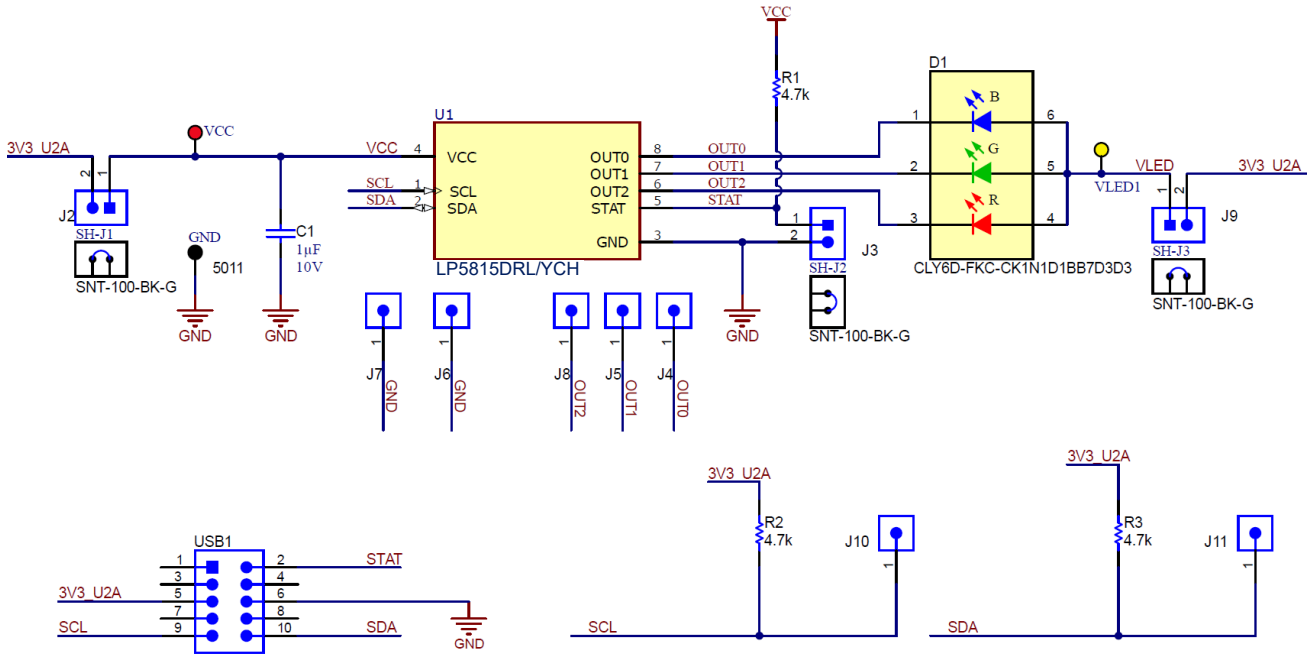


Figure 4-2. LP5815DRLEVM and LP5815YCHEVM Schematic

4.2 PCB Layouts

Figure 4-3 and Figure 4-4 show the top layer and bottom layer of the LP5814DRLEVM and LP5814YCHEVM PCB layout.

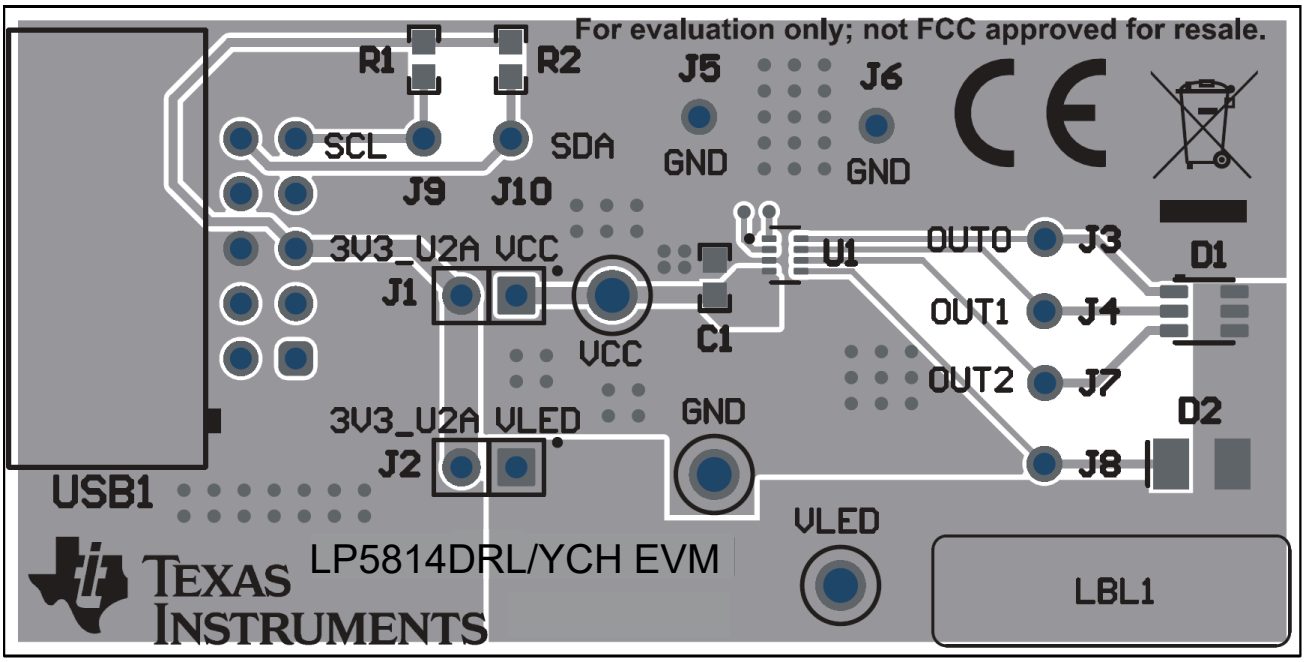


Figure 4-3. LP5814DRLEVM and LP5814YCHEVM PCB Top Layer

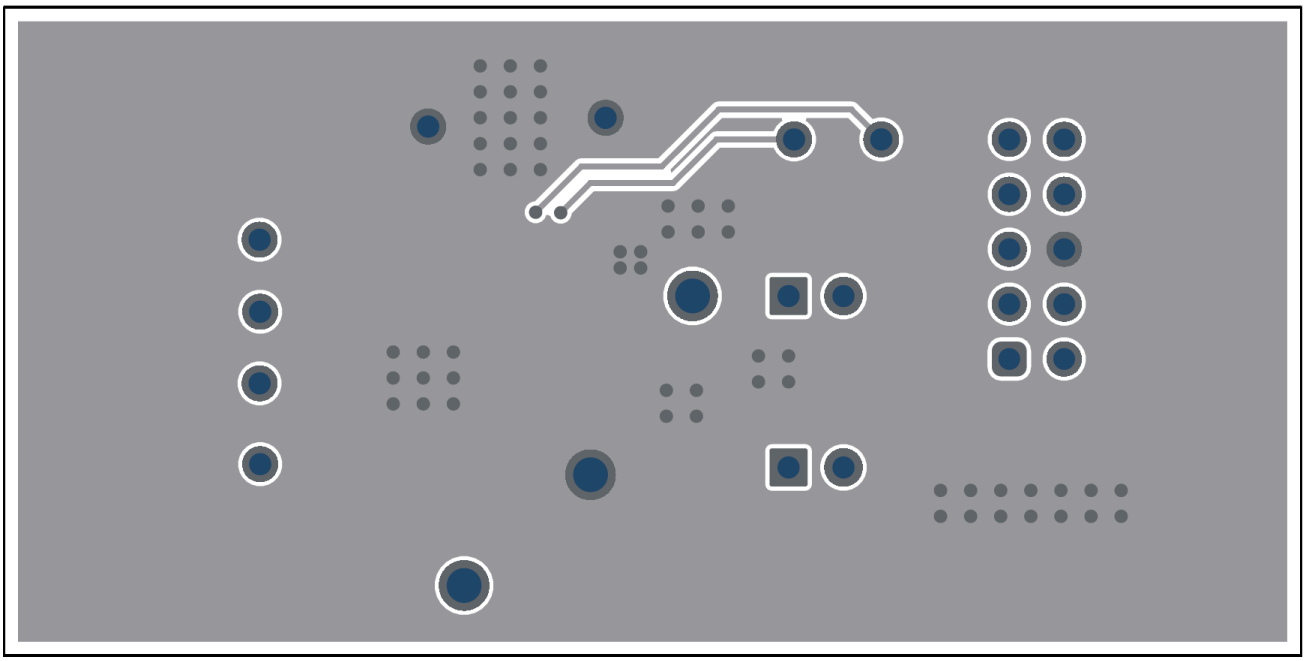


Figure 4-4. LP5814DRLEVM and LP5814YCHEVM PCB Bottom Layer

Figure 4-5 and Figure 4-6 show the top layer and bottom layer of the LP5815DRLEVM and LP5815YCHEVM PCB layout.

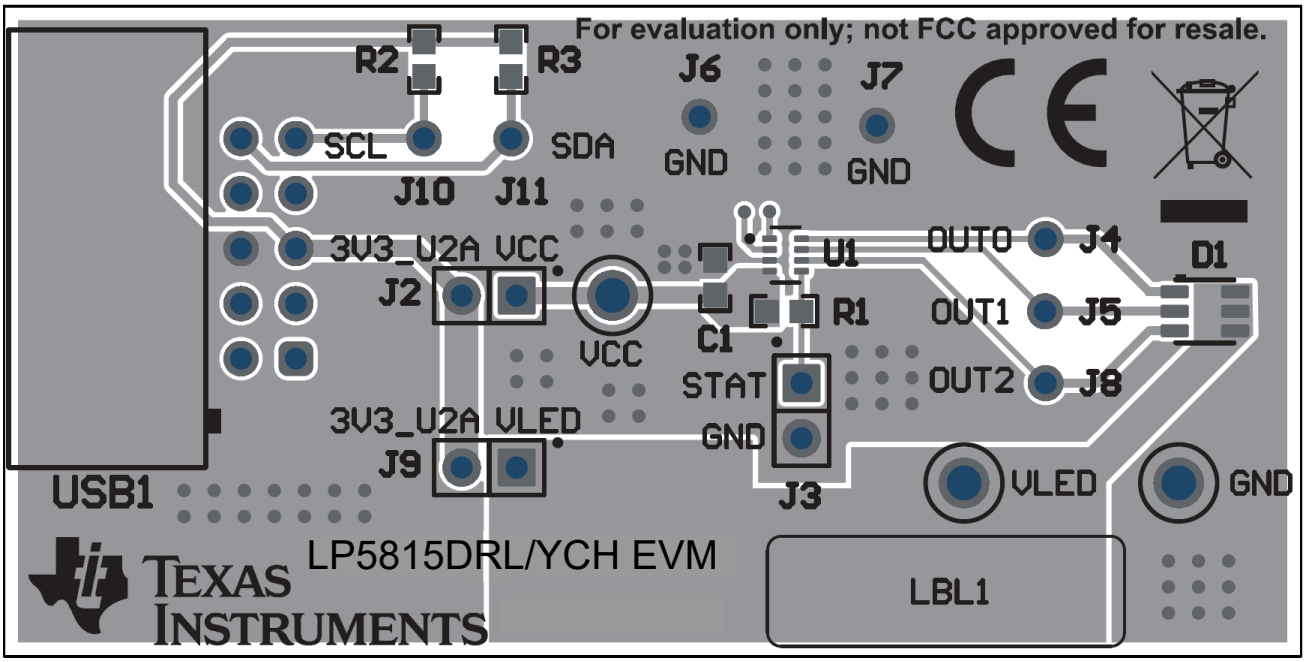


Figure 4-5. LP5815DRLEVM and LP5815YCHEVM PCB Top Layer

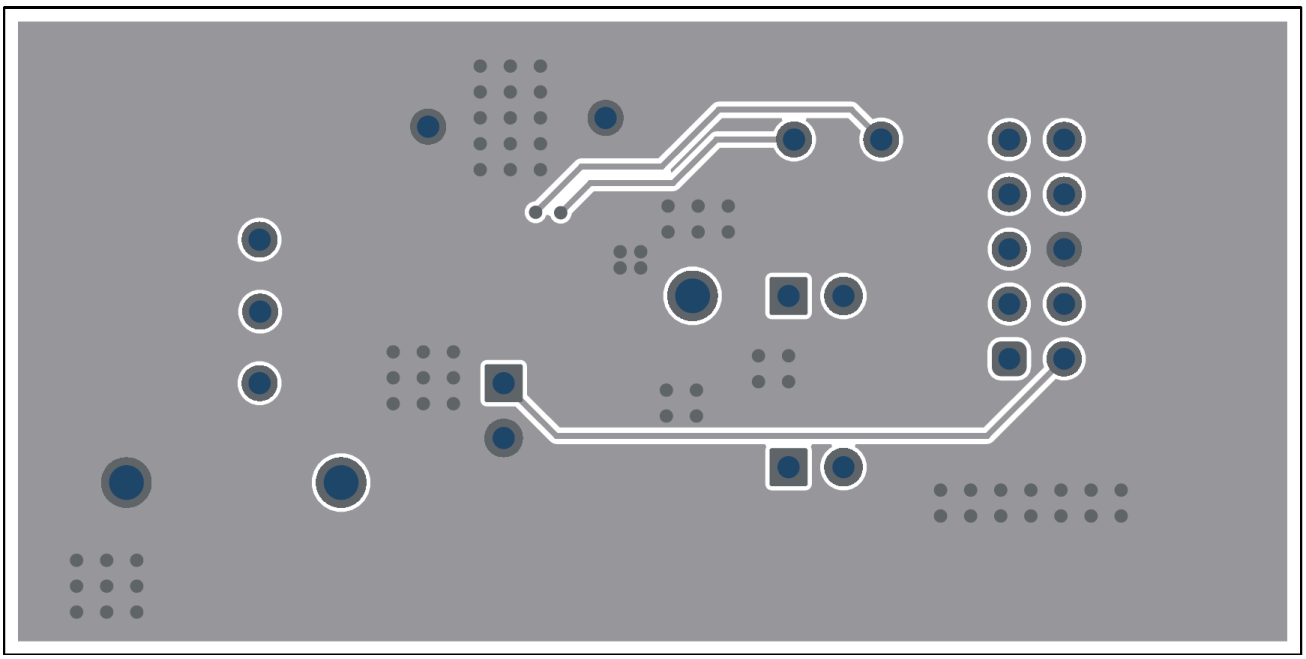


Figure 4-6. LP5815DRLEVM and LP5815YCHEVM PCB Bottom Layer

4.3 Bill of Materials (BOM)

Table 4-1 shows the bill of materials (BOM) of LP5814DRLEVM and LP5814YCHEVM.

Table 4-1. LP5814DRLEVM and LP5814YCHEVM BOM

DESIGNATOR	QUANTITY	DESCRIPTION	MANUFACTURER	PART NUMBER
C1	1	CAP, CERM, 1µF, 10V, +/- 10%, X7R, 0603	Taiyo Yuden	LMK107B7105KA-T
D1	1	LED, RGB, SMD	Cree	CLY6D-FKC-CK1N1D1BB7D3D3
D2	1	LED, Cool White, SMD	Cree	CLM3C-WKW-CWBYA453
J1, J2	2	Header, 100mil, 2x1, Gold, TH	Samtec	HTSW-102-07-G-S
J3, J4, J5, J6, J7, J8, J9, J10	8	Header, 2.54mm, 1x1, Gold, TH	Samtec	TSW-101-08-G-S
R1, R2	2	RES, 4.7k, 5%, 0.1W, 0603	Vishay-Dale	CRCW06034K70JNEA
SH-J1, SH-J2	2	Shunt, 100mil, Gold plated, Black	Samtec	SNT-100-BK-G
GND	1	Test Point, Multipurpose, Black, TH	Keystone	5011
VCC	1	Test Point, Multipurpose, Red, TH	Keystone	5010
VLED	1	Test Point, Multipurpose, Yellow, TH	Keystone	5014
USB1	1	Header(shrouded), 2.54mm, 15x2, Gold with Tin tail, R/A, TH	Sullins Connector Solutions	SBH11-PBPC-D05-RA-BK
U1	1	4-Channel I2C Interface RGBW LED Driver with Auto Animation Control	Texas Instruments	LP5814DRL/YCHR

Table 4-2 shows the bill of materials (BOM) of LP5815DRLEVM and LP5815YCHEVM.

Table 4-2. LP5815DRLEVM and LP5815YCHEVM BOM

DESIGNATOR	QUANTITY	DESCRIPTION	MANUFACTURER	PART NUMBER
C1	1	CAP, CERM, 1µF, 10V, +/- 10%, X7R, 0603	Taiyo Yuden	LMK107B7105KA-T
D1	1	LED, RGB, SMD	Cree	CLY6D-FKC-CK1N1D1BB7D3D3
J2, J3, J9	3	Header, 100mil, 2x1, Gold, TH	Samtec	HTSW-102-07-G-S
J4, J5, J6, J7, J8, J10, J11	7	Header, 2.54mm, 1x1, Gold, TH	Samtec	TSW-101-08-G-S
R1, R2, R3	3	RES, 4.7k, 5%, 0.1W, 0603	Vishay-Dale	CRCW06034K70JNEA
SH-J1, SH-J2, SH-J3	3	Shunt, 100mil, Gold plated, Black	Samtec	SNT-100-BK-G
GND	1	Test Point, Multipurpose, Black, TH	Keystone	5011
VCC	1	Test Point, Multipurpose, Red, TH	Keystone	5010
VLED	1	Test Point, Multipurpose, Yellow, TH	Keystone	5014
USB1	1	Header(shrouded), 2.54mm, 15x2, Gold with Tin tail, R/A, TH	Sullins Connector Solutions	SBH11-PBPC-D05-RA-BK
U1	1	3-Channel I2C Interface RGB LED Driver with Instant Blinking and Auto Animation Control	Texas Instruments	LP5815DRL/YCHR

5 Additional Information

5.1 Trademarks

All trademarks are the property of their respective owners.

6 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Revision * (October 2024) to Revision A (August 2025)	Page
• Added *GUI Installation* and *GUI Guidance* sections	5

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CAUTION

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Interference Statement for Class A EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Interference Statement for Class B EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help.*

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This device complies with Industry Canada license-exempt RSSs. Operation is subject to the following two conditions:

(1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concernant les EVMs avec appareils radio:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Concerning EVMs Including Detachable Antennas:

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

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Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur

3.3 *Japan*

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https://www.ti.com/ja-jp/legal/notice-for-evaluation-kits-delivered-in-japan.html

3.3.2 *Notice for Users of EVMs Considered "Radio Frequency Products" in Japan:* EVMs entering Japan may not be certified by TI as conforming to Technical Regulations of Radio Law of Japan.

If User uses EVMs in Japan, not certified to Technical Regulations of Radio Law of Japan, User is required to follow the instructions set forth by Radio Law of Japan, which includes, but is not limited to, the instructions below with respect to EVMs (which for the avoidance of doubt are stated strictly for convenience and should be verified by User):

1. Use EVMs in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,
2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

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3.4 *European Union*

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