

XDP<sup>™</sup> digital power

### About this document

### Scope and purpose

The purpose of this document is to give a quick guide to operation of the XDPL8221 reference board for all power classes of LED lighting applications, and how to use the .dp Vision software to program the operating parameters of the digital controller XDPL8221.

### **Intended audience**

This document is intended for anyone who wants to evaluate the XDPL8221 reference design for LED lighting.

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### Tools

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### 1 Tools

### **1.1** Required hardware and software tools

The required hardware and software tools are listed in **Table 1**. Please order all the hardware tools and download and install all the software tools.

| Table 1 | Required hardware and software tools for getting started |
|---------|--|
|---------|--|

| Name   | <b>Ordering link</b>  | Description   | Ordering content   |  |  |  |
|--|---|---|--|--|--|--|
| Please order all the hardw   | e tools. Click on the links below:  |   |  |  |  |  |
| XDPL8221 reference<br>board  | Click on the link:<br><u>device-Demo</u>  | XDPL8221 reference<br>board for LED lighting  | XDPL8221 reference<br>board<br>Driver for LED lighting<br>Programming cable<br>To connect the<br>XDPL8221 reference<br>board with the .dp<br>Interface Gen2  |  |  |  |
| .dp Interface Gen2   | Click on the link:<br>IF-BOARD.DP-GEN2  | Interface board to control<br>XDPL8221 from<br>PC/notebook  | .dp Interface Gen2<br>Interface for<br>programming the<br>XDPL8221 digital<br>controller<br>USB cable<br>To connect the .dp<br>Interface Gen2 with a<br>PC   |  |  |  |
| Please download and inst   | all all the software tools.   | Click on the links below:   |  |  |  |  |
| <b>Graphic User Interface</b><br>( <b>GUI</b> ) for read and write<br>access to the<br>parameters in the OTP                                 | Click on the link and<br>follow the instruction<br>in the right column:<br><u>.dp Vision</u>                                | Accept the mentioned<br>terms and conditions<br>Click "Run"<br>Install "dp.vision"  | .dp Vision installer<br>(*.msi)  |  |  |  |
| <b>dpVision_folder_set-up</b><br>Copies auxiliary files<br>including the<br>parameters .csv file to<br>the respective directory<br>structure | Click on the link and<br>follow the instruction<br>in the next column:<br>REF-XDPL8221-<br>U50W_ dpVision_<br>folder_set-up | On the website of the<br>respective board,<br>choose and open the<br>appropriate .zip file within<br>the folder "Tools&<br>Software"(e.g. for the 50<br>W reference board,<br>choose<br>" <b>REF-XDPL8221-U50W_</b><br><b>dpvision_folder_set-up</b> "<br>Double-click the<br>*.msi file to install | XDP <sup>™</sup> digital power – dp<br>Vision set-up with the<br>following documents:<br>XDPL8221 parameters<br>.csv file<br>XDPL images file<br>XDPL8221<br>documentation files<br>XDPL system simulation<br>and design creation tool<br>.dp Interface Gen2<br>firmware |  |  |  |



**Getting started** 

### 2 Getting started

Attention: The instructions of this manual work without VAC connection.

Attention: Before you connect the reference board to the mains, pay attention to the safety hints in the recent "REF-XDPL8221-U50W Engineering report Vx.x" thoroughly. Incorrect use of the reference board could be dangerous, and even life-threatening!

### 2.1 Hardware connection

Connect the .dp Interface Gen2 to a notebook/PC with the USB cable.

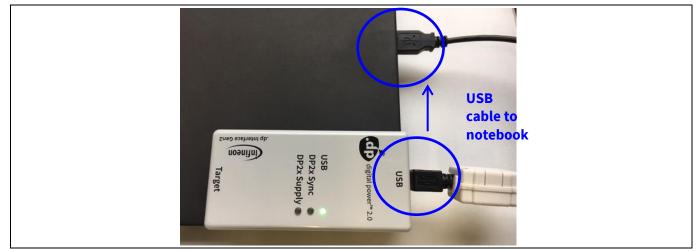


Figure 1 Connection between .dp Interface Gen2 and notebook

Note: Sometimes the detection of the .dp Interface Gen2 fails on USB3.0 ports. Therefore the use of a USB2.0 port might be necessary (which can be provided by an external USB2.0 hub if the machine only offers USB3.0 ports).



### **Getting started**

Connect the .dp Interface Gen2 to the XDPL8221 reference board with the programming cable.

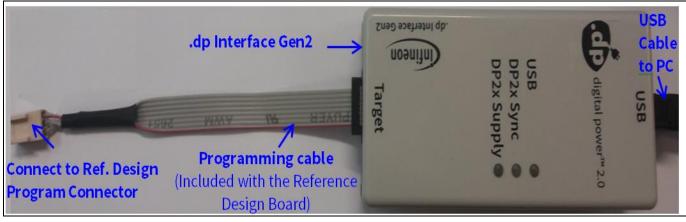


Figure 2 .dp Interface Gen2 connection

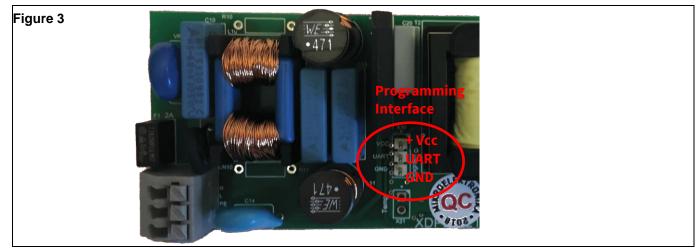


Figure 4 Connection between the .dp Interface Gen2 and the XDPL8221 reference board

*Note:* Please ensure that the connector of the programming cable is plugged in correctly: the colored wire indicates Pin 1 and should be connected to the V<sub>cc</sub> pin on the XDPL8221 reference board.

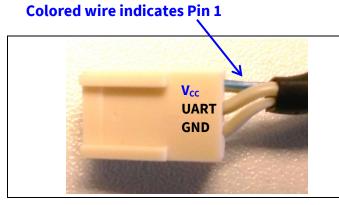


Figure 5 Program connector Vcc, UART, GND

Pin 1 should be connected to the V<sub>cc</sub> pin

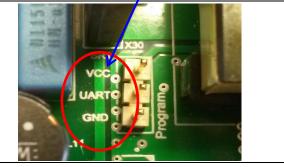


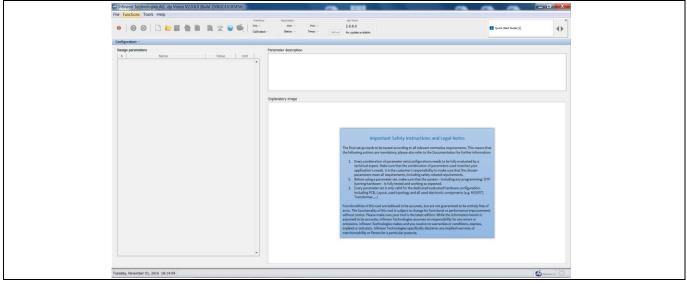
Figure 5 Programming interface Vcc, UART, GND



### Getting started

### 2.2 Parameter configuration

Start the .dp Vision program by clicking the ".dp Vision" shortcut on the desktop. The screen shown in Figure 6 will appear.





Load the XDPL8221 parameters configuration file (\*.csv) in the folder (*HOME*) \*Infineon Technologies AG*\.*dp* vision\*Parameters* as shown in **Figure 8**. Please select the corresponding file (e.g., for a 50 W board choose the "XDPL8221\_FWvx.x.x\_50W" file).

### Select the appropriate .csv file to open

|                   | Interface<br>Interface<br>PWr-<br>Calibrated - | Application<br>HW2 - FW2 -<br>Status - Temp: - Task | .dp Vison<br>2.0.8.0<br>ml No update available.   |                                   | 1 Quick Start G                                       | aude [1] |
|-------------------|--|---|---|-----------------------------------|---|----------|
| Configuration: -  |  |   | The update svarabe.   |                                   |   |          |
| Design parameters | Para   | neter description                                   |   |                                   |   |          |
| Neme              | Value Unit                                     |   |   |                                   |   |          |
|                   |  |   |   |                                   |   |          |
|                   |  |   |   |                                   |   |          |
|                   | Sopen Config                                   | uration file  |   | ×                                 | 1   |          |
|                   | Look   | Parameters  | - 00  | o-                                |   |          |
|                   | <u></u>  | XDPL8220_FWv0.5.4_50W_FF2_E                         | asic_ParA   |                                   |   |          |
|                   | Recent   |   |   |                                   |   |          |
|                   | Items  |   |   |                                   |   |          |
|                   |  |   |   |                                   |   |          |
|                   | Desktop  |   |   |                                   | Legal Notes   |          |
|                   | 14   |   |   |                                   | ive requirements. This means that                     |          |
|                   | My<br>Documents                                |   |   |                                   | mentation for further information:                    |          |
|                   | <b>A</b>                                       |   |   |                                   | to be fully evaluated by a<br>eters used matches your |          |
|                   | Computer                                       |   |   |                                   | ake sure that the chosen<br>requirements.             |          |
|                   | <b>(</b>                                       |   |   |                                   | including any programming/ OTP                        |          |
|                   |  | le name: XDPL8220_FWv0.5.4_50                       |   | Open                              | d hardware configuration,                             |          |
|                   |  | les of type: Comma-Separated Valu                   | es(*.csv) •   | Cancel                            | c components (e.g. MOSFET,                            |          |
|                   |  |   | Functionalities of this tool are believed to be   | accurate, but are not             | guaranteed to be entirely free of                     |          |
|                   |  |   | error. The functionality of this tool is subject<br>without notice. Please make sure your tool is | the latest edition. Wh            | ille the information herein is                        |          |
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|                   |  |   |   |                                   |   |          |
|                   |  |   |   |                                   |   |          |
|                   |  |   |   |                                   |   |          |

Figure 7 Load the .csv file

After loading the parameters .csv file, a list of XDPL8221 configurable parameters will show (see the box on the left in **Figure 8**). These values can be modified by users and will turn blue.



### **Getting started**

List of configurable parameters

### Click on the message bar for detailed information

| Infineon Technologies AG, .dp Vision V2.0.9.1 (Build 8092017142632)                       |   | N                     | – Ø ×           |
|---|---|-----------------------|-----------------|
| File Functions Tools Help   |   |                       |                 |
| ●   ④ ⊘   □ □ ■ ■ ■ ■ ■ ≥ @ €   □nerfoce<br>PVi-<br>Calibrated -                          | Applation<br>Aparldi - Feitdi -   | Quick Start Guide [1] | *               |
| Design parameters   | rameter description   |                       |                 |
| D Name Value Unit   |   |                       |                 |
| Output Set-Points   |   |                       |                 |
| Hardware Configuration  |   |                       |                 |
| PFC Protections   |   |                       |                 |
| Flyback Protections   |   |                       |                 |
| Adaptive Temperature Protection   |   |                       |                 |
| General Protections   |   |                       |                 |
| Startup and Shutdown  |   |                       |                 |
|   | planatory image   |                       |                 |
| Flyback Control Loop  |   |                       |                 |
| Dimming   |   |                       |                 |
| Fine Tuning Parameters  |   |                       |                 |
|   |   |                       |                 |
|   |   |                       |                 |
|   |   |                       |                 |
|   | Important Safety Instructions and Legal Notes   |                       |                 |
|   | ···· <del>·</del> ·······························   |                       |                 |
|   | The final setup needs to be tested according to all relevant normative requirements. This means that  |                       |                 |
|   | the following actions are mandatory; please also refer to the Documentation for further information:  |                       |                 |
|   |   |                       |                 |
|   | <ol> <li>Every combination of parameter sets/configurations needs to be fully evaluated by a</li> </ol>   |                       |                 |
|   | technical expert. Make sure that the combination of parameters used matches your  |                       |                 |
|   | application's needs. It is the customer's responsibility to make sure that the chosen   |                       |                 |
|   | parameters meet all requirements, including safety-related requirements.  |                       |                 |
|   | <ol> <li>Before using a parameter set, make sure that the system – including any programming/ OTP</li> </ol>  |                       |                 |
|   | burning hardware – is fully tested and working as expected. 3. Every parameter set is only valid for the dedicated evaluated hardware configuration,  |                       |                 |
|   | <ol> <li>Every parameter sets only value for the dedicated evaluated evaluate coming a atom,<br/>including PCB, Layout, used topology and all used electronic components (e.g. MOSFET,</li> </ol> |                       |                 |
|   | Transformer,)   |                       |                 |
|   |   |                       |                 |
|   | Functionalities of this tool are believed to be accurate, but are not guaranteed to be entirely free of   |                       |                 |
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|   |   |                       |                 |
|   |   |                       |                 |
| v   |   |                       |                 |
|   |   |                       |                 |
|   |   |                       |                 |
|   |   |                       |                 |
|   |   |                       |                 |
| Thursday, June 28, 2018 17:37:37 [Memory] Minimum: 6 MB, Current: 171 MB, Maximum: 171 MB |   |                       | Depth power 2.0 |
|   |   |                       |                 |

Figure 8 Parameters file loaded in .dp Vision

### *Note:* The message bar shown in Figure 8 provides detailed information. For further information, please refer to the "dpvision User manual".

| Message description   | × |  |
|---|---|--|
| Quick Start Guide Click on Open Configuration Set icon (or choose Open item from menu File->Open) to load configuration file. |   |  |
| Warning Info Message 1 of 1   |   |  |
| Dismiss All Dismiss     Close   |   |  |

Figure 9 Message description



### **Getting started**

There are two options available to configure the IC based on the parameter values in .dp Vision.

- 1) Non-permanent for testing
- 2) Permanent for regular operation

### 1) Test configuration

This function will download the parameter values from .dp Vision into the XDPL8221 RAM memory space, and it will then be followed by an automatic IC start-up for application testing with the new configuration. As long as the board is activated, the  $V_{cc}$  is supplied.

Parameters configuration with this option is not permanent, because the loaded RAM content gets lost once the IC supply voltage is turned off or the IC restarts due to certain protections. For detailed information, please refer to the "dpvision User manual" in the "Documents" folder.

**Table 2** shows the procedures for using test configuration function in .dp Vision to load the new parameter values in the RAM and test the application with the new configuration.

| Step         | Instruction  |
|--------------|--|
| 1            | Open configuration file and change parameter value (see example in <b>Figure 8</b> ).  |
| 2            | Ensure that the primary supply voltage (AC input) to the board is not active and the hardware connection for configuration is OK based on <b>Figure 2</b> and <b>Figure 4</b> .  |
| 3            | Press <sup>(2)</sup> to supply power and establish a connection to the target XDPL8221. After this, XDPL8221 will be in configuration mode and the device status <sup>(9)</sup> should change to <sup>(0)</sup> .  |
| 4 (optional) | Ensure that the LED output is connected to a load, and switch on AC input (e.g. 230 V AC).<br>After this, the board will not start because XDPL8221 is still in configuration mode.  |
| 5            | Press to test the configuration with target XDPL8221.<br>After this, the IC will automatically start normal operation with the new configuration and the window below will pop up:<br>Image: Configuration of the window below will pop up:         Image: Configuration of the window below will pop up:         Image: Configuration of the window below will pop up:         Image: Configuration of the window below will pop up:         Image: Configuration of the window below will pop up:         Image: Configuration of the window below will pop up:         Image: Configuration of the window below will pop up:         Image: Configuration of the window below will pop up:         Image: Configuration of the window below will pop up:         Image: Configuration of the window below will pop up:         Image: Configuration of the window below will pop up:         Image: Configuration of the pop up:         Image: Configuration of the pre-existing parameters, the XDPL8221 will not download them to RAM. |
|              |  |
| 6            | Press "Close" on the pop-up window.  |
| 7            | To test another configuration, repeat these steps.   |

### Table 2Test configuration procedures

Note: If there is any error between steps 1 and 7, refer to the message bar of .dp Vision for the error message. For further information, please refer to the "dpvision User manual".



### **Getting started**

### 2) Burn configuration

As the XDPL8221 chip on the 50 W reference design PCB has a first full set of parameters in its One-Time Programmable (OTP) memory space, only changed parameters are written in the OTP memory. For detailed information, please refer to the "dpvision User manual" in the "Documents" folder.

Table 3 shows the procedures to burn a parameter update in .dp Vision into the OTP memory.

| Table 3         | Burn configuration procedures   |  |  |  |
|-----------------|---|--|--|--|
| Step            | Instruction   |  |  |  |
| 1               | Load configuration file (see example in <b>Figure 8</b> ).  |  |  |  |
| 2               | Modify the parameter value needed, then press [File] >> [Save] or [File] >> [Save as], to save the configuration file. Otherwise, proceed to step 3.  |  |  |  |
| 3<br>(optional) | Disconnect or turn off AC input voltage and check the hardware connection for configuration, see <b>Figure 2</b> and <b>Figure 4</b> .  |  |  |  |
| 4               | Press 🕲 to supply power and establish connection to the target XDPL8221. After this, XDPL8221 will enter configuration mode and the device status \varTheta should change to .  |  |  |  |
| 5               | Press       to burn configuration into target XDPL821.         After this step, a window pops up, like one of these below.         Image: the step of the |  |  |  |
| 6               | Press "Proceed" or "Yes" to burn the configuration. After this, a window pops up indicating success.  |  |  |  |
| 7               | Press "OK" on the pop-up window then disconnect the programming cable from the board connector and test the application, if needed.   |  |  |  |



**Getting started** 

### **Revision history**

### Major changes since the last revision

| Page or reference | Description of change |
|-------------------|-----------------------|
| All               | First release         |
|                   |                       |
|                   |                       |

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