ILD2111 - Digital DC/DC Buck Controller IC

.dp digital power 2.0

ILD2111 Evaluation System

Getting Started

Application Note

About this document

Scope and purpose

This document presents basic information on how to start evaluating and using the ILD2111 evaluation system and user-friendly graphical user interface tool .dp vision. It presents all steps necessary to get the board and related environment up and running.

Intended audience

This document is intended for anyone who wants to start evaluating and using the ILD2111 evaluation system.

Table of Contents

1 Introduction

The ILD2111 is a high-performance digital microcontroller-based DC/DC buck LED controller IC designed as a constant current source. More information can be found in [1].

The ILD2111 evaluation board is presented in **Figure 1**. The solution and evaluation board are used as a second stage (DC/DC converter). As such, the board needs to be supplied by an appropriate DC source (a first stage). Depending on the purpose of the evaluation, the first stage might be a laboratory DC source or dedicated AC/DC converter. More information on typical application and component dimensioning and selection can be found in [2].

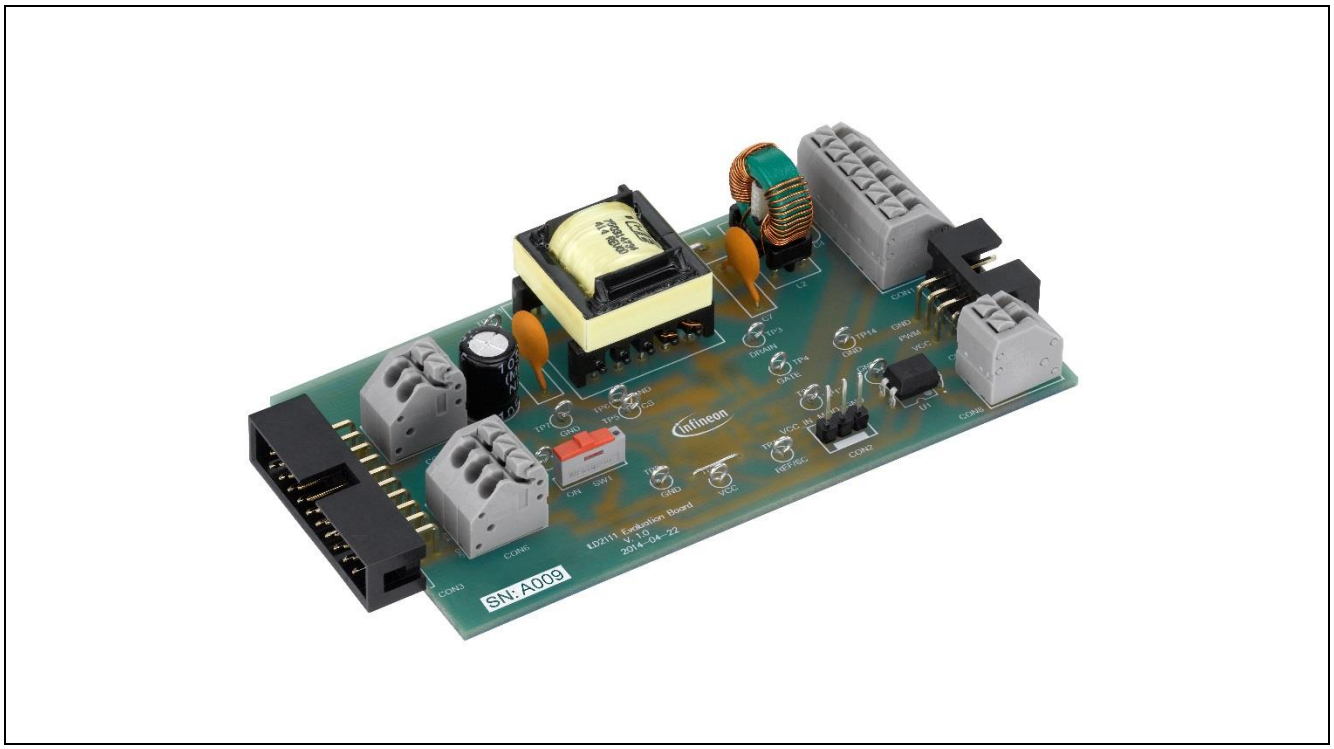

Figure 1 ILD2111 Evaluation Board

2 Environment Setup

This section explains the basics of the ILD2111 evaluation board connections to the external components and devices as well as how to use the .dp vision tool for optional parameterization. The evaluation board comes fully functional and parameterized (see [3] for details). As such, it can be used without the need for the .dp vision tool. However, if the user has to modify certain parameters for the purpose of evaluation, the .dp vision tool provides a comprehensive interface (for detailed information about the tool, please see [4]).

2.1 Hardware Setup

Figure 2 shows the ILD2111 evaluation board with all relevant connections.

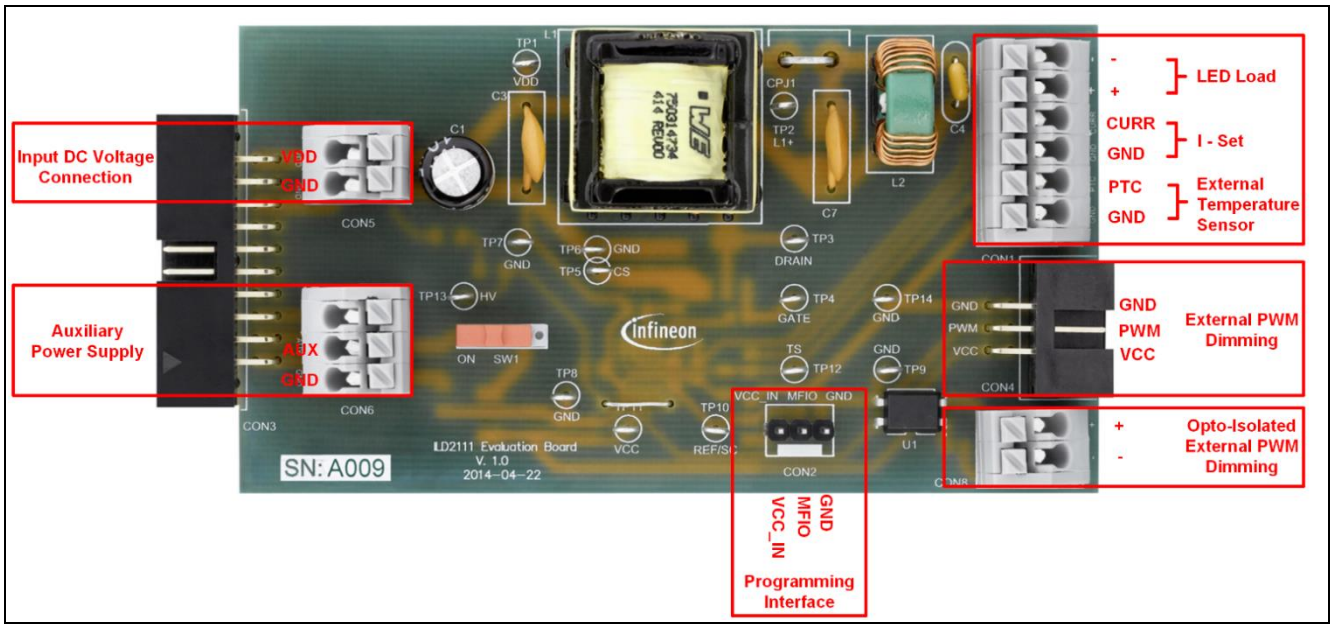

Figure 2 ILD2111 Evaluation Board Connections

Power supply options for the ILD2111 evaluation board are described in Table 1 below.

Table 1 Power Supply for the Evaluation Board

Power Supply	SW1	Description
Auxiliary power supply	ON (left position)	The evaluation board is powered by the auxiliary power supply
Power supply via interface board	OFF (right position)	The evaluation board is powered by the interface board
Both of the above power supplies are connected	ON (left position)	The evaluation board will be supplied by the voltage with the higher value

The following connections are supported and listed in Table 2 below.

Table 2 ILD2111 Evaluation Board Connections

Interface name	Interface pins	Description
Input DC Voltage Connection	VDD	CON5 - Input DC voltage (35 V – 50 V) connection.
	GND	
Auxiliary Power Supply[1)]	AUX	CON6 – Auxiliary power supply (11 – 24 VDC).
	GND	
Programming Interface[2)]	VCC_IN	CON2 – UART communication interface. The UART interface uses a single line (MFIO) for receiving Rx and transmitting Tx data.
	MFIO	
	GND	
LED Load	-	CON1 – Output LED light module connection (8 LEDs ~ 25 V, 800 mA ~ 20 W).
	+	
I – Set	CURR	CON1 – Resistance connection for output current determination.
	GND	
External Temperature Sensor	PTC	CON1 – External PTC temperature sensor connection.
	GND	
External PWM Dimming	GND	CON4 – For dimming operation, an additional hardware interface should be connected to the input (non-isolated) according to the manufacturer's instructions.
	PWM	
	VCC[3)]	
Opto-Isolated External PWM Dimming	+	CON8 – For dimming operation, an additional hardware interface should be connected to the input (opto-isolated) according to the manufacturer's instructions.
	-	

2.1.1 Powering-up the Evaluation Board

In order to evaluate the ILD2111 evaluation board it needs to be powered up. There are two power sources: VDD (DC voltage used for power conversion to the output) and VCC used to power up the IC.

2.1.1.1 VDD Supply

Connect an appropriate DC source to the connector CON3 or CON5 as indicated in **Figure 2**. The VDD is rated up to 70 V and any higher voltage could lead to damage or malfunction of the evaluation board.

2.1.1.2 VCC Supply

For the purpose of evaluation and parameterization with .dp vision, the VCC power supply should be connected only via a programming interface. **Figure 3** shows how to connect the ILD2111 evaluation board to the .dp Interface Board Gen2 (see **[5]**) using an ILD2111 connecting cable with switch box, as well as connection to the PC via USB cable.

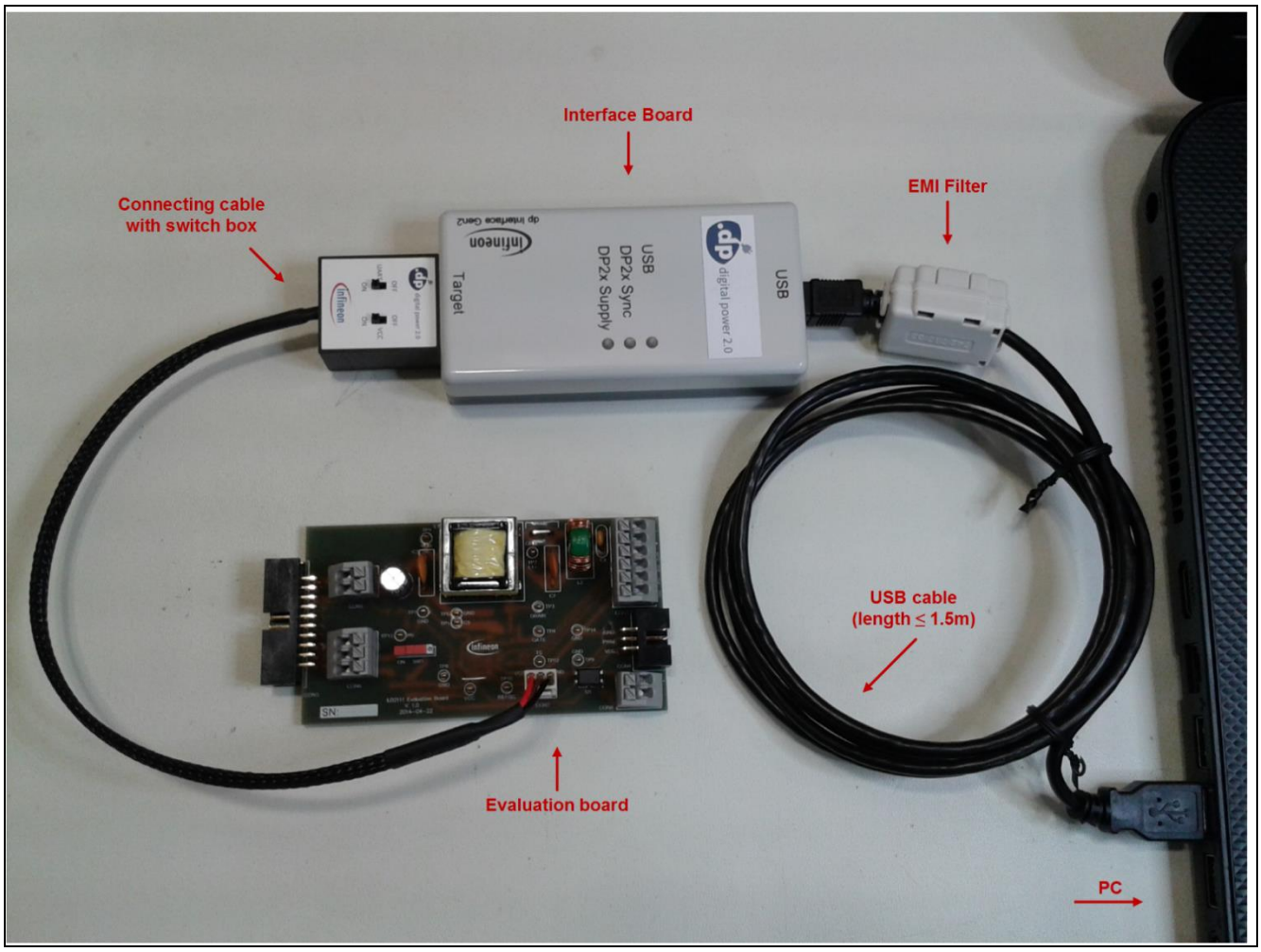

Figure 3 ILD2111 Evaluation Board Connection to PC

If the VCC is not provided over the programming interface or if the influence of the VCC voltage has to be evaluated, the auxiliary power supply can be used to power up and evaluate the system. This power supply is provided through the CON6 connector (see **Figure 2**). As shown in **Table 1,** this supply can be connected / disconnected by SW1.

2.1.2 Switch Box Configuration

The connecting cable with the switch box connects the .dp Interface Board Gen2 and ILD2111 evaluation board (see **Figure 3**). The switch box implements two switches: one for the VCC power supply (marked as VCC) and the other for data line for serial communication (marked as UART). The principal scheme of the connecting cable with the switch box is shown in **Figure 4**.

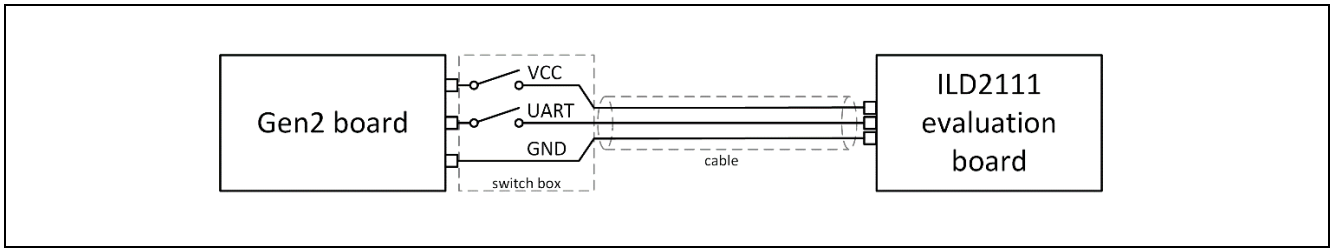

Figure 4 Connection Between Interface Board Gen2 and ILD2111 Evaluation Board

Both switches need to be closed (= On) for evaluation with .dp vision.

2.1.3 LED Load Connection

The LED load should be connected to the CON1 connector (see **Figure 2**). The anode of the LED load should be connected to the "+" and the cathode to the "–" connector. Keep in mind that the LED load is not referenced to ground but rather to VDD, meaning that "–" is not connected to ground and that "+" is connected to VDD. Based on the default parameter setting, we recommend a minimum LED current rating of 1200 mA.

2.1.4 External Temperature Sensor

If an external temperature sensor is needed, it must be connected to CON1 (a PTC and adjacent GND connectors) (see **Figure 2**).

2.1.5 External PWM Dimming

The external PWM dimming signal can be supplied to the ILD2111 evaluation board over two interfaces. The first one is a direct interface over the CON4 connector (see **Figure 2**). The user needs to take care that the voltage level does not exceed the internal IC power supply of 3.3 V on the PWM pin (see electrical characteristics in **[1]**). The second interface is over the optocoupler through the CON8 connector. This signal arrives inverted to the IC.

2.1.6 I-Set Connection

If the user needs to set the desired current over the I-Set interface, then the appropriate resistor needs to be connected to the CON1 connector (CURR and adjacent GND connectors) (see **Figure 2**). Due to the multiplexing of the pin functionality, the I-Set resistor (and associated FW function) and the communication interface could interfere with each other and therefore need to be decoupled.

The I-Set procedure can be executed on system power-up. The UART switch in the switch box (see **Figure 2**) needs to be in the OFF position. After that the UART switch can be turned on if the communication is needed. In order to enter the communication mode and to avoid communication problems, the current set resistor should be disconnected afterwards. Typically, this approach is suitable if the desired parameter set is burned into the OTP.

If the user needs to evaluate the system with some altered parameters, but without permanently burning (patching) them to the OTP, the previous procedure is not applicable. However, there is a way to execute the I-Set by reconnecting the LED load. For this purpose, execute the test configuration set from .dp vision with both switches of the switch box in the ON position. After successful start-up, disconnect the UART with the

associated switch and briefly disconnect the LED load[1]. After the load is reconnected the value of the output current should reflect the applied R-Set value. If the communication is needed again, follow the procedure described in the previous paragraph.

2.2 Software Setup

In order to use .dp vision, the user needs to install it on a used PC running Windows OS (for details, see **[4]**). Beside the .dp vision tool, a project-specific add-on also needs to be installed. This add-on will provide updated documentation and configuration files for the project. These files will be installed in the .dp vision installation folder.

2.2.1 Graphical User Interface (GUI) – .dp vision

The .dp vision software is a PC-based tool whose purpose is to enable easy configuration and user-friendly selection and definition of the project-specific parameter settings, allow adaptation and fine-tuning of the firmware behavior with respect to the application hardware configuration and dimensioning, fulfilling the given system requirements. The software can be downloaded from www.hitex.com/dp. Once the interface board is ordered, a link to download the software free-of-charge will be offered.
Figure 5 shows the initial .dp vision window after application start-up.

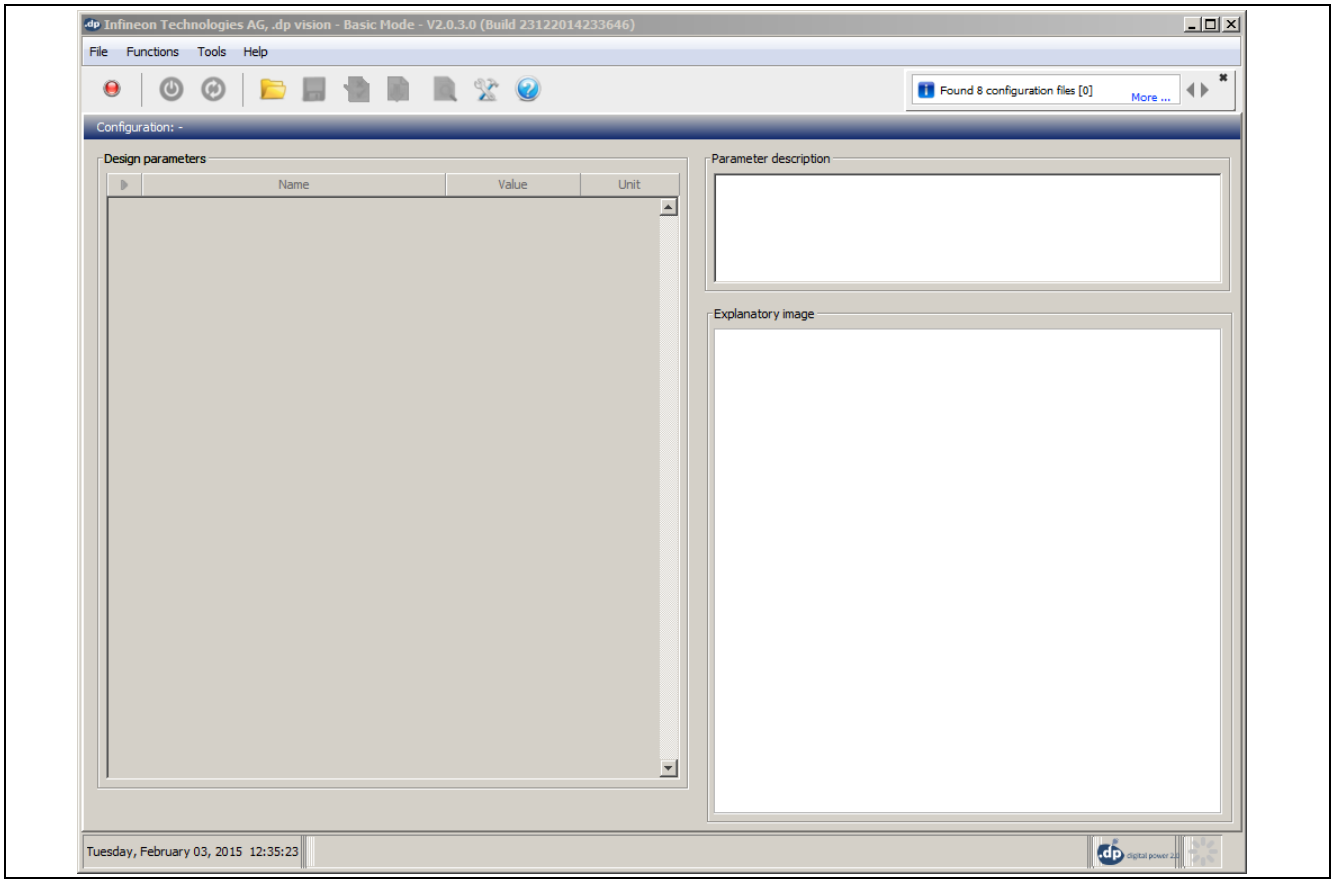

Figure 5 .dp vision Initial Window

[1] Keep in mind that this operation could be potentially dangerous for the LED load due to the fact that the output voltage will rise during disconnection and that the inrush current, as a consequence of an output capacitor discharge, will appear during the next connection of the LED load.

Since no configuration file (.csv) is loaded, many functions are disabled. After opening a project configuration file, which can be found in the installation folder (provided with the installation of the project-specific add-on), the .dp vision window is as shown in **Figure 6**.

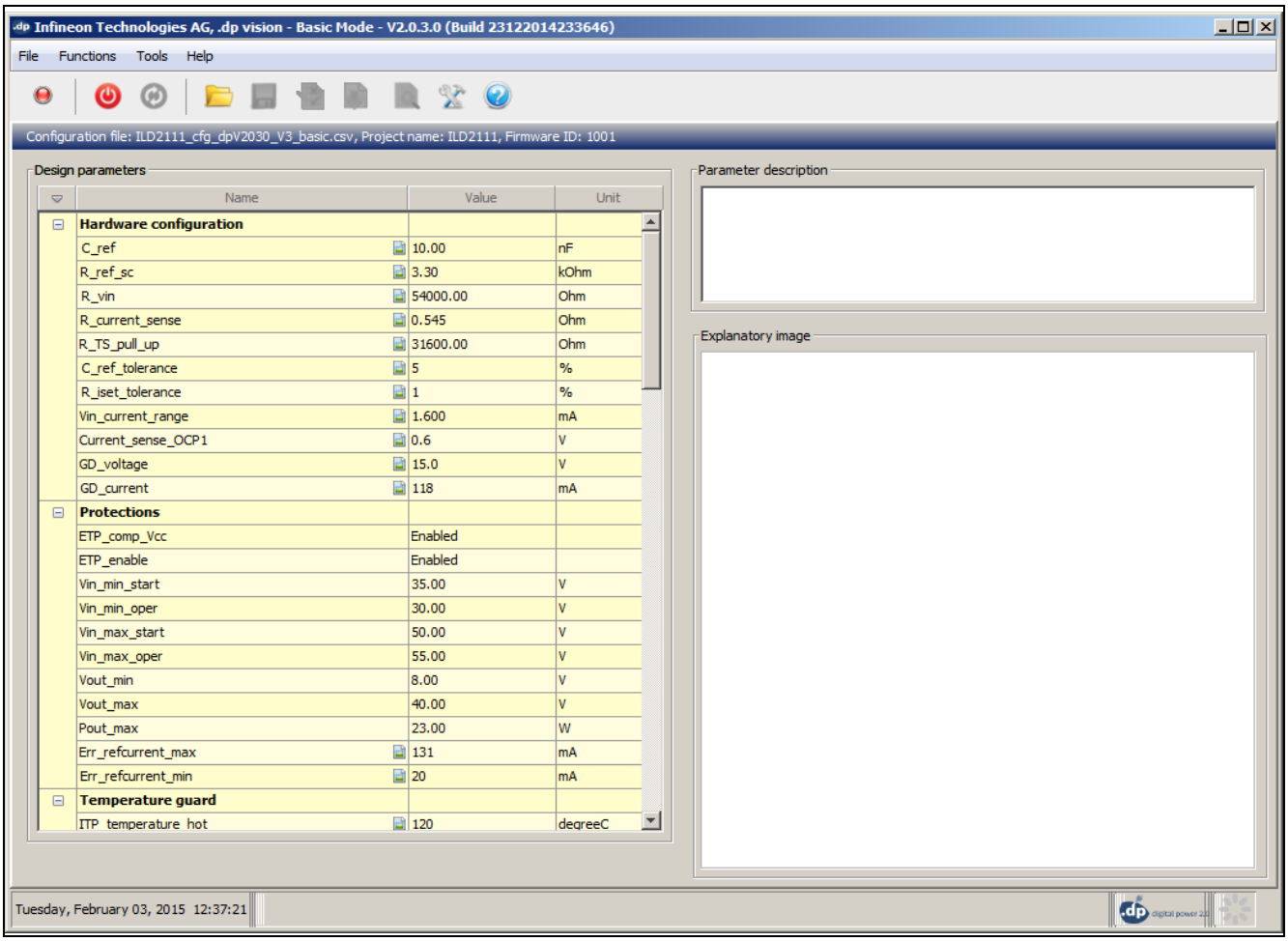

Figure 6 .dp vision Window After Loading Configuration File

The user is now able to connect to the target system by pressing a power device On/Off button ( ). If everything is connected properly, a Quick Button bar will appear, as shown in **Figure 7**.

Figure 7 .dp vision – Quick Button Bar

In the event of an error, an appropriate error message will be shown in a message field (see **Figure 8**).

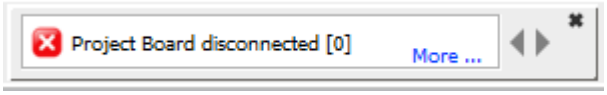

Figure 8 .dp vision – Message Field

After these steps the user will be able to perform tests or to burn parameters.

The current configuration can be tested by pressing a Test Configuration Set button (). If any parameter is changed by the user in the design parameters field, the new configuration has to be saved first and then it can be tested (otherwise testing is disabled).

Parameters are burned by pressing a Burn Configuration Set button (). If the initial parameters are already burned, patching is possible only to the extent of the available memory. This process is automatic and initiated by the same button and the user is interactively guided through the process.

More details about .dp vision can be found in the Tool User Manual (see **[4]**).

3 References

[1] ILD2111 Data Sheet
[2] ILD2111 Design Guide
[3] ILD2111 Evaluation System Application Note
[4] .dp vision User Manual
[5] .dp Interface Board Gen2 User Manual

Revision History

Major changes since the last revision

Page or Reference	Description of change
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Email: erratum@infineon.com

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