XDP7xx Gang Programmer user guide

Scope and purpose

Guiding the users on the functioning of the XDP7xx Gang Programmer board.

Intended audience

This document is intended for test engineers and production.

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Safety precautions

Note: Please note the following warnings regarding the hazards associated with development systems.

Table 1 Safety precautions

	**Warning**: *The evaluation or reference board contains DC bus capacitors which take time to discharge after removal of the main supply. Before working on the drive system, wait five minutes for capacitors to discharge to safe voltage levels. Failure to do so may result in personal injury or death.*
	**Caution:** *The heat sink and device surfaces of the evaluation or reference board may become hot during testing. Hence, necessary precautions are required while handling the board. Failure to comply may cause injury.*
	**Caution:** *The evaluation or reference board contains parts and assemblies sensitive to electrostatic discharge (ESD). Electrostatic control precautions are required when installing, testing, servicing or repairing the assembly. Component damage may result if ESD control procedures are not followed. If you are not familiar with electrostatic control procedures, refer to the applicable ESD protection handbooks and guidelines.*
	**Caution:** *The evaluation or reference board is shipped with packing materials that need to be removed prior to installation. Failure to remove all packing materials that are unnecessary for system installation may result in overheating or abnormal operating conditions.*

Table of contents

1 Introduction

The XDP7xx Gang Programmer provides an easier and efficient way for the user to program a maximum four XDP devices simultaneously. The XDP Gang Programmer supports the programming of the following devices:

- XDP710-001
- XDP710-002
- XDP700-002

The communication dongle and 22 V voltage supply for the devices are integrated inside the programmer board that reduces the external connections and only requires the USB connection between the board and the computer running the Gang Programmer GUI.

Note: This document highlights the programming steps for XDP710-002. The same steps can be replicated for programming XDP710-001 and XDP700-002.

2 Hardware and software requirements

The following hardware and software are required for the setup:

- XDP7xx Gang Programmer board (PRGXDP710 Rev D) shown in Figure 1
- USB-C cable
- XDP Gang Programmer (GUI)
  - From Infineon Development Center > Tools > search for “XDP Gang Programmer GUI” > Download.

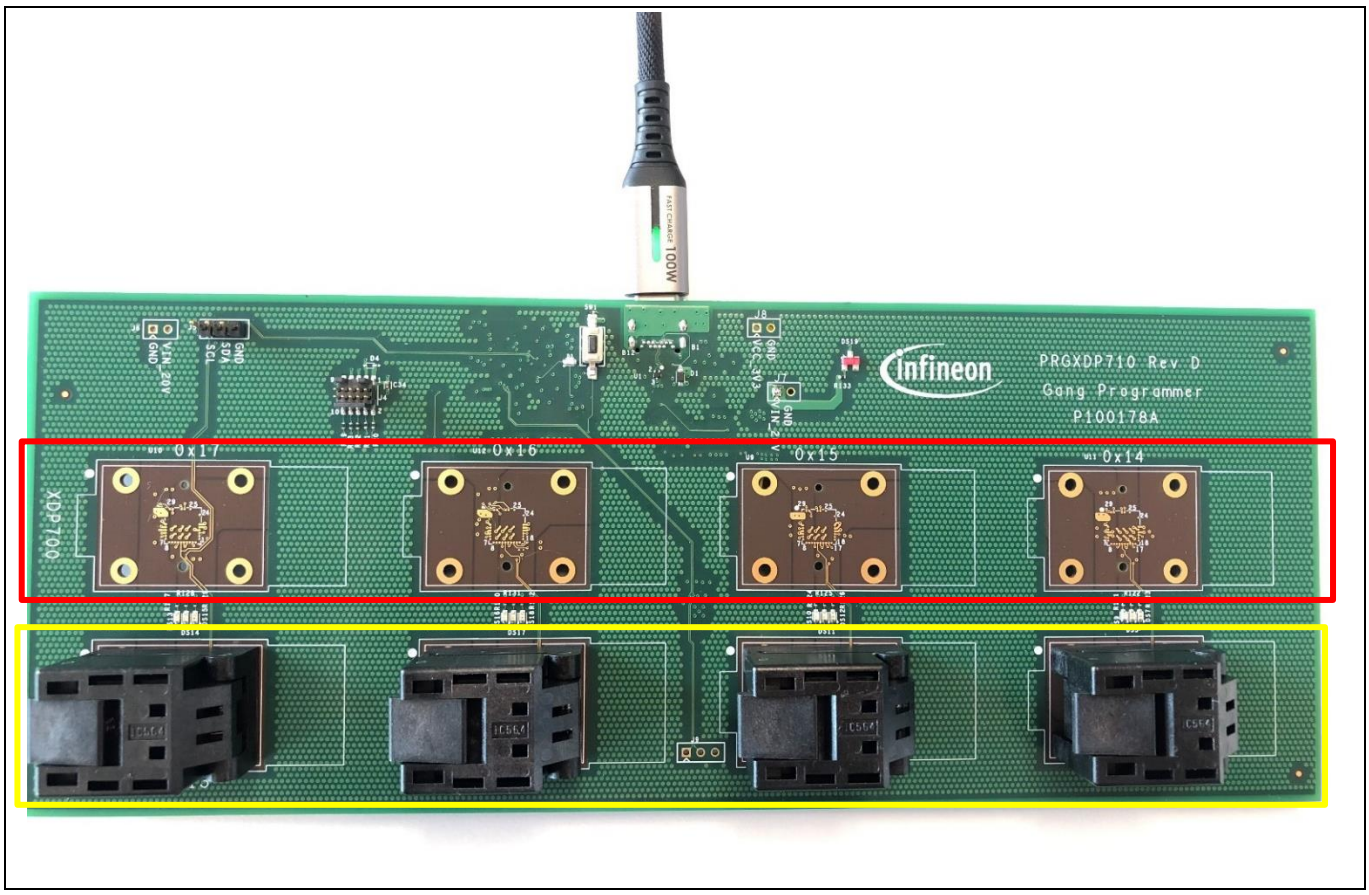

Figure 1 XDP7xx Gang Programmer board

Hardware and software requirements

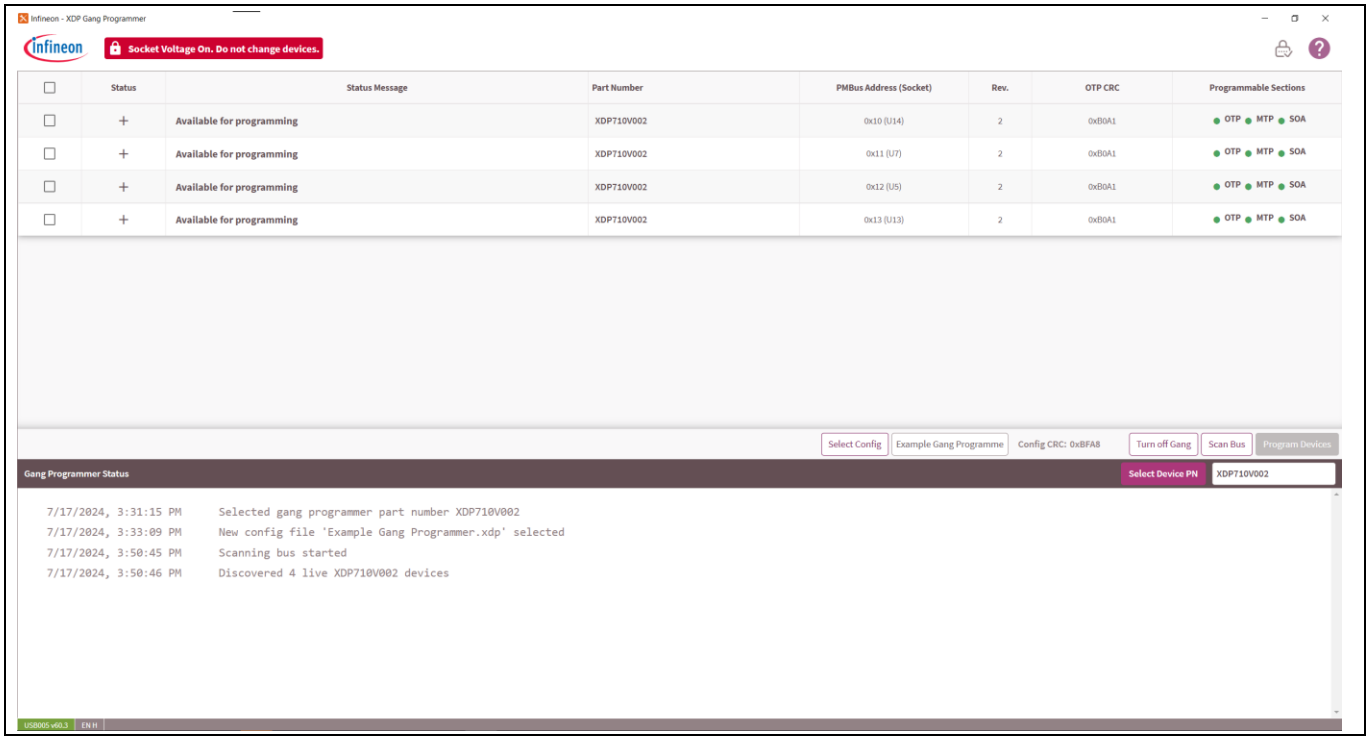

Figure 2 XDP Gang Programmer GUI

3 XDP7xx Gang Programmer board

The following is a description of the XDP7xx Gang Programmer board.

3.1 Electrical specifications

- **Input voltage:** 5 V via USB-C
- **Output voltage:** 3.3 V and 22 V generated internally

3.2 Ordering code

Table 2 Ordering code for XDP700/10

Device	Ordering code
XDP710-002	PRG_XDP710_BRD
XDP710-001	PRG_XDP710_BRD
XDP700-002	PRG_XDP700_BRD

3.3 Block diagram

The XDP7xx gang programmer block diagram shown in Figure 3 consists of:

- **Buck regulator (5 V to 3.3 V):** Provides 3.3 V to the PSoC™ 6 MCU
- **Boost regulator (5 V to 22 V):** Provides 22 V to the XDP7xx devices
- **PSoC™ 6 MCU:** This works as a communication dongle between the host computer running XDP GUI and XDP7xx devices
- **Sockets:** The board has two rows for mounting the sockets. Row 1 highlighted in red is for programming XDP700 devices while the Row 2 highlighted in yellow is for programming XDP710 devices as shown in Figure 1
- **XDP Gang Programmer GUI:** This GUI is based on the XDP Designer platform, which makes it easier to interface with gang programmer board and program
- **USB Type C connector:** USB Type C is needed for communication and powering the board from the host PC

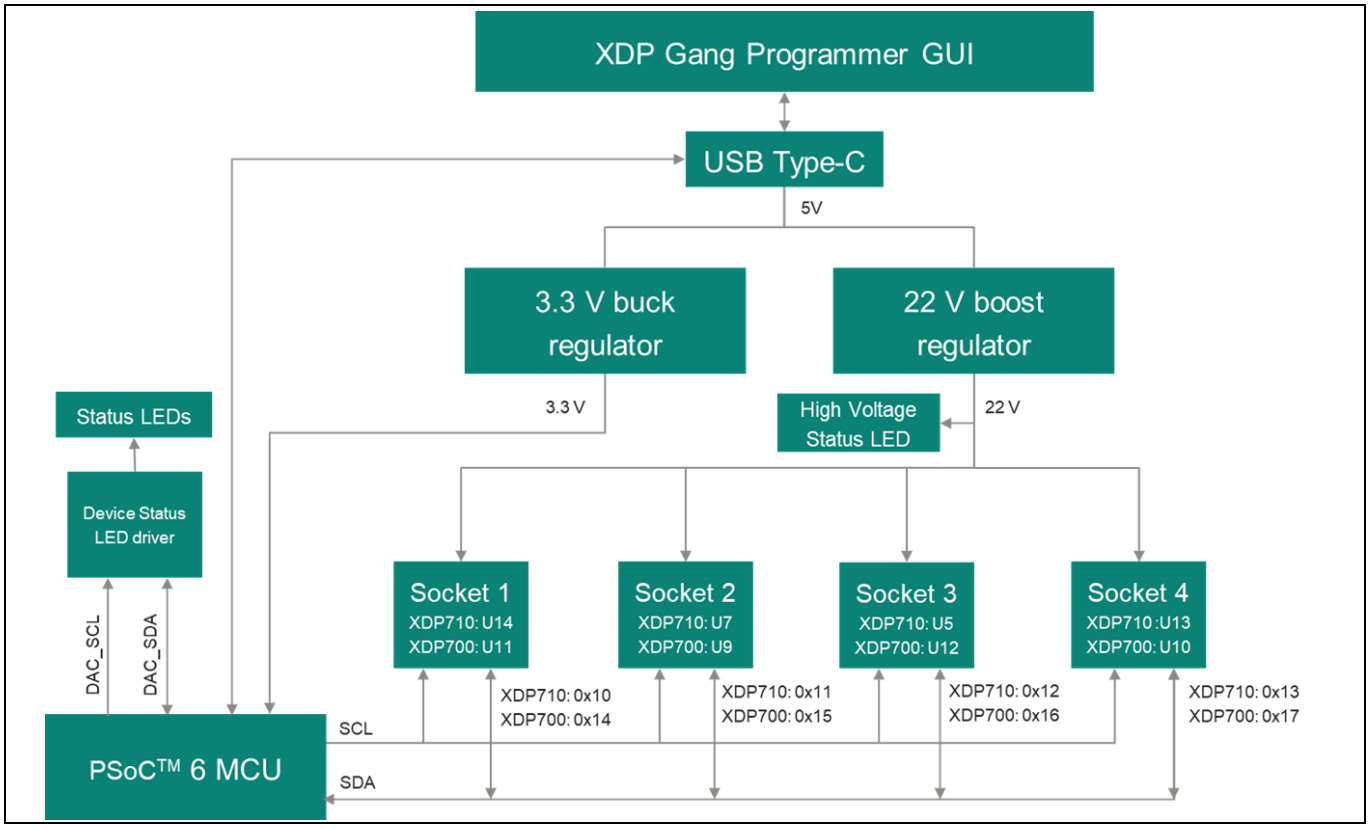

Figure 3 XDP710 evaluation platform block diagram

3.4 XDP7x0 Gang Programmer board schematics

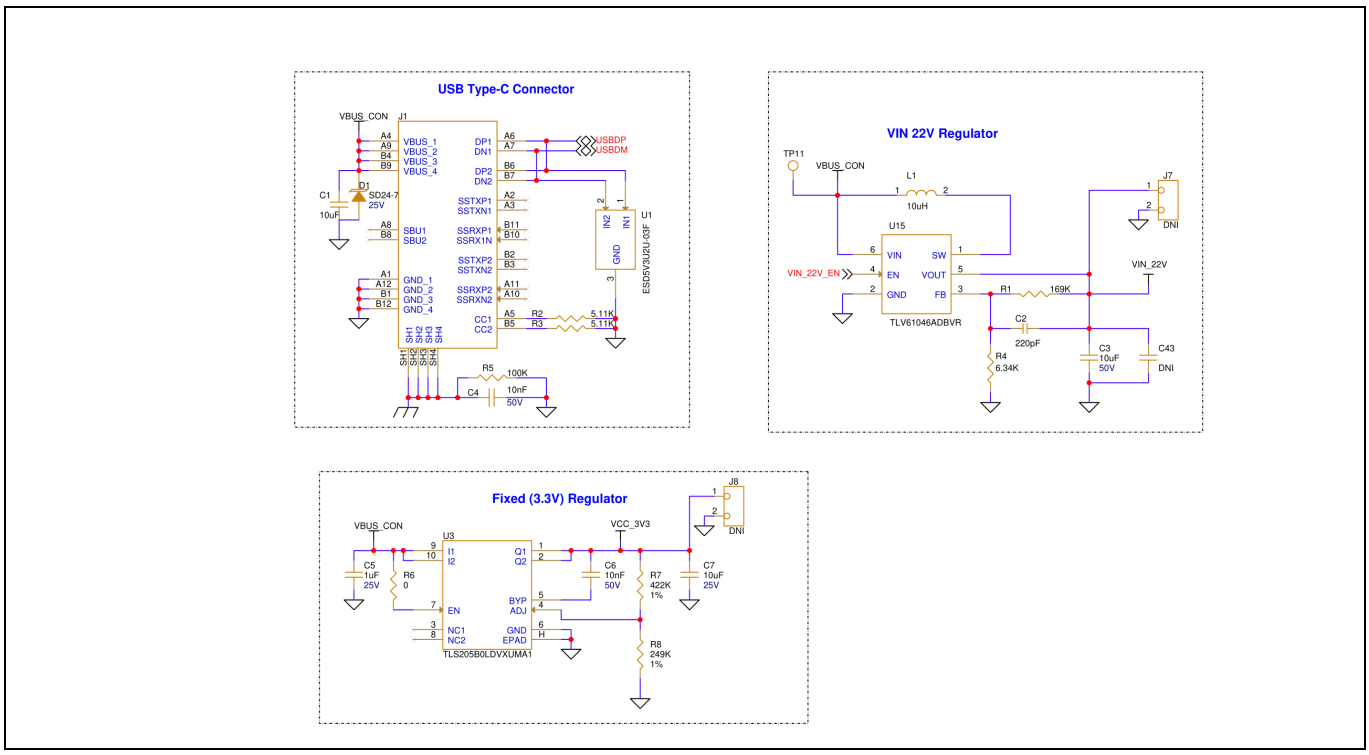

Figure 4 Schematic for voltage regulator

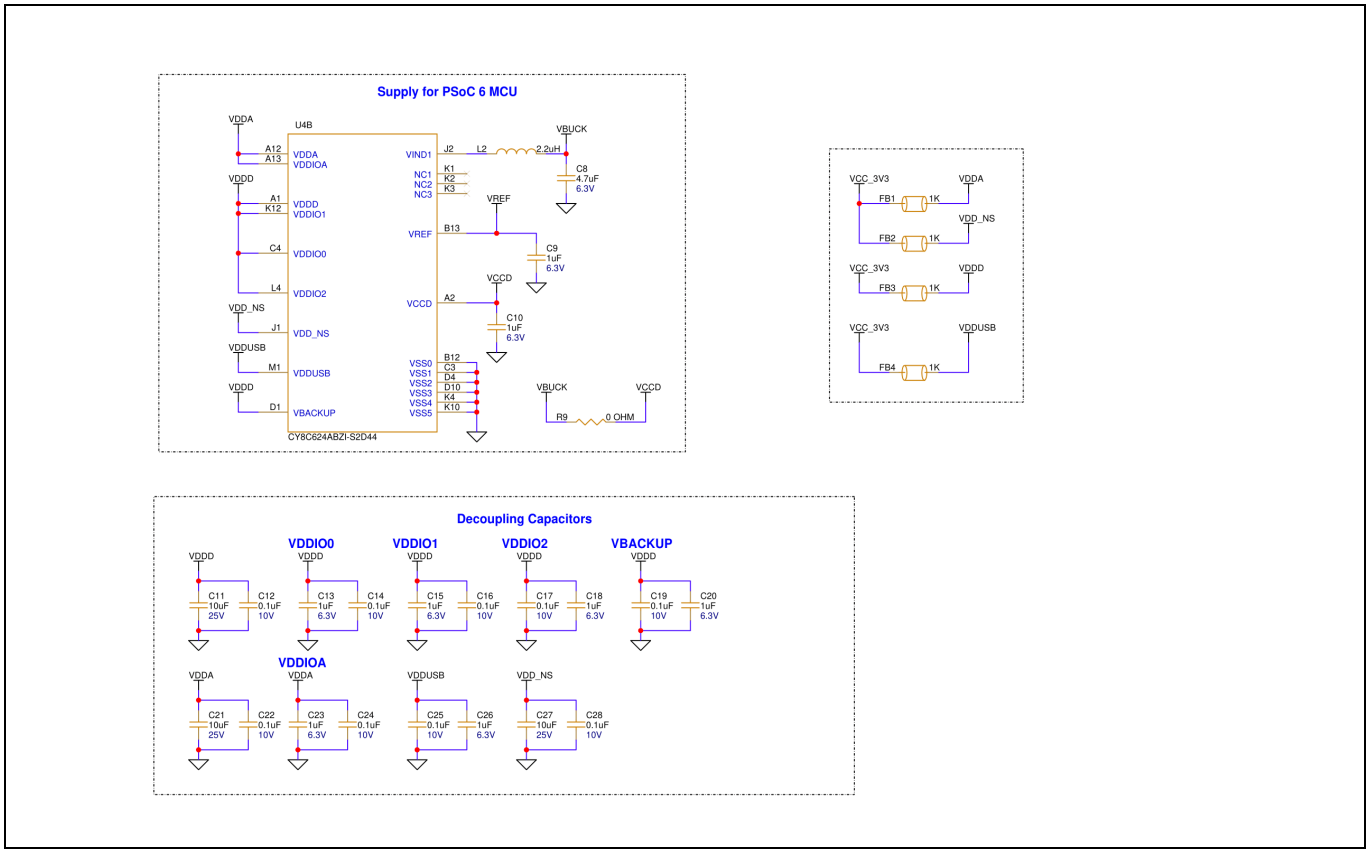

Figure 5 Schematic for PSoC™ 6 Power

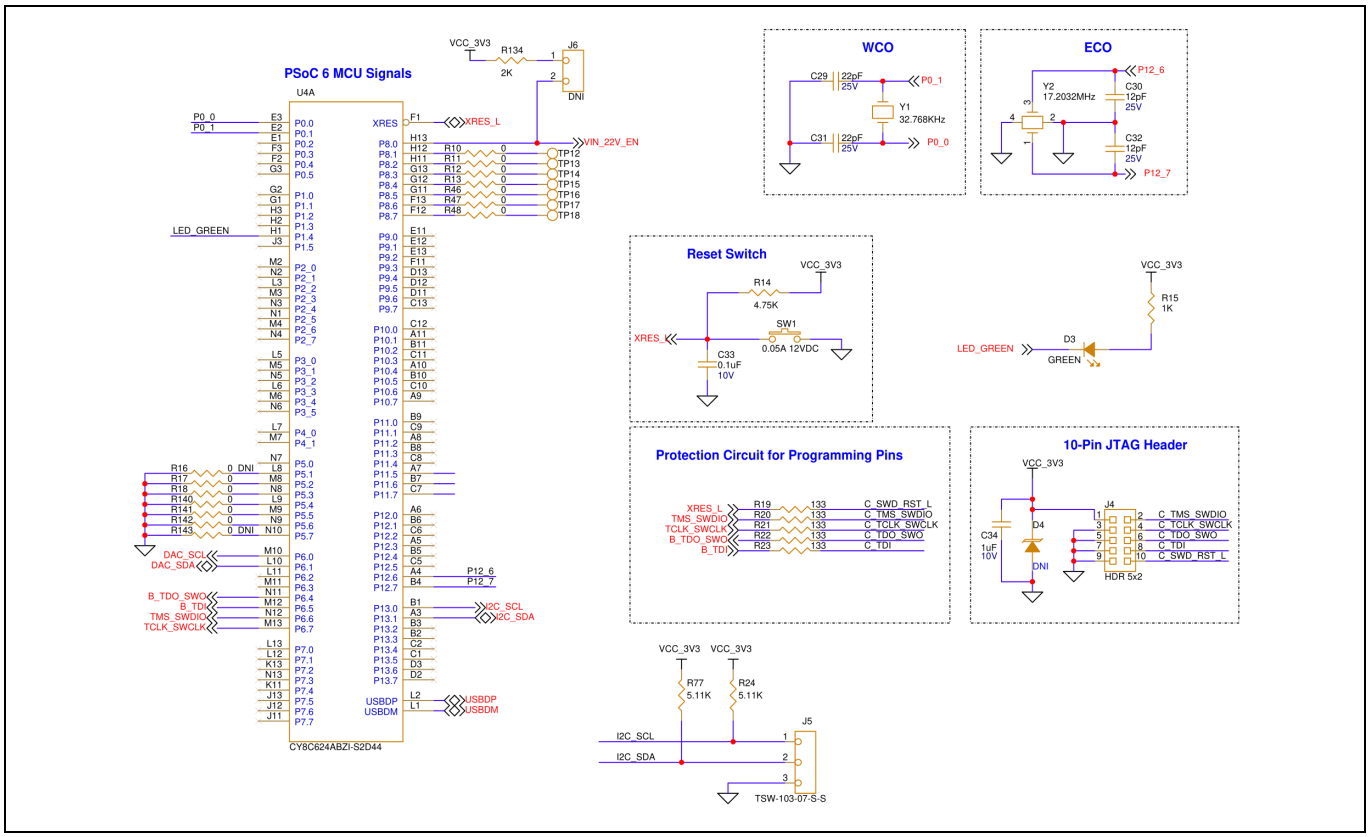

Figure 6 Schematic for PSoC™ 6 signals

XDP7xx Gang Programmer board

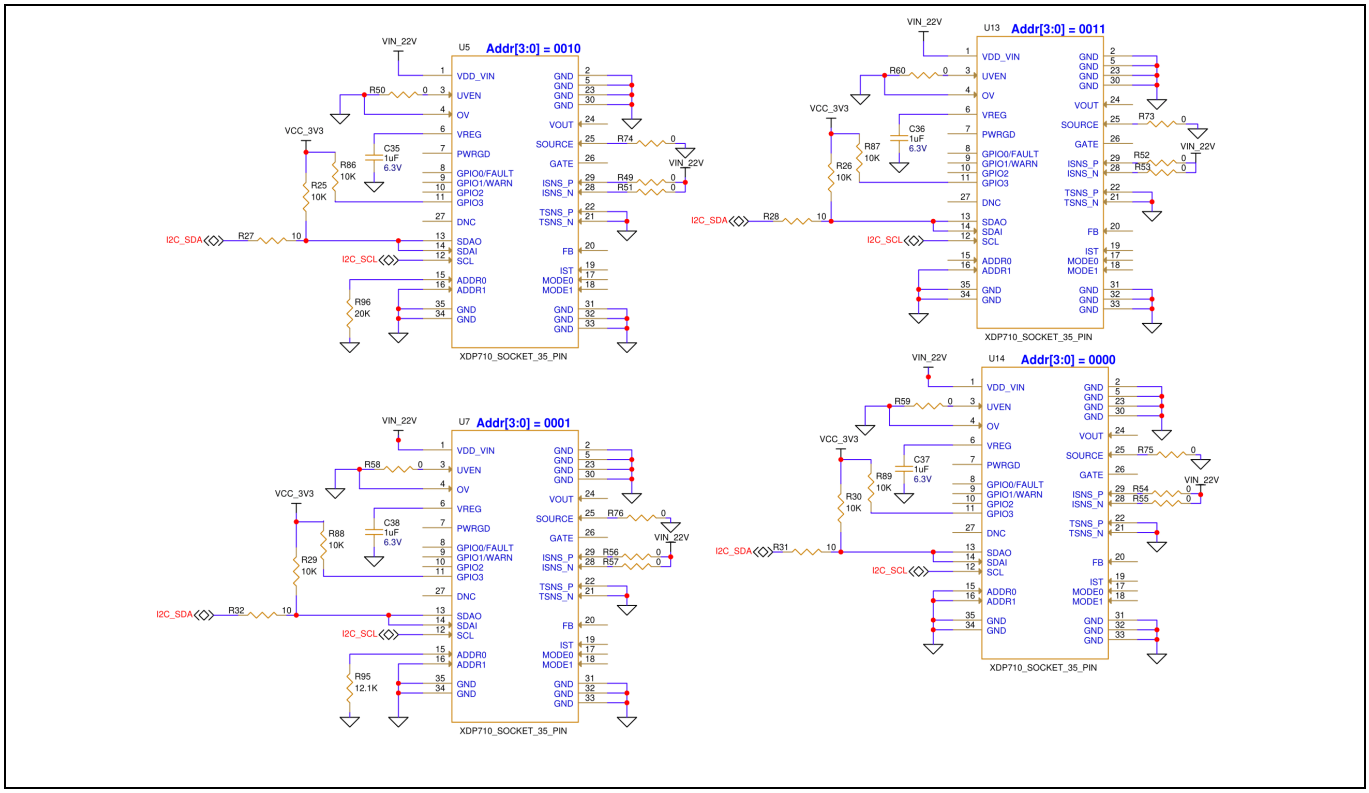

Figure 7 Schematic for XDP710 sockets

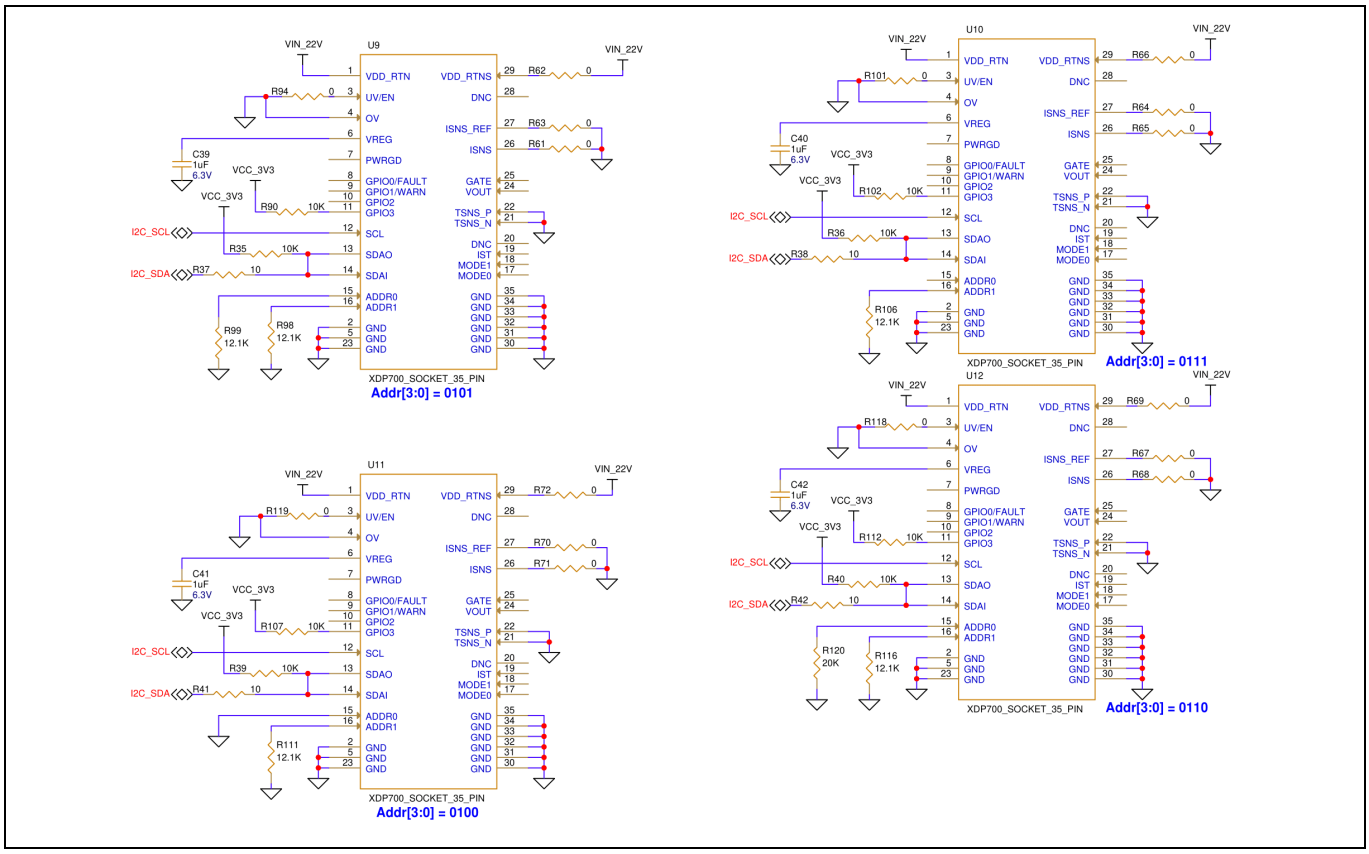

Figure 8 Schematic for XDP700 sockets

XDP7xx Gang Programmer board

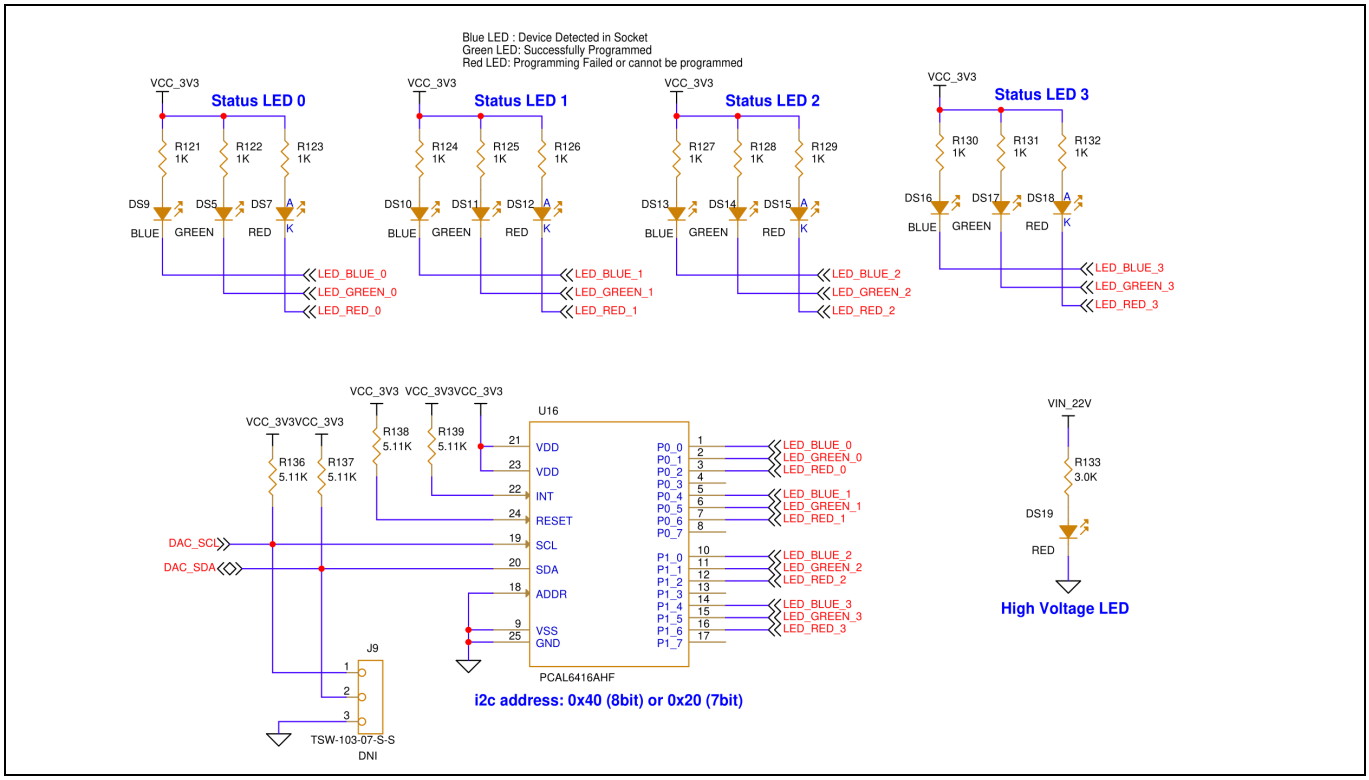

Figure 9 Schematic for LEDs

3.1 Gang Programmer board layout

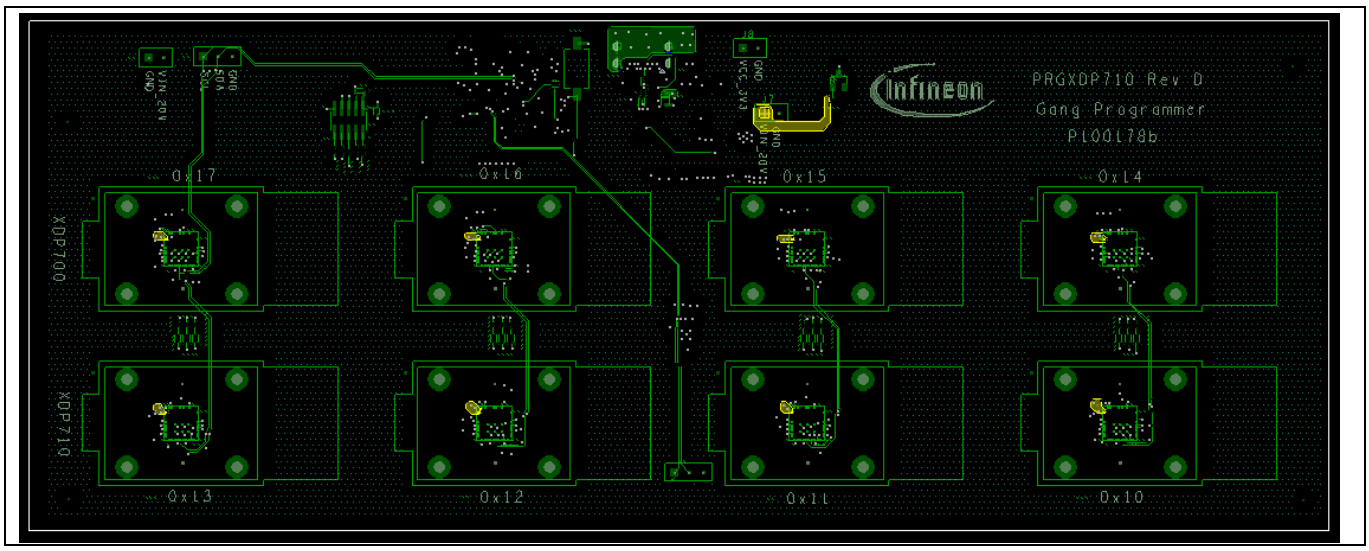

Figure 10 Top layer layout of main PCB

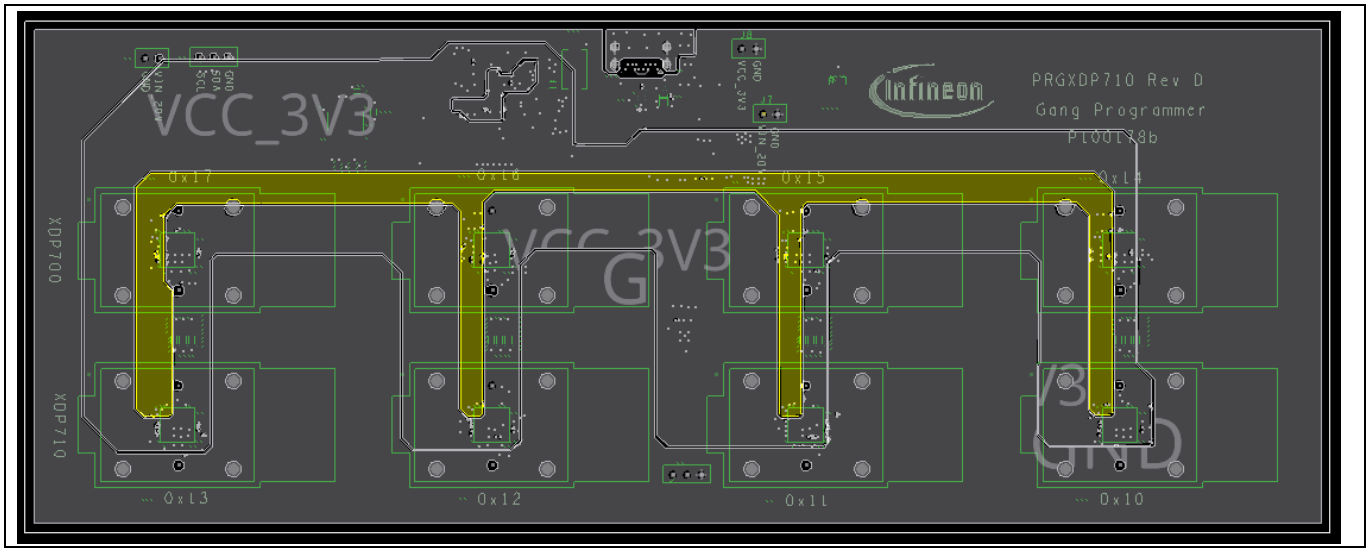

Figure 11 Mid 1 layer (V_{CC}) layout of main PCB

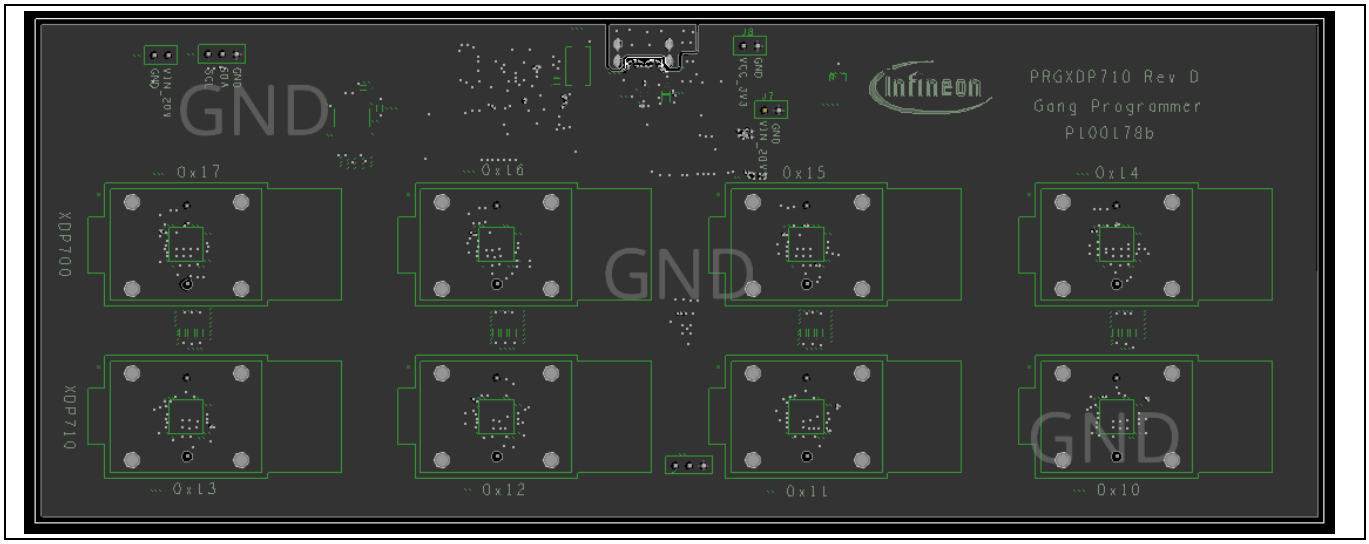

Figure 12 Mid 2 layer (GND) layout of main PCB

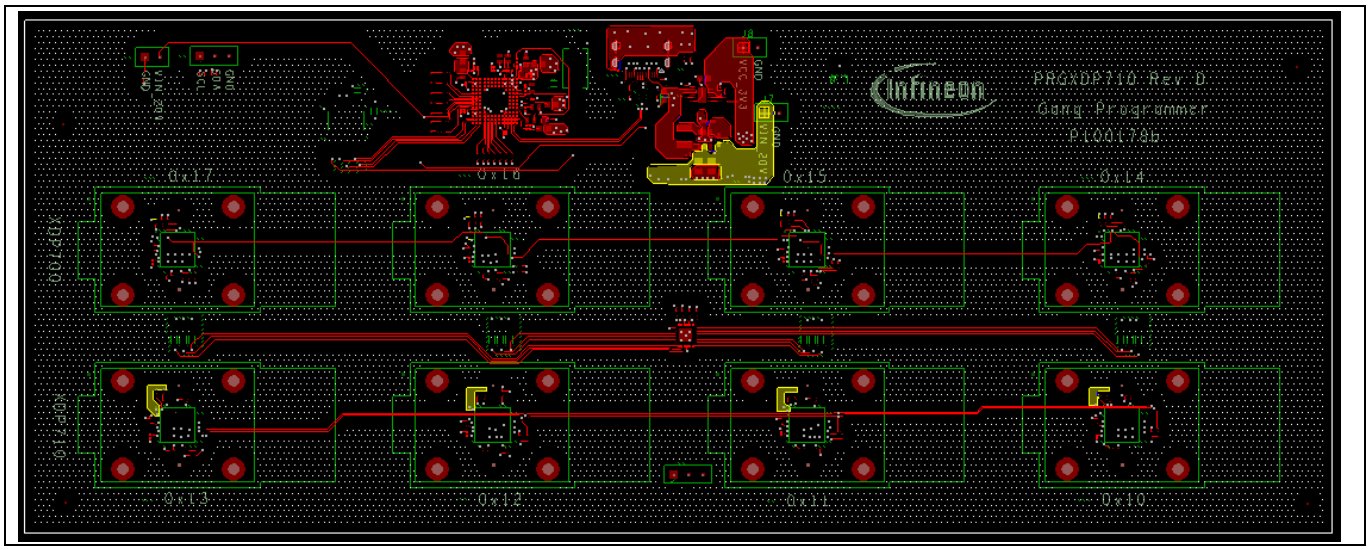

Figure 13 Bottom layer layout of main PCB

4 Board setup and programming

4.1 Set up the board

- Connect the USB cable between the board and the host PC.

The green LED starts flashing indicating that the board has power when the connection is successful.

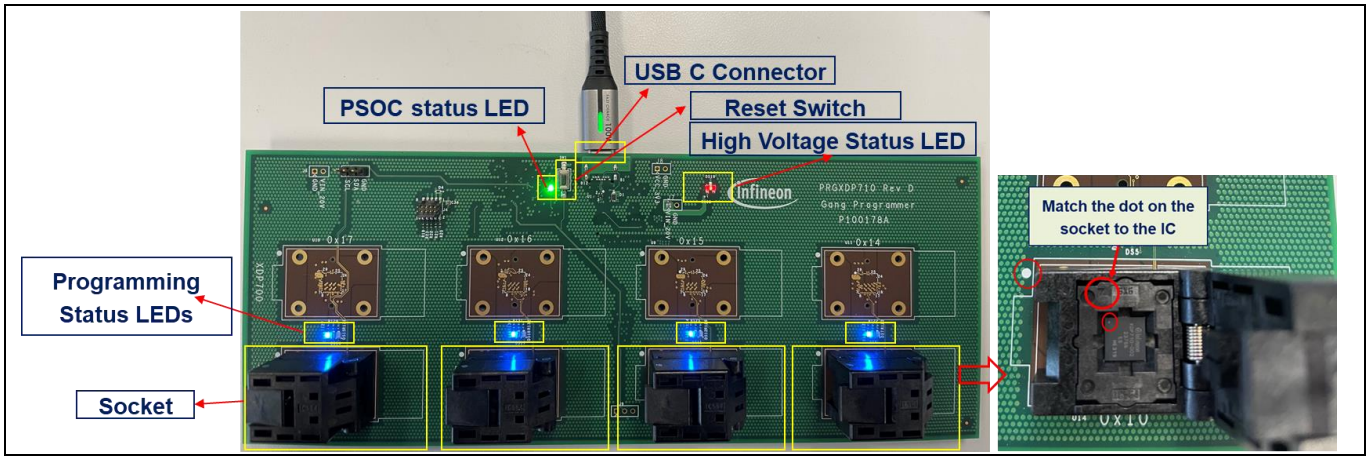

Figure 14 Gang Programmer board setup

4.2 Set up the XDP Gang Programmer GUI

1. Open **XDP Gang Programmer GUI** on the host PC.

Figure 15 XDP Gang Programmer

The green tab on the left bottom corner should read **USB005 v60.3** indicating that the board has established the communication with the GUI as shown in Figure 16.

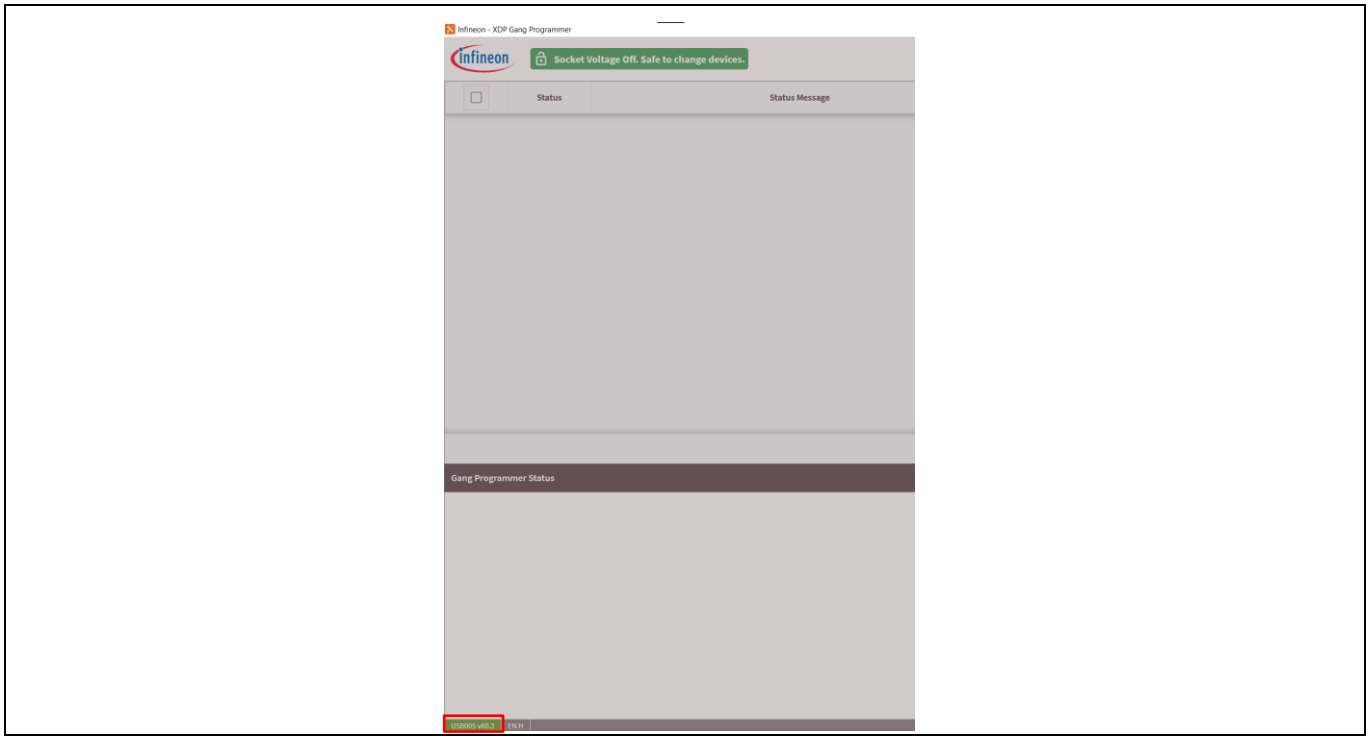

Figure 16 XDP Gang Programmer GUI connection with the board

2. Select the desired XDP7x0V00x device from the list and click **Update**.

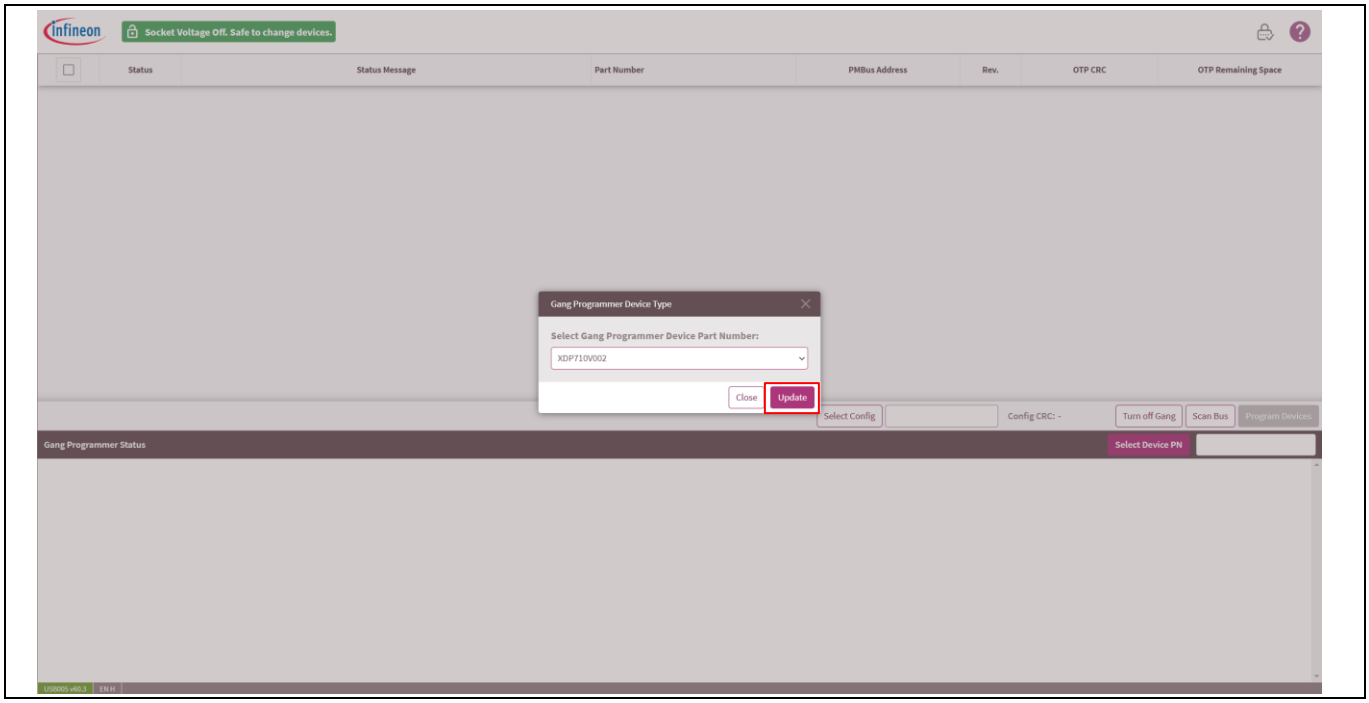

Figure 17 Select the XDP710V002 device

3. Click **Select Config**.
   The **Select Config File** popup appears.

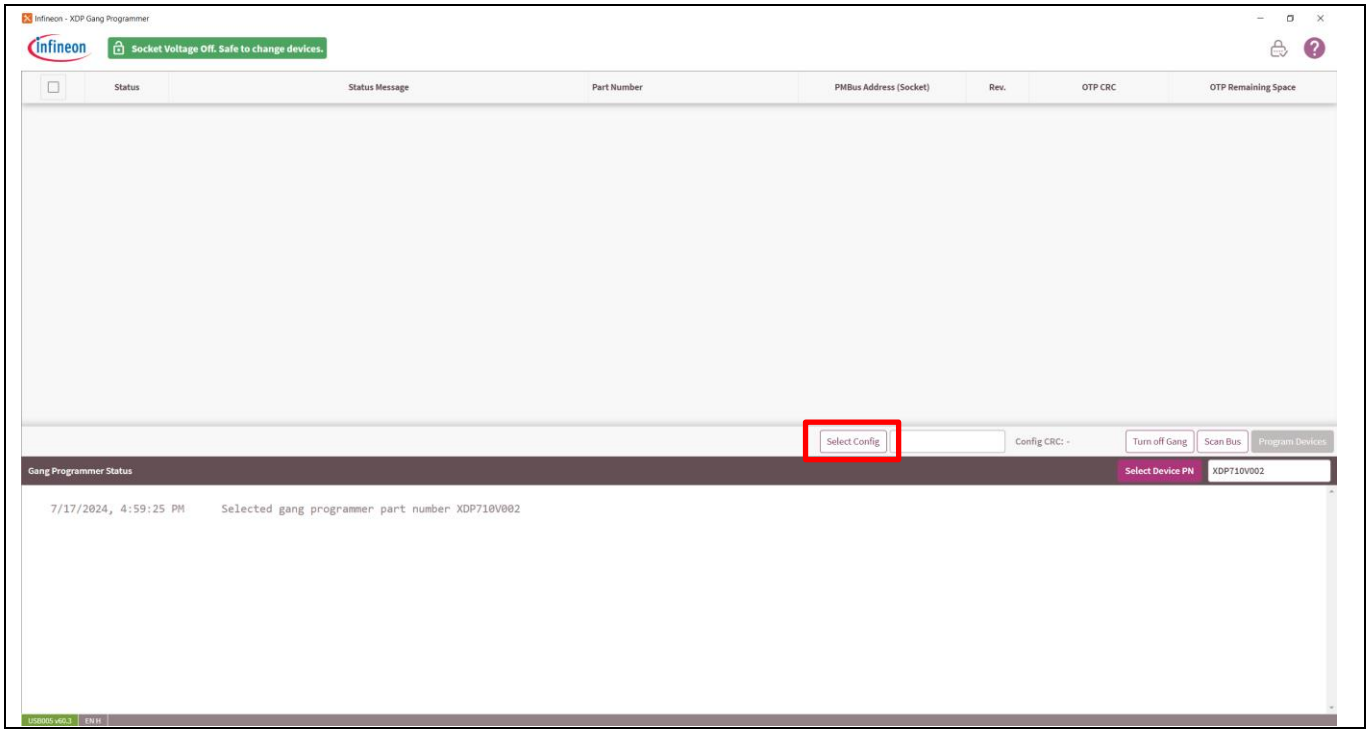

Figure 18 Selecting desired config file

4. Click **Browse** and select the necessary configuration file from your PC.
5. Click **Load** to load the config file onto the GUI.
   If the selected config file is not compatible with the device, an error message appears.

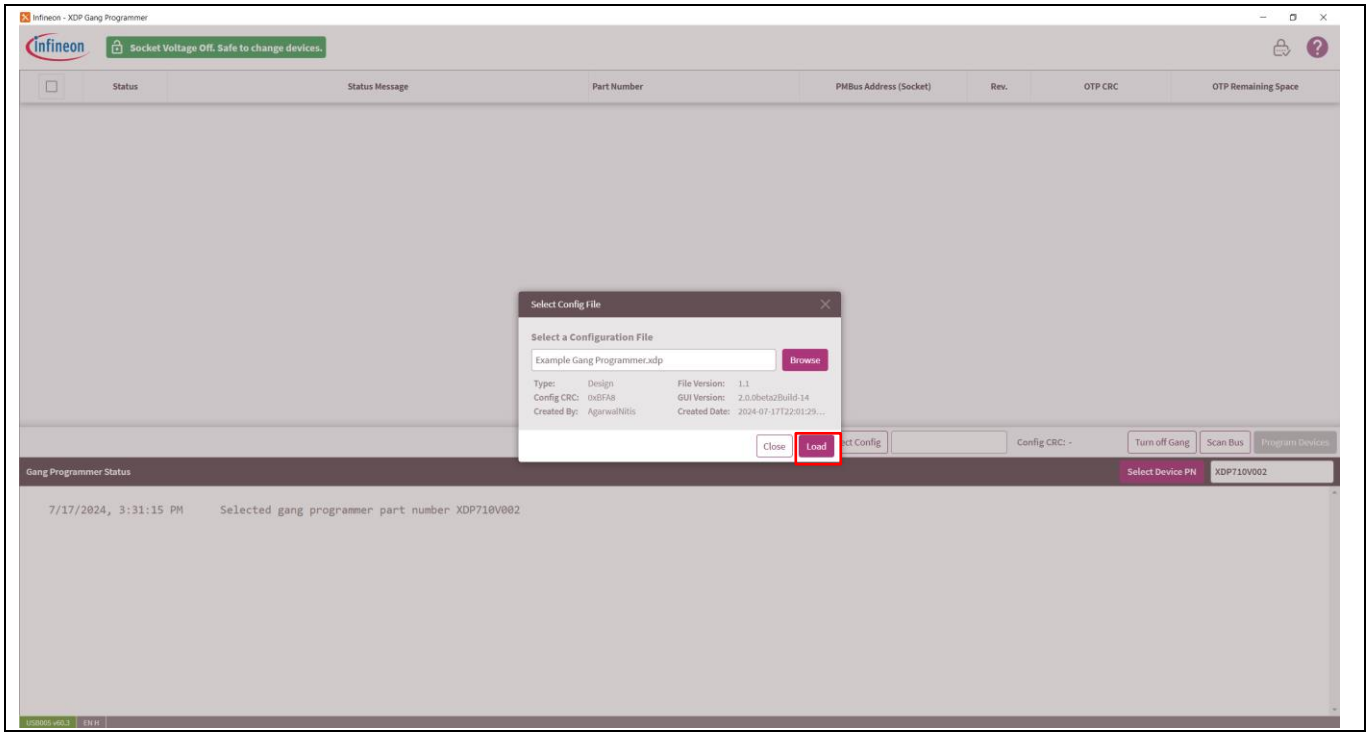

Figure 19 Selecting desired config file

6. After loading the config file, ensure that the message in green appears as shown in Figure 20.
   The socket voltage message in green indicates that the sockets have 0 V and is safe to install the devices.

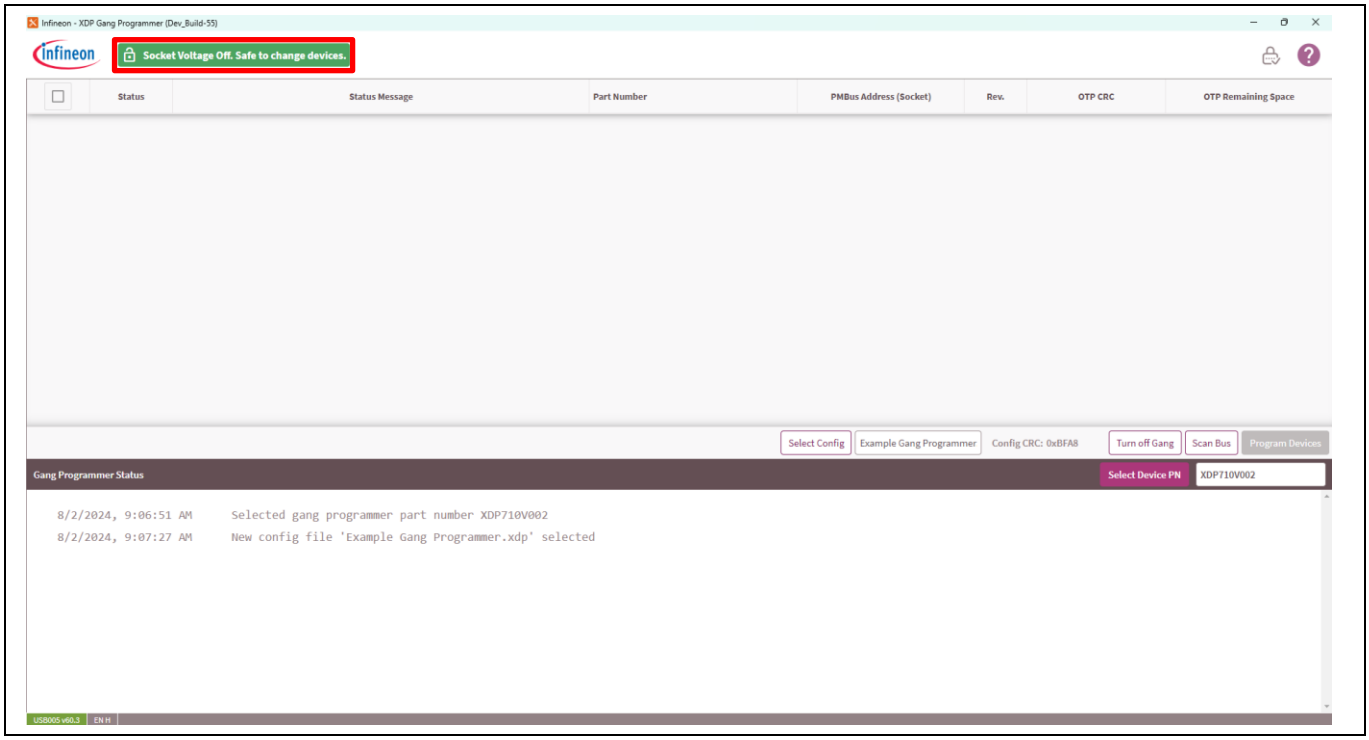

Figure 20 Safe socket voltage message

7. Install the devices in the correct orientation as shown in Figure 21 and close the sockets securely.

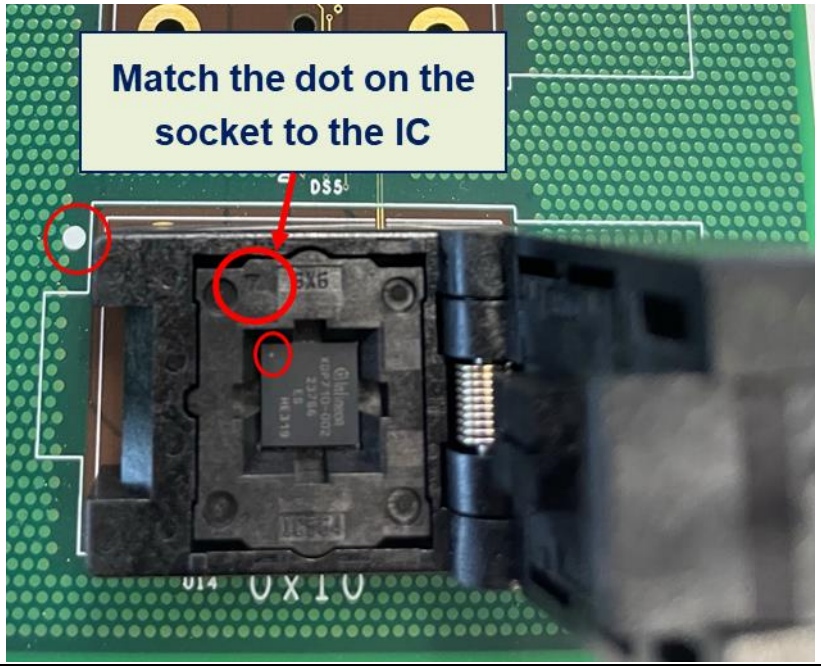

Figure 21 Match the notch with a dot on the IC for correct installation

4.1 Programming the installed devices

The following steps shows the process to program the IC after completing the initial setup.

4.2.1 Detecting connected devices

1. Click on **Scan Bus** to detect the connected devices.
   The boost regulator is enabled which supplies 22 V to the sockets necessary for OTP programming.

Attention: ***Do not open the sockets at this stage as it could damage the device and/or the programmer board.***

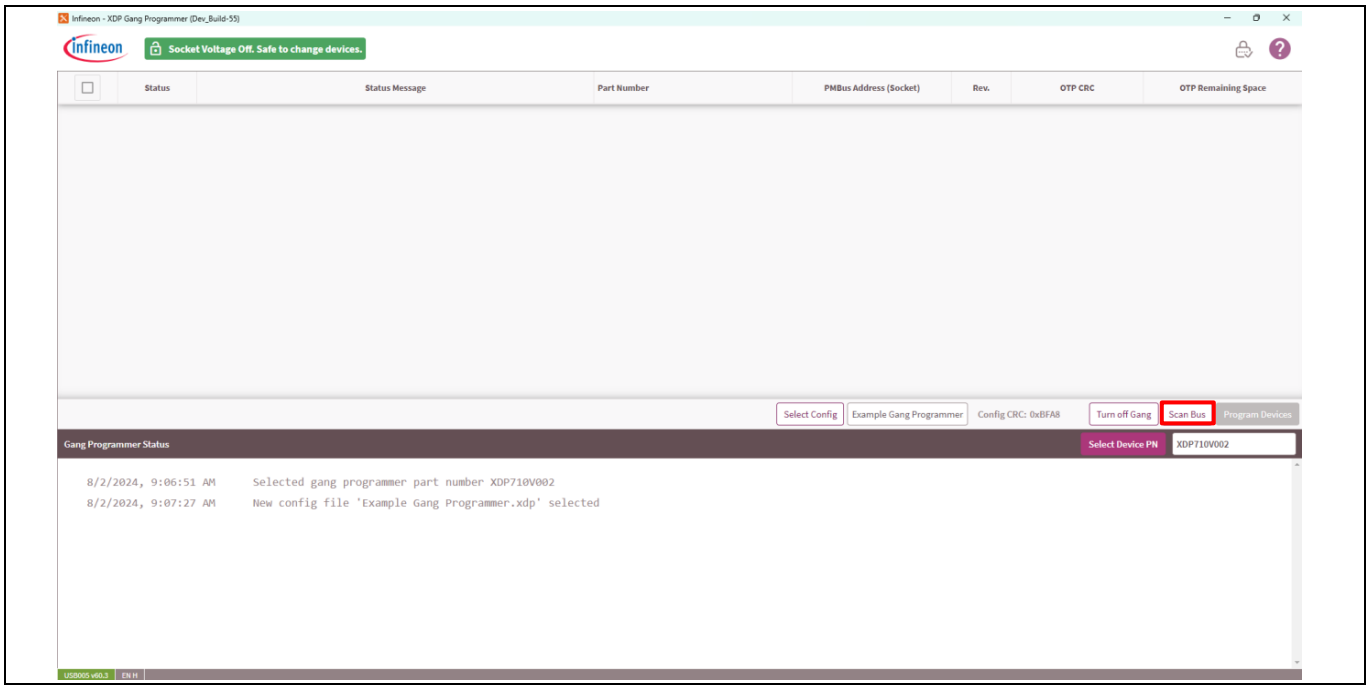

Figure 22 Scanning bus to detect connected devices

The bus is scanned instantly and the socket voltage message in red on the top left side shows that the board has a high voltage (22 V) as shown in Figure 23.

Note: *Whenever the socket voltage message appears, it indicates that the socket has 22 V and the sockets should not be opened as it could result in damage to the devices or/and the programmer board.*

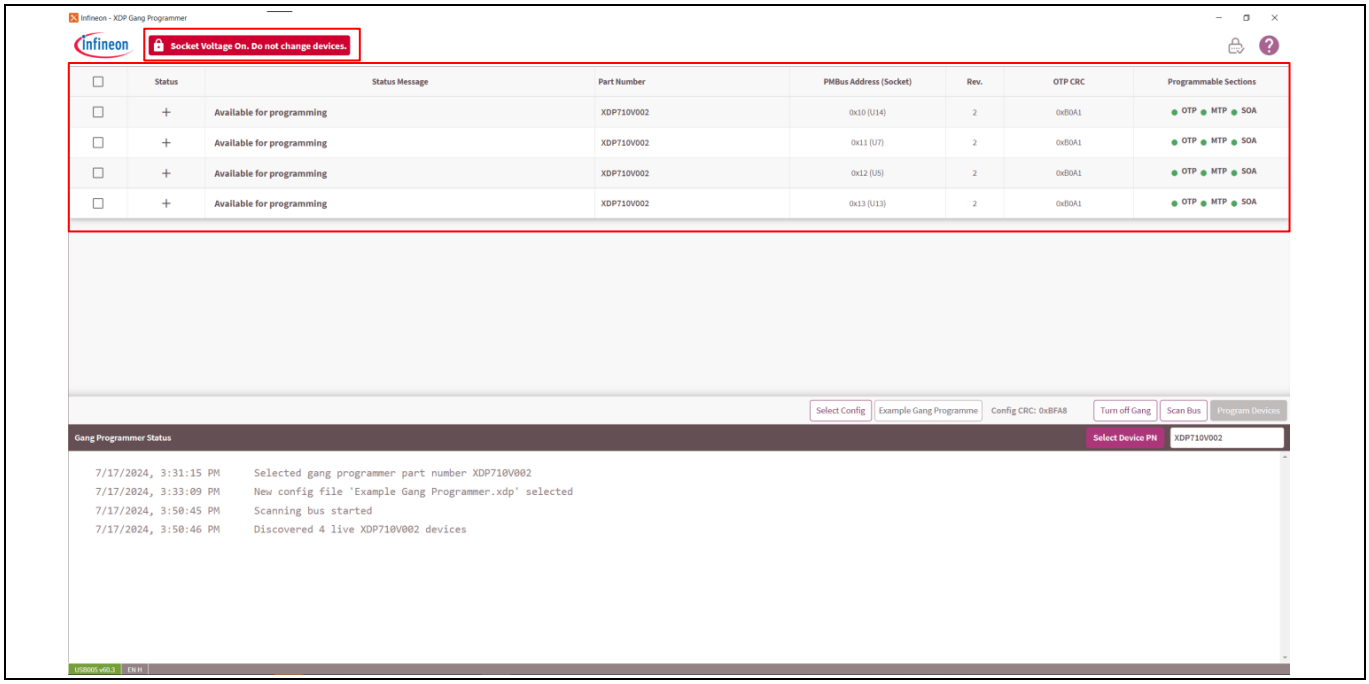

Figure 23 High socket voltage message

After the scan is complete, the connected devices are listed as shown in Figure 24.

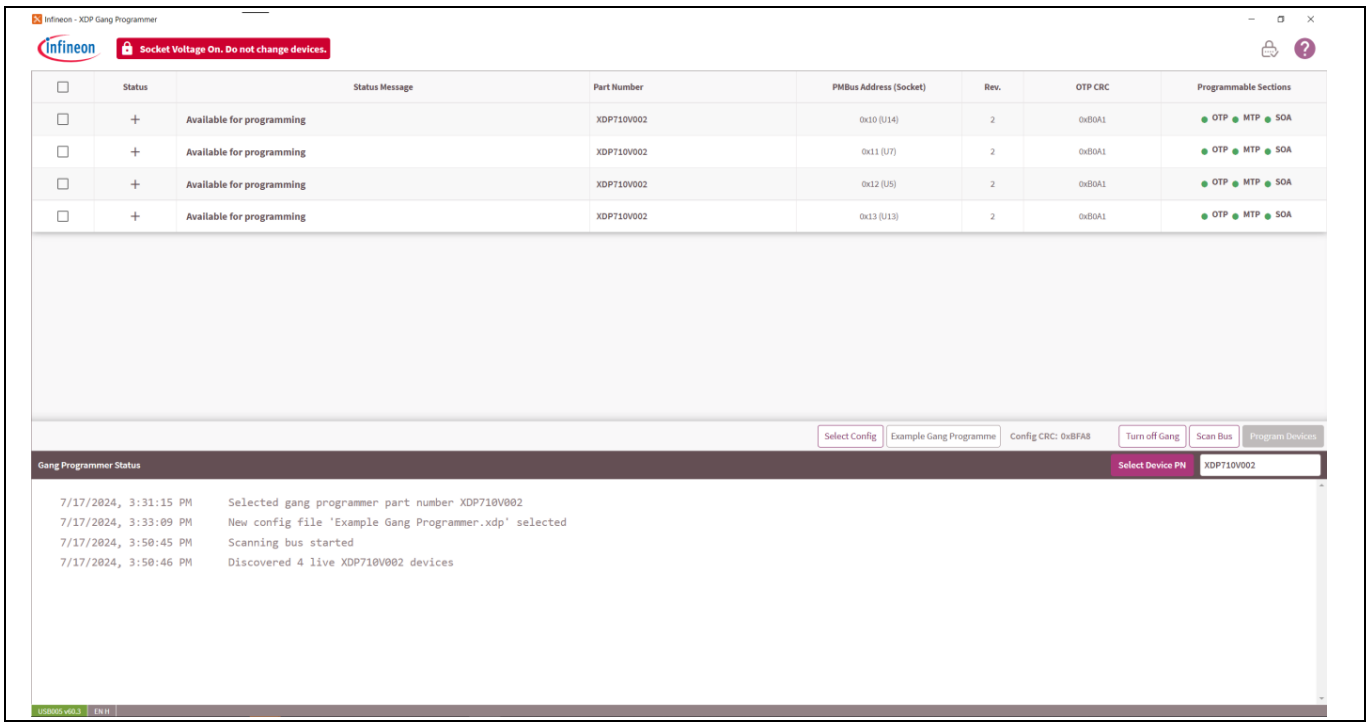

Figure 24 List of connected devices identified after scanning

4.2.2 OTP programming the connected devices

Figure 25 shows the list of connected devices. The **Status** (**+**) and **Status Message** indicates that the device is available for programming. In **Programmable Sections**, a green indictor next to the OTP, MTP, and SOA memories, shows the availability for programming.

*Note: If config file does not contain SOA programmable section, then **SOA** section will not be shown under **Programmable Sections***

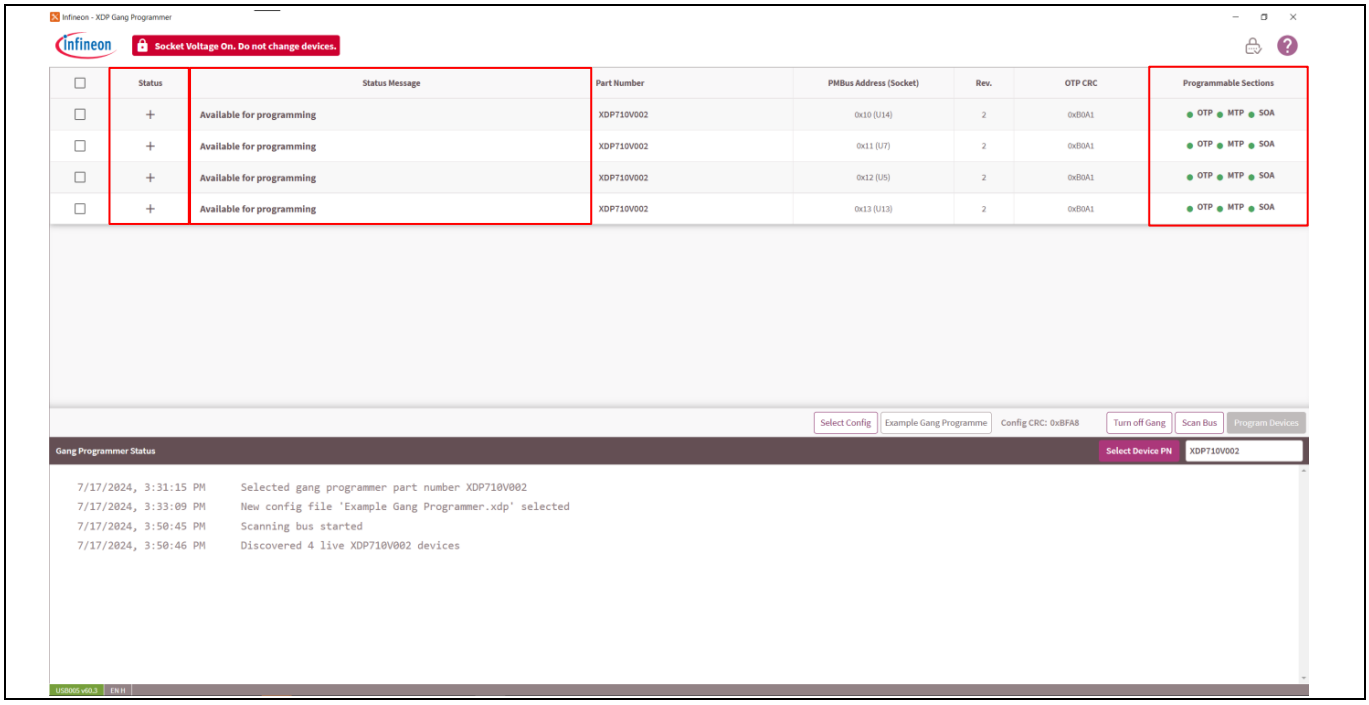

Figure 25 Reading device status and programmable sections

From the Figure 26 it can be observed that the red LED is on indicating that the 22 V rail is active, and the blue LEDs indicates that the devices have been identified in the corresponding socket.

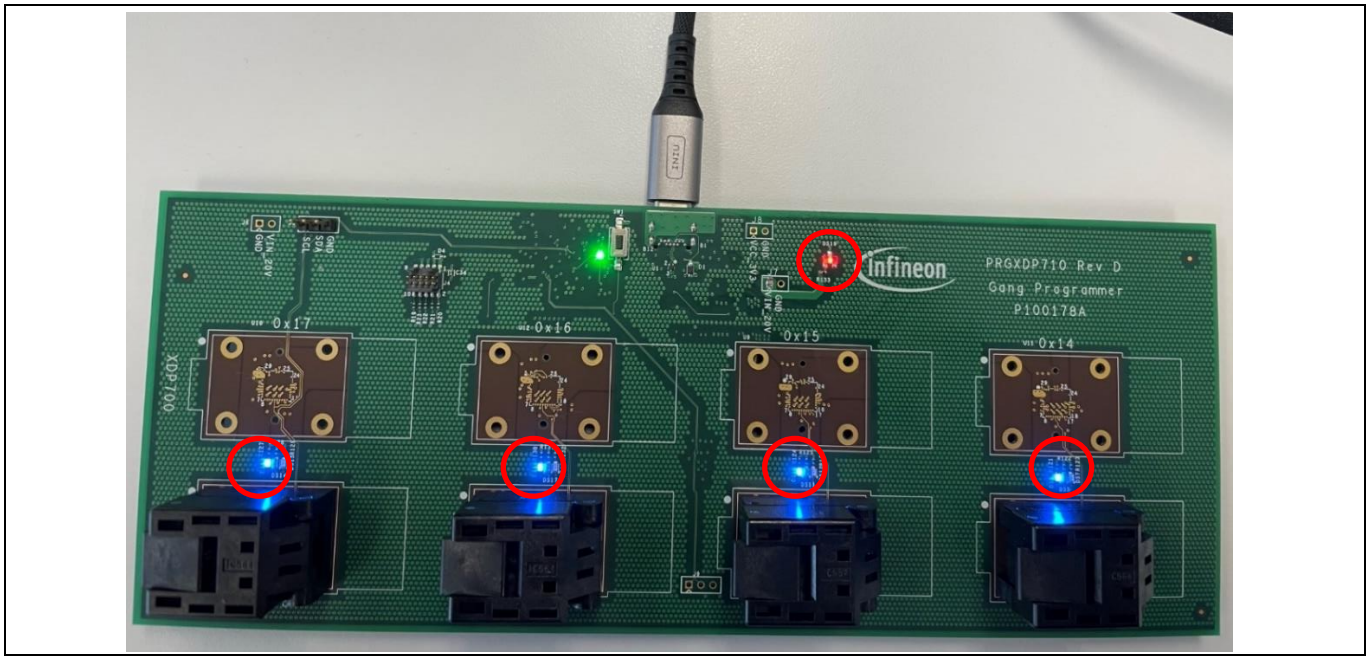

Figure 26 High-voltage LED and device detection LED

2. Select the devices for programming.
   The **Status** shows '●' indicating that the device is **Selected for programming** as shown in Figure 27.

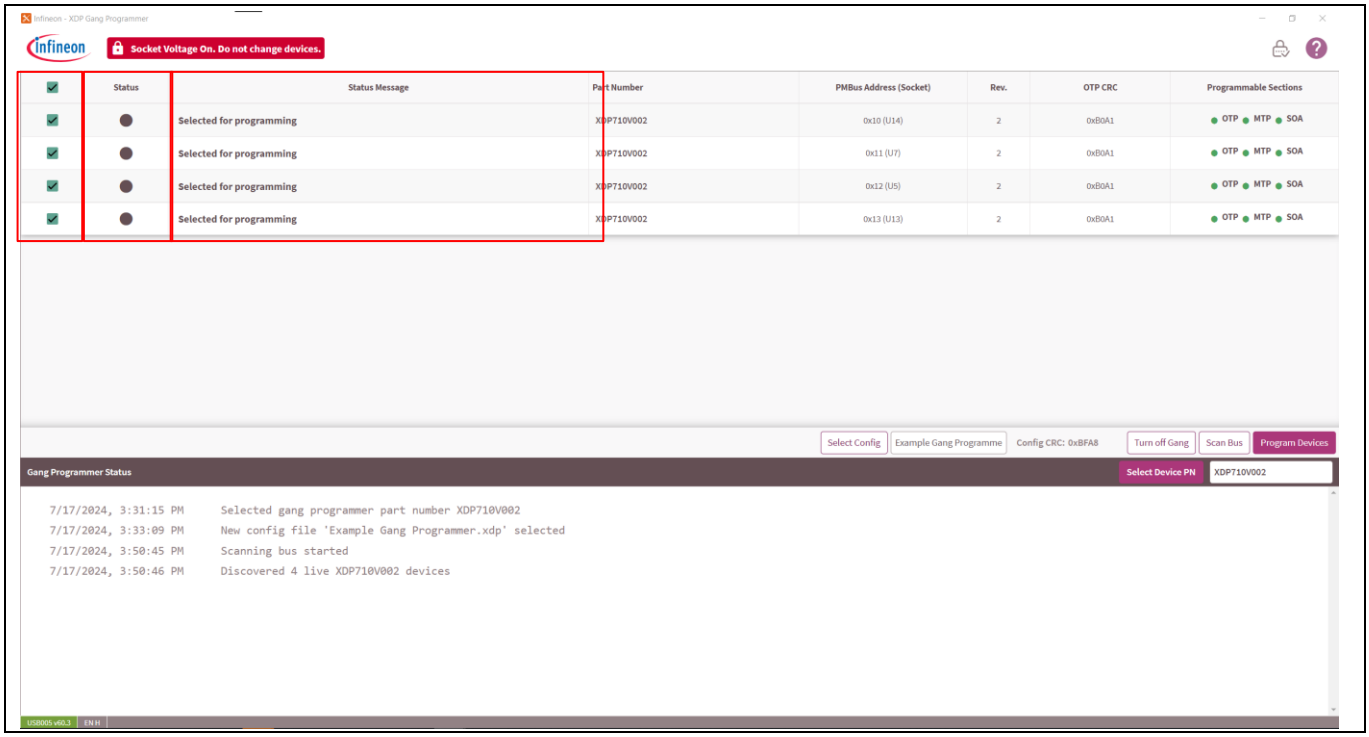

Figure 27 Selecting devices for programming

3. Click **Program Devices**.
   The programming starts automatically.

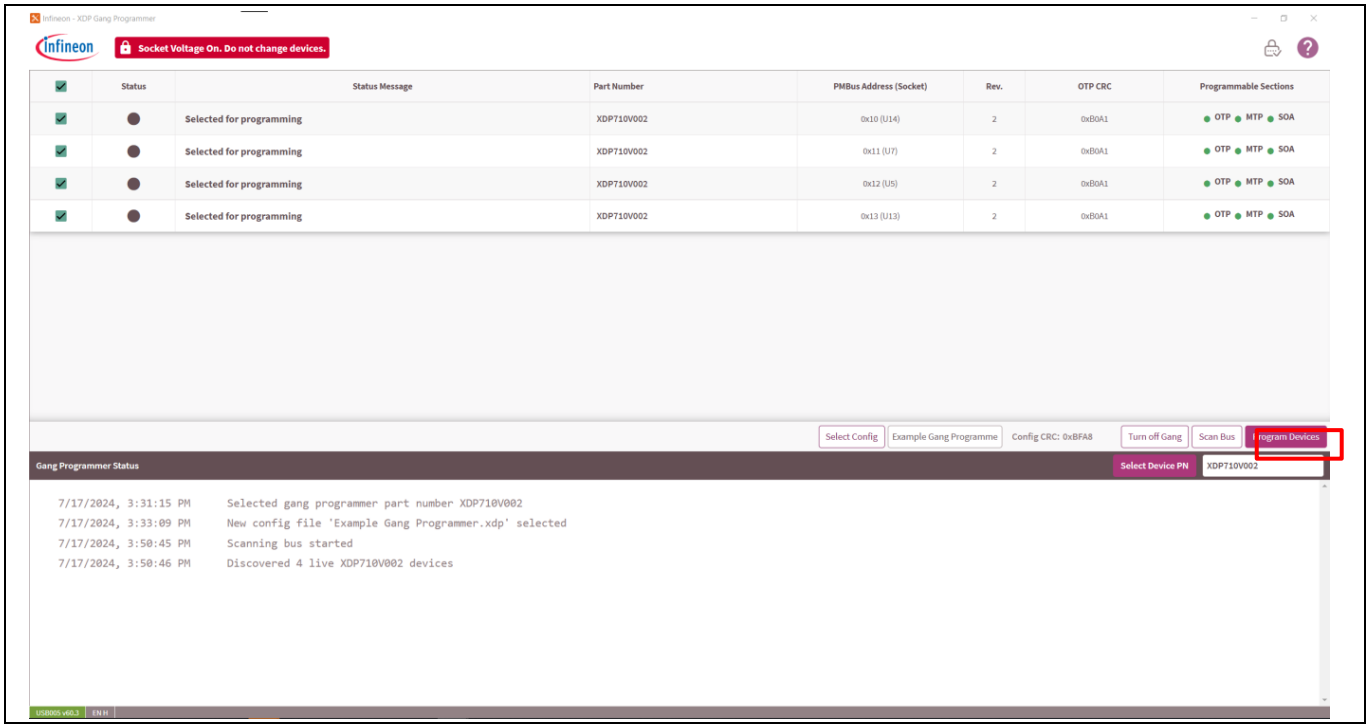

Figure 28 Programming the selected devices

When the programming starts, **Status** shows three dots indicating the **Programming config**. The devices that have the programming completed are highlighted in yellow with a message **Programming successful, pending validation** as shown in Figure 29.

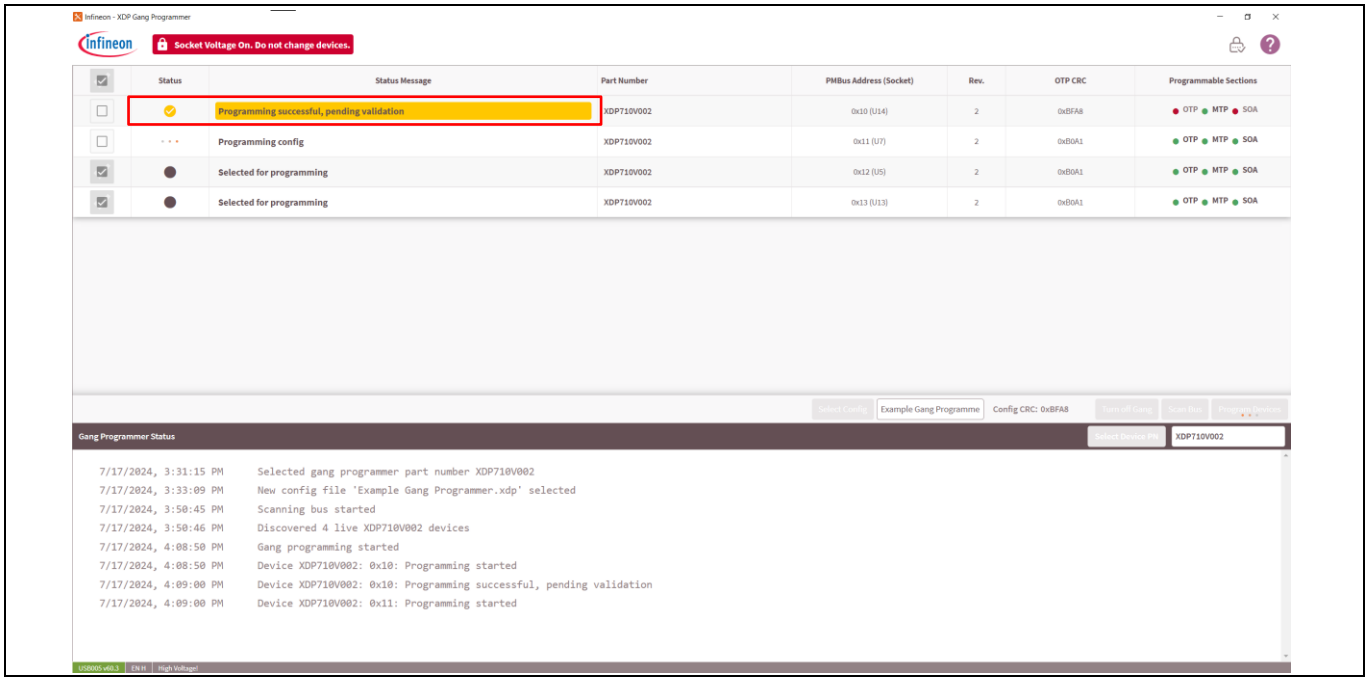

Figure 29 Device status during programming

Once all the devices are programmed, the following actions can be observed:

- The programmer will reboot all the devices and validate the programmed configuration.
- After the validation is complete, the socket voltage message indicating that the device is programmed correctly appears as shown in Figure 30.
- OTP and SOA will appear in red indicating that the device has been programmed and cannot be programmed again.
- The socket voltage message on the top left will turn green indicating the boost regulator has turned off and it is safe to open the sockets and replace the devices.

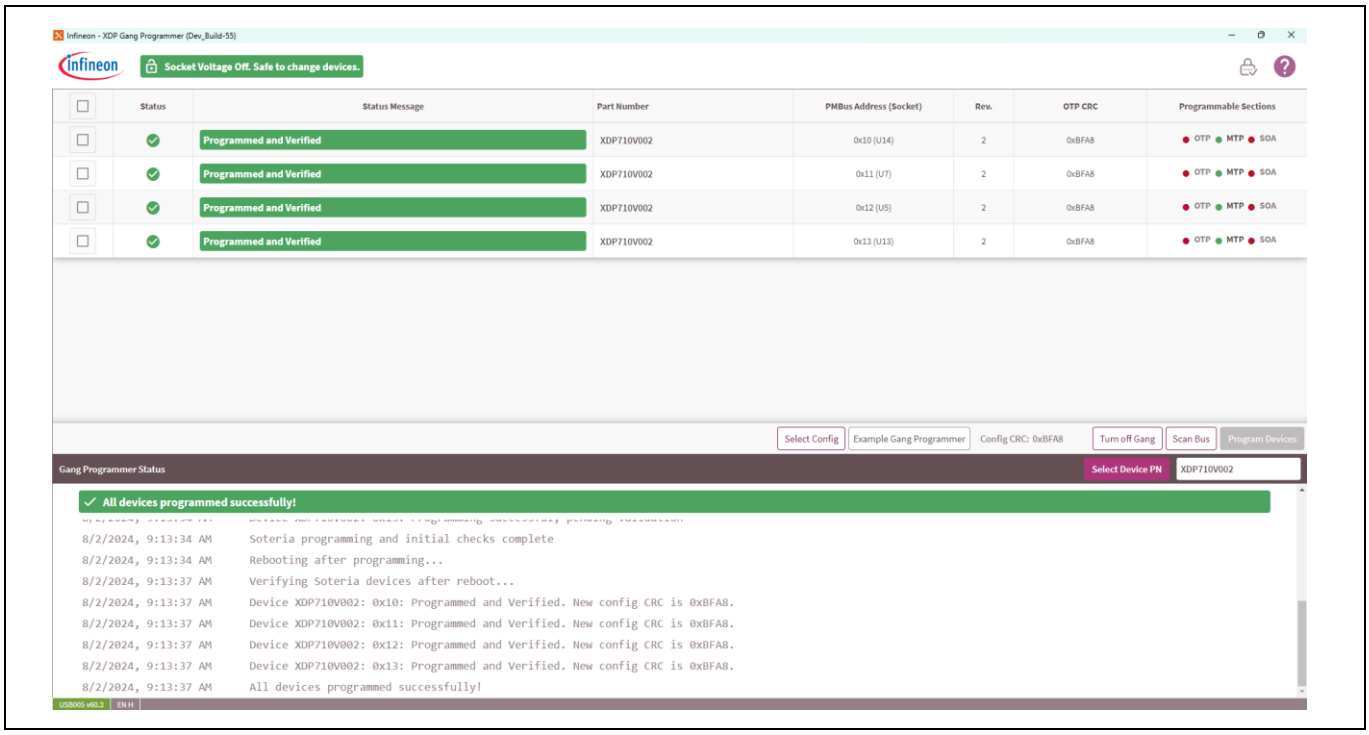

Figure 30 Successful programming of all four devices

- The green LEDs next to the sockets indicates that the programming is successful.
- The red LED is off indicating that it is safe to replace the devices as shown in Figure 31.

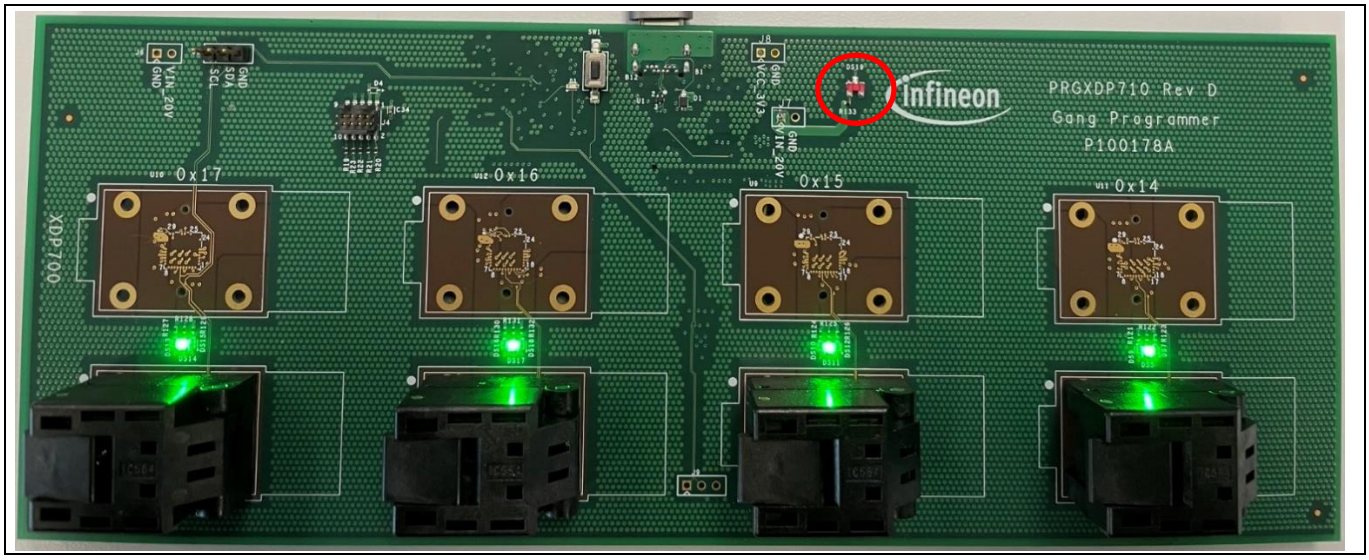

Figure 31 Successful programming of all four devices indicated by green LED

After safely removing the devices from the sockets, new devices can be installed and the socket should be closed securely.

4.1.1 Re-programming devices

If the devices are already programmed, the GUI blocks them from getting programmed again by disabling the device selection button. The **Status** shows '⊘' sign indicating that the **Device already programmed** as shown in Figure 32.

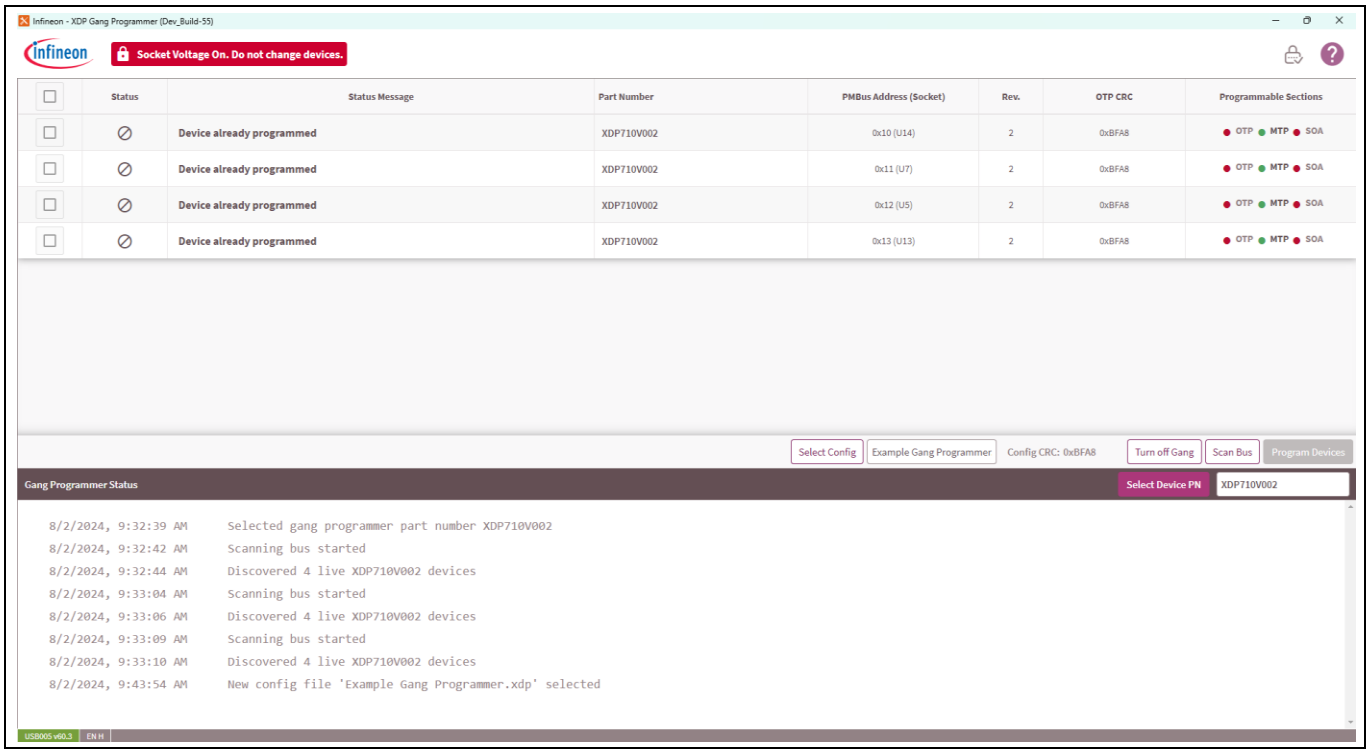

Figure 32 Reprogram the devices

5 Programming failures due to loss of 22 V

If for any reason the voltage supplied by the boost regulator to the connected devices falls below 20 V, the device fails to execute OTP programming. In this case, the voltage should be measured in between VIN_20V and GND pins as shown in Figure 33.

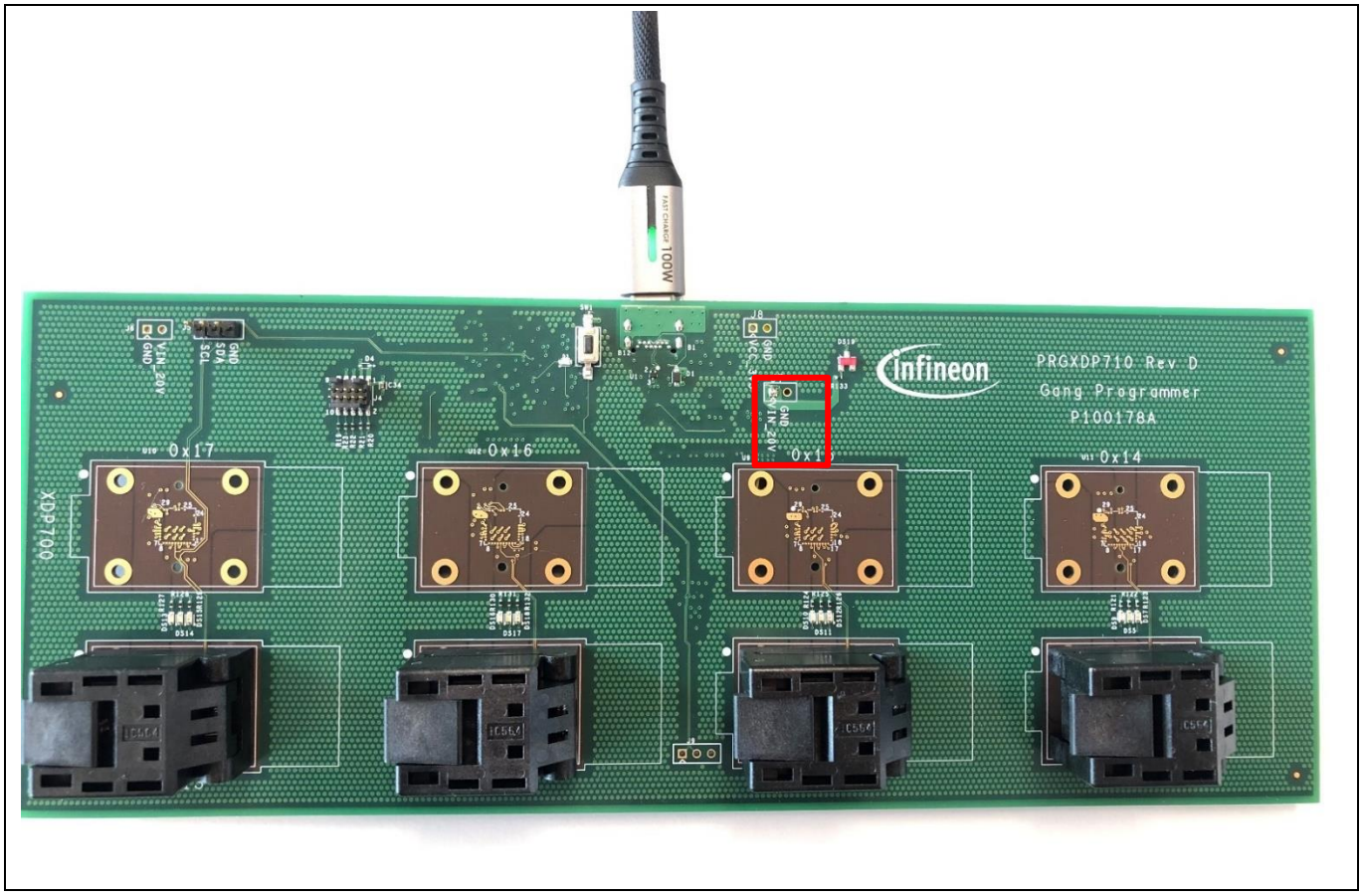

Figure 33 XDP7xx Gang Programmer board

References

[1] Infineon Technologies AG: *XDP710-002 hot-swap controller datasheet;* Available online

[2] Infineon Technologies AG: *XDP700-002 hot-swap controller datasheet*; Available online

[3] Infineon Technologies AG: *XDP710-001 hot-swap controller datasheet*; Available online

[4] Infineon Technologies AG: *XDP7x0-002 configuration file translation and programming guide*; Available online

[5] Infineon Technologies AG: *XDP710-001 configuration file translation and programming guide*; Available online

Revision history

Document revision	Date	Description of changes
V 1.0	2024-08-28	Initial release

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