



EVDK Face Identification Demonstration

User Guide

FPGA-UG-02092-1.0

August 2019

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Acronyms in This Document

A list of acronyms used in this document.

Acronym	Definition
EVDK	Embedded Vision Development Kit
FPGA	Field-Programmable Gate Array
LED	Light-emitting diode
NN	Neural Network
SD	Secure Digital
SPI	Serial Peripheral Interface
VIP	Video Interface Platform
USB	Universal Serial Bus

1. Introduction

This document provides technical information and instructions on setting up and running the EVDK Face Identification Demo.

Refer to the following documents for detailed information on Lattice development boards and kit:

- [Lattice Embedded Vision Development Kit User Guide \(FPGA-UG-02015\)](#)
- [CrossLink VIP Input Bridge Board Evaluation Board User Guide \(FPGA-EB-02002\)](#)
- [ECP5 VIP Processor Board Evaluation Board User Guide \(FPGA-EB-02001\)](#)
- [HDMI VIP Output Bridge Board Evaluation Board User Guide \(FPGA-EB-02003\)](#)

2. Functional Description

The EVDK-based Face Identification Demo is designed to utilize the Lattice Embedded Vision Development Kit with MicroSD Card Adapter Board, as shown in [Figure 2.1](#).

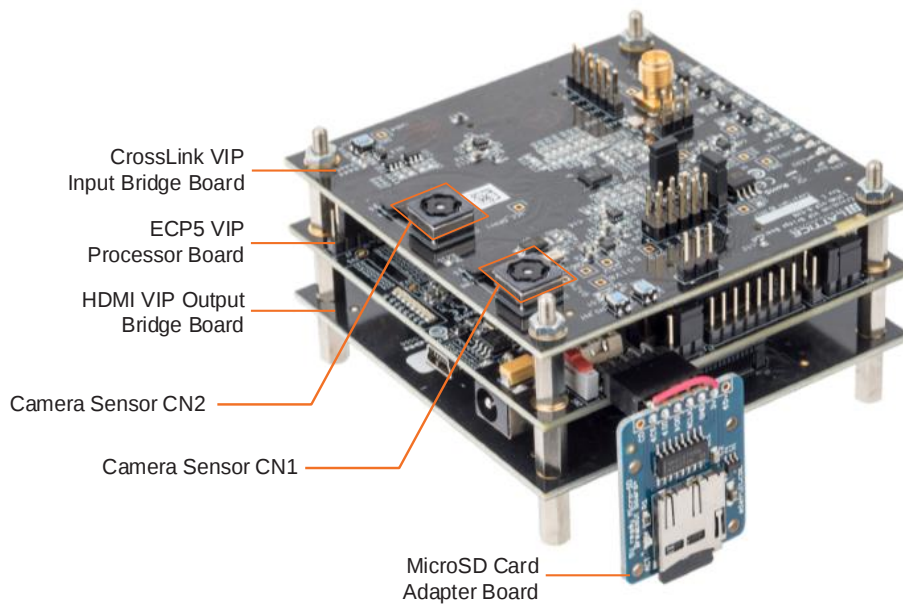


Figure 2.1. Lattice EVDK with MicroSD Card Adapter

The Lattice Embedded Vision Development Kit features a stackable modular architecture consisting of three boards:

- CrossLink™ Video Interface Platform (VIP) Input Bridge Board
- ECP5 VIP Processor Board
- HDMI VIP Output Bridge Board

3. Demo Setup

This section describes the demo setup.

3.1. Hardware requirements

- Lattice Embedded Vision Development Kit
 - Mini-USB Cable
 - 12 V Power Supply
- HDMI Cable
- HDMI Monitor (1080p30)
- MicroSD Card Adapter
- MicroSD Card
- 1 × 4 Membrane Keypad (<https://www.adafruit.com/product/1332>)
- Hardware Rework
 - Remove four zero Ω resistors R92, R93, R94, and R95 and Connect 1 × 4 keypad to J28

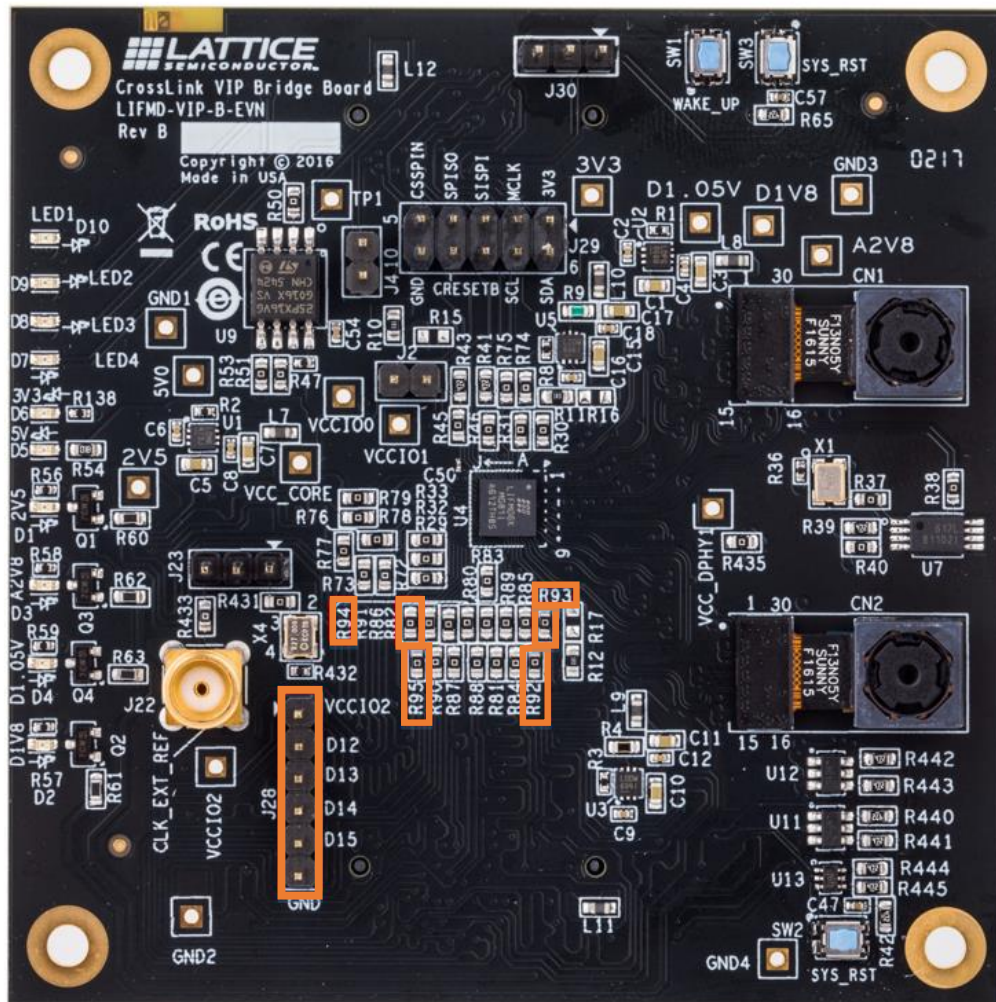


Figure 3.1. CrossLink VIP Input Bridge Board Hardware Rework

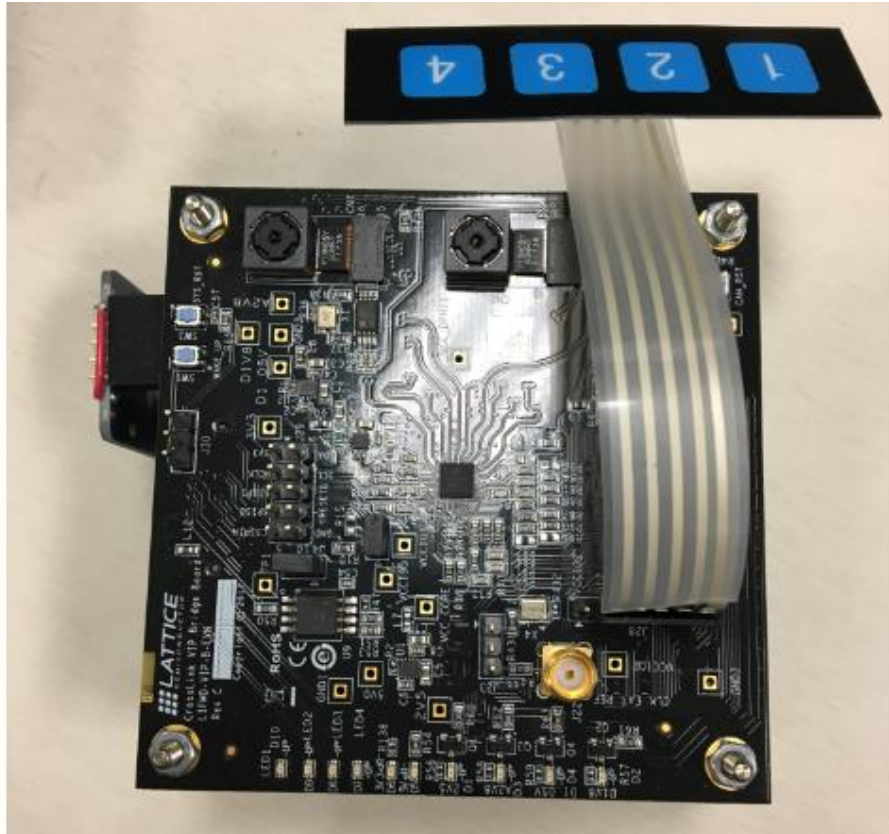


Figure 3.2. CrossLink VIP Input Bridge Board with 1 × 4 Keypad

3.2. Software Requirements

- Lattice Diamond® Programmer (refer to <http://www.latticesemi.com/programmer>)
- Win32 MicroSD Disk Imager (refer to <https://sourceforge.net/projects/win32diskimager/>)

4. Programming the Demo

Both the CrossLink VIP Input Bridge Board and the ECP5 VIP Processor Board must be configured and programmed. The demo design firmware must also be programmed onto the MicroSD card, which is plugged into the MicroSD Card Adaptor Board.

4.1. Programming the CrossLink SPI Flash

4.1.1. Erasing the CrossLink SRAM Prior to Reprogramming

If the CrossLink is already programmed (either directly or loaded from SPI Flash), erase the CrossLink SRAM before reprogramming the CrossLink SPI Flash. Keep the board powered on to prevent reloading on reboot.

To erase CrossLink:

1. Launch Diamond Programmer with **Create a new blank project**.
2. Select **LIFMD** for **Device Family** and **LIF-MD6000** for **Device** as shown in Figure 4.1.

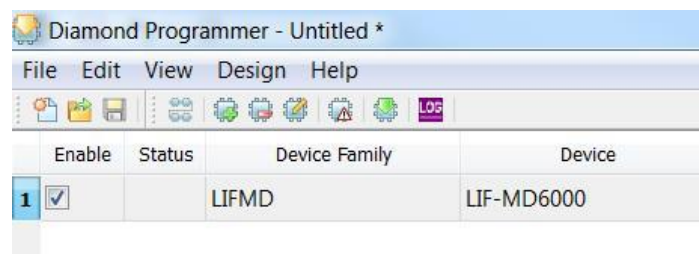


Figure 4.1. Select Device

3. Right-click and select **Device Properties**.
4. Select **SSPI SRAM Programming** for Access mode and **Erase Only** for Operation.



Figure 4.2. Device Operation

5. Click **OK** to close the Device Properties window.
6. Click the **Program** button  in Diamond Programmer to start the erase sequence.

4.1.2. Programming the SPI on the CrossLink VIP Input Bridge Board

To program the SPI on the CrossLink VIP Input Bridge board:

1. Ensure the CrossLink device is erased by performing Steps 1-6.
2. Right-click and select **Device Properties**.
3. Select **SPI Flash Programming** for **Access mode** and make the following selections:
 - a. For **Programming file**, browse and select the **CrossLink bitfile (*.bit)**, *Dual_Camera_to_Parallel_Crosslink.bit*.
 - b. For **SPI Flash Options**, refer to [Table 4.1](#).

Table 4.1. SPI Flash Options Selection Guide

Item	Rev B	Rev C
Family	SPI Serial Flash	SPI Serial Flash
Vendor	Micron	Macronix
Device	SPI-N25Q128A	MX25L12835F
Package	8-pin SO8	8-Land WSON

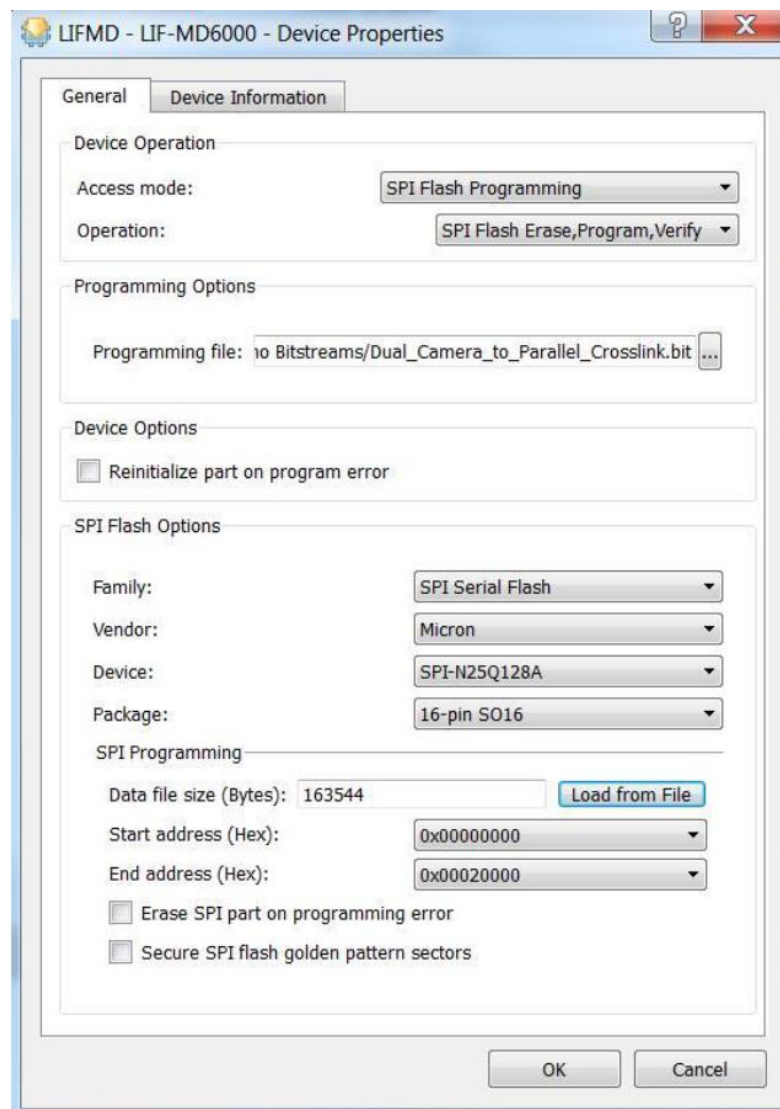


Figure 4.3. Device Properties

4. Click **OK** to close the **Device Properties** window.
5. Click the **Program** button  in Diamond Programmer to start the programming sequence.
6. After successful programming, the **Output** console displays the results as shown in [Figure 4.4](#).



Figure 4.4. Output Console

4.2. ECP5 VIP Processor Board

4.2.1. Erasing the ECP5 Prior to Reprogramming

If the ECP5 VIP Processor Board and the CrossLink VIP Processor Board are already configured and programmed, erase first the ECP5 SRAM memory, then program the ECP5's SPI Flash in the next section. The demo design firmware must also be programmed onto the MicroSD card which is plugged into the MicroSD Card Adaptor Board.

Keep the board powered when re-programming the SPI Flash in the next section.

To erase the ECP5:

1. Launch Diamond Programmer with **Create a new blank project**.
2. Select **ECP5UM** for **Device Family** and **LFE5UM-85F** for **Device**.

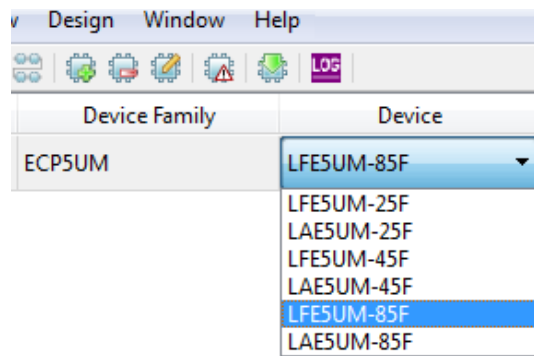


Figure 4.5. Selecting Device

3. Right-click and select **Device Properties**.
4. Select **JTAG 1532 Mode** for **Access Mode** and **Erase Only** for **Operation**.

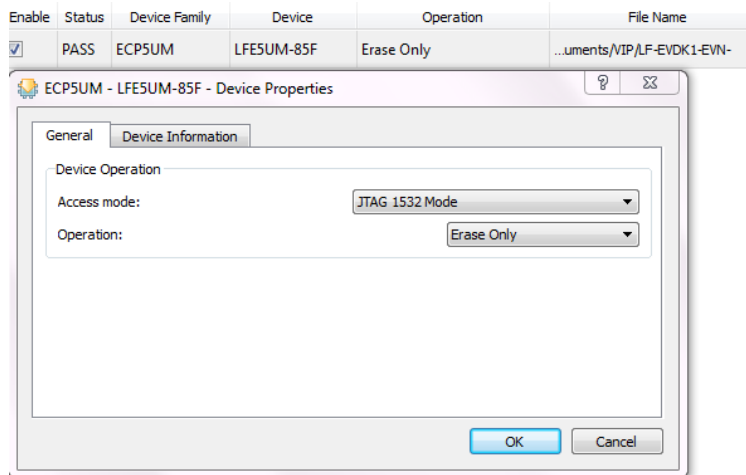


Figure 4.6. Device Operation

5. Click **OK** to close the Device Properties window.
6. Click the **Program** button  in Diamond Programmer to start the Erase sequence.

4.2.2. Programming the SPI on the ECP5 VIP Processor Board

To program the SPI:

1. Ensure the ECP5 device is erased by performing Steps 1-6.
2. Right-click and select **Device Properties**.
3. Select **SPI Flash Background Programming** for **Access mode** and make the following selections:
 - a. For **Programming file**, browse and select the **Object Count Demo bitfile (*.bit)**, *object_count_impl1.bit*.
 - b. For **SPI Flash Options**, refer [Table 4.2](#).

Table 4.2. SPI Flash Options Selection Guide

Item	Rev B	Rev C
Family	SPI Serial Flash	SPI Serial Flash
Vendor	Micron	Macronix
Device	SPI-N25Q128A	MX25L12835F
Package	8-pin SO8	8-Land WSON

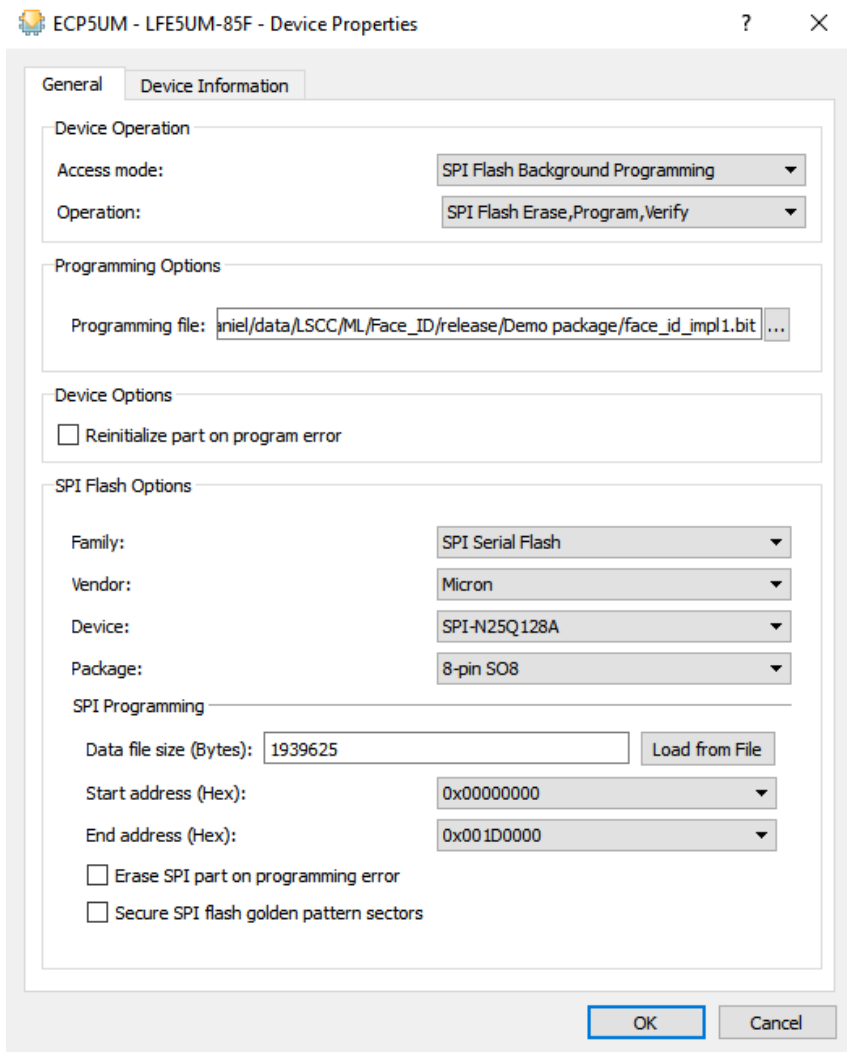


Figure 4.7 Device Properties

4. Click **OK** to close the **Device Properties** window.
5. Click the **Program** button  in Diamond Programmer to start the programming sequence.
6. After successful programming, the **Output** console displays the results as shown in [Figure 4.8](#).



Figure 4.8 Output Console

4.2.3. Programming the MicroSD Card Firmware

To write the image to the MicroSD card:

1. Download and install the Win32diskimager Image Writer software from the following link:
<https://sourceforge.net/projects/win32diskimager/>.
2. Use Win32diskimager to write the appropriate Flash image file to the SD memory card. Depending on your PC, you may need a separate adapter (not described in this document) to physically connect to the card.
3. In Win32 Disk Imager, select the **Image File(vip_human_cnt_sensAI20.bin)** and **Card Reader** as shown in Figure 4.9

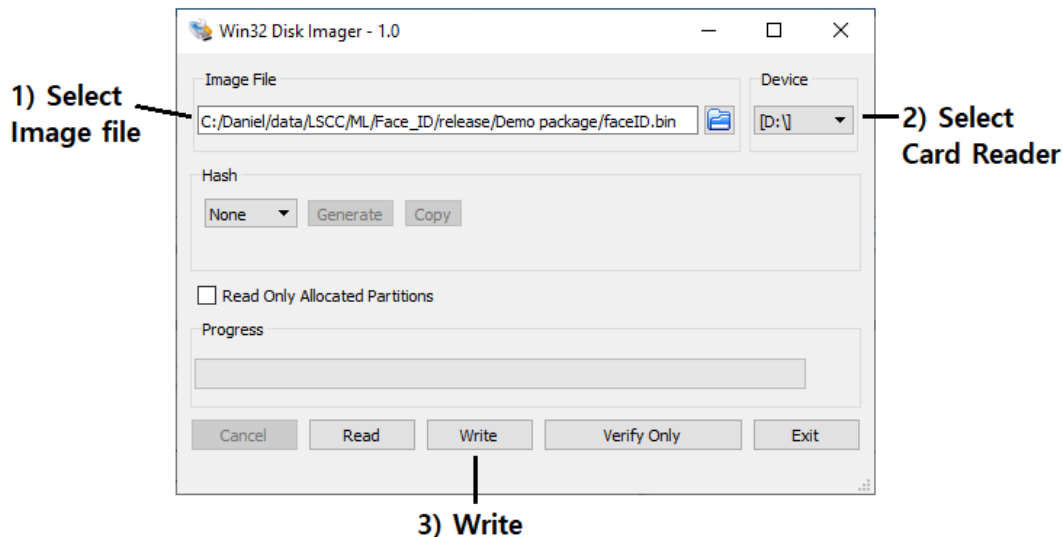


Figure 4.9 Win32 Disk Imager

4. Click **Write**.

5. Running the Demo

To run the demo:

1. Insert the configured MicroSD card into the MicroSD Card Adapter, and connect it to the Embedded Vision Development Kit.
2. Cycle the power on the Embedded Vision Development Kit to allow ECP5 and CrossLink to be reconfigured from Flash.
3. Connect the 1 × 4 membrane keypad to GND-D12 of J28 at CrossLink VIP Bridge board as shown in [Figure 5.1](#).



Figure 5.1 Attaching 1 × 4 Membrane Keypad to CrossLink VIP Bridge Board

4. Connect the Embedded Vision Development Kit to the HDMI monitor. The camera image should be displayed on monitor as shown in [Figure 5.2](#). Turn on *Guide marks* by pressing 2 in keypad as shown in [Figure 5.2](#).



Figure 5.2 Face Identification Demo Initial Screen

5. Register your face by pressing 1 on the keypad.



Figure 5.3 Face Registration

A maximum of eight faces can be registered. The detected face index is displayed in *Face ID* as shown in Figure 5.4.



Figure 5.4 Face Detection

Press 3 on the keypad to clear all registered faces.

Technical Support Assistance

Submit a technical support case through www.latticesemi.com/techsupport.

Revision History

Revision 1.0, August 2019

Section	Change Summary
All	Initial release



www.latticesemi.com