TMS320C5515 Fingerprint Development Kit (FDK) Quick Start Guide

1 FDK Overview

The C5515 Fingerprint Development Kit (FDK) is a complete signal chain solution that enables manufacturers and developers, who are interested in integrating fingerprint biometrics features into their product, to go to market faster. The kit contains two widely-used fingerprint sensor types (1 swipe sensor and 1 optical sensor), one core board with Texas Instruments' latest C5515 low power digital signal processor and one extension board for user interaction. The kit also includes complete hardware design collateral, simplified application source code and technical documentation (including a user's guide and application notes), to help users understand how to develop a fingerprint application. A production quality demo and its .out file are also included in the kit to enable users to experience the final product performance. Some target applications include fingerprint-enabled physical access control products (electronic door locks and safe boxes), USB smart keys and storage device, PC user identification, and time and attendance monitoring systems.

The part number for the FDK is TMDXBDKFP5515.

2 FDK Content

The development kit includes:

- 1 core board (30mmx30mm) based on C5515 low power DSP
- 1 extension board (78mmx30mm) for power supply, communication and user interaction
- 1 swipe fingerprint sensor (AuthenTec ATW310)
- 1 optical fingerprint sensor (Tooan OP-100R)
- Mini converter board for JTAG emulation
- A-mini B USB cable for power supply
- A mini DVD containing:
  - Code Composer Studio™ IDE
  - Simplified fingerprint application source code
  - Demo code .out file
  - C5515 datasheet and chip support library (CSL)
  - Technical documentation, including user guide, application notes, quick start guide, schematics, BOM, gerbers

3 FDK System Specifications

The following table shows the system specifications for the fingerprint development kit.

Table 1. FDK System Specifications

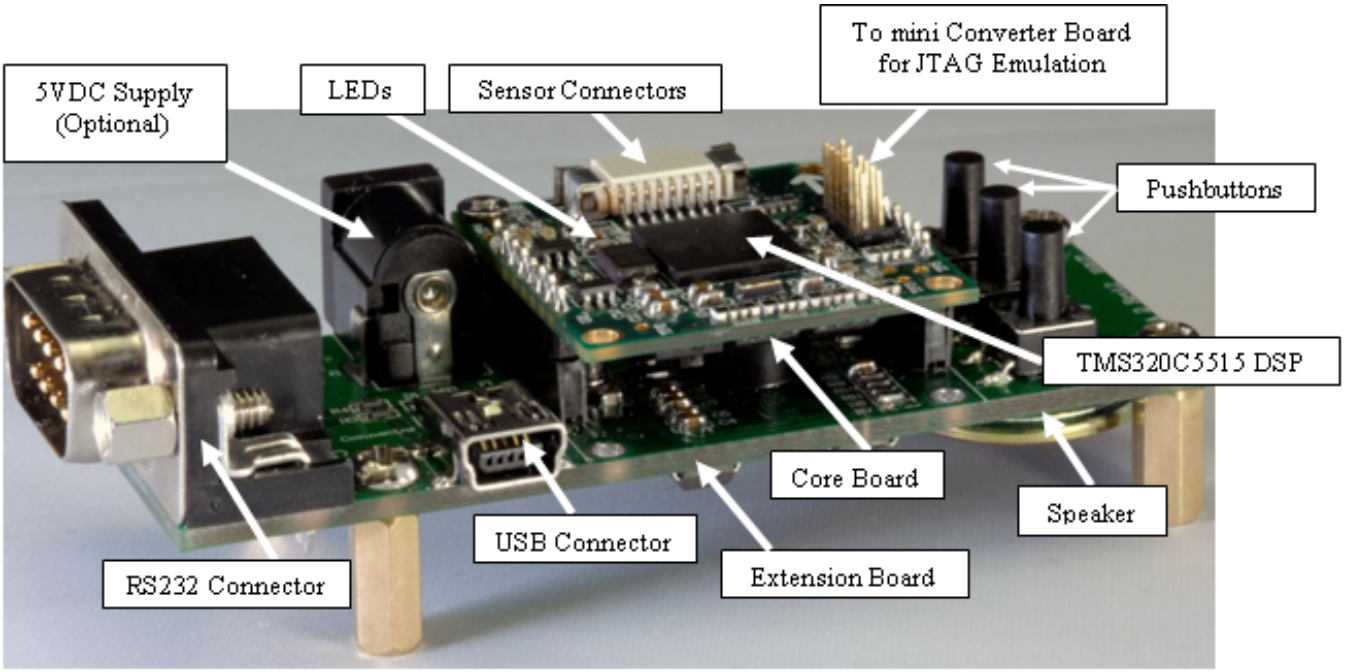
Matching Method	1:1 and 1:N
1:1 matching spec	20ms
Template size per fingerprint	256 bytes
template storage capacity	50-400 prints
Fingerprint sensor resolution	300-500 dpi
False rejection rate	<1%
False acceptance rate	<0.001%
Power requirement	DC 5V / 100mA (not including sensor)
Communication interfaces	UART 1200-115200bps; USB2.0 full and high speed
Operating temperature	-10°C ~ 70°C
Board size	Core board: 30mmx30mm Extension board: 78mmx30mm

4 FDK Hardware Overview

A side view of the FDK hardware is shown in Figure 1 and includes the following features:

- USB interface for power supply and communication to the PC
- RS232 communication interface used to communicate with the PC
- Three pushbuttons used to delete, register and match fingerprints as labeled on the extension board
- Two sensor connectors on the core board used to connect to swipe and optical sensors
- Red LED used to indicate program loading status (two blinks) and the green LED is used to indicate waiting for fingerprint input (flashing).

Figure 1. C5515 Fingerprint Development Boards Side View



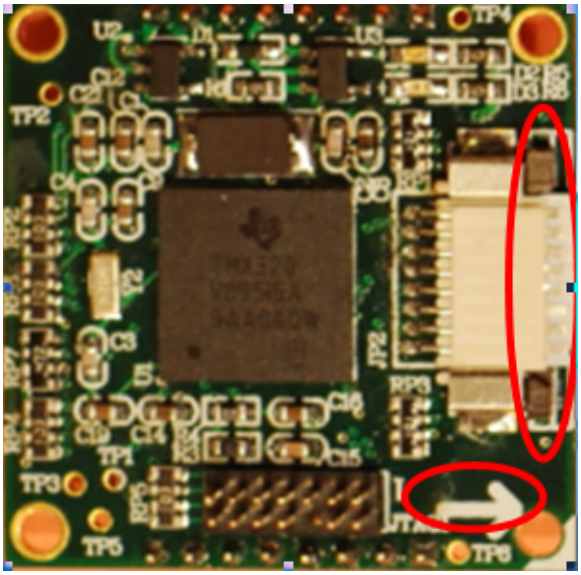
5 FDK Installation

Please follow these steps to install the fingerprint development kit:

1. Plug the swipe sensor into the connector indicated by the red circle in Figure 2. If you choose to use the optical sensor, the sensor connector is on the other side of the core board.
2. Plug the core board into the extension board as indicated in Figure 1. Make sure the arrow (shown in Figure 2) on both boards point in the same direction
3. Connect A-mini B USB cable to the USB port on the extension board and PC to power up the system.

After this step, you will be able to experience “Demonstration Mode” explained in Section 6.1 with the existing demo code that is on the system flash.

Figure 2. C5515 FDK Core Board



6 FDK Operation Modes

The FDK can be used in the following three modes.

6.1 Demonstration Mode

When power is supplied to the FDK boards through USB cable, the red LED on the core board blinks twice, indicating that the program is loaded successfully and initialization has completed. Follow these steps to perform **Delete**, **Registration** and **Matching** operations.

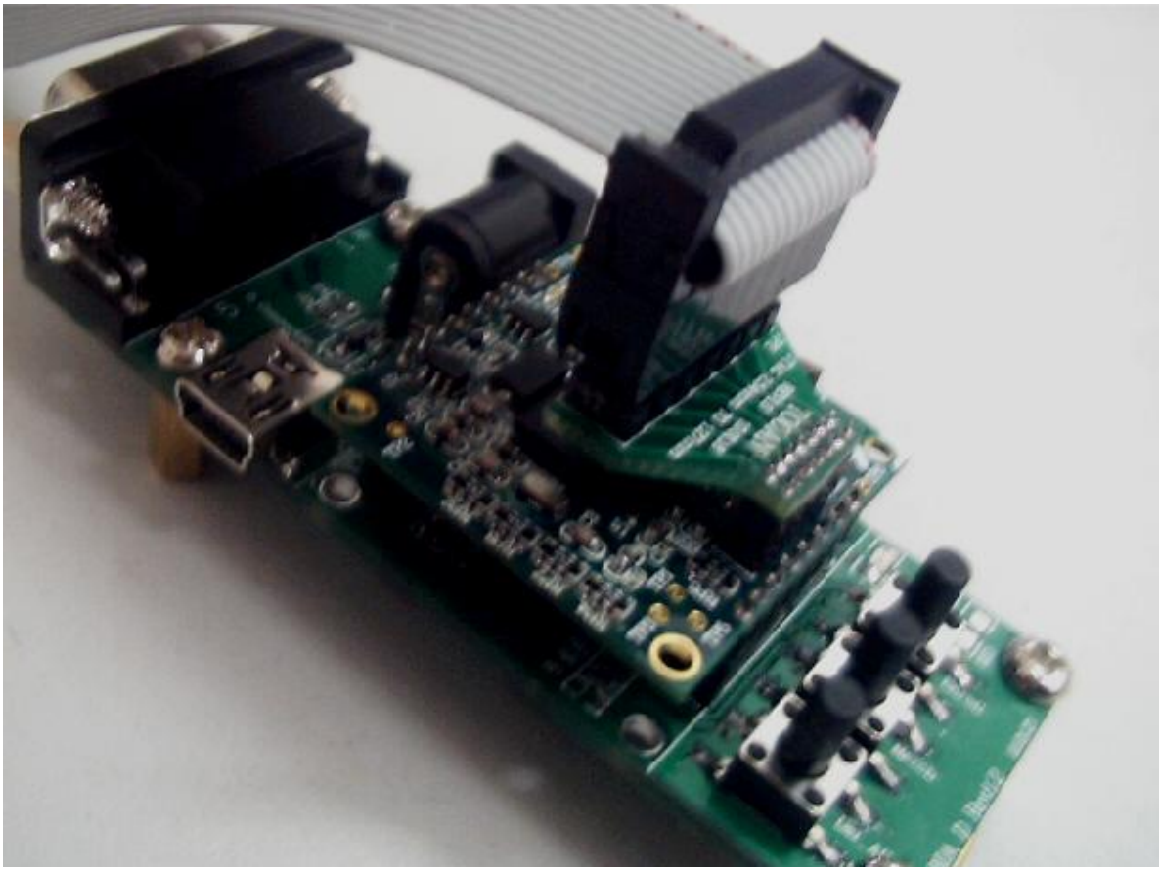
- **Deletion**
  - Press the DEL_ALL button. The speaker will have voice notification of deletion "Succeeded," indicating that all fingerprints have been deleted. This step is optional. You can register a new fingerprint without deleting the stored fingerprints.
- **Registration**
  - Press the ENROLL button. The speaker will have voice notification of "Register new user." Swipe your finger three times after the flashing green light.
    - After hearing a short beep and seeing the flashing green light, swipe your finger once. If the fingerprint collection is successful, the speaker will have a short beep and green LED stops flashing. The system is ready to collect fingerprint again.
    - After seeing the flashing green light again, swipe the same finger the 2nd time. Repeat the same procedure for the 3rd time.
  - If the fingerprint registration operation succeeded, the speaker will produce three short beeps, pronouncing “registration succeeded” and the green LED light stops flashing.
  - If the fingerprint registration operation failed, the speaker will produce 3 long beeps, pronouncing “registration failed” and the green LED light stops flashing. Registration operation needs to start from beginning again.
- **Matching**
  - Press the “MATCH" button. The speaker will have voice notification of “Perform fingerprint matching.”
  - After hearing a short beep and seeing the flashing green light, swipe the finger you want to match with the fingerprint you registered.
    - If fingerprint matching is successful, the speaker will produce three short beeps, pronouncing “matching succeeded” and the green LED light stops flashing.
    - If fingerprint matching failed, the speaker will produce three long beeps, pronouncing “matching failed” and the green LED light stops flashing.

NOTE: Voice quality improvements for voice notifications are being developed and will be available in future versions of the FDK.

6.2 Emulation Mode

Plug the miniconverter board to the connector on the core board. Supply power through USB cable to the FDK boards and connect the emulator to the board through JTAG as shown in Figure 3. Then emulation can be performed.

Figure 3. Mini Converter Board and JTAG Emulator Connection



Emulation operations that can be conducted include:

- Fingerprint image acquisition
- Fingerprint segmentation and gray balance
- Fingerprint image enhancement and binarization
- Thinning
- Feature extraction and annotation
- Fingerprints matching

6.3 RS232 Control Mode

The FDK can also be controlled via RS232 port. Install the provided demo program, by copying the demo program (TMDXBDKFP5515 Test .exe) to your PC. The PC is required to have Windows XP or Vista Operating System. Ensure that RS232 and USB are connected to the PC. The demo program on the PC can be used to control the FDK.

7 Support Resources

- For additional information regarding the TMS320C5000 family of DSPs, please refer to the following page on TI website.
  www.ti.com/c5000
- Code Composer Studio support is available via a forum at
  http://community.ti.com/forums/138.aspx
- Additional development support is available via the online community/tool folder:
  www.ti.com/c5515fdk

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