BFM100 Datasheet
Version 1.0

Preliminary

Revision History

Version	Date	Description
1.0	**21.Aug. 2006**	**Initial Release**

Disclaimer:

Bioidentic reserves the right to make changes, without further notice, to any product, including circuits and/or software described or contained in this document in order to improve design and/or performance.

Contents

1. Overview

The **BFM100** module is embedded fingerprint matching module consisting of a reliable capacitive fingerprint sensor, a TI DSP processor and FLASH memory for storage of up to 1500 user's templates and advance fingerprint recognition software. It is intended to be used by the OEM for enabling the complete fingerprint biometrics in their access control systems. At the same time it is ideal for low cost stand alone door lock system with fingerprint recognition and user interface software built in the module. **BFM100** is easy to integrate with its two RS232/485 interface channels. USB interface is available too for firmware update and monitoring using PC. RTC (built in **BFM100**) and software support event logging in the FLASH in case of stand-alone operation.

2. BFM100 as stand alone door-lock system (autonomous operation)

BFM100 module can be used as stand alone door-lock system. In this mode (autonomous operation) BFM100 controls 3 LEDs - "Mode" (yellow LED), "FAIL" (red LED) and "PASS" (green LED).
The above LEDs and the build in Buzzer are used for the following 4 indications:

- **Pass** – Indicates that the current operation has terminated with "Positive result". Green LED lits for two seconds and two short beeps are generated
- **Ok** – It is currently used to indicate that the current fingerprint impression is accepted in the *Multiple Enrolment* mode**.** Green LED lits for half second and sound is not generated
- **Fail** – Indicates that the current operation has terminated with "Negative" result. Red LED lits for half second and single beep is generated.
- **Bad** – Indicates low quality of fingerprints. Red LED lits for half second and sound is not generated.

In addition 2 sounds (without LED indication) are used **Pass Sound** and **Fail Sound** which are similar as described above.

BFM100 can operate in four basic modes:

- ***Authentication*** - This is the normal operational mode of the module. One put his/her finger on the sensor, BFM100 check if this finger matches with a template from the database and responds with **Pass**, **Fail** or **Bad** indication correspondingly. In case of **Bad** indication user can put his/her finger again.
- ***Single Enrolment*** - In this mode a new templates can be put in the database. Each finger impression is processed and is stored in database (as unique template) and is indicated with **Pass**. In case the finger is already available in the database **Fail** is generated. In some cases the quality of the acquired fingerprint image makes impossible the enrolment procedure. In this case BFM100 responds with **Fail**.

- ***Multiple Enrolment*** **-** In this mode a new template is created from several fingerprint impressions of the same finger. As a result the template which will be stored in the database represents better this finger and includes bigger part of it. Each finger impression is processed and is used to improve one *composite* template. **BFM100** responds with **Ok** or **Bad**. In case the finger is already available in the database after the first impression BFM100 responds with **Fail.** After max 10 impressions BFM100 will terminate the enrolment with **Pass** or **Fail** indication. In case of Pass it will store the *composite* template in the database.
- ***Delete*** **-** In this mode one can delete his/her finger. After the impression BFM100 responds with **Pass** (template found and deleted from the database)**, Fail** (template is not found) and **Bad** (fingerprint impression with low quality). Note that in autonomous operation it is not possible to delete a template if corresponding finger is not physically available. It is possible however to delete the whole database.

Switching of the modes is done using **Mode** button. Since **Enrolment** and **Delete** modes are database management modes and they need to be authorized by a **Master finger**. As soon as **Master finger** is recognized the mode is changed in rotary principle (in the order modes are described) and **Pass Sound** is generated**.** If there is no any **Master Finger** in the database (production default), mode is switching immediately after **Mode** button pressing and authorization is not expected.

Master Finger can be enrolled as you apply low level on the GPI1 pin and then use **single enrolment** or **multiple enrolment**. You can enroll as many Master Fingers as you want.

Note that using BFM100 without **Master Finger** compromises the security of your fingerprint biometric system!

3. Authentication Specifications

3.1 Fingerprint Module

Matching	1:1 and 1:N
EER[1] [%]	< 0.9
Enrollment time [sec] (five capturing of the finger)	5
Verification time [sec]	1.5
Database capacity	1500 templates

Note [1] - EER depends on the database

3.2 Fingerprint Sensor

Sensor Type	capacitive
Resolution [dpi]	500
Sensing area [mm]	12.8 x 15
Image size [pixel]	256 x 300

4. Hardware Specifications

4.1 Operation Range

Parameter	Min	Typ	Max
Supply voltage [V]	4.5	5	5.5
Operational temperature [°C]	0		70

4.2 Absolute Maximum Ratings

Parameter	Min	Max
Supply voltage [V]	-0.5	6

4.3 Electrical DC characteristics (Vdd=5V, T=27°C)

Parameter	Min	Typ	Max
Supply current (idle) [mA]		70	
Supply current (processing) [mA]			150
High level input voltage [V]	2		
Low level input voltage [V]			0.8

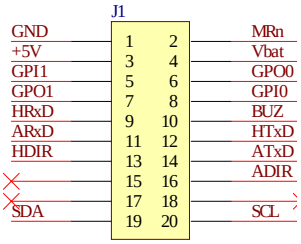
4.4 Interfaces

Interface	Description
Host UART	5 V CMOS with direction control for RS485, from 4.8 up to 230.4 kbps is supported, 115.2 kbps - factory default.
Auxiliary UART	5 V CMOS with direction control for RS485.
USB	USB Full-speed (12Mbps) intended for firmware update and monitoring.
I^2C	For serial connection with HOST controllers. (optional)
General Purpose Outputs	2 Push-Pull 5V CMOS Outputs (20 mA)
Buzzer Output	1 Push-Pull 5V CMOS Output (20 mA)
Inputs	2 CMOS inputs (with 5.1K pull-up)
Buttons	3 General Purpose Buttons (switch push buttons)
LEDs	Yellow, Red and Green

4.5 Connectors Specifications

Connector/Jumpers	Description
J1	Host Interface
J2	USB interface
J3	Sensor interface
J4	LEDs & Buttons
JP1	Position 2-3 - Normal operation Position 1-2 - Firmware update
GPI1	High – Normal Operation Low – **Master Finger** Enrolment

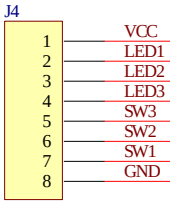
4.5.1 Host interface



Pin	Description
GND	Ground
MRn	Manual reset input of BFM100 - active low
+5V	Power Supply Input.
Vbat	+1.5V from external battery for RTC
GPI1	Used to set the module in **Master** Finger Enrolment Mode
GPO0	General Purpose Output
GPO1	General Purpose Output
GPI0	General Purpose Input
BUZ	Buzzer
ARxD	Receive Input (CMOS) of the **Auxiliary** serial channel

ATxD	Transmit Output (CMOS) of the **Auxiliary** serial channel
ADIR	Direction for the **Auxiliary** serial channel if RS485 is implemented
HRxD	Receive Input (CMOS) of the **Host** serial channel
HTxD	Transmit Output (CMOS) of the **Host** serial channel
HDIR	Direction for the **Host** serial channel if RS485 is implemented
SDA	Data pin of the I^2C
SCL	Clock pin of the I^2C

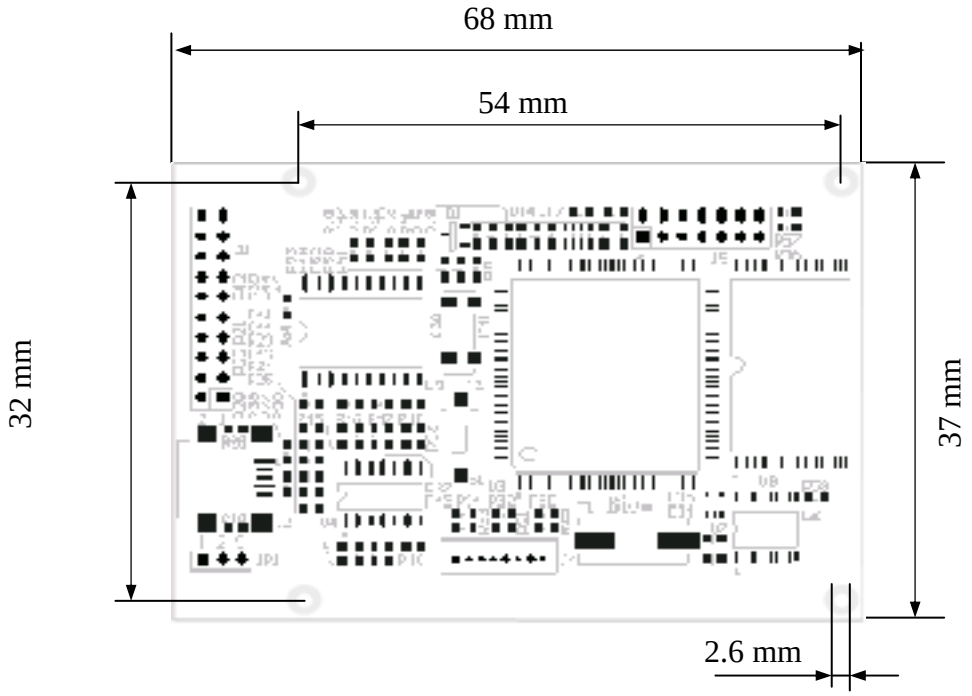
4.5.2 LEDs & Buttons

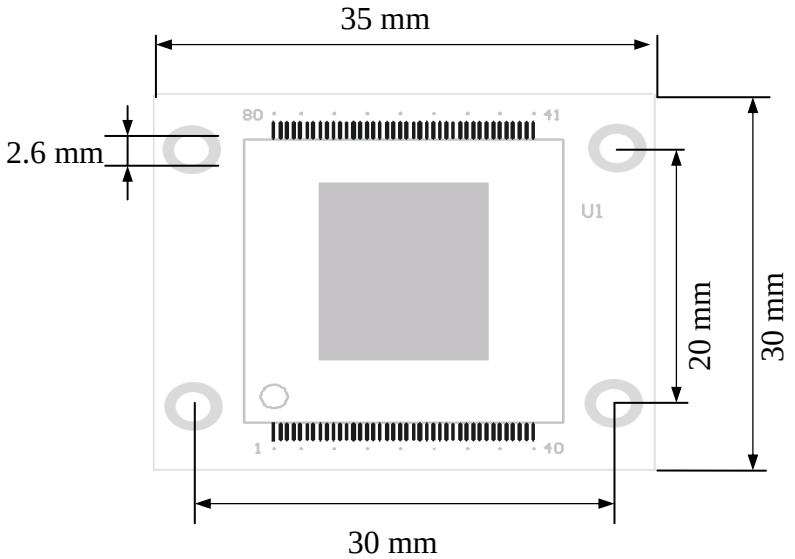


Pin	**Description**
Vcc	Power +5V (For LED anodes)
GND	Ground for buttons.
LED1	Green LED output - active low
LED2	Red LED output - active low
LED3	Yellow LED output - active low
SW3	Button 3, detect as pressed if grounded
SW2	Button 2, detect as pressed if grounded
SW1	Button 1, detect as pressed if grounded

4.6 Physical Dimensions of BFM100 Module and Sensor

Board	Dimensions
BFM100 Module [mm]	68 x 37 x 11 (L x W x H)
BFM100 FC Sensor [mm]	35 x 30 x 10 (L x W x H)





5. Communication Protocol

Detailed description of communication protocol supported by BFM100 can be found in the Bioidentic web site: BFM100 Communication Protocol.pdf

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