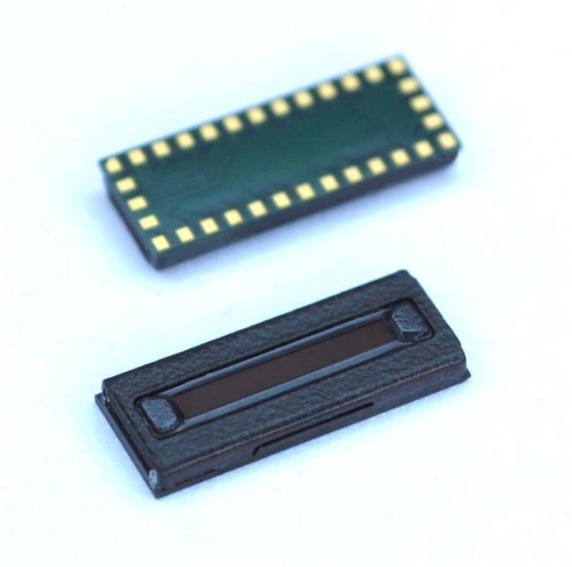
FPC1080 Integration Guide

Fingerprint Swipe Sensor System



Contents

1 Document Control

1.1 Revision history

Rev	Date	Changes	Author	Approved
A	2011-06-05	New Document	HSt et al	
B	2011-09-02	Much new info, and new recommended parameter set.	ESe	HSt

1.2 References

Ref No	Title	Revision
1	FPC1080Demo_QuickReference	F
2	710-FPC1080A_Product-specification	F

Data command (0xC4). It is also possible to start capturing the image data of a new frame at the same time as the current is read by using the *Read and Capture Image (0xCC)* command.

Figure 5 Block diagram of basic image capture.

5.3.2 Image Capture with Extended Hardware Support

The basic idea of the extended hardware support is to check the amount of translation between the current frame and prior frame before uploading the current one. If this translation is too small it makes sense to refrain from uploading the current frame and instead immediately capture a new one and check if there is more translation between this newer frame and the first one. The objective of this is of course to minimize the amount of redundant image data acquired.

To enable the extended hardware support (aka the “Smart Sensor Mechanism”) the first bit of the *fngrDriveConf (0x1C)* register should be set. A first image is then captured as usual with the *Capture Image (0xC0)* command. This image is to be used as reference point to which translations will be estimated by the hardware. To set is as a reference; send the *Set Smart Sensor Reference (0x48)* command. This frame can now be read using *the Read Image Data command (0xC4)* or the *Read and Capture Image (0xCC)* command.

When a second frame is captured it is now possible to check its translation with respect to the first one by using the *Read Smart Sensor Data (0x10)* command. If the translation is deemed sufficient first reset the reference to this very frame (using the *Set Smart Sensor Reference (0x48)* command) and read it either using the *Read Image Data command (0xC4)* or the *Read and Capture Image (0xCC)* command. There is now a new reference and the process of capturing and checking the translation can begin again. On the other hand, if the translation is deemed too small then the read can be skipped **and the old reference should be kept**. Just proceed with a new *Capture Image (0xC0)* command.

1. Read the interrupt register WITHOUT clearing it using the *Read Interrupt with No Clear (0x18)* command.
2. Read the smart sensor data using the *Read Smart Sensor Data (0x10)* command.
3. Clear the interrupt using the *Read Interrupt with Clear (0x64)* command.
4. Perform a dummy smart sensor data read; again using the *Read Smart Sensor Data (0x10)* command but disregarding the result.

In case the interrupt received is a *Finger Lost Interrupt* the sensor will go idle after the interrupt is cleared. The SmartSensor data received in action item 2 above has the following format:

Data Bit(s)	Name	Function/Coding
39:38	Not used	'0' when read.
37		Y-translations sign bit.
36		X-translations sign bit.
35		Long click detected.
34		Short click detected.
33		Motion Estimation Correlation bit 9.
32		Motion Estimation Correlation bit 8.
31:24		Motion Estimation Correlation bit 7 down to 0.
23:16		Motion counter
15:8		Y-translation, absolute value.
7:0		X-translation, absolute value.
- Seven bytes access: byte 1: address, byte 2: dummy, byte 3-7: smart sensor data - 5 databytes are received. The last received byte corresponds to bits0:7.		

Table 4: Smart Sensor data received from the sensor upon a Read Smart Sensor Data command.

The figure below gives the general flow for handling the sensor in navigation mode.

9 Appendix A – List of Commands

Command	Code/"Address"			Description
	Hex	Dec	Bin	
Capture image	C0	192	11000000	Capture new image. Memories are not swapped and memory address is cleared by the Main Controller block. One byte access, only the command is transmitted.
Read and capture image	CC	204	11001100	Memories are swapped and memory address is cleared before the read and the new image capture is started. The first valid data is received after a dummy byte, i.e. the 3rd byte (command + dummy byte first). The read continues until csN is de-asserted.
Read image data	C4	196	11000100	Memories are swapped and memory address is cleared before the read is started. The 1st valid data is received after a dummy byte, i.e. the 3rd byte (command + dummy byte first). The read continues until csN is de-asserted.
Set smart sensor reference	48	72	01001000	Set smart sensor reference (save motion estimation data). One byte access, only the command is transmitted.
Read smart sensor data	10	16	00010000	Read five byte smart sensor data, see register smartSensData. Seven bytes access: byte 1: address, byte 2: dummy, byte 2-7: smart sensor data
Read interrupt with clear	64	100	01100100	Read interrupt register and clear it. Two byte access, command and interrupt data.
Read interrupt with no clear	18	24	00011000	Read interrupt register. The register is not cleared. Two byte access, command and interrupt data.
Finger present query	20	32	00100000	Check if a finger is present. One byte access, only the command is transmitted.
Wait for finger present	24	36	00100100	Continue check for a finger until a finger is present. One byte access, only the command is transmitted.
Activate sleep mode	28	40	00101000	Go to Sleep Mode. One byte access, only the command is transmitted.
Activate deep sleep mode	2C	44	00101100	Go to Deep Sleep Mode. One byte access, only the command is transmitted.
Activate navigation mode	30	48	00110000	Go to Navigation Mode. One byte access, only the command is transmitted.
Activate idle mode	34	52	00110100	Go to Idle Mode. Works like a "reset" for the system. One byte access, only the command is transmitted.
Read from/Write to registers				See each register below. Command = register value. Note that data is written and read simultaneously, in the same operation.

10 Appendix B – Register Summary

The following table shows the available registers, and their address. For a complete description of each register, please refere to the FPC1080 Product Specification document [3].

Register name (address)	Address
fngDwnMin	0x38
fngrDwnMid	0x4C
fngerDwnMax	0x3C
fngrDetThreshold	0x5C
fngrLostThreshold	0x60
fngrLostCntr	0x6C
fngrDownCntr	0x70
fdPxlSum	0x68
sleepCntr	0x74
navCntr	0x80
fngrDetCntr	0x90
colRdSpeed	0x50
dXThreshold	0x54
dYThreshold	0x58
fpcInterrupts	0x18 or 0x64
fpcStatus	0x14
fpcDebug	0xD0
fngrDriveConf	0x1C
tstPattern1Xreg	0x78
tstPattern2Xreg	0x7C
smartSensData	0x10
hwID	0x9C
fpcConfig	0x44
biasMode	0x40
ADCOffset	0xA0
pxlSetup	0xA8
imgRowSel	0xAC
ADCSetup	0x88

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