DATA MODUL

Microchip mXT640U
PCAP Touch controller w/ I2C interface
12039388

Revision: preliminary version not
              released

Date: 2019-10-30

Table of contents

1 Introduction

The I²C mXT640U controller is designed as a part of the capacitive touch system developed by DATA MODUL. It offers the possibility to connect a projective capacitive touch sensor to embedded systems using the provided I²C interface. For the connection a cable may be used or the board may be hand soldered to another carrier board using the provided soldering pads.

The controller is based on the Microchip maXTouch 640U IC which offers excellent touch performance and a high noise resistance. With outstanding filter technology Microchip's maXTouch ICs are suitable for industrial, medical and other applications with high noise immunity requirements.

For the communication with the OS the controller uses the I²C interface based on Microchip's I²C protocol. For Linux, a special driver is required which is available on Github or in the mainline kernel.

For more information about the Microchip I²C protocol, please refer to the *Interfacing with maXTouch Touchscreen Controllers* Application note (MXTAN0213) on the Microchip webpage.

2   Controller specification

2.1 Mechanical features

|	
Size	33x21 mm
Height	3.2 mm (soldering pads) or 4.5 mm (with connector)
Operating temperature	-20 to +75 ºC
Storage temperature	-25 to +85 ºC
Temperature slew rate	10 ºC /minute (max.)
Relative humidity	95 % at 60 ºC no condensation
RoHS compliant	Yes

2.2 Connection features

Protocol	I^2C version 6.0
Touch report	16 fingers simultaneously (max.)
Resolution	4096 x 4096 (x/y)
Report rate	3.4 MHz max. (subject to configuration)
Connector	MOLEX 53261-0971 (and equivalent) or solder pads

2.3 Electrical features

Power supply	3.3 V± 5%
V_{in} ripple	±40 mV peak-peak (max.)
On board voltage	3.3 and 9V max. (subject to configuration)
Power consumption	90 mW (max. subject to configuration)

DATA MODUL

3 Mechanical drawing
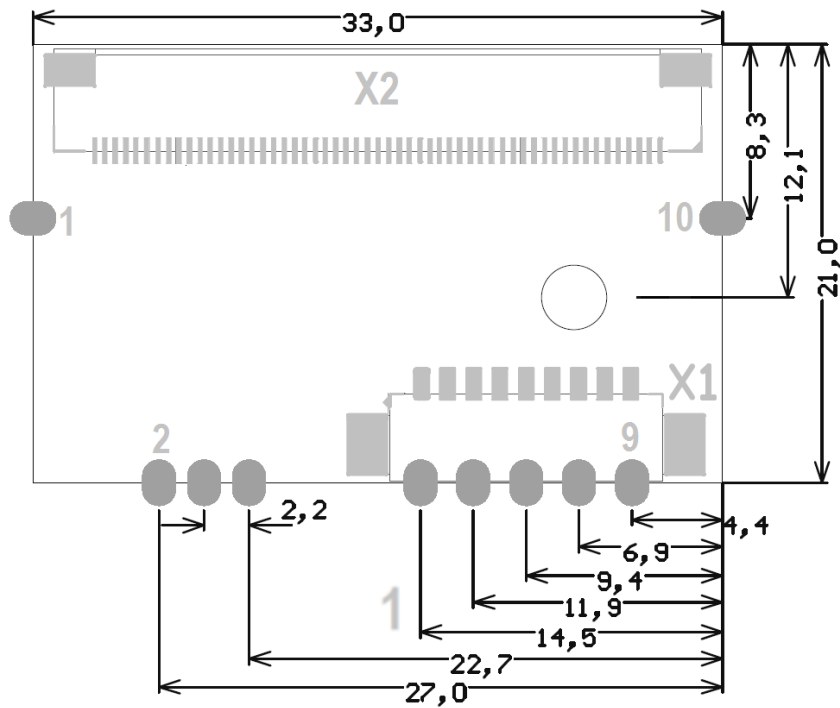
all Dimensions in mm (Tolerance +/- 0,3 mm)

Date: 2019-10-30

DATA MODUL

4   Connectors and signals

4.1   Interface specification

Protocol	I^2C version 6.0	
Touch report	16 fingers simultaneously max.	
Resolution	4096 x 4096 (x/y)	
I^2C address	0x4A or 0x4B	
HID-I^2C vendor ID / product ID	0x03EB (Microchip) / 0x2163 (mXT640U)	
Required pull-up resistance	Standard mode (100 kHz) Fast mode (400 kHz) Fast+ mode (1 MHz) High-Speed mode (3.4 MHz)	1kΩ to 10kΩ 1kΩ to 3kΩ 0.7kΩ max. 0.5kΩ to 0.75kΩ
Low input logic level	SDA, SCL, RES, GPIO	-0.3V to 0.3x VDD
High input logic level	SDA, SCL, RES, GPIO	0.7 x VDD to VDD 0.85 x VDD to VDD
Low output logic level	CHG, GPIO	0V to 0.2 x VDD
High output logic level	CHG, GPIO	0.8 x VDD to VDD

4.2   Connectors

Connector	Type	Connection
X1	1.25 mm pitch 9 pin header MOLEX 53261-0971	I^2C, VDD, GND
X2	0.5 mm pitch 55 pin header	Flextail to touch sensor
Soldering pads 1-10		Alternative to X1 (This should be done via hand soldering)

4.3   X1 and soldering pads

X1	Pad	Signal	Description
1	5	VDD	Power supply
2	6	SDA	I²C Data, need Pull Up
3	7	SCL	I²C Clock, need Pull Up
4	8	CHG	Change, need Pull Up
5	9	RES	Chip reset
6	2	-	*Do not connect*
7	3	-	*Do not connect*
8	-	ADDSEL	I²C address selection (GND for 0x4A, pull up to VDD select 0x4B)
9	1,4,10	GND	Ground

Date: 2019-10-30

5 Appendix – frequently asked questions

5.1 I²C drivers and loading RAW settings

The controllers are not pre-programmed. To load the required RAW settings file into the maXTouch controller the mxt-app (https://github.com/atmel-maxtouch/mxt-app) might be used or the autoload function in the Linux driver https://github.com/atmel-maxtouch is suitable as well.

The RAW settings file containing touch sensor specific information is provided by DATA MODUL.

A RAW settings file must be loaded into the controller in order to use the touch input system. Once loaded, the settings are stored permanently in the mXT640 IC. It is not necessary to load the RAW settings file after each power cycle or boot cycle of the system.

5.2 Touch coordinates are not stable and the cursor is "jumping around"?

One possible cause might be that the touch controller is missing the systems ground reference. Another reason might be an extreme amount of noise that exceeds the touch threshold set in the controller and therefore is triggering touch events. Check the ground connection and make sure that possible noise sources like switching power supplies or dimmed LED backlights are either switched off or properly shielded.

For best touch performance the touch controller needs a low AC impedance connection to the person that operates the system to achieve a good current loop back to the controller. Please take care the controller has a good connection to the system ground and that there are no electrically isolated power supplies or isolation transformers that may obstruct the AC current loop between the touch system and the user.

If the instability is caused by a noise source like a display, a switching power regulator or a RF antenna your system may have an integration issue. With proper settings the controller can most likely suppress the noise so please contact DATA MODUL to create matching settings for the noise situation in the system. However, eliminating the noise source should be the first thing to check. If you experience any difficulties please contact DATA MODUL.

5.3 Connecting is done, but no touch function at all?

Please check the connection of the FPC cable to the controller board. If the tail is inserted upside-down you will not get any touch events. Please always connect the tail first before you power up the controller to avoid damage of the controller IC.

DATA MODUL

DATA MODUL Aktiengesellschaft
Landsberger Str. 322
80687 Munich, Germany
Tel. +49-89-5 60 17-0
Fax +49-89-5 60 17-119
www.data-modul.com

Logistics, Production & Services:
DATA MODUL Weikersheim GmbH
Lindenstrasse 8
DE-97990 Weikersheim - Germany
Phone: +49-7934-101-0
Fax: +49-7934-101-101

DATA MODUL's worldwide offices
can be found on our website:
www.data-modul.com/eu/contact-worldwide.html