maXTouch 144-node Touchscreen Controller Product Brief

Description

The mXT144U 1.0 uses a unique charge-transfer acquisition engine to implement Microchip's patented capacitive sensing method. Coupled with a state-of-the-art CPU, the entire touchscreen sensing solution can measure, classify and track a number of individual finger touches with a high degree of accuracy in the shortest response time. The mXT144U 1.0 allows for both mutual and self capacitance measurements, with the self capacitance measurements being used to augment the mutual capacitance measurements to produce reliable touch information.

maXTouch® Adaptive Sensing Touchscreen Technology

- Up to 12 X (transmit) lines and 12 Y (receive) lines
- A maximum of 144 nodes can be allocated to the touchscreen
- Touchscreen size 3.3 inches (1:1 aspect ratio), assuming a sensor electrode pitch of 5 mm. Other sizes may be possible with different electrode pitches and appropriate sensor material
- Multiple touch support with up to 5 concurrent touches tracked in real time

Touch Sensor Technology

- Discrete/out-cell support including glass and PET film-based sensors
- Support for standard (for example, Diamond) and proprietary sensor patterns (review of designs by Microchip recommended)

Front Panel Material

- Works with PET or glass, including curved profiles (configuration and stack-up to be approved by Microchip)
- Glass 0.4 mm to 4.5 mm (dependent on screen size, touch size, configuration and stack-up)
- Plastic 0.2 mm to 2.2 mm (dependent on screen size, touch size, configuration and stack-up)

Touch Performance

- Moisture/Water Compensation
  - No false touch with condensation or water drop up to 22 mm diameter
  - One-finger tracking with condensation or water drop up to 22 mm diameter

- Glove Support
  - Multiple-finger glove touches up to 1.5 mm thickness (subject to stack-up design)
  - Single-finger glove touch up to 5 mm thickness (subject to stack-up design)
- Mutual capacitance and self capacitance measurements supported for robust touch detection
- Noise suppression technology to combat ambient, charger noise, and power-line noise
  - Up to 240 Vpp between 1 Hz and 1 kHz sinusoidal waveform
  - Up to 20 Vpp between 1 kHz and 1 MHz sinusoidal waveform
- Scan Speed
  - Up to 450 Hz one finger reporting rate (subject to configuration)
  - Typical report rate for 5 touches ≥150 Hz (subject to configuration)
  - Initial touch latency <11 ms for first touch from idle (subject to configuration)
  - Configurable to allow for power and speed optimization

On-chip Gestures

- Reports one-touch and two-touch gestures
- Supports wake up/unlock gestures, including symbol recognition

Keys

- Up to 8 nodes can be allocated as mutual capacitance sensor keys (subject to other configurations)
- Adjacent Key Suppression (AKS) technology is supported for false key touch prevention

Enhanced Algorithms

- Lens bending algorithms to remove display noise
- Touch suppression algorithms to remove unintentional large touches, such as palm
- Palm Recovery Algorithm for quick restoration to normal state

Product Data Store Area

- Up to 60 bytes of user-defined data can be stored during production

Power Saving

- Programmable timeout for automatic transition from active to idle states
- Pipelined analog sensing detection and digital processing to optimize system power efficiency
- Low power idle mode reduces measurements to the minimum required to detect touches, at which point the device enters active mode to perform full measurement and touch processing

Application Interfaces

- I^2C-compatible slave with support for Standard mode (up to 100 kHz), Fast mode (up to 400 kHz)
- Interrupt to indicate when a message is available
- SPI Debug Interface to read the real-time raw data for tuning and debugging purposes

Power Supply

- Digital (Vdd) 3.3 V nominal
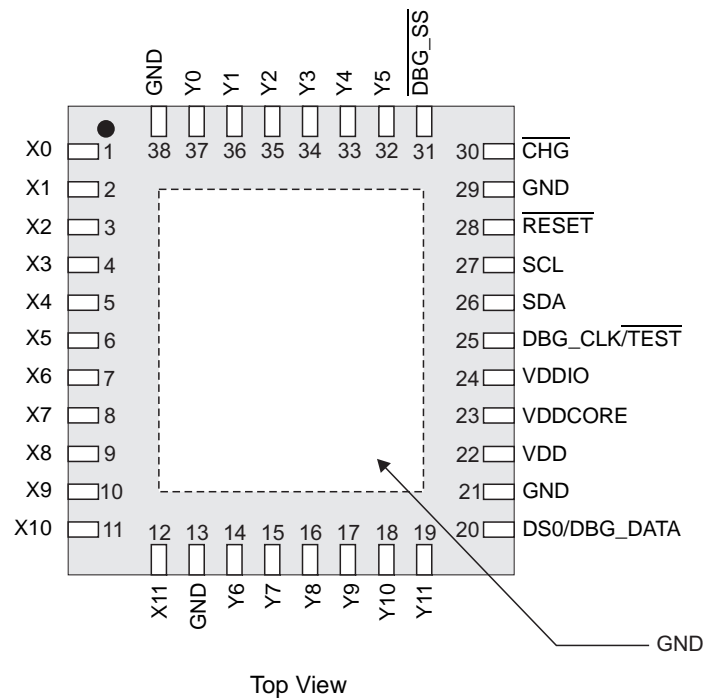- Digital I/O (VddIO) 3.3 V nominal

Package

- 38-pin XQFN 4 × 4 × 0.35 mm, 0.35 mm pitch

Operating Temperature

- −40°C to +85°C

Product Brief

PIN CONFIGURATION
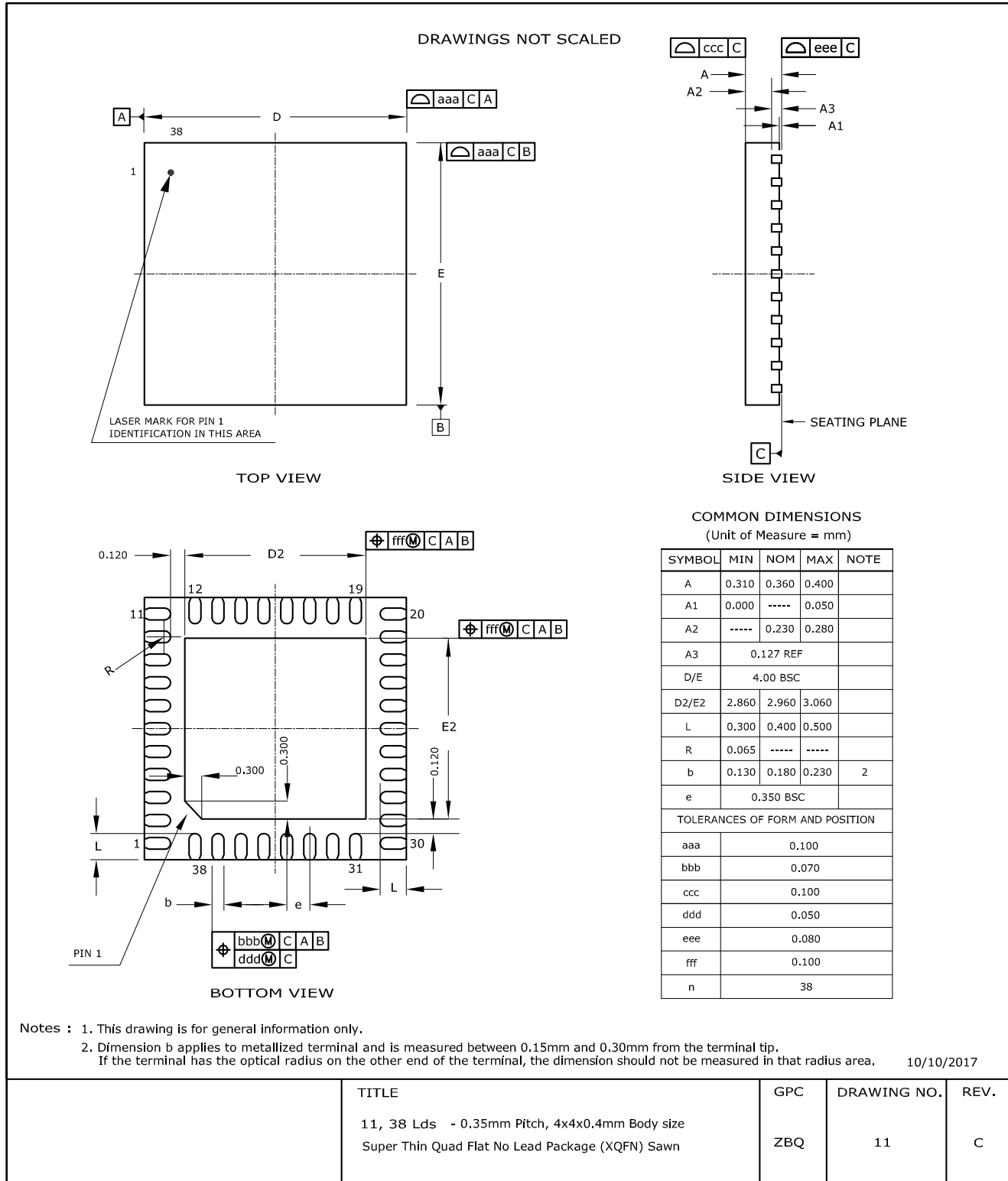
Pin Configuration – 38-pin XQFN

Top View

MXT144U 1.0

1.0 PACKAGING INFORMATION

The following section gives the technical details of the package for the device.

1.1 38-pin XQFN 4 × 4 × 0.35 mm

DRAWINGS NOT SCALED

TOP VIEW

SIDE VIEW

BOTTOM VIEW

LASER MARK FOR PIN 1 IDENTIFICATION IN THIS AREA

SEATING PLANE

PIN 1

COMMON DIMENSIONS
(Unit of Measure = mm)

SYMBOL	MIN	NOM	MAX	NOTE
A	0.310	0.360	0.400	
A1	0.000	-----	0.050	
A2	-----	0.230	0.280	
A3	0.127 REF			
D/E	4.00 BSC			
D2/E2	2.860	2.960	3.060	
L	0.300	0.400	0.500	
R	0.065	-----	-----	
b	0.130	0.180	0.230	2
e	0.350 BSC			
TOLERANCES OF FORM AND POSITION				
aaa	0.100			
bbb	0.070			
ccc	0.100			
ddd	0.050			
eee	0.080			
fff	0.100			
n	38			

Notes : 1. This drawing is for general information only.
2. Dimension b applies to metallized terminal and is measured between 0.15mm and 0.30mm from the terminal tip.
If the terminal has the optical radius on the other end of the terminal, the dimension should not be measured in that radius area.

10/10/2017

TITLE	GPC	DRAWING NO.	REV.
11, 38 Lds - 0.35mm Pitch, 4x4x0.4mm Body size Super Thin Quad Flat No Lead Package (XQFN) Sawn	ZBQ	11	C

APPENDIX A: REVISION HISTORY

Revision A (November 2017)

Initial edition for firmware revision 1.0.AB – Release

MXT144U 1.0

PRODUCT IDENTIFICATION SYSTEM

The table below gives details on the product identification system for maXTouch devices. See "Orderable Part Numbers" below for example part numbers for the mXT144U.

To order or obtain information, for example on pricing or delivery, refer to the factory or the listed sales office.

PART NO.	–XXX	[X]	[XX]	[X]	[XXX]
Device	Package	Temperature Range	Sample Type	Tape and Reel Option	Pattern

Device:		Base device name	
Package:	A	=	QFP (Plastic Quad Flatpack)
	CCU	=	UFBGA (Ultra Thin Fine-pitch Ball Grid Array)
	C2U	=	UFBGA (Ultra Thin Fine-pitch Ball Grid Array)
	NHU	=	UFBGA (Ultra Thin Fine-pitch Ball Grid Array)
	C4U	=	X1FBGA (Extra Thin Fine-pitch Ball Grid Array)
	MAU	=	XQFN (Super Thin Quad Flat No Lead Sawn)
	MA5U	=	XQFN (Super Thin Quad Flat No Lead Sawn)
	UU	=	WLCSP (Wafer Level Chip Scale Package)
Temperature Range:	Blank	=	–40°C to +85°C (Grade 3)
	T	=	–40°C to +85°C (Grade 3)
	B	=	–40°C to +105°C (Grade 2)
Sample Type:	Blank	=	Release Sample
	ES	=	Pre-release (Engineering) Sample
Tape and Reel Option:	Blank	=	Standard Packaging (Tube or Tray)
	R	=	Tape and Reel [1]
Pattern:		QTP, SQTP, Code or Special Requirements (Blank Otherwise)	

Note 1: Tape and Reel identifier only appears in the catalog part number description. This identifier is used for ordering purposes and is not printed on the device package. See "Orderable Part Numbers" below or check with your Microchip Sales Office for package availability with the Tape and Reel option.

Orderable Part Numbers

Orderable Part Number	Firmware Revision	Description
ATMXT144U-MAU025 (Supplied in trays)	1.0.AB	38-pin XQFN 4 × 4 × 0.35 mm, RoHS compliant Industrial grade; not suitable for automotive characterization
ATMXT144U-MAUR025 (Supplied in tape and reel)		

Product Brief

Note the following details of the code protection feature on Microchip devices:

• Microchip products meet the specification contained in their particular Microchip Data Sheet.

• Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.

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═ ISO/TS 16949 ═

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