

**MICROCHIP**

# **mXT1067TD-AT/mXT1067TD-AB 1.0**

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## **maXTouch 1066-node (I<sup>2</sup>C) Touchscreen Controller**

### **Product Brief**

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#### **Description**

The mXT1067TD-AT/mXT1067TD-AB 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 mXT1067TD-AT/mXT1067TD-AB 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.

#### **Automotive Applications**

- AEC-Q100 Qualified
- Developed following Automotive SPICE® Level 3 certified processes
- CISPR 25 compliant (for both mutual and self capacitance measurements)

#### **maXTouch® Adaptive Sensing Touchscreen Technology**

- Up to 41 X (transmit) lines and 26 Y (receive) lines for use by touchscreen and keys
- A maximum of 1066 nodes can be allocated to the touchscreen
- Touchscreen size 10.51 inches (16:10 aspect ratio), assuming a sensor electrode pitch of 5.5 mm. Other sizes are possible with different electrode pitches and appropriate sensor material
- Multiple touch support with up to 16 concurrent touches tracked in real time

#### **Keys**

- Up to 16 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

#### **Touch Sensor Technology**

- Discrete/out-cell support including glass and PET film-based sensors
- On-cell/touch-on display support including TFT, IPS and OLED
- Synchronization with display refresh timing capability
- Support for standard (for example, Diamond) and proprietary sensor patterns (review of designs by Microchip or a Microchip-qualified touch sensor module partner is recommended)

#### **Front Panel Material**

- Works with PET or glass, including curved profiles (configuration and stack-up to be approved by Microchip or a Microchip-qualified touch sensor module partner)
- Glass 0.4 mm to 4 mm (dependent on screen size, touch size, configuration and stack-up)
- Plastic 0.2 mm to 3 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
  - Glove touches up to 5 mm thickness (subject to stack-up design)
- Mutual capacitance and self capacitance measurements supported for robust touch detection
- P2P mutual capacitance measurements supported for extra sensitive multi-touch sensing
- Noise suppression technology to combat ambient and power-line noise
  - Up to 240 V<sub>PP</sub> between 1 Hz and 1 kHz sinusoidal waveform
  - Up to 20 V<sub>PP</sub> between 1 kHz and 1 MHz sinusoidal waveform
- Burst Frequency
  - Flexible and dynamic Tx burst frequency selection to reduce EMC disturbance
  - Controlled Tx burst frequency drift over process and temperature range
  - Configurable Tx waveform shaping to reduce emissions

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- Scan Speed
  - Up to 112 Hz report rate for one finger (subject to configuration)
  - Typical report rate for 10 touches  $\geq 85$  Hz (subject to configuration)
  - Initial touch latency  $< 20$  ms for first touch from idle (subject to configuration)
  - Configurable to allow for power and speed optimization
- Touch panel failure detection
  - Automatic touch sensor diagnostics during run time to support the implementation of safety critical features
  - Diagnostics reported using dedicated output pin or by standard Object Protocol messages
  - Configurable test limits

## On-chip Gestures

- Reports one-touch and two-touch gestures

## 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

## Power Saving

- Programmable timeout for automatic transition from Active to Idle state
- Pipelined analog sensing detection and digital processing to optimize system power efficiency

## Application Interfaces

- I<sup>2</sup>C slave with support for Standard mode (up to 100 kHz), Fast mode (up to 400 kHz), Fast-mode Plus (up to 1 MHz)
- Interrupt to indicate when a message is available
- Additional SPI Debug Interface to read the raw data for tuning and debugging purposes

## Power Supply

- Digital (V<sub>dd</sub>) 3.3 V nominal
- Digital I/O (V<sub>ddIO</sub>) 3.3 V nominal
- Analog (AV<sub>dd</sub>) 3.3 V nominal
- High voltage internal X line drive (XV<sub>dd</sub>) 6.6 V with internal voltage pump (XV<sub>dd</sub> connected to V<sub>dd</sub> if voltage pump not used)

## Package

- 128-lead TQFP 14 × 14 × 1 mm, 0.4 mm pitch

## Operating Temperature

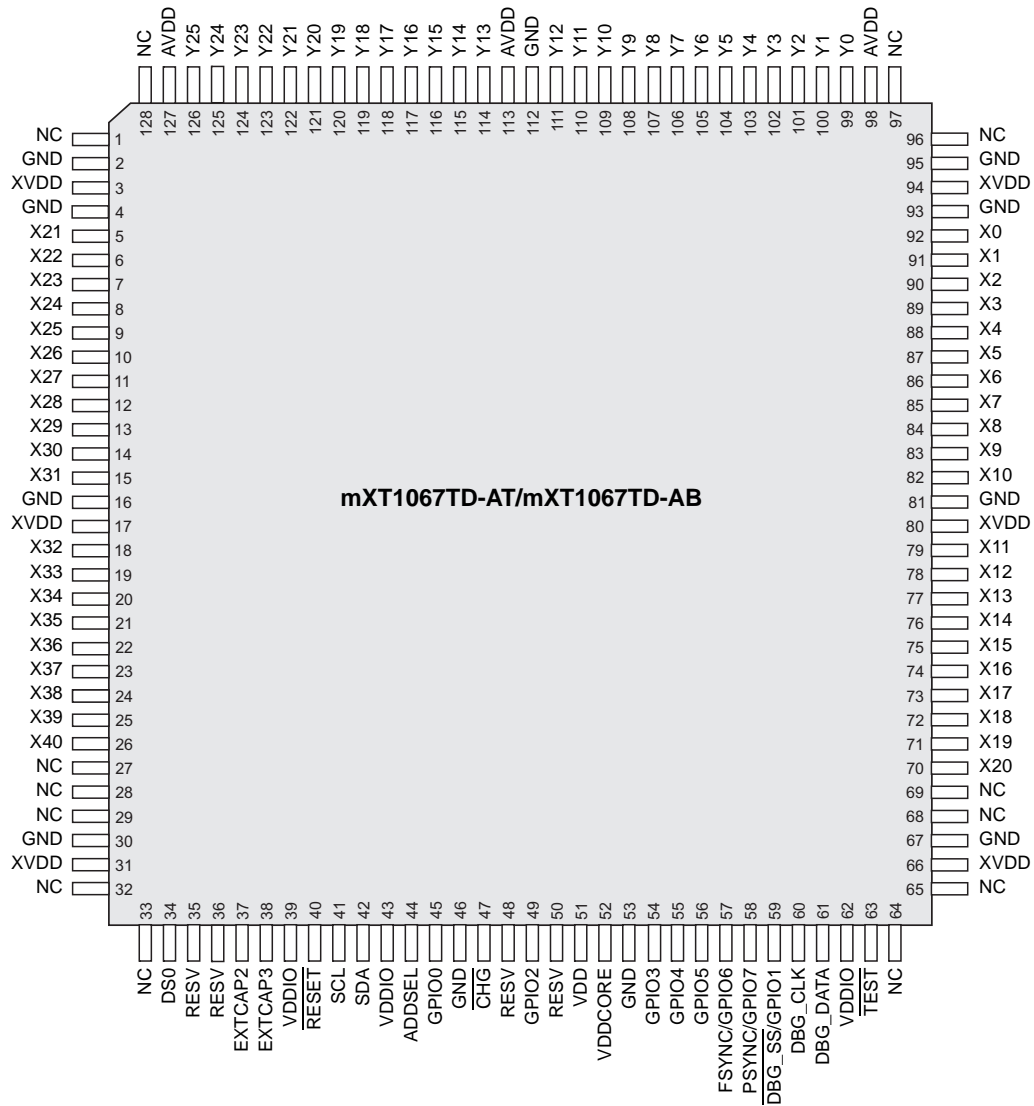
- mXT1067TD-AT:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  (Grade 3)
- mXT1067TD-AB:  $-40^{\circ}\text{C}$  to  $+105^{\circ}\text{C}$  (Grade 2)

## Design Services

- Review of device configuration, stack-up and sensor patterns
- Custom firmware versions can be considered
- Contact your Microchip representative for more information

## PIN CONFIGURATION

### Pin Configuration – 128-lead TQFP



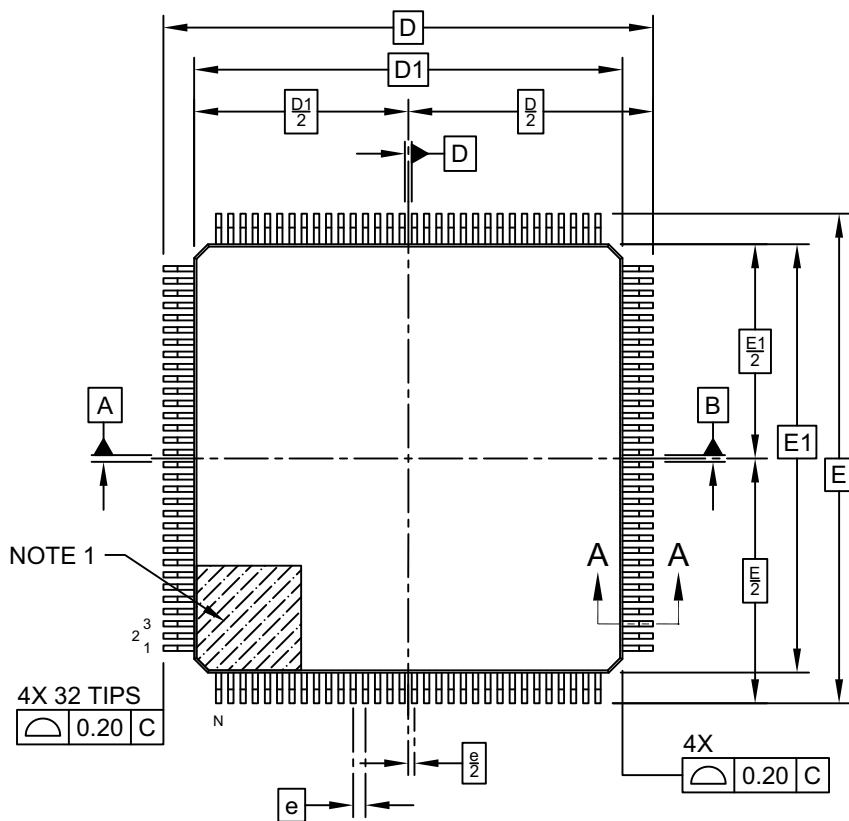
Top view

# mXT1067TD-AT/mXT1067TD-AB 1.0

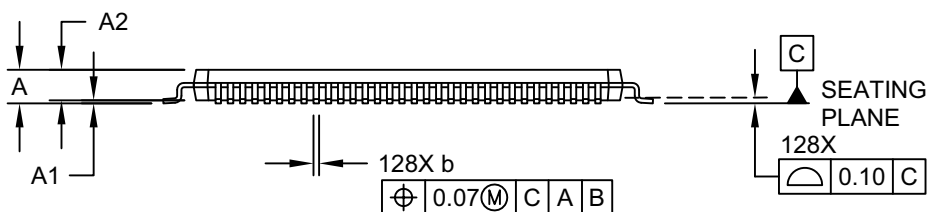
## 1.0 PACKAGING INFORMATION

**128-Lead Thin Plastic Quad Flatpack (ZA) - 14x14 mm Body [TQFP]**  
**SMSC Legacy VTQE3; Atmel Legacy Global Package Code APL**

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



TOP VIEW

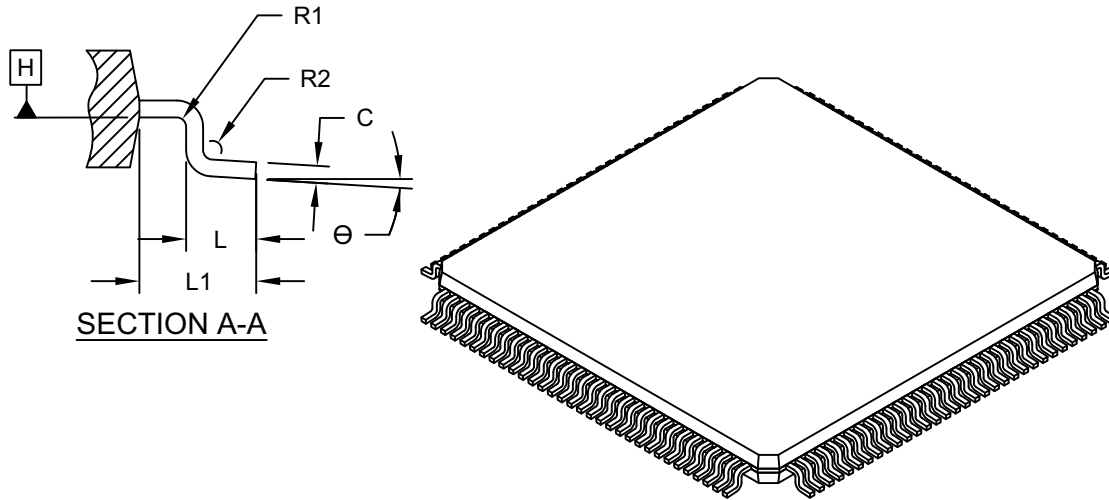


SIDE VIEW

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## 128-Lead Thin Plastic Quad Flatpack (ZA) - 14x14 mm Body [TQFP] SMSC Legacy VTQE3; Atmel Legacy Global Package Code APL

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Leads	N	128		
Lead Pitch	e	0.40 BSC		
Overall Height	A	-	-	1.20
Standoff	A1	0.05	0.10	0.15
Molded Package Thickness	A2	0.95	1.00	1.05
Foot Length	L	0.45	0.60	0.75
Footprint	L1	1.00 REF		
Foot Angle	$\theta$	0°	-	7°
Overall Width	E	16.00 BSC		
Overall Length	D	16.00 BSC		
Molded Package Width	E1	14.00 BSC		
Molded Package Length	D1	14.00 BSC		
Lead Width	b	0.13	0.16	0.23
Mold Draft Angle Top	C	0.09	-	0.20
Lead Bend Radius	R1	0.08	-	-
Lead Bend Radius	R2	0.08	-	0.20

**Notes:**

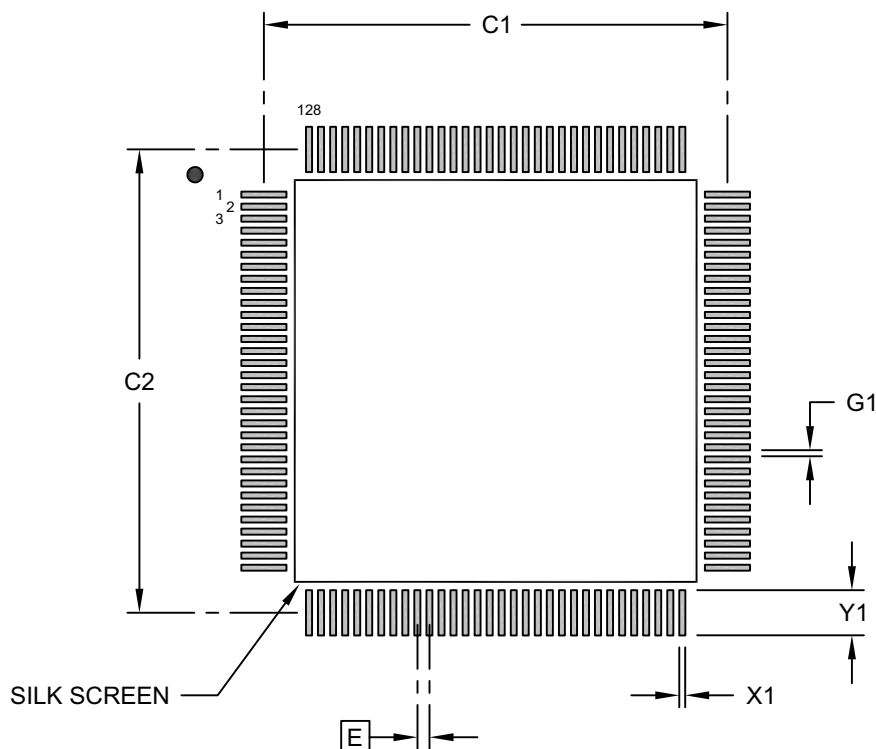
- Pin 1 visual index feature may vary, but must be located within the hatched area.
- Dimensioning and tolerancing per ASME Y14.5M  
BSC: Basic Dimension. Theoretically exact value shown without tolerances.  
REF: Reference Dimension, usually without tolerance, for information purposes only.

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## 128-Lead Thin Plastic Quad Flatpack (ZA) - 14x14 mm Body [TQFP] SMSC Legacy VTQE3; Atmel Legacy Global Package Code APL

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



### RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E	0.40 BSC		
Contact Pad Spacing	C1		15.40	
Contact Pad Spacing	C2		15.40	
Contact Pad Width (X20)	X1			0.20
Contact Pad Length (X20)	Y1			1.50
Contact Pad to Contact Pad (X124)	G1	0.20		

#### Notes:

- Dimensioning and tolerancing per ASME Y14.5M  
BSC: Basic Dimension. Theoretically exact value shown without tolerances.
- For best soldering results, thermal vias, if used, should be filled or tented to avoid solder loss during reflow process

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## APPENDIX A: REVISION HISTORY

### Revision A (December 2018)

Initial edition for firmware revision 1.0 – Release

# mXT1067TD-AT/mXT1067TD-AB 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 mXT1067TD-AT/mXT1067TD-AB.

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

PART NO.	-XXX	[X]	[X]	[XXX]
Device	Package	Temperature Range	Tape and Reel Option	Pattern
Device:	Base device name			
Package:	A	=	QFP (Plastic Quad Flatpack)	
	AM	=	VQFN (Plastic Very Thin Quad Flat No Lead)	
Temperature Range:	T	=	-40°C to +85°C (Grade 3)	
	B	=	-40°C to +105°C (Grade 2)	
Tape and Reel Option:	Blank	=	Standard Packaging (Tube or Tray)	
	R	=	Tape and Reel <sup>(1)</sup>	
Pattern:	Extension, 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
ATMXT1067TD-AT12CVAO (Supplied in trays)	1.0.AA	128-lead TQFP 14 × 14 × 1 mm, RoHS compliant Operating temperature range -40°C to +85°C (Grade 3)
ATMXT1067TD-ATRI2CVAO (Supplied in tape and reel)		
ATMXT1067TD-AB12CVAO (Supplied in trays)	1.0.AA	128-lead TQFP 14 × 14 × 1 mm, RoHS compliant Operating temperature range -40°C to +105°C (Grade 2)
ATMXT1067TD-ABRI2CVAO (Supplied in tape and reel)		



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**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.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
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