**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 VPP between 1 Hz and 1 kHz sinusoidal waveform
  - Up to 20 VPP 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
- Scan Speed
  - Up to 112 Hz report rate for one finger (subject to configuration)
  - Typical report rate for 10 touches ≥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**
- I²C 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 (Vdd) 3.3 V nominal
- Digital I/O (VddIO) 3.3 V nominal
- Analog (AVdd) 3.3 V nominal
- High voltage internal X line drive (XVdd) 6.6 V with internal voltage pump (XVdd connected to Vdd if voltage pump not used)

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

**Operating Temperature**
- mXT1067TD-AT: −40°C to +85°C (Grade 3)
- mXT1067TD-AB: −40°C to +105°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
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

Microchip Technology Drawing C04-181 Rev A Sheet 1 of 2
### 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

---

#### Notes:
1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. 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.

<table>
<thead>
<tr>
<th>Units</th>
<th>MILLIMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dimension Limits</strong></td>
<td>MIN</td>
</tr>
<tr>
<td>Number of Leads</td>
<td>N</td>
</tr>
<tr>
<td>Lead Pitch</td>
<td>e</td>
</tr>
<tr>
<td>Overall Height</td>
<td>A</td>
</tr>
<tr>
<td>Standoff</td>
<td>A1</td>
</tr>
<tr>
<td>Molded Package Thickness</td>
<td>A2</td>
</tr>
<tr>
<td>Foot Length</td>
<td>L</td>
</tr>
<tr>
<td>Footprint</td>
<td>L1</td>
</tr>
<tr>
<td>Foot Angle</td>
<td>θ</td>
</tr>
<tr>
<td>Overall Width</td>
<td>E</td>
</tr>
<tr>
<td>Overall Length</td>
<td>D</td>
</tr>
<tr>
<td>Molded Package Width</td>
<td>E1</td>
</tr>
<tr>
<td>Molded Package Length</td>
<td>D1</td>
</tr>
<tr>
<td>Lead Width</td>
<td>b</td>
</tr>
<tr>
<td>Mold Draft Angle Top</td>
<td>C</td>
</tr>
<tr>
<td>Lead Bend Radius</td>
<td>R1</td>
</tr>
<tr>
<td>Lead Bend Radius</td>
<td>R2</td>
</tr>
</tbody>
</table>

---

Microchip Technology Drawing C04-181 Rev A Sheet 1 of 2
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

<table>
<thead>
<tr>
<th>Units</th>
<th>Dimension Limits</th>
<th>MILIMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>MIN</td>
</tr>
<tr>
<td>Contact Pitch</td>
<td>E</td>
<td>0.40</td>
</tr>
<tr>
<td>Contact Pad Spacing</td>
<td>C1</td>
<td>15.40</td>
</tr>
<tr>
<td>Contact Pad Spacing</td>
<td>C2</td>
<td>15.40</td>
</tr>
<tr>
<td>Contact Pad Width (X20)</td>
<td>X1</td>
<td>0.20</td>
</tr>
<tr>
<td>Contact Pad Length (X20)</td>
<td>Y1</td>
<td>1.50</td>
</tr>
<tr>
<td>Contact Pad to Contact Pad (X124)</td>
<td>G1</td>
<td>0.20</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>PART NO.</th>
<th>Device</th>
<th>Package</th>
<th>Temperature Range</th>
<th>Tape and Reel Option</th>
<th>Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>XX</td>
<td>[X]</td>
<td>[X]</td>
<td>[XXX]</td>
</tr>
</tbody>
</table>

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 (1)

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

<table>
<thead>
<tr>
<th>Orderable Part Number</th>
<th>Firmware Revision</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATMXT1067TD-ATI2CVAO</td>
<td>1.0.AA</td>
<td>128-lead TQFP 14 x 14 x 1 mm, RoHS compliant, Operating temperature range –40°C to +85°C (Grade 3)</td>
</tr>
<tr>
<td>ATMXT1067TD-ATRI2CVAO</td>
<td>1.0.AA</td>
<td>128-lead TQFP 14 x 14 x 1 mm, RoHS compliant, Operating temperature range –40°C to +105°C (Grade 2)</td>
</tr>
<tr>
<td>ATMXT1067TD-ABI2CVAO</td>
<td>1.0.AA</td>
<td>128-lead TQFP 14 x 14 x 1 mm, RoHS compliant, Operating temperature range –40°C to +105°C (Grade 2)</td>
</tr>
<tr>
<td>ATMXT1067TD-ABRI2CVAO</td>
<td>1.0.AA</td>
<td>128-lead TQFP 14 x 14 x 1 mm, RoHS compliant, Operating temperature range –40°C to +105°C (Grade 2)</td>
</tr>
</tbody>
</table>
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.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as “unbreakable.”

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip’s code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION, INCLUDING BUT NOT LIMITED TO ITS CONDITION, QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR PURPOSE. Use of Microchip devices in life support and/or safety applications is entirely at the buyer’s risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights unless otherwise stated.

Microchip received ISO/TS-16949:2009 certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona; Gresham, Oregon and design centers in California and India. The Company’s quality system processes and procedures are for its PIC® MCUs and dsPIC® DSCs, KeloLoc® code hopping devices, Serial EEPROMs, microperipherals, nonvolatile memory and analog products. In addition, Microchip’s quality system for the design and manufacture of development systems is ISO 9001:2000 certified.

**QUALITY MANAGEMENT SYSTEM CERTIFIED BY DNV**

[ISO/TS 16949]
Worldwide Sales and Service

AMERICAS
Corporate Office
2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 480-792-7200
Fax: 480-792-7277
Technical Support:
http://www.microchip.com/support
Web Address:
www.microchip.com

Atlanta
Duluth, GA
Tel: 678-957-9614
Fax: 678-957-1455

Austin, TX
Tel: 512-257-3370

Boston
Westborough, MA
Tel: 508-369-7000
Fax: 508-369-7008

Chicago
Itasca, IL
Tel: 630-285-0087
Fax: 630-285-0088

Dallas
Addison, TX
Tel: 972-818-7423
Fax: 972-818-2924

Detroit
Novi, MI
Tel: 248-848-4000

Houston, TX
Tel: 281-894-5983

Indianapolis
Noblesville, IN
Tel: 317-773-8323
Fax: 317-773-5453
Tel: 317-536-2380

Los Angeles
Mission Viejo, CA
Tel: 949-462-9523
Fax: 949-462-9608
Tel: 951-273-7800

Raleigh, NC
Tel: 919-844-7510

New York, NY
Tel: 631-435-6000

San Jose, CA
Tel: 408-735-9110
Fax: 408-436-4270

Canada - Toronto
Tel: 905-695-1980
Fax: 905-695-2078

ASIA/PACIFIC
Australia - Sydney
Tel: 61-2-9868-6733
China - Beijing
Tel: 86-10-8569-7000
China - Chengdu
Tel: 86-28-8665-5511
China - Chongqing
Tel: 86-23-8980-9588
China - Dongguan
Tel: 86-769-8702-9880
China - Guangzhou
Tel: 86-20-8755-8029
China - Hangzhou
Tel: 86-571-8792-8115
China - Hong Kong SAR
Tel: 852-2943-5100
China - Nanjing
Tel: 86-25-8473-2460
China - Qingdao
Tel: 86-532-8502-7355
China - Shanghai
Tel: 86-21-3326-8000
China - Shenyang
Tel: 86-24-2334-2829
China - Shenzhen
Tel: 86-755-8864-2200
China - Suzhou
Tel: 86-186-2633-1526
China - Wuhan
Tel: 86-27-5980-5300
China - Xian
Tel: 86-29-8833-7252
China - Xiamen
Tel: 86-592-2388138
China - Zuhai
Tel: 86-756-3210040

ASIA/PACIFIC
India - Bangalore
Tel: 91-80-3090-4444
India - New Delhi
Tel: 91-11-4160-8631
India - Pune
Tel: 91-20-4121-0114
Japan - Osaka
Tel: 81-6-6152-7160
Japan - Tokyo
Tel: 81-3-6880-3770
Korea - Daegu
Tel: 82-53-744-4301
Korea - Seoul
Tel: 82-2-554-7200
Malaysia - Kuala Lumpur
Tel: 60-3-7651-7906
Malaysia - Penang
Tel: 60-4-227-8870
Philippines - Manila
Tel: 63-2-634-9065
Singapore
Tel: 65-6334-8870
Taiwan - Hsin Chu
Tel: 886-3-577-8366
Taiwan - Kaohsiung
Tel: 886-7-213-7820
Taiwan - Taipei
Tel: 886-2-2508-8060
Thailand - Bangkok
Tel: 66-2-694-1351
Vietnam - Ho Chi Minh
Tel: 84-28-5448-2100

ASIA/PACIFIC

EUROPE
Austria - Wels
Tel: 43-7242-2244-39
Fax: 43-7242-2244-393
Denmark - Copenhagen
Tel: 45-4450-2828
Fax: 45-4485-2829
Finland - Espoo
Tel: 358-9-4520-820
France - Paris
Tel: 33-1-69-53-63-20
Fax: 33-1-69-30-90-79
Germany - Garching
Tel: 49-8931-354-560
Germany - Haan
Tel: 49-2129-376640
Germany - Heilbronn
Tel: 49-7131-354-560
Germany - Karlsruhe
Tel: 49-721-625370
Germany - Munich
Tel: 49-89-627-144-0
Fax: 49-89-627-144-44
Germany - Rosenheim
Tel: 49-8433-354-560
Israel - Ra'anana
Tel: 972-9-744-7705
Italy - Milan
Tel: 39-0331-742611
Fax: 39-0331-466781
Italy - Padova
Tel: 39-049-7625286
Netherlands - Drunen
Tel: 31-416-690399
Fax: 31-416-690340
Norway - Trondheim
Tel: 47-7289-4388
Poland - Warsaw
Tel: 48-22-3325737
Romania - Bucharest
Tel: 40-21-407-87-50
Spain - Madrid
Tel: 34-91-708-08-90
Fax: 34-91-708-08-91
Sweden - Gothenburg
Tel: 46-31-704-60-40
Sweden - Stockholm
Tel: 46-8-5090-4654
UK - Wokingham
Tel: 44-118-921-5800
Fax: 44-118-921-5820