
maXTouch 2911-node Touchscreen Controller

Product Brief

Description

The mXT2952TD 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 mXT2952TD 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 41 X (transmit) lines and 71 Y (receive) lines for use by touchscreen and keys
- Touchscreen size 21 inches (16:9 aspect ratio), assuming a sensor electrode pitch of 6.5 mm. Other sizes are possible with different electrode pitches and appropriate sensor material
- A maximum of 2911 X/Y nodes can be allocated to the touch sensor
- Multiple touch support with up to 16 concurrent touches tracked in real time
- HID Mouse mode reporting of single touches to the host, subject to configuration
- Dual-boot OS support for Microsoft[®] Windows[®] and Android[™]

Keys

- Up to 32 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)
- 10 mm glass (or 5 mm PMMA) with bare finger (dependent on screen size, touch size, configuration and stack-up)
- 6 mm glass (or 3 mm PMMA) with multi-finger 5 mm glove (2.7 mm PMMA equivalent) (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
- 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, charger, and power-line noise
 - Up to 240 V_{PP} between 1 Hz and 1 kHz sinusoidal waveform
 - Up to 20 V_{PP} between 1 kHz and 1 MHz sinusoidal waveform
- Stylus Support
 - Supports passive stylus with 1.5 mm contact diameter, subject to configuration, stack-up, and sensor design
- Burst Frequency
 - Flexible and dynamic Tx burst frequency selection to reduce EMC disturbance
 - 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 ≥ 100 Hz (subject to configuration)
 - Initial touch latency < 14 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
- Supports wake up/unlock gestures, including symbol recognition

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), High Speed mode (up to 3.4 MHz)
- USB HID interface for Microsoft Windows 8.x and later versions
- HID-I²C interface for Microsoft Windows 8.x and later versions
- 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) 3.3V nominal
- Digital I/O (VddIO) 1.8V to 3.3V (I²C mode), 3.3V (USB mode)
- Analog (AVdd) 3.3V nominal
- High voltage external X line drive (XVdd) up to 9.2V

Package



































































































































































- 162-ball UFBGA 10 × 5 × 0.6 mm, 0.5 mm pitch

Operating Temperature

- -40°C to $+85^{\circ}\text{C}$

PIN CONFIGURATION

0.1 162-ball UFBGA

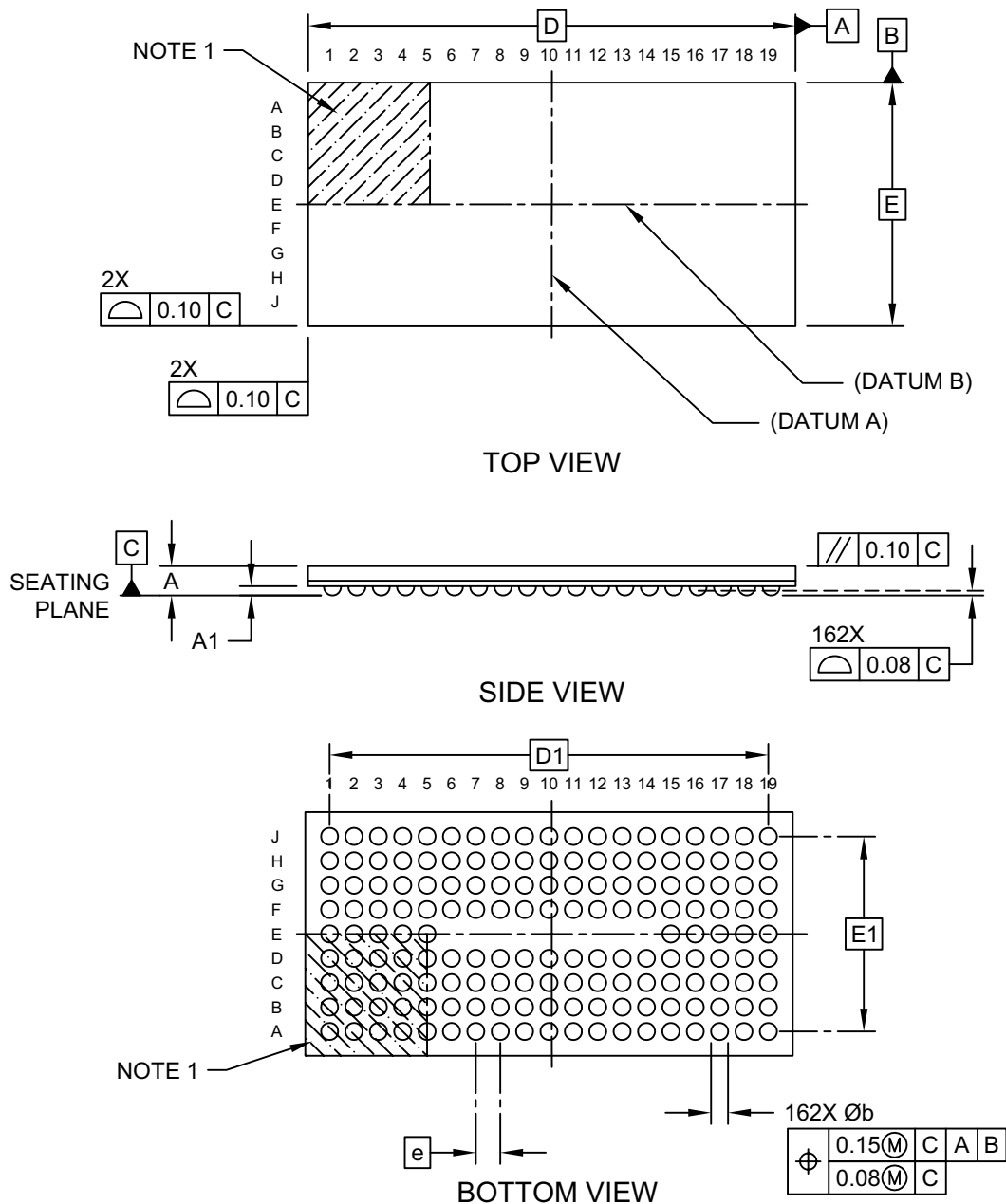
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
A	 SCL	 <u>RESET</u>	 VDDIO	 DS0	 Y68	 Y64	 Y60	 AVDD	 GND	 Y50	 Y46	 Y42	 AVDD	 GND	 X38	 X39	 X40	 RESV	 RESV
B	 SDA	 USBDM	 GND	 Y70	 Y67	 Y63	 Y59	 Y56	 Y53	 Y49	 Y45	 Y41	 Y38	 VDDCORE	 X33	 X34	 X35	 X36	 X37
C	 ADDSEL USBDP	 COMMSEL	 AVDD	 Y69	 Y66	 Y62	 Y58	 Y55	 Y52	 Y48	 Y44	 Y40	 Y37	 GND	 X28	 X29	 X30	 X31	 X32
D	 I2CMODE	 NOISE_IN	 GND	 GND	 Y65	 Y61	 Y57	 Y54	 Y51	 Y47	 Y43	 Y39	 Y36	 XVDD	 X23	 X24	 X25	 X26	 X27
E	 CHG	 GPIO0 DBG_SS	 AVDD	 GND	 GND										 GND	 X19	 X20	 X21	 X22
F	 GPIO1	 GPIO2	 GND	 GND	 Y29	 Y25	 Y21	 Y18	 Y15	 Y11	 Y7	 Y3	 Y0	 XVDD	 X14	 X15	 X16	 X17	 X18
G	 GPIO3	 GPIO4 SYNC	 VDDIO	 Y33	 Y30	 Y26	 Y22	 Y19	 Y16	 Y12	 Y8	 Y4	 Y1	 GND	 X9	 X10	 X11	 X12	 X13
H	 GPIO5	 DBG_CLK XIN	 VDDIN	 Y34	 Y31	 Y27	 Y23	 Y20	 Y17	 Y13	 Y9	 Y5	 Y2	 XVDD	 X4	 X5	 X6	 X7	 X8
J	 DBG_DATA XOUT	 TEST	 VDDCORE	 Y35	 Y32	 Y28	 Y24	 AVDD	 GND	 Y14	 Y10	 Y6	 AVDD	 GND	 VREGBOOST	 X0	 X1	 X2	 X3

Top View

1.0 PACKAGING INFORMATION

162-Ball Ultra Thin Fine Pitch Ball Grid Array (C6B) - 10x5x0.6 mm Body [UFBGA] Atmel Legacy Global Package Code CAK

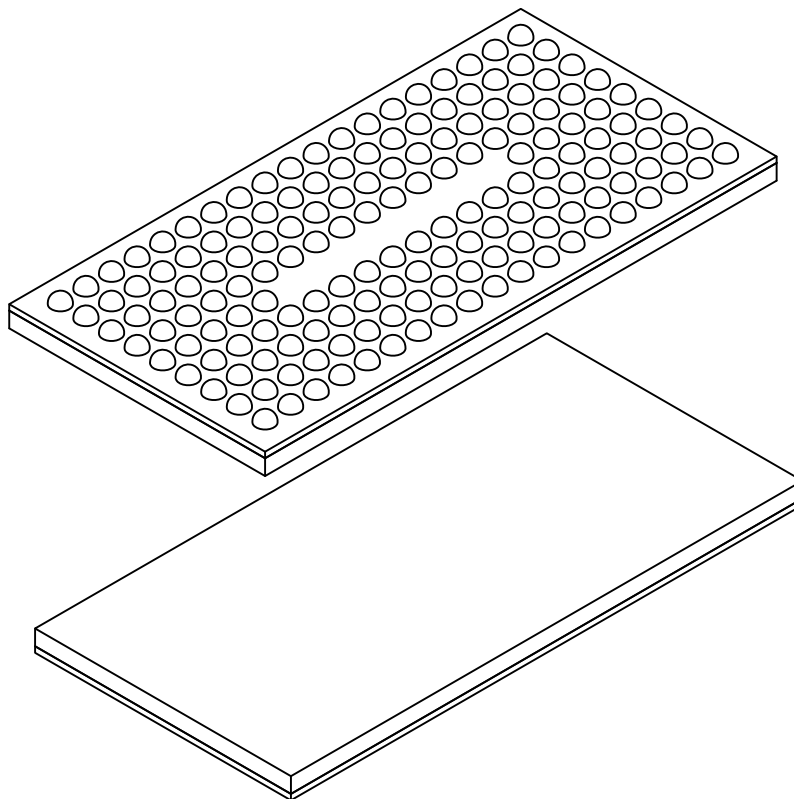
Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Microchip Technology Drawing C04-21167 Rev A Sheet 1 of 2

**162-Ball Ultra Thin Fine Pitch Ball Grid Array (C6B) - 10x5x0.6 mm Body [UFBGA]
Atmel Legacy Global Package Code CAK**

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 Terminals	N	162		
Pitch	e	0.50 BSC		
Overall Height	A	0.488	0.546	0.60
Standoff	A1	0.120	0.155	0.190
Overall Length	D	10.00 BSC		
Overall Ball Spacing	D1	9.00 BSC		
Overall Width	E	5.00 BSC		
Exposed Pad Width	E1	4.00 BSC		
Ball Diameter	b	0.20	0.25	0.30

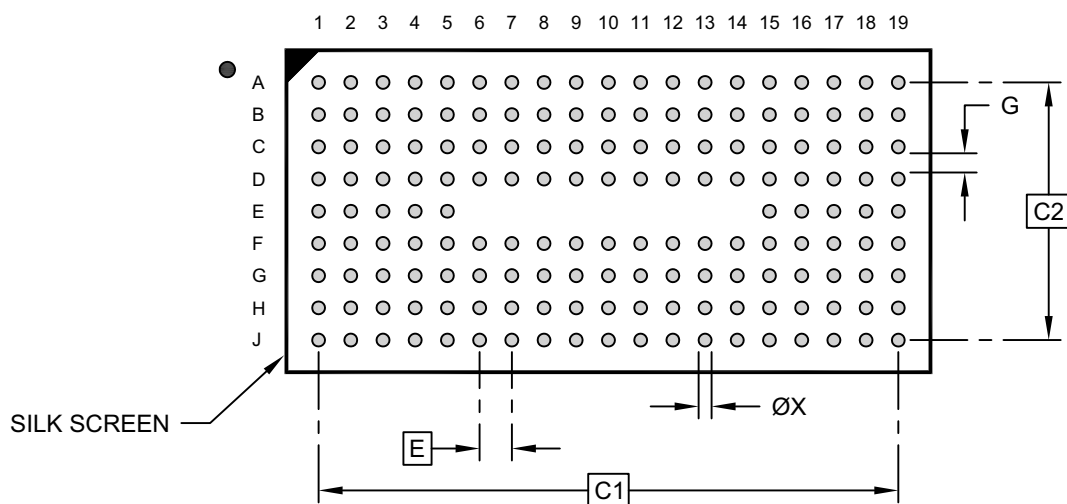
Notes:

- 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.

Microchip Technology Drawing C04-21167 Rev A Sheet 2 of 2

162-Ball Ultra Thin Fine Pitch Ball Grid Array (C6B) - 10x5x0.6 mm Body [UFBGA] Atmel Legacy Global Package Code CAK

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	0.50 BSC		
Contact Pad Spacing	C1	9.00 BSC		
Contact Pad Spacing	C2	4.00 BSC		
Contact Pad Diameter (X162)	X1			0.20
Contact Pad to Contact Pad	G	0.30		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-23167 Rev A

APPENDIX A: REVISION HISTORY

Revision A (July 2019)

Initial edition for firmware revision 1.0.AA – Release

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 mXT2952TD.

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)

CC

=

UFBGA (Ultra Thin Fine-pitch Ball Grid Array)

C2

=

UFBGA (Ultra Thin Fine-pitch Ball Grid Array)

NH

=

UFBGA (Ultra Thin Fine-pitch Ball Grid Array)

C4

=

X1FBGA (Extra Thin Fine-pitch Ball Grid Array)

MA

=

XQFN (Super Thin Quad Flat No Lead Sawn)

MA5

=

XQFN (Super Thin Quad Flat No Lead Sawn)

Temperature Range:

U

=

–40°C to +85°C (Grade 3)

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

Orderable Part Number	Firmware Revision	Description
ATMXT2952TD-C2U001 (Supplied in trays)	1.0.AA	162-ball UFBGA 10 × 5 × 0.6 mm, RoHS compliant Industrial grade; not suitable for automotive characterization
ATMXT2952TD-C2UR001 (Supplied in tape and reel)		

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. Microchip disclaims all liability arising from this information and its use. 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.

Trademarks

The Microchip name and logo, the Microchip logo, Adaptec, AnyRate, AVR, AVR logo, AVR Freaks, BesTime, BitCloud, chipKIT, chipKIT logo, CryptoMemory, CryptoRF, dsPIC, FlashFlex, flexPWR, HELDO, IGLOO, JukeBlox, KeeLoq, Klear, LANCheck, LinkMD, maXStylus, maXTouch, MediaLB, megaAVR, Microsemi, Microsemi logo, MOST, MOST logo, MPLAB, OptoLyzer, PackeTime, PIC, picoPower, PICSTART, PIC32 logo, PolarFire, Prochip Designer, QTouch, SAM-BA, SenGenuity, SpyNIC, SST, SST Logo, SuperFlash, Symmetricom, SyncServer, Tachyon, TempTrackr, TimeSource, tinyAVR, UNI/O, Vectron, and XMEGA are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

APT, ClockWorks, The Embedded Control Solutions Company, EtherSynch, FlashTec, Hyper Speed Control, HyperLight Load, IntelliMOS, Libero, motorBench, mTouch, Powermite 3, Precision Edge, ProASIC, ProASIC Plus, ProASIC Plus logo, Quiet-Wire, SmartFusion, SyncWorld, Temux, TimeCesium, TimeHub, TimePictra, TimeProvider, Vite, WinPath, and ZL are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Adjacent Key Suppression, AKS, Analog-for-the-Digital Age, Any Capacitor, AnyIn, AnyOut, BlueSky, BodyCom, CodeGuard, CryptoAuthentication, CryptoAutomotive, CryptoCompanion, CryptoController, dsPICDEM, dsPICDEM.net, Dynamic Average Matching, DAM, ECAN, EtherGREEN, In-Circuit Serial Programming, ICSP, INICnet, Inter-Chip Connectivity, JitterBlocker, KlearNet, KlearNet logo, memBrain, Mindi, MiWi, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, MultiTRAK, NetDetach, Omniscient Code Generation, PICDEM, PICDEM.net, PICkit, PICtail, PowerSmart, PureSilicon, QMatrix, REAL ICE, Ripple Blocker, SAM-ICE, Serial Quad I/O, SMART-I.S., SQI, SuperSwitcher, SuperSwitcher II, Total Endurance, TSHARC, USBCheck, VariSense, ViewSpan, WiperLock, Wireless DNA, and ZENA are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

The Adaptec logo, Frequency on Demand, Silicon Storage Technology, and Symmcom are registered trademarks of Microchip Technology Inc. in other countries.

GestIC is a registered trademark of Microchip Technology Germany II GmbH & Co. KG, a subsidiary of Microchip Technology Inc., in other countries.

All other trademarks mentioned herein are property of their respective companies.

© 2019, Microchip Technology Incorporated, All Rights Reserved.

ISBN: 978-1-5224-4673-6

For information regarding Microchip's Quality Management Systems, please visit www.microchip.com/quality.

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](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: 774-760-0087
 Fax: 774-760-0088

Chicago
 Itasca, IL
 Tel: 630-285-0071
 Fax: 630-285-0075

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
 Tel: 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: 86-186-6233-1526

China - Wuhan
 Tel: 86-27-5980-5300

China - Xian
 Tel: 86-29-8833-7252

China - Xiamen
 Tel: 86-592-2388138

China - Zhuhai
 Tel: 86-756-3210040

ASIA/PACIFIC

India - Bangalore
 Tel: 91-80-3090-4444

India - New Delhi
 Tel: 91-11-4160-8631

India - Pune
 Tel: 91-20-4121-0141

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: 886-7-213-7830

Taiwan - Taipei
 Tel: 886-2-2508-8600

Thailand - Bangkok
 Tel: 66-2-694-1351

Vietnam - Ho Chi Minh
 Tel: 84-28-5448-2100

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: 49-8931-9700

Germany - Haan
 Tel: 49-2129-3766400

Germany - Heilbronn
 Tel: 49-7131-72400

Germany - Karlsruhe
 Tel: 49-721-625370

Germany - Munich
 Tel: 49-89-627-144-0
 Fax: 49-89-627-144-44

Germany - Rosenheim
 Tel: 49-8031-354-560

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: 47-7288-4388

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 - Gothenberg
 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

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Microchip:

[ATMXT2952TD-C2U001](#) [ATMXT2952TD-C2UR001](#)