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

- I^2C 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-I^2C 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 (I^2C mode), 3.3V (USB mode)
- Analog (AVdd) 3.3V nominal
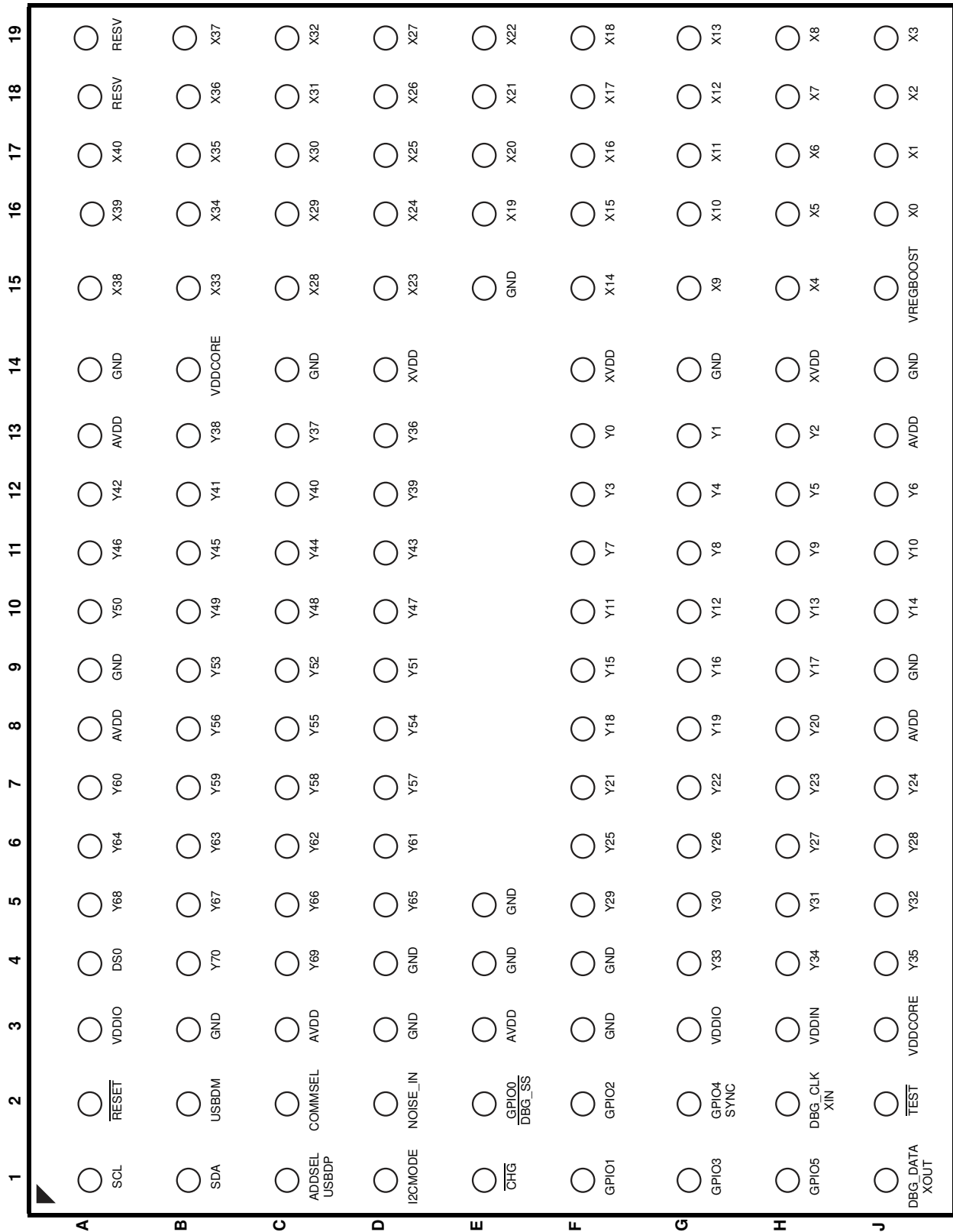- High voltage external X line drive (XVdd) up to 9.2V

Package

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

Operating Temperature

- –40°C to +85°C

PIN CONFIGURATION

0.1 162-ball UFBGA

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

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

TOP VIEW

SIDE VIEW

BOTTOM VIEW

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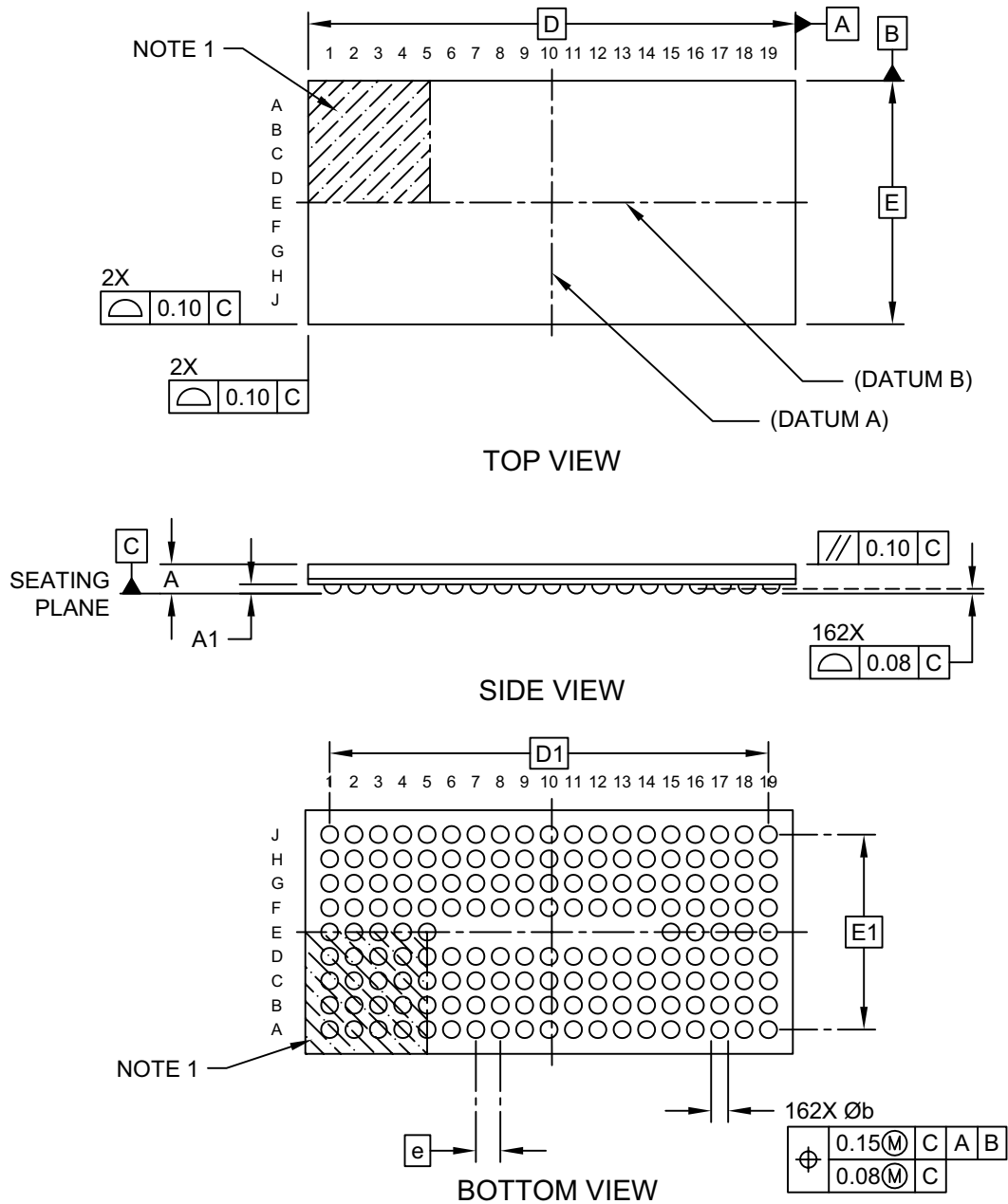
162-Ball Ultra Thin Fine Pitch Ball Grid Array (C6B) - 10x5x0.6 mm Body [UFBGA] Atmel Legacy Global Package Code CAK

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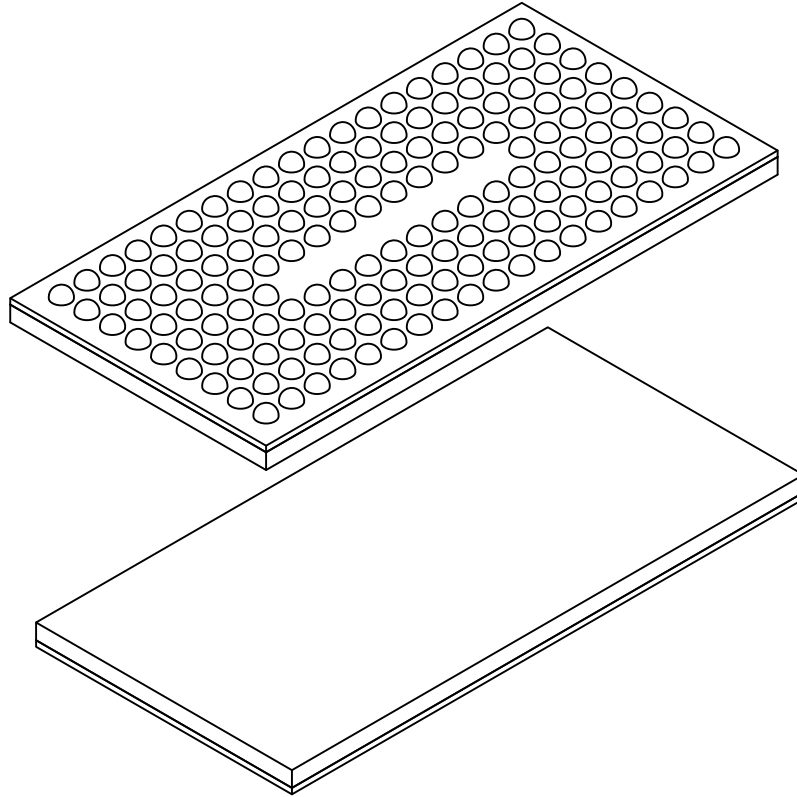
Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Terminals	N		162	
Pitch	e		0.50 BSC	
Overall Height	A	0.488	0.546	0.60
Standoff	A1	0.120	0.155	0.190
Overall Length	D		10.00 BSC	
Overall Ball Spacing	D1		9.00 BSC	
Overall Width	E		5.00 BSC	
Exposed Pad Width	E1		4.00 BSC	
Ball Diameter	b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

Notes:

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.

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162-Ball Ultra Thin Fine Pitch Ball Grid Array (C6B) - 10x5x0.6 mm Body [UFBGA]
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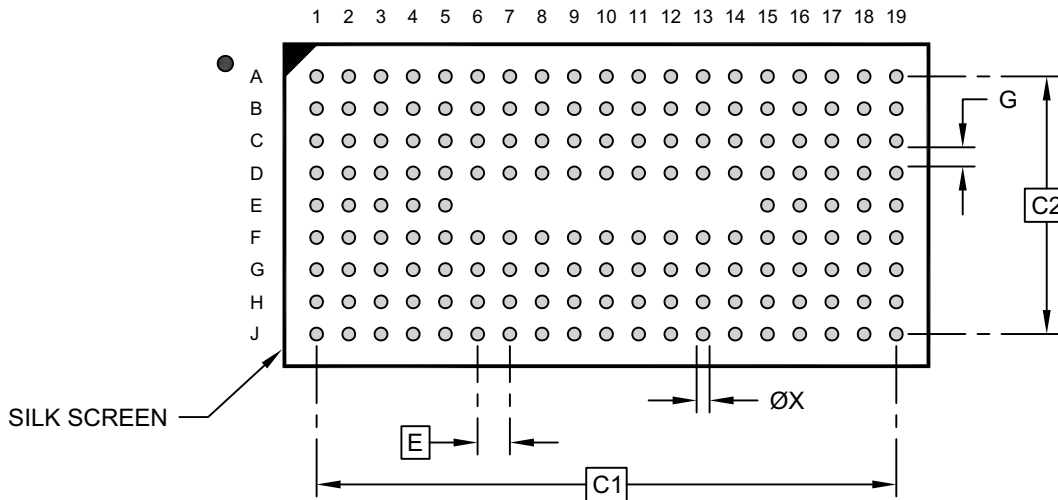
RECOMMENDED LAND PATTERN

	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

Product Brief

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.

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