mXT2912TD-AxUW 1.0

maXTouch 2911-node Touchscreen Controller Product Brief

Description

The mXT2912TD-AxUW 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 mXT2912TD-AxUW 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)
- ASIL-B related FMEDA processes applied

maXTouch® Adaptive Sensing Touchscreen Technology

- Microchip has patents related to the Ultrawide Touch technology. The touch sensor, which will be developed by the customer, its partners, and/or Microchip for Ultrawide touch programs, can only be part of a touch solution that incorporates a Microchip touchscreen controller to implement the relevant functionality.
- Single ultrawide touchscreen up to 20 X lines by 142 Y lines, made up of 40 X by 71 Y in a multiplexed arrangement (subject to configuration)
- Touchscreen size 34 inches (7:1 aspect ratio), assuming a sensor electrode pitch of 6 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 32 nodes can be allocated as mutual capacitance sensor keys in addition to the touchscreen, defined as 2 key arrays (subject to availability of X and Y lines and 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, LCD (ITPS, 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 and Design

- 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)
- Support for non-rectangular sensor designs (for example, circular, rounded or with cutouts)

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 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

- 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
  - Typical report rate for 10 touches ≥50 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

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

Data Store

- 60-byte CRC-checksummed data area for use as a run-time Product Data Store Area
- Up to 64 bytes of user's custom data (not CRC checksummed)

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 client interface with support for Standard mode (up to 100 kHz), Fast mode (up to 400 kHz), Fast-mode Plus (up to 1 MHz)
- SPI client interface (up to 8 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) 3.3V nominal
- Digital I/O (VddIO) 3.3V nominal
- Analog (AVdd) 3.3V nominal
- High voltage external X line drive (XVdd) up to 8.5V

Package

- 176-lead LQFP 24 × 24 × 1.4 mm, 0.5 mm pitch

Operating Temperature

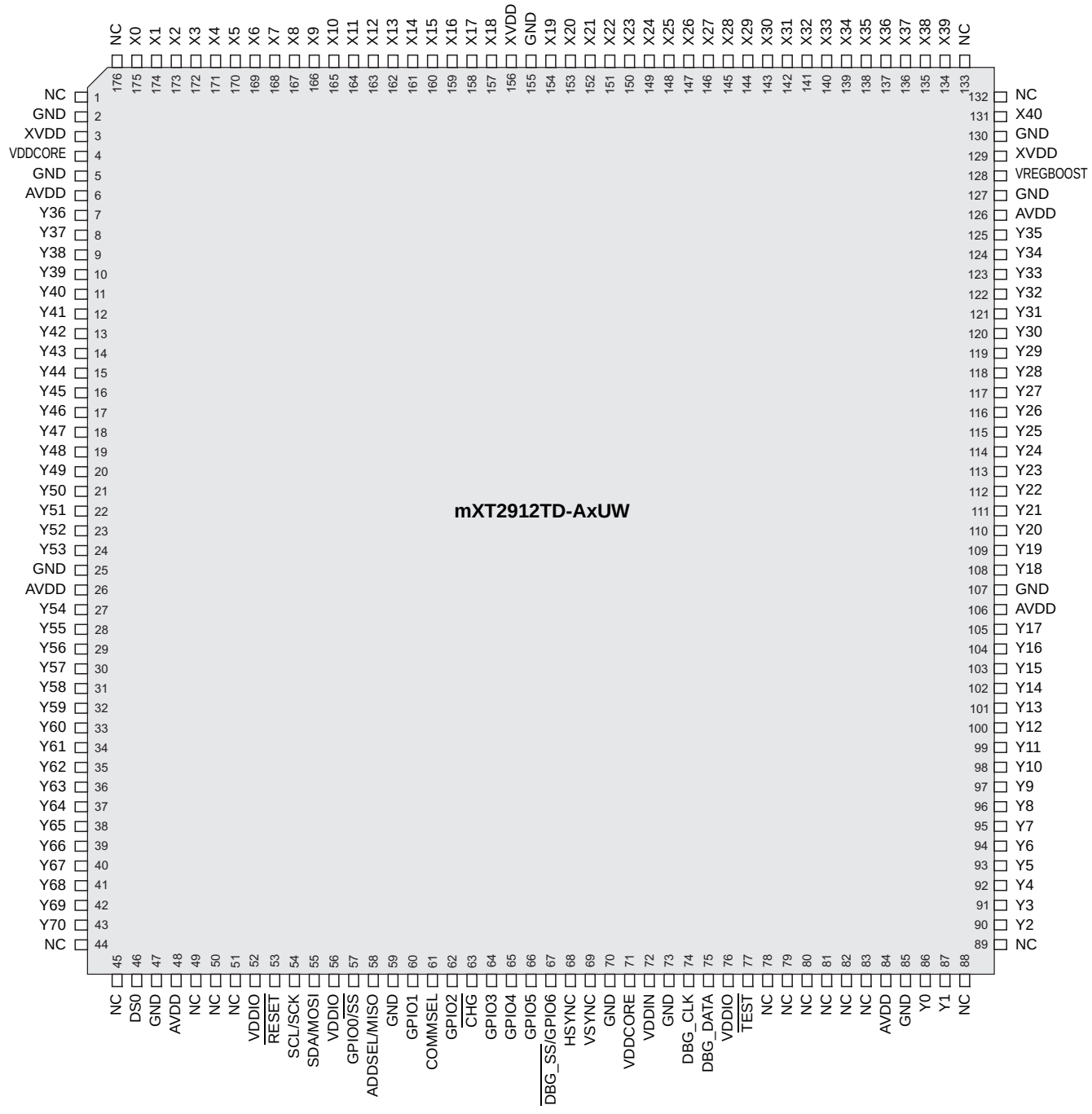
- ATMXT2912TD-ATUW: –40°C to +85°C (Grade 3)
- ATMXT2912TD-ABUW: –40°C to +105°C (Grade 2)

Design Services

- Review of device configuration, stack-up and sensor patterns

PIN CONFIGURATION

176-lead LQFP

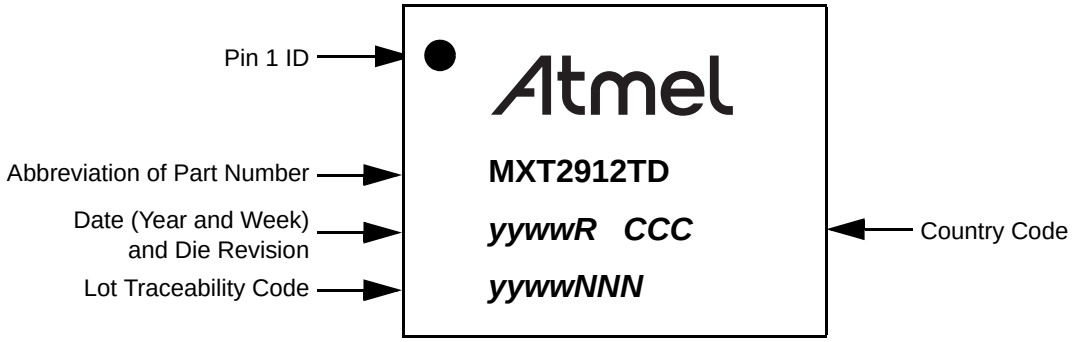


Top view

1.0 PACKAGING INFORMATION

1.1 Package Marking Information

1.1.1 176-LEAD LQFP



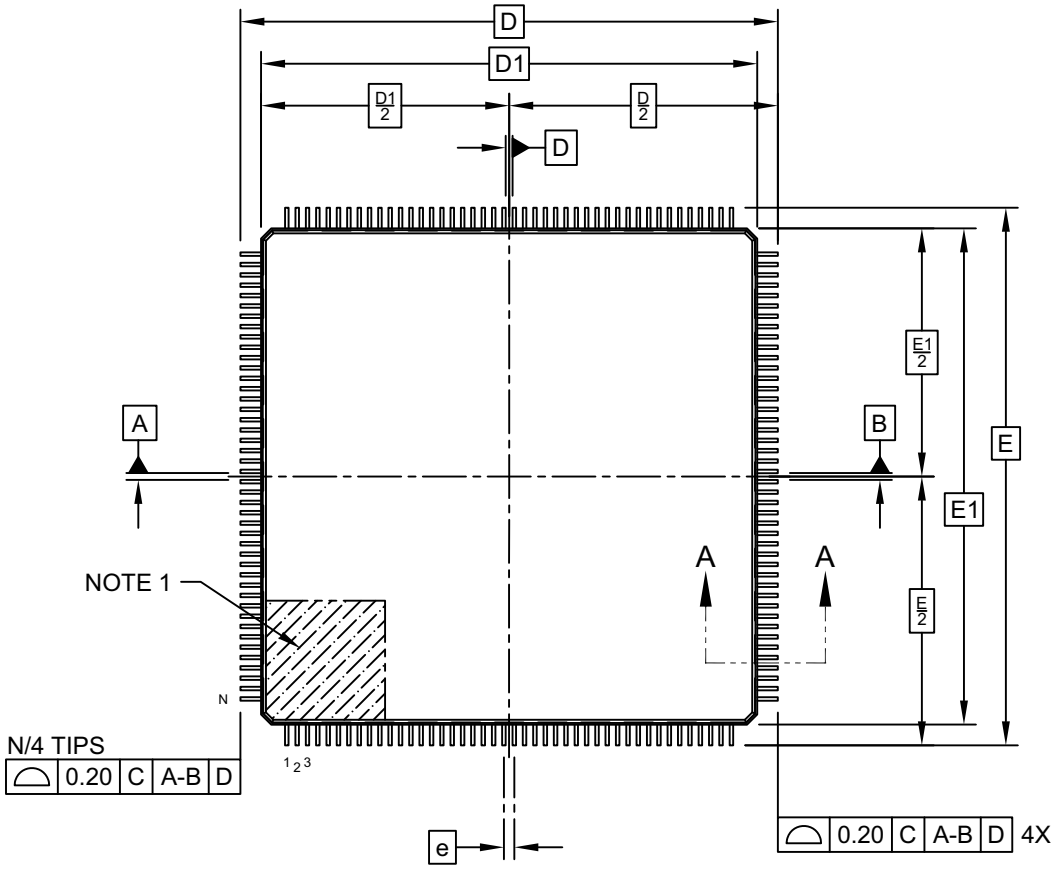
1.1.2 ORDERABLE PART NUMBERS

The product identification system for maXTouch devices is described in "Product Identification System". That section also lists example part numbers for the device.

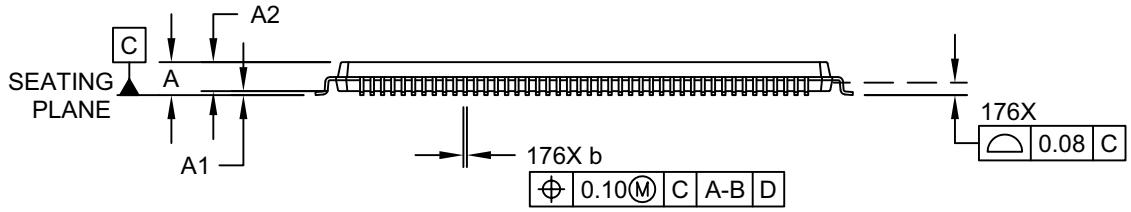
1.2 Package Details

176-Lead Plastic Quad Flatpack (2VB) - 24x24x1.4 mm Body [LQFP]
Atmel Legacy Global Package Code AGR

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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176-Lead Plastic Quad Flatpack (2VB) - 24x24x1.4 mm Body [LQFP]
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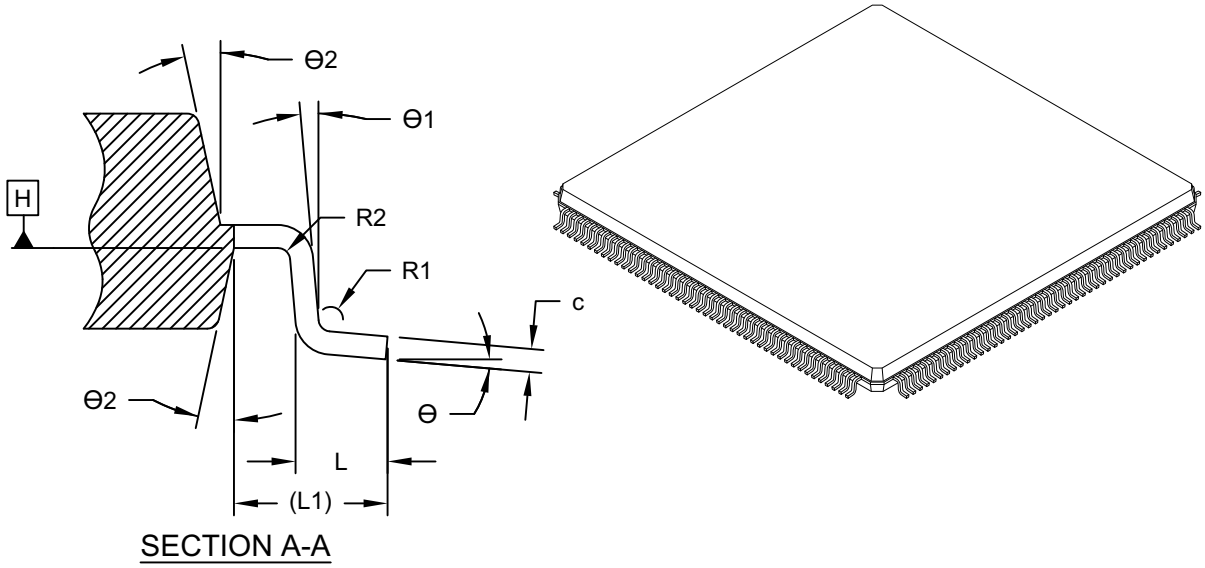

SECTION A-A

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Terminals	N		176	
Pitch	e		0.50 BSC	
Overall Height	A	-	-	1.60
Standoff	A1	0.05	-	0.15
Molded Package Thickness	A2	1.35	1.40	1.45
Overall Length	D		26.00 BSC	
Molded Package Length	D1		24.00 BSC	
Overall Width	E		26.00 BSC	
Molded Package Width	E1		24.00 BSC	
Terminal Width	b	0.17	0.22	0.27
Terminal Thickness	c	0.09	-	0.20
Terminal Length	L	0.45	0.60	0.75
Footprint	L1		1.00 REF	-
Lead Bend Radius	R	0.08	-	-
Lead Bend Radius	R2	0.08	-	0.20
Foot Angle	Θ	0°	3.5°	7°
Lead Angle	Θ1	0°	-	-
Terminal-to-Exposed-Pad	Θ2	11°	12°	13°

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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176-Lead Plastic Quad Flatpack (2VB) - 24x24x1.4 mm Body [LQFP]
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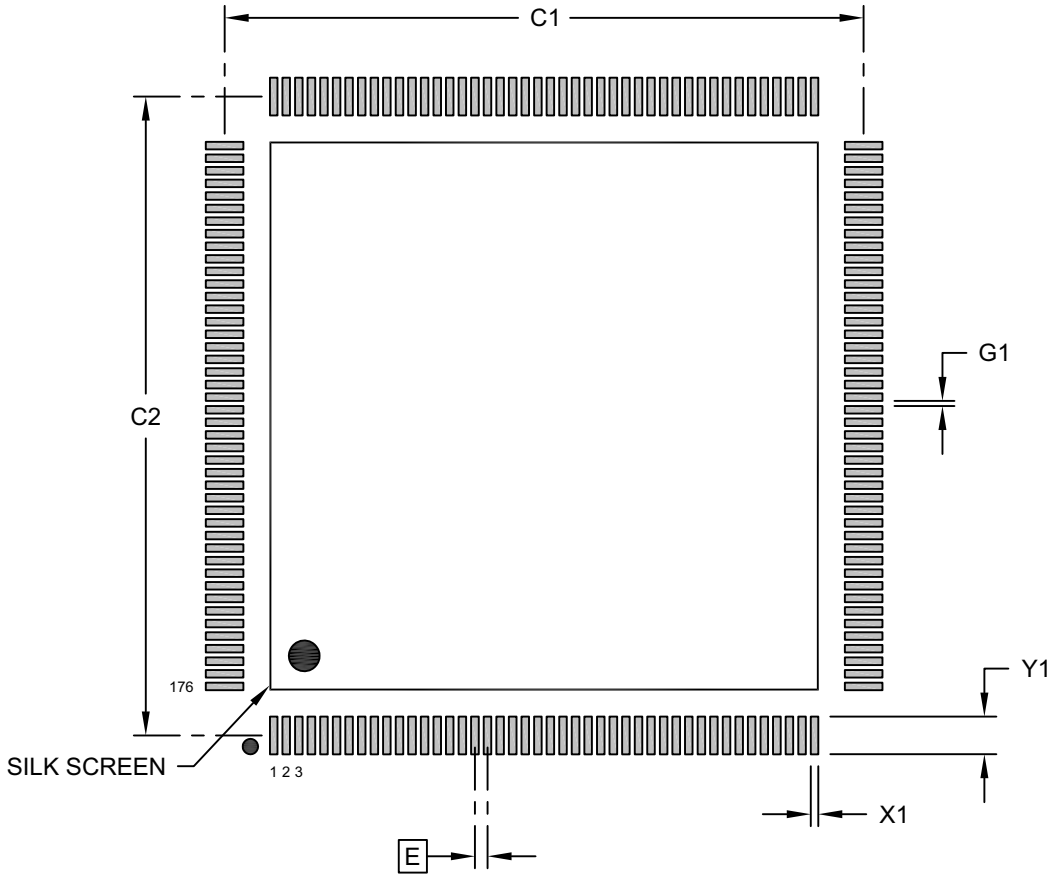

RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E		0.50 BSC	
Contact Pad Spacing	C1		25.40	
Contact Pad Spacing	C2		25.40	
Contact Pad Width (X176)	X1			0.30
Contact Pad Length (X176)	Y1			1.50
Contact Pad to Center Pad (X172)	G1	0.20		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

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

Microchip Technology Drawing C04-23013 Rev A

APPENDIX A: REVISION HISTORY

Revision A (March 2021)

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 mXT2912TD-AxUW.

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 (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
ATMXT2912TD-ATUWVAO (Supplied in trays)	1.0.AA	176-lead LQFP 24 × 24 × 1.4 mm, RoHS compliant Operating temperature range –40°C to +85°C (Grade 3)
ATMXT2912TD-ATRUWVAO (Supplied in tape and reel)		
ATMXT2912TD-ABUWVAO (Supplied in trays)	1.0.AA	176-lead LQFP 24 × 24 × 1.4 mm, RoHS compliant Operating temperature range –40°C to +105°C (Grade 2)
ATMXT2912TD-ABRUWVAO (Supplied in tape and reel)		

NOTES:

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

- Microchip products meet the specifications contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is secure when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods being used in attempts to breach the code protection features of the Microchip devices. We believe that these methods require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Attempts to breach these code protection features, most likely, cannot be accomplished without violating Microchip's intellectual property rights.
- Microchip is willing to work with any customer who is concerned about the integrity of its code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of its code. Code protection does not mean that we are guaranteeing the product is "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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