mXT2912TD-AB 5.0

maXTouch 2911-node Touchscreen Controller Product Brief

Description

The mXT2912TD-AB 5.0 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-AB 5.0 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 Automotive Qualified (see "Product Identification System" on page 9)
- CISPR 25 compliant (for Standard Mutual and Self Capacitance measurements)

maXTouch® Adaptive Sensing Technology

- Up to 41 X (transmit) lines and 71 Y (receive) lines for use by a touchscreen and/or 2 key arrays
- A maximum of 2911 nodes can be allocated to the touch sensor
- Touchscreen size 16.82 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

Touch Sensor Technology

- On-cell/touch-on display support including OLED and LCD (ITPS, IPS)
- Discrete/out-cell support including glass and PET film-based sensors
- 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 sensor 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 sensor 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
- Multiple acquisition schemes for robust and sensitive multi-touch sensing, including:
  - Mutual capacitance capacitance measurements
  - Self Capacitance measurements
  - P2P Mutual Capacitance measurements
- Noise suppression technology to combat ambient and power-line noise
  - Up to 240 V_{PP} between 1 Hz and 1 kHz sinusoidal waveform (no touches)
  - 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 ≥90 Hz (subject to configuration)
  - Initial touch latency <20 ms for first touch from idle (subject to configuration)
  - Configurable 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

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

Enhanced Algorithms

- Lens bending algorithms to remove display noise
- Touch suppression algorithms to remove unintentional large touches
- Palm Recovery Algorithm for quick restoration to normal state
- Display Noise Equalization to support free-form display shapes, such as rounded or circular shapes
- Enhanced Touch Separation algorithm for improved two touch separation/tracking in all directions.

On-chip Gestures

- Reports one-touch and two-touch gestures

Data Store

- 60-byte CRC checksummed data area for use as a run-time Product Data Store Area
- 64-byte data area for 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

- Client interface for main communication with the device. Can be one of:
  - I^2C interface, with support for Standard mode (up to 100 kHz), Fast mode (up to 400 kHz), Fast-mode Plus (up to 1 MHz)
  - SPI 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

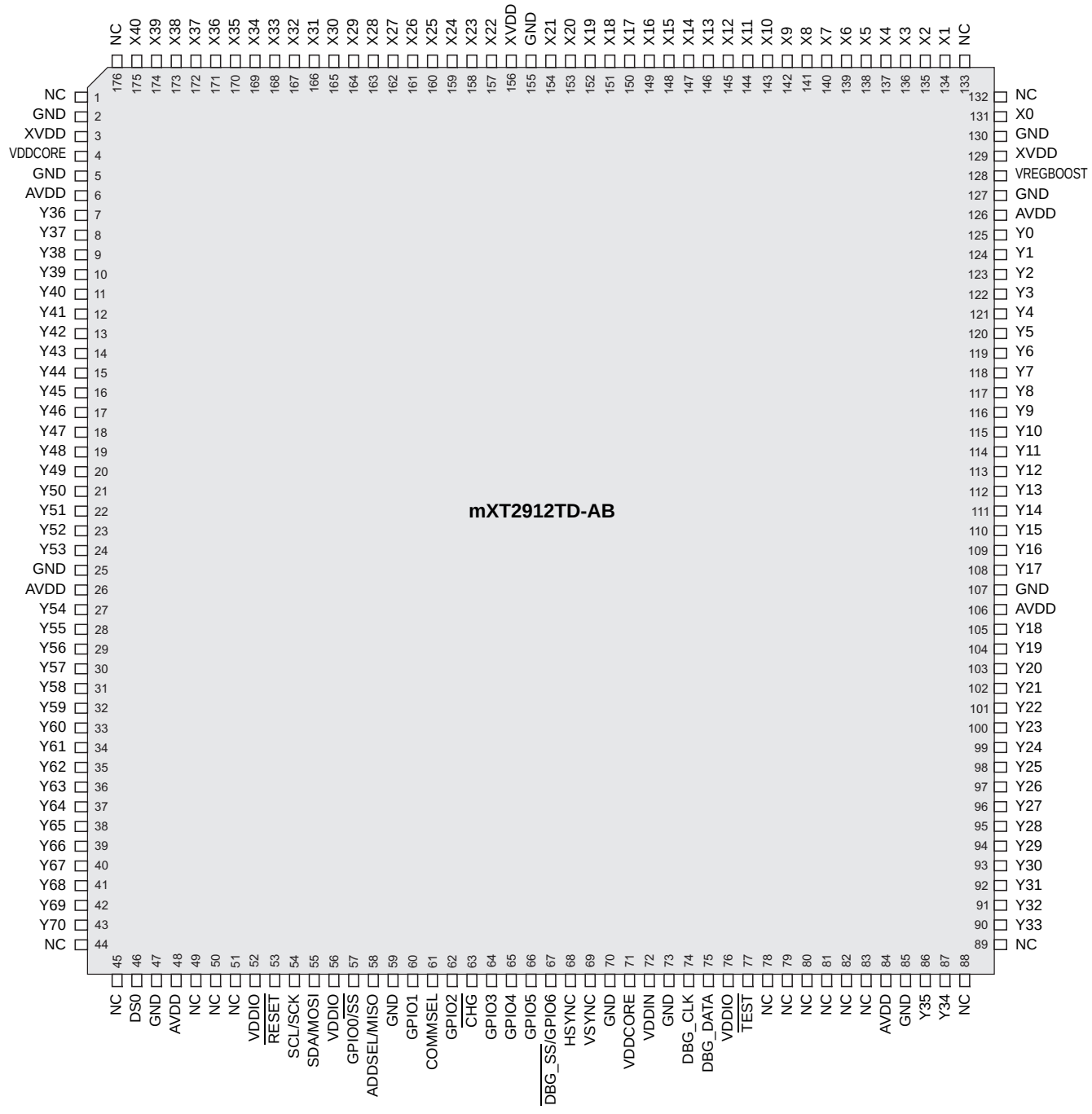
- 176-lead LQFP 24 × 24 × 1.4 mm, 0.5 mm pitch

Operating Temperature

- –40°C to +105°C (Grade 2)

PIN CONFIGURATION

176-lead LQFP

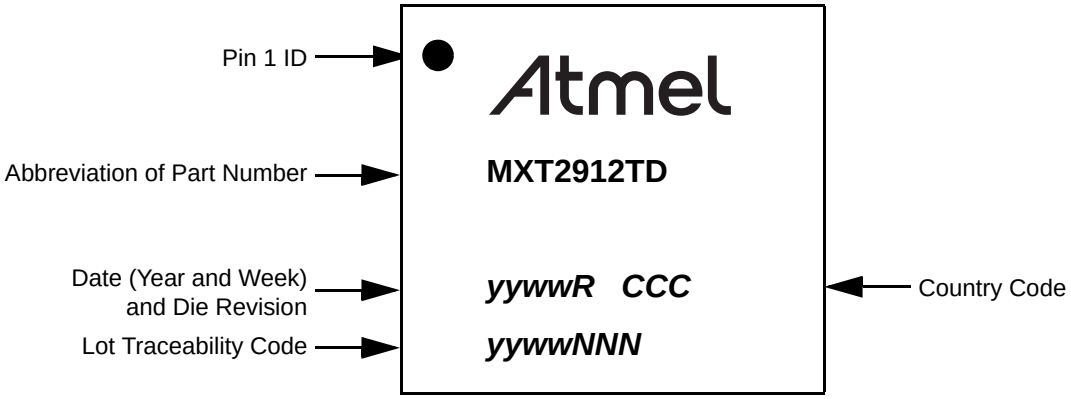


Top view

1.0 PACKAGING INFORMATION

1.1 Package Marking Information

1.1.1 176-LEAD LQFP



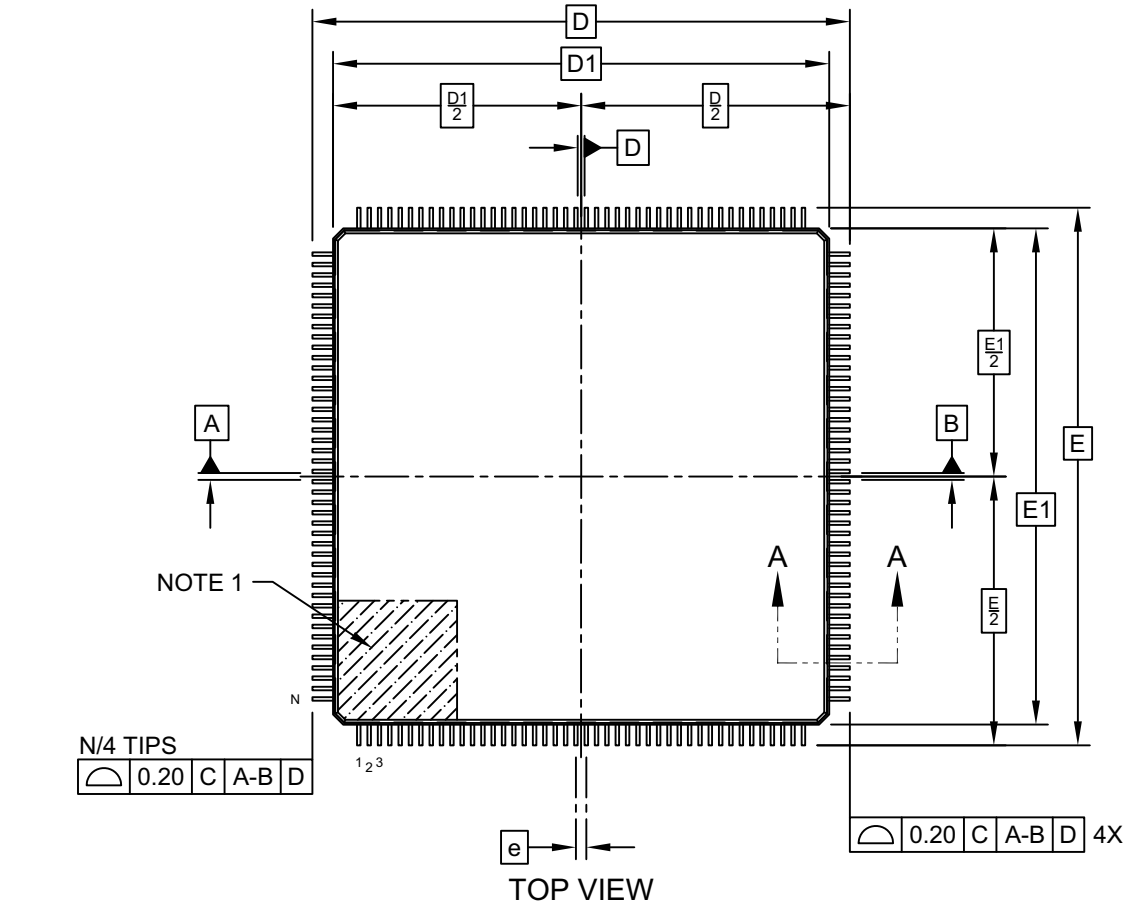
1.1.2 ORDERABLE PART NUMBERS

The product identification system for maXTouch devices is described in “Product Identification System” on page 9. That section also lists example part numbers for the device.

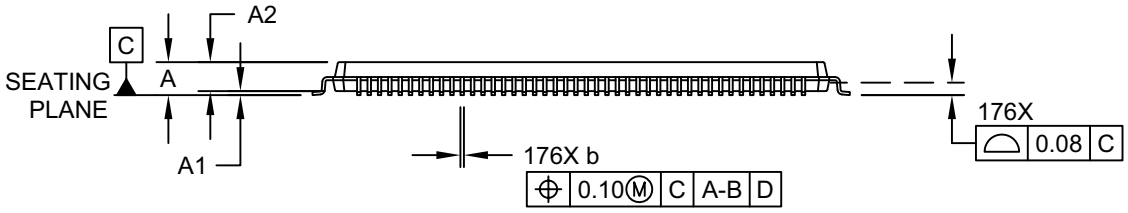
1.2 Package Details

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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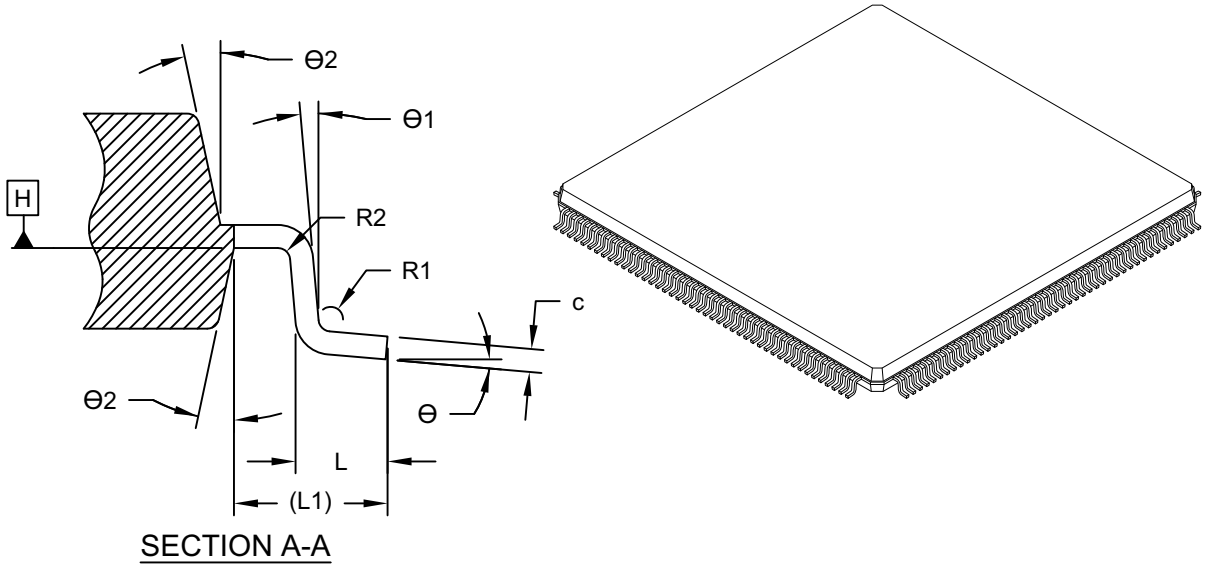

SECTION A-A

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]
Atmel Legacy Global Package Code AGR

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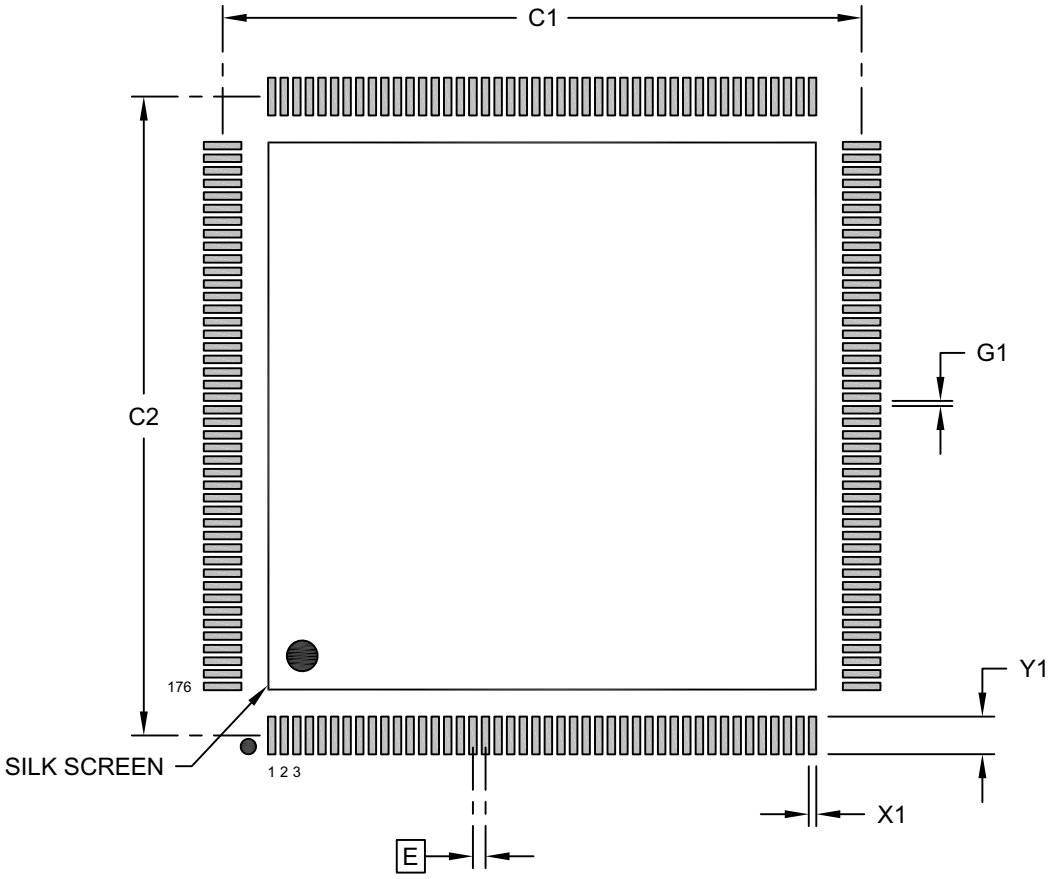

RECOMMENDED LAND PATTERN

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 (August 2023)

Initial edition for firmware revision 5.0.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-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	Qualification

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: (1)	*Blank*	=	Standard Packaging (Tube or Tray)
	R	=	Tape and Reel
Qualification:	VA*x*	=	AEC-Q100 Automotive Qualified
	Other Text	=	Industrial (Non-automotive) Part

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-ABVA3 (Supplied in trays)	5.0.AA	176-lead LQFP 24 × 24 × 1.4 mm, RoHS compliant Operating temperature range –40°C to +105°C (Grade 2)
ATMXT2912TD-ABRVA3 (Supplied in tape and reel)		

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