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## maXTouch 640-node Touchscreen Controller Product Brief

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### Description

The mXT640U 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 mXT640U 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<sup>®</sup> Adaptive Sensing Touchscreen Technology

- Up to 32 X (transmit) lines and 20 Y (receive) lines
- A maximum of 640 nodes can be allocated to the touchscreen
- Touchscreen size of 9.66 inches (16:10 aspect ratio), assuming a sensor electrode pitch of 6.5 mm. Other sizes may be possible with different electrode pitches and appropriate sensor material
- Multiple touch support with up to 16 concurrent touches tracked in real time
- Dual-boot OS support for Microsoft<sup>®</sup> Windows<sup>®</sup> and Android

### 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 recommended)

### Front Panel Material

- Works with PET or glass, including curved profiles (configuration and stack-up to be approved by Microchip)
- Glass 0.4 mm to 4.5 mm, dependent on screen size, touch size and stack-up
- Plastic 0.2 mm to 2.2 mm, dependent on screen size, touch size 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
  - Multiple-finger glove touches up to 1.5 mm thickness (subject to stack-up design)
  - Single-finger glove touch up to 5 mm thickness (subject to stack-up design)
- Mutual capacitance and self capacitance measurements supported for robust touch detection
- Noise suppression technology to combat ambient, charger noise, 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
- Stylus Support
  - Supports passive stylus with 1 mm contact diameter, subject to configuration, stack up, and sensor design
- Scan Speed
  - Up to 250 Hz one finger reporting rate, subject to configuration
  - Typical report rate for 10 touches  $\geq 100$  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

- Supports wake up/unlock gestures, including symbol recognition

### Keys

- Up to 32 nodes can be allocated as mutual capacitance sensor keys (subject to other configurations)
- Support for 3 Generic Keys in addition to the touchscreen array (subject to other configurations)
- Adjacent Key Suppression (AKS) technology is supported for false key touch prevention

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## 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

## Product Data Store Area

- Up to 32 bytes of user-defined data can be stored during production

## Power Saving

- Programmable timeout for automatic transition from active to idle states
- Pipelined analog sensing detection and digital processing to optimize system power efficiency

## Application Interfaces

- I<sup>2</sup>C interface: Standard/Fast mode 400 kHz, Fast-mode Plus 1 MHz, High-speed mode up to 3.4 MHz
- HID-I<sup>2</sup>C interface for Microsoft<sup>®</sup> Windows<sup>®</sup> 8.x and later versions
- Interrupt to indicate when a message is available
- SPI Debug Interface to read the real-time 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
- High voltage internal X line drive (XVdd) 9.9 V with internal voltage pump

## Package

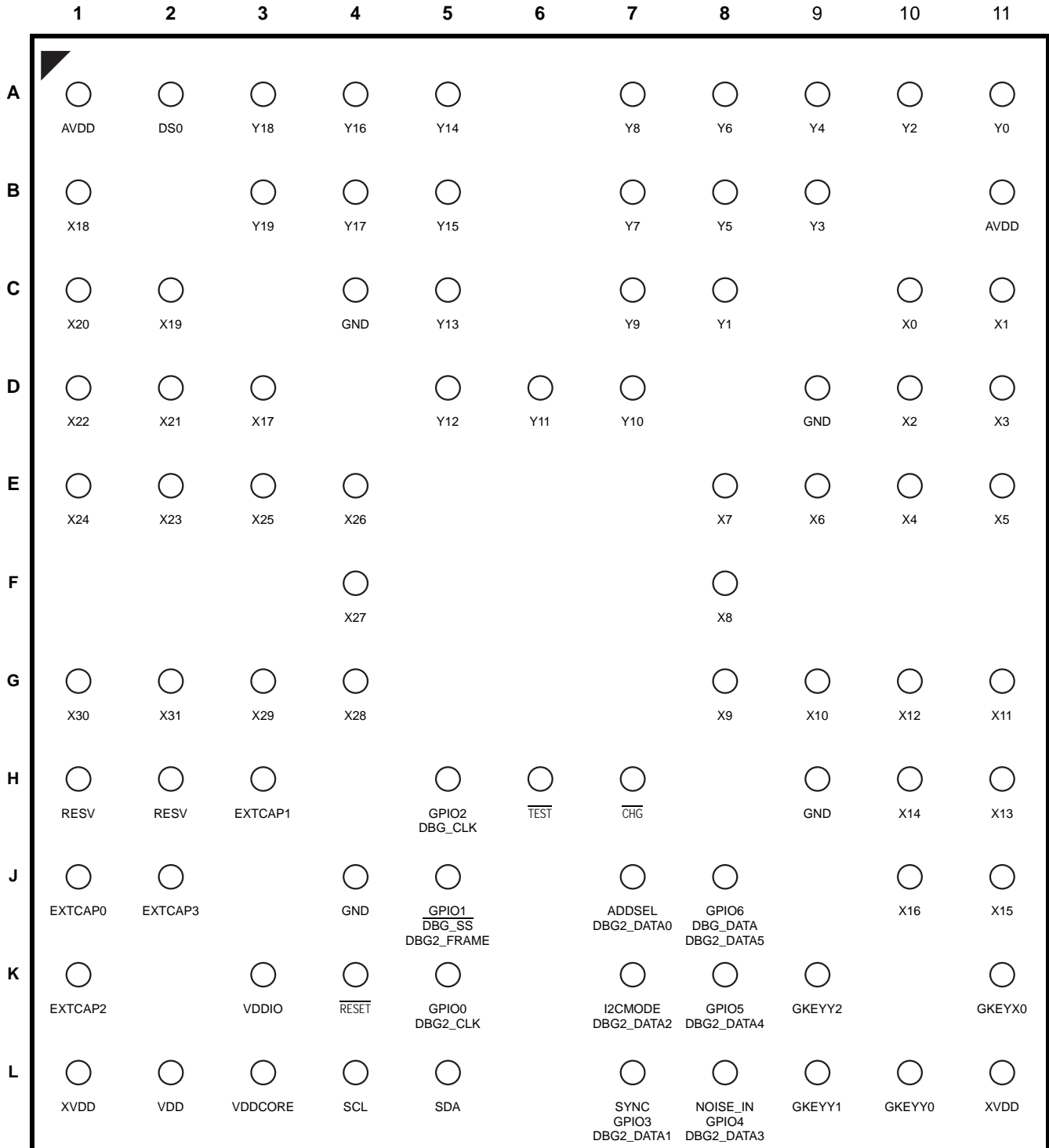
- 88-ball UFBGA 6 × 6 × 0.6 mm, 0.5 mm pitch

## Operating Temperature

- -40°C to +85°C

## PIN CONFIGURATION

### 88-ball UFBGA



Top View

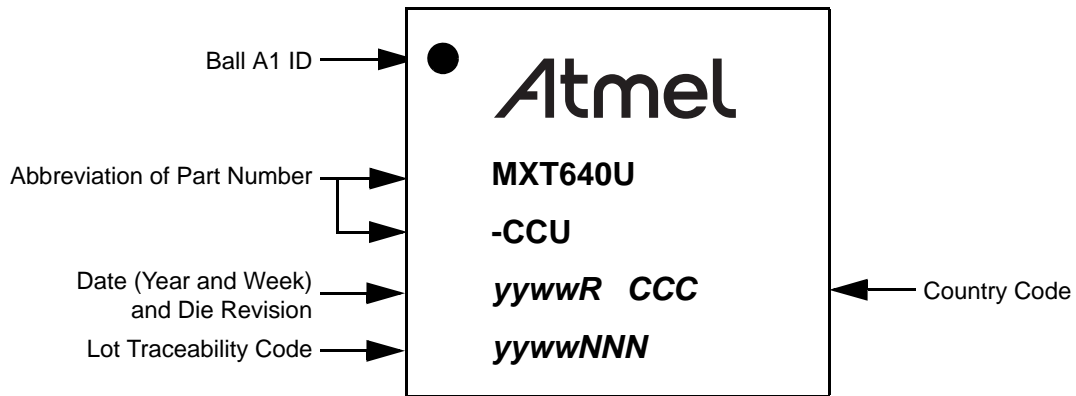
# MXT640U 1.1

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## 1.0 PACKAGING INFORMATION

### 1.1 Package Marking Information

#### 1.1.1 88-BALL UFBGA



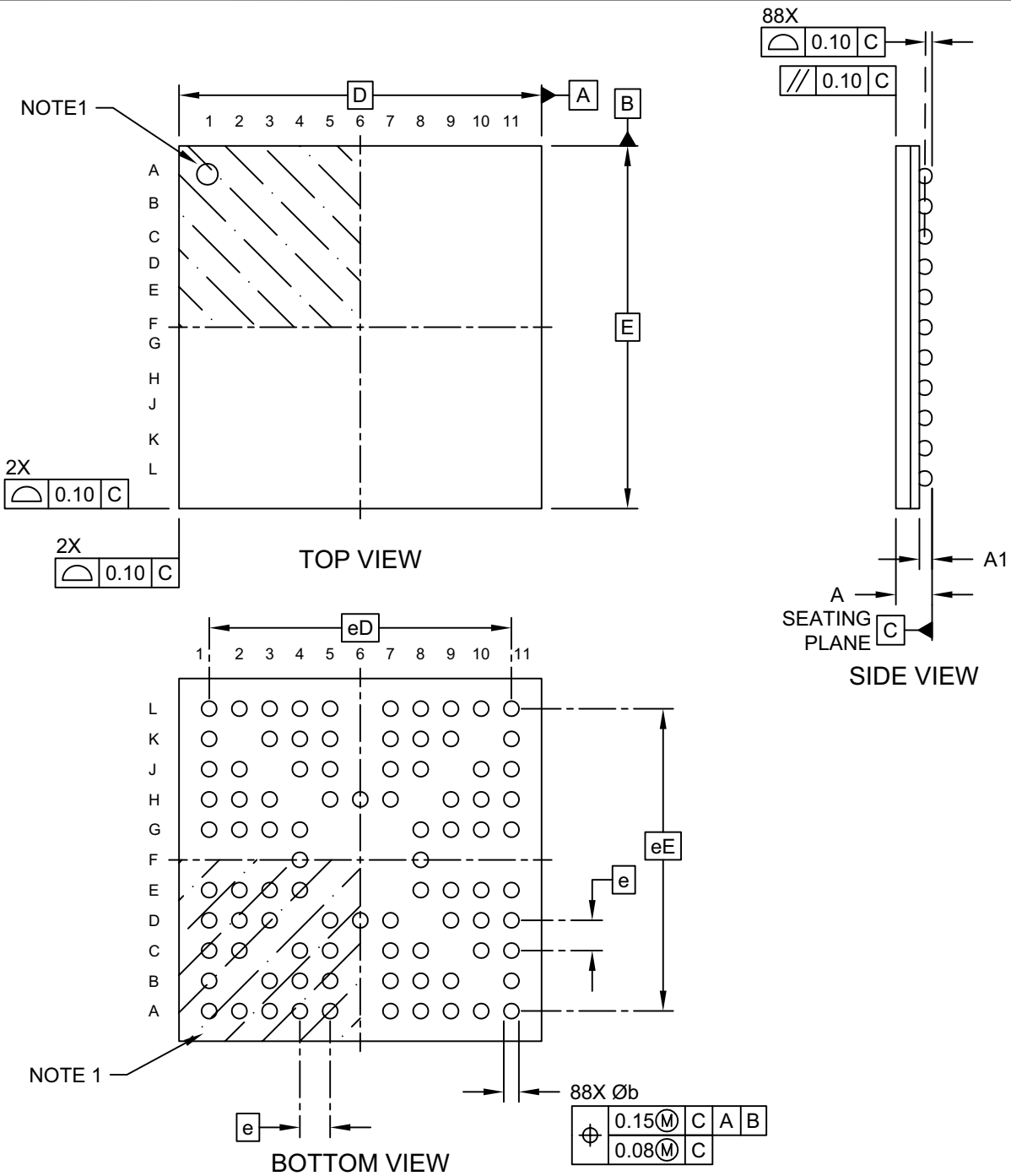
#### 1.1.2 ORDERABLE PART NUMBERS

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

### 88-Ball Ultra Thin Fine Pitch Ball Grid Array (BVB) - 6x6x0.6 mm Body [UFBGA] Atmel Legacy Global Package Code CJM

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

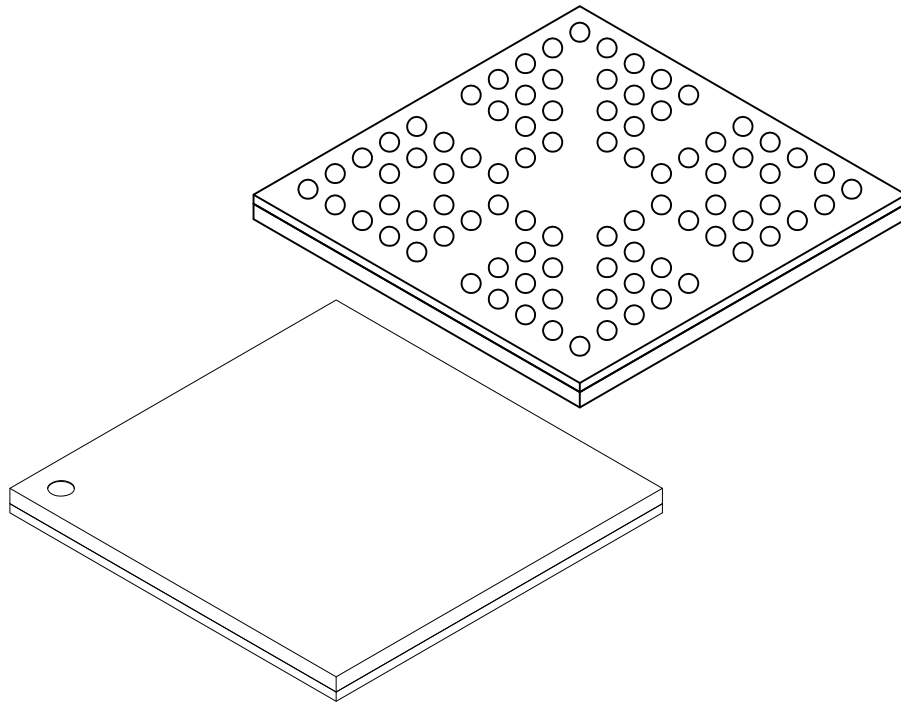


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## 88-Ball Ultra Thin Fine Pitch Ball Grid Array (BVB) - 6x6x0.6 mm Body [UFBGA] Atmel Legacy Global Package Code CJM

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



Dimension Limits	Units	MILLIMETERS		
		MIN	NOM	MAX
Number of Terminals	N	88		
Pitch	e	0.50 BSC		
Overall Terminal Spacing	eD	5.00 BSC		
Overall Terminal Spacing	eE	5.00 BSC		
Overall Height	A	–	–	0.60
Standoff	A1	0.11	–	0.21
Overall Length	D	6.00 BSC		
Overall Width	E	6.00 BSC		
Terminal Diameter	b	0.22	0.25	0.28

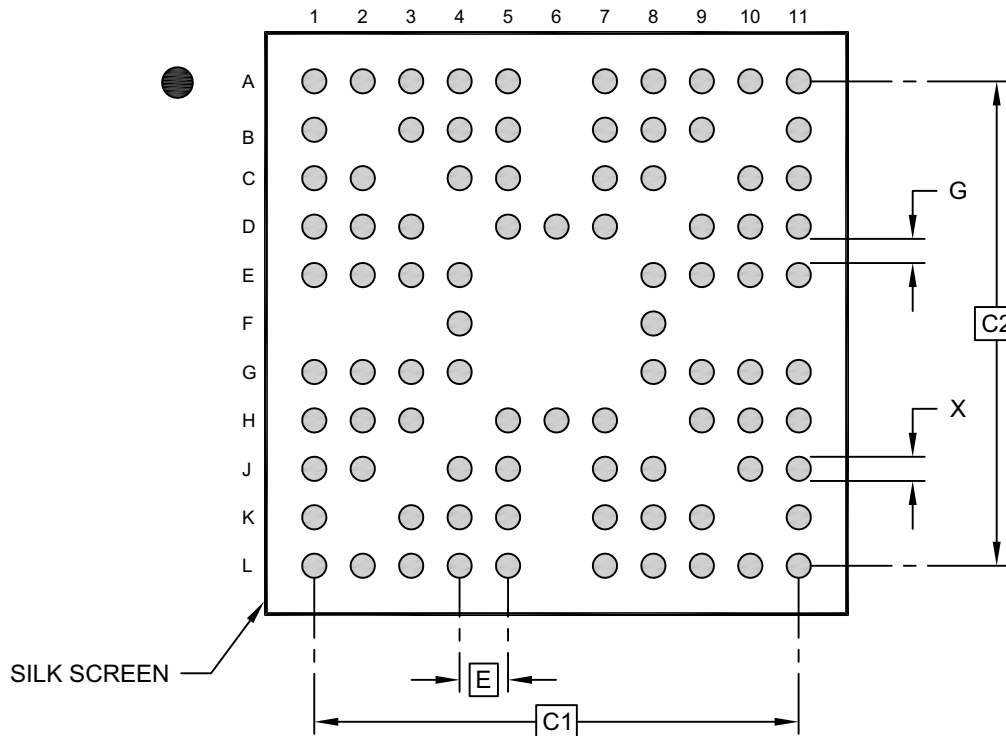
**Notes:**

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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## 88-Ball Ultra Thin Fine Pitch Ball Grid Array (BVB) - 6x6x0.6 mm Body [UFBGA] Atmel Legacy Global Package Code CJM

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



### RECOMMENDED LAND PATTERN

Dimension Limits	Units	MILLIMETERS		
		MIN	NOM	MAX
Contact Pitch	E		0.50 BSC	
Overall Contact Pitch	C1		5.00 BSC	
Overall Contact Pitch	C2		5.00 BSC	
Contact Pad Diameter	X			0.28
Contact Pad to Contact Pad	G	0.25		

#### Notes:

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

Microchip Technology Drawing C04-23158 Rev A

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## APPENDIX A: REVISION HISTORY

### Revision A (September 2017)

Initial edition for firmware revision 1.1 – Release

### Revision B (November 2020)

Updated for firmware revision 1.1.AB – Release

This revision incorporates the following updates:

- [“Product Identification System”](#):
  - [“Orderable Part Numbers”](#): Orderable part numbers and firmware version updated
- 88-ball X1FBGA 6 × 6 × 0.45 mm package removed

## 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 mXT640U.

To order or obtain information, for example on pricing or delivery, refer to the factory or the listed sales office.

PART NO.	-XXX	[X]	[XX]	[X]	[XXX]																																																																																																						
Device	Package	Temperature Range	Sample Type	Tape and Reel Option	Pattern																																																																																																						
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<p><b>Note 1:</b> 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 <a href="#">“Orderable Part Numbers”</a> below or check with your Microchip Sales Office for package availability with the Tape and Reel option.</p>																																																																																																											

## Orderable Part Numbers

Orderable Part Number	Firmware Revision	Description
ATMXT640U-CCU001 (Supplied in trays)	1.1.AB	88-ball UFBGA 6 × 6 × 0.6 mm, RoHS compliant Industrial grade sample; not suitable for automotive characterization
ATMXT640U-CCUR001 (Supplied in tape and reel)		

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NOTES:

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

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- 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.
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