
maXTouch 1066-node Touchscreen Controller Product Brief

Description

The mXT1066TD 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 mXT1066TD 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 26 Y (receive) lines for use by a touchscreen
- A maximum of 1066 nodes can be allocated to the touch sensor
- Touchscreen size of 12.4 inches (16:10 aspect ratio), assuming a sensor electrode pitch of 6.5 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
- Dual-boot OS support for Microsoft[®] Windows[®] and Android[™]

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

- 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
- Scan Speed
 - Typical report rate for 10 touches ≥ 85 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
- 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

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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 60 bytes of user-defined data can be stored during production

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)
- 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 (V_{dd}) 3.3V nominal
- Digital I/O (V_{ddIO}) 1.8V nominal to 3.3V nominal
- Analog (AV_{dd}) 3.3V nominal
- High voltage internal X line drive (XV_{dd}) 6.6V or 9.9V with internal voltage pump

Packages

- 114-ball UFBGA 7 × 5 × 0.65 mm, 0.5 mm pitch, High Density Interconnect
- 117-ball UFBGA 9.5 × 7 × 0.65 mm, 0.65 mm pitch, non-HDI package

Operating Temperature

- -40°C to +85°C

Design Services

- Review of device configuration, stack-up and sensor patterns
- Custom firmware versions can be considered
- Contact your Microchip representative for more information

PIN CONFIGURATION

114-ball UFBGA

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|----------|----------|----------|--------------|-------------------|-------------|--------------|-----------------|---------------------|----------------------------|------------|-----------|----------|----------|
| A | ○ X21 | ○ X22 | ○ XVDD | ○ Y23 | ○ Y19 | ○ Y15 | ○ Y11 | ○ Y7 | ○ Y3 | ○ Y0 | ○ AVDD | ○ X1 | ○ X0 |
| B | ○ X23 | ○ X24 | ○ GND | ○ Y24 | ○ Y20 | ○ Y16 | ○ Y12 | ○ Y8 | ○ Y4 | ○ Y1 | ○ GND | ○ X3 | ○ X2 |
| C | ○ X25 | ○ X26 | ○ GND | ○ Y25 | ○ Y21 | ○ Y17 | ○ Y13 | ○ Y9 | ○ Y5 | ○ Y2 | ○ XVDD | ○ X5 | ○ X4 |
| D | ○ X27 | ○ X28 | ○ X29 | ○ AVDD | ○ Y22 | ○ Y18 | ○ Y14 | ○ Y10 | ○ Y6 | ○ GND | ○ X8 | ○ X7 | ○ X6 |
| E | ○ X30 | ○ X31 | ○ X32 | ○ AVDD | ○ GND | | | | ○ GND | ○ VDDIO | ○ X11 | ○ X10 | ○ X9 |
| F | ○ X33 | ○ X34 | ○ X35 | ○ VDDIO | ○ NC | ○ RESV | ○ GPIO1 | ○ GPIO5 | ○ <u>DBG_SS</u> TEST | ○ RESV | ○ X14 | ○ X13 | ○ X12 |
| G | ○ X36 | ○ X37 | ○ XVDD | ○ <u>RESET</u> | ○ ADDSEL | ○ I2CMODE | ○ GPIO0 | ○ GPIO4 HSYNC | ○ DBG_DATA | ○ RESV | ○ XVDD | ○ X16 | ○ X15 |
| H | ○ X38 | ○ X39 | ○ EXTCAP0 | ○ EXTCAP2 | ○ SDA | ○ RESV | ○ <u>CHG</u> | ○ GPIO3 VSYNC | ○ DBG_CLK | ○ RESV | ○ RESV | ○ X18 | ○ X17 |
| J | ○ X40 | ○ DS0 | ○ EXTCAP1 | ○ EXTCAP3 | ○ SCL | ○ VDDCORE | ○ VDD | ○ GPIO2 | ○ RESV | ○ RESV | ○ RESV | ○ X20 | ○ X19 |

Top View

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117-ball UFBGA

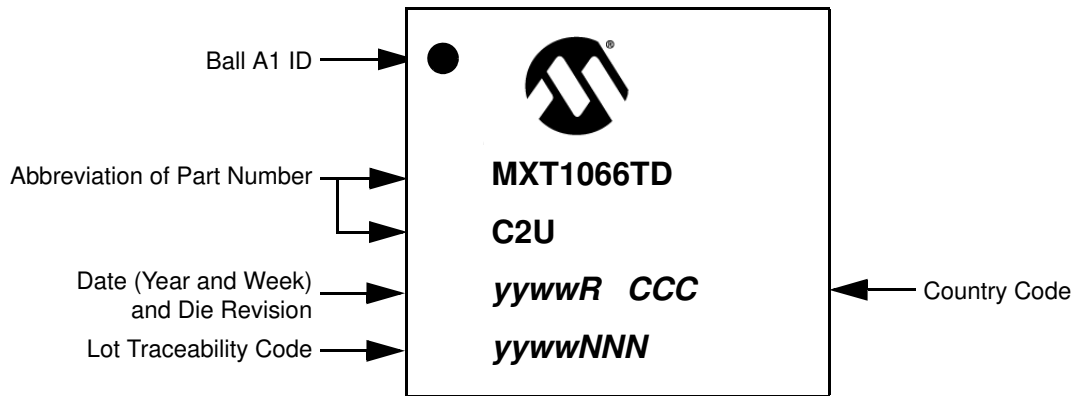
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|-----|-----|---------|---------|--------|---------|----------------|----------------|----------------|------|------|-----|-----|
| A | | | | | | | | | | | | | |
| | X21 | X22 | XVDD | Y23 | Y19 | Y15 | Y11 | Y7 | Y3 | Y0 | AVDD | X1 | X0 |
| B | | | | | | | | | | | | | |
| | X23 | X24 | GND | Y24 | Y20 | Y16 | Y12 | Y8 | Y4 | Y1 | GND | X3 | X2 |
| C | | | | | | | | | | | | | |
| | X25 | X26 | GND | Y25 | Y21 | Y17 | Y13 | Y9 | Y5 | Y2 | XVDD | X5 | X4 |
| D | | | | | | | | | | | | | |
| | X27 | X28 | X29 | AVDD | Y22 | Y18 | Y14 | Y10 | Y6 | GND | X8 | X7 | X6 |
| E | | | | | | | | | | | | | |
| | X30 | X31 | X32 | AVDD | GND | VDDCORE | VDD | GND | VDDIO | XVDD | X11 | X10 | X9 |
| F | | | | | | | | | | | | | |
| | X33 | X34 | X35 | VDDIO | NC | CHG | GPIO3 VSYNC | DBG_DAT A | DBG_SS TEST | RESV | X14 | X13 | X12 |
| G | | | | | | | | | | | | | |
| | X36 | X37 | XVDD | RESET | ADDSEL | RESV | GPIO2 | DBG_CLK | RESV | RESV | RESV | X16 | X15 |
| H | | | | | | | | | | | | | |
| | X38 | X39 | EXTCAP0 | EXTCAP2 | SDA | I2CMODE | GPIO1 | GPIO5 | RESV | RESV | RESV | X18 | X17 |
| J | | | | | | | | | | | | | |
| | X40 | DS0 | EXTCAP1 | EXTCAP3 | SCL | RESV | GPIO0 | GPIO4 HSYNC | RESV | RESV | RESV | X20 | X19 |

Top View

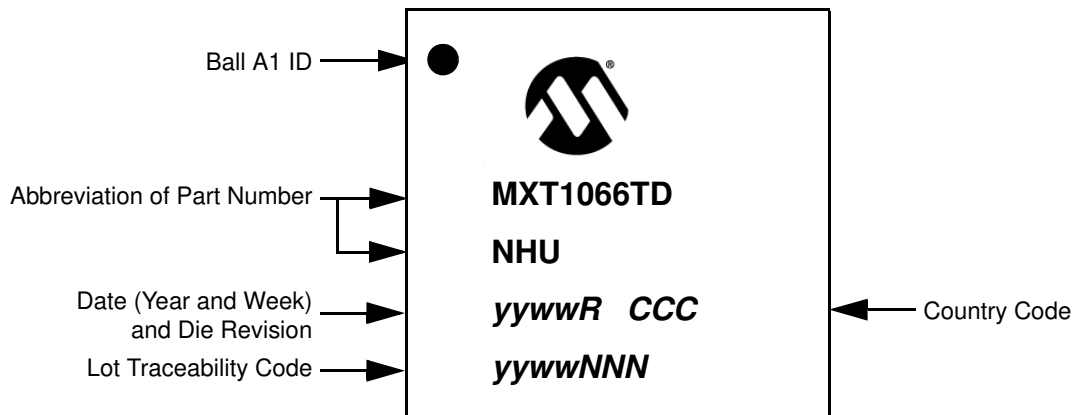
1.0 PACKAGING INFORMATION

1.1 Package Marking Information

1.1.1 114-BALL UFBGA



1.1.2 117-BALL UFBGA



1.1.3 ORDERABLE PART NUMBERS

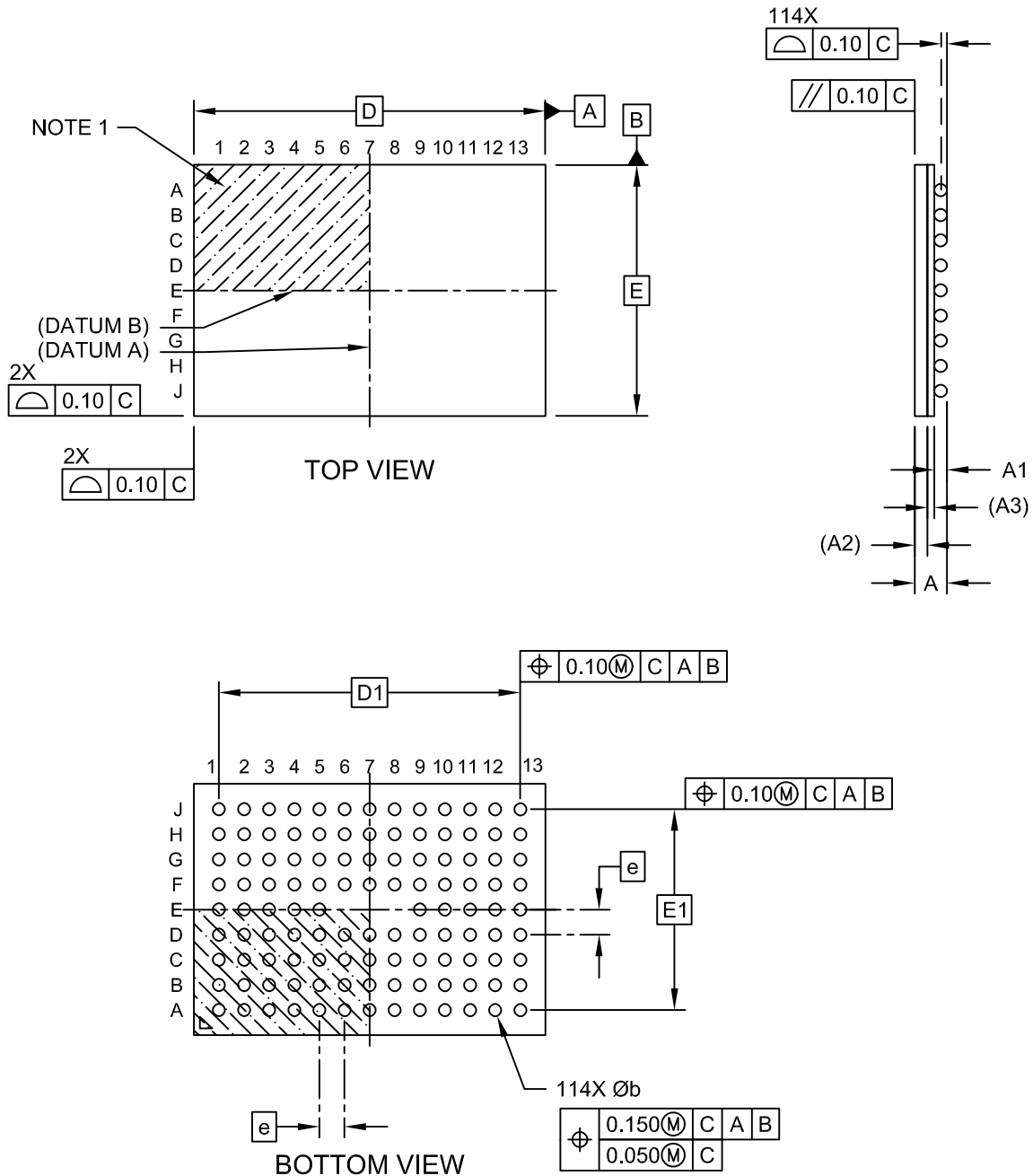
The product identification system for maXTouch devices is described in [“Product Identification System”](#). That section also lists example part numbers for the device.

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1.2 Package Details

114-Ball Ultra Thin Fine-Pitch Ball Grid Array Package (C2B) - 7x5x0.65 mm Body With 13x9 Array, 0.5 mm Pitch [UFBGA]; Atmel Legacy GPC CBJ

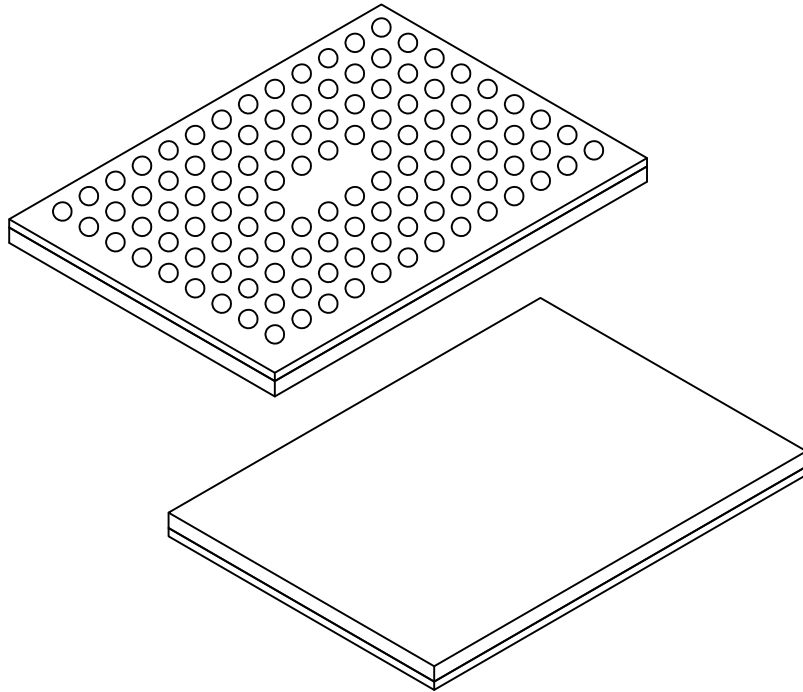
Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



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114-Ball Ultra Thin Fine-Pitch Ball Grid Array Package (C2B) - 7x5x0.65 mm Body With 13x9 Array, 0.5 mm Pitch [UFBGA]; Atmel Legacy GPC CBJ

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



| | | MILLIMETERS | | |
|---------------------|----|-------------|-----|-------|
| Units | | | | |
| Dimension Limits | | MIN | NOM | MAX |
| Number of Terminals | N | 114 | | |
| Pitch | e | 0.50 BSC | | |
| Overall Height | A | - | - | 0.65 |
| Ball Height | A1 | 0.140 | - | 0.240 |
| Mold Thickness | A2 | 0.250 REF | | |
| Substrate Thickness | A3 | 0.136 REF | | |
| Overall Length | D | 7.00 BSC | | |
| Ball Array Length | D1 | 6.00 BSC | | |
| Overall Width | E | 5.00 BSC | | |
| Ball Array Width | E1 | 4.00 BSC | | |
| Ball Width | b | 0.200 | - | 0.300 |
| Ball Diameter | | 0.250 REF | | |

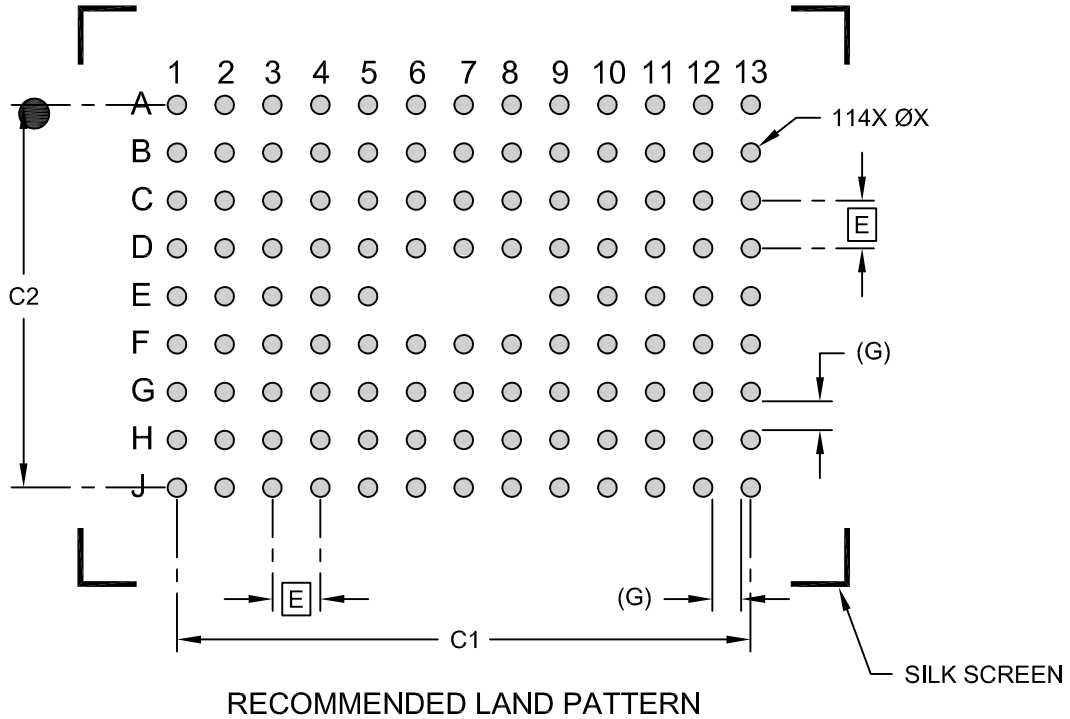
Notes:

- Pin 1 visual index feature may vary, but must be located within the hatched area.
- Package is saw singulated
- 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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114-Ball Ultra Thin Fine-Pitch Ball Grid Array Package (C2B) - 7x5x0.65 mm Body With 13x9 Array, 0.5 mm Pitch [UFBGA]; Atmel Legacy GPC CBJ

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 |
| Contact Pitch | E | 0.50 BSC | | |
| Optional Pad Diameter (X114) | X | | | 0.20 |
| Contact Pad Spacing | C1 | | 6.00 | |
| Contact Pad Spacing | C2 | | 4.00 | |
| Column and Row Spacing | G | 0.30 REF | | |

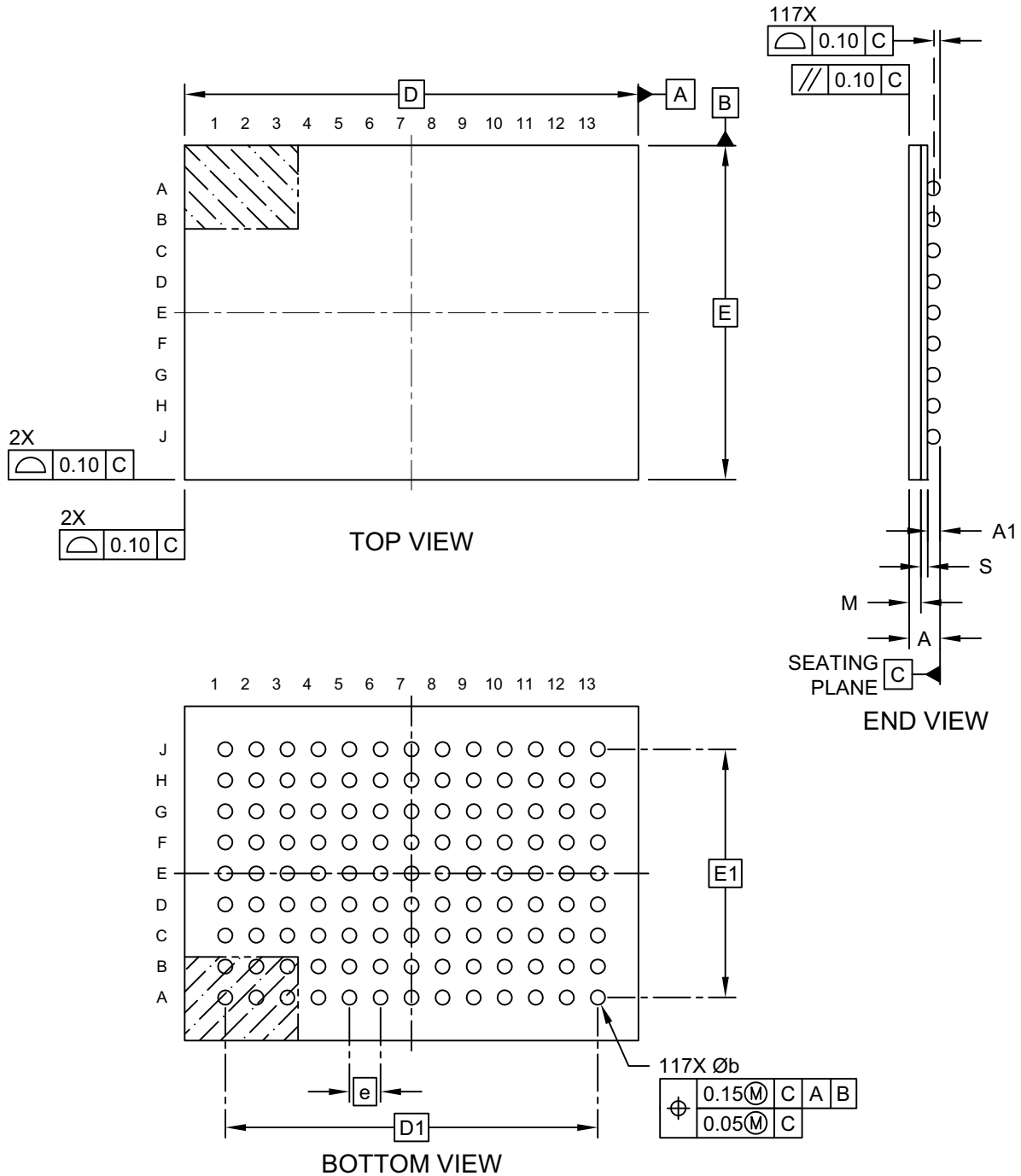
Notes:

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

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117-Ball Ultra Thin Fine-Pitch Ball Grid Array Package (C5B) - 9.5x7.0x0.65 mm Body [UFBGA]

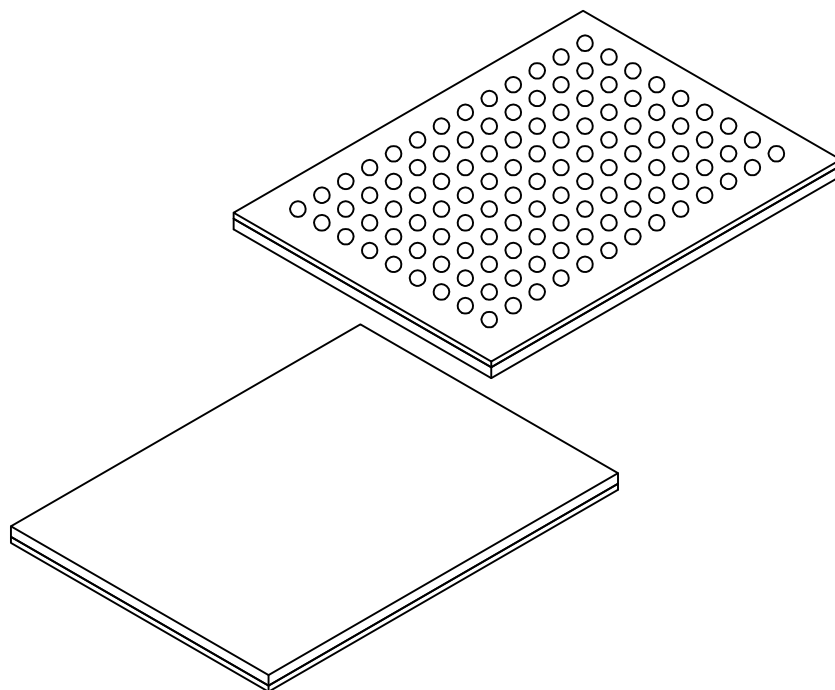
Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



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117-Ball Ultra Thin Fine-Pitch Ball Grid Array Package (C5B) - 9.5x7.0x0.65 mm Body [UFBGA]

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 | | 117 | | |
| Pitch | e | | 0.65 BSC | | |
| Overall Height | A | – | – | | 0.65 |
| Ball Height | A1 | 0.16 | 0.21 | | 0.26 |
| Mold Thickness | M | | 0.25 REF | | |
| Substrate Thickness | S | | 0.136 REF | | |
| Overall Length | D | | 9.50 BSC | | |
| Ball Array Length | D1 | | 7.80 BSC | | |
| Overall Width | E | | 7.00 BSC | | |
| Ball Array Width | E1 | | 5.20 BSC | | |
| Ball Diameter | b | 0.25 | 0.30 | | 0.35 |

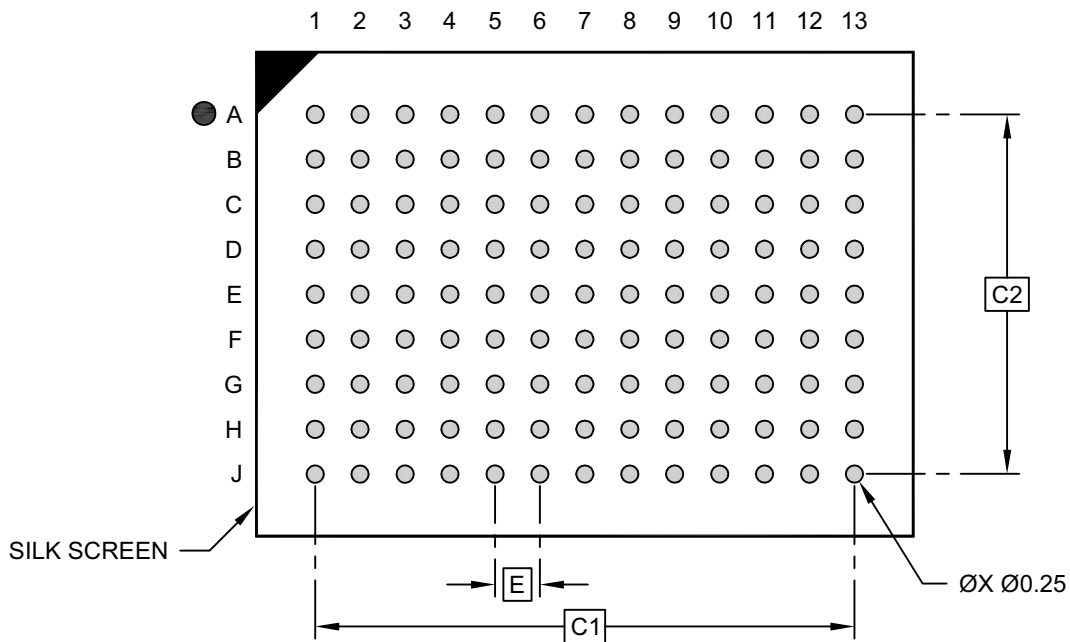
Notes:

1. Ball A1 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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117-Ball Ultra Thin Fine-Pitch Ball Grid Array Package (C5B) - 9.5x7.0x0.65 mm Body [UFBGA]

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 | 0.65 BSC | | |
| Contact Pad Spacing | C1 | 7.80 BSC | | |
| Contact Pad Spacing | C2 | 5.20 BSC | | |
| Contact Pad Width (Xnn) | X | | | 0.25 |

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

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APPENDIX A: REVISION HISTORY

Revision A (June 2020)

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 mXT1066TD.

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: | <i>Blank</i> | = | 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 |
|--|-------------------|--|
| ATMXT1066TD-C2U001 (Supplied in trays) | 1.0.AA | 114-ball UFBGA 7 × 5 × 0.65 mm, RoHS compliant Industrial grade; not suitable for automotive characterization |
| ATMXT1066TD-C2UR001 (Supplied in tape and reel) | | |
| ATMXT1066TD-NHU001 (Supplied in trays) | 1.0.AA | 117-ball UFBGA 9.5 × 7 × 0.65 mm, RoHS compliant Industrial grade; not suitable for automotive characterization |
| ATMXT1066TD-NHUR001 (Supplied in tape and reel) | | |

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NOTES:

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."

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Corporate Office
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Fax: 49-89-627-144-44

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Fax: 31-416-690340

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Fax: 34-91-708-08-91

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Tel: 46-8-5090-4654

UK - Wokingham
Tel: 44-118-921-5800
Fax: 44-118-921-5820