mXT1066TD 1.0.AB

maXTouch 1066-node Touchscreen Controller Product Brief

Description

The mXT1066TD 1.0.AB 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.AB 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

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

- 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), High Speed mode (up to 3.4 MHz)
- 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 nominal to 3.3V nominal
- Analog (AVdd) 3.3V nominal
- High voltage internal X line drive (XVdd) 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

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	$\overline{\text{DBG\_SS}}$ $\overline{\text{TEST}}$	RESV	X14	X13	X12
G	X36	X37	XVDD	$\overline{\text{RESET}}$	ADDSEL	I2CMODE	GPIO0	GPIO4 HSYNC	DBG_DATA	RESV	XVDD	X16	X15
H	X38	X39	EXTCAP0	EXTCAP2	SDA	RESV	$\overline{\text{CHG}}$	GPIO3 VSYNC	DBG_CLK	RESV	RESV	X18	X17
J	X40	DS0	EXTCAP1	EXTCAP3	SCL	VDDCORE	VDD	GPIO2	RESV	RESV	RESV	X20	X19

Top View

117-ball UFBGA

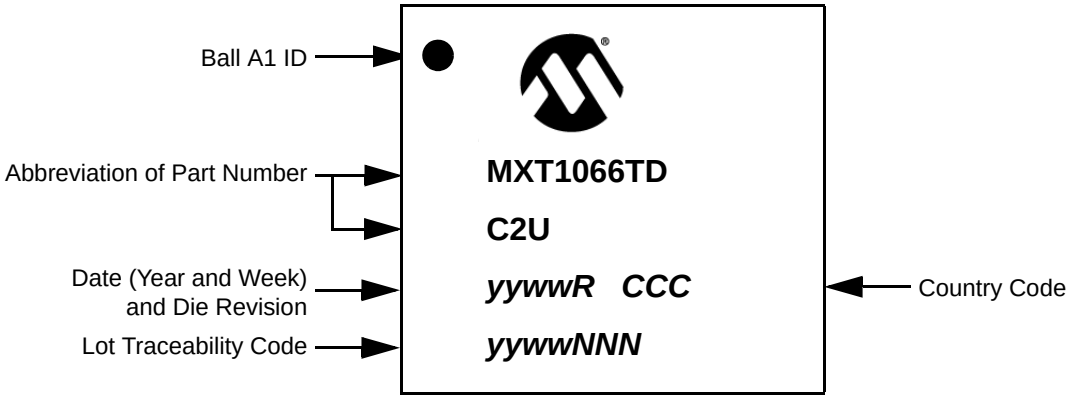
	1	2	3	4	5	6	7	8	9	10	11	12	13
A	X21	X22	XVDD	Y23	Y19	Y15	Y11	Y7	Y3	Y0	AVDD	X1	X0
B	X23	X24	GND	Y24	Y20	Y16	Y12	Y8	Y4	Y1	GND	X3	X2
C	X25	X26	GND	Y25	Y21	Y17	Y13	Y9	Y5	Y2	XVDD	X5	X4
D	X27	X28	X29	AVDD	Y22	Y18	Y14	Y10	Y6	GND	X8	X7	X6
E	X30	X31	X32	AVDD	GND	VDDCORE	VDD	GND	VDDIO	XVDD	X11	X10	X9
F	X33	X34	X35	VDDIO	NC	$\overline{\text{CHG}}$	GPIO3 VSYNC	DBG_DATA	$\overline{\text{DBG\_SS}}$ $\overline{\text{TEST}}$	RESV	X14	X13	X12
G	X36	X37	XVDD	$\overline{\text{RESET}}$	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

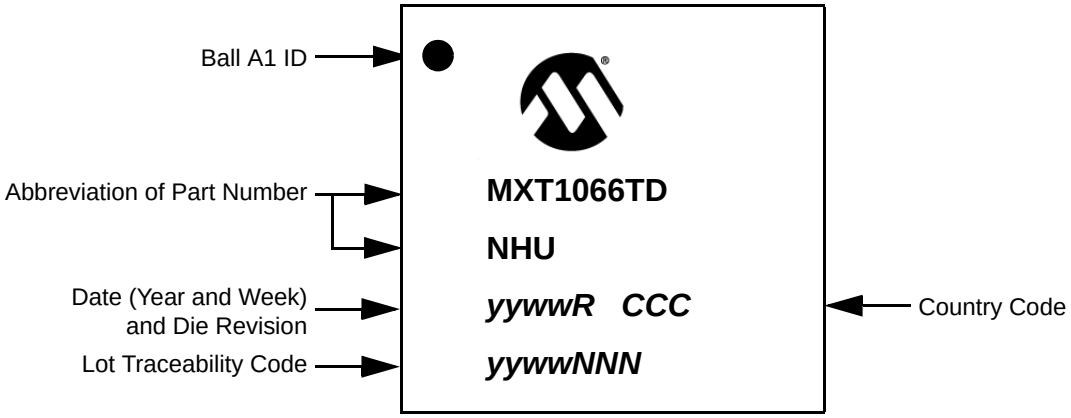
1.0 PACKAGING INFORMATION

1.1 Package Marking Information

1.1.1 114-BALL UFBGA



1.1.2 117-BALL UFBGA



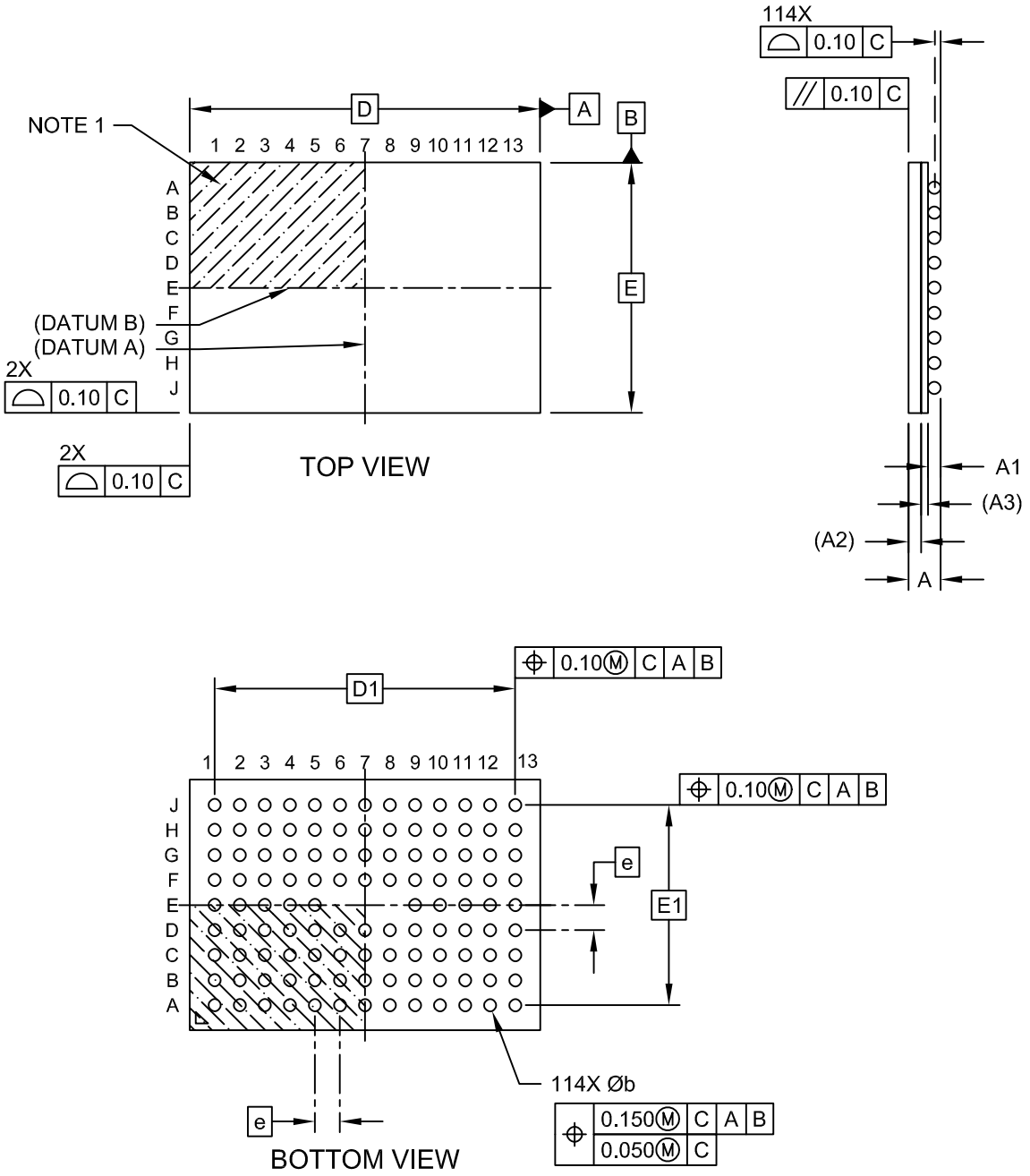
1.1.3 ORDERABLE PART NUMBERS

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

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

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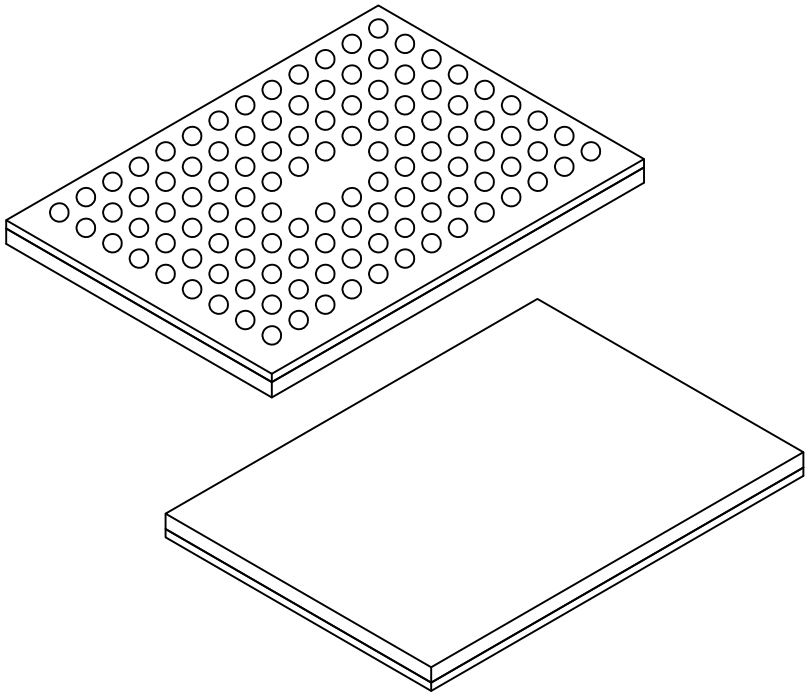


Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Terminals	N		114	
Pitch	e		0.50 BSC	
Overall Height	A	-	-	0.65
Ball Height	A1	0.140	-	0.240
Mold Thickness	A2		0.250 REF	
Substrate Thickness	A3		0.136 REF	
Overall Length	D		7.00 BSC	
Ball Array Length	D1		6.00 BSC	
Overall Width	E		5.00 BSC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

Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated
3. Dimensioning and tolerancing per ASME Y14.5M

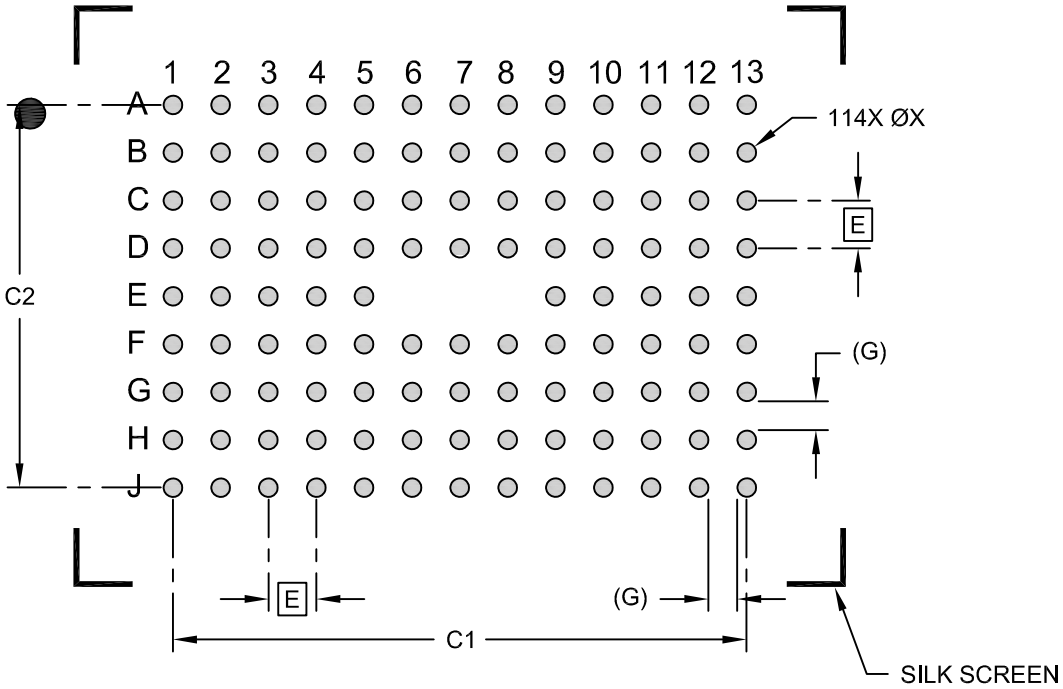
   BSC: Basic Dimension. Theoretically exact value shown without tolerances.

   REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-21163 Rev A Sheet 2 of 2

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



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		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		

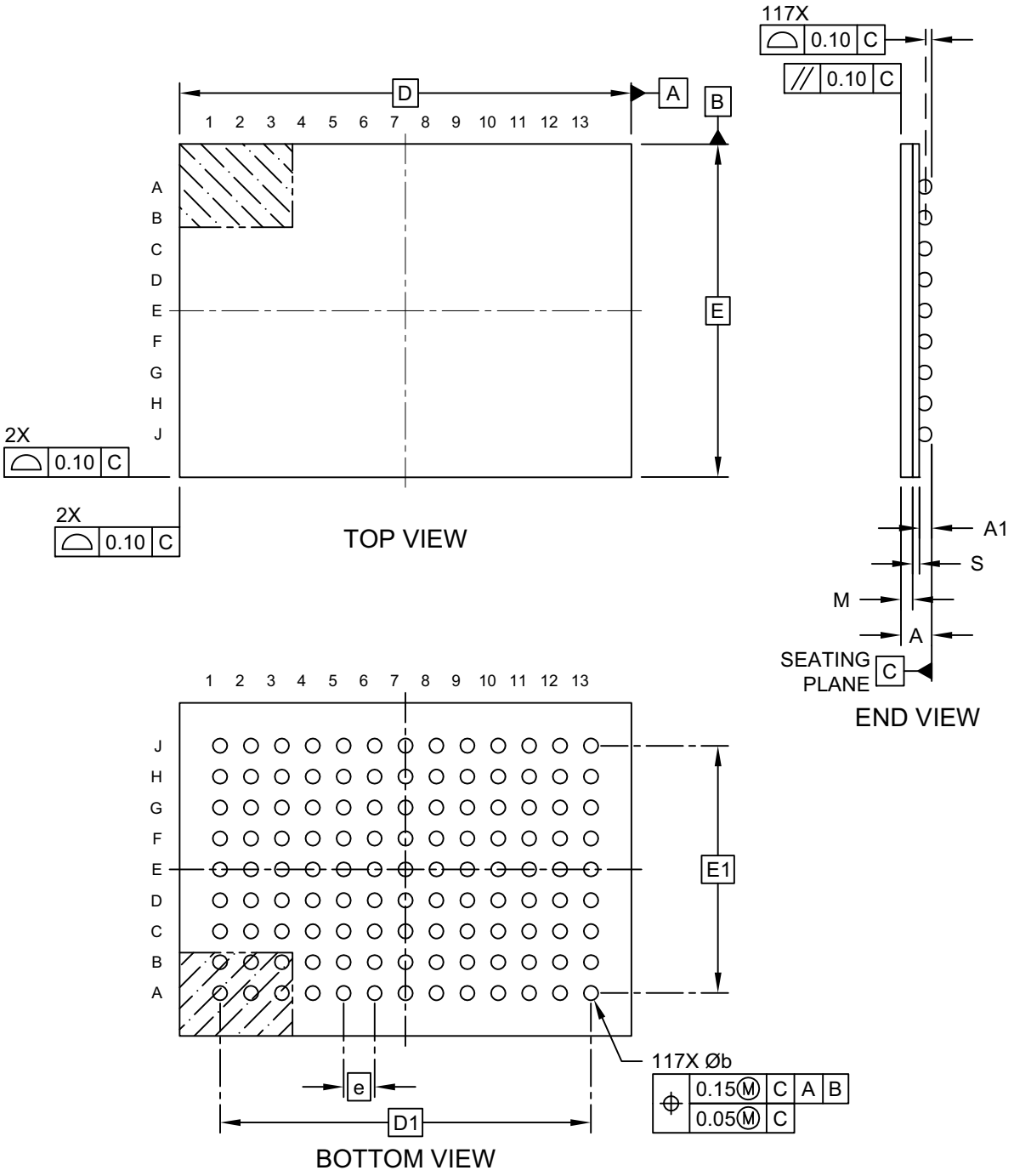
Notes:

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

Microchip Technology Drawing C04-23163 Rev A

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

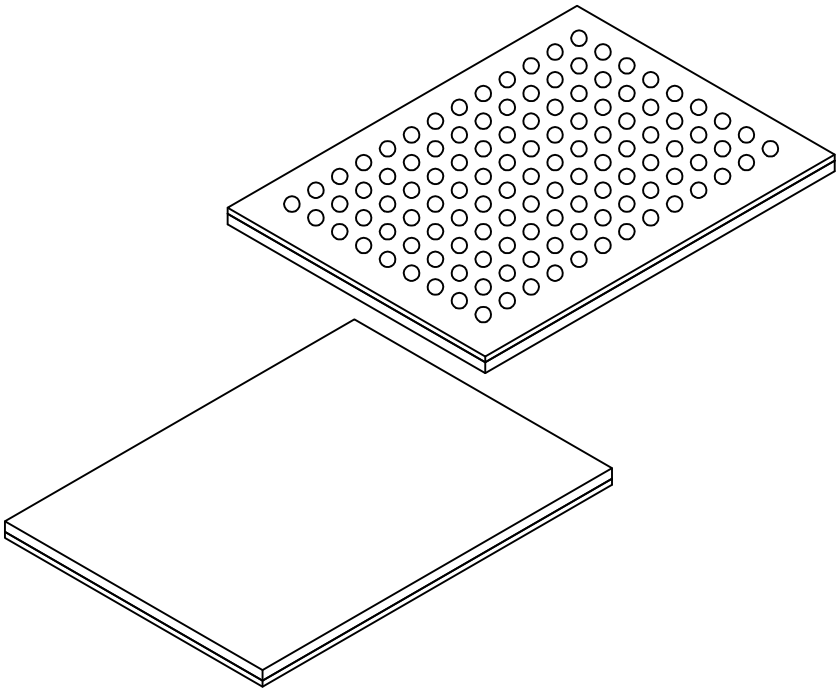
Note: For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging



Microchip Technology Drawing C04-21166 Rev A Sheet 1 of 2

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

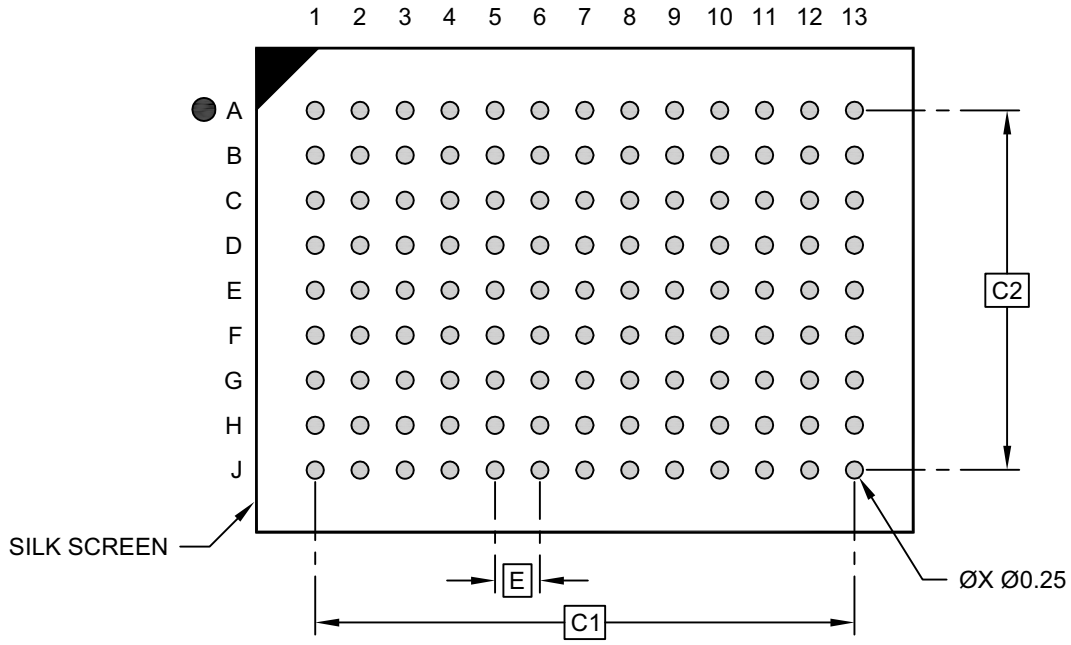
Notes:

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.

Microchip Technology Drawing C04-21166 Rev A Sheet 2 of 2

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

Units		MILLIMETERS		
Dimension Limits		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.

Microchip Technology Drawing C04-23166 Rev A

APPENDIX A: REVISION HISTORY

Revision A (January 2021)

Initial edition for firmware revision 1.0.AB – 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:	*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
ATMXT1066TD-C2U002 (Supplied in trays)	1.0.AB	114-ball UFBGA 7 × 5 × 0.65 mm, RoHS compliant Industrial grade; not suitable for automotive characterization
ATMXT1066TD-C2UR002 (Supplied in tape and reel)		
ATMXT1066TD-NHU002 (Supplied in trays)	1.0.AB	117-ball UFBGA 9.5 × 7 × 0.65 mm, RoHS compliant Industrial grade; not suitable for automotive characterization
ATMXT1066TD-NHUR002 (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.
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