mXT1664T3 2.0

maXTouch 1664-node Touchscreen Controller Product Brief

Description

The mXT1664T3 2.0 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 mXT1664T3 2.0 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 32 X (transmit) lines and 52 Y (receive) lines for use by touchscreen.
- A maximum of 1664 nodes can be allocated to the touchscreen
- Touchscreen size of 15.6 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
- 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)
- Glass 0.4 mm to 4.5 mm (dependent on screen size, touch size, configuration and stack-up)
- Plastic 0.2 mm to 2.2 mm (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
- 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, 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
  - Up to 250 Hz reporting rate for one finger (subject to configuration)
  - Typical report rate for 16 touches ≥100 Hz (subject to configuration)
  - Initial touch latency <10 ms for first touch from idle (subject to configuration)
  - Configurable to allow for power and speed optimization

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

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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^2C 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)
- USB HID interface for Microsoft Windows 8.x and later versions
- HID-I^2C interface for Microsoft Windows 8.x and later versions
- Interrupt to indicate when a message is available
- SPI Debug Interface to read the 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 external X line drive (XVdd) up to 10 V

Packages

- 136-ball UFBGA 7 × 7 × 0.6 mm, 0.5 mm pitch
- 162-ball UFBGA 10 × 5 × 0.6 mm, 0.5 mm pitch

Operating Temperature

- –40°C to +85°C

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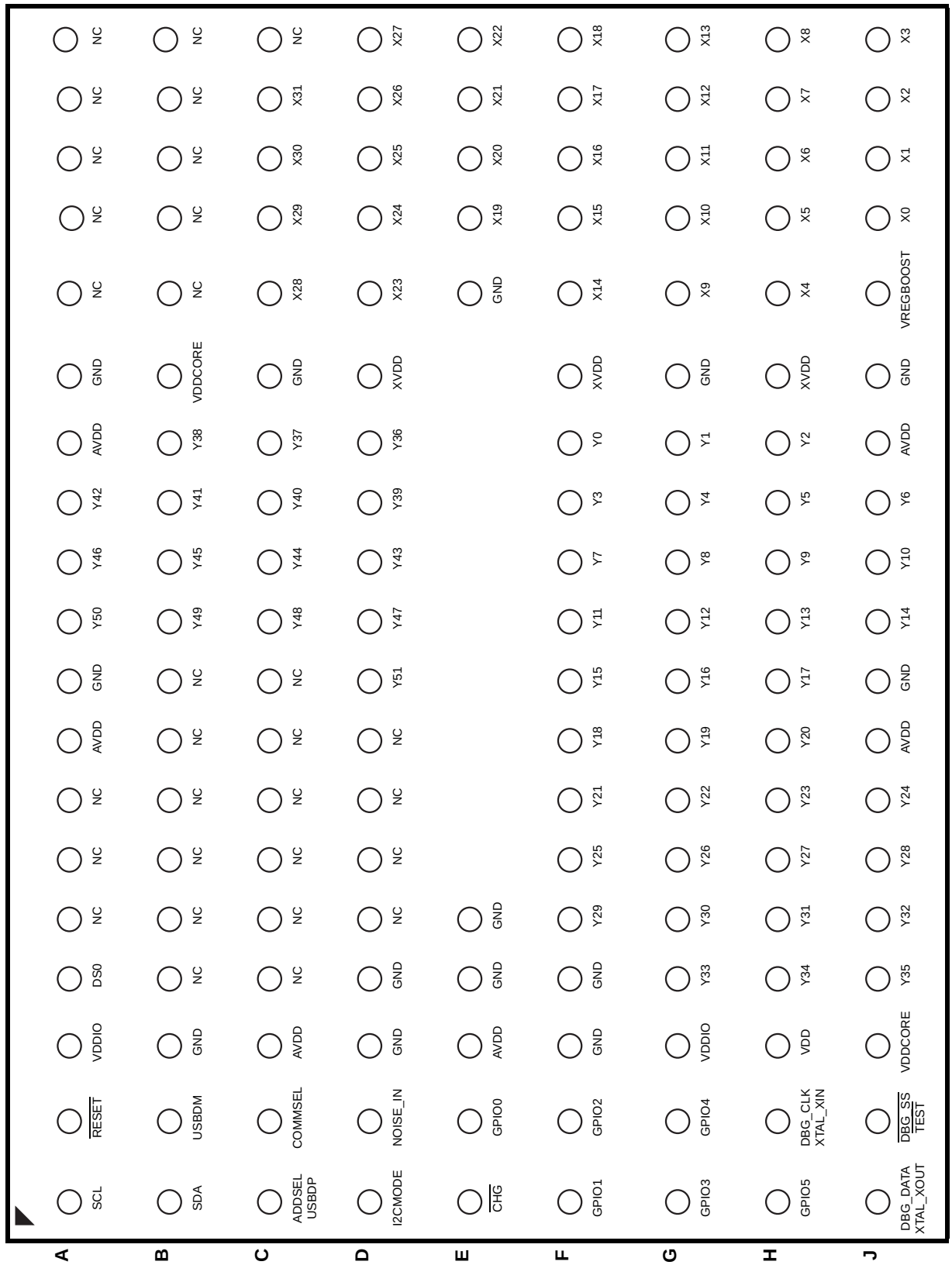
PIN CONFIGURATION

0.1 136-ball UFBGA

	1	2	3	4	5	6	7	8	9	10	11	12	13
A	X31	X30	X28	X25	X22	X19	XVDD	GND	X12	X9	X6	X3	X1
B	XVDD	X29	X27	X24	X21	X18	X16	X14	X11	X8	X5	X2	X0
C	GND	GND	X26	X23	X20	X17	X15	X13	X10	X7	X4	XVDD	VREGBOOST
D	AVDD	VDDCORE	GND								GND	GND	AVDD
E	Y27	Y26	AVDD								AVDD	Y0	Y1
F	Y30	Y29	Y28			GPIO0	GPIO4	GND			Y2	Y3	Y4
G	Y33	Y32	Y31			$\overline{\text{CHG}}$		$\overline{\text{DBG_SS}}$ $\overline{\text{TEST}}$			Y5	Y6	Y7
H	Y36	Y35	Y34			NOISE_IN	GPIO3	DBG_DATA XTAL_XOUT		DS0	Y8	Y9	Y10
J	Y39	Y38	Y37								Y11	Y12	Y13
K	Y42	Y41	Y40	VDDIO	USBDM	I2CMODE	GND	PTCXY0	PTCXY1	NC	Y14	Y15	Y16
L	Y45	Y44	Y43	GND	SDA	COMMSEL	GPIO2	DBG_CLK XTAL_XIN	PTCXY2	NC	Y17	Y18	Y19
M	Y48	Y47	Y46	GND	SCL	ADDSEL USBDP	GPIO1	GPIO5	PTCXY3	GND	Y20	Y21	Y22
N	Y51	Y50	Y49	AVDD	$\overline{\text{RESET}}$	VDD	VDDCORE	VDDIO	PTCXY4	AVDD	Y23	Y24	Y25

Top View

0.2 162-ball UFBGA



Top View

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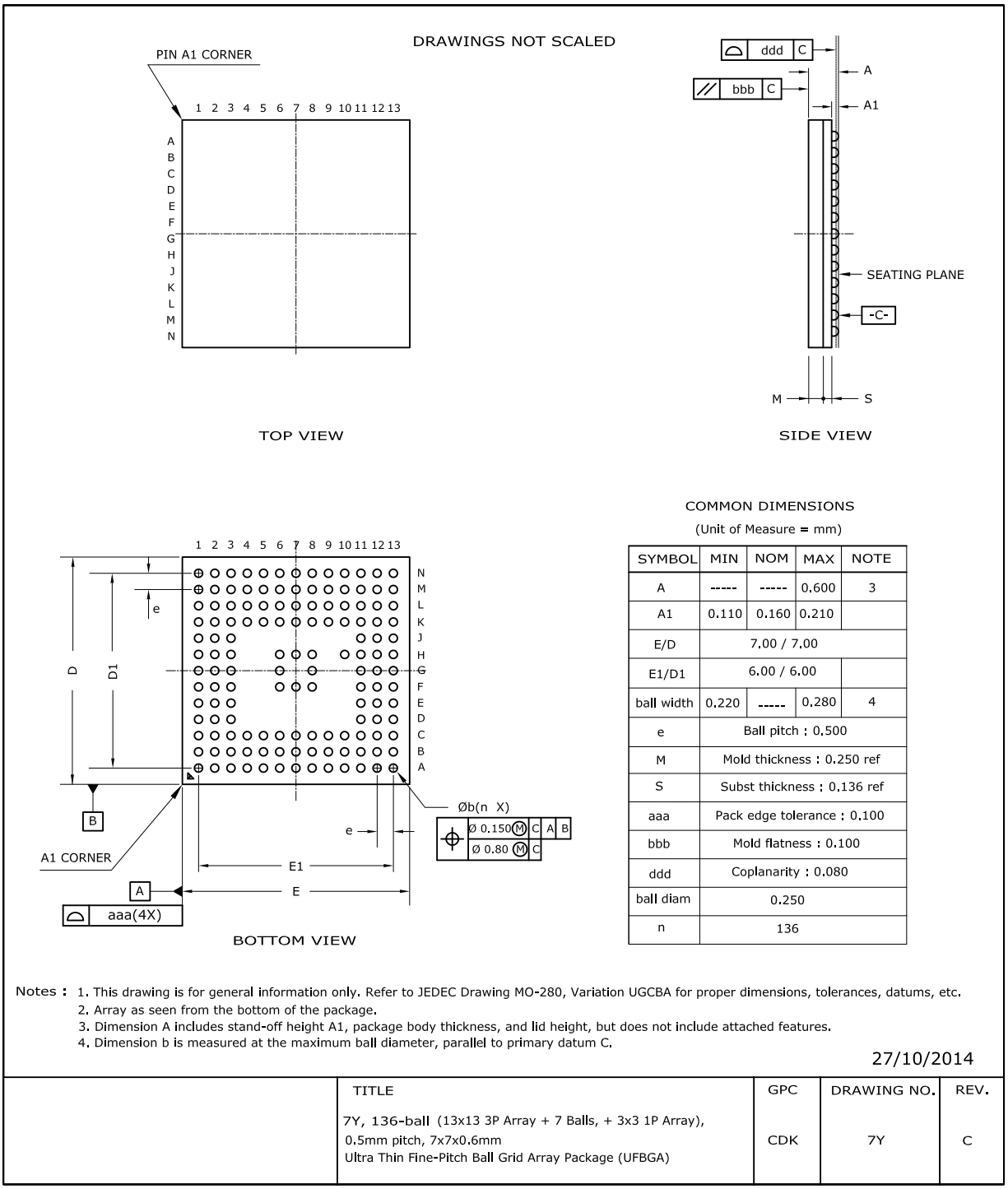
1.0 PACKAGING INFORMATION

1.1 136-ball UFBGA 7 × 7 × 0.6 mm

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



COMMON DIMENSIONS

(Unit of Measure = mm)

SYMBOL	MIN	NOM	MAX	NOTE
A	-----	-----	0.600	3
A1	0.110	0.160	0.210	
E/D	7.00 / 7.00			
E1/D1	6.00 / 6.00			
ball width	0.220	-----	0.280	4
e	Ball pitch : 0.500			
M	Mold thickness : 0.250 ref			
S	Subst thickness : 0.136 ref			
aaa	Pack edge tolerance : 0.100			
bbb	Mold flatness : 0.100			
ddd	Coplanarity : 0.080			
ball diam	0.250			
n	136			

Notes :
1. This drawing is for general information only. Refer to JEDEC Drawing MO-280, Variation UGCBA for proper dimensions, tolerances, datums, etc.
2. Array as seen from the bottom of the package.
3. Dimension A includes stand-off height A1, package body thickness, and lid height, but does not include attached features.
4. Dimension b is measured at the maximum ball diameter, parallel to primary datum C.

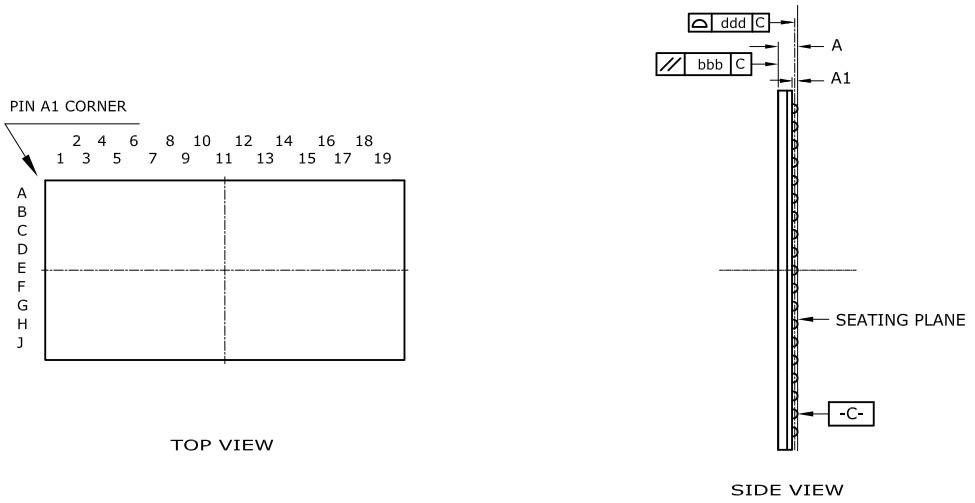
27/10/2014

	TITLE	GPC	DRAWING NO.	REV.
	7Y, 136-ball (13x13 3P Array + 7 Balls, + 3x3 1P Array), 0.5mm pitch, 7x7x0.6mm Ultra Thin Fine-Pitch Ball Grid Array Package (UFBGA)	CDK	7Y	C

1.2 162-ball UFBGA 10 × 5 × 0.6 mm

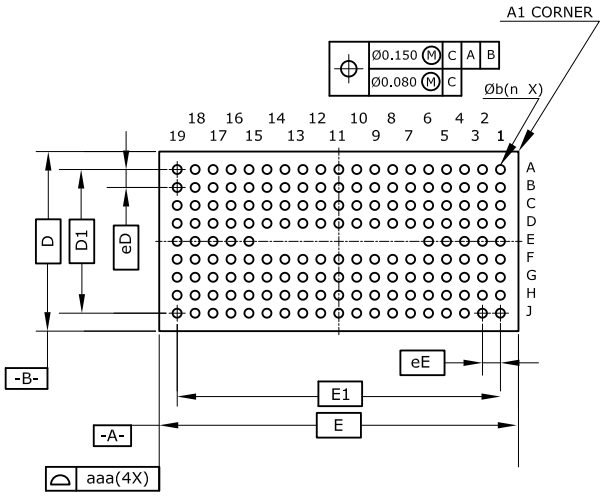
NOTE For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging

DRAWINGS NOT SCALED



TOP VIEW

SIDE VIEW



BOTTOM VIEW

COMMON DIMENSIONS

(Unit of Measure = mm)

SYMBOL	MIN	NOM	MAX	NOTE
A	0.488	0.546	0.600	3
A1	0.120	0.155	0.190	
E	9.90	10.00	10.10	
D	4.90	5.00	5.10	
E1	8.90	9.00	9.10	
D1	3.90	4.00	4.10	
ball width	0.250	-----	0.350	4
eD/eE	Ball pitch : 0.500			
aaa	Package edge tolerance : 0.100			
bbb	Mold flatness : 0.100			
ddd	Coplanarity : 0.080			
ball diam	0.250			
n	162			

Notes :
1. No JEDEC Drawing Reference.
2. Array as seen from the bottom of the package.
3. Dimension A includes stand-off height A1, package body thickness, and lid height, but does not include attached features.
4. Dimension b is measured at the maximum ball diameter, parallel to primary datum C.

02/13/2015

	TITLE	GPC	DRAWING NO.	REV.
	7M, 162-ball - 19x9 4P array (+ 2 balls), 0.5mm pitch, 10x5x0.6mm Ultra Thin Fine-Pitch Ball Grid Array Package (UFBGA)	CAK	7M	D

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APPENDIX A: REVISION HISTORY

Revision A (August 2018)

Initial edition for firmware revision 2.0 – 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 mXT1664T3.

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

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)
Sample Type:	Blank	=	Release Sample
	ES	=	Pre-release (Engineering) Sample
Tape and Reel Option:	Blank	=	Standard Packaging (Tube or Tray)
	R	=	Tape and Reel (1)
Pattern:	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
ATMXT1664T3-CCU035 (Supplied in trays)	2.0.AA	136-ball UFBGA 7 × 7 × 0.6 mm, RoHS compliant Industrial grade; not suitable for automotive characterization
ATMXT1664T3-CCUR035 (Supplied in tape and reel)		
ATMXT1664T3-C2U035 (Supplied in trays)	2.0.AA	162-ball UFBGA 10 × 5 × 0.6 mm, RoHS compliant Industrial grade; not suitable for automotive characterization
ATMXT1664T3-C2UR035 (Supplied in tape and reel)		

Atmel SL Code

An SL (QS) code was required on Atmel purchase orders, but is no longer used by Microchip. The SL code has been replaced by the 3-digit QTP code suffix on all Microchip industrial grade orderable part numbers.

The legacy Atmel SL (QS) code for mXT1664T3 2.0.AA is QS976.

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- 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.
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- Microchip is willing to work with the customer who is concerned about the integrity of their code.
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