

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

MXT1664T3 2.0

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

- 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)
- USB HID interface for Microsoft Windows 8.x and later versions
- HID-I²C 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

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			 CHG		 DBG_SS 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	 PTCX0	 PTCX1	 NC	 Y14	 Y15	 Y16
L	 Y45	 Y44	 Y43	 GND	 SDA	 COMMSEL	 GPIO2	 DBG_CLK XTAL_XIN	 PTCX2	 NC	 Y17	 Y18	 Y19
M	 Y48	 Y47	 Y46	 GND	 SCL	 ADDSEL USBDP	 GPIO1	 GPIO5	 PTCX3	 GND	 Y20	 Y21	 Y22
N	 Y51	 Y50	 Y49	 AVDD	 RESET	 VDD	 VDDCORE	 VDDIO	 PTCX4	 AVDD	 Y23	 Y24	 Y25

Top View

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0.2 162-ball UFBGA

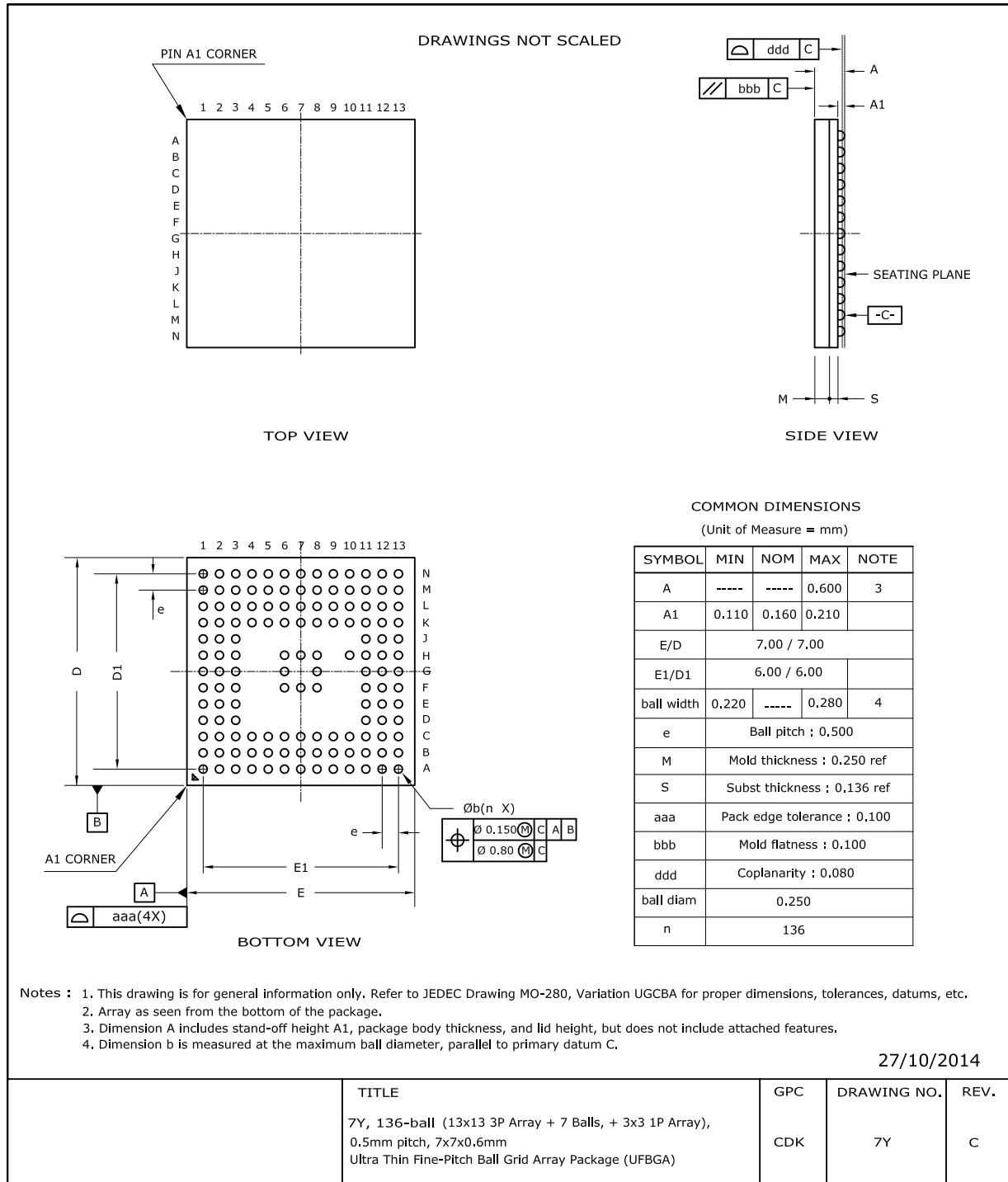
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
A	SCL	RESET	VDDIO	DS0	NC	NC	NC	AVDD	GND	Y50	Y46	Y42	AVDD	GND	NC	NC	NC	NC	NC
B	SDA	USBDM	GND	NC	NC	NC	NC	NC	NC	Y49	Y45	Y41	Y38	VDDCORE	NC	NC	NC	NC	NC
C	ADDSEL USBDP	COMMSSEL	AVDD	NC	NC	NC	NC	NC	NC	Y48	Y44	Y40	Y37	GND	X28	X29	X30	X31	NC
D	I2CMODE	NOISE_IN	GND	GND	NC	NC	NC	NC	Y51	Y47	Y43	Y39	Y36	XVDD	X23	X24	X25	X26	X27
E	CHG	GPIO0	AVDD	GND	GND	NC	NC	GND	Y29	Y11	Y7	Y3	Y0	XVDD	X14	X19	X20	X21	X22
F	GPIO1	GPIO2	GND	GND	NC	Y25	Y21	Y18	Y15	Y11	Y7	Y3	Y0	XVDD	X14	X15	X16	X17	X18
G	GPIO3	GPIO4	VDDIO	Y33	Y30	Y26	Y22	Y19	Y16	Y12	Y8	Y4	Y1	GND	X9	X10	X11	X12	X13
H	GPIO5	DBG_CLK XTAL_XIN	VDD	Y34	Y31	Y27	Y23	Y20	Y17	Y13	Y9	Y5	Y2	XVDD	X4	X5	X6	X7	X8
J	DBG_DATA XTAL_XOUT	DBG_SS TEST	VDDCORE	Y35	Y32	Y28	Y24	AVDD	GND	Y14	Y10	Y6	AVDD	GND	VREGBOOST	X0	X1	X2	X3

Top View

1.0 PACKAGING INFORMATION

1.1 136-ball UFBGA 7 × 7 × 0.6 mm

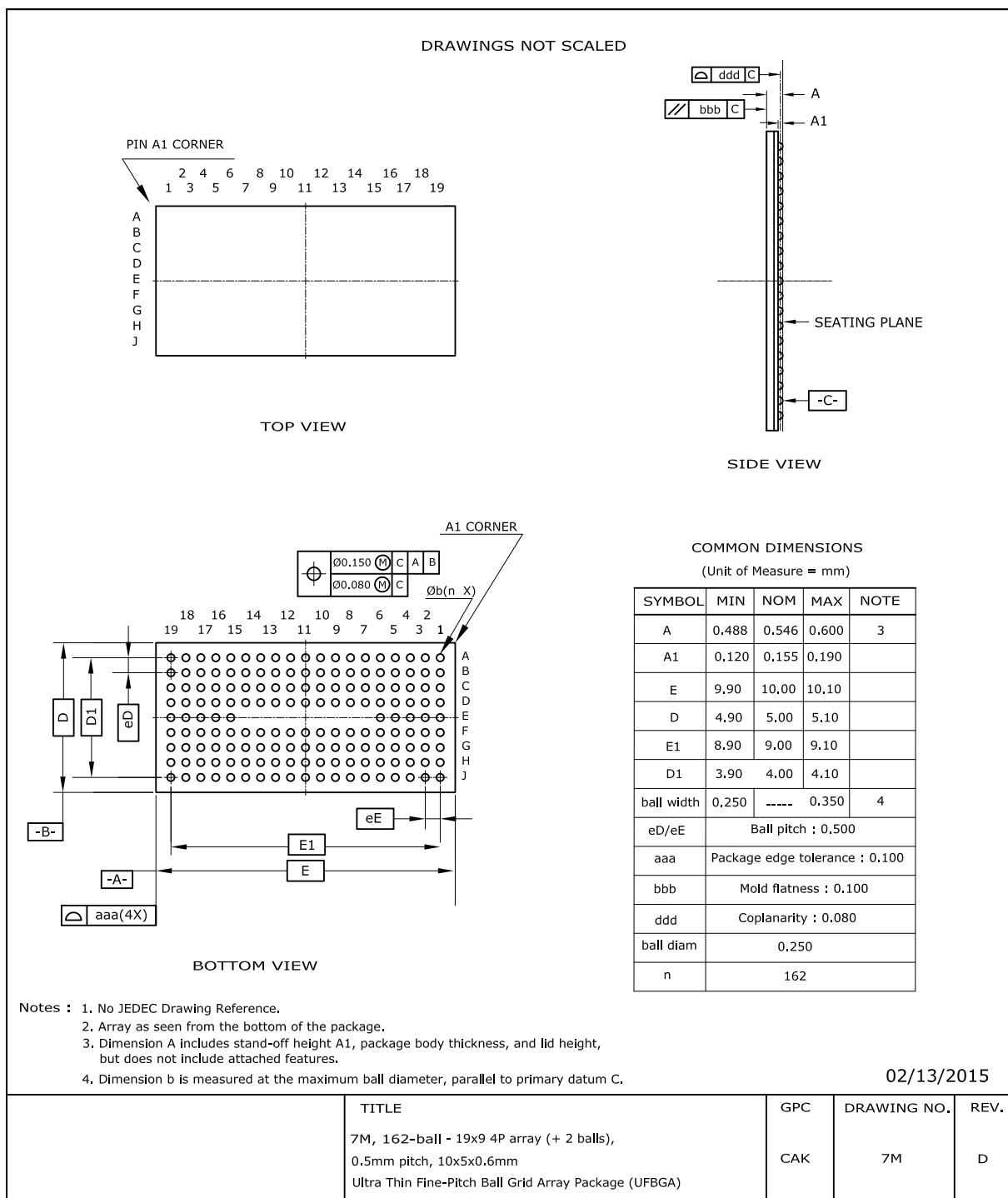
NOTE For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



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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>



APPENDIX A: REVISION HISTORY

Revision A (August 2018)

Initial edition for firmware revision 2.0 – Release

MXT1664T3 2.0

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.

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.
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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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