mXT799T-AT/mXT799T-AB 1.0

maXTouch 798-node Touchscreen Controller Product Brief

Description

The mXT799T-AT/mXT799T-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 mXT799T-AT/mXT799T-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 32 X (transmit) lines and 52 Y (receive) lines
- A maximum of 798 nodes can be allocated to the touchscreen
- Touchscreen size 9.4 inches (16:9 aspect ratio), assuming a sensor electrode pitch of 5.5 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

Automotive Applications

- AEC-Q100 Qualified
- Developed following Automotive SPICE® Level 3 certified processes
- CISPR-25 compliant (for both mutual and self capacitance measurements)

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 mm with GFF stack, 0.55 mm to 4 mm with OGS stack (dependent on screen size, touch size, configuration and stack-up)
- Plastic 0.2 mm to 3 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 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
- Burst Frequency
  - Controlled Tx burst frequency drift over process and temperature range
- Scan Speed
  - Up to 110 Hz one finger reporting rate (subject to configuration)
  - Typical report rate for 10 touches ≥100 Hz (subject to configuration)
  - Initial touch latency <25 ms for first touch from idle (subject to configuration)
  - Configurable to allow for power and speed optimization

On-chip Gestures

- Reports one-touch and two-touch gestures

Keys

- Up to 32 nodes can be allocated as mutual capacitance sensor keys (subject to other configurations)
- Adjacent Key Suppression (AKS) technology is supported for false key touch prevention

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

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-compatible 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)
- SPI slave interface (up to 8 MHz)
- 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 external X line drive (XVdd) up to 9.0 V

Package

- 144-pin LQFP 20 × 20 × 1.4 mm, 0.5 mm pitch

Operating Temperature

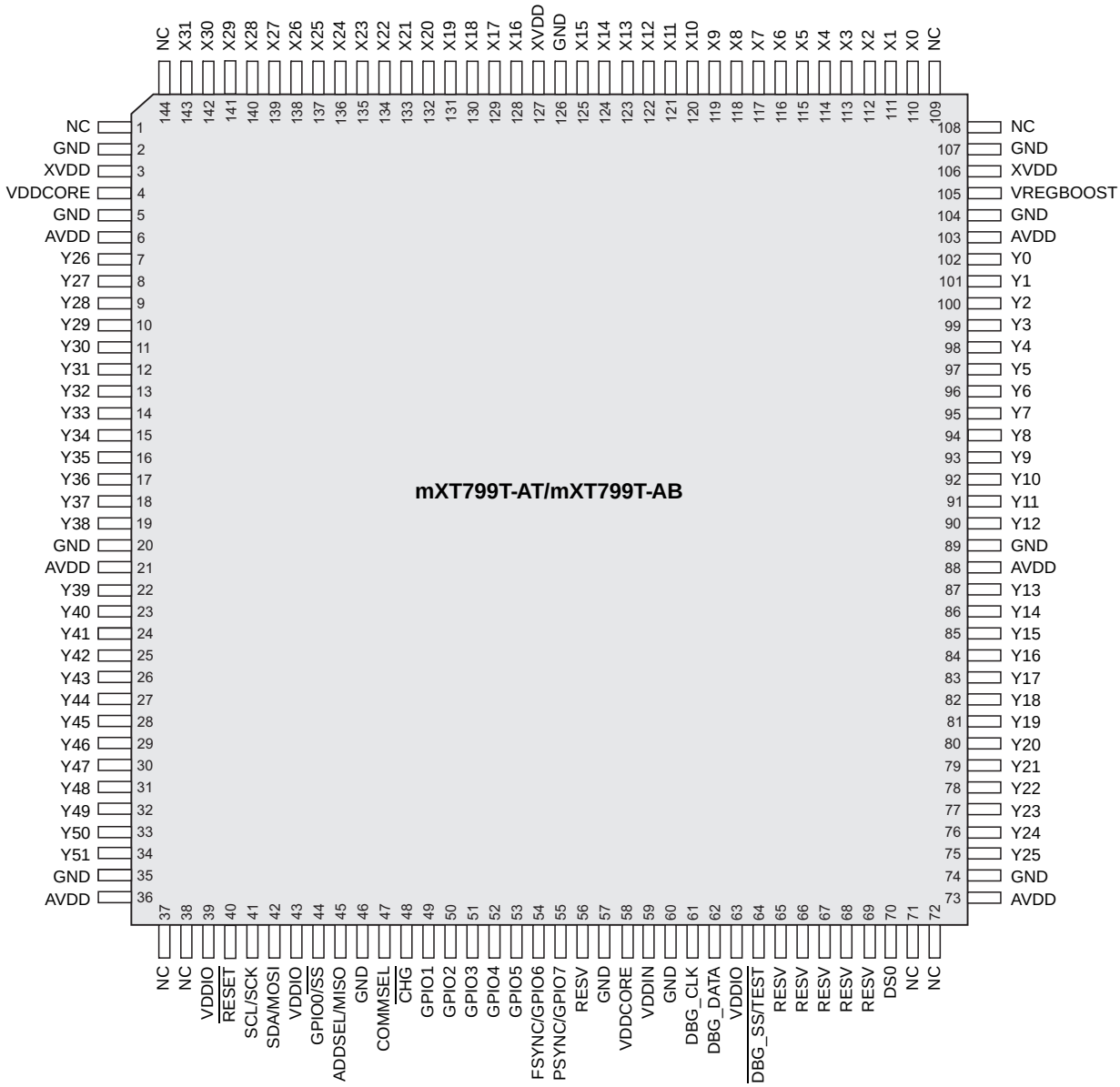
- mXT799T-AT: –40°C to +85°C (Grade 3)
- mXT799T-AB: –40°C to +105°C (Grade 2)

Design Services

- Review of device configuration, stack-up and sensor patterns
- Custom firmware versions can be considered, such as for specific gestures or proprietary OEM host communication protocols
- Contact your Microchip representative for more information

PIN CONFIGURATION

Pin Configuration – 144-pin LQFP



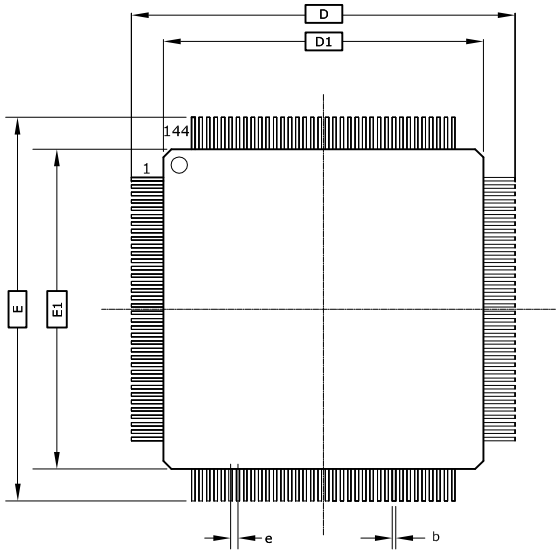
Top view

1.0 PACKAGING INFORMATION

The following section gives the technical details of the package for the device.

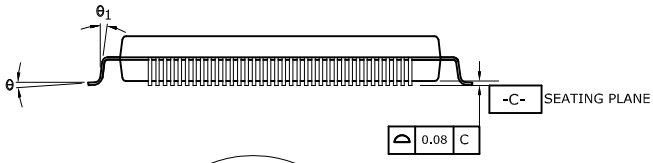
1.1 144-pin LQFP 20 × 20 × 1.4 mm

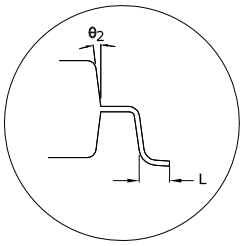
DRAWINGS NOT SCALED



TOP VIEW

SIDE VIEW





DETAIL VIEW

COMMON DIMENSIONS

(Unit of Measure = mm)

SYMBOL	MIN	NOM	MAX	NOTE
A	-----	-----	1.60	
A1	0.05	-----	0.15	
A2	1.35	1.40	1.45	
D/E	22.00 ± 0.20 BSC			
D1/E1	20.00 ± 0.20 BSC			2
L	0.45	0.60	0.75	
b	0.22 bsc			
c	0.09	-----	0.20	
e	0.50 bsc			
θ	0°	3.5°	7°	
θ_1	0°	-----	-----	
θ_2	11°	12°	13°	
n	144			

Notes :
1. This drawing is for general information only. Refer to JEDEC Drawing MS-026, Variation BFB.
2. Dimensions D1 and E1 do not include mold protrusion. Allowable protrusion is 0.25mm per side. Dimensions D1 and E1 are maximum plastic body size dimensions including mold mismatch.
3. Lead coplanarity is 0.08mm maximum.

11/09/2016

	TITLE	GPC	DRAWING NO.	REV.
	RU, 144 Lds - 0.5mm Pitch, 20x20x1.4mm Body Size Low Profile Plastic Quad Flat Package (LQFP)	AEI	RU	I

APPENDIX A: REVISION HISTORY

Revision A (October 2017)

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 mXT799T-AT/mXT799T-AB.

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)
	CCU	=	UFBGA (Ultra Thin Fine-pitch Ball Grid Array)
	C2U	=	UFBGA (Ultra Thin Fine-pitch Ball Grid Array)
	NHU	=	UFBGA (Ultra Thin Fine-pitch Ball Grid Array)
	C4U	=	X1FBGA (Extra Thin Fine-pitch Ball Grid Array)
	MAU	=	XQFN (Super Thin Quad Flat No Lead Sawn)
	MA5U	=	XQFN (Super Thin Quad Flat No Lead Sawn)
	UU	=	WLCSP (Wafer Level Chip Scale Package)
Temperature Range:	*Blank*	=	–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
ATMXT799T-AT (Supplied in trays)	1.0.AB	144-pin LQFP 20 × 20 × 1.4 mm, RoHS compliant Operating temperature range –40°C to +85°C (Grade 3) Automotive grade sample; suitable for automotive characterization
ATMXT799T-ATR (Supplied in tape and reel)		
ATMXT799T-AB (Supplied in trays)	1.0.AB	144-pin LQFP 20 × 20 × 1.4 mm, RoHS compliant Operating temperature range –40°C to +105°C (Grade 2) Automotive grade sample; suitable for automotive characterization
ATMXT799T-ABR (Supplied in tape and reel)		

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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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