Features

- QTouch® Sensor Channels
  - Up to 8 keys
- Integrated Haptic Engine
  - Haptic events may be triggered by touch detection or controlled by a host microcontroller over SPI
- Data Acquisition
  - QTouch “Dual Pulse” key measurement/touch detection method
  - Configurable measurement timing and averaging
  - Spread spectrum charge transfer
  - Raw data from channel measurement can be read over the SPI interface
- GPIO Pins
  - 12 dedicated bi-directional GPIO pins, plus up to 4 additional pins (replacing keys)
  - Configurable as software PWM Drive, digital inputs or outputs
- Device setup
  - Device configuration may be stored in NVRAM
- Operation
  - Power-On reset and brown-out detection
  - Internal calibrated oscillator
- Key Outline Sizes
  - 6 mm x 6 mm or larger (panel thickness dependent); widely different sizes and shapes possible, including solid or ring shapes
- Key Spacing
  - 7 mm centre to centre or more (panel thickness dependent)
- Layers required
  - One
- Electrode Materials:
  - Etched copper, silver, carbon, ITO
- Electrode Substrates:
  - PCB materials; polyamide FPCB; PET films, glass
- Panel materials:
  - Plastic, glass, composites, painted surfaces (low particle density metallic paints possible)
- Panel Thickness:
  - Up to 10 mm glass, 5 mm plastic (electrode size dependent)
- Key Sensitivity:
  - Individually configured over SPI interface
- Signal Processing:
  - Self-calibration, auto drift compensation, noise filtering
  - Patented Adjacent Key Suppression® (AKS®) technology to ensure accurate key detection
- Interface:
  - Master/Slave SPI interface, up to 750 kHz
  - Object-based communications protocol
- Power:
  - 2.0V to 5.5V
- Packages:
  - 32-pin 5 x 5 mm MLF RoHS compliant
  - 32-pin 7 x 7mm TQFP RoHS compliant

QTouch 8-key Touch Sensor IC

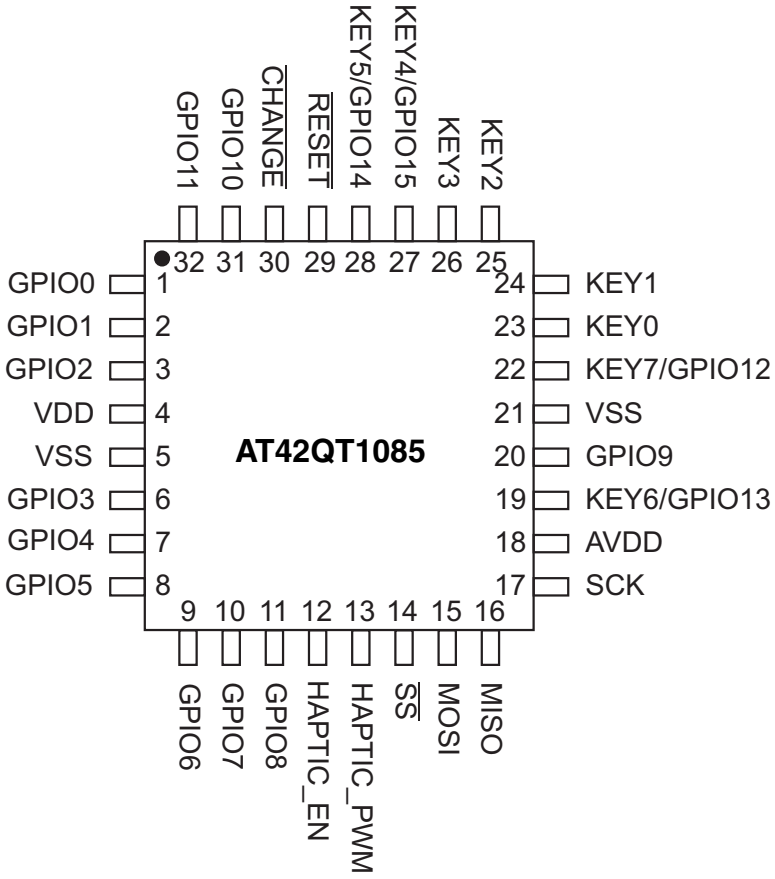
AT42QT1085

Summary

9625BSX–AT42–05/11

1. Pinout and Schematic

1.1 Pinout Configuration



1.2 Pinout Descriptions

Table 1-1. Pin Listing

Pin	Name	Type	Comments	If Unused, Connect To...
1	GPIO0	I/O	General Purpose IO	Leave open
2	GPIO1	I/O	General Purpose IO	Leave open
3	GPIO2	I/O	General Purpose IO	Leave open
4	VDD	P	Power	–
5	VSS	P	Ground	–
6	GPIO3	I/O	General Purpose IO	Leave open
7	GPIO4	I/O	General Purpose IO	Leave open
8	GPIO5	I/O	General Purpose IO	Leave open
9	GPIO6	I/O	General Purpose IO	Leave open
10	GPIO7	I/O	General Purpose IO	Leave open
11	GPIO8	I/O	General Purpose IO	Leave open

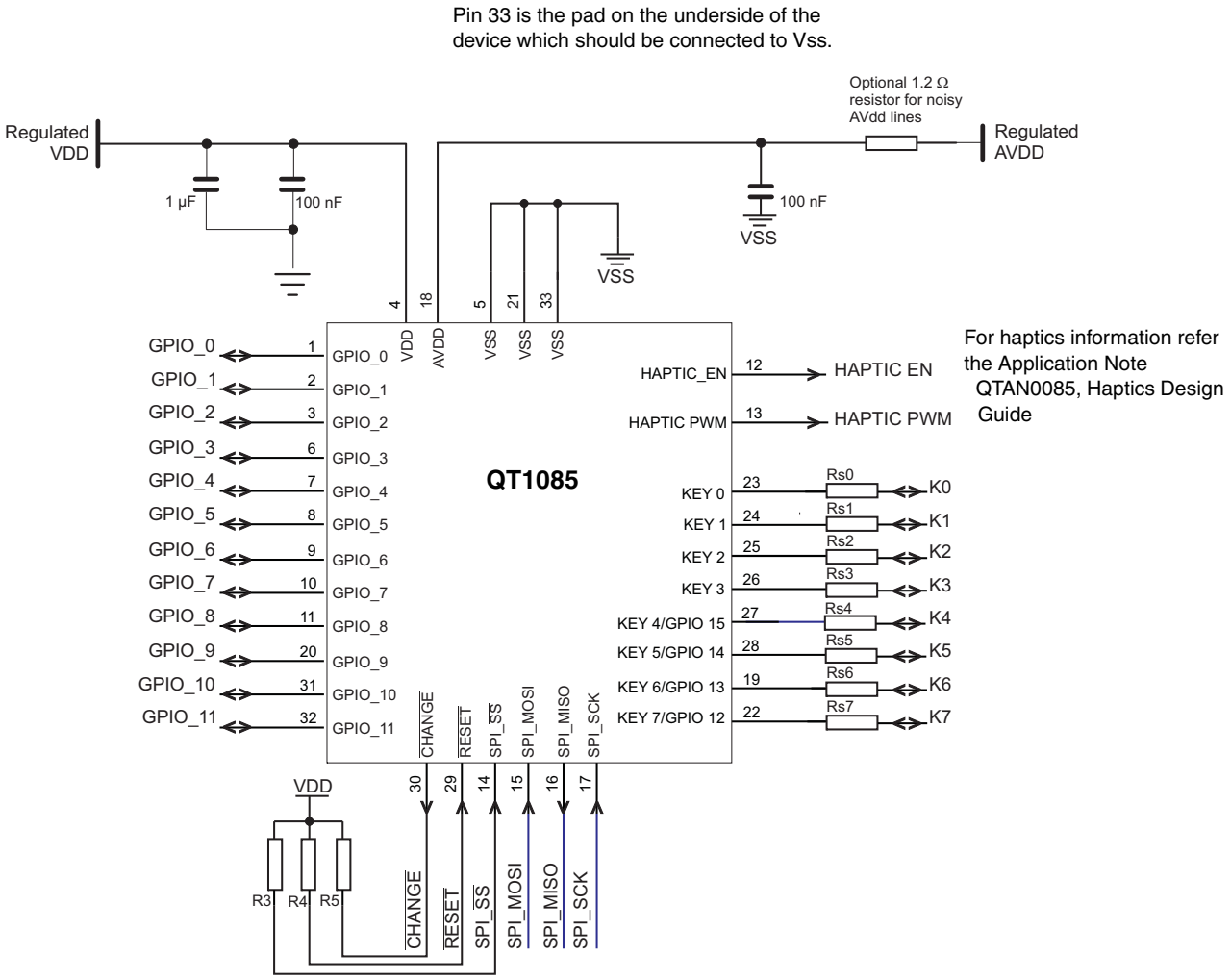
Table 1-1. Pin Listing (Continued)

Pin	Name	Type	Comments	If Unused, Connect To...
12	HAPTIC_EN	O	Enable pin for haptic amplifier	Leave open
13	HAPTIC_PWM	O	Drive for haptic effects	Leave open
14	$\overline{SS}$	I	SPI Enable	Leave open
15	MOSI	I	SPI Data In	Leave open
16	MISO	O	SPI Data Out	Leave open
17	SCK	I	SPI Clock	Leave open
18	AVDD	P	Analog Power	–
19	KEY6/GPIO13	I/O	Sense pin/General Purpose IO	Leave open
20	GPIO 9	I/O	General purpose IO	Leave open
21	VSS	P	Ground	–
22	KEY7/GPIO12	I/O	Sense pin/General Purpose IO	Leave open
23	KEY0	I/O	Sense pin	Leave open
24	KEY1	I/O	Sense pin	Leave open
25	KEY2	I/O	Sense pin	Leave open
26	KEY3	I/O	Sense pin	Leave open
27	KEY4/GPIO15	I/O	Sense pin/General Purpose IO	Leave open
28	KEY5/GPIO14	I/O	Sense pin/General Purpose IO	Leave open
29	$\overline{RESET}$	I	Reset, internal pull-up	Leave open
30	$\overline{CHANGE}$	OD	Status change indicator	Leave open
31	GPIO10	I/O	General Purpose IO	Leave open
32	GPIO11	I/O	General Purpose IO	Leave open

I Input only O Output only, push-pull I/O Input/output
OD Open drain output P Ground or power

1.3 Schematic

Figure 1-1. Typical Circuit



2. Overview

2.1 Introduction

The AT42QT1085 (QT1085) is an easy to use dual-pulse mode sensor IC based on Atmel principles for robust operation and ease of design. It is intended for any touch-key application.

The QT1085 is capable of detecting near-proximity or touch on up to eight sensor channels, configured as keys, and 12 dedicated GPIO channels. Four additional GPIO channels can be configured by replacing four of the sensor channels (one per channel).

The keys can be constructed in different shapes and sizes. Refer to the *Touch Sensors Design Guide* and Application Note QTAN0002, *Secrets of a Successful QTouch® Design*, for more information on construction and design methods (both downloadable from the Atmel® website).

Each GPIO channel may be configured as a digital input or output. In output mode, a GPIO pin may be set to output a PWM signal at any of 16 duty cycles (4-bit PWM). The QT1085 allows electrodes to project sense fields through any dielectric such as glass or plastic.

This device has many advanced features which provide for reliable, trouble-free operation over the life of the product. In particular the QT1085 features advanced self-calibration, drift compensation, and fast thermal tracking. The QT1085 can tolerate some fluctuations in the power supply, and in many applications will not require a dedicated voltage regulator.

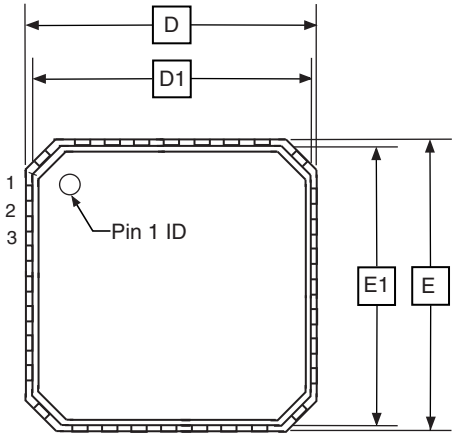
A full haptics engine is integrated into the device, allowing feedback effects to be triggered on key detection or directly activated by a host microcontroller.

The QT1085 includes all signal processing functions necessary to provide stable sensing under a wide variety of changing conditions. Only a few external parts are required for operation and no external Cs capacitors are required.

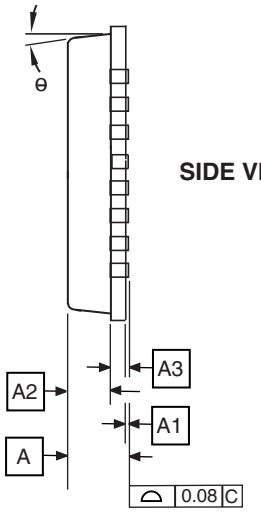
The QT1085 modulates its acquisition pulses in a spread-spectrum fashion in order to heavily suppress the effects of external noise, and to suppress RF emissions. The QT1085 uses a dual-pulse method of acquisition. This provides greater noise immunity and eliminates the need for external sampling capacitors, allowing touch sensing using a single pin.

2.2 Mechanical Dimensions

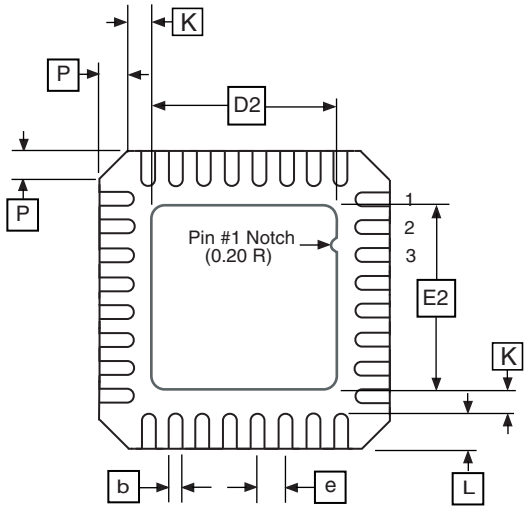
2.2.1 32-pin 5 x 5 mm MLF



TOP VIEW



SIDE VIEW



BOTTOM VIEW

Note: JEDEC Standard MO-220, Fig. 2 (Anvil Singulation), VHHD-2.

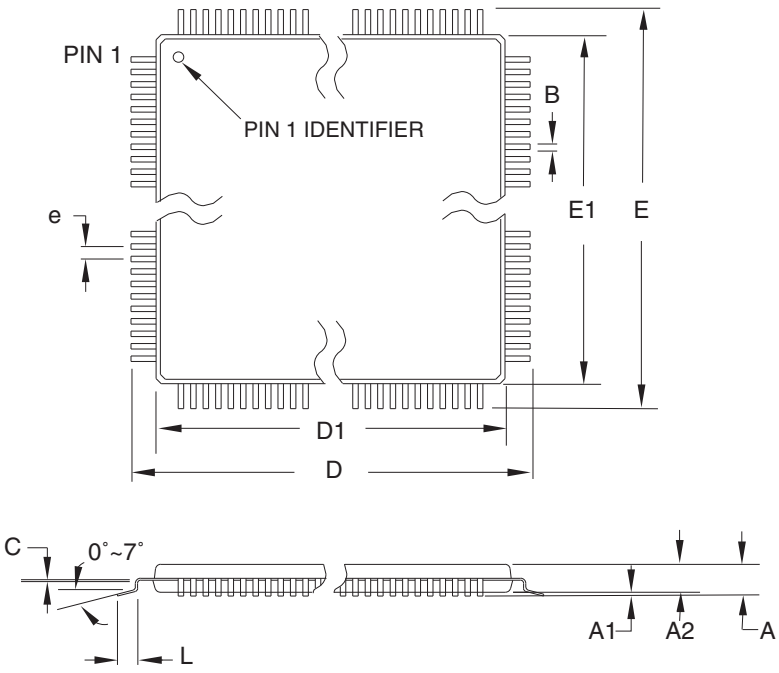
COMMON DIMENSIONS
(Unit of Measure = mm)

SYMBOL	MIN	NOM	MAX	NOTE
A	0.80	0.90	1.00	
A1	–	0.02	0.05	
A2	–	0.65	1.00	
A3		0.20 REF		
b	0.18	0.23	0.30	
D	4.90	5.00	5.10	
D1	4.70	4.75	4.80	
D2	2.95	3.10	3.25	
E	4.90	5.00	5.10	
E1	4.70	4.75	4.80	
E2	2.95	3.10	3.25	
e		0.50 BSC		
L	0.30	0.40	0.50	
P	–	–	0.60	
θ	–	–	12^{o}	
K	0.20	–	–	

5/25/06

	TITLE	DRAWING NO.	REV.
2325 Orchard Parkway San Jose, CA 95131	**32M1-A**, 32-pad, 5 x 5 x 1.0 mm Body, Lead Pitch 0.50 mm, 3.10 mm Exposed Pad, Micro Lead Frame Package (MLF)	32M1-A	E

2.2.2 32-pin 7 x 7mm TQFP



COMMON DIMENSIONS
(Unit of Measure = mm)

SYMBOL	MIN	NOM	MAX	NOTE
A	–	–	1.20	
A1	0.05	–	0.15	
A2	0.95	1.00	1.05	
D	8.75	9.00	9.25	
D1	6.90	7.00	7.10	Note 2
E	8.75	9.00	9.25	
E1	6.90	7.00	7.10	Note 2
B	0.30	–	0.45	
C	0.09	–	0.20	
L	0.45	–	0.75	
e	0.80 TYP			

Notes:
1. This package conforms to JEDEC reference MS-026, Variation ABA.
2. Dimensions D1 and E1 do not include mold protrusion. Allowable protrusion is 0.25 mm per side. Dimensions D1 and E1 are maximum plastic body size dimensions including mold mismatch.
3. Lead coplanarity is 0.10 mm maximum.

10/5/2001

	TITLE	DRAWING NO.	REV.
2325 Orchard Parkway San Jose, CA 95131	**32A,** 32-lead, 7 x 7 mm Body Size, 1.0 mm Body Thickness, 0.8 mm Lead Pitch, Thin Profile Plastic Quad Flat Package (TQFP)	32A	B

2.3 Part Numbers

Part Number	Description
AT42QT1085X-MU	32-pin 5 x 5 mm MLF RoHS compliant
AT42QT1085X-AU	32-pin 7 x 7mm TQFP RoHS compliant

Note: “X” in the part number before the hyphen (-) denotes a preliminary chip. This is removed on release, so the part number will be as given but with the “X” removed.

Revision History

Revision Number	History
Revision ASX – April 2011	Initial release of summary document.
Revision BSX – May 2011	Change to TQFP part number.

Headquarters

Atmel Corporation
2325 Orchard Parkway
San Jose, CA 95131
USA
Tel: (+1) (408) 441-0311
Fax: (+1) (408) 487-2600

International

Atmel Asia
Unit 01-05 & 16, 19F
BEA Tower, Millennium City 5
418 Kwun Tong Road
Kwun Tong
Kowloon
HONG KONG
Tel: (+852) 2245-6100
Fax: (+852) 2722-1369

Touch Technology Division
1560 Parkway
Solent Business Park
Whiteley
Fareham
Hampshire
PO15 7AG
UNITED KINGDOM
Tel: (+44) 844 894 1920
Fax: (+44) 1489 557 066

Atmel Munich GmbH
Business Campus
Parkring 4
D- 85748 Garching b.
MUNICH
Tel: (+49) 89-31970-111
Fax: (+49) 89-3194621

Atmel Japan
9F, Tonetsu Shinkawa Bldg.
1-24-8 Shinkawa
Chuo-ku, Tokyo 104-0033
JAPAN
Tel: (+81) 3-3523-3551
Fax: (+81) 3-3523-7581

Product Contact

Web Site
www.atmel.com

Technical Support
touch@atmel.com

Sales Contact
www.atmel.com/contacts

Literature Requests
www.atmel.com/literature

9625BSX–AT42–05/11