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**Embedded - Microcontrollers - Application Specific: Tailored Solutions for Precision and Performance**

**Embedded - Microcontrollers - Application Specific** represents a category of microcontrollers designed with unique features and capabilities tailored to specific application needs. Unlike general-purpose microcontrollers, application-specific microcontrollers are optimized for particular tasks, offering enhanced performance, efficiency, and functionality to meet the demands of specialized applications.

**What Are Embedded - Microcontrollers - Application Specific?**

Application specific microcontrollers are engineered to

#### Details

Product Status	Obsolete
Applications	Trusted Platform Module (TPM)
Core Processor	AVR
Program Memory Type	EEPROM
Controller Series	-
RAM Size	-
Interface	LPC
Number of I/O	-
Voltage - Supply	3.3V
Operating Temperature	0°C ~ 70°C
Mounting Type	Surface Mount
Package / Case	28-TSSOP (0.240", 6.10mm Width)
Supplier Device Package	28-TSSOP
Purchase URL	<a href="https://www.e-xfl.com/product-detail/microchip-technology/at97sc3204-x1a190-1">https://www.e-xfl.com/product-detail/microchip-technology/at97sc3204-x1a190-1</a>

## 1. Features

- Full Trusted Computing Group (TCG) Trusted Platform Module (TPM) Version 1.2 Compatibility
- Compliant with TCG PC Client Specific TPM Interface Specification Version 1.2
- Single-chip Turnkey Solution
- Hardware Asymmetric Crypto Engine
- 2048-bit RSA® Sign in 200ms
- AVR® RISC Microprocessor
- Internal EEPROM Storage for RSA Keys
- 33MHz LPC (Low Pin Count) Bus for Easy PC Interface
- Secure Hardware and Firmware Design and Chip Layout
- True Random Number Generator (RNG) – FIPS 140-2 Compliant
- NV Storage space for 1280-bytes of user defined data
- 3.3V Supply Voltage
- 28-lead Thin TSSOP, Wide TSSOP or 40-lead QFN Packages
- Offered in both Commercial (0 to 70°C) and Industrial (-40 to +85°C) Temperature Ranges

## 2. Description

The Atmel® AT97SC3204 is a fully integrated security module designed to be integrated into personal computers and other embedded systems. It implements version 1.2 of the Trusted Computing Group (TCG) specification for Trusted Platform Modules (TPM).

The TPM includes a cryptographic accelerator capable of computing a 2048-bit RSA signature in 200ms and a 1024-bit RSA signature in 40ms. Performance of the SHA-1 accelerator is 20µs per 64-byte block.

The chip communicates with the PC through the LPC interface. The TPM supports SIRQ (for interrupts) and CLKRUN to permit clock stopping for power savings in mobile computers.



## Trusted Platform Module

### Atmel AT97SC3204 LPC Interface

### Summary

- \* See the full data sheet for detailed design information

5294BS-TPM-9/10



Note: This is a summary document. A complete document is available under NDA. For more information, please contact your local Atmel sales office.

Table 1-1. Pin Configurations

Pin Name	Function
V <sub>CC</sub>	3.3V Supply Voltage
SB3V	Standby 3.3V Supply Voltage
GND	Ground
LRESET#	PCI Reset Input Active Low
LAD0	LPC Command, Address, Data Line Input/Output
LAD1	LPC Command, Address, Data Line Input/Output
LAD2	LPC Command, Address, Data Line Input/Output
LAD3	LPC Command, Address, Data Line Input/Output
LCLK	33MHz PCI Clock Input
LFRAME#	LPC FRAME Input
CLKRUN#	PCI Clock Run Input/Output
LPCPD#	LPC Power Down Input
SERIQ	Serialized Interrupt Request Input/Output
GPIO6	General Purpose Input/Output
TestI	Test Input (disabled)
TestBI	Test Input (disabled)
ATest	Atmel Test Pin
NC	No Connect
NBO	Not Bounded out

Figure 2-1. Pinout Diagrams

28-pin Thin TSSOP  
4.4 mm x 9.7 mm Body  
0.65 mm Pitch

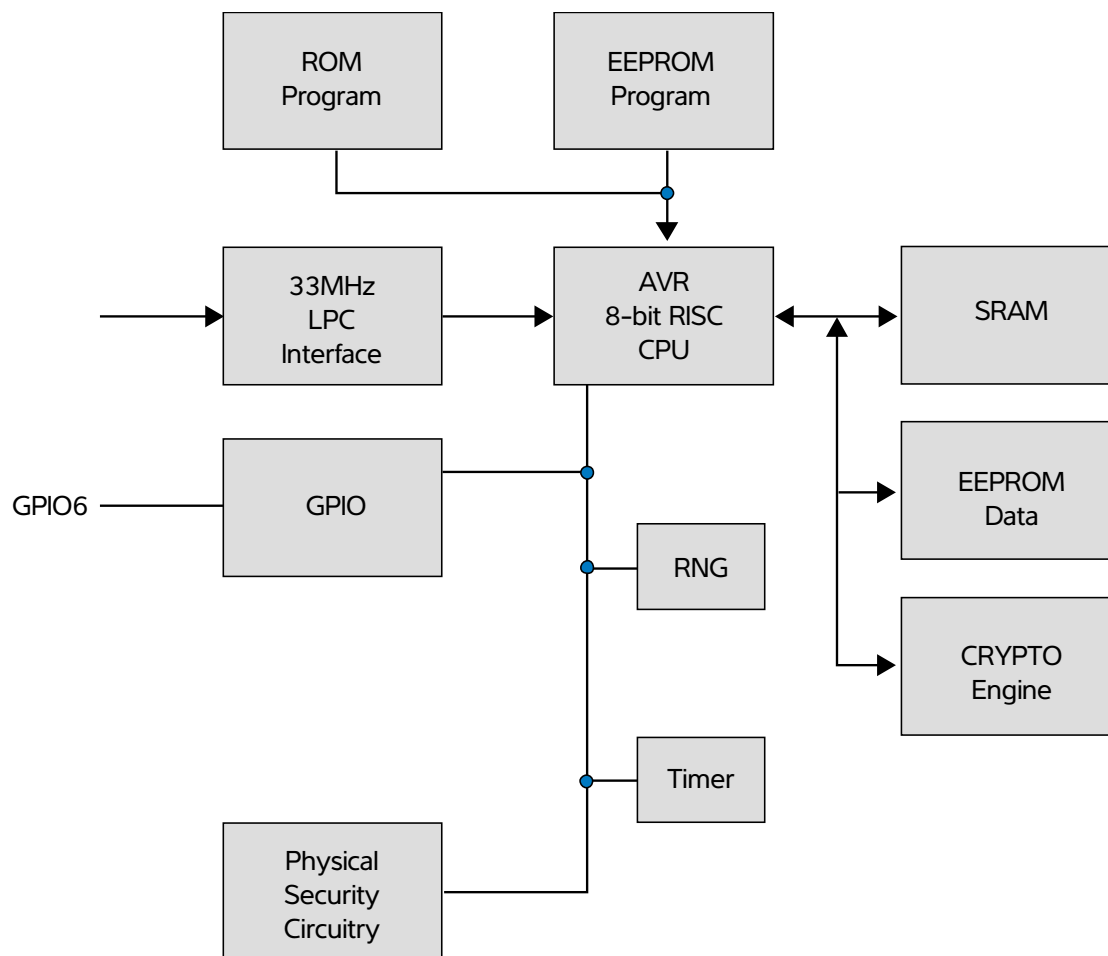
28-pin TSSOP  
6.1 mm x 9.7 mm Body  
0.65 mm Pitch

40-pin QFN  
6.0 mm x 6.0 mm Body  
0.50 mm Pitch

A <sub>Test</sub>	1	28	LPCPD#
A <sub>Test</sub>	2	27	SERIRQ
A <sub>Test</sub>	3	26	LAD0
GND	4	25	GND
SB3V	5	24	V <sub>CC</sub>
GPIO6	6	23	LAD1
NC	7	22	LFRAME#
TestI	8	21	LCLK
TestBI	9	20	LAD2
V <sub>CC</sub>	10	19	V <sub>CC</sub>
GND	11	18	GND
NBO	12	17	LAD3
NBO	13	16	LRESET#
NBO	14	15	CLKRUN#

A <sub>Test</sub>	40	39	38	37	36	35	34	33	32	31	30	LAD0
GND	2										29	GND
SB3V	3										28	V <sub>CC</sub>
GPIO6	4										27	LAD1
NC	5										26	LFRAME#
TestI	6										25	LCLK
TestBI	7										24	LAD2
V <sub>CC</sub>	8										23	V <sub>CC</sub>
GND	9										22	GND
NBO	10										21	LAD3
NBO	11										20	LRESET#
NBO	12										19	CLKRUN#
NBO	13										18	LRESET#
NBO	14										17	CLKRUN#
NBO	15										16	LRESET#
NBO	16										15	CLKRUN#
NBO	17										14	LRESET#
NBO	18										13	CLKRUN#
NBO	19										12	LRESET#
NBO	20										11	CLKRUN#

Figure 2-2. Atmel AT97SC3204 Block Diagram



The TPM includes a hardware random number generator, including a FIPS-approved Pseudo Random Number Generator that is used for key generation and TCG protocol functions. The RNG is also available to the system to generate random numbers that may be needed during normal operation.

The chip uses a dynamic internal memory management scheme to store multiple RSA keys. Other than the standard TCG commands (TPM\_FlushSpecific, TPM\_Loadkey2), no system intervention is required to manage this internal key cache.

The TPM is offered to OEM and ODM manufacturers as a turnkey solution, including the firmware integrated on the chip. In addition, Atmel provides the necessary device driver software for integration into certain operating systems, along with BIOS drivers. Atmel will also provide manufacturing support software for use by OEMs and ODMs during initialization and verification of the TPM during board assembly.

Full documentation for TCG primitives can be found in the TCG TPM Main Specification, Parts 1 to 3, on the TCG Web site located at <https://www.trustedcomputinggroup.org>. TPM features specific to PC Client platforms are specified in the "TCG PC Client Specific TPM Interface Specification, Version 1.2", also available on the TCG web site. Implementation guidance for 32-bit PC platforms is outlined in the "TCG PC Client Specific Implementation Specification for Conventional BIOS for TCG Version 1.2", also available on the TCG web site.

### 3. Ordering Information

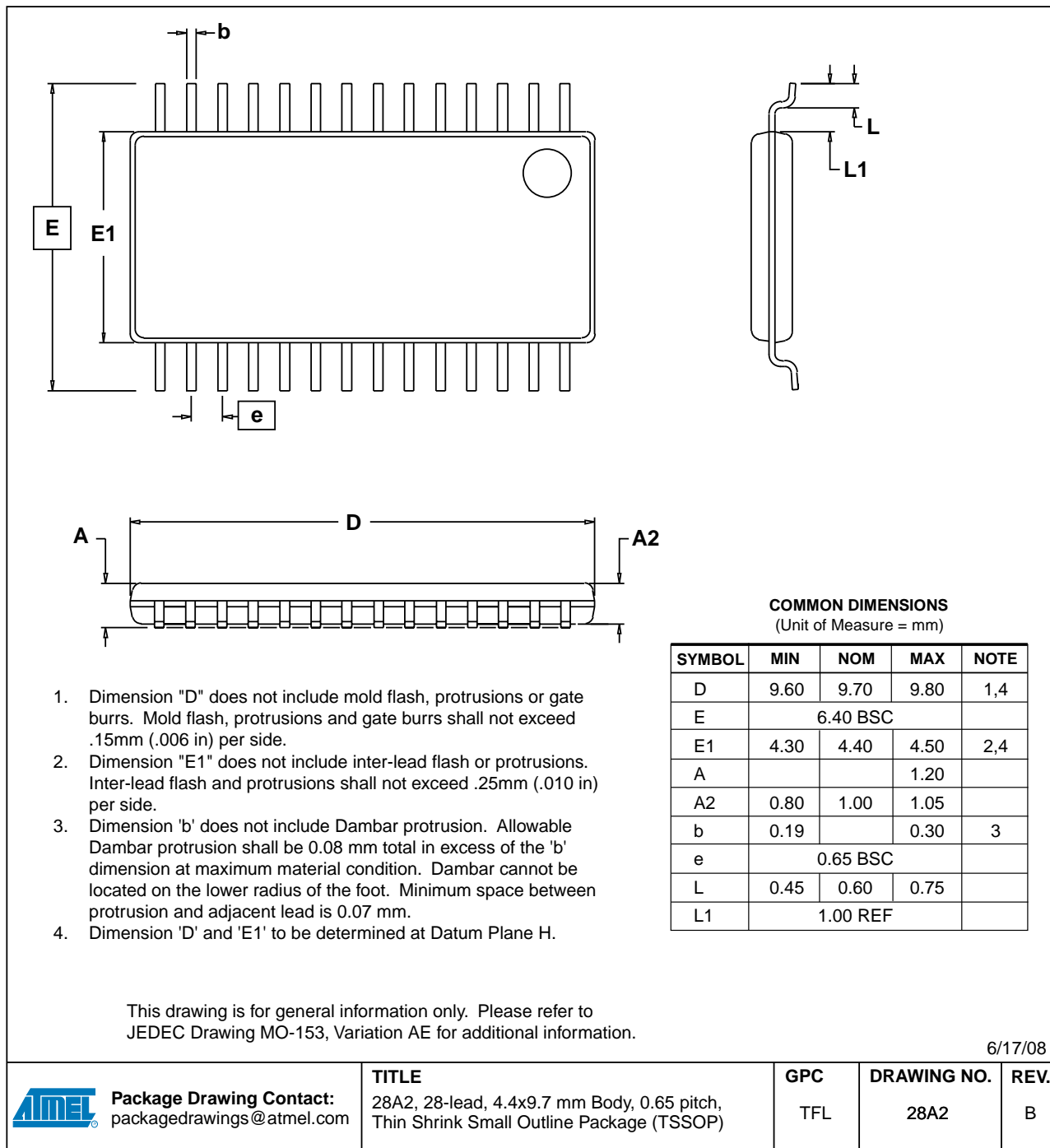
Table 1-2. Atmel AT24C256C Ordering Information

Atmel Ordering Code	Package		Operating Range
AT97SC3204 <sup>(1)</sup>	28A2 (28-pin Thin TSSOP)	Lead-free, RoHS	Commercial (0°C to 70°C) Industrial (-40°C to 85°C)
AT97SC3204 <sup>(1)</sup>	28A3 (28-pin TSSOP)	Lead-free, RoHS	Commercial (0°C to 70°C) Industrial (-40°C to 85°C)
AT97SC3204 <sup>(1)</sup>	40ML1 (40-pin QFN) <sup>(2)</sup>	Lead-free, RoHS	Commercial (0°C to 70°C) Industrial (-40°C to 85°C)

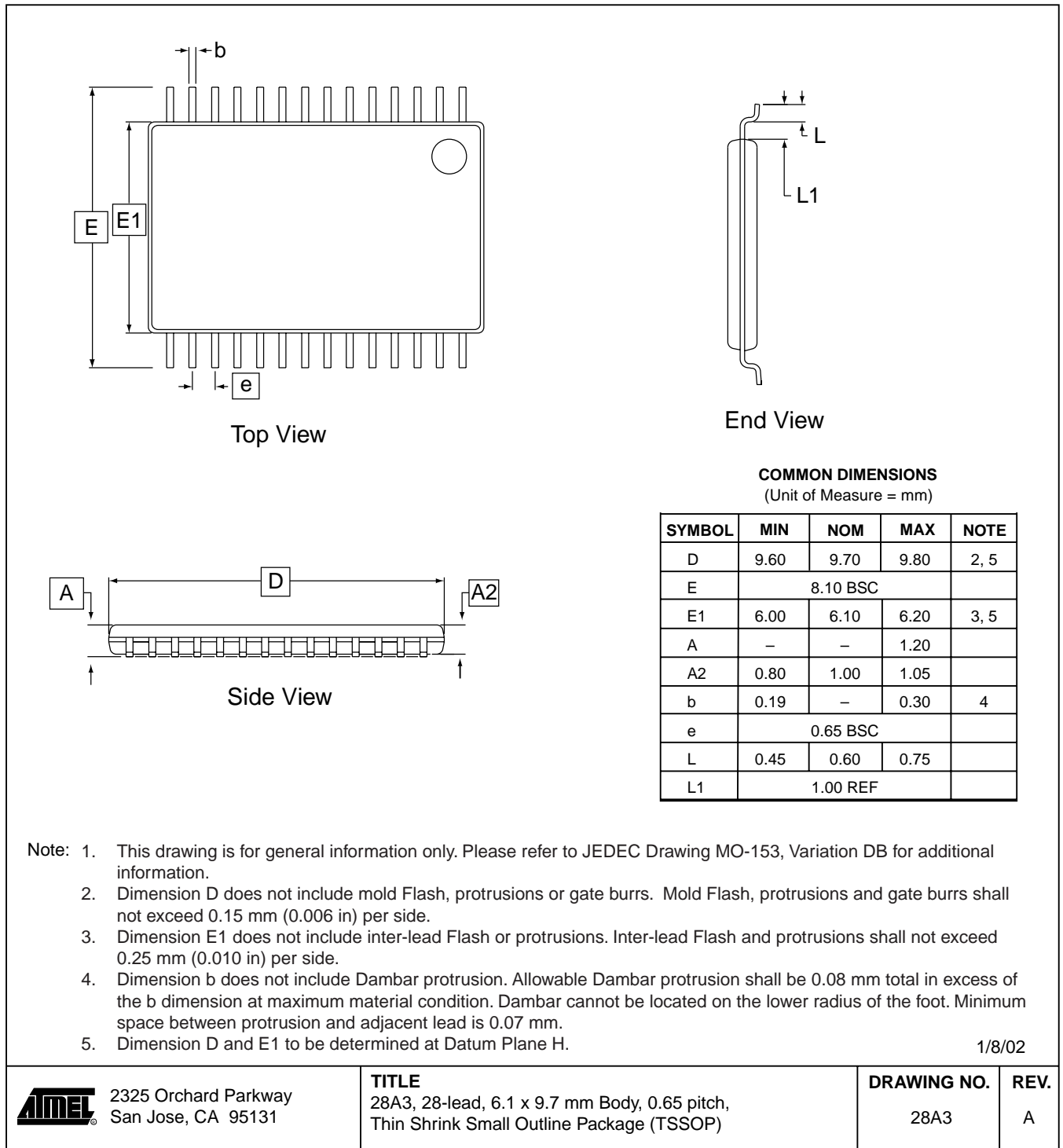
Notes: 1. Please see the Atmel AT97SC3204 datasheet addendum for the complete catalog number ordering code

## 4. Package Drawing

### 28A2 – Thin TSSOP

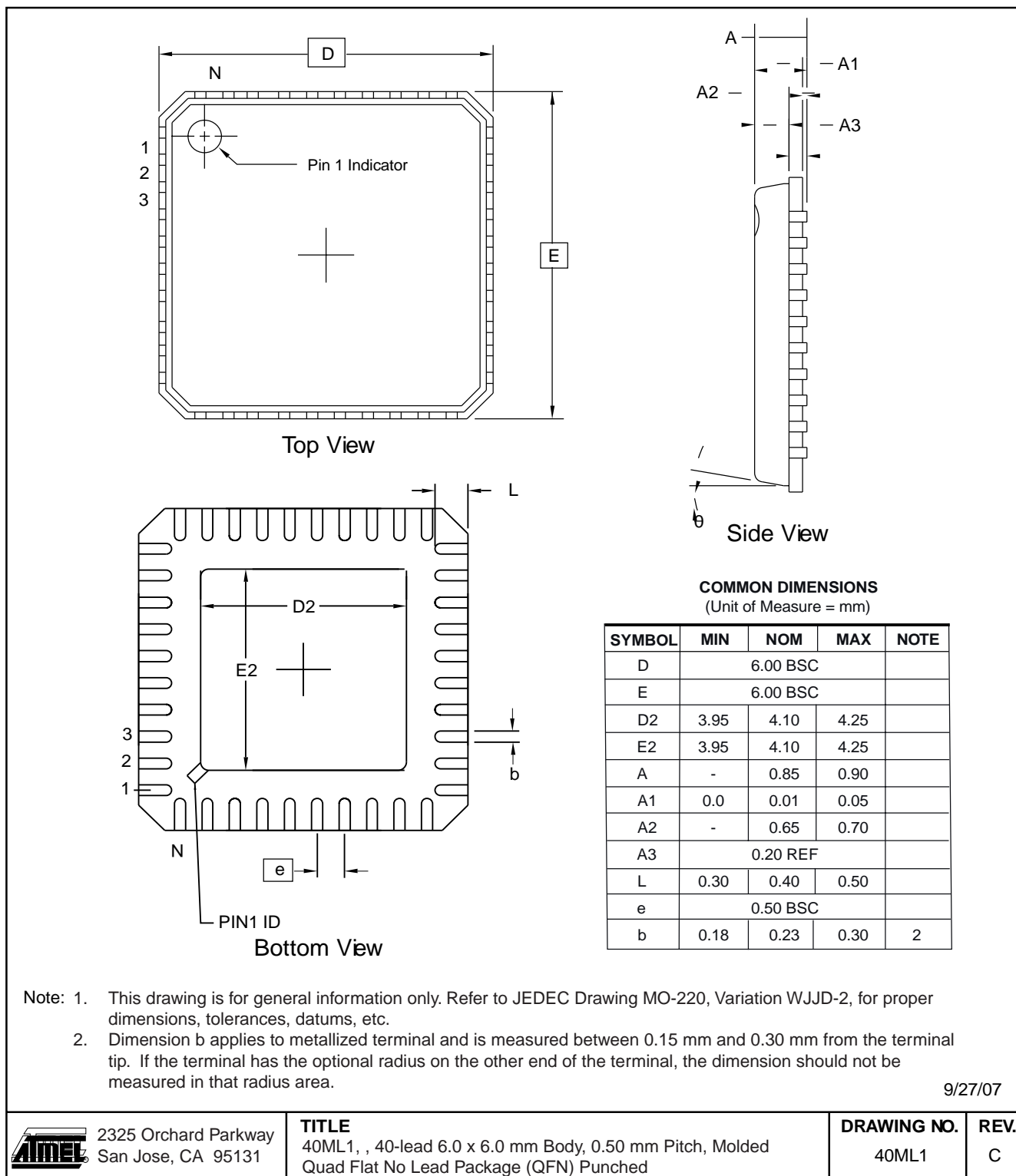


28A3 – TSSOP





# 40ML1 – QFN



## 5. Revision History

Doc. Rev.	Date	Comments
5294BS	10/2010	Added Industrial Grade support detail
5294AS	01/2008	Initial document release



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