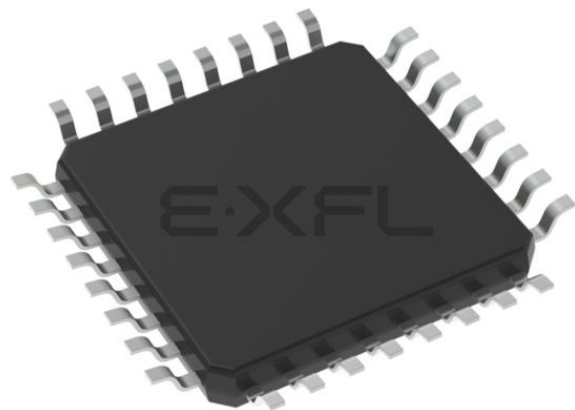




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### What is "[Embedded - Microcontrollers](#)"?

"[Embedded - Microcontrollers](#)" refer to small, integrated circuits designed to perform specific tasks within larger systems. These microcontrollers are essentially compact computers on a single chip, containing a processor core, memory, and programmable input/output peripherals. They are called "embedded" because they are embedded within electronic devices to control various functions, rather than serving as standalone computers. Microcontrollers are crucial in modern electronics, providing the intelligence and control needed for a wide range of applications.

### Applications of "[Embedded - Microcontrollers](#)"

#### Details

|                            |                                                                                                                                                                     |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Status             | Active                                                                                                                                                              |
| Core Processor             | ARM® Cortex®-M0+                                                                                                                                                    |
| Core Size                  | 32-Bit Single-Core                                                                                                                                                  |
| Speed                      | 48MHz                                                                                                                                                               |
| Connectivity               | I <sup>2</sup> C, SPI, UART/USART                                                                                                                                   |
| Peripherals                | Brown-out Detect/Reset, POR, WDT                                                                                                                                    |
| Number of I/O              | 26                                                                                                                                                                  |
| Program Memory Size        | 16KB (16K x 8)                                                                                                                                                      |
| Program Memory Type        | FLASH                                                                                                                                                               |
| EEPROM Size                | -                                                                                                                                                                   |
| RAM Size                   | 2K x 8                                                                                                                                                              |
| Voltage - Supply (Vcc/Vdd) | 1.62V ~ 3.6V                                                                                                                                                        |
| Data Converters            | A/D 10x12b; D/A 1x10b                                                                                                                                               |
| Oscillator Type            | Internal                                                                                                                                                            |
| Operating Temperature      | -40°C ~ 85°C (TA)                                                                                                                                                   |
| Mounting Type              | Surface Mount                                                                                                                                                       |
| Package / Case             | 32-TQFP                                                                                                                                                             |
| Supplier Device Package    | 32-TQFP (7x7)                                                                                                                                                       |
| Purchase URL               | <a href="https://www.e-xfl.com/product-detail/microchip-technology/atsamd20e14b-aut">https://www.e-xfl.com/product-detail/microchip-technology/atsamd20e14b-aut</a> |

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## 2. Configuration Summary

|                                                   | SAM D20J                                                                                                                                                                                                                                                                            | SAM D20G                              | SAM D20E                              |
|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|---------------------------------------|
| Pins                                              | 64                                                                                                                                                                                                                                                                                  | 48                                    | 32                                    |
| General Purpose I/O-pins (GPIOs)                  | 52                                                                                                                                                                                                                                                                                  | 38                                    | 26                                    |
| Flash                                             | 256/128/64/32KB                                                                                                                                                                                                                                                                     | 256/128/64/32KB                       | 256/128/64/32KB                       |
| SRAM                                              | 32/16/8/4/2KB                                                                                                                                                                                                                                                                       | 32/16/8/4/2KB                         | 32/16/8/4/2KB                         |
| Timer Counter (TC) instances                      | 8                                                                                                                                                                                                                                                                                   | 6                                     | 6                                     |
| Waveform output channels per TC instance          | 2                                                                                                                                                                                                                                                                                   | 2                                     | 2                                     |
| Serial Communication Interface (SERCOM) instances | 6                                                                                                                                                                                                                                                                                   | 6                                     | 4                                     |
| Analog-to-Digital Converter (ADC) channels        | 20                                                                                                                                                                                                                                                                                  | 14                                    | 10                                    |
| Analog Comparators (AC)                           | 2                                                                                                                                                                                                                                                                                   | 2                                     | 2                                     |
| Digital-to-Analog Converter (DAC) channels        | 1                                                                                                                                                                                                                                                                                   | 1                                     | 1                                     |
| Real-Time Counter (RTC)                           | Yes                                                                                                                                                                                                                                                                                 | Yes                                   | Yes                                   |
| RTC alarms                                        | 1                                                                                                                                                                                                                                                                                   | 1                                     | 1                                     |
| RTC compare values                                | One 32-bit value or two 16-bit values                                                                                                                                                                                                                                               | One 32-bit value or two 16-bit values | One 32-bit value or two 16-bit values |
| External Interrupt lines                          | 16                                                                                                                                                                                                                                                                                  | 16                                    | 16                                    |
| Peripheral Touch Controller (PTC) X and Y lines   | 16x16                                                                                                                                                                                                                                                                               | 12x10                                 | 10x6                                  |
| Maximum CPU frequency                             | 48MHz                                                                                                                                                                                                                                                                               |                                       |                                       |
| Packages                                          | QFN<br>TQFP<br>UFBGA                                                                                                                                                                                                                                                                | QFN<br>TQFP<br>WLCSP                  | QFN<br>TQFP                           |
| Oscillators                                       | 32.768kHz crystal oscillator (XOSC32K)<br>0.4-32MHz crystal oscillator (XOSC)<br>32.768kHz internal oscillator (OSC32K)<br>32KHz ultra-low-power internal oscillator (OSCULP32K)<br>8MHz high-accuracy internal oscillator (OSC8M)<br>48MHz Digital Frequency Locked Loop (DFLL48M) |                                       |                                       |
| Event System channels                             | 8                                                                                                                                                                                                                                                                                   | 8                                     | 8                                     |
| SW Debug Interface                                | Yes                                                                                                                                                                                                                                                                                 | Yes                                   | Yes                                   |
| Watchdog Timer (WDT)                              | Yes                                                                                                                                                                                                                                                                                 | Yes                                   | Yes                                   |

| Ordering Code    | FLASH (bytes) | SRAM (bytes) | Package | Carrier Type |
|------------------|---------------|--------------|---------|--------------|
| ATSAMD20G17A-AU  | 128K          | 16K          | TQFP48  | Tray         |
| ATSAMD20G17A-AUT |               |              |         | Tape & Reel  |
| ATSAMD20G17A-AN  |               |              |         | Tray         |
| ATSAMD20G17A-ANT |               |              |         | Tape & Reel  |
| ATSAMD20G17A-MU  |               |              | QFN48   | Tray         |
| ATSAMD20G17A-MUT |               |              |         | Tape & Reel  |
| ATSAMD20G17A-MN  |               |              |         | Tray         |
| ATSAMD20G17A-MNT |               |              |         | Tape & Reel  |
| ATSAMD20G17A-UUT |               |              | WLCSP45 | Tape & Reel  |
| ATSAMD20G18A-AU  | 256K          | 32K          | TQFP48  | Tray         |
| ATSAMD20G18A-AUT |               |              |         | Tape & Reel  |
| ATSAMD20G18A-AN  |               |              |         | Tray         |
| ATSAMD20G18A-ANT |               |              |         | Tape & Reel  |
| ATSAMD20G18A-MU  |               |              | QFN48   | Tray         |
| ATSAMD20G18A-MUT |               |              |         | Tape & Reel  |
| ATSAMD20G18A-MN  |               |              |         | Tray         |
| ATSAMD20G18A-MNT |               |              |         | Tape & Reel  |
| ATSAMD20G18A-UUT |               |              | WLCSP45 | Tape & Reel  |

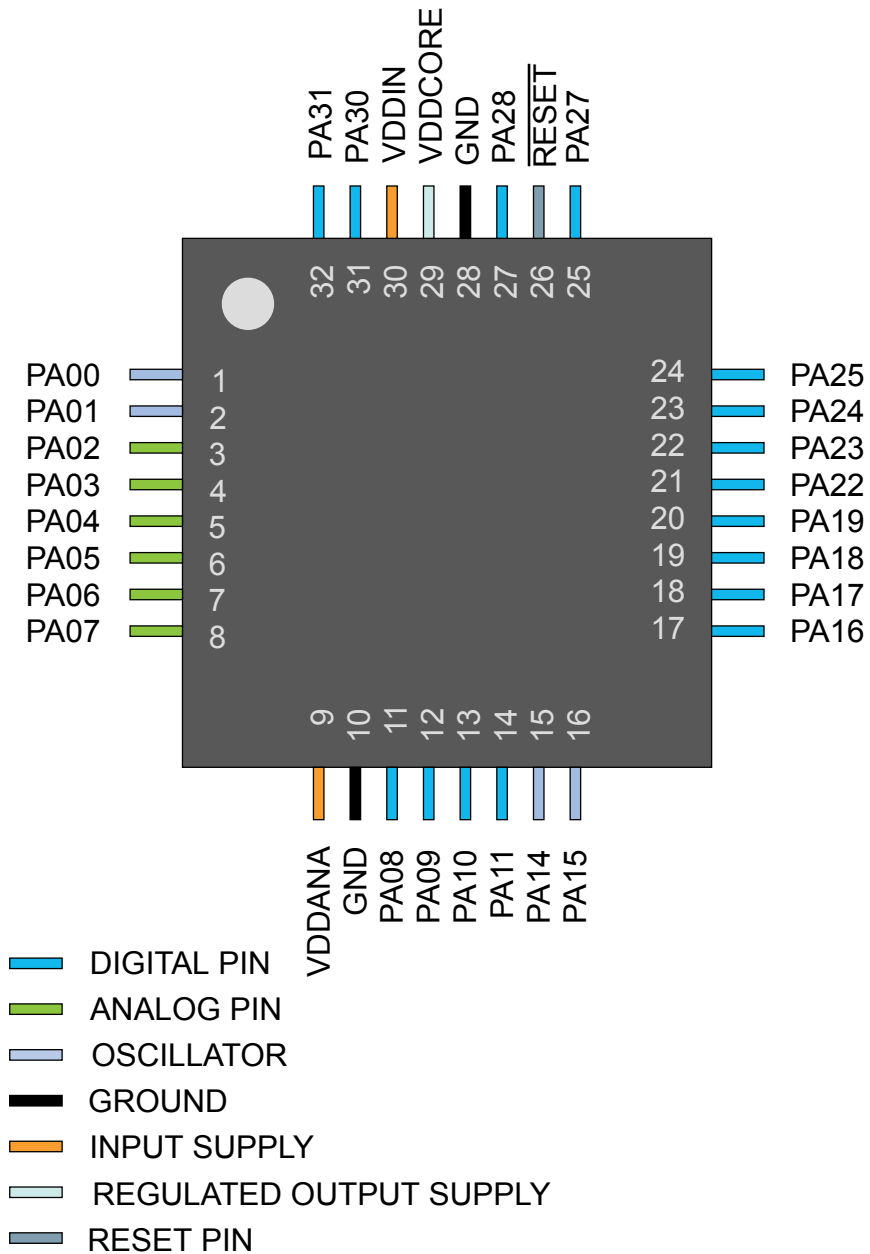
### 3.3. SAM D20J

| Ordering Code    | FLASH (bytes) | SRAM (bytes) | Package | Carrier Type |
|------------------|---------------|--------------|---------|--------------|
| ATSAMD20J14A-AU  | 16K           | 2K           | TQFP64  | Tray         |
| ATSAMD20J14A-AUT |               |              |         | Tape & Reel  |
| ATSAMD20J14A-AN  |               |              |         | Tray         |
| ATSAMD20J14A-ANT |               |              |         | Tape & Reel  |
| ATSAMD20J14A-MU  |               |              | QFN64   | Tray         |
| ATSAMD20J14A-MUT |               |              |         | Tape & Reel  |
| ATSAMD20J14A-MN  |               |              |         | Tray         |
| ATSAMD20J14A-MNT |               |              |         | Tape & Reel  |

| Ordering Code    | FLASH (bytes) | SRAM (bytes) | Package | Carrier Type |
|------------------|---------------|--------------|---------|--------------|
| ATSAMD20J15A-AU  | 32K           | 4K           | TQFP64  | Tray         |
| ATSAMD20J15A-AUT |               |              |         | Tape & Reel  |
| ATSAMD20J15A-AN  |               |              |         | Tray         |
| ATSAMD20J15A-ANT |               |              |         | Tape & Reel  |
| ATSAMD20J15A-MU  |               |              | QFN64   | Tray         |
| ATSAMD20J15A-MUT |               |              |         | Tape & Reel  |
| ATSAMD20J15A-MN  |               |              |         | Tray         |
| ATSAMD20J15A-MNT |               |              |         | Tape & Reel  |
| ATSAMD20J16A-AU  | 64K           | 8K           | TQFP64  | Tray         |
| ATSAMD20J16A-AUT |               |              |         | Tape & Reel  |
| ATSAMD20J16A-AN  |               |              |         | Tray         |
| ATSAMD20J16A-ANT |               |              |         | Tape & Reel  |
| ATSAMD20J16A-MU  |               |              | QFN64   | Tray         |
| ATSAMD20J16A-MUT |               |              |         | Tape & Reel  |
| ATSAMD20J16A-MN  |               |              |         | Tray         |
| ATSAMD20J16A-MNT |               |              |         | Tape & Reel  |
| ATSAMD20J16A-CU  |               |              | UFBGA64 | Tray         |
| ATSAMD20J16A-CUT |               |              |         | Tape & Reel  |
| ATSAMD20J17A-AU  | 128K          | 16K          | TQFP64  | Tray         |
| ATSAMD20J17A-AUT |               |              |         | Tape & Reel  |
| ATSAMD20J17A-AN  |               |              |         | Tray         |
| ATSAMD20J17A-ANT |               |              |         | Tape & Reel  |
| ATSAMD20J17A-MU  |               |              | QFN64   | Tray         |
| ATSAMD20J17A-MUT |               |              |         | Tape & Reel  |
| ATSAMD20J17A-MN  |               |              |         | Tray         |
| ATSAMD20J17A-MNT |               |              |         | Tape & Reel  |
| ATSAMD20J17A-CU  |               |              | UFBGA64 | Tray         |
| ATSAMD20J17A-CUT |               |              |         | Tape & Reel  |

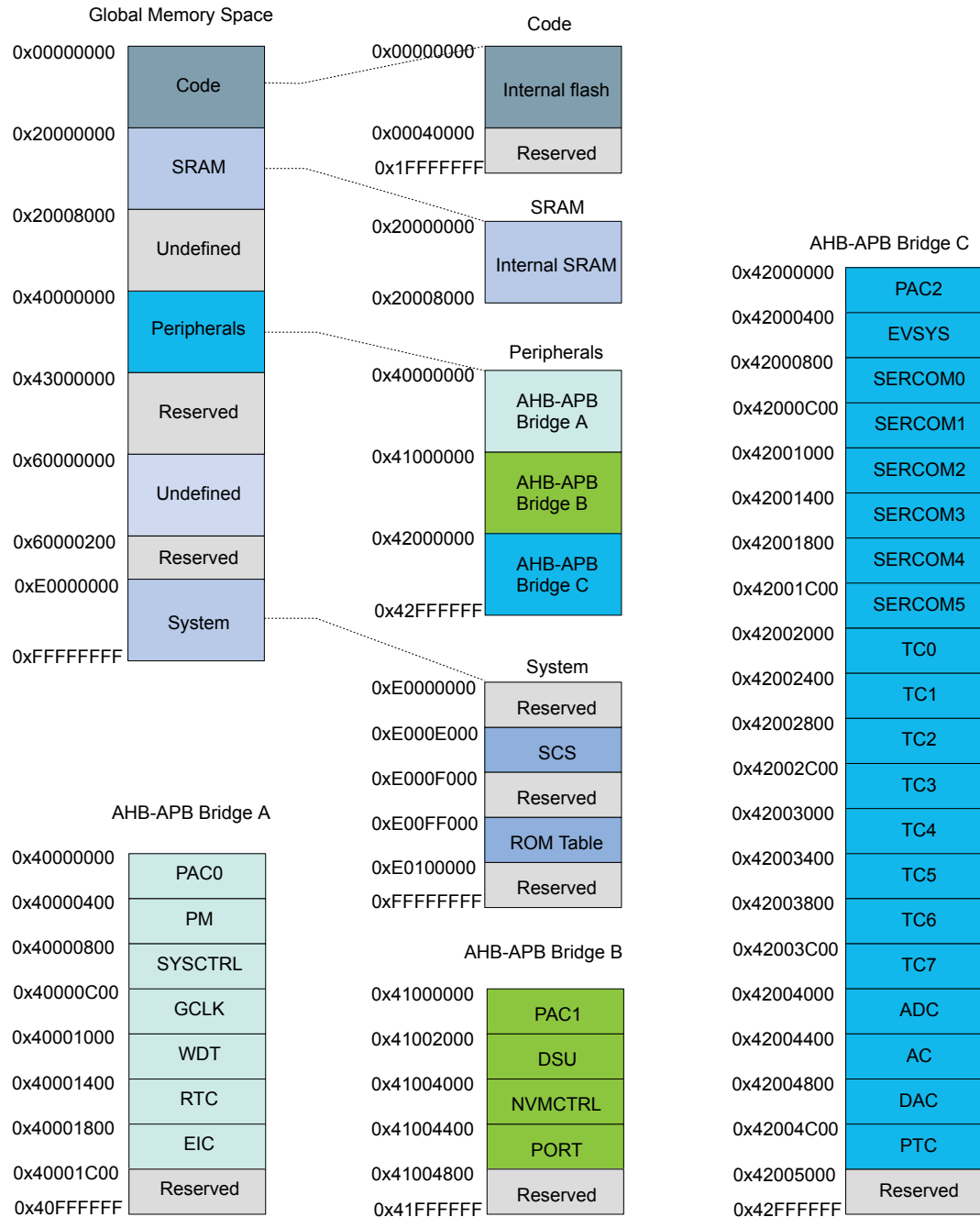
### 5.3. SAM D20E

#### 5.3.1. QFN32 / TQFP32



## 6. Product Mapping

Figure 6-1. Product Mapping



This figure represents the full configuration of the SAM D20 device with maximum flash and SRAM capabilities and a full set of peripherals. Refer to the [Configuration Summary](#) for details.

- The System Timer is a 24-bit timer that extends the functionality of both the processor and the NVIC. Refer to the Cortex-M0+ Technical Reference Manual for details ([www.arm.com](http://www.arm.com)).
- Nested Vectored Interrupt Controller (NVIC)
  - External interrupt signals connect to the NVIC, and the NVIC prioritizes the interrupts. Software can set the priority of each interrupt. The NVIC and the Cortex-M0+ processor core are closely coupled, providing low latency interrupt processing and efficient processing of late arriving interrupts. Refer to [Nested Vector Interrupt Controller](#) and the Cortex-M0+ Technical Reference Manual for details ([www.arm.com](http://www.arm.com)).
- System Control Block (SCB)
  - The System Control Block provides system implementation information, and system control. This includes configuration, control, and reporting of the system exceptions. Refer to the Cortex-M0+ Devices Generic User Guide for details ([www.arm.com](http://www.arm.com)).
- Micro Trace Buffer (MTB)
  - The CoreSight MTB-M0+ (MTB) provides a simple execution trace capability to the Cortex-M0+ processor. Refer to section [Micro Trace Buffer](#) and the CoreSight MTB-M0+ Technical Reference Manual for details ([www.arm.com](http://www.arm.com)).

### 7.1.3. Cortex-M0+ Address Map

Table 7-2. Cortex-M0+ Address Map

| Address                               | Peripheral                                  |
|---------------------------------------|---------------------------------------------|
| 0xE000E000                            | System Control Space (SCS)                  |
| 0xE000E010                            | System Timer (SysTick)                      |
| 0xE000E100                            | Nested Vectored Interrupt Controller (NVIC) |
| 0xE000ED00                            | System Control Block (SCB)                  |
| 0x41006000 (see also Product Mapping) | Micro Trace Buffer (MTB)                    |

### 7.1.4. I/O Interface

#### 7.1.4.1. Overview

Because accesses to the AMBA® AHB-Lite™ and the single cycle I/O interface can be made concurrently, the Cortex-M0+ processor can fetch the next instructions while accessing the I/Os. This enables single cycle I/O accesses to be sustained for as long as needed. Refer to *CPU Local Bus* for more information.

#### 7.1.4.2. Description

Direct access to PORT registers.

## 7.2. Nested Vector Interrupt Controller

### 7.2.1. Overview

The Nested Vectored Interrupt Controller (NVIC) in the SAM D20 supports 32 interrupt lines with four different priority levels. For more details, refer to the Cortex-M0+ Technical Reference Manual ([www.arm.com](http://www.arm.com)).

### 7.2.2. Interrupt Line Mapping

Each of the 28 interrupt lines is connected to one peripheral instance, as shown in the table below. Each peripheral can have one or more interrupt flags, located in the peripheral's Interrupt Flag Status and Clear

Write-protect registers allow the user to disable a selected peripheral's write-protection without doing a read-modify-write operation. These registers are mapped into two I/O memory locations, one for clearing and one for setting the register bits. Writing a one to a bit in the Write Protect Clear register (WPCLR) will clear the corresponding bit in both registers (WPCLR and WPSET) and disable the write-protection for the corresponding peripheral, while writing a one to a bit in the Write Protect Set (WPSET) register will set the corresponding bit in both registers (WPCLR and WPSET) and enable the write-protection for the corresponding peripheral. Both registers (WPCLR and WPSET) will return the same value when read.

If a peripheral is write-protected, and if a write access is performed, data will not be written, and the peripheral will return an access error (CPU exception).

The PAC also offers a safety feature for correct program execution, with a CPU exception generated on double write-protection or double unprotection of a peripheral. If a peripheral *n* is write-protected and a write to one in WPSET[*n*] is detected, the PAC returns an error. This can be used to ensure that the application follows the intended program flow by always following a write-protect with an unprotect, and vice versa. However, in applications where a write-protected peripheral is used in several contexts, e.g., interrupts, care should be taken so that either the interrupt can not happen while the main application or other interrupt levels manipulate the write-protection status, or when the interrupt handler needs to unprotect the peripheral, based on the current protection status, by reading WPSET.

## 7.7. Register Description

Atomic 8-, 16- and 32-bit accesses are supported. In addition, the 8-bit quarters and 16-bit halves of a 32-bit register, and the 8-bit halves of a 16-bit register can be accessed directly. Refer to the Product Mapping for PAC locations.

### Related Links

[Product Mapping](#) on page 19

### 7.7.1. PAC0 Register Description

### 7.7.1.1. Write Protect Clear

**Name:** WPCLR  
**Offset:** 0x00  
**Reset:** 0x000000  
**Property:** –

|        |    |     |     |     |      |         |     |    |
|--------|----|-----|-----|-----|------|---------|-----|----|
| Bit    | 31 | 30  | 29  | 28  | 27   | 26      | 25  | 24 |
|        |    |     |     |     |      |         |     |    |
| Access |    |     |     |     |      |         |     |    |
| Reset  |    |     |     |     |      |         |     |    |
| Bit    | 23 | 22  | 21  | 20  | 19   | 18      | 17  | 16 |
|        |    |     |     |     |      |         |     |    |
| Access |    |     |     |     |      |         |     |    |
| Reset  |    |     |     |     |      |         |     |    |
| Bit    | 15 | 14  | 13  | 12  | 11   | 10      | 9   | 8  |
|        |    |     |     |     |      |         |     |    |
| Access |    |     |     |     |      |         |     |    |
| Reset  |    |     |     |     |      |         |     |    |
| Bit    | 7  | 6   | 5   | 4   | 3    | 2       | 1   | 0  |
|        |    | EIC | RTC | WDT | GCLK | SYSCTRL | PM  |    |
| Access |    | R/W | R/W | R/W | R/W  | R/W     | R/W |    |
| Reset  |    | 0   | 0   | 0   | 0    | 0       | 0   |    |

#### Bit 6 – EIC

Writing a zero to these bits has no effect.

Writing a one to these bits will clear the Write Protect bit for the corresponding peripherals.

| Value | Description                   |
|-------|-------------------------------|
| 0     | Write-protection is disabled. |
| 1     | Write-protection is enabled.  |

#### Bit 5 – RTC

Writing a zero to these bits has no effect.

Writing a one to these bits will clear the Write Protect bit for the corresponding peripherals.

| Value | Description                   |
|-------|-------------------------------|
| 0     | Write-protection is disabled. |
| 1     | Write-protection is enabled.  |

#### Bit 4 – WDT

Writing a zero to these bits has no effect.

Writing a one to these bits will clear the Write Protect bit for the corresponding peripherals.

| Value | Description                   |
|-------|-------------------------------|
| 0     | Write-protection is disabled. |
| 1     | Write-protection is enabled.  |

### Bit 3 – GCLK

Writing a zero to these bits has no effect.

Writing a one to these bits will clear the Write Protect bit for the corresponding peripherals.

| Value | Description                   |
|-------|-------------------------------|
| 0     | Write-protection is disabled. |
| 1     | Write-protection is enabled.  |

### Bit 2 – SYSCTRL

Writing a zero to these bits has no effect.

Writing a one to these bits will clear the Write Protect bit for the corresponding peripherals.

| Value | Description                   |
|-------|-------------------------------|
| 0     | Write-protection is disabled. |
| 1     | Write-protection is enabled.  |

### Bit 1 – PM

Writing a zero to these bits has no effect.

Writing a one to these bits will clear the Write Protect bit for the corresponding peripherals.

| Value | Description                   |
|-------|-------------------------------|
| 0     | Write-protection is disabled. |
| 1     | Write-protection is enabled.  |

### 7.7.1.2. Write Protect Set

**Name:** WPSET  
**Offset:** 0x04  
**Reset:** 0x000000  
**Property:** –

|        |    |     |     |     |      |         |     |    |
|--------|----|-----|-----|-----|------|---------|-----|----|
| Bit    | 31 | 30  | 29  | 28  | 27   | 26      | 25  | 24 |
|        |    |     |     |     |      |         |     |    |
| Access |    |     |     |     |      |         |     |    |
| Reset  |    |     |     |     |      |         |     |    |
| Bit    | 23 | 22  | 21  | 20  | 19   | 18      | 17  | 16 |
|        |    |     |     |     |      |         |     |    |
| Access |    |     |     |     |      |         |     |    |
| Reset  |    |     |     |     |      |         |     |    |
| Bit    | 15 | 14  | 13  | 12  | 11   | 10      | 9   | 8  |
|        |    |     |     |     |      |         |     |    |
| Access |    |     |     |     |      |         |     |    |
| Reset  |    |     |     |     |      |         |     |    |
| Bit    | 7  | 6   | 5   | 4   | 3    | 2       | 1   | 0  |
|        |    | EIC | RTC | WDT | GCLK | SYSCTRL | PM  |    |
| Access |    | R/W | R/W | R/W | R/W  | R/W     | R/W |    |
| Reset  |    | 0   | 0   | 0   | 0    | 0       | 0   |    |

#### Bit 6 – EIC

Writing a zero to these bits has no effect.

Writing a one to these bits will clear the Write Protect bit for the corresponding peripherals.

| Value | Description                   |
|-------|-------------------------------|
| 0     | Write-protection is disabled. |
| 1     | Write-protection is enabled.  |

#### Bit 5 – RTC

Writing a zero to these bits has no effect.

Writing a one to these bits will clear the Write Protect bit for the corresponding peripherals.

| Value | Description                   |
|-------|-------------------------------|
| 0     | Write-protection is disabled. |
| 1     | Write-protection is enabled.  |

#### Bit 4 – WDT

Writing a zero to these bits has no effect.

Writing a one to these bits will clear the Write Protect bit for the corresponding peripherals.

| Value | Description                   |
|-------|-------------------------------|
| 0     | Write-protection is disabled. |
| 1     | Write-protection is enabled.  |

#### Bit 1 – DSU

Writing a zero to these bits has no effect.

Writing a one to these bits will clear the Write Protect bit for the corresponding peripherals.

| Value | Description                   |
|-------|-------------------------------|
| 0     | Write-protection is disabled. |
| 1     | Write-protection is enabled.  |

### 7.7.3.1. Write Protect Clear

**Name:** WPCLR  
**Offset:** 0x00  
**Reset:** 0x00800000  
**Property:** –

|        |         |         |         |         |         |         |       |     |
|--------|---------|---------|---------|---------|---------|---------|-------|-----|
| Bit    | 31      | 30      | 29      | 28      | 27      | 26      | 25    | 24  |
|        |         |         |         |         |         |         |       |     |
| Access |         |         |         |         |         |         |       |     |
| Reset  |         |         |         |         |         |         |       |     |
| Bit    | 23      | 22      | 21      | 20      | 19      | 18      | 17    | 16  |
|        |         |         |         |         | PTC     | DAC     | AC    | ADC |
| Access |         |         |         |         | R/W     | R/W     | R/W   | R/W |
| Reset  |         |         |         |         | 0       | 0       | 0     | 0   |
| Bit    | 15      | 14      | 13      | 12      | 11      | 10      | 9     | 8   |
|        | TC7     | TC6     | TC5     | TC4     | TC3     | TC2     | TC1   | TC0 |
| Access | R/W     | R/W     | R/W     | R/W     | R/W     | R/W     | R/W   | R/W |
| Reset  | 0       | 0       | 0       | 0       | 0       | 0       | 0     | 0   |
| Bit    | 7       | 6       | 5       | 4       | 3       | 2       | 1     | 0   |
|        | SERCOM5 | SERCOM4 | SERCOM3 | SERCOM2 | SERCOM1 | SERCOM0 | EVSYS |     |
| Access | R/W     | R/W     | R/W     | R/W     | R/W     | R/W     | R/W   |     |
| Reset  | 0       | 0       | 0       | 0       | 0       | 0       | 0     |     |

#### Bit 19 – PTC

Writing a zero to these bits has no effect.

Writing a one to these bits will clear the Write Protect bit for the corresponding peripherals.

| Value | Description                   |
|-------|-------------------------------|
| 0     | Write-protection is disabled. |
| 1     | Write-protection is enabled.  |

#### Bit 18 – DAC

Writing a zero to these bits has no effect.

Writing a one to these bits will clear the Write Protect bit for the corresponding peripherals.

| Value | Description                   |
|-------|-------------------------------|
| 0     | Write-protection is disabled. |
| 1     | Write-protection is enabled.  |

#### Bit 17 – AC

Writing a zero to these bits has no effect.

Writing a one to these bits will clear the Write Protect bit for the corresponding peripherals.

| Value | Description                   |
|-------|-------------------------------|
| 0     | Write-protection is disabled. |
| 1     | Write-protection is enabled.  |

#### Bit 16 – ADC

Writing a zero to these bits has no effect.

Writing a one to these bits will clear the Write Protect bit for the corresponding peripherals.

| Value | Description                   |
|-------|-------------------------------|
| 0     | Write-protection is disabled. |
| 1     | Write-protection is enabled.  |

#### Bits 15,14,13,12,11,10,9,8 – TCx

Writing a zero to these bits has no effect.

Writing a one to these bits will clear the Write Protect bit for the corresponding peripherals.

| Value | Description                   |
|-------|-------------------------------|
| 0     | Write-protection is disabled. |
| 1     | Write-protection is enabled.  |

#### Bits 7,6,5,4,3,2 – SERCOMx

Writing a zero to these bits has no effect.

Writing a one to these bits will clear the Write Protect bit for the corresponding peripherals.

| Value | Description                   |
|-------|-------------------------------|
| 0     | Write-protection is disabled. |
| 1     | Write-protection is enabled.  |

#### Bit 1 – EVSYS

Writing a zero to these bits has no effect.

Writing a one to these bits will clear the Write Protect bit for the corresponding peripherals.

| Value | Description                   |
|-------|-------------------------------|
| 0     | Write-protection is disabled. |
| 1     | Write-protection is enabled.  |

### 7.7.3.2. Write Protect Set

**Name:** WPSET  
**Offset:** 0x04  
**Reset:** 0x00800000  
**Property:** –

|        |         |         |         |         |         |         |       |     |
|--------|---------|---------|---------|---------|---------|---------|-------|-----|
| Bit    | 31      | 30      | 29      | 28      | 27      | 26      | 25    | 24  |
|        |         |         |         |         |         |         |       |     |
| Access |         |         |         |         |         |         |       |     |
| Reset  |         |         |         |         |         |         |       |     |
| Bit    | 23      | 22      | 21      | 20      | 19      | 18      | 17    | 16  |
|        |         |         |         |         | PTC     | DAC     | AC    | ADC |
| Access |         |         |         |         | R/W     | R/W     | R/W   | R/W |
| Reset  |         |         |         |         | 0       | 0       | 0     | 0   |
| Bit    | 15      | 14      | 13      | 12      | 11      | 10      | 9     | 8   |
|        | TC7     | TC6     | TC5     | TC4     | TC3     | TC2     | TC1   | TC0 |
| Access | R/W     | R/W     | R/W     | R/W     | R/W     | R/W     | R/W   | R/W |
| Reset  | 0       | 0       | 0       | 0       | 0       | 0       | 0     | 0   |
| Bit    | 7       | 6       | 5       | 4       | 3       | 2       | 1     | 0   |
|        | SERCOM5 | SERCOM4 | SERCOM3 | SERCOM2 | SERCOM1 | SERCOM0 | EVSYN |     |
| Access | R/W     | R/W     | R/W     | R/W     | R/W     | R/W     | R/W   |     |
| Reset  | 0       | 0       | 0       | 0       | 0       | 0       | 0     |     |

#### Bit 19 – PTC

Writing a zero to these bits has no effect.

Writing a one to these bits will clear the Write Protect bit for the corresponding peripherals.

| Value | Description                   |
|-------|-------------------------------|
| 0     | Write-protection is disabled. |
| 1     | Write-protection is enabled.  |

#### Bit 18 – DAC

Writing a zero to these bits has no effect.

Writing a one to these bits will clear the Write Protect bit for the corresponding peripherals.

| Value | Description                   |
|-------|-------------------------------|
| 0     | Write-protection is disabled. |
| 1     | Write-protection is enabled.  |

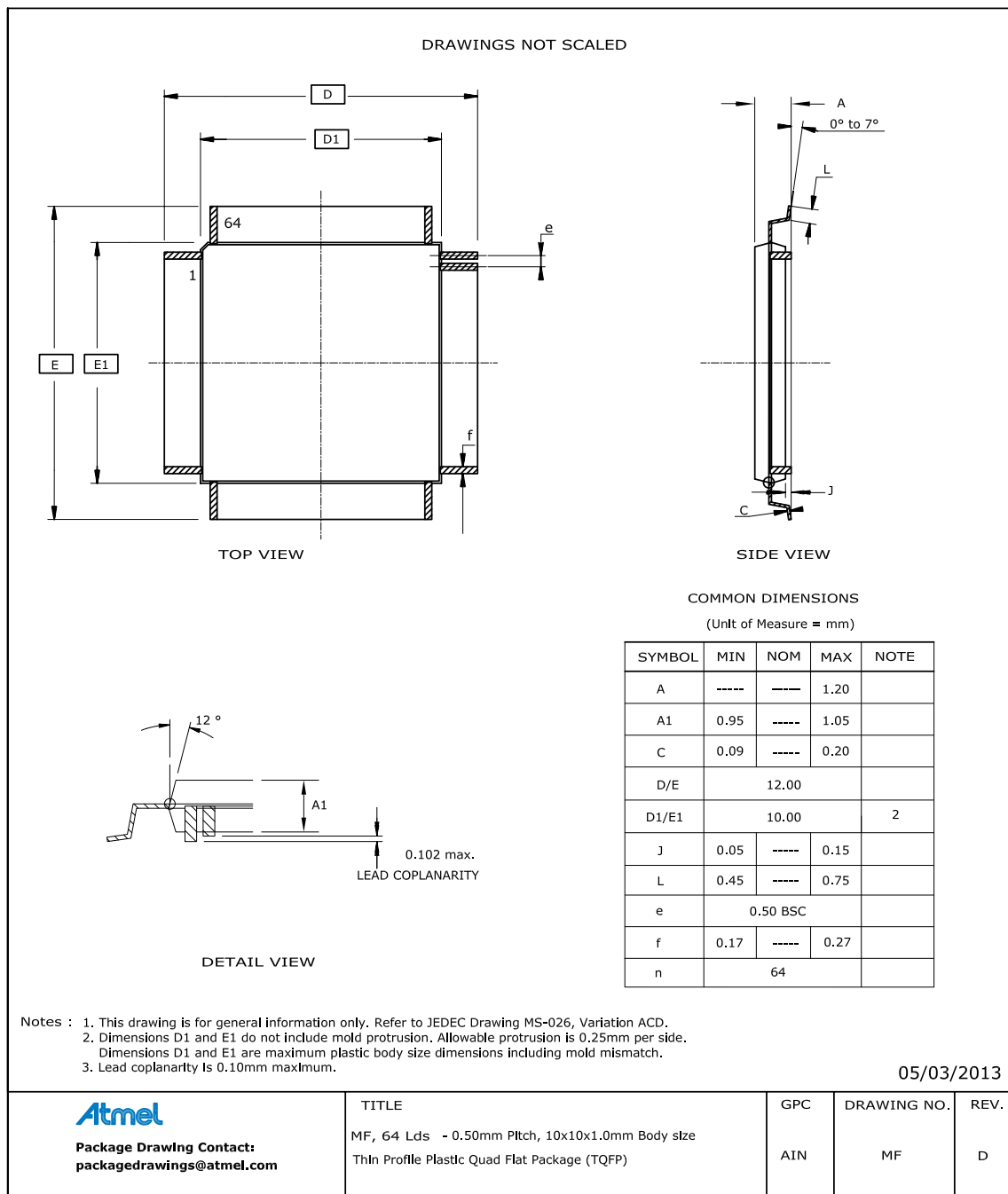
#### Bit 17 – AC

Writing a zero to these bits has no effect.

Writing a one to these bits will clear the Write Protect bit for the corresponding peripherals.

## 8.2. Package Drawings

### 8.2.1. 64 pin TQFP



**Table 8-2. Device and Package Maximum Weight**

|     |    |
|-----|----|
| 300 | mg |
|-----|----|

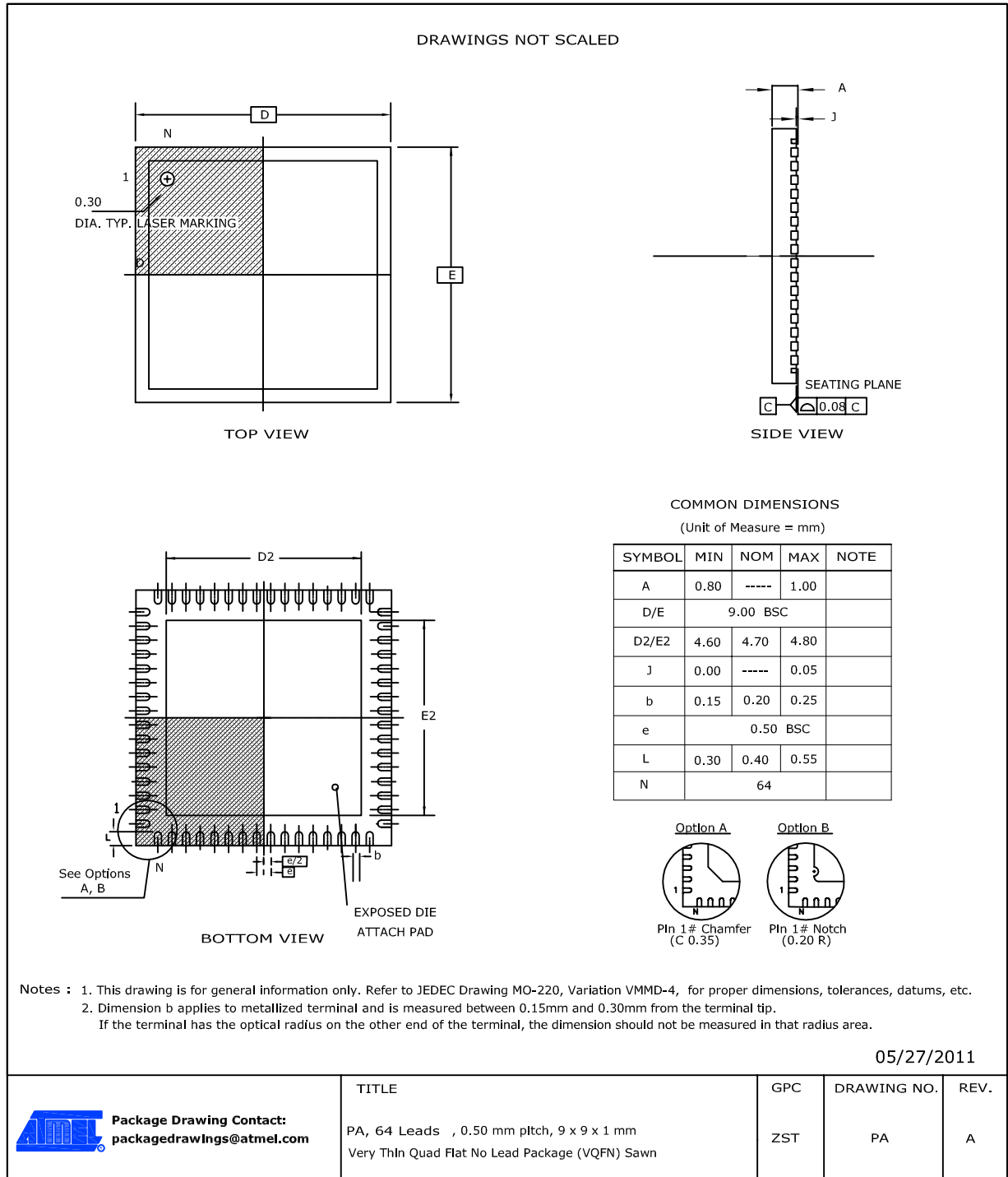
**Table 8-3. Package Characteristics**

|                            |      |
|----------------------------|------|
| Moisture Sensitivity Level | MSL3 |
|----------------------------|------|

**Table 8-4. Package Reference**

|                         |        |
|-------------------------|--------|
| JEDEC Drawing Reference | MS-026 |
| JESD97 Classification   | E3     |

### 8.2.2. 64 pin QFN



**Note:** The exposed die attach pad is not connected electrically inside the device.

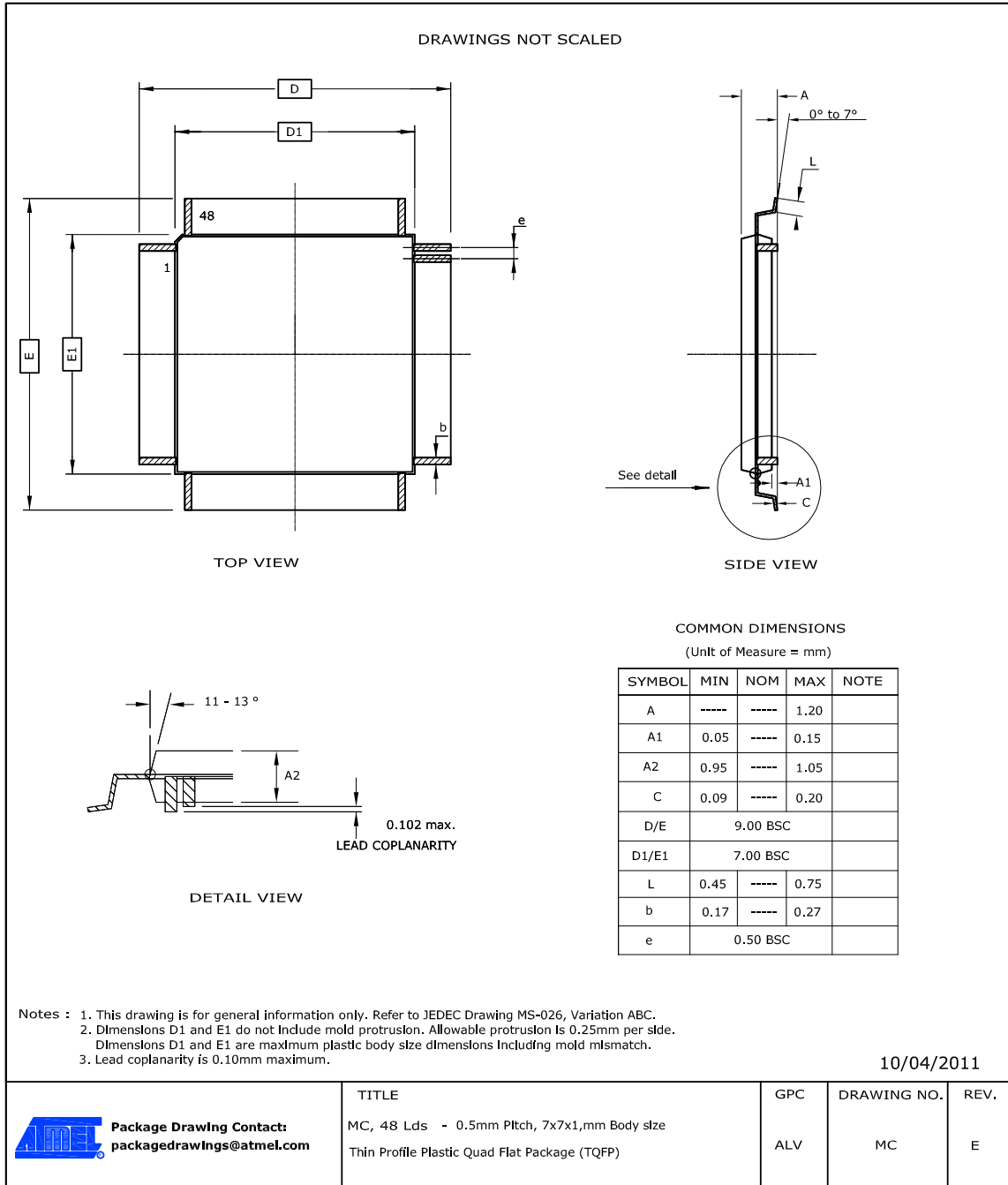
**Table 8-9. Package Characteristics**

|                            |      |
|----------------------------|------|
| Moisture Sensitivity Level | MSL3 |
|----------------------------|------|

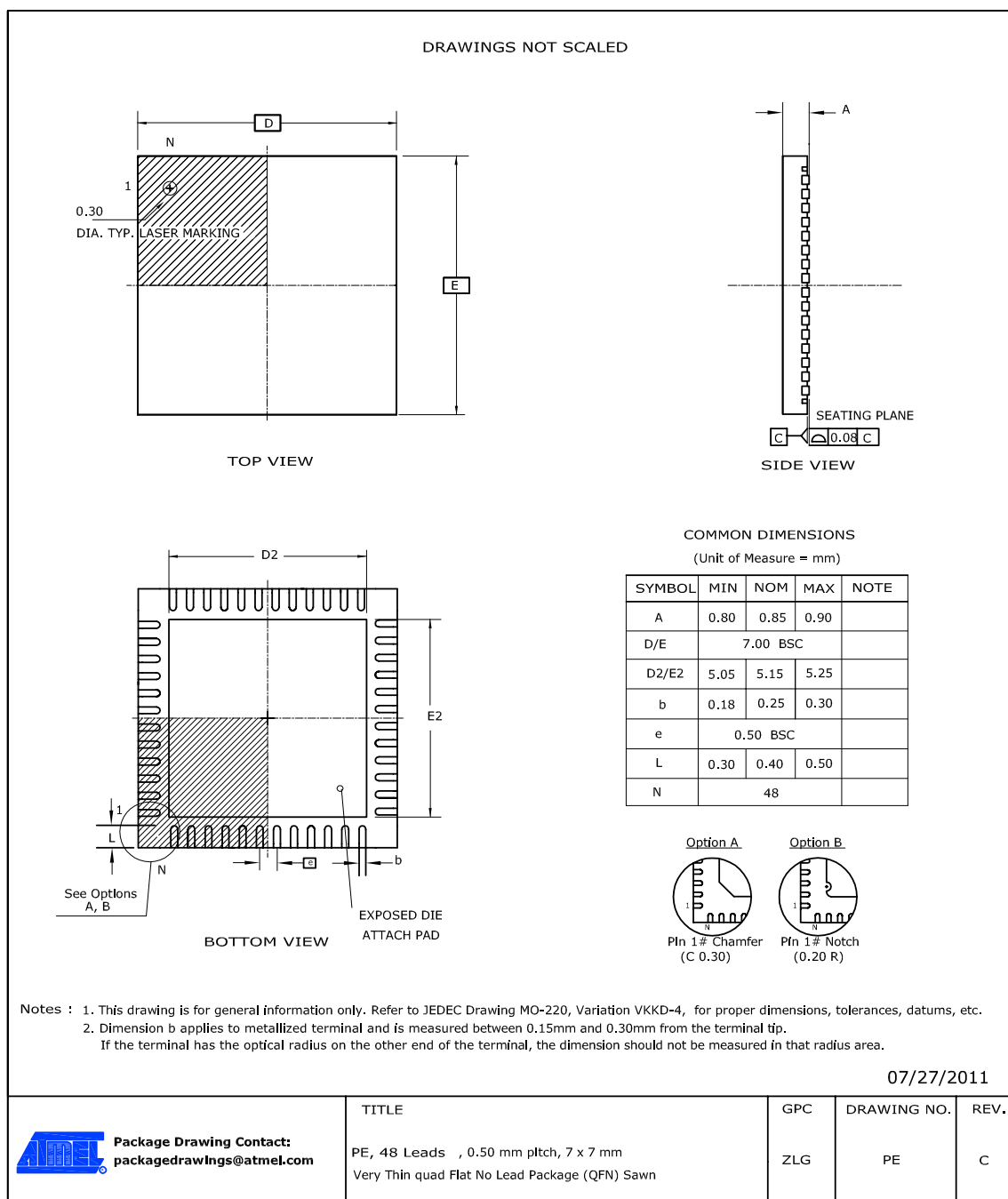
**Table 8-10. Package Reference**

|                         |        |
|-------------------------|--------|
| JEDEC Drawing Reference | MO-220 |
| JESD97 Classification   | E8     |

#### 8.2.4. 48 pin TQFP



## 8.2.5. 48 pin QFN



**Note:** The exposed die attach pad is not connected electrically inside the device.

**Table 8-14. Device and Package Maximum Weight**

|     |    |
|-----|----|
| 140 | mg |
|-----|----|

**Table 8-15. Package Characteristics**

|                            |      |
|----------------------------|------|
| Moisture Sensitivity Level | MSL3 |
|----------------------------|------|

Table 8-16. Package Reference

|                         |        |
|-------------------------|--------|
| JEDEC Drawing Reference | MO-220 |
| JESD97 Classification   | E3     |

## 8.2.6. 45-ball WLCSP

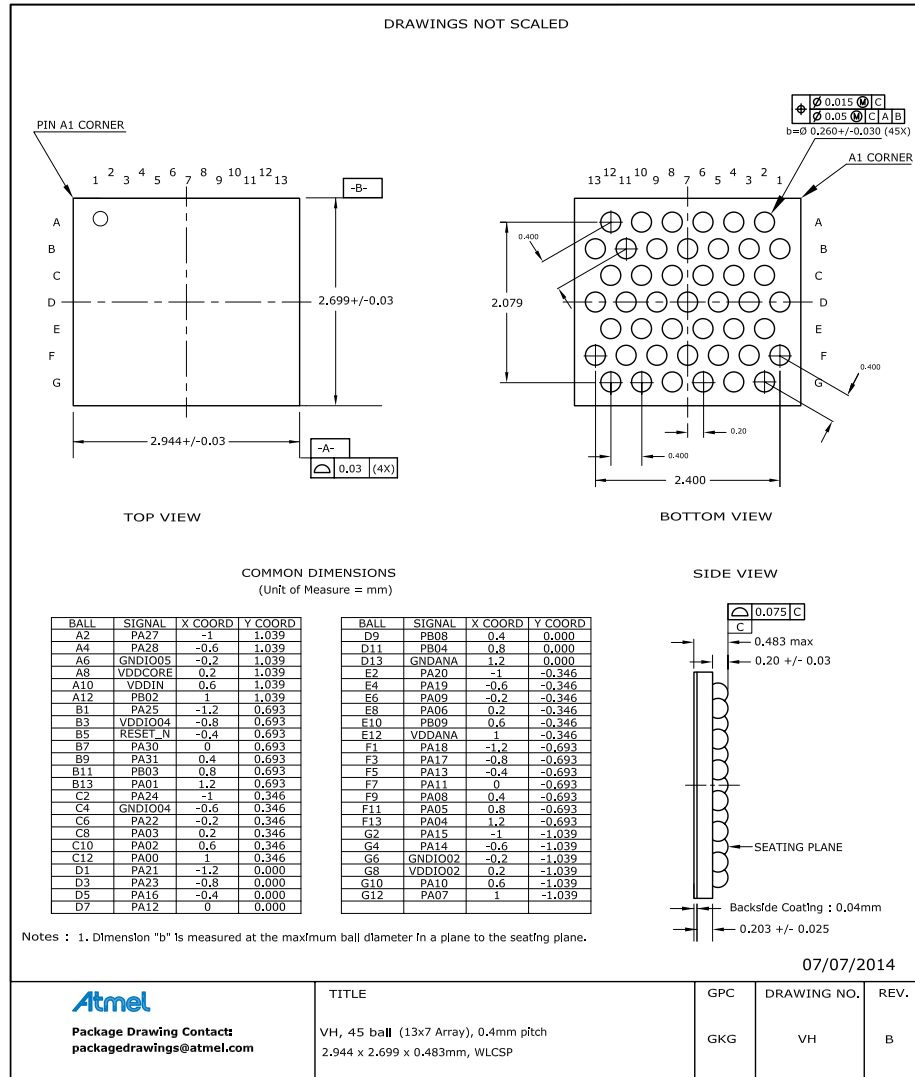


Table 8-17. Device and Package Maximum Weight

|     |    |
|-----|----|
| 7.3 | mg |
|-----|----|

Table 8-18. Package Characteristics

|                            |      |
|----------------------------|------|
| Moisture Sensitivity Level | MSL1 |
|----------------------------|------|

Table 8-19. Package Reference

|                         |        |
|-------------------------|--------|
| JEDEC Drawing Reference | MO-220 |
| JESD97 Classification   | E1     |