# Atrua Wings™ ATW300 Family

***Fingerprint Touch Sensor Data Sheet***

## KEY FEATURES

- **Low Power Consumption**
  - 1.4 mA avg. operating current
  - 1.1 mA avg. navigation operating current
  - 2.6 µA finger detection current
  - 0.2 µA power down current
- **High Performance**
  - Up to 48 cm/sec swipe/movement rate
  - Acquisition rate greater than 3,700 frames per sec. (512 bytes per frame)
- **Compact Size**
  - 0.56 x 8.73 mm active sensing area
  - 2.5 x 14.5 x 1.06 mm (1.35 mm package caps) package size
- **Integrated Over-Current Protection Circuit**
  - Reduces component count and BOM cost
  - Minimizes total solution board area
- **I/O Interface Flexibility**
  - 8-bit parallel MCU interface
  - High Speed Serial Peripheral Interface (SPI)
- **Low Voltage**
  - 1.8 V – 3.3 V I/O
  - 2.5 V – 3.3 V core
- **Rugged Surface**
  - ±15 kV ESD protection (IEC61000-4-2 Level 4)
  - Withstands over 20 million swipes
  - Abrasion & Corrosion Resistant
- **Adaptable Sensitivity**
  - Automatic Gain Control for Optimized Gray-Scale Image with Wide Range of Finger/Skin/Environmental Conditions
- **Lead-Free Assembly Compliant LGA Package** (Green/RoHS Compliant package available)
- **Gold -Colored Sensor Surface Border**

## TYPICAL APPLICATIONS

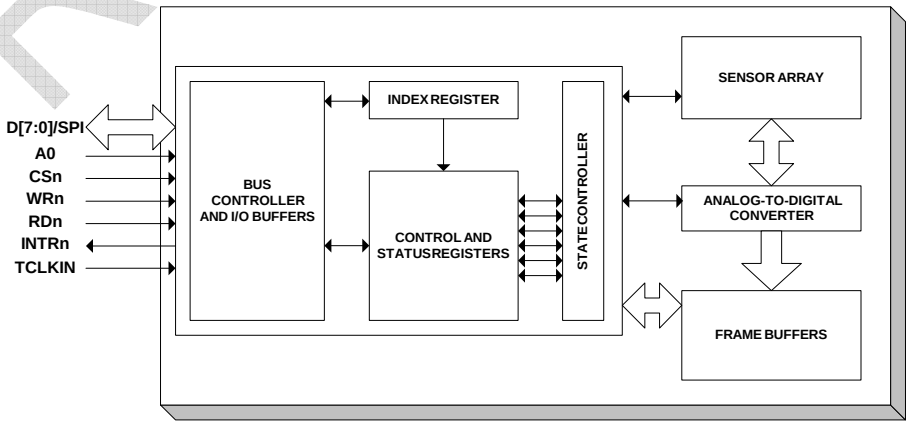
- **ATW300 family's low cost, small size and minimal power consumption make it especially suited for use in mobile device applications such as:**
  - Mobile phones
  - Portable MP3 and media players
  - PDAs
  - Secure storage products
  - Portable gaming devices
  - Smart Cards
  - Mobile computing devices and peripherals
  - Portable products that benefit from small, feature-rich controls

## QUICK TIME-TO-MARKET

- **Atrua provides a comprehensive set of hardware and software support tools for rapid application development:**
  - Evaluation Kit
  - Software Development Kit
  - Hardware Development Kit for Embedded Systems



## BLOCK DIAGRAM



## GENERAL DESCRIPTION

The ATW300 family of fingerprint touch sensors (ATW3xx) are the sensor portion of the Atrua Wings™ touch processing system. The system consists of:

- Touch sensors – small, low cost and low power sensors which provide information on finger features and movement.
- Algorithms – fingerprint recognition, navigation and control functions which are highly precise and accurate and operate in a very CPU- and memory-efficient manner.

The ATW3xx touch sensor creates partial images (frames) of the finger by sensing the ridges and valleys on the finger as it is moved or "swept" across its surface. This small adaptive capacitive sensor provides high performance and low power consumption through an integrated 124 x 8 sensing array of metal electrodes. Ridges and valleys on the finger yield varying capacitance values across the array, which are read to form a partial image of the fingerprint. Internal circuits within the sensor die convert the sensed data into a stream of digital data (a frame) that is presented to the host microprocessor via an 8-bit bidirectional bus interface, which is compatible with most microprocessors, or through a high-speed SPI interface.

There are two key classes of algorithms that execute on the host processor and comprise the core functions of this fingerprint touch processing system:

- Fingerprint Authentication
- Control and Navigation

These algorithms operate on the data streamed from the sensor. Authentication extracts minutiae features used for fingerprint verification, and matches the minutiae pattern to the template for the user's enrolled finger. The navigation/control algorithms analyze finger motions to provide control functions.

Optimized for use in mobile devices, the low cost, small physical size and minimal power consumption of the ATW3xx touch sensor simplify its integration into mobile phones and other small mobile devices. The ATW3xx integrates the typically external over-current protection circuit to enable significant BOM cost savings and to further minimize the board area required for the total solution.

Additionally, the ATW3xx has an integrated analog-to-digital converter to digitize the sensed data and an automatic gain control (AGC) function that provides high quality fingerprint images from all types of skin, dry to moist, in a wide range of climatic conditions, even cold and dry. It also features low operating current. Power consumption can be further reduced by utilizing one of the finger detect modes, which automatically minimizes current when the touch sensor is not in contact with a finger.

The ATW3xx touch sensor is fabricated in standard CMOS technology and is provided in a lead-free assembly compliant LGA package and a "green" package option, which meets the requirements for RoHS. The sensor surface is protected by a special abrasion and chemical-resistant coating to provide long life with high reliability.

## CONVENTIONS

Unless otherwise noted, a positive logic (active High) convention is assumed throughout this document. A lowercase 'n' following a signal name (e.g., INTRn) indicates that the signal is active Low.

The designation 0xNNNN indicates a hexadecimal number.

The designation 0bNNNN indicates a binary number.

## SIGNAL DESCRIPTIONS

| Name | Type | Description |
|---|---|---|
| D[7:0] | Bi-directional | **8-bit Mode**:<br>**Data bus with Schmitt-trigger inputs.** These pins provide an 8-bit data path for read and write operations. The bus is in the high-impedance state when CSn or RDn is negated.<br><br>**SPI Mode:**<br>D7/MISO functions as the MISO (Master In Slave Out). Data is shifted out of the SPI slave and into the SPI master.<br><br>D6/MOSI functions as the MOSI (Master Out Slave In). Data is shifted out of the SPI master and into the SPI slave.<br><br>D5/SCK_INV selects the polarity of SCK. When SCK_INV is Low, data is shifted out of the MISO on the falling edge of SCK and the MOSI is sampled on the rising edge of SCK. When SCK_INV is High, data is shifted out of the MISO on the rising edge of SCK and the MOSI is sampled on the falling edge of SCK. |
| A0/SCK | Input | **8-bit Mode:**<br>**Address.** Schmitt-trigger input.<br><br>When A[0] is Low, the Index Address register (IDX_REG) is selected as the source/destination for read and write transactions. When A[0] is High, the indexed register (see Functional Description) is selected as the source/destination for read and write transactions.<br><br>**SPI Mode:**<br>**SPI Clock.** Schmitt-trigger input.<br><br>When SCK_INV is Low, data is shifted out the MISO on the falling edge of SCK and the MOSI is sampled on the rising edge of SCK. When SCK_INV is High, data is shifted out the MISO on the rising edge of SCK and the MOSI is sampled on the falling edge of SCK. |
| CSn/SCSn | Input | **8-bit Mode:**<br>**Chip Select, active Low.** Schmitt-trigger input.<br><br>This input must be asserted to read data from or write data to the ATW3XX. When High, the data bus is in the high impedance state.<br><br>**SPI Mode:**<br>**Slave Chip Select, active Low.** Schmitt-trigger input.<br><br>Drive SCSn Low to select the device as an SPI slave. Drive SCSn High to deselect the device, reset the SPI, and to place the MISO in the high impedance state. |

| Name | Type | Description |
|---|---|---|
| RDn | Input | **8-bit Mode:**<br>**Read Enable, active Low.** Schmitt-trigger input.<br><br>This input must be asserted for read operations and negated for write operations. When High, data outputs from the device are disabled and the data bus pins are placed in the high impedance state.<br><br>**SPI Mode:**<br>RDn must be driven Low. Drive both RDn and WRn Low to place the device into SPI mode. The device returns to 8-bit Mode if either RDn or WRn is driven High. |
| WRn | Input | **8-bit Mode:**<br>**Write Enable, active Low.** Schmitt-trigger input.<br><br>Controls writing of commands or data to the ATW3xx. A write operation takes place when WRn is asserted while CSn is Low and RDn is High. The data is latched on the rising edge of WRn.<br><br>**SPI Mode:**<br>WRn must be driven Low. Drive both RDn and WRn Low to place the device into SPI mode. The device returns to 8-bit Mode if either RDn or WRn is driven High. |
| INTRn | Output | **Interrupt Request, active Low.** INTRn is asserted if interrupts are enabled and an interrupt event takes place. |
| TCLKIN | Input | **External Clock Input.** The ATW3xx has an internal clock and does not require an external clock input. This input is for testing only and should be left unconnected for normal operation. |
| $V_{DDC}$ | Power | **Core Power.** |
| $V_{SSC}$ | Ground | **Core Ground.** |
| $V_{DDO}$ | Power | **I/O Power.** |
| $V_{SSO}$ | Ground | **I/O Ground.** |
| SHGND | Ground | **ESD Ground.** These pins are intended to provide a discharge path during an electrostatic discharge event. Connect these pins to chassis ground. |

## ABSOLUTE MAXIMUM RATINGS[1]

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $T_{STG}$ | Storage Temperature | -40 to +125 | ºC |
| $T_{BIAS}$ | Ambient Temperature with Power Applied | -40 to +85 | ºC |
| $T_L$ | Lead Temperature, max 20s duration[2] | +250 | ºC |
| $V_{IN}$ | Voltage on Pin with Respect to $V_{SSO}$:<br>$V_{DDO}$<br>All Other Pins | <br>-0.5 to +4.0<br>-0.5 to ($V_{DD}$ + 0.5) | <br>V<br>V |
| $I_{OS}$ | Output Short Circuit Current | 200 | mA |
| ESD (HBM) | Electrostatic Discharge, Human Body Model, JEDEC JESD22-A114-B | ±1800 | V |
| ESD (CDM) | Electrostatic Discharge, Charged Device Model, JEDEC JESD22-C101-A | ±2000 | V |
| Surface ESD | Electrostatic Air Discharge, IEC-61000-4-2 | ±15 | kV |

**Notes:**

1. Conditions in excess of those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only; functional operation of the device at these or any other conditions above those indicated in the operational sections of this data sheet is not implied. Exposure of the device to absolute maximum rating conditions for extended periods may affect device reliability.
2. Reflow details per JEDEC Standard 22-A113D.

## RECOMMENDED OPERATING CONDITIONS[1]

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $T_A$ | Ambient Operating Temperature | -20 to +70 | ºC |
| $V_{DDC}$ | Core Power Operating Supply Voltage | +2.5 to +3.3 | V |
| $V_{DDO}$ | I/O Power Operating Supply Voltage[2] | +1.8 to +3.3 | V |
| MSL | JEDEC Moisture Sensitivity Level | 3 | |

**Notes:**

1. Recommended Operating Conditions define those limits between which the functionality of the device is guaranteed.
2. $V_{DDO}$ can be at a lower supply level than $V_{DDC}$ if the application requires. Allowed modes of operation are in the following table.

## ALLOWED POWER SUPPLY VOLTAGE COMBINATIONS

| $V_{DDO}$ | $V_{DDC}$ |
|---|---|
| 1.8 V | 2.5 V or 3.3 V |
| 2.5 V | 2.5 V or 3.3 V |
| 3.3 V | 3.3 V |

**Notes:**

1. $V_{DDC}$ must be equal to or higher than $V_{DDO}$.
2. $V_{DDO}$ is not allowed to be higher than $V_{DDC}$.

## POWER SEQUENCING

$V_{DDC}$ and $V_{DDO}$ should be applied at the same time. If $V_{DDC}$ and $V_{DDO}$ cannot be applied concurrently, then $V_{DDC}$ must be applied before applying voltage to $V_{DDO}$ or any signal pin.

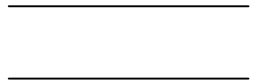
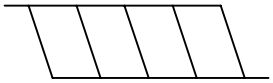
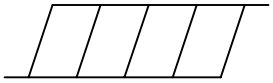
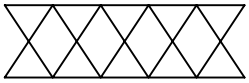
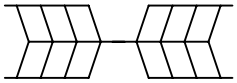
## DC CHARACTERISTICS[1, 2, 3]

| Parameter | Description | Test Conditions | Min | Typ | | | Max | Unit |
|---|---|---|---|---|---|---|---|---|
| $V_{DDC}$ | Core Supply Voltage | | 2.25 | 2.5 | 2.5 | 3.3 | 3.63 | V |
| $V_{DDO}$ | I/O Supply Voltage | | 1.65 | 1.8 | 2.5 | 3.3 | 3.63 | V |
| $I_I$ | Input Leakage | $0 \le V_{IN} \le V_{DDO}$, $V_{DDO}$ = Max | -3 | | | | 3 | µA |
| $I_{OZ}$ | Input current for outputs in Hi-Z | $0 \le V_{OUT} \le V_{DDO}$, $V_{DDO}$ = Max | -1 | | | | 1 | µA |
| $I_{DD1}$ | $V_{DD}$ Stand-by without partial power down, Quiescent Current | $V_{DDC}$ = Max | | 15 | 20 | 40 | 95 | µA |
| $I_{DD2}$ | $V_{DD}$ Peak Operating Current.[4] | $V_{DDC}$ = Max | | 3.9 | 3.9 | 5 | 12 | mA |
| $I_{DD3}$ | $V_{DD}$ Average Operating Current, 500 fps | $V_{DDC}$ = Typ | | 1.4 | 1.5 | 2 | | mA |
| $I_{DD4}$ | $V_{DD}$ Average Operating Current, 250 fps (Navigation) | $V_{DDC}$ = Typ | | 1.1 | 1.1 | 1.7 | | mA |
| $I_{DD5}$ | $V_{DD}$ Average Operating Current with Finger Detect Surface Contact Detect State Active (Monitoring) | $V_{DDC}$ = Max | | 2.6 | 2.7 | 4.6 | 36 | µA |
| $I_{DD6}$ | $V_{DD}$ Peak Operating Current [4] with Finger Detect Mode 3 Active (Monitoring) or Mode 2 prior to asserting the interrupt. | $V_{DDC}$ = Max | | | | 5 | 12 | mA |
| $I_{DD7}$ | $V_{DD}$ Average Operating Current with Finger Detect Mode 3 Active (Monitoring, Interval=400 ms) | $V_{DDC}$ = Max | | 3.9 | 4.0 | 4.4 | 60 | µA |
| $I_{DD8}$ | $V_{DD}$ Quiescent Current with Finger Detect Mode 1, 2 or 3 Triggered (After interrupt asserted) | $V_{DDC}$ = Max | | 23 | 23 | 38 | 80 | µA |
| $I_{DD9}$ | $V_{DD}$ Partial Power Down, Quiescent Current | $V_{DDC}$ = Max | | 0.7 | 1.5 | 1.6 | 25 | µA |
| $I_{DD10}$ | $V_{DD}$ Full Power Down Quiescent Current | $V_{DDC}$ = Max | | 0.2 | 0.2 | 0.2 | 4 | µA |
| $V_{IL}$ | Input Low Voltage | | | | | | 0.3 x $V_{DDO}$ | V |
| $V_{IH}$ | Input High Voltage | | 0.7 x $V_{DDO}$ | | | | | V |
| $V_{OL}$ | Low-Level Output Voltage | $I_{OL}$ = Min | | | | | 0.2 x $V_{DDO}$ | V |
| $V_{OH}$ | High-Level Output Voltage | $I_{OH}$ = Max | 0.8 x $V_{DDO}$ | | | | | V |

**Notes:**
1. All maximum $I_{DD}$ specifications in table are tested with $V_{DD}$ = $V_{DD}$ Max and ambient temperature = 85°C.
2. All typical $I_{DD}$ specifications in table are tested with ambient temperature = 25°C.
3. All operating $I_{DD}$ specifications in table are tested with 2X clock.
4. Peak operating current ($I_{DD2}$ , $I_{DD6}$ ) is observed when performing an A/D conversion, which lasts nominally 256 µs.

| Parameter | Description | Test Conditions | | Min | Max | Unit |
|---|---|---|---|---|---|---|
| $I_{OH}$ | High-Level Output Current | $V_{DDO} \geq 2.25V$ | Strong Drivers | | -6 | mA |
| | | | Medium Drivers | | -4 | mA |
| | | | Weak Drivers | | -2 | mA |
| | | $1.65V \leq V_{DDO} \leq 1.95V$ | Strong Drivers | | -3 | mA |
| | | | Medium Drivers | | -2 | mA |
| | | | Weak Drivers | | -1 | mA |
| $I_{OL}$ | Low-Level Output Current | $V_{DDO} \geq 2.25V$ | Strong Drivers | 6 | | mA |
| | | | Medium Drivers | 4 | | mA |
| | | | Weak Drivers | 2 | | mA |
| | | $1.65V \leq V_{DDO} \leq 1.95V$ | Strong Drivers | 3 | | mA |
| | | | Medium Drivers | 2 | | mA |
| | | | Weak Drivers | 1 | | mA |

## KEY TO SWITCHING WAVEFORMS

| WAVEFORM | INPUTS | OUTPUTS |
|---|---|---|
|  | Steady | |
|  | Changing from H to L | |
|  | Changing from L to H | |
|  | Don't Care, Any Change Permitted | Changing, State Unknown |
|  | Does Not Apply | Centerline is High Impedance State (Hi-Z) |

## TEST CONDITIONS

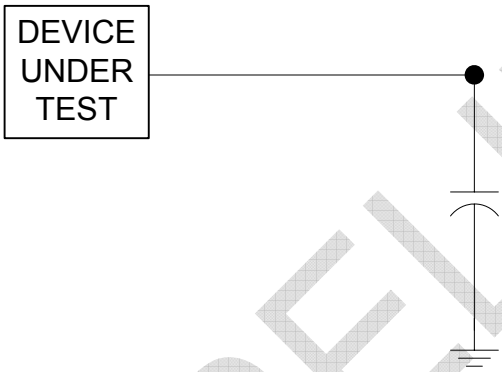



**Figure 1. Test Setup**

**Table 1. AC Test Specifications**

| Test Condition | Value | Unit |
|---|---|---|
| Output Load | See Test Setup | |
| Output Load Capacitance | 15 | pF |
| Input Rise and Fall Times | 5 | ns |
| Input Signal Low Level | 0 | V |
| Input Signal High Level | $0.9xV_{DDO}$ | V |
| Input Timing Reference Level | $0.5xV_{DDO}$ | V |
| Output Timing Reference Level | $0.5xV_{DDO}$ | V |

## AC CHARACTERISTICS

**Read Operation**

| | Parameter | Description | Test Setup | Min | Max | Unit |
|---|---|---|---|---|---|---|
| $t_1$ | td(W-R) | WRn High to RDn Low delay | | 20 | | ns |
| $t_2$ | tsu(A-R) | A0 setup to RDn Low | | 10 | | ns |
| $t_3$ | tsu(S-R) | CSn setup to RDn Low | | 0 | | ns |
| $t_4$ | ta(S) | D[7:0] valid from CSn Low | RDn ≤ $V_{IL}$ | | 40 | ns |
| $t_5$ | ta(R) | D[7:0] valid from RDn Low | CSn ≤ $V_{IL}$ | | 40 | ns |
| $t_6$ | th(R-A) | A0 hold after RDn High | | 5 | | ns |
| $t_7$ | th(R-S) | CSn hold after RDn High | | 0 | | ns |
| $t_8$ | th(R-Q) | D[7:0] hold after RDn High | | 0 | | ns |
| $t_9$ | th(R-S) | D[7:0] hold after CSn High | | 0 | | ns |
| $t_{10}$ | tdis(R) | D[7:0] Hi-Z after RDn High | CSn ≤ $V_{IL}$ | | 20 | ns |
| $t_{11}$ | tdis(S) | D[7:0] Hi-Z after CSn High | RDn ≤ $V_{IL}$ | | 20 | ns |
| $t_{12}$ | tw(RL) | RDn Low pulse width | CSn ≤ $V_{IL}$ | | 40 | ns |
| $t_{13}$ | tw(RH) | RDn High pulse width | RDn ≤ $V_{IL}$ | | 20 | ns |

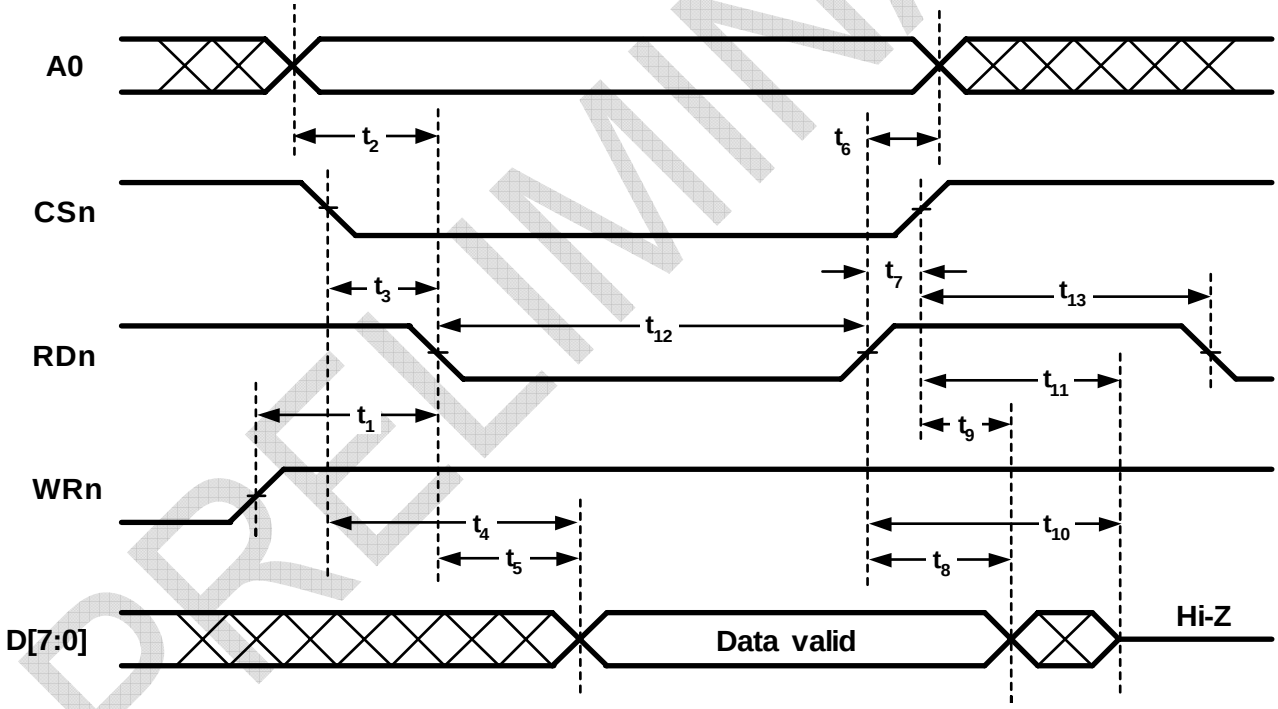



**Figure 2. Read Operation Timing**

**Write Operations**

| | Parameter | Description | Min | Max | Unit |
|---|---|---|---|---|---|
| $t_{14}$ | td(R-W) | RDn High to WRn Low delay | 20 | | ns |
| $t_{15}$ | tsu(A-W) | A0 setup to WRn Low | 10 | | ns |
| $t_{16}$ | tsu(S-W) | CSn setup to WRn Low | 10 | | ns |
| $t_{17}$ | tsu(D-W) | Input data setup to WRn Low | 10 | | ns |
| $t_{18}$ | th(W-A) | A0 hold after WRn High | 5 | | ns |
| $t_{19}$ | th(W-S) | CSn hold after WRn High | 5 | | ns |
| $t_{20}$ | th(W-D) | Input data hold after WRn High | 5 | | ns |
| $t_{21}$ | th(W-S) | Input data hold after CSn High | 5 | | ns |
| $t_{22}$ | tw(WL) | WRn Low pulse width | 20 | | ns |
| $t_{23}$ | tw(WH) | WRn High pulse width | 20 | | ns |

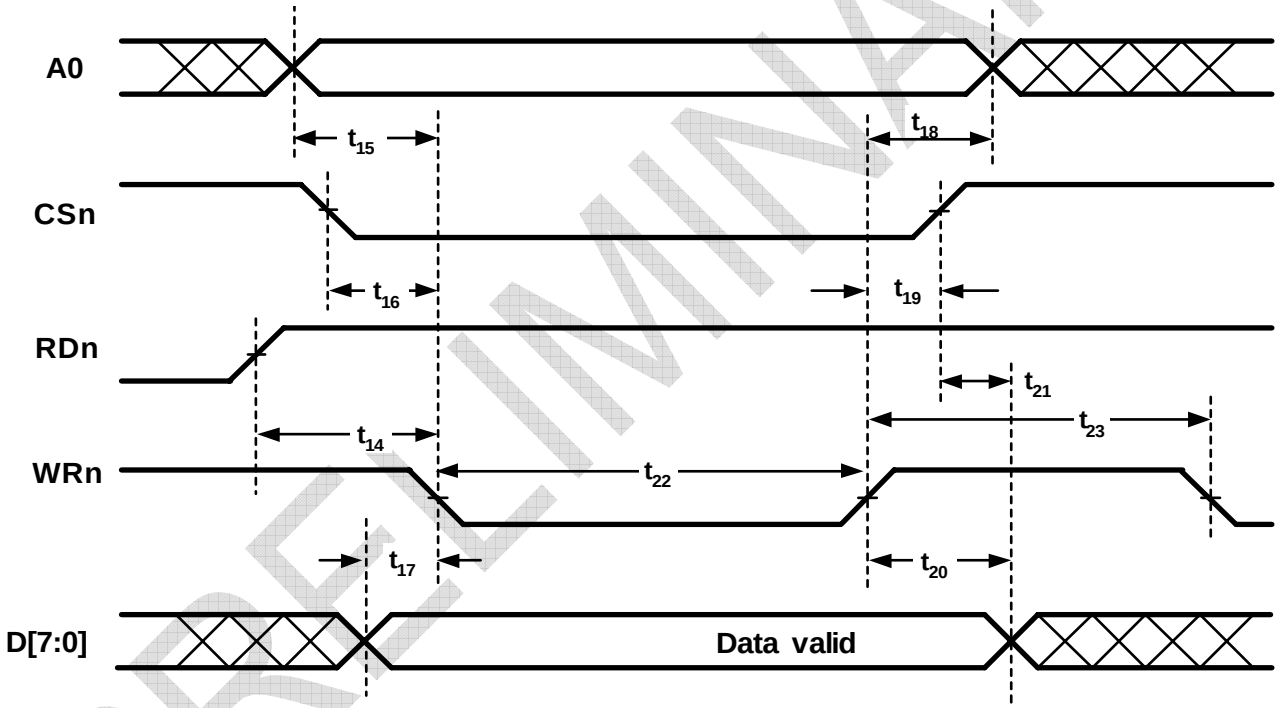



**Figure 3. Write Operation Timings**

**SPI Slave Timing (1.8 V $V_{DDO}$)**

| | Parameter | Description | Test Setup | Min | Max | Unit |
|---|---|---|---|---|---|---|
| $t_{24}$ | tw(KL) | SCK Low pulse width | | 40 | | ns |
| $t_{25}$ | tw(KH) | SCK High pulse width | | 40 | | ns |
| $t_{26}$ | ta(S) | MISO valid from SCSn Low | | | 35 | ns |
| $t_{27}$ | tsu(D-K) | MOSI setup to SCK High | | 10 | | ns |
| $t_{28}$ | ta(K-Q) | SCK Low to MISO valid | SCSn ≤ $V_{IL}$ | | 35 | ns |
| $t_{29}$ | tdis(S) | SCSn High to MISO Hi-Z | | | 15 | ns |

**SPI Slave Timing (2.5 V or 3.3 V $V_{DDO}$)**

| | Parameter | Description | Test Setup | Min | Max | Unit |
|---|---|---|---|---|---|---|
| $t_{24}$ | tw(KL) | SCK Low pulse width | | 30 | | ns |
| $t_{25}$ | tw(KH) | SCK High pulse width | | 30 | | ns |
| $t_{26}$ | ta(S) | MISO valid from SCSn Low | | | 30 | ns |
| $t_{27}$ | tsu(D-K) | MOSI setup to SCK High | | 5 | | ns |
| $t_{28}$ | ta(K-Q) | SCK Low to MISO valid | SCSn ≤ $V_{IL}$ | | 20 | ns |
| $t_{29}$ | tdis(S) | SCSn High to MISO Hi-Z | | | 15 | ns |

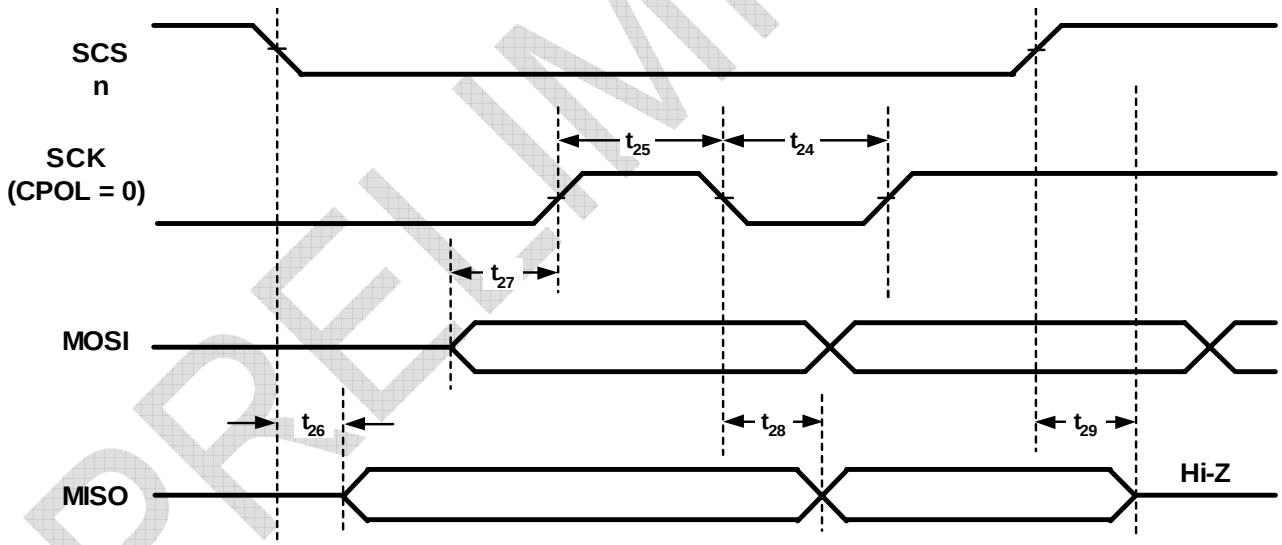



**Figure 4. SPI Slave Timing**

**INTRn Timing**

| | Parameter | Description | Test Setup | Min | Max | Unit |
|---|---|---|---|---|---|---|
| $t_{30}$ | td(E-I) | Interrupt Event or INT Register status to INTRn valid. | | | 60 | ns |
| $t_{31}$ | td(W-I) | Writing INT Register to INTRn valid. | | | 60 | ns |

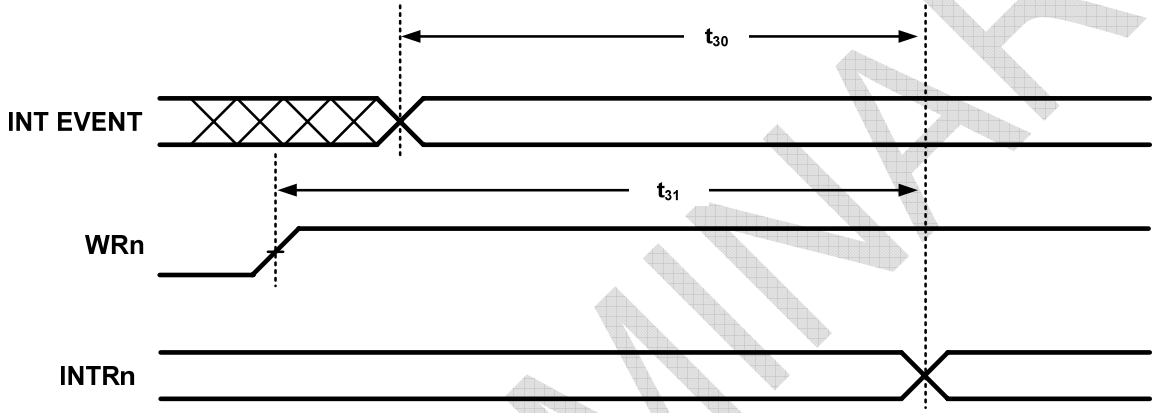
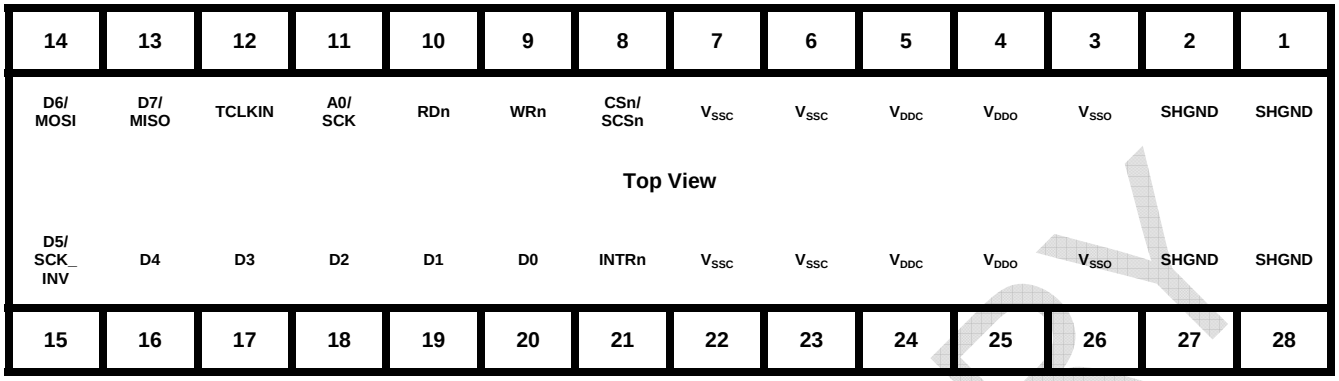



**Figure 5. INTRn Timing**

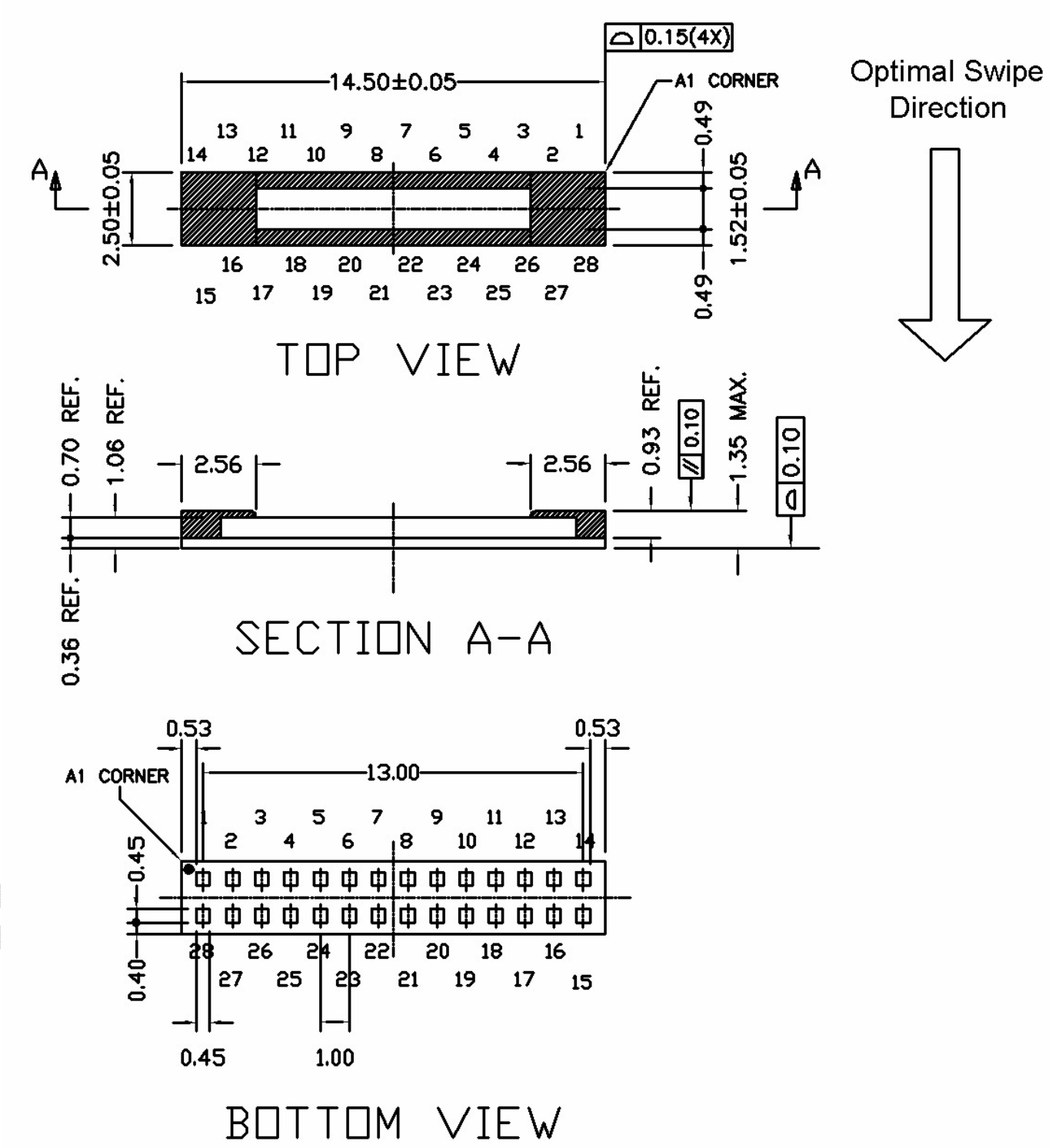
## SENSOR PINOUT DESCRIPTION




## Sensor Pinout Table

| Pin# | Name |
|---|---|
| 1 | SHGND |
| 2 | SHGND |
| 3 | $V_{SSO}$ |
| 4 | $V_{DDO}$ |
| 5 | $V_{DDC}$ |
| 6 | $V_{SSC}$ |
| 7 | $V_{SSC}$ |
| 8 | CSn / SCSn |
| 9 | WRn |
| 10 | RDn |
| 11 | A0 / SCK |
| 12 | TCLKIN |
| 13 | D7 / MISO |
| 14 | D6 / MOSI |
| 15 | D5 / SCK_INV |
| 16 | D4 |
| 17 | D3 |
| 18 | D2 |
| 19 | D1 |
| 20 | D0 |
| 21 | INTRn |
| 22 | $V_{SSC}$ |
| 23 | $V_{SSC}$ |
| 24 | $V_{DDC}$ |
| 25 | $V_{DDO}$ |
| 26 | $V_{SSO}$ |
| 27 | SHGND |
| 28 | SHGND |

## LGA PACKAGE MECHANICAL DIMENSIONS

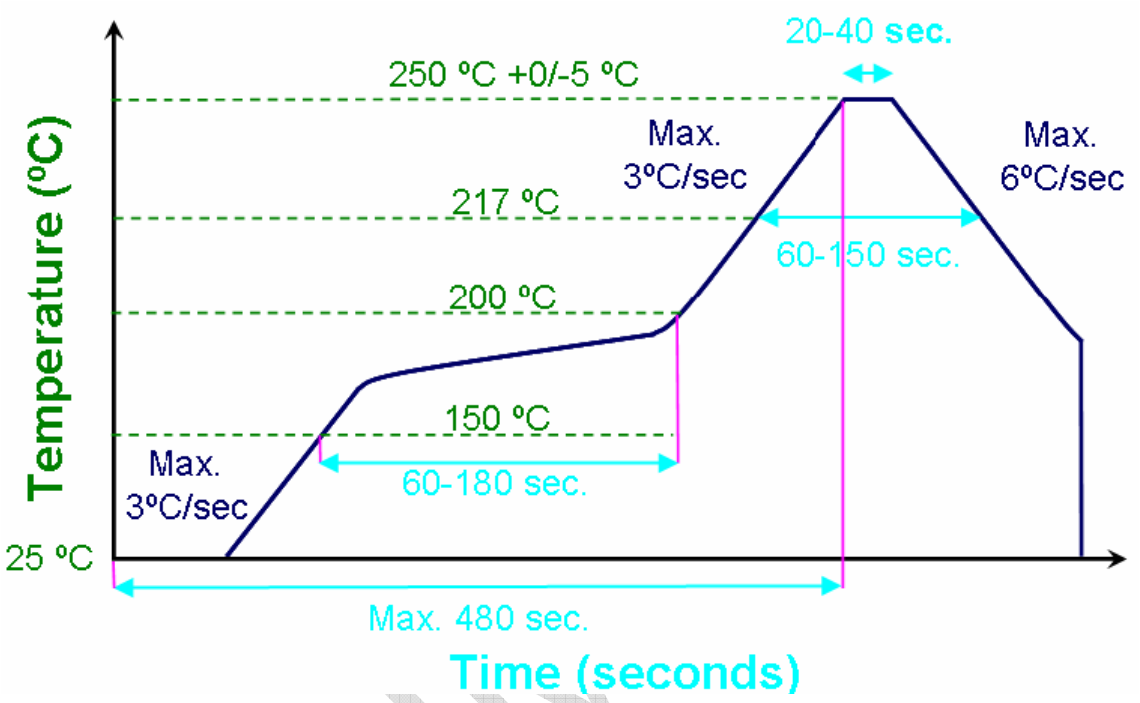


## HANDLING GUIDELINES

- Sensors and sensor sub-assemblies must always be handled and stored in properly designated work areas.
- Avoid excessive mechanical shock such as dropping the sensors and/or sub-assemblies.
- Do not stack sensor boards directly on top of each other.
- Before board mounting, operators should handle individual sensors with shovel style Teflon coated tweezers and/or rubber tip vacuum wands or tweezers.
- All automated equipment plungers and mechanical assemblies that contact the sensor surface should be thoroughly inspected and cleaned before coming into contact with the sensors. The inspection and cleaning procedure should be repeated at least once per shift.
- The use of protective tape on the sensor surface is not recommended. If used, it should be electrically conductive.
- Designated work areas must be checked periodically to ensure their continued safety from ESD. Main concerns include
    - Proper grounding methods
    - Static dissipation of work surfaces
    - Static dissipation of floor surfaces
    - Static dissipation of automated handling equipment.
    - Operation of ion blowers and ion air guns
- When handling sensors and sensor sub-assemblies, operators must be properly grounded by one of the following
    - A wrist strap connected to earth ground
    - Two heel grounders with both feet on a static dissipative floor surface.
- Designated work areas must be kept free of static generating materials such as Styrofoam, vinyl, plastic, fabrics or any other static generating materials
- When not being processed, sensors and sensor sub-assemblies must be stored in shielded boxes or bags.

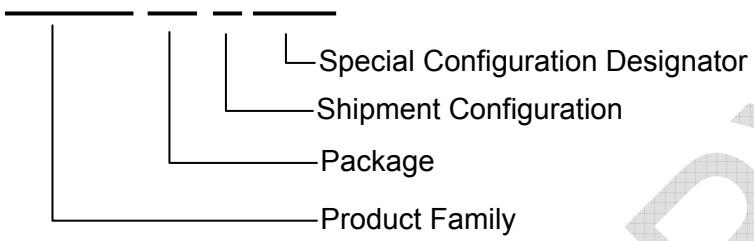
## RECOMMENDED SOLDER REFLOW PROFILE

Reflow immunity testing is performed during sensor reliability qualification per JESD22-A113D. Atrua Technologies' recommended lead-free reflow profile was developed from the JESD22-A113D procedure and is summarized below.



## PACKAGE MARKING

**ATW3***XX*–*YY*–$Z_1Z_2Z_3Z_4$




**Where:**

**ATW3XX indicates the ATRUA Wings Product Family:**
ATW310 – Gold-Colored Sensor Surface Border
**YY indicates PACKAGE:**
LA – Land Grid Array (LGA) package
**$Z_1$ indicates the SHIPMENT CONFIGURATION :**
0 – Standard Trays
1 – Standard Tape & Reel
***$Z_2Z_3Z_4$* is a designator for other SPECIAL CONFIGURATIONS:**
000 – Standard Configuration

**Example:**

ATW310-LA-1000 designates an ATW300 family sensor with gold-color sensor surface, LGA package, shipped in Tape & Reel configuration.

## Important Notice



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