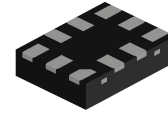


Autonomous USB Type-C Controller with Super Speed Switch Control



Bottom View
X2QFN10 1.6x1.2, 0.4P
CASE 722AC

FUSB301

Description

The FUSB301 is a fully autonomous Type-C controller optimized for <15 W applications. The FUSB301 offers CC logic detection for Source Mode, Sink Mode, Dual Role Port Mode, accessory detection support, and dead battery support. The FUSB301 features an external switch pin (SS_SW) to enable an external USB Super Speed Switch without interrupting the processor. The FUSB301 features an extremely low power disable mode as well as low power during normal operation. It is available in an ultra thin, 10-Lead TMLP package.

Features

- Fully Autonomous Type-C Controller
- Supports Type-C Versions 1.1 and 1.0
- V_{DD} Operating Range, 3.0 V – 5.5 V
- Low Disable Power: I_{CC} = 2 μA (Max.)
- Low Standby Power: I_{CC} = 7 μA (Max.)
- Dual Role Port Mode with Optional Accessory Support
- Capable of Supporting Try.SNK and Try.SRC
- Super Speed Switch Control
- Dead Battery Support (SINK Support when No Power Applied)
- 2 kV HBM ESD Protection
- Small Packaging, 10 Lead TMLP (1.6 mm × 1.2 mm × 0.375 mm)

ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

Application

- Smartphones
- Tablets
- Notebooks
- Ultra Portable Applications

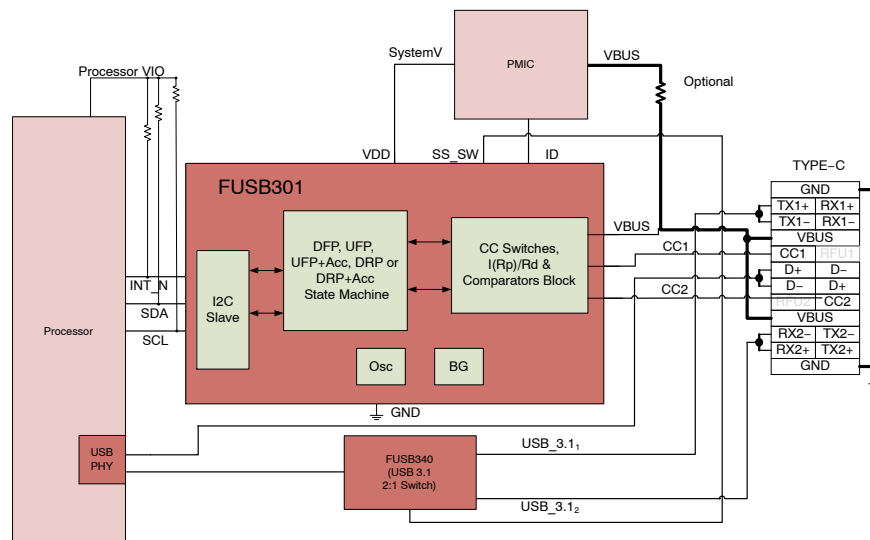


Figure 1. Typical Application

FUSB301

ORDERING INFORMATION

| Part Number | Top Mark | Operating Temperature Range | Package | Packing Method [†] |
|-------------|----------|-----------------------------|---|-----------------------------|
| FUSB301TMX | NU | -40 to 85°C | 10-Lead Ultra-thin Molded Leadless Package (TMLP) 1.6 mm × 1.2 mm × 0.375 mm | Tape and Reel |

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, [BRD8011/D](#).

BLOCK DIAGRAM

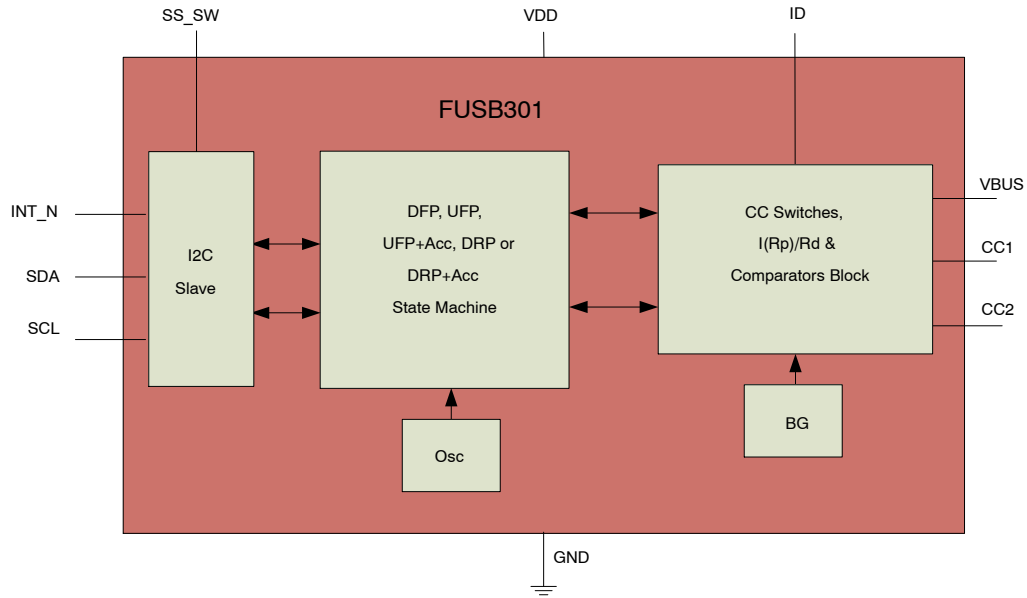


Figure 2. Block Diagram

PIN CONFIGURATION

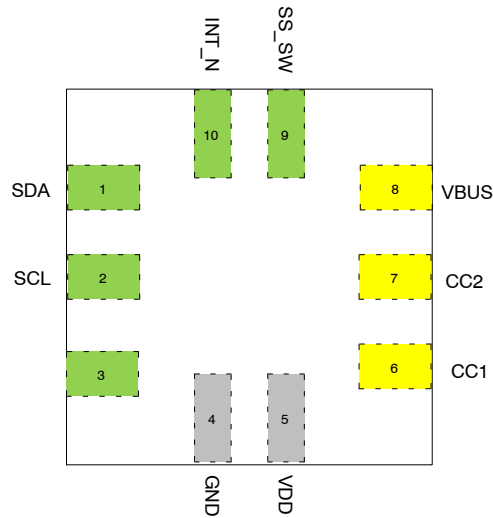


Figure 3. Pin Assignment (Top Through View)

FUSB301

PIN DESCRIPTIONS

| Pin # | Name | Type | Description |
|---------------------------------------|----------|-------------------|--|
| USB Type-C Connector Interface | | | |
| 6, 7 | CC1, CC2 | I/O | Type-C Configuration Channel |
| 8 | VBUS | Input | VBUS input pin for attach and detach detection |
| 4 | GND | Ground | Ground |
| Power Interface | | | |
| 5 | VDD | Power | Input Supply Voltage |
| Signal Interface | | | |
| 1 | SDA | Input | I ² C serial data signal to be connected to the I ² C master |
| 2 | SCL | Open-Drain I/O | I ² C serial clock signal to be connected to the I ² C master |
| 3 | ID | Open-Drain Output | Used to Identify if connected device is Source to Sink. The ID Pin can be used to interface with USB 2.0 Input on the processor. |
| 9 | SS_SW | CMOS Output | External Super Speed Switch control without processor interrupt. |
| 10 | INT_N | Open-Drain Output | Active Low open drain interrupt output used to prompt processor to read I ² C register bits. |

Dead Battery

If power is not applied to FUSB301 and it is attached to a Source device, then the Source would pull up the CC line connected through the cable. The FUSB301 in response would turn on the pull-down that will bring the CC voltage to a range that the Source can detect an attach and turn on VBUS.

Power Up, Initialization and Reset, Interrupt Operation

When power is first applied, the FUSB301 will power up in Sink mode with all interrupts masked. The local processor must configure the FUSB301 to the desired mode and clear the global interrupt mask bit, INT_MASK. The INT_N pin is an active low, open drain output. This pin indicates to the host processor that an interrupt has occurred in the FUSB301 which needs attention. The INT_N pin is in a high impedance state by default after power-up or device reset, and the global interrupt mask (INT_MASK in Control register) is set. After INT_MASK bit is cleared by the local

processor, the INT_N pin stays high impedance in preparation of future interrupts. When an interruptible event occurs, INT_N is driven LOW and is in a high impedance state again when the processor clears the interrupt by reading the interrupt registers. Subsequent to the initial power up or reset; if the processor writes a “1” to global interrupt mask bit when the system is already powered up, the INT_N pin stays in a high impedance state and ignores all interrupts until the global interrupt mask bit is cleared. If an event happens that would ordinarily cause an interrupt when the global interrupt mask bit is set, the INT_N pin goes LOW when the global interrupt mask is cleared.

SuperSpeed Switch Control

For applications that require a SuperSpeed USB switch (USB3.1 Gen 1), the SS_SW pin will autonomously control the USB switch, such as the FUSB340TMX, without interrupting the processor.

Table 1. SUPERSPEED SWITCH TRUTH TABLE

| CC1 | CC2 | ORIENT1 | ORIENT0 | SS_SW |
|-----------------|-----------------|---------|---------|-------|
| Not Connected | Not Connected | 0 | 0 | Low |
| Connected to CC | | 0 | 1 | Low |
| | Connected to CC | 1 | 0 | High |
| Not Connected | Not Connected | 1 | 1 | Low |

Table 2. ID PIN TRUTH TABLE

| TYPE Register (h12, bit 4) | Description | ID |
|----------------------------|-------------------|----------------|
| SINK = b0 | SINK Not Detected | Hi-Z (default) |
| SINK = b1 | SINK Detected | Low |

FUSB301

ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | | Min. | Max. | Unit | |
|-----------------------|---|------------------------------------|---------|------|------|----|
| V _{DD} | Supply Voltage from V _{DD} | | -0.5 | 6.0 | V | |
| V _{BUS} | VBUS Supply Voltage | | -0.5 | 28 | V | |
| V _{CC_HDDRP} | CC pins when configured as Host, Device or Dual Role Port | | -0.5 | 6.0 | V | |
| T _{STORAGE} | Storage Temperature Range | | -65 | +150 | °C | |
| T _J | Maximum Junction Temperature | | - | +150 | °C | |
| T _L | Lead Temperature (Soldering, 10 seconds) | | - | +260 | °C | |
| ESD | IEC 6100-4-2 System ESD | Connector Pins (VBUS, CC1 and CC2) | Air Gap | 15 | - | kV |
| | | | Contact | 8 | - | |
| | Human Body Model, JEDEC JESD22-A114 | Connector Pins (VBUS, CC1 and CC2) | | 4 | - | |
| | | Others | | 2 | - | |
| | Charged Device Model, JEDEC LESD22-C101 | All Pins | 1 | - | | |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

RECOMMENDED OPERAING CONDITIONS

| Symbol | Parameter | Min. | Typ. | Max. | Unit |
|------------------|-----------------------|--------------------|------|------|------|
| V _{BUS} | VBUS Supply Voltage | 3.7 | 5.0 | 21 | V |
| V _{DD} | Supply Voltage | 2.8 ⁽¹⁾ | 3.3 | 5.5 | V |
| T _A | Operating Temperature | -40 | - | +85 | °C |

1. This is for functional operation only and isn't the lowest limit for all subsequent electrical specifications below. All electrical parameters have a minimum of 3 V operation.

DC AND TRANSIENT CHARACTERISTICS

Unless otherwise specified: Recommended T_A and T_J temperature ranges. All typical values are at T_A = 25°C and V_{DD} = 3.3 V unless otherwise specified.

| Symbol | Parameter | T _A = -40 to +85°C T _J = -40 to +125°C | | | Unit |
|-----------------------------------|--|---|------|------|------|
| | | Min. | Typ. | Max. | |
| Type C Specific Parameters | | | | | |
| I _{80_CCX} | Source 80 μA CC Current (Default) HOST_CUR1 = 0, HOST_CUR0 = 1 | 64 | 80 | 96 | μA |
| I _{180_CCX} | Source 180 μA CC Current (1.5 A) HOST_CUR1 = 1, HOST_CUR0 = 0 | 166 | 180 | 194 | μA |
| I _{330_CCX} | Source 330 μA CC Current (3 A) HOST_CUR1 = 1, HOST_CUR0 = 1 | 304 | 330 | 356 | μA |
| V _{SNKDB} | Sink Pull-Down Voltage in Dead Battery Under all Pull-up SOURCE Loads | - | - | 2.18 | V |
| R _{DEVICE} | Sink Pull-Down Resistance when V _{DD} is within Operating Range | 4.6 | 5.1 | 5.6 | kΩ |
| z _{OPEN} | CC Resistance for Disabled State | 126 | - | - | kΩ |
| v _{Ra-SRCdef} | Ra Detection Threshold for CC Pin for Source for Defaul Current on VBUS | 0.15 | 0.20 | 0.25 | V |
| v _{Ra-SRC1.5A} | Ra Detection Threshold for CC Pin for Source for 1.5 A Current on VBUS | 0.35 | 0.40 | 0.45 | V |
| v _{Ra-SRC3A} | Ra Detection Threshold for CC Pin for Source for 3 A Current on VBUS | 0.75 | 0.80 | 0.85 | V |

FUSB301

DC AND TRANSIENT CHARACTERISTICS

Unless otherwise specified: Recommended T_A and T_J temperature ranges. All typical values are at $T_A = 25^\circ\text{C}$ and $V_{DD} = 3.3\text{ V}$ unless otherwise specified. (continued)

| Symbol | Parameter | $T_A = -40\text{ to }+85^\circ\text{C}$ $T_J = -40\text{ to }+125^\circ\text{C}$ | | | Unit |
|-------------|--|---|------|------|------|
| | | Min. | Typ. | Max. | |
| vRd-SRCdef | Rd Detection Threshold for Source for Default Current (HOST_CUR1/0 = 01) | 1.50 | 1.60 | 1.65 | V |
| vRd-SRC1.5A | Rd Detection Threshold for Source for 1.5 A Current (HOST_CUR1/0 = 10) | 1.50 | 1.60 | 1.65 | V |
| vRd-SRC3A | Rd Detection Threshold for Source for 3 A Current (HOST_CUR1/0 = 11) | 2.45 | 2.60 | 2.75 | V |
| vRa-SNK | Ra Detection Threshold for CC Pin for Sink | 0.15 | 0.20 | 0.25 | V |
| vRd-def | Rd Default Current Detection Threshold for Sink | 0.61 | 0.66 | 0.70 | V |
| vRd-1.5A | Rd 1.5 A Current Detection Threshold for Sink | 1.16 | 1.23 | 1.31 | V |
| vRd-3.0A | Rd 3 A Current Detection Threshold for Sink | 2.04 | 2.11 | 2.18 | V |
| vVBUSthr | VBUS Threshold at which I_VBUSOK Interrupt is Triggered | 3.7 | - | - | V |

CURRENT CONSUMPTION

| Symbol | Parameter | V_{DD} (V) | Conditions | $T_A = -40\text{ to }+85^\circ\text{C}$ $T_J = -40\text{ to }+125^\circ\text{C}$ | | | Unit |
|----------|---|--------------|---------------------------------------|---|------|------|---------------|
| | | | | Min. | Typ. | Max. | |
| Idisable | Disabled Current | 3.0 to 5.5 | Disabled State | - | 0.35 | 2.0 | μA |
| Istby | Unattached Sink | 3.0 to 5.5 | Nothing attached | - | 3.5 | 7.0 | μA |
| | Unattached Sink + Acc, Source + Acc, or DRP | | Nothing attached, Internally Toggling | - | 5 | 20 | μA |
| Iattach | Attach Current (Less Host Current) | 3.0 to 5.5 | Attached as a Sink | - | 5 | 15 | μA |
| | | | Attached as a Source | - | 10 | 15 | μA |

TIMING PARAMETERS

| Symbol | Parameter | $T_A = -40\text{ to }+85^\circ\text{C}$ $T_J = -40\text{ to }+125^\circ\text{C}$ | | | Unit | |
|----------------|---|---|-------|-------|------|----|
| | | Min. | Typ. | Max. | | |
| tCCDebounce | Debounce Time for CC (Source or Accessory) | 100 | 150 | 200 | ms | |
| | Debounce Time for CC (Sink) | 63 | 75 | 87 | ms | |
| tPDDebounce | Debounce Time for CC Detach Detection | 10 | 15 | 20 | ms | |
| tAccDetect | Debounce Time to Detect AudioAccessory, or DebugAccessory is Attached | 50 | 100 | 200 | ms | |
| tErrorRecovery | Time staying in the ErrorRecovery State if sent there via the ERROR_REC bit or by a change of Modes | 25 | 50 | 100 | ms | |
| tVBUSondeb | Debounce Time of VBUS Detection when acting as a Sink to Signal VBUS is present | 0.167 | 0.200 | 0.375 | ms | |
| tVBUSoffdeb | Debounce Time of VBUS Detection when acting as a Sink to Signal VBUS has been removed | 10 | 15 | 20 | ms | |
| tDRPToggle1 | For DRP Operation, Time Spent in Unattached.Sink before going to Unattached.Source State | DRPROGGLE = 00 | 35 | - | 70 | ms |
| | | DRPROGGLE = 01 | 30 | - | 60 | |
| | | DRPROGGLE = 10 | 25 | - | 50 | |
| | | DRPROGGLE = 11 | 20 | - | 40 | |

FUSB301

TIMING PARAMETERS

| Symbol | Parameter | T _A = -40 to +85°C T _J = -40 to +125°C | | | Unit | |
|-------------|--|---|------|------|------|----|
| | | Min. | Typ. | Max. | | |
| tDRPToggle2 | For DRP Operation, Time Spent in Unattached.Source before going to Unattached.Sink State | DRPROGGLE = 00 | 15 | - | 30 | ms |
| | | DRPROGGLE = 01 | 20 | - | 40 | |
| | | DRPROGGLE = 10 | 25 | - | 50 | |
| | | DRPROGGLE = 11 | 30 | - | 60 | |

IO SPECIFICATIONS

| Symbol | Parameter | V _{DD} (V) | Conditions | T _A = -40 to +85°C T _J = -40 to +125°C | | | Unit |
|---|--|---------------------|-----------------------------|---|------|------|------|
| | | | | Min. | Typ. | Max. | Unit |
| Host Interface Pins (ID) | | | | | | | |
| V _{OLID} | Output Low Voltage | 3.0 to 5.5 | I _{OL} = 4 mA | - | - | 0.4 | V |
| Host Interface Pins (SS_SW) | | | | | | | |
| V _{OHSW} | Output High Voltage | 3.0 to 5.5 | I _{OH} = -2 mA | 0.7V _{DD} | - | - | V |
| V _{OLSW} | Output Low Voltage | 3.0 to 5.5 | I _{OL} = 4 mA | - | - | 0.4 | V |
| Host Interface Pins (INT_N) | | | | | | | |
| V _{OLINTN} | Output Low Voltage | 3.0 to 5.5 | I _{OL} = 4 mA | - | - | 0.4 | V |
| I²C Interface Pins – Fast Mode SDA, SCL | | | | | | | |
| V _{ILI2C} | Low-Level Input Voltage | 3.0 to 5.5 | | - | - | 0.4 | V |
| V _{IHI2C} | High-Level Input Voltage | 3.0 to 5.5 | | 1.2 | - | - | V |
| V _{HYS} | Hysteresis of Schmitt Trigger Inputs | 3.0 to 5.5 | | 0.2 | - | - | V |
| I _{I2C} | Input Current of SDA and SCL Pins | 3.0 to 5.5 | Input Voltage 0.26 V to 2 V | -10 | - | 10 | μA |
| I _{CCTI2C} | V _{DD} Current when SDA and SCL is HIGH | 3.0 to 5.5 | Input Voltage 1.8 V | -10 | - | 10 | μA |
| V _{OLSDA} | Low-Level Output Voltage at 3 mA Sink Current (Open-Drain) | 3.0 to 5.5 | | 0 | - | 0.3 | V |
| C _I | Capacitance for Each I/O Pin | 3.0 to 5.5 | | | - | 10 | pF |

FAST MODE I²C SPECIFICATIONS (see Figure 4)

| Symbol | Parameter | Fast Mode | | Unit |
|---------------------|---|----------------------------|------|------|
| | | Min. | Max. | |
| f _{SCL} | I2C_SCL Clock Frequency | 0 | 400 | kHz |
| t _{HD;STA} | Hold Time (Repeated) START Condition | 0.6 | - | μs |
| t _{LOW} | LOW Period of I2C_SCL Clock | 1.3 | - | μs |
| t _{HIGH} | HIGH Period of I2C_SCL Clock | 0.6 | - | μs |
| t _{SU;STA} | Set-up Time for Repeated START Condition | 0.6 | - | μs |
| t _{HD;DAT} | Data Hold Time | 0 | 0.9 | μs |
| t _{SU;DAT} | Data Set-up Time (Note 2) | 100 | - | ns |
| t _r | Rise Time of I2C_SDA and I2C_SCL Signals (Note 3) | 20*(V _{DD} /5.5V) | 250 | ns |
| t _f | Fall Time of I2C_SDA and I2C_SCL Signals (Note 3) | 20*(V _{DD} /5.5V) | 250 | ns |
| t _{SU;STO} | Set-up Time for STOP Condition | 0.6 | - | μs |

FUSB301

FAST MODE I²C SPECIFICATIONS (see Figure 4) (continued)

| Symbol | Parameter | Fast Mode | | Unit |
|------------------|---|-----------|------|------|
| | | Min. | Max. | |
| t _{BUF} | BUS-Free Time between STOP and START Conditions | 1.3 | - | μs |
| t _{SP} | Pulse Width of Spikes that Must Be Suppressed by the Input Filter | 0 | 50 | ns |

- A fast-mode I²C bus device can be used in a standard-mode I²C bus system, but the requirement t_{SU;DAT} ≥ 250 ns must be met. This is automatically the case of the device does not stretch the LOW period of the I²C_SCL signal. If such a device does stretch the LOW period I²C_SCL signal, it must output the next data bit to the I²C_SDA line t_{r_max} + t_{SU;DAT} = 1000 + 250 = 1250 ns (according to the standard-mode I²C bus specification) before the I²C_SCL line is released.
- C_b equals the total capacitance of one bus line in pF. If mixed with high-speed devices, faster fall times are allowed according to the I²C specification.

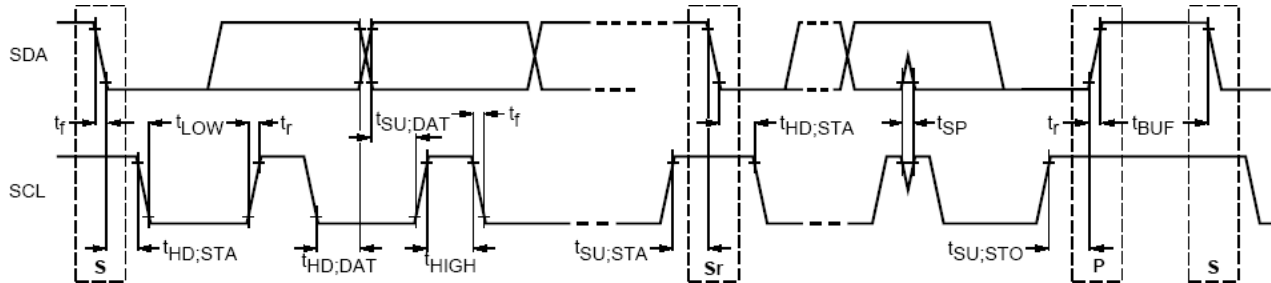
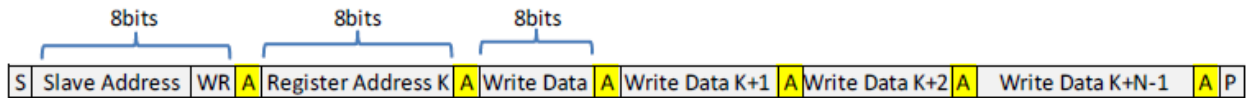


Figure 4. Definition of Timing for Full-Speed Mode Devices on the I²C Bus

I²C INTERFACE

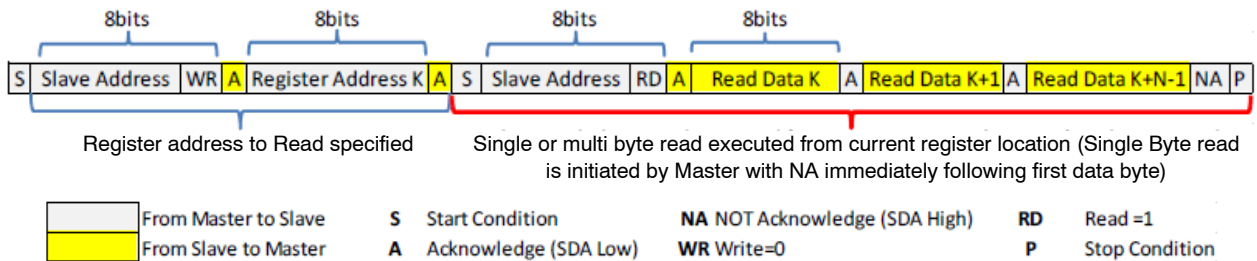
The FUSB301 includes a full I²C slave controller. The I²C slave fully complies with the I²C specification version 6

requirements. This block is designed for fast mode. Examples of an I²C write and read sequence are shown Figure 5 and Figure 6 respectively.



NOTE: Single Byte read is initiated by Master with P immediately following first data byte.

Figure 5. I²C Write Example



NOTE: If Register is not specified Master will begin read from current register. In this case only sequence showing in Red bracket is needed.

Figure 6. I²C Read Example

FUSB301

I²C ADDRESS

Table 3. FUSB301 I²C SLAVE ADDRESS

| Name | Size (Bits) | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---------------|-------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Slave Address | 8 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | R/W |

REGISTER DEFINITIONS

Table 4. REGISTER MAP

| Address | Register Name | Type | RST Val | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|-----------|---------------|------|---------|------------------|-------|---------|---------|-------------------|-----------|------------|-----------|
| 0x01 | Device ID | RO | 12 | Version ID [3:0] | | | | Revision ID [3:0] | | | |
| 0x02 | Modes | R/W | 04 | | | DRP+ACC | DRP | Sink+ACC | Sink | Source+ACC | Source |
| 0x03 | Control | R/W | 03 | DRPTOGGLE | | | | | HOST_CUR1 | HOST_CUR0 | INT_MASK |
| 0x04 | Manual | W/C | 00 | | | | | UNATT_SNK | UNATT_SRC | DISABLED | ERROR_REC |
| 0x05 | Reset | W/C | 00 | | | | | | | | SW_RES |
| 0x06–0x0F | Reserved | X | xx | Do Not Use | | | | | | | |
| 0x10 | Mask | R/W | 00 | | | | | M_ACC_CH | M_BC_LVL | M_DETACH | M_ATTACH |
| 0x11 | Status | RO | 00 | | | ORIENT1 | ORIENT0 | VBUSOK | BC_LVL1 | BC_LVL0 | ATTACH |
| 0x12 | Type | RO | 00 | | | | Sink | Source | | DEBUGACC | AUDIOACC |
| 0x13 | Interrupt | R/C | 00 | | | | | I_ACC_CH | I_BC_LVL | I_DETACH | I_ATTACH |
| 0x14–0x1F | Reserved | X | xx | Do Not Use | | | | | | | |

4. Do not use registers that are blank.

5. Values read from undefined register bits are invalid. Do not write to undefined registers.

Table 5. DEVICE ID

Address: 01h

Reset Value: 0x0001_0010

Type: Read Only

| Bit # | Name | Size (Bits) | Description |
|-------|-------------|-------------|---|
| 7:4 | Version ID | 4 | Device version ID by Trim or etc. A_[Version ID]: 0001 |
| 3:0 | Revision ID | 4 | Revision History of each version [Revision ID]_revC: 0010 |

Table 6. MODES

Address: 02h

Reset Value: 0x0000_0100

Type: Read/Write

| Bit # | Name | Size (Bits) | Description |
|-------|------------|-------------|---|
| 7:6 | Reserved | 2 | Do Not Use |
| 5 | DRP+ACC | 1 | 1: Configure device as a Dual Role Port (DRP) with accessory support |
| 4 | DRP | 1 | 1: Configure device as a Dual Role Port (DRP) without accessory support |
| 3 | Sink+ACC | 1 | 1: Configure device as a Sink with accessory support |
| 2 | Sink | 1 | 1: Configure device as a Sink without accessory support |
| 1 | Source+ACC | 1 | 1: Configure device as a Source with accessory support |
| 0 | Source | 1 | 1: Configure device as a Source without accessory support |

FUSB301

Table 7. CONTROL

Address: 03h

Reset Value: 0×XX00_X011

Type: Read/Write

| Bit # | Name | Size (Bits) | Description |
|-------|----------------|-------------|---|
| 7:6 | Reserved | 2 | Do Not Use |
| 5:4 | DRPTOGGLE | 2 | Selects different timing for Dual Role Port Toggle between Unattached. Sink State and Unattached.SOURCE State. 00: 35 ms min. in Unattached.Sink and 15 ms min. In Unattached.SOURCE 01: 30 ms min. In Unattached.Sink and 20 ms min. In Unattached.SOURCE 10: 25 ms min. In Unattached.Sink and 25 ms min. In Unattached.SOURCE 11: 20 ms min. In Unattached.Sink and 30 ms min. In Unattached.SOURCE |
| 3 | Reserved | 1 | Do Not Use |
| 2:1 | HOST_CUR [1:0] | 2 | 1: Controls the pull-up current when device enabled as a Source 00: No Current 01: 80 μA – Default USB Power 10: 180 μA – Medium Current Mode: 1.5 A 11: 330 μA – High Current Mode: 3 A |
| 0 | INT_MASK | 1 | 1: Global interrupt mask to mask all interrupts |

Table 8. MANUAL (Note 6)

Address: 04h

Reset Value: 0×XXXX_0000

Type: Write/Clear

| Bit # | Name | Size (Bits) | Description |
|-------|--------------------|-------------|--|
| 7:4 | Reserved | 4 | Do Not Use |
| 3 | UNATT_SNK (Note 7) | 1 | 1: Put device in Unattached.Sink state as defined in the Type C spec |
| 2 | UNATT_SRC | 1 | 1: Put device in Unattached.Source state as defined in the Type C spec |
| 1 | DISABLED (Note 8) | 1 | 1: Put device in Disabled state as defined in the Type C spec |
| 0 | ERROR_REC | 1 | 1: Put device in ErrorRecovery state as defined in the Type C spec |

6. If more than one bit is set to “b1” simultaneously then an order of priority will be used. 1st priority is DISABLED, 2nd is ERROR_REC, 3rd is UNATT_SRC, last is UNATT_SNK. The highest priority bit will take precedence and all other bits will be cleared automatically.
7. Wait 2 ms between Modes = Sink and Manual = UNATT_SNK writes.
8. The DISABLED bit must be manually cleared.

Table 9. RESET

Address: 05h

Reset Value: 0×XXXX_XXX0

Type: Write/Clear

| Bit # | Name | Size (Bits) | Description |
|-------|----------|-------------|---------------------------------------|
| 7:6 | Reserved | 7 | Do Not Use |
| 0 | SW_RES | 1 | 1: Reset the system and I2C Register. |

Table 10. MASK

Address: 10h

Reset Value: 0×XXXX_0000

Type: Read/Write

| Bit # | Name | Size (Bits) | Description |
|-------|----------|-------------|---|
| 7:4 | Reserved | 4 | Do Not Use |
| 3 | M_ACC_CH | 1 | 1: Mask a change from Accessory Present to Attached Accessory |
| 2 | M_BC_LVL | 1 | 1: Mask a change in I_BC_LVL interrupt bit |

FUSB301

Table 10. MASK (continued)

Address: 10h

Reset Value: 0×XXXX_0000

Type: Read/Write

| Bit # | Name | Size (Bits) | Description |
|-------|----------|-------------|--|
| 1 | M_DETACH | 1 | 1: Mask the I_DETACH interrupt bit |
| 0 | M_ATTACH | 1 | 1: Mask a change in the I_ATTACH interrupt bit |

Table 11. STATUS

Address: 11h

Reset Value: 0×XX00_0000

Type: Read

| Bit # | Name | Size (Bits) | Description |
|-------|-------------|-------------|--|
| 7:6 | Reserved | 2 | Do Not Use |
| 5:4 | ORIENT[1:0] | 2 | Status to indicate which CCx pins has the CC cable connection 11: A fault has occurred during the detection 10: Cable CC is connected through the CC2 pin 01: Cable CC is connected through the CC1 pin 00: No or unresolved connection detected. |
| 3 | VBUSOK | 1 | 1: Status to indicate VBUS is in the valid range |
| 2:1 | BC_LVL[1:0] | 2 | Thresholds that allow detection of current advertisement on CC line 00: Ra or unattached Sink 01: Rd threshold for Sink default current advertisement 10: RD threshold for Sink 1.5 A current advertisement 11: RD threshold for Sink 3 A current advertisement |
| 0 | ATTACH | 1 | 1: Attached to a device or accessory of a type shown in the Type register |

Table 12. TYPE

Address: 12h

Reset Value: 0×XXX0_0X00

Type: Read

| Bit # | Name | Size (Bits) | Description |
|-------|----------|-------------|--|
| 7:5 | Reserved | 3 | Do Not Use |
| 4 | Sink | 1 | 1: Indicates a Sink has been detected |
| 3 | Source | 1 | 1: Indicates a Source has been detected |
| 2 | Reserved | 1 | Do Not Use |
| 1 | DEBUGACC | 1 | 1: Indicates a Debug Accessory has been detected |
| 0 | AUDIOACC | 1 | 1: Indicates a Audio Accessory has been detected |

Table 13. INTERRUPT0

Address: 13h

Reset Value: 0×XXXX_X000

Type: Write/Clear

| Bit # | Name | Size (Bits) | Description |
|-------|----------|-------------|---|
| 7:4 | Reserved | 4 | Do Not Use |
| 3 | I_ACC_CH | 1 | 1: Interrupt flagged when a change from Accessory Present to Audio Accessory or Debug Accessory occurs. |
| 2 | I_BC_LVL | 1 | 1: Interrupt flagged when a change in BC_LVL advertised current level has occurred |

FUSB301

Table 13. INTERRUPT0 (continued)

Address: 13h

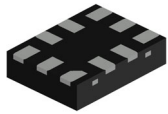
Reset Value: 0×XXXX_X000

Type: Write/Clear

| Bit # | Name | Size (Bits) | Description |
|-------|----------|-------------|--|
| 1 | I_DETACH | 1 | 1: Interrupt flagged when a device or accessory has been detached |
| 0 | I_ATTACH | 1 | 1: Interrupt flagged when a device or accessory of type indicated in the Type register has been attached |

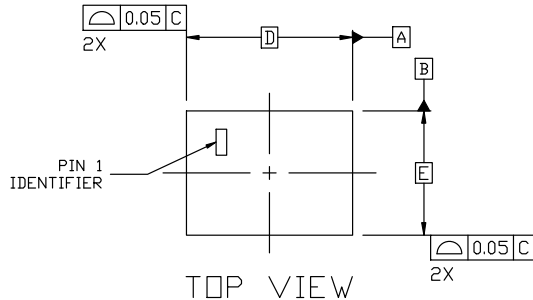
MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

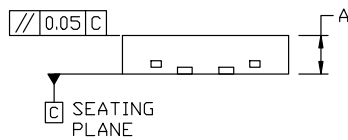


X2QFN10 1.60x1.20x0.37, 0.40P
CASE 722AC
ISSUE A

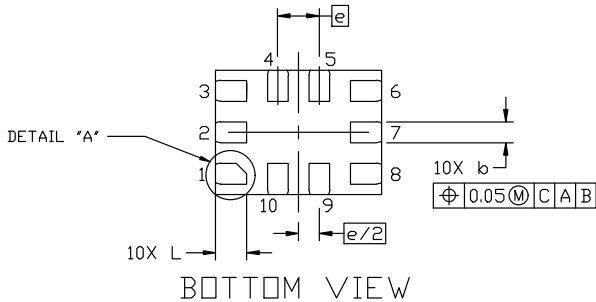
DATE 15 NOV 2023



TOP VIEW



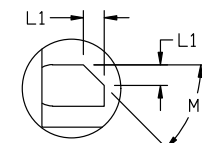
SIDE VIEW



BOTTOM VIEW

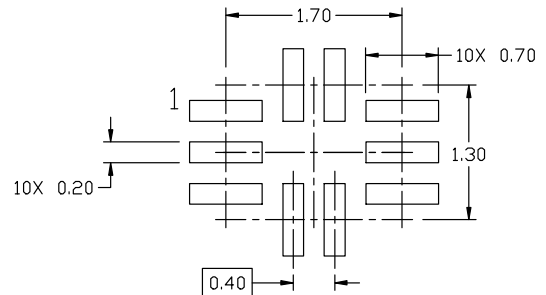
NOTES:

1. DIMENSIONS AND TOLERANCING AS PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSION: MILLIMETERS.



DETAIL "A"
 SCALE 2:1

| DIM | MILLIMETERS | | |
|-----|-------------|------|------|
| | MIN. | NOM. | MAX. |
| A | 0.34 | 0.37 | 0.40 |
| b | 0.15 | 0.20 | 0.25 |
| D | 1.60 BSC | | |
| E | 1.20 BSC | | |
| e | 0.40 BSC | | |
| L | 0.25 | 0.30 | 0.35 |
| L1 | 0.10 (REF) | | |
| M | 45° (REF) | | |



RECOMMENDED
 MOUNTING FOOTPRINT

*FOR ADDITIONAL INFORMATION ON OUR PB-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCES MANUAL, SOLDERRM/D.

| | | |
|-------------------------|--------------------------------------|--|
| DOCUMENT NUMBER: | 98AON13692G | Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| DESCRIPTION: | X2QFN10 1.60x1.20x0.37, 0.40P | PAGE 1 OF 1 |

onsemi and ONSEMI are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

onsemi, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales