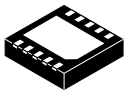
# FUSB3301

# USB Type-C Controller for Mobile Chargers and Power Adapters

ON Semiconductor®

www.onsemi.com



**WDFN**
**10 LEAD**
**CASE 511DM**

### Description

The FUSB3301 is an autonomous Source only Type−C controller optimized for mobile chargers and power adapters. It broadcasts the available current of the charger over CC1/CC2 using the USB Type−C standard and prevents VBUS from being asserted until a valid connection has been verified. It can be used for up to 15 W charging using Type−C protocols. The FUSB3301 has very low standby power consumption and is packaged in a 0.5 mm pitch MLP to accommodate power adapter PCBs.

### Features

- Fully Autonomous Type−C Controller
- Supports Type−C Version 1.2
- Fixed Source Mode
- Low Standby Power: $I_{CC}$ = 5 μA (Typical)
- VBUS Switch Control
- Advertises Three Standard Type−C VBUS Current Levels (900 mA, 1.5 A, 3.0 A)
- 2 kV HBM ESD Protection
- 10 Lead MLP Package
- $V_{DD}$ Operating Range, 3.0 V – 5.5 V

### Applications

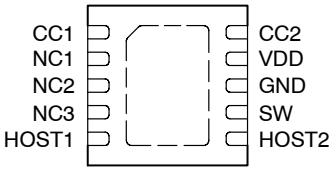
- USB Type−C Power Ports
- Mobile Chargers
- Power Adapters
- AC−DC Adapters

### MARKING DIAGRAM




NZ = Specific Device Marking

### PIN ASSIGNMENT




(Top View)

### ORDERING INFORMATION

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

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## ORDERING INFORMATION

| Part Number | Top Mark | Operating Temperature Range | Package | Packing Method |
|---|---|---|---|---|
| FUSB3301MPX | NZ | −40 to 85°C | 10−Lead, MLP, 3 mm x 3 mm | Tape and Reel |

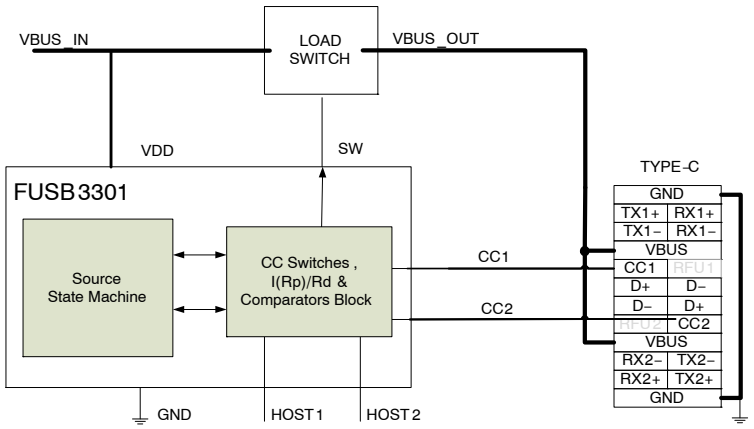



**Figure 1. Block Diagram**

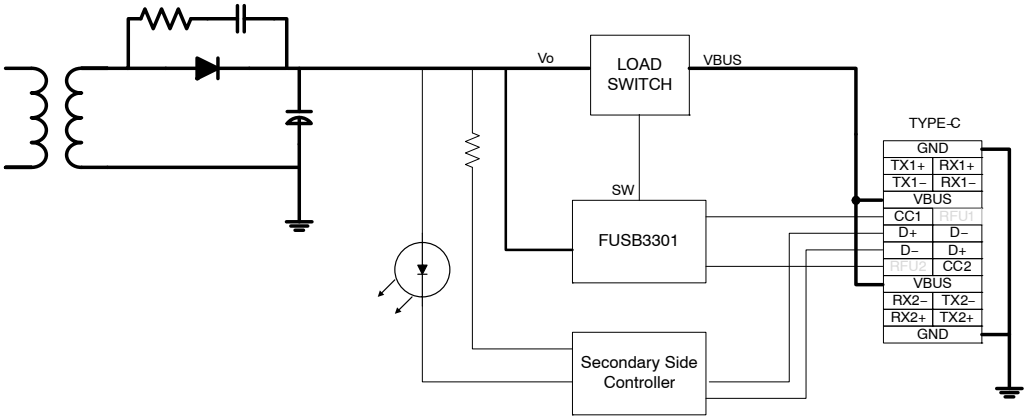



**Figure 2. Typical Application**

**Table 1. PIN DESCRIPTIONS**

| Pin # | Name | Type | Description |
|---|---|---|---|
| 1 | CC1 | Input/Output | Type−C Configuration Channel |
| 2 | NC1 (Note 1) | NC | No Connect |
| 3 | NC2 (Note 1) | NC | No Connect |
| 4 | NC3 (Note 1) | NC | No Connect |
| 5 | HOST1 | Input | Host Current Select Pin with Internal Pull−up |
| 6 | HOST2 | Input | Host Current Select Pin with Internal Pull−up |
| 7 | SW | Output | Open Drain output to control the VBUS load switch |
| 8 | GND | Power | Ground |
| 9 | VDD | Power | Power Supply |
| 10 | CC2 | Input/Output | Type−C Configuration Channel |

1. No connect pins can float or can be tied to ground.

**Table 2. CONNECTION STATE TABLE**

| CC1 | CC2 | SW | Description |
|---|---|---|---|
| NC | NC | HiZ | No Attach |
| Rd | NC | L | Attach to UFP (Sink) |
| NC | Rd | L | Attach to UFP (Sink) |
| Rd | Rd | HiZ | No Attach |
| Ra | NC | HiZ | No Attach |
| NC | Ra | HiZ | No Attach |
| Ra | Ra | HiZ | No Attach |

**Host Current**

**Table 3. HOST INPUT TRUTH TABLE**

| HOST2 | HOST1 | CC Current (μA) | Host Current (A) |
|---|---|---|---|
| GND / LOW | GND / LOW | 330 | 3.0 |
| GND / LOW | FLOAT / HIGH | 180 | 1.5 |
| FLOAT / HIGH | GND / LOW | 180 | 1.5 |
| FLOAT / HIGH | FLOAT / HIGH | 80 | 0.9 |

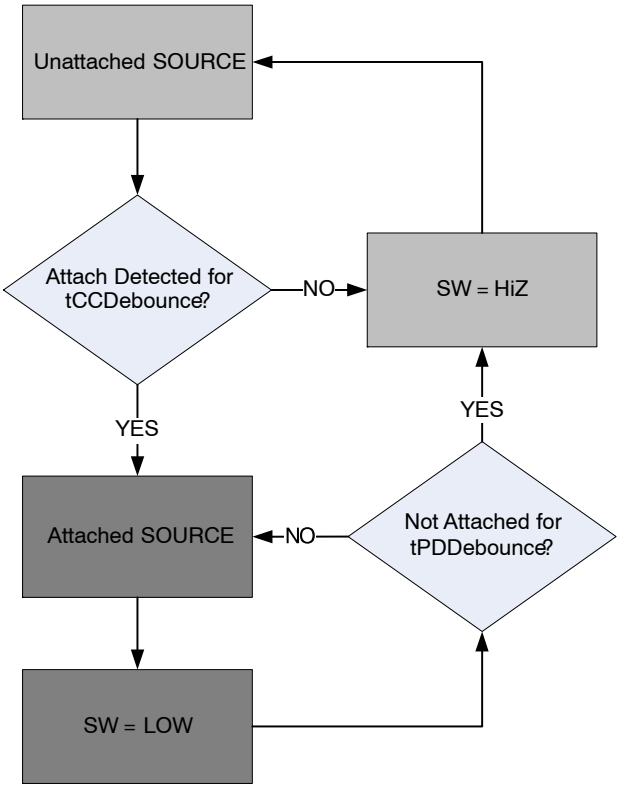



**Figure 3. Source Attach Flowchart**

**Table 4. ABSOLUTE MAXIMUM RATINGS**

| Symbol | Parameter | | | Min | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{DD}$ | Supply Voltage | | | −0.5 | 6.0 | V |
| $V_{CCX}$ | CC pins when configured as HOST | | | −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 61000−4−2 System ESD | Connector Pins (VBUS, CC1 & CC2) | Air Gap | 15 | | kV |
| | | | Contact | 8 | | |
| | Human Body Model, JEDEC JESD22−A114 | Connector Pins (VBUS, CC1 and CC2) | | 4 | | kV |
| | | Others | | 2 | | |
| | Charged Device Model, JEDEC JESD22−C101 | All Pins | | 1 | | kV |

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.

**Table 5. RECOMMENDED OPERATING CONDITIONS**

| Symbol | Parameter | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| $V_{DD}$ | Supply Voltage | 3.0 | 5.0 | 5.5 | V |
| $T_A$ | Operating Ambient Temperature | −40 | | +85 | °C |
| $T_J$ | Operating Junction Temperature | −40 | | +125 | °C |

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

**Table 6. DC AND TRANSIENT CHARACTERISTICS** All typical values are at $T_A$=25°C unless otherwise specified.

| Symbol | Parameter | $T_A$ = −40 to +85°C, $T_J$=−40 to +125°C | | | Unit |
|---|---|---|---|---|---|
| | | Min | Typ | Max | |
| $I_{80_CCX}$ | Source 80 μA CC Current (Default) HOST2=VDD, HOST1=VDD | 64 | 80 | 96 | μA |
| $I_{180_CCX}$ | Source 180 μA CC Current (1.5 A) HOST2=VDD, HOST1=GND or HOST2=GND, HOST1=VDD | 166 | 180 | 194 | μA |
| $I_{330_CCX}$ | Source 330 μA CC Current (3 A) HOST2=GND, HOST1=GND | 304 | 330 | 356 | μA |
| zOPEN | CC Resistance for Disabled State | 126 | | | kΩ |
| vRa−SRCdef | Ra Detection Threshold for CC Pin for Source for Default Current on VBUS | 0.15 | 0.20 | 0.25 | V |
| vRa−SRC1.5A | Ra Detection Threshold for CC pin for Source for 1.5 A Current on VBUS | 0.35 | 0.40 | 0.45 | V |
| vRa−SRC3A | Ra Detection Threshold for CC Pin for Source for 3 A Current on VBUS | 0.75 | 0.80 | 0.85 | V |
| vRd−SRCdef | Rd Detection Threshold for Source for Default Current (HOST2/1=VDD/VDD) | 1.50 | 1.60 | 1.65 | V |
| vRd−SRC1.5A | Rd detection threshold for Source for 1.5 A Current (HOST2/1=GND/VDD or VDD/GND) | 1.50 | 1.60 | 1.65 | V |
| vRd−SRC3A | Rd Detection Threshold for Source for 3 A Current (HOST2/1=GND/GND) | 2.45 | 2.60 | 2.75 | V |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

**Table 7. CURRENT CONSUMPTION**

| Symbol | Parameter | Conditions | $V_{DD}$ (V) | $T_A$ = −40 to +85°C<br>$T_J$=−40 to +125°C | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | Min | Typ | Max | |
| Istby | Unattached Source | Nothing attached, Host Pins = VDD, GND, Float. | 3.0 to 5.5 | | 5 | 20 | μA |
| Iattach | Attach Current (Less Host Current) | Attached, Host Pins=VDD, GND, Float. | 3.0 to 5.5 | | 10 | 15 | μA |

**Table 8. TIMING PARAMETERS**

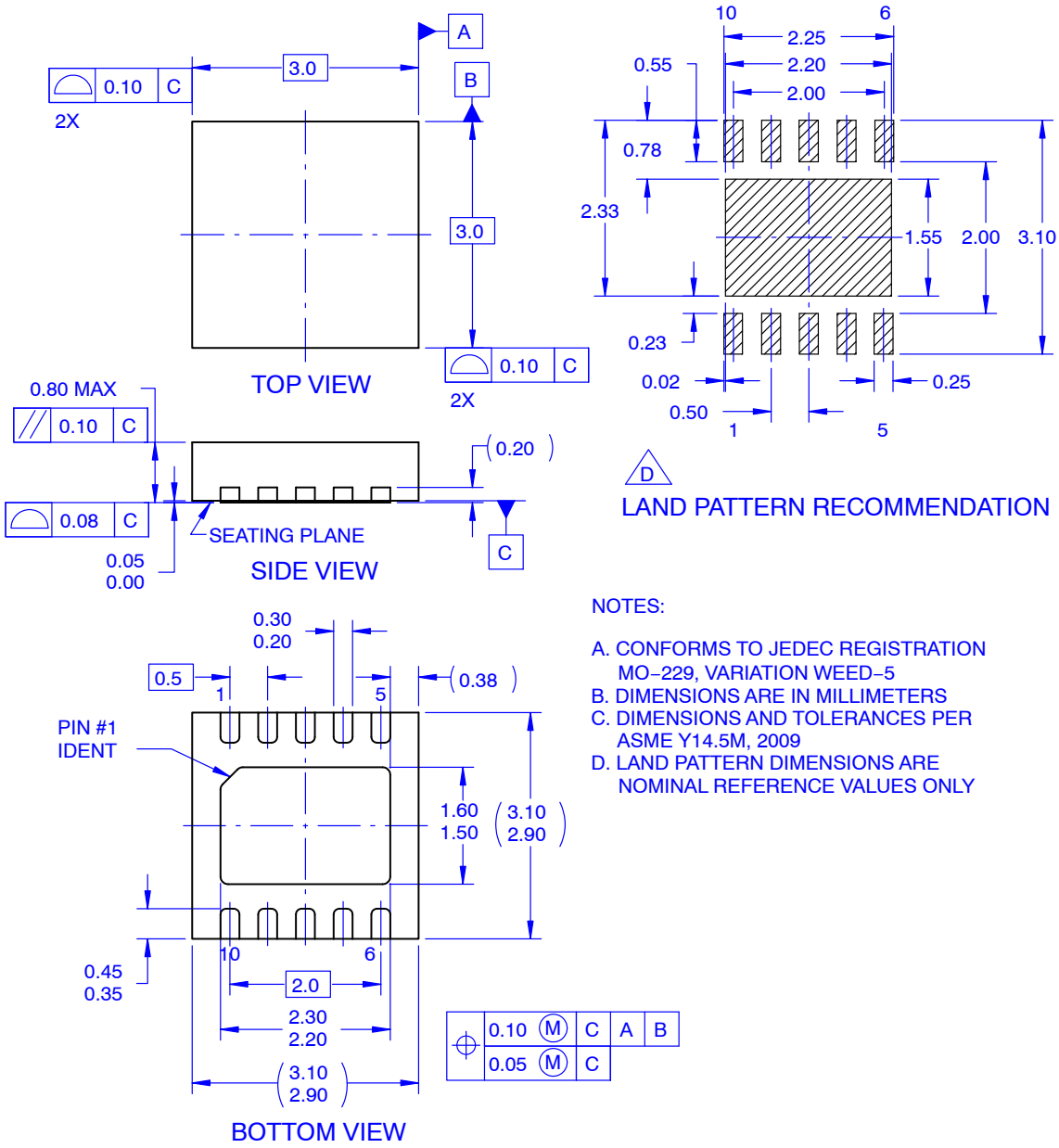
| Symbol | Parameter | $T_A$ = −40 to +85°C<br>$T_J$=−40 to +125°C | | | Unit |
|---|---|---|---|---|---|
| | | Min | Typ | Max | |
| tCCDebounce | Time from CC Voltage Detection until SW goes LOW | 100 | 150 | 200 | ms |
| tPDDebounce | Time from CC Voltage Not Detected until SW goes to High−Z | 10 | 15 | 20 | ms |

**Table 9. IO SPECIFICATIONS**

| Symbol | Parameter | Conditions | $V_{DD}$ (V) | $T_A$ = −40 to +85°C<br>$T_J$=−40 to +125°C | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | Min | Typ | Max | |
| $V_{OLSW}$ | SW Output Low Voltage | $I_{OL}$=4 mA | 3.0 to 5.5 | | | 0.4 | V |
| $V_{ILHOST}$ | HOST1/2 Low−Level Input Voltage | | 3.0 to 5.5 | | | $0.3V_{DD}$ | V |
| $V_{IHHOST}$ | HOST1/2 High−Level Input Voltage | | 3.0 to 5.5 | $0.7V_{DD}$ | | | V |

**WDFN10 3x3, 0.5P**
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ISSUE O

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NOTES:

A. CONFORMS TO JEDEC REGISTRATION MO−229, VARIATION WEED−5
B. DIMENSIONS ARE IN MILLIMETERS
C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 2009
D. LAND PATTERN DIMENSIONS ARE NOMINAL REFERENCE VALUES ONLY

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