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# FUSB3301

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

### Features

- Fully Autonomous Type-C Controller
- Supports Type-C Version 1.1
- Fixed Source Mode
- Low Standby Power:  $I_{CC} = 5 \mu A$  (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

### 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.

### Applications

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

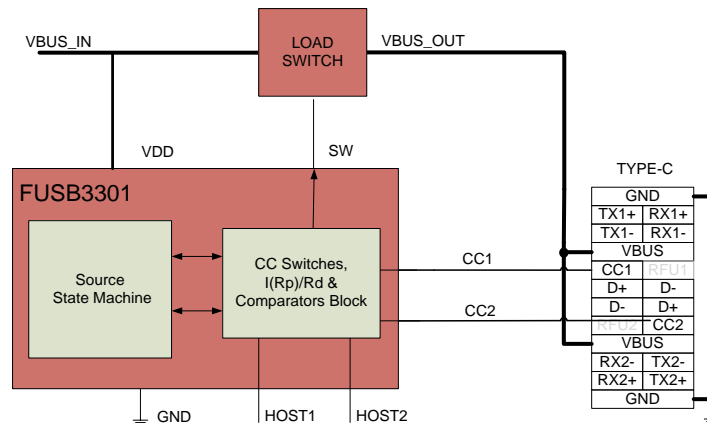


Figure 1. Block Diagram

### 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

## Typical Application

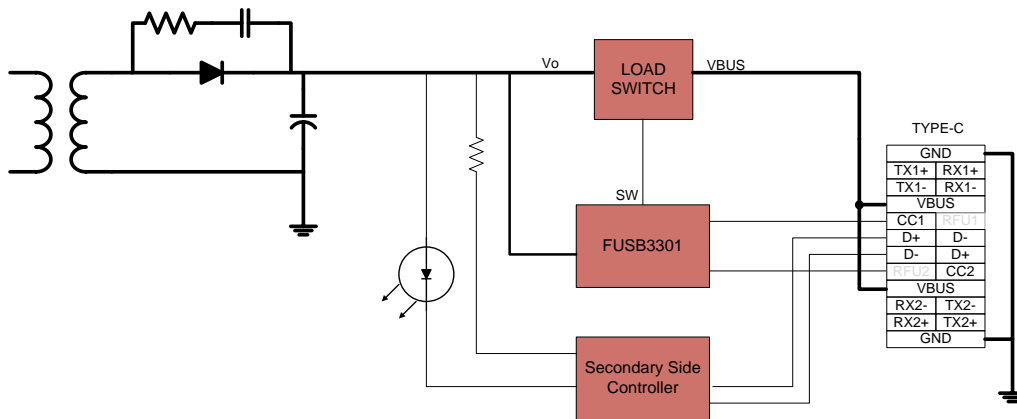


Figure 2. Typical Application

## Pin Configuration

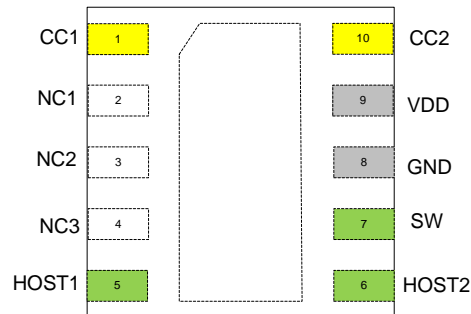


Figure 3. Pin Assignment (Top Through View)

## Pin Descriptions

Pin #	Name	Type	Description
1	CC1	Input/Output	Type-C Configuration Channel
2	NC1 <sup>(1)</sup>	NC	No Connect
3	NC2 <sup>(1)</sup>	NC	No Connect
4	NC3 <sup>(1)</sup>	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

### Note:

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

**Table 1. Connection State Table**

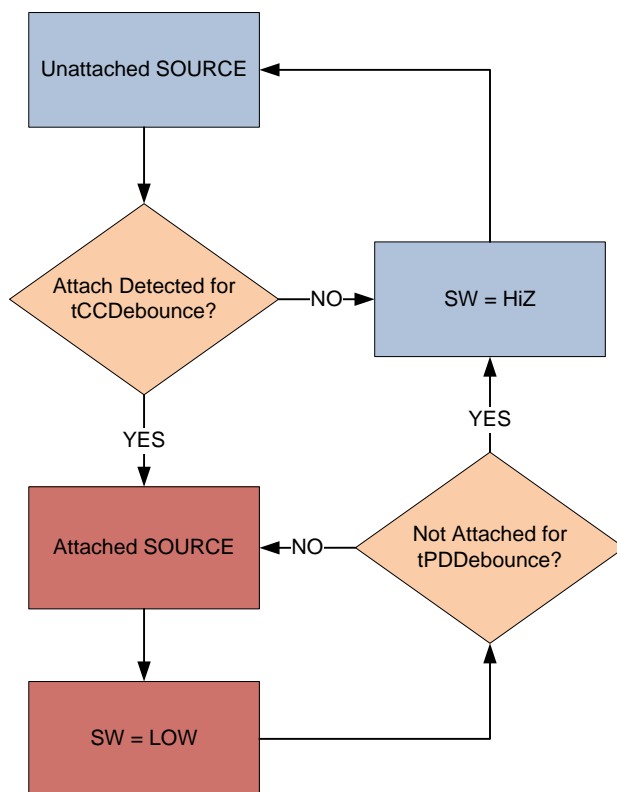
CC1	CC2	SW	Description
NC	NC	HiZ	No Attach
Rd	NC	L	Attach to UFP (Sink)
NC	Rd	L	Attach to UFP (Sink)
Rd	Rd	HiZ	No Attach
Ra	NC	HiZ	No Attach
NC	Ra	HiZ	No Attach
Ra	Ra	HiZ	No Attach

**Host Current**

**Table 2. HOST Input Truth Table**

HOST2	HOST1	CC Current ( $\mu$ A)	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

**Source Attach Flowchart**



**Figure 4. Source Attach Flowchart**

## Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Parameter		Min.	Max.	Unit
V <sub>DD</sub>	Supply Voltage		-0.5	6.0	V
V <sub>CCX</sub>	CC pins when configured as HOST		-0.5	6.0	V
T <sub>STORAGE</sub>	Storage Temperature Range		-65	+150	C
T <sub>J</sub>	Maximum Junction Temperature			+150	C
T <sub>L</sub>	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	

## Recommended Operating Conditions

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance. Fairchild does not recommend exceeding them or designing to Absolute Maximum Ratings.

Symbol	Parameter	Min.	Typ.	Max.	Unit
V <sub>DD</sub>	Supply Voltage	3.0	5.0	5.5	V
T <sub>A</sub>	Operating Ambient Temperature	-40		+85	C
T <sub>J</sub>	Operating Junction Temperature	-40		+125	C

## DC and Transient Characteristics

All typical values are at T<sub>A</sub>=25°C unless otherwise specified.

Symbol	Parameter	T <sub>A</sub> = -40 to +85°C T <sub>J</sub> = -40 to +125°C			Unit
		Min.	Typ.	Max.	
I <sub>80_CCX</sub>	Source 80 μA CC Current (Default) HOST2=VDD, HOST1=VDD	64	80	96	μA
I <sub>180_CCX</sub>	Source 180 μA CC Current (1.5 A) HOST2=VDD, HOST1=GND or HOST2=GND, HOST1=VDD	166	180	194	μA
I <sub>330_CCX</sub>	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

### Current Consumption

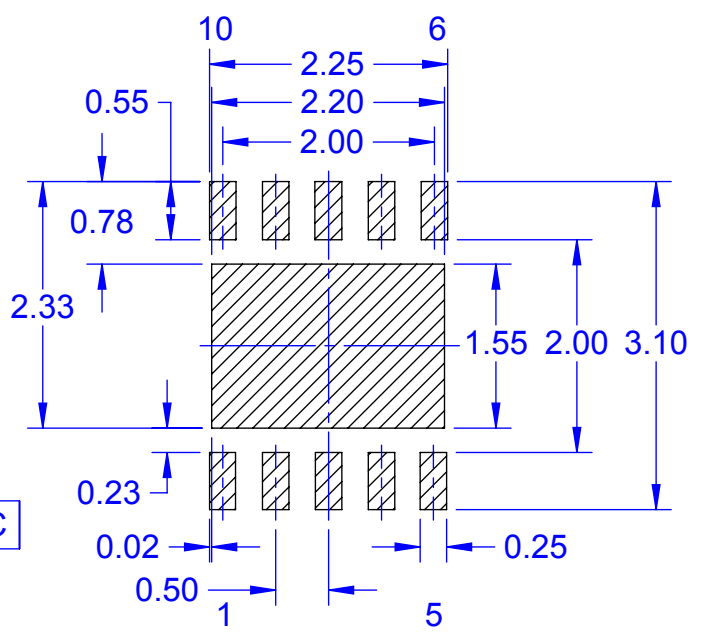
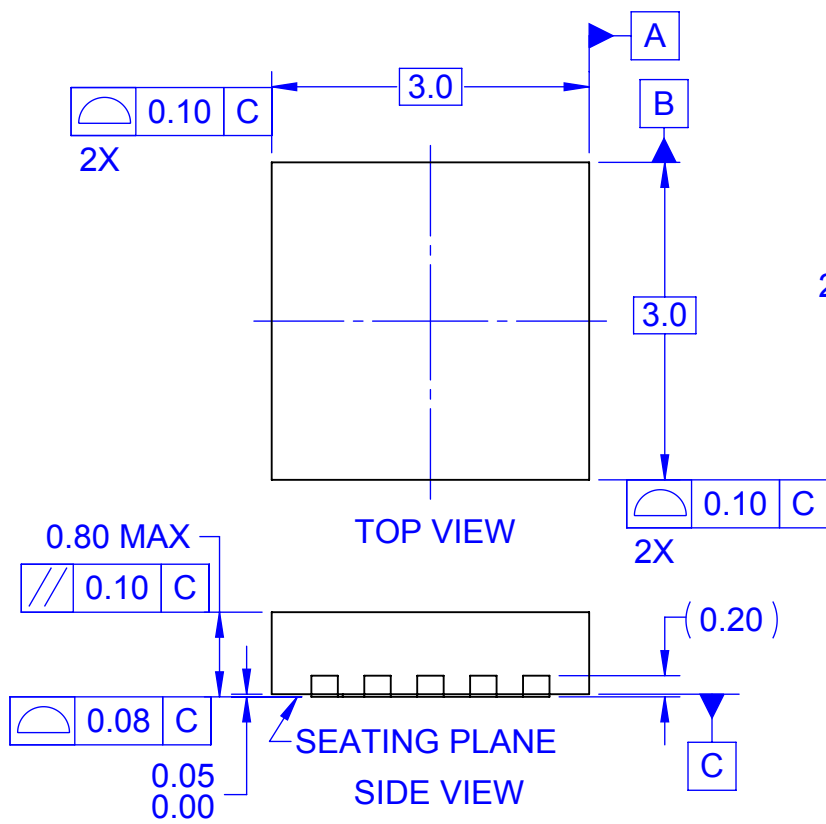
Symbol	Parameter	Conditions	V <sub>DD</sub> (V)	T <sub>A</sub> = -40 to +85°C T <sub>J</sub> = -40 to +125°C			Unit
				Min.	Typ.	Max.	
I <sub>stby</sub>	Unattached Source	Nothing attached, Host Pins = VDD, GND, Float.	3.0 to 5.5		5	20	μA
I <sub>attach</sub>	Attach Current (Less Host Current)	Attached, Host Pins=VDD, GND, Float.	3.0 to 5.5		10	15	μA

### Timing Parameters

Symbol	Parameter	T <sub>A</sub> = -40 to +85°C T <sub>J</sub> = -40 to +125°C			Unit
		Min.	Typ.	Max.	
t <sub>CCDebounce</sub>	Time from CC Voltage Detection until SW goes LOW	100	150	200	ms
t <sub>PDDebounce</sub>	Time from CC Voltage Not Detected until SW goes to High-Z	10	15	20	ms

### IO Specifications

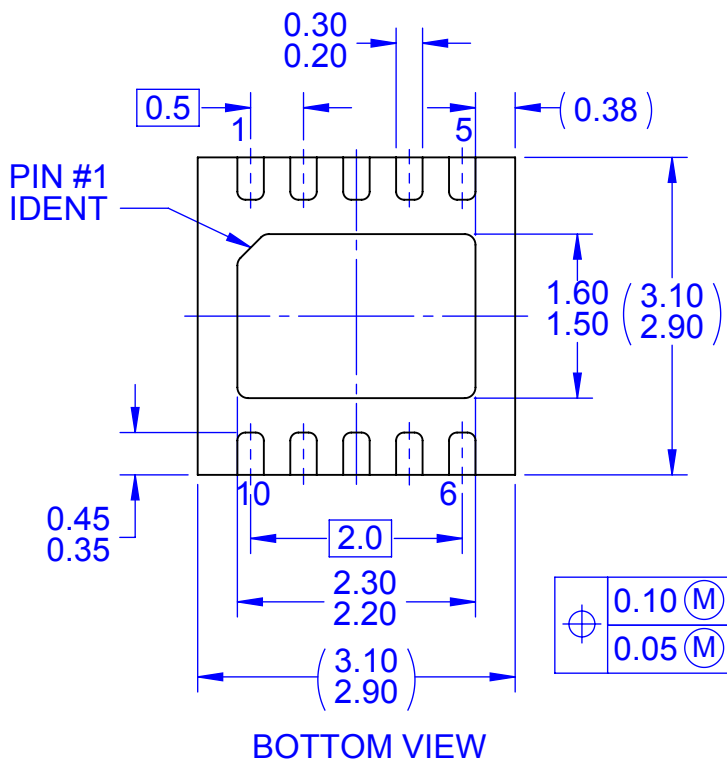
Symbol	Parameter	Conditions	V <sub>DD</sub> (V)	T <sub>A</sub> = -40 to +85°C T <sub>J</sub> = -40 to +125°C			Unit
				Min.	Typ.	Max.	
V <sub>OLSW</sub>	SW Output Low Voltage	I <sub>OL</sub> =4 mA	3.0 to 5.5			0.4	V
V <sub>ILHOST</sub>	HOST1/2 Low-Level Input Voltage		3.0 to 5.5			0.3V <sub>DD</sub>	V
V <sub>IHHOST</sub>	HOST1/2 High-Level Input Voltage		3.0 to 5.5	0.7V <sub>DD</sub>			V



**LAND PATTERN RECOMMENDATION**

**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
- E. DRAWING FILENAME: MKT-MLP10Brev2



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