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301

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 s et≥1 T211 ernal TEW) to enabt Mernal

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.
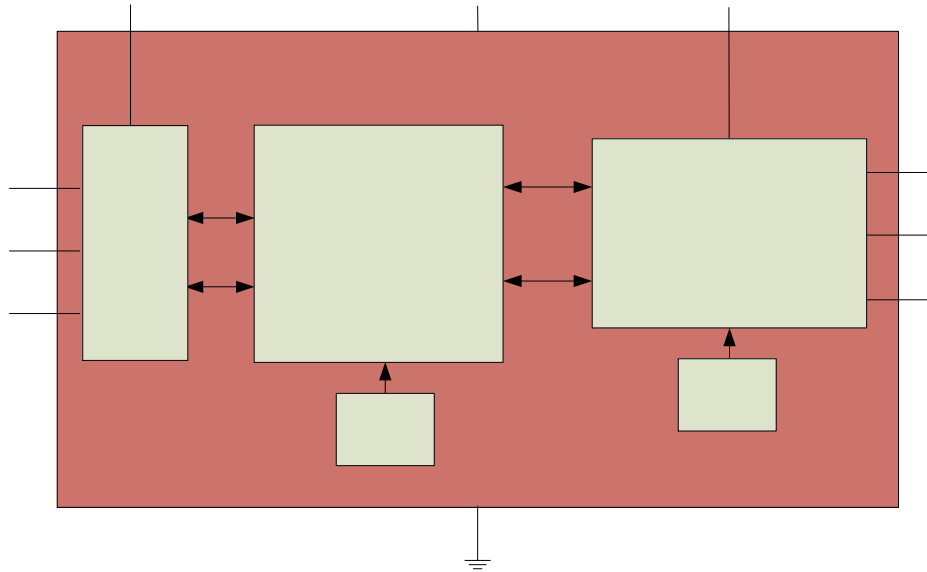
BLOCK DIAGRAM

Figure 2. Block Diagram

PIN CONFIGURATION
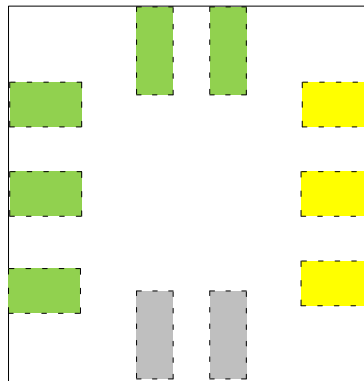
Figure 3. Pin Assignment (Top Through View)

FUSB301

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}					

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. (continued)

Symbol	Parameter	$T_A = -40$ to $+85°C$ $T_J = -40$ to $+125°C$			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)				

FUSB301

TIMING PARAMETERS

Symbol	Parameter		TA = −40 to +85°C TJ = −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)

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
0×01	Device ID	RO	12	Version ID [3:0]				Revision ID [3:0]			
0×02	Modes	R/W	04			DRP+ACC	DRP	Sink+ACC	Sink	Source+ACC	Source
0×03	Control	R/W	03			DRPTOGGLE			HOST_CUR1	HOST_CUR0	INT_MASK
0×04	Manual	W/C	00					UNATT_SNK	UNATT_SRC	DISABLED	ERROR_REC
0×05	Reset	W/C	00								SW_RES
0×06–0×0F	Reserved	X	xx	Do Not Use							
0×10	Mask	R/W	00					M_ACC_CH	M_BC_LVL	M_DETACH	M_ATTACH
0×11	Status	RO	00			ORIENT1	ORIENT0	VBUSOK	BC_LVL1	BC_LVL0	ATTACH
0×12	Type	RO	00				Sink	Source		DEBUGACC	AUDIOACC

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×

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

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

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

DATE 15 NOV 2023
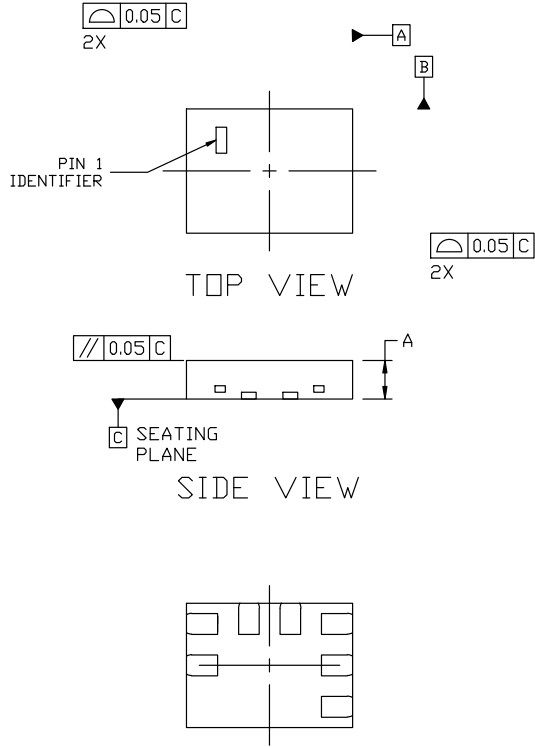
NOTES:

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

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		

⌒ 0.05 C
2X

◢ A

B

PIN 1
IDENTIFIER

TOP VIEW

⌒ 0.05 C
2X

∥ 0.05 C

A

C SEATING
PLANE

SIDE VIEW