

FUSB301A

ORDERING INFORMATION

Part Number	Top Mark	Operating Temperature Range	Package	Packing Method†
FUSB301A	NX	40 to 85°C	12 Lead Ultra thin Molded Leadless Package (TMLP) 1.6 mm × 1.6 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

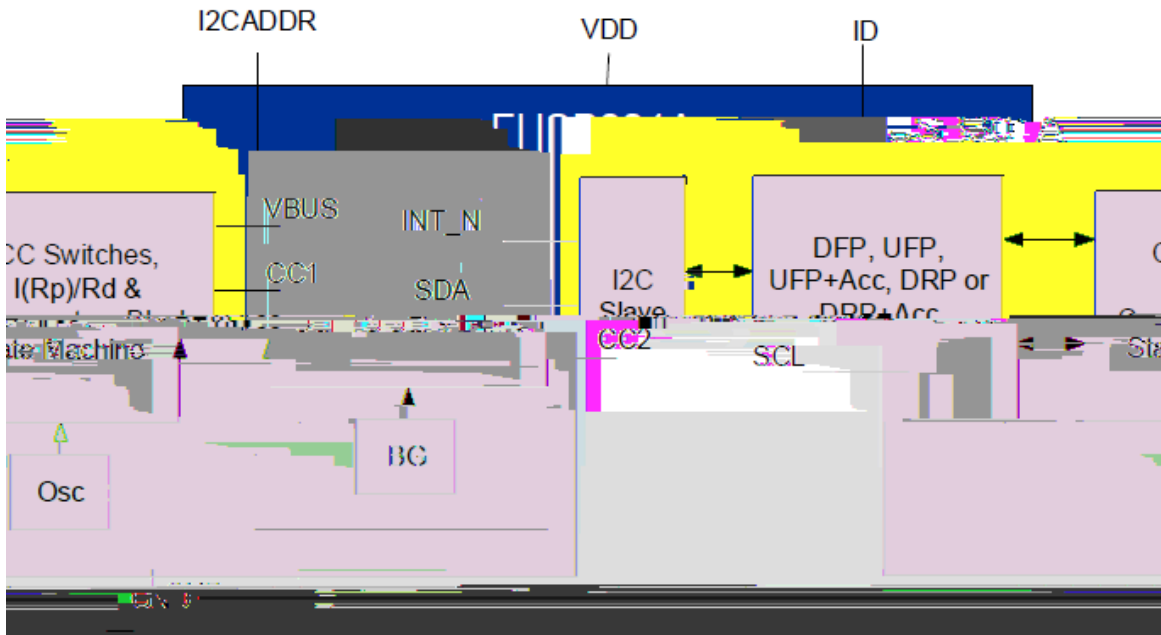


Figure 2. Block Diagram

PIN CONFIGURATION

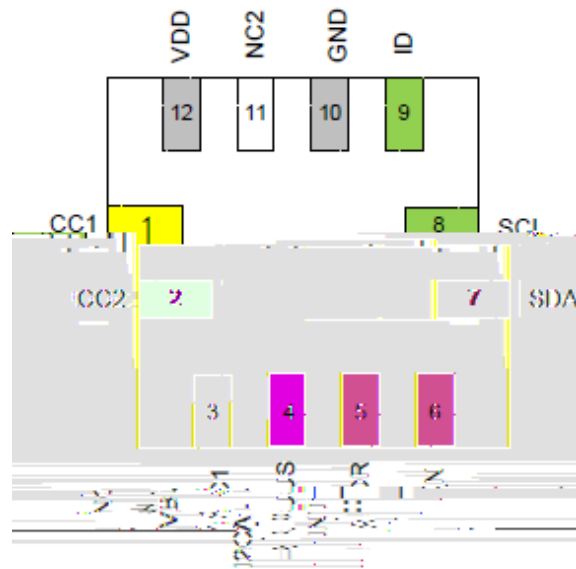


Figure 3. Pin Assignment (Top Through View)

FUSB301A



FUSB301A

ABSOLUTE MAXIMUM RATINGS (continued)

Symbol	Parameter		Min.	Max.	Unit
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 Default 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
v _{Rd SRCdef}	Rd Detection Threshold for Source for Default Current (HOST_CUR1/0 = 01)	1.50	1.60	1.65	V
v _{Rd SRC1.5A}	Rd Detection Threshold for Source for 1.5 A Current (HOST_CUR1/0 = 10)	1.50	1.60	1.65	V

FUSB301A

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_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.	Unit
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.	Unit
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					

FUSB301A

TIMING PARAMETERS

Symbol	Parameter	T _A = -40 to +85°C T _J = -40 to +125°C			Unit	
		Min.	Typ.	Max.	Unit	
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 (I2CADDR)							
V _{ILADDR}	Low Level Input Voltage	3.0 to 5.5				0.3V _{DD}	V
V _{IHADDR}	High Level Input Voltage	3.0 to 5.5		0.7V _{DD}			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}	VDD Current when SDA and SCL are HIGH	3.0 to 5.5	Input Voltage 1.8 V			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 ⁽²⁾	3.0 to 5.5				10	pF

FUSB301A



FUSB301A



FUSB301A

Table 9. MASK (continued)

Address: 10h

Reset Value: 0xFFFF_0000

Type: Read/Write

Bit #	Name	Size (Bits)	Description
2	M_BC_LVL	1	1: Mask a change in I_BC_LVL interrupt bit
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 10. STATUS

Address: 11h

Reset Value: 0XX00_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 11. TYPE

Address: 12h

Reset Value: 0XXXX0_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 12. INTERRUPT0

Address: 13h

Reset Value: 0XXXXX_X000

Type: Write/Clear

Bit #	Name	Size (Bits)	Description
7:4	Reserved	4	Do Not Use
3	I_ACC_CH	1	

FUSB301A

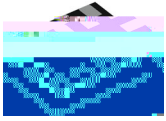
Table 12. INTERRUPT0 (continued)

Address: 13h

Reset Value: 0xFFFF_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

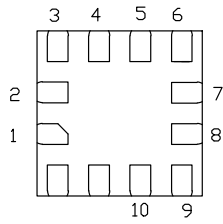


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NOTES:

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