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

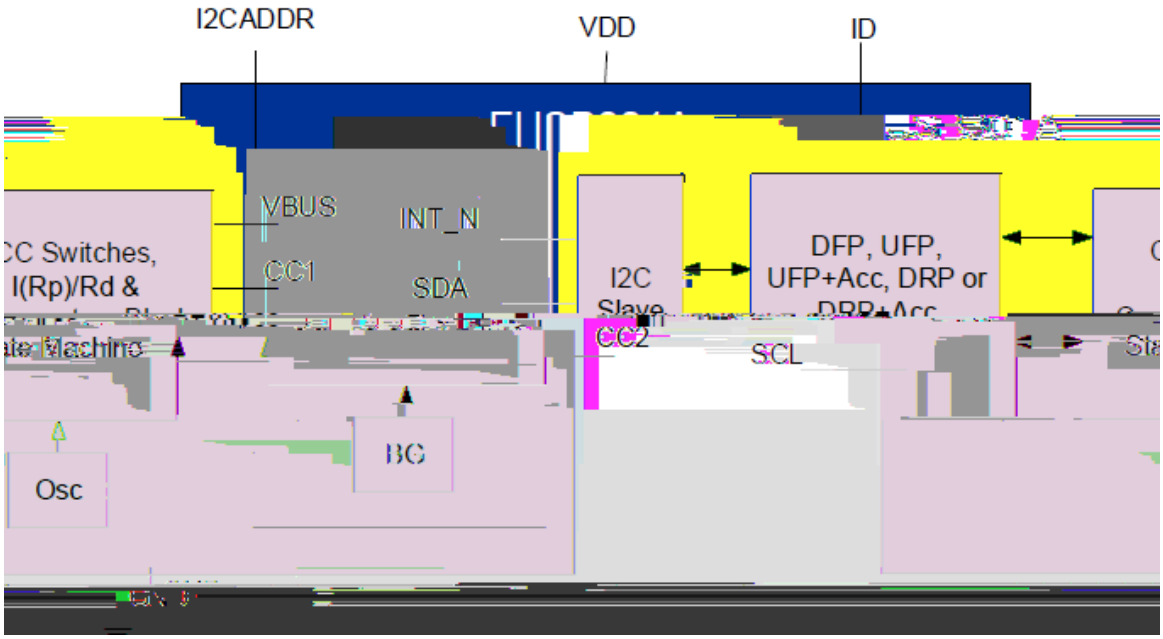


Figure 2. Block Diagram

PIN CONFIGURATION

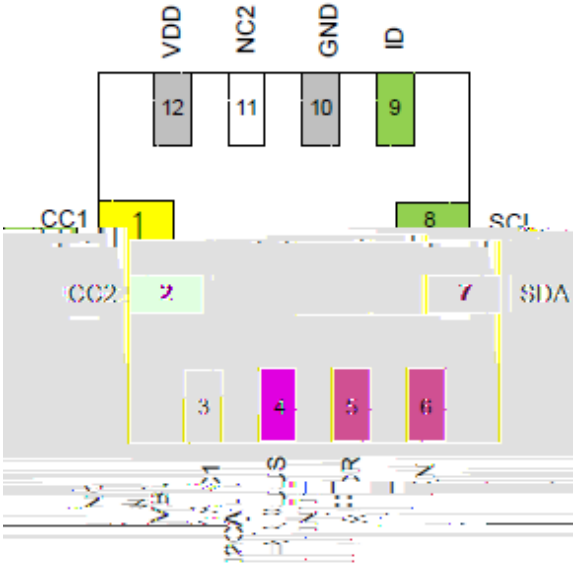


Figure 3. Pin Assignment (Top Through View)

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
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 (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

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_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 to +85°C, T_J = −40 to +125°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 to +85°C, T_J = −40 to +125°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					

TIMING PARAMETERS

Symbol	Parameter		T_A = −40 to +85°C, T_J = −40 to +125°C 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 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
I^2C 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

Table 9. MASK (continued)
Address: 10h
Reset Value: 0×XXXX_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: 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 11. TYPE
Address: 12h
Reset Value: 0×XXX0_0X00
Type: Read

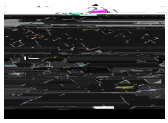
Bit #	Name	Size (Bits)	Description
7:5	Reserved	3	Do Not Use
4	Sink	1	1: Indicates a Sink has been detected
3	Source	1	1: Indicates a Source has been detected
2	Reserved	1	Do Not Use
1	DEBUGACC	1	1: Indicates a Debug Accessory has been detected
0	AUDIOACC	1	1: Indicates a Audio Accessory has been detected

Table 12. 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	

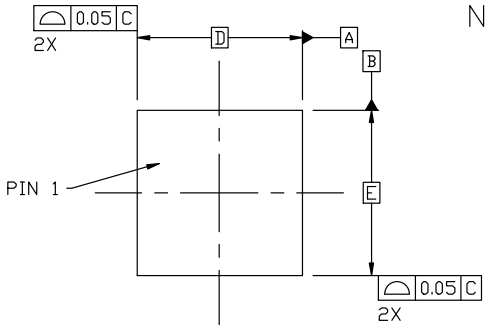
Table 12. INTERRUPT0 (continued)
Address: 13h
Reset Value: 0×XXXX_X000
Type: Write/Clear

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

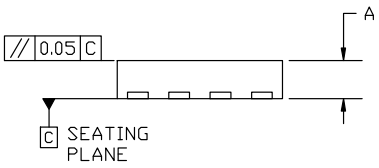


X2QFN12 1.60x1.60x0.37, 0.40P
CASE 722AD
ISSUE A

DATE 15 NOV 2023



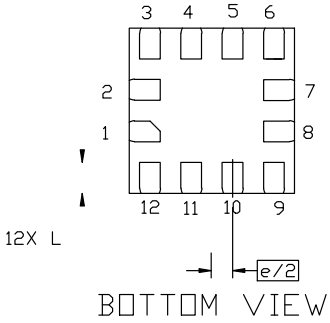
TOP VIEW



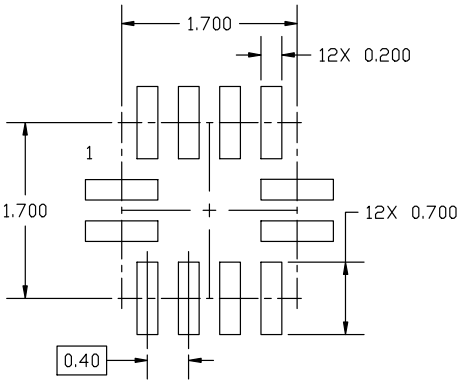
NOTES:

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	1.60 BSC		
e	0.40 BSC		
L	0.25	0.30	0.35
L1	0.10 (REF)		
M	45° (REF)		



BOTTOM VIEW



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.