

## DIO3303

### 3:1 USB 2.0 High-Speed (480 Mbps) USB Switch

#### Features

- Low  $R_{ON}$  at USB channel:
- Low USB  $C_{ON}$ : 6.8 pF
- USB switch -3 dB bandwidth: 720 MHz
- High crosstalk and off-isolation
- Voltage supply operation: 2.7 V to 4.4 V
- 5.25 V tolerance on COM pin
- Green packaged: DQFN-12
- 4 kV HBM ESD rating, 2 kV CDM ESD rating

#### Applications

- Cell phones
- PDAs and MP3s
- Portable instrumentation
- Battery powered communications
- Computer peripherals

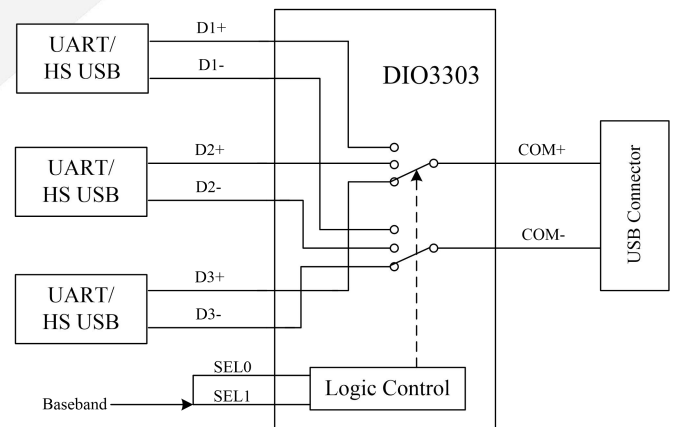
#### Descriptions

The DIO3303 is a SP3T (single pole/triple throw) switch capable of handling 3 different USB 2.0 high-speed data signal inputs with compliance of USB 2.0 high speed signal eye pattern.

The DIO3303 can also handle all USB 1.1/2.0 full-speed and UART signals as well with minimum additive distortion.

It is available in DQFN-12 packages, and operates over a temperature range of  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ .

#### Block Diagram



#### Ordering Information

Part Number	Top Marking	Green	$T_A$	Package	
DIO3303LN12	YWHC	Yes	$-40$ to $+85^{\circ}\text{C}$	DQFN 1.8*1.8-12	Tape & Reel, 3000

## Pin Assignment

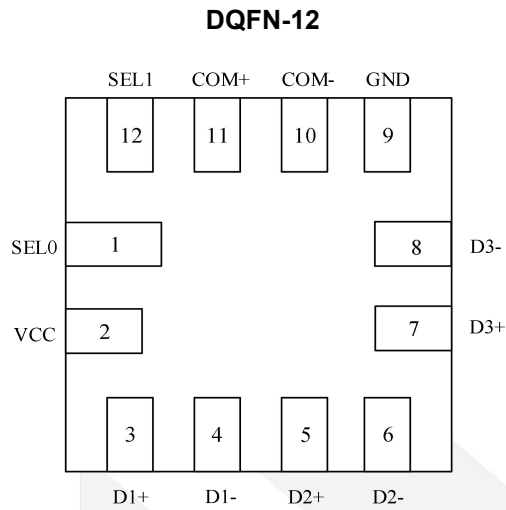


Figure 1. Top View

## Pin Descriptions

Pin Name	Direction	Description
Vcc	P	Power supply
GND	P	Ground
D1+	I/O	HS/UART channel 1, D+ signal
D1-	I/O	HS/UART channel 1, D- signal
D2+	I/O	HS/UART channel 2, D+ signal
D2-	I/O	HS/UART channel 2, D- signal
D3+	I/O	HS/UART channel 3, D+ signal
D3-	I/O	HS/UART channel 3, D- signal
COM+	I/O	COM+ signal, and share D1+, D2+, D3+
COM-	I/O	COM- signal, and share D1-, D2-, D3-
SEL0/SEL1	I	Switch selection pins

## Truth Table

SEL 1	SEL 0	D1+, D1-	D2+, D2-	D3+, D3-
0	0	OFF	OFF	OFF
0	1	ON	OFF	OFF
1	0	OFF	ON	OFF
1	1	OFF	OFF	ON



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## Absolute Maximum Ratings

Stresses beyond those listed under the Absolute Maximum Rating table may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other condition beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Symbol	Parameter	Min	Max	Unit
V <sub>CC</sub>	Supply voltage	-0.5	6.0	V
V <sub>SW</sub>	USB/UART input I/O voltage	-0.5	6.0	V
	Other channels	-0.5	6.0	
I <sub>IK</sub>	DC input diode current	-50		mA
I <sub>SW</sub>	USB/UART I/O current		50	mA
	Other channels		50	
I <sub>PEAK</sub>	I/O peak current		150	mA
T <sub>STG</sub>	Storage temperature	-65	+150	°C
ESD	HBM, JEDEC: JESD22-A114		4	kV
	CDM, JEDEC: JESD22-C101		2	

## Recommend Operating Conditions

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. DIOO does not recommend exceeding them or designing to absolute maximum ratings.

Symbol	Parameter	Min	Max	Unit
V <sub>CC</sub>	Supply voltage	2.7	4.4	V
V <sub>SW</sub>	USB/UART I/O voltage	0	4	V
T <sub>A</sub>	Operating temperature	-40	85	°C



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## DC Electrical Characteristics

All typical value are at  $T_A = 25^\circ\text{C}$  unless otherwise specified.

Symbol	Parameter	Conditions	V <sub>CC</sub> (V)	Temp	Min	Typ	Max	Unit
				(°C)				
V <sub>IH</sub>	Input voltage high		3.2 to 4.4	full	1.4			V
V <sub>IL</sub>	Input voltage low		3.2 to 4.4	full			0.6	V
I <sub>IN</sub>	Control input leakage	V <sub>SW</sub> = 0 to V <sub>CC</sub>	4.4	full	-1		1	μA
I <sub>OZ</sub>	Off state leakage	0 ≤ Dn, COM ≤ 3.6 V	4.4	full	-2		2	μA
I <sub>OFF</sub>	Power-off leakage current (all I/O ports)	V <sub>SW</sub> = 0 V to 4.4 V, V <sub>CC</sub> = 0 V	0	full			10	μA
R <sub>ONUSB</sub>	HS USB switch on resistance	V <sub>SW</sub> = 0.4 V, I <sub>ON</sub> = 8 mA	3.2 to 4.4	full		3.5	6	Ω
T <sub>BBM</sub>	Break-Before-Make time		3.2 to 4.4	full		190		μs
R <sub>TERM</sub>	Internal termination res.		3.2 to 4.2	full		1		kΩ
I <sub>CCSL</sub>	Battery supply sleep mode average current	Static current, SEL = 0	3.2 to 4.2	full			1	μA
I <sub>CC</sub>	Battery supply active mode average current		3.2 to 4.2	full		60	100	μA
I <sub>CCCT</sub>	Increase in I <sub>CC</sub> current per control voltage and V <sub>CC</sub>	V <sub>CNTRL</sub> = 2.8 V, V <sub>CC</sub> = 4.4 V	3.2 to 4.2	full		3	8	μA
		V <sub>CNTRL</sub> = 1.8 V, V <sub>CC</sub> = 4.4 V	3.2 to 4.2	full		8	10	μA



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## AC Electrical Characteristics

All typical value are for  $V_{CC} = 3.8\text{ V}$  at  $25^\circ\text{C}$  unless otherwise specified.

Symbol	Parameter		Conditions	$V_{CC}$ (V)	Temp	Min	Typ	Max	Unit
					( $^\circ\text{C}$ )				
OIRR	USB rejection $D_{n\pm}$ to $COM_{\pm}$		$R_L = 50\ \Omega$ , $f = 1\text{ MHz}$	3.8	$25^\circ\text{C}$		-85		dB
			$R_L = 50\ \Omega$ , $f = 240\text{ MHz}$				-36		
Xtalk	Active channel COM+ to COM-	USB/ UART	$R_L = 50\ \Omega$ , $f = 1\text{ MHz}$	3.8	$25^\circ\text{C}$		-75		dB
			$R_L = 50\ \Omega$ , $f = 240\text{ MHz}$				-36		
BW	HS USB Channel -3dB bandwidth		$R_L = 50\ \Omega$ , $C_L = 0\text{ pF}$	3.8	$25^\circ\text{C}$		720		MHz
			$R_L = 50\ \Omega$ , $C_L = 5\text{ pF}$				550		MHz

## Capacitance

Symbol	Parameter		Conditions	Temp	Min	Typ	Max	Unit
				( $^\circ\text{C}$ )				
$C_{IN}$	Control pin input capacitance		$V_{CC} = 0\text{ V}$	$25^\circ\text{C}$		1.5		pF
$C_{ON}$	USB mode on capacitance		$V_{CC} = 3.8\text{ V}$ , $f = 1\text{ MHz}$	$25^\circ\text{C}$		6.8		
$C_{OFF}$	USB mode off capacitance		$V_{CC} = 3.8\text{ V}$	$25^\circ\text{C}$		4.0		



### Eye Pattern Compliance

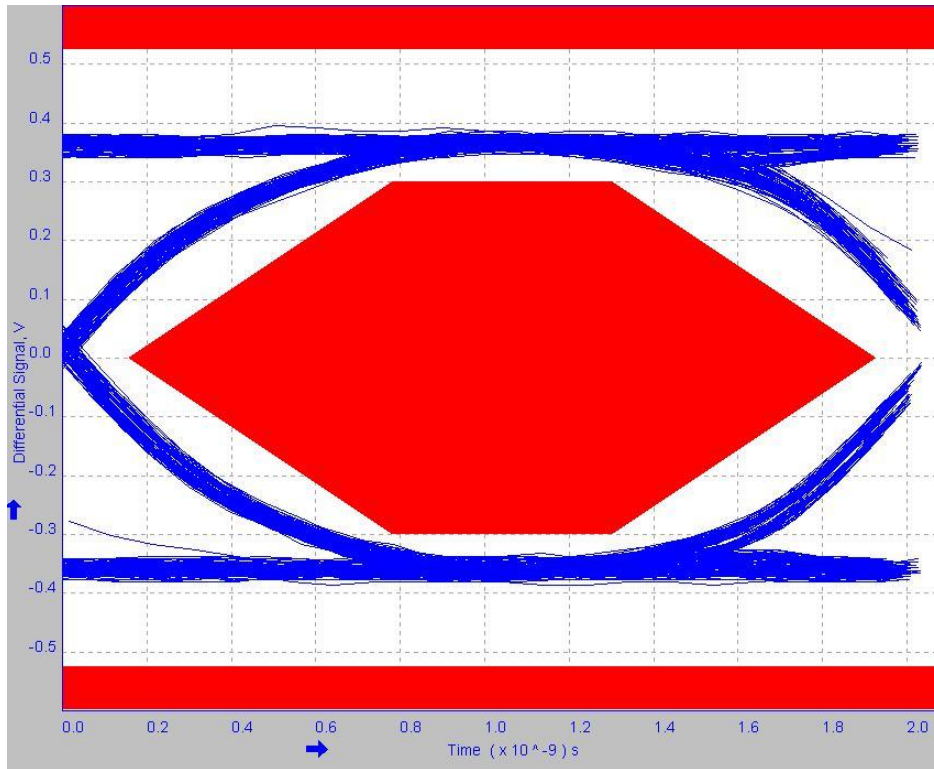
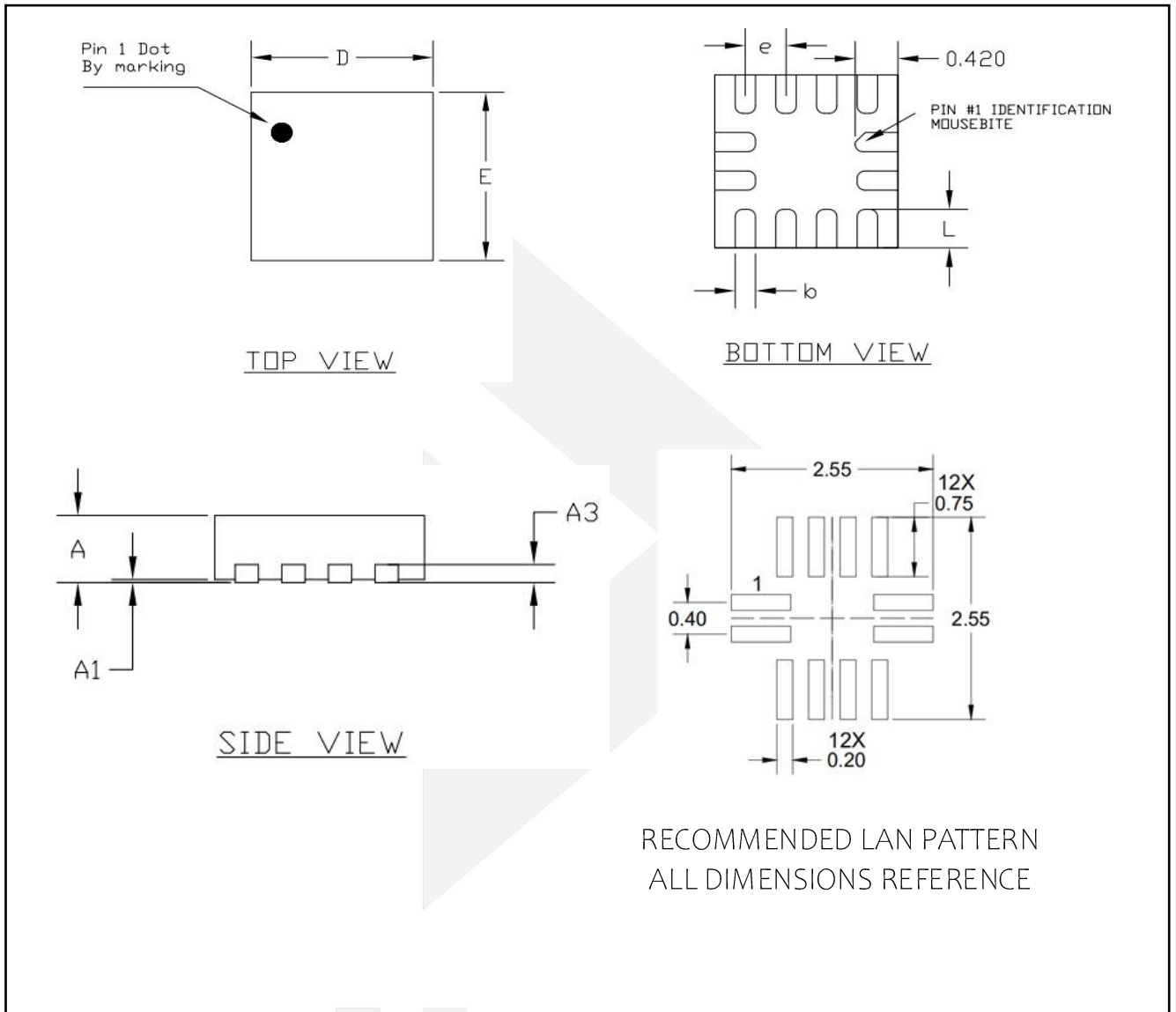


Figure 3. Eye pattern 480 MHz USB signal with switch



## Physical Dimensions: DQFN-12



Common Dimensions (mm)			
PKG	UT ULTRA THIN		
REF	MIN.	NOM.	MAX.
A	> 0.50	0.55	0.60
A1	0.00	-	0.05
A3	0.15 REF		
D	1.75	1.8	1.85
E	1.75	1.8	1.85
L	0.35	0.40	0.45
b	0.15	0.20	0.25
e	0.40 BSC		

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