

DIO32321EN8

Ultra High Bandwidth (> 2 GHz) Dual SPDT Data Switch

Features

- Super high bandwidth (-3 dB): > 2.0 GHz
- V_{CC} operation at 2.7 V to 5.5 V
- Low Con: 5 pF (typ.)
- Low R_{on} : 5.5 Ω (typ.)
- Low power consumption: 1 μ A (max.)
- Low I_{CCT} : 0.5 μ A (typ.) at $V_{IN} = 1.8$ V, $V_{CC} = 3.6$ V
- Packaged in Green DFN1.6*1.2-8
- 6 kV HBM ESD on all pins
- Power-off/on protection on common ports
D+/D- pins tolerate up to 5.5 V

Descriptions

The DIO32321 is a low power, dual SPDT2-port high-speed analog switch. It handles bidirectional signal flow optimized for switching a high-speed (480Mbps) source or a full-speed (12Mbps) source.

DIO32321 has high channel-to-channel noise isolation and low bit-to-bit skew which allows it to pass high-speed differential signals with good signal integrity. Each switch offers little or no attenuation of the high-speed signals at the outputs.

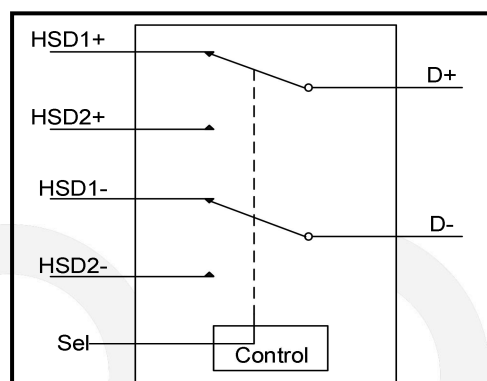
The DIO32321 contains special circuitry on the D+/D- pins, which can tolerate up to 5.5 V when the USB devices either powered off or powered on.

DIO32321 is available in type Green package: DFN1.6*1.2-8.

Applications

- Cell-Phone/PDA
- MP3/MP4/PMP
- STB/LCDTV

Block Diagram



Ordering Information

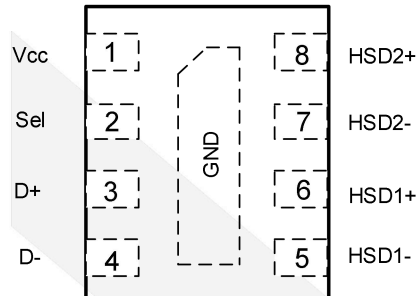
Order Part Number	Top Marking		T_A	Package	
DIO32321EN8	YWBA	Green	-40 to 85°C	DFN1.6*1.2-8	Tape & Reel, 5000



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Pin Assignment



DFN1.6*1.2-8
Figure 1. Top View

Pin Descriptions

Pin Name	Description
Sel	Switch select
D+, D-	USB data bus
HSDn+, HSDn-	Multiplexed source inputs

Truth Table

Sel	Function
L	D+, D- = HSD1+, HSD1-
H	D+, D- = HSD2+, HSD2-



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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_{CC}	Supply voltage	-0.3	6.0	V
V_{sel}	DC input voltage (Sel)	-0.3	V_{CC}	V
V_{SW}	DC input I/O voltage	-0.3	$V_{CC} + 0.3$	V
	DC input I/O voltage (D+/D-)	-0.3	6.0	V
$V_{D+/D-}$	D+/D- DC voltage ^(Note 1)	-0.3	9	V
I_{IK}	DC input diode current	-50		mA
I_{OUT}	DC output current		50	mA
T_{STG}	Storage temperature	-65	150	°C
ESD	JEDEC: JESD22-A114, all pins	6		kV

Note 1: This rating only applies to the D+/D- pin with respect to GND. V_{CC} must be powered within the recommended operating conditions of 2.7 V to 5.5 V. Any condition where V_{CC} is unpowered must reference the rest of the Absolute Maximum Ratings Table.

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_{CC}	Supply voltage	2.7	5.5	V
V_{sel}	Control input voltage (Sel)	0	V_{CC}	V
V_{SW}	Switch I/O voltage (HSD1±, HSD2±)	0	V_{CC}	V
	Switch I/O voltage (D+, D-)	0	5.5	V
T_A	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	Vcc (V)	Min	Typ	Max	Unit
V_{IH}	Input voltage high		2.7 to 5.5	0.85			V
V_{IL}	Input voltage low		2.7 to 5.5			0.35	V
I_{IN}	Control input leakage	$V_{SW} = 0$ to V_{CC}	3.6	-1		1	μA
I_{OZ}	Off state leakage	$0 \leq D_n, \text{HSD1n}, \text{HSD2n} \leq 3.6 \text{ V}$	3.6	-1		1	μA
I_{OFF}	Power-off leakage current (all common ports)	$V_{SW} = 0\text{V}$ to 3.6 V , $V_{CC} = 0 \text{ V}$, See Figure 9	0	-1		1	μA
R_{ON}	HS switch on resistance	$V_{SW} = 0.4 \text{ V}$, $I_{ON} = 8 \text{ mA}$, See Figure 8	3.3		5.5	8	Ω
ΔR_{ON}	HS delta R_{ON}	$V_{SW} = 0.4 \text{ V}$, $I_{ON} = 8 \text{ mA}$	3.3		0.1		Ω
I_{CC}	Quiescent supply current	$V_{sel} = 0$ or V_{CC} ,	3.6		0.4	1	μA
I_{CCT}	Increase in I_{CC} current per control voltage and V_{CC}	$V_{sel} = 2.6 \text{ V}$, $V_{CC} = 3.6 \text{ V}$	3.6		0.5	1	μA
		$V_{sel} = 1.8 \text{ V}$, $V_{CC} = 3.6 \text{ V}$	3.6		0.5	1	μA

Note: Specifications subject to change without notice.



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AC Electrical Characteristics

All typical value are for $V_{CC} = 3.3\text{ V}$ at 25°C unless otherwise specified.

Symbol	Parameter	Conditions	$V_{CC}(\text{V})$	Temp	Min	Typ	Max	Unit
				($^{\circ}\text{C}$)				
t_{ON}	Turn-on time Sel to output	$R_L = 50\ \Omega$, $C_L = 5\text{ pF}$, $V_{SW} = 0.8\text{ V}$, See Figure 15	3.0 to 3.6	full			3.0	us
t_{OFF}	Turn-off time Sel to output	$R_L = 50\ \Omega$, $C_L = 5\text{ pF}$, $V_{SW} = 0.8\text{ V}$, See Figure 15	3.0 to 3.6	full			14	ns
t_{PD}	Propagation delay	$R_L = 50\ \Omega$, $C_L = 5\text{ pF}$	3.3	25°C		0.25		ns
				full			5.0	ns
t_{BBM}	Break-before-make	$R_L = 50\ \Omega$, $C_L = 5\text{ pF}$, $V_{SW} = 0.8\text{ V}$, See Figure 14	3.0 to 3.6	25°C		12		ns
				full	10		28	ns
OIRR	Off Isolation	$R_L = 50\ \Omega$, $f = 240\text{ MHz}$ See Figure 13	3.0 to 3.6	25°C		-37		dB
Xtalk	Non-adjacent Channel Crosstalk	$R_L = 50\ \Omega$, $f = 240\text{ MHz}$ See Figure 12	3.0 to 3.6	25°C		-45		dB
BW	-3dB bandwidth	$R_L = 50\ \Omega$, $C_L = 0\text{ pF}$, See Figure 11	3.0 to 3.6	25°C		2000		MHz
		$R_L = 50\ \Omega$, $C_L = 5\text{ pF}$, See Figure 11		25°C		720		MHz
$t_{SK(P)}$	Skew of opposite transitions of the same output	$R_L = 50\ \Omega$, $C_L = 5\text{ pF}$	3.0 to 3.6	25°C		20		ps

Capacitance

Symbol	Parameter	Conditions	Temp	Min	Typ	Max	Unit
			($^{\circ}\text{C}$)				
C_{IN}	Control Pin input Capacitance	$V_{CC}=0\text{V}$	25°C		1.2		pF
C_{ON}	D+/D- on Capacitance	$V_{CC}=3.3\text{V}$, $f=240\text{MHz}$, See Figure 10	25°C		5		

Specifications subject to change without notice.



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Typical Performance Characteristics

$T_A = 25^\circ\text{C}$, $V_{CC} = 3.6\text{ V}$, unless otherwise specified.

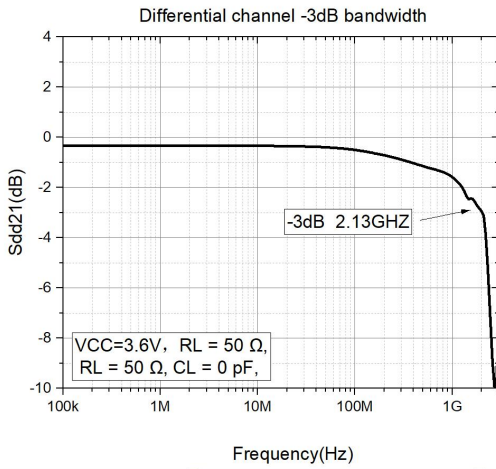


Figure 2. -3dB bandwidth vs. frequency

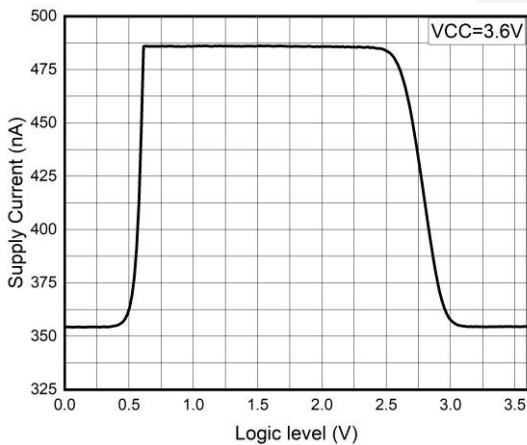


Figure 4. Supply current vs. Logic level

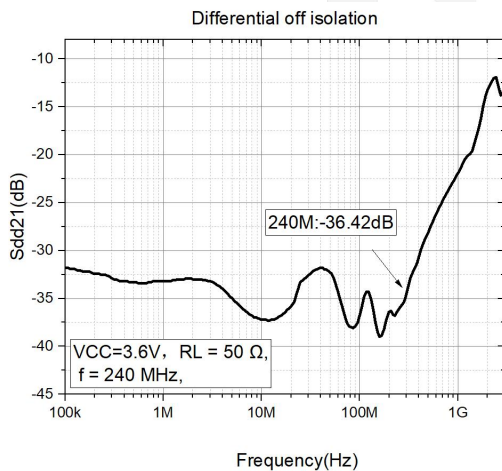
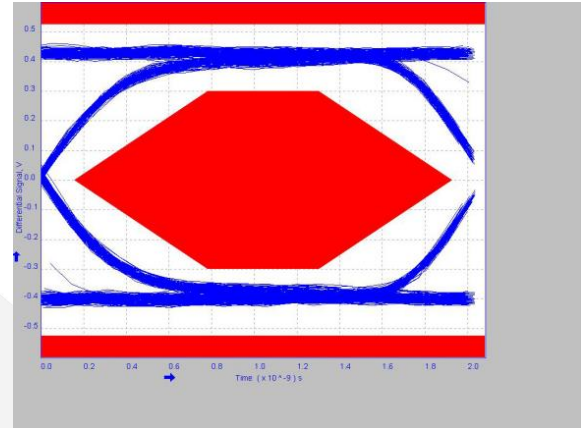


Figure 6. Off-isolation vs. frequency



TIME SCALE (0.2 ns/DIV)
Figure 3. 480 Mbps with USB switch in signal path

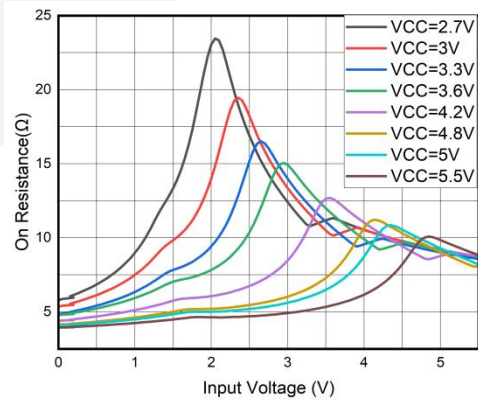


Figure 5. On resistance vs. input voltage

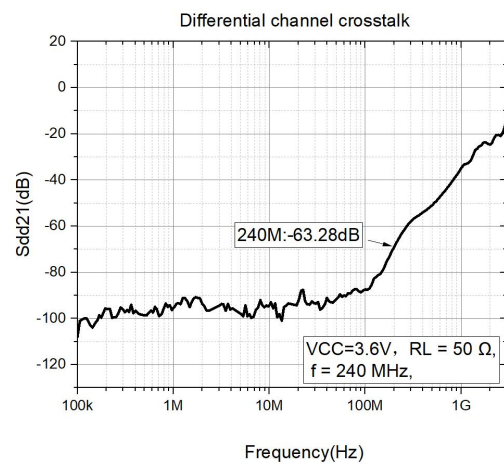


Figure 7. Crosstalk vs. frequency

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Test Diagrams

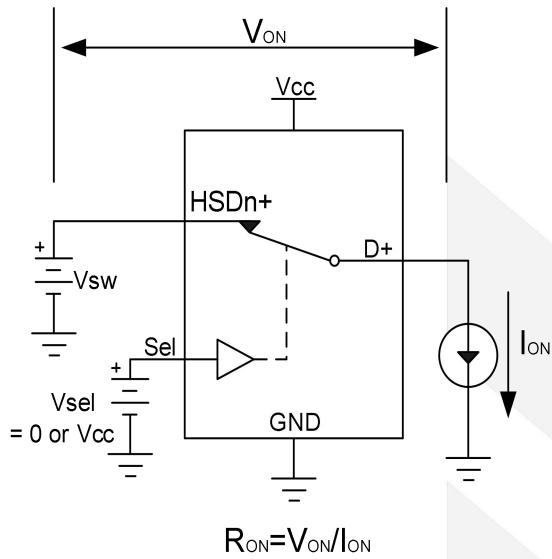


Figure 8. Switch on resistor

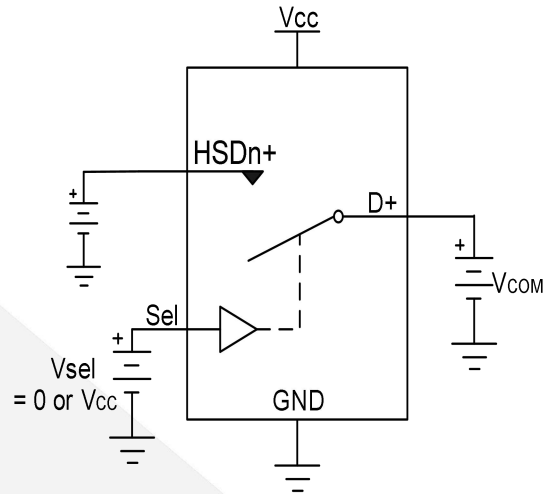


Figure 9. Switch off leakage

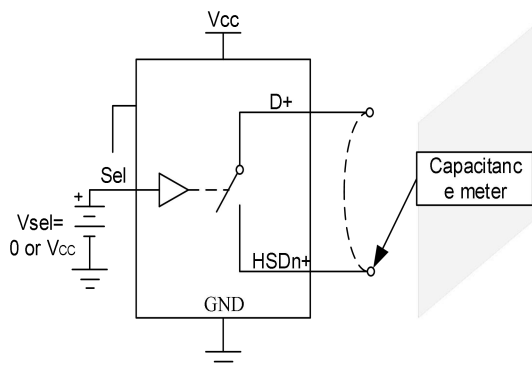


Figure 10. Channel ON/OFF capacitance

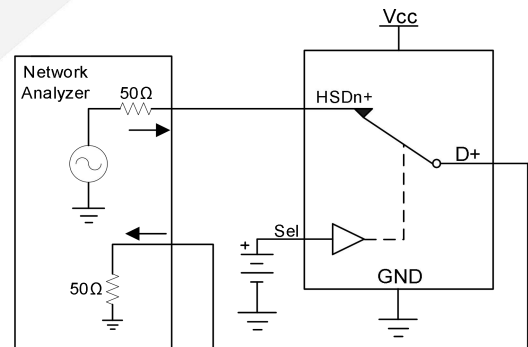


Figure 11. Bandwidth

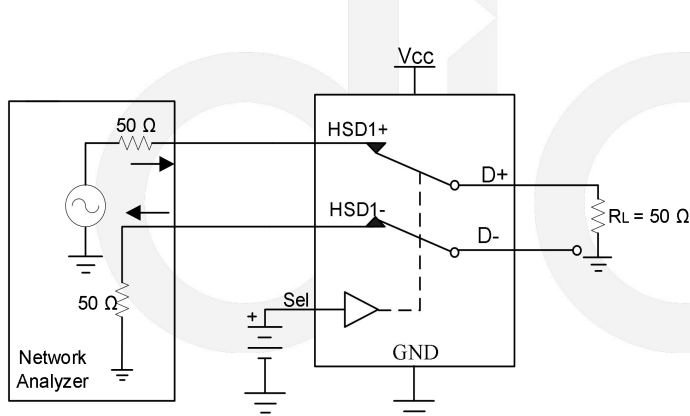


Figure 12. Channel-to-channel crosstalk

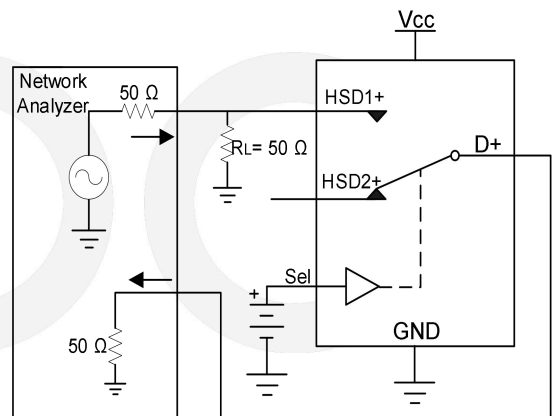


Figure 13. Off-isolation

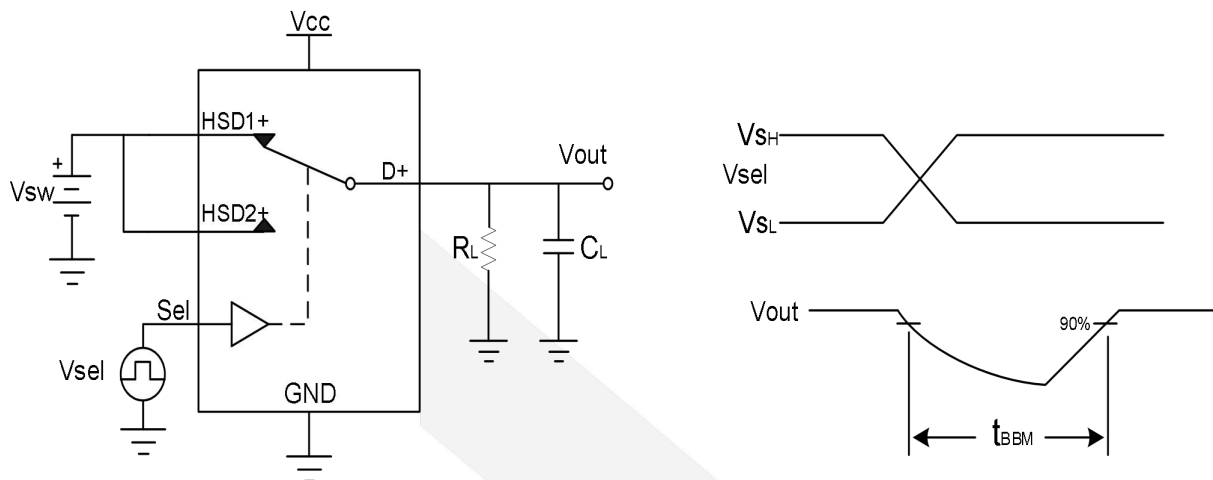


Figure 14. Break-before-make

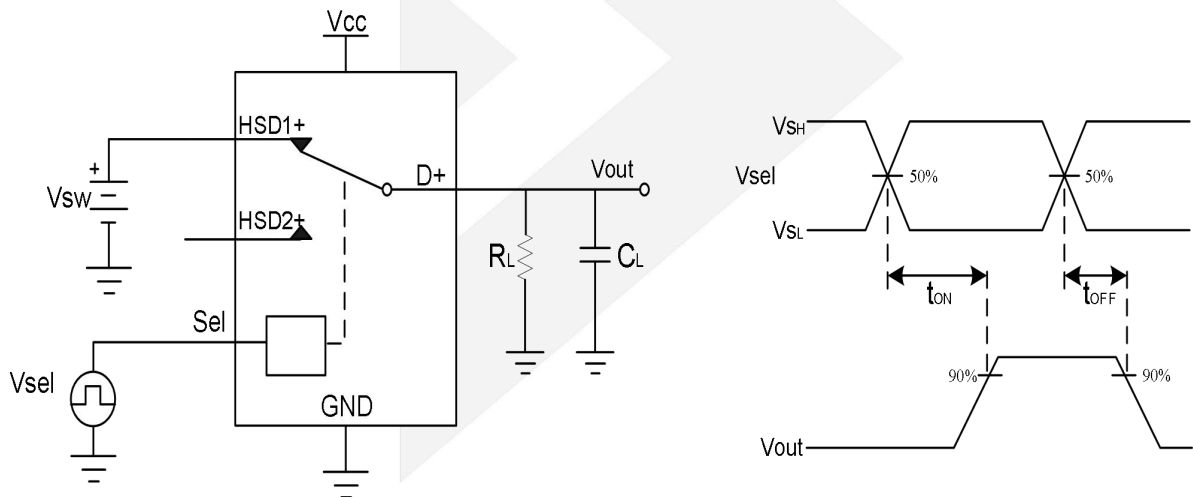
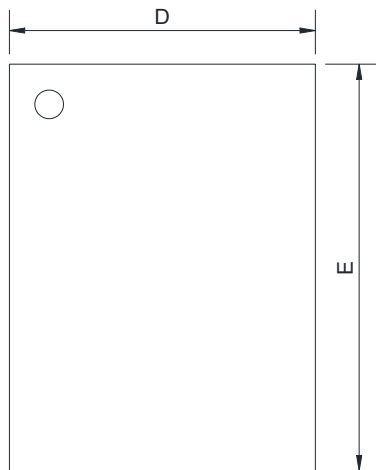
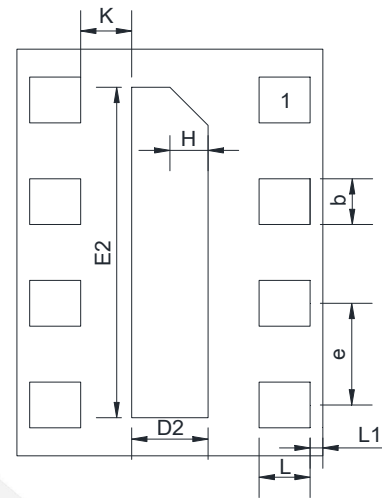


Figure 15. Turn-on/Turn-off

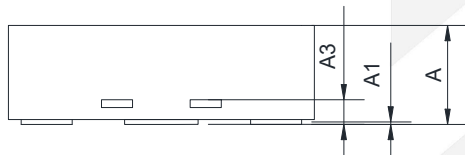
Physical Dimension: DFN1.6*1.2-8



TOP VIEW



BOTTOM VIEW



SIDE VIEW

Symbol	Dimensions in Millimeters		
	Min	Nom	Max
A	0.34	0.37	0.40
A1	0.00	0.02	0.05
A3	0.10REF		
b	0.13	0.18	0.23
D	1.10	1.20	1.30
E	1.50	1.60	1.70
D2	0.25	0.30	0.35
E2	1.25	1.30	1.35
e	0.30	0.40	0.50
H	0.15REF		
K	0.15	0.20	0.25
L	0.15	0.20	0.25
L1	0.00	0.05	0.10

CONTACT US

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For additional product information or full datasheet, please contact our sales department or representatives.

A large, light gray watermark of the Dioo logo is centered on the page. It consists of a stylized arrow pointing right, followed by the word "dioo" in a lowercase, sans-serif font.

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