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 C_{ON}: 5 pF (typ.)
- Low R_{ON}: 5.5 Ω (typ.)
- Low power consumption: 1 μA (max.)
- Low I_{CCT}: 0.5 μA (typ.) at V_{sel} = 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

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 (480 Mbps) source or a full-speed (12 Mbps) source.

The 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.

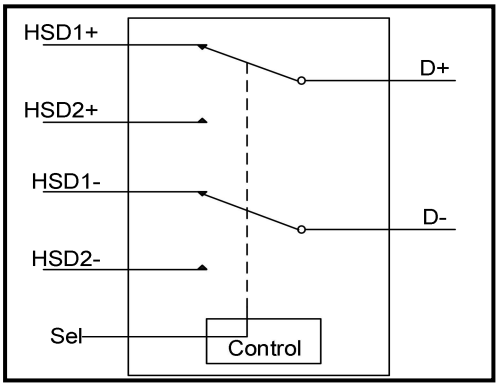
The DIO32321 contains special circuitry on the D+/D- pins, which can tolerate up to 5.5 V when the USB devices either powered off or powered on.

The DIO32321 is available in the Green package: DFN1.6×1.2-8.

Applications

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

Block Diagram



Ordering Information

Ordering Part No.	Top Marking	MSL	RoHS	T_A	Package	
DIO32321EN8	YWBA	1	Green	-40 to 85°C	DFN1.6×1.2-8	Tape & Reel, 5000

Pin Assignment

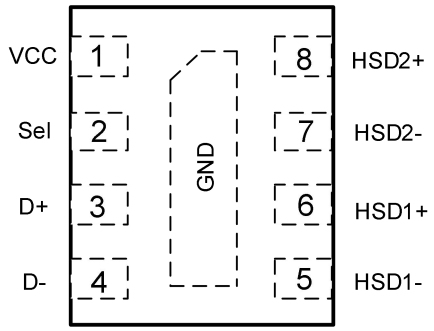


Figure 1. DFN1.6×1.2-8 (Top view)

Pin Descriptions

Pin Name	Description
Sel	Switch select
D+, D-	USB data bus
HSDn+, HSDn-	Multiplexed source inputs
VCC	Power supply
GND	Ground

Truth Table

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

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	V_{CC} + 0.3	V
$V_{D+/D-}$	D+/D– DC voltage (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
HBM	ESDA/JEDEC JS-001, all pins	±6		kV

Note:

(1) This rating only applies to the D+/D– pin with respect to GND. VCC must be powered within the recommended operating conditions of 2.7 V to 5.5 V. Any condition where VCC 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	Vcc	V
V_{SW}	Switch I/O voltage (HSD1±, HSD2±)	0	Vcc	V
	Switch I/O voltage (D+, D-)	0	V_{CC}	V
T_A	Operating temperature	-40	85	°C

DC Electrical Characteristics

All typical value are at T_A = 25°C, unless otherwise specified.

Symbol	Parameter	Conditions	V_{CC} (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 ≤ Dn, HSD1n, HSD2n ≤ 3.6 V	3.6	-1		1	μA
I_{OFF}	Power-off leakage current (all common ports)	V_{SW} = 0 V to 3.6 V, V_{CC} = 0 V, See Figure 9	0	-1		1	uA
R_{ON}	HS switch on resistance	V_{SW} = 0.4 V, I_{ON} = 8 mA, See Figure 8	3.3		5.5	8	Ω
ΔR_{ON}	HS delta R_{ON}	V_{SW} = 0.4 V, I_{ON} = 8 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 V, V_{CC} = 3.6 V	3.6		0.5	1	μA
		V_{sel} = 1.8 V, V_{CC} = 3.6 V	3.6		0.5	1	μA

Note:

(1) Specifications subject to change without notice.

AC Electrical Characteristics

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

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

Note:

(1) Specifications subject to change without notice.

Capacitance

Symbol	Parameter	Conditions	Temp	Min	Typ	Max	Unit
C_{IN}	Control pin input capacitance	V_{CC} = 0 V	25°C		1.2		pF
C_{ON}	D+/D- on capacitance	V_{CC} = 3.3 V, f = 240 MHz, See Figure 10	25°C		5		

Note:

(1) Specifications subject to change without notice.

Typical Performance Characteristics

T_A = 25°C, V_{CC} = 3.6 V, unless other otherwise specified.

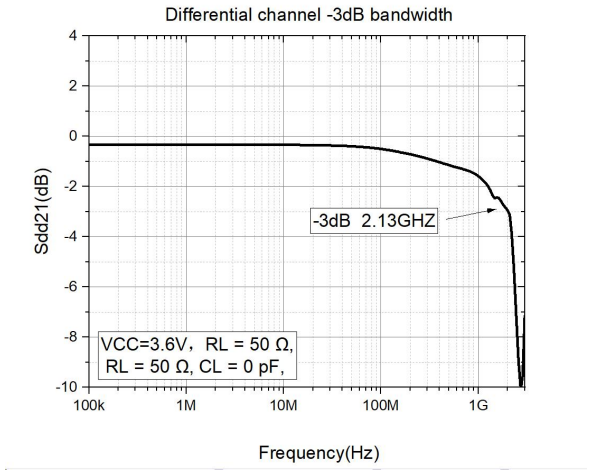
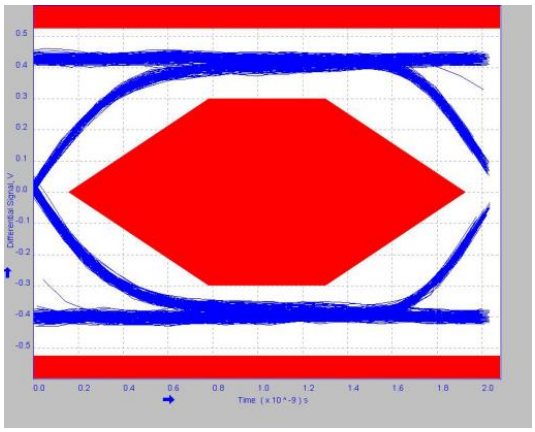


Figure 2. -3dB bandwidth vs. Frequency



TIME SCALE (0.2 ns/DIV)

Figure 3. 480 Mbps with USB switch in signal path

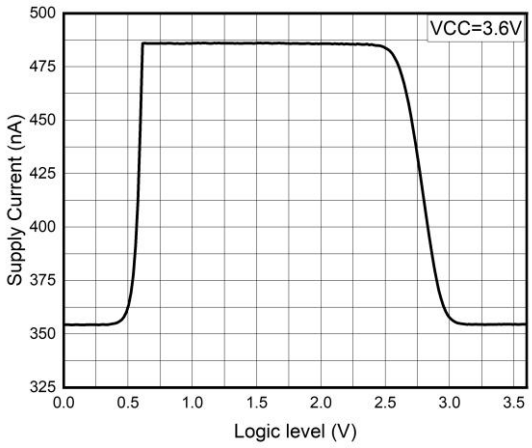


Figure 4. Supply current vs. Logic level

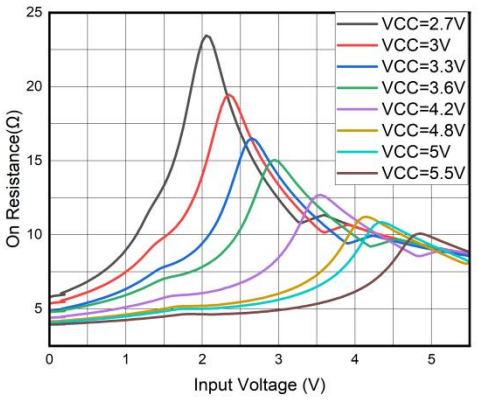


Figure 5. On resistance vs. Input voltage

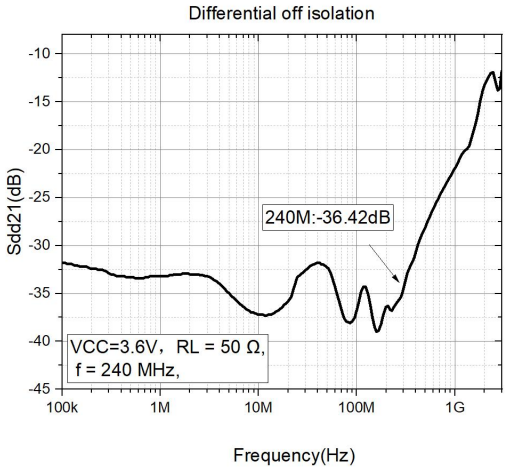


Figure 6. Off-isolation vs. Frequency

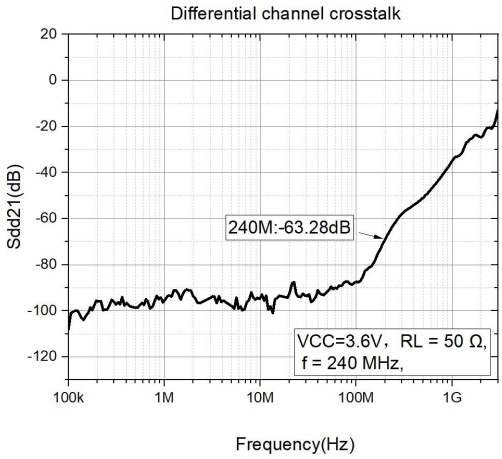


Figure 7. Crosstalk vs. Frequency

Test Diagrams

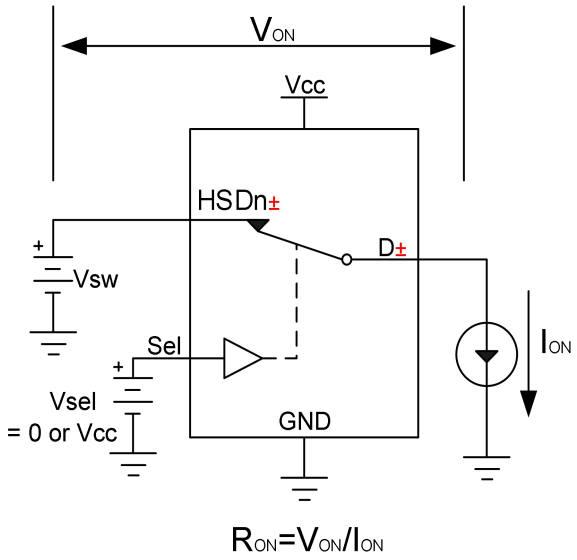


Figure 8. Switch on resistor

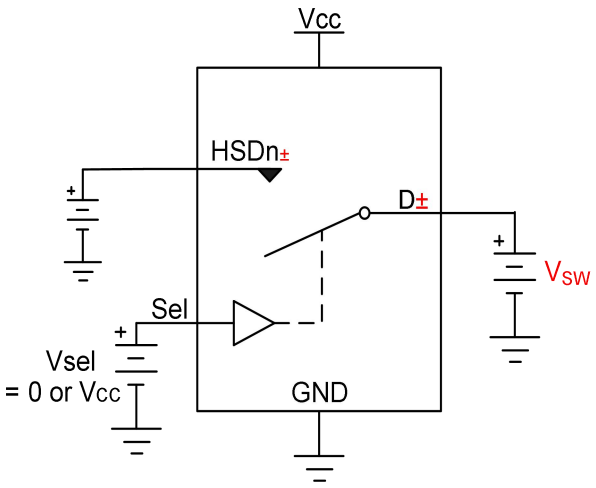


Figure 9. Switch off leakage

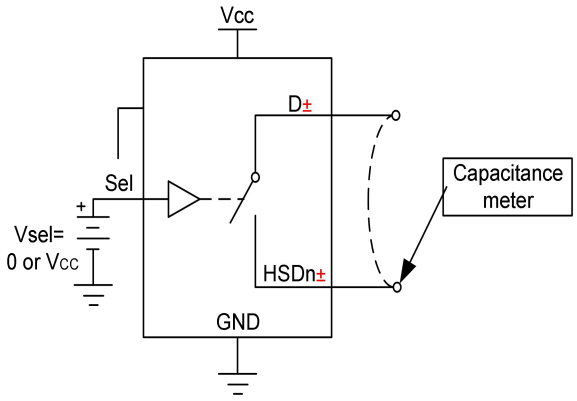


Figure 10. Channel ON/OFF capacitance

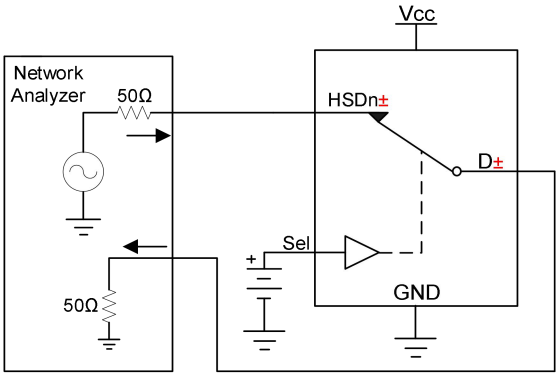


Figure 11. Bandwidth

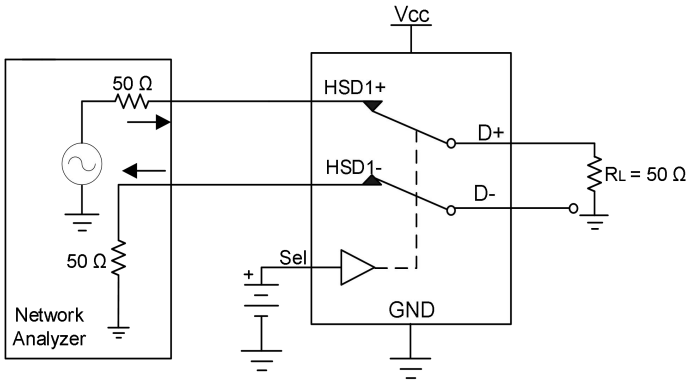


Figure 12. Channel-to-channel crosstalk

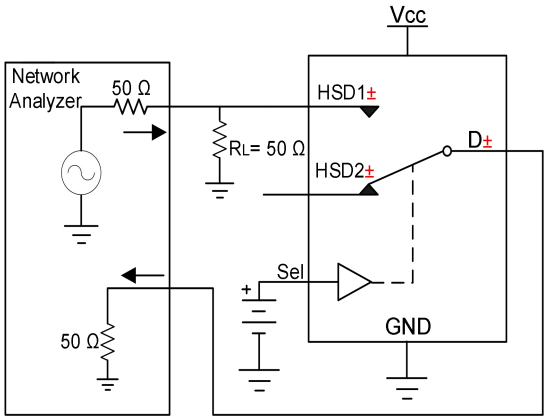


Figure 13. Off-isolation

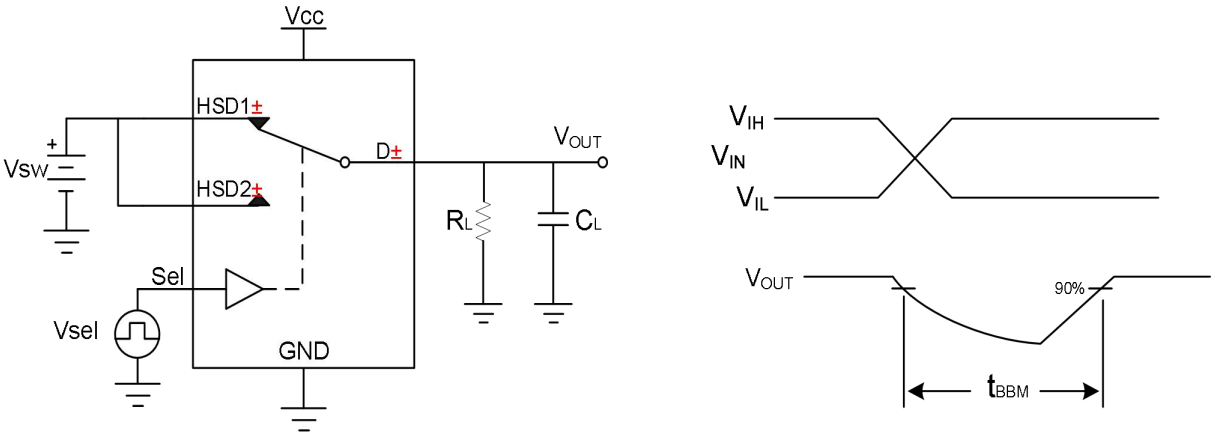


Figure 14. Break-before-make

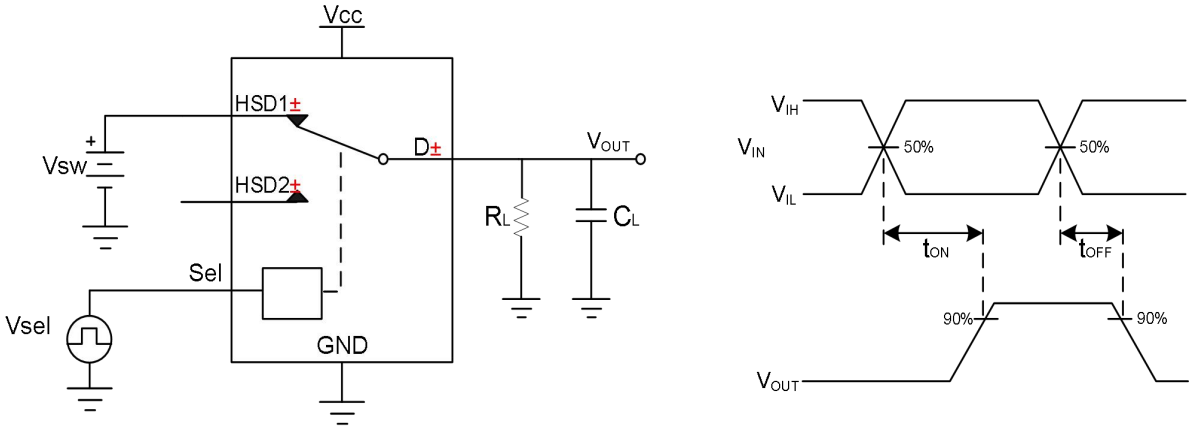
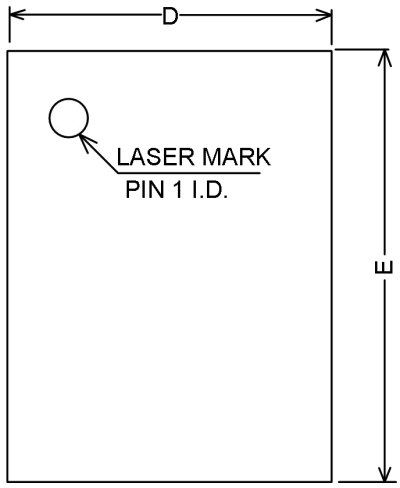
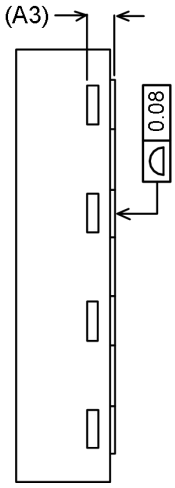


Figure 15. Turn-on/Turn-off

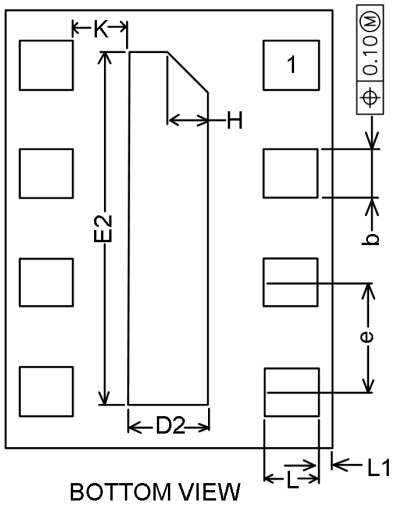
Physical Dimension: DFN1.6*1.2-8



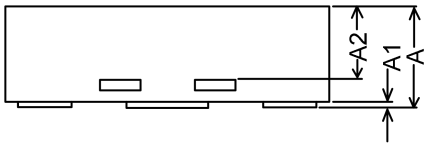
TOP VIEW



SIDE VIEW



BOTTOM VIEW



SIDE VIEW

Common Dimensions (Units of measure = Millimeter)			
Symbol	**Min**	**Nom**	**Max**
A	0.34	0.37	0.40
A1	0.00	0.02	0.05
A2		0.27 REF	
A3		0.10 REF	
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		0.15 REF	
K	0.15	0.20	0.25
L	0.15	0.20	0.25
L1	0.00	0.05	0.10

CONTACT US

Dioo is a professional design and sales corporation for high-quality and performance analog semiconductors. The company focuses on industry markets, such as cell phones, handheld products, laptops, medical equipment, and so on. Dioo's product families include analog signal processing and amplifying, LED drivers, and charger ICs. Go to http://www.dioo.com for a complete list of Dioo product families.

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