

DIO1159B

Low On-Resistance, Low THD Analog Switch

Features

- 5.5 V tolerant on control pin
- Voltage operation: 1.65 V to 5.5 V
- Low on resistance:
1 Ω at 5 V supply voltage
- Excellent on-resistance matching
- Low total harmonic distortion (THD)
- Low charge injection
- Low power consumption
- Green and RoHS packaged:
SC70-6, SOT23-6, and DFN-6

Descriptions

The DIO1159B is a low-power, single-pole double-throw analog switch, which is designed to operate from a single 1.65 V to 5.5 V supply.

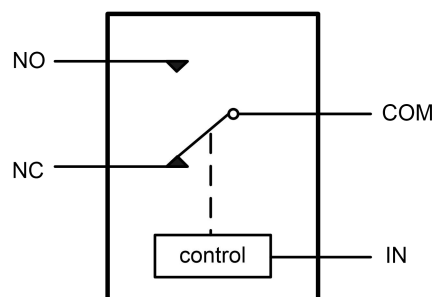
The DIO1159B has low on-resistance, excellent on-resistance matching, and very low total harmonic distortion performance to prevent signal distortion during signals transferring. All these features make the DIO1159B suitable for portable audio applications.

The DIO1159B is available in different packages: SC70-6, SOT23-6, and DFN-6.

Applications

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

Block Diagram

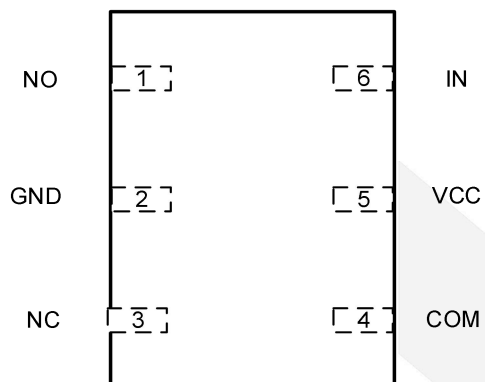


Ordering Information

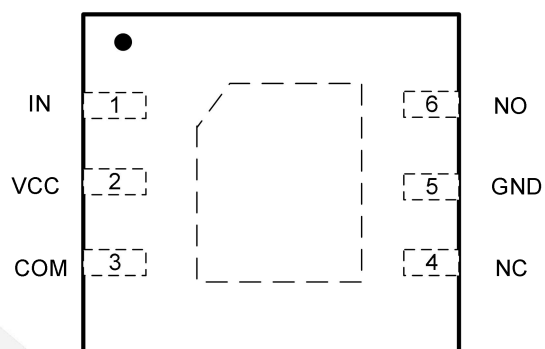
Order Part Number	Top Marking	RoHS	T _A	Package	
DIO1159BSC6	YWXC	Green	-40 to 105 °C	SC70-6	Tape & Reel, 3000
DIO1159BST6	YWXC	Green	-40 to 105 °C	SOT23-6	Tape & Reel, 3000
DIO1159BFN6	YWXA	Green	-40 to 105 °C	DFN1.6*1.6-6	Tape & Reel, 3000
DIO1159BCN6	1159	Green	-40 to 105 °C	DFN1.8*2-6	Tape & Reel, 3000
DIO1159BQN6	YW9	Green	-40 to 105 °C	DFN1.45*1-6	Tape & Reel, 5000
DIO1159BMN6	YWE9	Green	-40 to 105 °C	DFN1.5*1-6	Tape & Reel, 5000

Note: Y: Year, W: Week, X: Internal code, C/A: Product code;

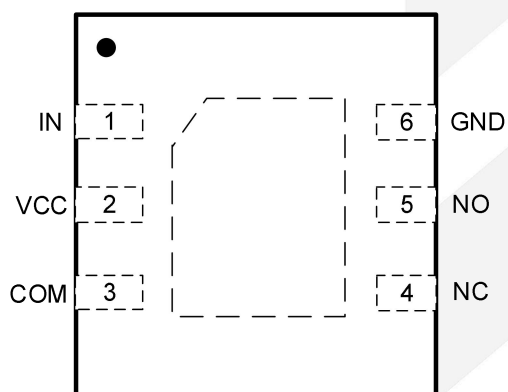
Pin Assignment



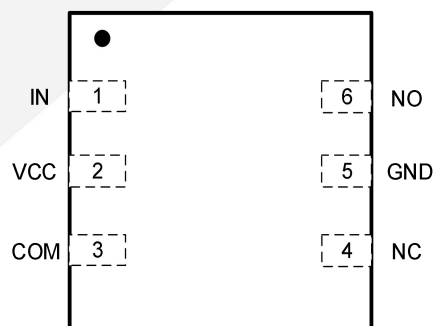
SOT23-6/SC70-6



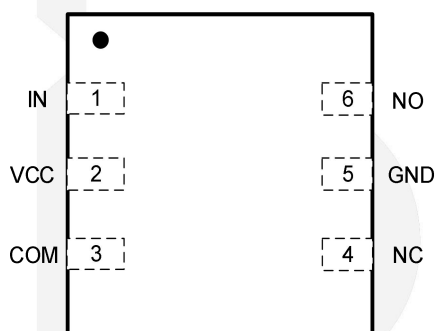
DFN1.6*1.6-6



DFN1.8*2-6



DFN1.45*1-6



DFN1.5*1-6

Figure 1. Top View



DIO1159B

Low On-Resistance, Low THD Analog Switch

Pin Descriptions

Pin Name	Description
NO	Normally open
GND	Ground
NC	Normally closed
COM	Common
VCC	Power supply
IN	Control

Truth Table

IN	Function
L	COM to NC
H	COM to NO



DIO1159B

Absolute Maximum Ratings

Exceeding the maximum ratings listed under Absolute Maximum Ratings when designing is likely to damage the device permanently. Do not design to the maximum limits because long-time exposure to them might impact the device's reliability. The ratings are obtained over an operating free-air temperature range unless otherwise specified.

Symbol	Parameter	Min	Max	Unit
V_{CC}	Supply voltage	-0.5	6.5	V
V_{SW}	DC switch voltage	-0.5	$V_{CC}+0.5$	V
V_{IN}	DC control voltage	-0.5	6.5	V
I_{SW}	On-state switch current	-300	300	mA
I_{SW}	On-state peak switch current	-400	400	
	Continuous current through GND	-100	100	mA
T_{STG}	Storage temperature range	-65	150	°C
T_J	Operating junction temperature	-40	150	°C

Recommend Operating Conditions

Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. The ratings are obtained over an operating free-air temperature range unless otherwise specified.

Symbol	Parameter	Min	Max	Unit
V_{CC}	Supply voltage	1.65	5.5	V
V_{IN}	Control input voltage	0	5.5	V
V_{SW}, V_{COM}	Switch input voltage	0	V_{CC}	V
T_A	Operating temperature	-40	105	°C
T_J	Operating junction temperature	-40	150	°C



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ESD Ratings

When a statically-charged person or object touches an electrostatic discharge sensitive device, the electrostatic charge might be drained through sensitive circuitry in the device. If the electrostatic discharge possesses sufficient energy, damage might occur to the device due to localized overheating.

Model	Condition	Rating	Unit
ESD	HBM, JEDEC: JS-001-2017	±8	kV

Thermal Considerations

The thermal resistance determines the heat insulation property of a material. The higher the thermal resistance is, the lower the heat loss. Accumulation of heat energy degrades the performance of semiconductor components.

Symbol	Metric	Value	Unit
$R_{\theta JA}$	Thermal resistance, junction-to-air thermal resistance	170	°C/W
$R_{\theta JC}$	Thermal resistance, junction-to-case thermal resistance	130	°C/W



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Electrical Characteristics

All typical value are at $V_{CC} = 5\text{ V}$; $T_A = 25^\circ\text{C}$, unless otherwise specified.

Symbol	Parameter	Conditions	Temp	Min	Typ	Max	Unit
V_{IH}	Input voltage high		-40 to 105°C	1.65			V
V_{IL}	Input voltage low		-40 to 105°C			0.6	V
I_{IN}	Control input leakage	$V_{IN} = 5\text{ V}$ or 0 V , $V_{CC} = 5\text{ V}$	25°C	-2		2	nA
			-40 to 105°C	-100		100	
$I_{NC(OFF)}$ $I_{NO(OFF)}$	NC, NO, COM off leakage current	$V_{SW} = 0.3\text{ V}$, 3.3 V , $V_{COM} = 3.3\text{ V}$, 0.3 V , $V_{CC} = 5\text{ V}$, see Figure 3	25°C	-20	2	20	nA
			-40 to 105°C	-100		100	
$I_{COM(ON)}$	COM on leakage current	$V_{COM} = 0.3\text{ V}$, 3.3 V , $V_{SW} = 0.3\text{ V}$, 3.3 V , or floating, $V_{CC} = 5\text{ V}$	25°C	-20	2	20	nA
			-40 to 105°C	-100		100	
I_{CC}	Quiescent supply current	$V_{CC} = 5\text{ V}$, $V_{IN} = V_{CC}$ or GND, switch ON or OFF	25°C		10	50	nA
			-40 to 105°C			500	
I_{CCT}	Increase in I_{CC} input	$V_{CC} = 5\text{ V}$, $V_{IN} = 1.8\text{ V}$	25°C		46		μA
		$V_{CC} = 5\text{ V}$, $V_{IN} = 2.8\text{ V}$			18		
R_{ON}	Switch on resistance	$V_{CC} = 5\text{ V}$, $V_{SW} = 1\text{ V}$, $I_{SW} = -100\text{ mA}$, see Figure 2	25°C		1	1.5	Ω
			-40 to 105°C			2.0	
ΔR_{ON}	On resistance matching between channels	$V_{CC} = 5\text{ V}$, $V_{SW} = 1\text{ V}$, $I_{SW} = -100\text{ mA}$	25°C		0.05	0.2	Ω
			-40 to 105°C			0.3	
$R_{FLT(ON)}$	On resistance flatness	$V_{CC} = 5\text{ V}$, $V_{SW} = 1\text{ V}$, 3.5 V , $I_{SW} = -100\text{ mA}$	-40 to 105°C		0.8	1.2	Ω
t_{ON}	Turn-On time	$V_{SW} = 1.5\text{ V}$ or 0 V , $R_L = 50\text{ Ω}$, $C_L = 35\text{ pF}$ see Figure 8	25°C		70		ns
t_{OFF}	Turn-Off time	$V_{SW} = 1.5\text{ V}$ or 0 V , $R_L = 50\text{ Ω}$, $C_L = 35\text{ pF}$ see Figure 8	25°C		20		ns
t_{BBM}	Break-before-make time	$V_{SW} = V_{CC}$, $R_L = 50\text{ Ω}$, $C_L = 35\text{ pF}$ see Figure 7	25°C		55		ns
X_{TALK}	Crosstalk	$R_L = 50\text{ Ω}$, $f = 20\text{ kHz}$, $V_{SW} = 1\text{ V}_{RMS}$	0°C		-60		dB
OIRR	Off isolation	$R_L = 50\text{ Ω}$, signal = 0 dBm, $f = 1\text{ MHz}$	25°C		-55		dB
BW	-3 dB bandwidth	$R_L = 50\text{ Ω}$, signal = 0 dBm, see Figure 5	25°C		100		MHz
THD	Total harmonic distortion	$R_L = 600\text{ Ω}$, $C_L = 50\text{ pF}$, $f = 20\text{ Hz}$ to 20 kHz	25°C		0.002		%
$C_{IN}^{(1)}$	Control pin input capacitance	$V_{IN} = V_{CC}$ or 0 V	25°C		1.5		pF
$C_{OFF}^{(1)}$	OFF capacitance	Switch off $V_{SW} = V_{CC}$ or 0 V see Figure 4	25°C		22		pF

$C_{ON}^{(1)}$	On capacitance	Switch on $V_{COM} = V_{CC}$ or 0 V see Figure 4	25°C		49	pF
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Note:

- (1) Guaranteed by design.
- (2) Specification subject to change without notice.

Test Diagrams

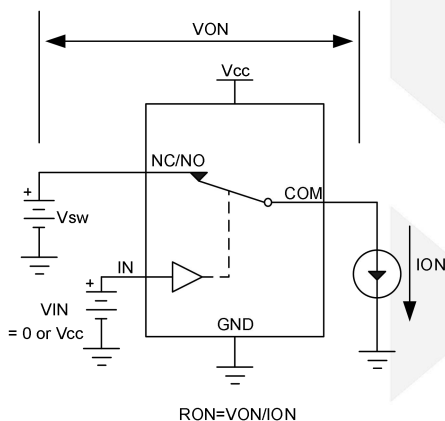


Figure 2 . Switch on resistor

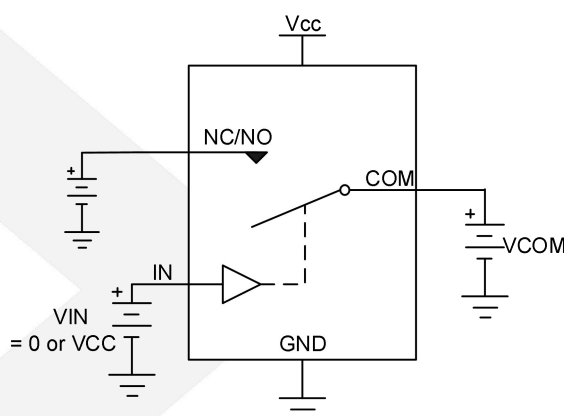


Figure 3. Switch off leakage

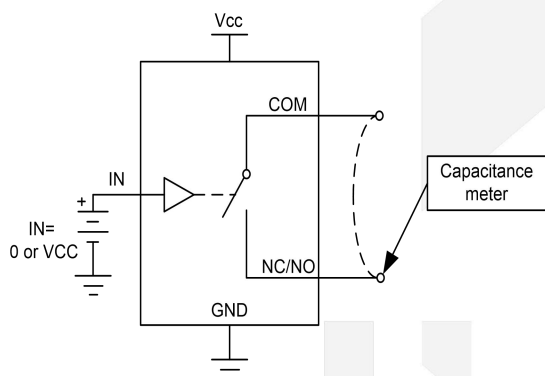


Figure 4. On/off capacitance test

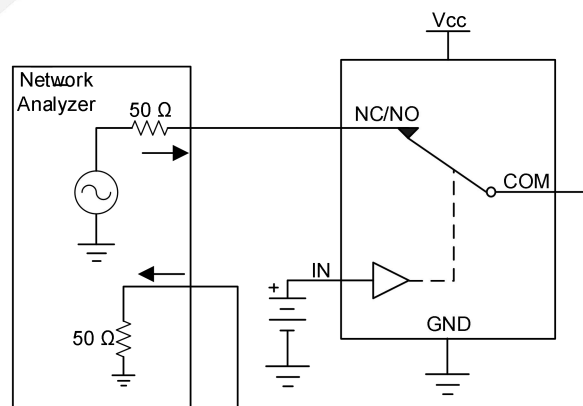


Figure 5 . Bandwidth

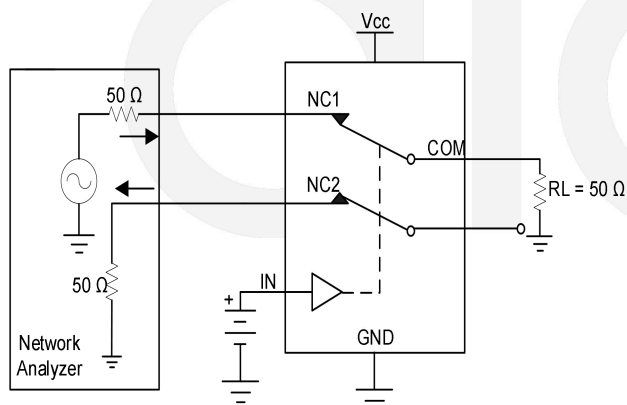


Figure 6. Channel-to-channel crosstalk

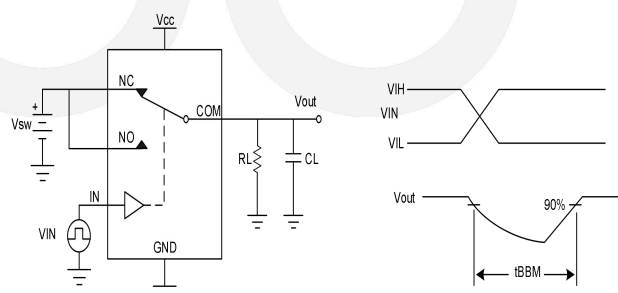


Figure 7. Break-Before-Make

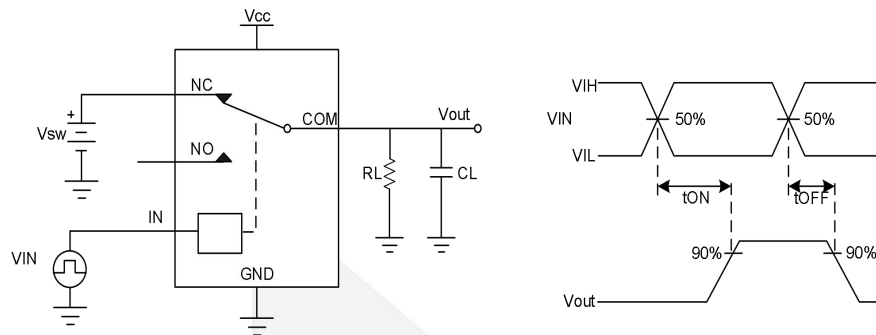
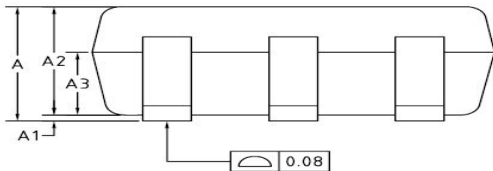
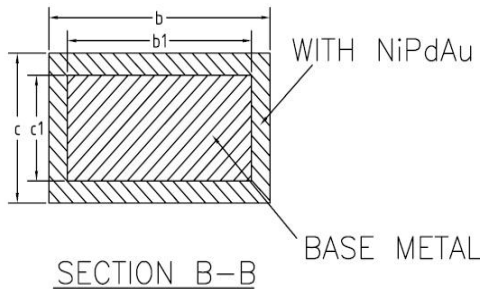
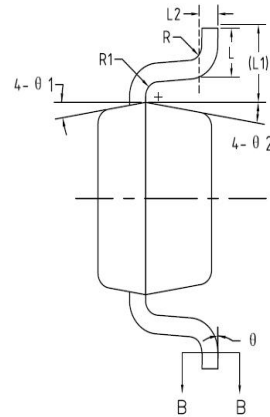
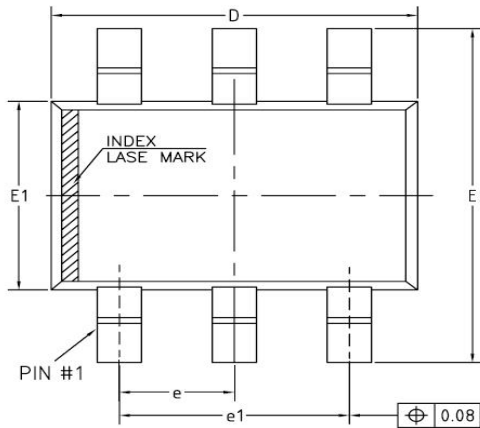


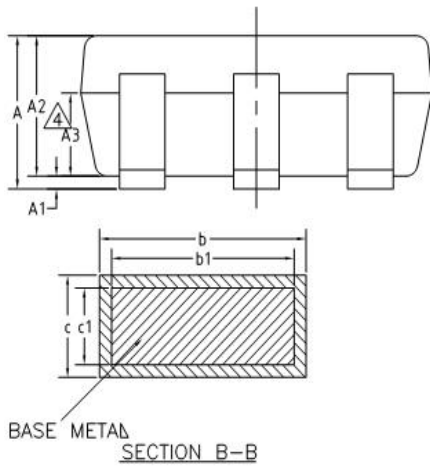
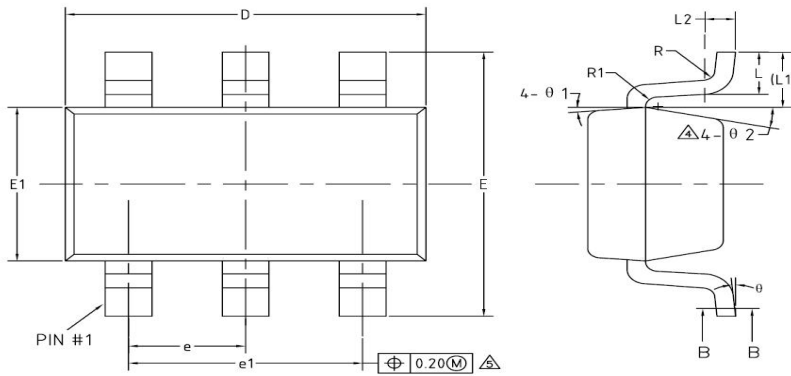
Figure 8 Turn-On/Turn-Off

Physical Dimensions: SC70-6



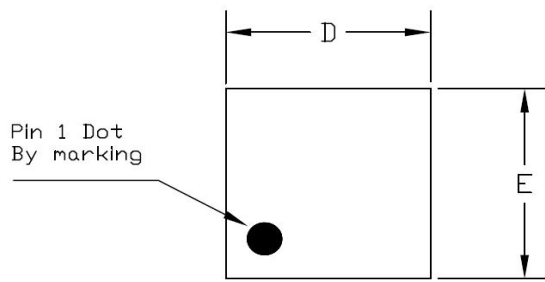
Common Dimensions (Units of Measure = Millimeter)			
Symbol	Min	Nom	Max
A	0.85	-	1.05
A1	0	-	0.10
A2	0.80	0.90	1.00
A3	0.47	0.52	0.57
b	0.22	-	0.29
b1	0.22	0.25	0.28
c	0.115	-	0.15
c1	0.115	0.13	0.14
D	2.02	2.07	2.12
E	2.20	2.30	2.40
E1	1.25	1.30	1.35
e	0.65 BSC		
e1	1.30 BSC		
L	0.28	0.33	0.38
L1	0.50 REF		
L2	0.15 BSC		
R	0.10	-	-
R1	0.10	-	0.25
θ	0°	-	8°
θ1	6°	9°	12°
θ2	6°	9°	12°

Physical Dimensions: SOT23-6

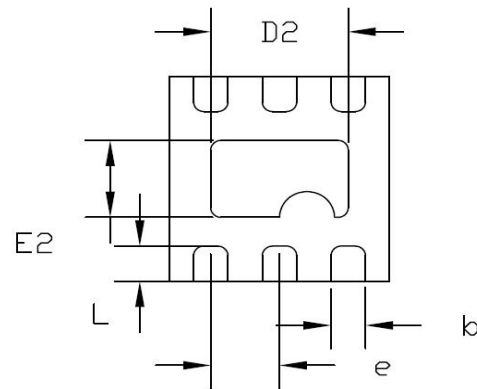


Common Dimensions (Units of Measure = Millimeter)			
Symbol	Min	Nom	Max
A	-	-	1.25
A1	0	-	0.15
A2	1.00	1.10	1.20
A3	0.60	0.65	0.70
b	0.36	-	0.50
b1	0.36	0.38	0.45
c	0.14	-	0.20
c1	0.14	0.15	0.16
D	2.826	2.926	3.026
E	2.60	2.80	3.00
E1	1.526	1.626	1.726
e	0.90	0.95	1.00
e1	1.80	1.90	2.00
L	0.35	0.45	0.60
L1	0.59 REF		
L2	0.25 BSC		
R	0.10	-	-
R1	0.10	-	0.25
Θ	0°	-	8°
Θ1	3°	5°	7°
Θ2	6°	-	14°

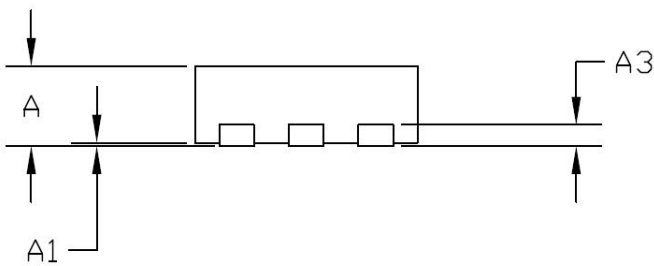
Physical Dimensions: DFN1.6*1.6-6



TOP VIEW



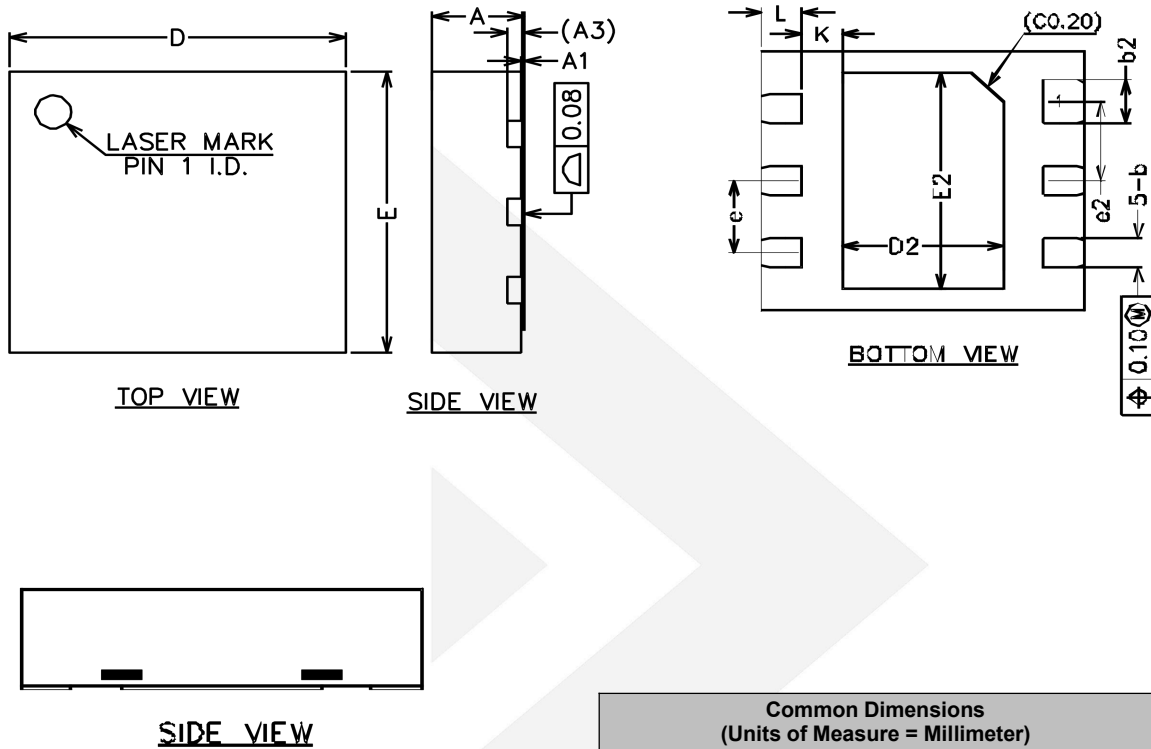
BOTTOM VIEW



SIDE VIEW

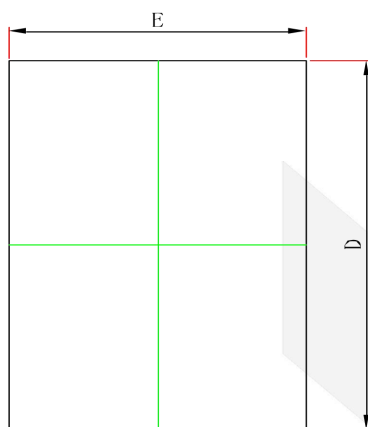
Common Dimensions (Units of Measure = Millimeter)			
Symbol	Min	Nom	Max
A	0.50	0.55	0.60
A1	0.00	-	0.05
A3	0.15 REF		
D	1.55	1.60	1.65
E	1.55	1.60	1.65
D2	0.90	1.00	1.05
E2	0.50	0.60	0.65
L	0.20	0.25	0.30
b	0.20	0.25	0.30
e	0.50 BSC		

Physical Dimensions: DFN1.8*2-6

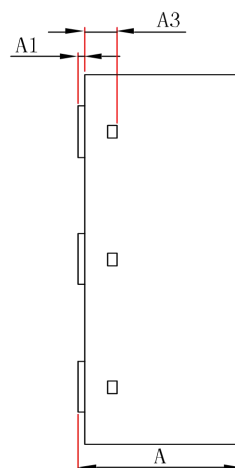


Common Dimensions (Units of Measure = Millimeter)			
Symbol	Min	Nom	Max
A	0.34	0.37	0.40
A1	0.00	0.02	0.05
A3	0.10 REF		
b	0.15	0.20	0.25
b2	0.25	0.30	0.35
D	1.90	2.00	2.10
D2	0.90	1.00	1.10
E	1.70	1.80	1.90
E2	1.40	1.50	1.60
e	0.40	0.50	0.60
e2	0.45	0.55	0.65
K	0.15	-	-
L	0.20	0.25	0.30

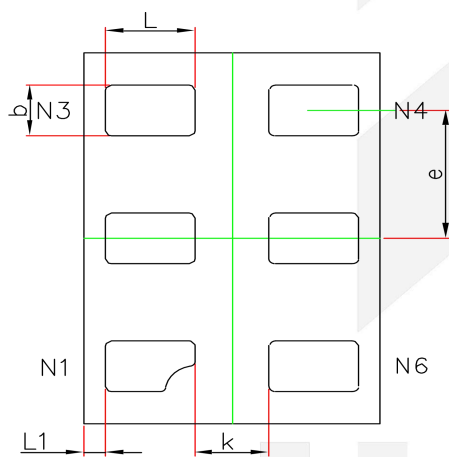
Physical Dimensions: DFN1.45*1-6



TOP VIEW



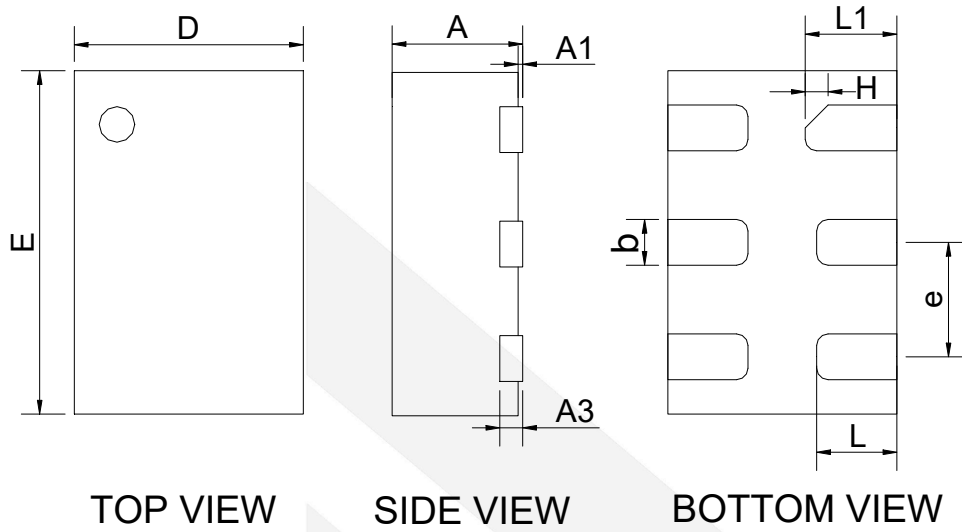
SIDE VIEW



BOTTOM VIEW

Common Dimensions (Units of Measure = Millimeter)		
Symbol	Min	Max
A	0.500	0.600
A1	-0.004	0.046
A3	0.110 REF	
D	1.350	1.550
E	0.900	1.100
k	0.250 REF	
b	0.150	0.250
e	0.500 TYP	
L	0.224	0.376
L1	0.075 REF	

Physical Dimensions: DFN1.5*1-6



Common Dimensions (Units of Measure = Millimeter)			
Symbol	Min	Nom	Max
A	0.50	-	0.6
A1	0.00	0.02	0.05
A3	0.10 REF		
D	0.90	1.00	1.10
E	1.40	1.50	1.60
b	0.15	0.20	0.25
e	0.40	0.50	0.60
H	0.10 REF		
L	0.30	0.35	0.40
L1	0.35	0.40	0.45

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.

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