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 V_{CC}
- Excellent on-resistance matching
- Low total harmonic distortion (THD)
- Low charge injection
- Low power consumption
- Green or RoHS packaged:
  SC70-6, SOT23-6, and DFN-6

Applications

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

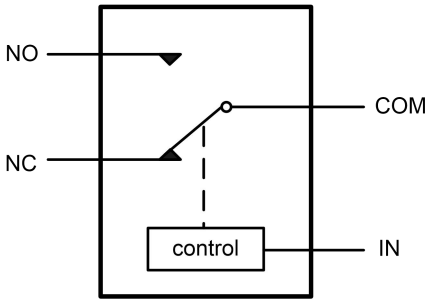
Descriptions

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.

Block Diagram

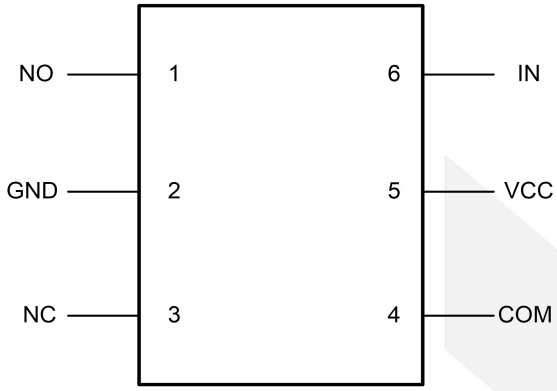


Ordering Information

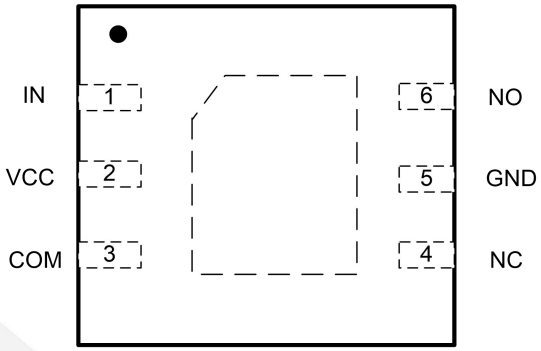
Order Part Number	Top Marking		T_A	Package	
DIO1159BSC6	YWXC	Green or RoHS	-40 to 85 °C	SC70-6	Tape & Reel, 3000
DIO1159BST6	YWXC	Green or RoHS	-40 to 85 °C	SOT23-6	Tape & Reel, 3000
DIO1159BFN6	YWXA	Green or RoHS	-40 to 85 °C	DFN1.6*1.6-6	Tape & Reel, 3000
DIO1159BCN6	1159	Green or RoHS	-40 to 85 °C	DFN1.8*2-6	Tape & Reel, 3000
DIO1159BQN6	YW9	Green or RoHS	-40 to 85 °C	DFN1.45*1-6	Tape & Reel, 5000
DIO1159BMN6	YWE9	Green or RoHS	-40 to 85 °C	DFN1.5*1-6	Tape & Reel,5000

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

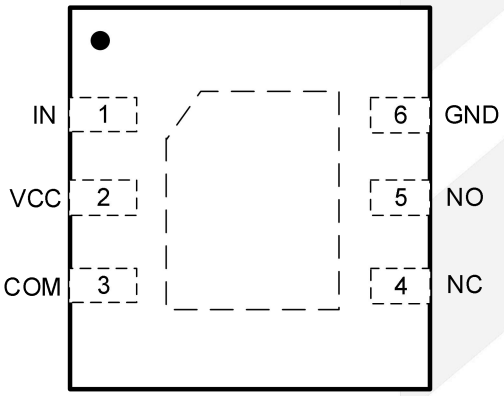
Pin Assignment



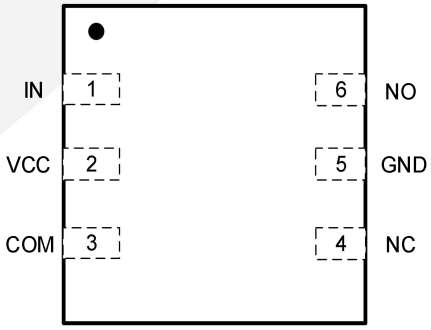
SOT23-6/SC70-6



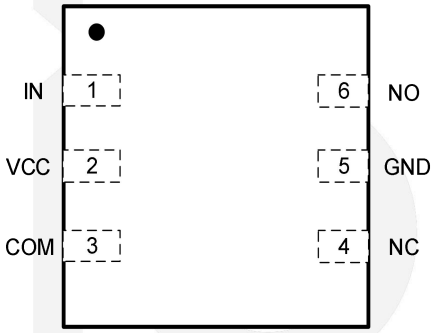
DFN1.6*1.6-6



DFN1.8*2-6



DFN1.45*1-6



DFN1.5*1-6

Figure 1. Top View

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

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

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	85	°C

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

Electrical Characteristics

All typical value are at V_{CC} = 5 V; T_A = 25°C, unless otherwise specified.

Symbol	Parameter	Conditions	Temp.	Min	Typ	Max	Unit
V_{IH}	Input voltage high		-40 to 85°C	1.65			V
V_{IL}	Input voltage low		-40 to 85°C			0.6	V
I_{IN}	Control input leakage	V_{IN} = 5 V or 0 V, V_{CC} = 5 V	25°C	-2		2	nA
			-40 to 85°C	-100		100	
$I_{NC(OFF)}$ $I_{NO(OFF)}$	NC, NO, COM off leakage current see Figure 3	V_{SW} = 0.3 V, 3.3 V, V_{COM} = 3.3 V, 0.3 V, V_{CC} = 5 V	25°C	-20	2	20	nA
			-40 to 85°C	-100		100	
$I_{COM(ON)}$	COM on leakage current	V_{COM} = 0.3 V, 3.3 V, V_{SW} = 0.3 V, 3.3 V, or floating, V_{CC} = 5 V	25°C	-20	2	20	nA
			-40 to 85°C	-100		100	
I_{CC}	Quiescent supply current	V_{CC} = 5 V, V_{IN} = V_{CC} or GND, switch ON or OFF	25°C		10	50	nA
			-40 to 85°C			500	
I_{CCT}	Increase in I_{CC} input	V_{CC} = 5 V, V_{IN} = 1.8 V	25°C		46		μA
		V_{CC} = 5 V, V_{IN} = 2.8 V			22		
R_{ON}	Switch on resistance see Figure 2	V_{CC} = 5 V, V_{SW} = 1 V, I_{SW} = -100 mA	25°C		1	1.5	Ω
			-40 to 85°C			2.0	
ΔR_{ON}	On resistance matching between channels	V_{CC} = 5 V, V_{SW} = 1 V, I_{SW} = -100 mA	25°C		0.05	0.2	Ω
			-40 to 85°C			0.3	
$R_{FLT(ON)}$	On resistance flatness	V_{CC} = 5 V, V_{SW} = 1 V, 3.5 V, I_{SW} = -100 mA	-40 to 85°C		0.8	1.2	Ω
T_{ON}	Turn-On time see Figure 8	V_{SW} = 1.5 V or 0 V, R_L = 50 Ω, C_L = 35 pF see Figure 8	25°C			70	ns
T_{OFF}	Turn-Off time see Figure 8	V_{SW} = 1.5 V or 0 V, R_L = 50 Ω, C_L = 35 pF see Figure 8	25°C			10	ns
T_{BBM}	Break before make time see Figure 7	V_{SW} = V_{CC}, R_L = 50 Ω, C_L = 35 pF see Figure 7	25°C			60	ns
OIRR	Off isolation	R_L = 50 Ω, signal = 0 dBm, f = 1 MHz	25°C		-55		dB
BW	-3 dB bandwidth see Figure 5	R_L = 50 Ω, signal = 0 dBm, see Figure 5	25°C		100		MHz
THD	Total harmonic distortion	R_L = 600 Ω, C_L = 50 pF, f = 20 Hz to 20 kHz, see Figure 5	25°C		0.002		%
C_{IN}	Control pin input capacitance	V_{IN} = V_{CC} or 0 V	25°C		1.5		pF
C_{OFF}	OFF capacitance see Figure 4	Switch off V_{SW} = V_{CC} or 0 V see Figure 4	25°C		22		pF
C_{ON}	On capacitance see Figure 4	Switch on V_{COM} = V_{CC} or 0 V see Figure 4	25°C		49		pF

Test Diagrams

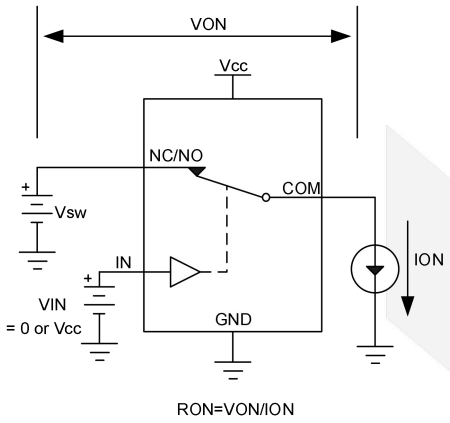


Figure 2 . Switch on resistor

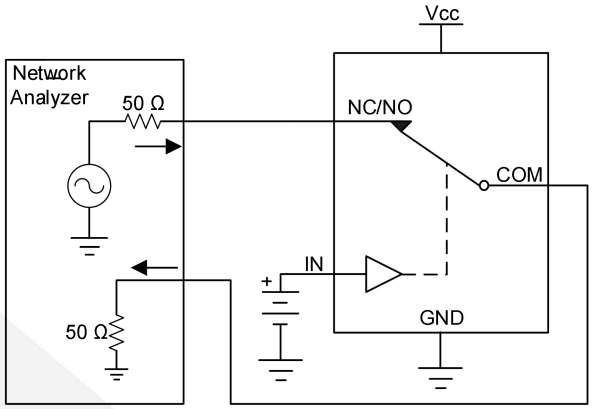


Figure 5 . Bandwidth

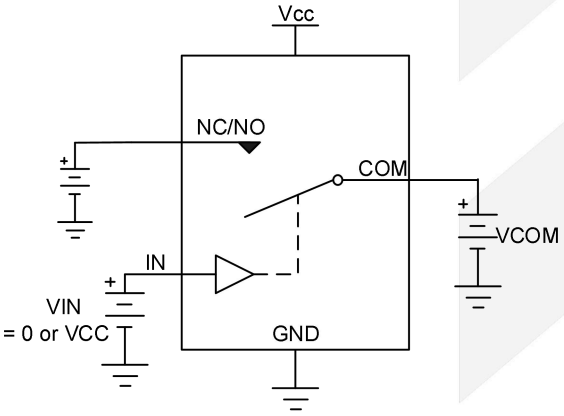


Figure 3. Switch off leakage

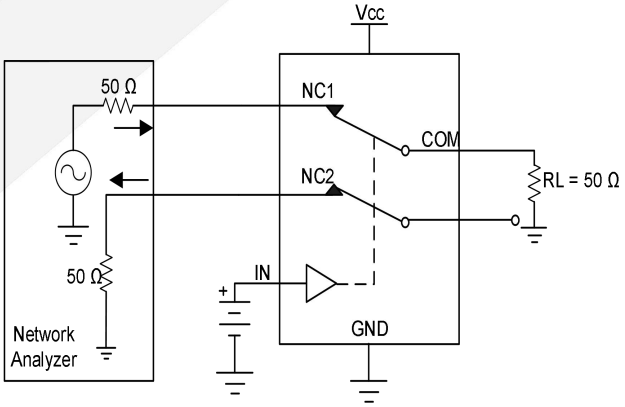


Figure 6. Channel-to-channel crosstalk

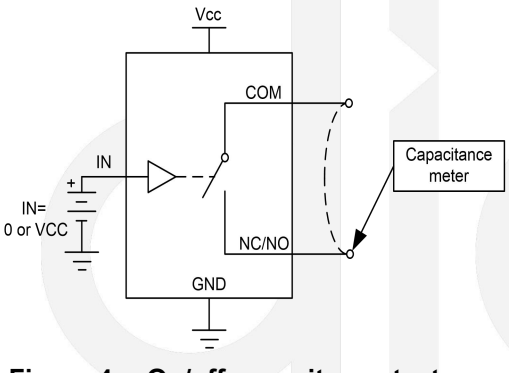


Figure 4. On/off capacitance test

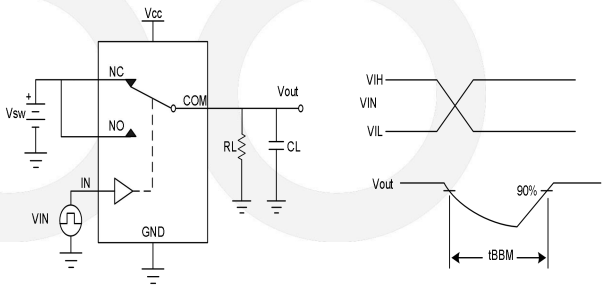


Figure 7. Break-Before-Make

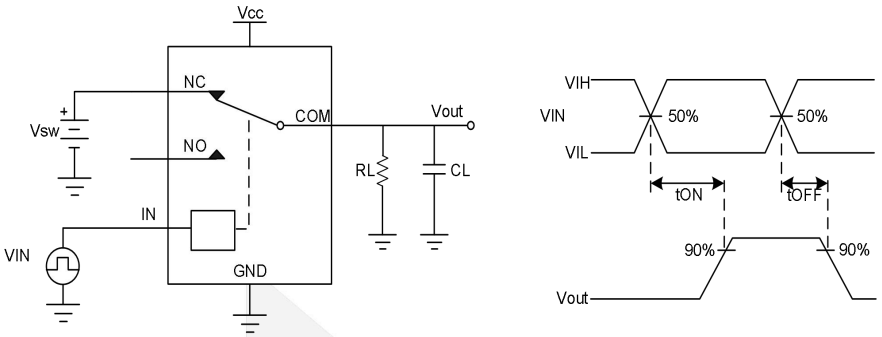
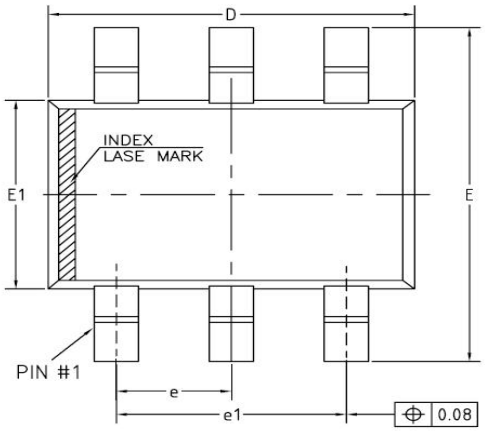
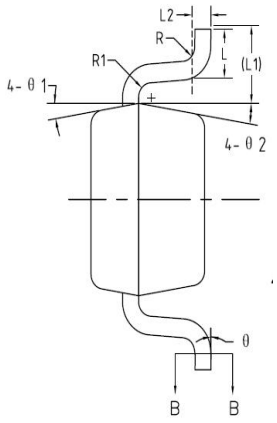
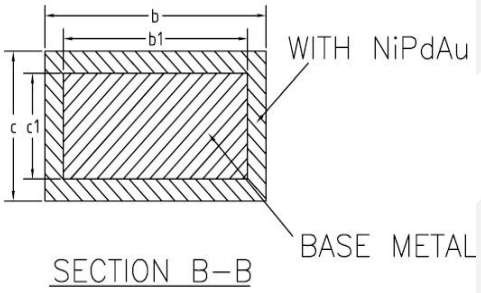


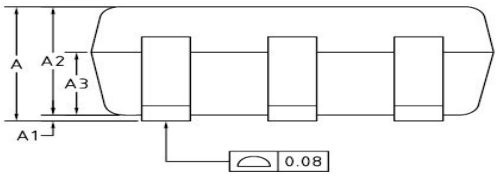
Figure 8 Turn-On/Turn-Off

Physical Dimensions: SC70-6



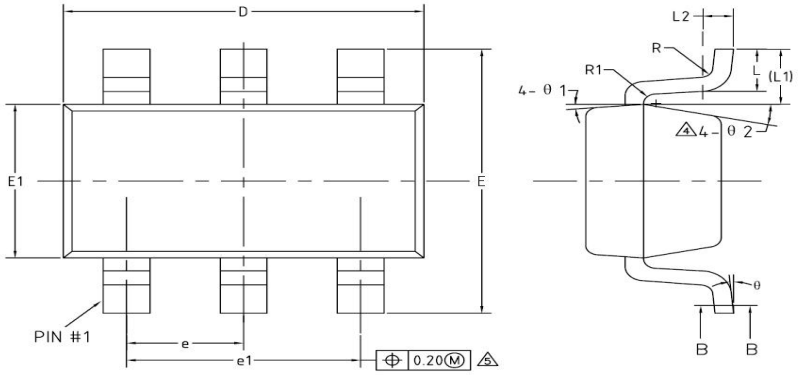


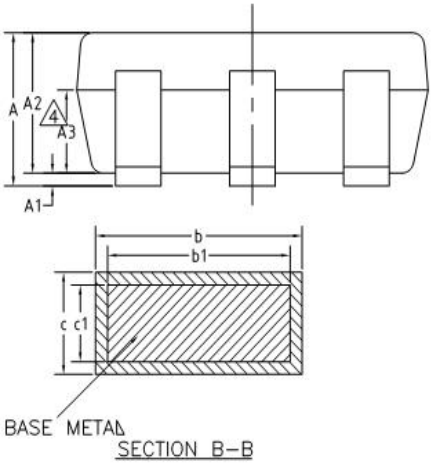




Common Dimensions (Units of measure=millimeter)			
Symbol	**Min**	**Nom**	**Max**
A	0.85	-	1.05
A1	0	-	0.10
A2	0.80	0.90	1.00
A3	0.47	0.52	0.57
b	0.22	-	0.29
b1	0.22	0.25	0.28
c	0.115	-	0.15
c1	0.115	0.13	0.14
D	2.02	2.07	2.12
E	2.20	2.30	2.40
E1	1.25	1.30	1.35
e	0.65 BSC		
e1	1.30 BSC		
L	0.28	0.33	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°

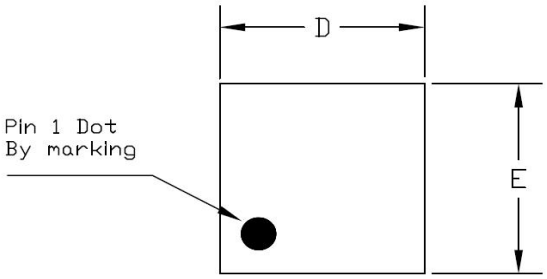
Physical Dimensions: SOT23-6



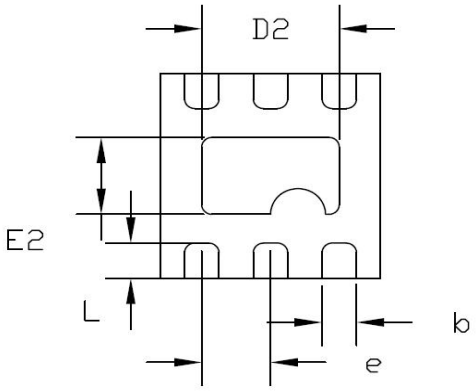


Common Dimensions (Units of measure=millimeter)			
Symbol	**Min**	**Nom**	**Max**
A	-	-	1.25
A1	0	-	0.15
A2	1.00	1.10	1.20
A3	0.60	0.65	0.70
b	0.36	-	0.50
b1	0.36	0.38	0.45
c	0.14	-	0.20
c1	0.14	0.15	0.16
D	2.826	2.926	3.026
E	2.60	2.80	3.00
E1	1.526	1.626	1.726
e	0.90	0.95	1.00
e1	1.80	1.90	2.00
L	0.35	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°

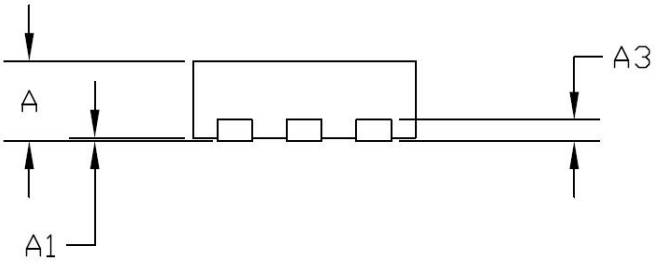
Physical Dimensions: DFN1.6*1.6-6



TOP VIEW



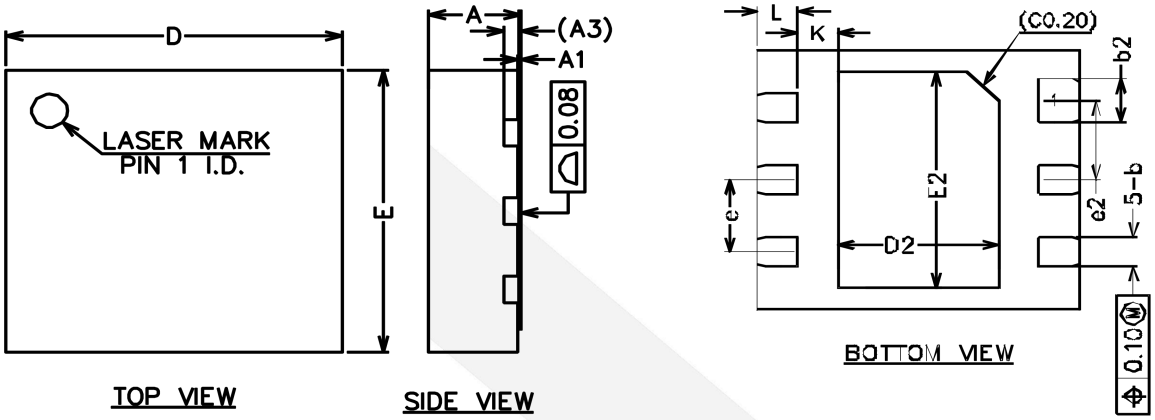
BOTTOM VIEW



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	

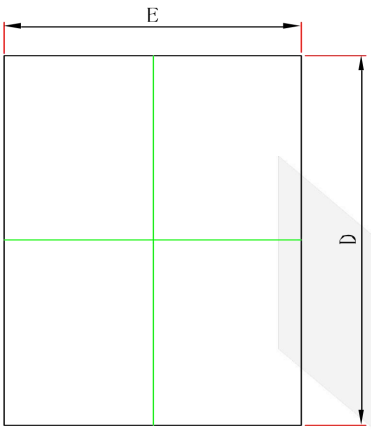
Physical Dimensions: DFN1.8*2-6



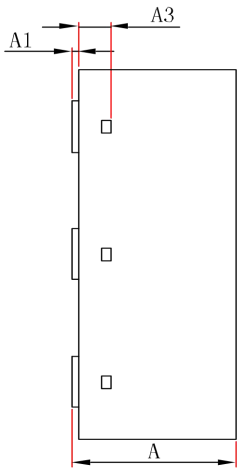
SIDE VIEW

Common Dimensions (Units of measure=millimeter)			
Symbol	**Min**	**Nom**	**Max**
A	0.34	0.37	0.40
A1	0.00	0.02	0.05
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

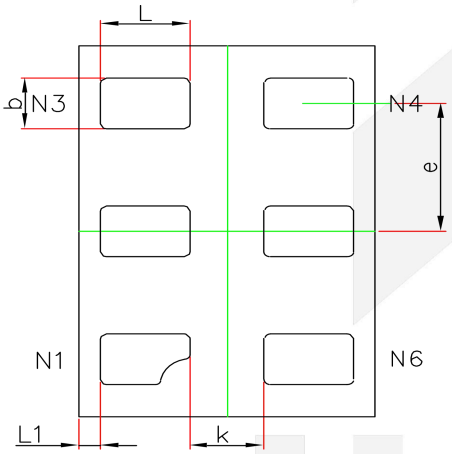
Physical Dimensions: DFN1.45*1-6



TOP VIEW



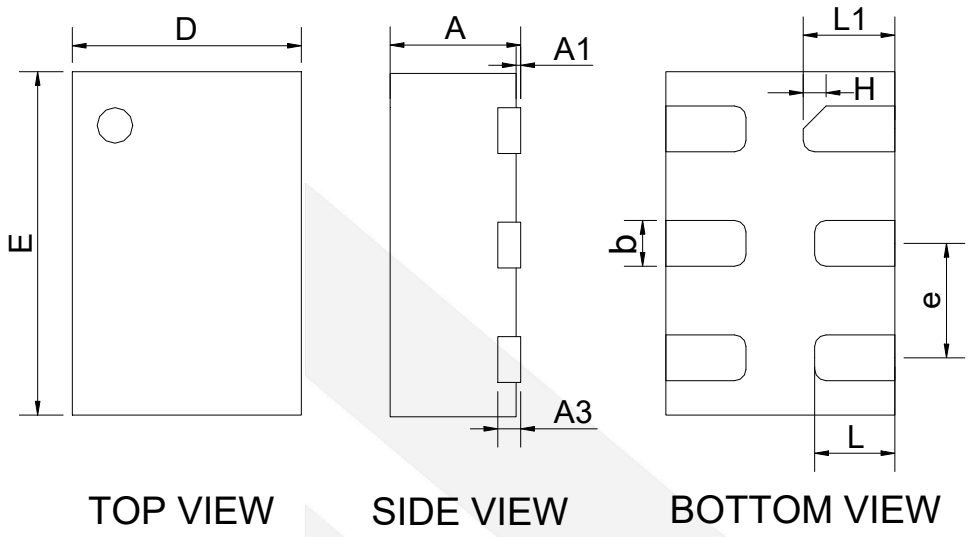
SIDE VIEW



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.