

DIO1166

Enhanced Low Voltage SPST Analog Switch with Power on and Power Off Protection

Features

- Over-voltage tolerance (OVT) Features at common port
- Low on capacitance: 18pF typical
- Low on resistance: 10Ω maximum
- Low power consumption: 1uA
Maximum 10uA maximum I_{CC} over an expanded voltage range ($V_{in}=2.7V$, $V_{CC}=4.3V$)
- Wide -3dB Bandwidth: >300MHz
- Wide supply range: 1.65~5.5V
- Packaged: 5-Lead SC70
- 8kV HBM ESD rating, 2kV CDM ESD rating

Descriptions

This single analog switch is designed for 1.65V to 5.5V V_{CC} operation.

The DIO1166 device can handle analog and digital signals. The device permits bidirectional transmission of signals with amplitudes of up to 5.5V(peak). It features power ON/OFF protection on ports effectively protecting device against external signal perturbation. It also offers excellent -3db bandwidth and lower ON resistance, which can be used as analog switch in multiple applications.

Applications

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

Ordering Information

Order Part Number	Top Marking		T_A	Package	
DIO1166SC5	YW6J	RoHS/Green	-40 to +85°C	SC70-5	Tape & Reel, 3000

Pin Assignment

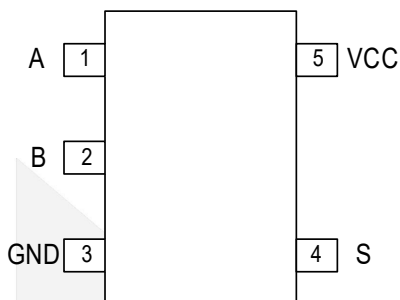


Figure 1 Top View

Pin Descriptions

Pin Name	Description
A	Data Port
B	Data Port
GND	Ground
S	Control Port (L=OFF, H=ON)
Vcc	Power Supply

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	-0.5	+6	V
V_S	DC Switch voltage	-0.5	$V_{CC}+0.5$	V
V_{IN}	DC Input voltage	-0.5	+6	V
I_{IK}	DC Input diode current	-50		mA
I_{SW}	Switch current		100	mA
I_{SWpeak}	Peak switch current (Pulse at 1ms duration, <10% Duty Cycle)		200	mA
P_D	Power dissipation at 85°C		180	mW
T_{STG}	Storage temperature range	-65	150	°C
T_j	Junction temperature		150	°C
T_L	Lead temperature range		260	°C
ESD	HBM, JEDEC : JESD22-A114		8	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_{CC}	Supply voltage	1.65	5.5	V
V_{CNTRL}	Control input voltage	1.65	5.5	V
V_{SW}	Switch input voltage	1.65	5.5	V
T_A	Operating temperature	-40	85	°C
Θ_{JA}	Thermal resistance in still air		350	°C/W

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	$T_A = -40^\circ\text{C}$ to 85°C	1.8--2.7	1.3			V
			2.7--3.6	1.7			
			4.5--5.5	2.2			
V_{IL}	Input voltage low	$T_A = -40^\circ\text{C}$ to 85°C	1.8--2.7			0.6	V
			2.7--3.6			0.7	
			4.5--5.5			1.0	
I_{IN}	Control input leakage	$T_A = -40^\circ\text{C}$ to 85°C $V_{in} = 0\text{V}$ to V_{cc}	2.7--3.6	-1		1	μA
			4.5--5.5	-1		1	
I_{OFF}	Power off leakage current	$A=1\text{V}$, 4.5V , $B=4.5$, 1V	5.5	-2		2	nA
		$T_A=-40^\circ\text{C}$ to 85°C , $A=1\text{V}$, 4.5V , $B=4.5$, 1V	5.5	-20		20	
$I_{A(ON)}$	On leakage current of port A	$A=1\text{V}$, 4.5V , $B=4.5$, 1V , 4.5V or Floating	5.5	-4		4	nA
		$T_A = -40^\circ\text{C}$ to 85°C					
		$A=1\text{V}$, 4.5V , $B=4.5$, 1V , 4.5V or Floating	5.5	-40		40	
R_{ON}	Switch on resistance See figure 2	$I_{out} = 30\text{mA}$, $B = 1.5\text{V}$	2.7		10		Ω
		$I_{out} = 30\text{mA}$, $B = 3.5\text{V}$	4.5		4		
		$T_A = -40^\circ\text{C}$ to 85°C , $I_{out} = 30\text{mA}$, $B = 1.5\text{V}$	2.7			12	
		$T_A = -40^\circ\text{C}$ to 85°C , $I_{out} = 30\text{mA}$, $B = 3.5\text{V}$	4.5			6	
ΔR_{ON}	On resistance matching between channels	$I_{out} = 30\text{mA}$, $B = 1.5\text{V}$	4.5			0.2	Ω
		$T_A = -40^\circ\text{C}$ to 85°C , $I_{out} = 30\text{mA}$, $B = 1.5\text{V}$	4.5			0.4	
$R_{FLT(ON)}$	On resistance flatness	$I_{out} = 30\text{mA}$, $B = 0\text{V}$, 0.75V , 1.5V	2.7			5	Ω
		$I_{out} = 30\text{mA}$, $B = 0\text{V}$, 1V , 2V	4.5			1	
		$T_A = -40^\circ\text{C}$ to 85°C $I_{out} = 30\text{mA}$, $B = 0\text{V}$, 0.75V , 1.5V	2.7			5	
		$T_A = -40^\circ\text{C}$ to 85°C $I_{out} = 30\text{mA}$, $B = 0\text{V}$, 1V , 2V	4.5			1	
I_{CC}	Quiescent supply current	$V_{in} = 0\text{V}$ or V_{cc} , $I_{out} = 0$	3.6		0.1		μA
			5.5		0.1		
		$T_A = -40^\circ\text{C}$ to 85°C $V_{in} = 0\text{V}$ or V_{cc} , $I_{out} = 0$	3.6			1	
			5.5			1	
ΔI_{CC}	Increase in I_{CC} per Input	One input at 2.7V , others at V_{cc} or GND	4.3		0.2	5	μA
		$T_A = -40^\circ\text{C}$ to 85°C , One input at 2.7V , others at V_{cc} or GND	4.3			10	

AC Electrical Characteristics

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

Symbol	Parameter	Conditions	Vcc(V)	Min	Typ	Max	Unit
T_{ON}	Turn-On time See figure 3	$B = 1.5V, R_L = 50\Omega, C_L = 35pF$	2.7--3.6			35	ns
		$B = 1.5V, R_L = 50\Omega, C_L = 35pF$	4.5--5.5			25	
T_{OFF}	Turn-Off Time See figure 3	$B = 1.5V, R_L = 50\Omega, C_L = 35pF$	2.7--3.6			30	ns
		$B = 1.5V, R_L = 50\Omega, C_L = 35pF$	4.5--5.5			20	
Q	Charge injection See figure 4	$C_L = 1nF, V_{GEN} = 0V, R_{GEN} = 0\Omega$	2.7--3.6		10		pC
			4.5--5.5		20		
OIRR	Off isolation See figure 5	$F = 1MHz, R_L = 50\Omega$	2.7--3.6		-77		dB
			4.5--5.5		-80		
BW	-3dB bandwidth See figure 6	$R_L = 50\Omega$	2.7--3.6		350		MHz
			4.5--5.5		350		
THD	Total harmon distortion See figure 7	$R_L = 600\Omega, V_{in} = 0.5V$ $f = 20Hz$ to $20KHz$	2.7--3.6		0.02		%
			4.5--5.5		0.02		

Capacitance

	Parameter	Conditions	Min	Typ	Max	Unit
C_{IN}	Control pin input capacitance	$V_{CC} = 0V$		1		pF
C_{OFF}	B port off capacitance (see figure 8)	$V_{CC} = 4.5V, f = 1MHz$		5		
C_{ON}	On capacitance (see figure 9)			16		

Test Diagrams

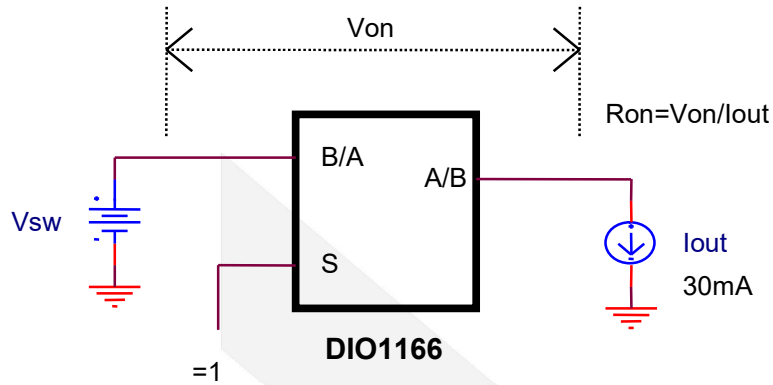


Figure 2. On Resistance

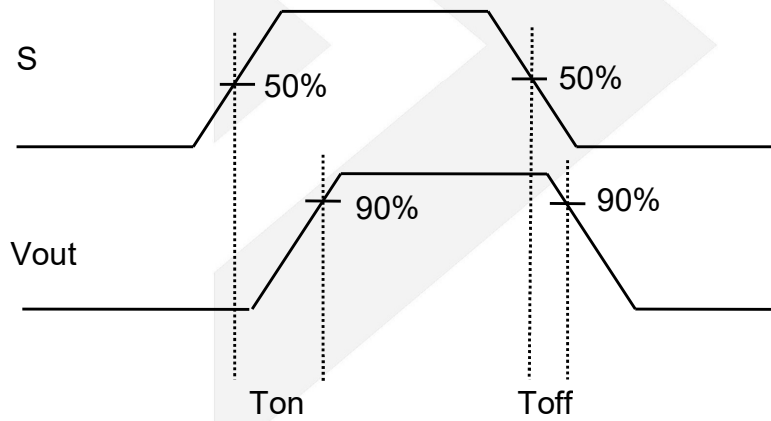


Figure 3. Turn On/Off Time

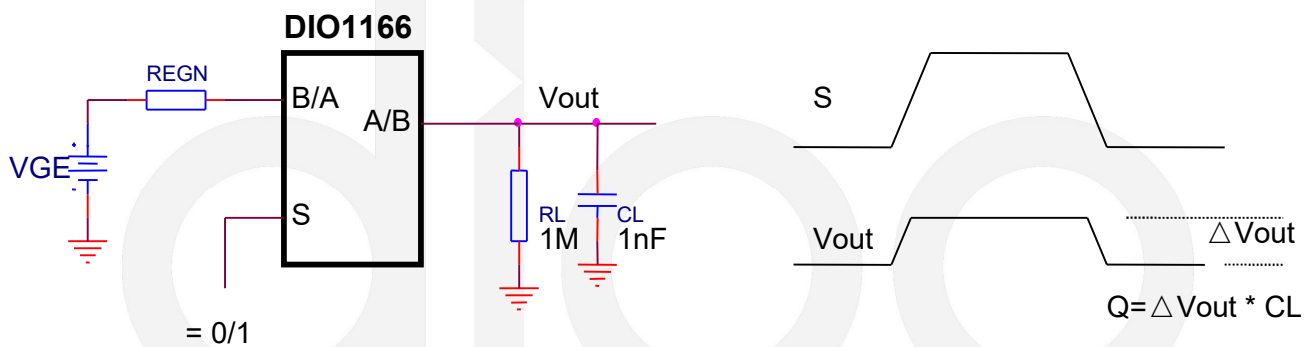


Figure 4. Charge Injection

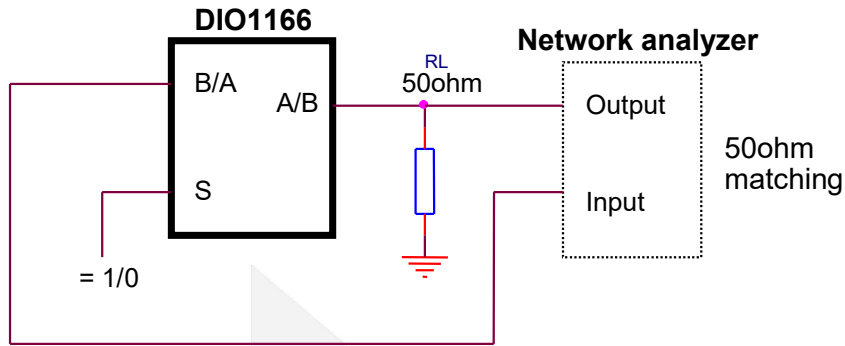


Figure 5. Channel Off Isolation

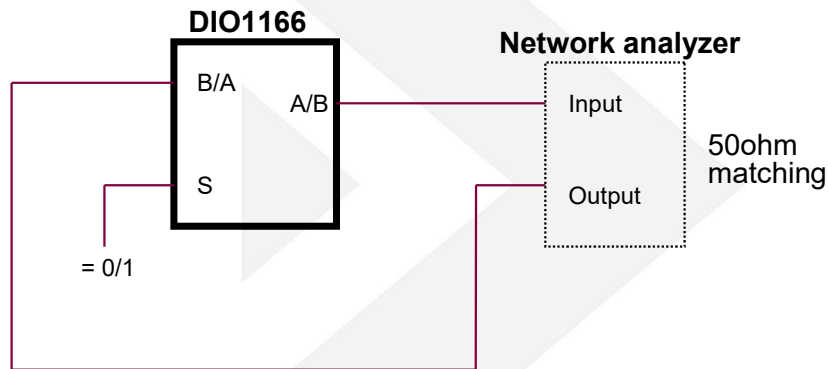


Figure 6. -3dB Bandwidth

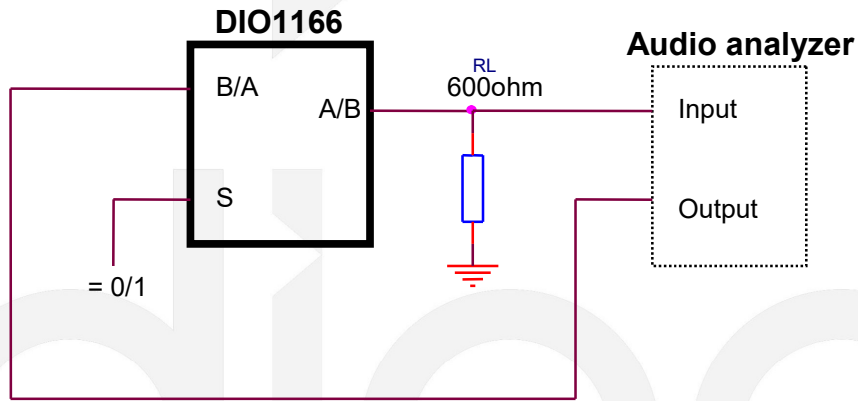


Figure 7. Total Harmonic Distortion

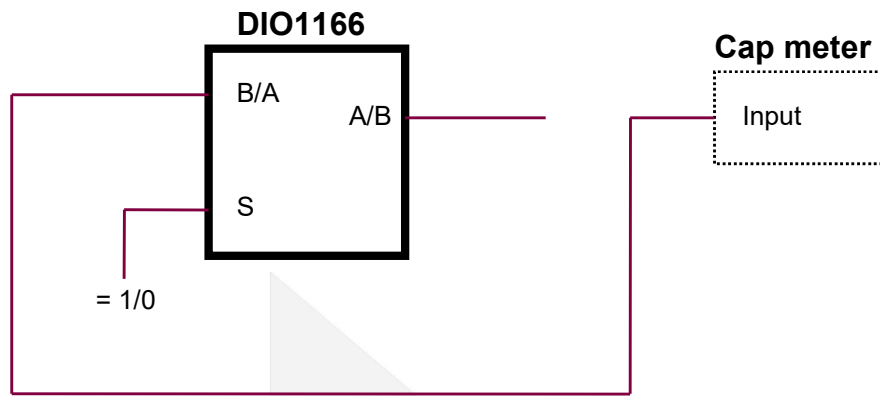


Figure 8. Channel Off Capacitance

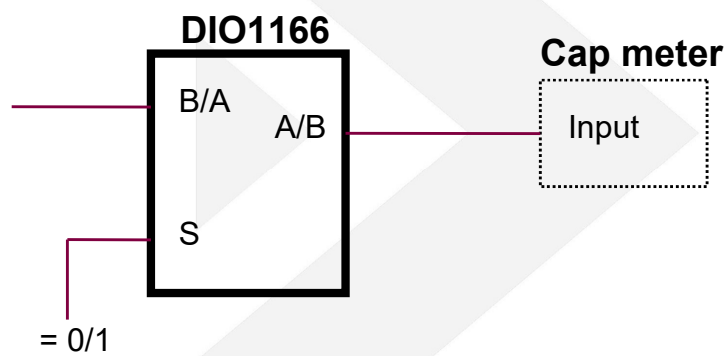
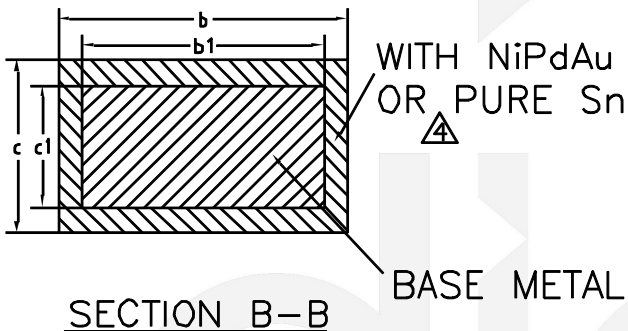
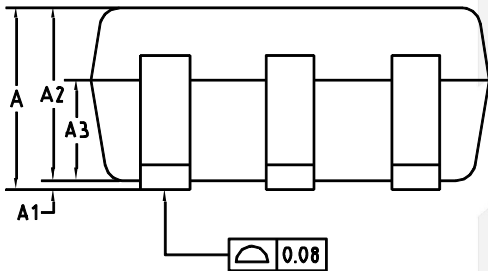
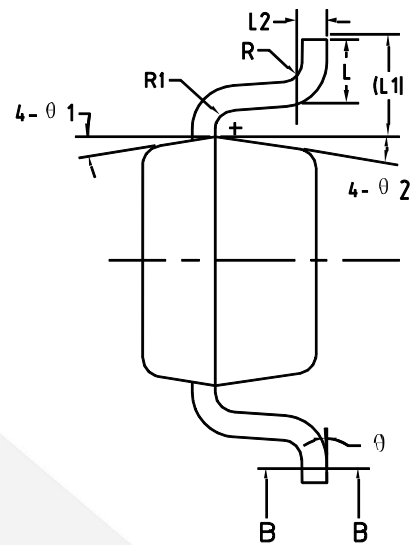
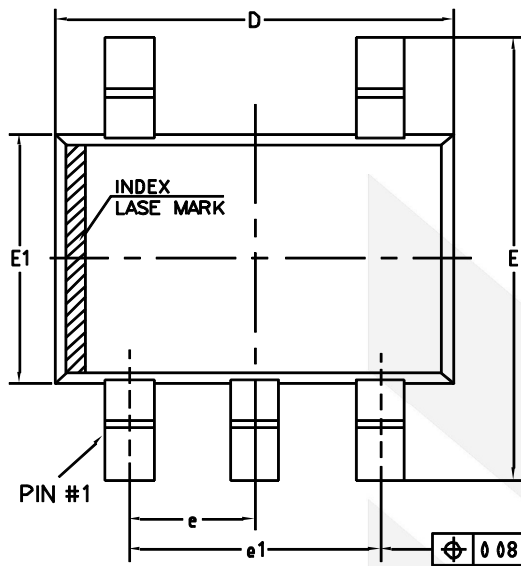


Figure 9. Channel On Capacitance

Physical Dimensions: SC70-5

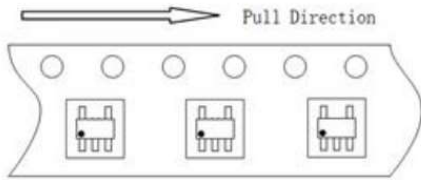


COMMON DIMENSIONS (UNITS OF MEASURE=MILLIMETER)			
Symbol	MIN	NOM	MAX
A	0.85	-	1.05
A1	0	-	0.10
A2	0.80	0.90	1.00
A3	0.47	0.52	0.57
b	0.23	-	0.33
b1	0.22	0.25	0.28
c	0.12	-	0.18
c1	0.115	0.13	0.14
D	2.02	2.07	2.12
E	2.20	2.30	2.40
E1	1.25	1.30	1.35
e	0.65BSC		
e1	1.30BSC		
L	0.28	0.33	0.38
L1	0.50REF		
L2	0.15BSC		
R	0.10	-	-
R1	0.10	-	0.25
θ	0°	-	8°
θ1	6°	9°	12°
θ2	6°	9°	12°

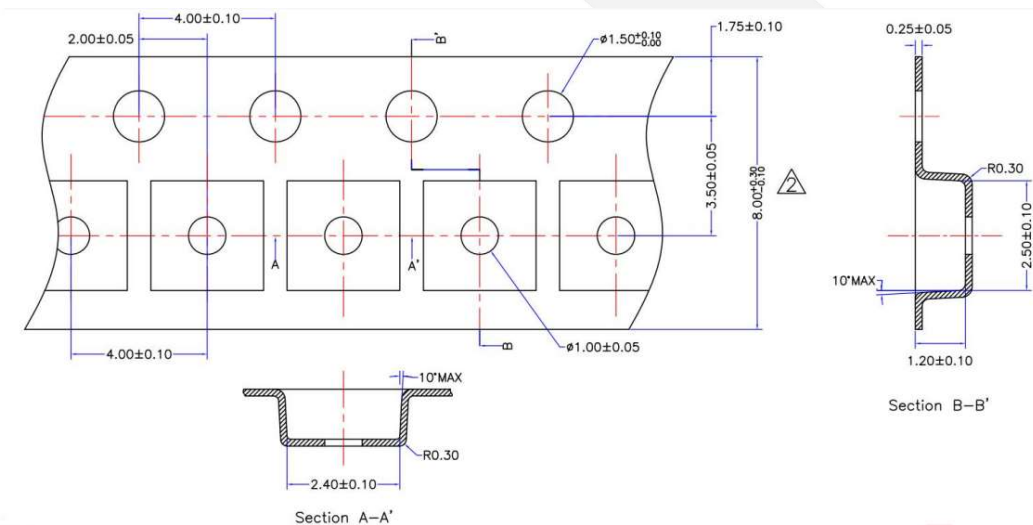
Enhanced Low Voltage SPST Analog Switch with Power on and Power off Protection

Package Information: SC70-5

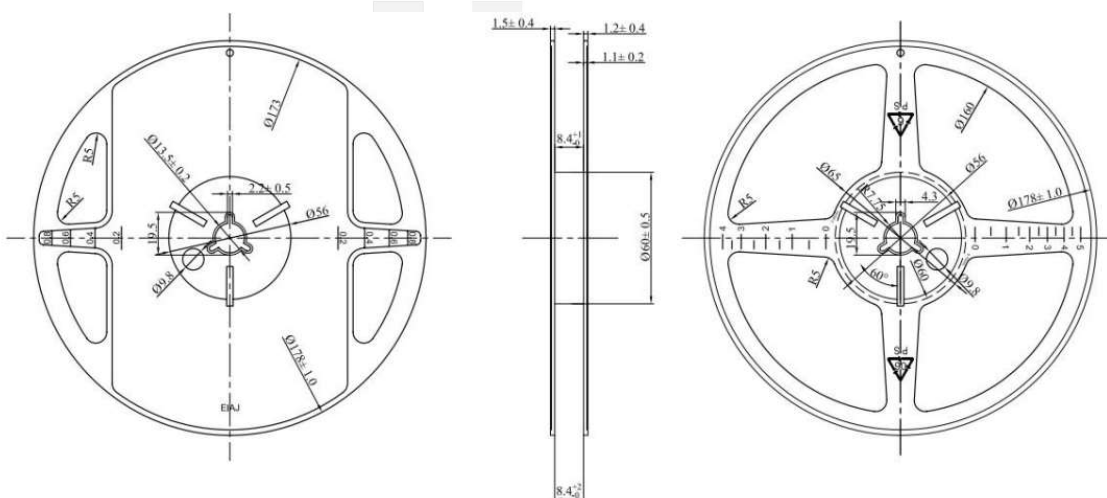
PIN1 ORIENTATION IN TAPE



TAPE DIMENSIONS (Unit in mm)



REEL DIMENSIONS (Unit in mm)





DIO1166

PACKAGING SPECIFICATIONS

PKG	Pcs / reel	Reel / box	Pcs / box	Box / carton	Pcs /carton
SC70-5	3000	4	12000	12	144000

Enhanced Low Voltage SPST Analog Switch with Power on and Power off Protection

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.

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