

DIO1500

Four-pole single-throw (4PST) Depletion Mode Isolation Switch

Features

- Support 4-pole single-throw
- Depletion Mode MOSFETs
- $V_{CC(OFF)}$: 1.6V to 3.0V
- R_{ON} : 0.5Ω Typical
- $R_{ON-Flat}$: 0.01Ω Typical
- Package: 12-Ball WLCSP, (with Back side Laminate), 3x4 Array, 0.4mm Pitch, 250 μm Ball

Applications

- Cell phones
- Smart Phones
- Tablets
- MP3
- GPS
- PMP

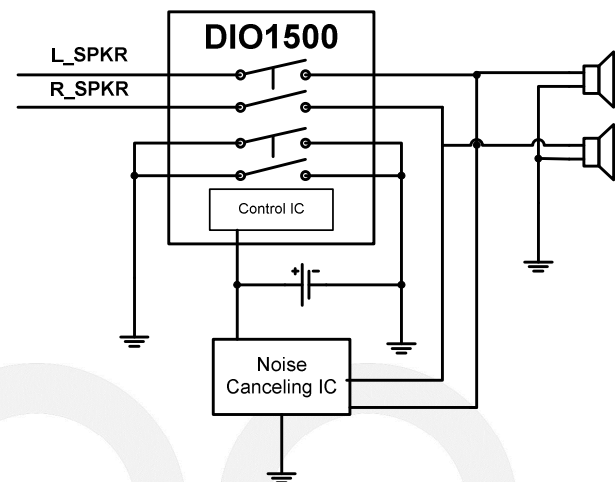
Descriptions

The DIO1500 is a high-performance four-pole single-throw (4PST) analog switch with wide VCC range.

The key feature of DIO1500 is the Depletion-Mode isolation technology. That allows the device to conduct signals when there is no VCC available and to isolate the signals when VCC is present.

In additional, select pins allow the internal oscillator frequency to be adjusted between 500kHz and 750kHz in 75kHz steps when VCC is present. This feature can improve electromagnetic interference (EMI).

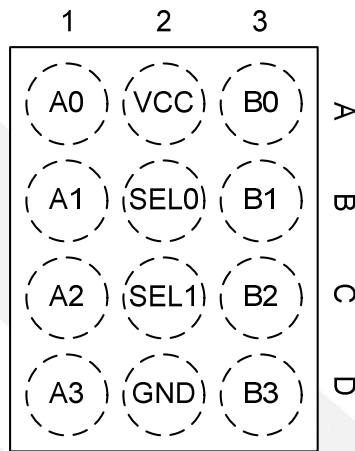
Typical Applications



Ordering Information

Order Part Number	Top Marking		T_A	Package	
DIO1500WL12	1500	Green	-40 to +85°C	WLCSP-12	Tape & Reel, 3000

Pin Configuration



WLCSP-12

Figure 1 Pin Assignment (Top View)

Pin Definitions

Name	Type	Description
A0	I/O	A-Port
A1	I/O	A-Port
A2	I/O	A-Port
A3	I/O	A-Port
VCC	Supply/Control	Isolation Circuit Supply Voltage (see Table 1)
SEL0	Input	Oscillator Frequency Control (see Table 2). Used to shift the electromagnetic interference (EMI) signature to meet the customer specifications.
SEL1	Input	
GND	Ground	System Ground
B0	I/O	B-Port
B1	I/O	B-Port
B2	I/O	B-Port
B3	I/O	B-Port



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Truth Table (Table 1)

VCC	Function
0V-0.2V	B0-B3=A0-A3
1.6V-3.0V	Disconnect, B0-B3≠A0-A3

Oscillator Frequency Step Logic (Table 2)

SEL1	SEL0	Frequency(Typ.)
LOW	LOW	500kHz
LOW	HIGH	575kHz
HIGH	LOW	650kHz
HIGH	HIGH	725kHz



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Absolute maximum Rating

Stresses beyond those listed under “Absolute Maximum Rating” 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 maxim rating conditions for extended periods may affect device reliability.

Parameter	Rating	Unit
Supply/Control Voltage VCC	-0.3 to 5.5	V
Input Voltage(Select Pins) V _{IN}	-0.3 to VCC	V
DC Switch I/O Voltage(Switch Conducting) V _{SW(ON)}	-5 to +5	V
DC Switch I/O Voltage(Switch Isolated) V _{SW(OFF)} ⁽¹⁾	-1.0 to 3	V
DC Input Diode Current I _{IK}	-50	mA
Switch I/O Current I _{SW}	350	mA
Peak Switch Current I _{SWPEAK}	500	mA
Absolute Maximum Operating Temperature T _A	-40 to +85	°C
Storage Temperature T _{STG}	-65 to +150	°C
ESD HBM	6.5	kV

1. When a switch is isolated (OFF), V_{SW} value must be <VCC.

Recommended 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	Conditions	Min	Typ.	Max	Unit
VCC _(ON)	Supply Voltage with Switch Conducting		0		0.2	V
VCC _(OFF)	Supply Voltage with Switch Isolated		1.6		3.0	V
V _{SW(ON)}	DC Switch I/O Voltage (Switch Conducting)	VCC= 0V	-2		2	V
V _{SW(OFF)}	DC Switch I/O Voltage (Switch Isolated)	VCC = 1.6V to 3.0V	-1.0		1.4	V



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Electrical Characteristics

T_A = 25°C unless otherwise specified.

Symbol	Parameter	Conditions	VCC(V)	Min	Typ	Max	Unit
DC Electrical Characteristics							
I _{ON}	Switch-to-GND Leakage Current (Switch Conducting)	An=-1.0V to 1.4V, Bn=Float	0	0	0.3	1.0	μA
I _{OFF}	Switch-to-GND Leakage Current (Switch Isolated)	An=0.4V to 1.4V, Bn=Float	3	0	0.5	3.5	μA
R _{ON}	Switch On Resistance ⁽²⁾	I _{SW} = ±24mA, V _{SW} = -1.0V to +1.4V	0		0.5		Ω
R _{FLAT(ON)}	On Resistance Flatness ⁽²⁾	I _{SW} = ±24 mA, V _{SW} = -1.0V to +1.4V	0		0.01		Ω
I _{CC}	Quiescent Supply Current	SEL0=SEL1=VCC	3	0	50	70	μA
V _{IH}	Input Voltage High (Select Pins) ⁽³⁾		3	0.8VCC			V
V _{IL}	Input Voltage Low (Select Pins) ⁽³⁾		3			0.2VCC	V
I _{IN}	Input Leakage Current (Select Pins)		3	0		±1	μA
AC Electrical Characteristics							
t _{ON}	Turn-On Time V _{CC} to Output ^(4,5)	R _L =32Ω, C _L =10pF, V _{SW} =1.4V	1.6		1		μs
t _{OFF}	Turn-Off Time V _{CC} to Output ^(4,5)	R _L =32Ω, C _L =10pF, V _{SW} =1.4V	1.6		180		μs
OIRR	Off Isolation ^(4,5)	R _L =32Ω, f=20kHz, V _{SW} =0.35V _{RMS}	1.6		-90		dB
X _{TALK}	Crosstalk ^(4,5)	R _L =32Ω, f=20kHz, V _{SW} =1V _{RMS}	0		-90		dB
BW	-3dB Bandwidth ⁽⁵⁾	R _L =50Ω, C _L =0pF	0		300		MHz
THD+N	Total Harmonic Distortion + Noise ^(4,5)	R _L =32Ω, f=20Hz to 20kHz, V _{SW} =1V _{RMS}	0		0.001		%

2. Guaranteed by test and characterization.
3. Voltages on select control pins must be ≤VCC.
4. SEL0=SEL1=LOW.
5. Guaranteed by characterization.



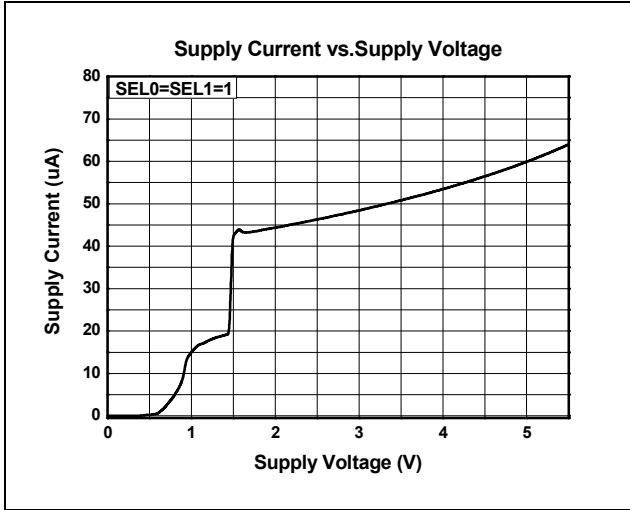
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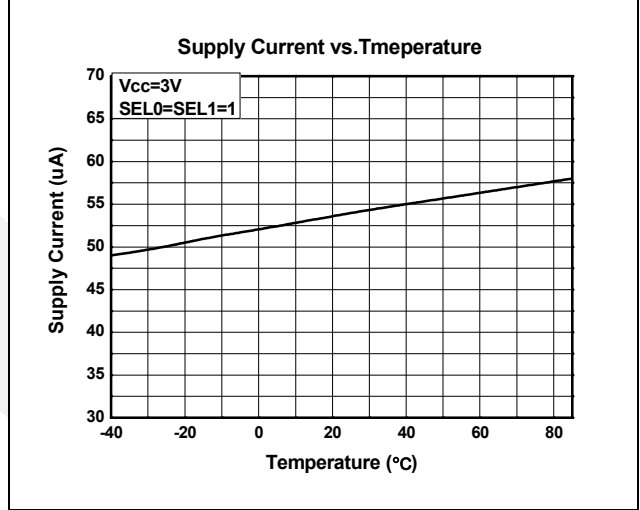
Typical Performance Characteristics

$T_A = 25^\circ\text{C}$ unless otherwise specified.

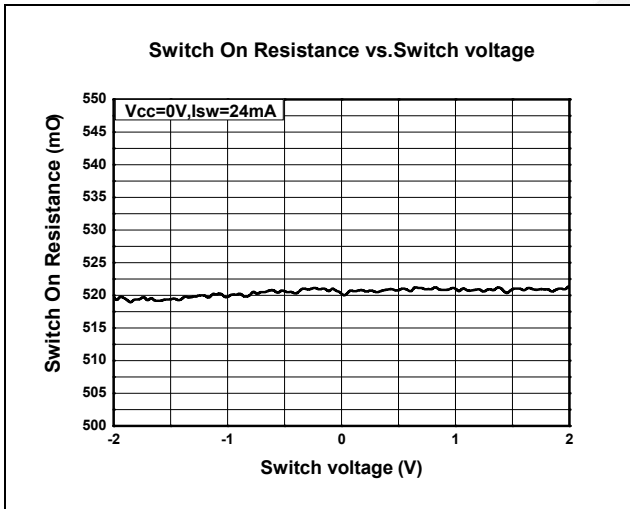
I_{CC} vs. V_{CC}



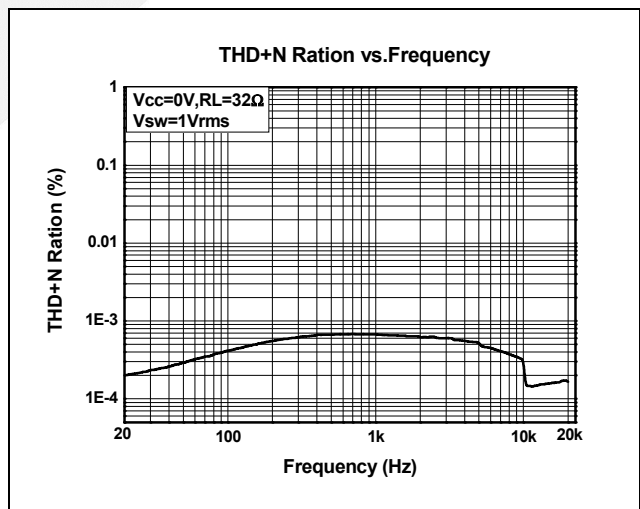
I_{CC} vs. Temperature



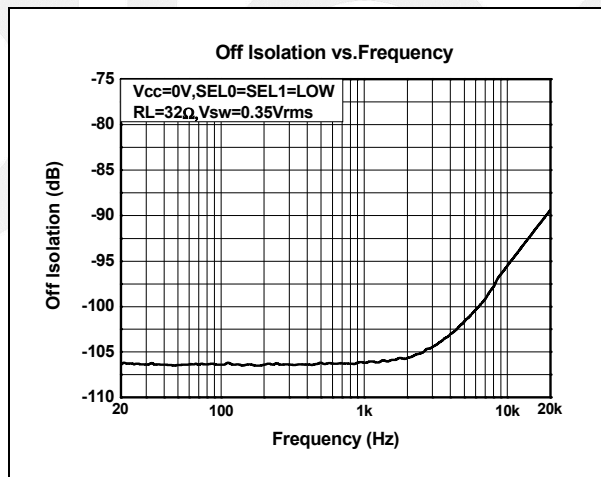
R_{ON} vs. V_{SW}



THD+N vs. Frequency



QIRR vs. Frequency





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