High-Speed, Low r_{ON}, SPDT Analog Switch
(2:1 Multiplexer)

DESCRIPTION

The DG2307 is a single-pole-double-throw switch/2:1 mux designed for 2 to 5.5 V applications. Using Vishay Siliconix proprietary sub-micro CMOS process, the DG2307 achieves low on-resistance, low power consumption. It is 1.6 V TTL logic compatible across the operation voltage range. With its low r_{ON} and low parasitic capacitance character, it is ideal for clock signal and high speed data stream switching. It has low insertion lost and negligible propagation delay.

The DG2307 can handle both analog and digital signals and permits signals to be transmitted in either direction. When Bn pin is at off status, the path will have a high impedance with respect to the output. Break before make is guaranteed.

As a committed partner to the community and the environment, Vishay Siliconix manufactures this product with the lead (Pb)-free device terminations. For analog switching products manufactured with 100 % matte tin device terminations, the lead (Pb)-free "-E3" suffix is being used as a designator.

FEATURES

- Operates From Single 2 ~ 5.5 V
- SC70-6 Package
- 5 Ω Switch Connection Between Ports
- Minimal Propagation Delay
- TTL Compatible Input Level
- RoHS Compliant

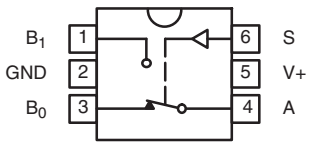
Pb-free
RoHS COMPLIANT

APPLICATIONS

- Cellular Phones
- PDAs
- GPS
- MP3
- Data Acquisition

FUNCTIONAL BLOCK DIAGRAM AND PIN CONFIGURATION

SC-70
6- Pin



Top View

Device Marking: G1

TRUTH TABLE	
Logic Input (S)	**Function**
0	B_0 Connected to A
1	B_1 Connected to A

ORDERING INFORMATION		
Temp Range	**Package**	**Part Number**
- 40 to 85 °C	SC70-6	DG2307DL-T1-E3

ABSOLUTE MAXIMUM RATINGS

Parameter		Limit	Unit
Reference V+ to GND		- 0.3 to + 6	V
S, A, B[a]		- 0.3 to (V+ + 0.3 V)	
Continuous Current (Any terminal)		± 50	mA
Peak Current (Pulsed at 1 ms, 10 % duty cycle)		± 200	
Storage Temperature	(D Suffix)	- 65 to 150	°C
Power Dissipation (Packages)[b]	6-Pin SC70[c]	250	mW

Notes:
a. Signals on A, or B or S exceeding V+ will be clamped by internal diodes. Limit forward diode current to maximum current ratings.
b. All leads welded or soldered to PC Board.
c. Derate 3.1 mW/°C above 70 °C.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions 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.

SPECIFICATIONS

Parameter	Symbol	Test Conditions Otherwise Unless Specified V+ = 3.0 V, V_S = 0.25 V to 0.7 V+[e]		Temp[a]	Limits - 40 to 85 °C Min[b]	Typ[c]	Max[b]	Unit
DC Characteristics								
High Level Input Voltage	V_{SH}	V+ = 2.3 to 5.5 V		Full	0.7 V+			V
Low Level Input Voltage	V_{SL}	V+ = 2.3 to 5.5 V		Full			0.3 V+	
On Resistance	R_{ON}	V+ = 4.5 V	V_{BN} = 0 V, I_A = - 30 mA	Full		4	6	Ω
			V_{BN} = 2.3 V, I_A = - 30 mA	Full		9	12	
		V+ = 3.0 V	V_{BN} = 0 V, I_A = - 24 mA	Full		6	9	
			V_{BN} = 1.5 V, I_A = - 24 mA	Full		13.5	20	
On Resistance Matching Between Channels	ΔR_{ON}	V+ = 4.5 V, V_{BN} = 0 V, I_A = - 30 mA		Room		0.32		
		V+ = 3.0 V, V_{BN} = 0 V, I_A = - 24 mA		Room		0.31		
Input Leakage Current	I_S	V+ = 5.5 V, V_A = 5.5 V		Room Full	- 0.1 - 1.0		0.1 - 1.0	µA
Off Stage Switch Leakage	$I_{BN(off)}$	V+ = 5.5 V, V_A/V_B = 0 V/5.5 V		Room Full	- 0.1 - 1.0		0.1 - 1.0	
On State Switch Leakage	$I_{BN(on)}$	V+ = 5.5 V, V_A/V_B = 0 V/5.5 V		Room Full	- 0.1 - 1.0		0.1 - 1.0	
Power Supply								
Power Supply Range	V+			Full	2		5.5	
Quiescent Supply Current	I+	V+ = 5.5 V, V_A = V_B = V+ or GND		Room Full			1 10	µA

SPECIFICATIONS

Parameter	Symbol	Test Conditions Otherwise Unless Specified V+ = 3.0 V, V_S = 0.25 V to 0.7 V+[e]		Temp[a]	Limits - 40 to 85 °C Min[b]	Typ[c]	Max[b]	Unit
AC Electrical Characteristics								
Prop Delay Time[f]	t_{PHL}/t_{PLH}	V_A = 0 V	V+ = 2.3 to 2.7 V	Full		1.2		ns
			V+ = 3.0 to 3.6 V	Full		0.8		
			V+ = 4.5 to 5.5 V	Full		0.3		
Output Enable Time[f]	t_{PZL}/t_{PZH}	V_{LOAD} = 2 x V+ for t_{PZL} V_{LOAD} = 0 V for t_{PZH}	V+ = 2.3 to 2.7 V	Room Full		5.9 6.2		
			V+ = 3.0 to 3.6 V	Room Full		4.1 4.5		
			V+ = 4.5 to 5.5 V	Room Full		2.6 2.9		
Output Disable Time[f]	t_{PLZ}/t_{PHZ}	V_{LOAD} = 2 x V+ for t_{PLZ} V_{LOAD} = 0 V for t_{PHZ}	V+ = 2.3 to 2.7 V	Room Full		5.9 6.2		
			V+ = 3.0 to 3.6 V	Room Full		4.1 4.5		
			V+ = 4.5 to 5.5 V	Room Full		2.6 2.9		
Break-Before-Make Time[d]	t_{BBM}	V+ = 2.3 to 2.7 V		Full	0.5			
		V+ = 3.0 to 3.65 V		Full	0.5			
		V+ = 4.5 to 5.5 V		Full	0.5			
Charge Injection[d]	Q	C_L = 0.1 nF, V_{GEN} = 0 V R_{GEN} = 0 Ω	V+ = 5 V	Room		7		pC
			V+ = 3.3 V	Room		3		
Analog Switch Characteristics								
Off Isolation[d]	OIRR	V+ = 5 V, R_L = 50 Ω, f = 10 MHz		Room		- 57.6		dB
Crosstalk[d]	X_{TALK}			Room		- 58.7		
- 3 db Bandwidth[d]	BW	R_L = 50 Ω		Room		250		MHz
Capacitance								
Control Pin Capacitance[d]	C_{IN}	V+ = 0 V		Room		4.9		pF
B Port Off Capacitance[d]	C_{IO-B}	V+ = 5 V		Room		6.5		
A Port Capacitance When Switch Enable[d]	$C_{IO-A(on)}$			Room		18.5		

Notes:
a. Room = 25 °C, Full = as determined by the operating suffix.
b. The algebraic convention whereby the most negative value is a minimum and the most positive a maximum, is used in this data sheet.
c. Typical values are for design aid only, not guaranteed nor subject to production testing.
d. Guarantee by design, nor subjected to production test.
e. V_{IN} = input voltage to perform proper function.
f. Guaranteed by design and not production tested. The bus switch propagation delay is a function of the RC time constant contributed by the on-resistance and the specified load capacitance with an ideal voltage source (zero output impedance) driving the switch.

LOGIC DIAGRAM (POSITIVE LOGIC)

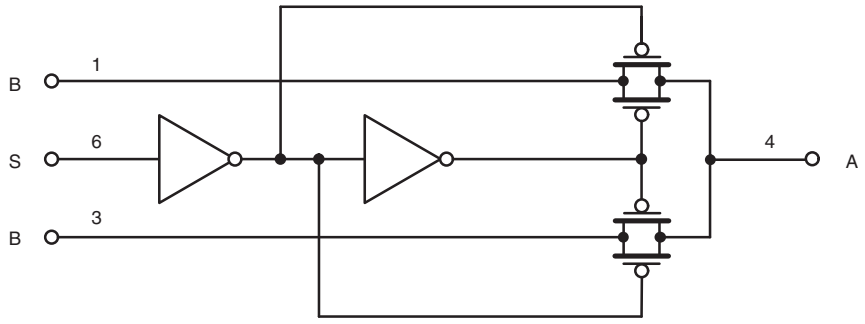
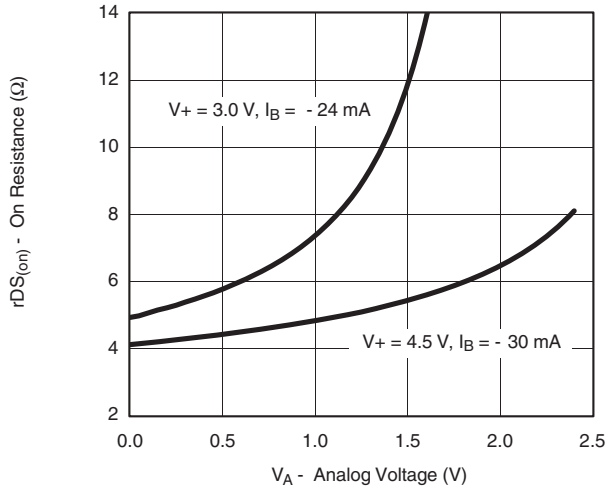
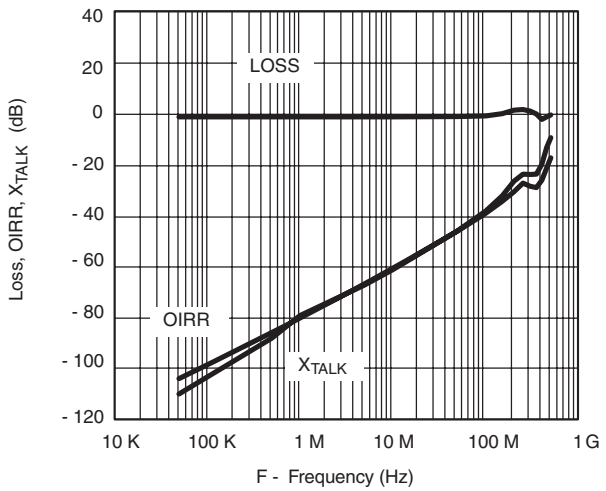


Figure 1.

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

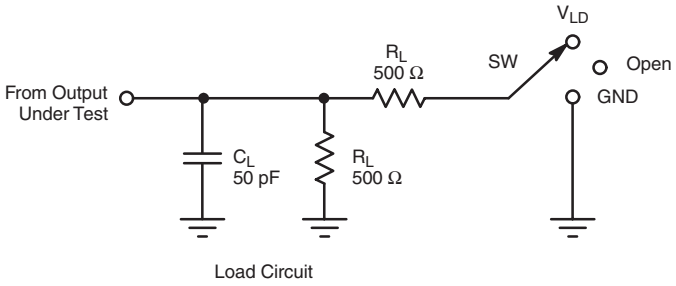


$r_{DS(on)}$ vs. V_A vs. V_{SUPPLY}



Insertion Loss, Off-Isolation, Crosstalk vs. Frequency

AC LOADING AND WAVEFORMS



TEST	SW
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	V_{LD}
t_{PHZ}/t_{PZH}	GND

Figure 2. AC Test Circuit

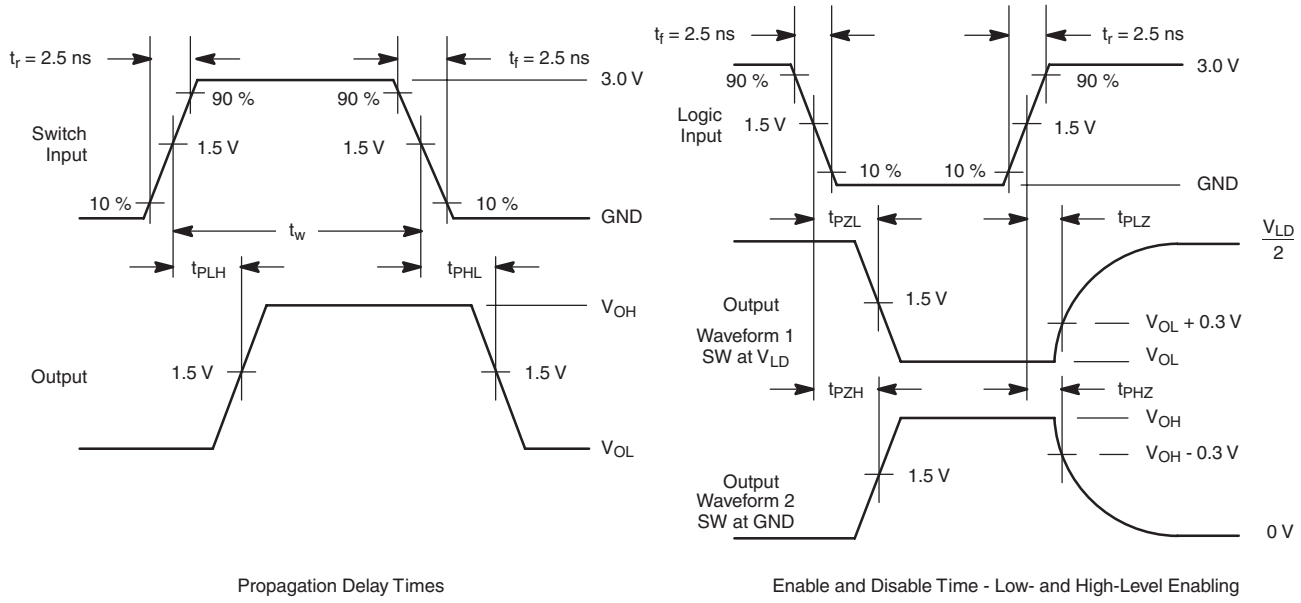
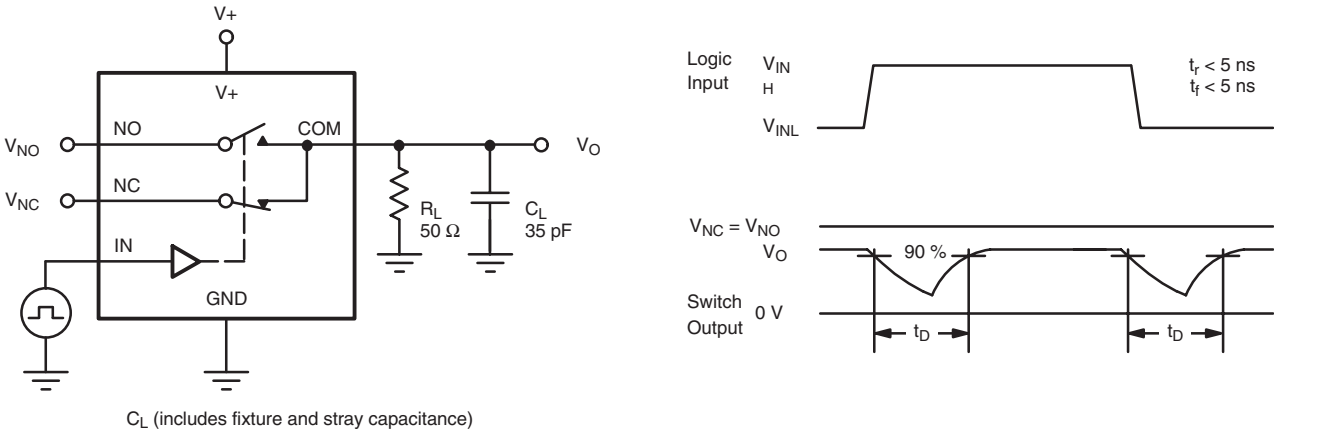


Figure 3. AC Waveforms

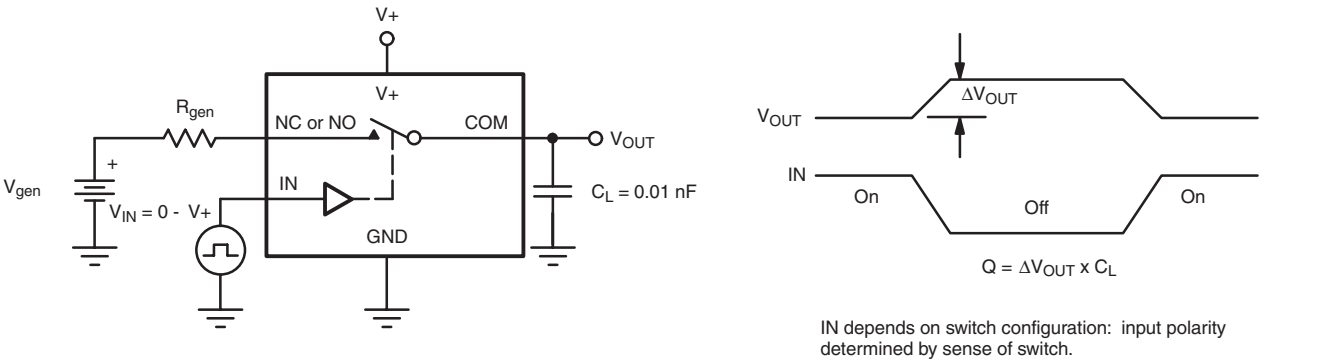
Notes:
a. C_L includes probe and jig capacitance.
b. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control.
c. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
d. All input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z_O = 50 Ω.
e. The outputs are measured one at a time with one transition per measurement.
f. t_{PLZ} and t_{PHZ} are the same as t_{dis}.
g. t_{PZL} and t_{PZH} are the same as t_{dis}.
h. t_{PLH} and t_{PHL} are the same as t_{dis}.
i. V_{LD} = 2 V+.

TEST CIRCUITS



C_L (includes fixture and stray capacitance)

Figure 4. Break-Before-Make Interval



IN depends on switch configuration: input polarity determined by sense of switch.

Figure 5. Charge Injection

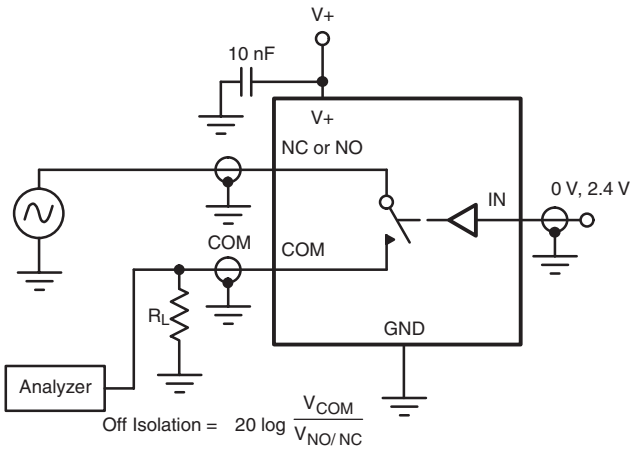


Figure 6. Off-Isolation

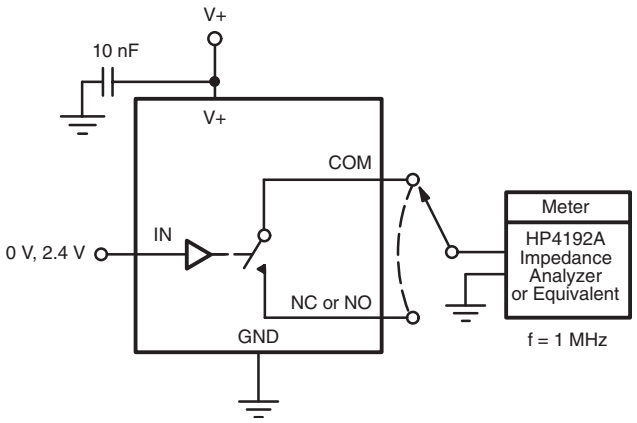


Figure 7. Channel Off/On Capacitance

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