

8-Channel Multiplex Switch with Decode

FEATURES

- Break-Before-Make Switching
- Pull-Up Resistors on Inputs
- Bi-Directional Signal Handling

BENEFITS

- Reduced System Cross-Talk
- Easily Interfaced to TTL

APPLICATIONS

- Multiplexing ± 5 V Analog Signals
- Data Acquisition Systems

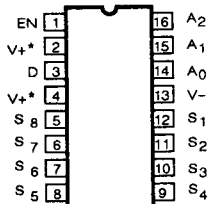
DESCRIPTION

Designed for applications where single-ended, Break-Before-Make switching action is required, the DG501 is an 8-channel analog multiplexer that is capable of handling bi-directional signals up to ± 5 V. In addition, an "OFF" state can be activated by using a chip enable signal. In the OFF state, this device can block up to 10 V peak-to-peak signals. An on-chip decoder accepts a 3 bit binary word

which enables the selection of any one of the eight analog switches to be turned on individually. Pull-up resistors are provided at each logic input to simplify TTL interface. This device is available in either a 16-pin plastic or ceramic DIP and is available in commercial, C suffix (0 to 70°C), industrial, B suffix (-25 to 85°C) and military, A suffix (-55 to 125°C) temperature ranges.

PIN CONFIGURATION

Dual-In-Line Package



Top View

Order Numbers:

Side Braze: DG501AP, DG501BP,

Plastic: DG501CJ

TRUTH TABLE

LOGIC INPUTS				CHANNEL
A ₀	A ₁	A ₂	EN	'ON'
L	L	L	H	S ₁
H	L	L	H	S ₂
L	H	L	H	S ₃
H	H	L	H	S ₄
L	L	H	H	S ₅
H	L	H	H	S ₆
L	H	H	H	S ₇
H	H	H	H	S ₈
X	X	X	L	OFF

Logic Levels*

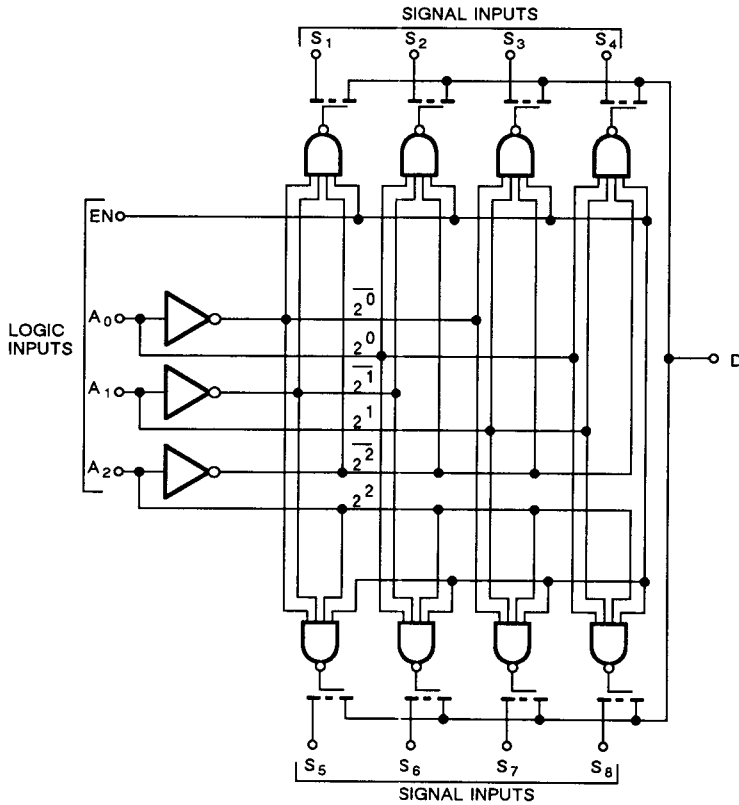
LOW: $V_L = V_{LOW} < 0.6$ V

HIGH: $V_H = V_{HIGH} > 3.5$ V

* Both V+ lines are internally connected, either one or both may be used. V+ common to substrate.

* For supply voltages of 5 V and -20 V

FUNCTION BLOCK DIAGRAM



5

ABSOLUTE MAXIMUM RATINGS

V+ to V-	30 V
V- to V+	-0.3 V
V+ to V _A , V _{EN}	30 V
V _A , V _{EN} to V+	-0.3 V
V+ to V _D or V _S	30 V
V _D V _S to V+	-0.3 V
V _D to V _S	±25 V
V _A , V _{EN} to V-	30 V
V _D or V _S to V-	30 V
Current, (Any Terminal)	-20 mA

Storage Temperature (A & B Suffix)	-65 to 150°C
(C Suffix)	-65 to 125°C
Operating Temperature (A Suffix)	-55 to 125°C
(B Suffix)	-25 to 85°C
(C Suffix)	0 to 70°C

Power Dissipation*	
16-Pin Ceramic DIP**	900 mW
16-Pin Plastic DIP***	470 mW

- * Device mounted with all leads welded or soldered to PC board.
- ** Derate 12 mW/°C above 75°C.
- *** Derate 6.5 mW/°C above 25°C.

ELECTRICAL CHARACTERISTICS ^a										
PARAMETER	SYMBOL	Test Conditions Unless Otherwise Specified: V ₊ = 5 V, V ₋ = -20 V V _{EN} = 3.5 V V _{AL} = 0.6 V V _{AH} = 3.5 V	LIMITS						UNIT	
			1=25°C 2=125,85,70°C 3=-55,-25,0°C		A SUFFIX		B, C SUFFIX			
			TEMP	TYP ^d	MIN ^b	MAX ^b	MIN ^b	MAX ^b		
SWITCH										
Analog Signal Range ^c	V _{ANALOG}		1,2,3		-5	5	-5	5	V	
Drain-Source ON Resistance	r _{DS(ON)}	I _S = -10C μA V ₋ = -15 V	V _D = 5 V	1,3 2	75		200 300		200 300	Ω
			V _D = 0 V	1,3 2	97		250 375		250 350	
			V _D = -5 V	1,3 2	140		600 900		800 900	
		I _S = -1 mA V ₋ = -20 V	V _D = 5 V	1,3 2	65		150 225		150 200	
			V _D = 0 V	1,3 2	80		200 300		200 300	
			V _D = -5 V	1,3 2	100		250 375		250 350	
Source OFF Leakage Current	I _{S(OFF)}	V _S = -5 V, V _D = 5 V V _{EN} = 0.6 V	1 2	-0.005	-1 -1000		-3 -150		nA	
Drain OFF Leakage Current	I _{D(OFF)}	V _D = -5 V, V _S = 5 V V _{EN} = 0.6 V	1 2	-0.07	-8 -4000		-10 -500			
Channel ON Leakage Current	I _{D(ON)} + I _{S(ON)}	V _D = V _S = 5 V	1 2	0.1		8 4000		10 500		
INPUT										
Logic Input Current Input Voltage LOW	I _{INL}	V _{AL} = 0	1	0.8	-1.2		-1.2		mA	
Logic Input Current Input Voltage HIGH	I _{INH}	V _{AH} = 3.5 V	1			-150		-150	μA	
DYNAMIC										
Switching Time	t _{TRANS}	See Switching Time Test Circuit V _{S1} = ±1 V V _{S8} = ±1 V V _{S2} thru V _{S7} = 0 V	V ₋ = -20 V	1			1.5		2	μs
			V ₋ = -15 V	1			2.5		3	
Break-Before-Make Interval	t _{OPEN}	See Switching Time Test Circuit V _{S(AII)} = 1 V		1	0.05					
Turn-ON Time	t _{ON}			1	1.2					
Turn-OFF Time	t _{OFF}			1	0.8					

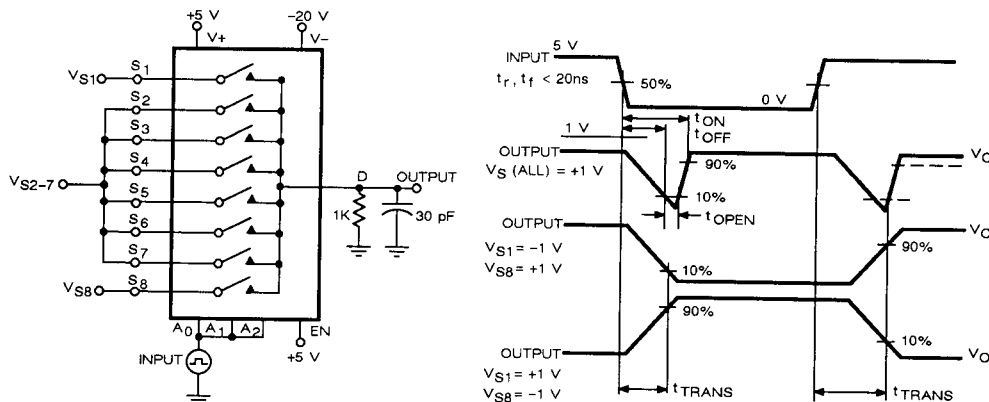
ELECTRICAL CHARACTERISTICS ^a									
PARAMETER	SYMBOL	Test Conditions Unless Otherwise Specified: $V_+ = 5\text{ V}$, $V_- = -20\text{ V}$ $V_{EN} = 3.5\text{ V}$ $V_{AL} = 0.6\text{ V}$ $V_{AH} = 3.5\text{ V}$	LIMITS						UNIT
			1=25°C 2=125,85,70°C 3=-55,-25,0°C		A SUFFIX -55 to 125°C		B, C SUFFIX		
			TEMP	TYP ^d	MIN ^b	MAX ^b	MIN ^b	MAX ^b	
DYNAMIC (Cont'd)									
Turn-ON Time	t_{ON}	See Switching Time Test Circuit $V_{S(ALL)} = 1\text{ V}$ $V_- = -15\text{ V}$	1	2					μs
Turn-OFF Time	t_{OFF}		1	0.8					
Source-OFF Capacitance	$C_{S(OFF)}$	$V_S = V_D = 5\text{ V}$ $V_{EN} = 0.6\text{ V}$ $f = 1\text{ MHz}$	1	10					pF
Drain-OFF Capacitance	$C_{D(OFF)}$		1	20					
SUPPLY									
Drain Supply Current	I-	$V_{EN} = 0\text{ V}$ $V_{AL(A,II)} = 0\text{ V}$	1	-2.6	-6		-6		mA
Source Supply Current	I+		1	5.6		8		8	
Drain Supply Current	I-	$V_{EN} = 3.5\text{ V}$ $V_{AL(A,II)} = 0\text{ V}$	1	-2.4	-6		-6		
Source Supply Current	I+		1	4.9		7		7	

5

NOTES:

- a. Refer to PROCESS OPTION FLOWCHART for additional information.
- 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. Guaranteed by design, not subject to production test.
- d. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.

SWITCHING TIME TEST CIRCUIT



APPLICATION HINTS*

V+ Positive Supply Voltage (V)	V- Negative Supply Voltage (V)	V _{EN} Enable Input Voltage Min High/ Max Low (V)	V _{IN} Logic Input Voltage V _{INH} Min/ V _{INL} Max (V)	V _S or V _D Analog Voltage Range (V)
5**	-20	3.5/0.6	3.5/0.6	-5 to 5
5	-15	3.5/0.6	3.5/0.6	-5 to 5

* Application Hints are for DESIGN AID ONLY, and not guaranteed and not subject to production testing.

**Electrical parameters chart based on V+ = 5 V, V- = -20 V.