

DG125

5-Channel SPST PMOS Analog Switch

FEATURES

- Internal Zener Diode Protection
- Low Standby Power Requirements ($P_{STDBY} < 0.5 \text{ mW}$)
- Low OFF Leakage
- Low Level Logic Control

BENEFITS

- Reduces Switching Errors
- Reduces External Components

APPLICATIONS

- Communication Systems
- Portable and Battery Operation
- Op Amp Switching
- Variable Gain Switching

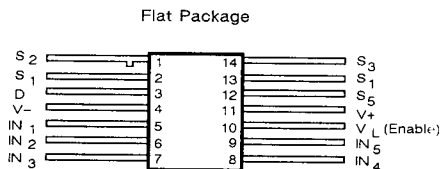
DESCRIPTION

The DG125 is a 5-channel single-pole, single-throw analog switch designed for low level logic controlled analog switching in instrumentation, process control, and communications systems. Featuring make-before-break action, the DG125, built on Siliconix's PMOS process, can be used in closed loop systems to select one or more of five inputs for multiplexing/demultiplexing, summing of analog signals, or for gain bandwidth control (by switching passive elements), without opening the loop.

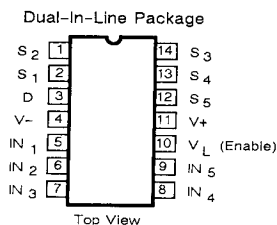
In standby or OFF state, power consumption is less than 0.5 mW. The DG125 is a bi-directional MOS switch, rated to handle $\pm 10 \text{ V}$ analog signals at up to 30 mA continuous current. Each switch will block 20 V peak-to-peak signals when OFF.

Packaging for the DG125 includes 14-pin side brake and flatpack options. Performance grades include both the military, A suffix (-55 to 125°C) and industrial, B suffix (-25 to 85°C) temperature ranges. The flatpack option is only available in the military grade.

PIN CONFIGURATION

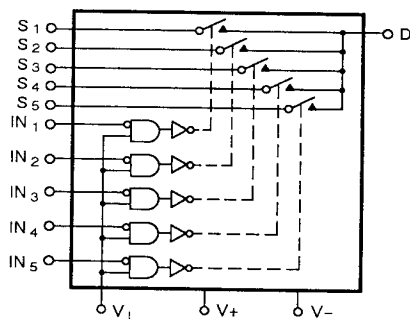


Top View
Order Number: DG125AL/883



Top View
Order Numbers: DG125AP or DG125BP

FUNCTIONAL BLOCK DIAGRAM



One 5-Channel Switch per Package*

Truth Table

LOGIC	SWITCH
0	ON
1	OFF

Logic "0" $< 0.5 \text{ V}$
Logic "1" $\geq 4.1 \text{ V}$

*Switches Shown for Logic "1" Input

Not Recommended for New Designs

ABSOLUTE MAXIMUM RATINGS

V_+ to V_-	36 V	Current, (Any Terminal)	30 mA
V_D to V_-	36 V	Storage Temperature	-65 to 150°C
V_S to V_-	36 V	Operating Temperature (A Suffix)	-55 to 125°C
V_D to V_S	25 V	(B Suffix)	-25 to 85°C
V_S to V_D	25 V	Power Dissipation (Package)*	
V_L to V_-	30 V	Flat Package**	750 mW
V_{IN} to V_-	30 V	14-Pin DIP***	825 mW
V_L to V_{IN}	6 V		

* All leads soldered or welded to PC board.

** Derate 10 mW/°C above 75°C.

*** Derate 11mW/°C above 75°C.

ELECTRICAL CHARACTERISTICS ^a											
PARAMETER	SYMBOL	Test Conditions Unless Otherwise Specified: V ₊ = 10 V V ₋ = -20 V V _L = 4.5 V		LIMITS						UNIT	
				1=25°C 2=125,85°C 3=-55,-25°C		A SUFFIX -55 to 125°C		B SUFFIX -25 to 85°C			
				TEMP	TYP ^d	MIN ^b	MAX ^b	MIN ^b	MAX ^b		
SWITCH											
Analog Signal Range ^c	V _{ANALOG}			1,2,3		-10	10	-10	10	V	
Drain-Source ON Resistance	r _{DS(ON)}	I _S = -1 mA V _{IN} = 0.5 V	V _D = 10 V	1,3 2	70		100 125		125 150	Ω	
			V _D = 0 V	1,3 2	100		200 250		225 300		
			V _D = -10 V	1,3 2	270		450 600		500 600		
Source OFF Leakage Current	I _{S(OFF)}	V _S = -10 V, V _D = 10 V V _{IN} = 4.1 V	1 2	-0.02	-1 -1000		-5 -100		nA		
Drain OFF Leakage Current	I _{D(OFF)}	V _D = -10 V, V _S = 10 V V _{IN} = 4.1 V	1 2	-0.7	-1 -4000		-10 -300				
Channel ON Leakage Current	I _{D(ON)} + I _{S(ON)}	V _D = 10 V, V _{IN} = 0.5 V I _S = 0	1 2	-0.003		4 4000		10 300			
INPUT											
Input Current with Input Voltage HIGH	I _{INH}	V _{IN} = 4.1 V	1,3 2	0.006	-1 -10	1 10	-10 -10	10 10	μA		
Input Current with Input Voltage LOW	I _{INL}	V _{IN} = 0.5 V	1,3 2	-0.5	-0.7 -0.7		-1 -1		mA		
DYNAMIC											
Turn-ON Time	t _{ON}	See Switching Time Test Circuit	1	0.1		0.3		0.5	μs		
Turn-OFF Time	t _{OFF}		1	0.65		2		2			

ELECTRICAL CHARACTERISTICS^a

PARAMETER	SYMBOL	Test Conditions Unless Otherwise Specified: V ₊ = 10 V V ₋ = -20 V V _L = 4.5 V			LIMITS				UNIT
			1=25°C		A		B		
			2=125, 85°C		SUFFIX		SUFFIX		
			3=-55, -25°C		-55 to 125°C		-25 to 85°C		
			TEMP	TYP ^d	MIN ^b	MAX ^b	MIN ^b	MAX ^b	

DYNAMIC (Cont'd)

Source-OFF Capacitance	$C_{S(OFF)}$	$V_S = 0\text{ V}, I_D = 0$ $f = 1\text{ MHz}$	1	3					pF
Drain-OFF Capacitance	$C_{D(OFF)}$	$V_D = 0\text{ V}, I_S = 0$ $f = 1\text{ MHz}$	1	7					
Off Isolation		$R_L = 100\ \Omega, C_L = 3\text{ pF}$ $f = 5\text{ MHz}$	1	> 50					dB

SUPPLY

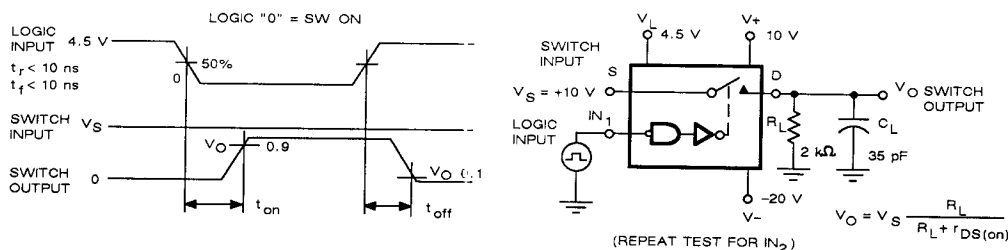
Positive Supply Current	I_+	One Channel ON $V_{IN1} = 0.5\text{ V}$	1	1.4		3		3	mA
Negative Supply Current	I_-		1	-2.4	-6		-6		
Logic Supply Current	I_L		1	1.15		3		3	
Positive Supply Current	I_+	All Channels OFF $V_{IN} = 4.1\text{ V}$	1	0.1		15		25	μA
Negative Supply Current	I_-		1	-0.02	-20		-40		
Logic Supply Current	I_L		1	0.04		20		20	

NOTES:

- Refer to PROCESS OPTION FLOWCHART for additional information.
- The algebraic convention whereby the most negative value is a minimum and the most positive a maximum, is used in this data sheet.
- Guaranteed by design, not subject to production test.
- Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.

SWITCHING TIME TEST CIRCUIT

Switch output waveform shown for $V_S = \text{constant}$ with logic input waveform as shown. Note that V_S may be + or - as per switching time test circuit. V_O is the steady state output with switch ON. Feedthrough via gate capacitance may result in spikes at leading and trailing edge of output waveform.



Not Recommended for New Designs

APPLICATION HINTS

V ₊ Positive Supply Voltage (V)	V ₋ Negative Supply Voltage (V)	V _L Logic Supply Voltage (V)	V _{IN} Logic Input Voltage V _{INH} Min/ V _{INL} Max (V)	V _S or V _D Analog Voltage Range (V)
10	-20	4.5	4.1/0.5	-10 to 10
15	-15	4.5	4.1/0.5	-5 to 15
20	-10	4.5	4.1/0.5	0 to 20