

High-Speed Analog N-Channel DMOS FETs Improved On-Resistance



SD310 / SD312 / SD314

FEATURES

- High Input to Output Isolation 120dB
- Low On Resistance 15 Ohms @ 15V
- Low Feedthrough and Feedback Transients
- Low Capacitance:
 - Input (Gate) 2.4pF typ.
 - Output 1.3pF typ.
 - Feedback 0.3pF typ.
- No Protection Diode from Gate to Substrate for very high impedance applications
- Maximum Gate Voltage $\pm 40V$

APPLICATIONS

SD310:

- Analog Switch Driver

SD312 and SD314:

- Analog Switches
- High-Speed Digital Switches
- Multiplexers
- A to D Converters
- D to A Converters
- Choppers
- Sample & Hold

DESCRIPTION

The Calogic SD310 is a 30V analog switch driver without a built-in protection diode from gate to substrate for use with SD312 and SD314 DMOS analog switches.

The SD312 is a high performance, high-speed, high-voltage, and low resistance analog switch capable of switching $\pm 5V$ signals. The maximum threshold of 2V permits simple direct TTL or CMOS driving for small applications.

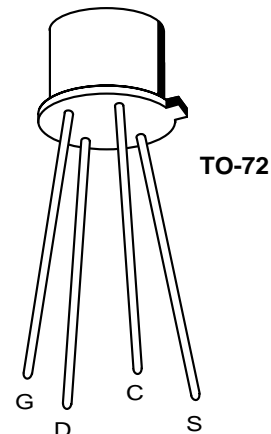
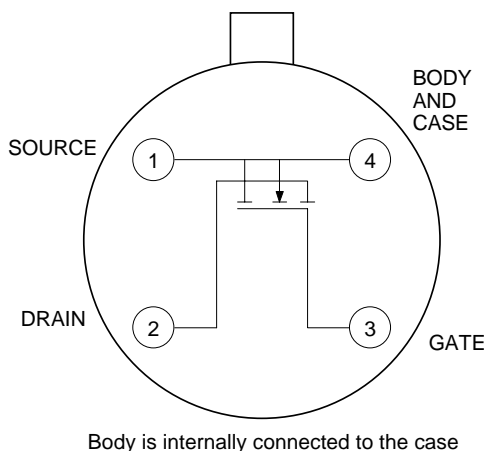
The SD314 is DMOS analog switch capable of switching $\pm 10V$ analog signals with all other parameters identical to those of SD312.

All three devices are manufactured with an implanted high-speed, high-voltage, and low resistance double-diffused MOS (DMOS) process. SD310, SD312 and SD314 devices also have no built-in protection diode to enhance performance in high impedance circuits. The devices are available in 4-lead hermetic TO-72 package and in die form for hybrid applications. Custom devices based on SD310, SD312 and SD314 can also be ordered.

ORDERING INFORMATION

Part	Package	Temperature Range
SD310DE	Hermetic TO-72 Package	-55°C to +125°C
SD312DE	Hermetic TO-72 Package	-55°C to +125°C
SD314DE	Hermetic TO-72 Package	-55°C to +125°C
XSD310	Sorted Chips in Carriers	-55°C to +125°C
XSD312	Sorted Chips in Carriers	-55°C to +125°C
XSD314	Sorted Chips in Carriers	-55°C to +125°C

SCHEMATIC DIAGRAM (Top View)





ABSOLUTE MAXIMUM RATINGS

Drain Current 50mA
 Total Device Dissipation at 25°C Case Temperature . . . 1.2W
 Storage Temperature Range -65° to +200°C
 Lead Temperature (1/16" from case for 10 sec.) 300°C
 Operating Temperature Range -55°C to +125°C

PARAMETER		SD310	SD312	SD314	UNIT
V _{DS}	Drain-to-source	+30	+10	+20	V _{dc}
V _{SD}	Source-to-drain*	+10	+10	+20	V _{dc}
V _{DB}	Drain-to-body	+30	+15	+25	V _{dc}
V _{SB}	Source-to-body	+15	+15	+25	V _{dc}
V _{GS}	Gate-to-source	±40	±40	±40	V _{dc}
V _{GB}	Gate-to-body	±40	±40	±40	V _{dc}
V _{GD}	Gate-to-drain	±40	±40	±40	V _{dc}

DC ELECTRICAL CHARACTERISTICS (T_A = 25°C, unless other specified.)

SYMBOL	PARAMETER	SD310			SD312			SD314			UNITS	TEST CONDITIONS	
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX			
BREAKDOWN VOLTAGE													
BV _{DS}	Drain-to-source	30	35								V	V _{GS} = V _{BS} = 0V, I _D = 10μA	
		10	25		10	25		20	25			V _{GS} = V _{BS} = -5V, I _S = 10nA	
BV _{SD}	Source-to drain	10			10			20				V _{GD} = V _{BD} = -5V, I _D = 10nA	
BV _{DB}	Drain-to-body	15			15			25				V _{GB} = 0V, source OPEN, I _D = 10nA	
BV _{SB}	Source-to-body	15			15			25				V _{GB} = 0V, drain OPEN, I _S = 10μA	
LEAKAGE CURRENT													
I _{DS} (OFF)	Drain-to-source		1	10		1	10			1	10	nA	V _{GS} = V _{BS} = -5V, V _{DS} = +10V
													V _{GS} = V _{BS} = -5V, V _{DS} = +20V
I _{SD} (OFF)	Source-to-drain		1	10		1	10						V _{GS} = V _{BD} = -5V, V _{SD} = +10V
									1	10			V _{GS} = V _{BD} = -5V, V _{SD} = +20V
I _{GBS}	Gate			0.1			0.1				0.1		V _{DB} = V _{SB} = 0V, V _{GS} = ±40V
V _T	Threshold voltage	0.5	1.0	2.0	0.5	1.0	2.0	0.5	1.0	2.0	V		V _{DS} = V _{GS} = V _T , I _S = 1μA, V _{SB} = 0V
r _{DS} (ON)	Drain-to-source resistance		30	50		30	50		30	50	Ω		I _D = 1.0mA, V _{SB} = 0, V _{GS} = +5V
			20	35		20	35		20	35			I _D = 1.0mA, V _{SB} = 0, V _{GS} = +10V
			15	25		15			15				I _D = 1.0mA, V _{SB} = 0, V _{GS} = +15V

AC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	SD310			SD312			SD314			UNITS	TEST CONDITIONS
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX		
g _{fs}	Forward transconductance	15	20		15	20		15	20		mmhos	V _{DS} = 10V, V _{SB} = 0V, I _D = 20mA, f = 1kHz
SMALL SIGNAL CAPACITANCES (See capacitance model)												
C _(GS+GD+GB)	Gate node		2.4	3.7		2.4	3.7		2.4	3.7	pF	V _{DS} = 10V, f = 1MHz V _{GS} = V _{BS} = -15V
C _(GD+DB)	Drain node		1.3	1.7		1.3	1.7		1.3	1.7		
C _(GS+SB)	Source node		3.5	4.5		3.5	4.5		3.5	4.5		
C _{DG}	Reverse transfer		0.3	0.7		0.3	0.7		0.3	0.7		

Package Dimensions TO-72

