

SD210 / SD212 / SD214

FEATURES

- High Input to Output Isolation 120dB
- Low On Resistance 30 Ohm
- Low Feedthrough and Feedback Transients
- Low Capacitances:
 - 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

SD210:

- Analog Switch Driver

SD212 and SD214:

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

DESCRIPTION

The Calogic SD210 is a 30V analog switch driver without a built-in protection diode from gate to substrate for use with SD212 and SD214 DMOS analog switches.

The SD212 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 signal applications.

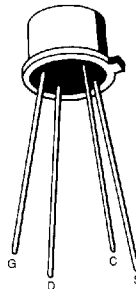
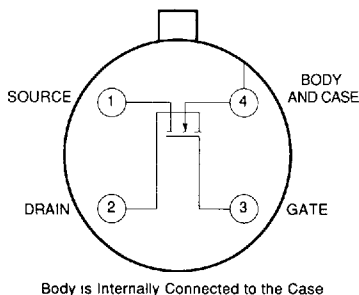
The SD214 DMOS analog switch is capable of switching $\pm 10V$ analog signals with all other parameters identical to those of SD212.

All three devices are manufactured with an implanted high-speed, high-voltage, and low resistance double-diffused MOS (DMOS) process. SD210, SD212 and SD214 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 SD210, SD212 and SD214 can also be ordered.

ORDERING INFORMATION

Part	Package	Temperature Range
SD210DE	Hermetic TO-72 Package	-55°C to +125°C
XSD210	Sorted Chips in Carriers	-55°C to +125°C
SD212DE	Hermetic TO-72 Package	-55°C to +125°C
XSD212	Sorted Chips in Carriers	-55°C to +125°C
SD214DE	Hermetic TO-72 Package	-55°C to +125°C
XSD214	Sorted Chips in Carriers	-55°C to +125°C

Schematic Diagram (Top View)



CD1-2



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	SD210	SD212	SD214	UNIT
V _{DS} Drain-to-source	+30	+10	+20	Vdc
V _{SD} Source-to-drain*	+10	+10	+20	Vdc
V _{DB} Drain-to-body	+30	+15	+25	Vdc
V _{SB} Source-to-body	+15	+15	+25	Vdc
V _{GS} Gate-to-source	±40	±40	±40	Vdc
V _{GB} Gate-to-body	±40	±40	±40	Vdc
V _{GD} Gate-to-drain	±40	±40	±40	Vdc

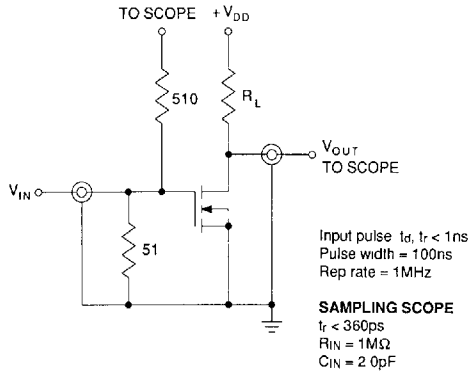
DC ELECTRICAL CHARACTERISTICS (T_A = 25°C, unless otherwise specified.)

PARAMETER	TEST CONDITIONS	SD210		SD212		SD214		UNIT
		MIN.	TYP. MAX.	MIN.	TYP. MAX.	MIN.	TYP. MAX.	
Breakdown voltage BV _{DS} Drain-to-source	V _{GS} = V _{BS} = 0V, I _D = 10μA	30	35					V
	V _{GS} = V _{BS} = -5V, I _S = 10nA	10	25	10	25	20	25	V
BV _{SD} Source-to-drain	V _{GD} = V _{BD} = -5V, I _D = 10nA	10		10		20		V
BV _{DB} Drain-to body	V _{GB} = 0V, source OPEN, I _D = 10nA	15		15		25		V
BV _{SB} Source-to body	V _{GB} = 0V, drain OPEN, I _S = 10μA	15		15		25		V
Leakage current								
I _{DS} (OFF) Drain-to-source	V _{GS} = V _{BS} = -5V V _{DS} = +10V V _{DS} = +20V	1	10	1	10	1	10	nA
								nA
I _{SD} (OFF) Source-to-drain	V _{GS} = V _{BD} = -5V V _{SD} = +10V V _{SD} = +20V	1	10	1	10	1	10	nA
								nA
I _{GBS} Gate	V _{DB} = V _{SB} = 0V, V _{GS} = ±40V		0.1		0.1		0.1	nA
V _T Threshold voltage	V _{DS} = V _{GS} = V _T , I _S = 1μA, V _{SB} = 0V	0.5	1.0	2.0	0.1	1.0	2.0	V
r _{DS} (ON) Drain-to-source resistance	I _D = 1.0mA, V _{SB} = 0 V _{GS} = +5V V _{GS} = +10V V _{GS} = +15V V _{GS} = +20V V _{GS} = +25V	50	70	50	70	50	70	Ω
		30	45	30	45	30	45	Ω
		23		23		23		Ω
		19		19		19		Ω
		19		19		19		Ω
		17		17		17		Ω

AC ELECTRICAL CHARACTERISTICS

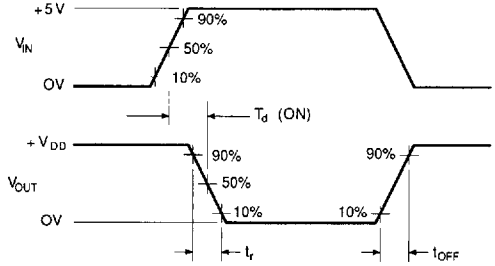
PARAMETER	TEST CONDITIONS	SD210		SD212		SD214		UNIT
		MIN.	TYP. MAX.	MIN.	TYP. MAX.	MIN.	TYP. MAX.	
g _{fs} Forward transconductance	V _{DS} = 10V, V _{SB} = 0V, I _D = 20mA, f = 1kHz	10	15	10	15	10	15	mS
Small Signal Capacitances (See capacitance model) V _{DS} = 10V, f = 1MHz V _{GS} = V _{BS} = -15V								
C _(GS+GD+GB) Gate Node		2.4	3.5	2.4	3.5	2.4	3.5	pF
C _(GD+DB) Drain node		1.3	1.5	1.3	1.5	1.3	1.5	pF
C _(GS+SB) Source node		3.5	5.5	3.5	5.5	3.5	5.5	pF
C _{DG} Reverse transfer		0.3	0.5	0.3	0.5	0.3	0.5	pF

Test Conditions



Switching

Typical Waveforms

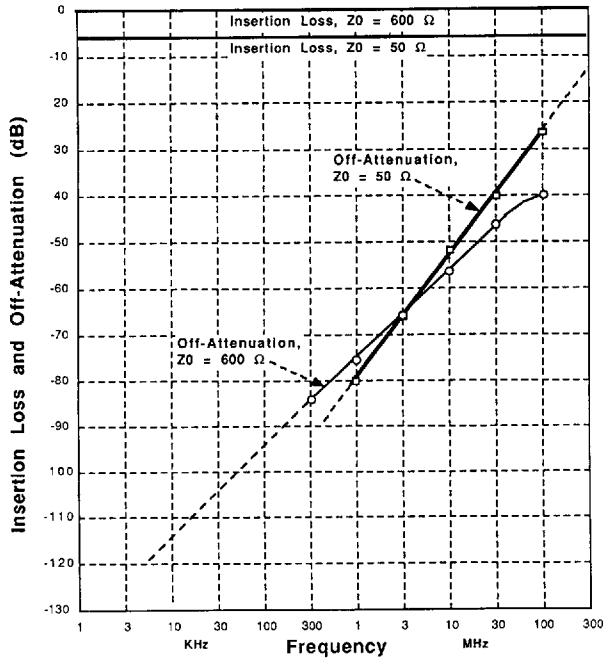


SWITCHING CHARACTERISTICS

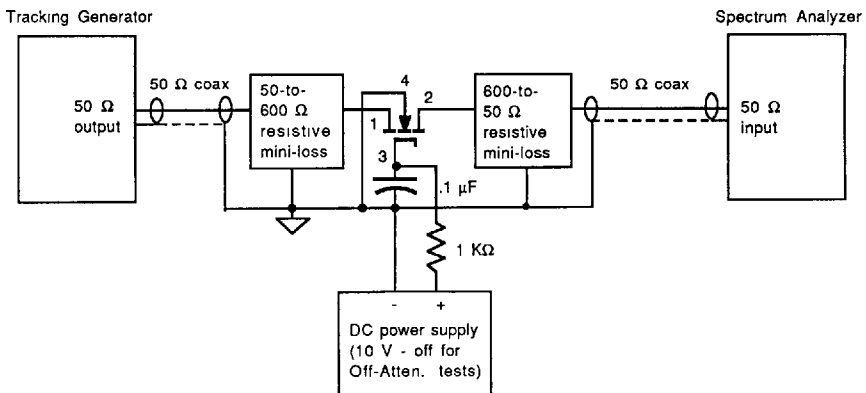
V _{DD}		t _d (ON) (ns)		t _r (ns)		t _{OFF} (ns)*		UNITS
		TYP.	MAX.	TYP.	MAX.	TY.	MAX.	
5	680	0.6	1.0	0.7	1.0	9.0		nsec
10	680	0.7		0.8		9.0		nsec
15	1k	0.9		1.0		14.0		nsec

*t_{OFF} is dependent on R_L and C_L and does not depend on the device characteristics

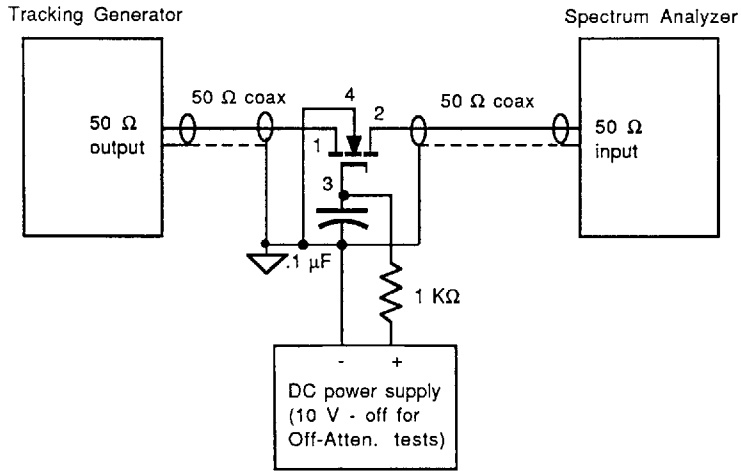
Insertion Loss and Off-Attenuation vs. Frequency



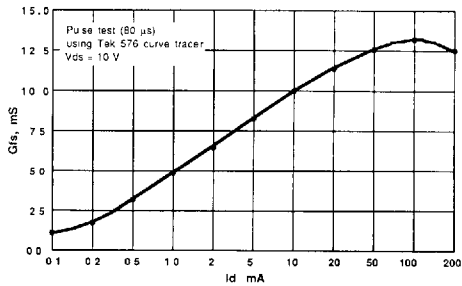
600Ω Insertion Loss and Off-Attenuation Fixture Schematic (un-shielded leads near device under test are extremely short)



50Ω Insertion Loss and Off-Attenuation Fixture Schematic (un-shielded leads near device under test are extremely short)



Forward Transconductance vs. Drain Current



Drain-Source DC On-Resistance vs. Gate-to-Source Voltage

