

CALMOS

SD5000N

TECHNOLOGY

HIGH-SPEED LDMOS QUAD FET ANALOG SWITCH ARRAY

Features

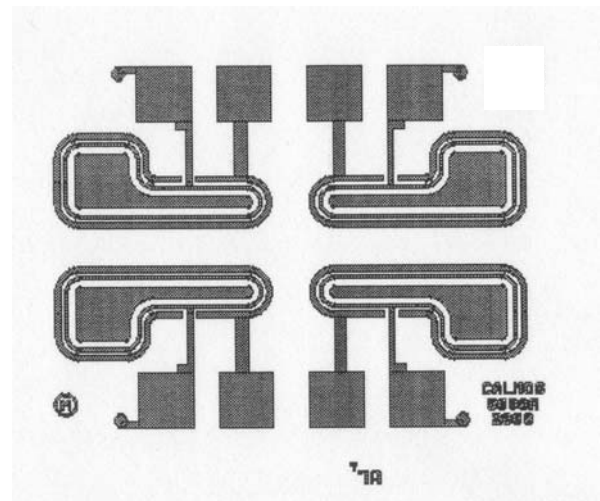
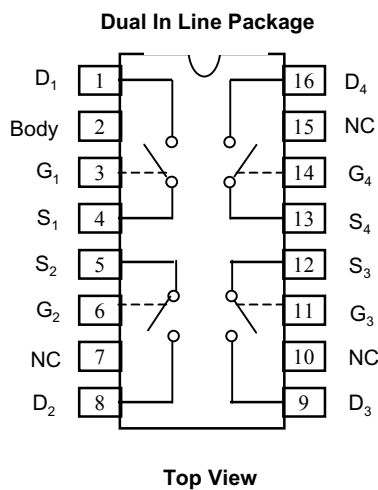
- Low Propagation Time – 600psec
- Low On Resistance
- Low Insertion Loss
- Low Crosstalk – -107dB typical @ 3kHz
- Bidirectional Operation
- Low Capacitances:
 - Analog Input – 3.5pF typ.
 - Input (Gate) – 2.4pF typ.
 - Output – 1.3pF typ.
 - Feedback – 0.3pF typ.

Applications

- Analog Switching
- Audio Routing
- Sample and Hold
- Crosspoint Switches
- Choppers
- Video Switching

Description

The SD5000 series consists of enhancement-mode MOSFETs designed for high speed low-glitch switching in audio, video, and high-frequency applications. The SD5000 is optimized as an Analog Switch with a 25V Source to Body breakdown and low Drain Leakage. The SD5000 series uses CALMOS TECHNOLOGIES ULTRA REL DMOS Process for reliability and robust performance. These MOSFETs utilize lateral construction to achieve low capacitance and ultra-fast switching speeds. An integrated Zener diode provides ESD protection. The devices are available in 16-pin plastic DIP package and in die form for hybrid applications.



ORDERING INFORMATION

Part	Package	Temp Range
SD5000N	Plastic DIP Package	0 to 85°C
SD5000CP	Sorted Chips in Carriers	0 to 85°C
SD5000W	Die in Wafer Form	0 to 85°C

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ABSOLUTE MAXIMUM RATINGS

($T_A = 25\text{ °C}$ unless otherwise noted)

Stresses in excess of the maximum ratings can cause permanent damage to the device.

Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the document. Exposure to maximum ratings for extended periods of time can adversely affect reliability.

Gate-Source Voltage	30/-25V	Operating Junction Temp.	-55 to +85 °C
Gate-Substrate Voltage	30/-0.3V	Storage Temperature	-55 to +150 °C
Gate-Drain Voltage	30/-25V	Continuous Drain Current	50mA
Package - Power Dissipation	640mW (linear derating factor – 10.7mW/ °C above 25 °C)		
Each Device - Power Dissipation	300mW (linear derating factor – 5.0mW/ °C above 25 °C)		

ELECTRICAL CHARACTERISTICS ($T_A = 25\text{ °C}$ unless otherwise noted)

Parameter	Symbol	Test Conditions	SD5000			Units	
			Min	Typ	Max		
Analog Signal Range	V_{analog}		-10		+10	V	
Drain-Source Breakdown Voltage	BV_{DS}	$I_D = 10\text{ nA}$ $V_{\text{GS}} = V_{\text{BS}} = -5\text{ V}$	20	25		V	
Source-Drain Breakdown Voltage	BV_{SD}	$I_S = 10\text{ nA}$ $V_{\text{GD}} = V_{\text{BD}} = -5\text{ V}$	20			V	
Drain-Substrate Breakdown Voltage	BV_{DB}	$I_D = 10\text{ nA}$, $V_{\text{GB}} = 0$ Source Open	25			V	
Source-Substrate Breakdown Voltage	BV_{SB}	$I_D = 10\text{ }\mu\text{A}$, $V_{\text{GB}} = 0$ Drain Open	25			V	
Drain-Source Leakage	$I_{\text{D(off)}}$	$V_{\text{GS/BS}} = -5$	$V_{\text{DS}} = 20\text{ V}$	1.0	10	nA	
			$V_{\text{DS}} = 10\text{ V}$			nA	
Source- Drain Leakage	$I_{\text{S(off)}}$	$V_{\text{GD/BD}} = -5$	$V_{\text{SD}} = 20\text{ V}$	1.0	10	nA	
			$V_{\text{SD}} = 10\text{ V}$			nA	
Gate Leakage	I_{GBS}	$V_{\text{DB/SB}} = 0$	$V_{\text{GB}} = 30\text{ V}$		1.0	μA	
			$V_{\text{GB}} = 25\text{ V}$			μA	
Gate Threshold Voltage	$V_{\text{GS(th)}}$	$V_{\text{DS}} = V_{\text{GS}}$, $I_D = 1\text{ }\mu\text{A}$, $V_{\text{SB}} = 0$	0.1	1.0	2.0	V	
Drain-Source ON Resistance	$r_{\text{S(on)}}$	$I_D = 1\text{ mA}$ $V_{\text{SB}} = 0\text{ V}$	$V_{\text{GS}} = 5\text{ V}$		50	70	Ω
			$V_{\text{GS}} = 10\text{ V}$		30		Ω
			$V_{\text{GS}} = 15\text{ V}$		23		Ω
			$V_{\text{GS}} = 20\text{ V}$		19		Ω
Match ON Resistance	$r_{\text{S(on)}}$	$V_{\text{GS}} = 5\text{ V}$		1	5	Ω	

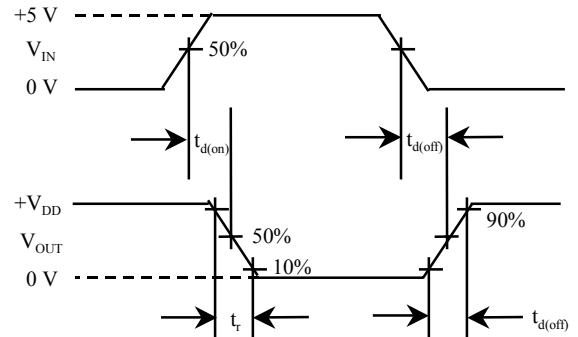
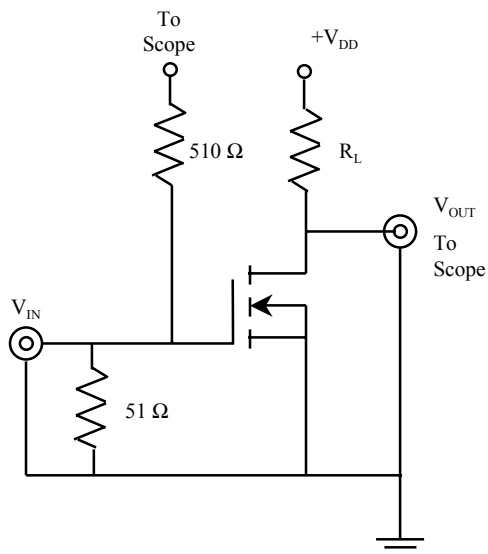
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ELECTRICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Conditions	SD5000			Units	
			Min	Typ	Max		
DYNAMIC	Common-Source Forward Transconductance	g_{fs}	$V_{DS}=10\text{V}$ $I_D=20\text{mA}$ $f=1\text{kHz}$, $V_{SB}=0$ Pulsed	10	12		mS
	Gate Node Capacitance	$C_{(gs+gd+gb)}$	$V_{DS}=10\text{V}$ $V_{GS}=V_{BS}=-15\text{V}$ $f=1\text{MHz}$		2.4	3.5	pF
	Drain Node Capacitance	$C_{(gd+db)}$			1.3	1.5	pF
	Source Node Capacitance	$C_{(gs+sb)}$			3.5	4.0	pF
	Reverse Transfer Capacitance	$C_{(dg)}$			0.3	0.5	pF
	Crosstalk	C_T	$f=3\text{kHz}$, $R_G=600$		-107.0		dB
	Turn ON Delay Time	$t_{d(on)}$	$V_{DD}=5\text{V}$ $V_{G(on)}=10\text{V}$ $R_L=680\Omega$ $R_G=51\Omega$		0.7	1.0	ns
	Rise Time	t_r			0.8	1.0	ns
Turn OFF Time	$t_{d(off)}^*$			10.0		ns	

* $t_{d(off)}$ is dependent on R_L and c and does not depend on the device characteristics

Switching Time Test Circuit



Input Pulse: $t_d, t_r < 1\text{ ns}$

Rep rate: 1 MHz

Sampling Scope $t_r < 350\text{ ps}$

$R_{IN} = 1\text{ M}\Omega$

$C_{IN} = 2\text{ pF}$