

## SD5000 / SD5001 / SD5002 SD5400 / SD5401 / SD5402

### FEATURES

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

### APPLICATIONS

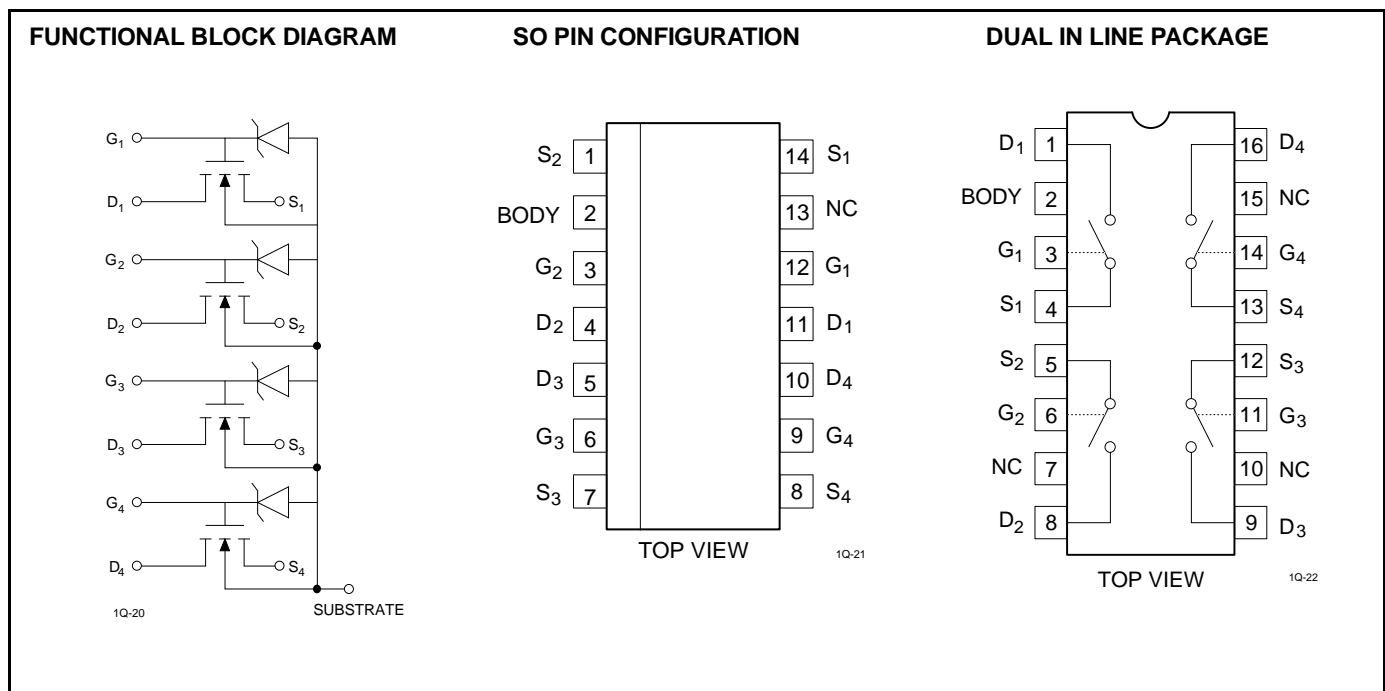
- Analog Switching
- Audio Routing
- Sample & Hold
- Crosspoint Switches
- Choppers
- Video Switches

### DESCRIPTION

The SD5000 Series are monolithic arrays of four bidirectional, high performance analog switches manufactured with implanted high-speed, high-voltage and low resistance double-difused MOS (DMOS) process. The maximum threshold of 2V permits simple TTL and CMOS driving in small signal applications.

### ORDERING INFORMATION

Part	Package	Temperature Range
SD5000N	Plastic DIP Package	-55°C to +150°C
SD5001N	Plastic DIP Package	-55°C to +150°C
SD5002N	Plastic DIP Package	-55°C to +150°C
XSD5000	Sorted Chips in Carriers	-55°C to +150°C
XSD5001	Sorted Chips in Carriers	-55°C to +150°C
XSD5002	Sorted Chips in Carriers	-55°C to +150°C
SD5400CY	Plastic DIP Package	-55°C to +150°C
SD5401CY	Plastic DIP Package	-55°C to +150°C
SD5402CY	Plastic DIP Package	-55°C to +150°C
XSD5400	Sorted Chips in Carriers	-55°C to +150°C
XSD5401	Sorted Chips in Carriers	-55°C to +150°C
XSD5402	Sorted Chips in Carriers	-55°C to +150°C



**DC ELECTRICAL CHARACTERISTICS**  $T_A = 25^\circ\text{C}$

SYMBOL	PARAMETERS	SD5000/SD5400			SD5001/SD5401			SD5002/SD5402			UNITS	CONDITIONS
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX		
V <sub>analog</sub>	Analog Signal Range	-10		+10	-5		+5	-7.5		+7.5	V	
Breakdown Voltage												
BV <sub>DS</sub> BV <sub>SD</sub> BV <sub>DB</sub> BV <sub>SB</sub>	Drain-Source Source-Drain Drain-Body Source-Body	20 20 25 25	25		10 10 15 15	25		15 15 22.5 22.5	25		V	V <sub>GS</sub> = V <sub>BS</sub> = -5V, I <sub>D</sub> = 10nA V <sub>GD</sub> = V <sub>BD</sub> = -5V, I <sub>S</sub> = 10nA V <sub>GB</sub> = 0V, I <sub>D</sub> = 10nA Source Open V <sub>GB</sub> = 0V, I <sub>S</sub> = 10μA, Drain Open
Leakage Current - SD5000/SD5400												
I <sub>DS(OFF)</sub> I <sub>SD(OFF)</sub> I <sub>GBS</sub>	Drain-Source Source-Drain Gate		1.0 1.0	10.0 10.0							nA nA μA	V <sub>GS</sub> = V <sub>BS</sub> = -5V, V <sub>DS</sub> = 20V V <sub>GD</sub> = V <sub>BD</sub> = -5V, V <sub>SD</sub> = 20V V <sub>DB</sub> = V <sub>SB</sub> = 0V, V <sub>GB</sub> = 30V
Leakage Current - SD5001/SD5401												
I <sub>DS(OFF)</sub> I <sub>SD(OFF)</sub> I <sub>GBS</sub>	Drain-Source Source-Drain Gate					1.0 1.0	10.0 10.0				nA nA μA	V <sub>GS</sub> = V <sub>BS</sub> = -5V, V <sub>DS</sub> = 10V V <sub>GD</sub> = V <sub>BD</sub> = -5V, V <sub>SD</sub> = 10V V <sub>DB</sub> = V <sub>SB</sub> = 0V, V <sub>GB</sub> = 25V
Leakage Current - SD5002/SD5402												
I <sub>DS(OFF)</sub> I <sub>SD(OFF)</sub> I <sub>GBS</sub>	Drain-Source Source-Drain Gate								1.0 1.0	10.0 10.0	nA nA μA	V <sub>GS</sub> = V <sub>BS</sub> = -5V, V <sub>DS</sub> = 15V V <sub>GD</sub> = V <sub>BD</sub> = -5V, V <sub>SD</sub> = 15V V <sub>DB</sub> = V <sub>SB</sub> = 0V, V <sub>GB</sub> = 30V
V <sub>T</sub>	Threshold Voltage	0.1	1.0	2.0	0.1	1.0	2.0	0.1	1.0	2.0	V	V <sub>DS</sub> = V <sub>GS</sub> = V <sub>T</sub> , V <sub>SB</sub> = 0V, I <sub>D</sub> = 1μA
R <sub>DS(ON)</sub>	Drain-Source ON Resistance		50 30 23 19	70		50 30 23 19	70		50 30 23 19	70	Ω	V <sub>GS</sub> = 5V, V <sub>SB</sub> = 0V, I <sub>D</sub> = 1mA V <sub>GS</sub> = 10V, V <sub>SB</sub> = 0V, I <sub>D</sub> = 1mA V <sub>GS</sub> = 15V, V <sub>SB</sub> = 0V, I <sub>D</sub> = 1mA V <sub>GS</sub> = 20V, V <sub>SB</sub> = 0V, I <sub>D</sub> = 1mA
R <sub>DS(ON)</sub>	Match ON Resistance		1	5		1	5		1	5	Ω	V <sub>GS</sub> = 5V

**AC ELECTRICAL CHARACTERISTICS**  $T_A = 25^\circ\text{C}$

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	CONDITIONS
g <sub>fs</sub>	Forward Transconductance	10	12		mS	V <sub>DS</sub> = 10V, I <sub>D</sub> = 20mA, V <sub>SB</sub> = 0V, f = 1kHz
Capacitances						
C <sub>G</sub> C <sub>D</sub> C <sub>S</sub> C <sub>DG</sub>	Gate Node Drain Node Source Node Reverse Transfer		2.4 1.3 3.5 0.3	3.5 1.5 4.0 0.5	pF	V <sub>DS</sub> = 10V, f = 1MHz, V <sub>GS</sub> = V <sub>BS</sub> = -15V
C <sub>T</sub>	Crosstalk		107.0		dB	f = 3kHz, R <sub>G</sub> = 600Ω

**SWITCHING CHARACTERISTICS**  $T_A = 25^\circ\text{C}$

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	CONDITIONS
t <sub>d(ON)</sub>	Turn-On Time		0.7	1.0	nsec	R <sub>L</sub> = 680Ω, R <sub>G</sub> = 51 V <sub>DD</sub> = 5V V <sub>G(ON)</sub> = 10V
t <sub>r</sub>	Rise Time		0.8	1.0		
t <sub>OFF*</sub>	Turn-Off Time		10.0			

\*t<sub>OFF</sub> is dependent on R<sub>L</sub> and C and does not depend on the device characteristics.

**ABSOLUTE MAXIMUM RATINGS**

SYMBOL	PARAMETER	SD5000/SD5400 MAX. VALUE	SD5001/SD5401 MAX. VALUE	SD5002/SD5402 MAX. VALUE	UNITS
Breakdown Voltage					
V <sub>DS</sub>	Drain-Source	20	10	15	V
V <sub>SD</sub>	Source-Drain	20	10	15	
V <sub>DB</sub>	Drain-Body	25	15	22.5	
V <sub>SB</sub>	Source-Body	25	15	22.5	
V <sub>GS</sub>	Gate-Source	30/ - 25	25/ - 15	30/ - 22.5	
V <sub>GB</sub>	Gate-Body	30/ - 0.3	25/ - 0.3	30/ - 0.3	
V <sub>GD</sub>	Gate-Drain	30/ - 25	30/ - 15	30/ - 22.5	

**ABSOLUTE MAXIMUM**

SYMBOL	PARAMETER	VALUE	UNIT
I <sub>D</sub>	Drain Current	50	mA
Temperature Range			
T <sub>J</sub>	Operating	-55 to +85	°C
T <sub>S</sub>	Storage	-55 to +150	
Power Dissipation			
P <sub>D</sub>	Package	640 (Note 1)	mW
P <sub>D</sub>	Each Device	300 (Note 2)	

Note 1: Linear Derating Factor - 10.7mW/°C above 25°C

Note 2: Linear Derating Factor - 5.0mW/°C above 25°C