

SD5000/5400 Series

N-Channel Lateral DMOS FETs

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SD5000I
SD5000N
SD5001N

SD5400CY
SD5401CY

Product Summary

Part Number	$V_{(BR)DS}$ Min (V)	$V_{GS(th)}$ Max (V)	$r_{DS(on)}$ Max (Ω)	C_{rss} Max (pF)	t_{ON} Max (ns)
SD5000I	20	1.5	70 @ $V_{GS} = 5$ V	0.5	2
SD5000N	20	1.5	70 @ $V_{GS} = 5$ V	0.5	2
SD5001N	10	1.5	70 @ $V_{GS} = 5$ V	0.5	2
SD5400CY	20	1.5	75 @ $V_{GS} = 5$ V	0.5	2
SD5401CY	10	1.5	75 @ $V_{GS} = 5$ V	0.5	2

Features

- Quad SPST Switch with Zener Input Protection
- Low Interelectrode Capacitance and Leakage
- Ultra-High Speed Switching— t_{ON} : 1 ns
- Ultra-Low Reverse Capacitance: 0.2 pF
- Low Guaranteed r_{DS} @ 5 V
- Low Turn-On Threshold Voltage

Benefits

- High-Speed System Performance
- Low Insertion Loss at High Frequencies
- Low Transfer Signal Loss
- Simple Driver Requirement
- Single Supply Operation

Applications

- Fast Analog Switch
- Fast Sample-and-Holds
- Pixel-Rate Switching
- Video Switch
- Multiplexer
- DAC Deglitchers
- High-Speed Driver

Description

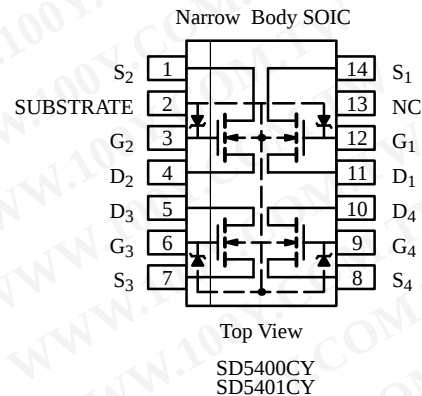
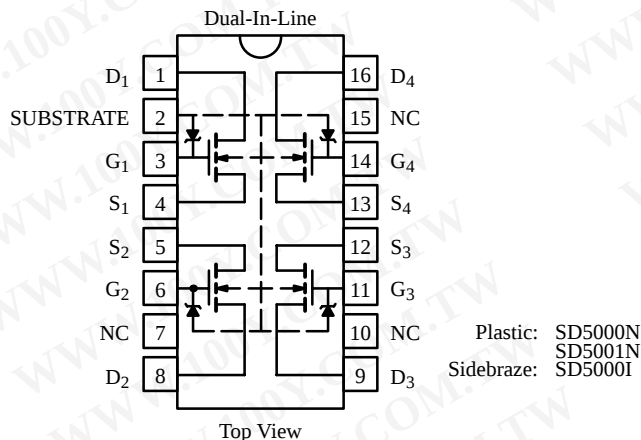
The SD5000/5400 series of monolithic switches features four individual double-diffused enhancement-mode MOSFETs built on a common substrate. These bidirectional devices provide low on-resistance and low interelectrode capacitances to minimize insertion loss and crosstalk.

Built on Siliconix' proprietary DMOS process, the SD5000/5400 series utilizes lateral construction to achieve low capacitance and ultra-fast switching speeds. For

manufacturing reliability, these devices feature poly-silicon gates protected by Zener diodes.

The SD5000/5400 are rated to handle ± 10 -V analog signals, while the SD5001/5401 are rated for ± 5 -V signals.

For similar products packaged in TO-206AF (TO-72) and TO-253 (SOT-143) see the SD211DE/SST211 series.



Updates to this data sheet may be obtained via facsimile by calling Siliconix FaxBack, 1-408-970-5600. Please request FaxBack document #70296. Applications information may also be obtained via FaxBack, request document #70607.

SD5000/5400 Series

Absolute Maximum Ratings (T_A = 25°C Unless Otherwise Noted)

Gate-Drain, Gate-Source Voltage (SD5000, SD5400)	+30 V/–25 V	Drain Current	50 mA
(SD5001, SD5401)	+25 V/–15 V	Lead Temperature (1/16" from case for 10 seconds)	300°C
Gate-Substrate Voltage (SD5000, SD5400)	+30 V/–0.3 V	Storage Temperature	–65 to 150°C
(SD5001, SD5401)	+25 V/–0.3 V	Operating Junction Temperature	–55 to 150°C
Drain-Source Voltage (SD5000, SD5400)	20 V	Power Dissipation ^{a, b} : (Package)	500 mW
(SD5001, SD5401)	10 V	(Each Device)	300 mW
Drain-Source-Substrate Voltage (SD5000, SD5400)	25 V	Notes:	
(SD5001, SD5401)	15 V	a. SD5000/SD5001 derate 5 mW/°C above 25°C	
		b. SD5400/SD5401 derate 4 mW/°C above 25°C	

Specifications^a

Parameter	Symbol ^b	Test Conditions ^b		Typ ^c	Limits				Unit
					SD5000 SD5400		SD5001 SD5401		
					Min	Max	Min	Max	
Static									
Drain-Source Breakdown Voltage	V _{(BR)DS}	V _{GS} = V _{BS} = -5 V, I _D = 10 nA		30	20		10		V
Source-Drain Breakdown Voltage	V _{(BR)SD}	V _{GD} = V _{BD} = -5 V, I _S = 10 nA		22	20		10		
Drain-Substrate Breakdown Voltage	V _{(BR)DBO}	V _{GB} = 0 V, I _D = 10 nA, Source Open		35	25		15		
Source-Substrate Breakdown Voltage	V _{(BR)SBO}	V _{GB} = 0 V, I _S = 10 μA, Drain Open		35	25		15		
Drain-Source Leakage	I _{DS(off)}	V _{GS} = V _{BS} = -5 V	V _{DS} = 10 V	0.4				10	nA
			V _{DS} = 15 V	0.7					
			V _{DS} = 20 V	0.9		10			
Source-Drain Leakage	I _{SD(off)}	V _{GD} = V _{BD} = -5 V	V _{SD} = 10 V	0.5				10	
			V _{SD} = 15 V	0.8					
			V _{SD} = 20 V	1		10			
Gate Leakage	I _{GBS}	V _{DB} = V _{SB} = 0 V, V _{GB} = 30V		0.01		100		100	
Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 1 μA, V _{SB} = 0 V		0.8	0.1	1.5	0.1	1.5	V
Drain-Source On-Resistance	r _{DS(on)}	V _{SB} = 0 V I _D = 1 mA	SD5000 Series V _{GS} = 5 V	58		70		70	Ω
			SD5400 Series V _{GS} = 5 V	60		75		75	
			V _{GS} = 10 V	38					
			V _{GS} = 15 V	30					
			V _{GS} = 20 V	26					
Resistance Match	Δr _{DS(on)}		V _{GS} = 5 V	1		5		5	
Dynamic									
Forward Transconductance	g _{fs}	V _{DS} = 10 V V _{SB} = 0 V I _D = 20 mA f = 1 kHz	SD5000 Series	12	10		10		mS
			SD5400 Series	11	9		9		
Gate Node Capacitance	C _(GS+GD+GB)	V _{DS} = 10 V f = 1 MHz V _{GS} = V _{BS} = -15 V	SD5000 Series	2.5		3.5		3.5	pF
Drain Node Capacitance	C _(GD+DB)			2.0		3		3	
Source Node Capacitance	C _(GS+SB)			3.7		5		5	
Reverse Transfer Capacitance	C _{rss}			0.2		0.5		0.5	
Crosstalk		f = 3 kHz		-107					dB

SD5000/5400 Series

Specifications^a

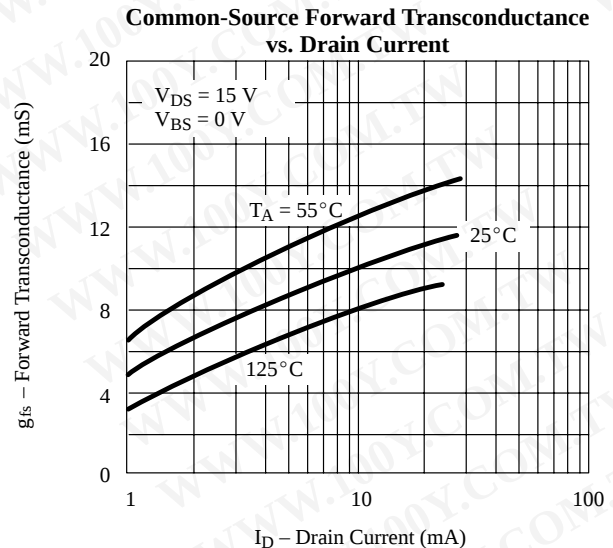
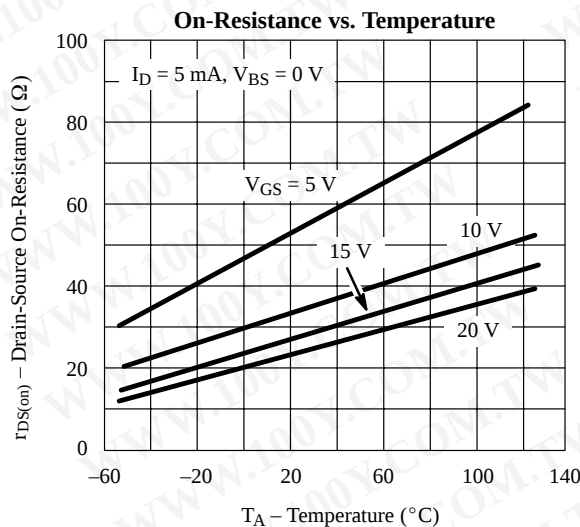
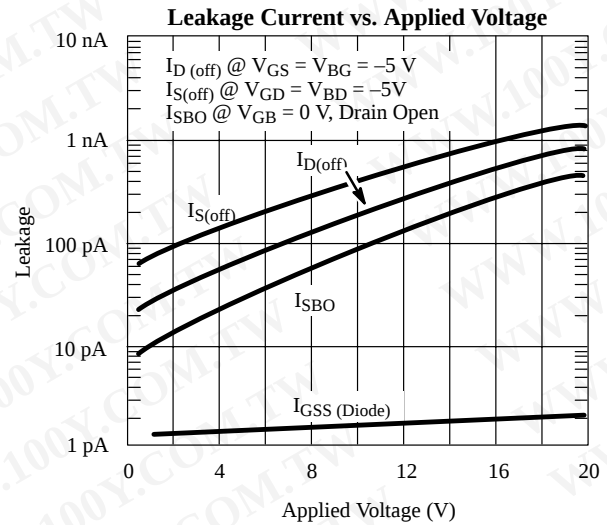
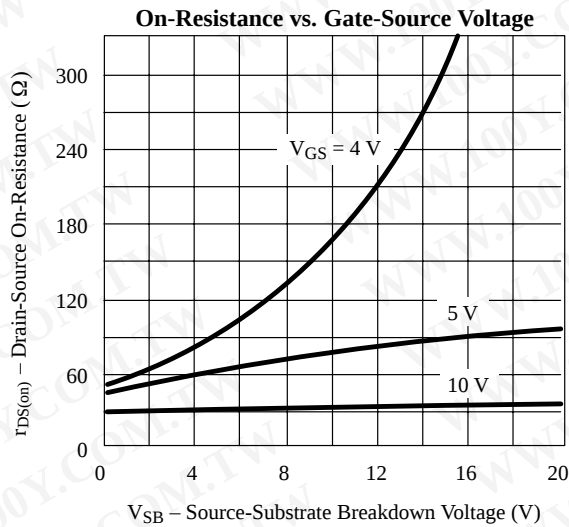
Parameter	Symbol ^b	Test Conditions ^b	Typ ^c	Limits				Unit
				SD5000 SD5400		SD5001 SD5401		
				Min	Max	Min	Max	
Switching								
Turn-On Time	t _{d(on)}	V _{SB} = 5 V, V _{IN} 0 to 5 V, R _G = 25 Ω V _{DD} = 5 V, R _L = 680 Ω	0.5		1		1	ns
	t _r		0.6		1		1	
Turn-Off Time	t _{d(off)}		2					
	t _f		6					

Notes:

- $T_A = 25^\circ\text{C}$ unless otherwise noted.
- B is the body (substrate) and $V_{(BR)}$ is breakdown.
- Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.

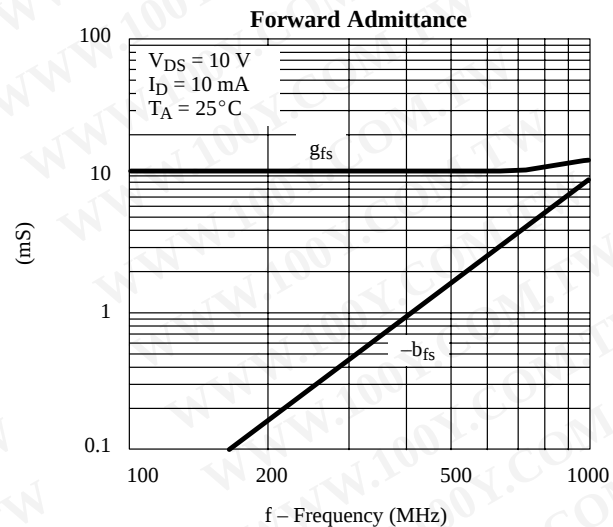
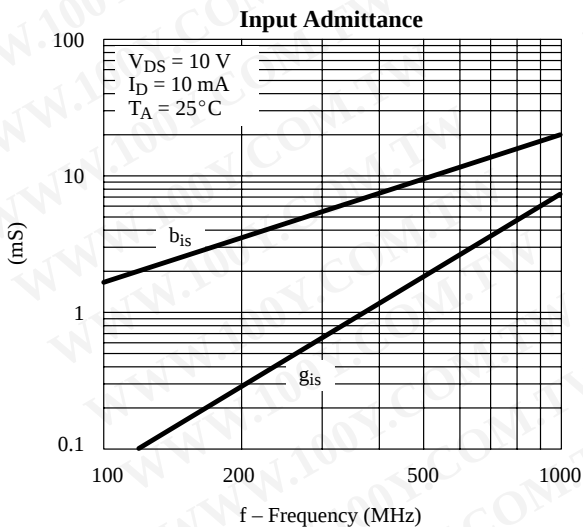
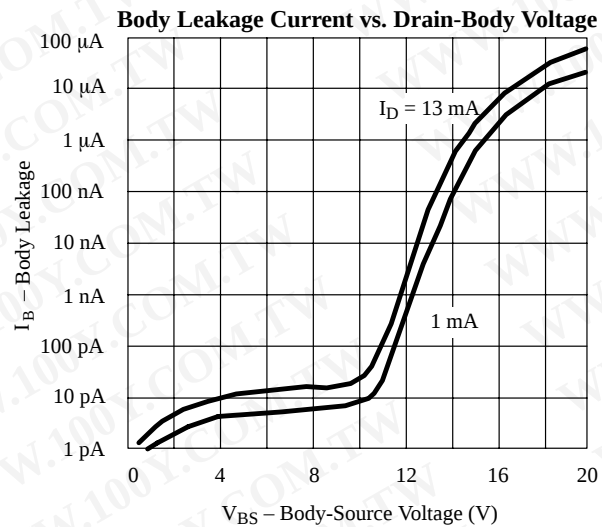
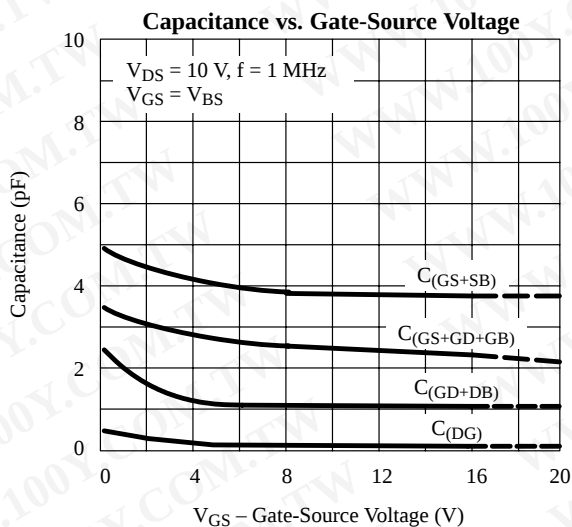
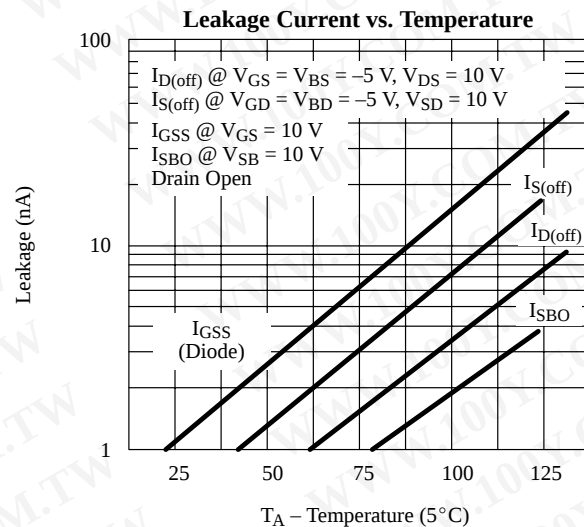
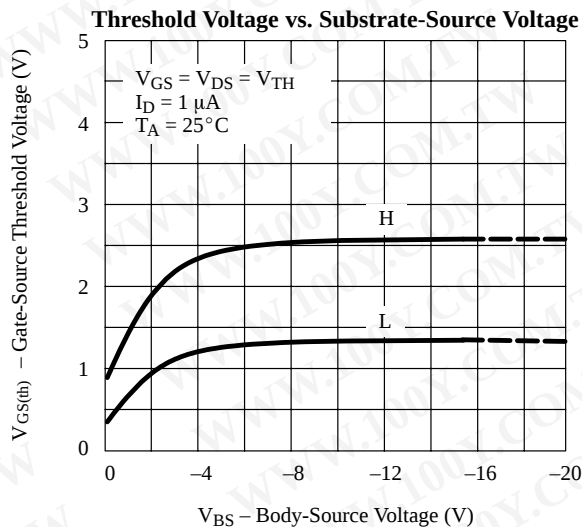
DMCA

Typical Characteristics



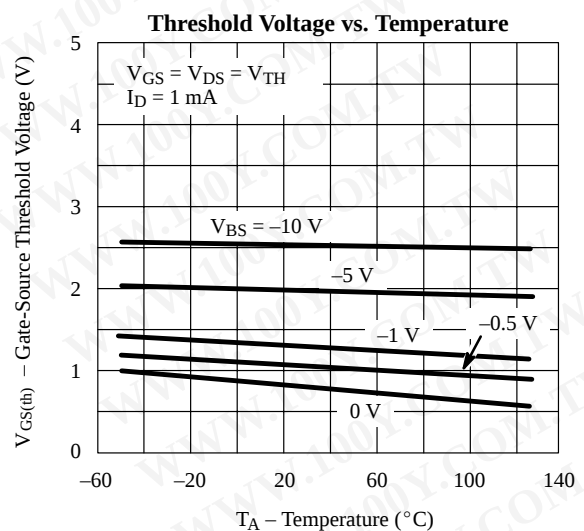
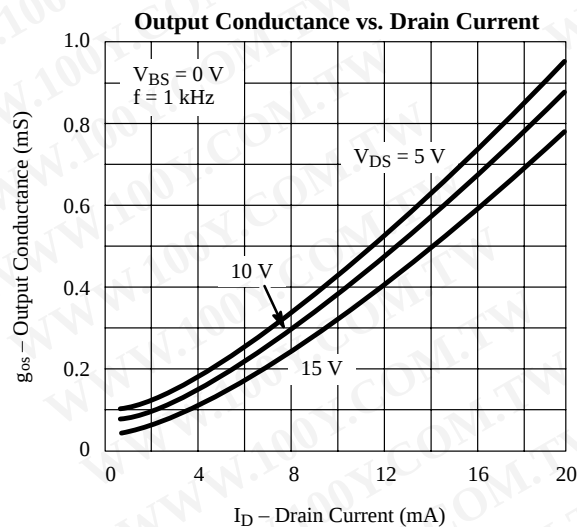
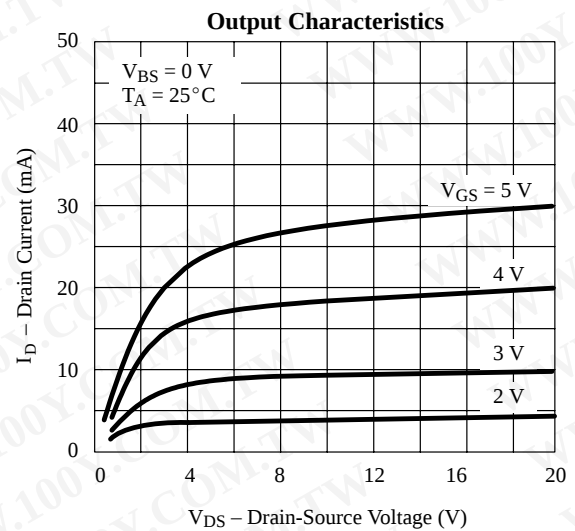
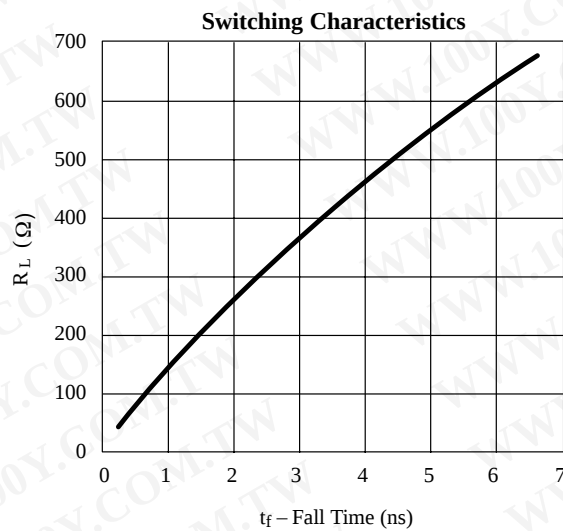
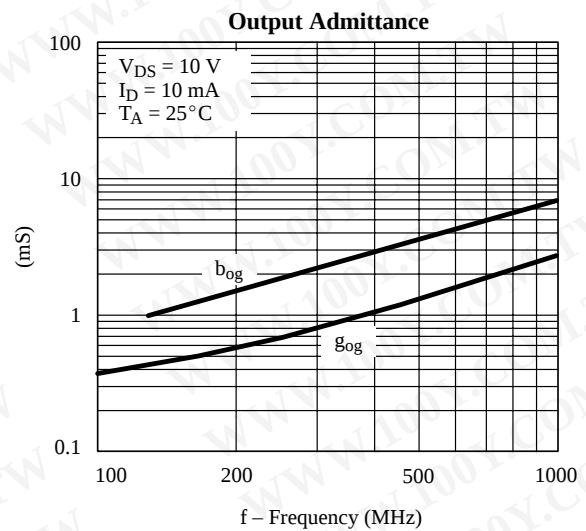
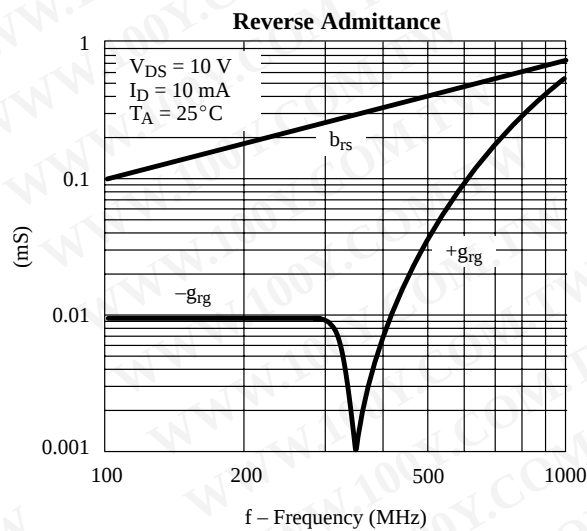
SD5000/5400 Series

Typical Characteristics (Cont'd)



SD5000/5400 Series

Typical Characteristics (Cont'd)



SD5000/5400 Series

Switching Time Test Circuit

