

# DG181AA/883 Datasheet



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DiGi Electronics Part Number	DG181AA/883-DG
Manufacturer	<a href="#">Vishay Siliconix</a>
Manufacturer Product Number	DG181AA/883
Description	IC SW SPST-NCX2 300HM TO100-10
Detailed Description	2 Circuit IC Switch 1:1 300hm TO-100-10

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## Purchase and inquiry

Manufacturer Product Number:

DG181AA/883

Series:

-

Switch Circuit:

SPST - NC

Number of Circuits:

2

Channel-to-Channel Matching ( $\Delta R_{on}$ ):

-

Voltage - Supply, Dual ( $V_{\pm}$ ):

$\pm 15V$

-3db Bandwidth:

-

Channel Capacitance ( $C_{S(off)}$ ,  $C_{D(off)}$ ):

9pF, 6pF

Crosstalk:

-

Mounting Type:

Through Hole

Supplier Device Package:

TO-100-10

Manufacturer:

Vishay Siliconix

Product Status:

Obsolete

Multiplexer/Demultiplexer Circuit:

1:1

On-State Resistance (Max):

30Ohm

Voltage - Supply, Single ( $V_{+}$ ):

-

Switch Time ( $T_{on}$ ,  $T_{off}$ ) (Max):

150ns, 130ns

Charge Injection:

-

Current - Leakage ( $I_{S(off)}$ ) (Max):

1nA

Operating Temperature:

-55°C ~ 125°C (TA)

Package / Case:

TO-100-10 Metal Can

Base Product Number:

DG181

## Environmental & Export classification

RoHS Status:

RoHS non-compliant

REACH Status:

REACH Unaffected

HTSUS:

8542.39.0001

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99





# High-Speed Drivers with Dual SPST JFET Switches

## FEATURES

- Constant On-Resistance Over Entire Analog Range
- Low Leakage
- Low Crosstalk
- Rad Hardness

## BENEFITS

- Low Distortion
- Eliminates Large Signal Errors
- High Precision
- High Bandwidth Capability
- Fault Protection

## APPLICATIONS

- Audio Switching
- Video Switching
- Sample/Hold
- Guidance and Control Systems
- Aerospace

## DESCRIPTION

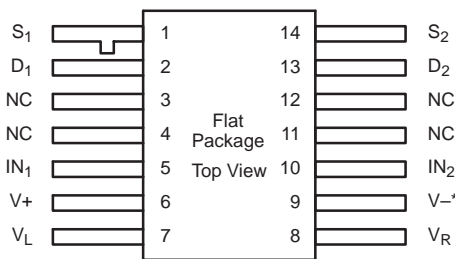
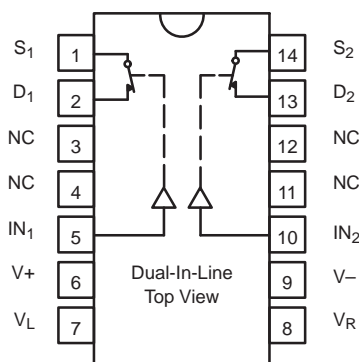
The DG180/181/182 are precision dual single-pole, single-throw (SPST) analog switches designed to provide accurate switching of video and audio signals. This series is ideally suited for applications requiring a constant on-resistance over the entire analog range.

The major difference in the devices is the on-resistance (DG180—10 Ω, DG181—30 Ω, DG182—75 Ω). Reduced errors are achieved through low leakage current ( $I_{D(on)}$  < 2 nA). Applications which benefit from the flat JFET

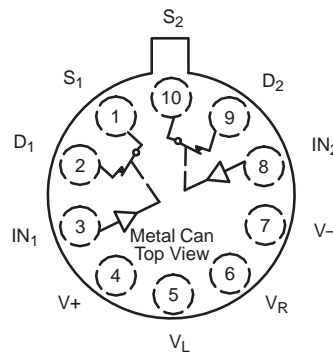
on-resistance include audio switching, video switching, and data acquisition.

To achieve fast and accurate switch performance, each device comprises four n-channel JFET transistors and a TTL compatible bipolar driver. In the on state, each switch conducts current equally well in either direction. In the off condition, the switches will block up to 20 V peak-to-peak, with feedthrough of less than -60 dB at 10 MHz.

## FUNCTIONAL BLOCK DIAGRAM AND PIN CONFIGURATION



Refer to JAN38510 Information, Military Section



\*Common to Substrate and Case

TRUTH TABLE	
Logic	Switch
0	ON
1	OFF

Logic "0" ≤ 0.8 V  
 Logic "1" ≥ 2.0 V



# DG180/181/182

Vishay Siliconix

ORDERING INFORMATION		
Temp Range	Package	Part Number
-25 to 85°C	10-Pin Metal Can	DG181BA
	14-Pin Sidebrazed	DG180BP
-55 to 125°C	10-Pin Metal Can	DG180AA/883, 5962-8767301IA
		DG181AA/883, JM38510/11101BIA
		DG182AA/883, JM38510/11102BIA
	14-Pin Sidebrazed	DG180AP/883, 5962-8767301CA
		DG181AP/883, JM38510/11101BCA
		DG182AP/883, JM38510/11102BCA
	14-Pin Flat Pack	5962-8767301XA
		JM38510/11101BXA
		JM38510/11102BXA

## ABSOLUTE MAXIMUM RATINGS

V+ to V-	36 V	Current (S or D) DG181, DG182	30 mA
V+ to V <sub>D</sub>	33 V	Current (All Other Pins)	30 mA
V <sub>D</sub> to V-	33 V	Storage Temperature	-65 to 150°C
V <sub>D</sub> to V <sub>D</sub>	±22 V	Power Dissipation <sup>a</sup>	
V <sub>L</sub> to V-	36 V	10-Pin Metal Can <sup>b</sup>	450 mW
V <sub>L</sub> to V <sub>IN</sub>	8 V	14-Pin Sidebrazed <sup>c</sup>	825 mW
V <sub>L</sub> to V <sub>R</sub>	8 V	14-Pin Flat Pack <sup>d</sup>	900 mW
V <sub>IN</sub> to V <sub>R</sub>	8 V		
V <sub>R</sub> to V-	27 V	Notes:	
V <sub>R</sub> to V <sub>IN</sub>	2 V	a. All leads welded or soldered to PC Board.	
Current (S or D) DG180	200 mA	b. Derate 6 mW/°C above 75°C	
		c. Derate 11 mW/°C above 75°C	
		d. Derate 10 mW/°C above 75°C	

## SCHEMATIC DIAGRAM (TYPICAL CHANNEL)

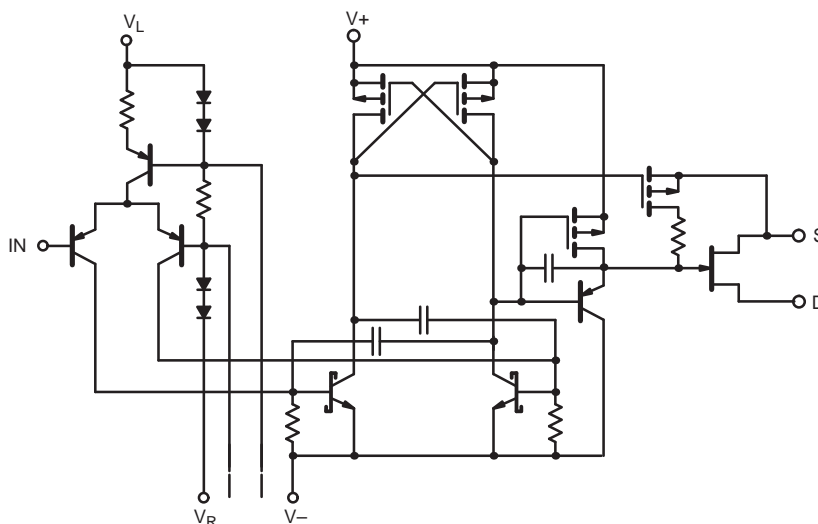


FIGURE 1.



SPECIFICATIONS <sup>a</sup> FOR DG180									
Parameter	Symbol	Test Conditions Unless Specified $V_+ = 15\text{ V}$ , $V_- = -15\text{ V}$ , $V_L = 5\text{ V}$ $V_R = 0\text{ V}$ , $V_{IN} = 2\text{ V}$ , $0.8\text{ V}^f$	Temp <sup>b</sup>	Typ <sup>c</sup>	A Suffix -55 to 125°C		B Suffix -25 to 85°C		Unit
					Min <sup>d</sup>	Max <sup>d</sup>	Min <sup>d</sup>	Max <sup>d</sup>	
<b>Analog Switch</b>									
Analog Signal Range <sup>e</sup>	$V_{ANALOG}$		Full		-7.5	15	-7.5	15	V
Drain-Source On-Resistance	$r_{DS(on)}$	$I_S = -10\text{ mA}$ , $V_D = -7.5\text{ V}$	Room Full	7.5		10 20		15 25	$\Omega$
Source Off Leakage Current	$I_{S(off)}$	$V_S = \pm 10\text{ V}$ , $V_D = \mp 10\text{ V}$ $V_+ = 10\text{ V}$ , $V_- = -20\text{ V}$	Room Hot	0.05		10 1000		15 300	nA
		$V_S = \pm 7.5\text{ V}$ , $V_D = \mp 7.5\text{ V}$	Room Hot	0.05		10 1000		15 300	
Drain Off Leakage Current	$I_{D(off)}$	$V_S = \pm 10\text{ V}$ , $V_D = \mp 10\text{ V}$ $V_+ = 10\text{ V}$ , $V_- = -20\text{ V}$	Room Hot	0.04		10 1000		15 300	
		$V_S = \pm 7.5\text{ V}$ , $V_D = \mp 7.5\text{ V}$	Room Hot	0.03		10 1000		15 300	
Channel On Leakage Current	$I_{D(on)}$	$V_D = V_S = \pm 7.5\text{ V}$	Room Hot	-0.1	-2 -200		-10 -200		
Saturation Drain Current	$I_{DSS}$	2 ms Pulse Duration	Room	300					mA
<b>Digital Input</b>									
Input Current with Input Voltage High	$I_{INH}$	$V_{IN} = 5\text{ V}$	Room Hot	<0.01		10 20		10 20	$\mu\text{A}$
Input Current with Input Voltage Low	$I_{INL}$	$V_{IN} = 0\text{ V}$	Full	-30	-250		-250		
<b>Dynamic Characteristics</b>									
Turn-On Time	$t_{on}$	See Switching Time Test Circuit	Room	240		400		600	ns
Turn-Off Time	$t_{off}$		Room	140		200		250	
Source-Off Capacitance	$C_{S(off)}$	$f = 1\text{ MHz}$	Room	21					pF
Drain-Off Capacitance	$C_{D(off)}$		$V_S = -5\text{ V}$ , $I_D = 0$	Room	17				
Channel-On Capacitance	$C_{D(on)}$		$V_D = -5\text{ V}$ , $I_S = 0$	Room	17				
Off Isolation	OIRR	$f = 1\text{ MHz}$ , $R_L = 75\ \Omega$	Room	>55					dB
<b>Power Supplies</b>									
Positive Supply Current	$I_+$	$V_{IN} = 0\text{ V}$ , or $5\text{ V}$	Room	0.6		1.5		1.5	mA
Negative Supply Current	$I_-$		Room	-2.7	-5		-5		
Logic Supply Current	$I_L$		Room	3		4.5		4.5	
Reference Supply Current	$I_R$		Room	-1	-2		-2		

## Notes:

- Refer to PROCESS OPTION FLOWCHART.
- Room = 25°C, Full = as determined by the operating temperature suffix.
- Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
- The algebraic convention whereby the most negative value is a minimum and the most positive a maximum, is used in this data sheet.
- Guaranteed by design, not subject to production test.
- $V_{IN}$  = input voltage to perform proper function.



# DG180/181/182

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SPECIFICATIONS <sup>a</sup> FOR DG181										
Parameter	Symbol	Test Conditions Unless Specified $V_+ = 15\text{ V}, V_- = -15\text{ V}, V_L = 5\text{ V}$ $V_R = 0\text{ V}, V_{IN} = 2\text{ V}, 0.8\text{ V}^f$	Temp <sup>b</sup>	Typ <sup>c</sup>	A Suffix -55 to 125°C		B Suffix -25 to 85°C		Unit	
					Min <sup>d</sup>	Max <sup>d</sup>	Min <sup>d</sup>	Max <sup>d</sup>		
<b>Analog Switch</b>										
Analog Signal Range <sup>e</sup>	$V_{ANALOG}$		Full		-7.5	15	-7.5	15	V	
Drain-Source On-Resistance	$r_{DS(on)}$	$I_S = -10\text{ mA}, V_D = -7.5\text{ V}$	Room Full	18		30 60		50 75	$\Omega$	
Source Off Leakage Current	$I_{S(off)}$	$V_S = \pm 10\text{ V}, V_D = \mp 10\text{ V}$ $V_+ = 10\text{ V}, V_- = -20\text{ V}$	Room Hot	0.05		1 100		5 100	nA	
		$V_S = \pm 7.5\text{ V}, V_D = \mp 7.5\text{ V}$	Room Hot	0.07		1 100		5 100		
Drain Off Leakage Current	$I_{D(off)}$	$V_S = \pm 10\text{ V}, V_D = \mp 10\text{ V}$ $V_+ = 10\text{ V}, V_- = -20\text{ V}$	Room Hot	0.5		1 100		5 100		
		$V_S = \pm 7.5\text{ V}, V_D = \mp 7.5\text{ V}$	Room Hot	0.6		1 100		5 100		
Channel On Leakage Current	$I_{D(on)}$	$V_D = V_S = \pm 7.5\text{ V}$	Room Hot	-0.02	-2 -200		-10 -200			
<b>Digital Input</b>										
Input Current with Input Voltage High	$I_{INH}$	$V_{IN} = 5\text{ V}$	Room Hot	<0.01		10 20		10 20	$\mu\text{A}$	
Input Current with Input Voltage Low	$I_{INL}$	$V_{IN} = 0\text{ V}$	Full	-30	-250		-250			
<b>Dynamic Characteristics</b>										
Turn-On Time	$t_{on}$	See Switching Time Test Circuit	Room	85		150		180	ns	
Turn-Off Time	$t_{off}$		Room	95		130		150		
Source-Off Capacitance	$C_{S(off)}$	f = 1 MHz	Room						pF	
Drain-Off Capacitance	$C_{D(off)}$									$V_S = -5\text{ V}, I_D = 0$
Channel-On Capacitance	$C_{D(on)}$									$V_D = -5\text{ V}, I_S = 0$
Off Isolation	OIRR	$f = 1\text{ MHz}, R_L = 75\ \Omega$	Room	>50					dB	
<b>Power Supplies</b>										
Positive Supply Current	$I_+$	$V_{IN} = 0\text{ V}, \text{ or } 5\text{ V}$	Room	0.6		1.5		1.5	mA	
Negative Supply Current	$I_-$		Room	-2.7	-5		-5			
Logic Supply Current	$I_L$		Room	3.1		4.5		4.5		
Reference Supply Current	$I_R$		Room	-1	-2		-2			

Notes:

- a. Refer to PROCESS OPTION FLOWCHART.
- b. Room = 25°C, Full = as determined by the operating temperature suffix.
- c. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
- d. The algebraic convention whereby the most negative value is a minimum and the most positive a maximum, is used in this data sheet.
- e. Guaranteed by design, not subject to production test.
- f.  $V_{IN}$  = input voltage to perform proper function.



SPECIFICATIONS <sup>a</sup> FOR DG182									
Parameter	Symbol	Test Conditions Unless Specified $V_+ = 15\text{ V}$ , $V_- = -15\text{ V}$ , $V_L = 5\text{ V}$ $V_R = 0\text{ V}$ , $V_{IN} = 2\text{ V}$ , $0.8\text{ V}^f$	Temp <sup>b</sup>	Typ <sup>c</sup>	A Suffix -55 to 125°C		B Suffix -25 to 85°C		Unit
					Min <sup>d</sup>	Max <sup>d</sup>	Min <sup>d</sup>	Max <sup>d</sup>	
<b>Analog Switch</b>									
Analog Signal Range <sup>e</sup>	$V_{ANALOG}$		Full		-10	15	-10	15	V
Drain-Source On-Resistance	$r_{DS(on)}$	$I_S = -10\text{ mA}$ , $V_D = -7.5\text{ V}$	Room Full	35		75 150		100 150	$\Omega$
Source Off Leakage Current	$I_{S(off)}$	$V_S = \pm 10\text{ V}$ , $V_D = \mp 10\text{ V}$ $V_+ = 10\text{ V}$ , $V_- = -20\text{ V}$	Room Hot	0.05		1 100		5 100	nA
		$V_S = \pm 10\text{ V}$ , $V_D = \mp 10\text{ V}$	Room Hot	0.07		1 100		5 100	
Drain Off Leakage Current	$I_{D(off)}$	$V_S = \pm 10\text{ V}$ , $V_D = \mp 10\text{ V}$ $V_+ = 10\text{ V}$ , $V_- = -20\text{ V}$	Room Hot	0.4		1 100		5 100	
		$V_S = \pm 10\text{ V}$ , $V_D = \mp 10\text{ V}$	Room Hot	0.5		1 100		5 100	
Channel On Leakage Current	$I_{D(on)}$	$V_D = V_S = \pm 10\text{ V}$	Room Hot	-0.02	-2 -200		-10 -200		
<b>Digital Input</b>									
Input Current with Input Voltage High	$I_{INH}$	$V_{IN} = 5\text{ V}$	Room Hot	<0.01		10 20		10 20	$\mu\text{A}$
Input Current with Input Voltage Low	$I_{INL}$	$V_{IN} = 0\text{ V}$	Full	-30	-250		-250		
<b>Dynamic Characteristics</b>									
Turn-On Time	$t_{on}$	See Switching Time Test Circuit	Room	120		250		300	ns
Turn-Off Time	$t_{off}$		Room	100		130		150	
Source-Off Capacitance	$C_{S(off)}$	f = 1 MHz	Room	9					pF
Drain-Off Capacitance	$C_{D(off)}$		$V_D = -5\text{ V}$ , $I_S = 0$	Room	6				
Channel-On Capacitance	$C_{D(on)}$		$V_D = V_S = 0\text{ V}$	Room	14				
Off Isolation	OIRR	f = 1 MHz, $R_L = 75\ \Omega$	Room	>50					dB
<b>Power Supplies</b>									
Positive Supply Current	$I_+$	$V_{IN} = 0\text{ V}$ , or 5 V	Room	0.6		1.5		1.5	mA
Negative Supply Current	$I_-$		Room	-2.7	-5		-5		
Logic Supply Current	$I_L$		Room	3.1		4.5		4.5	
Reference Supply Current	$I_R$		Room	-1	-2		-2		

## Notes:

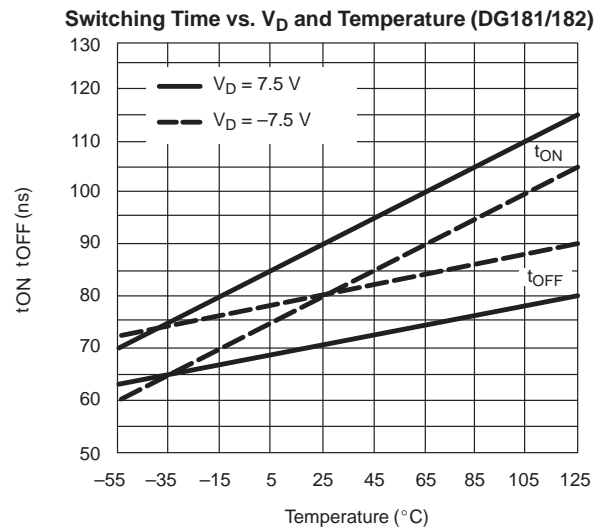
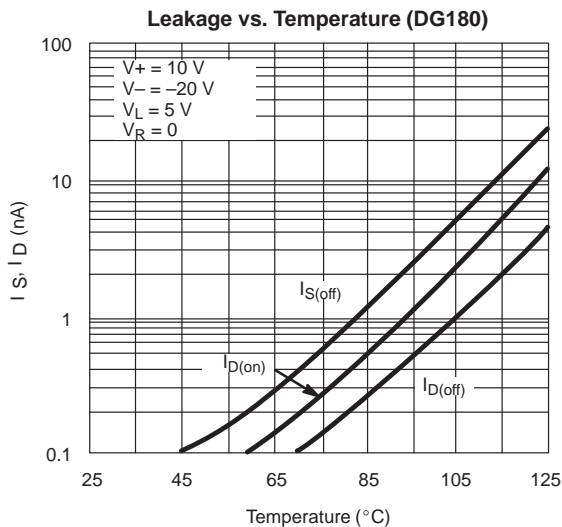
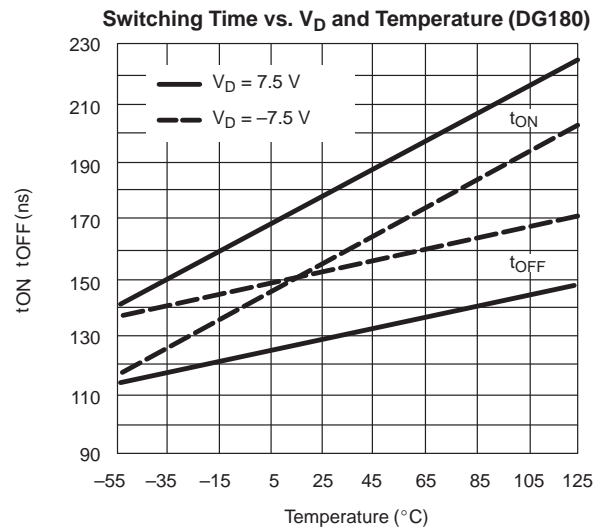
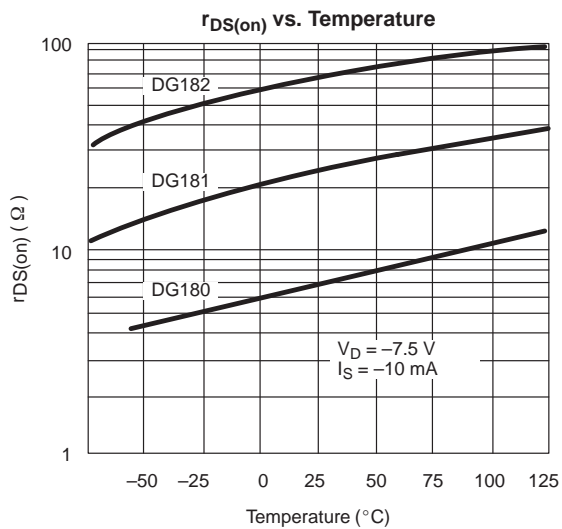
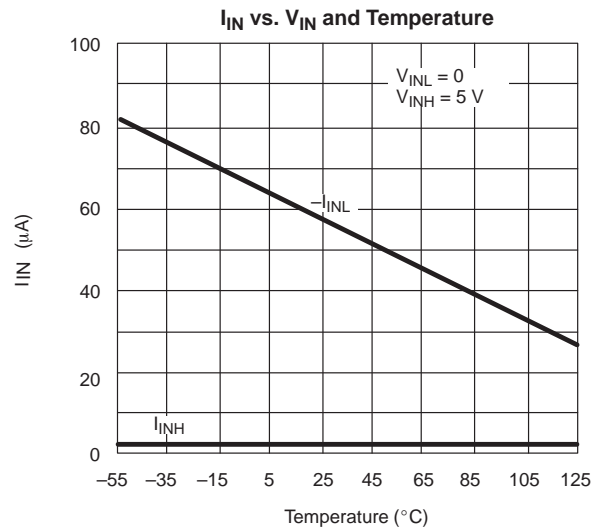
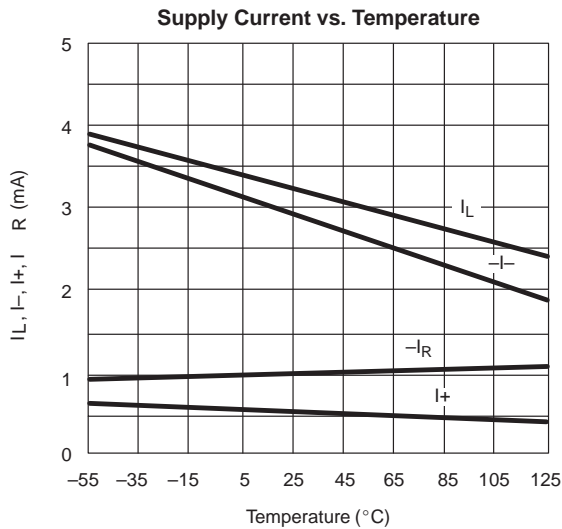
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# DG180/181/182

Vishay Siliconix



## TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

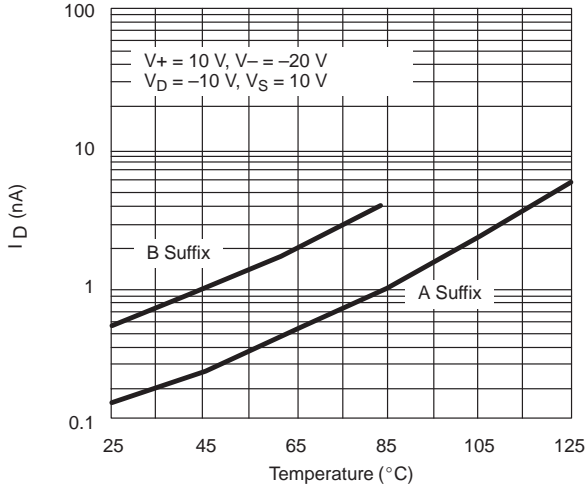




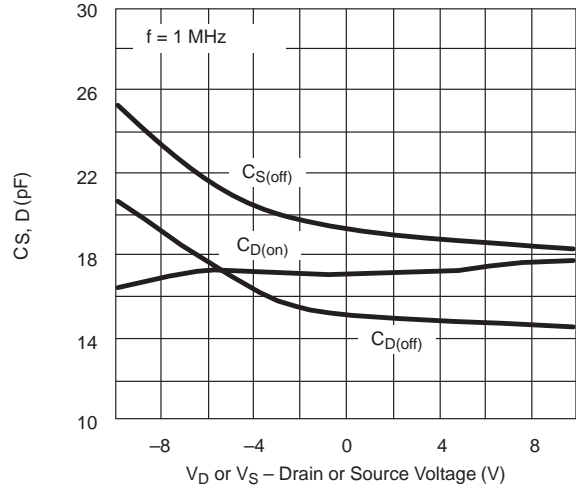


**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

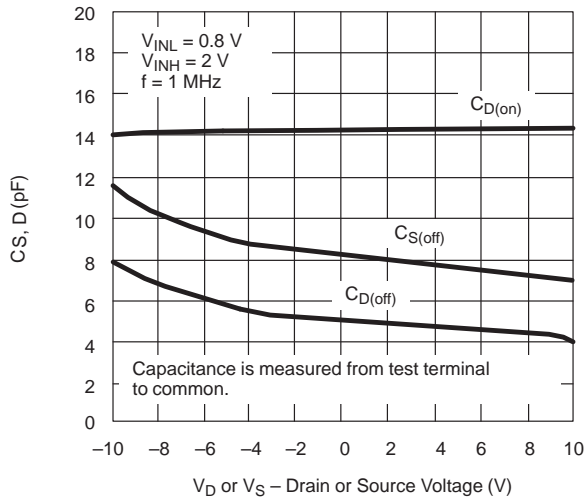
**$I_{D(off)}$  vs. Temperature (DG181/182)**



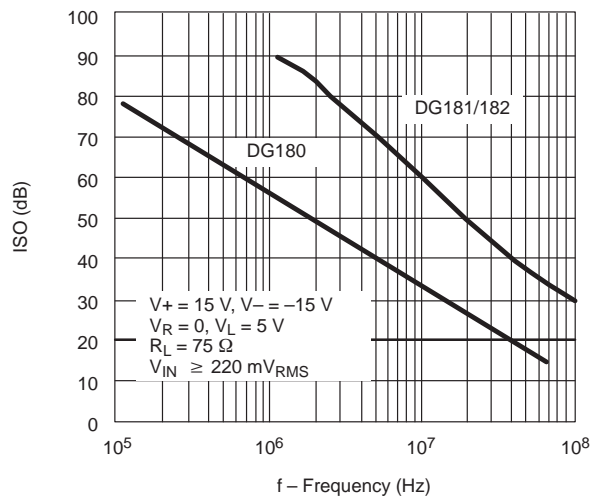
**Capacitance vs.  $V_D$  or  $V_S$  (DG180)**



**Capacitance vs.  $V_D$  or  $V_S$  (DG181/182)**



**Off Isolation vs. Frequency**





# DG180/181/182

Vishay Siliconix

## TEST CIRCUITS

Feedthrough due to charge injection may result in spikes at the leading and trailing edge of the output waveform.

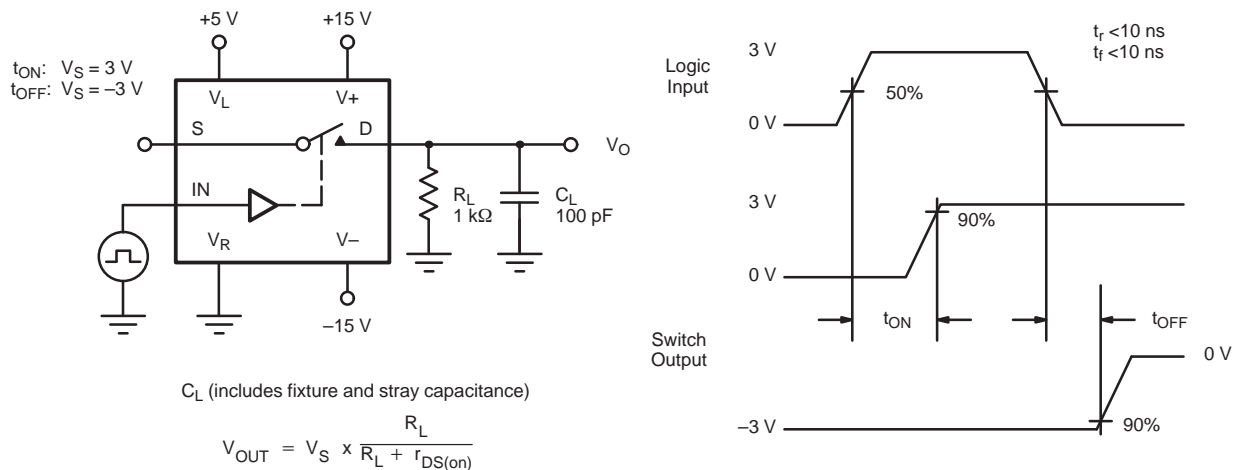


FIGURE 2. Switching Time

### APPLICATION HINTS<sup>a</sup>

Switch	V+ Positive Supply Voltage (V)	V- Negative Supply Voltage (V)	V <sub>L</sub> Logic Supply Voltage (V)	V <sub>R</sub> Reference Supply Voltage (V)	V <sub>IN</sub> Logic Input Voltage V <sub>INH(min)</sub> /V <sub>INL(max)</sub> (V)	V <sub>S</sub> Analog Voltage Range (V)
DG180 DG181	15 <sup>b</sup>	-15	5	GND	2.0/0.8	-7.5 to 15
	10	-20	5	GND	2.0/0.8	-12.5 to 10
	12	-12	5	GND	2.0/0.8	-4.5 to 12
DG182	15 <sup>b</sup>	-15	5	GND	2.0/0.8	-10 to 15
	10	-20	5	GND	2.0/0.8	-15 to 10
	12	-12	5	GND	2.0/0.8	-7 to 12

Notes:

- a. Application Hints are for DESIGN AID ONLY, not guaranteed and not subject to production testing.
- b. Electrical Parameter Chart based on V+ = 15 V, V<sub>L</sub> = 5 V, V<sub>R</sub> = GND



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