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**DG183/184/185**

**Vishay Siliconix**

## High-Speed Drivers and Dual DPST JFET Switches

### FEATURES

- Constant On-Resistance Over Entire Analog Range
- Low Leakage
- Low Crosstalk
- Break-Before-Make Switching
- Rad Hardness

### BENEFITS

- Low Distortion
- Eliminates Large Signal Errors
- High Precision
- Improved Channel Isolation
- Eliminates Inadvertent Shorting Between Channels
- Fault Protection

### APPLICATIONS

- Audio Switching
- Precision Switching
- Video Switching
- Video Routing
- Sample/Hold
- Aerospace

### DESCRIPTION

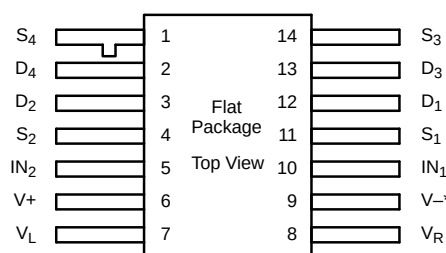
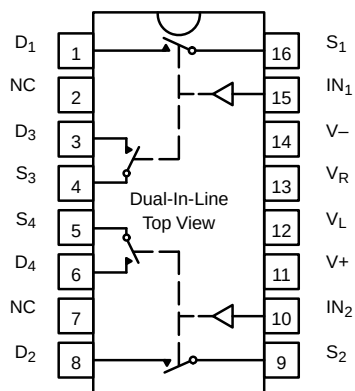
The DG183/184/185 are precision dual double-pole, single-throw (DPST) analog switches designed to provide accurate switching of video and audio signals. This series is ideally suited for applications requiring a constant on-resistance over the entire analog range.

The major difference in the devices is the on-resistance (DG183—10  $\Omega$ , DG184—30  $\Omega$ , DG185—75  $\Omega$ ). 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           | OFF    |
| 1           | ON     |

Logic "0"  $\leq$  0.8 V  
Logic "1"  $\geq$  2.0 V



## DG183/184/185

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| ORDERING INFORMATION |                  |                               |
|----------------------|------------------|-------------------------------|
| Temp Range           | Package          | Part Number                   |
| -25 to 85°C          | 16-Pin Sidebraz  | DG183BP                       |
|                      |                  | DG184BP                       |
| -55 to 125°C         | 16-Pin Sidebraz  | DG183AP/883                   |
|                      |                  | DG184AP/883, JM38510/11103BEA |
|                      |                  | DG185AP/883, JM38510/11104BEA |
|                      | 14-Pin Flat Pack | JM38510/11103BXA              |
|                      |                  | JM38510/11104BXA              |

### ABSOLUTE MAXIMUM RATINGS

|                                   |        |
|-----------------------------------|--------|
| V <sub>+</sub> to V <sub>-</sub>  | 36 V   |
| V <sub>+</sub> to V <sub>D</sub>  | 33 V   |
| V <sub>D</sub> to V <sub>-</sub>  | 33 V   |
| V <sub>D</sub> to V <sub>D</sub>  | ±22 V  |
| V <sub>L</sub> to V <sub>-</sub>  | 36 V   |
| V <sub>L</sub> to V <sub>IN</sub> | 8 V    |
| V <sub>L</sub> to V <sub>R</sub>  | 8 V    |
| V <sub>IN</sub> to V <sub>R</sub> | 8 V    |
| V <sub>R</sub> to V <sub>-</sub>  | 27 V   |
| V <sub>R</sub> to V <sub>IN</sub> | 2 V    |
| Current (S or D) DG183            | 200 mA |

|                                |              |
|--------------------------------|--------------|
| Current (S or D) DG184, DG185  | 30 mA        |
| Current (All Other Pins)       | 30 mA        |
| Storage Temperature            | -65 to 150°C |
| Power Dissipation <sup>a</sup> |              |
| 16-Pin Sidebraz <sup>b</sup>   | 900 mW       |
| 14-Pin Flat Pack <sup>c</sup>  | 900 mW       |

**Notes:**

- All leads welded or soldered to PC Board.
- Derate 12 mW/°C above 75°C
- Derate 10 mW/°C above 75°C

### SCHEMATIC DIAGRAM (TYPICAL CHANNEL)

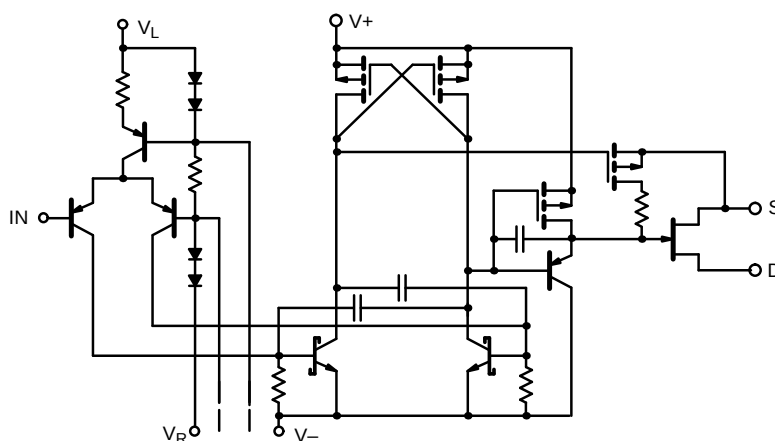


FIGURE 1.



**DG183/184/185**

**Vishay Siliconix**

**SPECIFICATIONS<sup>a</sup> FOR DG183**

| Parameter                             | Symbol  | Test Conditions<br>Unless Specified<br><br>V+ = 15 V, V− = −15 V, VL = 5 V<br>VR = 0 V, VIN = 0.8 V or 2 V <sup>f</sup> | Temp <sup>b</sup> | Typ <sup>c</sup> | A Suffix<br>−55 to 125°C |                  | B Suffix<br>−25 to 85°C |                  | Unit |    |
|---------------------------------------|---------|-------------------------------------------------------------------------------------------------------------------------|-------------------|------------------|--------------------------|------------------|-------------------------|------------------|------|----|
|                                       |         |                                                                                                                         |                   |                  | Min <sup>d</sup>         | Max <sup>d</sup> | Min <sup>d</sup>        | Max <sup>d</sup> |      |    |
| Analog Switch                         |         |                                                                                                                         |                   |                  |                          |                  |                         |                  |      |    |
| Analog Signal Range <sup>e</sup>      | VANALOG |                                                                                                                         | Full              |                  | −7.5                     | 15               | −7.5                    | 15               | V    |    |
| Drain-Source On-Resistance            | rDS(on) | IS = −10 mA, VD = −7.5 V                                                                                                | Room Full         | 7.5              |                          | 10<br>20         |                         | 15<br>25         | Ω    |    |
| Source Off Leakage Current            | IS(off) | VS = ±10 V, VD = ∓10 V<br>V+ = 10 V, V− = −20 V                                                                         | Room Hot          | 0.05             |                          | 10<br>1000       |                         | 15<br>300        | nA   |    |
|                                       |         | VS = ±7.5 V, VD = ∓7.5 V                                                                                                | Room Hot          | 0.05             |                          | 10<br>1000       |                         | 15<br>300        |      |    |
| Drain Off Leakage Current             | ID(off) | VS = ±10 V, VD = ∓10 V<br>V+ = 10 V, V− = −20 V                                                                         | Room Hot          | 0.04             |                          | 10<br>1000       |                         | 15<br>300        |      |    |
|                                       |         | VS = ±7.5 V, VD = ∓7.5 V                                                                                                | Room Hot          | 0.03             |                          | 10<br>1000       |                         | 15<br>300        |      |    |
| Channel On Leakage Current            | ID(on)  | VD = VS = ±7.5 V                                                                                                        | Room Hot          | −0.1             | −2<br>−200               |                  | −10<br>−200             |                  |      |    |
| Saturation Drain Current              | IDSS    | 2 ms Pulse Duration                                                                                                     | Room              | 300              |                          |                  |                         |                  | mA   |    |
| Digital Input                         |         |                                                                                                                         |                   |                  |                          |                  |                         |                  |      |    |
| Input Current with Input Voltage High | IINH    | VIN = 5 V                                                                                                               | Room Hot          | <0.01            |                          | 10<br>20         |                         | 10<br>20         | μA   |    |
| Input Current with Input Voltage Low  | IINL    | VIN = 0 V                                                                                                               | Full              | −30              | −250                     |                  | −250                    |                  |      |    |
| Dynamic Characteristics               |         |                                                                                                                         |                   |                  |                          |                  |                         |                  |      |    |
| Turn-On Time                          | ton     | See Switching Time Test Circuit                                                                                         |                   | Room             | 240                      |                  | 400                     |                  | 600  | ns |
| Turn-Off Time                         | toff    |                                                                                                                         |                   | Room             | 140                      |                  | 200                     |                  | 220  |    |
| Source-Off Capacitance                | CS(off) | f = 1 MHz                                                                                                               | VS = −5 V, ID = 0 | Room             | 21                       |                  |                         |                  | pF   |    |
| Drain-Off Capacitance                 | CD(off) |                                                                                                                         | VD = −5 V, IS = 0 | Room             | 17                       |                  |                         |                  |      |    |
| Channel-On Capacitance                | CD(on)  |                                                                                                                         | VD = VS = 0 V     | Room             | 17                       |                  |                         |                  |      |    |
| Off Isolation                         | OIRR    | f = 1 MHz, RL = 75 Ω                                                                                                    |                   | Room             | >55                      |                  |                         |                  | dB   |    |
| Power Supplies                        |         |                                                                                                                         |                   |                  |                          |                  |                         |                  |      |    |
| Positive Supply Current               | I+      | VIN = 0 V, or 5 V                                                                                                       |                   | Room             | 0.6                      |                  | 1.5                     |                  | 1.5  | mA |
| Negative Supply Current               | I−      |                                                                                                                         |                   | Room             | −2.7                     | −5               |                         | −5               |      |    |
| Logic Supply Current                  | IL      |                                                                                                                         |                   | Room             | 3.1                      |                  | 4.5                     |                  | 4.5  |    |
| Reference Supply Current              | IR      |                                                                                                                         |                   | 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.



# DG183/184/185

Vishay Siliconix

## SPECIFICATIONS<sup>a</sup> FOR DG184

| Parameter                             | Symbol              | Test Conditions<br>Unless Specified<br><br>V <sup>+</sup> = 15 V, V <sup>-</sup> = -15 V, V <sub>L</sub> = 5 V<br>V <sub>R</sub> = 0 V, V <sub>IN</sub> = 0.8 V or 2 V <sup>f</sup> | Temp <sup>b</sup>                         | Typ <sup>c</sup> | A Suffix<br>-55 to 125°C |                  | B Suffix<br>-25 to 85°C |                  | Unit |    |
|---------------------------------------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|------------------|--------------------------|------------------|-------------------------|------------------|------|----|
|                                       |                     |                                                                                                                                                                                     |                                           |                  | Min <sup>d</sup>         | Max <sup>d</sup> | Min <sup>d</sup>        | Max <sup>d</sup> |      |    |
| Analog Switch                         |                     |                                                                                                                                                                                     |                                           |                  |                          |                  |                         |                  |      |    |
| Analog Signal Range <sup>e</sup>      | V <sub>ANALOG</sub> |                                                                                                                                                                                     | Full                                      |                  | -7.5                     | 15               | -7.5                    | 15               | V    |    |
| Drain-Source On-Resistance            | r <sub>DS(on)</sub> | I <sub>S</sub> = -10 mA, V <sub>D</sub> = -7.5 V                                                                                                                                    | Room Full                                 | 22               |                          | 30<br>60         |                         | 50<br>75         | Ω    |    |
| Source Off Leakage Current            | I <sub>S(off)</sub> | V <sub>S</sub> = ±10 V, V <sub>D</sub> = ∓10 V<br>V <sup>+</sup> = 10 V, V <sup>-</sup> = -20 V                                                                                     | Room Hot                                  | 0.06             |                          | 1<br>100         |                         | 5<br>100         | nA   |    |
|                                       |                     | V <sub>S</sub> = ±7.5 V, V <sub>D</sub> = ∓7.5 V                                                                                                                                    | Room Hot                                  | 0.05             |                          | 1<br>100         |                         | 5<br>100         |      |    |
| Drain Off Leakage Current             | I <sub>D(off)</sub> | V <sub>S</sub> = ±10 V, V <sub>D</sub> = ∓10 V<br>V <sup>+</sup> = 10 V, V <sup>-</sup> = -20 V                                                                                     | Room Hot                                  | 0.4              |                          | 1<br>100         |                         | 5<br>100         |      |    |
|                                       |                     | V <sub>S</sub> = ±7.5 V, V <sub>D</sub> = ∓7.5 V                                                                                                                                    | Room Hot                                  | 0.3              |                          | 1<br>100         |                         | 5<br>100         |      |    |
| Channel On Leakage Current            | I <sub>D(on)</sub>  | V <sub>D</sub> = V <sub>S</sub> = ±7.5 V                                                                                                                                            | Room Hot                                  | -0.02            | -2<br>-200               |                  | -10<br>-200             |                  |      |    |
| Digital Input                         |                     |                                                                                                                                                                                     |                                           |                  |                          |                  |                         |                  |      |    |
| Input Current with Input Voltage High | I <sub>INH</sub>    | V <sub>IN</sub> = 5 V                                                                                                                                                               | Room Hot                                  | <0.01            |                          | 10<br>20         |                         | 10<br>20         | μA   |    |
| Input Current with Input Voltage Low  | I <sub>INL</sub>    | V <sub>IN</sub> = 0 V                                                                                                                                                               | Full                                      | -30              | -250                     |                  | -250                    |                  |      |    |
| Dynamic Characteristics               |                     |                                                                                                                                                                                     |                                           |                  |                          |                  |                         |                  |      |    |
| Turn-On Time                          | t <sub>on</sub>     | See Switching Time Test Circuit                                                                                                                                                     |                                           | Room             | 85                       |                  | 150                     |                  | 180  | ns |
| Turn-Off Time                         | t <sub>off</sub>    |                                                                                                                                                                                     |                                           | Room             | 95                       |                  | 130                     |                  | 150  |    |
| Source-Off Capacitance                | C <sub>S(off)</sub> | f = 1 MHz                                                                                                                                                                           | V <sub>S</sub> = -5 V, I <sub>D</sub> = 0 | Room             | 9                        |                  |                         |                  |      | pF |
| Drain-Off Capacitance                 | C <sub>D(off)</sub> |                                                                                                                                                                                     | V <sub>D</sub> = -5 V, I <sub>S</sub> = 0 | Room             | 6                        |                  |                         |                  |      |    |
| Channel-On Capacitance                | C <sub>D(on)</sub>  |                                                                                                                                                                                     | V <sub>D</sub> = V <sub>S</sub> = 0 V     | Room             | 14                       |                  |                         |                  |      |    |
| Off Isolation                         | OIRR                | f = 1 MHz, R <sub>L</sub> = 75 Ω                                                                                                                                                    |                                           | Room             | >50                      |                  |                         |                  |      | dB |
| Power Supplies                        |                     |                                                                                                                                                                                     |                                           |                  |                          |                  |                         |                  |      |    |
| Positive Supply Current               | I <sup>+</sup>      | V <sub>IN</sub> = 0 V, or 5 V                                                                                                                                                       |                                           | Room             | 0.6                      |                  | 3                       |                  | 3    | mA |
| Negative Supply Current               | I <sup>-</sup>      |                                                                                                                                                                                     |                                           | Room             | -2.7                     | -5.5             |                         | -5.5             |      |    |
| Logic Supply Current                  | I <sub>L</sub>      |                                                                                                                                                                                     |                                           | Room             | 3.1                      |                  | 4.5                     |                  | 4.5  |    |
| Reference Supply Current              | I <sub>R</sub>      |                                                                                                                                                                                     |                                           | 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.



**DG183/184/185**

**Vishay Siliconix**

**SPECIFICATIONS<sup>a</sup> FOR DG185**

| Parameter                             | Symbol  | Test Conditions<br>Unless Otherwise Specified<br><br>V+ = 15 V, V− = −15 V, VL = 5 V<br>VR = 0 V, VIN = 0.8 V or 2 V† | Temp <sup>b</sup> | Typ <sup>c</sup> | A Suffix<br>−55 to 125°C |                  | B Suffix<br>−25 to 85°C |                  | Unit |    |
|---------------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------|-------------------|------------------|--------------------------|------------------|-------------------------|------------------|------|----|
|                                       |         |                                                                                                                       |                   |                  | Min <sup>d</sup>         | Max <sup>d</sup> | Min <sup>d</sup>        | Max <sup>d</sup> |      |    |
| Analog Switch                         |         |                                                                                                                       |                   |                  |                          |                  |                         |                  |      |    |
| Analog Signal Range <sup>e</sup>      | VANALOG |                                                                                                                       | Full              |                  | −10                      | 15               | −10                     | 15               | V    |    |
| Drain-Source On-Resistance            | rDS(on) | IS = −10 mA, VD = −7.5 V                                                                                              | Room Full         | 35               |                          | 75<br>150        |                         | 100<br>150       | Ω    |    |
| Source Off Leakage Current            | IS(off) | VS = ±10 V, VD = ∓10 V<br>V+ = 10 V, V− = −20 V                                                                       | Room Hot          | 0.05             |                          | 1<br>100         |                         | 5<br>100         | nA   |    |
|                                       |         | VS = ±10 V, VD = ∓10 V                                                                                                | Room Hot          | 0.07             |                          | 1<br>100         |                         | 5<br>100         |      |    |
| Drain Off Leakage Current             | ID(off) | VS = ±10 V, VD = ∓10 V<br>V+ = 10 V, V− = −20 V                                                                       | Room Hot          | 0.4              |                          | 1<br>100         |                         | 5<br>100         |      |    |
|                                       |         | VS = ±10 V, VD = ∓10 V                                                                                                | Room Hot          | 0.3              |                          | 1<br>100         |                         | 5<br>100         |      |    |
| Channel On Leakage Current            | ID(on)  | VD = VS = ±10 V                                                                                                       | Room Hot          | −0.03            | −2<br>−200               |                  | −10<br>−200             |                  |      |    |
| Digital Input                         |         |                                                                                                                       |                   |                  |                          |                  |                         |                  |      |    |
| Input Current with Input Voltage High | IINH    | VIN = 5 V                                                                                                             | Room Hot          | <0.01            |                          | 10<br>20         |                         | 10<br>20         | μA   |    |
| Input Current with Input Voltage Low  | IINL    | VIN = 0 V                                                                                                             | Full              | −30              | −250                     |                  | −250                    |                  |      |    |
| Dynamic Characteristics               |         |                                                                                                                       |                   |                  |                          |                  |                         |                  |      |    |
| Turn-On Time                          | ton     | See Switching Time Test Circuit                                                                                       |                   | Room             | 120                      |                  | 250                     |                  | 300  | ns |
| Turn-Off Time                         | toff    |                                                                                                                       |                   | Room             | 100                      |                  | 130                     |                  | 150  |    |
| Source-Off Capacitance                | CS(off) | f = 1 MHz                                                                                                             |                   | Room             | 9                        |                  |                         |                  |      | pF |
| Drain-Off Capacitance                 | CD(off) |                                                                                                                       |                   | Room             | 6                        |                  |                         |                  |      |    |
| Channel-On Capacitance                | CD(on)  |                                                                                                                       |                   | Room             | 14                       |                  |                         |                  |      |    |
| Off Isolation                         | OIRR    | f = 1 MHz, RL = 75 Ω                                                                                                  |                   | Room             | >50                      |                  |                         |                  |      | dB |
| Power Supplies                        |         |                                                                                                                       |                   |                  |                          |                  |                         |                  |      |    |
| Positive Supply Current               | I+      | VIN = 0 V, or 5 V                                                                                                     |                   | Room             | 0.6                      |                  | 3                       |                  | 3    | mA |
| Negative Supply Current               | I−      |                                                                                                                       |                   | Room             | −2.7                     | −5.5             |                         | −5.5             |      |    |
| Logic Supply Current                  | IL      |                                                                                                                       |                   | Room             | 3.1                      |                  | 4.5                     |                  | 4.5  |    |
| Reference Supply Current              | IR      |                                                                                                                       |                   | Room             | −1                       | −2               |                         | −2               |      |    |

**Notes:**

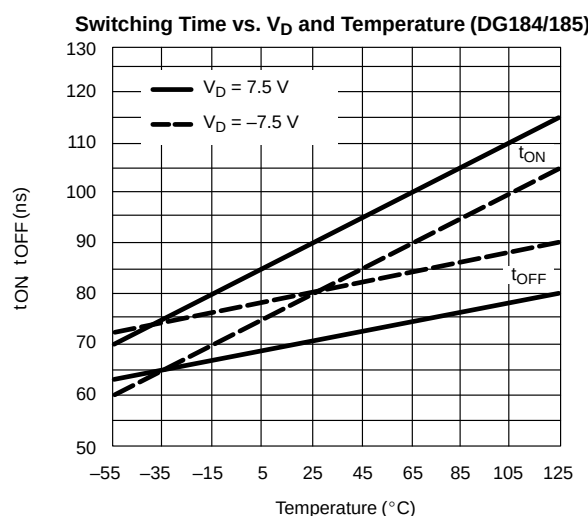
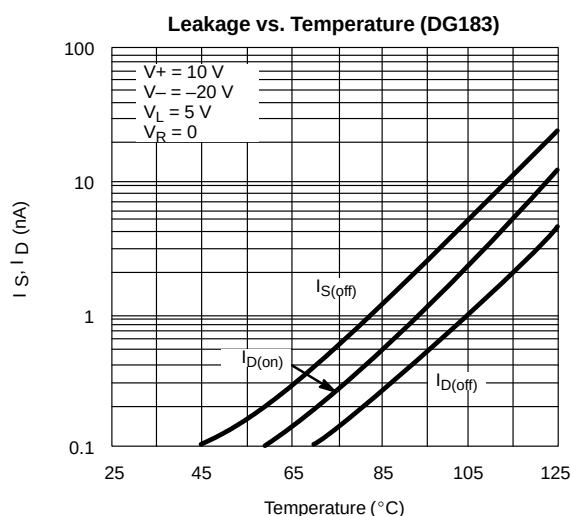
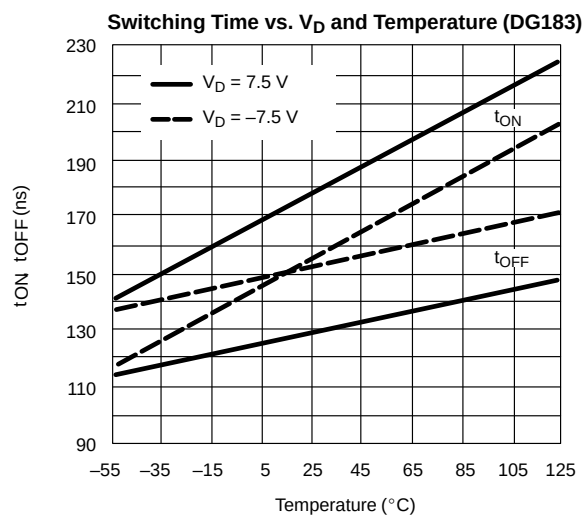
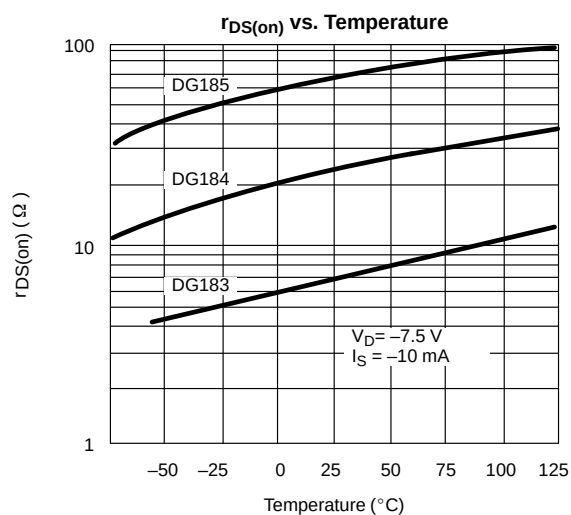
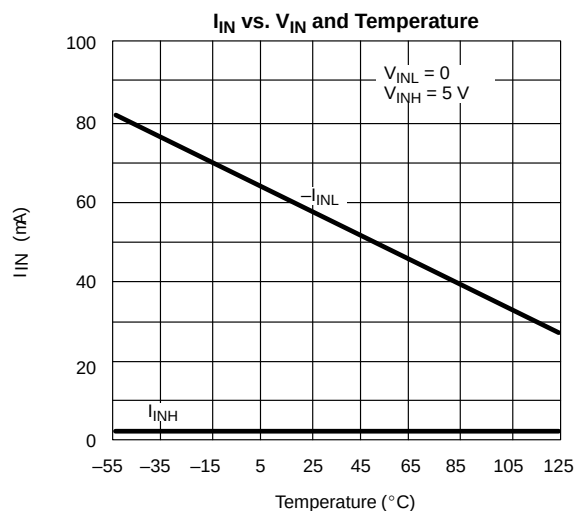
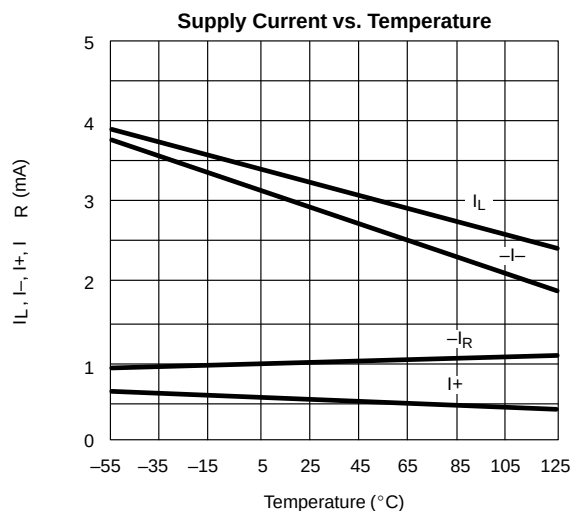
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# DG183/184/185

Vishay Siliconix



## TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

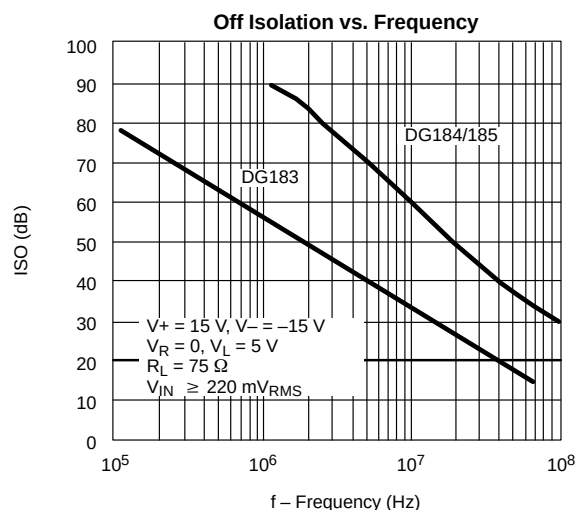
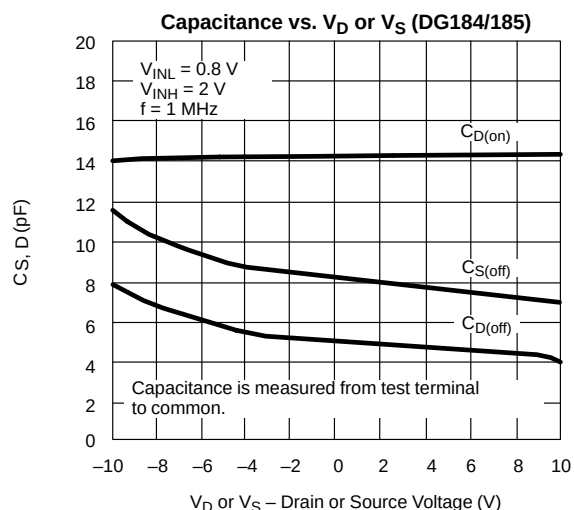
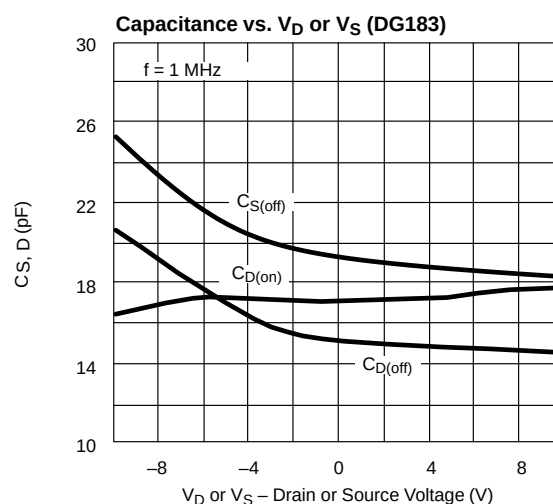
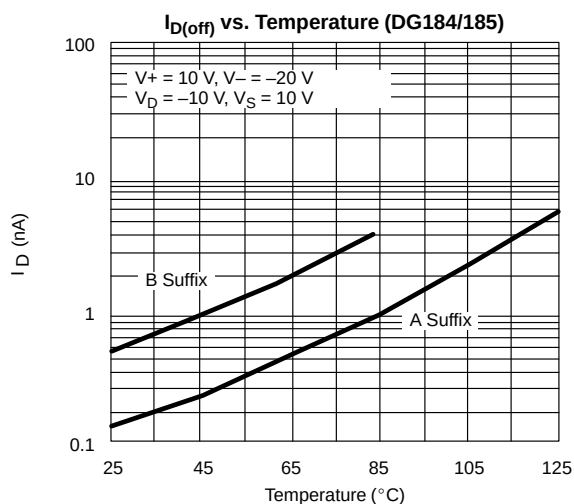




# DG183/184/185

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## TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)









## Legal Disclaimer Notice

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