## Description

The DGD2117 and DGD2118 are high voltage / high speed gate drivers capable of driving one N-Channel MOSFET or IGBT in a bootstrap configuration. High voltage processing techniques enable the DGD2117 and DGD2118 to switch at 600V.

The DGD2117 and DGD2118 logic inputs are compatible with standard CMOS outputs. The driver outputs feature high pulse current buffers designed for minimum driver cross conduction. The single floating channel can be used in high side and low side configuration.

The DGD2117 and DGD2118 are offered in SO-8 (Type TH) package and the operating temperature extends from -40°C to +125°C.

## Applications

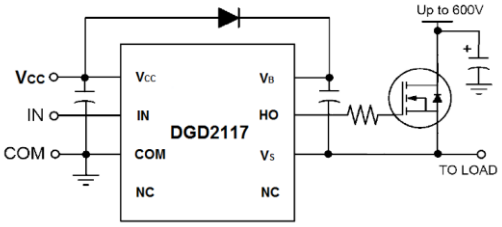
- DC-DC Converters
- DC-AC Inverters
- AC-DC Power Supplies
- Motor Controls
- Class D Power Amplifiers

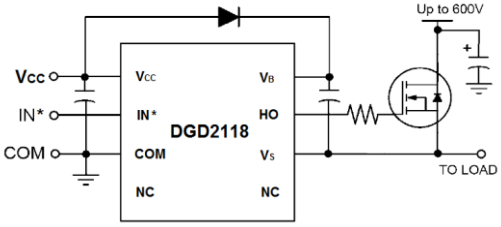
## Features

- Floating Channel in Bootstrap Operation to 600V
- Drives One N-Channel MOSFET or IGBT
- Outputs Tolerant to Negative Transients
- Wide Logic Supply: 10V to 20V
- Schmitt Triggered Logic Input with Internal Pull Down
- Undervoltage Lockout
- Extended Temperature Range: -40°C to +125°C
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

## Mechanical Data

- Case: SO-8 (Type TH)
- Case Material: Molded Plastic. "Green" Molding Compound.
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 3 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.075 grams (Approximate)




Typical Configuration

SO-8 (Type TH)
Top View

## Ordering Information (Note 4)

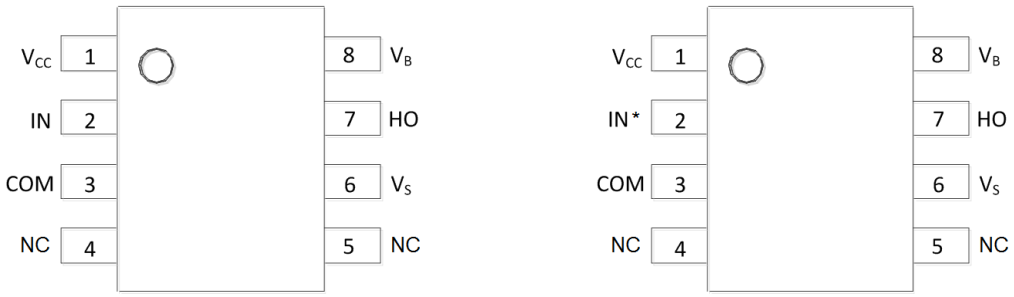
| Part number | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---|---|---|---|---|
| DGD2117S8-13 | DGD2117 | 13 | 12 | 2,500 |
| DGD2118S8-13 | DGD2118 | 13 | 12 | 2,500 |

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

## Marking Information


= Manufacturer's Marking
DGD211x = Product Type Marking Code (See Table Above)
YY = Year (ex: 16 = 2016)
WW = Week (01 to 53)

## Pin Diagrams



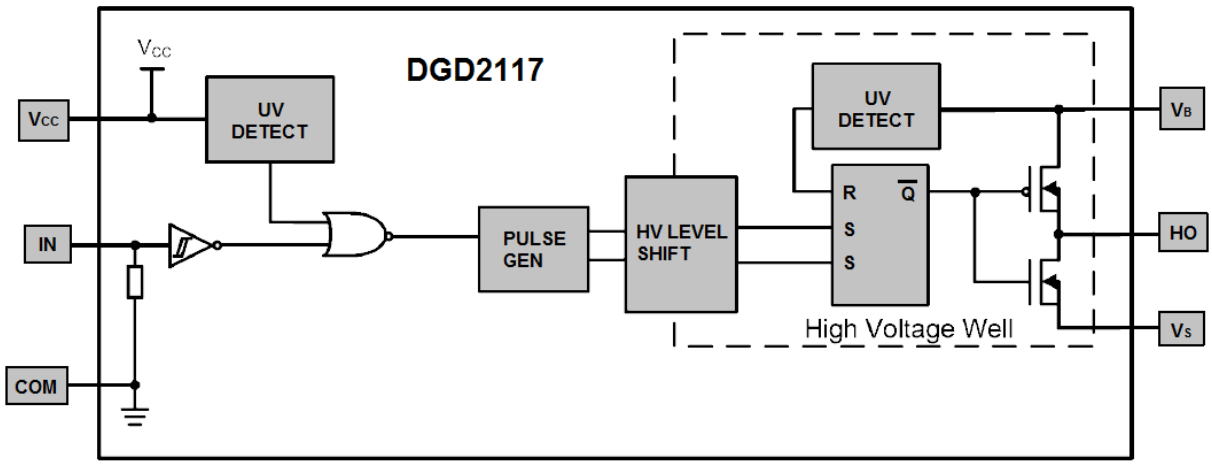

DGD2117 DGD2118

Top View SO-8 (Type TH)

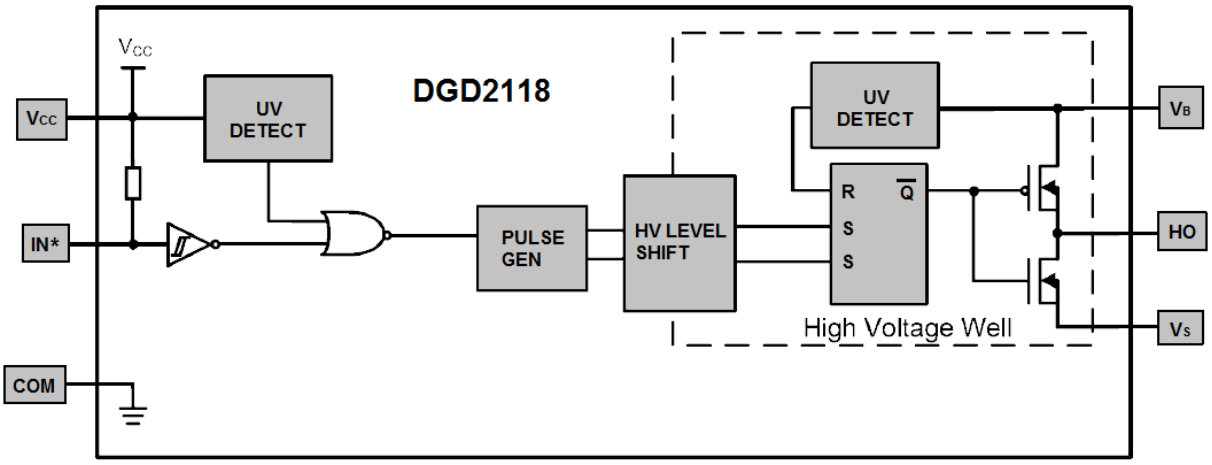
## Pin Descriptions

| Pin Number | Pin Name | Function |
|---|---|---|
| 1 | $V_{CC}$ | Logic and gate driver supply |
| 2 | IN | DGD2117 Logic input for gate driver output (HO), in phase with HO |
| 2 | IN* | DGD2118 Logic input for gate driver output (HO), out of phase with HO |
| 3 | COM | Logic ground |
| 4, 5 | NC | No Connection (No Internal Connection) |
| 6 | $V_S$ | High-side floating supply return |
| 7 | HO | High-side gate drive output |
| 8 | $V_B$ | High-side floating supply |

## Functional Block Diagram



## Functional Block Diagram (Cont.)




## Absolute Maximum Ratings (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| High-side Floating Supply Voltage | $V_B$ | -0.3 to +624 | V |
| High-side Floating Supply Offset Voltage | $V_S$ | $V_B$-24 to $V_B$+0.3 | V |
| High-side Floating Output Voltage | $V_{HO}$ | $V_S$-0.3 to $V_B$+0.3 | V |
| Logic Supply Voltage | $V_{CC}$ | -0.3 to +24 | V |
| Logic Input Voltage | $V_{IN}$ | -0.3 to $V_{CC}$+0.3 | V |
| Allowable Offset Supply Voltage Transient | $dV_S$ / dt | 50 | V/ns |

## Thermal Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Power Dissipation Linear Derating Factor (Note 5) | $P_D$ | 0.625 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | $R_{\theta JA}$ | 200 | °C/W |
| Thermal Resistance, Junction to Case (Note 6) | $R_{\theta JC}$ | 45 | °C/W |
| Operating Temperature | $T_J$ | +150 | °C |
| Lead Temperature (Soldering, 10s) | $T_L$ | +300 | |
| Storage Temperature Range | $T_{STG}$ | -55 to +150 | |

Note: 5. When mounted on a standard JEDEC 2-layer FR-4 board.

## Recommended Operating Conditions

| Parameter | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| High Side Floating Supply Absolute Voltage | $V_B$ | $V_S$ + 10 | $V_S$ + 20 | V |
| High Side Floating Supply Offset Voltage | $V_S$ | (Note 6) | 600 | V |
| High Side Floating Output Voltage | $V_{HO}$ | $V_S$ | $V_B$ | V |
| Low Side and Logic Fixed Supply Voltage | $V_{CC}$ | 10 | 20 | V |
| Logic Input Voltage | $V_{IN}$ | 0 | $V_{CC}$ | V |
| Ambient Temperature | $T_A$ | -40 | +125 | °C |

Note: 6. Logic operation for $V_S$ = -5V to +600V. Logic state held for $V_S$ of -5V to -$V_{BS}$.

## DC Electrical Characteristics ($V_{BIAS}$ ($V_{CC}$, $V_{BS}$) = 15V, @$T_A$ = +25°C, unless otherwise specified.) (Note 7)

| Parameter | | Symbol | Min | Typ | Max | Unit | Conditions |
|---|---|---|---|---|---|---|---|
| Logic “1” (DGD2117) & Logic “0” (DGD2118) Input Voltage | | $V_{IH}$ | 9.5 | – | – | V | – |
| Logic “0” (DGD2117) & Logic “1” (DGD2118) Input Voltage | | $V_{IL}$ | – | – | 6.0 | V | – |
| High Level Output Voltage, $V_{BIAS}$ - $V_O$ | | $V_{OH}$ | – | 0.05 | 0.2 | V | $I_O$ = 2mA |
| Low Level Output Voltage, $V_O$ | | $V_{OL}$ | – | 0.02 | 0.1 | V | $I_O$ = 2mA |
| Offset Supply Leakage Current | | $I_{LK}$ | – | – | 50 | µA | $V_B$ = $V_S$ = 600V |
| Quiescent $V_{BS}$ Supply Current | | $I_{BSQ}$ | – | 50 | 240 | µA | $V_{IN}$ = 0V or $V_{CC}$ |
| Quiescent $V_{CC}$ Supply Current | | $I_{CCQ}$ | – | 70 | 340 | µA | $V_{IN}$ = 0V or $V_{CC}$ |
| Logic “1” Input Bias Current | DGD2117 | $I_{IN+}$ | – | 20 | 40 | µA | $V_{IN}$ = $V_{CC}$ |
| | DGD2118 | | | | | | $V_{IN}$ = 0V |
| Logic “0” Input Bias Current | DGD2117 | $I_{IN-}$ | – | – | 5.0 | µA | $V_{IN}$ = 0V |
| | DGD2118 | | | | | | $V_{IN}$ = $V_{CC}$ |
| $V_{BS}$ Supply Under-voltage Positive Going Threshold | | $V_{BSUV+}$ | 7.6 | 8.6 | 9.6 | V | – |
| $V_{BS}$ Supply Under-voltage Negative Going Threshold | | $V_{BSUV-}$ | 7.2 | 8.2 | 9.2 | V | – |
| $V_{CC}$ Supply Under-voltage Positive Going Threshold | | $V_{CCUV+}$ | 7.6 | 8.6 | 9.6 | V | – |
| $V_{CC}$ Supply Under-voltage Negative Going Threshold | | $V_{CCUV-}$ | 7.2 | 8.2 | 9.2 | V | – |
| Output High Short Circuit Pulsed Current | | $I_{O+}$ | 200 | 290 | – | mA | $V_O$ = 0V, $V_{IN}$ = Logic “1”, PW ≤ 10µs |
| Output Low Short Circuit Pulsed Current | | $I_{O-}$ | 420 | 600 | – | mA | $V_O$ = 15V, $V_{IN}$ = Logic “0”, PW ≤ 10µs |

Note: 7. The $V_{IN}$ and $I_{IN}$ parameters are referenced to COM and are applicable to the logic input pins: IN and IN*. The $V_O$ and $I_O$ parameters are referenced to COM and are applicable to the output pin: HO.

## AC Electrical Characteristics ($V_{BIAS}$ ($V_{CC}$, $V_{BS}$) = 15V, $C_L$ = 1000pF, @$T_A$ = +25°C, unless otherwise specified.)

| Parameter | Symbol | Min | Typ | Max | Unit | Conditions |
|---|---|---|---|---|---|---|
| Turn-on Propagation Delay | $t_{ON}$ | – | 125 | 200 | ns | $V_S$ = 0V |
| Turn-off Propagation Delay | $t_{OFF}$ | – | 105 | 180 | ns | $V_S$ = 600V |
| Turn-on Rise Time | $t_r$ | – | 75 | 130 | ns | – |
| Turn-off Fall Time | $t_f$ | – | 35 | 65 | ns | – |

## Timing Waveforms

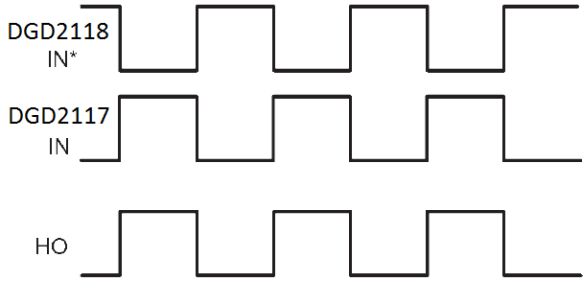



**Figure 1.** Input / Output Timing Diagram

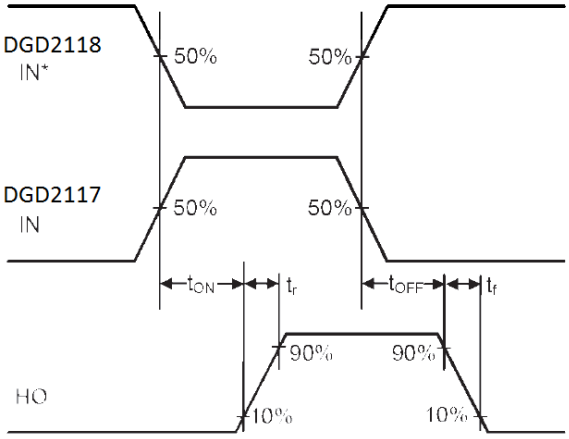



**Figure 2.** Switching Time Waveform Definitions

## Typical Performance Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

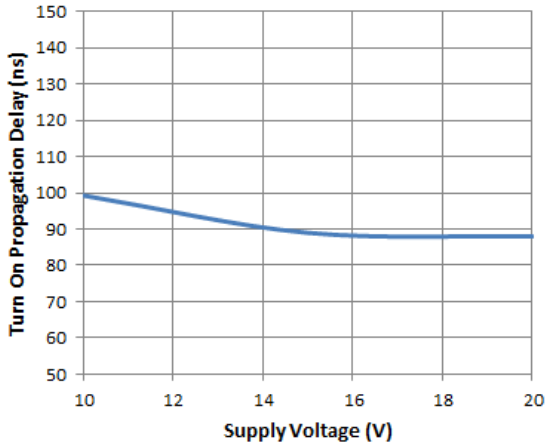



**Figure 3.** Turn-on Propagation Delay vs. Supply Voltage

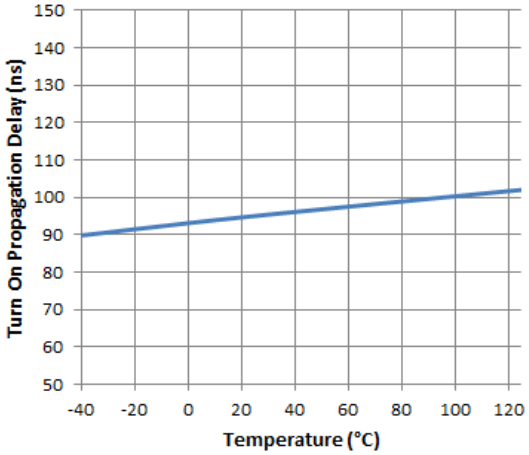



**Figure 4.** Turn-on Propagation Delay vs. Temperature

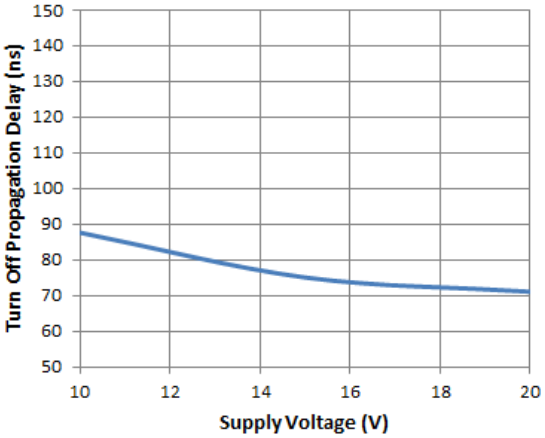



**Figure 5.** Turn-off Propagation Delay vs. Supply Voltage

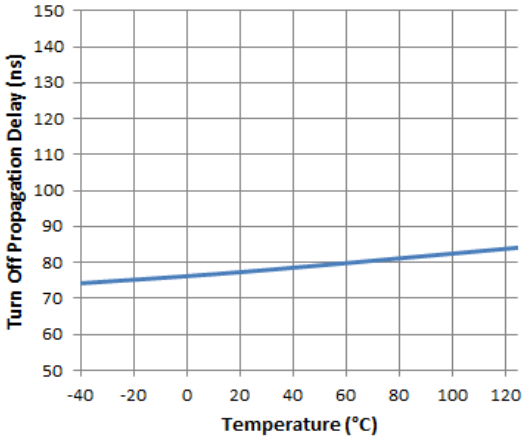



**Figure 6.** Turn-off Propagation Delay vs. Temperature

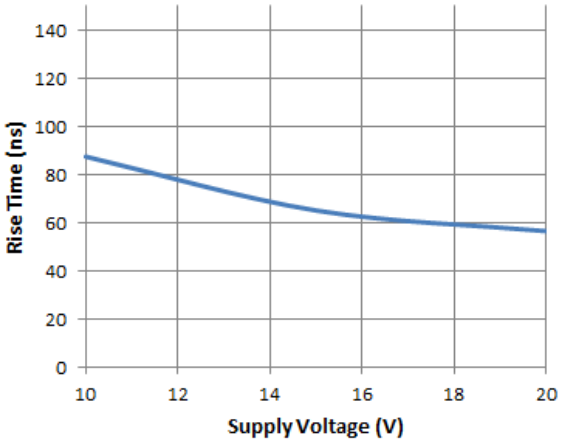



**Figure 7.** Rise Time vs. Supply Voltage

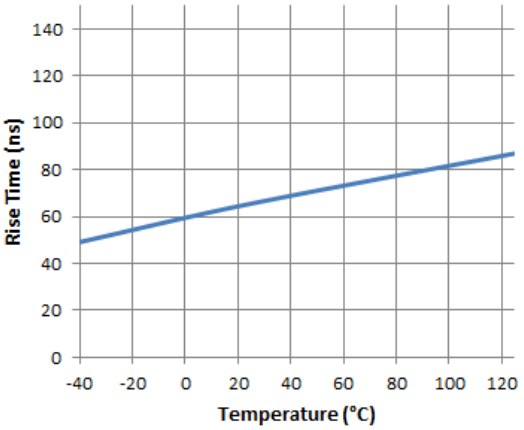



**Figure 8.** Rise Time vs. Temperature

## Typical Performance Characteristics (Cont.)

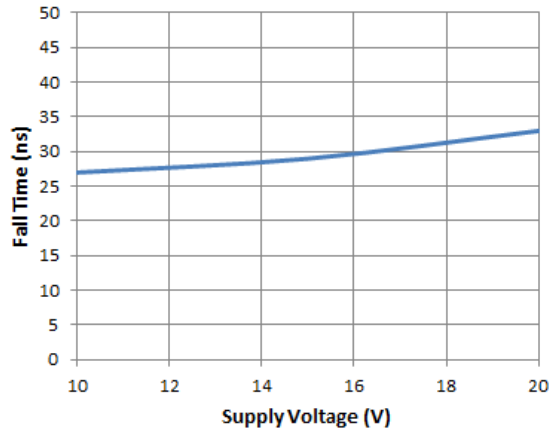



**Figure 9.** Fall Time vs. Supply Voltage

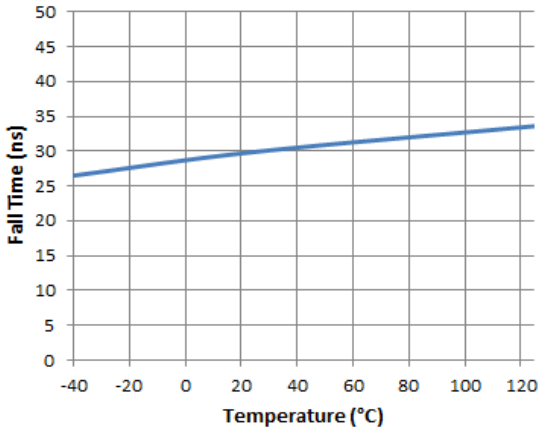



**Figure 10.** Fall Time vs. Temperature

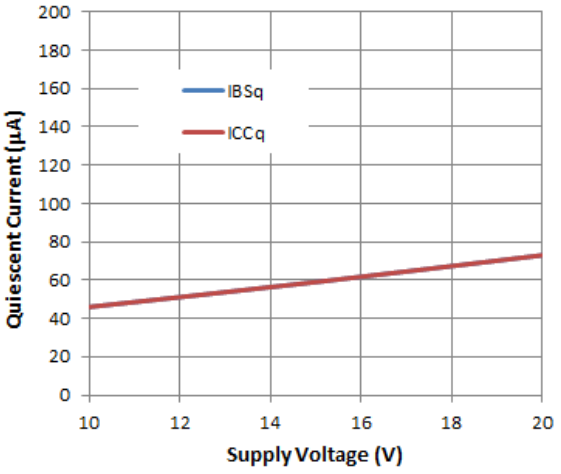



**Figure 11.** Quiescent Current vs. Supply Voltage

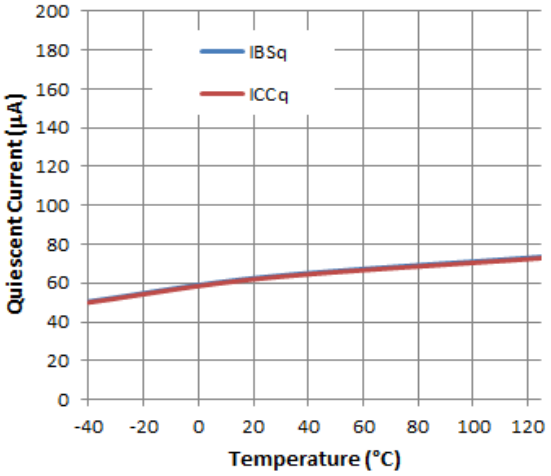



**Figure 12.** Quiescent Current vs. Temperature

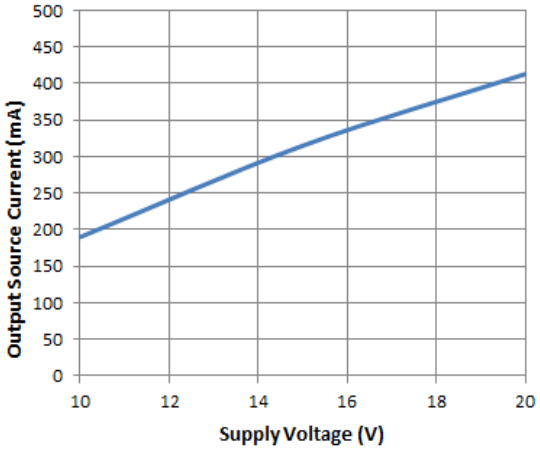



**Figure 13.** Output Source Current vs. Supply Voltage

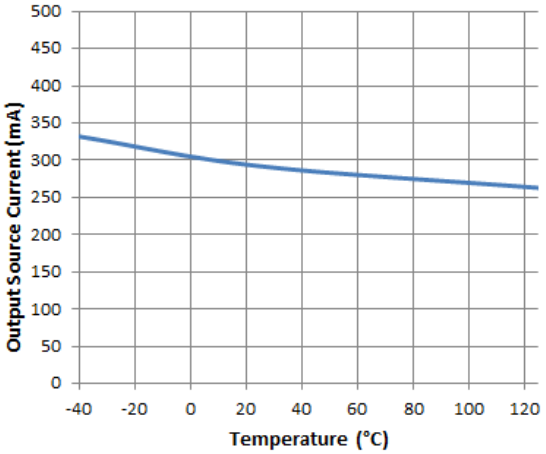



**Figure 14.** Output Source Current vs. Temperature

## Typical Performance Characteristics (Cont.)

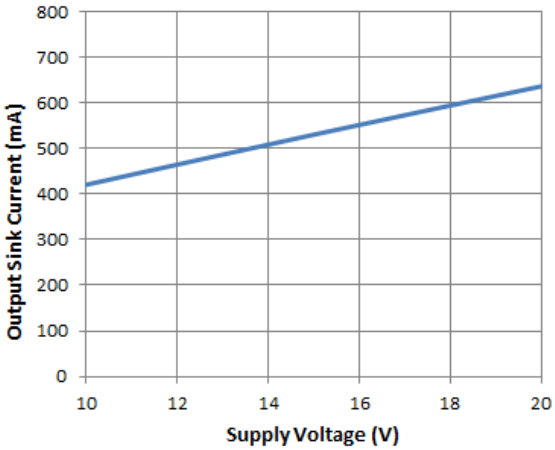



**Figure 15.** Output Sink Current vs. Supply Voltage

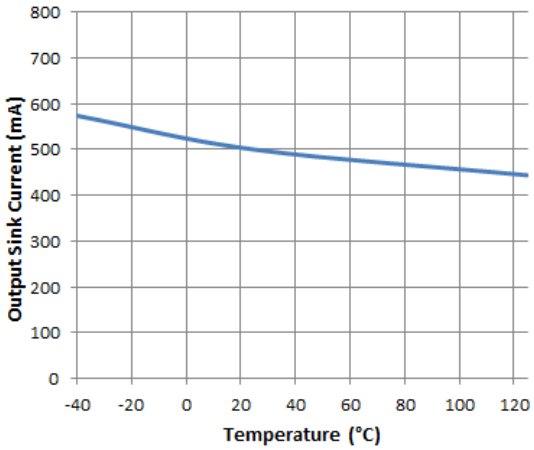



**Figure 16.** Output Sink Current vs. Temperature

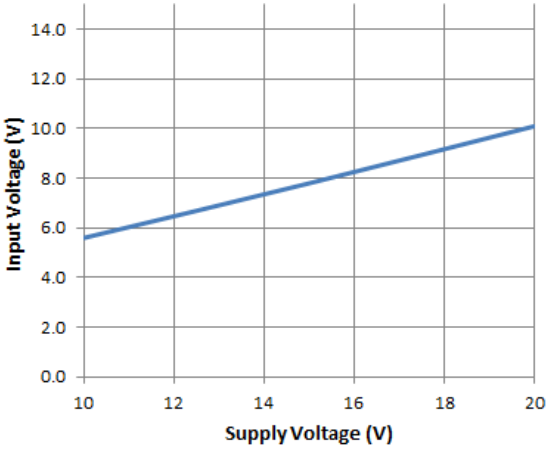



**Figure 17.** DGD2117 Logic 1 (DGD2118 Logic 0) Input Voltage vs. Supply Voltage

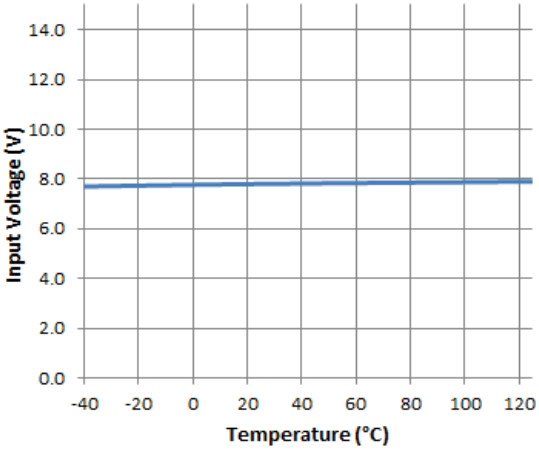



**Figure 18.** DGD2117 Logic 1 (DGD2118 Logic 0) Input Voltage vs. Temperature

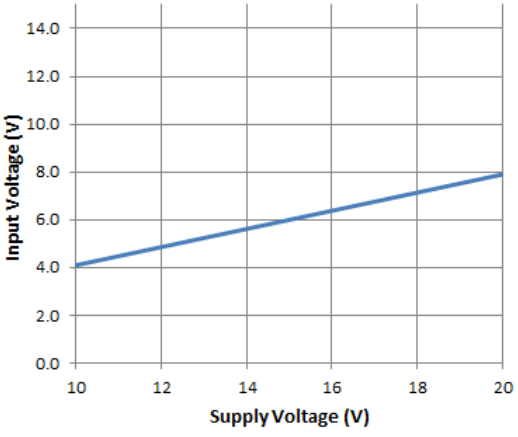



**Figure 19.** DGD2117 Logic 0 (DGD2118 Logic 1) Input Voltage vs. Supply Voltage

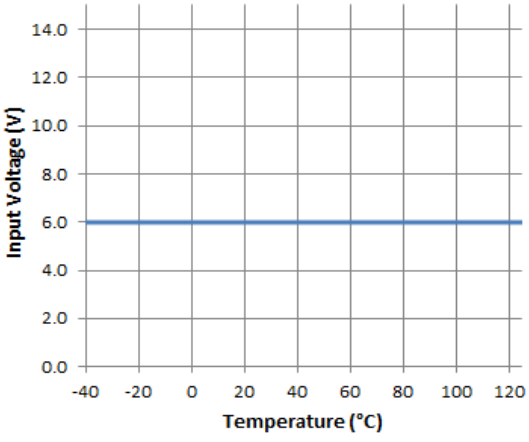



**Figure 20.** DGD2117 Logic 0 (DGD2118 Logic 1) Input Voltage vs. Temperature

## Typical Performance Characteristics (Cont.)

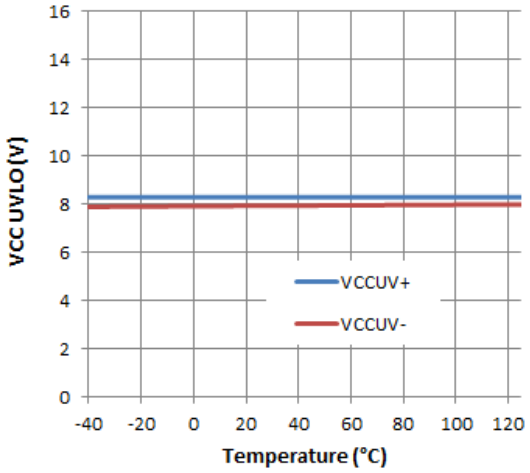



**Figure 21.** VCC UVLO vs. Temperature

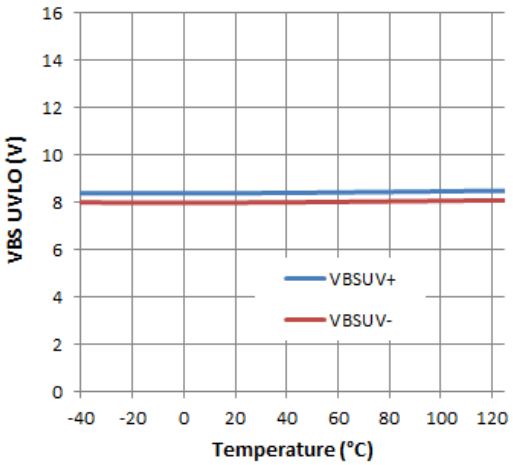



**Figure 22.** VBS UVLO vs. Temperature

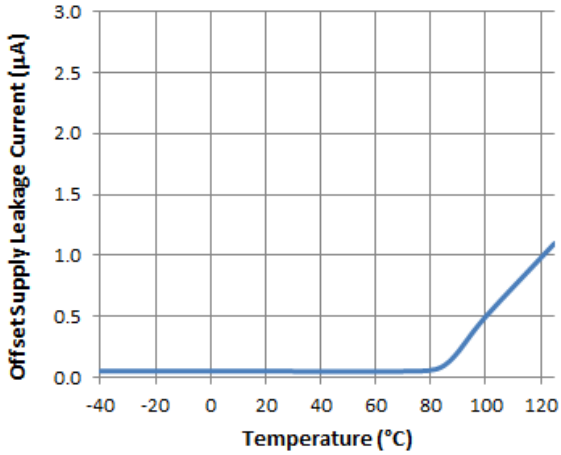
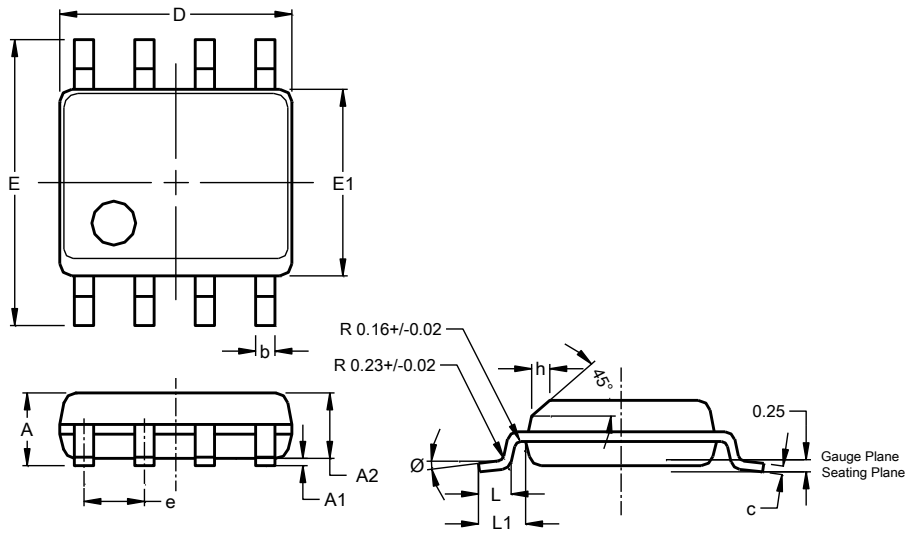



**Figure 23.** Offset Supply Leakage Current vs. Temperature

## Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

**SO-8 (Type TH)**

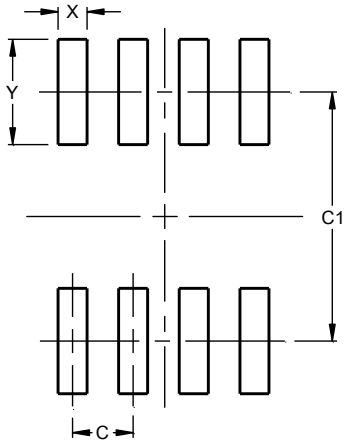



| SO-8 (Type TH) | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 1.35 | 1.75 | -- |
| **A1** | 0.10 | 0.25 | -- |
| **A2** | -- | -- | 1.45 |
| **b** | 0.35 | 0.51 | -- |
| **c** | 0.190 | 0.248 | -- |
| **D** | 4.80 | 5.00 | 4.90 |
| **E** | 5.80 | 6.20 | 6.00 |
| **E1** | 3.80 | 4.00 | 3.90 |
| **e** | -- | -- | 1.27 |
| **h** | 0.25 | 0.50 | -- |
| **L** | 0.41 | 1.27 | -- |
| **L1** | -- | -- | 1.04 |
| **Ø** | 0° | 8° | -- |
| **All Dimensions in mm** | | | |

## Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

**SO-8 (Type TH)**




| Dimensions | Value (in mm) |
|---|---|
| **C** | 1.27 |
| **C1** | 5.20 |
| **X** | 0.60 |
| **Y** | 2.20 |

Note: For high voltage applications, the appropriate industry sector guidelines should be considered with regards to creepage and clearance distances between device Terminals and PCB tracking.

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1. are intended to implant into the body, or

2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

Customers represent that they have all necessary expertise in the safety and regulatory ramifications of their life support devices or systems, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of Diodes Incorporated products in such safety-critical, life support devices or systems, notwithstanding any devices- or systems-related information or support that may be provided by Diodes Incorporated. Further, Customers must fully indemnify Diodes Incorporated and its representatives against any damages arising out of the use of Diodes Incorporated products in such safety-critical, life support devices or systems.



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