

Description

The DGD0579UFNQ is a high-frequency, high-side and low-side gate driver with internal bootstrap diode capable of driving N-channel MOSFETs in a half-bridge configuration. The floating high-side driver is rated up to 100V in a bootstrap configuration.

The DGD0579UFNQ logic inputs are compatible with standard TTL and CMOS levels (down to 3.3V) to interface easily with MCUs. A UVLO for the high side and low side will protect MOSFETs with loss of supply. Cross conduction prevention logic also protects MOSFETs by preventing the HO and LO from being on at the same time.

Fast and well-matched propagation delays allow for a higher switching frequency, which enables a smaller, more compact power switching design that uses smaller associated components. To minimize space, an internal bootstrap diode is included. The DGD0579UFNQ is offered in the U-DFN3030-10 package and operates over an extended -40°C to +125°C temperature range.

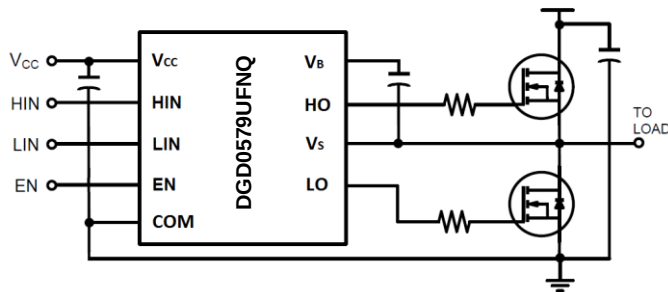
Features

- 100V Floating High-Side Driver
- Drives Two N-Channel MOSFETs in a Half-Bridge Configuration
- 1.5A Source/2.5A Sink Output Current Capability
- Internal Bootstrap Diode
- Undervoltage Lockout for High-Side and Low-Side Drivers
- Delay Matching Maximum of 10ns
- Propagation Delay Typical of 60ns
- Logic Input (HIN, LIN, and EN) 3.3V Capability
- Ultra Low Standby Currents (< 1μA)
- 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)**
- **The DGD0579UFNQ is suitable for automotive applications requiring specific change control; this part is AEC-Q100 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**

<https://www.diodes.com/quality/product-definitions/>

Applications

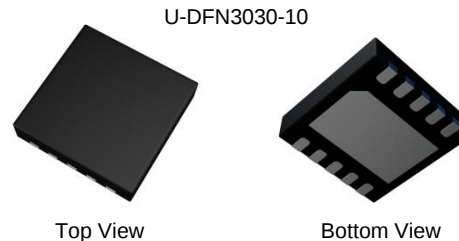
- DC-DC converters
- Motor controls
- Battery powered hand tools
- Class-D power amplifiers



Typical Configuration

Mechanical Data

- Package: U-DFN3030-10
- Package Material: Molded Plastic. "Green" Molding Compound
UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 3 per J-STD-020
- Terminals: Finish – Matte Tin Finish
Solderable per MIL-STD-202, Method 208 (63)
- Weight: 0.017 grams (Approximate)



Top View

Bottom View

Ordering Information (Note 4)

Orderable Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
DGD0579UFNQ-7	U-DFN3030-10	DGD0579U	7	8	3,000	Reel

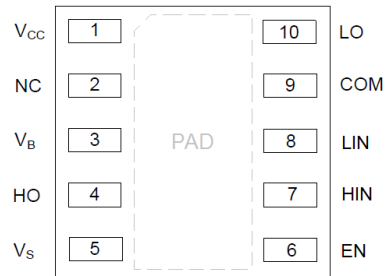
- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen- 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



DGD0579U = Product Type Marking Code
YY = Year (ex: 23 = 2023)
WW = Week (01 to 53)

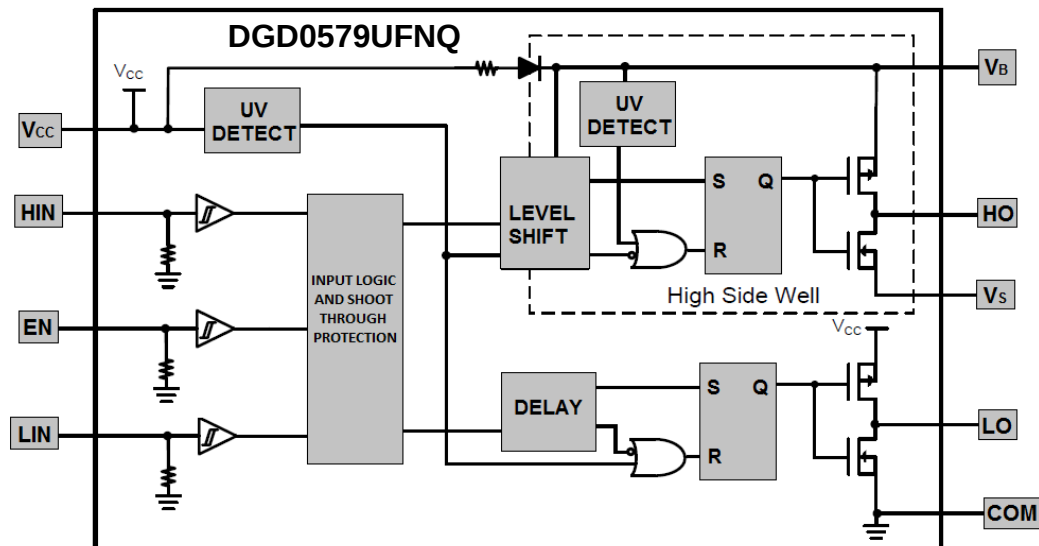
Pin Diagrams



Pin Descriptions

Pin Number	Pin Name	Function
1	V _{CC}	Low-Side and Logic Supply
2	NC	No Connect (No Internal Connection)
3	V _B	High-Side Floating Supply
4	HO	High-Side Gate Drive Output
5	V _S	High-Side Floating Supply Return
6	EN	Logic Input Enable, A Logic Low Turns Off Gate Driver
7	HIN	Logic Input for High-Side Gate Driver, in Phase with HO
8	LIN	Logic Input for Low-Side Gate Driver, in Phase with LO
9	COM	Low-Side and Logic Return
10	LO	Low-Side Gate Drive Output
PAD	Substrate	Connect to COM on PCB

Functional Block Diagram



Absolute Maximum Ratings (@T_A = +25°C, unless otherwise specified.) (Note 5)

Characteristic	Symbol	Value	Unit
High-Side Floating Positive Supply Voltage	V _B	-0.3 to +120	V
High-Side Floating Negative Supply Voltage	V _S	V _B -20 to V _B +0.3	V
High-Side Floating Output Voltage	V _{HO}	V _S -0.3 to V _B +0.3	V
Offset Supply Voltage Transient	dV _S /dt	50	V/ns
Logic and Low-Side Fixed Supply Voltage	V _{CC}	-0.3 to +20	V
Low-Side Output Voltage	V _{LO}	-0.3 to V _{CC} +0.3	V
Logic Input Voltage (HIN, LIN and EN)	V _{IN}	-0.3 to V _{CC} +0.3	V

Note: 5. Stresses greater than those listed under *Absolute Maximum Ratings* can cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions* is not implied. Exposure to *Absolute Maximum Ratings* for extended periods can affect device reliability.

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

Characteristic	Symbol	Value	Unit
Power Dissipation Linear Derating Factor (Note 6)	P _D	0.4	W
Thermal Resistance, Junction to Ambient (Note 6)	R _{θJA}	64	°C/W
Thermal Resistance, Junction to Case (Note 6)	R _{θJC}	42	°C/W
Operating Temperature	T _J	+150	°C
Lead Temperature (soldering, 10s)	T _L	+300	
Storage Temperature Range	T _{STG}	-55 to +150	

Note: 6. When mounted on a standard JEDEC 2-layer FR-4 board.

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
High-Side Floating Supply	V _B	V _S + 6.3	V _S + 18	V
High-Side Floating Supply Offset Voltage	V _S	(Note 7)	100 (Note 8)	V
High-Side Floating Output Voltage	V _{HO}	V _S	V _B	V
Logic and Low Side Fixed Supply Voltage	V _{CC}	7	18	V
Low-Side Output Voltage	V _{LO}	0	V _{CC}	V
Logic Input Voltage (HIN, LIN and EN)	V _{IN}	0	5	V
Ambient Temperature	T _A	-40	+125	°C

Notes: 7. Logic operation for V_S of -5V to +100V.
8. Provided V_B doesn't exceed absolute maximum rating of 120V.

DC Electrical Characteristics ($V_{CC} = V_{BS} = 12V$, $COM = V_S = 0V$, $@T_A = +25^\circ C$, unless otherwise specified.) (Note 9)

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Logic "1" Input Voltage (HIN, LIN)	V_{IH}	2.5	—	—	V	—
Logic "0" Input Voltage (HIN, LIN)	V_{IL}	—	—	0.8	V	—
Enable Logic "1" Input Voltage (EN)	V_{EIH}	1.6	—	—	V	—
Enable Logic "0" Input Voltage (EN)	V_{EIL}	—	—	0.5	V	—
Input Voltage Hysteresis	V_{INHYS}	—	0.7	—	V	—
High Level Output Voltage, $V_{BIAS} - V_O$	V_{OH}	—	0.05	0.3	V	$I_{O+} = 10mA$
Low Level Output Voltage, V_O	V_{OL}	—	0.02	0.1	V	$I_{O-} = 10mA$
Offset Supply Leakage Current	I_{LK}	—	0.1	1	μA	$V_B = V_S = 100V$
V_{CC} Shutdown Supply Current	I_{CCSD}	—	0	1	μA	$V_{IN} = 0V$ or $5V$, $V_{EN} = 0V$
V_{CC} Quiescent Supply Current	I_{CCQ}	—	80	150	μA	$V_{IN} = 0V$ or $5V$
V_{CC} Operating Supply Current	I_{CCOP}	—	8.2	—	mA	$f_S = 500kHz$, $C_L = 1nF$
V_{BS} Quiescent Supply Current	I_{BSQ}	—	50	100	μA	$V_{IN} = 0V$ or $5V$
V_{BS} Operating Supply Current	I_{BSOP}	—	8.0	—	mA	$f_S = 500kHz$, $C_L = 1nF$
Logic "1" Input Bias Current	I_{IN+}	—	—	50	μA	$V_{IN} = 5V$
Logic "0" Input Bias Current	I_{IN-}	—	—	5	μA	$V_{IN} = 0V$
V_{BS} Supply Undervoltage Positive Going Threshold	V_{BSUV+}	3.8	4.9	5.8	V	—
V_{BS} Supply Undervoltage Negative Going Threshold	V_{BSUV-}	3.3	4.5	5.3	V	—
V_{CC} Supply Undervoltage Positive Going Threshold	V_{CCUV+}	4.0	5.2	6.7	V	—
V_{CC} Supply Undervoltage Negative Going Threshold	V_{CCUV-}	3.5	4.7	6.2	V	—
Output High Short Circuit Pulsed Current	I_{O+}	1.0	1.5	—	A	$V_O = 0V$, $P_W \leq 10\mu s$
Output Low Short Circuit Pulsed Current	I_{O-}	1.5	2.5	—	A	$V_O = 15V$, $P_W \leq 10\mu s$
Forward Voltage of Bootstrap Diode	V_{F1}	—	0.6	0.75	V	$I_F = 100\mu A$
Forward Voltage of Bootstrap Diode	V_{F2}	—	1.4	1.75	V	$I_F = 100mA$

Note: 9. The V_{IN} and I_{IN} parameters are applicable to the logic pins: HIN, LIN, and EN. The V_O and I_O parameters are applicable to the respective output pins: HO and LO.

AC Electrical Characteristics ($V_{CC} = V_{BS} = 12V$, $COM = V_S = 0V$, $C_L = 1000pF$, $@T_A = +25^\circ C$, unless otherwise specified.)

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Turn-on Propagation Delay	t_{ON}	—	65	—	ns	—
Turn-off Propagation Delay	t_{OFF}	—	58	—	ns	$V_S = 100V$
Delay Matching, HO & LO Turn-on	t_{DM}	—	—	10	ns	—
Turn-on Rise Time	t_r	—	19	—	ns	—
Turn-off Fall Time	t_f	—	15	—	ns	—

Timing Waveforms

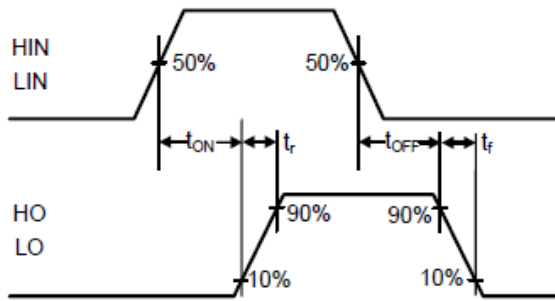


Figure 1. Switching Time Waveform Definitions

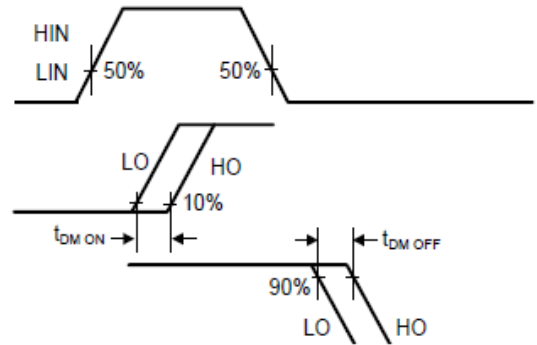


Figure 2. Delay Matching Waveform Definitions

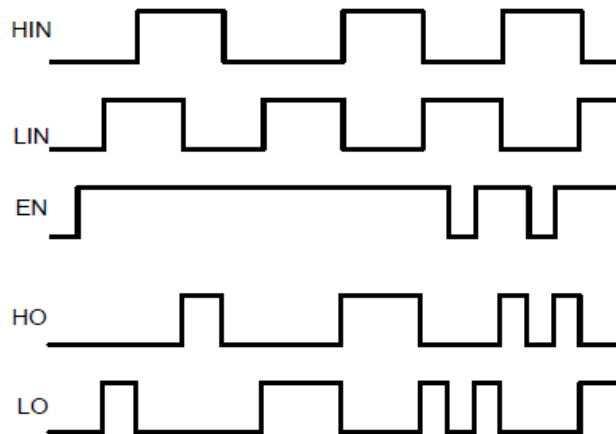


Figure 3. Input / Output Timing Diagram

Typical Performance Characteristics ($V_{CC} = 15V$, $@T_A = +25^\circ C$, unless otherwise specified.)

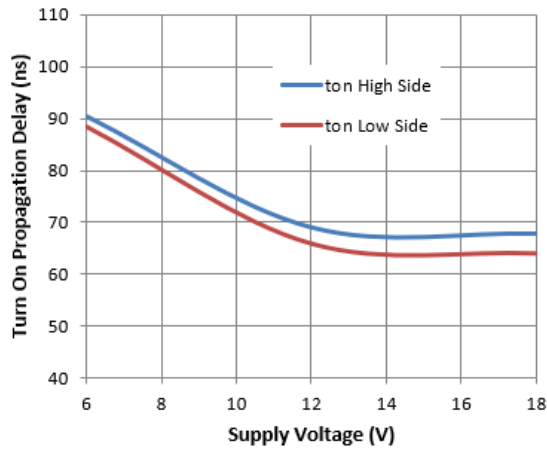


Figure 4. Turn-on Propagation Delay vs. Supply Voltage

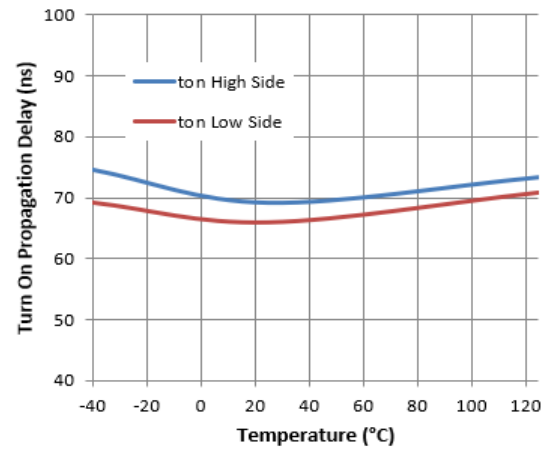


Figure 5. Turn-on Propagation Delay vs. Temperature

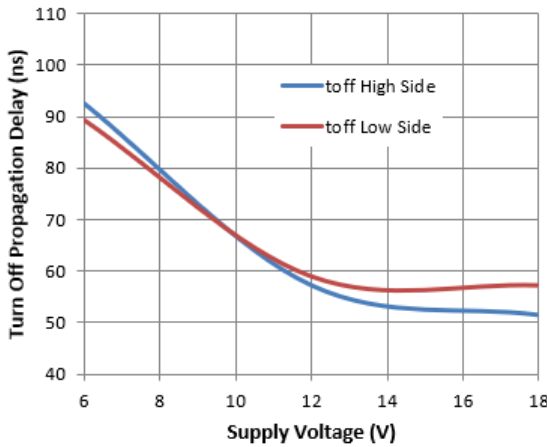


Figure 6. Turn-off Propagation Delay vs. Supply Voltage

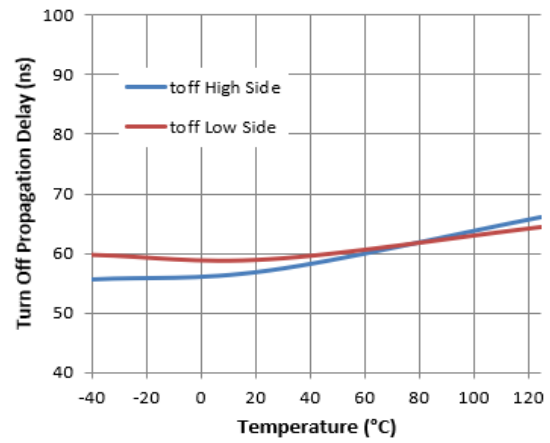


Figure 7. Turn-off Propagation Delay vs. Temperature

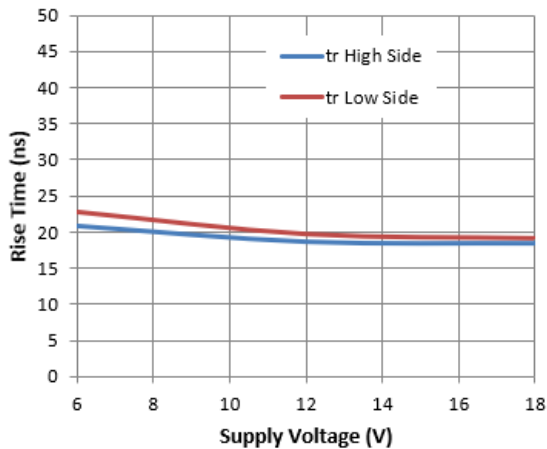


Figure 8. Rise Time vs. Supply Voltage

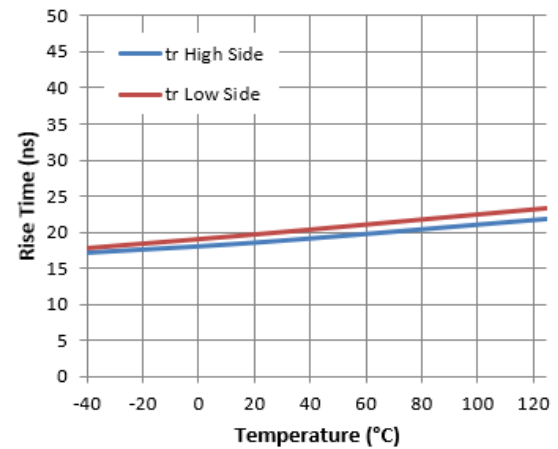


Figure 9. Rise Time vs. Temperature

Typical Performance Characteristics ($V_{CC} = 15V$, $@T_A = +25^\circ C$, unless otherwise specified.) (continued)

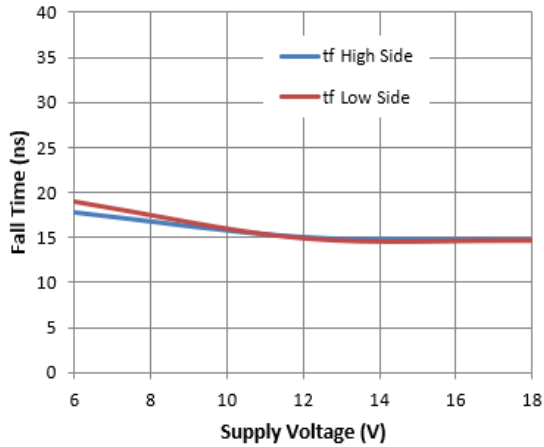


Figure 10. Fall Time vs. Supply Voltage

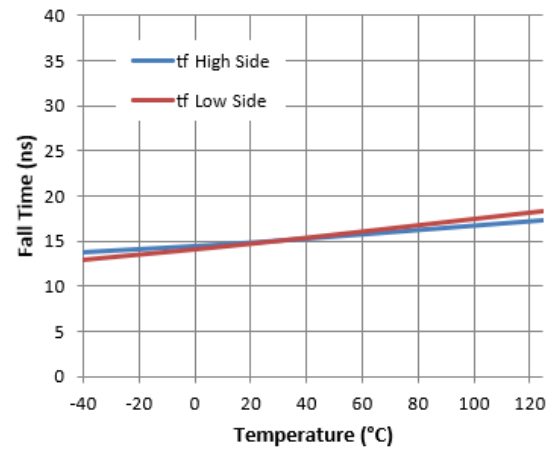


Figure 11. Fall Time vs. Temperature

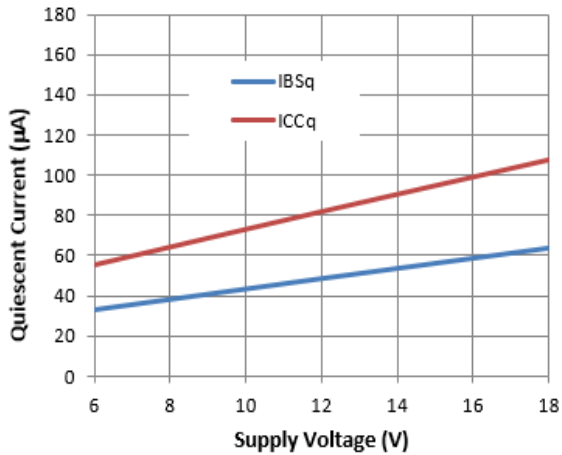


Figure 12. Quiescent Current vs. Supply Voltage

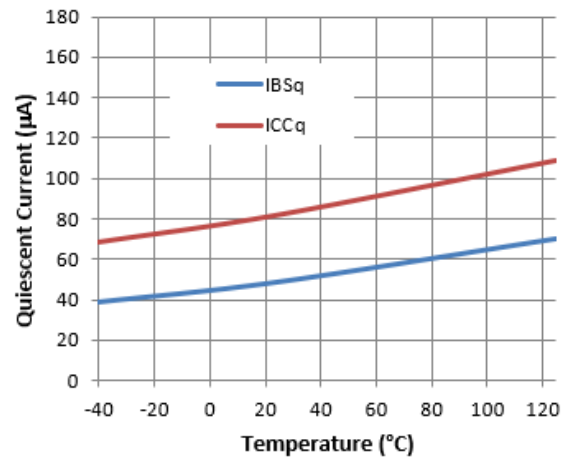


Figure 13. Quiescent Current vs. Temperature

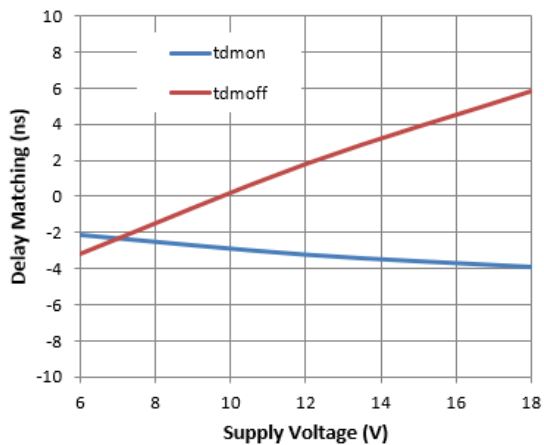


Figure 14. Delay Matching vs. Supply Voltage

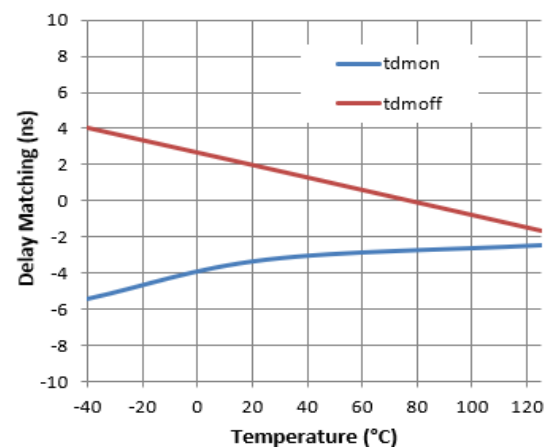


Figure 15. Delay Matching vs. Temperature

Typical Performance Characteristics ($V_{CC} = 15V$, $@T_A = +25^\circ C$, unless otherwise specified.) (continued)

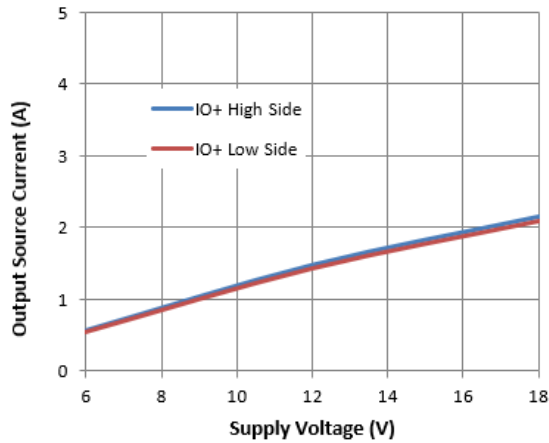


Figure 16. Output Source Current vs. Supply Voltage

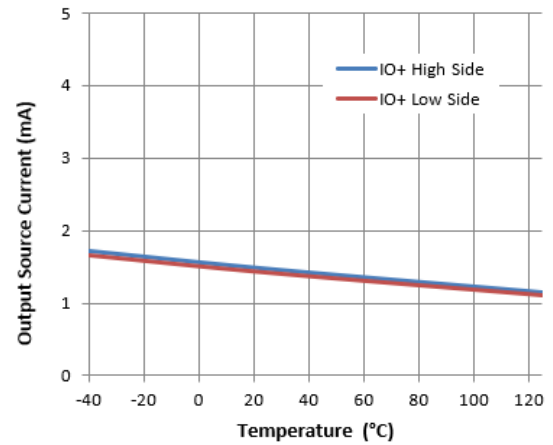


Figure 17. Output Source Current vs. Temperature

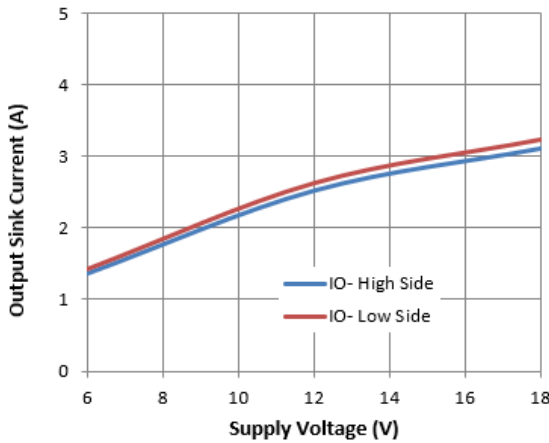


Figure 18. Output Sink Current vs. Supply Voltage

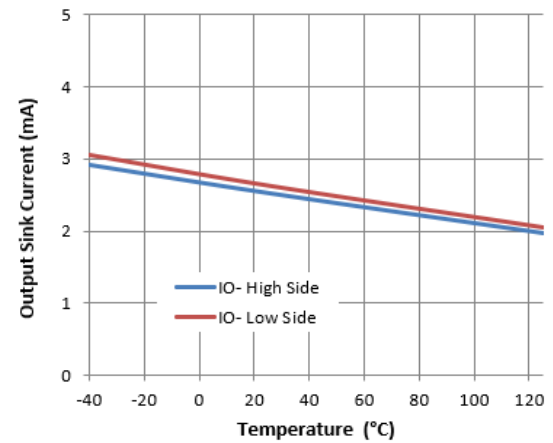


Figure 19. Output Sink Current vs. Temperature

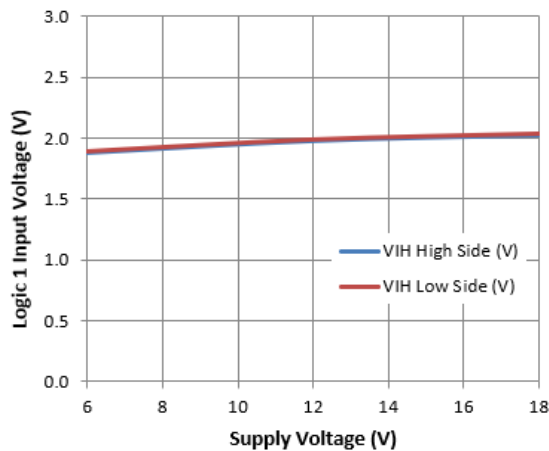


Figure 20. Logic 1 Input Voltage vs. Supply Voltage

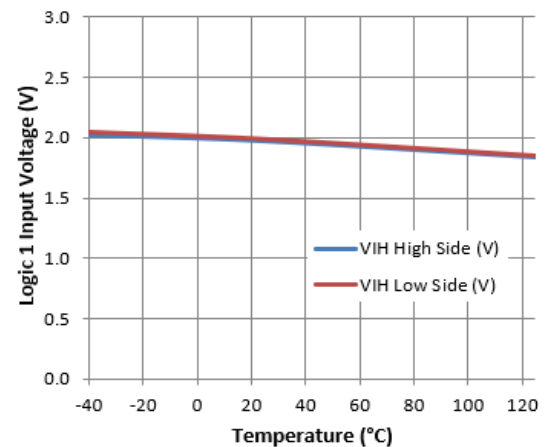


Figure 21. Logic 1 Input Voltage vs. Temperature

Typical Performance Characteristics ($V_{CC} = 15V$, $@T_A = +25^\circ C$, unless otherwise specified.) (continued)

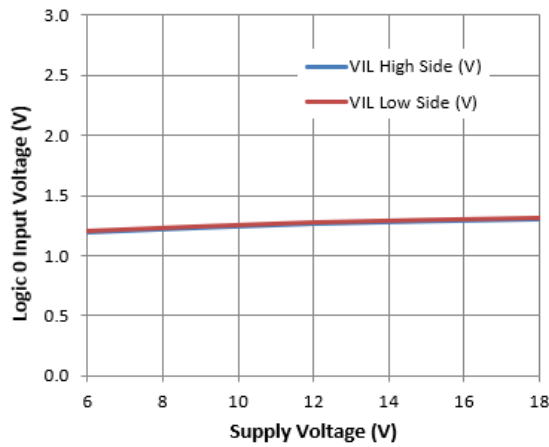


Figure 22. Logic 0 Input Voltage vs. Supply Voltage

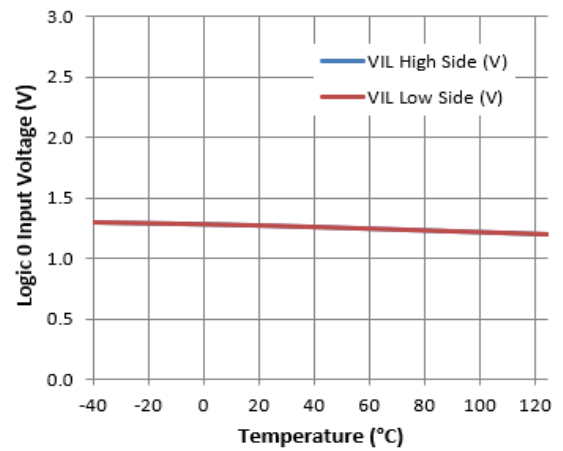


Figure 23. Logic 0 Input Voltage vs. Temperature

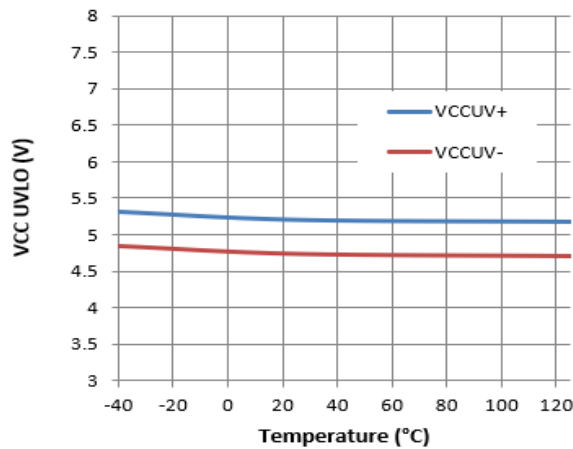


Figure 24. VCC UVLO vs. Temperature

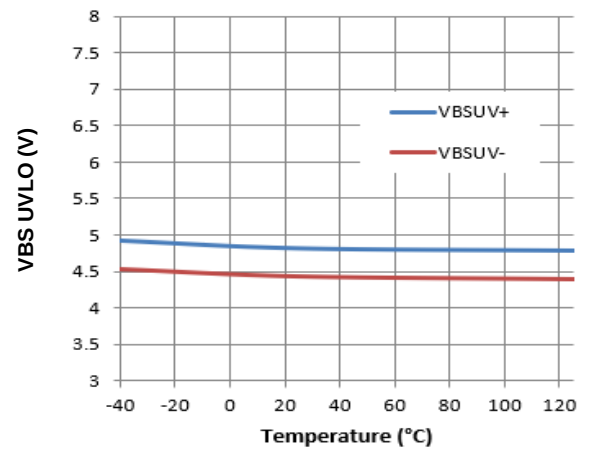


Figure 25. VBS UVLO vs. Temperature

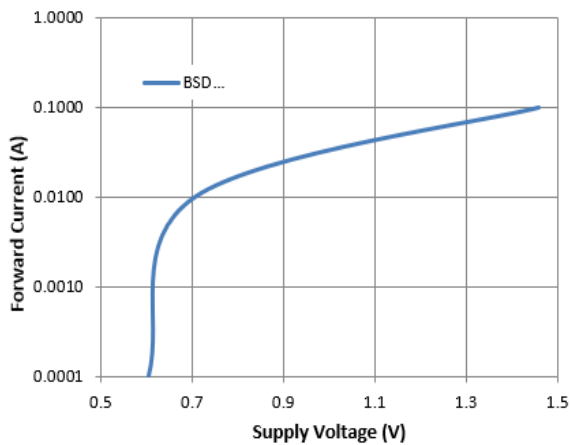


Figure 26. Bootstrap Diode I-V Characteristics

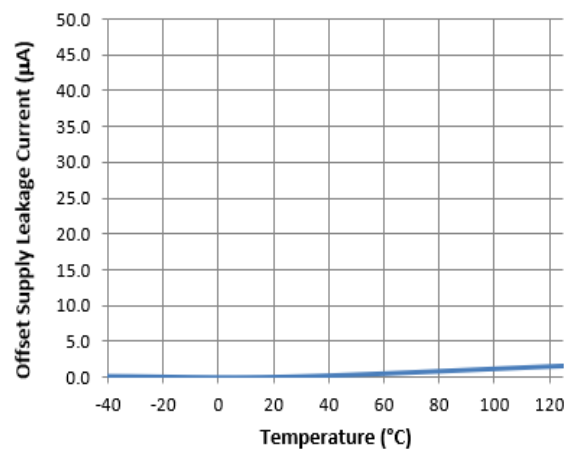
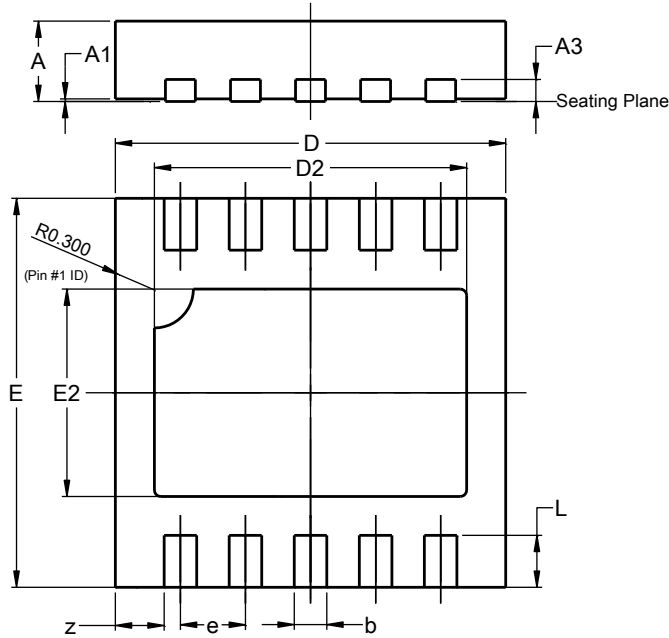


Figure 27. Offset Supply Leakage Current vs. Temperature

Package Outline Dimensions

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

U-DFN3030-10

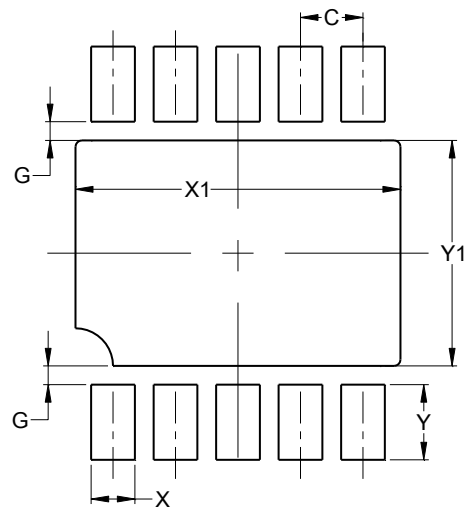


U-DFN3030-10			
Dim	Min	Max	Typ
A	0.57	0.63	0.60
A1	0.00	0.05	0.02
A3	—	—	0.15
b	0.20	0.30	0.25
D	2.90	3.10	3.00
D2	2.30	2.50	2.40
E	2.90	3.10	3.00
E2	1.50	1.70	1.60
e	--	--	0.50
L	0.25	0.55	0.40
z	—	—	0.375
All Dimensions in mm			

Suggested Pad Layout

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

U-DFN3030-10



Dimensions	Value (in mm)
C	0.50
G	0.15
X	0.35
X1	2.60
Y	0.60
Y1	1.80

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