

Description

The DGD0597FU is a high-frequency, high-side and low-side gate driver capable of driving N-channel MOSFETs in a half-bridge configuration. The floating high-side driver is rated up to 40V and provides a 5V gate drive to the MOSFETs.

The device's logic inputs are compatible with standard TTL and CMOS levels (down to 3.3V) to interface easily with MCUs. A UVLO will protect ICs and MOSFETs with loss of supply.

Fast and well-matched propagation delays allow a higher switching frequency, enabling a smaller and more compact power-switching design using smaller associated components. The DGD0597FU is offered in the V-QFN3030-8 (Standard) package and operates over an extended -40°C to +125°C temperature range.

Applications

- Wireless power chargers
- Motor drives
- Logic-level MOSFET gate drivers

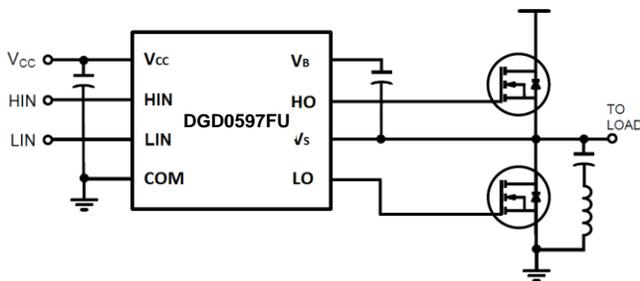
Features

- 40V floating high-side driver
- Low V_{CC} operating voltage: 4.5V to 5.5V
- Drives two N-channel logic-level MOSFETs in a half-bridge configuration
- 1.5A source / 2.5A sink output current capability
- Internal bootstrap diode included
- 3.4V UVLO with 0.4V hysteresis
- Fast rise and fall times (7ns/5ns)
- Propagation delay typical of 14ns
- Delay matching typical of 2.5ns
- 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)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](mailto:contact@diodes.com) or your local Diodes representative.**

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

Mechanical Data

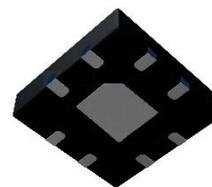
- Package: V-QFN3030-8
- Package Material: Molded Plastic. "Green" Molding Compound
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 3 per J-STD-020
- Terminals: Finish – Matte Tin Finish
- Solderable per MIL-STD-202, Method 208
- Weight: 0.017 grams (Approximate)



Typical Configuration



Top View



Bottom View

V-QFN3030-8 (Standard)

Ordering Information (Note 4)

Orderable Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
DGD0597FU-7	V-QFN3030-8 (Standard)	DGD0597	7	8	3,000	Reel

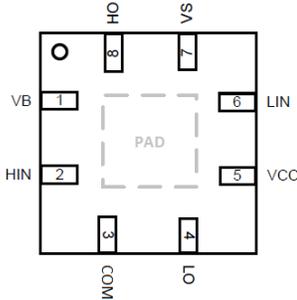
- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen-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



DGD0597 = Product Type Marking Code
 YY = Year (ex: 23 = 2023)
 WW = Week (01 - 53)

Pin Diagrams

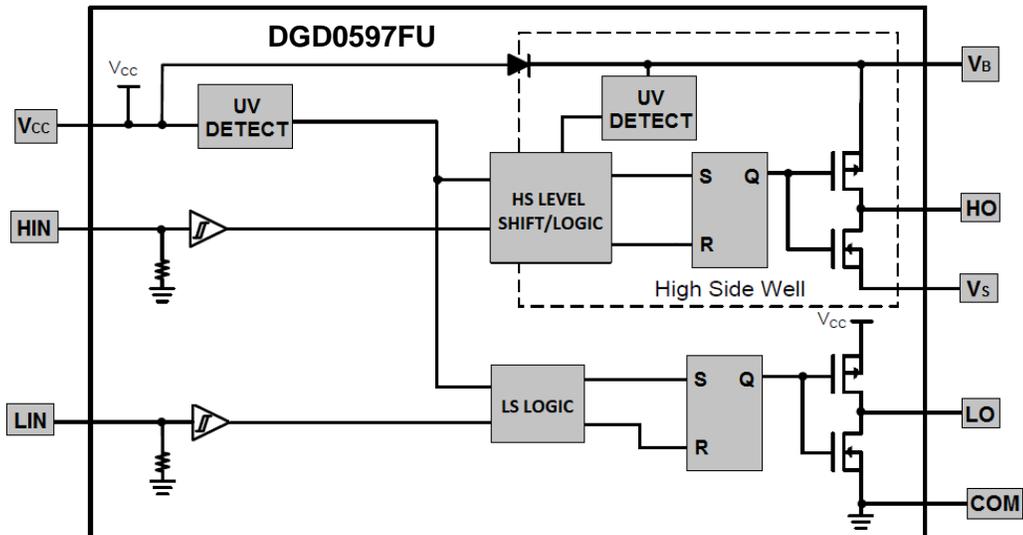


Top View: V-QFN3030-8 (Standard)

Pin Descriptions

Pin Number	Pin Name	Function
1	VB	High-Side Floating Supply
2	HIN	Logic Input for High-Side Gate Driver, in Phase with HO, Pull Down Resistor at Input
3	COM	Low-Side and Logic Return
4	LO	Low-Side Gate Driver Output
5	VCC	Low-Side and Logic Supply
6	LIN	Logic Input for Low-Side Gate Driver, in Phase with LO, Pull Down Resistor at Input
7	VS	High-Side Floating Supply Return
8	HO	High-Side Gate Driver Output
PAD	Substrate	Connect to COM on PCB

Functional Block Diagram



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

Characteristic	Symbol	Value	Unit
High-Side Floating Positive Supply Voltage	V _B	-0.3 to +50	V
High-Side Floating Negative Supply Voltage	V _S	V _B -6 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 +6	V
Low-Side Output Voltage	V _{LO}	-0.3 to V _{CC} +0.3	V
Logic Input Voltage (HIN and LIN)	V _{IN}	-0.3 to +6	V

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

Characteristic	Symbol	Value	Unit
Power Dissipation Linear Derating Factor (Note 5)	P _D	1.0	W
Thermal Resistance, Junction to Ambient (Note 5)	R _{θJA}	120	°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	V _B	V _S + 4.5	V _S + 5.5	V
High-Side Floating Supply Offset Voltage	V _S	0	40 (Note 6)	V
High-Side Floating Output Voltage	V _{HO}	V _S	V _B	V
Logic and Low Side Fixed Supply Voltage	V _{CC}	4.5	5.5	V
Low-Side Output Voltage	V _{LO}	0	V _{CC}	V
Logic Input Voltage (HIN and LIN)	V _{IN}	0	5	V
Ambient Temperature	T _A	-40	+125	°C

Note: 6. Provided V_B doesn't exceed absolute maximum rating of 50V.

DC Electrical Characteristics ($V_{CC} = 5V$, @ $T_A = +25^\circ C$, unless otherwise specified.)

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Logic "1" Input Voltage	V_{HIH}	2.5	2.1	–	V	–
Logic "0" Input Voltage	V_{HIL}	–	1.3	0.8	V	–
Logic Input Bias Current	I_{IN+}	–	28	60	μA	$V_{IN} = V_{CC}$
V_{CC} Quiescent Supply Current	I_{CCQ}	–	40	60	μA	–
V_{CC} Operating Supply Current	I_{CCO}	–	300	500	μA	HO and LO Open, $f_s = 250kHz$
Source Impedence	R_{SO}	–	1.5	2.6	Ω	Source = 100mA
Sink Impedence	R_{SI}	–	0.4	1.6	Ω	Sink = 100mA
Output High Short Circuit Pulsed Current	I_{O+}	–	1.5	–	A	$V_O = 0V$, $PW \leq 10\mu s$
Output Low Short Circuit Pulsed Current	I_{O-}	–	2.5	–	A	$V_O = 15V$, $PW \leq 10\mu s$
V_{CC} Supply Undervoltage Positive Going Threshold	V_{CCUV+}	2.85	3.4	3.85	V	–
V_{CC} Supply Undervoltage Hysteresis	V_{CCU_HYST}	–	0.4	–	V	–
V_{BS} Supply Undervoltage Positive Going Threshold	V_{BSUV+}	2.85	3.3	3.65	V	–
V_{BS} Supply Undervoltage Hysteresis	V_{BSU_HYST}	–	0.4	–	V	–
Bootstrap Diode Forward Voltage	V_{BFD}	–	650	750	mV	$I = 100\mu A$
Bootstrap Diode Reverse Leakage	I_{BDL}	–	0.1	1.0	μA	$V_B = V_S = 45.5V$ $V_{CC} = 0V$

AC Electrical Characteristics ($V_{CC} = 5V$, @ $T_A = +25^\circ C$, unless otherwise specified.)

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Turn-on Rise Time	t_r	–	7	–	ns	$C_L = 1000pF$
Turn-off Fall Time	t_f	–	5	–	ns	$C_L = 1000pF$
Turn-on Propagation Delay	t_{on}	–	14	–	ns	–
Turn-off Propagation Delay	t_{off}	–	14	–	ns	–
Delay Matching	t_{DM}	–	2.5	10	ns	–

Timing Waveforms

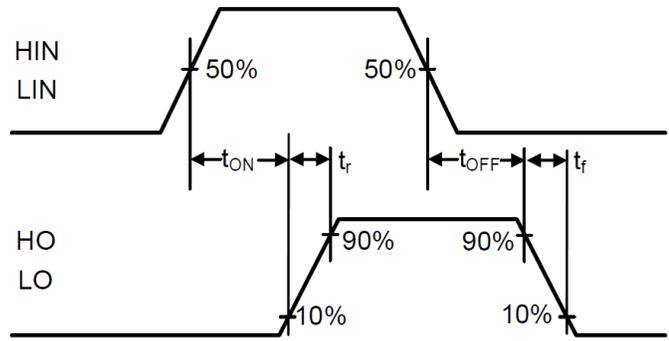


Figure 1. Switching Time Waveform Definitions

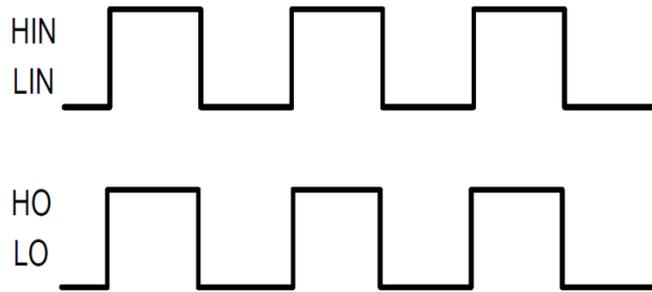


Figure 2. Input Output Timing Diagram

Typical Performance Characteristics ($V_{CC} = 5V$, $@T_A = +25^\circ C$, unless otherwise specified.)

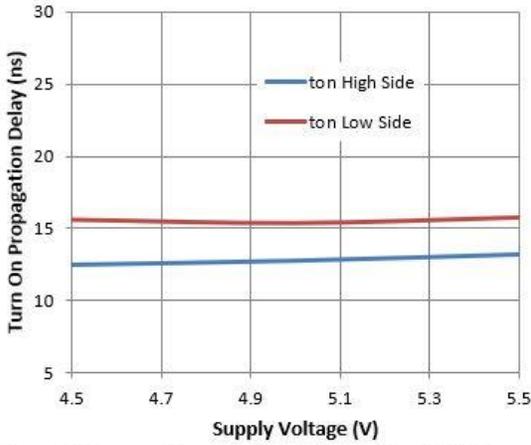


Figure 3. Turn-on Propagation Delay vs. Supply Voltage

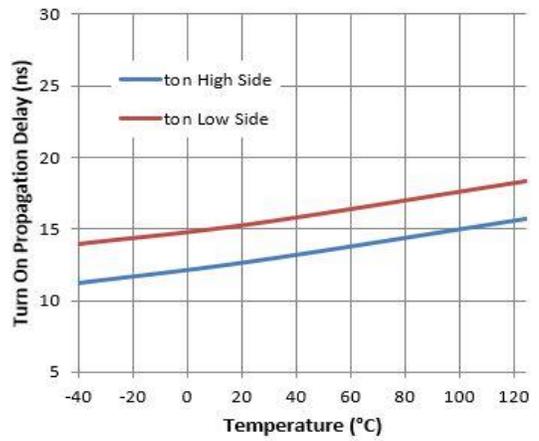


Figure 4. Turn-on Propagation Delay vs. Temperature

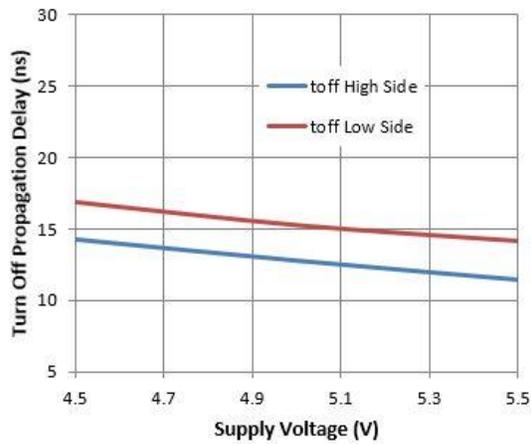


Figure 5. Turn-off Propagation Delay vs. Supply Voltage

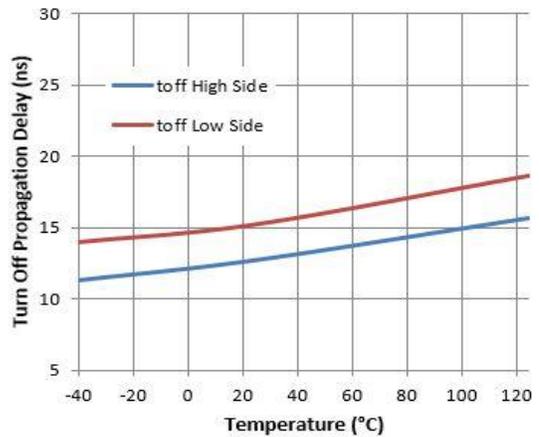


Figure 6. Turn-off Propagation Delay vs. Temperature

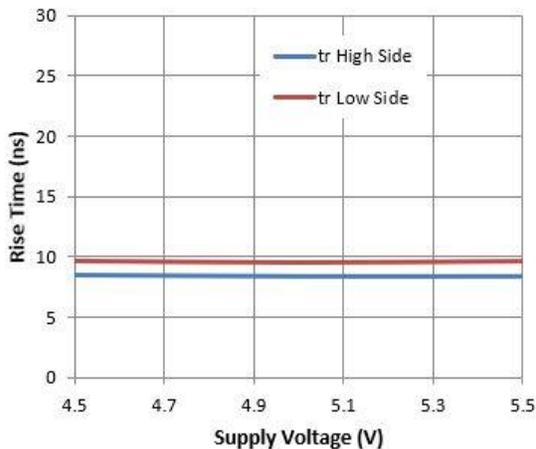


Figure 7. Rise Time vs. Supply Voltage

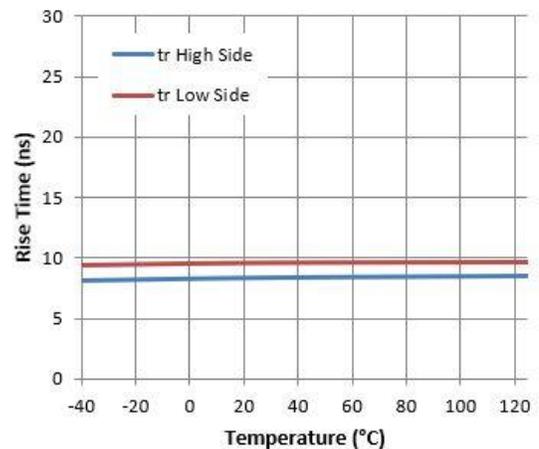


Figure 8. Rise Time vs. Temperature

Typical Performance Characteristics (continued)

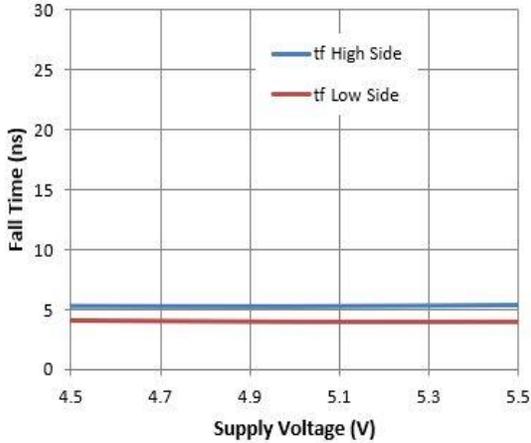


Figure 9. Fall Time vs. Supply Voltage

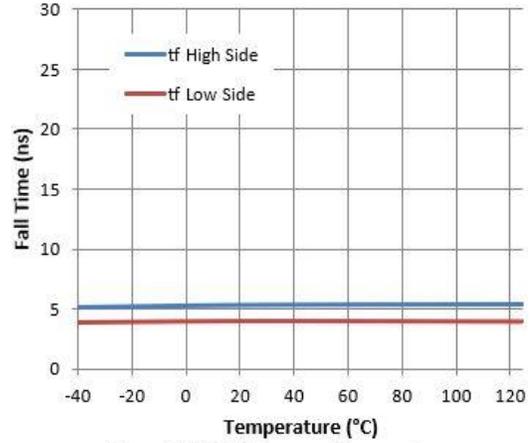


Figure 10. Fall Time vs. Temperature

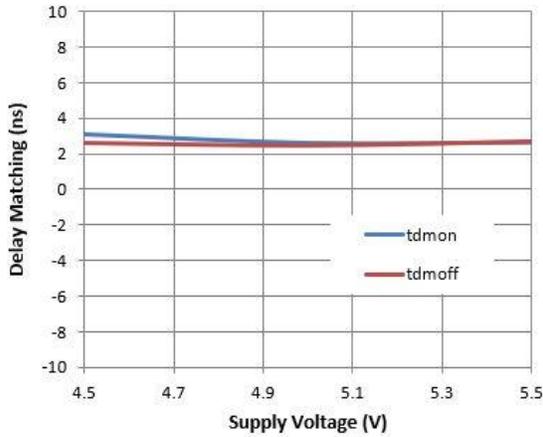


Figure 11. Delay Matching vs. Supply Voltage

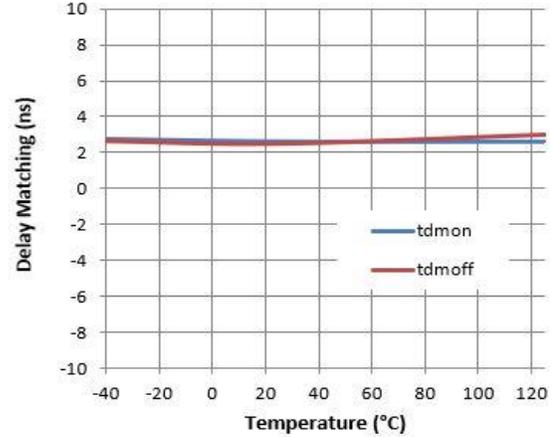


Figure 12. Delay Matching vs. Temperature

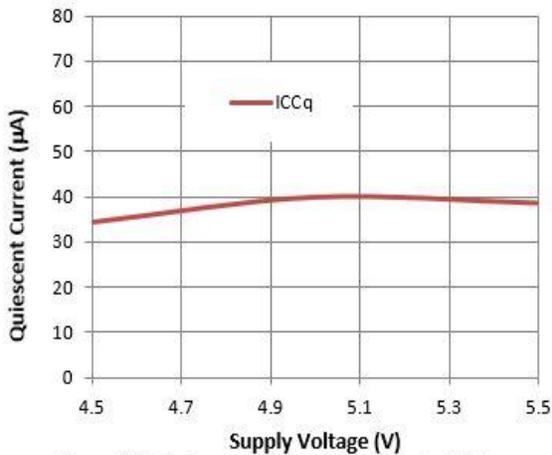


Figure 13. Quiescent Current vs. Supply Voltage

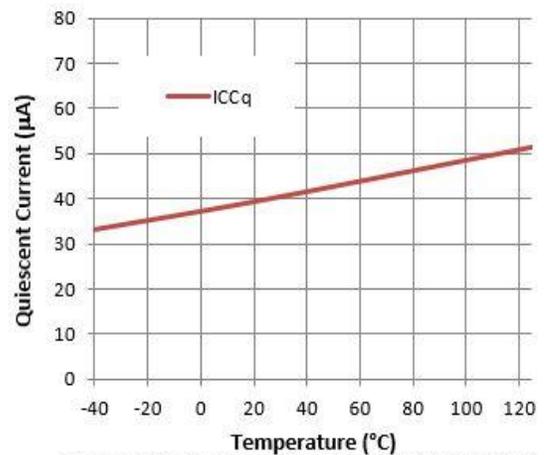


Figure 14. Quiescent Current vs. Temperature

Typical Performance Characteristics (continued)

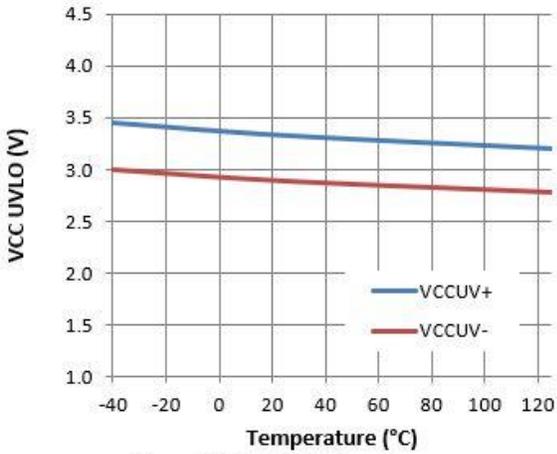


Figure 15. VCC UVLO vs. Temperature

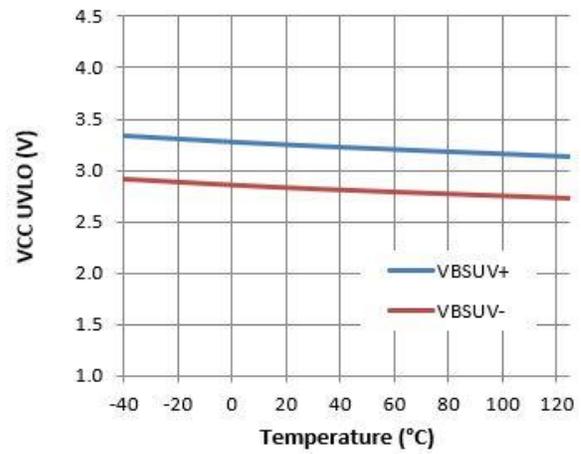


Figure 16. VBS UVLO vs. Temperature

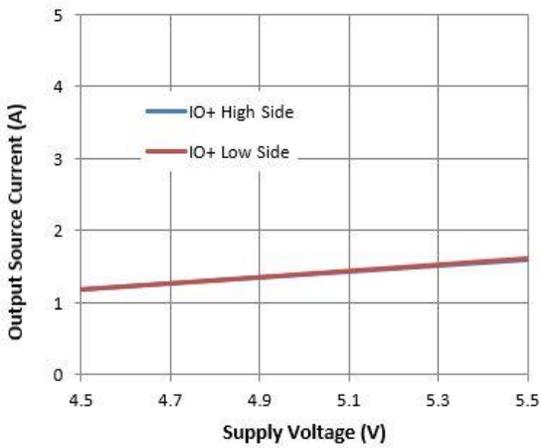


Figure 17. Output Source Current vs. Supply Voltage

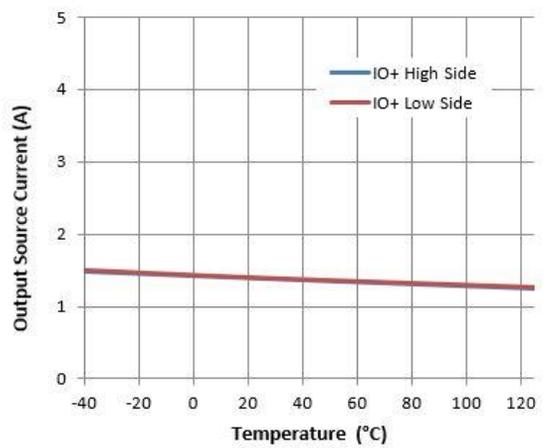


Figure 18. Output Source Current vs. Temperature

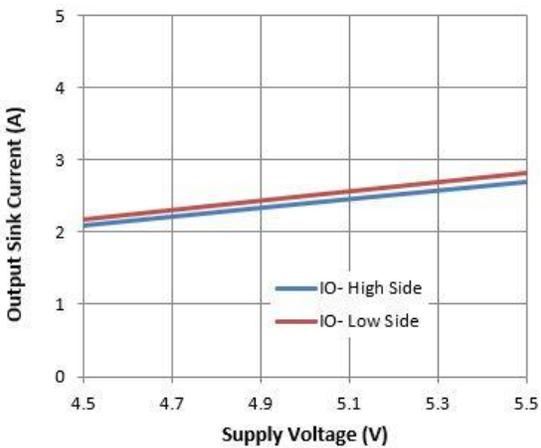


Figure 19. Output Sink Current vs. Supply Voltage

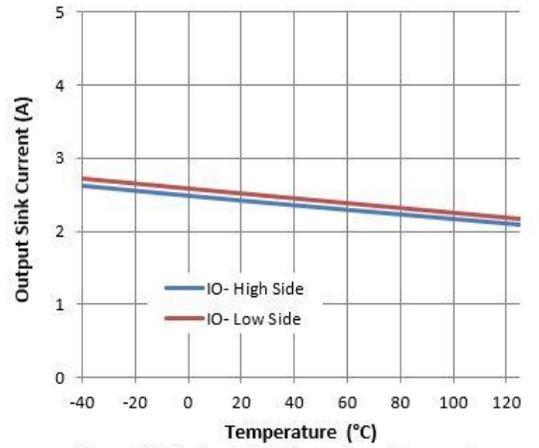


Figure 20. Output Sink Current vs. Temperature

Typical Performance Characteristics (continued)

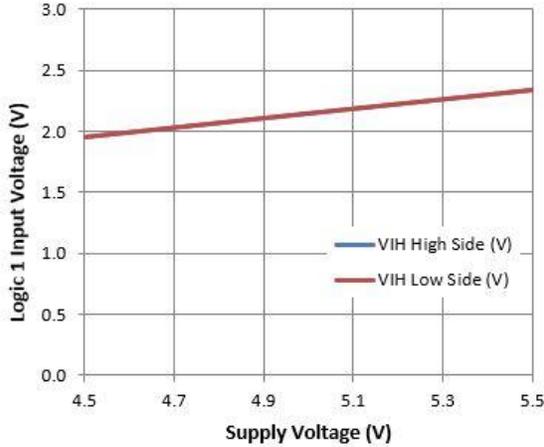


Figure 21. Logic 1 Input Voltage vs. Supply Voltage

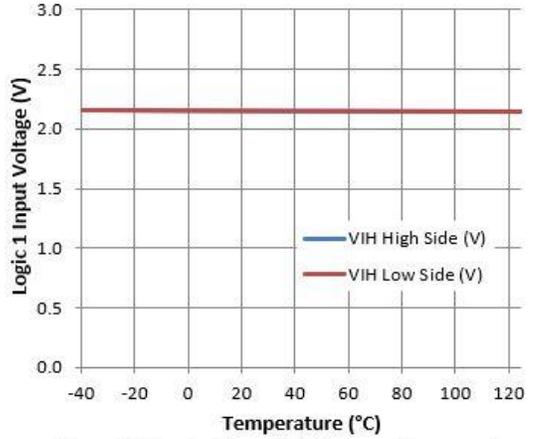


Figure 22. Logic 1 Input Voltage vs. Temperature

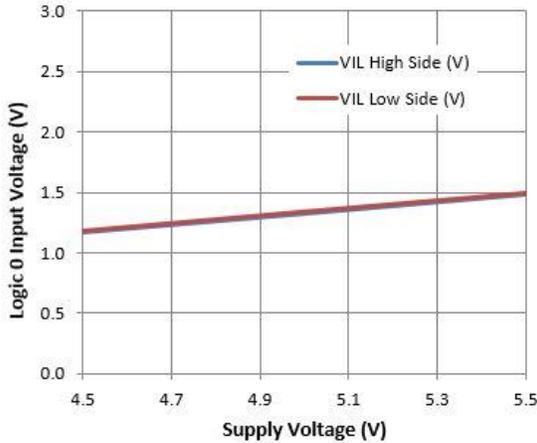


Figure 23. Logic 0 Input Voltage vs. Supply Voltage

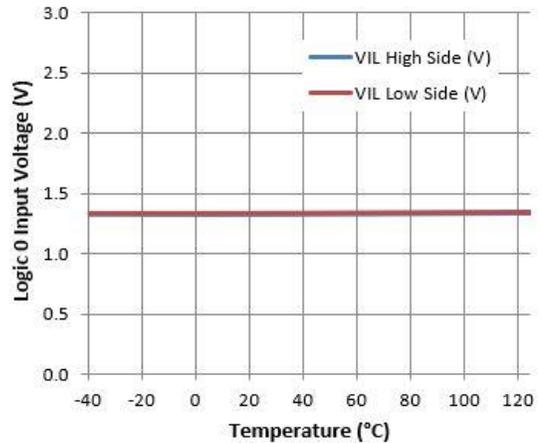


Figure 24. Logic 0 Input Voltage vs. Temperature

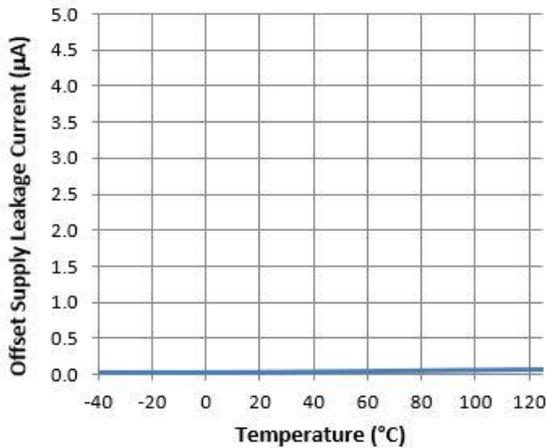


Figure 25. Offset Supply Leakage Current vs. Temperature

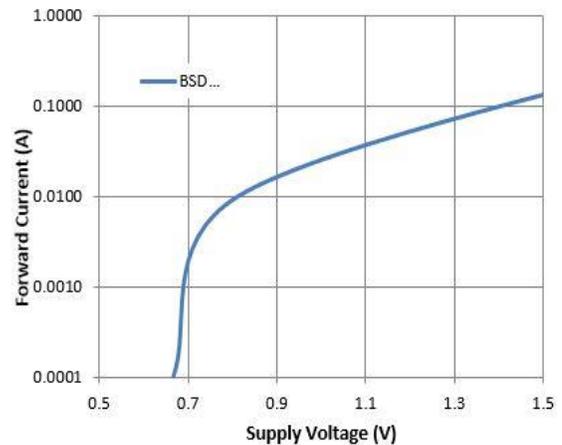
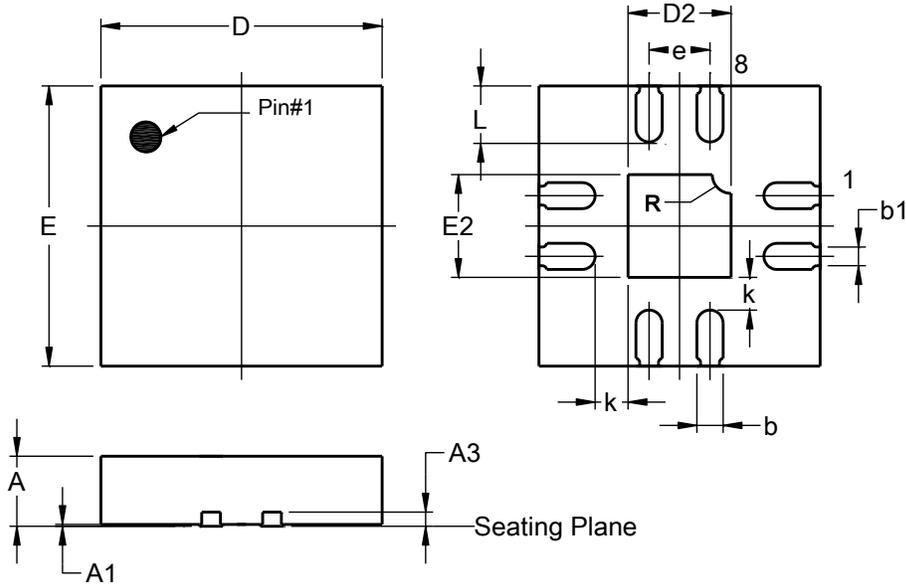


Figure 26. Bootstrap Diode I-V Characteristics

Package Outline Dimensions

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

V-QFN3030-8 (Standard)

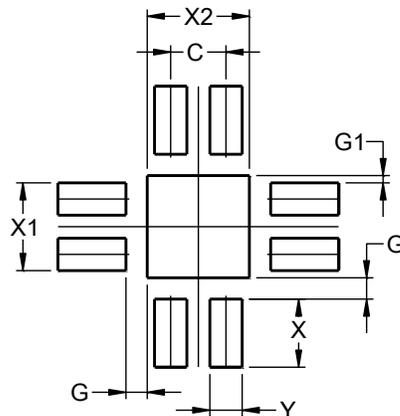


V-QFN3030-8 (Standard)			
Dim	Min	Max	Typ
A	0.70	0.85	0.75
A1	0.00	0.05	0.02
A3	0.203REF		
b	0.23	0.33	0.28
b1	0.20REF		
D	2.90	3.10	3.00
D2	1.00	1.20	1.10
E	2.90	3.10	3.00
E2	1.00	1.20	1.10
e	0.65BSC		
L	0.55	0.65	0.60
k	0.30	0.40	0.35
R	0.20REF		
All Dimensions in mm			

Suggested Pad Layout

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

V-QFN3030-8 (Standard)



Dimensions	Value (in mm)
C	0.650
G	0.250
G1	0.085
X	0.800
X1	1.030
X2	1.200
Y	0.380

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