

Description

The DGD2103A is a high-voltage, high-speed gate driver capable of driving N-channel MOSFETs and IGBTs in a half-bridge configuration. High-voltage processing techniques enable the DGD2103A's high side to switch to 600V in a bootstrap operation.

The DGD2103A logic inputs are compatible with standard TTL and CMOS levels (down to 3.3V) to interface easily with controlling devices. The driver outputs feature high pulse current buffers designed for minimum driver cross conduction. The DGD2103A has a fixed internal deadtime of 520ns (typical).

The DGD2103A is offered in SO-8 (Type TH) package and operates over an extended -40°C to +125°C temperature range.

Applications

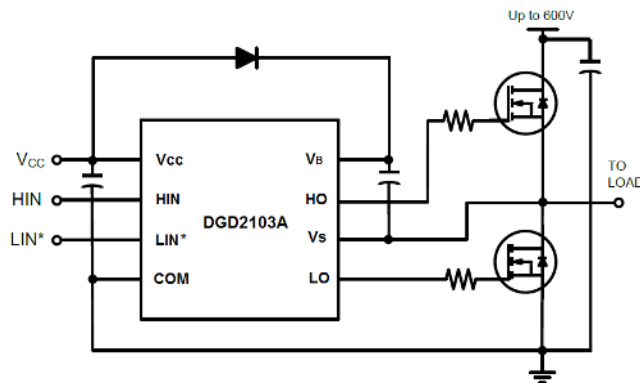
- DC-DC Converters
- DC-AC Inverters
- AC-DC Power Supplies
- Motor Controls
- Class D Power Amplifiers

Features

- Floating High-Side Driver in Bootstrap Operation to 600V
- Drives Two N-channel MOSFETs or IGBTs in a Half Bridge Configuration
- 210mA Source / 360mA Sink Output Current Capability
- Outputs Tolerant to Negative Transients
- Internal Dead Time of 520ns to Protect MOSFETs
- Wide Low Side Gate Driver Supply Voltage: 10V to 20V
- Logic Input (HIN and LIN*) 3.3V Capability
- Schmitt Triggered Logic Inputs
- Undervoltage Lockout for V_{CC} (Logic and Low Side Supply)
- 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 Ⓜ3
- Weight: 0.075 grams (Approximate)



Typical Configuration



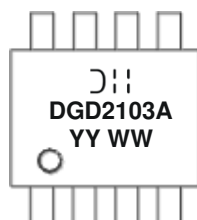
SO-8 (Type TH)
Top View

Ordering Information (Note 4)

Part Number	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
DGD2103AS8-13	DGD2103A	13	12	2,500

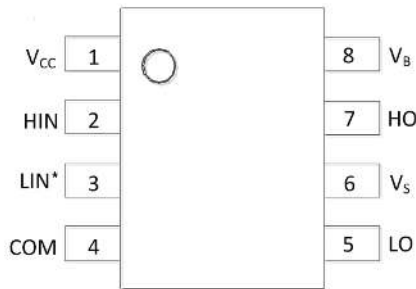
- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen- and Antimony-free "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
 DGD2103A = Product Type Marking Code
 YY = Year (ex: 16 = 2016)
 WW = Week (01 to 53)

Pin Diagrams

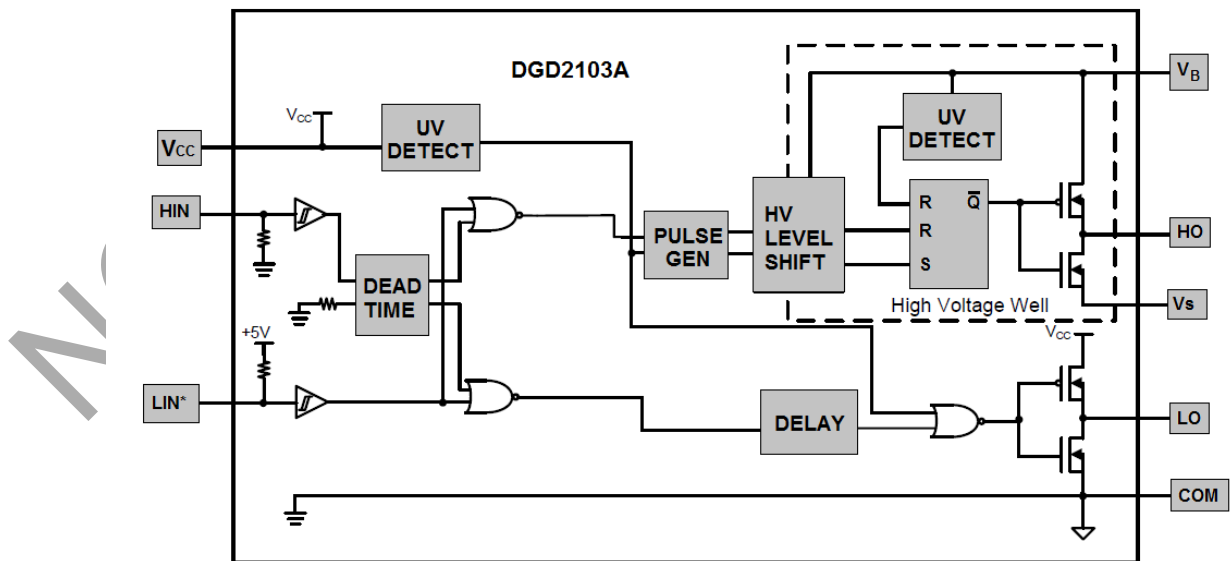


Top View: SO-8 (Type TH)

Pin Descriptions

Pin Number	Pin Name	Function
1	V _{CC}	Logic and Low Side Supply
2	HIN	Logic Input for High-Side Gate Driver Output in Phase with HO
3	LIN*	Logic input for Low-Side Gate Driver Output out of Phase with LO
4	COM	Low-Side and Logic Return
5	LO	Low-Side Gate Drive Output
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



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
Offset Supply Voltage Transient	dV _S / dt	50	V/ns
Low-Side Fixed Supply Voltage	V _{CC}	-0.3 to +24	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 V _{CC} +0.3	V

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 _{θJA}	200	°C/W
Operating Temperature	T _J	+150	
Lead Temperature (Soldering, 10s)	T _L	+300	°C
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
Low-Side Output Voltage	V _{LO}	0	V _{CC}	V
Logic Input Voltage	V _{IN}	0	5	V
Ambient Temperature	T _A	-40	+125	°C

Note: 6. Logic operation for V_S of -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	Condition
Logic "1" (HIN) & Logic "0" (LIN*) Input Voltage	V_{IH}	2.5	–	–	V	$V_{CC} = 10V$ to 20V
Logic "0" (HIN) & Logic "1" (LIN*) Input Voltage	V_{IL}	–	–	0.8	V	$V_{CC} = 10V$ to 20V
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}	–	30	55	μA	$V_{IN} = 0V$ or 5V
Quiescent V_{CC} Supply Current	I_{CCQ}	–	370	500	μA	$V_{IN} = 0V$ or 5V
Logic "1" Input Bias Current	I_{IN+}	–	3.0	10	μA	HIN = 5V, LIN* = 0V
Logic "0" Input Bias Current	I_{IN-}	–	–	5.0	μA	HIN = 0V, LIN* = 5V
V_{CC} Supply Under-Voltage Positive Going Threshold	V_{CCUV+}	8.0	8.9	9.8	V	–
V_{CC} Supply Under-Voltage Negative Going Threshold	V_{CCUV-}	7.4	8.2	9.0	V	–
Output High Short Circuit Pulsed Current	I_{O+}	130	210	–	mA	$V_O = 0V$, $PW \leq 10\mu s$
Output Low Short Circuit Pulsed Current	I_{O-}	270	360	–	mA	$V_O = 15V$, $PW \leq 10\mu s$

Note: 7. The V_{IN} and I_{IN} parameters are applicable to the two logic pins: HIN and LIN*. The V_O and I_O parameters are applicable to the respective output pins: HO and LO.

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	Condition
Turn-On Propagation Delay	t_{ON}	–	680	820	ns	$V_S = 0V$
Turn-Off Propagation Delay	t_{OFF}	–	150	220	ns	$V_S = 600V$
Delay Matching, HO & LO Turn-On / Turn-Off	t_{DM}	–	–	60	ns	–
Turn-On Rise Time	t_R	–	100	170	ns	$V_S = 0V$
Turn-Off Fall Time	t_F	–	50	60	ns	$V_S = 0V$
Deadtime: $t_{DT LO-HO}$ & $t_{DT HO-LO}$	t_{DT}	400	520	650	ns	–

NOT RECOMMENDED FOR NEW DESIGN

Timing Waveforms

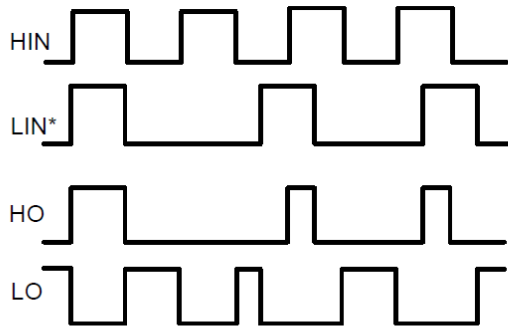


Figure 1. Input / Output Timing Diagram

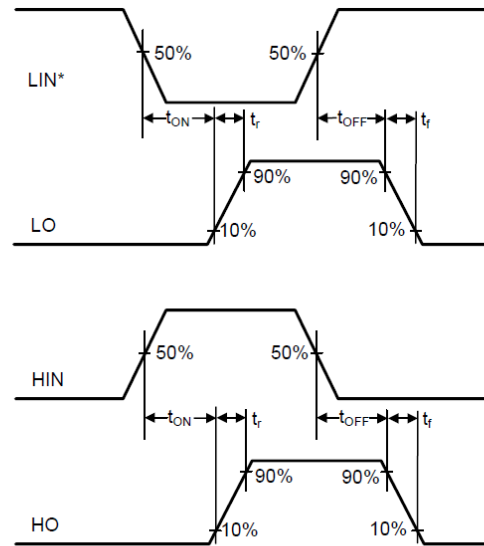


Figure 2. Switching Time Waveform Definitions

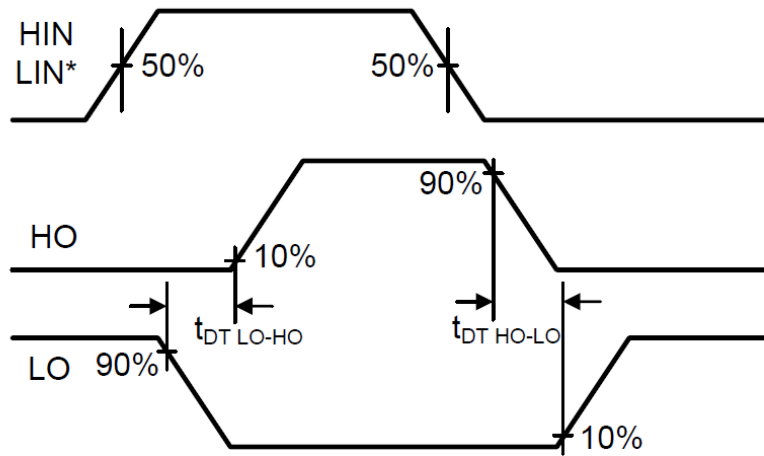


Figure 3. Deadtime Waveform Definitions

NOT RECOMMENDED

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

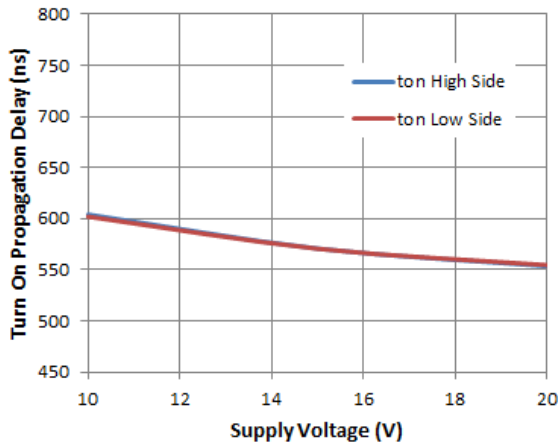


Figure 4. Turn-on Propagation Delay vs. Supply Voltage

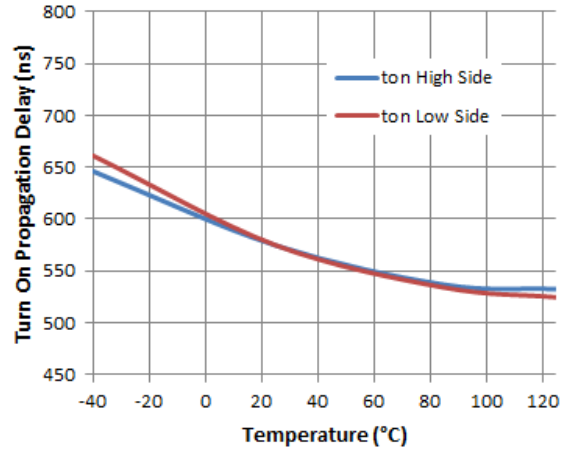


Figure 5. Turn-on Propagation Delay vs. Temperature

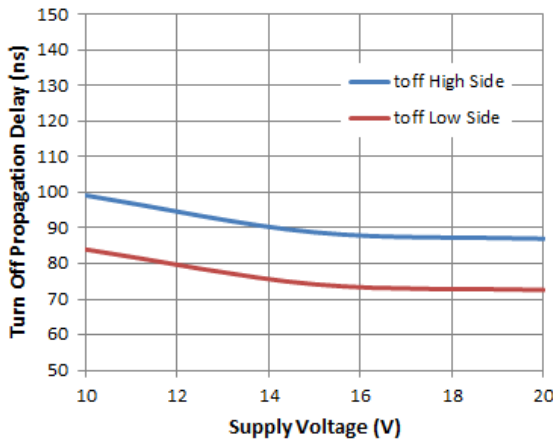


Figure 6. Turn-off Propagation Delay vs. Supply Voltage

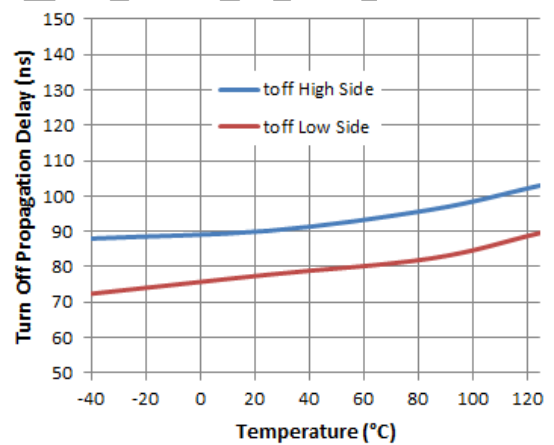


Figure 7. Turn-off Propagation Delay vs. Temperature

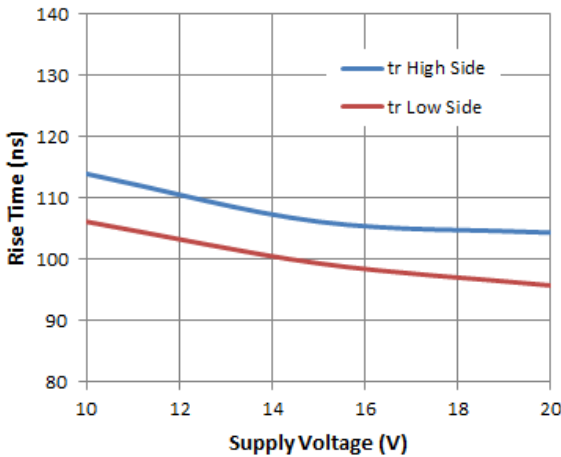


Figure 8. Rise Time vs. Supply Voltage

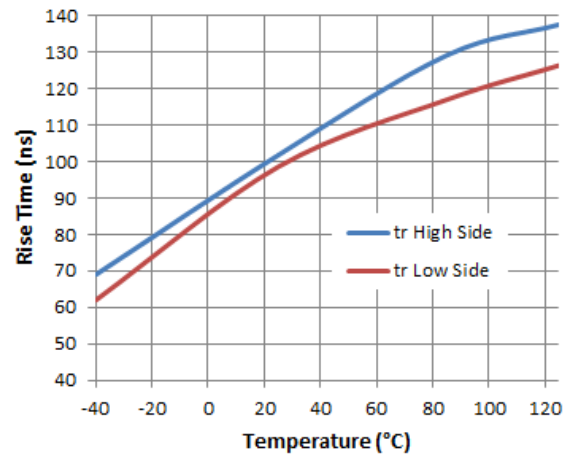


Figure 9. Rise Time vs. Temperature

Typical Performance Characteristics (Cont.)

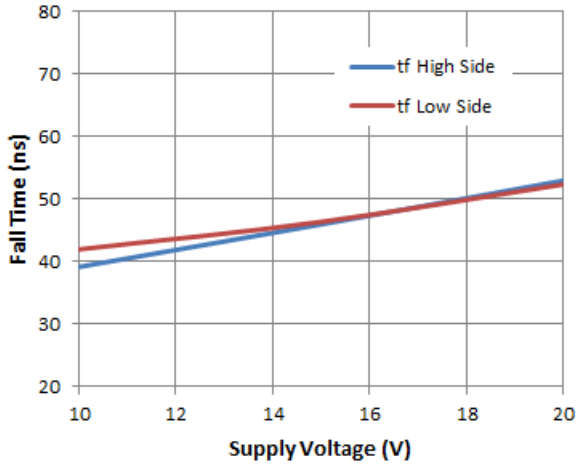


Figure 10. Fall Time vs. Supply Voltage

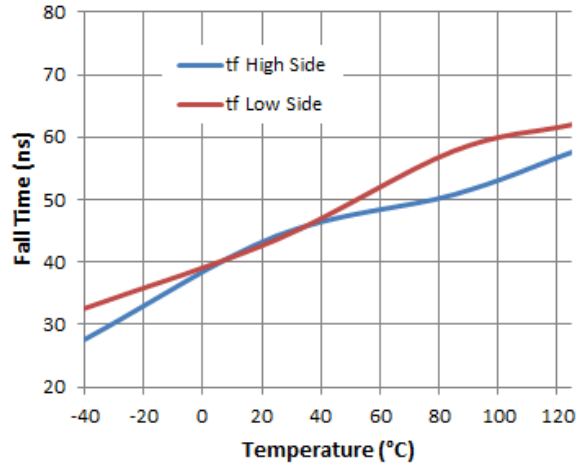


Figure 11. Fall Time vs. Temperature

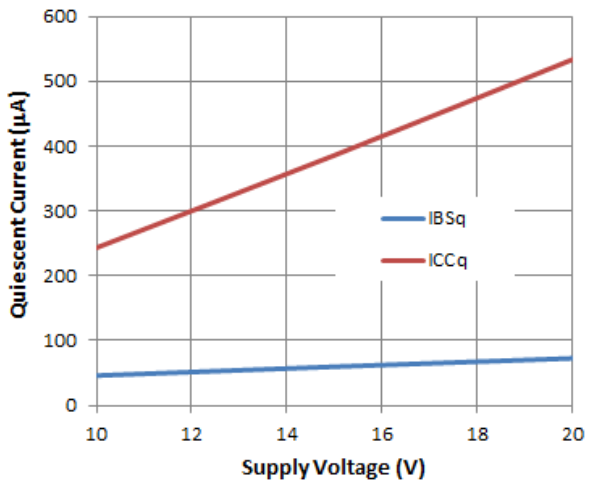


Figure 12. Quiescent Current vs. Supply Voltage

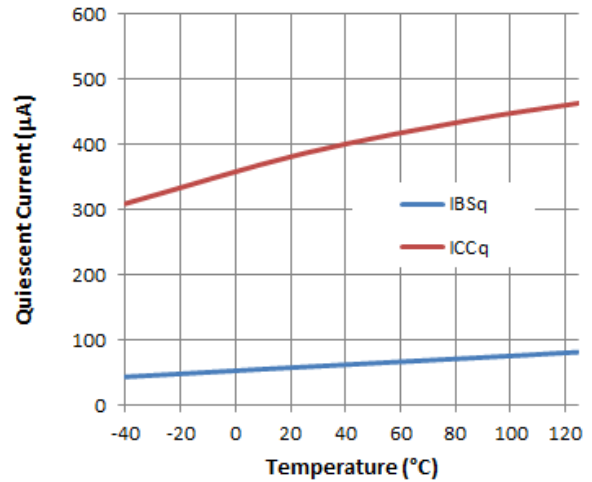


Figure 13. Quiescent Current vs. Temperature

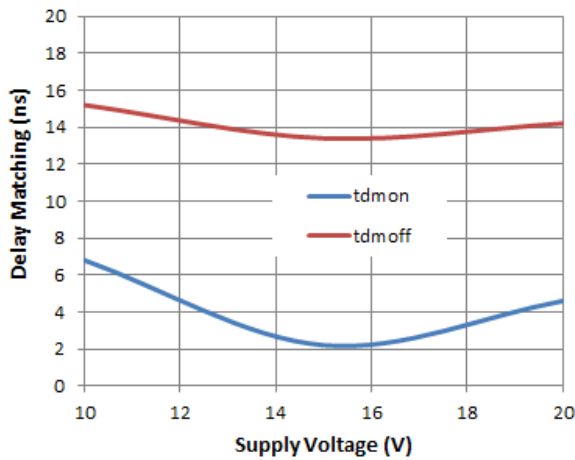


Figure 14. Delay Matching vs. Supply Voltage

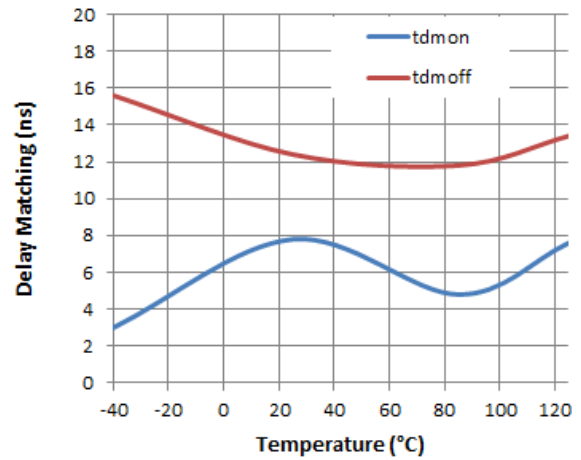


Figure 15. Delay Matching vs. Temperature

Typical Performance Characteristics (Cont.)

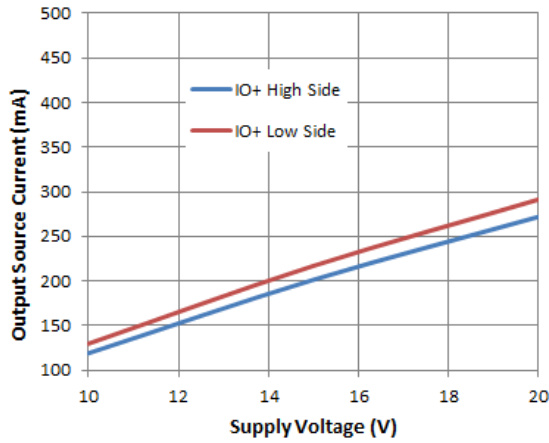


Figure 16. Output Source Current vs. Supply Voltage

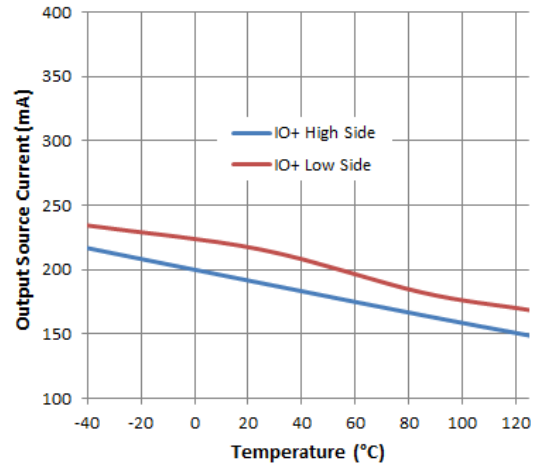


Figure 17. Output Source Current vs. Temperature

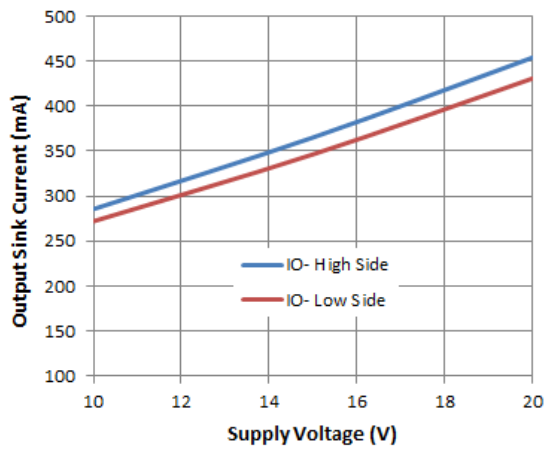


Figure 18. Output Sink Current vs. Supply Voltage

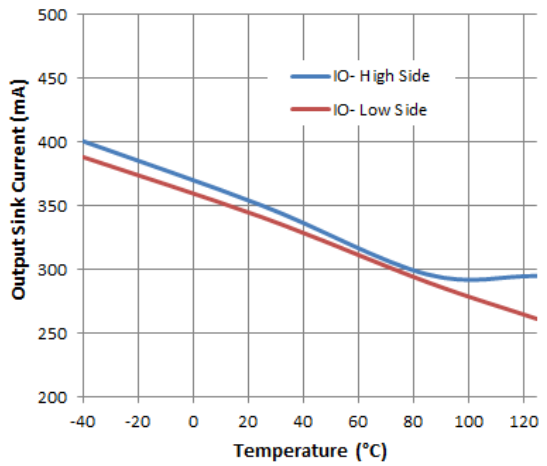


Figure 19. Output Sink Current vs. Temperature

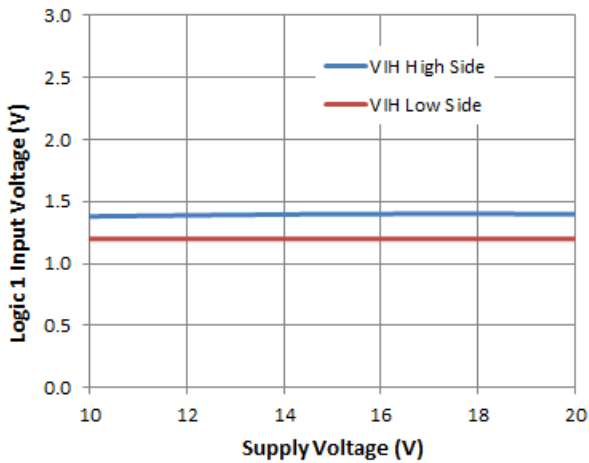


Figure 20. Logic 1 Input Voltage vs. Supply Voltage

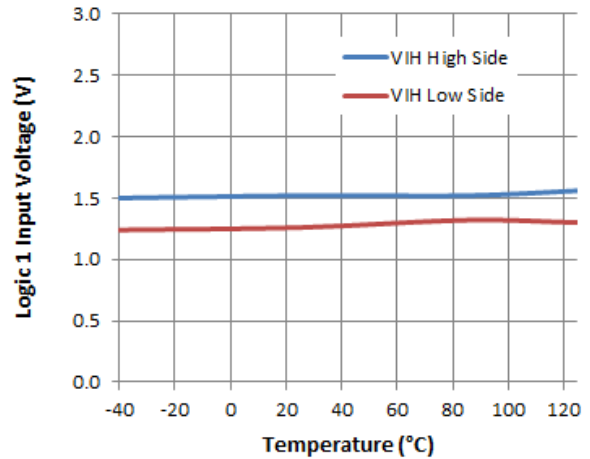


Figure 21. Logic 1 Input Voltage vs. Temperature

Typical Performance Characteristics (Cont.)

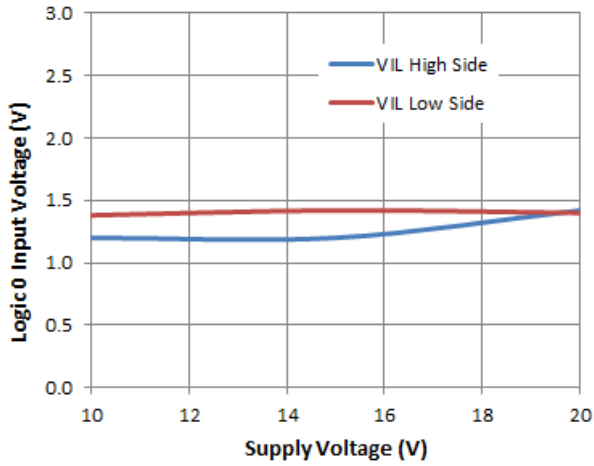


Figure 22. Logic 0 Input Voltage vs. Supply Voltage

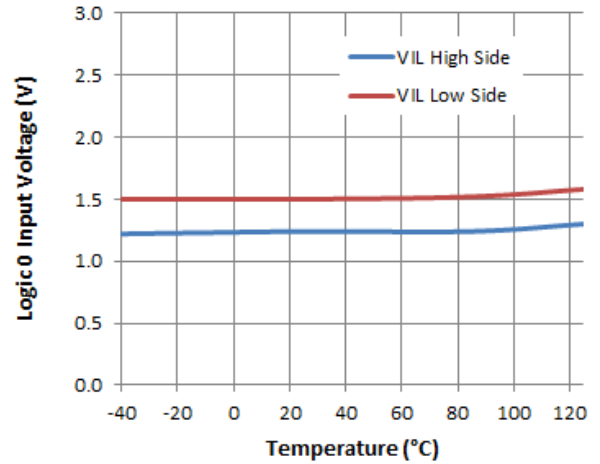


Figure 23. Logic 0 Input Voltage vs. Temperature

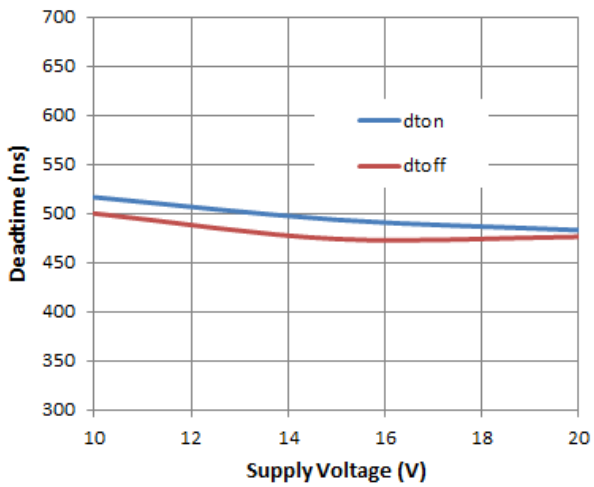


Figure 24. Deadtime vs. Supply Voltage

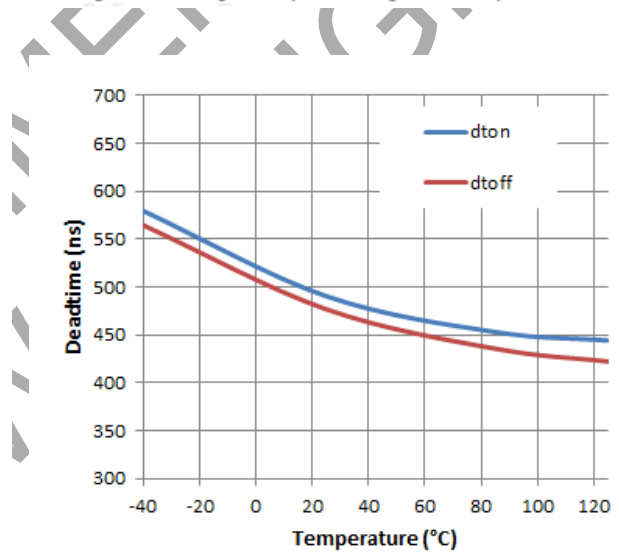


Figure 25. Deadtime vs. Temperature

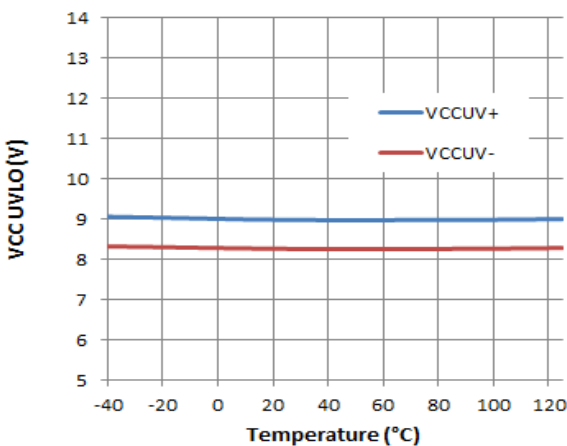


Figure 26. VCC UVLO vs. Temperature

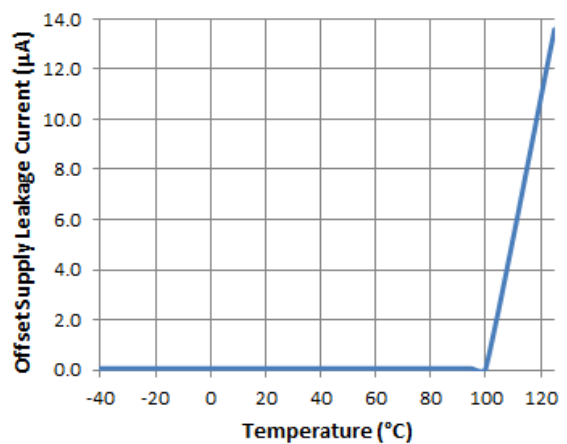
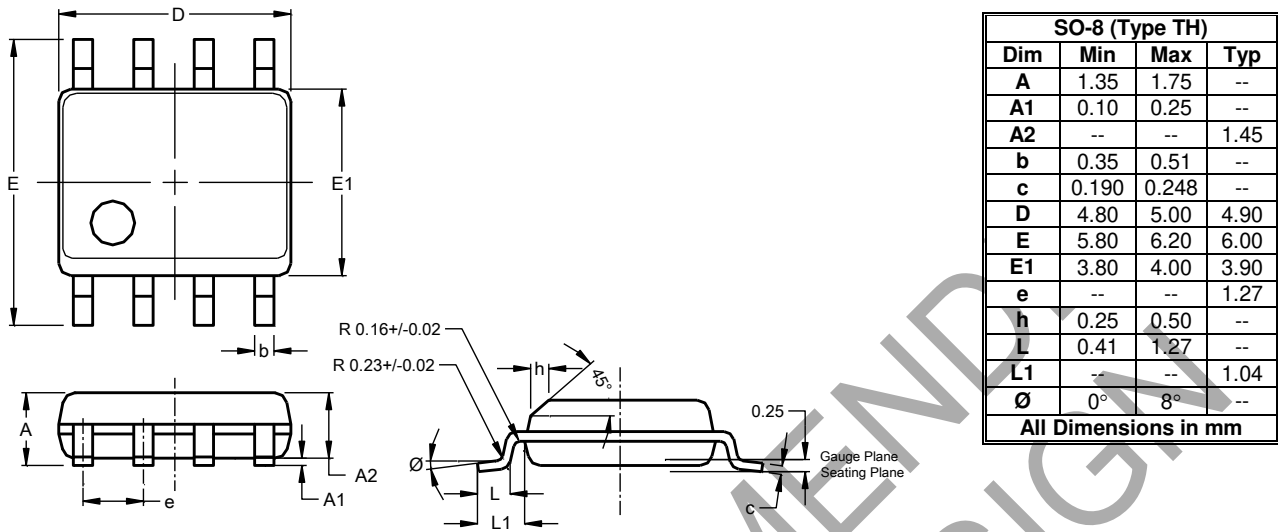


Figure 27. Offset Supply Leakage Current vs. Temperature

Package Outline Dimensions

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

SO-8 (Type TH)



Suggested Pad Layout

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

SO-8 (Type TH)



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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