DGD2108

HALF-BRIDGE GATE DRIVER IN SO-8 (TYPE TH)

Description

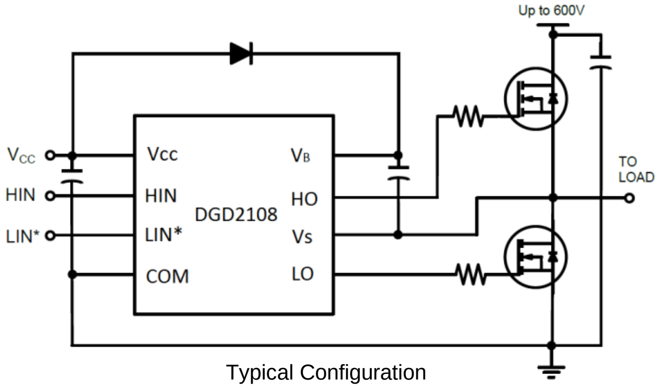
The DGD2108 is a high-voltage / high-speed gate driver capable of driving N-Channel MOSFETs and IGBTs in a half bridge configuration. High-voltage processing techniques enable the DGD2108's high-side to switch to 600V in a bootstrap operation.

The DGD2108 logic inputs are compatible with standard TTL and CMOS levels (down to 3.3V) for easy interfacing with controlling devices. The driver outputs feature high-pulse current buffers designed for minimum driver cross conduction. Internal deadtime protects high-voltage MOSFETs.

The DGD2108 is offered in SO-8 (Type TH) package, 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



Typical Configuration

Features

- Floating high-side driver in bootstrap operation to 600V
- Drives two N-Channel MOSFETs or IGBTs in a half bridge configuation
- Outputs tolerant to negative transients
- Internal logic and dead time of 540ns to protect MOSFETs
- Wide logic and low-side gate driver supply voltage: 10V to 20V
- Logic inputs (HIN and LIN*) 3.3V capability
- Schmitt triggered logic inputs with internal pull down
- Undervoltage lockout for high and low side drivers
- 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)

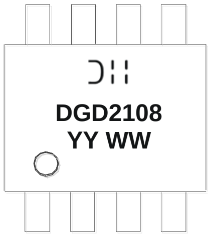
SO-8 (Type TH)
Top View

Ordering Information (Note 4)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DGD2108S8-13	DGD2108	13	12	2,500

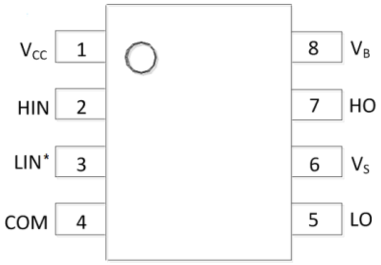
Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "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
DGD2108 = Product Type Marking Code
YY = Year (ex: 16 = 2016)
WW = Week (01 - 53)

Pin Diagrams

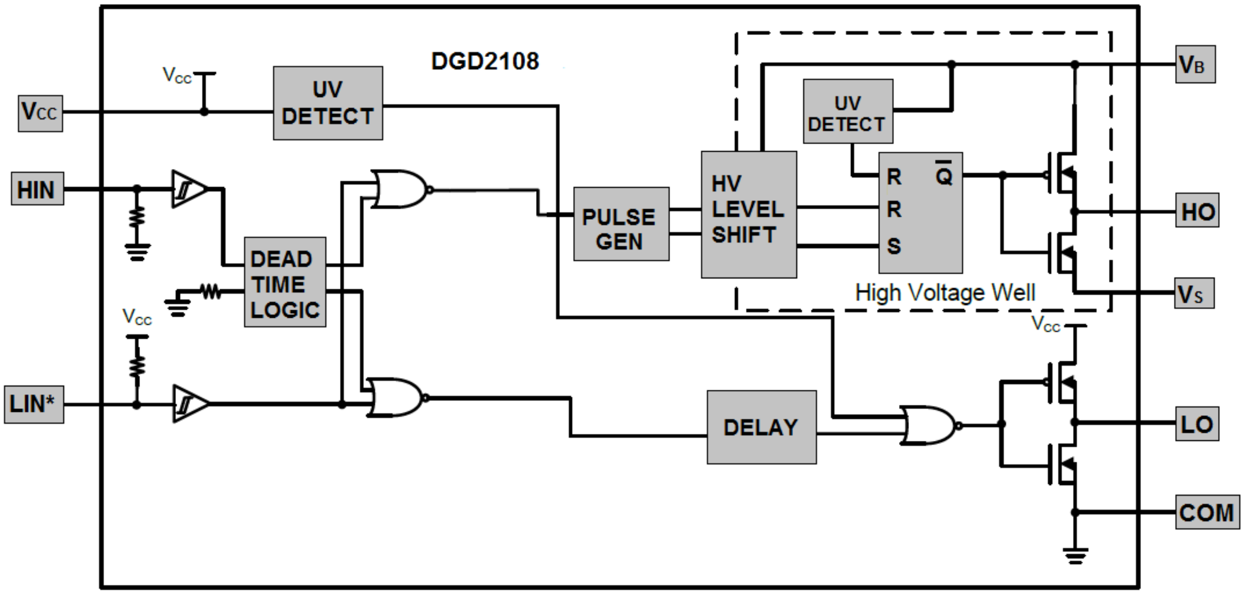


Top view SO-8 (Type TH)

Pin Descriptions

Pin Number	Pin Name	Function
1	V_{CC}	Low-side and logic fixed 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 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 and logic 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)	$R_{\theta JA}$	200	°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
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	Conditions
Logic "1" input voltage	V_{IH}	2.5	–	–	V	V_{CC} = 10V to 20V
Logic "0" input voltage	V_{IL}	–	–	0.6	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}	–	0.2	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}	20	75	130	µA	V_{IN} = 0V or 5V
Quiescent V_{CC} supply current	I_{CCQ}	0.4	1.0	1.6	mA	V_{IN} = 0V or 5V
Logic "1" input bias current	I_{IN+}	–	5	20	µA	HIN = 5V, LIN* = 0V
Logic "0" input bias current	I_{IN-}	–	–	5	µA	HIN = 0V, LIN* = 5V
V_{BS} supply undervoltage positive going threshold	V_{BSUV+}	8.0	8.9	9.8	V	–
V_{BS} supply undervoltage negative going threshold	V_{BSUV-}	7.4	8.2	9.0	V	–
V_{CC} supply undervoltage positive going threshold	V_{CCUV+}	8.0	8.9	9.8	V	–
V_{CC} supply undervoltage negative going threshold	V_{CCUV-}	7.4	8.2	9.0	V	–
Hysteresis	V_{CCUVH} V_{BSUVH}	0.3	0.7	–	V	– –
Output high short circuit pulsed current	I_{O+}	120	290	–	mA	V_O = 0V, PW ≤ 10µs
Output low short circuit pulsed current	I_{O-}	250	600	–	mA	V_O = 15V, PW ≤ 10µs

Note: 7. The V_{IN} and I_{IN} parameters are referenced to V_{SS} and are applicable to the two logic input pins: HIN and LIN*. The V_O and I_O parameters are referenced to COM and 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	Conditions
Turn-on propagation delay	t_{ON}	–	220	300	ns	V_S = 0V
Turn-off propagation delay	t_{OFF}	–	200	280	ns	V_S = 0V or 600V
Delay matching, | t_{ON} - t_{OFF}|	t_{DMON}	–	–	30	ns	–
Turn-on rise time	t_r	–	100	220	ns	V_S = 0V
Turn-off fall time	t_f	–	35	80	ns	V_S = 0V
Deadtime: $t_{DT\ LO\text{-}HO}$ & $t_{DT\ HO\text{-}LO}$	t_{DT}	400	540	680	ns	–
Deadtime matching: $t_{DT\ LO\text{-}HO}$ - $t_{DT\ HO\text{-}LO}$	t_{MDT}	–	0	60	ns	–

Timing Waveforms

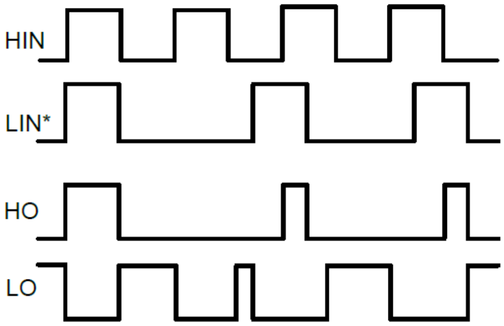


Figure 1. Input / Output Timing Diagram

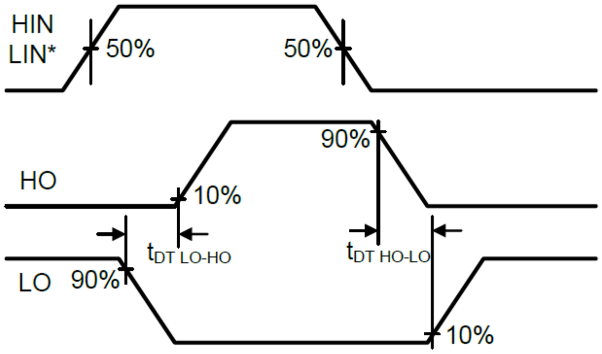


Figure 2. Deadtime Waveform Definitions

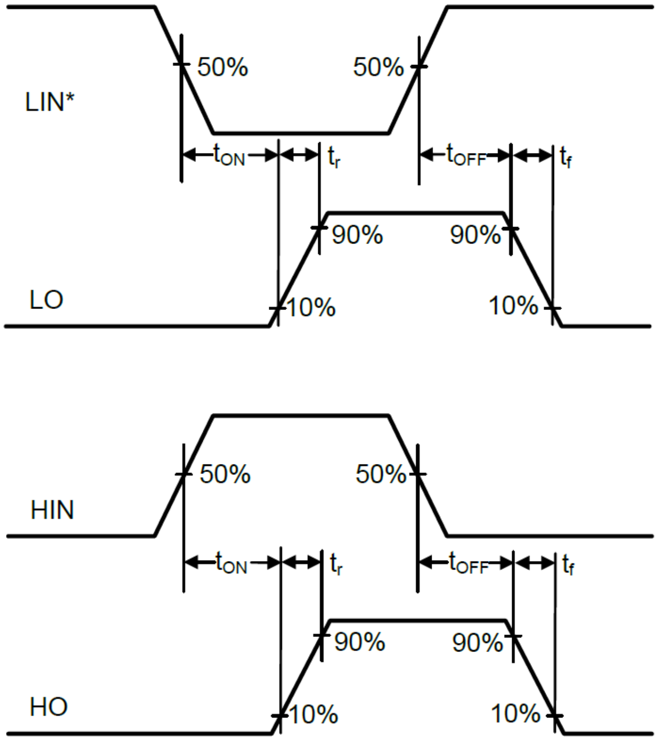


Figure 3. Switching Time Waveform Definitions

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

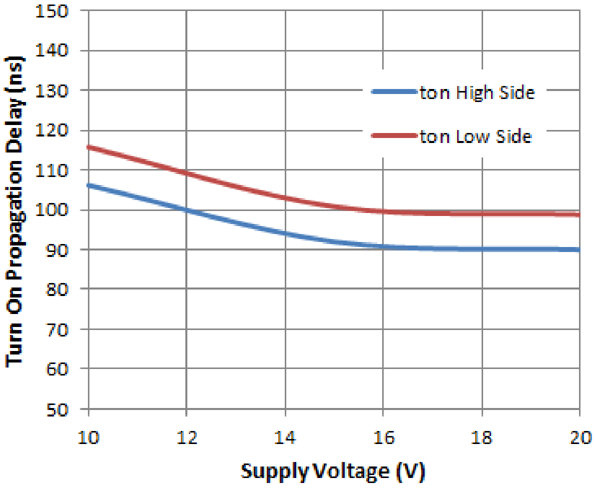


Figure 4. Turn-on Propagation Delay vs. Supply Voltage

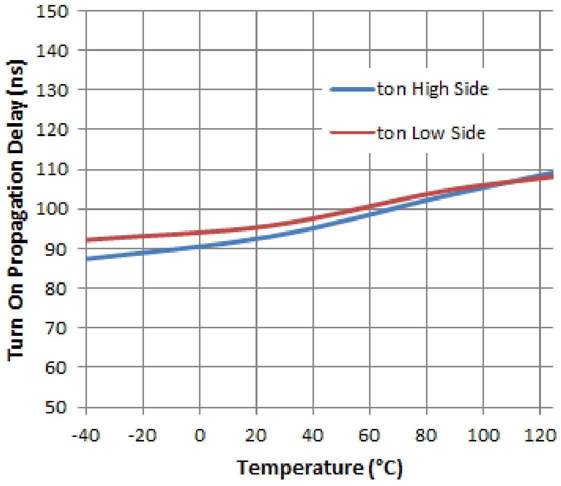


Figure 5. Turn-on Propagation Delay vs. Temperature

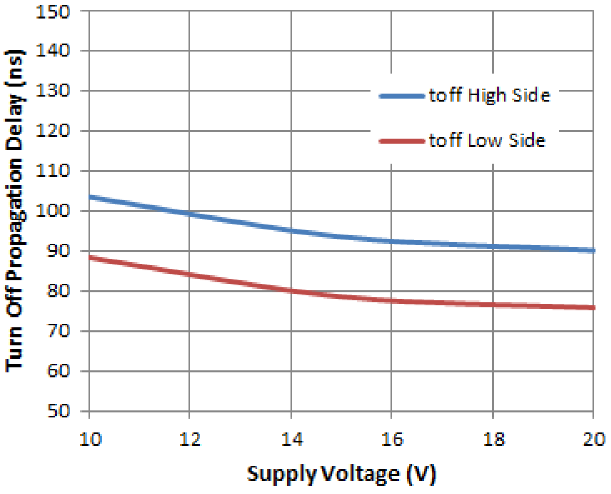


Figure 6. Turn-off Propagation Delay vs. Supply Voltage

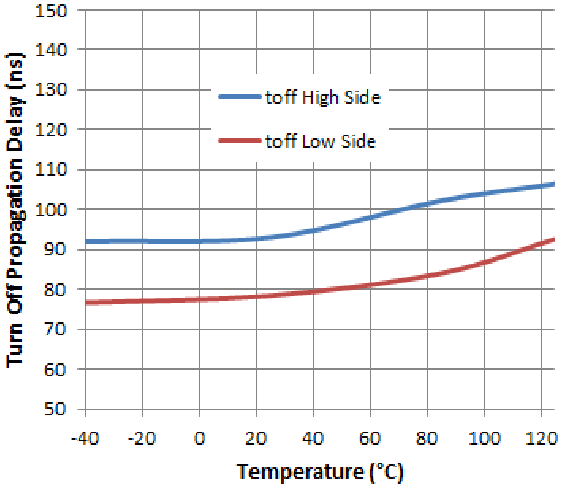


Figure 7. Turn-off Propagation Delay vs. Temperature

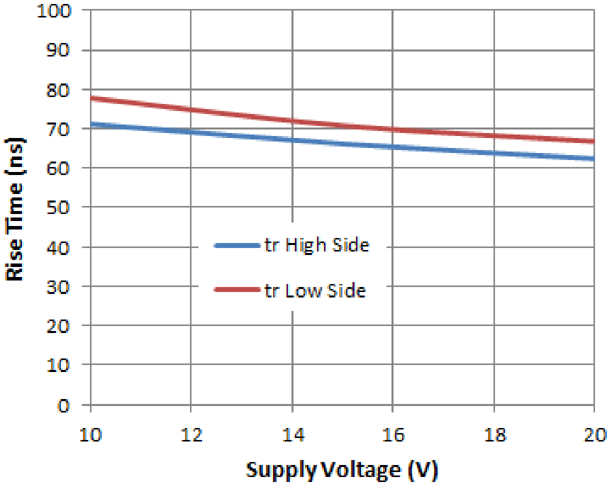


Figure 8. Rise Time vs. Supply Voltage

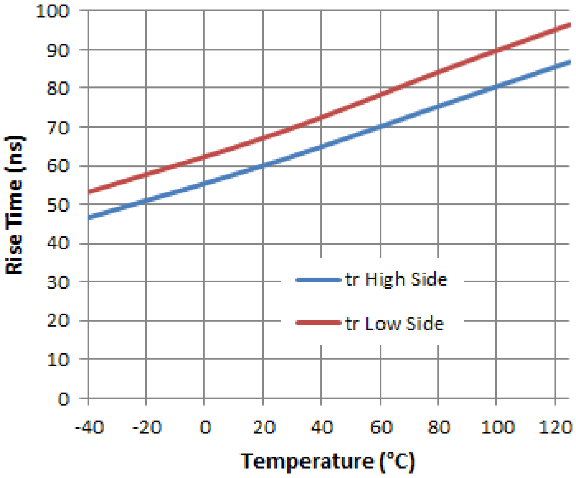


Figure 9. Rise Time vs. Temperature

Typical Performance Characteristics (continued)

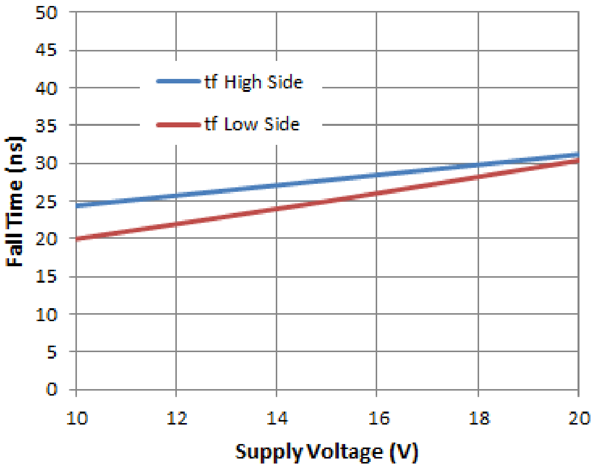


Figure 10. Fall Time vs. Supply Voltage

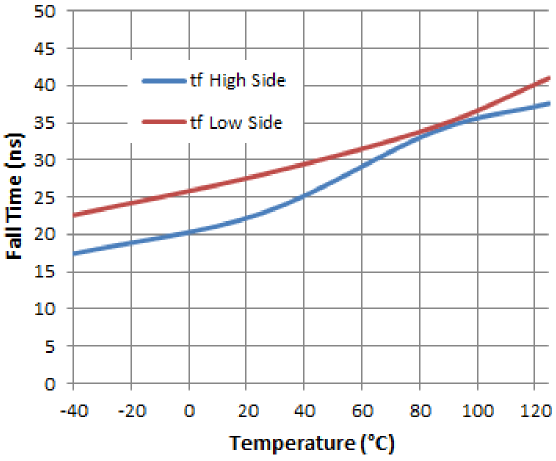


Figure 11. Fall Time vs. Temperature

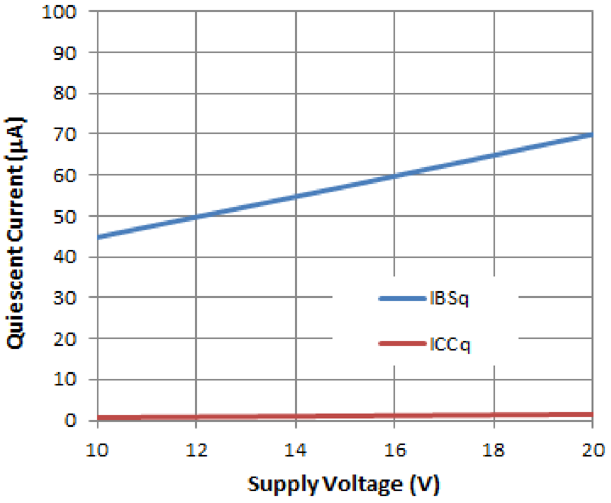


Figure 12. Quiescent Current vs. Supply Voltage

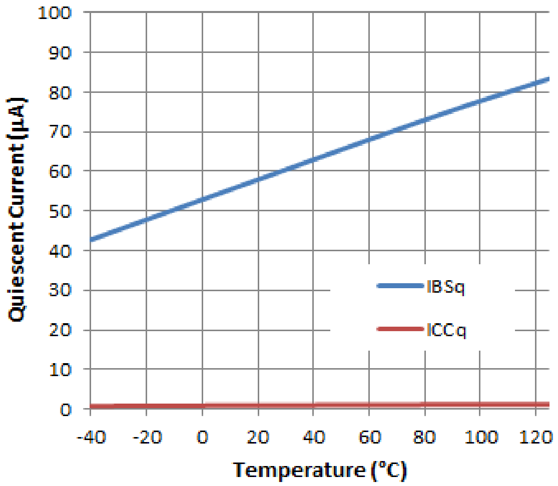


Figure 13. Quiescent Current vs. Temperature

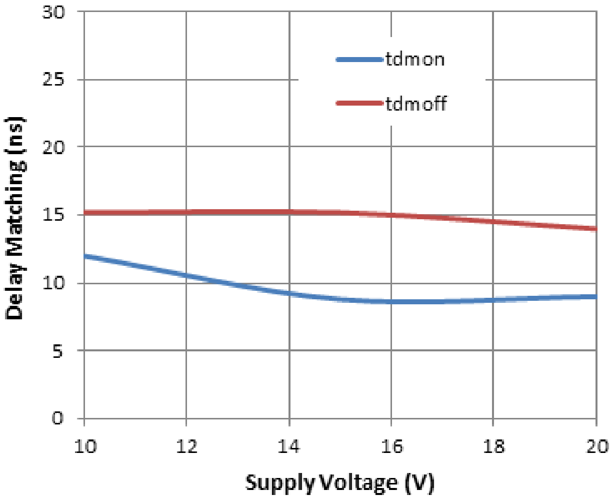


Figure 14. Delay Matching vs. Supply Voltage

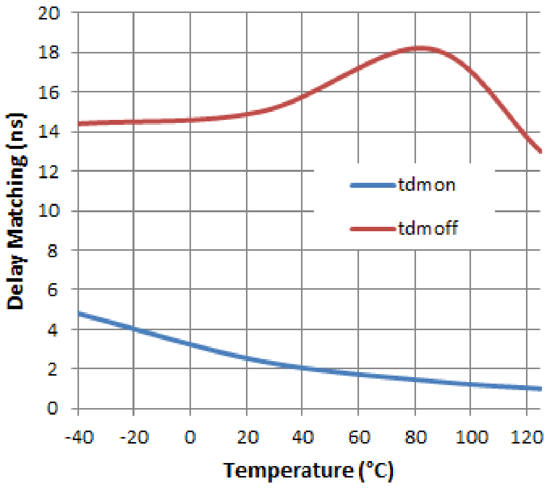


Figure 15. Delay Matching vs. Temperature

Typical Performance Characteristics (cont.)

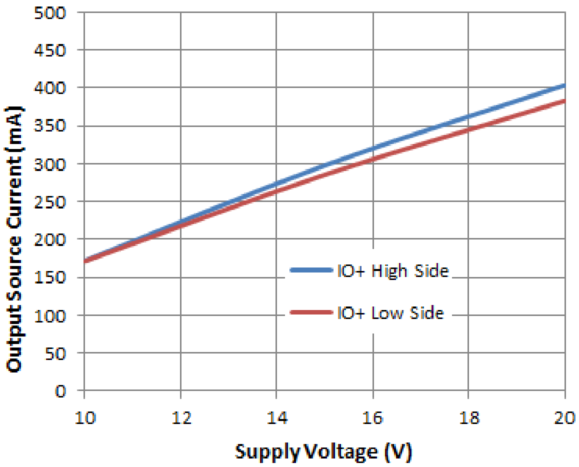


Figure 16. Output Source Current vs. Supply Voltage

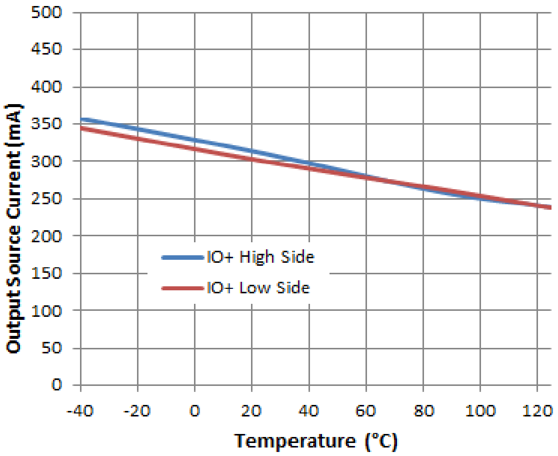


Figure 17. Output Source Current vs. Temperature

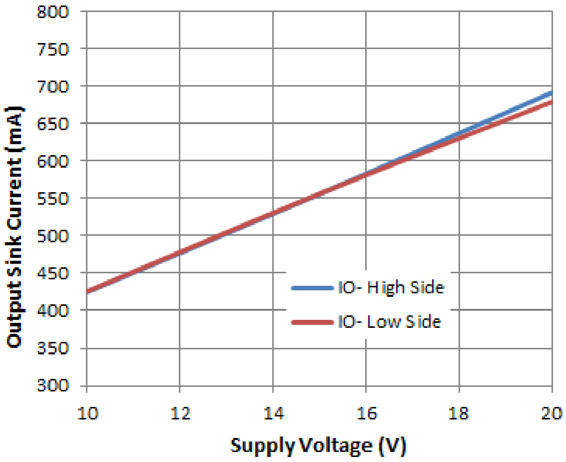


Figure 18. Output Sink Current vs. Supply Voltage

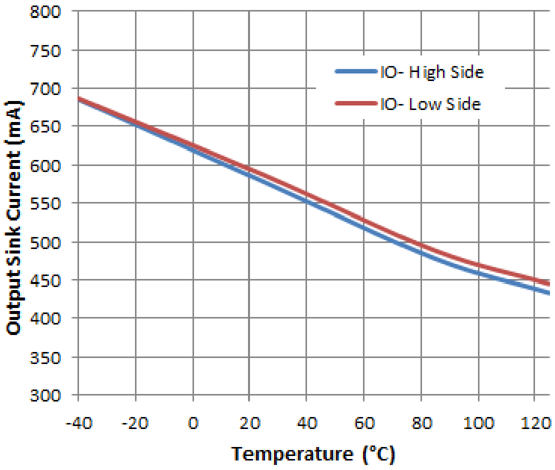


Figure 19. Output Sink Current vs. Temperature

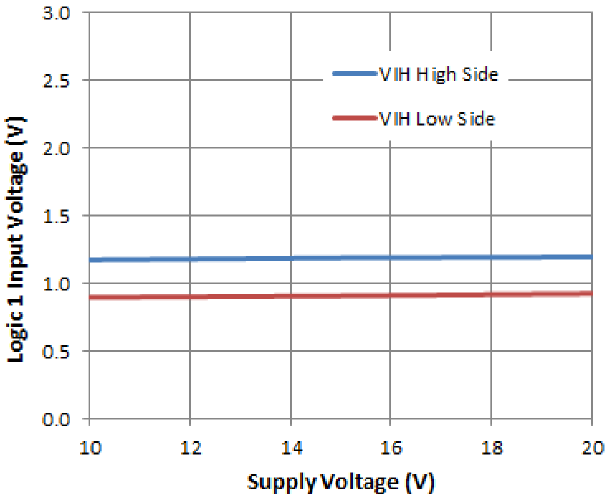


Figure 20. Logic 1 Input Voltage vs. Supply Voltage

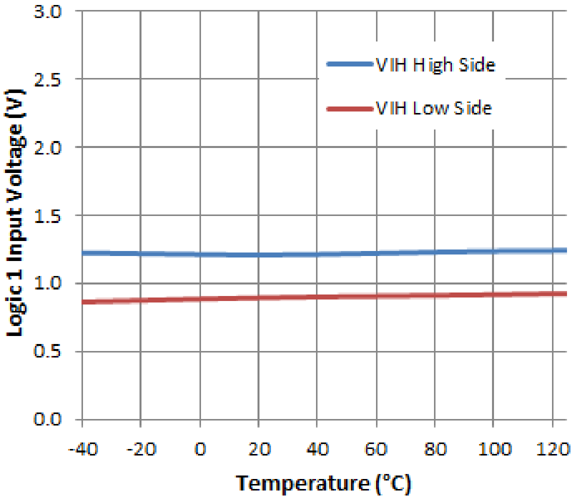


Figure 21. Logic 1 Input Voltage vs. Temperature

Typical Performance Characteristics (cont.)

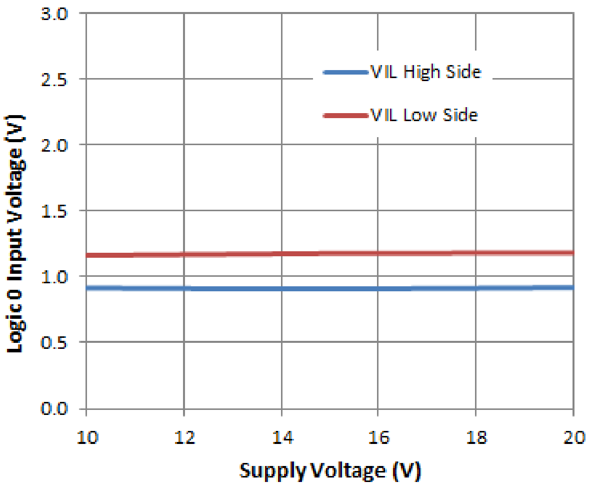


Figure 22. Logic 0 Input Voltage vs. Supply Voltage

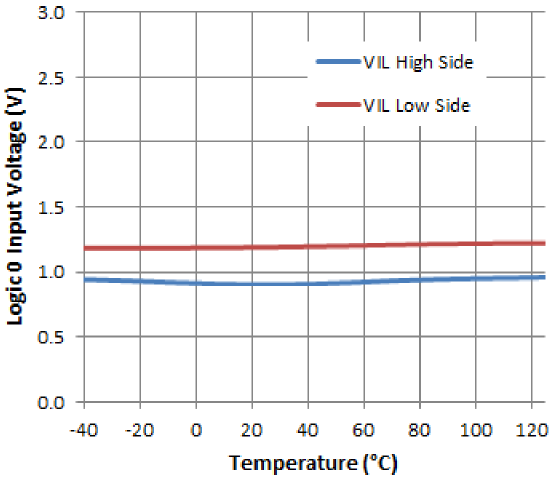


Figure 23. Logic 0 Input Voltage vs. Temperature

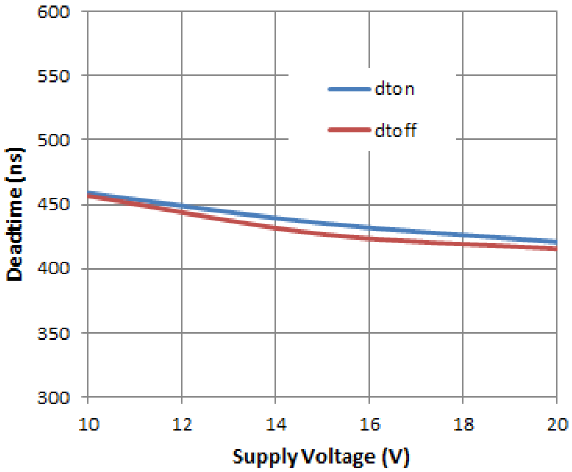


Figure 24. Deadtime vs. Supply Voltage

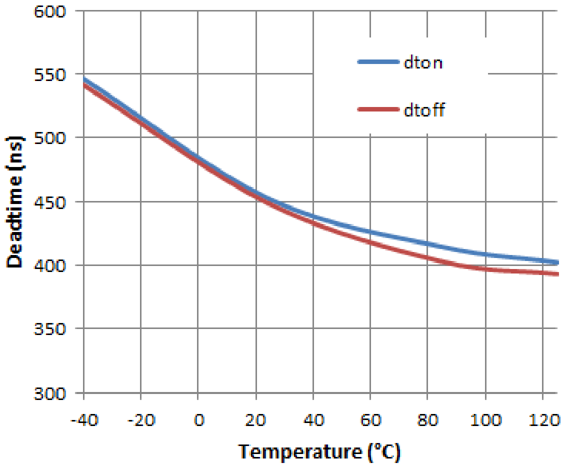


Figure 25. Deadtime vs. Temperature

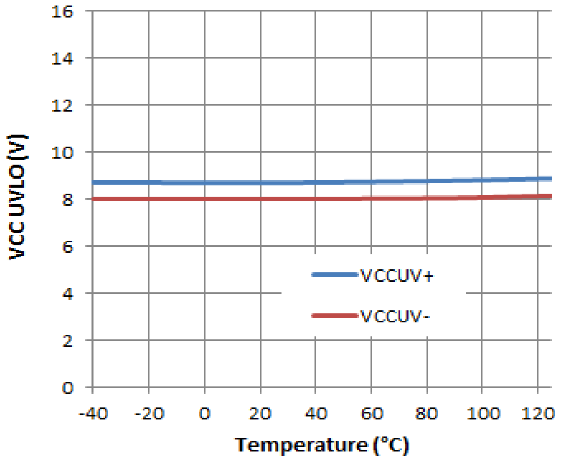


Figure 26. VCC UVLO vs. Temperature

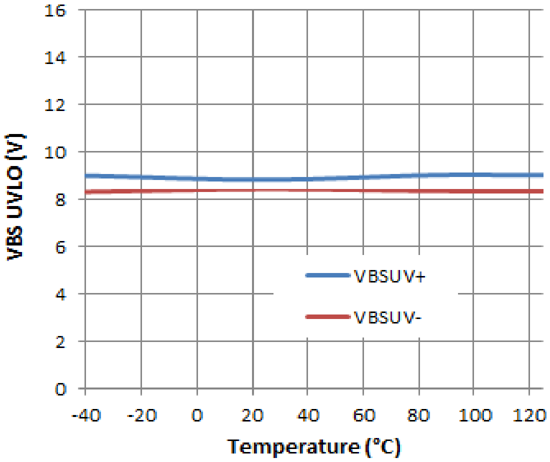


Figure 27. VBS UVLO vs. Temperature

Typical Performance Characteristics (cont.)

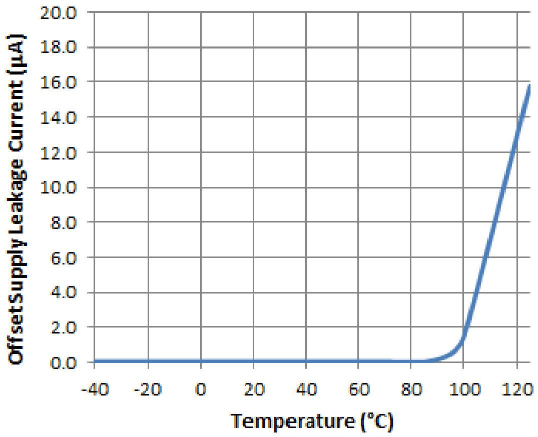
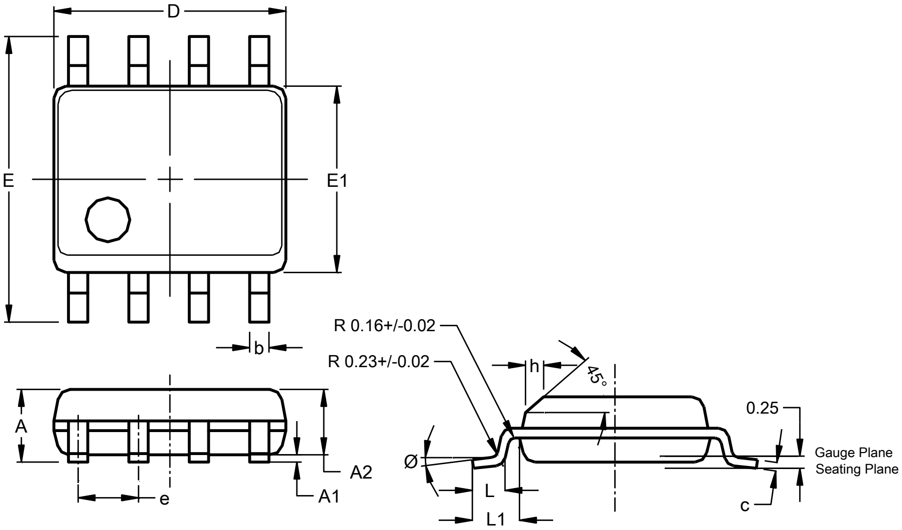


Figure 28. Offset Supply Leakage Current vs. Temperature

Package Outline Dimensions

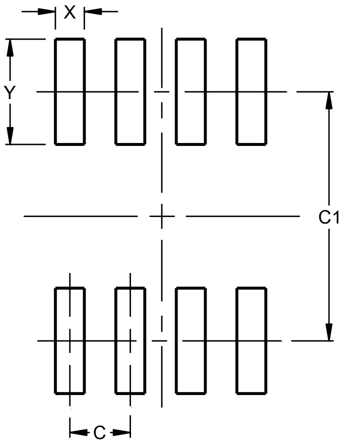
Please see AP02001 at http://www.diodes.com/_files/datasheets/ap02001.pdf for the latest version.



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 AP02001 at http://www.diodes.com/_files/datasheets/ap02001.pdf for the latest version.



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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