DUAL 4.0A HIGH SPEED LOW-SIDE GATE DRIVER IN SO-8

Description

The DGD0227 dual, high-speed, low-side MOSFET and IGBT driver is capable of driving 4A of peak current. The DGD0227 logic inputs are compatible with standard TTL and CMOS levels (down to 3.3V) to interface easily with MCUs. Fast and well-matched propagation delays allow high-speed operation, enabling a smaller, more compact power-switching design using smaller associated components.

The DGD0227 is offered in the SO-8 (Type TH) package and operates over an extended -40°C to +125°C temperature range.

Features

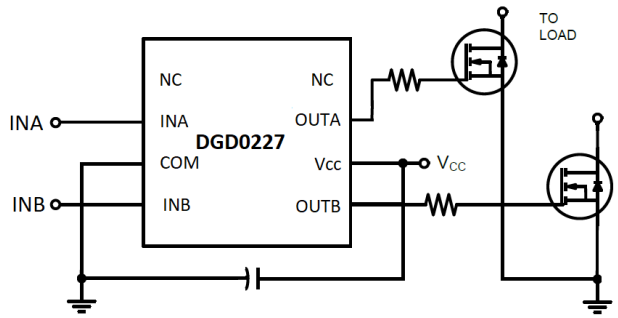
- Efficient Low Cost Solution for Driving MOSFETs and IGBTs
- Wide Supply Voltage Operating Range: 4.5V to 18V
- 4.0A Source / 4.0A Sink Output Current Capability
- Fast Propagation Delay (35ns Typ)
- Fast Rise and Fall Times (20ns Typ)
- Logic Input (IN) 3.3V Capability
- Extended Temperature Range: -40°C to +125°C
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Applications

- DC-DC Converters
- Line Drivers
- Motor Controls
- Switch Mode Power Supplies

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)

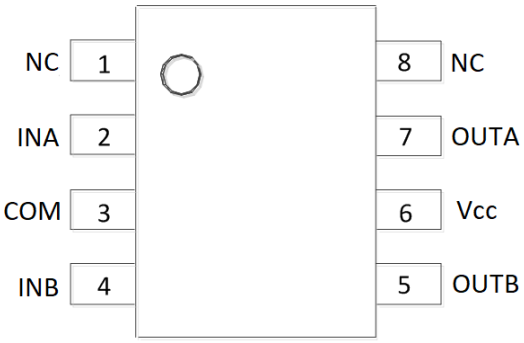
Product	Marking	Reel Size (inches)	Tape Width (mm)	Quantity Per Reel
DGD0227S8-13	DGD0227	13	12	2,500

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 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
DGD0227 = Product Type Marking Code
YY = Year (ex: 18 = 2018)
WW = Week (01 to 53)

Pin Diagrams

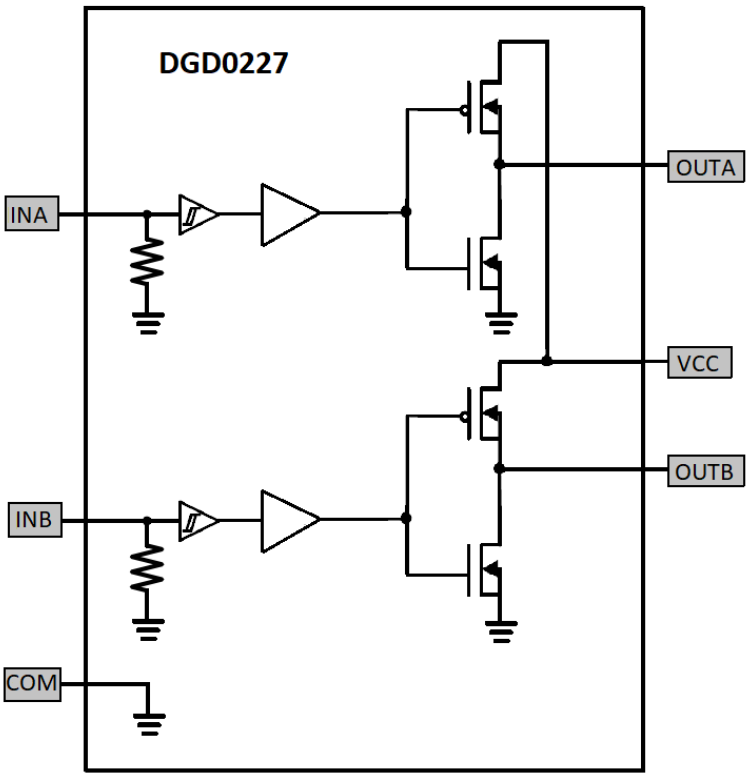


Top View: SO-8 (Type TH)

Pin Descriptions

Pin Number	Pin Name	Function
1, 8	NC	No Connection (No internal connection)
2	INA	Logic Input for A Phase, in Phase with OUTA
3	COM	Supply Return
4	INB	Logic Input for B Phase, in Phase with OUTB
5	OUTB	Gate Driver Output B Phase
6	V_{CC}	Supply Input
7	OUTA	Gate Driver Output A Phase

Functional Block Diagram



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

Characteristic	Symbol	Value	Unit
Low-side Fixed Supply Voltage	V_{CC}	-0.3 to +22	V
Output Voltage (OUTA, OUTB)	V_{OUT}	-0.3 to V_{CC} +0.3	V
Logic Input Voltage (INA, INB)	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
Storage Temperature Range	T_{STG}	-55 to +150	

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

ESD Ratings (Note 6)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	2,000	V	2
Electrostatic Discharge – Charge Device Model	ESD CDM	750	V	III

Note: 6. Refer to JEDEC specification JESD22-A114 and JESD22-C101.

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V_{CC}	4.5	18	V
Output Voltage (OUTA/OUTB)	V_{OUT}	0	V_{CC}	V
Logic Input Voltage (INA, INB)	V_{IN}	0	5	V
Ambient Temperature	T_A	-40	+125	°C

DC Electrical Characteristics (V_{BIAS} (4.5V < V_{CC} < 18V), @T_A = +25°C, unless otherwise specified.) (Note 7)

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Logic “1” Input Voltage	V_{IH}	2.4	—	—	V	—
Logic “0” Input Voltage	V_{IL}	—	—	0.7	V	—
Logic “1” Input Bias Current	I_{IH+}	—	—	10	µA	V_{IN} = 3.3V
Logic “0” Input Bias Current	I_{IH-}	—	—	10	µA	V_{IN} = 0V
High Level Output Voltage, V_{BIAS} - V_O	V_{OH}	—	30	100	mV	I_{OUT} = -10mA
Low Level Output Voltage	V_{OL}	—	16	50	mV	I_{OUT} = 10mA
Quiescent V_{CC} Supply Current	I_{CCQ}	—	40	100	µA	V_{IN} = 0V or 3.3V
Output High Short Circuit Pulsed Current	I_{O+}	—	4.0	—	A	V_{CC} = 14V
Output Low Short Circuit Pulsed Current	I_{O-}	—	4.0	—	A	V_{CC} = 14V
Output Resistance, High	R_{OH}	—	1.5	—	Ω	I_{OUT} = -10mA, V_{CC} = 14V
Output Resistance, Low	R_{OL}	—	1.0	—	Ω	I_{OUT} = 10mA, V_{CC} = 14V

Note: 7. The V_{IN} and I_{IN} parameters are applicable to the logic pins; INA and INB. The V_O and I_O parameters are applicable to the output pins: OUTA and OUTB.

AC Electrical Characteristics (V_{BIAS} (4.5V < V_{CC} < 18V), C_L = 1000pF, @T_A = +25°C, unless otherwise specified.)

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Turn-On Rise Time	t_R	—	20	40	ns	V_{CC} = 14V
Turn-Off Fall Time	t_F	—	20	40	ns	V_{CC} = 14V
Turn-On Propagation Delay	t_{ON}	—	40	100	ns	V_{CC} = 14V
Turn-Off Propagation Delay	t_{OFF}	—	35	50	ns	V_{CC} = 14V

Timing Waveforms

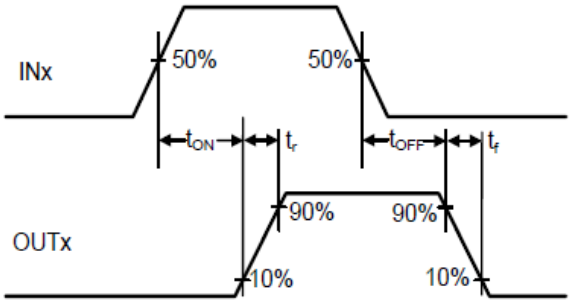


Figure 1. Switching Time Waveform Definitions

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

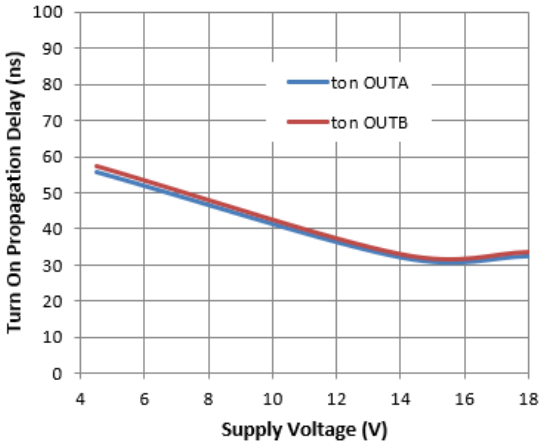


Figure 4. Turn-on Propagation Delay vs. Supply Voltage

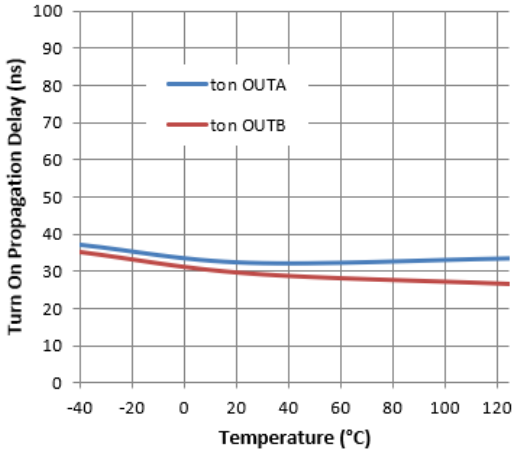


Figure 5. Turn-on Propagation Delay vs. Temperature

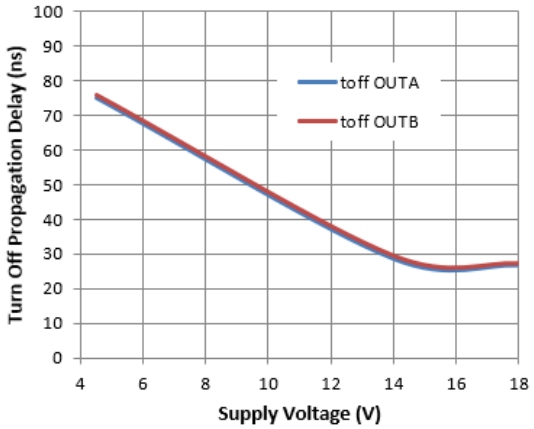


Figure 6. Turn-off Propagation Delay vs. Supply Voltage

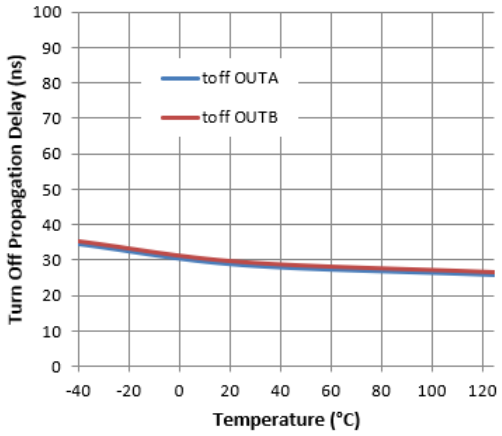


Figure 7. Turn-off Propagation Delay vs. Temperature

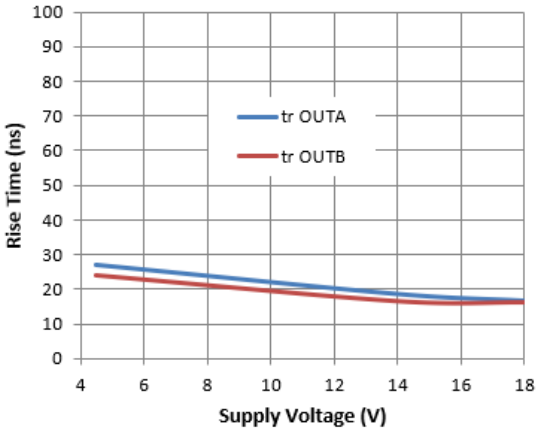


Figure 8. Rise Time vs. Supply Voltage

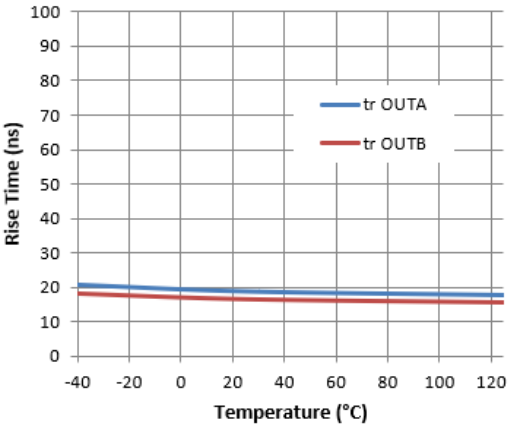


Figure 9. Rise Time vs. Temperature

Typical Performance Characteristics (continued)

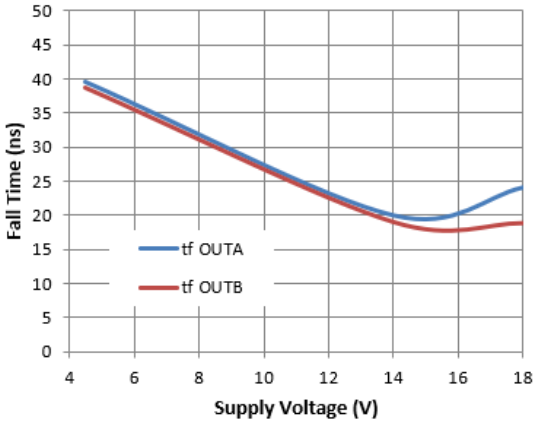


Figure 10. Fall Time vs. Supply Voltage

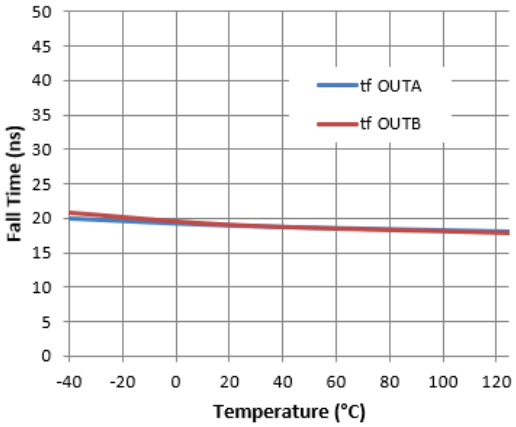


Figure 11. Fall Time vs. Temperature

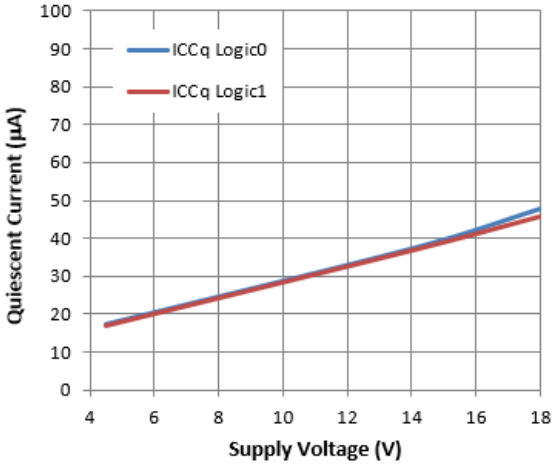


Figure 12. Quiescent Current vs. Supply Voltage

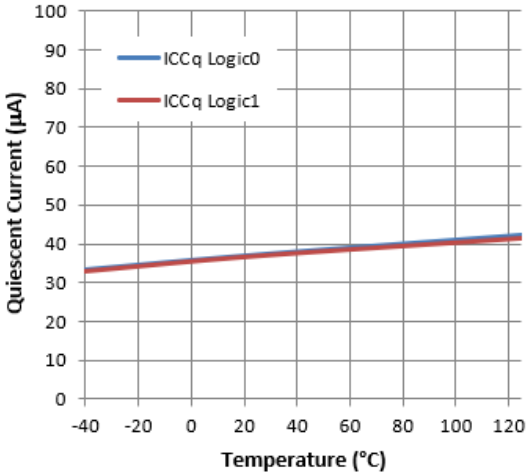


Figure 13. Quiescent Current vs. Temperature

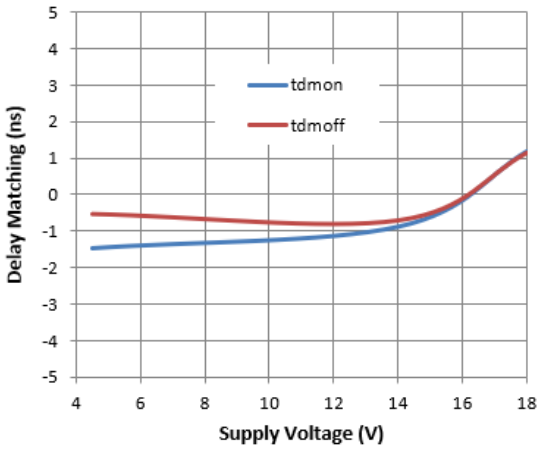


Figure 14. Delay Matching vs. Supply Voltage

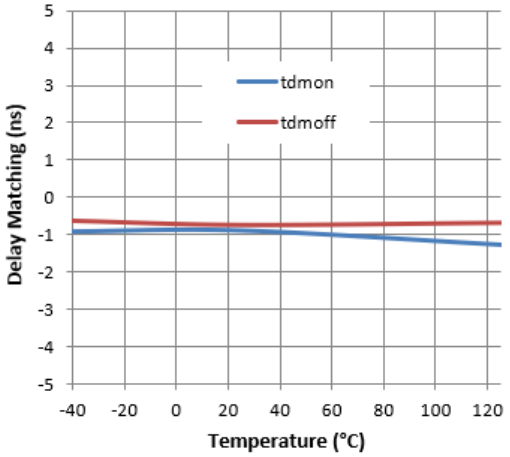


Figure 15. Delay Matching vs. Temperature

Typical Performance Characteristics (cont.)

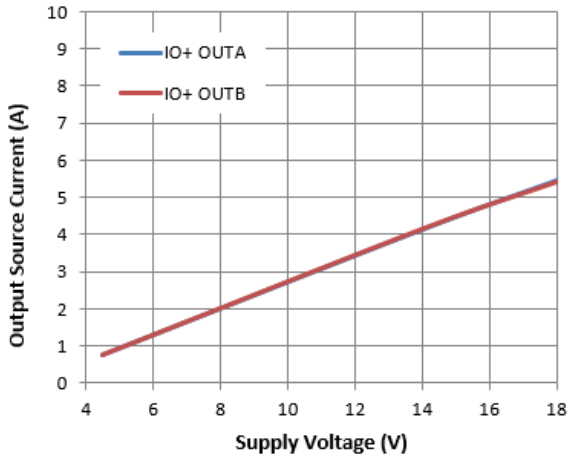


Figure 16. Output Source Current vs. Supply Voltage

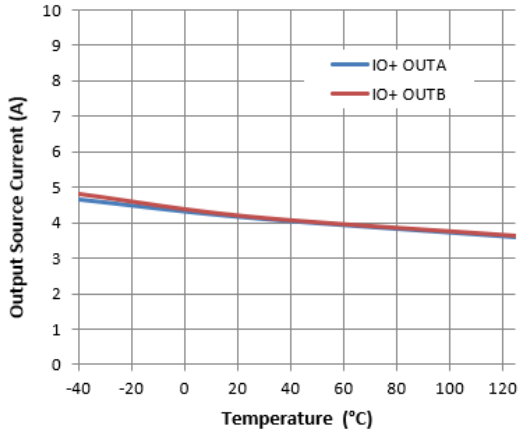


Figure 17. Output Source Current vs. Temperature

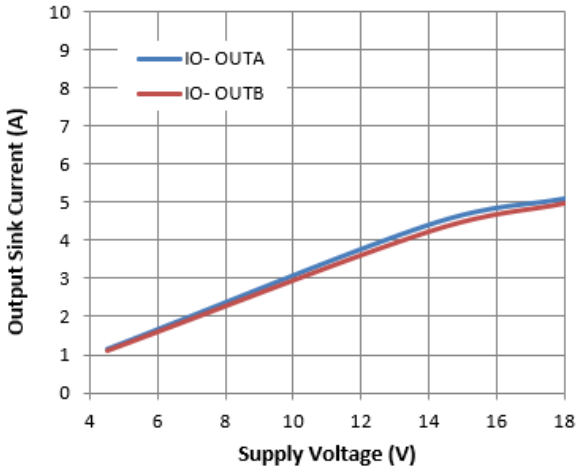


Figure 18. Output Sink Current vs. Supply Voltage

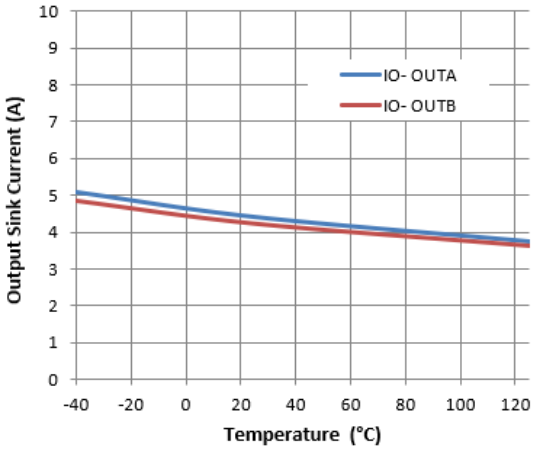


Figure 19. Output Sink Current vs. Temperature

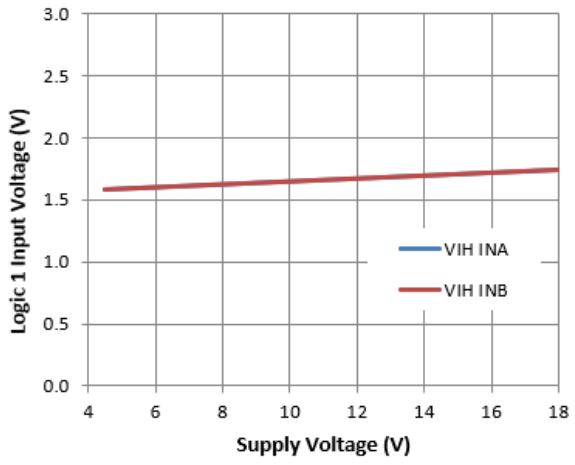


Figure 20. Logic 1 Input Voltage vs. Supply Voltage

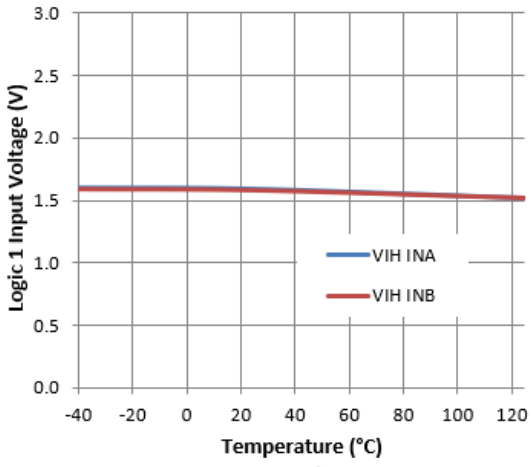


Figure 21. Logic 1 Input Voltage vs. Temperature

Typical Performance Characteristics (cont.)

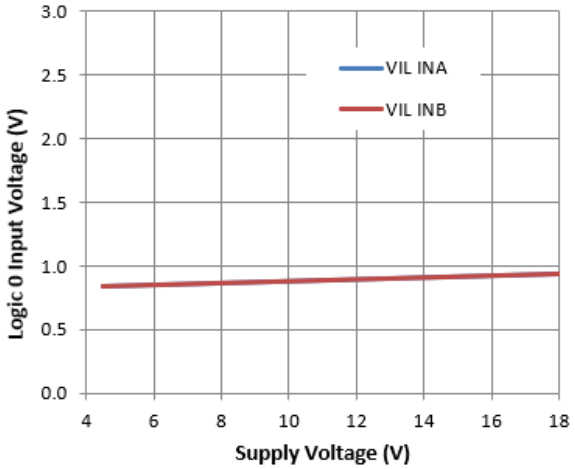


Figure 22. Logic 0 Input Voltage vs. Supply Voltage

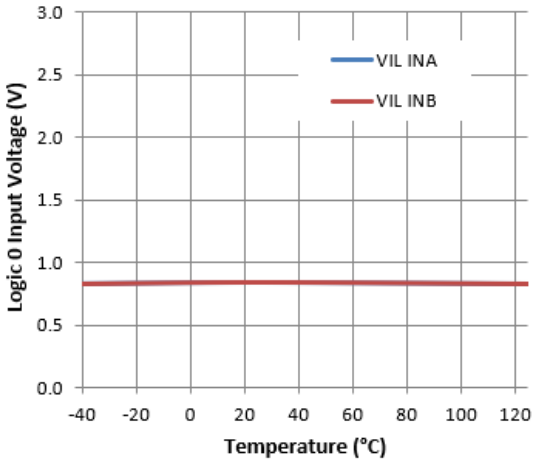
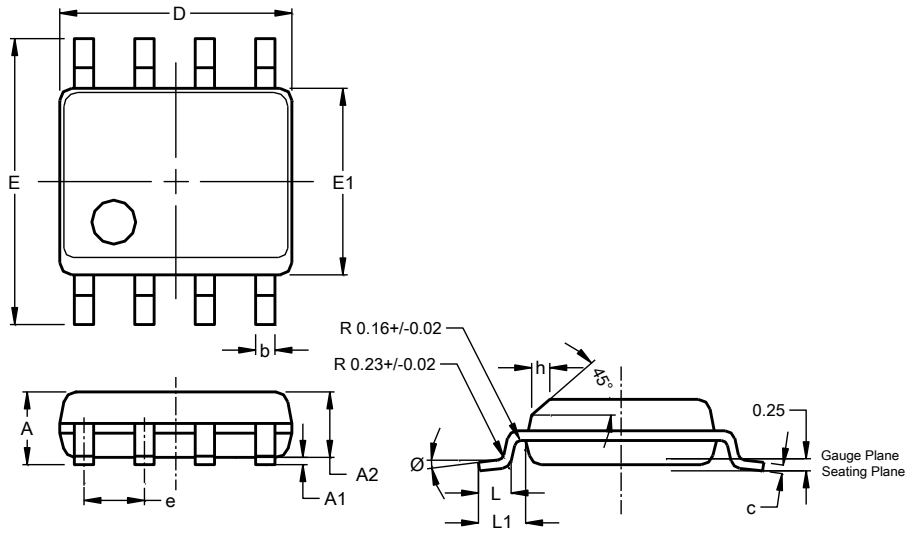


Figure 23. Logic 0 Input Voltage vs. Temperature

Package Outline Dimensions

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

SO-8 (Type TH)

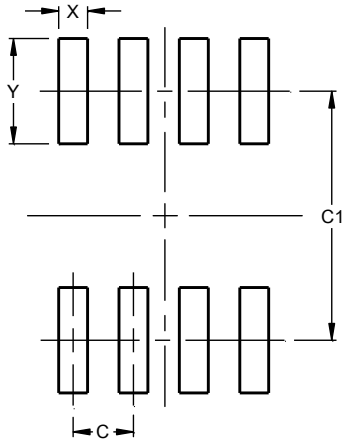


SO-8 (Type TH)			
Dim	**Min**	**Max**	**Typ**
A	1.35	1.75	–
A1	0.10	0.25	–
A2	–	–	1.45
b	0.35	0.51	–
c	0.190	0.248	–
D	4.80	5.00	4.90
E	5.80	6.20	6.00
E1	3.80	4.00	3.90
e	–	–	1.27
h	0.25	0.50	–
L	0.41	1.27	–
L1	–	–	1.04
Ø	0°	8°	–
All Dimensions in mm			

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

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