1.5A HIGH SPEED SINGLE GATE DRIVER

Description

The DGD0215 and DGD0216 high speed / low side MOSFET and IGBT drivers are capable of driving 1.9A of peak current. The DGD0215 and DGD0216 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 and more compact power switching design using smaller associated components.

The DGD0215 and DGD0216 are highly resistant to noise, and are able to withstand up to 5V positive or negative on the ground pin without damage. The devices can also withstand 500mA of reverse current forced back into the outputs without damage or logic change. The DGD0215 provides an inverted output and the DGD0216 provides a non-inverting ouput.

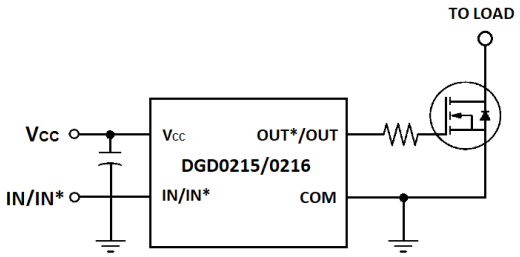
The DGD0215 and DGD0216 are offered in TSOT25 package and the operating temperature extends from -40°C to +125°C.

Features

- Efficient Low Cost Solution for Driving MOSFETs and IGBTs
- Wide Supply Voltage Operating Range: 4.5V to 18V
- 1.9A Source / 1.8A Sink Output Current Capability
- Inverting and Non-Inverting Input Configurations
- Fast Propagation Delay (35ns typ)
- Fast Rise and Fall Times (15ns 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)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative.**
  https://www.diodes.com/quality/product-definitions/

Applications

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



Typical Configuration

Mechanical Data

- Case: TSOT25 (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: 0.012 grams (Approximate)

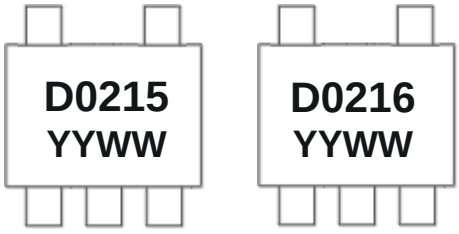
TSOT25

Ordering Information (Note 4)

Part number	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
DGD0215WT-7	D0215	7	8	3,000
DGD0216WT-7	D0216	7	8	3,000

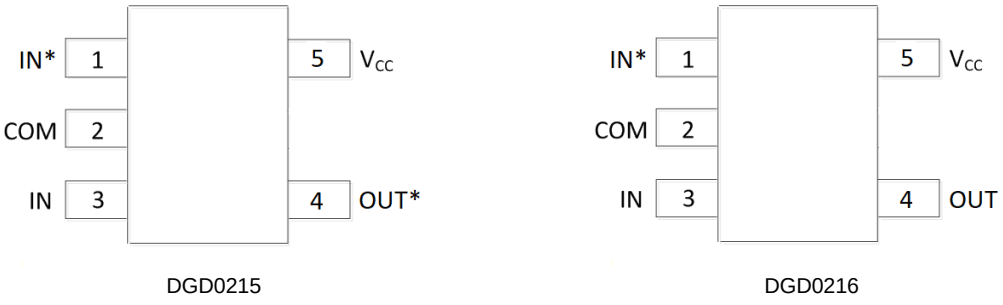
Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen-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



D0215/D0216 = Product Type Marking Code
YY = Year (ex: 20 = 2020)
WW = Week (01 to 53)

Pin Diagrams

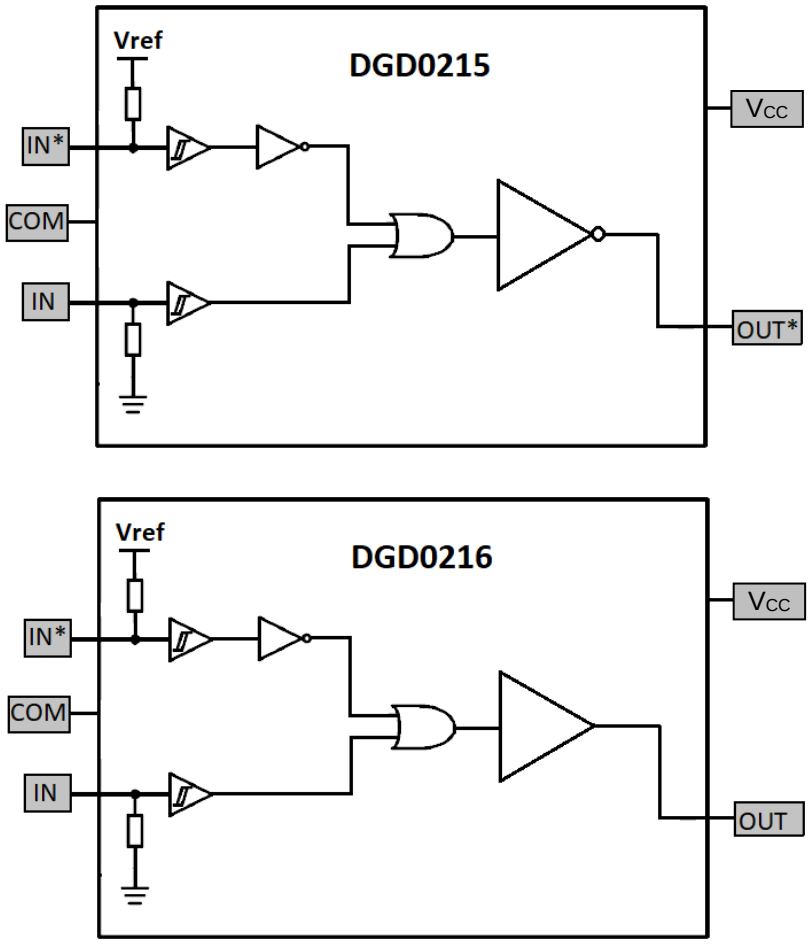


Top View: TSOT25 (Type TH)

Pin Descriptions

Pin Number	Pin Name	Function
1	IN*	Logic Input, In Phase with OUT* (DGD0215), Out of Phase with OUT (DGD0216), leave open when not in use.
2	COM	Supply Return
3	IN	Logic Input, Out of Phase with OUT* (DGD0215), In Phase with OUT (DGD0216), leave open when not in use.
4	OUT*/OUT	Gate Drive Output
5	V_{CC}	Supply Input

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 (OUT/OUT*)	V_{OUT}	-0.3 to V_{CC}+0.3	V
Logic Input Voltage (IN)	V_{IN}	-5 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	0.54	W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	188	°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.

ESD Ratings (Note 6)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	2,000	V	2

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

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V_B	4.5	18	V
Output Voltage (OUT/OUT*)	V_S	0	V_{CC}	V
Logic Input Voltage (IN)	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	1.6	—	V	—
Logic “0” Input Voltage	V_{IL}	—	1.3	0.8	V	—
Logic “1” Input Bias Current	I_{IN+}	—	—	5	µA	V_{IN} = 3V, V_{IN*} = 0V
Logic “0” Input Bias Current	I_{IN-}	—	—	2	µA	V_{IN} = 0V, V_{IN*} = 3V
High Level Output Voltage, V_{BIAS} - V_O	V_{OH}	—	25	—	mV	—
Low Level Output Voltage	V_{OL}	—	25	—	mV	—
Quiescent V_{CC} Supply Current	I_{CCQ}	—	50	100	µA	V_{IN} = 0V or 3V
Output High Short Circuit Pulsed Current	I_{O+}	—	1.9	—	A	V_{CC} = 12V
Output Low Short Circuit Pulsed Current	I_{O-}	—	1.8	—	A	V_{CC} = 12V
Output Resistance, High	R_{OH}	—	3.3	—	Ω	I_{OUT} = 10mA, V_{CC} = 12V
Output Resistance, Low	R_{OL}	—	2.3	—	Ω	I_{OUT} = 10mA, V_{CC} = 12V

Note: 7. The V_{IN} and I_{IN} parameters are applicable to the logic input pin: IN. The V_O and I_O parameters are applicable to the output pins: OUT and OUT*.

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

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Turn-On Rise Time	t_R	—	15	25	ns	C_L = 1000pF, V_{CC} = 12V
Turn-Off Fall Time	t_F	—	15	25	ns	C_L = 1000pF, V_{CC} = 12V
Turn-On Propagation Delay	t_{ON}	—	35	50	ns	V_{CC} = 12V
Turn-Off Propagation Delay	t_{OFF}	—	35	55	ns	V_{CC} = 12V

DC Electrical Characteristics (V_{BIAS} (4.5V < V_{CC} < 18V), @T_C = -40°C to +125°C, unless otherwise specified.)

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Logic “1” Input Voltage	V_{IH}	2.4	—	—	V	—
Logic “0” Input Voltage	V_{IL}	—	—	0.8	V	—
Logic “1” Input Bias Current	I_{IN+}	—	—	10	µA	V_{IN} = 3V
Logic “0” Input Bias Current	I_{IN-}	—	0	5	µA	V_{IN} = 0V
High Level Output Voltage, V_{BIAS} - V_O	V_{OH}	—	25	—	mV	—
Low Level Output Voltage	V_{OL}	—	25	—	mV	—
Quiescent V_{CC} Supply Current	I_{CCQ}	—	0.1	0.2	mA	V_{IN} = 0V or 3V
Output Resistance, High	R_{OH}	—	—	10	Ω	I_{OUT} = 10mA, V_{CC} = 12V
Output Resistance, Low	R_{OL}	—	—	7	Ω	I_{OUT} = 10mA, V_{CC} = 12V

AC Electrical Characteristics (V_{BIAS} (4.5V < V_{CC} < 18V), @T_C = -40°C to +125°C, unless otherwise specified.)

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Turn-On Rise Time	t_R	—	30	40	ns	C_L = 1000pF, V_{CC} = 12V
Turn-Off Fall Time	t_F	—	30	40	ns	C_L = 1000pF, V_{CC} = 12V
Turn-On Propagation Delay	t_{ON}	—	45	55	ns	V_{CC} = 12V
Turn-Off Propagation Delay	t_{OFF}	—	50	60	ns	V_{CC} = 12V

Timing Waveforms

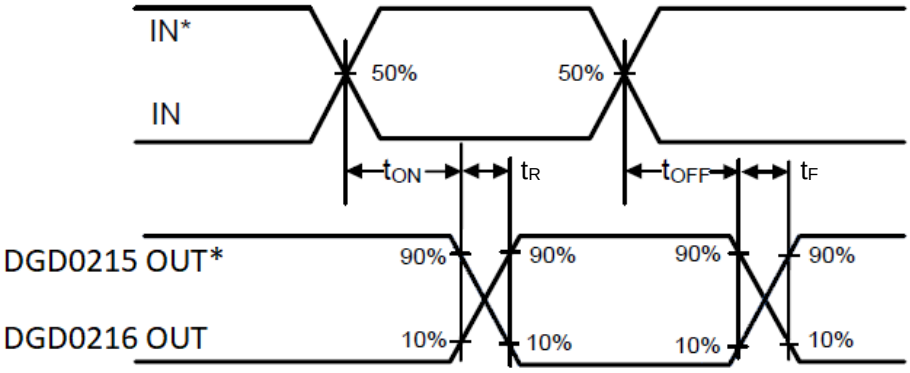


Figure 1. Switching Time Waveform Definitions

Input/Output Response Table

Input Pin	Input Logic	DGD0215 (OUT*)	DGD0216 (OUT)
IN	H	L	H
IN	L	H	L
IN*	H	H	L
IN*	L	L	H

Typical Performance Characteristics (V_{CC} = 12V, @T_A = +25°C, unless otherwise specified.)

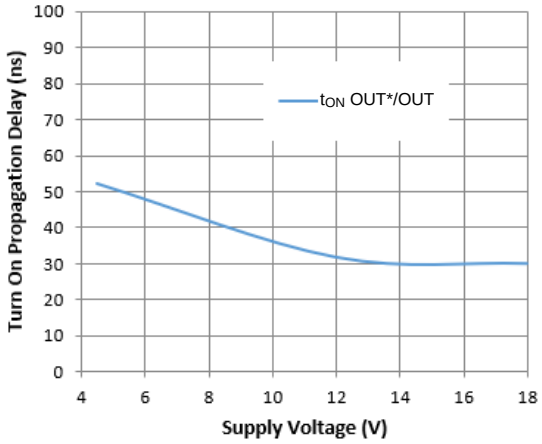


Figure 2. Turn-on Propagation Delay vs. Supply Voltage

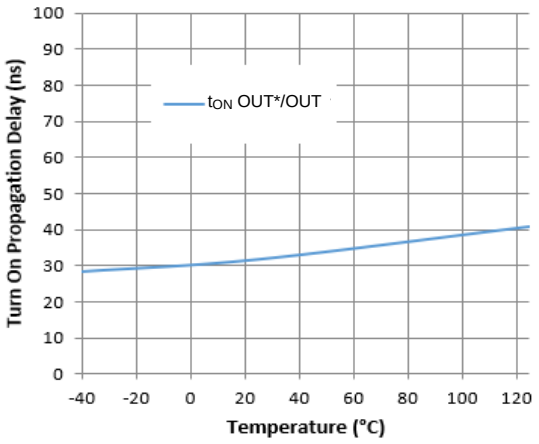


Figure 3. Turn-on Propagation Delay vs. Temperature

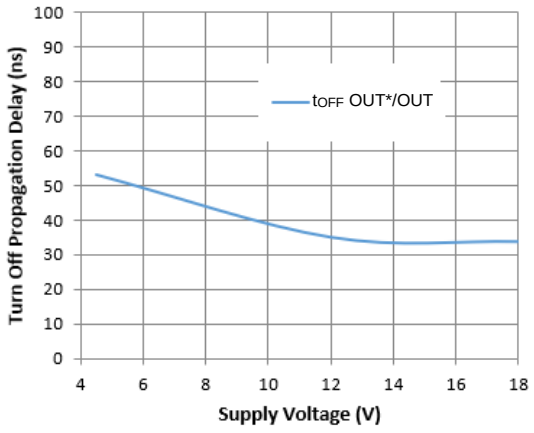


Figure 4. Turn-off Propagation Delay vs. Supply Voltage

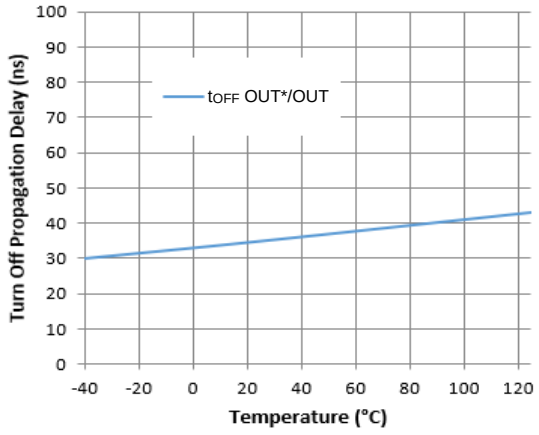


Figure 5. Turn-off Propagation Delay vs. Temperature

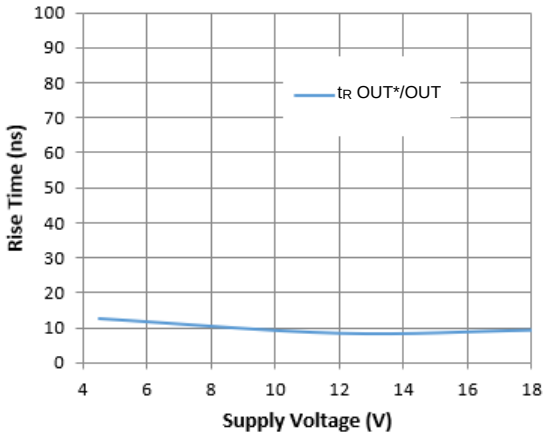


Figure 6. Rise Time vs. Supply Voltage

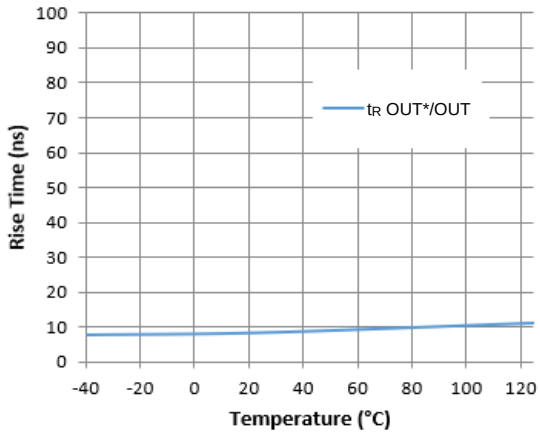


Figure 7. Rise Time vs. Temperature

Typical Performance Characteristics (continued)

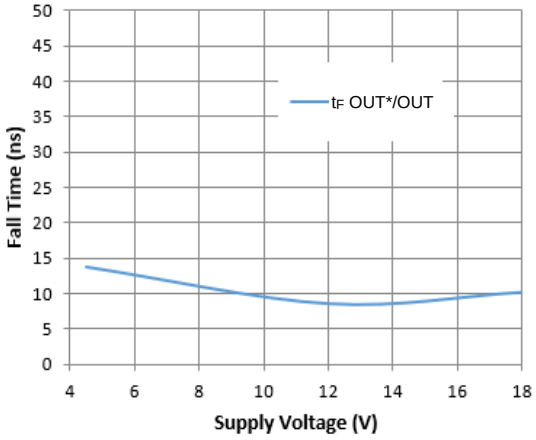


Figure 8. Fall Time vs. Supply Voltage

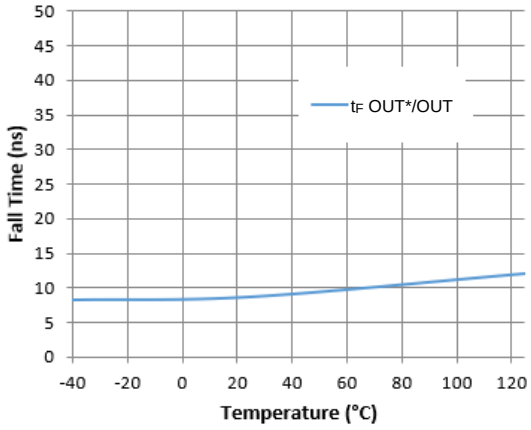


Figure 9. Fall Time vs. Temperature

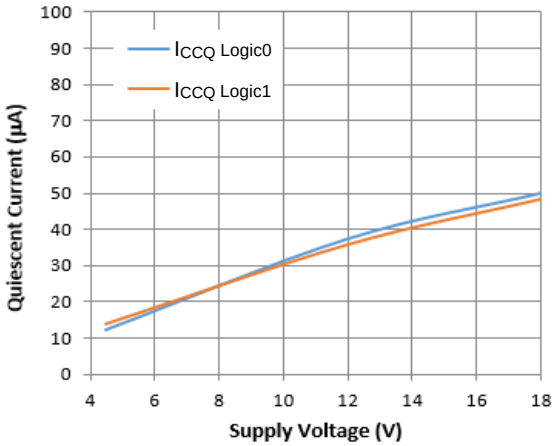


Figure 10. Quiescent Current vs. Supply Voltage

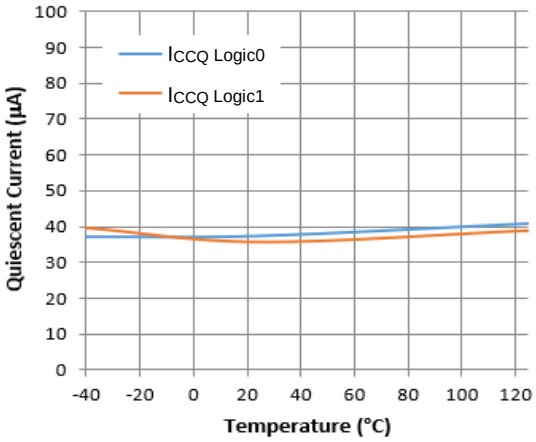


Figure 11. Quiescent Current vs. Temperature

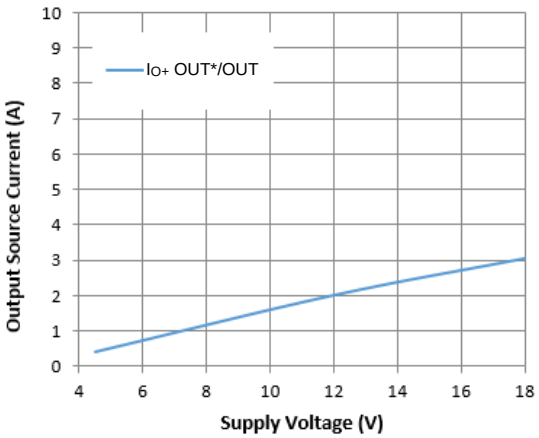


Figure 12. Output Source Current vs. Supply Voltage

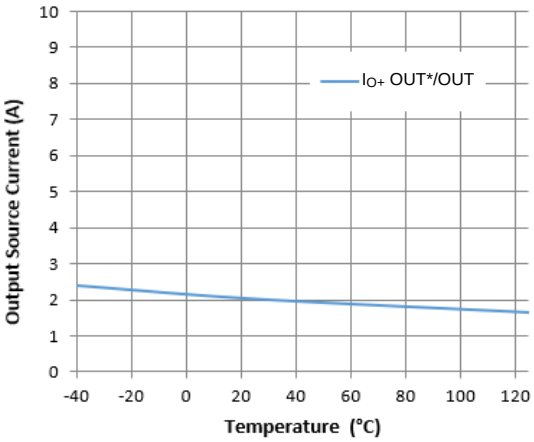


Figure 13. Output Source Current vs. Temperature

Typical Performance Characteristics (continued)

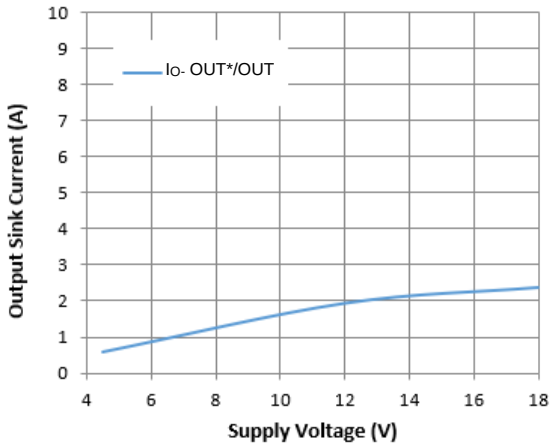


Figure 14. Output Sink Current vs. Supply Voltage

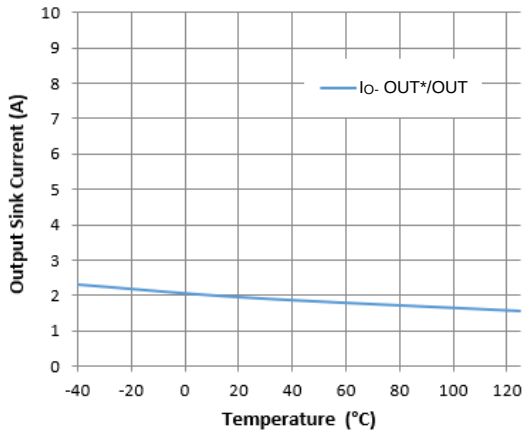


Figure 15. Output Sink Current vs. Temperature

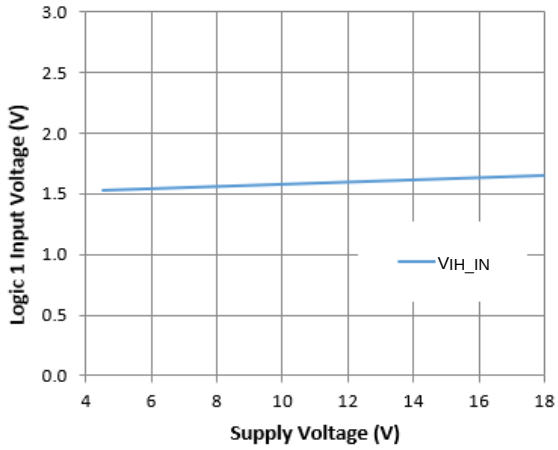


Figure 16. Logic 1 Input Voltage vs. Supply Voltage

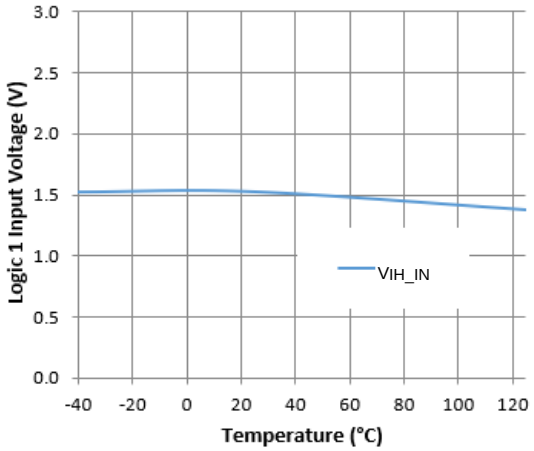


Figure 17. Logic 1 Input Voltage vs. Temperature

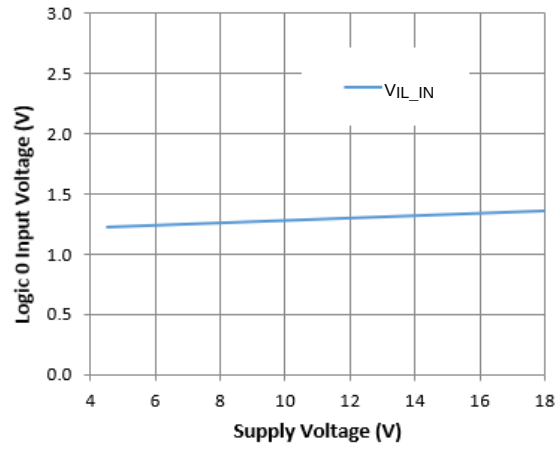


Figure 18. Logic 0 Input Voltage vs. Supply Voltage

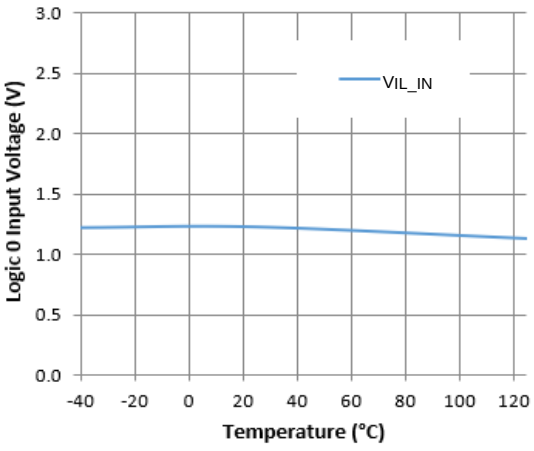
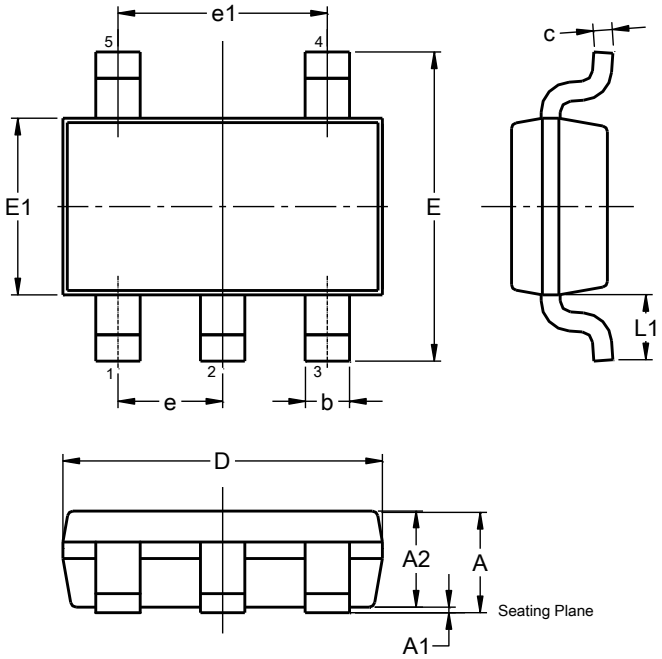


Figure 19. Logic 0 Input Voltage vs. Temperature

Package Outline Dimensions

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

TSOT25 (Type TH)

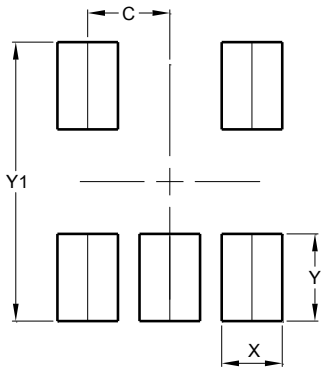


TSOT25 (Type TH)			
Dim	**Min**	**Max**	**Typ**
A	--	1.10	--
A1	0.01	0.10	--
A2	0.70	1.00	0.90
b	0.30	0.50	--
c	0.08	0.20	--
D	2.90 BSC		
E	2.80 BSC		
E1	1.60 BSC		
e	0.95 BSC		
e1	1.90 BSC		
L1	0.60 REF		
All Dimensions in mm			

Suggested Pad Layout

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

TSOT25 (Type TH)



Dimensions	Value (in mm)
C	0.950
X	0.700
Y	1.000
Y1	3.199

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2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

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