

## Description

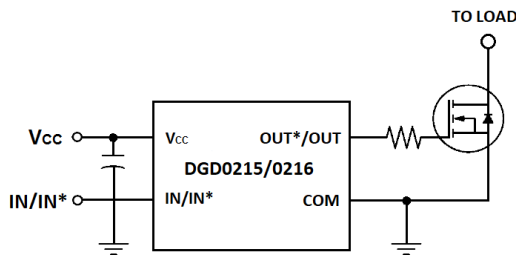
The DGD0215 and DGD0216 high speed / low side MOSFET and IGBT drivers are capable of driving 1.9A of peak current. The DGD0215 and DGD0216 logic inputs are compatible with standard TTL and CMOS levels (down to 3.3V) to interface easily with MCUs. Internal undervoltage lockout (UVLO) will protect MOSFETs with loss of supply by turning off the output when Vcc falls below the operating range. 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 output.

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

## Applications

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



Typical Configuration



TSOT25 (Type TH)

## 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
- Undervoltage Lockout for Vcc Supply
- 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)**

## Mechanical Data

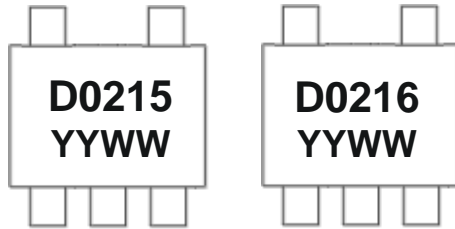
- Case: TSOT25
- Case Material: Molded Plastic. "Green" Molding Compound.
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 3 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads. Solderable per MIL-STD-202, Method 208  $\text{E3}$
- Weight: 0.012 grams (Approximate)

## 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

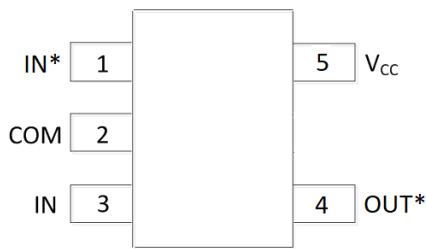
- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  3.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

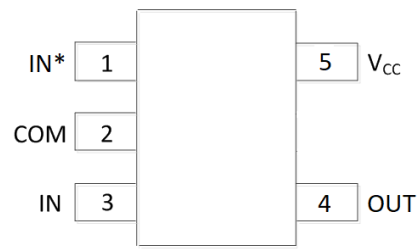


D021x = Product Type Marking Code  
 YY = Year (ex: 19 = 2019)  
 WW = Week (01 to 53)

## Pin Diagrams



DGD0215



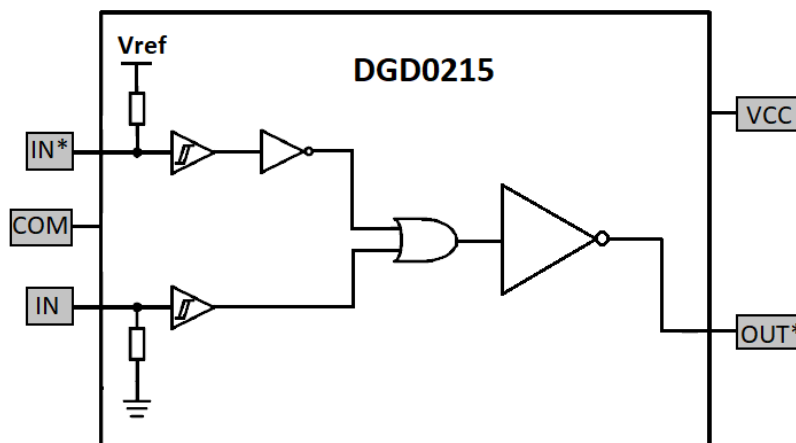
DGD0216

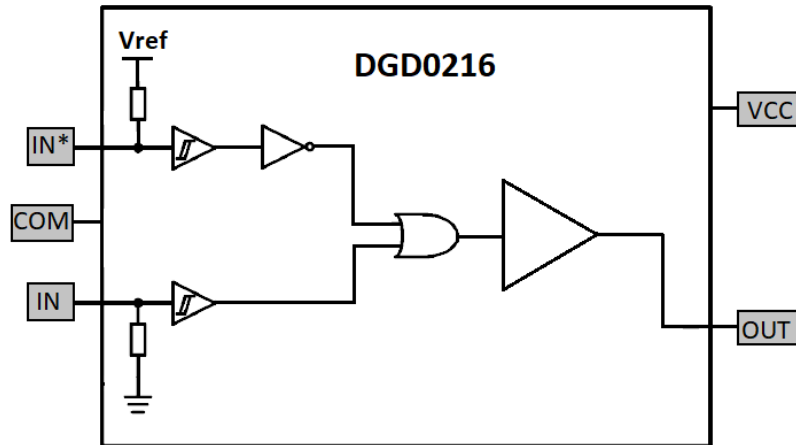
Top View: TSOT25 (Type TH)

## 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	Vcc	Supply Input

## Functional Block Diagram



**Functional Block Diagram (Cont.)**

**Absolute Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Low-side Fixed Supply Voltage	V <sub>CC</sub>	-0.3 to +22	V
Output Voltage (OUT/OUT*)	V <sub>OUT</sub>	-0.3 to V <sub>CC</sub> +0.3	V
Logic Input Voltage (IN)	V <sub>IN</sub>	-5 to V <sub>CC</sub> +0.3	V

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation Linear Derating Factor (Note 5)	P <sub>D</sub>	0.54	W
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	188	°C/W
Operating Temperature	T <sub>J</sub>	+150	°C
Lead Temperature (Soldering, 10s)	T <sub>L</sub>	+300	
Storage Temperature Range	T <sub>STG</sub>	-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 <sub>B</sub>	4.5	18	V
Output Voltage (OUT/OUT*)	V <sub>S</sub>	0	V <sub>CC</sub>	V
Logic Input Voltage (IN)	V <sub>IN</sub>	0	5	V
Ambient Temperature	T <sub>A</sub>	-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	$\mu$ A	$V_{IN} = 3V, V_{IN^*} = 0V$
Logic "0" Input Bias Current	$I_{IN-}$	–	–	2	$\mu$ A	$V_{IN} = 0V, V_{IN^*} = 3V$
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	$\mu$ A	$V_{IN} = 0V$ 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	–	$\Omega$	$I_{OUT} = 10mA, V_{CC} = 12V$
Output Resistance, Low	$R_{OL}$	–	2.3	–	$\Omega$	$I_{OUT} = 10mA, V_{CC} = 12V$

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	$V_{CC} = 12V$

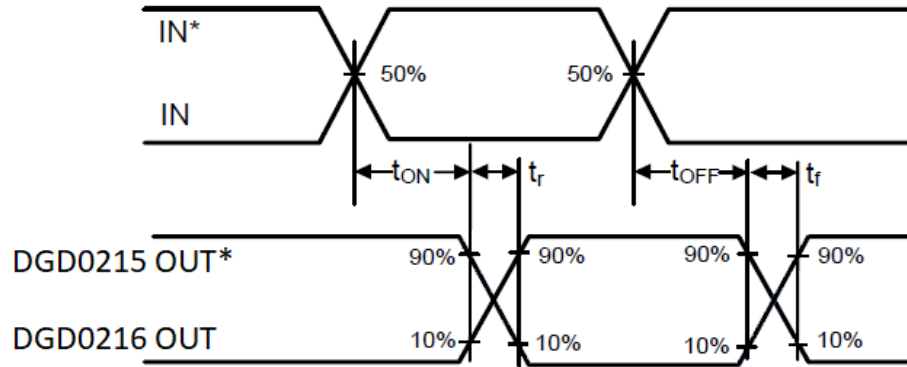
**DC Electrical Characteristics** ( $V_{BIAS}$  (4.5V <  $V_{CC}$  < 18V), @ $T_C$  = -40°C to +125°C, unless otherwise specified.)

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	$\mu$ A	$V_{IN} = 3V$
Logic "0" Input Bias Current	$I_{IN-}$	–	0	5	$\mu$ A	$V_{IN} = 0V$
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	$\Omega$	$I_{OUT} = 10mA$ , $V_{CC} = 12V$
Output Resistance, Low	$R_{OL}$	–	–	7	$\Omega$	$I_{OUT} = 10mA$ , $V_{CC} = 12V$

**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**

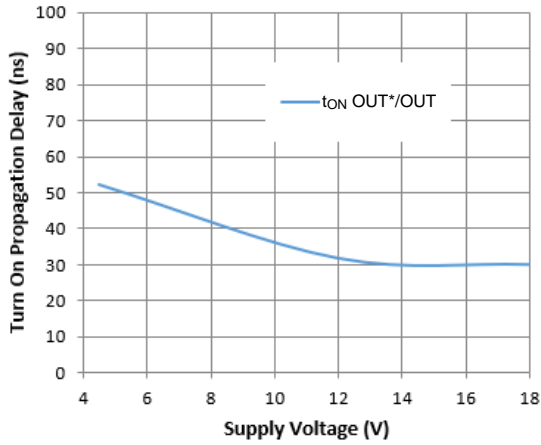


**Figure 1.** Switching Time Waveform Definitions

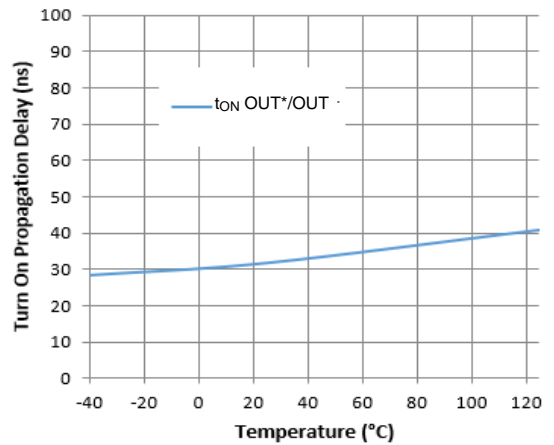
**Input/Output Response Table**

Input pin	Input logic	DGD0215 (OUT*)	DGD0216 (OUT)
IN	H	L	H
IN	L	H	L
IN*	H	H	L
IN*	L	L	H

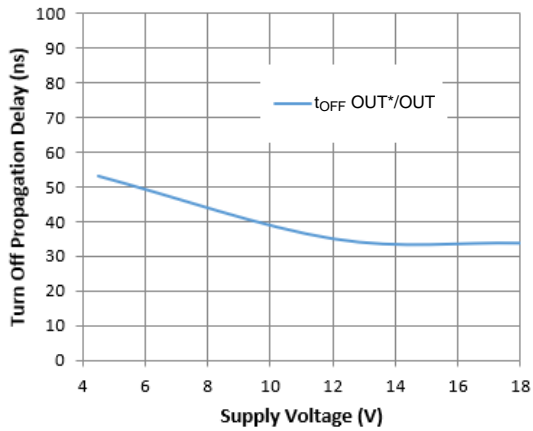
**Typical Performance Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)



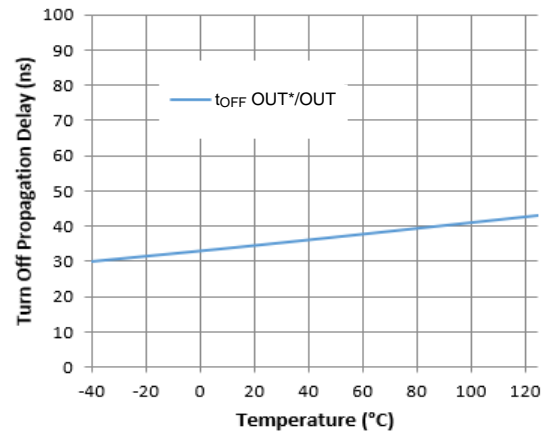
**Figure 2.** Turn-on Propagation Delay vs. Supply Voltage



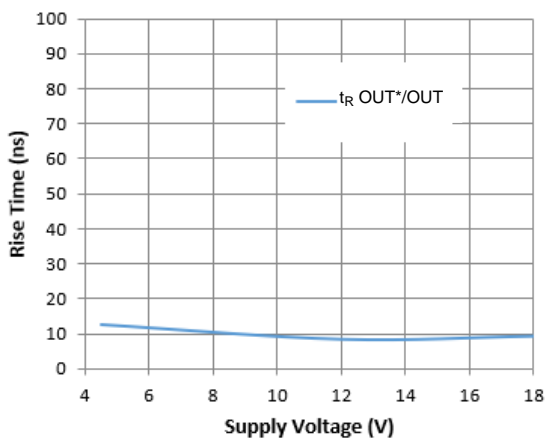
**Figure 3.** Turn-on Propagation Delay vs. Temperature



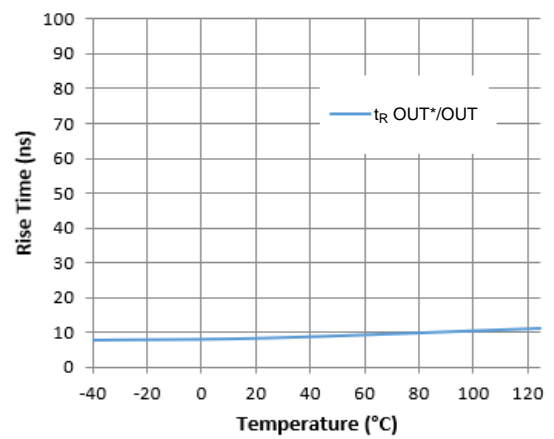
**Figure 4.** Turn-off Propagation Delay vs. Supply Voltage



**Figure 5.** Turn-off Propagation Delay vs. Temperature



**Figure 6.** Rise Time vs. Supply Voltage



**Figure 7.** Rise Time vs. Temperature

**Typical Performance Characteristics (Cont.)**

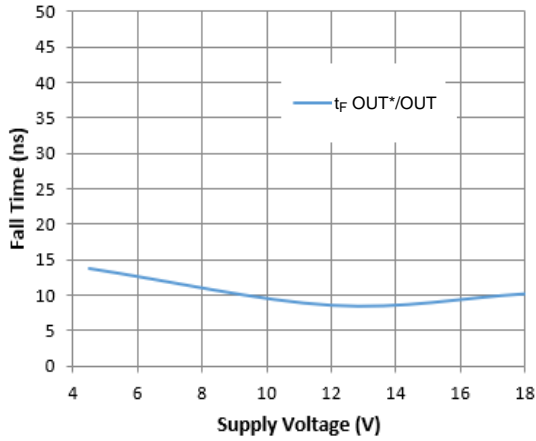


Figure 8. Fall Time vs. Supply Voltage

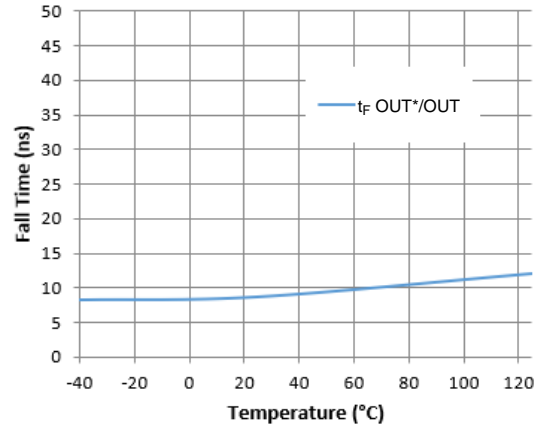


Figure 9. Fall Time vs. Temperature

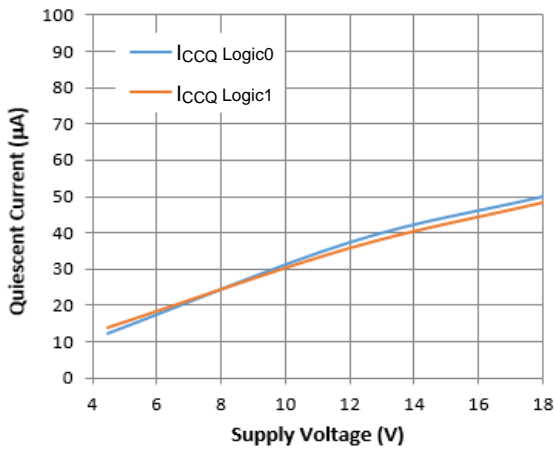


Figure 10. Quiescent Current vs. Supply Voltage

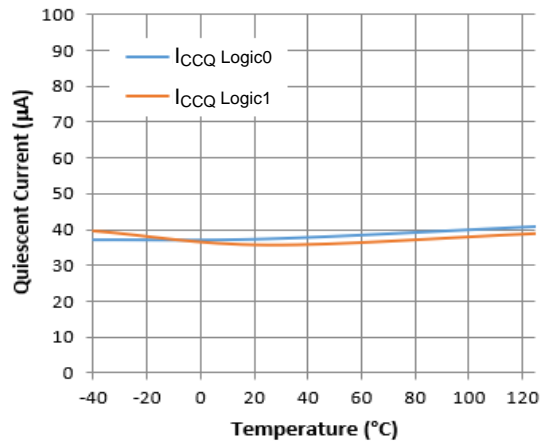


Figure 11. Quiescent Current vs. Temperature

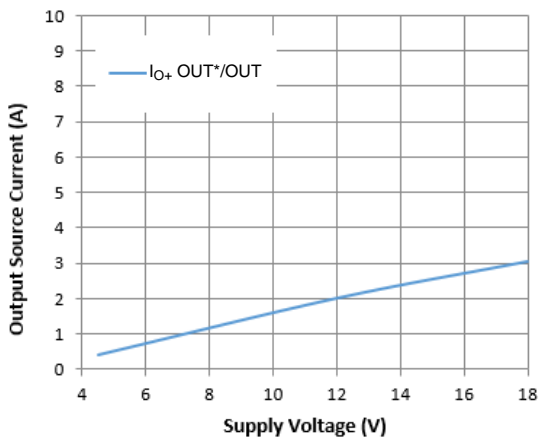


Figure 12. Output Source Current vs. Supply Voltage

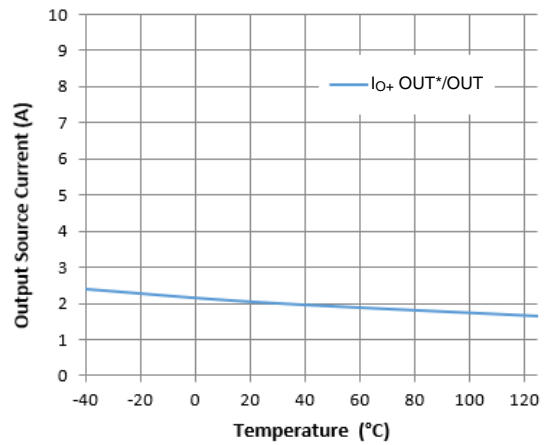


Figure 13. Output Source Current vs. Temperature



**Typical Performance Characteristics (Cont.)**

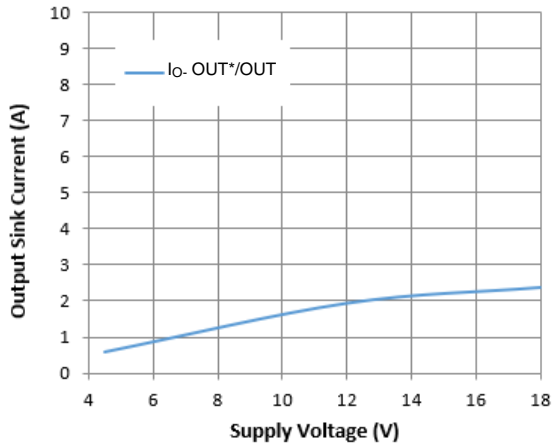


Figure 14. Output Sink Current vs. Supply Voltage

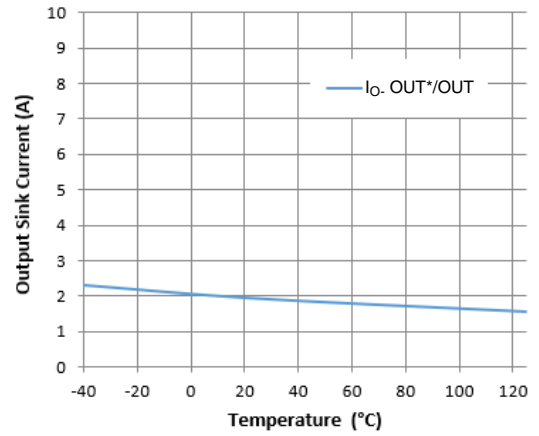


Figure 15. Output Sink Current vs. Temperature

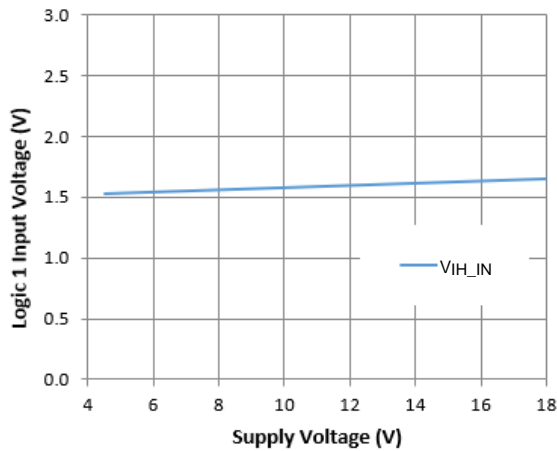


Figure 16. Logic 1 Input Voltage vs. Supply Voltage

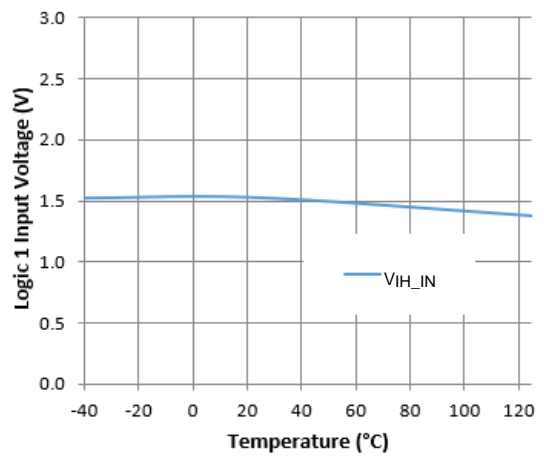


Figure 17. Logic 1 Input Voltage vs. Temperature

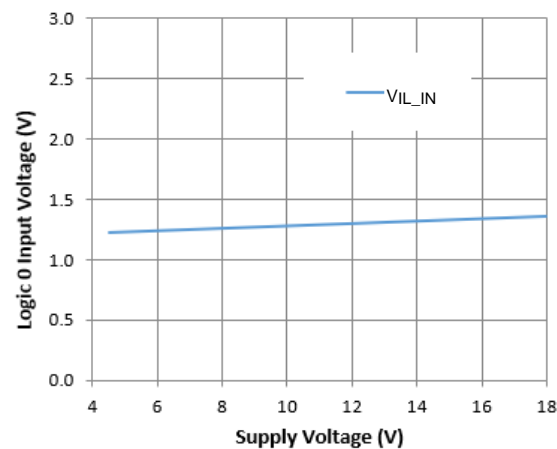


Figure 18. Logic 0 Input Voltage vs. Supply Voltage

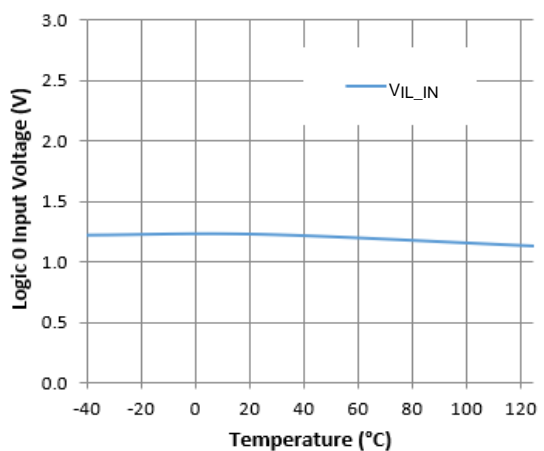
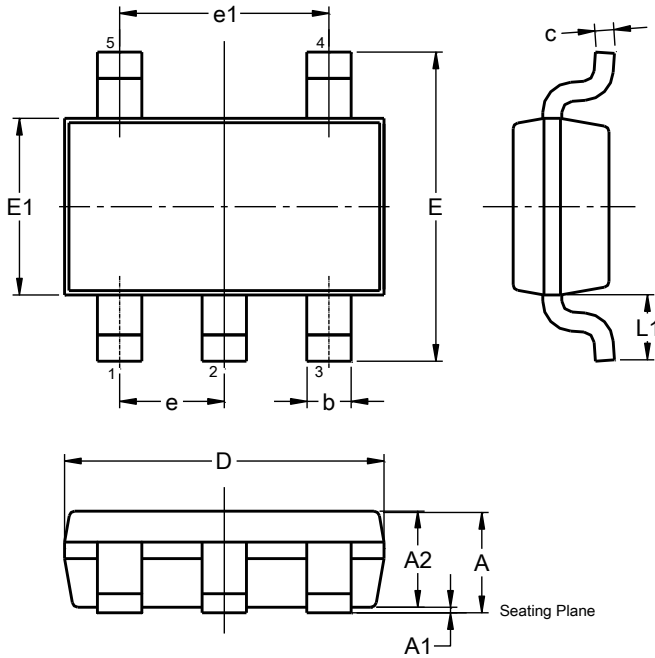


Figure 19. Logic 0 Input Voltage vs. Temperature

**Package Outline Dimensions**

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

TSOT25 (Type TH)

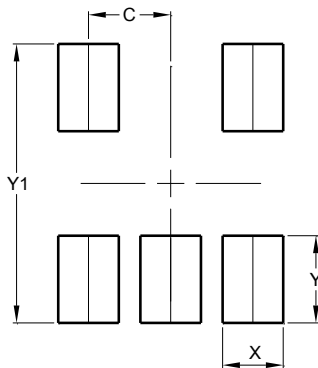


TSOT25 (Type TH)			
Dim	Min	Max	Typ
A	--	1.10	--
A1	0.01	0.10	--
A2	0.70	1.00	0.90
b	0.30	0.50	--
c	0.08	0.20	--
D	2.90 BSC		
E	2.80 BSC		
E1	1.60 BSC		
e	0.95 BSC		
e1	1.90 BSC		
L1	0.60 REF		
All Dimensions in mm			

**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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