

Description

The DGD0211E single high-speed/low-side MOSFET and IGBT driver is capable of driving 1.9A of peak current. The device has adjustable logic input thresholds depending on the XREF level, allowing use with 5.0V, 3.3V, and 2.5V supply systems. The DGD0211E also provides a single non-inverted input.

Because of fast propagation times of 34ns typical and rise/fall times of 18ns typical, the DGD0211E is well suited for high-speed applications such as switch-mode power supplies and PFC circuits.

The DGD0211E is offered in the TSOT25 package and the operating temperature extends from -40°C to +125°C.

Features

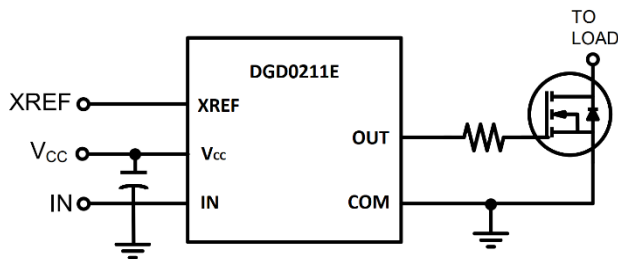
- Low-Side Gate Driver for Driving MOSFETs and IGBTs
- Wide Supply Voltage Operating Range: 4.5V to 18V
- 1.9A Source / 1.8A Sink Output Current Capability
- Single Non-Inverting Input Configuration
- Fast Propagation Delay (34ns Typ)
- Fast Rise and Fall Times (18ns Typ)
- Extended Temperature Range: -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

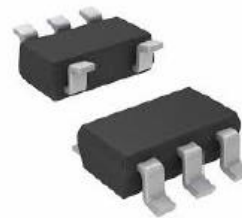
- Line drivers
- Motor controls
- Switch-mode power supplies

Mechanical Data

- Package: TSOT25
- Package Material: Molded Plastic. "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads. Solderable per MIL-STD-202, Method 208 Ⓔ3
- Weight: 0.012 grams (Approximate)



Typical Configuration



TSOT25

Ordering Information (Note 4)

Orderable Part Number	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
				Quantity	Carrier
DGD0211EWT-7	D0211E	7	8	3,000	Reel

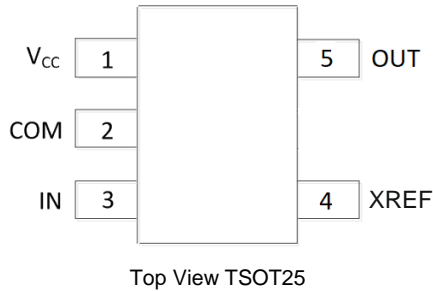
- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen-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



D0211E = Product Type Marking Code
YY = Year (ex: 24 = 2024)
WW = Week (01 to 53)

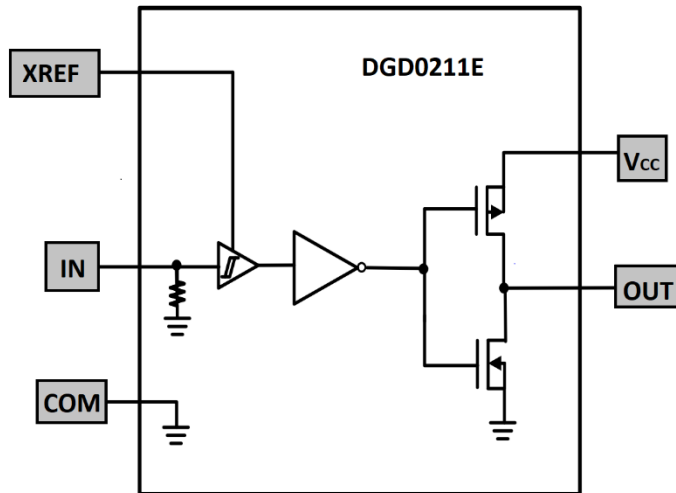
Pin Diagrams



Pin Descriptions

Pin Number	Pin Name	Function
1	V _{CC}	Supply Input
2	COM	Supply Return
3	IN	Non-Inverting Logic Input, in Phase with OUT
4	XREF	External Reference Voltage, Reference for Input Thresholds
5	OUT	Gate Drive Output

Functional Block Diagrams



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

Characteristic	Symbol	Value	Unit
Low-Side Fixed Supply Voltage	V _{CC}	-0.3 to +24	V
Output Voltage (OUT)	V _{OUT}	-0.3 to V _{CC} +0.3	V
Logic Input Voltage (IN)	V _{IN}	-0.3 to V _{XREF} +0.3	V
External Reference Voltage	V _{XREF}	-0.3 to 5.5	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 _{θJA}	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.

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V _{CC}	4.5	18	V
Output Voltage (OUT)	V _{OUT}	0	V _{CC}	V
Logic Input Voltage (IN)	V _{IN}	0	XREF	V
External Reference Voltage	V _{XREF}	2.5	5	V
Ambient Temperature	T _A	-40	+125	°C

DC Electrical Characteristics (V_{BIAS} (V_{CC}, V_{BS}) = 12V, @T_A = +25°C, unless otherwise specified.) (Note 6)

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Logic "1" Input Voltage	V _{IH}	—	52	—	%XREF	XREF = 2.5V – 5.0V
Logic "0" Input Voltage	V _{IL}	—	42	—	%XREF	XREF = 2.5V – 5.0V
Logic "1" Input Bias Current	I _{IN+}	—	—	5	µA	V _{IN} = 3V, XREF = 3V
Logic "0" Input Bias Current	I _{IN-}	—	—	2	µA	V _{IN} = 0V, XREF = 3V
High Level Output Voltage, V _{BIAS} - V _O	V _{OH}	—	34	—	mV	I _{OUT} = 10mA
Low Level Output Voltage	V _{OL}	—	25	—	mV	I _{OUT} = 10mA
Quiescent V _{CC} Supply Current	I _{CCQ}	—	4	10	µA	Inputs Open
Output High Short Circuit Pulsed Current	I _{O+}	—	1.9	—	A	V _{OUT} = 0V, V _{IN} = Logic "1", PW ≤ 10µs
Output Low Short Circuit Pulsed Current	I _{O-}	—	1.8	—	A	V _{OUT} = 12V, V _{IN} = Logic "1", PW ≤ 10µs
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: 6. 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 pin: OUT.

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

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Turn-On Rise Time	t _r	—	17	25	ns	C _L = 1000pF, V _{CC} = 12V
Turn-Off Fall Time	t _f	—	18	25	ns	C _L = 1000pF, V _{CC} = 12V
Turn-On Propagation Delay	t _{ON}	—	27	50	ns	V _{CC} = 12V
Turn-Off Propagation Delay	t _{OFF}	—	34	55	ns	V _{CC} = 12V

Timing Waveforms

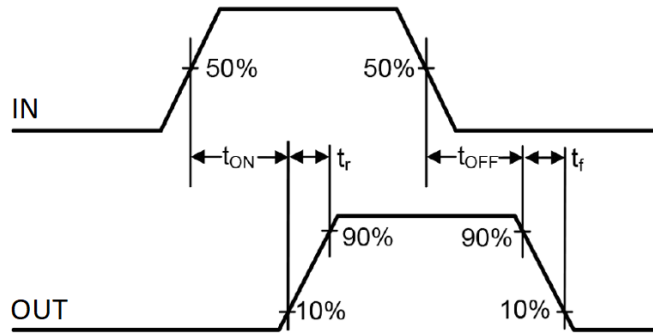


Figure 1. Switching Time Waveform Definitions

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

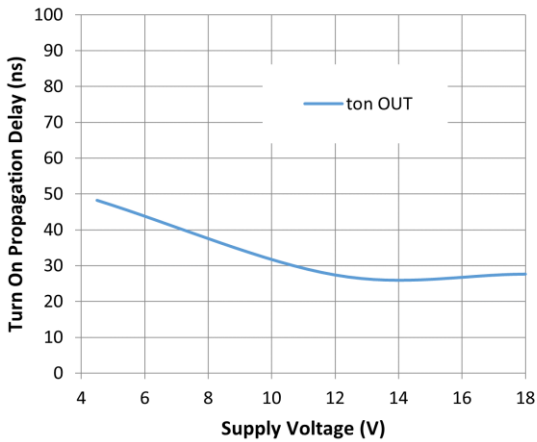


Figure 2. Turn-on Propagation Delay vs. Supply Voltage

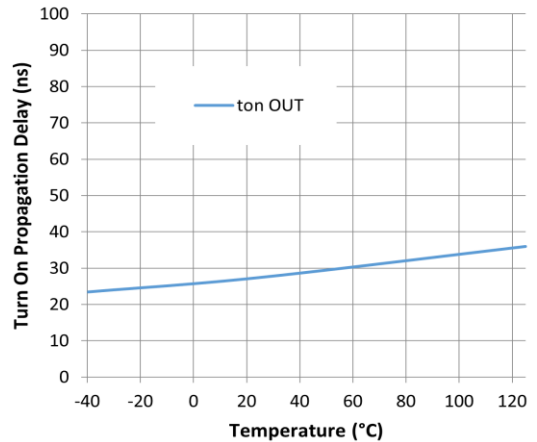


Figure 3. Turn-on Propagation Delay vs. Temperature

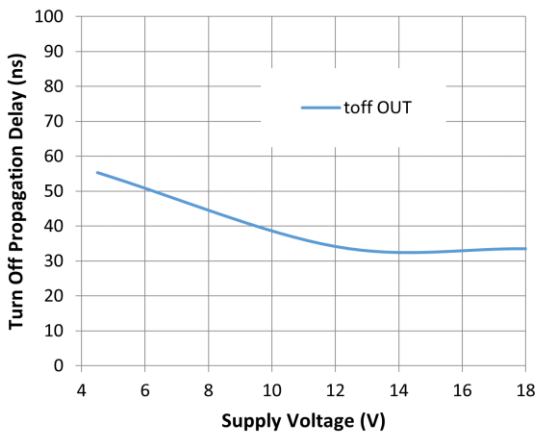


Figure 4. Turn-off Propagation Delay vs. Supply Voltage

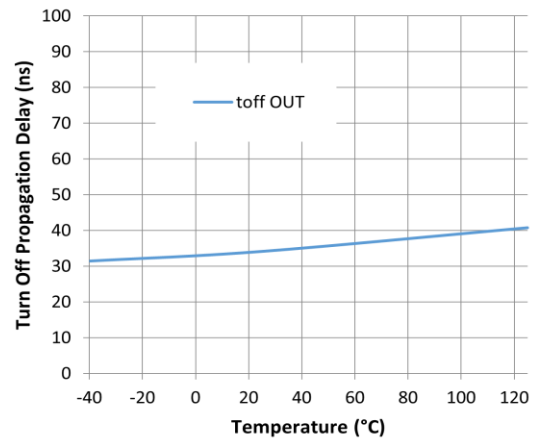


Figure 5. Turn-off Propagation Delay vs. Temperature

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

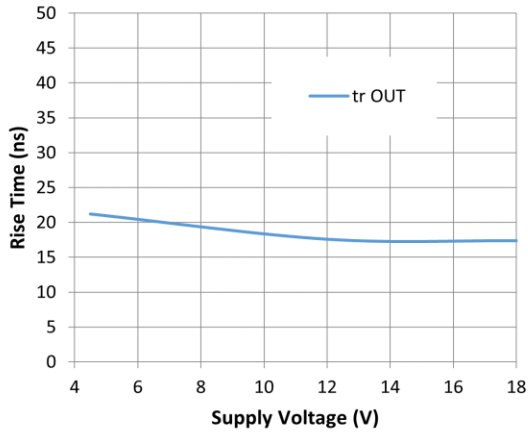


Figure 6. Rise Time vs. Supply Voltage

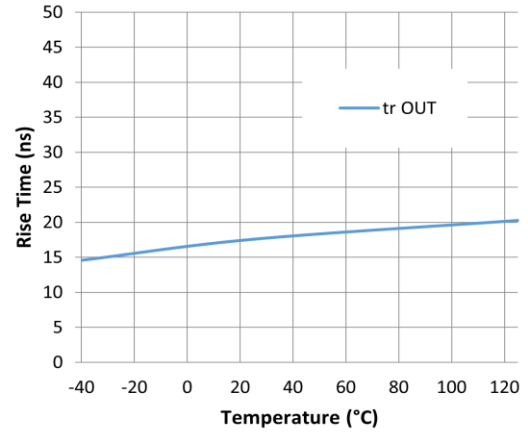


Figure 7. Rise Time vs. Temperature

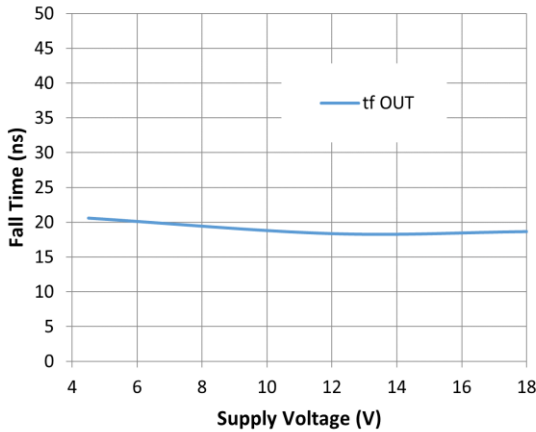


Figure 8. Fall Time vs. Supply Voltage

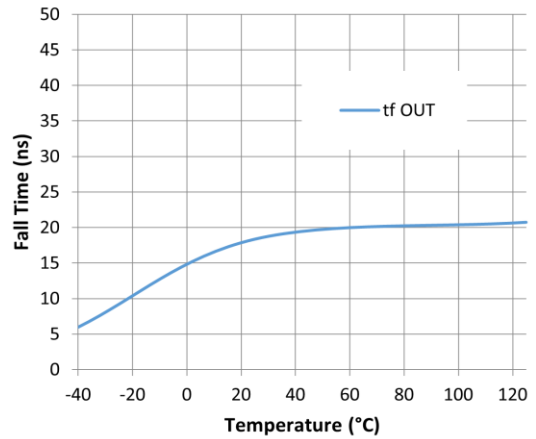


Figure 9. Fall Time vs. Temperature

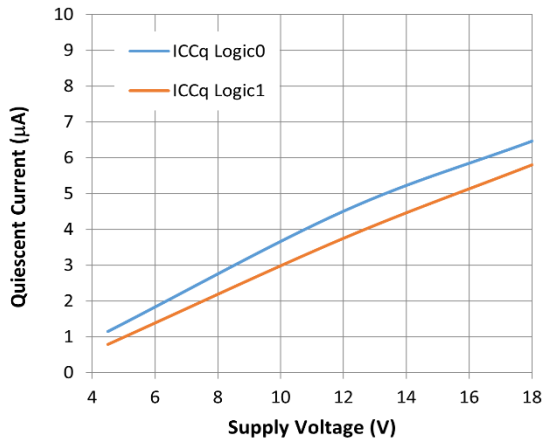


Figure 10. Quiescent Current vs. Supply Voltage

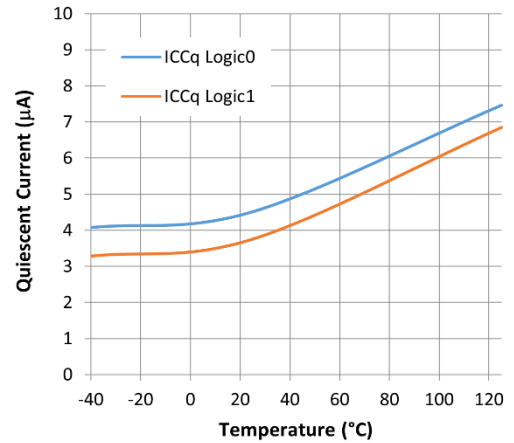


Figure 11. Quiescent Current vs. Temperature

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

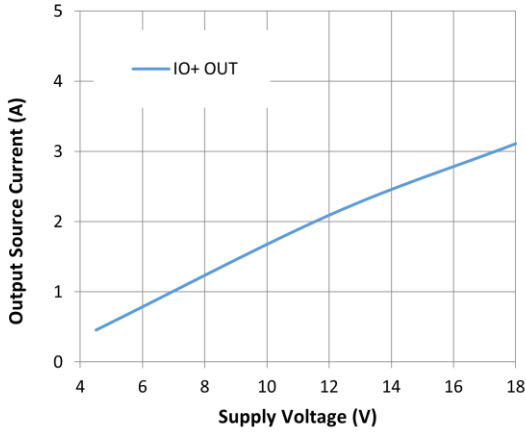


Figure 12. Output Source Current vs. Supply Voltage

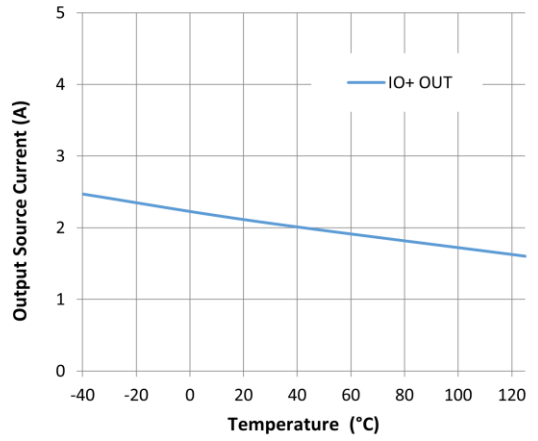


Figure 13. Output Source Current vs. Temperature

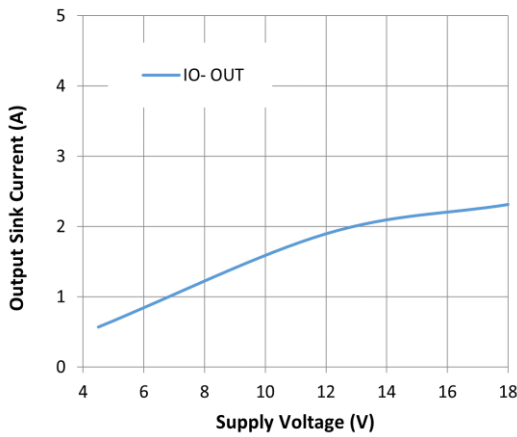


Figure 14. Output Sink Current vs. Supply Voltage

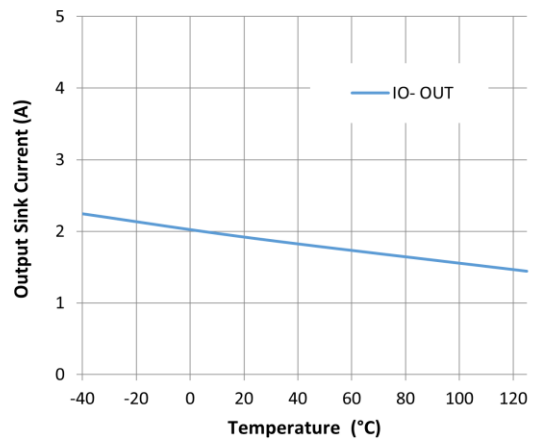


Figure 15. Output Sink Current vs. Temperature

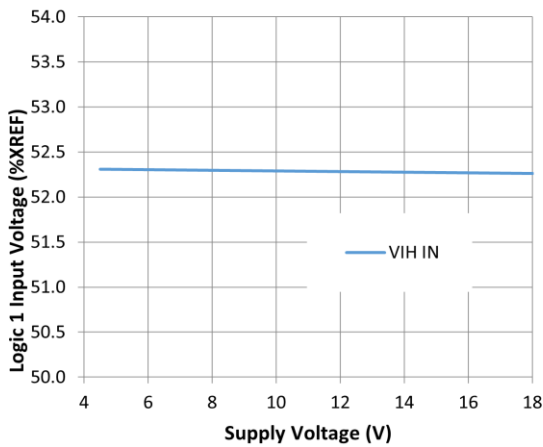


Figure 16. Logic 1 Input Voltage vs. Supply Voltage

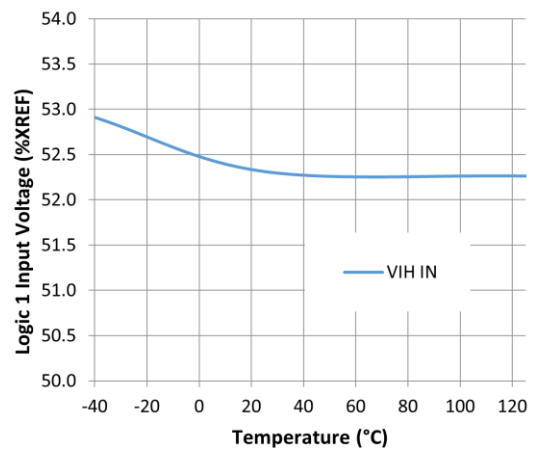


Figure 17. Logic 1 Input Voltage vs. Temperature

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

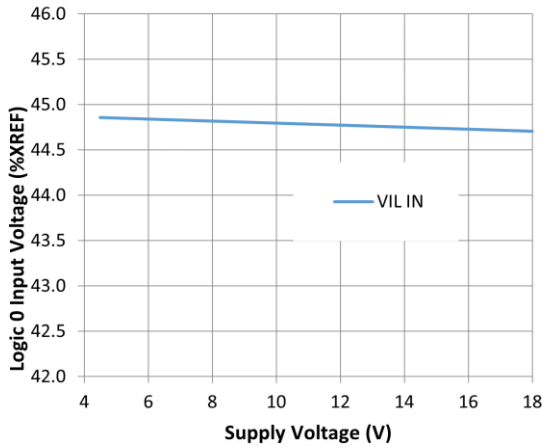


Figure 18. Logic 0 Input Voltage vs. Supply Voltage

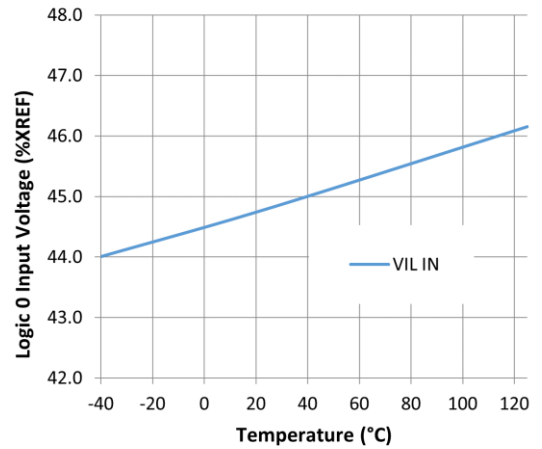


Figure 19. Logic 0 Input Voltage vs. Temperature

Applications Information

The input thresholds of the DGD0211EWT can be adjusted depending on XREF voltage level. This voltage can be set from 2.5V up to 5V, offering compatibility with standard TTL and lower-level logic families. The logic HIGH input voltage threshold is approximately 52% of V_{XREF} and the logic LOW input voltage threshold is approximately 42% of V_{XREF} .

To ensure a stable operation, the output of the DGD0211EWT is held LOW during startup until V_{CC} reaches 2.5V. Past this point, the output will follow the input.

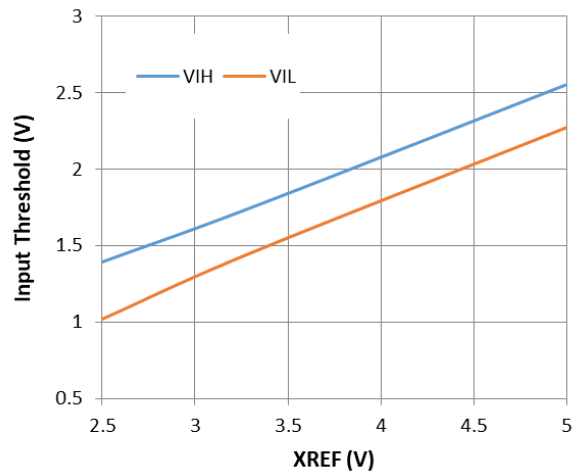
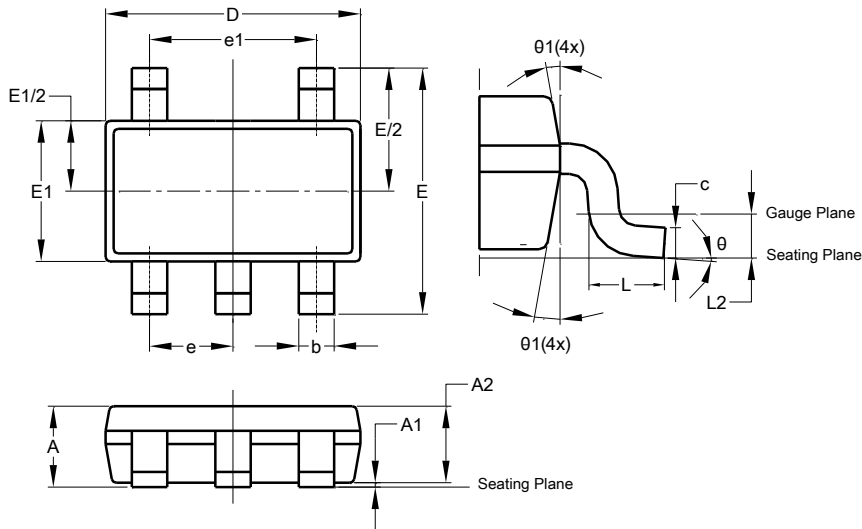


Figure 20. Input Voltage vs. Xref Voltage

Package Outline Dimensions

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

TSOT25

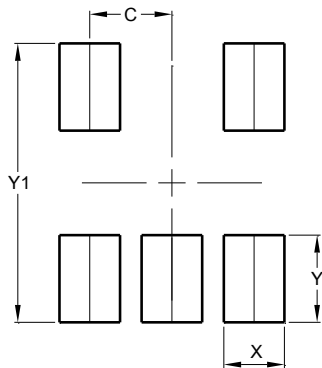


TSOT25			
Dim	Min	Max	Typ
A	-	1.00	-
A1	0.01	0.10	-
A2	0.84	0.90	-
b	0.30	0.45	-
c	0.12	0.20	-
D	-	-	2.90
E	-	-	2.80
E1	-	-	1.60
e	0.95 BSC		
e1	1.90 BSC		
L	0.30	0.50	
L2	0.25 BSC		
theta	0°	8°	4°
theta1	4°	12°	-
All Dimensions in mm			

Suggested Pad Layout

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

TSOT25



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

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