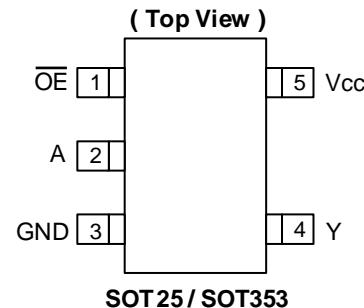


Description

The 74LVC1G125Q is an automotive-compliant single, non-inverting buffer/bus driver with a 3-state output. The output enters a high-impedance state when a HIGH level is applied to the output enable (OE) pin. The device is designed for operation with a power supply range of 1.65V to 5.5V. The inputs are tolerant to 5.5V, allowing this device to be used in a mixed-voltage environment. The device is fully specified for partial power-down applications using I_{OFF} . The I_{OFF} circuitry disables the output preventing damaging current backflow when the device is powered down.

Pin Assignments



Features

- Grade 1 Ambient Temperature Operation: -40°C to +125°C
- Wide Supply Voltage Range from 1.65V to 5.5V
- $\pm 24\text{mA}$ Output Drive at 3.3V
- CMOS Low Power Consumption
- I_{OFF} Supports Partial Power-Down Mode Operation
- Inputs Accept up to 5.5V Regardless of Vcc Level
- ESD Protection Tested per AEC-Q100
- Exceeds 2000V Human Body Model (AEC-Q100-002)
- Exceeds 1000V Charged Device Model (AEC-Q100-011)
- Latch-Up Exceeds 100mA (AEC-Q100-004)
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The 74LVC1G125Q is suitable for automotive applications requiring specific change control; this part is AEC-Q100 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**

<https://www.diodes.com/quality/product-definitions/>

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.

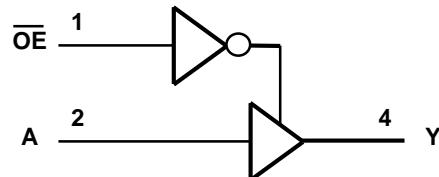
Applications

- Voltage Level Shifting
- General Purpose Logic
- Power Down Signal Isolation
- Wide Array of Products such as:
 - Automotive Applications within Grade 1 Temperature Range
 - Industrial Computing/Controls/Automation
 - High Reliability Networking/Communications
 - Industrial/Agricultural Equipment

Pin Descriptions

Pin Name	Description
\overline{OE}	Output Enable Active LOW
A	Data Input
GND	Ground
Y	Data Output
Vcc	Supply Voltage

Logic Diagram



Function Table

Inputs		Output
\overline{OE}	A	Y
L	H	H
L	L	L
H	X	Z

Absolute Maximum Ratings (Notes 4 & 5)

Symbol	Description	Rating	Unit
ESD HBM	Human Body Model ESD Protection	2	kV
ESD CDM	Charged Device Model ESD Protection	1	kV
Vcc	Supply Voltage Range	-0.5 to 6.5	V
V _I	Input Voltage Range	-0.5 to 6.5	V
V _O	Voltage Applied to Output in High Impedance or I _{OFF} State	-0.5 to 6.5	V
V _O	Voltage Applied to Output in High or Low State	-0.5 to V _{CC} + 0.5	V
I _{IK}	Input Clamp Current V _I < 0	-50	mA
I _{OK}	Output Clamp Current	-50	mA
I _O	Continuous Output Current	±50	mA
I _{CC} , I _{GN}	Continuous Current Through V _{CC} or GND	±100	mA
T _J	Operating Junction Temperature	-40 to +150	°C
T _{TSG}	Storage Temperature	-65 to +150	°C

Notes:

- Stresses beyond the absolute maximum can result in immediate failure or reduced reliability. These are stress values and device operation should be within recommended values.
- Forcing the maximum allowed voltage could cause a condition exceeding the maximum current or conversely forcing the maximum current could cause a condition exceeding the maximum voltage. The ratings of both current and voltage must be maintained within the controlled range.

Recommended Operating Conditions (Note 6)

Symbol	Parameter		Min	Max	Unit
V _{CC}	Operating Voltage	Operating	1.65	5.5	V
		Data Retention Only	1.5	—	V
V _{IH}	High-Level Input Voltage	V _{CC} = 1.65V to 1.95V	0.65 × V _{CC}	—	V
		V _{CC} = 2.3V to 2.7V	1.7	—	
		V _{CC} = 3V to 3.6V	2	—	
		V _{CC} = 4.5V to 5.5V	0.7 × V _{CC}	—	
V _{IL}	Low-Level Input Voltage	V _{CC} = 1.65V to 1.95V	—	0.35 × V _{CC}	V
		V _{CC} = 2.3V to 2.7V	—	0.7	
		V _{CC} = 3V to 3.6V	—	0.8	
		V _{CC} = 4.5V to 5.5V	—	0.3 × V _{CC}	
V _I	Input Voltage		0	5.5	V
V _O	Output Voltage		0	V _{CC}	V
I _{OH}	High-Level Output Current	V _{CC} = 1.65V	—	-4	mA
		V _{CC} = 2.3V	—	-8	
		V _{CC} = 2.7V	—	-12	
		V _{CC} = 3V	—	-16	
		V _{CC} = 4.5V	—	-24	
		V _{CC} = 4.5V	—	-32	
I _{OL}	Low-Level Output Current	V _{CC} = 1.65V	—	4	mA
		V _{CC} = 2.3V	—	8	
		V _{CC} = 2.7V	—	12	
		V _{CC} = 3V	—	16	
		V _{CC} = 4.5V	—	32	
Δt/ΔV	Input Transition Rise or Fall Rate	V _{CC} = 1.8V ± 0.15V, 2.5V ± 0.2V	—	20	ns/V
		V _{CC} = 3.3V ± 0.3V	—	10	
		V _{CC} = 5V ± 0.5V	—	5	
T _A	Operating Free-Air Temperature		-40	+125	°C

Note: 6. Unused inputs should be held at V_{CC} or Ground.

Electrical Characteristics (All typical values are at $V_{CC} = 3.3V$, $T_A = +25^\circ C$)

Symbol	Parameter	Test Conditions	V_{CC}	-40°C to +125°C			Unit	
				Min	Typ	Max		
V_{OH}	High Level Output Voltage	$V_I = V_{IH}$ or V_{IL}	$I_{OH} = -100\mu A$	1.65V to 5.5V	$V_{CC} - 0.1$	—	—	
			$I_{OH} = -4mA$	1.65V	0.95	—	—	
			$I_{OH} = -8mA$	2.3V	17	—	—	
			$I_{OH} = -12mA$	2.7V	1.9	—	—	
			$I_{OH} = -24mA$	3V	2.0	—	—	
			$I_{OH} = -32mA$	4.5V	3.4	—	—	
V_{OL}	Low Level Output Voltage	$V_I = V_{IH}$ or V_{IL}	$I_{OL} = 100\mu A$	1.65V to 5.5V	—	—	0.1	
			$I_{OL} = 4mA$	1.65V	—	—	0.7	
			$I_{OL} = 8mA$	2.3V	—	—	0.45	
			$I_{OL} = 12mA$	2.7V	—	—	0.6	
			$I_{OL} = 24mA$	3V	—	—	0.8	
			$I_{OL} = 32mA$	4.5V	—	—	0.8	
I_I	Input Current	$V_I = 5.5V$ or GND		0 to 5.5V	—	± 0.1	± 1	μA
I_{OFF}	Power Down Leakage Current	V_I or $V_O = 5.5V$		0V	—	—	± 2	μA
I_{OZ}	Z-State Leakage Current	$V_O = \text{Ground to } 5.5V$		3.6V	—	—	± 2	μA
I_{CC}	Supply Current	$V_I = 5.5V$ or GND, $I_O = 0$		5.5V	—	0.1	4	μA
ΔI_{CC}	Additional Supply Current	One input at $V_{CC} - 0.6V$ Other inputs at V_{CC} or GND		3V to 5.5V	—	—	500	μA
C_I	Input Capacitance	$V_I = V_{CC}$ or GND		3.3V	—	3.5	—	pF

Package Characteristics

Symbol	Parameter	Package	Test Conditions	Min	Typ	Max	Unit
θ_{JA}	Thermal Resistance Junction-to-Ambient	SOT25	Note 7	—	184	—	$^\circ C/W$
		SOT353		—	385	—	
θ_{JC}	Thermal Resistance Junction-to-Case	SOT25	Note 7	—	62	—	$^\circ C/W$
		SOT353		—	164	—	

Note: 7. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.

Switching Characteristics

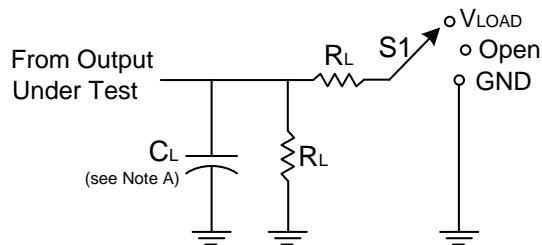
Figure 1 Typical Values at $T_A = +25^\circ\text{C}$ and nominal voltages 1.8V, 2.5V, 2.7V, 3.3V, and 5.0V.

Parameter	From Input	To Output	V _{CC}	T _A = -40°C to +125°C			Unit
				Min	Typ	Max	
t _{PD}	A	Y	1.8V \pm 0.15V	1.0	3.3	10.5	ns
			2.5V \pm 0.2V	0.5	2.2	7.0	
			2.7V	0.5	2.5	7.0	
			3.3V \pm 0.3V	0.5	2.1	6.0	
			5.0V \pm 0.5V	0.5	1.7	5.5	
t _{EN}	$\overline{\text{OE}}$	Y	1.8V \pm 0.15V	1.0	4.1	12.0	ns
			2.5V \pm 0.2V	0.5	2.8	8.5	
			2.7V	0.5	3.3	8.5	
			3.3V \pm 0.3V	0.5	2.4	7.0	
			5.0V \pm 0.5V	0.5	2.1	6.5	
t _{DIS}	$\overline{\text{OE}}$	Y	1.8V \pm 0.15V	1.0	4.3	12.0	ns
			2.5V \pm 0.2V	0.5	2.7	6.5	
			2.7V	0.5	3.0	6.5	
			3.3V \pm 0.3V	0.5	3.1	6.5	
			5.0V \pm 0.5V	0.5	2.2	5.5	

Operating Characteristics

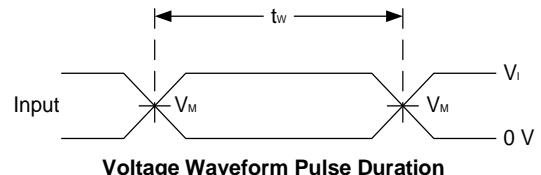
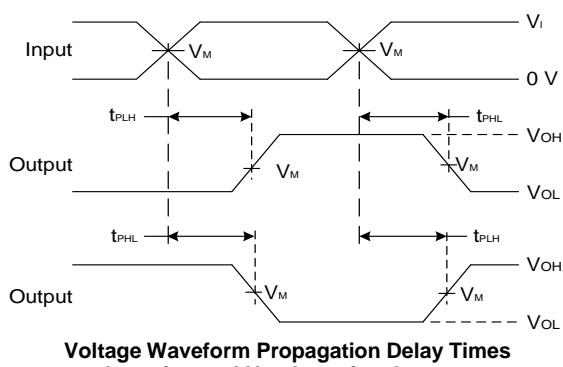
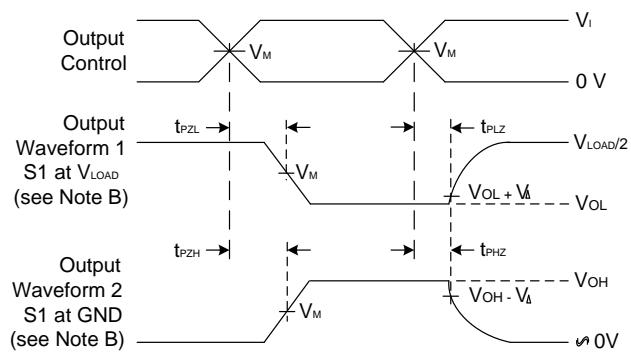
T_A = +25°C

Parameter			Test Conditions	V _{CC} = 1.8V	V _{CC} = 2.5V	V _{CC} = 3.3V	V _{CC} = 5V	Unit
				Typ	Typ	Typ	Typ	
C _{PD}	Power Dissipation Capacitance	Outputs Enabled	f = 10MHz	19	19	19	21	pF
		Outputs Disabled		2	2	3	4	

Parameter Measurement Information


TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	V_{LOAD}
t_{PHZ}/t_{PZH}	GND

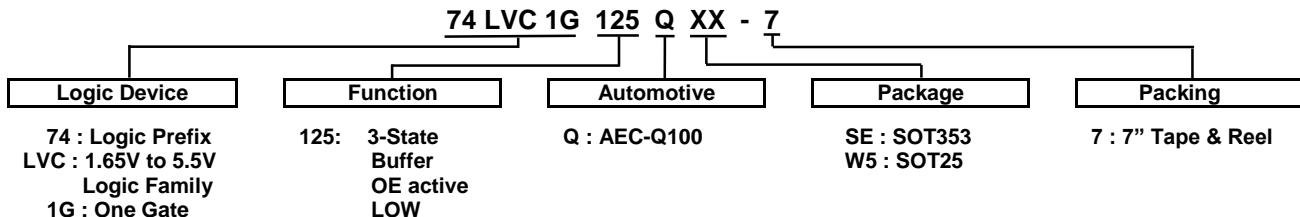
V _{CC}	Inputs		V _M	V _{LOAD}	C _L	R _L	V _Δ
	V _I	t _{R/tF}					
1.8V±0.15V	V _{CC}	≤2ns	V _{CC} /2	2 × V _{CC}	30pF	1kΩ	0.15V
2.5V±0.2V	V _{CC}	≤2ns	V _{CC} /2	2 × V _{CC}	30pF	500Ω	0.15V
2.7V	2.7V	≤2.5ns	1.5V	6V	50pF	500Ω	0.3V
3.3V±0.3V	3V	≤2.5ns	1.5V	6V	50pF	500Ω	0.3V
5V±0.5V	V _{CC}	≤2.5ns	V _{CC} /2	2 × V _{CC}	50pF	500Ω	0.3V


Voltage Waveform Pulse Duration

Voltage Waveform Propagation Delay Times
Inverting and Non Inverting Outputs

Voltage Waveform Enable and Disable Times
Low and High Level Enabling
Figure 1. Load Circuit and Voltage Waveforms

Notes:

- A. Includes test lead and test apparatus capacitance.
- B. All pulses are supplied at pulse repetition rate $\leq 10\text{MHz}$.
- C. Inputs are measured separately one transition per measurement.
- D. t_{PLZ} and t_{PHZ} are the same as t_{DIS} .
- E. t_{PZL} and t_{PZH} are the same as t_{EN} .
- F. t_{PLH} and t_{PHL} are the same as t_{PD} .

Ordering Information (Note 8)

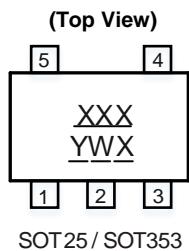


Part Number	Package Code	Package (Notes 9 & 10)	Package Size	7" Tape and Reel	
				Quantity	Part Number Suffix
74LVC1G125QSE-7	SE	SOT353	2.15mm × 2.1mm × 1.1mm 0.65mm lead pitch	3000/Tape & Reel	-7
74LVC1G125QW5-7	W5	SOT25	3.0mm × 2.8mm × 1.2mm 0.95mm lead pitch	3000/Tape & Reel	-7

Notes:

8. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.
9. Pad layout as shown in Diodes Incorporated's package outline PDFs, which can be found on our website at <http://www.diodes.com/package-outlines.html>.
10. The taping orientation is located on our website at <https://www.diodes.com/assets/Packaging-Support-Docs/ap02007.pdf>.

Marking Information



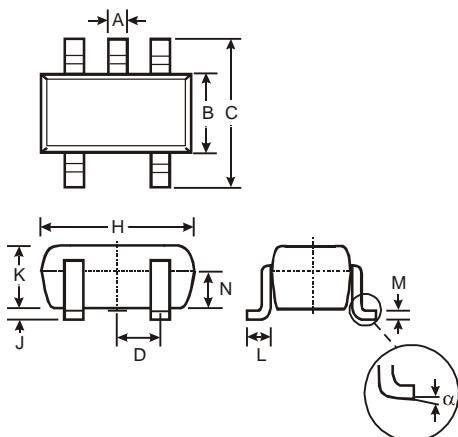
XXX : Identification Code
Y : Year 0~9
W : Week: A~Z 1~26 week
 a~z 27~52 week
 z represents week 52 and 53
X : A~Z: Internal Code

Part Number	Package	Identification Code
74LVC1G125QW5-7	SOT25	UYQ
74LVC1G125QSE-7	SOT353	UYQ

Package Outline Dimensions

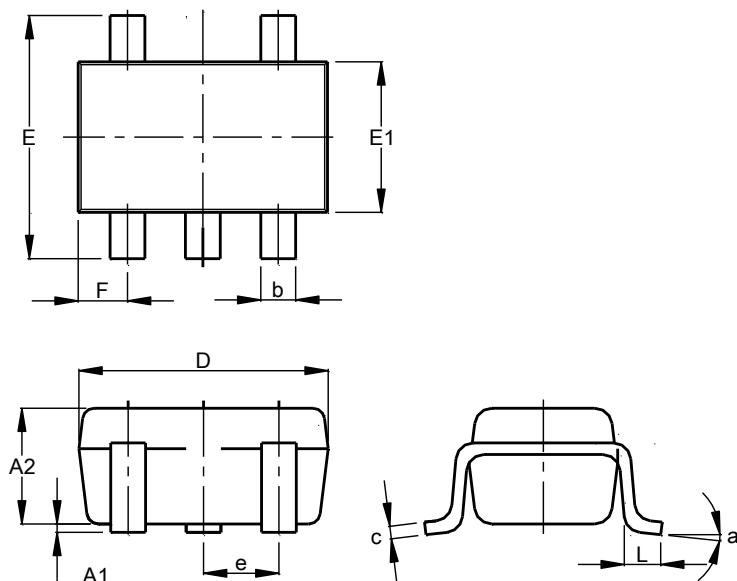
Please see <http://www.diodes.com/package-outlines.html> for the latest version.

(1) Package Type: SOT25



SOT25			
Dim	Min	Max	Typ
A	0.35	0.50	0.38
B	1.50	1.70	1.60
C	2.70	3.00	2.80
D	-	-	0.95
H	2.90	3.10	3.00
J	0.013	0.10	0.05
K	1.00	1.30	1.10
L	0.35	0.55	0.40
M	0.10	0.20	0.15
N	0.70	0.80	0.75
α	0°	8°	-
All Dimensions in mm			

(2) Package Type: SOT353

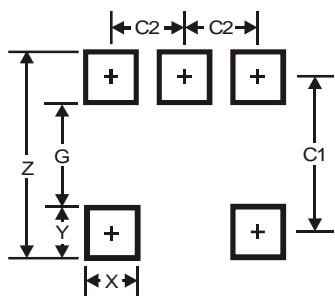


SOT353			
Dim	Min	Max	Typ
A1	0.00	0.10	0.05
A2	0.90	1.00	0.95
b	0.10	0.30	0.25
c	0.10	0.22	0.11
D	1.80	2.20	2.15
E	2.00	2.20	2.10
E1	1.15	1.35	1.30
e	0.650 BSC		
F	0.40	0.45	0.425
L	0.25	0.40	0.30
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

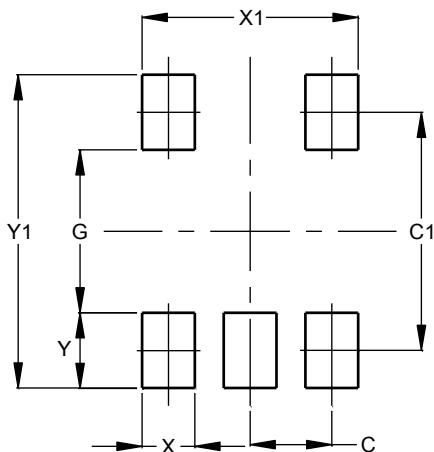
Please see <http://www.diodes.com/package-outlines.html> for the latest version.

(1) Package Type: SOT25



Dimensions	Value
Z	3.20
G	1.60
X	0.55
Y	0.80
C1	2.40
C2	0.95

(2) Package Type: SOT353



Dimensions	Value (in mm)
C	0.650
C1	1.900
G	1.300
X	0.420
X1	1.720
Y	0.600
Y1	2.500

Mechanical Data

SOT25

- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208③
- Weight: 0.0158 grams (Approximate)

SOT353

- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208③
- Weight: 0.0064 grams (Approximate)

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