



### 74LVC1G07Q

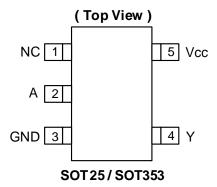
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#### SINGLE BUFFER WITH OPEN DRAIN OUTPUT

### **Description**

The 74LVC1G07Q is an automotive-compliant, single buffer with an open-drain output. 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 IOFF. The IOFF circuitry disables the output preventing damaging current backflow when the device is powered down. The open-drain output can be connected to other open drain outputs to implement active-low wired-OR or active-high wired-AND functions. The maximum sink current is 32mA at 5V.

### **Pin Assignments**



#### **Features**

- Grade 1 Ambient Temperature Operation: -40°C to +125°C
- Wide Supply Voltage Range from 1.65V to 5.5V
- 24mA Sink Current at 3.3V
- CMOS Low Power Consumption
- Ioff 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 74LVC1G07Q 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/

### **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

Notes:

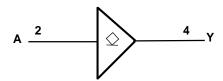
- 1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
- 2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
- 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.



# **Pin Descriptions**

Pin Name	Description
NC	No Connection
А	Data Input
GND	Ground
Y	Data Output
Vcc	Supply Voltage

# **Logic Diagram**



# **Function Table**

Input	Output
Α	Y
Н	Z
L	L

# 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
V <sub>CC</sub>	Supply Voltage Range	-0.5 to 6.5	V
VI	Input Voltage Range	-0.5 to 6.5	V
Vo	Voltage Applied to Output in High Impedance or IOFF State	-0.5 to 6.5	V
Vo	Voltage Applied to Output in High or Low State	-0.5 to Vcc +0.5	V
I <sub>IK</sub>	Input Clamp Current V <sub>I</sub> < 0	-50	mA
lok	Output Clamp Current	-50	mA
lo	Continuous Output Current	50	mA
Icc, Ignd	Continuous Current Through Vcc or GND	±100	mA
TJ	Operating Junction Temperature	-40 to +150	°C
T <sub>STG</sub>	Storage Temperature	-65 to +150	°C

Notes:

<sup>4.</sup> Stresses beyond the absolute maximum can result in immediate failure or reduced reliability. These are stress values and device operation should be within recommend values.

<sup>5.</sup> 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	Operating Voltage	Operating	1.65	5.5	V
Vcc	Operating Voltage	Data retention only	1.5	_	V
		Vcc = 1.65V to 1.95V	0.65 × Vcc	_	
\ /	High Loyal Input Valtage	Vcc = 2.3V to 2.7V	1.7	_	V
ViH	High-Level Input Voltage	V <sub>CC</sub> = 3V to 3.6V	2	_	v
		V <sub>CC</sub> = 4.5V to 5.5V	0.7 × V <sub>CC</sub>	_	
		V <sub>CC</sub> = 1.65V to 1.95V	_	0.35 × V <sub>CC</sub>	
.,	Lavelavellenvt Valtage	V <sub>CC</sub> = 2.3V to 2.7V	_	0.7	.,
VIL	Low-Level Input Voltage	V <sub>CC</sub> = 3V to 3.6V	_	0.8	V
		Vcc = 4.5V to 5.5V	_	0.3 × Vcc	
Vı	Input Voltage		0	5.5	V
Vo	Output Voltage		0	5.5	V
		Vcc = 1.65V	_	4	
		Vcc = 2.3V	_	8	
la.	Low Lovel Output Current	Vcc = 2.7V	_	12	mA
loL	Low-Level Output Current	V 2V	_	16	IIIA
		Vcc = 3V	_	24	
		Vcc = 4.5V	_	32	
		$V_{CC} = 1.8V \pm 0.15V, 2.5V \pm 0.2V$	_	20	
Δt/ΔV	Input Transition Rise or Fall Rate	$V_{CC} = 3.3V \pm 0.3V$	_	10	ns/V
		$Vcc = 5V \pm 0.5V$	_	5	
TA	Operating Free-Air Temperature	_	-40	+125	°C

Note:

6. Unused inputs should be held at  $V_{\text{CC}}$  or Ground.



# **Electrical Characteristics** (All typical values are at $V_{CC} = 3.3V$ , $T_A = +25$ °C)

Cumbal	Parameter	Took Co	Tost Conditions		-40°	C to +125	,C	Unit
Symbol	Parameter	Test Conditions		Vcc	Min	Тур	Max	Unit
			I <sub>OL</sub> = 100μA	1.65V to 5.5V		_	0.1	
			IoL = 4mA	1.65V	_	_	0.45	
			IoL = 8mA	2.3V	_	_	0.3	.,
Vol	Low Level Output Voltage	VI = VIL	IoL = 12mA	2.7V	_	_	0.4	V
			IoL = 24mA	3V	_	_	0.55	
			IoL = 32mA	4.5V	_	_	0.55	
lı	Input Current	V <sub>I</sub> = 5.5V or GN	ID	0 to 5.5V	_	±0.1	±1	μΑ
loff	Power Down Leakage Current	V <sub>I</sub> or V <sub>O</sub> = 5.5V		0V		_	±2	μΑ
loz	Z-State Leakage Current	VI = VIH, VO = 5.5V		1.65V or 5.5V	_	±0.1	±2	μΑ
Icc	Supply Current	V <sub>I</sub> = 5.5V or GND, I <sub>O</sub> = 0		5.5V	_	0.1	4	μΑ
ΔΙσο	Additional Supply Current	Input at Vcc – 0.6V		3V to 5.5V	_	_	500	μΑ
Cı	Input Capacitance	VI = Vcc to GNE	)	3.3V	-	5.0		pF

# **Package Characteristics**

Symbol	Parameter	Package	Test Conditions	Min	Тур	Max	Unit
0	Thermal Resistance	SOT25	Note 7	1	184	1	900
θја	Junction-to-Ambient	SOT353	Note 7	-	385	1	°C/W
0	Thermal Resistance	SOT25	Note 7	_	62	_	2011
θЈС	Junction-to-Case	SOT353 Note 7		_	164	_	°C/W

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

# **Switching Characteristics**

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

Parameter	From	То	Vcc	T <sub>A</sub> = -4	Unit		
Farameter	Input	Output	VCC	Min	Тур	Max	Ollic
		1.8V ± 0.15V	1.0	2.6	8.4		
		Y		$2.5V \pm 0.2V$	0.5	1.7	7.0
t <sub>PD</sub>	Α		2.7V	0.5	2.3	6.0	ns
			$3.3V \pm 0.3V$	0.5	2.2	5.5	
			$5.0V \pm 0.5V$	0.5	1.6	4.5	

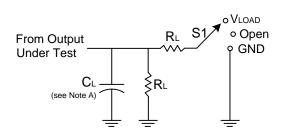
# **Operating Characteristics**

 $T_A = +25$ °C

Parameter		Test Conditions	Vcc = 1.8V	Vcc = 2.5V	Vcc = 3.3V	Vcc = 5V	Unit	
			Тур	Тур	Тур	Тур		
C <sub>PD</sub>	Power Dissipation Capacitance	f = 10MHz	5	5	6	6	pF	

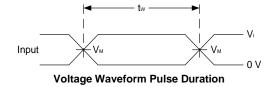


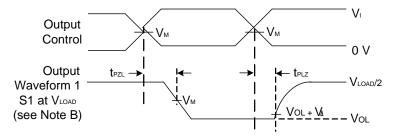
### **Measurement Information**



TEST	S1	CLRL
t <sub>PLZ</sub> /t <sub>PZL</sub>	$V_{LOAD}$	Per Table

V	Inp	uts	V	V		ъ.	$oldsymbol{V}\Delta$
V <sub>CC</sub>	Vı	t <sub>R</sub> /t <sub>F</sub>	V <sub>M</sub>	V <sub>LOAD</sub>	CL	R∟	VΔ
1.8V±0.15V	Vcc	≤2ns	Vcc/2	2 × Vcc	30pF	1kΩ	0.15V
2.5V±0.2V	Vcc	≤2ns	Vcc/2	2 × Vcc	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	Vcc	≤2.5ns	Vcc/2	2 × Vcc	50pF	500Ω	0.3V





**Voltage Waveform Enable and Disable Times** Low and High Level Enabling

Figure 1. Load Circuit and Voltage Waveforms

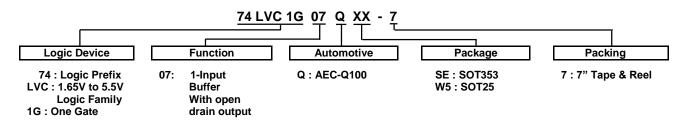
Notes:

- A. Includes test lead and test apparatus capacitance.

- A. Includes test lead at pulse repetition rate ≤ 10MHz.
  C. The input is one transition per measurement.
  D. For the open drain device t<sub>PLZ</sub> and t<sub>PZL</sub> are the same as t<sub>PD</sub>.
- E. t<sub>PZL</sub> is measured at V<sub>M</sub>.
- F.  $t_{PLZ}$  is measured at  $V_{OL}$  + $V_{\Delta}$ .



# Ordering Information (Note 8)



Part Number	Package	Package	Package	7" Tape and Reel		
Fait Number	Code	(Notes 9 & 10)	Size	Quantity	Part Number Suffix	
74LVC1G07QSE-7	SE	SOT353	2.15mm × 2.1mm × 1.1mm 0.65mm lead pitch	3000/Tape & Reel	-7	
74LVC1G07QW5-7	W5	SOT25	$3.0$ mm $\times$ $2.8$ mm $\times$ $1.2$ mm $0.95$ mm 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**

#### (Top View)

XXX YWX

XXX: Identification Code : Year 0~9

: Week: A~Z 1~26 week a~z 27~52 week

z represents week 52 and 53

X : A~ Z: Internal Code

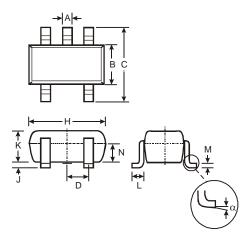
SOT 25 / SOT 353

Part Number	Package	Identification Code		
74LVC1G07QW5-7	SOT25	UNQ		
74LVC1G07QSE-7	SOT353	UNQ		



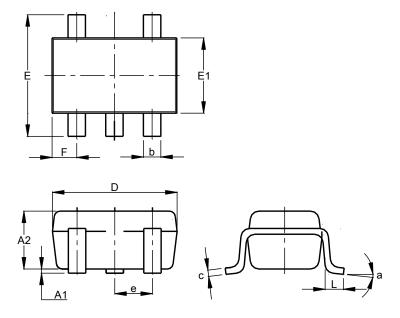
# **Package Outline Dimensions**

### (1) Package Type: SOT25



SOT25					
Dim	Min	Max	Тур		
Α	0.35	0.50	0.38		
В	1.50	1.70	1.60		
С	2.70	3.00	2.80		
D	-	-	0.95		
Н	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



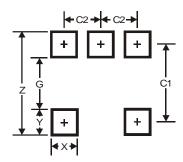
SOT353					
Dim	Min	Max	Тур		
A1	0.00	0.10	0.05		
A2	0.90	1.00	0.95		
b	0.10	0.30	0.25		
С	0.10	0.22	0.11		
D	1.80	2.20	2.15		
Е	2.00	2.20	2.10		
E1	1.15	1.35	1.30		
е	0.650 BSC				
F	0.40	0.45	0.425		
L	0.25	0.40	0.30		
а	0°	8°			
All Dimensions in mm					



# **Suggested Pad Layout**

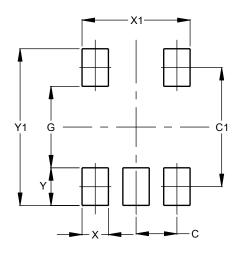
Please see http://www.diodes.com/package-outlines.html for the latest version.

#### (1) Package Type: SOT25



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

#### (2) Package Type: SOT353



Dimensions	Value (in mm)
С	0.650
C1	1.900
G	1.300
Х	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 208
- 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 208 @3
- Weight: 0.0064 grams (Approximate)



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