

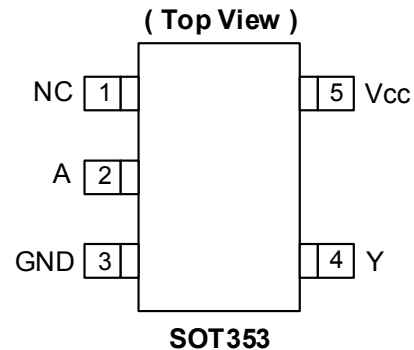
Description

The 74LVC1G14Q is an automotive-compliant, single 1-input Schmitt trigger inverter with a standard push-pull 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 I_{OFF}. The I_{OFF} circuitry disables the output preventing damaging current backflow when the device is powered down.

The gate performs the positive Boolean function:

$$Y = \overline{A}$$

Pin Assignments



Features

- Grade 1 Ambient Temperature Operation: -40°C to 125°C
- Wide Supply Voltage Range from 1.65V to 5.5V
- ±24mA 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 V_{CC} 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 74LVC1G14Q is suitable for automotive applications requiring specific change control and is AEC-Q100 qualified, has a grade 1 -40°C to 125°C temperature rating, is PPAP capable, and is manufactured in IATF16949:2016 certified facilities.**

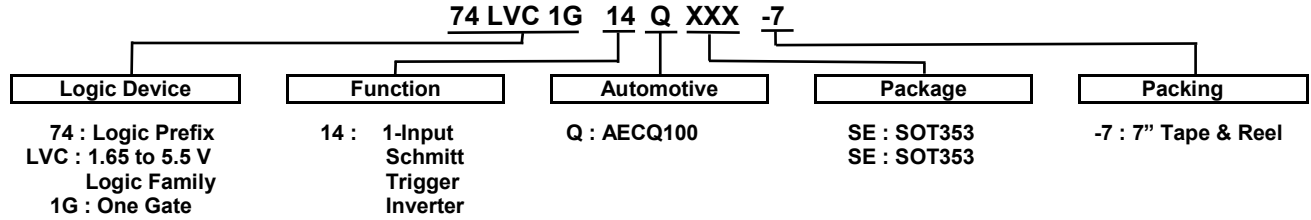
Applications

- 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.

Ordering Information



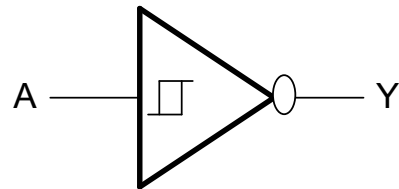
Part Number	Package Code	Package (Notes 4 & 5)	Package Size	7" Tape and Reel	
				Quantity	Part Number Suffix
74LVC1G14QSE-7	SE	SOT353	2.0mm × 2.0mm × 1.1mm 0.65 mm lead pitch	3000/Tape & Reel	-7

Notes: 4. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.
 5. Pad layout as shown in Diodes Inc. suggested pad layouts, which can be found on our website at see <http://www.diodes.com/package-outlines.html>.
 6. The taping orientation is located on our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

Pin Descriptions

Pin Name	Description
NC	No Connection
A	Data Input
GND	Ground
Y	Data Output
V _{CC}	Supply Voltage

Logic Diagram



Function Table

Inputs	Output
A	Y
H	L
L	H

Absolute Maximum Ratings (Notes 7 & 8)

Symbol	Description	Rating	Unit
ESD HBM	Human Body Model ESD Protection	2	kV
ESD CDM	Charged Device Model ESD Protection	1	kV
V_{CC}	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_{GND}	Continuous Current Through V_{CC} or GND	± 100	mA
T_J	Operating Junction Temperature	-40 to 150	°C
T_{STG}	Storage Temperature	-65 to 150	°C

Notes: 7. Stresses beyond the absolute maximum may result in immediate failure or reduced reliability. These are stress values and device operation should be within recommend values.
8. 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 9)

Symbol	Parameter		Min	Max	Unit
V_{CC}	Operating Voltage	Operating	1.65	5.5	V
		Data retention only	1.5	—	V
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	
		$V_{CC} = 3V$	—	-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	
		$V_{CC} = 3V$	—	24	
		$V_{CC} = 4.5V$	—	32	
T_A	Operating Free-Air Temperature	—	-40	+125	°C

Notes: 9. Unused inputs should be held at V_{CC} or Ground.

Electrical Characteristics $T_A = -40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$ (All typical values are at $V_{CC} = 3.3\text{V}$, $T_A = +25^{\circ}\text{C}$)

Symbol	Parameter	Test Conditions		V_{CC}	Min	Typ.	Max	Unit
V_{T+}	Positive- Going Input Threshold Voltage	—		1.65V	0.79	—	1.16	V
		—		2.3V	1.11	—	1.56	
		—		3V	1.50	—	1.87	
		—		4.5V	2.16	—	2.74	
		—		5.5V	2.61	—	3.33	
V_{T-}	Negative- Going Input Threshold Voltage	—		1.65V	0.39	—	0.64	V
		—		2.3V	0.58	—	0.89	
		—		3V	0.84	—	1.16	
		—		4.5V	1.41	—	1.79	
		—		5.5V	1.87	—	2.29	
ΔV_T	Hysteresis ($V_{T+} - V_{T-}$)	—		1.65V	0.37	—	0.62	V
		—		2.3V	0.48	—	0.77	
		—		3V	0.56	—	0.87	
		—		4.5V	0.71	—	1.04	
		—		5.5V	0.71	—	1.11	
V_{OH}	High Level Output Voltage	$V_I = V_{T-}$	$I_{OH} = -100\mu\text{A}$	1.65V to 5.5V	$V_{CC} - 0.1$	—	—	V
			$I_{OH} = -4\text{mA}$	1.65V	0.95	—	—	
			$I_{OH} = -8\text{mA}$	2.3V	1.7	—	—	
			$I_{OH} = -12\text{mA}$	2.7V	1.9	—	—	
			$I_{OH} = -24\text{mA}$	3V	2.0	—	—	
			$I_{OH} = -32\text{mA}$	4.5V	3.4	—	—	
V_{OL}	Low-Level Output Voltage	$V_I = V_{T+}$	$I_{OL} = 100\mu\text{A}$	1.65V to 5.5V	—	—	0.1	V
			$I_{OL} = 4\text{mA}$	1.65V	—	—	0.7	
			$I_{OL} = 8\text{mA}$	2.3V	—	—	0.45	
			$I_{OL} = 12\text{mA}$	2.7V	—	—	0.6	
			$I_{OL} = 24\text{mA}$	3V	—	—	0.8	
			$I_{OL} = 32\text{mA}$	4.5V	—	—	0.8	
I_I	Input Current	$V_I = 5.5\text{V}$ or GND	$V_I = 5.5\text{V}$ or GND	0 to 5.5V	—	—	± 1	μA
I_{OFF}	Power Down Leakage Current	V_I or $V_O = 5.5\text{V}$		0	—	—	± 2	μA
I_{CC}	Supply Current	$V_I = 5.5\text{V}$ or GND $I_O = 0$		1.65V to 5.5V	—	—	4	μA
ΔI_{CC}	Additional Supply Current	Input at $V_{CC} - 0.6\text{V}$		2.3V to 5.5V	—	—	500	μA
C_i	Input Capacitance	$V_I = 5.5\text{V}$ to GND		3.3V	—	5.0	—	pF

Package Characteristics

Symbol	Parameter	Test Conditions	V_{CC}	Min	Typ.	Max	Unit
θ_{JA}	Thermal Resistance Junction-to-Ambient	SOT353	Note 10	—	371	—	$^{\circ}\text{C/W}$
θ_{JC}	Thermal Resistance Junction-to-Case	SOT353	Note 10	—	143	—	$^{\circ}\text{C/W}$

Note: 10. 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.

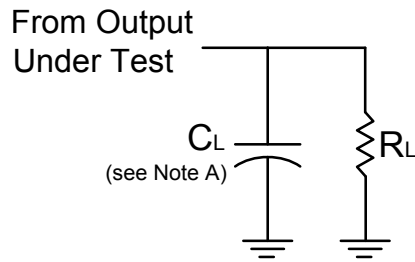
Parameter	From Input	To Output	V_{CC}	$T_A = -40^\circ\text{C to } 125^\circ\text{C}$			Unit
				Min	Typ	Max	
t_{PD}	A	Y	$1.8\text{V} \pm 0.15\text{V}$	1.0	4.1	14.0	ns
			$2.5\text{V} \pm 0.2\text{V}$	0.7	2.8	8.5	
			2.7V	0.7	3.2	8.5	
			$3.3\text{V} \pm 0.3\text{V}$	0.7	3.0	7.0	
			$5.0\text{V} \pm 0.5\text{V}$	0.7	2.2	6.5	

Operating Characteristics

$T_A = +25^\circ\text{C}$

Parameter		Test Conditions	$V_{CC} = 1.8\text{V}$	$V_{CC} = 2.5\text{V}$	$V_{CC} = 3.3\text{V}$	$V_{CC} = 5\text{V}$	Unit
			Typ.	Typ.	Typ.	Typ.	
C_{pd}	Power Dissipation Capacitance	$f = 10\text{ MHz}$	14	15	15	16	pF

Parameter Measurement Information



V_{CC}	Inputs		V_M	C_L	R_L
	V_I	t_r/t_f			
$1.8V \pm 0.15V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	30pF	1k Ω
$2.5V \pm 0.2V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	30pF	500 Ω
$3.3V \pm 0.3V$	3V	$\leq 2.5ns$	1.5V	50pF	500 Ω
$5V \pm 0.5V$	V_{CC}	$\leq 2.5ns$	$V_{CC}/2$	50pF	500 Ω

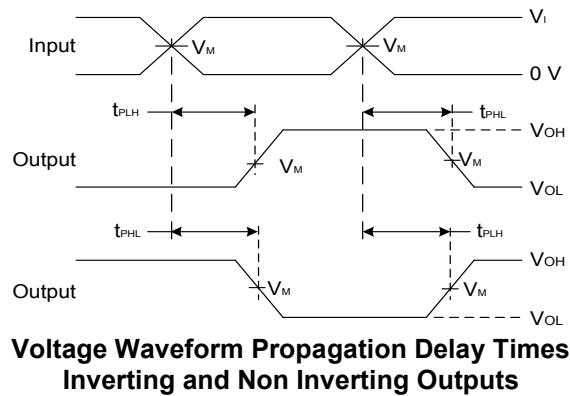
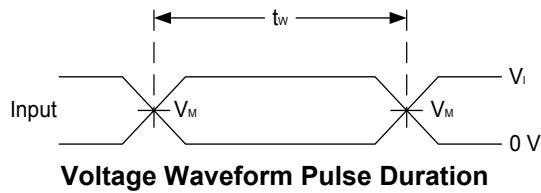


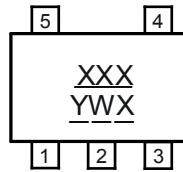
Figure 1. Load Circuit and Voltage Waveforms

- Notes:
- A. Includes test lead and test apparatus capacitance.
 - B. All pulses are supplied at pulse repetition rate $\leq 10MHz$.
 - C. Inputs are measured separately one transition per measurement.
 - D. t_{PLH} and t_{PHL} are the same as t_{PD} .

Marking Information

SOT353

(Top View)



SOT353

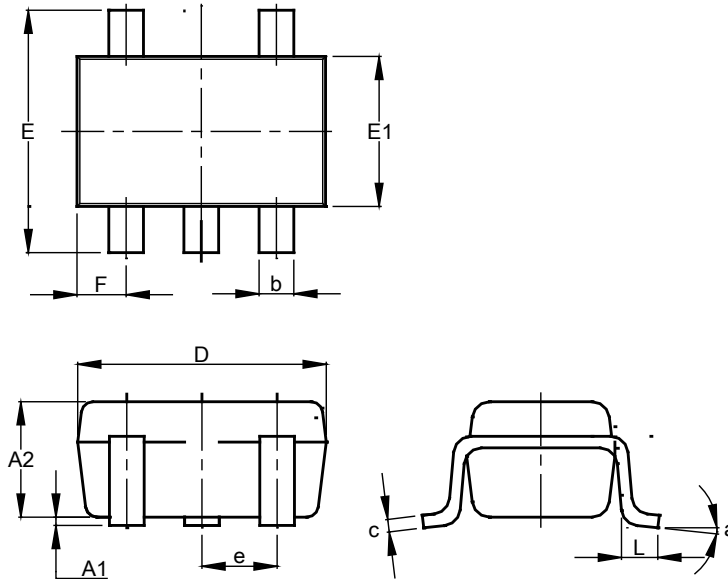
XXX : Identification Code
Y : Year 0~9
W : Week: A~Z 1~26 week
 a~z 27~52 week
 z represents week 52 and 53
 : A~Z : Internal Code

Part Number	Package	Identification Code
74LVC1G14QSE-7	SOT353	UPQ

Package Outline Dimensions

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

SOT353

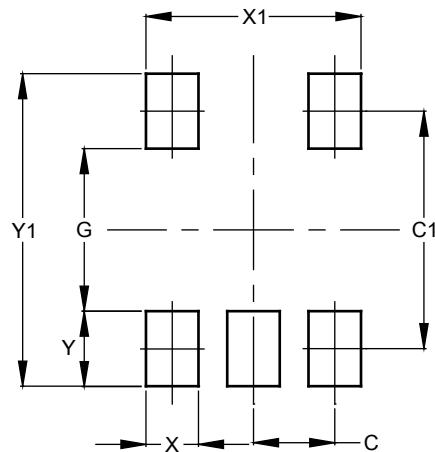


SOT353			
Dim	Min	Max	Typ
A1	0.00	0.10	0.05
A2	0.90	1.00	0.95
b	0.10	0.30	0.25
c	0.10	0.22	0.11
D	1.80	2.20	2.15
E	2.00	2.20	2.10
E1	1.15	1.35	1.30
e	0.650 BSC		
F	0.40	0.45	0.425
L	0.25	0.40	0.30
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

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

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

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