

### Features

- Operate from 1.65V to 5.5V
- Inputs accept voltages to 5.5V
- I<sub>OFF</sub> supports partial-power-down mode
- Low power dissipation
- Max t<sub>PD</sub> of 4 ns at 3.3V
- ESD Protection Exceeds JESD 22
  - 2000-V Human-Body Model (A114-A)
  - 1000-V Charged-Device Model (C101)
- SOT23-5 Package Available
- SOT353 Package Available

### General Description

The 74LVC1G86 is a single 2-input EXCLUSIVE-OR gate which provides the Function  $Y = A \oplus B$  or  $Y = \overline{A}B + A\overline{B}$  in positive logic. Inputs can be driven from either 3.3V or 5V devices. These features allow the use of these devices in a mixed 3.3V and 5V environment.

This device is fully specified for partial Power-down applications using I<sub>OFF</sub>. The I<sub>OFF</sub> circuitry disables the output, preventing the damaging backflow current through the device when it is powered down.

### Ordering Information

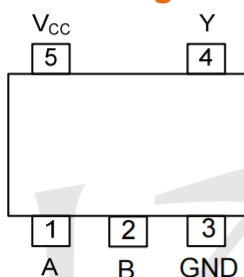
ORDER NUMBER	PACKAGE DESCRIPTION	PACKAGE OPTION
74LVC1G86GV	SOT23-5	Tape and Reel,3000
74LVC1G86GW	SOT353	Tape and Reel,3000

### Logic Diagram



Logic symbol

### Pin Configuration



SOT-23-5

SOT-353

### Marking

74LVC1G86GV Marking:V86

74LVC1G86GW Marking:VH

### Function Table

INPUT(A)	INPUT(B)	OUTPUT(Y)
L	L	L
H	L	H
L	H	H
H	H	L

Note: H: HIGH voltage level; L: LOW voltage level

### Applications

- Voltage Level Shifting
- General Purpose Logic
- Power Down Signal Isolation
- Wide array of products such as:
  - PCs, Networking, Notebooks, Netbooks, PDAs
  - Tablet Computers, E-readers
  - Computer Peripherals, Hard Drives, CD/DVD ROM
  - TV, DVD, DVR, Set-Top Box
  - Cell Phones, Personal Navigation / GPS
  - MP3 Players, Cameras, Video Recorders



### Absolute Maximum Ratings

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V_{CC}$	-0.5 ~ +6.5	V
Input Voltage	$V_{IN}$	-0.5 ~ +6.5	V
Output Voltage	$V_{OUT}$	Output in the high or low state	-0.5 ~ $V_{CC}+0.5$
		Output in the high-impedance or power-off state	-0.5 ~ +6.5
Continuous $V_{CC}$ or GND Current	$I_{CC}$	±100	mA
Continuous Output Current ( $V_{OUT}=0$ to $V_{CC}$ )	$I_{OUT}$	±50	mA
Input Clamp Current ( $V_{IN}<0$ )	$I_{IK}$	-50	mA
Output Clamp Current ( $V_{OUT}<0$ )	$I_{OK}$	-50	mA
Storage Temperature Range	$T_{STG}$	-65 ~ +150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

### Recommended Operating Conditions

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	$V_{CC}$	Operating	1.65		5.5	V
		Data retention only	1.5			V
Input Voltage	$V_{IN}$		0		5.5	V
Output Voltage	$V_{OUT}$	High or low state	0		$V_{CC}$	V
High-level Output Current	$I_{OH}$	$V_{CC}=1.65V$			-4	mA
		$V_{CC}=2.3V$			-8	mA
		$V_{CC}=3V$			-16	mA
		$V_{CC}=3V$			-24	mA
		$V_{CC}=4.5V$			-32	mA
Low-level Output Current	$I_{OL}$	$V_{CC}=1.65V$			4	mA
		$V_{CC}=2.3V$			8	mA
		$V_{CC}=3V$			16	mA
		$V_{CC}=3V$			24	mA
		$V_{CC}=4.5V$			32	mA
Input Transition Rise or Fall Rate	$\Delta t/\Delta v$	$V_{CC}=1.8V\pm 0.15V, 2.5V\pm 0.2V$			20	ns/V
		$V_{CC}=3.3V\pm 0.3V$			10	ns/V
		$V_{CC}=5V\pm 0.5V$			5	ns/V
Operating Temperature	$T_A$		-40		+125	°C

### Electrical Characteristics

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
High-level Input Voltage	$V_{IH}$	$V_{CC}=1.65V$ to $1.95V$	$0.65 \times V_{CC}$			V	
		$V_{CC}=2.3V$ to $2.7V$	1.7			V	
		$V_{CC}=3V$ to $3.6V$	2			V	
		$V_{CC}=4.5V$ to $5.5V$	$0.7 \times V_{CC}$			V	
Low-level Input Voltage	$V_{IL}$	$V_{CC}=1.65V$ to $1.95V$			$0.35 \times V_{CC}$	V	
		$V_{CC}=2.3V$ to $2.7V$			0.7	V	
		$V_{CC}=3V$ to $3.6V$			0.8	V	
		$V_{CC}=4.5V$ to $5.5V$			$0.3 \times V_{CC}$	V	
High-Level Output Voltage	$V_{OH}$	$V_{CC}=1.65 \sim 5.5V$ , $I_{OH}=-100\mu A$	$V_{CC}-0.1$			V	
		$V_{CC}=1.65V$ , $I_{OH}=-4mA$	1.2			V	
		$V_{CC}=2.3V$ , $I_{OH}=-8mA$	1.9			V	
		$V_{CC}=3.0V$	$I_{OH}=-16mA$	2.4			V
			$I_{OH}=-24mA$	2.3			V
		$V_{CC}=4.5V$ , $I_{OH}=-32mA$	3.8			V	
Low-Level Output Voltage	$V_{OL}$	$V_{CC}=1.65 \sim 5.5V$ , $I_{OL}=100\mu A$			0.1	V	
		$V_{CC}=1.65V$ , $I_{OL}=4mA$			0.45	V	
		$V_{CC}=2.3V$ , $I_{OL}=8mA$			0.3	V	
		$V_{CC}=3.0V$	$I_{OL}=16mA$			0.4	V
			$I_{OL}=24mA$			0.55	V
		$V_{CC}=4.5V$ , $I_{OL}=32mA$			0.55	V	
Input Leakage Current	$I_{(LEAK)}$	$V_{CC}=0 \sim 5.5V$ , $V_{IN}=5.5V$ or GND			$\pm 5$	$\mu A$	
Power OFF Leakage Current	$I_{off}$	$V_{CC}=0V$ , $V_{IN}$ or $V_{OUT}=5.5V$			$\pm 10$	$\mu A$	
Quiescent Supply Current	$I_{CC}$	$V_{CC}=1.65 \sim 5.5V$ , $V_{IN}=V_{CC}$ or GND, $I_{OUT}=0$			10	$\mu A$	
Additional Quiescent Supply Current Per Input Pin	$\Delta I_{CC}$	$V_{CC}=3 \sim 5.5V$ , One input at $V_{CC}-0.6V$ , Other inputs at $V_{CC}$ or GND			500	$\mu A$	
Input Capacitance	$C_I$	$V_{CC}=3.3V$ , $V_{IN}=V_{CC}$ or GND		6		pF	

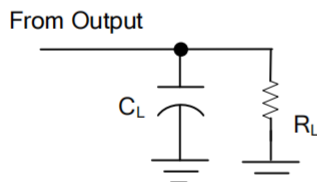
### Dynamic Characteristics (Input: $t_R, t_F \leq 3ns$ ; $P_{RR} \leq 1MHz$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation delay from input to output	$t_{PLH}$ $t_{PHL}$	$V_{CC}=1.8 \pm 0.15V$ , $C_L=15pF$ , $R_L=1M\Omega$	2.1		9.1	ns
		$V_{CC}=2.5 \pm 0.2V$ , $C_L=15pF$ , $R_L=1M\Omega$	1		4.5	ns
		$V_{CC}=3.3 \pm 0.3V$ , $C_L=15pF$ , $R_L=1M\Omega$	0.6		4	ns
		$V_{CC}=5 \pm 0.5V$ , $C_L=15pF$ , $R_L=1M\Omega$	0.8		3.3	ns
Propagation delay from input to output	$t_{PLH}$ $t_{PHL}$	$V_{CC}=1.8 \pm 0.15V$ , $C_L=30pF$ , $R_L=1K\Omega$	3.5		9.9	ns
		$V_{CC}=2.5 \pm 0.2V$ , $C_L=30pF$ , $R_L=500\Omega$	1.8		5.5	ns
		$V_{CC}=3.3 \pm 0.3V$ , $C_L=50pF$ , $R_L=500\Omega$	1.3		5	ns
		$V_{CC}=5 \pm 0.5V$ , $C_L=50pF$ , $R_L=500\Omega$	1		4	ns

### Operating Characteristics

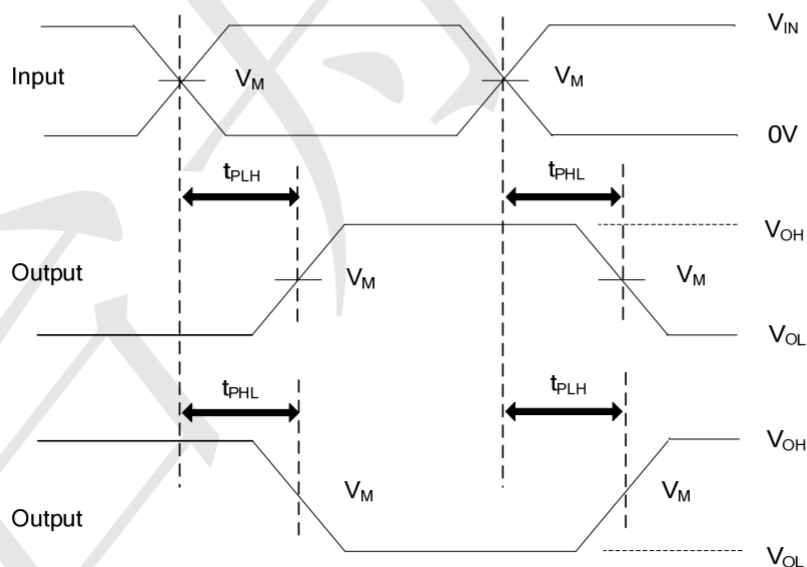
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	$C_{PD}$	$V_{CC}=1.8V$		22		pF
		$V_{CC}=2.5V$		22		pF
		$V_{CC}=3.3V$		22		pF
		$V_{CC}=5V$		24		pF

### Test Circuit And Waveforms



TEST CIRCUIT

$V_{CC}$	Inputs		$V_M$	$C_L$	$R_L$
	$V_{IN}$	$t_R, t_F$			
$1.8V \pm 0.15V$	$V_{CC}$	$\leq 2ns$	$V_{CC}/2$	15pF	1M $\Omega$
				30pF	1K $\Omega$
$2.5V \pm 0.2V$	$V_{CC}$	$\leq 2ns$	$V_{CC}/2$	15pF	1M $\Omega$
				30pF	500 $\Omega$
$3.3V \pm 0.3V$	3V	$\leq 2.5ns$	1.5V	15pF	1M $\Omega$
				50pF	500 $\Omega$
$5V \pm 0.5V$	$V_{CC}$	$\leq 2.5ns$	$V_{CC}/2$	15pF	1M $\Omega$
				50pF	500 $\Omega$

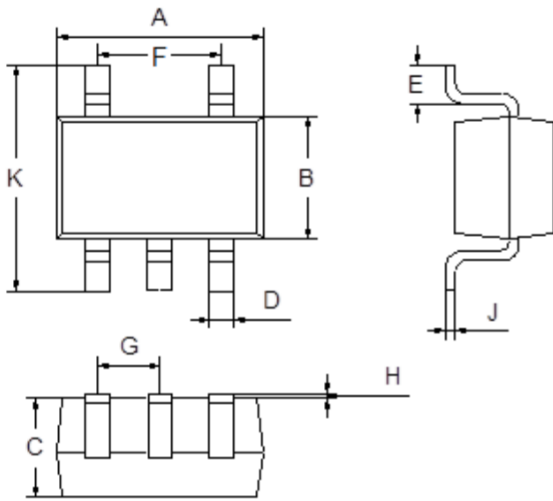


PROPAGATION DELAY TIMES



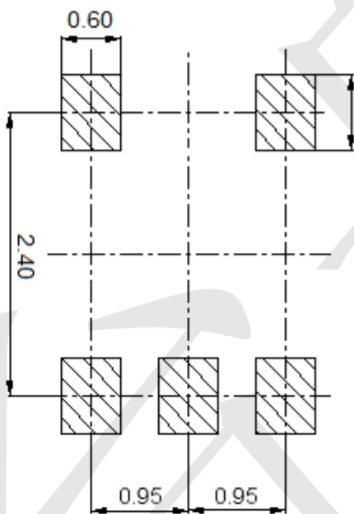
**Package Outline Dimensions** (Unit: mm)

SOT23-5



Dimension	Min.	Max.
A	2.80	3.00
B	1.50	1.70
C	1.00	1.20
D	0.35	0.45
E	0.35	0.55
F	1.80	2.00
G	0.90	1.00
H	0.02	0.10
J	0.10	0.20
K	2.60	3.00

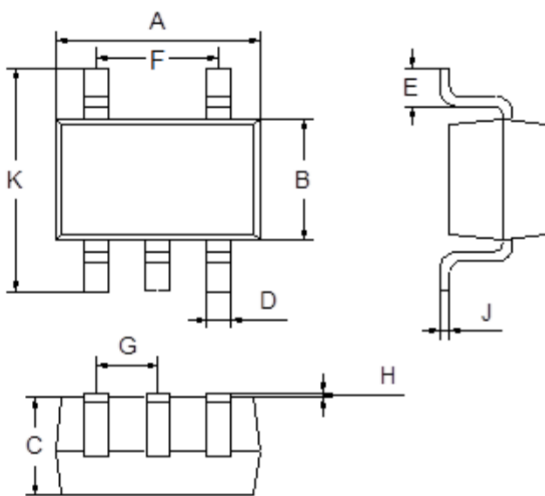
**Mounting Pad Layout** (Unit: mm)





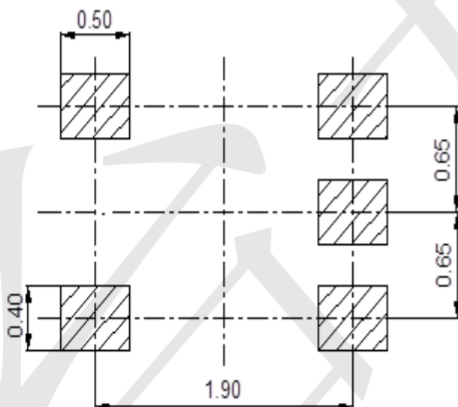
**Package Outline Dimensions** (Unit: mm)

SOT353



Dimension	Min.	Max.
A	2.00	2.20
B	1.15	1.35
C	0.85	1.05
D	0.15	0.35
E	0.25	0.40
F	1.20	1.40
G	0.60	0.70
H	0.02	0.10
J	0.05	0.15
K	2.20	2.40

**Mounting Pad Layout** (Unit: mm)



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