



## U7SH02

CMOS IC

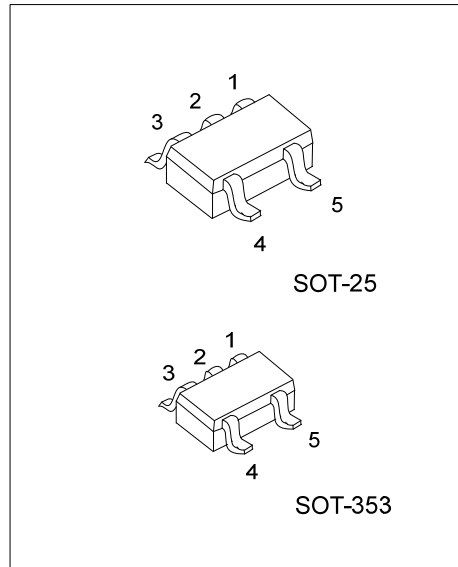
### 2-INPUT NOR GATE

#### DESCRIPTION

The U7SH02 is a 2-input NOR gate, it provides the function  $Y = \overline{A+B}$   
This device has power-down protective circuit, preventing device destruction when it is powered down.

#### FEATURES

- \* Operation voltage range: 2~5.5V
- \* Low power current:  $I_{CC} = 2\mu A$ (Max)
- \* High speed:  $t_{PD} = 3.8ns$ (Typ)
- \* High noise immunity
- \* Power down protection

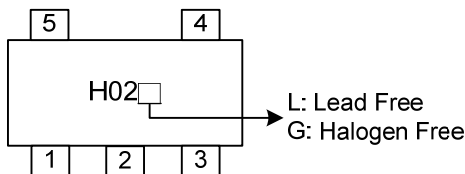


#### ORDERING INFORMATION

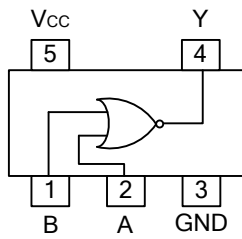
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U7SH02L-AF5-R	U7SH02G-AF5-R	SOT-25	Tape Reel
U7SH02L-AL5-R	U7SH02G-AL5-R	SOT-353	Tape Reel

<p>U7SH02L-AF5-R</p> <p>(1) Packing Type (2) Package Type (3) Lead Free</p>	<p>(1) R: Tape Reel (2) AF5: SOT-25, AL5: SOT-353 (3) G: Halogen Free, L: Lead Free</p>
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#### MARKING



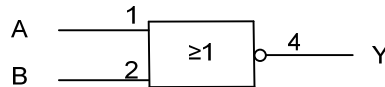
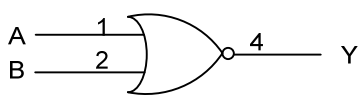
■ PIN CONFIGURATION



■ FUNCTION TABLE (each gate)

INPUT		OUTPUT
A	B	Y
L	L	H
L	H	L
H	L	L
H	H	L

■ LOGIC DIAGRAM (positive logic)



■ ABSOLUTE MAXIMUM RATINGS (unless otherwise specified)(Note 1)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V_{CC}$	-0.5~7	V
Input Voltage	$V_{IN}$	-0.5~7	V
Output Voltage	$V_{OUT}$	-0.5~ $V_{CC}+0.5$	V
Input Clamp Current	$I_{IK}$	-20	mA
Output Clamp Current	$I_{OK}$	±20	mA
Output Current	$I_{OUT}$	±25	mA
$V_{CC}$ or GND Current	$I_{CC}$	±50	mA
Power Dissipation	$P_D$	200	mW
Storage Temperature	$T_{STG}$	-65 ~ +150	°C

Note 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

2. 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 COMDITIONS

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	$V_{CC}$		2		5.5	V
Input Voltage	$V_{IN}$		0		5.5	V
Output Voltage	$V_{OUT}$		0		$V_{CC}$	V
Input Transition Rise or Fall Rate	$\Delta t/\Delta V$	$V_{CC}=3.3+0.3V$			100	ns/V
		$V_{CC}=5.0+0.5V$			20	
Operating Temperature	$T_A$		-40		85	°C

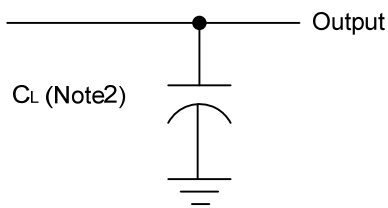
■ STATIC CHARACTERISTICS ( $T_A=25\text{ }^\circ\text{C}$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
High-Level Input Voltage	$V_{IH}$	$V_{CC}=2.0V$	1.5			V
		$V_{CC}=3.0V$	2.1			
		$V_{CC}=5.5V$	3.85			
Low-Level Input Voltage	$V_{IL}$	$V_{CC}=2.0V$			0.5	V
		$V_{CC}=3.0V$			0.9	
		$V_{CC}=5.5V$			1.65	
High-Level Output Voltage	$V_{OH}$	$V_{CC}=2.0V, I_{OH}=-50\mu A$	1.9	2.0		V
		$V_{CC}=3.0V, I_{OH}=-50\mu A$	2.9	3.0		
		$V_{CC}=4.5V, I_{OH}=-50\mu A$	4.4	4.5		
		$V_{CC}=3.0V, I_{OH}=-4mA$	2.58			
		$V_{CC}=4.5V, I_{OH}=-8mA$	3.94			
Low-Level Output Voltage	$V_{OL}$	$V_{CC}=2.0V, I_{OL}=50\mu A$			0.1	V
		$V_{CC}=3.0V, I_{OL}=50\mu A$			0.1	
		$V_{CC}=4.5V, I_{OL}=50\mu A$			0.1	
		$V_{CC}=3.0V, I_{OH}=4mA$			0.36	
		$V_{CC}=4.5V, I_{OH}=8mA$			0.36	
Input Leakage Current	$I_{I(LEAK)}$	$V_{CC}=0V\sim 5.5V, V_{IN}=V_{CC}$ or GND			±0.1	μA
Quiescent Supply Current	$I_Q$	$V_{CC}=5.5V, V_{IN}=V_{CC}$ or GND, $I_{OUT}=0$			2	μA
Input Capacitance	$C_{IN}$	$V_{CC}=5V, V_{IN}=V_{CC}$ or GND		4	10	pF

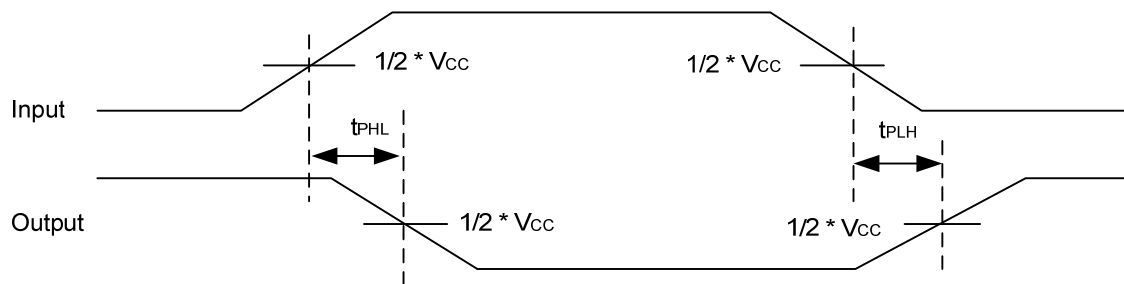
■ DYNAMIC CHARACTERISTICS (T<sub>A</sub>=25 °C, Input: t<sub>R</sub>, t<sub>F</sub>=3ns)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation delay from input (A or B) to output(Y)	t <sub>PLH</sub>	V <sub>CC</sub> =3.3V±0.3V, C <sub>L</sub> =15 pF		5.5	7.9	ns
	t <sub>PHL</sub>			5.5	7.9	
	t <sub>PLH</sub>	V <sub>CC</sub> =3.3V±0.3V, C <sub>L</sub> =50 pF		8.0	11.4	
	t <sub>PHL</sub>			8.0	11.4	
Propagation delay from input (A or B) to output(Y)	t <sub>PLH</sub>	V <sub>CC</sub> = 5V±0.5V, C <sub>L</sub> =15 pF		3.8	5.5	ns
	t <sub>PHL</sub>			3.8	5.5	
	t <sub>PLH</sub>	V <sub>CC</sub> = 5V±0.5V, C <sub>L</sub> =50 pF		5.3	10	
	t <sub>PHL</sub>			5.3	10	
<b>OPERATING CHARACTERISTICS</b>						
Power Dissipation Capacitance	C <sub>PD</sub>	No load		15		pF

■ TEST CIRCUIT AND WAVEFORM



Note 2: CL includes probe and jig capacitance.



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