

### Features

- Wide supply voltage range from 2.3V to 3.6V
- Inputs accept voltages up to 3.6V
- I<sub>OFF</sub> supports partial-power-down mode
- Low static power consumption; I<sub>CC</sub>=1.5μA (Max.)
- ESD Protection Exceeds JESD 22
  - 2000-V Human-Body Model (A114-A)
  - 200-V Machine Model (A115-A)
  - 1000-V Charged-Device Model (C101)

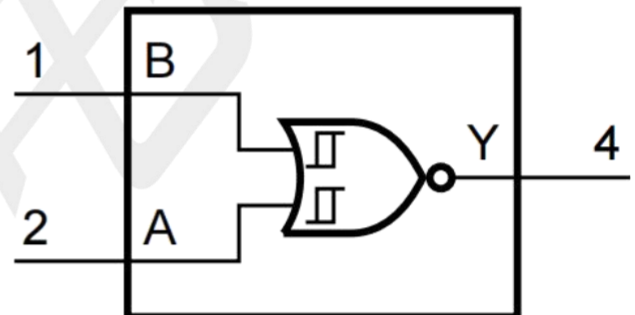
### General Description

The provides the single 2-input NOR function. This device ensures a very low static and dynamic power consumption across the entire VCC range from 2.3 V to 3.6 V. The is designed for logic-level translation applications with input switching levels that accept 1.8 V low-voltage CMOS signals, while operating from either a single 2.5 V or 3.3 V supply voltage.

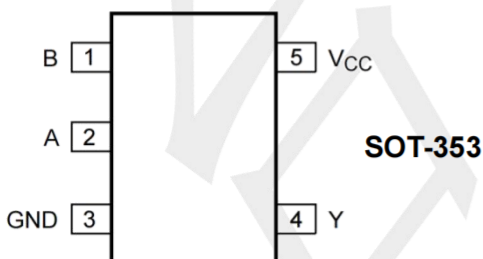
### Applications

- AV Receiver
- Audio Dock: Portable
- Blu-ray Player and Home Theater
- Embedded PC
- Personal Digital Assistant(PDA)
- Power: Telecom/Server AC/DC Supply: Single Controller: Analog and Digital
- Solid State Drive(SSD): Client and Enterprise
- Wireless Headset, Keyboard, and Mouse

### Logic Diagram



### Pin Configuratio (TOP VIEW)



### Function Table

Input		Output
A	B	Y
L	L	H
L	H	L
H	L	L
H	H	L

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

### Absolute Maximum Ratings

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CC}$	supply voltage		-0.5	+4.6	V
$I_{IK}$	input clamping current	$V_I < 0\text{ V}$	-50	--	mA
$V_I$	input voltage		-0.5	+4.6	V
$I_{OK}$	output clamping current	$V_O < 0\text{ V}$	-50	--	mA
$V_O$	output voltage	Active mode and Power-down mode	-0.5	+4.6	V
$I_O$	output current	$V_O = 0\text{ V to }V_{CC}$	--	$\pm 20$	mA
$I_{CC}$	supply current		--	50	mA
$I_{GND}$	ground current		-50	--	mA
$T_{stg}$	storage temperature		-65	+150	°C
$P_{tot}$	total power dissipation	$T_{amb} = -40\text{ °C to }+125\text{ °C}$	--	250	mW

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.  $P_{tot}$  derates linearly with 3.0 mW/K above 67 °C.

### Recommended Operating Conditions

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CC}$	supply voltage		2.3	3.6	V
$V_I$	input voltage		0	3.6	V
$V_O$	output voltage	Active mode	0	$V_{CC}$	V
		Power-down mode; $V_{CC} = 0\text{ V}$	0	3.6	V
$T_{amb}$	ambient temperature		-40	+125	°C

### Static characteristics (At recommended operating conditions; voltages are referenced to GND)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>T<sub>amb</sub> = 25 °C</b>						
V <sub>T+</sub>	positive-going threshold voltage	V <sub>CC</sub> = 2.3 V to 2.7 V	0.60	--	1.10	V
		V <sub>CC</sub> = 3.0 V to 3.6 V	0.75	--	1.16	V
V <sub>T-</sub>	negative-going threshold voltage	V <sub>CC</sub> = 2.3 V to 2.7 V	0.35	--	0.60	V
		V <sub>CC</sub> = 3.0 V to 3.6 V	0.50	--	0.85	V
V <sub>H</sub>	hysteresis voltage	(V <sub>H</sub> = V <sub>T+</sub> - V <sub>T-</sub> )				
		V <sub>CC</sub> = 2.3 V to 2.7 V	0.23	--	0.60	V
		V <sub>CC</sub> = 3.0 V to 3.6 V	0.25	--	0.56	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>T+</sub> or V <sub>T-</sub>				
		I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 2.3 V to 3.6 V	V <sub>CC</sub> - 0.1	--	--	V
		I <sub>O</sub> = -2.3 mA; V <sub>CC</sub> = 2.3 V	2.05	--	--	V
		I <sub>O</sub> = -3.1 mA; V <sub>CC</sub> = 2.3 V	1.9	--	--	V
		I <sub>O</sub> = -2.7 mA; V <sub>CC</sub> = 3.0 V	2.72	--	--	V
		I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V	2.6	--	--	V
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>T+</sub> or V <sub>T-</sub>				
		I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 2.3 V to 3.6 V	--	--	0.10	V
		I <sub>O</sub> = 2.3 mA; V <sub>CC</sub> = 2.3 V	--	--	0.31	V
		I <sub>O</sub> = 3.1 mA; V <sub>CC</sub> = 2.3 V	--	--	0.44	V
		I <sub>O</sub> = 2.7 mA; V <sub>CC</sub> = 3.0 V	--	--	0.31	V
		I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V	--	--	0.44	V
I <sub>I</sub>	input leakage current	V <sub>I</sub> = GND to 3.6 V; V <sub>CC</sub> = 0 V to 3.6 V	--	--	±0.1	μA
I <sub>OFF</sub>	power-off leakage current	V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V	--	--	±0.1	μA
ΔI <sub>OFF</sub>	additional power-off leakage current	V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V to 0.2 V	--	--	±0.1	μA
I <sub>CC</sub>	supply current	V <sub>I</sub> = GND or V <sub>CC</sub> ; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 2.3 V to 3.6 V	--	--	1.2	μA
C <sub>I</sub>	input capacitance	V <sub>CC</sub> = 0 V to 3.6 V; V <sub>I</sub> = GND or V <sub>CC</sub>	--	0.8	--	pF
C <sub>O</sub>	output capacitance	V <sub>O</sub> = GND; V <sub>CC</sub> = 0 V	--	1.7	--	pF

### Static characteristics (At recommended operating conditions; voltages are referenced to GND)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>T<sub>amb</sub> = -40 °C to +125 °C</b>						
V <sub>T+</sub>	positive-going threshold voltage	V <sub>CC</sub> = 2.3 V to 2.7 V	0.60	--	1.10	V
		V <sub>CC</sub> = 3.0 V to 3.6 V	0.75	--	1.19	V
V <sub>T-</sub>	negative-going threshold voltage	V <sub>CC</sub> = 2.3 V to 2.7 V	0.33	--	0.64	V
		V <sub>CC</sub> = 3.0 V to 3.6 V	0.46	--	0.85	V
V <sub>H</sub>	hysteresis voltage	(V <sub>H</sub> = V <sub>T+</sub> - V <sub>T-</sub> )				
		V <sub>CC</sub> = 2.3 V to 2.7 V	0.10	--	0.60	V
		V <sub>CC</sub> = 3.0 V to 3.6 V	0.15	--	0.56	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>T+</sub> or V <sub>T-</sub>				
		I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 2.3 V to 3.6 V	V <sub>CC</sub> - 0.11	--	--	V
		I <sub>O</sub> = -2.3 mA; V <sub>CC</sub> = 2.3 V	1.77	--	--	V
		I <sub>O</sub> = -3.1 mA; V <sub>CC</sub> = 2.3 V	1.67	--	--	V
		I <sub>O</sub> = -2.7 mA; V <sub>CC</sub> = 3.0 V	2.40	--	--	V
		I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V	2.30	--	--	V
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>T+</sub> or V <sub>T-</sub>				
		I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 2.3 V to 3.6 V	--	--	0.11	V
		I <sub>O</sub> = 2.3 mA; V <sub>CC</sub> = 2.3 V	--	--	0.36	V
		I <sub>O</sub> = 3.1 mA; V <sub>CC</sub> = 2.3 V	--	--	0.50	V
		I <sub>O</sub> = 2.7 mA; V <sub>CC</sub> = 3.0 V	--	--	0.36	V
		I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V	--	--	0.50	V
I <sub>I</sub>	input leakage current	V <sub>I</sub> = GND to 3.6 V; V <sub>CC</sub> = 0 V to 3.6 V	--	--	±0.5	μA
I <sub>OFF</sub>	power-off leakage current	V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V	--	--	±0.5	μA
ΔI <sub>OFF</sub>	additional power-off leakage current	V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V to 0.2 V	--	--	±0.5	μA
I <sub>CC</sub>	supply current	V <sub>I</sub> = GND or V <sub>CC</sub> ; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 2.3 V to 3.6 V	--	--	1.5	μA
ΔI <sub>CC</sub>	additional supply current	V <sub>CC</sub> = 2.3 V to 2.7 V; I <sub>O</sub> = 0 A [1]	--	--	0.8	μA
		V <sub>CC</sub> = 3.0 V to 3.6 V; I <sub>O</sub> = 0 A [2]	--	--	10	μA

**Notes:** 1. One input at 0.3 V or 1.1 V, other input at V<sub>CC</sub> or GND.  
2. One input at 0.45 V or 1.2 V, other input at V<sub>CC</sub> or GND.

### Dynamic characteristics (Voltages are referenced to GND)

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		Unit
			Min	Typ	Max	Min	Max	
<b>V<sub>CC</sub> = 2.3 V to 2.7 V; V<sub>I</sub> = 1.65 V to 1.95 V</b>								
t <sub>pd</sub>	propagation delay	A, B to Y; see						
		C <sub>L</sub> = 5 pF	1.9	3.3	5.2	0.5	6.8	ns
		C <sub>L</sub> = 10 pF	2.3	3.9	6.0	1.0	7.9	ns
		C <sub>L</sub> = 15 pF	2.7	4.4	6.6	1.0	8.7	ns
		C <sub>L</sub> = 30 pF	3.5	5.5	8.1	1.5	10.8	ns
<b>V<sub>CC</sub> = 2.3 V to 2.7 V; V<sub>I</sub> = 2.3 V to 2.7 V</b>								
t <sub>pd</sub>	propagation delay	A, B to Y; see						
		C <sub>L</sub> = 5 pF	1.6	3.2	5.2	0.5	6.0	ns
		C <sub>L</sub> = 10 pF	1.9	3.8	6.0	1.0	7.1	ns
		C <sub>L</sub> = 15 pF	2.3	4.2	6.6	1.0	7.9	ns
		C <sub>L</sub> = 30 pF	3.1	5.4	8.1	1.5	10.0	ns
<b>V<sub>CC</sub> = 2.3 V to 2.7 V; V<sub>I</sub> = 3.0 V to 3.6 V</b>								
t <sub>pd</sub>	propagation delay	A, B to Y; see						
		C <sub>L</sub> = 5 pF	1.5	2.9	4.7	0.5	5.5	ns
		C <sub>L</sub> = 10 pF	1.6	3.5	5.4	1.0	6.5	ns
		C <sub>L</sub> = 15 pF	1.9	4.0	6.1	1.0	7.4	ns
		C <sub>L</sub> = 30 pF	2.7	5.1	7.5	1.5	9.5	ns
<b>V<sub>CC</sub> = 3.0 V to 3.6 V; V<sub>I</sub> = 1.65 V to 1.95 V</b>								
t <sub>pd</sub>	propagation delay	A, B to Y; see						
		C <sub>L</sub> = 5 pF	1.9	2.7	3.8	0.5	8.0	ns
		C <sub>L</sub> = 10 pF	2.3	3.3	4.5	1.0	8.5	ns
		C <sub>L</sub> = 15 pF	2.6	3.8	5.0	1.0	9.1	ns
		C <sub>L</sub> = 30 pF	3.4	4.9	6.5	1.5	9.8	ns
<b>V<sub>CC</sub> = 3.0 V to 3.6 V; V<sub>I</sub> = 2.3 V to 2.7 V</b>								
t <sub>pd</sub>	propagation delay	A, B to Y; see						
		C <sub>L</sub> = 5 pF	1.6	2.6	4.0	0.5	5.3	ns
		C <sub>L</sub> = 10 pF	1.9	3.2	4.8	1.0	6.1	ns
		C <sub>L</sub> = 15 pF	2.1	3.7	5.4	1.0	6.8	ns
		C <sub>L</sub> = 30 pF	2.9	4.8	6.9	1.5	8.5	ns

### Dynamic characteristics (Voltages are referenced to GND)

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		Unit
			Min	Typ	Max	Min	Max	
$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}; V_I = 3.0 \text{ V to } 3.6 \text{ V}$								
$t_{pd}$	propagation delay	A, B to Y; see						
		$C_L = 5 \text{ pF}$	1.1	2.6	4.1	0.5	4.7	ns
		$C_L = 10 \text{ pF}$	1.5	3.2	4.8	1.0	5.7	ns
		$C_L = 15 \text{ pF}$	1.8	3.6	5.5	1.0	6.2	ns
		$C_L = 30 \text{ pF}$	2.5	4.8	7.0	1.5	7.8	ns
$T_{amb} = 25 \text{ °C}$								
$C_{PD}$	power dissipation capacitance	$f_i = 1 \text{ MHz}; V_I = \text{GND to } V_{CC}$						
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	--	4	--	--	--	pF
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	--	5	--	--	--	pF

### Measurement points

Supply voltage	Output	Input		
$V_{CC}$	$V_M$	$V_M$	$V_I$	$t_r = t_f$
2.3 V to 3.6 V	$0.5 \times V_{CC}$	$0.5 \times V_I$	1.65 V to 3.6 V	$\leq 3.0 \text{ ns}$

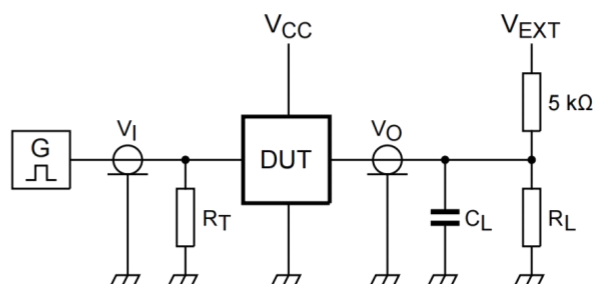
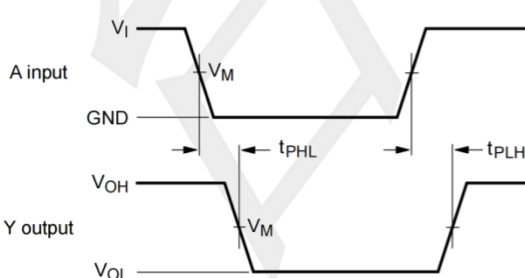
### Test data

Supply voltage	Load		$V_{EXT}$		
$V_{CC}$	$C_L$	$R_L$	$t_{PLH}, t_{PHL}$	$t_{PZH}, t_{PHZ}$	$t_{PZL}, t_{PLZ}$
2.3 V to 3.6 V	5 pF, 10 pF, 15 pF and 30 pF	5 kΩ or 1 MΩ	open	GND	$2 \times V_{CC}$

For measuring enable and disable times  $R_L = 5 \text{ k}\Omega$ .

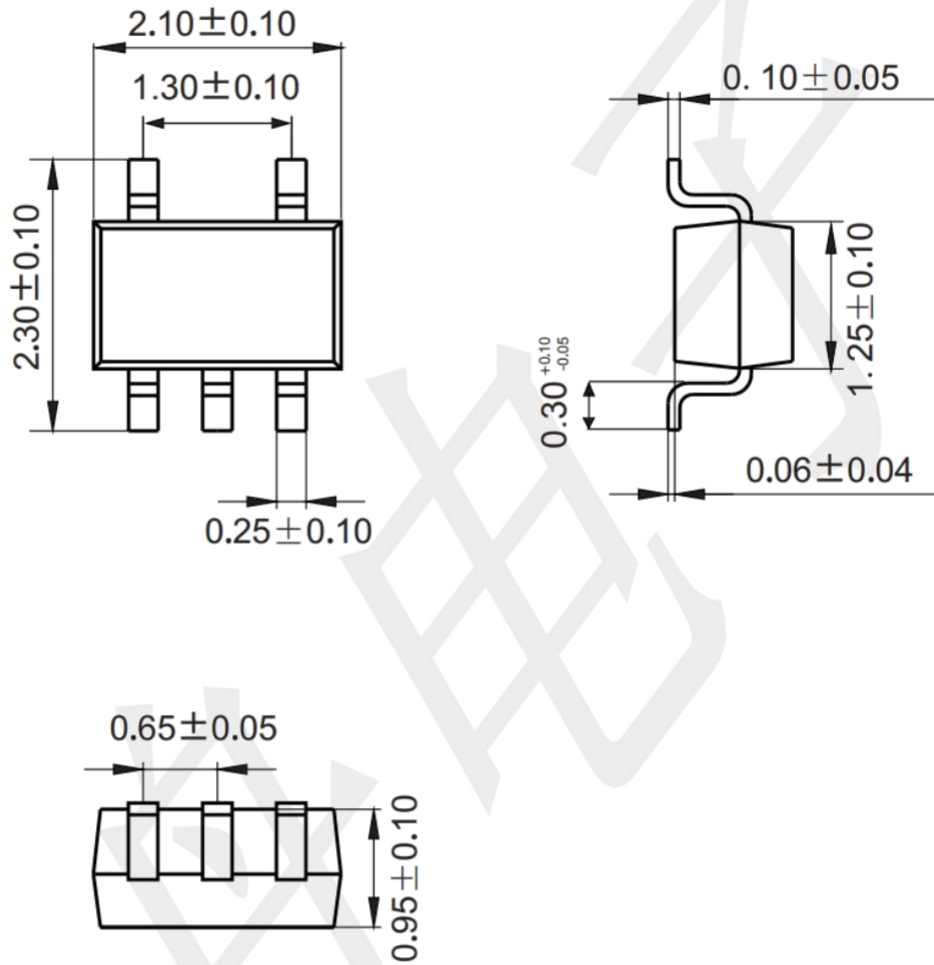
For measuring propagation delays, setup and hold times and pulse width  $R_L = 1 \text{ M}\Omega$ .

### Waveforms and test circuit



**Package information (Unit: mm)**

SOT-353



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

