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SN74AUP1T32DCKR-TP

Low-power 2-input OR-gate with voltage-level translator

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Features

- Wide supply voltage range from 2.3V to 3.6V
- Inputs accept voltages up to 3.6V
- I_{OFF} supports partial-power-down mode
- Low static power consumption; I_{CC}=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)

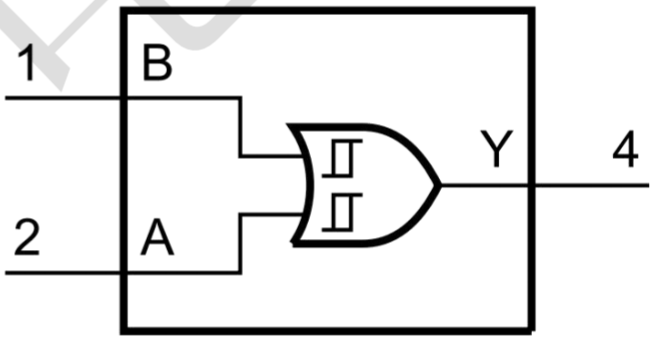
Applications

- 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

General Description

The SN74AUP1T32DCKR-TP provides the single 2-input OR 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.
The wide supply voltage range ensures normal operation as battery voltage drops from 3.6 V to 2.3 V.
Schmitt trigger inputs make the circuit tolerant to slower input rise and fall times across the entire VCC range.

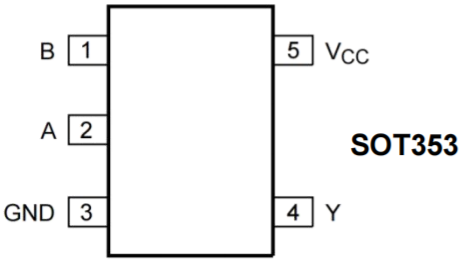
Logic Diagram



Ordering Information

ORDER NUMBER	PACKAGE DESCRIPTION	PACKAGE OPTION
SN74AUP1T32DCKR-TP	SOT353	Tape and Reel,3000

Pin Configuratio (TOP VIEW)



SOT353

Function Table

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

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 V	-50	--	mA
V_I	input voltage		-0.5	+4.6	V
I_{OK}	output clamping current	V_O < 0 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 V to V_{CC}	--	±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 °C to +125 °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.
Ptot 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 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
T_{amb} = 25 °C						
V_{T+}	positive-going threshold voltage	V_{CC} = 2.3 V to 2.7 V	0.60	--	1.10	V
		V_{CC} = 3.0 V to 3.6 V	0.75	--	1.16	V
V_{T-}	negative-going threshold voltage	V_{CC} = 2.3 V to 2.7 V	0.35	--	0.60	V
		V_{CC} = 3.0 V to 3.6 V	0.50	--	0.85	V
V_H	hysteresis voltage	($V_H = V_{T+} - V_{T-}$)				
		V_{CC} = 2.3 V to 2.7 V	0.23	--	0.60	V
		V_{CC} = 3.0 V to 3.6 V	0.25	--	0.56	V
V_{OH}	HIGH-level output voltage	$V_I = V_{T+}$ or V_{T-}				
		I_O = -20 μA; V_{CC} = 2.3 V to 3.6 V	V_{CC} - 0.1	--	--	V
		I_O = -2.3 mA; V_{CC} = 2.3 V	2.05	--	--	V
		I_O = -3.1 mA; V_{CC} = 2.3 V	1.9	--	--	V
		I_O = -2.7 mA; V_{CC} = 3.0 V	2.72	--	--	V
		I_O = -4.0 mA; V_{CC} = 3.0 V	2.6	--	--	V
V_{OL}	LOW-level output voltage	$V_I = V_{T+}$ or V_{T-}				
		I_O = 20 μA; V_{CC} = 2.3 V to 3.6 V	--	--	0.10	V
		I_O = 2.3 mA; V_{CC} = 2.3 V	--	--	0.31	V
		I_O = 3.1 mA; V_{CC} = 2.3 V	--	--	0.44	V
		I_O = 2.7 mA; V_{CC} = 3.0 V	--	--	0.31	V
		I_O = 4.0 mA; V_{CC} = 3.0 V	--	--	0.44	V
I_I	input leakage current	V_I = GND to 3.6 V; V_{CC} = 0 V to 3.6 V	--	--	±0.1	μA
I_{OFF}	power-off leakage current	V_I or V_O = 0 V to 3.6 V; V_{CC} = 0 V	--	--	±0.1	μA
ΔI_{OFF}	additional power-off leakage current	V_I or V_O = 0 V to 3.6 V; V_{CC} = 0 V to 0.2 V	--	--	±0.1	μA
I_{CC}	supply current	V_I = GND or V_{CC}; I_O = 0 A; V_{CC} = 2.3 V to 3.6 V	--	--	1.2	μA
C_I	input capacitance	V_{CC} = 0 V to 3.6 V; V_I = GND or V_{CC}	--	0.8	--	pF
C_O	output capacitance	V_O = GND; V_{CC} = 0 V	--	1.7	--	pF

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
T_{amb} = -40 °C to +125 °C						
V_{T+}	positive-going threshold voltage	V_{CC} = 2.3 V to 2.7 V	0.60	--	1.10	V
		V_{CC} = 3.0 V to 3.6 V	0.75	--	1.19	V
V_{T-}	negative-going threshold voltage	V_{CC} = 2.3 V to 2.7 V	0.33	--	0.64	V
		V_{CC} = 3.0 V to 3.6 V	0.46	--	0.85	V
V_H	hysteresis voltage	($V_H = V_{T+} - V_{T-}$)				
		V_{CC} = 2.3 V to 2.7 V	0.10	--	0.60	V
		V_{CC} = 3.0 V to 3.6 V	0.15	--	0.56	V
V_{OH}	HIGH-level output voltage	$V_I = V_{T+}$ or V_{T-}				
		I_O = -20 µA; V_{CC} = 2.3 V to 3.6 V	V_{CC} - 0.1	--	--	V
		I_O = -2.3 mA; V_{CC} = 2.3 V	1.97	--	--	V
		I_O = -3.1 mA; V_{CC} = 2.3 V	1.86	--	--	V
		I_O = -2.7 mA; V_{CC} = 3.0 V	2.67	--	--	V
		I_O = -4.0 mA; V_{CC} = 3.0 V	2.55	--	--	V
V_{OL}	LOW-level output voltage	$V_I = V_{T+}$ or V_{T-}				
		I_O = 20 µA; V_{CC} = 2.3 V to 3.6 V	--	--	0.1	V
		I_O = 2.3 mA; V_{CC} = 2.3 V	--	--	0.33	V
		I_O = 3.1 mA; V_{CC} = 2.3 V	--	--	0.45	V
		I_O = 2.7 mA; V_{CC} = 3.0 V	--	--	0.33	V
		I_O = 4.0 mA; V_{CC} = 3.0 V	--	--	0.45	V
I_I	input leakage current	V_I = GND to 3.6 V; V_{CC} = 0 V to 3.6 V	--	--	±0.5	µA
I_{OFF}	power-off leakage current	V_I or V_O = 0 V to 3.6 V; V_{CC} = 0 V	--	--	±0.5	µA
ΔI_{OFF}	additional power-off leakage current	VI or VO = 0 V to 3.6 V; VCC = 0 V to 0.2 V	--	--	±0.5	µA
I_{CC}	supply current	VI = GND or VCC; IO = 0 A; VCC = 2.3 V to 3.6 V	--	--	1.5	µA
ΔI_{CC}	additional supply current	VCC = 2.3 V to 2.7 V; IO = 0 A [1]	--	--	0.6	µA
		VCC = 3.0 V to 3.6 V; IO = 0 A [2]	--	--	10	µA

Notes: 1.One input at 0.3 V or 1.1 V, other input at V_{CC} or GND.
2.One input at 0.45 V or 1.2 V, other input at V_{CC} 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	
V_{CC} = 2.3 V to 2.7 V; V_I = 1.65 V to 1.95 V								
t_{pd}	propagation delay	A, B to Y; see						
		C_L = 5 pF	2.0	3.3	5.2	0.5	6.8	ns
		C_L = 10 pF	2.3	3.9	6.0	1.0	7.9	ns
		C_L = 15 pF	2.7	4.4	6.6	1.0	8.7	ns
		C_L = 30 pF	3.5	5.5	8.1	1.5	10.8	ns
V_{CC} = 2.3 V to 2.7 V; V_I = 2.3 V to 2.7 V								
t_{pd}	propagation delay	A, B to Y; see						
		C_L = 5 pF	1.6	3.2	5.2	0.5	6.0	ns
		C_L = 10 pF	1.9	3.8	6.0	1.0	7.1	ns
		C_L = 15 pF	2.3	4.2	6.6	1.0	7.9	ns
		C_L = 30 pF	3.1	5.4	8.1	1.5	10.0	ns
V_{CC} = 2.3 V to 2.7 V; V_I = 3.0 V to 3.6 V								
t_{pd}	propagation delay	A, B to Y; see						
		C_L = 5 pF	1.2	2.9	4.7	0.5	5.5	ns
		C_L = 10 pF	1.6	3.5	5.4	1.0	6.5	ns
		C_L = 15 pF	1.9	4.0	6.1	1.0	7.4	ns
		C_L = 30 pF	2.7	5.1	7.5	1.5	9.5	ns
V_{CC} = 3.0 V to 3.6 V; V_I = 1.65 V to 1.95 V								
t_{pd}	propagation delay	A, B to Y; see						
		C_L = 5 pF	1.8	2.7	3.8	0.5	8.0	ns
		C_L = 10 pF	2.3	3.3	4.5	1.0	8.5	ns
		C_L = 15 pF	2.6	3.8	5.0	1.0	9.1	ns
		C_L = 30 pF	3.4	4.9	6.5	1.5	9.8	ns
V_{CC} = 3.0 V to 3.6 V; V_I = 2.3 V to 2.7 V								
t_{pd}	propagation delay	A, B to Y; see						
		C_L = 5 pF	1.5	2.6	4.0	0.5	5.3	ns
		C_L = 10 pF	1.9	3.2	4.8	1.0	6.1	ns
		C_L = 15 pF	2.1	3.7	5.4	1.0	6.8	ns
		C_L = 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 V to 3.6 V; V_I = 3.0 V to 3.6 V								
t_{pd}	propagation delay	A, B to Y; see						
		C_L = 5 pF	1.1	2.6	4.1	0.5	4.7	ns
		C_L = 10 pF	1.5	3.2	4.8	1.0	5.7	ns
		C_L = 15 pF	1.8	3.6	5.5	1.0	6.2	ns
		C_L = 30 pF	2.5	4.8	7.0	1.5	7.8	ns
T_{amb} = 25 °C								
C_{PD}	power dissipation capacitance	f_i = 1 MHz; V_I = GND to V_{CC}						
		V_{CC} = 2.3 V to 2.7 V	--	4	--	--	--	pF
		V_{CC} = 3.0 V to 3.6 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 × V_{CC}	0.5 × V_I	1.65 V to 3.6 V	≤ 3.0 ns

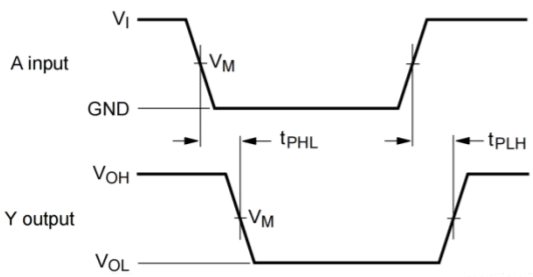
Test data

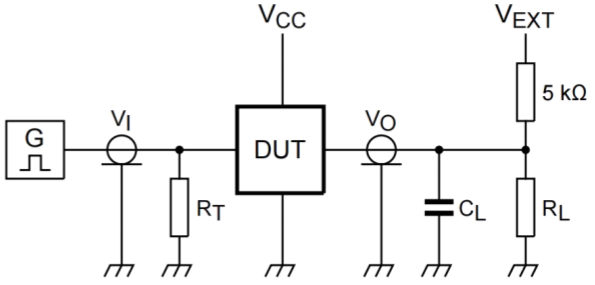
Supply voltage	Load		V_{EXT}		
V_{CC}	C_L	R_L	t_{PLH}, t_{PHL}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
2.3 V to 3.6 V	5 pF, 10 pF, 15 pF and 30 pF	5 kΩ or 1 MΩ	open	GND	2 × V_{CC}

For measuring enable and disable times R_L = 5 kΩ.

For measuring propagation delays, setup and hold times and pulse width R_L = 1 MΩ.

Waveforms and test circuit





Package information (Unit: mm)

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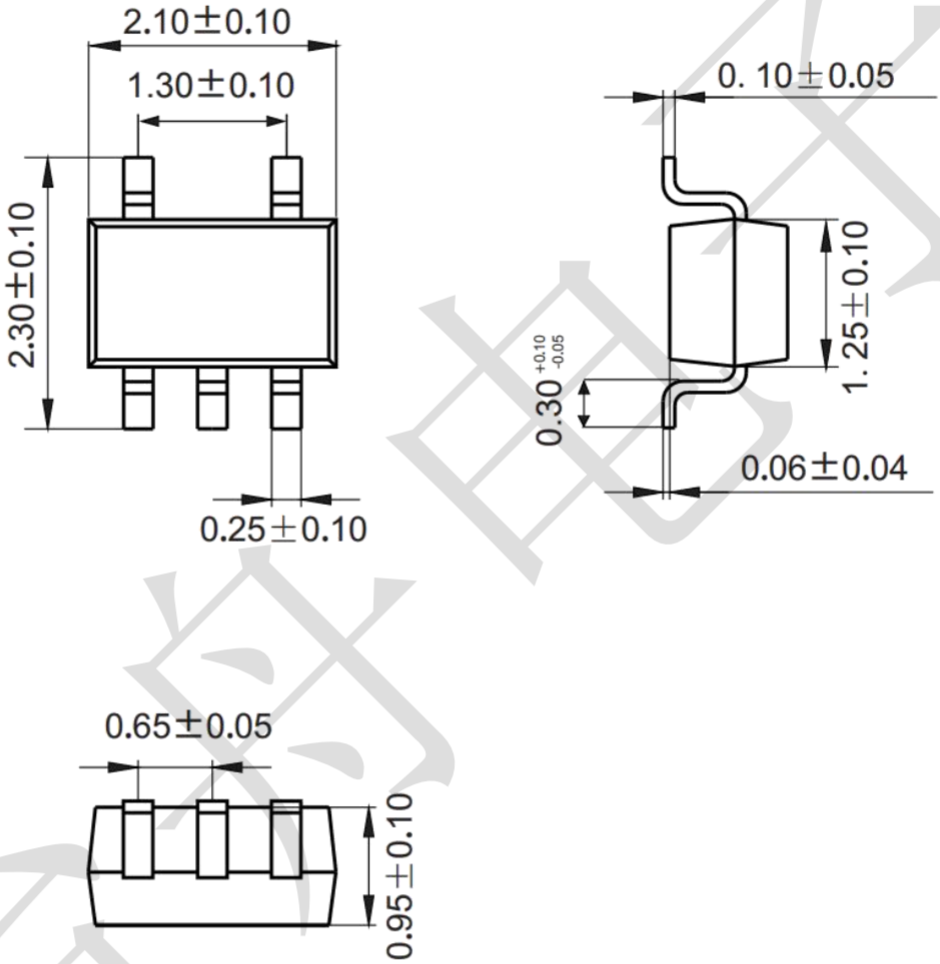

Mounting Pad Layout (unit: mm)