

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)

General Description

The TP74AUP1T08 provides the single 2-input AND 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.

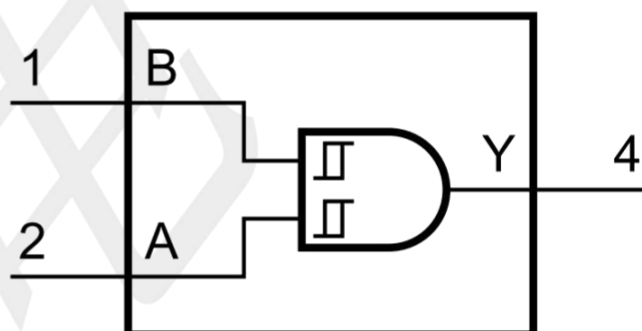
The wide supply voltage range ensures normal operation as battery voltage drops from 3.6 V to 2.3 V.

Schmitt trigger inputs make the circuit tolerant to slower input rise and fall times across the entire VCC range.

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

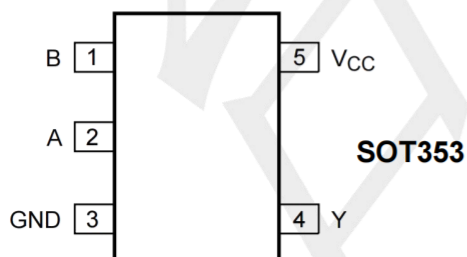
Logic Diagram



Ordering Information

ORDER NUMBER	PACKAGE DESCRIPTION	PACKAGE OPTION
TP74AUP1T08C5	SOT353	Tape and Reel,3000

Pin Configuratio (TOP VIEW)



Function Table

Input		Output
A	B	Y
L	L	L
L	H	L
H	L	L
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	$V_I < 0\text{ V}$	-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	$V_O = 0\text{ V to } V_{CC}$	--	± 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
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
$T_{amb} = -40^{\circ}\text{C to } +125^{\circ}\text{C}$						
V_{T+}	positive-going threshold voltage	$V_{CC} = 2.3\text{ V to } 2.7\text{ V}$	0.60	--	1.10	V
		$V_{CC} = 3.0\text{ V to } 3.6\text{ V}$	0.75	--	1.19	V
V_{T-}	negative-going threshold voltage	$V_{CC} = 2.3\text{ V to } 2.7\text{ V}$	0.33	--	0.64	V
		$V_{CC} = 3.0\text{ V to } 3.6\text{ V}$	0.46	--	0.85	V
V_H	hysteresis voltage	$(V_H = V_{T+} - V_{T-})$				
		$V_{CC} = 2.3\text{ V to } 2.7\text{ V}$	0.10	--	0.60	V
		$V_{CC} = 3.0\text{ V to } 3.6\text{ V}$	0.15	--	0.56	V
V_{OH}	HIGH-level output voltage	$V_I = V_{T+} \text{ or } V_{T-}$				
		$I_O = -20\text{ }\mu\text{A}; V_{CC} = 2.3\text{ V to } 3.6\text{ V}$	$V_{CC} - 0.11$	--	--	V
		$I_O = -2.3\text{ mA}; V_{CC} = 2.3\text{ V}$	1.77	--	--	V
		$I_O = -3.1\text{ mA}; V_{CC} = 2.3\text{ V}$	1.67	--	--	V
		$I_O = -2.7\text{ mA}; V_{CC} = 3.0\text{ V}$	2.40	--	--	V
		$I_O = -4.0\text{ mA}; V_{CC} = 3.0\text{ V}$	2.30	--	--	V
V_{OL}	LOW-level output voltage	$V_I = V_{T+} \text{ or } V_{T-}$				
		$I_O = 20\text{ }\mu\text{A}; V_{CC} = 2.3\text{ V to } 3.6\text{ V}$	--	--	0.11	V
		$I_O = 2.3\text{ mA}; V_{CC} = 2.3\text{ V}$	--	--	0.36	V
		$I_O = 3.1\text{ mA}; V_{CC} = 2.3\text{ V}$	--	--	0.50	V
		$I_O = 2.7\text{ mA}; V_{CC} = 3.0\text{ V}$	--	--	0.36	V
		$I_O = 4.0\text{ mA}; V_{CC} = 3.0\text{ V}$	--	--	0.50	V
I_I	input leakage current	$V_I = \text{GND to } 3.6\text{ V}; V_{CC} = 0\text{ V to } 3.6\text{ V}$	--	--	± 0.75	μA
I_{OFF}	power-off leakage current	$V_I \text{ or } V_O = 0\text{ V to } 3.6\text{ V}; V_{CC} = 0\text{ V}$	--	--	± 0.75	μA
ΔI_{OFF}	additional power-off leakage current	$V_I \text{ or } V_O = 0\text{ V to } 3.6\text{ V}; V_{CC} = 0\text{ V to } 0.2\text{ V}$	--	--	± 0.75	μA
I_{CC}	supply current	$V_I = \text{GND or } V_{CC}; I_O = 0\text{ A}; V_{CC} = 2.3\text{ V to } 3.6\text{ V}$	--	--	3.5	μA
ΔI_{CC}	additional supply current	$V_{CC} = 2.3\text{ V to } 2.7\text{ V}; I_O = 0\text{ A [1]}$	--	--	1.8	μA
		$V_{CC} = 3.0\text{ V to } 3.6\text{ V}; I_O = 0\text{ A [2]}$	--	--	18	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	$0.5 \times V_{CC}$	$0.5 \times V_I$	1.65 V to 3.6 V	$\leq 3.0 \text{ ns}$

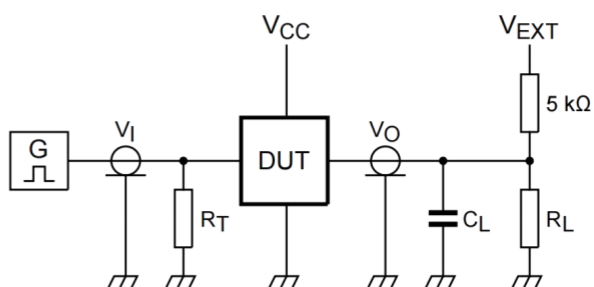
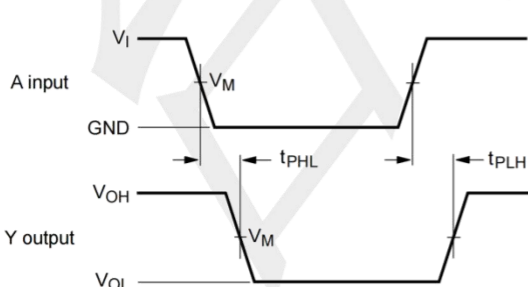
Test data

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 $R_L = 5 \text{ k}\Omega$.

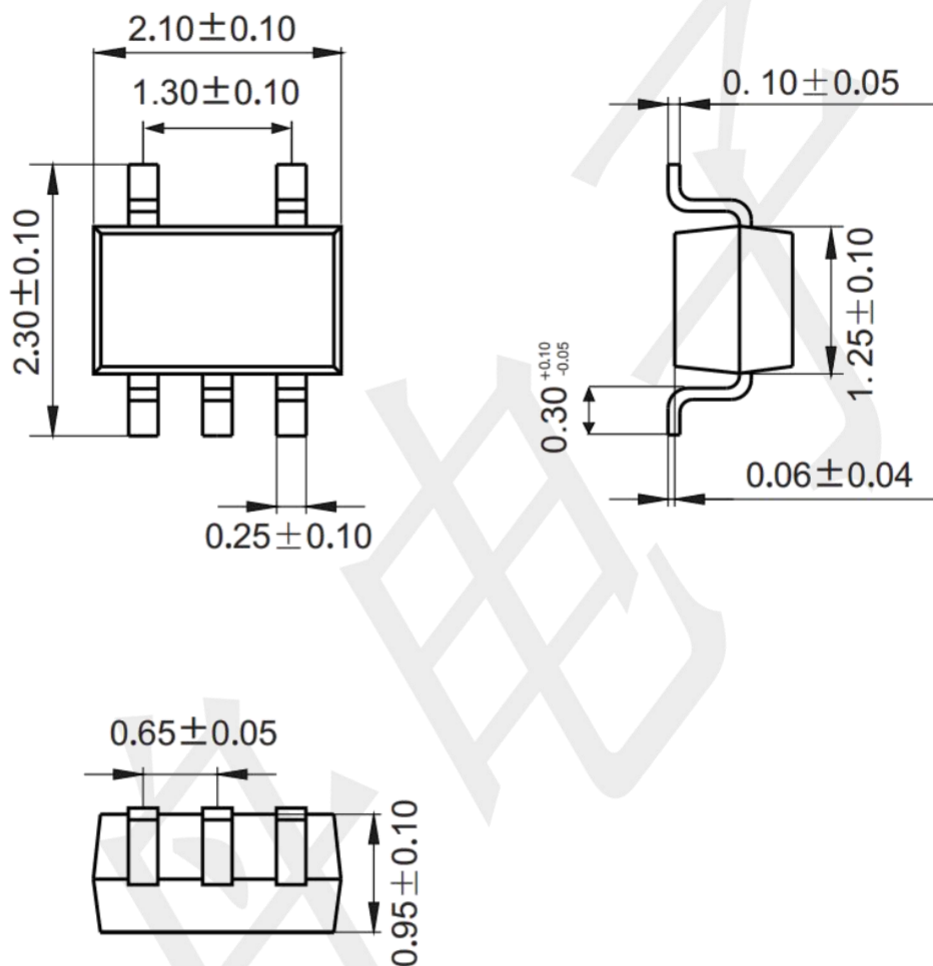
For measuring propagation delays, setup and hold times and pulse width $R_L = 1 \text{ M}\Omega$.

Waveforms and test circuit



Package information (Unit: mm)

SOT353



Mounting Pad Layout (unit: mm)

