ET74HCT86 - Quadruple 2-Input XOR Gates

General Description

This device contains four independent 2-input XOR gates. Each gate performs the Boolean function Y = A ⊕ B in positive logic.

Features

- Buffered Inputs: TTL Level
- Wide Operating Voltage Range:4.5 V to 5.5 V
- Wide Operating Temperature Range: -40°C to +125°C
- Supports Fan-Out Up to 10 LSTTL Loads
- Significant Power Reduction Compared to LSTTL Logic ICs
- ESD Protection:

  --HBM JESD22-A114-A Exceeds 2000 V
  --CDM JESD22-C101-A Exceeds 1000 V
- Latch-up Performance Exceeds 200 mA

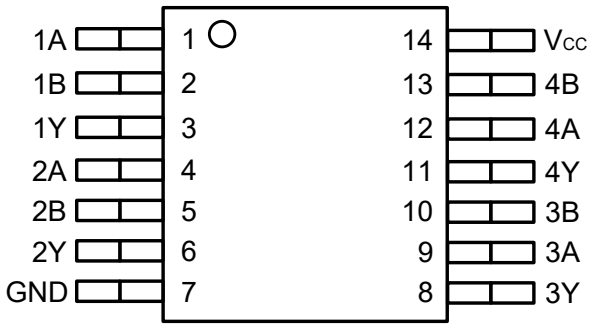
Applications

- Detect Phase Differences In Input Signals
- Create a Select-able Inverter / Buffer

Device Information

Part No.	Package	Packing Option	MSL
ET74HCT86M	SOP14	Tape and Reel, 4K	3
ET74HCT86V	TSSOP14	Tape and Reel, 4K	3

Pin Configuration



Top View

Pin Functions

Pin		I/O	Description
Name	No.		
1A	1	Input	Channel 1, Input A
1B	2	Input	Channel 1, Input B
1Y	3	Output	Channel 1, Output Y
2A	4	Input	Channel 2, Input A
2B	5	Input	Channel 2, Input B
2Y	6	Output	Channel 2, Output Y
GND	7	—	Ground
3Y	8	Output	Channel 3, Output Y
3A	9	Input	Channel 3, Input A
3B	10	Input	Channel 3, Input B
4Y	11	Output	Channel 4, Output Y
4A	12	Input	Channel 4, Input A
4B	13	Input	Channel 4, Input B
V_{CC}	14	—	Positive Supply

Block Diagram

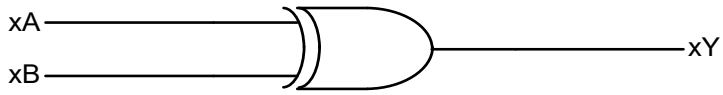


Fig1. Logic Symbol

Functional Description

Function Table

Input		Output
xA	xB	xY
L	L	L
L	H	H
H	L	H
H	H	L

Absolute Maximum Ratings

Over operating free-air temperature range (unless otherwise noted)

Symbol	Parameter		Value	Unit
V_{CC}	Supply Voltage		−0.5 to 7.0	V
I_{IK}	Input Clamp Current (1)	V_I < -0.5V or V_I > V_{CC} + 0.5V	±20	mA
I_{OK}	Output Clamp Current (1)	V_O < -0.5V or V_O > V_{CC} + 0.5V	±20	mA
I_O	Continuous Output Current	V_O > -0.5V or V_O < V_{CC} + 0.5V	±25	mA
I_{CC}	Continuous Current through V_{CC} or GND		±50	mA
T_J	Max Junction Temperature		150	°C
T_{LEAD}	Lead Temperature (Soldering 10s)		300	°C
T_{STG}	Storage Temperature		−65 to 150	°C
V_{ESD}	ESD Human Body Model (JESD22−A114)		±2000	V
	ESD Charged Device Model (JESD22−C101)		±1000	
I_{LU}	Max Latch up Current (EIA/JESD78E)		±200	mA

Note1: The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

Thermal Characteristics

Symbol	Thermal Metric	Package		Unit
		SOP14	TSSOP14	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	120	150	°C/W

Recommended Operating Conditions

Over operating free-air temperature range (unless otherwise noted)

Symbol	Parameter		Min	Max	Unit
V_{CC}	Supply Voltage		4.5	5.5	V
V_{IH}	High-level Input Voltage	V_{CC} = 4.5 V to 5.5 V	2		V
V_{IL}	Low-level Input Voltage	V_{CC} = 4.5 V to 5.5 V		0.8	V
V_I	Input Voltage		0	V_{CC}	V
V_O	Output Voltage		0	V_{CC}	V
T_A	Operating Free Air Temperature		-40	125	°C
t_t	Input Transition Time	V_{CC} = 4.5 V		500	ns
		V_{CC} = 5.5 V		400	

Operating Characteristics

Over operating free-air temperature range; typical values measured at T_A = 25°C (unless otherwise noted)

Symbol	Parameter	Condition	V_{CC}	Min	Typ	Max	Unit
C_{PD}	Power Dissipation Capacitance Gate	No Load	5V		12		pF

Electrical Characteristics

Over operating free-air temperature range; typical values measured at T_A = 25°C (unless otherwise noted).

Symbol	Parameter	Condition		V_{CC}	Operating Free-air Temperature (T_A)							Unit
					T_A=25°C			-40°C≤T_A≤85°C		-40°C≤T_A≤125°C		
					Min	Typ	Max	Min	Max	Min	Max	
V_{OH}	High−Level Output Voltage	V_I = V_{IH} or V_{IL}	I_{OH} =-20μA	4.5 V	4.4			4.4		4.4		V
			I_{OH} =-4mA	4.5 V	3.98			3.84		3.7		
V_{OL}	Low−Level Output Voltage	V_I = V_{IH} or V_{IL}	I_{OH} =20μA	4.5 V			0.1		0.1		0.1	V
			I_{OH} =4mA	4.5 V			0.26		0.33		0.4	
I_I	Input Leakage Current	V_I = V_{CC} and GND	I_O = 0	5.5 V			±0.1		±1		±1	μA
I_{CC}	Supply Current	V_I = V_{CC} or GND	I_O = 0	5.5 V			2		20		40	μA
ΔI_{CC} [(2)]	Additional Quiescent Device Current Per Input Pin.	V_I = V_{CC} - 2.1		4.5 V to 5.5 V		100	360		450		490	μA
C_I	Input Capacitance			5 V			10		10		10	pF

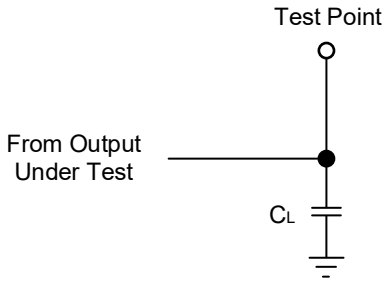
Note2: For dual-supply systems theoretical worst case (V_I = 2.4 V, V_{CC} = 5.5 V) specification is 1.8 mA.

Switching Characteristics

Over operating free-air temperature range; typical values measured at T_A = 25°C (unless otherwise noted)

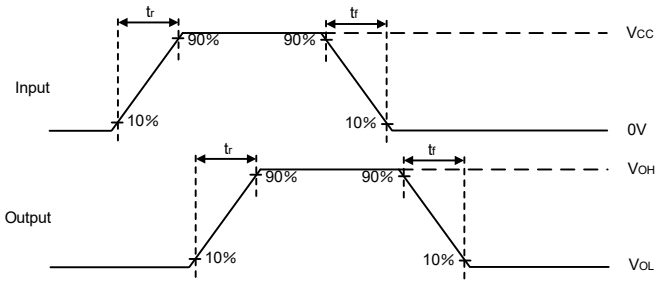
Symbol	Parameter	From	To	Condition	V_{CC}	Operating Free-air Temperature (T_A)							Unit
						T_A=25°C			-40°C≤T_A≤85°C		-40°C≤T_A≤125°C		
						Min	Typ	Max	Min	Max	Min	Max	
t_{pd}	Propagation Delay	A or B	Y	C_L = 50 pF	4.5 V to 5.5V		4	7		8		9	ns
		A or B	Y	C_L = 15 pF	4.5 V to 5.5V		3	5		8		9	
t_t	Transition-time		Y	C_L = 50 pF	4.5 V			7		8		10	ns

Parameter Measurement Information



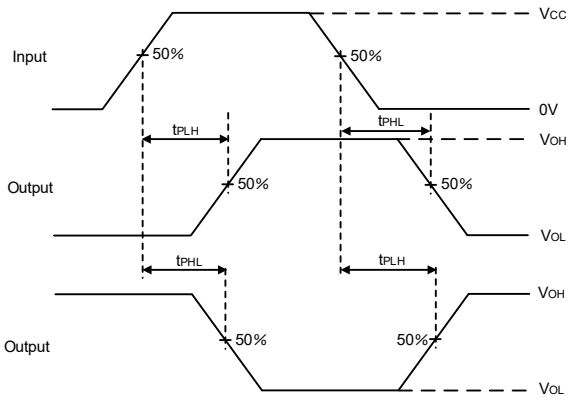
C_L = 50 pF and includes probe and jig capacitance

Fig2. Load Circuit



t_t is the greater of t_r and t_f

Fig3. Voltage Wave-forms Transition Times

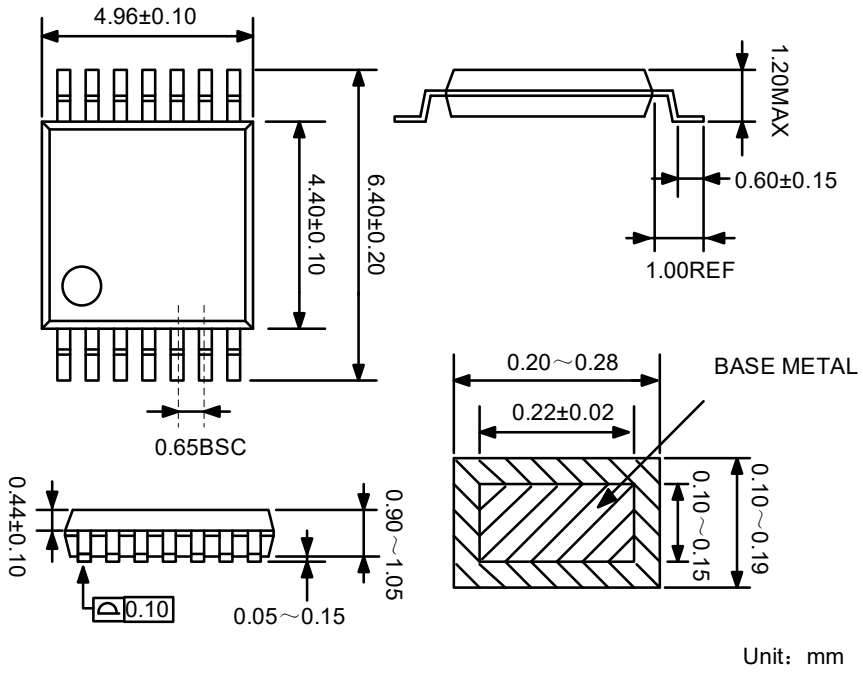


The maximum between t_{PLH} and t_{PHL} is used for t_{pd}

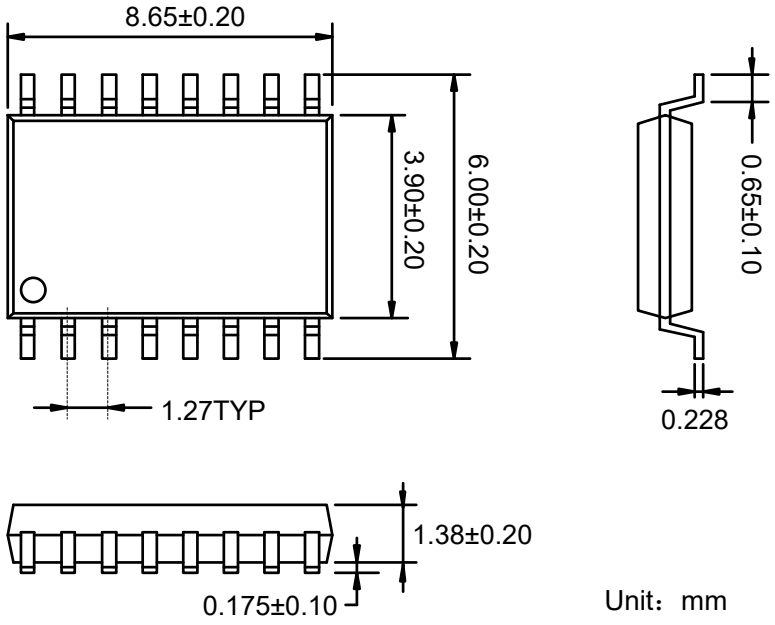
Fig4. Voltage Wave-forms Propagation Delays

Package Dimension

TSSOP14

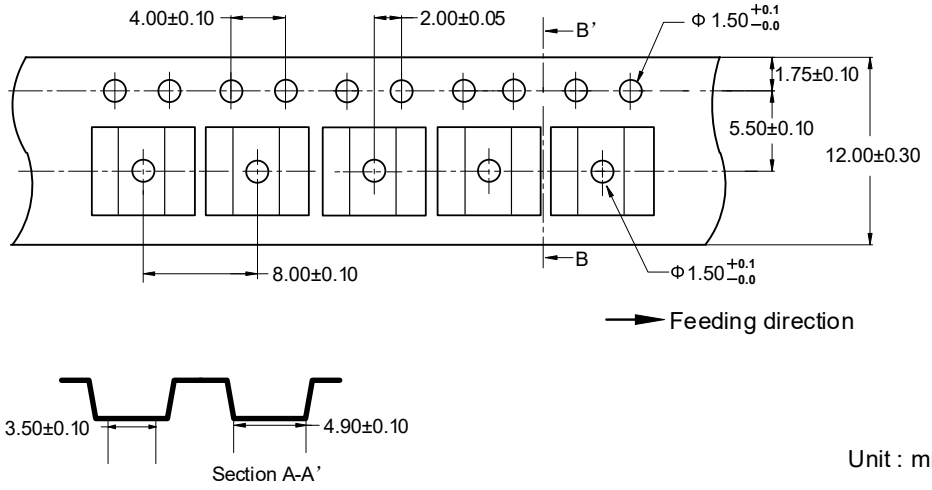


SOP14



Tape Information

TSSOP14



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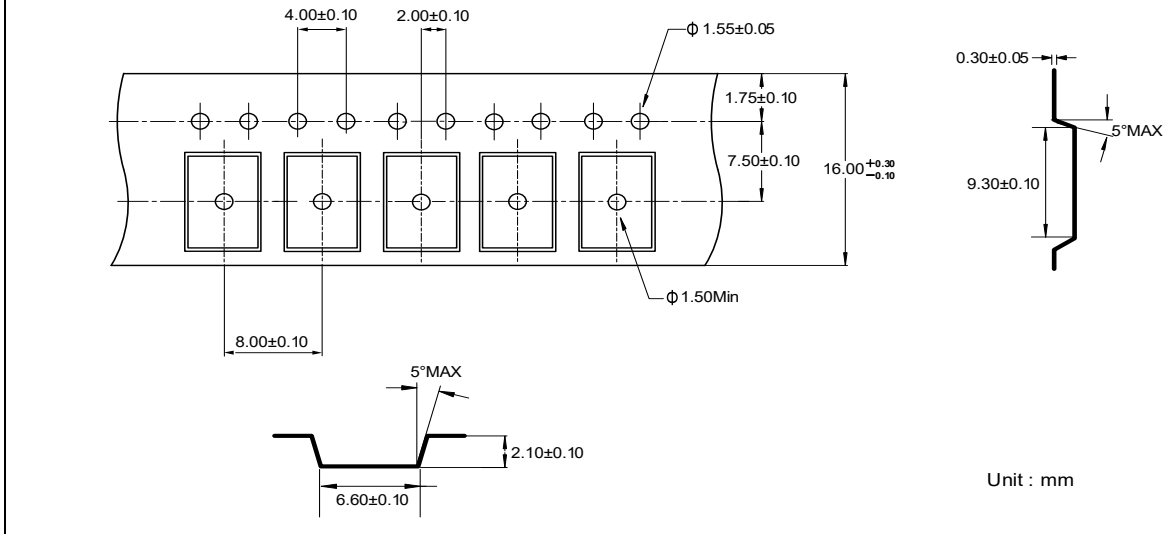

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
0.0	2023-08-10	Preliminary Version	Wangar	Tugz	Liujy
1.0	2025-6-19	Official Version	Yuyf	Tugz	Liujy