ET74HC86 - Quadruple 2-Input XOR Gates

General Description

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

Features

- Buffered Inputs: CMOS Level
- Wide Operating Voltage Range: 2 V to 6 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

Applications

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

Device Information

Part No.	Package	MSL
ET74HC86M	SOP14	Level 3
ET74HC86V	TSSOP14	Level 3

Pin Configuration

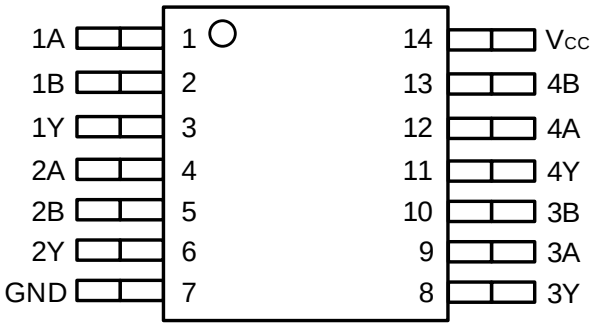


Fig1. Top View

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

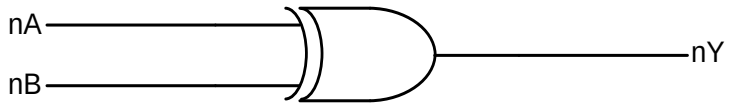


Fig2. Logic Symbol

Functional Description

Function Table

Input		Output
nA	**nB**	**nY**
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	-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	ºC
T_{LEAD}	Lead Temperature (Soldering 10s)		260	ºC
T_{STG}	Storage Temperature		−65 to 150	ºC
V_{ESD}	ESD Human Body Model (JESD22−A114)		±2000	V
	ESD Charged Device Model (JESD22−C101)		±1500	
I_{LU}	Latchup Current Above V_{CC} and GND(EIA/JESD78)		±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	90	125	°C/W

Recommended Operating Conditions

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

Symbol	Parameter		Min	Max	Unit
V_{CC}	Supply Voltage		2	6	V
V_{IH}	High-level Input Voltage	V_{CC} = 2 V	1.5		V
		V_{CC} = 4.5 V	3.15		
		V_{CC} = 6 V	4.2		
V_{IL}	Low-level Input Voltage	V_{CC} = 2 V		0.5	V
		V_{CC} = 4.5 V		1.35	
		V_{CC} = 6 V		1.8	
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} = 2 V		1000	ns
		V_{CC} = 4.5 V		500	
		V_{CC} = 6 V		400	
		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	2V-6V		10		pF

Electrical Characteristics

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

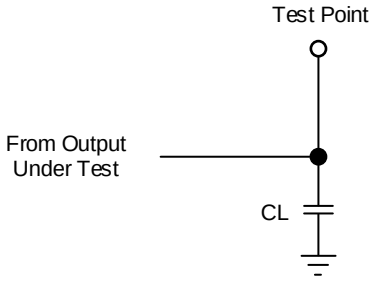
Symbol	Parameter	Condition		V_{CC}	Operating Free-air Temperature (T_A)						Unit
					T_A=25°C		-40°C≤T_A≤85°C		-40°C≤T_A≤125°C		
					Min	Max	Min	Max	Min	Max	
V_{OH}	High−Level Output Voltage	V_I = V_{IH} or V_{IL}	I_{OH} =-20μA	2 V	1.9		1.9		1.9		V
				4.5 V	4.4		4.4		4.4		
				6 V	5.9		5.9		5.9		
			I_{OH} =-4mA	4.5 V	3.98		3.84		3.7		
			I_{OH} =-5.2mA	6 V	5.48		5.34		5.2		
V_{OL}	Low−Level Output Voltage	V_I = V_{IH} or V_{IL}	I_{OH} =20μA	2 V		0.1		0.1		0.1	V
				4.5 V		0.1		0.1		0.1	
				6 V		0.1		0.1		0.1	
			I_{OH} =4mA	4.5 V		0.26		0.33		0.4	
			I_{OH} =5.2mA	6 V		0.26		0.33		0.4	
I_I	Input Leakage Current	V_I = V_{CC} or 0		6 V		±0.1		±1		±1	μA
I_{CC}	Supply Current	V_I = V_{CC} or 0	I_O = 0	6 V		2		20		40	μA
C_I	Input Capacitance			5 V		10		10		10	pF

Switching 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	
t_{pd}	Propagation Delay	nA or nB to nY C_L = 50 pF	2 V		12	25		35		50	ns
			4.5 V		4	10		15		20	
			6 V		3.5	8		12		18	
		nA or nB to nY C_L = 15 pF	5 V		2.5	7		10		15	
t_t	Transition-time	nY C_L = 50 pF	2 V		17.5	35		45		60	ns
			4.5 V		4	10		15		20	
			6 V		3.5	8		12		15	

Parameter Measurement Information



C_L includes probe and jig capacitance

Fig3. Load Circuit

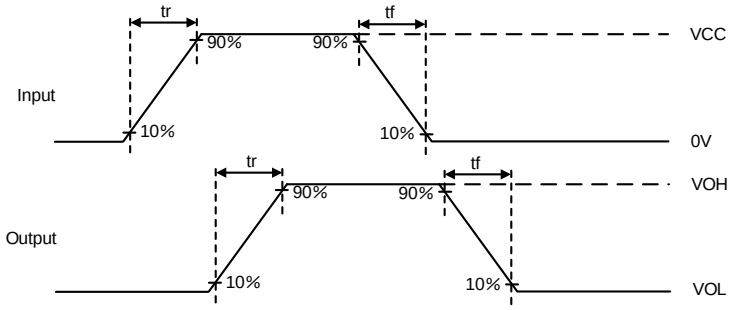


Fig4. Voltage Wave-forms Transition Times

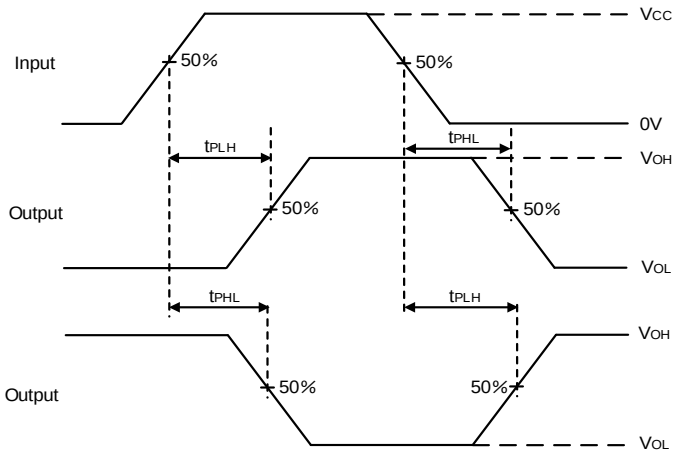
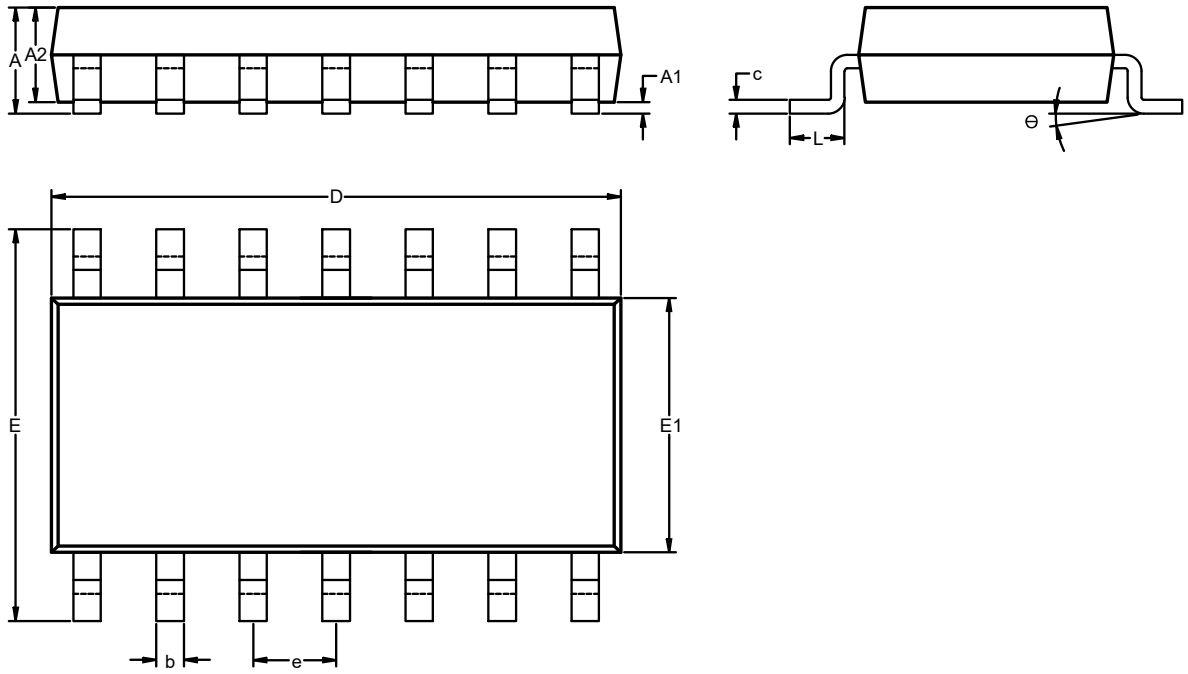


Fig5. Voltage Wave-forms Propagation Delays

Package Dimension

SOP14

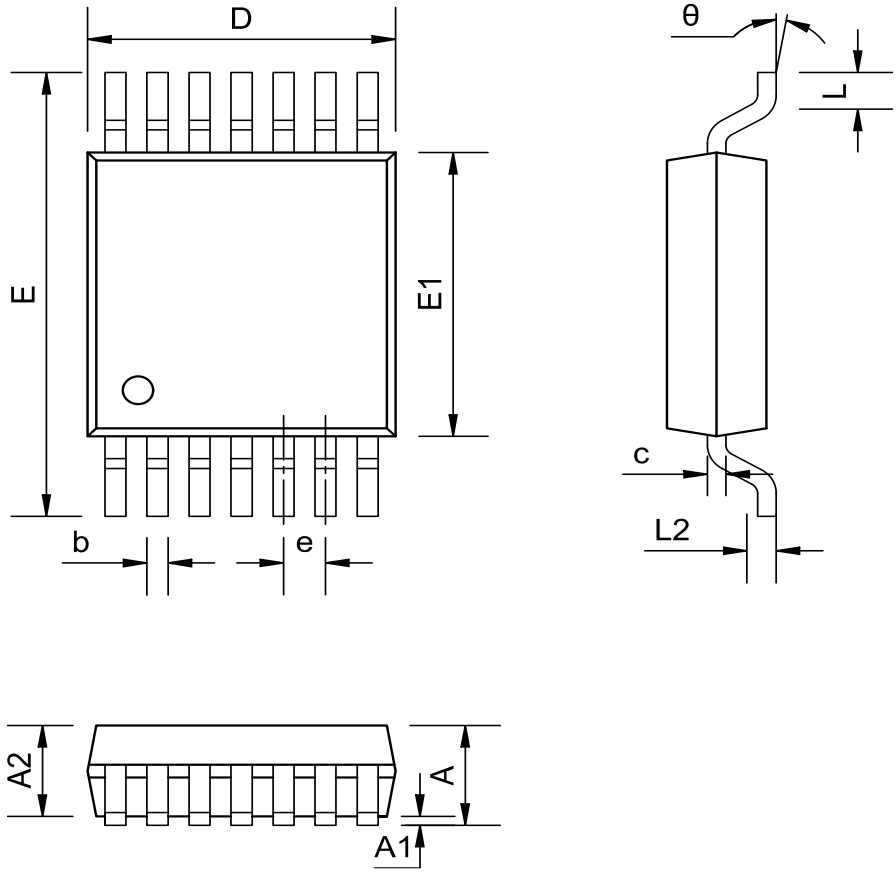


COMMON DIMENSIONS

(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	--	--	1.75
A1	0.10	0.15	0.25
A2	1.35	1.45	1.55
b	0.36	--	0.51
c	0.18	--	0.25
D	8.55	8.65	8.75
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.22	1.27	1.32
L	0.45	0.60	0.80
θ	0°	--	8°

TSSOP14



Dimensions

(mm are the original dimensions)

SYMBOL	MIN	NOM	MAX
A	--	--	1.20
A1	0.05	--	0.15
A2	0.90	1.00	1.05
A3	0.34	0.44	0.54
b	0.20	--	0.28
c	0.10	--	0.19
D	4.86	4.96	5.06
E	6.20	6.40	6.60
E1	4.30	4.40	4.50
e	0.65BSC		
L	0.45	0.60	0.75
Θ	0°	--	8°

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	2024-02-28	Update Ectable	Wangar	Tugz	Liujy