



Product Specification

XBLW LM239

Quad Voltage Comparators

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Descriptions

The LM239 is a quad voltage integrated comparators, mainly obtained in consumer and industrial electronics products, and designed for use in level detection, low-level sensing. It is available in DIP14/SOP14/TSSOP14 package.



Feature

- Single or Split Supply Operation
- Low Input Biasing Current: 25 nA (Typ)
- Low Input Offset Current: 5.0 nA (Typ)
- Low Output Saturation Voltage: 130 mV (Typ)
- Output Voltage Compatible With TTL, CMOS Logic Systems
- Wide Supply Voltage Range
Single Supplies: 2.0V to 36V
Dual Supplies: $\pm 1.0V$ to $\pm 18V$

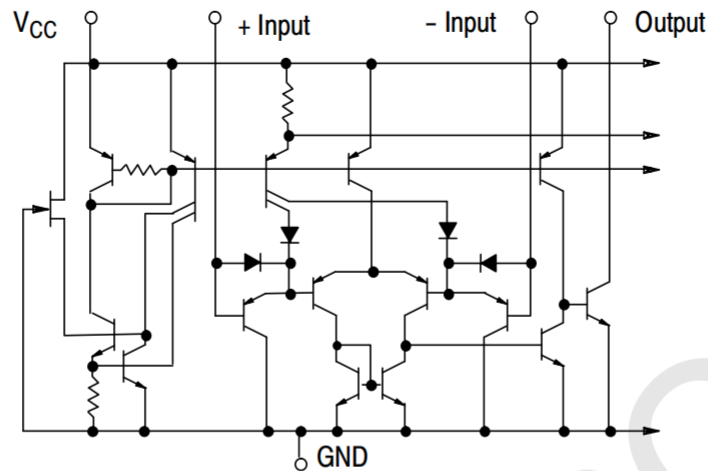
Applications

- Vacuum robot
- Single phase UPS
- Server PSU
- Cordless power tool
- Wireless infrastructure
- Appliances
- Building automation
- Factory automation & control
- Motor drives
- Infotainment & cluster

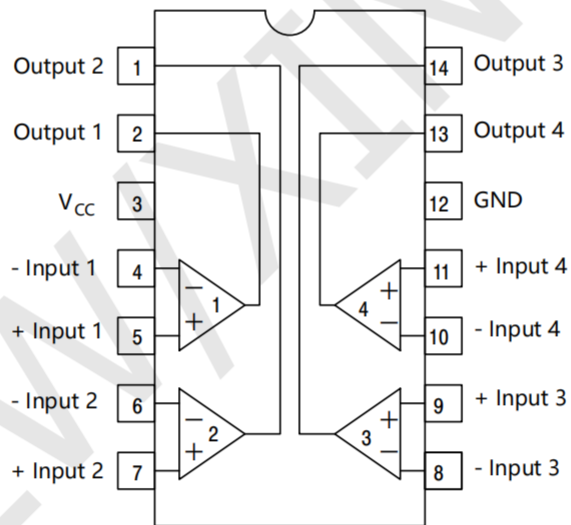
Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty
XBLW LM239N	DIP-14	LM239N	Tube	1000pcs/Box
XBLW LM239DTR	SOP-14	LM239	Tape	2500pcs/Reel
XBLW LM239TDTR	TSSOP-14	LM239	Tape	3000pcs/Reel

Schematic Diagram



Pin Diagram



(Top View)

Pins Configurations

No.	Description	Symbol	No.	Description	Symbol
1	OUTPUT 2	OUT2	8	INVERTING INPUT 3	IN3(-)
2	OUTPUT 1	OUT1	9	NONINVERTING INPUT 3	IN3(+)
3	POWER SUPPLY	Vcc	10	INVERTING INPUT 4	IN4(-)
4	INVERTING INPUT 1	IN1(-)	11	NONINVERTING INPUT 4	IN4(+)
5	NONINVERTING INPUT 1	IN1(+)	12	GROUND	GND
6	INVERTING INPUT 2	IN2(-)	13	OUTPUT 4	OUT4
7	NONINVERTING INPUT 2	IN2(+)	14	OUTPUT 3	OUT3

Absolute Maximum Ratings

TA=25°C, unless otherwise noted

Parameter	Symbol	Value	Unit
Supply Voltage	V _{CC}	36 or ±18	V
Input Differential Voltage Range	V _{IDR}	36	V
Input common-mode Voltage Range	V _{ICMR}	-0.3 ~ V _{CC}	V
Output Current	I _{SC}	50	mA
Power Dissipation(Note *)	P _D	1.0	W
Ambient Temperature	T _{amb}	-20 ~ 85	°C
Storage Temperature	T _{stg}	-65 ~ 150	°C

Note *: When used above 25°C, the power consumption decreases by 8mW for every 1°C increase.

Electrical Characteristics

TA=25°C, V_{CC}=5V, unless otherwise noted

Characteristics	Test Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
Input Offset Voltage	Ta=25°C	V _{IO}		2.0	5.0	mV
	0°C ≤ Ta ≤ 70°C				9.0	
Input Offset Current	Ta=25°C	I _{IO}		5.0	50	nA
	0°C ≤ Ta ≤ 70°C				150	
Input Bias Current	Ta=25°C	I _{IB}		25	250	nA
	0°C ≤ Ta ≤ 70°C				400	
Input Common Mode Voltage Range	Ta=25°C	V _{ICR}	0		V _{CC} -1.5	V
	0°C ≤ Ta ≤ 70°C		0		V _{CC} -2.0	
Supply Current	R _L =∞	I _{CC}		0.8	2.0	mA
	R _L =∞ V _{CC} =30V			1.0	2.5	
Voltage Gain	R _L > 15K, V _{CC} =15V	G _V	50	200		V/mV
Large Signal Response Time	V _{IN} =TTL Logic Swing, V _{REF} =1.4V, V _{RL} =5.0V, R _L =5.1K	t _{RES}		300		ns
Response Time	V _{RL} =5.0V, R _L =5.1K	t _{RES}		1.3		us
Input Differential Voltage		V _{ID}			V _{CC}	V
Output Sink Current	V _{IN} (-) ≥ 1.0V, V _{IN} (+) = 0V, V _O ≤ 1.5V	I _{SINK}	6.0	16		mA
Output Saturation Voltage	V _{IN} (-) ≥ 1.0V, V _{IN} (+) = 0V, I _{SINK} ≤ 4.0mA	V _{SAT}		130	400	mV
	V _{IN} (-) ≥ 1.0V, V _{IN} (+) = 0V, I _{SINK} ≤ 4.0mA, 0°C ≤ Ta ≤ 70°C				700	
Output Leakage Current	V _{IN} (+) ≥ 1.0V, V _{IN} (-) = 0V, V _O = 5V	I _{OL}		0.1		nA
	V _{IN} (+) ≥ 1.0V, V _{IN} (-) = 0V, V _O = 30V, 0°C ≤ Ta ≤ 70°C				1000	

Applications

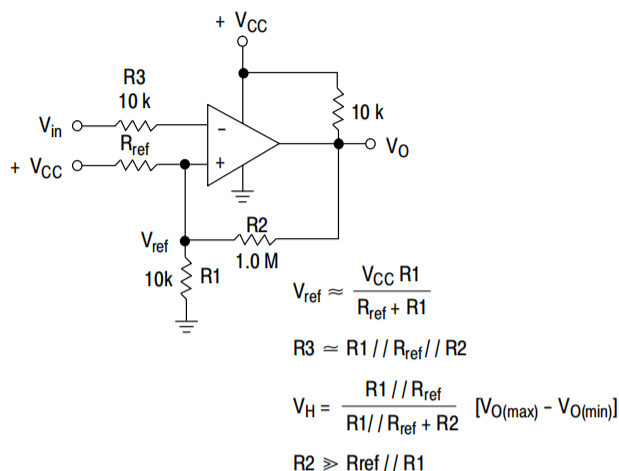


Figure 1. Inverting Comparator with Hysteresis

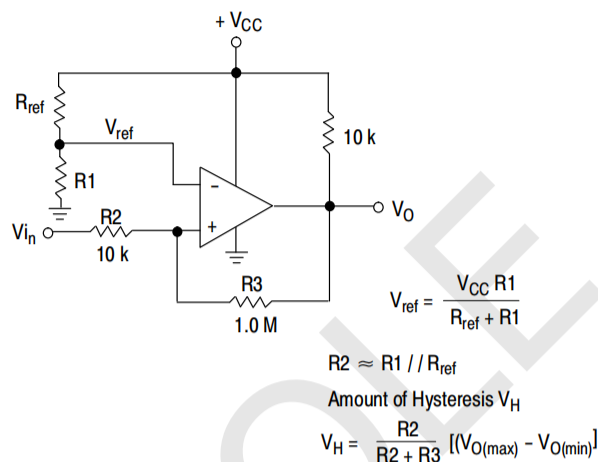
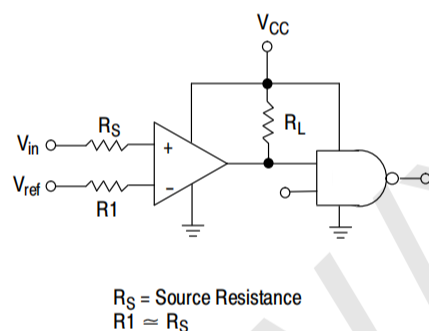


Figure 2. Noninverting Comparator with Hysteresis



Logic	Device	V _{CC} (V)	R _L kΩ
CMOS	1/4 MC14001	+15	100
TTL	1/4 MC7400	+5.0	10

Figure 3. Driving Logic

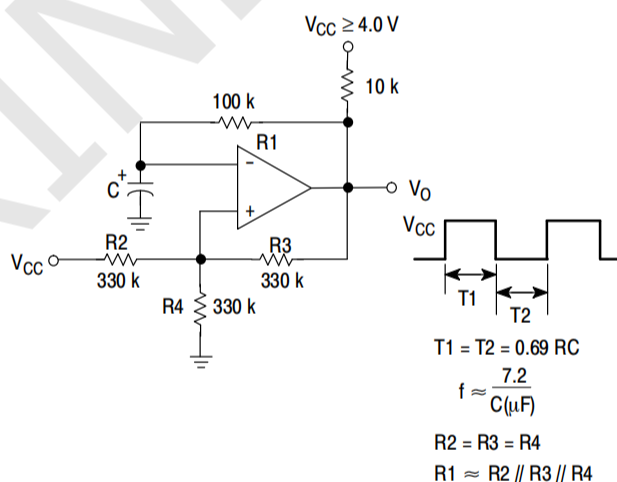


Figure 4. Squarewave Oscillator

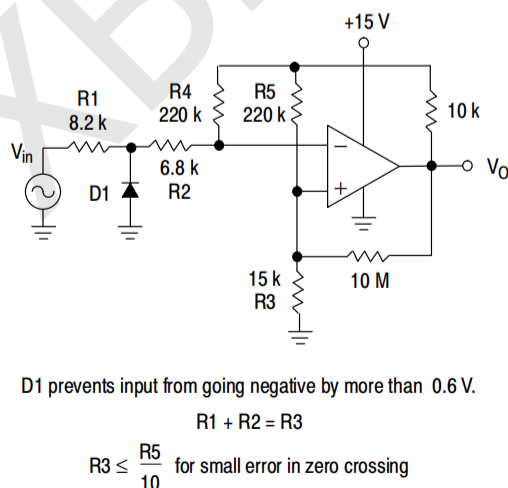
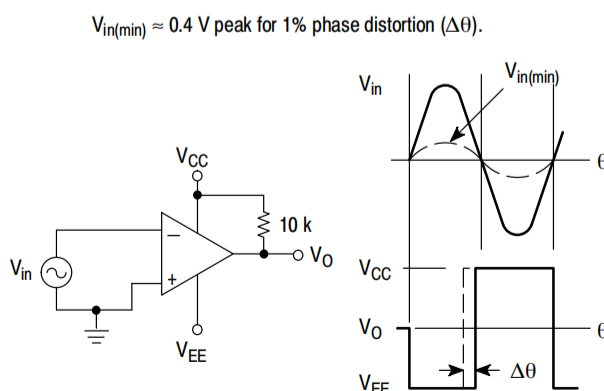


Figure 5. Zero Crossing Detector (Single Supply)



**Figure 6. Zero Crossing Detector
(Split Supplies)**

Typical Characteristics Curves

($V_{CC} = 15\text{ Vdc}$, $T_A = +25^\circ\text{C}$ (each comparator) unless otherwise noted.)

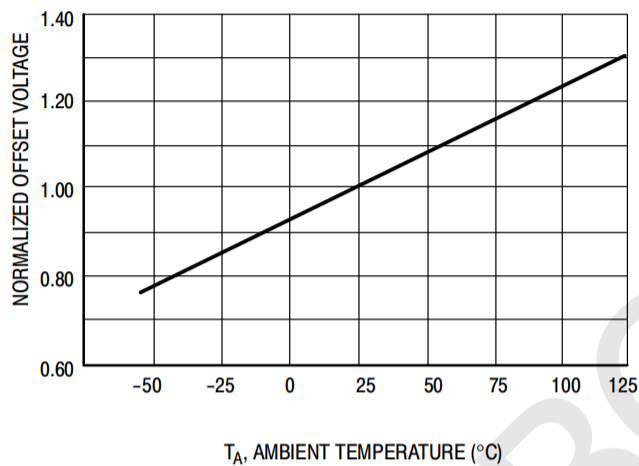


Figure 7. Normalized Input Offset Voltage

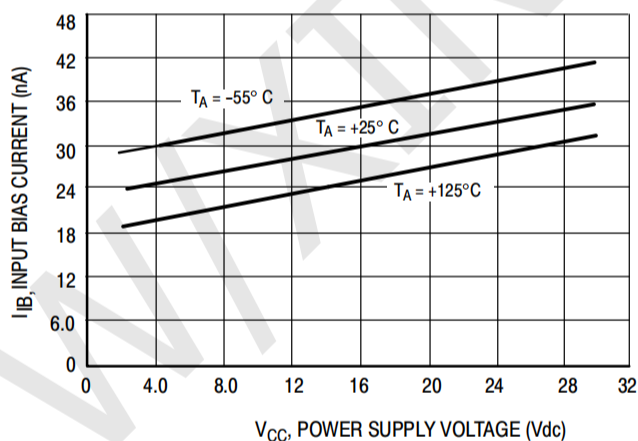


Figure 8. Input Bias Current

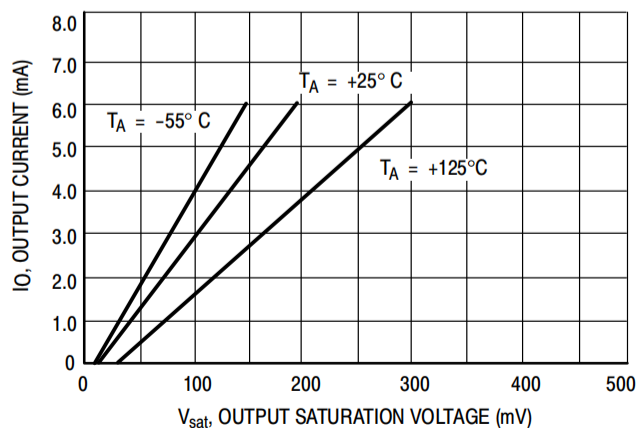
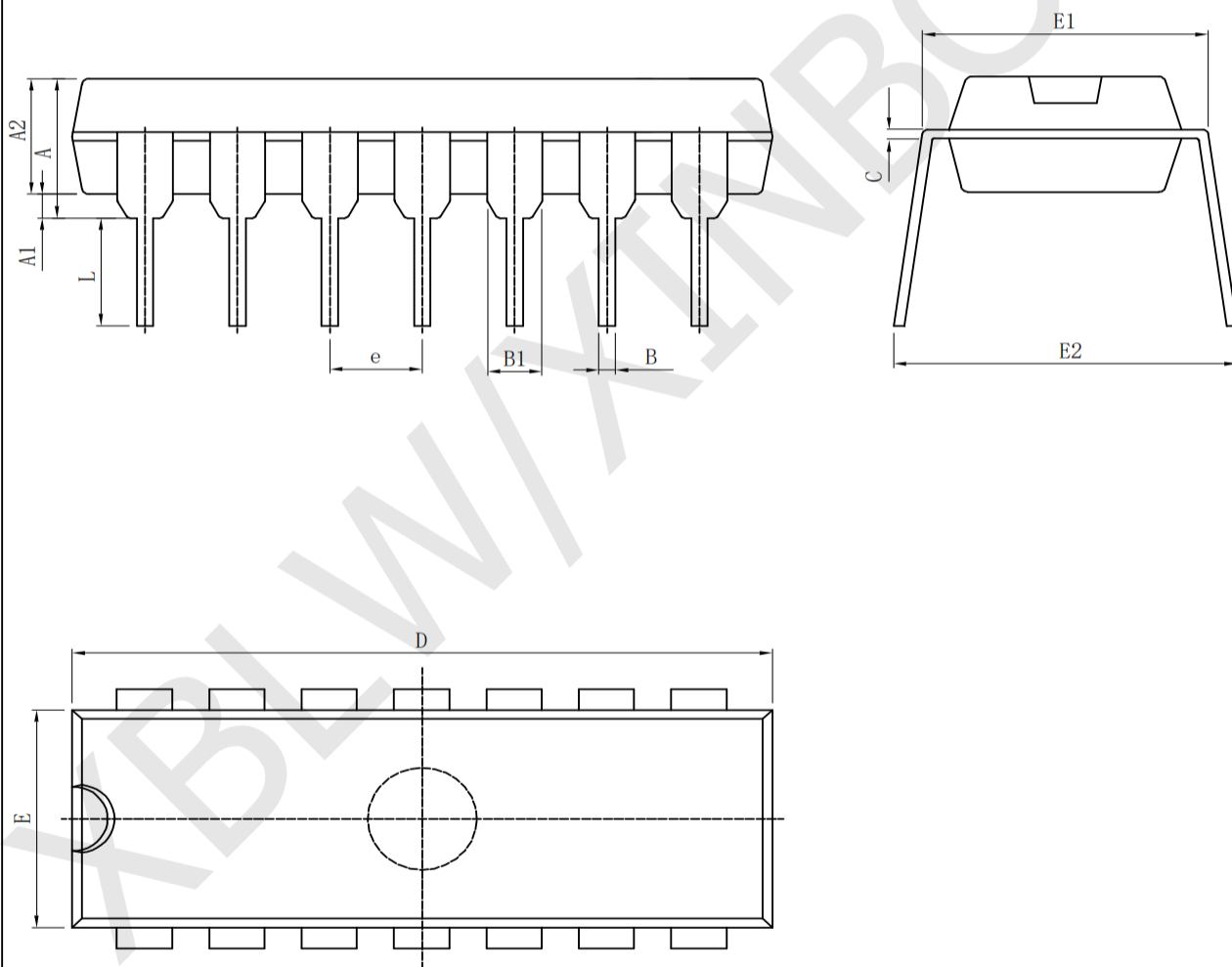


Figure 9. Output Sink Current versus Output Saturation Voltage

Package Information

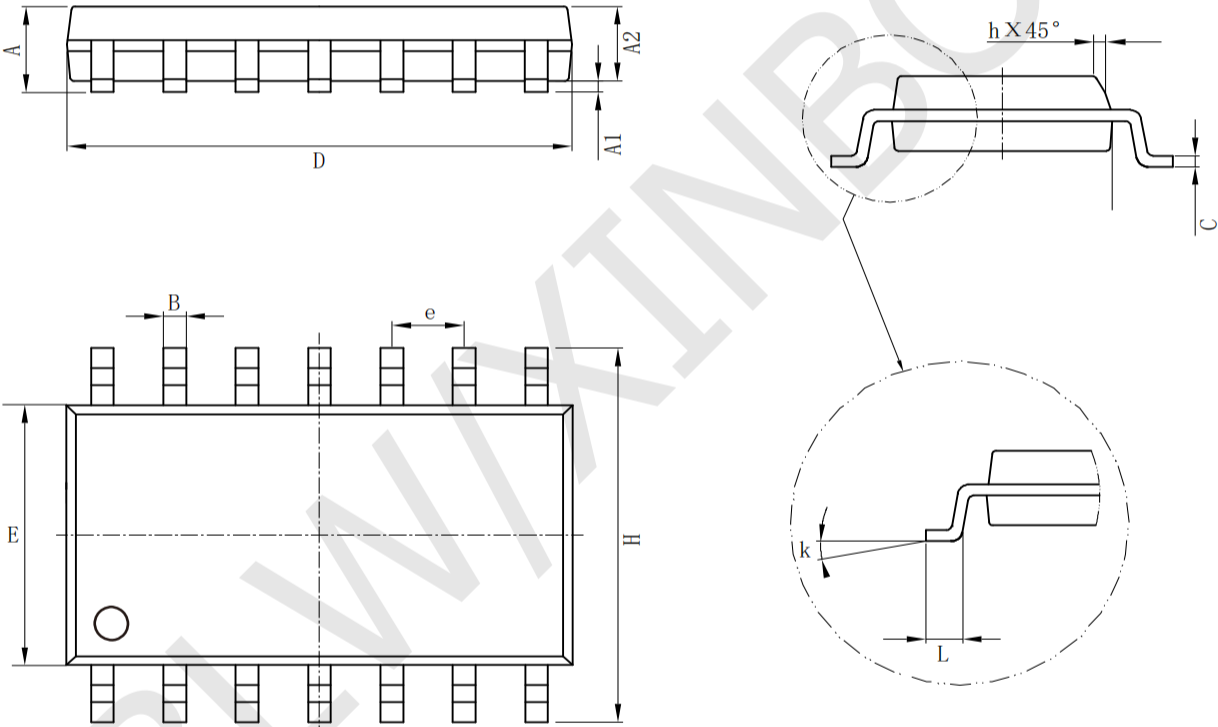
· DIP-14

Symbol	Dimensions In Millimeters		Symbol	Dimensions In Inches	
	Min (mm)	Max (mm)		Min (in)	Max (in)
A	3.710	4.310	A	0.146	0.170
A1	0.510		A1	0.020	
A2	3.200	3.600	A2	0.126	0.142
B	0.380	0.570	B	0.015	0.022
B1	1.524 (BSC)		B1	0.060 (BSC)	
C	0.204	0.360	C	0.008	0.014
D	18.800	19.200	D	0.740	0.756
E	6.200	6.600	E	0.244	0.260
E1	7.320	7.920	E1	0.288	0.312
e	2.540 (BSC)		e	0.100 (BSC)	
L	3.000	3.600	L	0.118	0.142
E2	8.400	9.000	E2	0.331	0.354



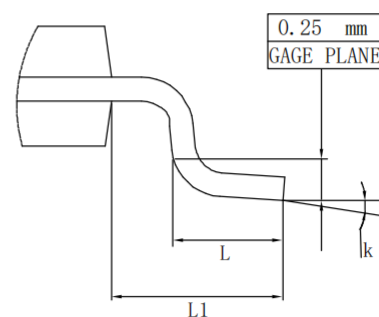
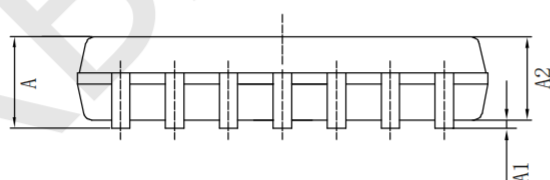
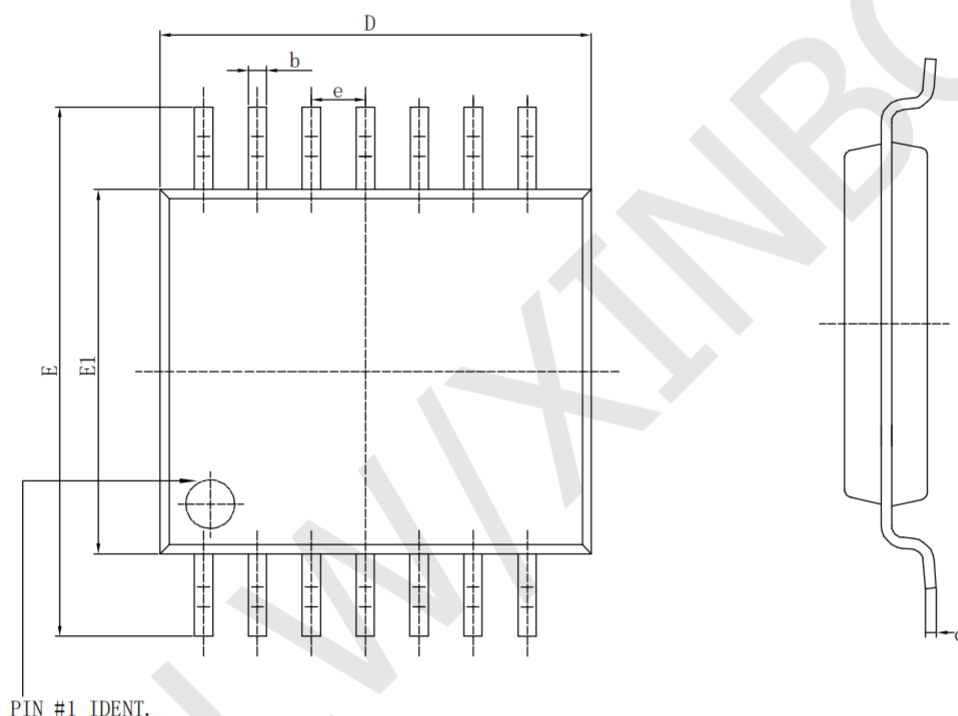
· SOP-14

Size Symbol	Dimensions In Millimeters		Size Symbol	Dimensions In Inches	
	Min(mm)	Max(mm)		Min(in)	Max(in)
A	1.350	1.750	A	0.050	0.068
A1	0.100	0.250	A1	0.004	0.009
A2	1.100	1.650	A2	0.040	0.060
B	0.330	0.510	B	0.010	0.020
C	0.190	0.250	C	0.007	0.009
D	8.550	8.750	D	0.330	0.340
E	3.800	4.000	E	0.150	0.150
e	1.27		e	0.05	
H	5.800	6.200	H	0.220	0.240
h	0.250	0.500	h	0.009	0.020
L	0.400	1.270	L	0.015	0.050
k	8° (max)		k	8° (max)	



TSSOP-14

Size Symbol	Dimensions In Millimeters		Size Symbol	Dimensions In Inches	
	Min (mm)	Max (mm)		Min (in)	Max (in)
A		1.200	A		0.047
A1	0.050	0.150	A1	0.002	0.006
A2	0.800	1.050	A2	0.031	0.041
b	0.190	0.300	b	0.007	0.012
c	0.090	0.200	c	0.004	0.0089
D	4.900	5.100	D	0.193	0.201
E	6.200	6.600	E	0.244	0.260
E1	4.300	4.500	E1	0.169	0.176
e	0.65		e	0.0256	
L	0.450	0.750	L	0.018	0.030
L1	1.00		L1	0.039	
k	0°	8°	k	0°	8°



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