Description

The SN74HC07N is a contains six buffers. The outputs of the SN74HC07N is open-drain and can be connected to other open-drain outputs to implement active-LOW wired-OR or active-HIGH wired-AND functions. The open-drain outputs require pull-up resistors to perform correctly.

Features

Specified from -40℃ to +125℃
Packaging information: DIP-14/SOP-14/TSSOP-14

Ordering Information

Product Model	Package Type	Packing	Packing Qty
SN74HC07N	DIP-14	Tube	1000Pcs/Box
SN74HC07NDTR	SOP-14	Tape	2500Pcs/Reel
SN74HC07NTDTR	TSSOP-14	Tape	3000Pcs/Reel

Block Diagram

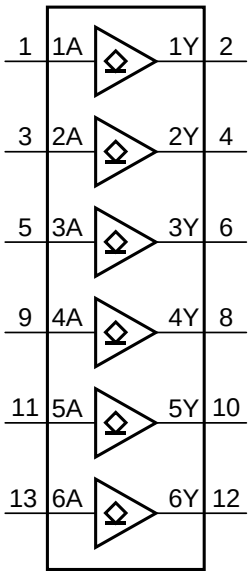


Figure 1. Logic symbol

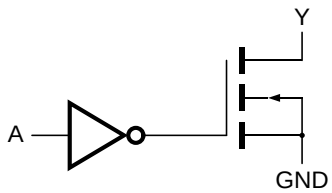
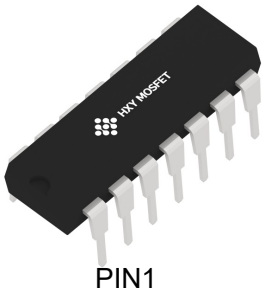
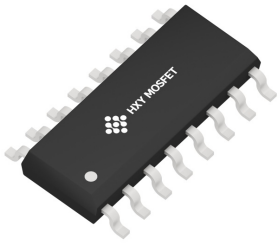


Figure 2. Logic diagram (one gate)

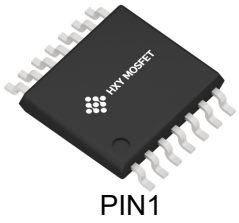
Pin Configurations



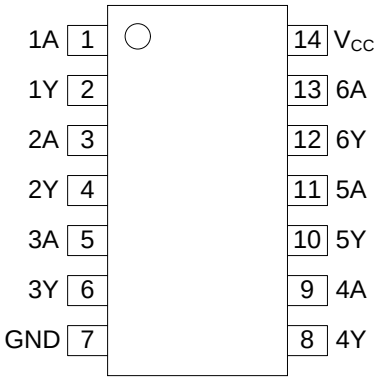
DIP-14



SOP-14



TSSOP-14



Pin Description

Pin No.	Pin Name	Description
1	1A	data input
2	1Y	data output
3	2A	data input
4	2Y	data output
5	3A	data input
6	3Y	data output
7	GND	ground (0V)
8	4Y	data output
9	4A	data input
10	5Y	data output
11	5A	data input
12	6Y	data output
13	6A	data input
14	V_{CC}	supply voltage

Function Table

Input	Output
nA	**nY**
L	L
H	Z

Note: H=HIGH voltage level; L=LOW voltage level; Z=high-impedance OFF-state.

Electrical Parameter

Absolute Maximum Ratings

(Voltages are referenced to GND(ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Max.	Unit
supply voltage	V_{CC}	-		-0.5	+7.0	V
output voltage	V_O	-		-0.5	+7.0	V
input clamping current	I_{IK}	V_I < -0.5V or V_I > V_{CC}+0.5V		-	±20	mA
output clamping current	I_{OK}	V_O < -0.5V		-	-20	mA
output current	I_O	-0.5V < V_O		-	-25	mA
supply current	I_{CC}	-		-	+50	mA
ground current	I_{GND}	-		-50	-	mA
storage temperature	T_{stg}	-		-65	+150	℃
total power dissipation	P_{tot}	-		-	500	mW
soldering temperature	T_L	10s	DIP	245		℃
			SOP/TSSOP	260		

Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
supply voltage	V_{CC}	-	2.0	5.0	6.0	V
input voltage	V_I	-	0	-	V_{CC}	V
output voltag e	V_O	-	0	-	V_{CC}	V
input transition rise and fall rate	Δt/ΔV	V_{CC}=2.0V	-	-	625	ns/V
		V_{CC}=4.5V	-	1.67	139	ns/V
		V_{CC}=6.0 V	-	-	83	ns/V
ambient temperature	T_{amb}	-	-40	-	+125	℃

Electrical Characteristics

DC Characteristics 1

(T_{amb}=25℃, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
HIGH-level input voltage	V_{IH}	V_{CC}=2.0V		1.5	1.2	-	V
		V_{CC}=4.5V		3.15	2.4	-	V
		V_{CC}=6.0V		4.2	3.2	-	V
LOW-level input voltage	V_{IL}	V_{CC}=2.0V		-	0.8	0.5	V
		V_{CC}=4.5V		-	2.1	1.35	V
		V_{CC}=6.0 V		-	2.8	1.8	V
LOW-level output voltage	V_{OL}	V_I=V_{IH} or V_{IL}	I_O=20uA; V_{CC}=2.0V	-	0	0.1	V
			I_O=20uA; V_{CC}=4.5V	-	0	0.1	V
			I_O=20uA; V_{CC}=6.0 V	-	0	0.1	V
			I_O=4.0mA; V_{CC}=4.5V	-	0.15	0.26	V
			I_O=5.2mA; V_{CC}=6.0 V	-	0.16	0.26	V
input leakage current	I_I	V_I=V_{CC} or GND; V_{CC}=6.0V		-	-	±1.0	uA
OFF-state output current	I_{OZ}	per input pin; V_I=V_{IL}; V_O=V_{CC} or GND; other inputs at V_{CC} or GND; V_{CC}=6.0V; I_O=0A		-	-	±1.0	uA
supply current	I_{CC}	V_I=V_{CC} or GND; I_O=0A; V_{CC}=6.0V		-	-	2	uA
input capacitance	C_I	-		-	3.5	-	pF

DC Characteristics 2

(T_{amb}=-40℃ to +85℃, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
HIGH-level input voltage	V_{IH}	V_{CC}=2.0V		1.5	-	-	V
		V_{CC}=4.5V		3.15	-	-	V
		V_{CC}=6.0V		4.2	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=2.0V		-	-	0.5	V
		V_{CC}=4.5V		-	-	1.35	V
		V_{CC}=6.0 V		-	-	1.8	V
LOW-level output voltage	V_{OL}	V_I=V_{IH} or V_{IL}	I_O=20uA; V_{CC}=2.0V	-	-	0.1	V
			I_O=20uA; V_{CC}=4.5V	-	-	0.1	V
			I_O=20uA; V_{CC}=6.0 V	-	-	0.1	V
			I_O=4.0mA; V_{CC}=4.5V	-	-	0.33	V
			I_O=5.2mA; V_{CC}=6.0 V	-	-	0.33	V
input leakage current	I_I	V_I=V_{CC} or GND; V_{CC}=6.0V		-	-	±1.0	uA
OFF-state output current	I_{OZ}	per input pin; V_I=V_{IL}; V_O=V_{CC} or GND; other inputs at V_{CC} or GND; V_{CC}=6.0V; I_O=0A		-	-	±5.0	uA
supply current	I_{CC}	V_I=V_{CC} or GND; I_O=0A; V_{CC}=6.0V		-	-	20	uA

DC Characteristics 3

(T_{amb}=-40℃ to +125℃, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
HIGH-level input voltage	V_{IH}	V_{CC}=2.0V		1.5	-	-	V
		V_{CC}=4.5V		3.15	-	-	V
		V_{CC}=6.0V		4.2	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=2.0V		-	-	0.5	V
		V_{CC}=4.5V		-	-	1.35	V
		V_{CC}=6.0V		-	-	1.8	V
LOW-level output voltage	V_{OL}	V_I=V_{IH} or V_{IL}	I_O=20uA; V_{CC}=2.0V	-	-	0.1	V
			I_O=20uA; V_{CC}=4.5V	-	-	0.1	V
			I_O=20uA; V_{CC}=6.0 V	-	-	0.1	V
			I_O=4.0mA; V_{CC}=4.5V	-	-	0.4	V
			I_O=5.2mA; V_{CC}=6.0 V	-	-	0.4	V
input leakage current	I_I	V_I=V_{CC} or GND; V_{CC}=6.0V		-	-	±1.0	uA
OFF-state output current	I_{OZ}	per input pin; V_I=V_{IL}; V_O=V_{CC} or GND; other inputs at V_{CC} or GND; V_{CC}=6.0V; I_O=0A		-	-	±10	uA
supply current	I_{CC}	V_I=V_{CC} or GND; I_O=0A; V_{CC}=6.0V		-	-	40	uA

AC Characteristics 1

(T_{amb}=25℃, GND=0V, C_L=50pF, unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
nA to nY propagation delay	t_{pd}	see Figure 4[1]	V_{CC}=2.0V	-	28	95	ns
			V_{CC}=4.5 V	-	10	19	ns
			V_{CC}=5.0V; C_L=15pF	-	8	-	ns
			V_{CC}=6.0V	-	8	16	ns
transition time	t_t	see Figure 4[2]	V_{CC}=2.0V	-	19	75	ns
			V_{CC}=4.5V	-	7	15	ns
			V_{CC}=6.0 V	-	6	13	ns
power dissipation capacitance	C_{PD}	per package; V_I=GND to V_{CC}[3]		-	4	-	pF

Note:

[1] t_{pd} is the same as t_{PLZ} and t_{PZL}.

[2] t_t is the same as t_{THL}.

[3] C_{PD} isused to determine the dynamic power dissipation (P_D in uW).

$P_D=C_{PD}\times V_{CC}^2\times f_i\times N+\Sigma(C_L\times V_{CC}^2\times f_o)$ where:

f_i=input frequency in MHz; f_o=output frequency in MHz; C_L=output load capacitance in pF;

V_{CC}=supply voltage in V;

N=number of inputs switching; $\Sigma(C_L\times V_{CC}^2\times f_o)$=sum of outputs.

AC Characteristics 2

(T_{amb}=-40℃ to +85℃, GND=0V, C_L=50pF, unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
nA to nY propagation delay	t_{pd}	see Figure 4[1]	V_{CC}= 2.0V	-	-	120	ns
			V_{CC}=4.5V	-	-	24	ns
			V_{CC}=6.0V	-	-	20	ns
transition time	t_t	see Figure 4[2]	V_{CC}=2.0V	-	-	95	ns
			V_{CC}=4.5V	-	-	19	ns
			V_{CC}=6.0 V	-	-	16	ns

Note:

[1] t_{pd} is the same as t_{PLZ} and t_{PZL}.

[2] t_t is the same as t_{THL}.

AC Characteristics 3

(T_{amb}=-40℃to +125℃, GND=0V, C_L=50pF, unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
nA to nY propagation delay	t_{pd}	see Figure 4[1]	V_{CC}=2.0V	-	-	145	ns
			V_{CC}=4.5V	-	-	29	ns
			V_{CC}=6.0V	-	-	25	ns
transition time	t_t	see Figure 4[2]	V_{CC}=2.0V	-	-	110	ns
			V_{CC}=4.5V	-	-	22	ns
			V_{CC}=6.0 V	-	-	19	ns

Note:

[1] t_{pd} is the same as t_{PLZ} and t_{PZL}.

[2] t_t is the same as t_{THL}.

Testing Circuit

AC Testing Circuit

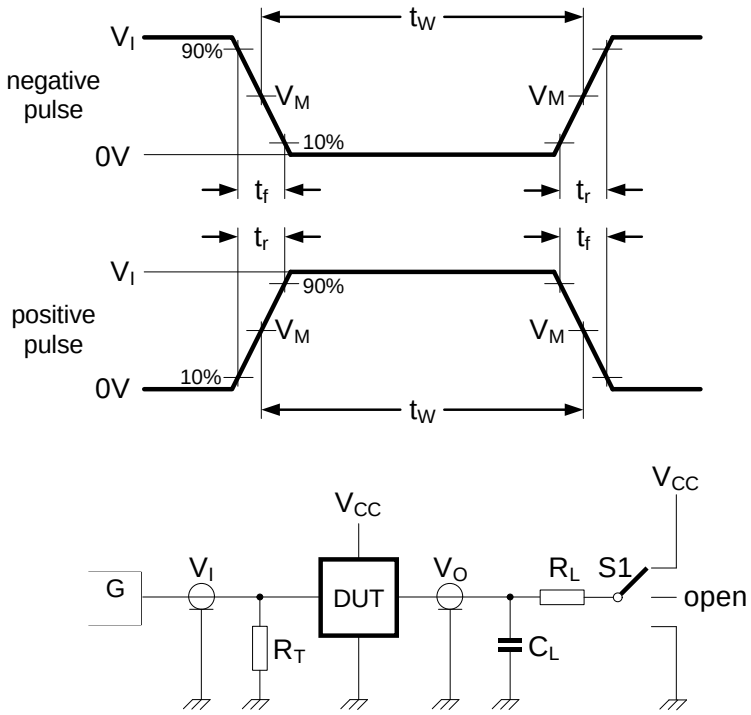


Figure 3. Test circuit for measuring switching times

Definitions for test circuit:

C_L=Load capacitance including jig and probe capacitance.

R_T=Termination resistance should be equal to the output impedance Z of the pulse generator.

R_L=Load resistance.

S1=Test selection switch.

AC Testing Waveforms

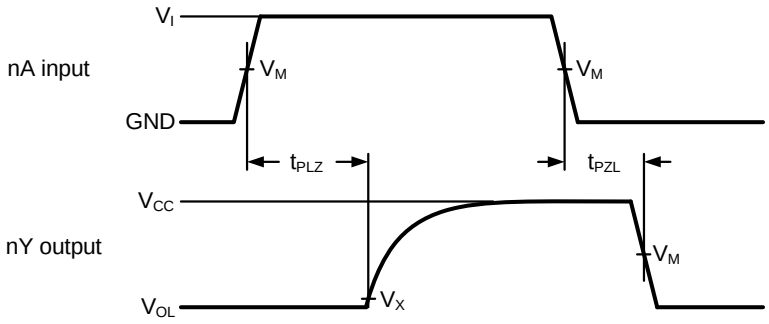


Figure 4. The inputnA to output nY propagation delays and output transition times

Measurement Points

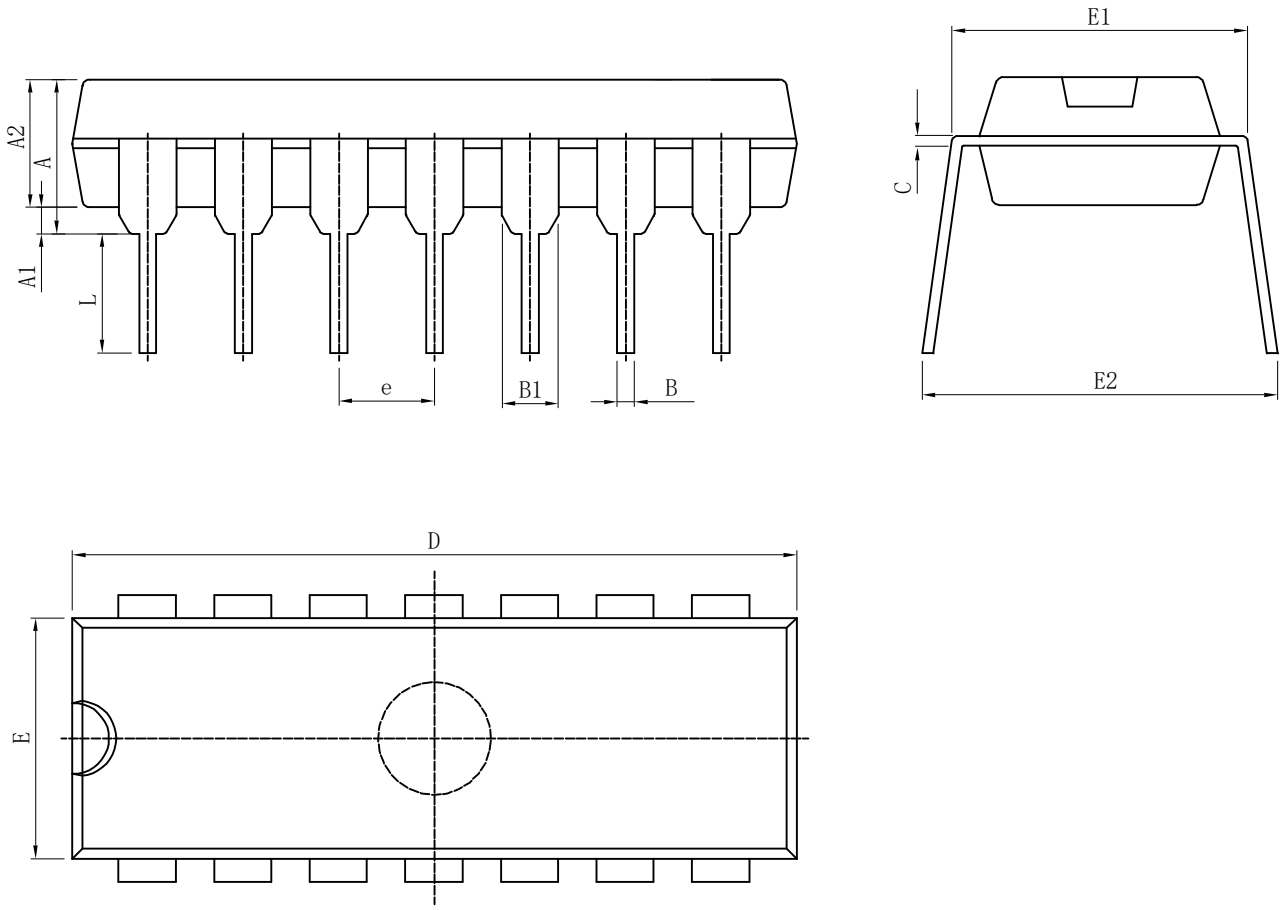
Type	Input	Output	
	V_M	V_M	V_X
SN74HC07N	$0.5\times V_{CC}$	$0.5\times V_{CC}$	$0.1\times V_{CC}$

Test Data

Type	Input		Load		S1 position
	V_I	t_r ,t_f	C_L	R_L	t_{PZL}, t_{PLZ}
SN74HC07N	V_{CC}	6ns	15pF, 50pF	1kΩ	V_{CC}

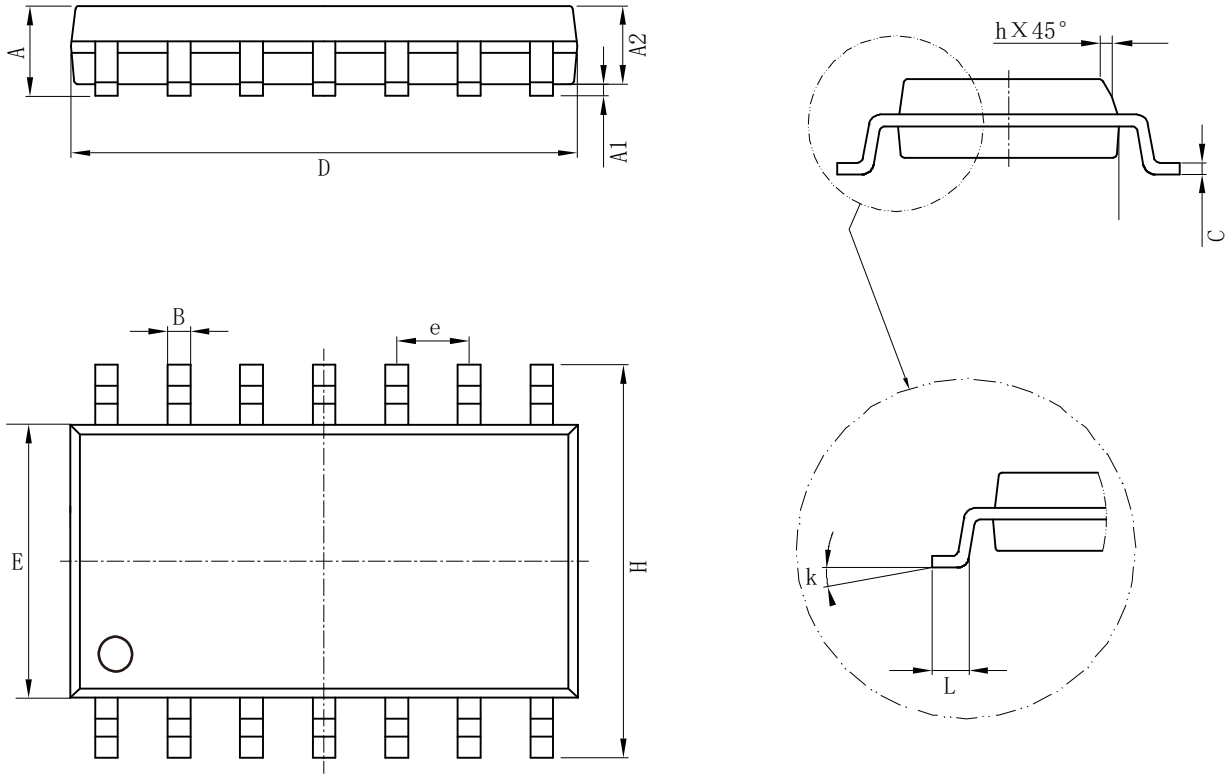
Package Information

DIP-14



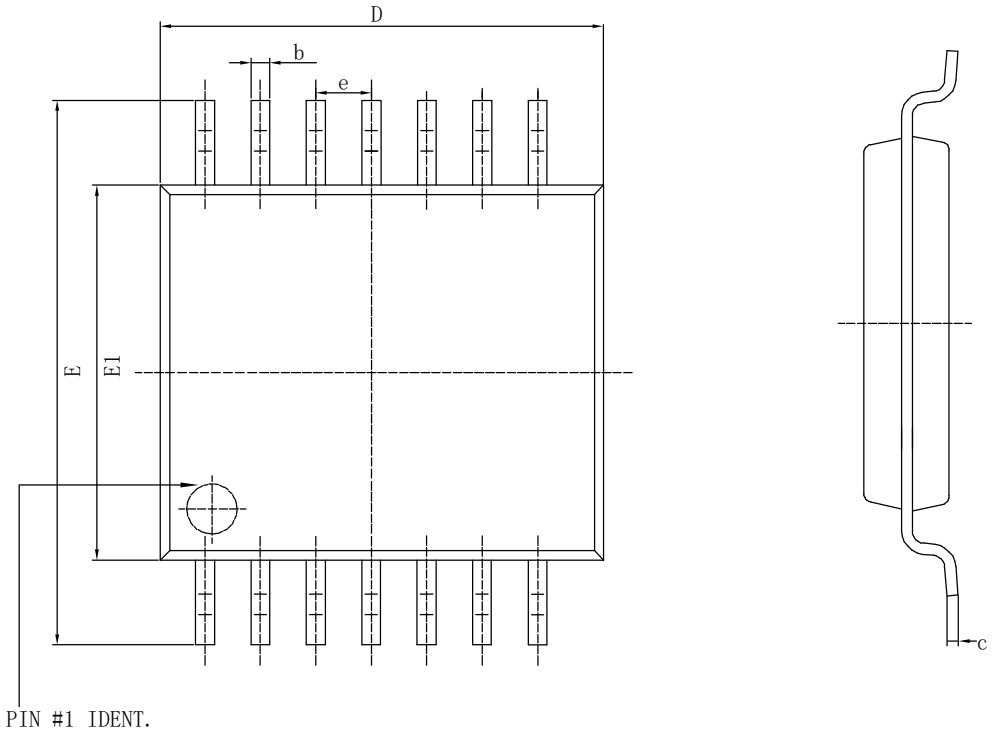
Size / Symbol	Dimensions In Millimeters		Size / Symbol	Dimensions In Inches	
	Min(mm)	Max(mm)		Min(in)	Max(in)
A	3.710	4.310	A	0.146	0.170
A1	0.510		A1	0.020	
A2	3.200	3.600	A2	0.126	0.142
B	0.380	0.570	B	0.015	0.022
B1	1.524(BSC)		B1	0.060(BSC)	
C	0.204	0.360	C	0.008	0.014
D	18.800	19.200	D	0.740	0.756
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

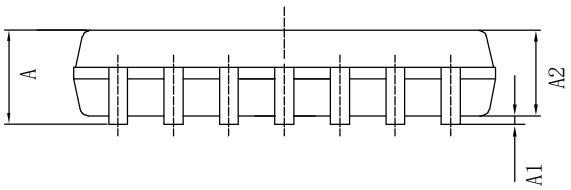
SOP-14

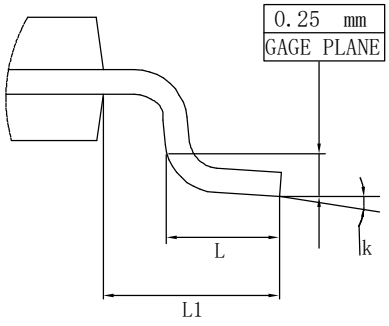


Size / Symbol	Dimensions In Millimeters		Size / Symbol	Dimensions In Inches	
	Min(mm)	Max(mm)		Min(in)	Max(in)
A	1.350	1.750	A	0.050	0.068
A1	0.100	0.250	A1	0.004	0.009
A2	1.100	1.650	A2	0.040	0.060
B	0.330	0.510	B	0.010	0.020
C	0.190	0.250	C	0.007	0.009
D	8.550	8.750	D	0.330	0.340
E	3.800	4.000	E	0.150	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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