

Product Specification

XBLW SN74LS574

Octal D-type flip-flop; positive edge-trigger;
3-state

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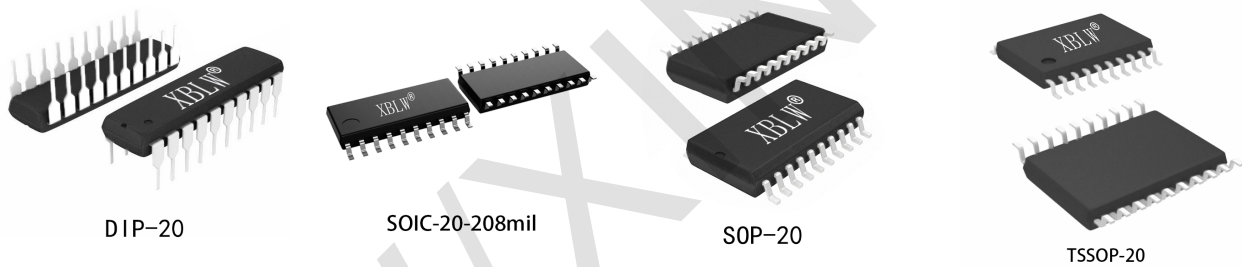


Description

The SN74LS574 is an octal positive-edge triggered D-type flip-flop with 3-state outputs. The device features a clock (CP) and output enable (\overline{OE}) inputs. A HIGH on \overline{OE} causes the outputs to assume a high-impedance OFF-state. Operation of the \overline{OE} input does not affect the state of the flip-flops.

Features

- 3-state non-inverting outputs for bus oriented applications
- 8-bit positive, edge-triggered register
- Specified from -20°C to +85°C
- Packaging information: DIP-20/SOP-20/TSSOP-20/SOIC-20-208mil



Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty
XBLW SN74LS574N	DIP-20	74LS574N	Tube	720Pcs/Box
XBLW SN74LS574DTR	SOP-20	74LS574	Tape	2000Pcs/Reel
XBLW SN74LS574TDTR	TSSOP-20	74LS574	Tape	2000Pcs/Reel
XBLW SN74LS574NSDTR	SOIC-20-208mil	74LS574	Tape	2000Pcs/Reel

Block Diagram

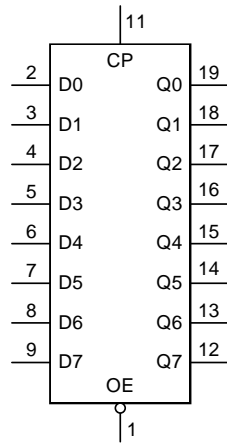


Figure 1. Logic symbol

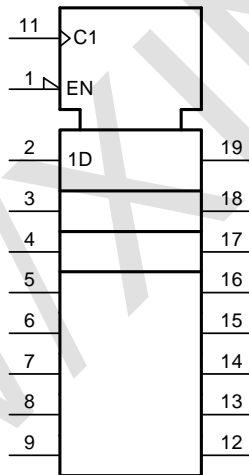


Figure 2. IEC logic symbol

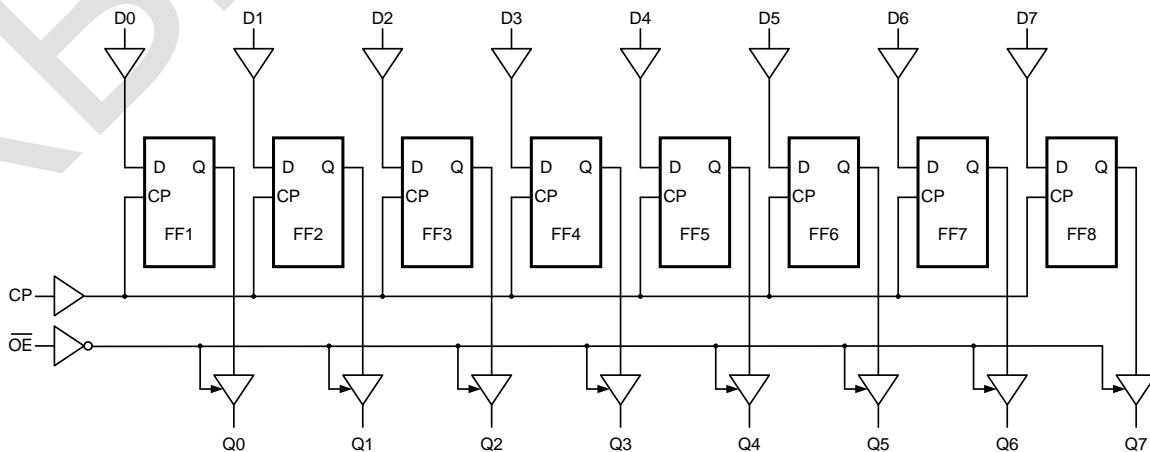


Figure 3. Logic diagram

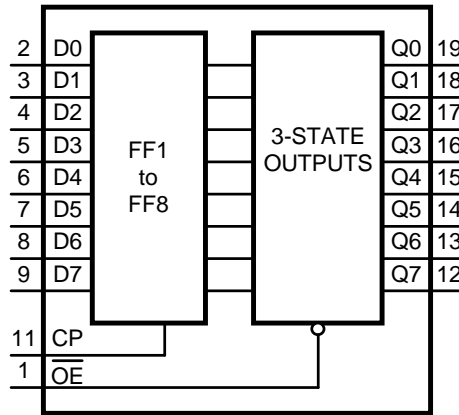
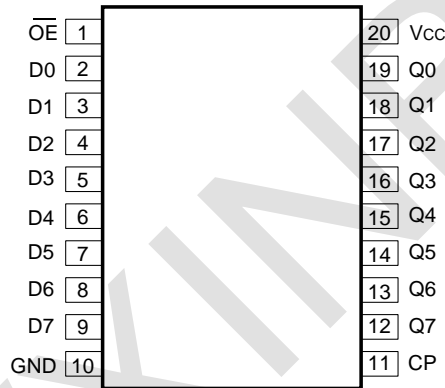


Figure 4. Functional diagram

Pin Configurations



Pin Description

Pin No.	Pin Name	Description
1	OE	3-state output enable input (active LOW)
2	D0	data input
3	D1	data input
4	D2	data input
5	D3	data input
6	D4	data input
7	D5	data input
8	D6	data input
9	D7	data input
10	GND	ground (0V)
11	CP	clock input (LOW-to-HIGH, edge-triggered)
12	Q7	flip-flop output
13	Q6	flip-flop output
14	Q5	flip-flop output
15	Q4	flip-flop output
16	Q3	flip-flop output
17	Q2	flip-flop output
18	Q1	flip-flop output
19	Q0	flip-flop output
20	V _{CC}	supply voltage

Function Table

Operating modes	Input			Internal flip-flop	Output Qn
	\overline{OE}	CP	Dn		
Load and read register	L	↑	l	L	L
	L	↑	h	H	H
Load register and disable output	H	↑	l	L	Z
	H	↑	h	H	Z

Note:

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

h=HIGH voltage level one set-up time prior to the LOW-to-HIGH clock

transition; l=LOW voltage level one set-up time prior to the LOW-to-HIGH clock

transition; ↑=LOW-to-HIGH clock transition.

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
input clamping current	I_{IK}	$V_I < -0.5V$ or $V_I > V_{CC}+0.5V$	-	±20	mA
output clamping current	I_{OK}	$V_O < -0.5V$ or $V_O > V_{CC}+0.5V$	-	±20	mA
output current	I_O	$-0.5V < V_O < V_{CC}+0.5V$	-	±35	mA
supply current	I_{CC}	-	-	70	mA
ground current	I_{GND}	-	-70	-	mA
storage temperature	T_{stg}	-	-65	+150	°C
total power dissipation	P_{tot}	-	-	500	mW
soldering temperature	T_L	10s	DIP	245	°C
			SOP/TSSOP	260	°C

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 voltage	V_O	-	0	-	V_{CC}	V
ambient temperature	T_{amb}	-	-20	-	+85	°C

Electrical Characteristics

DC Characteristics 1

($T_{amb}=25^{\circ}C$, 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	
		$V_{CC}=6.0V$	-	2.8	1.8	V	
HIGH-level output voltage	V_{OH}	$V_I = V_{IH} \text{ or } V_{IL}$	$I_O=-20\mu A; V_{CC}=2.0V$	1.9	2.0	-	V
			$I_O=-20\mu A; V_{CC}=4.5V$	4.4	4.5	-	V
			$I_O=-20\mu A; V_{CC}=6.0V$	5.9	6.0	-	V
			$I_O=-6.0mA; V_{CC}=4.5V$	3.98	4.32	-	V
			$I_O=-7.8mA; V_{CC}=6.0V$	5.48	5.81	-	V
LOW-level output voltage	V_{OL}	$V_I = V_{IH} \text{ or } V_{IL}$	$I_O=20\mu A; V_{CC}=2.0V$	-	0	0.1	V
			$I_O=20\mu A; V_{CC}=4.5V$	-	0	0.1	V
			$I_O=20\mu A; V_{CC}=6.0V$	-	0	0.1	V
			$I_O=6.0mA; V_{CC}=4.5V$	-	0.15	0.26	V
			$I_O=7.8mA; V_{CC}=6.0V$	-	0.16	0.26	V
input leakage current	I_I	$V_I=V_{CC} \text{ or } GND; V_{CC}=6.0V$	-	-	± 1.0	μA	
OFF-state output current	I_{OZ}	$V_I=V_{IH} \text{ or } V_{IL}; V_{CC}=6.0V; V_O=V_{CC} \text{ or } GND$	-	-	± 1.0	μA	
supply current	I_{CC}	$V_I=V_{CC} \text{ or } GND; I_O=0A; V_{CC}=6.0V$	-	-	8.0	μA	
input capacitance	C_I	-	-	3.5	-	pF	

DC Characteristics 2

($T_{amb} = -20^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
HIGH-level input voltage	V_{IH}	$V_{CC}=2.0\text{V}$	1.5	-	-	V	
		$V_{CC}=4.5\text{V}$	3.15	-	-	V	
		$V_{CC}=6.0\text{V}$	4.2	-	-	V	
LOW-level input voltage	V_{IL}	$V_{CC}=2.0\text{V}$	-	-	0.5	V	
		$V_{CC}=4.5\text{V}$	-	-	1.35	V	
		$V_{CC}=6.0\text{V}$	-	-	1.8	V	
HIGH-level output voltage	V_{OH}	$V_I = V_{IH} \text{ or } V_{IL}$	$I_O = -20\mu\text{A}; V_{CC} = 2.0\text{V}$	1.9	-	-	V
			$I_O = -20\mu\text{A}; V_{CC} = 4.5\text{V}$	4.4	-	-	V
			$I_O = -20\mu\text{A}; V_{CC} = 6.0\text{V}$	5.9	-	-	V
			$I_O = -6.0\text{mA}; V_{CC} = 4.5\text{V}$	3.84	-	-	V
			$I_O = -7.8\text{mA}; V_{CC} = 6.0\text{V}$	5.34	-	-	V
LOW-level output voltage	V_{OL}	$V_I = V_{IH} \text{ or } V_{IL}$	$I_O = 20\mu\text{A}; V_{CC} = 2.0\text{V}$	-	-	0.1	V
			$I_O = 20\mu\text{A}; V_{CC} = 4.5\text{V}$	-	-	0.1	V
			$I_O = 20\mu\text{A}; V_{CC} = 6.0\text{V}$	-	-	0.1	V
			$I_O = 6.0\text{mA}; V_{CC} = 4.5\text{V}$	-	-	0.33	V
			$I_O = 7.8\text{mA}; V_{CC} = 6.0\text{V}$	-	-	0.33	V
input leakage current	I_I	$V_I = V_{CC} \text{ or } \text{GND}; V_{CC} = 6.0\text{V}$	-	-	± 2.0	μA	
OFF-state output current	I_{OZ}	$V_I = V_{IH} \text{ or } V_{IL}; V_{CC} = 6.0\text{V}; V_O = V_{CC} \text{ or } \text{GND}$	-	-	± 2.0	μA	
supply current	I_{CC}	$V_I = V_{CC} \text{ or } \text{GND}; I_O = 0\text{A}; V_{CC} = 6.0\text{V}$	-	-	80	μA	

AC Characteristics 1

($T_{amb}=25^{\circ}C$, $GND=0V$, $C_L=50pF$, unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
CP to Qn propagation delay	t_{PLH}, t_{PHL}	see Figure 6	$V_{CC}=2.0V$	-	47	150	ns
			$V_{CC}=4.5V$	-	17	30	ns
			$V_{CC}=5.0V; C_L=15pF$	-	14	-	ns
			$V_{CC}=6.0V$	-	14	26	ns
\bar{OE} to Qn enable time	t_{PZH}, t_{PZL}	see Figure 8	$V_{CC}=2.0V$	-	44	140	ns
			$V_{CC}=4.5V$	-	16	28	ns
			$V_{CC}=6.0V$	-	13	24	ns
\bar{OE} to Qn disable time	t_{PLZ}, t_{PHZ}	see Figure 8	$V_{CC}=2.0V$	-	39	125	ns
			$V_{CC}=4.5V$	-	14	25	ns
			$V_{CC}=6.0V$	-	11	21	ns
transition time	t_{THL}, t_{TLH}	Qn output; see Figure 6	$V_{CC}=2.0V$	-	14	60	ns
			$V_{CC}=4.5V$	-	5	12	ns
			$V_{CC}=6.0V$	-	4	10	ns
pulse width	t_w	CP; HIGH or LOW; see Figure 7	$V_{CC}=2.0V$	80	14	-	ns
			$V_{CC}=4.5V$	16	5	-	ns
			$V_{CC}=6.0V$	14	4	-	ns
Dn to CP set-up time	t_{su}	see Figure 7	$V_{CC}=2.0V$	60	6	-	ns
			$V_{CC}=4.5V$	12	2	-	ns
			$V_{CC}=6.0V$	10	2	-	ns
Dn to CP hold time	t_h	see Figure 7	$V_{CC}=2.0V$	5	0	-	ns
			$V_{CC}=4.5V$	5	0	-	ns
			$V_{CC}=6.0V$	5	0	-	ns
maximum frequency	f_{max}	CP input; see Figure 6	$V_{CC}=2.0V$	6.0	-	-	MHz
			$V_{CC}=4.5V$	30	-	-	MHz
			$V_{CC}=5.0V; C_L=15pF$	32	-	-	MHz
			$V_{CC}=6.0V$	35	-	-	MHz

AC Characteristics 2

($T_{amb} = -20^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, $\text{GND} = 0\text{V}$, $C_L = 50\text{pF}$, unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
CP to Qn propagation delay	t_{PLH}, t_{PHL}	see Figure 6	$V_{CC} = 2.0\text{V}$	-	-	190	ns
			$V_{CC} = 4.5\text{V}$	-	-	35	ns
			$V_{CC} = 6.0\text{V}$	-	-	33	ns
$\bar{O}E$ to Qn enable time	t_{PZH}, t_{PZL}	see Figure 8	$V_{CC} = 2.0\text{V}$	-	-	175	ns
			$V_{CC} = 4.5\text{V}$	-	-	35	ns
			$V_{CC} = 6.0\text{V}$	-	-	30	ns
$\bar{O}E$ to Qn disable time	t_{PLZ}, t_{PHZ}	see Figure 8	$V_{CC} = 2.0\text{V}$	-	-	155	ns
			$V_{CC} = 4.5\text{V}$	-	-	31	ns
			$V_{CC} = 6.0\text{V}$	-	-	26	ns
transition time	t_{THL}, t_{TLH}	Qn output; see Figure 6	$V_{CC} = 2.0\text{V}$	-	-	75	ns
			$V_{CC} = 4.5\text{V}$	-	-	15	ns
			$V_{CC} = 6.0\text{V}$	-	-	13	ns
pulse width	t_w	CP; HIGH or LOW; see Figure 7	$V_{CC} = 2.0\text{V}$	100	-	-	ns
			$V_{CC} = 4.5\text{V}$	20	-	-	ns
			$V_{CC} = 6.0\text{V}$	17	-	-	ns
Dn to CP set-up time	t_{su}	see Figure 7	$V_{CC} = 2.0\text{V}$	75	-	-	ns
			$V_{CC} = 4.5\text{V}$	15	-	-	ns
			$V_{CC} = 6.0\text{V}$	13	-	-	ns
Dn to CP hold time	t_h	see Figure 7	$V_{CC} = 2.0\text{V}$	5	-	-	ns
			$V_{CC} = 4.5\text{V}$	5	-	-	ns
			$V_{CC} = 6.0\text{V}$	5	-	-	ns
maximum frequency	f_{max}	CP input; see Figure 6	$V_{CC} = 2.0\text{V}$	4.8	-	-	MHz
			$V_{CC} = 4.5\text{V}$	24	-	-	MHz
			$V_{CC} = 6.0\text{V}$	28	-	-	MHz

Measurement Points

Type	Input	Output		
	V_M	V_M	V_X	V_Y
SN74LS574	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$0.1 \times V_{CC}$	$0.9 \times V_{CC}$

Test Data

Type	Input		Load		S1 position		
	V_I	t_r, t_f	C_L	R_L	t_{PHL}, t_{PLH}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
SN74LS574	V_{CC}	6ns	15pF, 50pF	1k Ω	open	GND	V_{CC}

Testing Circuit

AC Testing Circuit

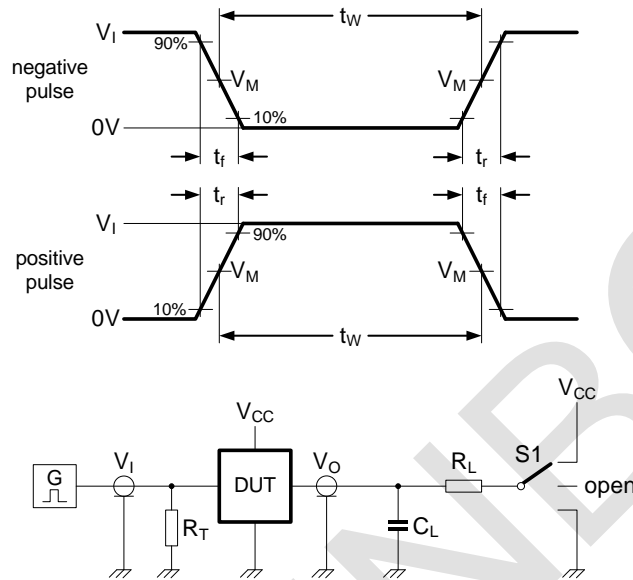


Figure 5. Test circuit for measuring switching times

Definitions for test circuit: R_L =Load resistance.

C_L =Load capacitance including jig and probe capacitance.

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

S1=Test selection switch.

AC Testing Waveforms

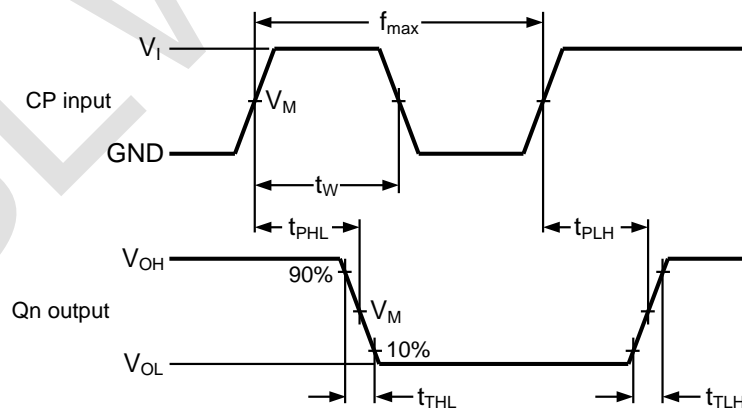
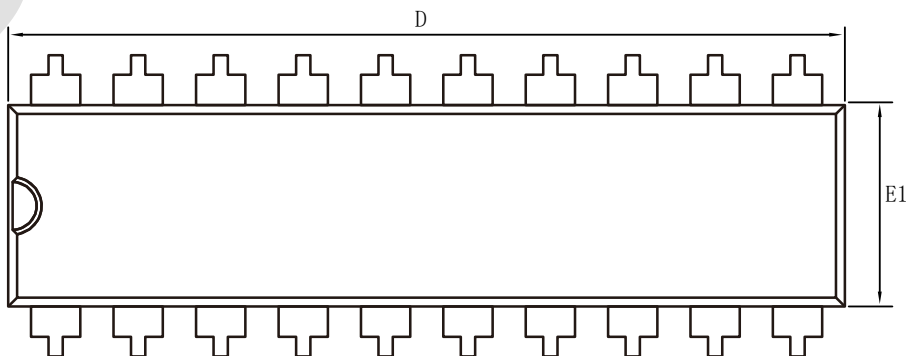
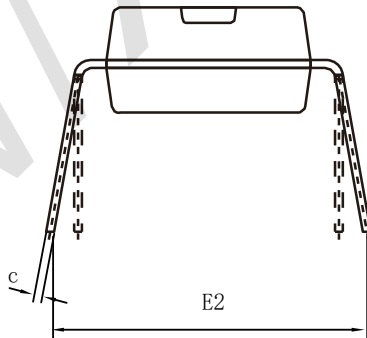
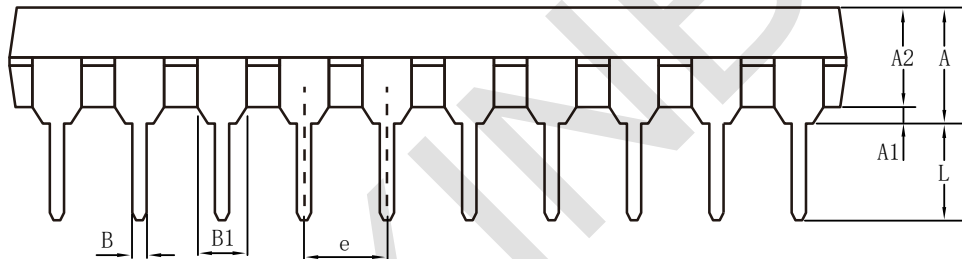


Figure 6. Propagation delay input (CP) to output (Qn), output transition time, clock input (CP) pulse width and the maximum frequency (CP)

Package Information

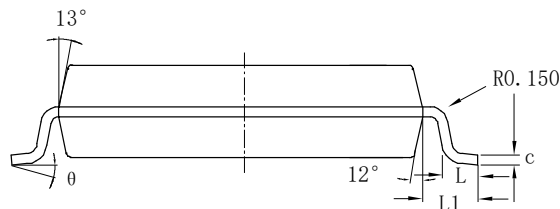
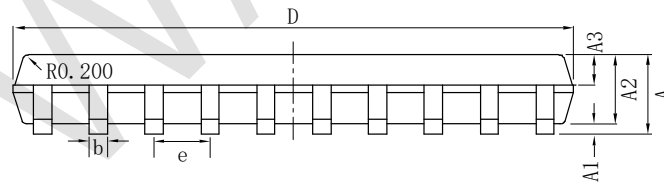
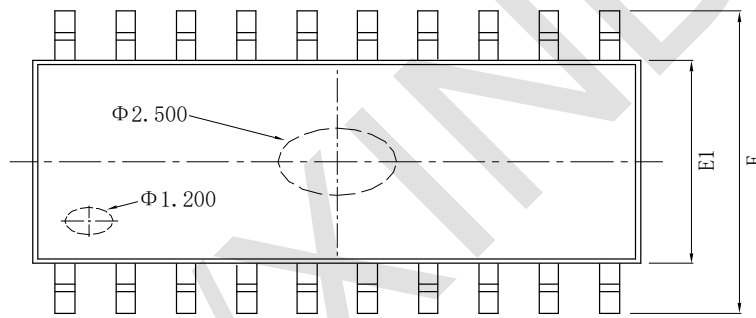
· DIP-20

Symbol	Size	Dimensions In Millimeters		Symbol	Size	Dimensions In Inches	
		Min (mm)	Max (mm)			Min (in)	Max (in)
A		3.600	5.330	A		0.142	0.210
A1		0.510		A1		0.020	
A2		3.200	3.600	A2		0.126	0.142
B		0.360	0.530	B		0.014	0.021
B1		1.52 (BSC)		B1		0.060 (BSC)	
c		0.204	0.360	c		0.008	0.014
D		25.70	26.54	D		1.010	1.040
E1		6.200	6.750	E1		0.244	0.260
E2		7.620	9.300	E2		0.300	0.366
e		2.54 (BSC)		e		0.100 (BSC)	
L		3.000	3.600	L		0.118	0.142



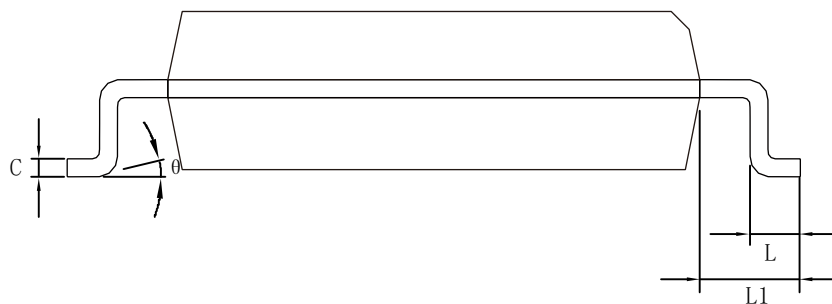
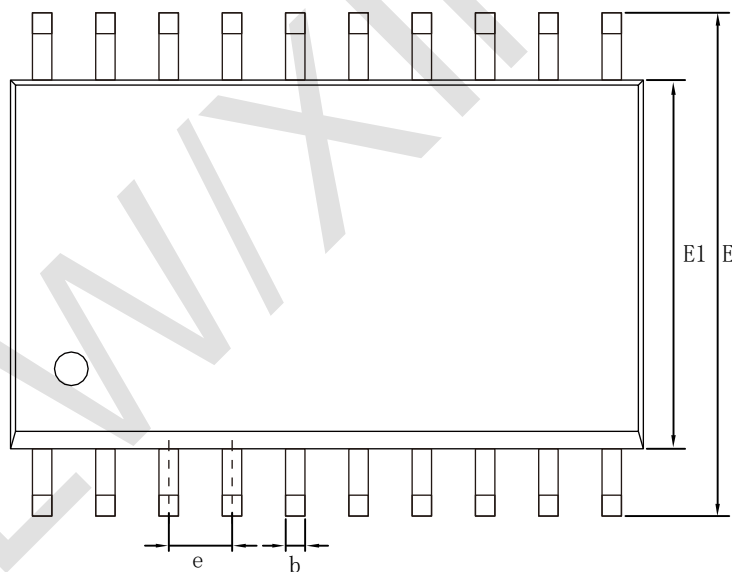
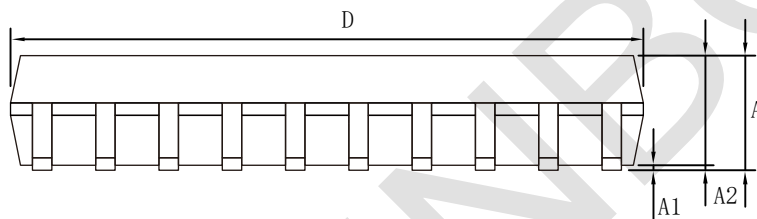
• S01C-20-208mil

Size Symbol	Dimensions In Millimeters		Size Symbol	Dimensions In Inches	
	Min (mm)	Max (mm)		Min (in)	Max (in)
A		2.000	A		0.079
A1	0.050	0.250	A1	0.002	0.010
A2	1.650	1.850	A2	0.065	0.073
b	0.350	0.550	b	0.014	0.022
c	0.150	0.200	c	0.006	0.008
D	12.25	12.65	D	0.482	0.498
E	7.600	8.000	E	0.299	0.315
E1	5.100	5.500	E1	0.201	0.217
e	1.270		e	0.050	
L	0.550	0.950	L	0.022	0.037
L1	1.250		L1	0.049	
θ	0°	8°	θ	0°	8°



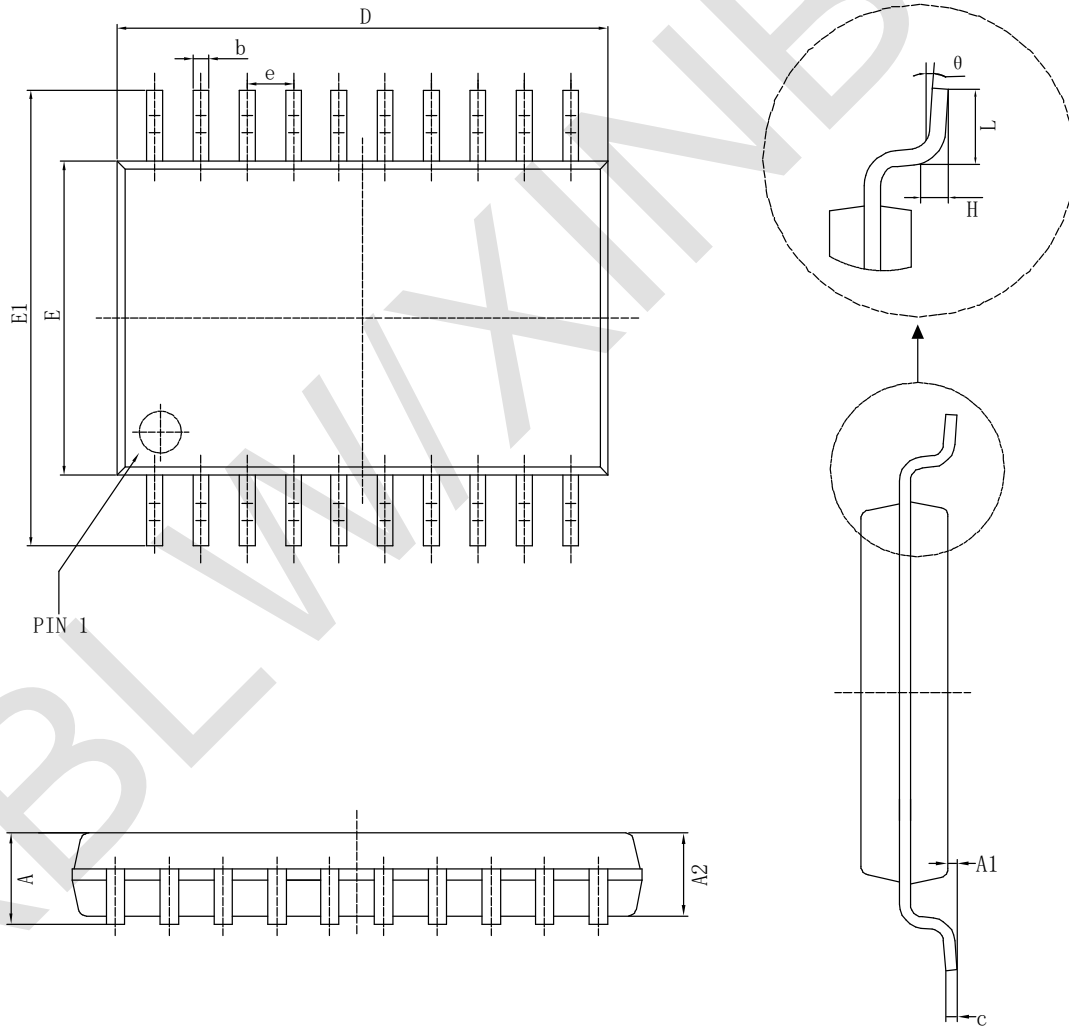
• SOP-20

Symbol	Size	Dimensions In Millimeters		Symbol	Size	Dimensions In Inches	
		Min (mm)	Max (mm)			Min (in)	Max (in)
A		2.470	2.650	A		0.097	0.104
A1		0.050	0.300	A1		0.002	0.012
A2		2.200	2.440	A2		0.087	0.096
b		0.350	0.500	b		0.014	0.020
c		0.150	0.300	c		0.006	0.012
D		12.54	12.94	D		0.494	0.509
E		10.00	10.60	E		0.394	0.417
E1		7.300	7.700	E1		0.287	0.303
e		1.270 (BSC)		e		0.050 (BSC)	
L		0.400	1.050	L		0.016	0.041
L1		1.300	1.500	L1		0.051	0.059
θ		0°	8°	θ		0°	8°



· TSSOP-20

Symbol	Dimensions In Millimeters		Symbol	Dimensions In Inches	
	Min (mm)	Max (mm)		Min (in)	Max (in)
D	6.400	6.600	D	0.252	0.259
E	4.300	4.500	E	0.169	0.177
b	0.190	0.300	b	0.007	0.012
c	0.090	0.200	c	0.004	0.008
E1	6.250	6.550	E1	0.246	0.258
A		1.200	A		0.047
A2	0.800	1.000	A2	0.031	0.039
A1	0.050	0.150	A1	0.002	0.006
e	0.65 (BSC)		e	0.026 (BSC)	
L	0.500	0.700	L	0.020	0.028
H	0.25 (TYP)		H	0.01 (TYP)	
θ	1°	7°	θ	1°	7°



Statement

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