

TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

## TC74HCT573AP, TC74HCT573AF, TC74HCT573AFW

### Octal D-Type Latch with 3-State Output

The TC74HCT573A is a high speed CMOS OCTAL LATCH with 3-STATE OUTPUT fabricated with silicon gate C<sup>2</sup>MOS technology.

It achieves the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation.

Its inputs are compatible with TTL, NMOS, and CMOS output voltage levels.

Its 8-bit D-type latch is controlled by a latch enable input (LE) and a output enable input ( $\overline{OE}$ ).

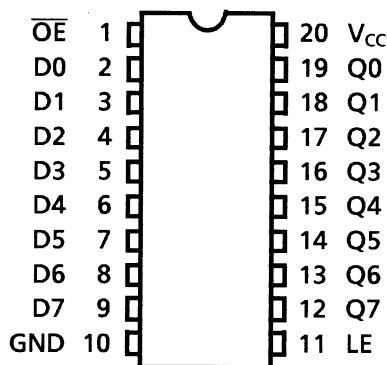
When the  $\overline{OE}$  input is high, the eight outputs are in a high impedance state.

All inputs are equipped with protection circuits against static discharge or transient excess voltage.

### Features

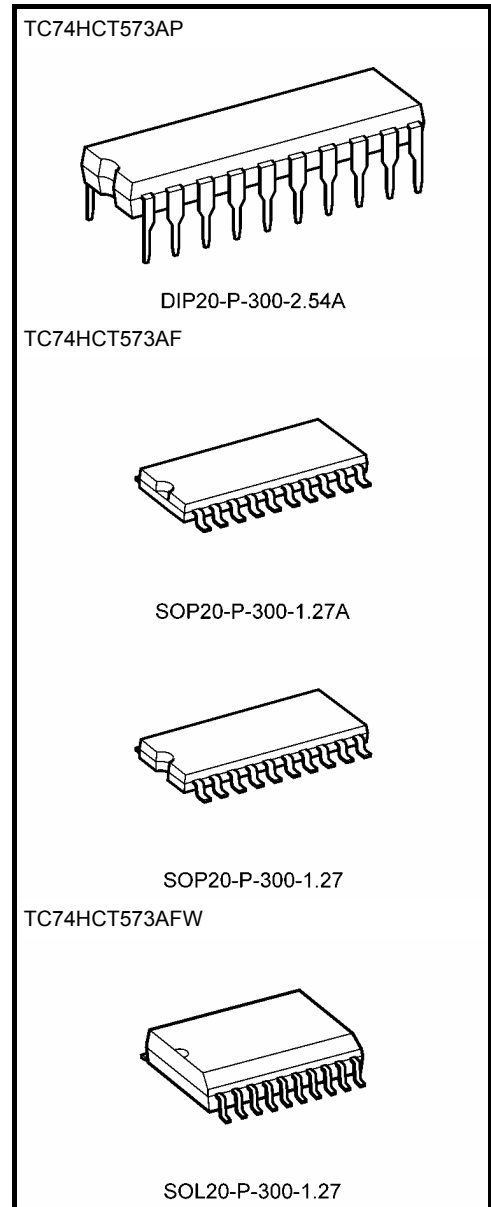
- High speed:  $t_{pd} = 18 \text{ ns (typ.)}$  at  $V_{CC} = 5 \text{ V}$
- Low power dissipation:  $I_{CC} = 4 \mu\text{A (max)}$  at  $T_a = 25^\circ\text{C}$
- Compatible with TTL outputs:  $V_{IL} = 0.8 \text{ V (max)}$   
 $V_{IH} = 2.0 \text{ V (min)}$
- Output drive capability: 15 LSTTL loads
- Symmetrical output impedance:  $|I_{OH}| = I_{OL} = 6 \text{ mA (min)}$
- Balanced propagation delays:  $t_{pLH} \approx t_{pHL}$
- Pin and function compatible with 74LS573

### Pin Assignment



(TOP VIEW)

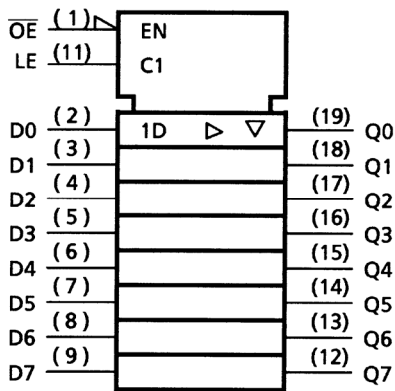
Note: xxxFW (JEDEC SOP) is not available in Japan.



### Weight

DIP20-P-300-2.54A	: 1.30 g (typ.)
SOP20-P-300-1.27A	: 0.22 g (typ.)
SOP20-P-300-1.27	: 0.22 g (typ.)
SOL20-P-300-1.27	: 0.46 g (typ.)

## IEC Logic Symbol



## Truth Table

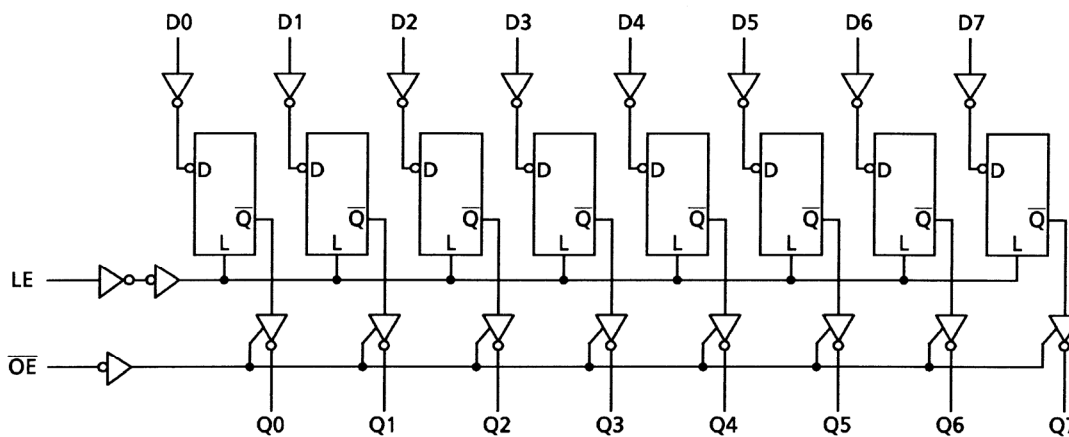
Inputs			Output
$\overline{OE}$	LE	D	Q
H	X	X	Z
L	L	X	$Q_n$
L	H	L	L
L	H	H	H

X: Don't care

Z: High impedance

$Q_n$ : Q outputs are latched at the time when the LE input is taken to a low logic level.

## System Diagram



## Absolute Maximum Ratings (Note 1)

Characteristics	Symbol	Rating	Unit
Supply voltage range	$V_{CC}$	-0.5~7	V
DC input voltage	$V_{IN}$	-0.5~ $V_{CC} + 0.5$	V
DC output voltage	$V_{OUT}$	-0.5~ $V_{CC} + 0.5$	V
Input diode current	$I_{IK}$	$\pm 20$	mA
Output diode current	$I_{OK}$	$\pm 20$	mA
DC output current	$I_{OUT}$	$\pm 35$	mA
DC $V_{CC}$ /ground current	$I_{CC}$	$\pm 75$	mA
Power dissipation	$P_D$	500 (DIP) (Note 2)/180 (SOP)	mW
Storage temperature	$T_{stg}$	-65~150	°C

Note 1: Exceeding any of the absolute maximum ratings, even briefly, lead to deterioration in IC performance or even destruction.

Note 2: 500 mW in the range of  $T_a = -40$  to  $65^\circ\text{C}$ . From  $T_a = 65$  to  $85^\circ\text{C}$  a derating factor of  $-10$  mW/°C shall be applied until 300 mW.

## Recommended Operating Conditions (Note)

Characteristics	Symbol	Rating	Unit
Supply voltage	$V_{CC}$	4.5~5.5	V
Input voltage	$V_{IN}$	0~ $V_{CC}$	V
Output voltage	$V_{OUT}$	0~ $V_{CC}$	V
Operating temperature	$T_{opr}$	-40~85	°C
Input rise and fall time	$t_r, t_f$	0~500	ns

Note: The recommended operating conditions are required to ensure the normal operation of the device. Unused inputs must be tied to either  $V_{CC}$  or GND.

## Electrical Characteristics

### DC Characteristics

Characteristics	Symbol	Test Condition	$T_a = 25^\circ\text{C}$			$T_a = -40\sim 85^\circ\text{C}$		Unit		
			$V_{CC}$ (V)	Min	Typ.	Max	Min		Max	
High-level input voltage	$V_{IH}$	—	4.5~5.5	2.0	—	—	2.0	—	V	
Low-level input voltage	$V_{IL}$	—	4.5~5.5	—	—	0.8	—	0.8	V	
High-level output voltage	$V_{OH}$	$V_{IN} = V_{IH}$ or $V_{IL}$	$I_{OH} = -20 \mu\text{A}$	4.5	4.4	4.5	—	4.4	—	V
			$I_{OH} = -6 \text{ mA}$	4.5	4.18	4.31	—	4.13	—	
Low-level output voltage	$V_{OL}$	$V_{IN} = V_{IH}$ or $V_{IL}$	$I_{OL} = 20 \mu\text{A}$	4.5	—	0.0	0.1	—	0.1	V
			$I_{OL} = 6 \text{ mA}$	4.5	—	0.17	0.26	—	0.33	
3-state output off-state current	$I_{OZ}$	$V_{IN} = V_{IH}$ or $V_{IL}$ $V_{OUT} = V_{CC}$ or GND	5.5	—	—	$\pm 0.5$	—	$\pm 5.0$	$\mu\text{A}$	
Input leakage current	$I_{IN}$	$V_{IN} = V_{CC}$ or GND	5.5	—	—	$\pm 0.1$	—	$\pm 1.0$	$\mu\text{A}$	
Quiescent supply current	$I_{CC}$	$V_{IN} = V_{CC}$ or GND	5.5	—	—	4.0	—	40.0	$\mu\text{A}$	
	$I_C$	Per input: $V_{IN} = 0.5 \text{ V}$ or $2.4 \text{ V}$ Other input: $V_{CC}$ or GND	5.5	—	—	2.0	—	2.9	mA	

## Timing Requirements (input: $t_r = t_f = 6 \text{ ns}$ )

Characteristics	Symbol	Test Condition	Ta = 25°C		Ta = -40~85°C		Unit
			V <sub>CC</sub> (V)	Typ.	Limit	Limit	
Minimum pulse width (LE)	$t_W$ (H)	—	4.5	—	15	19	ns
			5.5	—	14	17	
Minimum set-up time (data)	$t_s$	—	4.5	—	10	13	ns
			5.5	—	9	11	
Minimum hold time (data)	$t_h$	—	4.5	—	5	5	ns
			5.5	—	5	5	

## AC Characteristics (input: $t_r = t_f = 6 \text{ ns}$ )

Characteristics	Symbol	Test Condition	Ta = 25°C			Ta = -40~85°C		Unit		
			CL (pF)	V <sub>CC</sub> (V)	Min	Typ.	Max		Min	Max
Output transition time	$t_{TLH}$	—	50	4.5	—	7	12	—	15	ns
	$t_{THL}$			5.5	—	6	11	—	14	
Propagation delay time (LE-Q)	$t_{pLH}$	—	50	4.5	—	19	29	—	36	ns
				5.5	—	17	26	—	33	
	$t_{pHL}$		150	4.5	—	24	37	—	46	
				5.5	—	22	34	—	43	
Propagation delay time (D-Q)	$t_{pLH}$	—	50	4.5	—	17	26	—	33	ns
				5.5	—	14	23	—	29	
	$t_{pHL}$		150	4.5	—	22	34	—	43	
				5.5	—	20	31	—	39	
Output enable time	$t_{pZL}$	$R_L = 1 \text{ k}\Omega$	50	4.5	—	18	27	—	34	ns
				5.5	—	15	24	—	30	
	$t_{pZH}$		150	4.5	—	23	35	—	44	
				5.5	—	20	32	—	40	
Output disable time	$t_{pLZ}$	$R_L = 1 \text{ k}\Omega$	50	4.5	—	18	24	—	30	ns
				5.5	—	16	22	—	28	
$t_{pHZ}$	150		4.5	—	23	35	—	44		
			5.5	—	20	32	—	40		
Input capacitance	$C_{IN}$	—	—	—	5	10	—	10	pF	
Output capacitance	$C_{OUT}$	—	—	—	10	—	—	—	pF	
Power dissipation capacitance	$C_{PD}$ (Note)	—	—	—	38	—	—	—	pF	

Note:  $C_{PD}$  is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

Average operating current can be obtained by the equation:

$$I_{CC}(\text{opr}) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$$

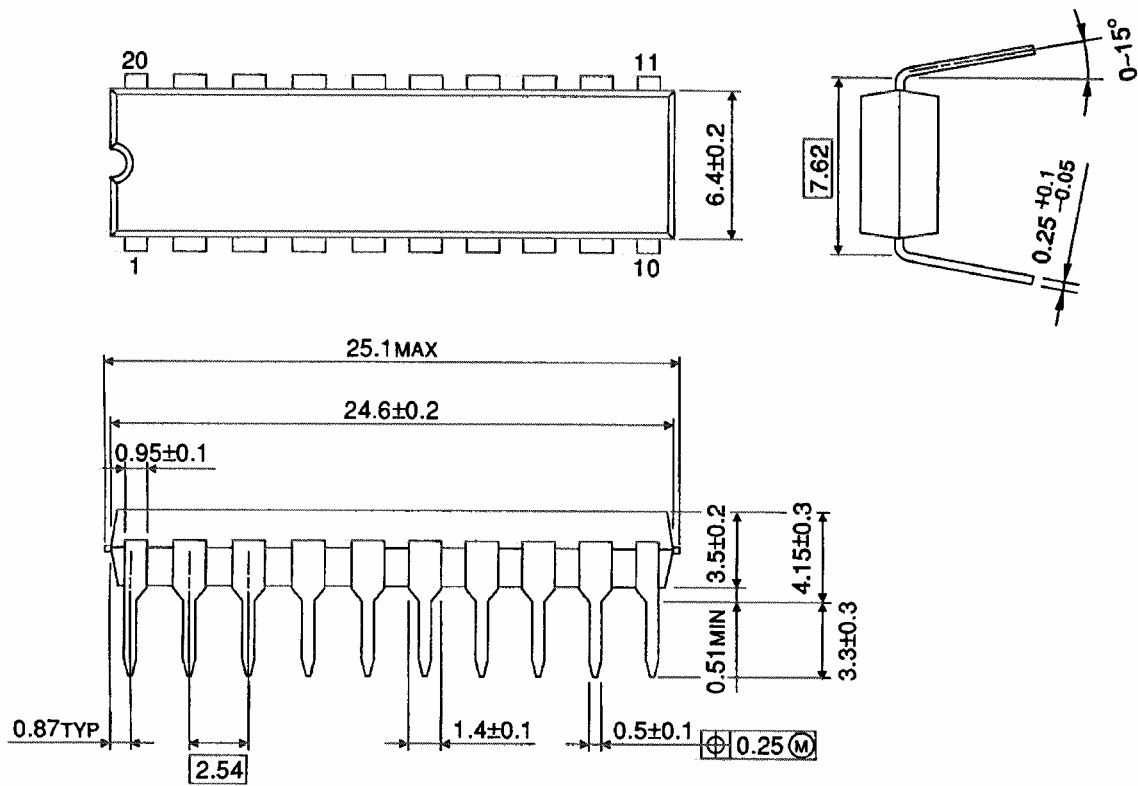
And the total  $C_{PD}$  when n pcs. of latch operate can be gained by the following equation:

$$C_{PD}(\text{total}) = 25 + 13 \cdot n$$

## Package Dimensions

DIP20-P-300-2.54A

Unit : mm

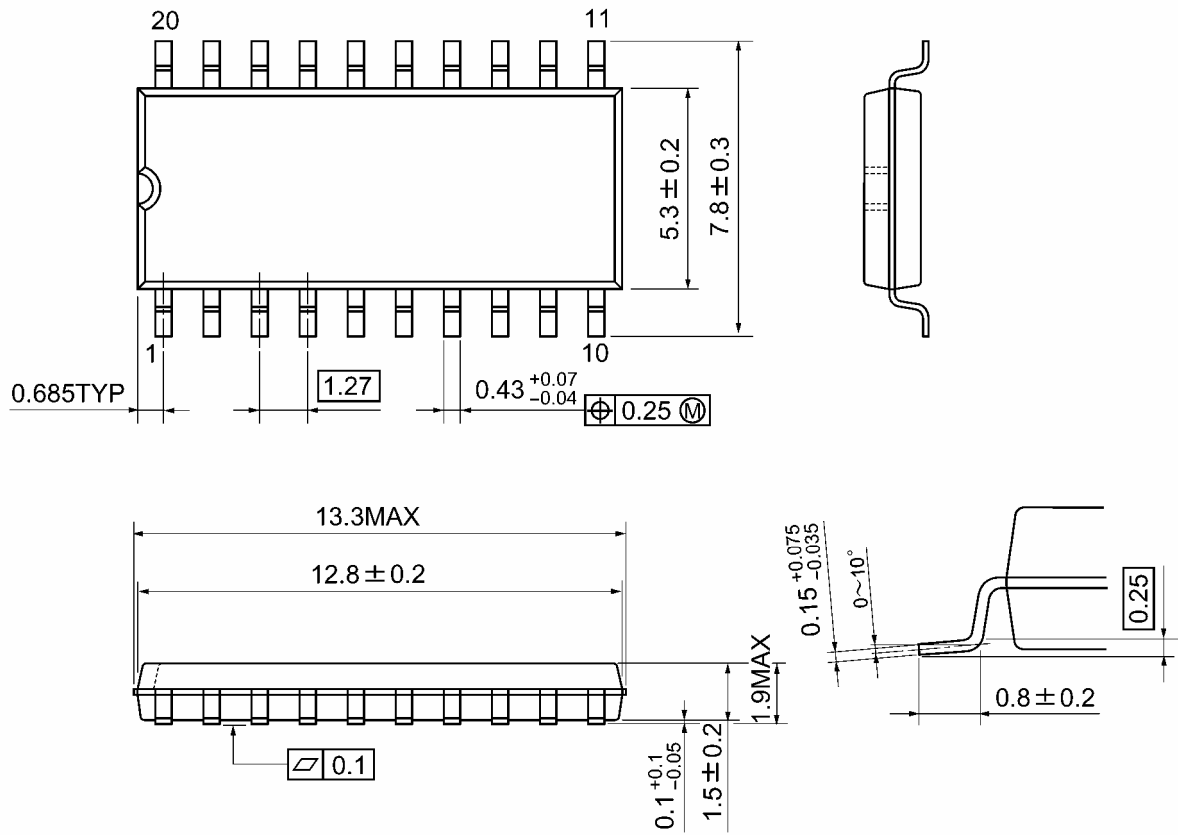


Weight: 1.30 g (typ.)

## Package Dimensions

SOP20-P-300-1.27A

Unit: mm

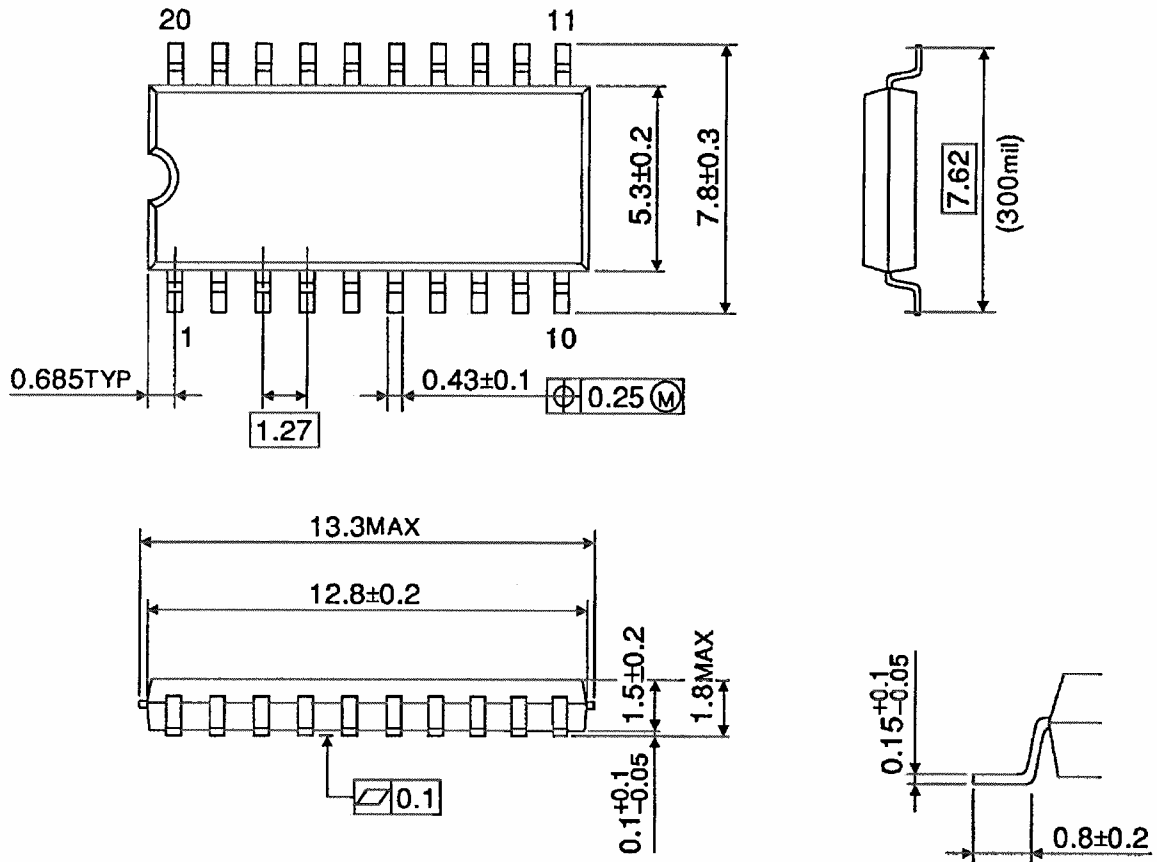


Weight: 0.22 g (typ.)

## Package Dimensions

SOP20-P-300-1.27

Unit : mm

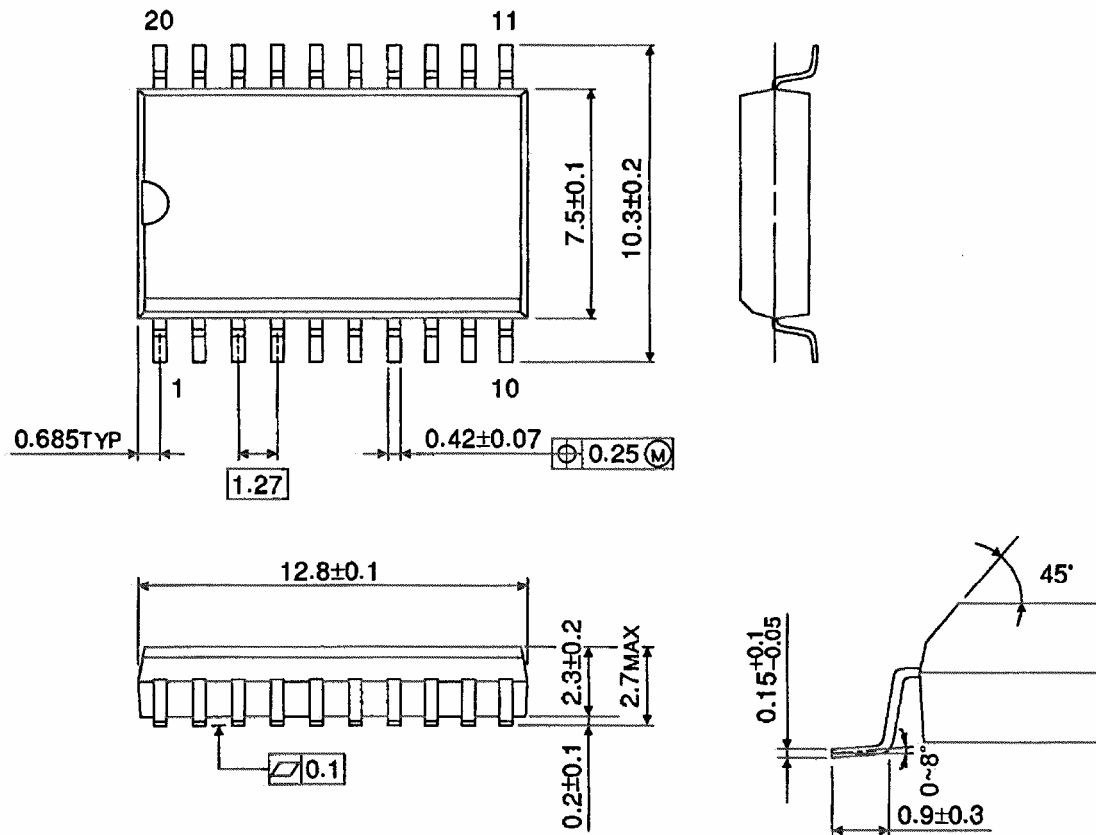


Weight: 0.22 g (typ.)

## Package Dimensions (Note)

SOL20-P-300-1.27

Unit : mm



Note: This package is not available in Japan.

Weight: 0.46 g (typ.)



**Note: Lead (Pb)-Free Packages****DIP20-P-300-2.54A SOP20-P-300-1.27A****RESTRICTIONS ON PRODUCT USE**

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