TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

TC74ACT373P,TC74ACT373F,TC74ACT373FW,TC74ACT373FT

Octal D-Type Latch with 3-State Output

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

The TC74ACT373 is an advanced high speed CMOS OCTAL LATCH with 3-STATE OUTPUT fabricated with silicon gate and double-layer metal wiring C^2MOS technology.

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

This device may be used as a level converter for interfacing TTL or NMOS to High Speed CMOS. The inputs are compatible with TTL, NMOS and CMOS output voltage levels.

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

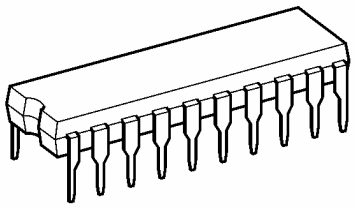
When the ($\overline{OE}$) input is high, the eight outputs are in a high impedance state.

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

Features

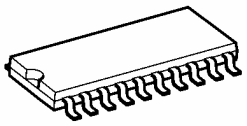
- High speed: t_{pd} = 5.2 ns (typ.) at V_{CC} = 5 V
- Low power dissipation: I_{CC} = 8 μA (max) at Ta = 25°C
- Compatible with TTL outputs: V_{IL} = 0.8 V (max)
  V_{IH} = 2.0 V (min)
- Symmetrical output impedance: $|I_{OH}| = I_{OL}$ = 24 mA (min)
  Capability of driving 50 Ω transmission lines.
- Balanced propagation delays: $t_{pLH} \simeq t_{pHL}$
- Pin and function compatible with 74F373

TC74ACT373P

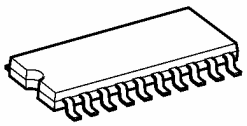


DIP20-P-300-2.54A

TC74ACT373F

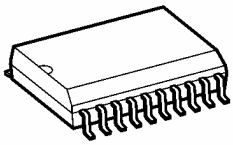


SOP20-P-300-1.27A



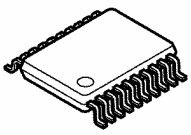
SOP20-P-300-1.27

TC74ACT373FW



SOL20-P-300-1.27

TC74ACT373FT

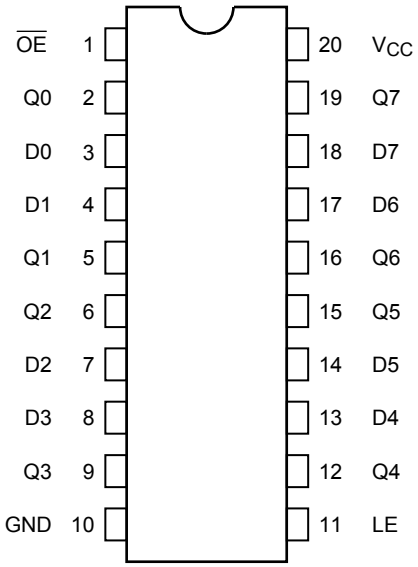


TSSOP20-P-0044-0.65A

Weight

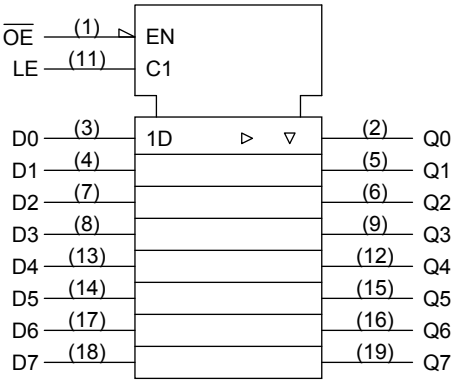
DIP20-P-300-2.54A	: 1.30 g (typ.)
SOP20-P-300-1.27A	: 0.22 g (typ.)
SOP20-P-300-1.27	: 0.22 g (typ.)
SOL20-P-300-1.27	: 0.46 g (typ.)
TSSOP20-P-0044-0.65A	: 0.08 g (typ.)

Pin Assignment



(top view)

IEC Logic Symbol



Truth Table

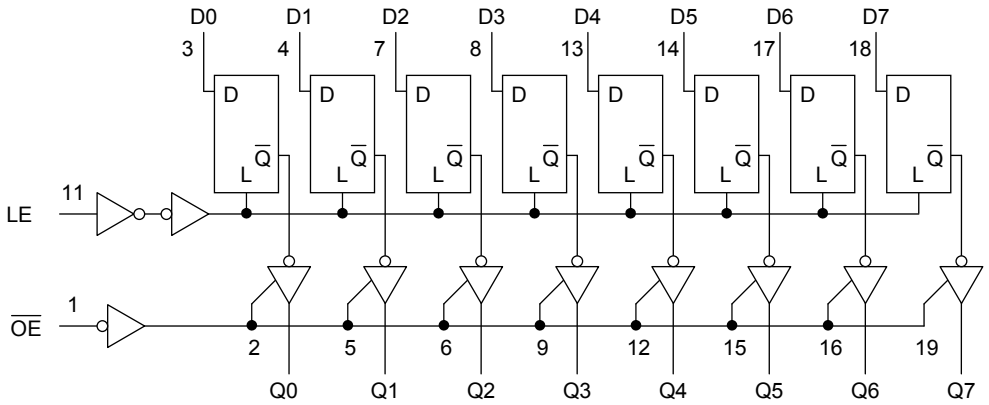
Inputs			Output
$\overline{OE}$	LE	D	Q
H	X	X	Z
L	L	X	Q_n
L	H	L	L
L	H	H	H

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 to 7.0	V
DC input voltage	V_{IN}	−0.5 to V_{CC} + 0.5	V
DC output voltage	V_{OUT}	−0.5 to V_{CC} + 0.5	V
Input diode current	I_{IK}	±20	mA
Output diode current	I_{OK}	±50	mA
DC output current	I_{OUT}	±50	mA
DC V_{CC}/ground current	I_{CC}	±200	mA
Power dissipation	P_D	500 (DIP) (Note 2)/180 (SOP/TSSOP)	mW
Storage temperature	T_{stg}	−65 to 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 Ta = −40 to 65°C. From Ta = 65 to 85°C a derating factor of −10 mW/°C should be applied up to 300 mW.

Recommended Operating Conditions (Note)

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	4.5 to 5.5	V
Input voltage	V_{IN}	0 to V_{CC}	V
Output voltage	V_{OUT}	0 to V_{CC}	V
Operating temperature	T_{opr}	−40 to 85	°C
Input rise and fall time	dt/dV	0 to 10	ns/V

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

Electrical Characteristics

DC Characteristics

Characteristics	Symbol	Test Condition			Ta = 25°C			Ta = −40 to 85°C		Unit
				V_{CC} (V)	Min	Typ.	Max	Min	Max	
High-level input voltage	V_{IH}	—		4.5 to 5.5	2.0	—	—	2.0	—	V
Low-level input voltage	V_{IL}	—		4.5 to 5.5	—	—	0.8	—	0.8	V
High-level output voltage	V_{OH}	V_{IN} = V_{IH} or V_{IL}	I_{OH} = −50 μA	4.5	4.4	4.5	—	4.4	—	V
			I_{OH} = −24 mA	4.5	3.94	—	—	3.80	—	
			I_{OH} = −75 mA (Note)	5.5	—	—	—	3.85	—	
Low-level output voltage	V_{OL}	V_{IN} = V_{IH} or V_{IL}	I_{OL} = 50 μA	4.5	—	0.0	0.1	—	0.1	V
			I_{OL} = 24 mA	4.5	—	—	0.36	—	0.44	
			I_{OL} = 75 mA (Note)	5.5	—	—	—	—	1.65	
3-state output off-state current	I_{OZ}	V_{IN} = V_{IH} or V_{IL} V_{OUT} = V_{CC} or GND		5.5	—	—	±0.5	—	±5.0	μA
Input leakage current	I_{IN}	V_{IN} = V_{CC} or GND		5.5	—	—	±0.1	—	±1.0	μA
Quiescent supply current	I_{CC}	V_{IN} = V_{CC} or GND		5.5	—	—	8.0	—	80.0	μA
	I_C	Per input: V_{IN} = 3.4 V Other input: V_{CC} or GND		5.5	—	—	1.35	—	1.5	mA

Note: This spec indicates the capability of driving 50 Ω transmission lines.

One output should be tested at a time for a 10 ms maximum duration.

Timing Requirements (input: $t_r = t_f = 3$ ns)

Characteristics	Symbol	Test Condition	Ta = 25°C		Ta = −40 to 85°C	Unit
		V_{CC} (V)	Limit	Limit	Limit	
Minimum pulse width (LE)	$t_{w\,(H)}$	—	5.0 ± 0.5	—	5.0	5.0	ns
Minimum set-up time	t_s	—	5.0 ± 0.5	—	2.0	2.0	ns
Minimum hold time	t_h	—	5.0 ± 0.5	—	3.0	3.0	ns

AC Characteristics (C_L = 50 pF, R_L = 500 Ω, input: $t_r = t_f$ = 3 ns)

Characteristics	Symbol	Test Condition	Ta = 25°C			Ta = −40 to 85°C		Unit
		V_{CC} (V)	Min	Typ.	Max	Min	Max	
Propagation delay time (LE-Q)	t_{pLH} t_{pHL}	— 5.0 ± 0.5	—	5.8	9.2	1.0	10.5	ns
Propagation delay time (D-Q)	t_{pLH} t_{pHL}	— 5.0 ± 0.5	—	5.9	9.6	1.0	11.0	ns
Output enable time	t_{pZL} t_{pZH}	— 5.0 ± 0.5	—	6.5	10.5	1.0	12.0	ns
Output disable time	t_{pLZ} t_{pHZ}	— 5.0 ± 0.5	—	5.5	7.8	1.0	9.0	ns
Input capacitance	C_{IN}	—	—	5	10	—	10	pF
Output capacitance	C_{OUT}	—	—	10	—	—	—	pF
Power dissipation capacitance	C_{PD}	(Note)	—	32	—	—	—	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:

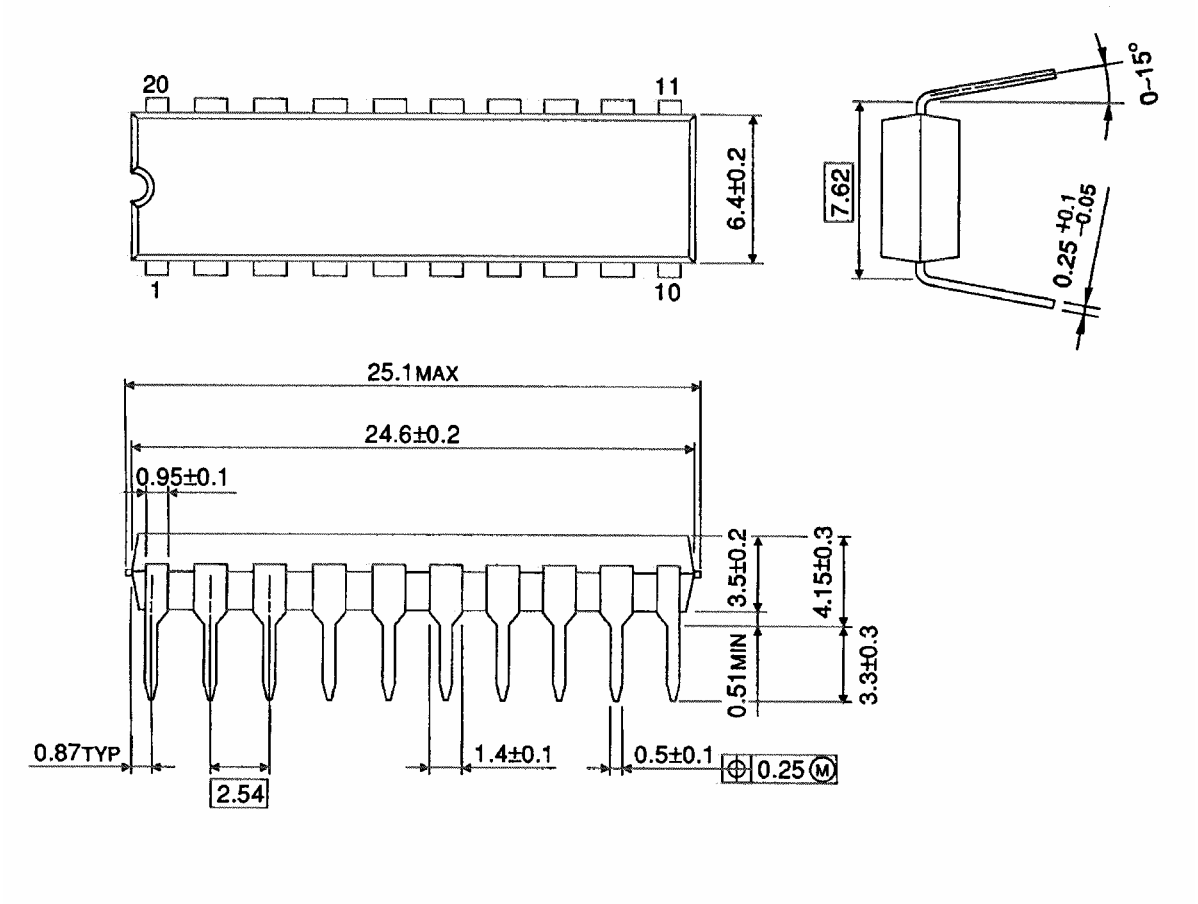
$I_{CC\ (opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/8$ (per latch)

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

C_{PD} (total) = 20 + 12·n

Package Dimensions

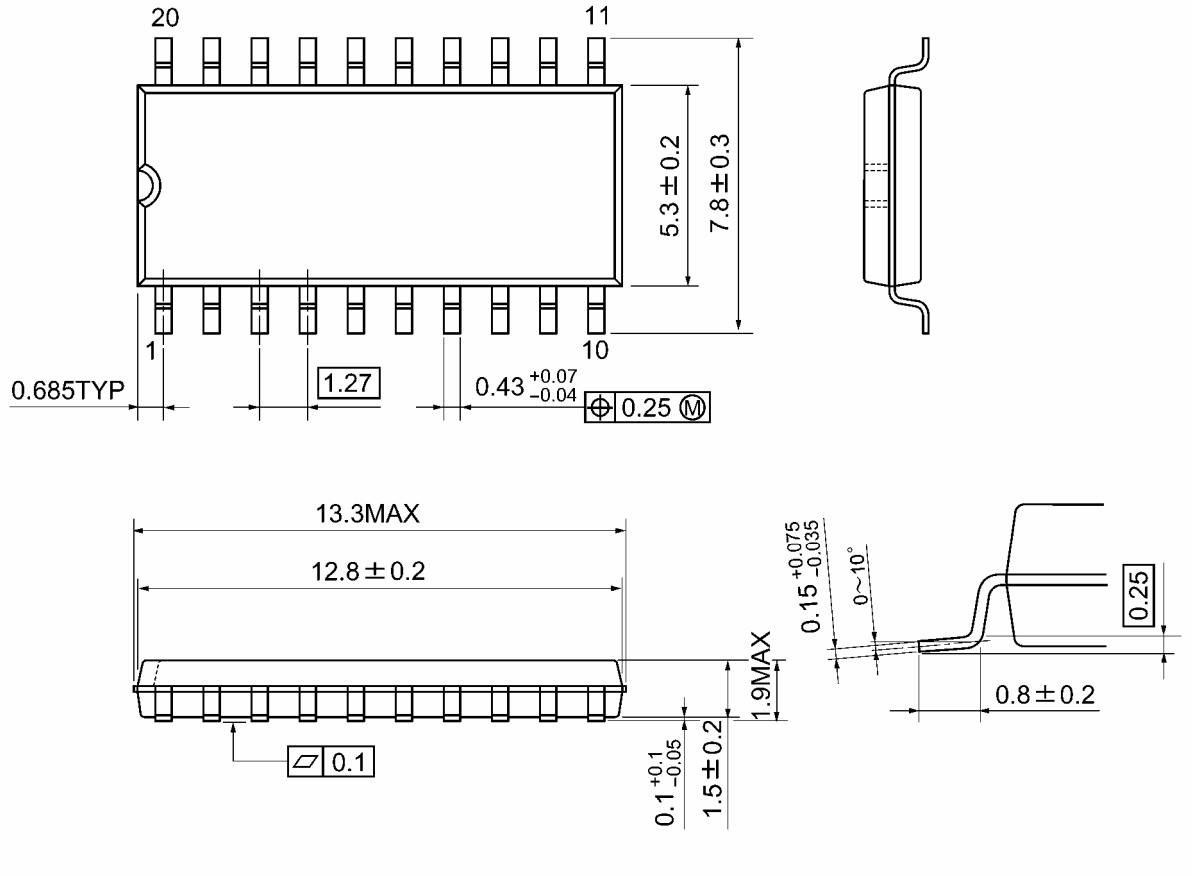
DIP20-P-300-2.54A Unit : mm



Weight: 1.30 g (typ.)

Package Dimensions

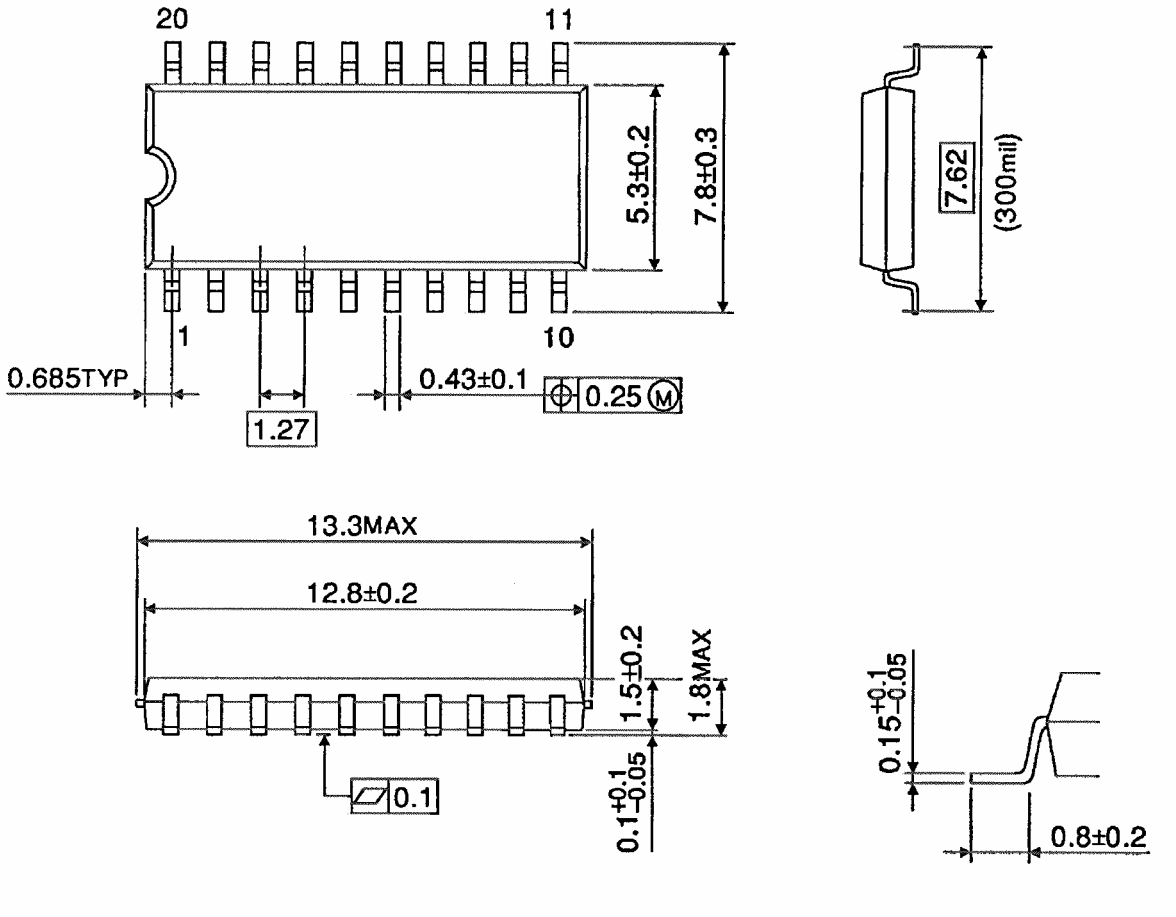
SOP20-P-300-1.27A Unit: mm



Weight: 0.22 g (typ.)

Package Dimensions

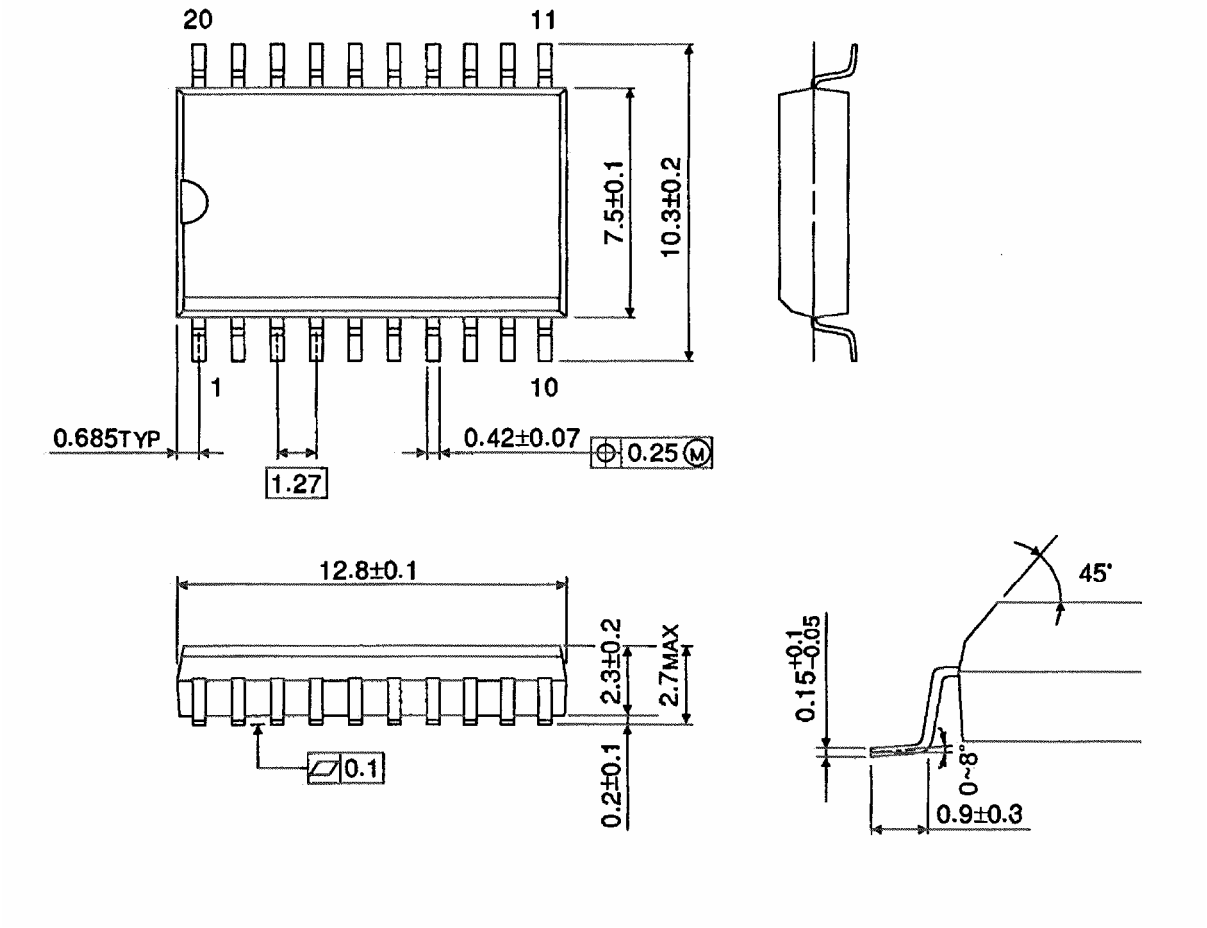
SOP20-P-300-1.27 Unit : mm



Weight: 0.22 g (typ.)

Package Dimensions (Note)

SOL20-P-300-1.27 Unit : mm

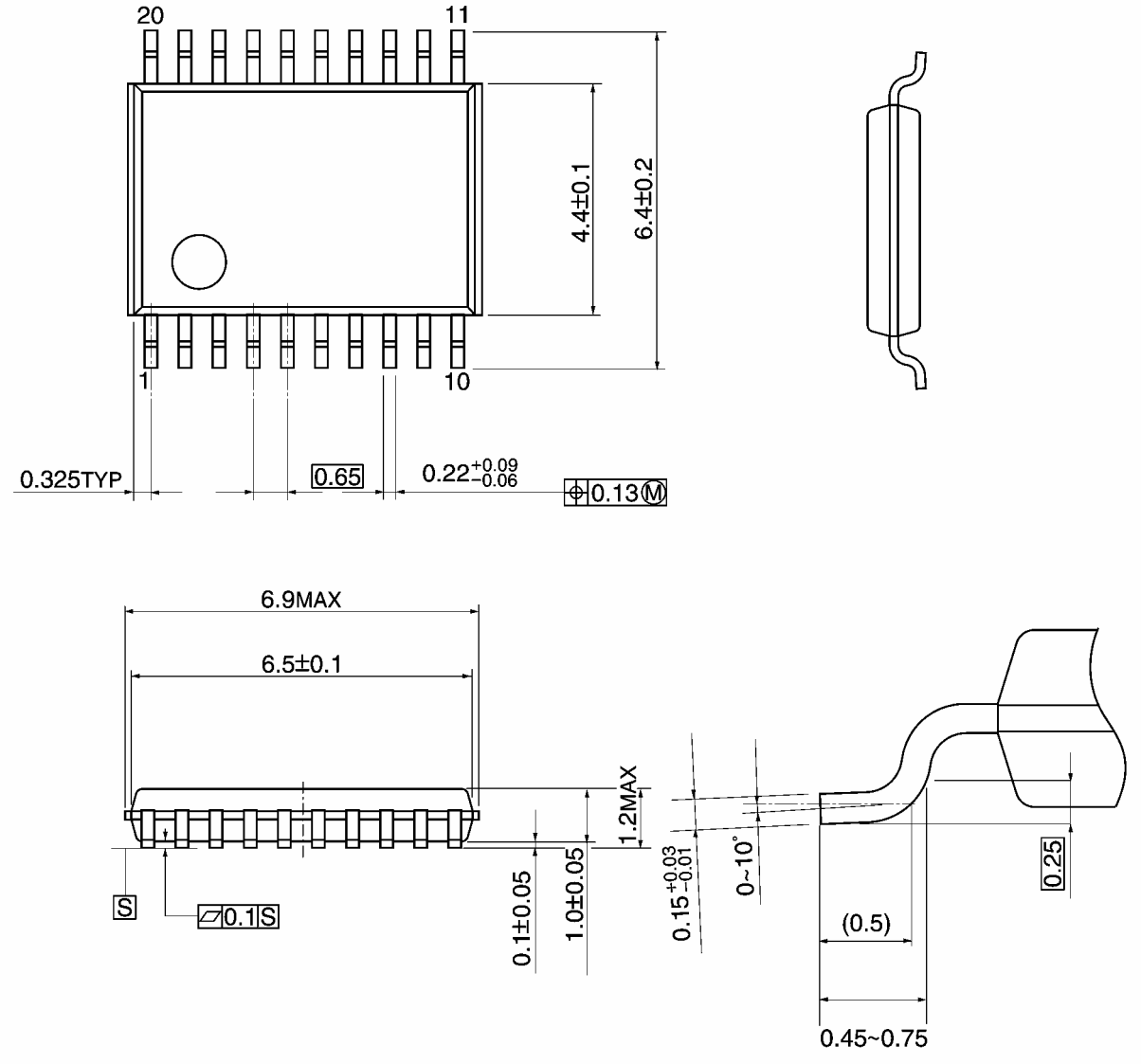


Note: This package is not available in Japan.

Weight: 0.46 g (typ.)

Package Dimensions

TSSOP20-P-0044-0.65A Unit: mm



Weight: 0.08 g (typ.)

Note: Lead (Pb)-Free Packages

DIP20-P-300-2.54A SOP20-P-300-1.27A TSSOP20-P-0044-0.65A

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20070701-EN

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