

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

**TC74AC373P, TC74AC373F, TC74AC373FW, TC74AC373FT**

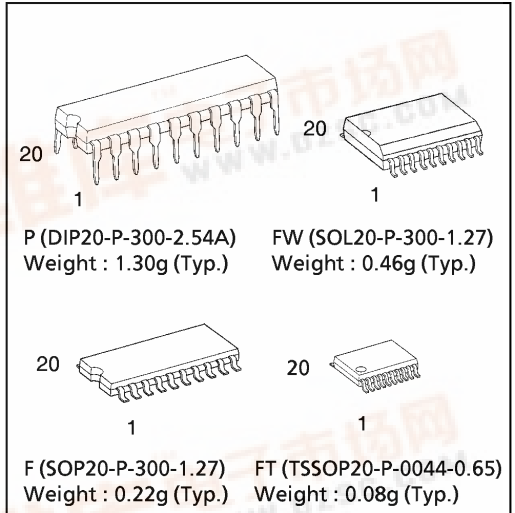
**OCTAL D-TYPE LATCH WITH 3-STATE OUTPUT**

The TC74AC373 is an advanced high speed CMOS OCTAL LATCH with 3-STATE OUTPUT fabricated with silicon gate and double-layer metal wiring C<sup>2</sup>MOS technology. It achieves the high speed operation similar to equivalent Bipolar Schottky TTL while maintaining the CMOS low power dissipation. These 8-bit D-type latches are 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.

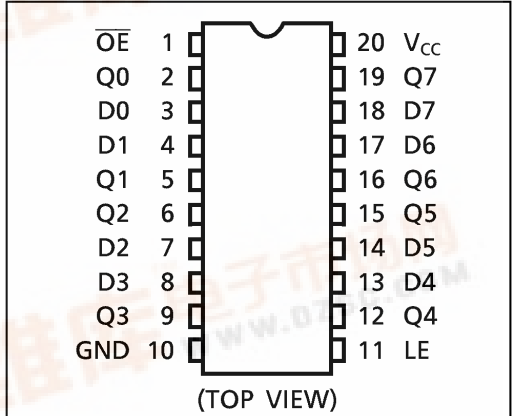
**FEATURES :**

- High Speed.....  $t_{pd} = 4.8ns$ (typ.) at  $V_{CC} = 5V$
- Low Power Dissipation.....  $I_{CC} = 8\mu A$ (Max.) at  $T_a = 25^\circ C$
- High Noise Immunity.....  $V_{NIH} = V_{NIL} = 28\% V_{CC}$  (Min.)
- Symmetrical Output Impedance...  $|I_{OH}| = |I_{OL}| = 24mA$ (Min.)  
Capability of driving 50 $\Omega$  transmission lines.
- Balanced Propagation Delays.....  $t_{pLH} \approx t_{pHL}$
- Wide Operating Voltage Range...  $V_{CC}$  (opr) = 2V~5.5V
- Pin and Function Compatible with 74F373

(Note) The JEDEC SOP (FW) is not available in Japan.



**PIN ASSIGNMENT**

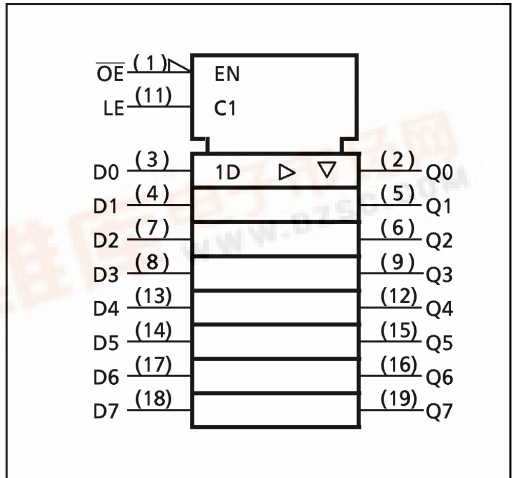


**TRUTH TABLE**

INPUTS			OUTPUTS
$\overline{OE}$	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.

**IEC LOGIC SYMBOL**

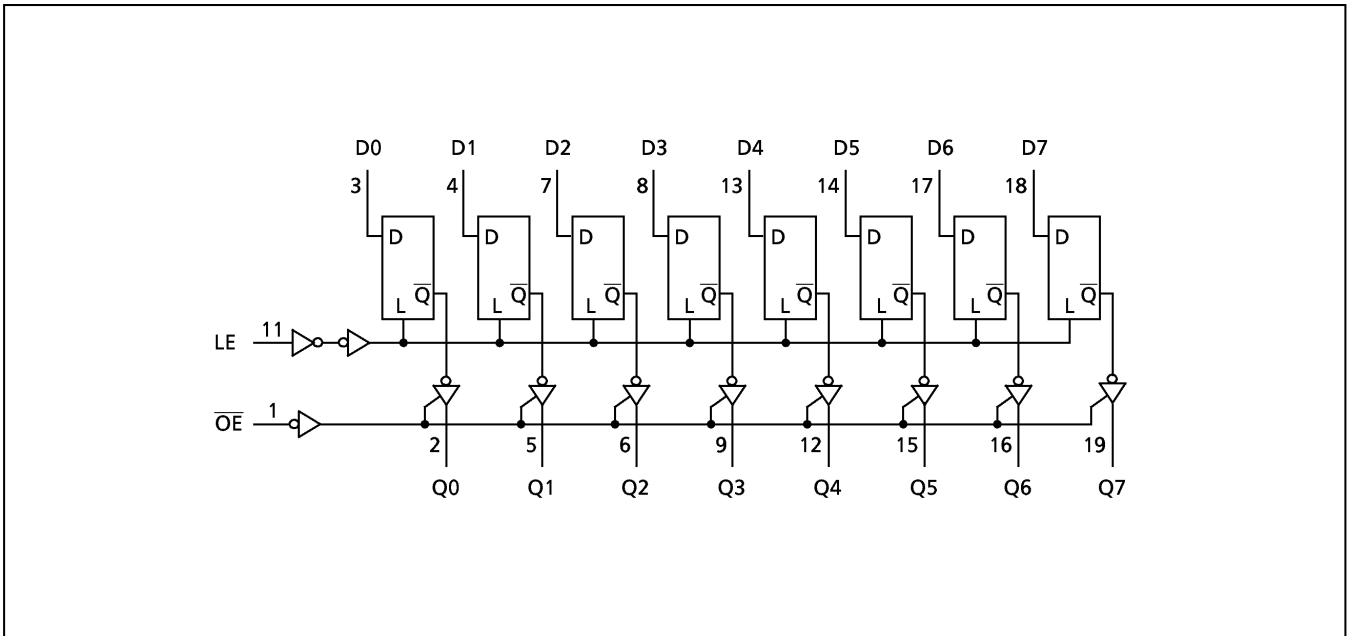


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**SYSTEM DIAGRAM**



**ABSOLUTE MAXIMUM RATINGS**

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	$V_{CC}$	-0.5~7.0	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	$I_{OK}$	$\pm 50$	mA
DC Output Current	$I_{OUT}$	$\pm 50$	mA
DC $V_{CC}$ /Ground Current	$I_{CC}$	$\pm 200$	mA
Power Dissipation	$P_D$	500 (DIP)* / 180 (SOP/TSSOP)	mW
Storage Temperature	$T_{stg}$	-65~150	°C

\*500mW in the range of  $T_a = -40^{\circ}\text{C} \sim 65^{\circ}\text{C}$ . From  $T_a = 65^{\circ}\text{C}$  to  $85^{\circ}\text{C}$  a derating factor of  $-10\text{mW}/^{\circ}\text{C}$  should be applied up to 300mW.

**RECOMMENDED OPERATING CONDITIONS**

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	$V_{CC}$	2.0~5.5	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	dt/dV	0~ 100 ( $V_{CC} = 3.3 \pm 0.3\text{V}$ ) 0~ 20 ( $V_{CC} = 5 \pm 0.5\text{V}$ )	ns/V

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**DC ELECTRICAL CHARACTERISTICS**

PARAMETER	SYMBOL	TEST CONDITION	V <sub>CC</sub> (V)	Ta = 25°C			Ta = -40~85°C		UNIT	
				MIN.	TYP.	MAX.	MIN.	MAX.		
High - Level Input Voltage	V <sub>IH</sub>		2.0 3.0 5.5	1.50 2.10 3.85	— — —	— — —	1.50 2.10 3.85	— — —	V	
Low - Level Input Voltage	V <sub>IL</sub>		2.0 3.0 5.5	— — —	— — —	0.50 0.90 1.65	— — —	0.50 0.90 1.65	V	
High - Level Output Voltage	V <sub>OH</sub>	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = -50μA	2.0	1.9	2.0	—	1.9	—	V
				3.0	2.9	3.0	—	2.9	—	
				4.5	4.4	4.5	—	4.4	—	
			I <sub>OH</sub> = -4mA I <sub>OH</sub> = -24mA I <sub>OH</sub> = -75mA*	3.0	2.58	—	—	2.48	—	V
				4.5	3.94	—	—	3.80	—	
				5.5	—	—	—	3.85	—	
Low - Level Output Voltage	V <sub>OL</sub>	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 50μA	2.0	—	0.0	0.1	—	0.1	V
				3.0	—	0.0	0.1	—	0.1	
				4.5	—	0.0	0.1	—	0.1	
			I <sub>OL</sub> = 12mA I <sub>OL</sub> = 24mA I <sub>OL</sub> = 75mA*	3.0	—	—	0.36	—	0.44	V
				4.5	—	—	0.36	—	0.44	
				5.5	—	—	—	—	1.65	
3 - State Output Off - State Current	I <sub>OZ</sub>	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> V <sub>OUT</sub> = V <sub>CC</sub> or GND	5.5	—	—	± 0.5	—	± 5.0	μA	
Input Leakage Current	I <sub>IN</sub>	V <sub>IN</sub> = V <sub>CC</sub> or GND	5.5	—	—	± 0.1	—	± 1.0		
Quiescent Supply Current	I <sub>CC</sub>	V <sub>IN</sub> = V <sub>CC</sub> or GND	5.5	—	—	8.0	—	80.0		

\* : This spec indicates the capability of driving 50Ω transmission lines.  
One output should be tested at a time for a 10ms maximum duration.

**TIMING REQUIREMENTS (Input t<sub>r</sub> = t<sub>f</sub> = 3ns)**

PARAMETER	SYMBOL	TEST CONDITION	Ta = 25°C		Ta = -40~85°C		UNIT
			V <sub>CC</sub> (V)	LIMIT	LIMIT	LIMIT	
Minimum Pulse Width (LE)	t <sub>W</sub> (H)		3.3 ± 0.3	7.0	7.0	7.0	ns
			5.0 ± 0.5	5.0	5.0	5.0	
Minimum Set - up Time	t <sub>s</sub>		3.3 ± 0.3	6.0	6.0	6.0	
			5.0 ± 0.5	3.5	3.5	3.5	
Minimum Hold Time	t <sub>h</sub>		3.3 ± 0.3	1.0	1.0	1.0	
			5.0 ± 0.5	1.0	1.0	1.0	

AC ELECTRICAL CHARACTERISTICS (  $C_L = 50\text{pF}$ ,  $R_L = 500\Omega$ , Input  $t_r = t_f = 3\text{ns}$  )

PARAMETER	SYMBOL	TEST CONDITION	Ta = 25°C			Ta = -40~85°C		UNIT	
			V <sub>CC</sub> (V)	MIN.	TYP.	MAX.	MIN.		MAX.
Propagation Delay Time (LE-Q)	t <sub>pLH</sub> t <sub>pHL</sub>		3.3 ± 0.3	—	7.7	13.2	1.0	15.0	ns
			5.0 ± 0.5	—	6.1	8.7	1.0	10.0	
Propagation Delay Time (D-Q)	t <sub>pLH</sub> t <sub>pHL</sub>		3.3 ± 0.3	—	7.6	12.9	1.0	14.7	
			5.0 ± 0.5	—	5.8	8.3	1.0	9.5	
Output Enable Time	t <sub>pZL</sub> t <sub>pZH</sub>		3.3 ± 0.3	—	7.6	12.9	1.0	14.7	
			5.0 ± 0.5	—	6.1	8.7	1.0	10.0	
Output Disable Time	t <sub>pLZ</sub> t <sub>pHZ</sub>		3.3 ± 0.3	—	7.0	11.0	1.0	12.5	
			5.0 ± 0.5	—	5.4	7.5	1.0	8.5	
Input Capacitance	C <sub>IN</sub>		—	5	10	—	10	pF	
Output Capacitance	C <sub>OUT</sub>		—	10	—	—	—		
Power Dissipation Capacitance	C <sub>PD</sub> (1)		—	38	—	—	—		

Note (1) C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption.

Average operating current can be obtained by the equation :

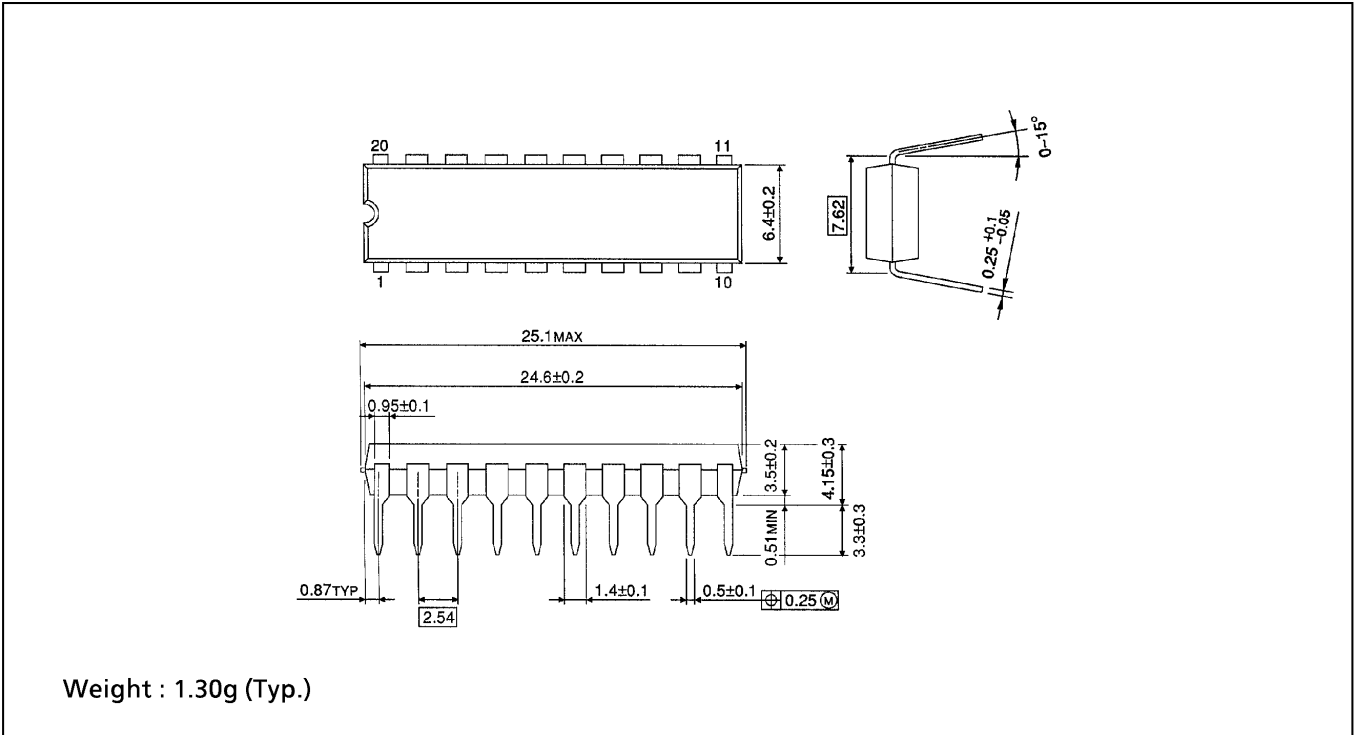
$$I_{CC(opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} \cdot I_{CC} / 8(\text{per Latch})$$

And the total C<sub>PD</sub> when n pcs. of Latch operate can be gained by the following equation :

$$C_{PD}(\text{total}) = 26 + 12 \cdot n$$

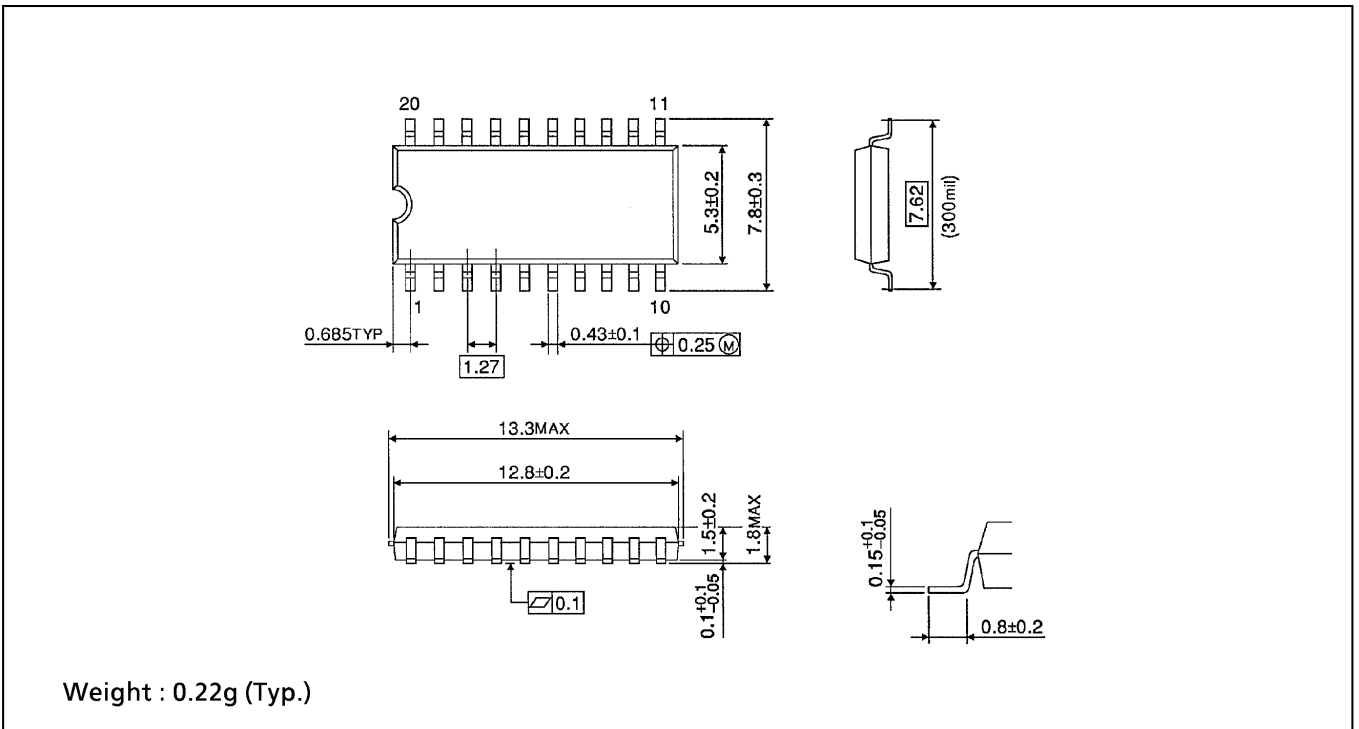
**DIP 20PIN OUTLINE DRAWING (DIP20-P-300-2.54A)**

Unit in mm



**SOP 20PIN (200mil BODY) OUTLINE DRAWING (SOP20-P-300-1.27)**

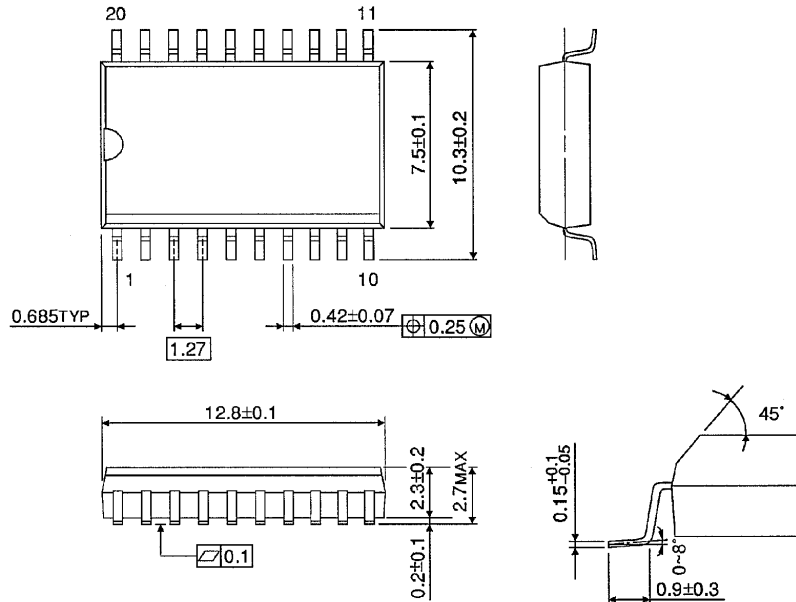
Unit in mm



**SOP 20PIN (300mil BODY) OUTLINE DRAWING (SOL20-P-300-1.27)**

Unit in mm

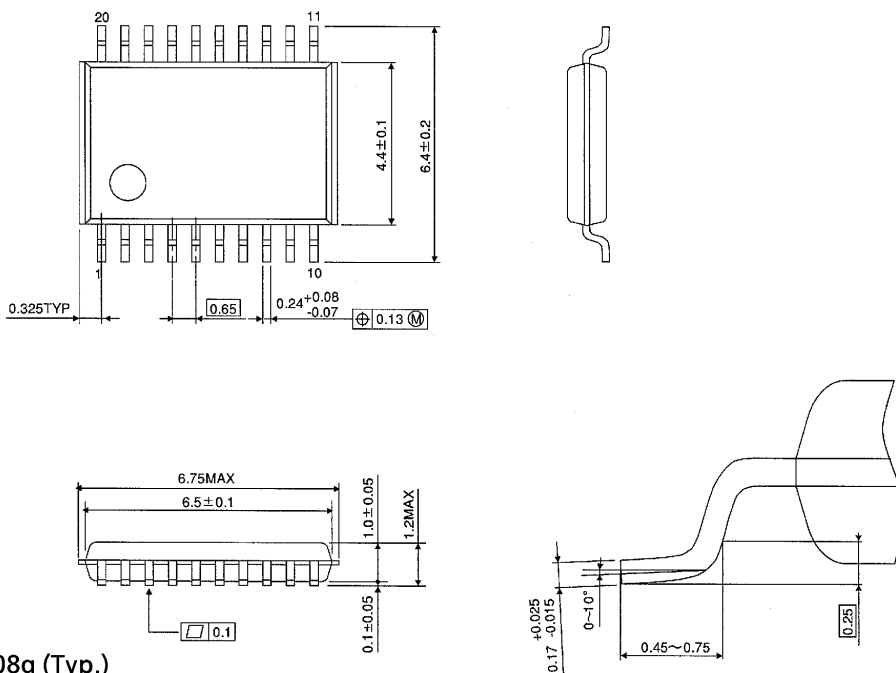
(Note) This package is not available in Japan.



Weight : 0.46g (Typ.)

**TSSOP 20PIN OUTLINE DRAWING (TSSOP20-P-0044-0.65)**

Unit in mm



Weight : 0.08g (Typ.)