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TOSHIBA CMOS Digital Integrated Circuit　　Silicon Monolithic

TC74LVX240F,TC74LVX240FW,TC74LVX240FT
TC74LVX244F,TC74LVX244FW,TC74LVX244FT

Octal Bus Buffer

TC74LVX240 Inverted, 3-State Outputs

TC74LVX244 Non-Inverted, 3-State Outputs

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

The TC74LVX240,244F/ FW/ FT is a high-speed CMOS OCTAL BUS BUFFER fabricated using silicon gate CMOS technology. Designed for use in 3-V systems, it achieves high-speed operation while maintaining the CMOS low power dissipation. This device is suitable for low-voltage and battery operated systems.

The TC74LVX240 is an inverting 3-state buffer while the TC74LVX244 is non-inverting. Both devices have two active-low output enables. These devices are designed to be used in such applications as 3-state memory address drivers.
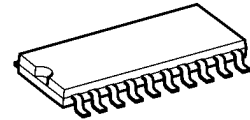
An input protection circuit ensures that 0 to 5.5V can be applied to the input pins without regard to the supply voltage. This device can be used to interface 5V to 3V systems and two supply systems such as battery back up. This circuit prevents device destruction due to mismatched supply and input voltages.
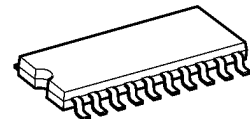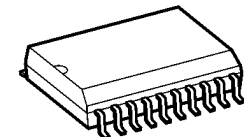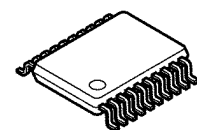
TC74LVX240F, TC74LVX244F

SOP20-P-300-1.27A

SOP20-P-300-1.27

TC74LVX240FW, TC74LVX244FW

SOL20-P-300-1.27

TC74LVX240FT, TC74LVX244FT

TSSOP20-P-0044-0.65A

Weight
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.)

Features

- High-speed: t_{pd} = 4.7 ns (typ.) (V_{CC} = 3.3 V)
- Low power dissipation: I_{CC} = 4 μA (max) (Ta = 25°C)
- Input voltage level: V_{IL} = 0.8 V (max) (V_{CC} = 3 V)
  V_{IH} = 2.0 V (min) (V_{CC} = 3 V)
- Power-down protection provided on all inputs
- Balanced propagation delays: $t_{pLH} \simeq t_{pHL}$
- Low niose: V_{OLP} = 0.8 V (max)
- Pin and function compatible with 74HC240/244

Pin Assignment (top view)

TC74LVX240

1$\overline{G}$	1		20	V$_{CC}$
1A1	2		19	2$\overline{G}$
2$\overline{Y}$4	3		18	1$\overline{Y}$1
1A2	4		17	2A4
2$\overline{Y}$3	5		16	1$\overline{Y}$2
1A3	6		15	2A3
2$\overline{Y}$2	7		14	1$\overline{Y}$3
1A4	8		13	2A2
2$\overline{Y}$1	9		12	1$\overline{Y}$4
GND	10		11	2A1

TC74LVX244

1$\overline{G}$	1		20	V$_{CC}$
1A1	2		19	2$\overline{G}$
2Y4	3		18	1Y1
1A2	4		17	2A4
2Y3	5		16	1Y2
1A3	6		15	2A3
2Y2	7		14	1Y3
1A4	8		13	2A2
2Y1	9		12	1Y4
GND	10		11	2A1

IEC Logic Symbol

TC74LVX240

1$\overline{G}$ (1) EN

1A1 (2)	$\triangleright$	$\triangledown$	(18) 1$\overline{Y}$1
1A2 (4)			(16) 1$\overline{Y}$2
1A3 (6)			(14) 1$\overline{Y}$3
1A4 (8)			(12) 1$\overline{Y}$4

2$\overline{G}$ (19) EN

2A1 (11)	$\triangleright$	$\triangledown$	(9) 2$\overline{Y}$1
2A2 (13)			(7) 2$\overline{Y}$2
2A3 (15)			(5) 2$\overline{Y}$3
2A4 (17)			(3) 2$\overline{Y}$4

TC74LVX244

1$\overline{G}$ (1) EN

1A1 (2)	$\triangleright$	$\triangledown$	(18) 1Y1
1A2 (4)			(16) 1Y2
1A3 (6)			(14) 1Y3
1A4 (8)			(12) 1Y4

2$\overline{G}$ (19) EN

2A1 (11)	$\triangleright$	$\triangledown$	(9) 2Y1
2A2 (13)			(7) 2Y2
2A3 (15)			(5) 2Y3
2A4 (17)			(3) 2Y4

Truth Table

Inputs		Outputs	
$\overline{G}$	A$_n$	Y$_{n\,(244)}$	$\overline{Y}_{n\,(240)}$
L	L	L	H
L	H	H	L
H	X	Z	Z

X: Don't care

Z: High impedance

Absolute Maximum Ratings (Note)

Characteristics	Symbol	Rating	Unit
Supply voltage range	V_{CC}	−0.5 to 7.0	V
DC input voltage	V_{IN}	−0.5 to 7.0	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}	±20	mA
DC output current	I_{OUT}	±25	mA
DC V_{CC}/ground current	I_{CC}	±75	mA
Power dissipation	P_D	180	mW
Storage temperature	T_{stg}	−65 to 150	°C

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

Recommended Operating Conditions (Note)

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	2.0 to 3.6	V
Input voltage	V_{IN}	0 to 5.5	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 100	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		Sym-bol	Test Condition		V_{CC} (V)	Ta = 25°C			Ta = −40 to 85°C		Unit
						Min	Typ.	Max	Min	Max	
Input voltage	H-level	V_{IH}	—		2.0	1.5	—	—	1.5	—	V
					3.0	2.0	—	—	2.0	—	
					3.6	2.4	—	—	2.4	—	
	L-level	V_{IL}	—		2.0	—	—	0.5	—	0.5	
					3.0	—	—	0.8	—	0.8	
					3.6	—	—	0.8	—	0.8	
Output voltage	H-level	V_{OH}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OH} = -50~\mu A$	2.0	1.9	2.0	—	1.9	—	V
				$I_{OH} = -50~\mu A$	3.0	2.9	3.0	—	2.9	—	
				$I_{OH} = -4~mA$	3.0	2.58	—	—	2.48	—	
	L-level	V_{OL}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OL} = 50~\mu A$	2.0	—	0	0.1	—	0.1	
				$I_{OL} = 50~\mu A$	3.0	—	0	0.1	—	0.1	
				$I_{OL} = 4~mA$	3.0	—	—	0.36	—	0.44	
3-State output Off-state current		I_{OZ}	$V_{IN} = V_{IH}$ or V_{IL} $V_{OUT} = V_{CC}$ or GND		3.6	—	—	±0.25	—	±2.5	μA
Input leakage current		I_{IN}	V_{IN} = 5.5 V or GND		3.6	—	—	±0.1	—	±1.0	μA
Quiescent supply current		I_{CC}	$V_{IN} = V_{CC}$ or GND		3.6	—	—	4.0	—	40.0	μA

2006-06-01

AC Characteristics (input: $t_r = t_f = 3$ ns)

Characteristics	Symbol	Test Condition			Ta = 25°C			Ta = −40 to 85°C		Unit
			V_{CC} (V)	C_L (pF)	Min	Typ.	Max	Min	Max	
Propagation delay time (TC74LVX240)	t_{pLH}	—	2.7	15	—	5.7	10.1	1.0	12.5	ns
				50	—	8.2	13.6	1.0	16.0	
	t_{pHL}		3.3 ± 0.3	15	—	4.3	6.2	1.0	7.5	
				50	—	6.8	9.7	1.0	11.0	
Propagation delay time (TC74LVX244)	t_{pLH}	—	2.7	15	—	6.1	11.4	1.0	13.5	ns
				50	—	8.6	14.9	1.0	17.0	
	t_{pHL}		3.3 ± 0.3	15	—	4.7	7.1	1.0	8.5	
				50	—	7.2	10.6	1.0	12.0	
Output enable time	t_{pZL}	$R_L = 1$ kΩ	2.7	15	—	7.1	13.8	1.0	16.5	ns
				50	—	9.6	17.3	1.0	20.0	
	t_{pZH}		3.3 ± 0.3	15	—	5.5	8.8	1.0	10.5	
				50	—	8.0	12.3	1.0	14.0	
Output disable time	t_{pLZ}	$R_L = 1$ kΩ	2.7	50	—	11.6	16.0	1.0	19.0	ns
	t_{pHZ}		3.3 ± 0.3	50	—	9.7	11.4	1.0	13.0	
Output to output skew	t_{osLH}	(Note 1)	2.7	50	—	—	1.5	—	1.5	ns
	t_{osHL}		3.3 ± 0.3	50	—	—	1.5	—	1.5	
Input capacitance	C_{IN}	(Note 2)			—	4	10	—	10	pF
Output capacitance	C_{OUT}	—			—	6	—	—	—	pF
Power dissipation capacitance (Note 3)	C_{PD}	TC74LVX240			—	17	—	—	—	pF
		TC74LVX244			—	19	—	—	—	

Note 1: Parameter guaranteed by design.

$(t_{osLH} = |t_{pLHm} − t_{pLHn}|, t_{osHL} = |t_{pHLm} − t_{pHLn}|)$

Note 2: Parameter guaranteed by design.

Note 3: C_{PD} 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:

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

Noise Characteristics (Ta = 25°C, input: $t_r = t_f$ = 3 ns, C_L = 50 pF)

Characteristics	Symbol	Test Condition	V_{CC} (V)	Typ.	Limit	Unit
Quiet output maximum dynamic V_{OL}	V_{OLP}	—	3.3	0.5	0.8	V
Quiet output minimum dynamic V_{OL}	V_{OLV}	—	3.3	−0.5	−0.8	V
Minimum high level dynamic input voltage V_{IH}	V_{IHD}	—	3.3	—	2.0	V
Maximum low level dynamic input voltage V_{IL}	V_{ILD}	—	3.3	—	0.8	V

Input Equivalent Circuit
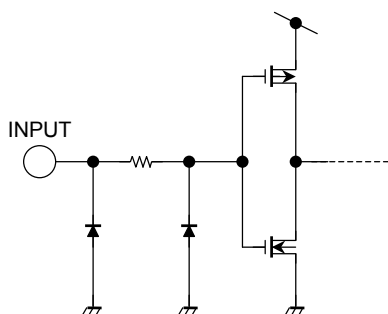
Package Dimensions

SOP20-P-300-1.27A   Unit: mm
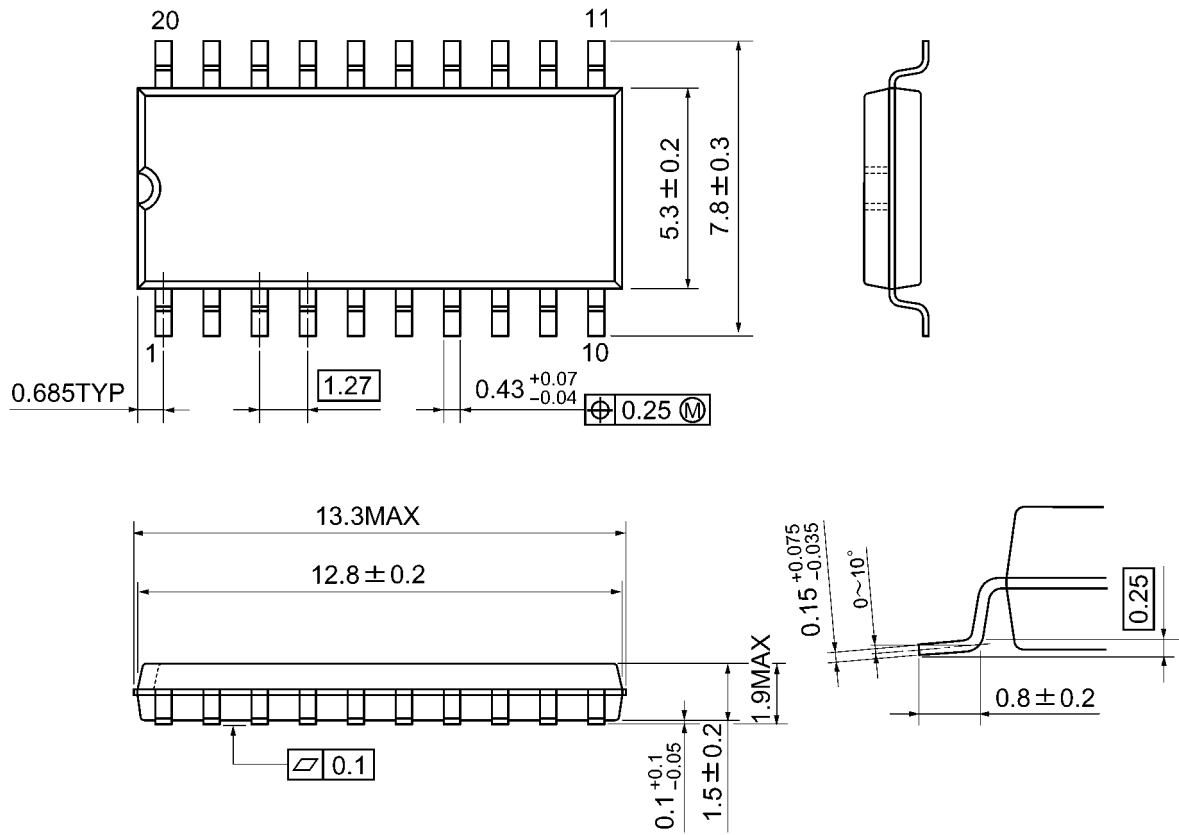
Weight: 0.22 g (typ.)

Package Dimensions

SOP20-P-300-1.27

Unit : mm

20   11

5.3±0.2   7.8±0.3

1   10

0.685TYP

1.27

0.43±0.1

⊕ 0.25 Ⓜ

7.62
(300mil)

13.3MAX

12.8±0.2

1.5±0.2   1.8MAX

0.1 +0.1 -0.05

⬦ 0.1

0.15 +0.1 -0.05

0.8±0.2
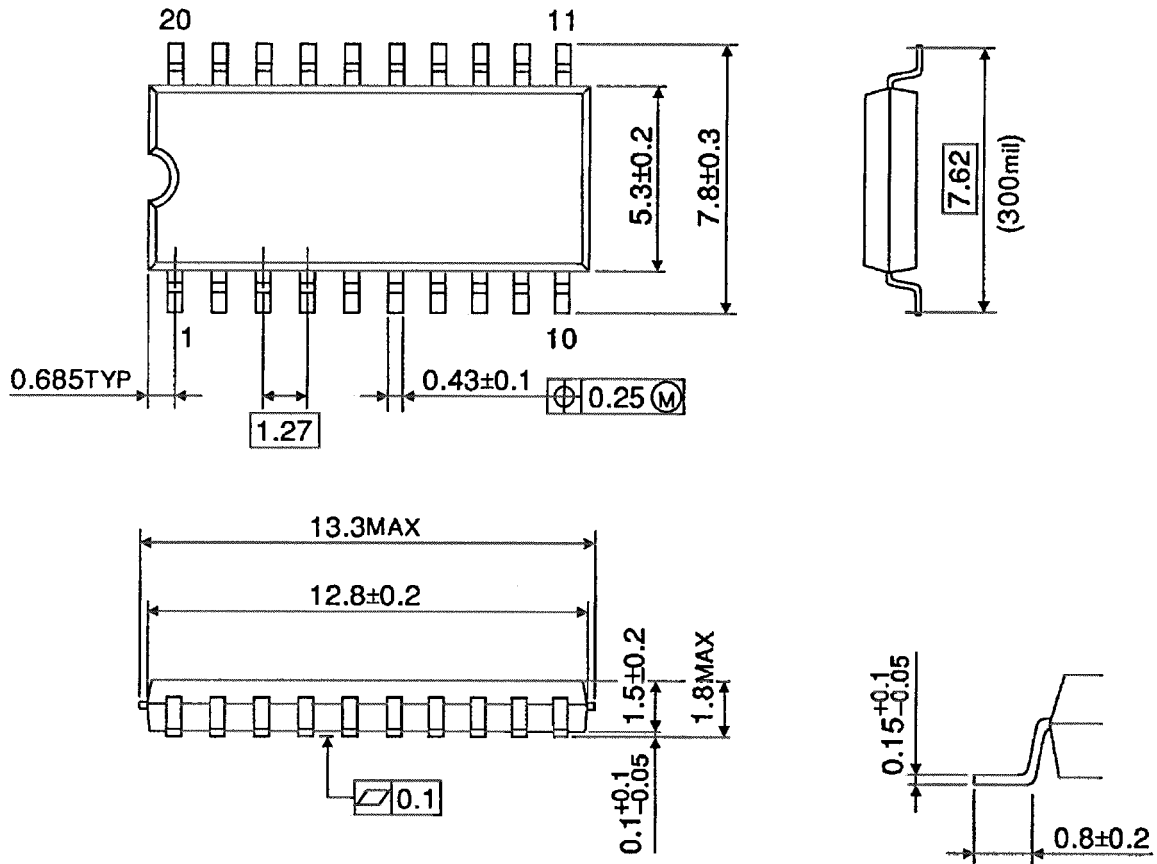
Weight: 0.22 g (typ.)

Package Dimensions (Note)

SOL20-P-300-1.27   Unit : mm
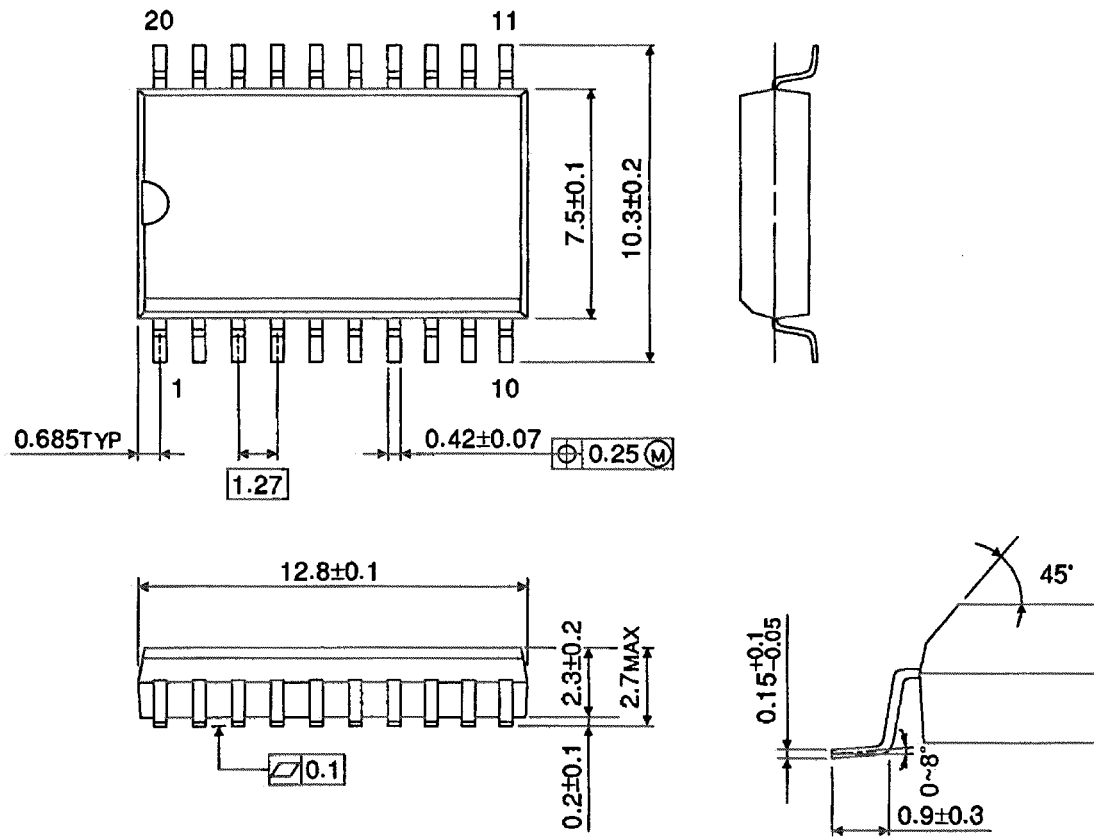
Note: This package is not available in Japan.

Weight: 0.46 g (typ.)

Package Dimensions

TSSOP20-P-0044-0.65A   Unit: mm

0.325TYP   0.65   0.22$^{+0.09}_{-0.06}$ ⊕ 0.13 Ⓜ

4.4±0.1   6.4±0.2

20   11   1   10

6.9MAX

6.5±0.1

1.2MAX

0.1±0.05   1.0±0.05   0.15$^{+0.03}_{-0.01}$ 0~10°   0.25   (0.5)   0.45~0.75

S   ⌖ 0.1 S
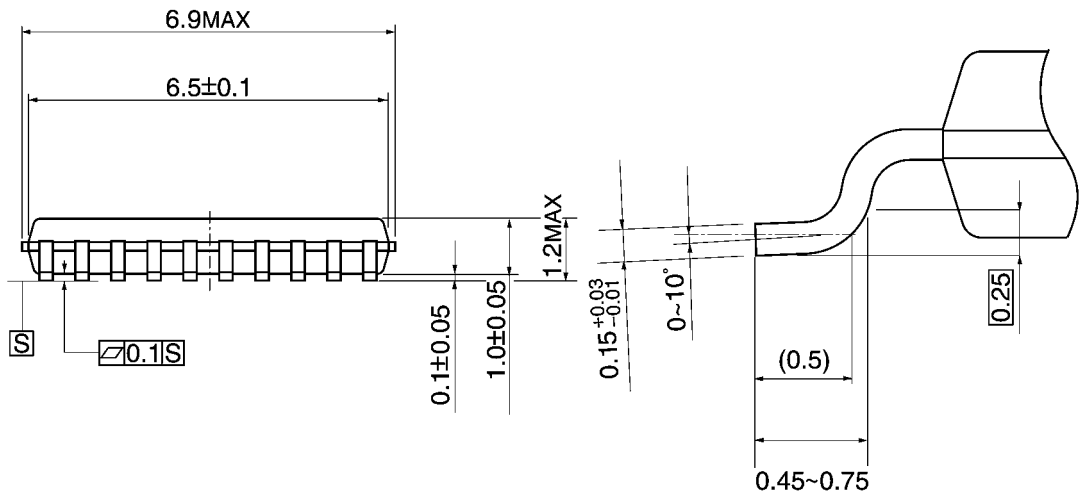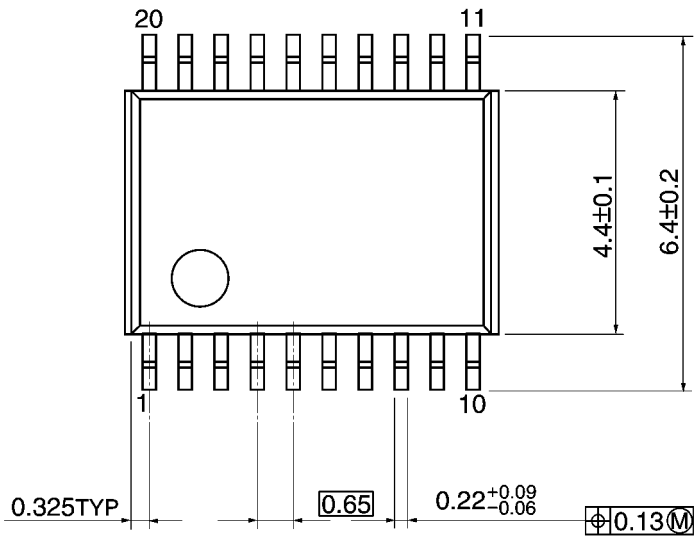
Weight: 0.08 g (typ.)

Note: Lead (Pb)-Free Packages

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

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