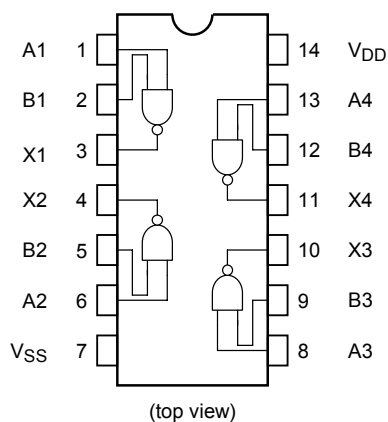


TC4011BP, TC4011BF, TC4011BFN, TC4011BFT

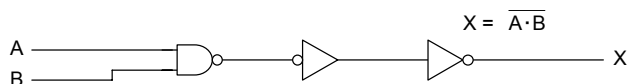
TC4011B Quad 2 Input NAND Gate

The TC4011B is 2-input positive logic NAND gate respectively. Since all the outputs of these gates are provided with the inverters as buffers, the input/output characteristics have been improved and the variation of propagation delay time due to the increase in load capacity is kept down to the minimum.

Pin Assignment

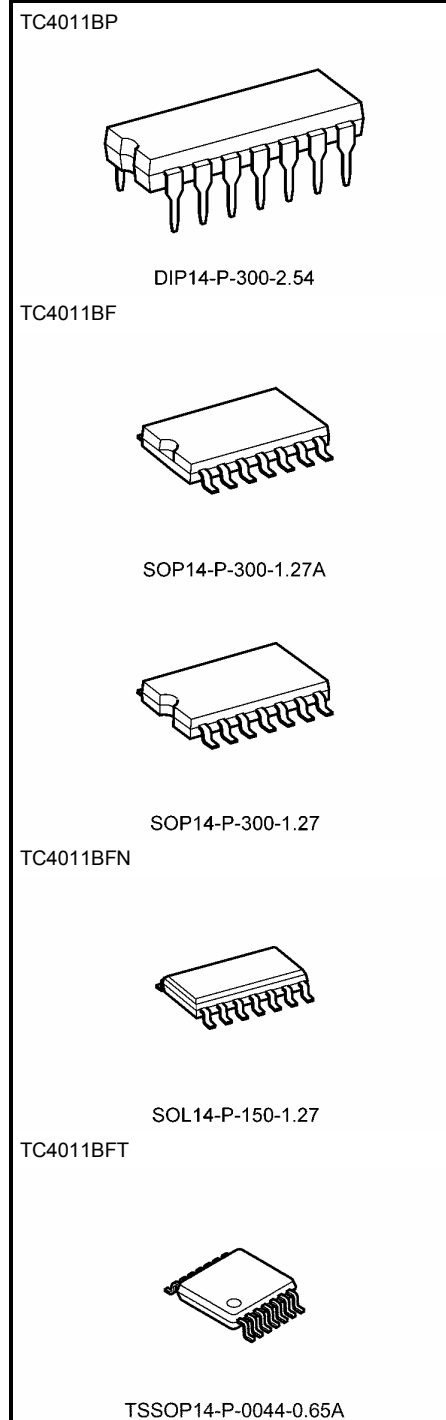


Logic Diagram



Weight	
DIP14-P-300-2.54	: 0.96 g (typ.)
SOP14-P-300-1.27A	: 0.18 g (typ.)
SOP14-P-300-1.27	: 0.18 g (typ.)
SOL14-P-150-1.27	: 0.12 g (typ.)
TSSOP14-P-0044-0.65A	: 0.06 g (typ.)

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



Absolute Maximum Ratings (Note)

Characteristics	Symbol	Rating	Unit
DC supply voltage	V_{DD}	$V_{SS} - 0.5$ to $V_{SS} + 20$	V
Input voltage	V_{IN}	$V_{SS} - 0.5$ to $V_{DD} + 0.5$	V
Output voltage	V_{OUT}	$V_{SS} - 0.5$ to $V_{DD} + 0.5$	V
DC input current	I_{IN}	± 10	mA
Power dissipation	P_D	300 (DIP)/180 (SOIC)	mW
Operating temperature range	T_{opr}	-40 to 85	°C
Storage temperature range	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 ($V_{SS} = 0$ V) (Note)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
DC supply voltage	V_{DD}	—	3	—	18	V
Input voltage	V_{IN}	—	0	—	V_{DD}	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.

Static Electrical Characteristics ($V_{SS} = 0 \text{ V}$)

Characteristics	Symbol	Test Condition	V_{DD} (V)	-40°C		25°C			85°C		Unit
				Min	Max	Min	Typ.	Max	Min	Max	
High-level output voltage	V_{OH}	$ I_{OUT} < 1 \mu\text{A}$ $V_{IN} = V_{SS}, V_{DD}$	5	4.95	—	4.95	5.00	—	4.95	—	V
			10	9.95	—	9.95	10.00	—	9.95	—	
			15	14.95	—	14.95	15.00	—	14.95	—	
Low-level output voltage	V_{OL}	$ I_{OUT} < 1 \mu\text{A}$ $V_{IN} = V_{SS}, V_{DD}$	5	—	0.05	—	0.00	0.05	—	0.05	V
			10	—	0.05	—	0.00	0.05	—	0.05	
			15	—	0.05	—	0.00	0.05	—	0.05	
Output high current	I_{OH}	$V_{OH} = 4.6 \text{ V}$	5	-0.61	—	-0.51	-1.0	—	-0.42	—	mA
		$V_{OH} = 2.5 \text{ V}$	5	-2.50	—	-2.10	-4.0	—	-1.70	—	
		$V_{OH} = 9.5 \text{ V}$	10	-1.50	—	-1.30	-2.2	—	-1.10	—	
		$V_{OH} = 13.5 \text{ V}$	15	-4.00	—	-3.40	-9.0	—	-2.80	—	
		$V_{IN} = V_{SS}, V_{DD}$									
Output low current	I_{OL}	$V_{OL} = 0.4 \text{ V}$	5	0.61	—	0.51	1.2	—	0.42	—	mA
		$V_{OL} = 0.5 \text{ V}$	10	1.50	—	1.30	3.2	—	1.10	—	
		$V_{OL} = 1.5 \text{ V}$	15	4.00	—	3.40	12.0	—	2.80	—	
		$V_{IN} = V_{DD}$									
Input high voltage	V_{IH}	$V_{OUT} = 0.5 \text{ V}$	5	3.5	—	3.5	2.75	—	3.5	—	V
		$V_{OUT} = 1.0 \text{ V}$	10	7.0	—	7.0	5.50	—	7.0	—	
		$V_{OUT} = 1.5 \text{ V}$	15	11.0	—	11.0	8.25	—	11.0	—	
		$ I_{OUT} < 1 \mu\text{A}$									
Input low voltage	V_{IL}	$V_{OUT} = 4.5 \text{ V}$	5	—	1.5	—	2.25	1.5	—	1.5	V
		$V_{OUT} = 9.0 \text{ V}$	10	—	3.0	—	4.50	3.0	—	3.0	
		$V_{OUT} = 13.5 \text{ V}$	15	—	4.0	—	6.75	4.0	—	4.0	
		$ I_{OUT} < 1 \mu\text{A}$									
Input current	"H" level	I_{IH}	$V_{IH} = 18 \text{ V}$	18	—	0.1	—	10^{-5}	0.1	—	μA
	"L" level	I_{IL}	$V_{IL} = 0 \text{ V}$	18	—	-0.1	—	-10^{-5}	-0.1	—	
Quiescent supply current	I_{DD}	$V_{IN} = V_{SS}, V_{DD}$ (Note)	5	—	0.25	—	0.001	0.25	—	7.5	μA
			10	—	0.50	—	0.001	0.50	—	15.0	
			15	—	1.00	—	0.002	1.00	—	30.0	

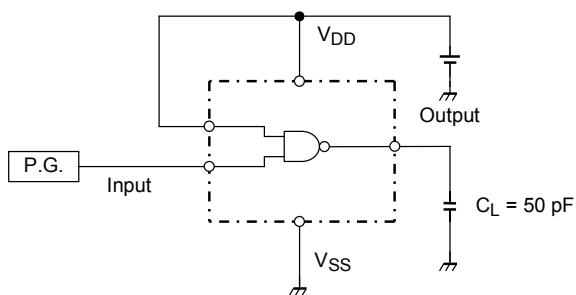
Note: All valid input combinations.

Dynamic Electrical Characteristics (Ta = 25°C, VSS = 0 V, CL = 50 pF)

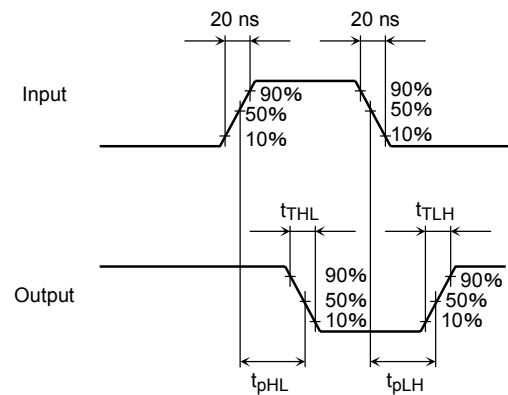
Characteristics	Symbol	Test Condition	VDD (V)	Min	Typ.	Max	Unit
Output transition time	t_{TLH}	—	5	—	70	200	ns
			10	—	35	100	
			15	—	30	80	
Output transition time	t_{THL}	—	5	—	70	200	ns
			10	—	35	100	
			15	—	30	80	
Propagation delay time	t_{pLH}	—	5	—	65	200	ns
			10	—	30	100	
			15	—	25	80	
Propagation delay time	t_{pHL}	—	5	—	65	200	ns
			10	—	30	100	
			15	—	25	80	
Input capacitance	C_{IN}	—	—	—	5	7.5	pF

Circuit and Waveform for Measurement of Dynamic Characteristics

Circuit



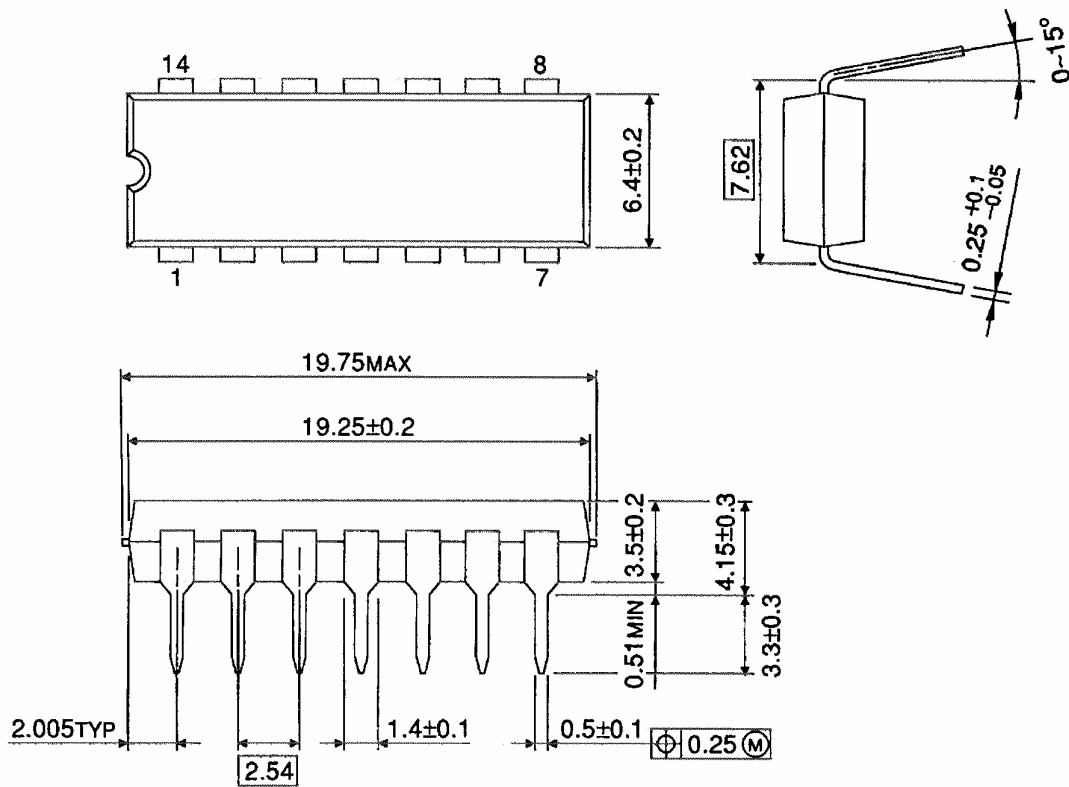
Waveform



Package Dimensions

DIP14-P-300-2.54

Unit : mm

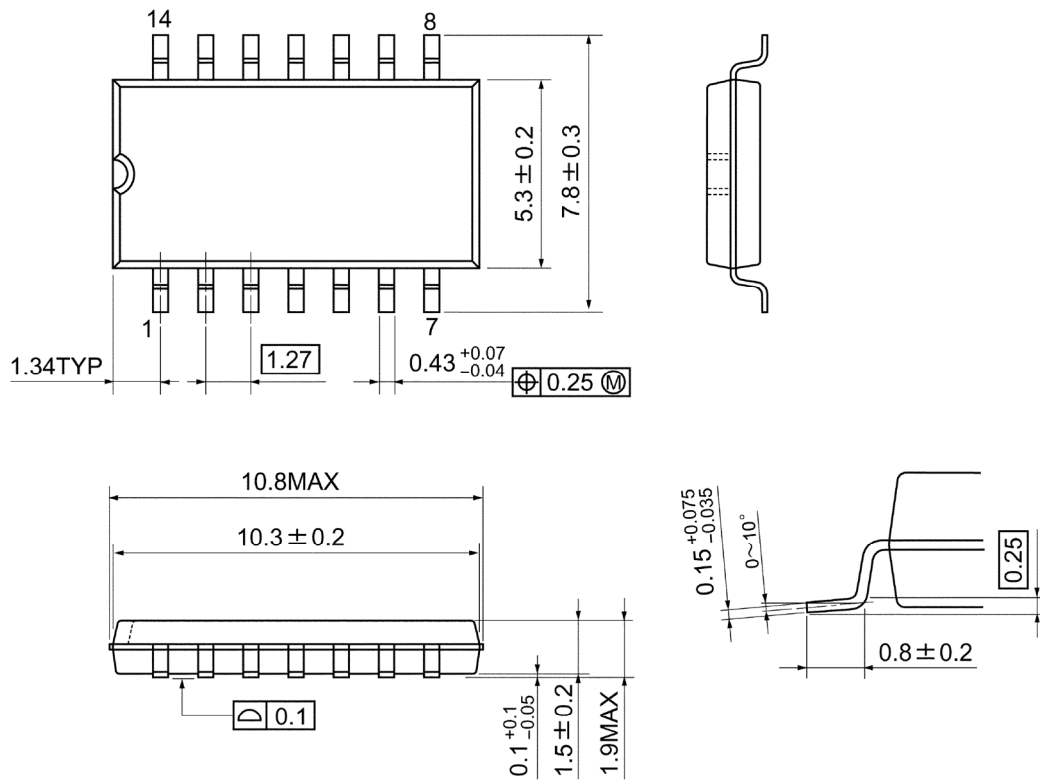


Weight: 0.96 g (typ.)

Package Dimensions

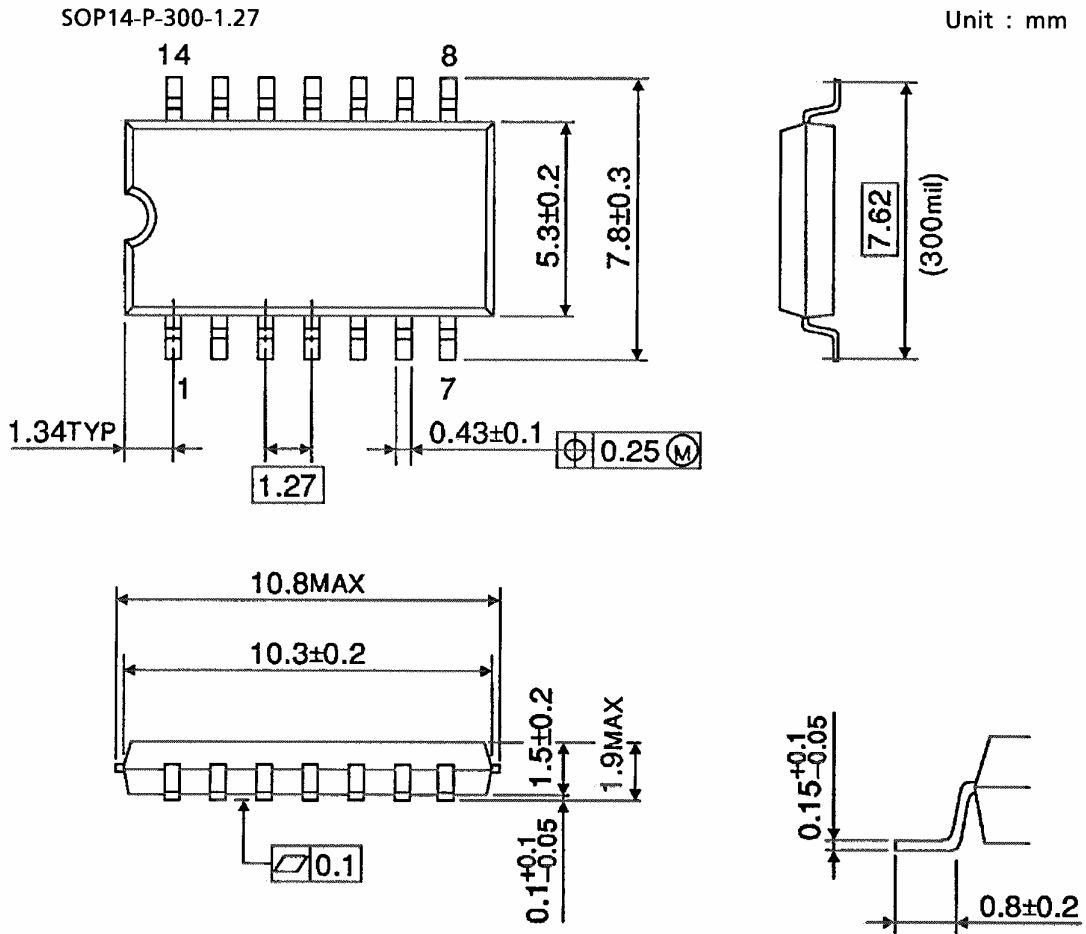
SOP14-P-300-1.27A

Unit: mm



Weight: 0.18 g (typ.)

Package Dimensions

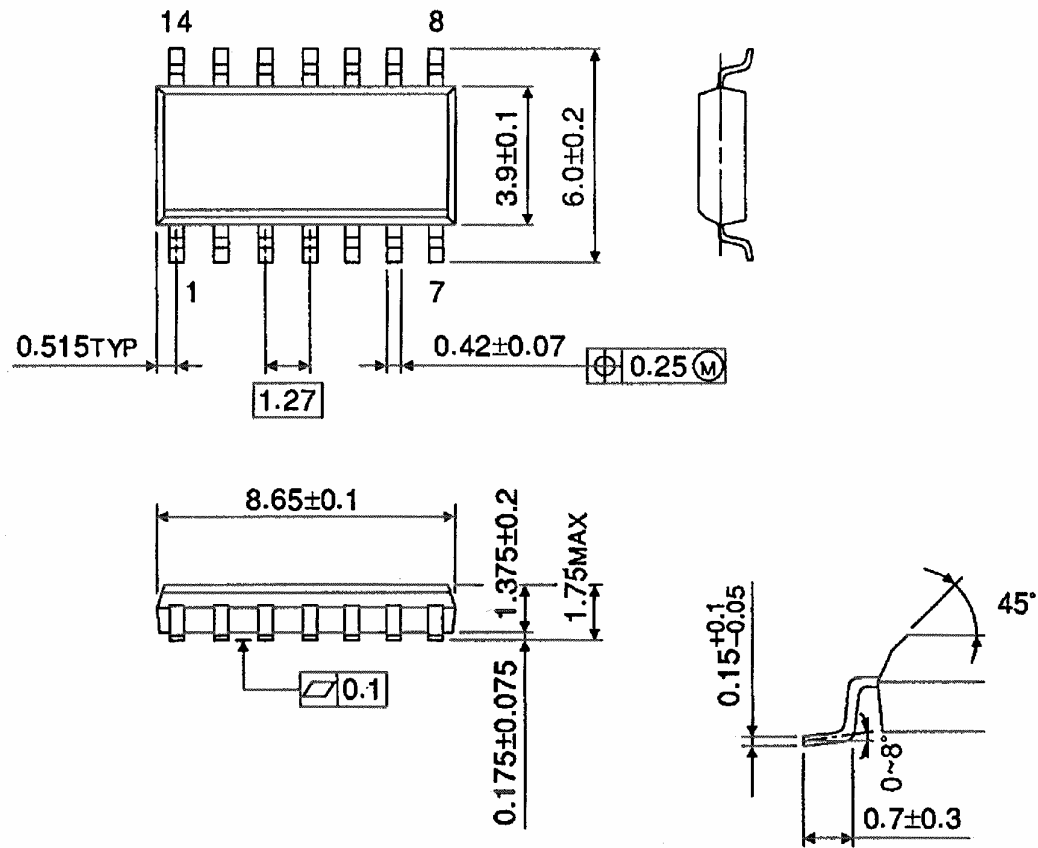


Weight: 0.18 g (typ.)

Package Dimensions (Note)

SOL14-P-150-1.27

Unit : mm



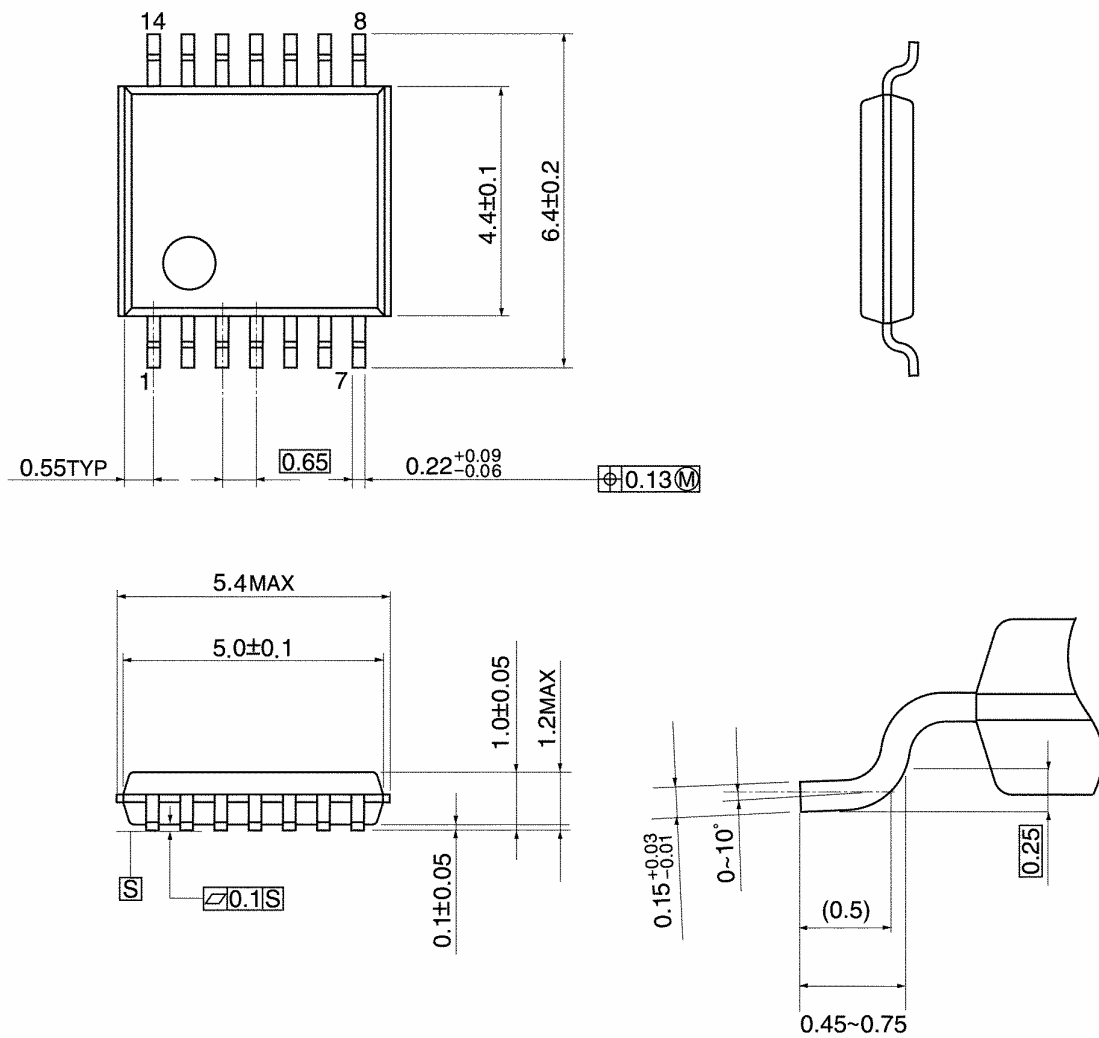
Note: This package is not available in Japan.

Weight: 0.12 g (typ.)

Package Dimensions

TSSOP14-P-0044-0.65A

Unit: mm



Weight: 0.06 g (typ.)

Note: Lead (Pb)-Free Packages

DIP14-P-300-2.54 SOP14-P-300-1.27A SOL14-P-150-1.27 TSSOP14-P-0044-0.65A

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