

TOSHIBA BIPOLAR DIGITAL IC SILICON MONOLITHIC

**TD62930P, TD62930F****THREE-CHANNEL SMALL-SIGNAL IGBT GATE DRIVER**

The TD62930P and TD62930F are drivers using 5V-signal input to output the signals required to drive IGBT gates. TD62930P/F is the most suitable for low-side drive of a miniature IGBT to use for inverter for the household electric appliances mainly.

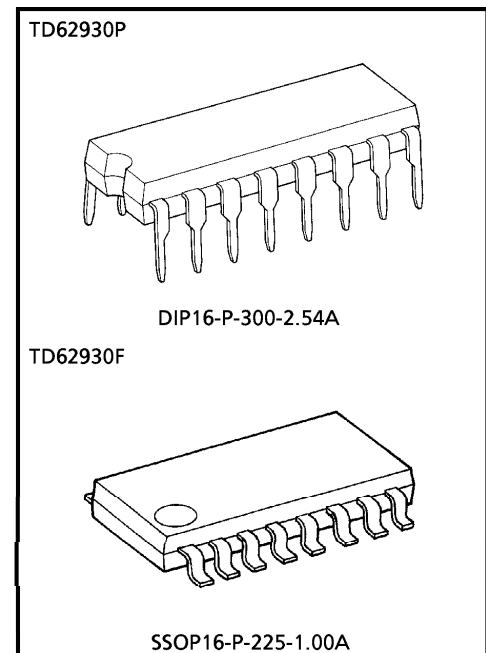
The outputs are separated into high-side and low-side outputs. This separation simplifies the IGBT gate on/off timing control.

Two output signals are assigned for one input signal.

The high-side output is high-level for high-level input, and high impedance for low-level input. The low-side output is high impedance for high-level input, and low-level for low-level input.

**FEATURES**

- Power supply voltage (maximum rating)
  - High-voltage block power supply voltage  $V_{CC} = 30V$
  - Low-voltage block power supply voltage  $V_{DD} = 7V$
- Output current (maximum rating)
  - High-side peak current  $I_{OUT} = -0.4A$  (max)
  - Low-side peak current  $I_{OUT} = 0.4A$  (max)
- Input-output response speed  $t_{pHL}, t_{pLH} \leq 1\mu s$  (max)
- Package : DIP16/SSOP16 (1.00mm pitch)

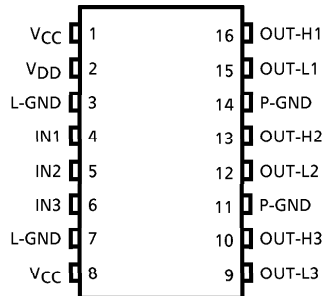


Weight  
 DIP16-P-300-2.54A : 1.11g (typ.)  
 SSOP16-P-225-1.00A : 0.14g (typ.)

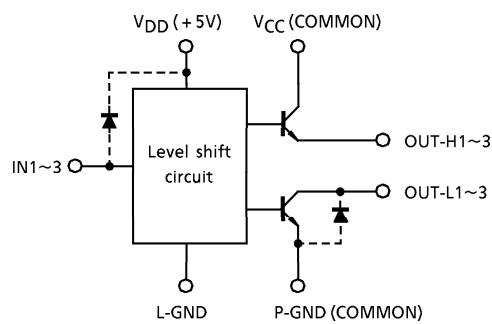
961001EBA1

- TOSHIBA is continually working to improve the quality and the reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to observe standards of safety, and to avoid situations in which a malfunction or failure of a TOSHIBA product could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent products specifications. Also, please keep in mind the precautions and conditions set forth in the TOSHIBA Semiconductor Reliability Handbook.
- The products described in this document are subject to foreign exchange and foreign trade control laws.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.

**PIN ASSIGNMENT (TOP VIEW)**



**INTERNAL EQUIVALENT CIRCUIT**



**PIN DESCRIPTION**

PIN No.	PIN NAME	FUNCTION
1, 8	VCC	30V supply pins
2	VDD	5V supply pin
3, 7	L-GND	Ground pins for 5V supply
4, 5, 6	IN1~3	Input pins for 5V output control signals
11, 14	P-GND	Ground pins for 30V supply
9, 12, 15	OUT-L1~3	Low-side output pins
10, 13, 16	OUT-H1~3	High-side output pins

**MAXIMUM RATINGS (Ta = 25°C)**

CHARACTERISTIC	PIN / PACKAGE	SYMBOL	RATING	UNIT
Power Supply Voltage	V <sub>CC</sub>	V <sub>CC</sub>	30	V
Power Supply Voltage	V <sub>DD</sub>	V <sub>DD</sub>	7	V
Input Voltage	IN1~3	V <sub>IN</sub>	- 0.5~V <sub>DD</sub> + 0.5	V
Output Voltage	OUT-H1~3	V <sub>OUT</sub> (H)	0~20 (Ta = - 20~85°C)	V
			0~30 (Ta = - 20~70°C)	
	OUT-L1~3	V <sub>OUT</sub> (L)	- 0.5~20 (Ta = - 20~85°C)	V
			- 0.5~30 (Ta = - 20~70°C)	
High-level Output Peak Current	OUT-H1~3	I <sub>OPH</sub> (Note 1)	- 0.4	A / ch
Low-level Output Peak Current	OUT-L1~3	I <sub>OPL</sub> (Note 1)	+ 0.4	A / ch
Operating Frequency	IN1~3	f	25	kHz
Power Dissipation	DIP16	P <sub>D1</sub> (Note 2)	1.47 (FREE AIR)	W
	SSOP16	P <sub>D2</sub> (Note 2)	0.78 (ON PCB)	W
Operating Ambient Temperature		T <sub>opr</sub>	- 20~85	°C
Storage Temperature		T <sub>stg</sub>	- 55~150	°C

(Note 1) Output pin current

The pulse width of the output pin current at peak is  $\leq 1\mu s$ , 300pps.

(Note 2) When ambient temperature exceeds 25°C

Derate the power dissipation of DIP-type devices at 11.76mW / 1°C (device only) and  
Derate the power dissipation of SMD-type devices at 6.24mW / 1°C (mounted on the board).

**RECOMMENDED OPERATING CONDITIONS (Unless otherwise specified, Ta = - 20 to 70°C)**

CHARACTERISTIC	PIN	SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
Input Voltage	IN1~3	V <sub>IH</sub>	V <sub>CC</sub> = 15V, V <sub>DD</sub> = 4.5~5.5V	3.5	—	—	V
		V <sub>IL</sub>		—	—	1.0	
Input Current	IN1~3	I <sub>IH</sub>	V <sub>CC</sub> = 15V, V <sub>DD</sub> = 4.5~5.5V	—	—	5	mA
		I <sub>IL</sub>		—	—	- 5	
Input Power Supply Voltage	V <sub>CC</sub>	V <sub>CC</sub>		10	15	25	V
	V <sub>DD</sub>	V <sub>DD</sub>		4.5	5.0	5.5	
Output Current	OUT-H1~3	I <sub>OH</sub> (DC)	V <sub>CC</sub> = 20V, V <sub>DD</sub> = 4.5V	—	—	- 0.1	A
		I <sub>OH</sub> (Peak)		—	—	- 0.35	
	OUT-L1~3	I <sub>OL</sub> (DC)	V <sub>CC</sub> = 20V, V <sub>DD</sub> = 4.5V	—	—	0.1	
		I <sub>OL</sub> (Peak)		—	—	0.35	
Operating Temperature		T <sub>opr</sub>	V <sub>CC</sub> = 30V, V <sub>DD</sub> = 5.5V	- 20	25	70	°C
			V <sub>CC</sub> = 20V, V <sub>DD</sub> = 5.5V	- 20	25	85	

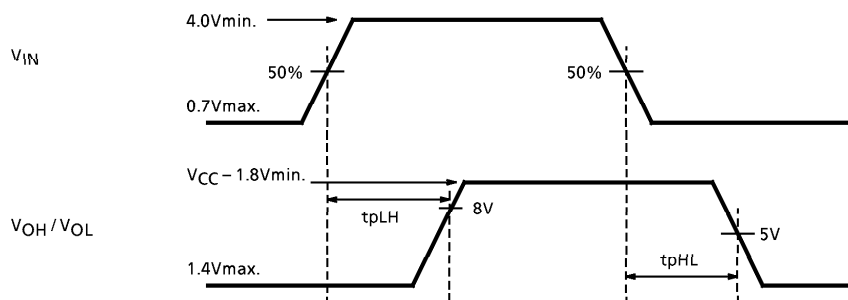
ELECTRICAL CHARACTERISTICS (Unless otherwise specified,  $T_a = -20$  to  $70^\circ\text{C}$ )

CHARACTERISTIC		PIN	SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
Input Current	High level	IN1~3	$I_{IH}$	$V_{CC} = 15\text{V}, V_{IN} = 5\text{V}$	0.1	0.2	0.4	mA
	Low level		$I_{IL}$	$V_{CC} = 15\text{V}, V_{IN} = 0\text{V}$	—	0	—	
Output Voltage	High level	OUT-H1~3	$V_{OH}$	$V_{CC} = 15\text{V}, V_{IH} = 5\text{V}, R_{LH} = 100\Omega$	$V_{CC} - 4.0$	$V_{CC} - 1.9$	$V_{CC} - 1.0$	V
	Low level	OUT-L1~3	$V_{OL}$	$V_{CC} = 15\text{V}, V_{IL} = 0\text{V}, R_{LL} = 100\Omega$	0.3	0.5	2.5	
Dissipation Current 1		$V_{DD}$	$I_{DDL}$	$V_{DD} = 5.5\text{V}, V_{IH} = 0\text{V}, T_a = 25^\circ\text{C}$	—	1.5	3.0	mA
				$V_{DD} = 5.5\text{V}, V_{IH} = 0\text{V}, T_a = -20\sim 85^\circ\text{C}$	—	—	3.5	
			$I_{DDH}$	$V_{DD} = 5.5\text{V}, V_{IH} = 5\text{V}, T_a = 25^\circ\text{C}$	—	1.8	3.5	
				$V_{DD} = 5.5\text{V}, V_{IH} = 5\text{V}, T_a = -20\sim 85^\circ\text{C}$	—	—	4.0	
Dissipation Current 2		$V_{CC}$	$I_{CCL}$	$V_{CC} = 30\text{V}, V_{DD} = 5.5\text{V}, V_{IH} = 0\text{V}, T_a = 25^\circ\text{C}$	—	10.2	15.0	mA
				$V_{CC} = 30\text{V}, V_{DD} = 5.5\text{V}, V_{IH} = 0\text{V}$	—	—	18.0	
			$I_{CCH}$	$V_{CC} = 30\text{V}, V_{DD} = 5.5\text{V}, V_{IH} = 5\text{V}, T_a = 25^\circ\text{C}$	—	7.5	11.0	
				$V_{CC} = 30\text{V}, V_{DD} = 5.5\text{V}, V_{IH} = 5\text{V}$	—	—	14.0	
Operating Power Supply Voltage	$V_{CC}$	$V_{CCopr}$		10	—	30	V	

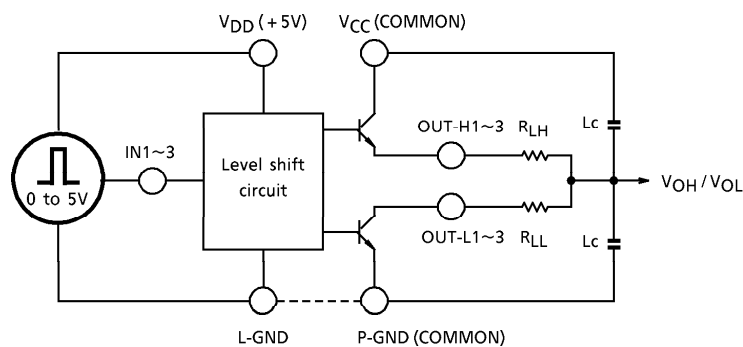
SWITCHING CHARACTERISTICS (Unless otherwise specified,  $T_a = -20\sim 70^\circ\text{C}$ )

CHARACTERISTIC		PIN	SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
Output Propagation Delay Time	High level	OUT-H1~3	tPLH	$V_{DD} = 5.0\text{V}, V_{CC} = 15\text{V}, R_{LH} = R_{LL} = 100\Omega, V_{IN} = 0.7$ to $4\text{V}$	—	0.25	1.00	$\mu\text{s}$
	Low level	OUT-L1~3	tPHL	$V_{DD} = 5.0\text{V}, V_{CC} = 15\text{V}, R_{LH} = R_{LL} = 100\Omega, V_{IN} = 4$ to $0.7\text{V}$	—	0.25	1.00	

**SWITCHING WAVEFORM**



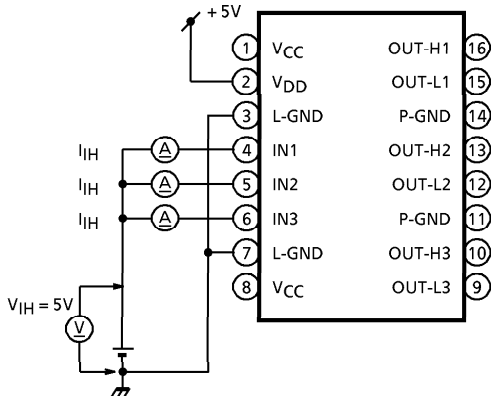
**PROPAGATION DELAY TIME TEST CIRCUIT**



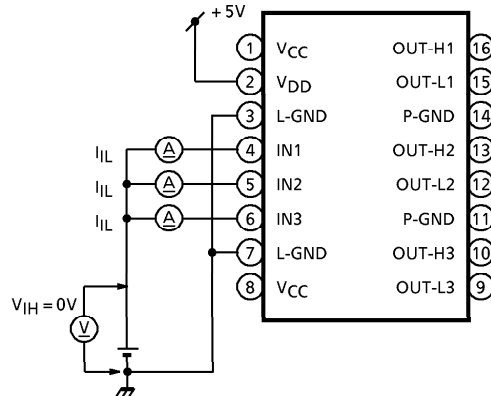
Toshiba recommends connecting load resistors as in the above diagram, utilizing the independence of the high-level and low-level sides of this IC.

**TEST CIRCUIT**

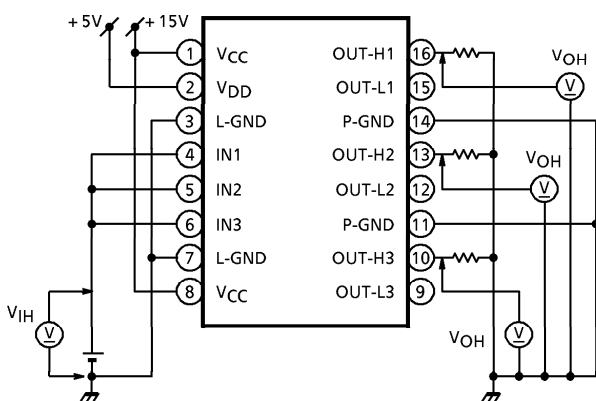
(1)  $I_{IH}$



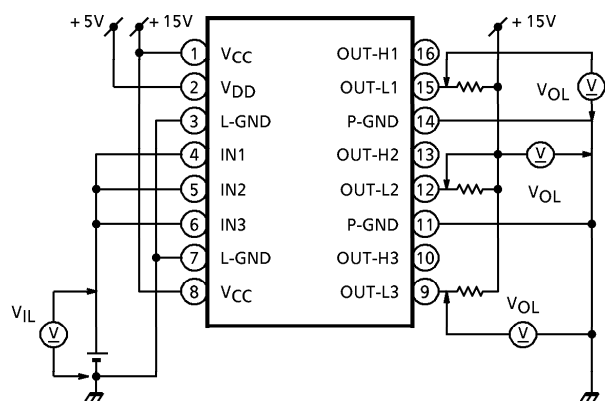
(2)  $I_{IL}$



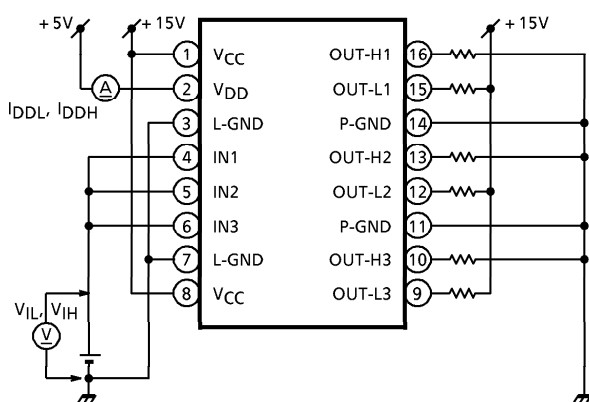
(3)  $V_{IH}, V_{OH}$



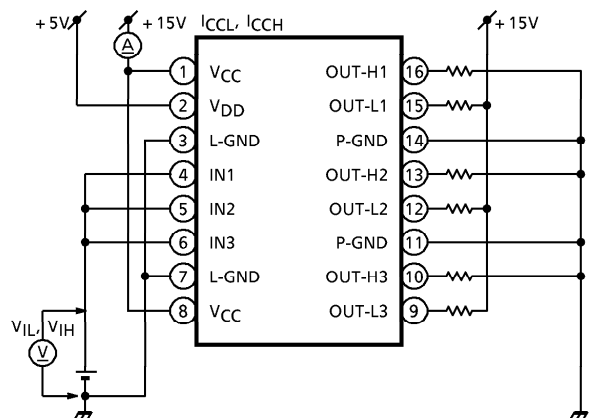
(4)  $V_{IL}, V_{OL}$



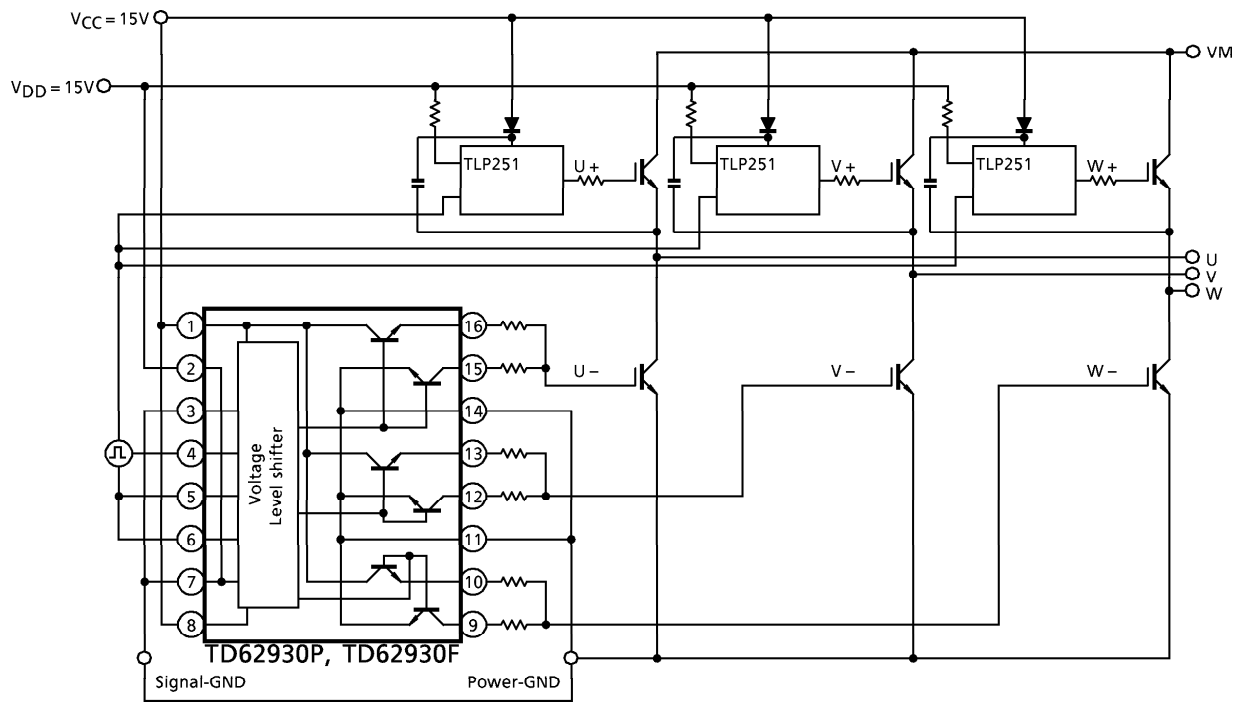
(5)  $I_{DDL}, I_{DDH}$



(6)  $I_{CCL}, I_{CCH}$



**APPLICATION CIRCUIT**

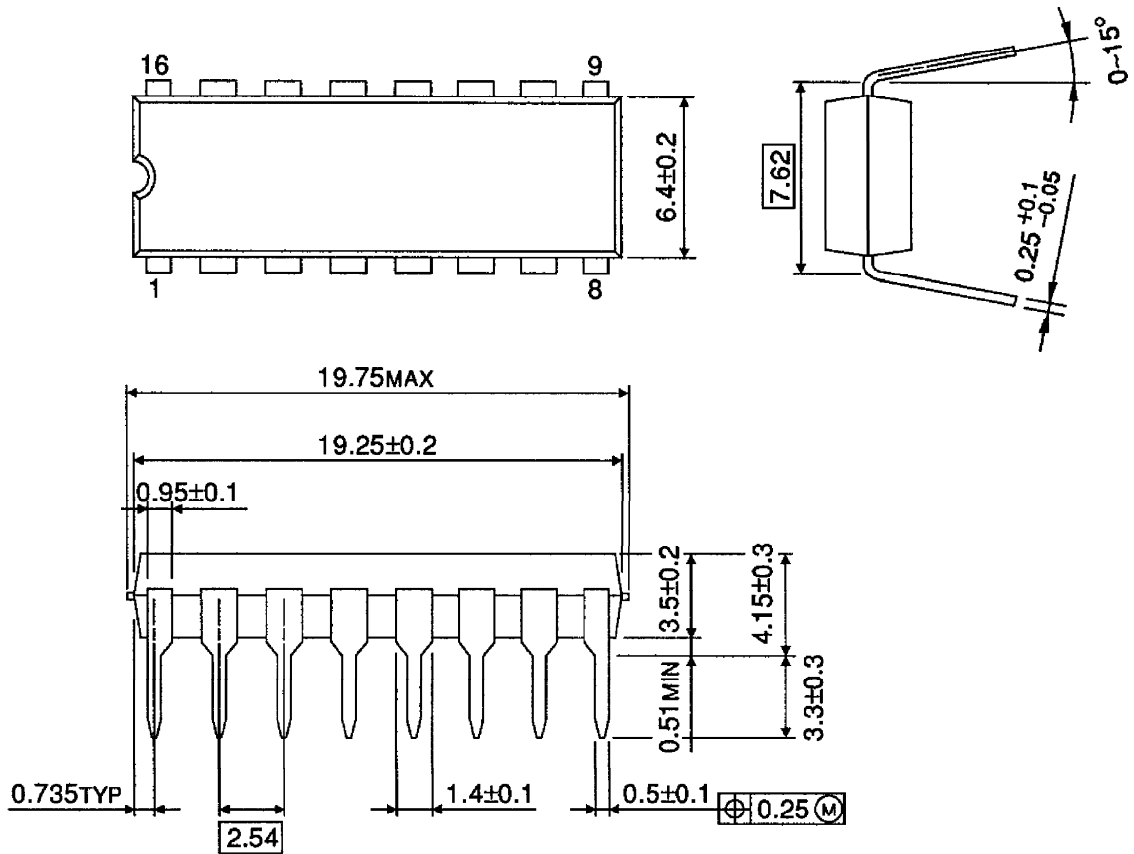


**PRECAUTIONS for USING**

Utmost care is necessary in the design of the output line,  $V_{CC}$  and GND (L-GND, P-GND) line since IC may be destroyed due to short-circuit between outputs, air contamination fault, or fault by improper grounding.

OUTLINE DRAWING  
DIP16-P-300-2.54A

Unit : mm

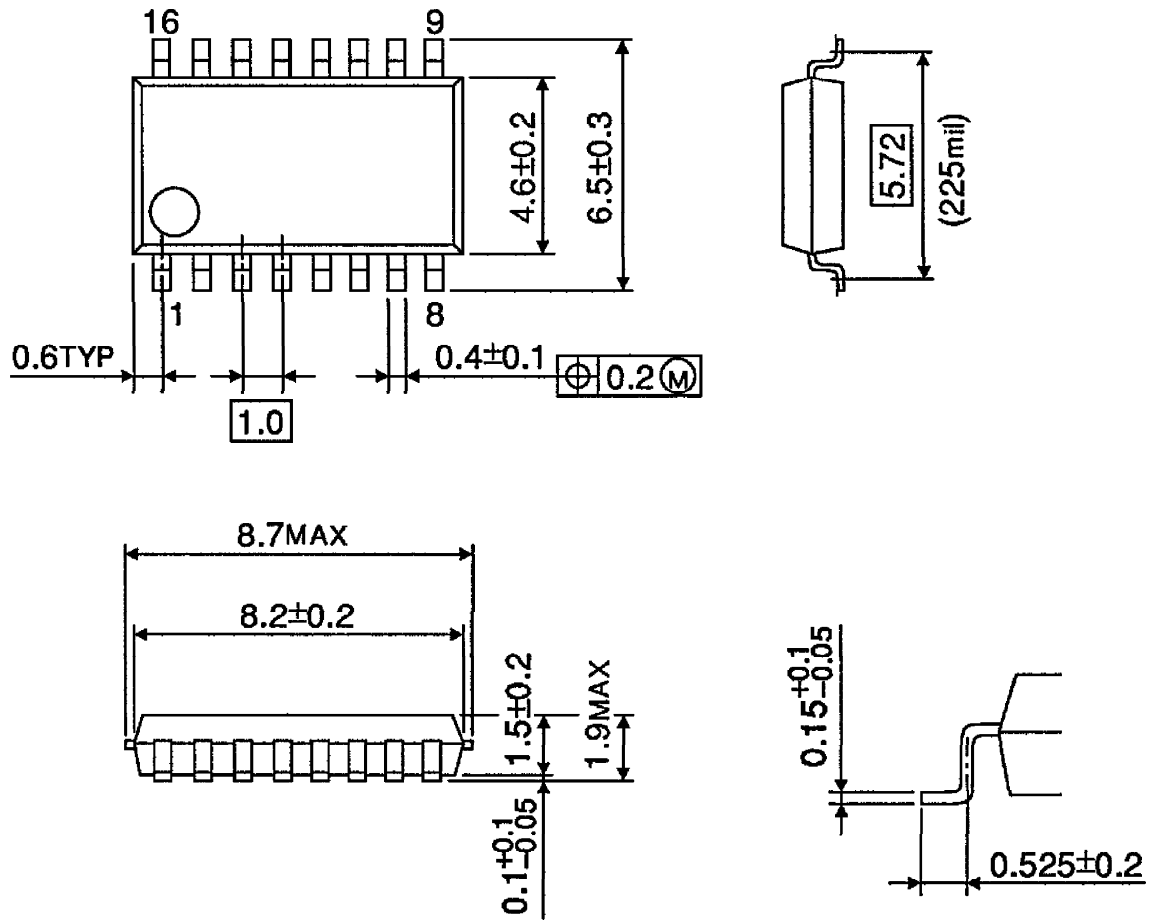


Weight : 1.11g (Typ.)



**OUTLINE DRAWING**  
SSOP16-P-225-1.00A

Unit : mm



Weight : 0.14g (Typ.)