

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.

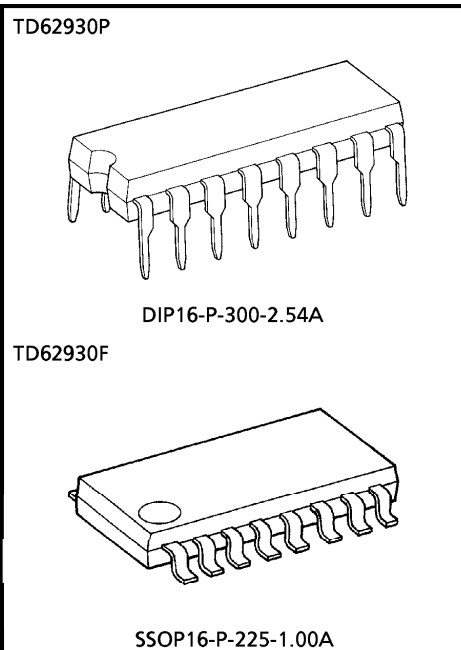
The outputs are separated into high-side and low-side outputs. This separation simplifies the IGBT gate on/off timing control.

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)

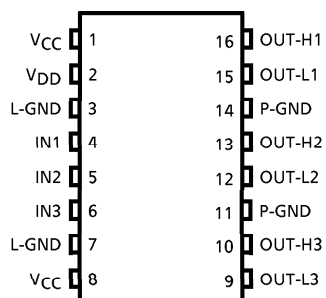


Weight
 DIP16-P-300-2.54A : 1.11g (typ.)
 SSOP16-P-225-1.00A : 0.14g (typ.)

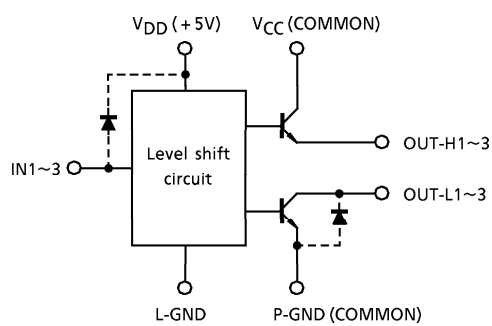
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PIN ASSIGNMENT (TOP VIEW)



INTERNAL EQUIVALENT CIRCUIT



PIN DESCRIPTION

PIN No.	PIN NAME	FUNCTION
1, 8	V _{CC}	30V supply pins
2	V _{DD}	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 _{CC}	V _{CC}	30	V
Power Supply Voltage	V _{DD}	V _{DD}	7	V
Input Voltage	IN1~3	V _{IN}	- 0.5~V _{DD} + 0.5	V
Output Voltage	OUT-H1~3	V _{OUT} (H)	0~20 (Ta = - 20~85°C)	V
			0~30 (Ta = - 20~70°C)	
	OUT-L1~3	V _{OUT} (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 _{OPH} (Note 1)	- 0.4	A / ch
Low-level Output Peak Current	OUT-L1~3	I _{OPL} (Note 1)	+ 0.4	A / ch
Operating Frequency	IN1~3	f	25	kHz
Power Dissipation	DIP16	P _{D1} (Note 2)	1.47 (FREE AIR)	W
	SSOP16	P _{D2} (Note 2)	0.78 (ON PCB)	W
Operating Ambient Temperature		T _{opr}	- 20~85	°C
Storage Temperature		T _{stg}	- 55~150	°C

(Note 1) Output pin current

The pulse width of the output pin current at peak is $\leq 1\mu\text{s}$, 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	High level	IN1~3	V _{IH}	V _{CC} = 15V, V _{DD} = 4.5~5.5V	3.5	—	—	V
	Low level		V _{IL}		—	—	1.0	
Input Current	High level	IN1~3	I _{IH}	V _{CC} = 15V, V _{DD} = 4.5~5.5V	—	—	5	mA
	Low level		I _{IL}		—	—	− 5	
Input Power Supply Voltage		V _{CC}	V _{CC}		10	15	25	V
		V _{DD}	V _{DD}		4.5	5.0	5.5	
Output Current		OUT-H1~3	IOH (DC)	V _{CC} = 20V, V _{DD} = 4.5V	—	—	− 0.1	A
			IOH (Peak)		—	—	− 0.35	
		OUT-L1~3	IOL (DC)	V _{CC} = 20V, V _{DD} = 4.5V	—	—	0.1	
			IOL (Peak)		—	—	0.35	
Operating Temperature			T _{opr}	V _{CC} = 30V, V _{DD} = 5.5V	− 20	25	70	°C
				V _{CC} = 20V, V _{DD} = 5.5V	− 20	25	85	

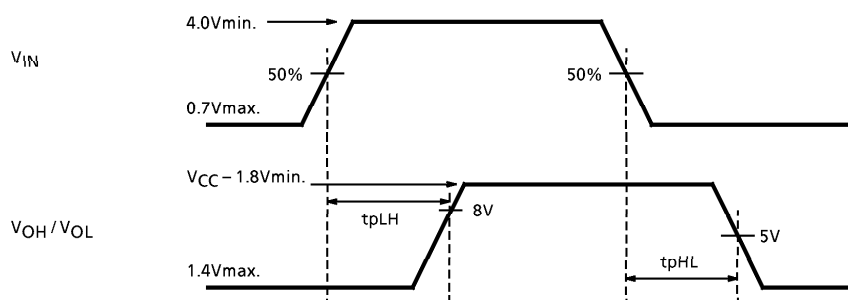
ELECTRICAL CHARACTERISTICS (Unless otherwise specified, $T_a = -20$ to 70°C)

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

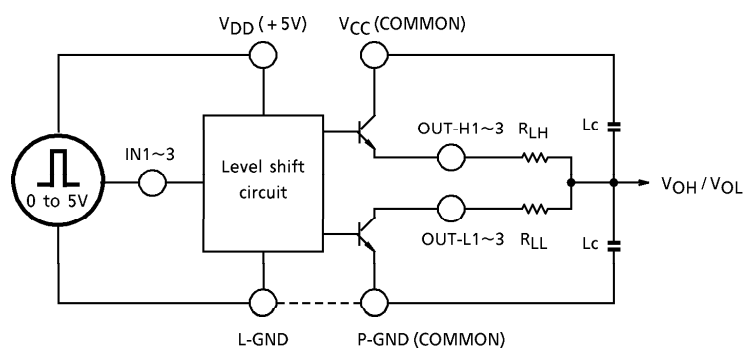
SWITCHING CHARACTERISTICS (Unless otherwise specified, $T_a = -20 \sim 70^\circ\text{C}$)

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

SWITCHING WAVEFORM



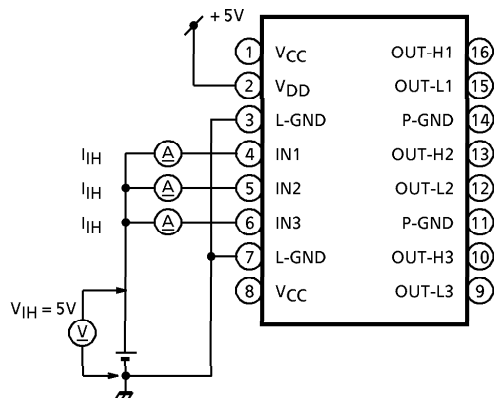
PROPAGATION DELAY TIME TEST CIRCUIT



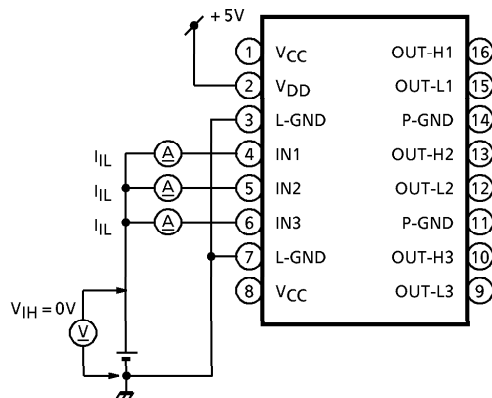
Toshiba recommends connecting load resistors as in the above diagram, utilizing the independence of the high-level and low-level sides of this IC.

TEST CIRCUIT

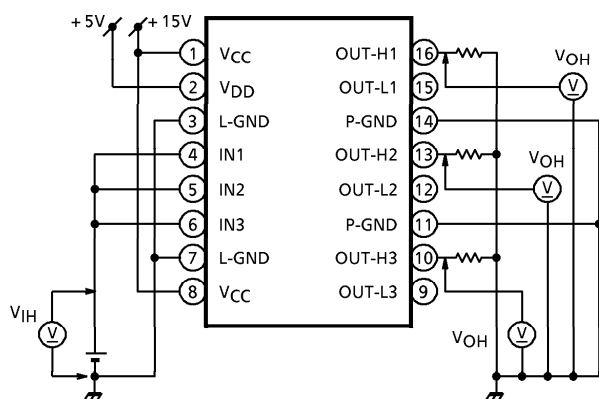
(1) I_{IH}



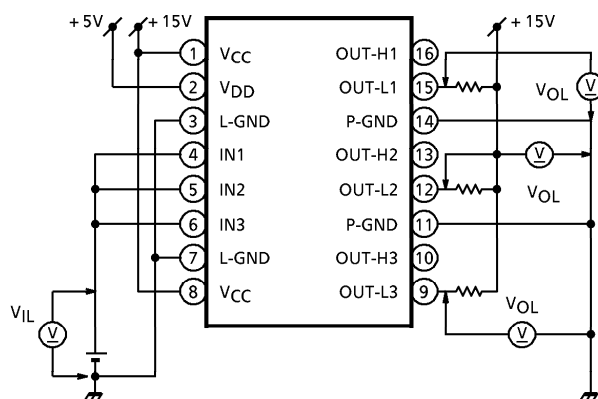
(2) I_{IL}



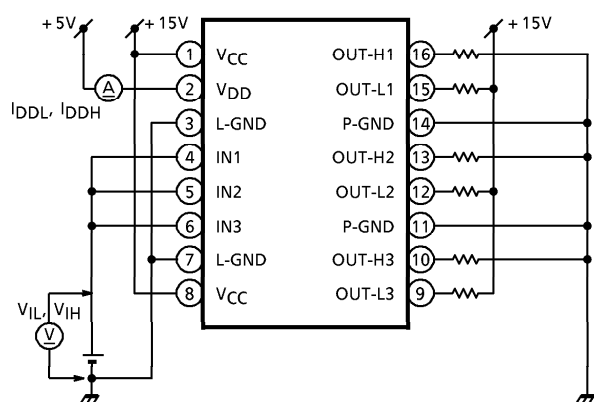
(3) V_{IH} , V_{OH}



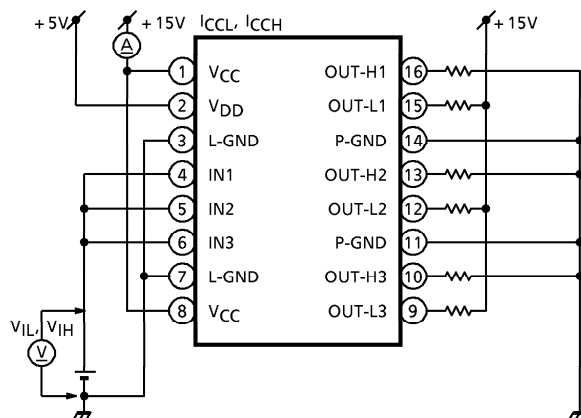
(4) V_{IL} , V_{OL}



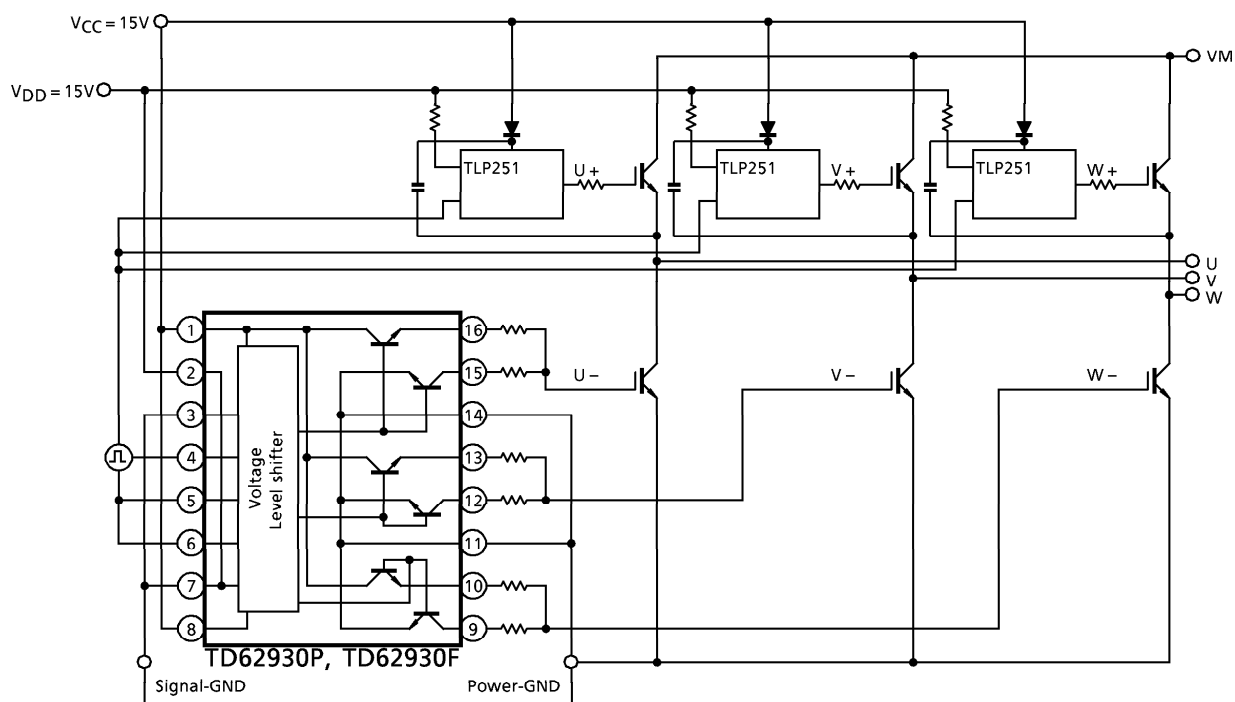
(5) I_{DDL} , I_{DDH}



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



APPLICATION CIRCUIT

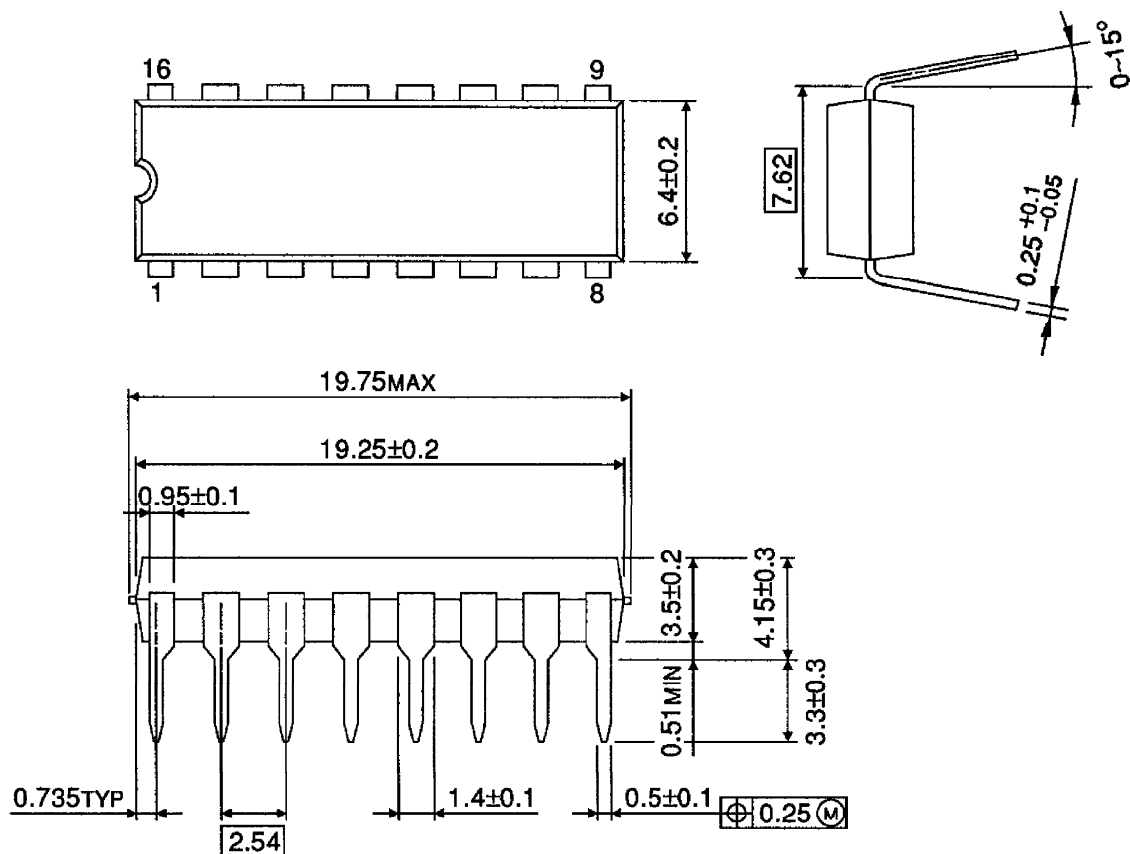


PRECAUTIONS for USING

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

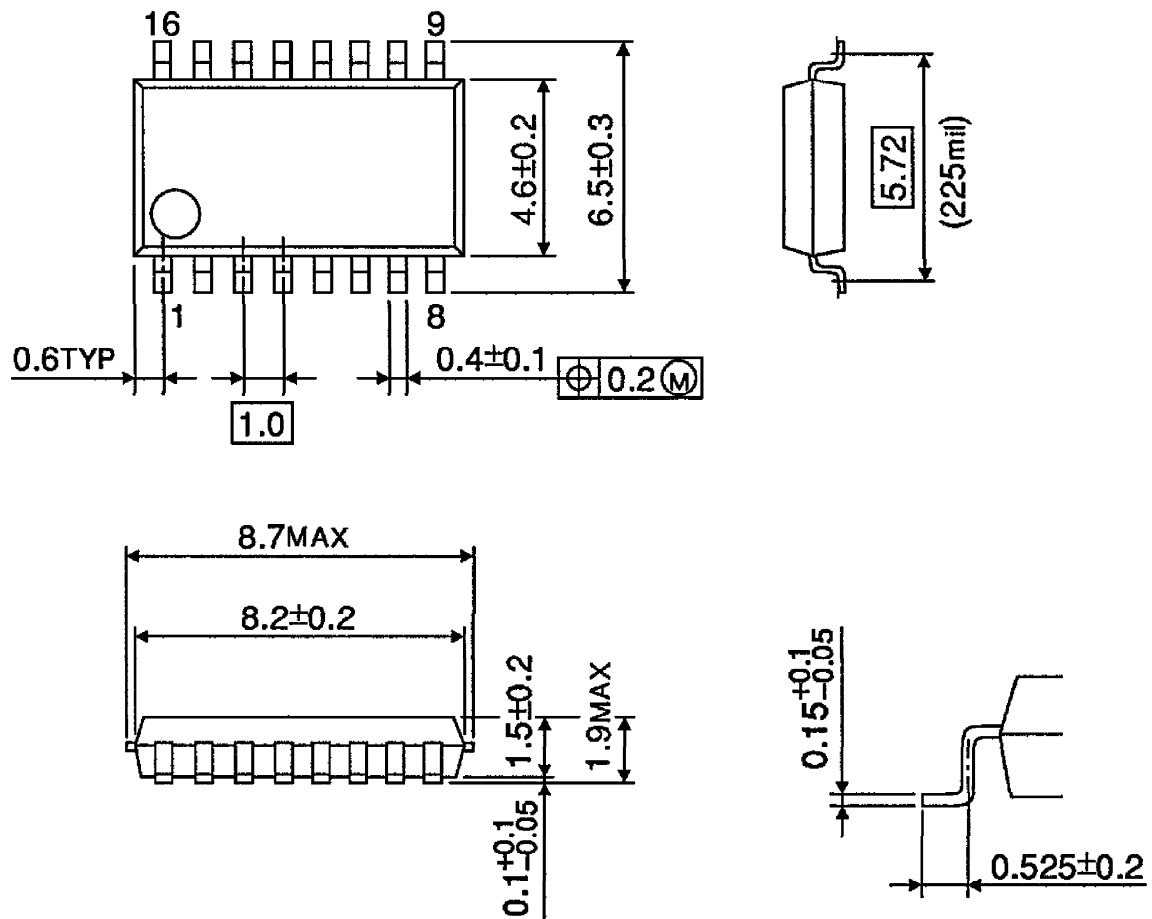


Weight : 1.11g (Typ.)

OUTLINE DRAWING

SSOP16-P-225-1.00A

Unit : mm



Weight : 0.14g (Typ.)