PRELIMINARY
Notice: This is not a final specification. Some parametric limits are subject to change.

MITSUBISHI HIGH SPEED CMOS

M74HC258P/FP/DP

QUADRUPLE 2-INPUT DATA SELECTOR/MULTIPLEXER WITH 3-STATE OUTPUTS

DESCRIPTION

The M74HC258 is a semiconductor integrated circuit consisting of four 2-line to 1-line data selectors/multiplexers with 3-state outputs.

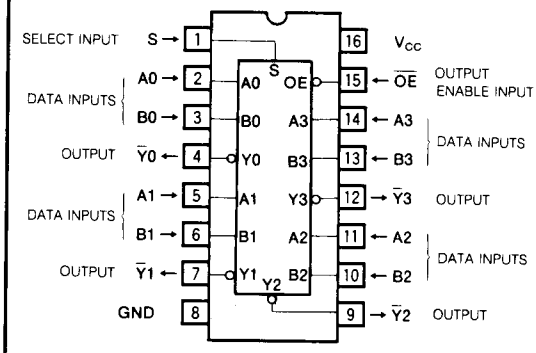
FEATURES

- High-fanout 3-state output (I_{OL}=6mA, I_{OH}=−6mA)
- High-speed: 12ns typ. (C_L=50pF, V_{CC}=5V)
- Low power dissipation: 20μW/package, max (V_{CC}=5V, T_a=25℃, quiescent state)
- High noise margin: 30% of V_{CC}, min (V_{CC}=4.5V, 6V)
- Capable of driving 15 74LSTTL loads
- Wide operating voltage range: V_{CC}=2~6V
- Wide operating temperature range: T_a=−40~+85℃

APPLICATION

General purpose, for use in industrial and consumer digital equipment.

PIN CONFIGURATION (TOP VIEW)



Outline 16P4, 16P2N, 16P2P

FUNCTIONAL DESCRIPTION

Use of silicon gate technology allows the M74HC258P to maintain the low power dissipation and high noise margin characteristics of the standard CMOS logic 4000B series while giving high-speed performance equivalent to the 74LS258.

The M74HC258 consists of four circuits each containing data selector functions for selecting one of two input line signals and multiplexer functions for converting 2-bit parallel data into serial data using time-division.

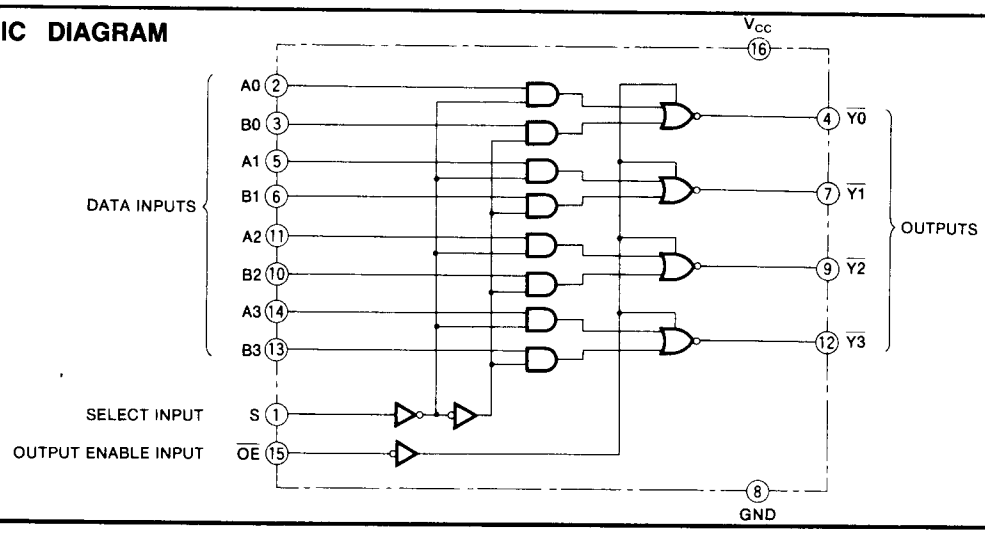
The 2-line signals are applied to data inputs A and B, and after one of the data inputs has been selected by select input S, it is output at pin $\overline{Y}$. By applying 2-bit parallel data to A and B, and connecting the output of a binary counter to S, the data at A and B will be inverted and sequentially output at $\overline{Y}$ in synchronous with the clock pulse in the order A-B. S and output-enable input $\overline{OE}$ are common to all four circuits. When $\overline{OE}$ is high, all outputs Y will become high impedance state irrespective of other inputs.

FUNCTION TABLE (Note 1)

Inputs				Output
$\overline{OE}$	S	A	B	$\overline{Y}$
H	X	X	X	Z
L	L	L	X	H
L	L	H	X	L
L	H	X	L	H
L	H	X	H	L

Note 1 : X : Irrelevant
Z : High impedance

LOGIC DIAGRAM



MITSUBISHI ELECTRIC

QUADRUPLE 2-INPUT DATA SELECTOR/MULTIPLEXER WITH 3-STATE OUTPUTS

ABSOLUTE MAXIMUM RATINGS (T_a = −40∼+85℃, unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		−0.5∼+7.0	V
V_I	Input voltage		−0.5∼V_{CC}+0.5	V
V_O	Output voltage		−0.5∼V_{CC}+0.5	V
I_{IK}	Input protection diode current	V_I < 0V	−20	mA
		V_I > V_{CC}	20	
I_{OK}	Output parasitic diode current	V_O < 0V	−20	mA
		V_O > V_{CC}	20	
I_O	Output current per output pin		±35	mA
I_{CC}	Supply/GND current	V_{CC}, GND	±75	mA
P_d	Power dissipation	(Note 2)	500	mW
Tstg	Storage temperature range		−65∼+150	℃

Note 2 : M74HC258FP, T_a = −40∼+70℃ and T_a = 70∼85℃ are derated at −6mW/℃.
M74HC258DP, T_a = −40∼+50℃ and T_a = 50∼85℃ are derated at −5mW/℃.

RECOMMENDED OPERATING CONDITIONS (T_a = −40∼+85℃)

Symbol	Parameter		Limits			Unit
			Min	Typ	Max	
V_{CC}	Supply voltage		2		6	V
V_I	Input voltage		0		V_{CC}	V
V_O	Output voltage		0		V_{CC}	V
T_{opr}	Operating temperature range		−40		+85	℃
t_r, t_f	Input risetime, falltime	V_{CC} = 2.0V	0		1000	ns
		V_{CC} = 4.5V	0		500	
		V_{CC} = 6.0V	0		400	

ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test conditions		Limits						Unit
					25℃			−40∼+85℃		
				V_{CC}(V)	Min	Typ	Max	Min	Max	
V_{IH}	High-level input voltage	V_O = 0.1V, V_{CC}−0.1V $\|I_O\|$ = 20μA		2.0	1.5			1.5		V
				4.5	3.15			3.15		
				6.0	4.2			4.2		
V_{IL}	Low-level input voltage	V_O = 0.1V, V_{CC}−0.1V $\|I_O\|$ = 20μA		2.0			0.5		0.5	V
				4.5			1.35		1.35	
				6.0			1.8		1.8	
V_{OH}	High-level output voltage	V_I = V_{IH}, V_{IL}	I_{OH} = −20μA	2.0	1.9			1.9		V
			I_{OH} = −20μA	4.5	4.4			4.4		
			I_{OH} = −20μA	6.0	5.9			5.9		
			I_{OH} = −6.0mA	4.5	4.18			4.13		
			I_{OH} = −7.8mA	6.0	5.68			5.63		
V_{OL}	Low-level output voltage	V_I = V_{IH}, V_{IL}	I_{OL} = 20μA	2.0			0.1		0.1	V
			I_{OL} = 20μA	4.5			0.1		0.1	
			I_{OL} = 20μA	6.0			0.1		0.1	
			I_{OL} = 6.0mA	4.5			0.26		0.33	
			I_{OL} = 7.8mA	6.0			0.26		0.33	
I_{IH}	High-level input current	V_I = 6V		6.0			0.1		1.0	μA
I_{IL}	Low-level input current	V_I = 0V		6.0			−0.1		−1.0	μA
I_{OZH}	Off-state high-level output current	V_I = V_{IH}, V_{IL}, V_O = V_{CC}		6.0			0.5		5.0	μA
I_{OZL}	Off-state low-level output current	V_I = V_{IH}, V_{IL}, V_O = GND		6.0			−0.5		−5.0	μA
I_{CC}	Quiescent supply current	V_I = V_{CC}, GND, I_O = 0μA		6.0			4.0		40.0	μA

QUADRUPLE 2-INPUT DATA SELECTOR/MULTIPLEXER WITH 3-STATE OUTPUTS

SWITCHING CHARACTERISTICS (V_{CC} = 5V, T_a = 25℃)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
t_{TLH}	Low-level to high-level and high-level to low-level output transition time	C_L = 50pF (Note 4)			10	ns
t_{THL}					10	ns
t_{PLH}	Low-level to high-level and high-level to low-level output propagation time (A, B − $\overline{Y}$)				18	ns
t_{PHL}					18	ns
t_{PLH}	Low-level to high-level and high-level to low-level output propagation time (S − $\overline{Y}$)				18	ns
t_{PHL}					18	ns
t_{PLZ}	Output disable time from low-level and high-level ($\overline{OE}$ − $\overline{Y}$)	C_L = 5 pF (Note 4)			25	ns
t_{PHZ}					25	ns
t_{PZL}	Output enable time to low-level and high-level ($\overline{OE}$ − $\overline{Y}$)	C_L = 50pF (Note 4)			28	ns
t_{PZH}					28	ns

SWITCHING CHARACTERISTICS (V_{CC} = 2~6V, T_a = −40~+85℃)

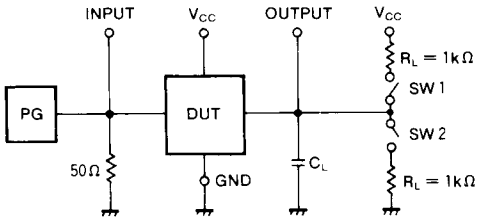
Symbol	Parameter	Test conditions		Limits					Unit
				25℃			−40~+85℃		
			V_{CC}(V)	Min	Typ	Max	Min	Max	
t_{TLH}	Low-level to high-level and high-level to low-level output transition time	C_L = 50pF (Note 4)	2.0			60		75	ns
			4.5			12		15	
			6.0			10		13	
t_{THL}			2.0			60		75	ns
			4.5			12		15	
			6.0			10		13	
t_{PLH}	Low-level to high-level and high-level to low-level output propagation time (A, B − $\overline{Y}$)	C_L = 50pF (Note 4)	2.0			100		126	ns
			4.5			20		25	
			6.0			17		21	
t_{PHL}			2.0			100		126	ns
			4.5			20		25	
			6.0			17		21	
t_{PLH}		C_L = 150pF (Note 4)	2.0			150		189	ns
			4.5			30		38	
			6.0			26		32	
t_{PHL}			2.0			150		189	ns
			4.5			30		38	
			6.0			26		32	
t_{PLH}	Low-level to high-level and high-level to low-level output propagation time (S − $\overline{Y}$)	C_L = 50pF (Note 4)	2.0			100		126	ns
			4.5			20		25	
			6.0			17		21	
t_{PHL}			2.0			100		126	ns
			4.5			20		25	
			6.0			17		21	
t_{PLH}		C_L = 150pF (Note 4)	2.0			150		189	ns
			4.5			30		38	
			6.0			26		32	
t_{PHL}			2.0			150		189	ns
			4.5			30		38	
			6.0			26		32	

SWITCHING CHARACTERISTICS (V_{CC} = 2~6V, T_a = −40~+85℃) (Continued)

Symbol	Parameter	Test conditions		Limits					Unit
				25℃			−40~+85℃		
			V_{CC}(V)	Min	Typ	Max	Min	Max	
t_{PLZ}	Output disable time from low-level and high-level ($\overline{OE}$ − $\overline{Y}$)	C_L = 50pF (Note 4)	2.0			150		189	ns
			4.5			30		38	
			6.0			26		32	
t_{PHZ}			2.0			150		189	ns
			4.5			30		38	
			6.0			26		32	
t_{PZL}	Output eaable time to low-level and high-level ($\overline{OE}$ − $\overline{Y}$)	C_L = 50pF (Note 4)	2.0			150		189	ns
			4.5			30		38	
			6.0			26		32	
t_{PZH}			2.0			150		189	ns
			4.5			30		38	
			6.0			26		32	
t_{PZL}		C_L = 150pF (Note 4)	2.0			200		252	ns
			4.5			40		50	
			6.0			34		43	
t_{PZH}			2.0			200		252	ns
			4.5			40		50	
			6.0			34		43	
C_I	Input capacitance					10		10	pF
C_O	Off-state output capacitance	$\overline{OE}$ = V_{CC}				15		15	pF
C_{PD}	Power dissipation capacitance (Note 3)								pF

Note 3 : C_{PD} is the internal capacitance of the IC calculated from operation supply current under no-load conditions. The power dissipation during operation under no-load conditions is calculated using the following formula:
$P_D = C_{PD} \cdot V_{CC}^2 \cdot f_i + I_{CC} \cdot V_{CC}$

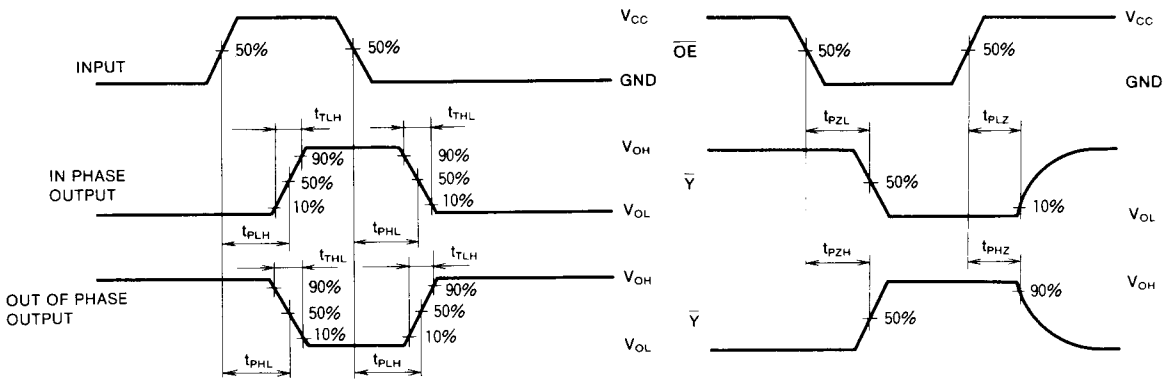
Note 4 : Test Circuit



Parameter	SW 1	SW 2
t_{TLH}, t_{THL} t_{PLH}, t_{PHL}	Open	Open
t_{PLZ}	Closed	Open
t_{PHZ}	Open	Closed
t_{PZL}	Closed	Open
t_{PZH}	Open	Closed

(1) The pulse generator (PG) has the following characteristics (10%~90%): t_r = 6ns, t_f = 6ns
(2) The capacitance C_L includes stray wiring capacitance and the probe input capacitance.

TIMING DIAGRAM

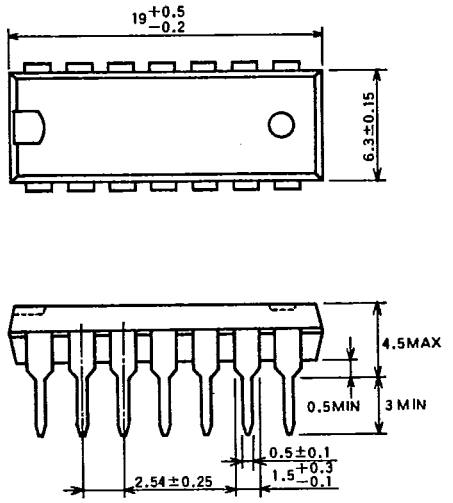


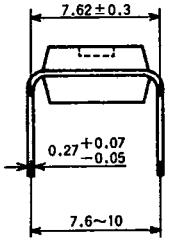
MITSUBISHI HIGH SPEED CMOS

PACKAGE OUTLINES

TYPE 14P4 14-PIN MOLDED PLASTIC DIP

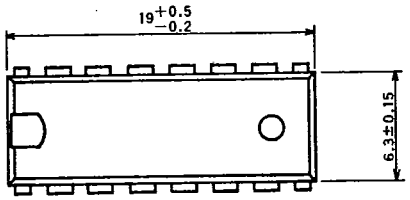
Dimension in mm

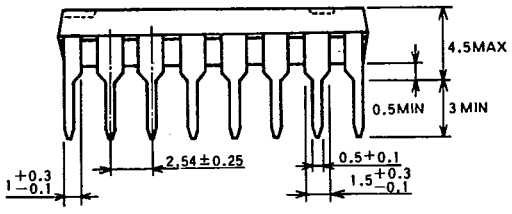


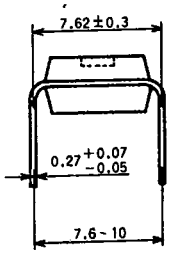


TYPE 16P4 16-PIN MOLDED PLASTIC DIP

Dimension in mm





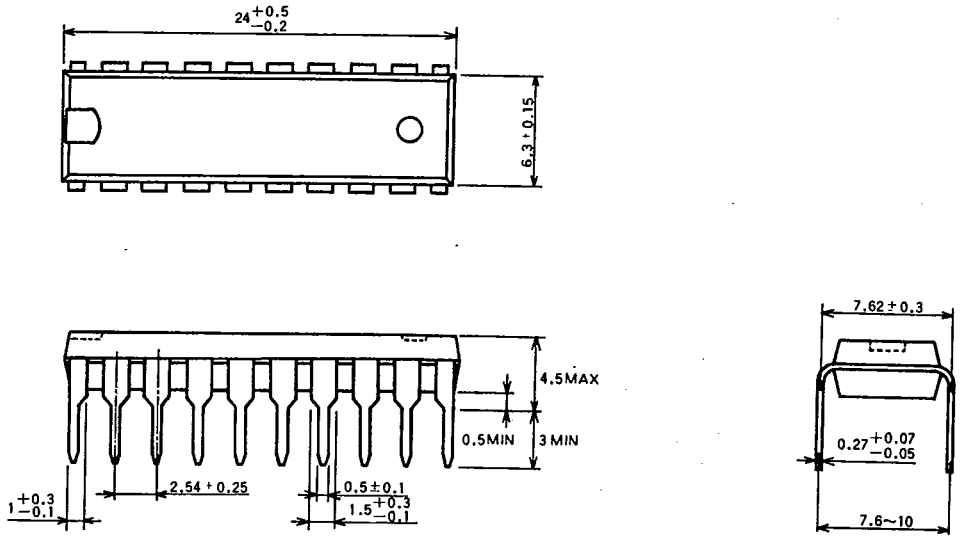


MITSUBISHI HIGH SPEED CMOS

PACKAGE OUTLINES

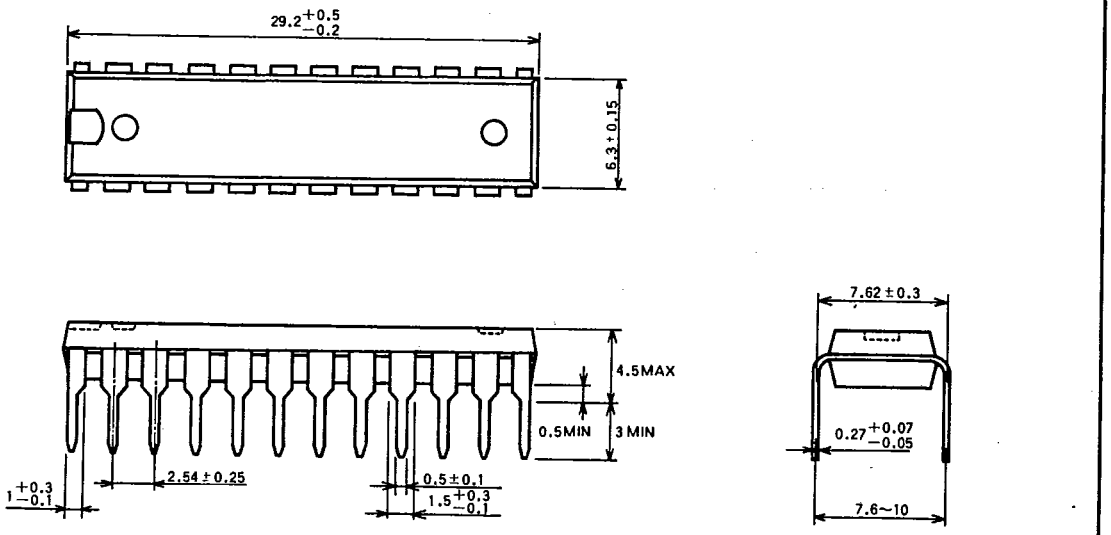
TYPE 20P4 20-PIN MOLDED PLASTIC DIP

Dimension in mm



TYPE 24P4D 24-PIN MOLDED PLASTIC DIP

Dimension in mm



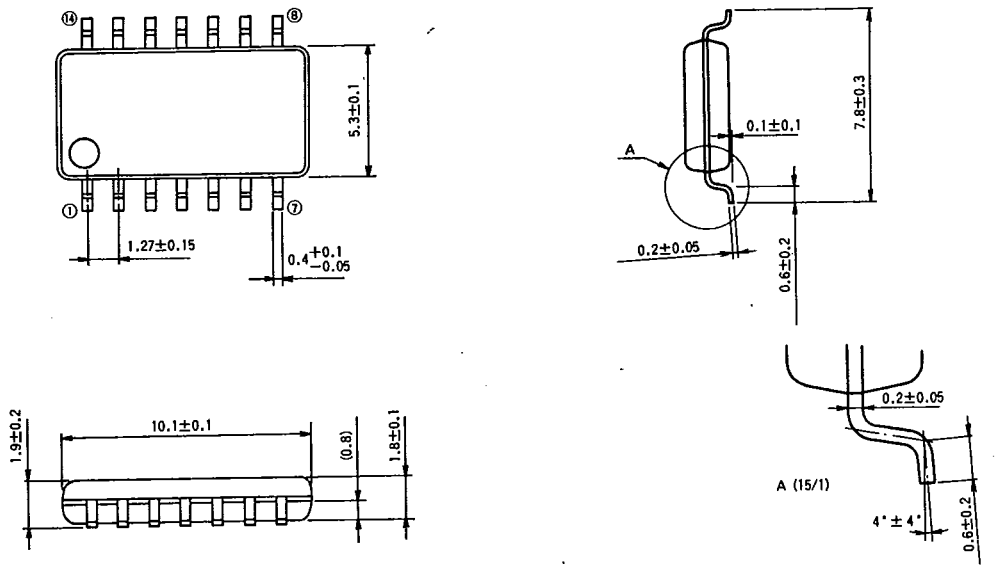
MITSUBISHI ELECTRIC

MITSUBISHI HIGH SPEED CMOS

PACKAGE OUTLINES

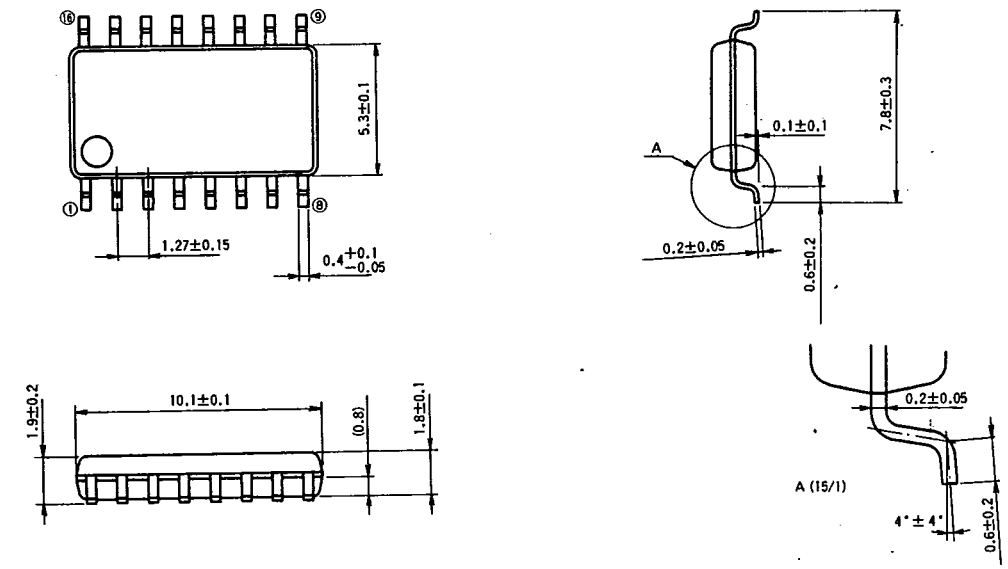
TYPE 14P2N 14PIN MOLDED PLASTIC SOP

Dimension in mm



TYPE 16P2N 16PIN MOLDED PLASTIC SOP

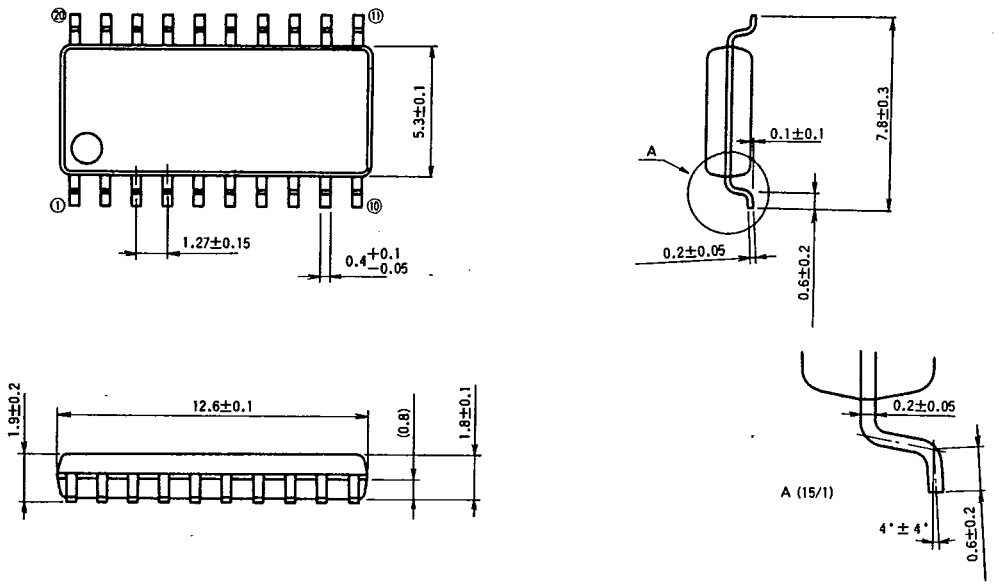
Dimension in mm



PACKAGE OUTLINES

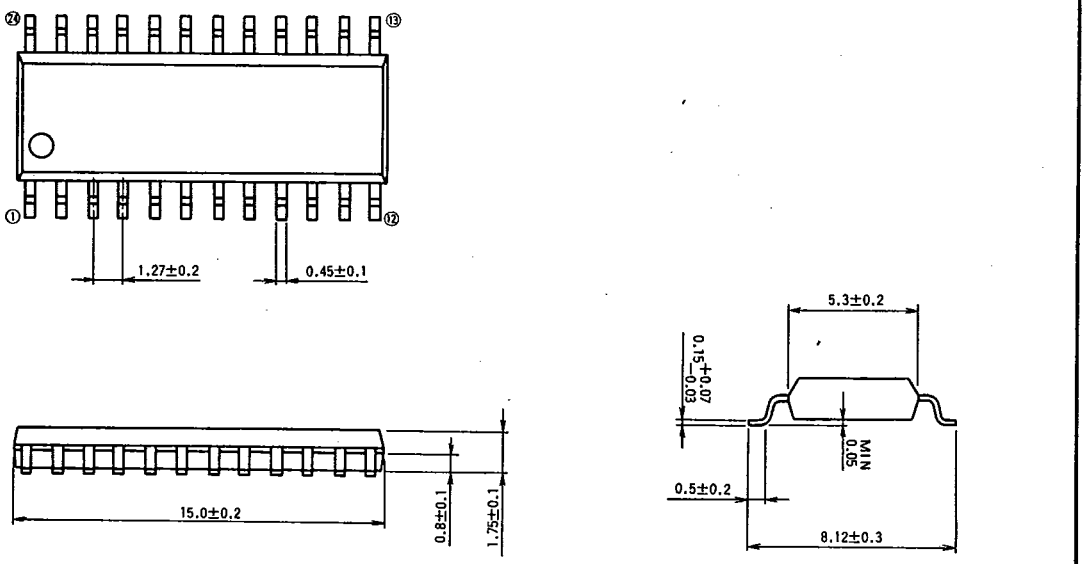
TYPE 20P2N 20PIN MOLDED PLASTIC SOP

Dimension in mm



TYPE 24P2 24PIN MOLDED PLASTIC SOP

Dimension in mm

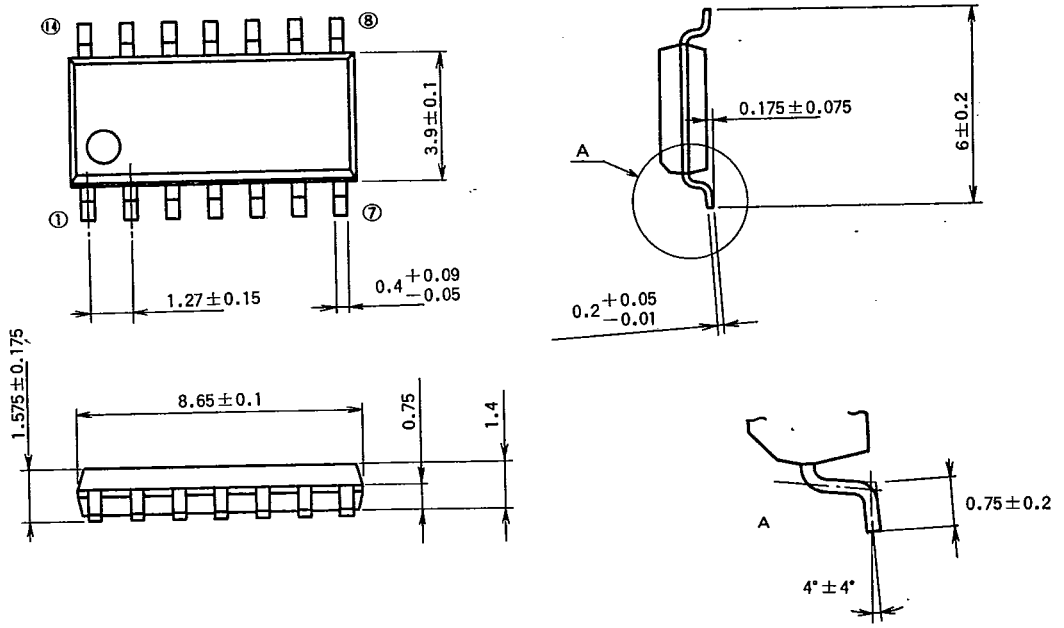


MITSUBISHI ELECTRIC

PACKAGE OUTLINES

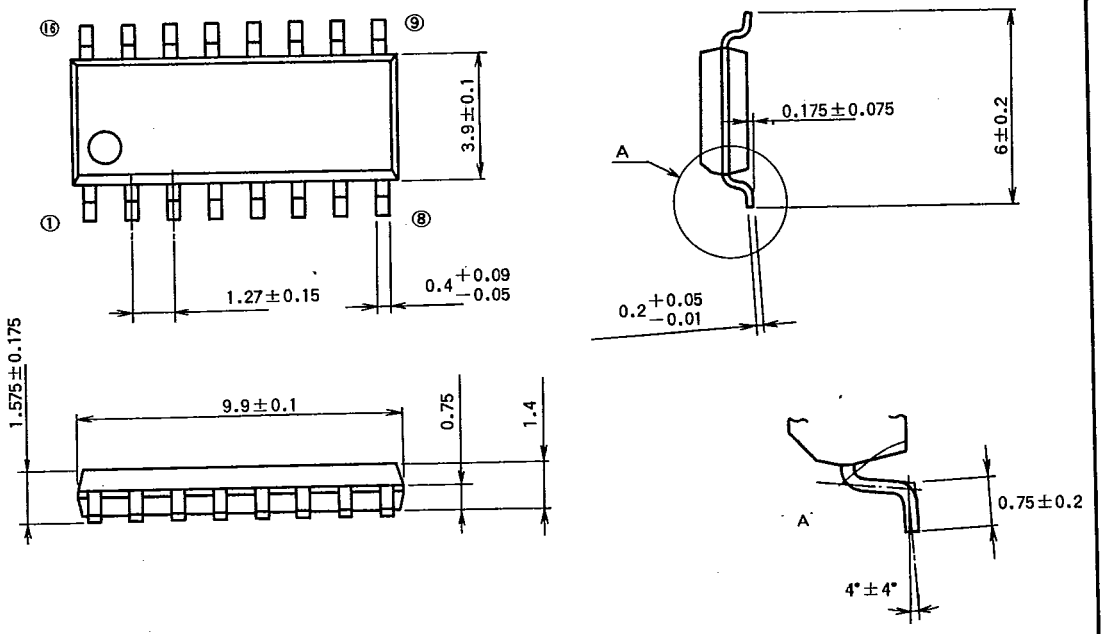
TYPE 14P2P 14-PIN MOLDED PLASTIC SOP(JEDEC 150mil body)

Dimension in mm



TYPE 16P2P 16-PIN MOLDED PLASTIC SOP(JEDEC 150mil body)

Dimension in mm



PACKAGE OUTLINES

TYPE 20P2V 20-PIN MOLDED PLASTIC SOP(JEDEC 300mil body)

Dimension in mm