

MITSUBISHI LSTTLs M74LS145P

BCD-TO-DECIMAL DECODER/DRIVER

DESCRIPTION

The M74LS145P is a semiconductor integrated circuit provided with BCD-to-decimal decoder/driver function and open collector outputs.

FEATURES

- High output current ($I_O=80\text{mA}$ with $V_{OL}\leq 3\text{V}$;
 $I_O=24\text{mA}$ with $V_O\leq 0.5\text{V}$)
- High output breakdown voltage ($V_O\geq 15\text{V}$)
- All outputs high with reactive input
- Wide operating temperature range ($T_a=-20\sim+75^\circ\text{C}$)

APPLICATION

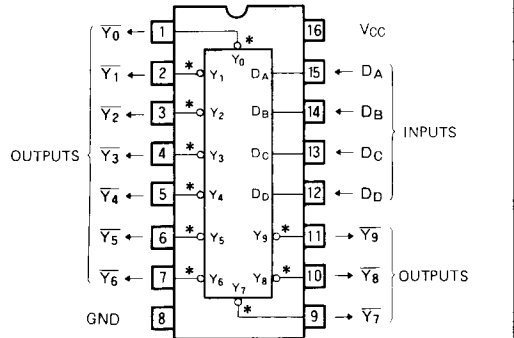
General purpose, for use in industrial and consumer equipment.

FUNCTIONAL DESCRIPTION

When inputs D_A , D_B , D_C and D_D are designated with a BCD code in this decoder/driver, the $\bar{Y}_0\sim\bar{Y}_9$ output corresponding to the number is set low while the other 9 outputs are set high. When a binary number of 10 or more is applied to $D_A\sim D_D$, all the outputs are set high.

The outputs are open collector types with a breakdown voltage of 15V and an I_{OL} of 80mA (with $V_{OL}\leq 3\text{V}$) This device is therefore suitable for use as an LSTTL/MOS interface, display tube and relay driver.

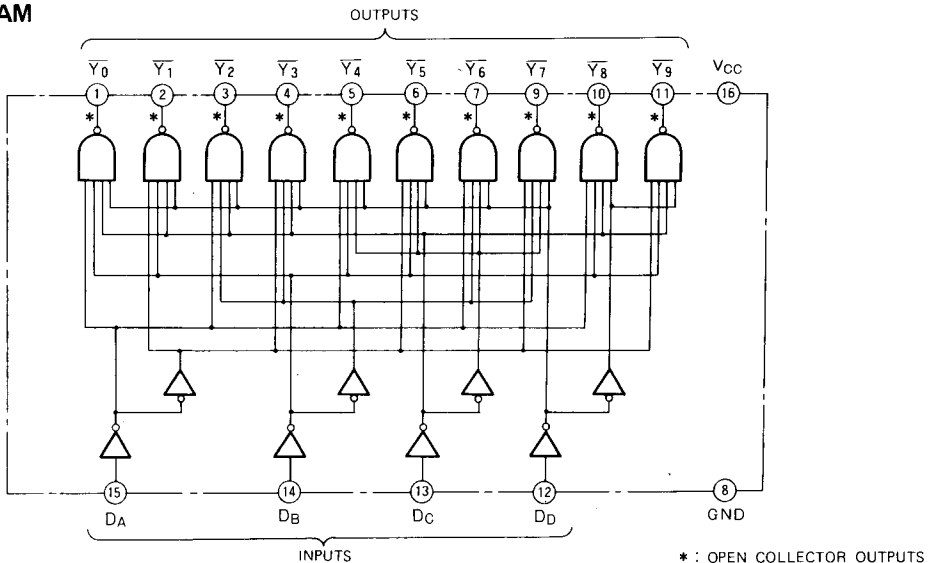
PIN CONFIGURATION (TOP VIEW)



* : OPEN COLLECTOR OUTPUTS

Outline 16P4

BLOCK DIAGRAM



* : OPEN COLLECTOR OUTPUTS

BCD-TO-DECIMAL DECODER/DRIVER

FUNCTION TABLE

Decimal number	D _D	D _C	D _B	D _A	\overline{Y}_0	\overline{Y}_1	\overline{Y}_2	\overline{Y}_3	\overline{Y}_4	\overline{Y}_5	\overline{Y}_6	\overline{Y}_7	\overline{Y}_8	\overline{Y}_9
0	L	L	L	L	L	H	H	H	H	H	H	H	H	H
1	L	L	L	H	H	L	H	H	H	H	H	H	H	H
2	L	L	H	L	H	H	L	H	H	H	H	H	H	H
3	L	L	H	H	H	H	H	L	H	H	H	H	H	H
4	L	H	L	L	H	H	H	H	L	H	H	H	H	H
5	L	H	L	H	H	H	H	H	H	L	H	H	H	H
6	L	H	H	L	H	H	H	H	H	H	L	H	H	H
7	L	H	H	H	H	H	H	H	H	H	H	L	H	H
8	H	L	L	L	H	H	H	H	H	H	H	H	L	H
9	H	L	L	H	H	H	H	H	H	H	H	H	H	L
10	H	L	H	L	H	H	H	H	H	H	H	H	H	H
11	H	L	H	H	H	H	H	H	H	H	H	H	H	H
12	H	H	L	L	H	H	H	H	H	H	H	H	H	H
13	H	H	L	H	H	H	H	H	H	H	H	H	H	H
14	H	H	H	L	H	H	H	H	H	H	H	H	H	H
15	H	H	H	H	H	H	H	H	H	H	H	H	H	H

ABSOLUTE MAXIMUM RATINGS (T_a = -20 ~ +75°C, unless otherwise noted)

Symbol	Parameter	Conditions	Limits	Unit
V _{CC}	Supply voltage		-0.5 ~ +7	V
V _I	Input voltage		-0.5 ~ +15	V
V _O	Output voltage	High-level state	-0.5 ~ +15	V
T _{opr}	Operating free-air ambient temperature range		-20 ~ +75	°C
T _{stg}	Storage temperature range		-65 ~ +150	°C

RECOMMENDED OPERATING CONDITIONS (T_a = -20 ~ +75°C, unless otherwise noted)

Symbol	Parameter		Limits			Unit
			Min	Typ	Max	
V _{CC}	Supply voltage		4.75	5	5.25	V
I _{OH}	High-level output current	V _{OH} = 15V	0		250	μA
I _{OL}	Low-level output current	V _{OL} ≤ 0.4V	0		12	mA
		V _{OL} ≤ 0.5V	0		24	mA

ELECTRICAL CHARACTERISTICS (T_a = -20 ~ +75°C, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ*	Max	
V _{IH}	High-level input voltage		2			V
V _{IL}	Low-level input voltage				0.8	V
V _{IC}	Input clamp voltage	V _{CC} = 4.75V, I _{IC} = -18mA			-1.5	V
I _{OH}	High-level output voltage	V _{CC} = 4.75V, V _I = 0.8V V _I = 2V, V _O = 15V			250	μA
V _{OL}	Low-level output voltage	V _{CC} = 4.75V V _I = 0.8V, V _I = 2V	I _{OL} = 12mA	0.25	0.4	V
			I _{OL} = 24mA	0.35	0.5	V
			I _{OL} = 80mA	2.3	3	V
I _{IH}	High-level input current	V _{CC} = 5.25V, V _I = 2.7V			20	μA
I _{IL}	Low-level input current	V _{CC} = 5.25V, V _I = 10V			0.1	mA
I _{IL}	Low-level input current	V _{CC} = 5.25V, V _I = 0.4V			-0.4	mA
I _{CC}	Supply current	V _{CC} = 5.25V (Note 1)		7	13	mA

* : All typical values are at V_{CC} = 5V, T_a = 25°C.

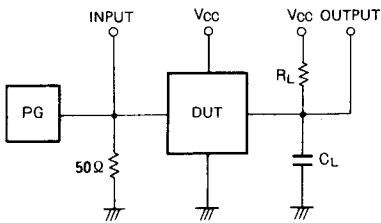
Note 1: I_{CC} is measured with D_A ~ D_D at 0V.

BCD-TO-DECIMAL DECODER/DRIVER

SWITCHING CHARACTERISTICS ($V_{CC}=5V$, $T_a=25^{\circ}C$, unless otherwise noted)

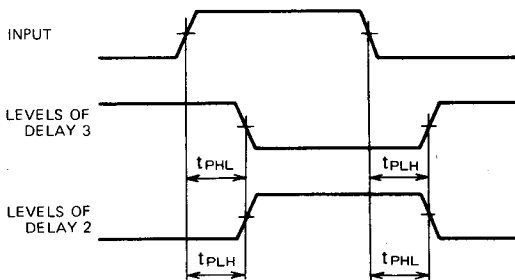
Symbol	Parameter	Test conditions	Limits			Unit	
			Min	Typ	Max		
t_{PLH}	Low-to-high-level, high-to-low-level output propagation time	$R_L=665\Omega$, $C_L=45pF$ (Note 2)		27	50	ns	
t_{PHL}				17	50	ns	
t_{PLH}			delay gate stages 2		27	50	ns
t_{PHL}			delay gate stages 3		17	50	ns

Note 2: Measurement circuit



- (1) The pulse generator (PG) has the following characteristics:
PRR=1MHz, $t_r=6ns$, $t_f=6ns$, $t_w=500ns$, $V_P=3V_{P-P}$, $Z_0=50\Omega$.
- (2) C_L includes probe and jig capacitance

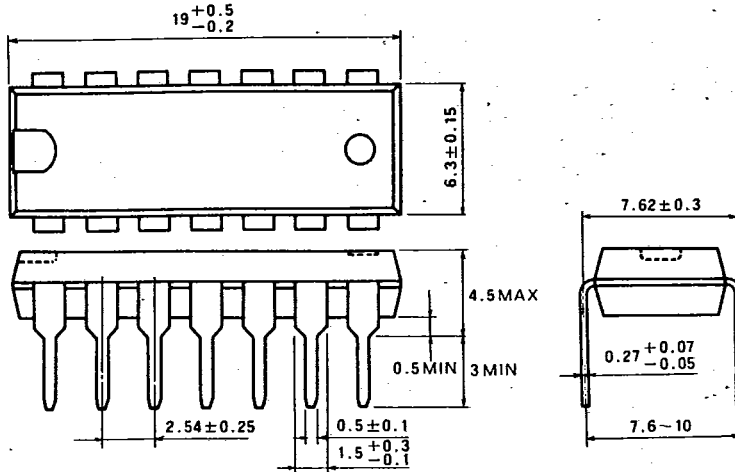
TIMING DIAGRAM (Reference=1.3V)



T-90-20

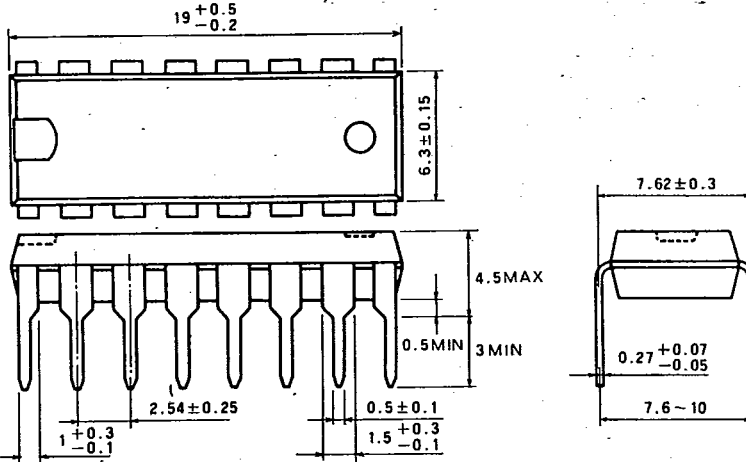
TYPE 14P4 14-PIN MOLDED PLASTIC DIL

Dimension in mm



TYPE 16P4 16-PIN MOLDED PLASTIC DIL

Dimension in mm



TYPE 20P4 20-PIN MOLDED PLASTIC DIL

Dimension in mm

