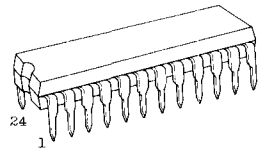
TC74HC4514P 4-TO-16 LINE DECODER/LATCH
TC74HC4515P 4-TO-16 LINE DECODER/LATCH (INV.)

GENERAL DESCRIPTION

The TC74HC4514 and TC74HC4515 are high speed CMOS 4-LINE TO 16-LINE DECODER WITH LATCHED INPUTS fabricated with silicon gate C^2MOS technology. It achieves the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation. A binary code stored in the four input latches (A thru D) provides a high level (HC4514) or a low level (HC4515) at the selected one of sixteen outputs excluding the other fifteen outputs, when the inhibit input (INHIBIT) is held low. When the inhibit input is held high, all outputs are kept low level (HC4514) or high level (HC4515), while the latch function is available. The data applied to the data inputs are transfered to the Q outputs of latches when the strobe input is held high. When the strobe input is taken low, the information data applied to the data input at a time is retained at the output of latches. All inputs are equipped with protection circuits against static discharge or transient excess voltage.

FEATURES:

- High Speed ..... t_{pd}=24ns (Typ.) at V_{CC}=5V
- Low Power Dissipation ..... I_{CC}=4μA (Max.) at 25°C
- High Noise Immunity ..... $V_{NIH}=V_{NIL}$=28% V_{CC} (Min.)
- Output Drive Capability ..... 10 LSTTL Loads
- Symmetrical Output Impedance ..... $|I_{OH}|=I_{OL}$=4mA
- Balanced Propagation Delays ..... $t_{pLH}\fallingdotseq t_{pHL}$
- Wide Operating Voltage Range ..... V_{CC} (opr.)=2V∿6V
- Pin and Function Compatible with 4514B/4515B



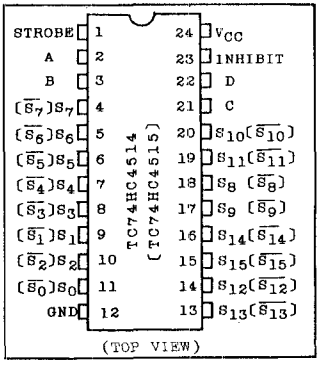
DIP(5-30F)
0.300 INCH(7.62mm) ROW SPACING

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	V_{CC}	-0.5∿7	V
DC Input Voltage	V_{IN}	-0.5∿V_{CC}+0.5	V
DC Output Voltage	V_{OUT}	-0.5∿V_{CC}+0.5	V
Input Diode Current	I_{IK}	±20	mA
Output Diode Current	I_{OK}	±20	mA
DC Output Current	I_{OUT}	±25	mA
DC V_{CC}/Ground Current	I_{CC}	±50	mA
Power Dissipation	P_D	500*	mW
Storage Temperature	T_{stg}	-65∿150	°C
Lead Temperature 10sec	T_L	300	°C

* 500mW in the range of Ta=-40°C∿65°C and from Ta=65°C up to 85°C derating factor of -10mW/°C shall be applied until 300mW.

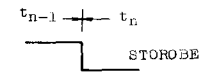
PIN ASSIGNMENT



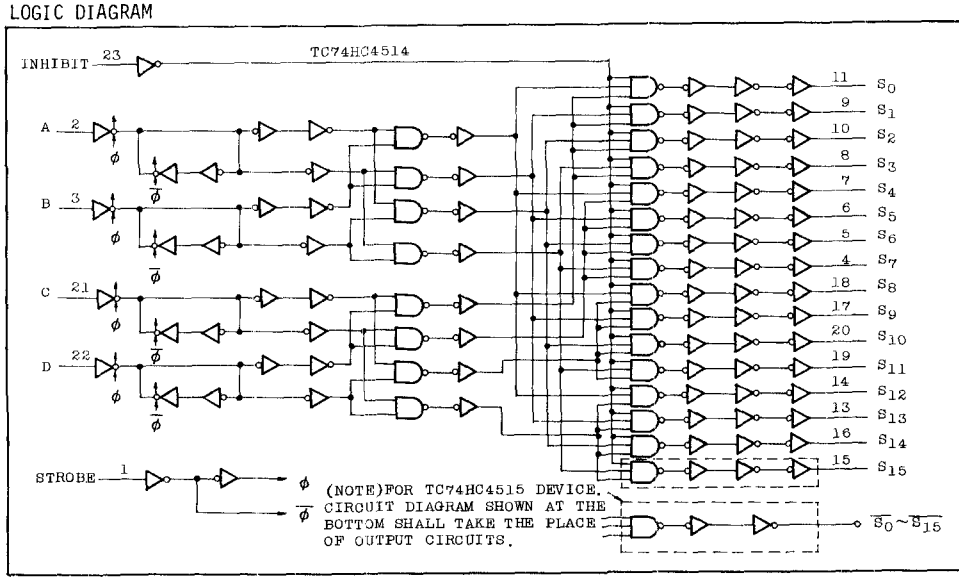
TRUTH TABLE

INPUTS					SELECTED OUTPUT TC74HC4514P — 'H' (TC74HC4515P — 'L')
INHIBIT	A	B	C	D	
L	L	L	L	L	S_0 ($\overline{S_0}$)
L	H	L	L	L	S_1 ($\overline{S_1}$)
L	L	H	L	L	S_2 ($\overline{S_2}$)
L	H	H	L	L	S_3 ($\overline{S_3}$)
L	L	L	H	L	S_4 ($\overline{S_4}$)
L	H	L	H	L	S_5 ($\overline{S_5}$)
L	L	H	H	L	S_6 ($\overline{S_6}$)
L	H	H	H	L	S_7 ($\overline{S_7}$)
L	L	L	L	H	S_8 ($\overline{S_8}$)
L	H	L	L	H	S_9 ($\overline{S_9}$)
L	L	H	L	H	S_{10} ($\overline{S_{10}}$)
L	H	H	L	H	S_{11} ($\overline{S_{11}}$)
L	L	L	H	H	S_{12} ($\overline{S_{12}}$)
L	H	L	H	H	S_{13} ($\overline{S_{13}}$)
L	L	H	H	H	S_{14} ($\overline{S_{14}}$)
L	H	H	H	H	S_{15} ($\overline{S_{15}}$)
H	*	*	*	*	TC74HC4514 — ALL OUTPUTS 'L' (TC74HC4515 — ALL OUTPUTS 'H')

- * : DON'T CARE
- STROBE = 'H' ; REFER TO TRUTH TABLE
- STROBE = 'L' DATA AT THE NEGATIVE GOING TRANSITION OF STROBE SHALL BE PROVIDED ON THE EACH OUTPUT WHILE STROBE IS HELD LOW.



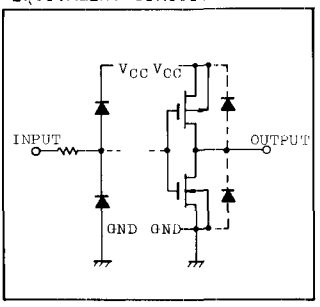
LOGIC DIAGRAM



RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	LIMIT	UNIT
Supply Voltage	V_{CC}	2 ∿ 6	V
Input Voltage	V_{IN}	0 ∿ V_{CC}	V
Output Voltage	V_{OUT}	0 ∿ V_{CC}	V
Operating Temperature	T_{opr}	-40 ∿ 85	°C
Input Rise and Fall Time	t_r, t_f	0 ∿ 1000 (V_{CC}=2.0V) 0 ∿ 500 (V_{CC}=4.5V) 0 ∿ 400 (V_{CC}=6.0V)	ns

INPUT and OUTPUT EQUIVALENT CIRCUIT



DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION		V_{CC}	Ta=25°C MIN.	Ta=25°C TYP.	Ta=25°C MAX.	Ta=-40∿85°C MIN.	Ta=-40∿85°C MAX.	UNIT
High-Level Input Voltage	V_{IH}			2.0	1.5	-	-	1.5	-	V
				4.5	3.15	-	-	3.15	-	
				6.0	4.2	-	-	4.2	-	
Low-Level Input Voltage	V_{IL}			2.0	-	-	0.5	-	0.5	V
				4.5	-	-	1.35	-	1.35	
				6.0	-	-	1.8	-	1.8	
High-Level Output Voltage	V_{OH}	V_{IN}=V_{IH} or V_{IL}	I_{OH}=-20μA	2.0	1.9	2.0	-	1.9	-	V
				4.5	4.4	4.5	-	4.4	-	
				6.0	5.9	6.0	-	5.9	-	
			I_{OH}=-4mA	4.5	4.18	4.31	-	4.13	-	
			I_{OH}=-5.2mA	6.0	5.68	5.80	-	5.63	-	
Low-Level Output Voltage	V_{OL}	V_{IN}=V_{IH} or V_{IL}	I_{OL}=20μA	2.0	-	0.0	0.1	-	0.1	V
				4.5	-	0.0	0.1	-	0.1	
				6.0	-	0.0	0.1	-	0.1	
			I_{OL}=4mA	4.5	-	0.17	0.32	-	0.37	
			I_{OL}=5.2mA	6.0	-	0.18	0.32	-	0.37	
Input Leakage Current	I_{IN}	V_{IN}=V_{CC} or GND		6.0	-	-	±0.1	-	±1.0	μA
Quiescent Supply Current	I_{CC}	V_{IN}=V_{CC} or GND		6.0	-	-	4.0	-	40.0	

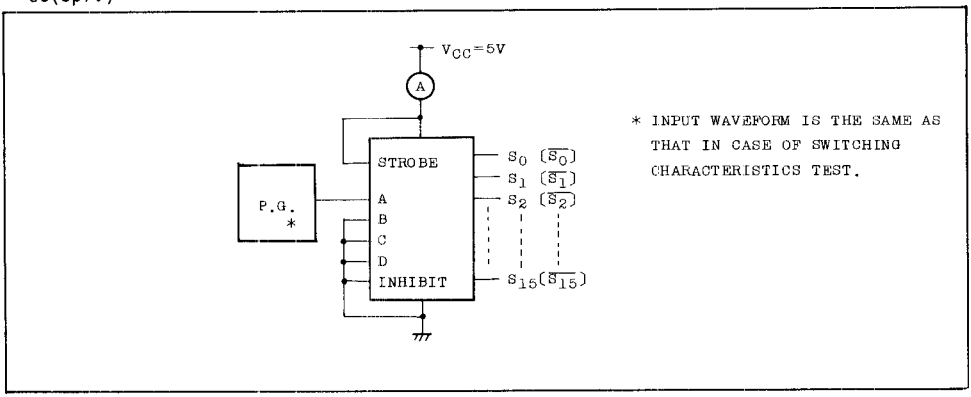
AC ELECTRICAL CHARACTERISTICS (C_L=50pF, INPUT $t_r=t_f$=6nS)

PARAMETER	SYMBOL	TEST CONDITION	V_{CC}	25°C MIN.	25°C TYP.	25°C MAX.	-40 ~ 85°C MIN.	-40 ~ 85°C MAX.	UNIT
Output Rise, Fall Time	t_{TLH} t_{THL}		2.0	-	30	75	-	90	nS
			4.5	-	8	15	-	18	
			6.0	-	7	13	-	16	
Propagation Delay Time DATA - S_n, $\overline{S_n}$	t_{PLH} t_{PHL}		2.0	-	120	225	-	270	
			4.5	-	29	45	-	54	
			6.0	-	25	39	-	46	
STROBE - S_n, $\overline{S_n}$	t_{PLH} t_{PHL}		2.0	-	130	255	-	310	
			4.5	-	33	51	-	62	
			6.0	-	28	44	-	53	
INHIBIT - S_n, $\overline{S_n}$	t_{PLH} t_{PHL}		2.0	-	90	175	-	210	
			4.5	-	22	35	-	42	
			6.0	-	19	30	-	36	
Mininum Pulse Width STROBE	$t_{w(H)}$		2.0	-	30	75	-	90	
			4.5	-	8	15	-	18	
			6.0	-	7	13	-	16	
Minimum Set-up Time DATA	t_s		2.0	-	12	50	-	60	
			4.5	-	4	10	-	12	
			6.0	-	4	9	-	11	
Minimum Hold Time DATA	t_h		2.0	-	-	25	-	30	
			4.5	-	-	5	-	6	
			6.0	-	-	4	-	5	
Input Capacitance	C_{IN}			-	5	10	-	10	pF
Power Dissipation Capacitance	C_{PD}(1)	TC74HC4514P		-	69	-	-	-	
		[TC74HC4515P]		-	[72]	-	-	-	

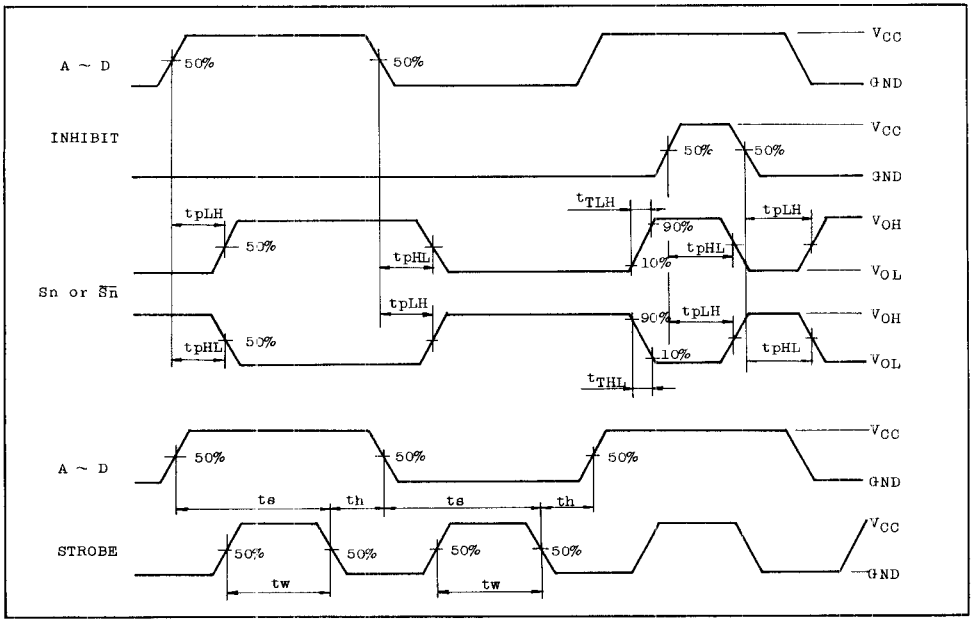
Note(1) C_{PD} is defined as the value of internal equivalent capacitance of IC which is calculated from the operating current consumption without load (refer to Test Circuit). Average operating current can be obtained by the equation hereunder.

$$I_{CC(opr)}=C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$$

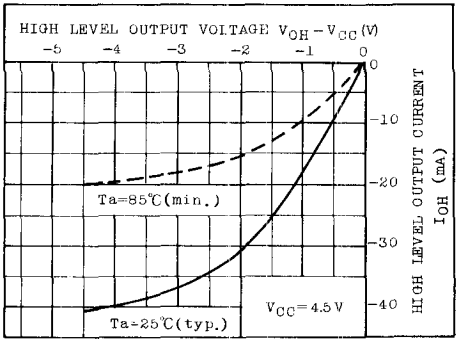
I_{CC}(opr.) TEST WAVEFORM



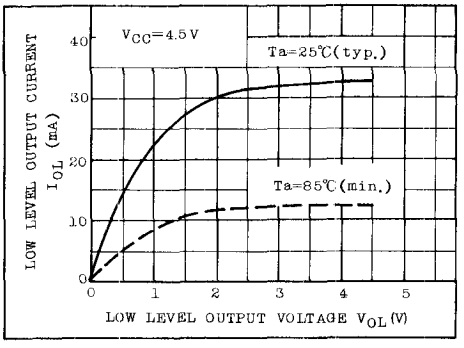
SWITCHING CHARACTERISITCS TEST WAVEFORM



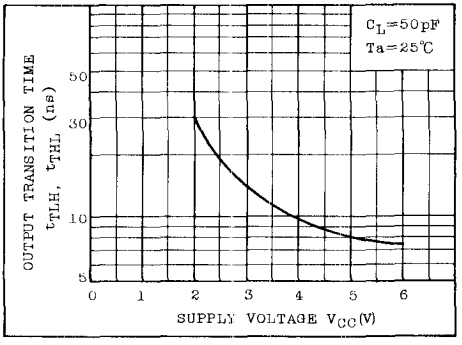
I_{OH} CHARACTERISTICS



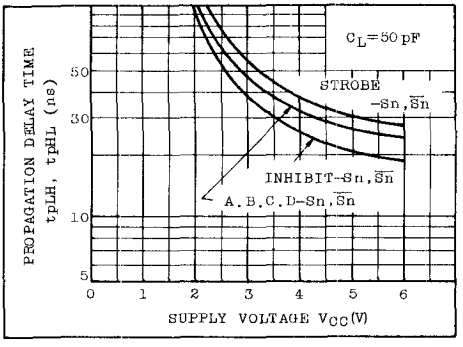
I_{OL} CHARACTERISTICS



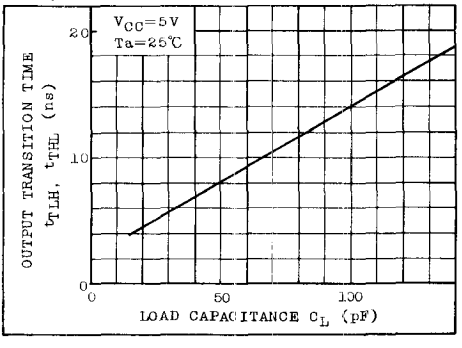
t_{TLH}, t_{THL} - V_{CC} CHARACTERISTICS (TYP.)



t_{PLH}, t_{PHL} - V_{CC} CHARACTERISTICS (TYP.)



t_{TLH}, t_{THL} - C_L CHARACTERISTICS (TYP.)



t_{PLH}, t_{PHL} - C_L CHARACTERISITCS (TYP.)