SGS-THOMSON MICROELECTRONICS

M54HC155
M74HC155

DUAL 2-TO-4 LINE DECODER/3 TO 8 LINE DECODER

- HIGH SPEED
  t_{PD} = 18 ns (TYP.) at V_{CC} = 5V
- LOW POWER DISSIPATION
  I_{CC} = 4 μA (MAX.) at T_A = 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} = 4 mA (MIN.)
- BALANCED PROPAGATION DELAYS
  t_{PLH} = t_{PHL}
- WIDE OPERATING VOLTAGE RANGE
  V_{CC} (OPR) = 2V to 6V
- PIN AND FUNCTION COMPATIBLE
  WITH 54/74LS155

B1N
Plastic Package

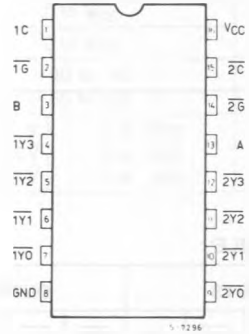
F1
Ceramic Frit Seal Package

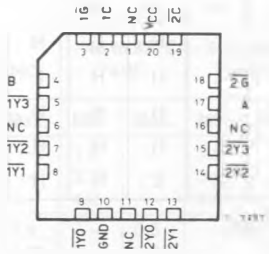
M1
Micro Package

C1
Plastic Chip Carrier

ORDERING NUMBERS:
M54HC155 F1
M74HC155 B1N
M74HC155 F1
M74HC155 C1
M74HC155 M1

PIN CONNECTIONS (top view)





NC = No Internal Connection

DESCRIPTION

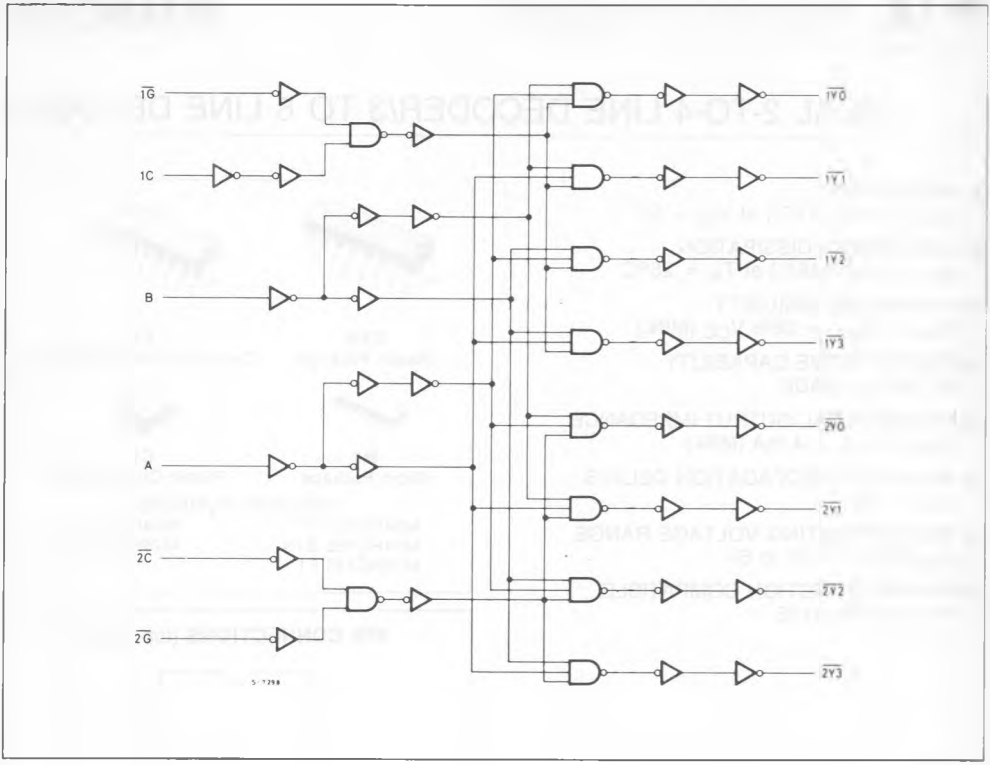
The M54/74HC155 is a high speed CMOS DUAL 2-TO-4 LINE DECODER fabricated in silicon gate C²MOS technology.

It has the same high speed performance of LSTTL combined with true CMOS low power consumption. It features dual 1-TO-4 line demultiplexers with individual strobe inputs (1G and 2G), individual data inputs (1C and $\overline{2C}$) and common binary address inputs (A and B).

When both decoders are enabled by the strobes, the inverted output of 1C data and non-inverted output of $\overline{2C}$ data will be brought to the select output pins of each sections. A 1-TO-8 line demultiplexer can also be easily built up by providing a data signal to both 1C and $\overline{2C}$ inputs; the output order from the msb is 1Y3, 1Y2, 1Y1, 1Y0, 2Y3, 2Y2, 2Y1, 2Y0. This device can be used as a 2-to-4 line decoder or a 3-to-8 line decoder when 1C is held high and $\overline{2C}$ is held low.

All inputs are equipped with protection circuits against static discharge and transient excess voltage.

LOGIC DIAGRAM



TRUTH TABLE

INPUTS				OUTPUTS			
B	A	1G	1C	1Y0	1Y1	1Y2	1Y3
X	X	H	X	H	H	H	H
L	L	L	H	L	H	H	H
L	H	L	H	H	L	H	H
H	L	L	H	H	H	L	H
H	H	L	H	H	H	H	L
X	X	X	L	H	H	H	H

X: DON'T CARE

INPUTS				OUTPUTS			
B	A	2G	2C	2Y0	2Y1	2Y3	2Y3
X	X	H	X	H	H	H	H
L	L	L	L	L	H	H	H
L	H	L	L	H	L	H	H
H	L	L	L	H	H	L	H
H	H	L	L	H	H	H	L
X	X	X	H	H	H	H	H

X: DON'T CARE

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	−0.5 to 7	V
V_I	DC Input Voltage	−0.5 to V_{CC} + 0.5	V
V_O	DC Output Voltage	−0.5 to V_{CC} + 0.5	V
I_{IK}	DC Input Diode Current	± 20	mA
I_{OK}	DC Output Diode Current	± 20	mA
I_O	DC Output Source Sink Current Per Output Pin	± 25	mA
I_{CC} or I_{GND}	DC V_{CC} or Ground Current	± 50	mA
P_D	Power Dissipation	500 (*)	mW
T_{stg}	Storage Temperature	−65 to 150	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

(*) 500 mW: ≅ 65°C derate to 300 mW by 10 mW/°C: 65°C to 85°C

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter		Value		Unit
V_{CC}	Supply Voltage		2 to 6		V
V_I	Input Voltage		0 to V_{CC}		V
V_O	Output Voltage		0 to V_{CC}		V
T_A	Operating Temperature	74HC Series 54HC Series	−40 to 85 −55 to 125		°C
t_r, t_f	Input Rise and Fall Time	V_{CC} = 2 V V_{CC} = 4.5V V_{CC} = 6 V	0 to 1000 0 to 500 0 to 400		ns

DC SPECIFICATIONS

Symbol	Parameter	V_{CC}	Test Condition	T_A = 25°C 54HC and 74HC			−40 to 85°C 74HC		−55 to 125°C 54HC		Unit
				Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
V_{IH}	High Level Input Voltage	2.0 4.5 6.0		1.5 3.15 4.2	— — —	— — —	1.5 3.15 4.2	— — —	1.5 3.15 4.2	— — —	V
V_{IL}	Low Level Input Voltage	2.0 4.5 6.0		— — —	— — —	0.5 1.35 1.8	— — —	0.5 1.35 1.8	— — —	0.5 1.35 1.8	V

DC SPECIFICATIONS (Continued)

Symbol	Parameter	V_{CC}	Test Condition		$T_A = 25°C$ 54HC and 74HC			-40 to $85°C$ 74HC		-55 to $125°C$ 54HC		Unit
					Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
V_{OH}	High Level Output Voltage	2.0	V_I	I_O	1.9	2.0	—	1.9	—	1.9	—	V
		4.5	V_{IH} or V_{IL}	$-20\ \mu A$	4.4	4.5	—	4.4	—	4.4	—	
		6.0			5.9	6.0	—	5.9	—	5.9	—	
		4.5		-4.0 mA	4.18	4.31	—	4.13	—	4.10	—	
		6.0		-5.2 mA	5.68	5.8	—	5.63	—	5.60	—	
V_{OL}	Low Level Output Voltage	2.0	V_{IH} or V_{IL}	$20\ \mu A$	—	0	0.1	—	0.1	—	0.1	V
		4.5			—	0	0.1	—	0.1	—	0.1	
		6.0			—	0	0.1	—	0.1	—	0.1	
		4.5		4.0 mA	—	0.17	0.26	—	0.33	—	0.40	
		6.0		5.2 mA	—	0.18	0.26	—	0.33	—	0.40	
I_I	Input Leakage Current	6.0	$V_I = V_{CC}$ or GND		—	—	± 0.1	—	± 1	—	± 1	μA
I_{CC}	Quiescent Supply Current	6.0	$V_I = V_{CC}$ or GND		—	—	4	—	40	—	80	μA

AC ELECTRICAL CHARACTERISTICS ($V_{CC} = 5V$, $T_A = 25°C$, $C_L = 15pF$, Input $t_r = t_f = 6ns$)

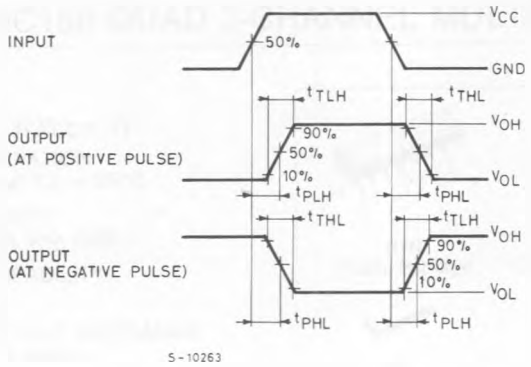
Symbol	Parameter	54HC and 74HC			Unit
		Min.	Typ.	Max.	
t_{TLH} t_{THL}	Output Transition Time		4	8	ns
t_{PLH} t_{PHL}	Propagation Delay Time		19	30	ns

AC ELECTRICAL CHARACTERISTICS ($C_L = 50pF$, Input $t_r = t_f = 6ns$)

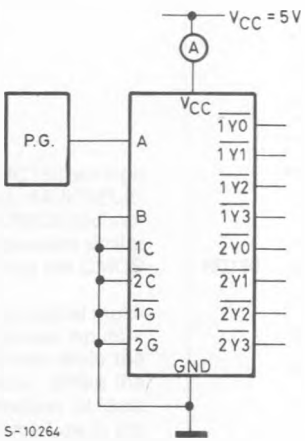
Symbol	Parameter	V_{CC}	Test Condition	$T_A = 25°C$ 54HC and 74HC			-40 to $85°C$ 74HC		-55 to $125°C$ 54HC		Unit
				Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
t_{TLH} T_{THL}	Output Transition Time	2.0		—	30	75	—	95	—	110	ns
		4.5		—	8	15	—	19	—	22	
		6.0		—	7	13	—	16	—	19	
t_{PLH} t_{PHL}	Propagation Delay Time	2.0		—	88	175	—	220	—	265	ns
		4.5		—	22	35	—	44	—	53	
		6.0		—	19	30	—	37	—	45	
C_{IN}	Input Capacitance			—	5	10	—	10	—	10	pF
C_{PD} (*)	Power Dissipation Capacitance			—	65	—	—	—	—	—	pF

Note (*) C_{PD} is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load (refer to Test circuit).
Average operating current can be abtained by equation hereunder.
$I_{CC(opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$

SWITCHING CHARACTERISTICS TEST WAVEFORM



TEST WAVEFORM I_{CC} (Opr.)



INPUT WAVEFORM IS THE SAME AS THAT IN CASE OF SWITCHING CHARACTERISTICS TEST