

MM74HC154 4-to-16 Line Decoder

General Description

The MM74HC154 decoder utilizes advanced silicon-gate CMOS technology, and is well suited to memory address decoding or data routing applications. It possesses high noise immunity, and low power consumption of CMOS with speeds similar to low power Schottky TTL circuits.

The MM74HC154 have 4 binary select inputs (A, B, C, and D). If the device is enabled these inputs determine which one of the 16 normally HIGH outputs will go LOW. Two active LOW enables (G1 and G2) are provided to ease cascading of decoders with little or no external logic.

Each output can drive 10 low power Schottky TTL equivalent loads, and is functionally and pin equivalent to the 74LS154. All inputs are protected from damage due to static discharge by diodes to V_{CC} and ground.

Features

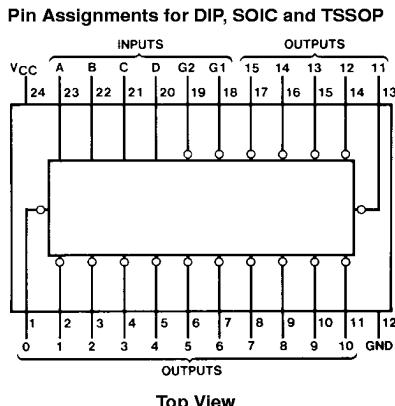
- Typical propagation delay: 21 ns
- Power supply quiescent current: 80 µA
- Wide power supply voltage range: 2–6V
- Low input current: 1 µA maximum

Ordering Code:

Order Number	Package Number	Package Description
MM74HC154WM	M24B	24-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide Body
MM74HC154MTC	MTC24	24-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
MM74HC154N	N24C	24-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-100, 0.300" Wide

Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

Connection Diagram



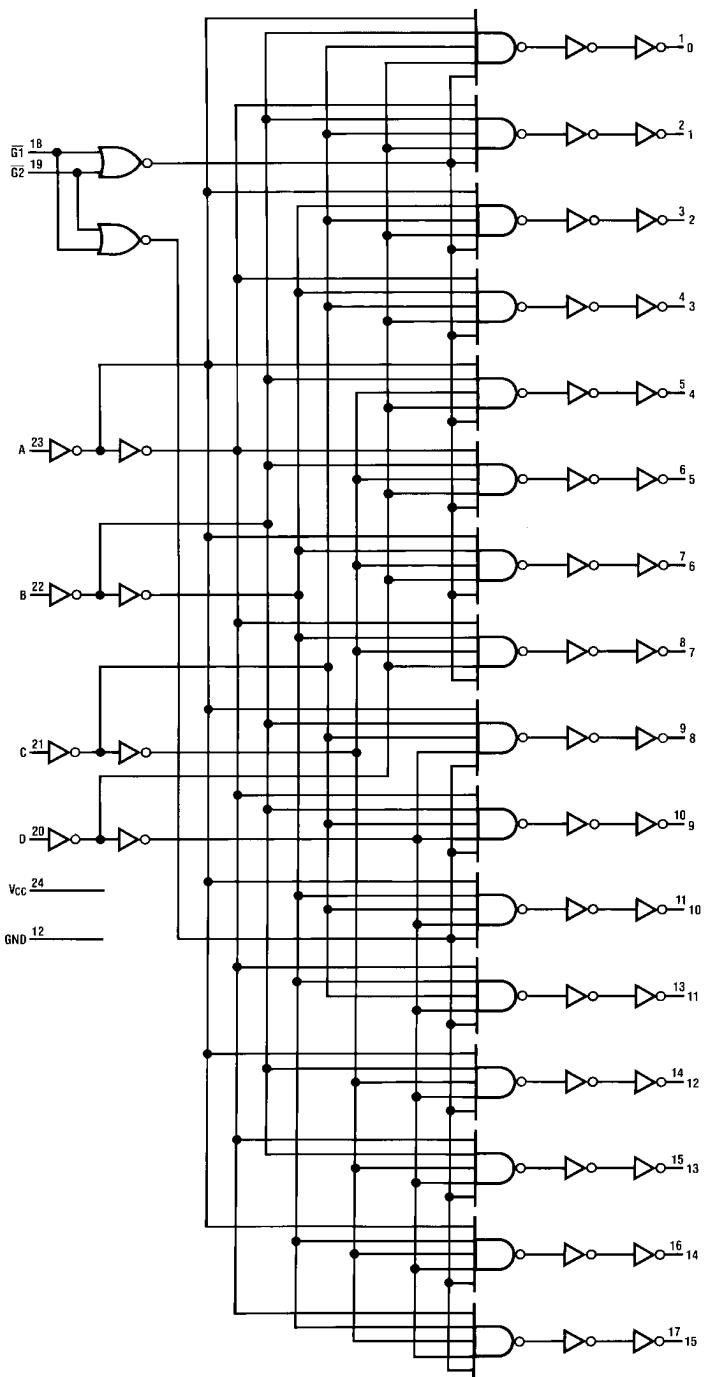
Truth Table

		Inputs				Low Output (Note 1)
G1	G2	D	C	B	A	
L	L	L	L	L	L	0
L	L	L	L	L	H	1
L	L	L	L	H	L	2
L	L	L	L	H	H	3
L	L	L	H	L	L	4
L	L	L	H	L	H	5
L	L	L	H	H	L	6
L	L	L	H	H	H	7
L	L	H	L	L	L	8
L	L	H	L	L	H	9
L	L	H	L	H	L	10
L	L	H	L	H	H	11
L	L	H	H	L	L	12
L	L	H	H	L	H	13
L	L	H	H	H	L	14
L	L	H	H	H	H	15
L	H	X	X	X	X	—
H	L	X	X	X	X	—
H	H	X	X	X	X	—

Note 1: All others HIGH

MM74HC154

Logic Diagram



Absolute Maximum Ratings ^(Note 2)				Recommended Operating Conditions		
(Note 3)						
Supply Voltage (V_{CC})	-0.5 to +7.0V			Supply Voltage (V_{CC})	2	6 V
DC Input Voltage (V_{IN})	-1.5 to V_{CC} +1.5V			DC Input or Output Voltage (V_{IN}, V_{OUT})	0	V_{CC} V
DC Output Voltage (V_{OUT})	-0.5 to V_{CC} +0.5V			Operating Temperature Range (T_A)	-40	+85 °C
Clamp Diode Current (I_{IK}, I_{OK})	±20 mA			Input Rise or Fall Times		
DC Output Current, per pin (I_{OUT})	±25 mA			(t_r, t_f) $V_{CC} = 2.0V$	1000	ns
DC V_{CC} or GND Current, per pin (I_{CC})	±50 mA			$V_{CC} = 4.5V$	500	ns
Storage Temperature Range (T_{STG})	-65°C to +150°C			$V_{CC} = 6.0V$	400	ns
Power Dissipation (P_D)				Note 2: Absolute Maximum Ratings are those values beyond which damage to the device may occur.		
(Note 4)	600 mW			Note 3: Unless otherwise specified all voltages are referenced to ground.		
S.O. Package only	500 mW			Note 4: Power Dissipation temperature derating — plastic "N" package: -12 mW/°C from 65°C to 85°C.		
Lead Temperature (T_L) (Soldering 10 seconds)	260°C					
DC Electrical Characteristics (Note 5)						
Symbol	Parameter	Conditions	V_{CC}	$T_A = 25^\circ C$	$T_A = -40 \text{ to } 85^\circ C$	Units
				Typ	Guaranteed Limits	
V_{IH}	Minimum HIGH Level Input Voltage		2.0V		1.5	V
			4.5V		3.15	V
			6.0V		4.2	V
V_{IL}	Maximum LOW Level Input Voltage		2.0V		0.5	V
			4.5V		1.35	V
			6.0V		1.8	V
V_{OH}	Minimum HIGH Level Output Voltage	$V_{IN} = V_{IH}$ or V_{IL} $ I_{OUT} \leq 20 \mu A$	2.0V	2.0	1.9	V
			4.5V	4.5	4.4	V
			6.0V	6.0	5.9	V
	$V_{IN} = V_{IH}$ or V_{IL} $ I_{OUT} \leq 4.0 \text{ mA}$ $ I_{OUT} \leq 5.2 \text{ mA}$	4.5V	4.2	3.98	V	
		6.0V	5.7	5.48	V	
V_{OL}	Maximum LOW Level Output Voltage	$V_{IN} = V_{IH}$ or V_{IL} $ I_{OUT} \leq 20 \mu A$	2.0V	0	0.1	V
			4.5V	0	0.1	V
			6.0V	0	0.1	V
	$V_{IN} = V_{IH}$ or V_{IL} $ I_{OUT} \leq 4.0 \text{ mA}$ $ I_{OUT} \leq 5.2 \text{ mA}$	4.5V	0.2	0.26	V	
		6.0V	0.2	0.26	V	
I_{IN}	Maximum Input Current	$V_{IN} = V_{CC}$ or GND	6.0V		±0.1	μA
I_{CC}	Maximum Quiescent Supply Current	$V_{IN} = V_{CC}$ or GND $I_{OUT} = 0 \mu A$	6.0V		8.0	μA
Note 5: For a power supply of 5V ±10% the worst case output voltages (V_{OH} and V_{OL}) occur for HC at 4.5V. Thus the 4.5V values should be used when designing with this supply. Worst case V_{IH} and V_{IL} occur at $V_{CC} = 5.5V$ and 4.5V respectively. (The V_{IH} value at 5.5V is 3.85V.) The worst case leakage current (I_{IN} , I_{CC} , and I_{OZ}) occur for CMOS at the higher voltage and so the 6.0V values should be used.						

AC Electrical Characteristics

$V_{CC} = 5V$, $T_A = 25^\circ C$, $C_L = 15 \text{ pF}$, $t_r = t_f = 6 \text{ ns}$

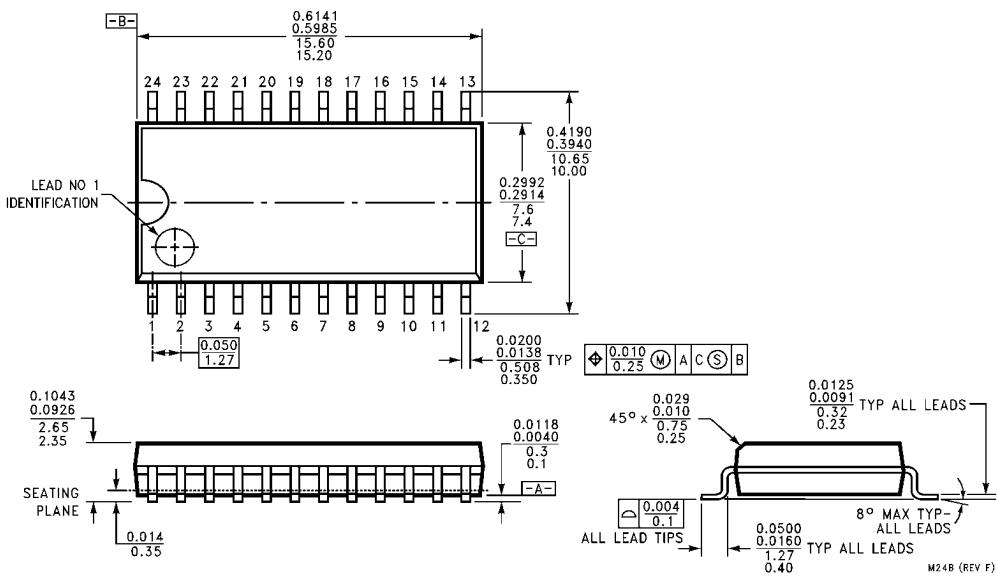
Symbol	Parameter	Conditions	Typ	Guaranteed Limit	Units
t_{PHL}, t_{PLH}	Maximum Propagation Delay, $\overline{G1}$, $\overline{G2}$ or A, B, C, D		21	32	ns

AC Electrical Characteristics

$V_{CC} = 2.0V$ to $6.0V$, $C_L = 50 \text{ pF}$, $t_r = t_f = 6 \text{ ns}$ (unless otherwise specified)

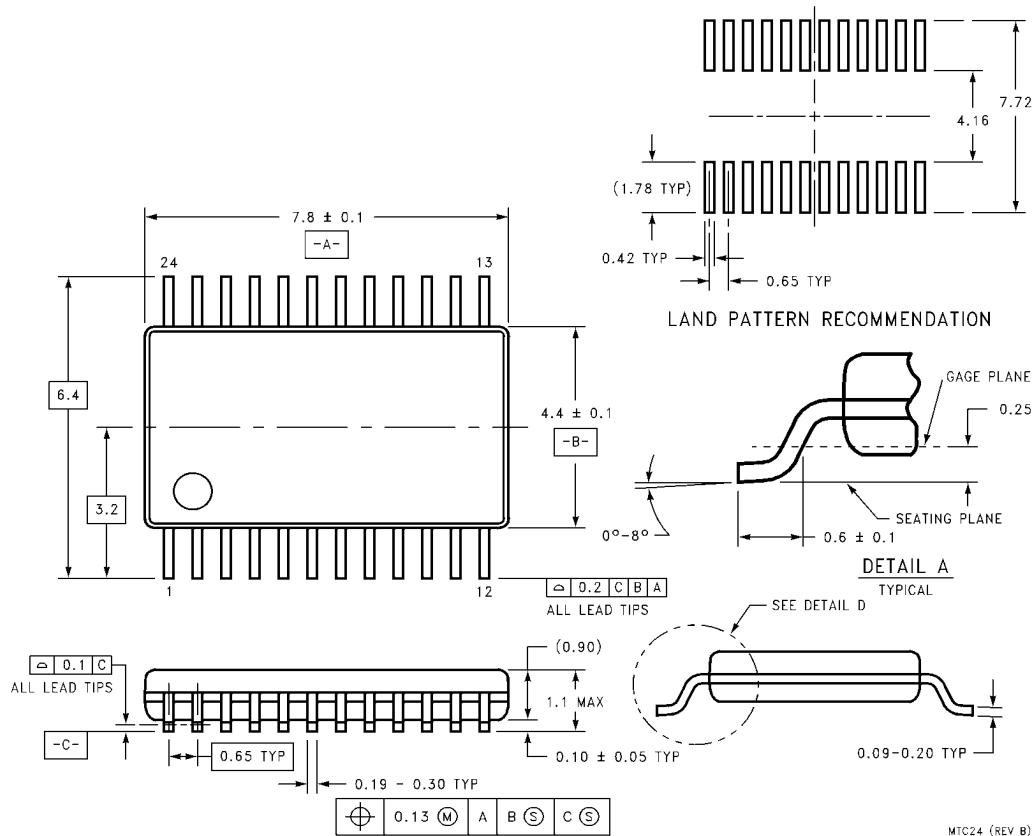
Symbol	Parameter	Conditions	V_{CC}	$T_A = 25^\circ C$		Units
				Typ	Guaranteed Limits	
t_{PHL}, t_{PLH}	Maximum Propagation Delay, $\overline{G1}$ or $\overline{G2}$ or A, B, C, D		2.0V	63	160	ns
			4.5V	24	36	ns
			6.0V	20	30	ns
t_{TLH}, t_{THL}	Maximum Output Rise and Fall Time		2.0V	25	75	ns
			4.5V	7	15	ns
			6.0V	6	13	ns
C_{PD}	Power Dissipation Capacitance (Note 6)			90		pF
C_{IN}	Maximum Input Capacitance			5	10	pF

Note 6: C_{PD} determines the no load dynamic power consumption, $P_D = C_{PD} V_{CC}^2 f + I_{CC} V_{CC}$, and the no load dynamic current consumption, $I_S = C_{PD} V_{CC} f + I_{CC}$.

Physical Dimensions inches (millimeters) unless otherwise noted

24-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide Body
Package Number M24B

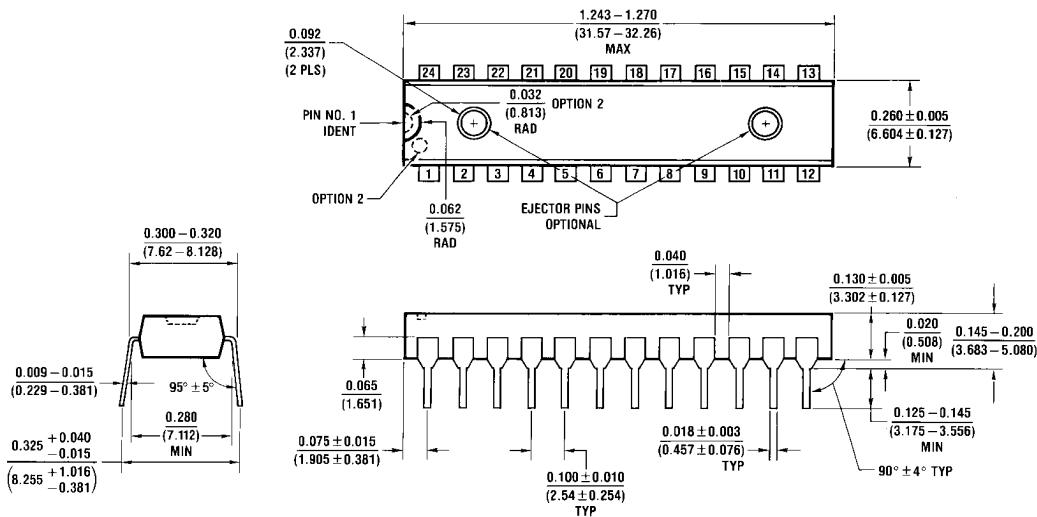
Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



**24-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
Package Number MTC24**

Physical Dimensions

inches (millimeters) unless otherwise noted (Continued)



N24C (REV F)

24-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-100, 0.300" Wide
Package Number N24C

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