



MOTOROLA

MC74AC256 MC74ACT256

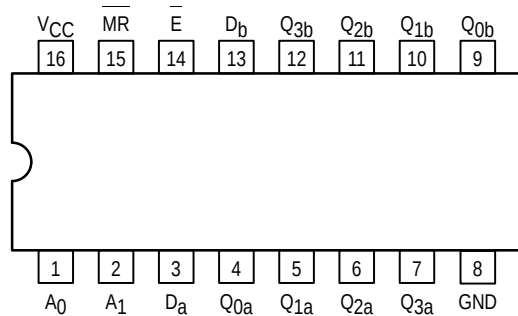
DUAL 4-BIT
ADDRESSABLE
LATCH

Dual 4-Bit Addressable Latch

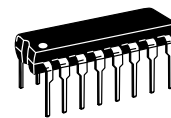
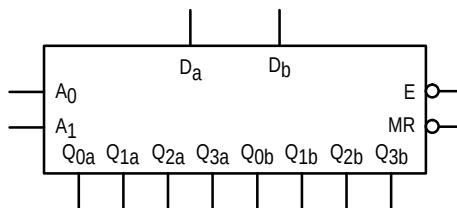
The MC74AC256/74ACT256 dual addressable latch has four distinct modes of operation which are selectable by controlling the Clear and Enable inputs (see Function Table). In the addressable latch mode, data at the Data (D) inputs is written into the addressed latches. The addressed latches will follow the Data input with all unaddressed latches remaining in their previous states.

In the memory mode, all latches remain in their previous states and are unaffected by the Data or Address inputs. To eliminate the possibility of entering erroneous data in the latches, the enable should be held HIGH (inactive) while the address lines are changing. In the dual 1-of-4 decoding or demultiplexing mode ($MR = E = \text{LOW}$), addressed outputs will follow the level of the D inputs with all other outputs LOW. In the clear mode, all outputs are LOW and unaffected by the Address and Data inputs.

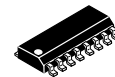
- Combines Dual Demultiplexer and 8-Bit Latch
- Serial-to-Parallel Capability
- Output from Each Storage Bit Available
- Random (Addressable) Data Entry
- Easily Expandable
- Common Clear Input
- Useful as Dual 1-of-4 Active HIGH Decoder



LOGIC SYMBOL



N SUFFIX
CASE 648-08
PLASTIC



D SUFFIX
CASE 751B-05
PLASTIC

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MODE SELECT-FUNCTION TABLE

Operating Mode	Inputs					Outputs			
	MR	E	D	A ₀	A ₁	Q ₀	Q ₁	Q ₂	Q ₃
Master Reset	L	H	X	X	X	L	L	L	L
Demultiplex (Active HIGH Decoder when D = H)	L	L	d	L	L	Q = d	L	L	L
	L	L	d	H	L	L	Q = d	L	L
	L	L	d	L	H	L	L	Q = d	L
	L	L	d	H	H	L	L	L	Q = d
Store (Do Nothing)	H	H	X	X	X	q ₀	q ₁	q ₂	q ₃
Addressable Latch	H	L	d	L	L	Q = d	q ₁	q ₂	q ₃
	H	L	d	H	L	q ₀	Q = d	q ₂	q ₃
	H	L	d	L	H	q ₀	q ₁	Q = d	q ₃
	H	L	d	H	H	q ₀	q ₁	q ₂	Q = d

H = HIGH Voltage Level Steady State

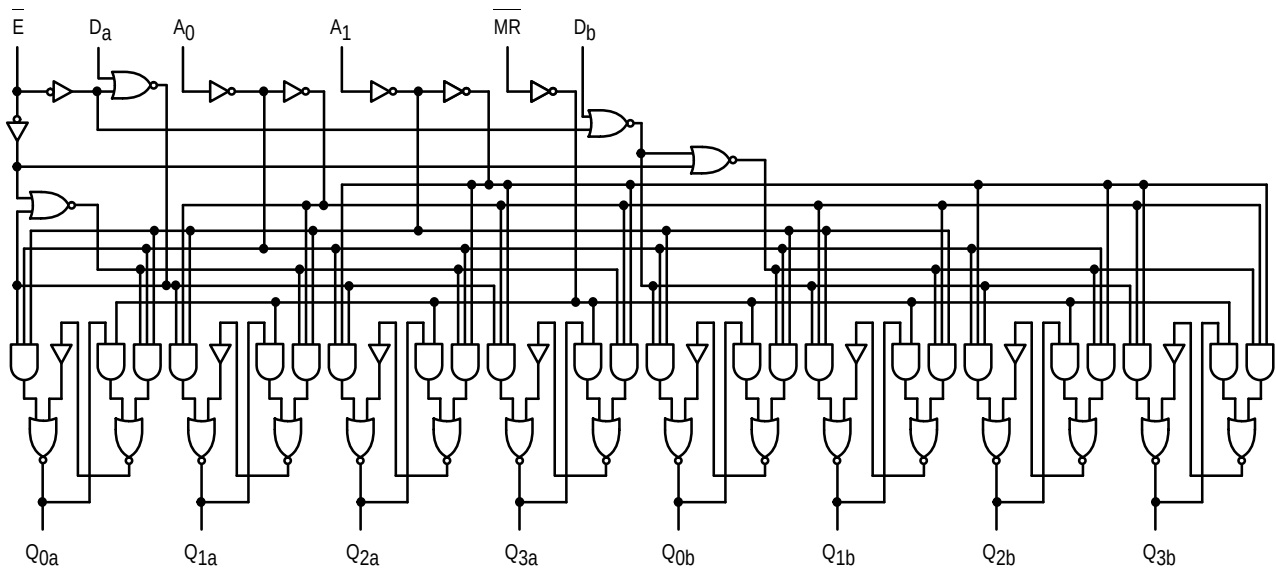
L = LOW Voltage Level Steady State

X = Immaterial

d = HIGH or LOW Data one setup time prior to the LOW-to-HIGH Enable transition

q = Lower case letters indicate the state of the referenced output established during the last cycle in which it was addressed or cleared.

LOGIC DIAGRAM



Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

MAXIMUM RATINGS*

Symbol	Parameter	Value	Unit
V _{CC}	DC Supply Voltage (Referenced to GND)	−0.5 to +7.0	V
V _{in}	DC Input Voltage (Referenced to GND)	−0.5 to V _{CC} +0.5	V
V _{out}	DC Output Voltage (Referenced to GND)	−0.5 to V _{CC} +0.5	V
I _{in}	DC Input Current, per Pin	±20	mA
I _{out}	DC Output Sink/Source Current, per Pin	±50	mA
I _{CC}	DC V _{CC} or GND Current per Output Pin	±50	mA
T _{stg}	Storage Temperature	−65 to +150	°C

* Maximum Ratings are those values beyond which damage to the device may occur. Functional operation should be restricted to the Recommended Operating Conditions.

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RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Typ	Max	Unit
V _{CC}	Supply Voltage	'AC	2.0	5.0	V
		'ACT	4.5	5.0	
V _{in} , V _{out}	DC Input Voltage, Output Voltage (Ref. to GND)	0		V _{CC}	V
t _r , t _f	Input Rise and Fall Time (Note 1) 'AC Devices except Schmitt Inputs	V _{CC} @ 3.0 V	150		ns/V
		V _{CC} @ 4.5 V	40		
		V _{CC} @ 5.5 V	25		
t _r , t _f	Input Rise and Fall Time (Note 2) 'ACT Devices except Schmitt Inputs	V _{CC} @ 4.5 V	10		ns/V
		V _{CC} @ 5.5 V	8.0		
T _J	Junction Temperature (PDIP)			140	°C
T _A	Operating Ambient Temperature Range	−40	25	85	°C
I _{OH}	Output Current — High			−24	mA
I _{OL}	Output Current — Low			24	mA

1. V_{in} from 30% to 70% V_{CC}; see individual Data Sheets for devices that differ from the typical input rise and fall times.

2. V_{in} from 0.8 V to 2.0 V; see individual Data Sheets for devices that differ from the typical input rise and fall times.

DC CHARACTERISTICS

Symbol	Parameter	V _{CC} (V)	74AC		74AC		Unit	Conditions
			T _A = +25°C		T _A = −40°C to +85°C			
			Typ	Guaranteed Limits				
V _{IH}	Minimum High Level Input Voltage	3.0 4.5 5.5	1.5 2.25 2.75	2.1 3.15 3.85	2.1 3.15 3.85	V	V _{OUT} = 0.1 V or V _{CC} − 0.1 V	
V _{IL}	Maximum Low Level Input Voltage	3.0 4.5 5.5	1.5 2.25 2.75	0.9 1.35 1.65	0.9 1.35 1.65	V	V _{OUT} = 0.1 V or V _{CC} − 0.1 V	
V _{OH}	Minimum High Level Output Voltage	3.0 4.5 5.5	2.99 4.49 5.49	2.9 4.4 5.4	2.9 4.4 5.4	V	I _{OUT} = −50 μA	
		3.0 4.5 5.5		2.56 3.86 4.86	2.46 3.76 4.76	V	*V _{IN} = V _{IL} or V _{IH} −12 mA I _{OH} −24 mA −24 mA	
V _{OL}	Maximum Low Level Output Voltage	3.0 4.5 5.5	0.002 0.001 0.001	0.1 0.1 0.1	0.1 0.1 0.1	V	I _{OUT} = 50 μA	
		3.0 4.5 5.5		0.36 0.36 0.36	0.44 0.44 0.44	V	*V _{IN} = V _{IL} or V _{IH} 12 mA I _{OL} 24 mA 24 mA	
I _{IN}	Maximum Input Leakage Current	5.5		±0.1	±1.0	μA	V _I = V _{CC} , GND	
I _{OLD}	†Minimum Dynamic Output Current	5.5			75	mA	V _{OLD} = 1.65 V Max	
I _{OHD}		5.5			−75	mA	V _{OHD} = 3.85 V Min	
I _{CC}	Maximum Quiescent Supply Current	5.5		8.0	80	μA	V _{IN} = V _{CC} or GND	

* All outputs loaded; thresholds on input associated with output under test.

† Maximum test duration 2.0 ms, one output loaded at a time.

Note: I_{IN} and I_{CC} @ 3.0 V are guaranteed to be less than or equal to the respective limit @ 5.5 V V_{CC}.

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AC CHARACTERISTICS (For Figures and Waveforms — See Section 3)

Symbol	Parameter	V _{CC} * (V)	74AC			74AC		Unit	Fig. No.
			T _A = +25°C C _L = 50 pF			T _A = -40°C to +85°C C _L = 50 pF			
			Min	Typ	Max	Min	Max		
t _{PLH}	Propagation Delay D _N to Q _N	3.3 5.0	2.0 2.0	9.0 6.5	14.5 10.0	1.5 1.5	17.0 11.5	ns	3-5
t _{PHL}	Propagation Delay D _N to Q _N	3.3 5.0	2.0 2.0	9.0 6.0	13.5 9.5	1.5 1.5	16.0 11.0	ns	3-5
t _{PLH}	Propagation Delay E to Q _N	3.3 5.0	2.0 2.0	10.5 7.0	15.0 10.5	1.5 1.5	17.5 12.5	ns	3-6
t _{PHL}	Propagation Delay E to Q _N	3.3 5.0	2.0 2.0	8.0 7.5	12.5 9.0	1.5 1.5	15.0 11.0	ns	3-6
t _{PLH}	Propagation Delay Address to Q _N	3.3 5.0	2.0 2.0	12.0 8.0	19.0 13.0	1.5 1.5	22.5 15.5	ns	3-6
t _{PHL}	Propagation Delay Address to Q _N	3.3 5.0	2.0 2.0	10.0 7.0	16.0 11.0	1.5 1.5	19.0 13.0	ns	3-6
t _{PHL}	Propagation Delay MR to Q	3.3 5.0	2.0 2.0	8.0 6.0	12.0 9.0	1.5 1.5	13.5 10.0	ns	3-7

* Voltage Range 3.3 V is 3.3 V ±0.3 V.
Voltage Range 5.0 V is 5.0 V ±0.5 V.

AC OPERATING REQUIREMENTS

Symbol	Parameter	V _{CC} * (V)	74AC		74AC	Unit	Fig. No.
			T _A = +25°C C _L = 50 pF		T _A = -40°C to +85°C C _L = 50 pF		
			Typ	Guaranteed Minimum			
t _s	Setup Time, HIGH or LOW D _n to E	3.3 5.0		3.5 2.5	4.5 3.5	ns	3-9
t _h	Hold Time, HIGH or LOW D _n to E	3.3 5.0		2.5 2.0	2.5 2.0	ns	3-9
t _s	Setup Time Address to E	3.3 5.0		7.0 4.0	9.0 6.0	ns	3-6
t _h	Hold Time Address to E	3.3 5.0		2.0 2.0	2.0 2.0	ns	3-6

* Voltage Range 3.3 V is 3.3 V ±0.3 V.
Voltage Range 5.0 V is 5.0 V ±0.5 V.

MC74AC256 MC74ACT256

DC CHARACTERISTICS

Symbol	Parameter	V _{CC} (V)	74ACT		74ACT		Unit	Conditions
			T _A = +25°C		T _A = –40°C to +85°C			
			Typ	Guaranteed Limits				
V _{IH}	Minimum High Level Input Voltage	4.5 5.5	1.5 1.5	2.0 2.0	2.0 2.0	V	V _{OUT} = 0.1 V or V _{CC} – 0.1 V	
V _{IL}	Maximum Low Level Input Voltage	4.5 5.5	1.5 1.5	0.8 0.8	0.8 0.8	V	V _{OUT} = 0.1 V or V _{CC} – 0.1 V	
V _{OH}	Minimum High Level Output Voltage	4.5 5.5	4.49 5.49	4.4 5.4	4.4 5.4	V	I _{OUT} = –50 μA	
		4.5 5.5		3.86 4.86	3.76 4.76	V	*V _{IN} = V _{IL} or V _{IH} –24 mA I _{OH} –24 mA	
V _{OL}	Maximum Low Level Output Voltage	4.5 5.5	0.001 0.001	0.1 0.1	0.1 0.1	V	I _{OUT} = 50 μA	
		4.5 5.5		0.36 0.36	0.44 0.44	V	*V _{IN} = V _{IL} or V _{IH} 24 mA I _{OL} 24 mA	
I _{IN}	Maximum Input Leakage Current	5.5		±0.1	±1.0	μA	V _I = V _{CC} , GND	
ΔI _{CCT}	Additional Max. I _{CC} /Input	5.5	0.6		1.5	mA	V _I = V _{CC} – 2.1 V	
I _{OLD}	†Minimum Dynamic Output Current	5.5			75	mA	V _{OLD} = 1.65 V Max	
I _{OHD}		5.5			–75	mA	V _{OHD} = 3.85 V Min	
I _{CC}	Maximum Quiescent Supply Current	5.5		8.0	80	μA	V _{IN} = V _{CC} or GND	

* All outputs loaded; thresholds on input associated with output under test.

† Maximum test duration 2.0 ms, one output loaded at a time.

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AC CHARACTERISTICS (For Figures and Waveforms — See Section 3)

Symbol	Parameter	V _{CC} * (V)	74ACT			74ACT		Unit	Fig. No.
			T _A = +25°C C _L = 50 pF			T _A = -40°C to +85°C C _L = 50 pF			
			Min	Typ	Max	Min	Max		
t _{PLH}	Propagation Delay D _N to Q _N	5.0	2.0	6.5	11.5	1.5	13.0	ns	3-5
t _{PHL}	Propagation Delay D _N to Q _N	5.0	2.0	7.0	11.0	1.5	12.5	ns	3-5
t _{PLH}	Propagation Delay E to Q _N	5.0	2.0	8.0	12.0	1.5	14.0	ns	3-6
t _{PHL}	Propagation Delay E to Q _N	5.0	2.0	6.5	10.5	1.5	12.5	ns	3-6
t _{PLH}	Propagation Delay Address to Q _N	5.0	2.0	10.5	14.5	1.5	17.0	ns	3-6
t _{PHL}	Propagation Delay Address to Q _N	5.0	2.0	9.0	12.5	1.5	14.5	ns	3-6
t _{PHL}	Propagation Delay MR to Q	5.0	2.0	7.0	10.5	1.5	11.5	ns	3-7

* Voltage Range 5.0 V is 5.0 V ±0.5 V.

AC OPERATING REQUIREMENTS

Symbol	Parameter	V _{CC} * (V)	74ACT		74ACT	Unit	Fig. No.
			T _A = +25°C C _L = 50 pF		T _A = -40°C to +85°C C _L = 50 pF		
			Typ	Guaranteed Minimum			
t _s	Setup Time, HIGH or LOW D _n to E	5.0		3.5	4.5	ns	3-9
t _h	Hold Time, HIGH or LOW D _n to E	5.0		2.5	2.5	ns	3-9
t _s	Setup Time Address to E	5.0		5.5	6.5	ns	3-6
t _h	Hold Time Address to E	5.0		2.5	2.5	ns	3-6

* Voltage Range 5.0 V is 5.0 V ±0.5 V.

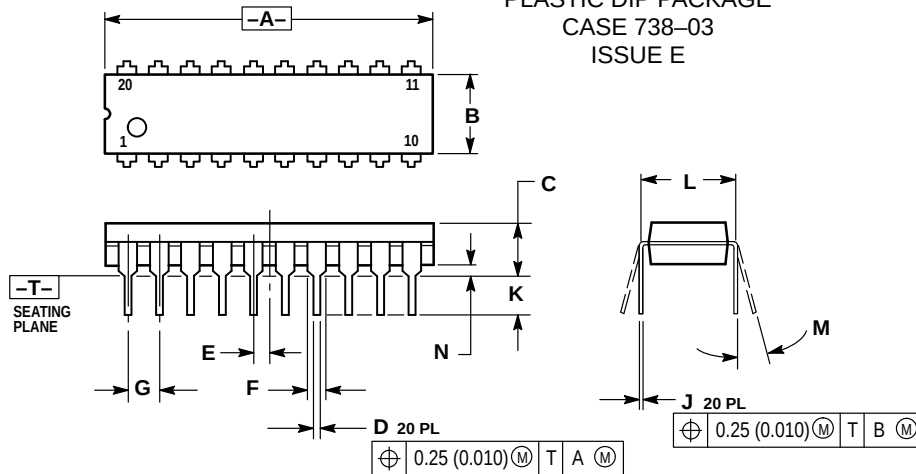
CAPACITANCE

Symbol	Parameter	Value Typ	Unit	Test Conditions
C _{IN}	Input Capacitance	4.5	pF	V _{CC} = 5.0 V
CPD	Power Dissipation Capacitance	30.0	pF	V _{CC} = 5.0 V

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OUTLINE DIMENSIONS

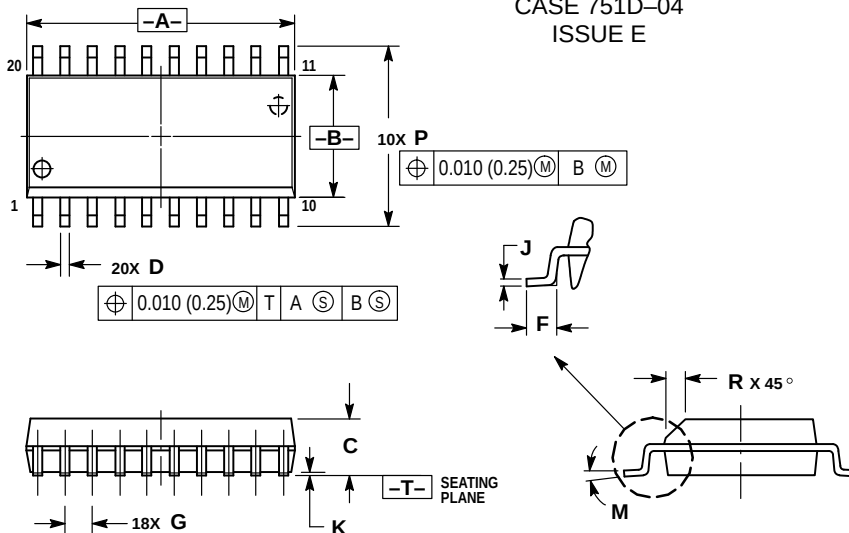
N SUFFIX PLASTIC DIP PACKAGE CASE 738-03 ISSUE E



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
 4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	1.010	1.070	25.66	27.17
B	0.240	0.260	6.10	6.60
C	0.150	0.180	3.81	4.57
D	0.015	0.022	0.39	0.55
E	0.050 BSC		1.27 BSC	
F	0.050	0.070	1.27	1.77
G	0.100 BSC		2.54 BSC	
J	0.008	0.015	0.21	0.38
K	0.110	0.140	2.80	3.55
L	0.300 BSC		7.62 BSC	
M	0°	15°	0°	15°
N	0.020	0.040	0.51	1.01

DW SUFFIX PLASTIC SOIC PACKAGE CASE 751D-04 ISSUE E



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: MILLIMETER.
 3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
 4. MAXIMUM MOLD PROTRUSION 0.150 (0.006) PER SIDE.
 5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.13 (0.005) TOTAL IN EXCESS OF D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	12.65	12.95	0.499	0.510
B	7.40	7.60	0.292	0.299
C	2.35	2.65	0.093	0.104
D	0.35	0.49	0.014	0.019
F	0.50	0.90	0.020	0.035
G	1.27 BSC		0.050 BSC	
J	0.25	0.32	0.010	0.012
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	10.05	10.55	0.395	0.415
R	0.25	0.75	0.010	0.029

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MC74AC256/D

