

Dual Binary to 1-of-4 Decoder/Demultiplexer

MC14555B, MC14556B

The MC14555B and MC14556B are constructed with complementary MOS (CMOS) enhancement mode devices. Each Decoder/Demultiplexer has two select inputs (A and B), an active low Enable input (E), and four mutually exclusive outputs (Q0, Q1, Q2, Q3). The MC14555B has the selected output go to the “high” state, and the MC14556B has the selected output go to the “low” state. Expanded decoding such as binary-to-hexadecimal (1-of-16), etc., can be achieved by using other MC14555B or MC14556B devices.

Applications include code conversion, address decoding, memory selection control, and demultiplexing (using the Enable input as a data input) in digital data transmission systems.

Features

- Diode Protection on All Inputs
- Active High or Active Low Outputs
- Expandable
- Supply Voltage Range = 3.0 Vdc to 18 Vdc
- All Outputs Buffered
- Capable of Driving Two Low-Power TTL Loads or One Low-Power Schottky TTL Load Over the Rated Temperature Range
- NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant

MAXIMUM RATINGS (Voltages Referenced to V_{SS})

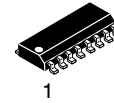
Parameter	Symbol	Value	Unit
DC Supply Voltage Range	V _{DD}	−0.5 to +18.0	V
Input or Output Voltage Range (DC or Transient)	V _{in} , V _{out}	−0.5 to V _{DD} + 0.5	V
Input or Output Current (DC or Transient) per Pin	I _{in} , I _{out}	±10	mA
Power Dissipation, per Package (Note 1)	P _D	500	mW
Ambient Temperature Range	T _A	−55 to +125	°C
Storage Temperature Range	T _{stg}	−65 to +150	°C
Lead Temperature (8-Second Soldering)	T _L	260	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Temperature Derating: “D/DW” Packages: −7.0 mW/°C From 65°C To 125°C

This device contains protection circuitry to guard against damage due to high static voltages or electric fields. However, precautions must be taken to avoid applications of any voltage higher than maximum rated voltages to this high-impedance circuit. For proper operation, V_{in} and V_{out} should be constrained to the range V_{SS} ≤ (V_{in} or V_{out}) ≤ V_{DD}.

Unused inputs must always be tied to an appropriate logic voltage level (e.g., either V_{SS} or V_{DD}). Unused outputs must be left open.



SOIC-16
D SUFFIX
CASE 751B

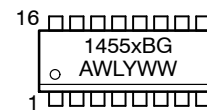
PIN ASSIGNMENTS

E _A	1	16	V _{DD}	E _A	1	16	V _{DD}
A _A	2	15	E _B	A _A	2	15	E _B
B _A	3	14	A _B	B _A	3	14	A _B
Q0 _A	4	13	B _B	Q0 _A	4	13	B _B
Q1 _A	5	12	Q0 _B	Q1 _A	5	12	Q0 _B
Q2 _A	6	11	Q1 _B	Q2 _A	6	11	Q1 _B
Q3 _A	7	10	Q2 _B	Q3 _A	7	10	Q2 _B
V _{SS}	8	9	Q3 _B	V _{SS}	8	9	Q3 _B

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MARKING DIAGRAMS



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- x = 5 or 6
- A = Assembly Location
- WL, L = Wafer Lot
- YY, Y = Year
- WW, W = Work Week
- G = Pb-Free Package

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

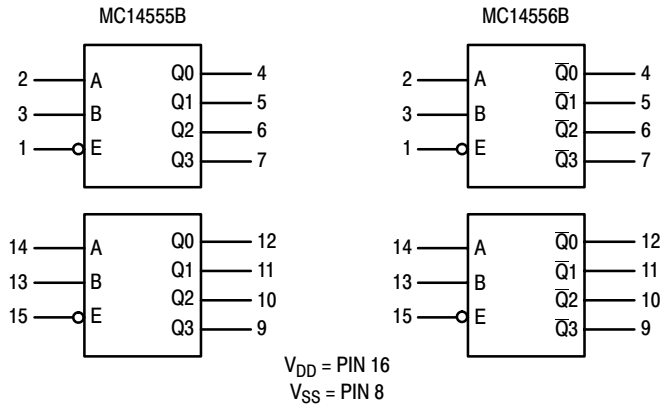
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TRUTH TABLE

Inputs			Outputs							
Enable	Select		MC14555B				MC14556B			
E	B	A	Q3	Q2	Q1	Q0	Q3	Q2	Q1	Q0
0	0	0	0	0	0	1	1	1	1	0
0	0	1	0	0	1	0	1	1	0	1
0	1	0	0	1	0	0	1	0	1	1
0	1	1	1	0	0	0	0	1	1	1
1	X	X	0	0	0	0	1	1	1	1

X = Don't Care

BLOCK DIAGRAM



ELECTRICAL CHARACTERISTICS (Voltages Referenced to V_{SS})

Characteristic	Symbol	V _{DD} Vdc	- 55°C		25°C			125°C		Unit
			Min	Max	Min	Typ (Note 2)	Max	Min	Max	
Output Voltage V _{in} = V _{DD} or 0	V _{OL}	5.0	–	0.05	–	0	0.05	–	0.05	Vdc
		10	–	0.05	–	0	0.05	–	0.05	
		15	–	0.05	–	0	0.05	–	0.05	
	V _{OH}	5.0	4.95	–	4.95	5.0	–	4.95	–	Vdc
Input Voltage (V _O = 4.5 or 0.5 Vdc) (V _O = 9.0 or 1.0 Vdc) (V _O = 13.5 or 1.5 Vdc)		10	9.95	–	9.95	10	–	9.95	–	
		15	14.95	–	14.95	15	–	14.95	–	
“1” Level (V _O = 0.5 or 4.5 Vdc) (V _O = 1.0 or 9.0 Vdc) (V _O = 1.5 or 13.5 Vdc)	V _{IL}	5.0	–	1.5	–	2.25	1.5	–	1.5	Vdc
		10	–	3.0	–	4.50	3.0	–	3.0	
		15	–	4.0	–	6.75	4.0	–	4.0	
	V _{IH}	5.0	3.5	–	3.5	2.75	–	3.5	–	Vdc
Output Drive Current (V _{OH} = 2.5 Vdc) (V _{OH} = 4.6 Vdc) (V _{OH} = 9.5 Vdc) (V _{OH} = 13.5 Vdc)		10	7.0	–	7.0	5.50	–	7.0	–	
		15	11	–	11	8.25	–	11	–	
Source	I _{OH}	5.0	–3.0	–	–2.4	–4.2	–	–1.7	–	mAdc
		5.0	–0.64	–	–0.51	–0.88	–	–0.36	–	
		10	–1.6	–	–1.3	–2.25	–	–0.9	–	
	I _{OL}	15	–4.2	–	–3.4	–8.8	–	–2.4	–	mAdc
Sink	I _{OL}	5.0	0.64	–	0.51	0.88	–	0.36	–	
		10	1.6	–	1.3	2.25	–	0.9	–	
		15	4.2	–	3.4	8.8	–	2.4	–	
Input Current	I _{in}	15	–	±0.1	–	±0.00001	±0.1	–	±1.0	μAdc
Input Capacitance, (V _{in} = 0)	C _{in}	–	–	–	–	5.0	7.5	–	–	pF
Quiescent Current (Per Package)	I _{DD}	5.0	–	5.0	–	0.005	5.0	–	150	μAdc
		10	–	10	–	0.010	10	–	300	
		15	–	20	–	0.015	20	–	600	
Total Supply Current (Notes 3, 4) (Dynamic plus Quiescent, Per Package) (C _L = 50 pF on all outputs, all buffers switching)	I _T	5.0 10 15	I _T = (0.85 μA/kHz) f + I _{DD} I _T = (1.70 μA/kHz) f + I _{DD} I _T = (2.60 μA/kHz) f + I _{DD}							μAdc

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

2. Data labelled “Typ” is not to be used for design purposes but is intended as an indication of the IC’s potential performance.

3. The formulas given are for the typical characteristics only at 25°C.

4. To calculate total supply current at loads other than 50 pF: I_T(C_L) = I_T(50 pF) + (C_L – 50) Vfk where: I_T is in μA (per package), C_L in pF, V = (V_{DD} – V_{SS}) in volts, f in kHz is input frequency, and k = 0.002.

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SWITCHING CHARACTERISTICS (Note 5) ($C_L = 50 \text{ pF}$, $T_A = 25^\circ\text{C}$)

Characteristic	Symbol	V_{DD}	Min	Typ (Note 6)	Max	Unit
Output Rise and Fall Time $t_{TLH}, t_{THL} = (1.5 \text{ ns/pF}) C_L + 25 \text{ ns}$ $t_{TLH}, t_{THL} = (0.75 \text{ ns/pF}) C_L + 12.5 \text{ ns}$ $t_{TLH}, t_{THL} = (0.55 \text{ ns/pF}) C_L + 9.5 \text{ ns}$	t_{TLH}, t_{THL}	5.0 10 15	— — —	100 50 40	200 100 80	ns
Propagation Delay Time – A, B to Output $t_{PLH}, t_{PHL} = (1.7 \text{ ns/pF}) C_L + 135 \text{ ns}$ $t_{PLH}, t_{PHL} = (0.66 \text{ ns/pF}) C_L + 62 \text{ ns}$ $t_{PLH}, t_{PHL} = (0.5 \text{ ns/pF}) C_L + 45 \text{ ns}$	t_{PLH}, t_{PHL}	5.0 10 15	— — —	220 95 70	440 190 140	ns
Propagation Delay Time – E to Output $t_{PLH}, t_{PHL} = (1.7 \text{ ns/pF}) C_L + 115 \text{ ns}$ $t_{PLH}, t_{PHL} = (0.66 \text{ ns/pF}) C_L + 52 \text{ ns}$ $t_{PLH}, t_{PHL} = (0.5 \text{ ns/pF}) C_L + 40 \text{ ns}$	t_{PLH}, t_{PHL}	5.0 10 15	— — —	200 85 65	400 170 130	ns

5. The formulas given are for the typical characteristics only at 25°C .

6. Data labelled "Typ" is not to be used for design purposes but is intended as an indication of the IC's potential performance.

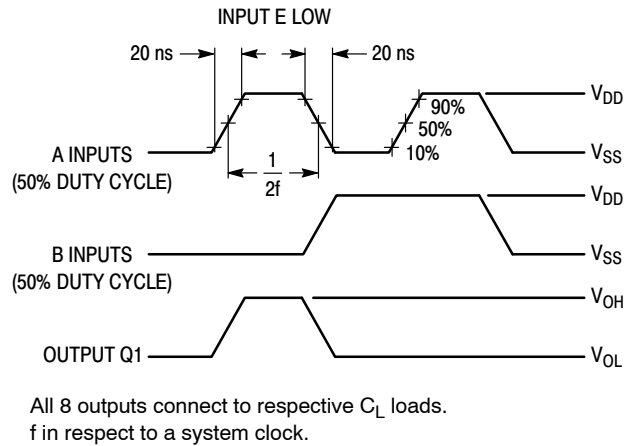


Figure 1. Dynamic Power Dissipation Signal Waveforms

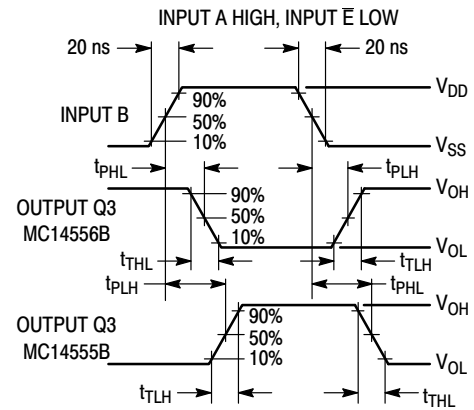
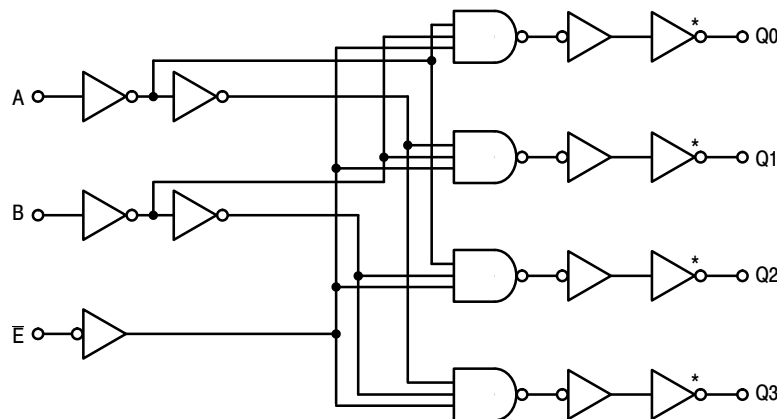


Figure 2. Dynamic Signal Waveforms

LOGIC DIAGRAM (1/2 of Dual)



*Eliminated for MC14555B

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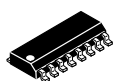
ORDERING INFORMATION

Device	Package	Shipping [†]
MC14555BDG	SOIC-16 (Pb-Free)	48 Units / Rail
MC14555BDR2G	SOIC-16 (Pb-Free)	2500 / Tape & Reel
NLV14555BDR2G*	SOIC-16 (Pb-Free)	2500 / Tape & Reel
MC14556BDR2G	SOIC-16 (Pb-Free)	2500 / Tape & Reel
NLV14556BDR2G*	SOIC-16 (Pb-Free)	2500 / Tape & Reel

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

*NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable.

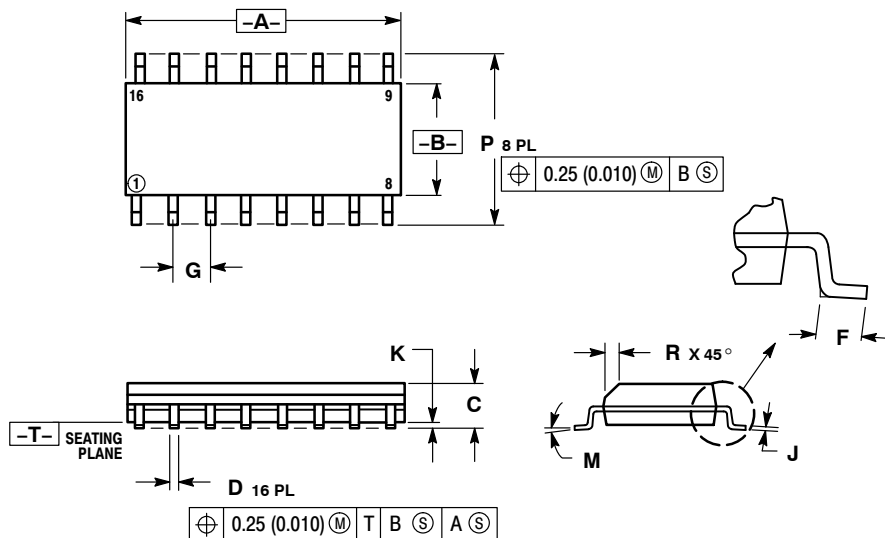
MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



SCALE 1:1

SOIC-16 CASE 751B-05 ISSUE K

DATE 29 DEC 2006



NOTES:

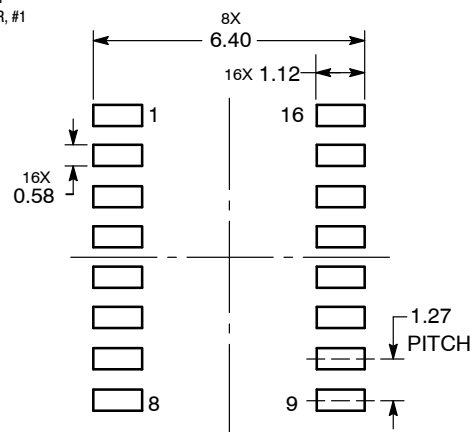
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.80	10.00	0.386	0.393
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

STYLE 1:	STYLE 2:	STYLE 3:	STYLE 4:
PIN 1. COLLECTOR	PIN 1. CATHODE	PIN 1. COLLECTOR, DYE #1	PIN 1. COLLECTOR, DYE #1
2. BASE	2. ANODE	2. BASE, #1	2. COLLECTOR, #1
3. EMITTER	3. NO CONNECTION	3. EMITTER, #1	3. COLLECTOR, #2
4. NO CONNECTION	4. CATHODE	4. COLLECTOR, #1	4. COLLECTOR, #2
5. EMITTER	5. CATHODE	5. COLLECTOR, #2	5. COLLECTOR, #3
6. BASE	6. NO CONNECTION	6. BASE, #2	6. COLLECTOR, #3
7. COLLECTOR	7. ANODE	7. EMITTER, #2	7. COLLECTOR, #4
8. COLLECTOR	8. CATHODE	8. COLLECTOR, #2	8. COLLECTOR, #4
9. BASE	9. CATHODE	9. COLLECTOR, #3	9. BASE, #4
10. EMITTER	10. ANODE	10. BASE, #3	10. EMITTER, #4
11. NO CONNECTION	11. NO CONNECTION	11. EMITTER, #3	11. BASE, #3
12. EMITTER	12. CATHODE	12. COLLECTOR, #3	12. EMITTER, #3
13. BASE	13. CATHODE	13. COLLECTOR, #4	13. BASE, #2
14. COLLECTOR	14. NO CONNECTION	14. BASE, #4	14. EMITTER, #2
15. EMITTER	15. ANODE	15. EMITTER, #4	15. BASE, #1
16. COLLECTOR	16. CATHODE	16. COLLECTOR, #4	16. EMITTER, #1

STYLE 5:	STYLE 6:	STYLE 7:
PIN 1. DRAIN, DYE #1	PIN 1. CATHODE	PIN 1. SOURCE N-CH
2. DRAIN, #1	2. CATHODE	2. COMMON DRAIN (OUTPUT)
3. DRAIN, #2	3. CATHODE	3. COMMON DRAIN (OUTPUT)
4. DRAIN, #2	4. CATHODE	4. GATE P-CH
5. DRAIN, #3	5. CATHODE	5. COMMON DRAIN (OUTPUT)
6. DRAIN, #3	6. CATHODE	6. COMMON DRAIN (OUTPUT)
7. DRAIN, #4	7. CATHODE	7. COMMON DRAIN (OUTPUT)
8. DRAIN, #4	8. CATHODE	8. SOURCE P-CH
9. GATE, #4	9. ANODE	9. SOURCE P-CH
10. SOURCE, #4	10. ANODE	10. COMMON DRAIN (OUTPUT)
11. GATE, #3	11. ANODE	11. COMMON DRAIN (OUTPUT)
12. SOURCE, #3	12. ANODE	12. COMMON DRAIN (OUTPUT)
13. GATE, #2	13. ANODE	13. GATE N-CH
14. SOURCE, #2	14. ANODE	14. COMMON DRAIN (OUTPUT)
15. GATE, #1	15. ANODE	15. COMMON DRAIN (OUTPUT)
16. SOURCE, #1	16. ANODE	16. SOURCE N-CH

RECOMMENDED SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

*For additional information on our Pb-Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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