

CD4555B, CD4556B Types

CMOS Dual Binary to 1 of 4 Decoder/Demultiplexers

High-Voltage Types (20-Volt Rating)

CD4555B: Outputs High on Select

CD4556B: Outputs Low on Select

■ CD4555B and CD4556B are dual one-of-four decoders/demultiplexers. Each decoder has two select inputs (A and B), an Enable input (\bar{E}), and four mutually exclusive outputs. On the CD4555B the outputs are high on select; on the CD4556B the outputs are low on select.

When the Enable input is high, the outputs of the CD4555B remain low and the outputs of the CD4556B remain high regardless of the state of the select inputs A and B. The CD4555B and CD4556B are similar to types MC14555 and MC14556, respectively.

The CD4555B and CD4556B types are supplied in 16-lead hermetic dual-in-line ceramic packages (F3A suffix), 16-lead dual-in-line plastics packages (E suffix), and 16-lead small-outline packages (M, M96, and MT suffixes). The CD4555B is also supplied in 16-lead small-outline packages (NSR suffix) and 16-lead thin shrink small-outline packages (PW and PWR suffixes.)

RECOMMENDED OPERATING CONDITIONS

For maximum reliability, nominal operating conditions should be selected so that operation is always within the following ranges.

| CHARACTERISTIC | V _{DD} | MIN. | MAX. | UNITS |
|---|-----------------|------|------|-------|
| Supply Voltage Range (For T _A = Full Package Temp. Range) | — | 3 | 18 | V |

MAXIMUM RATINGS, Absolute-Maximum Values:

DC SUPPLY-VOLTAGE RANGE, (V_{DD})

Voltages referenced to V_{SS} Terminal) -0.5V to +20V

INPUT VOLTAGE RANGE, ALL INPUTS -0.5V to V_{DD} +0.5V

DC INPUT CURRENT, ANY ONE INPUT ±10mA

POWER DISSIPATION PER PACKAGE (P_D):

For T_A = -55°C to +100°C 500mW

For T_A = +100°C to +125°C Derate Linearity at 12mW/°C to 200mW

DEVICE DISSIPATION PER OUTPUT TRANSISTOR

FOR T_A = FULL PACKAGE-TEMPERATURE RANGE (All Package Types)..... 100mW

OPERATING-TEMPERATURE RANGE (T_A) -55°C to +125°C

STORAGE TEMPERATURE RANGE (T_{stg}) -65°C to +150°C

LEAD TEMPERATURE (DURING SOLDERING):

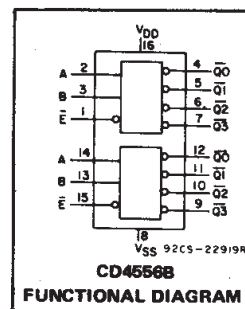
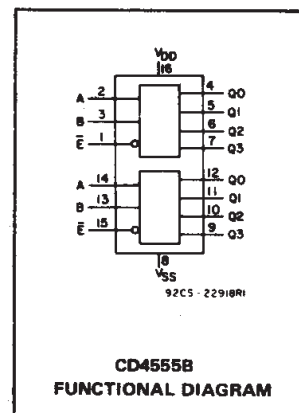
At distance 1/16 ± 1/32 inch (1.59 ± 0.79mm) from case for 10s max +265°C

Features:

- Expandable with multiple packages
- Standard, symmetrical output characteristics
- 100% tested for quiescent current at 20 V
- Maximum input current of 1 μA at 18 V over full package temperature range; 100 nA at 18 V and 25°C
- Noise margin (full package-temperature range): 1 V at V_{DD} = 5 V
2 V at V_{DD} = 10 V
2.5 V at V_{DD} = 15 V
- 5-V, 10-V, and 15-V parametric ratings
- Meets all requirements of JEDEC Tentative Standard No. 13B, "Standard Specifications for Description of 'B' Series CMOS Devices"

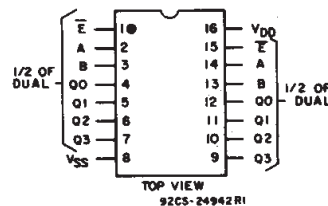
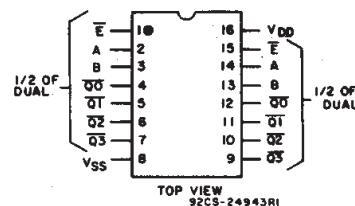
Applications:

- Decoding
- Code conversion
- Demultiplexing (using Enable input as a data input)
- Memory chip-enable selection
- Function selection



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COMMERCIAL CMOS
HIGH VOLTAGE ICs

TERMINAL ASSIGNMENTS



CD4555B, CD4556B Types

STATIC ELECTRICAL CHARACTERISTICS

| CHARACTERISTIC | CONDITIONS | | | LIMITS AT INDICATED TEMPERATURES (°C) | | | | | | | UNITS |
|--|--------------------|---------------------|---------------------|---------------------------------------|-------|-------|-------|-------|-------------------|------|-------|
| | V _O (V) | V _{IN} (V) | V _{DD} (V) | -55 | -40 | +85 | +125 | +25 | | | |
| | | | | | | | | Min. | Typ. | Max. | |
| Quiescent Device Current, I _{DD} Max. | — | 0,5 | 5 | 5 | 5 | 150 | 150 | — | 0,04 | 5 | μA |
| | — | 0,10 | 10 | 10 | 10 | 300 | 300 | — | 0,04 | 10 | |
| | — | 0,15 | 15 | 20 | 20 | 600 | 600 | — | 0,04 | 20 | |
| | — | 0,20 | 20 | 100 | 100 | 3000 | 3000 | — | 0,08 | 100 | |
| Output Low (Sink) Current I _{OL} Min. | 0,4 | 0,5 | 5 | 0,64 | 0,61 | 0,42 | 0,36 | 0,51 | 1 | — | mA |
| | 0,5 | 0,10 | 10 | 1,6 | 1,5 | 1,1 | 0,9 | 1,3 | 2,6 | — | |
| | 1,5 | 0,15 | 15 | 4,2 | 4 | 2,8 | 2,4 | 3,4 | 6,8 | — | |
| | — | — | — | — | — | — | — | — | — | — | |
| Output High (Source) Current, I _{OH} Min. | 4,6 | 0,5 | 5 | -0,64 | -0,61 | -0,42 | -0,36 | -0,51 | -1 | — | mA |
| | 2,5 | 0,5 | 5 | -2 | -1,8 | -1,3 | -1,15 | -1,6 | -3,2 | — | |
| | 9,5 | 0,10 | 10 | -1,6 | -1,5 | -1,1 | -0,9 | -1,3 | -2,6 | — | |
| | 13,5 | 0,15 | 15 | -4,2 | -4 | -2,8 | -2,4 | -3,4 | -6,8 | — | |
| Output Voltage: Low-Level, V _{OL} Max. | — | 0,5 | 5 | 0,05 | | | — | 0 | 0,05 | — | V |
| | — | 0,10 | 10 | 0,05 | | | — | 0 | 0,05 | — | |
| | — | 0,15 | 15 | 0,05 | | | — | 0 | 0,05 | — | |
| Output Voltage: High-Level, V _{OH} Min. | — | 0,5 | 5 | 4,95 | | | 4,95 | 5 | — | — | V |
| | — | 0,10 | 10 | 9,95 | | | 9,95 | 10 | — | — | |
| | — | 0,15 | 15 | 14,95 | | | 14,95 | 15 | — | — | |
| Input Low Voltage, V _{IL} Max. | 0,5,4,5 | — | 5 | 1,5 | | | — | — | 1,5 | — | V |
| | 1,9 | — | 10 | 3 | | | — | — | 3 | — | |
| | 1,5,13,5 | — | 15 | 4 | | | — | — | 4 | — | |
| Input High Voltage, V _{IH} Min. | 0,5,4,5 | — | 5 | 3,5 | | | 3,5 | — | — | — | V |
| | 1,9 | — | 10 | 7 | | | 7 | — | — | — | |
| | 1,5,13,5 | — | 15 | 11 | | | 11 | — | — | — | |
| Input Current I _{IN} Max. | | 0,18 | 18 | ±0,1 | ±0,1 | ±1 | ±1 | — | ±10 ⁻⁵ | ±0,1 | μA |

DYNAMIC ELECTRICAL CHARACTERISTICS at T_A = 25°C; Input t_p, t_f = 20 ns, C_L = 50 pF, R_L = 200 KΩ

| CHARACTERISTIC | TEST CONDITIONS | LIMITS | | UNITS | |
|--|-----------------|-----------------------|------|-------|------|
| | | V _{DD} Volts | TYP. | | MAX. |
| Propagation Delay Time, t _{PHL} , A or B Input to t _{PLH} Any Output | | 5 | 220 | 440 | ns |
| | | 10 | 95 | 190 | |
| | | 15 | 70 | 140 | |
| E Input to Any Output | | 5 | 200 | 400 | ns |
| | | 10 | 85 | 170 | |
| | | 15 | 65 | 130 | |
| Transition Time t _{THL} , t _{TLH} | | 5 | 100 | 200 | ns |
| | | 10 | 50 | 100 | |
| | | 15 | 40 | 80 | |
| Input Capacitance C _{IN} | Any Input | | 5 | 7,5 | pF |

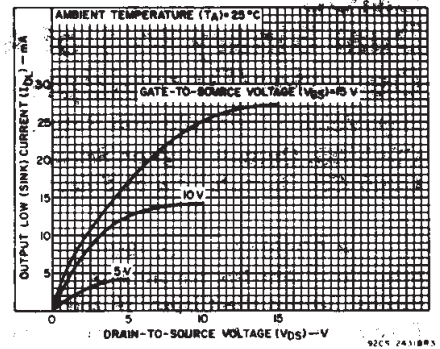


Fig. 1 — Typical output low (sink) current characteristics.

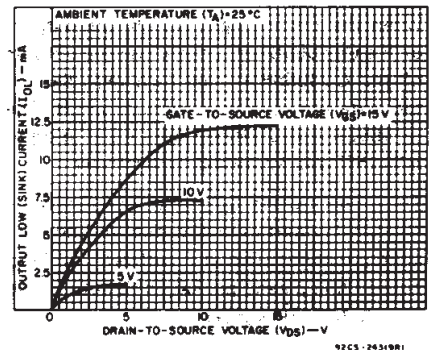


Fig. 2 — Minimum output low (sink) current characteristics.

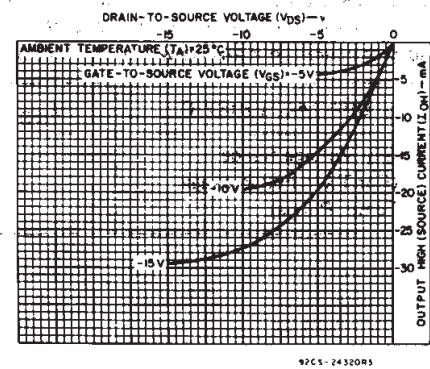


Fig. 3 — Typical output high (source) current characteristics.

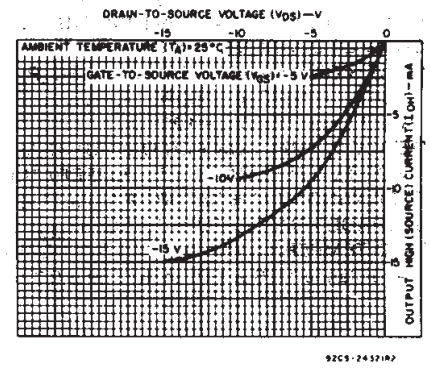
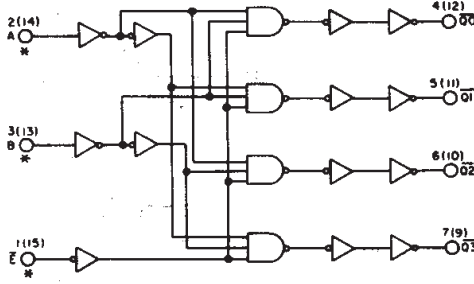
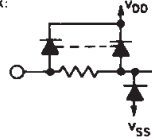


Fig. 4 — Minimum output high (source) current characteristics.

CD4555B, CD4556B Types

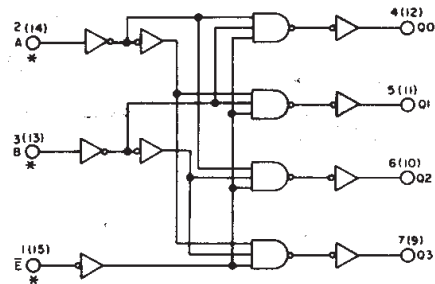


* ALL INPUTS PROTECTED BY CMOS PROTECTION NETWORK:

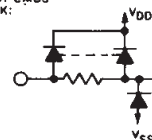


92CS-2422(R1)

Fig. 5 - CD4556B logic diagram (1 of 2 identical circuits).



* ALL INPUTS PROTECTED BY CMOS PROTECTION NETWORK:



92CS-2422(R1)

Fig. 6 - CD4555B logic diagram (1 of 2 identical circuits).

TRUTH TABLE

| INPUTS | | OUTPUTS CD4555B | | | | OUTPUTS CD4556B | | | |
|-----------|--------|-----------------|----|----|----|-----------------|------------|------------|------------|
| ENABLE | SELECT | Q3 | Q2 | Q1 | Q0 | Q3 | Q2 | Q1 | Q0 |
| \bar{E} | B A | Q3 | Q2 | Q1 | Q0 | $\bar{Q}3$ | $\bar{Q}2$ | $\bar{Q}1$ | $\bar{Q}0$ |
| 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

LOGIC 1 \equiv HIGH
LOGIC 0 \equiv LOW

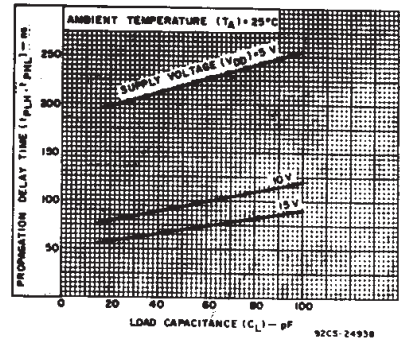


Fig. 7 - Typical propagation delay time vs. load capacitance (A or B input to any output).

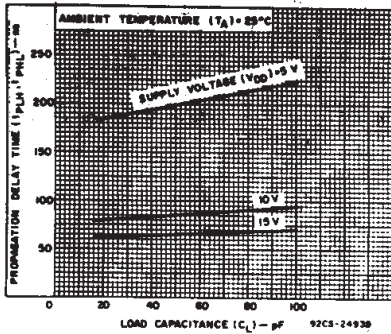


Fig. 8 - Typical propagation delay time vs. load capacitance (E input to any output).

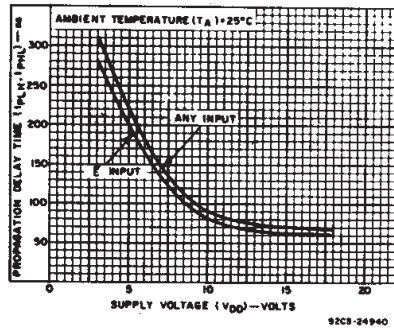


Fig. 9 - Typical propagation delay time vs. supply voltage.

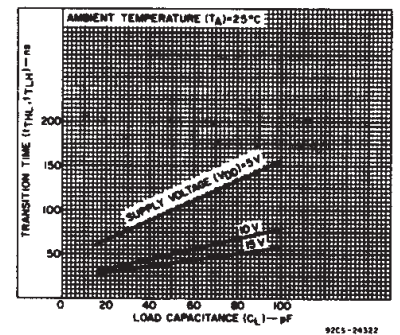


Fig. 10 - Typical transition time vs. load capacitance.

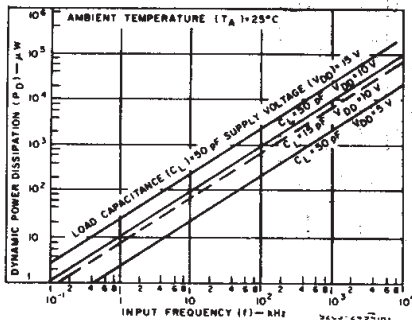


Fig. 11 - Typical dynamic power dissipation vs. frequency.

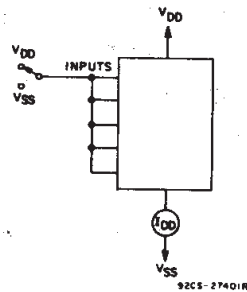


Fig. 12 - Quiescent device current test circuit.

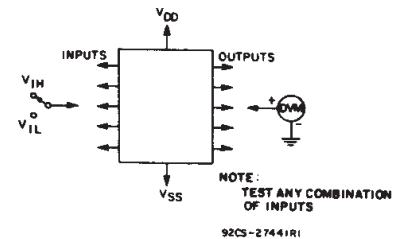


Fig. 13 - Input voltage test circuit.

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HIGH VOLTAGE ICs

CD4555B, CD4556B Types

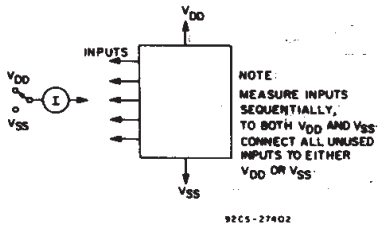


Fig. 14 - Input current test circuit.

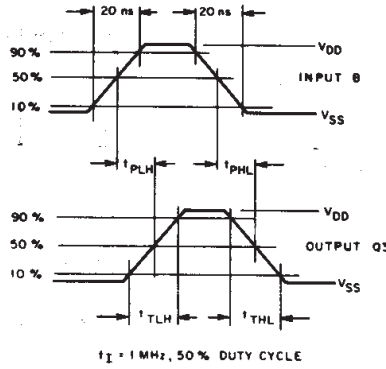


Fig. 15 - CD4555B B input to Q3 output dynamic signal waveforms.

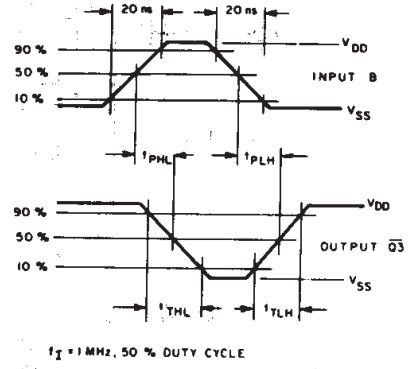


Fig. 16 - CD4556B B input to Q3 output dynamic signal waveforms.

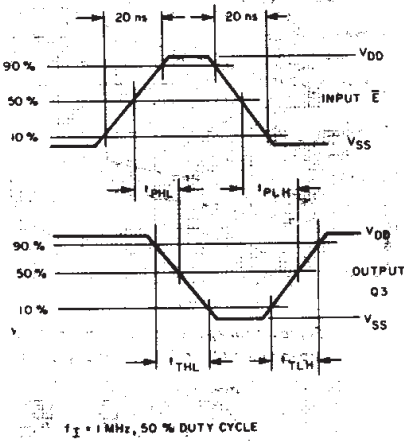


Fig. 17 - CD4555B E input to Q3 output dynamic signal waveforms.

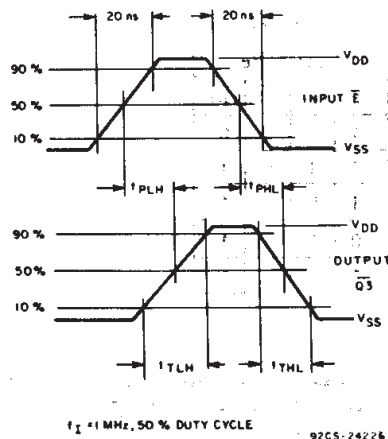
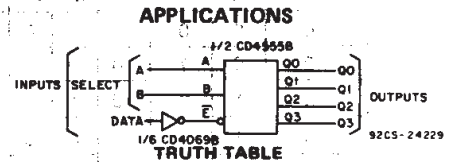


Fig. 18 - CD4556B E input to Q3 output dynamic signal waveforms.



TRUTH TABLE

| SELECT INPUTS | | OUTPUTS | | | |
|---------------|---|---------|------|------|------|
| B | A | Q0 | Q1 | Q2 | Q3 |
| 0 | 0 | DATA | 0 | 0 | 0 |
| 0 | 1 | 0 | DATA | 0 | 0 |
| 1 | 0 | 0 | 0 | DATA | 0 |
| 1 | 1 | 0 | 0 | 0 | DATA |

Fig. 19 - 1-of-4 line data demultiplexer using CD4555B.

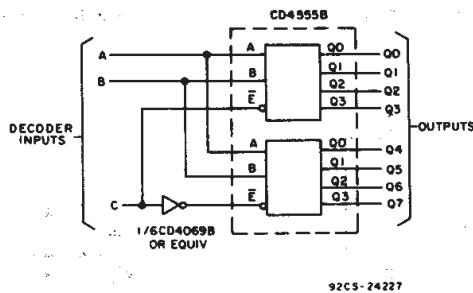


Fig. 20 - 1-of-8 decoder using CD4555B.

TRUTH TABLE

| INPUTS | | | Q OUTPUTS | | | | | | | |
|--------|---|---|-----------|---|---|---|---|---|---|---|
| C | B | A | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |

CD4555B, CD4556B Types

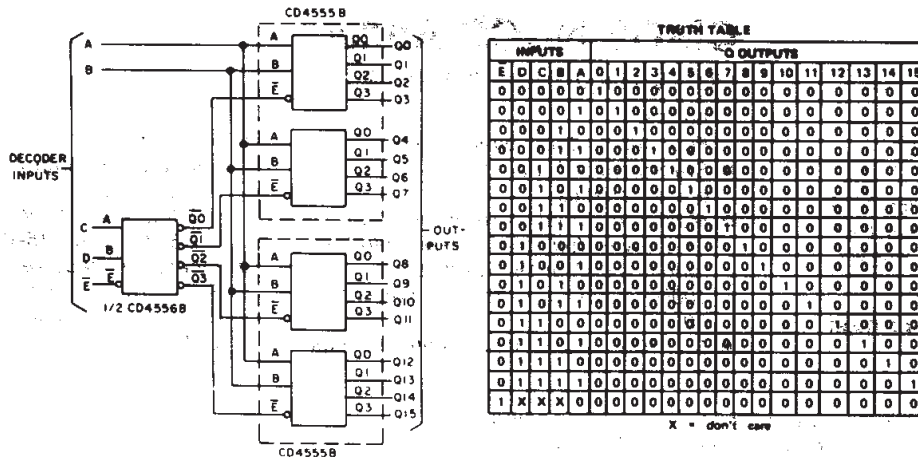
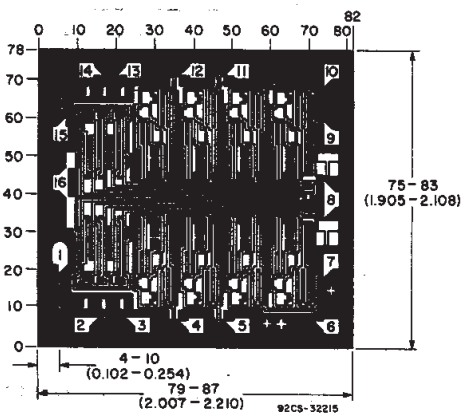
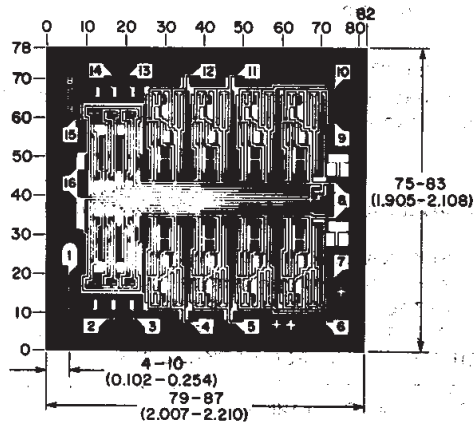


Fig. 21 - 1-of-16 decoder using CD4555B and CD4556B.



DIMENSIONS AND PAD LAYOUT FOR CD4555BH.



DIMENSIONS AND PAD LAYOUT FOR CD4556BH.

Dimensions in parentheses are in millimeters and are derived from the basic inch dimensions as indicated. Grid graduations are in mils (10⁻³ inch).

COMMERCIAL CMOS HIGH VOLTAGE ICs

PACKAGING INFORMATION

| Orderable Device | Status ⁽¹⁾ | Package Type | Package Drawing | Pins | Package Qty | Eco Plan ⁽²⁾ | Lead/Ball Finish | MSL Peak Temp ⁽³⁾ |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|--|
| 7704701EA | ACTIVE | CDIP | J | 16 | 1 | None | Call TI | Level-NC-NC-NC |
| 7704801EA | ACTIVE | CDIP | J | 16 | 1 | None | Call TI | Level-NC-NC-NC |
| CD4555BE | ACTIVE | PDIP | N | 16 | 25 | Pb-Free (RoHS) | CU NIPDAU | Level-NC-NC-NC |
| CD4555BF3A | ACTIVE | CDIP | J | 16 | 1 | None | Call TI | Level-NC-NC-NC |
| CD4555BM | ACTIVE | SOIC | D | 16 | 40 | Pb-Free (RoHS) | CU NIPDAU | Level-2-260C-1 YEAR/ Level-1-235C-UNLIM |
| CD4555BM96 | ACTIVE | SOIC | D | 16 | 2500 | Pb-Free (RoHS) | CU NIPDAU | Level-2-260C-1 YEAR/ Level-1-235C-UNLIM |
| CD4555BMT | ACTIVE | SOIC | D | 16 | 250 | Pb-Free (RoHS) | CU NIPDAU | Level-2-260C-1 YEAR/ Level-1-235C-UNLIM |
| CD4555BNSR | ACTIVE | SO | NS | 16 | 2000 | Pb-Free (RoHS) | CU NIPDAU | Level-2-260C-1 YEAR/ Level-1-235C-UNLIM |
| CD4555BPW | ACTIVE | TSSOP | PW | 16 | 90 | Pb-Free (RoHS) | CU NIPDAU | Level-1-250C-UNLIM |
| CD4555BPWR | ACTIVE | TSSOP | PW | 16 | 2000 | Pb-Free (RoHS) | CU NIPDAU | Level-1-250C-UNLIM |
| CD4556BE | ACTIVE | PDIP | N | 16 | 25 | Pb-Free (RoHS) | CU NIPDAU | Level-NC-NC-NC |
| CD4556BF | ACTIVE | CDIP | J | 16 | 1 | None | Call TI | Level-NC-NC-NC |
| CD4556BF3A | ACTIVE | CDIP | J | 16 | 1 | None | Call TI | Level-NC-NC-NC |
| CD4556BM | ACTIVE | SOIC | D | 16 | 40 | Pb-Free (RoHS) | CU NIPDAU | Level-2-260C-1 YEAR/ Level-1-235C-UNLIM |
| CD4556BM96 | ACTIVE | SOIC | D | 16 | 2500 | Pb-Free (RoHS) | CU NIPDAU | Level-2-260C-1 YEAR/ Level-1-235C-UNLIM |
| CD4556BMT | ACTIVE | SOIC | D | 16 | 250 | Pb-Free (RoHS) | CU NIPDAU | Level-2-260C-1 YEAR/ Level-1-235C-UNLIM |

⁽¹⁾ The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

⁽²⁾ Eco Plan - May not be currently available - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

None: Not yet available Lead (Pb-Free).

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Green (RoHS & no Sb/Br): TI defines "Green" to mean "Pb-Free" and in addition, uses package materials that do not contain halogens, including bromine (Br) or antimony (Sb) above 0.1% of total product weight.

⁽³⁾ MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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J (R-GDIP-T**)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



| DIM \ PINS ** | 14 | 16 | 18 | 20 |
|---------------|------------------------|------------------------|------------------------|------------------------|
| A | 0.300 (7,62) BSC | 0.300 (7,62) BSC | 0.300 (7,62) BSC | 0.300 (7,62) BSC |
| B MAX | 0.785 (19,94) | .840 (21,34) | 0.960 (24,38) | 1.060 (26,92) |
| B MIN | — | — | — | — |
| C MAX | 0.300 (7,62) | 0.300 (7,62) | 0.310 (7,87) | 0.300 (7,62) |
| C MIN | 0.245 (6,22) | 0.245 (6,22) | 0.220 (5,59) | 0.245 (6,22) |



4040083/F 03/03

- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - This package is hermetically sealed with a ceramic lid using glass frit.
 - Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
 - Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
 - The 20 pin end lead shoulder width is a vendor option, either half or full width.

D (R-PDSO-G16)

PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
 - D. Falls within JEDEC MS-012 variation AC.

MECHANICAL DATA

NS (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

PW (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14 PINS SHOWN



4040064/F 01/97

- NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.
 D. Falls within JEDEC MO-153

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