

# 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 <sub>DD</sub>	MIN.	MAX.	UNITS
Supply Voltage Range (For T <sub>A</sub> = Full Package Temp. Range)	—	3	18	V

### MAXIMUM RATINGS, Absolute-Maximum Values:

DC SUPPLY-VOLTAGE RANGE, (V<sub>DD</sub>)

Voltages referenced to V<sub>SS</sub> Terminal) ..... -0.5V to +20V

INPUT VOLTAGE RANGE, ALL INPUTS ..... -0.5V to V<sub>DD</sub> +0.5V

DC INPUT CURRENT, ANY ONE INPUT ..... ±10mA

POWER DISSIPATION PER PACKAGE (P<sub>D</sub>):

For T<sub>A</sub> = -55°C to +100°C ..... 500mW

For T<sub>A</sub> = +100°C to +125°C ..... Derate Linearly at 12mW/°C to 200mW

DEVICE DISSIPATION PER OUTPUT TRANSISTOR

FOR T<sub>A</sub> = FULL PACKAGE-TEMPERATURE RANGE (All Package Types)..... 100mW

OPERATING-TEMPERATURE RANGE (T<sub>A</sub>) ..... -55°C to +125°C

STORAGE TEMPERATURE RANGE (T<sub>stg</sub>) ..... -65°C to +150°C

LEAD TEMPERATURE (DURING SOLDERING):

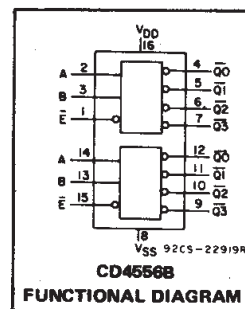
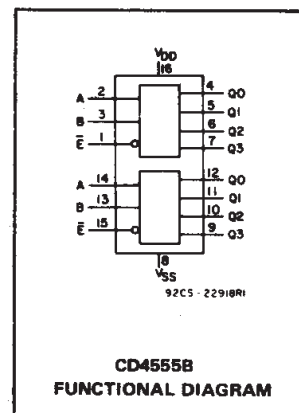
At distance 1/16 ± 1/32 inch (1.59 ± 0.79mm) from case for 10s max ..... +265°C

### 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<sub>DD</sub> = 5 V  
2 V at V<sub>DD</sub> = 10 V  
2.5 V at V<sub>DD</sub> = 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"

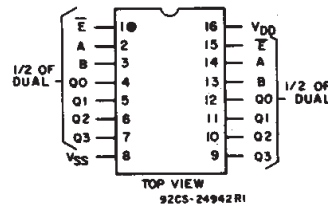
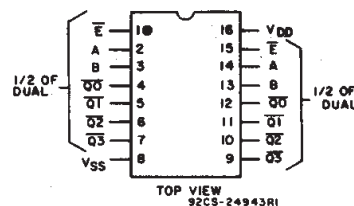
### Applications:

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



3  
COMMERCIAL CMOS  
HIGH VOLTAGE ICs

### TERMINAL ASSIGNMENTS



# CD4555B, CD4556B Types

## STATIC ELECTRICAL CHARACTERISTICS

CHARACTERISTIC	CONDITIONS			LIMITS AT INDICATED TEMPERATURES (°C)							UNITS
	V <sub>O</sub> (V)	V <sub>IN</sub> (V)	V <sub>DD</sub> (V)	-55	-40	+85	+125	+25			
								Min.	Typ.	Max.	
Quiescent Device Current, I <sub>DD</sub> 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 <sub>OL</sub> 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 <sub>OH</sub> 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 <sub>OL</sub> 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 <sub>OH</sub> 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 <sub>IL</sub> 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 <sub>IH</sub> 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 <sub>IN</sub> Max.		0,18	18	±0,1	±0,1	±1	±1	—	±10 <sup>-5</sup>	±0,1	μA

**DYNAMIC ELECTRICAL CHARACTERISTICS at T<sub>A</sub> = 25°C; Input t<sub>p</sub>, t<sub>f</sub> = 20 ns, C<sub>L</sub> = 50 pF, R<sub>L</sub> = 200 KΩ**

CHARACTERISTIC	TEST CONDITIONS	LIMITS		UNITS	
		V <sub>DD</sub> Volts	TYP.		MAX.
Propagation Delay Time, t <sub>PHL</sub> , A or B Input to t <sub>PLH</sub> 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 <sub>THL</sub> , t <sub>TLH</sub>		5	100	200	ns
		10	50	100	
		15	40	80	
Input Capacitance C <sub>IN</sub>	Any Input		5	7,5	pF

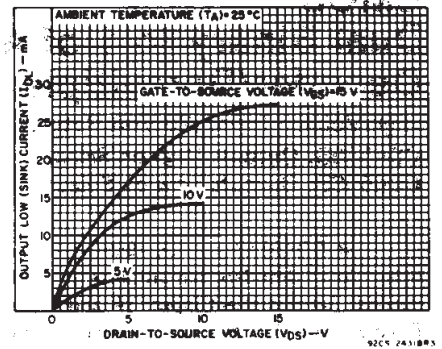


Fig. 1 — Typical output low (sink) current characteristics.

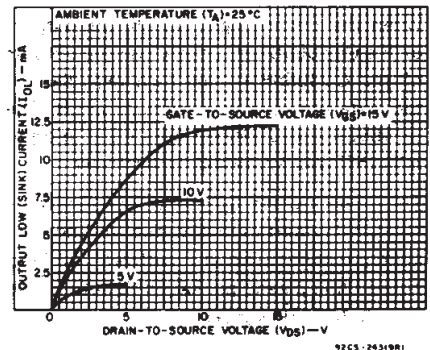


Fig. 2 — Minimum output low (sink) current characteristics.

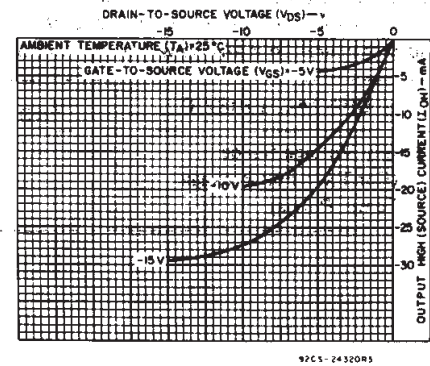


Fig. 3 — Typical output high (source) current characteristics.

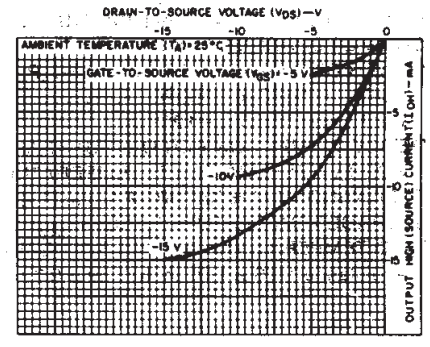
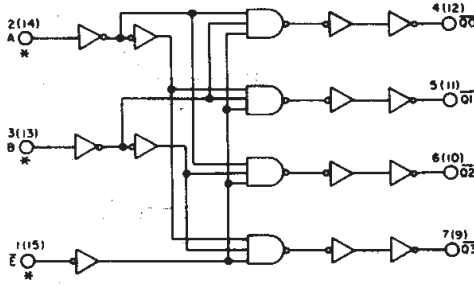
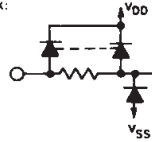


Fig. 4 — Minimum output high (source) current characteristics.

# CD4555B, CD4556B Types

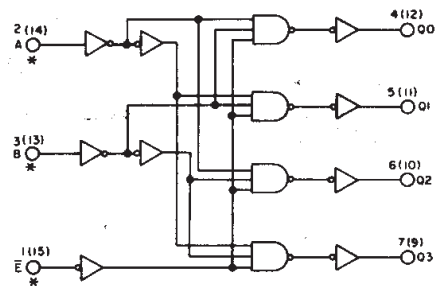


\* ALL INPUTS PROTECTED BY CMOS PROTECTION NETWORK:

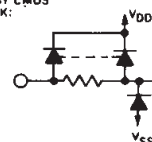


92CS-2422(R1)

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

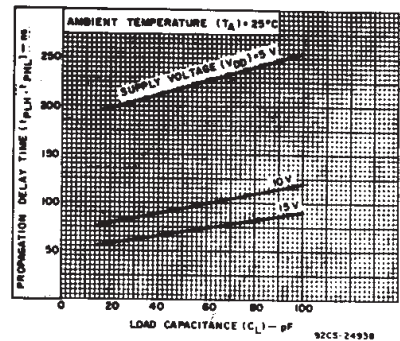


Fig. 7 - Typical propagation delay time vs. load capacitance (A or B input to any output).

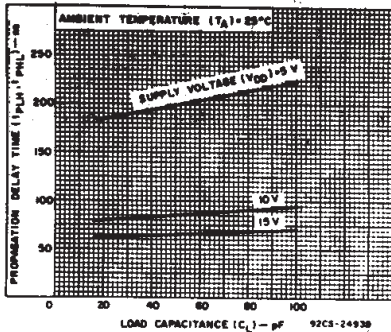


Fig. 8 - Typical propagation delay time vs. load capacitance (E input to any output).

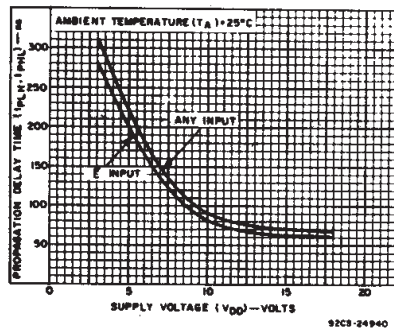


Fig. 9 - Typical propagation delay time vs. supply voltage.

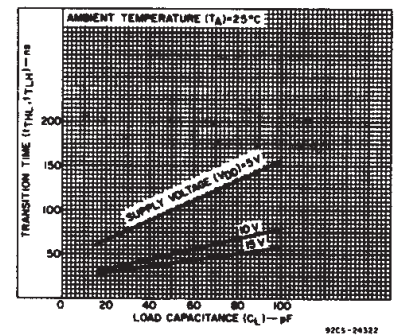


Fig. 10 - Typical transition time vs. load capacitance.

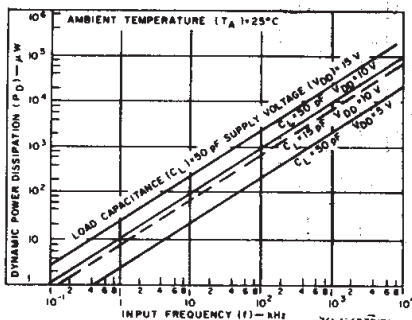


Fig. 11 - Typical dynamic power dissipation vs. frequency.

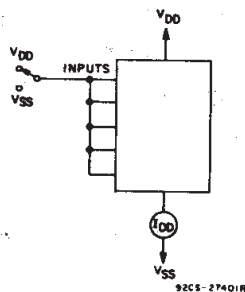


Fig. 12 - Quiescent device current test circuit.

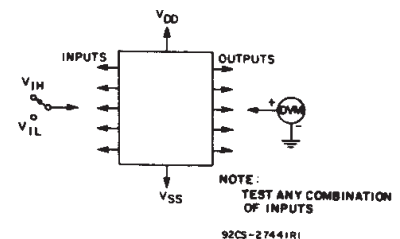


Fig. 13 - Input voltage test circuit.

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# CD4555B, CD4556B Types

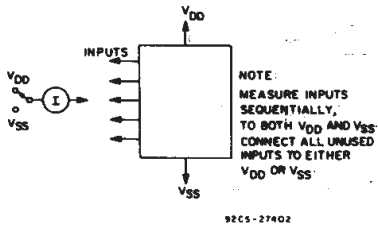


Fig. 14 - Input current test circuit.

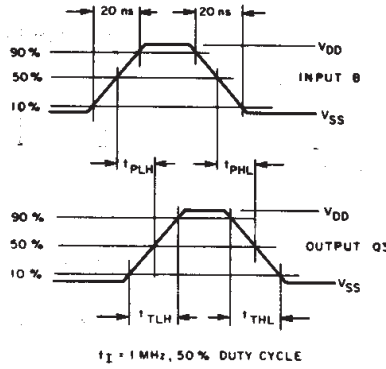


Fig. 15 - CD4555B B input to Q3 output dynamic signal waveforms.

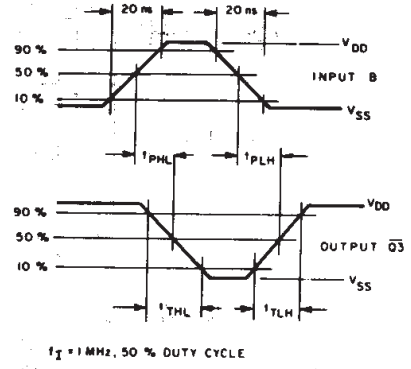


Fig. 16 - CD4556B B input to Q3 output dynamic signal waveforms.

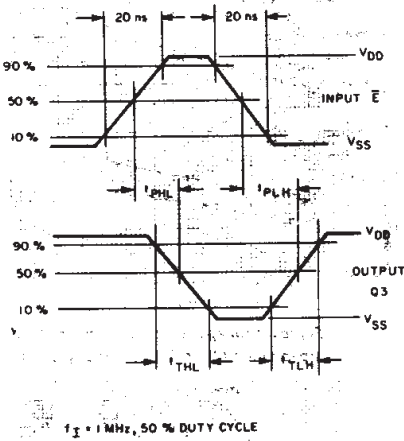


Fig. 17 - CD4555B E input to Q3 output dynamic signal waveforms.

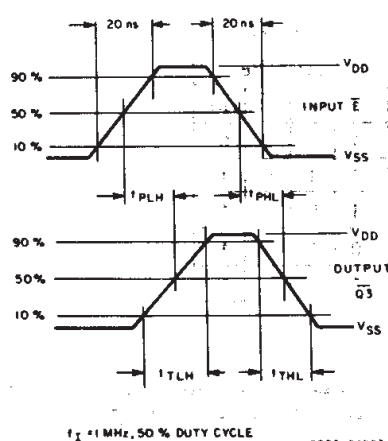
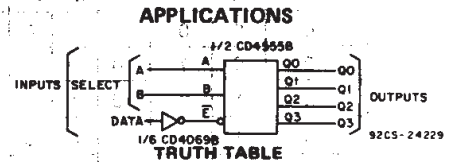


Fig. 18 - CD4556B E input to Q3 output dynamic signal waveforms.



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.

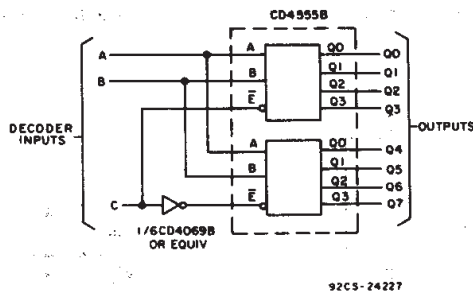


Fig. 20 - 1-of-8 decoder using CD4555B.

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

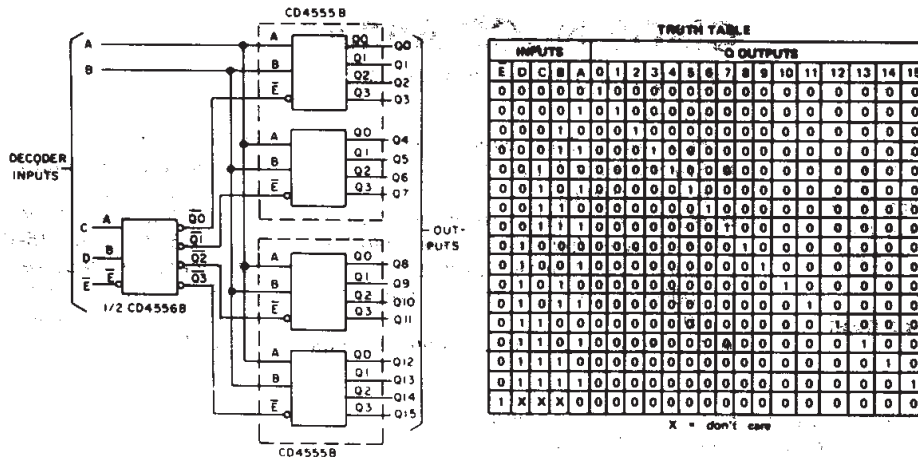
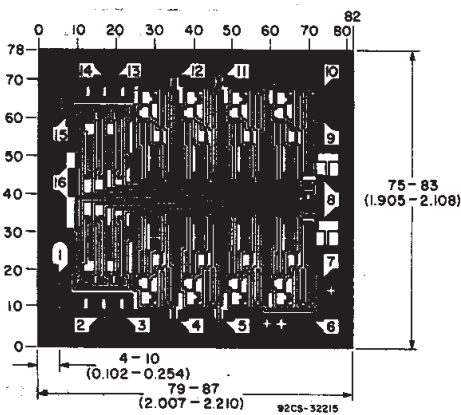
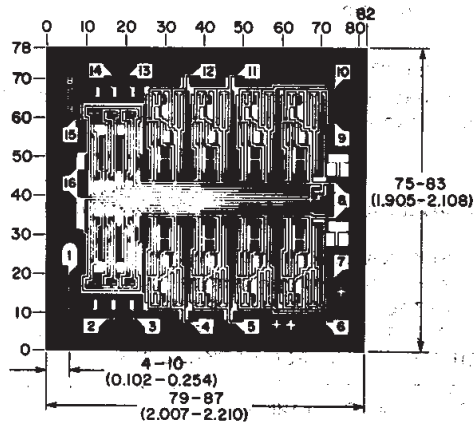


Fig. 21 - 1-of-16 decoder using CD4555B and CD4556B.



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<sup>-3</sup> inch).

**COMMERCIAL CMOS HIGH VOLTAGE ICs**

**PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
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

<sup>(1)</sup> 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.

<sup>(2)</sup> 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.

<sup>(3)</sup> 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:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. This package is hermetically sealed with a ceramic lid using glass frit.
  - D. Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
  - E. 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



4040049/E 12/2002

- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - (C) Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
  - (D) 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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Mailing Address: Texas Instruments  
Post Office Box 655303 Dallas, Texas 75265