TEXAS INSTRUMENTS

Data sheet acquired from Harris Semiconductor
SCHS075

CD4517B Types

CMOS Dual 64-Stage Static Shift Register

High-Voltage Types (20-Volt Rating)

■ CD4517B dual 64-stage static shift register consists of two independent registers each having a clock, data, and write enable input and outputs accessible at taps following the 16th, 32nd, 48th, and 64th stages. These taps also serve as input points allowing data to be inputted at the 17th, 33rd, and 49th stages when the write enable input is a logic 1 and the clock goes through a low-to-high transition. The truth table indicates how the clock and write enable inputs control the operation of the CD4517B. Inputs at the intermediate taps allow entry of 64 bits into the register with 16 clock pulses. The 3-state outputs permit connection of this device to an external bus.

The CD4517B is supplied in 16-lead hermetic dual-in-line ceramic packages (D and F suffixes), 16-lead dual-in-line plastic packages (E suffix), and in chip form (H suffix).

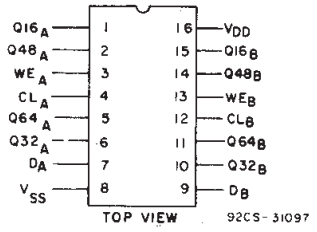
Features:

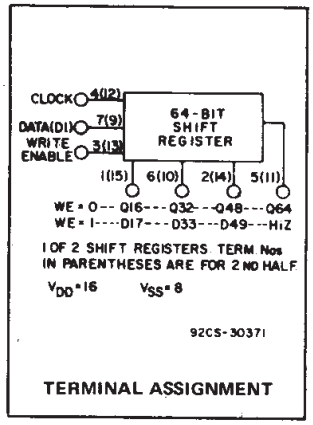
- Low quiescent current – 10 nA/pkg (typ.) at V_{DD} = 5 V
- Clock frequency 12 MHz (typ.) at V_{DD} = 10 V
- Schmitt trigger clock inputs allow operation with very slow clock rise and fall times
- Capable of driving two low-power TTL loads, one low- power Schottky TTL load, or two HTL loads
- Three-state outputs
- 100% tested for quiescent current at 20 V
- Standardized, symmetrical output characteristics
- 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:

- Time-delay circuits
- Scratch-pad memories
- General-purpose serial shift-register applications

TERMINAL ASSIGNMENT





TERMINAL ASSIGNMENT

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

RECOMMENDED OPERATING CONDITIONS

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

CHARACTERISTIC	LIMITS		UNITS
	MIN.	MAX.	
Supply-Voltage Range (For T_A = Full Package Temperature Range)	3	18	V

TRUTH TABLE

Clock	Write Enable	Data	Stage 16 Tap	Stage 32 Tap	Stage 48 Tap	Stage 64 Tap
0	0	X	Q16	Q32	Q48	Q64
0	1	X	Z	Z	Z	Z
1	0	X	Q16	Q32	Q48	Q64
1	1	X	Z	Z	Z	Z
⌒	0	DI In	Q16	Q32	Q48	Q64
⌒	1	DI In	D17 In	D33 In	D49 In	Z
⌒	0	X	Q16	Q32	Q48	Q64
⌒	1	X	Z	Z	Z	Z

X = Don't Care Z = High Impedance

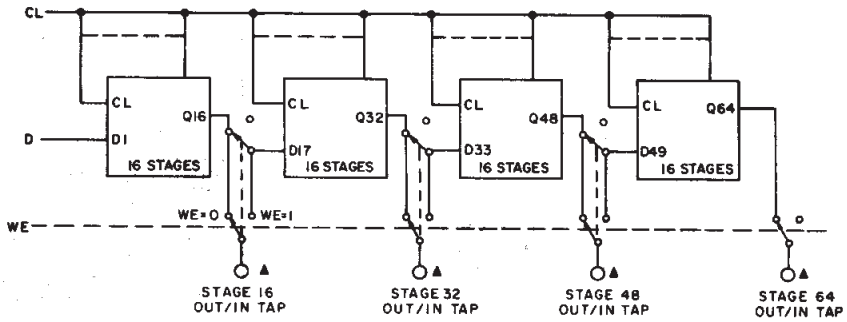


Fig. 1—CD4517B functional block diagram (one half).

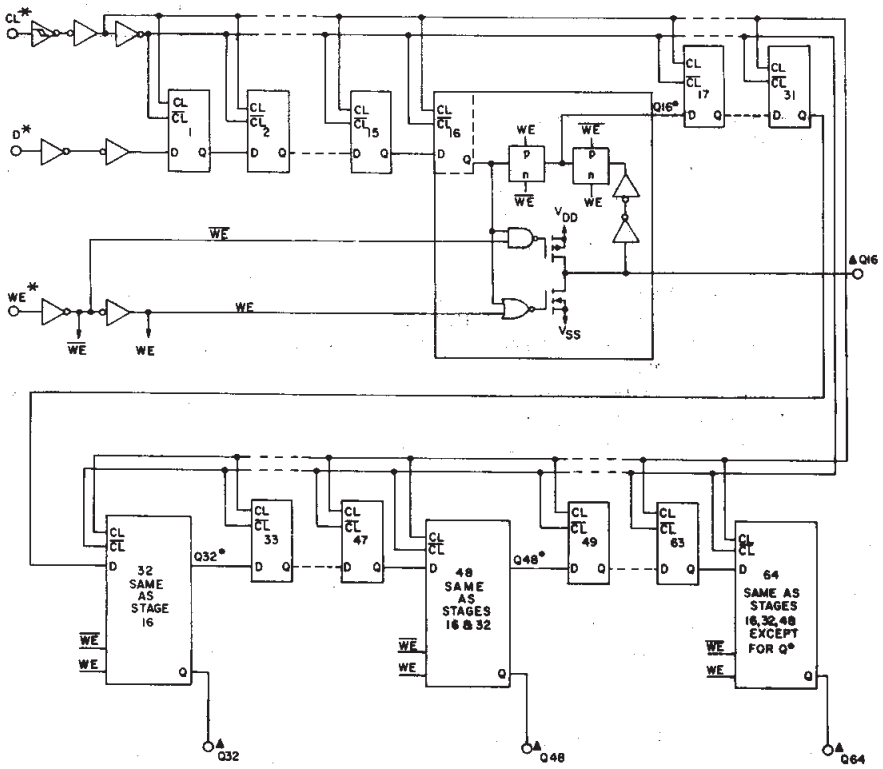
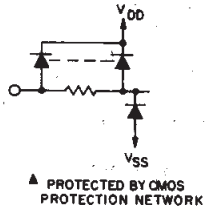
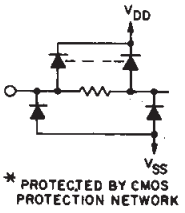


Fig. 2—CD4517B logic block diagram (one half).





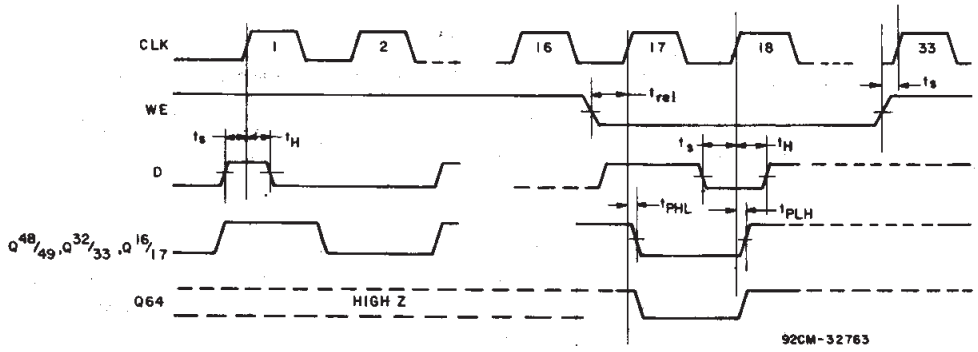


Fig. 3—Dynamic test waveforms.

STATIC ELECTRICAL CHARACTERISTICS

CHARACTERISTIC	CONDITIONS			LIMITS AT INDICATED TEMPERATURES (°C)							UNITS
								+25			
	V_O (V)	V_{IN} (V)	V_{DD} (V)	−55	−40	+85	+125	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	–	
	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	–	
	–	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	–	–	
	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
3-State Output Leakage Current I_{OUT} Max.	0,18	0,18	18	±0.4	±0.4	±12	±12	–	$±10^{-4}$	±0.4	μA

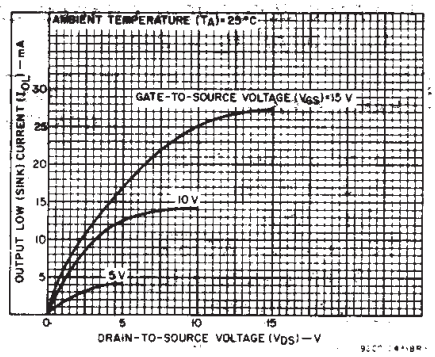


Fig. 4—Typical n-channel output low (sink) current characteristics.

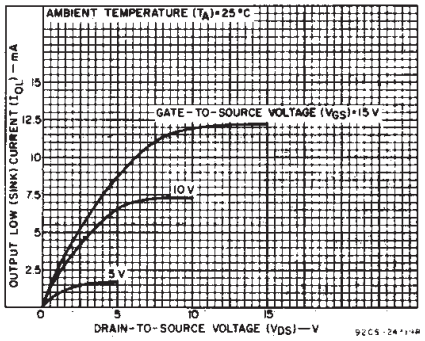


Fig. 5—Minimum n-channel output low (sink) current characteristics.

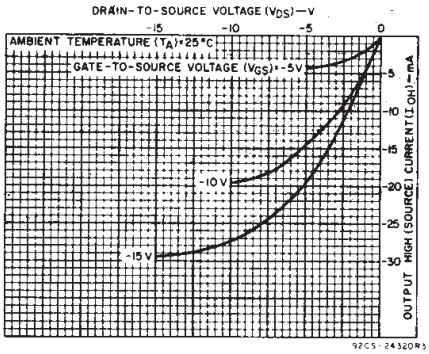


Fig. 6—Typical p-channel output high (source) current characteristics.

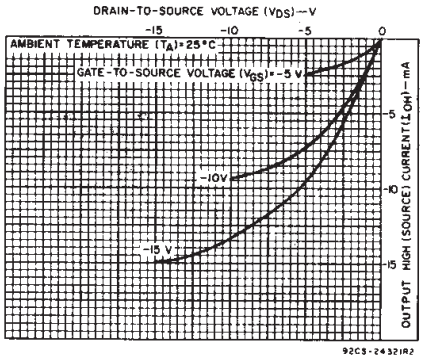


Fig. 7—Minimum p-channel output high (source) current characteristics.

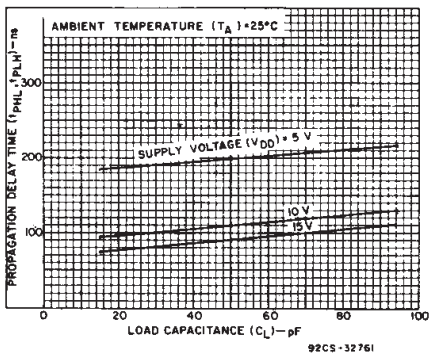


Fig. 8—Typical propagation delay time as a function of load capacitance.

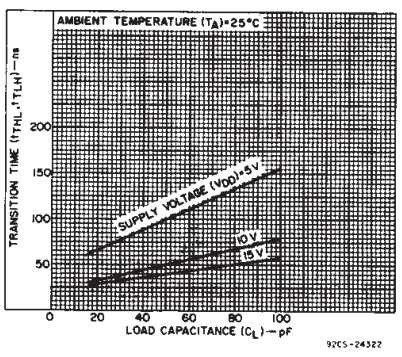


Fig. 9—Typical transition time a a function of load capacitance.

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

CHARACTERISTIC	TEST CONDITIONS	V_{DD} (V)	LIMITS Min.	LIMITS Typ.	LIMITS Max.	UNITS
Propagation Delay Time: CL to Bit 16 Tap t_{PHL}, t_{PLH}		5	—	200	400	ns
		10	—	110	220	
		15	—	90	180	
3-State Output, WE to Bit 16 Tap t_{PHZ}, t_{PLZ}, t_{PZH}, t_{PZL} (See Note)		5	—	75	150	ns
		10	—	40	80	
		15	—	30	60	
Output Transition Time t_{THL}, t_{TLH}		5	—	100	200	ns
		10	—	50	100	
		15	—	40	80	
Write Enable-to-Clock Setup Time		5	0	−50	—	ns
		10	0	−25	—	
		15	0	−15	—	
Data-to-Clock Setup Time, t_s		5	20	0	—	ns
		10	10	0	—	
		15	10	0	—	
Minimum Write Enable-to-Clock Release Time		5	—	50	100	ns
		10	—	25	50	
		15	—	20	40	
Minimum Data-to-Clock Hold Time, t_H		5	—	100	200	ns
		10	—	50	100	
		15	—	25	50	
Minimum Clock Pulse Width, t_W		5	—	90	180	ns
		10	—	40	80	
		15	—	25	50	
Maximum Clock Input Frequency, f_{CL}		5	3	6	—	MHz
		10	6	12	—	
		15	8	15	—	
Maximum Clock Input Rise or Fall Time, t_{fCL} t_{rCL}		5	UNLIMITED			μs
		10				
		15				
Input Capacitance C_{IN}	Any Input		—	5	7.5	pF

NOTE: Measured at the point of 10% change in output with an output load of 50 pF, RL = 1 kΩ to V_{DD} for t_{PZL}, t_{PLZ} and R_L = 1 kΩ to V_{SS} for t_{PZH}, t_{PHZ}.

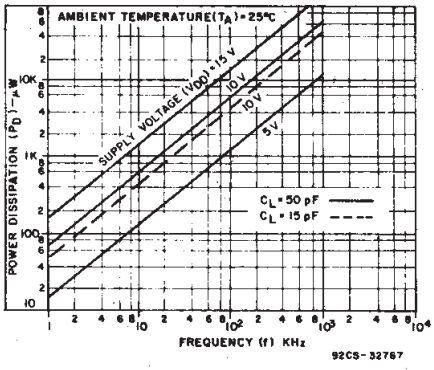


Fig. 10—Typical power dissipation as a function of frequency.

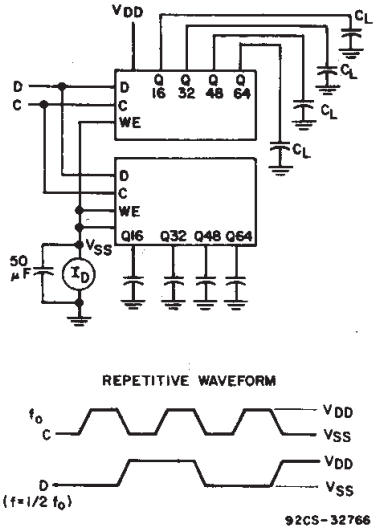


Fig. 11—Dynamic power dissipation test circuit and waveforms.

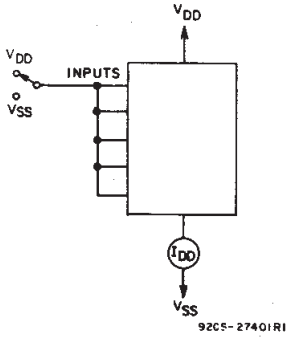


Fig. 12—Quiescent-device-current test circuit.

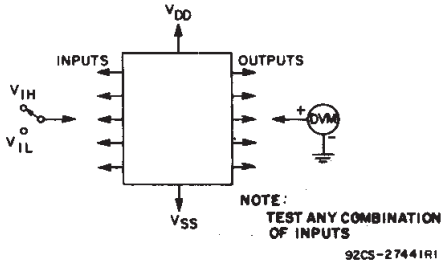


Fig. 13—Input-voltage test circuit.

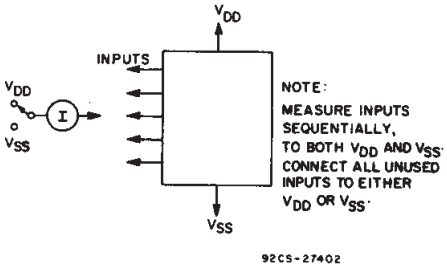
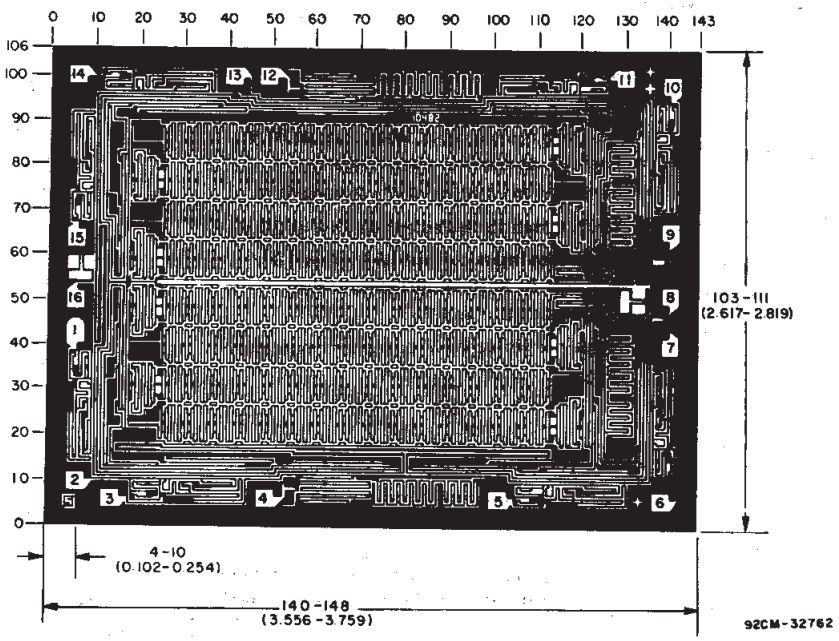


Fig. 14—Input current test circuit.



Dimensions and pad layout for CD4517B.

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

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)
CD4517BE	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
CD4517BEE4	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
CD4517BF3A	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type

(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.

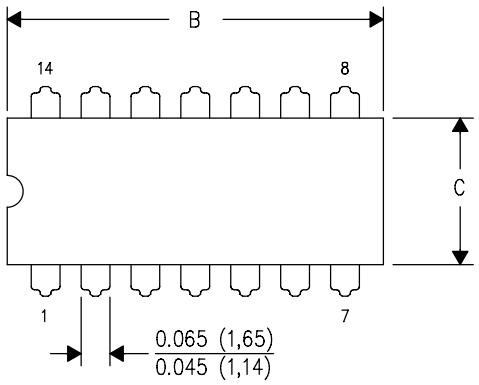
(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
TBD: The Pb-Free/Green conversion plan has not been defined.
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.
Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

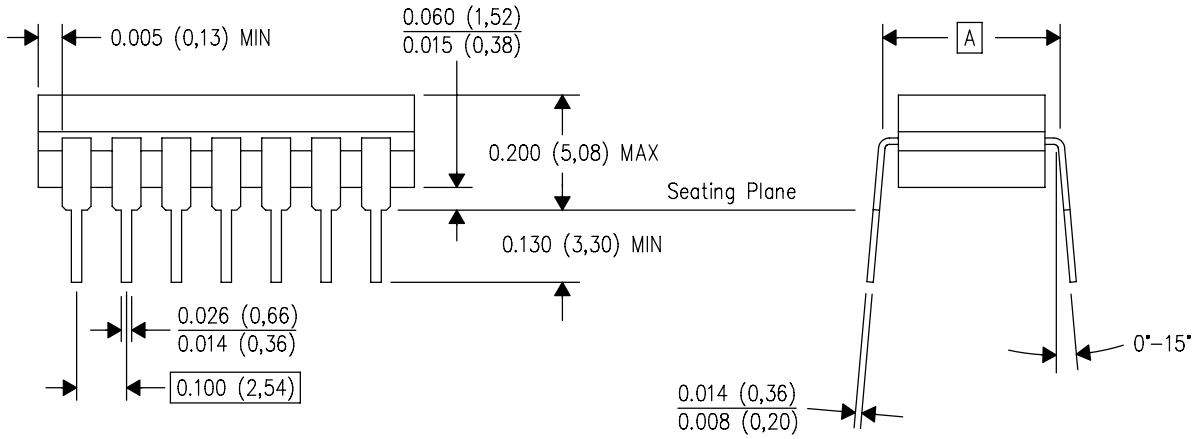
J (R–GDIP–T**)

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)



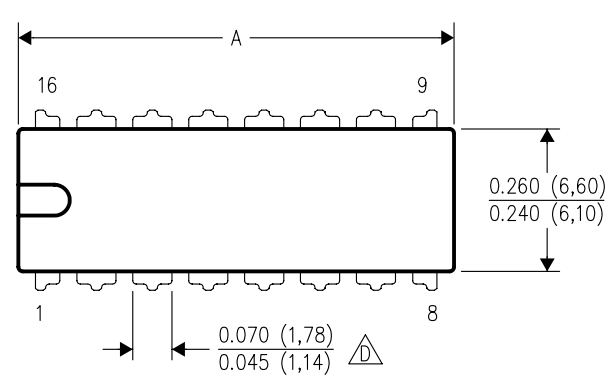
4040083/F 03/03

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.

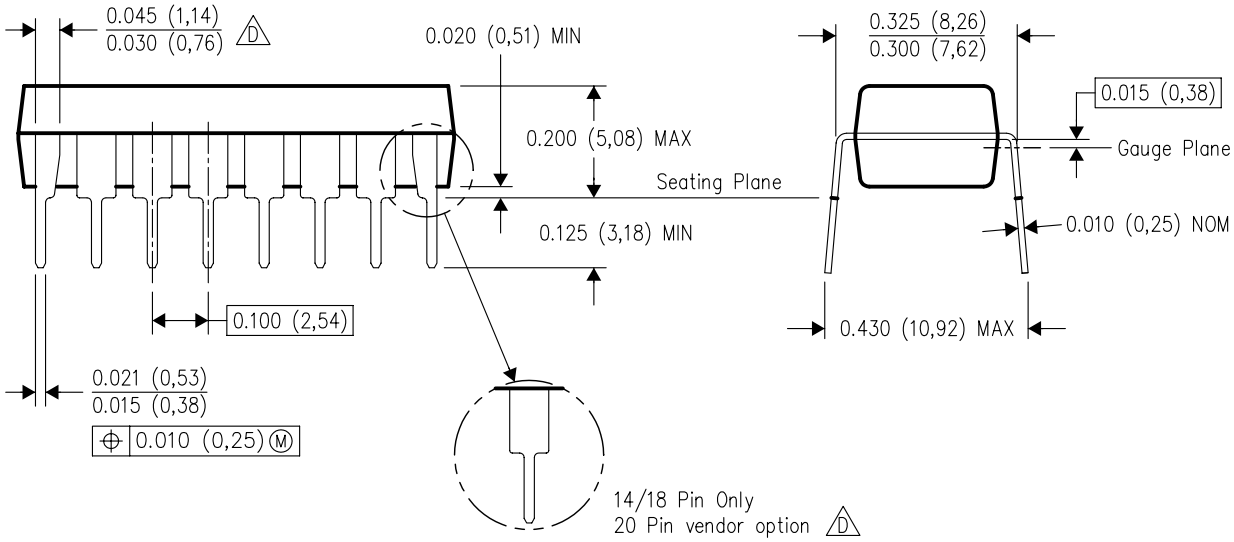
N (R–PDIP–T**)

PLASTIC DUAL–IN–LINE PACKAGE

16 PINS SHOWN



DIM \ PINS **	14	16	18	20
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
MS–001 VARIATION (C)	AA	BB	AC	AD



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.

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