

SN54ALS576B, SN54AS576 SN74ALS576B, SN74ALS577A, SN74AS576 OCTAL D-TYPE EDGE-TRIGGERED FLIP-FLOPS WITH 3-STATE OUTPUTS

SDAS065B – DECEMBER 1982 – REVISED JANUARY 1995

- 3-State Buffer-Type Inverting Outputs Drive Bus Lines Directly
- Bus-Structured Pinout
- Buffered Control Inputs
- SN74ALS577A Has Synchronous Clear
- Package Options Include Plastic Small-Outline (DW) Packages, Ceramic Chip Carriers (FK), Standard Plastic (N, NT) and Ceramic (J) 300-mil DIPs, and Ceramic Flat (W) Packages

description

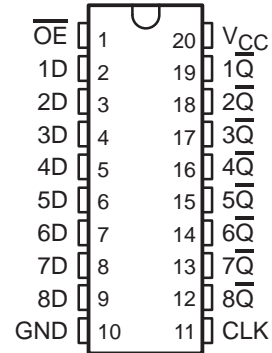
These octal D-type edge-triggered flip-flops feature 3-state outputs designed specifically for bus driving. They are particularly suitable for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

These flip-flops enter data on the low-to-high transition of the clock (CLK) input.

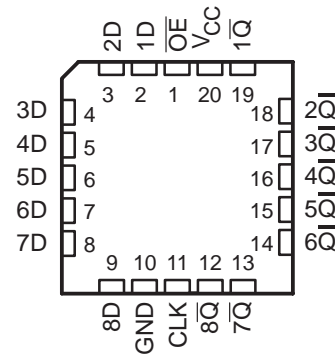
The output-enable (\overline{OE}) input does not affect internal operations of the flip-flops. Old data can be retained or new data can be entered while the outputs are disabled.

The SN54ALS576B and SN54AS576 are characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ALS576B, SN74ALS577A, and SN74AS576 are characterized for operation from 0°C to 70°C .

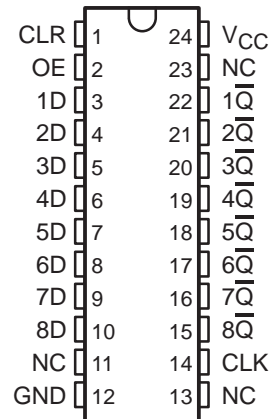
SN54ALS576B, SN54AS576 ... J OR W PACKAGE
SN74ALS576B, SN74AS576 ... DW OR N PACKAGE
(TOP VIEW)



SN54ALS576B, SN54AS576 ... FK PACKAGE
(TOP VIEW)



SN74ALS577A ... DW OR NT PACKAGE
(TOP VIEW)



NC – No internal connection

SN54ALS576B, SN54AS576
SN74ALS576B, SN74ALS577A, SN74AS576
OCTAL D-TYPE EDGE-TRIGGERED FLIP-FLOPS WITH 3-STATE OUTPUTS
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Function Tables

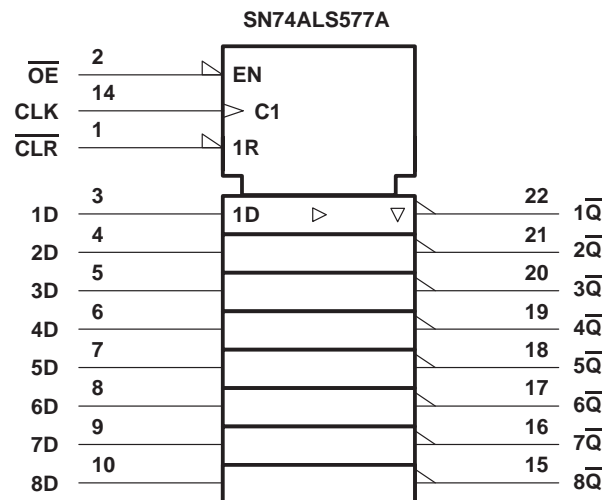
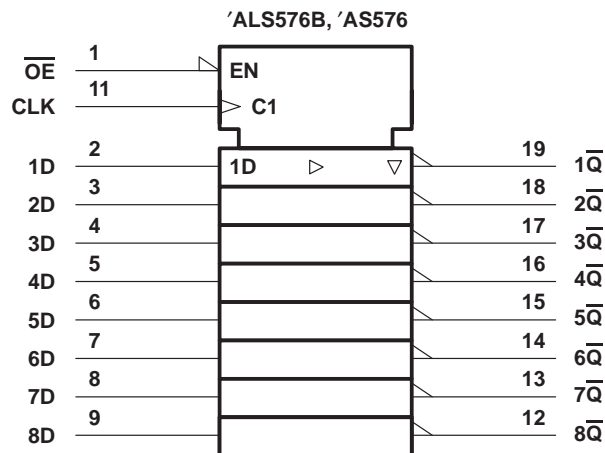
'ALS576B, 'AS576
(each flip-flop)

| INPUTS | | | OUTPUT \overline{Q} |
|-----------------|------------|---|--------------------------|
| \overline{OE} | CLK | D | |
| L | \uparrow | H | L |
| L | \uparrow | L | H |
| L | L | X | \overline{Q}_0 |
| H | X | X | Z |

SN74ALS577A
(each flip-flop)

| INPUTS | | | | OUTPUT \overline{Q} |
|-----------------|------------------|------------|---|--------------------------|
| \overline{OE} | \overline{CLR} | CLK | D | |
| L | L | \uparrow | X | H |
| L | H | \uparrow | H | L |
| L | H | \uparrow | L | H |
| L | H | L | X | \overline{Q}_0 |
| H | X | X | X | Z |

logic symbols†



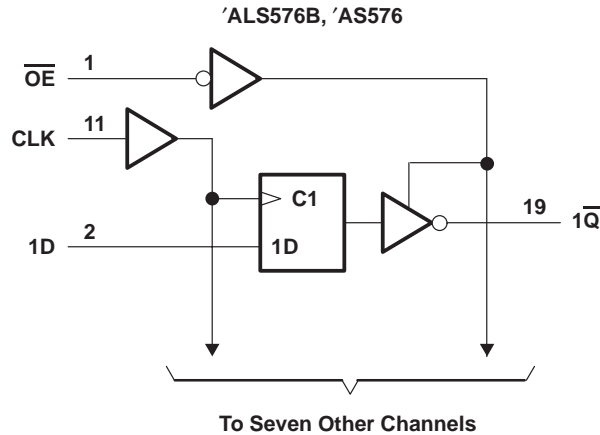
† These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

Pin numbers shown for the 'ALS576B and 'AS576 are for the DW, J, N, and W packages.

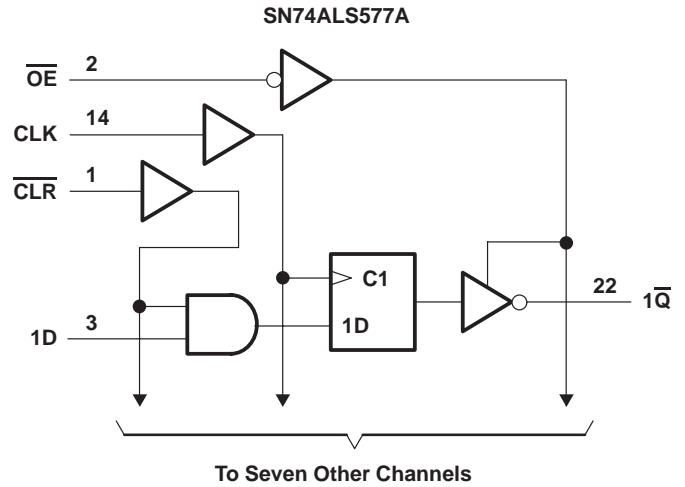
Pin numbers shown for the SN74ALS577A are for the DW and NT packages.

SN54ALS576B, SN54AS576
SN74ALS576B, SN74ALS577A, SN74AS576
OCTAL D-TYPE EDGE-TRIGGERED FLIP-FLOPS WITH 3-STATE OUTPUTS
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logic diagrams (positive logic)



Pin numbers shown are for the DW, J, N, and W packages.



Pin numbers shown are for the DW and NT packages.

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)[†]

| | |
|---|----------------|
| Supply voltage, V_{CC} | 7 V |
| Input voltage, V_I | 7 V |
| Voltage applied to a disabled 3-state output | 5.5 V |
| Operating free-air temperature range, T_A : SN54ALS576B | –55°C to 125°C |
| SN74ALS576B, SN74ALS577A | 0°C to 70°C |
| Storage temperature range | –65°C to 150°C |

[†] Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

recommended operating conditions

| | | | SN54ALS576B | | | SN74ALS576B SN74ALS577A | | | UNIT |
|-------------|------------------------------------|------------------------------|-------------|-----|-----|----------------------------|-----|------|------|
| | | | MIN | NOM | MAX | MIN | NOM | MAX | |
| V_{CC} | Supply voltage | | 4.5 | 5 | 5.5 | 4.5 | 5 | 5.5 | V |
| V_{IH} | High-level input voltage | | 2 | | | 2 | | | V |
| V_{IL} | Low-level input voltage | | | | 0.7 | | | 0.8 | V |
| I_{OH} | High-level output current | | | | –1 | | | –2.6 | mA |
| I_{OL} | Low-level output current | | | | 12 | | | 24 | mA |
| f_{clock} | Clock frequency | 'ALS576B | 0 | | 22 | 0 | | 30 | MHz |
| | | SN74ALS577A | | | | 0 | | 30 | |
| t_w | Pulse duration | 'ALS576B, CLK high or low | 25 | | | 16.5 | | | ns |
| | | SN74ALS577A, CLK high or low | | | | 16.5 | | | |
| t_{su} | Setup time before CLK [↑] | Data | 15 | | | 15 | | | ns |
| | | SN74ALS577A CLR | | | | 15 | | | |
| t_h | Hold time after CLK [↑] | Data | 4 | | | 0 | | | ns |
| | | SN74ALS577A CLR | | | | 0 | | | |
| T_A | Operating free-air temperature | | –55 | | 125 | 0 | | 70 | °C |

SN54ALS576B, SN54AS576
SN74ALS576B, SN74ALS577A, SN74AS576
OCTAL D-TYPE EDGE-TRIGGERED FLIP-FLOPS WITH 3-STATE OUTPUTS
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electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

| PARAMETER | TEST CONDITIONS | SN54ALS576B | | | SN74ALS576B SN74ALS577A | | | UNIT |
|-----------------|---|--------------|------|------|----------------------------|------|------|---------------|
| | | MIN | TYP† | MAX | MIN | TYP† | MAX | |
| V_{IK} | $V_{CC} = 4.5\text{ V}$, $I_I = -18\text{ mA}$ | | | -1.2 | | | -1.2 | V |
| V_{OH} | $V_{CC} = 4.5\text{ V to } 5.5\text{ V}$, $I_{OH} = -0.4\text{ mA}$ | $V_{CC} - 2$ | | | $V_{CC} - 2$ | | | V |
| | $V_{CC} = 4.5\text{ V}$, $I_{OH} = -1\text{ mA}$ | 2.4 | 3.3 | | | | | |
| | $V_{CC} = 4.5\text{ V}$, $I_{OH} = -2.6\text{ mA}$ | | | | 2.4 | 3.2 | | |
| V_{OL} | $V_{CC} = 4.5\text{ V}$, $I_{OL} = 12\text{ mA}$ | | 0.25 | 0.4 | | 0.25 | 0.4 | V |
| | $V_{CC} = 4.5\text{ V}$, $I_{OL} = 24\text{ mA}$ | | | | | 0.35 | 0.5 | |
| I_{OZH} | $V_{CC} = 5.5\text{ V}$, $V_O = 2.7\text{ V}$ | | | 20 | | | 20 | μA |
| I_{OZL} | $V_{CC} = 5.5\text{ V}$, $V_O = 0.4\text{ V}$ | | | -20 | | | -20 | μA |
| I_I | $V_{CC} = 5.5\text{ V}$, $V_I = 7\text{ V}$ | | | 0.1 | | | 0.1 | mA |
| I_{IH} | $V_{CC} = 5.5\text{ V}$, $V_I = 2.7\text{ V}$ | | | 20 | | | 20 | μA |
| I_{IL} | $V_{CC} = 5.5\text{ V}$, $V_I = 0.4\text{ V}$ | | | -0.2 | | | -0.2 | mA |
| $I_{O\ddagger}$ | $V_{CC} = 5.5\text{ V}$, $V_O = 2.25\text{ V}$ | -20 | | -112 | -30 | | -112 | mA |
| I_{CC} | $V_{CC} = 5.5\text{ V}$, Outputs high | | 10 | 18 | | 10 | 18 | mA |
| | $V_{CC} = 5.5\text{ V}$, Outputs low | | 15 | 24 | | 15 | 24 | |
| | $V_{CC} = 5.5\text{ V}$, Outputs disabled | | 16 | 30 | | 16 | 30 | |

† All typical values are at $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$.

‡ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS} .

switching characteristics (see Figure 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T _A = MIN to MAX [§] | | | | | | UNIT |
|------------------|-----------------|--------------------|--|-----|-------------|-----|-------------|-----|------|
| | | | SN54ALS576B | | SN74ALS576B | | SN74ALS577A | | |
| | | | MIN | MAX | MIN | MAX | MIN | MAX | |
| f _{max} | | | 22 | | 30 | | 30 | | MHz |
| t _{PLH} | CLK | Any \overline{Q} | 4 | 24 | 3 | 14 | 4 | 14 | ns |
| t _{PHL} | | | 4 | 20 | 4 | 14 | 4 | 14 | |
| t _{PZH} | \overline{OE} | Any \overline{Q} | 4 | 24 | 3 | 18 | 4 | 18 | ns |
| t _{PZL} | | | 3 | 23 | 4 | 18 | 4 | 18 | |
| t _{PHZ} | \overline{OE} | Any \overline{Q} | 2 | 14 | 1 | 10 | 2 | 10 | ns |
| t _{PLZ} | | | 3 | 29 | 2 | 15 | 3 | 15 | |

§ For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.



SN54ALS576B, SN54AS576
SN74ALS576B, SN74ALS577A, SN74AS576

OCTAL D-TYPE EDGE-TRIGGERED FLIP-FLOPS WITH 3-STATE OUTPUTS

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absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

| | |
|---|----------------|
| Supply voltage, V_{CC} | 7 V |
| Input voltage, V_I | 7 V |
| Voltage applied to a disabled 3-state output | 5.5 V |
| Operating free-air temperature range, T_A : SN54AS576 | –55°C to 125°C |
| SN74AS576 | 0°C to 70°C |
| Storage temperature range | –65°C to 150°C |

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

recommended operating conditions

| | | SN54AS576 | | | SN74AS576 | | | UNIT |
|----------------------|--------------------------------|-----------|-----|-----|-----------|-----|-----|------|
| | | MIN | NOM | MAX | MIN | NOM | MAX | |
| V _{CC} | Supply voltage | 4.5 | 5 | 5.5 | 4.5 | 5 | 5.5 | V |
| V _{IH} | High-level input voltage | 2 | | | 2 | | | V |
| V _{IL} | Low-level input voltage | | | 0.8 | | | 0.8 | V |
| I _{OH} | High-level output current | | | −12 | | | −15 | mA |
| I _{OL} | Low-level output current | | | 32 | | | 48 | mA |
| f _{clock} * | Clock frequency | 0 | | 100 | 0 | | 125 | MHz |
| t _w * | Pulse duration | CLK high | | | 4 | | | ns |
| | | CLK low | | | 2 | | | |
| t _{su} * | Setup time, data before CLK↑ | 3 | | | 2 | | | ns |
| t _h * | Hold time, data after CLK↑ | 3 | | | 2 | | | ns |
| T _A | Operating free-air temperature | −55 | | | 125 | | | °C |

* On products compliant to MIL-STD-883, Class B, this parameter is based on characterization data but is not production tested.



electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

| PARAMETER | | TEST CONDITIONS | | SN54AS576 | | SN74AS576 | | UNIT |
|------------------|------------|---|--------------------------|---------------------|------|---------------------|------|------|
| | | | | MIN | TYP† | MAX | MIN | |
| V _{IK} | | V _{CC} = 4.5 V, I _I = −18 mA | | −1.2 | | −1.2 | | V |
| V _{OH} | | V _{CC} = 4.5 V to 5.5 V, I _{OH} = −2 mA | | V _{CC} − 2 | | V _{CC} − 2 | | V |
| | | V _{CC} = 4.5 V | I _{OH} = −12 mA | 2.4 | 3.2 | | | |
| | | | I _{OH} = −15 mA | | | 2.4 | 3.3 | |
| V _{OL} | | V _{CC} = 4.5 V | I _{OL} = 32 mA | 0.29 | 0.5 | | | V |
| | | | I _{OL} = 48 mA | | | 0.33 | 0.5 | |
| I _{OZH} | | V _{CC} = 5.5 V, V _O = 2.7 V | | 50 | | 50 | | μA |
| I _{OZL} | | V _{CC} = 5.5 V, V _O = 0.4 V | | −50 | | −50 | | μA |
| I _I | | V _{CC} = 5.5 V, V _I = 7 V | | 0.1 | | 0.1 | | mA |
| I _{IH} | | V _{CC} = 5.5 V, V _I = 2.7 V | | 20 | | 20 | | μA |
| I _{IL} | D | V _{CC} = 5.5 V, V _I = 0.4 V | | −3 | | −2 | | mA |
| | All others | | | −0.5 | | −0.5 | | |
| I _O ‡ | | V _{CC} = 5.5 V, V _O = 2.25 V | | −30 | −112 | −30 | −112 | mA |
| I _{CC} | | V _{CC} = 5.5 V | Outputs high | 77 | 125 | 77 | 125 | mA |
| | | | Outputs low | 84 | 135 | 84 | 135 | |
| | | | Outputs disabled | 84 | 135 | 84 | 135 | |

† All typical values are at $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$.

‡ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS} .

switching characteristics (see Figure 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R ₁ = 500 Ω, R ₂ = 500 Ω, T _A = MIN to MAX§ | | | | UNIT |
|--------------------|-----------------|--------------------|--|-----|-----------|-----|------|
| | | | SN54AS576 | | SN74AS576 | | |
| | | | MIN | MAX | MIN | MAX | |
| f _{max} * | | | 100 | | 125 | | MHz |
| t _{PLH} | CLK | Any \overline{Q} | 3 | 11 | 3 | 8 | ns |
| t _{PHL} | | | 4 | 11 | 4 | 9 | |
| t _{PZH} | \overline{OE} | Any \overline{Q} | 2 | 7 | 2 | 6 | ns |
| t _{PZL} | | | 3 | 11 | 3 | 10 | |
| t _{PHZ} | \overline{OE} | Any \overline{Q} | 2 | 7 | 2 | 6 | ns |
| t _{PLZ} | | | 2 | 7 | 2 | 6 | |

* On products compliant to MIL-STD-883, Class B, this parameter is based on characterization data but is not production tested.

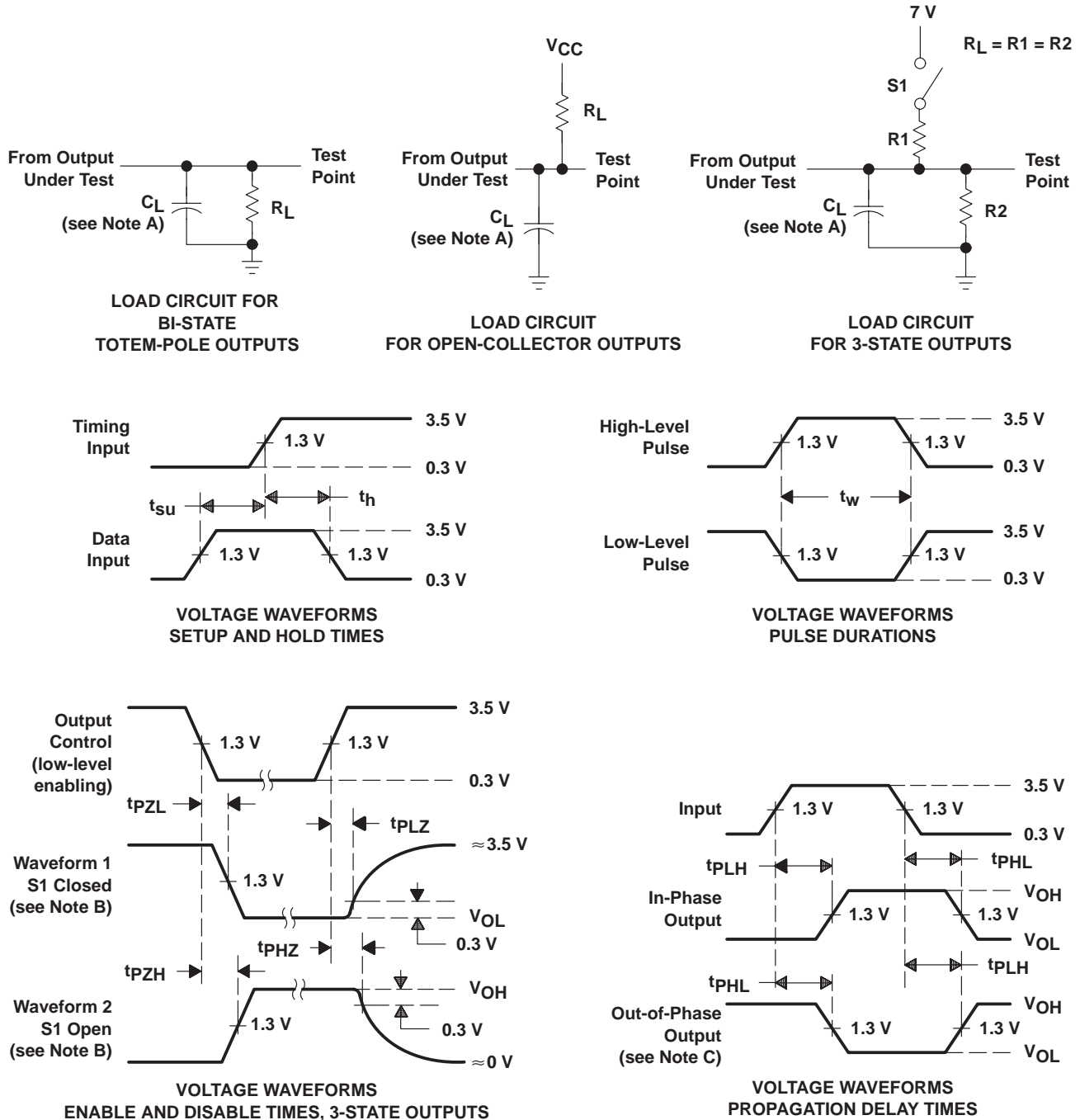
§ For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

SN54ALS576B, SN54AS576
SN74ALS576B, SN74ALS577A, SN74AS576

OCTAL D-TYPE EDGE-TRIGGERED FLIP-FLOPS WITH 3-STATE OUTPUTS

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PARAMETER MEASUREMENT INFORMATION SERIES 54ALS/74ALS AND 54AS/74AS DEVICES



- NOTES: A. C_L includes probe and jig capacitance.
 B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
 C. When measuring propagation delay items of 3-state outputs, switch S1 is open.
 D. All input pulses have the following characteristics: $PRR \leq 1$ MHz, $t_r = t_f = 2$ ns, duty cycle = 50%.
 E. The outputs are measured one at a time with one transition per measurement.

Figure 1. Load Circuits and Voltage Waveforms

PACKAGING INFORMATION

| Orderable Device | Status ⁽¹⁾ | Package Type | Package Drawing | Pins | Package Qty | Eco Plan ⁽²⁾ | Lead/Ball Finish | MSL Peak Temp ⁽³⁾ |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| 84001022A | ACTIVE | LCCC | FK | 20 | 1 | TBD | Call TI | Level-NC-NC-NC |
| 8400102RA | ACTIVE | CDIP | J | 20 | 1 | TBD | Call TI | Level-NC-NC-NC |
| 8400102SA | ACTIVE | CFP | W | 20 | 1 | TBD | Call TI | Level-NC-NC-NC |
| SN54ALS576BJ | ACTIVE | CDIP | J | 20 | 1 | TBD | Call TI | Level-NC-NC-NC |
| SN54AS576J | ACTIVE | CDIP | J | 20 | 1 | TBD | Call TI | Level-NC-NC-NC |
| SN74ALS576BDW | ACTIVE | SOIC | DW | 20 | 25 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN74ALS576BDWE4 | ACTIVE | SOIC | DW | 20 | 25 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN74ALS576BDWR | ACTIVE | SOIC | DW | 20 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN74ALS576BDWRE4 | ACTIVE | SOIC | DW | 20 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN74ALS576BN | ACTIVE | PDIP | N | 20 | 20 | Pb-Free (RoHS) | CU NIPDAU | Level-NC-NC-NC |
| SN74ALS576BN3 | OBSOLETE | PDIP | N | 20 | | TBD | Call TI | Call TI |
| SN74ALS576BNE4 | ACTIVE | PDIP | N | 20 | 20 | Pb-Free (RoHS) | CU NIPDAU | Level-NC-NC-NC |
| SN74ALS576BNSR | ACTIVE | SO | NS | 20 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN74ALS576BNSRE4 | ACTIVE | SO | NS | 20 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN74ALS577ADW | ACTIVE | SOIC | DW | 24 | 25 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN74ALS577ADWE4 | ACTIVE | SOIC | DW | 24 | 25 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN74ALS577ADWR | ACTIVE | SOIC | DW | 24 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN74ALS577ADWRE4 | ACTIVE | SOIC | DW | 24 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN74ALS577ANSR | ACTIVE | SO | NS | 24 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN74ALS577ANSRE4 | ACTIVE | SO | NS | 24 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN74ALS577ANT | ACTIVE | PDIP | NT | 24 | 15 | Pb-Free (RoHS) | CU NIPDAU | Level-NC-NC-NC |
| SN74ALS577ANT3 | OBSOLETE | PDIP | NT | 24 | | TBD | Call TI | Call TI |
| SN74ALS577ANTE4 | ACTIVE | PDIP | NT | 24 | 15 | Pb-Free (RoHS) | CU NIPDAU | Level-NC-NC-NC |
| SN74AS576DW | ACTIVE | SOIC | DW | 20 | 25 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN74AS576DWE4 | ACTIVE | SOIC | DW | 20 | 25 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN74AS576DWR | ACTIVE | SOIC | DW | 20 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN74AS576DWRE4 | ACTIVE | SOIC | DW | 20 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN74AS576N | ACTIVE | PDIP | N | 20 | 20 | Pb-Free | CU NIPDAU | Level-NC-NC-NC |

| Orderable Device | Status ⁽¹⁾ | Package Type | Package Drawing | Pins | Package Qty | Eco Plan ⁽²⁾ | Lead/Ball Finish | MSL Peak Temp ⁽³⁾ |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| (RoHS) | | | | | | | | |
| SN74AS576NE4 | ACTIVE | PDIP | N | 20 | 20 | Pb-Free (RoHS) | CU NIPDAU | Level-NC-NC-NC |
| SNJ54ALS576BFB | ACTIVE | LCCC | FK | 20 | 1 | TBD | Call TI | Level-NC-NC-NC |
| SNJ54ALS576BJ | ACTIVE | CDIP | J | 20 | 1 | TBD | Call TI | Level-NC-NC-NC |
| SNJ54ALS576BW | ACTIVE | CFP | W | 20 | 1 | TBD | Call TI | Level-NC-NC-NC |
| SNJ54AS576FK | ACTIVE | LCCC | FK | 20 | 1 | TBD | Call TI | Level-NC-NC-NC |
| SNJ54AS576J | ACTIVE | CDIP | J | 20 | 1 | TBD | Call TI | Level-NC-NC-NC |

⁽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.

OBSELETE: TI has discontinued the production of the device.

⁽²⁾ Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS) 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.

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.

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J (R-GDIP-T**)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



| PINS ** DIM | 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) |

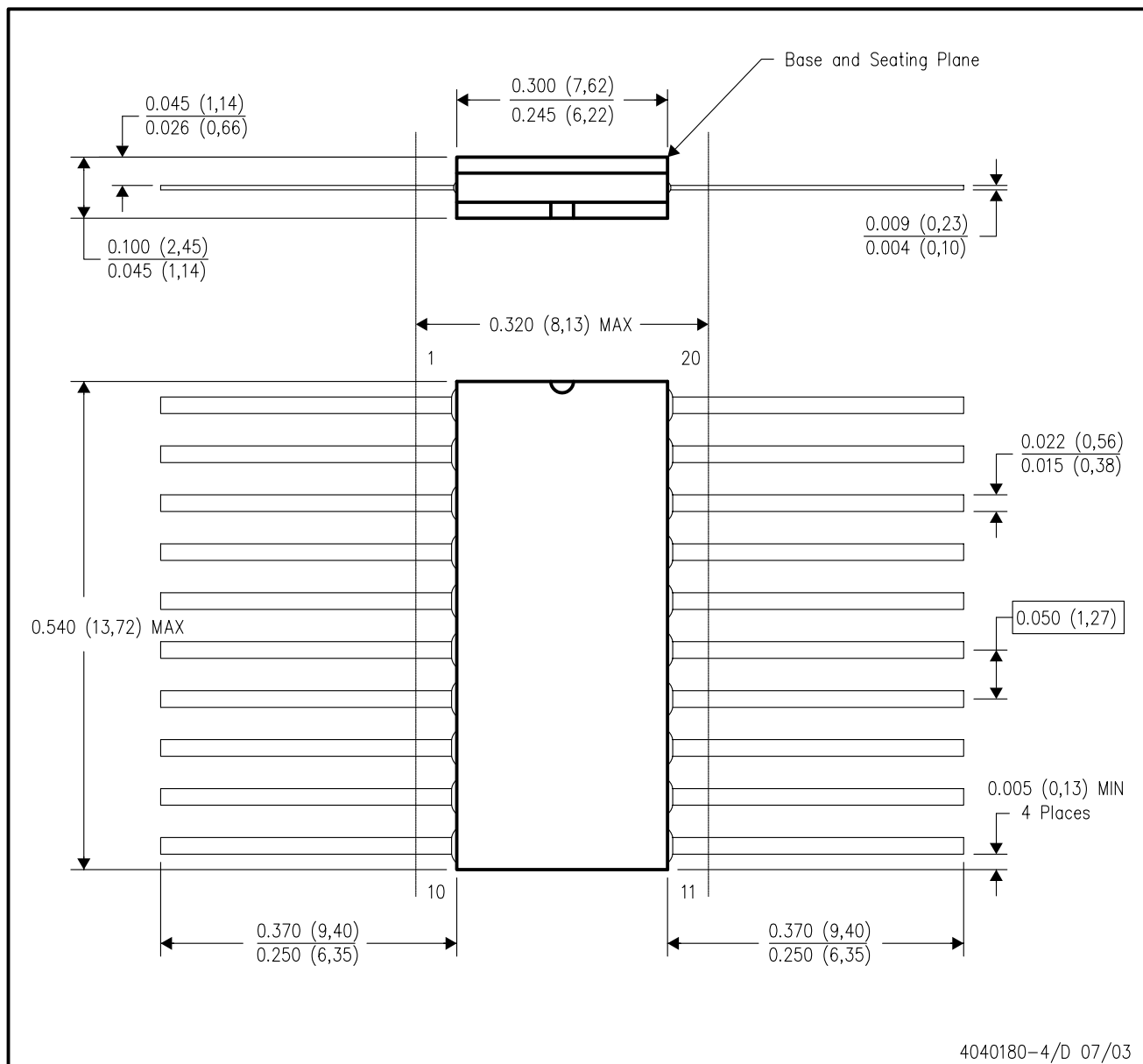


4040083/F 03/03

- 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.

W (R-GDFP-F20)

CERAMIC DUAL FLATPACK

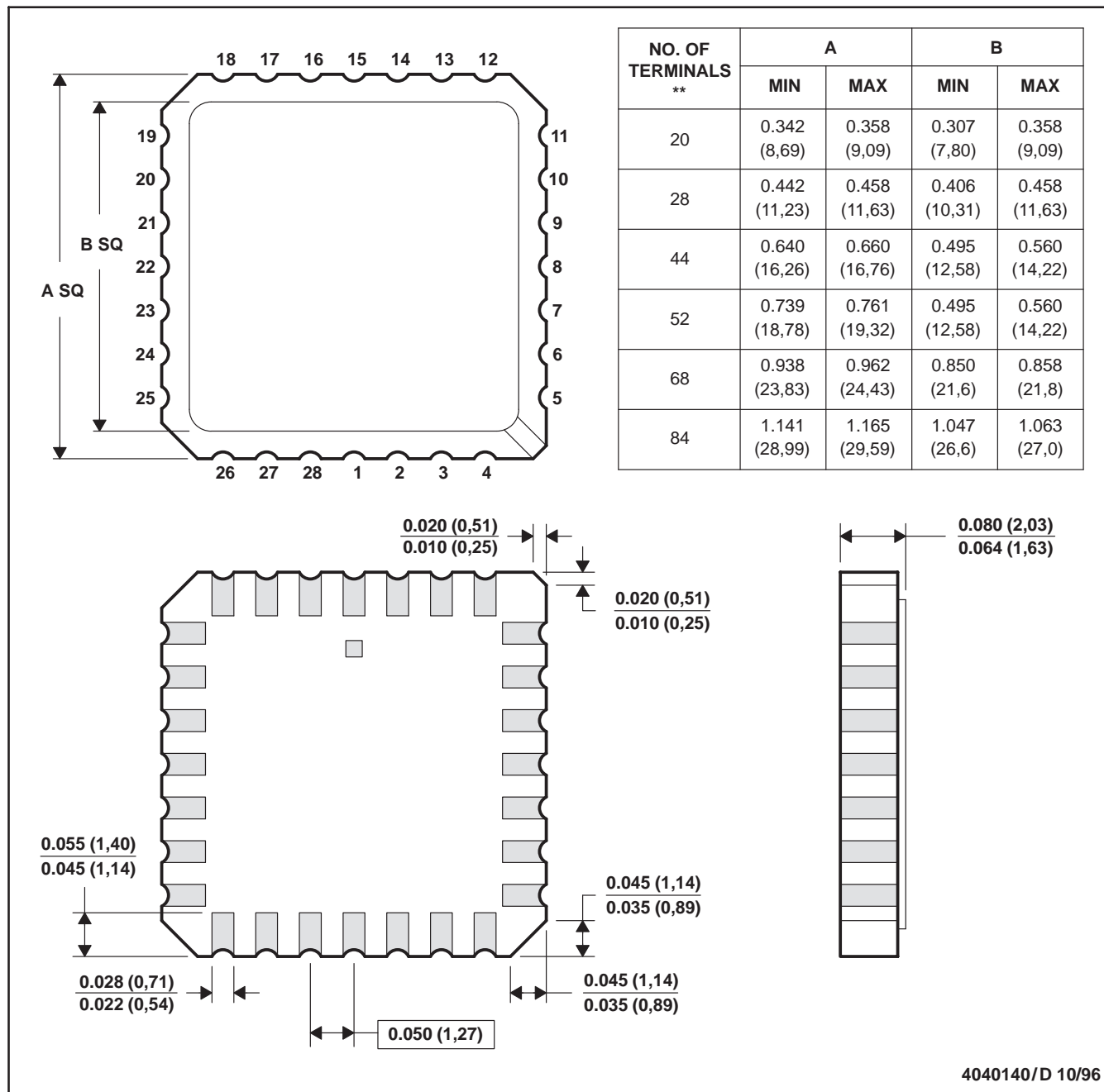


- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - This package can be hermetically sealed with a ceramic lid using glass frit.
 - Index point is provided on cap for terminal identification only.
 - Falls within Mil-Std 1835 GDFP2-F20

FK (S-CQCC-N**)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package can be hermetically sealed with a metal lid.
 - D. The terminals are gold plated.
 - E. Falls within JEDEC MS-004

N (R-PDIP-T**)

16 PINS SHOWN

PLASTIC DUAL-IN-LINE PACKAGE



| PINS ** | 14 | 16 | 18 | 20 |
|---------------------|------------------|------------------|------------------|------------------|
| DIM | | | | |
| 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 | AA | BB | AC | AD |



14/18 Pin Only
20 Pin vendor option

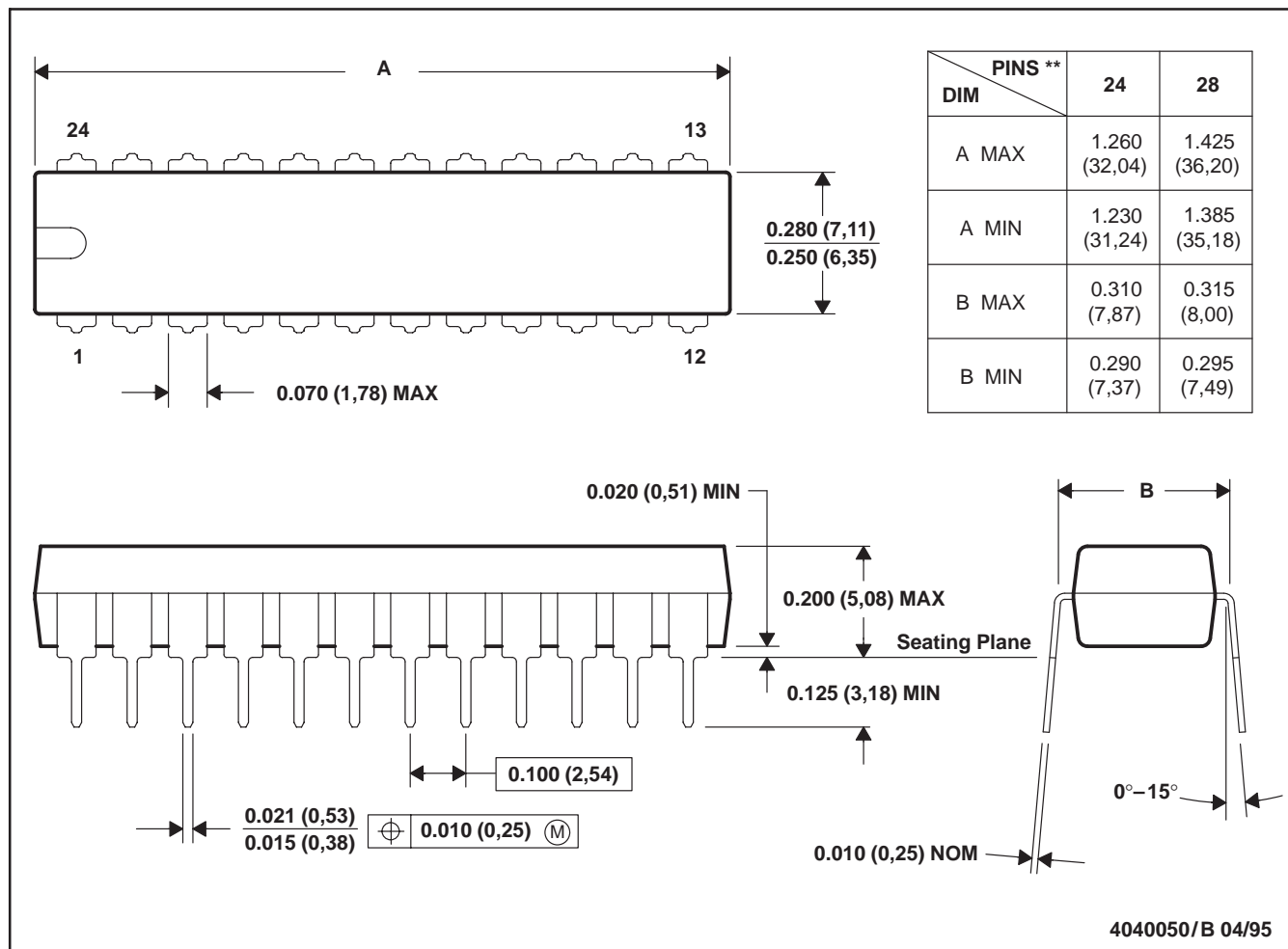
4040049/E 12/2002

- 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.

NT (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

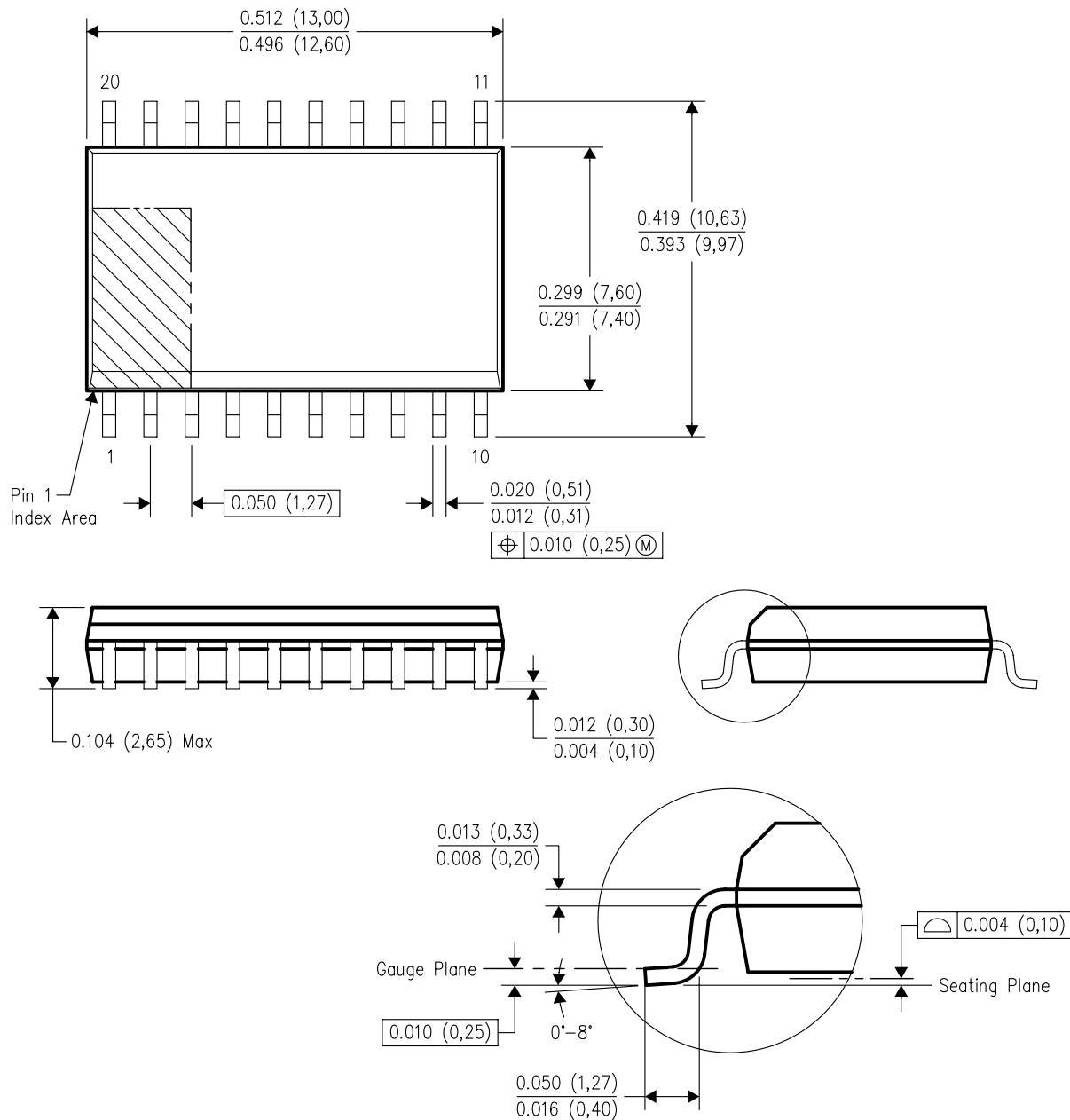
24 PINS SHOWN



- NOTES: A. All linear dimensions are in inches (millimeters).
 B. This drawing is subject to change without notice.

DW (R-PDSO-G20)

PLASTIC SMALL-OUTLINE PACKAGE

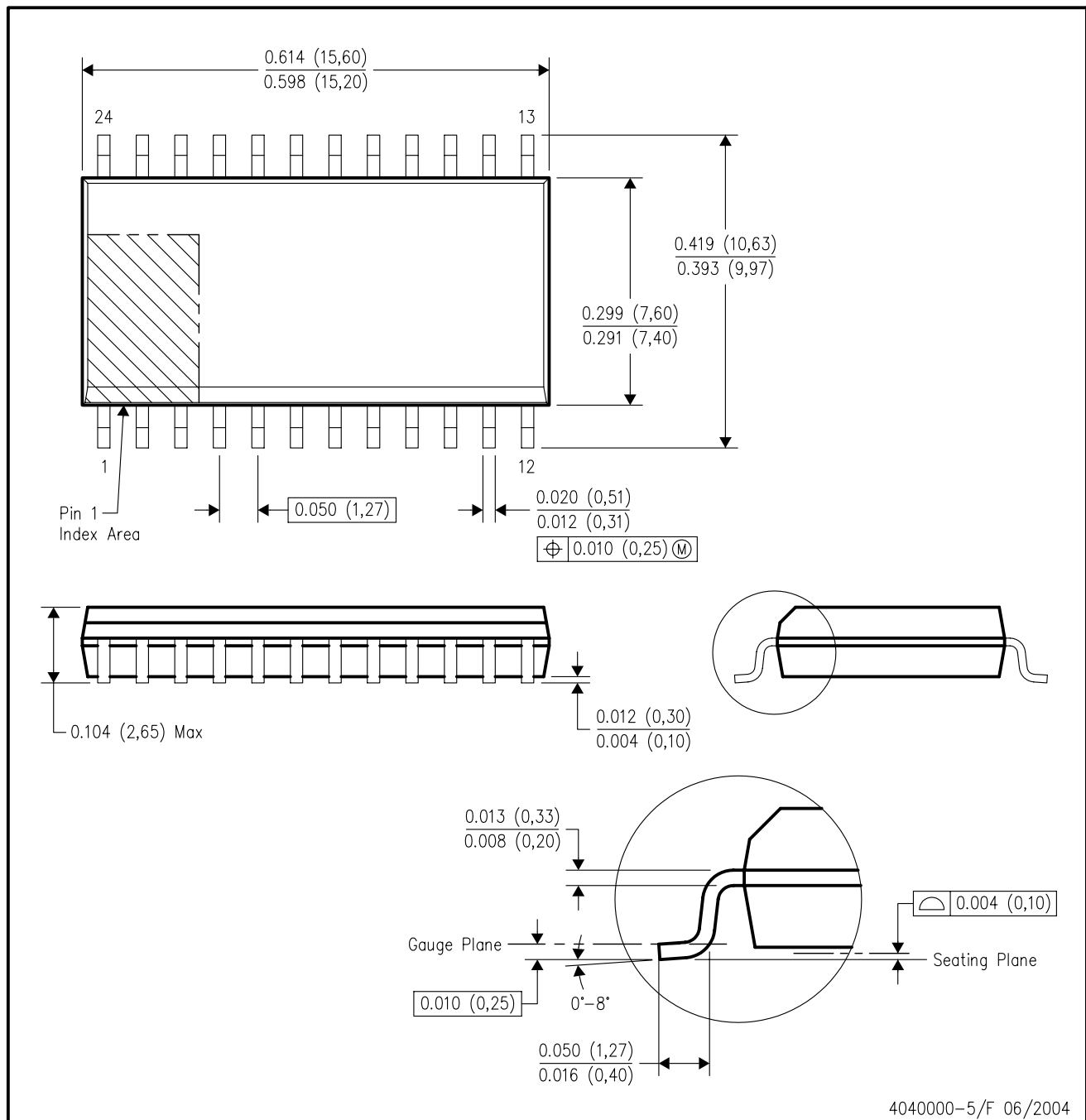


4040000-4/F 06/2004

- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
 - Falls within JEDEC MS-013 variation AC.

DW (R-PDSO-G24)

PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
 - Falls within JEDEC MS-013 variation AD.

MECHANICAL DATA

NS (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



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

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Mailing Address: Texas Instruments
Post Office Box 655303 Dallas, Texas 75265

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