

54ABT377

Octal D-Type Flip-Flop with Clock Enable

General Description

The 'ABT377 has eight edge-triggered, D-type flip-flops with individual D inputs and Q outputs. The common buffered Clock (CP) input loads all flip-flops simultaneously, when the Clock Enable (\overline{CE}) is LOW.

The register is fully edge-triggered. The state of each D input, one setup time before the LOW-to-HIGH clock transition, is transferred to the corresponding flip-flop's Q output. The \overline{CE} input must be stable only one setup time prior to the LOW-to-HIGH clock transition for predictable operation.

Features

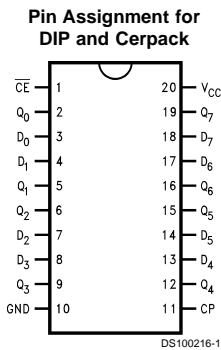
- Clock enable for address and data synchronization applications

- Eight edge-triggered D flip-flops
- Buffered common clock
- See 'ABT273 for master reset version
- See 'ABT373 for transparent latch version
- See 'ABT374 for TRI-STATE® version
- Output sink capability of 48 mA, source capability of 24 mA
- Guaranteed latchup protection
- High impedance glitch free bus loading during entire power up and power down cycle
- Non-destructive hot insertion capability
- Disable time less than enable time to avoid bus contention
- Standard Microcircuit Drawing (SMD) 5962-9314801

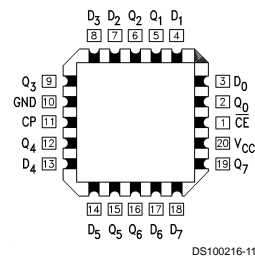
Ordering Code:

| Military | Package Number | Package Description |
|---------------|----------------|---|
| 54ABT377J-QML | J20A | 20-Lead Ceramic Dual-In-Line |
| 54ABT377W-QML | W20A | 20-Lead Cerpac |
| 54ABT377E-QML | E20A | 20-Lead Ceramic Leadless Chip Carrier, Type C |

Connection Diagram



Pin Assignment for LCC



| Pin Names | Description |
|--------------------------------|---------------------------|
| D ₀ -D ₇ | Data Inputs |
| \overline{CE} | Clock Enable (Active LOW) |
| CP | Clock Pulse Input |
| Q ₀ -Q ₇ | Data Outputs |

Absolute Maximum Ratings (Note 1)

| | |
|--|--------------------------------------|
| Storage Temperature | -65°C to +150°C |
| Ambient Temperature under Bias | -55°C to +125°C |
| Junction Temperature under Bias | |
| Ceramic | -55°C to +175°C |
| V _{CC} Pin Potential to Ground Pin | -0.5V to +7.0V |
| Input Voltage (Note 2) | -0.5V to +7.0V |
| Input Current (Note 2) | -30 mA to +5.0 mA |
| Voltage Applied to Any Output in the Disabled or Power-Off State | -0.5V to +4.75V |
| in the HIGH State | -0.5V to V _{CC} |
| Current Applied to Output in LOW State (Max) | Twice the rated I _{OL} (mA) |

| | |
|---|------------------------|
| DC Latchup Source Current (Across Comm Operating Range) | -500 mA |
| Over Voltage Latchup | V _{CC} + 4.5V |

Recommended Operating Conditions

| | |
|------------------------------|-----------------|
| Free Air Ambient Temperature | |
| Military | -55°C to +125°C |
| Supply Voltage | |
| Military | +4.5V to +5.5V |
| Minimum Input Edge Rate | (ΔV/Δt) |
| Data Input | 50 mV/ns |
| Enable Input | 20 mV/ns |

DC Electrical Characteristics

| Symbol | Parameter | ABT377 | | | Units | V _{CC} | Conditions | |
|------------------|-----------------------------------|-----------------|------|------|------------|-----------------|---|--|
| | | Min | Typ | Max | | | | |
| V _{IH} | Input HIGH Voltage | 2.0 | | | V | | Recognized HIGH Signal | |
| V _{IL} | Input LOW Voltage | | | 0.8 | V | | Recognized LOW Signal | |
| V _{CD} | Input Clamp Diode Voltage | | | -1.2 | V | Min | I _{IN} = -18 mA | |
| V _{OH} | Output HIGH Voltage | 54ABT | 2.5 | | V | Min | I _{OH} = -3 mA | |
| | | 54ABT | 2.0 | | | | I _{OH} = -24 mA | |
| V _{OL} | Output LOW Voltage | 54ABT | | 0.55 | V | Min | I _{OL} = 48 mA | |
| I _{IH} | Input HIGH Current | | 5 | | μA | Max | V _{IN} = 2.7V (Note 4) | |
| | | | 5 | | | | V _{IN} = V _{CC} | |
| I _{BVI} | Input HIGH Current Breakdown Test | | 7 | | μA | Max | V _{IN} = 7.0V | |
| I _{IL} | Input LOW Current | | -5 | | μA | Max | V _{IN} = 0.5V (Note 4) | |
| | | | -5 | | | | V _{IN} = 0.0V | |
| V _{ID} | Input Leakage Test | 4.75 | | | V | 0.0 | I _{ID} = 1.9 μA All Other Pins Grounded | |
| I _{OS} | Output Short-Circuit Current | -100 | -275 | | mA | Max | V _{OUT} = 0.0V | |
| I _{CEX} | Output High Leakage Current | | 50 | | μA | Max | V _{OUT} = V _{CC} | |
| I _{CCH} | Power Supply Current | | 50 | | μA | Max | All Outputs HIGH | |
| I _{CCL} | Power Supply Current | | 30 | | mA | Max | All Outputs LOW | |
| I _{CCT} | Maximum I _{CC} /Input | Outputs Enabled | | 1.5 | | mA | Max | V _I = V _{CC} - 2.1V |
| | | | | | | | | Data Input V _I = V _{CC} - 2.1V All Others at V _{CC} or GND |
| I _{CCD} | Dynamic I _{CC} | No Load | | 0.3 | mA/ MHz | Max | Outputs Open (Note 3) One bit Toggling, 50% Duty Cycle | |

Note 1: Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

Note 2: Either voltage limit or current limit is sufficient to protect inputs.

Note 3: For 8 bits toggling, I_{CCD} < 0.5 mA/MHz.

Note 4: Guaranteed but not tested.

AC Electrical Characteristics

| Symbol | Parameter | 54ABT | | Units |
|------------------|---------------------|--|-----|-------|
| | | $T_A = -55^\circ\text{C to }+125^\circ\text{C}$ $V_{CC} = 4.5\text{V to }5.5\text{V}$ $C_L = 50\text{ pF}$ | | |
| | | Min | Max | |
| f_{max} | Max Clock Frequency | 150 | | MHz |
| t_{PLH} | Propagation Delay | 2.2 | 6.0 | ns |
| t_{PHL} | CP to O_n | 2.8 | 6.8 | |

AC Operating Requirements

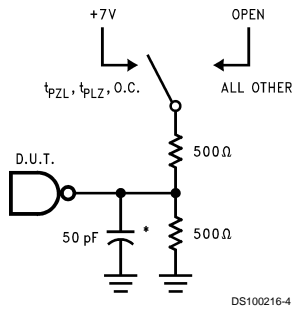
| Symbol | Parameter | 54ABT | | Units |
|-----------------|-------------------------------------|--|-----|-------|
| | | $T_A = -55^\circ\text{C to }+125^\circ\text{C}$ $V_{CC} = 4.5\text{V to }5.5\text{V}$ $C_L = 50\text{ pF}$ | | |
| | | Min | Max | |
| $t_s(\text{H})$ | Setup Time, HIGH | 2.0 | | ns |
| $t_s(\text{L})$ | or LOW D_n to CP | 2.0 | | |
| $t_h(\text{H})$ | Hold Time, HIGH | 1.8 | | ns |
| $t_h(\text{L})$ | or LOW D_n to CP | 1.8 | | |
| $t_s(\text{H})$ | Setup Time, HIGH | 3.0 | | ns |
| $t_s(\text{L})$ | or LOW $\overline{\text{CE}}$ to CP | 3.0 | | |
| $t_h(\text{H})$ | Hold Time, HIGH | 1.0 | | ns |
| $t_h(\text{L})$ | or LOW $\overline{\text{CE}}$ to CP | 1.0 | | |
| $t_w(\text{H})$ | Pulse Width, CP, | 3.3 | | ns |
| $t_w(\text{L})$ | HIGH or LOW | 3.3 | | |

Capacitance

| Symbol | Parameter | Typ | Units | Conditions |
|---------------------------|--------------------|-----|-------|--|
| C_{IN} | Input Capacitance | 5 | pF | $V_{CC} = 0\text{V}, T_A = 25^\circ\text{C}$ |
| C_{OUT} (Note 5) | Output Capacitance | 9 | pF | $V_{CC} = 5.0\text{V}$ |

Note 5: C_{OUT} is measured at frequency $f = 1\text{ MHz}$, per MIL-STD-883B, Method 3012.

AC Loading



*Includes jig and probe capacitance

FIGURE 1. Standard AC Test Load

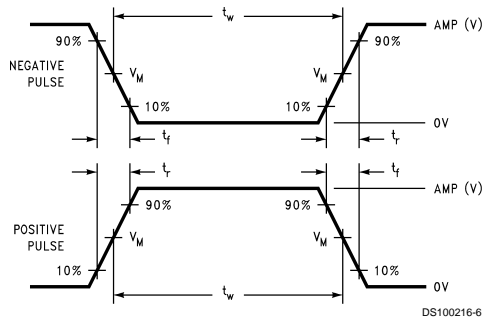


FIGURE 2. $V_M = 1.5V$

Input Pulse Requirements

| Amplitude | Rep. Rate | t_w | t_r | t_f |
|-----------|-----------|--------|--------|--------|
| 3.0V | 1 MHz | 500 ns | 2.5 ns | 2.5 ns |

FIGURE 3. Test Input Signal Requirements

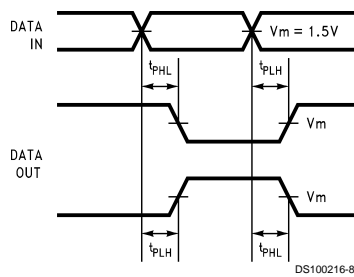


FIGURE 4. Propagation Delay Waveforms for Inverting and Non-Inverting Functions

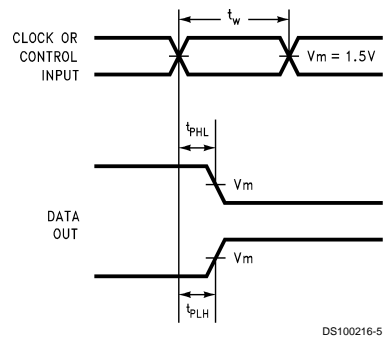


FIGURE 5. Propagation Delay, Pulse Width Waveforms

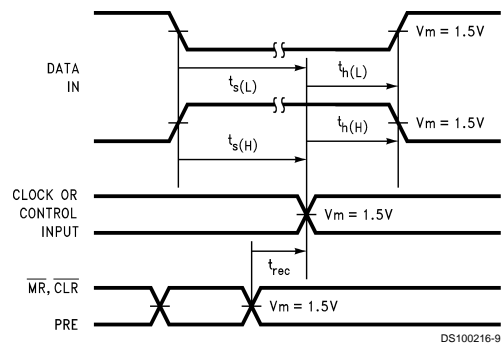
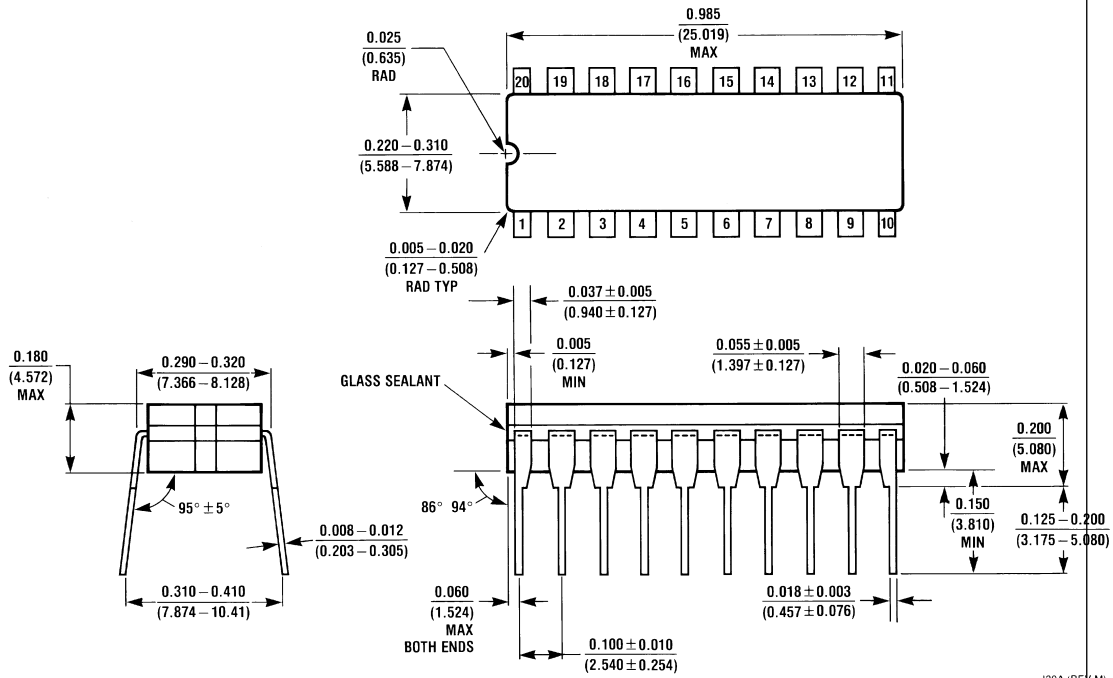
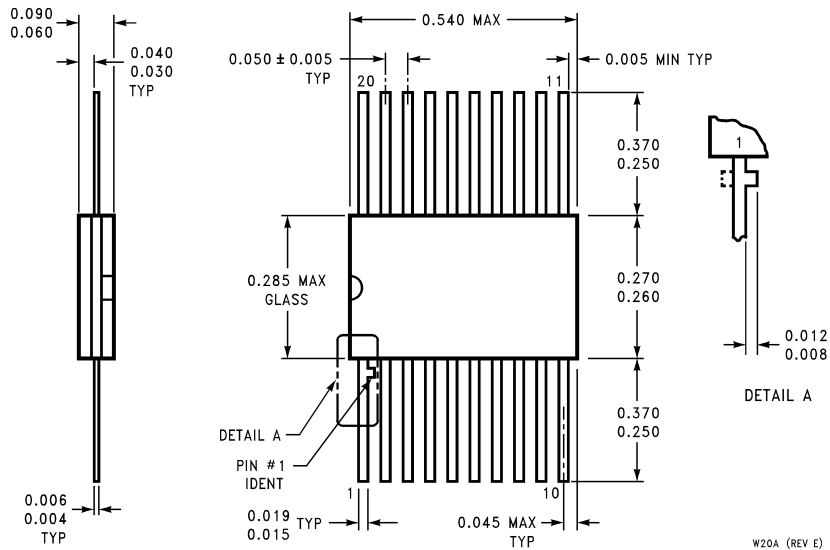


FIGURE 6. Setup Time, Hold Time and Recovery Time Waveforms

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



20-Lead Ceramic Dual-In-Line Package
NS Package Number J20A



20-Lead Ceramic Flatpack
NS Package Number W20A

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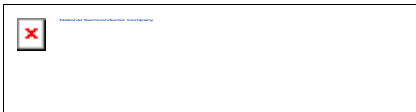
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54ABT377 Octal D-Type Flip-Flop with Clock Enable

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Datasheet

| Title | Size (in Kbytes) | Date |  View Online |  Download |  Receive via Email |
|---|---------------------|----------|---|--|---|
| 54ABT377 Octal D-Type Flip-Flop with Clock Enable | 151 Kbytes | 6-Aug-98 | View Online | Download | Receive via Email |
| 54ABT377 Mil-Aero Datasheet MN54ABT377-X | 167 Kbytes | | View Online | Download | Receive via Email |

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Package Availability, Models, Samples & Pricing

| Part Number | Package | | Status | Models | | Samples & Electronic Orders | Budgetary Pricing | | Std Pack Size | Package Marking |
|-----------------|---------|--------|-----------------|--------|------|-----------------------------|-------------------|-----------|---------------|--|
| | Type | # pins | | SPICE | IBIS | | Quantity | \$US each | | |
| 5962-9314801Q2A | LCC | 20 | Full production | N/A | N/A | . | 50+ | \$8.5000 | tube of 50 | [logo]çZçSç4çA 54ABT377E -QML \$E 5962- 9314801Q2A |

| | | | | | | | | | | |
|-----------------|---------|----|-----------------|-----|-----|---|-----|----------|------------------|--|
| 5962-9314801QRA | Cerdip | 20 | Full production | N/A | N/A |  | 50+ | \$6.0000 | tube of 20 | [logo]çZçSç4çA\$E 54ABT377J-QML 5962-9314801QRA |
| 5962-9314801QSA | Cerpack | 20 | Full production | N/A | N/A | . | 50+ | \$7.0000 | tube of 19 | [logo]çZçSç4çA\$E 54ABT377W- QML 5962- 9314801QSA |

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