

Am25S18

Quad D Register with Standard and Three-State Outputs

DISTINCTIVE CHARACTERISTICS

- Advanced Schottky technology
- Four D-type flip-flops
- Four standard totem-pole outputs
- Four three-state outputs
- 75MHz clock frequency

GENERAL DESCRIPTION

The Am25S18 consists of four D-type flip-flops with a buffered common clock. Information meeting the set-up and hold requirements on the D inputs is transferred to the Q outputs on the LOW-to-HIGH transition of the clock.

The same data as on the Q outputs is enabled at the three-state Y outputs when the "output control" (\overline{OE}) input is LOW. When the \overline{OE} input is HIGH, the Y outputs are in the high-impedance state.

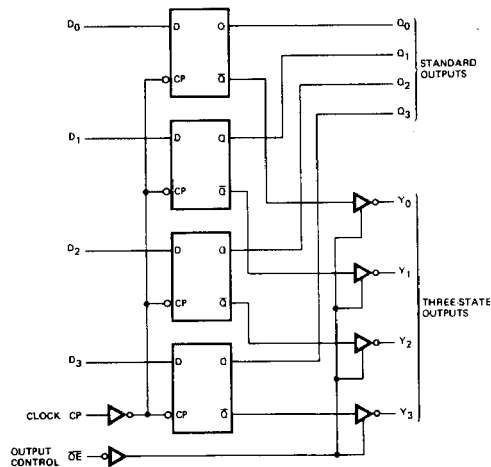
The Am25S18 is a 4-bit, high speed Schottky register intended for use in real-time signal processing systems

where the standard outputs are used in a recursive algorithm and the three state outputs provide access to a data bus to dump the results after a number of iterations.

The device can also be used as an address register or status register in computers or computer peripherals.

Likewise, the Am25S18 is also useful in certain display applications where the standard outputs can be decoded to drive LED's (or equivalent) and the three-state outputs are bus organized for occasional interrogation of the data as displayed.

BLOCK DIAGRAM

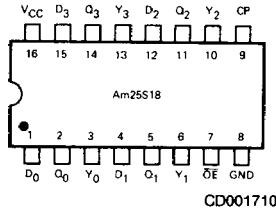


BD001510

RELATED PRODUCTS

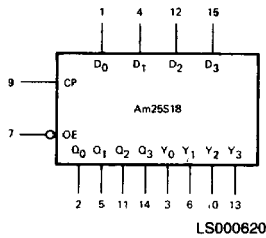
| Part No. | Description |
|------------|-------------|
| Am25S07 | Register |
| Am25S08 | Register |
| Am25S09 | Register |
| Am25S374 | Register |
| Am29821-26 | Register |

CONNECTION DIAGRAM Top View

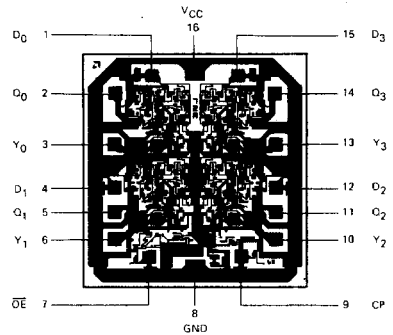


Note: Pin 1 is marked for orientation

LOGIC SYMBOL



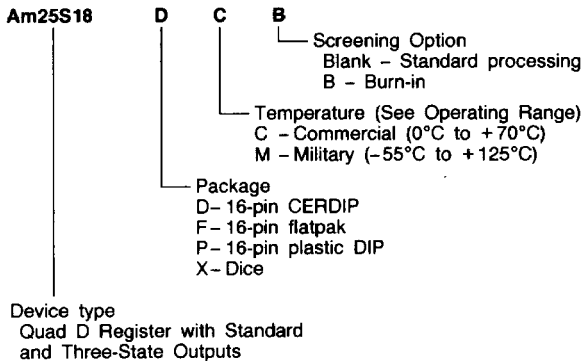
METALLIZATION AND PAD LAYOUT



DIE SIZE 0.077" x 0.079"

ORDERING INFORMATION

AMD products are available in several packages and operating ranges. The order number is formed by a combination of the following: Device number, speed option (if applicable), package type, operating range and screening option (if desired).



| Valid Combinations | |
|--------------------|------------------------------|
| Am25S18 | PC DC, DM FM XC, XM |

Valid Combinations
Consult the AMD sales office in your area to determine if a device is currently available in the combination you wish.

04650

| Pin No. | Name | I/O | Description |
|---------|-----------------|-----|--|
| | D_i | I | The four data inputs to the register. |
| | Q_i | O | The four data outputs of the register with standard totem-pole active pull-up outputs. Data is passed non-inverted. |
| | Y_i | O | The four three-state data outputs of the register. When the three-state outputs are enabled, data is passed non-inverted. A HIGH on the "output control" input forces the Y_i outputs to the high-impedance state. |
| 9 | CP | I | Clock. The buffered common clock for the register. Enters data on the LOW-to-HIGH transition. |
| 7 | \overline{OE} | O | Output Control. When the \overline{OE} input is HIGH, the Y_i outputs are in the high-impedance state. When the \overline{OE} input is LOW, the TRUE register data is present at the Y_i outputs. |

TRUTH TABLE

| INPUTS | | | OUTPUTS | | | NOTES |
|-----------------|----------|---|---------|---|---|-------|
| \overline{OE} | CLOCK CP | D | Q | Y | | |
| H | L | X | NC | Z | - | |
| H | H | X | NC | Z | - | |
| H | ↑ | L | L | Z | - | |
| H | ↑ | H | H | Z | - | |
| L | ↑ | L | L | L | - | |
| L | ↑ | H | H | H | - | |
| L | - | - | L | L | 1 | |
| L | - | - | H | H | 1 | |

L = LOW NC = No change
H = HIGH ↑ = LOW to HIGH transition
X = Don't care Z = High impedance
Note: 1. When \overline{OE} is LOW, the Y output will be in the same logic state as the Q output.

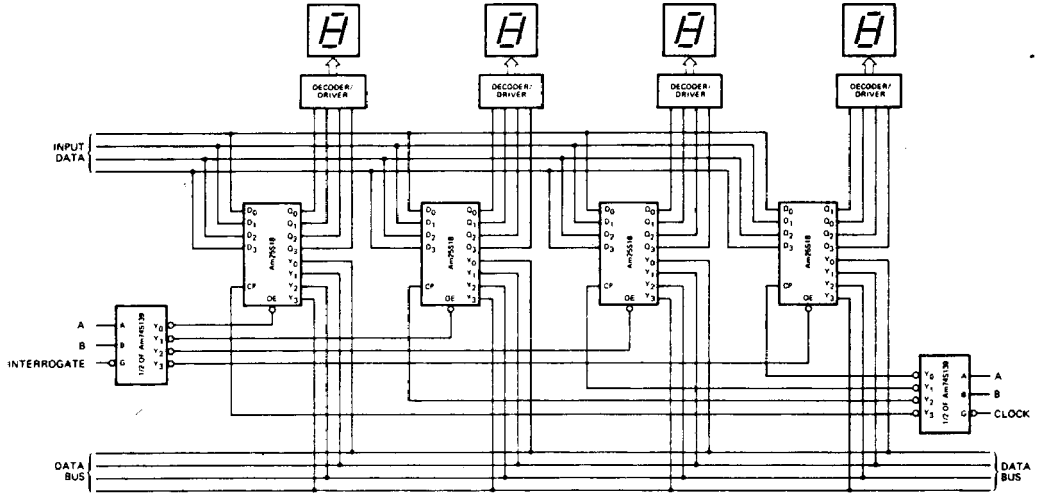
LOADING RULES (In Unit Loads)

| Input/Output | Pin Nos. | Input Unit Load | Fan-out | |
|-----------------|----------|-----------------|-------------|------------|
| | | | Output HIGH | Output LOW |
| D_0 | 1 | 1 | - | - |
| Q_0 | 2 | - | 20 | 10* |
| Y_0 | 3 | - | 40/130 | 10* |
| D_1 | 4 | 1 | - | - |
| Q_1 | 5 | - | 20 | 10* |
| Y_1 | 6 | - | 40/130 | 10* |
| \overline{OE} | 7 | 1 | - | - |
| GND | 8 | - | - | - |
| CP | 9 | 1 | - | - |
| Y_2 | 10 | - | 40/130 | 10* |
| Q_2 | 11 | - | 20 | 10* |
| D_2 | 12 | 1 | - | - |
| Y_3 | 13 | - | 40/130 | 10* |
| Q_3 | 14 | - | 20 | 10* |
| D_3 | 15 | 1 | - | - |
| VCC | 16 | - | - | - |

A Schottky TTL Unit Load is defined as 50 μ A measured at 2.7V HIGH and -2.0mA measured at 0.5V LOW.

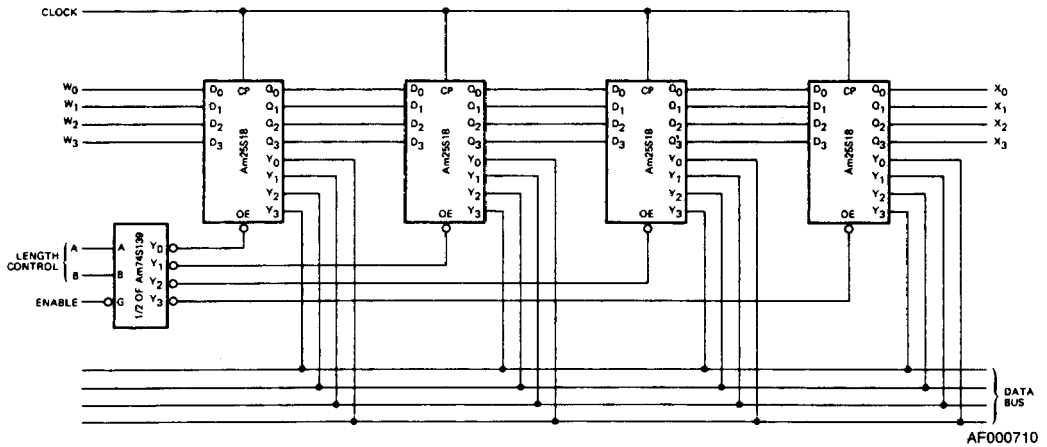
*Fan-out on each Q_i and Y_i output pair should not exceed 15 unit loads (30mA) for $i = 0, 1, 2, 3$.

APPLICATIONS



AF000720

The Am25S18 Used As Display Register With Bus Interrogate Capability.



AF000710

The Am25S18 As A Variable Length (1, 2, 3 or 4 Word) Shift Register.

ABSOLUTE MAXIMUM RATINGS

| | |
|---|-------------------------------|
| Storage Temperature | -65°C to +150°C |
| (Ambient) Temperature Under Bias | -55°C to +125°C |
| Supply Voltage to Ground Potential (Pin 16 to Pin 18) Continuous | -0.5V to +7.0V |
| DC Voltage Applied to Outputs For HIGH Output State | -0.5V to +V _{CC} max |
| DC Input Voltage | -0.5V to +5.5V |
| DC Output Current, Into Outputs | 30mA |
| DC Input Current | -30mA to +5.0mA |

Stresses above those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent device failure. Functionality at or above these limits is not implied. Exposure to absolute maximum ratings for extended periods may affect device reliability.

OPERATING RANGES**Commercial (C) Devices**

| | |
|----------------------|------------------|
| Temperature | 0°C to +70°C |
| Supply Voltage | +4.75V to +5.25V |

Military (M) Devices

| | |
|----------------------|-----------------|
| Temperature | -55°C to +125°C |
| Supply Voltage | +4.5V to +5.5V |

Operating ranges define those limits over which the functionality of the device is guaranteed.

DC CHARACTERISTICS over operating range unless otherwise specified

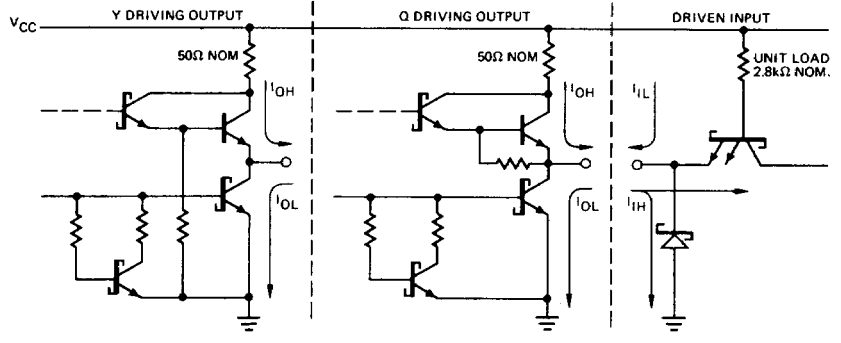
| Parameters | Description | Test Conditions (Note 2) | Min | Typ (Note 1) | Max | Units | |
|-----------------------------|---------------------------------------|--|--------------------------|------------------------------|------|-------|-------|
| V _{OH} | Output HIGH Voltage | V _{CC} = MIN. V _{IN} = V _{IH} or V _{IL} | Q I _{OH} = -1mA | MIL | 2.5 | 3.4 | Volts |
| | | | | COM'L | 2.7 | 3.4 | |
| | | | Y | XM, I _{OH} = -2mA | 2.4 | 3.4 | |
| | | | | XC, I _{OH} = -6.5mA | 2.4 | 3.2 | |
| V _{OL} | Output LOW Voltage (Note 6) | V _{CC} = MIN., I _{OL} = 20mA V _{IN} = V _{IH} or V _{IL} | | | 0.5 | Volts | |
| V _{IH} | Input HIGH Level | Guaranteed input logical HIGH voltage for all inputs | 2.0 | | | Volts | |
| V _{IL} | Input LOW Level | Guaranteed input logical LOW voltage for all inputs | | | 0.8 | Volts | |
| V _I | Input Clamp Voltage | V _{CC} = MIN., I _{IN} = -18mA | | | -1.2 | Volts | |
| I _{IL} (Note 3) | Input LOW Current | V _{CC} = MAX., V _{IN} = 0.5V | | | -2.0 | mA | |
| I _{IH} (Note 3) | Input HIGH Current | V _{CC} = MAX., V _{IN} = 2.7V | | | 50 | μA | |
| I _I | Input HIGH Current | V _{CC} = MAX., V _{IN} = 5.5V | | | 1.0 | mA | |
| I _O | Y Output Off-State Leakage Current | V _{CC} = MAX. | | | 50 | μA | |
| | | | | | -50 | | |
| I _{SC} | Output Short Circuit Current (Note 4) | V _{CC} = MAX. | -40 | | -100 | mA | |
| I _{CC} | Power Supply Current | V _{CC} = MAX. (Note 5) | | 80 | 130 | mA | |

- Notes: 1. Typical limits are at V_{CC} = 5.0V, T_A = 25°C ambient and maximum loading.
 2. For conditions shown as MIN. or MAX., use the appropriate value specified under Operating Ranges for the applicable device type.
 3. Actual input currents = Unit Load Current x Input Load Factor (See Loading Rules).
 4. Not more than one output should be shorted at a time. Duration of the short circuit test should not exceed one second.
 5. I_{CC} is measured with all inputs at 4.5V and all outputs open.
 6. Measured on Q outputs with Y outputs open. Measured on Y outputs with Q outputs open.

SWITCHING CHARACTERISTICS ($T_A = +25^\circ\text{C}$, $V_{CC} = 5.0\text{V}$, $R_L = 280\Omega$)

| Parameters | Description | Test Conditions | Min | Typ | Max | Units | |
|------------|---|----------------------|---------------------|-----|------|-------|----|
| t_{PLH} | Clock to Q Output | $C_L = 15\text{pF}$ | | 6.0 | 9.0 | ns | |
| t_{PHL} | | | | 8.5 | 13 | | |
| t_{pw} | Clock Pulse Width | | HIGH | 7.0 | | ns | |
| | | | LOW | 9.0 | | | |
| t_s | Data | | | 5.0 | | ns | |
| t_h | Data | | | 3.0 | | ns | |
| t_{PLH} | Clock to Y Output (\overline{OE} LOW) | | | | 6.0 | 9.0 | ns |
| t_{PHL} | | | | | 8.5 | 13 | |
| t_{ZH} | Output Control to Output | | $C_L = 15\text{pF}$ | | 12.5 | 19 | ns |
| t_{ZL} | | | | | 12 | 18 | |
| t_{HZ} | | $C_L = 5.0\text{pF}$ | | 4.0 | 6.0 | | |
| t_{LZ} | | | | 7.0 | 10.5 | | |
| f_{max} | Maximum Clock Frequency | $C_L = 15\text{pF}$ | 75 | 100 | | MHz | |

SCHOTTKY INPUT/OUTPUT CURRENT INTERFACE CONDITIONS



IC000170

Note: Actual current flow direction shown.