

74F552

Octal Registered Transceiver with Parity and Flags

General Description

The 74F552 octal transceiver contains two 8-bit registers for temporary storage of data flowing in either direction. Each register has its own clock pulse and clock enable input as well as a flag flip-flop that is set automatically as the register is loaded. The flag output will be reset when the output enable returns to HIGH after reading the output port. Each register has a separate output enable control for its 3-STATE buffer. The separate Clocks, Flags, and Enables provide considerable flexibility as I/O ports for demand-response data transfer. When data is transferred from the A Port to the B Port, a parity bit is generated. On the other hand, when data is transferred from the B Port to the A Port, the parity of input data on B₀–B₇ is checked.

Features

- 8-Bit bidirectional I/O Port with handshake
- Register status flag flip-flops
- Separate clock enable and output enable
- Parity generation and parity check
- B-outputs sink 64 mA
- 3-STATE outputs

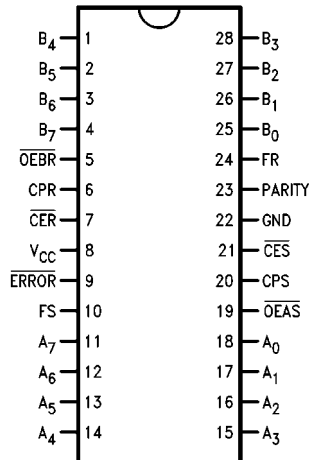
Ordering Code:

| Order Number | Package Number | Package Description |
|--------------|----------------|---|
| 74F552SC | M28B | 28-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide |
| 74F552QC | V28A | 28-Lead Plastic Lead Chip Carrier (PLCC), JEDEC MO-047, 0.450 Square |

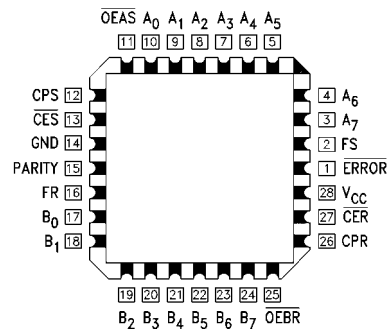
Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

Connection Diagrams

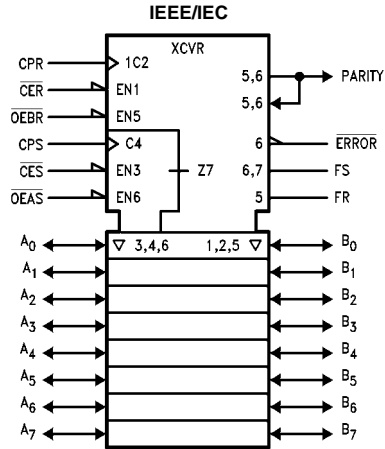
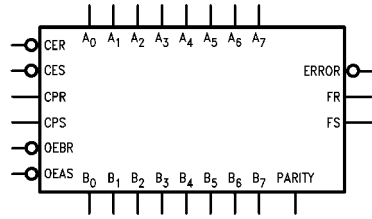
Pin Assignments for SOIC



Pin Assignments for PLCC



Logic Symbols



Unit Loading/Fan Out

| Pin Names | Description | U.L. | |
|--------------------------------|---|-----------------------------|---|
| | | HIGH/LOW | Input I _{IH} /I _{IL} Output I _{OH} /I _{OL} |
| A ₀ -A ₇ | A-to-B Port Data Inputs or B-to-A 3-STATE | 3.5/1.083 150/40 (33.3) | 70 μA/-0.65 mA -3 mA/24 mA (20 mA) |
| B ₀ -B ₇ | B-to-A Transceiver Inputs or A-to-B 3-STATE Output | 3.5/1.083 600/106.6 (80) | 70 μA/-0.65 mA -12 mA/64 mA (48 mA) |
| FR | B Port Flag Output | 50/33.3 | -1 mA/20 mA |
| FS | A Port Flag Output | 50/33.3 | -1 mA/20 mA |
| PARITY | Parity Bit Transceiver Input or Output | 3.5/1.083 600/106.6 (50) | 70 μA/-0.65 mA -12 mA/64 mA (48 mA) |
| $\overline{\text{ERROR}}$ | Parity Check Output (Active LOW) | 50/33.3 | -1 mA/20 mA |
| $\overline{\text{CER}}$ | R Registers Clock Enable Input (Active LOW) | 1.0/1.0 | 20 μA/-0.6 mA |
| $\overline{\text{CES}}$ | S Registers Clock Enable Input (Active LOW) | 1.0/1.0 | 20 μA/-0.6 mA |
| CPR | R Registers Clock Pulse Input (Active Rising Edge) | 1.0/1.0 | 20 μA/-0.6 mA |
| CPS | S Registers Clock Pulse Input (Active Rising Edge) | 1.0/1.0 | 20 μA/-0.6 mA |
| $\overline{\text{OEBR}}$ | B Port and PARITY Output Enable (Active LOW) and Clear FR Input (Active Rising Edge) | 1.0/2.0 | 20 μA/-1.2 mA |
| $\overline{\text{OEAS}}$ | A Port Output Enable (Active LOW) and Clear FS Input (Active Rising Edge) | 1.0/2.0 | 20 μA/-1.2 mA |

Functional Description

Data applied to the A-inputs are entered and stored in the R register on the rising edge of the CPR Clock Pulse, provided that the Clock Enable ($\overline{\text{CER}}$) is LOW; simultaneously, the status flip-flop is set and the flag (FR) output goes HIGH. As the Clock Enable ($\overline{\text{CER}}$) returns to HIGH, the data will be held in the R register. These data entered from the A-inputs will appear at the B Port I/O pins after the Output Enable ($\overline{\text{OEBR}}$) has gone LOW. When $\overline{\text{OEBR}}$ is LOW, a parity bit appears at the PARITY pin, which will be set HIGH when there is an even number of 1s or all 0s at the Q outputs of the R register. After the data is assimilated, the receiving system clears the flag FR by changing the signal at the $\overline{\text{OEBR}}$ pin from LOW-to-HIGH.

Data flow from B-to-A proceeds in the same manner described for A-to-B flow. A LOW at the $\overline{\text{CES}}$ pin and a LOW-to-HIGH transition at CPS pin enters the B-input data and the parity-input data into the S registers and the parity register respectively and set the flag output FS to HIGH. A LOW signal at the $\overline{\text{OEAS}}$ pin enables the A Port I/O pins and a LOW-to-HIGH transition of the $\overline{\text{OEAS}}$ signal clears the FS flag. When $\overline{\text{OEAS}}$ is LOW, the parity check output ERROR will be HIGH if there is an odd number of 1s at the Q outputs of the S registers and the parity register. The flag FS can be cleared by a LOW-to-HIGH transition of the $\overline{\text{OEAS}}$ signal.

Register Function Table

(Applies to R or S Register)

| Inputs | | | Internal Q | Function |
|--------|----|------------------------|---------------|---------------|
| D | CP | $\overline{\text{CE}}$ | | |
| X | X | H | NC | Hold Data |
| L | ↗ | L | L | Load Data |
| H | ↗ | L | H | |
| X | ↑ | L | NC | Keep Old Data |

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial

↗ = LOW-to-HIGH Transition
↑ = Not LOW-to-HIGH Transition
NC = No Change

Flag Flip-Flop Function Table

(Applies to R or S Flag Flip-Flop)

| Inputs | | | Flag Output | Function |
|------------------------|----|------------------------|----------------|------------|
| $\overline{\text{CE}}$ | CP | $\overline{\text{OE}}$ | | |
| H | X | ↑ | NC | Hold Flag |
| L | ↗ | ↑ | H | Set Flag |
| X | X | ↗ | L | Clear Flag |

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial

↗ = LOW-to-HIGH Transition
↑ = Not LOW-to-HIGH Transition
NC = No Change

Output Control

| $\overline{\text{OE}}$ | Internal Q | A or B Outputs | Function |
|------------------------|---------------|-------------------|----------------|
| H | X | Z | Disable Output |
| L | L | L | Enable Output |
| L | H | H | Enable Output |

H = HIGH Voltage Level
L = LOW Voltage Level

X = Immaterial
Z = High Impedance

Parity Generation Function

| $\overline{\text{OEBR}}$ | Number of HIGHS in the Q Outputs of the R Register | Parity Output |
|--------------------------|---|---------------|
| H | X | Z |
| L | 0, 2, 4, 6, 8 | H |
| L | 1, 3, 5, 7 | L |

H = HIGH Voltage Level
L = LOW Voltage Level

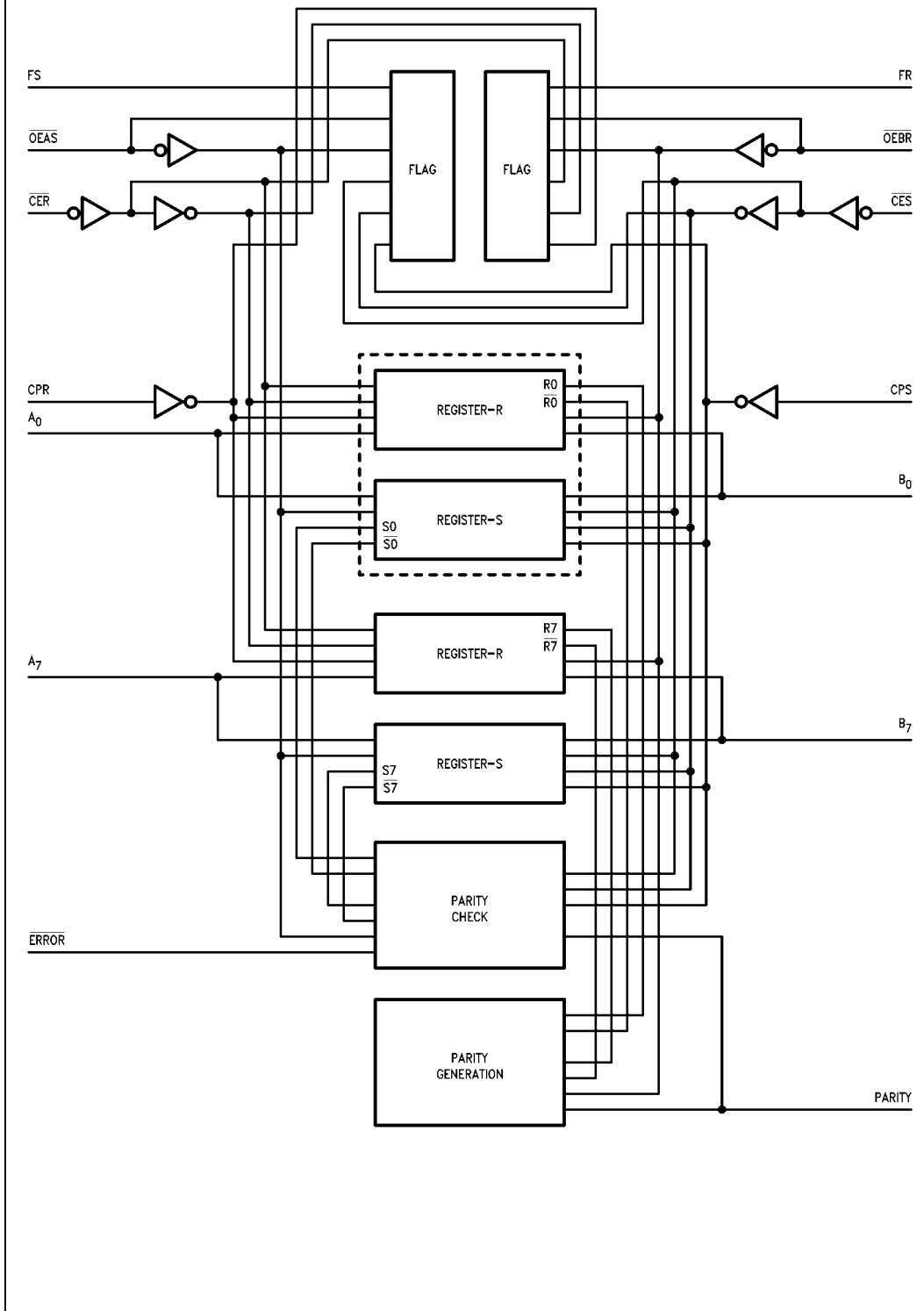
X = Immaterial
Z = High Impedance

Parity Check Function

| $\overline{\text{OEAS}}$ | Number of HIGHS in the Q Outputs of the S Register | Parity Input | ERROR Output |
|--------------------------|---|-----------------|-----------------|
| H | X | X | H |
| L | 0, 2, 4, 6, 8 | L | L |
| L | 1, 3, 5, 7 | L | H |
| L | 0, 2, 4, 6, 8 | H | H |
| L | 1, 3, 5, 7 | H | L |

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial

Block Diagram



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 | -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 Output in HIGH State (with V _{CC} = 0V) | |
| Standard Output | -0.5V to V _{CC} |
| 3-STATE Output | -0.5V to +5.5V |
| Current Applied to Output in LOW State (Max) | twice the rated I _{OL} (mA) |

Recommended Operating Conditions

| | |
|------------------------------|----------------|
| Free Air Ambient Temperature | 0°C to +70°C |
| Supply Voltage | +4.5V to +5.5V |

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.

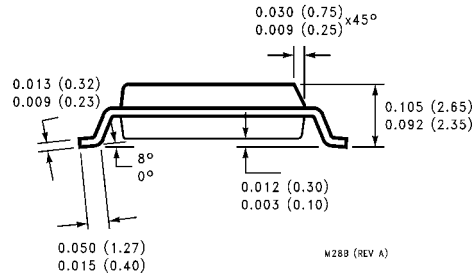
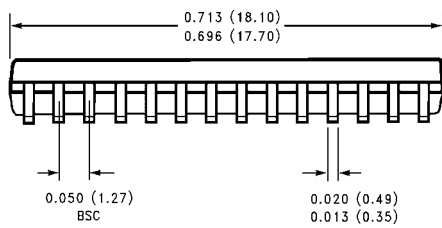
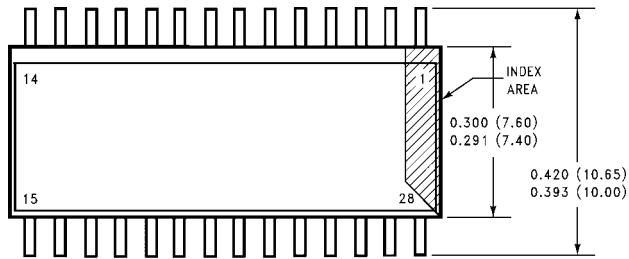
DC Electrical Characteristics

| Symbol | Parameter | Min | Typ | Max | Units | V _{CC} | Conditions |
|------------------------------------|------------------------------------|--|-----|--------------------|-------|-----------------|--|
| V _{IH} | Input HIGH Voltage | 2.0 | | | V | | Recognized as a HIGH Signal |
| V _{IL} | Input LOW Voltage | | | 0.8 | V | | Recognized as a LOW Signal |
| V _{CD} | Input Clamp Diode Voltage | | | -1.2 | V | Min | I _{IN} = -18 mA (<u>CER</u> , <u>CES</u> , CPR, CPS, <u>OE_{BR}</u> , <u>OEAS</u>) |
| V _{OH} | Output HIGH Voltage | 10% V _{CC} 2.5 10% V _{CC} 2.4 10% V _{CC} 2.0 5% V _{CC} 2.7 5% V _{CC} 2.7 | | | V | Min | I _{OH} = -1 mA (FR, FS, <u>ERROR</u> , A _n) I _{OH} = -3 mA (A _n , B _n PARITY) I _{OH} = -15 mA (B _n , PARITY) I _{OH} = -1 mA (FR, FS, <u>ERROR</u> , A _n) I _{OH} = -3 mA (A _n , B _n , PARITY) |
| V _{OL} | Output LOW Voltage | 10% V _{CC} 10% V _{CC} 10% V _{CC} | | 0.5 0.5 0.55 | V | Min | I _{OL} = 20 mA (FR, FS, <u>ERROR</u>) I _{OL} = 24 mA (A _n) I _{OL} = 64 mA (B _n , PARITY) |
| I _{IH} | Input HIGH Current | | | 5.0 | μA | Max | V _{IN} = 2.7V (<u>CER</u> , <u>CES</u> , CPR, CPS, <u>OE_{BR}</u> , <u>OEAS</u>) |
| I _{BVI} | Input HIGH Current Breakdown Test | | | 7.0 | μA | Max | V _{IN} = 7.0V (<u>CER</u> , <u>CES</u> , CPR, CPS, <u>OE_{BR}</u> , <u>OEAS</u>) |
| I _{BVIT} | Input HIGH Current Breakdown (I/O) | | | 0.5 | mA | Max | V _{IN} = 5.5V (A _n , B _n , PARITY) |
| I _{C_{EX}} | Output HIGH Leakage Current | | | 50 | μA | Max | V _{OUT} = V _{CC} (FR, FS, <u>ERROR</u> , A _n , B _n , PARITY) |
| V _{ID} | Input Leakage Test | 4.75 | | | V | 0.0 | I _{ID} = 1.9 μA All other pins grounded |
| I _{OD} | Output Leakage Circuit Current | | | 3.75 | μA | 0.0 | V _{I_{OD}} = 150 mV All other pins grounded |
| I _{IL} | Input LOW Current | | | -0.6 -1.2 | mA | Max | V _{IN} = 0.5V (<u>CER</u> , <u>CES</u> , CPR, CPS) V _{IN} = 0.5V (<u>OE_{BR}</u> , <u>OEAS</u>) |
| I _{IH} + I _{OZH} | Output Leakage Current | | | 70 | μA | Max | V _{OUT} = 2.7V (A _n , B _n , PARITY) |
| I _{IL} + I _{OZL} | Output Leakage Current | | | -650 | μA | Max | V _{OUT} = 0.5V (A _n , B _n , PARITY) |
| I _{OS} | Output Short-Circuit Current | -60 -100 | | -175 -250 | mA | Max | V _{OUT} = 0V (FR, FS, <u>ERROR</u> , A _n) V _{OUT} = 0V (B _n , PARITY) |
| I _{ZZ} | Bus Drainage Test | | | 500 | μA | 0.0V | V _{OUT} = 5.25V (A _n , B _n , PARITY) |
| I _{CC_H} | Power Supply Current | | 100 | 150 | mA | Max | V _O = HIGH |
| I _{CC_L} | Power Supply Current | | 100 | 150 | mA | Max | V _O = LOW |
| I _{CC_Z} | Power Supply Current | | 110 | 165 | mA | Max | V _O = HIGH Z |

| AC Electrical Characteristics | | | | | | | |
|-------------------------------|--|---|------|------|--|------|-------|
| Symbol | Parameter | T _A = +25°C V _{CC} = +5.0V C _L = 50 pF | | | T _A = 0°C to +70°C V _{CC} = +5.0V C _L = 50 pF | | Units |
| | | Min | Typ | Max | Min | Max | |
| t _{PLH} | Propagation Delay | 3.5 | 6.0 | 8.0 | 3.0 | 9.0 | ns |
| t _{PHL} | CPS or CPR to A _n or B _n | 4.0 | 7.0 | 9.5 | 3.5 | 10.5 | |
| t _{PLH} | Propagation Delay | 3.0 | 5.5 | 7.5 | 2.5 | 8.5 | ns |
| t _{PHL} | Propagation Delay | 3.5 | 6.0 | 8.0 | 3.0 | 9.0 | ns |
| t _{PLH} | Propagation Delay | 8.0 | 14.0 | 18.0 | 7.0 | 20.0 | ns |
| t _{PHL} | CPR to Parity | 8.5 | 14.5 | 18.5 | 7.5 | 20.5 | |
| t _{PLH} | Propagation Delay | 8.0 | 13.5 | 17.5 | 7.0 | 19.5 | ns |
| t _{PHL} | CPS to ERROR | 7.5 | 13.0 | 16.5 | 6.5 | 18.5 | |
| t _{PLH} | Propagation Delay | 3.5 | 6.0 | 8.0 | 3.0 | 9.0 | ns |
| t _{PHL} | OEAS to ERROR | 3.0 | 5.0 | 7.0 | 2.5 | 8.0 | |
| t _{PZH} | Enable Time OEAS | 3.0 | 5.5 | 7.5 | 2.5 | 8.5 | ns |
| t _{PZL} | or OEBR to B _n or A _n | 3.5 | 7.0 | 9.5 | 3.0 | 10.5 | |
| t _{PHZ} | Disable Time OEAS | 3.0 | 6.5 | 8.5 | 2.5 | 9.5 | ns |
| t _{PLZ} | or OEBR to B _n or A _n | 3.0 | 5.5 | 7.5 | 2.5 | 8.5 | |
| t _{PZH} | Enable Time | 3.0 | 4.5 | 7.5 | 2.5 | 8.5 | ns |
| t _{PZL} | OEBR to Parity | 3.5 | 6.0 | 9.5 | 3.0 | 10.5 | |
| t _{PHZ} | Disable Time | 3.0 | 5.5 | 8.5 | 2.5 | 9.5 | ns |
| t _{PLZ} | OEBR to Parity | 3.0 | 6.5 | 7.5 | 2.5 | 8.5 | |

| AC Operating Requirements | | | | | | |
|---------------------------|---|---|-----|--|-----|-------|
| Symbol | Parameter | T _A = +25°C V _{CC} = +5.0V | | T _A = 0°C to +70°C V _{CC} = +5.0V | | Units |
| | | Min | Max | Min | Max | |
| t _S (H) | Setup Time, HIGH or LOW | 7.5 | | 8.5 | | ns |
| t _S (L) | A _n or B _n or Parity to CPS or CPR | 4.5 | | 5.0 | | |
| t _H (H) | Hold Time, HIGH or LOW | 0 | | 0 | | ns |
| t _H (L) | A _n or B _n or Parity to CPS or CPR | 0 | | 0 | | |
| t _S (H) | Setup, Time HIGH or LOW | 6.0 | | 7.0 | | ns |
| t _S (L) | CES or CER to CPS or CPR | 10.0 | | 11.5 | | |
| t _H (H) | Hold Time, HIGH or LOW | 0 | | 0 | | ns |
| t _H (L) | CES or CER to CPS or CPR | 0 | | 0 | | |
| t _W (H) | Pulse Width, HIGH or LOW | 4.0 | | 4.5 | | ns |
| t _W (L) | CPS or CPR | 6.0 | | 7.0 | | |

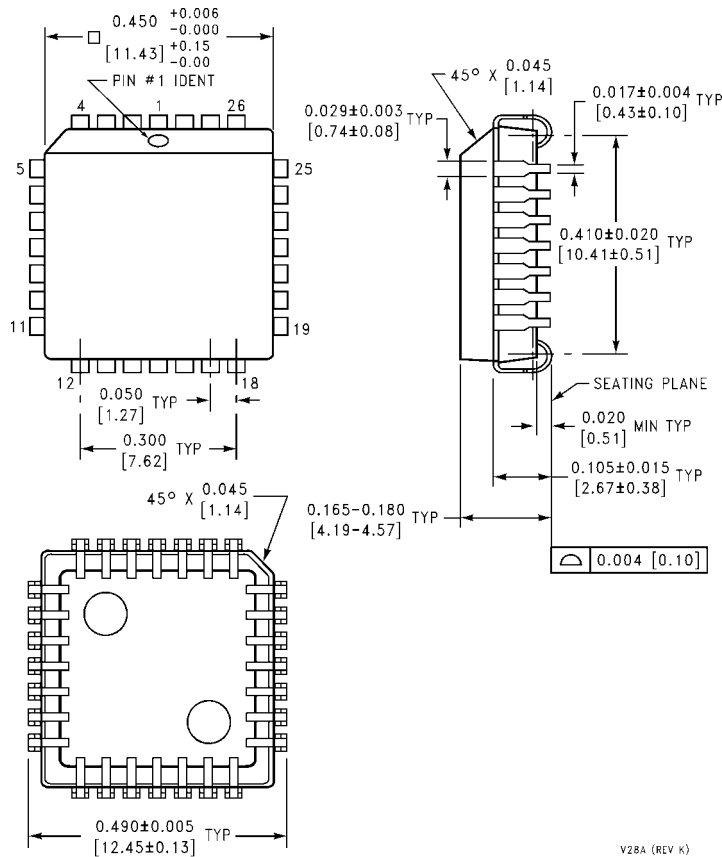
Physical Dimensions inches (millimeters) unless otherwise noted



M289 (REV A)

**28-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide
Package Number M28B**

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



28-Lead Plastic Lead Chip Carrier (PLCC), JEDEC MO-047, 0.450 Square Package Number V28A

V28A (REV K)

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