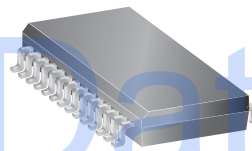


DABiC-IV 20-Bit Serial-Input Latched Source Driver

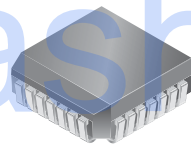
Features and Benefits

- Controlled output slew rate
- High-speed data storage
- 60 V minimum output break down
- High data-input rate
- PNP active pull-downs
- Low output-saturation voltages
- Low-power CMOS logic and latches
- Improved replacements for TL5812x, UCN5812x, and UCQ5812x

Package:



28-pin SOICW
(Package LW)



28-pin PLCC
(EP package)

Not to scale

Description

The A6812 device combines a 20-bit CMOS shift register, accompanying data latches and control circuitry with bipolar sourcing outputs, and PNP active pull-downs. Designed primarily to drive vacuum-fluorescent displays, the 60 V and -40 mA output ratings also allow these devices to be used in many other peripheral power driver applications. The A6812 features an increased data-input rate (compared with the older UCN/UCQ5812-F) and a controlled output slew rate.

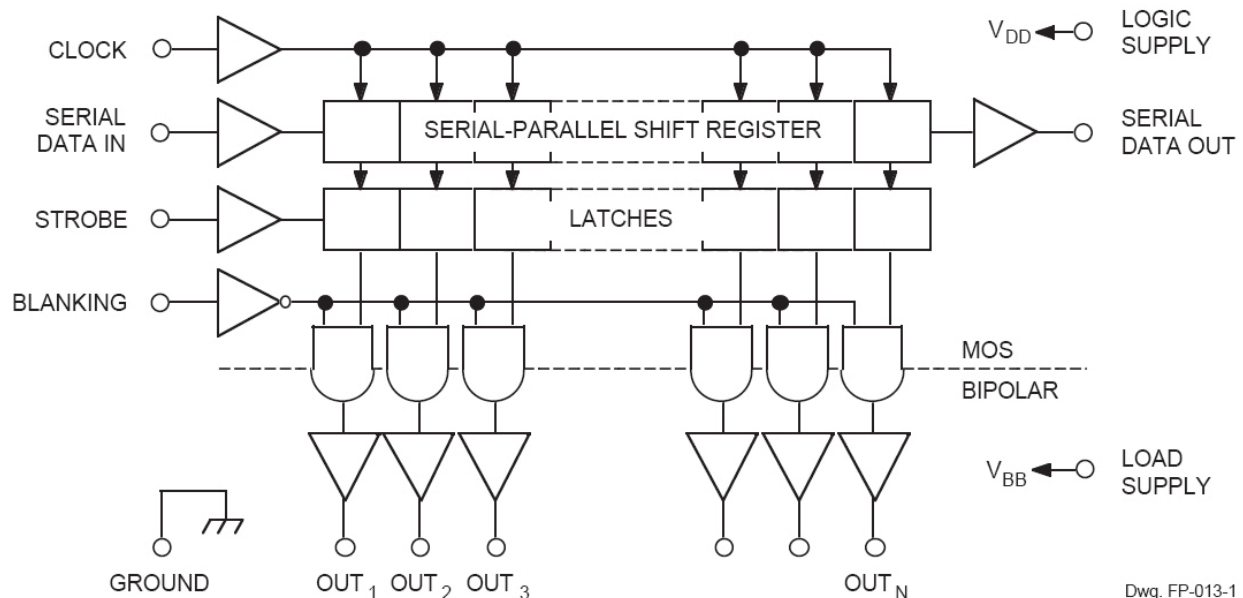
The CMOS shift register and latches allow direct interfacing with microprocessor-based systems. With a 3.3 or 5 V logic supply, they operate to at least 10 MHz.

A CMOS serial data output permits cascaded connections in applications requiring additional drive lines. Similar devices are available as the A6810 (10-bit) and A6818 (32-bit).

The A6812 output source drivers are NPN Darlingtons, capable of sourcing up to 40 mA. The controlled output slew rate reduces electromagnetic noise, which is an important consideration in systems that include telecommunications and/or microprocessors and to meet government emissions

Continued on the next page...

Functional Block Diagram



Dwg. FP-013-1

Description (continued)

regulations. For inter-digit blanking, all output drivers can be disabled and all sink drivers turned on with a BLANKING input high. The PNP active pull-downs sink at least 2.5 mA.

Three temperature ranges are available for optimum performance in commercial (suffix S-), industrial (suffix E-), or automotive (suffix K-) applications. Package styles are provided for surface-mount SOIC (suffix -LW), or minimum-area surface-mount PLCC (suffix

-EP). Copper lead frames, low logic-power dissipation, and low output-saturation voltages allow these drivers to source 25 mA from all outputs continuously to more than 43°C (suffix -LW) or 61°C (suffix -EP).

Each package is available in a lead (Pb) free version, with 100% matte tin leadframe plating.

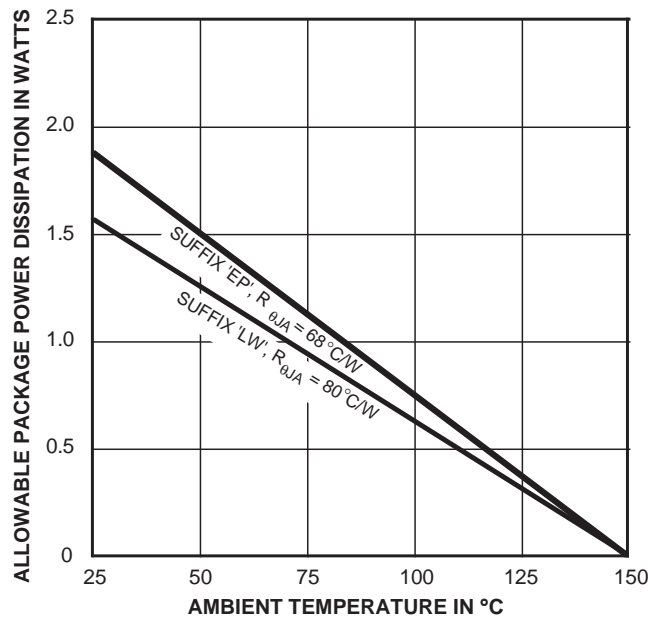
Selection Guide

| Part Number | Pb-free | Packing | Package | Ambient Temperature, T _A (°C) |
|--------------|---------|-------------------------|---------|--|
| A6812EEPTR | – | 800 pieces/13-in. reel | PLCC | –40 to 85 |
| A6812EEPTR-T | Yes | | | |
| A6812ELWTR-T | Yes | 1000 pieces/13-in. reel | SOIC-W | –40 to 125 |
| A6812KLWTR-T | Yes | 1000 pieces/13-in. reel | SOIC-W | |
| A6812SEPTR | – | 800 pieces/13-in. reel | PLCC | –20 to 85 |
| A6812SEPTR-T | Yes | | | |
| A6812SLWTR-T | Yes | 1000 pieces/13-in. reel | SOIC-W | |

Absolute Maximum Ratings*

| Characteristic | Symbol | Notes | Rating | Units |
|---------------------------------|------------|---------|------------------------|-------|
| Logic Supply Voltage | V_{DD} | | 7 | V |
| Driver Supply Voltage | V_{BB} | | 60 | V |
| Input Voltage Range | V_{IN} | | -0.3 to $V_{DD} + 0.3$ | V |
| Continuous Output Current Range | I_{OUT} | | -40 to 15 | mA |
| Operating Ambient Temperature | T_A | Range E | -40 to 85 | °C |
| | | Range K | -40 to 125 | °C |
| | | Range S | -20 to 85 | °C |
| Maximum Junction Temperature | $T_J(max)$ | | 150 | °C |
| Storage Temperature | T_{stg} | | -65 to 125 | °C |

*Caution: These CMOS devices have input static protection (Class 2) but are still susceptible to damage if exposed to extremely high static electrical charges.



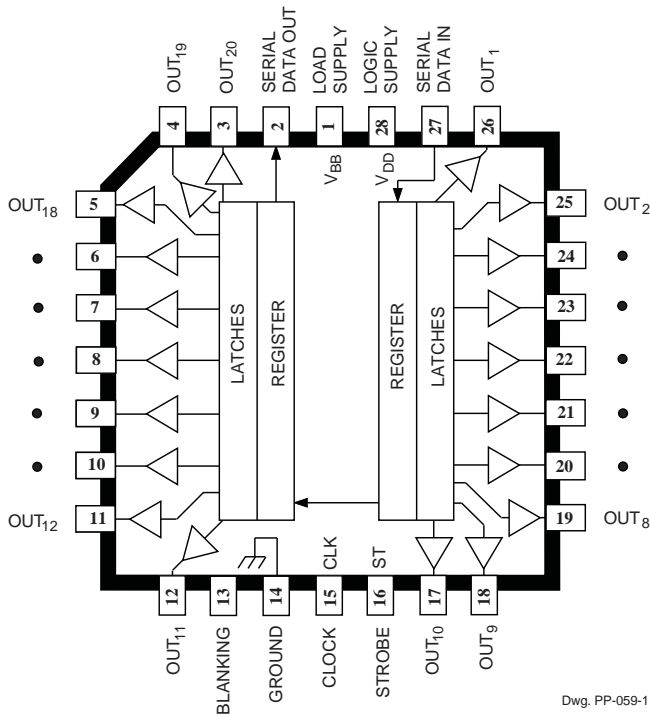
Dwg. GP-024-2

Thermal Characteristics

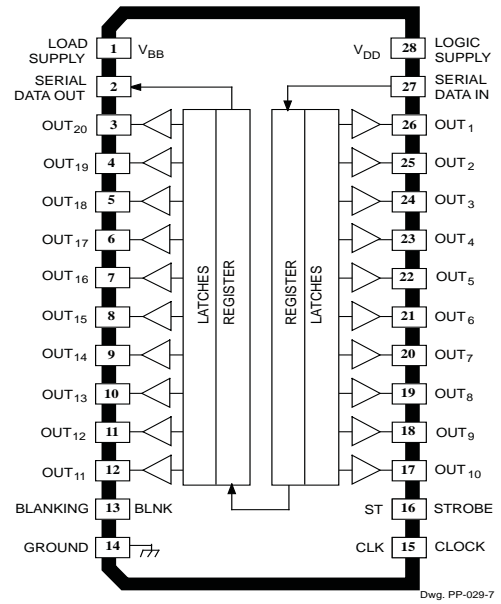
| Characteristic | Symbol | Test Conditions* | Value | Units |
|----------------------------|-----------------|--|-------|-------|
| Package Thermal Resistance | $R_{\theta JA}$ | Package EP, 1-layer PCB with solder limited to mounting pads | 68 | °C/W |
| | | Package LW, 1-layer PCB with solder limited to mounting pads | 80 | °C/W |

*Additional thermal information available on the Allegro website

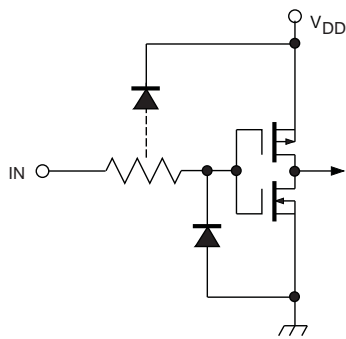
EP Package



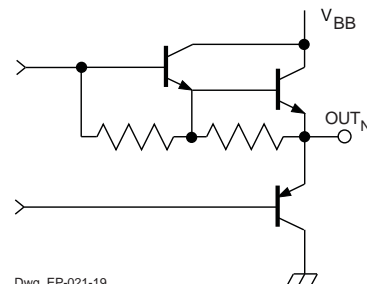
LW Package






TYPICAL INPUT CIRCUIT



TYPICAL OUTPUT DRIVER



TRUTH TABLE

| Serial Data Input | Clock Input | Shift Register Contents | | | | | | Serial Data Output | Strobe Input | Latch Contents | | | | | | Blanking | Output Contents | | | | | |
|-------------------|---|-------------------------|----------------|----------------|-----|------------------|------------------|--------------------|--------------|----------------|----------------|----------------|-----|------------------|----------------|----------|-----------------|----------------|----------------|-----|------------------|----------------|
| | | I ₁ | I ₂ | I ₃ | ... | I _{N-1} | I _N | | | R ₁ | R ₂ | R ₃ | ... | R _{N-1} | R _N | | I ₁ | I ₂ | I ₃ | ... | I _{N-1} | |
| I _N |  | | | | | | | | | | | | | | | | | | | | | |
| H |  | H | R ₁ | R ₂ | ... | R _{N-2} | R _{N-1} | R _{N-1} | | | | | | | | | | | | | | |
| L |  | L | R ₁ | R ₂ | ... | R _{N-2} | R _{N-1} | R _{N-1} | | | | | | | | | | | | | | |
| X | | R ₁ | R ₂ | R ₃ | ... | R _{N-1} | R _N | R _N | | | | | | | | | | | | | | |
| | | X | X | X | ... | X | X | X | L | R ₁ | R ₂ | R ₃ | ... | R _{N-1} | R _N | | | | | | | |
| | | P ₁ | P ₂ | P ₃ | ... | P _{N-1} | P _N | P _N | H | P ₁ | P ₂ | P ₃ | ... | P _{N-1} | P _N | L | P ₁ | P ₂ | P ₃ | ... | P _{N-1} | P _N |
| | | | | | | | | | X | X | X | ... | X | X | H | L | L | L | ... | L | L | |

L = Low Logic Level H = High Logic Level X = Irrelevant P = Present State R = Previous State

ELECTRICAL CHARACTERISTICS at $T_A = +25^\circ\text{C}$ (A6812S-) or over operating temperature range (A6812E- or A6812K-), $V_{BB} = 60\text{ V}$; unless otherwise noted

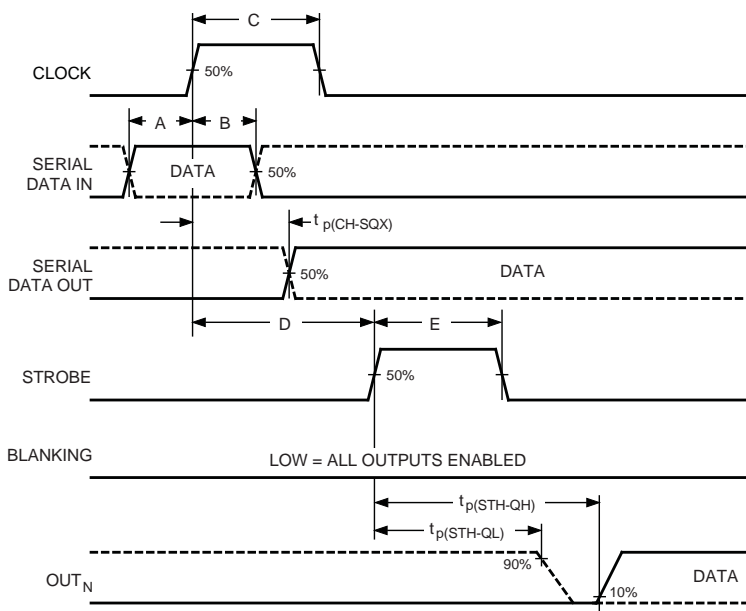
| Characteristic | Symbol | Test Conditions | Limits @ $V_{DD} = 3.3\text{ V}$ | | | Limits @ $V_{DD} = 5\text{ V}$ | | | Units |
|--------------------------------|-----------------|---|----------------------------------|--------|------|--------------------------------|--------|------|------------------|
| | | | Min. | Typ. | Max. | Min. | Typ. | Max. | |
| Output Leakage Current | I_{CEX} | $V_{OUT} = 0\text{ V}$ | — | <-0.1 | -15 | — | <-0.1 | -15 | μA |
| Output Voltage | $V_{OUT(1)}$ | $I_{OUT} = -25\text{ mA}$ | 57.5 | 58.3 | — | 57.5 | 58.3 | — | V |
| | $V_{OUT(0)}$ | $I_{OUT} = 1\text{ mA}$ | — | 1.0 | 1.5 | — | 1.0 | 1.5 | V |
| Output Pull-Down Current | $I_{OUT(0)}$ | $V_{OUT} = 5\text{ V to }V_{BB}$ | 2.5 | 5.0 | — | 2.5 | 5.0 | — | mA |
| Input Voltage | $V_{IN(1)}$ | | 2.2 | — | — | 3.3 | — | — | V |
| | $V_{IN(0)}$ | | — | — | 1.1 | — | — | 1.7 | V |
| Input Current | $I_{IN(1)}$ | $V_{IN} = V_{DD}$ | — | <0.01 | 1.0 | — | <0.01 | 1.0 | μA |
| | $I_{IN(0)}$ | $V_{IN} = 0\text{ V}$ | — | <-0.01 | -1.0 | — | <-0.01 | -1.0 | μA |
| Input Clamp Voltage | V_{IK} | $I_{IN} = -200\text{ }\mu\text{A}$ | — | -0.8 | -1.5 | — | -0.8 | -1.5 | V |
| Serial Data Output Voltage | $V_{OUT(1)}$ | $I_{OUT} = -200\text{ }\mu\text{A}$ | 2.8 | 3.05 | — | 4.5 | 4.75 | — | V |
| | $V_{OUT(0)}$ | $I_{OUT} = 200\text{ }\mu\text{A}$ | — | 0.15 | 0.3 | — | 0.15 | 0.3 | V |
| Maximum Clock Frequency | f_c | | 10* | — | — | 10* | — | — | MHz |
| Logic Supply Current | $I_{DD(1)}$ | All Outputs High | — | 0.25 | 0.75 | — | 0.3 | 1.0 | mA |
| | $I_{DD(0)}$ | All Outputs Low | — | 0.25 | 0.75 | — | 0.3 | 1.0 | mA |
| Load Supply Current | $I_{BB(1)}$ | All Outputs High, No Load | — | 3.0 | 6.0 | — | 3.0 | 6.0 | mA |
| | $I_{BB(0)}$ | All Outputs Low | — | 0.2 | 20 | — | 0.2 | 20 | μA |
| Blanking-to-Output Delay | $t_{dis(BQ)}$ | $C_L = 30\text{ pF}$, 50% to 50% | — | 0.7 | 2.0 | — | 0.7 | 2.0 | μs |
| | $t_{en(BQ)}$ | $C_L = 30\text{ pF}$, 50% to 50% | — | 1.8 | 3.0 | — | 1.8 | 3.0 | μs |
| Strobe-to-Output Delay | $t_{p(STH-QL)}$ | $R_L = 2.3\text{ k}\Omega$, $C_L = 30\text{ pF}$ | — | 0.7 | 2.0 | — | 0.7 | 2.0 | μs |
| | $t_{p(STH-QH)}$ | $R_L = 2.3\text{ k}\Omega$, $C_L = 30\text{ pF}$ | — | 1.8 | 3.0 | — | 1.8 | 3.0 | μs |
| Output Fall Time | t_f | $R_L = 2.3\text{ k}\Omega$, $C_L = 30\text{ pF}$ | 2.4 | — | 12 | 2.4 | — | 12 | μs |
| Output Rise Time | t_r | $R_L = 2.3\text{ k}\Omega$, $C_L = 30\text{ pF}$ | 2.4 | — | 12 | 2.4 | — | 12 | μs |
| Output Slew Rate | dV/dt | $R_L = 2.3\text{ k}\Omega$, $C_L = 30\text{ pF}$ | 4.0 | — | 20 | 4.0 | — | 20 | V/ μs |
| Clock-to-Serial Data Out Delay | $t_{p(CH-SQX)}$ | $I_{OUT} = \pm 200\text{ }\mu\text{A}$ | — | 50 | — | — | 50 | — | ns |

Negative current is defined as coming out of (sourcing) the specified device terminal.

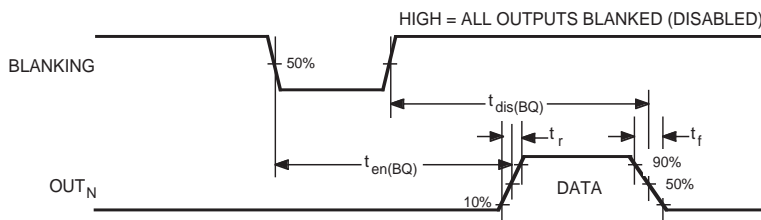
Typical data is for design information only and is at $T_A = +25^\circ\text{C}$.

* Operation at a clock frequency greater than the specified minimum is possible but not warranted.

TIMING REQUIREMENTS and SPECIFICATIONS
(Logic Levels are V_{DD} and Ground)



Dwg. WP-029



Dwg. WP-030A

- A.** Data Active Time Before Clock Pulse
(Data Set-Up Time), $t_{su(D)}$ **25 ns**
- B.** Data Active Time After Clock Pulse
(Data Hold Time), $t_{h(D)}$ **25 ns**
- C.** Clock Pulse Width, $t_{w(CH)}$ **50 ns**
- D.** Time Between Clock Activation and Strobe, $t_{su(C)}$ **100 ns**
- E.** Strobe Pulse Width, $t_{w(STH)}$ **50 ns**

NOTE – Timing is representative of a 10 MHz clock. Higher speeds may be attainable with increased supply voltage; operation at high temperatures will reduce the specified maximum clock frequency.

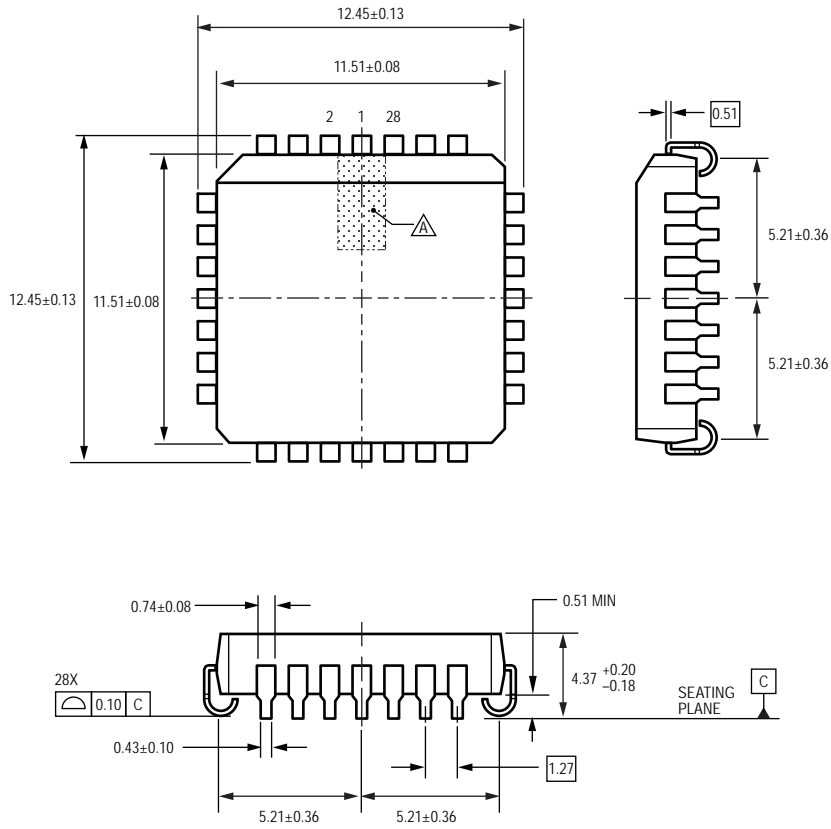
Serial Data present at the input is transferred to the shift register on the logic “0” to logic “1” transition of the CLOCK input pulse. On succeeding CLOCK pulses, the registers shift

data information towards the SERIAL DATA OUTPUT. The SERIAL DATA must appear at the input prior to the rising edge of the CLOCK input waveform.

Information present at any register is transferred to the respective latch when the STROBE is high (serial-to-parallel conversion). The latches will continue to accept new data as long as the STROBE is held high. Applications where the latches are bypassed (STROBE tied high) will require that the BLANKING input be high during serial data entry.

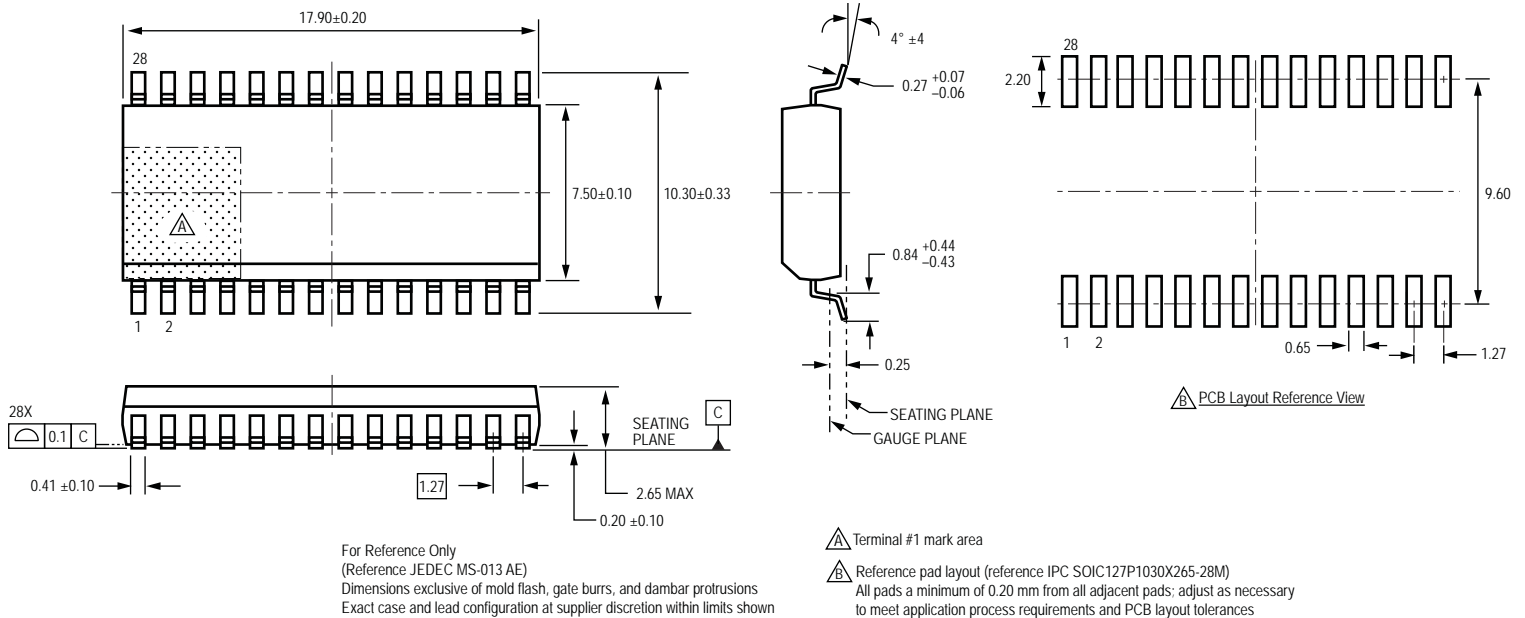
When the BLANKING input is high, the output source drivers are disabled (OFF); the pnp active pull-down sink drivers are ON. The information stored in the latches is not affected by the BLANKING input. With the BLANKING input low, the outputs are controlled by the state of their respective latches.

EP Package, 28-Pin PLCC



For Reference Only
 (reference JEDEC MS-018 AB)
 Dimensions in millimeters
 Dimensions exclusive of mold flash, gate burrs, and dambar protrusions
 Exact case and lead configuration at supplier discretion within limits shown
 ▲ Terminal #1 mark area

LW Package, 28-Pin SOICW



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