

# 6810

Data Sheet  
26182:124E

## DABiC-IV, 10-BIT SERIAL-INPUT, LATCHED SOURCE DRIVER

The A6810- devices combine 10-bit CMOS shift registers, 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 A6810- feature an increased data input rate (compared with the older UCN/UCQ5810-F) and a controlled output slew rate.

The CMOS shift register and latches allow direct interfacing with microprocessor-based systems. With a 3.3 V or 5 V logic supply, serial-data input rates of at least 10 MHz .

A CMOS serial data output permits cascade connections in applications requiring additional drive lines. Similar devices are available as the A6812- (20 bits) and A6818- (32 bits).

The A6810- output source drivers are npn Darlington's, 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 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 will sink at least 2.5 mA.

The A6810- are available in three temperature ranges for optimum performance in commercial (suffix S-), industrial (suffix E-), or automotive (suffix K-) applications. They are provided in two package styles for through-hole DIP (suffix -A) or minimum-area surface-mount SOIC (suffix -LW). Copper lead frames, low logic-power dissipation, and low output-saturation voltages allow all devices to source 25 mA from all outputs continuously over the maximum operating temperature range.

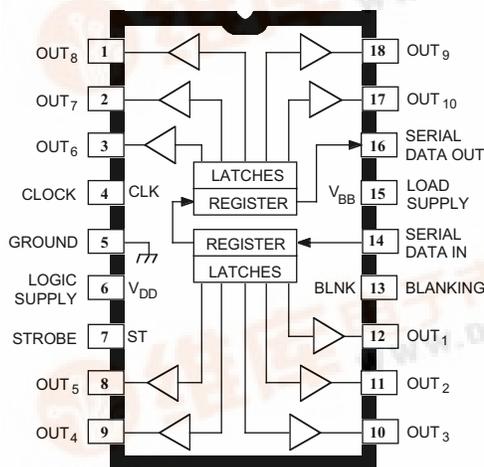
The lead (Pb) free versions are provided with 100% matte tin leadframe plating.

### FEATURES

- Controlled Output Slew Rate
- High-Speed Data Storage
- 60 V Minimum Output Breakdown
- High Data Input Rate
- PNP Active Pull-Downs
- Low Output-Saturation Voltages
- Low-Power CMOS Logic and Latches
- Improved Replacements for TL4810-, UCN5810-, and UCQ5810-



A6810xA



Dwg. PP-029

### ABSOLUTE MAXIMUM RATINGS at $T_A = 25^\circ\text{C}$

Logic Supply Voltage, $V_{DD}$ .....	7.0 V
Driver Supply Voltage, $V_{BB}$ .....	60 V
Continuous Output Current Range, $I_{OUT}$ .....	-40 mA to +15 mA
Input Voltage Range, $V_{IN}$ .....	-0.3 V to $V_{DD} + 0.3$ V
Package Power Dissipation, $P_D$ .....	See Graph
Operating Temperature Range, $T_A$ (Suffix 'E-') .....	-40°C to +85°C
(Suffix 'K-') .....	-40°C to +125°C
(Suffix 'S-') .....	-20°C to +85°C
Storage Temperature Range, $T_S$ .....	-55°C 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.



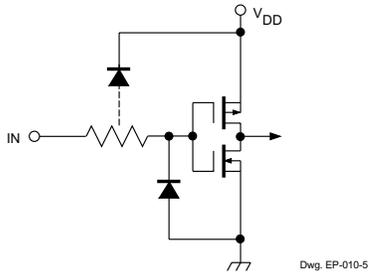
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## 10-BIT SERIAL-INPUT, LATCHED SOURCE DRIVER

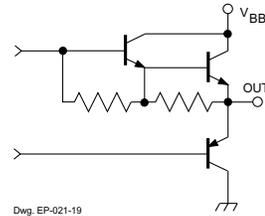
### PRODUCT SELECTION GUIDE

Part Number	Pb-free	Packing	Ambient Temperature, $T_A$ (°C)	Package
A6810SA	-	21 pieces/tube	-20 to 85	18-pin DIP
A6810SA-T	Yes		-40 to 85	
A6810EA	-		-40 to 85	
A6810EA-T	Yes			
A6810KA	-	37 pieces/tube	-40 to 125	20-pin SOIC-W
A6810KA-T	Yes		-40 to 125	
A6810SLW	-	37 pieces/tube	-20 to 85	
A6810SLW-T	Yes		-20 to 85	
A6810SLWTR	-	1000 pieces/13-in. reel	-40 to 85	
A6810SLWTR-T	Yes		-40 to 85	
A6810ELW	-	37 pieces/tube	-40 to 85	
A6810ELW-T	Yes		-40 to 85	
A6810ELWTR	-	1000 pieces/13-in. reel	-40 to 125	
A6810ELWTR-T	Yes		-40 to 125	
A6810KLW	-	37 pieces/tube	-40 to 125	
A6810KLW-T	Yes		-40 to 125	
A6810KLWTR	-	1000 pieces/13-in. reel	-40 to 125	
A6810KLWTR-T	Yes		-40 to 125	

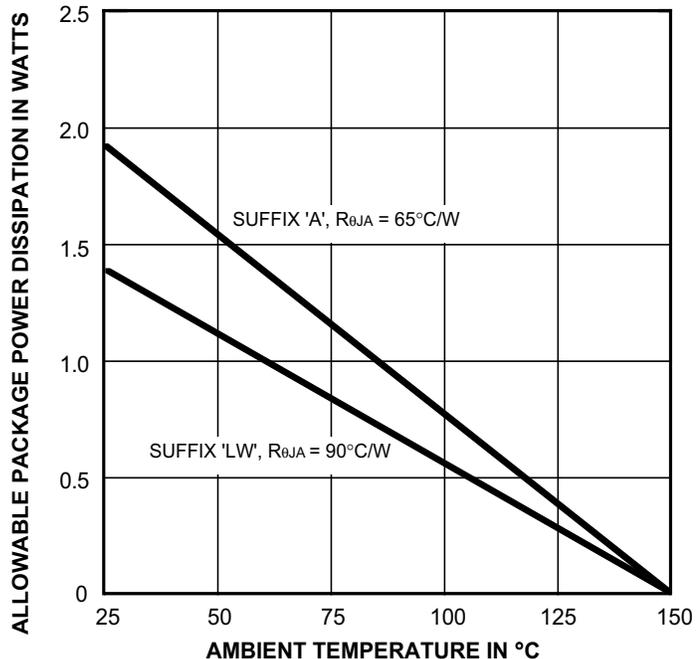
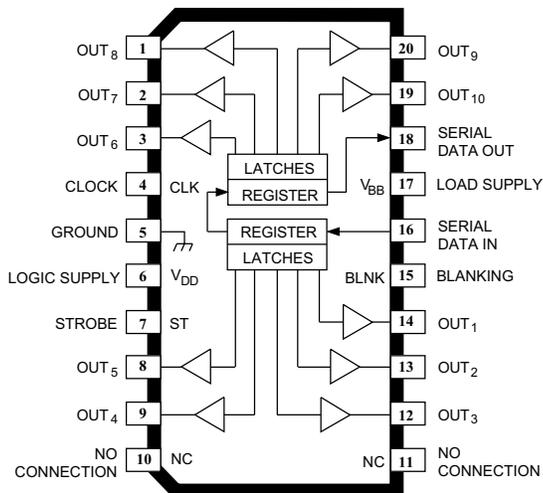
TYPICAL INPUT CIRCUIT



TYPICAL OUTPUT DRIVER



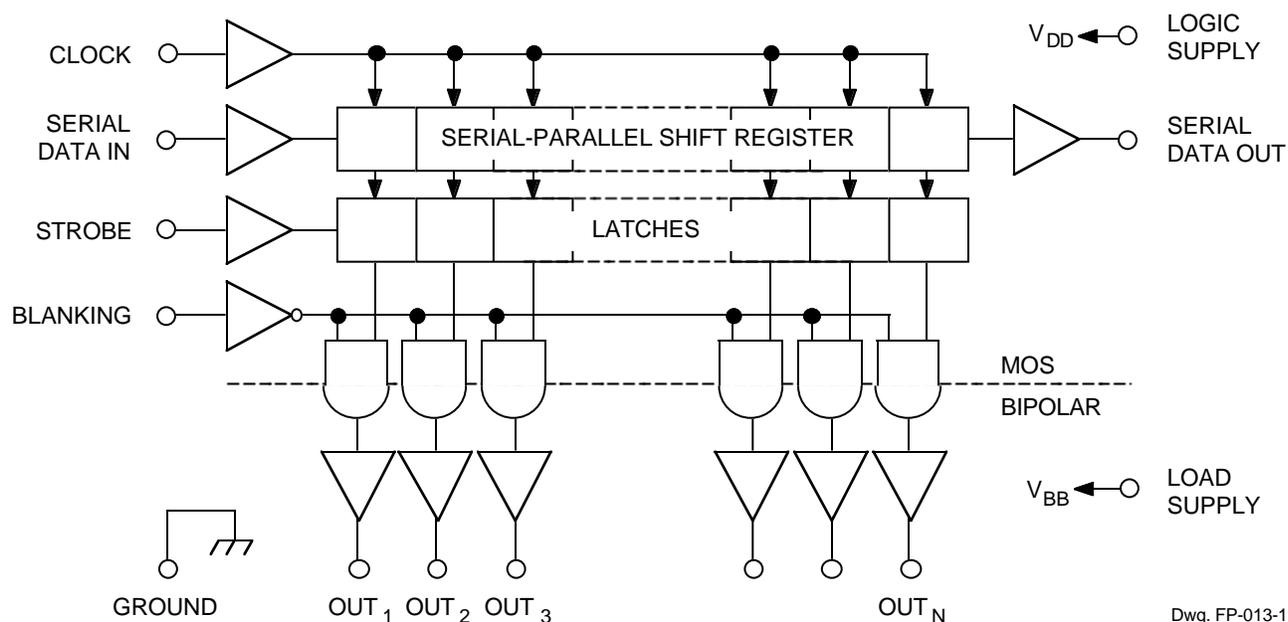
A6810xLW



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## 10-BIT SERIAL-INPUT, LATCHED SOURCE DRIVER

### FUNCTIONAL BLOCK DIAGRAM



Dwg. FP-013-1

### TRUTH TABLE

Serial Data Input	Clock Input	Shift Register Contents						Serial Data Output	Strobe Input	Latch Contents						Blanking	Output Contents					
		I <sub>1</sub>	I <sub>2</sub>	I <sub>3</sub>	...	I <sub>N-1</sub>	I <sub>N</sub>			I <sub>1</sub>	I <sub>2</sub>	I <sub>3</sub>	...	I <sub>N-1</sub>	I <sub>N</sub>		I <sub>1</sub>	I <sub>2</sub>	I <sub>3</sub>	...	I <sub>N-1</sub>	I <sub>N</sub>
H	┌	H	R <sub>1</sub>	R <sub>2</sub>	...	R <sub>N-2</sub>	R <sub>N-1</sub>	R <sub>N-1</sub>														
L	┐	L	R <sub>1</sub>	R <sub>2</sub>	...	R <sub>N-2</sub>	R <sub>N-1</sub>	R <sub>N-1</sub>														
X	└	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	...	R <sub>N-1</sub>	R <sub>N</sub>	R <sub>N</sub>														
		X	X	X	...	X	X	X	L	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	...	R <sub>N-1</sub>	R <sub>N</sub>							
		P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	...	P <sub>N-1</sub>	P <sub>N</sub>	P <sub>N</sub>	H	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	...	P <sub>N-1</sub>	P <sub>N</sub>	L	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	...	P <sub>N-1</sub>	P <sub>N</sub>
										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

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## 10-BIT SERIAL-INPUT, LATCHED SOURCE DRIVER

**ELECTRICAL CHARACTERISTICS at  $T_A = +25^\circ\text{C}$  (A6810S-) or over operating temperature range (A6810E-),  $V_{BB} = 60\text{ V}$  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	$\mu\text{A}$
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	$\mu\text{A}$
	$I_{IN(0)}$	$V_{IN} = 0\text{ V}$	—	<-0.01	-1.0	—	<-0.01	-1.0	$\mu\text{A}$
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	—	1.5	3.0	—	1.5	3.0	mA
	$I_{BB(0)}$	All Outputs Low	—	0.2	20	—	0.2	20	$\mu\text{A}$
Blanking-to-Output Delay	$t_{dis(BQ)}$	$C_L = 30\text{ pF}$ , 50% to 50%	—	0.7	2.0	—	0.7	2.0	$\mu\text{s}$
	$t_{en(BQ)}$	$C_L = 30\text{ pF}$ , 50% to 50%	—	1.8	3.0	—	1.8	3.0	$\mu\text{s}$
Strobe-to-Output Delay	$t_{p(STH-QL)}$	$R_L = 2.3\text{ k}\Omega$ , $C_L \leq 30\text{ pF}$	—	0.7	2.0	—	0.7	2.0	$\mu\text{s}$
	$t_{p(STH-QH)}$	$R_L = 2.3\text{ k}\Omega$ , $C_L \leq 30\text{ pF}$	—	1.8	3.0	—	1.8	3.0	$\mu\text{s}$
Output Fall Time	$t_f$	$R_L = 2.3\text{ k}\Omega$ , $C_L \leq 30\text{ pF}$	2.4	—	12	2.4	—	12	$\mu\text{s}$
Output Rise Time	$t_r$	$R_L = 2.3\text{ k}\Omega$ , $C_L \leq 30\text{ pF}$	2.4	—	12	2.4	—	12	$\mu\text{s}$
Output Slew Rate	dV/dt	$R_L = 2.3\text{ k}\Omega$ , $C_L \leq 30\text{ pF}$	4.0	—	20	4.0	—	20	V/ $\mu\text{s}$
Clock-to-Serial Data Out Delay	$t_{p(CH-SQX)}$	$I_{OUT} = \pm 200\text{ }\mu\text{A}$	—	50	—	—	50	—	ns

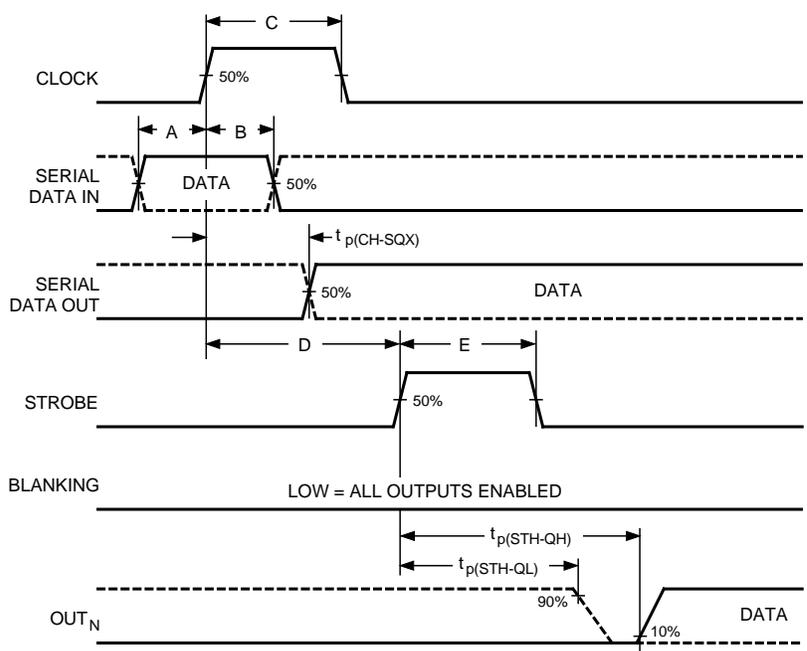
Negative current is defined as coming out of (sourcing) the specified device terminal.

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

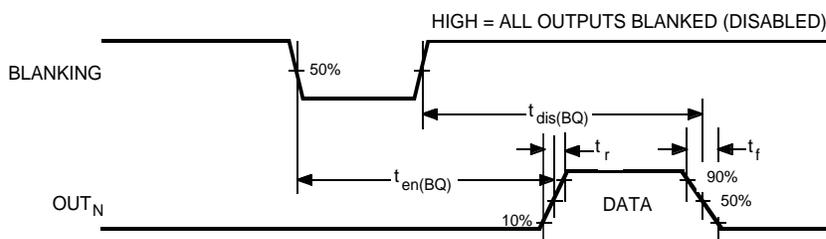
\*Operation at a clock frequency greater than the specified minimum value is possible but not warranted.

**10-BIT SERIAL-INPUT,  
LATCHED SOURCE DRIVER**

**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; 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.

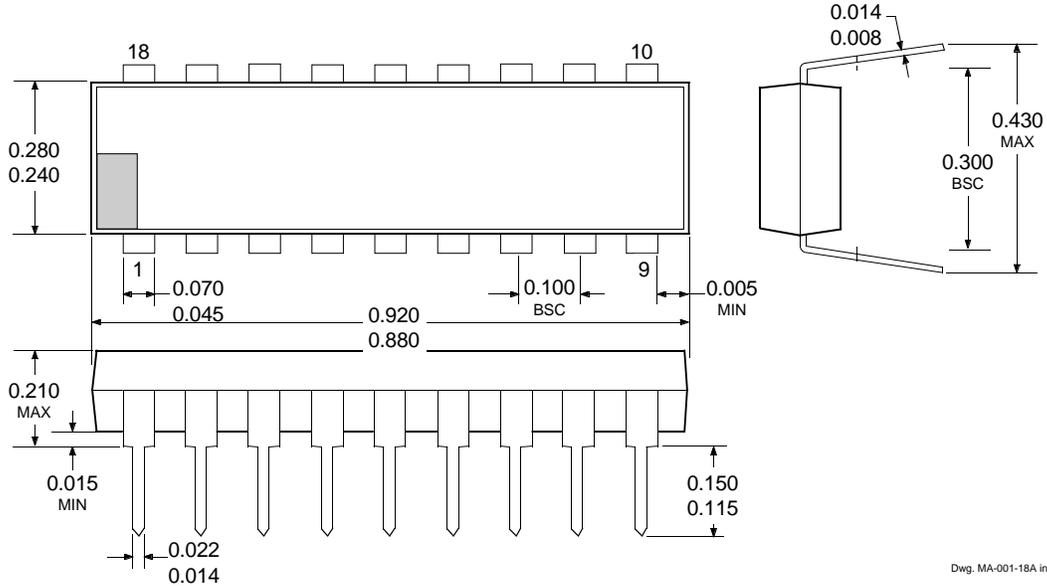
When the BLANKING input is high, the output source drivers are disabled (OFF); the pnp active pull-down sink drivers are ON. The information stored in the latches is not affected by the BLANKING input. With the BLANKING input low, the outputs are controlled by the state of their respective latches.

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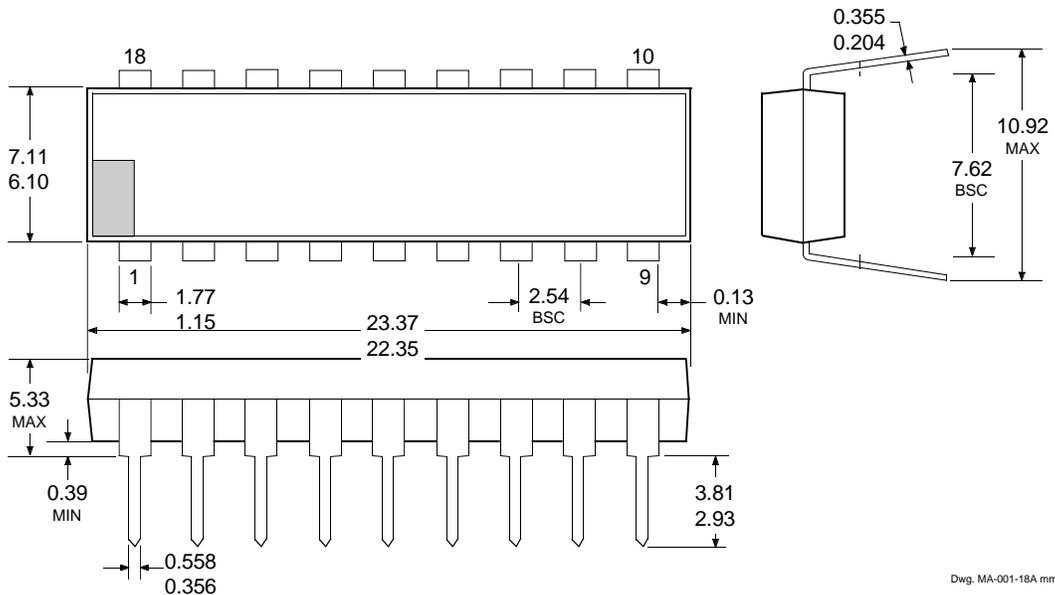
## 10-BIT SERIAL-INPUT, LATCHED SOURCE DRIVER

### A6810EA & A6810SA

Dimensions in Inches  
(controlling dimensions)



Dimensions in Millimeters  
(for reference only)



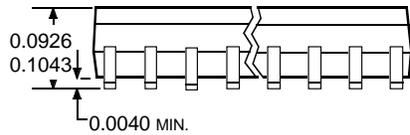
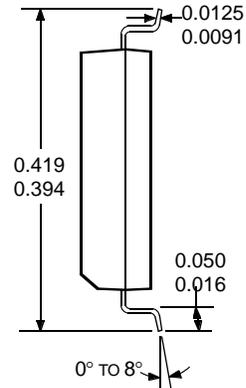
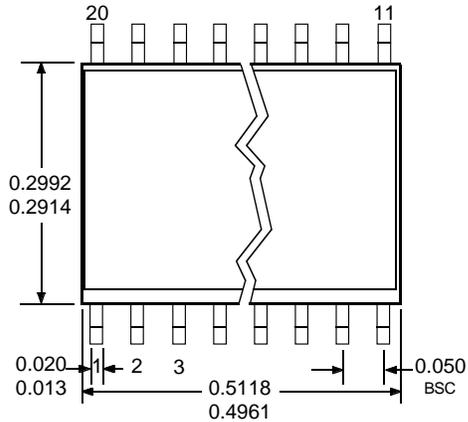
- NOTES: 1. Exact body and lead configuration at vendor's option within limits shown.  
2. Lead spacing tolerance is non-cumulative.  
3. Lead thickness is measured at seating plane or below.  
4. Supplied in standard sticks/tubes of 21 devices.

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## 10-BIT SERIAL-INPUT, LATCHED SOURCE DRIVER

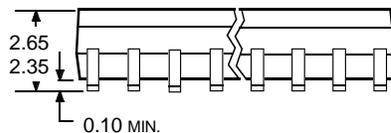
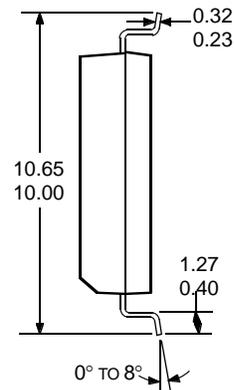
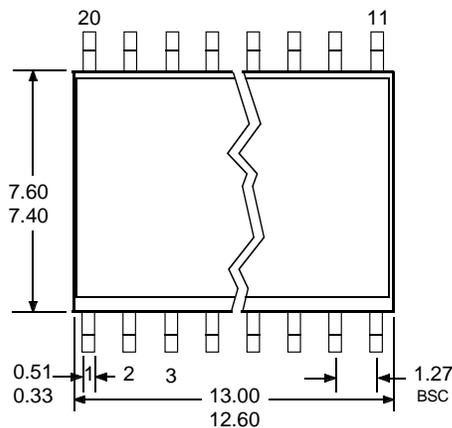
### A6810ELW & A6810SLW

Dimensions in Inches  
(for reference only)



Dwg. MA-008-20 in

Dimensions in Millimeters  
(controlling dimensions)



Dwg. MA-008-20 mm

- NOTES: 1. Exact body and lead configuration at vendor's option within limits shown.  
 2. Lead spacing tolerance is non-cumulative.  
 3. Supplied in standard sticks/tubes of 37 devices or add "TR" to part number for tape and reel.

**6810**

***10-BIT SERIAL-INPUT,  
LATCHED SOURCE DRIVER***

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