

DABiC-5 8-Bit Serial Input Latched Sink Drivers

Features and Benefits

- 3.3 to 5 V logic supply range
- Power-on reset (POR)
- To 10 MHz data input rate
- CMOS, TTL compatible inputs
- -40°C operation available
- Low-power CMOS logic and latches
- Schmitt trigger inputs for improved noise immunity
- High-voltage current-sink outputs
- Internal pull-up/pull-down resistors
- Output transient-protection diodes
- Single or split supply operation

Packages:

Not to scale



20-pin SOICW (package LW)
(drop-in replacement for discontinued 18-pin SOIC variants)



18-pin DIP (Package A)

Description

The merging of low-power CMOS logic and bipolar output power drivers using the proprietary DABiC-5 fabrication process permit the A6841 integrated circuits to be used in a wide variety of peripheral power driver applications. Each device has an eight-bit CMOS shift register and CMOS control circuitry, eight CMOS data latches, and eight bipolar current-sinking Darlington output drivers. The 500 mA, NPN Darlington outputs, with integral transient-suppression diodes, are suitable for use with relays, solenoids, and other inductive loads.

All package variations of the A6841 offer premium performance with a minimum output-breakdown voltage rating of 50 V (35 V sustaining). All drivers can be operated with a split supply where the negative supply is up to -20 V.

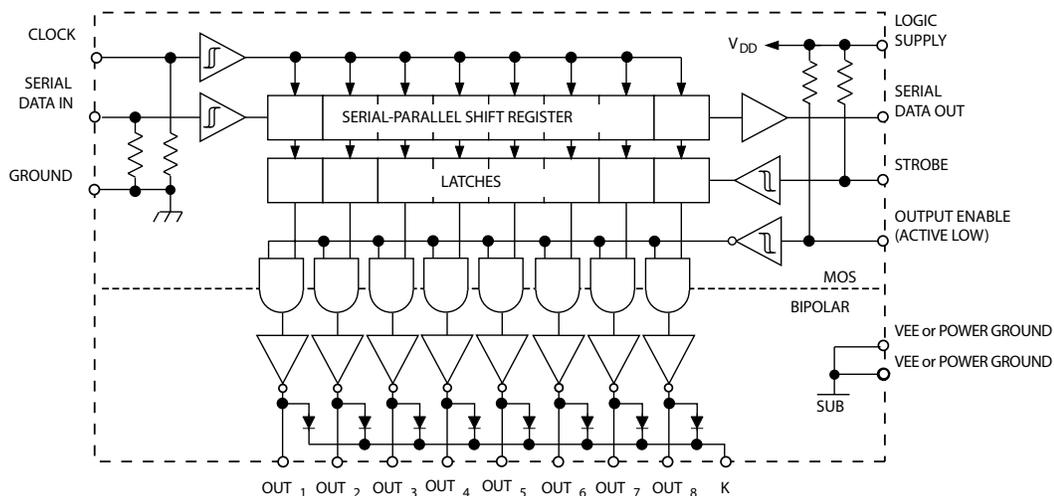
The CMOS inputs are compatible with standard CMOS logic levels. TTL circuits may require the use of appropriate pull-up resistors. By using the serial data output, drivers can be cascaded for interface applications requiring additional drive lines.

The A6841 is provided in an 18-pin plastic DIP (suffix A), and a 20-pin wide-body SOIC (suffix LW) with improved thermal characteristics compared to the 18-pin SOIC version it replaces (100% pin-compatible electrically). These devices are lead (Pb) free, with 100% matte tin plated leadframes.

Applications include:

- Relays
- Solenoids
- Inductive loads

Functional Block Diagram



Selection Guide

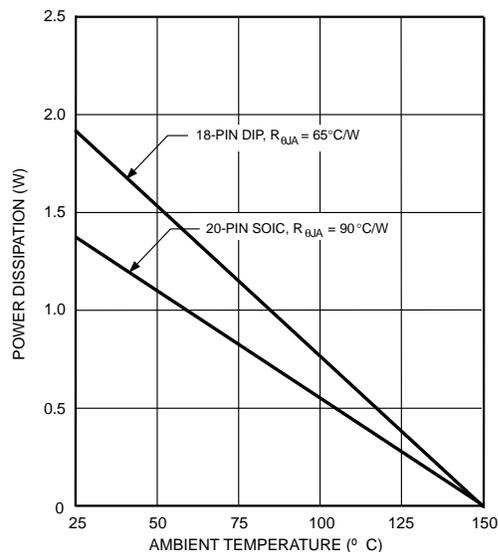
Part Number	Package	Packing	Ambient
A6841EA-T	18-pin DIP	21 pieces per tube	-40°C to 85°C
A6841ELW-20-T	20-pin wide body SOIC	37 pieces per tube	
A6841ELWTR-20-T	20-pin wide body SOIC	1000 pieces per reel	
A6841SA-T	18-pin DIP	21 pieces per tube	-20°C to 85°C
A6841SLW-20-T	20-pin wide body SOIC	37 pieces per tube	
A6841SLWTR-20-T	20-pin wide body SOIC	1000 pieces per reel	

Absolute Maximum Ratings*

Characteristic	Symbol	Notes	Rating	Units
Logic Supply Voltage	V_{DD}		7	V
Emitter Supply Voltage	V_{EE}		-20	V
Input Voltage Range	V_{IN}		-0.3 to $V_{DD} + 0.3$	V
Output Voltage	V_{CE}		50	V
	$V_{CE(SUS)}$	For inductive load applications	35	V
Continuous Output Current	I_{OUT}	Each output	500	mA
Operating Ambient Temperature	T_A	Range E	-40 to 85	°C
		Range S	-20 to 85	°C
Maximum Junction Temperature	$T_J(max)$		150	°C
Storage Temperature	T_{stg}		-55 to 150	°C

Caution: CMOS devices have input-static protection, but are susceptible to damage when exposed to extremely high static-electrical charges.

Allowable Package Power Dissipation, P_D



ELECTRICAL CHARACTERISTICS¹ Unless otherwise noted: $T_A = 25^\circ\text{C}$, $V_{EE} = 0\text{ V}$, logic supply operating voltage $V_{DD} = 3.0\text{ to }5.5\text{ V}$

Characteristic	Symbol	Test Conditions	$V_{dd} = 3.3\text{ V}$			$V_{dd} = 5\text{ V}$			Units
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Output Leakage Current	I_{CEX}	$V_{OUT} = 50\text{ V}$	–	–	10	–	–	10	μA
Output Sustaining Voltage	$V_{CE(SUS)}$	$I_{OUT} = 350\text{ mA}$, $L = 3\text{ mH}$	35	–	–	35	–	–	V
Collector–Emitter Saturation Voltage	$V_{CE(SAT)}$	$I_{OUT} = 100\text{ mA}$	–	–	1.1	–	–	1.1	V
		$I_{OUT} = 200\text{ mA}$	–	–	1.3	–	–	1.3	V
		$I_{OUT} = 350\text{ mA}$	–	–	1.6	–	–	1.6	V
Input Voltage	$V_{IN(1)}$		2.2	–	–	3.3	–	–	V
	$V_{IN(0)}$		–	–	1.1	–	–	1.7	V
Input Resistance	R_{IN}		50	–	–	50	–	–	k Ω
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 ²	f_c		10	–	–	10	–	–	MHz
Logic Supply Current	$I_{DD(1)}$	One output on, OE = L, ST = H	–	–	2.0	–	–	2.0	mA
	$I_{DD(0)}$	All outputs off, OE = H, ST = H, P1 through P8 = L	–	–	100	–	–	100	μA
Clamp Diode Leakage Current	I_r	$V_r = 50\text{ V}$	–	–	50	–	–	50	μA
Clamp Diode Forward Voltage	V_f	$I_f = 350\text{ mA}$	–	–	2	–	–	2	V
Output Enable-to-Output Delay	$t_{dis(BQ)}$	$V_{CC} = 50\text{ V}$, $R_1 = 500\text{ }\Omega$, $C_1 \leq 30\text{ pF}$	–	–	1.0	–	–	1.0	μs
	$t_{en(BQ)}$	$V_{CC} = 50\text{ V}$, $R_1 = 500\text{ }\Omega$, $C_1 \leq 30\text{ pF}$	–	–	1.0	–	–	1.0	μs
Strobe-to-Output Delay	$t_{p(STH-QL)}$	$V_{CC} = 50\text{ V}$, $R_1 = 500\text{ }\Omega$, $C_1 \leq 30\text{ pF}$	–	–	1.0	–	–	1.0	μs
	$t_{p(STH-QH)}$	$V_{CC} = 50\text{ V}$, $R_1 = 500\text{ }\Omega$, $C_1 \leq 30\text{ pF}$	–	–	1.0	–	–	1.0	μs
Output Fall Time	t_f	$V_{CC} = 50\text{ V}$, $R_1 = 500\text{ }\Omega$, $C_1 \leq 30\text{ pF}$	–	–	1.0	–	–	1.0	μs
Output Rise Time	t_r	$V_{CC} = 50\text{ V}$, $R_1 = 500\text{ }\Omega$, $C_1 \leq 30\text{ pF}$	–	–	1.0	–	–	1.0	μs
Clock-to-Serial Data Out Delay	$t_{p(CH-SQX)}$	$I_{OUT} = \pm 200\text{ }\mu\text{A}$	–	50	–	–	50	–	ns

¹Positive (negative) current is defined as conventional current going into (coming out of) the specified device pin.

²Operation at a clock frequency greater than the specified minimum value is possible but not warranted.

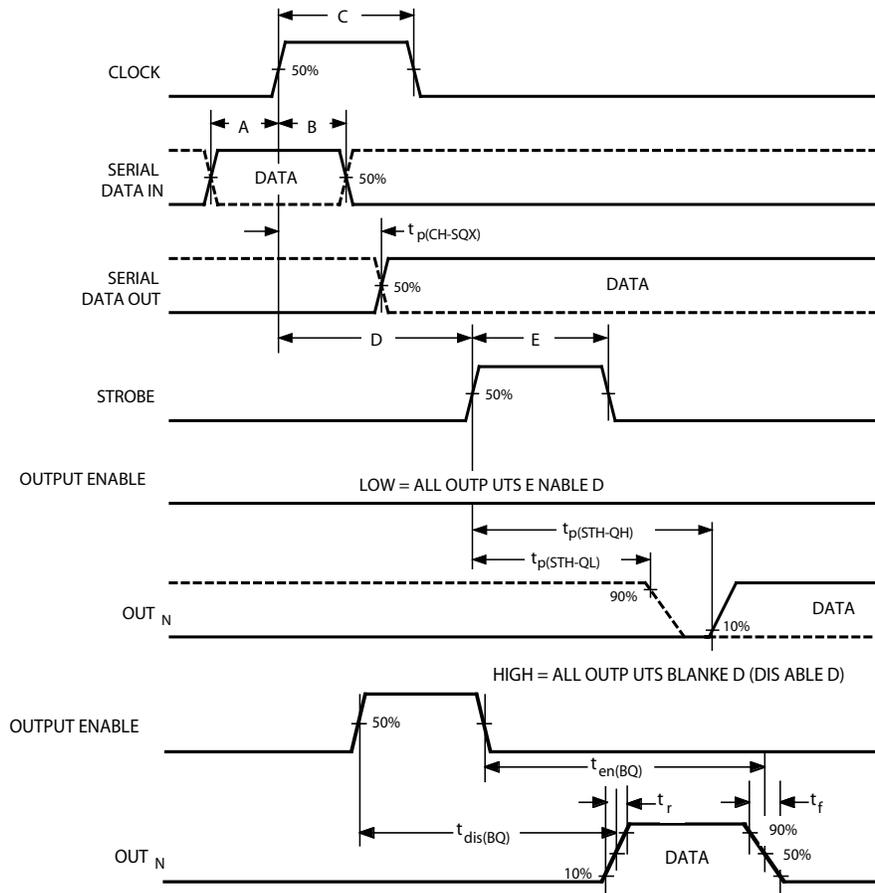
Truth Table

Serial Data Input	Clock Input	Shift Register Contents						Serial Data Output	Strobe Input	Latch Contents						Output Enable Input	Output Contents								
		I_1	I_2	I_3	...	I_8	R_1			R_2	R_3	...	R_8	L_1	L_2		L_3	...	L_8	P_1	P_2	P_3	...	P_8	
H	\uparrow	H	R_1	R_2	...	R_7	R_7																		
L	\uparrow	L	R_1	R_2	...	R_7	R_7																		
X	\uparrow	R_1	R_2	R_3	...	R_8	R_8																		
		X	X	X	...	X	X	L			R_1	R_2	R_3	...	R_8										
		P_1	P_2	P_3	...	P_8	P_8	H			P_1	P_2	P_3	...	P_8	L									
											X	X	X	...	X	H									

L = Low Logic Level
H = High Logic Level
X = Irrelevant

P = Present State
R = Previous State

Timing Requirements and Specifications
(Logic Levels are V_{DD} and Ground)



Key	Description	Symbol	Time (ns)
A	Data Active Time Before Clock Pulse (Data Set-Up Time)	$t_{su(D)}$	25
B	Data Active Time After Clock Pulse (Data Hold Time)	$t_h(D)$	25
C	Clock Pulse Width	$t_w(CH)$	50
D	Time Between Clock Activation and Strobe	$t_{su(C)}$	100
E	Strobe Pulse Width	$t_w(STH)$	50

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.

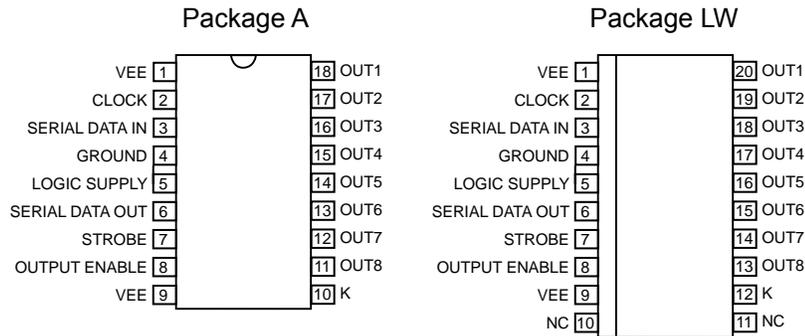
Powering-on with the inputs in the low state ensures that the registers and latches power-on in the low state (POR).

Serial Data present at the input is transferred to the shift register on the logical 0 to logical 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 OUTPUT ENABLE input be high during serial data entry.

When the OUTPUT ENABLE input is high, all of the output buffers are disabled (OFF). The information stored in the latches or shift register is not affected by the OUTPUT ENABLE input. With the OUTPUT ENABLE input low, the outputs are controlled by the state of their respective latches.

Pin-out Diagrams

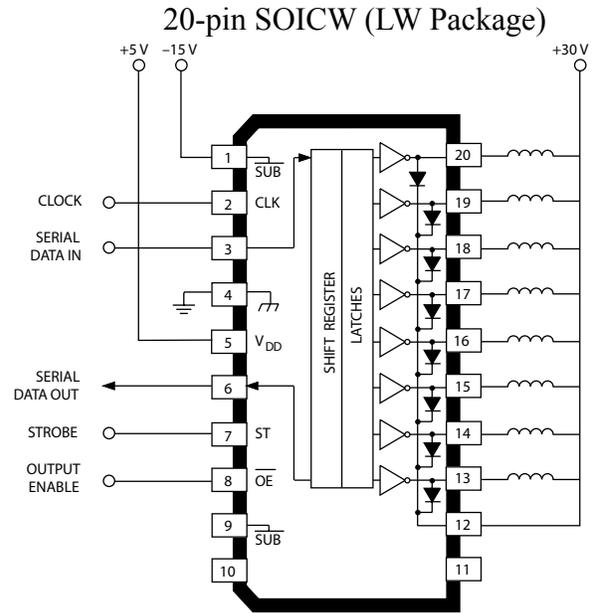
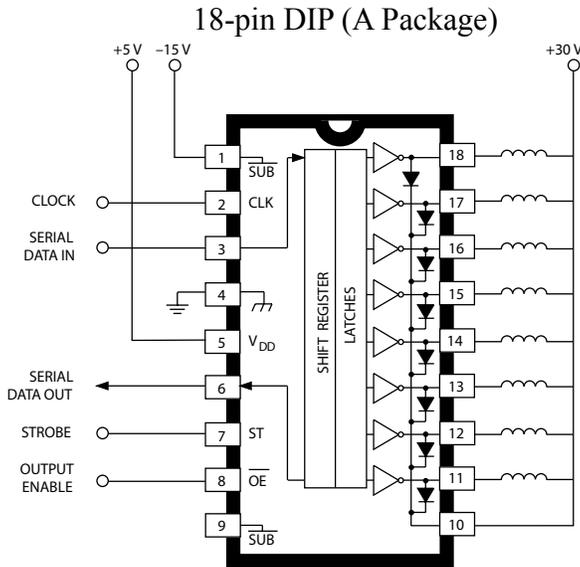


(NC pins, 10 and 11, not present on discontinued 18-pin LW package)

Terminal List Table

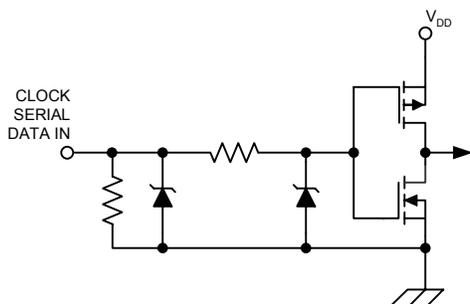
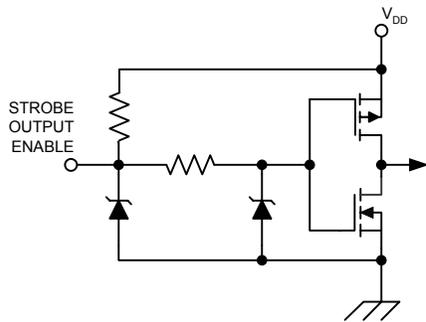
Name	Description	Number	
		Package A	Package LW
VEE	Power Ground to substrate	1, 9	1, 9
CLOCK	Clock	2	2
SERIAL DATA IN	Serial Data In	3	3
GROUND	Logic Ground	4	4
VDD	Logic Supply	5	5
SERIAL DATA OUT	Serial Data Out, for cascading devices	6	6
STROBE	Strobe	7	7
OUTPUT ENABLE	Output Enable (active low)	8	8
K	Common to +V _L , for inductive loads	10	12
NC	Not internally connected	–	10, 11
OUT8	Sink Output 8	11	13
OUT7	Sink Output 7	12	14
OUT6	Sink Output 6	13	15
OUT5	Sink Output 5	14	16
OUT4	Sink Output 4	15	17
OUT3	Sink Output 3	16	18
OUT2	Sink Output 2	17	19
OUT1	Sink Output 1	18	20

Typical Application
Relay/solenoid driver using split supply

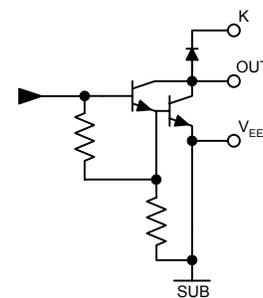


Pins 10 and 11 can float; other pins match discontinued 18-pin SOIC: 1 to 9 same, pins 12 to 20 match pins 10 to 18

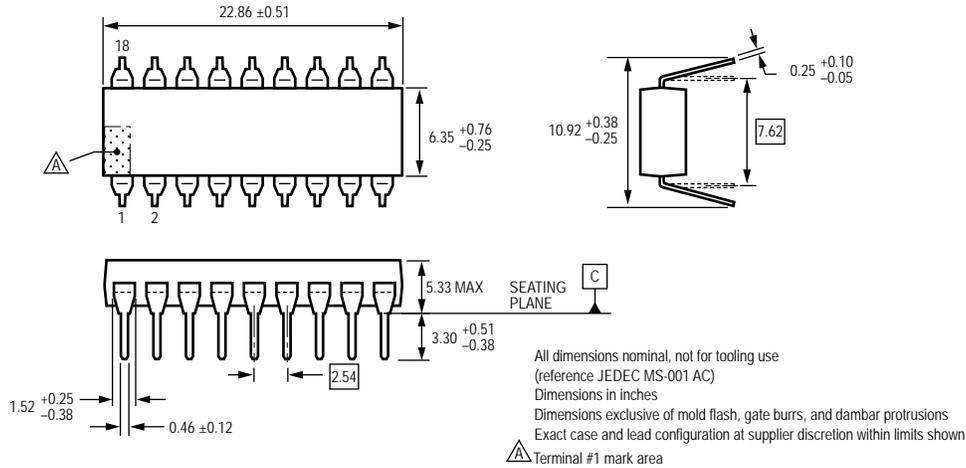
Typical Input Circuits



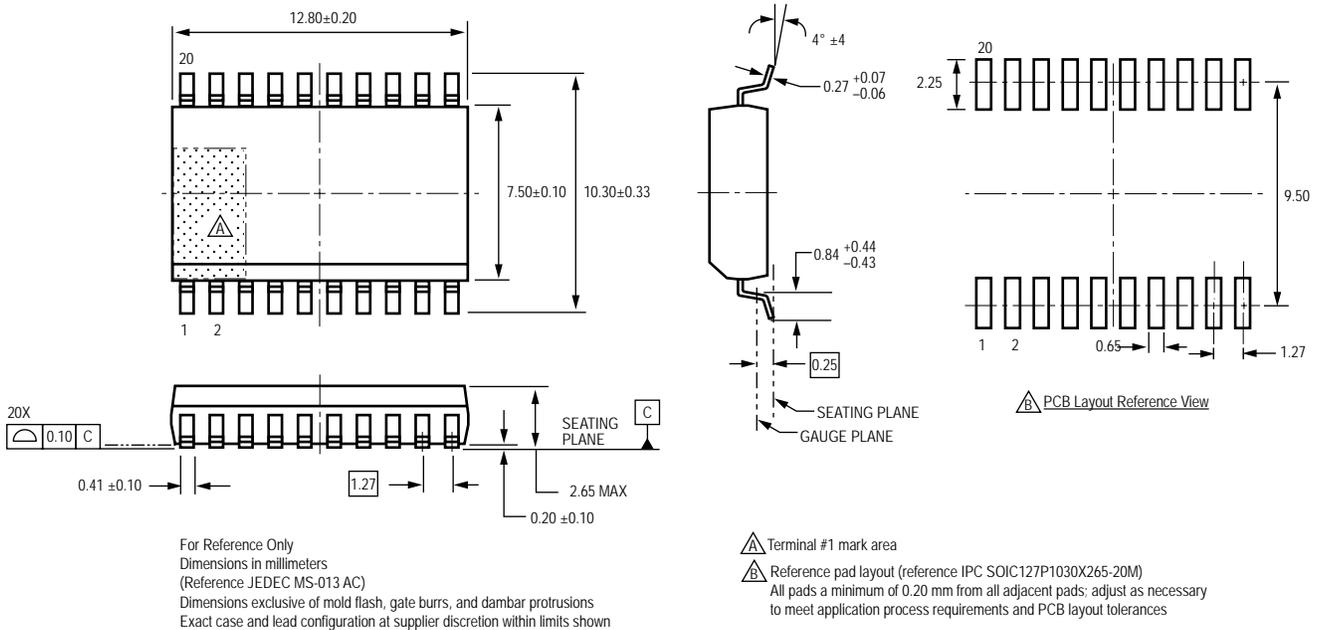
Typical Output Driver



Package A, 18-Pin DIP



Package LW, 20-Pin SOICW



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