

# DATA SHEET

**74F841/842**

Bus interface latches

Product data

Replaces datasheet 74F841/842/843/845/846 of 1999 Jun 23

2004 Jan 23

# 10-bit bus interface latches, non-inverting/inverting (3-State)

## 74F841/74F842

### FEATURES

- High speed parallel latches
- Extra data width for wide address/data paths or buses carrying parity
- High impedance NPN base input structure minimizes bus loading
- $I_{IL}$  is 20  $\mu$ A for minimum bus loading
- Buffered control inputs to reduce AC effects
- Ideal where high speed, light loading, or increased fan-in are required as with MOS microprocessors
- Positive and negative over-shoots are clamped to ground
- 3-State outputs glitch free during power-up and power-down
- 48 mA sink current
- Slim dual in-line 300 mil package
- Broadside pinout

### DESCRIPTION

The 74F841 and 74F842 bus interface latches are designed to provide extra data width for wider address/data paths of buses carrying parity.

The 74F841 consists of ten D-type latches with 3-State outputs. The flip-flops appear transparent to the data when Latch Enable (LE) is HIGH. This allows asynchronous operation, as the output transition follows the data in transition. On the LE HIGH-to-LOW transition, the data that meets the set-up and hold time is latched.

Data appears on the bus when the Output Enable ( $\overline{OE}$ ) is LOW. When  $\overline{OE}$  is HIGH the output is in the high-impedance state.

The 74F842 is the inverted output version of the 74F841.

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74F841, 74F842	5.5 ns	60 mA

### ORDERING INFORMATION

COMMERCIAL RANGE:  $V_{CC} = 5 V \pm 10\%$ ;  $T_{amb} = 0^{\circ}C$  to  $+70^{\circ}C$

Type number	Package		
	Name	Description	Version
N74F841N, N74F842N	DIP24	plastic dual in-line package; 24 leads (300 mil)	SOT222-1
N74F841D, N74F842D	SO24	plastic small outline package; 24 leads; body width 7.5 mm	SOT137-1

### INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

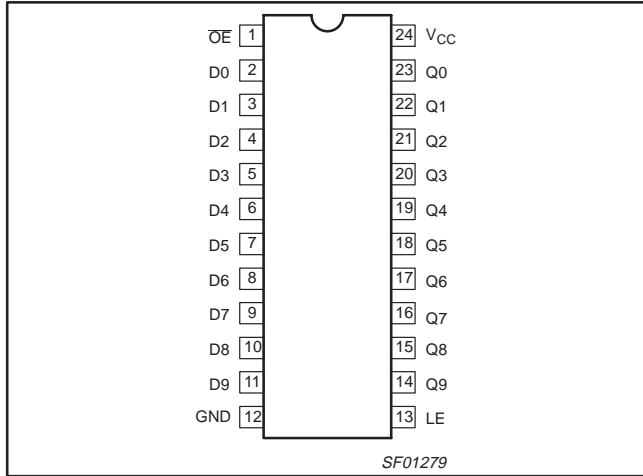
PINS	DESCRIPTION	74F(U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
Dn	Data inputs	1.0/0.033	20 $\mu$ A / 20 $\mu$ A
LE	Latch Enable input	1.0/0.033	20 $\mu$ A / 20 $\mu$ A
$\overline{OE}$	Output Enable input (active-LOW)	1.0/0.033	20 $\mu$ A / 20 $\mu$ A
Qn	Data outputs	1200/80	24 mA / 48 mA
$\overline{Qn}$	Data outputs	1200/80	24 mA / 48 mA

NOTE: One (1.0) FAST Unit Load is defined as: 20  $\mu$ A in the HIGH state and 0.6 mA in the LOW state.

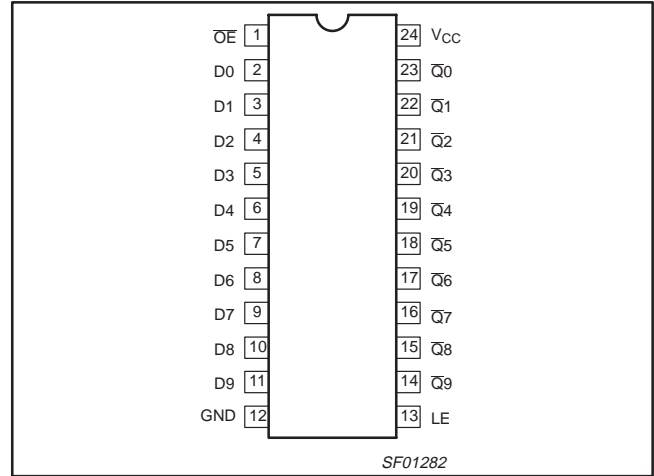
# 10-bit bus interface latches, non-inverting/inverting (3-State)

## 74F841/74F842

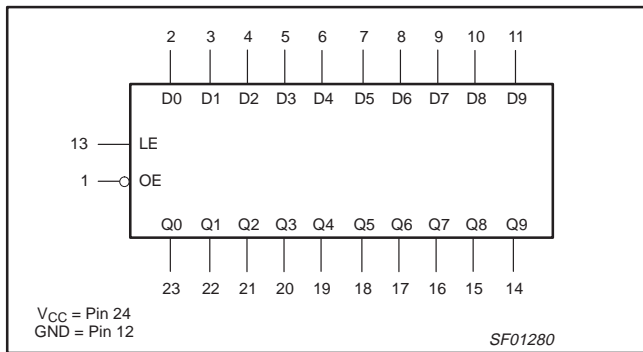
### PIN CONFIGURATION for 74F841



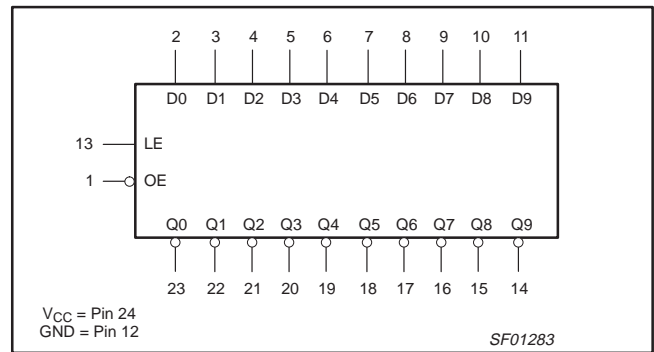
### PIN CONFIGURATION for 74F842



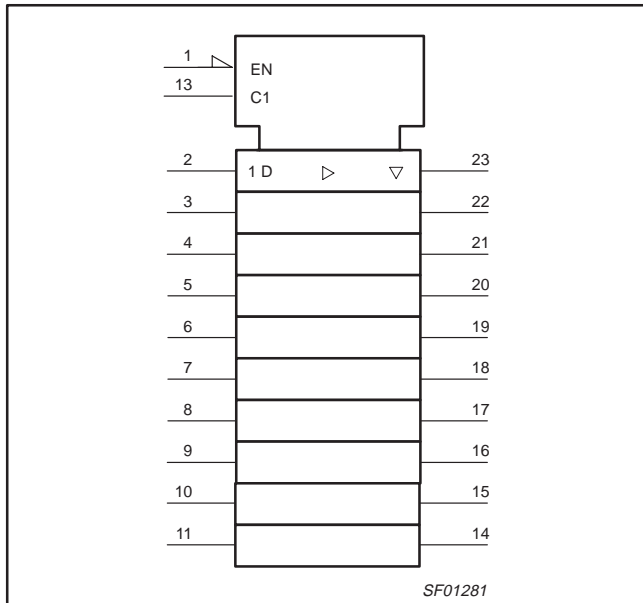
### LOGIC SYMBOL for 74F841



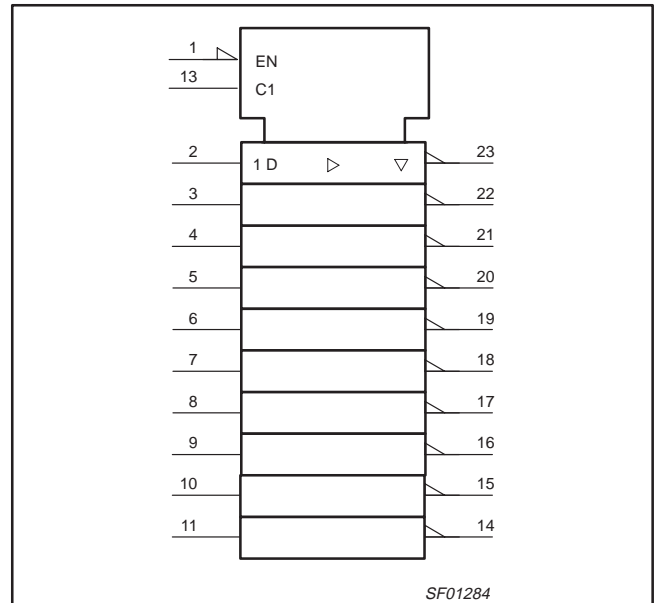
### LOGIC SYMBOL for 74F842



### LOGIC SYMBOL (IEEE/IEC) for 74F841



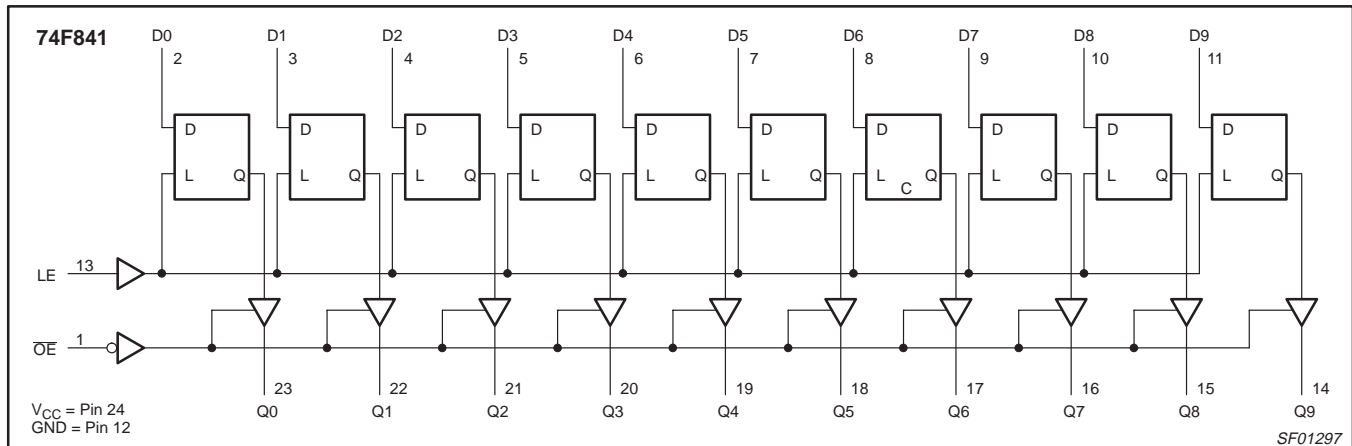
### LOGIC SYMBOL (IEEE/IEC) for 74F842



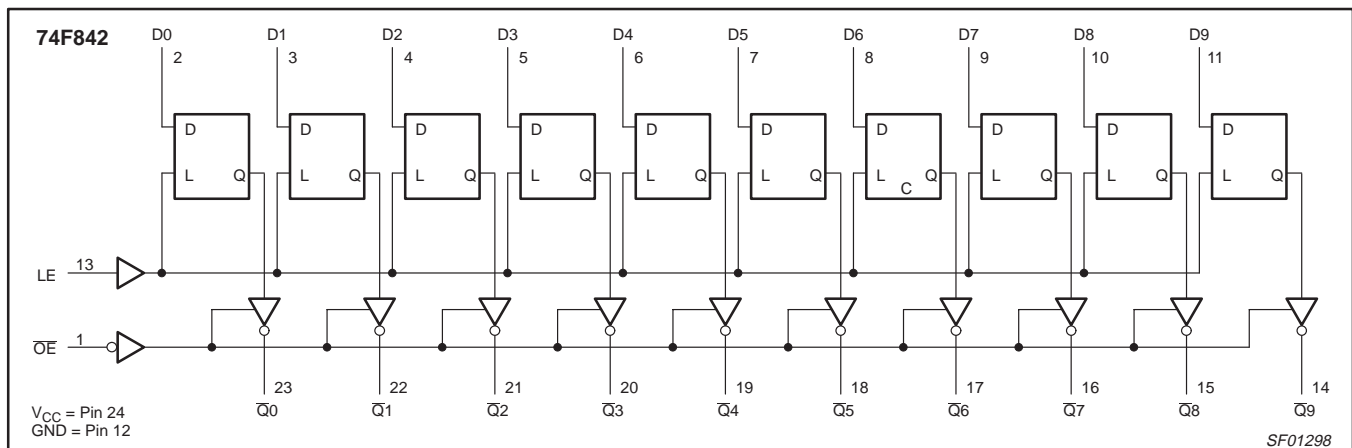
# 10-bit bus interface latches, non-inverting/inverting (3-State)

74F841/74F842

## LOGIC DIAGRAM for 74F841



## LOGIC DIAGRAM for 74F842



## FUNCTION TABLE for 74F841 and 74F842

INPUTS			OUTPUTS		OPERATING MODE
			74F841	74F842	
$\overline{OE}$	LE	D <sub>n</sub>	Q <sub>n</sub>	$\overline{Q}_n$	
L	H	L	L	H	Transparent
L	H	H	H	L	
L	↓	l	L	H	Latched
L	↓	h	H	L	
H	X	X	Z	Z	High Impedance
L	L	X	NC	NC	Hold

H = HIGH voltage level  
 L = LOW voltage level  
 h = HIGH state one set-up time before the HIGH-to-LOW LE transition  
 l = LOW state one set-up time before the HIGH-to-LOW LE transition  
 ↓ = HIGH-to-LOW transition  
 X = Don't care  
 NC = No change  
 Z = High impedance "off" state

# 10-bit bus interface latches, non-inverting/inverting (3-State)

74F841/74F842

## ABSOLUTE MAXIMUM RATINGS

Operation beyond the limits set forth in this table may impair the useful life of the device.  
Unless otherwise noted these limits are over the operating free-air temperature range.

SYMBOL	PARAMETER	RATING	UNIT
$V_{CC}$	supply voltage	-0.5 to +7.0	V
$V_{IN}$	input voltage	-0.5 to +7.0	V
$I_{IN}$	input current	-30 to +5	mA
$V_{OUT}$	voltage applied to output in HIGH output state	-0.5 to $V_{CC}$	V
$I_{OUT}$	current applied to output in LOW output state	84	mA
$T_{amb}$	operating free-air temperature range	0 to +70	°C
$T_{stg}$	storage temperature range	-65 to +150	°C

## RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	LIMITS			UNIT
		MIN	NOM	MAX	
$V_{CC}$	supply voltage	4.5	5.0	5.5	V
$V_{IH}$	HIGH-level input voltage	2.0	-	-	V
$V_{IL}$	LOW-level input voltage	-	-	0.8	V
$I_{IK}$	input clamp current	-	-	-18	mA
$I_{OH}$	HIGH-level output current	-	-	-24	mA
$I_{OL}$	LOW-level output current	-	-	48	mA
$T_{amb}$	operating free-air temperature range	0	-	+70	°C

# 10-bit bus interface latches, non-inverting/inverting (3-State)

74F841/74F842

## DC ELECTRICAL CHARACTERISTICS

Over recommended operating free-air temperature range unless otherwise noted.

SYMBOL	PARAMETER		TEST CONDITIONS <sup>1</sup>		LIMITS			UNIT		
					MIN	TYP <sup>2</sup>	MAX			
V <sub>OH</sub>	HIGH-level output voltage		V <sub>CC</sub> = MIN; V <sub>IL</sub> = MAX; V <sub>IH</sub> = MIN	I <sub>OH</sub> = -15 mA	± 10%V <sub>CC</sub>	2.2	–	–	V	
					± 5%V <sub>CC</sub>	2.2	3.3	–	V	
				I <sub>OH</sub> = -24 mA	± 10%V <sub>CC</sub>	2.0	–	–	V	
					± 5%V <sub>CC</sub>	2.0	–	–	V	
V <sub>OL</sub>	LOW-level output voltage		V <sub>CC</sub> = MIN; V <sub>IL</sub> = MAX; V <sub>IH</sub> = MIN	I <sub>OL</sub> = 32 mA	± 10%V <sub>CC</sub>	–	0.38	0.55	V	
				I <sub>OL</sub> = 48 mA	± 5%V <sub>CC</sub>	–	0.38	0.55	V	
V <sub>IK</sub>	Input clamp voltage		V <sub>CC</sub> = MIN; I <sub>I</sub> = I <sub>IK</sub>		–	-0.73	-1.2	V		
I <sub>I</sub>	Input current at maximum input voltage		V <sub>CC</sub> = 0 V; V <sub>I</sub> = 7.0 V		–	–	100	μA		
I <sub>IH</sub>	HIGH-level input current		V <sub>CC</sub> = MAX; V <sub>I</sub> = 2.7 V		–	–	20	μA		
I <sub>IL</sub>	LOW-level input current		V <sub>CC</sub> = MAX; V <sub>I</sub> = 0.5 V		–	–	-20	μA		
I <sub>OZH</sub>	Off-state output current, HIGH-level voltage applied		V <sub>CC</sub> = MAX; V <sub>O</sub> = 2.7 V		–	–	50	μA		
I <sub>OZL</sub>	Off-state output current, LOW-level voltage applied		V <sub>CC</sub> = MAX; V <sub>O</sub> = 0.5 V		–	–	-50	μA		
I <sub>OS</sub>	Short-circuit output current <sup>3</sup>		V <sub>CC</sub> = MAX		-100	–	-225	mA		
I <sub>CC</sub>	Supply current (total)		74F841	I <sub>CCH</sub>	V <sub>CC</sub> = MAX	–	50	65	mA	
				I <sub>CCL</sub>		–	60	80	mA	
				I <sub>CCZ</sub>		–	70	92	mA	
			74F842	I <sub>CCH</sub>		V <sub>CC</sub> = MAX	–	40	60	mA
				I <sub>CCL</sub>			–	65	90	mA
				I <sub>CCZ</sub>			–	60	90	mA

### NOTES:

- For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
- All typical values are at V<sub>CC</sub> = 5 V, T<sub>amb</sub> = 25 °C.
- Not more than one output should be shorted at a time. For testing I<sub>OS</sub>, the use of high-speed test apparatus and/or sample-and-hold techniques are preferable in order to minimize internal heating and more accurately reflect operational values. Otherwise, prolonged shorting of a HIGH output may raise the chip temperature well above normal and thereby cause invalid readings in other parameter tests. In any sequence of parameter test, I<sub>OS</sub> tests should be performed last.

# 10-bit bus interface latches, non-inverting/inverting (3-State)

74F841/74F842

## AC ELECTRICAL CHARACTERISTICS for 74F841/74F842

SYMBOL	PARAMETER		TEST CONDITION	LIMITS					UNIT
				T <sub>amb</sub> = +25 °C V <sub>CC</sub> = +5.0 V C <sub>L</sub> = 50 pF; R <sub>L</sub> = 500 Ω			T <sub>amb</sub> = 0 °C to +70 °C V <sub>CC</sub> = +5.0 V ± 10% C <sub>L</sub> = 50 pF; R <sub>L</sub> = 500 Ω		
				MIN	TYP	MAX	MIN	MAX	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation delay Dn to Qn	74F841	Waveform 1, 2	2.0 2.5	4.0 4.5	7.5 7.5	2.0 2.5	8.0 8.0	ns
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation delay LE to Qn		Waveform 1, 2	4.5 4.0	6.5 6.0	9.5 9.0	4.0 3.5	10.0 9.5	ns
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation delay Dn to Q̄n	74F842	Waveform 1, 2	3.5 3.0	5.5 5.0	8.5 8.0	4.5 4.0	9.0 8.5	ns
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation delay LE to Q̄n		Waveform 1, 2	5.0 4.5	7.0 6.5	10.0 9.0	3.0 3.0	10.5 9.5	ns
t <sub>PZH</sub> t <sub>PZL</sub>	Output enable time HIGH or LOW-level OE to Qn or Q̄n		Waveform 4 Waveform 5	2.5 4.0	4.5 6.0	8.0 9.5	2.0 3.0	8.5 10.5	ns
t <sub>PHZ</sub> t <sub>PLZ</sub>	Output disable time HIGH or LOW-level OE to Qn or Q̄n		Waveform 4 Waveform 5	1.0 1.0	4.5 5.0	8.0 8.0	1.0 1.0	8.5 8.5	ns

## AC SET-UP REQUIREMENTS for 74F841/74F842

SYMBOL	PARAMETER		TEST CONDITION	LIMITS				UNIT
				T <sub>amb</sub> = +25 °C V <sub>CC</sub> = +5.0 V C <sub>L</sub> = 50 pF; R <sub>L</sub> = 500 Ω		T <sub>amb</sub> = 0 °C to +70 °C V <sub>CC</sub> = +5.0 V ± 10% C <sub>L</sub> = 50 pF; R <sub>L</sub> = 500 Ω		
				MIN	TYP	MIN	MAX	
t <sub>s</sub> (H) t <sub>s</sub> (L)	Set-up time, HIGH or LOW Dn to LE		Waveform 3	0.0 0.0	– –	1.0 1.0	– –	ns
t <sub>h</sub> (H) t <sub>h</sub> (L)	Hold time, HIGH or LOW Dn to LE	74F841	Waveform 3	2.5 3.0	– –	3.0 4.0	– –	ns
t <sub>w</sub> (H)	LE pulse width, HIGH		Waveform 3	3.5	–	4.0	–	ns
t <sub>h</sub> (H) t <sub>h</sub> (L)	Hold time, HIGH or LOW Dn to LE	74F842	Waveform 3	3.0 3.5	– –	3.5 4.5	– –	ns
t <sub>w</sub> (H)	LE pulse width, HIGH		Waveform 3	3.0	–	3.0	–	ns

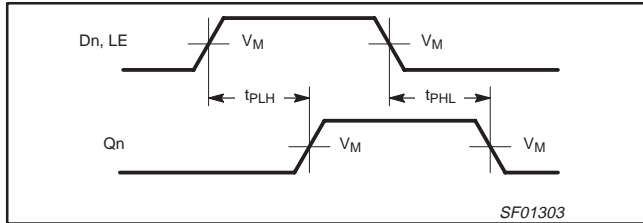
# 10-bit bus interface latches, non-inverting/inverting (3-State)

74F841/74F842

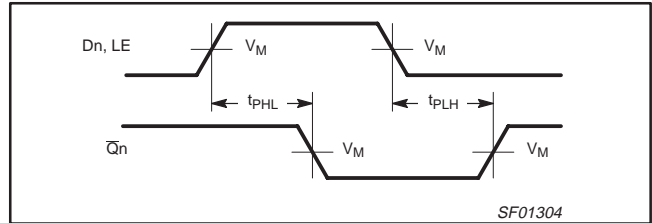
## AC WAVEFORMS

For all waveforms,  $V_M = 1.5\text{ V}$ .

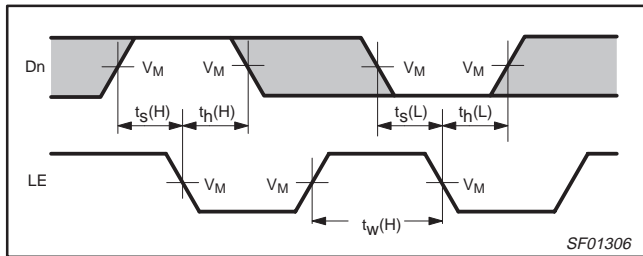
The shaded areas indicate when the input is permitted to change for predictable output performance.



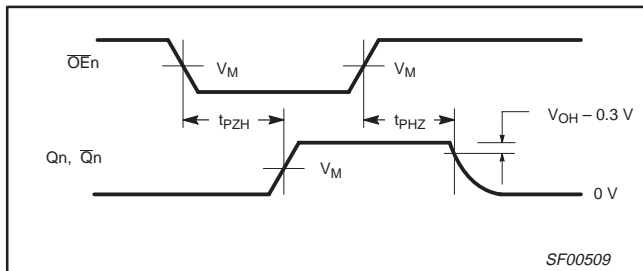
**Waveform 1. Propagation delay, non-inverting path**



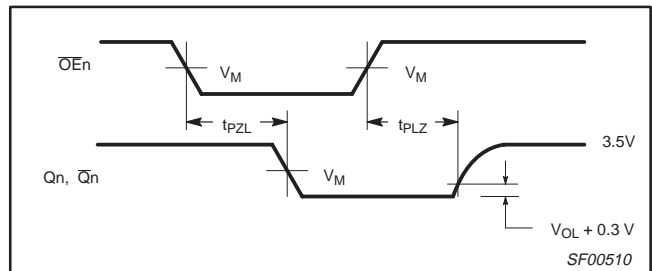
**Waveform 2. Propagation delay, inverting path**



**Waveform 3. Data set-up and hold times**



**Waveform 4. 3-State Output Enable time to HIGH level and Output Disable time from HIGH level**



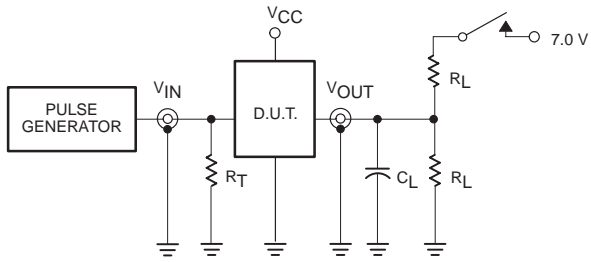
**Waveform 5. 3-State Output Enable time to LOW level and Output Disable time from LOW level**



# 10-bit bus interface latches, non-inverting/inverting (3-State)

74F841/74F842

## TEST CIRCUIT AND WAVEFORMS



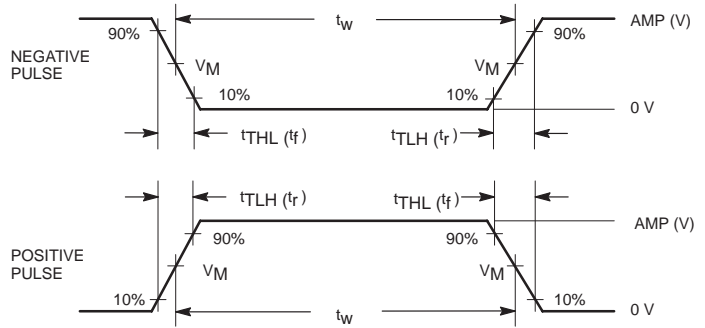
Test Circuit for 3-State Outputs

### SWITCH POSITION

TEST	SWITCH
$t_{PLZ}$	closed
$t_{PZL}$	closed
All other	open

### DEFINITIONS:

- $R_L$  = Load resistor; see AC electrical characteristics for value.
- $C_L$  = Load capacitance includes jig and probe capacitance; see AC electrical characteristics for value.
- $R_T$  = Termination resistance should be equal to  $Z_{OUT}$  of pulse generators.



Input Pulse Definition

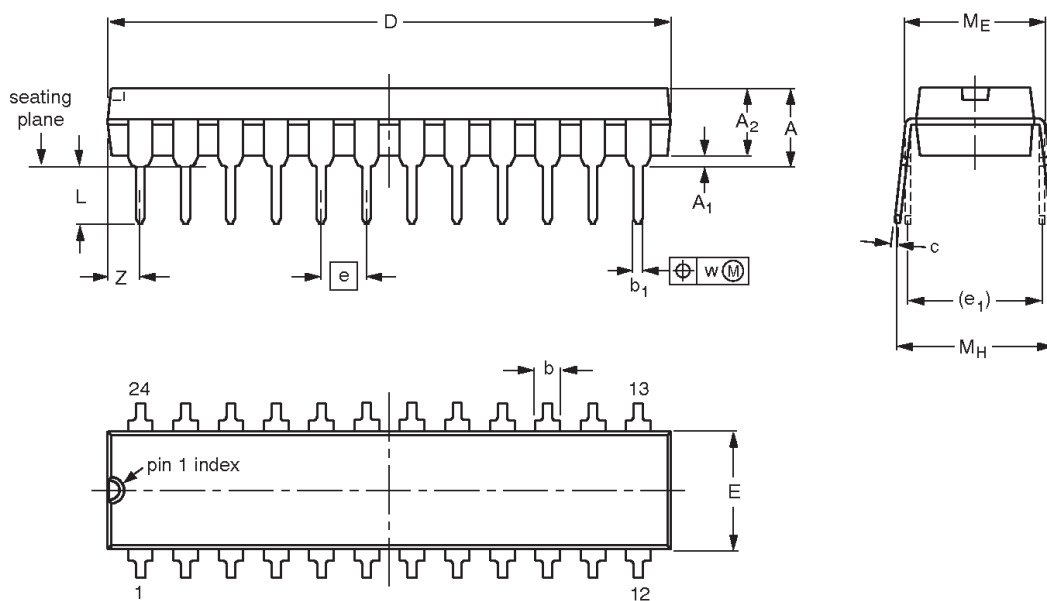
family	INPUT PULSE REQUIREMENTS					
	amplitude	$V_M$	rep. rate	$t_w$	$t_{TLH}$	$t_{THL}$
74F	3.0 V	1.5 V	1 MHz	500 ns	2.5 ns	2.5 ns

10-bit bus interface latches, non-inverting/inverting (3-State)

74F841/74F842

DIP24: plastic dual in-line package; 24 leads (300 mil)

SOT222-1



DIMENSIONS (mm dimensions are derived from the original inch dimensions)

UNIT	A max.	A <sub>1</sub> min.	A <sub>2</sub> max.	b	b <sub>1</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	e <sub>1</sub>	L	M <sub>E</sub>	M <sub>H</sub>	w	Z <sup>(1)</sup> max.
mm	4.7	0.38	3.94	1.63 1.14	0.56 0.43	0.36 0.25	31.9 31.5	6.73 6.25	2.54	7.62	3.51 3.05	8.13 7.62	10.03 7.62	0.25	2.05
inches	0.185	0.015	0.155	0.064 0.045	0.022 0.017	0.014 0.010	1.256 1.240	0.265 0.246	0.1	0.3	0.138 0.120	0.32 0.30	0.395 0.300	0.01	0.081

Note

1. Plastic or metal protrusions of 0.25 mm (0.01 inch) maximum per side are not included.

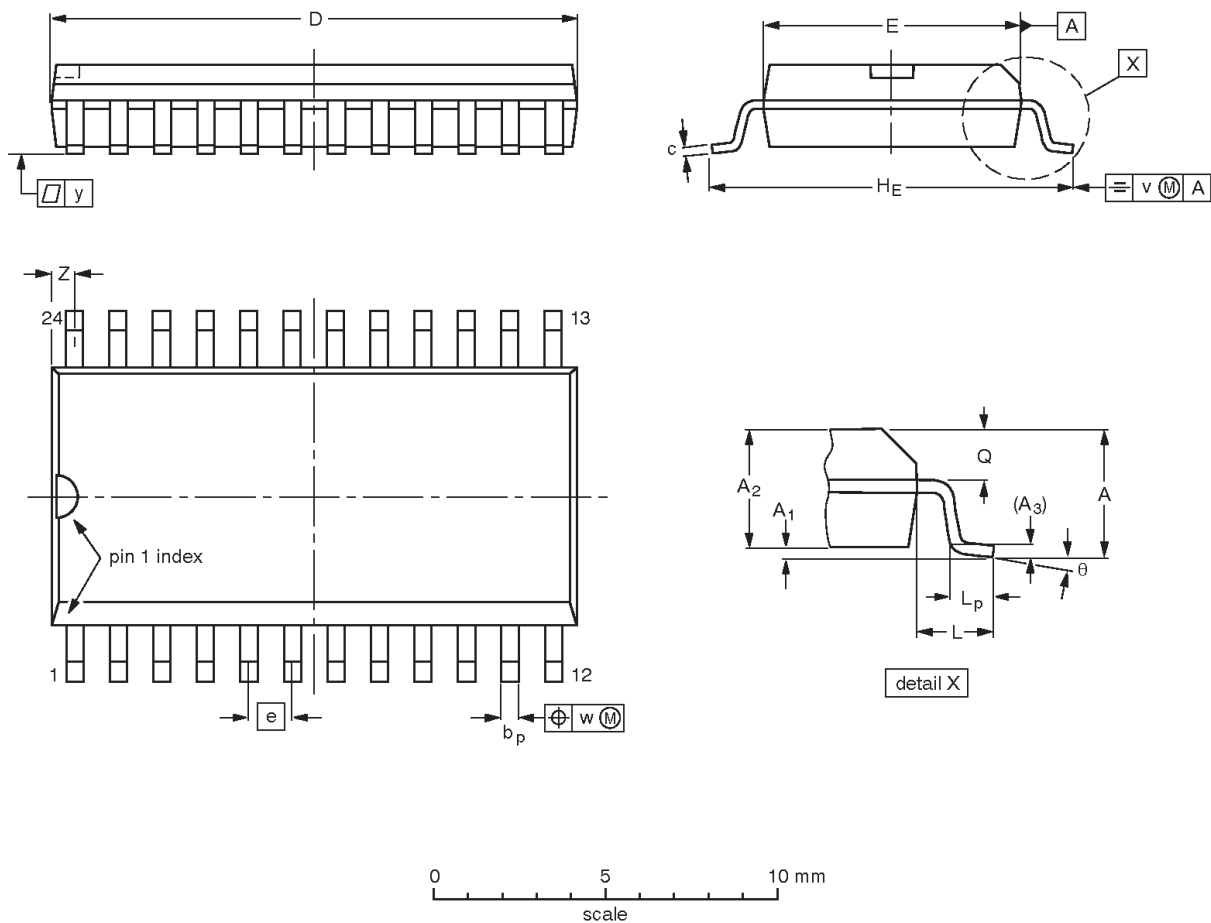
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT222-1		MS-001				99-12-27 03-03-12

10-bit bus interface latches, non-inverting/inverting (3-State)

74F841/74F842

SO24: plastic small outline package; 24 leads; body width 7.5 mm

SOT137-1



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	b <sub>p</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	HE	L	L <sub>p</sub>	Q	v	w	y	Z <sup>(1)</sup>	θ
mm	2.65	0.3 0.1	2.45 2.25	0.25	0.49 0.36	0.32 0.23	15.6 15.2	7.6 7.4	1.27	10.65 10.00	1.4	1.1 0.4	1.1 1.0	0.25	0.25	0.1	0.9 0.4	8° 0°
inches	0.1	0.012 0.004	0.096 0.089	0.01	0.019 0.014	0.013 0.009	0.61 0.60	0.30 0.29	0.05	0.419 0.394	0.055	0.043 0.016	0.043 0.039	0.01	0.01	0.004	0.035 0.016	

Note

1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT137-1	075E05	MS-013				99-12-27 03-02-19

# 10-bit bus interface latches, non-inverting/inverting (3-State)

74F841/74F842

## REVISION HISTORY

Rev	Date	Description
_4	20040123	<b>Product data (9397 750 12746). ECN 853-1208 A15379 of 22 January 2004.</b> <b>Replaces Product specification 74F841/842/843/845/846_3 dated 1999 Jun 23 (9397 750 06143).</b> Modifications: <ul style="list-style-type: none"> <li>• Delete all references to 74F843, 74F845, 74F846 (products discontinued).</li> </ul>
_3	19990623	<b>Product specification (9397 750 06143). ECN 853-1208 21851 of 23 June 1999.</b> <b>Replaces datasheet 74F841/842/843/844/845/846 of 1999 Jan 08.</b>

## Data sheet status

Level	Data sheet status <sup>[1]</sup>	Product status <sup>[2]</sup> <sup>[3]</sup>	Definitions
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
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