

# DATA SHEET

## **74F2373**

Octal transparent latch with  $30\Omega$   
equivalent output termination (3-State)

Product specification  
Supersedes data of 1995 Jun 20  
IC15 Data Handbook

1999 Feb 01

# Octal transparent latch with 30Ω equivalent output termination (3-State)

74F2373

## FEATURES

- 8-bit transparent latch
- 30 Ohm output termination for driving DRAM
- 3-State outputs glitch free during power-up and power-down
- Common 3-State output register
- Independent register and 3-State buffer operation

## DESCRIPTION

The 74F2373 is an octal transparent latch coupled to eight 3-State output devices. The two sections of the device are controlled independently by enable (E) and output enable ( $\overline{OE}$ ) control gates.

The 30 Ohm series termination on the outputs reduces over/undershoot, making them ideal for driving DRAM

The data on the D inputs is transferred to the latch outputs when the enable (E) input is high. The latch remains transparent to the data input while E is high, and stores the data that is present one setup time before the high-to-low enable transition.

The 3-State output buffers are designed to drive heavily loaded 3-State buses, MOS memories, or MOS microprocessors.

The active low output enable ( $\overline{OE}$ ) controls all eight 3-State buffers independent of the latch operation. When  $\overline{OE}$  is low, latched or transparent data appears at the output.

When  $\overline{OE}$  is high, the outputs are in high impedance "off" state, which means they will neither drive nor load the bus.

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74F2373	4.5ns	35mA

## ORDERING INFORMATION

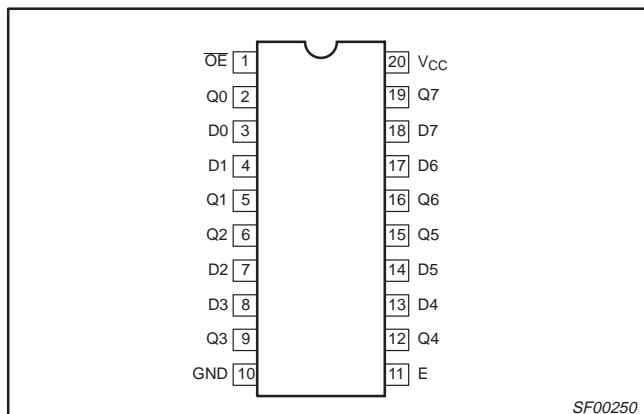
DESCRIPTION	ORDER CODE	DRAWING NUMBER
	COMMERCIAL RANGE $V_{CC} = 5V \pm 10\%$ , $T_{amb} = 0^{\circ}C$ to $+70^{\circ}C$	
20-pin plastic DIP	N74F2373N	SOT146-1
20-pin plastic SOL	N74F2373D	SOT163-1

## INPUT AND OUTPUT LOADING AND FAN OUT TABLE

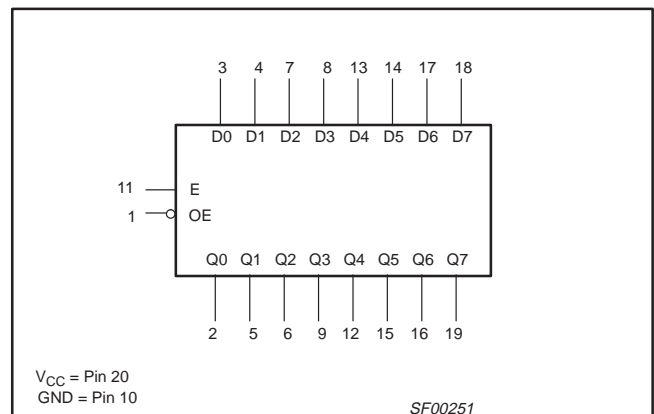
PINS	DESCRIPTION	74F (U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
D0 - D7	Data inputs	1.0/1.0	20μA/0.6mA
E	Enable input (active high)	1.0/1.0	20μA/0.6mA
$\overline{OE}$	Output enable inputs (active low)	1.0/1.0	20μA/0.6mA
Q0 - Q7	3-State outputs	150/40	3.0mA/3.0mA

NOTE: One (1.0) FAST unit load is defined as: 20μA in the high state and 0.6mA in the low state.

## PIN CONFIGURATION



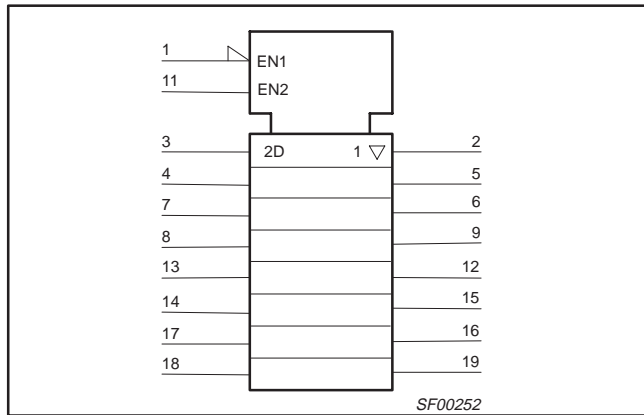
## LOGIC SYMBOL



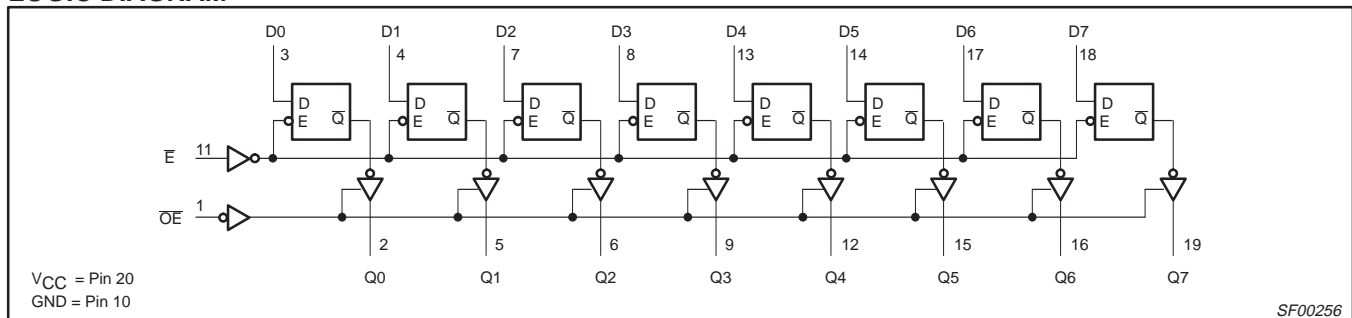
# Octal transparent latch with 30Ω equivalent output termination (3-State)

74F2373

## IEC/IEEE SYMBOL



## LOGIC DIAGRAM



## FUNCTION TABLE

INPUTS			INTERNAL REGISTER	OUTPUTS	OPERATING MODE
$\overline{OE}$	E	Dn		Q0 - Q7	
L	H	L	L	L	Enable and read register
L	H	H	H	H	
L	↓	l	L	L	Latch and read register
L	↓	h	H	H	
L	L	X	NC	NC	Hold
H	L	X	NC	Z	Disable outputs
H	H	Dn	Dn	Z	

### NOTES:

- H = High-voltage level
- h = High state must be present one setup time before the high-to-low enable transition
- L = Low-voltage level
- l = Low state must be present one setup time before the high-to-low enable transition
- NC = No change
- X = Don't care
- Z = High impedance "off" state
- ↓ = High-to-low enable transition

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74F2373

## ABSOLUTE MAXIMUM RATINGS

(Operation beyond the limit 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 <sub>CC</sub>	Supply voltage	-0.5 to +7.0	V
V <sub>IN</sub>	Input voltage	-0.5 to +7.0	V
I <sub>IN</sub>	Input current	-30 to +5	mA
V <sub>OUT</sub>	Voltage applied to output in high output state	-0.5 to V <sub>CC</sub>	V
I <sub>OUT</sub>	Current applied to output in low output state	24	mA
T <sub>amb</sub>	Operating free air temperature range	0 to +70	°C
T <sub>stg</sub>	Storage temperature range	-65 to +150	°C

## RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	LIMITS			UNIT
		MIN	NOM	MAX	
V <sub>CC</sub>	Supply voltage	4.5	5.0	5.5	V
V <sub>IH</sub>	High-level input voltage	2.0			V
V <sub>IL</sub>	Low-level input voltage			0.8	V
I <sub>Ik</sub>	Input clamp current			-18	mA
I <sub>OH</sub>	High-level output current			-3*	mA
I <sub>OL</sub>	Low-level output current			5*	mA
T <sub>amb</sub>	Operating free air temperature range	0		+70	°C

\* 12mA with reduced noise margin

## 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> = -3mA	±10%V <sub>CC</sub>	2.4		V	
			±5%V <sub>CC</sub>	2.7	3.4	V	
		V <sub>CC</sub> = MIN, V <sub>IL</sub> = MAX, V <sub>IH</sub> = MIN, I <sub>OH</sub> = -12mA	±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> = -5mA	±10%V <sub>CC</sub>		0.42	0.50	V
			±5%V <sub>CC</sub>		0.42	0.50	V
		V <sub>CC</sub> = MIN, V <sub>IL</sub> = MAX, V <sub>IH</sub> = MIN, I <sub>OL</sub> = 12mA	±10%V <sub>CC</sub>		0.67		V
			±5%V <sub>CC</sub>		0.67		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> = MAX, V <sub>I</sub> = 7.0V			100	μA	
I <sub>IH</sub>	High-level input current	V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.7V			20	μA	
I <sub>IL</sub>	Low-level input current	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.5V			-0.6	mA	
I <sub>OZH</sub>	Off-state output current, high-level voltage applied	V <sub>CC</sub> = MAX, V <sub>O</sub> = 2.7V			50	μA	
I <sub>OZL</sub>	Off-state output current, low-level voltage applied	V <sub>CC</sub> = MAX, V <sub>O</sub> = 0.5V			-50	μA	
I <sub>OS</sub>	Short-circuit output current <sup>3</sup>	V <sub>CC</sub> = MAX		-60	-150	mA	
I <sub>CC</sub>	Supply current (total)	V <sub>CC</sub> = MAX		35	60	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> = 5V, 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 tests, I<sub>OS</sub> tests should be performed last.

# Octal transparent latch with 30Ω equivalent output termination (3-State)

74F2373

## AC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITION	LIMITS					UNIT
			T <sub>amb</sub> = +25°C V <sub>CC</sub> = +5.0V C <sub>L</sub> = 50pF, R <sub>L</sub> = 500Ω			T <sub>amb</sub> = 0°C to +70°C V <sub>CC</sub> = +5.0V ± 10% C <sub>L</sub> = 50pF, R <sub>L</sub> = 500Ω		
			MIN	TYP	MAX	MIN	MAX	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation delay Dn to Qn	Waveform 2	3.0 2.0	5.3 3.7	8.0 6.0	3.0 2.0	9.0 7.0	ns
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation delay E to Qn	Waveform 1	5.0 3.0	9.0 4.0	12.0 8.0	5.0 3.0	12.5 8.5	ns
t <sub>PZH</sub> t <sub>PZL</sub>	Output enable time to high or low level	Waveform 4 Waveform 5	2.0 2.0	5.0 5.6	12.0 8.0	2.0 2.0	12.5 8.5	ns
t <sub>PHZ</sub> t <sub>PLZ</sub>	Output disable time from high or low level	Waveform 4 Waveform 5	2.0 2.0	4.5 3.8	6.5 5.5	2.0 2.0	7.5 6.5	ns

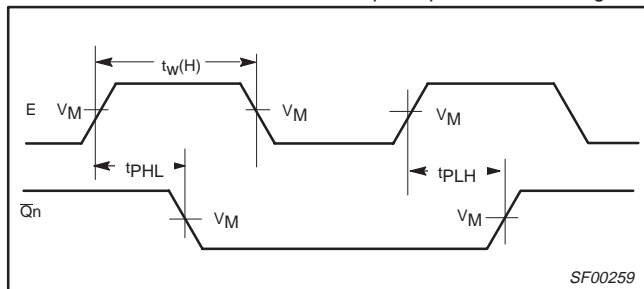
## AC SETUP REQUIREMENTS

SYMBOL	PARAMETER	TEST CONDITION	LIMITS					UNIT
			T <sub>amb</sub> = +25°C V <sub>CC</sub> = +5.0V C <sub>L</sub> = 50pF, R <sub>L</sub> = 500Ω			T <sub>amb</sub> = 0°C to +70°C V <sub>CC</sub> = +5.0V ± 10% C <sub>L</sub> = 50pF, R <sub>L</sub> = 500Ω		
			MIN	TYP	MAX	MIN	MAX	
t <sub>SU</sub> (H) t <sub>SU</sub> (L)	Setup time, high or low level Dn to E	Waveform 3	0 1.0			0 1.0		ns
t <sub>H</sub> (H) t <sub>H</sub> (L)	Hold time, high or low level Dn to E	Waveform 3	3.0 3.0			3.0 3.0		ns
t <sub>w</sub> (H)	E Pulse width, high	Waveform 1	3.5			4.0		ns

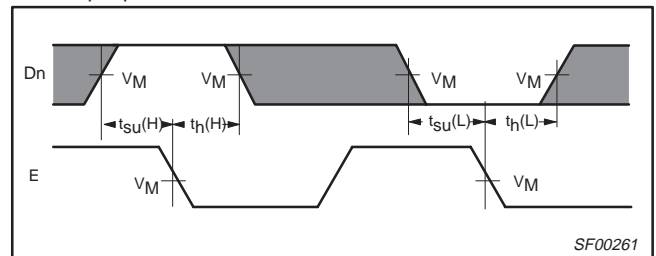
## AC WAVEFORMS

For all waveforms, V<sub>M</sub> = 1.5V.

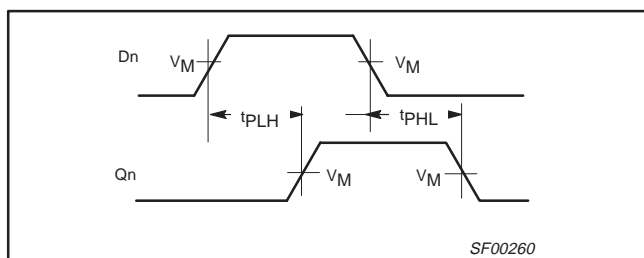
The shaded areas indicate when the input is permitted to change for predictable output performance.



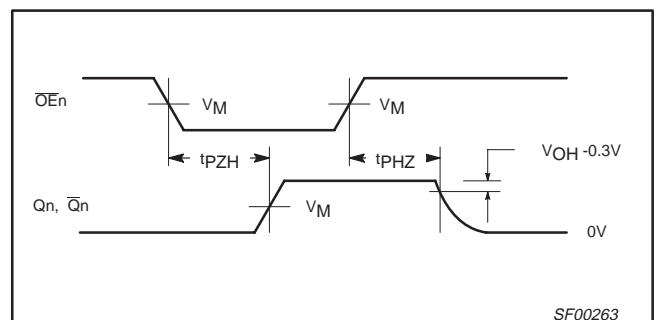
Waveform 1. Propagation delay for enable to output and enable pulse width



Waveform 3. Data setup time and hold times



Waveform 2. Propagation delay for data to output



Waveform 4. 3-State output enable time to high level and output disable time from high level

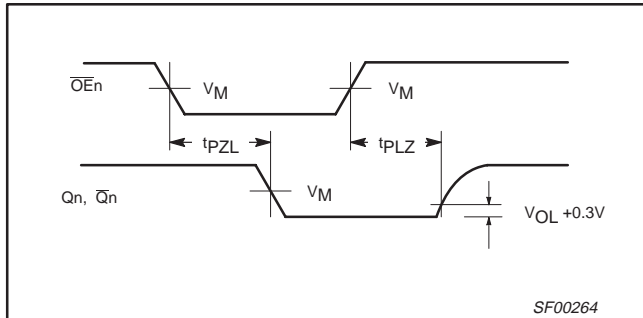
# Octal transparent latch with 30Ω equivalent output termination (3-State)

74F2373

## AC WAVEFORMS (Continued)

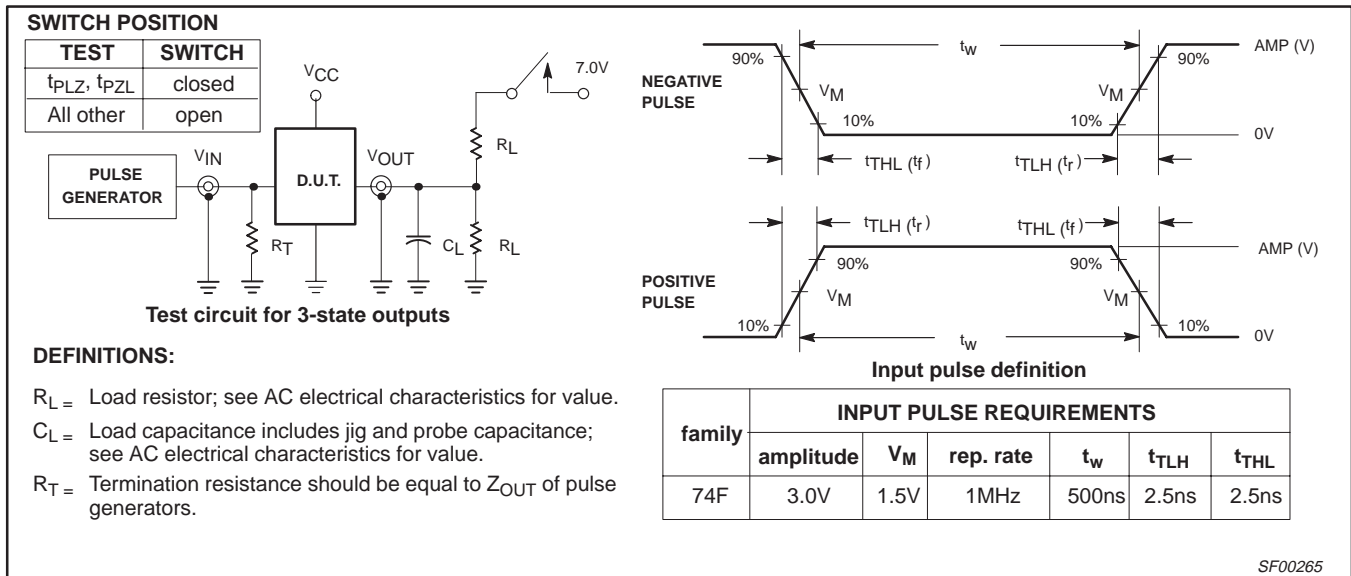
For all waveforms,  $V_M = 1.5V$ .

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



Waveform 5. 3-State output enable time to low level and output disable time from low level

## TEST CIRCUIT AND WAVEFORMS



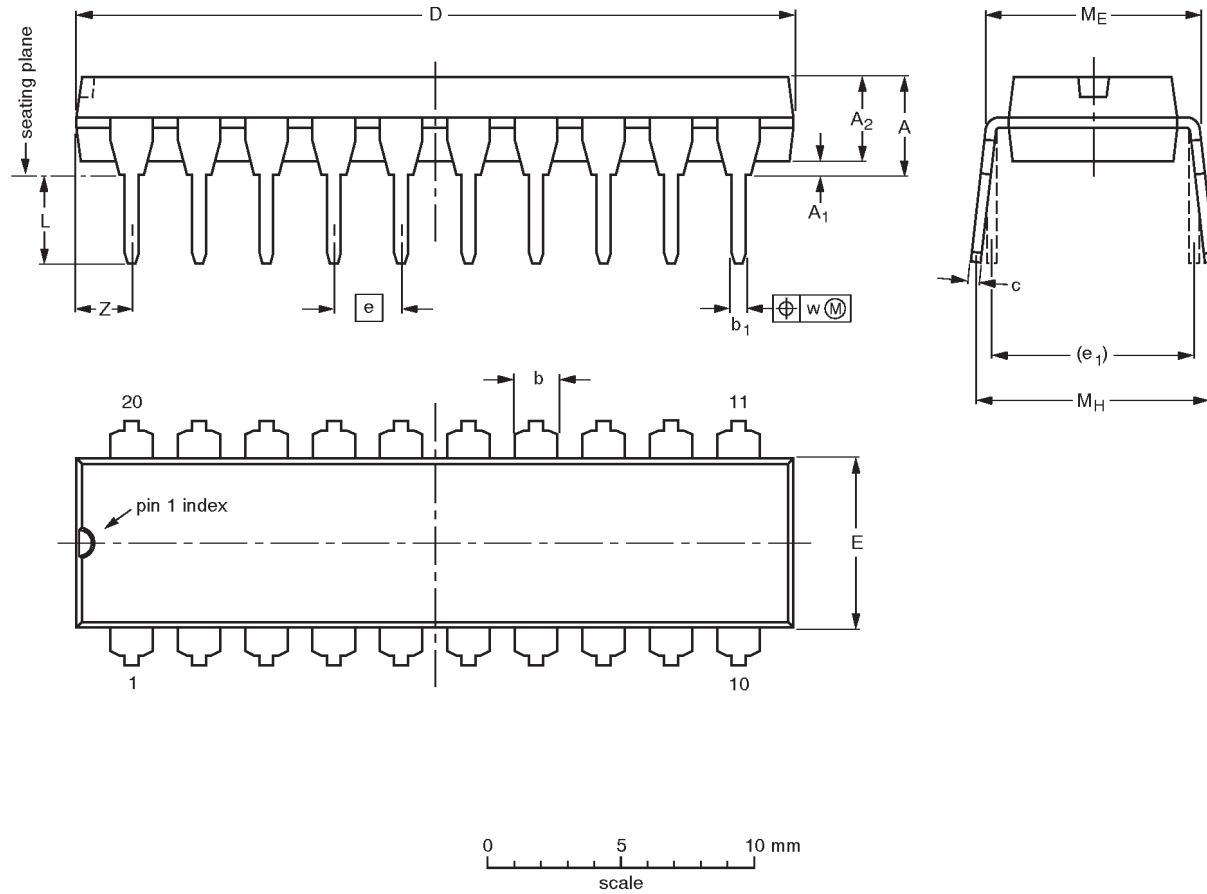
SF00265

# Octal transparent latch with 30Ω equivalent output termination (3-State)

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DIP20: plastic dual in-line package; 20 leads (300 mil)

SOT146-1



**DIMENSIONS** (inch dimensions are derived from the original mm 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	4.2	0.51	3.2	1.73 1.30	0.53 0.38	0.36 0.23	26.92 26.54	6.40 6.22	2.54	7.62	3.60 3.05	8.25 7.80	10.0 8.3	0.254	2.0
inches	0.17	0.020	0.13	0.068 0.051	0.021 0.015	0.014 0.009	1.060 1.045	0.25 0.24	0.10	0.30	0.14 0.12	0.32 0.31	0.39 0.33	0.01	0.078

**Note**

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT146-1			SC603			92-11-17 95-05-24

# Octal transparent latch with 30Ω equivalent output termination (3-State)

74F2373

SO20: plastic small outline package; 20 leads; body width 7.5 mm

SOT163-1



**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	H <sub>E</sub>	L	L <sub>p</sub>	Q	v	w	y	z <sup>(1)</sup>	θ
mm	2.65	0.30 0.10	2.45 2.25	0.25	0.49 0.36	0.32 0.23	13.0 12.6	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	0.10	0.012 0.004	0.096 0.089	0.01	0.019 0.014	0.013 0.009	0.51 0.49	0.30 0.29	0.050	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 maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT163-1	075E04	MS-013AC				95-01-24 97-05-22



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Octal transparent latch with 30Ω equivalent output  
termination (3-State)

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74F2373

**NOTES**

# Octal transparent latch with 30Ω equivalent output termination (3-State)

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## Data sheet status

Data sheet status	Product status	Definition [1]
Objective specification	Development	This data sheet contains the design target or goal specifications for product development. Specification may change in any manner without notice.
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[1] Please consult the most recently issued datasheet before initiating or completing a design.

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