National Semiconductor

Not Intended For New Designs

T-46-07-01

100175
Quint Latch 100K In/10K Out

General Description

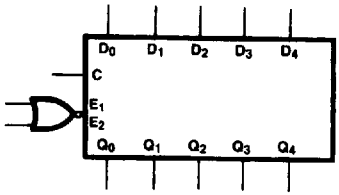
The 100175 is a 5-bit latch with temperature and voltage compensated 100K compatible inputs and voltage compensated 10K compatible outputs. Each latch has one data input and one output. All five latches share a common clear input and two enable inputs. All inputs have 50 kΩ pull-down resistors.

Features

- Outputs specified to drive a 50Ω load
- Available in 16-pin ceramic DIP
- 100K compatible inputs/10K compatible outputs

Ordering Code: See Section 6

Logic Symbol

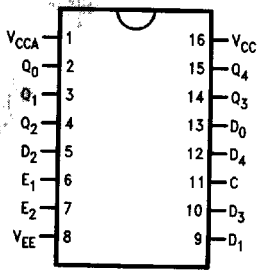


TL/F/9870–2

Pin Names	Description
D_0–D_4	100K Data Inputs
E_1, E_2	100K Enable Inputs
C	100K Common Clear Input
Q_0–Q_4	10K Data Outputs

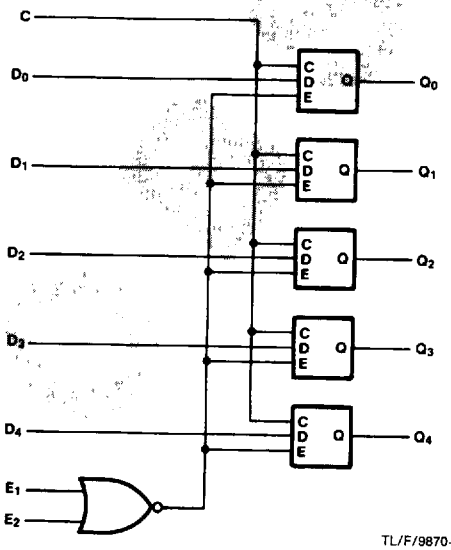
Connection Diagram

16-Pin DIP



TL/F/9870–1

Logic Diagram



TL/F/9870–3

Truth Table

Inputs				Output
D_n	E_1	E_2	C	Q_n
H	L	L	X	H
L	L	L	X	L
X	H	X	L	Q_{n-1}
X	X	H	L	Q_{n-1}
X	H	X	H	L
X	X	H	H	L

H = HIGH Voltage Level
L = LOW Voltage Level
X = Don't Care
Q_{n-1} = Previous State

3

100175

Absolute Maximum Ratings

Above which the useful life may be impaired

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Storage Temperature	−65°C to +150°C
Ambient Temperature Under Bias (T_A)	−55°C to +125°C
Maximum Junction Temperature (T_J)	+150°C
Supply Voltage	−8V
Input Voltage (DC)	−5.2V to +0V
Output Current (DC Output HIGH)	−55 mA
Operating Range	−5.72V to −4.68V
Lead Temperature (Soldering, 10 sec.)	300°C

Recommended Operating Conditions

	Min	Typ	Max
Supply Voltage (V_{EE})	−5.72V	−5.2V	−4.68V
Ambient Temperature (T_A)	0°C		+75°C

DC Electrical Characteristics

V_{EE} = −5.2V, V_{CC} = V_{CCA} = GND, T_A = 0°C to +75°C (Notes 1, 2)

Symbol	Parameter	Temp	Min	Typ	Max	Units	Conditions
V_{OH}	Output HIGH Voltage	T_A = 0°C	−1000		−840	mV	V_{IN} = V_{IH} (Max) or V_{IL} (Min)
		T_A = +25°C	−960		−810	mV	
		T_A = +75°C	−900		−720	mV	
V_{OL}	Output LOW Voltage	T_A = 0°C	−1870		−1665	mV	V_{IN} = V_{IH} (Max) or V_{IL} (Min)
		T_A = +25°C	−1850		−1650	mV	
		T_A = +75°C	−1830		−1625	mV	
V_{OHC}	Output HIGH Voltage	T_A = 0°C	−1020			mV	V_{IN} = V_{IH} (Min) or V_{IL} (Max)
		T_A = +25°C	−980			mV	
		T_A = +75°C	−920			mV	
V_{OLC}	Output LOW Voltage	T_A = 0°C			−1645	mV	V_{IN} = V_{IH} (Min) or V_{IL} (Max)
		T_A = +25°C			−1630	mV	
		T_A = +75°C			−1605	mV	
V_{IH}	Input HIGH Voltage		−1165		−880	mV	Guaranteed HIGH Signal for All Inputs
V_{IL}	Input LOW Voltage		−1810		−1475	mV	Guaranteed LOW Signal for All Inputs
I_{IH}	Input HIGH Current				290		V_{IN} = V_{IH} (Max)
I_{IL}	Input LOW Current		0.50			μA	V_{IN} = V_{IL} (Min)
I_{EE}	V_{EE} Supply Current		−125	−90	−50	mA	Inputs Open

Loading with 50Ω to −2.0V

Note 1: The specified limits represent the "worst case" value for the parameter. Since these "worst case" values normally occur at the temperature extremes, additional noise immunity and guard banding can be achieved by decreasing the allowable system operating ranges

Note 2: The specified limits shown in the DC Characteristics can be met only after thermal equilibrium has been established. Thermal equilibrium is established by applying power for at least 2 minutes while maintaining transverse air flow of 2.5 meters/s (500 linear feet/min) over the device either mounted in the test socket or on the printed circuit board. Test voltage values are given in the DC Operating Conditions and defined in *Figure 4.*

DC Electrical Characteristics

V_{EE} = −4.68V, V_{CC} = V_{CCA} = GND, T_A = 0°C to +75°C (Notes 1, 2)

Symbol	Parameter	Temp	Min	Typ	Max	Units	Conditions
V_{OH}	Output HIGH Voltage	T_A = 0°C	−1000		−840	mV	V_{IN} = V_{IH} (Max) or V_{IL} (Min)
		T_A = +25°C	−960		−810	mV	
		T_A = +75°C	−900		−720	mV	
V_{OL}	Output LOW Voltage	T_A = 0°C	−1870		−1665	mV	V_{IN} = V_{IH} (Max) or V_{IL} (Min)
		T_A = +25°C	−1850		−1650	mV	
		T_A = +75°C	−1830		−1625	mV	
V_{OHC}	Output HIGH Voltage	T_A = 0°C	−1020			mV	V_{IN} = V_{IH} (Min) or V_{IL} (Max)
		T_A = +25°C	−980			mV	
		T_A = +75°C	−920			mV	
V_{OLC}	Output LOW Voltage	T_A = 0°C			−1645	mV	V_{IN} = V_{IH} (Min) or V_{IL} (Max)
		T_A = +25°C			−1630	mV	
		T_A = +75°C			−1605	mV	
V_{IH}	Input HIGH Voltage		−1150		−880	mV	Guaranteed HIGH Signal for All Inputs
V_{IL}	Input LOW Voltage		−1810		−1475	mV	Guaranteed LOW Signal for All Inputs
I_{IH}	Input HIGH Current				290		V_{IN} = V_{IH} (Max)
I_{IL}	Input LOW Current		0.50			μA	V_{IN} = V_{IL} (Min)
I_{EE}	V_{EE} Supply Current		−125	−90	−50	mA	Inputs Open

Loading with 50Ω to −2.0V

Note 1: The specified limits represent the "worst case" value for the parameter. Since these "worst case" values normally occur at the temperature extremes, additional noise immunity and guard banding can be achieved by decreasing the allowable system operating ranges.

Note 2: The specified limits shown in the DC Characteristics can be met only after thermal equilibrium has been established. Thermal equilibrium is established by applying power for at least 2 minutes while maintaining transverse air flow of 2.5 meters/s (500 linear feet/min) over the device either mounted in the test socket or on the printed circuit board. Test voltage values are given in the DC Operating Conditions and defined in *Figure 4.*

100175

DC Electrical Characteristics

$V_{EE} = -5.72V$, $V_{CC} = V_{CCA} = GND$, $T_A = 0°C$ to $+75°C$ (Notes 1, 2)

Symbol	Parameter	Temp	Min	Typ	Max	Units	Conditions
V_{OH}	Output HIGH Voltage	$T_A = 0°C$	−1000		−840	mV	$V_{IN} = V_{IH}$ (Max) or V_{IL} (Min)
		$T_A = +25°C$	−960		−810	mV	
		$T_A = +75°C$	−900		−720	mV	
V_{OL}	Output LOW Voltage	$T_A = 0°C$	−1870		−1665	mV	$V_{IN} = V_{IH}$ (Max) or V_{IL} (Min)
		$T_A = +25°C$	−1850		−1650	mV	
		$T_A = +75°C$	−1830		−1625	mV	
V_{OHC}	Output HIGH Voltage	$T_A = 0°C$	−1020			mV	$V_{IN} = V_{IH}$ (Min) or V_{IL} (Max)
		$T_A = +25°C$	−980			mV	Loading with 50Ω to −2.0V
		$T_A = +75°C$	−920			mV	
V_{OLC}	Output LOW Voltage	$T_A = 0°C$			−1645	mV	$V_{IN} = V_{IH}$ (Min) or V_{IL} (Max)
		$T_A = +25°C$			−1630	mV	
		$T_A = +75°C$			−1605	mV	
V_{IH}	Input HIGH Voltage		−1165		−880	mV	Guaranteed HIGH Signal for All Inputs
V_{IL}	Input LOW Voltage		−1810		−1490	mV	Guaranteed LOW Signal for All Inputs
I_{IH}	Input HIGH Current				290		$V_{IN} = V_{IH}$ (Max)
I_{IL}	Input LOW Current		0.50			μA	$V_{IN} = V_{IL}$ (Min)
I_{EE}	V_{EE} Supply Current		−125	−90	−50	mA	Inputs Open

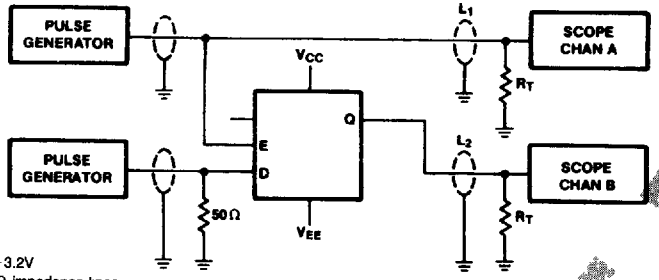
Note 1: The specified limits represent the "worst case" value for the parameter. Since these "worst case" values normally occur at the temperature extremes, additonal noise immunity and guard banding can be achieved by decreasing the allowable system operating ranges.

Note 2: The specified limits shown in the DC Charactenstics can be met only after thermal equilibrium has been established. Thermal equilibnum is established by applying power for at least 2 minutes while maintaining transverse air flow of 2.5 meters/s (500 linear feet/min) over the device either mounted in the test socket or on the printed circuit board. Test voltage values are given in the DC Operating Conditions and defined in *Figure 4*.

AC Electrical Characteristics

$V_{EE} = -5.2V \pm 10\%$, $V_{CC} = V_{CCA} = GND$

Symbol	Parameter	$T_A = 0°C$		$T_A = +25°C$		$T_A = +75°C$		Units	Conditions
		Min	Max	Min	Max	Min	Max		
t_{PDLH} t_{PDHL}	Propagation Delay Data to Output	1.10	2.60	1.10	2.75	1.10	3.00	ns	*Figures 1 & 2*
t_{PDLH} t_{PDHL}	Propagation Delay Enable to Output	1.20	3.40	1.20	3.50	1.20	3.75	ns	*Figures 1 & 3*
t_{PDHL}	Propagation Delay Clear to Output	1.30	3.20	1.30	3.20	1.30	3.20	ns	*Figures 1, 3 & 4*
t_S	Setup Time D_0–D_4		2.50		2.50		2.50	ns	*Figures 1 & 5*
t_H	Hold Time D_0–D_4		0.50		0.50		0.50	ns	
t_{TLH} t_{THL}	Transition Time 20% to 80%, 80% to 20%	1.10	3.25	1.20	3.25	1.20	3.50	ns	*Figures 1, 2, 3 & 4*

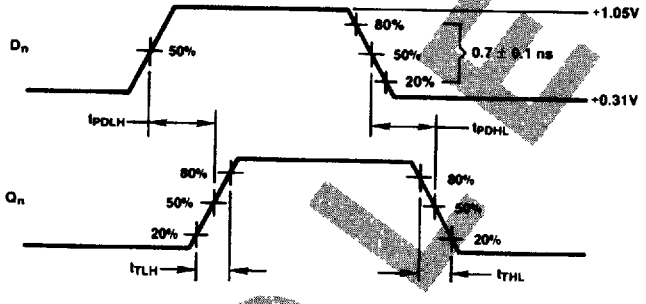


TL/F/9870–4

Notes:

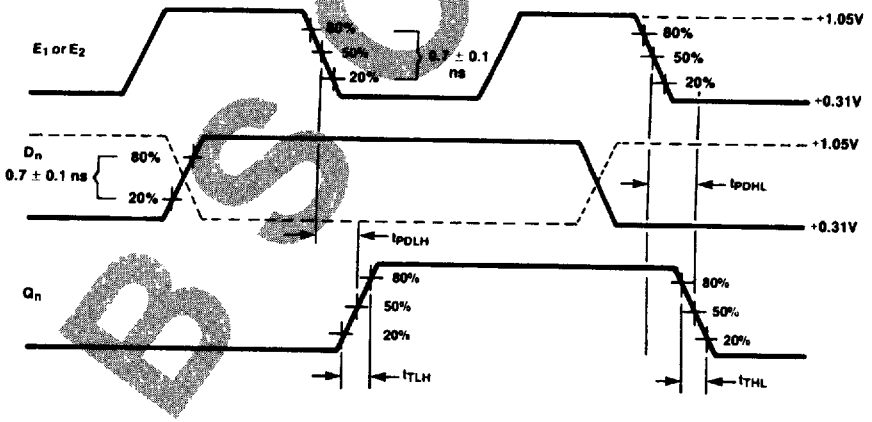
V_{CC}, V_{CCA} = +2V, V_{EE} = −3.2V
L1 and L2 = equal length 50Ω impedance lines
R_T = 50Ω terminator internal to scope
Decoupling 0.1 μf from GND to V_{CC} and V_{EE}
All unused outputs are loaded with 50Ω to GND
C_L = Fixture and stray capacitance ≤ 3 pF

FIGURE 1. AC Test Circuit



TL/F/9870–5

FIGURE 2. Data Propagation Delay @ T_A = +25°C

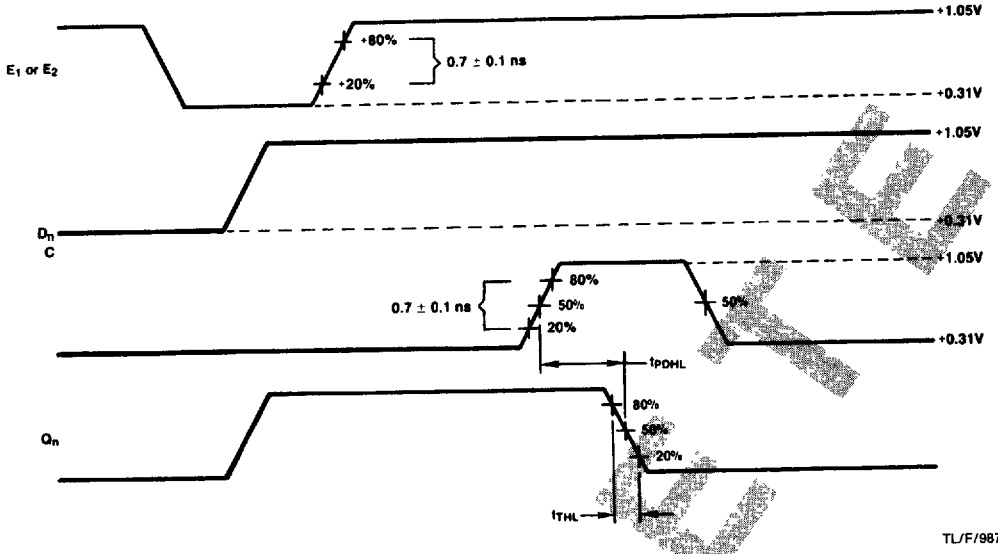


TL/F/9870–6

FIGURE 3. Enable Propagation Delay @ T_A = +25°C

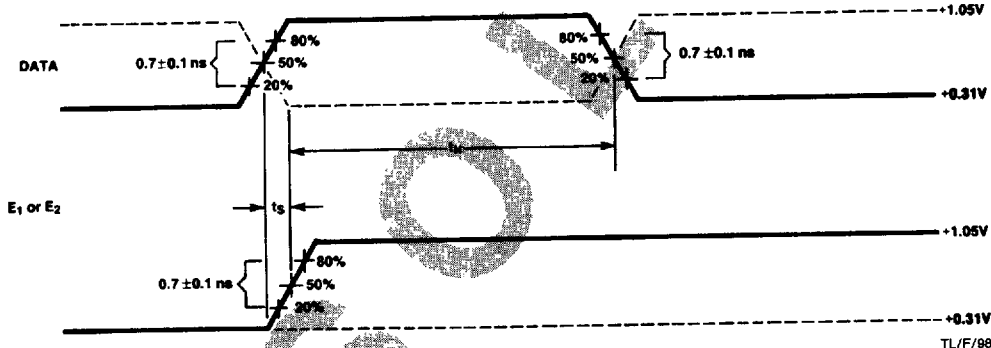
3

100175



TL/F/9870-7

FIGURE 4. Clear Propagation Delay @ $T_A = +25°C$



TL/F/9870-8

FIGURE 5. Data Setup and Hold Time