National Semiconductor

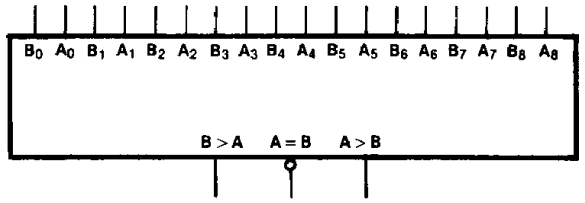
F100166
9-Bit Comparator

General Description

The F100166 is a 9-bit magnitude comparator which compares the arithmetic value of two 9-bit words and indicates whether one word is greater than, or equal to, the other. Other functions can be generated by the wire-OR of the outputs. All inputs have 50 kΩ pulldown resistors.

Ordering Code: See Section 8

Logic Symbol

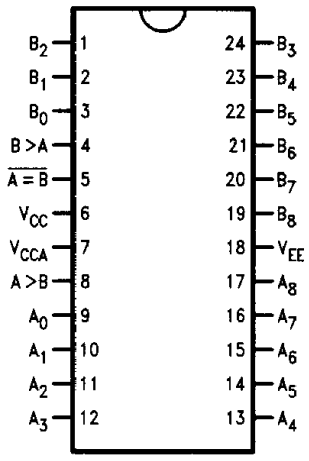


TL/F/9867–3

Pin Names	Description
A_0–A_8	A Data Inputs
B_0–B_8	B Data Inputs
A > B	A Greater than B Output
B > A	B Greater than A Output
$\overline{A = B}$	Complement A Equal to B Output (Active LOW)

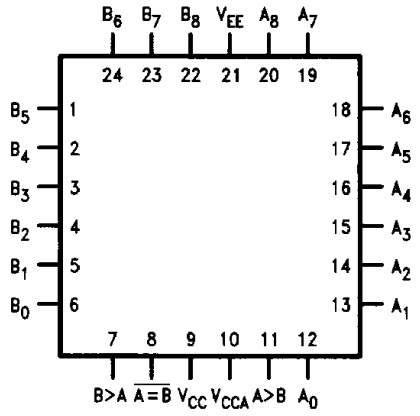
Connection Diagrams

24-Pin DIP



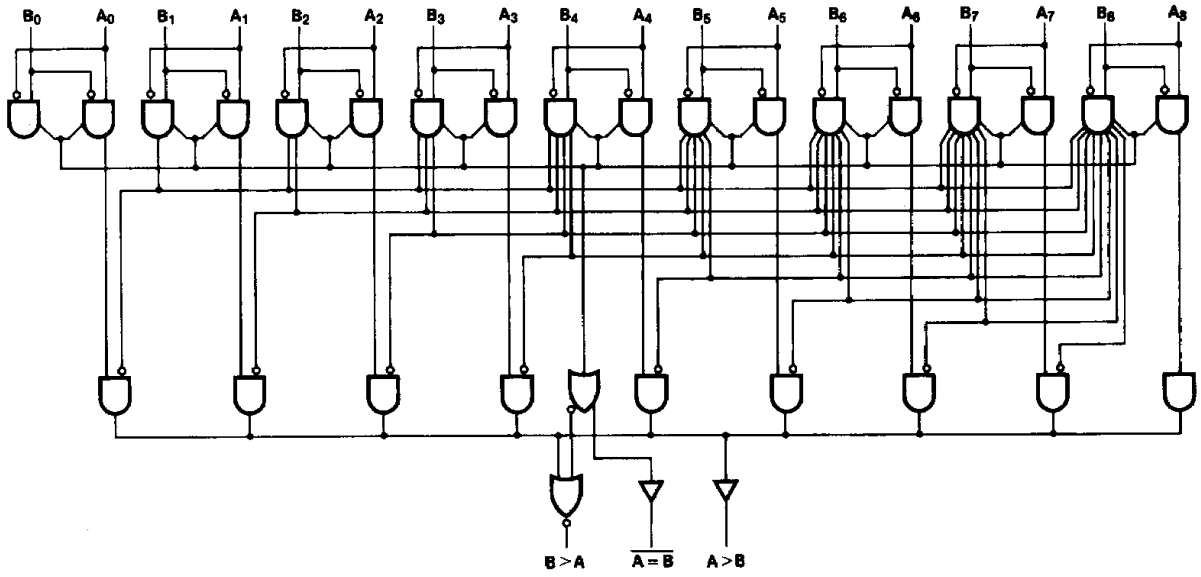
TL/F/9867–1

24-Pin Quad Cerpak



TL/F/9867–2

Logic Diagram



TL/F/9867–5

Truth Table

Inputs									Outputs		
A_8B_8	A_7B_7	A_6B_6	A_5B_5	A_4B_4	A_3B_3	A_2B_2	A_1B_1	A_0B_0	A > B	B > A	$\overline{A = B}$
H L									H	L	H
L H									L	H	H
$A_8 = B_8$	H L								H	L	H
$A_8 = B_8$	L H								L	H	H
$A_8 = B_8$	$A_7 = B_7$	H L							H	L	H
$A_8 = B_8$	$A_7 = B_7$	L H							L	H	H
$A_8 = B_8$	$A_7 = B_7$	$A_6 = B_6$	H L						H	L	H
$A_8 = B_8$	$A_7 = B_7$	$A_6 = B_6$	L H						L	H	H
$A_8 = B_8$	$A_7 = B_7$	$A_6 = B_6$	$A_5 = B_5$	H L					H	L	H
$A_8 = B_8$	$A_7 = B_7$	$A_6 = B_6$	$A_5 = B_5$	L H					L	H	H
$A_8 = B_8$	$A_7 = B_7$	$A_6 = B_6$	$A_5 = B_5$	$A_4 = B_4$	H L				H	L	H
$A_8 = B_8$	$A_7 = B_7$	$A_6 = B_6$	$A_5 = B_5$	$A_4 = B_4$	L H				L	H	H
$A_8 = B_8$	$A_7 = B_7$	$A_6 = B_6$	$A_5 = B_5$	$A_4 = B_4$	$A_3 = B_3$	H L			H	L	H
$A_8 = B_8$	$A_7 = B_7$	$A_6 = B_6$	$A_5 = B_5$	$A_4 = B_4$	$A_3 = B_3$	L H			L	H	H
$A_8 = B_8$	$A_7 = B_7$	$A_6 = B_6$	$A_5 = B_5$	$A_4 = B_4$	$A_3 = B_3$	$A_2 = B_2$	H L		H	L	H
$A_8 = B_8$	$A_7 = B_7$	$A_6 = B_6$	$A_5 = B_5$	$A_4 = B_4$	$A_3 = B_3$	$A_2 = B_2$	L H		L	H	H
$A_8 = B_8$	$A_7 = B_7$	$A_6 = B_6$	$A_5 = B_5$	$A_4 = B_4$	$A_3 = B_3$	$A_2 = B_2$	$A_1 = B_1$	H L	H	L	H
$A_8 = B_8$	$A_7 = B_7$	$A_6 = B_6$	$A_5 = B_5$	$A_4 = B_4$	$A_3 = B_3$	$A_2 = B_2$	$A_1 = B_1$	L H	L	H	H
$A_8 = B_8$	$A_7 = B_7$	$A_6 = B_6$	$A_5 = B_5$	$A_4 = B_4$	$A_3 = B_3$	$A_2 = B_2$	$A_1 = B_1$	$A_0 = B_0$	L	L	L

H = HIGH Voltage Level
L = LOW Voltage Level
Blank = Don't Care

Absolute Maximum Ratings

Above which the useful life may be impaired. (Note 1)

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
Maximum Junction Temperature (T_J)	+150°C
Case Temperature under Bias (T_C)	0°C to +85°C
V_{EE} Pin Potential to Ground Pin	−7.0V to +0.5V
Input Voltage (DC)	V_{EE} to +0.5V
Output Current (DC Output HIGH)	−50 mA
Operating Range (Note 2)	−5.0V to −4.2V

DC Electrical Characteristics

V_{EE} = −4.5V, V_{CC} = V_{CCA} = GND, T_C = 0°C to +85°C (Note 3)

Symbol	Parameter	Min	Typ	Max	Units	Conditions (Note 4)	
V_{OH}	Output HIGH Voltage	−1025	−955	−880	mV	V_{IN} = $V_{IH\ (Max)}$ or $V_{IL\ (Min)}$	Loading with 50Ω to −2.0V
V_{OL}	Output LOW Voltage	−1810	−1705	−1620			
V_{OHC}	Output HIGH Voltage	−1035			mV	V_{IN} = $V_{IH\ (Min)}$ or $V_{IL\ (Max)}$	Loading with 50Ω to −2.0V
V_{OLC}	Output LOW Voltage			−1610			
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_{IL}	Input LOW Current	0.50			μA	V_{IN} = $V_{IL\ (Min)}$	

DC Electrical Characteristics

V_{EE} = −4.2V, V_{CC} = V_{CCA} = GND, T_C = 0°C to +85°C (Note 3)

Symbol	Parameter	Min	Typ	Max	Units	Conditions (Note 4)	
V_{OH}	Output HIGH Voltage	−1020		−870	mV	V_{IN} = $V_{IH\ (Max)}$ or $V_{IL\ (Min)}$	Loading with 50Ω to −2.0V
V_{OL}	Output LOW Voltage	−1810		−1605			
V_{OHC}	Output HIGH Voltage	−1030			mV	V_{IN} = $V_{IH\ (Min)}$ or $V_{IL\ (Max)}$	Loading with 50Ω to −2.0V
V_{OLC}	Output LOW Voltage			−1595			
V_{IH}	Input HIGH Voltage	−1150		−870	mV	Guaranteed HIGH Signal for All Inputs	
V_{IL}	Input LOW Voltage	−1810		−1475	mV	Guaranteed LOW Signal for All Inputs	
I_{IL}	Input LOW Current	0.50			μA	V_{IN} = $V_{IL\ (Min)}$	

DC Electrical Characteristics

V_{EE} = −4.8V, V_{CC} = V_{CCA} = GND, T_C = 0°C to +85°C (Note 3)

Symbol	Parameter	Min	Typ	Max	Units	Conditions (Note 4)	
V_{OH}	Output HIGH Voltage	−1035		−880	mV	V_{IN} = $V_{IH\ (Max)}$ or $V_{IL\ (Min)}$	Loading with 50Ω to −2.0V
V_{OL}	Output LOW Voltage	−1830		−1620			
V_{OHC}	Output HIGH Voltage	−1045			mV	V_{IN} = $V_{IH\ (Min)}$ or $V_{IL\ (Max)}$	Loading with 50Ω to −2.0V
V_{OLC}	Output LOW Voltage			−1610			
V_{IH}	Input HIGH Voltage	−1165		−880	mV	Guaranteed HIGH Signal for All Inputs	
V_{IL}	Input LOW Voltage	−1830		−1490	mV	Guaranteed LOW Signal for All Inputs	
I_{IL}	Input LOW Current	0.50			μA	V_{IN} = $V_{IL\ (Min)}$	

Note 1: Absolute maximum ratings are those values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

Note 2: Parametric values specified at −4.2V to −4.8V.

Note 3: 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 4: Conditions for testing shown in the tables are chosen to guarantee operation under "worst case" conditions.

DC Electrical Characteristics

V_{EE} = −4.2V to −4.8V unless otherwise specified, V_{CC} = V_{CCA} = GND, T_C = 0°C to +85°C

Symbol	Parameter	Min	Typ	Max	Units	Conditions
I_{IH}	Input HIGH Current All Inputs			250	μA	V_{IN} = $V_{IH\ (Max)}$
I_{EE}	Power Supply Current	−238	−170	−119	mA	Inputs Open

Ceramic Dual-In-Line Package AC Electrical Characteristics

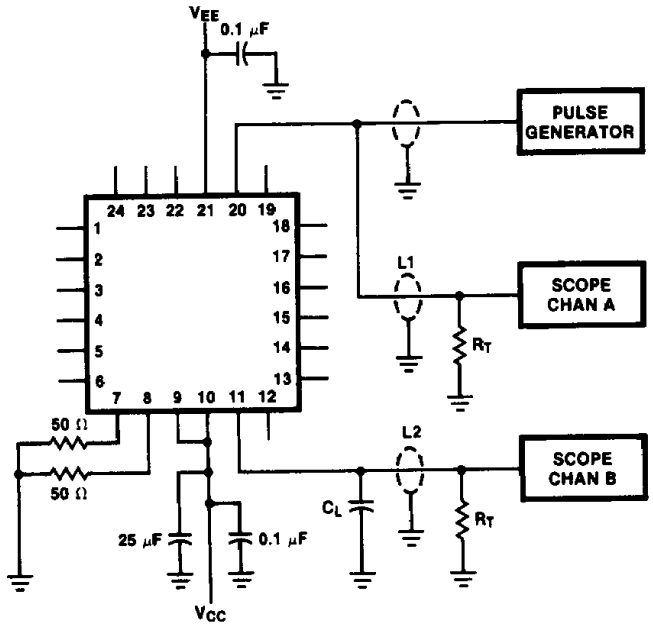
V_{EE} = −4.2V to −4.8V, V_{CC} = V_{CCA} = GND

Symbol	Parameter	T_C = 0°C		T_C = +25°C		T_C = +85°C		Units	Conditions
		Min	Max	Min	Max	Min	Max		
t_{PLH} t_{PHL}	Propagation Delay Data to Output	1.40	3.50	1.40	3.50	1.40	3.90	ns	*Figures 1* and *2*
t_{TLH} t_{THL}	Transition Time 20% to 80%, 80% to 20%	0.45	1.55	0.45	1.50	0.45	1.50	ns	

Cerpak AC Electrical Characteristics

V_{EE} = −4.2V to −4.8V, V_{CC} = V_{CCA} = GND

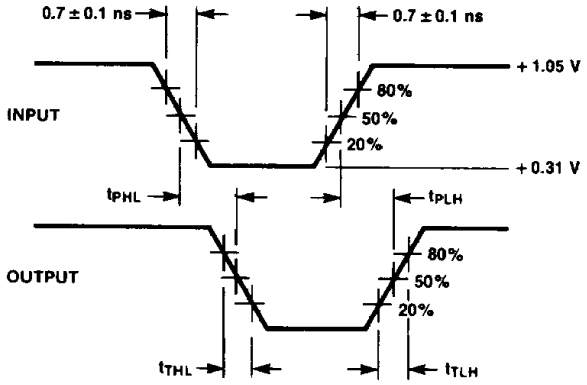
Symbol	Parameter	T_C = 0°C		T_C = +25°C		T_C = +85°C		Units	Conditions
		Min	Max	Min	Max	Min	Max		
t_{PLH} t_{PHL}	Propagation Delay Data to Output	1.40	3.30	1.40	3.30	1.40	3.70	ns	*Figures 1* and *2*
t_{TLH} t_{THL}	Transition Time 20% to 80%, 80% to 20%	0.45	1.45	0.45	1.40	0.45	1.40	ns	



TL/F/9867–6

FIGURE 1. AC Test Circuit

Notes:
V_{CC}, V_{CCA} = +2V, V_{EE} = −2.5V
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
Pin numbers shown are for flatpak; for DIP see logic symbol



TL/F/9867–7

FIGURE 2. Propagation Delay and Transition Times