National Semiconductor

DM93S47
High Speed 6-Bit Identity Comparator

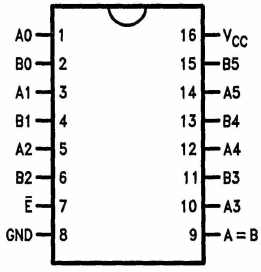
General Description

The DM93S47 is a very high speed 6-bit identity comparator. The device features an open-collector output for wired-OR expansion and active LOW enable. The DM93S47 is fabricated with the Schottky barrier diode process for high speed, and is completely compatible with all TTL families.

This device is recommended for applications where wired-OR expansion is desired and the speed of an active pull-up is not required. The DM93S47 is a pin-for-pin replacement for the DM7160/8160.

Connection Diagram

Dual-In-Line Package



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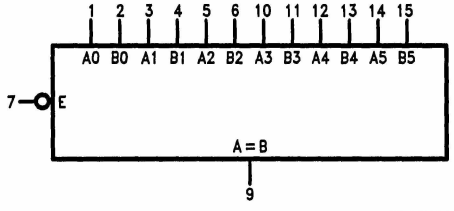
Order Number DM93S47N
See NS Package Number N16E

Logic Symbol



V_{CC} = Pin 16
GND = Pin 8

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Truth Table

Inputs		Output
$\bar{E}$	A_n, B_n	A = B
L	$A_n = B_n$	H
L	$A_n \neq B_n$	L
H	$A_n \neq B_n$	H
H	$A_n = B_n$	H

H = HIGH Voltage Level
L = LOW Voltage Level

Absolute Maximum Ratings (Note)

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

Supply Voltage	7V
Input Voltage	5.5V
Operating Free Air Temperature Range (DM93S)	0°C to +70°C
Storage Temperature Range	−65°C to +150°C

Note: *The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the "Electrical Characteristics" table are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.*

Recommended Operating Conditions

Symbol	Parameter	DM93S47			Units
		Min	Nom	Max	
V_{CC}	Supply Voltage	4.75	5	5.25	V
V_{IH}	High Level Input Current	2			V
V_{IL}	Low Level Input Current			0.8	V
I_{OH}	High Level Output Current			−1	mA
I_{OL}	Low Level Output Current			20	mA
T_A	Free Air Operating Temperature	0		70	°C

Electrical Characteristics over recommended operating free air temperature range (unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ (Note 1)	Max	Units
V_I	Input Clamp Voltage	V_{CC} = Min, I_I = −18 mA			−1.2	V
V_{OH}	High Level Output Voltage	V_{CC} = Min, I_{OH} = Max, V_{IL} = Max	2.7	3.4		V
V_{OL}	Low Level Output Voltage	V_{CC} = Min, I_{OH} = Max, V_{IH} = Min		0.35	0.5	V
I_I	Input Current @ Max Input Voltage	V_{CC} = Max, V_I = 5.5V			1	mA
I_{IH}	High Level Input Current	V_{CC} = Max, V_I = 2.7V			50	μA
I_{IL}	Low Level Input Current	V_{CC} = Max, V_I = 0.5V			−2.0	mA
I_{OS}	Short Circuit Output Current	V_{CC} = Max (Note 2)	−40		−100	mA
I_{CC}	Supply Current	V_{CC} = Max			65	mA

Note 1: All typicals are at V_{CC} = 5V, T_A = 25°C.

Note 2: Not more than one output should be shorted at a time, and the duration should not exceed one second.

Switching Characteristics

V_{CC} = +5.0V, T_A = +25°C (See Section 1 for Waveforms and Load Configurations)

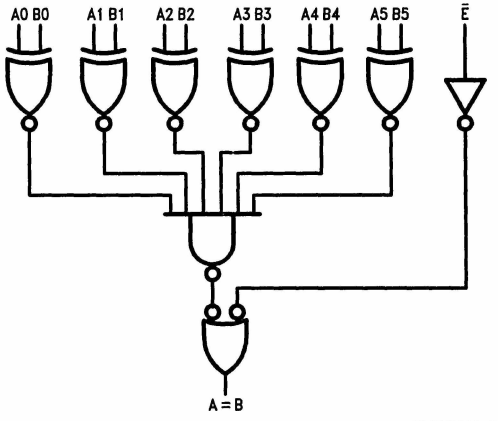
Symbol	Parameter	Conditions	C_L = 15 pF, R_L = 280Ω		Units
			Min	Max	
t_{PLH} t_{PHL}	Propagation Delay A_n or B_n to A = B	$\overline{E}$ = GND, Other Inputs = 4.5V, Test Each Input Individually	5.0 5.0	17 17	ns
t_{PLH} t_{PHL}	Propagation Delay A_n or B_n to A = B	$\overline{E}$ = GND, Other Inputs = GND, Test Each Input Individually	4.0 4.0	14 15	ns
t_{PLH} t_{PHL}	Propagation Delay $\overline{E}$ to A = B	$A_n \neq B_n$	3.0 3.0	10 10	ns

Functional Description

The DM93S47 is a very high speed 6-bit identity comparator. When enabled ($\overline{E}$ input LOW), the A = B output is HIGH if the two 6-bit words are equal. When disabled ($\overline{E}$ input HIGH), the A = B output is forced HIGH. Equality is determined by Exclusive-NOR circuits which individually compare the equivalent bits from each word. Since the A = B output state is determined by the equality of each pair of inputs, the equivalent A_n and B_n pins can be interchanged to facilitate board layout or wiring. The active LOW Enable ($\overline{E}$) can be used as a high speed strobe. When the Enable is HIGH, the A = B output is forced HIGH. This allows devices tied to a common wired-OR (actually wired-AND) node to be strobed individually or in groups. Only the enabled devices will determine the state of the output node.

$$(A = B) = \overline{E} + (\overline{A0 \oplus B0}) \bullet (\overline{A1 \oplus B1}) \bullet (\overline{A2 \oplus B2}) \bullet (\overline{A3 \oplus B3}) \bullet (\overline{A4 \oplus B4}) \bullet (\overline{A5 \oplus B5})$$

Logic Diagram



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