National Semiconductor

MICROCIRCUIT DATA SHEET

MNDM54LS85-X REV 1A0

Original Creation Date: 04/24/98
Last Update Date: 08/24/98
Last Major Revision Date: 04/24/98

4-BIT MAGNITUDE COMPARATOR

General Description

The '85 is a high speed, expandable 4-bit magnitude comparator which compares two 4-bit words in any monotonic code (binary, BCD or other) and generates three outputs: A less than B, A greater than B, and A equal to B. Three expansion inputs allow serial (ripple) expansion over any word length without external gates.

Industry Part Number

54LS85

NS Part Numbers

DM54LS85J/883
DM54LS85W/883

Prime Die

L085

Processing

MIL-STD-883, Method 5004

Quality Conformance Inspection

MIL-STD-883, Method 5005

Subgrp	Description	Temp (^{O}C)
1	Static tests at	+25
2	Static tests at	+125
3	Static tests at	-55
4	Dynamic tests at	+25
5	Dynamic tests at	+125
6	Dynamic tests at	-55
7	Functional tests at	+25
8A	Functional tests at	+125
8B	Functional tests at	-55
9	Switching tests at	+25
10	Switching tests at	+125
11	Switching tests at	-55

Features

- Easily Expandible
- Binary or BCD Comparison
- A>B, A<B, A=B Outputs Available

(Absolute Maximum Ratings)

(Note 1)

Storage Temperature	-65 C to +150 C
Ambient Temperature under Bias	-55 C to +125 C
Input Voltage	-0.5V to +10.0V
VCC Pin Potential to Ground Pin	-0.5V to +7.0V
Junction Temperature under Bias	-55C to +175C
Current Applied to Output in LOW state (Max)	twice the rated Iol (ma)

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.

Recommended Operating Conditions

Free Air Ambient Temperature	
Military	-55 C to +125 C
Supply Voltage	
Military	+4.5V to +5.5V

Electrical Characteristics

DC PARAMETER

(The following conditions apply to all the following parameters, unless otherwise specified.)
DC: VCC 4.5V to 5.5V, Temp range: -55C to 125C

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
IIH (1)	Input High Current	VCC=5.5V, VM=2.7V, VINL=0.0V	1, 3	IA<B, IA>B		20.0	uA	1, 2, 3
IIH (2)	Input High Current	VCC=5.5V, VM=2.7V, VINL=0.0V	1, 3	An, Bn, IA=B		60.0	uA	1, 2, 3
IBVI (1)	Input High Current	VCC=5.5V, VM=10.0V, VINH=4.5V	1, 3	IA<B, IA>B		100	uA	1, 2, 3
IBVI (2)	Input High Current	VCC=5.5V, VM=10.0V	1, 3	An, Bn, IA=B		300	uA	1, 2, 3
IIL (1)	Input LOW Current	VCC=5.5V, VM=0.4V	1, 3	IA<B, IA>B	-0.5	-400	uA	1, 2, 3
IIL (2)	Input LOW Current	VCC=5.5V, VM=0.4V	1, 3	An, Bn	-0.09	-1.2	mA	1, 2, 3
IIL (3)	Input LOW Current	VCC=5.5V, VM=0.4V	1, 3	IA=B	-0.09	-1.2	mA	1, 2, 3
VOL	Output LOW Voltage	VCC=4.5V, VIH=2.0V, IOL=4.0mA, VINH=4.5V, VIL=0.7V, VINL=0.0V	1, 3	OUTPUTS		0.4	V	1, 2, 3
VOH	High Level Output Voltage	VCC=4.5V, VIH=2.0V, IOH=-0.4mA, VIL=0.7V, VINL=0.0V, VINH=4.5V	1, 3	OUTPUTS	2.5		V	1, 2, 3
IOS	Short Circuit Output Current	VCC=5.5V, VINH=4.5V, VOUT=0.0V, VINL=0.0V	1, 3	OUTPUT	-20.0	-100	mA	1, 2, 3
VCD	Input Clamp Diode Voltage	VCC=4.5V, IM=-18mA, VINH=4.5V	1, 3	INPUTS		-1.5	V	1, 2, 3
ICC	Supply Current	VCC=5.5V, VINL=0.0V, VINH=4.5V	1, 3	VCC		20.0	mA	1, 2, 3

Electrical Characteristics

AC PARAMETER - 15pF

(The following conditions apply to all the following parameters, unless otherwise specified.)
AC: CL=15pF, RL=2k ohms Temp range: +25C

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tpLH (1)	Propagation Delay An/Bn to OA=B, OA<B, OA>B	VCC=5.0V	5			36.0	ns	9
tpHL (1)	Propagation Delay An/Bn to OA=B, OA<B, OA>B	VCC=5.0V	5			30.0	ns	9
tpLH (2)	Propagation Delay IA<B, IA>B, IA=B to OA<B, OA>B	VCC=5.0V	5			22.0	ns	9
tpHL (2)	Propagation Delay IA<B, IA>B, IA=B to OA<B<, OA>B	VCC=5.0V	5			17.0	ns	9
tpLH (3)	Propagation Delay	VCC=5.0V	5	IA=B to OA=B		17.0	ns	9
tpHL (3)	Propagation Delay	VCC=5.0V	5	IA=B to OA=B		17.0	ns	9

AC PARAMETER - 50pF

(The following conditions apply to all the following parameters, unless otherwise specified.)
AC: CL=50pF, RL=2K ohms Temp range: -55C to +125C

tpLH (1)	Propagation Delay An/Bn to OA=B, OA<B, OA>B	VCC=5.0V	2, 4		2.0	36.0	ns	9
			2, 4		2.0	42.0	ns	10, 11
tpHL (1)	Propagation Delay An/Bn to OA=B, OA<B, OA>B	VCC=5.0V	2, 4		2.0	35.0	ns	9
			2, 4		2.0	42.0	ns	10, 11
tpLH (2)	Propagation Delay IA<B, IA>B, IA=B to OA<B, OA>B	VCC=5.0V	2, 4		2.0	22.0	ns	9
			2, 4		2.0	30.0	ns	10, 11
tpHL (2)	Propagation Delay IA<B, IA>B, IA=B to OA<B, OA>B	VCC=5.0V	2, 4		2.0	20.0	ns	9
			2, 4		2.0	28.0	ns	10, 11
tpLH (3)	Propagation Delay	VCC=5.0V	2, 4	IA=B to OA=B	2.0	20.0	ns	9
			2, 4	IA=B to OA=B	2.0	28.0	ns	10, 11
tpHL (3)	Propagation Delay	VCC=5.0V	2, 4	IA=B to OA=B	2.0	25.0	ns	9
			2, 4	IA=B to OA=B	2.0	36.0	ns	10, 11

Note 1: Screen tested 100% on each device at -55C, +25C & +125C temperature, subgroups A1, 2, 3, 7 & 8.
Note 2: Screen tested 100% on each device at +25C temperature only, subgroup A9.
Note 3: Sample tested (Method 5005, Table 1) on each MFG. lot at +25C, +125C & -55C temperature, subgroups A1, 2, 3, 7 & 8.

(Continued)

Note 4: Sample tested (Method 5005, Table 1) on each MFG. lot at +25C, subgroup A9. Subgroups 10 & 11 are guaranteed, not tested.
Note 5: Guaranteed, not tested.

Revision History

Rev	ECN #	Rel Date	Originator	Changes
1A0	M0002886	08/24/98	Linda Collins	Initial MDS release: MNDM54LS85-X Rev. 1A0. Added note 4 to the AC (50pF) notes reference column. Reworded the phrase in note 4 from 'and periodically at +125C & -55C, subgroups 10 & 11' to 'Subgroups 10 & 11 are guaranteed, not tested'.