

MN54ACT283-X REV 3A0

 Original Creation Date: 07/02/96
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4-Bit Binary Full Adder With Fast Carry
General Description

The ACT283 high-speed 4-bit binary full adder with internal carry lookahead accepts two 4-bit binary words (A0-A3, B0-B3) and a Carry Input (C0). It generates the binary Sum outputs (S0-S3) and the Carry output (C4) from the most significant bit. The ACT283 will operate with either active HIGH or active LOW operands (positive or negative logic).

Industry Part Number

54ACT283

Prime Die

D283

NS Part Numbers

 54ACT283DMQB
 54ACT283FMQB
 54ACT283LMQB

Processing

MIL-STD-883, Method 5004

Quality Conformance Inspection

MIL-STD-883, Method 5005

Subgrp	Description	Temp (°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

- Outputs Source /Sink 24 mA
- TTL Compatible Inputs

(Absolute Maximum Ratings)

Supply Voltage (Vcc)	-0.5V to +7.0V
DC Input Diode Current (Iik)	
Vi = -0.5V	-20 mA
Vi = Vcc +0.5V	+20 mA
DC Output Diode Current (Iok)	
Vo = -0.5V	-20 mA
Vo = Vcc +0.5V	+20 mA
DC Output Voltage (Vo)	-0.5V to Vcc +0.5V
DC Vcc or Ground Current Per output pin (Icc or Ignd)	±50 mA
Junction Temperature (Tj)	
Ceramic Flatpack	175 C
Thermal Resistance	
Junction-to-case (Theta JC)	25C/watt
Junction -to- ambient (Theta JA)	95C/watt
(1 Watt at no airflow)	
Storage Temperature	-65 C to +150 C
Lead Temperature	
Soldering, 10 seconds	+300 C
ESD Classification	Class 3
Maximum Power Dissipation	500 mW

Recommended Operating Conditions

Supply Voltage (Vcc)	4.5V to 5.5V
Input Voltage (Vi)	0V to Vcc
Output Voltage (Vo)	0V to Vcc
Operating Temperature	-55 C to +125 C
Minimum Input Edge Rate (Delta V/Delta t)	
ACT Devices	
Vin from 0.8V to 2.0V	
Vcc @ 4.5V, 5.5V	125 mV/ns
Maximum Output Current	
High Level (IOH)	-24 mA
Low Level (IOL)	24 mA

Electrical Characteristics

DC PARAMETERS:

(The following conditions apply to all the following parameters, unless otherwise specified.)

DC: VCC 4.5V to 5.5V, Temp range: -55C to +125C NOTE: -55C TEMPERATURE, SUBGROUP 3 IS GUARANTEED BUT NOT TESTED.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
IIH	High Level Input Current	VCC=5.5V, VIH=5.5V	1, 2	IN		0.1	uA	1
			1, 2	IN		1.0	uA	2, 3
IIL	Low Level Input Current	VCC=5.5V, VIL=0.0V	1, 2	IN		-0.1	uA	1
			1, 2	IN		-1.0	uA	2, 3
VOL	Low Level Output Voltage	VCC=4.5V, IOL=50.0uA, VIL=0.8V, VIH=2.0V	1, 2	OUT		.10	V	1, 2, 3
		VCC=5.5V, IOL=50.0uA, VIL=0.8V, VIH=2.0V	1, 2	OUT		.10	V	1, 2, 3
		VCC=4.5V, IOL=24.0mA, VIL=0.8V, VIH=2.0V	1, 2	OUT		.50	V	2, 3
			1, 2	OUT		.36	V	1
		VCC=5.5V, IOL=24.0mA, VIL=0.8V, VIH=2.0V	1, 2	OUT		.50	V	2, 3
			1, 2	OUT		.36	V	1
VIOL	Input Offset Voltage Low	VCC=5.5V, IOL=50.0mA, VIL=0.0V, VIH=5.5V	1, 2, 5	OUT		1.65	V	1, 2, 3
VOH	High Level Output Voltage	VCC=4.5V, IOL= -50.0uA, VIL=0.8V, VIH=2.0V	1, 2	OUT	4.4		V	1, 2, 3
		VCC=5.5V, IOL= -50.0uA, VIL=0.8V, VIH=2.0V	1, 2	OUT	5.4		V	1, 2, 3
		VCC=4.5V, IOL= -24.0mA, VIL=0.8V, VIH=2.0V	1, 2	OUT	3.7		V	2, 3
			1, 2	OUT	3.86		V	1
		VCC=5.5V, IOL= -24.0mA, VIL=0.8V, VIH=2.0V	1, 2	OUT	4.7		V	2, 3
			1, 2	OUT	4.86		V	1
VIOH	Input Offset Voltage High	VCC=5.5V, IOL= -50.0mA, VIL=0.0V, VIH=5.5V	1, 2, 5	OUT	3.85		V	1, 2, 3
ICC	Supply Current	VCC=5.5V, VIN=5.5V or Gnd	1, 2	VCC		8.0	uA	1
			1, 2	VCC		160	uA	2, 3
ICCT	Supply Current	VCC=5.5V, VINH=3.4V	1, 2	VCC		1.0	mA	1
			1, 2	VCC		1.6	mA	2, 3
VIKL		VCC=4.5V, IKL= -18mA	1, 2	IN		-1.2	V	1, 2, 3
VIKH		VCC=4.5V, IKH=18mA	1, 2	IN		5.7	V	1, 2, 3
CIN	INPUT PIN CAPACITANCE		6	IN		10	pF	4

Electrical Characteristics

DC PARAMETERS: (Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)

DC: VCC 4.5V to 5.5V, Temp range: -55C to +125C NOTE: -55C TEMPERATURE, SUBGROUP 3 IS GUARANTEED BUT NOT TESTED.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
CPD	POWER DISSIPATION CAPACITANCE		6			25	pF	4

AC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)

AC: CL=50pF RL=500 OHMS TRISE/TFALL=3.0ns Temp. Range -55C to 125C. NOTE: -55C TEMPERATURE, SUBGROUP 11 IS GUARANTEED BUT NOT TESTED.

tpLH(1)	Propagation Delay	Vcc= 4.5V	3, 4, 7	C0 to Sn	2.5	11.0	ns	9
			3, 4, 7	C0 to Sn	2.5	14.0	ns	10, 11
tpHL(1)	Propagation Delay	Vcc= 4.5V	3, 4, 7	C0 to Sn	2.5	10.0	ns	9
			3, 4, 7	C0 to Sn	2.5	14.0	ns	10, 11
tpLH(2)	Propagation Delay	Vcc= 4.5V	3, 4, 7	An/Bn to Sn	2.0	13.0	ns	9
			3, 4, 7	An/Bn to Sn	2.0	17.0	ns	10, 11
tpHL(2)	Propagation Delay	Vcc= 4.5V	3, 4, 7	An/Bn to Sn	2.0	13.5	ns	9
			3, 4, 7	An/Bn to Sn	2.0	17.0	ns	10, 11
tpLH(3)	Propagation Delay	Vcc= 4.5V	3, 4, 7	C0 to C4	2.5	8.0	ns	9
			3, 4, 7	C0 to C4	2.5	10.0	ns	10, 11
tpHL(3)	Propagation Delay	Vcc= 4.5V	3, 4, 7	C0 to C4	2.5	9.0	ns	9
			3, 4, 7	C0 to C4	2.5	11.0	ns	10, 11
tpLH(4)	Propagation Delay	Vcc= 4.5V	3, 4, 7	An/Bn to C4	2.5	8.5	ns	9
			3, 4, 7	An/Bn to C4	2.5	10.5	ns	10, 11
tpHL(4)	Propagation Delay	Vcc= 4.5V	3, 4, 7	An/Bn to C4	2.5	9.5	ns	9
			3, 4, 7	An/Bn to C4	2.5	11.5	ns	10, 11

Note 1: SCREEN TESTED 100% ON EACH DEVICE AT +25C & +125C TEMPERATURE, SUBGROUPS 1, 2, 7 & 8.

(Continued)

- Note 2: SAMPLE TESTED (METHOD 5005, TABLE 1) ON EACH MFG. LOT AT +25C & +125C TEMPERATURE, SUBGROUPS A1, 2, 7 & 8.
- Note 3: SCREEN TESTED 100% ON EACH DEVICE AT +25C TEMPERATURE ONLY, SUBGROUP A9.
- Note 4: SAMPLE TESTED (METHOD 5005, TABLE 1) ON EACH MFG. LOT AT +25C & +125C TEMPERATURE, SUBGROUPS A9 & 10.
- Note 5: TRANSMISSION LINE DRIVING TEST, GUARDBANDED LIMITS SET FOR +25C, 2 MSEC DURATION MAX.
- Note 6: GUARANTEED BUT NOT TESTED. (DESIGN CHARACTERIZATION DATA ONLY.)
- Note 7: +25C & +125C MIN LIMITS GUARANTEED FOR 5.5V BY GUARDBANDING 4.5V MINIMUM LIMITS.

Revision History

Rev	ECN #	Rel Date	Originator	Changes
3A0	M0002888	07/08/98	Linda Collins	New update: MN54ACT283-X Rev. 3A0. Corrected the subgroups for all the AC tests by changing the 9 to 10 and the 10 to 9.