

MN54ACT323-X REV 1B0

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8-Input Universal Shift/Storage Register

General Description

The ACT323 is an 8-bit universal shift/storage register with 3-state outputs. Four modes of operation are possible hold(store), shift left, shift right and load data. The parallel load inputs and flip-flop outputs are multiplexed to reduce the total number of package pins. Additional outputs are provided for flip-flops Q0, Q7 to allow easy serial cascading. A separate active LOW Synchronous Reset is used to reset the register.

Industry Part Number

54ACT323

Prime Die

J323

NS Part Numbers

54ACT323DMQB

54ACT323FMQB

54ACT323LMQB

Processing

MIL-STD-883, Method 5004

Quality Conformance Inspection

MIL-STD-883, Method 5005

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

Features

- Icc and Ioz reduced by 50%
- Common parallel I/O for reduced pin count
- Additional serial inputs and outputs for expansion
- Four operating modes: shift left, shift right, load and store
- TRI-STATE outputs for bus-oriented applications
- Outputs source/sink 24 mA
- TTL-compatible inputs
- Standard Military Drawing (SMD)
- ACT323: 5962-91607

(Absolute Maximum Ratings)

(Note 1)

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 Input Voltage (Vi)	-0.5V to Vcc +0.5V
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 Output Source or Sink Current (Io)	±50 mA
DC Vcc or Ground Current Per Output Pin (Icc or Ignd)	±50 mA
Storage Temperature (Tstg)	-65 C to +150 C
Junction Temperature (Tj)	
CDIP	175 C

Note 1: Absolute maximum ratings are those values beyond which damage to the device may occur. The databook specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, and output/input loading variables. National does not recommend operation of FACT TM circuits outside databook specifications.

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 (Ta)	-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

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, VM=5.5V	1, 2	INPUT		0.1	uA	1
			1, 2	INPUT		1.0	uA	2, 3
IIL	Low Level Input Current	VCC=5.5V, VM=0.0V	1, 2	INPUT		-0.1	uA	1
			1, 2	INPUT		-1.0	uA	2, 3
VOL	Low Level Output Voltage	VCC=4.5V, VIL=0.8V, VIH=2.0V, IOL=50.0uA	1, 2	OUTPUT		.10	V	1, 2, 3
		VCC=5.5V, VIL=0.8V, VIH=2.0V, IOL=50.0uA	1, 2	OUTPUT		.10	V	1, 2, 3
		VCC=4.5V, VIL=0.8V, VIH=2.0V, IOL=24.0mA	1, 2	OUTPUT		.36	V	1
		VCC=4.5V, VIL=0.8V, VIH=2.0V, IOL=24.0mA	1, 2	OUTPUT		.50	V	2, 3
		VCC=5.5V, VIL=0.8V, VIH=2.0V, IOL=24.0mA	1, 2	OUTPUT		.36	V	1
		VCC=5.5V, VIL=0.8V, VIH=2.0V, IOL=24.0mA	1, 2	OUTPUT		.50	V	2, 3
VIOL	Dynamic Output Current LOW	VCC=5.5V, VIL=0.8V, VIH=2.0V, IOL=50.0mA	1, 2, 5	OUTPUT		1.65	V	1, 2, 3
VOH	High Level Output Voltage	VCC=4.5V, VIL=0.8V, VIH=2.0V, IOH=-50.0uA	1, 2	OUTPUT	4.40		V	1, 2, 3
		VCC=5.5V, VIL=0.8V, VIH=2.0V, IOH=-50.0uA	1, 2	OUTPUT	5.40		V	1, 2, 3
		VCC=5.5V, VIL=0.8V, VIH=2.0V, IOH=-24.0mA	1, 2	OUTPUT	4.86		V	1
		VCC=5.5V, VIL=0.8V, VIH=2.0V, IOH=-24.0mA	1, 2	OUTPUT	4.70		V	2, 3
		VCC=4.5V, VIL=0.8V, VIH=2.0V, IOH=-24.0mA	1, 2	OUTPUT	3.86		V	1
		VCC=4.5V, VIL=0.8V, VIH=2.0V, IOH=-24.0mA	1, 2	OUTPUT	3.70		V	2, 3
VIOH	Dynamic output Current HIGH	VCC=5.5V, VIL=0.8V, VIH=2.0V, IOH=-50.0mA	1, 2, 5	OUTPUT	3.85		V	1, 2, 3
ICCH	Supply Current Outputs HIGH	VCC=5.5V	1, 2	VCC		4.0	uA	1
			1, 2	VCC		80	uA	2, 3
ICCL	Supply Current Outputs LOW	VCC=5.5V	1, 2	VCC		4.0	uA	1
			1, 2	VCC		80	uA	2, 3
ICCZ	Supply Current Outputs Tri-State	VCC=5.5V	1, 2	VCC		4.0	uA	1
			1, 2	VCC		80	uA	2, 3
ICCT	Supply Current per Input	VCC=5.5V, VIHT=VCC-2.1V	1, 2	VCC		1.0	mA	1
			1, 2	VCC		1.6	mA	2, 3

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
IOZH	Maximum TRI-STATE	VCC=4.5V, VIH=2.0V, VM=4.5V	1, 2	OUTPUT		0.25	uA	1
			1, 2	OUTPUT		5.0	uA	2, 3
		VCC=5.5V, VIH=2.0V, VM=5.5V	1, 2	OUTPUT		0.25	uA	1
			1, 2	OUTPUT		5.0	uA	2, 3
IOZL	Maximum TRI-STATE	VCC=4.5V, VIH=2.0V, VM=0.0V	1, 2	OUTPUT		-0.25	uA	1
			1, 2	OUTPUT		-5.0	uA	2, 3
		VCC=5.5V, VIH=2.0V, VM=0.0V	1, 2	OUTPUT		-0.25	uA	1
			1, 2	OUTPUT		-5.0	uA	2, 3

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	CP to Q0 or Q1	1.5	13.5	ns	9
			3, 4, 7	CP to Q0 or Q1	1.5	16.5	ns	10, 11
tpHL(1)	Propagation Delay	Vcc=4.5V	3, 4, 7	CP to Q0 or Q1	1.5	13.5	ns	9
			3, 4, 7	CP to Q0 or Q1	1.5	17.0	ns	10, 11
tpLH(2)	Propagation Delay	Vcc=4.5V	3, 4, 7	CP to I/On	1.5	13.0	ns	9
			3, 4, 7	CP to I/On	1.5	16.5	ns	10, 11
tpHL(2)	Propagation Delay	Vcc=4.5V	3, 4, 7	CP to I/On	1.5	15.0	ns	9
			3, 4, 7	CP to I/On	1.5	18.0	ns	10, 11
tpZH	Output Enable Time	Vcc=4.5V	3, 4, 7	OE to I/On	1.5	12.5	ns	9
			3, 4, 7	OE to I/On	1.5	15.5	ns	10, 11

Electrical Characteristics

AC Parameters(Continued)

(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.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tpZL	Output Enable Time	Vcc=4.5V	3, 4, 7	OE to I/On	1.5	13.0	ns	9
			3, 4, 7	OE to I/On	1.5	15.5	ns	10, 11
tpHZ	Output Enable Time	Vcc=4.5V	3, 4, 7	OE to I/On	1.5	13.0	ns	9
			3, 4, 7	OE to I/On	1.5	15.5	ns	10, 11
tpLZ	Output Enable Time	Vcc=4.5V	3, 4, 7	OE to I/On	1.5	12.0	ns	9
			3, 4, 7	OE to I/On	1.5	15.0	ns	10, 11
ts(H/L)(1)	Setup Time HIGH or LOW	Vcc=4.5V	6	Sn to CP	5.0		ns	9
			6	Sn to CP	6.0		ns	10, 11
th(H/L)(1)	Hold Time HIGH or LOW	Vcc=4.5V	6	Sn to CP	1.5		ns	9
			6	Sn to CP	2.0		ns	10, 11
ts(H/L)(2)	Setup Time HIGH or LOW	Vcc=4.5V	6	I/O to CP	4.0		ns	9
			6	I/O to CP	4.5		ns	10, 11
th(H/L)(2)	Hold Time HIGH or LOW	Vcc=4.5V	6	I/O to CP	2.5		ns	9, 10, 11
			6	DSn to CP	4.0		ns	9
ts(H/L)(3)	Setup Time HIGH or LOW	Vcc=4.5V	6	DSn to CP	4.0		ns	9
			6	DSn to CP	4.5		ns	10, 11
th(H/L)(3)	Hold Time HIGH or LOW	Vcc=4.5V	6	DSn to CP	2.0		ns	9, 10, 11
			6	SR to CP	2.5		ns	9
ts(H/L)(4)	Setup Time HIGH or LOW	Vcc=4.5V	6	SR to CP	2.5		ns	9
			6	SR to CP	3.0		ns	10, 11
th(H/L)(4)	Setup Time HIGH or LOW	Vcc=4.5V	6	SR to CP	1.5		ns	9, 10, 11
			6	CP	5.0		ns	9, 10, 11
tw(H/L)	Pulse Width HIGH LOW	Vcc=4.5V	6	CP	5.0		ns	9, 10, 11

Electrical Characteristics

AC Parameters(Continued)

(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.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
Fmax	Maximum Input Frequency	Vcc=4.5V	6	CP	90		MHz	9
			6	CP	70		MHz	10, 11

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

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, GUARDBAND LIMITS SET FOR +25C, 2 MSEC DURATION MAX.

Note 6: GUARANTEED BUT NOT TESTED (DESIGN CHARACTERIZATION DATA).

Note 7: +25C & +125C MIN LIMITS GUARANTEED FOR 5.5V BY GUARDBANDING 4.5V MINIMUM LIMITS.