

MN54AC574-X REV 2A0

 Original Creation Date: 07/01/96
 Last Update Date: 03/31/97
 Last Major Revision Date: 01/31/97

Octal D-Type Flip-Flop With TRI-State Outputs

General Description

The AC574 is a high - speed, low power octal flip-flop with a buffered common Clock (CP) and a buffered common Output Enable (\overline{OE}). The information presented to the D inputs is stored in the flip-flops on the LOW-to-HIGH Clock (CP) transition.

This device is functionally identical to the AC374 except for the pinouts.

Industry Part Number

54AC574

Prime Die

Z574

NS Part Numbers

 54AC574DMQB
 54AC574FMQB
 54AC574LMQB

Processing

MIL-STD-883, Method 5004

Quality Conformance Inspection

MIL-STD-883 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

- Icc and Ioz reduced by 50%
- Inputs and outputs on opposite sides of package allowing easy interface with microprocessors
- Useful as input or output port for microprocessors
- Functionally identical to AC374
- TRI-STATE outputs for bus-oriented applications
- Outputs source/sink 24 mA
- Standard Military Drawing (SMD)

(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™ circuits outside databook specifications.

Recommended Operating Conditions

Input Voltage (Vi)	0V to Vcc
Output Voltage (Vo)	0V to Vcc
Supply Voltage (Vcc)	2.0V to 6.0V
Operating Temperature (Ta)	-55 C to +125 C
Minimum Input Edge Rate	
AC Devices	
Vin from 30% to 70% of Vcc	
Vcc @ 3.0V, 4.5V, 5.5V	125mV/ns

Electrical Characteristics

DC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)
 DC: VCC 3.0V 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	INPUTS		0.1	uA	1
			1, 2	INPUTS		1.0	uA	2, 3
IIL	Low Level Input Current	VCC=5.5V, VM=0.0V	1, 2	INPUTS		-0.1	uA	1
			1, 2	INPUTS		-1.0	uA	2, 3
VOL	Low Level Output Voltage	VCC=3.0V, VIH=2.1V, VIL=0.9V, IOL=50.0uA	1, 2	OUTPUTS		.10	V	1, 2, 3
		VCC=4.5V, VIH=3.15V, VIL=1.35V, IOL=50.0uA	1, 2	OUTPUTS		.10	V	1, 2, 3
		VCC=5.5V, VIH=3.85V, VIL=1.65V, IOL=50.0uA	1, 2	OUTPUTS		.10	V	1, 2, 3
		VCC=3.0V, VIH=2.1V, VIL=0.9V, IOL=12.0mA	1, 2	OUTPUTS		.36	V	1
			1, 2	OUTPUTS		.50	V	2, 3
		VCC=4.5V, VIH=3.15V, VIL=1.35V, IOL=24.0mA	1, 2	OUTPUTS		.32	V	1
			1, 2	OUTPUTS		.40	V	2, 3
		VCC=5.5V, VIH=3.85V, VIL=1.65V, IOL=24.0mA	1, 2	OUTPUTS		.32	V	1
	1, 2	OUTPUTS		.40	V	2, 3		
VIOLOW	Dynamic Output Current LOW	VCC=5.5V, VIH=3.85V, VIL=1.65V, IOL=50.0mA	1, 2, 5	OUTPUTS		1.65	V	1, 2, 3
VOH	High Level Output Voltage	VCC=3.0V, VIL=0.9V, VIH=2.1V, IOH=-50.0uA	1, 2	OUTPUTS	2.90		V	1, 2, 3
		VCC=4.5V, VIL=1.35V, VIH=3.15V, IOH=-50.0uA	1, 2	OUTPUTS	4.40		V	1, 2, 3
		VCC=5.5V, VIL=1.65V, VIH=3.85V, IOH=-50.0uA	1, 2	OUTPUTS	5.40		V	1, 2, 3
		VCC=3.0V, VIL=0.9V, VIH=2.1V, IOH=-12.0mA	1, 2	OUTPUTS	2.56		V	1
			1, 2	OUTPUTS	2.40		V	2, 3
		VCC=4.5V, VIL=1.35V, VIH=3.15V, IOH=-24.0mA	1, 2	OUTPUTS	3.86		V	1
			1, 2	OUTPUTS	3.70		V	2, 3
		VCC=5.5V, VIL=1.65V, VIH=3.85V, IOH=-24.0mA	1, 2	OUTPUTS	4.86		V	1
	1, 2	OUTPUTS	4.70		V	2, 3		
VIOHIGH	Dynamic Output Current HIGH	VCC=5.5V, VINH=5.5V, VIL=1.65V, VIH=3.85V, IOH=-50.0mA	1, 2, 5	OUTPUTS	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

Electrical Characteristics

DC PARAMETERS (Continued)

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

DC: VCC 3.0V 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
ICCL	Supply Current Outputs LOW	VCC=5.5V	1, 2	VCC		4.0	uA	1
			1, 2	VCC		80	uA	2, 3
IC CZ	Supply Current Outputs Tri-State	VCC=5.5V	1, 2	VCC		4.0	uA	1
			1, 2	VCC		80	uA	2, 3
IOZH	Maximum TRI-STATE Current	VCC=3.0V, VM=3.0V, VIH=2.1V	1, 2	OUTPUTS		0.25	uA	1
			1, 2	OUTPUTS		5.0	uA	2, 3
		VCC=4.5V, VM=4.5V, VIH=3.15V	1, 2	OUTPUTS		0.25	uA	1
			1, 2	OUTPUTS		5.0	uA	2, 3
		VCC=5.5V, VM=5.5V, VIH=3.85V	1, 2	OUTPUTS		0.25	uA	1
			1, 2	OUTPUTS		5.0	uA	2, 3
IOZL	Maximum TRI-STATE Current	VCC=3.0V, VM=0.0V, VIH=2.1V	1, 2	OUTPUTS		-0.25	uA	1
			1, 2	OUTPUTS		-5.0	uA	2, 3
		VCC=4.5V, VM=0.0V, VIH=3.15V	1, 2	OUTPUTS		-0.25	uA	1
			1, 2	OUTPUTS		-5.0	uA	2, 3
		VCC=5.5V, VM=0.0V, VIH=3.85V	1, 2	OUTPUTS		-0.25	uA	1
			1, 2	OUTPUTS		-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, TR=3.0ns, TF=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 On	1.5	9.5	ns	9
			3, 4, 7	CP to On	1.5	11.5	ns	10, 11
tpHL(1)	Propagation Delay	VCC=4.5V	3, 4, 7	CP to On	1.5	8.5	ns	9
			3, 4, 7	CP to On	1.5	10.5	ns	10, 11
tpZH(1)	Output Enable Time	VCC=4.5V	3, 4, 7	OUTPUT ENABLE	1.5	8.5	ns	9
			3, 4, 7	OUTPUT ENABLE	1.5	9.5	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, TR=3.0ns, TF=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(1)	Output Enable Time	VCC=4.5V	3, 4, 7	OUTPUT ENABLE	1.5	8.0	ns	9
			3, 4, 7	OUTPUT ENABLE	1.5	9.5	ns	10, 11
tpHZ(1)	Output Disable Time	VCC=4.5V	3, 4, 7	OUTPUT DISABLE	1.5	10.0	ns	9
			3, 4, 7	OUTPUT DISABLE	1.5	11.5	ns	10, 11
tpLZ(1)	Output Disable Time	VCC=4.5V	3, 4, 7	OUTPUT DISABLE	1.5	7.5	ns	9
			3, 4, 7	OUTPUT DISABLE	1.5	9.0	ns	10, 11
ts(H/L)(1)	Setup Time HIGH or LOW	VCC=4.5V	6	Dn to CP	3.5		ns	9, 10, 11
th(H/L)(1)	Hold Time HIGH or LOW	VCC=4.5V	6	Dn to CP	2.5		ns	9, 10, 11
tw(H/L)(1)	CP Pulse Width HIGH or LOW	VCC=4.5V	6	CP Pulse Width	5.0		ns	9, 10, 11
Fmax (1)	Maximum Clock Frequency	VCC=4.5V	6	CP	95		MHZ	9
			6	CP	85		MHZ	10, 11
tpLH(2)	Propagation Delay	VCC=3.0V	3, 4	Dn to On	1.0	13.5	ns	9
			3, 4	Dn to On	1.0	16.5	ns	10, 11
tpHL(2)	Propagation Delay	VCC=3.0V	3, 4	Dn to On	1.0	12.0	ns	9
			3, 4	Dn to On	1.0	15.0	ns	10, 11
tpZH(2)	Output Enable Time	VCC=3.0V	3, 4	OUTPUT ENABLE	1.0	11.0	ns	9
			3, 4	OUTPUT ENABLE	1.0	13.0	ns	10, 11
tpZL(2)	Output Enable Time	VCC=3.0V	3, 4	OUTPUT ENABLE	1.0	10.5	ns	9
			3, 4	OUTPUT ENABLE	1.0	12.5	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, TR=3.0ns, TF=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
tpHZ(2)	Output Disable Time	VCC=3.0V	3, 4	OUTPUT DISABLE	1.0	12.0	ns	9
			3, 4	OUTPUT DISABLE	1.0	14.0	ns	10, 11
tpLZ(2)	Output Disable Time	VCC=3.0V	3, 4	OUTPUT DISABLE	1.0	9.0	ns	9
			3, 4	OUTPUT DISABLE	1.0	10.5	ns	10, 11
ts(H/L)(2)	Setup Time HIGH or LOW	VCC=3.0V	6	Dn to CP	4.5		ns	9, 10, 11
th(H/L)(2)	Hold Time HIGH or LOW	VCC=3.0V	6	Dn to CP	2.5		ns	9, 10, 11
tw(H/L)(2)	CP Pulse Width HIGH or LOW	VCC=3.0V	6	CP Pulse Width	6.0		ns	9
			6	CP Pulse Width	7.5		ns	10, 11
Fmax(2)	Maximum Clock Frequency	VCC=3.0V	6	CP	75		MHZ	9
			6	CP	55		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 MIN. LIMITS.