

MN54AC377-X REV 1B0

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Octal D-Type Flip - Flop With Clock Enable

General Description

The AC377 has eight edge-triggered, D-type flip-flops with individual D inputs and Q outputs. The common buffered Clock (CP) input loads all flip-flops simultaneously, when the Clock Enable (\overline{CE}) is LOW.

The register is fully edge-triggered. The state of each D input, one setup time before the LOW-to-HIGH clock transition is transferred to the corresponding flip-flop's Q output. The \overline{CE} input must be stable only one setup time prior to the LOW-to-HIGH clock transition for predictable operation.

Industry Part Number

54AC377

NS Part Numbers

 54AC377DMQB
 54AC377FMQB
 54AC377LMQB

Prime Die

Z377

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 reduced by 50%
- Ideal for addressable register applications
- Clock enable for address and data synchronization applications
- Eight edge-triggered D flip-flops
- Buffered common clock
- Outputs source/sink 24 mA
- Standard Military Drawing (SMD)
- AC377: 5962-88702

(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

(Note 1)

Supply Voltage (Vcc)	2.0V to 6.0V
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)	
AC Devices	
Vin from 30% to 70% of Vcc	
Vcc @ 3.0V, 4.5V, 5.5V	125 mV/ns

Note 1: See individual datasheets for those devices which differ from the typical input rise and fall times noted here.

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		.36	V	1
			1, 2	OUTPUTS		.50	V	2, 3
		VCC=5.5V, VIH=3.85V, VIL=1.65V, IOL=24.0mA	1, 2	OUTPUTS		.36	V	1
1, 2	OUTPUTS			.50	V	2, 3		
VIOLOW	Dynamic Output Current LOW	VCC=5.5V, VIL=1.65V, IOL=50.0mA, VIH=3.85V	1, 2, 5	OUTPUTS		1.65	V	1, 2, 3
VOH	High Level Output Voltage	VCC=3.0V, VIH=2.1V, VIL=0.9V, IOH=-50.0mA	1, 2	OUTPUTS	2.90		V	1, 2, 3
		VCC=4.5V, VIH=3.15V, VIL=1.35V, IOH=-50.0uA	1, 2	OUTPUTS	4.40		V	1, 2, 3
		VCC=5.5V, VIH=3.85V, VIL=1.65V, IOH=-50.0uA	1, 2	OUTPUTS	5.40		V	1, 2, 3
		VCC=3.0V, VIH=2.1V, VIL=0.9V, IOH=-12.0mA	1, 2	OUTPUTS	2.56		V	1
			1, 2	OUTPUTS	2.40		V	2, 3
		VCC=4.5V, VIH=3.15V, VIL=1.35V, IOH=-24.0mA	1, 2	OUTPUTS	3.86		V	1
			1, 2	OUTPUTS	3.70		V	2, 3
		VCC=5.5V, VIH=3.85V, VIL=1.65V, 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, VIH=3.85V, VIL=1.65V, 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

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 Qn	1.5	8.0	ns	9
			3, 4, 7	CP to Qn	1.5	10.0	ns	10, 11
tpHL(1)	Propagation Delay	VCC=4.5V	3, 4, 7	CP to Qn	1.5	9.0	ns	9
			3, 4, 7	CP to Qn	1.5	11.0	ns	10, 11
ts(H/L)(1)	Setup Time HIGH or LOW	VCC=4.5V	6	D to CP	5.0		ns	9
			6	D to CP	6.0		ns	10, 11
th(H/L)(1)	Hold Time HIGH or LOW	VCC=4.5V	6	D to CP	2.0		ns	9
			6	D to CP	2.5		ns	10, 11
ts(H/L)(2)	Setup Time HIGH or LOW	VCC=4.5V	6	\overline{CE} to CP	5.0		ns	9
			6	\overline{CE} to CP	6.0		ns	10, 11
th(H/L)(2)	Hold Time HIGH or LOW	VCC=4.5V	6	\overline{CE} to CP	1.0		ns	9
			6	\overline{CE} to CP	2.0		ns	10, 11
tw(H/L)(1)	CP Pulse Width	VCC=4.5V	6	CP	5.0		ns	9, 10, 11
FMAX(1)	Maximum Clock Frequency	VCC=4.5V	6	CP	95		MHz	9, 10, 11
tpLH(2)	Propagation Delay	VCC=3.0V	3, 4	CP to Qn	1.0	11.5	ns	9
			3, 4	CP to Qn	1.0	14.0	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
tpHL(2)	Propagation Delay	VCC=3.0V	3, 4	CP to Qn	1.0	12.0	ns	9
			3, 4	CP to Qn	1.0	15.0	ns	10, 11
ts(H/L)(3)	Setup Time HIGH or LOW	VCC=3.0V	6	D to CP	6.5		ns	9
			6	D to CP	7.5		ns	10, 11
th(H/L)(3)	Hold Time HIGH or LOW	VCC=3.0V	6	D to CP	1.0		ns	9
			6	D to CP	1.5		ns	10, 11
ts(H/L)(4)	Setup Time HIGH or LOW	VCC=3.0V	6	\overline{CE} to CP	7.0		ns	9
			6	\overline{CE} to CP	9.5		ns	10, 11
th(H/L)(4)	Hold Time HIGH or LOW	VCC=3.0V	6	\overline{CE} to CP	0		ns	9
			6	\overline{CE} to CP	1.0		ns	10, 11
tw(H/L)(2)	CP Pulse Width	VCC=3.0V	6	CP	5.5		ns	9
			6	CP	6.5		ns	10, 11
Fmax(2)	Maximum Clock Frequency	VCC=3.0V	6	CP	85		MHz	9
			6	CP	75		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, SUBGROUP 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.