



MICROCIRCUIT DATA SHEET

MN54ACTQ273-X REV 2A0

Original Creation Date: 07/15/96
Last Update Date: 05/25/99
Last Major Revision Date: 03/19/99

Octal D-Type Flip-Flop With Master Reset

General Description

The ACTQ273 has eight edge-triggered D-type flip-flops with individual D inputs and Q outputs. The common buffered Clock (CP) and Master Reset (MR) input load and reset (clear) all flip-flops simultaneously.

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.

All outputs will be forced LOW independently of Clock or Data inputs by a LOW voltage level on the MR input. The device is useful for applications where the true output only is required and the Clock and Master Reset are common to all storage elements.

The ACTQ utilizes NSC Quiet Series technology to guarantee quiet output switching and improve dynamic threshold performance. FACT Quiet Series TM features GTO TM output control and undershoot corrector in addition to a split group bus for superior performance.

Industry Part Number

54ACTQ273

NS Part Numbers

54ACTQ273DMQB*
54ACTQ273FMQB**
54ACTQ273LMQB***

Prime Die

D273

Controlling Document

5962-89735

Processing

MIL-STD-883, Method 5004

Quality Conformance Inspection

MIL-STD-883 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 reduced by 50%
- Guaranteed simultaneous switching noise level and dynamic threshold performance
- Guaranteed pin-to-pin skew AC performance
- Improved latch-up immunity
- Buffered common clock and asynchronous master reset
- Outputs source/sink 24 mA
- 4 kV minimum ESD immunity
- Standard Military Drawing (SMD)
- ACTQ273: 5962-8973501RA*, SA**, 2A***

(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
DC Latch-up Source or Sink Current	±300 mA
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)	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	
ACTQ Devices	
Vin from 0.8V to 2.0V	
Vcc @ 4.5V, 5.5V	125 mV/ns

Note 1: PLCC packaging is not recommended for applications requiring greater than 2000 temperature cycles from -40C to + 125C.

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, VINH=4.5V, VIH=2.0V, VIL=0.8V, IOL=50.0uA	1, 2	OUTPUT		.10	V	1, 2, 3
		VCC=5.5V, VINH=5.5V, VIH=2.0V, VIL=0.8V, IOL=50.0uA	1, 2	OUTPUT		.10	V	1, 2, 3
		VCC=4.5V, VINH=4.5V, VIH=2.0V, VIL=0.8V, IOL=24.0mA	1, 2	OUTPUT		.36	V	1
			1, 2	OUTPUT		.50	V	2, 3
		VCC=5.5V, VINH=5.5V, VIH=2.0V, VIL=0.8V, IOL=24.0mA	1, 2	OUTPUT		.36	V	1
			1, 2	OUTPUT		.50	V	2, 3
VIOL	Dynamic Output Current LOW	VCC=5.5V, VIH=5.5V, VIL=0.0V, IOL=50.0mA	1, 2, 5	OUTPUT		1.65	V	1, 2, 3
VOH	High Level Output Voltage	VCC=4.5V, VINL=0.0V, VIH=2.0V, VIL=0.8V, IOH=-50uA	1, 2	OUTPUT	4.40		V	1, 2, 3
		VCC=5.5V, VINL=0.0V, VIH=2.0V, VIL=0.8V, IOH=-50.0uA	1, 2	OUTPUT	5.40		V	1, 2, 3
		VCC=4.5V, VINL=0.0V, VIH=2.0V, VIL=0.8V, IOH=-24.0mA	1, 2	OUTPUT	3.86		V	1
			1, 2	OUTPUT	3.70		V	2, 3
		VCC=5.5V, VINL=0.0V, VIH=2.0V, VIL=0.8V, IOH=-24.0mA	1, 2	OUTPUT	4.86		V	1
			1, 2	OUTPUT	4.70		V	2, 3
VIOH	Dynamic Output Current HIGH	VCC=5.5V, VINH=5.5V, VIH=5.5V, VIL=0.0V, IOH=-50.0mA	1, 2, 5	OUTPUT	3.85		V	1, 2, 3
ICCH	Supply Current	VCC=5.5V, VINH=5.5V	1, 2	VCC		4.0	uA	1
			1, 2	VCC		80	uA	2, 3
ICCL	Supply Current	VCC=5.5V, VINH=5.5V, VINL=0.0V	1, 2	VCC		4.0	uA	1
			1, 2	VCC		80	uA	2, 3
ICCT	Supply Current	VCC=5.5V, VIHT=VCC-2.1V	1, 2	VCC		1.0	mA	1
			1, 2	VCC		1.6	mA	2, 3
VIKL		VCC=4.5V, IKL=-18mA	1, 2	INPUT		-1.2	V	1, 2, 3
VIKH		VCC=4.5V, IKH=18mA	1, 2	INPUT		5.7	V	1, 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
VILD	Maximum Low Level Dynamic Input Voltage	VCC=5.0V, LOAD 50pF / 500 OHMS	6, 8	INPUT		0.8	V	4
VIHD	Minimum High Level Dynamic Input Voltage	VCC=5.0V, LOAD 50pF / 500 OHMS	6, 8	INPUT	2.2		V	4
VOLP	Quiet Output Maximum Dynamic VOL	VCC=5.0V, LOAD 50pF / 500 OHMS	6, 7	OUTPUT		1.7	V	4
VOLV	Quiet Output Minimum Dynamic VOL	VCC=5.0V, LOAD 50pF / 500 OHMS	6, 7	OUTPUT		-1.2	V	4
VOHP	Quiet Output Maximum Dynamic VOH	VCC=5.0V, LOAD 50pF / 500 OHMS	6, 9	OUTPUT		VOH +1.2	V	4
VOHV	Quiet Output Minimum Dynamic VOH	VCC=5.0V, LOAD 50pF / 500 OHMS	6, 9	OUTPUT		VOH -2.2	V	4

Electrical Characteristics

AC PARAMETERS

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

AC: CL=50pf, RL=500 OHMS, TR/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
tpLH	Propagation Delay	VCC=4.5V	3, 4	CP to Qn	1.5	9.0	ns	9
			3, 4	CP to Qn	1.5	10.0	ns	10, 11
tpHL	Propagation Delay	VCC=4.5V	3, 4	CP to Qn	1.5	9.0	ns	9
			3, 4	CP to Qn	1.5	10.0	ns	10, 11
tpHL(2)	Propagation Delay	VCC=4.5V	3, 4	MR to Q	1.5	9.5	ns	9
			3, 4	MR to Q	1.5	11.0	ns	10, 11
ts(H/L)	Setup Time HIGH or LOW	VCC=4.5V	6	Dn to CP	5.0		ns	9, 10, 11
th(H/L)	Hold Time HIGH or LOW	VCC=4.5V	6	Dn to CP	2.0		ns	9, 10, 11
tw(H/L)(1)	Pulse Width	VCC=4.5V	6	MR Pulse Width	5.0		ns	9, 10, 11
tw(H/L)(2)	Pulse Width	VCC=4.5V	6	CP Pulse Width	5.0		ns	9, 10, 11
Fmax	Maximum Clock Frequency	VCC=4.5V	6		95		MHz	9
			6		85		MHz	10, 11
tREC	Recovery Time	VCC=4.5V	6	MR to CP	4.0		ns	9, 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, GUARDBANDED LIMITS SET FOR +25C, 2 MSEC DURATION MAX.
- Note 6: GUARANTEED BUT NOT TESTED. (DESIGN CHARACTERIZATION DATA)
- Note 7: MAX NUMBER OF OUTPUTS DEFINED AS (N). DATA INPUTS ARE DRIVEN 0V TO 3V. ONE OUTPUT @ VOL.
- Note 8: MAX NUMBER OF DATA INPUTS (N) SWITCHING. (N-1) INPUTS SWITCHING 0V TO 3V. INPUT-UNDER-TEST SWITCHING 3V TO THRESHOLD (VILD), 0V TO THRESHOLD (VIHD), FREQ= 1 MHZ.
- Note 9: MAX NUMBER OF OUTPUTS DEFINED AS (N). DATA INPUTS ARE DRIVEN 0V TO 3V. ONE OUTPUT @ VOH.

Revision History

Rev	ECN #	Rel Date	Originator	Changes
2A0	M0003322	05/25/99	Linda Collins	Changed the test limits from 4.70 min. room temp to 4.86 min. and the temp limit from 4.86 min. to 4.70 min. for VOH. Changed the 4.5V Vcc for VOH to 5.5V Vcc and the 5.5V Vcc to 4.5V Vcc for VOH. Added VOHV and VOHP. Added note 9. Changed the default pin name fot tpHL (2) from DN to CP to MR to Q.