National Semiconductor

MICROCIRCUIT DATA SHEET

MN54ACTQ574-X REV 2A0

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Octal D Flip-Flop with TRI-STATE Outputs

General Description

The ACTQ574 is a high-speed, low-power octal D-type 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.

The ACTQ574 utilizes Quiet Series technology to guarantee quiet output switching and improve dynamic threshold performance. FACT Quiet Series TM features G TO TM output control and undershoot corrector in addition to a split ground bus for superior performance.

The ACTQ574 is functionally identical to the ACTQ374 but with different pin-out.

Industry Part Number

54ACTQ574

NS Part Numbers

54ACTQ574DMQB
54ACTQ574FMQB
54ACTQ574LMQB

Prime Die

D574

Processing

MIL-STD-883, Method 5004

Quality Conformance Inspection

MIL-STD-883 5005

Subgrp	Description	Temp (^{O}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%
- Guaranteed simultaneous switching noise level and dynamic threshold performance
- Guaranteed pin-to-pin skew AC performance
- Inputs and outputs on opposite sides of the package allowing easy interface with microprocessors.
- Functionally identical to the ACQ/ACTQ374
- TRI-STATE outputs drive bus lines or buffer memory address registers
- Outputs source/sink 24 mA
- 4 kV minimum ESD immunity

(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)	-0.5 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 TM 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: All commercial 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, VIL=0.8V, IOL=24.0mA, VIH=2.0V	1, 2	OUTPUT		.36	V	1
			1, 2	OUTPUT		.50	V	2, 3
		VCC=4.5V, VIL=0.8V, IOL=50.0uA, VIH=2.0V	1, 2	OUTPUT		.10	V	1, 2, 3
		VCC=5.5V, VIL=0.8V, IOL=24.0mA, VIH=2.0V	1, 2	OUTPUT		.36	V	1
			1, 2	OUTPUT		.50	V	2, 3
		VCC=5.5V, VIL=0.8V, IOL=50.0uA, VIH=2.0V	1, 2	OUTPUT		.10	V	1, 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, VIL=0.8V, IOH=-24.0mA, VIH=2.0V	1, 2	OUTPUT	3.86		V	1
			1, 2	OUTPUT	3.70		V	2, 3
		VCC=4.5V, VIL=0.8V, IOH=-50.0uA, VIH=2.0V	1, 2	OUTPUT	4.40		V	1, 2, 3
		VCC=5.5V, VIL=0.8V, IOH=-24.0mA, VIH=2.0V	1, 2	OUTPUT	4.86		V	1
			1, 2	OUTPUT	4.70		V	2, 3
		VCC=5.5V, VIL=0.8V, IOH=-50.0uA, VIH=2.0V	1, 2	OUTPUT	5.40		V	1, 2, 3
VIOH	Dynamic Output current HIGH	VCC=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	1, 2	VCC		4.0	uA	1
			1, 2	VCC		80	uA	2, 3
ICCZ	Supply Current	VCC=5.5V	1, 2	VCC		4.0	uA	1
			1, 2	VCC		80	uA	2, 3
ICCL	Supply Current	VCC=5.5V	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

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 Leakage current	VCC=4.5V, VM=4.5V, VIH=2.0V	1, 2	OUTPUT		0.25	uA	1
			1, 2	OUTPUT		5.0	uA	2, 3
		VCC=5.5V, VM=5.5V, VIH=2.0V	1, 2	OUTPUT		0.25	uA	1
			1, 2	OUTPUT		5.0	uA	2, 3
IOZL	Maximum TRI-STATE Leakage current	VCC=4.5V, VM=0.0V, VIH=2.0V	1, 2	OUTPUT		-0.25	uA	1
			1, 2	OUTPUT		-5.0	uA	2, 3
		VCC=5.5V, VM=0.0V, VIH=2.0V	1, 2	OUTPUT		-0.25	uA	1
			1, 2	OUTPUT		-5.0	uA	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
VILD	Maximum Low Level Dynamic Input Voltage	VCC=5.0V, LOAD 50pF / 500 OHMS	6, 9	INPUT		0.8	V	4
VIHD	Minimum High Level Dynamic Input Voltage	VCC=5.0V, LOAD 50pF / 500 OHMS	6, 9	INPUT	2.2		V	4
VOLP	Quiet Output Maximum Dynamic Vol	VCC=5.0V, LOAD 50pF / 500 OHMS	6, 8	OUTPUT		1.5	V	4
VOLV	Quiet Output Minimum Dynamic Vol	VCC=5.0V, LOAD 50pF / 500 OHMS	6, 8	OUTPUT		-1.2	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, 7	CP to On	1.5	9.5	ns	9
			3, 4, 7	CP to On	1.5	11.0	ns	10, 11
tpHL	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	11.0	ns	10, 11
tpZH	Output Enable Time	VCC=4.5V	3, 4, 7	$\overline{OE}$ to On	1.5	9.5	ns	9
			3, 4, 7	$\overline{OE}$ to On	1.5	11.0	ns	10, 11
tpZL	Output Enable Time	VCC=4.5V	3, 4, 7	$\overline{OE}$ to On	1.5	9.5	ns	9
			3, 4, 7	$\overline{OE}$ to On	1.5	11.0	ns	10, 11
tpHZ	Output Disable Time	VCC=4.5V	3, 4, 7	$\overline{OE}$ to On	1.5	8.5	ns	9
			3, 4, 7	$\overline{OE}$ to On	1.5	10.0	ns	10, 11
tpLZ	Output Disable Time	VCC=4.5V	3, 4, 7	$\overline{OE}$ to On	1.5	8.5	ns	9
			3, 4, 7	$\overline{OE}$ to On	1.5	10.0	ns	10, 11
ts(H/L)	Setup Time HIGH or LOW	VCC=4.5V	6	Dn to CP	3.5		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)	Pulse Width	VCC=4.5V	6	CP	5.0		ns	9, 10, 11
fMAX	Maximum Clock Frequency	VCC=4.5V	6	CP	95		MHz	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: +25C & +125C MIN LIMITS GUARANTEED FOR 5.5V BY GUARDBANDING 4.5V MIN. LIMITS.

(Continued)

Note 8: MAX NUMBER OF OUTPUTS DEFINED AS (N). DATA INPUTS ARE DRIVEN 0V TO 3V. ONE OUTPUT @ VOL.

Note 9: 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.

Revision History

Rev	ECN #	Rel Date	Originator	Changes
2A0	M0003315	05/25/99	Linda Collins	Removed the reference to SMD 5962-8960102 from the Features section. Changed the test condition from VIHT=VCC-2.0V to VIHT=VCC-2.1V for ICCT. Changed the test conditions from VM=4.5V to VM=0.0V and VM=5.5V to VM=0.0V for IOZL.