

MN54ACTQ541-X REV 2A0

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Octal Buffer/Line Driver with TRI-STATE Outputs
General Description

The ACTQ541 is an octal buffer/line driver designed to be employed as a memory and address driver, clock driver and bus oriented transmitter/receiver.

This device is similar in function to the ACTQ244 while providing flow-through architecture (inputs on opposite side from outputs). This pinout arrangement makes this device especially useful as an output port for microprocessors, allowing ease of layout and greater PC board density.

The ACTQ541 utilizes NSC's FACT™ Quiet Series technology to guarantee quiet output switching the improved dynamic threshold performance. FACT Quiet series features GTO output control and undershoot corrector in addition to split ground bus for superior performance.

Industry Part Number

54ACTQ541

NS Part Numbers

 54ACTQ541DMQB*
 54ACTQ541FMQB**
 54ACTQ541LMQB***

Prime Die

D541

Controlling Document

5962-96829

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 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 package for easy board layout
- Non-inverting TRI-STATE outputs
- Guaranteed 4 kV minimum ESD immunity
- TTL compatible inputs
- Outputs source/sink 24 mA
- SMD (Standard Military Drawing)
- 5962-9682901QRA*, QSA**, Q2A***

(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)	
PDIP	140 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
Minimum Input Edge Rate Delta V/Delta T	
ACTQ Devices	
Vin from 0.8V to 2.0V	
Vc @ 4.5V, 5.5V	125 mV/ns

Note 1: All commercial packaging is not recommended for application 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, VIH=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, VIL=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
			1, 2	OUTPUT		.36	V	1
		VCC=5.5V, VIL=0.8V, IOL=24.0mA, VIH=2.0V	1, 2	OUTPUT		.50	V	2, 3
VCC=5.5V, VIL=0.8V, IOL=50.0uA, VIL=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
			1, 2	OUTPUT	4.86		V	1
		VCC=5.5V, VIL=0.8V, IOH=-24.0mA, VIH=2.0V	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, VIH=5.5V	1, 2	VCC		4.0	uA	1
			1, 2	VCC		80	uA	2, 3
ICCL	Supply Current	VCC=5.5V, VIL=0.0V	1, 2	VCC		4.0	uA	1
			1, 2	VCC		80	uA	2, 3
ICCZ	Supply Current	VCC=5.5V, VIN=0.0V OR 5.5V	1, 2	VCC		4.0	uA	1
			1, 2	VCC		80	uA	2, 3
ICCT	Supply Current	VCC=5.5V, VINH=3.4V	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
VOHP	Quiet Output Maximum Dynamic Voh	VCC=5.0V, LOAD 50pF / 500 OHMS	6, 10	OUTPUT		VOH +1.0	V	4
VOHV	Quiet Output Minimum Dynamic Voh	VCC=5.0V, LOAD 50pF / 500 OHMS	6, 10	OUTPUT		VOH -2.3	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	Dn to On	2.0	8.0	ns	9
			3, 4, 7	Dn to On	2.0	9.0	ns	10, 11
tpHL	Propagation Delay	VCC=4.5V	3, 4, 7	Dn to On	2.0	8.0	ns	9
			3, 4, 7	Dn to On	2.0	9.0	ns	10, 11
tpZH	Output Enable Time	VCC=4.5V	3, 4, 7	\overline{OE} to On	1.5	8.0	ns	9
			3, 4, 7	\overline{OE} to On	1.5	9.5	ns	10, 11
tpZL	Output Enable Time	VCC=4.5V	3, 4, 7	\overline{OE} to On	1.5	10.0	ns	9
			3, 4, 7	\overline{OE} to On	1.5	11.5	ns	10, 11
tpHZ	Output Disable Time	VCC=4.5V	3, 4, 7	\overline{OE} to On	1.5	8.0	ns	9
			3, 4, 7	\overline{OE} to On	1.5	9.5	ns	10, 11
tpLZ	Output Disable Time	VCC=4.5V	3, 4, 7	\overline{OE} to On	1.5	8.0	ns	9
			3, 4, 7	\overline{OE} to On	1.5	9.5	ns	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 MINIMUM LIMITS.

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.

Note 10: 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	M0003311	05/27/99	Linda Collins	Added VOHV and VOHP. Added note 10. Changed IOL to IOH in the VOH and VIOH test conditions.