

MN54ACTQ16245-X REV 2A0

 Original Creation Date: 07/12/96
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16-Bit Transceiver with TRI-STATE Outputs

General Description

The ACTQ16245 contains sixteen non-inverting bidirectional buffers with TRI-STATE outputs and is intended for bus oriented applications. The device is byte controlled. Each has separate control inputs which can be shorted together for full 16-bit operation. The T/R inputs determine the direction of data flow through the device. The OE inputs disable both the A and B ports by placing them in a high impedance state.

The ACTQ16245 utilizes NSC Quiet Series technology to guarantee quiet output switching and improved dynamic threshold performance. FACT Quiet Series TM features GTO TM output control for superior performance.

Industry Part Number

54ACTQ16245

NS Part Numbers

54ACTQ16245FMQB

Prime Die

D16245

Controlling Document

SEE FEATURES SECTION

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

- Utilizes NSC FACT Quiet Series technology
- Guaranteed simultaneous switching noise level and dynamic threshold performance
- Guaranteed pin-to-pin output skew
- Bidirectional non-inverting buffers
- Separate control logic for each byte
- 16-bit version of the ACTQ245
- Outputs source/sink 24 mA
- Additional specs for multiple output switching
- Output loading specs for both 50pF and 250pF loads

CONTROLLING DOCUMENTS:

54ACTQ16245FMQB 5962-9562001QXA

(Absolute Maximum Ratings)

(Note 1)

Supply Voltage (Vcc)	-0.5V to +7.0V
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
Storage Temperature (Tstg)	-65 C to + 150 C
DC Input Diode Current (Iik)	
Vin = -0.5V	-20 mA
Vin = Vcc +0.5V	+20 mA
DC Vcc or Ground Current per Output Pin	±50 mA
DC Output Source or Sink Current (Io)	±50 mA
Junction Temperature (Tj)	
Ceramic Flatpack	+175 C
Thermal Resistance	
Junction-To-Case (Theta JC)	10 C/Watt
Junction-To-Ambient (Theta JA)	80 C/Watt
(1 Watt at no airflow)	
Lead Temperature	
(Soldering , 10 Seconds)	+ 300 C
ESD Clasification	1500V
Maximum Power Dissipation	750 mW

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

Supply Voltage (Vcc)	4.5V to 5.5V
Input Voltage (Vi)	0V to Vcc
Output Voltage (Vo)	0V to Vcc
Operating Temperature	-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
Maximum Output Current	
High Level (IOH)	-24 mA
Low Level (IOL)	24 mA

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, 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, IOL=-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, IOL=-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, IOL=-24.0mA, VIH=2.0V	1, 2	OUTPUT	4.70		V	2, 3
VCC=5.5V, VIL=0.8V, IOL=-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, IOL=-50.0mA	1, 2, 5	OUTPUT	3.85		V	1, 2, 3
ICC	Supply Current	VCC=5.5V, VIN=5.5V or Gnd	1, 2	VCC		8.0	uA	1
			1, 2	VCC		160	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
IOZHT	Maximum I/O Leakage Current	VCC=4.5V, VOUT=4.5V, VIL=0.0V, VIH(OE)=2.0V	1, 2	OUTPUT		0.5	uA	1
			1, 2	OUTPUT		10	uA	2, 3
		VCC=5.5V, VOUT=5.5V, VIL=0.0V, VIH(OE)=2.0V	1, 2	OUTPUT		0.5	uA	1
			1, 2	OUTPUT		10	uA	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
IOZLT	Maximum I/O Leakage Current	VCC=4.5V, VOUT=4.5V, VIL=0.0V, VIH(OE)=2.0V	1, 2	OUTPUT		-0.5	uA	1
			1, 2	OUTPUT		-10	uA	2, 3
		VCC=5.5V, VOUT=5.5V, VIL=0.0V, VIH(OE)=2.0V	1, 2	OUTPUT		-0.5	uA	1
			1, 2	OUTPUT		-10	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
CIN	INPUT PIN CAPACITANCE - CONTROL PINS		6	INPUT		5	pF	4
CIN	INPUT PIN CAPACITANCE - I/O PINS		6	INPUT		15	pF	4
COUT	OUTPUT PIN CAPACITANCE		6	OUTPUT		15	pF	4
CPD	POWER DISSIPATION CAPACITANCE	VCC=5.0V	6			100	pF	4
VILD	Maximum Low Dynamic Input Voltage Level	VCC=5.0V, LOAD 50pF / 500 OHMS	6, 9	INPUT		0.8	V	4
VIHD	Minimum High Dynamic Input Voltage Level	VCC=5.0V, LOAD 50pF / 500 OHMS	6, 9	INPUT	2.0		V	4
VOLP	Quiet Output Maximum Dynamic Vol	VCC=5.0V, LOAD 50pF / 500 OHMS Maximum High Output Noise	6, 8	OUTPUT		1200	mV	4
VOLV	Quiet Output Minimum Dynamic Vol	VCC=5.0V, LOAD 50pF / 500 OHMS Maximum Low Output Noise	6, 8	OUTPUT		-1500	mV	4
VOHP	Maximum Overshoot	VCC=5.0V, LOAD 50pF / 500 OHMS Maximum Overshoot	6, 8	OUTPUT		VOH +1500	mV	4
VOHV	Minimum Vcc Droop	VCC=5.0V, LOAD 50pF / 500 OHMS Minimum Vcc Droop	6, 8	OUTPUT		VOH -1600	mV	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	An/Bn to Bn/An	2.0	8.0	ns	9
			3, 4, 7	An/Bn to Bn/An	2.0	9.5	ns	10, 11
tpHL	Propagation Delay	VCC=4.5V	3, 4, 7	An/Bn to Bn/An	2.0	8.0	ns	9
			3, 4, 7	An/Bn to Bn/An	2.0	9.5	ns	10, 11
tpLZ	Output Disable Time	VCC=4.5V	3, 4, 7	OE to An/Bn	1.5	8.0	ns	9
			3, 4, 7	OE to An/Bn	1.5	9.5	ns	10, 11
tpHZ	Output Disable Time	VCC=4.5V	3, 4, 7	OE to An/Bn	1.5	8.0	ns	9
			3, 4, 7	OE to An/Bn	1.5	9.5	ns	10, 11
tpZL	Output Enable Time	VCC=4.5V	3, 4, 7	OE to An/Bn	2.5	10.5	ns	9
			3, 4, 7	OE to An/Bn	2.5	13.0	ns	10, 11
tpZH	Output Enable Time	VCC=4.5V	3, 4, 7	OE to An/Bn	2.5	9.5	ns	9
			3, 4, 7	OE to An/Bn	2.5	11.0	ns	10, 11
TOSHL	Pin to Pin Skew HL Data to Output	VCC=4.5V	6	Pin to Pin Skew		1.2	ns	9, 10, 11
TOSLH	Pin to Pin Skew LH Data to Output	VCC=4.5V	6	Pin to Pin Skew		1.3	ns	9, 10, 11
TOST	Pin to Pin Skew LH/HL Data to Output	VCC=4.5V	6	Pin to Pin Skew		3.0	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.

(Continued)

- 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.
- 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
1B0	M0003727	08/14/03	Rose Malone	Update MDS: MN54ACTQ16245-X, Rev. 1A0 to MN54ACTQ16245-X, Rev. 1B0. Changed ESD rating from Class 1 to 1500V in Absolute Section and typo error for VOHV Parameter max. limit from VOH -1.0V to -1.6V to match the SMD drawing.
2A0	M0004077	08/14/03	Rose Malone	Updated MDS: MN54ACTQ16245-X, Rev. 1B0 to MN54ACTQ16245-X, Rev. 2A0. Changed limits for the following parameters: VOLP from 0.8V to 1200mV, VOLV from -0.8V to -1500mV, VOHP from VOH +1.0V to VOH +1500mV.