National *Semiconductor*

54ACTQ16244
# 16-Bit Buffer/Line Driver with TRI-STATE® Outputs

General Description

The 'ACTQ16244 contains sixteen non-inverting buffers with TRI-STATE outputs designed to be employed as a memory and address driver, clock driver, or bus oriented transmitter/receiver. The device is nibble controlled. Each nibble has separate TRI-STATE control inputs which can be shorted together for full 16-bit operation.

The 'ACTQ16244 utilizes NSC Quiet Series technology to guarantee quiet output switching and improved dynamic threshold performance. FACT Quiet Series® features GTO® output control for superior performance.

Features

■ Utilizes NSC FACT Quiet Series technology
■ Guaranteed simultaneous switching noise level and dynamic threshold performance
■ Separate control logic for each byte and nibble
■ 16-bit version of the 'ACTQ244
■ Outputs source/sink 24 mA
■ Standard Microcircuit Drawing (SMD) 5962-9561901
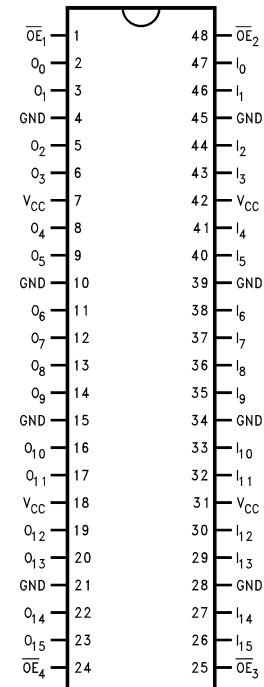
Logic Symbol

DS010925-1
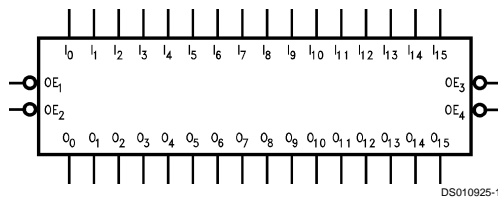
Pin Description

Pin Names	Description
$\overline{OE}_n$	Output Enable Input (Active Low)
I_0–I_{15}	Inputs
O_0–O_{15}	Outputs

Connection Diagram

Pin Assignment for CERPAK

DS010925-2

Functional Description

The 'ACTQ16244 contains sixteen non-inverting buffers with TRI-STATE standard outputs. The device is nibble (4 bits) controlled with each nibble functioning identically, but independent of the other. The control pins can be shorted together to obtain full 16-bit operation. The TRI-STATE outputs are controlled by an Output Enable ($\overline{OE}_n$) input for each nibble. When $\overline{OE}_n$ is LOW, the outputs are in 2-state mode. When $\overline{OE}_n$ is HIGH, the outputs are in the high impedance mode, but this does not interfere with entering new data into the inputs.

Truth Tables

Inputs		Outputs
$\overline{OE}_1$	I_0–I_3	O_0–O_3
L	L	L
L	H	H
H	X	Z

Inputs		Outputs
$\overline{OE}_3$	I_8–I_{11}	O_8–O_{11}
L	L	L
L	H	H

Inputs		Outputs
$\overline{OE}_3$	I_8–I_{11}	O_8–O_{11}
H	X	Z

Inputs		Outputs
$\overline{OE}_2$	I_4–I_7	O_4–O_7
L	L	L
L	H	H
H	X	Z

Inputs		Outputs
$\overline{OE}_4$	I_{12}–I_{15}	O_{12}–O_{15}
L	L	L
L	H	H
H	X	Z

H = High Voltage Level
L = Low Voltage Level
X = Immaterial
Z = High Impedance

Logic Diagram

DS010925-3
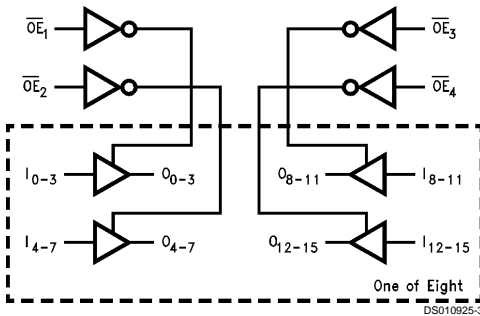
Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/ Distributors for availability and specifications.

Supply Voltage (V_{CC})	−0.5V to +7.0V
DC Input Diode Current (I_{IK})	
V_I = − 0.5V	−20 mA
V_I = V_{CC} + 0.5V	+20 mA
DC Output Diode Current (I_{OK})	
V_O = −0.5V	−20 mA
V_O = V_{CC} + 0.5V	+20 mA
DC Output Voltage (V_O)	−0.5V to V_{CC} + 0.5V
DC Output Source/Sink Current (I_O)	±50 mA
DC V_{CC} or Ground Current	
per Output Pin	±50 mA
Junction Temperature	
C-DIP	+175°C
Storage Temperature	−65°C to +150°C

Recommended Operating Conditions

Supply Voltage (V_{CC})	
'ACTQ	4.5V to 5.5V
Input Voltage (V_I)	0V to V_{CC}
Output Voltage (V_O)	0V to V_{CC}
Operating Temperature (T_A)	
54ACTQ	−55°C to +125°C
Minimum Input Edge Rate (dV/dt)	
'ACTQ Devices	125 mV/ns
V_{IN} from 0.8V to 2.0V	
V_{CC} @ 4.5V, 5.5V	

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.

DC Electrical Characteristics for 'ACTQ Family Devices

Symbol	Parameter	V_{CC} (V)	54ACTQ	Units	Conditions
			T_A = −55°C to +125°C		
			Guaranteed Limits		
V_{IH}	Minimum High	4.5	2.0	V	V_{OUT} = 0.1V
	Input Voltage	5.5	2.0		or V_{CC} − 0.1V
V_{IL}	Maximum Low	4.5	0.8	V	V_{OUT} = 0.1V
	Input Voltage	5.5	0.8		or V_{CC} − 0.1V
V_{OH}	Minimum High	4.5	4.4	V	I_{OUT} = −50 µA
	Output Voltage	5.5	5.4		
					(Note 2)
					V_{IN} = V_{IL} or V_{IH}
		4.5	3.70	V	I_{OH} = −24 mA
		5.5	4.70		I_{OH} = −24 mA
V_{OL}	Maximum Low	4.5	0.1	V	I_{OUT} = 50 µA
	Output Voltage	5.5	0.1		
					(Note 2)
					V_{IN} = V_{IL} or V_{IH}
		4.5	0.50	V	I_{OH} = 24 mA
		5.5	0.50		I_{OH} = 24 mA
I_{OZ}	Maximum TRI-STATE	5.5	±10.0	µA	V_I = V_{IL}, V_{IH}
	Leakage Current				V_O = V_{CC}, GND
I_{IN}	Maximum Input	5.5	±1.0	µA	V_I = V_{CC}, GND
	Leakage Current				
I_{CCT}	Maximum I_{CC}/Input	5.5	1.6	mA	V_I = V_{CC} −2.1V
I_{CC}	Max Quiescent	5.5	160.0	µA	V_{IN} = V_{CC} or GND
	Supply Current				(Note 5)
I_{OLD}	Minimum Dynamic	5.5	50	mA	V_{OLD} = 1.65V Max
I_{OHD}	Output Current (Note 3)		50	mA	V_{OHD} = 3.85V Min
V_{OLP}	Quiet Output	5.0	0.8	V	
	Maximum Dynamic V_{OL}				(Notes 4, 5)
V_{OLV}	Quiet Output	5.0	-0.8	V	
	Minimum Dynamic V_{OL}				(Notes 4, 5)

Note 2: All outputs loaded; thresholds associated with output under test.

DC Electrical Characteristics for 'ACTQ Family Devices (Continued)

Note 3: Maximum test duration 2.0 ms; one output loaded at a time.

Note 4: Maximum number of outputs that can switch simultaneously is n. (n − 1) outputs are switched LOW and one output held LOW.

Note 5: Maximum number of outputs that can switch simultaneously is n. (n − 1) outputs are switched HIGH and one output held HIGH.

Note 6: Max number of data inputs (n) switching. (n − 1) input switching 0V to 3V ('ACTQ) input under test switching 3V to threshold (V_{ILD})

AC Electrical Characteristics

Symbol	Parameter	V_{CC} (V) (Note 7)	54ACTQ $T_A =$ −55°C to +125°C C_L = 50 pF		Units
			Min	Max	
t_{PLH}	Propagation Delay		2.5	10.0	
t_{PHL}	A_n, B_n to B_n, A_n	5.0	2.5	9.5	ns
t_{PZH}	Output Enable	5.0	2.5	9.5	ns
t_{PZL}	Time		2.5	10.5	
t_{PHZ}	Output Disable	5.0	2.0	9.5	ns
t_{PLZ}	Time		2.0	9.5	

Note 7: Voltage Range 5.0 is 5.0V ±0.5V.

Capacitance

Symbol	Parameter	Typ	Units	Conditions
C_{IN}	Input Pin Capacitance	4.5	pF	V_{CC} = 5.0V
C_{PD}	Power Dissipation Capacitance	95	pF	V_{CC} = 5.0V

Physical Dimensions inches (millimeters) unless otherwise noted

0.070−0.100
[1.78−2.54]

0.040−0.054
[1.02−1.37]

0.640 [16.26] MAX

0.005 [0.13] MIN TYP

48   25

0.250−0.350
[6.35−8.89]

0.400
[10.16] MAX
GLASS

0.376−0.384
[9.55−9.75]

0.250−0.350
[6.35−8.89]

PIN #1
IDENT

1

24

0.004−0.009
[0.10−0.23] TYP

0.006−0.010
[0.15−0.25]

0.008−0.012
[0.20−0.30] TYP

0.025
[0.64] TYP

WA48A [REV A]
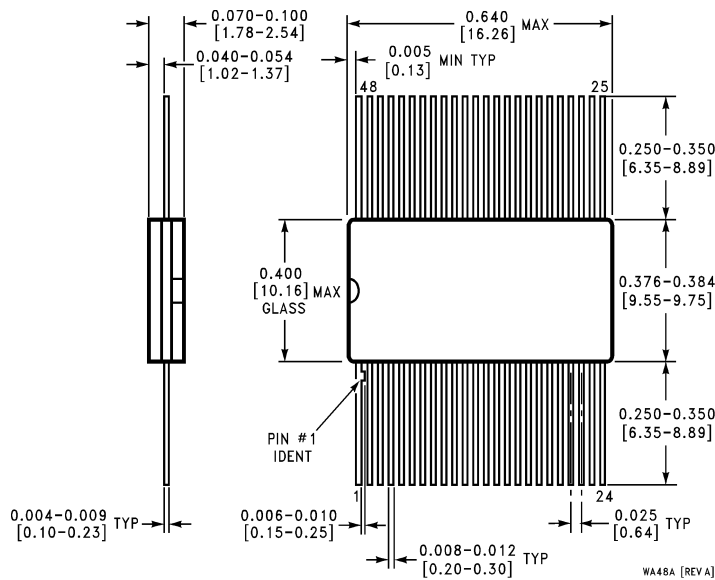
48-Lead CERPAK (F)
NS Package Number WA48A

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tems which, (a) are intended for surgical implant into
the body, or (b) support or sustain life, and whose fail-
ure to perform when properly used in accordance
with instructions for use provided in the labeling, can
be reasonably expected to result in a significant injury
to the user.

2. A critical component in any component of a life support
device or system whose failure to perform can be rea-
sonably expected to cause the failure of the life support
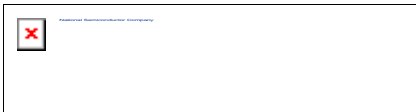device or system, or to affect its safety or effectiveness.

54ACTQ16244 **16-Bit Buffer/Line Driver with TRI-STATE Outputs**

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Datasheet

Title	Size (in Kbytes)	Date	View Online	Download	Receive via Email
54ACTQ16244 16-Bit Buffer/Line Driver with TRI-STATE Outputs	74 Kbytes	3-Sep-98	View Online	Download	Receive via Email
54ACTQ16244 Mil-Aero Datasheet MN54ACTQ16244-X	25 Kbytes		View Online	Download	Receive via Email

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Package Availability, Models, Samples & Pricing

Part Number	Package		Status	Models		Samples & Electronic Orders	Budgetary Pricing		Std Pack Size	Package Marking
	Type	# pins		SPICE	IBIS		Quantity	$US each		
5962-9561901QXA	Cerquad	48	Full production	N/A	N/A	.	50+	$20.0000	tube of 14	[logo]¢Z¢S¢4¢A$E 54ACTQ16244 FMQB/Q¢M5962 -9561901QXA
RM54ACTQ16244VX	Cerquad	48	Preliminary	N/A	N/A	.			tube of N/A	[logo]¢Z¢S¢4¢A$E RM54ACTQ1624 4VX WAFER # ¢R

5962R9561901VXA	Cerquad	48	Full production	N/A	N/A	.	50+	$138.0000	tube of 14	[logo]¢Z¢S¢4¢A$E 54ACTQ16244 WRQV 5962R 9561901VXA
54ACTQ16244 MDA	die		Lifetime buy	N/A	N/A	.	50+	$15.5000	100	-

[Information as of 2-Sep-2000]

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