

# 54ACTQ541

## Quiet Series Octal Buffer/Line Driver with TRI-STATE® Outputs

### General Description

The 'ACTQ541 is an octal buffer and line driver with TRI-STATE outputs designed to be employed as a memory and address driver, clock driver, or bus-oriented transmitter/receiver.

The 'ACTQ541 is similar to the 'ACTQ244 while providing flow-through architecture (inputs on opposite sides 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.

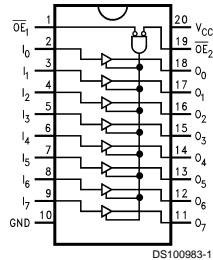
The 'ACTQ541 utilizes NSC Quiet Series technology to guarantee quiet output switching and improved dynamic threshold performance. FACT Quiet Series™ features GTO™ output control and undershoot corrector in addition to a split ground bus for superior AC MOS performance.

### Features

- Non-inverting buffers
- Guaranteed simultaneous switching noise level and dynamic threshold performance
- Flow-through pinout for ease of PC board layout
- Non-inverting TRI-STATE™ outputs
- TTL compatible inputs
- CMOS power consumption
- Output source/sink 24 mA
- Standard Microcircuit Drawing (SMD) 5962-9682901

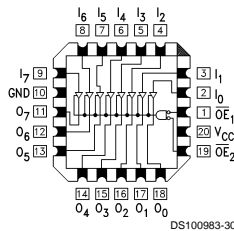
### Connection Diagram

**Pin Assignment  
DIP and Cerpack**



DS100983-1

**Pin Assignment  
LCC**



DS100983-30

Pin Names	Description
$\overline{OE}_1, \overline{OE}_2$	Output Enable Input (Active Low)
$I_0-I_7$	Inputs
$O_0-O_7$	Outputs

### Truth Table

Inputs			Outputs
$\overline{OE}_1$	$\overline{OE}_2$	I	ACTQ541
L	L	H	H
H	X	X	Z
X	H	X	Z
L	L	L	L

H = HIGH Voltage Level  
 L = LOW Voltage Level  
 X = Immaterial  
 Z = High Impedance

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 FACT™ and FACT Quiet Series™ are trademarks of Fairchild Semiconductor Corporation.

### 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 Input Voltage ( $V_I$ )	-0.5V to $V_{CC} + 0.5V$
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 or Sink Current ( $I_O$ )	±50 mA
DC $V_{CC}$ or Ground Current per Output Pin ( $I_{CC}$ or $I_{GND}$ )	±50 mA
Storage Temperature ( $T_{STG}$ )	-65°C to +150°C
DC Latch-Up	

Source or Sink Current	±300 mA
Junction Temperature ( $T_J$ )	
CDIP	175°C

### Recommended Operating Conditions

Free Air Ambient Temperature	
Military	-55°C to +125°C
Supply Voltage	
Military	+4.5V to +5.5V
Minimum Input Edge Rate ( $\Delta V/\Delta t$ )	
'ACTQ Devices	125 mV/ns
$V_{IN}$ from 0.8 to 2.0V	
$V_{CC}$ 4.5V, 5.5V	

**Note 1:** Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

**Note 2:** Either voltage limit or current limit is sufficient to protect inputs.

### 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 Level Input Voltage	4.5	2.0	V	$V_{OUT} = 0.1V$ or $V_{CC} - 0.1V$
		5.5	2.0		
$V_{IL}$	Maximum Low Level Input Voltage	4.5	0.8	V	$V_{OUT} = 0.1V$ or $V_{CC} - 0.1V$
		5.5	0.8		
$V_{OH}$	Minimum High Level Output Voltage	4.5	4.4	V	$I_{OUT} = -50 \mu A$
		5.5	5.4		
		4.5	3.70	V	(Note 3) $V_{IN} = V_{IL}$ or $V_{IH}$ $I_{OH} = -24 \text{ mA}$ $I_{OH} = -24 \text{ mA}$
		5.5	4.70		
$V_{OL}$	Maximum Low Level Output Voltage	4.5	0.1	V	$I_{OUT} = 50 \mu A$
		5.5	0.1		
		4.5	0.50	V	(Note 3) $V_{IN} = V_{IL}$ or $V_{IH}$ $I_{OL} = 24 \text{ mA}$ $I_{OL} = 24 \text{ mA}$
		5.5	0.50		
$I_{IN}$	Maximum Input Leakage Current	5.5	±1.0	μA	$V_I = V_{CC}, GND$
$I_{OZ}$	TRI-STATE Output Leakage Current, High or Low	5.5	±10.0	μA	$\overline{OE} = 2.0V$
$I_{CCT}$	Maximum $I_{CC}$ /Input	5.5	1.6	mA	$V_I = V_{CC} - 2.1V$
$I_{OLD}$	Minimum Dynamic	5.5	50	mA	$V_{OLD} = 1.65V \text{ Max}$
$I_{OHD}$	Output Current (Note 4)	5.5	-50	mA	$V_{OHD} = 3.85V \text{ Min}$
$I_{CC}$	Maximum Quiescent Supply Current	5.5	160.0	μA	$V_{IN} = V_{CC}$ or GND (Note 4)

## DC Electrical Characteristics for 'ACTQ Family Devices (Continued)

Symbol	Parameter	V <sub>CC</sub> (V)	54ACTQ		Units	Conditions
			T <sub>A</sub> = -55°C to +125°C			
			Guaranteed Limits			
V <sub>OLP</sub>	Quiet Output Maximum Dynamic V <sub>OL</sub>	5.0	1.5		V	(Note 4)
V <sub>OLV</sub>	Quiet Output Minimum Dynamic V <sub>OL</sub>	5.0	-1.2		V	(Note 5)

**Note 3:** All outputs loaded; thresholds on input associated with output under test.

**Note 4:** Maximum test duration 2.0 ms, one output loaded at a time.

**Note 5:** Max number of outputs defined as (n). Data inputs are 0V to 3V. One output @ GND.

## AC Electrical Characteristics

Symbol	Parameter	54ACTQ		Units	Fig. No.
		T <sub>A</sub> = -55°C to +125°C V <sub>CC</sub> = 4.5V-5.5V C <sub>L</sub> = 50 pF			
		Min	Max		
t <sub>PLH</sub>	Propagation Delay	2.0	9.0	ns	
t <sub>PHL</sub>	Data to Outputs	2.0	9.0		
t <sub>PZH</sub>	Output Enable Time	1.5	9.5	ns	
t <sub>PZL</sub>		1.5	11.5		
t <sub>PHZ</sub>	Output Disable Time	1.5	9.5	ns	
t <sub>PLZ</sub>		1.5	9.5		

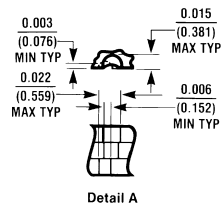
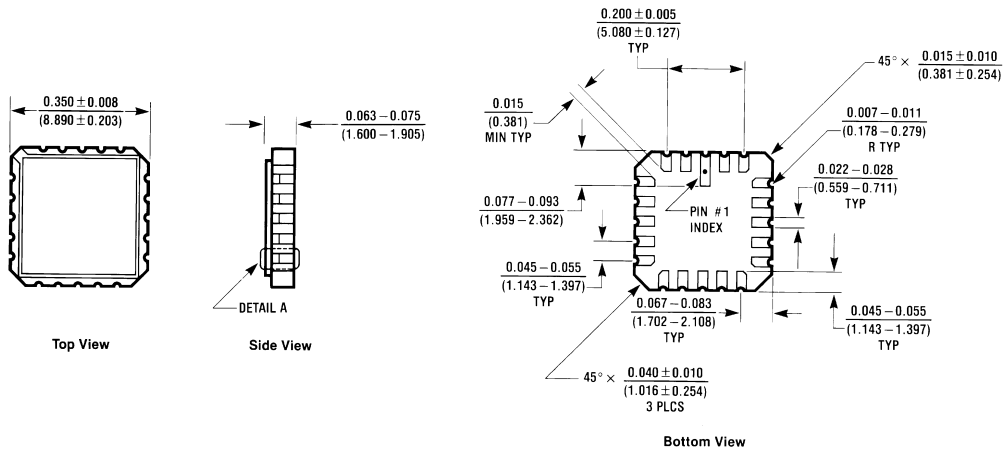
## Capacitance

Symbol	Parameter	Max	Units	Conditions T <sub>A</sub> = 25°C
C <sub>IN</sub>	Input Capacitance	12.0	pF	V <sub>CC</sub> = 0.0V
C <sub>OUT</sub> (Note 6)	Output Capacitance	15.0	pF	V <sub>CC</sub> = 5.0V

**Note 6:** C<sub>OUT</sub> is measured at frequency of f = 1 MHz, per MIL-STD-883B, Method 3012.

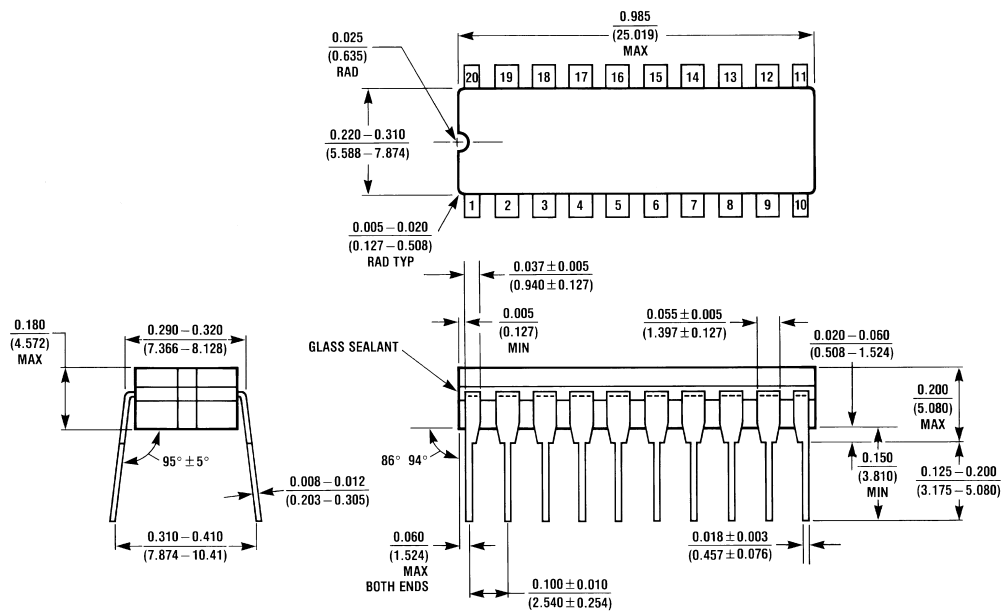


**Physical Dimensions** inches (millimeters) unless otherwise noted



**20-Terminal Ceramic Chip Carrier**  
 NS Package Number E20A

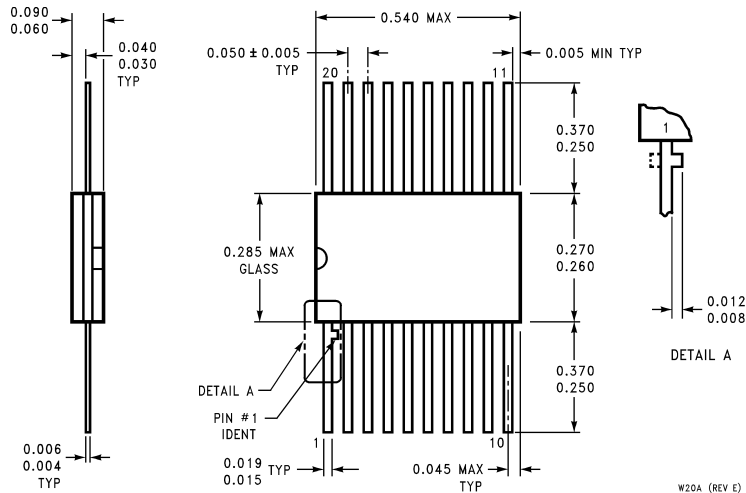
E20A (REV D)



**20-Lead Ceramic Dual-In-Line Package**  
 NS Package Number J20A

J20A (REV M)

**Physical Dimensions** inches (millimeters) unless otherwise noted (Continued)



**20-Lead Ceramic Flatpack  
NS Package Number W20A**

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