54ACQ244 • 54ACTQ244 Quiet Series Octal Buffer/Line Driver with TRI-STATE® Outputs

Check for Samples: 54ACQ244, 54ACTQ244

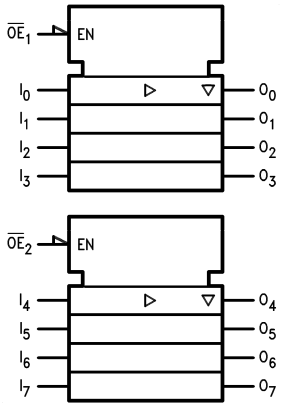
FEATURES

- **I_{CC} and I_{OZ} reduced by 50%**
- **Guaranteed simultaneous switching noise level and dynamic threshold performance**
- **Improved latch-up immunity**
- **TRI-STATE outputs drive bus lines or buffer memory address registers**
- **Outputs source/sink 24 mA**
- **Faster prop delays than the standard 'AC/'ACT244**
- **4 kV minimum ESD immunity**
- **Standard Microcircuit Drawing (SMD)**
  - **'ACTQ244: 5962-92186**
  - **'ACQ244: 5962-92176**

DESCRIPTION

The 'ACQ/'ACTQ244 is an octal buffer and line driver designed to be employed as a memory address driver, clock driver and bus oriented transmitter or receiver which provides improved PC board density. The ACQ/ACTQ 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 performance.

Figure 1. IEE/IEC



Pin Names	Description
$\overline{OE}_1$, $\overline{OE}_2$	TRI-STATE Output Enable Inputs
I_0–I_7	Inputs
O_0–O_7	Outputs

Connection Diagram

Figure 2. Pin Assignment for DIP and Flatpak

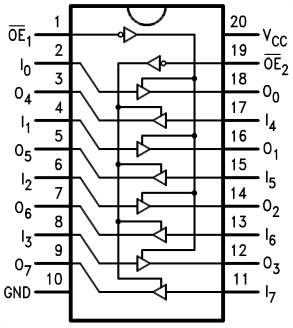
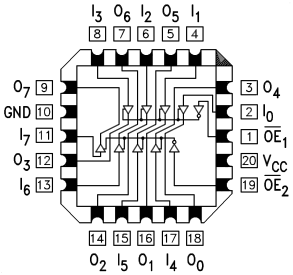


Figure 3. Pin Assignment for LCC



Truth Table

(1)

Inputs		Outputs
$\overline{OE}_1$	I_n	(Pins 12, 14, 16, 18)
L	L	L
L	H	H
H	X	Z

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

Inputs		Outputs
$\overline{OE}_2$	I_n	(Pins 3, 5, 7, 9)
L	L	L
L	H	H
H	X	Z

These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

Absolute Maximum Ratings (1)

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

(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 OperatingConditions

Supply Voltage (V_{CC})	
'ACQ	2.0V to 6.0V
'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)	
54ACQ/ACTQ	−55°C to +125°C
Minimum Input Edge Rate ΔV/Δt	
'ACQ Devices	
V_{IN} from 30% to 70% of V_{CC}	
V_{CC} @ 3.0V, 4.5V, 5.5V	125 mV/ns
Minimum Input Edge Rate ΔV/Δt	
'ACTQ Devices	
V_{IN} from 0.8V to 2.0V	
V_{CC} @ 4.5V, 5.5V	125 mV/ns

DC Electrical Characteristics for 'ACQ Family Devices

			54ACQ		
Symbol	**Parameter**	**V_{CC}**	**T_A = −55°C to +125°C**	**Units**	**Conditions**
		(V)	**Guaranteed Limits**		
V_{IH}	Minimum High Level	3.0	2.1		V_{OUT} = 0.1V
	Input Voltage	4.5	3.15	V	or V_{CC} − 0.1V
		5.5	3.85		
V_{IL}	Maximum Low Level	3.0	0.9		V_{OUT} = 0.1V
	Input Voltage	4.5	1.35	V	or V_{CC} − 0.1V
		5.5	1.65		
V_{OH}	Minimum High Level	3.0	2.9		I_{OUT} = −50 µA
	Output Voltage	4.5	4.4	V	
		5.5	5.4		
					(1) V_{IN} = V_{IL} or V_{IH}
		3.0	2.4		I_{OH} = −12 mA
		4.5	3.7	V	I_{OH} = −24 mA
		5.5	4.7		I_{OH} = −24 mA
V_{OL}	Maximum Low Level	3.0	0.1		I_{OUT} = 50 µA
	Output Voltage	4.5	0.1	V	
		5.5	0.1		
					(1) V_{IN} = V_{IL} or V_{IH}
		3.0	0.50		I_{OL} = 12 mA
		4.5	0.50	V	I_{OL} = 24 mA
		5.5	0.50		I_{OL} = 24 mA
I_{IN}	Maximum Input	5.5	±1.0	µA	V_I = V_{CC}, GND
	Leakage Current				(2)
I_{OLD}	Minimum Dynamic (3)	5.5	50	mA	V_{OLD} = 1.65V Max
I_{OHD}	Output Current	5.5	−50	mA	V_{OHD} = 3.85V Min
I_{CC}	Maximum Quiescent	5.5	80.0	µA	V_{IN} = V_{CC}
	Supply Current				or GND (2)
I_{OZ}	Maximum TRI-STATE				V_I(OE) = V_{IL}, V_{IH}
	Leakage Current	5.5	±5.0	µA	V_I = V_{CC}, GND
					V_O = V_{CC}, GND
V_{OLP}	Quiet Output	5.0	1.5	V	
	(4) (5) Maximum Dynamic V_{OL}				
V_{OLV}	Quiet Output	5.0	−1.2	V	(4) (5)
	Minimum Dynamic V_{OL}				

(1) All outputs loaded thresholds on input associated with output under test.
(2) I_{IN} and I_{CC} @ 3.0V are guaranteed to be less than or equal to the respective limit @ 5.5V V_{CC}.I_{CC} for 54ACQ @ 25°C is identical to 74ACQ @ 25°C.
(3) Maximum test duration 2.0 ms, one output loaded at a time.
(4) Plastic DIP package.
(5) Max number of outputs defined as (n). Data Inputs are driven 0V to 5V. One output @ GND.

DC Electrical Characteristics for 'ACTQ Family Devices

			54ACTQ		
Symbol	**Parameter**	**V_{CC}**	**−55°C to +125°C**	**Units**	**Conditions**
		(V)	**Guaranteed Limits**		
V_{IH}	Minimum High Level	4.5	2.0	V	V_{OUT} = 0.1V
	Input Voltage	5.5	2.0		or V_{CC} − 0.1V
V_{IL}	Maximum Low Level	4.5	0.8	V	V_{OUT} = 0.1V
	Input Voltage	5.5	0.8		or V_{CC} − 0.1V
V_{OH}	Minimum High Level	4.5	4.4	V	I_{OUT} = −50 µA
	Output Voltage	5.5	5.4		
					(1) 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 Level	4.5	0.1	V	I_{OUT} = 50 µA
	Output Voltage	5.5	0.1		
					(1) V_{IN} = V_{IL} or V_{IH}
		4.5	0.50	V	I_{OL} = 24 mA
		5.5	0.50		I_{OL} = 24 mA
I_{IN}	Maximum Input	5.5	±1.0	µA	V_I = V_{CC}, GND
	Leakage Current				
I_{OZ}	Maximum TRI-STATE	5.5	±5.0	µA	V_I = V_{IL}, V_{IH}
	Leakage Current				V_O = V_{CC}, GND
I_{CCT}	Maximum I_{CC}/Input	5.5	1.6	mA	V_I = V_{CC} − 2.1V
I_{OLD}	Minimum Dynamic (2)	5.5	50	mA	V_{OLD} = 1.65V Max
I_{OHD}	Output Current	5.5	−50	mA	V_{OHD} = 3.85V Min
I_{CC}	Maximum Quiescent	5.5	80.0	µA	V_{IN} = V_{CC}
	Supply Current				or GND (3)
V_{OLP}	Quiet Output	5.0	1.5	V	
	(4) (5) Maximum Dynamic V_{OL}				
V_{OLV}	Quiet Output	5.0	−1.2	V	(4) (5)
	Minimum Dynamic V_{OL}				

(1) All outputs loaded thresholds on input associated with output under test.
(2) Maximum test duration 2.0 ms, one output loaded at a time.
(3) I_{CC} for 54ACTQ @ 25°C is identical to 74ACTQ @ 25°C.
(4) Plastic DIP package.
(5) Max number of outputs defined as (n). Data Inputs are driven 0V to 3V. One output @ GND.

AC Electrical Characteristics

			54ACQ			
		V_{CC}	T_A = −55°C			Fig.
Symbol	Parameter	(V)	to +125°C		Units	No.
		(1)	C_L = 50 pF			
			Min	Max		
t_{PHL}, t_{PLH}	Propagation Delay	3.3	1.0	12.5	ns	
	Data to Output	5.0	1.0	9.0		
t_{PZL}, t_{PZH}	Output Enable Time	3.3	1.0	12.0	ns	
		5.0	1.0	10.0		
t_{PHZ}, t_{PLZ}	Output Disable Time	3.3	1.0	11.5	ns	
		5.0	1.0	10.0		

(1) Voltage Range 5.0 is 5.0V ±0.5V.Voltage Range 3.3 is 3.3V ±0.3V.

AC Electrical Characteristics

			54ACTQ			
		V_{CC}	T_A = −55°C			Fig.
Symbol	Parameter	(V)	to +125°C		Units	No.
		(1)	C_L = 50 pF			
			Min	Max		
t_{PHL}, t_{PLH}	Propagation Delay	5.0	1.5	9.0	ns	
	Data to Output					
t_{PZL}, t_{PZH}	Output Enable Time	5.0	1.5	10.5	ns	
t_{PHZ}, t_{PLZ}	Output Disable Time	5.0	1.5	10.5	ns	

(1) Voltage Range 5.0 is 5.0V ±0.5V.

Capacitance

Symbol	Parameter	Typ	Units	Conditions
C_{IN}	Input Capacitance	4.5	pF	V_{CC} = OPEN
C_{PD}	Power Dissipation	70	pF	V_{CC} = 5.0V
	Capacitance			

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