54ACTQ32QML Quiet Series Quad 2-Input OR Gate

Check for Samples: 54ACTQ32QML

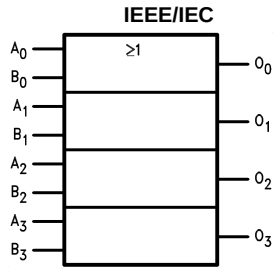
FEATURES

- **Radiation features 54ACTQ32 guaranteed to 100k rd(Si)**
- **I_{CC} reduced by 50%**
- **Minimum 4KV ESD protection**
- **Guaranteed simultaneous switching noise level and dynamic threshold performance**
- **Improved latch-up immunity**
- **Outputs source/sink 24 mA**
- **ACTQ32 has TTL-compatible inputs**

DESCRIPTION

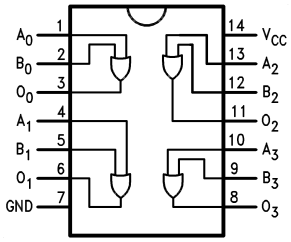
The 'ACTQ32 contains four, 2-input OR gates and utilizes NSC Quiet Series technology to guarantee quiet output switching and improved dynamic threshold performance. FACT Quiet Series™ features GTO™ output control and undershoot corrector in addition to a split ground bus for superior ACMOS performance.

Logic Symbol



Connection Diagram

Figure 1. Pin Assignment for DIP and Flatpak



Pin Names	Description
A_n, B_n	Inputs
O_n	Outputs

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.

Capacitance

Symbol	Parameter	Max	Units	Conditions
C_I	Input Capacitance	10.0	pF	V_{CC} = Open
C_{PD}	Power Dissipation	72.0	pF	V_{CC} = 5.0V
	Capacitance			

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
Thermal Resistance, Junction to Case (θ_{JC})	See Mil-Std-1835
Storage Temperature (T_{Stg})	−65°C ≤ T_A ≤ +150°C
Junction Temperature (T_J)	175°C
Maximum Power Dissipation (P_D)	500mW
Lead Temperature (soldering, 10 seconds)	300°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 Operating Conditions

Supply Voltage (V_{CC})	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)	−55°C ≤ T_A ≤ +125°C
Minimum Input Edge Rate (ΔV/Δt) V_I from 0.8V to 2.0V V_{CC} @ 4.5V, 5.5V	125 mV/ns
Maximum High Level Output Current (I_{OH})	−24mA
Maximum Low Level Output Current (I_{OL})	+24mA

Radiation Features

54ACTQ32JRQMLV	100 krads (Si)
54ACTQ32WRQMLV	100 krads (Si)

Quality Conformance Inspection

Mil-Std-883, Method 5005 - Group A

Subgroup	Description	Temp °C
1	Static tests at	25
2	Static tests at	125
3	Static tests at	-55

Subgroup	Description	Temp °C
4	Dynamic tests at	25
5	Dynamic tests at	125
6	Dynamic tests at	-55
7	Functional tests at	25
8A	Functional tests at	125
8B	Functional tests at	-55
9	Switching tests at	25
10	Switching tests at	125
11	Switching tests at	-55

54ACTQ32–QMLV RH Electrical Characteristics DC Parameters

The following conditions apply, unless otherwise specified.
DC: V_{CC} = 4.5V to 5.5V, Temperature range −55°C to 125°C

Symbol	Parameter	Conditions	Notes	Min	Max	Units	Sub-groups
I_{IH}	High Level Input Current	V_{CC} = 5.5V, V_{IH} = 5.5V	(1), (2)		0.1	µA	1
			(1), (2)		1.0	µA	2, 3
I_{IL}	Low Level Input Current	V_{CC} = 5.5V, V_{IL} = 0.0V	(1), (2)		-0.1	µA	1
			(1), (2)		-1.0	µA	2, 3
V_{OL}	Low Level Output Voltage	V_{CC} = 4.5V, V_{IH} = 2.0V, V_{IL} = 0.8V, I_{OL} = 50.0µA	(1), (2)		0.1	V	1, 2, 3
		V_{CC} = 5.5V, V_{IH} = 2.0V, V_{IL} = 0.8V, I_{OL} = 50.0µA	(1), (2)		0.1	V	1, 2, 3
		V_{CC} = 4.5V, V_{IH} = 2.0V, V_{IL} = 0.8V, I_{OL} = 24.0mA	(1), (2)		0.36	V	1
			(1), (2)		0.5	V	2, 3
		V_{CC} = 5.5V, V_{IH} = 2.0V, V_{IL} = 0.8V, I_{OL} = 24.0mA	(1), (2)		0.36	V	1
			(1), (2)		0.5	V	2, 3
V_{IOL}	Dynamic Output Current LOW	V_{CC} = 5.5V, V_{IH} = 5.5V, V_{IL} = 0.0V, I_{OL} = 50.0mA	(1), (2), (3)		1.65	V	1, 2, 3
V_{OH}	High Level Output Voltage	V_{CC} = 4.5V, V_{IH} = 2.0V, V_{IL} = 0.8V, I_{OL} = -50.0µA	(1), (2)	4.40		V	1, 2, 3
		V_{CC} = 5.5V, V_{IH} = 2.0V, V_{IL} = 0.8V, I_{OL} = -50.0µA	(1), (2)	5.40		V	1, 2, 3
		V_{CC} = 4.5V, V_{IH} = 2.0V, V_{IL} = 0.8V, I_{OL} = -24.0mA	(1), (2)	3.86		V	1
			(1), (2)	3.70		V	2, 3
		V_{CC} = 5.5V, V_{IH} = 2.0V, V_{IL} = 0.8V, I_{OL} = -24.0mA	(1), (2)	4.86		V	1
			(1), (2)	4.70		V	2, 3
V_{IOH}	Dynamic Output Current HIGH	V_{CC} = 5.5V, V_{IH} = 2.0V, V_{IL} = 0.8V, I_{OL} = -50.0mA	(1), (2), (3)	3.85		V	1, 2, 3
I_{CCH}	Supply Current	V_{CC} = 5.5V, V_{IH} = 5.5V	(1), (2)		100	nA	1
			(1), (2)		40	µA	2, 3
I_{CCL}	Supply Current	V_{CC} = 5.5V, V_{IH} = 0.0V	(1), (2)		100	nA	1
			(1), (2)		40	µA	2, 3
I_{CCF}	Supply Current Functional	V_{CC} = 5.5V, V_{IH} = 0.0V	(1), (2)		100	nA	1
			(1), (2)		40	µA	2, 3
I_{CCT}	Supply Current	V_{CC} = 5.5V, V_{IH} = 3.4V	(1), (2)		1.0	mA	1
			(1), (2)		1.6	mA	2, 3
V_{IKL}		V_{CC} = 4.5V, IKL = -18mA	(1), (2)		-1.2	V	1, 2, 3
V_{IKH}		V_{CC} = 4.5V, IKH = 18mA	(1), (2)		5.7	V	1, 2, 3
V_{ILD}	Maximum Low Level Dynamic Input Voltage	V_{CC} = 5.0V, Load 50pF / 500Ω	(4), (5)		0.8	V	4
V_{IHD}	Minimum High Level Dynamic Input Voltage	V_{CC} = 5.0V, Load 50pF / 500Ω	(4), (5)	2.2		V	4
V_{OLP}	Quiet Output Maximum Dynamic V_{OL}	V_{CC} = 5.0V, Load 50pF / 500Ω	(4), (6)		1.5	V	4
V_{OLV}	Quiet Output Minimum Dynamic V_{OL}	V_{CC} = 5.0V, Load 50pF / 500Ω	(4), (6)		-1.2	V	4

(1) Screen tested 100% on each device @ +25°C & +125°C temperature, Subgroup 1, 2, 7 & 8.
(2) Sample tested (TM5005, Table 1) on each manufacturing lot @ +25°C, +125°C, & −55°C, Subgroups A1, 2, 3, 7, & 8
(3) Transmission line driving test, guardbanded limits set for +25°C, 2mS duration maximum
(4) Guaranteed but not tested. Design characterization data
(5) Maximum number of data inputs (n) switching. (n-1) inputs switching 0V to 3V. Input-Under-Test switching 3V to threshold (V_{ILD}, 0V to threshold V_{IHD}, f = 1MHz
(6) Maximum number of outputs defined as (n) switching. Data inputs are driven 0V to 3V. One output @ V_{OL}

54ACTQ32–QMLV RH Electrical Characteristics AC Parameters

The following conditions apply, unless otherwise specified.

AC: C_L = 50pF, R_L = 500Ω, t_{Rise} = 3.0nS, t_{Fall} = 3.0nS

Symbol	Parameter	Conditions	Notes	Min	Max	Units	Sub-groups
t_{PLH}	Propagation Delay	V_{CC} = 4.5V	(1), (2), (3)	1.5	7.0	ns	9
			(1), (2), (3)	1.5	7.5	ns	10, 11
t_{PHL}	Propagation Delay	V_{CC} = 4.5V	(1), (2), (3)	1.5	7.0	ns	9
			(1), (2), (3)	1.5	7.5	ns	10, 11
t_{OSLH}	Output to Output Skew	V_{CC} = 4.5V	(4)		1.0	ns	9, 10, 11
t_{OSHL}	Output to Output Skew	V_{CC} = 4.5V	(4)		1.0	ns	9, 10, 11

(1) Screen tested 100% on each device @ +25°C, only. Subgroup A9.
(2) Sample tested (TM5005, Table 1) on each manufacturing lot @ +25°C, +125°C, & −55°C temperature, Subgroups A9, 10 & 11
(3) +25°C, & +125°C minimum limits guaranteed for 5.5V by guardbanding 4.5V minimum limits.
(4) Guaranteed but not tested. Design characterization data

54ACTQ32–QMLV RH Electrical Characteristics Delta Parameters

The following conditions apply, unless otherwise specified.
Burn-in and operating life test, Delta parameters (+25°C)

Symbol	Parameter	Conditions	Notes	Min	Max	Units	Sub-groups
I_{CCH}	Quiescent supply current		(1), (2)		±100	nA	1
I_{CCL}	Quiescent supply current		(1), (2)		±100	nA	1

(1) These parameters shall be recorded before and after the required burn-in and life tests to determine the delta limits.
(2) This limit may not be production tested.

REVISION HISTORY SECTION

Date Released	Revision	Section	Originator	Changes
12/14/05	A	New Release, Corporate format. Additions made in conversion: Radiation Features, Delta parameter table in electricals and Notes 11 & 12.	L. Lytle	1 MDS datasheet converted into one Corp. datasheet format. Additions made in conversion: Radiation Features, pg 3, Delta parameter table in electricals and Notes 11 & 12 , pg 6 to reflect SMD. MV54ACTQ32–X Rev 1A0 will be archived.

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