

Q

3.3 Volt CMOS 8-Bit Buffers/Line Drivers

QS74FCT3240
QS74FCT3244
QS74FCT32240
QS74FCT32244

FEATURES/BENEFITS

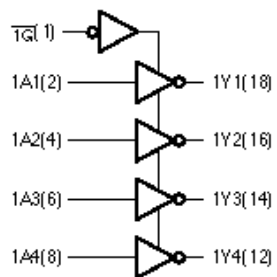
- Pin and function compatible to the 74F240/4, 74LVT240/4 and 74FCT240T/4T
- Available in SOIC and QSOP
- Undershoot clamp diodes on all inputs
- Ground bounce controlled outputs
- Low power QCMOS: 0.03 μ W typ static
- JEDEC spec compatible
- $I_{OL} = 24$ mA Com.
- TTL-compatible input and output levels
- Extended temperature -40°C to $+85^{\circ}\text{C}$
- 2.7V to 3.6V Supply Voltage
- 5V compatible input pins

DESCRIPTION

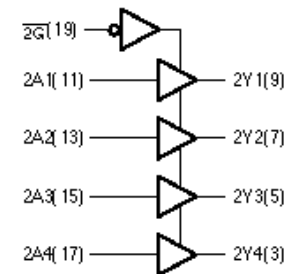
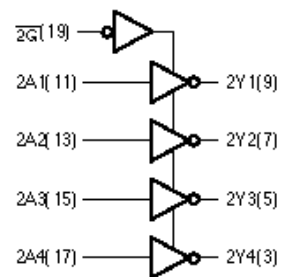
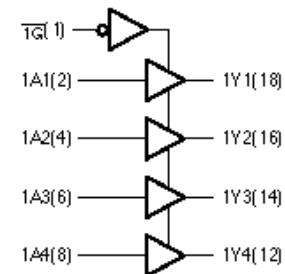
The FCT3240 and FCT3244 are 8-bit buffers/line drivers with three-state outputs that is ideal for driving high-capacitance loads as in memory address and data buses. All inputs have clamp diodes for undershoot noise suppression and all outputs have ground bounce suppression (see QSI Application Note AN-001). Input pins can be driven by 3.3V or 5V components allowing voltage transition in mixed supply systems. Ultra-low power QCMOS technology makes this product ideal for portable computing systems or communications devices.

FUNCTIONAL BLOCK DIAGRAM

FCT3240
FCT32240



FCT3244
FCT32244

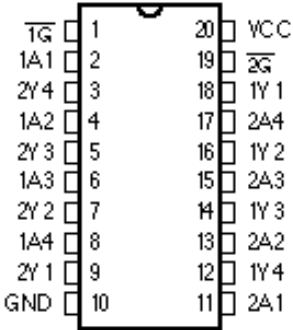


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PIN CONFIGURATION
(All Pins Top View)

Note: For QVSOP, see QS74FCT2X3244 Datasheet (MDSL-00063)

SOIC, QSOP



PIN DESCRIPTION

Name	I/O	Description
xA4-xA0	I	Data Inputs
xY4-xY0	O	Data Outputs - Three State
1G	I	Output Enable
2G	I	Output Enable

FCT3240/32240 FUNCTION TABLE

1G, 2G	Input A	Output Y
H	X	Z
L	L	H
L	H	L

FCT3244/32244 FUNCTION TABLE

1G, 2G	Input A	Output Y
H	X	Z
L	L	L
L	H	H

ABSOLUTE MAXIMUM RATINGS⁽¹⁾

Supply Voltage to Ground	–0.5V to +4.6V
DC Output Voltage V _{OUT}	–0.5V to V _{CC} + 0.5V ⁽²⁾
DC Input Voltage V _{IN}	–0.5V to +7.0V
AC Input Voltage (for a pulse width ≤ 20 ns)	–3.0V
DC Input Diode Current with V _{IN} < 0	±20 mA
DC Output Diode Current with V _{OUT} < 0	±50 mA
DC Output Current Max. Sink Current/Pin	±60 mA
Maximum Power Dissipation	0.5 watts
T _{STG} Storage Temperature	–65° to +150°C

- Note:**
1. Stresses greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to this device resulting in functional or reliability type failures.
 2. Not to exceed 4.6V

CAPACITANCE

T_A = 25°C, f = 1 MHz, V_{IN} = 0V, V_{OUT} = 0V

Pins	SOIC	QSOP	Unit
1, 19	4	4	pF
2-9, 11-18	8	8	pF

Note: Capacitance is characterized but not tested.

RECOMMENDED OPERATING CONDITIONS

Symbol	Description	Min	Max	Unit
V _{CC}	Supply Voltage	2.7	3.6	V
V _{IN}	Input Voltage	0	V _{CC}	V
V _{OUT}	Output Voltage	0	V _{CC}	V
T _A	Ambient Operating Temperature	–40	+85	°C
Dt/DV	Input Transition Rise or Fall Rate ⁽¹⁾	0	8	ns/V

- Notes:**
1. As measured between 0.8V and 2V.

DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Recommended operating conditions apply unless otherwise specified.

Symbol	Parameter	Test Conditions	Min	Typ ⁽¹⁾	Max	Unit
V_{IH}	Input HIGH Voltage	Input Pins	2.0	—	5.5	V
		I/O Pins	2.0	—	$V_{CC}+0.5$	V
V_{IL}	Input LOW Voltage	Input Pins	−0.5	—	0.8	V
DV_T	Input Hysteresis	$V_{TLH} - V_{THL}$ for All Inputs	—	0.2	—	V
$ I_{IH} $ $ I_{IL} $	Input Current Input HIGH or LOW	$V_{CC} = \text{Max.}, 0 \leq V_{IN} < V_{CC}$	—	—	1	μA
$ I_{OZ} $	Off-State Output Current (Hi-Z)	$V_{CC} = \text{Max.}, 0 \leq V_{IN} \leq V_{CC}$	—	—	5	μA
I_{OS}	Short Circuit Current	$V_{CC} = \text{Max.}, V_{OUT} = \text{GND}^{(2,3)}$	−60	—	−225	mA
V_{IC}	Input Clamp Voltage	$V_{CC} = \text{Min.}, I_{IN} = -18 \text{ mA}^{(3)}$	—	−0.7	—	V
V_{OH}	Output HIGH Voltage	$V_I = V_{IH} \text{ or } V_{IL}, V_{CC} = \text{Min.}, I_{OH} = -100 \mu\text{A}$	$V_{CC}-0.2$	—	—	V
		$V_I = V_{IH} \text{ or } V_{IL}, V_{CC} = 3\text{V}, I_{OH} = -8 \text{ mA}$	2.4	—	—	V
V_{OL}	Output LOW Voltage (FCT3XXX)	$V_I = V_{IH} \text{ or } V_{IL}, V_{CC} = \text{Min.}, I_{OL} = 100 \mu\text{A}$	—	—	0.2	V
		$V_I = V_{IH} \text{ or } V_{IL}, V_{CC} = 3\text{V}, I_{OL} = 16 \text{ mA}$	—	—	0.4	V
		$V_I = V_{IH} \text{ or } V_{IL}, V_{CC} = 3\text{V}, I_{OL} = 24 \text{ mA}$	—	—	0.5	V
V_{OL}	Output LOW Voltage (FCT32XXX−25W)	$V_I = V_{IH} \text{ or } V_{IL}, V_{CC} = 3\text{V}, I_{OL} = 8 \text{ mA}$	—	—	0.5	V
R_{OUT}	Output Resistance ⁽⁴⁾ (FCT32XXX−25W)	$V_{CC} = 3\text{V}, I_{OL} = 8 \text{ mA}$	—	40	—	W

Notes:

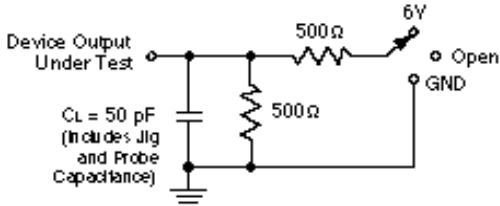
1. Typical values indicate $V_{CC} = 3.3\text{V}$ and $T_A = 25^\circ\text{C}$.
2. Not more than one output should be shorted and the duration is ≤ 1 second.
3. These parameters are guaranteed by design but not tested.
4. R_{OUT} represents total output impedance and includes added series termination resistance.

POWER SUPPLY CHARACTERISTICS

Symbol	Parameter	Test Conditions ⁽¹⁾	Min	Typ	Max	Unit
I _{cc}	Quiescent Power Supply Current	V _{cc} = Max., freq = 0 0V ≤ V _{IN} ≤ 0.2V or V _{cc} -0.2V ≤ V _{IN} ≤ V _{cc}	—	0.01	20	μA
DI _{cc}	Supply Current per Input @ TTL HIGH	V _{cc} = Max., freq = 0, V _{IN} = V _{cc} - 0.6V	—	1.0	20	μA
Q _{ccD}	Supply Current per Input per MHz	V _{cc} = Max., Outputs Open and Enabled One Bit Toggling @ 50% Duty Cycle Other Inputs at GND or V _{cc} ^(2,3)	—	40	85	μA/MHz

Notes:

- For conditions shown as Min. or Max., use the appropriate values specified under DC specifications.
- For flip-flops, Q_{ccD} is measured by switching one of the data input pins so that the output changes every clock cycle. This is a measurement of device power consumption only and does not include power to drive load capacitance or tester capacitance. This parameter is guaranteed by design but not tested.
- I_c can be computed using the above parameters as explained in the Technical Overview section.



Test	Switch
t _{PHL} /t _{PLH}	Open
t _{PZL} /t _{PLZ}	6V
t _{PZH} /t _{PHZ}	GND

Load Circuit for Outputs

Notes

- Input pulse characteristics: 0V to 2.7V, t_r = t_f = 2.5 ns (10% to 90%), transition measured at 1.5V, pulse generator Z_{out} = 50Ω.

SWITCHING CHARACTERISTICS OVER OPERATING RANGE

Recommended operating conditions apply unless otherwise specified.

FCT3240/32240

Symbol	Description ⁽¹⁾	3240, 32240 (V _{CC} = 3.3V ± 0.3V)		3240A, 32240A (V _{CC} = 3.3V ± 0.3V)		Unit
		Min	Max	Min	Max	
t _{PLH} t _{PHL}	Propagation Delay Ai to Yi, FCT3240	1.5	8	1.5	4.8	ns
t _{PLH} t _{PHL}	Propagation Delay Ai to Yi, FCT32240	1.5	8	1.5	4.8	ns
t _{PZH} t _{PZL}	Output Enable OE to Yi, FCT3240	1.5	10	1.5	6.2	ns
t _{PZH} t _{PZL}	Output Enable OE to Yi, FCT32240	1.5	10	1.5	6.2	ns
t _{PLZ} t _{PHZ}	Disable Time ⁽²⁾	1.5	9.5	1.5	5.6	ns

Notes:

1. Minimums guaranteed but not tested.
2. This parameter is guaranteed by design but not tested.
3. See Test Circuit and Waveforms.

FCT3244/32244

Symbol	Description ⁽¹⁾	3244, 32244 (V _{CC} = 3.3V ± 0.3V)		3244A, 32244A (V _{CC} = 3.3V ± 0.3V)		Unit
		Min	Max	Min	Max	
t _{PLH} t _{PHL}	Propagation Delay Ai to Yi, FCT3244	1.5	6.5	1.5	4.8	ns
t _{PLH} t _{PHL}	Propagation Delay Ai to Yi, FCT32244	1.5	6.5	1.5	4.8	ns
t _{PZH} t _{PZL}	Output Enable OE to Yi, FCT3244	1.5	8	1.5	6.2	ns
t _{PZH} t _{PZL}	Output Enable OE to Yi, FCT32244	1.5	8	1.5	6.2	ns
t _{PLZ} t _{PHZ}	Disable Time ⁽²⁾	1.5	7	1.5	5.6	ns

Notes:

1. Minimums guaranteed but not tested.
2. This parameter is guaranteed by design but not tested.
3. See Test Circuit and Waveforms.