



Is Now Part of



ON Semiconductor®

To learn more about ON Semiconductor, please visit our website at
www.onsemi.com

Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild_questions@onsemi.com.

ON Semiconductor and the ON Semiconductor logo are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

74VCX16374

Low Voltage 16-Bit D-Type Flip-Flops with 3.6V Tolerant Inputs and Outputs

General Description

The VCX16374 contains sixteen non-inverting D-type flip-flops with 3-STATE outputs and is intended for bus oriented applications. The device is byte controlled. A buffered clock (CP) and output enable (\overline{OE}) are common to each byte and can be shorted together for full 16-bit operation.

The 74VCX16374 is designed for low voltage (1.2V to 3.6V) V_{CC} applications with I/O compatibility up to 3.6V.

The 74VCX16374 is fabricated with an advanced CMOS technology to achieve high speed operation while maintaining low CMOS power dissipation.

Features

- 1.2V to 3.6V V_{CC} supply operation
- 3.6V tolerant inputs and outputs
- t_{PD}
 - 3.0 ns max for 3.0V to 3.6V V_{CC}
- Power-off high impedance inputs and outputs
- Supports live insertion and withdrawal (Note 1)
- Static Drive (I_{OH}/I_{OL})
 - ± 24 mA @ 3.0V V_{CC}
- Uses proprietary noise/EMI reduction circuitry
- Latch-up performance exceeds 300 mA
- ESD performance:
 - Human body model > 2000V
 - Machine model > 200V
- Also packaged in plastic Fine-Pitch Ball Grid Array (FBGA)

Note 1: To ensure the high-impedance state during power up or power down, \overline{OE} should be tied to V_{CC} through a pull-up resistor; the minimum value of the resistor is determined by the current-sourcing capability of the driver.

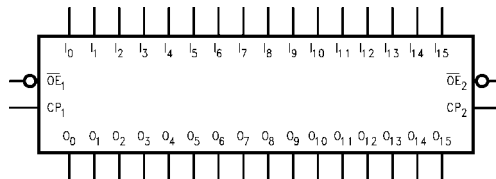
Ordering Code:

Order Number	Package Number	Package Descriptions
74VCX16374G (Note 2)(Note 3)	BGA54A	54-Ball Fine-Pitch Ball Grid Array (FBGA), JEDEC MO-205, 5.5mm Wide
74VCX16374MTD (Note 3)	MTD48	48-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 6.1mm Wide

Note 2: Ordering code "G" indicates Trays.

Note 3: Devices also available in Tape and Reel. Specify by appending suffix letter "X" to the ordering code.

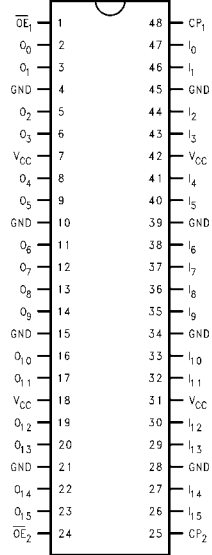
Logic Symbol



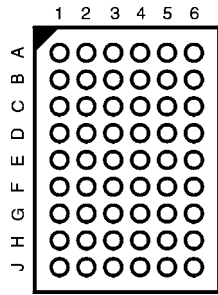
74VCX16374 Low Voltage 16-Bit D-Type Flip-Flops with 3.6V Tolerant Inputs and Outputs

Connection Diagrams

Pin Assignment for TSSOP



Pin Assignment for FBGA



(Top Thru View)

Pin Descriptions

Pin Names	Description
\overline{OE}_n	Output Enable Input (Active LOW)
CP _n	Clock Pulse Input
I ₀ -I ₁₅	Inputs
O ₀ -O ₁₅	Outputs
NC	No Connect

FBGA Pin Assignments

	1	2	3	4	5	6
A	O ₀	NC	\overline{OE}_1	CP ₁	NC	I ₀
B	O ₂	O ₁	NC	NC	I ₁	I ₂
C	O ₄	O ₃	V _{CC}	V _{CC}	I ₃	I ₄
D	O ₆	O ₅	GND	GND	I ₅	I ₆
E	O ₈	O ₇	GND	GND	I ₇	I ₈
F	O ₁₀	O ₉	GND	GND	I ₉	I ₁₀
G	O ₁₂	O ₁₁	V _{CC}	V _{CC}	I ₁₁	I ₁₂
H	O ₁₄	O ₁₃	NC	NC	I ₁₃	I ₁₄
J	O ₁₅	NC	\overline{OE}_2	CP ₂	NC	I ₁₅

Truth Tables

Inputs			Outputs
CP ₁	\overline{OE}_1	I ₀ -I ₇	O ₀ -O ₇
↗	L	H	H
↗	L	L	L
L	L	X	O ₀
X	H	X	Z

Inputs			Outputs
CP ₂	\overline{OE}_2	I ₈ -I ₁₅	O ₈ -O ₁₅
↗	L	H	H
↗	L	L	L
L	L	X	O ₀
X	H	X	Z

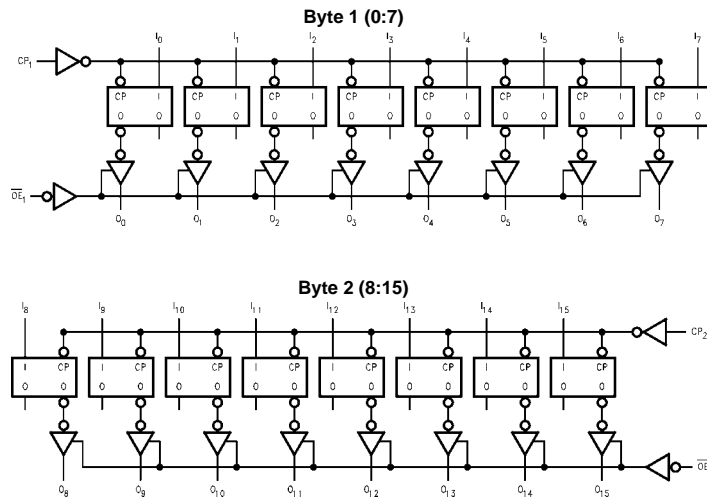
H = HIGH Voltage Level
 L = LOW Voltage Level
 X = Immaterial (HIGH or LOW, inputs may not float)
 Z = High Impedance
 O₀ = Previous O₀ before HIGH-to-LOW of CP

Functional Description

The 74VCX16374 consists of sixteen edge-triggered flip-flops with individual D-type inputs and 3-STATE true outputs. The device is byte controlled with each byte functioning identically, but independent of the other. The control pins can be shorted together to obtain full 16-bit operation. Each clock has a buffered clock and buffered Output Enable common to all flip-flops within that byte. The description which follows applies to each byte. Each

flip-flop will store the state of their individual I inputs that meet the setup and hold time requirements on the LOW-to-HIGH Clock (CP_n) transition. With the Output Enable (\overline{OE}_n) LOW, the contents of the flip-flops are available at the outputs. When \overline{OE}_n is HIGH, the outputs go to the high impedance state. Operations of the \overline{OE}_n input does not affect the state of the flip-flops.

Logic Diagram



Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

Absolute Maximum Ratings (Note 4)

Supply Voltage (V_{CC})	-0.5V to +4.6V
DC Input Voltage (V_I)	-0.5V to +4.6V
Output Voltage (V_O)	
Outputs 3-STATED	-0.5V to +4.6V
Outputs Active (Note 5)	-0.5V to $V_{CC} + 0.5V$
DC Input Diode Current (I_{IK}) $V_I < 0V$	-50 mA
DC Output Diode Current (I_{OK})	
$V_O < 0V$	-50 mA
$V_O > V_{CC}$	+50 mA
DC Output Source/Sink Current	
(I_{OH}/I_{OL})	± 50 mA
DC V_{CC} or GND Current per	
Supply Pin (I_{CC} or GND)	± 100 mA
Storage Temperature Range (T_{STG})	-65°C to +150°C

Recommended Operating Conditions (Note 6)

Power Supply	
Operating	1.2V to 3.6V
Input Voltage	-0.3V to +3.6V
Output Voltage (V_O)	
Output in Active States	0V to V_{CC}
Output in "OFF" State	0.0V to 3.6V
Output Current in I_{OH}/I_{OL}	
$V_{CC} = 3.0V$ to 3.6V	± 24 mA
$V_{CC} = 2.3V$ to 2.7V	± 18 mA
$V_{CC} = 1.65V$ to 2.3V	± 6 mA
$V_{CC} = 1.4V$ to 1.6V	± 2 mA
$V_{CC} = 1.2V$	± 100 μ A
Free Air Operating Temperature (T_A)	-40°C to +85°C
Minimum Input Edge Rate ($\Delta t/\Delta V$)	
$V_{IN} = 0.8V$ to 2.0V, $V_{CC} = 3.0V$	10 ns/V

Note 4: The Absolute Maximum Ratings are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the Absolute Maximum Ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

Note 5: I_O Absolute Maximum Rating must be observed.

Note 6: Floating or unused inputs must be held HIGH or LOW.

DC Electrical Characteristics

Symbol	Parameter	Conditions	V_{CC} (V)	Min	Max	Units
V_{IH}	HIGH Level Input Voltage		2.7 - 3.6	2.0		V
			2.3 - 2.7	1.6		
			1.65 - 2.3	$0.65 \times V_{CC}$		
			1.4 - 1.6	$0.65 \times V_{CC}$		
			1.2	$0.65 \times V_{CC}$		
V_{IL}	LOW Level Input Voltage		2.7 - 3.6		0.8	V
			2.3 - 2.7		0.7	
			1.65 - 2.3		$0.35 \times V_{CC}$	
			1.4 - 1.6		$0.35 \times V_{CC}$	
			1.2		$0.05 \times V_{CC}$	
V_{OH}	HIGH Level Output Voltage	$I_{OH} = -100 \mu A$	2.7 - 3.6	$V_{CC} - 0.2$		V
		$I_{OH} = -12$ mA	2.7	2.2		
		$I_{OH} = -18$ mA	3.0	2.4		
		$I_{OH} = -24$ mA	3.0	2.2		
		$I_{OH} = -100 \mu A$	2.3 - 2.7	$V_{CC} - 0.2$		
		$I_{OH} = -6$ mA	2.3	2.0		
		$I_{OH} = -12$ mA	2.3	1.8		
		$I_{OH} = -18$ mA	2.3	1.7		
		$I_{OH} = -100 \mu A$	1.65 - 2.3	$V_{CC} - 0.2$		
		$I_{OH} = -6$ mA	1.65	1.25		
		$I_{OH} = -100 \mu A$	1.4 - 1.6	$V_{CC} - 0.2$		
		$I_{OH} = -2$ mA	1.4	1.05		
		$I_{OH} = -100 \mu A$	1.2	$V_{CC} - 0.2$		

DC Electrical Characteristics (Continued)							
Symbol	Parameter	Conditions	V _{CC} (V)	Min	Max	Units	
V _{OL}	LOW Level Output Voltage	I _{OL} = 100 μA	2.7 - 3.6		0.2	V	
		I _{OL} = 12 mA	2.7		0.4		
		I _{OL} = 18 mA	3.0		0.4		
		I _{OL} = 24 mA	3.0		0.55		
		I _{OL} = 100 μA	2.3 - 2.7		0.2		
		I _{OL} = 12 mA	2.3		0.4		
		I _{OL} = 18 mA	2.3		0.6		
		I _{OL} = 100 μA	1.65 - 2.3		0.2		
		I _{OL} = 6 mA	1.65		0.3		
I _I	Input Leakage Current	0 ≤ V _I ≤ 3.6V	1.2 - 3.6		±5.0	μA	
I _{OZ}	3-STATE Output Leakage	0 ≤ V _O ≤ 3.6V V _I = V _{IH} or V _{IL}	1.2 - 3.6		±10	μA	
I _{OFF}	Power-OFF Leakage Current	0 ≤ (V _I , V _O) ≤ 3.6V	0		10	μA	
I _{CC}	Quiescent Supply Current	V _I = V _{CC} or GND V _{CC} ≤ (V _I , V _O) ≤ 3.6V (Note 7)	1.2 - 3.6		20	μA	
ΔI _{CC}	Increase in I _{CC} per Input	V _{IH} = V _{CC} - 0.6V	2.7 - 3.6		750		
Note 7: Outputs disabled or 3-STATE only.							
AC Electrical Characteristics (Note 8)							
Symbol	Parameter	Conditions	V _{CC} (V)	T _A = -40°C to +85°C		Units	Figure Number
				Min	Max		
f _{MAX}	Maximum Clock Frequency	C _L = 30 pF, R _L = 500Ω	3.3 ± 0.3	250		ns	Figures 1, 2
			2.5 ± 0.2	200			
			1.8 ± 0.15	100			
		C _L = 15 pF, R _L = 2kΩ	1.5 ± 0.1	80			Figures 7, 8
			1.2	40			
t _{PHL} , t _{PLH}	Propagation Delay CP to O _n	C _L = 30 pF, R _L = 500Ω	3.3 ± 0.3	0.8	3.0	ns	Figures 1, 2
			2.5 ± 0.2	1.0	3.9		
			1.8 ± 0.15	1.5	7.8		
		C _L = 15 pF, R _L = 2kΩ	1.5 ± 0.1	1.0	15.6		Figures 7, 8
			1.2	1.5	39		
t _{PZL} , t _{PZH}	Output Enable Time	C _L = 30 pF, R _L = 500Ω	3.3 ± 0.3	0.8	3.5	ns	Figures 1, 3, 4
			2.5 ± 0.2	1.0	4.6		
			1.8 ± 0.15	1.5	9.2		
		C _L = 15 pF, R _L = 2kΩ	1.5 ± 0.1	1.0	18.4		Figures 7, 9, 10
			1.2	1.5	46		
t _{PLZ} , t _{PHZ}	Output Disable Time	C _L = 30 pF, R _L = 500Ω	3.3 ± 0.3	0.8	3.5	ns	Figures 1, 3, 4
			2.5 ± 0.2	1.0	3.8		
			1.8 ± 0.15	1.5	6.8		
		C _L = 15 pF, R _L = 2kΩ	1.5 ± 0.1	1.0	13.6		Figures 7, 9, 10
			1.2	1.5	34		
t _S	Setup Time	C _L = 30 pF, R _L = 500Ω	3.3 ± 0.3	1.5		ns	Figures 1, 6
			2.5 ± 0.2	1.5			
			1.8 ± 0.15	2.5			
		C _L = 15 pF, R _L = 2kΩ	1.5 ± 0.1	3.0			Figures 6, 7
			1.2	6			

AC Electrical Characteristics (Continued)

Symbol	Parameter	Conditions	V _{CC} (V)	T _A = -40°C to +85°C		Units	Figure Number
				Min	Max		
t _H	Hold Time	C _L = 30 pF, R _L = 500Ω	3.3 ± 1.0	1.0		ns	Figures 1, 6
			2.5 ± 0.2	1.0			
			1.8 ± 0.15	1.0			
		C _L = 15 pF, R _L = 2kΩ	1.5 ± 0.1	2.0			Figures 6, 7
			1.2	6			
t _W	Pulse Width	C _L = 30 pF, R _L = 500Ω	3.3 ± 0.3	1.5		ns	Figures 1, 4
			2.5 ± 0.2	1.5			
			1.8 ± 0.15	4.0			
		C _L = 15 pF, R _L = 2kΩ	1.5 ± 0.1	4.0			Figures 4, 7
			1.2	8			
t _{OSSL} t _{OSSLH}	Output to Output Skew (Note 9)	C _L = 30 pF, R _L = 500Ω	3.3 ± 0.3		0.5	ns	
			2.5 ± 0.2		0.5		
			1.8 ± 0.15		0.75		
		C _L = 15 pF, R _L = 2kΩ	1.5 ± 0.1		1.5		
			1.2		1.2		

Note 8: For C_L = 50pF, add approximately 300 ps to the AC maximum specification.

Note 9: Skew is defined as the absolute value of the difference between the actual propagation delay for any two separate outputs of the same device. The specification applies to any outputs switching in the same direction, either HIGH-to-LOW (t_{OSSL}) or LOW-to-HIGH (t_{OSSLH}).

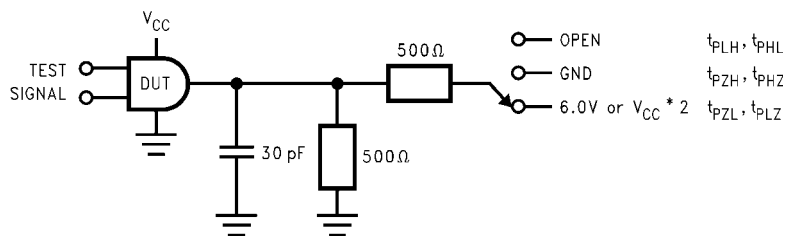
Dynamic Switching Characteristics

Symbol	Parameter	Conditions	V _{CC} (V)	T _A = +25°C	Units
				Typical	
V _{OLP}	Quiet Output Dynamic Peak V _{OL}	C _L = 30 pF, V _{IH} = V _{CC} , V _{IL} = 0V	1.8	0.25	V
			2.5	0.6	
			3.3	0.8	
V _{OLV}	Quiet Output Dynamic Valley V _{OL}	C _L = 30 pF, V _{IH} = V _{CC} , V _{IL} = 0V	1.8	-0.25	V
			2.5	-0.6	
			3.3	-0.8	
V _{OHV}	Quiet Output Dynamic Valley V _{OH}	C _L = 30 pF, V _{IH} = V _{CC} , V _{IL} = 0V	1.8	1.5	V
			2.5	1.9	
			3.3	2.2	

Capacitance

Symbol	Parameter	Conditions	T _A = +25°C	Units
			Typical	
C _{IN}	Input Capacitance	V _{CC} = 1.8V, 2.5V or 3.3V, V _I = 0V or V _{CC}	6	pF
C _{OUT}	Output Capacitance	V _I = 0V or V _{CC} , V _{CC} = 1.8V, 2.5V or 3.3V	7	pF
C _{PD}	Power Dissipation Capacitance	V _I = 0V or V _{CC} , f = 10 MHz, V _{CC} = 1.8V, 2.5V or 3.3V	20	pF

AC Loading and Waveforms (V_{CC} 3.3V ± 0.3V to 1.8V ± 0.15V)



TEST	SWITCH
t_{PLH}, t_{PHL}	Open
t_{PZL}, t_{PLZ}	6V at $V_{CC} = 3.3V \pm 0.3V$; $V_{CC} \times 2V$ at $V_{CC} = 2.5V \pm 0.2V; 1.8V \pm 0.15V$
t_{PZH}, t_{PHZ}	GND

FIGURE 1. AC Test Circuit

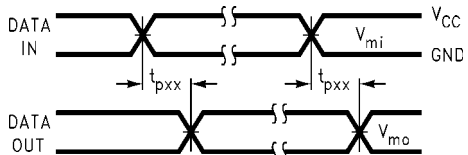


FIGURE 2. Waveform for Inverting and Non-Inverting Functions

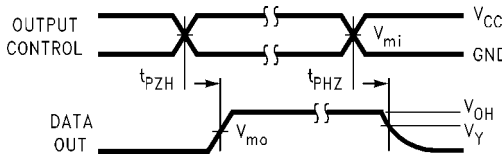


FIGURE 3. 3-STATE Output High Enable and Disable Times for Low Voltage Logic

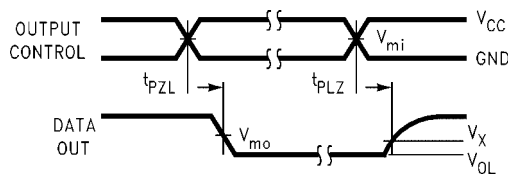


FIGURE 4. 3-STATE Output Low Enable and Disable Times for Low Voltage Logic

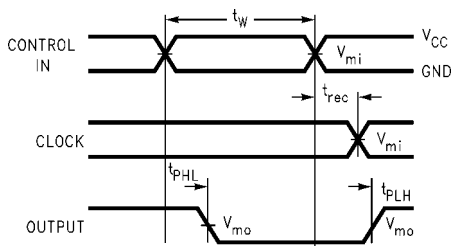


FIGURE 5. Propagation Delay, Pulse Width and t_{rec} Waveforms

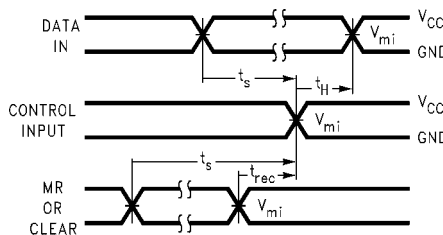
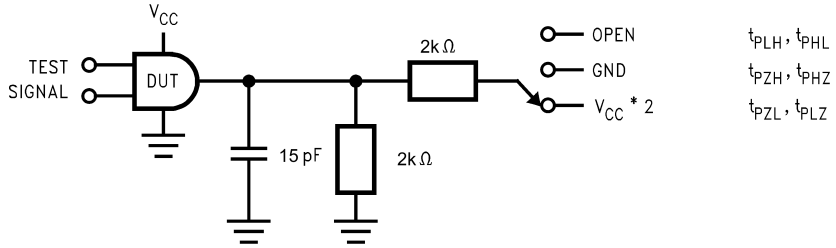


FIGURE 6. Setup Time, Hold Time and Recovery Time for Low Voltage Logic

Symbol	V_{CC}		
	3.3V ± 0.3V	2.5V ± 0.2V	1.8V ± 0.15V
V_{mi}	1.5V	$V_{CC}/2$	$V_{CC}/2$
V_{mo}	1.5V	$V_{CC}/2$	$V_{CC}/2$
V_X	$V_{OL} + 0.3V$	$V_{OL} + 0.15V$	$V_{OL} + 0.15V$
V_Y	$V_{OH} - 0.3V$	$V_{OH} - 0.15V$	$V_{OH} - 0.15V$

AC Loading and Waveforms (V_{CC} 0.15V ± 0.1V to 1.2V)



TEST	SWITCH
t_{PLH}, t_{PHL}	Open
t_{PZL}, t_{PLZ}	$V_{CC} \times 2V$ at $V_{CC} = 1.5V \pm 0.1V$
t_{PZH}, t_{PHZ}	GND

FIGURE 7. AC Test Circuit

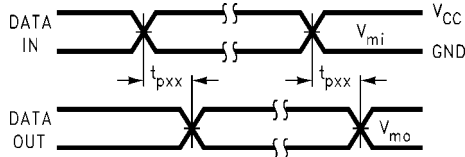


FIGURE 8. Waveform for Inverting and Non-Inverting Functions

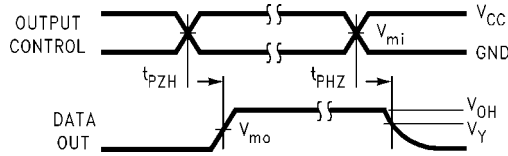


FIGURE 9. 3-STATE Output High Enable and Disable Times for Low Voltage Logic

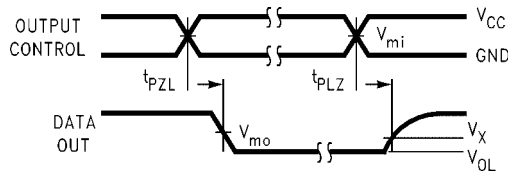
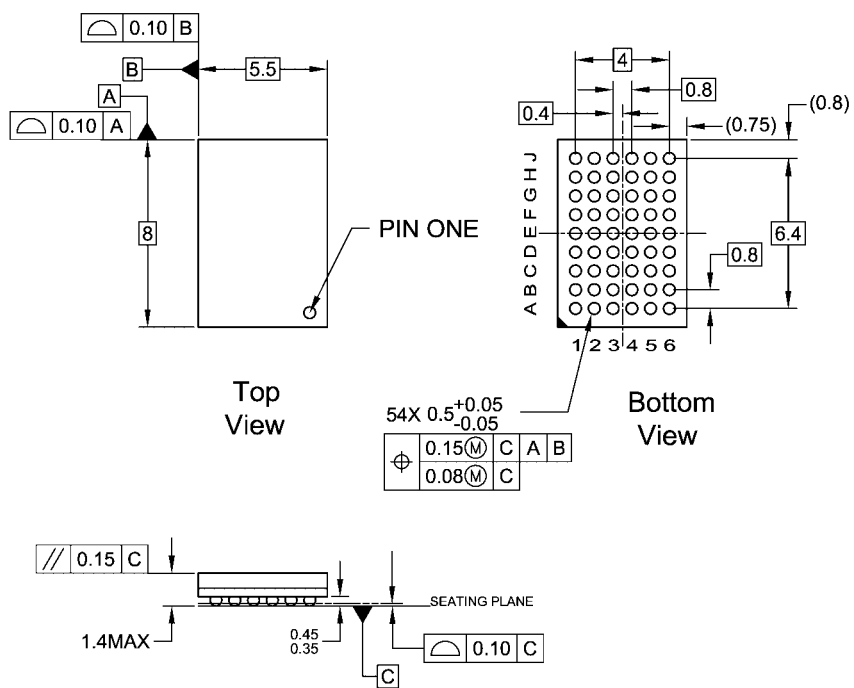


FIGURE 10. 3-STATE Output Low Enable and Disable Times for Low Voltage Logic

Symbol	V_{CC}
	1.5V ± 0.1V
V_{mi}	$V_{CC}/2$
V_{mo}	$V_{CC}/2$
V_X	$V_{OL} + 0.1V$
V_Y	$V_{OH} - 0.1V$

Physical Dimensions inches (millimeters) unless otherwise noted



NOTES:

- A. THIS PACKAGE CONFORMS TO JEDEC M0-205
- B. ALL DIMENSIONS IN MILLIMETERS
- C. LAND PATTERN RECOMMENDATION: NSMD (Non Solder Mask Defined)
.35MM DIA PADS WITH A SOLDERMASK OPENING OF .45MM CONCENTRIC TO PADS
- D. DRAWING CONFORMS TO ASME Y14.5M-1994

BGA54ArevD

**54-Ball Fine-Pitch Ball Grid Array (FBGA), JEDEC M0-205, 5.5mm Wide
Package Number BGA54A**

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



MTD48REV C

**48-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 6.1mm Body Width
Package Number MTD48**

Fairchild does not assume any responsibility for use of any circuitry described, no circuit patent licenses are implied and Fairchild reserves the right at any time without notice to change said circuitry and specifications.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF FAIRCHILD SEMICONDUCTOR CORPORATION. As used herein:

- Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and (c) whose failure 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.
- A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

www.fairchildsemi.com

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81-3-5817-1050

ON Semiconductor Website: www.onsemi.com
Order Literature: <http://www.onsemi.com/orderlit>
For additional information, please contact your local
Sales Representative