

**FEATURES:**

- Typical  $t_{sk(o)}$  (Output Skew) < 250ps
- ESD > 2000V per MIL-STD-883, Method 3015; > 200V using machine model ( $C = 200\text{pF}$ ,  $R = 0$ )
- $V_{CC} = 3.3V \pm 0.3V$ , Normal Range
- $V_{CC} = 2.7V$  to  $3.6V$ , Extended Range
- CMOS power levels ( $0.4\mu\text{W}$  typ. static)
- All inputs, outputs, and I/O are 5V tolerant
- Supports hot insertion
- Available in SSOP and TSSOP packages

**DRIVE FEATURES:**

- Balanced Output Drivers:  $\pm 12\text{mA}$
- Low switching noise

**APPLICATIONS:**

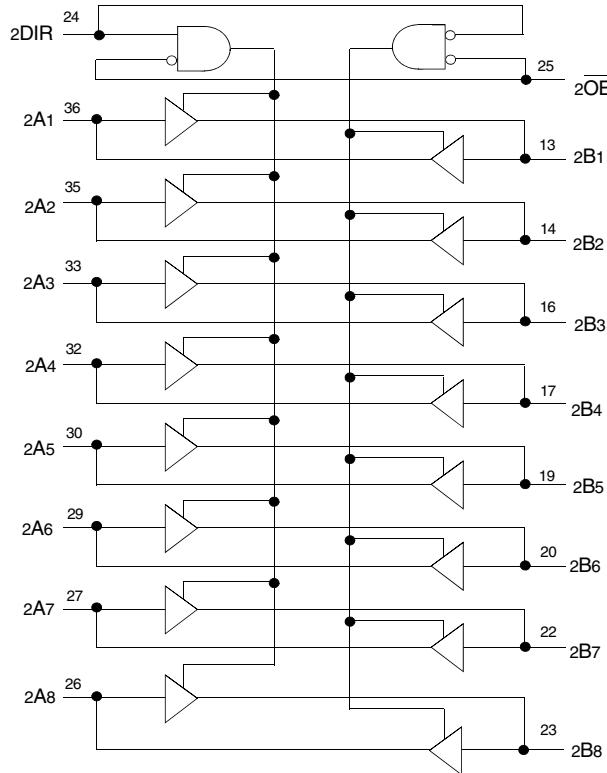
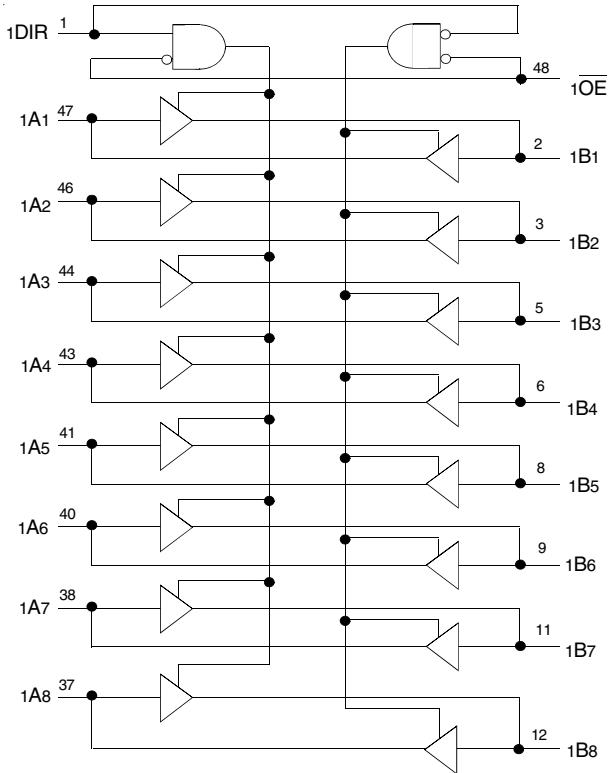
- 5V and 3.3V mixed voltage systems
- Data communication and telecommunication systems

**DESCRIPTION:**

This 16-bit bus transceiver is built using advanced dual metal CMOS technology. This high-speed, low power transceiver is ideal for asynchronous communication between two busses (A and B). The Direction and Output Enable controls are designed to operate this device as either two independent 8-bit transceivers or one 16-bit transceiver. The direction control pin (DIR) controls the direction of data flow. The output enable pin ( $\bar{OE}$ ) overrides the direction control and disables both ports. All inputs are designed with hysteresis for improved noise margin.

All pins can be driven from either 3.3V or 5V devices. This feature allows the use of this device as a translator in a mixed 3.3V/5V supply system.

The LVCR162245A has series resistors in the device output structure which will significantly reduce line noise when used with light loads. The driver has been designed to drive  $\pm 12\text{mA}$  at the designated threshold levels.

**FUNCTIONAL BLOCK DIAGRAM**

## PIN CONFIGURATION

1DIR	1	48	1 $\overline{OE}$
1B1	2	47	1A1
1B2	3	46	1A2
GND	4	45	GND
1B3	5	44	1A3
1B4	6	43	1A4
Vcc	7	42	Vcc
1B5	8	41	1A5
1B6	9	40	1A6
GND	10	39	GND
1B7	11	38	1A7
1B8	12	37	1A8
2B1	13	36	2A1
2B2	14	35	2A2
GND	15	34	GND
2B3	16	33	2A3
2B4	17	32	2A4
Vcc	18	31	Vcc
2B5	19	30	2A5
2B6	20	29	2A6
GND	21	28	GND
2B7	22	27	2A7
2B8	23	26	2A8
2DIR	24	25	2 $\overline{OE}$

SSOP/ TSSOP  
TOP VIEWABSOLUTE MAXIMUM RATINGS<sup>(1)</sup>

Symbol	Description	Max	Unit
VTERM <sup>(2)</sup>	Terminal Voltage with Respect to GND	-0.5 to +6.5	V
VTERM <sup>(3)</sup>	Terminal Voltage with Respect to GND	-0.5 to +6.5	V
TSTG	Storage Temperature	-65 to +150	°C
I <sub>OUT</sub>	DC Output Current	-50 to +50	mA
I <sub>IK</sub>	Continuous Clamp Current, V <sub>I</sub> < 0 or V <sub>O</sub> < 0	-50	mA
I <sub>CC</sub>	Continuous Current through each V <sub>CC</sub> or GND	±100	mA
I <sub>SS</sub>			

## NOTES:

1. Stresses greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.
2. V<sub>CC</sub> terminals.
3. All terminals except V<sub>CC</sub>.

CAPACITANCE (T<sub>A</sub> = +25°C, F = 1.0MHz)

Symbol	Parameter <sup>(1)</sup>	Conditions	Typ.	Max.	Unit
C <sub>IN</sub>	Input Capacitance	V <sub>IN</sub> = 0V	4.5	6	pF
C <sub>OUT</sub>	Output Capacitance	V <sub>OUT</sub> = 0V	6.5	8	pF
C <sub>I/O</sub>	I/O Port Capacitance	V <sub>IN</sub> = 0V	6.5	8	pF

## NOTE:

1. As applicable to the device type.

## PIN DESCRIPTION

Pin Names	Description
x $\overline{OE}$	Output Enable Input (Active LOW)
xDIR	Direction Control Input
xA <sub>x</sub>	Side A Inputs or 3-State Outputs
xB <sub>x</sub>	Side B Inputs or 3-State Outputs

FUNCTION TABLE (EACH 8-BIT SECTION)<sup>(1)</sup>

Inputs		Outputs
x $\overline{OE}$	xDIR	
L	L	Bus B Data to Bus A
L	H	Bus A Data to Bus B
H	X	Isolation

## NOTE:

1. H = HIGH Voltage Level
- X = Don't Care
- L = LOW Voltage Level

## DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:

Operating Condition:  $TA = -40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ 

Symbol	Parameter	Test Conditions		Min.	Typ. <sup>(1)</sup>	Max.	Unit
VIH	Input HIGH Voltage Level	Vcc = 2.3V to 2.7V		1.7	—	—	V
		Vcc = 2.7V to 3.6V		2	—	—	
VIL	Input LOW Voltage Level	Vcc = 2.3V to 2.7V		—	—	0.7	V
		Vcc = 2.7V to 3.6V		—	—	0.8	
IIH IIL	Input Leakage Current	Vcc = 3.6V	VI = 0 to 5.5V	—	—	$\pm 5$	$\mu\text{A}$
IOZH IOZL	High Impedance Output Current (3-State Output pins)	Vcc = 3.6V	VO = 0 to 5.5V	—	—	$\pm 10$	$\mu\text{A}$
IOFF	Input/Output Power Off Leakage	Vcc = 0V, VIN or VO $\leq$ 5.5V		—	—	$\pm 50$	$\mu\text{A}$
VIK	Clamp Diode Voltage	Vcc = 2.3V, IIN = $-18\text{mA}$		—	-0.7	-1.2	V
VH	Input Hysteresis	Vcc = 3.3V		—	100	—	mV
I <sub>CCL</sub> I <sub>CCH</sub> I <sub>CCZ</sub>	Quiescent Power Supply Current	Vcc = 3.6V		—	—	10	$\mu\text{A}$
		VIN = GND or Vcc $3.6 \leq VIN \leq 5.5\text{V}^{(2)}$		—	—	10	
$\Delta I_{CC}$	Quiescent Power Supply Current Variation	One input at Vcc - 0.6V, other inputs at Vcc or GND		—	—	500	$\mu\text{A}$

## NOTES:

1. Typical values are at Vcc = 3.3V,  $+25^{\circ}\text{C}$  ambient.

2. This applies in the disabled state only.

## OUTPUT DRIVE CHARACTERISTICS

Symbol	Parameter	Test Conditions <sup>(1)</sup>		Min.	Max.	Unit
VOH	Output HIGH Voltage	Vcc = 2.3V to 3.6V	IOH = $-0.1\text{mA}$	Vcc - 0.2	—	V
		Vcc = 2.3V	IOH = $-4\text{mA}$	1.9	—	
			IOH = $-6\text{mA}$	1.7	—	
		Vcc = 2.7V	IOH = $-4\text{mA}$	2.2	—	
			IOH = $-8\text{mA}$	2	—	
		Vcc = 3V	IOH = $-6\text{mA}$	2.4	—	
			IOH = $-12\text{mA}$	2	—	
		Vcc = 2.3V to 3.6V	IOH = $0.1\text{mA}$	—	0.2	V
			IOH = $4\text{mA}$	—	0.4	
			IOH = $6\text{mA}$	—	0.55	
			IOH = $4\text{mA}$	—	0.4	
			IOH = $8\text{mA}$	—	0.6	
VOL	Output LOW Voltage	Vcc = 2.3V	IOH = $6\text{mA}$	—	0.55	V
			IOH = $12\text{mA}$	—	0.8	
		Vcc = 2.7V	IOH = $6\text{mA}$	—	0.55	
			IOH = $12\text{mA}$	—	0.8	
		Vcc = 3V	IOH = $6\text{mA}$	—	0.55	
			IOH = $12\text{mA}$	—	0.8	

## NOTE:

1. VIH and VIL must be within the min. or max. range shown in the DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE table for the appropriate Vcc range.  $TA = -40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ .

OPERATING CHARACTERISTICS,  $V_{CC} = 3.3V \pm 0.3V$ ,  $T_A = 25^\circ C$ 

Symbol	Parameter	Test Conditions	Typical	Unit
$C_{PD}$	Power Dissipation Capacitance per Transceiver Outputs enabled	$C_L = 0\text{pF}$ , $f = 10\text{MHz}$	39	$\text{pF}$
$C_{PD}$	Power Dissipation Capacitance per Transceiver Outputs disabled		4	

SWITCHING CHARACTERISTICS<sup>(1)</sup>

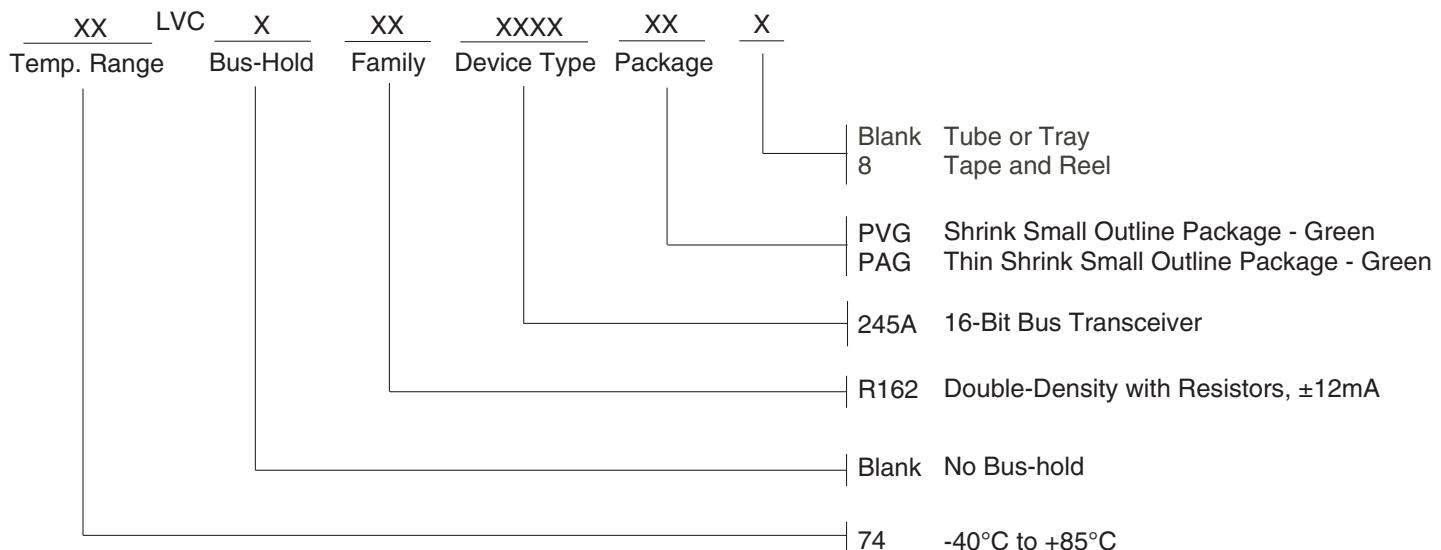
Symbol	Parameter	$V_{CC} = 2.7V$		$V_{CC} = 3.3V \pm 0.3V$		Unit
		Min.	Max.	Min.	Max.	
$t_{PLH}$	Propagation Delay $x_{Ax}$ to $x_{Bx}$ , $x_{Bx}$ to $x_{Ax}$	—	5.7	1.5	4.8	ns
$t_{PHL}$		—	—	—	—	—
$t_{PZH}$	Output Enable Time $x_{OE}$ to $x_{Ax}$ or $x_{Bx}$	—	7.9	1.5	6.3	ns
$t_{PZL}$		—	—	—	—	—
$t_{PHZ}$	Output Disable Time $x_{OE}$ to $x_{Ax}$ or $x_{Bx}$	—	8.3	2.2	7.4	ns
$t_{PLZ}$		—	—	—	—	—
$tsk(o)$	Output Skew <sup>(2)</sup>	—	—	—	500	ps

## NOTES:

1. See TEST CIRCUITS AND WAVEFORMS.  $T_A = -40^\circ C$  to  $+85^\circ C$ .
2. Skew between any two outputs of the same package and switching in the same direction.



## ORDERING INFORMATION



## DATASHEET DOCUMENT HISTORY

07/28/2015 Pg. 6 Updated the ordering information by removing non RoHS parts and adding Tape and Reel information.

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### Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,  
Koto-ku, Tokyo 135-0061, Japan  
[www.renesas.com](http://www.renesas.com)

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