



74LCX16245

LOW VOLTAGE CMOS 16-BIT BUS TRANSCEIVER WITH 5V TOLERANT INPUTS AND OUTPUT (3-STATE)

- 5V TOLERANT INPUTS AND OUTPUTS
- HIGH SPEED:
 $t_{PD} = 4.5 \text{ ns (MAX.)}$ at $V_{CC} = 3\text{V}$
- POWER DOWN PROTECTION ON INPUTS AND OUTPUTS
- SYMMETRICAL OUTPUT IMPEDANCE:
 $|I_{OH}| = I_{OL} = 24\text{mA (MIN)}$ at $V_{CC} = 3\text{V}$
- PCI BUS LEVELS GUARANTEED AT 24 mA
- BALANCED PROPAGATION DELAYS:
 $t_{PLH} \approx t_{PHL}$
 OPERATING VOLTAGE RANGE:
 $V_{CC(OPR)} = 2.0\text{V to } 3.6\text{V}$ (1.5V Data Retention)
- PIN AND FUNCTION COMPATIBLE WITH 74 SERIES 16245
- LATCH-UP PERFORMANCE EXCEEDS 500mA (JESD 17)
- ESD PERFORMANCE:
HBM > 2000V (MIL STD 883 method 3015); MM > 200V

DESCRIPTION

The 74LCX16245 is a low voltage CMOS 16 BIT BUS TRANSCEIVER (3-STATE) fabricated with sub-micron silicon gate and double-layer metal wiring C2MOS technology. It is ideal for low power and high speed 3.3V applications; it can be interfaced to 5V signal environment for both inputs and outputs.

This IC is intended for two-way asynchronous communication between data buses; the direction of data transmission is determined by DIR input. The two enable inputs nG can be used to disable the device so that the buses are effectively isolated.

It has same speed performance at 3.3V than 5V AC/ACT family, combined with a lower power consumption.

All inputs and outputs are equipped with protection circuits against static discharge, giving them 2KV ESD immunity and transient excess voltage. All floating bus terminals during High Z State must be held HIGH or LOW.

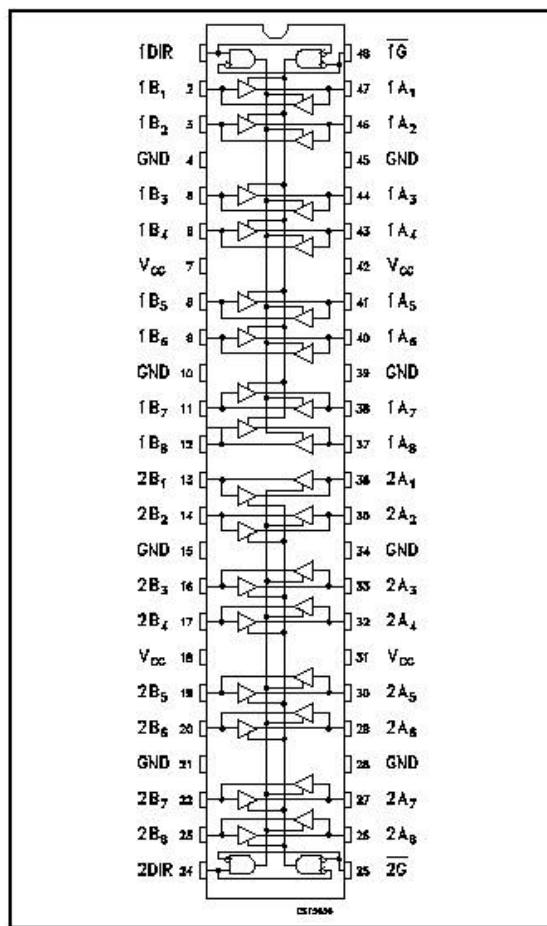


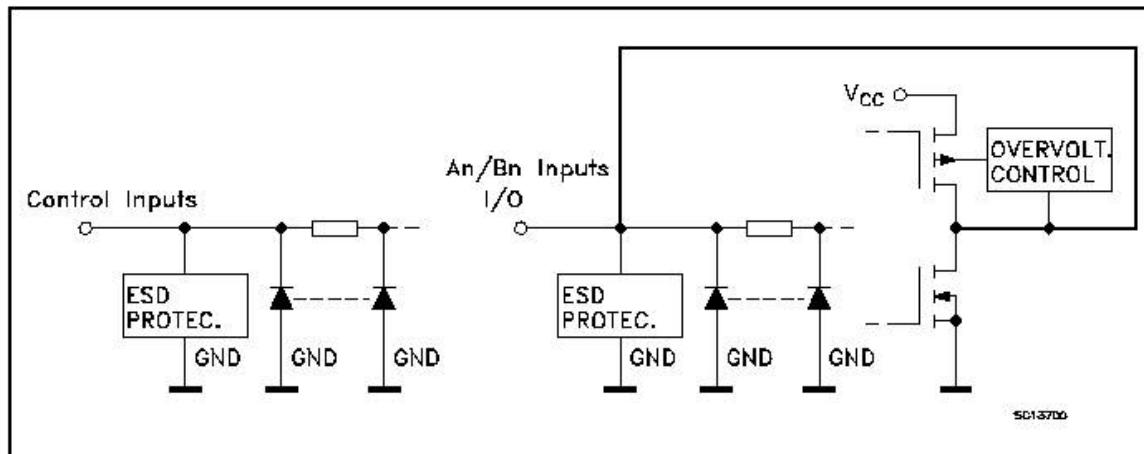
TSSOP

ORDER CODES

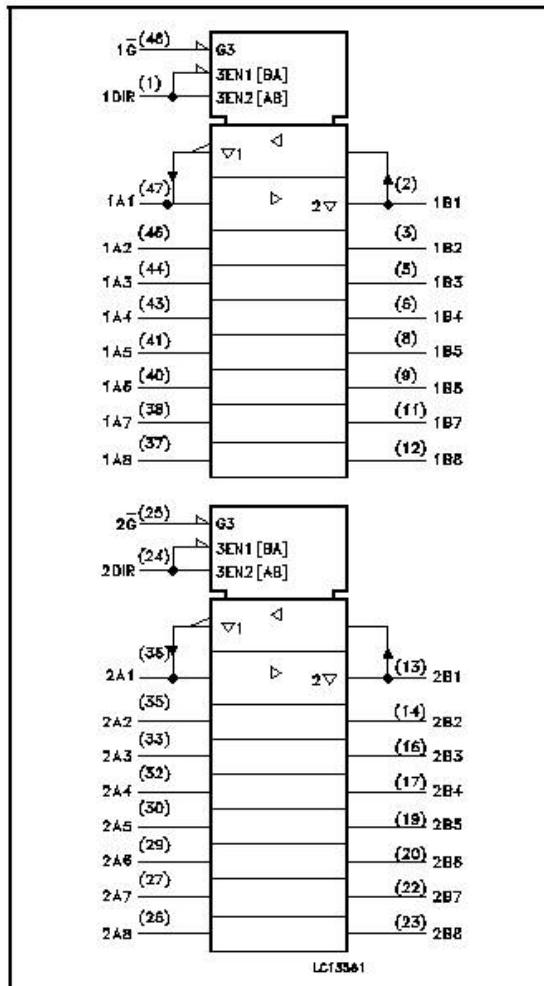
PACKAGE	TUBE	T&R
TSSOP		74LCX16245TTR

PIN CONNECTION



74LCX16245**INPUT AND OUTPUT EQUIVALENT CIRCUIT****PIN DESCRIPTION**

PIN No	SYMBOL	NAME AND FUNCTION
1	1DIR	Directional Control
2, 3, 5, 6, 8, 9, 11, 12	1B1 to 1B8 Data Inputs/Outputs	
13, 14, 16, 17, 19, 20, 22, 23	2B1 to 2B8 Data Inputs/Outputs	
24	2DIR	Directional Control
25	2G	Output Enable Input
36, 35, 33, 32, 30, 29, 27, 26	2A1 to 2A8 Data Inputs/Outputs	
47, 46, 44, 43, 41, 40, 38, 38	1A1 to 1A8 Data Inputs/Outputs	
48	1G	Output Enable Input
4, 10, 15, 21, 28, 34, 39, 45	GND	Ground (0V)
7, 18, 31, 42	VCC	Positive Supply Voltage

IEC LOGIC SYMBOLS**TRUTH TABLE**

INPUTS		FUNCTION		OUTPUT
G	DIR	A BUS	B BUS	Y _n
L	L	OUTPUT	INPUT	A=B
L	H	INPUT	OUTPUT	B=A
H	X	Z	Z	Z

X : Don't Care
Z : High Impedance

74LCX16245**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
Vcc	Supply Voltage	-0.5 to +7.0	V
Vi	DC Input Voltage (DIR, G)	-0.5 to +7.0	V
VI/O	Bus I/O Voltage (OFF State)	-0.5 to +7.0	V
VI/O	Bus I/O Voltage (High or Low State) (note 1)	-0.5 to Vcc + 0.5	V
Iik	DC Input Diode Current	- 50	mA
Iok	DC Output Diode Current (note 2)	- 50	mA
Io	DC Output Current	? 50	mA
ICC	DC Supply Current per Supply Pin	? 100	mA
IGND	DC Ground Current per Supply Pin	? 100	mA
Tstg	Storage Temperature	-65 to +150	?C
TL	Lead Temperature (10 sec)	300	?C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied

- 1) Io absolute maximum rating must be observed
- 2) Vo < GND

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
VCC	Supply Voltage (note 1)	2.0 to 3.6	V
VI	Input Voltage	0 to 5.5	V
VO	Output Voltage (OFF State)	0 to 5.5	V
VO	Output Voltage (High or Low State)	0 to VCC	V
IOH, IOL	High or Low Level Output Current (VCC = 3.0 to 3.6V)	? 24	mA
IOH, IOL	High or Low Level Output Current (VCC = 2.7V)	? 12	mA
T _{op}	Operating Temperature	-55 to 125	?C
dt/dv	Input Rise and Fall Time (note 2)	0 to 10	ns/V

1) Truth Table guaranteed: 1.5V to 3.6V

2) VIN from 0.8V to 2V at VCC = 3.0V



74LCX16245

DC SPECIFICATIONS

Symbol	Parameter	Test Condition		Value				Unit	
		Vcc (V)		-40 to 85 °C		-55 to 125 °C			
				Min.	Max.	Min.	Max.		
V _{IH}	High Level Input Voltage	2.7 to 3.6		2.0		2.0		V	
V _{IL}	Low Level Input Voltage				0.8		0.8	V	
V _{OH}	High Level Output Voltage	2.7 to 3.6	Io=-100 mA	Vcc-0.2		Vcc-0.2		V	
		2.7	Io=-12 mA	2.2		2.2			
		3.0	Io=-18 mA	2.4		2.4			
			Io=-24 mA	2.2		2.2			
V _{OL}	Low Level Output Voltage	2.7 to 3.6	Io=-100 mA	0.2		0.2		V	
		2.7	Io=12 mA	0.4		0.4			
		3.0	Io=16 mA	0.4		0.4			
			Io=24 mA	0.55		0.55			
I _l	Input Leakage Current	2.7 to 3.6	V _I = 0 to 5.5V	?5		?5	?A		
I _{off}	Power Off Leakage Current	0	V _I or V _O = 5.5V		10		10	?A	
I _{OZ}	High Impedance Output Leakage Current	2.7 to 3.6	V _I = V _{IH} or V _{IL} V _O = 0 to V _{CC}	?5		?5	?A		
I _{CC}	Quiescent Supply Current	2.7 to 3.6	V _I = V _{CC} or GND	20		20		?A	
			V _I or V _O = 3.6 to 5.5V	?20		?20			
ΔI _{CC}	I _{CC} incr. per Input	2.7 to 3.6	V _{IH} = V _{CC} - 0.6V	500		500	?A		

DYNAMIC SWITCHING CHARACTERISTICS

Symbol	Parameter	Test Condition		Value			Unit	
		Vcc (V)		TA = 25 °C				
				Min.	Typ.	Max.		
V _{OLP}	Dynamic Low Level Quiet Output (note 1)	3.3	C _L = 50pF V _{IL} = 0V, V _{IH} = 3.3V		0.8		V	
V _{OLV}					-0.8			

1) Number of outputs defined as "n". Measured with "n-1" outputs switching from HIGH to LOW or LOW to HIGH. The remaining output is measured in the LOW state.

74LCX16245**AC ELECTRICAL CHARACTERISTICS**

Symbol	Parameter	Test Condition				Value				Unit
		Vcc (V)	CL (pF)	RL (Ω)	t _{ns}	-40 to 85 °C		-55 to 125 °C		
t _{PZH} t _{PHL}	Propagation Delay Time	2.7	50	500	2.5	1.5	5.2	1.5	5.2	ns
		3.0 to 3.6				1.5	4.5	1.5	4.5	
t _{PZL} t _{ZPH}	Output Enable Time	2.7	50	500	2.5	1.5	7.2	1.5	7.2	ns
		3.0 to 3.6				1.5	6.5	1.5	6.5	
t _{PLZ} t _{ZHZ}	Output Disable Time	2.7	50	500	2.5	1.5	6.9	1.5	6.9	ns
		3.0 to 3.6				1.5	6.4	1.5	6.4	
t _{OSLH} t _{OSSL}	Output To Output Skew Time (note1, 2)	3.0 to 3.6	50	500	2.5		1.0		1.0	ns

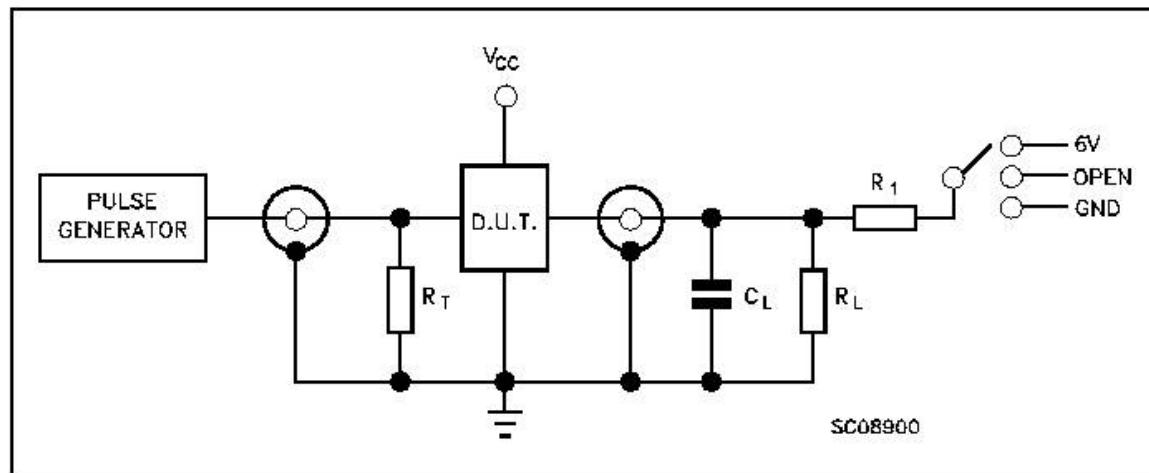
1) Skew is defined as the absolute value of the difference between the actual propagation delay for any two outputs of the same device switching in the same direction, either HIGH or LOW ($t_{OSLH} = |t_{PLHm} - t_{PLHn}|$, $t_{OSSL} = |t_{PHLm} - t_{PHLn}|$)

2) Parameter guaranteed by design

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Test Condition			Value			Unit	
		Vcc (V)			TA = 25 °C				
			Min.	Typ.	Max.				
C _{IN}	Input Capacitance	3.3	V _{IN} = 0 to V _{CC}		7			pF	
C _{OUT}	Output Capacitance	3.3	V _{IN} = 0 to V _{CC}		8			pF	
CPD	Power Dissipation Capacitance (note 1)	3.3	f _{IN} = 10MHz V _{IN} = 0 or V _{CC}		20			pF	

1) CPD is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation. $I_{CC(\text{opr})} = CPD \times V_{CC} \times f_{IN} + I_{CC}/16$ (per circuit)

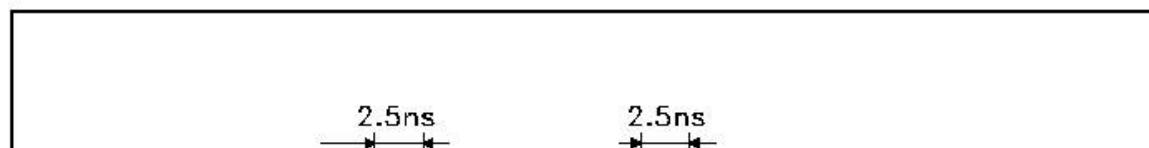
**74LCX16245****TEST CIRCUIT**

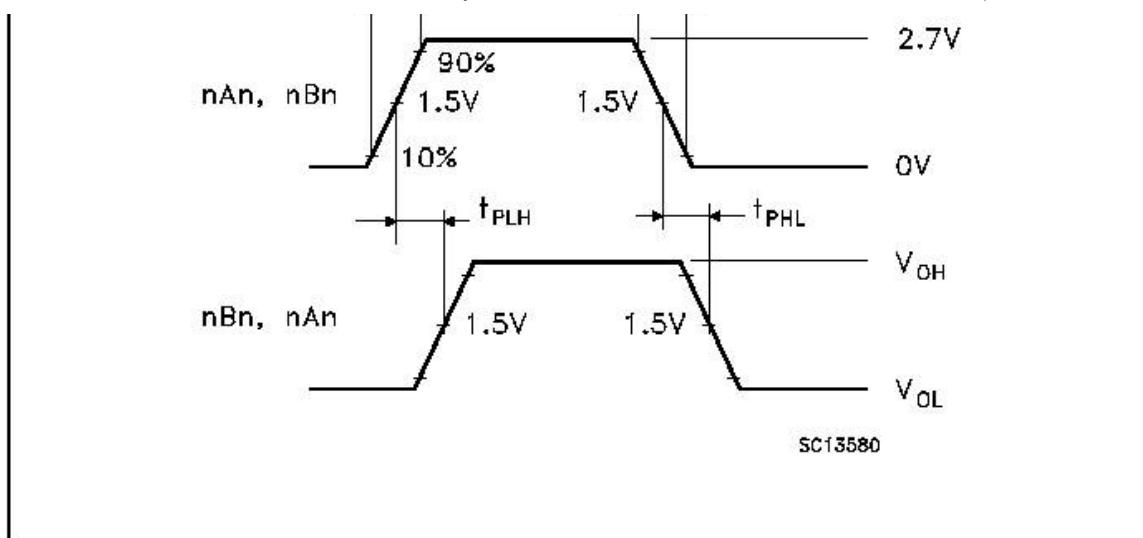
TEST	SWITCH
tPLH, tPHL	Open
tPZL, tPLZ	6V
tPZH, tPHZ	GND

$C_L = 50 \text{ pF}$ or equivalent (includes jig and probe capacitance)

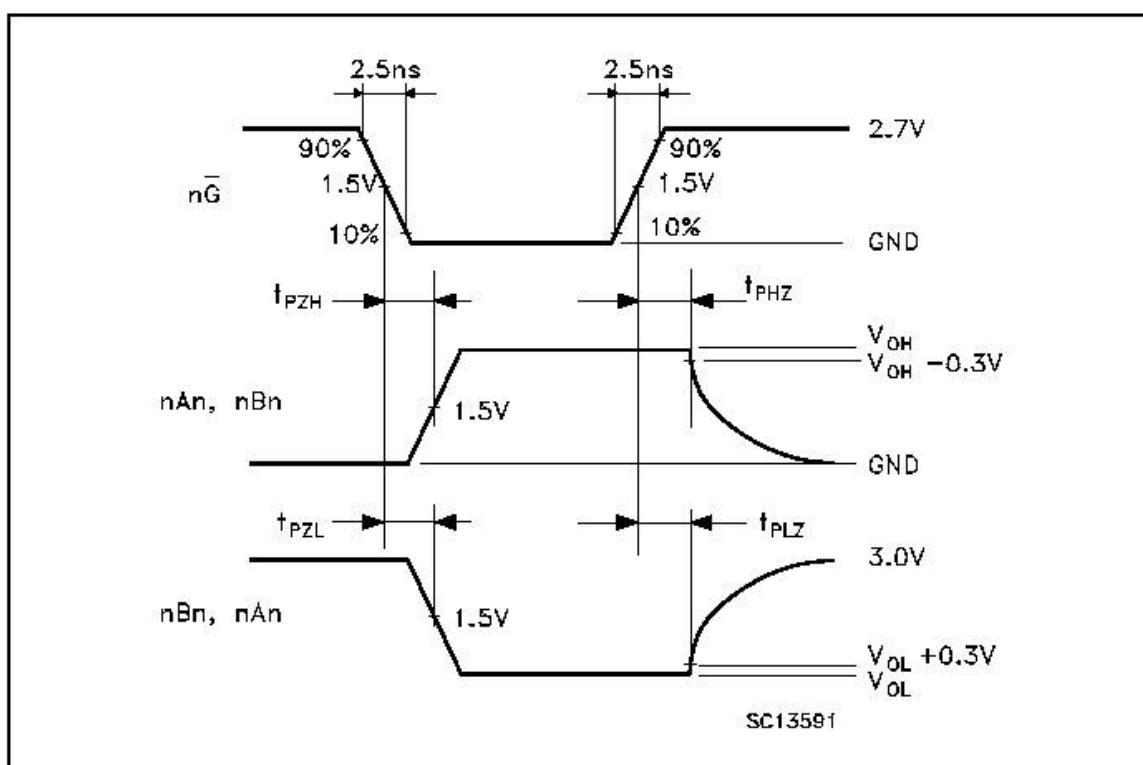
$R_L = R_1 = 500 \Omega$ or equivalent
 $R_T = Z_{out}$ of pulse generator (typically 50Ω)

WAVEFORM 1: PROPAGATION DELAYS ($f=1\text{MHz}$; 50% duty cycle)





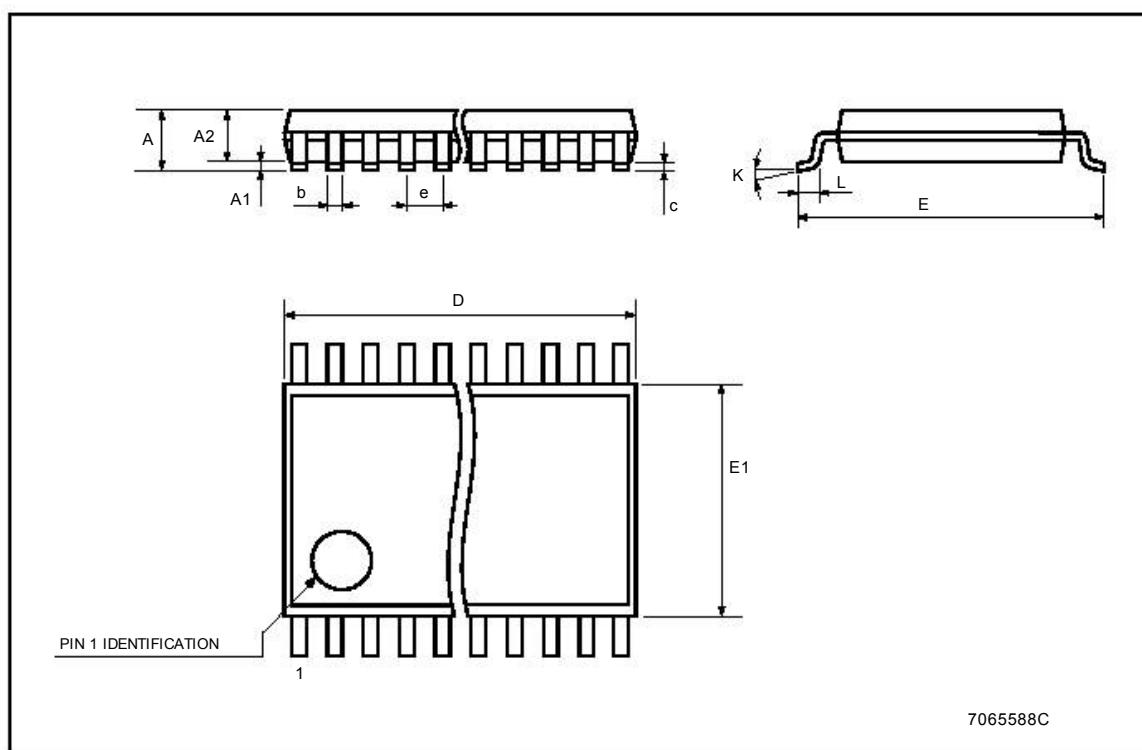
6/10

**74LCX16245****WAVEFORM 2: OUTPUT ENABLE AND DISABLE TIME (f=1MHz; 50% duty cycle)**

**74LCX16245****TSSOP48 MECHANICAL DATA**

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			1.2			0.047
A1	0.05		0.15	0.002		0.006
A2		0.9			0.035	
b	0.17		0.27	0.0067		0.011
c	0.09		0.20	0.0035		0.0079
D	12.4		12.6	0.488		0.496
E		8.1 BSC			0.318 BSC	
E1	6.0		6.2	0.236		0.244

e		0.5 BSC		0.0197 BSC	
K	0?		8?	0?	8?
L	0.50		0.75	0.020	0.030

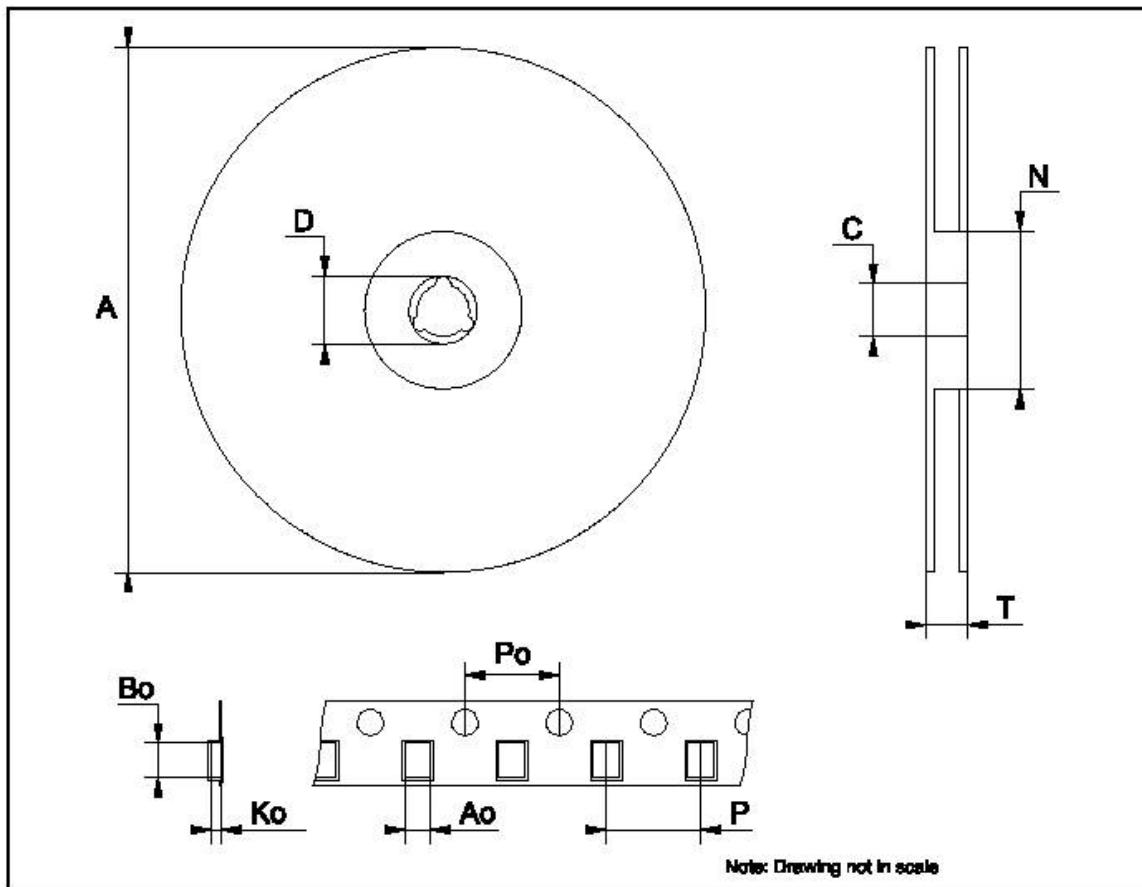


8/10

**74LCX16245**

Tape & Reel TSSOP48 MECHANICAL DATA						
DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			330			12.992
C	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		
T			30.4			1.197
Ao	8.7		8.9	0.343		0.350

Bo	13.1	13.3	0.516	0.524
Ko	1.5	1.7	0.059	0.067
Po	3.9	4.1	0.153	0.161
P	11.9	12.1	0.468	0.476



Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

? The ST logo is a registered trademark of STMicroelectronics

? 2003 STMicroelectronics - Printed in Italy - All Rights Reserved
STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - Canada - China - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco
Singapore - Spain - Sweden - Switzerland - United Kingdom - United States.

? <http://www.st.com>

