



# 74AC16245

## 16-BIT BUS TRANSCEIVER WITH 3-STATE OUTPUTS (NON INVERTED)

- HIGH SPEED:  
 $t_{PD} = 4.5 \text{ ns (TYP.) at } V_{CC} = 5V$
- LOW POWER DISSIPATION:  
 $I_{CC} = 4 \mu\text{A (MAX.) at } T_A = 25^\circ\text{C}$
- HIGH NOISE IMMUNITY:  
 $V_{NIH} = V_{NIL} = 28\% V_{CC} \text{ (MIN.)}$
- POWER DOWN PROTECTION ON INPUTS
- SYMMETRICAL OUTPUT IMPEDANCE:  
 $|I_{OH}| = I_{OL} = 24 \text{ mA (MIN)}$
- BALANCED PROPAGATION DELAYS:  
 $t_{PLH} \approx t_{PHL}$
- OPERATING VOLTAGE RANGE:  
 $V_{CC(OPR)} = 2V \text{ to } 6V$
- PIN AND FUNCTION COMPATIBLE WITH  
74 SERIES 16245
- IMPROVED LATCH-UP IMMUNITY

### DESCRIPTION

The 74AC16245 is an advanced high-speed CMOS 16-BIT BUS TRANSCEIVER (3-STATE) fabricated with sub-micron silicon gate and double-layer metal wiring C<sup>2</sup>MOS technology.

This IC is intended for two-way asynchronous communication between data busses; the direction of data transmission is determined by DIR input. The enable input  $\bar{G}$  can be used to disable the device so that the busses are effectively isolated.

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.

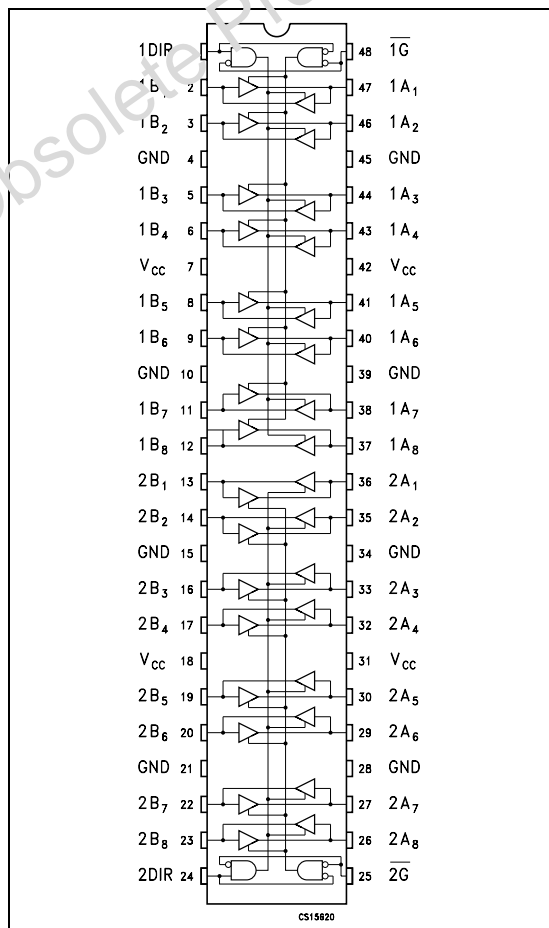


TSSOP

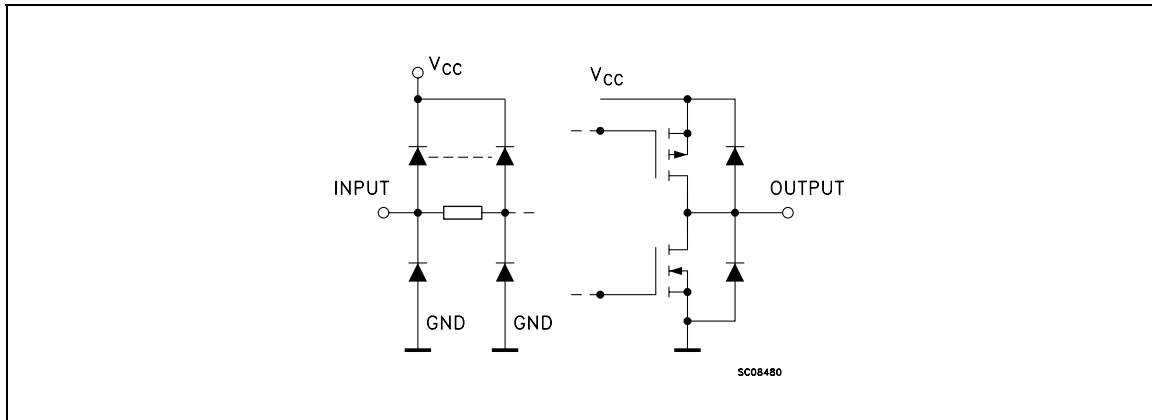
### ORDER CODES

PACKAGE	TUBE	T & F.
TSSOP		74AC16245TTR

### PIN CONNECTION



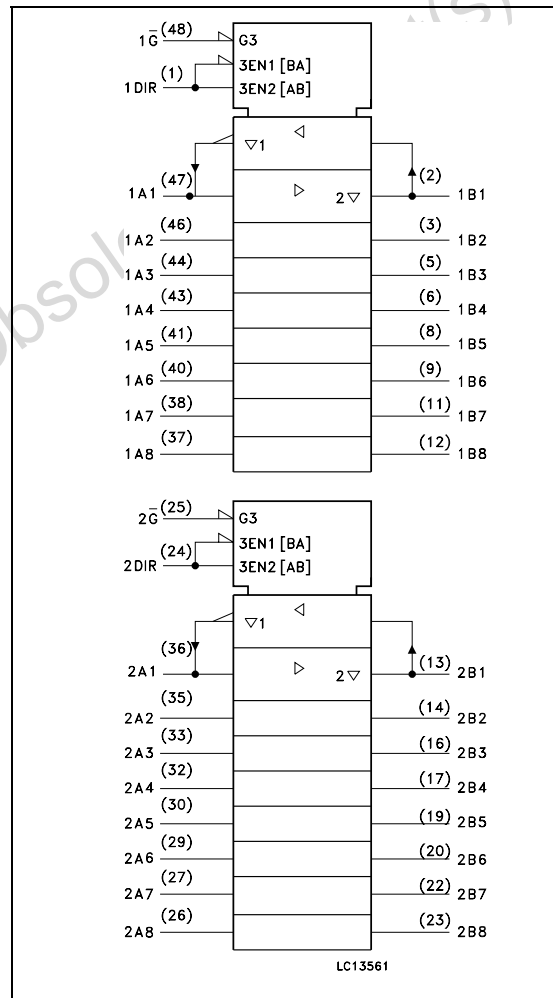
INPUT AND OUTPUT EQUIVALENT CIRCUIT



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	V <sub>CC</sub>	Positive Supply Voltage

IEC LOGIC SYMBOLS



TRUTH TABLE

INPUTS		FUNCTION		OUTPUT
$\bar{G}$	DIR	A BUS	B BUS	Y <sub>n</sub>
L	L	OUTPUT	INPUT	A = B
L	H	INPUT	OUTPUT	B = A
H	X	Z	Z	Z

X : Don't Care  
Z : High Impedance

**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
$V_{CC}$	Supply Voltage	-0.5 to +7.0	V
$V_I$	DC Input Voltage	-0.5 to +7.0	V
$V_O$	DC Output Voltage	-0.5 to $V_{CC} + 0.5$	V
$I_{IK}$	DC Input Diode Current	$\pm 20$	mA
$I_{OK}$	DC Output Diode Current	$\pm 20$	mA
$I_O$	DC Output Current	$\pm 25$	mA
$I_{CC}$ or $I_{GND}$	DC $V_{CC}$ or Ground Current	$\pm 200$	mA
$T_{stg}$	Storage Temperature	-65 to +150	°C
$T_L$	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.

**RECOMMENDED OPERATING CONDITIONS**

Symbol	Parameter	Value	Unit
$V_{CC}$	Supply Voltage	2 to 6	V
$V_I$	Input Voltage	0 to $V_{CC}$	V
$V_O$	Output Voltage	0 to $V_{CC}$	V
$T_{op}$	Operating Temperature	-55 to 125	°C
dt/dv	Input Rise and Fall Time (note 1) $V_{CC} = 3.0, 4.5$ or $5.5$	0 to 8	ns/V

1)  $V_{IN}$  from 30% to 70% of  $V_{CC}$

## DC SPECIFICATIONS

Symbol	Parameter	Test Condition		Value						Unit	
		V <sub>CC</sub> (V)		T <sub>A</sub> = 25 °C			-40 to 85°C		-55 to 125°C		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
V <sub>IH</sub>	High Level Input Voltage	3.0	V <sub>O</sub> = 0.1 V or V <sub>CC</sub> -0.1V	2.1	1.5		2.1		2.1		V
		4.5		3.15	2.25		3.15		3.15		
		5.5		3.85	2.75		3.85		3.85		
V <sub>IL</sub>	Low Level Input Voltage	3.0	V <sub>O</sub> = 0.1 V or V <sub>CC</sub> -0.1V		1.5	0.9		0.9		0.9	V
		4.5			2.25	1.35		1.35		1.35	
		5.5			2.75	1.65		1.65		1.65	
V <sub>OH</sub>	High Level Output Voltage	3.0	I <sub>O</sub> = -50 μA	2.9	2.99		2.9		2.9		V
		4.5	I <sub>O</sub> = -50 μA	4.4	4.49		4.4		4.4		
		5.5	I <sub>O</sub> = -50 μA	5.4	5.49		5.4		5.4		
		3.0	I <sub>O</sub> = -12 mA	2.56			2.46		2.46		
		4.5	I <sub>O</sub> = -24 mA	3.86			3.76		3.76		
		5.5	I <sub>O</sub> = -24 mA	4.86			4.76		4.76		
V <sub>OL</sub>	Low Level Output Voltage	3.0	I <sub>O</sub> = 50 μA		0.002	0.1		0.1		0.1	V
		4.5	I <sub>O</sub> = 50 μA		0.001	0.1		0.1		0.1	
		5.5	I <sub>O</sub> = 50 μA		0.001	0.1		0.1		0.1	
		3.0	I <sub>O</sub> = 12 mA			0.36		0.44		0.44	
		4.5	I <sub>O</sub> = 24 mA			0.36		0.44		0.44	
I <sub>I</sub>	Input Leakage Current	5.5	V <sub>I</sub> = V <sub>CC</sub> or GND			± 0.1		± 1		± 1	μA
I <sub>OZ</sub>	High Impedance Output Leakage Current	5.5	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> V <sub>O</sub> = V <sub>CC</sub> or GND			± 0.5		± 5		± 5	μA
I <sub>CC</sub>	Quiescent Supply Current	5.5	V <sub>I</sub> = V <sub>CC</sub> or GND			4		40		40	μA

AC ELECTRICAL CHARACTERISTICS (C<sub>L</sub> = 50 pF, R<sub>L</sub> = 500 Ω, Input t<sub>r</sub> = t<sub>f</sub> = 3ns)

Symbol	Parameter	Test Condition		Value						Unit	
		V <sub>CC</sub> (V)	C <sub>L</sub> (pF)	T <sub>A</sub> = 25°C			-40 to 85°C		-55 to 125°C		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay Time	3.3(*)			6	6.3		8.5		9.0	ns
		5.0(**)			4.5	5.0		6.5		7.5	
t <sub>PZL</sub> t <sub>PZH</sub>	Output Enable Time	3.3(*)			8	8.5		11.0		12.0	ns
		5.0(**)			5.5	6.0		7.0		8.0	
t <sub>PLZ</sub> t <sub>PHZ</sub>	Output Disable Time	3.3(*)			7.5	8.0		9.3		10.0	ns
		5.0(**)			5.7	6.0		7.0		8.0	

(\*) Voltage range is 3.3V ± 0.3V

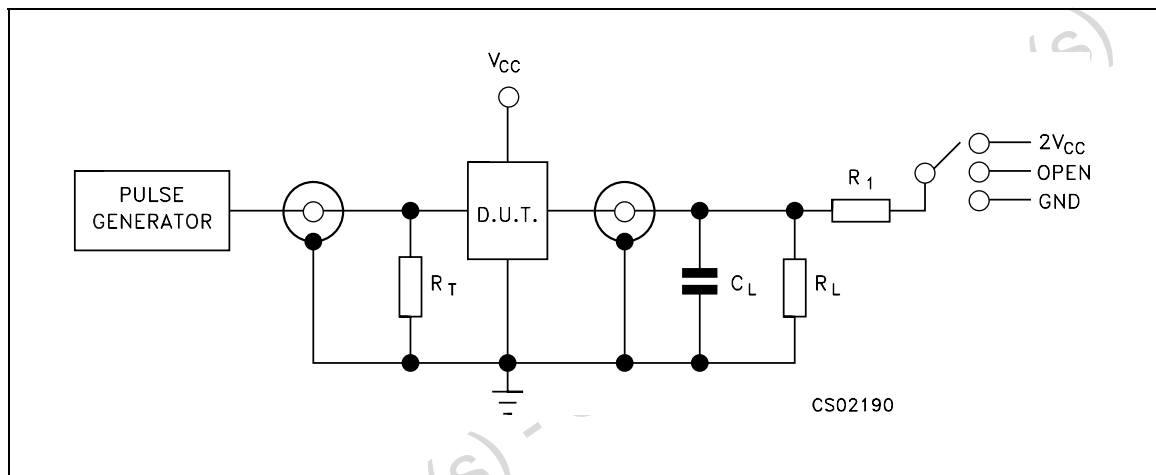
(\*\*) Voltage range is 5.0V ± 0.5V

## CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Test Condition		Value						Unit	
		$V_{CC}$ (V)		$T_A = 25^\circ\text{C}$			$-40$ to $85^\circ\text{C}$		$-55$ to $125^\circ\text{C}$		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
$C_{IN}$	Input Capacitance				7	10		10		10	pF
$C_{I/O}$	Input Output Capacitance				14						pF
$C_{PD}$	Power Dissipation Capacitance (note 1)	5.0	$f_{IN} = 10\text{MHz}$		25						pF

1)  $C_{PD}$  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.  $I_{CC(oper)} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}/16$  (per Latch)

## TEST CIRCUIT



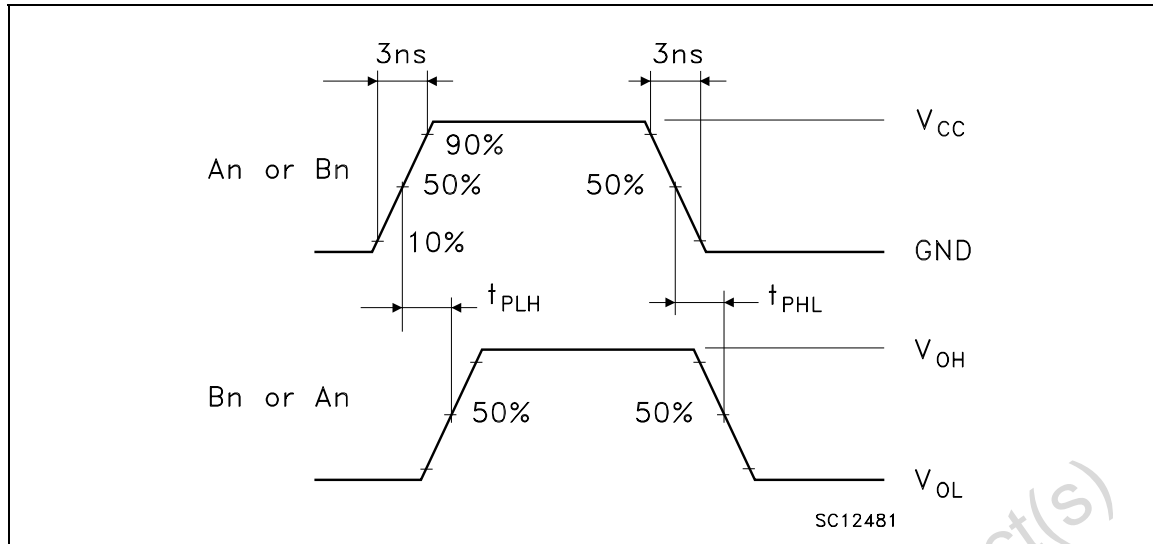
TEST	SWITCH
$t_{PLH}$ , $t_{PHL}$	Open
$t_{PZL}$ , $t_{PLZ}$	$2V_{CC}$
$t_{PZH}$ , $t_{PHZ}$	GND

$C_L = 50$  pF or equivalent (includes jig and probe capacitance)

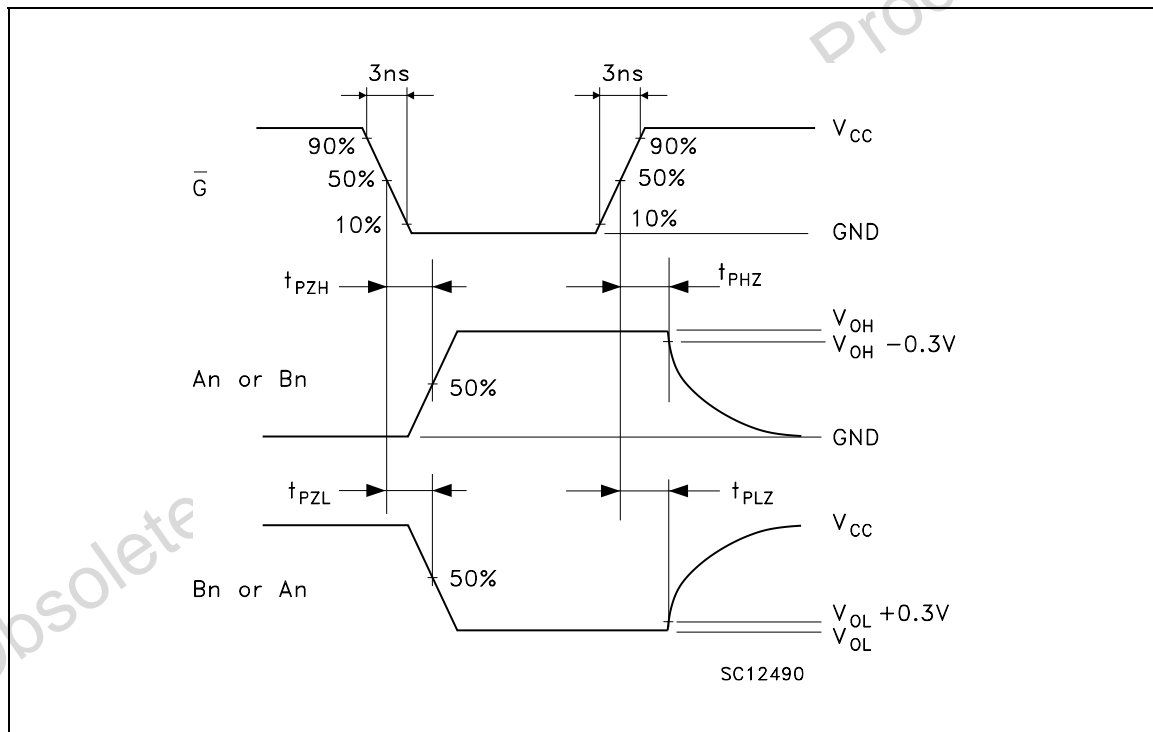
$R_L = R_1 = 1\text{K}\Omega$  or equivalent

$R_T = Z_{OUT}$  of pulse generator (typically  $50\Omega$ )

WAVEFORM 1: PROPAGATION DELAYS (f=1MHz; 50% duty cycle)

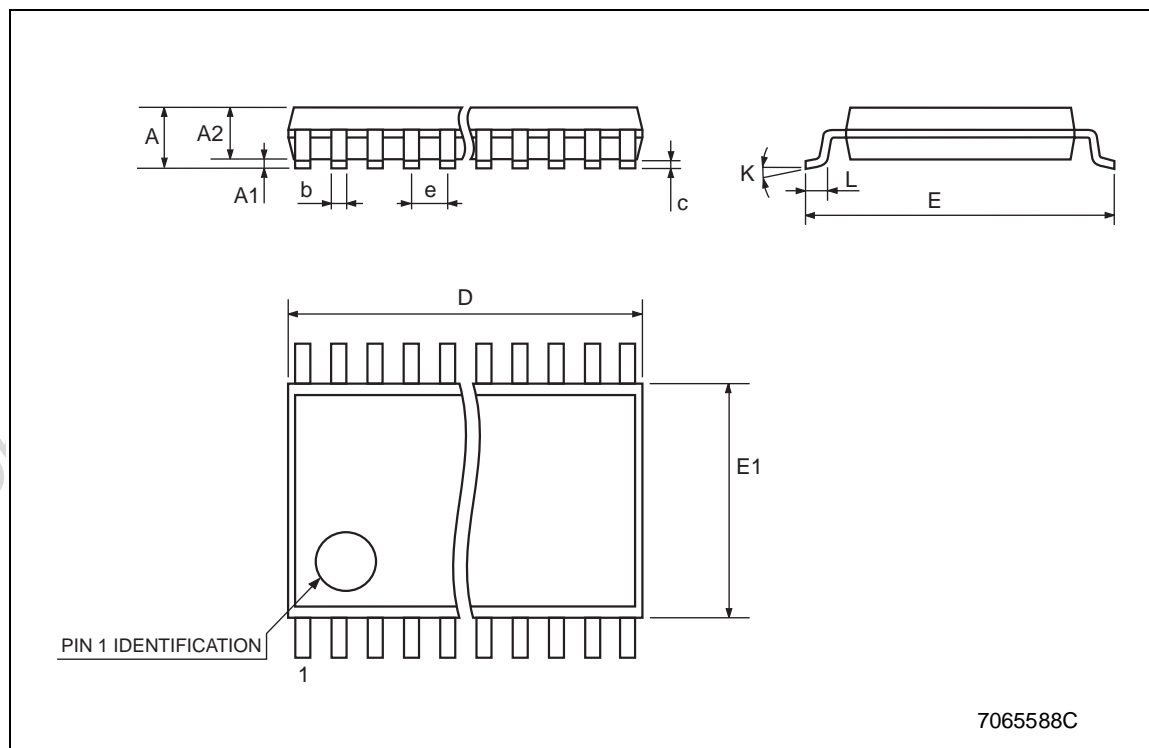


WAVEFORM 2: OUTPUT ENABLE AND DISABLE TIME (f=1MHz; 50% duty cycle)



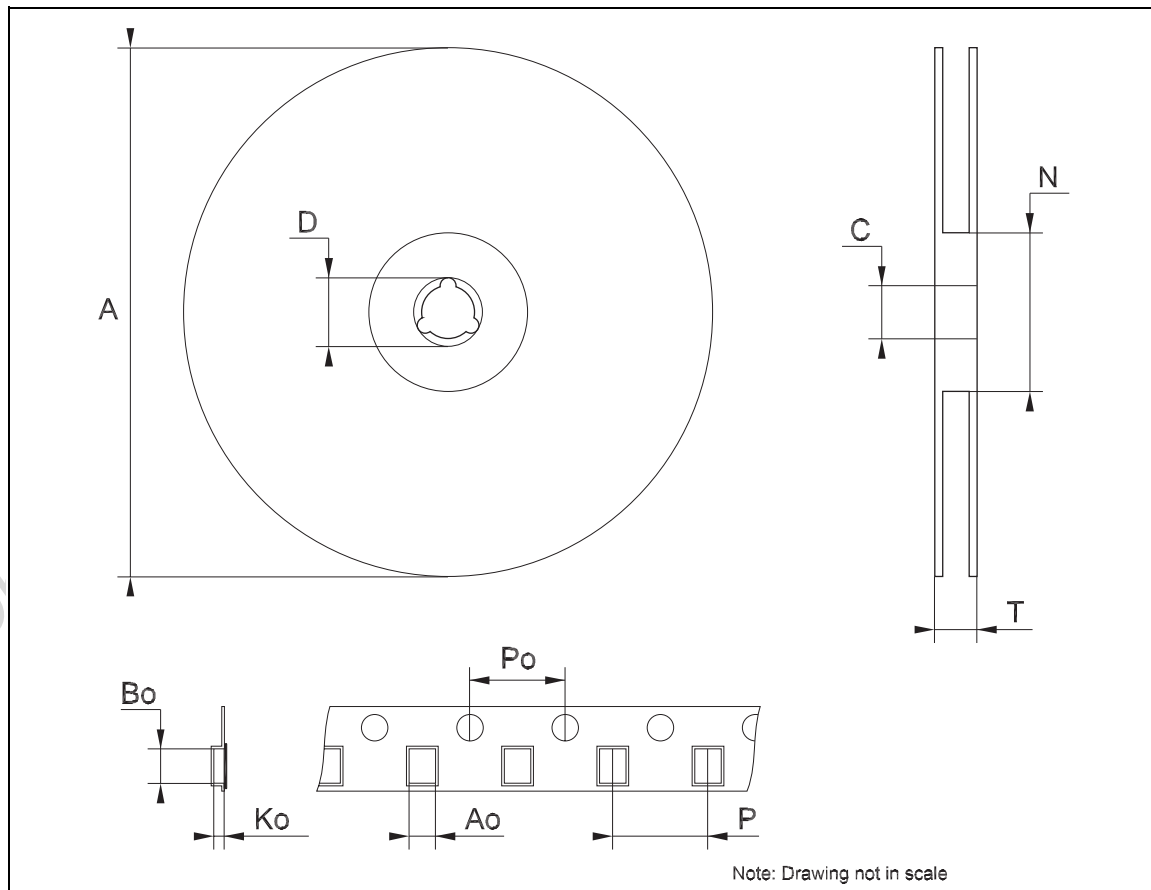
## TSSOP48 MECHANICAL DATA

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



## Tape &amp; 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





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