74LCX16541

LOW VOLTAGE CMOS 16-BIT BUS BUFFER (3-STATE) WITH 5V TOLERANT INPUTS/OUTPUTS (NON INVERTED)

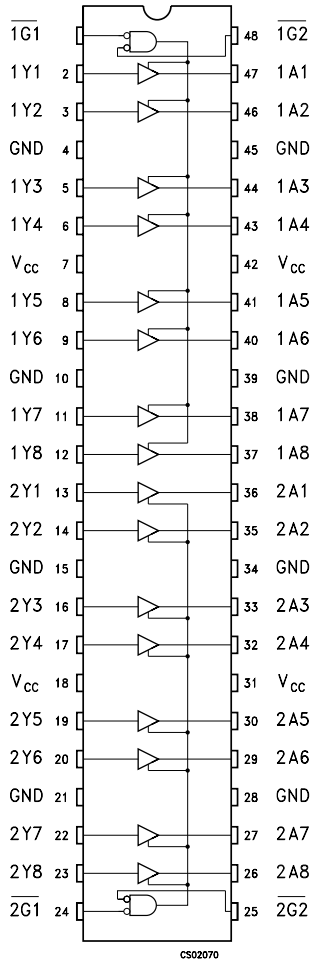
- 5V TOLERANT INPUTS AND OUTPUTS
- HIGH SPEED:
  t_{PD} = 4.1 ns (MAX.) at V_{CC} = 5V
- LOW POWER DISSIPATION:
  I_{CC} = 2 µA (MAX.) at T_A=25°C
- HIGH NOISE IMMUNITY:
  $V_{NIH} = V_{NIL}$ = 28% V_{CC} (MIN.)
- POWER DOWN PROTECTION ON INPUTS AND OUPUTS
- SYMMETRICAL OUTPUT IMPEDANCE:
  $|I_{OH}| = I_{OL}$ = 24 mA (MIN)
- BALANCED PROPAGATION DELAYS:
  $t_{PLH} \cong t_{PHL}$
- OPERATING VOLTAGE RANGE:
  V_{CC}(OPR) = 2V to 3.6V (1.5V Data Retention)
- PIN AND FUNCTION COMPATIBLE WITH 74 SERIES 16541
- IMPROVED LATCH-UP IMMUNITY
- ESD PERFORMANCE:
  HBM>2000V(MIL STD 883 method 3015);
  MM>200V

TSSOP

ORDER CODES

PACKAGE	TUBE	T & R
TSSOP		74LCX16541TTR

PIN CONNECTION



DESCRIPTION

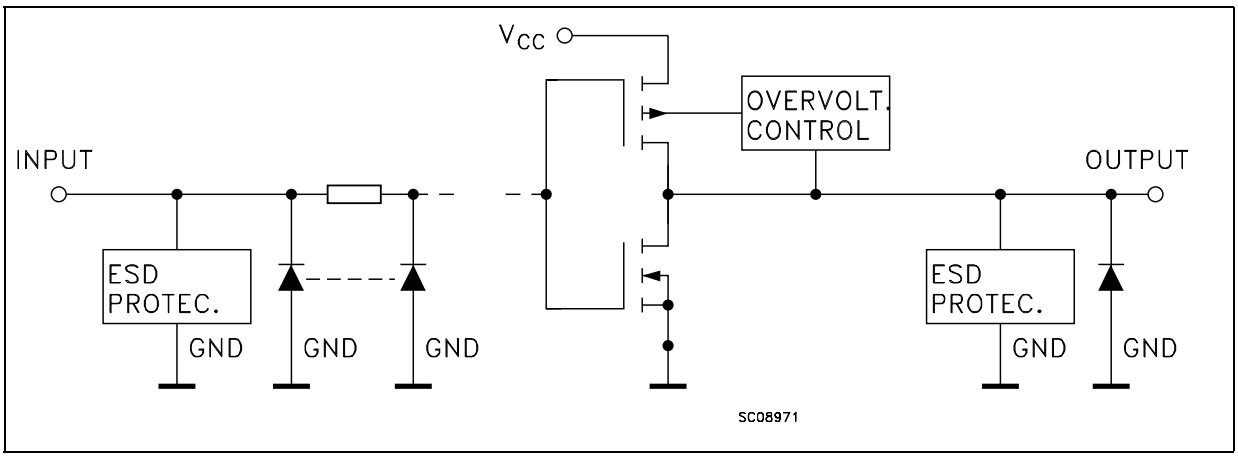
The 74LCX16541 is an advanced high-speed CMOS 16-BIT BUS BUFFER (3-STATE) fabricated with sub-micron silicon gate and double-layer metal wiring C^2MOS tecnology.

This is composed of two 8-bit sections with separate output-enable signals. For either 8-bit buffers section, the 3 STATE control gate operates as a two input AND such that if either nG1 and nG2 are high, all outputs are in the high impedence state. This device is designed to be used with 3 state memory address driveres, etc.

It hase 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.

INPUT AND OUTPUT EQUIVALENT CIRCUIT



PIN DESCRIPTION

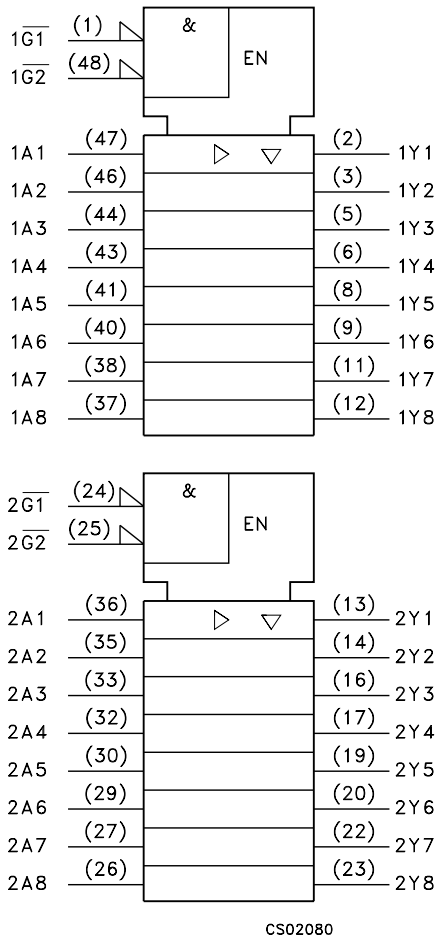
PIN No	SYMBOL	NAME AND FUNCTION
1, 48	$\overline{1G1}$, $\overline{1G2}$	Output Enable Inputs
2, 3, 5, 6, 8, 9, 11, 12	1Y1 to 1Y8	Data Outputs
13, 14, 16, 17, 19, 20, 22, 23	2Y1 to 2Y8	Data Outputs
24, 25	$\overline{2G1}$, $\overline{2G2}$	Output Enable Inputs
36, 35, 33, 32, 30, 29, 27, 26	2A1 to 2A8	Data Outputs
47, 46, 44, 43, 41, 40, 38, 37	1A1 to 1A8	Data Outputs
4, 10, 15, 21, 28, 34, 39, 45	GND	Ground (0V)
7, 18, 31, 42	V_{CC}	Positive Supply Voltage

TRUTH TABLE

INPUTS			OUTPUT
$\overline{G1}$	$\overline{G2}$	An	Yn
H	X	X	Z
X	H	X	Z
L	L	H	H
L	L	L	L

X : Don't Care
Z : High Impedance

IEC LOGIC SYMBOLS



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 +7.0	V
V_O	DC Output Voltage (High or Low State) (note 1)	-0.5 to Vcc+0.5	V
I_{IK}	DC Input Diode Current	–50	mA
I_{OK}	DC Output Diode Current (note 2)	– 50	mA
I_O	DC Output Current	+ 50	mA
I_{CC} or I_{GND}	DC V_{CC} or Ground Current	± 100	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

1) Io absolute maximum rating must be observed

2)Vo < GND

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage (note 1)	2 to 3.6	V
V_I	Input Voltage	0 to 5.5	V
V_O	Output Voltage (OFF State)	0 to 5.5	V
V_O	Output Voltage (High or Low State)	0 to Vcc	V
T_{op}	Operating Temperature	-55 to 125	°C
I_{OH}, I_{OL}	High or Low Level Output Current (Vcc = 3.0 to 3.6V)	± 24	mA
I_{OH}, I_{OL}	High or Low Level Output Current (Vcc = 2.7V)	± 12	mA
dt/dv	Input Rise and Fall Time (note 2)	0 to 10	ns/V

1) Truth Table guaranteed: 1.5V to 3.6V

2) V_{IN} from0.8V to 2V at V_{CC}=3.0V

DC SPECIFICATIONS

Symbol	Parameter	Test Condition		Value				Unit
		V_{CC} (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	I_O=-100 µA	V_{CC}-0.2		V_{CC}-0.2		V
		2.7	I_O=-12 mA	2.2		2.2		
		3.0	I_O=-12 mA	2.4		2.4		
		3.0	I_O=-24 mA	2.2		2.2		
V_{OL}	Low Level Output Voltage	2.7 to 3.6	I_O=100 µA		0.2		0.2	V
		2.7	I_O=12 mA		0.4		0.4	
		3.0	I_O=24 mA		0.55		0.55	
I_{OZ}	High Impedance Output Leakage Current	2.7 to 3.6	V_I = 0 to 5.5V		± 5		± 5	µA
I_I	Input Leakage Current	2.7 to 3.6	V_I = 0 to 5.5V		± 5		± 5	µA
I_{off}	Power Off Leakage Current	0	V_I or V_O = 5.5V		10		10	µA
I_{CC}	Quiescent Supply Current	2.7 to 3.6	V_I = V_{CC} or GND		20		20	µA

AC ELECTRICAL CHARACTERISTICS (C_L = 50 pF, R_L = 500 Ω, Input t_r = t_f = 2.5ns)

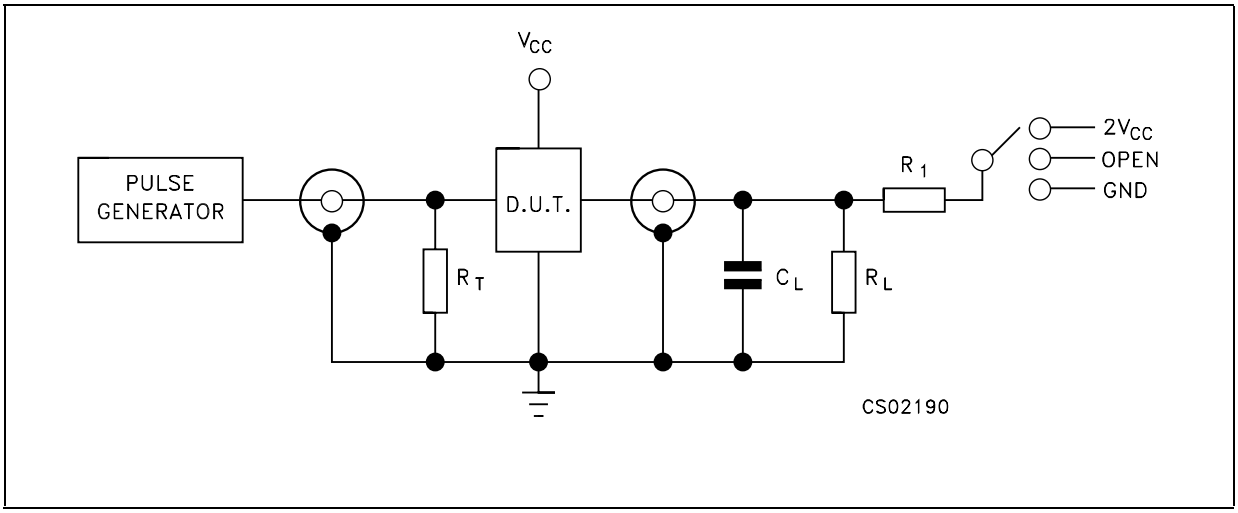
Symbol	Parameter	Test Condition			Value				Unit
		V_{CC} (V)	C_L (pF)		-40 to 85°C		-55 to 125°C		
					Min.	Max.	Min.	Max.	
t_{PLH} t_{PHL}	Propagation Delay Time A to Y	2.7			1.5	4.7	1.5	4.7	ns
		3.0 to 3.6			1.5	4.1	1.5	4.1	
t_{PZL} t_{PZH}	Output Enable Time	2.7			1.5	5.8	1.5	5.8	ns
		3.0 to 3.6			1.5	4.6	1.5	4.6	
t_{PLZ} t_{PHZ}	Output Disable Time	2.7			1.5	6.2	1.5	6.2	ns
		3.0 to 3.6			1.5	5.8	1.5	5.8	

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Test Condition		Value			Unit
		V_{CC} (V)		T_A = 25 °C			
				Min.	Typ.	Max.	
C_{IN}	Input Capacitance	3.3	V_I = 0V or V_{CC}		4		pF
C_{OUT}	Output Capacitance	3.3	V_I = 0V or V_{CC}		10		pF
C_{PD}	Power Dissipation Capacitance (note 1) Output enabled	2.5	f_{IN} = 10MHz		45		pF
		3.3	V_I = 0V or V_{CC}		50		
	Power Dissipation Capacitance (note 1) Output disabled	2.5	f_{IN} = 10MHz		3		pF
		3.3	V_I = 0V or V_{CC}		4		

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. $I_{CC(opr)} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}/16$

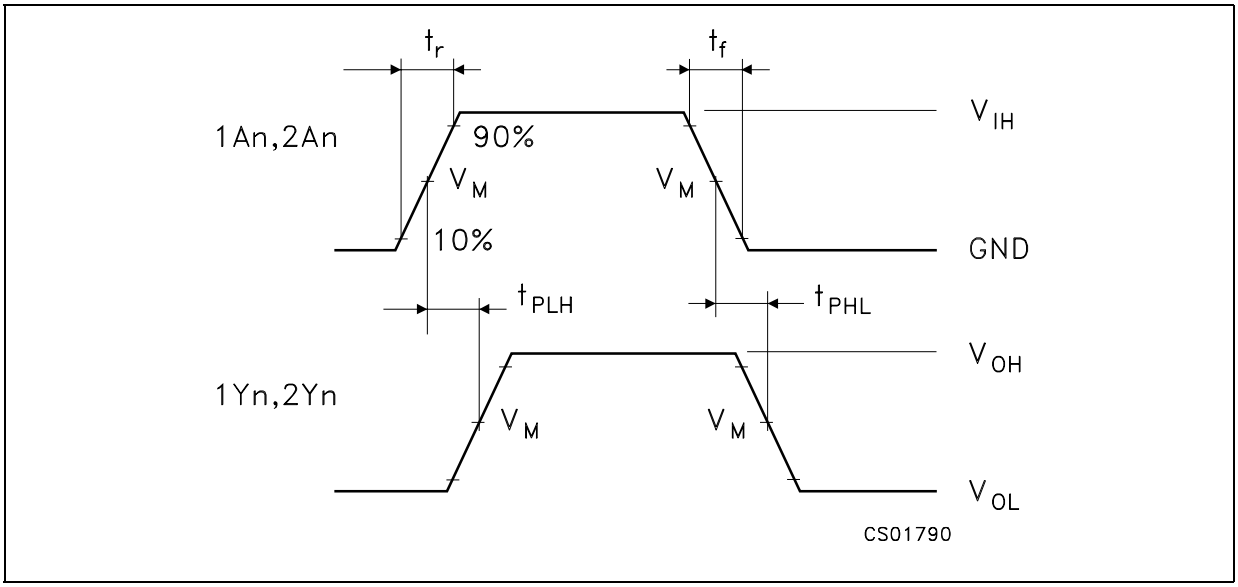
TEST CIRCUIT



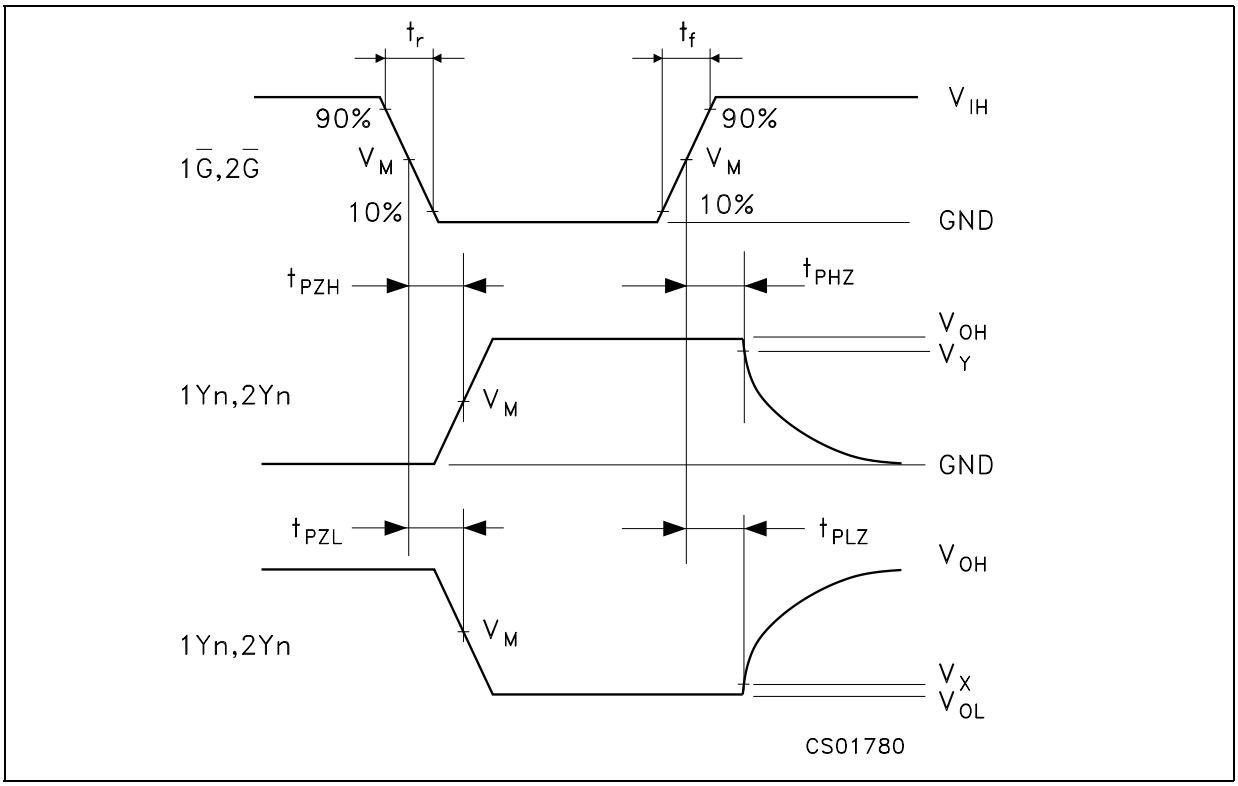
TEST	SWITCH
t_{PLH}, t_{PHL}	Open
t_{PZL}, t_{PLZ}	$2V_{CC}$
t_{PZH}, t_{PHZ}	GND

C_L = 50 pF or equivalent (includes jig and probe capacitance)
R_L = R1 = 500 Ω or equivalent
R_T = Z_{OUT} of pulse generator (typically 50Ω)

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

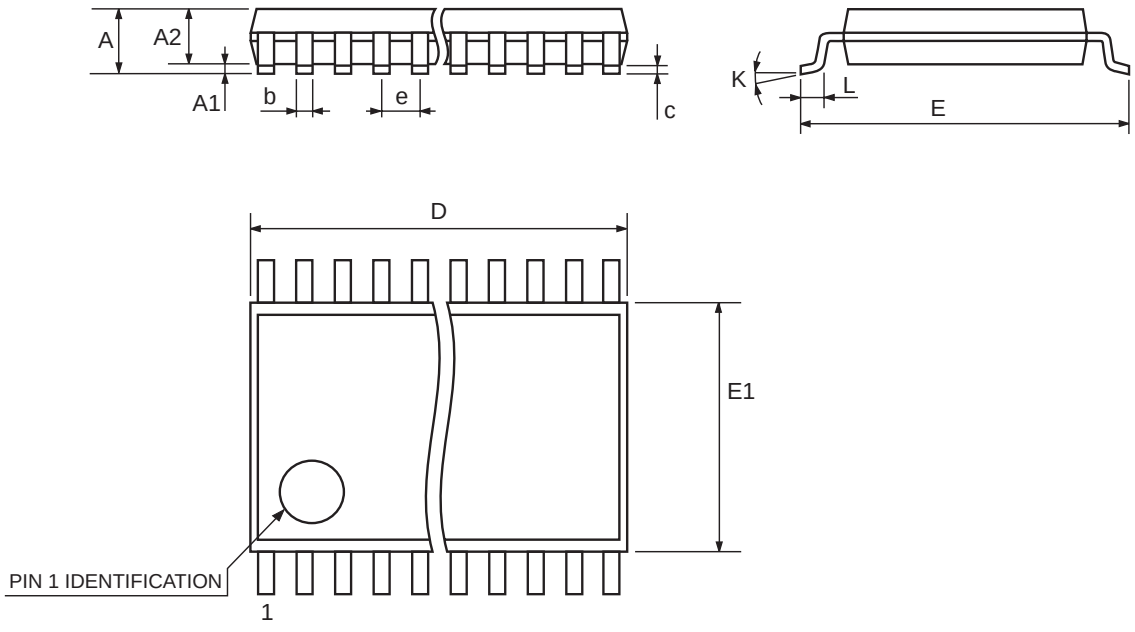


WAVEFORM 2: OUTPUT ENABLE AND DISABLE TIME (f=1MHz; 50% duty cycle; $V_Y = V_{OH}$-03V, $V_X = V_{OL}$+0.3V)



TSSOP48 MECHANICAL DATA

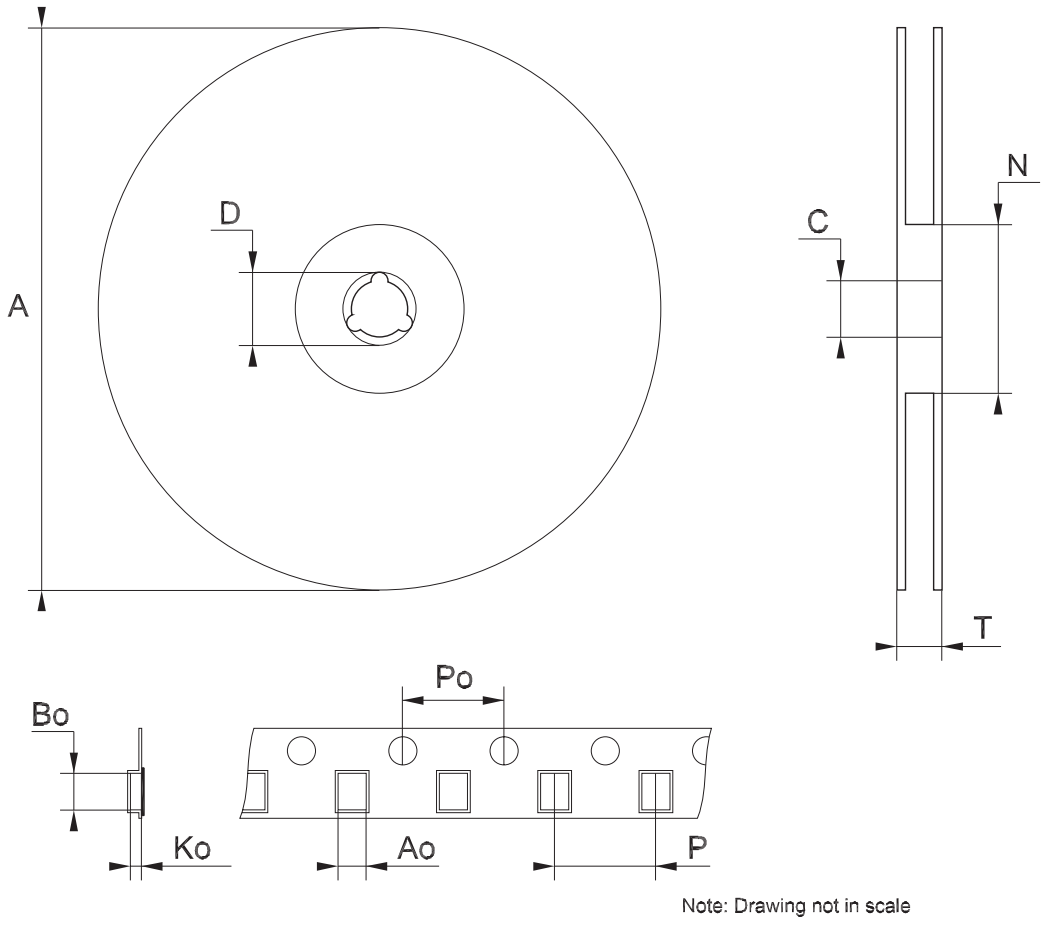
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			1.2			0.047
A1	0.05		0.15	0.002		0.006
A2		0.9			0.035	
b	0.17		0.27	0.0067		0.011
c	0.09		0.20	0.0035		0.0079
D	12.4		12.6	0.488		0.496
E		8.1 BSC			0.318 BSC	
E1	6.0		6.2	0.236		0.244
e		0.5 BSC			0.0197 BSC	
K	0˚		8˚	0˚		8˚
L	0.50		0.75	0.020		0.030



7065588C

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



Note: Drawing not in scale