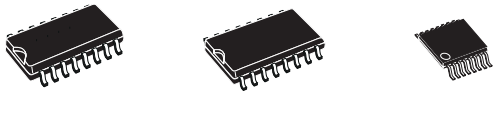
M74HC4852

DUAL 4:1 CHANNEL ANALOG MUX/DEMUX WITH INJECTION CURRENT PROTECTION

- LOW POWER DISSIPATION:
  I_{CC} = 2µA(MAX.) at T_A=25°C
- INJECTION CURRENT PROTECTION:
  $V_{\Delta OUT}$<1mV at V_{CC}=5V I_{IN}≤1mA R_S≤3.9KΩ
- "ON" RESISTANCE at T_A=25°C:
  215Ω TYP. (V_{CC} = 3.0V)
  150Ω TYP. (V_{CC} = 4.5V)
  160Ω TYP. (V_{CC} = 6V)
- FAST SWITCHING:
  t_{pd} = 8.6ns (TYP.) at T_A = 25 °C, V_{CC} = 4.5V
- WIDE OPERATING SUPPLY VOLTAGE RANGE: V_{CC} = 2V TO 6V
- HIGH NOISE IMMUNITY:
  V_{NIH} = V_{NIL} = 28% V_{CC} (MIN.)
- PIN AND FUNCTION COMPATIBLE WITH SERIES 4052, 4852
- LATCH-UP PERFORMANCE EXCEEDS 500mA (JESD 17)
- ESD PERFORMANCE:
  HBM > 2000V (JESD22-A114B);
  MM > 200V



SOP **SOP-Large** **TSSOP**

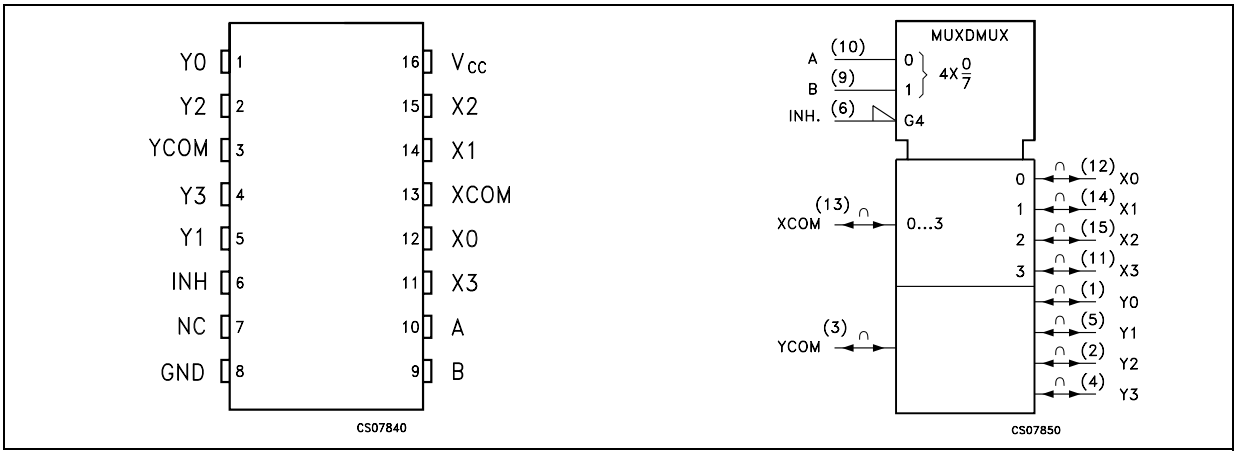
ORDER CODES

PACKAGE	TUBE	T & R
SOP	M74HC4852M1R	M74HC4852RM13TR
SOP-Large		M74HC4852MWR
TSSOP		M74HC4852TTR

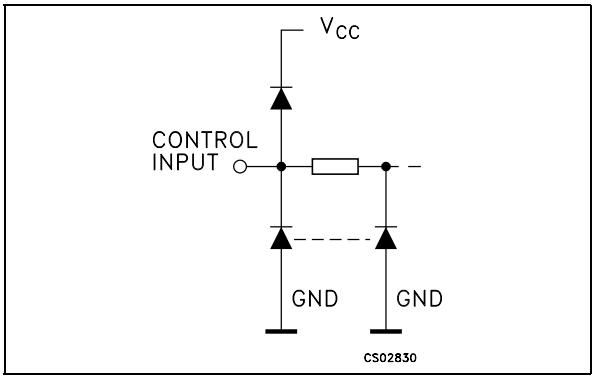
DESCRIPTION

The M74HC4852 is a dual four-channel analog MULTIPLEXER/DEMULTIPLEXER fabricated with silicon gate C^2MOS technology.
It is pin to pin compatible with the equivalent to standard HC4052 and MC14052, but features injection current effect control. This makes this device especially suited for usage in automotive applications where voltages in excess of normal logic voltage are common. The injection current effect control allows signals at disabled input channels to exceed the supply voltage range or go down ground without affecting the signal of the enabled analog channel. This eliminates the need for external diode-resistor networks typically used to keep the analog channel signals within the supply voltage range. This analog switch is bidirectional and digitally controlled. It has two binary control inputs A and B to select 1 of 4 to be turned on, and connected to the output, and a INH input to disable all channels.
All inputs and outputs are equipped with protection circuits against static discharge, giving them 2KV ESD immunity and transient excess voltage.

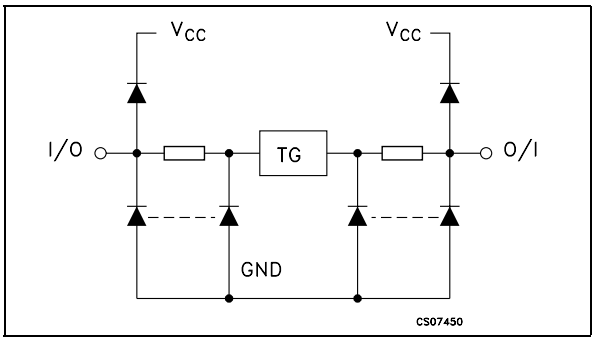
PIN CONNECTION AND IEC LOGIC SYMBOLS



CONTROL INPUT EQUIVALENT CIRCUIT



I/O EQUIVALENT CIRCUIT



PIN DESCRIPTION

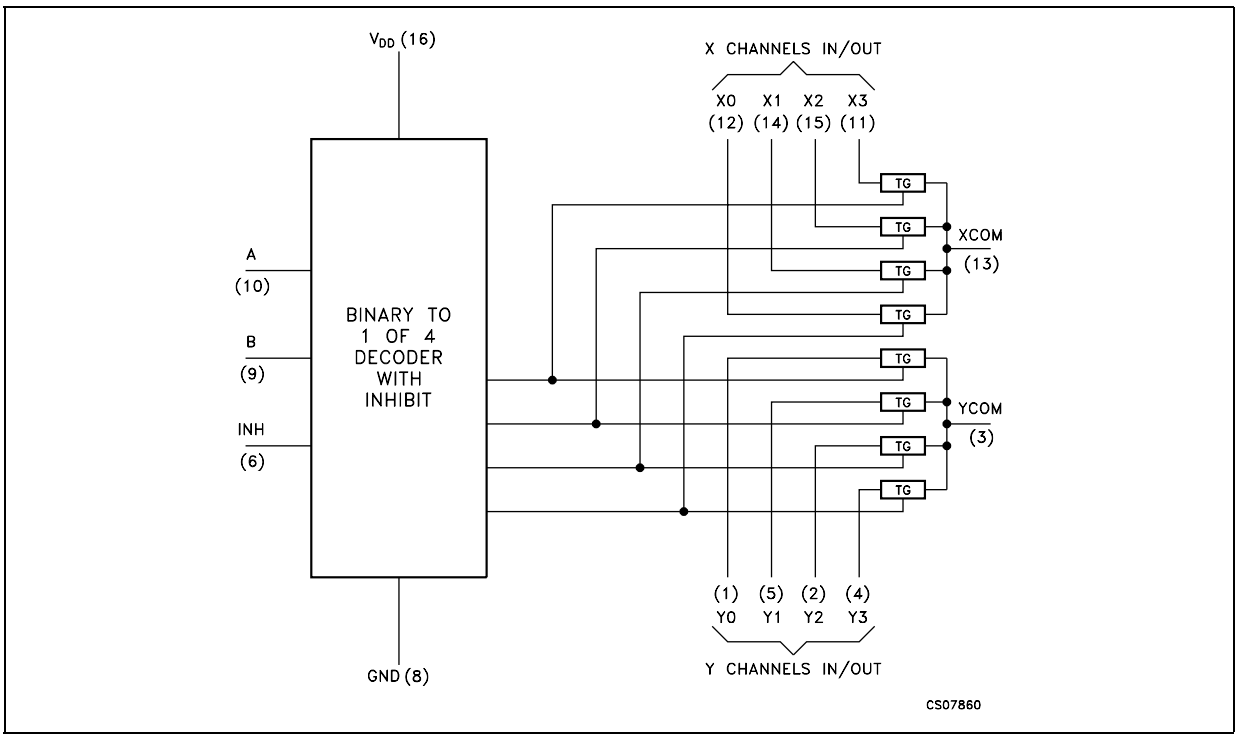
PIN N°	SYMBOL	NAME AND FUNCTION
3, 13	YCOM, XCOM	Common Output/Input
6	INH	INHIBIT Input
7	NC	Not Connected
10, 9	A, B	Select Inputs
12,14,15,11, 1, 5, 2, 4	X0 to X3, Y0 to Y3	Independent Input/Outputs
8	GND	Ground (0V)
16	V_{CC}	Positive Supply Voltage

TRUTH TABLE

INPUT STATE			ON CHANNEL	
INH	B	A		
L	L	L	X0	Y0
L	L	H	X1	Y1
L	H	L	X2	Y2
L	H	H	X3	Y3
H	X	X	NONE	NONE

X: Don't care

FUNCTIONAL DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V_{CC}	Supply Voltage		-0.5 to +7	V
V_{IN}	Control Input Voltage		-0.5 to V_{CC} + 0.5	V
$V_{I/O}$	Switch I/O Voltage		-0.5 to V_{CC} + 0.5	V
I_{CK}	Control Input Diode Current		± 25	mA
I_{IOK}	I/O Diode Current		± 25	mA
I_{CC}	DC V_{CC} or Ground Current		± 50	mA
P_D	Power Dissipation	SOP	500(*)	mW
		TSSOP	450(*)	mW
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

(*) Power dissipation at 65 °C. Derating from 65°C to 125°C: SO Package -7mW/°C; TSSOP Package -6.1mW/°C

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter		Value	Unit
V_{CC}	Supply Voltage		2 to 6	V
$V_{I/O}$	Input Output Voltage		0 to V_{CC}	V
$V_{I/O}$	Static or Dynamic Voltage Across Switch (note1)		0 to 1.2	V
V_{IN}	Control Input Voltage		0 to V_{CC}	V
T_{op}	Operating Temperature		-55 to 125	°C
t_r, t_f	Input Rise and Fall Time (note2)	V_{CC} = 2.0V	0 to 1000	ns
	(Channel Select or Enable Inputs only)	V_{CC} = 3.0.V	0 to 800	
		V_{CC} = 3.3V	0 to 700	
		V_{CC} = 4.5V	0 to 500	
		V_{CC} = 6.0V	0 to 400	

1) For voltage drops across switch greater than 1.2V (switch on), excessive V_{CC} current may drawn; i.e., the current out of the switch may contain both V_{CC} and switch input components. The reliability of the device will be unaffected unless the Maximum Ratings are exceeded.

2) V_{IN} from 30% to 70% V_{CC} of channel Selected or Enable Inputs

DC SPECIFICATIONS

Symbol	Parameter	Test Condition			Value							Unit
		V_{CC} (V)			T_A = 25°C			up to 85°C		up to 125°C		
					Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
V_{IHC}	High Level Input Voltage	2.0			1.5			1.5		1.5		V
		3.0			2.1			2.1		2.1		
		3.0			2.3			2.3		2.3		
		4.5			3.15			3.15		3.15		
		6.0			4.2			4.2		4.2		
V_{ILC}	Low Level Input Voltage	2.0					0.5		0.5		0.5	V
		3.0					0.9		0.9		0.9	
		3.3					1.0		1.0		1.0	
		4.5					1.35		1.35		1.35	
		6.0					1.8		1.8		1.8	
R_{ON}	ON Resistance	2.0	I_S=2mA	V_{IN} = V_{IHC} or V_{ILC} V_{IS} = V_{CC} to GND		500	650		670		700	Ω
		3.0	I_S≤2mA			215	280		320		360	
		3.3				210	270		305		345	
		4.5				160	210		240		270	
		6.0				150	195		220		250	
ΔR_{ON}	Difference of ON Resistance between switches	2.0	I_S=2mA	V_{IN} = V_{IHC} or V_{ILC} V_{IS} = V_{CC}/2		4	10		15		20	Ω
		3.0	I_S≤2mA			2	8		12		16	
		3.3				2	8		12		16	
		4.5				2	8		12		16	
		6.0				3	9		13		18	
I_{OFF}	Input/Output Leakage Current (SWITCH OFF) (Any Channel)	6.0	V_{IN} = V_{CC} or GND				±0.1		± 0.5		± 1.0	µA
I_{OFF}	Input/Output Leakage Current (SWITCH OFF) (Common Channel)	6.0	V_{IN} = V_{CC} or GND				± 0.2		± 2		± 4	µA
I_{ON}	Switch Input Leakage Current (SWITCH ON, OUTPUT OPEN)	6.0	V_{IN} = V_{CC} or GND				±0.1		± 0.5		± 1	µA
I_{IN}	Control Input Current	6.0	V_{IN} = V_{CC} or GND				± 0.1		± 0.1		± 1	µA
I_{CC}	Quiescent Supply Current	6.0	V_{IN} = V_{CC} or GND $V_{IN(analog)}$= GND				2		20		40	µA

AC ELECTRICAL CHARACTERISTICS (C_L = 50 pF, Input $t_r = t_f$ = 6ns)

Symbol	Parameter	Test Condition		Value							Unit
		V_{CC} (V)	TEST CIRCUIT 1	T_A = 25°C			up to 85°C		up to 125°C		
				Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
t_{PHL},t_{PLH}	Propagation Delay Time, Analog Input to Analog Output	2.0			19.5	25		29		32	ns
		3.0			12	15.5		17.5		19.5	
		3.3			11	14.5		16.5		18.5	
		4.5			8.6	11.5		12.5		13.5	
		6.0			8	10		11		12	
t_{PHL},t_{PLH}	Propagation Delay Time Channel-Select to Analog Output	2.0			23	30		35		40	ns
		3.0			13.5	17.5		20		23	
		3.3			12.5	16.5		19		22	
		4.5			10	13		15		17	
		6.0			9.5	12.5		14.5		16.5	
$t_{PHZ}$$t_{PZH}$ t_{PLZ},t_{PZL}	Enable Disable Time, Enable or Channel-Select to Analog Output	2.0				95		105		115	ns
		3.0				90		100		110	
		3.3				85		95		105	
		4.5				80		90		100	
		6.0				78		80		80	
C_{IN}	Input Capacitance (Digital Pins)				3.5	10		10		10	pF
C_{IN}	Input Capacitance (Switches Off, Any Single Analog Pins)				6.7	15		15		15	pF
C_{IN}	Input Capacitance (Switches Off, Any Common Analog Pins)				22	40		40		40	pF
C_{PD}	Power Dissipation Capacitance (*)	3.3			24						pF
		5.0			28						

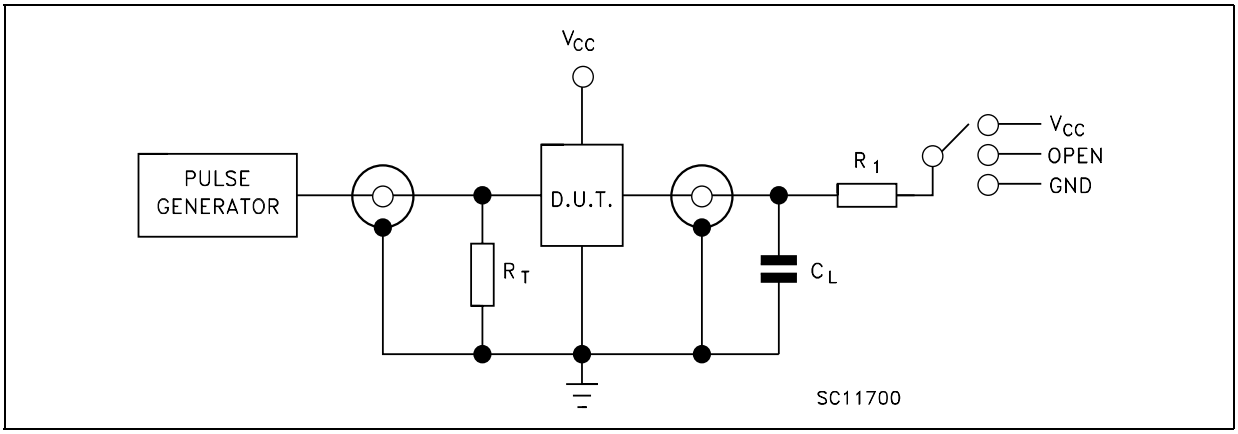
(*) C_{PD} is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation. $I_{CC(opr)} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}/8$

INJECTION CURRENT COUPLING SPECIFICATION (T_A= -55°C to +125°C)

Symbol	Parameter	Test Condition		Value		Unit
		V_{CC} (V)	TEST CIRCUIT 2	Typ.(1)	Max.	
$V_{\Delta OUT}$	Shift of Output Voltage of Enabled Analog Channel	3.3	$I_{IN} \le$ 1mA, $R_S \le$ 3.9KΩ	0.050	1.0	mV
		5.0		0.100	1.0	
		3.3	$I_{IN} \le$ 10mA, $R_S \le$ 3.9KΩ	0.345	5.0	
		5.0		0.067	5.0	
		3.3	$I_{IN} \le$ 1mA, $R_S \le$ 20KΩ	0.050	2.0	
		5.0		0.110	2.0	
		3.3	$I_{IN} \le$ 10mA, $R_S \le$ 20KΩ	0.050	20	
		5.0		0.024	20	

1) Typical values are measured at T_A=25°C e they are calculated as a difference from V_{OUT} without Injection Current and V_{OUT} with Injection Current.
I_{IN} = total current injected into any other disabled channel, one at time.

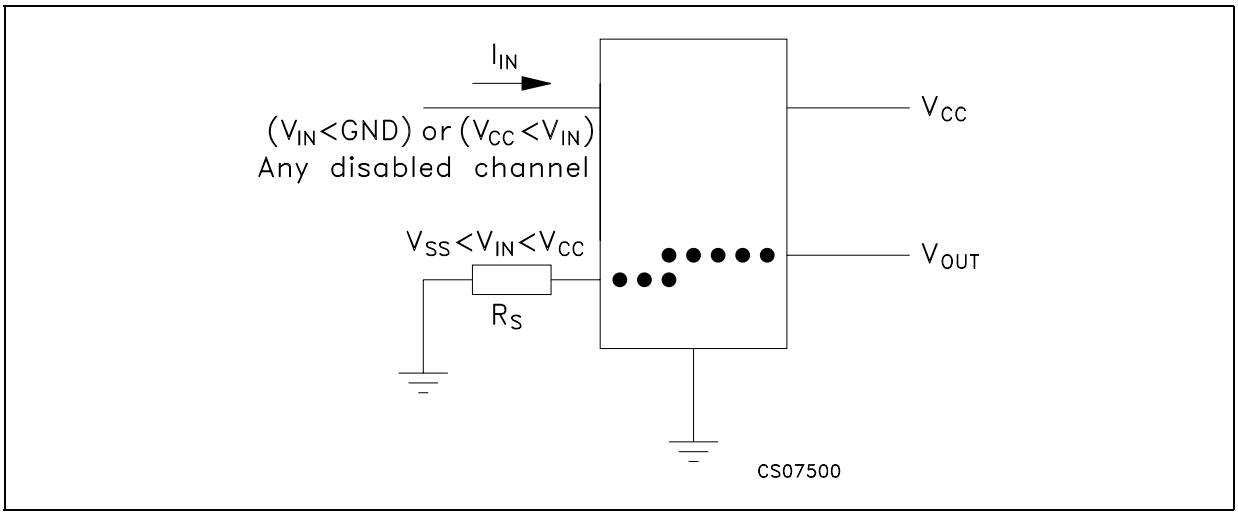
TEST CIRCUIT 1



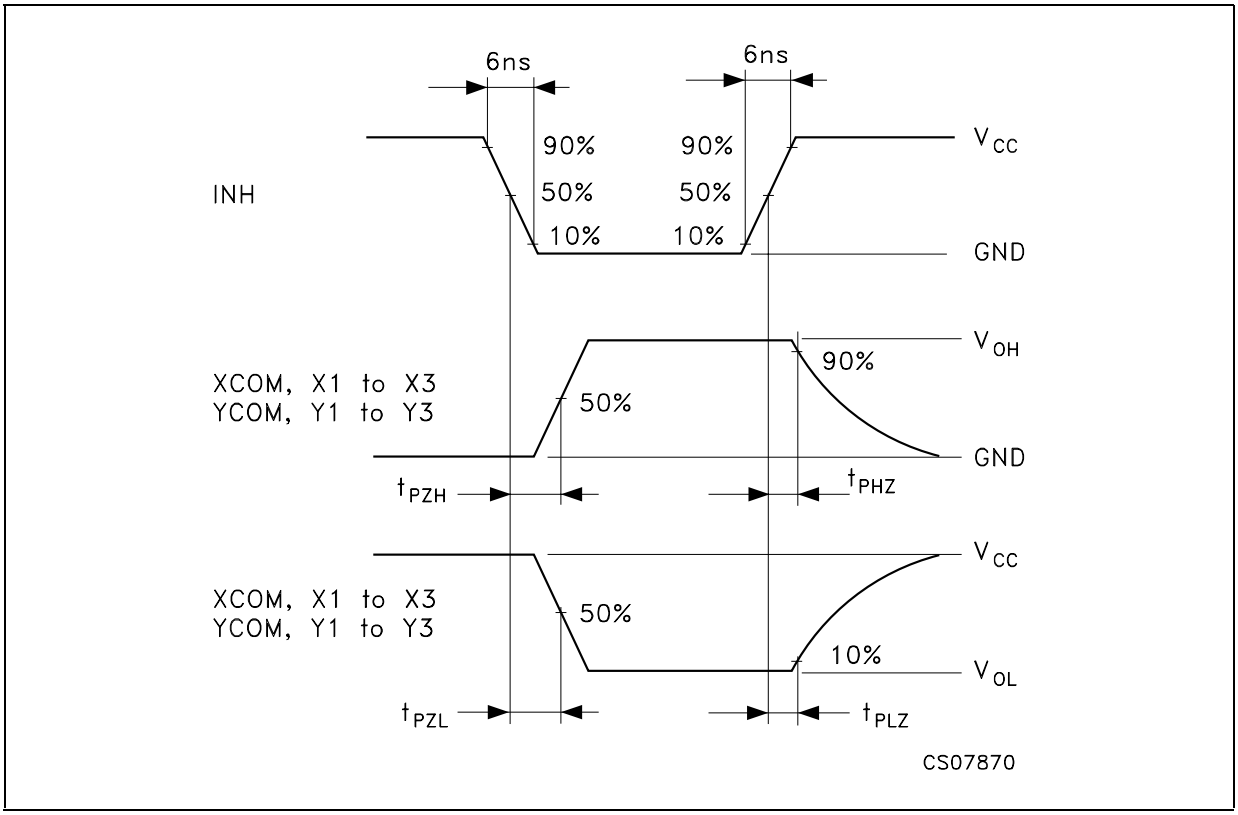
TEST	SWITCH
t_{PLH}, t_{PHL}	Open
t_{PZL}, t_{PLZ}	V_{CC}
t_{PZH}, t_{PHZ}	GND

C_L =50pF or equivalent (includes jig and probe capacitance)
R_L = R1 = 10KΩ or equivalent
R_T = Z_{OUT} of pulse generator (typically 50Ω)

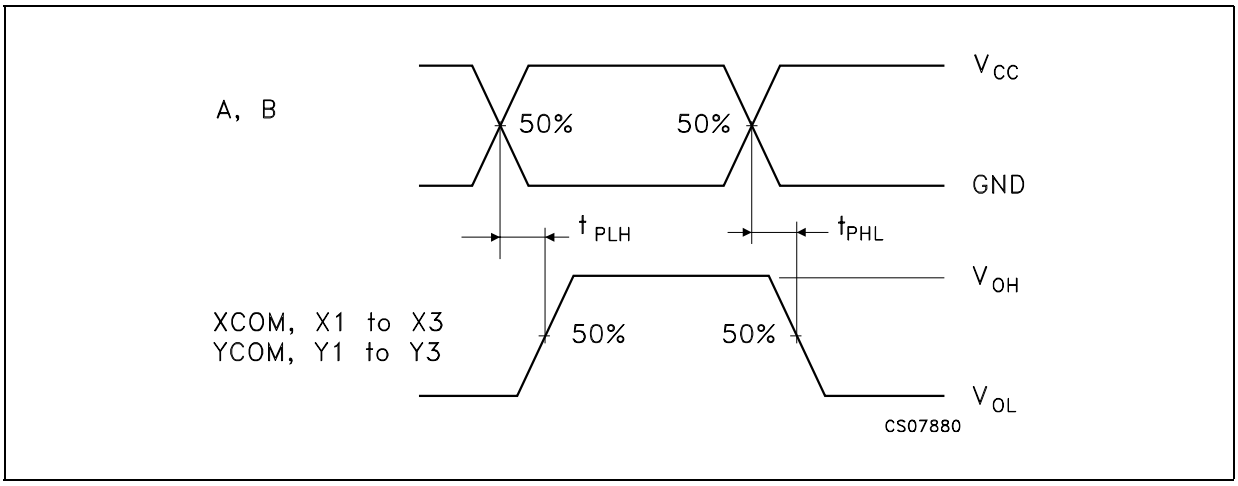
TEST CIRCUIT 2



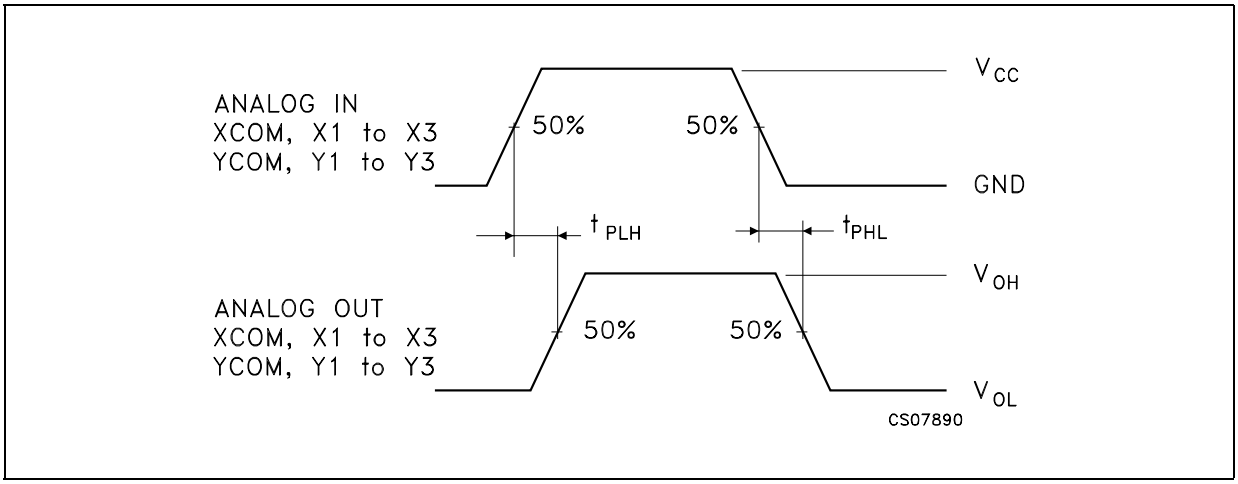
WAVEFORM: PROPAGATION DELAY (f=1MHz; 50% duty cycle)



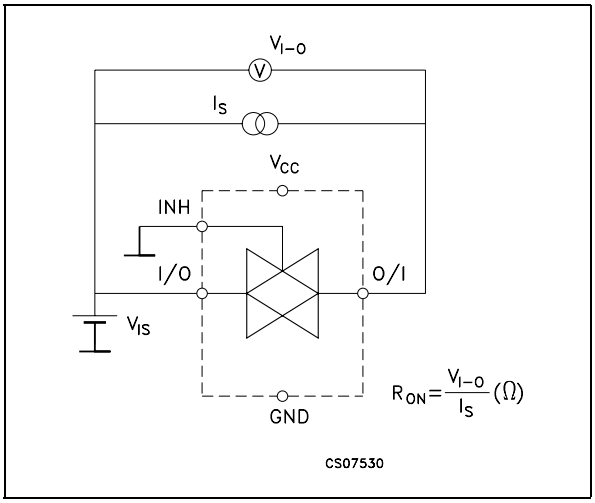
WAVEFORM: PROPAGATION DELAY (f=1MHz; 50% duty cycle)



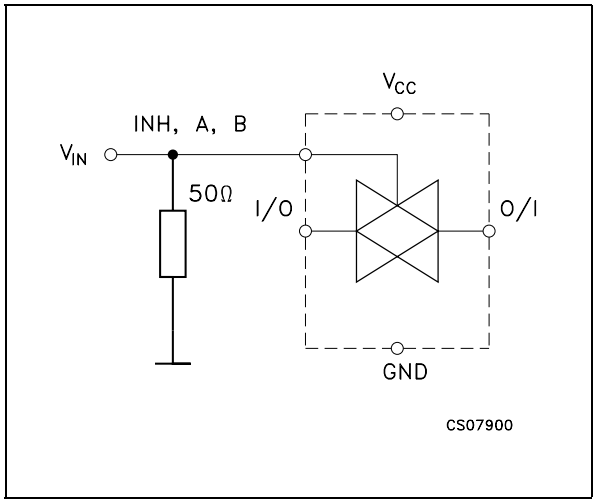
WAVEFORM: PROPAGATION DELAY (f=1MHz; 50% duty cycle)



CHANNEL RESISTANCE (R_{ON})

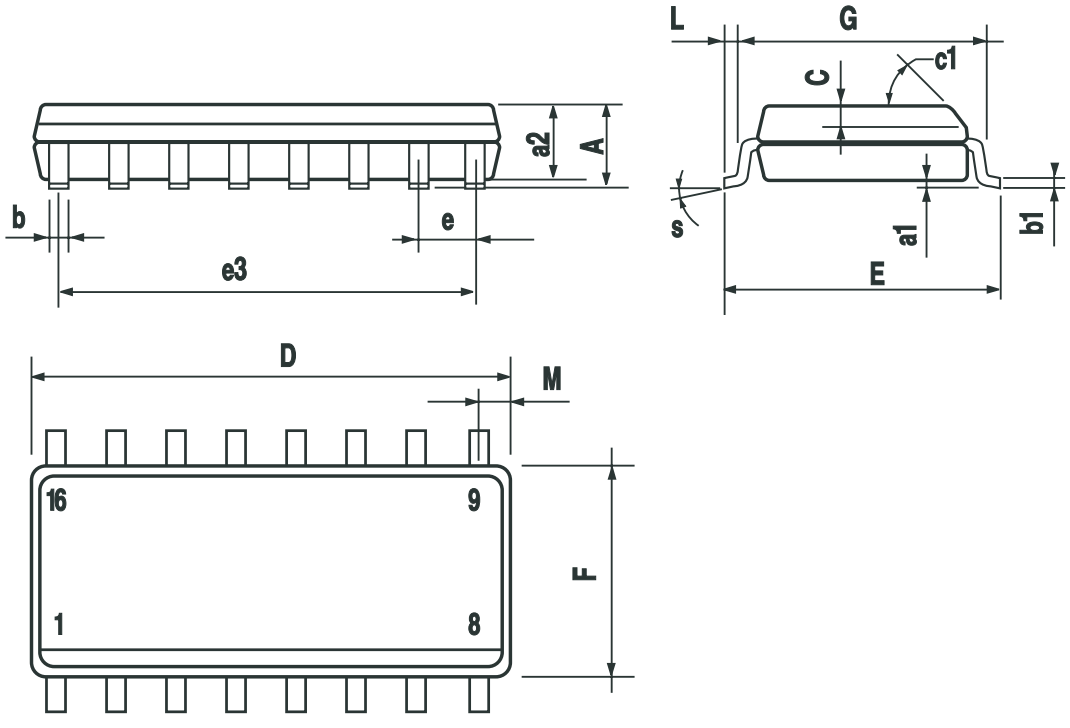


I_{CC} (Opr.)



SO-16 MECHANICAL DATA

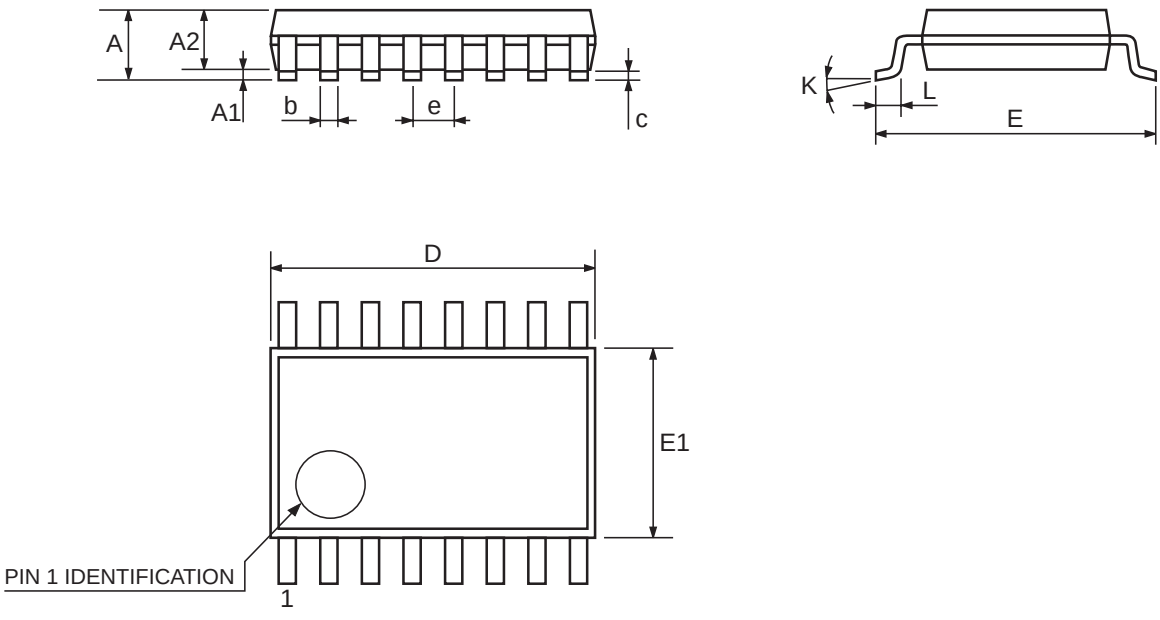
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.2	0.004		0.008
a2			1.65			0.064
b	0.35		0.46	0.013		0.018
b1	0.19		0.25	0.007		0.010
C		0.5			0.019	
c1	45° (typ.)					
D	9.8		10	0.385		0.393
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		8.89			0.350	
F	3.8		4.0	0.149		0.157
G	4.6		5.3	0.181		0.208
L	0.5		1.27	0.019		0.050
M			0.62			0.024
S	8° (max.)					



PO13H

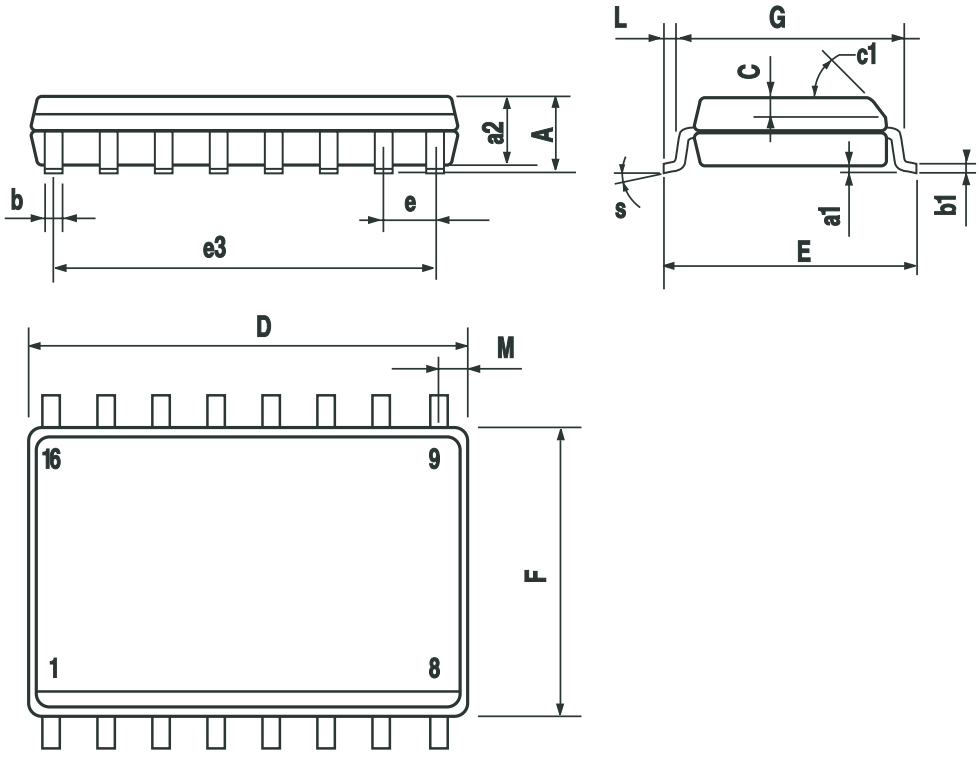
TSSOP16 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			1.2			0.047
A1	0.05		0.15	0.002	0.004	0.006
A2	0.8	1	1.05	0.031	0.039	0.041
b	0.19		0.30	0.007		0.012
c	0.09		0.20	0.004		0.0079
D	4.9	5	5.1	0.193	0.197	0.201
E	6.2	6.4	6.6	0.244	0.252	0.260
E1	4.3	4.4	4.48	0.169	0.173	0.176
e		0.65 BSC			0.0256 BSC	
K	0°		8°	0°		8°
L	0.45	0.60	0.75	0.018	0.024	0.030



SO-16L MECHANICAL DATA

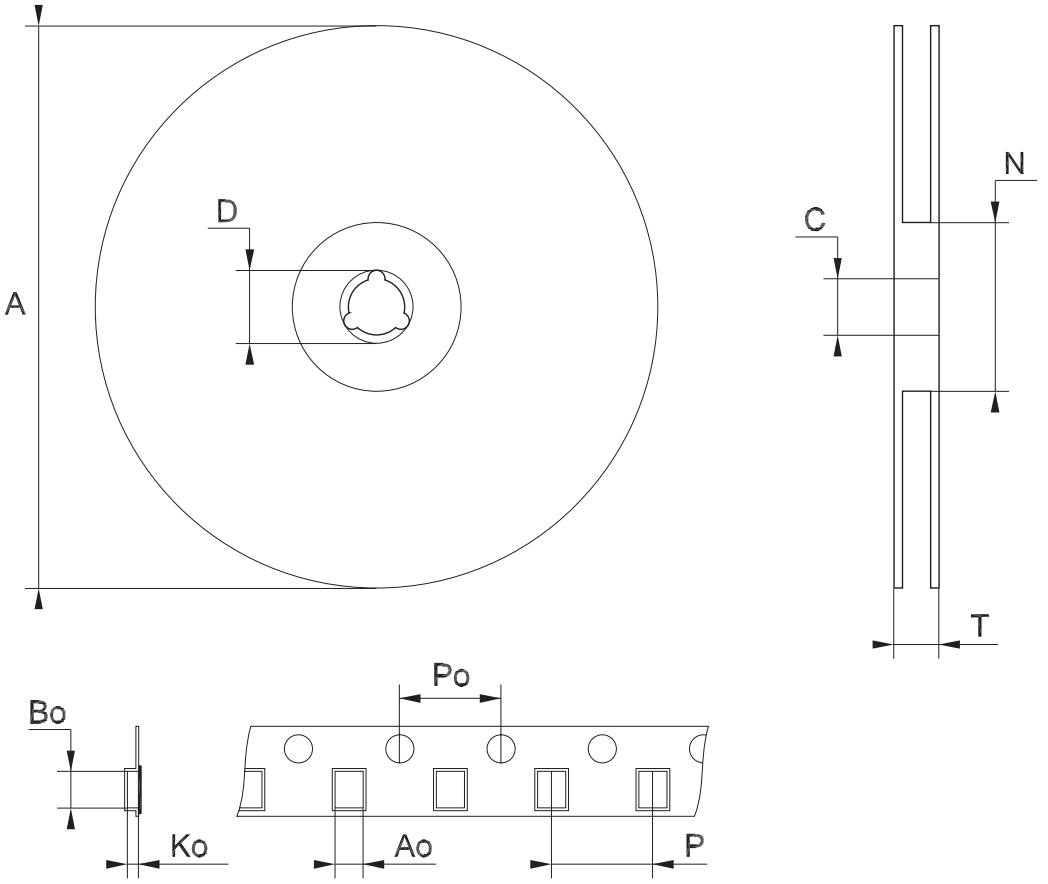
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			2.65			0.104
a1	0.1		0.2	0.004		0.008
a2			2.45			0.096
b	0.35		0.49	0.014		0.019
b1	0.23		0.32	0.009		0.012
C		0.5			0.020	
c1	45° (typ.)					
D	10.1		10.5	0.397		0.413
E	10.0		10.65	0.393		0.419
e		1.27			0.050	
e3		8.89			0.350	
F	7.4		7.6	0.291		0.300
G						
L	0.5		1.27	0.020		0.050
M			0.75			0.029
S	8		° (max.)			



PO13I

Tape & Reel SO-16 MECHANICAL DATA

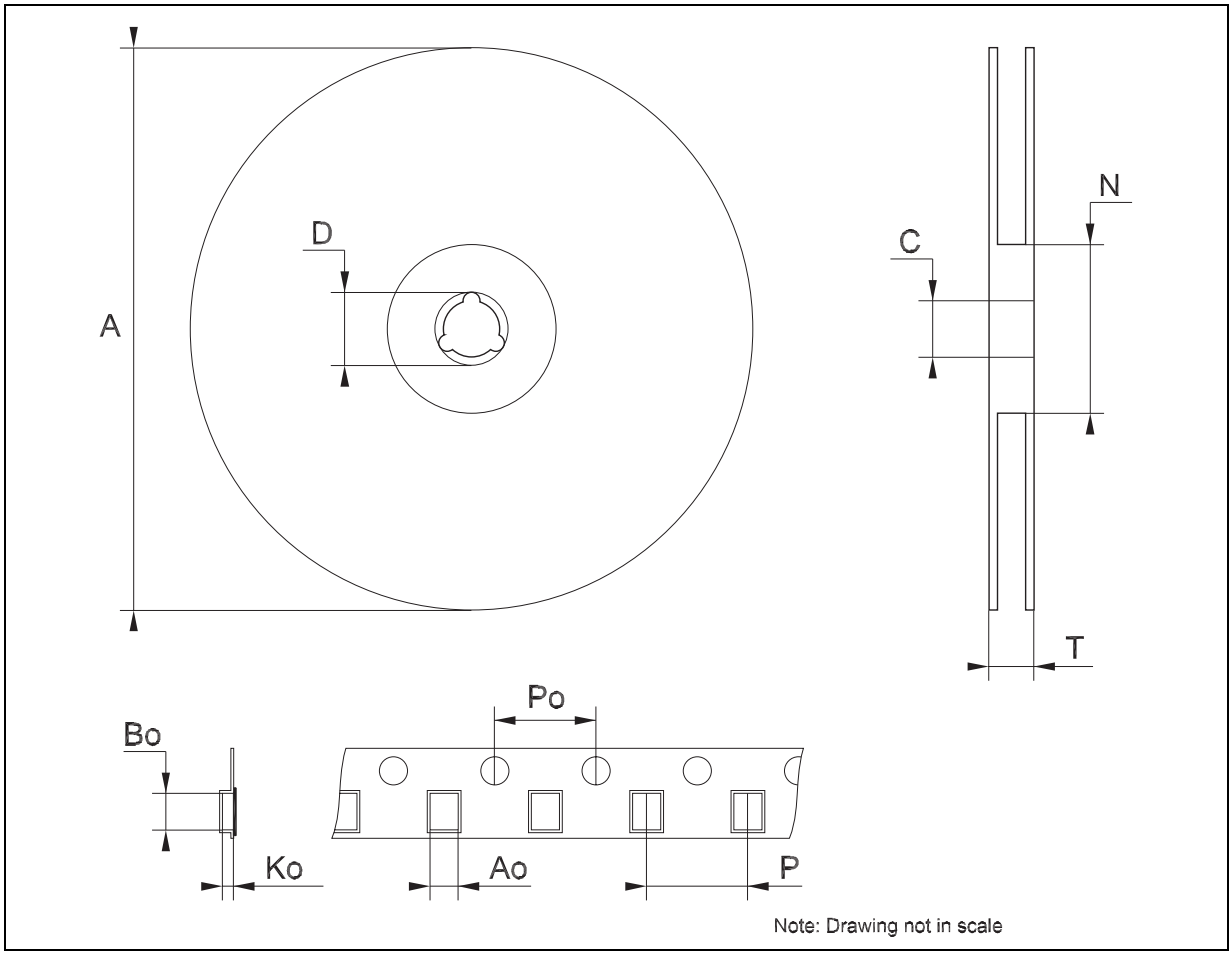
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			330			12.992
C	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		
T			22.4			0.882
Ao	6.45		6.65	0.254		0.262
Bo	10.3		10.5	0.406		0.414
Ko	2.1		2.3	0.082		0.090
Po	3.9		4.1	0.153		0.161
P	7.9		8.1	0.311		0.319



Note: Drawing not in scale

Tape & Reel TSSOP16 MECHANICAL DATA

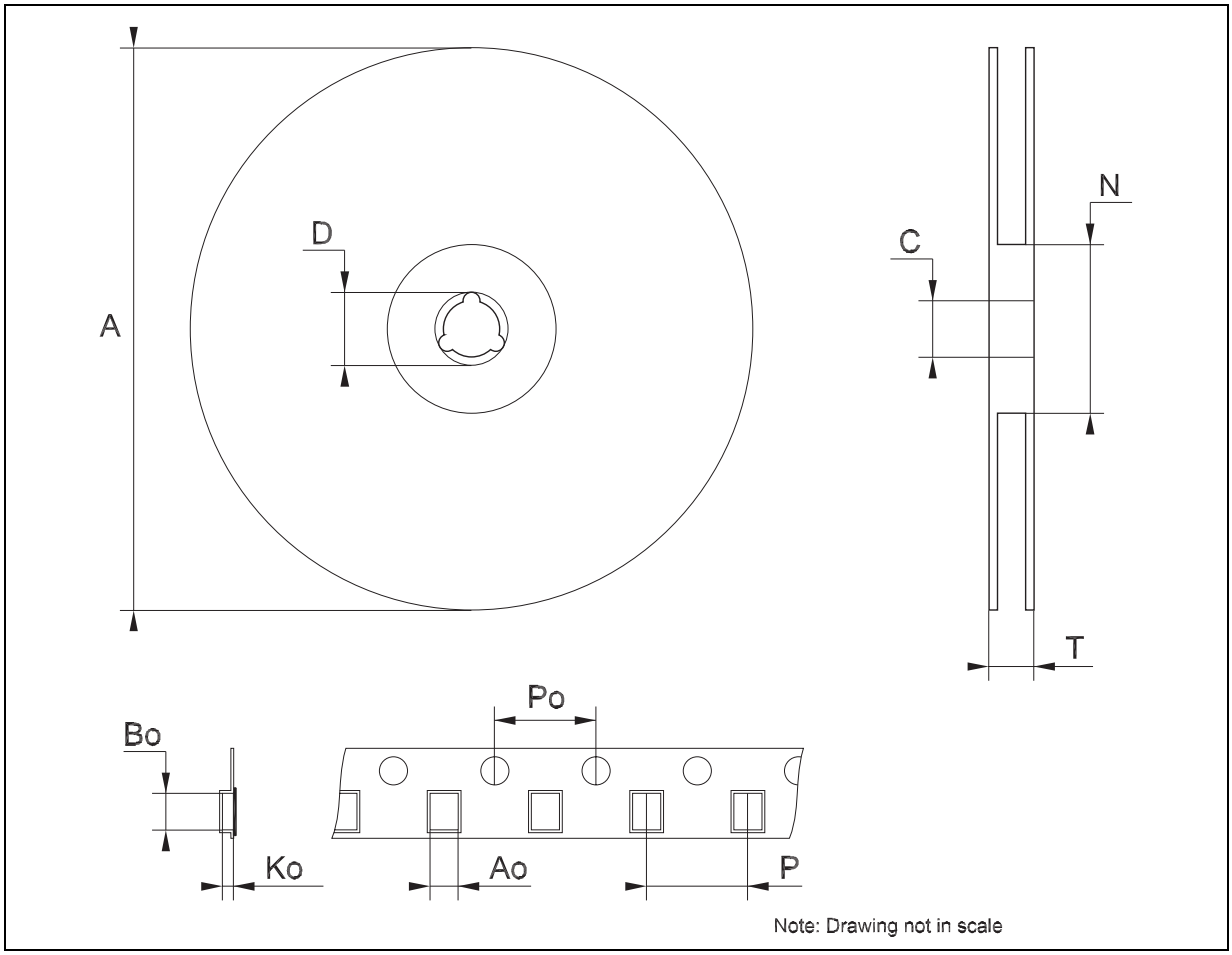
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			330			12.992
C	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		
T			22.4			0.882
Ao	6.7		6.9	0.264		0.272
Bo	5.3		5.5	0.209		0.217
Ko	1.6		1.8	0.063		0.071
Po	3.9		4.1	0.153		0.161
P	7.9		8.1	0.311		0.319



Note: Drawing not in scale

Tape & Reel SO-16L 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			22.4			0.882
Ao	10.8		11.0	0.425		0.433
Bo	10.7		10.9	0.421		0.429
Ko	2.9		3.1	0.114		0.122
Po	3.9		4.1	0.153		0.161
P	11.9		12.1	0.468		0.476



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