



# HCF4010B

## HEX BUFFER/CONVERTER (NON INVERTING)

- PROPAGATION DELAY TIME:  
 $t_{PD} = 50\text{ns}$  (Typ.) at  $V_{DD} = 10\text{V}$   $C_L = 50\text{pF}$
- HIGH TO LOW LEVEL LOGIC CONVERSION
- MULTIPLEXER: 1 TO 6 OR 6 TO 1
- HIGH "SINK" AND "SOURCE" CURRENT CAPABILITY
- QUIESCENT CURRENT SPECIFIED UP TO 20V
- 5V, 10V AND 15V PARAMETRIC RATINGS
- INPUT LEAKAGE CURRENT  
 $I_l = 100\text{nA}$  (MAX) AT  $V_{DD} = 18\text{V}$   $T_A = 25^\circ\text{C}$
- 100% TESTED FOR QUIESCENT CURRENT
- MEETS ALL REQUIREMENTS OF JEDEC JESD13B "STANDARD SPECIFICATIONS FOR DESCRIPTION OF B SERIES CMOS DEVICES"

### DESCRIPTION

The HCF4010B is a monolithic integrated circuit fabricated in Metal Oxide Semiconductor technology available in DIP and SOP packages.

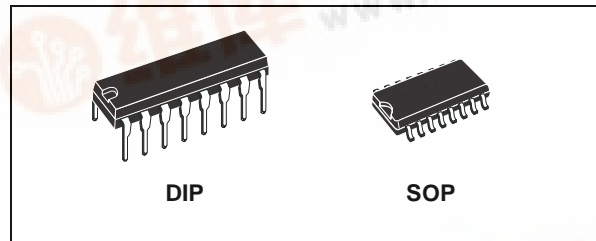


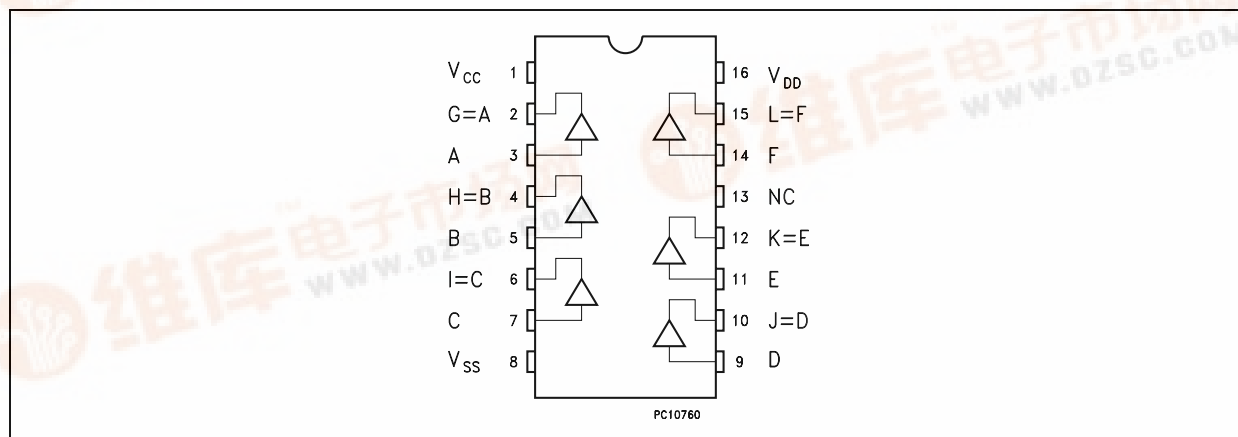
Table 1: Order Codes

PACKAGE	TUBE	T & R
DIP	HCF4010BEY	
SOP	HCF4010BM1	HCF4010M013TR

It is a non inverting Hex Buffer/Converter and can be used as CMOS to TTL logic level converter as current "sink" or "source" driver or as multiplexer (1 to 6).

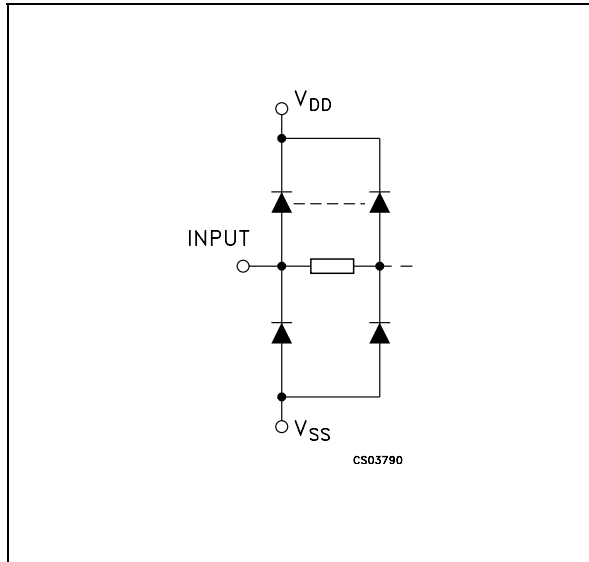
It is a preferred replacement of HCF4050B in buffer applications.

Figure 1: Pin Connection



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**Figure 2: Input Equivalent Circuit**



**Table 2: Pin Description**

PIN N°	SYMBOL	NAME AND FUNCTION
3, 5, 7, 9, 11, 14	A, B, C, D, E, F	Data Inputs
2, 4, 6, 10, 12, 15	G, H, I, J, K, L	Data Outputs
13	NC	Not Connected
1	V <sub>CC</sub>	Positive Supply Voltage
8	V <sub>SS</sub>	Negative Supply Voltage
16	V <sub>DD</sub>	Positive Supply Voltage

**Table 3: Truth Table**

INPUTS	OUTPUTS
A, B, C, D, E, F	G, H, I, J, K, L
L	L
H	H

**Table 4: Absolute Maximum Ratings**

Symbol	Parameter	Value	Unit
V <sub>DD</sub>	Supply Voltage	-0.5 to +22	V
V <sub>I</sub>	DC Input Voltage	-0.5 to V <sub>DD</sub> + 0.5	V
I <sub>I</sub>	DC Input Current	± 10	mA
P <sub>D</sub>	Power Dissipation per Package	200	mW
	Power Dissipation per Output Transistor	100	mW
T <sub>op</sub>	Operating Temperature	-55 to +125	°C
T <sub>stg</sub>	Storage Temperature	-65 to +150	°C

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

All voltage values are referred to V<sub>SS</sub> pin voltage.

**Table 5: Recommended Operating Conditions**

Symbol	Parameter	Value	Unit
V <sub>DD</sub>	Supply Voltage	3 to 20	V
V <sub>I</sub>	Input Voltage	0 to V <sub>DD</sub>	V
T <sub>op</sub>	Operating Temperature	-55 to 125	°C

Table 6: DC Specifications

Symbol	Parameter	Test Condition				Value						Unit	
		V <sub>I</sub> (V)	V <sub>O</sub> (V)	I <sub>ol</sub>   ( $\mu$ A)	V <sub>DD</sub> = 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.
I <sub>L</sub>	Quiescent Current	0/5			5		0.02	1		30		30	$\mu$ A
		0/10			10		0.02	2		60		60	
		0/15			15		0.02	4		120		120	
		0/20			20		0.04	20		600		600	
V <sub>OH</sub>	High Level Output Voltage	0/5		<1	5	4.95			4.95		4.95		V
		0/10		<1	10	9.95			9.95		9.95		
		0/15		<1	15	14.95			14.95		14.95		
V <sub>OL</sub>	Low Level Output Voltage	5/0		<1	5		0.05			0.05		0.05	V
		10/0		<1	10		0.05			0.05		0.05	
		15/0		<1	15		0.05			0.05		0.05	
V <sub>IH</sub>	High Level Input Voltage		0.5/4.5	<1	5	3.5			3.5		3.5		V
			1/9	<1	10	7			7		7		
			1.5/13.5	<1	15	11			11		11		
V <sub>IL</sub>	Low Level Input Voltage		4.5/0.5	<1	5			1.5		1.5		1.5	V
			9/1	<1	10			3		3		3	
			13.5/1.5	<1	15			4		4		4	
I <sub>OH</sub>	Output Drive Current	0/5	2.5	<1	5	-0.8	-1.6		-0.65		-0.65		mA
		0/5	4.6	<1	5	-0.2	-0.4		-0.18		-0.18		
		0/10	9.5	<1	10	-0.45	-0.9		-0.38		-0.38		
		0/15	13.5	<1	15	-1.5	-3		-1.25		-1.25		
I <sub>OL</sub>	Output Sink Current	0/5	0.4	<1	5	3	4		2.4		2.4		mA
		0/10	0.5	<1	10	8	10		6.4		6.4		
		0/15	1.5	<1	15	24	36		19		19		
I <sub>I</sub>	Input Leakage Current	0/18	Any Input		18		$\pm 10^{-5}$	$\pm 0.1$		$\pm 1$		$\pm 1$	$\mu$ A
C <sub>I</sub>	Input Capacitance		Any Input				5	7.5					pF

The Noise Margin for both "1" and "0" level is: 1V min. with V<sub>DD</sub>=5V, 2V min. with V<sub>DD</sub>=10V, 2.5V min. with V<sub>DD</sub>=15V

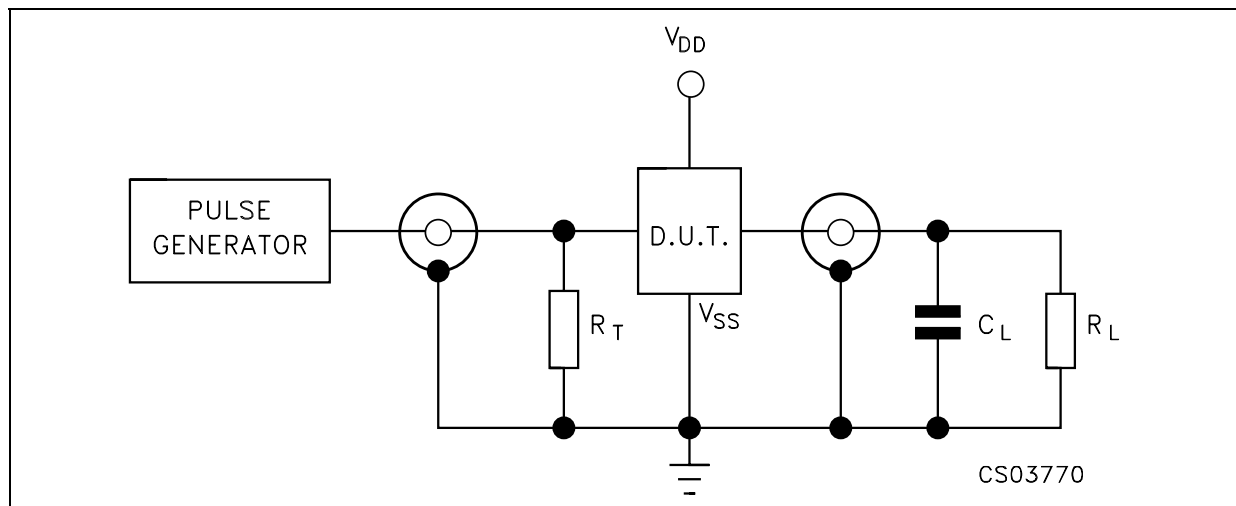
## HCF4010B

**Table 7: Dynamic Electrical Characteristics** ( $T_{amb} = 25^{\circ}\text{C}$ ,  $C_L = 50\text{pF}$ ,  $R_L = 200\text{K}\Omega$ ,  $t_r = t_f = 20\text{ ns}$ )

Symbol	Parameter	Test Condition			Value (*)			Unit
		$V_{DD}$ (V)	$V_I$ (V)	$V_{CC}$ (V)	Min.	Typ.	Max.	
$t_{TLH}$	Output Transition Time	5	5	5		150	350	ns
		10	10	10		75	15	
		15	15	15		55	110	
$t_{THL}$	Output Transition Time	5	5	5		35	70	ns
		10	10	10		20	40	
		15	15	15		15	30	
$t_{PLH}$	Propagation Delay Time	5	5	5		100	200	ns
		10	10	10		50	100	
		10	10	5		50	100	
		15	15	15		35	70	
		15	15	5		35	70	
$t_{PHL}$	Propagation Delay Time	5	5	5		65	130	ns
		10	10	10		35	70	
		10	10	5		30	70	
		15	15	15		25	50	
		15	15	5		20	40	

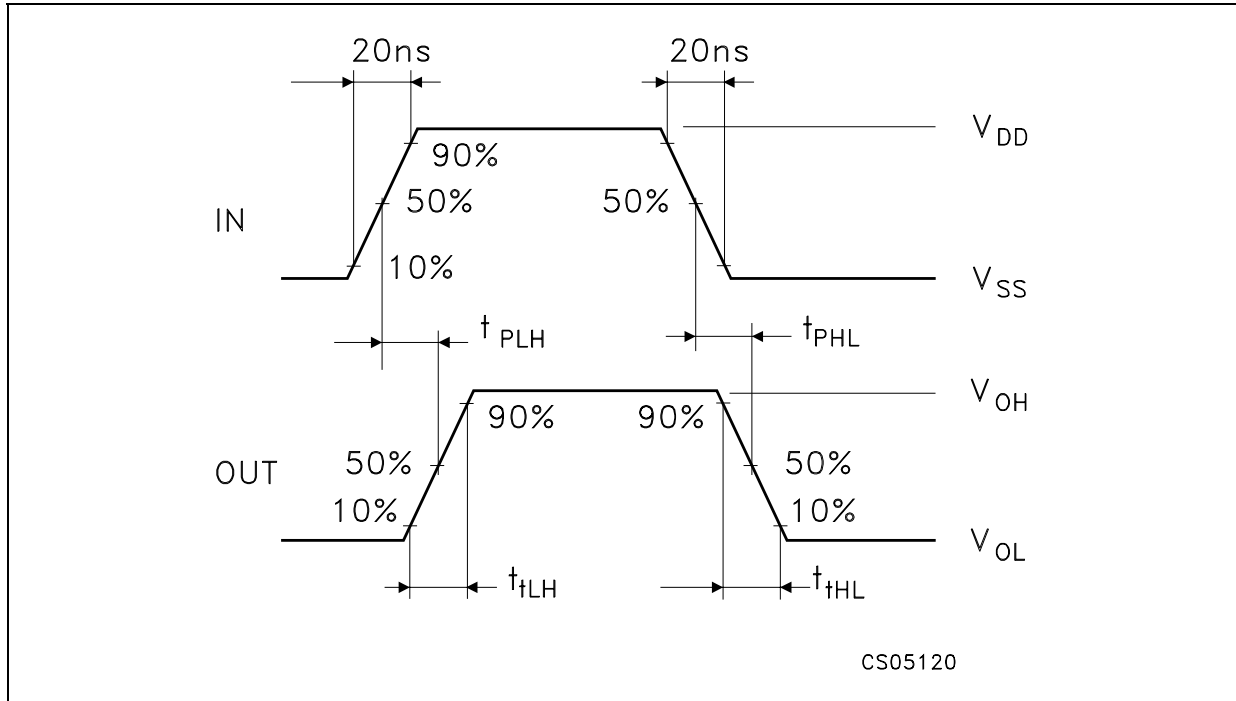
(\*) Typical temperature coefficient for all  $V_{DD}$  value is  $0.3\%/^{\circ}\text{C}$ .

**Figure 3: Test Circuit**



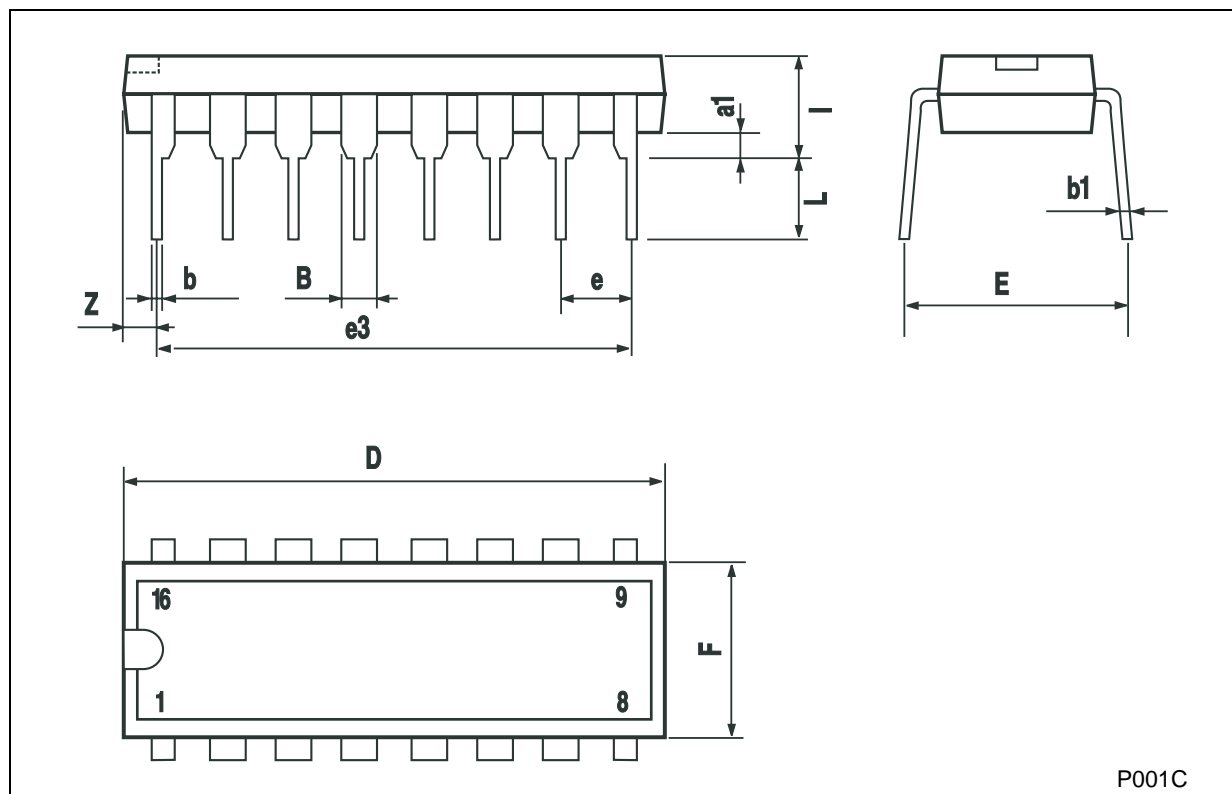
$C_L = 50\text{pF}$  or equivalent (includes jig and probe capacitance)  
 $R_L = 200\text{K}\Omega$   
 $R_T = Z_{OUT}$  of pulse generator (typically  $50\Omega$ )

Figure 4: Waveform - Propagation Delay Times (f=1MHz; 50% duty cycle)



**Plastic DIP-16 (0.25) MECHANICAL DATA**

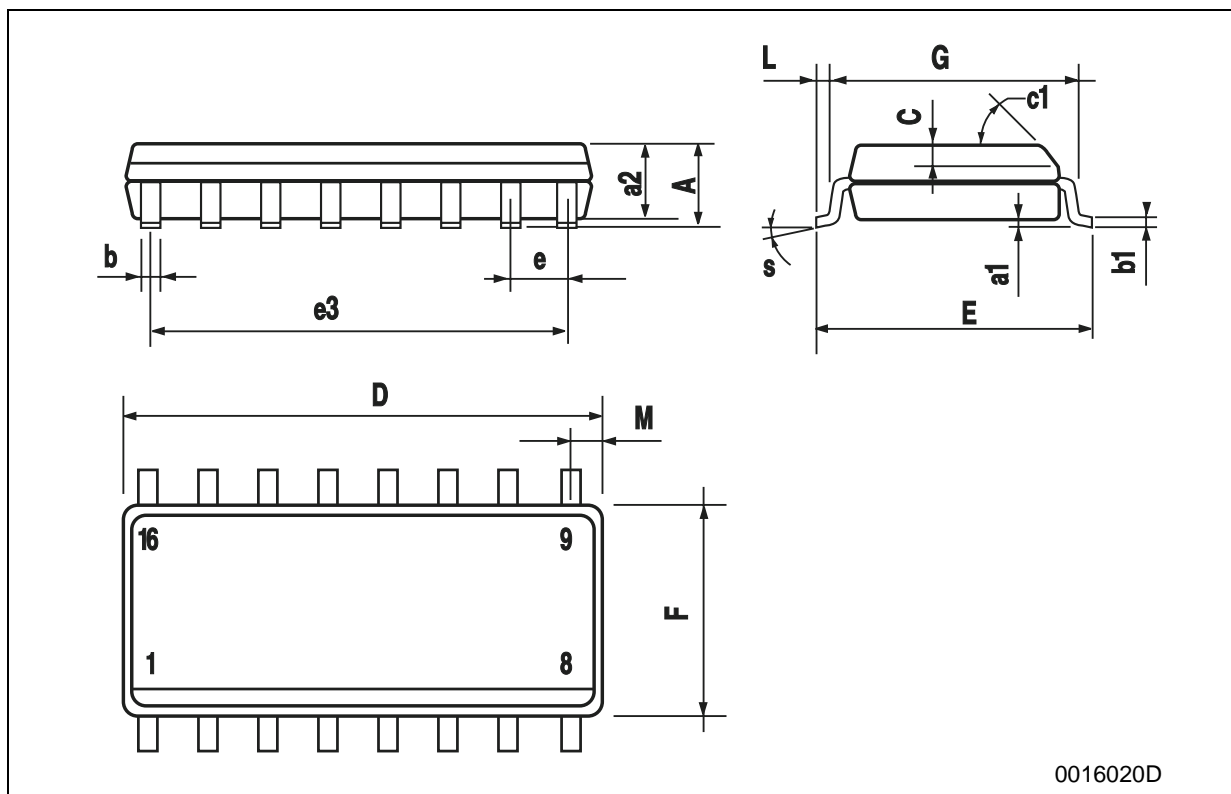
DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	0.77		1.65	0.030		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
e		2.54			0.100	
e3		17.78			0.700	
F			7.1			0.280
l			5.1			0.201
L		3.3			0.130	
Z			1.27			0.050



P001C

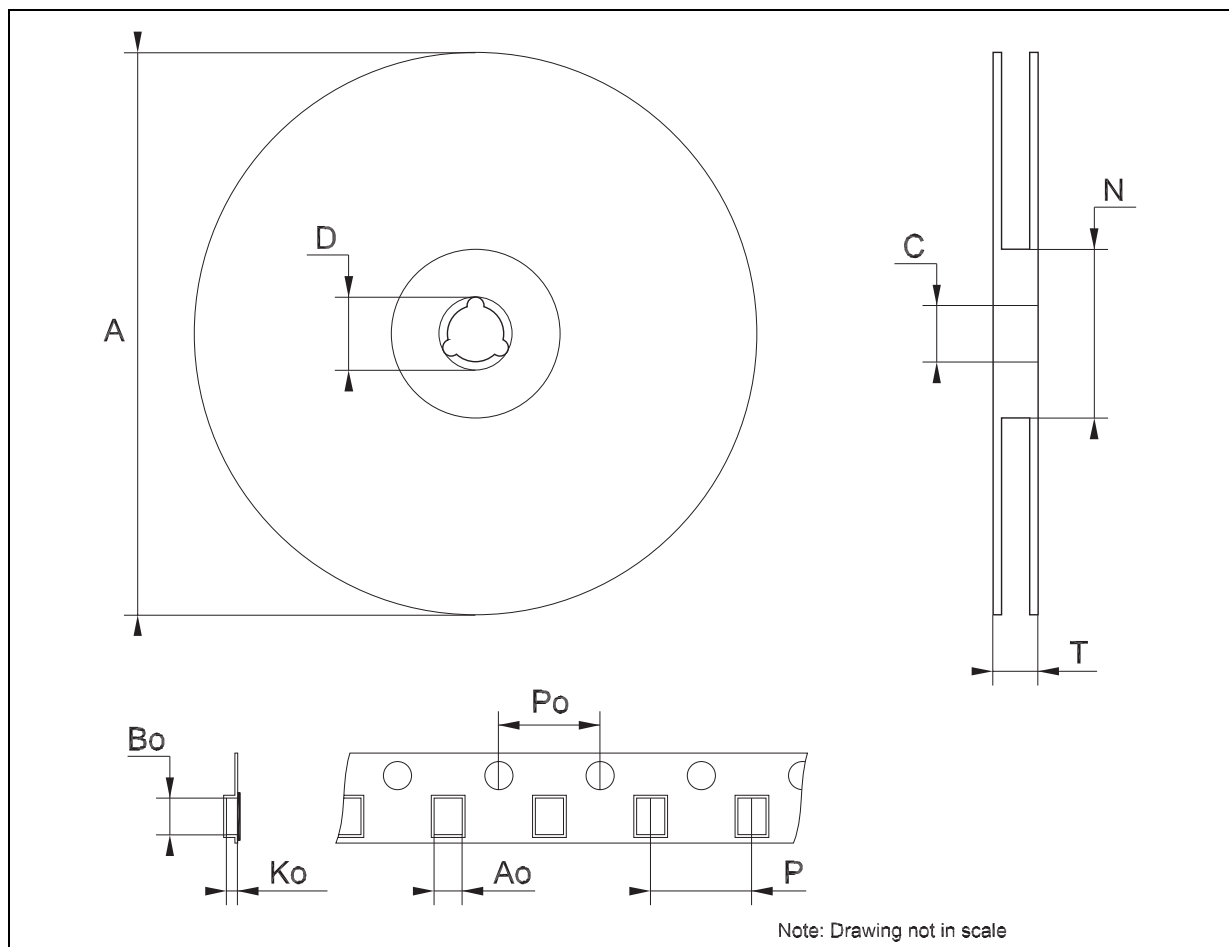
## SO-16 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.25	0.004		0.010
a2			1.64			0.063
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.)					



**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





**Table 8: Revision History**

Date	Revision	Description of Changes
16-Mar-2005	3	Add $V_{CC}$ on Table 6.

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