



4-BIT MAGNITUDE COMPARATOR

- QUIESCENT CURRENT SPECIFIED UP TO 20V
- STANDARD B-SERIES OUTPUT DRIVE
- EXPANSION TO 8-16...4 N BITS BY CASCADING UNIT
- MEDIUM SPEED OPERATION : COMPARES TWO 4-BIT WORDS IN 250ns (Typ.) at 10V
- 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"



ORDER CODES

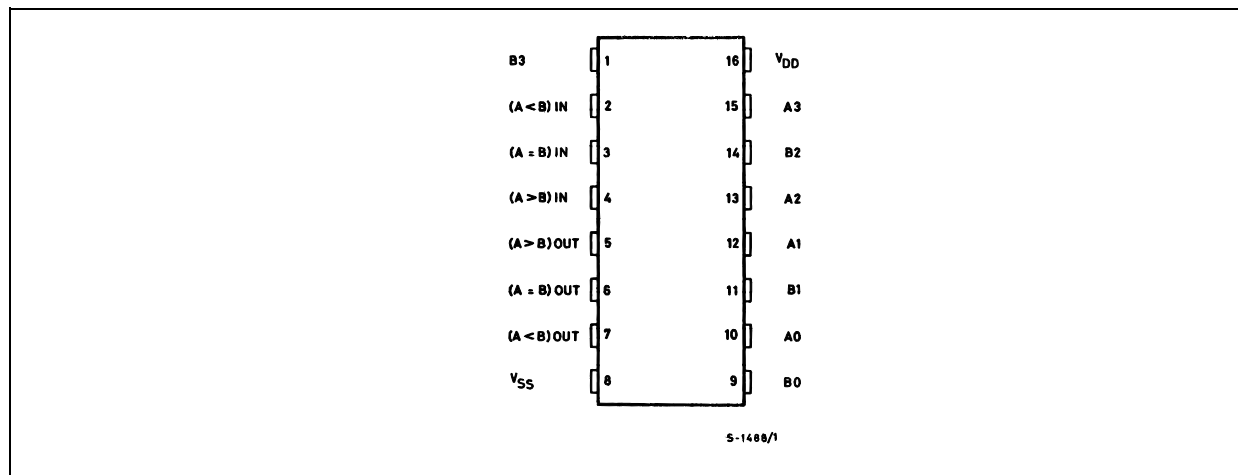
PACKAGE	TUBE	T & R
DIP	HCF4063BEY	
SOP	HCF4063BM1	HCF4063M013TR

DESCRIPTION

The HCF4063B is a monolithic integrated circuit fabricated in Metal Oxide Semiconductor technology available in DIP and SOP packages. The HCF4063B is a low power 4-bit magnitude comparator designed for use in computer and logic applications that require the comparison of two 4-bit words. This logic circuit determines whether one 4-bit word (Binary or BCD) is "less than", "equal to" or "greater than" a second 4 bit word. The HCF4063B has eight comparing inputs (A3, B3 through A0, B0), three outputs (A<B, A=B, A>B) and three cascading inputs (A<B, A=B, A>B)

that permit system s designers to expand the comparator function to 8, 12, 16...4N bits. When a single HCF4063B is used the cascading inputs are connected as follows :
 (A<B) = low, (A=B) = high, (A>B) = low.
 For words longer than 4 bits, HCF4063B device may be cascaded by connecting the outputs of the less-significant comparator to the corresponding cascading inputs of the more significant comparator. Cascading inputs (A<B, A=B, and A>B) on the least significant comparator are connected to a low, a high, and a low level, respectively.

PIN CONNECTION



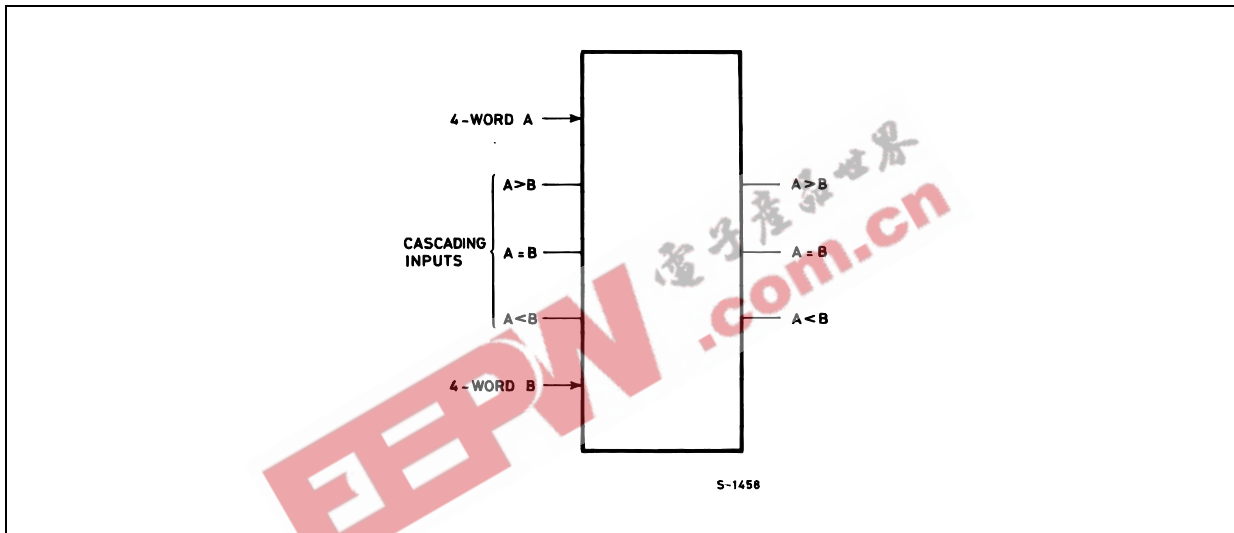
IINPUT EQUIVALENT CIRCUIT



PIN DESCRIPTION

PIN No	SYMBOL	NAME AND FUNCTION
10, 12, 13, 15	A0 to A3	Word A Inputs
9, 11, 14, 1	B0 to B3	Word B Inputs
5, 6, 7	A>B, A=B, A<B	Outputs
4, 3, 2	A>B, A=B, A<B	Cascading Inputs
8	V _{SS}	Negative Supply Voltage
16	V _{DD}	Positive Supply Voltage

FUNCTIONAL DIAGRAM

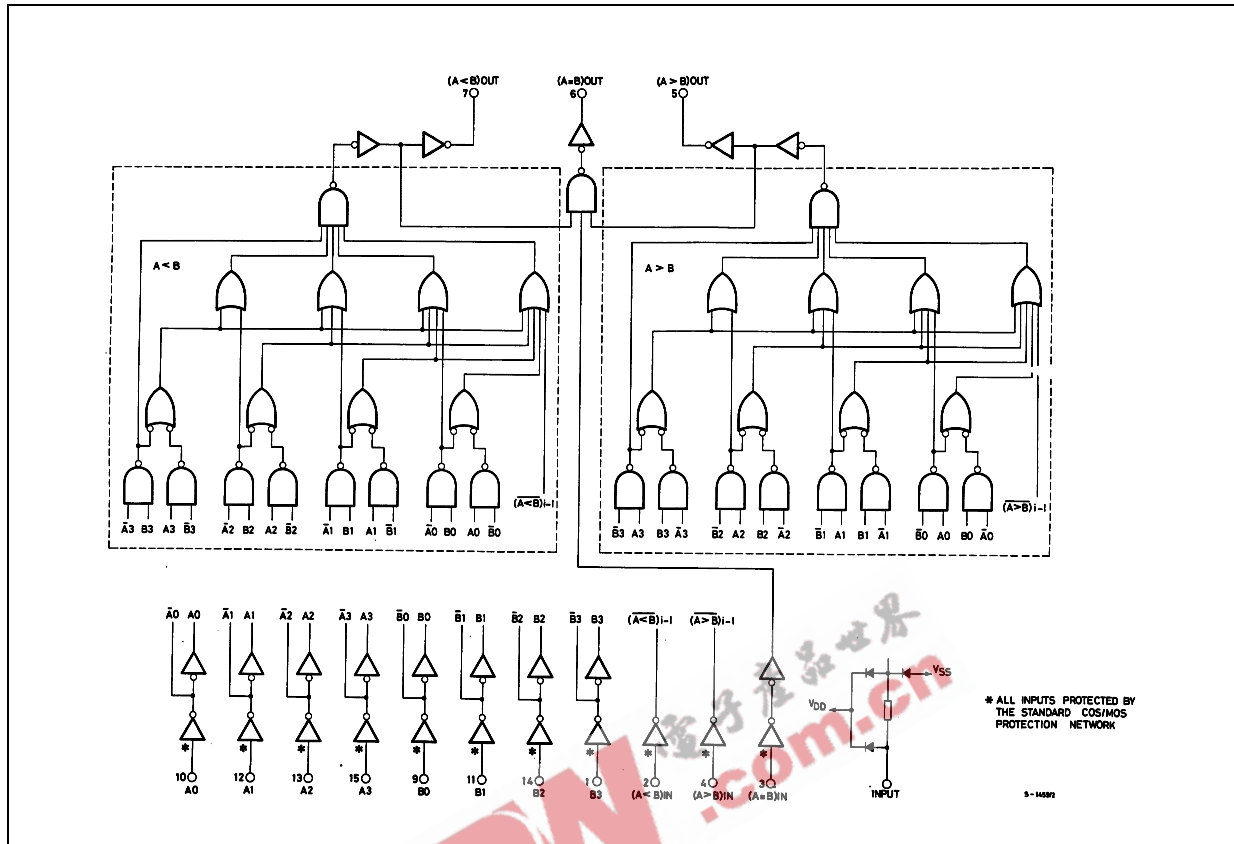


TRUTH TABLE

INPUTS							OUTPUTS		
COMPARING				CASCADING					
A3, B3	A2, B2	A1, B1	A0, B0	A<B	A=B	A>B	A<B	A=B	A>B
A3 > B3	X	X	X	X	X	X	L	L	H
A3 = B3	A2 > B2	X	X	X	X	X	L	L	H
A3 = B3	A2 = B2	A1 > B1	X	X	X	X	L	L	H
A3 = B3	A2 = B2	A1 = B1	A0 > B0	X	X	X	L	L	H
A3 = B3	A2 = B2	A1 = B1	A0 = B0	L	L	H	L	L	H
A3 = B3	A2 = B2	A1 = B1	A0 = B0	L	H	L	L	H	L
A3 = B3	A2 = B2	A1 = B1	A0 < B0	X	X	X	H	L	L
A3 = B3	A2 < B2	X	X	X	X	X	H	L	L
A3 < B3	X	X	X	X	X	X	H	L	L

X : Don't Care

LOGIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{DD}	Supply Voltage	-0.5 to +22	V
V_I	DC Input Voltage	-0.5 to $V_{DD} + 0.5$	V
I_I	DC Input Current	± 10	mA
P_D	Power Dissipation per Package	200	mW
	Power Dissipation per Output Transistor	100	mW
T_{op}	Operating Temperature	-55 to +125	$^{\circ}C$
T_{stg}	Storage Temperature	-65 to +150	$^{\circ}C$

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_{SS} pin voltage.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V_{DD}	Supply Voltage	3 to 20	V
V_I	Input Voltage	0 to V_{DD}	V
T_{op}	Operating Temperature	-55 to 125	$^{\circ}C$

DC SPECIFICATIONS

Symbol	Parameter	Test Condition				Value						Unit	
		V _I (V)	V _O (V)	I _{oI} (μA)	V _{DD} (V)	T _A = 25°C			-40 to 85°C		-55 to 125°C		
						Min.	Typ.	Max.	Min.	Max.	Min.		Max.
I _L	Quiescent Current	0/5			5		0.04	5		150		150	μA
		0/10			10		0.04	10		300		300	
		0/15			15		0.04	20		600		600	
		0/20			20		0.08	100		3000		3000	
V _{OH}	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 _{OL}	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 _{IH}	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 _{IL}	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 _{OH}	Output Drive Current	0/5	2.5	<1	5	-1.36	-3.2		-1.1		-1.1		mA
		0/5	4.6	<1	5	-0.44	-1		-0.36		-0.36		
		0/10	9.5	<1	10	-1.1	-2.6		-0.9		-0.9		
		0/15	13.5	<1	15	-3.0	-6.8		-2.4		-2.4		
I _{OL}	Output Sink Current	0/5	0.4	<1	5	0.44	1		0.36		0.36		mA
		0/10	0.5	<1	10	1.1	2.6		0.9		0.9		
		0/15	1.5	<1	15	3.0	6.8		2.4		2.4		
I _I	Input Leakage Current	0/18	Any Input		18		±10 ⁻⁵	±0.1		±1		±1	μA
C _I	Input Capacitance		Any Input				5	7.5					pF

The Noise Margin for both "1" and "0" level is: 1V min. with V_{DD}=5V, 2V min. with V_{DD}=10V, 2.5V min. with V_{DD}=15V

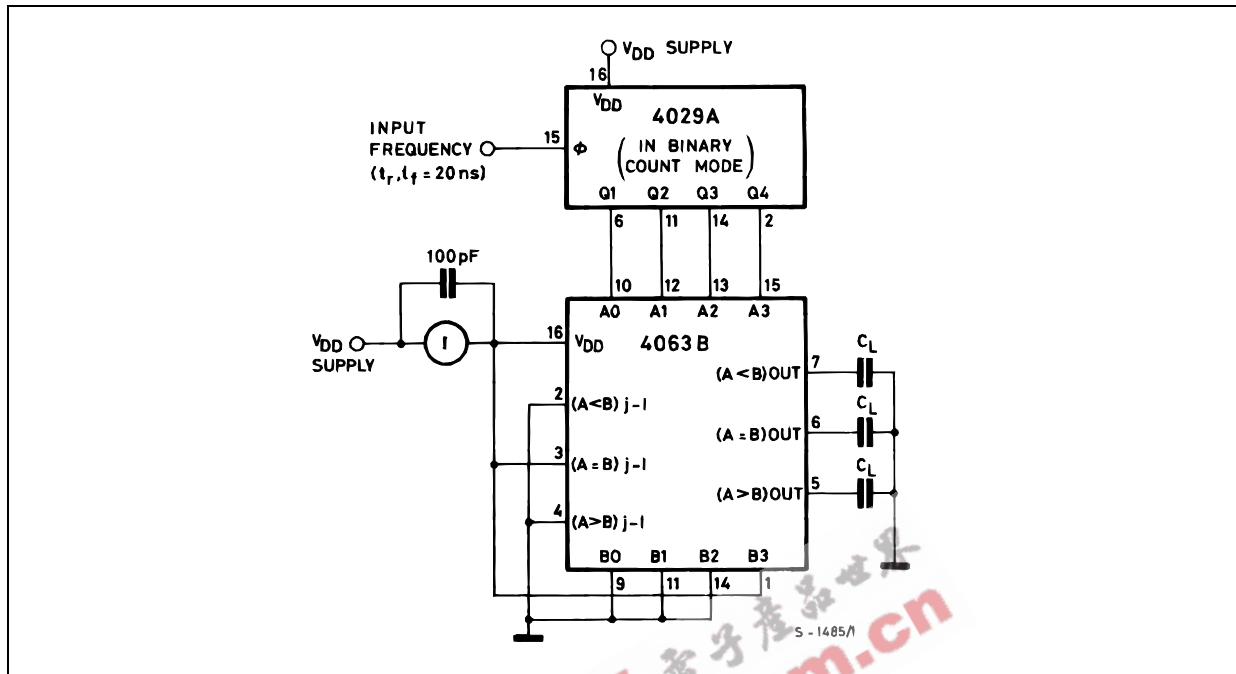
DYNAMIC ELECTRICAL CHARACTERISTICS (T_{amb} = 25°C, C_L = 50pF, R_L = 200KΩ, t_r = t_f = 20 ns)

Symbol	Parameter	Test Condition		Value (*)			Unit
		V _{DD} (V)		Min.	Typ.	Max.	
t _{PLH} t _{PHL}	Propagation Delay Time	5	Comparing Inputs to Outputs		625	1250	ns
		10			250	500	
		15			175	350	
t _{PLH} t _{PHL}	Propagation Delay Time	5	Cascading Inputs to Outputs		500	1000	ns
		10			200	400	
		15			140	280	
t _{THL} t _{TLH}	Transition Time	5			100	200	ns
		10			50	100	
		15			40	80	

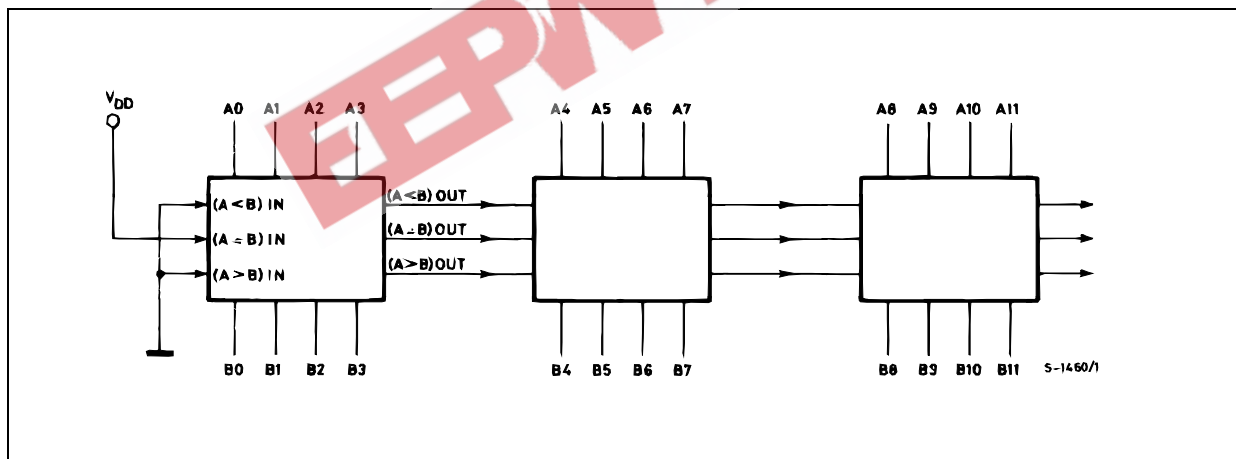
(*) Typical temperature coefficient for all V_{DD} value is 0.3 %/°C.

TYPICAL APPLICATIONS

DINAMIC POWER DISSIPATION



TYPICAL SPEED CHARACTERISTICS OF A 12-BIT COMPARATOR

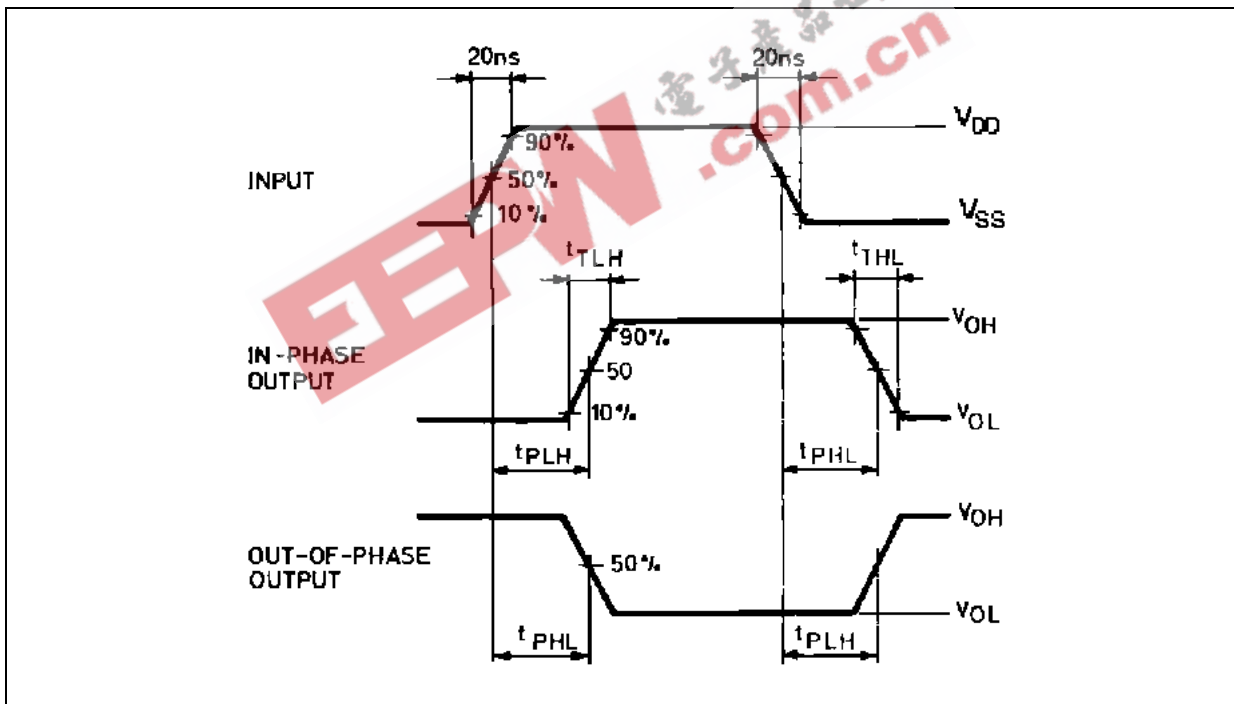


TEST CIRCUIT



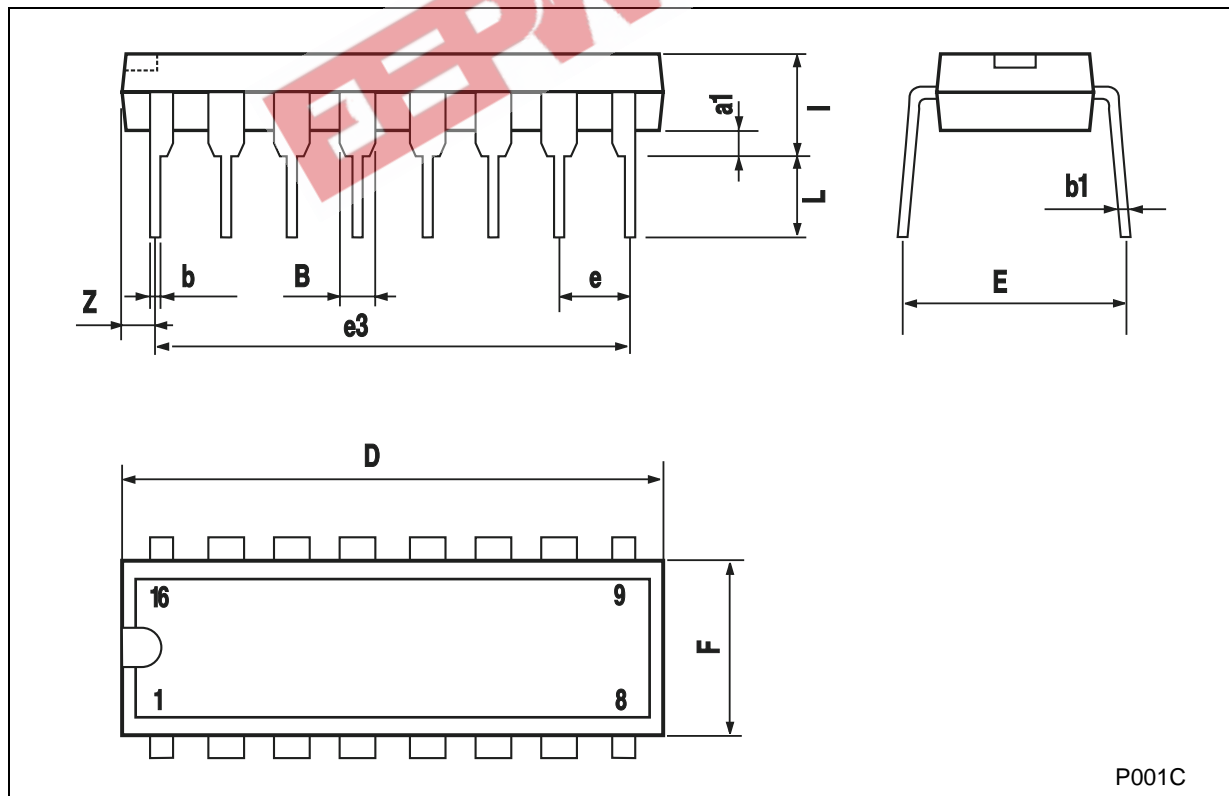
$C_L = 50\text{pF}$ or equivalent (includes jig and probe capacitance)
 $R_L = 200\text{K}\Omega$
 $R_T = Z_{OUT}$ of pulse generator (typically 50Ω)

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



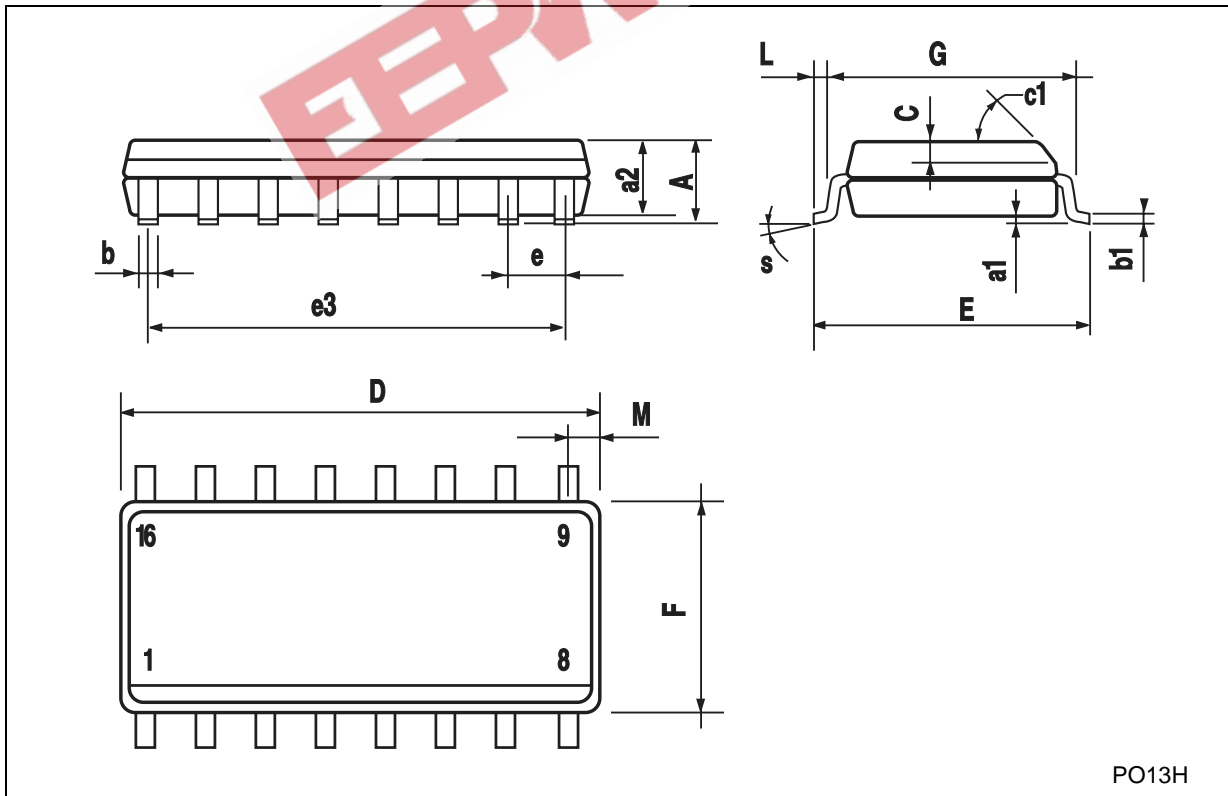
Plastic DIP-16 (0.25) MECHANICAL DATA

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
I			5.1			0.201
L		3.3			0.130	
Z			1.27			0.050



SO-16 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.2	0.003		0.007
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

EEPW 电子产品世界
.com.cn

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

© 2001 STMicroelectronics - Printed in Italy - All Rights Reserved
STMicroelectronics GROUP OF COMPANIES

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

© <http://www.st.com>

