



# HCF4041UB

## QUAD TRUE/COMPLEMENT BUFFER

- BALANCED SINK AND SOURCE CURRENT: APPROXIMATELY 4 TIMES STANDARD "B" DRIVE
- EQUALIZED DELAY TO TRUE AND COMPLEMENT OUTPUTS
- QUIESCENT CURRENT SPECIFIED UP TO 20V
- STANDARDIZED SYMMETRICAL OUTPUT CHARACTERISTICS
- 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 HCF4041UB is a monolithic integrated circuit fabricated in Metal Oxide Semiconductor technology available in DIP and SOP packages. The HCF4041UB is a QUAD TRUE/COMPLEMENT buffer consisting of n and p channel units having low channel resistance and

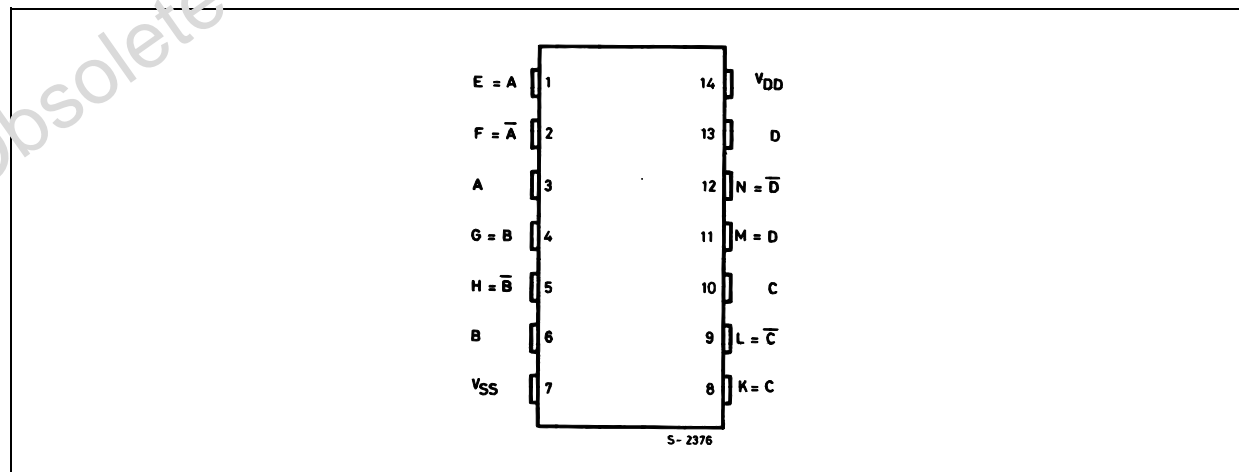


### ORDER CODES

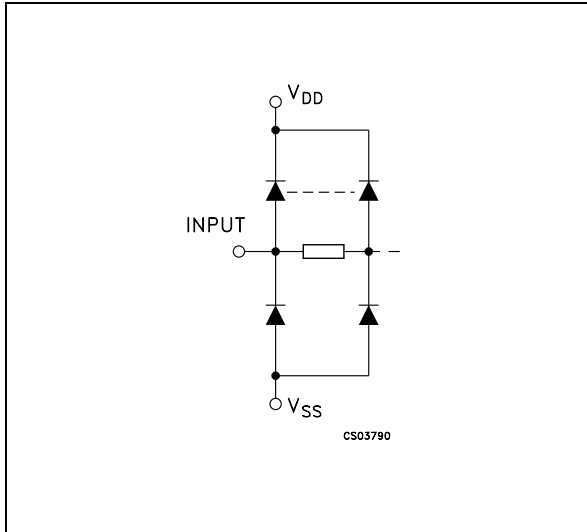
PACKAGE	TUBE	T & R
DIP	HCF4041UBEY	
SOP	HCF4041UBM1	HCF4041UM013TR

high current (sourcing and sinking) capability. This device is intended for use as a buffer, line driver, or CMOS to TTL driver. It can be used as an ultra-low power resistor network driver for A/D and D/A conversion, as a transmission line driver, and in other applications where high noise immunity and low power dissipation are primary design requirements.

### PIN CONNECTION



INPUT EQUIVALENT CIRCUIT



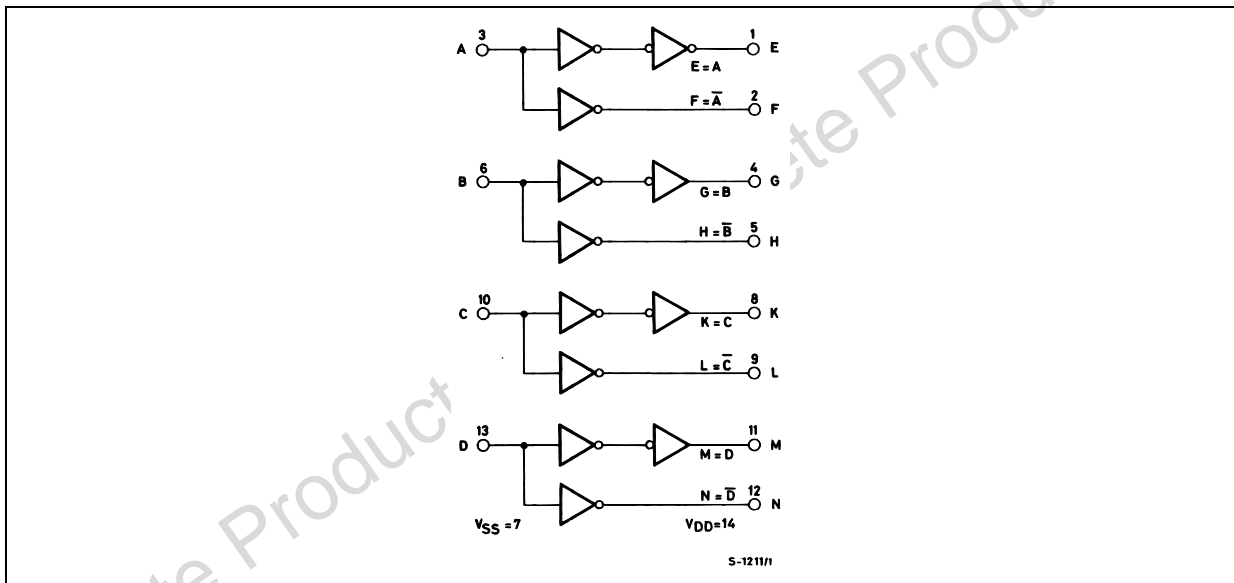
PIN DESCRIPTION

PIN No	SYMBOL	NAME AND FUNCTION
3, 6, 10, 13	A, B, C, D	Data Inputs
1, 4, 8, 11	E, G, K, M	Data Outputs (TRUE)
2, 5, 9, 12	F, H, L, N	Data Outputs (COMPLEMENT)
7	V <sub>SS</sub>	Negative Supply Voltage
14	V <sub>DD</sub>	Positive Supply Voltage

TRUTH TABLE

INPUTS	OUTPUTS (TRUE)	OUTPUTS (COMPLEMENT)
A, B, C, D	E, G, K, M	F, H, L, N
H	H	L
L	L	H

FUNCTIONAL DIAGRAM



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.

## 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	°C

## DC SPECIFICATIONS

Symbol	Parameter	Test Condition				Value						Unit	
		$V_I$ (V)	$V_O$ (V)	$ I_{OL} $ ( $\mu$ A)	$V_{DD}$ (V)	$T_A = 25^\circ\text{C}$			-40 to 85°C		-55 to 125°C		
						Min.	Typ.	Max.	Min.	Max.	Min.		Max.
$I_L$	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	
$V_{OH}$	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	4			4		4		V
			1/9	<1	10	8			8		8		
			1.5/13.5	<1	15	12.5			12.5		12.5		
$V_{IL}$	Low Level Input Voltage		4.5/0.5	<1	5			1		1		1	V
			9/1	<1	10			2		2		2	
			13.5/1.5	<1	15			2.5		2.5		2.5	
$I_{OH}$	Output Drive Current	0/5	2.5	<1	5	-5.44	-12.8		-4.08		-4.08		mA
		0/5	4.6	<1	5	-1.36	-3.2		-1.02		-1.02		
		0/10	9.5	<1	10	-4.25	-10		-3.18		-3.18		
		0/15	13.5	<1	15	-16.1	-38		-12.1		-12.1		
$I_{OL}$	Output Sink Current	0/5	0.4	<1	5	1.36	3.2		1.02		1.02		mA
		0/10	0.5	<1	10	4.25	10		3.18		3.18		
		0/15	1.5	<1	15	16.1	38		12.11		12.11		
$I_I$	Input Leakage Current	0/18	Any Input		18		$\pm 10^{-5}$	$\pm 0.1$		$\pm 1$		$\pm 1$	$\mu$ A
$C_I$	Input Capacitance		Any Input				15	22.5					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  $V_{DD}=15V$

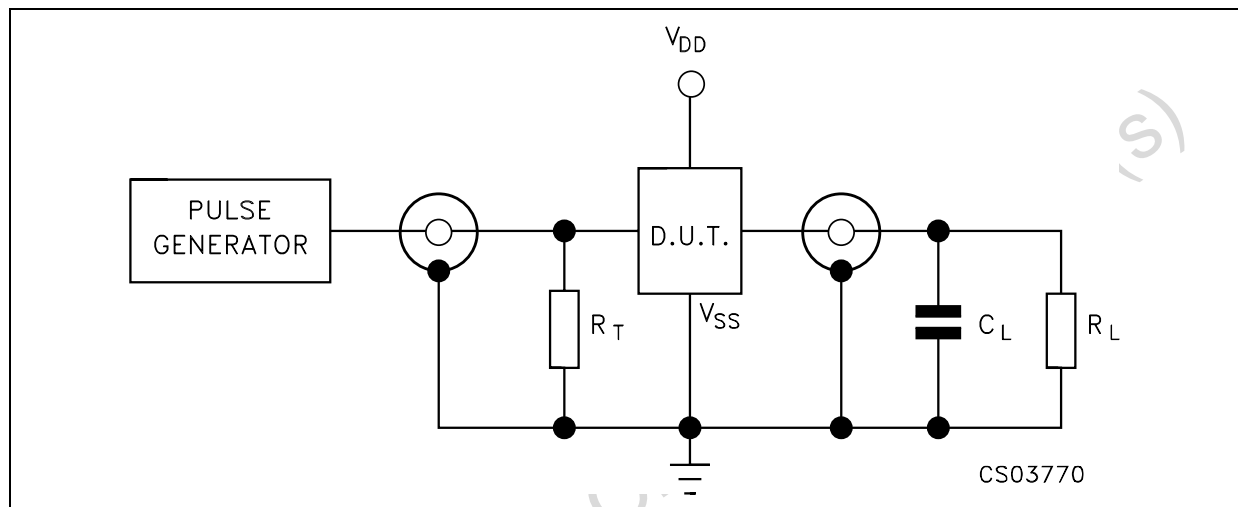
## HCF4041UB

**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)		Min.	Typ.	Max.	
$t_{PLH}$ $t_{PHL}$	Propagation Delay Time	5			60	120	ns
		10			35	70	
		15			25	50	
$t_{TLH}$ $t_{THL}$	Output Transition Time	5			40	80	ns
		10			20	40	
		15			15	30	

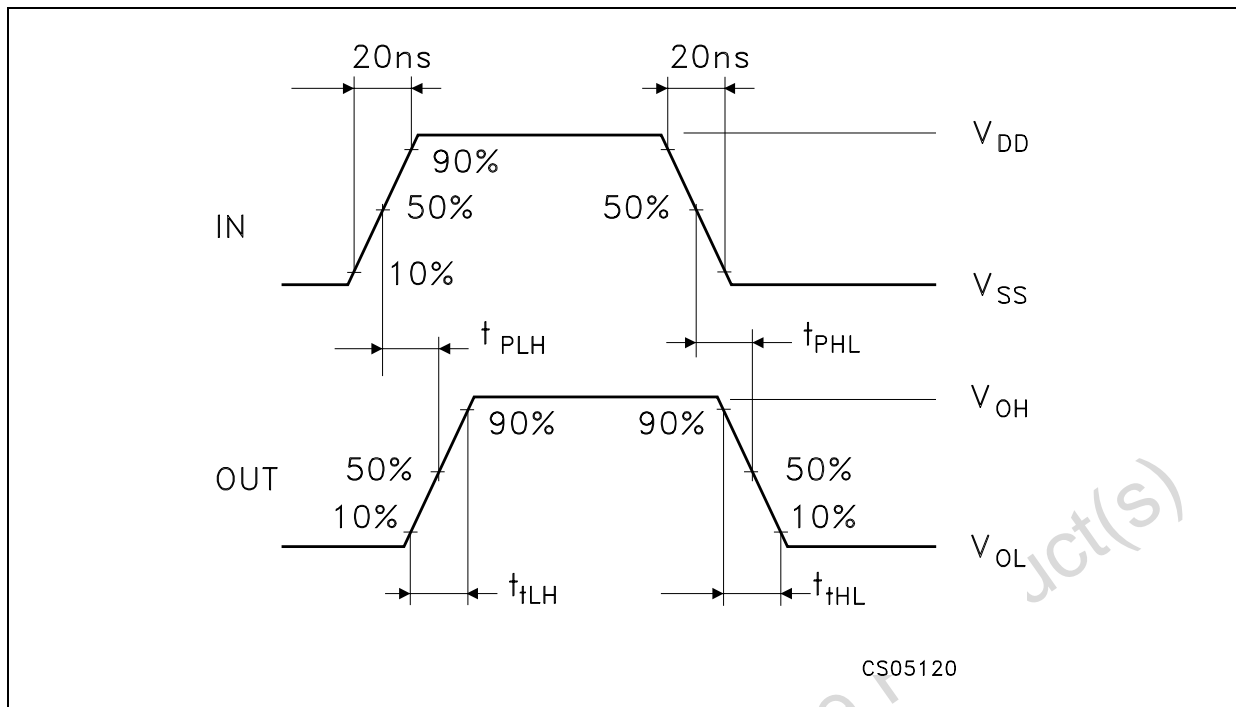
(\*) Typical temperature coefficient for all  $V_{DD}$  value is 0.3 %/°C.

### TEST CIRCUIT

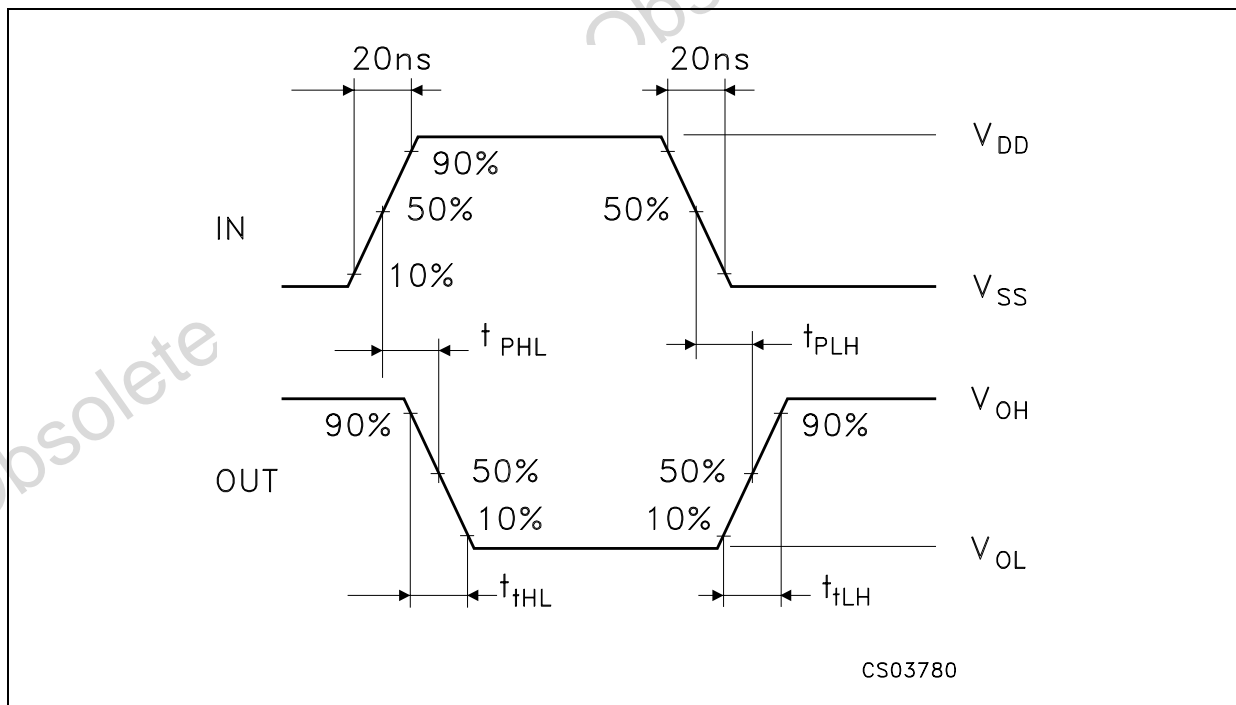


$C_L = 50\text{pF}$  or equivalent (includes jig and probe capacitance)  
 $R_L = 200\text{K}\Omega$   
 $R_T = Z_{OUT}$  of pulse generator (typically  $50\Omega$ )

**WAVEFORM 1 : PROPAGATION DELAY TIMES FOR NON INVERTING CONDITIONS (f=1MHz; 50% duty cycle)**

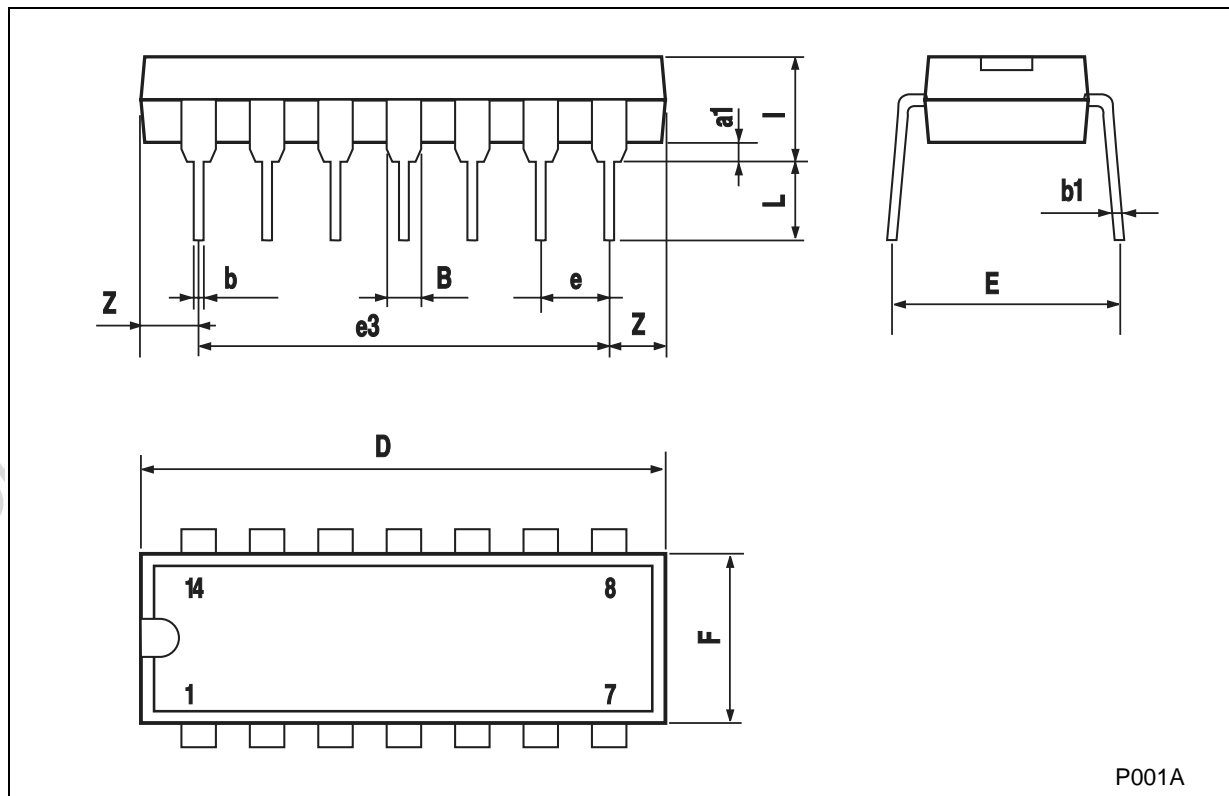


**WAVEFORM 2 : PROPAGATION DELAY TIMES FOR INVERTING CONDITIONS (f=1MHz; 50% duty cycle)**



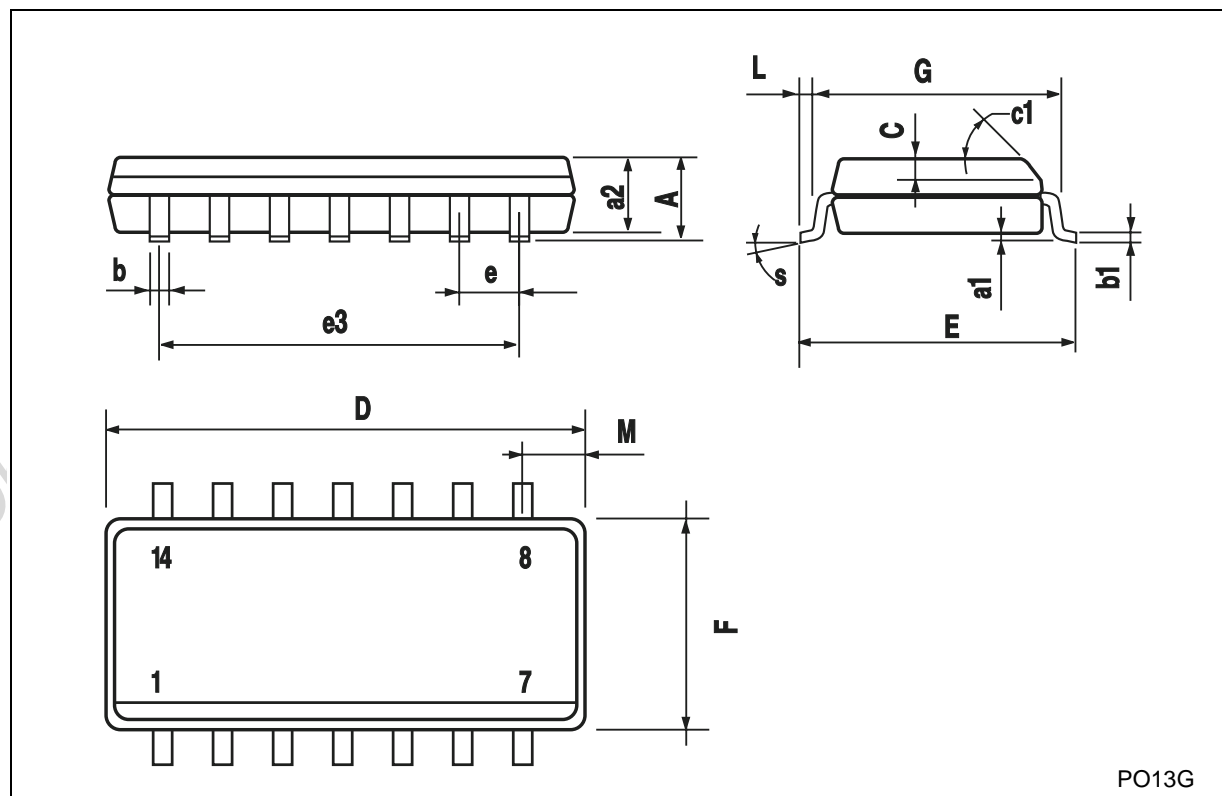
## Plastic DIP-14 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	1.39		1.65	0.055		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		15.24			0.600	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z	1.27		2.54	0.050		0.100



## SO-14 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	8.55		8.75	0.336		0.344
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		7.62			0.300	
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			0.68			0.026
S	8° (max.)					



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