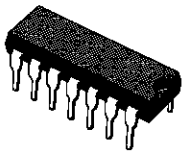
SGS-THOMSON MICROELECTRONICS

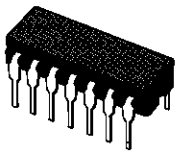
HCC/HCF4041UB

QUAD TRUE/COMPLEMENT BUFFER

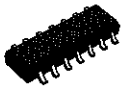
- BALANCED SINK AND SOURCE CURRENT ; APPROXIMATELY 4 TIMES STANDARD "B" DRIVE
- EQUALIZED DELAY TO TRUE AND COMPLEMENT OUTPUTS
- QUIESCENT CURRENT SPECIFIED TO 20V FOR HCC DEVICE
- 5V, 10V AND 15V PARAMETRIC RATINGS
- INPUT CURRENT OF 100nA AT 18V AND 25°C FOR HCC DEVICE
- 100 % TESTED FOR QUIESCENT CURRENT
- MEETS ALL REQUIREMENTS OF JEDEC TENTATIVE STANDARD N° 13A, "STANDARD SPECIFICATIONS FOR DESCRIPTION OF "B" SERIES CMOS DEVICES"



EY
(Plastic Package)



F
(Ceramic Frit Seal Package)



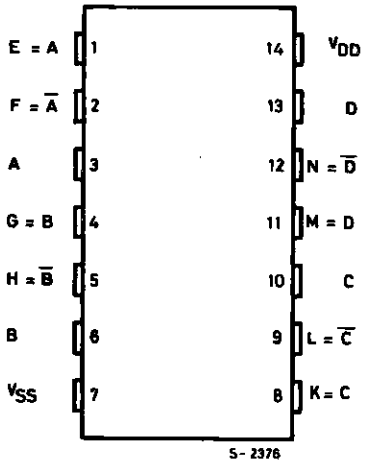
M1
(Micro Package)

C1
(Plastic Chip Carrier)

ORDER CODES :

HCC4041BF	HCF4041BM1
HCF4041BEY	HCF4041BC1

PIN CONNECTIONS

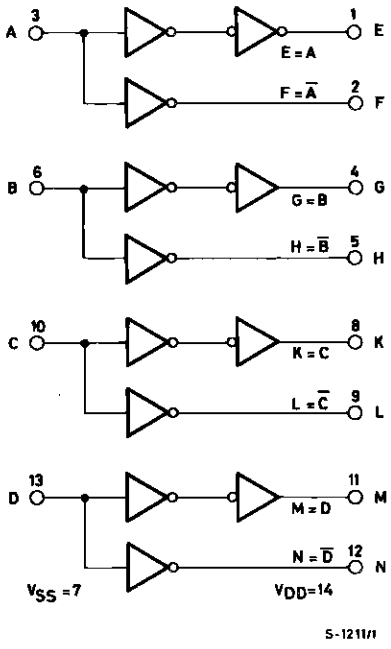


DESCRIPTION

The **HCC4041UB** (extended temperature range) and **HCF4041UB** (intermediate temperature range) are monolithic integrated circuits, available in 14-lead dual in-line plastic or ceramic package and plastic micro package.

The **HCC/HCF4041UB** types are quad true/complement buffers consisting of n- and p-channel units having low channel resistance and high current (sourcing and sinking) capability. The **HCC/HCF4041UB** is intended for use as a buffer, line driver, or COS/MOS-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.

FUNCTIONAL DIAGRAM



ABSOLUTE MAXIMUM RATINGS

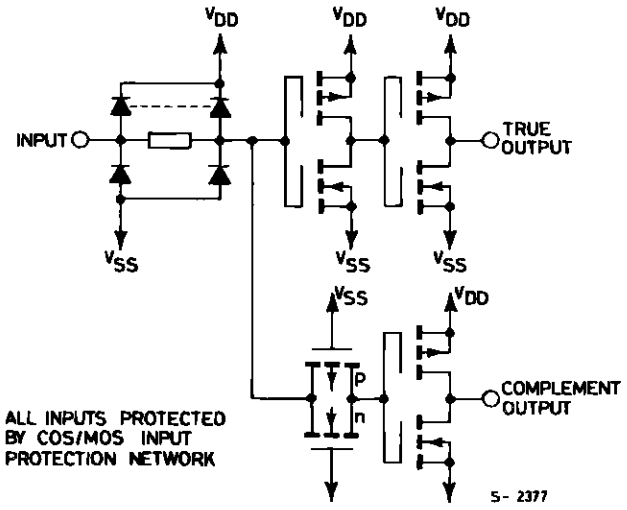
Symbol	Parameter	Value	Unit
V_{DD}*	Supply Voltage : **HCC** Types **HCF** Types	– 0.5 to + 20 – 0.5 to + 18	V V
V_i	Input Voltage	– 0.5 to V_{DD} + 0.5	V
I_I	DC Input Current (any one input)	± 10	mA
P_{tot}	Total Power Dissipation (per package) Dissipation per Output Transistor for T_{op} = Full Package-temperature Range	200 100	mW mW
T_{op}	Operating Temperature : **HCC** Types **HCF** Types	– 55 to + 125 – 40 to + 85	°C °C
T_{stg}	Storage Temperature	– 65 to + 150	°C

Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for external periods may affect device reliability.
* All voltage values are referred to V_{SS} pin voltage.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V_{DD}	Supply Voltage : **HCC** Types **HCF** Types	3 to + 18 3 to + 15	V V
V_I	Input Voltage	0 to V_{DD}	V
T_{op}	Operating Temperature : **HCC** Types **HCF** Types	– 55 to + 125 – 40 to + 85	°C °C

SCHEMATIC DIAGRAM



STATIC ELECTRICAL CHARACTERISTICS (over recommended operating conditions)

Symbol	Parameter		Test Conditions				Value							Unit
			V_I (V)	V_O (V)	$\|I_O\|$ (μA)	V_{DD} (V)	T_{Low}*		25°C			T_{High}*		
							Min.	Max.	Min.	Typ.	Max.	Min.	Max.	
I_L	Quiescent Current	HCC Types	0/ 5			5		1		0.02	1		30	μA
			0/10			10		2		0.02	2		60	
			0/15			15		4		0.02	4		120	
			0/20			20		20		0.04	20		600	
		HCF Types	0/ 5			5		4		0.02	4		30	
			0/10			10		8		0.02	8		60	
			0/15			15		16		0.02	16		120	
V_{OH}	Output High 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}	Output Low 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}	Input High 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		

* T_{Low} = – 55°C for **HCC** device : – 40°C for **HCF** device.
* T_{High} = + 125°C for **HCC** device : + 85°C for **HCF** device.
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.

STATIC ELECTRICAL CHARACTERISTICS (continued)

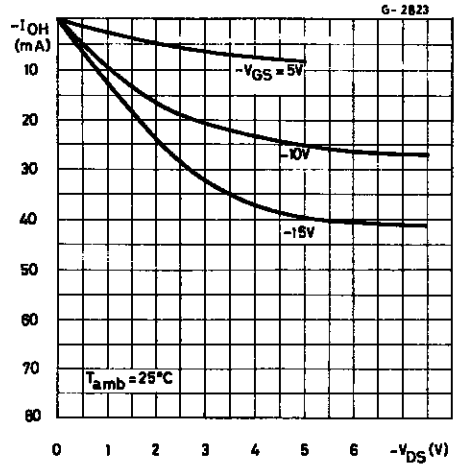
Symbol	Parameter		Test Conditions				Value							Unit
			V_I (V)	V_O (V)	$\|I_O\|$ (μA)	V_{DD} (V)	T_{Low}*		25°C			T_{High}*		
							Min.	Max.	Min.	Typ.	Max.	Min.	Max.	
V_{IL}	Input Low Voltage			4.5/0.5	< 1	5		1			1		1	V
				9/1	< 1	10		2			2		2	
				13.5/1.5	< 1	15		2.5			2.5		2.5	
I_{OH}	Output Drive Current	HCC Types	0/ 5	2.5		5	– 8.4		– 6.4	– 12.8		– 4.6		mA
			0/ 5	4.6		5	– 2.1		– 1.6	– 3.2		– 1.2		
			0/10	9.5		10	– 6.25		– 5	– 10		– 3.5		
			0/15	13.5		15	– 24		– 19	– 38		– 13		
		HCF Types	0/ 5	2.5		5	– 6.8		– 5.44	– 12.8		– 4.08		
			0/ 5	4.6		5	– 1.7		– 1.36	– 3.2		– 1.02		
			0/10	9.5		10	– 5.31		– 4.25	– 10		– 3.18		
			0/15	13.5		15	–20.18		–16.15	– 38		–12.11		
I_{OL}	Output Sink Current	HCC Types	0/ 5	0.4		5	2.1		1.6	3.2		1.2		
			0/10	0.5		10	6.25		5	10		3.5		
			0/15	1.5		15	24		19	38		13		
		HCF Types	0/ 5	0.4		5	1.7		1.36	3.2		1.02		
			0/10	0.5		10	5.31		4.25	10		3.18		
			0/15	1.5		15	20.18		16.15	38		12.11		
I_{IH}, I_{IL}	Input leakage Current	HCC Types	0/18	Any Input		18		± 0.1		$\pm 10^{-5}$	± 0.1		± 1	μA
		HCF Types	0/15			15		± 0.3		$\pm 10^{-5}$	± 0.3		± 1	
C_I	Input Capacitance			Any Input						15	22.5			pF

* T_{Low} = – 55°C for **HCC** device : – 40°C for **HCF** device.
* T_{High} = + 125°C for **HCC** device : + 85°C for **HCF** device.
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.

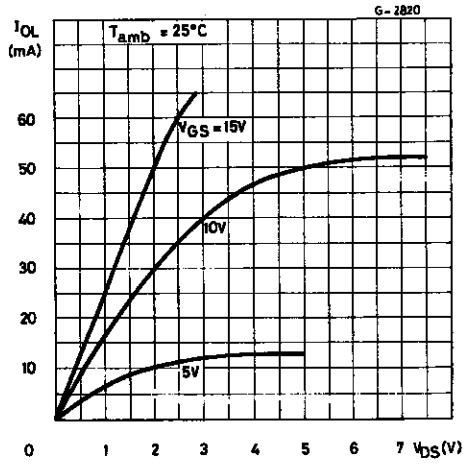
DYNAMIC ELECTRICAL CHARACTERISTICS (T_{amb} = 25°C, C_L = 50pF, R_L = 200kΩ, typical temperature coefficient for all V_{DD} values is 0.3 %/°C, all input rise and fall times = 20ns)

Symbol	Parameter	Test Conditions	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_{THL}, t_{TLH}	Transition Time		5		40	80	ns
			10		20	40	
			15		15	30	

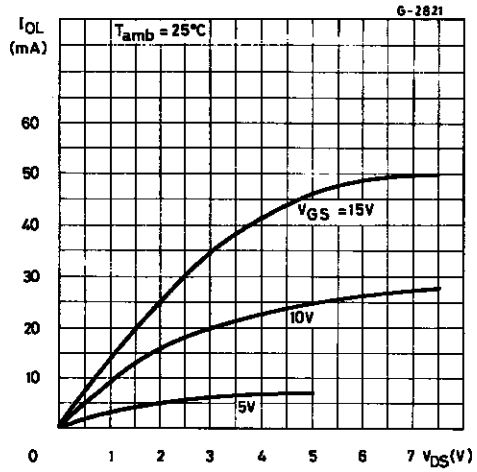
Minimum Output High (source) Current Characteristics.



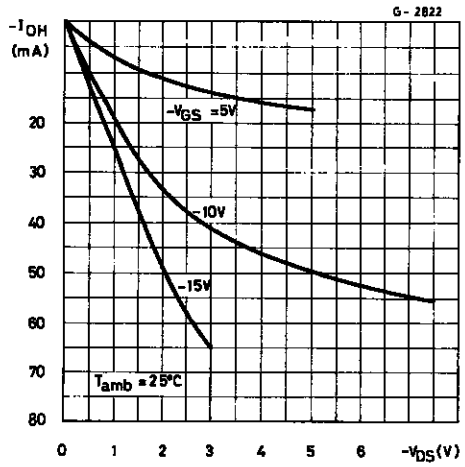
Typical Output Low (sink) Current.



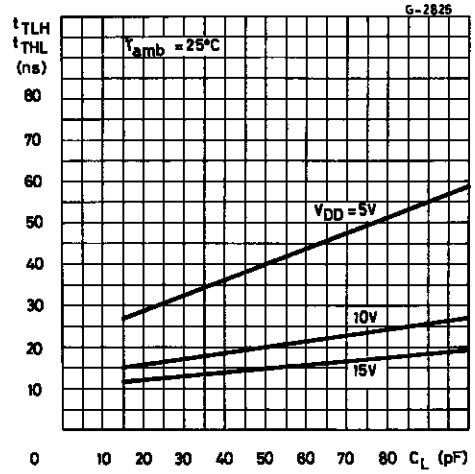
Minimum Output Low (sink) Current Characteristics.



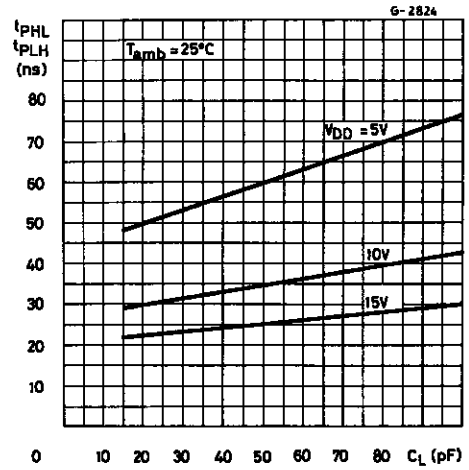
Typical Output High (source) Current Characteristics.



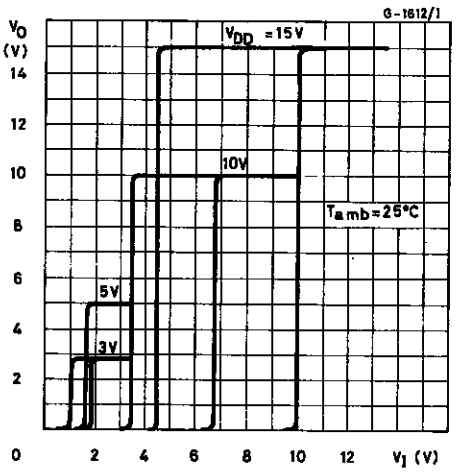
Typical Transition Time vs. Load Capacitance.

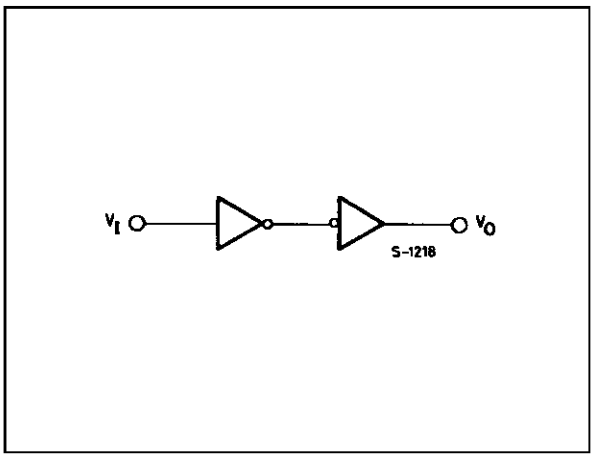


Typical Propagation Delay Time vs. Load Capacitance.

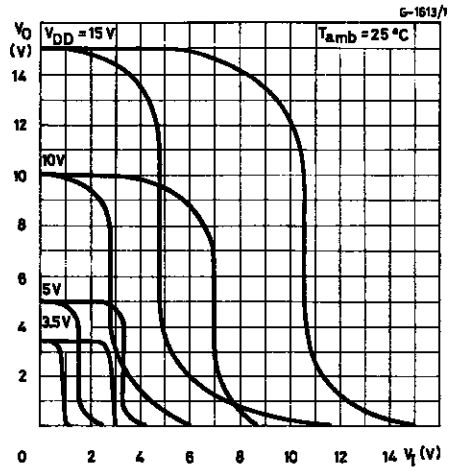


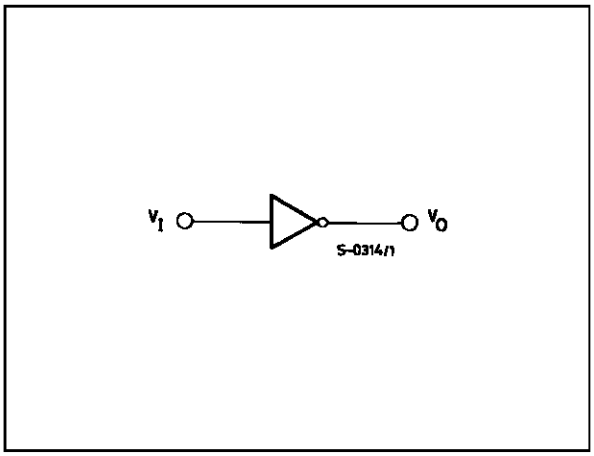
Minimum and Maximum Transfer Characteristics-true Output-and Test Circuit.



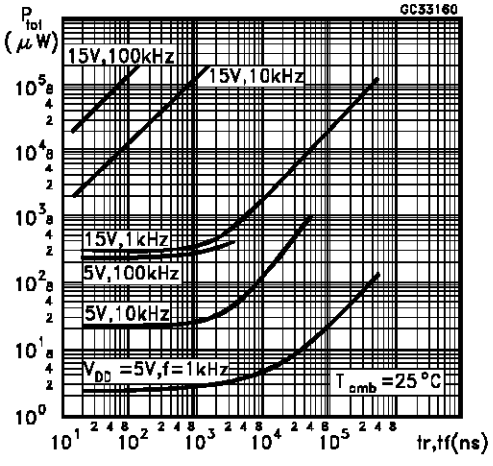


Minimum Maximum Transfer Characteristics Complement Output-and Test Circuit.

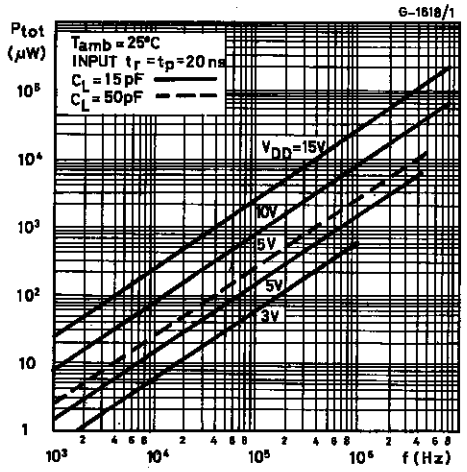




Typical Power Dissipation vs. Input Rise and Fall Time per Output Pair.

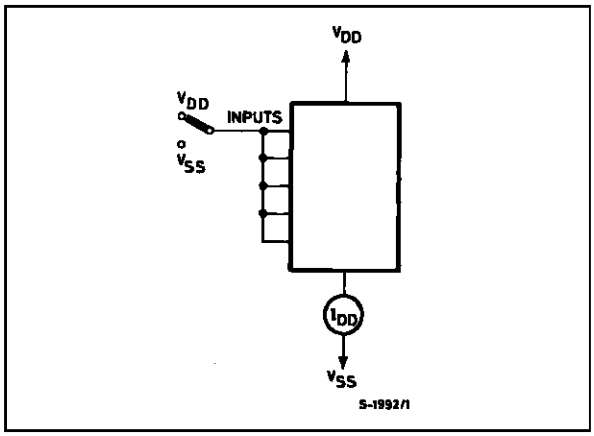


Typical Power Dissipation vs. Frequency per Output Pair.

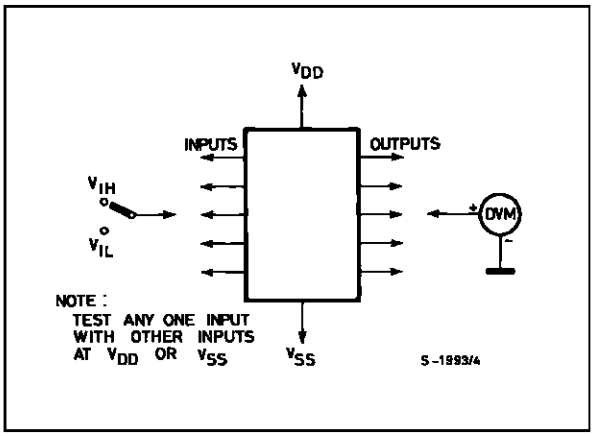


TEST CIRCUITS

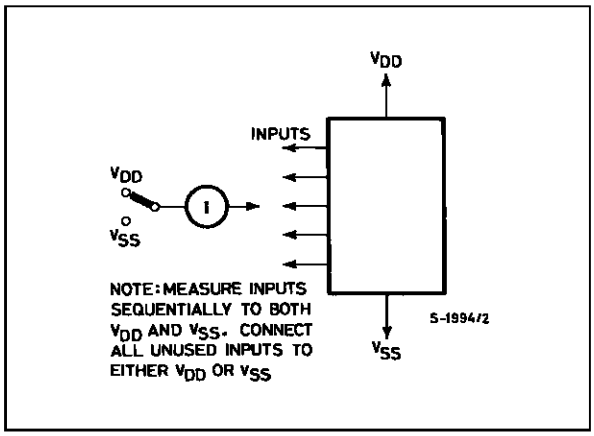
Quiescent Device Current.



Noise Immunity.

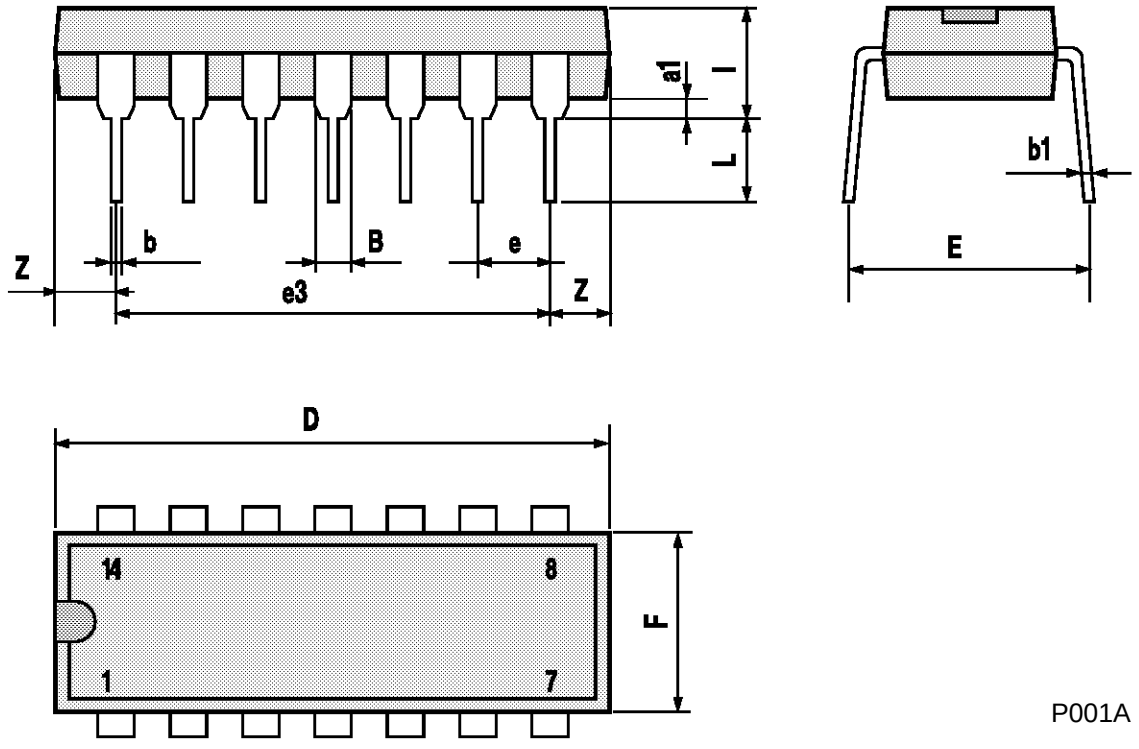


Input Leakage Current.



Plastic DIP14 MECHANICAL DATA

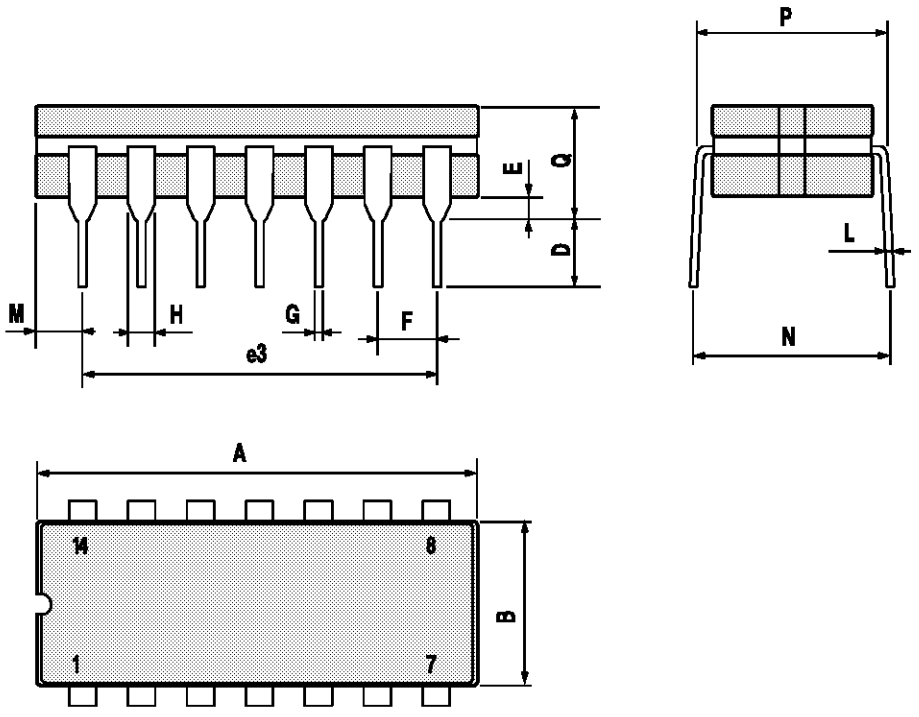
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	1.39		1.65	0.055		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
e		2.54			0.100	
e3		15.24			0.600	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z	1.27		2.54	0.050		0.100



P001A

Ceramic DIP14/1 MECHANICAL DATA

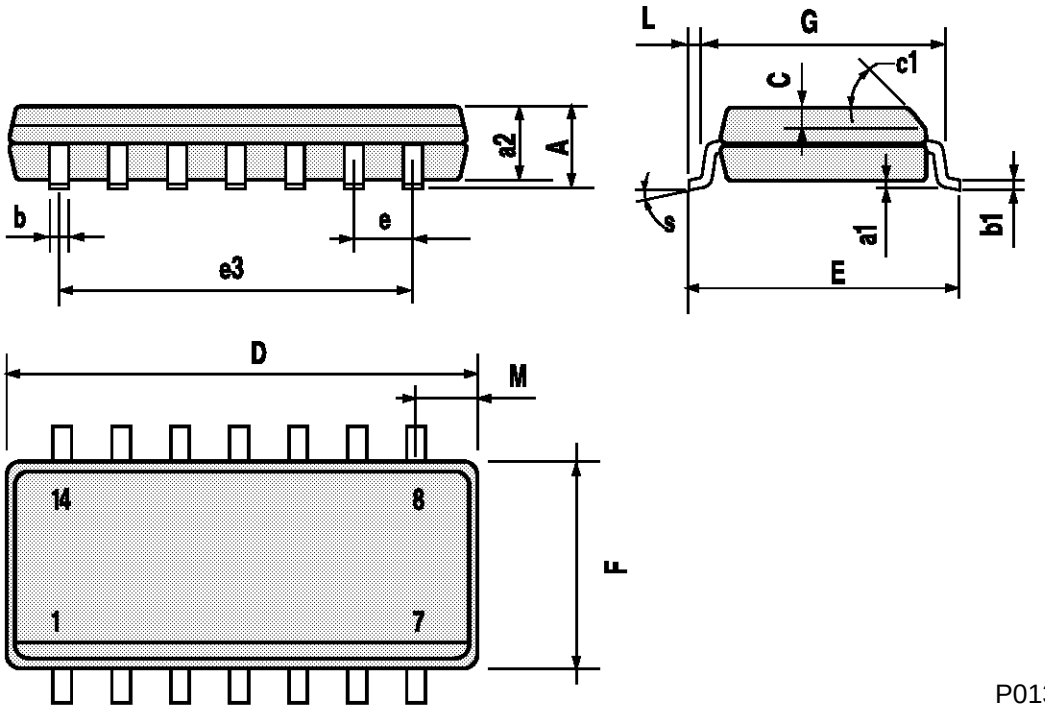
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			20			0.787
B			7.0			0.276
D		3.3			0.130	
E	0.38			0.015		
e3		15.24			0.600	
F	2.29		2.79	0.090		0.110
G	0.4		0.55	0.016		0.022
H	1.17		1.52	0.046		0.060
L	0.22		0.31	0.009		0.012
M	1.52		2.54	0.060		0.100
N			10.3			0.406
P	7.8		8.05	0.307		0.317
Q			5.08			0.200



P053C

SO14 MECHANICAL DATA

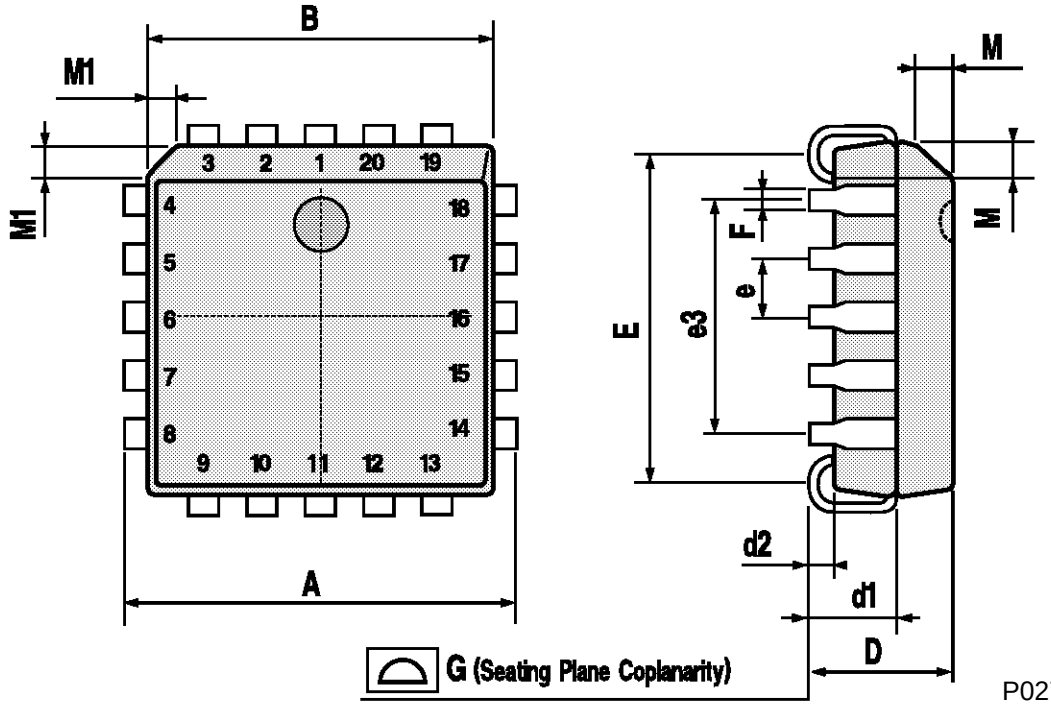
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.2	0.003		0.007
a2			1.65			0.064
b	0.35		0.46	0.013		0.018
b1	0.19		0.25	0.007		0.010
C		0.5			0.019	
c1	45° (typ.)					
D	8.55		8.75	0.336		0.344
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		7.62			0.300	
F	3.8		4.0	0.149		0.157
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.)					



P013G

PLCC20 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	9.78		10.03	0.385		0.395
B	8.89		9.04	0.350		0.356
D	4.2		4.57	0.165		0.180
d1		2.54			0.100	
d2		0.56			0.022	
E	7.37		8.38	0.290		0.330
e		1.27			0.050	
e3		5.08			0.200	
F		0.38			0.015	
G			0.101			0.004
M		1.27			0.050	
M1		1.14			0.045	



P027A