COS/MOS INTEGRATED CIRCUIT

4041 UB

HCC/HCF 4041 UB

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 100 nA AT 18V AND 25°C FOR HCC DEVICE
- 100% TESTED FOR QUIESCENT CURRENT
- MEETS ALL REQUIREMENTS OF JEDEC TENTATIVE STANDARD NO. 13A, "STANDARD SPECIFICATIONS FOR DESCRIPTION OF "B" SERIES CMOS DEVICES"

The **HCC 4041 UB** (extended temperature range) and **HCF 4041 UB** (intermediate temperature range) are monolithic integrated circuits, available in 14-lead dual in-line plastic or ceramic package, ceramic flat package and plastic micropackage.

The **HCC/HCF 4041 UB** 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/HCF 4041 UB** 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.

ABSOLUTE MAXIMUM RATINGS

V_{DD}*	Supply voltage: **HCC** types	-0.5 to 20	V
	HCF types	-0.5 to 18	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)	200	mW
	Dissipation per output transistor for T_{op} = full package-temperature range	100	mW
T_{op}	Operating temperature: **HCC** types	-55 to 125	°C
	HCF types	-40 to 85	°C
T_{stg}	Storage temperature	-65 to 150	°C

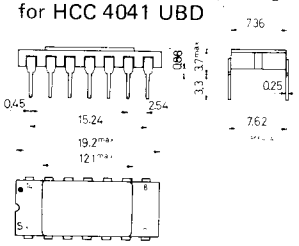
* All voltage values are referred to V_{SS} pin voltage

ORDERING NUMBERS:

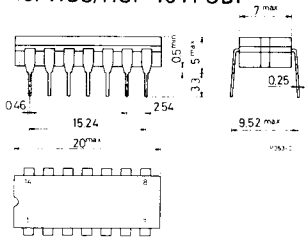
HCC 4041 UBD for dual in-line ceramic package
HCC 4041 UBF for dual in-line ceramic package, frit seal
HCC 4041 UBK for ceramic flat package
HCF 4041 UBE for dual in-line plastic package
HCF 4041 UBF for dual in-line ceramic package, frit-seal
HCF 4041 UBM for plastic micropackage

MECHANICAL DATA (dimensions in mm)

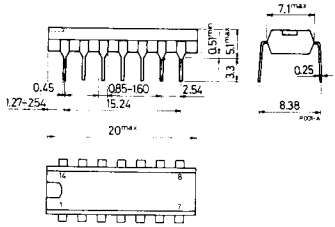
Dual in-line ceramic package for HCC 4041 UBD



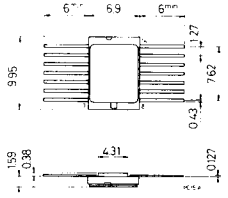
Dual in-line ceramic package for HCC/HCF 4041 UBF



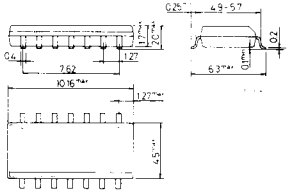
Dual in-line plastic package for HCF 4041 UBE



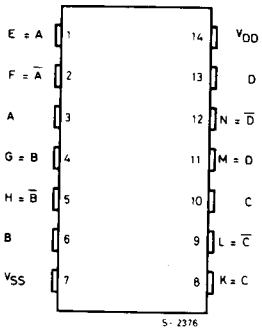
Ceramic flat package for HCC 4041 UBK



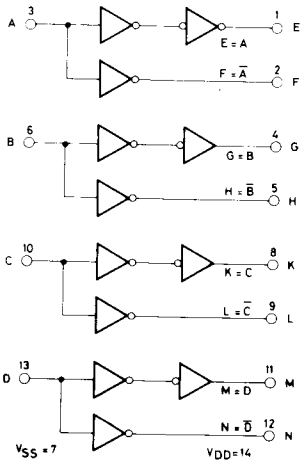
Plastic micropackage for HCF 4041 UBM



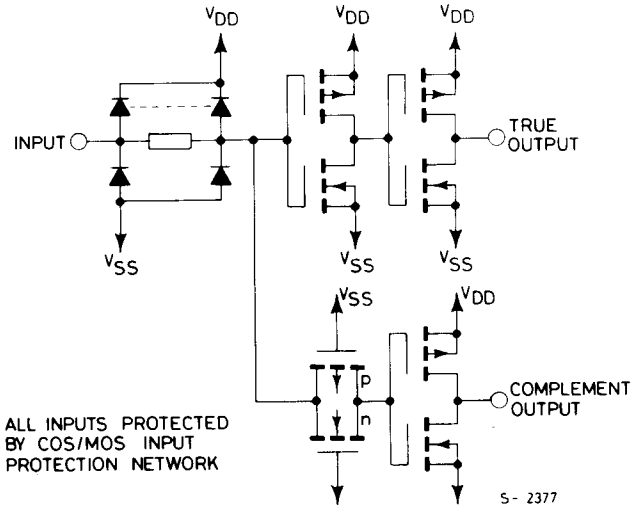
CONNECTION DIAGRAM



FUNCTIONAL DIAGRAM

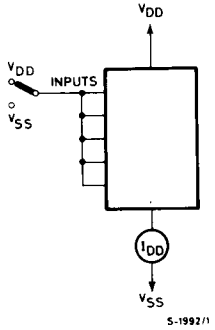


SCHEMATIC DIAGRAM

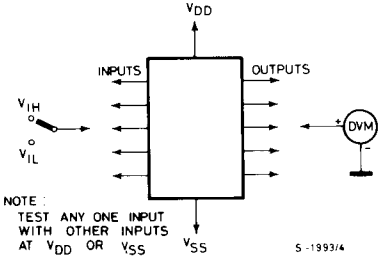


TEST CIRCUITS

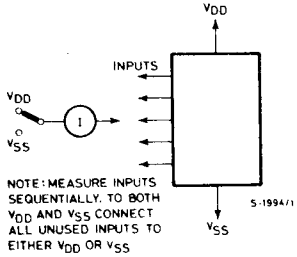
Quiescent device current



Noise immunity



Input leakage current



RECOMMENDED OPERATING CONDITIONS

V_{DD}	Supply voltage: **HCC** types	3 to 18	V
	HCF types	3 to 15	V
V_I	Input voltage	0 to V_{DD}	V
T_{op}	Operating temperature: **HCC** types	-55 to 125	°C
	HCF types	-40 to 85	°C

STATIC ELECTRICAL CHARACTERISTICS (over recommended operating conditions)

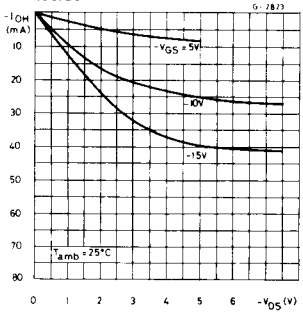
Parameter			Test conditions				Values							Unit
			V_I (V)	V_O (V)	$\|I_O\|$ (μA)	V_{DD} (V)	T_{Low}*		25°C			T_{High}*		
							Min.	Max.	Min.	Typ.	Max.	Min.	Max.	
I_L	Quiescent current	HCC types	0/ 5			5		1		0.02	1		30	μA
			0/10			10		2		0.02	2		60	
			0/15			15		4		0.02	4		120	
			0/20			20		20		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		
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	
CI	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

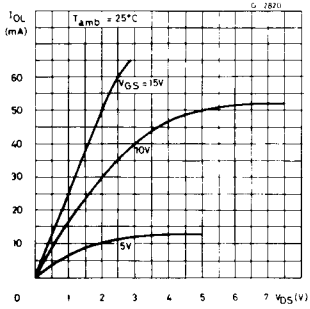
DYNAMIC ELECTRICAL CHARACTERISTICS (T_{amb}= 25°C, C_L= 50 pF, R_L= 200 kΩ, typical temperature coefficient for all V_{DD} values is 0.3%/°C, all input rise and fall times = 20 ns)

Parameter	Test conditions	Values			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	

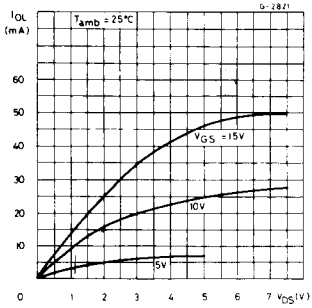
Minimum output high (source) current characteristics



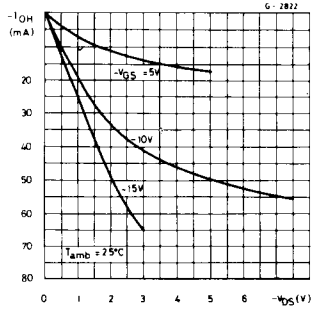
Typical output low (sink) current



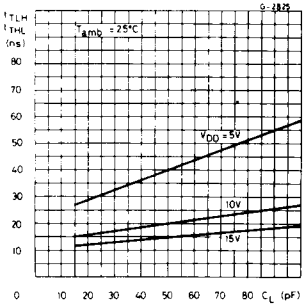
Minimum output low (sink) current characteristics



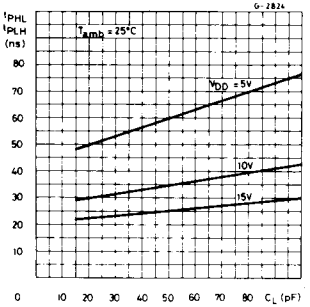
Typical output high (source) current characteristics



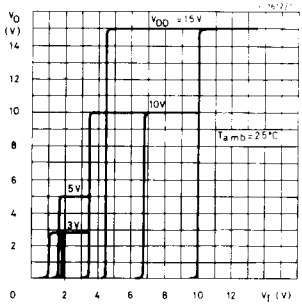
Typical transition time vs. load capacitance

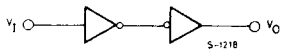


Typical propagation delay time vs. load capacitance

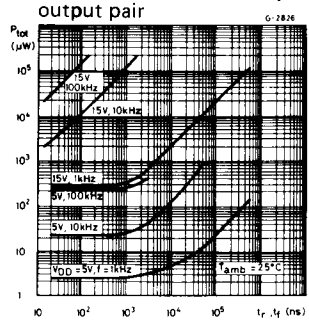


Minimum and maximum transfer characteristics-true output-and test circuit

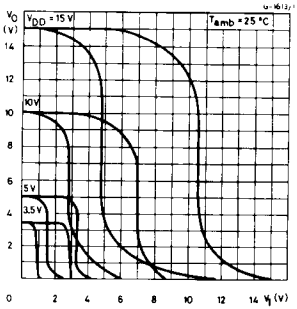


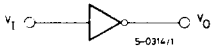


Typical power dissipation vs. input rise and fall time per output pair



Minimum maximum transfer characteristics complement output-and test circuit





Typical power dissipation vs. frequency per output pair