

COS/MOS INTEGRATED CIRCUIT

4086B



EXPANDABLE 4-WIDE 2-INPUT AND-OR-INVERT GATE

- MEDIUM-SPEED OPERATION-- $t_{PHL} = 90$ ns; $t_{PLH} = 140$ ns (TYP.) AT 10V
- INHIBIT AND ENABLE INPUTS
- BUFFERED OUTPUTS
- QUIESCENT CURRENT SPECIFIED TO 20V FOR HCC DEVICE
- STANDARDIZED SYMMETRICAL OUTPUT CHARACTERISTICS
- 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 4086B** (extended temperature range) and **HCF 4086B** (intermediate temperature range) are monolithic integrated circuit, available in 14-lead dual in-line plastic or ceramic package, ceramic flat package and plastic micropackage.

The **HCC/HCF 4086B** contains one 4-wide 2-input AND-OR-INVERT gate with an INHIBIT/ $\overline{\text{EXP}}$ input and an ENABLE/EXP input. For a 4-wide A-O-I function INHIBIT/ $\overline{\text{EXP}}$ is tied to V_{SS} and ENABLE/EXP to V_{DD} . See application and its associated explanation for applications where a capability greater than 4-wide is required.

ABSOLUTE MAXIMUM RATINGS

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)	200	mW
	Dissipation per output transistor for $T_{op} =$ full package-temperature range	100	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

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

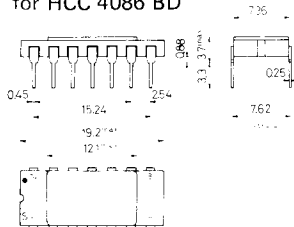
ORDERING NUMBERS:

HCC 4086 BD for dual in-line ceramic package
HCC 4086 BF for dual in-line ceramic package, frit seal
HCC 4086 BK for ceramic flat package
HCF 4086 BE for dual in-line plastic package
HCF 4086 BF for dual in-line ceramic package, frit seal
HCF 4086 BM for plastic micropackage

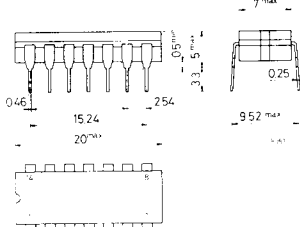
HCC/HCF 4086 B

MECHANICAL DATA (dimensions in mm)

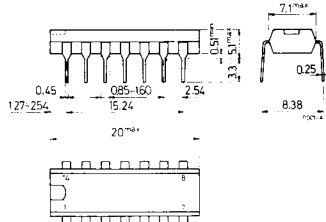
Dual in-line ceramic package
for HCC 4086 BD



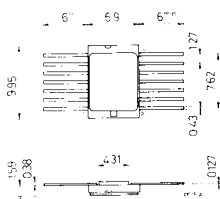
Dual in-line ceramic package
for HCC/HCF 4086 BF



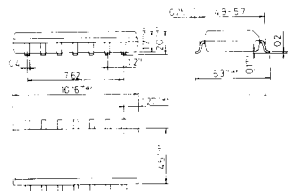
Dual in-line plastic package
for HCF 4086 BE



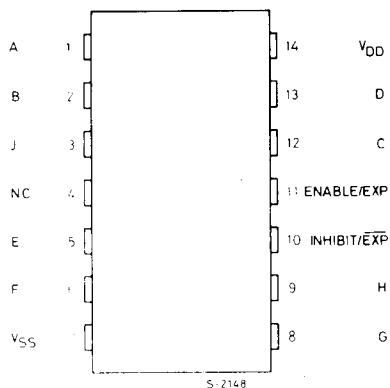
Ceramic flat package for
HCC 4086 BK



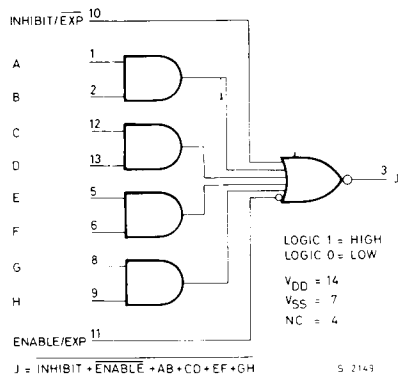
Plastic micropackage for
HCF 4086 BM



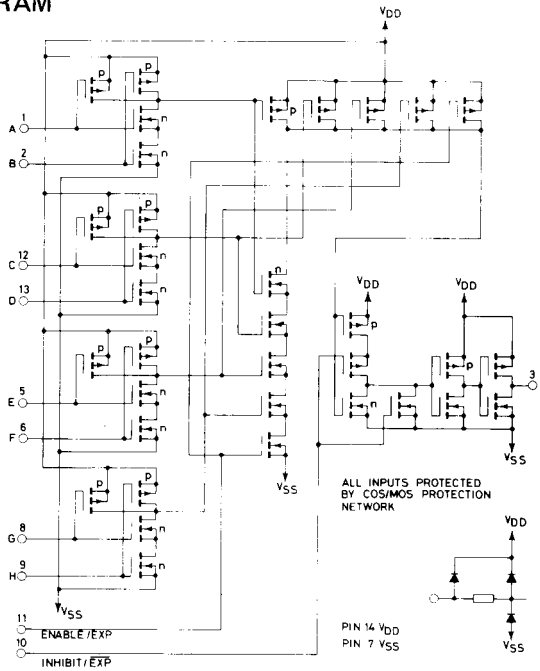
CONNECTION DIAGRAM



FUNCTIONAL DIAGRAM

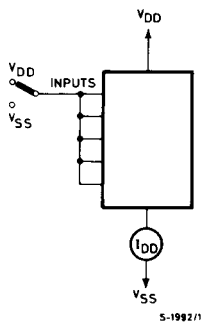


SCHEMATIC DIAGRAM

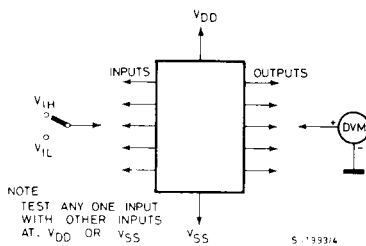


TEST CIRCUITS

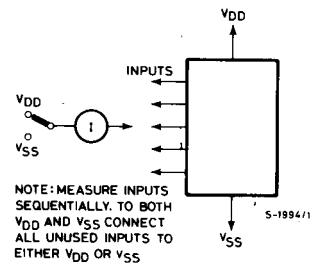
Quiescent device current



Input voltage



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	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}	Input low 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	HCC types	0/ 5	2.5		5	-2		-1.6	-3.2		-1.15		mA
			0/ 5	4.6		5	-0.64		-0.51	-1		-0.36		
			0/10	9.5		10	-1.6		-1.3	-2.6		-0.9		
			0/15	13.5		15	-4.2		-3.4	-6.8		-2.4		
	HCF types	0/ 5	2.5		5	-1.53		-1.36	-3.2		-1.1			
		0/ 5	4.6		5	-0.52		-0.44	-1		-0.36			
		0/10	9.5		10	-1.3		-1.1	-2.6		-0.9			
		0/15	13.5		15	-3.6		-3.0	-6.8		-2.4			
I _{OL}	Output sink current	HCC types	0/ 5	0.4		5	0.64		0.51	1		0.36	mA	
			0/10	0.5		10	1.6		1.3	2.6		0.9		
			0/15	1.5		15	4.2		3.4	6.8		2.4		
	HCF types	0/ 5	0.4		5	0.52		0.44	1		0.36			
		0/10	0.5		10	1.3		1.1	2.6		0.9			
		0/15	1.5		15	3.6		3.0	6.8		2.4			
I _{IH} , I _{IL}	Input leakage current	HCC types	0/18	Any input	18		±0.1		+10 ⁻⁵	±0.1		± 1	μA	
		HCF types	0/15		15		±0.3		+10 ⁻⁵	±0.3		± 1		
C _I	Input capacitance			Any input					5	7.5			pF	

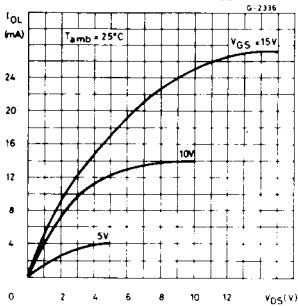
* T_{Low} = - 55°C for HCC device; -40°C for HCF device.* T_{High} = +125°C for HCC device; +85°C for HCF device.

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

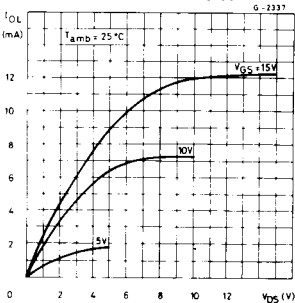
DYNAMIC ELECTRICAL CHARACTERISTICS
(
T_{amb} = 25 °C, C_L = 15 pF, R_L = 200 kΩ
typical temperature coefficient for all V_{DD} = 0.3%/°C values, all input rise and fall time = 20 ns.
)

Parameter	Test conditions	Values			Unit
		V _{DD} (V)	Min.	Typ.	Max.
t _{PHL} Propagation delay time (Data)		5		225	450
		10		90	180
		15		60	120
t _{PLH} Propagation delay time (Data)		5		310	620
		10		125	250
		15		90	180
t _{PHL} Propagation delay time (Inhibit)		5		150	300
		10		60	120
		15		40	80
t _{PLH} Propagation delay time (Inhibit)		5		250	500
		10		100	200
		15		70	140
t _{THL} , t _{TLH} Transition time		5		100	200
		10		50	100
		15		40	80

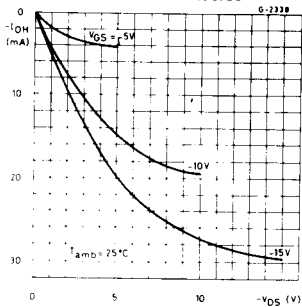
Typical output low (sink) current characteristics



Minimum output low (sink) current characteristics

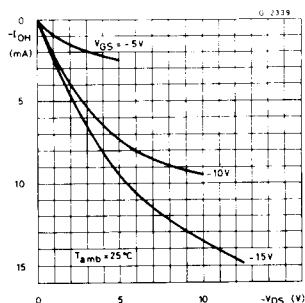


Typical output high (source) current characteristics

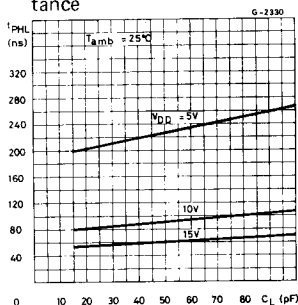


HCC/HCF 4086B

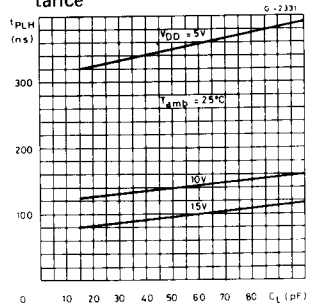
Minimum output high (source) current characteristics



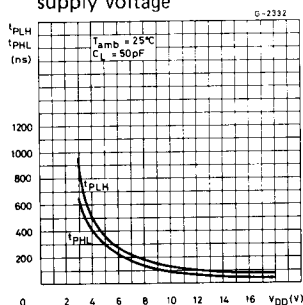
Typical DATA or ENABLE high-to-low level propagation delay time vs. load capacitance



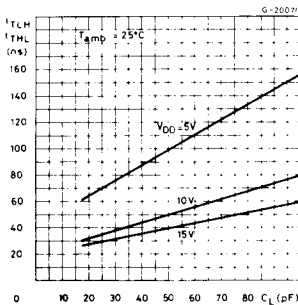
Typical DATA or ENABLE low-to-high level propagation delay time vs. load capacitance



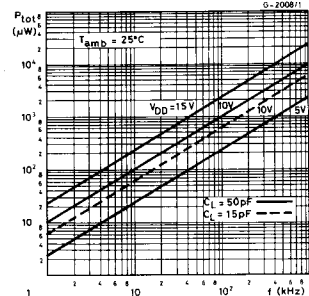
Typical DATA or ENABLE propagation delay time vs. supply voltage



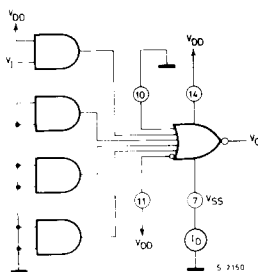
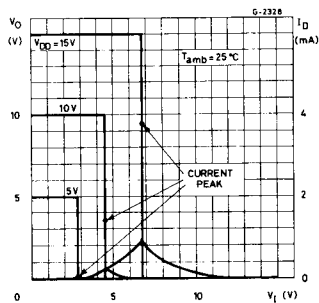
Typical transition time vs. load capacitance



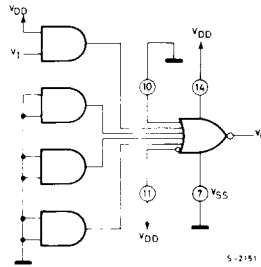
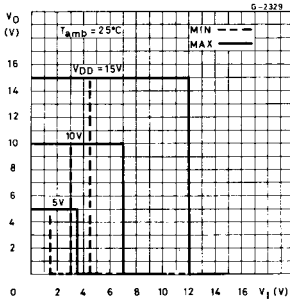
Typical power dissipation vs. frequency



Typical voltage and current transfer characteristics and test circuit

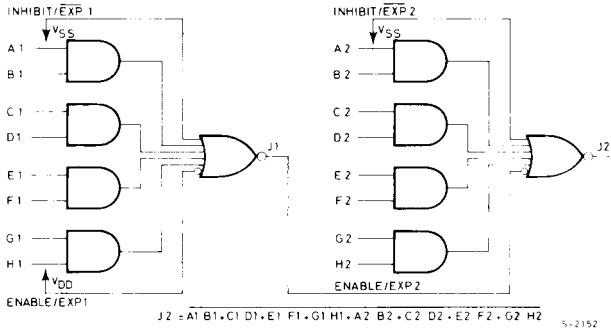


Minimum and maximum voltage transfer characteristics and test circuit

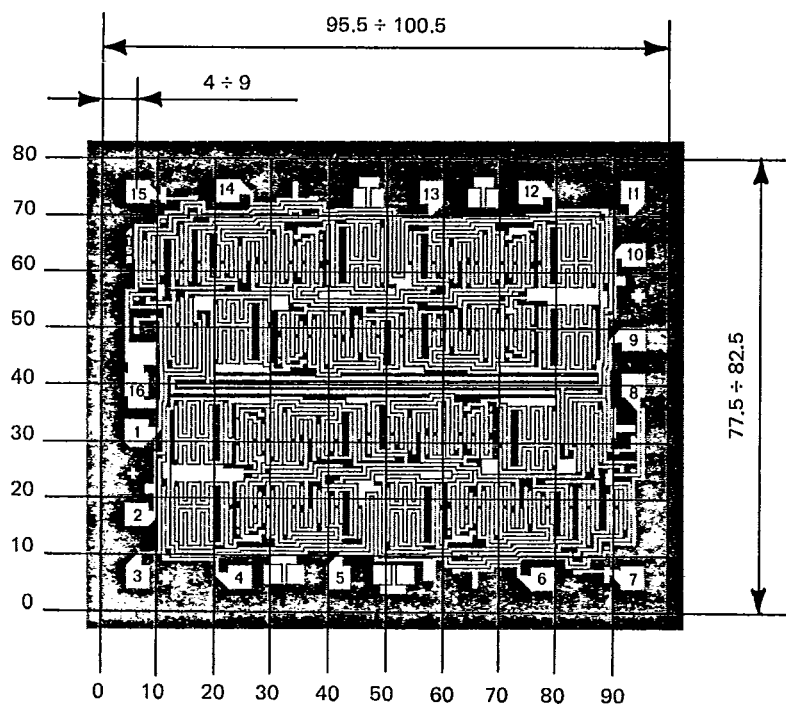


APPLICATION

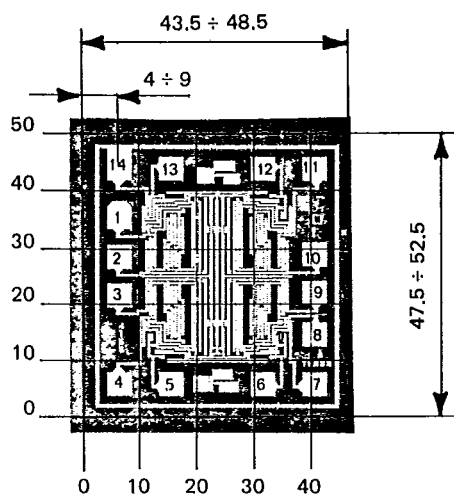
Two 4086B connected as an 8-wide 2-input A-O-I gate



This application shows two HCC/HCF 4086B utilized to obtain an 8-wide 2-input A-O-I function. The output (J1) of one HCC/HCF 4086B is fed directly to the ENABLE/EXP 2 line of the second HCC/HCF 4086B. In a similar fashion, any NAND gate output can be fed directly into the ENABLE/EXP input to obtain a 5-wide A-O-I function. In addition, any AND gate output can be fed directly into the INHIBIT/EXP input with the same result.



4015B



4016B