

GUS/MUS
INTEGRATED
CIRCUIT



7929225 S G S SEMICONDUCTOR CORP

QUAD AND/OR SELECT GATE

- MEDIUM SPEED OPERATION: $t_{PHL} = t_{PLH} = 60$ ns (TYP.) AT $C_L = 50$ pF, $V_{DD} = 10$ V
- STANDARDIZED, SYMMETRICAL OUTPUT CHARACTERISTICS
- 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 4019B** (extended temperature range) and **HCF 4019B** (intermediate temperature range) are monolithic integrated circuit, available in 16-lead dual in-line plastic or ceramic package, ceramic flat package and plastic micropackage.

The **HCC/HCF 4019B** types are comprised of four AND/OR select gate configurations, each consisting of two 2-input AND gates driving a single 2-input OR gate. Selection is accomplished by control bits K_a and K_b . In addition to selection of either channel A or channel B information, the control bits can be applied simultaneously to accomplish the logical $A + B$ function.

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 4019 BD for dual in-line ceramic package
 HCC 4019 BF for dual in-line ceramic package, frit seal
 HCC 4019 BK for ceramic flat package
 HCF 4019 BE for dual in-line plastic package
 HCF 4019 BF for dual in-line ceramic package, frit seal
 HCF 4019 BM for plastic micropackage



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STATIC ELECTRICAL CHARACTERISTICS (over recommended operating conditions)

Parameter		Test conditions				Values						Unit		
		V _I (V)	V _O (V)	I _O (μ A)	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	μ A
			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			
V _{IL}	Input low voltage	1.5/13.5	< 1	15	11		11				11		V	
		4.5/0.5	< 1	5		1.5			1.5		1.5			
		9/1	< 1	10		3			3		3			
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				
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		$\pm 10^{-5}$	± 0.1		± 1	μ A	
		HCF types	0/15		15		± 0.3		$\pm 10^{-5}$	± 0.3		± 1		
C _I	Input capacitance	All A and B inputs							5	7.5			pF	
		Ka and Kb inputs							10	15			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



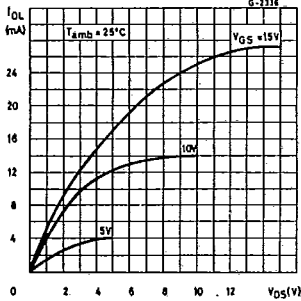
HCC/HCF 4019B

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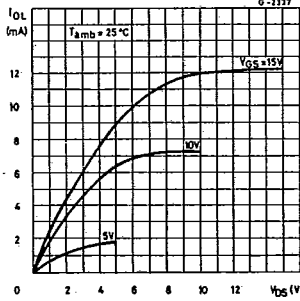
DYNAMIC ELECTRICAL CHARACTERISTICS ($T_{amb} = 25^{\circ}C$, $C_L = 50$ pF, $R_L = 200$ k Ω , typical temperature coefficient for all V_{DD} values is 0.3%/ $^{\circ}C$, all input rise and fall times = 20 ns)

Parameter	Test conditions	Values			Unit	
		V_{DD} (V)	Min.	Typ.		Max.
t_{PLH} , t_{PHL} Propagation delay time		5		150	300	ns
		10		60	120	
		15		50	100	
t_{TLH} , t_{THL} Transition time		5		100	200	ns
		10		50	100	
		15		40	80	

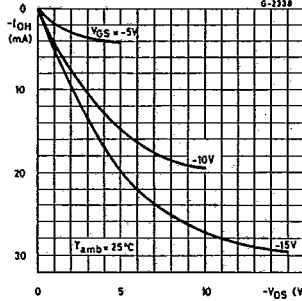
Typical output low (sink) current characteristics



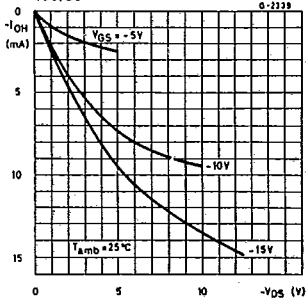
Minimum output low (sink) current characteristics



Typical output high (source) current characteristics

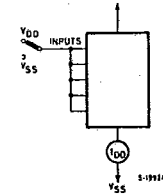


Minimum output high (source) current characteristics

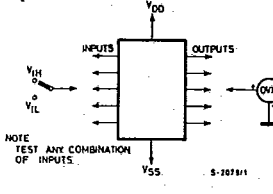


TEST CIRCUITS

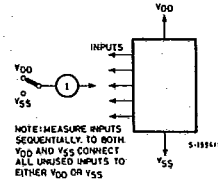
Quiescent device current



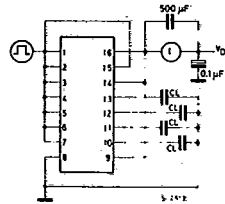
Input voltage



Input leakage current



Dynamic power dissipation

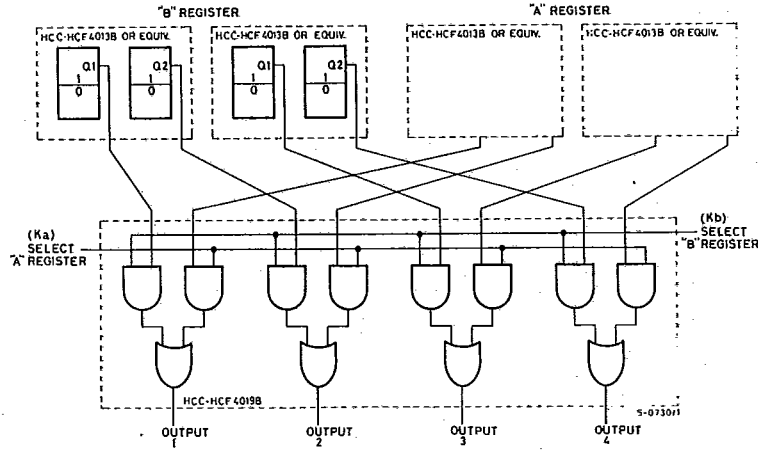




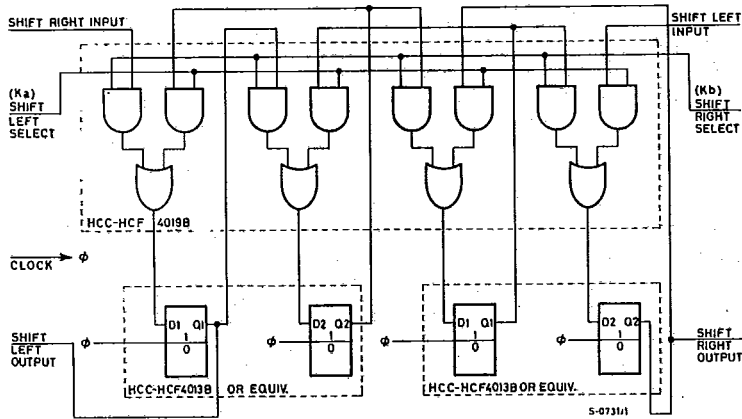
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TYPICAL APPLICATIONS

AND-OR selected gating



Shift left shift right register

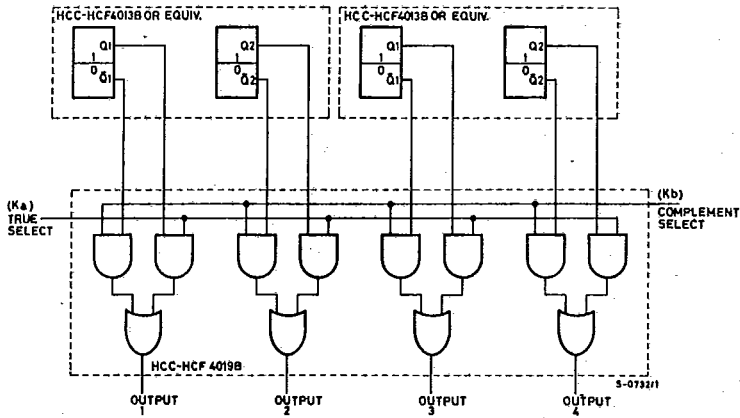




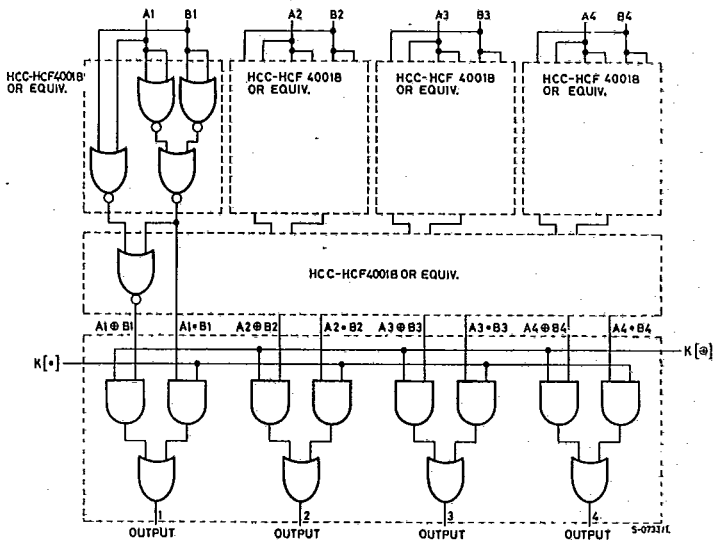
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TYPICAL APPLICATIONS (continued)

True complement selector

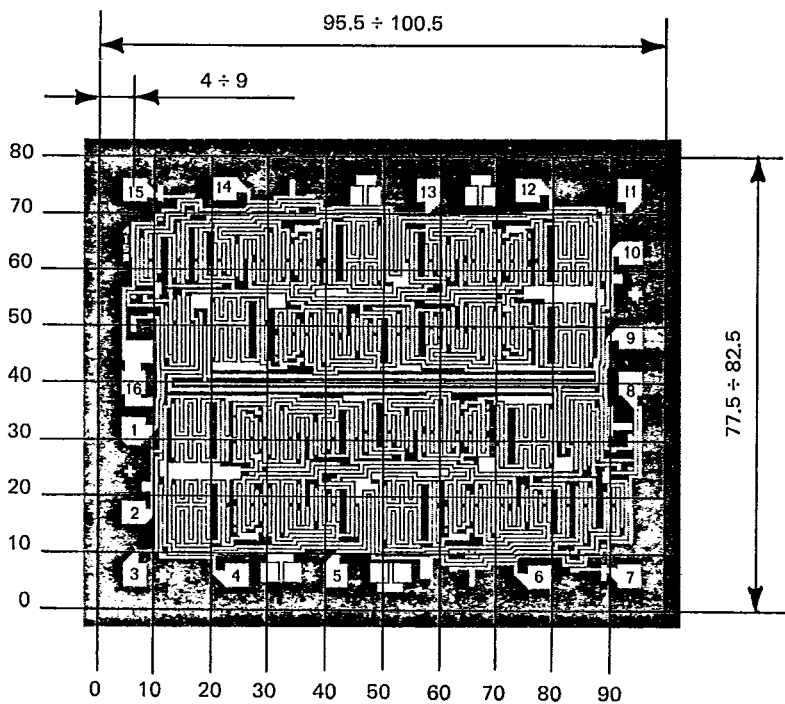


AND-OR exclusive - OR selector

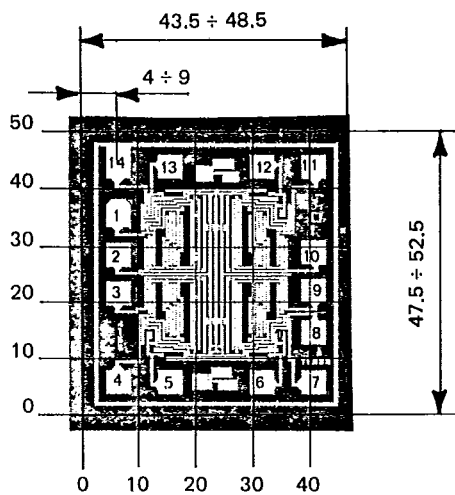


TRUTH TABLE

K [+]	K [⊖]	OUT
0	0	0
1	0	A - B
0	1	A ⊕ B
1	1	A + B



4015B



4016B