

COS/MOS INTEGRATED CIRCUITS

S G S-THOMSON 07C D 7929237 0014761 4



41C 0877- D T-46-07-15

QUAD 3-STATE R-S LATCHES: QUAD NOR R-S LATCH-4043B QUAD NAND R-S LATCH-4044B

- QUIESCENT CURRENT SPECIFIED TO 20V FOR HCC DEVICE
- 3-LEVEL OUTPUTS WITH COMMON OUTPUT ENABLE
- SEPARATE SET and RESET INPUT for EACH LATCH
- 5V, 10V, AND 15V PARAMETRIC RATINGS
- NOR and NAND CONFIGURATIONS
- 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 4043B, HCC 4044B, (extended temperature range) and the HCF 4043B, HCF 4044B (intermediate temperature range) are monolithic integrated circuits, available in 16-lead dual in-line plastic or ceramic package, ceramic flat package, and plastic micropackage. The HCC/HCF 4043B types are quad cross-coupled 3-state COS/MOS NOR latches and the HCC/HCF 4044B types are quad cross-coupled 3-state COS/MOS NAND latches. Each latch has a separate Q output and individual SET and RESET inputs. The Q outputs are controlled by a common ENABLE input. A logic "1" or "high" on the ENABLE input connects the latch states to the Q outputs. A logic "0" or "low" on the ENABLE input disconnects the latch states from the Q outputs, resulting in an open circuit condition on the Q outputs. The open circuit feature allows common bussing of the outputs.

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

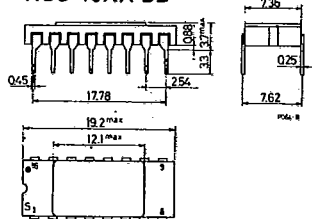
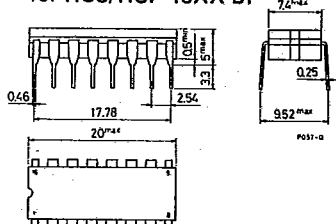
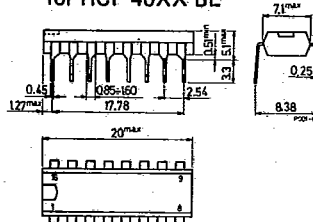
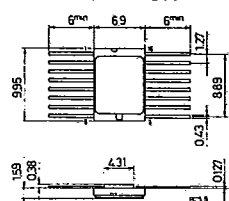
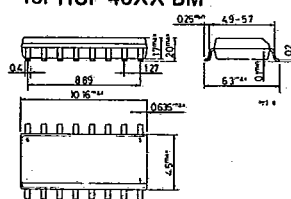
ORDERING NUMBERS:

HCC 40XX BD for dual in-line ceramic package
HCC 40XX BF for dual in-line ceramic package, frit seal
HCC 40XX BK for ceramic flat package
HCF 40XX BE for dual in-line plastic package
HCF 40XX BF for dual in-line ceramic package, frit seal
HCF 40XX BM for plastic micropackage



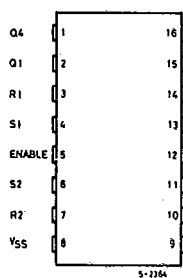
41C 08775 DT-46-07-15

MECHANICAL DATA (dimensions in mm)

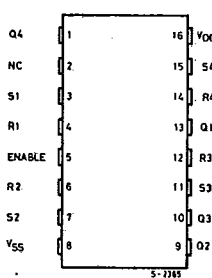
Dual in-line ceramic package
HCC 40XX BDDual in-line ceramic package
for HCC/HCF 40XX BFDual in-line plastic package
for HCF 40XX BECeramic flat package
for HCC 40XX BKPlastic micropackage
for HCF 40XX BM

CONNECTION DIAGRAMS

For 4043B

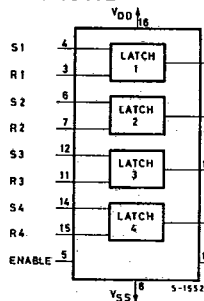


For 4044B

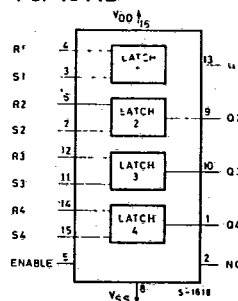


FUNCTIONAL DIAGRAMS

For 4043B



For 4044B



RECOMMENDED OPERATING CONDITIONS

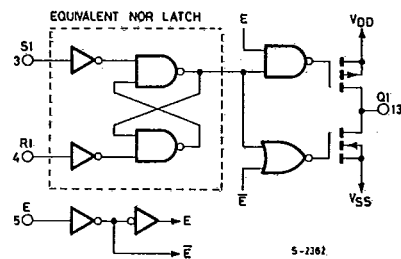
V_{DD}	Supply voltage: HCC types HCF types	3 to 18 3 to 15 0 to V_{DD}	V V V
V_I	Input voltage	-55 to 125	°C
T_{op}	Operating temperature: HCC types HCF types	-40 to 85	°C



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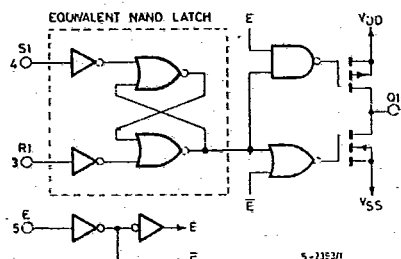
LOGIC DIAGRAMS

For 4043B

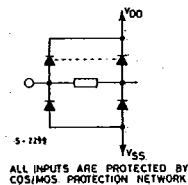


S-2282

For 4044B



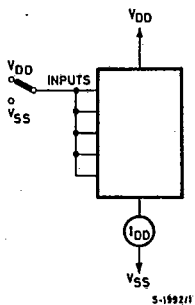
S-2323/1



ALL INPUTS ARE PROTECTED BY COSMOS PROTECTION NETWORK

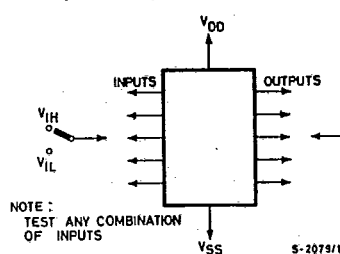
TEST CIRCUITS

Quiescent device current



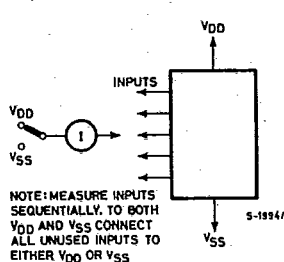
S-1992/1

Input voltage



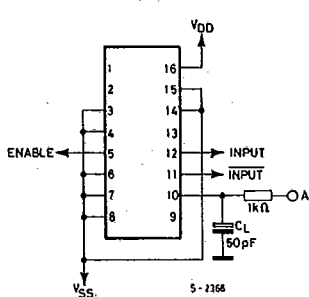
S-2079/1

Input current



S-1994/1

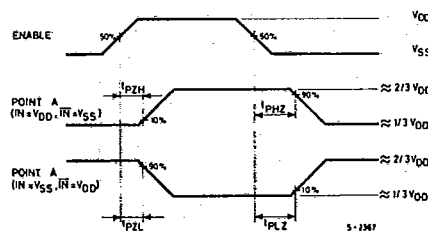
ENABLE propagation delay time and waveforms



S-2368

TEST	IN	IN'	A
t _{PHZ}	V _{DD}	V _{SS}	V _{SS}
t _{PLZ}	V _{SS}	V _{DD}	V _{DD}
t _{PZH}	V _{DD}	V _{SS}	V _{SS}
t _{PZL}	V _{SS}	V _{DD}	V _{DD}

Z = HIGH IMPEDANCE



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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	
I _{OH}	3-state output	HCC types	0/18	0/18		18		±0.4		±10 ⁻⁴	±0.4		± 12	μA
		HCF types	0/15	0/15		15		±1.0		±10 ⁻⁴	±1.0		±7.5	
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} = 5V2V min. with V_{DD} = 10V2.5V min. with V_{DD} = 15V

HCC/HCF 4043B
HCC/HCF 4044B

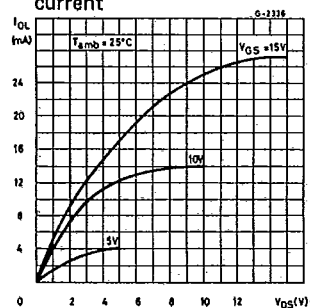
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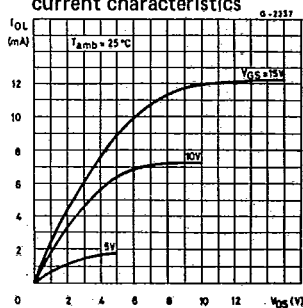
DYNAMIC ELECTRICAL CHARACTERISTICS ($T_{amb} = 25^{\circ}\text{C}$, $C_L = 50\text{ pF}$, $R_L = 200\text{ k}\Omega$, typical temperature coefficient for all V_{DD} values is $0.3\%/^{\circ}\text{C}$, all input rise and fall times = 20 ns)

Parameter		Test conditions	Values			Unit	
			V _{DD} (V)	Min.	Typ.		Max.
t _{PLH} , t _{PHL}	Propagation delay time (SET or RESET to Q)		5		150	300	ns
			10		70	140	
			15		50	100	
t _{PZH} , t _{PHZ}	3-State propagation delay time (ENABLE to Q)		5		115	230	ns
			10		55	110	
			15		40	80	
t _{PLZ} , t _{PZL}	Propagation delay time		5		90	180	ns
			10		50	100	
			15		35	70	
t _{TLH} , t _{THL}	Transition time		5		100	200	ns
			10		50	100	
			15		40	80	
t _w	Pulse width (SET or RESET)		5	160	80		ns
			10	80	40		
			15	40	20		

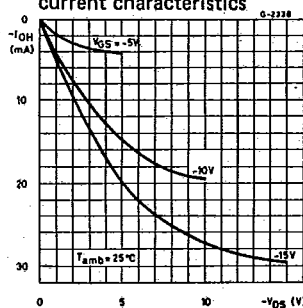
Typical output low (sink) current



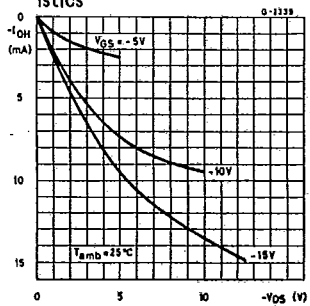
Minimum output low (sink) current characteristics



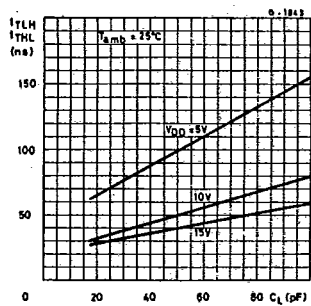
Typical output high (source) current characteristics



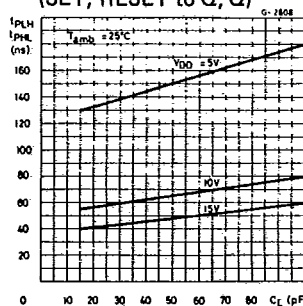
Minimum output high (source) current characteristics

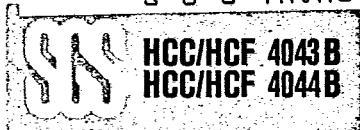


Typical transition time vs. load capacitance

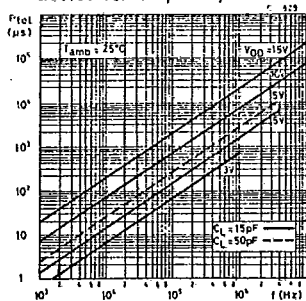


Typical propagation delay time vs. load capacitance (SET, RESET to Q, Q)



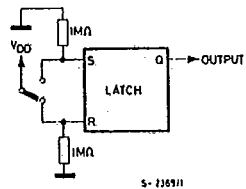


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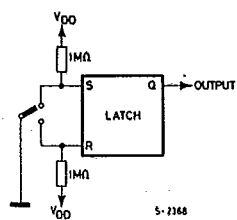
Typical power dissipation/
device vs. frequency

Switch bounce eliminator

for 4043B

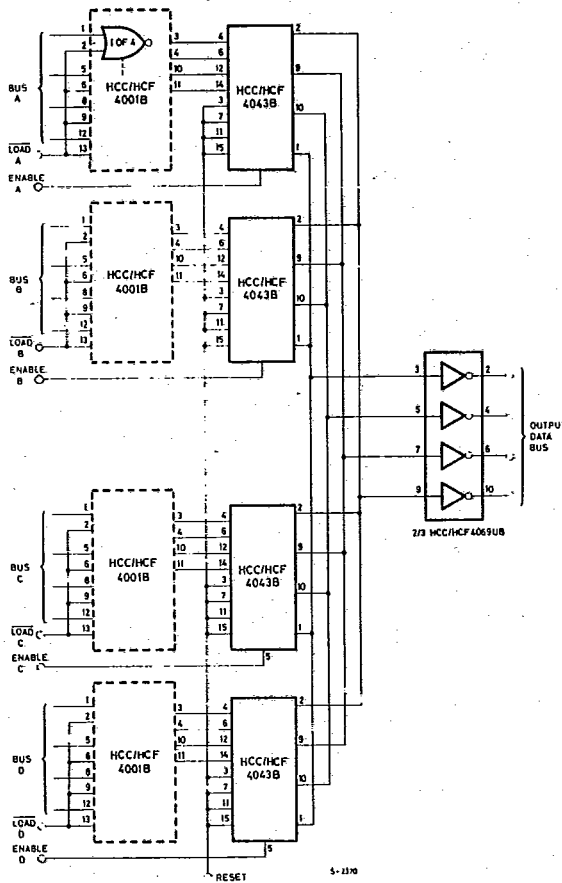


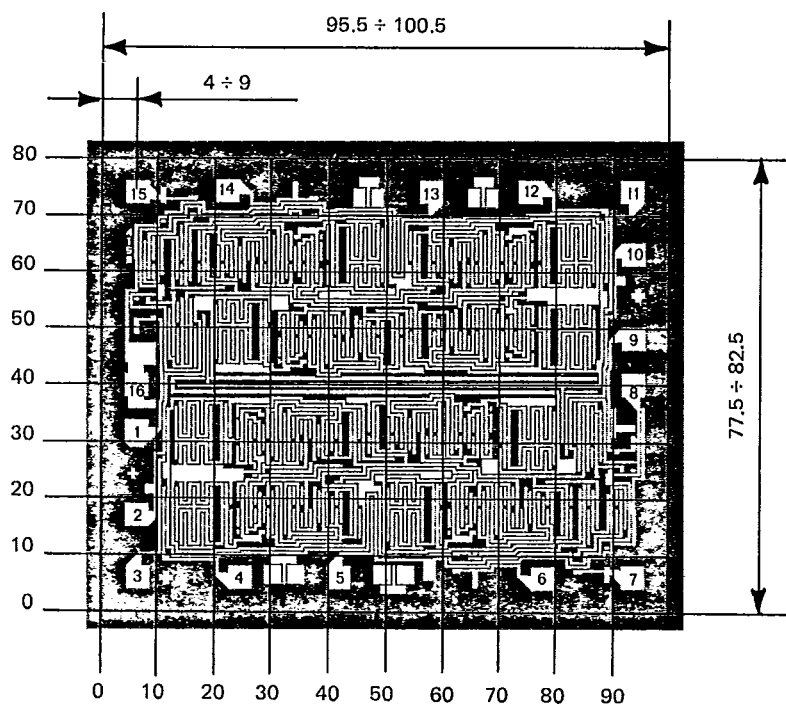
for 4044B



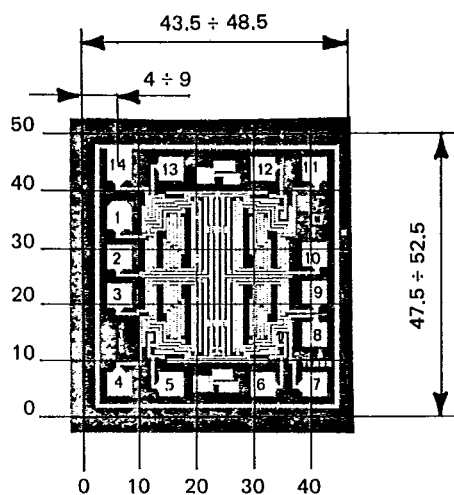
APPLICATIONS

Multiple bus storage





4015B



4016B