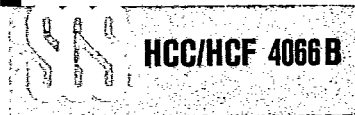


COS/MOS INTEGRATED CIRCUIT

S G S-THOMSON 07C D 7929237 0019265 6



41C 08847 DT-5/1-11

QUAD BILATERAL SWITCH FOR TRANSMISSION OR MULTIPLEXING OF ANALOG OR DIGITAL SIGNALS

- 15V DIGITAL OR $\pm 7.5V$ PEAK-TO-PEAK SWITCHING
- 80Ω TYPICAL ON RESISTANCE FOR 15V OPERATION
- SWITCH ON RESISTANCE MATCHED TO WITHIN 5Ω OVER 15V SIGNAL-INPUT RANGE
- ON RESISTANCE FLAT OVER FULL PEAK-TO-PEAK SIGNAL RANGE
- HIGH ON/OFF OUTPUT-VOLTAGE RATIO: 65 dB TYP. @ $f_{is} = 10$ kHz, $R_L = 10$ k Ω
- HIGH DEGREE OF LINEARITY: $< 0.5\%$ DISTORTION TYP. @ $f_{is} = 1$ kHz, $V_{is} = 5$ V_{p-p}, $V_{DD}-V_{SS} \geq 10V$, $R_L = 10$ k Ω
- EXTREMELY LOW OFF SWITCH LEAKAGE RESULTING IN VERY LOW OFFSET CURRENT AND HIGH EFFECTIVE OFF RESISTANCE; 10 pA TYP. @ $V_{DD}-V_{SS} = 10V$, $T_A = 25^\circ C$
- EXTREMELY HIGH CONTROL INPUT IMPEDANCE (CONTROL CIRCUIT ISOLATED FROM SIGNAL CIRCUIT); $10^{12}\Omega$ TYP.
- LOW CROSSTALK BETWEEN SWITCHES: -50 dB TYP. @ $f_{is} = 0.9$ MHz, $R_L = 1$ k Ω
- MATCHED CONTROL-INPUT TO SIGNAL-OUTPUT CAPACITANCE: REDUCES OUTPUT SIGNAL TRANSIENTS
- FREQUENCY RESPONSE, SWITCH ON = 40 MHz (TYP.)
- 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 4066B (extended temperature range) and HCF 4066B (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 4066B is a quad bilateral switch intended for the transmission or multiplexing of analog or digital signals. It is pin-for-pin compatible with HCC/HCF 4016B, but exhibits a much lower ON resistance. In addition, the ON resistance is relatively constant over the full input-signal range. The HCC/HCF 4066B consists of four independent bilateral switches. A single control signal is required per switch. Both the p and the n device in a given switch are biased ON or OFF simultaneously by the control signal. As shown in schematic diagram, the well of the n-channel device on each switch is either tied to the input when the switch is ON or to V_{SS} when the switch is OFF. This configuration eliminates the variation of the switch-transistor threshold voltage with input signal, and thus keeps the ON resistance low over the full operating-signal range. The advantages over single-channel switches include peak input signal voltage swings equal to the full supply voltage, and more constant ON impedance over the input-signal range. For sample-and-hold applications, however, the HCC/HCF 4016B is recommended.

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) 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	$^\circ C$ $^\circ C$
T_{stg}	Storage temperature	-65 to 150	$^\circ C$

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

ORDERING NUMBERS:

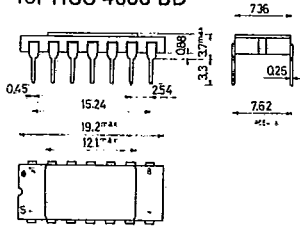
HCC 4066 BD for dual in-line ceramic package
HCC 4066 BF for dual in-line ceramic package, frit seal
HCC 4066 BK for ceramic flat package
HCF 4066 BE for dual in-line plastic package
HCF 4066 BF for dual in-line ceramic package, frit seal
HCF 4066 BM for plastic micropackage

HCC/HCF 4066 B

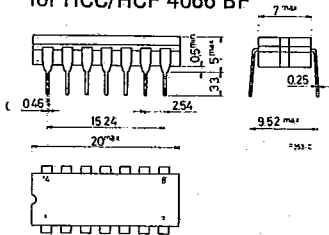
41C 08848 DT-51-11

MECHANICAL DATA (dimensions in mm)

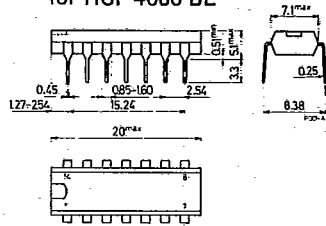
Dual in-line ceramic package for HCC 4066 BD



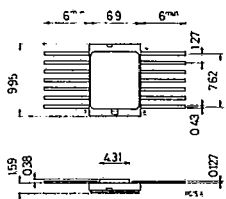
Dual in-line ceramic package for HCC/HCF 4066 BF



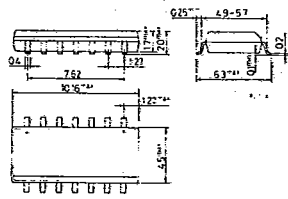
Dual in-line plastic package for HCF 4066 BE



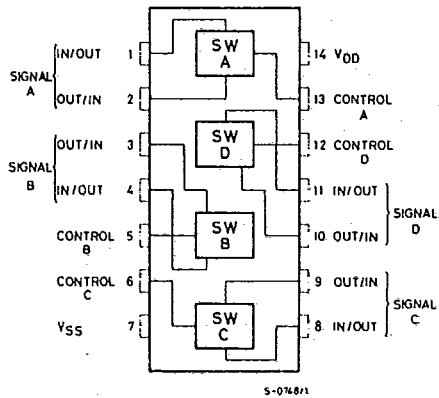
Ceramic flat package for HCC 4066 BK



Plastic micropackage for HCF 4066 BM



FUNCTIONAL DIAGRAM



RECOMMENDED OPERATING CONDITIONS

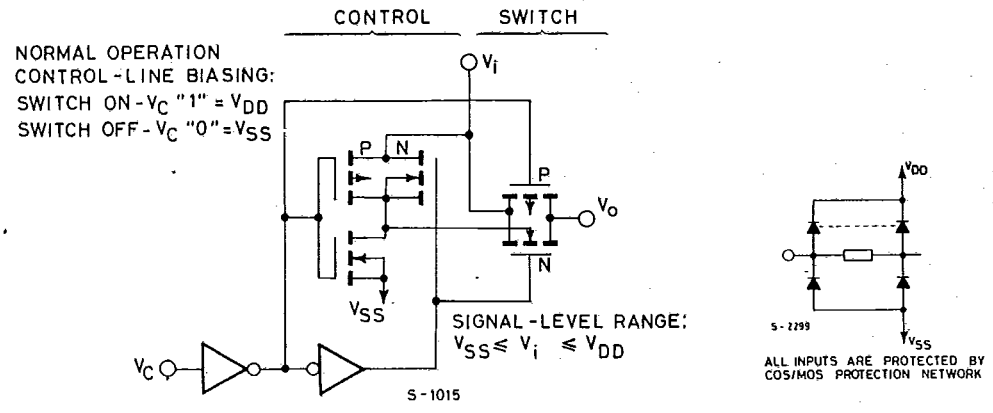
V_{DD}	Supply voltage: HCC types HCF types	3 to 18 3 to 15	V V
V_I	Input voltage	0 to V_{DD}	V
T_{op}	Operating temperature: HCC types HCF types	-55 to 125 -40 to 85	°C °C



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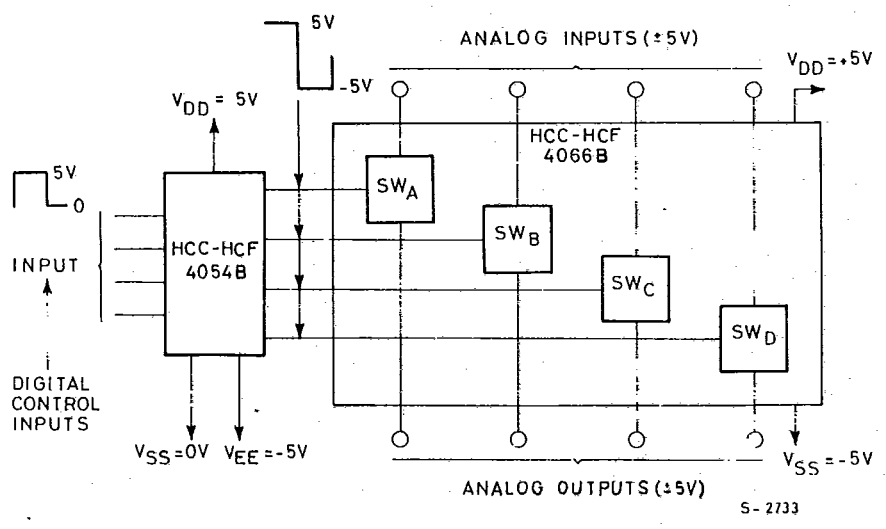
SCHEMATIC DIAGRAM

1 of 4 identical switches and its associated control circuitry



TYPICAL APPLICATIONS

Bidirectional signal transmission via digital control logic





41C 08851 DT-51-11

ELECTRICAL CHARACTERISTICS ($T_{amb} = 25^{\circ}C$, typical temperature coefficient for all V_{DD} values is 0,3% / $^{\circ}C$)

Parameter		Test conditions		Values						Unit			
				V_I (V)	V_{DD} (V)	T_{Low}^*		25°C			T_{High}^*		
						Min.	Max.	Min.	Typ.		Max.	Min.	Max.
I_L Quiescent device current (All switches ON or all switches OFF)	HCC types	0/ 5	5			0.25		0.01	0.25		7.5	μA	
		0/10	10			0.5		0.01	0.5		15		
		0/15	15			1		0.01	1		30		
	HCF types	0/20	20			5		0.02	5		150		
		0/ 5	5			1		0.01	1		7.5		
		0/10	10			2		0.01	2		15		
		0/15	15			4		0.01	4		30		
SIGNAL INPUTS (V_{is}) and Outputs (V_{os})													
R_{ON} On resistance	HCC types	$V_C = V_{DD}$ $R_L = 10\text{ K}\Omega$ return to $\frac{V_{DD}-V_{SS}}{2}$ $V_{is} = V_{SS}$ to V_{DD}	5		800		470	1050		1300	Ω		
			10		310		180	400		550			
	15			200		125	240		320				
	HCF types		5		850		470	1050		1200			
			10		330		180	400		500			
		15		210		125	240		300				
ΔON Resistance Between Any 2 switches, ΔR_{ON}		$R_L 10\text{ k}\Omega, V_C = V_{DD}$	5				15			Ω			
			10				10						
			15				5						
TDH Total Harmonic Distorsion		$V_C = V_{DD} = 5V, V_{SS} = -5V, V_{is} (p-p) = 5V$ (Sine wave centered in 0V) $R_L = 10\text{ k}\Omega, f_{is} = 1\text{ KHz}$ sine wave					0.4			%			
-3dB Cutoff Frequency (switch on)		$V_C = V_{DD} = 5V, V_{SS} = -5V, V_{is} (p-p) = 5V$ (Sine wave centered on 0V) $R_L = 1\text{ k}\Omega$					40			MHz			
-50 dB Feedthrough Frequency (switch off)		$V_C = V_{SS} = -5V, V_{is} (p-p) = 5V$ (Sine wave centered on 0V) $R_L = 1\text{ k}\Omega$					1			MHz			
-50 dB Crosstalk Frequency		$V_C(A) = V_{DD} = +5V, V_C(B) = V_{SS} = -5V, V_{is}(A) = 5\text{ Vp-p}, 50\Omega$ source $R_L = 1\text{ k}\Omega$					8			MHz			
t_{pd} Propagation delay (Signal Input to Signal output)		$R_L = 200\text{ k}\Omega, V_C = V_{DD}, V_{SS} = GND, C_L = 50\text{ pF}, V_{is} = 10V$ (Square wave centered on 5V) $t_r, t_f = 20\text{ ns}$	5				20	40		ns			
			10				10	20					
			15					7	15				
C_{is} Input capacitance		$V_{DD} = +5V, V_C = V_{SS} = -5V$					8			pF			
C_{os} Output capacitance							8						
C_{ios} Feedthrough							0.5						
Input/Output Leakage current switch OFF	HCC types	$V_C = 0V, V_{is} = 18V; V_{os} = 0V, V_{is} = 0V; V_{os} = 18V$	18		± 0.1		$\pm 10^{-3}$	± 0.1		± 1	μA		
	HCF types	$V_C = 0V, V_{is} = 15V; V_{os} = 0V, V_{is} = 0V; V_{os} = 15V$	15		± 0.3		$\pm 10^{-3}$	± 0.3		± 1			

HCC/HCF 4066 B

41C 08852 D T-51-11

ELECTRICAL CHARACTERISTICS (continued)

Parameter	Test conditions	V _{DD} (V)	Values						Unit		
			T _{Low} *		25°C			T _{High} *			
			Min.	Max.	Min.	Typ.	Max.	Min.		Max.	
CONTROL (V_C)											
V _{ILC} Control input Low voltage	I _{is} < 10 μA V _{is} = V _{SS} , V _{os} = V _{DD} and V _{is} = V _{DD} , V _{os} = V _{SS}	5		1			1		1	V	
		10		2			2		2		
		15		2			2		2		
V _{IHC} Control input High voltage		5	3.5		3.5			3.5		V	
		10	7		7			7			
		15	11		11			11			
I _{IH} , I _{IL} Input leakage current	HCC types	V _{is} ≤ V _{DD} V _{DD} -V _{SS} = 18V	18		±0.1		±10 ⁻⁵	±0.1		±1	μA
	HCF types	V _{DD} -V _{SS} = 15V V _{CC} ≤ V _{DD} -V _{SS}	15		±0.3		±10 ⁻⁵	±0.3		±1	
Crosstalk (control input to signal output)	V _C = 10V (Sq. wave). t _r , t _f = 20 ns R _L = 10 kΩ	10				50				mW	
Turn-On propagation delay	V _{IN} = V _{DD} t _r , t _f = 20 ns C _L = 50 pF R _L = 1 kΩ	5				35	70			ns	
		10				20	40				
		15				15	30				
Control input Repetition rate	V _{is} = V _{DD} , V _{SS} = GND R _L = 1 kΩ to gnd C _L = 50 pF V _C = 10V (Square wave centered on 5V) t _r , t _f = 20 ns V _{os} = ½ V _{OS} @ 1KHz.	5				6				MHz	
		10				9					
		15				9.5					
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} = 5V
 2V min. with V_{DD} = 10V
 2.5V min. with V_{DD} = 15V