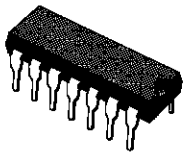
GATE J-K MASTER-SLAVE FLIP-FLOPS

- 16 MHz TOGGLE RATE (typ.) AT V_{DD} - V_{SS} = 10V
- GATED INPUTS
- QUIESCENT CURRENT SPECIFIED TO 20v FOR HCC DEVICE
- 5V, 10V AND 15V PARAMETRIC RATINGS
- INPUT CURRENT OF 100 nA AT 18V AND 25oC FOR HCC DEVICE
- 100% TESTED FOR QUIESCENT CURRENT
- MEETS ALL REQUIREMENTS OF JEDEC TENTATIVE STANDARD No 13 A, "STANDARD SPECIFICATIONS FOR DESCRIPTION OF B SERIES CMOS DEVICES"



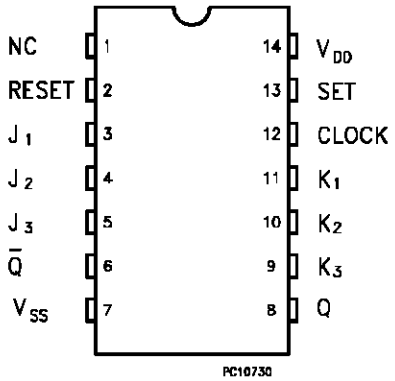
DESCRIPTION

The **CC4095/4096** (extended temperature range) and **CC4095/4096** (intermediate temperature range) are monolithic integrated circuits, available in 14 lead dual in-line plastic or ceramic package and plastic micropackage.

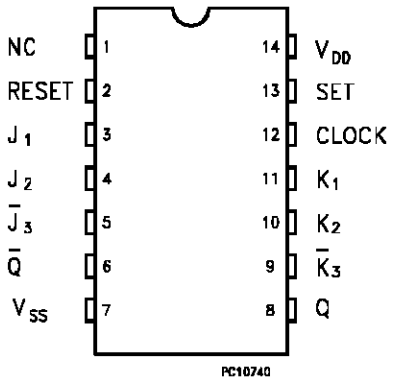
The **CC4095** and **CC4096** are J-K Master-Slave Flip-Flops featuring separate AND gating of multiple J and K inputs. The gated J-K input control transfer of information into the master section during clocked operation. Information on the J-K inputs is transferred to the Q and Q outputs on the positive edge of the clock pulse. SET and RESET inputs (active high) are provided for asynchronous operation.

PIN CONNECTIONS

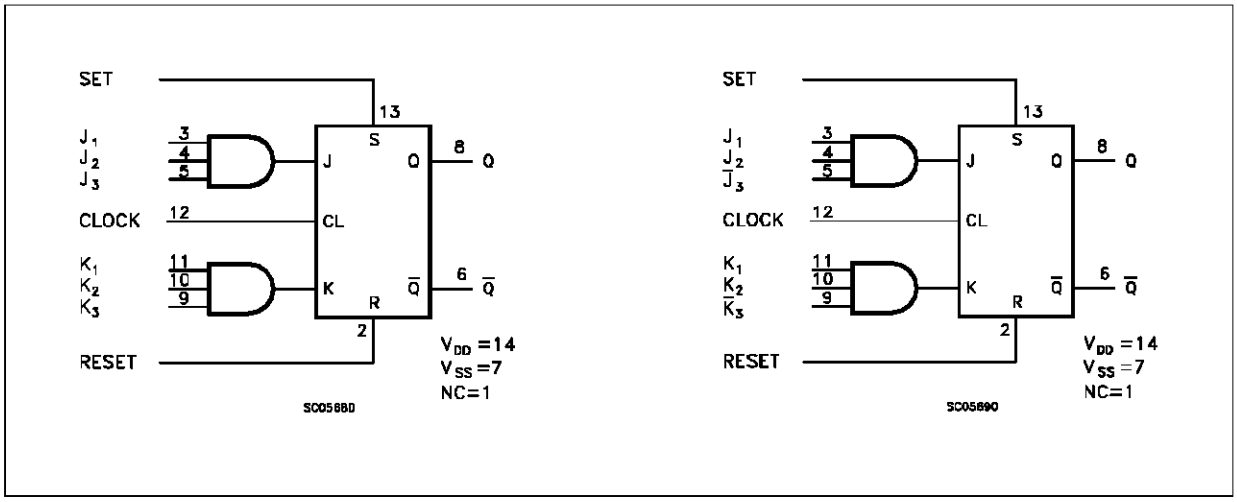
4095



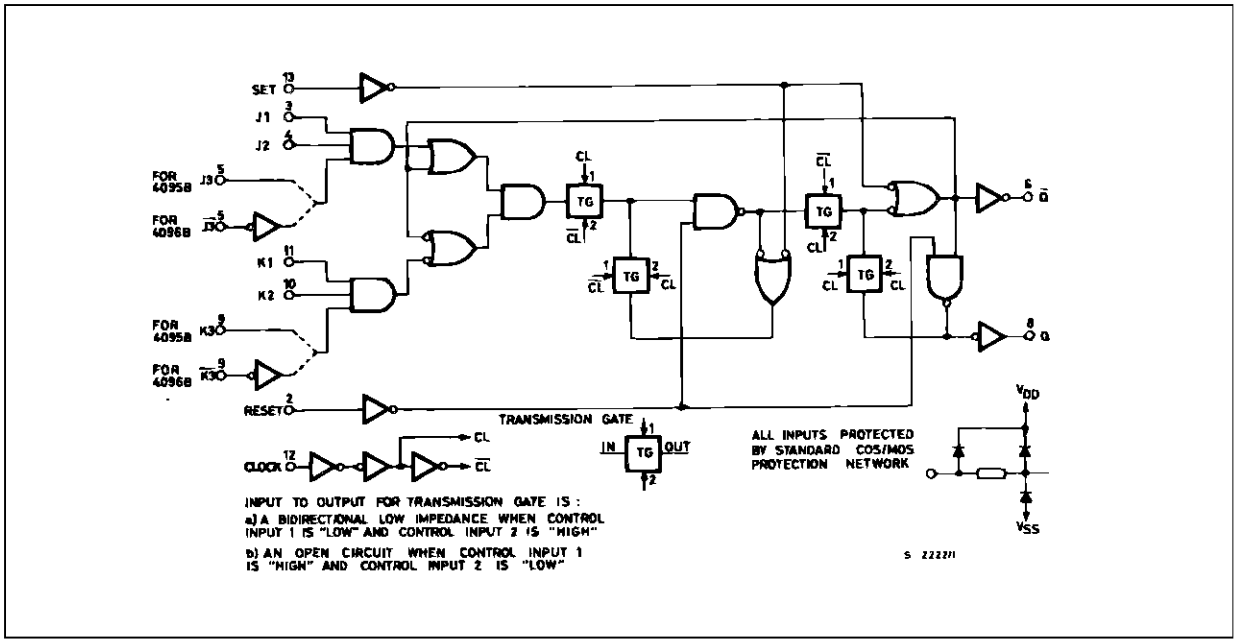
4096



FUNCTIONAL DIAGRAMS



LOGIC DIAGRAM



TRUTH TABLES

SYNCHRONOUS OPERATION (S=0 R=0)

Inputs Before Positive Clock Transition		Outputs After Positive Clock Transition	
J *	K *	Q	$\overline{Q}$
0	0	No Change	
0	1	0	1
1	0	1	0
1	1	Toggles	

* For 4095B J = J1 • J2 • $\overline{J3}$, K = K1 • K2 • $\overline{K3}$
* For 4095B J = J1 • J2 • $\overline{J3}$, K = K1 • K2 • $\overline{K3}$

ASYNCHRONOUS OPERATION (J and K DON'T CARE)

S	R	Q	$\overline{Q}$
0	0	No Change	
0	1	0	1
1	0	1	0
1	1	0	0

0 = V_{SS}, 1 = V_{DD}

ABSOLUTE MAXIMUM RATING

Symbol	Parameter	Value	Unit
V_{DD} *	Supply Voltage:	-0.5 to +20	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 Top = Full Package Temperature Range	200 100	mW mW
T_{op}	Operating Temperature:	-55 to +125	^oC
T_{stg}	Storage Temperature	-65 to +150	^oC

Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for external periods may affect device reliability.

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

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V_{DD}	Supply Voltage:	3 to 18	V
V_I	Input Voltage	0 to V_{DD}	V
T_{op}	Operating Temperature:	-55 to +125	^oC

STATIC ELECTRICAL CHARACTERISTICS (over recommended operating conditions)

Symbol	Parameter	Test Conditios				Value							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	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	
		0/18			18		20		0.04	20		600	
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		4.5	< 1	5	3.5		3.5			3.5		V
			9	< 1	10	7		7			7		
			13.5	< 1	15	11		11			11		
V_{IL}	Input Low Voltage		0.5	< 1	5		1.5			1.5		1.5	V
			1	< 1	10		3			3		3	
			1.5	< 1	15		4			4		4	
I_{OH}	Output Drive Current	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		
I_{OL}	Output Sink Current	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		
I_{IH}, I_{IL}	Input Leakage Current	0/18	Any Input		18		±0.1		$±10^{-5}$	±0.1		±1	μA
		0/15			15		±0.3		$±10^{-5}$	±0.3		±1	
C_I	Input Capacitance		Any Input						5	7.5			pF