

CD4019BM/CD4019BC Quad AND-OR Select Gate

General Description

The CD4019BM/CD4019BC is a complementary MOS quad AND-OR select gate. Low power and high noise margin over a wide voltage range is possible through implementation of N- and P-channel enhancement mode transistors. These complementary MOS (CMOS) transistors provide the building blocks for the 4 "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 . All inputs are protected against static discharge damage.

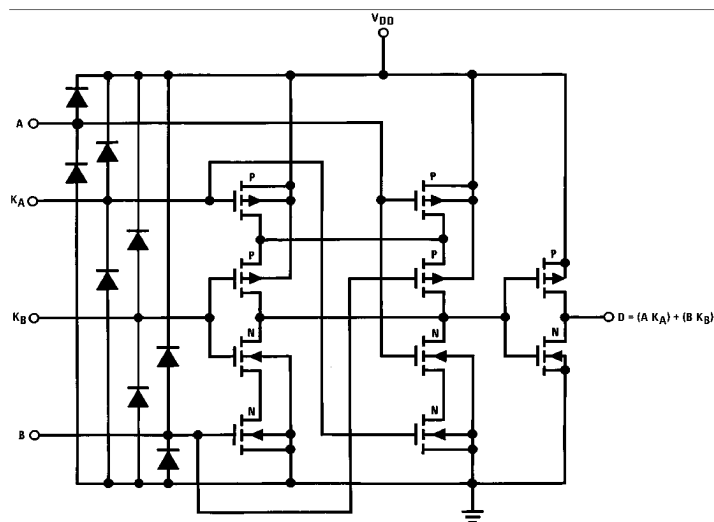
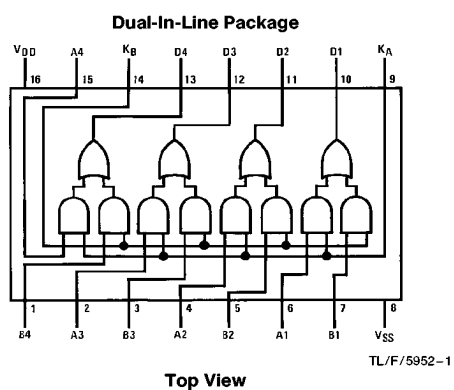
Features

- Wide supply voltage range 3.0V to 15V
- High noise immunity 0.45 V_{DD} (typ.)
- Low power TTL compatibility Fan out of 2 driving 74L or 1 driving 74LS

Applications

- AND-OR select gating
- Shift-right/shift-left registers
- True/complement selection
- AND/OR/EXCLUSIVE-OR selection

Connection and Schematic Diagrams



Schematic diagram for 1 of 4 identical stages

TL/F/5952-2

Absolute Maximum Ratings (Notes 1 & 2)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage (V_{DD})	– 0.5V to + 18V
Input Voltage (V_{IN})	– 0.5V to V_{DD} + 0.5V
Storage Temperature Range (T_S)	– 65°C to + 150°C
Power Dissipation (P_D)	
Dual-In-Line	700 mW
Small Outline	500 mW
Lead Temperature (T_L)	
(Soldering, 10 seconds)	260°C

Recommended Operation Conditions (Note 2)

DC Supply Voltage (V_{DD})	+ 3V to + 15V
Input Voltage (V_{IN})	0V to V_{DD} V
Operating Temperature Range (T_A)	
CD4019BM	– 55°C to + 125°C
CD4019BC	– 40°C to + 85°C

DC Electrical Characteristics CD4019BM (Note 2)

Symbol	Parameter	Conditions	– 55°C		+ 25°C			+ 125°C		Units
			Min	Max	Min	Typ	Max	Min	Max	
I_{DD}	Quiescent Device Current	$V_{DD} = 5V$		0.25		0.03	0.25		7.5	μA
		$V_{DD} = 10V$		0.5		0.05	0.5		15	μA
		$V_{DD} = 15V$		1.0		0.07	1.0		30	μA
V_{OL}	Low Level Output Voltage	$ I_O < 1 \mu A$								
		$V_{DD} = 5V$		0.05		0	0.05		0.05	V
		$V_{DD} = 10V$		0.05		0	0.05		0.05	V
V_{OH}	High Level Output Voltage	$ I_O < 1 \mu A$								
		$V_{DD} = 5V$	4.95		4.95	5		4.95		V
		$V_{DD} = 10V$	9.95		9.95	10		9.95		V
V_{IL}	Low Level Input Voltage	$V_{DD} = 5V, V_O = 0.5V \text{ or } 4.5V$		1.5		2	1.5		1.5	V
		$V_{DD} = 10V, V_O = 1.0V \text{ or } 9.0V$		3.0		4	3.0		3.0	V
		$V_{DD} = 15V, V_O = 1.5V \text{ or } 13.5V$		4.0		6	4.0		4.0	V
V_{IH}	High Level Input Voltage	$V_{DD} = 5V, V_O = 0.5V \text{ or } 4.5V$	3.5		3.5	3		3.5		V
		$V_{DD} = 10V, V_O = 1.0V \text{ or } 9.0V$	7.0		7.0	6		7.0		V
		$V_{DD} = 15V, V_O = 1.5V \text{ or } 13.5V$	11.0		11.0	9		11.0		V
I_{OL}	Low Level Output Current (Note 3)	$V_{DD} = 5V, V_O = 0.4V$	0.64		0.51	1		0.36		mA
		$V_{DD} = 10V, V_O = 0.5V$	1.6		1.3	2.5		0.9		mA
		$V_{DD} = 15V, V_O = 1.5V$	4.2		3.4	10		2.4		mA
I_{OH}	High Level Output Current (Note 3)	$V_{DD} = 5V, V_O = 4.6V$	– 0.25		– 0.2	– 0.4		– 0.14		mA
		$V_{DD} = 10V, V_O = 9.5V$	– 0.62		– 0.5	– 1.0		– 0.35		mA
		$V_{DD} = 15V, V_O = 13.5V$	– 1.8		– 1.5	– 3.0		– 1.1		mA
I_{IN}	Input Current	$V_{DD} = 15V, V_{IN} = 0V$		– 0.10		-10^{-5}	– 0.10		– 1.0	μA
		$V_{DD} = 15V, V_{IN} = 15V$		0.10		10^{-5}	0.10		1.0	μA

Note 1: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed; they are not meant to imply that the devices should be operated at these limits. The tables of "Recommended Operating Conditions" and "Electrical Characteristics" provide conditions for actual device operation.

Note 2: $V_{SS} = 0V$ unless otherwise specified.

Note 3: I_{OH} and I_{OL} are tested one output at a time.

DC Electrical Characteristics CD4019BC (Note 2)

Symbol	Parameter	Conditions	− 55°C		+ 25°C			+ 125°C		Units
			Min	Max	Min	Typ	Max	Min	Max	
I _{DD}	Quiescent Device Current	V _{DD} = 5V V _{DD} = 10V V _{DD} = 15V		1 2 4		0.03 0.05 0.07	1 2 4		7.5 15 30	μA μA μA
V _{OL}	Low Level Output Voltage	I _O < 1 μA V _{DD} = 5V V _{DD} = 10V V _{DD} = 15V		0.05 0.05 0.05		0 0 0	0.05 0.05 0.05		0.05 0.05 0.05	V V V
V _{OH}	High Level Output Voltage	I _O < 1 μA V _{DD} = 5V V _{DD} = 10V V _{DD} = 15V	4.95 9.95 14.95		4.95 9.95 14.95	5 10 15		4.95 9.95 14.95		V V V
V _{IL}	Low Level Input Voltage	V _{DD} = 5V, V _O = 0.5V or 4.5V V _{DD} = 10V, V _O = 1.0V or 9.0V V _{DD} = 15V, V _O = 1.5V or 13.5V		1.5 3.0 4.0		2 4 6	1.5 3.0 4.0		1.5 3.0 4.0	V V V
V _{IH}	High Level Input Voltage	V _{DD} = 5V, V _O = 0.5V or 4.5V V _{DD} = 10V, V _O = 1.0V or 9.0V V _{DD} = 15V, V _O = 1.5V or 13.5V	3.5 7.0 11.0		3.5 7.0 11.0	3 6 9		3.5 7.0 11.0		V V V
I _{OL}	Low Level Output Current (Note 3)	V _{DD} = 5V, V _O = 0.4V V _{DD} = 10V, V _O = 0.5V V _{DD} = 15V, V _O = 1.5V	0.52 1.3 3.6		0.44 1.1 3.0	1 2.5 10		0.36 0.9 2.4		mA mA mA
I _{OH}	High Level Output Current (Note 3)	V _{DD} = 5V, V _O = 4.6V V _{DD} = 10V, V _O = 9.5V V _{DD} = 15V, V _O = 13.5V	−0.2 −0.5 −1.4		−0.16 −0.4 −1.2	−0.4 −1.0 −3.0		−0.12 −0.3 −1.0		mA mA mA
I _{IN}	Input Current	V _{DD} = 15V, V _{IN} = 0V V _{DD} = 15V, V _{IN} = 15V		−0.30 0.30		−10 ^{−5} 10 ^{−5}	−0.30 0.30		−1.0 1.0	μA μA

Note 1: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed; they are not meant to imply that the devices should be operated at these limits. The tables of "Recommended Operating Conditions" and "Electrical Characteristics" provide conditions for actual device operation.

Note 2: V_{SS} = 0V unless otherwise specified.

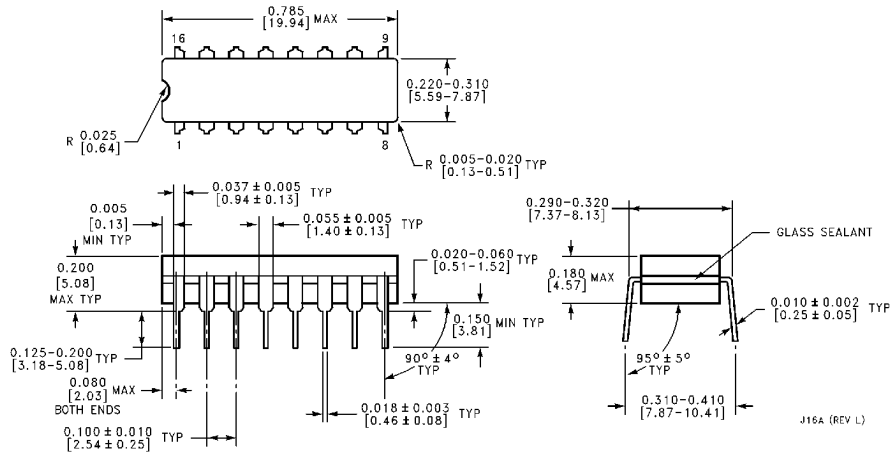
Note 3: I_{OH} and I_{OL} are tested one output at a time.

AC Electrical Characteristics* T_A = 25°C, C_L = 50 pF, R_L = 200k, unless otherwise specified

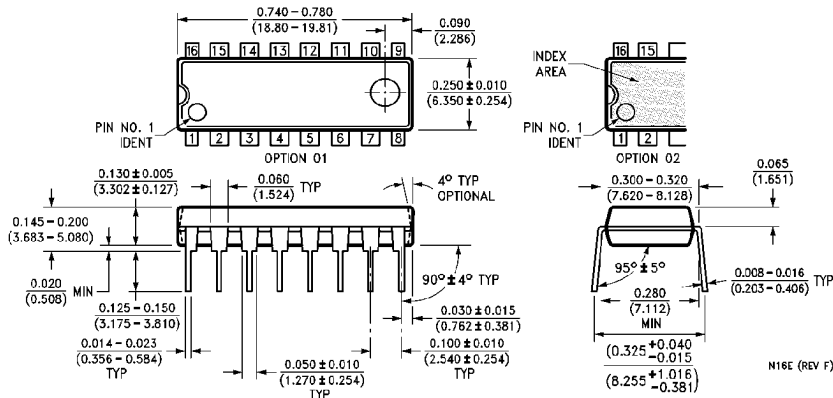
Symbol	Parameter	Conditions	Min	Typ	Max	Units
t _{PHL} , t _{PLH}	Propagation Delay, Input to Output	V _{DD} = 5V V _{DD} = 10V V _{DD} = 15V		100 50 45	300 120 100	ns ns ns
t _{THL}	High-to-Low Level Transition Time	V _{DD} = 5V V _{DD} = 10V V _{DD} = 15V		100 50 40	200 100 80	ns ns ns
t _{TLH}	Low-to-High Level Transition Time	V _{DD} = 5V V _{DD} = 10V V _{DD} = 15V		150 70 50	300 140 100	ns ns ns
C _{IN}	Input Capacitance	All A and B Inputs K _A and K _B Inputs		5 10	7.5 15	pF pF

*AC Parameters are guaranteed by DC correlated testing.

Physical Dimensions inches (millimeters) (Continued)



Ceramic Dual-In-Line Package (J)
Order Number CD4019BMJ or CD4019BCJ
NS Package Number J16A



Molded Dual-In-Line Package (N)
Order Number CD4019BMN or CD4019BCN
NS Package Number N16E

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