



MMC 4019

# QUAD AND/OR SELECT GATE

## GENERAL DESCRIPTION

The MMC 4019 consists of four AND/OR select gate configurations, each consisting of two 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. The MMC 4019 E/F/G/H types are supplied in 16-lead hermetic dual-in-line ceramic or plastic package.

## FEATURES

- Medium-speed operation  $t_{PHL} = t_{PLH} = 60$  ns (TYP.) at  $V_{DD} = 10$  V,  $C_L = 50$  pF
- 100% tested for quiescent current

## APPLICATIONS

- AND-OR select gating
- Shift-right/shift/left registers
- True/complement selection
- And-OR/exclusive-OR selector

## ABSOLUTE MAXIMUM RATINGS

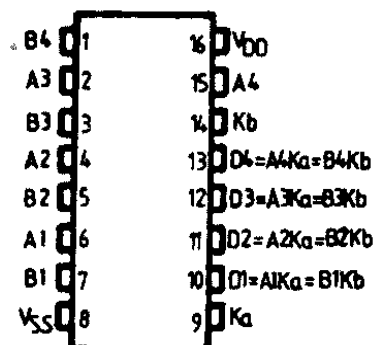
$V_{DD}^*$	Supply voltage: G and H types E and F types	-0.5 to 20	V
$V_i$	Input voltage	-0.5 to 18	V
$I_i$	DC input current (any one input)	-0.5 to $V_{DD} + 0.5$	V
$P_{tot}$	Total power dissipation (per package)	$\pm 10$	mA
	Dissipation per output transistor for $T_A =$ full package-temperature range	200	mW
$T_A$	Operating temperature: G and H types E and F types	100	m
$T_{stg}$	Storage temperature	-55 to 125	°C
		-40 to 85	°C
		-65 to 150	°C

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

## RECOMMENDED OPERATING CONDITIONS

$V_{DD}^*$	Supply voltage: G and H types E and F types	3 to 18	V
$V_i$	Input voltage	3 to 15	V
$T_A$	Operating temperature: G and H types E and F types	0 to $V_{DD}$	V
		-55 to 125	°C
		-40 to 85	°C

## CONNECTION DIAGRAM



**STATIC ELECTRICAL CHARACTERISTICS**

(over recommended operating conditions)

PARAMETER		TEST CONDITIONS				VALUES						UNIT	
		V <sub>I</sub> (V)	V <sub>O</sub> (V)	I <sub>O</sub>   ( $\mu$ A)	V <sub>DD</sub> (V)	T <sub>LOW</sub>		25°C			T <sub>HIGH</sub>		
						min.	max.	min.	typ	max.	min.		max.
I <sub>L</sub>	Quiescent current	G, H types	0/ 5			5		1		0.02	1		30
			0/10			10		2		0.02	2		60
			0/15			15		4		0.02	4		120
			0/20			20		20		0.04	20		600
	E, F 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 <sub>OH</sub>	Output high voltage												
		0/ 5		< 1	5	4.95		4.95			4.95		
		0/10		< 1	10	9.95		9.95			9.95		
		0/15		< 1	15	14.95		14.95			14.95		
V <sub>OL</sub>	Output low voltage												
		5 / 0		< 1	5		0.05			0.05		0.05	
		10/ 0		< 1	10		0.05			0.05		0.05	
		15/ 0		< 1	15		0.05			0.05		0.05	
V <sub>IH</sub>	Input high voltage												
			0.5/4.5	< 1	5	3.5		3.5			3.5		
			1/9	< 1	10	7		7			7		
			1.5/13.5	< 1	15	11		11			11		
V <sub>IL</sub>	Input low voltage												
			4.5/0.5	< 1	5		1.5			1.5		1.5	
			9/1	< 1	10		3			3		3	
			13.5/1.5	< 1	15		4			4		4	
I <sub>OH</sub>	Output drive current												
		G, H types	0/ 5	2.5		5	-2		-1.6	-3.2		-1.15	
			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	
		E, F 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 <sub>OL</sub>	Output sink current												
		G, H types	0/ 5	0.4		5	0.64		0.51	1		0.36	
			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	
		E, F 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 <sub>IH</sub> , I <sub>IL</sub>	Input leakage current												
		G, H types	0/18	Any input		18		$\pm 0.1$		$\pm 10^{-5}$	$\pm 0.1$		$\pm 1$
		E, F types	0/15			15		$\pm 0.3$		$\pm 10^{-5}$	$\pm 0.3$		$\pm 1$
C <sub>i</sub>	Input capacitance			Any input						5	7.5		pF

\* T<sub>LOW</sub> = -55°C for G, H devices; -40°C for E, F devices.\* T<sub>HIGH</sub> = +125°C for G, H devices; +85°C for E, F devices.

The Noise Margin for both "1" and "0" level is:

1 V min. with V<sub>DD</sub> = 5 V2 V min. with V<sub>DD</sub> = 10 V2.5 V min. with V<sub>DD</sub> = 15 V

### DYNAMIC ELECTRICAL CHARACTERISTICS

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

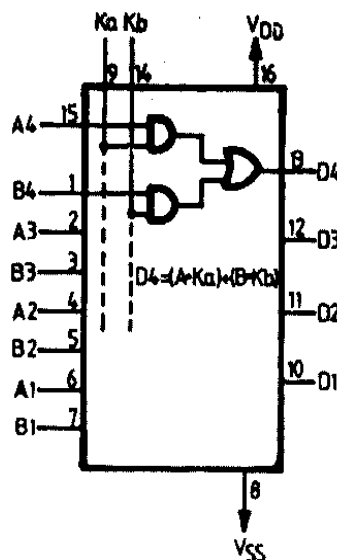
PARAMETER	TEST CONDITIONS	VALUES			UNIT	
		$V_{DD}$ (V)	min.	typ.		max.
$t_{PLH}$ $t_{PHL}$	Propagation delay time	5		150	300	ns
		10		60	120	
		15		50	100	
$t_{TLH}$ $t_{TLH}$	Transition time	5		100	200	ns
		10		50	100	
		15		40	80	

### TRUTH TABLE

$K_a$	$K_b$	$A_n$	$B_n$	DN
1	0	1	X	1
1	0	0	X	0
0	1	X	1	1
0	1	X	0	0
1	1	0	0	0
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

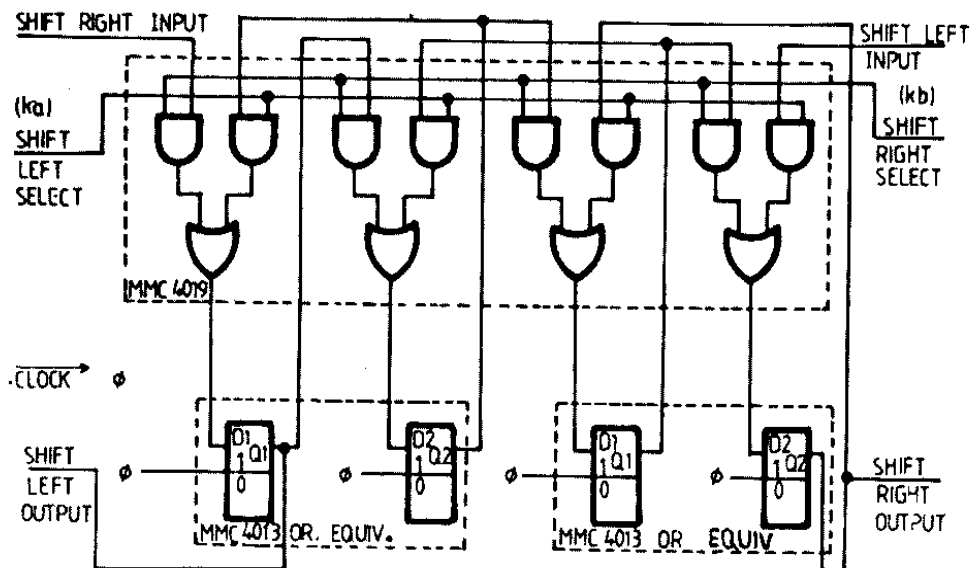
X = Don't Care

### LOGIC DIAGRAM

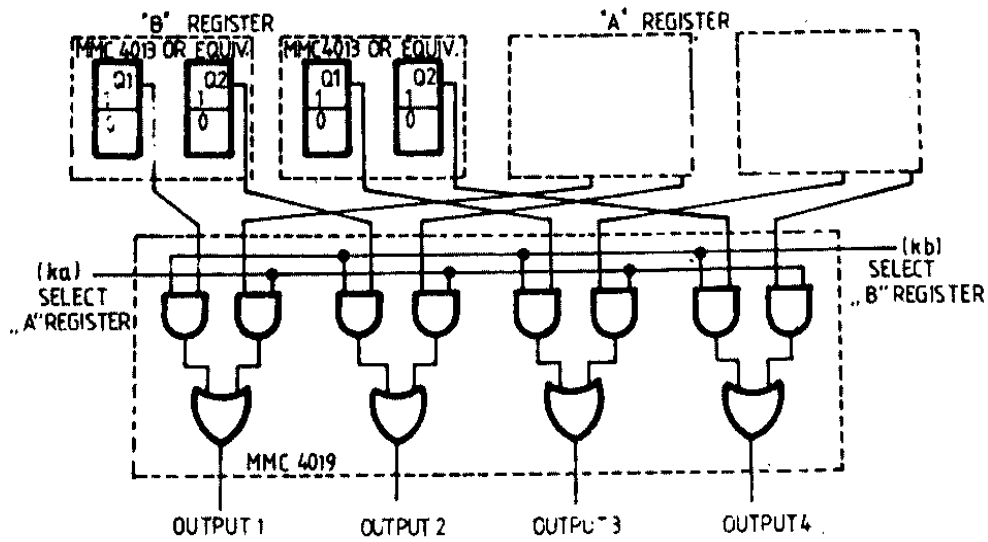


### TYPICAL APPLICATIONS

#### SHIFT-LEFT SHIFT-RIGHT REGISTER



AND-OR SELECTED GATING



TRUE COMPLEMENT SELECTOR

