



MMC 4071 MMC 4072 MMC 4075

# OR Gates: QUAD 2 INPUT MMC 4071 DUAL 4 INPUT MMC 4072 TRIPLE 3 INPUT MMC 4075

## GENERAL DESCRIPTION

These OR gates are monolithic complementary MOS (CMOS) integrated circuits. The N and P channel enhancement mode transistors provide a symmetrical circuit with output swings essentially equal to the supply voltage. This results in high noise immunity over a wide supply voltage range. No DC power other than that caused by leakage current is consumed during static conditions. All inputs are protected against static discharge and latching conditions.

The MMC 4071 MMC 4072 and MMC 4075E/F/G/H types provide the system designer with direct implementation of the OR function. All inputs and outputs are buffered.

The MMC 4071, MMC 4072 and MMC 4075E/F/G/H types are supplied in 14-lead hermetic dual-in-line ceramic or plastic packages.

## FEATURES

- Medium-Speed Operation- $t_{PLH}$ ,  $t_{PLH} = 60$  ns (typ.) at  $V_{DD} = 10$  V
- 100% tested for quiescent current

## ABSOLUTE MAXIMUM RATINGS

$V_{DD}^*$	Supply voltage: G and H types E and F types	-0.5 to -0.5 to	20 18	V V
$V_i$	Input voltage	-0.5 to	$V_{DD} + 0.5$	V
$I_i$	DC input current (any one input)		$\pm 10$	mA
$P_{tot}$	Total power dissipation (per package) 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	-55 to -40 to	125 85	$^{\circ}C$ $^{\circ}C$
$T_{stg}$	Storage temperature	-65 to	150	$^{\circ}C$

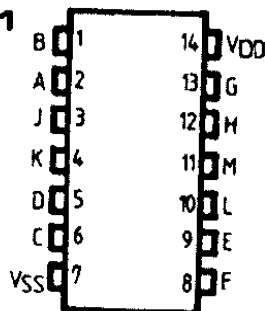
\* All voltage values are referred to  $V_{SS}$  pin voltage

## RECOMMENDED OPERATING CONDITIONS

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

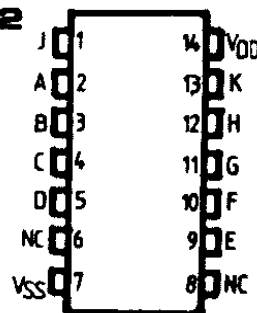
## CONNECTION DIAGRAMS

MMC 4071



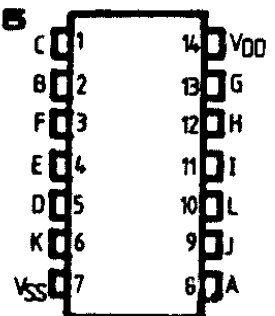
$$\begin{aligned} J &= A + B \\ K &= C + D \\ L &= E + F \\ M &= G + H \end{aligned}$$

MMC 4072



$$\begin{aligned} J &= A + B + C + D \\ K &= E + F + G + H \end{aligned}$$

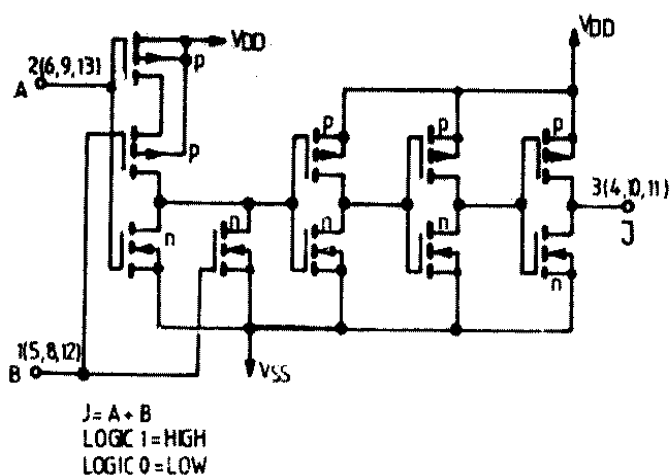
MMC 4075



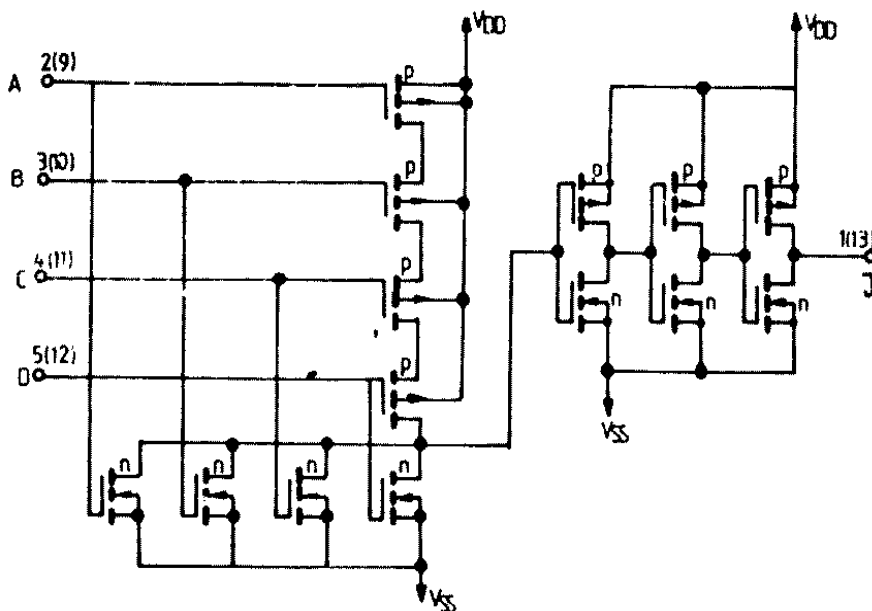
$$\begin{aligned} J &= A + B + C \\ K &= D + E + F \\ L &= G + H + I \end{aligned}$$

## SCHEMATIC DIAGRAMS

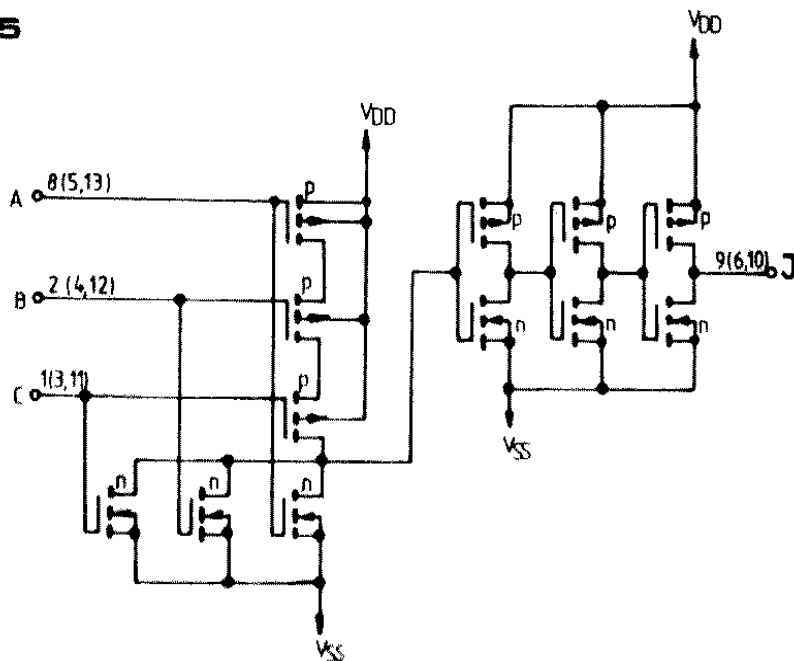
### MMC 4071



### MMC 4072



### MMC 4075



1 = HIGH LEVEL  
 0 = LOW LEVEL

**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 0/10 0/15 0/20			5 10 15 20		0.25 0.5 1 5		0.01 0.01 0.01 0.02	0.25 0.5 1 5		7.5 15 30 150	$\mu$ A
		E, F types	0/5 0/10 0/15			5 10 15		1 2 4		0.01 0.01 0.01	1 2 4		7.5 15 30	
V <sub>OH</sub>	Output high voltage		0/5 0/10 0/15		<1 <1 <1	5 10 15	4.95 9.95 14.95		4.95 9.95 14.95			4.95 9.95 14.95		V
V <sub>OL</sub>	Output low voltage		5/0 10/0 15/0		<1 <1 <1	5 10 15		0.05 0.05 0.05			0.05 0.05 0.05		0.05 0.05 0.05	V
V <sub>IH</sub>	Input high voltage			0.5/4.5 1/9 1.5/13.5	<1 <1 <1	5 10 15	3.5 7 11		3.5 7 11			3.5 7 11		V
V <sub>IL</sub>	Input low voltage			4.5/0.5 9/1 13.5/1.5	<1 <1 <1	5 10 15		1.5 3 4			1.5 3 4		1.5 3 4	V
I <sub>OH</sub>	Output drive current	G, H types	0/5 0/5 0/10 0/15	2.5 4.6 9.5 13.5		5 5 10 15	-2 -0.64 -1.6 -4.2		-1.6 -0.51 -1.3 -3.4	-3.2 -1 -2.6 -6.8		-1.15 -0.36 -0.9 -2.4		mA
		E, F types	0/5 0/5 0/10 0/15	2.5 4.6 9.5 13.5		5 5 10 15	-1.53 -0.52 -1.3 -3.6		-1.36 -0.44 -1.1 -3.0	-3.2 -1 -2.6 -6.8		-1.1 -0.36 -0.9 -2.4		
I <sub>OL</sub>	Output sink current	G, H types	0/5 0/10 0/15	0.4 0.5 1.5		5 10 15	0.64 1.6 4.2		0.51 1.3 3.4	1 2.6 6.8		0.36 0.9 2.4		mA
		E, F types	0/5 0/10 0/15	0.4 0.5 1.5		5 10 15	0.52 1.3 3.6		0.44 1.1 3.0	1 2.6 6.8		0.36 0.9 2.4		
I <sub>IH</sub> , I <sub>IL</sub>	Input leakage current	G, H types	0/18	Any input		18		$\pm 0.1$		$\pm 10^{-5}$	$\pm 0.1$		$\pm 1$	$\mu$ A
		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

**MMC 4071 MMC 4072 MMC 4075****DYNAMIC ELECTRICAL CHARACTERISTICS**

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

PARAMETER	TEST CONDITIONS	VALUES			UNIT
	$V_{DD}$ (V)	min.	typ.	max.	
$t_{PHL}$ Propagation delay-time	5		125	250	ns
	10		60	120	
	15		45	90	
$t_{PLH}$ Propagation delay time	5		175	350	ns
	10		70	140	
	15		50	110	
$t_{THL}$ Transition time $t_{TLH}$	5		100	200	ns
	10		50	100	
	15		40	80	