



# QUAD TRUE/COMPLEMENT BUFFER

## GENERAL DESCRIPTION

The MMC 4041 is a monolithic integrated circuit processed in standard Al-gate CMOS technology. The MMC 4041 contains four true/complement buffers consisting of n- and p-channel units having low channel resistance and high current (sourcing and sinking) capability. The MMC 4041 is intended for use as a buffer, line driver, or CMOS-to-TTL driver. It can be used as an ultra-low power resistor-network driver for A/D and D/A conversion, as a transmission-line driver, and in other applications where high noise immunity and low-power dissipation are primary design requirements.

## FEATURES

- Balanced sink and source current; approximately 4 times standard „B“ drive
- Equalized delay to true and complement outputs

## ABSOLUTE MAXIMUM RATINGS

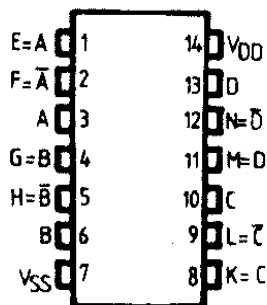
$V_{DD}^*$	Supply voltage: G and H types E and F types	-0.5 to 20 -0.5 to 18	V V
$V_i$	Input voltage	-0.5 to $V_{DD} + 0.5$	V
$I_i$	DC input current (any one input)	$\pm 10$	mA
$P_{tot}^*$	Total power dissipation (per package) Dissipation per output transistor for $T_A$ = full package-temperature range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

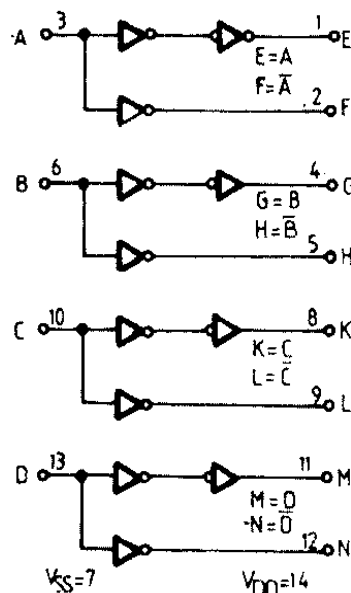
## RECOMMENDED OPERATING CONDITIONS

$V_{DD}^*$	Supply voltage: G and H types E and F types	3 to 18 3 to 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 125 -40 to 85	$^{\circ}C$ $^{\circ}C$

## CONNECTION DIAGRAM



## FUNCTIONAL 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>OL</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>I</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		V	
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	V	
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	4		4			4		V	
			1/9	< 1	10	8		8			8			
			1.5/13.5	< 1	15	12		12			12			
V <sub>IL</sub>	-Input low voltage		4.5/0.5	< 1	5		1			1		1	V	
			9/1	< 1	10		2			2		2		
			13.5/1.5	< 1	15		2.5			2.5		2.5		
I <sub>OH</sub>	Output drive current	G, H types	0/5	2.5		5	-8.4		-6.4	-12.8		-4.6		mA
			0/5	4.6		5	-2.1		-1.6	-3.2		-1.2		
0/10	9.5			10	-6.25		-5	-10		-3.5				
0/15	13.5			15	-24		-19	-38		-13				
E, F types	0/5	2.5		5	-6.8		-5.44	-12.8		-4.08				
	0/5	4.6		5	-1.7		-1.36	-3.2		-1.02				
	0/10	9.5		10	-5.31		-4.25	-10		-3.18				
	0/15	13.5		15	-20.18		-16.15	-38		-12.1				
I <sub>OL</sub>	Output sink current	G, H types	0/5	0.4		5	2.1		1.6	3.2		1.2		mA
			0/10	0.5		10	6.25		5	10		3.5		
0/15	1.5			15	24		19	38		13				
E, F types	0/5	0.4		5	1.7		1.36	3.2		1.02				
	0/10	0.5		10	5.31		4.25	10		3.18				
	0/15	1.5		15	20.18		16.15	38		12.11				
I <sub>IN</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.						15	225			pF	

T<sub>LOW</sub> = -55°C for G, H devices; -40°C for E, F devicesT<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**

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

PARAMETER	TEST CONDITIONS	VALUES			UNIT
	VDD(V)	min.	typ.	max.	
$t_{PLH}$ Propagation delay time $t_{PHL}$	5		60	120	ns
	10		35	70	
	15		25	50	
$t_{THL}$ Transition time $t_{TTL}$	5		40	80	ns
	10		20	40	
	15		15	30	

**SCHEMATIC DIAGRAM**

