QUAD TRUE/COMPLEMENT BUFFER

GENERAL DESCRIPTION

The MMC 4041 is a monolitic 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

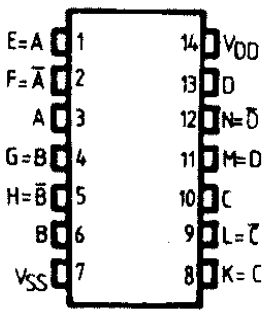
V_{DD}*	Supply voltage: G and H types	-0.5 to	20	V
	E and F types	-0.5 to	18	V
V_I	Input voltage	-0.5 to	V_{DD}+0.5	V
I_I	DC input current (any one input)		±10	mA
P_{tot}*	Total power dissipation (per package)		200	mW
	Dissipation per output transistor for T_A = full package-temperature range		100	mW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

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

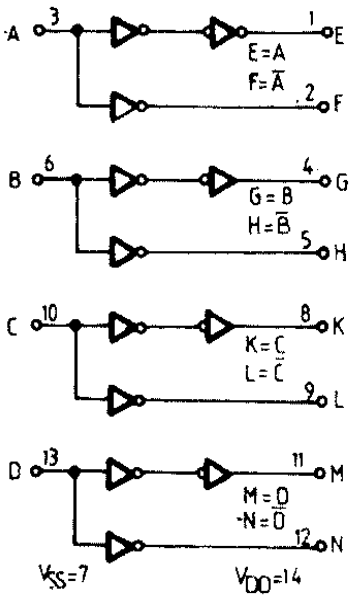
RECOMMENDED OPERATING CONDITIONS

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

CONNECTION DIAGRAM



FUNCTIONAL DIAGRAM



STATIC ELECTRICAL CHARACTERISTICS

(over recommended operating conditions)

PARAMETER		TEST CONDITIONS				VALUES							UNIT
		V_I (V)	V_O (V)	$\|I_O\|$ (μA)	V_{DD} (V)	T^*_{LOW} min.	T^*_{LOW} max.	25°C min.	25°C typ	25°C max.	T^*_{HIGH} min.	T^*_{HIGH} max.	
I_L Quiescent current	G, H types	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	
		0/20			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_{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			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_{IL} —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_{OH} 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_{OL} 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_{IH}, I_{IL} Input leakage current	G, H types	0/18	Any input		18		±0.1		±10 [5]	±0.1		±1	μA
	E, F types	0/15			15		±0.3		±10 [5]	±0.3		±1	
C_I Input capacitance			Any input						15	22.5			pF

T_{LOW} = -55° C for G, H devices; -40° C for E, F devices

T_{HIGH} = +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_{DD} = 5 V

2 V min. with V_{DD} = 10 V

2.5 V min. with V_{DD} = 15 V

DYNAMIC ELECTRICAL CHARACTERISTICS

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

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

SCHEMATIC DIAGRAM