



MMC4049 MMC4050

HEX BUFFER/CONVERTERS: MMC 4049-INVERTING TYPE MMC 4050-NON-INVERTING TYPE

GENERAL DESCRIPTION

The MMC 4049 and the MMC 4050 are monolithic integrated circuits processed in standard Al-gate CMOS technology. The MMC 4049 and the MMC 4050 are inverting and non-inverting hex-buffers, respectively, and feature logic-level conversion using only one supply voltage (V_{DD}). The input-signal high level (V_{IH}) can exceed the V_{DD} supply voltage when these devices are used for logic level conversions. These devices are intended for use as CMOS to DTL/TTL converters and can drive directly two DTL/TTL loads ($V_{DD} = 5V$, $V_{OL} \leq 0.4V$, and $I_O \geq 3.2mA$).

FEATURES

- High sink current for driving 2TTL loads
- High-to-low level logic conversion
- High sink and source current capability

ABSOLUTE MAXIMUM RATINGS

V_{DD}^*	Supply voltage: G and H types E and F types	-0.5 to 20 -0.5 to 18 -0.5 to $V_{DD}+0.5$	V V V
V_i	Input voltage		
I_i	DC input current (any one input)	± 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	°C °C
T_{stg}	Storage temperature	-65 to 150	°C

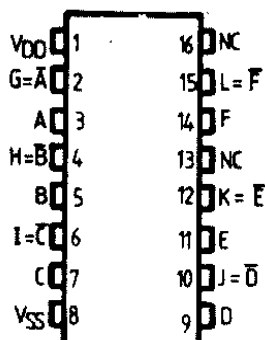
* All voltage values are referred to V_{SS} pin voltage

RECOMMENDED OPERATING CONDITIONS

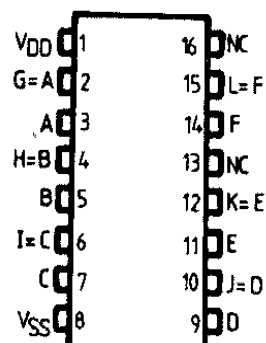
V_{DD}^*	Supply voltage: G and H types E and F types	3 to 18 3 to 15 0 to V_{DD}	V V V
V_i	Input voltage		
T_A	Operating temperature : G and H types E and F types	-55 to 125 -40 to 85	°C °C

CONNECTION DIAGRAMS

MMC 4049



MMC 4050



STATIC ELECTRICAL CHARACTERISTICS

(over recommended operating conditions)

PARAMETER		TEST CONDITIONS			VALUES						UNIT	
		V _I (V)	V _O (V)	V _{DD} (V)	T _{LOW}		25°C			T _{HIGH}		
					min.	max.	min.	typ	max.	min.		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		5	4.95		4.95			4.95		V
		0/10		10	9.95		9.95			9.95		
		0/15		15	14.95		14.95			14.95		
V _{OL} Output low voltage		5 / 0		5		0.05			0.05		0.05	V
		10/ 0		10		0.05			0.05		0.05	
		15/ 0		15		0.05			0.05		0.05	
V _{IH} Input high voltage (4049)			0.5 1 2	5 10 15	4 8 12		4 8 12			4 8 12		V
V _{IH} Input high voltage (4050)			4.5 9 13.5	5 10 15	3.5 7 11		3.5 7 11			3.5 7 11		V
V _{IL} Input low voltage (4049)			4.5 9 13	5 10 15		1 2 3			1 2 3		1 2 3	V
V _{IL} Input low voltage (4050)			0.5 1 1.5	5 10 15		1.5 3 4			1.5 3 4		1.5 3 4	V
I _{OH} Output drive current	G, H types	0/ 5	2.5	5	1.6		-1.25	-6.4		-0.9		mA
		0/ 5	4.6	5	0.64		-0.51	-1.6		-0.36		
		0/10	9.5	10	1.6		-1.30	-3.6		-0.9		
		0/15	13.5	15	4.7		-3.75	-12		-2.6		
	E, F types	0/ 5	2.5	5	1.5		-1.25	-6.4		-1		
		0/ 5	4.6	5	0.61		-0.51	-1.6		-0.42		
		0/10	9.5	10	1.5		-1.25	-3.6		-1		
		0/15	13.5	15	4.5		-3.75	-12		-3		
I _{OL} Output sink current	G, H types	0/ 5	0.4	5	3.75		3.2	6.4		2.2		μA
		0/10	0.5	10	10		8	16		5.6		
		0/15	1.5	15	30		24	48		17		
	E, F types	0/ 5	0.4	5	3.6		3.2	6.4		2.6		
		0/10	0.5	10	9.6		8	16		6.6		
		0/15	1.5	15	28		24	48		19		
I _{IH} , I _{IL} Input leakage current	G, H types	0/18		18		±0.1		±10 ⁻³	±0.1		±1	μA
	E, F types	0/15		15		±0.3		±10 ⁻³	±0.3		±1	
C _I Input capacitance	4049	Any input						15	22.5			pF
	4050							5	7.5			

* T_{LOW} = -55°C for G, H device; -40°C for E, F device* T_{HIGH} = +125°C for G, H device; +85°C for E, F device

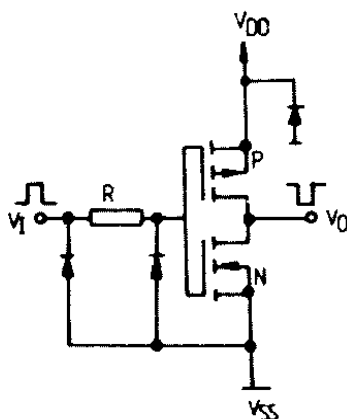
The noise margin (only MMC 4050 type) for both „1“ and „0“ level is:

1V min. with V_{DD} = 5V2V min. with V_{DD} = 10V2.5V min. with V_{DD} = 15V

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 ns).

PARAMETER	TEST CONDITIONS		VALUES			UNIT
	$V_I(\text{V})$	$V_{DD}(\text{V})$	min.	typ.	max.	
t_{PLH} Propagation delay time (4049)	5	5		60	120	ns
	10	10		32	65	
	10	5		45	90	
	15	15		25	50	
	15	5		45	90	
t_{PLH} Propagation delay time (4050)	5	5		70	140	ns
	10	10		40	80	
	10	5		45	90	
	15	15		30	60	
	15	5		40	80	
t_{PHL} Propagation delay time (4049)	5	5		32	65	ns
	10	10		20	40	
	10	5		15	30	
	15	15		15	30	
	15	5		10	20	
t_{PHL} Propagation delay time (4050)	5	5		55	110	ns
	10	10		22	55	
	10	5		50	100	
	15	15		15	30	
	15	5		50	100	
t_{TLH} Transition time	5	5		80	160	ns
	10	10		40	80	
	15	15		30	60	
t_{THL} Transition time	5	5		30	60	ns
	10	10		20	40	
	15	15		15	30	

SCHEMATIC DIAGRAMS**MMC 4049****MMC4050**