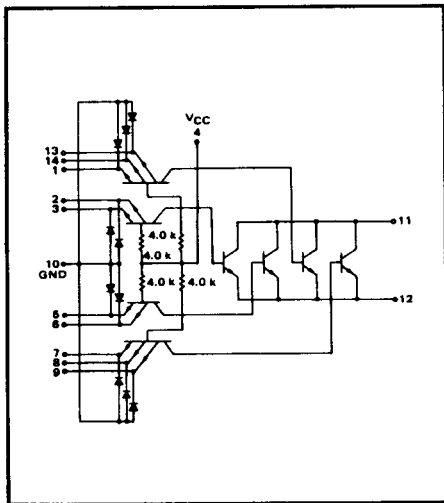
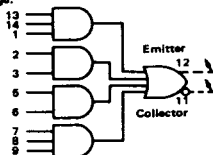


4-WIDE 3-2-2-3 INPUT
EXPANDER FOR
"AND-OR-INVERT" GATES

MC509 · MC559
MC409 · MC459



This device consists of two 2-input and two 3-input AND gates ORed together with the common ORing node made available as the output. The basic expandable gate can be expanded up to 10 AND gates by using the MC509 series or the MC510 series expander package.



Total Power Dissipation = 20 mW/pkg.

Propagation Delay Time:

$\Delta t_{pd} = +4.0$ ns typ (1.0 ns per ORed function)
When added to the expandable "AND-OR-INVERT" gate.

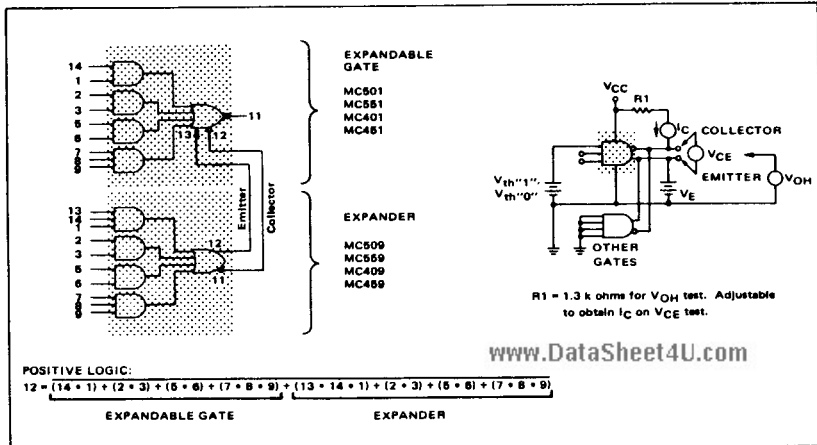
$\Delta t_{pd}/pF = 1.0$ ns/pF typ
Caused by additional capacitance at expansion points.

TYPE NO.	INPUT LOADING FACTOR (I _F)	TEMPERATURE RANGE
MC509 MC559	1 (-1.33 mA)	-65°C to +125°C
MC409 MC459	1 (-1.66 mA)	0°C to +75°C

Full output loading factor of the expandable gate is maintained.

APPLICATION: EXPANDABLE 4-WIDE "AND-OR-INVERT" GATE WITH A 4-WIDE 3-2-2-3 INPUT EXPANDER CONNECTED.

V_{CE}, V_{OH} TEST CIRCUIT



POSITIVE LOGIC:

$$12 = (14 \cdot 1) + (2 \cdot 3) + (5 \cdot 6) + (7 \cdot 8 \cdot 9) + (13 \cdot 14 \cdot 1) + (2 \cdot 3) + (5 \cdot 6) + (7 \cdot 8 \cdot 9)$$

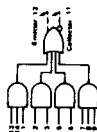
EXPANDABLE GATE

EXPANDER

R1 = 1.3 k ohms for V_{OH} test. Adjustable to obtain I_C on V_{CE} test.

ELECTRICAL CHARACTERISTICS

Test procedures are shown for only one input of the device. To complete testing, sequence through remaining inputs in the same manner.



TEST CONDITIONS

mA		Volts															
I_C	I_m	V_B	V_{B1}	V_{B2}	V_{B3}	V_{m1}	V_{m1}	V_{m0}	V_{m0}	V_{m0}	V_{m0}	V_{m0}	V_{m0}	V_{m0}	V_{m0}	V_{CC}	V_{CC}
4.0	1.0	4.5	1.00	0.90	0.8	2.0	1.0	5.5	*	-	5.0	-	-	-	-	5.0	-
4.0	1.0	4.5	0.85	0.75	0.8	1.7	1.2	5.5	*	**	5.0	9.0	-	-	-	5.0	-
4.0	1.0	4.5	0.85	0.55	0.8	1.4	0.9	5.5	*	-	5.0	-	-	-	-	5.0	-
4.0	1.0	4.5	0.90	0.80	0.8	1.9	1.1	5.5	*	-	5.0	-	-	-	-	5.0	7.0
4.0	1.0	4.5	0.85	0.75	0.8	1.8	1.2	5.5	*	**	5.0	7.0	-	-	-	5.0	-
4.0	1.0	4.5	0.75	0.65	0.8	1.7	1.1	5.5	*	-	5.0	-	-	-	-	5.0	-

TEST CURRENT / VOLTAGE APPLIED TO PINS LISTED BELOW :

Characteristic	Symbol	Pin Under Test	MC509, MC559 Test Limits						MC409, MC459 Test Limits						TEST CURRENT / VOLTAGE APPLIED TO PINS LISTED BELOW :																		
			-55°C Min	+25°C Min	+125°C Min	0°C Min	+25°C Max	+75°C Max	-55°C Min	+25°C Min	+125°C Min	0°C Min	+25°C Max	+75°C Max	I_C	I_m	V_B	V_{B1}	V_{B2}	V_{B3}	V_{m1}	V_{m1}	V_{m0}	V_{m0}	V_{m0}	V_{m0}	V_{m0}	V_{m0}	V_{m0}	V_{m0}	V_{CC}	V_{CC}	
Input Forward Current	I_F	1	-	-1.33	-	-1.33	-	-1.33	-	-1.66	-	-1.66	mAdc	-	-	2.3,5,6,7,8,9,13,14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	1.10
Leakage Current	I_R	1	-	100	-	100	-	100	-	100	-	100	μ Adc	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	2.3,5,6,7,8,9,10,13,14	
Inverse Beta Current	I_L	1	-	100	-	100	-	100	-	100	-	100	μ Adc	-	-	1	12	-	-	-	-	-	-	-	-	-	-	-	-	4	-	2.3,5,6,7,8,9,10	
Breakdown Voltage	$BV_{in}^{(1)}$	1	5.5	-	5.5	-	5.5	-	5.5	-	5.5	Vdc	-	-	12	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	2.3,5,6,7,8,9,10		
Output	V_{OH}	11	4.8	-	4.8	-	4.8	-	4.8	-	4.8	Vdc	-	-	12	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	2.3,5,6,7,8,9,10		
Output Voltage	$V_{CE}^{(2)}$	11	0.65	-	0.65	-	0.65	-	0.65	-	0.65	μ Adc	-	-	12	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	2.3,5,6,7,8,9,10		
Leakage Current	I_{OLK}	11	250	-	250	-	250	-	250	-	250	μ Adc	-	-	12	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	1.2,3,5,6,7,8,9,10,13,14		
Power Requirements (Total Device)	I_{max}	4	-	-	-	-	-	-	-	-	-	mAdc	-	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-	4	1.2,3,5,6,7,8,9,10,13,14	
Power Supply Drain	I_{PDH}	4	5.0	-	5.0	-	6.0	-	6.0	-	6.0	mAdc	-	-	7.0	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	10	1.2,3,5,6,7,8,9,10,13,14	
Power Supply Drain	I_{PDL}	4	6.0	-	6.0	-	7.0	-	7.0	-	7.0	mAdc	-	-	7.0	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	10	1.2,3,5,6,7,8,9,10,13,14	

* Indicated pins tied to V_{CC} thru 1.3 & k ohms - 1.0 Ω resistor.
 ** Indicated pins tied to V_{CC} thru 1.3 & k ohms - 1.0 Ω resistor.
 (1) V_{CE} is referenced to the emitter Voltage (Pin 12)