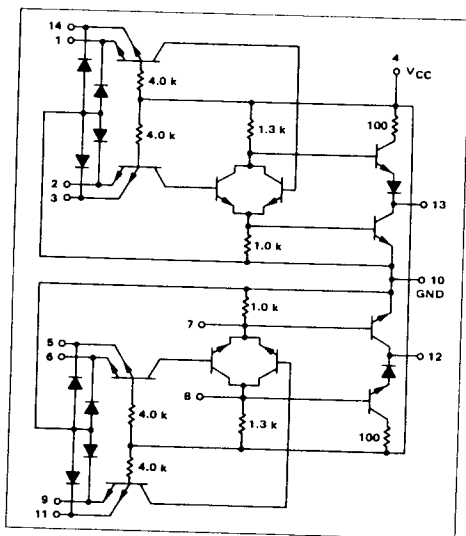


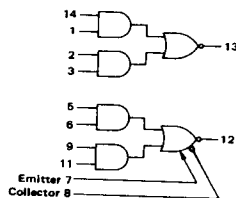
EXPANDABLE  
DUAL 2-WIDE 2-INPUT  
"AND-OR-INVERT" GATE

MTTL I MC500/400 series

MC520 • MC570  
MC420 • MC470



One side of this dual device consists of two 2-input AND gates ORed together and driving an output inverter. The other side consists of two 2-input gates ORed together and driving an output inverter with an output inverter with the ORING nodes made available for expansion. Up to 10 AND gates can be ORed together using the MC509 or MC510 expander series. Care should be taken to minimize the amount of capacitance on the expander terminals in order to maintain switching speeds.



Positive Logic:

$$13 = (1 \cdot 14) \cdot (2 \cdot 3)$$

$$12 = (5 \cdot 6) \cdot (7 \cdot 11) \cdot (\text{Expander})$$

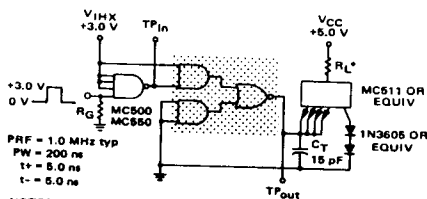
Total Power Dissipation = 40 mW typ/pkg

Propagation Delay Time = 12 ns typ

TYPE NO.	INPUT LOADING FACTOR (I <sub>F</sub> )	OUTPUT DRIVE (I <sub>OL</sub> )	TEMPERATURE RANGE
MC520	1	15 MC500 series Gates (20 mA)	-55°C to +125°C
MC570		7 MC500 series Gates (10 mA)	
MC420	1	12 MC400 series Gates (20 mA)	0° to +75°C
MC470		6 MC400 series Gates (10 mA)	

SWITCHING TIME TEST CIRCUIT

VOLTAGE WAVEFORMS AND DEFINITIONS



PRF = 1.0 MHz typ

PW = 200 ns

t<sub>r</sub> = 5.0 ns

t<sub>f</sub> = 5.0 ns

NOTES:

R<sub>G</sub> = 50 ohms

C<sub>T</sub> = the total parasitic capacitance which includes

probe, wiring, and load capacitances.

Scope rise time < 1.0 ns

Probe capacitance < 5.0 pF

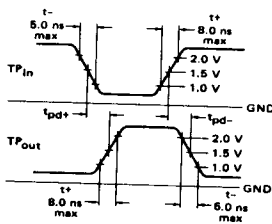
When checking expander side, expander pins should be open.

\*MC520 - 260 Ω

MC570 - 570 Ω

MC420 - 330 Ω

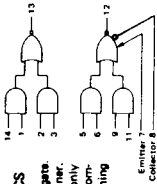
MC470 - 680 Ω



MC520, MC570/MC420, MC470 (continued)

**ELECTRICAL CHARACTERISTICS**

Test procedures are shown for only one gate. The other gates is tested in the same manner. Further, test procedures are shown for only one input of the gate under test. To complete testing, sequence through remaining inputs.



**TEST CONDITIONS**

mA		Volts															
$I_{OL}$	$I_{OH}$	$P_r$	$S_{id}$	$S_{id}$	$I_m$	$V_{IL}$	$V_{IH}$	$V_E$	$V_{M1}$	$V_{M0}$	$V_{M0}$	$V_{M0}$	$V_{CC}$	$V_{M0}$	$V_{CC}$	$V_{M0}$	
20	10	-1.5	-0.7	1.0	0.45	2.8	4.5	2.0	1.0	5.5	5.0	-	-	-	-	-	-
20	10	-1.5	-0.7	1.0	0.45	2.8	4.5	1.7	1.2	5.5	5.0	9.0	9.0	9.0	9.0	9.0	9.0
20	10	-1.5	-0.7	1.0	0.45	2.8	4.5	1.4	0.9	5.5	5.0	-	-	-	-	-	-
20	10	-1.2	-0.6	1.0	0.45	3.0	4.5	1.9	1.1	5.5	5.0	-	-	-	-	-	-
20	10	-1.2	-0.6	1.0	0.45	3.0	4.5	1.6	1.2	5.5	5.0	7.0	7.0	7.0	7.0	7.0	7.0
20	10	-1.2	-0.6	1.0	0.45	3.0	4.5	1.7	1.1	5.5	5.0	-	-	-	-	-	-

TEST CURRENT / VOLTAGE APPLIED TO PINS LISTED BELOW:

Characteristic	Symbol	Pin	MC520, MC570 Test Limits			MC420, MC470 Test Limits			Unit	$I_{OL}$	$I_{OH}$	$V_{IL}$	$V_{IH}$	$V_E$	$V_{M1}$	$V_{M0}$	$V_{M0}$	$V_{CC}$	$V_{M0}$	$V_{CC}$	$V_{M0}$	Gnd†	
			-55°C	+25°C	+125°C	0°C	+25°C	+75°C															0°C
Input Forward Current	$I_F$	1	-1.33	-1.33	-1.33	-1.66	-1.66	-1.66	mA	-	-	-	-	-	-	-	-	-	-	-	-	1.2, 3.10	
Leakage Current	$I_L$	1	100	100	100	100	100	100	$\mu$ Adc	-	-	-	-	-	-	-	-	-	-	-	-	2.3, 10.14	
Inverse Beta Current	$I_{\beta}$	1	100	100	100	100	100	100	$\mu$ Adc	-	-	-	-	-	-	-	-	-	-	-	-	2.3, 10	
Breakdown Voltage	$V_{B(in-op)}$	1	5.5	5.5	5.5	5.5	5.5	5.5	Vdc	-	-	-	-	-	-	-	-	-	-	-	-	2.3, 10	
B $V_{in}^+$ †	$V_{B(in+)}$	1	5.5	5.5	5.5	5.5	5.5	5.5	Vdc	-	-	-	-	-	-	-	-	-	-	-	-	2.3, 10.14	
Output Output Voltage	$V_{out}^{(op)}$	13	0.45	0.45	0.45	0.45	0.45	0.45	Vdc	13	-	-	-	-	-	-	-	-	-	-	-	2.3, 10	
Leakage Current	$I_{OL}$	13	250	250	250	250	250	250	$\mu$ Adc	-	-	-	-	-	-	-	-	-	-	-	-	2.3, 10.14	
Short-Circuit Current	$I_{SC}$	13	-10	-45	-10	-45	-10	-45	-10	-45	-	-	-	-	-	-	-	-	-	-	-	1.2, 3.10 13.14	
Output Voltage	$V_{OL}$	13	0.40	0.40	0.40	0.40	0.40	0.40	Vdc	13	-	-	-	-	-	-	-	-	-	-	-	2.3, 10	
	$V_{OH}$	13	3.2	3.2	3.35	3.0	3.1	3.15	Vdc	13	-	-	-	-	-	-	-	-	-	-	-	2.3, 10	
<b>Power Requirements</b>																							
(Total Device) Max. Power Supply Current	$I_{max}$	4	-	-	10	-	-	10	mAdc	-	-	-	-	-	-	-	-	-	-	-	-	-	1.2, 3.10, 14
Power Supply Drain	$I_{PDH}$	4	-	14	-	14	-	14	mAdc	-	-	-	-	-	-	-	-	-	-	-	-	101	
	$I_{PDL}$	4	7.0	7.0	7.0	8.0	8.0	8.0	mAdc	-	-	-	-	-	-	-	-	-	-	-	-	1.2, 3.10, 14	
<b>Switching Parameters</b>																							
Turn-On Delay	$t_{pd}$	1, 13	-	-	22	-	-	22	ns	-	-	-	-	-	-	-	-	-	-	-	-	-	14
Turn-Off Delay	$t_{pd}$	1, 13	-	-	22	-	-	22	ns	-	-	-	-	-	-	-	-	-	-	-	-	14	
Rise Time	$t_r$	1, 13	-	-	8.0	-	-	8.0	ns	-	-	-	-	-	-	-	-	-	-	-	-	14	
Fall Time	$t_f$	1, 13	-	-	6.0	-	-	6.0	ns	-	-	-	-	-	-	-	-	-	-	-	-	14	

\* Prime Pin-Out  
† Ground inputs to gates not under test during ALL tests unless otherwise noted.  
‡ The inputs to all gates must be ungrounded.

544

544