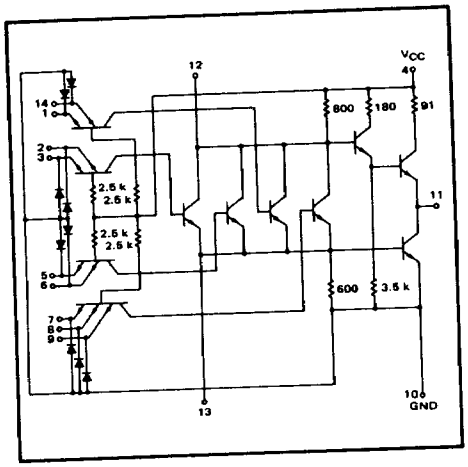
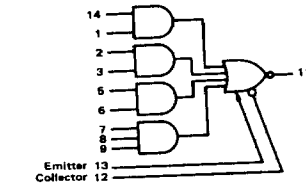
MC2104 • MC2154
MC2004 • MC2054



This device consists of three 2-input and one 3-input AND gates ORed together and driving an output inverter. The ORing nodes are made available for expansion, and up to 10 AND gates can be ORed together using the MC2102 or the MC2106 series expanders. Since switching speed is affected by the amount of capacitance on the expander nodes, care should be taken to minimize this capacitance to maintain switching speeds.



Positive Logic:
$11 = \overline{(14 \cdot 1) + (2 \cdot 3) + (5 \cdot 6) + (7 \cdot 8 \cdot 9) + (\text{Expanders})}$

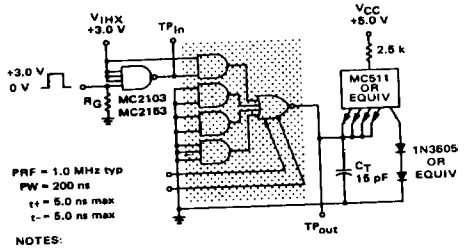
Negative Logic:
$11 = \overline{(14 + 1) \cdot (2 + 3) \cdot (5 + 6) \cdot (7 + 8 + 9) \cdot (\text{Expanders})}$

Total Power Dissipation = 36 mW typ/Pkg

Propagation Delay Time = 7.0 ns typ

TYPE NO.	INPUT LOADING FACTOR (I_F)		OUTPUT DRIVE		(I_{OL})	TEMPERATURE RANGE
MC2104 MC2154	1	−2.0 mA	11 6	MC2100 series Gates MC2100 series Gates	22 mA 12 mA	−55°C to +125°C
MC2004 MC2054	1	−2.5 mA	9 5	MC2000 series Gates MC2000 series Gates	22.5 mA 12.5 mA	0°C to +75°C

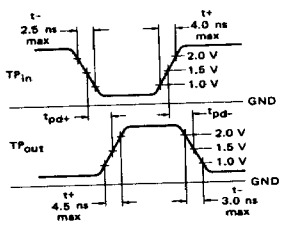
SWITCHING TIME TEST CIRCUIT



PRF = 1.0 MHz typ
PW = 200 ns
t_+ = 5.0 ns max
t_- = 5.0 ns max

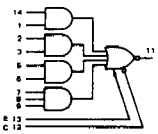
NOTES:
R_G = 50 ohms
C_T = the total parasitic capacitance which includes probe, wiring, and load capacitances.
Scope rise time < 1.0 ns
Probe capacitance < 5.0 pF
Expander pins should be left open when measuring switching times.

VOLTAGE WAVEFORMS AND DEFINITIONS



ELECTRICAL CHARACTERISTICS

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



Characteristic	Symbol	Pin Under Test	MC2104, MC2154 Test Limits −55°C Min	−55°C Max	+25°C Min	+25°C Max	+125°C Min	+125°C Max	MC2004, MC2054 Test Limits 0°C Min	0°C Max	+25°C Min	+25°C Max	+75°C Min	+75°C Max	Unit
Input															
Forward Current	I_F	1	-	-2.0	-	-2.0	-	-2.0	-	-2.5	-	-2.5	-	-2.5	mAdc
Leakage Current	I_R	1	-	100	-	100	-	100	-	100	-	100	-	100	μAdc
Inverse Beta Current	I_L	1	-	100	-	100	-	100	-	100	-	100	-	100	μAdc
Breakdown Voltage	BV_{in} "0"	1	5.5	-	5.5	-	5.5	-	5.5	-	5.5	-	5.5	-	Vdc
	BV_{in} "1"	1	5.5	-	5.5	-	5.5	-	5.5	-	5.5	-	5.5	-	Vdc
Output															
Output Voltage	V_{out} "0"	11	-	0.45	-	0.45	-	0.45	-	0.45	-	0.45	-	0.45	Vdc
	V_{out} "1"	11	2.5	-	2.4	-	2.5	-	2.5	-	2.4	-	2.5	-	Vdc
Leakage Current	I_{OLK}	11	-	250	-	250	-	250	-	250	-	250	-	250	μAdc
Short-Circuit Current	I_{SC}	11	-25	-100	-25	-100	-25	-100	-25	-100	-25	-100	-25	-100	mAdc
Output Voltage	V_{OL}	11	-	0.40	-	0.40	-	0.45	-	0.40	-	0.40	-	0.45	Vdc
	V_{OH}	11	2.70	-	3.10	-	3.15	-	2.9	-	3.0	-	3.0	-	Vdc
Power Requirements (Total Device)															
Maximum Power Supply Current	I_{max}	4	-	-	-	17	-	-	-	-	-	18	-	-	mAdc
Power Supply Drain	I_{PDH}	4	-	12	-	12	-	12	-	16	-	16	-	16	mAdc
	I_{PDL}	4	-	10	-	10	-	10	-	13	-	13	-	13	mAdc
Switching Parameters															
Turn-On Delay	t_{pd-}	1,11	-	-	-	12	-	-	-	-	-	12	-	-	ns
Turn-Off Delay	t_{pd+}	1,11	-	-	-	12	-	-	-	-	-	12	-	-	ns
Rise Time	t_+	1,11	-	-	-	4.5	-	-	-	-	-	4.5	-	-	ns
Fall Time	t_-	1,11	-	-	-	3.0	-	-	-	-	-	3.0	-	-	ns

* Prime Fan-Out.

@ Test Temperature		TEST CONDITIONS: mA I_{OL} Pr*	I_{OL} Std	I_{OH} Pr*	I_{OH} Std	Volts I_{in}	V_{IL}	V_{IH}	V_R	$V_{th\,1}$	$V_{th\,0}$	V_{out}	V_{CC}	V_{CCH}	V_{HX}
MC2104*, MC2154	−55°C	22.0	12.0	-2.2	-1.2	1.0	0.45	2.7	4.5	2.0	0.9	5.5	5.0	-	-
	+25°C	22.0	12.0	-2.2	-1.2	1.0	0.45	2.7	4.5	1.7	1.1	5.5	5.0	8.0	3.0
	+125°C	22.9	12.0	-2.2	-1.2	1.0	0.45	2.7	4.5	1.4	0.9	5.5	5.0	-	-
MC2004*, MC2054	0°C	22.5	12.5	-1.8	-1.0	1.0	0.45	2.9	4.5	1.9	1.0	5.5	5.0	-	-
	+25°C	22.5	12.5	-1.8	-1.0	1.0	0.45	2.9	4.5	1.8	1.1	5.5	5.0	7.0	3.0
	+75°C	22.5	12.5	-1.8	-1.0	1.0	0.45	2.9	4.5	1.7	1.0	5.5	5.0	-	-

Characteristic	TEST CURRENT / VOLTAGE APPLIED TO PINS LISTED BELOW: I_{OL}	I_{OH}	I_{in}	V_{IL}	V_{IH}	V_R	$V_{th\,1}$	$V_{th\,0}$	V_{out}	V_{CC}	V_{CCH}	V_{HX}	Gnd
Input													
Forward Current	-	-	-	-	-	14	-	-	-	4	-	-	1,2,3,5,6,7, 8,9,10
Leakage Current	-	-	-	-	-	1	-	-	-	4	-	-	2,3,5,6,7,8, 9,10,14
Inverse Beta Current	-	-	-	-	-	1	-	-	-	4	-	-	2,3,5,6,7, 8,9,10
Breakdown Voltage	-	-	1	-	-	-	-	-	-	4	-	-	2,3,5,6,7, 8,9,10
	-	-	1	-	-	-	-	-	-	4	-	-	2,3,5,6,7, 8,9,10,14
Output													
Output Voltage	11	-	-	-	-	-	1	-	-	4	-	-	2,3,5,6,7, 8,9,10
	-	11	-	-	-	-	-	1	-	4	-	-	2,3,5,6,7, 8,9,10
Leakage Current	-	-	-	-	-	-	-	-	11	4	-	-	1,2,3,5,6,7, 8,9,10,14
Short-Circuit Current	-	-	-	-	-	-	-	-	-	4	-	-	1,2,3,5,6,7, 8,9,10,11, 14
Output Voltage	11	-	-	-	1	-	-	-	-	4	-	-	2,3,5,6,7, 8,9,10
	-	11	-	1	-	-	-	-	-	4	-	-	2,3,5,6,7, 8,9,10
Power Requirements (Total Device)													
Maximum Power Supply Current	-	-	-	-	-	-	-	-	-	-	4	-	1,2,3,5,6,7, 8,9,10,14
Power Supply Drain	-	-	-	-	-	-	-	-	-	4	-	-	10
	-	-	-	-	-	-	-	-	-	4	-	-	1,2,3,5,6,7, 8,9,10,14
Switching Parameters	Pulse In	Pulse Out											
Turn-On Delay	1	11	-	-	-	-	-	-	-	4	-	14	2,3,5,6,7, 8,9,10
Turn-Off Delay	1	11	-	-	-	-	-	-	-	4	-	14	2,3,5,6,7, 8,9,10
Rise Time	1	11	-	-	-	-	-	-	-	4	-	14	2,3,5,6,7, 8,9,10
Fall Time	1	11	-	-	-	-	-	-	-	4	-	14	2,3,5,6,7, 8,9,10

Table 3-4 DSP56001A Identification by Signal Name (Continued)

Signal Name	132 pin "FC" PQFP or "FE" CQFP Pin No.	88 pin "RC" PGA Pin No.	Signal Name	132 pin "FC" PQFP or "FE" CQFP Pin No.	88 pin "RC" PGA Pin No.
$\overline{WT}$	45	L13	nc	103	
X/$\overline{Y}$	48	N13	nc	107	
XTAL	126	A6	nc	110	
nc	3		nc	116	
nc	4		nc	117	
nc	7		nc	122	
nc	17		nc	125	
nc	18		nc	132	
nc	21				

Power and ground pins have special considerations for noise immunity. See the section **Design Considerations**.

Table 3-5 DSP56001A Power Supply Pins

132 pin "FC" PQFP or "FE" CQFP Pin No.	88 pin "RC" PGA Pin No.	Power Supply	Circuit Supplied
63	L8	V_{CCN}	Address Bus Buffers
64			
55	L6	GNDN	
56	L9		
73			
74			