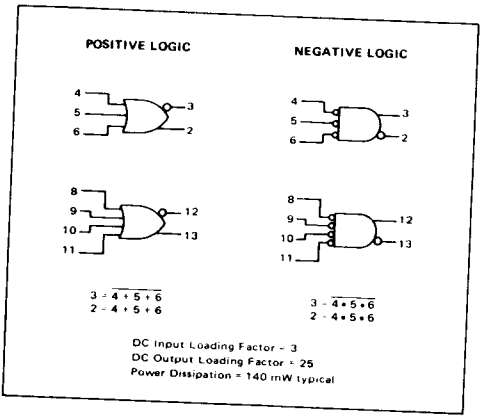
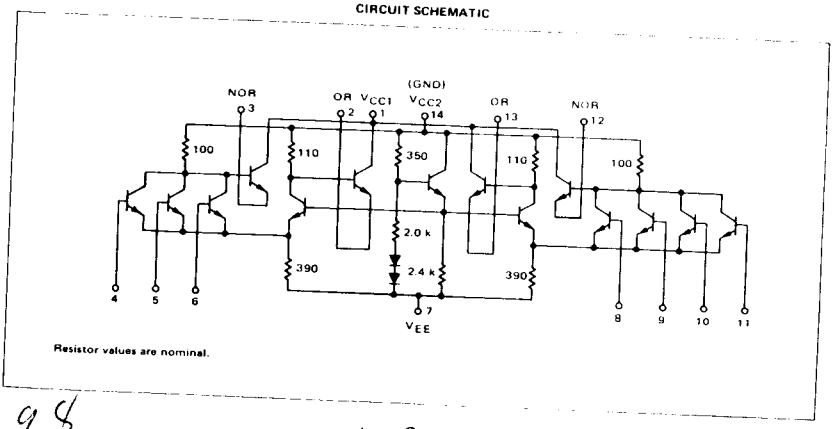
MC1026
MC1226

Provides simultaneous OR/NOR or AND/NAND output functions. It contains an internal bias reference insuring that the threshold point is always in the center of the transition region over the temperature range.

This circuit is designed to operate in high-speed digital computer applications as a 50-ohm transmission line driver, as a clock driver, or as a high-speed gate.



CIRCUIT SCHEMATIC

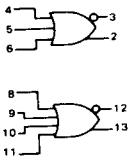


Resistor values are nominal.

198

ELECTRICAL CHARACTERISTICS

Test is shown for only one gate. The other gate is tested in a similar manner.



@Test Temperature

MC1226: −55°C, +25°C, +125°C

MC1026: 0°C, +25°C, +75°C

TEST VOLTAGE/CURRENT VALUES				
Vdc ±1.0%				mAdc
V_{IL}	V_{IH}	$V_{IH\ max}$	V_{EE}	I_L
-1.580	-1.000	-	-5.2	-2.5
-1.500	-0.850	-0.700	-5.2	-2.5
-1.310	-0.720	-	-5.2	-2.5
-1.530	-0.930	-	-5.2	-2.5
-1.500	-0.850	-0.700	-5.2	-2.5
-1.440	-0.790	-	-5.2	-2.5

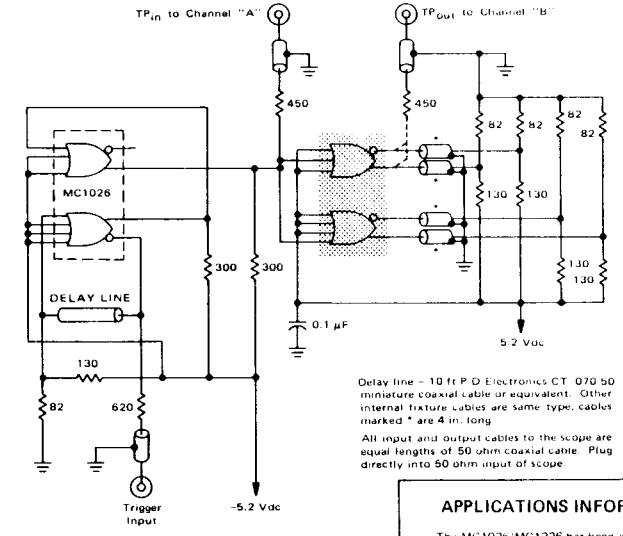
Characteristic	Symbol	Pin Under Test	MC1226 Test Limits −55°C Min	−55°C Max	+25°C Min	+25°C Max	+125°C Min	+125°C Max	Unit	MC1026 Test Limits 0°C Min	0°C Max	+25°C Min	+25°C Max	+75°C Min	+75°C Max	Unit	TEST VOLTAGE/CURRENT APPLIED TO PINS LISTED BELOW: V_{IL}	V_{IH}	$V_{IH\ max}$	V_{EE}	I_L	V_{CC} (Gnd)
Power Supply Drain Current	I_E	7	-	-	-	24.5	-	-	mAdc	-	-	-	24.5	-	-	mAdc	-	-	-	4,5,6,7,8,9,10,11	-	1,14
Input Current	I_{in}	4	-	-	-	300	-	-	μAdc	-	-	-	300	-	-	μAdc	-	-	4	5,6,7,8,9,10,11,*	-	1,14
		5	-	-	-	↓	-	-	↓	-	-	-	↓	-	-	↓	-	-	5	4,6,7,8,9,10,11,*	-	↓
		6	-	-	-		-	-		-	-	-		-	-		-	-	6	4,5,7,8,9,10,11,*	-	
Input Leakage Current	I_R	4	-	-	-	1.0	-	5.0	μAdc	-	-	-	1.0	-	5.0	μAdc	-	-	-	4,5,6,7,8,9,10,11,*	-	1,14
		5	-	-	-	↓	-	↓	↓	-	-	-	↓	-	↓	↓	-	-	-	↓	-	↓
		6	-	-	-		-			-	-	-		-			-	-	-		-	
"NOR" Logical "1" Output Voltage‡	V_{OH}‡	3	-1.000	-0.840	-0.850	-0.700	-0.720	-0.545	Vdc	-0.930	-0.750	-0.850	-0.700	-0.790	-0.635	Vdc	4	-	-	5,6,7,8,9,10,11,*	3	1,14
			↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	5	-	-	4,6,7,8,9,10,11,*	↓	↓
																	6	-	-	4,5,7,8,9,10,11,*		
"NOR" Logical "0" Output Voltage	V_{OL}	3	-2.110	-1.580	-2.000	-1.500	-1.900	-1.380	Vdc	-2.050	-1.530	-2.000	-1.500	-1.940	-1.440	Vdc	-	4	-	5,6,7,8,9,10,11,*	-	1,14
			↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	-	5	-	4,6,7,8,9,10,11,*	-	↓
																	-	6	-	4,5,7,8,9,10,11,*	-	
"OR" Logical "1" Output Voltage‡	V_{OH}‡	2	-1.000	-0.840	-0.850	-0.700	-0.720	-0.545	Vdc	-0.930	-0.750	-0.850	-0.700	-0.790	-0.635	Vdc	-	4	-	5,6,7,8,9,10,11,*	2	1,14
			↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	-	5	-	4,6,7,8,9,10,11,*	-	↓
																	-	6	-	4,5,7,8,9,10,11,*	-	
"OR" Logical "0" Output Voltage	V_{OL}	2	-2.110	-1.580	-2.000	-1.500	-1.970	-1.310	Vdc	-2.050	-1.530	-2.000	-1.500	-1.940	-1.440	Vdc	4	-	-	5,6,7,8,9,10,11,*	-	1,14
			↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	5	-	-	4,6,7,8,9,10,11,*	-	↓
																	6	-	-	4,5,7,8,9,10,11,*	-	
Switching Times**			Typ	Max	Typ	Max	Typ	Max		Typ	Max	Typ	Max	Typ	Max		Pulse In	Pulse Out				
Propagation Delay (Fan-Out - 2)†	t_{4+3-}	3	2.0	3.5	2.0	3.5	3.0	4.5	ns	2.0	3.5	2.0	3.5	2.5	4.0	ns	4	3	-	5,6,7,8,9,10,11	-	1,14
	t_{4-3+}	3	↓	3.0	↓	3.0	↓	4.0	↓	2.0	3.0	2.0	3.0	↓	3.5	↓		3	-		-	↓
	t_{4+2+}	2		3.0		3.0		4.0		2.0	3.0	2.0	3.0		3.5			2	-		-	
	t_{4-2-}	2	2.5	3.5	2.5	3.5		4.5		2.5	3.5	2.5	3.5		4.0			2	-		-	
Rise Time (Fan-Out - 2)	t_{3+}	3	3.0	3.0	2.0	3.0	↓	4.0		2.0	3.0	2.0	3.0	2.0	3.5			3	-		-	
	t_{2+}	2	2.5	3.5	2.5	3.5	3.5	4.5		2.5	3.5	2.5	3.5	3.0	4.0			2	-		-	
Fall Time (Fan-Out - 2)	t_{3-}	3	2.5	3.0	2.0	3.0	3.0	4.0		2.0	3.0	2.0	3.0	2.5	3.5			3	-		-	
	t_{2-}	2	2.0	3.0	2.0	3.0	3.0	4.0		2.0	3.0	2.0	3.0	2.5	3.5		↓	2	-	↓	-	↓

‡ V_{OH} limits apply from no load (0 mA) to full load (-2.5 mA).

* All output pins (2, 3, 12, 13) connected to V_{EE} through a 800-ohm resistor.

** Pulldown is Thevenin equivalent of 50 ohms to -2.0 V.

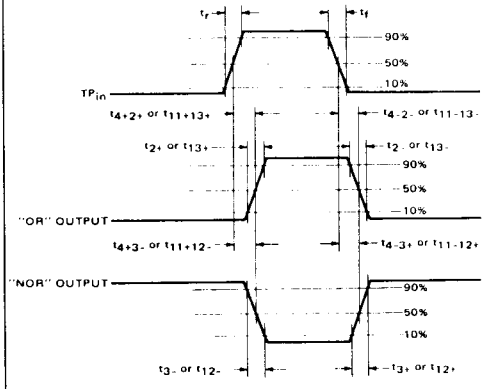
SWITCHING TIME TEST CIRCUIT



Delay line – 10 ft P D Electronics CT 070 50 miniature coaxial cable or equivalent. Other internal fixture cables are same type; cables marked * are 4 in. long.

All input and output cables to the scope are equal lengths of 50 ohm coaxial cable. Plug directly into 50 ohm input of scope.

PROPAGATION DELAY



APPLICATIONS INFORMATION

The MC1026/MC1226 has been designed with high-frequency capabilities and low output impedance for use as a high-speed clock driver and for driving transmission lines in excess of 50 MHz. Characteristics are similar to those of the MC1023 clock driver, including 2.0 ns propagation delay time and 5.0 ohm output impedance. The major differences between the MC1026 and the MC1023 are:

(1) The V_{CC} supply to the output emitter followers and the V_{CC} supply to the current switches (and V_{BB} network) have been separated (shown as V_{CC1} and V_{CC2} in the circuit schematic). This separation permits the outputs of one gate to drive impedances as low as 50 ohms without observable crosstalk in the other gate due to common impedances. Because of this additional V_{CC} supply pin, one of the gates has only three inputs.

(2) The internal output emitter follower pulldown resistors have been eliminated to reduce internal power consumption, allowing operation to +125°C in present packages, and permitting wired ORing of multiple outputs with use of a single external pulldown resistor.

The MC1026/MC1226 may be used for driving a 50-ohm coaxial cable as shown in Figure 1. The leads of the terminating resistors (the equivalent of 50 ohms to -2.0 volts) and the printed circuit leads from the BNC connectors to the input and output of the line driver must be kept as short as possible to reduce mismatch reflections. The V_{CC1} and V_{CC2} leads should be connected to ground at the pins.

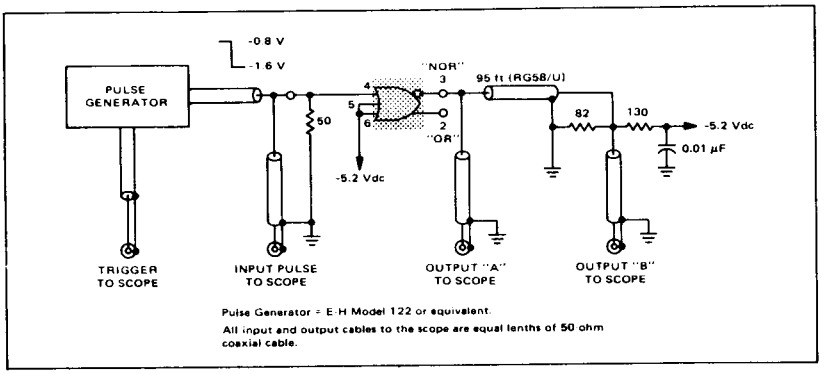
Figures 2 and 3 show the waveforms for the circuit of Figure 1 at 50 MHz. Note that the output at "B" is slightly attenuated (with an inherent increase in rise and fall times) when compared with output "A".

Figure 4 shows the typical switching times at 25°C and 20 MHz using the circuit shown in Figure 1.

200

APPLICATIONS INFORMATION (continued)

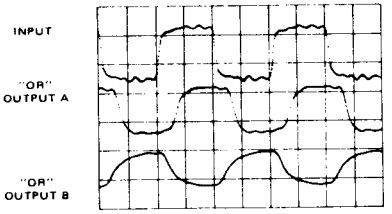
FIGURE 1 – LINE DRIVER TEST CIRCUIT



Pulse Generator = E-H Model 122 or equivalent.

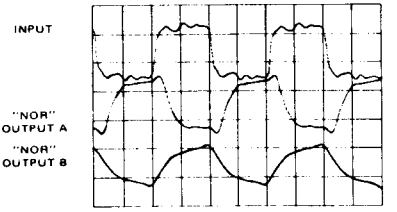
All input and output cables to the scope are equal lenths of 50 ohm coaxial cable.

FIGURE 2 – "OR" OUTPUT WAVEFORMS



VERTICAL SCALE: 500 mV/div

FIGURE 3 – "NOR" OUTPUT WAVEFORMS



HORIZONTAL SCALE: 5.0 ns/div

FIGURE 4 – TYPICAL SWITCHING TIMES
(Test Circuit Figure 1, T_A = 25°C, f = 20 MHz)

OUTPUT A

TEST		TIME (ns)
"OR" OUTPUT		
t_{pd++}	(50% to 50%)	2.6
t_{pd--}	(50% to 50%)	2.7
t_r	(10% to 90%)	2.6
t_f	(90% to 10%)	2.0
"NOR" OUTPUT		
t_{pd+-}	(50% to 50%)	2.6
t_{pd-+}	(50% to 50%)	2.5
t_r	(10% to 90%)	2.4
t_f	(90% to 10%)	2.7

OUTPUT B

TEST		TIME (ns)
"OR" OUTPUT		
t_r	(10% to 80%)	3.8
	(10% to 90%)	5.4
t_f	(80% to 10%)	3.4
	(90% to 10%)	5.4
"NOR" OUTPUT		
t_r	(10% to 80%)	3.8
	(10% to 90%)	5.4
t_f	(80% to 10%)	3.7
	(90% to 10%)	5.7

201