QUAD PREDRIVER

MC4042F, L, P*

DUAL LINE SELECTOR

MC4043F, L, P*

The MC4042 and MC4043 are designed for magnetic memory driver/selector applications.

The MC4042 monolithic quad predriver consists of four high-speed switching transistors, each driven by an MTTL compatible NOR gate. Each NOR gate has an individual address input and a common timing input. The inputs of the MC4042 can be driven directly with standard MTTL decoders such as the MC4006 binary to one-of-eight decoder or the MC4007 dual binary to one-of-four decoder. The open-collector output transistor of the MC4042 will sink 50 mA.

The MC4043 monolithic dual line selector consists of two high-speed 400 mA switches driven by MTTL compatible NOR gates. Each NOR gate has an individual address input and a common timing input. The address and timing inputs of the MC4043 can also be driven directly with standard MTTL decoders such as the MC4006 and MC4007.

The MC4042 and MC4043 input circuits are the same, but the output circuitry is different as shown in the device schematics. The output transistors of both devices have a minimum BV_{CEX} of 15 volts, and are gold doped to increase switching speeds.

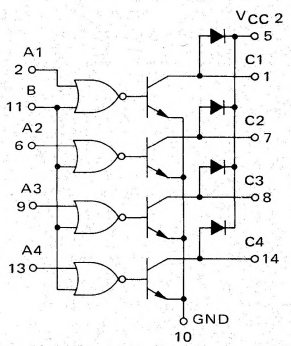
Many memory predriver applications employ transformer coupling between the predriver and driver stages. In such designs, large voltage overshoots occur due to the transformer inductance and high-speed switching currents. The collector of the MC4042 is internally clamped to prevent the collector from exceeding the maximum rated voltage during the switching transitions. The voltage applied to the diode clamp, pin 5, should be the same or greater than the collector voltages at pins 1, 7, 8, and 14, to prevent the diode clamp from being forward biased during nonswitching periods. The output transistor is driven with a conventional totem pole arrangement to provide active pullup and pulldown.

The collectors of the pullup transistors of the MC4043 are available at pins 1 and 7. An external load resistor to V_{CC} must be provided. This reduces power dissipation of the package and provides a means by which the speed of the device can be varied by changing the value of the pullup resistance.

The internal decoding circuitry of the MC4043 is such that both switches can be turned on at one time. However, due to power limitations, care must be taken to ensure that only one switch is turned on at any one time.

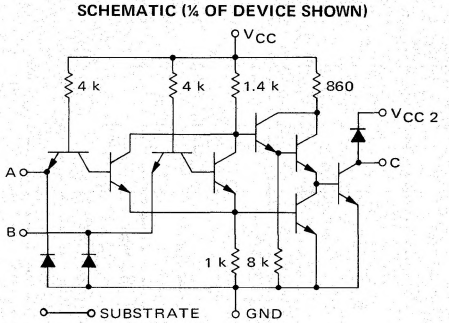
The MC4042 and MC4043 can provide a memory system with an inexpensive, reliable, fast drive system. They are also useful as relay or lamp drivers, high fan-out gates, and MOS drivers.

MC4042



Input Loading Factors:
A = 1, B = 4
Total Power Dissipation = 120 mW typ/pkg
Propagation Delay Time = 15 ns typ

SCHEMATIC (¼ OF DEVICE SHOWN)



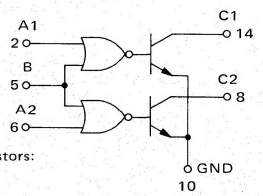
MC4042 AND MC4043

V_{CC} = PIN 4
GND = PIN 10
SUBSTRATE = PIN 3

TRUTH TABLE (One gate only)

A1	B	C1
0	0	0
0	1	1
1	0	1
1	1	1

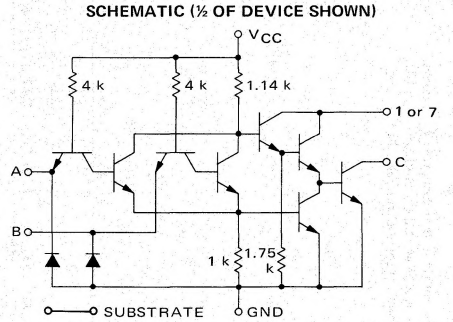
MC4043



Collectors of Output Transistors:
Gate 1 = Pin 1
Gate 2 = Pin 7

Input Loading Factors: A = 1, B = 2
Total Power Dissipation = 70 mW typ/pkg
Propagation Delay Time = 20 ns typ

SCHEMATIC (½ OF DEVICE SHOWN)



*F suffix = TO-86 ceramic flat package (Case 607).
L suffix = TO-116 ceramic dual in-line package (Case 632).
P suffix = TO-116 plastic dual in-line package (Case 605).

ELECTRICAL CHARACTERISTICS – MC4042

Test procedures are shown for the timing input, one address input, and one output. Test other inputs and outputs in the same manner.

@ Test Temperature	TEST CURRENT/VOLTAGE VALUES													
	mA				Volts									
	I_{OL}	I_{in}	4 I_{in}	I_D	V_{IL}	V_{IH}	V_F	V_R	V_{out}	V_{max}	V_{CC}	V_{CCL}	V_{CCH}	V_{CC2}
0°C	50	1.0	4.0	-	1.0	2.0	0.4	2.5	15	-	5.0	4.75	5.25	12
+25°C	50	1.0	4.0	10	1.0	1.7	0.4	2.5	15	7.0	5.0	4.75	5.25	12
+75°C	50	1.0	4.0	-	1.0	1.4	0.4	2.5	15	-	5.0	4.75	5.25	12

Characteristic	Symbol	Pin Under Test	MC4042 Test Limits 0°C Min	0°C Max	+25°C Min	+25°C Max	+75°C Min	+75°C Max	Unit	TEST CURRENT/VOLTAGE APPLIED TO PINS LISTED BELOW: I_{OL}	I_{in}	4 I_{in}	I_D	V_{IL}	V_{IH}	V_F	V_R	V_{out}	V_{max}	V_{CC}	V_{CCL}	V_{CCH}	V_{CC2}	Gnd
Input																								
Forward Current	I_F	2	-	-1.6	-	-1.6	-	-1.6	mAdc	-	-	-	-	-	-	2	11	-	-	-	-	4	-	3,10
		11	-	-6.4	-	-6.4	-	-6.4	mAdc	-	-	-	-	-	-	11	2,6,9,13	-	-	-	-	4	-	3,10
Leakage Current	I_R	2	-	40	-	40	-	40	μAdc	-	-	-	-	-	-	-	2	-	-	-	-	4	-	3,10
		11	-	160	-	160	-	160	μAdc	-	-	-	-	-	-	-	11	-	-	-	-	4	-	3,10
Breakdown Voltage	BV_{in}	2	5.5	-	5.5	-	5.5	-	Vdc	-	2	-	-	-	-	-	-	-	-	-	-	4	-	3,10
		11	5.5	-	5.5	-	5.5	-	Vdc	-	-	11	-	-	-	-	-	-	-	-	-	4	-	3,10
Output																								
Output Voltage	V_{OL}	1	-	0.5	-	0.5	-	0.5	Vdc	1	-	-	-	2	-	11	-	-	-	-	4	-	-	3,10
		1	-	0.5	-	0.5	-	0.5	Vdc	1	-	-	-	11	-	2	-	-	-	-	4	-	-	3,10
Output Leakage Current	I_{CEX}	1	-	250	-	250	-	250	μAdc	-	-	-	-	-	2	11	-	1	-	-	4	-	-	3,10
		1	-	250	-	250	-	250	μAdc	-	-	-	-	-	11	2	-	1	-	-	4	-	-	3,10
Clamp Voltage	V_D	1	-	-	-	1.5	-	-	Vdc	-	-	-	1	-	-	-	2,11	-	-	-	4	-	-	3,5,10
Power Requirements																								
Maximum Power Supply Current	I_{max}	4	-	-	-	36	-	-	mAdc	-	-	-	-	-	-	-	-	-	4	-	-	-	-	3,10
Power Supply Drain	I_{PDL}	4	-	42	-	42	-	42	mAdc	-	-	-	-	-	-	-	-	-	-	4	-	-	-	2,3,6,9,10,11,13
	I_{PDH}	4	-	23	-	23	-	23	mAdc	-	-	-	-	-	-	-	-	-	-	4	-	-	-	3,10
Switching Parameters										Pulse In A	Pulse In B		Pulse Out											
Turn-On Delay Time	t_{pd-}	11,1	-	-	-	25	-	-	ns	2	11		1	-	-	-	-	-	-	4	-	-	5	3,10
Turn-Off Delay	t_{pd+}	11,1	-	-	-	25	-	-	ns	2	11		1	-	-	-	-	-	-	4	-	-	5	3,10

ELECTRICAL CHARACTERISTICS – MC4043

Test procedures are shown for the timing input, one address input, and one output. Test other inputs and outputs in the same manner.

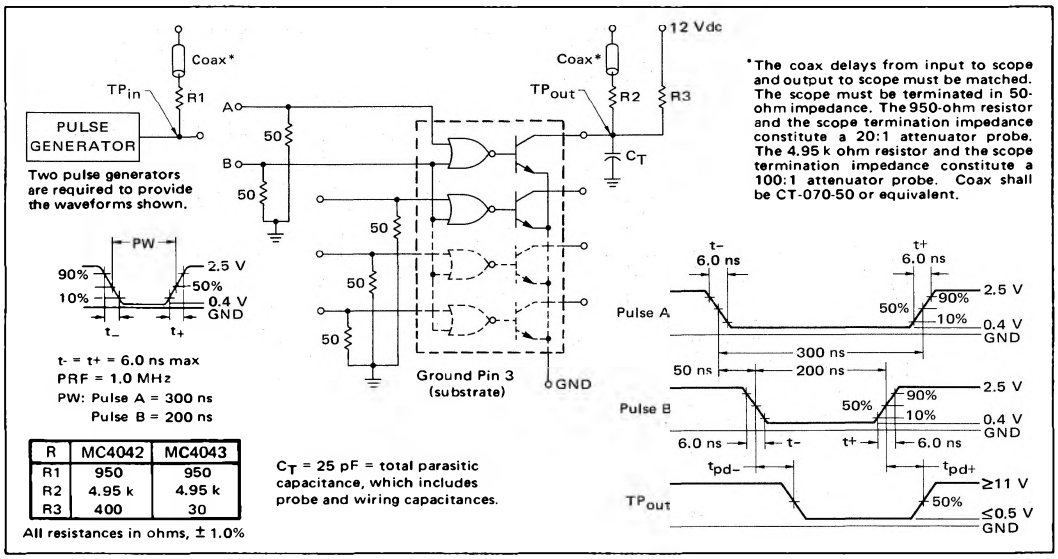
@ Test Temperature	TEST CURRENT/VOLTAGE VALUES																	
	mA			Volts														
	I_{OL}	I_{in}	2 I_{in}	V_{IL}	V_{IH}	V_F	V_R	V_{out}	V_{CEX}	V_{max}	V_{CC}	V_{CCL}	V_{CCH}					
0°C	400*	1.0	2.0	1.1	2.0	0.4	2.5	5.5	15	-	5.0	4.75	5.25					
+25°C	400*	1.0	2.0	1.1	1.8	0.4	2.5	5.5	15	7.0	5.0	4.75	5.25					
+75°C	400*	1.0	2.0	0.9	1.8	0.4	2.5	5.5	15	-	5.0	4.75	5.25					

Characteristic	Symbol	Pin Under Test	MC4043 Test Limits 0°C Min	0°C Max	+25°C Min	+25°C Max	+75°C Min	+75°C Max	Unit	TEST CURRENT/VOLTAGE APPLIED TO PINS LISTED BELOW: I_{OL}	I_{in}	2 I_{in}	V_{IL}	V_{IH}	V_F	V_R	V_{out}	V_{CEX}	V_{max}	V_{CC}	V_{CCL}	V_{CCH}	**	Gnd
Input																								
Forward Current	I_F	2	-	-1.6	-	-1.6	-	-1.6	mAdc	-	-	-	-	-	2	5,6	-	-	-	-	-	4	-	3,10
		5	-	-3.2	-	-3.2	-	-3.2	mAdc	-	-	-	-	-	5	2.6	-	-	-	-	-	4	-	3,10
Leakage Current	I_R	2	-	40	-	40	-	40	μAdc	-	-	-	-	-	-	2	-	-	-	-	-	4	-	3,5,6,10
		5	-	80	-	80	-	80	μAdc	-	-	-	-	-	-	5	-	-	-	-	-	4	-	2,3,6,10
Breakdown Voltage	BV_{in}	2	5.5	-	5.5	-	5.5	-	Vdc	-	2	-	-	-	-	-	-	-	-	-	-	4	-	3,10
		5	5.5	-	5.5	-	5.5	-	Vdc	-	-	5	-	-	-	-	-	-	-	-	-	4	-	3,10
Output																								
Output Voltage	V_{OL}*	14	-	0.5	-	0.5	-	0.5	Vdc	14	-	-	5	-	2	-	-	-	-	-	4	-	1	3,10
		14	-	0.5	-	0.5	-	0.5	Vdc	14	-	-	2	-	5	-	-	-	-	-	4	-	1	3,10
Output Leakage Current	$I_{CEX\ 1}$	14	-	2.0	-	2.0	-	2.0	mAdc	-	-	-	-	5	-	-	-	14	-	-	4	-	-	3,10
		14	-	2.0	-	2.0	-	2.0	mAdc	-	-	-	-	2	-	-	-	14	-	-	4	-	-	3,10
	$I_{CEX\ 2}$	1	-	500	-	500	-	500	μAdc	-	-	-	2	5	-	-	1	-	-	-	-	4	-	3,10
		1	-	500	-	500	-	500	μAdc	-	-	-	5	2	-	-	1	-	-	-	-	4	-	3,10
Power Requirements																								
Maximum Power Supply Current	I_{max}	4	-	-	-	35	-	-	mAdc	-	-	-	-	-	-	-	-	-	4	-	-	-	-	3,10
Power Supply Drain	I_{PD}	4	-	12	-	12	-	12	mAdc	-	-	-	2	-	5	-	-	-	-	4	-	-	-	3,10
		4	-	12	-	12	-	12	mAdc	-	-	-	6	-	5	-	-	-	-	4	-	-	-	3,10
Switching Parameters										Pulse In A		Pulse In B	Pulse Out											
Turn-On Delay Time	t_{pd-}	5,14	-	-	-	35	-	-	ns	2		5	14	-	-	-	-	-	-	4	-	-	1	3,10
Turn-Off Delay Time	t_{pd+}	5,14	-	-	-	26	-	-	ns	2		5	14	-	-	-	-	-	-	4	-	-	1	3,10

*Pulsed, 40% duty cycle @ 1.0 MHz.

**Connect pins to V_{CC} through a 75-ohm resistor.

SWITCHING TIME TEST CIRCUIT AND WAVEFORMS



MC4042 TYPICAL SWITCHING TIMES

FIGURE 1 – TURN-ON DELAY TIME versus TEMPERATURE

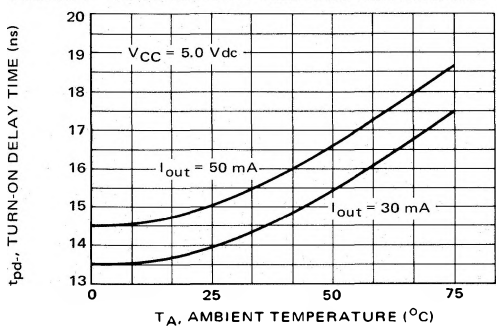


FIGURE 2 – TURN-OFF DELAY TIME versus TE

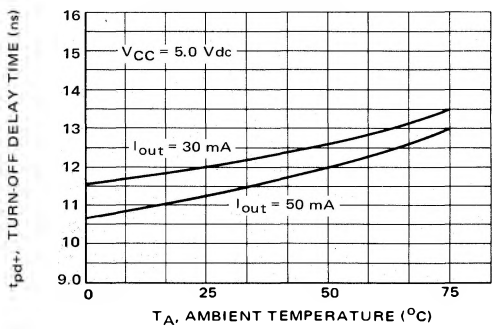


FIGURE 3 – TURN-ON DELAY TIME versus POWER SUPPLY VOLTAGE

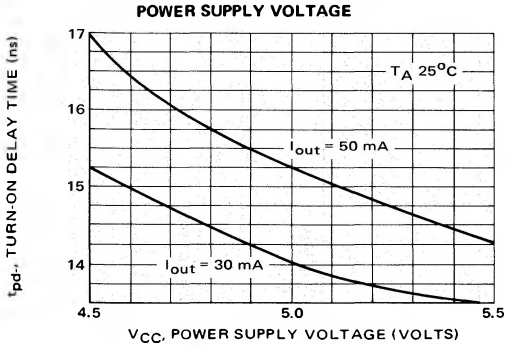
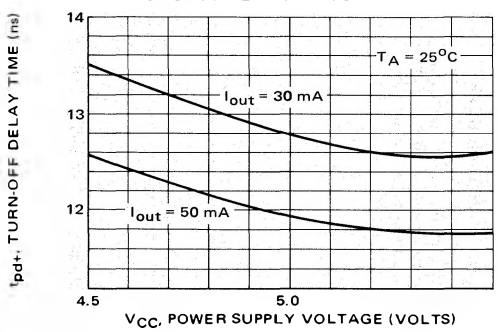


FIGURE 4 – TURN-OFF DELAY TIME versus POWER SUPPLY VOLTAGE



MC4043 TYPICAL SWITCHING TIMES

FIGURE 5 – PROPAGATION DELAY TIME versus PULLUP RESISTANCE (Pins 1 and 7)

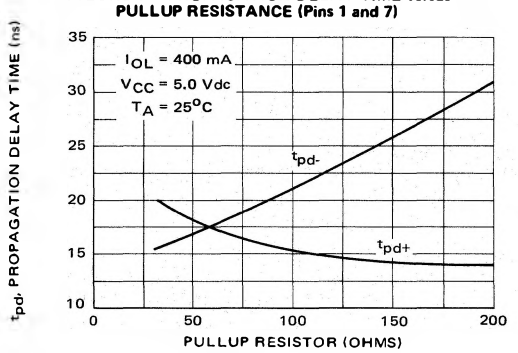


FIGURE 6 – PROPAGATION DELAY TIME versus TEMPERATURE

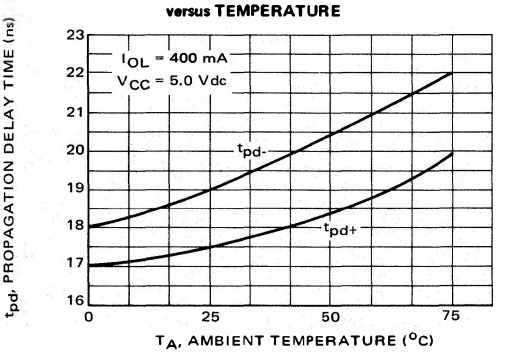


FIGURE 7 – PROPAGATION DELAY TIME versus COLLECTOR CURRENT

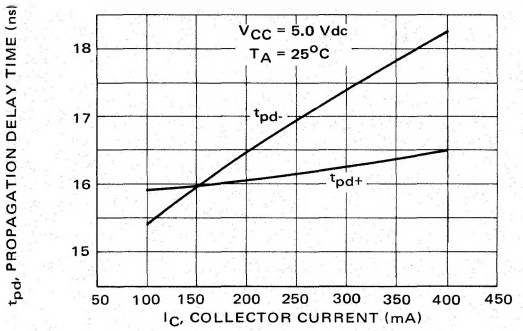
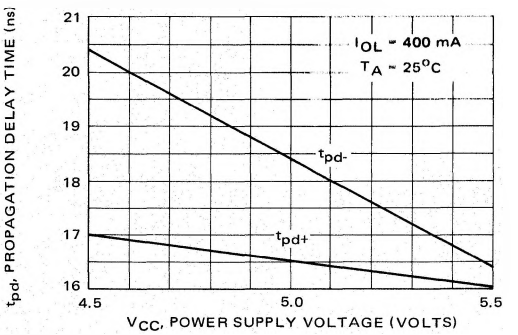


FIGURE 8 – PROPAGATION DELAY TIME versus POWER SUPPLY VOLTAGE



OUTPUT VOLTAGE VARIATIONS

FIGURE 9 – MC4042

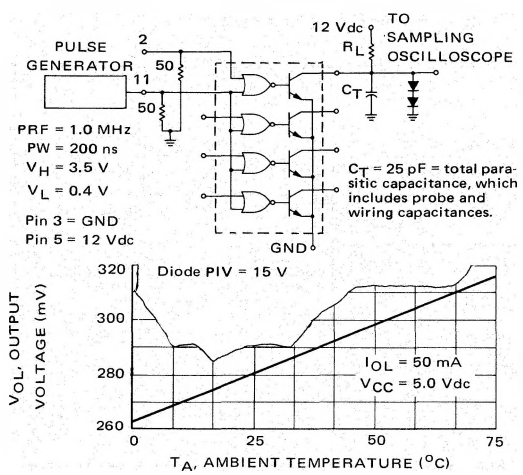
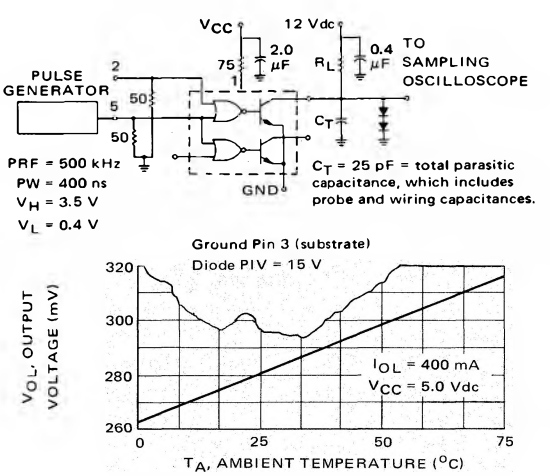


FIGURE 10 – MC4043



TYPICAL APPLICATION

Figure 11 illustrates a typical core memory driver/selector using MC4042 and MC4043 devices. The source circuit for the X or Y drive line consists of an MC4042 predriver transformer coupled to a fast high-current transistor. The sink circuit is the MC4043 line selector. The source and sink circuits are used in pairs and are arranged to permit bipolar currents to pass through a selected drive line. Supply voltage and resistor values are determined by system requirements.

FIGURE 11 – X or Y DRIVE SELECTION MATRIX