MOTOROLA

MC75451
MC75452
MC75453
MC75454

DUAL PERIPHERAL DRIVERS

These versatile devices are useful for interfacing digital logic to industrial electronic systems. They are useful as lamp drivers, relay drivers, logic buffers, line drivers, or MOS drivers.

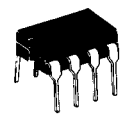
Each of these devices consists of a pair of MTTL gates with the output of each gate internally connected to the base of a transistor.

MC75451 provides the AND function
MC75452 provides the NAND function
MC75453 provides the OR function
MC75454 provides the NOR function

- 300 mA Output Current Capability
- Output Breakdown Voltage – 30 V Min
- MTTL compatible Inputs

DUAL PERIPHERAL DRIVERS

SILICON MONOLITHIC INTEGRATED CIRCUITS



U SUFFIX
CERAMIC PACKAGE
CASE 693

P SUFFIX
PLASTIC PACKAGE
CASE 626

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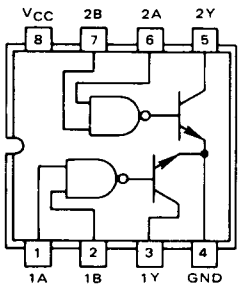
MC75451 – Positive AND



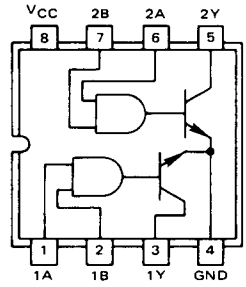
Positive Logic: Y = AB

TRUTH TABLE

A	B	Y
L	L	L ("on" state)
L	H	L ("on" state)
H	L	L ("on" state)
H	H	H ("off" state)

H = high level, L = low level.

MC75452 – Positive NAND



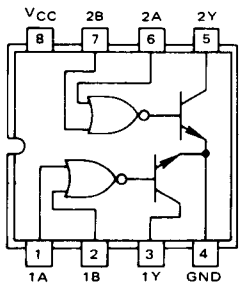
Positive Logic: $Y = \overline{AB}$

TRUTH TABLE

A	B	Y
L	L	H ("off" state)
L	H	H ("off" state)
H	L	H ("off" state)
H	H	L ("on" state)

H = high level, L = low level

MC75453 – Positive OR



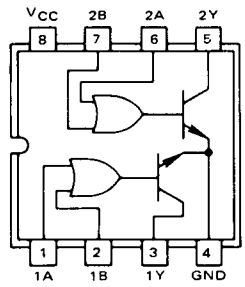
Positive Logic: Y = A + B

TRUTH TABLE

A	B	Y
L	L	L ("on" state)
L	H	H ("off" state)
H	L	H ("off" state)
H	H	H ("off" state)

H = high level, L = low level

MC75454 – Positive NOR



Positive Logic: $Y = \overline{A + B}$

TRUTH TABLE

A	B	Y
L	L	H ("off" state)
L	H	L ("on" state)
H	L	L ("on" state)
H	H	L ("on" state)

H = high level, L = low level.

MAXIMUM RATINGS (T_A = 0°C to 70°C unless otherwise noted.)

Rating	Symbol	Value	Unit
Power Supply Voltage(1)	V_{CC}	7.0	Vdc
Input Voltage	V_I	5.5	Vdc
Interemitter Voltage(2)	–	5.5	Vdc
Output Voltage(3)	V_O	30	Vdc
Output Current(4)	I_O	300	mA
Power Dissipation @ T_A = 25°C Derate above T_A = +25°C	P_D	830 6.6	mW mW/°C
Operating Ambient Temperature Range	T_A	0 to +70	°C
Storage Temperature Range	T_{stg}	-65 to +150	°C

(1) Voltage values are with respect to network ground terminal.
(2) This is the voltage between two emitters of a multiple-emitter transistor.
(3) This is the maximum voltage which should be applied to any output when it is in the "off" state.
(4) Both halves of these dual circuits may conduct rated current simultaneously; however, power dissipation averaged over a short time interval must fall within the continuous dissipation rating.

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ELECTRICAL CHARACTERISTICS (Unless otherwise noted, specifications apply for 4.75 ≤ V_{CC} ≤ 5.25 V and 0°C ≤ T_A ≤ 70°C)

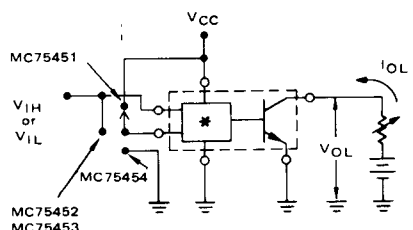
Characteristic		Figure	Symbol	Min	Typ (1)	Max	Unit
Input Voltage – High Logic State		1,2	V_{IH}	2.0	–	–	Vdc
Input Voltage – Low Logic State		1,2	V_{IL}	–	–	0.8	Vdc
Input Clamp Voltage (V_{CC} = 4.75 V, I_I = -12 mA)		4	V_I	–	-1.2	-1.5	Vdc
Output Current – High Logic State (V_{CC} = 4.75 V, V_{OH} = 30 V, V_{IH} = 2.0 V) (V_{CC} = 4.75 V, V_{OH} = 30 V, V_{IL} = 0.8 V)	MC75451, MC75453 MC75452, MC75454	2	I_{OH}	–	–	100	μA
Output Voltage – Low Logic State (V_{CC} = 4.75 V, V_{IL} = 0.8 V) (V_{CC} = 4.75 V, V_{IH} = 2.0 V) (I_{OL} = 100 mA) (I_{OL} = 300 mA)	MC75451, MC75453 MC75452, MC75454	1	V_{OL}	 – –	 0.25 0.5	 0.4 0.7	Vdc
Input Current – High Logic State (V_{CC} = 5.25 V, V_I = 2.4 V) (V_{CC} = 5.25 V, V_I = 5.5 V)		3	I_{IH}	 – –	 – –	 40 1.0	 μA mA
Input Current – Low Logic State (V_{CC} = 5.25 V, V_I = 0.4 V)		4	I_{IL}	–	-1.0	-1.6	mA
Power Supply Current – Output High Logic State (V_{CC} = 5.25 V, V_I = 5.0 V) (V_{CC} = 5.25 V, V_I = 0) (V_{CC} = 5.25 V, V_I = 5.0 V) (V_{CC} = 5.25 V, V_I = 0)	 MC75451 MC75452 MC75453 MC75454	5	I_{CCH}	 – – – –	 7.0 11 8.0 13	 11 14 11 17	mA
Power Supply Current – Output Low Logic State (V_{CC} = 5.25 V, V_I = 0) (V_{CC} = 5.25 V, V_I = 5.0 V) (V_{CC} = 5.25 V, V_I = 0) (V_{CC} = 5.25 V, V_I = 5.0 V)	 MC75451 MC75452 MC75453 MC75454	5	I_{CCL}	 – – – –	 52 56 54 61	 65 71 68 79	mA

(1) Typical Values Measured with V_{CC} = 5.0 V, T_A = 25°C.

TEST CIRCUITS

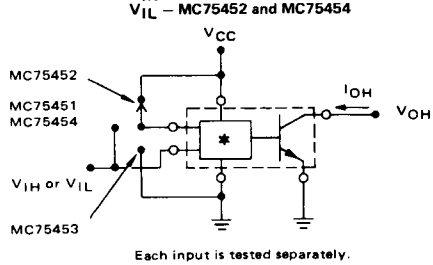
(Current into terminal is shown as a positive value.
Arrows indicate actual direction of current flow.)

FIGURE 1 – V_{OL},
V_{IH} – MC75452 and MC75454
V_{IL} – MC75451 and MC75453



*See Page 1 for specific gate type.

FIGURE 2 – I_{OH},
V_{IH} – MC75451 and MC75453
V_{IL} – MC75452 and MC75454



Each input is tested separately.

SWITCHING CHARACTERISTICS (V_{CC} = 5.0 V, T_A = +25°C unless otherwise noted.)

Characteristic	Symbol	Test Fig.	Min	Typ	Max	Unit
Propagation Delay Time						
($I_O \approx$ 200 mA, C_L = 15 pF, R_L = 50 ohms)						
MC75451						
Low-to-High-Level Output	t_{PLH}	6	–	17	–	ns
High-to-Low-Level Output	t_{PHL}		–	18	–	
MC75452						
Low-to-High-Level Output	t_{PLH}	6	–	18	–	ns
High-to-Low-Level Output	t_{PHL}		–	16	–	
MC75453						
Low-to-High-Level Output	t_{PLH}	6	–	15	–	ns
High-to-Low-Level Output	t_{PHL}		–	17	–	
MC75454						
Low-to-High-Level Output	t_{PLH}	6	–	25	–	ns
High-to-Low-Level Output	t_{PHL}		–	19	–	
Transition Time						
($I_O \approx$ 200 mA, C_L = 15 pF, R_L = 50 ohms)						
MC75451						
Low-to-High-Level Output	t_{TLH}	6	–	6.0	–	ns
High-to-Low-Level Output	t_{THL}		–	11	–	
MC75452						
Low-to-High-Level Output	t_{TLH}	6	–	8.0	–	ns
High-to-Low-Level Output	t_{THL}		–	9.0	–	
MC75453						
Low-to-High-Level Output	t_{TLH}	6	–	5.0	–	ns
High-to-Low-Level Output	t_{THL}		–	8.0	–	
MC75454						
Low-to-High-Level Output	t_{TLH}	6	–	5.0	–	ns
High-to-Low-Level Output	t_{THL}		–	8.0	–	

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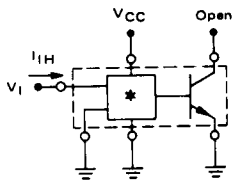
TEST CIRCUITS (Continued)

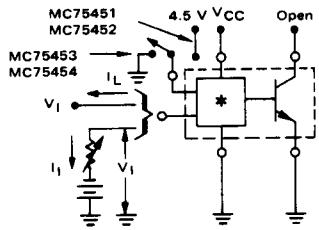
(Current into terminal is shown as a positive value.
Arrows indicate actual direction of current flow.)

FIGURE 3 – I_{IH} (ALL DEVICE TYPES)



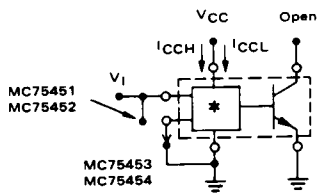
Each input is tested separately.

FIGURE 4 – I_{IL}, V_I (ALL DEVICE TYPES)



Each input is tested separately.

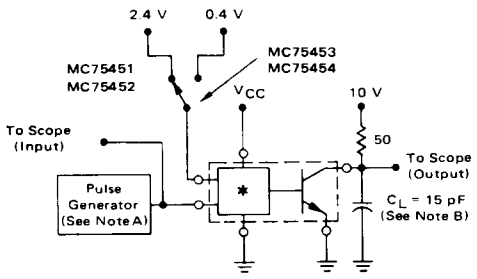
FIGURE 5 – I_{CCH}, I_{CCL} (ALL DEVICE TYPES)



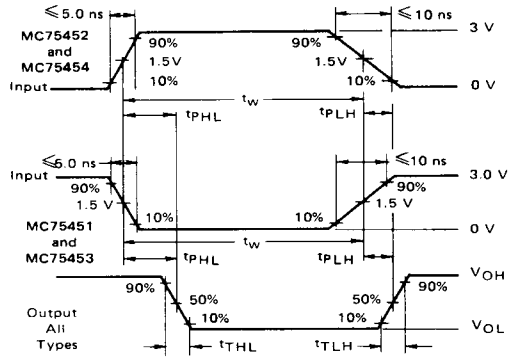
*See page 1 for specific gate type.

Both gates are tested simultaneously.

FIGURE 6 – SWITCHING TIMES TEST CIRCUIT AND WAVEFORMS



NOTES: A. Pulse generator characteristics: t_w = 0.5 μs, PRR = 1.0 MHz, $z_o \approx 50\ \Omega$
B. C_L includes probe and test fixture capacitance.



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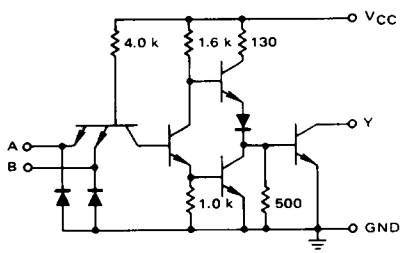
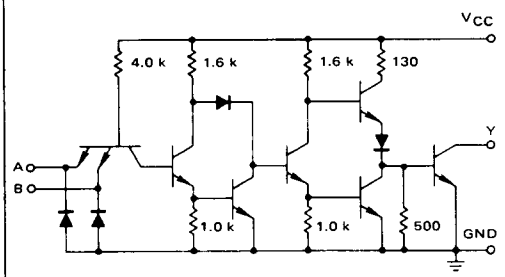
REPRESENTATIVE SCHEMATIC DIAGRAMS

(1/2 Circuits Shown)

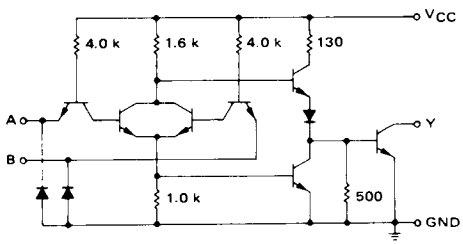
MC75451



MC75452



MC75453



MC75454