signetics

DUAL 4-5 INPUT OR/NOR GATE | 10109

10109B,F: –30 to +85°C

DIGITAL 10,000 SERIES ECL

DESCRIPTION

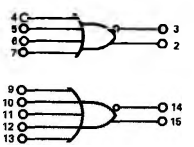
The 10109 is a high speed 4-input OR/NOR and 5-input OR/NOR dual gate. All inputs are terminated with a 50 kΩ resistor to V_{EE} which eliminates the need to tie unused inputs low. The gate has an excellent speed-power product of 50 picojoules. The 10109 is optimized for high performance logic applications. The 10109 has complementary outputs.

FEATURES

- FAST PROPAGATION DELAY = 2.0 ns TYP
- LOW POWER DISSIPATION = 50 mW/PACKAGE TYP (NO LOAD)
- HIGH FANOUT CAPABILITY – CAN DRIVE 50 Ω LINES
- HIGH Z INPUTS – INTERNAL 50 kΩ PULLDOWNS
- HIGH IMMUNITY FROM POWER SUPPLY VARIATIONS: V_{EE} = –5.2 V ±5% RECOMMENDED
- COMPLEMENTARY OR/NOR OUTPUTS
- OPEN EMITTERS FOR BUSSING AND LOGIC CAPABILITY

LOGIC DIAGRAM

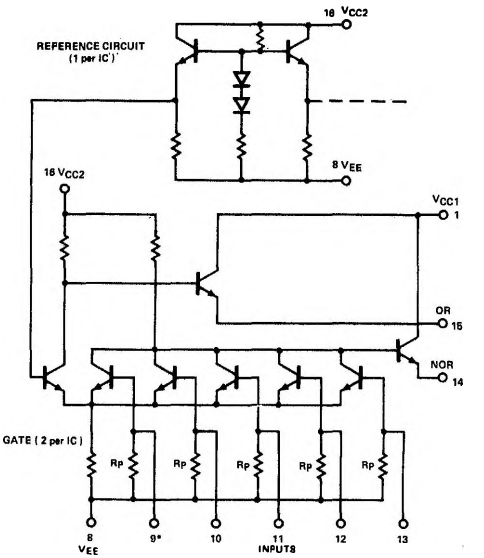
10109



V_{CC1} = 1, V_{CC2} = 16, V_{EE} = 8
POSITIVE LOGIC: HIGH LEVEL = '1'

CIRCUIT SCHEMATIC

10109



All Rp = 50 kΩ.
*5th input on one gate only.

TEMPERATURE RANGE

- –30 to +85°C Operating Ambient

PACKAGE TYPE

B: 16-Pin Silicone DIP
F: 16-Pin CERDIP

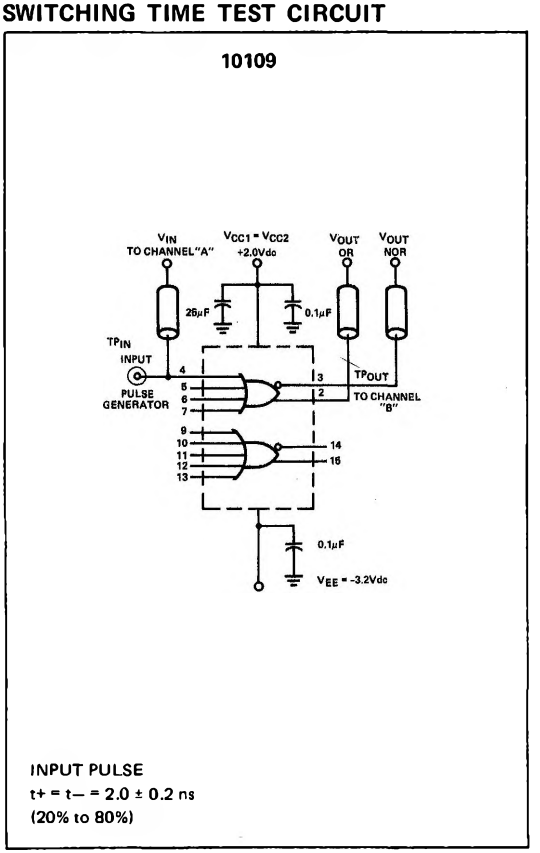
ELECTRICAL CHARACTERISTICS
(at Listed Voltages and Ambient Temperatures).

@ Test Temperature	TEST VOLTAGE VALUES (Volts) $V_{IH\ max}$	$V_{IL\ min}$	$V_{IHA\ min}$	$V_{ILA\ max}$	V_{EE}
−30°C	−0.890	−1.890	−1.205	−1.500	−5.2
+25°C	−0.810	−1.850	−1.105	−1.475	−5.2
+85°C	−0.700	−1.825	−1.035	−1.440	−5.2

Characteristic	Symbol	Pin Under Test	10109 Test Limits −30°C Min	−30°C Max	+25°C Min	+25°C Typ	+25°C Max	+85°C Min	+85°C Max	Unit	TEST VOLTAGE APPLIED TO PINS BELOW: $V_{IH\ max}$	$V_{IL\ min}$	$V_{IHA\ min}$	$V_{ILA\ max}$	V_{EE}	(V_{CC}) Gnd
Power Supply Drain Current	I_E	8	–	–	–	10	14	–	–	mAdc	–	–	–	–	8	1,16
Input Current	I_{inH}	4	–	–	–	–	265	–	–	µAdc	4	–	–	–	8	1,16
	I_{inL}	4	–	–	0.5	–	–	–	–	µAdc	–	4	–	–	8	1,16
High Output Voltage	V_{OH}	2	−1.060	−0.890	−0.960	–	−0.810	−0.890	−0.700	Vdc	4	–	–	–	8	1,16
		3	−1.060	−0.890	−0.960	–	−0.810	−0.890	−0.700	Vdc	–	4	–	–	8	1,16
Low Output Voltage	V_{OL}	2	−1.890	−1.675	−1.850	–	−1.650	−1.825	−1.615	Vdc	–	4	–	–	8	1,16
		3	−1.890	−1.675	−1.850	–	−1.650	−1.825	−1.615	Vdc	4	–	–	–	8	1,16
High Threshold Voltage	V_{OHA}	2	−1.080	–	−0.980	–	–	−0.910	–	Vdc	–	–	4	–	8	1,16
		3	−1.080	–	−0.980	–	–	−0.910	–	Vdc	–	–	–	4	8	1,16
Low Threshold Voltage	V_{OLA}	2	–	−1.655	–	–	−1.630	–	−1.595	Vdc	–	–	–	4	8	1,16
		3	–	−1.655	–	–	−1.630	–	−1.595	Vdc	–	–	4	–	8	1,16
Switching Times * (50-ohm load)													Pulse In	Pulse Out	−3.2 V	+2.0 V
Propagation Delay	t_{4+2+}	2	1.0	3.1	1.0	2.0	2.9	1.0	3.3	ns	–	–	4	2	8	1,16
	t_{4-2-}	2	↓	↓	↓	↓	↓	↓	↓		–	–	↓	2	↓	↓
	t_{4+3-}	3									–	–		3		
	t_{4-3+}	3									–	–		3		
Rise Time (20% to 80%)	t_{2+}	2	1.1	3.6	1.1		3.3	1.1	3.7		–	–		2		
	t_{3+}	3									–	–		3		
Fall Time (20% to 80%)	t_{2-}	2									–	–		2		
	t_{3-}	3	↓	↓	↓	↓	↓	↓	↓		–	–	↓	3	↓	↓

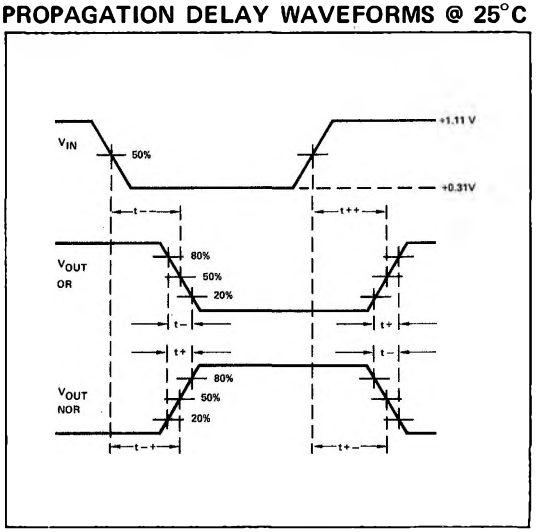
*Unused outputs connected to a 50-ohm resistor to ground.

SWITCHING TIME TEST CIRCUIT



INPUT PULSE
t+ = t− = 2.0 ± 0.2 ns
(20% to 80%)

PROPAGATION DELAY WAVEFORMS @ 25°C



NOTES:
1. Each ECL 10,000 series device has been designed to meet the DC specifications shown in the test table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 linear fpm is maintained. Voltage levels will shift approximately 2 mV with an air flow of 200 linear fpm. Outputs are terminated through a 50-ohm resistor to 2.0 volts.
2. For AC tests, all input and output cables to the scope are equal lengths of 50-ohm coaxial cable. Wire length should be < 1/4 inch from TP_{IN} to input pin and TP_{OUT} to output pin. A 50-ohm termination to ground is located in each scope input. Unused outputs are connected to a 50-ohm resistor to ground.
3. Test procedures are shown for only one input or set of input conditions. Other inputs are tested in the same manner.
4. All voltage measurements are referenced to the ground terminal. Terminals not specifically referenced are left electrically open.