

F100107

Quint Exclusive OR/NOR Gate

General Description

The F100107 is monolithic quint exclusive-OR/NOR gate. The Function output is the wire-OR of all five exclusive-OR outputs.

Refer to the F100307 datasheet for:

PCC Packaging

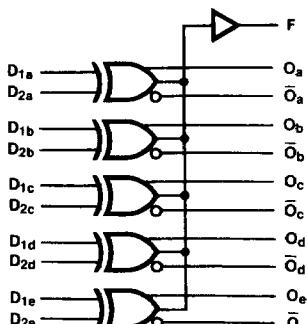
Lower Power

Military Versions

Extended Voltage Specs (-4.2V to -5.7V)

Ordering Code: See Section 8

Logic Symbol



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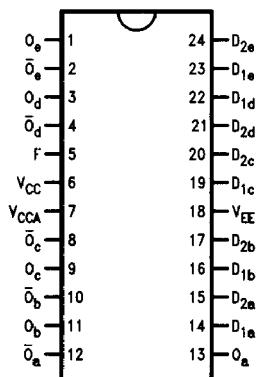
Logic Equation

$$F = (D_{1a} \oplus D_{2a}) + (D_{1b} \oplus D_{2b}) + (D_{1c} \oplus D_{2c}) + (D_{1d} \oplus D_{2d}) + (D_{1e} \oplus D_{2e})$$

Pin Names	Description
D _{1a} -D _{ne}	Data Inputs
F	Function Output
O _a -O _e	Data Outputs
O _a -O _e	Complementary Data Outputs

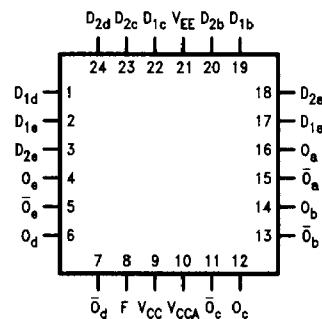
Connection Diagrams

24-Pin DIP



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24-Pin Quad Cerpak



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Absolute Maximum Ratings

Above which the useful life may be impaired. (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Storage Temperature -65°C to $+150^{\circ}\text{C}$

Maximum Junction Temperature (T_J) $+150^{\circ}\text{C}$

Case Temperature under Bias (T_C)	0°C to $+85^{\circ}\text{C}$
V_{EE} Pin Potential to Ground Pin	-7.0V to $+0.5\text{V}$
Input Voltage (DC)	V_{EE} to $+0.5\text{V}$
Output Current (DC Output HIGH)	-50 mA
Operating Range (Note 2)	-5.7V to -4.2V

DC Electrical Characteristics

$V_{EE} = -4.5\text{V}$, $V_{CC} = V_{CCA} = \text{GND}$, $T_C = 0^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ (Note 3)

Symbol	Parameter	Min	Typ	Max	Units	Conditions (Note 4)	
V_{OH}	Output HIGH Voltage	-1025	-955	-880	mV	$V_{IN} = V_{IH}$ (Max) or V_{IL} (Min)	Loading with 50Ω to -2.0V
V_{OL}	Output LOW Voltage	-1810	-1705	-1620		$V_{IN} = V_{IH}$ (Min) or V_{IL} (Max)	Loading with 50Ω to -2.0V
V_{OHC}	Output HIGH Voltage	-1035			mV	Guaranteed HIGH Signal for All Inputs	
V_{OLC}	Output LOW Voltage			-1610		Guaranteed LOW Signal for All Inputs	
V_{IH}	Input HIGH Voltage	-1165		-880	mV	$V_{IN} = V_{IL}$ (Min)	
V_{IL}	Input LOW Voltage	-1810		-1475	mV	$V_{IN} = V_{IL}$ (Max)	
I_{IL}	Input LOW Current	0.50			μA		

DC Electrical Characteristics

$V_{EE} = -4.2\text{V}$, $V_{CC} = V_{CCA} = \text{GND}$, $T_C = 0^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ (Note 3)

Symbol	Parameter	Min	Typ	Max	Units	Conditions (Note 4)	
V_{OH}	Output HIGH Voltage	-1020		-870	mV	$V_{IN} = V_{IH}$ (Max) or V_{IL} (Min)	Loading with 50Ω to -2.0V
V_{OL}	Output LOW Voltage	-1810		-1605		$V_{IN} = V_{IH}$ (Min) or V_{IL} (Max)	Loading with 50Ω to -2.0V
V_{OHC}	Output HIGH Voltage	-1030			mV	Guaranteed HIGH Signal for All Inputs	
V_{OLC}	Output LOW Voltage			-1595		Guaranteed LOW Signal for All Inputs	
V_{IH}	Input HIGH Voltage	-1150		-870	mV	$V_{IN} = V_{IL}$ (Min)	
V_{IL}	Input LOW Voltage	-1810		-1475	mV	$V_{IN} = V_{IL}$ (Max)	
I_{IL}	Input LOW Current	0.50			μA		

DC Electrical Characteristics

$V_{EE} = -4.8\text{V}$, $V_{CC} = V_{CCA} = \text{GND}$, $T_C = 0^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ (Note 3)

Symbol	Parameter	Min	Typ	Max	Units	Conditions (Note 4)	
V_{OH}	Output HIGH Voltage	-1035		-880	mV	$V_{IN} = V_{IH}$ (Max) or V_{IL} (Min)	Loading with 50Ω to -2.0V
V_{OL}	Output LOW Voltage	-1830		-1620		$V_{IN} = V_{IH}$ (Min) or V_{IL} (Max)	Loading with 50Ω to -2.0V
V_{OHC}	Output HIGH Voltage	-1045			mV	Guaranteed HIGH Signal for All Inputs	
V_{OLC}	Output LOW Voltage			-1610		Guaranteed LOW Signal for All Inputs	
V_{IH}	Input HIGH Voltage	-1165		-880	mV	$V_{IN} = V_{IL}$ (Min)	
V_{IL}	Input LOW Voltage	-1830		-1490	mV	$V_{IN} = V_{IL}$ (Max)	
I_{IL}	Input LOW Current	0.50			μA		

Note 1: Absolute maximum ratings are those values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

Note 2: Parametric values specified at -4.2V to -4.8V .

Note 3: The specified limits represent the "worst case" value for the parameter. Since these "worst case" values normally occur at the temperature extremes, additional noise immunity and guard banding can be achieved by decreasing the allowable system operating ranges.

Note 4: Conditions for testing shown in the tables are chosen to guarantee operation under "worst case" conditions.

DC Electrical Characteristics

$V_{EE} = -4.2V$ to $-4.8V$ unless otherwise specified, $V_{CC} = V_{CCA} = GND$, $T_C = 0^\circ C$ to $+85^\circ C$

Symbol	Parameter	Min	Typ	Max	Units	Conditions
I_{IH}	Input HIGH Current $D_{2a}-D_{2e}$ $D_{1a}-D_{1e}$			250 350	μA	$V_{IN} = V_{IH}$ (Max)
I_{EE}	Power Supply Current	-96	-66	-46	mA	Inputs Open

Ceramic Dual-In-Line Package AC Electrical Characteristics

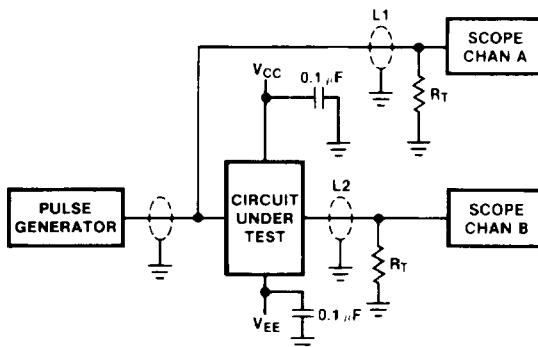
$V_{EE} = -4.2V$ to $-4.8V$, $V_{CC} = V_{CCA} = GND$

Symbol	Parameter	$T_C = 0^\circ C$		$T_C = +25^\circ C$		$T_C = +85^\circ C$		Units	Conditions
		Min	Max	Min	Max	Min	Max		
t_{PLH}	Propagation Delay $D_{2a}-D_{2e}$ to O, \bar{O}	0.55	1.90	0.55	1.80	0.55	1.90	ns	Figures 1 and 2
t_{PHL}	Propagation Delay $D_{1a}-D_{1e}$ to O, \bar{O}	0.55	1.70	0.55	1.60	0.55	1.70	ns	
t_{PLH}	Propagation Delay Data to F	1.15	2.75	1.15	2.75	1.15	3.00	ns	
t_{TLH}	Transition Time 20% to 80%, 80% to 20%	0.45	1.80	0.45	1.65	0.45	1.80	ns	

Cerpak AC Electrical Characteristics

$V_{EE} = -4.2V$ to $-4.8V$, $V_{CC} = V_{CCA} = GND$

Symbol	Parameter	$T_C = 0^\circ C$		$T_C = +25^\circ C$		$T_C = +85^\circ C$		Units	Conditions
		Min	Max	Min	Max	Min	Max		
t_{PLH}	Propagation Delay $D_{2a}-D_{2e}$ to O, \bar{O}	0.55	1.70	0.55	1.60	0.55	1.70	ns	Figures 1 and 2
t_{PHL}	Propagation Delay $D_{1a}-D_{1e}$ to O, \bar{O}	0.55	1.50	0.55	1.40	0.55	1.50	ns	
t_{PLH}	Propagation Delay Data to F	1.15	2.55	1.15	2.55	1.15	2.80	ns	
t_{TLH}	Transition Time 20% to 80%, 80% to 20%	0.45	1.70	0.45	1.55	0.45	1.70	ns	



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Notes:

$V_{CC}, V_{CCA} = +2V$, $V_{EE} = -2.5V$

L1 and L2 = equal length 50Ω impedance lines

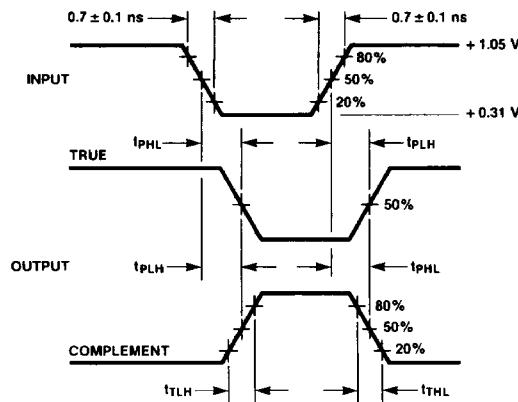
$R_T = 50\Omega$ terminator internal to scope

Decoupling 0.1 μF from GND to V_{CC} and V_{EE}

All unused outputs are loaded with 50Ω to GND

C_L = Fixture and stray capacitance ≤ 3 pF

FIGURE 1. AC Test Circuit



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FIGURE 2. Propagation Delay and Transition Times