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ECL Products	

10113
Gate

Quad Exclusive-OR Gate with Enable Input

FEATURES

- **Typical propagation delay: 2.6ns**
- **Typical supply current ($-I_{EE}$): 34mA**

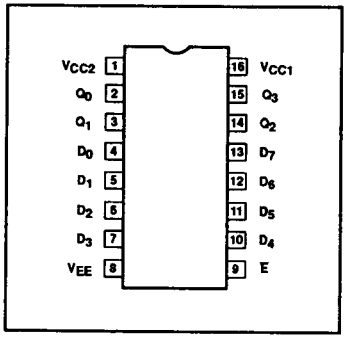
DESCRIPTION

The 10113 is a Quadruple Exclusive-OR Gate with enable input common to all gates. The enable is active in Low State. A 4-bit comparison function (A = B) can be obtained by wire-ORing the four outputs together. Direct connection to buses is possible thanks to open-emitter outputs. All unused inputs can be left open due to integrated pull-down resistors which avoid the need for a supply voltage.

ORDERING INFORMATION

DESCRIPTION	ORDER CODE
16–Pin Plastic DIP	10113N
16–Pin Ceramic DIP	10113F

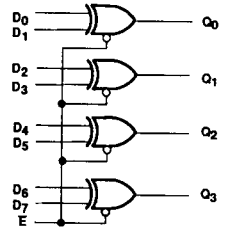
PIN CONFIGURATION



PIN DESCRIPTION

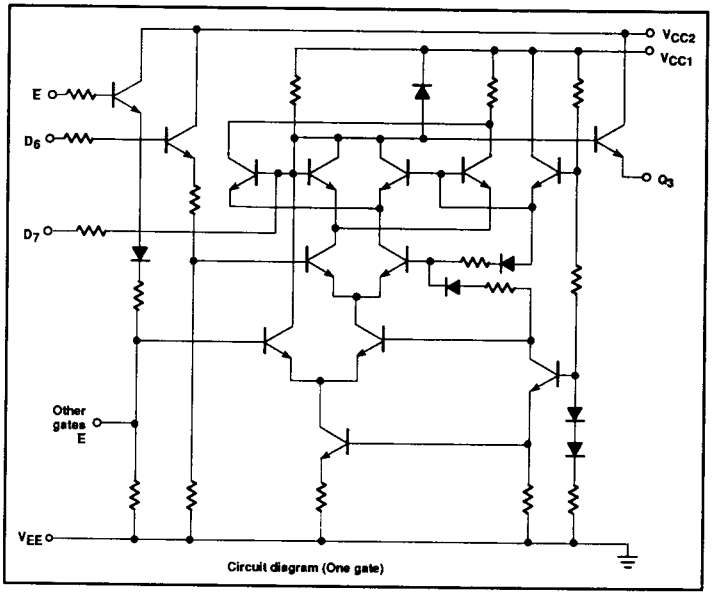
PINS	DESCRIPTION
$D_0 - D_7$	Data Inputs
$\overline{E}$	Enable Input
$Q_0 - Q_3$	Data Outputs

LOGIC DIAGRAM



$Q_0 = (D_0 \oplus D_1) \cdot E$
$Q_1 = (D_2 \oplus D_3) \cdot E$
$Q_2 = (D_4 \oplus D_5) \cdot E$
$Q_3 = (D_6 \oplus D_7) \cdot E$

SIMPLIFIED SCHEMATIC



Circuit diagram (One gate)

FUNCTION TABLE

INPUTS			OUTPUTS
D_0	D_1	$\overline{E}$	Q_0
L	L	L	L
L	H	L	H
H	L	L	H
H	H	L	L
X	X	H	L

H = High Voltage Level
X = Don't Care
L = Low Voltage Level

ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER		LIMITS	UNIT
V_{EE}	Supply voltage		–8.0	V
V_{IN}	Input voltage (V_{IN} should never be more negative than V_{EE})		0 to V_{EE}	V
I_O	Output source current (continuous)		–50	mA
T_S	Storage temperature range		–55 to +150	°C
T_J	Maximum junction temperature	Ceramic Package	+165	°C
		Plastic Package	+150	°C

NOTE:
Operation beyond the limits set forth in this table may impair the useful life of the device. Unless otherwise noted, these limits are specified over the operating ambient temperature range.

DC OPERATING CONDITIONS

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			MIN.	NOM.	MAX	
V_{CC1}, V_{CC2}	Circuit ground		0	0	0	V
V_{EE}	Supply voltage (negative)			–5.2		V
V_{IH}	High level input voltage	T_A = –30°C			–890	mV
		T_A = +25°C			–810	mV
		T_A = +85°C			–700	mV
V_{IHT}	High level input threshold voltage	T_A = –30°C	–1205			mV
		T_A = +25°C	–1105			mV
		T_A = +85°C	–1035			mV
V_{ILT}	Low level input threshold voltage	T_A = –30°C			–1500	mV
		T_A = +25°C			–1475	mV
		T_A = +85°C			–1440	mV
V_{IL}	Low level input voltage	T_A = –30°C	–1890			mV
		T_A = +25°C	–1850			mV
		T_A = +85°C	–1825			mV
T_A	Operating ambient temperature range		–30	+25	+85	°C

NOTE:
When operating at other than the specified V_{EE} voltage (–5.2V), the DC and AC Electrical Characteristics will vary slightly from specified values.

DC ELECTRICAL CHARACTERISTICS

$V_{CC1} = V_{CC2}$ = ground, $V_{EE} = -5.2V \pm 0.010V$, $T_A = -30°C$ to $+85°C$ output loading 50Ω to $-2.0V \pm 0.010V$ unless otherwise specified[1,3]

SYMBOL	PARAMETER		TEST CONDITIONS[2]		LIMITS MIN.	LIMITS TYP.	LIMITS MAX.	UNIT
V_{OH}	High level output voltage		$T_A = -30°C$	Apply V_{ILMIN} to enable input and one	-1060		-890	mV
			$T_A = +25°C$	gate input with V_{IHMAX} applied to	-960		-810	mV
			$T_A = +85°C$	the other gate input.	-890		-700	mV
V_{OHT}	High level output threshold voltage		$T_A = -30°C$	Apply V_{IHT} to one gate input	-1080			mV
			$T_A = +25°C$	with V_{ILMIN} applied to the other	-980			mV
			$T_A = +85°C$	gate input and enable input.	-910			mV
V_{OLT}	Low level output threshold voltage		$T_A = -30°C$	Apply V_{ILT} to one gate input			-1655	mV
			$T_A = +25°C$	with V_{ILMIN} applied to			-1630	mV
			$T_A = +85°C$	the other gate input.			-1595	mV
V_{OL}	Low level output voltage		$T_A = -30°C$		-1890		-1675	mV
			$T_A = +25°C$	Apply V_{ILMIN} to all inputs for each output.	-1850		-1650	mV
			$T_A = +85°C$		-1825		-1615	mV
I_{IH}	High level input current	D_0, D_3	$T_A = -30°C$				425	µA
		D_4, D_7	$T_A = +25°C$	Apply V_{IHMAX} to each input under test,			265	µA
		inputs	$T_A = +85°C$	one at a time, with V_{ILMIN} applied			265	µA
		D_1, D_2	$T_A = -30°C$	to all other inputs.			350	µA
		D_5, D_6	$T_A = +25°C$				220	µA
		inputs	$T_A = +85°C$				220	µA
		$\overline{E}$	$T_A = -30°C$	Apply V_{IHMAX} to $\overline{E}$ input			870	µA
		input	$T_A = +25°C$	with V_{ILMIN} applied to			545	µA
			$T_A = +85°C$	all other inputs.			545	µA
I_{IL}	Low level input current		$T_A = -30°C$	Apply V_{ILMIN} to each input under test,	0.5			µA
			$T_A = +25°C$	one at a time, with V_{IHMAX} applied	0.5			µA
			$T_A = +85°C$	to all other inputs.	0.3			µA
$-I_{EE}$	V_{EE} supply current		$T_A = -30°C$				46	mA
			$T_A = +25°C$			34	42	mA
			$T_A = +85°C$				46	mA
$\frac{\Delta V_{OH}}{\Delta V_{EE}}$	High level output voltage compensation		$T_A = +25°C$			0.016		V/V
$\frac{\Delta V_{OL}}{\Delta V_{EE}}$	Low level output voltage compensation					0.250		V/V
$\frac{\Delta V_{BB}}{\Delta V_{EE}}$	Reference bias voltage compensation					0.148		V/V

NOTES:

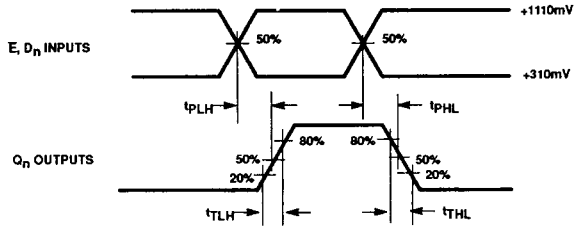
1. The specified limits represent the worst case values for the parameter. Since these worst case values normally occur at the supply voltage and temperature extremes, additional noise immunity can be achieved by decreasing the allowable operating condition ranges.
2. Conditions for testing shown in the tables are not necessarily worst case. For worst case testing guidelines, refer to DC Testing, Chapter 1, Section 3.
3. The specified limits shown in the DC Electrical Characteristics table can be met only after thermal equilibrium has been established. Thermal equilibrium is established by applying power for at least 2 minutes, while maintaining transverse airflow of 2.5 meters/sec (500 linear feet/min) over the device, mounted either in a test socket or on a printed circuit board. Test voltage values are given in the DC Operating Conditions table.

AC ELECTRICAL CHARACTERISTICS $V_{CC1} = V_{CC2} = \text{ground}, V_{EE} = -5.2V \pm 0.010V$

SYMBOL	PARAMETER	TEST CONDITION	LIMITS							UNIT
			$T_A = -30°C$		$T_A = +25°C$			$T_A = +85°C$		
			MIN.	MAX.	MIN.	TYP.	MAX.	MIN.	MAX.	
t_{PLH} t_{PHL}	Propagation delay D_n to Q_n	Waveform 1	1.20 1.20	3.80 3.80	1.30 1.30	2.60 2.60	3.70 3.70	1.30 1.30	4.20 4.20	ns ns
t_{PLH} t_{PHL}	Propagation delay E to Q_n	Waveform 1	1.30 1.30	4.10 4.10	1.50 1.50	3.40 3.40	4.00 4.00	1.50 1.50	4.60 4.60	ns ns
t_{TLH} t_{THL}	Transition time 20% to 80%, 80% to 20%	Waveform 1	1.30 1.30	3.50 3.50	1.30 1.30	2.50 2.50	3.50 3.50	1.30 1.30	3.50 3.50	ns ns

NOTE:
For AC test setup information, see AC Testing, Chapter 2, Section 3.

AC WAVEFORMS



Waveform 1. Propagation Delay and Transition Times