FAIRCHILD SEMICONDUCTOR™

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100315
Low Skew Quad Clock Driver

General Description

The 100315 contains four low skew differential drivers, designed for generation of multiple, minimum skew differential clocks from a single differential input. This device also has the capability to select a secondary single-ended clock source for use in lower frequency system level testing. The 100315 is a 300 Series redesign of the 100115 clock driver.

Features

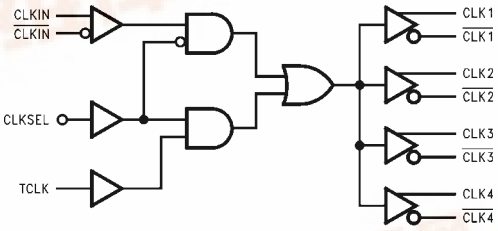
- Low output-to-output skew (≤50 ps)
- Differential inputs and outputs
- Secondary clock available for system level testing
- 2000V ESD protection
- Voltage compensated operating range: –4.2V to –5.7V

Ordering Code:

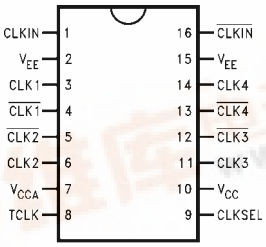
Order Number	Package Number	Package Descriptions
100315SC	M16A	16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150 Narrow

Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

Logic Diagram



Connection Diagram



Pin Descriptions

Pin Names	Description
CLKIN, $\overline{\text{CLKIN}}$	Differential Clock Inputs
$CLK_{1–4}$, $\overline{CLK}_{1–4}$	Differential Clock Outputs
TCLK	Test Clock Input (Note 1)
CLKSEL	Clock Input Select (Note 1)

Note 1: TCLK and CLKSEL are single-ended inputs, with internal 50 kΩ pull-down resistors.

Truth Table

CLKSEL	CLKIN	$\overline{\text{CLKIN}}$	TCLK	CLK_n	$\overline{CLK}_n$
L	L	H	X	L	H
L	H	L	X	H	L
H	X	X	L	L	H
H	X	X	H	H	L

L = LOW Voltage Level
H = HIGH Voltage Level
X = Don't Care

Absolute Maximum Ratings (Note 2)

Storage Temperature	−65°C to +150°C
Maximum Junction Temperature (T_J)	+150°C
Case Temperature under Bias (T_C)	0°C to +85°C
V_{EE} Pin Potential to Ground Pin	−7.0V to +0.5V
Input Voltage (DC)	V_{CC} to +0.5V
Output Current (DC Output HIGH)	−50 mA
Operating Range (Note 2)	−5.7V to −4.2V
ESD (Note 3)	≥2000V

Recommended Operating Conditions

Case Temperature (T_C)	0°C to +85°C
Supply Voltage (V_{EE})	−5.7V to −4.2V

Note 2: The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the absolute maximum rating. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

Note 3: ESD testing conforms to MIL-STD-883, Method 3015.

DC Electrical Characteristics (Note 4)

V_{EE} = −4.2V to −5.7V, V_{CC} = V_{CCA} = GND, T_C = 0°C to +85°C

Symbol	Parameter	Min	Typ	Max	Units	Conditions	
V_{OH}	Output HIGH Voltage	−1025	−955	−870	mV	V_{IN} = $V_{IH(Max)}$	Loading with
V_{OL}	Output LOW Voltage	−1830	−1705	−1620		or $V_{IL(Min)}$	50Ω to −2.0V
V_{OHC}	Output HIGH Voltage	−1035			mV	V_{IN} = $V_{IH(Min)}$	Loading with
V_{OLC}	Output LOW Voltage			−1610		or $V_{IL(Max)}$	50Ω to −2.0V
V_{IH}	Single-Ended Input HIGH Voltage	−1165		−870	mV	Guaranteed HIGH Signal for All Inputs	
V_{IL}	Single-Ended Input LOW Voltage	−1830		−1475	mV	Guaranteed LOW Signal for All Inputs	
I_{IL}	Input LOW Current	0.50			µA	V_{IN} = $V_{IL(Min)}$	
I_{IH}	Input HIGH Current						
	CLKIN, $\overline{\text{CLKIN}}$			150	µA	V_{IN} = $V_{IH(Max)}$	
	TCLK			250	µA		
	CLKSEL			250	µA		
V_{DIFF}	Input Voltage Differential	150			mV	Required for Full Output Swing	
V_{CM}	Common Mode Voltage	V_{CC} − 2V		V_{CC} − 0.5V	V		
I_{CBO}	Input Leakage Current	−10			µA	V_{IN} = V_{EE}	
I_{EE}	Power Supply Current	−67		−35	mA		

Note 4: 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.

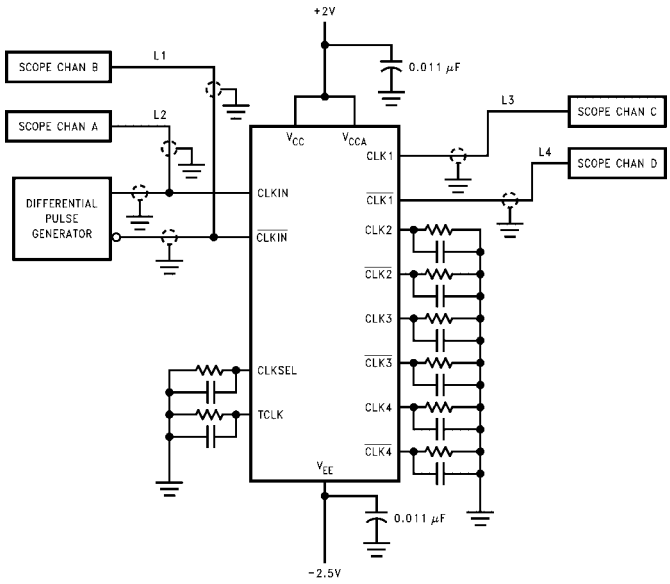
AC Electrical Characteristics

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

Symbol	Parameter	T_C = 0°C		T_C = +25°C		T_C = +85°C		Units	Conditions
		Min	Max	Min	Max	Min	Max		
f_{MAX}	Maximum Clock Frequency	750		750		750		MHz	
t_{PLH}	Propagation Delay CLKIN,								
t_{PHL}	$\overline{\text{CLKIN}}$ to $CLK_{(1-4)}$, $\overline{CLK}_{(1-4)}$								
	Differential	0.59	0.79	0.62	0.82	0.67	0.87	ns	Figures 1, 3
	Single-Ended	0.59	0.99	0.62	1.02	0.67	1.07		
t_{PLH}	Propagation Delay, TCLK	0.50	1.20	0.50	1.20	0.50	1.20	ns	Figures 1, 2
t_{PHL}	to $CLK_{(1-4)}$, $\overline{CLK}_{(1-4)}$								
t_{PLH}	Propagation Delay, CLKSEL	0.80	1.60	0.80	1.60	0.80	1.60	ns	Figures 1, 2
t_{PHL}	to $CLK_{(1-4)}$, $\overline{CLK}_{(1-4)}$								
t_{TLH}	Transition Time	0.30	0.80	0.30	0.80	0.30	0.80	ns	Figures 1, 4
t_{THL}	20% to 80%, 80% to 20%								
t_{OST}	Maximum Skew Opposite Edge								
DIFF	Output-to-Output Variation		50		50		50	ps	(Note 5)
	Data to Output Path								

Note 5: Output-to-Output Skew is defined as the absolute value of the difference between the actual propagation delay for any outputs within the same packaged device. The specifications apply to any outputs switching in the same direction either HIGH-to-LOW (t_{OSHL}), or LOW-to-HIGH (t_{OSLH}), or in opposite directions both HL and LH (t_{OST}). Parameters t_{OST} and t_{PS} guaranteed by design.

Test Circuit



Note:

Shown for testing CLKIN to CLK1 in the differential mode.

L1, L2, L3 and L4 = equal length 50Ω impedance lines.

All unused inputs and outputs are loaded with 50Ω in parallel with ≤3 pF to GND.

Scope should have 50Ω input terminator internally.

FIGURE 1. AC Test Circuit

Switching Waveforms

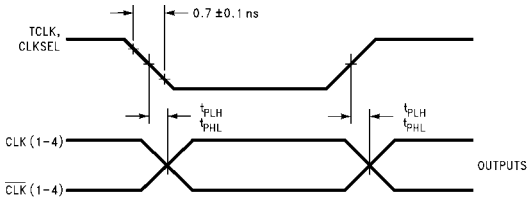


FIGURE 2. Propagation Delay, TCLK, CLKSEL to Outputs

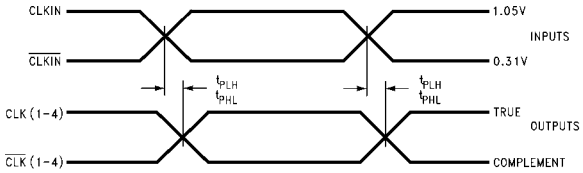


FIGURE 3. Propagation Delay, CLKIN/CLKIN to Outputs

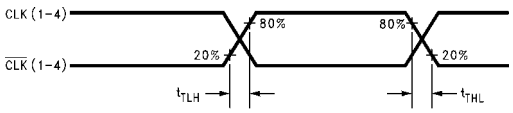
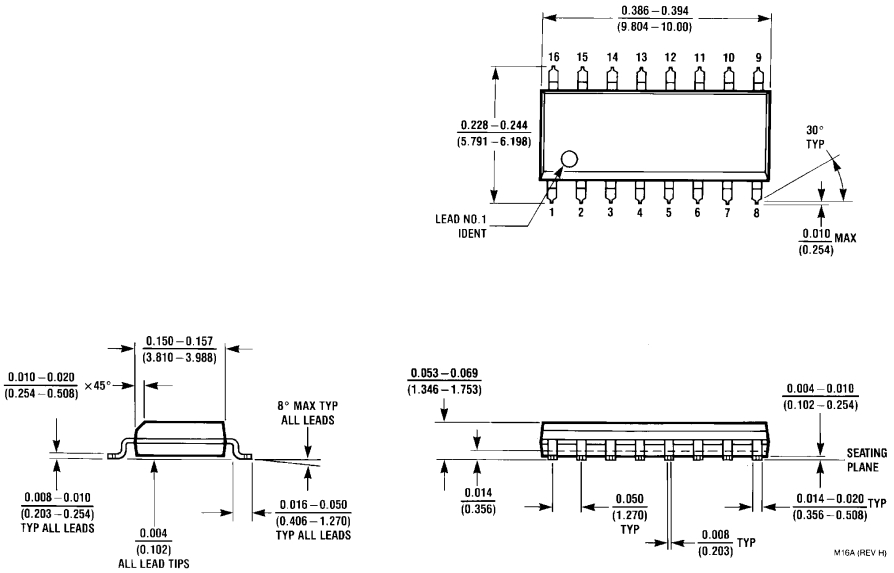


FIGURE 4. Transition Times

Physical Dimensions inches (millimeters) unless otherwise noted



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Package Number M16A

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