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General Description

The SY100EL14V is a low-skew, 1:5 clock distribution chip designed explicitly for low-skew clock distribution applications. The device can be driven by either a differential or single-ended ECL or, if positive power supplies are used, PECL input signal. The EL14V is suitable for operation in systems operating with 3.3V to 5.0V supplies. If a single-ended input is to be used, the V_{BB} output should be connected to the $\overline{\text{CLK}}$ input and bypassed to ground via a $0.01\mu\text{F}$ capacitor. The V_{BB} output is designed to act as the switching reference for the input of the EL14V under single-ended input conditions. As a result, this pin can only source/sink up to 0.5mA of current.

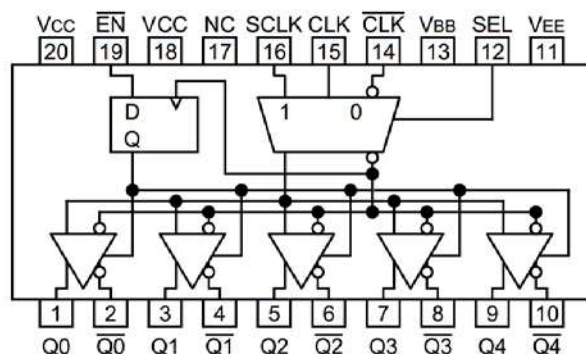
The EL14V features a multiplexed clock input to allow for the distribution of a lower speed scan or test clock along with the high speed system clock. When LOW (or left open and pulled LOW by the input pull-down resistor), the SEL pin will select the differential clock input.

The common enable ($\overline{\text{EN}}$) is synchronous, so that the outputs will only be enabled/disable when they are already in the LOW state. This avoids any chance of generating a runt clock pulse when the device is enabled/disabled as can happen with an asynchronous control. The internal flip-flop is clocked on the falling edge of the input clock. Therefore, all associated specification limits are referenced to the negative edge of the clock input.

When both differential inputs are left open, CLK input will pull down to V_{EE} and $\overline{\text{CLK}}$ input will bias around $V_{CC}/2$.

Datasheets and support documentation are available on Micrel's web site at: www.micrel.com.

Block Diagram



Features

- 3.3V and 5V power supply options
- 70fs_{RMS} typical additive phase jitter
- Typical 30ps output-to-output skew
- Max. 50ps output-to-output skew
- Synchronous enable/disable
- Multiplexed clock input
- 75k Ω internal input pull-down resistors
- Available in 20-pin SOIC package

Applications

- Processor clock distribution
- SONET clock distribution
- Fibre Channel clock distribution
- Gigabit Ethernet clock distribution

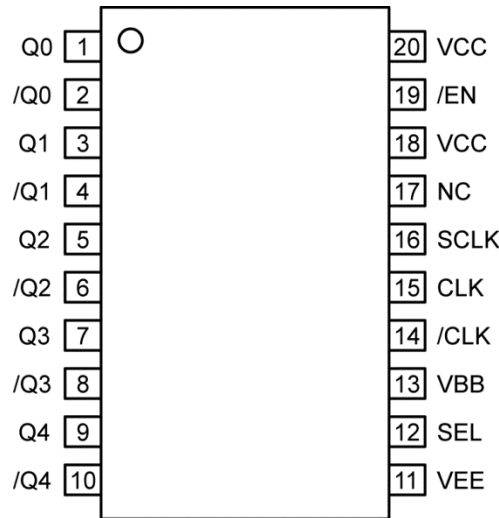
Ordering Information⁽¹⁾

Part Number	Package Type	Operating Range	Package Marking	Lead Finish
SY100EL14VZG	Z20-1	Industrial	SY100EL14VZG with Pb-Free bar-line indicator	Pb-Free NiPdAu
SY100EL14VZG TR ⁽²⁾	Z20-1	Industrial	SY100EL14VZG with Pb-Free bar-line indicator	Pb-Free NiPdAu

Note:

- Contact factory for die availability. Dice are guaranteed at T_A = 25°C, DC electricals only.
- Tape and Reel.

Pin Configuration



20-Pin Narrow SOIC
(Top View)

Pin Description

Pin	Function
CLK	Differential clock inputs
SCLK	Scan clock input
/EN	Synchronous enable
SEL	Clock select input
VBB	Reference output
Q0 – Q4	Differential clock outputs

Truth Table

CLK	SCLK	SEL	/EN	Q
L	X	L	L	L
H	X	L	L	H
X	L	H	L	L
X	H	H	L	H
X	X	X	H	L ⁽³⁾

Note:

- On next negative transition of CLK or SCLK

Absolute Maximum Ratings⁽⁴⁾

Input Voltage (V_{IN}) ⁽⁶⁾	
($V_{CC} = 0V$, V_{IN} not more positive than V_{CC}) ..	-6V to +0V
($V_{EE} = 0V$, V_{IN} not more positive than V_{CC})...	+0V to +6V
Operating Range (V_{EE}) ⁽⁷⁾	-5.7V to -3.0V
Output Current (I_{OUT}) Continuous.....	50mA
Surge.....	100mA
Lead Temperature (soldering, 20s).....	260°C
Storage Temperature (T_s)	-65 to +150°C
ESD Rating ⁽⁸⁾	>1.5kV

Operating Ratings⁽⁵⁾

Supply Voltage (V_{CC}) PECL Operation	3.0V to 5.5V
(V_{EE}) ECL Operation	-3.0V to -5.5V
Ambient Temperature (T_A)	-40°C to +85°C
Junction Thermal Resistance	
SOIC (θ_{JA})	58°C/W

DC Electrical Characteristics⁽⁹⁾

$V_{EE} = V_{EE}(\text{min})$ to $V_{EE}(\text{max})$; $V_{CC} = \text{GND}$, $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$, unless otherwise stated.

Outputs are terminated through a 50 Ω resistor to $V_{CC}-2.0V$.

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
V_{OH}	Output High Voltage ⁽¹⁰⁾	$T_A = -40^\circ\text{C}$	$V_{CC} - 1.085$	$V_{CC} - 1.005$	$V_{CC} - 0.880$	V
		$T_A = 0^\circ\text{C}$ to $+85^\circ\text{C}$	$V_{CC} - 1.025$	$V_{CC} - 0.955$	$V_{CC} - 0.880$	V
V_{OL}	Output Low Voltage ⁽¹⁰⁾	$T_A = -40^\circ\text{C}$	$V_{CC} - 1.830$	$V_{CC} - 1.695$	$V_{CC} - 1.555$	V
		$T_A = 0^\circ\text{C}$ to $+85^\circ\text{C}$	$V_{CC} - 1.810$	$V_{CC} - 1.705$	$V_{CC} - 1.620$	V
V_{OHA}	Output High Voltage ⁽¹⁰⁾	$T_A = -40^\circ\text{C}$	$V_{CC} - 1.095$			V
		$T_A = 0^\circ\text{C}$ to $+85^\circ\text{C}$	$V_{CC} - 1.035$			V
V_{OLA}	Output Low Voltage ⁽¹⁰⁾	$T_A = -40^\circ\text{C}$			$V_{CC} - 1.555$	V
		$T_A = 0^\circ\text{C}$ to $+85^\circ\text{C}$			$V_{CC} - 1.610$	V
V_{IH}	Input High Voltage		$V_{CC} - 1.165$		$V_{CC} - 0.880$	V
V_{IL}	Input Low Voltage		$V_{CC} - 1.810$		$V_{CC} - 1.475$	V
I_{IL}	Input Low Current ⁽¹¹⁾	Input LOW Current /CLK	0.5 -300			μA
I_{IH}	Input High Current				150	μA
I_{EE}	Power Supply Current	$T_A = -40^\circ\text{C}$ to $+25^\circ\text{C}$		32	40	mA
		$T_A = +85^\circ\text{C}$		34	42	
V_{BB}	Output Reference Voltage		$V_{CC} - 1.380$		$V_{CC} - 1.260$	V

Notes:

- Exceeding the absolute maximum ratings may damage the device.
- The device is not guaranteed to function outside its operating ratings.
- In PECL mode operation, $V_{IN}(\text{max}) = V_{CC}$.
- Parametric values specified at 100EL14V series: -3.0V to -5.5V.
- Devices are ESD sensitive. Handling precautions are recommended. Human body model, 1.5k Ω in series with 100pF.
- Specification for packaged product only
- $V_{IN} = V_{IH}(\text{max})$ or $V_{IL}(\text{min})$.
- $V_{IN} = V_{IL}(\text{max})$.

AC Electrical Characteristics

$V_{EE} = V_{EE}(\text{min})$ to $V_{EE}(\text{max})$; $V_{CC} = \text{GND}$, $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$, unless otherwise stated.

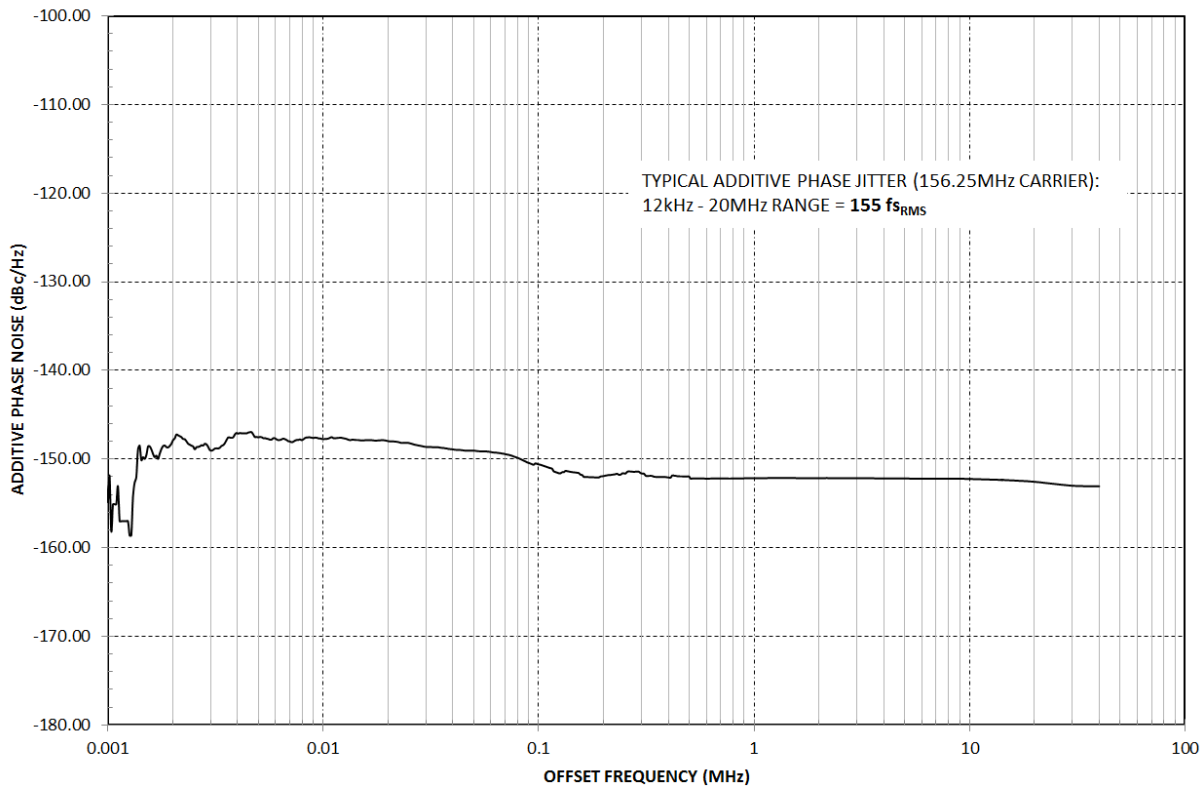
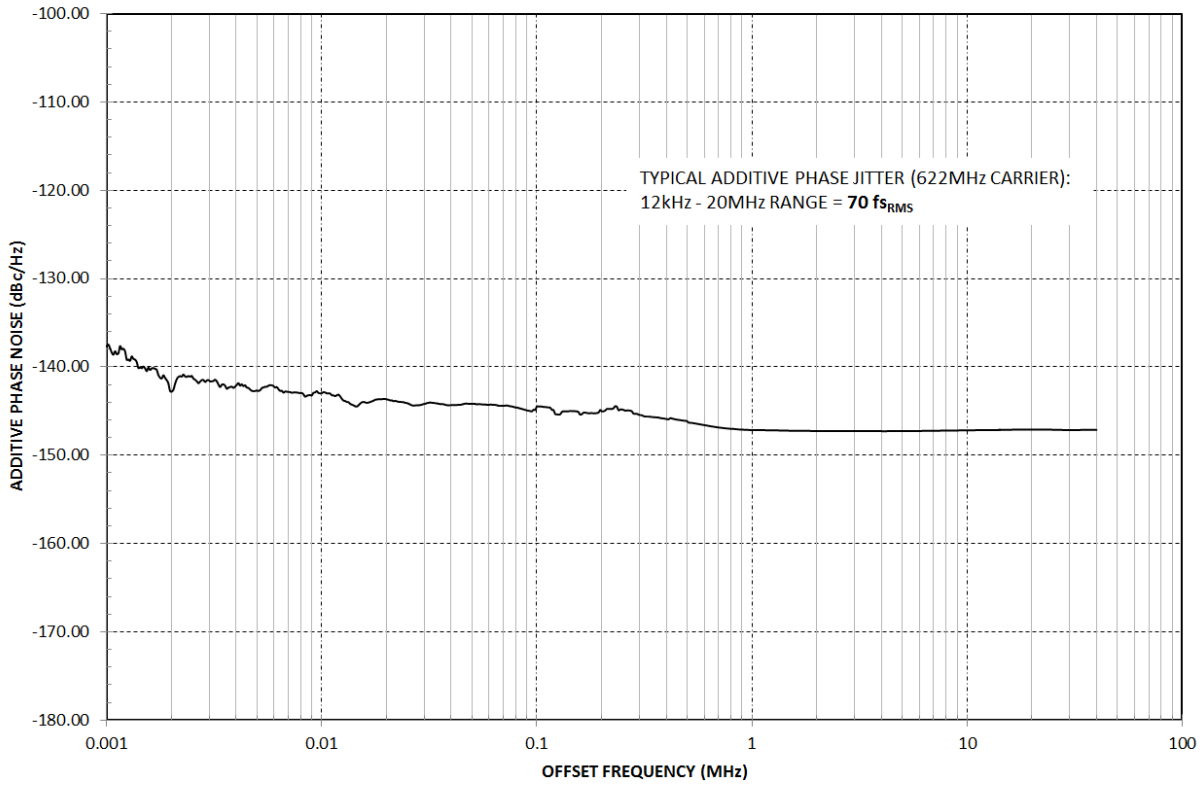
Symbol	Parameter	Condition	Min.	Typ.	Max.	Units	
t_{PLH} t_{PHL}	Propagation Delay CLK to Q (Diff)	$T_A = -40^\circ\text{C}$	520		720	ps	
		$T_A = 0^\circ\text{C}$	550		750	ps	
		$T_A = +25^\circ\text{C}$	580	680	780	ps	
		$T_A = +85^\circ\text{C}$	630		830	ps	
	Propagation Delay CLK to Q (SE)	$T_A = -40^\circ\text{C}$	470		770	ps	
		$T_A = 0^\circ\text{C}$	500		800	ps	
		$T_A = +25^\circ\text{C}$	530	680	830	ps	
		$T_A = +85^\circ\text{C}$	580		880	ps	
	Propagation Delay SCLK to Q	$T_A = -40^\circ\text{C}$	470		770	ps	
		$T_A = 0^\circ\text{C}$	500		800	ps	
		$T_A = +25^\circ\text{C}$	530	680	830	ps	
		$T_A = +85^\circ\text{C}$	580		880	ps	
t_{skew}	Part-to-Part Skew ⁽¹²⁾				200	ps	
	Within-Device Skew				50	ps	
t_S	Setup Time /EN		150			ps	
t_H	Hold Time /EN		200			ps	
V_{PP}	Minimum Input Swing, CLK		150			mV	
V_{CMR}	Common Mode Range ⁽¹³⁾	$V_{PP} < 500\text{mV}$	$T_A = -40^\circ\text{C}$	$V_{CC} - 2.000$		$V_{CC} - 0.400$	V
			$T_A = 0^\circ\text{C}$ to $+85^\circ\text{C}$	$V_{CC} - 2.100$		$V_{CC} - 0.400$	V
		$V_{PP} \geq 500\text{mV}$	$T_A = -40^\circ\text{C}$	$V_{CC} - 1.800$		$V_{CC} - 0.400$	V
			$T_A = 0^\circ\text{C}$ to $+85^\circ\text{C}$	$V_{CC} - 1.900$		$V_{CC} - 0.400$	V
t_r/t_f	Output Rise/Fall Time Q (20% - 80%)	$T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$ Typical value at $T_A = +25^\circ\text{C}$	230	360	500	ps	
t_{JITTER}	Additive Jitter	Carrier = 622MHz Integration Range: 12kHz to 20MHz		70		f_{SRMS}	
		Carrier = 156.25MHz Integration Range: 12kHz to 20MHz		155			

Notes:

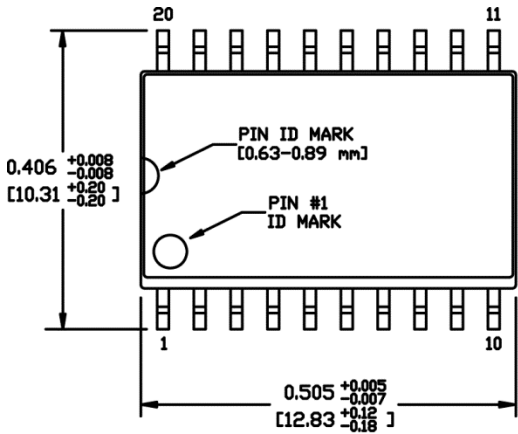
- Skews are specified for identical LOW-to-HIGH or HIGH-to-LOW transitions.
- The V_{CMR} range is referenced to the most positive side of the differential input signal. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between $V_{PP}(\text{min})$ and 1V. The lower end of the V_{CMR} range varies 1:1 with V_{EE} . The numbers in the specification table assume a nominal V_{EE} of 3.3V. For PECL operation, the $V_{CMR}(\text{min})$ will be fixed at $3.3\text{V} - |V_{CMR}(\text{min})|$.

Additive Phase Noise

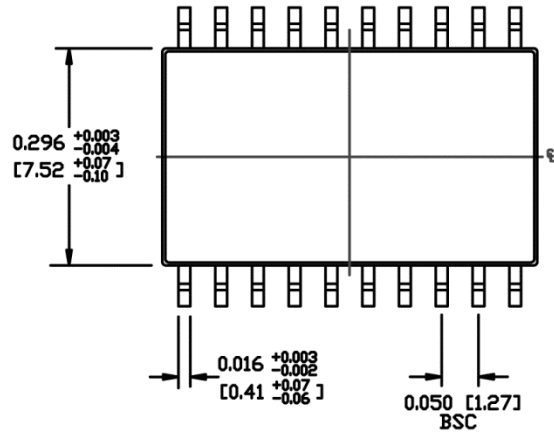
V_{CC} = +5V, T_A = 25°.



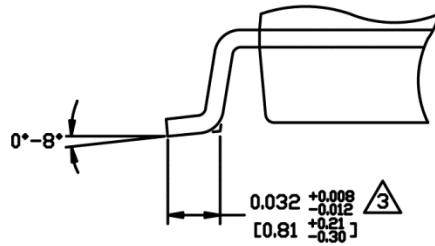
Package Information⁽¹⁴⁾



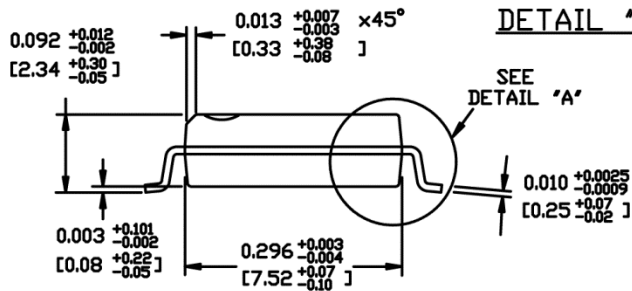
TOP VIEW
NOTE 1, 2



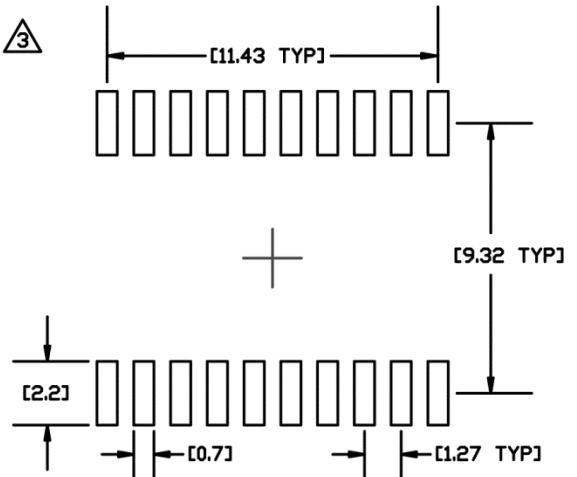
BOTTOM VIEW
NOTE 1, 2



DETAIL "A"



END VIEW
NOTE 1, 2, 3



RECOMMENDED LAND PATTERN

NOTES:

1. DIMENSIONS ARE IN INCHES[MM].
2. CONTROLLING DIMENSION: INCHES.
3. DIMENSION DOES NOT INCLUDE MOLD FLASH OR PROTRUSIONS, EITHER OF WHICH SHALL NOT EXCEED 0.006[0.15] PER SIDE.

20-Pin Narrow SOIC (Z20-1)

Note:

14. Package information is correct as of the publication date. For updates and most current information, go to www.micrel.com.

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