



# 5V/3.3V DUAL DIFFERENTIAL 2:1 MULTIPLEXER

SY100EL56V

## FEATURES

- 3.3V and 5V power supply options
- 440ps propagation delay
- Separate and common select
- High bandwidth output transitions
- Internal 75KΩ input pull-down resistors
- Available in 20-pin SOIC package

## DESCRIPTION

The SY100EL56V is a dual, fully differential 2:1 multiplexer. The differential data path makes the device ideal for multiplexing low skew clock or other skew sensitive signals. Multiple  $V_{BB}$  pins are provided to ease AC coupling input signals.

The device features both individual and common select inputs to address both data path and random logic applications.

The differential inputs have special circuitry which ensures device stability under open input conditions. When both differential inputs are left open the D input will pull down to  $V_{EE}$ , the /D input will bias around  $V_{CC}/2$  forcing the Q output LOW.

## PIN NAMES

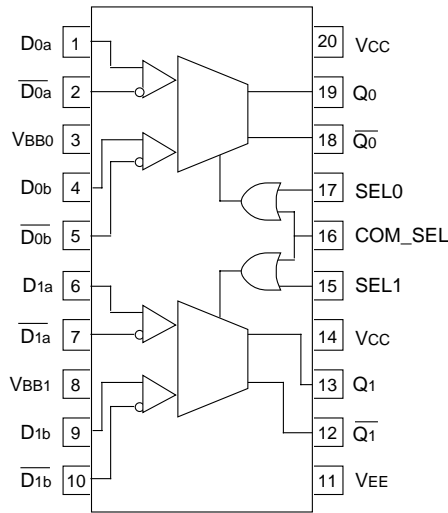
Pin	Function
D0a–D1a	Input Data a
D0b–D1b	Input Data b
SEL0–SEL1	Individual Select Input
COM_SEL	Common Select Input
Q0–Q1	True Outputs
/Q0–/Q1	Inverted Outputs

## TRUTH TABLE

SEL	Data
H	a
L	b

**PACKAGE/ORDERING INFORMATION**

**Ordering Information<sup>(1)</sup>**



**20-Pin Wide SOIC (Z20-1)**

Part Number	Package Type	Operating Range	Package Marking	Lead Finish
SY100EL56VZC	Z20-1	Commercial	SY100EL56VZC	Sn-Pb
SY100EL56VZCTR <sup>(2)</sup>	Z20-1	Commercial	SY100EL56VZC	Sn-Pb
SY100EL56VZI	Z20-1	Industrial	SY100EL56VZI	Sn-Pb
SY100EL56VZITR <sup>(2)</sup>	Z20-1	Industrial	SY100EL56VZI	Sn-Pb
SY100EL56VZG <sup>(3)</sup>	Z20-1	Industrial	SY100EL56VZG with Pb-Free bar-line indicator	Pb-Free NiPdAu
SY100EL56VZGTR <sup>(2, 3)</sup>	Z20-1	Industrial	SY100EL56VZG with Pb-Free bar-line indicator	Pb-Free NiPdAu

**Notes:**

1. Contact factory for die availability. Dice are guaranteed at T<sub>A</sub> = 25°C, DC Electricals only.
2. Tape and Reel.
3. Pb-Free package is recommended for new designs.

**PRODUCT/PROCESS INFORMATION**

Process:	Bipolar
ESD Rating:	Per Mil Std. 883 Human Body Model, >1.5kV (all pins).

**ABSOLUTE MAXIMUM RATINGS<sup>(1)</sup>**

Symbol	Rating	Value	Unit
V <sub>CC</sub>	Power Supply Voltage (V <sub>EE</sub> = 0)	+6.0 to 0	V
V <sub>EE</sub>	Power Supply Voltage (V <sub>CC</sub> = 0)	-6.0 to 0	V
V <sub>IN</sub>	Input Voltage (V <sub>CC</sub> = 0V, V <sub>IN</sub> not more negative than V <sub>EE</sub> ) Input Voltage (V <sub>EE</sub> = 0V, V <sub>IN</sub> not more positive than V <sub>CC</sub> )	-6.0 to 0 +6.0 to 0	V V
I <sub>OUT</sub>	Output Current -Continuous -Surge	50 100	mA
T <sub>LEAD</sub>	Lead Temperature (soldering, 20sec.)	+260	°C
T <sub>A</sub>	Operating Temperature Range	-40 to +85	°C
T <sub>store</sub>	Storage Temperature Range	-65 to +150	°C
θ <sub>JA</sub>	Thermal Resistance (Junction-to-Ambient) -Still Air -500lfpm	160 109	°C/W °C/W
θ <sub>JC</sub>	Thermal Resistance (Junction-to-Case)	39	°C/W
ESD	Mil Std. 883 Human Body Model, All Pins	>1.5k	V

**Note 1.** Permanent device damage may occur if absolute maximum ratings are exceeded. This is a stress rating only and functional operation is not implied at conditions other than those detailed in the operational sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

**DC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>**

V<sub>EE</sub> = V<sub>EE</sub> (Min) to V<sub>EE</sub> (Max); V<sub>CC</sub> = GND

Symbol	Parameter	T <sub>A</sub> = -40°C			T <sub>A</sub> = 0°C			T <sub>A</sub> = +25°C			T <sub>A</sub> = +85°C			Unit	
		Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.		
I <sub>EE</sub>	Power Supply Current	—	20	24	—	20	24	—	20	24	—	20	24	mA	
V <sub>BB</sub>	Output Reference Voltage	-1.38	—	-1.26	-1.38	—	-1.26	-1.38	—	-1.26	-1.38	—	-1.26	V	
I <sub>IH</sub>	Input HIGH Current	—	—	150	—	—	150	—	—	150	—	—	150	μA	
I <sub>IL</sub>	Input LOW Current	D <sub>n</sub>	0.5	—	—	0.5	—	—	0.5	—	—	0.5	—	—	μA
		$\overline{D}_n$	-600	—	—	-600	—	—	-600	—	—	-600	—	—	
V <sub>PP(DC)</sub>	Input Sensitivity <sup>(2)</sup>	50	—	—	50	—	—	50	—	—	50	—	—	mV	

**Note 1.** Parametric values specified at: 100EL56V Series: (-3.0V to -3.8V) or (-4.2V to -5.5V).

**Note 2.** Differential input voltage required to obtain a full ECL swing on the outputs.

## AC ELECTRICAL CHARACTERISTICS

$V_{EE} = V_{EE} (\text{Min})$  to  $V_{EE} (\text{Max})$ ;  $V_{CC} = \text{GND}$

Symbol	Parameter	$T_A = -40^\circ\text{C}$			$T_A = 0^\circ\text{C}$			$T_A = +25^\circ\text{C}$			$T_A = +85^\circ\text{C}$			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
t <sub>PD</sub>	Propagation D (Diff)	340	—	540	350	—	550	360	—	560	380	—	580	ps
	Delay D (SE)	290	—	590	300	—	600	310	—	610	330	—	630	
	to Output SEL	430	—	730	440	—	740	440	—	740	450	—	750	
	COM_SEL	430	—	730	440	—	740	440	—	740	450	—	750	
t <sub>SKEW</sub>	Within Device Skew <sup>(1)</sup>	—	40	80	—	40	80	—	40	80	—	40	80	ps
	Duty Cycle Skew <sup>(2)</sup>	—	—	100	—	—	100	—	—	100	—	—	100	ps
V <sub>PP(AC)</sub>	Minimum Input Swing <sup>(3)</sup>	150	—	1000	150	—	1000	150	—	1000	150	—	1000	mV
V <sub>CMR</sub>	Common Mode Range													V
	$V_{EE} = -3.0\text{V}$ to $-3.8\text{V}$ <sup>(4)</sup>													
	$V_{PP} < 500\text{mV}$	-2.0	—	-0.4	-2.1	—	-0.4	-2.1	—	-0.4	-2.1	—	-0.4	
	$V_{PP} \geq 500\text{mV}$	-1.8	—	-0.4	-1.9	—	-0.4	-1.9	—	-0.4	-1.9	—	-0.4	
	$V_{EE} = -4.2\text{V}$ to $-5.5\text{V}$ <sup>(5)</sup>													
$V_{PP} < 500\text{mV}$	-3.2	—	-0.4	-3.3	—	-0.4	-3.3	—	-0.4	-3.3	—	-0.4		
$V_{PP} \geq 500\text{mV}$	-3.0	—	-0.4	-3.1	—	-0.4	-3.1	—	-0.4	-3.1	—	-0.4		
t <sub>r</sub> t <sub>f</sub>	Output Rise/Fall Times Q (20% –80%)	200	—	540	200	—	540	200	—	540	200	—	540	ps

**Note 1.** Within device skew is defined as identical transitions on similar paths through a device.

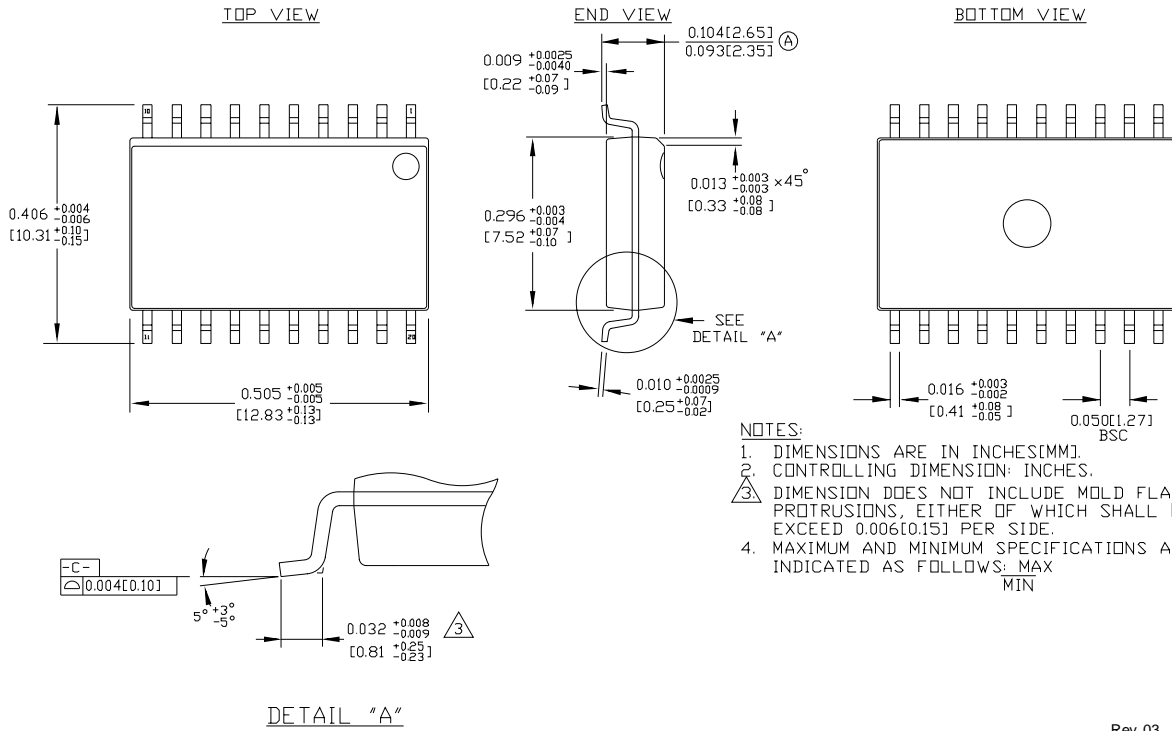
**Note 2.** Duty cycle skew is defined only for differential operation when the delays are measured from the cross point of the inputs to the cross point of the outputs.

**Note 3.** Minimum input swing for which AC parameters are guaranteed.

**Note 4.** The 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 CMR range varies 1:1 with  $V_{EE}$ . The numbers in the spec table assume a nominal  $V_{EE} = -3.3\text{V}$ . Note for PECL operation, the  $V_{CMR}(\text{min})$  will be fixed at  $3.3\text{V} - |V_{CMR}(\text{min})|$ .

**Note 5.** The 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 CMR range varies 1:1 with  $V_{EE}$ . The numbers in the spec table assume a nominal  $V_{EE} = -4.5\text{V}$ . Note for PECL operation, the  $V_{CMR}(\text{min})$  will be fixed at  $5.0\text{V} - |V_{CMR}(\text{min})|$ .

**20-PIN SOIC .300" WIDE (Z20-1)**



Rev. 03

**Package Notes:**

**Note 1.** Package meets Level 1 moisture sensitivity.

**MICREL, INC. 2180 FORTUNE DRIVE SAN JOSE, CA 95131 USA**

TEL + 1 (408) 944-0800 FAX + 1 (408) 474-1000 WEB <http://www.micrel.com>

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#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.