



5V/3.3V 2.5Gbps VARIABLE OUTPUT SWING DIFFERENTIAL RECEIVER

ECL Pro™
SY100EP16VS

FEATURES

- 3.3V and 5V power supply options
- Fast output transitions <160ps t_r / t_f
- Guaranteed operation over -40°C to $+85^{\circ}\text{C}$ temperature range
- Functionally equivalent to SY88927V and SY10EP16V
- Variable output swing from 100mV to 700mV
- Available in 8-pin (3mm) EPAD-MSOP package

APPLICATIONS

- Multimode optical transceiver
- VCSEL driver
- Backplane receiver



ECL Pro™

DESCRIPTION

The SY100EP16VS are differential receivers with variable output swing. The devices are functionally equivalent to the EP16V devices with an input that controls the amplitude of the outputs. EP16VS is commonly used as VCSEL laser driver.

The operational range of the EP16VS control input is from V_{BB} (max. swing) to V_{CC} (min. swing). Simple control of the output swing can be obtained by a variable resistor between the V_{BB} pin and V_{CC} with the wiper driving V_{CTRL} .

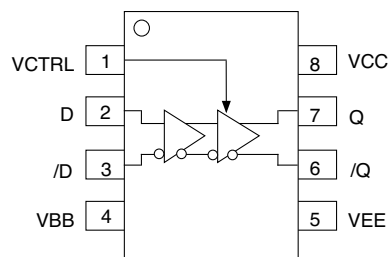
The EP16VS provides a V_{BB} output for either single-ended use or as a DC bias for AC coupling to the device. The V_{BB} pin should be used only as a bias for the EP16VS as its current sink/source capability is limited. Whenever used, the V_{BB} pin should be bypassed with a $0.01\mu\text{F}$ capacitor to V_{CC} (in PECL mode).

Under open input conditions (pulled to V_{EE}), internal input clamps will force the Q output LOW.

PIN NAMES

Pin	Function
D, /D	PECL Data Inputs
Q, /Q	Data Outputs
V_{BB}	Reference Voltage Output
V_{CTRL}	Output Swing Control
V_{CC}	Most Positive Power Supply Input
V_{EE}	Most Negative Power Supply Input

PACKAGE/ORDERING INFORMATION



8-Pin EPAD-MSOP

Ordering Information⁽¹⁾

Part Number	Package Type	Operating Range	Package Marking	Lead Finish
SY100EP16VSKC	K8-2	Commercial	P16S	Sn-Pb
SY100EP16VSKCTR ⁽²⁾	K8-2	Commercial	P16S	Sn-Pb
SY100EP16VSKI	K8-2	Industrial	P16S	Sn-Pb
SY100EP16VSKITR ⁽²⁾	K8-2	Industrial	P16S	Sn-Pb
SY100EP16VSKY ⁽³⁾	K8-2	Industrial	P16S with Pb-Free bar-line indicator	Pb-Free Matte-Sn
SY100EP16VSKYTR ^(2, 3)	K8-2	Industrial	P16S with Pb-Free bar-line indicator	Pb-Free Matte-Sn

Notes:

1. Contact factory for die availability. Dice are guaranteed at $T_A = 25^\circ\text{C}$, DC Electricals only.
2. Tape and Reel.
3. Pb-Free package is recommended for new designs.

ABSOLUTE MAXIMUM RATINGS⁽¹⁾

Symbol	Rating	Value	Unit
V _{EE}	Power Supply Voltage (V _{CC} = 0)	–6.0 to 0	V
V _{CC}	Power Supply Voltage (V _{EE} = 0)	+6.0 to 0	V
V _{IN}	Input Voltage (V _{CC} = 0V, V _{IN} not more negative than V _{EE}) Input Voltage (V _{EE} = 0V, V _{IN} not more negative than V _{CC})	–6.0 to 0 +6.0 to 0	V V
I _{OUT}	Output Current –Continuous –Surge	50 100	mA
I _{BB}	V _{BB} Sink/Source Current ⁽²⁾	±0.5	mA
T _A	Operating Temperature Range	–40 to +85	°C
T _{store}	Storage Temperature Range	–65 to +150	°C
T _{LEAD}	Lead Temperature (soldering, 20sec.)	260	°C
θ _{JA}	Package Thermal Resistance (Junction-to-Ambient) –Still-Air	38	°C/W

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⁽¹⁾

V_{CC} = +5V ±10% or +3.3V ±10%; R_{LOAD} = 50Ω to V_{CC} –2V⁽²⁾

Symbol	Parameter	T _A = –40°C		T _A = +25°C			T _A = +85°C		Unit
		Min.	Max.	Min.	Typ.	Max.	Min.	Max.	
I _{EE}	Power Supply Current	—	51	—	—	51	—	51	mA
V _{BB}	Output Reference Voltage	V _{CC} –1.38	V _{CC} –1.26	V _{CC} –1.38	—	V _{CC} –1.26	V _{CC} –1.38	V _{CC} –1.26	V
V _{OH}	Output HIGH Voltage ⁽³⁾	V _{CC} –1085	V _{CC} –880	V _{CC} –1025	V _{CC} –0955	V _{CC} –880	V _{CC} –1025	V _{CC} –880	mV
V _{OL}	Output LOW Voltage ⁽³⁾ V _{CTRL} = V _{BB} V _{CTRL} = V _{CC}	V _{CC} –1900	V _{CC} –1650	V _{CC} –1900	—	V _{CC} –1650	V _{CC} –1900	V _{CC} –1650	mV
		V _{CC} –1125	V _{CC} –975	V _{CC} –1125	—	V _{CC} –975	V _{CC} –1125	V _{CC} –975	mV
V _{IH}	Input HIGH Voltage	V _{CC} –1165	V _{CC} –880	V _{CC} –1165	—	V _{CC} –880	V _{CC} –1165	V _{CC} –880	mV
V _{IL}	Input LOW Voltage	V _{CC} –1810	V _{CC} –1475	V _{CC} –1810	—	V _{CC} –1475	V _{CC} –1810	V _{CC} –1475	mV
I _{IH}	Input HIGH Current D, /D V _{CTRL} ⁽⁴⁾	—	150	—	—	150	—	150	μA
		—	80	—	—	80	—	80	μA
I _{IL}	Input LOW Current	0.5	—	0.5	—	—	0.5	—	μA

Note 1. 100EP circuits are designed to meet the DC specifications shown in the above table after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and traverse airflow greater than 500lfpm is maintained.

Note 2. Input and output parameters vary 1:1 with V_{CC}.

Note 3. All loading with 50Ω to V_{CC} – 2.0V.

Note 4. V_{CTRL} = V_{CC} –0.88V.

AC ELECTRICAL CHARACTERISTICS
 $V_{CC} = +5V \pm 10\%$ or $+3.3V \pm 10\%$; $R_{LOAD} = 50\Omega$ to $V_{CC} - 2V$

Symbol	Parameter	$T_A = -40^\circ C$			$T_A = +25^\circ C$			$T_A = +85^\circ C$			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
t_{PLH} t_{PHL}	Propagation Delay to Output D (Diff) D (SE)	100 100	— 250	250 350	100 100	— 250	250 350	120 120	— 280	300 400	ps
V_{PP}	Minimum Input Swing ⁽¹⁾	150	—	—	150	—	—	150	—	—	mV
V_{CMR}	Common Mode Range ⁽²⁾	$V_{CC} - 1.3$	—	$V_{CC} - 0.4$	$V_{CC} - 1.3$	—	$V_{CC} - 0.4$	$V_{CC} - 1.3$	—	$V_{CC} - 0.4$	V
t_r, t_f	Output Rise/Fall Times ⁽³⁾ (20% to 80%)	—	—	160	—	95	160	—	—	160	ps

Note 1. Minimum input swing for which AC parameters are guaranteed. The device has a DC gain of ≈ 40 when output has a full swing.

Note 2. 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} (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 $V_{EE} = -3.3V$ and $V_{CC} = 0V$. Note for PECL operation, the V_{CMR} (min.) will be fixed at $3.3V - IV_{CMR}$ (min.).

Note 3. Output at full swing.

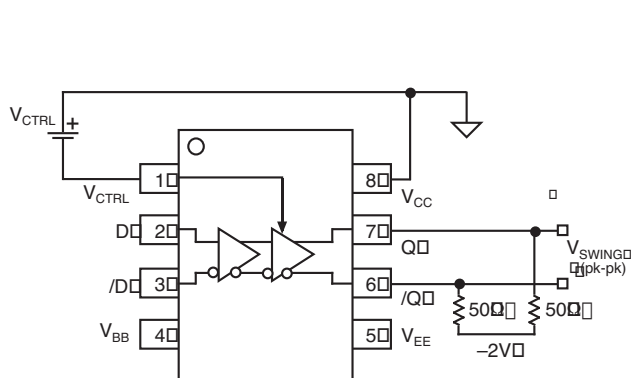
APPLICATION IMPLEMENTATION

Figure 1. Voltage Source Implementation

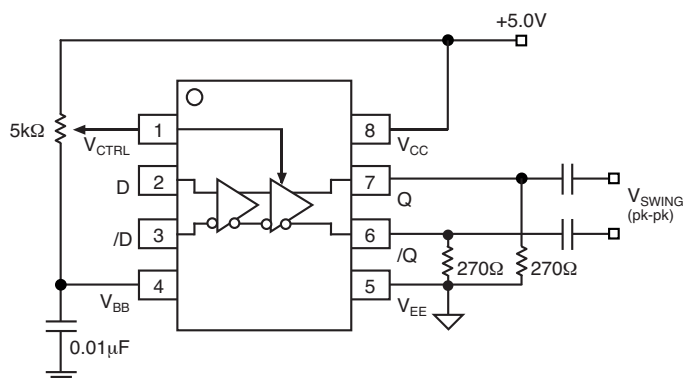
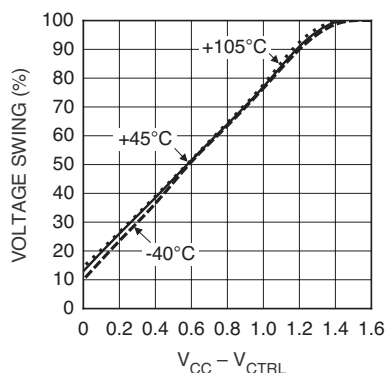


Figure 2. Alternative Implementation

TYPICAL VOLTAGE OUTPUT SWINGFigure 3. Typical Voltage Output Swing
 $V_{CC} = 3.3V$ or $5V$

TOP VIEW

4.90 [0.193] BSC

8 5

1 4

3.00 $\begin{matrix} +0.10 \\ -0.10 \\ +0.004 \\ -0.004 \end{matrix}$

END VIEW

0.10 $\begin{matrix} +0.05 \\ -0.05 \\ +0.002 \\ -0.002 \end{matrix}$

3.00 $\begin{matrix} +0.10 \\ -0.10 \\ +0.004 \\ -0.004 \end{matrix}$

1.02 $\begin{matrix} +0.08 \\ -0.08 \\ +0.003 \\ -0.003 \end{matrix}$

SEE DETAIL 'A'

BOTTOM VIEW

1.70 [0.067] REF

1.73 [0.068] REF

Expose Paddle

0.15 $\begin{matrix} +0.07 \\ -0.02 \\ +0.003 \\ -0.001 \end{matrix}$

0.33 $\begin{matrix} +0.12 \\ -0.12 \\ +0.005 \\ -0.005 \end{matrix}$

0.65 BSC [0.026]

DETAIL A

4.00 $\begin{matrix} +0.15 \\ -0.15 \\ +0.006 \\ -0.006 \end{matrix}$

NOTES:

1. DIMENSIONS ARE IN MM [INCHES].
2. CONTROLLING DIMENSION: MM
3. DIMENSION DOES NOT INCLUDE MOLD FLASH OR PROTRUSIONS, EITHER OF WHICH SHALL NOT EXCEED 0.20 [0.008] PER SIDE.

Rev. 01

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