MICREL

The Infinite Bandwidth Company™

FEATURES

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

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 to ground via a 0.01µF capacitor.

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

PIN CONFIGURATION/BLOCK DIAGRAM
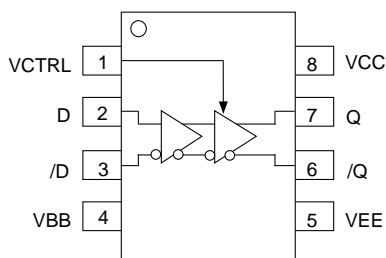
8-pin EPAD-MSOP

APPLICATIONS

- ■ **Multimode optical transceiver**
- ■ **VCSEL driver**
- ■ **Backplane receiver**

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

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 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
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}−1125	V_{CC}−1650 V_{CC}−975	V_{CC}−1900 V_{CC}−1125	— —	V_{CC}−1650 V_{CC}−975	V_{CC}−1900 V_{CC}−1125	V_{CC}−1650 V_{CC}−975	mV 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 80	— —	— —	150 80	— —	150 80	μA
I_{IL}	Input LOW Current	0.5	—	0.5	—	—	0.5	—	μA

NOTES:

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.

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

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

4. V_{CTRL} = V_{CC} −0.88V.

AC ELECTRICAL CHARACTERISTICS

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

Symbol	Parameter	T_A = −40°C			T_A = +25°C			T_A = +85°C			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
t_{PLH} t_{PHL}	Propagation Delay D (Diff) to Output 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] Q (20% to 80%)	—	—	160	—	95	160	—	—	160	ps

NOTES:

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

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 − |V_{CMR} (Min.)|.
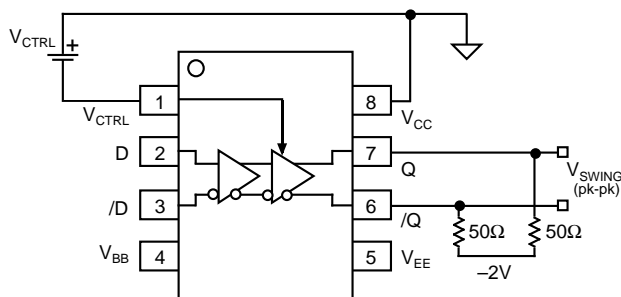
3. Output at full swing.

APPLICATION IMPLEMENTATION

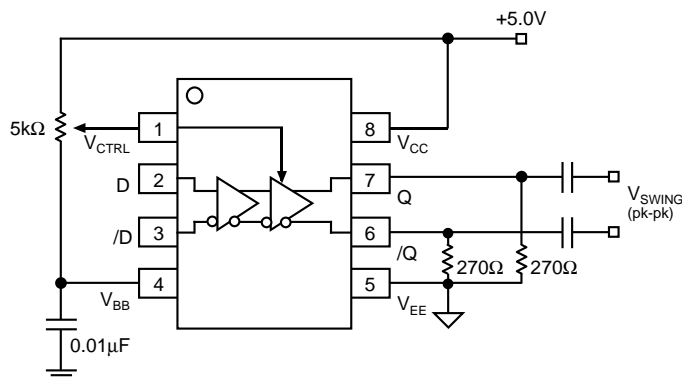**Figure 1. Voltage Source Implementation**

Figure 2. Alternative Implementation
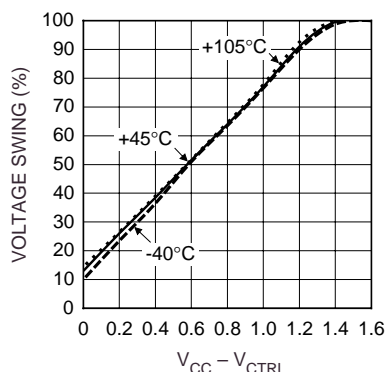
TYPICAL VOLTAGE OUTPUT SWING

Figure 3. Typical Voltage Output Swing V_{CC} = 3.3V or 5V

PRODUCT ORDERING CODE

Ordering Code	Package Type	Operating Range	Package Marking
SY100EP16VSKI	K8-2	Industrial	P16S
SY100EP16VSKITR*	K8-2	Industrial	P16S

*Tape and Reel

8 LEAD EPAD-MSOP (K8-2)

TOP VIEW

8   5

4.90 [0.193]
BSC

1   4

3.00 $^{+0.10}_{-0.10}$
[0.118$^{+0.004}_{-0.004}$]

END VIEW

1.02 $^{+0.08}_{-0.08}$
[0.040 $^{+0.003}_{-0.003}$]

0.10 $^{+0.05}_{-0.05}$
[0.004 $^{+0.002}_{-0.002}$]

3.00 $^{+0.10}_{-0.10}$
[0.118$^{+0.004}_{-0.004}$]

SEE DETAIL 'A'

0.15 $^{+0.07}_{-0.02}$
[0.006 $^{+0.003}_{-0.001}$]

0.33 $^{+0.12}_{-0.12}$
[0.013 $^{+0.005}_{-0.005}$]

BOTTOM VIEW

1.70 [0.067]
REF

1.73 [0.068]
REF

Expose Paddle

0.65   BSC
[0.026]

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.

-C-
0.102 [0.004]

4° $^{+2}_{-4}$

0.55 $^{+0.15}_{-0.15}$
[0.022 $^{+0.006}_{-0.006}$]

DETAIL A

Rev. 01