SY100EL16VS

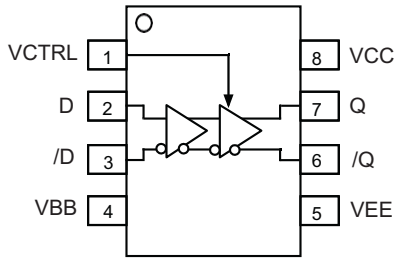
3.3V/5V Variable Output Swing Differential Receiver

Features

- 3.3V and 5V Power Supply Options
- High Bandwidth Output Transitions
- Internal 75 kΩ Pull-Down Resistors on D Inputs
- Functionally Equivalent to SY100EL16V with Variable Output Swing
- Improved Output Waveform Characteristics
- Available in 8-Pin (3 mm) MSOP Package

Package Type

SY100EL16VS
8-Pin MSOP



General Description

The SY100EL16VS is a differential receiver with variable output swing. The device is functionally equivalent to the EL16V device with an input that controls the amplitude of the outputs.

The operational range of the EL16VS 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 VBB pin and VCC with the wiper driving VCTRL.

The EL16VS provides a VBB output for either single ended use or as a DC bias for AC coupling to the device. The VBB pin should be used only as a bias for the EL16VS as its current sink/source capability is limited. Whenever used, the VBB pin should be bypassed to ground via a 0.01 µF capacitor.

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

1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings †

PECL Power Supply Voltage (V_{CC}) (Note 1) ..... +8V
NECL Power Supply Voltage (V_{EE}) (Note 2) ..... –8V
PECL Mode Input Voltage (V_{IN}) (Note 3) ..... +6V
NECL Mode Input Voltage (V_{IN}) (Note 4) ..... –6V
Continuous Output Current (I_{OUT}) ..... 50 mA
Surge Output Current (I_{OUT}) ..... 100 mA
ESD Rating (Note 5) ..... >2 kV

† Notice: Stresses above those listed under “Absolute Maximum ratings” may cause permanent damage to the device. Exposure to maximum rating conditions for extended periods may affect device reliability.

Note 1: V_{EE} = 0V.

2: V_{CC} = 0V.

3: V_{EE} = 0V, $V_{IN} \leq V_{CC}$.

4: V_{CC} = 0V, $V_{IN} \geq V_{EE}$.

5: Mil Std. 883 Human Body Model, all pins

DC ELECTRICAL CHARACTERISTICS (Note 1)

Electrical Characteristics: V_{CC} = 3.0V to 5.5V; V_{EE} = 0V or V_{EE} = –5.5V to –3.0V; V_{CC} = 0V; T_A = –40˚C to +85˚C, unless otherwise stated.

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Power Supply Current	I_{EE}	—	18	22	mA	T_A = –40˚C to +25˚C
		—	21	26		T_A = +85˚C
Output High Voltage (Note 2, Note 3)	V_{OH}	V_{CC} – 1.085	—	V_{CC} – 0.88	V	T_A = –40˚C
		V_{CC} – 1.025	V_{CC} – 0.955	V_{CC} – 0.88		T_A = 0˚C to 85˚C
Output Low Voltage (Note 2, Note 4) V_{CTRL} = V_{BB}	V_{OL}	V_{CC} – 1.890	—	V_{CC} – 1.620	V	T_A = –40˚C
		V_{CC} – 1.870	VCC – 1.775	V_{CC} – 1.680		T_A = 0˚C to 85˚C
Output Low Voltage (Note 2) V_{CTRL} = V_{CC}	V_{OL}	V_{CC} – 1.180	—	V_{CC} – 0.975	V	T_A = –40˚C
		V_{CC} – 1.135	V_{CC} – 1.065	V_{CC} – 0.990		T_A = 0˚C to 85˚C
Input High Voltage (Single Ended)	V_{IH}	V_{CC} – 1.165	—	V_{CC} – 0.880	V	—
Input Low Voltage (Single Ended)	V_{IL}	V_{CC} – 1.810	—	V_{CC} – 1.475	V	—
Output Reference Voltage	V_{BB}	V_{CC} – 1.38	—	V_{CC} – 1.26	V	—
Common Mode Range (Note 5)	V_{IHCMR}	V_{EE} + 2.0	—	V_{CC} – 0.4	V	T_A = –40˚C
		V_{EE} + 1.9	—	V_{CC} – 0.4		T_A = 0˚C to 85˚C
Input High Current	I_{IH}	—	—	150	µA	D, /D
		—	—	40		VCTRL

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

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

3: $V_{CC} \geq V_{CTRL} \geq V_{EE}$.

4: If VCTRL is an open circuit, use the V_{OH} (max. & min.) and V_{OL} (V_{CTRL} = V_{BB}: max only) limits.

5: The CMR range is referenced to the most positive side of the differential input voltage. Normal operation is obtained if the high level falls within the specified range and the peak-to-peak voltage lies between 150 mV and 1V.

AC ELECTRICAL CHARACTERISTICS

Electrical Characteristics: V_{CC} = 3.0V to 5.5V; V_{EE} = 0V or V_{EE} = -5.5V to -3.0V; T_A = -40˚C to +85˚C, unless otherwise stated. R_L = 50Ω to V_{CC} - 2.0V

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Propagation Delay D to Q (Differential)	t_{PLH}, t_{PHL}	175	—	325	ps	T_A = –40°C to +25°C
		205	—	355		T_A = +85°C
Propagation Delay D to Q (Single Ended)	t_{PLH}, t_{PHL}	125	250	425	ps	T_A = –40°C
		125	250	375		T_A = 0°C, +25°C
		155	280	405		T_A = +85°C
Duty Cycle Skew (Note 1)	t_{SKEW}	—	5	—	ps	T_A = –40°C
		—	5	20		T_A = 0°C to +85°C
Input Swing (Note 2)	V_{PP}	150	—	1000	mV	—
Output Rise/Fall Time Q (20% to 80%)	t_r/t_f	—	160	260	ps	—

Note 1: Duty cycle skew is the difference between a t_{PLH} and t_{PHL} propagation delay through a device.

2: Input swing for which AC parameters are guaranteed. The device has a DC gain of ~40 when output has a full swing.

TEMPERATURE SPECIFICATIONS

Parameters	Symbol	Min.	Typ.	Max.	Units	Conditions
Temperature Ranges						
Operating Temperature Range	T_A	–40	—	+85	°C	—
Storage Temperature Range	T_S	–65	—	+150	°C	—
Lead Temperature	T_{LEAD}	—	—	+260	°C	Soldering, 20 sec.
Package Thermal Resistance (MSOP)						
Junction-to-Ambient	θ_{JA}	—	206	—	°C/W	Still Air
		—	155	—		500 lfpm
Junction-to-Case	θ_{JC}	—	39	—	°C/W	—

2.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in Table 2-1.

TABLE 2-1: PIN FUNCTION TABLE

Pin Number	Pin Name	Description
1	VCTRL	Output Swing Control.
2, 3	D, /D	Data Input.
4	VBB	Reference Voltage Output.
5	VEE	Negative Power Supply.
6, 7	Q, /Q	Data Output.
8	VCC	Positive Power Supply.

3.0 NOMINAL PERFORMANCE CHARACTERISTICS

Note: The graphs and tables provided following this note are a statistical summary based on a limited number of samples and are provided for informational purposes only. The performance characteristics listed herein are not tested or guaranteed. In some graphs or tables, the data presented may be outside the specified operating range (e.g., outside specified power supply range) and therefore outside the warranted range.

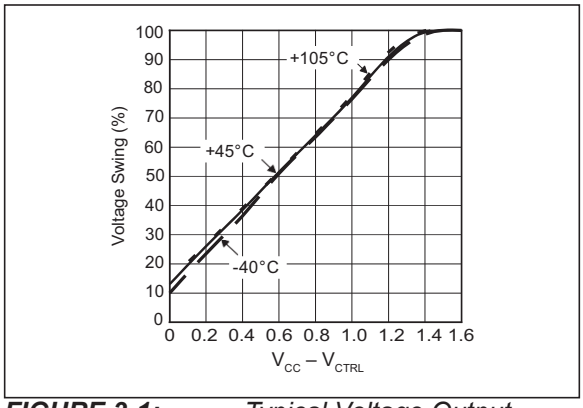


FIGURE 3-1: *Typical Voltage Output Swing (V_{CC} = 3.3V or 5V).*

4.0 APPLICATION IMPLEMENTATION

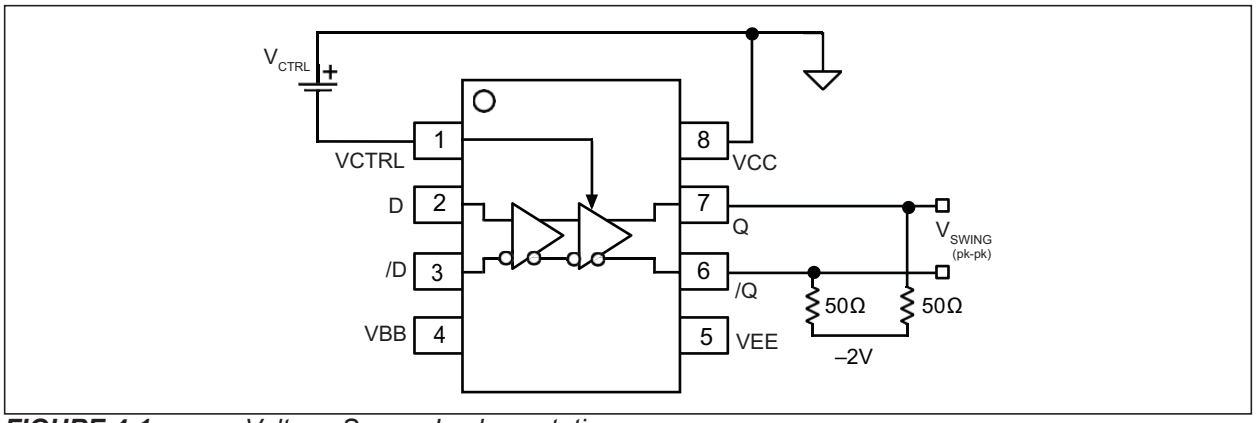


FIGURE 4-1: *Voltage Source Implementation.*

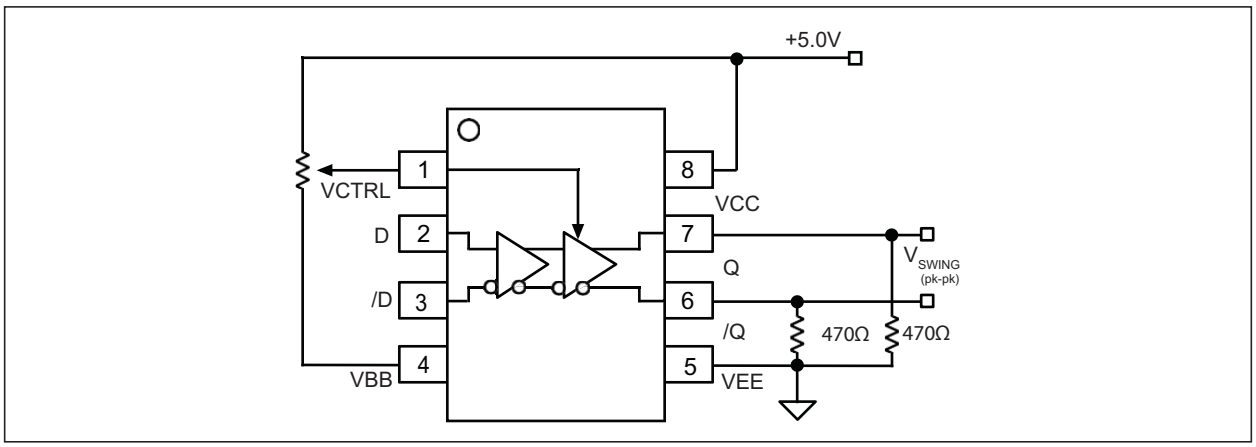


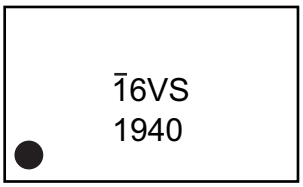
FIGURE 4-2: *Alternative Implementation.*

5.0 PACKAGING INFORMATION

5.1 Package Marking Information

8-Lead MSOP*

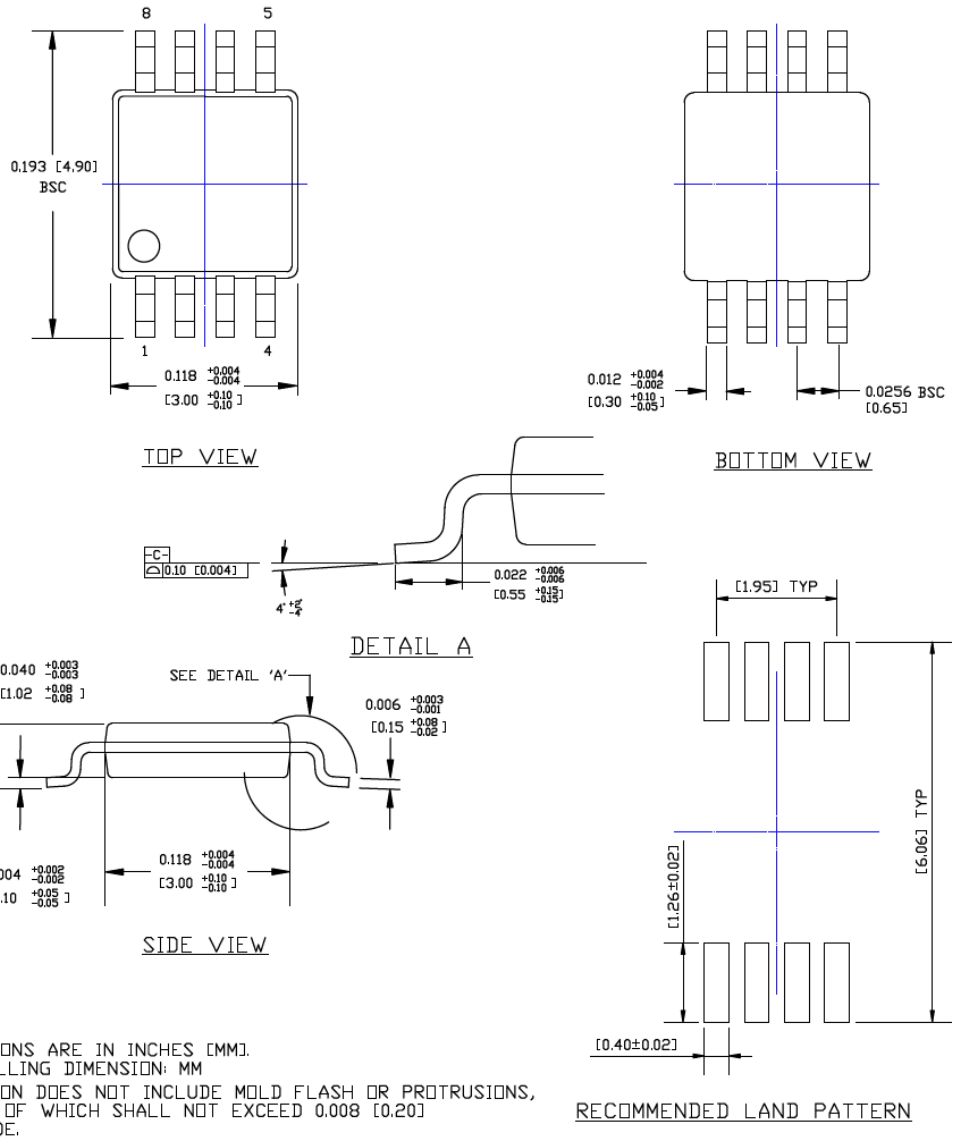
Example



Legend:	XX...X	Product code or customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week ‘01’)
	NNN	Alphanumeric traceability code
	(e3)	Pb-free JEDEC® designator for Matte Tin (Sn)
	*	This package is Pb-free. The Pb-free JEDEC designator ((e3)) can be found on the outer packaging for this package.
	●, ▲, ▼	Pin one index is identified by a dot, delta up, or delta down (triangle mark).
Note:	In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for customer-specific information. Package may or may not include the corporate logo.	
	Underbar (_) and/or Overbar (¯) symbol may not be to scale.	

TITLE
8 LEAD MSOP PACKAGE OUTLINE & RECOMMENDED LAND PATTERN

DRAWING #	MSOP-8LD-PL-1	UNIT	INCH [MM]



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

Note: For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging.

APPENDIX A: REVISION HISTORY

Revision A (August 2019)

- Converted Micrel document SY100EL16VS to Microchip data sheet template DS20006240A.
- Made minor text changes throughout the document.

NOTES:

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, contact your local Microchip representative or sales office.

PART NO.	-XX	X	X	X	-XX
Device	Supply Voltage Range	Special Feature	Package	Temperature Range	Special Processing

Device:	SY100EL16: Differential Receiver
Supply Voltage Range:	V = 3.3V/5V
Special Feature:	S = Variable Output Swing
Package:	K = 8-Lead MSOP (Pb-Free NiPdAu)
Temperature Range:	G = –40°C to +85°C
Special Processing:	<blank>= 100/Tube TR = 1,000/Reel

Examples:

a) SY100EL16VSKG: SY100EL16, 3.3V/5V, Variable Output Swing, 8-Lead MSOP, –40°C to +85°C, 100/Tube

b) SY100EL16VSKG-TR: SY100EL16, 3.3V/5V, Variable Output Swing, 8-Lead MSOP, –40°C to +85°C, 1,000/Reel

Note 1: Tape and Reel identifier only appears in the catalog part number description. This identifier is used for ordering purposes and is not printed on the device package. Check with your Microchip Sales Office for package availability with the Tape and Reel option

NOTES:

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