SY100EL16V

5V/3.3V ECL Differential Receiver

Features

- 3.3V and 5V Power Supply Options
- 250 ps Propagation Delay (Typical)
- High Bandwidth Output Transitions
- Internal 75 kΩ Input Pull-Down Resistors
- Available in 8-pin (3 mm x 3 mm) MSOP and SOIC Packages

General Description

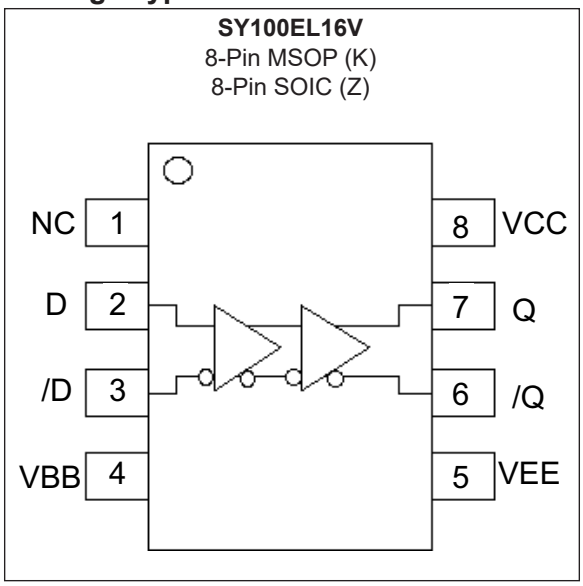
The SY100EL16V is a differential receiver. With fast output transition times, the SY100EL16V is ideally suited for interfacing with high-frequency sources.

The SY100EL16V 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 SY100EL16V 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 VEE), internal input clamps will force the Q output low.

Package Type

SY100EL16V
8-Pin MSOP (K)
8-Pin SOIC (Z)



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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, $V_{IN} \le V_{CC}$
4: V_{CC} = 0V, $V_{IN} \ge V_{EE}$
5: Mil Std. 883 Human Body Model, all pins

PECL DC ELECTRICAL CHARACTERISTICS

Electrical Specifications PECL: V_{CC} = 3.0V to 5.5V; V_{EE} = 0V; T_A = –40°C to +85°C, unless otherwise stated (Note 1)

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)	V_{OH}	V_{CC} – 1.085	V_{CC} – 1.005	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)	V_{OL}	V_{CC} – 1.830	V_{CC} – 1.695	V_{CC} – 1.555	V	T_A = –40°C
		V_{CC} – 1.810	V_{CC} – 1.705	V_{CC} – 1.620		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 3)	V_{IHCMR}	2.0	—	V_{CC} – 0.4	V	T_A = –40°C
		1.9	—	V_{CC} – 0.4		T_A = 0°C to +85°C
Input High Current	I_{IH}	—	—	150	µA	—
Input Low Current	I_{IL}	0.5	—	—	µA	$V_{IN} = V_{IL(MIN)}$

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: 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.

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NECL DC ELECTRICAL CHARACTERISTICS

Electrical Specifications NECL: V_{EE} = –5.5V to –3.0V; V_{CC} = 0V; T_A = –40°C to +85°C, unless otherwise stated (Note 1)

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)	V_{OH}	–1.085	–1.005	–0.88	V	T_A = –40°C
		–1.025	–0.955	–0.88		T_A = 0°C to +85°C
Output Low Voltage (Note 2)	V_{OL}	–1.830	–1.695	–1.555	V	T_A = –40°C
		–1.810	–1.705	–1.620		T_A = 0°C to +85°C
Input High Voltage (Single-Ended)	V_{IH}	–1.165	—	–0.880	V	—
Input Low Voltage (Single-Ended)	V_{IL}	–1.810	—	–1.475	V	—
Output Reference Voltage	V_{BB}	–1.38	—	–1.26	V	—
Common Mode Range (Note 3)	V_{IHCMR}	V_{EE} + 2.0	—	–0.4	V	T_A = –40°C
		V_{EE} + 1.9	—	–0.4		T_A = 0°C to +85°C
Input High Current	I_{IH}	—	—	150	µA	—
Input Low Current	I_{IL}	0.5	—	—	µA	V_{IN} = $V_{IL(MIN)}$

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: 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; V_{CC} = 0V; T_A = –40°C to +85°C, unless otherwise stated, (Note 1)

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Propagation Delay D to Q D (Differential)	t_{PLH} t_{PHL}	125	250	375	ps	T_A = –40°C
		175	250	325		T_A = 0°C, +25°C
		205	280	355		T_A = +85°C
Propagation Delay D to Q (Single-Ended)	t_{PLH} t_{PHL}	75	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 2)	t_{SKEW}	—	5	—	ps	T_A = –40°C
		—	5	20		T_A = 0°C to +85°C
Input Swing (Note 3)	V_{PP}	150	—	1000	mV	—
Output Rise/Fall Time Q (20% to 80%)	t_r/t_f	100	225	350	ps	—

Note 1: Specification for packaged product only.

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

3: Input swing for which AC parameters are ensured. The device has a DC gain of ≈40.

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TEMPERATURE SPECIFICATIONS

Parameters	Sym.	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.
Thermal Resistance						
Package Thermal Resistance, SOIC 8-Ld	θ_{JA}	—	160	—	°C/W	Still-Air
		—	109	—		500 lfpm
	θ_{JC}	—	39	—	°C/W	—
Package Thermal Resistance, MSOP 8-Ld	θ_{JA}	—	206	—	°C/W	Still-Air
		—	155	—		500 lfpm
	θ_{JC}	—	39	—	°C/W	—

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2.0 PIN DESCRIPTIONS

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

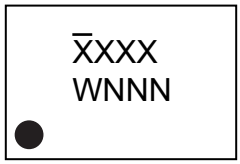
TABLE 2-1: PIN FUNCTION TABLE

Pin Name	Description
D	Data Input
Q	Data Output
VBB	Reference Voltage Output
NC	Not Connected
VCC	Positive Power Supply
VEE	Negative Power Supply

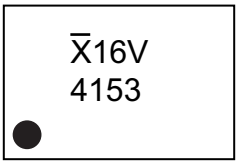
3.0 PACKAGING INFORMATION

3.1 Package Marking Information

8-Lead MSOP*



Example



8-Lead SOIC*

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.	

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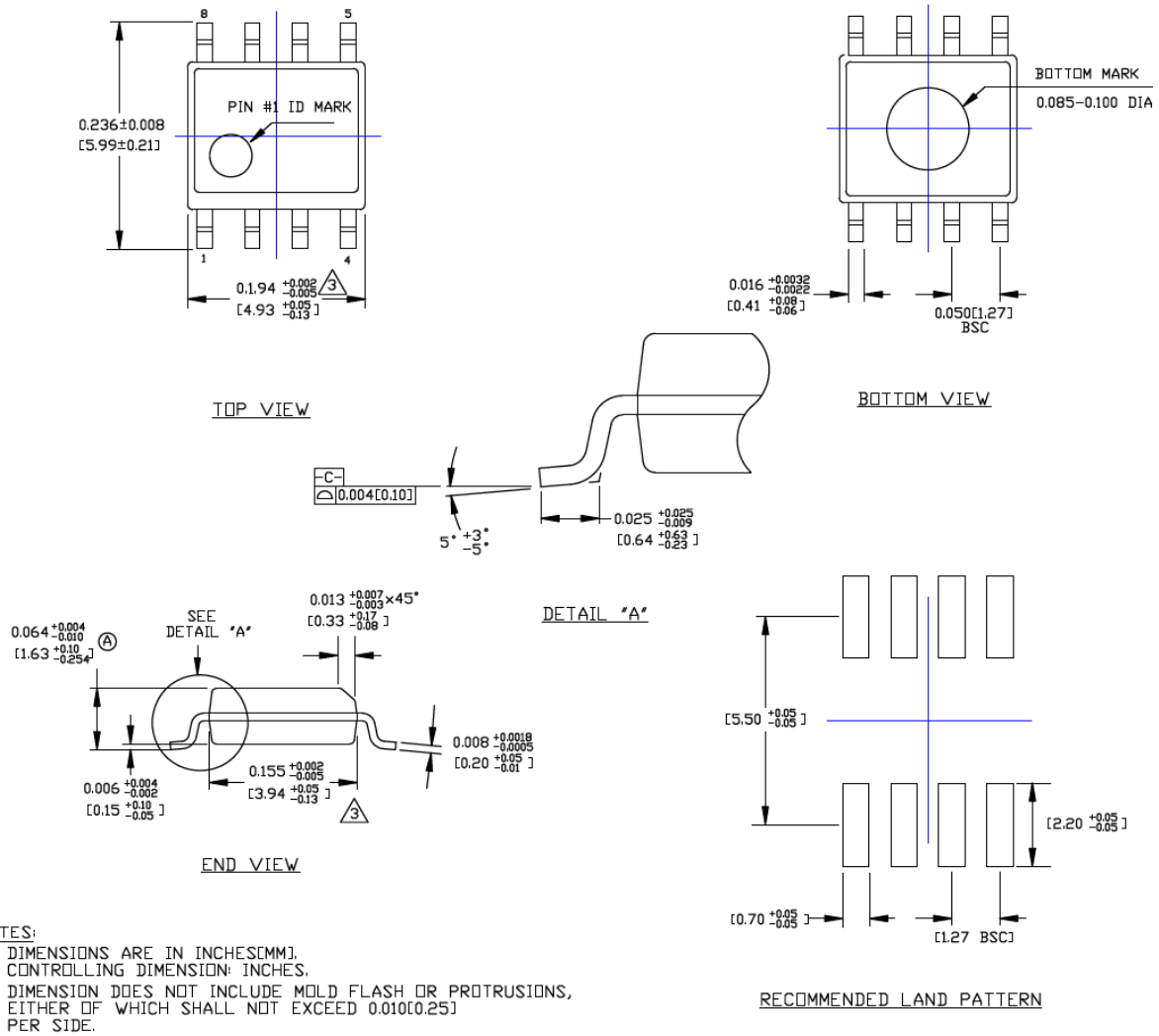
8-Lead SOIC Package Outline and Recommended Land Pattern

TITLE
8 LEAD SOICN PACKAGE OUTLINE & RECOMMENDED LAND PATTERN

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



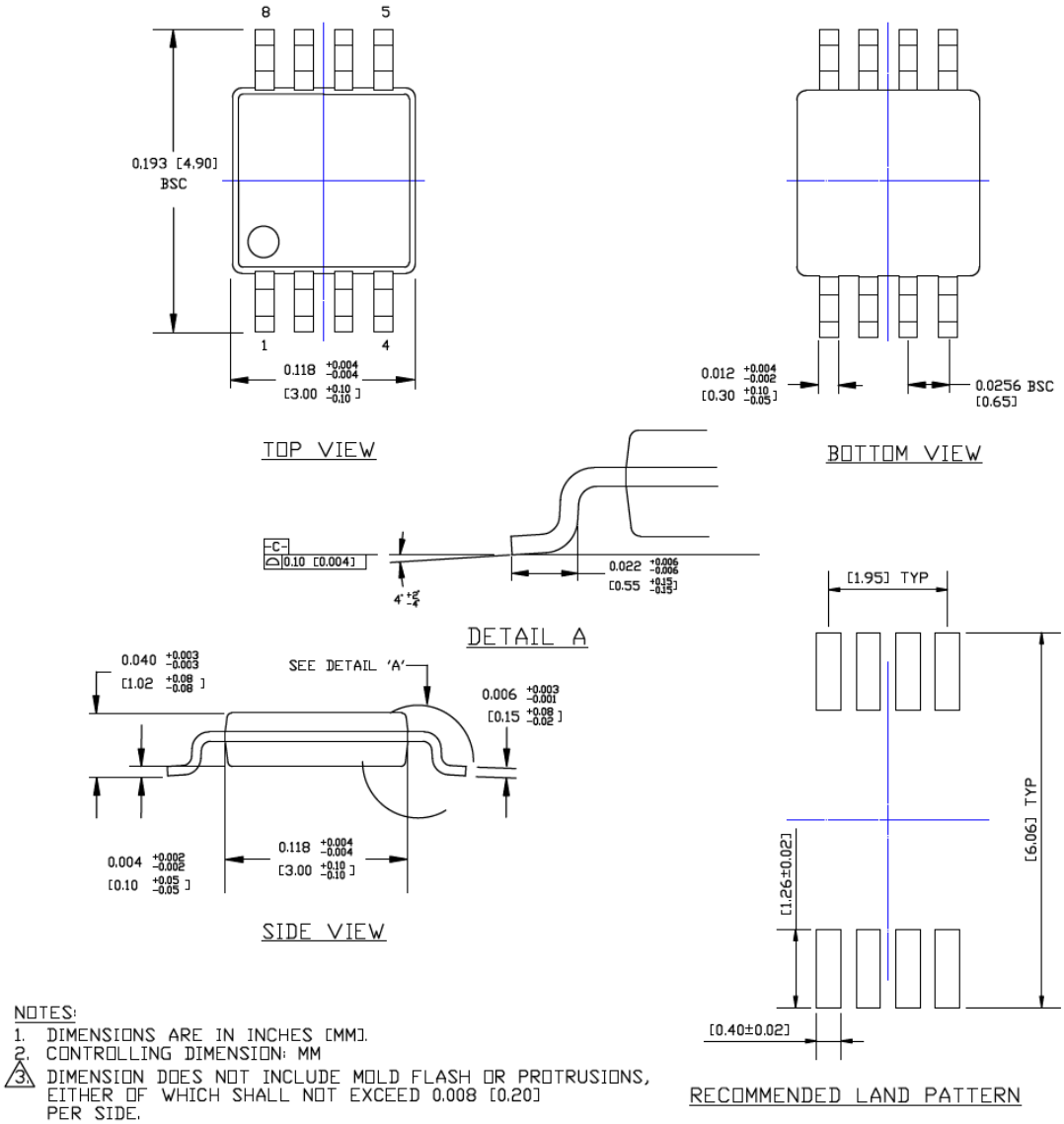
NOTES:
1. DIMENSIONS ARE IN INCHES[MM].
2. CONTROLLING DIMENSION: INCHES.
3. DIMENSION DOES NOT INCLUDE MOLD FLASH OR PROTRUSIONS, EITHER OF WHICH SHALL NOT EXCEED 0.010[0.25] PER SIDE.

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

8-Lead MSOP Package Outline and Recommended Land Pattern

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.

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APPENDIX A: REVISION HISTORY

Revision A (November 2018)

- Converted Micrel document SY100EL16V to Microchip data sheet template DS20006115A.
- Made minor text changes throughout the document.
- Removed all reference to the EOL SY10EL16V version.

Revision B (January 2020)

- Updated minimum values for Common Mode Range voltage in PECL DC Electrical Characteristics table and NECL DC Electrical Characteristics table.
- Minor stylistic updates to align data sheet with current style.
- Added Marking Spec for MSOP Package Option in **Section 3.1 "Package Marking Information"**.
- Added MSOP examples to the Product Identification System section.

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NOTES:

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PRODUCT IDENTIFICATION SYSTEM

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

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

Device:	SY100EL16:	5V/3.3V ECL Differential Receiver	
Supply Voltage Range:	V	=	3.3V/5V
Package:	Z K	= =	8-Lead SOIC (Pb-Free NiPdAu) 8-Lead MSOP (Pb-Free NiPdAu)
Temperature Range:	G	=	–40°C to +85°C
Special Processing:	<blank> TR	= =	95/Tube 1,000/Reel

Examples:

a) SY100EL16VZG: SY100EL16, 3.3V/5V, 8-Lead SOIC (Pb-Free NiPdAu), –40°C to +85°C, 95/Tube

b) SY100EL16VZG-TR: SY100EL16, 3.3V/5V, 8-Lead SOIC (Pb-Free NiPdAu), –40°C to +85°C, 1,000/Reel

c) SY100EL16VKG: SY100EL16, 3.3V/5V, 8-Lead MSOP (Pb-Free NiPdAu), –40°C to +85°C, 95/Tube

d) SY100EL16VKG-TR: SY100EL16, 3.3V/5V, 8-Lead MSOP (Pb-Free NiPdAu), –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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