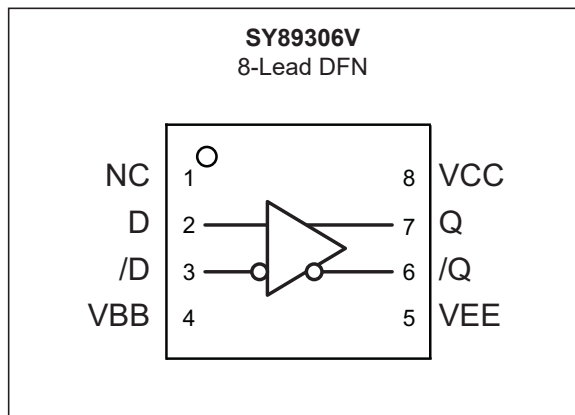


## 3.3V/5V 2.5 GHz Differential PECL/ECL Receiver/Buffer

### Features

- Maximum Frequency > 2.5 GHz
- Inputs (D, /D) Include 75 k $\Omega$  Input Pull-Down Resistors
- 100K PECL/ECL Compatible
- Industrial Temperature Range: -40°C to +85°C
- Available in an Ultra Small 8-Pin 2 mm x 2 mm DFN Package

### Package Type



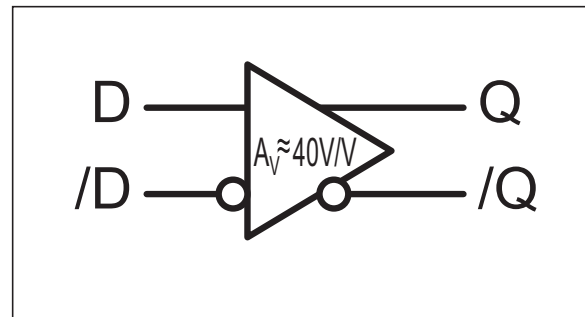
### General Description

The SY89306V is a high-speed differential buffer/receiver. The device is functionally equivalent to the SY100EL16V and SY88927V buffers, but features a 70% smaller footprint.

The SY89306V includes a VBB reference for single-ended AC-coupling applications. Whenever used, the VBB pin should be bypassed to ground via a 0.01  $\mu$ F capacitor. VBB reference can only sink/source 0.5 mA.

Under open input conditions (pulled to VEE), internal input clamps will force the Q output LOW.

### Block Diagram



# SY89306V

## 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

† **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  $-3.0V$ ;  $V_{CC} = 0V$ ;  $T_A = -40^\circ C$  to  $+85^\circ C$ , unless otherwise stated.

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Power Supply Current	$I_{EE}$	—	—	48	mA	—
Output High Voltage (Note 2)	$V_{OH}$	$V_{CC} - 1.085$	—	$V_{CC} - 0.88$	V	—
Output Low Voltage (Note 2)	$V_{OL}$	$V_{CC} - 1.830$	—	$V_{CC} - 1.555$	V	—
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)	$V_{IHCMR}$	$V_{EE} + 2.0$	—	$V_{CC} - 0.4$	V	—
Input High Current	$I_{IH}$	—	—	150	$\mu A$	—
Input Low Current	$I_{IL}$	0.5	—	—	$\mu A$	—

**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 lfm is maintained.

**2:** Outputs are terminated through a  $50\Omega$  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:**  $V_{CC} = 3.3V$  to  $5.5V$  or  $V_{EE} = -5.5V$  to  $-3.0V$ ;  $V_{CC} = 0V$ ;  $T_A = -40^{\circ}C$  to  $+85^{\circ}C$ , unless otherwise stated.  $R_L = 50\Omega$  to  $V_{CC} - 2.0V$

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Maximum Frequency (Note 1)	$f_{MAX}$	2.5	—	—	GHz	$V_{OUT} \geq 400$ mV
Propagation Delay D to Q (Differential)	$t_{PLH}$ , $t_{PHL}$	100	—	300	ps	$V_{IN} = 800$ mV
Duty Cycle Skew (Note 2)	$t_{SKEW}$	—	8	30	ps	—
Input Swing (Note 3)	$V_{PP}$	150	—	1000	mV	—
Output Rise/Fall Time Q (20% to 80%)	$t_r/t_f$	60	110	180	ps	—

**Note 1:**  $f_{MAX}$  guaranteed for functionality only.  $V_{OH}$  and  $V_{OL}$  are guaranteed at DC 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  $\approx 40$ .

# SY89306V

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## TEMPERATURE SPECIFICATIONS

Parameters	Symbol	Min.	Typ.	Max.	Units	Conditions
<b>Temperature Ranges</b>						
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.
<b>Package Thermal Resistance (DFN)</b>						
Junction-to-Ambient	$\theta_{JA}$	—	93	—	°C/W	Still Air
		—	87	—		500 lfpm
Junction-to-Case	$\theta_{JC}$	—	45	—	°C/W	—

## 2.0 PIN DESCRIPTIONS

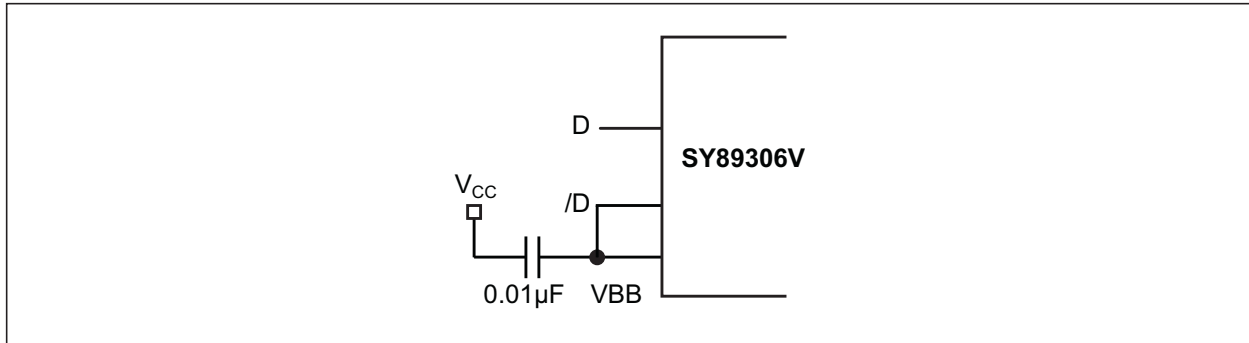
The descriptions of the pins are listed in [Table 2-1](#).

**TABLE 2-1: PIN FUNCTION TABLE**

Pin Number	Pin Name	Type	Description
2, 3	D, /D	100K ECL Input	Differential PECL/ECL Input: The signal inputs include internal 75 k $\Omega$ pull-down resistors. If inputs are left open, Q output will default to LOW. See <b>Section 3.0 “Input Interface Application”</b> for single-ended inputs.
7, 6	Q, /Q	100K ECL Output	Differential PECL/ECL Output: Q output defaults to LOW if D inputs left open. See <b>Section 4.0 “Termination Recommendations”</b> for recommendations on terminations.
8	VCC	Positive Power Supply	Positive Power Supply: Bypass with 0.1 $\mu$ F//0.01 $\mu$ F low ESR capacitors.
5	VEE Exposed Pad	Negative Power Supply	Negative Power Supply: VEE and exposed pad must be tied to most negative supply. For PECL/LVPECL connect to ground.
4	VBB	Reference Voltage Output	Bias Voltage: $V_{CC} - 1.32V$ . Used as reference voltage when AC coupling to the D, /D inputs. Max sink/source is $\pm 0.5$ mA.
1	NC	—	No connection.

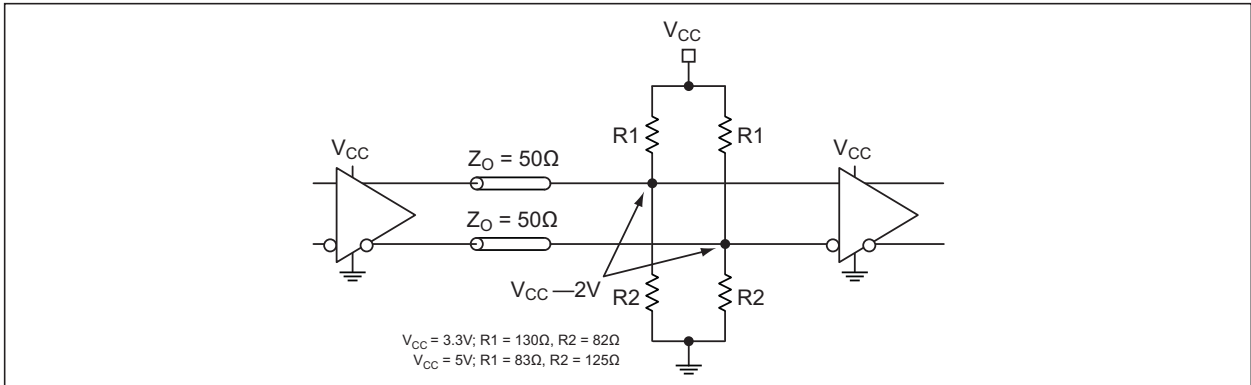
# SY89306V

## 3.0 INPUT INTERFACE APPLICATION

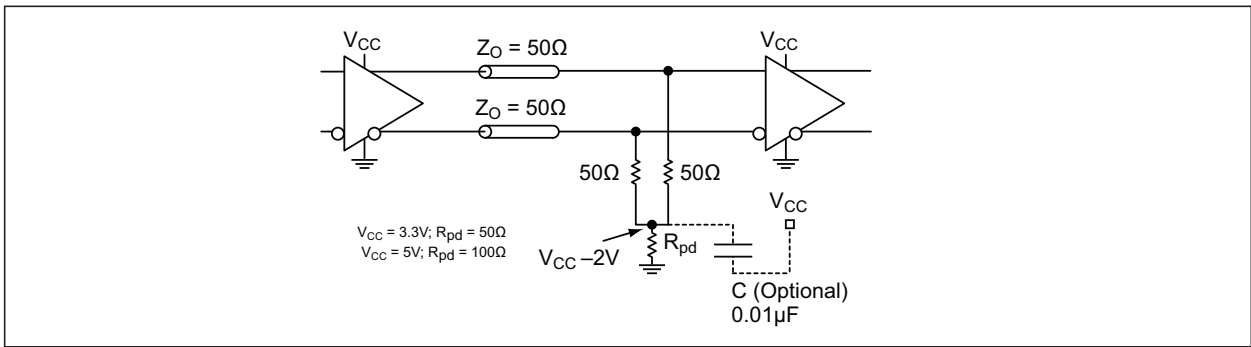


**FIGURE 3-1:** Single-Ended LVPECL Input (Terminating Unused Input).

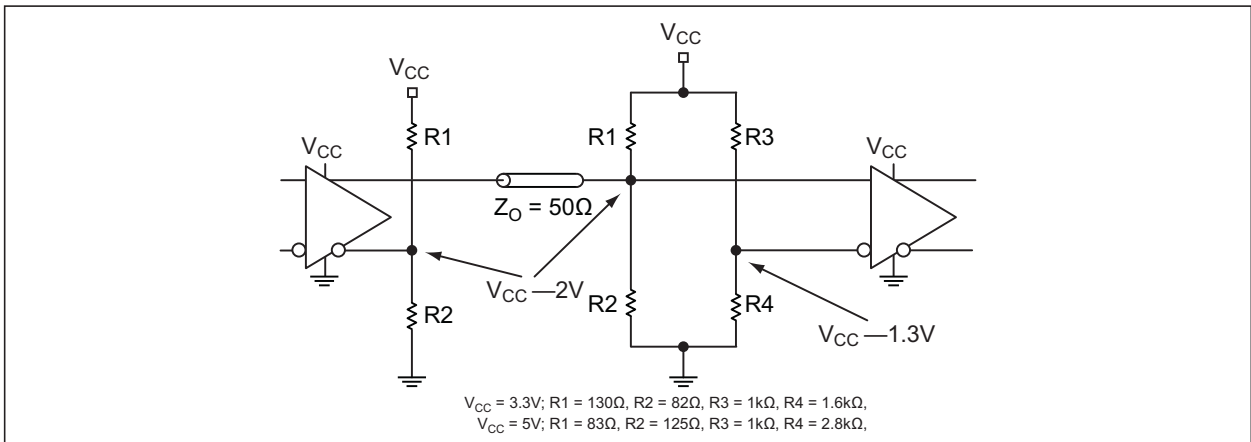
## 4.0 TERMINATION RECOMMENDATIONS



**FIGURE 4-1:** Parallel Thevenin-Equivalent Termination.



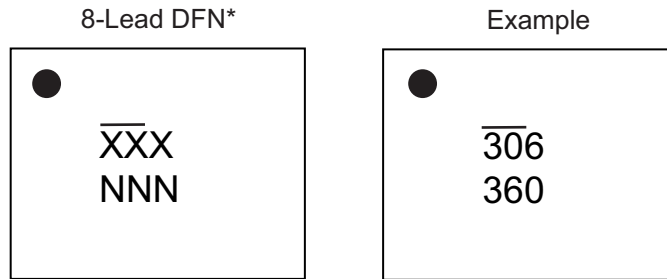
**FIGURE 4-2:** Three Resistor Y - Termination.



**FIGURE 4-3:** Terminating Unused I/O.

## 5.0 PACKAGING INFORMATION

### 5.1 Package Marking Information



<b>Legend:</b>	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).
<b>Note:</b>	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.	

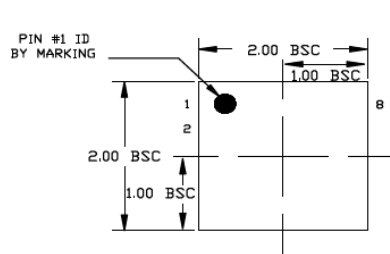


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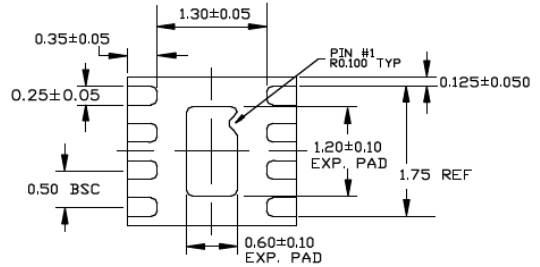
8 LEAD DFN 2x2mm PACKAGE OUTLINE & RECOMMENDED LAND PATTERN

**DRAWING #** DFN22-8LD-PL-1

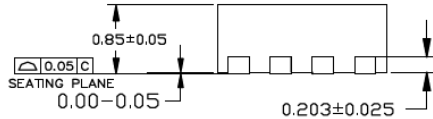
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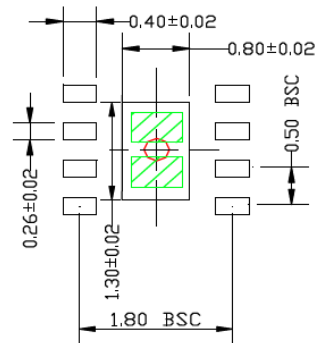
**TOP VIEW**  
NOTE: 1, 2, 3



**BOTTOM VIEW**  
NOTE: 1, 2, 3



**END VIEW**  
NOTE: 1, 2, 3



**RECOMMENDED LAND PATTERN**  
NOTE: 4, 5

**NOTE:**

1. MAX PACKAGE WARPAGE IS 0.05 MM
2. MAX ALLOWABLE BURR IS 0.076MM IN ALL DIRECTIONS
3. PIN #1 IS ON TOP WILL BE LASER MARKED
4. RED CIRCLE IN LAND PATTERN INDICATE THERMAL VIA. SIZE SHOULD BE 0.30-0.35MM IN DIAMETER AND SHOULD BE CONNECTED TO GND FOR MAX THERMAL PERFORMANCE
5. GREEN RECTANGLES (SHADED AREA) INDICATE SOLDER STENCIL OPENING ON EXPOSED PAD AREA. SIZE SHOULD BE 0.60x0.40 MM IN SIZE, 0.20 MM SPACING.

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

# SY89306V

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NOTES:

## APPENDIX A: REVISION HISTORY

### Revision A (June 2019)

- Converted Micrel document SY89306V to Microchip data sheet DS20006211A.
- Minor text changes throughout.
- Removed all reference to the EOL SY89316V.
- Updated DC and AC parameter tables in the **1.0** “**Electrical Characteristics**” section.

# SY89306V

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NOTES:

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

<u>PART NO.</u>	<u>-X</u>	<u>X</u>	<u>X</u>	<u>-XX</u>	<b>Examples:</b>
Device	Voltage Option	Package	Temperature Range	Special Processing	
<b>Device:</b>	SY89306:	2.5 GHz Differential PECL/ECL Receiver/Buffer			a) SY89306VMG-TR: 2.5 GHz Differential PECL/ECL Receiver/Buffer, 3.3V/5V, -40°C to +85°C, 8-Lead DFN, 1,000/Reel  <b>Note 1:</b> 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.
<b>Voltage Option:</b>	V	=	3.3V, 5V		
<b>Package:</b>	M	=	8-Lead DFN		
<b>Temperature Range:</b>	G	=	-40°C to +85°C (NiPdAu Pb-Free)		
<b>Special Processing:</b>	TR	=	1,000/Reel		

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NOTES:

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