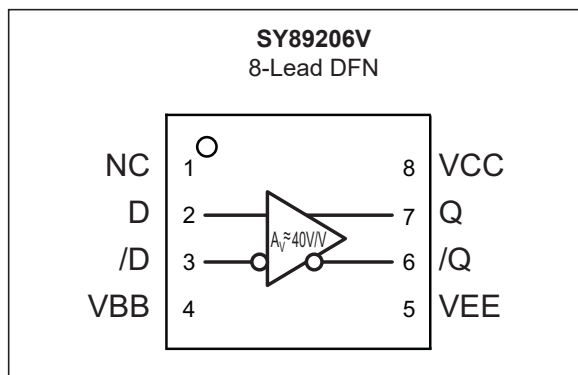


3.3V/5V 1 GHz Differential PECL/ECL Receiver/Buffer

Features

- Maximum Frequency >1.0 GHz
- 3.3V and 5V Power Supply Options
- 250 ps Typical Propagation Delay
- High Bandwidth Output Transitions
- Internal 75 k Ω Input Pull-Down Resistors
- 100k PECL/ECL Compatible
- Open Input Default State
- Industrial Temperature Range: -40°C to +85°C
- Available in an Ultra-Small 8-Pin 2 mm x 2 mm DFN Package

Package Type



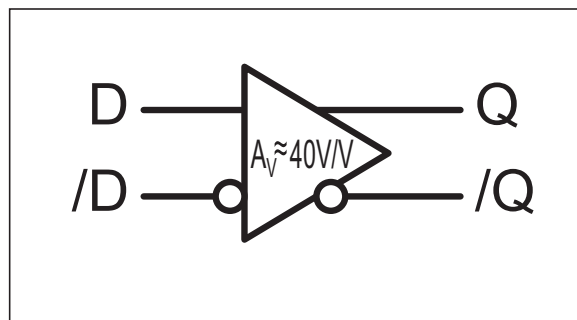
General Description

The SY89206V is a differential PECL/ECL receiver/buffer in a space-saving (2 mm x 2 mm) DFN package. The device is functionally equivalent to the SY100EL16V, but features a 70% smaller footprint.

The SY89206V 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 SY89206V as its current sink/source capability is limited. Whenever used, the VBB pin should be bypassed with a 0.01 μ F capacitor to VCC.

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

Block Diagram



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}	—	21	26	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	μA	—
Input Low Current	I_{IL}	0.5	—	—	μA	—

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: $V_{CC} = 3.3V$ 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. $R_L = 50\Omega$ to $V_{CC} - 2.0V$

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Maximum Frequency	f_{MAX}	1.0	—	—	GHz	$V_{OUT} \geq 400\text{ mV}$
Propagation Delay D to Q (Differential)	t_{PLH}, t_{PHL}	125	250	375	ps	—
Propagation Delay D to Q (Single-Ended)	t_{PLH}, t_{PHL}	75	250	425	ps	—
Duty Cycle Skew (Note 1)	t_{SKEW}	—	5	20	ps	—
Input Swing (Note 2)	V_{PP}	150	—	1000	mV	—
Output Rise/Fall Time Q (20% to 80%)	t_r/t_f	100	225	350	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 ensured. The device has a DC gain of ≈ 40 .

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 (DFN)						
Junction-to-Ambient	θ_{JA}	—	93	—	°C/W	Still-Air
		—	87	—		500 lfpm
Junction-to-Case	θ_{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 Ω pull-down resistors. If inputs are left open, Q output will default to LOW. See Section 3.0 “Input Interface Application” 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 Section 4.0 “Termination Recommendations” for recommendations on terminations.
8	VCC	Positive Power Supply	Positive Power Supply: Bypass with 0.1 μ F//0.01 μ 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 ± 0.5 mA.
1	NC	—	No connection.

3.0 INPUT INTERFACE APPLICATION

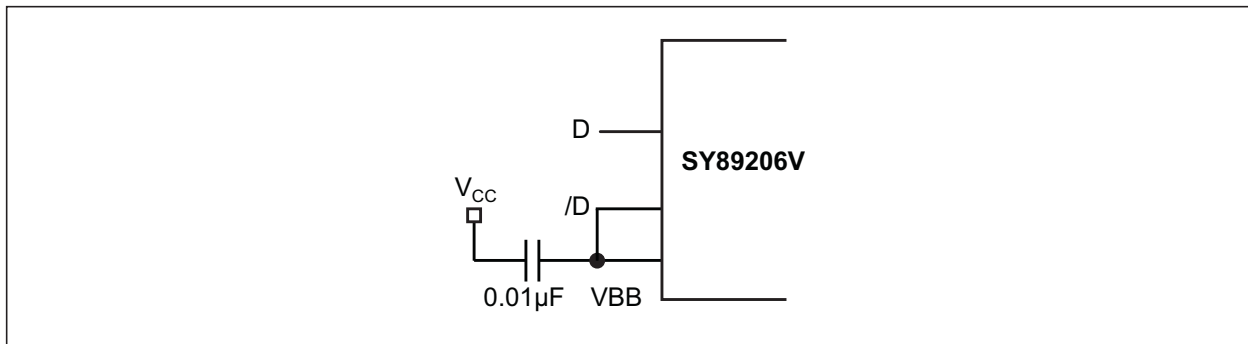


FIGURE 3-1: Single-Ended LVPECL Input (Terminating Unused Input).

4.0 TERMINATION RECOMMENDATIONS

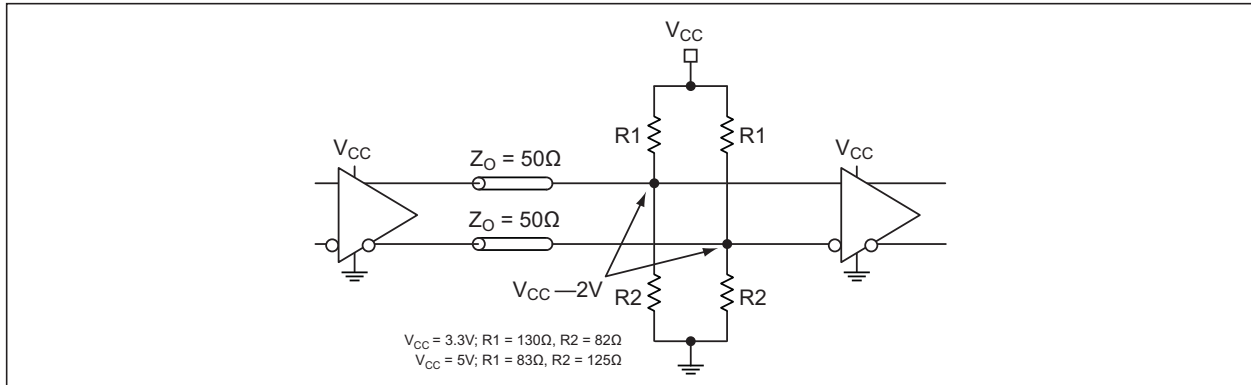


FIGURE 4-1: Parallel Thevenin-Equivalent Termination.

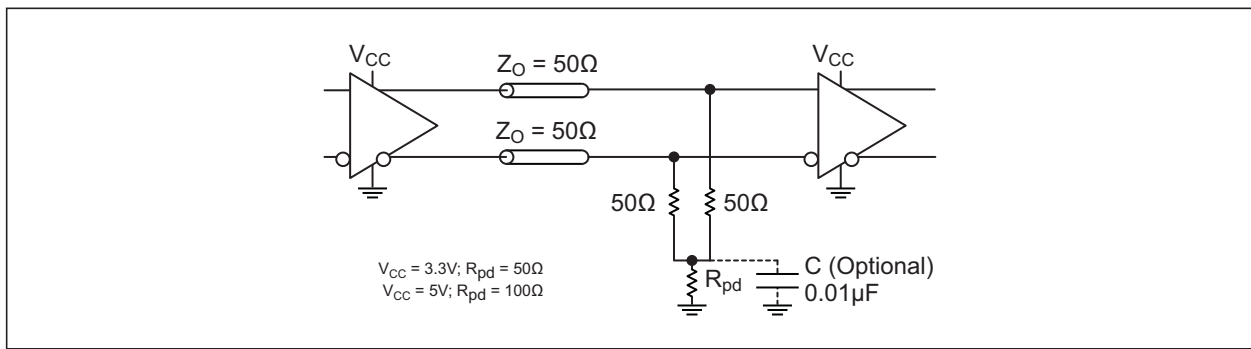


FIGURE 4-2: Three Resistor Y - Termination.

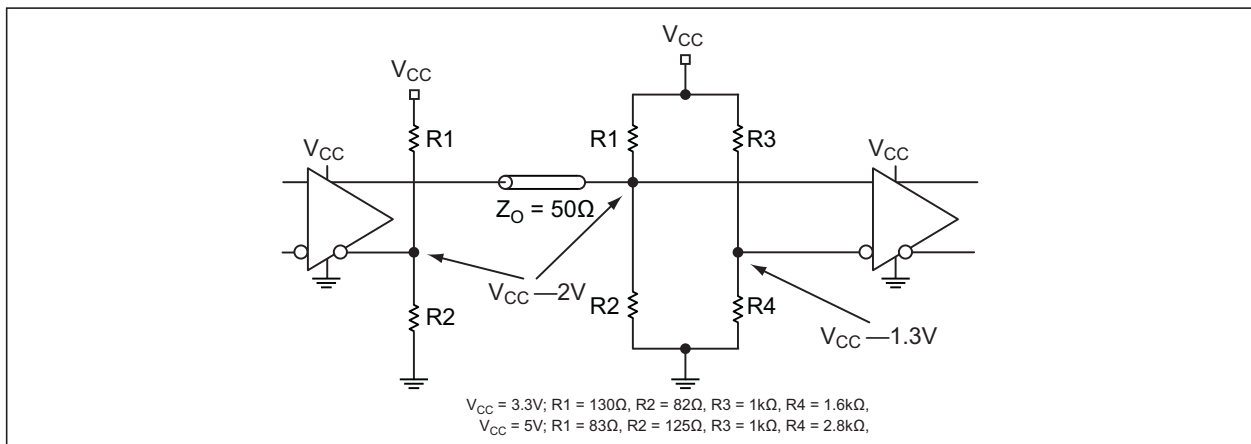
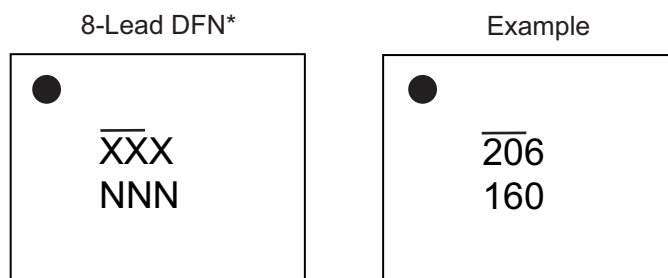


FIGURE 4-3: Terminating Unused I/O.

5.0 PACKAGING INFORMATION

5.1 Package Marking Information



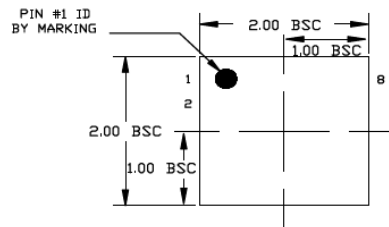
Legend:	XX...X	Product code or customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week '01')
	NNN	Alphanumeric traceability code
	(e3)	Pb-free JEDEC® designator for Matte Tin (Sn)
	*	This package 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

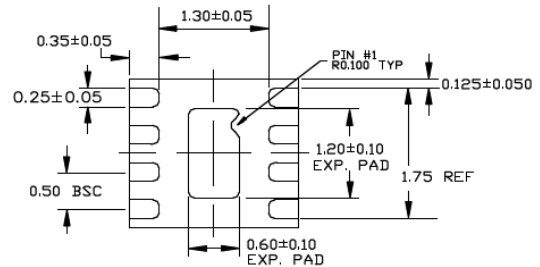
8 LEAD DFN 2x2mm PACKAGE OUTLINE & RECOMMENDED LAND PATTERN

DRAWING # DFN22-8LD-PL-1

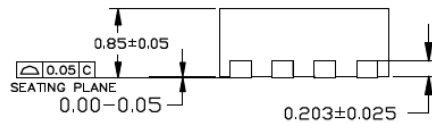
UNIT MM



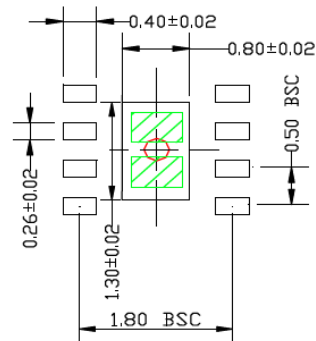
TOP VIEW
NOTE: 1, 2, 3



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>.

NOTES:

APPENDIX A: REVISION HISTORY

Revision A (June 2019)

- Converted Micrel document SY89206V to Microchip data sheet DS20006210A.
- Minor text changes throughout.
- Removed all reference to the EOL SY89216V.
- Updated DC and AC parameter tables in the **1.0** “**Electrical Characteristics**” section.

Revision B (August 2019)

- Updated minimum value for Common Mode Range in [DC Electrical Characteristics \(Note 1\)](#).

NOTES:

PRODUCT IDENTIFICATION SYSTEM

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>
Device	Voltage Option	Package	Temperature Range	Special Processing
Device: SY89206: 1 GHz Differential PECL/ECL Receiver/Buffer				
Voltage Option: V = 3.3V, 5V				
Package: M = 8-Lead DFN				
Temperature Range: G = -40°C to +85°C (NiPdAu Pb-Free)				
Special Processing: TR = 1,000/Reel				

Examples:

a) SY89206VMG-TR: 1 GHz Differential PECL/ECL Receiver/Buffer, 3.3V/5V, -40°C to +85°C, 8-Lead DFN, 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.

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