



PS9661, PS9661L

NEC's HIGH NOISE REDUCTION 25 Mbps CMOS OUTPUT TYPE 8-PIN DIP OPTOCOUPLER

DESCRIPTION

NEC's PS9661 and PS9661L are optically coupled isolators containing a GaAlAs LED on the input side and a CMOS output IC on the output side.

These photocouplers are high common mode transient immunity (CMR), high-speed CMOS output type devices, making them ideal for high-speed logic interface circuits.

The PS9661 is in a plastic DIP (Dual In-line Package) and the PS9661L is lead bending type (Gull-wing) for surface mounting.

FEATURES

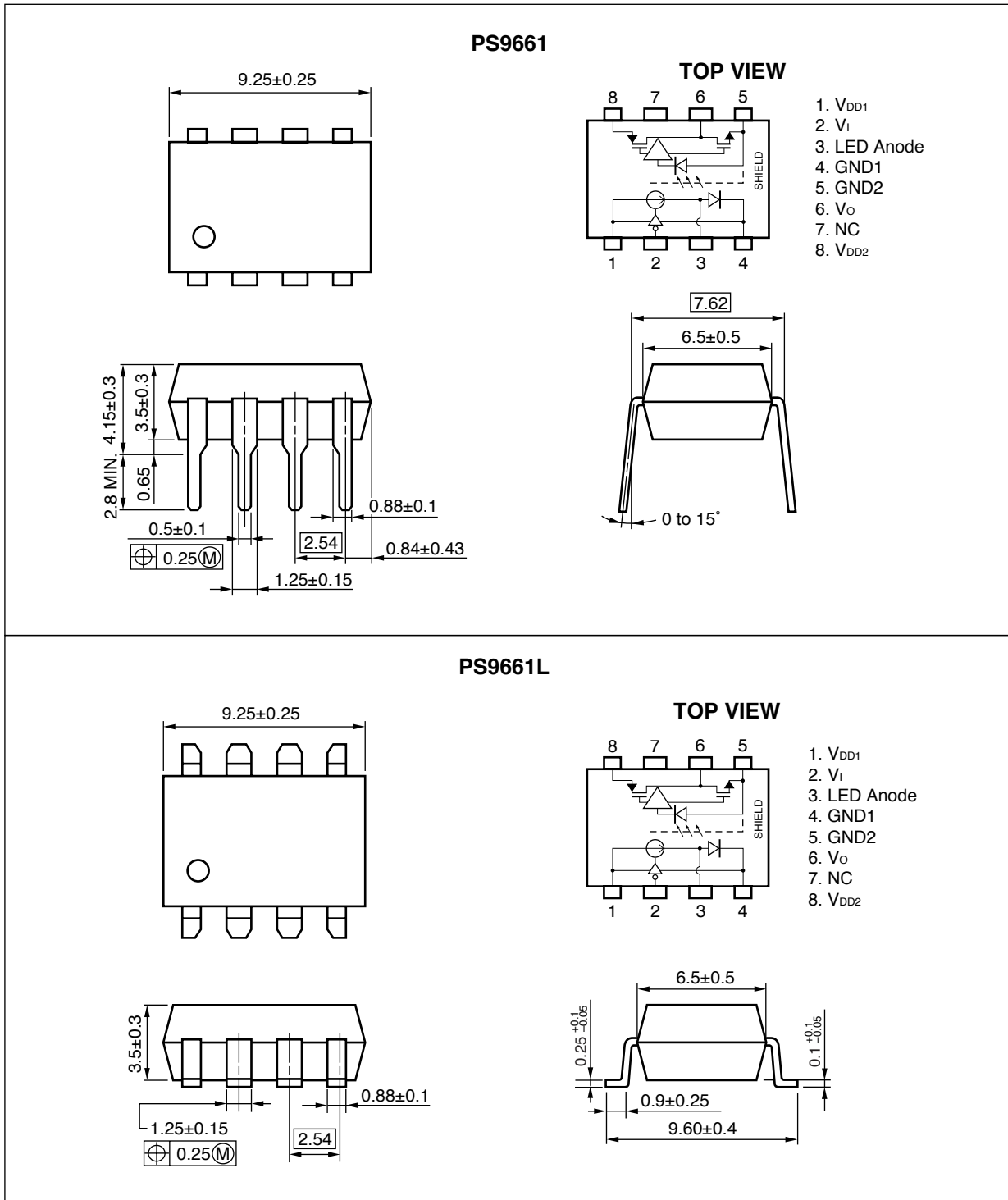
- High-speed response (25 Mbps)
- High common mode transient immunity ($CM_H, CM_L = \pm 20 \text{ kV}/\mu\text{s}$ TYP.)
- High isolation voltage ($BV = 3\,750 \text{ Vr.m.s.}$)
- Pulse width distortion ($t_{PHL} - t_{PLH} = 3 \text{ ns}$ TYP.)
- Ordering number of tape product: PS9661L-E3, E4: 1 000 pcs/reel

APPLICATIONS

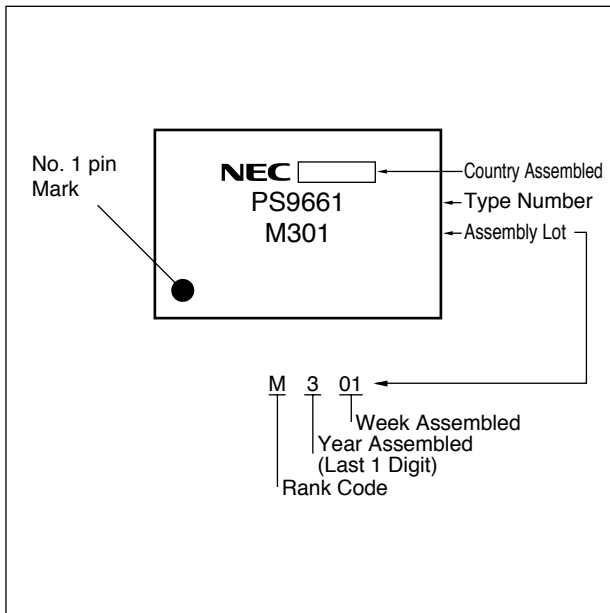
- Factory Automation Network
- Measurement equipment
- PDP

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PACKAGE DIMENSIONS (UNIT: mm)



MARKING EXAMPLE



ORDERING INFORMATION (Solder Contains Lead)

| Part Number | Package | Packing Style |
|-------------|-----------|------------------------------|
| PS9661 | 8-pin DIP | Magazine case 50 pcs |
| PS9661L | | |
| PS9661L-E3 | | Embossed Tape 1 000 pcs/reel |
| PS9661L-E4 | | |

ORDERING INFORMATION (Pb-Free)

| Part Number | Package | Packing Style |
|--------------|-----------|------------------------------|
| PS9661-A | 8-pin DIP | Magazine case 50 pcs |
| PS9661L-A | | |
| PS9661L-E3-A | | Embossed Tape 1 000 pcs/reel |
| PS9661L-E4-A | | |

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C, unless otherwise specified)

| Parameter | | Symbol | Ratings | Unit |
|-------------------------------|----------------|--|-------------------------------|---------|
| Diode | Input Voltage | V _I | -0.5 to V _{DD1} +0.5 | V |
| Detector | Supply Voltage | V _{DD1} , V _{DD2} | 0 to 5.5 | V |
| | Output Voltage | V _O | -0.5 to V _{DD2} +0.5 | V |
| | Output Current | I _O | 10 | mA |
| Isolation Voltage*1 | | BV | 3 750 | Vr.m.s. |
| Total Power Dissipation | | P _T | 150 | mW |
| Operating Ambient Temperature | | T _A | -40 to +85 | °C |
| Storage Temperature | | T _{stg} | -40 to +125 | °C |

*1 AC voltage for 1 minute at T_A = 25°C, RH = 60% between input and output.

RECOMMENDED OPERATING CONDITIONS (T_A = 25°C)

| Parameter | Symbol | MIN. | TYP. | MAX. | Unit |
|--------------------------|--|------|------|------------------|------|
| High Level Input Voltage | V _{IH} | 2.0 | | V _{DD1} | V |
| Low Level Input Voltage | V _{IL} | 0 | | 0.8 | V |
| Supply Voltage | V _{DD1} , V _{DD2} | 4.5 | 5.0 | 5.5 | V |
| Rise Time | t _r | | | 100 | ns |
| Fall Time | t _f | | | | |

ELECTRICAL CHARACTERISTICS (Recommended Operating Conditions Unless Otherwise Specified. Note That $V_{DD1} = V_{DD2} = 5\text{ V}$.)

| Parameter | | Symbol | Conditions | MIN. | TYP.*1 | MAX. | Unit | Fig. | | | |
|-----------|---|-----------------------|---|--|--------|------|---------------|------|--|-------------------|----|
| Diode | Low Level Supply Current | I_{DD1L} | $V_i = 0\text{ V}$ | | 7.5 | 10.0 | mA | 1 | | | |
| | High Level Supply Current | I_{DD1H} | $V_i = V_{DD1}$ | | 0.15 | 3.0 | | 2 | | | |
| | Input Current | I_i | $V_i = 0\text{ V}$ or $V_i = V_{DD1}$ | -10 | | 10 | μA | 3, 4 | | | |
| Detector | Output Supply Current | I_{DD2H} | $V_i = V_{DD1}$ | | 7 | 9 | mA | 5 | | | |
| | | I_{DD2L} | $V_i = 0\text{ V}$ | | 5 | 9 | | 6 | | | |
| | High Level Output Voltage | V_{OH} | $I_o = -20\ \mu\text{A}, V_i = V_{IH}$ | 4.4 | 5.0 | | V | 7 | | | |
| | | | $I_o = -4\ \text{mA}, V_i = V_{IH}$ | 4.0 | 4.8 | | | | | | |
| | Low Level Output Voltage | V_{OL} | $I_o = 20\ \mu\text{A}, V_i = V_{iL}$ | | 0.01 | 0.1 | | 8 | | | |
| | | | $I_o = 4\ \text{mA}, V_i = V_{iL}$ | | 0.32 | 1.0 | | | | | |
| Coupled | Isolation Resistance | R_{i-o} | $V_{i-o} = 1\ \text{kV}_{DC}$, RH = 40 to 60%, $T_A = 25^\circ\text{C}$ | 10^{11} | | | Ω | | | | |
| | Isolation Capacitance | C_{i-o} | $V = 0\text{ V}$, $f = 1\ \text{MHz}$, $T_A = 25^\circ\text{C}$ | | 1.3 | | pF | | | | |
| | Propagation Delay Time (H → L) | t_{PHL} | $C_L = 15\ \text{pF}$, CMOS Signal Levels | | 20 | 40 | ns | 9 | | | |
| | Propagation Delay Time (L → H) | t_{PLH} | | | 23 | 40 | | | | | |
| | Pulse Width | PW | | 40 | | | | | | | |
| | Pulse Width Distortion (PWD) | $ t_{PHL} - t_{PLH} $ | | | 3 | 8 | | | | | |
| | Propagation Delay Skew | t_{PSK} | | | | 20 | | | | | |
| | Rise Time | t_r | | | 9 | | | | | | |
| | Fall Time | t_f | | | 8 | | | | | | |
| | Common Mode Transient Immunity at High Level Output | CM_H | | $V_i = V_{DD1} = V_{DD2} = 5\text{V}$, $V_o > 0.8\ V_{DD1}$, $V_{CM} = 1\ \text{kV}$, $T_A = 25^\circ\text{C}$ | 10 | 20 | | | | kV/ μs | 10 |
| | Common Mode Transient Immunity at Low Level Output | CM_L | | $V_i = V_{DD1} = V_{DD2} = 5\text{V}$, $V_i = 0\text{V}$ $V_o < 0.8\ V_{DD1}$, $V_{CM} = 1\ \text{kV}$ | 10 | 20 | | | | | |

*1 Typical values at $T_A = 25^\circ\text{C}$

USAGE CAUTIONS

1. This product is weak for static electricity by designed with high-speed integrated circuit so protect against static electricity when handling.
2. By-pass capacitor of more than 0.1 μF is used between V_{DD} and GND near device. Also, ensure that the distance between the leads of the photocoupler and capacitor is no more than 10 mm.

MEASUREMENT CIRCUITS FOR ELECTRICAL CHARACTERISTICS

Fig. 1 I_{DD1L}

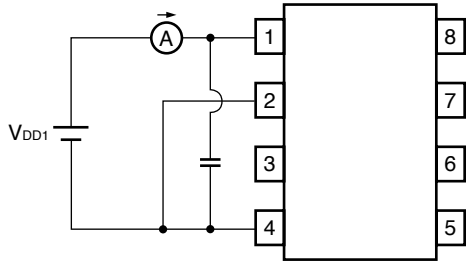


Fig. 2 I_{DD1H}

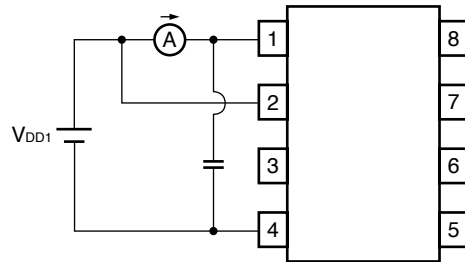


Fig. 3 I_{IH}

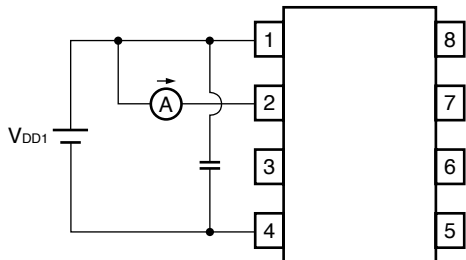


Fig. 4 I_{IL}

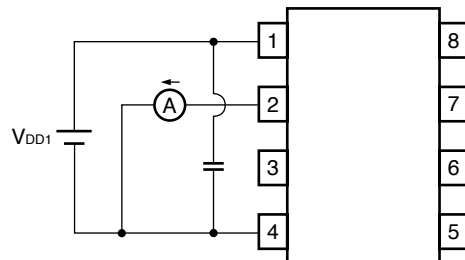


Fig. 5 I_{DD2H}

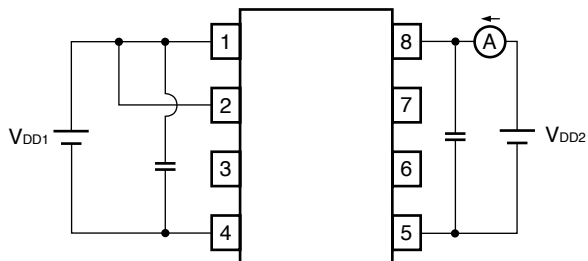


Fig. 6 I_{DD2L}

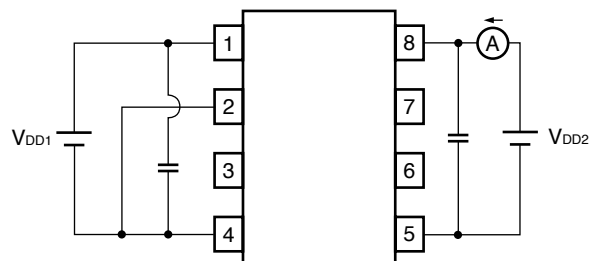


Fig. 7 V_{OH}

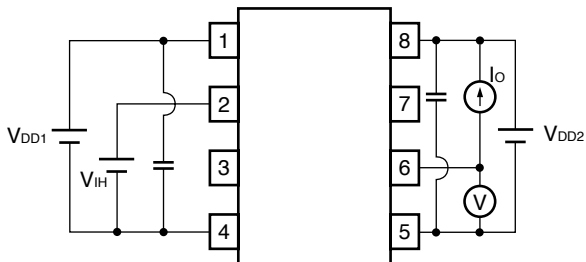
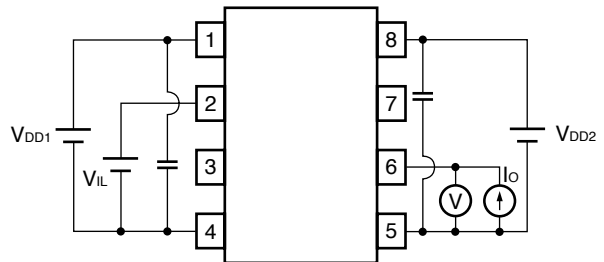
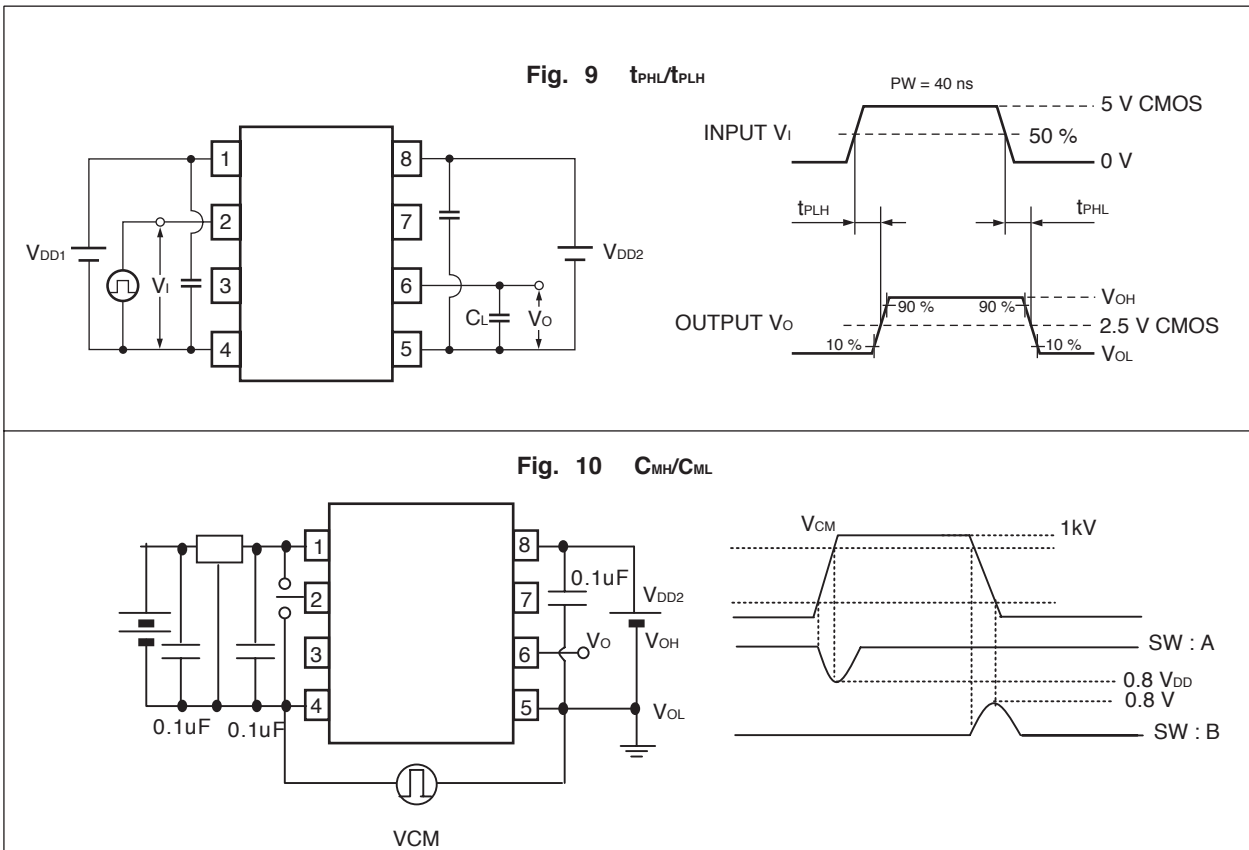


Fig. 8 V_{OL}





Life Support Applications

These NEC products are not intended for use in life support devices, appliances, or systems where the malfunction of these products can reasonably be expected to result in personal injury. The customers of CEL using or selling these products for use in such applications do so at their own risk and agree to fully indemnify CEL for all damages resulting from such improper use or sale.

CEL California Eastern Laboratories, Your source for NEC RF, Microwave, Optoelectronic, and Fiber Optic Semiconductor Devices.

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Subject: Compliance with EU Directives

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CEL Pb-free products have the same base part number with a suffix added. The suffix –A indicates that the device is Pb-free. The –AZ suffix is used to designate devices containing Pb which are exempted from the requirement of RoHS directive (*). In all cases the devices have Pb-free terminals. All devices with these suffixes meet the requirements of the RoHS directive.

This status is based on CEL’s understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

| Restricted Substance per RoHS | Concentration Limit per RoHS (values are not yet fixed) | Concentration contained in CEL devices | |
|-------------------------------|---|--|-----|
| | | -A | -AZ |
| Lead (Pb) | < 1000 PPM | Not Detected | (*) |
| Mercury | < 1000 PPM | Not Detected | |
| Cadmium | < 100 PPM | Not Detected | |
| Hexavalent Chromium | < 1000 PPM | Not Detected | |
| PBB | < 1000 PPM | Not Detected | |
| PBDE | < 1000 PPM | Not Detected | |

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