NEC HIGH SPEED OPTOCOUPLERS
NEC High Speed Optocouplers offer best in class performance and reliability

NEC offers a broad range of high speed digital and analog optocouplers with industry-leading performance and reliability. This series of optocouplers provides isolation for various applications including power supply, motor control and data communications interface circuits. The primary functions optocouplers serve are signal isolation, noise elimination, and level conversion.

NEC high speed optocouplers feature guaranteed CMR as high as 15 kV/μsec, output quiescent current as low as 3 mA, operating temperature to 100°C, speeds to 25 Mbps, and typical propagation delay as low as 20 ns.

A unique series of NEC’s 15 Mbs optocouplers is the first to offer dual 3.0 / 5.5 Volt operation. These single and dual channel devices provide the flexibility of a low voltage part that can continue to deliver characteristic specifications as the power supply range of the design increases.

Engineers tasked with miniaturizing their designs will also appreciate the variety of package styles NEC offers. From the low profile SOP-5 to the single and dual channel SO8, NEC packaging is designed to address engineers’ space constraints.

Manufacturing is done in NEC’s production facility in Japan where all processes from initial wafer fabrication to final QA and package marking are fully automated. This allows for higher production rates and lower manufacturing costs, while assuring the superior quality and consistency you’ve come to expect from NEC.

NEC optocouplers comply with worldwide safety standards.

Available in single and dual SO8, SOP-5, and 8 pin DIP packages
RS422/485 Interface Isolation

The RS485 serial communications standard is commonly used in data acquisition applications. The standard supports 32 drivers and receivers in a 2- or 4-wire differential configuration with cable lengths up to 4000 feet. Galvanic isolation becomes critical in the prevention of ground loops, electrical noise, and power spikes in widely distributed systems.

**Key Application Requirements**
- Wide range of data transfer rates: 1Mbs to 15Mbs
- High Common Mode Rejection Ratio (CMRR)
- Compact size
- Repeatability
- Reliability

**Recommended NEC Optocouplers**
PS8802-1, -2, PS8821-1, -2 (1Mbs) PS9121, PS9821-1, -2 (15Mbs)

CAN Interface Isolation

Controller Area Network (CAN) is a serial communications bus popular in industrial applications. Point-to-point and multiple systems use it to coordinate and synchronize events. Isolation is required in these distributed systems to protect against over-voltage transients, prevent ground loops, and reduce signal distortion.

**Key Application Requirements**
- Accurate signal timing
- High Common Mode Rejection Ratio (CMRR)
- Compact size
- Repeatability
- Reliability

**Recommended NEC Optocouplers**
PS9661, PS9851-1, -2

USB 1.1 Interface Isolation

USB is an inexpensive, high speed bus-integration interface used in computer-based systems. While the USB standard does not mandate isolation, designers recognize its importance in critical systems. Isolation protects USB interfaces from electrostatic discharge (ESD), ground loops, common mode noise, and EMI interference.

**Key Application Requirements**
- High CMRR
- Compact Size
- Low power consumption
- Data Transfer Rates: up to 15Mbs
- Reliability

**Recommended NEC Optocouplers**
PS9817, PS9851-1, -2
**Motor Drive Control Isolation**

Motor controllers combine low level logic with high voltage, high power electronics like *Intelligent Power Modules* (IPM). Isolation enables communication between the controllers and the drivers at both the high and low side power modules. Faults and other events are typically transferred across this isolation barrier as well.

**Key Application Requirements**

- Fast response time: < 0.8µs
- High Common Mode Rejection Ratio (CMRR): > 10 kV/µs
- Isolation: typically 2500 V AC
- Long creepage: up to 8mm

**Recommended NEC Optocouplers**

PS9213, PS9214, PS9687

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**Power Supply Isolation**

Power supplies are used in a wide variety of applications. Galvanic isolation is required for safety and to allow independent secondary side isolation. High speed optocouplers are used to transfer gate drive and synchronous rectification signals from the controller to the switching elements.

**Key Application Requirements**

- High temperature: up to 100°C
- Fast response time
- Low power consumption
- Compact size
- Repeatability

**Recommended NEC Optocouplers**

PS9817, PS9851-1, -2

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**802.3af Power over Ethernet (PoE)**

PoE offers a simple, cost effective, and reliable solution for power transmission. It delivers 13W of power over existing Ethernet cabling in various applications ranging from industrial IT to home office networks. To ensure safety for the end user, the 802.3af standard requires 1500V AC of galvanic isolation between the main switch circuitry and the Media Dependent Interface (RJ-45 terminal). The communication from the switch to the PSE chip occurs over an isolated I²C bus.

**Key Application Requirements**

- 3.3V and 5V operation
- 1500V AC minimum isolation
- Small size
- Standard Mode (100kHz data rate)
- Fast Mode (400kHz data rate)

**Recommended NEC Optocouplers**

PS8821-1, -2 (Standard Mode)
PS9121, PS9821-1, -2 (Fast Mode)
### NEC High Speed Optocoupler Selection Guide

#### 200kbs Analog

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
<th>B.V. (Vrms)</th>
<th>VCC (V max)</th>
<th>CTR (%)</th>
<th>tPHL (µs max)</th>
<th>tPLH (µs max)</th>
<th>CMIL/CMOL (kV/µs)</th>
<th>Ta (°C)</th>
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#### 1 Mbs Analog

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#### 1 Mbs Digital

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<th>PWD (ns max)</th>
<th>CMIL/CMOL (kV/µs)</th>
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<th>CMIL/CMOL (kV/µs)</th>
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### Notes

1. VDE certification is available as an option
2. Also available in single channel
3. Does not have base connection
4. High creepage part: 5.5 mm (min)
5. High creepage part: 8 mm
About CEL

California Eastern Laboratories is NEC’s exclusive sales and marketing partner for the products manufactured by NEC Compound Semiconductor Devices, Ltd. These include optocouplers, solid state relays, fiber optic lasers and detectors, and RF and wireless semiconductors. The company has sales offices throughout North and South America, maintains extensive inventories, and provides application engineering support.