

NEC HIGH SPEED OPTOCOUPERS

NEC

A Business Partner of NEC Compound Semiconductor Devices, Ltd.

NEC is a trademark of NEC Corporation.

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/ μ sec, 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.

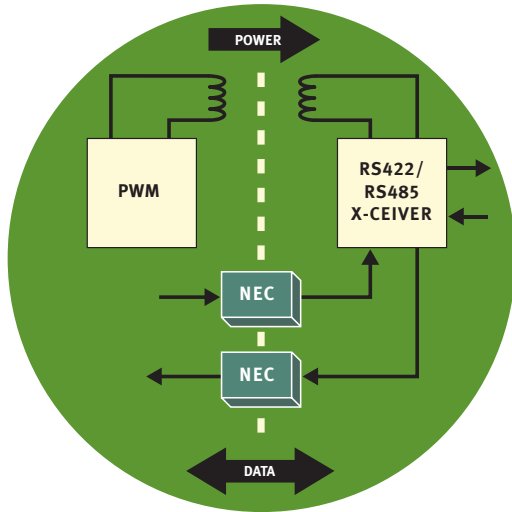
Manufacturing is done in NEC's production facility in Japan where all processes from initial wafer fabrication to final QA and package marking are fully automated. This allows for higher production rates and lower manufacturing costs, while assuring the superior quality and consistency you've come to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

NEC optocouplers comply with worldwide safety standards.

Available in single and dual SO8, SOP-5, and 8 pin DIP packages



NEC HIGH SPEED OPTOCOUPLER APPLICATIONS



RS422/485 Interface Isolation

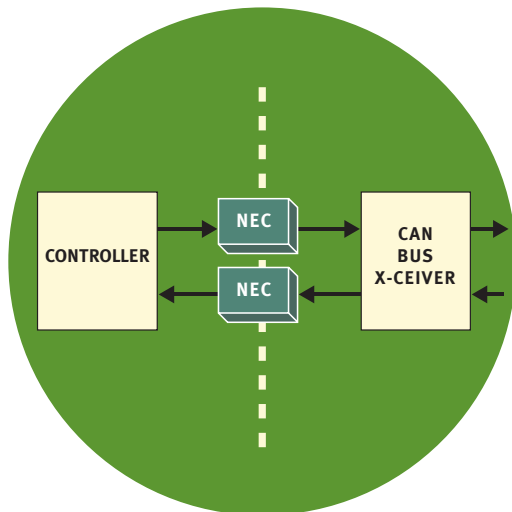
The RS485 serial communications standard is commonly used in data acquisition applications. The standard supports 32 drivers and receivers in a 2- or 4-wire differential configuration with cable lengths up to 4000 feet. Galvanic isolation becomes critical in the prevention of ground loops, electrical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

Key Application Requirements

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

Recommended NEC Optocouplers

PS8802-1, -2, PS8821-1, -2 (1 Mbs) PS9121, PS9821-1, -2 (15 Mbs)



CAN Interface Isolation

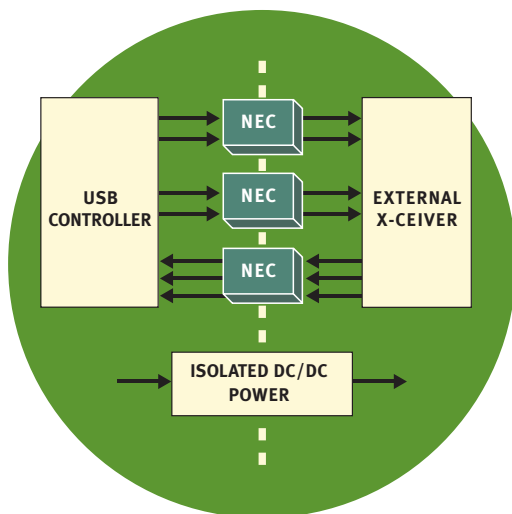
Controller Area Network (CAN) is a serial communications bus popular in industrial applications. Point-to-point and multiple systems use it to coordinate and synchronize events. Isolation is required in these distributed systems to protect against over-voltage transients, prevent ground loops, and reduce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

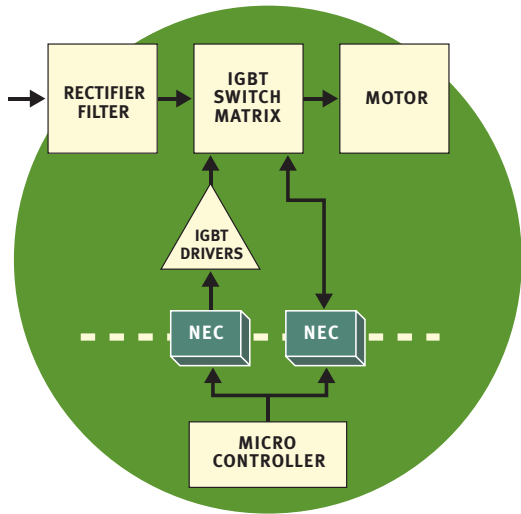
USB is an inexpensive, high speed bus-integration interface used in computer-based systems. While the USB standard does not mandate isolation, designers recognize its importance in critical systems. Isolation protects USB interfaces from electrostatic discharge (ESD), ground loops, common mode noise,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

Key Application Requirements

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

Recommended NEC Optocouplers

PS9817, PS9851-1, -2



Motor Drive Control Isolation

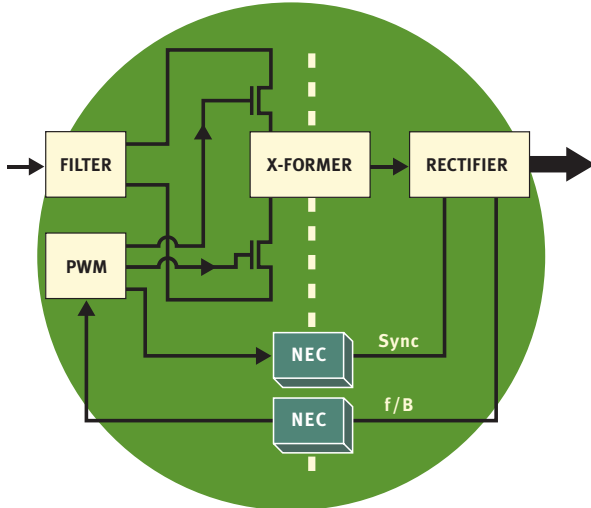
Motor controllers combine low level logic with high voltage, high power electronics like *Intelligent Power Modules* (IPM). Isolation enables communication between the controllers and the drivers at both the high and low side power modules. Faults and other events are typically transferred across this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

Key Application Requirements

- Fast response time: $< 0.8\mu\text{s}$
- High Common Mode Rejection Ratio (CMRR): $> 10\text{ kV}/\mu\text{s}$
- Isolation: typically 2500 V AC
- Long creepage: up to 8mm

Recommended NEC Optocouplers

PS9213, PS9214, PS9687



Power Supply Isolation

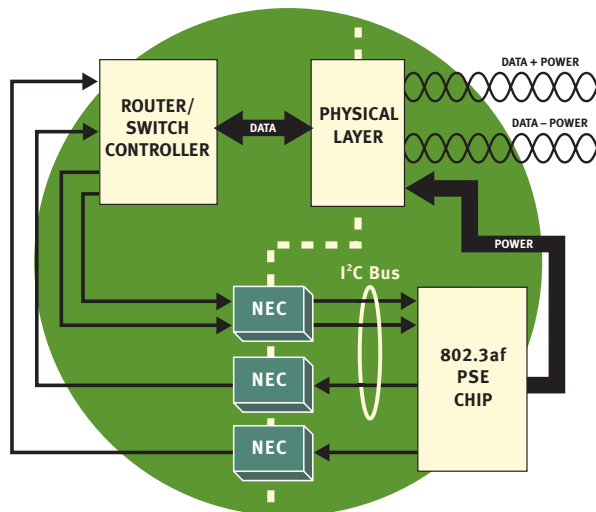
Power supplies are used in a wide variety of applications. Galvanic isolation is required for safety and to allow independent secondary side isolation. High speed optocouplers are used to transfer gate drive and synchronous rectification signals from the controller to the switching elements.

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



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
- 1500VAC 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

Part Number	Package	B.V. (Vrms)	V _{CC} (V max)	CTR (%)	t _{PHL} (μs max)	t _{PLH} (μs max)	CM _H /CM _L (kV/μs)	T _a (°C)	Safety Certification
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200 kbps Analog




PS8103	5pin SOP		2500	15	10 – 30	5	5	—	-40 – 100	UL, VDE ¹ , BSI
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1 Mbs Analog







PS8802 ²	S08		2500	35	15 – 45	0.8	1.2	10	-55 – 100	UL, VDE ¹
PS8821 ²	S08		2500	7	20	0.8	1.6	1	-55 – 100	UL, VDE ¹
PS8101	5pin SOP		2500	35	15 – 35	0.8	1.2	10	-55 – 100	UL, VDE ¹
PS8601	8pin DIP		5000	35	> 15	0.8	0.8	—	-55 – 100	UL, VDE ¹ , BSI
PS8602 ³	8pin DIP		5000	35	> 15	0.8	0.8	2	-55 – 100	UL, VDE ¹ , BSI

Part Number	Package	B.V. (Vrms)	V _{CC} (V)	t _{PHL} (ns max)	t _{PLH} (ns max)	PWD (ns max)	CM _H /CM _L (kV/μs)	T _a (°C)	Safety Certification
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


1 Mbs Digital

PS9113	5pin SOP		2500	30 max	500	750	650	15	-40 – 100	UL, VDE ¹
PS9213 ⁴	5pin SOP		2500	35 max	500	750	650	15	-40 – 100	UL, VDE ¹
PS9613	8pin DIP		5000	30 max	500	750	650	15	-40 – 100	UL, VDE ¹


10 Mbs Digital

PS9115	5pin SOP		2500	5 typ	85	85	50	10	-40 – 85	UL, VDE ¹
PS9117	5pin SOP		2500	5 typ	100	100	35	15	-40 – 85	UL, VDE ¹
PS9214 ⁴	5pin SOP		2500	5 typ	100	100	50	10	-40 – 85	UL, VDE ¹
PS9617	8pin DIP		5000	5 typ	100	100	35	15	-40 – 85	UL, VDE ¹
PS9687 ⁵	8pin DIP		5000	5 typ	100	100	35	15	-40 – 85	UL, VDE ¹
PS9817 ²	S08		2500	5 typ	100	100	35	15	-40 – 85	UL, VDE ¹

15 Mbs Digital

PS9121	5pin SOP		2500	3.3 typ	100	100	35	15	-40 – 85	UL, VDE ¹
PS9821 ²	S08		2500	3.3 typ	100	100	35	15	-40 – 85	UL, VDE ¹
PS9851 ²	S08		2500	5 typ	60	60	30	10	-40 – 100	UL, VDE ¹

25 Mbs Digital

PS9661	8pin DIP		3750	5 typ	40	40	8	10	-40 – 85	UL, VDE ¹
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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

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