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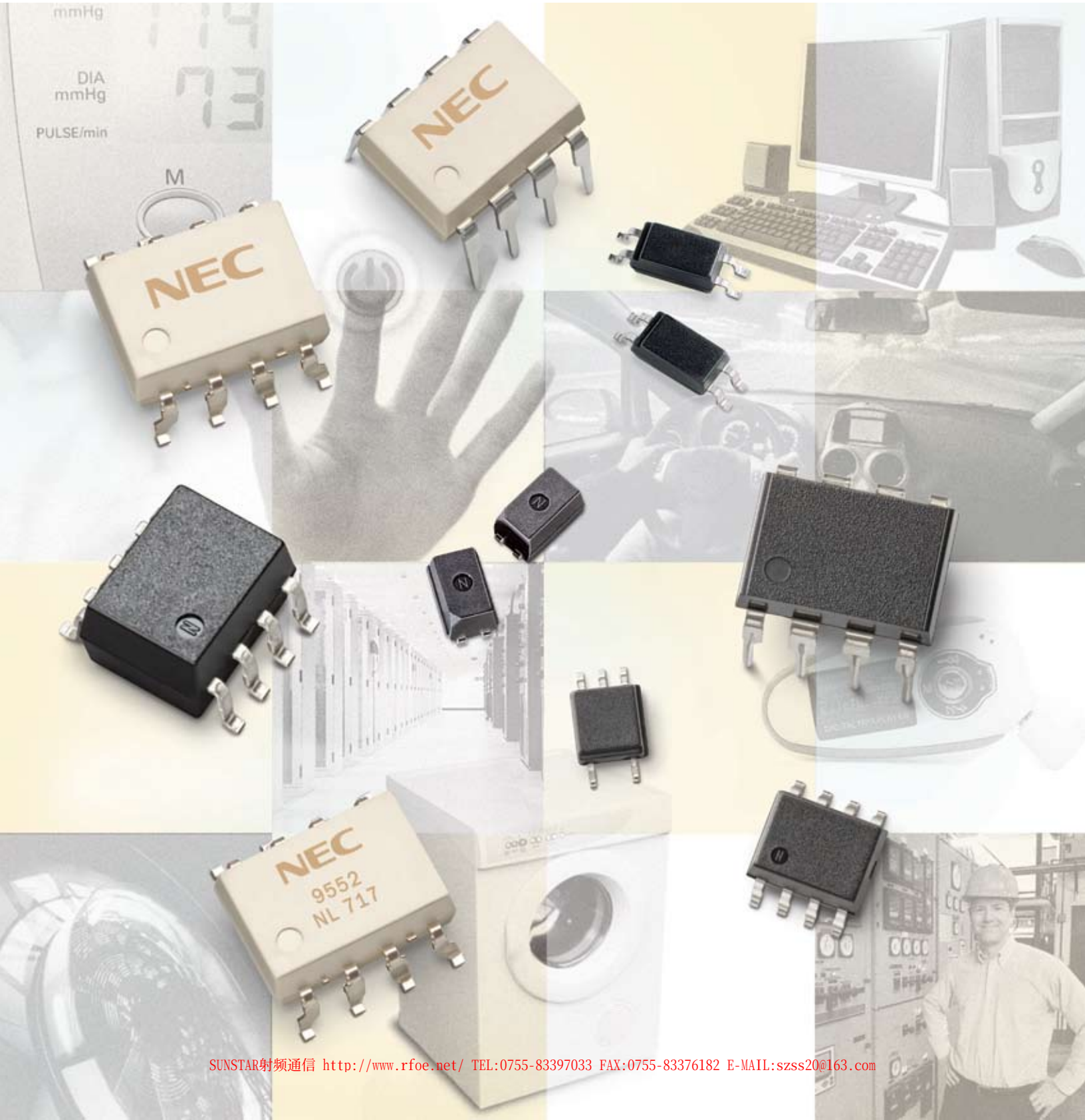
CEL California Eastern Laboratories

NEC ELECTRONICS OPTOCOUPLERS — 2008



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California Eastern Laboratories is the exclusive sales and marketing partner for the products made by the Compound Semiconductor Devices Division of NEC Electronics Corporation (CSDD). These include Optocouplers, Solid State Relays, RF and wireless ICs and transistors, and fiber optic lasers and detectors.

Serving customers throughout North and South America, CEL maintains extensive inventories and provides engineering and applications support. CEL has sales offices throughout the hemisphere, including a network of independent reps and distributors.

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NEC Optocoupler Families

Overview, Package Styles and Part Numbering System

Part Number	Description	Package Styles Available	Package Drawing (Page No.)
PS25XX Series	*Transistor Output*	*4 and 16 pin DIP and DIP SMT*	**19 – 21**
PS27XX Series	*Transistor Output*	*4 Pin SOP (2.54mm pin pitch)*	**21**
PS28XX Series	*Transistor Output*	*4, 12 and 16 pin SSOP (1.27mm pin pitch)*	**21 – 22**
PS29XX Series	*Transistor Output*	*4 pin Mini Flat (flat lead, 1.27mm pin pitch)*	**22**
PS81XX Series	*High Speed Analog*	*5 pin SOP (1.27mm pin pitch)*	**21**
PS83XX Series	*High Speed Analog*	*6 pin SDIP SMT*	**22**
PS85XX Series	*High Speed Analog*	*8 pin DIP and SMT DIP*	**20**
PS88XX Series	*High Speed Analog*	*S08*	**22**
PS91XX Series	*High Speed Digital*	*5 pin SOP (1.27mm pin pitch)*	**21**
PS92XX Series	*High Speed Digital*	*5 pin SOP (1.27mm pin pitch)*	**21**
PS93XX Series	*High Speed Digital*	*6 pin SDIP SMT*	**22**
PS94XX Series	*High Speed Digital*	*16 pin SSOP*	**22**
PS95XX Series	*High Speed Digital*	*8 pin DIP and SMT DIP*	**20**
PS98XX Series	*High Speed Digital*	*S08*	**22**

CHANNELS

1 *One Channel*
2 *Two Channel*
4 *Four Channel*

CONFIGURATION IDENTIFIER

CTR Rank

PSXX XX - X - XX - X - A

Blank *Standard Part*
A *Alternate Die Version*
B *High Temperature Version*
C *Alternate Die, Narrow CTR Version*

Pb-Free

A *SnBi Plating*
AX *NiPdAu Plating*

PACKAGE STYLE

Blank *Thru-Hole DIP, SOP, SSOP or NEC Mini Flat*
L *SMT DIP*
L1 *Thru-Hole DIP, Gull Wing**
L2, L3, L4 *SMT DIP Gull Wing** *(See package drawings)*

** 8mm Creepage versions available for selected parts*

TAPE & REEL OPTIONS

E3, E4 *Small Reel*
F3, F4 *Large Reel*

For details, download:
http://www.cel.com/pdf/misc/tape_reel.pdf

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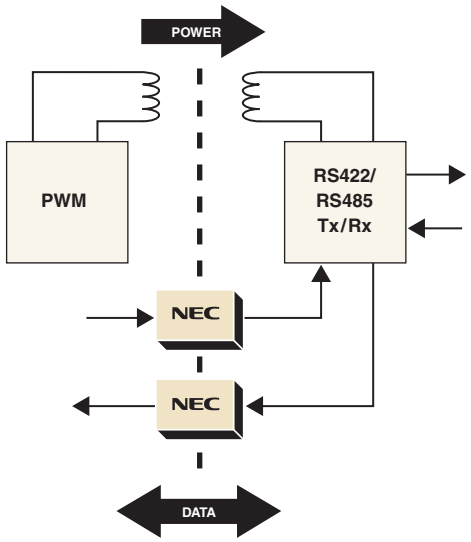


RS422/485 Interface Isolation

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.

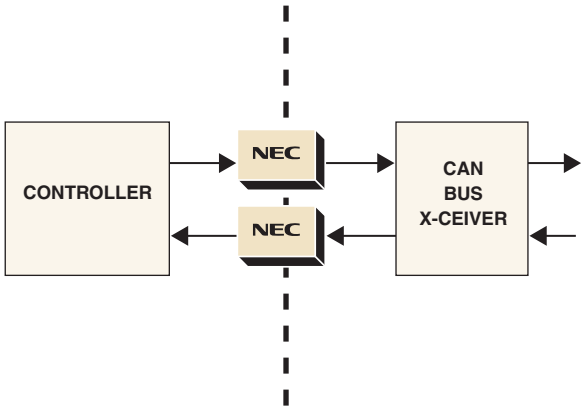
Key Application Requirements

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

Recommended NEC Optocouplers

Tx/Rx Input: **PS8802-1, 2, PS8821-1, 2** *(1Mbs)*
PS9121, PS9821-1, 2 *(15Mbs)*

Tx/Rx Output: **PS2711** *(Transistor Optocoupler)*



CAN Interface Isolation

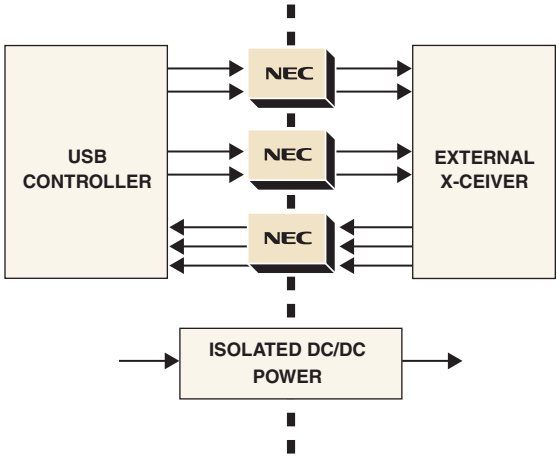
Controller Area Network (CAN) is a serial communications bus popular in industrial applications. Point-to-point and multi-point systems use it to coordinate and synchronize events. Isolation is required in these distributed systems to protect against over-voltage transients, prevent ground loops, and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

Key Application Requirements

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

Recommended NEC Optocouplers

PS9151, PS9851-1, 2



USB 2.0 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 Mbps
- Reliability

Recommended NEC Optocouplers

PS9121, PS9151, PS9821-1, 2, PS9851-1, 2

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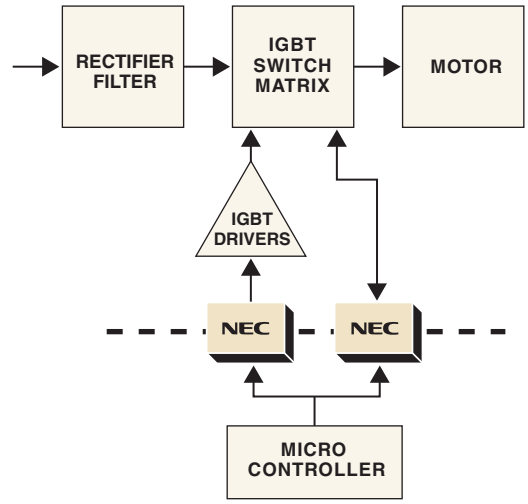


Motor Drive Control Isolation

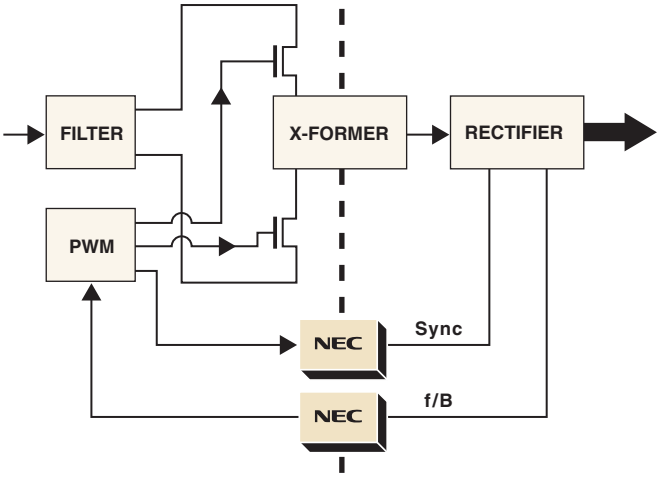
Motor controllers combine low level logic with high voltage, high power electronics like Intelligent Power Modules (IPM). Isolation enables communication between the controllers and the drivers at both the high and low side power modules. Faults and other events are typically transferred across this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

Key Application Requirements

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

Recommended NEC Optocouplers

PS9113, PS9213, PS9301, PS9401-2, PS9513, PS8551, PS9551, PS9552, PS9553



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.

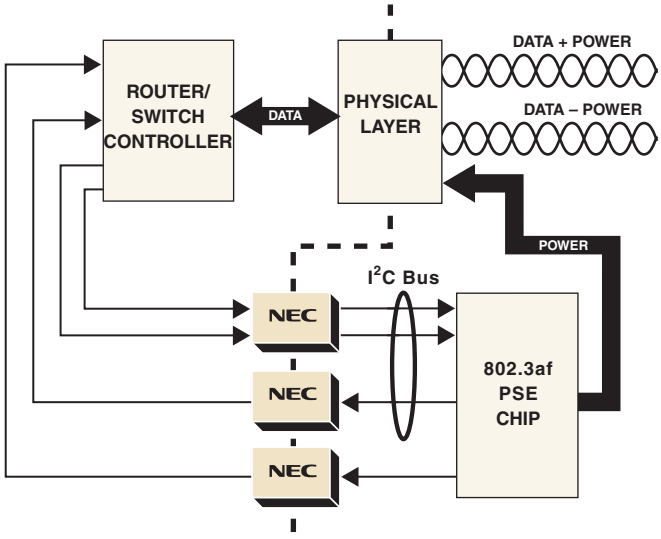
Key Application Requirements

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

Recommended NEC Optocouplers

Sync: **PS8501, PS9817-1, -2**

Feedback: **PS2561A/B, PS2761B** *(Transistor Optocouplers)*



802.3af Power over Ethernet (PoE)

PoE offers a simple, reliable, cost effective solution for power transmission. It can deliver 13W of power over existing Ethernet cabling in applications ranging from industrial IT to home office networks. To ensure safety, the 802.3af standard requires 1500 V 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 I^2C bus.

Key Application Requirements

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

Recommended NEC Optocouplers

PS8821-1, 2 *(Standard Mode)*
PS9121, PS9821-1, 2 *(Fast Mode)*
PS2841-4, PS2911 *(Transistor Optocouplers)*

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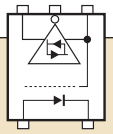
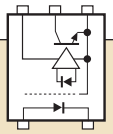
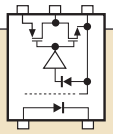
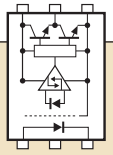
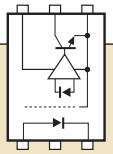
High Speed Digital Optocouplers

Package	Part Number	Speed (Mbps)	Vcc Range (V) *Recommended*	Absolute Max Rating BV (Vr.m.s.)	Absolute Max Rating IO (mA)	Absolute Max Rating IF (mA)	Typ tPHL (ns)	Typ tPLH (ns)	Safety Certification[1]
 ***Single channel, totem pole output***									***Isolation for measurement equipment, plasma display panels, and factory automation equipment***
SSOP5	**PS9115**	10	4.5 to 5.5	3750	13	30	33	40	UL, VDE
 ***Single channel, open collector output***									***Isolation for measurement equipment, plasma display panels, and factory automation equipment***
SOP5	**PS9117A**	10	4.5 to 5.5	3750	25	30	40	45	UL, VDE
SOP5	**PS9121**	15	2.7 to 3.6	3750	25	30	40	45	UL, VDE
SOP5[2]	**PS9122**	1	N = 2.7 to 3.6 L = 4.5 to 5.5	3750	10	25	500 max	700 max	UL, VDE
SOP5 5.5mm Creepage[2]	**PS9213**	1	4.5 to 30	2500	15	25	250	520	UL, VDE
SOP5 5.5mm Creepage	**PS9214**	10	4.5 to 5.5	2500	25	30	54	51	UL, VDE
 ***Single channel, CMOS output, –40 to 100°C operation***									***Isolation for measurement equipment, plasma display panels, and factory automation equipment***
SOP5	**PS9151**	15	4.5 to 5.5	3750	2	20	35	35	UL, VDE
 ***Single channel, totem pole output, –40 to 100°C operation***									***Isolation for IPM Drivers, Inverters***
SDIP6 Gull Wing SDIP6 8mm Creepage	**PS9303L** **PS9303L2**	1	4.5 to 20	5000	25	20	250	250	UL, VDE, CSA
 ***Single channel, open collector output***									***Isolation for measurement equipment, plasma display panels and factory automation equipment***
SDIP6 Gull Wing SDIP6 8mm Creepage	**PS9317L** **PS9317L2**	10	4.5 to 5.5	5000	25	20	40	35	UL, VDE, CSA

NOTES: 1. Other safety certifications available, see data sheet. 2. –40 to 100°C operation

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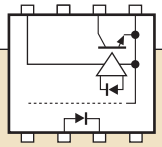
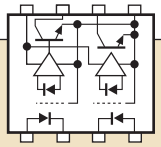
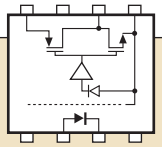
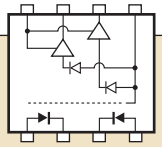
High Speed Digital Optocouplers *Continued...*

Package	Part Number	Speed (Mbps)	V_{CC} Range (V) *Recommended*	Absolute Max Rating BV ($V_{r.m.s.}$)	Absolute Max Rating I_O (mA)	Absolute Max Rating I_F (mA)	Typ t_{PHL} (ns)	Typ t_{PLH} (ns)	Safety Certification[1]
	***Single channel, open collector output***								***Isolation for measurement equipment, plasma display panels, and factory automation equipment***
DIP8 Thru-Hole DIP8 Thru-Hole 8mm Creepage SMT DIP8 8mm Creepage SMT DIP8 Gull Wing	**PS9587** **PS9587L1** **PS9587L2** **PS9587L3**	10	4.5 to 5.5	5000	25	30	35	45	UL, VDE
S08	**PS9817A-1**	10	4.5 to 5.5	2500	25	20	40	45	UL, VDE
S08	**PS9821-1**	15	2.7 to 3.6	2500	25	20	45	50	UL, VDE
S08	**PS9822-1**	1	N = 2.7 to 3.3 L = 4.5 to 5.5	2500	25	20	500 max	700 max	UL, VDE
	***Two channel, open collector output***								***Isolation for measurement equipment, plasma display panels, and factory automation equipment***
S08	**PS9817A-2**	10	4.5 to 5.5	2500	25	15	40	45	UL, VDE
S08	**PS9821-2**	15	2.7 to 3.6	2500	25	15	45	50	UL, VDE
S08	**PS9822-2**	1	N = 2.7 to 3.3 L = 4.5 to 5.5	2500	25	15	500 max	700 max	UL, VDE
	***Single channel, CMOS output***								***Isolation for measurement equipment, plasma display panels, and factory automation equipment***
S08	**PS9851-1**	15	4.5 to 5.5	2500	2	20	34	37	UL, VDE
	***Two channel, CMOS output***								***Isolation for measurement equipment, plasma display panels, and factory automation equipment***
S08	**PS9851-2**	15	4.5 to 5.5	2500	2	20	34	37	UL, VDE

NOTES: 1. Other safety certifications available, see data sheet.

Digital Optocouplers for MOSFET and IGBT Driver Isolation

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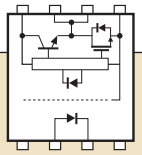
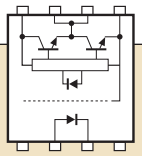
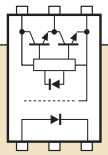
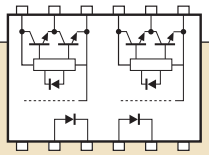
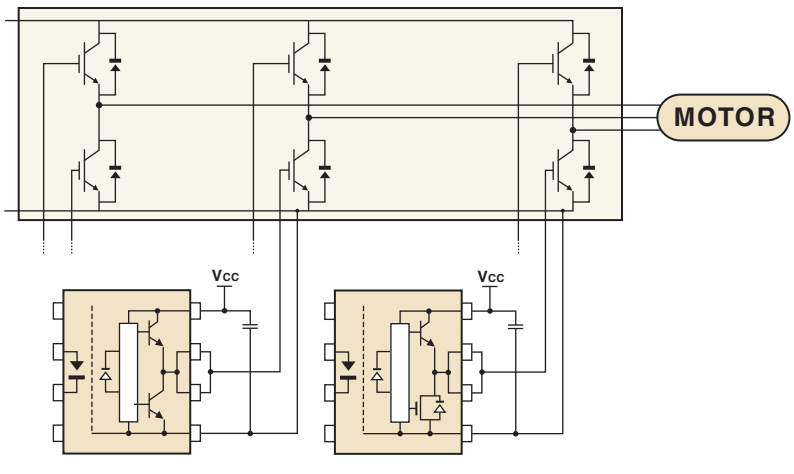
Package	Part Number	VCC Range (V)	Absolute Max Rating			Typ		Safety Certification[1]
			BV (Vr.m.s.)	IO (mA)	IF (mA)	tPHL (ns)	tPLH (ns)	
 ***Single channel for MOSFET, IGBT driver isolation, –40 to 100°C operation***								
DIP8 Thru-Hole DIP8 Thru-Hole 8mm Creepage SMT DIP8 Gull Wing 8mm Creepage SMT DIP8 Gull Wing	**PS9552** **PS9552L1** **PS9552L2** **PS9552L3**	15 to 30	5000	2500	25	300	300	UL, VDE, CSA, BSI
 ***Single Channel for MOSFET, IGBT driver isolation, –40 to 100°C operation***								
DIP8 Thru-Hole DIP8 Thru-Hole 8mm Creepage SMT DIP8 Gull Wing 8mm Creepage SMT DIP8 Gull Wing	**PS9553** **PS9553L1** **PS9553L2** **PS9553L3**	10 to 30	5000	600	25	200	200	UL, CSA, BSI
 ***Single channel for IGBT, MOSFET drivers, inverters, induction heating, and plasma display panels, –40 to 100°C operation***								
SDIP6 Gull Wing SDIP6 Gull Wing 8mm Creepage	**PS9301L** **PS9301L2**	10 to 30	5000	600	25	200	200	UL, CSA, BSI
 ***Two channel for IGBT, MOSFET drivers, inverters, induction heating, and plasma display panels, –40 to 100°C operation***								
SSOP16	**PS9401-2**	10 to 30	5000	600	25	200	200	UL, CSA, BSI

NOTES: 1. Other safety certifications available, see data sheet.

Motor drive applications demand higher voltages and current than most ICs and microcontrollers can handle. To address the problem a variety of new IGBT and MOSFET drivers have been developed. These drivers depend on the galvanic isolation that NEC optocouplers provide to protect their microcontrollers from the power surges, ground loops, and electrical noise their motors generate. NEC's PS9552 Series devices feature high common mode transient immunity, large peak output current, and fast switching speeds. *Under Voltage Lockout Protection* (UVLO) is also a standard feature, plus all PS9552 devices are housed in special RoHS-compliant white epoxy packages designed to limit heat absorption in high current applications.



PS9553
PS9301
PS9401

PS9552

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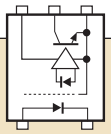
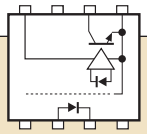
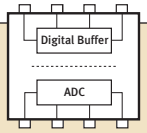
Digital High Functionality Optocouplers for Motor Drive Applications

Package	Part Number	V_{CC} Range (V) *Recommended*	Absolute Max Ratings			Typ		Safety Certification[1]
			BV ($V_{r.m.s.}$)	I_O (mA)	I_F (mA)	t_{PHL} (ns)	t_{PLH} (ns)	
 ***Single channel, open collector output, high temp operation***								***Isolation for intelligent power module drivers, inverters***
SOP5[2]	**PS9113**	4.5 to 35	3750	15	25	250	520	UL, VDE
SDIP6 Gull Wing[3]	**PS9313L**	-0.5 to 35	5000	15	25	240	460	UL, VDE, CSA
SDIP6 Gull Wing 8mm Creepage[3]	**PS9313L2**							
 ***Single channel, open collector output, –40 to 100°C operation***								***Isolation for intelligent power module drivers, inverters***
DIP8 Thru-Hole	**PS9513**	4.5 to 35	5000	15	25	250	520	UL, VDE, CSA, BSI
DIP8 Thru-Hole 8mm Creepage	**PS9513L1**							
SMT DIP8 Gull Wing 8mm Creepage	**PS9513L2**							
SMT DIP8 Gull Wing	**PS9513L3**							

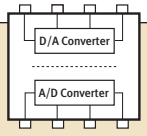
NOTES: 1. Other safety certifications available, see data sheet. 2. –40 to 100°C operation. 3. –40 to 110°C operation.

Isolation Amplifier – Digital

Package	Part Number	V_{DD} Range (V) *Recommended*	Input Supply Current I_{DD1} (mA max)	Output Supply Current I_{DD2} (mA max)	Resolution (bits min)	Output Clock Frequency (MHz typ)	BV ($V_{r.m.s.}$)	Safety Certification[1]
 ***Digital isolation amplifier for motor drive applications***								
SMT DIP8 Gull Wing 8mm Creepage	**PS9551L4**	4.5 to 5.5	14	10	15	10	5000	UL, CSA, BSI

NOTES: 1. Other safety certifications available, see data sheet.

Isolation Amplifier – Analog

Package	Part Number	Absolute Max Rating		Input Supply Current I_{DD1} (mA max)	Output Supply Current I_{DD2} (mA max)	Output Bandwidth (kHz typ)	Gain V/V (typ)	Gain Error (%)	Safety Certification[1]
		BV ($V_{r.m.s.}$)	V_{CC} (V)						
 ***Analog isolation amplifier for motor drive applications, –40 to 100°C operation***									
SMT DIP8 Gull Wing 8mm Creepage	**PS8551L4**	5000	5.5	18	16	100	8	±3%	UL, CSA, BSI

NOTES: 1. Other safety certifications available, see data sheet.

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High Speed Analog Optocouplers

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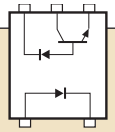
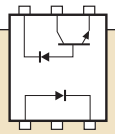
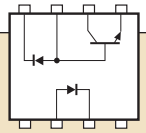
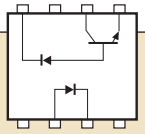
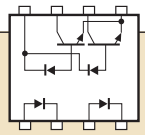
Package	Part Number	Speed (Mbps)	Absolute Maximum Ratings				Typical		CTR[1] (N = Full Range) Rank (%)	Safety Certification[2]
			BV (Vr.m.s.)	VCC (V)	IC (mA)	IF (mA)	tPHL (ns)	tPLH (ns)		
 ***Single channel for power supplies, inverters, computers, peripherals, –55 to 100°C operation***										
SOP5	**PS8101**	1	3750	35	8	25	500	600	**(N = 15 to 35)** K = 20 to 35	UL, VDE
 ***Single channel for power supplies, inverters, computers, peripherals, –40 to 110°C operation***										
SDIP6 SMT Gull Wing SDIP6 SMT Gull Wing 8mm Creepage	**PS8302L** **PS8302L2**	1	5000	35	8	25	220	350	15 min	UL, VDE, CSA
 ***Single channel for measurement and control equipment, modems, inverters, –55 to 100°C operation***										
DIP8 Thru-Hole DIP8 Thru-Hole 8mm Creepage SMT DIP8 Gull Wing 8mm Creepage SMT DIP8 Gull Wing	**PS8501** **PS8501L1** **PS8501L2** **PS8501L3**	1	5000	35	8	25	220	350	15 min	UL, CSA, BSI
 ***Single channel for measurement and control equipment, modems, inverters, –55 to 100°C operation***										
DIP8 Thru-Hole DIP8 Thru-Hole 8mm Creepage SMT DIP8 Gull Wing 8mm Creepage SMT DIP8 Gull Wing	**PS8502** **PS8502L1** **PS8502L2** **PS8502L3**	1	5000	35	8	25	220	350	15 min	UL, CSA, BSI
S08	**PS8802-1**	1	2500	35	8	25	300	600	**(N = 15 to 35)**	UL, VDE
S08	**PS8821-1**	1	2500	7	8	25	300	500	**(N = 20 to ...)**[3]	UL, VDE
 ***Two channel for measurement and control equipment, modems, inverters, –55 to 100°C operation***										
S08	**PS8802-2**	1	2500	35	8	25	300	600	**(N = 15 to 35)**	UL, VDE
S08	**PS8821-2**	1	2500	7	8	25	300	500	**(N = 20 to ...)**[3]	UL, VDE

NOTES: 1. CTR measured at VCC = 4.5V, IF = 16mA. 2. Other safety certifications available, see data sheet. 3. CTR measured at VCC = 3.3V, IF = 16mA.

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Single Transistor, General Purpose DC Optocouplers

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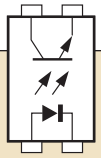
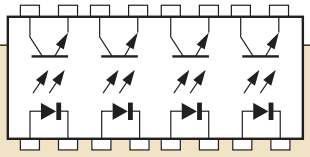
Package	Part Number	Absolute Maximum Ratings				CTR (N = Full Range) Rank (%)	Safety Certification
		BV (Vr.m.s.)	VCEO (V)	IF (mA)	IC (mA)		
 ***Single channel DC device for low-speed logic applications***						***CTR measured @ VCE = 5V, IF = 5mA***	
DIP4 Thru-Hole SMT DIP4	**PS2501** **PS2501L**	5000	80	80	50	**N = 80 to 600** K = 300 to 600 L = 200 to 400 M = 80 to 240 D = 100 to 300 H = 80 to 160 W = 130 to 260 Q = 100 to 200	UL
PS2501 w / alternate die DIP4 Thru-Hole SMT DIP4 *For high temp applications see **PS2561B**, page 14*	**PS2501A** **PS2501AL**	5000	70	30	30	**N = 50 to 400** H = 80 to 160 W = 130 to 260 Q = 100 to 200 L = 200 to 400 K = 300 to 600	UL
SOP4	**PS2701**	3750	40	50	80	**N = 50 to 300** P = 150 to 300 L = 100 to 300 M = 50 to 150	UL, VDE, BSI
PS2701 w / alternate die SOP4 *For high temp applications see **PS2761B**, page 14*	**PS2701A**	3750	70	30	30	**N = 50 to 300** P = 150 to 300 L = 100 to 300 M = 50 to 150	UL, VDE
SSOP4	**PS2801**	2500	80	50	50	**N = 80 to 600** K = 300 to 600 L = 100 to 300 P = 150 to 300	UL, VDE, BSI, CSA
PS2801 w / alternate die SSOP4 *For high temp applications see **PS2861B**, page 14*	**PS2801C**	2500	80	30	30	**N = 50 to 400** L = 100 to 300 M = 100 to 400 P = 150 to 300	UL, VDE
 ***Four channel DC device for low-speed logic applications***						***CTR measured @ VCE = 5V, IF = 5mA***	
DIP16 Thru-Hole SMT DIP16	**PS2501-4** **PS2501L-4**	5000	80	80	50	**N = 80 to 600**	UL
SSOP16	**PS2801-4**	2500	80	50	50	**N = 80 to 600**	UL, VDE, BSI, CSA
PS2801-4 w / alternate die SSOP16	**PS2801C-4**	2500	80	30	30	**N = 50 to 400** M = 100 to 400	UL

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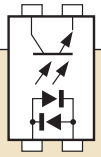
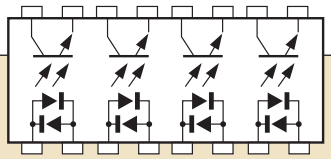
Single Transistor, General Purpose AC Optocouplers

Package	Part Number	Absolute Maximum Ratings				CTR (N = Full Range) Rank (%)	Safety Certification
		BV ($V_{r.m.s.}$)	V_{CEO} (V)	I_F (mA)	I_C (mA)		
 ***Single channel AC devices with high isolation voltage***						***CTR measured @ V_{CE} = 5 V, I_F = ±5 mA***	
DIP4 Thru-Hole SMT DIP4	**PS2505** **PS2505L**	5000	80	±80	50	**N = 80 to 600**	UL
SOP4	**PS2705**	3750	40	±50	80	**N = 50 to 300** P = 150 to 300 L = 100 to 300 M = 50 to 150	UL, VDE, BSI, CSA
PS2705 w / alternate die SOP4	**PS2705A**	3750	70	±30	30	**N = 50 to 300** L = 100 to 300 M = 50 to 150	UL, VDE
SSOP4	**PS2805**	2500	80	±50	50	**N = 80 to 600**	UL, VDE, BSI, CSA
PS2805 w / alternate die SSOP4	**PS2805C**	2500	80	±30	30	**N = 50 to 400** M = 100 to 400	UL, VDE
 ***Four channel AC devices with high isolation voltage***						***CTR measured @ V_{CE} = 5V, I_F = ±5mA***	
DIP16 Thru-Hole SMT DIP16	**PS2505-4** **PS2505L-4**	5000	80	±80	50	**N = 80 to 600**	UL
SSOP16	**PS2805-4**	2500	80	±50	50	**N = 80 to 600**	UL, VDE, BSI, CSA
PS2805-4 w / alternate die SSOP16	**PS2805C-4**	2500	80	±30	30	**N = 50 to 400** M = 100 to 400	UL, VDE

NOTES: 1. Other safety certifications available, see data sheet.

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Single Transistor DC & AC Optocouplers, Optimized for Power Supplies

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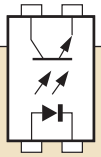
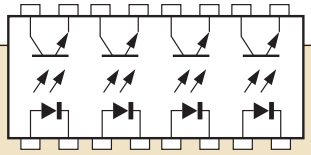
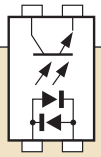
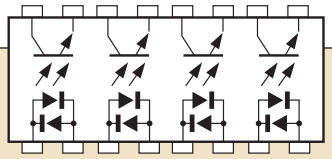
Package	Part Number	Absolute Maximum Ratings				CTR (N = Full Range) Rank (%)	Safety Certification
		BV (Vr.m.s.)	VCEO (V)	IF (mA)	IC (mA)		
 *Single channel DC devices optimized for power supply applications*						*CTR measured @ VCE = 5 V, IF = 1 mA*	
SOP4	**PS2711**	3750	40	50	40	**N = 100 to 400** K = 200 to 400 L = 150 to 300 M = 100 to 200	UL, VDE
SSOP4	**PS2811**	2500	40	50	40	**N = 100 to 400** K = 200 to 400 L = 150 to 300 M = 100 to 200	UL, VDE
4 Pin Mini Flat	**PS2911**	2500	40	50	40	**N = 100 to 400** K = 200 to 400 L = 150 to 300 M = 100 to 200	UL, VDE, BSI
 *Four channel DC device optimized for power supply applications*						*CTR measured @ VCE = 5 V, IF = 1 mA*	
SSOP16	**PS2811-4**	2500	40	50	40	**N = 100 to 400**	UL, VDE
 *Single channel AC devices optimized for power supply applications*						*CTR measured @ VCE = 5 V, IF = 1 mA*	
SOP4	**PS2715**	3750	40	±50	40	**N = 100 to 400**	UL, VDE
SSOP4	**PS2815**	2500	40	±50	40	**N = 100 to 400**	UL, VDE
4 Pin Mini Flat	**PS2915**	2500	40	±50	30	**N = 100 to 400**	UL, VDE, BSI
 *Four channel AC device optimized for power supply applications*						*CTR measured @ VCE = 5 V, IF = 1 mA*	
SSOP16	**PS2815-4**	2500	40	±50	40	**N = 100 to 400**	UL, VDE

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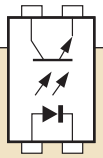
Single Transistor DC Optocouplers, Guaranteed 0.4mm Insulation (BSI)

Package	Part Number	Absolute Maximum Ratings				CTR (N = Full Range) Rank (%)	Safety Certification[1]
		BV(Vr.m.s.)	VCEO(V)	IF(mA)	Ic(mA)		
 ***Single channel DC devices, high isolation voltage***						***CTR measured @ VCE = 5V, IF = 5mA***	
DIP4 Thru-Hole SMT DIP4 DIP4 Thru-Hole Gull Wing	**PS2561** **PS2561L** **PS2561L1**	5000	80	80	50	**N = 80 to 400** L = 200 to 400 M = 80 to 240 D = 100 to 300 H = 80 to 160 W = 130 to 260	UL, VDE, BSI
PS2561 w/alternate die DIP4 Thru-Hole SMT DIP4 DIP4 Thru-Hole Gull Wing SMT DIP4 Gull Wing	**PS2561A** **PS2561AL** **PS2561AL1** **PS2561AL2**	5000	70	30	30	**N = 50 to 400** L = 200 to 400 H = 80 to 160 Q = 100 to 200 W = 130 to 260	UL, VDE, BSI
PS2561 110°C operation DIP4 Thru-Hole SMT DIP4 DIP4 Thru-Hole Gull Wing SMT DIP4 Gull Wing	**PS2561B** **PS2561BL** **PS2561BL1** **PS2561BL2**	5000	80	40	50	**N = 100 to 400** Q = 100 to 200 W = 130 to 260 D = 100 to 300 L = 200 to 400	UL, VDE
DIP4 Thru-Hole 8mm Creepage SMT DIP4 8mm Creepage	**PS2581L1** **PS2581L2**	5000	80	80	50	**N = 80 to 400** L = 200 to 400 M = 80 to 240 D = 100 to 300 H = 80 to 160 W = 130 to 260	UL, VDE, BSI
DIP4 Thru-Hole 8mm Creepage SMT DIP4 8mm Creepage	**PS2581AL1** **PS2581AL2**	5000	70	30	30	**N = 50 to 300** L = 200 to 400 H = 80 to 160 Q = 100 to 200 W = 130 to 260	UL, VDE, BSI
SOP4 ***110°C operation***	**PS2761B**	3750	70	25	40	**N = 50 to 400** K = 200 to 400 M = 50 to 150 L = 100 to 300	UL, BSI
SSOP4 ***110°C operation***	**PS2861B**	3750	70	50	50	**N = 50 to 400**	In process

NOTES: 1. Other safety certifications available, see data sheet.

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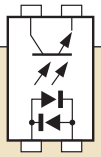
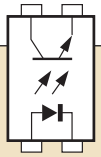
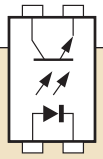
Single Transistor AC Optocouplers, Guaranteed 0.4mm Insulation (BSI)

Package	Part Number	Absolute Maximum Ratings				CTR (N = Full Range) Rank (%)	Safety Certification[1]
		BV(Vr.m.s.)	VCEO (V)	IF (mA)	IC (mA)		
 ***Single channel AC devices, high isolation voltage***						***CTR measured @ VCE = 5 V, IF = 5 mA***	
DIP4 Thru-Hole SMT DIP4 DIP4 Thru-Hole Gull Wing SMT DIP4 Gull Wing	**PS2565** **PS2565L** **PS2565L1** **PS2565L2**	5000	80	±80	50	**N = 80 to 400**	UL, VDE, BSI
SOP4	**PS2765**	3750	40	±50	40	**N = 50 to 400**	UL, VDE, BSI
SSOP4	**PS2865**	2500	40	±50	40	**N = 50 to 400**	UL, VDE, BSI

NOTES: 1. Other safety certifications available, see data sheet.

Single Transistor, High Performance DC Optocouplers

Package	Part Number	Absolute Maximum Ratings				CTR (N = Full Range) Rank (%)	Safety Certification
		BV(Vr.m.s.)	VCEO (V)	IF (mA)	IC (mA)		
 ***Single channel DC device, high drive current, high isolation voltage***						***CTR measured @ VCE = 3 V, IF = 100 mA***	
DIP4 Thru-Hole SMT DIP4	**PS2521** **PS2521L**	5000	80	150	50	**N = 20 to 80**	UL, CSA
 ***Single channel DC devices, high speed, high VCE***						***CTR measured @ VCE and IF as noted***	
DIP4 Thru-Hole SMT DIP4	**PS2503** **PS2503L**	5000	40	80	30	***VCE = 5 V, IF = 1 mA*** **N = 100 to 400** K = 200 to 400 L = 150 to 300 M = 100 to 200	UL, CSA
DIP4 Thru-Hole	**PS2513**	5000	120	60	30	***VCE = 5 V, IF = 5 mA*** **N = 50 to 200**	UL, VDE
SMT DIP4	**PS2513L**	5000	120	60	30	***VCE = 5 V, IF = 1 mA*** **N = 25 to 100**	UL, VDE
SOP4	**PS2703**	3750	120	50	30	***VCE = 5 V, IF = 5 mA*** **N = 50 to 400** K = 200 to 400 L = 100 to 300 M = 50 to 150	UL, VDE, BSI, CSA
4 Pin Mini Flat	**PS2913**	2500	120	50	30	***VCE = 5 V, IF = 1 mA*** **N = 50 to 200** K = 100 to 200 L = 75 to 150 M = 50 to 100	UL, VDE, BSI

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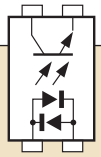
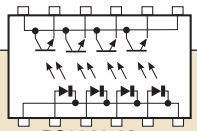
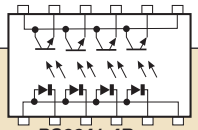
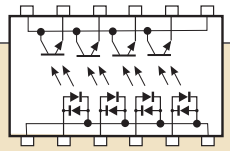
Single Transistor, High Performance AC Optocouplers

Package	Part Number	Absolute Maximum Ratings				CTR (N = Full Range) Rank (%)	Safety Certification
		BV (Vr.m.s.)	VCEO (V)	IF (mA)	IC (mA)		
 *Single channel AC devices, high drive current, high isolation voltage*						*CTR measured @ VCE = 3 V, IF = 100 mA*	
DIP4 Thru-Hole SMT DIP4	**PS2525** **PS2525L**	5000	80	±150	50	**N = 20 to 80**	UL, CSA

Single Transistor Optocouplers in Miniature Quad Packages

Package	Part Number	Absolute Maximum Ratings				CTR (N = Full Range) Rank (%)	Safety Certification
		BV (Vr.m.s.)	VCEO (V)	IF (mA)	IC (mA)		
 *PS2841-4A*  *PS2841-4B* *Four channel, DC devices*						*CTR measured @ VCE = 5 V, IF = 1 mA*	
SSOP12 SSOP12	**PS2841-4A** **PS2841-4B**	1500	70	20	20	**N = 100 to 400**	UL
 *Four channel, AC device*						*CTR measured @ VCE = 5V, IF = 1 mA*	
SSOP12	**PS2845-4A**	1500	70	±20	20	**N = 100 to 400**	UL

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Darlington Transistor, General Purpose Optocouplers

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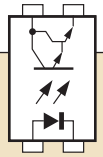
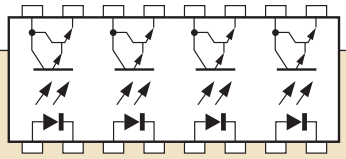
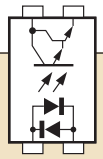
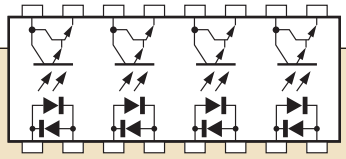
Package	Part Number	Absolute Maximum Ratings				CTR (N = Full Range) Rank (%)	Safety Certification
		BV (Vr.m.s.)	VCEO (V)	IF (mA)	IC (mA)		
 *Single channel DC devices, high isolation voltage*						*CTR measured @ VCE = 2 V, IF = 1 mA*	
DIP4 Thru-Hole SMT DIP4	**PS2502** **PS2502L**	5000	40	80	200	**N = 200 min** K = 2000 min. L = 700 to 3400 M = 200 to 1000	UL
SOP4	**PS2702**	3750	40	50	200	**N = 200 min** K = 2000 min. L = 700 to 3400 M = 200 to 1000	UL, VDE, BSI
SSOP4	**PS2802**	2500	40	50	90	**N = 200 min** K = 2000 min. L = 700 to 3400 M = 200 to 1000	UL, VDE, BSI, CSA
 *Four channel DC devices, high isolation voltage*						*CTR measured @ VCE = 2 V, IF = 1 mA*	
DIP16 Thru-Hole SMT DIP16	**PS2502-4** **PS2502L-4**	5000	40	80	160	**N = 200 min**	UL
SSOP16	**PS2802-4**	2500	40	50	100	**N = 200 min**	UL, VDE, BSI, CSA
 *Single channel AC device, high isolation voltage*						*CTR measured @ VCE = 2 V, IF = ±1 mA*	
DIP4 Thru-Hole SMT DIP4	**PS2506** **PS2506L**	5000	40	±80	200	**N = 200 min**	UL
 *Four channel AC device, high isolation voltage*						*CTR measured @ VCE = 2 V, IF = ±1 mA*	
DIP16 Thru-Hole SMT DIP16	**PS2506-4** **PS2506L-4**	5000	40	±80	160	**N = 200 min**	UL

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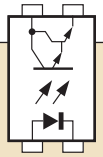
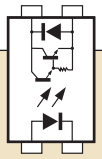
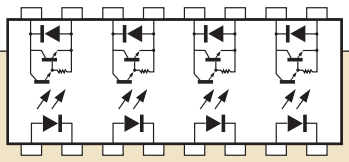
Darlington Transistor Optocouplers, Guaranteed 0.4mm Insulation (BSI)

Package	Part Number	Absolute Maximum Ratings				CTR (N = Full Range) Rank (%)	Safety Certification[1]
		BV ($V_{r.m.s.}$)	V_{CEO} (V)	I_F (mA)	I_C (mA)		
 *Single channel DC device, high isolation voltage*						*CTR measured @ V_{CE} = 2 V, I_F = 1 mA*	
DIP4 Thru-Hole SMT DIP4 DIP4 Thru-Hole Gull Wing SMT DIP4 Gull Wing	**PS2562** **PS2562L** **PS2562L1** **PS2562L2**	5000	40	80	200	**N = 200 min** K = 2000 to 3400 L = 700 to 3400 M = 200 to 1000	UL, VDE, BSE

NOTES: 1. Other safety certifications available, see data sheet.

Darlington Transistor, High V_{CEO} DC Optocouplers

Package	Part Number	Absolute Maximum Ratings				CTR (N = Full Range) Rank (%)	Safety Certification
		BV ($V_{r.m.s.}$)	V_{CEO} (V)	I_F (mA)	I_C (mA)		
 *Single channel DC devices*						*CTR measured @ V_{CE} = 2 V, I_F = 1 mA*	
DIP4 Thru-Hole SMT DIP4	**PS2533** **PS2533L**	5000	350	80	150	**N = 1500 to 6500**	UL, VDE, BSI
SOP4	**PS2733**	2500	350	50	150	**N = 1500 min**	UL, VDE, BSI
SSOP4	**PS2833**	2500	350	50	60	**N = 400 to 4500**	UL
4 Pin Mini Flat	**PS2933**	2500	350	50	60	**N = 400 to 4500**	UL, VDE, BSI
 *Four channel DC device*						*CTR measured @ V_{CE} = 2 V, I_F = 1 mA*	
SSOP16	**PS2833-4**	2500	350	50	60	**N = 400 to 4500**	UL

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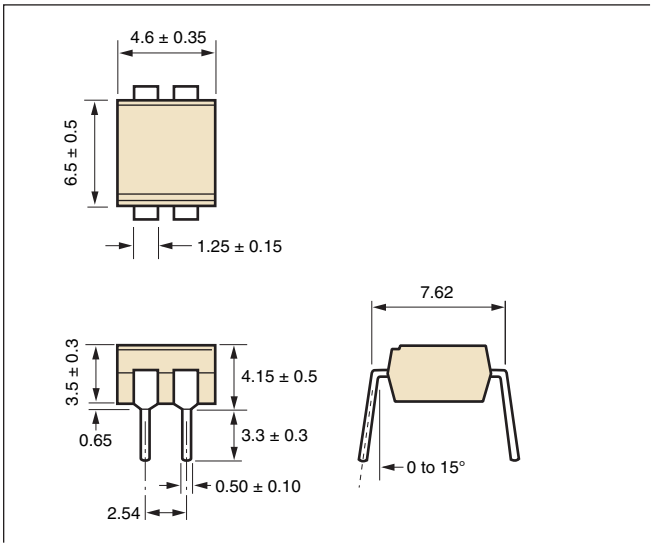
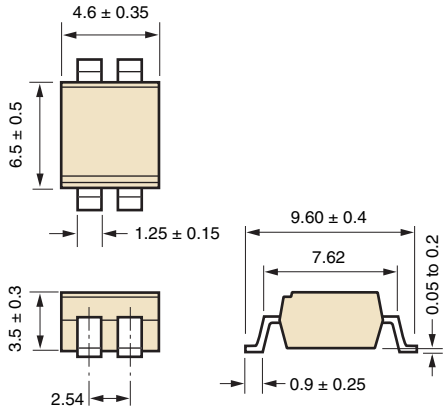
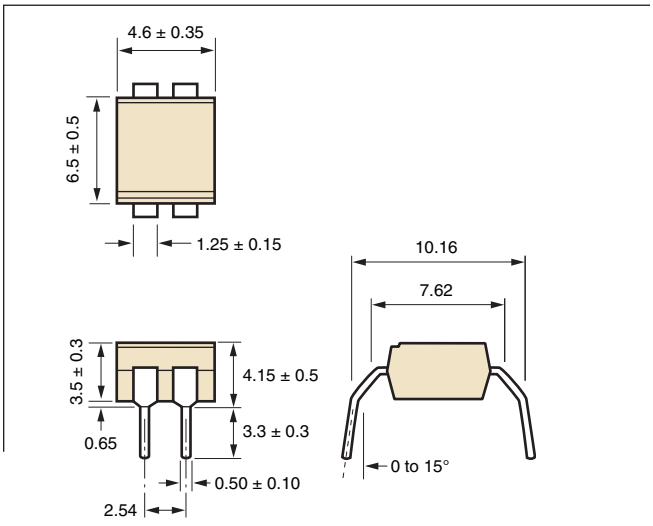
DIP4 Thru-Hole



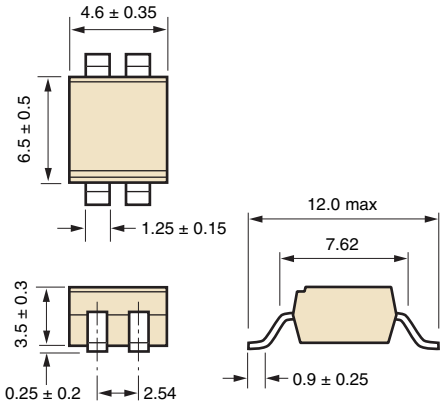
L — SMT DIP4



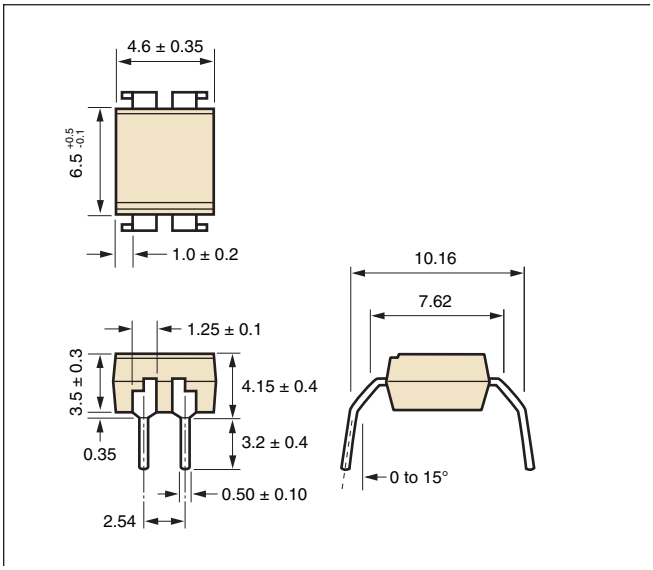
L1 — DIP4 Thru-Hole Gull Wing



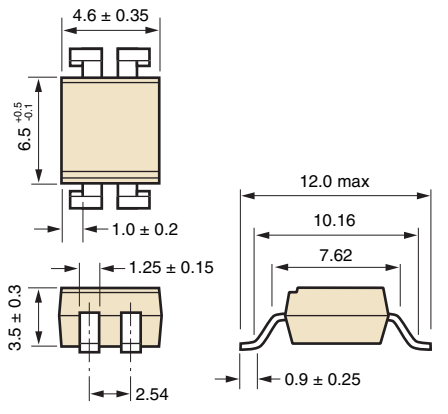
L2 — SMT DIP4 Gull Wing



L1 — DIP4 Thru-Hole Gull Wing with 8mm Creepage



L2 — SMT DIP4 Gull Wing with 8mm Creepage



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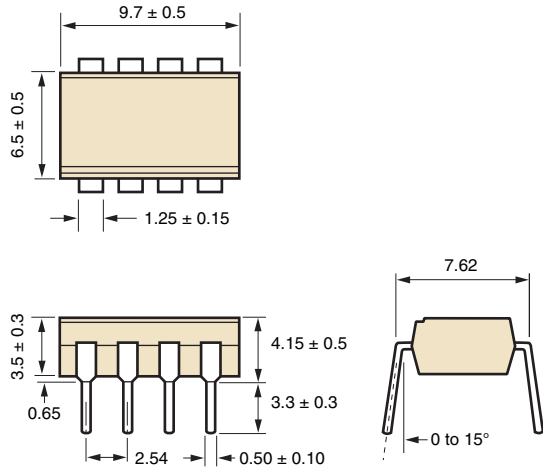
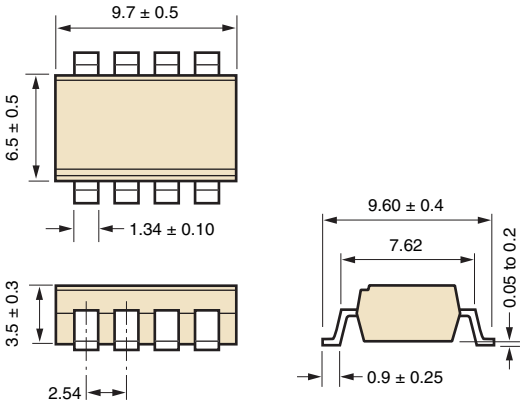
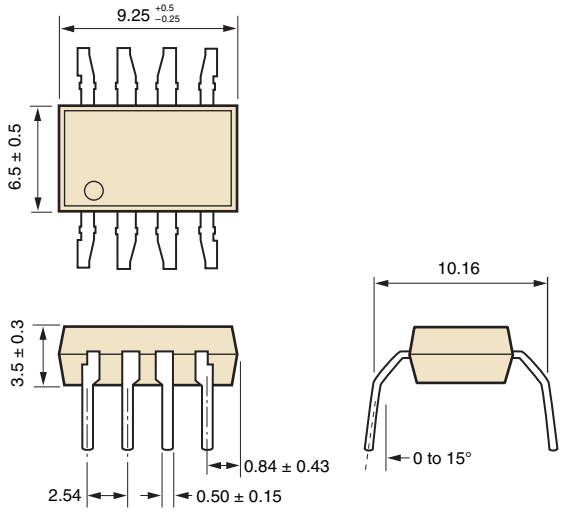
DIP8 Thru-Hole



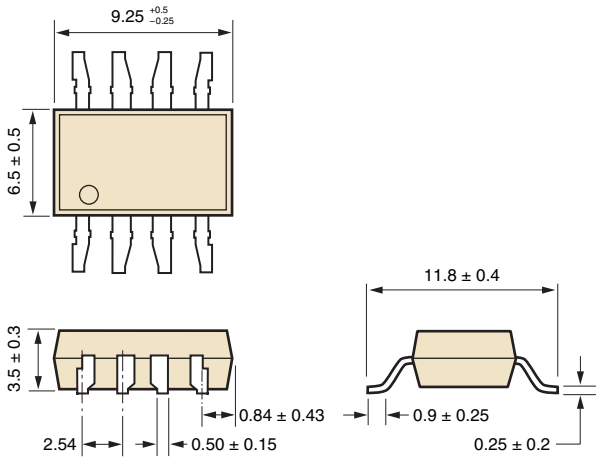
L — SMT DIP8



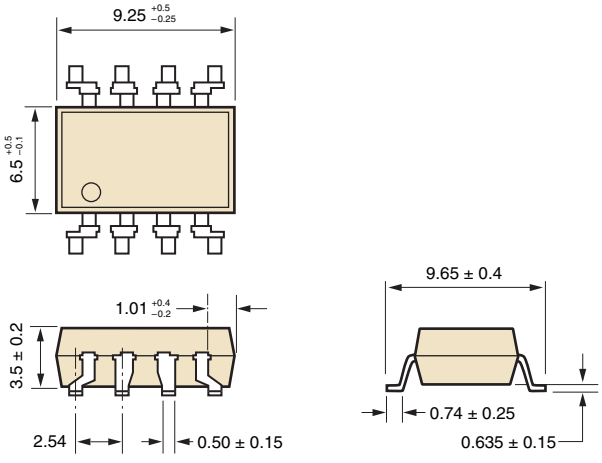
L1 — DIP8 Thru-Hole with 8mm Creepage



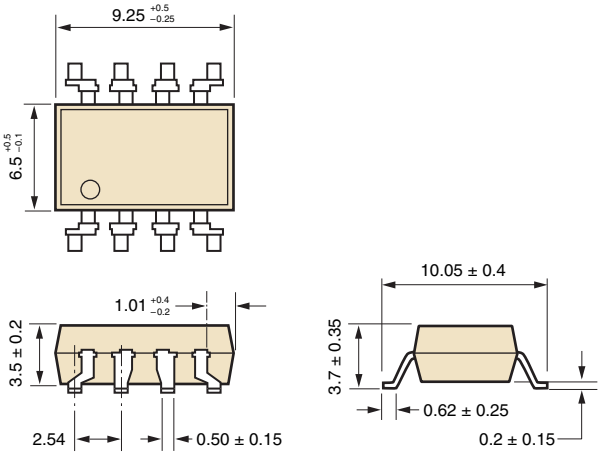
L2 — SMT DIP8 Gull Wing with 8mm Creepage



L3 — SMT DIP8 Gull Wing



L4 — SMT DIP8 Gull Wing with 8mm Creepage



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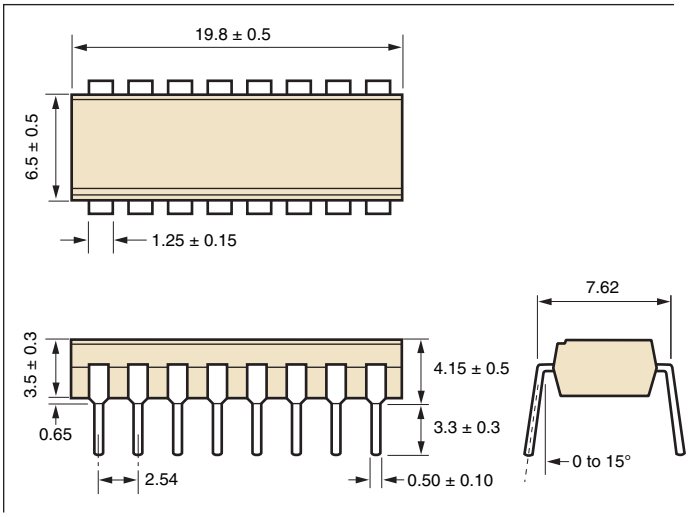
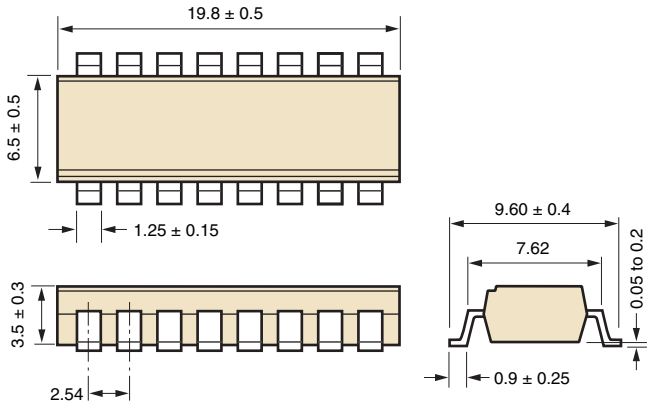
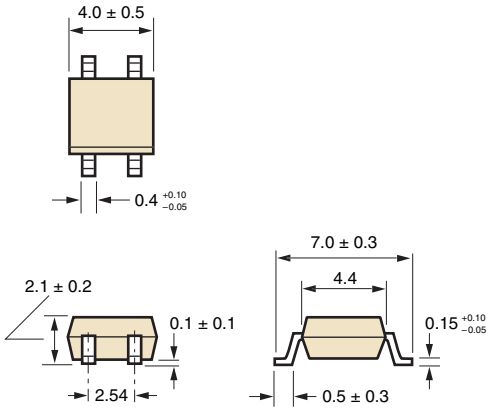
DIP16 Thru-Hole



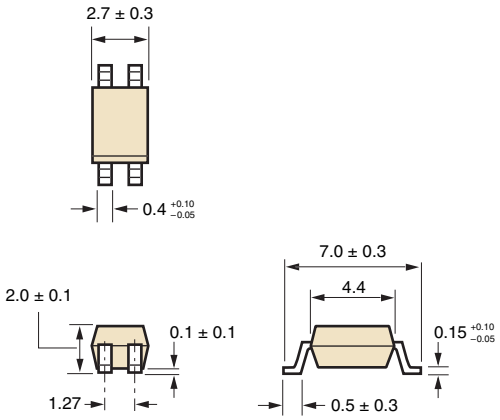
L — SMT DIP16



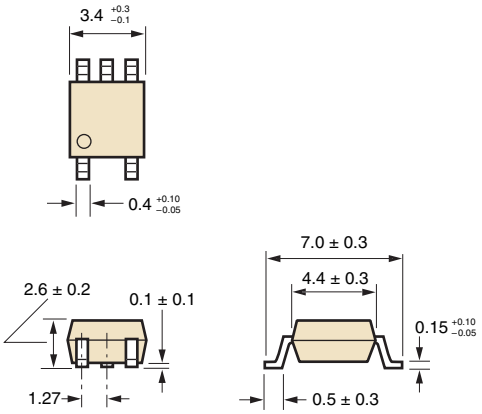
SOP4 2.54mm pin pitch



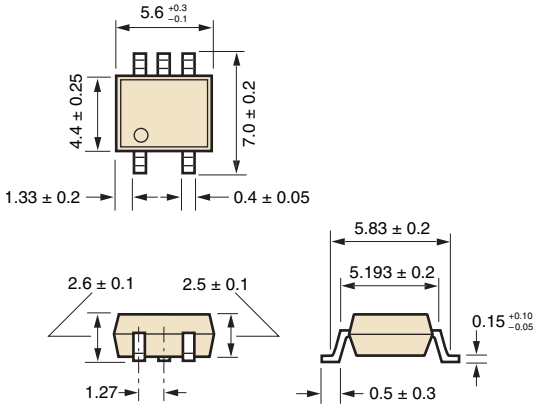
SSOP4 1.27mm pin pitch



SOP5 1.27mm pin pitch



SOP5 1.27mm pin pitch with 5.5mm Creepage



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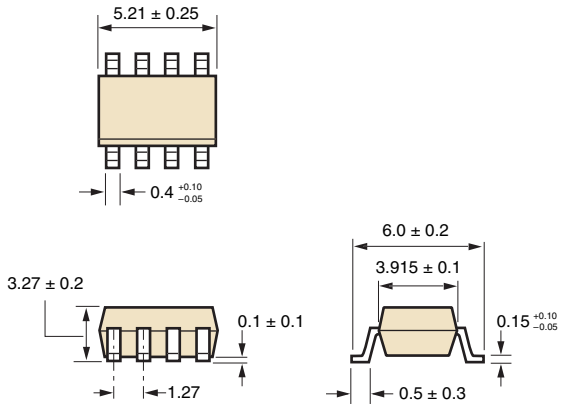
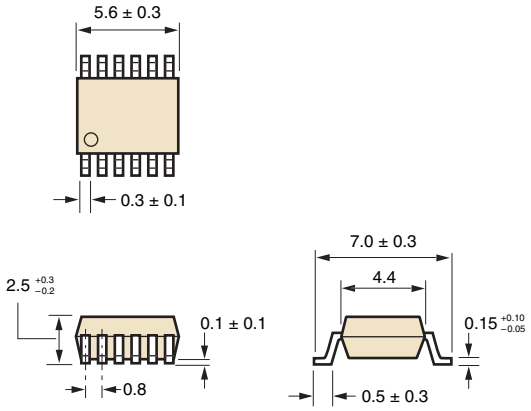
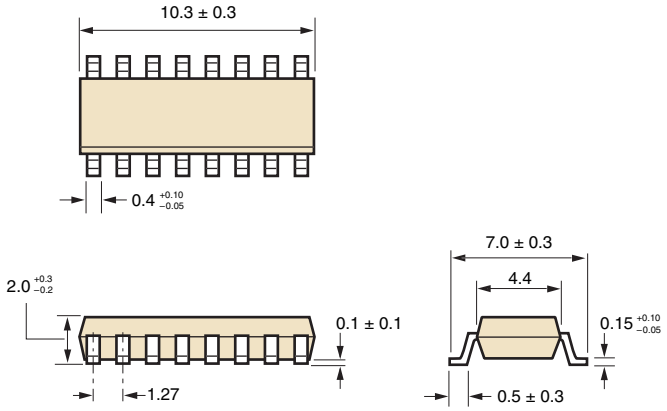
S08 1.27mm pin pitch



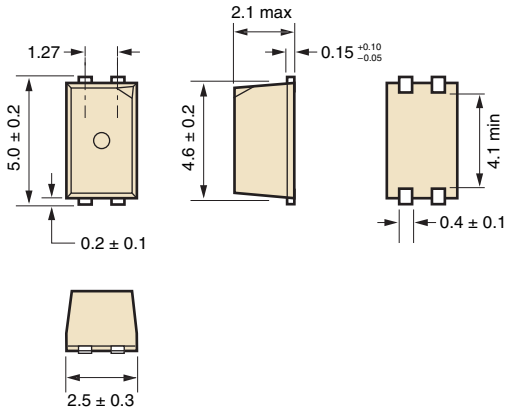
SSOP12 Mini Quad 1.27mm pin pitch



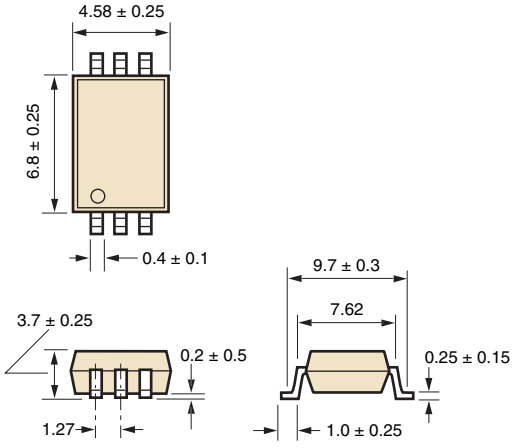
SSOP16 1.27mm pin pitch



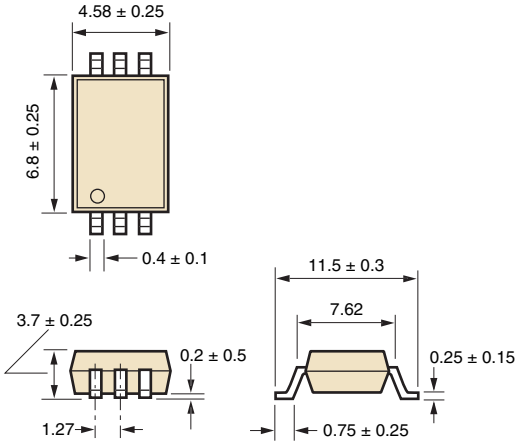
4 Pin Mini Flat



L — SDIP6 SMT Gull Wing



L2 — SDIP6 SMT Gull Wing with 8mm Creepage



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CEL California Eastern Laboratories

NEC ELECTRONICS SOLID STATE RELAYS — 2008

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Serving customers throughout North and South America, CEL maintains extensive inventories and provides engineering and applications support. CEL has sales offices throughout the hemisphere, including a network of independent reps and distributors.

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Product Failure Analysis

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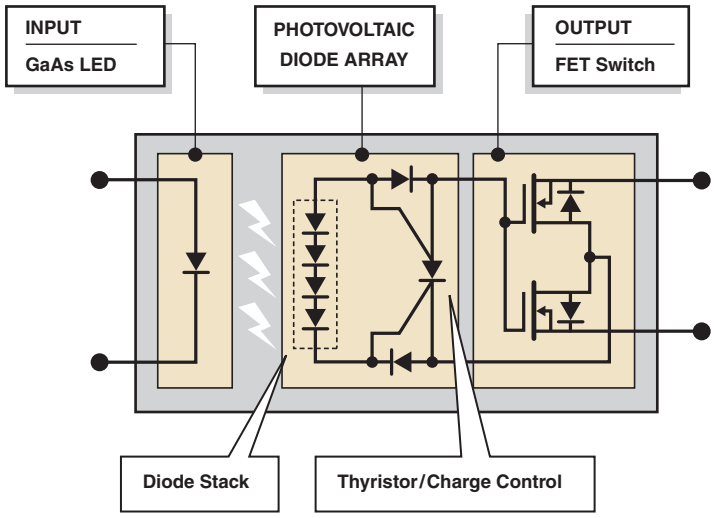
NEC Solid State Relays — An Introduction

Solid State Relays (SSRs) are semiconductor-based switching devices that operate optically rather than mechanically. They incorporate three major components: A GaAs LED on the input side, a photovoltaic diode array, and a FET switch on the output side. NEC Solid State Relays are available in three configurations:

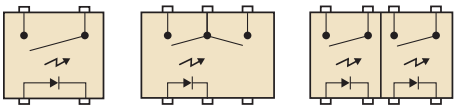


SOLID STATE RELAY: Basic Components

FORM A "Normally Open"

In a FORM A relay, when no input current is present, the FET switch on the output side is nonconductive, or "open." When current is applied, the LED lights and the photovoltaic diode array responds by producing a voltage that's applied to the gates of the FET. When the gates' voltage threshold is reached the FET switch becomes conductive — or closes — effectively switching the relay's load.

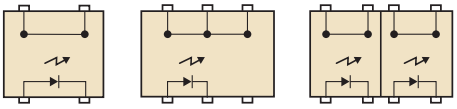
When the current is removed, the light stops and blocking diodes prevent charge from leaving the gates of the FET. As voltage from the photovoltaic array is reduced across the blocking diodes, it reaches a level that triggers a thyristor. The charge is then quickly removed from the gates and the FET goes nonconductive — returning the relay to its *Normally Open* state.



4 Pin | 6 Pin | 8 Pin Two Channel

FORM B "Normally Closed"

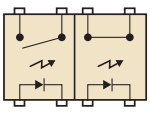
In a FORM B relay, when no input current is present, the output FET is conductive or "closed." As current is applied and the LED is lit, the photovoltaic array applies voltage to the FET gates, turning off the Depletion Mode FET switch, making it nonconductive, or "open." Removal of the input current returns the FET to its *Normally Closed* state.



4 Pin | 6 Pin | 8 Pin Two Channel

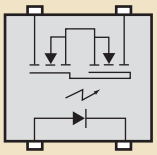
FORM C: Two Channel FORM A + FORM B

Two channel FORM C relays combine both a FORM A and a FORM B device in one package. If the two are connected in *series* and the FETs on the output side are connected in *parallel*, the FORM C device will function like an electro-mechanical relay (EMR). If they are *not* connected in series, the contacts can be operated independently by regulating the timing of the two input signals. This gives SSRs an advantage over mechanical relays: EMRs have only one control line which makes it fundamentally impossible to operate the two channels independently.

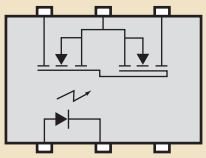


8 Pin Two Channel

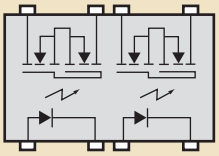
TYPICAL PIN CONFIGURATION



SOP4 & 4 Pin Mini Flat-Lead



DIP6 & SMT DIP6



DIP8, SMT DIP8 & SOP8

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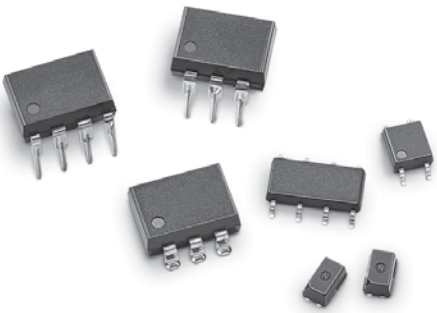
Why switch from Electro-Mechanical to Solid State Relays?

- **No moving parts**
- **High resistance to shock and vibration**
- **No arcing or contact bounce**
- **No Cross Talk**
- **Extremely fast**
- **Will switch AC or DC, output conduction is unrelated to input current levels**
- **Stable RON over the life of the device**
- **Proven reliability: 150X better than EMRs**

CEL offers a wide variety of NEC SSRs for a broad range of applications: These include low CxR devices for high frequency signal control, low RON devices for high current control, and devices designed specifically to handle high voltages. SSR input logic is compatible with a variety of control schemes and can be driven directly by low voltage microcontrollers. With NEC's broad product offering, it's easy to find an SSR that meets your specific needs.



NEC's **Mini Flat-Lead** *SSR package is the industry's smallest*

APPLICATIONS

- **Telecom/Datacom**
- **Test & Measurement**
- **Programmable Logic Control**
- **Instrumentation**
- **Power Switching**
- **Motor Drive Interfaces**

PACKAGE STYLES

NEC SSRs are available in a variety of industry-standard DIP and SOP packages. Many are pin-for-pin compatible with other devices on the market. For space-constrained designs, NEC offers a number of relays in a 4.6 x 2.64 x 1.85 mm *Mini Flat-Lead* package. The smallest in the industry, it enables extremely high placement densities, while its shortened signal paths help minimize the parasitic effects of the traces. See pages 9 and 10 for package drawings and dimensions.

MANUFACTURING and SAFETY CERTIFICATION

NEC's Phoenix Production Line is located at Kyushu Denshi, Japan, where all processes, from initial die loading to final QA and package marking, are fully-automated. This helps to speed production and lower manufacturing costs, while assuring the superior quality and consistency you've come to expect from NEC.

NEC SSRs are typically UL, CSA, BSI and VDE Part 2 certified (see tables). Other international certifications are also available, please refer to data sheets or contact CEL for specifics.

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NEC Solid State Relay Product Families

POWER and INDUSTRIAL APPLICATIONS	**PS710 Series / PS7113 Series** *High Current, Low RON devices in Thru-Hole and SMT DIP packages* **PS7205B, PS7206, PS7214** *High Current, Low RON devices in SOP4 packages* **PS7160, PS7360 Series** *600V Load Voltage devices in Thru-Hole and SMT DIP packages*
TELECOM APPLICATIONS *(Line Voltage)*	**PS7122, PS7221 Series** *250V Load Voltage, 200 to 260mA Load Current devices in Thru-Hole and SMT DIP and SOP packages* **PS714x, PS724x, PS734x Series** *400V Load Voltage, 120 – 200mA Load Current devices in Thru-Hole and SMT DIP and SOP packages*
INSTRUMENTATION and ATE *(Automated Test Equipment)*	**PS7200 Series** *Low CxR devices in SOP4 packages* **PS780x Series** *Low CxR devices ultra-miniature Mini Flat-Lead packages*

NEC Part Numbering System

PS7X XX X X - XX - XX - A

PACKAGE STYLE

- **PS71** *6 or 8 Pin Thru-Hole & SMT DIP*
- **PS72** *4 & 8 Pin SOP*
- **PS73** *6 Pin Thru-Hole & SMT DIP*
- **PS74** *4 Pin SOP*
- **PS78** *4 Pin Mini Flat-Lead*

FORM

- **1A** *Single Channel FORM A (Normally Open) device*
- **1B** *Single Channel FORM B (Normally Closed) device*
- **2A** *Dual Channel FORM A device*
- **2B** *Dual Channel FORM B device*
- **1C** *Dual Channel device, combines FORM A and FORM B*

CONFIGURATION IDENTIFIER

VARIATIONS

- **Blank** *Standard SSR*
- **A** *High Voltage/ Low Capacitance SSR*
- **C** *Current Limiting SSR*
- **E** *High Linearity SSR*

LEAD CONFIGURATION

- **Blank** *Standard DIP, SOP or Mini Flat-Lead package*
- **"L" Designation** *SMT DIP Gull Wing package*

Pb-FREE

- **A** *SnBi Plating*
- **Ax** *NiPdAu Plating*

TAPE & REEL OPTIONS

- **E3, E4** *Small Reel*
- **F3, F4** *Large Reel*

For details, visit:
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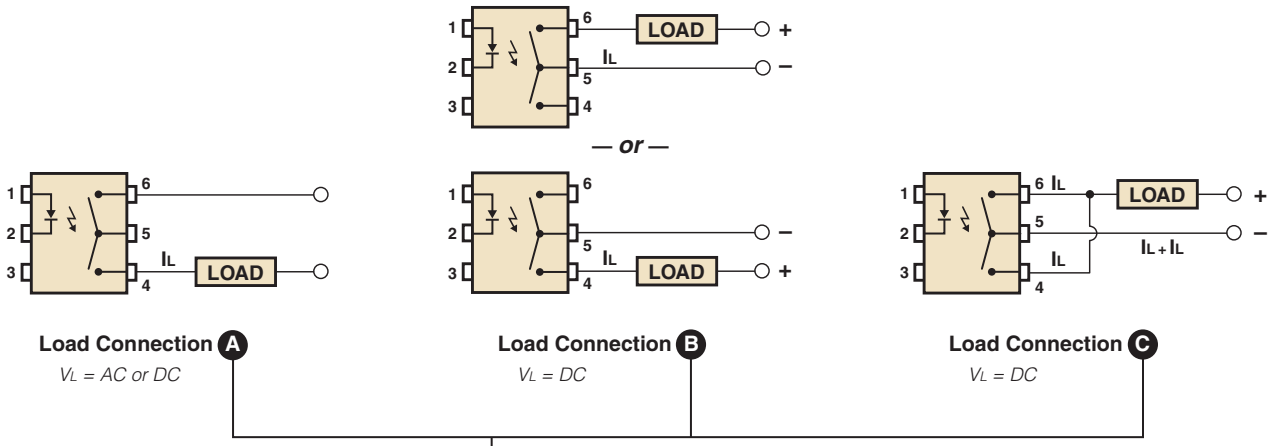
NEC Solid State Relays for Power and Industrial Applications

In power and industrial applications, 6 pin SSRs can be configured to switch loads in a variety of ways. The *Maximum Load Current* specifications in the tables below are provided for these configurations:



Package	Part Number	Form	Max. Load Current IL (mA)	Max. Load Voltage VL (V)	Typical Ratings RON Ω	COUT (pF) Norm. Open	COUT (pF) Norm. Closed	tON (ms)	tOFF (ms)	Safety Certification
Single Channel, 1500 Vr.m.s. Breakdown Voltage										
DIP6 Thru-Hole SMT DIP6 Gull Wing	**PS710A-1A** **PS710AL-1A**	A	A 1800 B 2000 C 3600	60	0.1	320	—	1.0	0.05	UL, BSI, CSA
DIP6 Thru-Hole SMT DIP6 Gull Wing	**PS710B-1A** **PS710BL-1A**	A	A 2500 B 3500 C 5000	60	0.05	500	—	2.5	0.05	UL
SMT DIP6 Gull Wing[1]	**PS710CL2-1A**	A	A 2000 B 3000 C 4000	60	0.1	320	—	1.0	0.05	Call
DIP6 Thru-Hole SMT DIP6 Gull Wing	**PS710E-1A** **PS710EL-1A**	A	A 2000 B 3000 C 4000	80	0.083	480	—	1.0	0.02	UL
DIP6 Thru-Hole SMT DIP6 Gull Wing	**PS7113-1A** **PS7113L-1A**	A	A 350 B 450 C 700	100	0.9	250	—	1.3	0.06	UL, BSI
DIP6 Thru-Hole SMT DIP6 Gull Wing	**PS7160-1A** **PS7160L-1A**	A	A 90 B 130 C 200	600	42	110	—	0.8	0.06	UL, BSI, CSA
SOP4	**PS7205B-1A**	A	500	80	0.9	30	—	0.18	0.04	Call
SOP4	**PS7206-1A**	A	600	60	0.6	70	—	0.4	0.08	UL
SOP4	**PS7214-1A**	A	400	100	1.0	120	—	1.3	0.1	UL
Dual Channel, 1500 Vr.m.s. Breakdown Voltage										
DIP8 Thru-Hole SMT DIP8 Gull Wing	**PS7113-2A** **PS7113L-2A**	A	A 350 B 450 C 700	100	0.9	250	—	1.3	0.06	UL, BSI, CSA
DIP8 Thru-Hole SMT DIP8 Gull Wing	**PS7160-2A** **PS7160L-2A**	A	A 90 B 130 C 200	600	42	110	—	0.8	0.06	UL, BSI, CSA
Single Channel, 3750 Vr.m.s. Breakdown Voltage										
DIP6 Thru-Hole SMT DIP6 Gull Wing	**PS7360-1A** **PS7360L-1A**	A	A 90 B 130 C 200	600	41	110	—	0.6	0.03	UL, BSI, CSA

NOTES: 1. SMT DIP6 Gull Wing package with #2 and #5 pins clipped, see data sheet.

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NEC Solid State Relays for Telecom Applications

Max Load Current specified using Load Connection Ⓐ (page 7) See individual data sheets for specifications for Load Connections Ⓑ & Ⓒ

Package	Part Number	Form	Isolation Voltage BV (Vr.m.s.)	Max. Load Current IL (mA)	Typical Ratings					Safety Certification
					RON Ω	COUT (pF)		tON (ms)	tOFF (ms)	
						Norm. Open	Norm. Closed			
Single Channel, 250V Load Voltage										
DIP6 Thru-Hole	**PS7122A-1A**	A	1500	200	4.5	120	—	0.04	0.5	UL, BSI, CSA
SMT DIP6 Gull Wing	**PS7122AL-1A**	A								
DIP6 Thru-Hole	**PS7122A-1B**	B	1500	200	4.5	—	340	0.04	0.5	UL, BSI, CSA
SMT DIP6 Gull Wing	**PS7122AL-1B**	B								
Two Channel, 250V Load Voltage										
DIP8 Thru-Hole	**PS7122A-2A**[1]	A	1500	200	4.5	120	—	0.04	0.5	UL, BSI, CSA
SMT DIP8 Gull Wing	**PS7122AL-2A**[1]	A								
SOP8	**PS7221A-2A**	A	1500	260	3.4	122	—	0.4	0.3	UL
DIP8 Thru-Hole	**PS7122A-2B**[1]	B	1500	200	4.5	—	340	0.04	0.5	UL, BSI, CSA
SMT DIP8 Gull Wing	**PS7122AL-2B**[1]	B								
DIP8 Thru-Hole	**PS7122A-1C**[1]	C	1500	200	4.5	120	340	0.5/0.04	0.04/0.5	UL, BSI, CSA
SMT DIP8 Gull Wing	**PS7122AL-1C**[1]	C								
Single Channel, 400V Load Voltage										
DIP6 Thru-Hole	**PS7141E-1A**[2]	A	1500	120	37	36	—	0.5	0.07	UL, BSI
SMT DIP6 Gull Wing	**PS7141EL-1A**[2]	A								
DIP6 Thru-Hole	**PS7142-1A**	A	1500	200	6	225	—	0.8	0.02	UL, BSI, CSA
SMT DIP6 Gull Wing	**PS7142L-1A**	A								
SOP4	**PS7241E-1A**[2]	A	1500	120	22	18	—	0.5	0.07	UL, BSI, VDE
DIP6 Thru-Hole	**PS7341-1A**	A	3750	150	20	65	—	0.35	0.03	UL, BSI, CSA
SMT DIP6 Gull Wing	**PS7341L-1A**	A								
DIP6 Thru-Hole	**PS7341C-1A**[3]	A	3750	120	27	63	—	0.55	0.07	UL, BSI, CSA, VDE
SMT DIP6 Gull Wing	**PS7341CL-1A**[3]	A								
DIP6 Thru-Hole	**PS7342-1A**	A	3750	200	6	225	—	1.2	0.06	UL, BSI, CSA, VDE
SMT DIP6 Gull Wing	**PS7342L-1A**	A								
SOP4	**PS7431-1A**	A	3000	120	24	35	—	0.8	0.07	UL, BSI, CSA, VDE
DIP6 Thru-Hole	**PS7141-1B**	B	1500	150	20	—	185	0.02	0.2	UL, BSI, CSA
SMT DIP6 Gull Wing	**PS7141L-1B**	B								
DIP6 Thru-Hole	**PS7142-1B**	B	1500	200	7	—	360	0.03	1.1	UL, BSI, CSA
SMT DIP6 Gull Wing	**PS7142L-1B**	B								
SOP4	**PS7241E-1B**[2]	B	1500	120	22	—	206	0.07	1.0	UL, BSI, VDE
DIP6 Thru-Hole	**PS7341-1B**	B	3750	150	20	—	185	0.03	0.6	UL, BSI, CSA, VDE
SMT DIP6 Gull Wing	**PS7341L-1B**	B								
Two Channel, 400V Load Voltage										
DIP8 Thru-Hole	**PS7141-2A**	A	1500	150	20	65	—	0.35	0.06	UL, BSI, CSA
SMT DIP8 Gull Wing	**PS7141L-2A**	A								
DIP8 Thru-Hole	**PS7141C-2A**[3]	A	1500	120	26	65	—	0.6	0.03	UL, BSI, CSA
SMT DIP8 Gull Wing	**PS7141CL-2A**[3]	A								
DIP8 Thru-Hole	**PS7142-2A**	A	1500	200	7.5	140	—	0.5	0.03	UL, BSI
SMT DIP8 Gull Wing	**PS7142L-2A**	A								
SOP8	**PS7241-2A**	A	1500	120	21	65	—	0.2	0.02	UL, BSI
DIP8 Thru-Hole	**PS7141-2B**	B	1500	150	20	—	185	0.02	0.2	UL, BSI, CSA
SMT DIP8 Gull Wing	**PS7141L-2B**	B								
DIP8 Thru-Hole	**PS7142-2B**	B	1500	200	7	—	430	0.03	1.1	UL, BSI
SMT DIP8 Gull Wing	**PS7142L-2B**	B								
SOP8	**PS7241-2B**	B	1500	120	21	—	185	0.02	0.1	UL, BSI, CSA
DIP8 Thru-Hole	**PS7141-1C**	C	1500	150	20	65	185	0.33/0.02	0.03/0.2	UL, BSI, CSA
SMT DIP8 Gull Wing	**PS7141L-1C**	C								
DIP8 Thru-Hole	**PS7142-1C**	C	1500	200	8	140	430	0.3/0.03	0.03/2.0	UL, BSI, CSA
SMT DIP8 Gull Wing	**PS7142L-1C**	C								
SOP8	**PS7241-1C**	C	1500	120	21	65	185	0.2/0.02	0.02/0.1	UL, BSI, CSA, VDE

NOTES: 1. High Voltage/Low Capacitance Relay 2. High Linearity Relay 3. Current Limiting Relay

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NEC Solid State Relays for ATE and Instrumentation

Low CxR, miniature SOP and Mini Flat-Lead packages

Package	Part Number	Form	Max. Load Current I_L (mA)	Max. Load Voltage V_L (V)	Typical Ratings					Safety Certification
					R_{ON} Ω	C_{OUT} (pF)		t_{ON} (ms)	t_{OFF} (ms)	
						Norm. Open	Norm. Closed			
Single Channel, 500 V r.m.s. Breakdown Voltage										
4 Pin Mini Flat-Lead	**PS7801-1A**	A	100	40	11.5	1.2	—	0.02	0.15	UL
4 Pin Mini Flat-Lead	**PS7801C-1A**	A	80	30	13	0.5	—	0.01	0.1	UL
4 Pin Mini Flat-Lead	**PS7801D-1A**	A	120	40	12	0.6	—	0.01	0.1	UL
4 Pin Mini Flat-Lead	**PS7801E-1A**	A	150	40	1.8	5.0	—	0.01	0.1	UL
4 Pin Mini Flat-Lead	**PS7801J-1A**	A	160	20	2.2	1.3	—	0.05	0.03	UL
4 Pin Mini Flat-Lead	**PS7801K-1A**	A	40	80	17.5	1.6	—	0.01	0.1	UL
4 Pin Mini Flat-Lead	**PS7801M-1A**[1]	A	160	20	3.3	0.95	—	0.05	0.03	UL
4 Pin Mini Flat-Lead	**PS7801P-1A**[1]	A	150	40	1.8	5	—	0.3	0.05	Call
4 Pin Mini Flat-Lead	**PS7802-1A**	A	250	40	1.1	11.5	—	0.1	0.08	UL
4 Pin Mini Flat-Lead	**PS7802A-1A**	A	250	40	1.1	11.5	—	0.05	0.05	UL

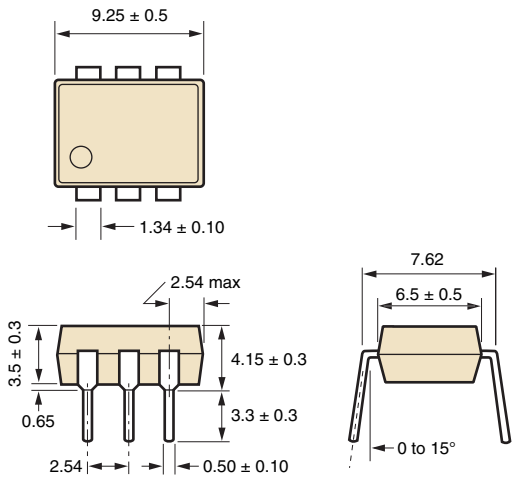
NOTES: 1. New products, available Fall 2008

Single Channel, 1500 V r.m.s. Breakdown Voltage										
SOP4	**PS7200A-1A**	A	100	40	9.3	3.0	—	0.01	0.07	UL, BSI, CSA, VDE
SOP4	**PS7200B-1A**	A	250	40	1.0	32	—	0.05	0.02	UL, BSI, CSA
SOP4	**PS7200E-1A**	A	250	40	0.8	33.5	—	0.48	0.15	Call
SOP4	**PS7200H-1A**	A	160	40	2.2	4.2	—	0.04	0.25	Call
SOP4	**PS7200K-1A**	A	200	40	1.1	9.6	—	0.1	0.1	UL, BSI, CSA
SOP4	**PS7200R-1A**	A	120	40	10	1.1	—	0.03	0.3	UL, BSI
SOP4	**PS7200U-1A**[1]	A	40	80	17	2.3	—	0.07	0.15	UL, VDE

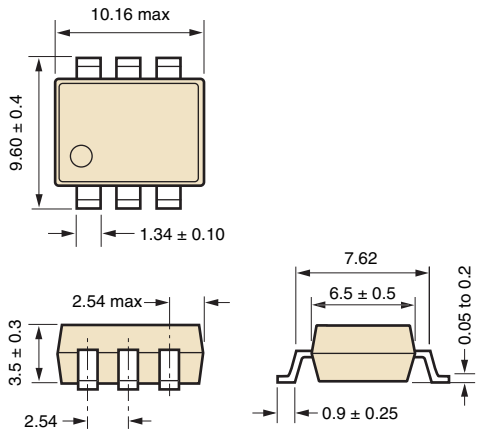
NOTES: 1. High Voltage/Low Capacitance Relay

NEC Solid State Relay Packages *Dimensions in millimeters. Dimensions are nominal. Please refer to data sheets.*

DIP6 Thru-Hole



SMT DIP6 Gull Wing



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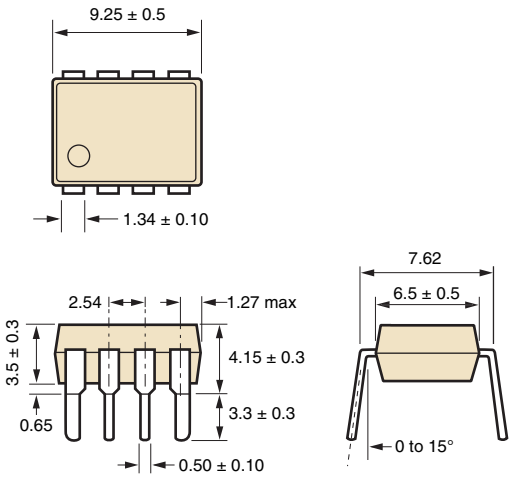
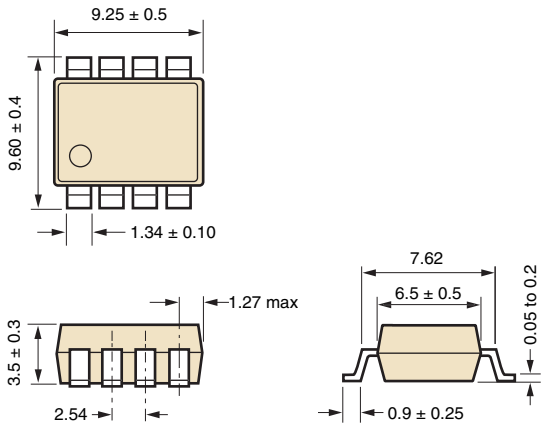
NEC Solid State Relay Packages

Dimensions in millimeters. Dimensions are nominal. Please refer to data sheets.

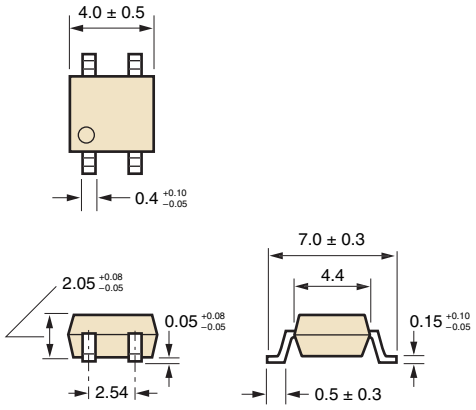
DIP8 Thru-Hole



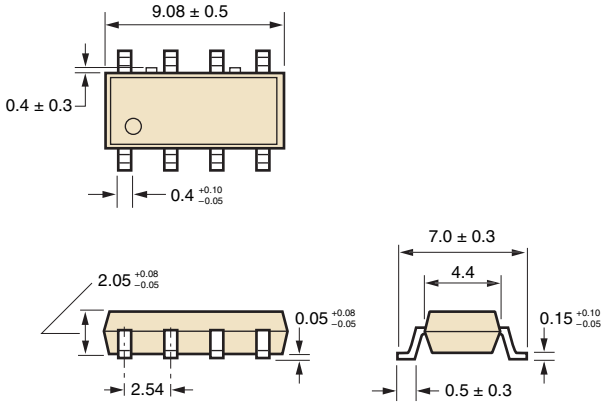
SMT DIP8 Gull Wing



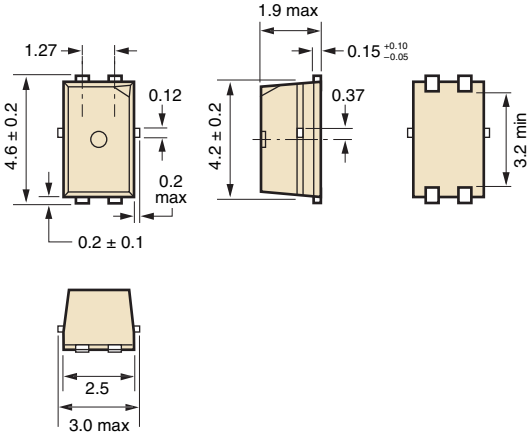
SOP4



SOP8



4 Pin Mini Flat-Lead



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