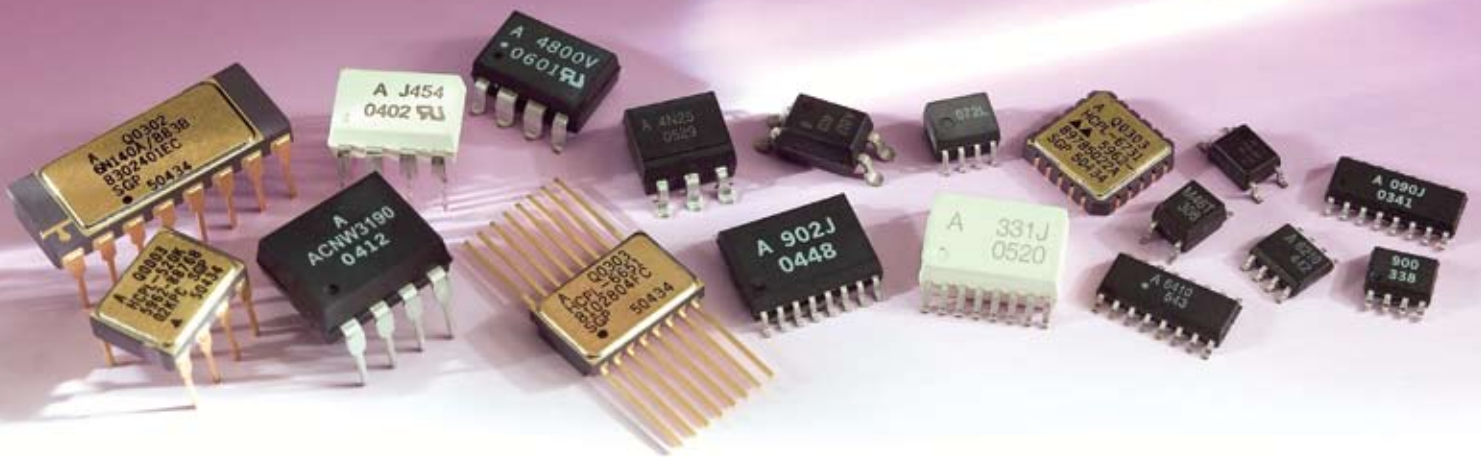


Optoisolation Products



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Avago Technologies offers the industry's best isolation technology along with the industry's leading CMR performance

Avago Technologies optocouplers can be used in an array of isolation applications ranging from power supply and motor control circuits to data communications and digital logic interface circuits.

The primary purpose of an optocoupler is to provide both electrical insulation and signal isolation. The popularity of Avago Technologies optocouplers is due to cost effective innovations in these areas.

Optocouplers eliminate the effects of electrical noise caused by crosstalk, power glitches and electrical interference. They provide high voltage isolation allowing safe interface between high and low voltages in electrical circuits. They are also used for shifting logic levels. Avago Technologies' key products include optocouplers with phototransistor output, digital and analog output, high speed and high gain performance, drivers for isolated gate transistors and intelligent power modules, smart current sensors, solid state relay (Photo MOSFET) and other application specific devices.

Avago Technologies offers the industry's best isolation technology along with the industry's leading CMR performance of up to $40 \text{ kV}/\mu\text{s}$ in a broad line of packages. Products include the lowest power dissipation with input current as low as $40 \mu\text{A}$, high speed digital optocouplers operating at up to 50 MBd , propagation delays as low as 22 ns , 3.3 V JEDEC compatible optocouplers. Avago Technologies' optocouplers are manufactured with high quality and reliability and have worldwide safety approvals including the highest maximum insulation voltage (V_{IORM}) at 1414 V (per IEC/EN/DIN EN 60747-5-2).



Avago Technologies offers a broad range of isolation products that provide performance features and benefits that are unmatched in the industry for industrial, computing, consumer, communication, medical, military and aerospace markets.

Applications for Avago Technologies' Isolation Products

Industrial

The widest portfolio of optocouplers to meet the extensive requirements of applications in factory automation.

- Automated test equipment
- Fieldbus
- Industrial communications
- Industrial networking
- Motor control
- PLC input/output isolation
- Power distribution systems
- Power generation
- Robotics
- Switching panel
- Switching power supplies
- Test and measurement equipment

Automotive

Avago Technologies automotive wide temperature optocouplers are AEC-Q100 qualified with applications in:

- Automotive and shipboard system CANBus interface isolation
- IPM motor inverter drives
- IPM DC-DC converters/ inverters for battery chargers
- Battery/inverter voltage monitoring

Medical

Avago Technologies offers optocouplers with high linearity and high resolution for severe isolation requirements to:

- Defibrillators
- ECG/EKG
- Endoscopes
- Magnetic resonance imaging
- Patient monitoring

Computers and Office Equipment

Avago Technologies' optocouplers with CMOS compatibility and high speed are used to provide interface isolation for:

- Isolated input/output module
- Isolated USB hub
- Printers and plotters

Communications

Avago Technologies provides high speed optocouplers in both single and dual surface-mount packages which are used in:

- Automated metering reading
- Digital cross connect
- Distributed power architecture
- ISDN
- Modems
- PBX and central office

- Power line communication
- Power over ethernet
- Telephone switching equipment
- Telephone terminal equipment
- Wireless base station

Consumer Electronics

Avago Technologies offers lower solution costs with highly integrated optocouplers for many consumer applications, such as:

- Air conditioning
- Alarm systems
- Audio and video equipment
- Electronic gaming
- Fitness equipment
- Induction cookers
- Plasma displays
- Washing machines

Military and Aerospace

Avago Technologies' high reliability optocouplers are suitable for military and aerospace applications such as:

- Aircraft, satellite and space systems
- Communications
- Computers
- Test systems
- Defense systems

Quick Guide to Direct Upgrades

Upgrade Part	Feature	Benefit
High Voltage Insulation		
Improved Isolation/Insulation Ability to protect surrounding circuitry against physical damages resulting from differential voltages.	HCNW family offers highest available working voltage ratings with regulatory approval per IEC/EN/DIN EN 60747-5-2 of 1414 V peak .	Meets international safety regulations and standards. Provides better isolation and overall safety performance.
Noise Isolation		
High CMR Common-mode transient rejection or signal isolation of data through suppression of noise transients.	Offers guaranteed CMR performance up to 40 kV/μs which is the highest available in the market.	Improves system performance, and reliability . More robust systems and better data integrity meet EMI and ESD requirements.
Power Consumption		
Drive Current, I_f Low Drive Current, LED drive current.	Offers the lowest I_f (up to 40 μA) devices in the market and broadest HCMOS compatibility.	Eliminates additional LED drive circuitry . Improves system efficiency and reduces power consumption and LED degradation.
Lower Power Supply Lower power supply (3.3V)	Lower the power consumption and meets JEDEC low voltage requirements.	Up to 50% energy saving.
Flexible Supply Voltages (3.3V/5V)	Support a combination of two different supply voltages at the input and output.	Built-in internal level shifter , eliminate the need of extra power supply. 3.3V or 5V. 3.3V helps to improve the overall power consumption.
Temperature		
Temperature The DC, speed performance and the reliability information is ensured at the specific temperature range.	Support up to -40°C to 125°C temperature range.	Allow extreme temperature operation.
Speed Benefits		
Propagation Delay, t_p Describes how quickly a logic signal can propagate through the system.	High speed digital optocouplers to meet wide range of applications with t_p as low as 22 ns .	Increase switching efficiency and better speed performance.
Upgrade Pulse Width Distortion, PWD PWD is the difference between t _{PHL} and t _{PLH} and often determines the maximum data rate capability of a transmission system.	The lowest PWD offered by optocoupler is 2 ns .	To ensure signal data integrity over long bus line.
Package and Space Savings		
Multi-Channels, Bi-directional Features	Integrated dual, triple, quad with bi-directional channels offers in small S08 and S016 package.	The integrated bi-directional channels help in space savings and ease of designs.
Surface Mount Device SMD permits more component density than DIP.	Smaller package to deliver the same functionality as standard DIP. True surface mount technology and standard footprint.	Lower assembly cost , easier and faster handling as well as better solderability.
8mm Clearance/Creepage (C/C) Packages	The package is 50% smaller than conventional DIP package. It can withstand high isolation voltages and meet regulatory requirements such as IEC/UL/CSA standards.	Provides space savings . Allows high voltage surge protection. Meets many IEC/UL/CSA equipment standards that call for clearance and creepage of 8mm .
Smaller S05 Package	Smaller S05 package (as compared to existing S0-8 package)	Provides greater than 40% space savings .

Digital Optocouplers

Existing Parts	Upgrade Parts	Upgrade Features	Footprint Information
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High Speed Family (>12.5MBd)

HCPL-0708	ACPL-071L [^]	<ul style="list-style-type: none"> Flexible supply voltages (3.3V/5V) Lower Propagation Delay (<40ns) Wide temperature (-40°C to 105°C) Glitch-Free Output 	Drop-in replacement
HCPL-0738	ACPL-074L [^]	<ul style="list-style-type: none"> Flexible supply voltages (3.3V/5V) Lower Propagation Delay (<40ns) Wide temperature (-40°C to 105°C) Glitch-Free Output 	Drop-in replacement
HCPL-0708	ACPL-M75L [^]	<ul style="list-style-type: none"> Flexible supply voltages (3.3V/5V) Lower Propagation Delay (<40ns) Wide temperature (-40°C to 105°C) Glitch-Free Output 	Smaller footprint
HCPL-2400	ACPL-W70L [^]	<ul style="list-style-type: none"> Flexible supply voltages (3.3V/5V) Lower Propagation Delay (<40ns) Wide temperature (-40°C to 105°C) Smaller 8mm C/C package (Stretched S06) Glitch-Free Output Lower Speed (15MBd)* 	Smaller footprint
HCPL-2430	ACPL-K73L [^]	<ul style="list-style-type: none"> Flexible supply voltages (3.3V/5V) Lower Propagation Delay (<40ns) Wide temperature (-40°C to 105°C) Smaller 8mm C/C package (Stretched S08) Glitch-Free Output Lower Speed (15MBd)* 	Smaller footprint
HCPL-0710/20/21	ACPL-072L	<ul style="list-style-type: none"> Flexible supply voltages (3.3V/5V) Wide temperature (-40°C to 105°C) Lower PWD (<6ns) 	Drop-in replacement
HCPL-7710/20/21	ACPL-772L	<ul style="list-style-type: none"> Flexible supply voltages (3.3V/5V) Wide temperature (-40°C to 105°C) Lower PWD (<6ns) 	Drop-in replacement

10MBd Family

HCPL-M600/01/11	ACPL-M60L	<ul style="list-style-type: none"> Flexible supply voltages (3.3V/5V) 	Drop-in replacement
HCPL-0600/01/11/1A/1N	ACPL-M60L	<ul style="list-style-type: none"> Flexible supply voltages (3.3V/5V) Smaller package (S05) 	Smaller footprint
HCPL-2601/11/1A/1N HCPL-260L HCPL-7601/11	ACPL-W60L	<ul style="list-style-type: none"> Flexible supply voltages (3.3V/5V) Smaller package (Stretched S06) 	Smaller footprint
HCPL-2630/31/3A/3N HCPL-260L HCPL-4661	ACPL-K63L	<ul style="list-style-type: none"> Flexible supply voltages (3.3V/5V) Smaller package (Stretched S08) 	Smaller footprint
HCPL-2601/11/1A/1N HCPL-7601/11	ACPL-P611 ACPL-W611	<ul style="list-style-type: none"> Smaller Stretched package (Stretched S06) 	Smaller footprint
HCPL-0600/01/11/1A/1N HCPL-M600/01/11 HCPL-2601/11/1A/1N HCPL-260L/3L HCPL-0630/31/3A/3N/61 HCPL-2630/31/3A/3N HCPL-4661 HCPL-7601/11	ACSL-6210/6300/6310/6400/6410/6420	<ul style="list-style-type: none"> Multi-channel, bidirectional Wide temperature (-40°C to 100°C) Flexible supply voltages (3.3V/5V) 	Smaller footprint
HCPL-M611	ACPL-M61U [^]	<ul style="list-style-type: none"> Wide temperature (-40°C to 125°C) Low LED input drive current I_F=10mA 	Drop-in replacement

Existing Parts	Upgrade Parts	Upgrade Features	Footprint Information
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Powerline Communication Interface

HCPL-0810 / 8100	ACPL-0820	<ul style="list-style-type: none"> Improved dual channel line driver (S08) Transmit voltage up to 7Vpp, and higher driving current of up to 1.5App. 	Pin layout change Smaller footprint
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Miniature Analog Isolation Amplifier

HCPL-7860 HCPL-786J	ACPL-7873 [^]	<ul style="list-style-type: none"> Wide operating temperature (-40 to +105°C) Reduced output clock frequency range with better accuracy (10 MHz ±10%) Input offset voltage (1.5 mV max) Offset drift (1.5 μV/°C typ) 	Drop-in replacement (for HCPL-7860)
HCPL-7840	HCPL-7800A	• ±1% gain accuracy	Drop-in replacement
	HCPL-7800	• ±3% gain accuracy	Drop-in replacement
HCPL-7520	HCPL-7510	• ±3% gain accuracy	Drop-in replacement

Integrated Gate Drive Optocoupler

HCPL-3120	ACPL-H312	<ul style="list-style-type: none"> Smaller package size 8mm Creepage and 7mm Clearance Supply current Icc 3mA maximum 	Smaller footprint
HCPL-3120 HCPL-J312 HCNW3120	ACPL-3130 ACPL-J313 ACNW3130	• Very High CMR (40kV/μs)	Drop-in replacement
HCPL-3140 HCPL-0314 HCPL-J314	ACPL-P314 ACPL-W314	<ul style="list-style-type: none"> 50% smaller package size 8mm Creepage and Clearance (ACPL-W314) 	Smaller footprint
HCPL-3020 HCPL-0302	ACPL-P302 ACPL-W302	<ul style="list-style-type: none"> 50% smaller package size 8mm Creepage and Clearance (ACPL-W302) 	Smaller footprint
HCPL-316J	ACPL-332J ACPL-331J	<ul style="list-style-type: none"> Integrated Active Miller Clamp Lower Propagation Delay (<250ns) Low PWD (<100ns) Direct LED drive without Buffer 	Pin layout change
HCPL-3120 / HCPL-J312 / HCNW3120 + External Transistor Stage for Higher Current Output	ACNW3190	<ul style="list-style-type: none"> 5A maximum peak output current Wide temperature (-40°C to 100°C) 	Pin layout change

Intelligent Power Module Interface Optocoupler

HCPL-4502 HCPL-4503	ACPL-K453	<ul style="list-style-type: none"> 8 mm Creepage and Clearance 50% smaller package size 	Smaller footprint
HCPL-4504	ACPL-W454	<ul style="list-style-type: none"> 8 mm Creepage and Clearance 50% smaller package size 	Smaller footprint
	ACPL-P454	<ul style="list-style-type: none"> 8 mm Creepage 50% smaller package size 	Smaller footprint
HCPL-4506	ACPL-W456	<ul style="list-style-type: none"> 8 mm Creepage and Clearance 50% smaller package size 	Smaller footprint
	ACPL-P456	<ul style="list-style-type: none"> 8 mm Creepage 50% smaller package size 	Smaller footprint
ACPL-4800	ACPL-P480	<ul style="list-style-type: none"> 8 mm Creepage 50% smaller package size 	Smaller footprint

Existing Parts	Upgrade Parts	Upgrade Features	Footprint Information
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Intelligent Power Module Interface Optocoupler (continued)

HCPL-4502/03/04/06 HCPL-0452/53/54/66 HCPL-M452/3/4/6	ACPL-P480	<ul style="list-style-type: none"> • 8 mm Creepage • Higher CMR 20kV/μs • 5MBd speed • Totem-pole output, positive logic 	
HCPL-4502/03/04/06 HCPL-0452/53/54/66 HCPL-M452/3/4/6	ACPL-4800	<ul style="list-style-type: none"> • Higher CMR 30kV/μs • 5MBd speed • Totem-pole output, positive logic 	
HCPL-M453	ACPL-M43U [^]	<ul style="list-style-type: none"> • Wide temperature (-40°C to 125°C) • Low LED input drive current I_F=10mA 	Drop-in replacement
HCPL-M456	ACPL-M46U [^]	<ul style="list-style-type: none"> • Wide temperature (-40°C to 125°C) • Low LED input drive current I_F=10mA 	Drop-in replacement

General Purpose Phototransistor Optocoupler

HCPL-817	ACPL-827 ACPL-847	<ul style="list-style-type: none"> • Multi-channel. 2-ch and 4-ch 	Higher Integrations
HCPL-814	ACPL-824 ACPL-844	<ul style="list-style-type: none"> • Multi-channel. 2-ch and 4-ch 	Higher Integrations
HCPL-181/817	ACPL-217	<ul style="list-style-type: none"> • Smaller package (S04 half-pitch) • CMR 10kV/μs (typ) • Extended Industrial -55 to 110°C • Viso 3kVrms (1min) 	Smaller footprint
HCPL-354/814	ACPL-214	<ul style="list-style-type: none"> • Smaller package (S04 half-pitch) • CMR 10kV/μs (typ) • Extended Industrial -55 to 110°C • Viso 3kVrms (1min) 	Smaller footprint

Note:

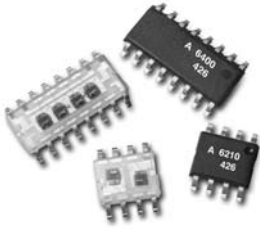
Drop-in replacement means no PCB board redesign is required.

Pin-to-Pin means the footprint is same but requires minimum PCB board redesign (eg. Removing of external resistor)

* Lower speed

[^] Advanced information, may subject to changes.

Optoisolation Products



Applications

- Full duplex communication
- Isolated line receiver
- Computer-peripheral interfaces
- Microprocessor system interfaces
- Digital isolation for A/D and D/A conversion
- Switching power supply
- Instrument input/output isolation
- Ground loop elimination
- Pulse transformer replacement

Multi-Channel Bi-Directional Digital Optocoupler

Description

The ACSL-6xx0 series are optoisolated, multi-channel and bidirectional, high-speed optocouplers. Integration of multiple optocouplers in monolithic form is achieved through patented process technology. These devices provide full duplex and bidirectional isolated data transfer and communication capability in compact surface mount packages. They are available in a 15Mbd speed option, wide supply voltage range and wide temperature range.

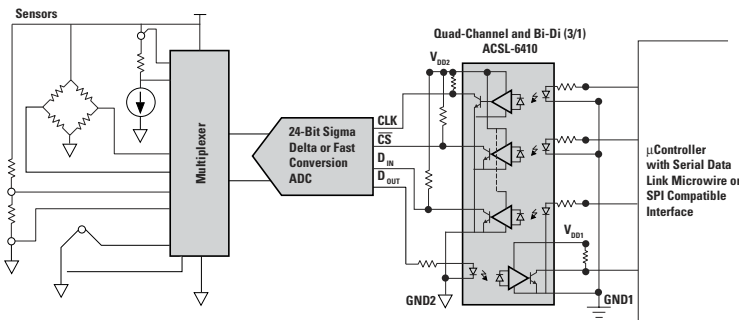
The isolated data acquisition system is ideal for digitizing the output of the sensors that operate in hostile environment. The ADC is a 24-bit sigma delta or fast conversion type, converts the analog voltage to a digital number. The digital number represents

the input voltage in discrete steps with finite resolution. The quad-channel and bi-directional, ACSL-6410, provides high CMR of 10kV/μs and electrical isolation of 2500Vrms between the host system and the data acquisition circuitry and sensors. The power supply is also isolated, usually via a transformer to isolate the AC line voltage from the DC voltages generated to power the data acquisition system.

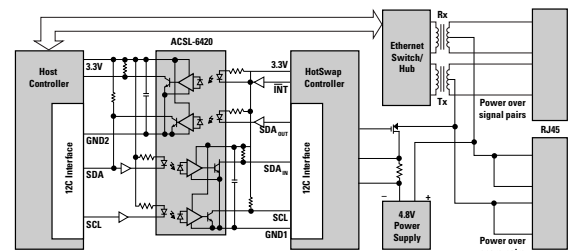
Benefits

- Higher integration - multi-channel provides small and thin packages for space savings; bi-directional channel facilitates PCB routing
- Wide voltage supply and temperature - provides design flexibility

Typical Block Diagram



Typical Power over Ethernet Diagram



Multi-Channel Bi-Directional Digital Optocoupler Product Selection

Part No.	Package	Channel	Forward Direction	Reverse Direction	I _{F(on)} mA Min.	t _{PLH} ns Max.	t _{PLH} ns Max.	P _{WD} ns Max.	t _{PSK} ns Max.	V _{CC} V Min.	V _{CC} V Max.	CMR - V/μs@V _{CM}		V _{ISO} V _{RMS} Min.	V _{ORM} V peak
												CMR V/μs (Min.)	V _{CM} V		
ACSL-6210-00RE NEW	S08	2	1	1	7	100	100	35	40	3	5.5	10000	1000	2500	560*
ACSL-6400-00TE NEW	S016	4	4	0	7	100	100	35	40	3	5.5	10000	1000	2500	560*
ACSL-6410-00TE NEW	S016	4	3	1	7	100	100	35	40	3	5.5	10000	1000	2500	560*
ACSL-6420-00TE NEW	S016	4	2	2	7	100	100	35	40	3	5.5	10000	1000	2500	560*
ACSL-6310-00TE NEW	S016	3	2	1	7	100	100	35	40	3	5.5	10000	1000	2500	560*
ACSL-6300-00TE NEW	S016	3	3	0	7	100	100	35	40	3	5.5	10000	1000	2500	560*

Notes:

* - with IEC/EN/DIN EN 60747-5-2 Option 060.

Optoisolation Products



Applications

- AC plasma display panel level shifting
- CAN Bus
- CC_Link
- Microprocessor system interface
- Multiplexed data transmission
- Switching power supply

High Speed Digital CMOS Logic Gate Optocoupler

Description

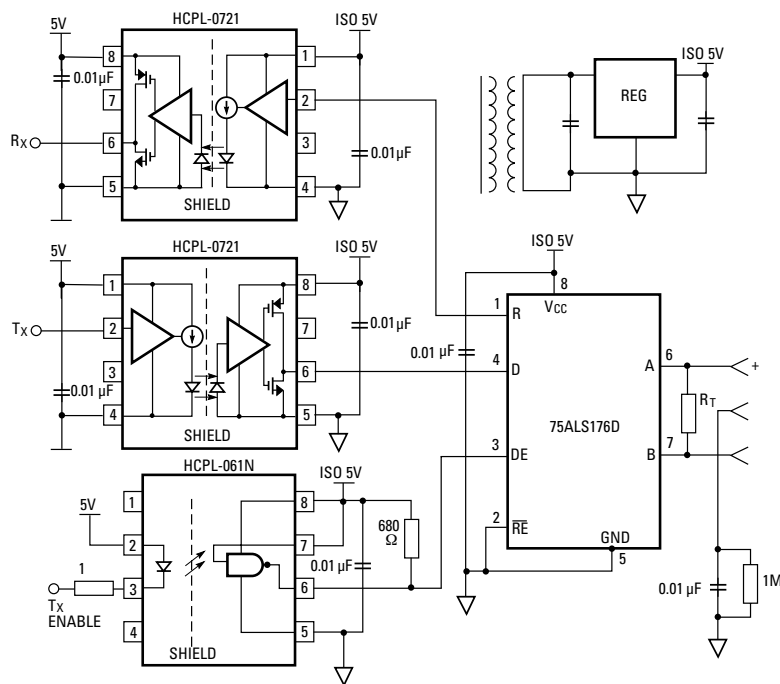
These optocouplers use the latest CMOS IC technology to achieve outstanding performance with very low power consumption. Serial fieldbuses are used today primarily as the communication system for the exchange of information between automation system and distributed field devices. PROFIBUS is the leading open fieldbus system and it has worldwide acceptance. PROFIBUS is essentially a twisted wire pair serial link that is very similar to RS 485. Profibus speed standard is either lower speed (1.5 MBd) or higher speed (12 MBd).

In this isolated multipoint transmission application circuit, two different optoisolators are utilized (HCPL-0721 and HCPL-061N). The benefits include low input drive current that maximizes LED lifetime/reliability and optimizes speed for Profibus and RS-485 applications.

Benefits

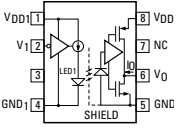
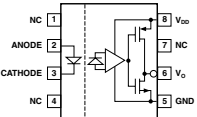
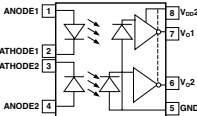
- High speed (up to 50 MBd)
- Wide temperature operation -40°C to 100°C (HCPL-x710)
- Low PWD (2ns) & low tp (22ns) to meet DeviceNet and Profibus application
- Buffer input and CMOS output to eliminate any pull-up resistor
- 5 kV isolation voltage (HCPL-77xx)
- Dual channel device is available to save space(HCPL-0738)
- Certified with reinforced insulation under IEC/EN/DIN EN 60747-5-2

Typical Profibus Block Diagram



Optoisolation Products

High Speed Digital CMOS Logic Gate Optocoupler Product Selection

Device	Part No.	Package	V _{DD} V	I _{F(on)} mA Min.	Max Data Rate MBd Min.	t _{PLH} ns Max.	t _{PHL} ns Max.	PWD ns Max.	t _{PSK} ns Max.	CMR - V/μs@V _{CM}		V _{ISO} V _{RMS} Min.	V _{IORM} V peak
										CMR V/μs (Min.)	V _{CM} V		
Single Channel CMOS Input 	HCPL-0710	S08	5	–	12.5	40	40	8	20	10000	1000	3750	560*
	HCPL-0720	S08	5	–	25	40	40	8	20	10000	1000	3750	560*
	HCPL-0721	S08	5	–	25	40	40	6	20	10000	1000	3750	560*
	HCPL-0723	S08	5	–	50	22	22	2	16	10000	1000	3750	560*
	HCPL-7710	300 mil DIP8	5	–	12.5	40	40	8	20	10000	1000	3750/5000 [#]	630*
	HCPL-7721	300 mil DIP8	5	–	25	40	40	6	20	10000	1000	3750/5000 [#]	630*
	HCPL-7720	300 mil DIP8	5	–	25	40	40	8	20	10000	1000	3750/5000 [#]	630*
	HCPL-7723	300 mil DIP8	5	–	50	22	22	2	16	10000	1000	3750/5000 [#]	630*
LED Input 	HCPL-0708	S08	5	10	15	60	60	30	40	10000	1000	3750	560*
Dual Channel LED Input 	HCPL-0738	S08	5	10	15	60	60	30	40	10000	1000	3750	560*

Notes:

* - with IEC/EN/DIN EN 60747-5-2 Option 060, [#] - with UL5000V_{RMS} / 1 minute Option 020

Optoisolation Products



20 Mbd Logic Gate Optocoupler

Description

These optocouplers have high data rate capability and low input current requirements. In analog-to-digital converters, designers should isolate the two portions of a circuit so that interference generated by digital switching and clock signals are not coupled to the analog section. The below figure demonstrates the ability of optocouplers to achieve isolation in a high speed parallel interface data communication application. Optocouplers reduce the channel distortion and thereby maximize the reliability of the circuit.

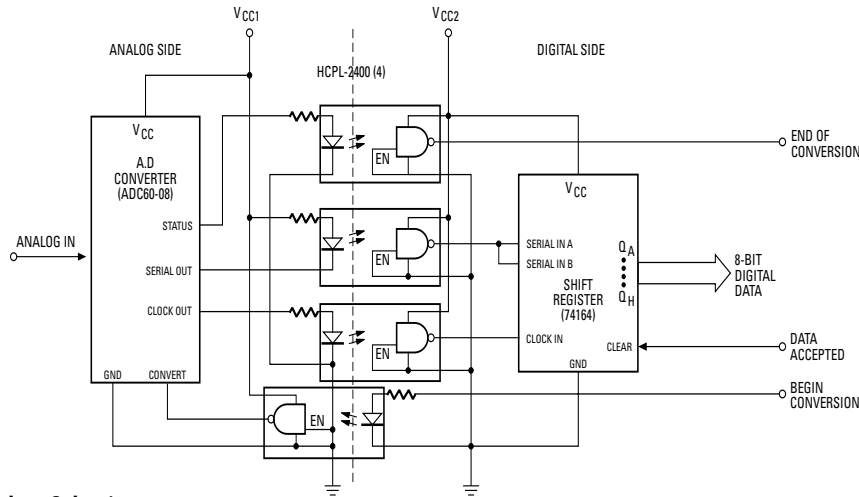
Benefits

- Totem pole & tri state output (with enable pin for HCPL-2400) to eliminate output pull-up resistors
- Certified with reinforced insulation under IEC/EN/DIN EN 60747-5-2, approved with $V_{iorm}=630V_{peak}$ (option 060)
- DIP-8 package (for min. 7mm creepage/clearance need) with $5kV V_{iso}$ protection (option 020)
- 2-channel for higher integration and space saving (HCPL-2430)

Applications

- Computer-peripheral interface
- High speed disk drive I/O
- Isolated bus driver (networking applications)
- Isolation of higher speed logic system
- Switching noise elimination

Typical Block Diagram



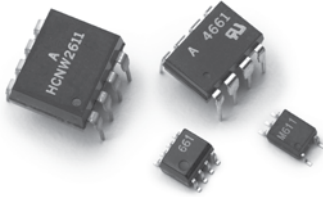
20 Mbd Logic Gate Optocoupler Product Selection

Device	Part No.	Package	$I_{F(on)}$ mA Min.	t_{PLH} ns Max.	t_{PLH} ns Max.	PWD ns Max.	t_{PSK} ns Max.	CMR - V/ $\mu s @ V_{CM}$		V_{ISO} V_{RMS} Min.	V_{IORM} V peak
								CMR V/ μs (Min.)	V_{CM} V		
Single Channel 	HCPL-2400	300 mil DIP8	4	60	60	25	35	1000	300	3750	630*
Dual Channel 	HCPL-2430	300 mil DIP8	4	60	60	25	35	1000	300	3750	630*

Notes:

* - with IEC/EN/DIN EN 60747-5-2 Option 060

Optoisolation Products



10 MBd Logic Gate Optocoupler

Description

This isolated RS-422 circuit uses two high-speed optocouplers that can switch up to 10 MBd signals. An isolated power supply V_{CC2} is required to power the DS 75176A driver/receiver integrated circuit.

The main benefit is preventing common-mode transients from interfering with the signal.

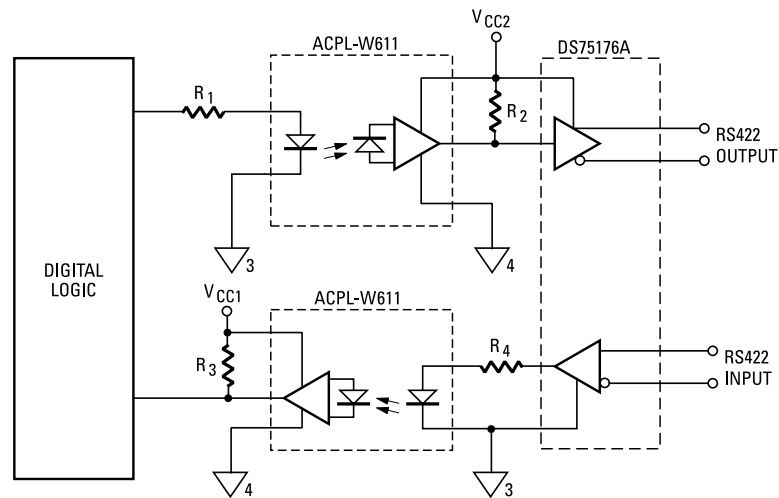
Benefits

- Provides high data rate transmission. It also offer high CMR for signal isolation from common mode transient noises

Applications

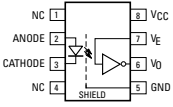
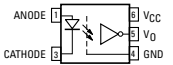
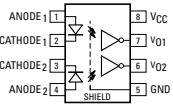
- Computer-peripheral interface
- Instrument input/output isolation
- Isolated line receiver
- Microprocessor system interface
- Switching power supply

Typical RS-422 Interface Block Diagram



Optoisolation Products

10 MBd Logic Gate Optocoupler Product Selection

Device	Part No.	Package	$I_{F(on)}$ mA Min.	t_{PLH} ns Max.	t_{PHL} ns Max.	PWD ns Max.	t_{PSK} ns Max.	CMR - V/ μ s@ V_{CM}		V_{ISO} V_{RMS} Min.	V_{IORM} V peak
								CMR V/ μ s (Min.)	V_{CM} V		
Single Channel 	ACPL-P611-000E NEW	Stretched SO6	5	100	100	35	40	10000	1000	3750/5000 [#]	891*
	ACPL-W611-000E NEW	Stretched SO6	5	100	100	35	40	10000	1000	3750/5000 [#]	1140*
	6N137	300 mil DIP8	5	100	100	35	40	1000	10	3750/5000 [#]	630*
	HCNW137	400 mil DIP8	5	100	100	40	40	5000	1000	5000	1414
	HCNW2601	400 mil DIP8	5	100	100	40	40	10000	1000	5000	1414
	HCNW2611	400 mil DIP8	5	100	100	40	40	15000	1000	5000	1414
	HCPL-061A	S08	3	100	100	45	60	1000	50	3750	560*
	HCPL-061N	S08	3	100	100	45	60	1000	1000	3750	560*
	HCPL-0600	S08	5	100	100	35	40	5000	1000	3750	560*
	HCPL-0601	S08	5	100	100	35	40	15000	1000	3750	560*
	HCPL-0611	S08	5	100	100	35	40	15000	1000	3750	560*
	HCPL-2601	300 mil DIP8	5	100	100	35	40	10000	1000	3750/5000 [#]	630*
	HCPL-2611	300 mil DIP8	5	100	100	35	40	15000	1000	3750/5000 [#]	630*
	HCPL-261A	300 mil DIP8	3	100	100	45	60	1000	50	3750/5000 [#]	630*
	HCPL-261N	300 mil DIP8	3	100	100	45	60	1000	1000	3750/5000 [#]	630*
	HCPL-7601	300 mil DIP8	2	100	120	55	75	1000	50	3750/5000 [#]	630*
HCPL-7611	300 mil DIP8	2	100	120	55	75	10000	1000	3750/5000 [#]	630*	
	ACPL-M61U-000E [^] NEW	S05	5	100	100	35	40	15000	1000	3750	—
	HCPL-M600	S05	5	100	100	35	40	—	—	3750	—
	HCPL-M601	S05	5	100	100	35	40	5000	50	3750	—
	HCPL-M611	S05	5	100	100	35	40	10000	1000	3750	—
Dual Channel 	HCPL-063A	S08	3	100	100	45	60	1000	50	3750	560*
	HCPL-063N	S08	3	100	100	45	60	15000	1000	3750	560*
	HCPL-0630	S08	5	100	100	35	40	5000	1000	3750	560*
	HCPL-0631	S08	5	100	100	35	40	10000	1000	3750	560*
	HCPL-0661	S08	5	100	100	35	40	15000	1000	3750	560*
	HCPL-263A	300 mil DIP8	3	100	100	45	60	1000	50	3750/5000 [#]	630*
	HCPL-263N	300 mil DIP8	3	100	100	45	60	15000	1000	3750/5000 [#]	630*
	HCPL-2630	300 mil DIP8	5	100	100	35	40	5000	1000	3750/5000 [#]	630*
	HCPL-2631	300 mil DIP8	5	100	100	35	40	10000	1000	3750/5000 [#]	630*
	HCPL-4661	300 mil DIP8	5	100	100	35	40	15000	1000	3750/5000 [#]	630*

Notes:

* - with IEC/EN/DIN EN 60747-5-2 Option 060, [#] - with UL 5000V_{RMS}/1 minute Option 020, [^] - Advanced information, may subject to changes.

Optoisolation Products



8 MBd Logic Gate Optocoupler

Description

The circuit shows a CMOS interface circuit for 8 MBd applications. Over the temperature range a CMOS CD4050 Hex Buffer can source about 0.7 mA (minimum), which is sufficient to drive the HCPL-2300 optocoupler. The 20 pF capacitor allows peaking currents to assist the LED in turning on and off quickly.

These optocouplers utilize a simple interface requiring low power consumption.

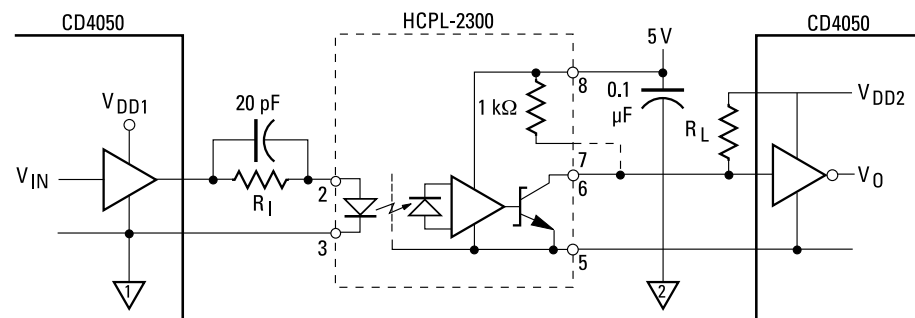
Benefits

- Offers low power consumption

Applications

- Computer-peripheral interface
- Digital isolation for A/D, D/A conversion
- High speed, long distance isolated line receiver
- Level shifting
- RS 232C interface

Typical CMOS Interface Block Diagram



V _{DD1} (V)	R ₁ (kΩ)	R _L (kΩ)	V _{DD2} (V)
5	5.11	1	5
10	13.3	2.37	10
15	19.6	3.16	15

8 MBd Logic Gate Optocoupler Product Selection

Device	Part No.	Package	I _{F(on)} mA Min.	t _{PLH} μs Max.	t _{PHL} μs Max.	CMR - V/μs@V _{CM}		V _{ISO} V _{RMS} Min.	V _{IORM} V peak
						CMR V/μs (Min.)	V _{CM} V		
	HCPL-0300	S08	0.5	0.16	0.2	100	50	3750	—
	HCPL-2300	300 mil DIP8	0.5	0.16	0.2	100	50	3750	630*

Notes:

* - with IEC/EN/DIN EN 60747-5-2 Option 060

Optoisolation Products



5 Mbd Logic Gate Optocoupler

Description

The circuit shown in the typical TTL interface block diagram is an interface between two TTL gates using an active output (totem pole) optocoupler, the HCPL-2201. A series switching circuit drives the optocoupler LED. The active output HCPL-2201 can be directly connected to a TTL gate, and no pull-up resistor is required. The HCPL-2201 can sink enough current to handle up to 16 LSTTL or 4 TTL loads.

Typically, the 5 Mbd logic gate optocoupler is used in the Isolated High-Low Gate Drive interface block diagram as shown below.

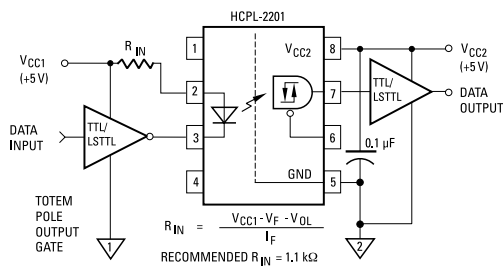
Benefits

- Pull up resistor not required at the optocoupler output
- Low power on the optocoupler input circuit
- Wide operating supply voltages up to 20V
- Built-in Schmitt Triggers for better signal integrity and accuracy in a noisy network/ circuits.

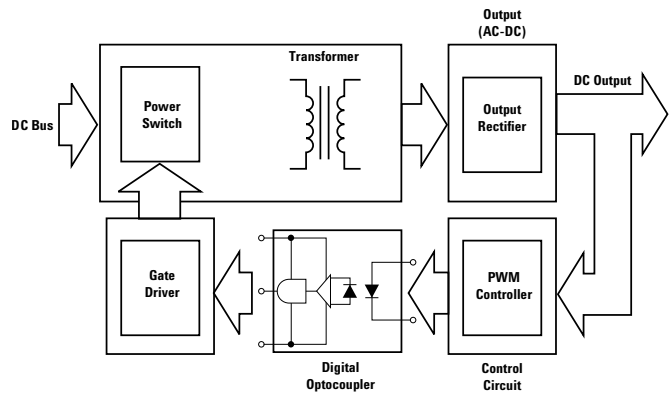
Applications

- Computer-peripheral interface
- Ground loop
- High speed line receiver
- Microprocessor system interface
- Pulse transformer replacement

Typical TTL Interface Block Diagram



Isolated High-Low Gate Drive Interface Block Diagram

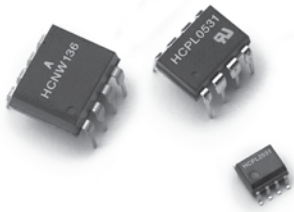


5 Mbd Logic Gate Optocoupler Product Selection

Device	Part No.	Package	I _{F(on)} mA Min.	t _{PLH} µs Max.	t _{PHL} µs Max.	CMR - V/µs@V _{CM}		V _{ISO} V _{RMS} Min.	V _{IORM} V peak
						CMR V/µs (Min.)	V _{CM} V		
	HCNW2201	400 mil DIP8	1.6	0.3	0.3	1000	50	5000	1414
	HCNW2211	400 mil DIP8	1.6	0.3	0.3	10000	1000	5000	1414
	HCPL-0201	S08	1.6	0.3	0.3	1000	50	3750	560*
	HCPL-0211	S08	1.6	0.3	0.3	10000	1000	3750	560*
	HCPL-2219	300 mil DIP8	1.6	0.3	0.3	2500	400	3750	630*
	HCPL-2200	300 mil DIP8	1.6	0.3	0.3	1000	50	3750	630*
	HCPL-2201	300 mil DIP8	1.6	0.3	0.3	1000	50	3750	630*
	HCPL-2211	300 mil DIP8	1.6	0.3	0.3	10000	1000	3750	630*
	HCPL-2202	300 mil DIP8	1.6	0.3	0.3	1000	50	3750	630*
	HCPL-2212	300 mil DIP8	1.6	0.3	0.3	10000	1000	3750	630*
	HCPL-2231	300 mil DIP8	1.8	0.3	0.3	1000	50	3750	—
HCPL-2232	300 mil DIP8	1.8	0.3	0.3	10000	1000	3750	—	

Notes: * - with IEC/EN/DIN EN 60747-5-2 Option 060

Optoisolation Products



1 Mbd Transistor Output Optocoupler

Description

The circuit in the level shifting/TTL interface block diagram shows how a 0 to 5 V logic signal can be level shifted to a -15 to 0 V signal. This circuit can safely be used for level shifting up to ± 800 V. The circuit uses an open collector output logic gate, the 74LS05, to drive the LED of the 6N135/6 optocoupler. The 6N135/6 also has an open collector output. The designer chooses R_{IN} to agree with the equation shown in the schematic. This equation sets the value of

the optocoupler LED forward current. The output of the 6N135/6 requires a pull-up resistor, R_L . The current-transfer ratio (CTR) of the optocoupler determines the maximum amount of current the optocoupler output can sink while maintaining the output voltage (between pins 5 and 6) of 0.5 V or less.

The benefit of the application is that it reduces the transient immunity problem and it is a convenient way of replacing the pulse transformer for high-voltage level shifting.

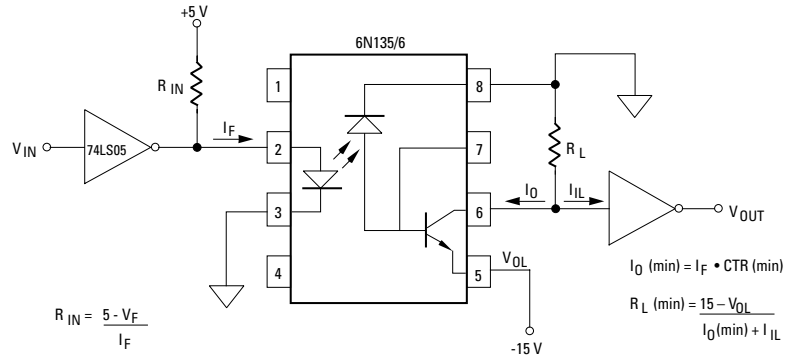
Benefits

- Allow level shifting capability
- High current transfer ratio

Applications

- Analog signal ground isolation
- High speed logic ground isolation
- Line receivers
- Replace pulse transformers
- Replace slow phototransistor isolators

Typical Level Shifting/TTL Interface Block Diagram



1 Mbd Transistor Output Optocoupler Product Selection

Device	Part No.	Package	$I_{F(on)}$ mA Min.	CTR			t_{PLH} μ s Max.	t_{PHL} μ s Max.	CMR - V/ μ s@ V_{CM}		V_{ISO} V_{RMS} Min.	V_{IORM} V peak
				% Min.	% Max.	I_F mA			CMR V/ μ s (Min.)	V_{CM} V		
	6N135	300 mil DIP8	16	7	50	16	2.0	2.0	1000	10	3750/5000 [#]	630*
	6N136	300 mil DIP8	16	19	50	16	1.0	1.0	1000	10	3750/5000 [#]	630*
	HCNW135	400 mil DIP8	16	5	—	16	2.0	2.0	1000	10	5000	1414
	HCNW136	400 mil DIP8	16	19	50	16	1.0	1.0	1000	10	5000	1414
	HCPL-0500	S08	16	7	50	16	2.0	2.0	1000	10	3750	560*
	HCPL-0501	S08	16	19	50	16	1.0	1.0	1000	10	3750	560*
	HCPL-2502	300 mil DIP8	16	15	22	16	0.8	0.8	—	—	3750/5000 [#]	—
	HCPL-2503	300 mil DIP8	8	15	—	8	2.5	1.5	—	—	3750/5000 [#]	—
	HCPL-0530	S08	16	7	50	16	2.0	2.0	1000	10	3750	—
	HCPL-0531	S08	16	19	50	16	1.0	1.0	1000	10	3750	—
	HCPL-2530	300 mil DIP8	16	7	50	16	2.0	2.0	1000	10	3750/5000 [#]	—
	HCPL-2531	300 mil DIP8	16	19	50	16	1.0	1.0	1000	10	3750/5000 [#]	—
	HCPL-2533	300 mil DIP8	8	15	—	8	2.5	1.5	—	—	3750	—

Notes:

* - with IEC/EN/DIN EN 60747-5-2 Option 060, [#] - with UL 5000V_{RMS}/1 minute Option 020

Optoisolation Products



100 kBd Darlington Transistor Output Optocoupler

Description

This differentially driven circuit can use up to eight 6N138 optocouplers at various receivers along the 90 m line. All stations are isolated. The first station would draw approximately 2.7 mA current, and the last station 1.8 mA of LED drive current. The output grounds of the optocoupler may be electrically separate.

The benefit of the application is its simple, low-cost, multidrop circuit for low signaling rates.

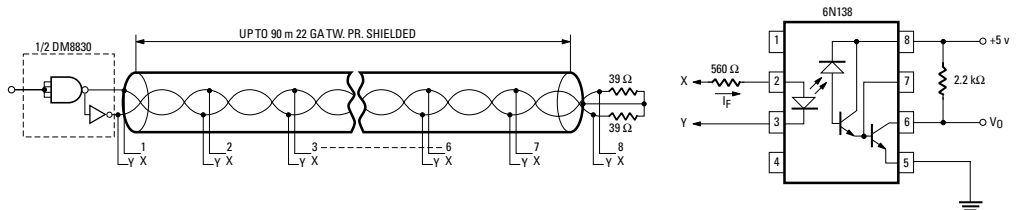
Benefits

- High CTR with low input current
- Low power consumption

Applications

- Digital logic ground isolation
- FIA RS-232C line receiver
- Low power systems and ground isolation
- Telephone ring detector

Typical Multidrop Line Receiver Block Diagram



100 kBd Darlington Transistor Output Optocoupler Product Selection

Device	Part No.	Package	I _{F(on)} mA Min.	CTR			CMR - V/μs@V _{CM}		V _{ISO} V _{RMS} Min.	V _{IORM} V peak
				% Min.	% Max.	I _F mA	CMR V/μs (Min.)	V _{CM} V		
	4N45	300 mil DIP6	0.5	200	1000	10	—	—	3750	630
	4N46	300 mil DIP6	0.5	200	1000	10	—	—	3750	630
	6N138	300 mil DIP8	0.5	300	2600	1.6	1000	10	3750/5000 [#]	—
	6N139	300 mil DIP8	0.5	400	5000	0.5	1000	10	3750/5000 [#]	630*
	HCNW138	400 mil DIP8	0.5	300	—	1.6	1000	10	5000	1414
	HCNW139	400 mil DIP8	0.5	400	—	0.5	1000	10	5000	1414
	HCPL-070A	S08	0.04	800	25000	0.04	1000	10	3750	560*
	HCPL-0700	S08	0.5	300	2600	1.6	1000	10	3750	560*
	HCPL-0701	S08	0.5	400	5000	0.5	1000	10	3750	560*
	HCPL-M700	S05	0.5	300	2600	1.6	1000	10	3750	—
	HCPL-M701	S05	0.5	400	3500	0.5	1000	10	3750	—
	HCPL-073A	S08	0.04	800	25000	0.04	1000	10	3750	—
	HCPL-0730	S08	0.5	400	5000	0.5	1000	10	3750	—
	HCPL-0731	S08	0.5	400	5000	0.5	1000	10	3750	—
	HCPL-2730	300 mil DIP8	0.5	400	5000	0.5	1000	10	3750/5000 [#]	—
	HCPL-2731	300 mil DIP8	0.5	400	5000	0.5	1000	10	3750/5000 [#]	—
HCPL-4731	300 mil DIP8	0.04	800	25000	0.04	1000	10	3750/5000 [#]	—	

Notes: * - with IEC/EN/DIN EN 60747-5-2 Option 060, # - with UL 5000V_{RMS}/1 minute Option 020

Optoisolation Products



Automotive Optocouplers

Description

Avago Technologies introduces a series of automotive optocouplers: ACPL-M43T and ACPL-M61T. These single channel, wide operating temperature, high CMR, high speed digital optocouplers in a five lead miniature footprint are specifically used in hybrid electric vehicle applications.

These digital optocouplers have an improved version of the light emitting diode for lower input driving current thus, providing longer LED operating lifetime, lower power consumption and higher efficiency over a -40°C to +125°C temperature range.

The typical circuit in the hybrid electric vehicle's motor inverter controller, DC-DC converter system, shows how the ACPL-M43T interfaces with the IPM module IGBT gate drive as well as fault detection isolation.

Most modern vehicles use communication media such as CANBus for data transmission and system control. In CANBus where transmission speed is up to 1Mbps, two 10MBd ACPL-M61T optocouplers in the CANBus interface are used for safe isolation such as in air-conditioner compressor controllers and battery management systems.

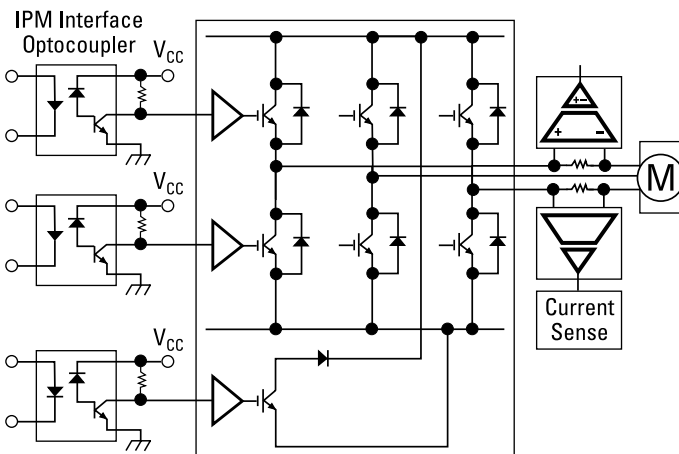
Benefits

- Wide operating temperature (-40°C to 125°C) meet AEC-Q100 guidelines
- High CMR (30 kV/μs at $V_{CM}=1kV$)
- High reliability suitable for automotive applications
- Low input LED drive current

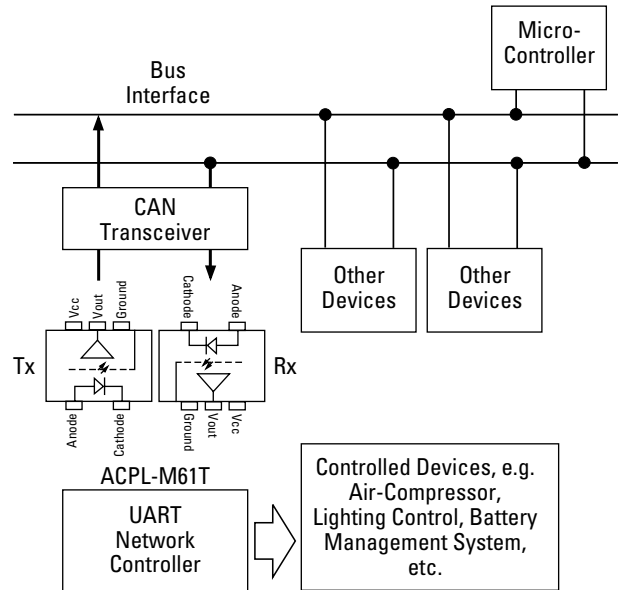
Applications

- Automotive IPM driver for DC-DC converters and motor inverters
- CANBus communications interface
- High temperature digital/analog signal isolation
- Power transistor isolation
- Automotive CANBus communications interface
- High temperature digital signal isolation
- Micro-controller interface
- Digital isolation for A/D, D/A conversion

Typical Intelligent Power Module Block Diagram

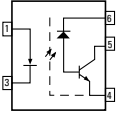
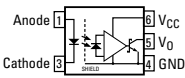


Automotive CANBus Block Diagram

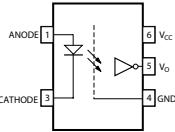


Optoisolation Products

Automotive 1MBd Transistor Output Optocoupler Product Selection

Device	Part No.	Package	Operating Temperature °C	I _F mA	CTR		t _{PLH} μs Max.	t _{PHL} μs Max.	CMR - V/μs@V _{CM}		V _{ISO} V _{RMS} Min.	V _{IORM} V peak
					% Min.	% Max.			CMR V/μs (Min.)	V _{CM} V		
Single Channel 	ACPL-M43T-000E NEW	S05	-40 to 125	10	32	80	1.0	1.0	15000	1500	3750	—
Anode Cathode 	ACPL-M46T-000E NEW	S05	-40 to 125	10	44	90	0.55	0.55	15000	1500	3750	—

Automotive 10MBd Logic Gate Optocoupler Product Selection

Device	Part No.	Package	Operating Temperature °C	I _{F(on)} mA Min.	t _{PLH} ns Max.	t _{PHL} ns Max.	PWD ns Max.	t _{PSK} ns Max.	CMR - V/μs@V _{CM}		V _{ISO} V _{RMS} Min.	V _{IORM} V peak
									CMR V/μs (Min.)	V _{CM} V		
Single Channel 	ACPL-M61T-000E NEW	S05	-40 to 125	5	100	100	35	40	15000	1000	3750	—

Optoisolation Products



3.3 V Digital Optocoupler Family

Description

Avago Technologies introduces a family of 3.3 V optocouplers that will ensure superior isolation performance for your low voltage designs.

Using Avago optocouplers for your design eliminates the need for using additional level shifting circuitry, and sacrificing board space and power consumption. All these factors contribute to a seamless integration of your design that is cost effective and in line with industry trends of moving away from the 5 V standard to lower voltage standards.

Avago's new range of 3.3 V optocouplers are the first commercially available optocouplers designed to meet the JEDEC specification for 3.3 V LVTTTL/LVCMOS logic, thereby simplifying the implementation of isolation in systems utilizing 3.3 V logic circuits.

These new optocouplers will provide not just a cost-effective solution, meeting all the requirements of isolation and insulation in 3.3 V systems, it will also provide the additional benefits of higher data rates and lower power supply requirements.

Avago Technologies' 3.3 V technology is available in the widest range of package platform offerings including dual channel and single channel versions in both standard DIP and SMT(SO8) packages.

Applications

- Computer peripheral interface
- Digital isolation for A/D, D/A conversion
- Digital logic ground isolation
- Inter-integrated Chip (I²C) control bus
- Line receivers
- LVTTTL/LVCMOS interface
- Power over ethernet
- Pulse transformer replacement

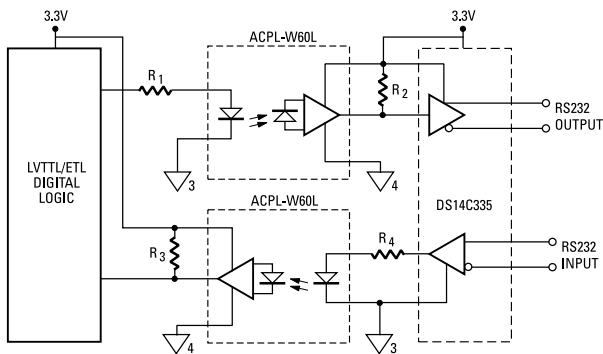
The typical TIA/EIA-232-E interface block diagram illustrates an RS232-E driver/receiver interface that uses HCPL-260L. DS14C335 is an RS232-E driver/receiver that operates on 3.3 V. The low power requirements and high CMR capability of HCPL-260L make it an ideal choice in data transmission and microprocessor interface applications.

A typical Power over Ethernet power source equipment (PSE) block diagram uses two 15 Mbd 3.3 V optocouplers to isolate between the 13 W 48 V power supply and the inter-integrated chip (I²C) control bus.

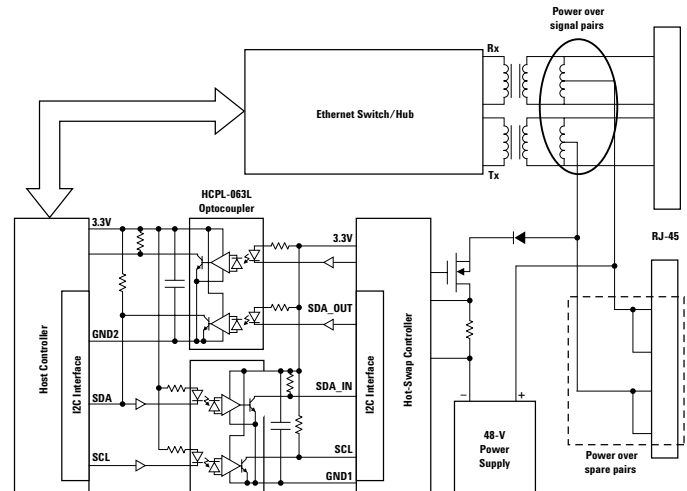
Benefits

- Provide high data rate and low power supply requirement
- Certified with reinforced insulation under IEC/EN/DIN EN 60747-5-2
- Dual supply voltages (3.3V/5V) for ACPL-x72L/071L/074L/W70L/K73L/M75L
- Wide temperature range (-40°C to 105°C) for ACPL-x72L/071L/074L/W70L/K73L/M75L
- Stretched packages (meeting 8mm Creepage and Clearance) available to save board space
- Non-inverting output (ACPL-x72L/W70L/K73L)

Typical TIA/EIA-232-E Interface Block Diagram



Typical Power over Ethernet Power Source Block Diagram



Optoisolation Products

3.3V Family (100 kBd Darlington Transistor Output Optocoupler)

Device	Part No.	Package	$I_{F(on)}$ mA Min.	CTR			t_{PLH} μ s Max.	t_{PHL} μ s Max.	CMR - V/ μ s@ V_{CM}		V_{ISO} V_{RMS} Min.	V_{IORM} V peak
				% Min.	% Max.	I_F mA			CMR V/ μ s (Min.)	V_{CM} V		
Single Channel 	HCPL-070L	S08	0.5	400	5000	0.5	90	30	1000	10	3750	560*
	HCPL-270L	300 mil DIP8	0.5	400	5000	0.5	90	30	1000	10	3750/5000 [#]	630*
Dual Channel 	HCPL-073L	S08	0.5	400	5000	0.5	90	30	1000	10	3750	560*
	HCPL-273L	300 mil DIP8	0.5	400	5000	0.5	90	30	1000	10	3750/5000 [#]	630*

Notes:

* - with IEC/EN/DIN EN 60747-5-2 Option 060, [#] - with UL 5000V_{RMS}/1 minute Option 020

3.3V Family (1 MBd Transistor Output Optocoupler)

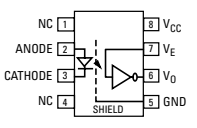
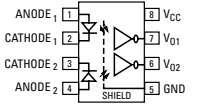
Device	Part No.	Package	$I_{F(on)}$ mA Min.	CTR			t_{PLH} μ s Max.	t_{PHL} μ s Max.	CMR - V/ μ s@ V_{CM}		V_{ISO} V_{RMS} Min.	V_{IORM} V peak
				% Min.	% Max.	I_F mA			CMR V/ μ s (Typ.)	V_{CM} V		
Single Channel 	HCPL-050L	S08	16	15	50	16	1.0	1.0	1000	10	3750	560*
	HCPL-250L	300 mil DIP8	16	15	50	16	1.0	1.0	1000	10	3750/5000 [#]	630*
Dual Channel 	HCPL-053L	S08	16	15	50	16	1.0	1.0	1000	10	3750	560*
	HCPL-253L	300 mil DIP8	16	15	50	16	1.0	1.0	1000	10	3750/5000 [#]	630*

Notes:

* - with IEC/EN/DIN EN 60747-5-2 Option 060, [#] - with UL 5000V_{RMS}/1 minute Option 020

Optoisolation Products

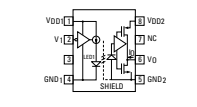
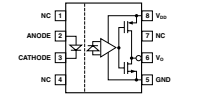
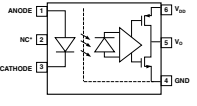
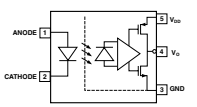
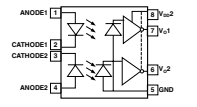
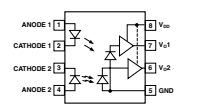
3.3V/5V Family (15 Mbd Logic Gate Optocoupler)

Device	Part No.	Package	$I_{F(on)}$ mA Min.	t_{PLH} ns Max.	t_{PHL} ns Max.	PWD ns Max.	t_{PSK} ns Max.	CMR - V/μs@V _{CM}		V _{ISO} V _{RMS} Min.	V _{IORM} V peak
								CMR V/μs (Min.)	V _{CM} V		
	ACPL-M60L-000E NEW	S05	5	90	75	25	40	15000	1000	3750	560*
	ACPL-W60L-000E NEW	Stretched S06	5	90	75	25	40	15000	1000	3750/5000 [#]	1140*
	HCPL-060L	S08	5	90	75	25	40	15000	1000	3750	560*
	HCPL-260L	300 mil DIP8	5	90	75	25	40	15000	1000	3750/5000 [#]	630*
	ACPL-K63L-000E NEW	Stretched S08	5	90	75	25	40	15000	1000	3750/5000 [#]	1140*
	HCPL-063L	S08	5	90	75	25	40	15000	1000	3750	560*
	HCPL-263L	300 mil DIP8	5	90	75	25	40	15000	1000	3750/5000 [#]	630*

Notes:

* - with IEC/EN/DIN EN 60747-5-2 Option 060, [#] - with UL 5000V_{RMS}/1 minute Option 020

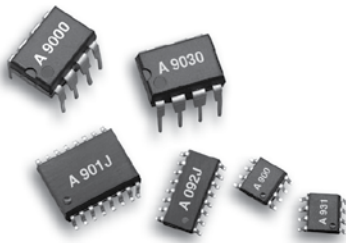
3.3V / 5V Family (15/25 Mbd High Speed Digital CMOS Logic Gate Optocoupler)

Device	Part No.	Package	V _{DD} V	$I_{F(on)}$ mA Min.	Max. Data Rate Mbd Min.	t_{PLH} ns Max.	t_{PHL} ns Max.	PWD ns Max.	t_{PSK} ns Max.	CMR - V/μs@V _{CM}		V _{ISO} V _{RMS} Min.	V _{IORM} V peak
										CMR V/μs (Min.)	V _{CM} V		
	ACPL-072L-000E NEW	S08	3.3/5	-	25	40	40	6	20	10000	1000	3750	560*
	ACPL-772L-000E NEW	300 mil DIP8	3.3/5	-	25	40	40	6	20	10000	1000	3750/5000 [#]	630*
	ACPL-071L-000E [^] NEW	S08	3.3/5	10	15	40	40	30	30	10000	1000	3750	560*
	ACPL-W70L-000E [^] NEW	Stretched S06	3.3/5	4	15	55	55	25	40	10000	1000	3750/5000 [#]	1140*
	ACPL-M75L-000E [^] NEW	S05	3.3/5	4	15	55	55	25	40	10000	1000	3750	560*
	ACPL-074L-000E [^] NEW	S08	3.3/5	10	15	40	40	30	30	10000	1000	3750	560*
	ACPL-K73L-000E [^] NEW	Stretched S08	3.3/5	4	15	55	55	25	40	10000	1000	3750/5000 [#]	1140*

Notes:

* - with IEC/EN/DIN EN 60747-5-2 Option 060, [#] - with UL 5000V_{RMS}/1 minute Option 020, [^] - Advanced Information, may subject to changes.

Optoisolation Products



Digital Isolator

Description

The HCPL-90xx/-09xx series CMOS digital isolators integrated with giant magnetoresistive (GMR) technology enable high speed performance and excellent transient immunity specifications.

All devices operate at 3.3 V or 5 V supply voltages, boasting low power consumption. They are able to withstand high common mode voltages, 15kV/ μ s at $V_{cm}=1000V$, and meet UL 1577 and IEC 61010-1 safety ratings.

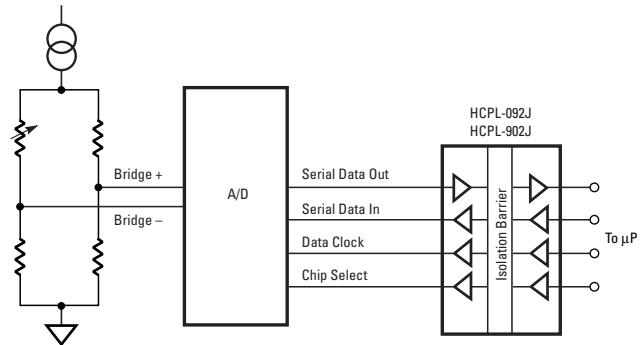
Benefits

- High speed (100MBd), low PWD (3ns) and low T_p (18ns)
- Wide temperature operation (-40°C to 100°C)
- Buffer input and CMOS output (eliminate input/output resistors)
- Multi-channel (1, 2 & 4-ch)
- Low power consumption

Applications

- Digital fieldbus isolation
- Multiplexed data transmission
- Computer peripheral interface
- High speed digital systems
- Isolated data interfaces
- Logic level shifting

Typical Isolated A/D Conversion Block Diagram



Digital Isolator HCPL-09XX AND HCPL-90XX Product Selection

Device	Part No.	Channel	Package	Max. Data Rate Mbd Min.	$t_{PLH} \& t_{PHL}$ ($V_{CC}=5.0V$) ns Max.	$t_{PLH} \& t_{PHL}$ ($V_{CC}=3.3V$) ns Max.	PWD ns Max.	t_{PSK} ns Max.	CMR - $V/\mu s @ V_{CM}$		V_{ISO} V_{RMS} Min.
									CMR $V/\mu s$ (Min.)	V_{CM} V	
	HCPL-0900	Single	S08	100	15	18	3	6	15000	1000	2500
	HCPL-9000	Single	300 mil DIP8	100	15	18	3	6	15000	1000	2500
	HCPL-0930	Dual	S08	100	15	18	3	6	15000	1000	2500
	HCPL-9030	Dual	300 mil DIP8	100	15	18	3	6	15000	1000	2500
	HCPL-0931	Dual, Bi-Dir	S08	100	15	18	3	6	15000	1000	2500
	HCPL-9031	Dual, Bi-Dir	300 mil DIP8	100	15	18	3	6	15000	1000	2500
	HCPL-090J	Quad	S016 Narrow Body	100	15	18	3	6	15000	1000	2500
	HCPL-900J	Quad	S016 Wide Body	100	15	18	3	6	15000	1000	2500
	HCPL-091J	Quad, 2/2 Bi-dir	S016 Narrow Body	100	15	18	3	6	15000	1000	2500
	HCPL-901J	Quad, 2/2 Bi-dir	S016 Wide Body	100	15	18	3	6	15000	1000	2500
	HCPL-092J	Quad, 3/1 Bi-dir	S016 Narrow Body	100	15	18	3	6	15000	1000	2500
	HCPL-902J	Quad, 3/1 Bi-dir	S016 Wide Body	100	15	18	3	6	15000	1000	2500

Optoisolation Products



Solid State Relay (Photo MOSFET)

Description

Avago Technologies' new ASSR Series are high-speed optically isolated MOSFET-output solid-state relays that feature performance that has been qualified over a wide industrial temperature range of -40°C to +85°C. They are Form A (normally open) single-pole single-throw relays in industry-standard 6-pin and 8-pin dual-in-line (DIP) packages, and 4-pin small outline (SO) packages. Their output ratings range from 60V to 600V maximum load voltage and from 40mA to 2.5A continuous output current. Their transient immunity of more than 1kV/μs and excellent noise rejection between input-output as well as between open terminals on the output will eliminate undesirable transient effects. Reinforced insulation of 3.75kV with fast switching speed makes them suitable for a wide range of industrial, consumer and automotive applications.

Compared to electromechanical relays, the ASSR Series offer distinct advantages, including the elimination of contact bounce, and problems due to shock, vibration, or mounting position. They have no wear out mechanism limiting the number of operations, and require no minimum contact "wetting" current. They are also free from magnetic fields, do not generate electrical noise, and are not sensitive to electromagnetic interference.

Benefits

- Superior to traditional electromechanical relays (EMR)
 - Lower power consumption
 - Faster switching speed with high transient immunity
 - Smaller size
 - Much better reliability
- High reinforced insulation in miniature SO-4 package
- Qualified performance over -40°C to +85°C
- Expanding portfolio to address diversified market
 - Low $R_{(ON)}$ for less insertion loss
 - Low $C_{(OFF)}$ for better isolation performance
 - High current capability with low $R_{(ON)}$

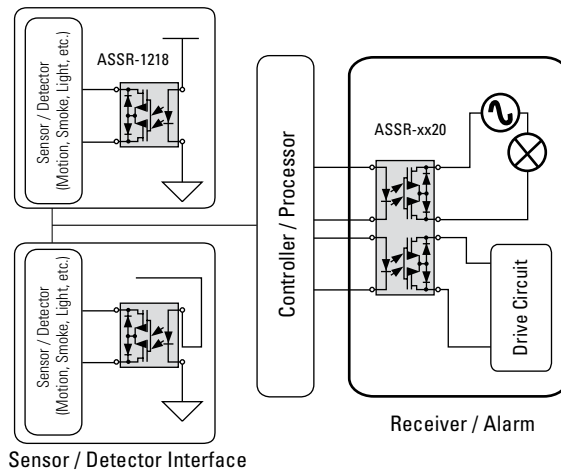
Applications

- Telecommunications switching
- Data communications
- Industrial control
- Medical system
- Security system
- Automatic test equipment
- Data acquisition system
- Measuring instruments
- EMR/reed relay replacement

General Purpose

The ASSR-14xx, ASSR-32xx, ASSR-41xx, and ASSR-50xx are designed for a wide variety of industrial and consumer electronics applications which includes telecommunications switching, data communications, automatic metering, medical system, security system, battery monitor, digital home appliances, set top boxes, etc.

Security Equipment Application Diagram



Optoisolation Products

Low $C_{(OFF)} \times R_{(ON)}$

The ASSR-xxxC and ASSR-xxxR Series are specifically designed for fast switching applications, commonly found in test and measurement applications such as pin electronics, data acquisition, multiplexers and matrix cards, and switching in the analog circuits of parametric measurement unit (PMUs). The low output capacitance, low on-resistance, and low output off-state leakage current of the ASSR Series provide higher system throughput and reduce system errors. In addition to their fast switching speeds, the ASSR Series provide reinforced insulation of 3.75kV, which is often required in industrial environments.

High Current

The ASSR-15x0, ASSR-1611, ASSR-4311 and ASSR-5211 are specifically designed for high current applications, commonly found in the industrial applications. In programmable controllers, input and output modules

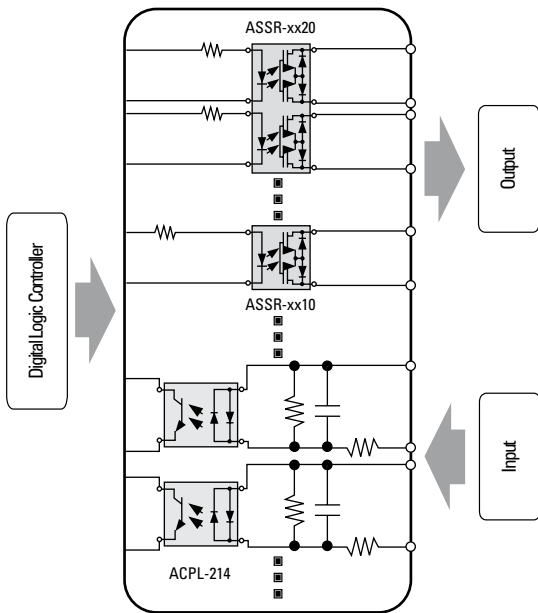
allow microprocessors to sense and control various loads. An AC output module allows logic-level voltages to control a switch that turns AC loads on and off. For example, the output module of a process controller might be used to control the motor starters of adjustable frequency drives, position valves, or dampers. As the computing speed increases, noise problems arise at the input interface as well as at the output interface. In addition, the use of small size relays result in more compact programmable controllers.

Unlike electromechanical relays, the ASSR Series do not have mechanical contacts, which could eventually deteriorate from arcing or dust particles.

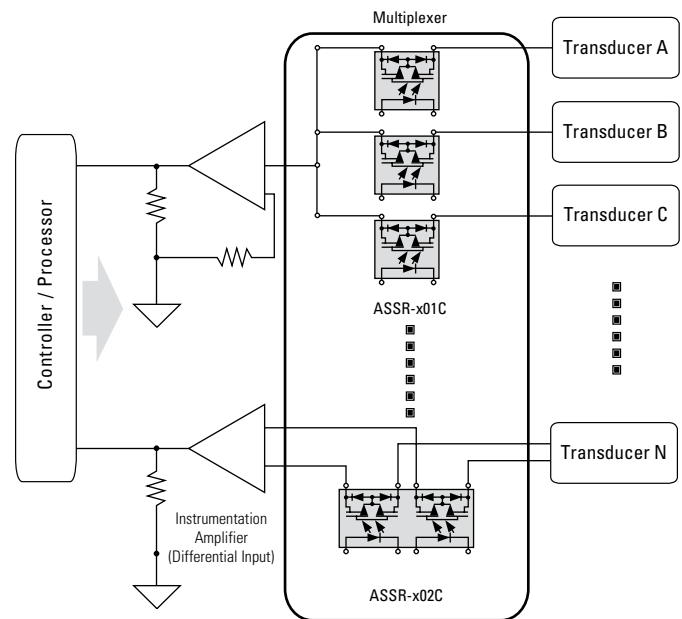
Standard

The ASSR-xxx8 and ASSR-xxx9 series are similar to competitive Photo MOSFET offerings with room temperature specifications only to address applications in controlled environments such as telecommunications and security equipment.

Digital I/O Application Diagram



Data Acquisition – Multiplexer Application Diagram



Optoisolation Products

Device	Part No.	Function	Package	Channel & Output Type	V _{ISO} kV Min.	V _{O(OFF)} V Min.	I _O A Max.	I _{O(OFF)} nA Max.	C _(OFF) pF Max.	R _(ON) Ω Max.	T _{ON} ms Max.	T _{OFF} ms Max.
	ASSR-1410-003E NEW	GP	S04	1 Form A	3.75	60	0.6	100	—	1	0.5	0.2
	ASSR-1510-003E NEW	HC	S04	1 Form A	3.75	60	1.0	100	—	0.5	1	0.2
	ASSR-301C-003E NEW	Low CxR	S04	1 Form A	3.75	250	0.05	10	15	40	0.5	0.2
	ASSR-321R-003E NEW	Low CxR	S04	1 Form A	3.75	250	0.2	4	60	8.5	0.5	0.2
	ASSR-3210-003E NEW	GP	S04	1 Form A	3.75	250	0.2	100	—	10	1	0.2
	ASSR-401C-003E NEW	Low CxR	S04	1 Form A	3.75	400	0.04	10	15	100	0.5	0.2
	ASSR-4110-003E NEW	GP	S04	1 Form A	3.75	400	0.12	100	—	25	0.5	0.2
	ASSR-4118-003E NEW	STD	S04	1 Form A	3.75	400	0.1	1000	—	35	3.0	1.0
	ASSR-1219-001E NEW	STD	300mil DIP6	1 Form A	3.75	60	0.2	1000	—	10	5.0	5.0
	ASSR-1411-001E NEW	GP	300mil DIP6	1 Form A	3.75	60	0.6	100	—	1	0.5	0.2
	ASSR-1511-001E NEW	HC	300mil DIP6	1 Form A	3.75	60	1.0	100	—	0.5	1	0.2
	ASSR-1611-001E [^] NEW	HC	300mil DIP6	1 Form A	3.75	60	2.5	100	—	0.1	3.0	0.5
	ASSR-3211-001E NEW	GP	300mil DIP6	1 Form A	3.75	250	0.2	100	—	10	1	0.2
	ASSR-4111-001E NEW	GP	300mil DIP6	1 Form A	3.75	400	0.12	100	—	25	0.5	0.2
	ASSR-4119-001E NEW	STD	300mil DIP6	1 Form A	3.75	400	0.1	1000	—	35	3.0	1.0
	ASSR-4311-001E [^] NEW	HC	300mil DIP6	1 Form A	3.75	400	0.4	100	—	6	3.0	0.5
	ASSR-5011-001E [^] NEW	GP	300mil DIP6	1 Form A	3.75	600	0.04	100	—	120	0.5	0.2
	ASSR-5211-001E [^] NEW	HC	300mil DIP6	1 Form A	3.75	600	0.2	100	—	16	3.0	0.5
	ASSR-1228-002E NEW	STD	300mil DIP8	2 Form A	3.75	60	0.2	1000	—	10	5.0	5.0
	ASSR-1420-002E NEW	GP	300mil DIP8	2 Form A	3.75	60	0.6	100	—	1	0.5	0.2
	ASSR-1520-002E NEW	HC	300mil DIP8	2 Form A	3.75	60	1.0	100	—	0.5	1	0.2
	ASSR-302C-002E NEW	Low CxR	300mil DIP8	2 Form A	3.75	250	0.05	10	15	40	0.5	0.2
	ASSR-322R-002E NEW	Low CxR	300mil DIP8	2 Form A	3.75	250	0.2	1	60	8.5	0.5	0.2
	ASSR-3220-002E NEW	GP	300mil DIP8	2 Form A	3.75	250	0.2	100	—	10	1	0.2
	ASSR-402C-002E NEW	Low CxR	300mil DIP8	2 Form A	3.75	400	0.04	10	15	100	0.5	0.2
	ASSR-4120-002E NEW	GP	300mil DIP8	2 Form A	3.75	400	0.12	100	—	25	0.5	0.2
	ASSR-4128-002E NEW	STD	300mil DIP8	2 Form A	3.75	400	0.1	1000	—	35	3.0	1.0
	ASSR-5020-002E [^] NEW	GP	300mil DIP8	2 Form A	3.75	600	0.04	100	—	120	0.5	0.2

Note:

[^] = Advanced Information, may subject to changes. GP = General Purpose, Low CxR = Low C_(OFF) x R_(ON), HC = High Current, STD = Standard

Solid State Relay (Photovoltaic Driver)

Device	Part No.	Function	Package	Channel & Output Type	V _{OC} V Min.	I _{SC} μA Min.	V _{ISO} V Min.
	ASSR-V621-002E NEW	GP	300mil DIP8	2 Form A	6.5	15	3750
	ASSR-V622-002E NEW	GP	300mil DIP8	2 Form A	6.5	15	3750

Optoisolation Products



Applications

- Automatic meter reading (AMR)
- Powerline modem
- Home automation/control
- Security and surveillance
- General purpose isolated transceiver
- Internet appliances

Powerline Communication Interface

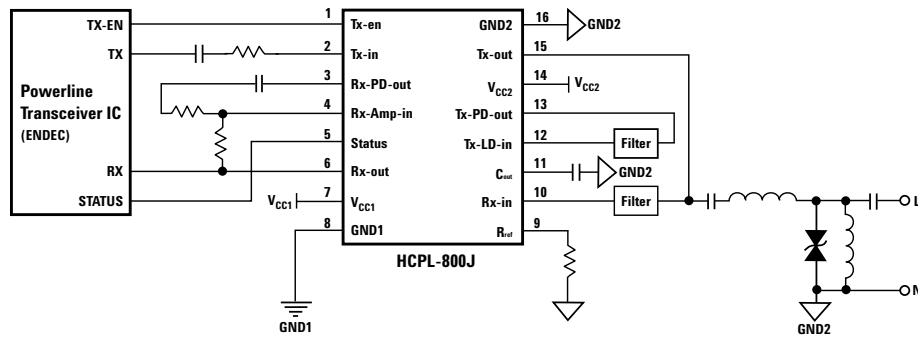
Description

The HCPL-800J, HCPL-0810 / 8100 and ACPL-0820 are designed for narrow band powerline communication (PLC) analog front end interfacing applications. Compact in size, suitable for FCC Part 15 and EN50065-1 compliant design, this family can interface many common PLM transceivers to the powerline, thus simplifying the powerline modem (PLM) implementations.

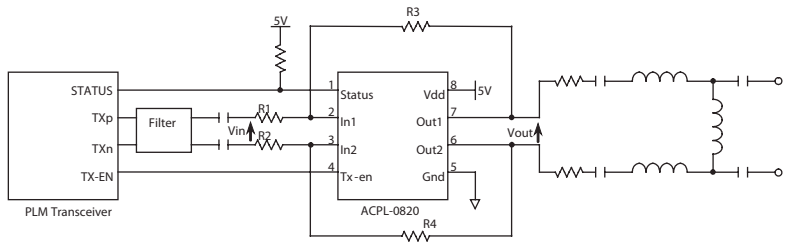
Benefits

- Compact integrated solution
- Low power consumption
- Integrated safety features such as over-temperature shutdown
- Suitable for FCC Part 15 and EN50065-1 compliant design

Typical Power Line Modem Using HCPL-800J



Typical Power Line Modem Using ACPL-0820



Gain of Amp1 = $-R3/R1$, Gain of Amp2 = $-R4/R2$, $R1=R2, R3=R4$, Overall Differential Output $V_{out} = (R3/R1) \cdot V_{in}$

Power Line Communication Interface Product Selection

Part No.	Package	Signal Path	Bandwidth MHz Typ.	GBWP MHz Typ.	I_o A _{pp} Typ.	Harmonic Distortion dBc, Max.		Isolation	V_{CC} V Typ.	V_{ISO} V _{RMS} Min.	V_{IIORM} V peak
						HD2	HD3				
ACPL-0820-000E NEW	S08	Tx only	—	3.0	1.5	-60	-65	No	5	—	—
HCPL-800J	S016	Tx/Rx	0.5	—	1.0	-60	-65	Yes	5	3750	891
HCPL-0810	S08	Tx only	—	3.5	1.0	-60	-65	No	5	—	—
HCPL-8100	300 mil DIP8	Tx only	—	3.5	1.0	-60	-65	No	5	—	—

Optoisolation Products



Miniature Analog Isolation Amplifier

Description

The HCPL-788J can be used for isolating the motor current sensing element from the control circuit while at the same time transmitting precision analog signals overcurrent fault signals. This circuit requires a high precision-sensing resistor for monitoring the motor current. The single-ended output allows it to directly interface with the A/D port of the micro-controller. Other benefits include an in-built fault detection, high CMR and a package that is small in size compared to Hall effect devices.

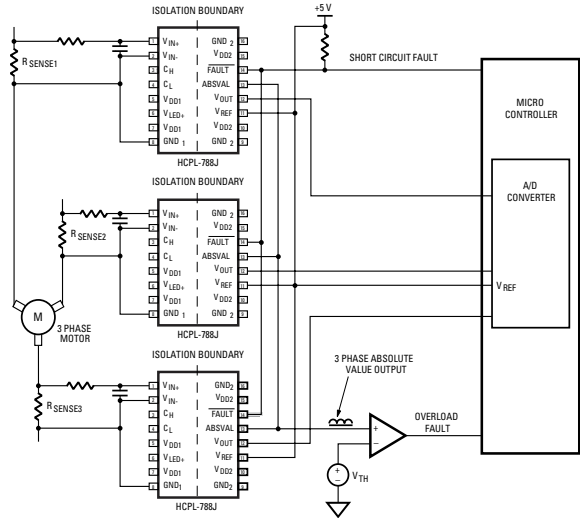
Benefits

- Patented Optical Isolation Amplifier With Sigma-Delta Modulation
- Compact package suitable for high volume production process
- Cost-effective solution
- Reinforced insulation

Applications

- Motor phase and rail current sensing
- Data acquisition systems
- Inverter current sensing
- General purpose current sensing and monitoring

Low Cost Three Phase Current Sensing with Short Circuit and Overload Detection Block Diagram

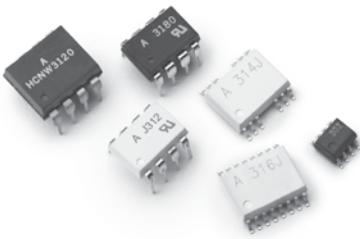


Miniature Analog Isolation Amplifier Product Selection

Device	Part No.	Package	Gain Tolerance % Max.	Non-Linearity % Max.	Prop Delay μ s Max.	CMR - V/μ s@ V_{CM}		Output Configuration	V_{ISO} V_{RMS} Min.	V_{IORM} V peak
						CMR V/μ s (Min.)	V_{CM} V			
	ACPL-796J-000E [^] NEW	S016	12-Bit Isolated Sigma-Delta Modulator (external clock)			15000	1000	Digital	3750	891
	ACPL-7873-000E [^] NEW	300 mil DIP8	12-Bit Isolated Sigma-Delta Modulator (-40 to +105°C)			15000	1000	Digital	3750	891
	HCPL-7860	300 mil DIP8	12-Bit Isolated Sigma-Delta Modulator			15000	1000	Digital	3750	891
	HCPL-7560	300 mil DIP8	8-Bit Isolated Sigma-Delta Modulator			15000	1000	Digital	3750	891*
	HCPL-786J	S016	12-Bit Isolated Sigma-Delta Modulator with 8.3 mm clearance and creepage			15000	1000	Digital	3750	891
	HCPL-0872	S016	Digital Interface IC for A/D Converter						-	-
	ACPL-782T-000E [^] NEW	300 mil DIP8	2 (-40 to 125°C)	0.2	9.9	10000	1000	Differential	3750	891
	HCPL-7800A	300 mil DIP8	1	0.2	9.9	10000	1000	Differential	3750	891
	HCPL-7800	300 mil DIP8	3	0.2	9.9	10000	1000	Differential	3750	891
	HCPL-7840	300 mil DIP8	5	0.2	9.9	10000	1000	Differential	3750	891*
	HCPL-788J	S016	5 (-40 to 85°C)	0.4	20	10000	1000	Single-ended	3750	891
	<ul style="list-style-type: none"> • Smart Current Sensor with integrated fast short circuit detection (3μs) • Analog Output direct compatible with A/D converters • 1μV/°C offset change vs temperature 								<ul style="list-style-type: none"> • 16 kHz bandwidth • Absolute value signal • Fault detection 	
	HCPL-7510	300 mil DIP8	3	0.4	9.9	10000	1000	Single-ended	3750	891*
	HCPL-7520	300 mil DIP8	5	0.4	9.9	10000	1000	Single-ended	3750	891*

Notes: * - with IEC/EN/DIN EN 60747-5-2 Option 060, ^ - Advanced Information, may subject to changes.

Optoisolation Products



Applications

- Isolated IGBT/MOSFET gate drive
- AC and brushless DC motor drives
- Industrial inverters
- Switching power supplies
- Uninterruptible power supplies (UPS)

Integrated Gate Drive Optocoupler

Description

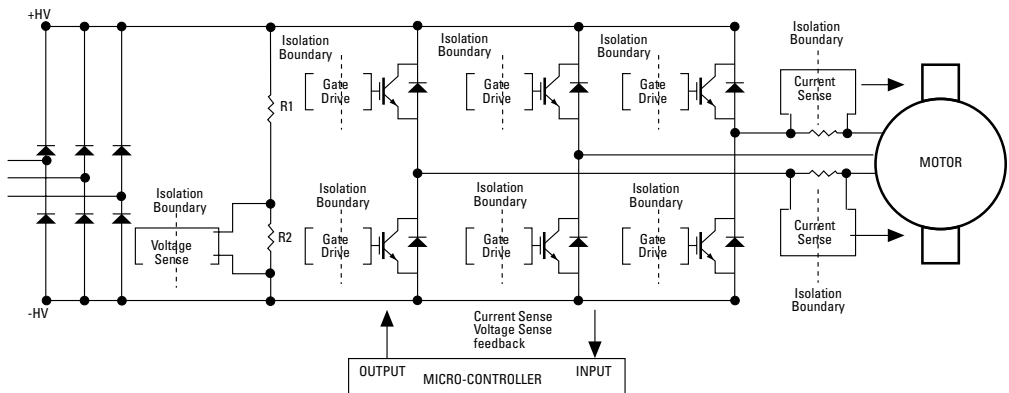
In typical motor drive and power control systems, there are several signals between the power devices and the micro-controller that need isolation and additional customized functions such as gate drive and current/voltage sensing. Avago Technologies' gate drive and isolation amplifier products provide low cost, high performance solutions for motor control applications.

High performance motor drives require precision timing for turning on and off the power devices on the inverter. The micro-controller that controls these functions needs to be isolated from the high voltage inverter side. Avago Technologies offers a variety of optoisolators that have built-in gate drive capability. For solutions that require lower output power capability, IPM interface optocouplers will meet the need.

Benefits

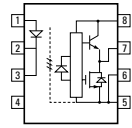
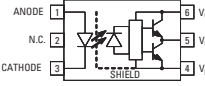
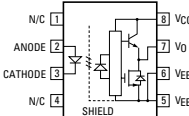
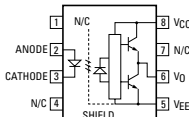
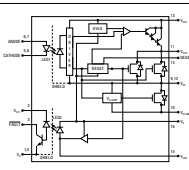
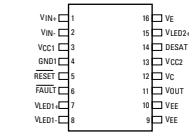
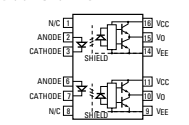
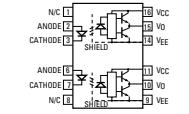
- Short propagation delay for faster switching
- Fast IGBT switching for improved efficiency
- High common mode transient rejection ensures reliable operation under noisy environment
- Direct drive of high power IGBTs
- Reduce component count and solution cost
- Reinforced insulation

Typical Motor Drive Block Diagram



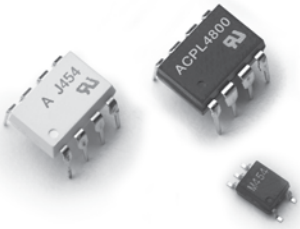
Optoisolation Products

Integrated Gate Drive Optocoupler Product Selection

Device	Part No.	Package	I _{F(on)} mA Min.	I _{OUT} A Min.	t _{PLH} µs Max.	t _{PHL} µs Max.	PDD µs Max.	V _{CC} V Max.	CMR - V/µs@V _{CM}		V _{ISO} V _{RMS} Min.	V _{IORM} V peak
									CMR V/µs (Min.)	V _{CM} V		
	ACPL-H312-000E NEW	Stretched S08	7	2.0	0.5	0.5	0.35	30	15000	1500	3750	891*
	ACPL-K312-000E [^] NEW	Stretched S08	7	2.0	0.5	0.5	0.35	30	15000	1500	3750	1140*
Single Channel 	ACPL-P302-000E NEW	Stretched S06	7	0.2	0.7	0.7	0.5	30	10000	1000	3750	891*
	ACPL-P314-000E NEW	Stretched S06	8	0.4	0.7	0.7	0.5	30	10000	1000	3750	891*
	ACPL-W302-000E NEW	Stretched S06	7	0.2	0.7	0.7	0.5	30	10000	1000	3750	1140*
	ACPL-W314-000E NEW	Stretched S06	8	0.4	0.7	0.7	0.5	30	10000	1000	3750	1140*
	ACNW3190-000E NEW	400 mil DIP8	10	4.0	0.5	0.5	0.3	30	15000	1500	5000	1414
	ACNW3130-000E NEW	400 mil DIP8	10	2.0	0.5	0.5	0.35	30	40000	1500	5000	1414
	ACPL-3130-000E NEW	300 mil DIP8	7	2.0	0.5	0.5	0.35	30	40000	1500	3750	630*
	ACPL-J313-000E NEW	300 mil DIP8	7	2.0	0.5	0.5	0.35	30	40000	1500	3750	891
	ACPL-T350-000E NEW	300 mil DIP8	7	2.0	0.5	0.5	0.35	30	15000	1500	3750	630*
	HCNW3120	400 mil DIP8	10	2.0	0.5	0.5	0.3	30	25000	1500	5000	1414
	HCPL-J312	300 mil DIP8	7	2.0	0.5	0.5	0.35	30	25000	1500	3750	891
	HCPL-J314	300 mil DIP8	8	0.4	0.7	0.7	0.5	30	25000	1500	3750	891
	HCPL-T250	300 mil DIP8	7	0.5	0.5	0.5	—	30	5000	600	3750	630*
	HCPL-T251	300 mil DIP8	8	0.1	1.0	1.0	—	30	10000	600	3750	—
	HCPL-0302	S08	7	0.2	0.7	0.7	0.5	30	10000	1000	3750	566*
	HCPL-0314	S08	8	0.4	0.7	0.7	0.5	30	25000	1000	3750	566*
	HCPL-3000	300 mil DIP8	8	0.5	5	5	—	18	—	—	5000	—
	HCPL-3020	300 mil DIP8	7	0.2	0.7	0.7	0.5	30	10000	1000	3750	630*
	HCPL-3100	300 mil DIP8	12	0.1	2	2	—	24	—	—	5000	—
	HCPL-3101	300 mil DIP8	8	0.1	0.5	0.5	—	24	—	—	5000	—
	HCPL-3120	300 mil DIP8	7	2.0	0.5	0.5	0.35	30	25000	1500	3750	630*
	HCPL-3140	300 mil DIP8	8	0.4	0.7	0.7	0.5	30	25000	1000	3750	630*
HCPL-3150	300 mil DIP8	7	0.5	0.5	0.5	0.35	30	15000	1500	3750	630*	
HCPL-3180	300 mil DIP8	10	2.0	0.2	0.2	0.09	20	10000	1500	3750	630*	
	ACPL-331J-000E NEW	S016	8	1.0	0.25	0.25	0.1	30	15000	1500	3750	891
	– 1.0A Highly Integrated Gate Drive Optocoupler with Active Miller Clamp, Over-Current Protection and Fault Feedback – Under Voltage Lock-Out Protection (UVLO) with Hysteresis											
	ACPL-332J-000E NEW	S016	8	2.0	0.25	0.25	0.1	30	15000	1500	3750	891
	– 2.0A Highly Integrated Gate Drive Optocoupler with Active Miller Clamp, Over-Current Protection and Fault Feedback – Under Voltage Lock-Out Protection (UVLO) with Hysteresis											
	HCPL-316J	S016	—	2.0	0.5	0.5	0.3	30	15000	1500	3750	891
	– 2.0 A Highly Integrated Gate Drive Optocoupler with over-current Protection and Fault Feedback – CMOS compatible – Under Voltage Lock-Out Protection (UVLO) with Hysteresis											
Dual Channel 	HCPL-314J	S016	8	0.4	0.7	0.7	0.5	30	25000	1500	3750	891
	HCPL-315J	S016	7	0.5	0.5	0.5	0.35	30	15000	1500	3750	891

Notes: * - with IEC/EN/DIN EN 60747-5-2 Option 060, ^ - Advanced Information, may subject to changes.

Optoisolation Products



Intelligent Power Module Interface Optocoupler

Description

The HCNW/HCPL-45xx and ACPL-48xx series optocouplers are designed for Intelligent Power Module (IPM) drive applications. Such as, in inverters and motor control systems. These high speed optocouplers have high CMR performance that help reject common mode noise in such high voltage systems. The output of HCNW/HCPL-45xx devices is conventional open-collector; the output of ACPL-48xx devices in the totem pole output stage eliminates the necessity of using the pull-up resistor and allows direct drive to the IPM.

Applications

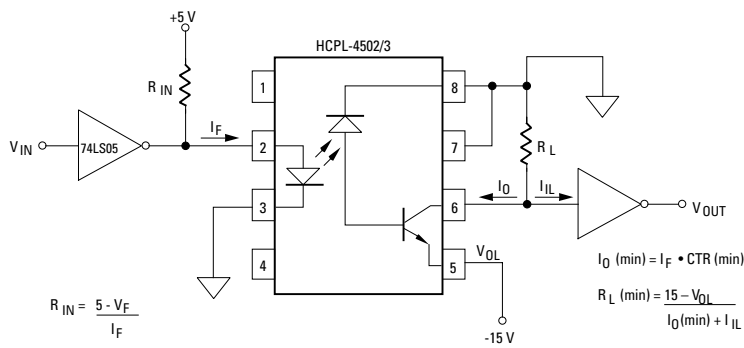
- Intelligent power module
- Inverter/Motor control
- Power switch design
- General purpose digital isolation

In addition to Intelligent Power Module drive, the HCNW/HCPL-45xx and ACPL-48xx series optocouplers can be used in general purpose isolation applications like high speed logic ground isolation, isolated line receivers, and microprocessor system interfaces.

Benefits

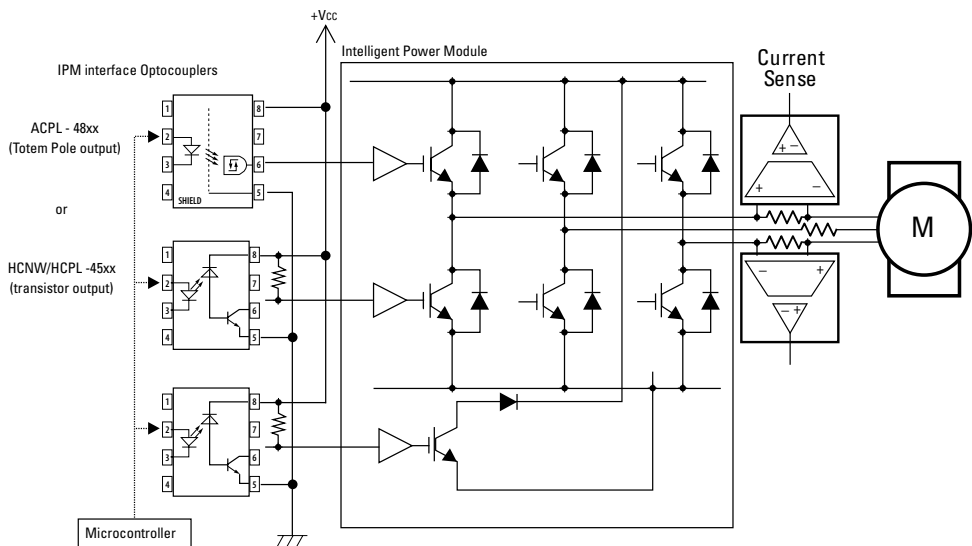
- Short propagation delay for faster switching
- Fast IGBT switching for improved efficiency
- High Common Mode Transient Rejection ensures reliable operation under noisy environment
- Wide operating temperature range
- Reinforced insulation

Typical Level Shifting/TTL Interface Block Diagram



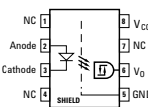

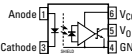
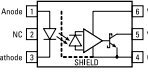
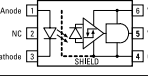
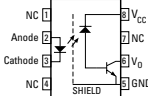
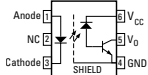
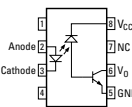
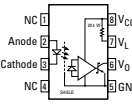
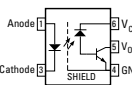
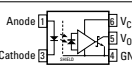
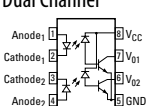
NOTE: FOR BEST CMR PERFORMANCE, CONNECT PIN 7 TO PIN 8.

Intelligent Power Module (IPM) Based Inverter Block Diagram



Optoisolation Products

Intelligent Power Module Interface Optocoupler Product Selection

Device	Part No.	Package	I _{F(on)} mA Min.	CTR			t _{PLH} μs Max.	t _{PHL} μs Max.	PDD μs Max.	CMR - V/μs@V _{CM}		V _{ISO} V _{RMS} Min.	V _{IORM} V peak
				% Min.	% Max.	I _F mA				CMR V/μs (Min.)	V _{CM} V		
Single Channel 	ACPL-4800-000E NEW	300 mil DIP8	6	—	—	—	0.35	0.35	0.25	30000	1000	3750	630*
	ACPL-M43U-000E [^] NEW	S05	10	32	80	10	1	1	0.9	15000	1000	3750	—
	ACPL-M46U-000E [^] NEW	S05	10	44	90	10	0.4	0.55	0.45	15000	1000	3750	—
	ACPL-P456-000E NEW	Stretched S06	10	44	>90	10	0.55	0.45	0.45	15000	1500	3750	891*
	ACPL-W456-000E NEW	Stretched S06	10	44	>90	10	0.55	0.45	0.45	15000	1500	3750	1140*
	ACPL-P480-000E NEW	Stretched S06	6	—	—	—	0.35	0.35	0.25	20000	1000	3750	891*
	ACPL-K453-000E NEW	Stretched S08	16	19	50	16	1.00	1.00	1.00	15000	1500	3750/5000 [#]	1140*
	ACPL-P454-000E NEW	Stretched S06	12	26	65	12	1.14	1.00	1.30	15000	1500	3750/5000 [#]	891*
	ACPL-W454-000E NEW	Stretched S06	12	26	65	12	1.14	1.00	1.30	15000	1500	3750/5000 [#]	1140*
	HCNW4502	400 mil DIP8	16	19	50	16	1.0	1.0	—	1000	10	5000	1414
	HCNW4503	400 mil DIP8	16	19	50	16	1.0	1.0	—	15000	1500	5000	1414
	HCNW4504	400 mil DIP8	12	25	65	12	1.4	1.0	1.3	15000	1500	5000	1414
	HCPL-0452	S08	16	19	50	16	1.0	1.0	—	1000	10	3750	560*
	HCPL-0453	S08	16	19	50	16	1.0	1.0	1.0	15000	1500	3750	560*
	HCPL-0454	S08	12	26	65	12	1.4	1.0	—	15000	1500	3750	560*
	HCPL-4502	300 mil DIP8	16	19	50	16	1.0	1.0	—	1000	10	3750/5000 [#]	630*
	HCPL-4503	300 mil DIP8	16	19	50	16	1.0	1.0	1.0	15000	1500	3750/5000 [#]	630*
	HCPL-4504	300 mil DIP8	12	26	65	12	1.4	1.0	1.3	15000	1500	3750/5000 [#]	630*
	HCPL-J454	300 mil DIP8	12	21	65	12	0.7	0.5	1.3	15000	1500	3750	891
	HCNW4506	400 mil DIP8	10	44	>90	10	0.55	0.40	—	15000	1500	5000	1414
	HCPL-0466	S08	10	44	>90	10	0.55	0.48	0.45	15000	1500	3750	560*
	HCPL-4506	300 mil DIP8	10	44	>90	10	0.55	0.40	0.45	15000	1500	3750/5000 [#]	630*
	HCPL-J456	300 mil DIP8	10	44	>90	10	0.55	0.40	0.45	15000	1500	3750	891
	HCPL-M452	S05	16	20	50	16	1.0	1.0	—	1000	10	3750	—
	HCPL-M453	S05	16	20	50	16	1.0	1.0	1.0	15000	1500	3750	—
	HCPL-M454	S05	12	26	65	12	1.4	1.0	1.3	15000	1500	3750	560*
	HCPL-M456	S05	10	44	>90	10	0.55	0.40	0.45	15000	1500	3750	560*
Dual Channel 	HCPL-0534	S08	16	19	50	16	1.0	1.0	—	15000	1500	3750	560*
	HCPL-4534	300 mil DIP8	16	19	50	16	1.0	1.0	—	15000	1500	3750/5000 [#]	630*

Notes: * - with IEC/EN/DIN EN 60747-5-2 Option 060, # - with UL 5000V_{RMS}/1 minute Option 020, ^ - Advanced information, may subject to changes.

Optoisolation Products



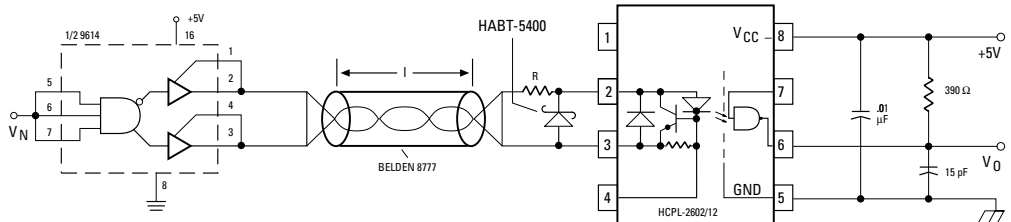
Isolated Line Receiver

Description

The HCPL-2602/12 have input current regulators and integrated high gain photo detectors. The input regulator serves as a line terminator for line receiver applications. The higher LED threshold voltage provides improved immunity to differential noise and the rejection internally shielded detector provides better common-mode rejection with no sacrifice in speed.

The diagram below illustrates an unbalanced line receiver using the integrated voltage-clamp input optocoupler, HCPL-2602. TTL data is converted to a differential signal via the differential line driver, and transmitted over twisted-pair wire. The Schottky diode helps to improve the turn-on and turn-off delays.

Typical Block Diagram



Benefits

- Line termination included – no extra circuitry required

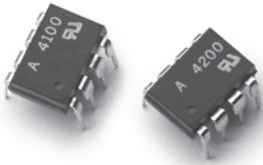
Applications

- Isolated line receiver
- Computer-peripheral interface
- Microprocessor system interface
- Digital isolation for A/D, D/A conversion
- Current sensing
- Instrument Input/Output isolation
- Ground loop elimination
- Pulse transformer replacement
- Power transistor isolation in motor drives

Line Receiver Product Selection

Device	Part No.	Package	Output Collector Output mA Max.	t_{PLH} μ s Max.	t_{PHL} μ s Max.	CMR - V/ μ s@VCM		V_{ISO} V_{RMS} Min.
						CMR V/ μ s (Min.)	V_{CM} V	
	HCPL-2602	300 mil DIP8	50	100	100	1000	50	3750
	HCPL-2612	300 mil DIP8	50	100	100	3500	300	3750
40 ns max propagation delay skew (part to part) Line termination circuitry included								

Optoisolation Products



Isolated 20 mA Current Loop Transmitter/Receiver

Description

Data transmission between electronic equipment which are physically separated by a distance of more than a few feet can be achieved by using the HCPL-4100 (transmitter) and the HCPL-4200 (receiver) optocouplers. These devices include specialized circuits for 20 mA digital current loop applications, and are designed to easily interface TTL and CMOS logic systems to current loop systems.

20 mA current loop systems conventionally signal a logic high state by transmitting 20 mA of loop current, and signal a logic low state by

allowing no more than a few milli-amperes of loop current. Optical coupling loops break ground loops and provide very high immunity to common mode interference. These devices are simple to use in a data transmission system for industrial applications and maintain integrity.

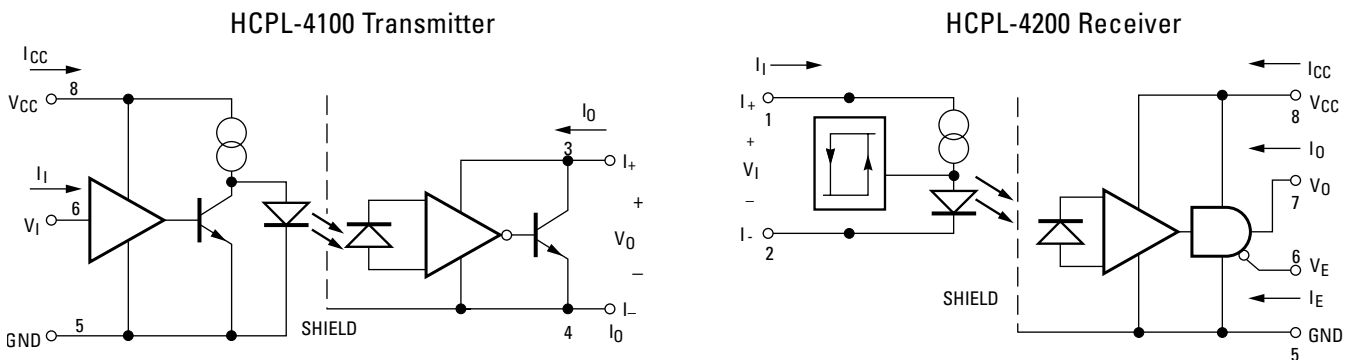
Benefits

- Direct control of the 20 mA current loop
- High noise immunity

Applications

- Isolated 20 mA current loop transmitter in:
 - Industrial control equipment
 - Computer peripherals
 - Data communications equipment

Typical Block Diagram



20 mA Current Loop Transmitter/Receiver Product Selection

Device	Part No.	Package	Data Rate kBd @ (meters)	t_{PLH} μs Max.	t_{PHL} μs Max.	CMR - V/ μs @VCM		V_{ISO} V_{RMS} Min.
						CMR V/ μs (Min.)	V_{CM} V	
Transmitter 	HCPL-4100	300 mil DIP8	20 (400)	1.6	1.0	1000	50	3750
	CMOS compatible data input for HCPL-4100							
Receiver 	HCPL-4200	300 mil DIP8	20 (1400)	1.6	1.0	1000	50	3750
	CMOS compatible data input for HCPL-4200							

Optoisolation Products



AC/DC to Logic Interface

Description

In the implementation of an interface from an electrically noisy environment into logic systems, it is often desirable to establish some current or voltage switching point or input switching threshold – the HCPL-3700 optocoupler provides such a solution. This device combines an AC or DC voltage and/or current detection function with high sensing input buffer ICs which permit control of threshold levels over a wide range like sensing industrial control systems, and ring detection in telephone system micro-processor interfacing.

The HCPL-0370/3700/3760 threshold-sensing optocoupler can be used for sensing the AC/DC power on/off condition. At the

optocoupler input, only a pair of series resistors $R_x/2$ are required to limit the current. The AC signal can be filtered with a capacitor at either the input or the output of the optocoupler. The value of R_x determines the threshold sensing voltage.

HCPL-0370/3700/3760's low threshold current reduces power dissipation and its built-in diode bridge and hysteresis circuit reduces the number of external components used.

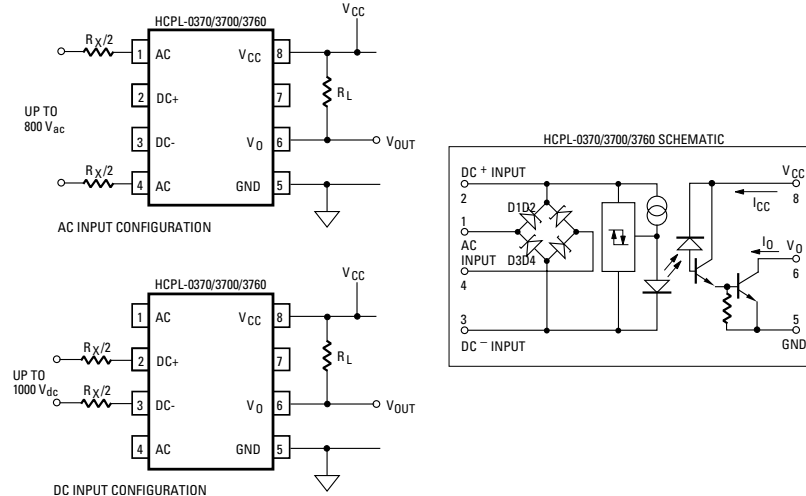
Benefits

- Low threshold current reduces power dissipation
- Hysteresis circuit reduces external components and PCB size

Applications

- Limit switch sensing
- Low voltage detector
- 5 V-240 V AC/DC voltage sensing
- Relay contact monitor
- Relay coil voltage monitor
- Current sensing
- Microprocessor interfacing

Typical Block Diagram



AC/DC to Logic Interface Product Selection

Device	Part No.	Package	Input Threshold Current		Hysteresis mA typ	t_{PLH} μs Max.	t_{PHL} μs Max.	CMR - $V/\mu s @ V_{CM}$		V_{ISO} V_{RMS} Min.
			mA					CMR $V/\mu s$ (Min.)	V_{CM} V	
			Min.	Max.						
	HCPL-0370	S08	1.96	3.11	1.2	40	15	600	140	3750
	HCPL-3700	300 mil DIP8	1.96	3.11	1.2	40	15	600	140	3750
	HCPL-3760	300 mil DIP8	0.87	1.56	0.6	40	15	600	140	3750
CMOS compatible output										

Optoisolation Products



High Linearity Analog Optocoupler

Description

Avago Technologies' Analog Isolation Applications with Linear Optocouplers HCNR200/1 constitute the basic optical coupling building blocks for high linearity isolation applications. The HCNR200/1 comprises of a high performance LED and two closely matched photodiodes. The output photodiode produces a photo current that is linearly related to the light output of the LED. These high speed, low cost isolation amplifiers are highly suitable for the use in the feedback path of switched mode power supplies, motor speed and position measurement. Very high linearity and excellent low transfer gain variation are the advantages of using HCNR200/1.

This circuit can be used in applications where high bandwidth, low-cost, and stable gain are required.

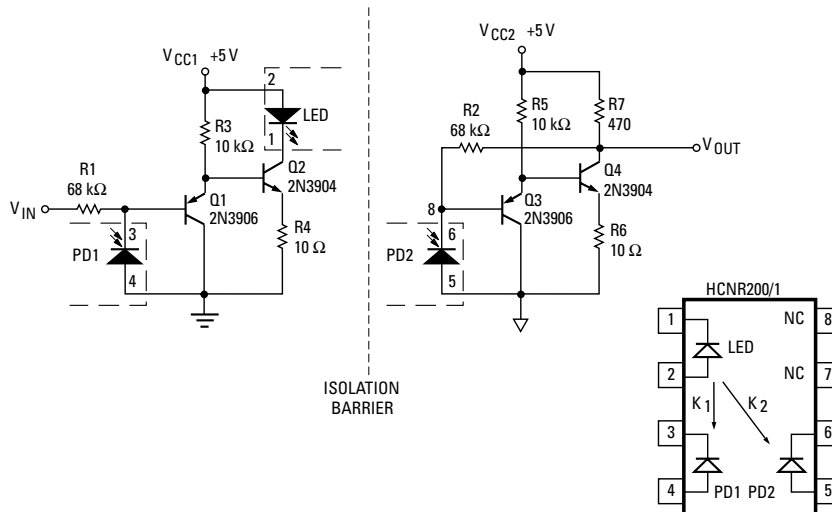
Benefits

- Simple and low cost
- Flexible design with the LED and both Photodiodes accessible to the designer
- Reinforced insulation

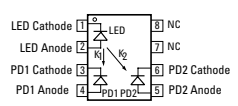
Applications

- Industrial process control:
 - Transducer isolator
 - Isolator for thermocouples
 - 4 mA to 20 mA loop isolation
- Low cost analog isolation
- Telecom: modem, PBX
- Switching power supply feedback loop and feedforward
- Monitor motor supply voltage
- Medical

Typical Block Diagram



High Linearity Analog Optocoupler Product Selection

Device	Part No.	Package	Transfer Gain % Max.	DC Non-Linearity % Max.	CTR		V_{ISO} V_{RMS} Min.	V_{IORM} V peak
					% Min.	% Max.		
	HCNR200	400 mil DIP8	+/-15	0.25	0.25	0.75	5000	1414*
	HCNR201	400 mil DIP8	+/-5	0.05	0.36	0.72	5000	1414*
-65 ppm/°C gain temperature coefficient 1.5 MHz bandwidth								

Notes:

* - with IEC/EN/DIN EN 60747-5-2 Option 050

Optoisolation Products



Wideband Analog/Video Optocoupler

Description

The HCPL-4562 and HCNW 4562 are recommended for very high bandwidth (up to 15 MHz) AC analog designs such as coupling audio or video signals.

This circuit, with the HCPL-4562 wideband analog/video optocoupler, is optimized for video signal coupling. The peaked response of the detector circuit helps extend the frequency range over which the gain is relatively constant. The number of gain stages, the overall circuit topology, and the DC bias point are all chosen to maximize the bandwidth.

HCPL-4562 provides simple and cost effective solutions for coupling audio and video signals.

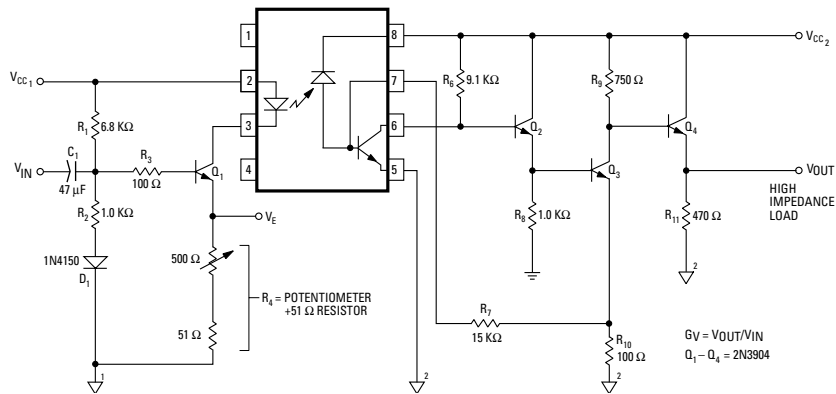
Benefits

- Optimized for video signal coupling
- Simple design for audio and video coupling
- Cost effective
- Reinforced insulation

Applications

- Video isolation for the following standards/formats:
NTSC, PAL, SECAM, S-VHS, ANALOG RGB
- Low drive current feedback
- Element in switching power supplies:
ISDN networks
- A/D converter signal isolation
- Analog signal ground isolation
- High voltage insulation

Typical Block Diagram



Wideband Analog/Video Optocoupler Product Selection

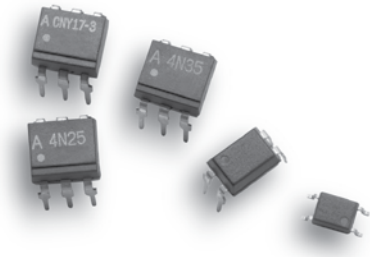
Device	Part No.	Package	Bandwidth MHz typ	DC Non-Linearity % Max.	CTR % typ	IMRR dB typ	V _{ISO} V _{RMS} Min.	V _{IORM} V peak
	HCNW4562	400 mil DIP8	9	0.15	52	119	5000	1414
	HCPL-4562	300 mil DIP8	17	0.25	45	122	3750/5000 [#]	630 [*]
0.3% / °C gain temperature coefficient								

Notes:

* - with IEC/EN/DIN EN 60747-5-2 Option 060

- with UL 5000V_{RMS}/1 minute Option 020

Optoisolation Products



General Purpose Phototransistor Optocoupler

Description

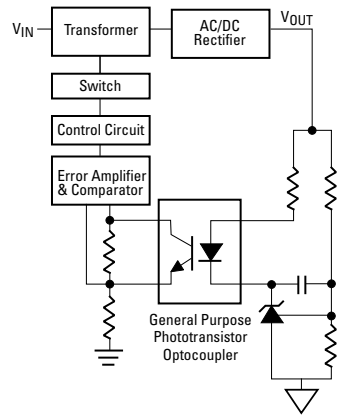
In switching power supply, Avago Technologies' phototransistor optocouplers are the preferred choice for providing isolated feedback for the regulation loop. For this application, they do an excellent job of isolation, minimizing circuit complexity and reducing cost.

For applications which require multiple isolated paths such as interfaces between logic circuits, the 2-channels and 4-channels phototransistors can be used.

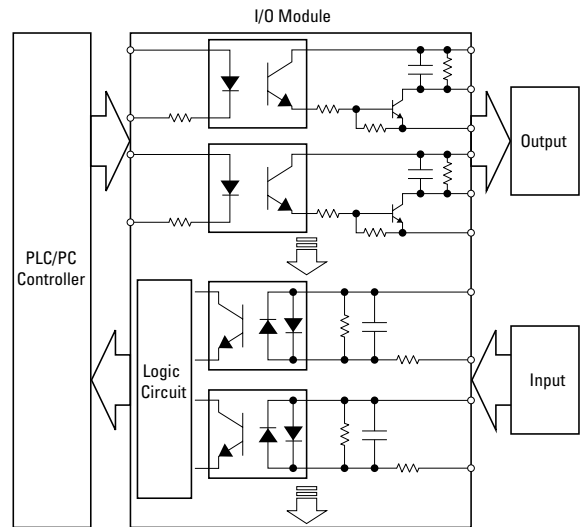
Applications

- Ground loop elimination
- Interface between logic circuits
- I/O or microprocessor interfacing
- Level shifting
- Regulation feedback circuits in smps

Typical Switching Power Supply Block Diagram

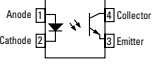
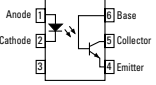
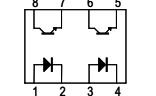
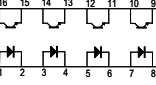


Programmable Logic Controller I/O Units



Optoisolation Products

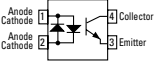
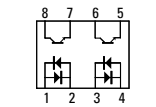
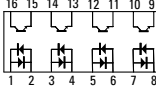
General Purpose Phototransistor Optocoupler – DC Input Product Selection

Device	Part No.	Package	Absolute Max. I_F mA	CTR				$V_{CE(sat)}$			t_r/t_f μs typ	BV_{CEO} V Min.	V_F		V_{ISO} V_{RMS} Min.	Note
				% Min.	% Max.	I_F mA	V_{CE} V	V Max.	I_F mA	I_C mA			V Max.	I_F mA		
 Single Channel-4 pin	ACPL-217-500E [§] NEW	S04	50	50	600	5	5	0.4	8	2.4	2/3	80	1.4	20	3000	1
	HCPL-181-000E [#]	S04	50	50	600	5	5	0.2	20	1	4/3	80	1.4	20	3750	1
	HCPL-817-000E* [§]	300 mil DIP4	50	50	600	5	5	0.2	20	1	4/3	70	1.4	20	5000	1/2/3
 Single Channel-6 pin	4N25-000E	300 mil DIP6	80	20	–	10	10	0.5	50	2	3/3	30	1.5	10	2500	1/2/3
	4N35-000E	300 mil DIP6	60	100	–	10	10	0.3	50	2	3/3	30	1.5	10	3550	1/2/3
	CNY17-1-000E	300 mil DIP6	60	40	80	10	5	0.3	10	2.5	5/5	70	1.7	60	5000	1/2/3
	CNY17-2-000E	300 mil DIP6	60	63	125	10	5	0.3	10	2.5	5/5	70	1.7	60	5000	1/2/3
	CNY17-3-000E	300 mil DIP6	60	100	200	10	5	0.3	10	2.5	5/5	70	1.7	60	5000	1/2/3
	CNY17-4-000E	300 mil DIP6	60	160	320	10	5	0.3	10	2.5	5/5	70	1.7	60	5000	1/2/3
 Dual Channel-8 pin	ACPL-827-000E [§] NEW	300 mil DIP8	50	50	600	5	5	0.2	20	1	4/3	70	1.4	20	5000	1/2/3
 Quad Channel-16 pin	ACPL-847-000E NEW	300 mil DIP16	50	50	600	5	5	0.2	20	1	4/3	70	1.4	20	5000	1/2/3

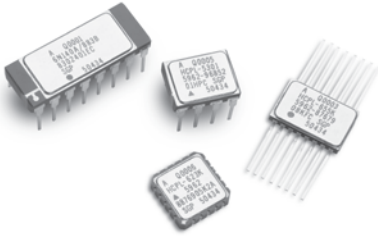
Notes:

- 1 - IEC/EN/DIN EN 60747-5-2 Option 060 available, 2 - 0.4" Lead Spacing Option W00 available, 3 - Gull Wing SMD option available
- * CTR rank with Option 000E, 00AE, 00BE, 00CE, 00DE and 00LE available, # - CTR rank with option 000E, 00AE, 00BE, 00CE and 00DE available
- @ CTR rank with Option 000E, 00BE and 00CE available
- § CTR rank with option 500E, 50AE, 50BE, 50CE and 50DE available,

General Purpose Phototransistor Optocoupler – AC Input

Device	Part No.	Package	Absolute Max. I_F mA	CTR				$V_{CE(sat)}$			t_r/t_f μs typ	BV_{CEO} V Min.	V_F		V_{ISO} V_{RMS} Min.	Note
				% Min.	% Max.	I_F mA	V_{CE} V	V Max.	I_F mA	I_C mA			V Max.	I_F mA		
 Single Channel-4 pin	ACPL-214-500E ^c NEW	S04	+/-50	20	400	± 5	5	0.4	± 8	2.4	2/3	80	1.4	± 20	3000	1
	HCPL-354-000E	S04	+/-50	20	400	± 1	5	0.2	± 20	1	4/3	35	1.4	± 20	3750	1
	HCPL-354-00AE	S04	+/-50	50	150	± 1	5	0.2	± 20	1	4/3	35	1.4	± 20	3750	1
	HCPL-814-000E	300 mil DIP4	+/-50	20	300	± 1	5	0.2	± 20	1	4/3	35	1.4	± 20	5000	1/2/3
	HCPL-814-00AE	300 mil DIP4	+/-50	50	150	± 1	5	0.2	± 20	1	4/3	35	1.4	± 20	5000	1/2/3
 Dual Channel-8 pin	ACPL-824-000E NEW	300 mil DIP8	+/-50	20	300	± 1	5	0.2	± 20	1	4/3	70	1.4	± 20	5000	1/2/3
 Quad Channel-16 pin	ACPL-844-000E NEW	300 mil DIP16	+/-50	20	300	± 1	5	0.2	± 20	1	4/3	70	1.4	± 20	5000	1/2/3

Optoisolation Products



Benefits

- Long term commitment - zero obsolescence
- Recognized for high quality, reliability, and customer support
- Certified and qualified to classes H and K of MIL-PRF-38534
- -55°C to +125°C operating temperature range
- All products available on DSCC SMD's
- General purpose and application specific products available

Applications

- Military end-use equipment and systems
- Aerospace
- Train control
- Medical equipment

Hermetic High Performance Optocouplers

Isolating one portion of an electrical circuit from another is the primary function of an optocoupler. These devices isolate different voltage levels between the input and output source. Avago Technologies' optocouplers are ideally suited for isolating highly sensitive portions of a circuit from the effects of transmitted common mode signals; offering a variety of input and output characteristics that enable their use in high speed, high performance applications. Avago Technologies' hermetic optocouplers excel in designs for harsh environments that require an exceptionally strong, rugged enclosure.

For design ease, we offer most functions in 8- and 16-Pin DIPs, 20 terminal LCCC's and 16-Pin Flat Packs with various lead configurations for thru-hole or surface mount, with either single, dual or quad channels. These products are capable of operation and storage over the full military temperature range of -55°C to +125°C and can be purchased as either commercial product or with full MIL-PRF-38534 Class Level H or K testing. In line with regulations and our customers needs, we do not offer unleaded solder on our solder dipped devices. All devices are manufactured and tested on a MIL-PRF-38534 certified line and are included in the DSCC (Defense Supply Center, Columbus) Qualified Manufacturers List QML-38534 for Hybrid Microcircuits.

Avago Technologies has supplied high reliability hermetic optocoupler products since 1975 for use in state-of-the-art applications. To meet the requirements of high reliability, products must be designed with rugged capabilities. They must be able to withstand severe levels of environmental stress and exposure without failure over extended periods

of time. We have accomplished this objective in designing optocouplers that have proven their merits in numerous advanced space and defense programs in the international marketplace. Avago Technologies' continuity and support of the industry has remained stable, with zero product obsolescence. We are committed to continued process and performance upgrades, backed up with diligent notification to our customers of any changes made.

If use in radiation environments is a concern, the shallow depth and small junctions featured in Avago Technologies' IC process provides high radiation immunity. Although the devices are not manufactured as "Rad-Hard", they have proven tolerant to radiation effects, which is substantiated by available data.

Statistical Process Control and extensive reliability monitoring (life testing of hundreds of thousands of hours) are standard processes for hermetic optocouplers. Control charts are utilized at each critical step of the process and reviewed by product engineering to assure expected quality and reliability.

Avago Technologies is a champion of DSCC's QML and SMD (Standard Microcircuit Drawing) programs. We support standardization, which results in cost-effectiveness and a streamlined acquisition process. As such Avago Technologies offers all Class H and Class K products under SMD numbers. Each Hi-Rel device is dual marked with the DSCC SMD and Avago Technologies' part numbers.

Our Screening and Quality Conformance Inspection is outlined on the following page. Custom programs may include full Group A, B, C, and D inspection if required.

Optoisolation Products

Screening per MIL-PRF-38534

Procedure	Method	Conditions	Class H	Class K
Nondestruct bond pull	2023		N/A	100%
Internal visual	2017		100%	100%
Temperature cycle	1010	Condition C, -65°C to +125°C, 10 cycles	100%	100%
Constant acceleration	2001	3Kg's, Y1 and Y2	100%	100%
Visual inspection		Internal requirements	100%	100%
PIND*	2020	Condition A	N/A	N/A*
Serialization			N/A	100%
Pre-Burn-In Elec. Test		Group A, subgroup 1 (except I ₁₋₀) (DC @ +25°C)	100%	100%
Burn-In	1015	Condition B, +125°C, 160 hours Condition B, +125°C, 320 hours	100%	100%
Interim Elec. Test		Group A, subgroup 1 (except I ₁₋₀) (DC @ +25°C)	N/A	100%
Post Burn-In Elec. Test		Group A, subgroup 1, (DC @ +25°C), 10% PDA Group A, subgroup 1, (DC @ +25°C), 2% PDA	100%	100%
Final Elec. Test		Group A, subgroup 2 (DC @ +125°C) Group A, subgroup 3 (DC @ -55°C) Group A, subgroup 9 (AC @ +25°C) Group A, subgroup 10 (AC @ +125°C) Group A, subgroup 11 (AC @ -55°C)	100% 100% 100% 100% 100%	100% 100% 100% 100% 100%
Fine Leak	1014	Condition A	100%	100%
Gross Leak	1014	Condition A	100%	100%
Radiographics	2012		N/A	100%
External visual	2009		100%	100%

* PIND and RGA (Internal Water Vapor Content) testing (Group C) is no longer required on Avago Technologies optocouplers due to the construction of the devices. DSCC approved this test elimination in 2002.

Quality Conformance Inspection

Group A Testing

Group A testing is satisfied per the in-line verification testing requirements of MIL-PRF-38534 for Class H devices utilizing Option 1.

Group A testing is performed per end of line sample testing requirements of MIL-PRF-38534 for Class K devices utilizing Option 2.

Group B Testing

Group B testing is satisfied by performing in-line process monitors as required by MIL-PRF-38534 for Class H devices utilizing Option 1.

Group B testing is satisfied by performing end of line sampling as required by MIL-PRF-38534 for Class K devices utilizing Option 2.

Group C Testing

Group C testing is performed only on the first inspection lot and as required to evaluate or qualify changes per the requirements of MIL-PRF-38534.

Group D Testing

Group D testing is not performed. Note that Group D requirements are satisfied during incoming inspection element evaluation.

Please be advised that Class H and Class K devices have very similar Screening and Quality Conformance Inspection requirements as shown above. Class K devices, however, have substantially more stringent element evaluation and assembly criteria. The quality and reliability of a Class K device must be built in, not tested out.

Optoisolation Products

Hermetically Sealed High Speed Logic Gate Optocouplers

Single Channel Schematic	Commercial Part Number	Class H	DSCC SMD Class H *	Class K	DSCC SMD Class K *	Package				No. of Channels	Typical Data Rate	Common Mode@ V _{CM} =50V	Input Current	Withstand Test Voltage
						8 pin DIP	16 pin DIP	16 pin FP	20 pad LCCC					
	HCPL-5200	HCPL-5201	5962-8876801	HCPL-520K	5962-8876802K	•				1	5MBd	1000V/μs	2-8 mA	1500 Vdc
	HCPL-5230	HCPL-5231	5962-8876901	HCPL-523K	5962-8876904K	•				2	5MBd	1000V/μs	2-8 mA	1500 Vdc
	HCPL-6230	HCPL-6231	5962-8876902	HCPL-623K	5962-8876905K				•	2	5MBd	1000V/μs	2-8 mA	1500 Vdc
	HCPL-6250	HCPL-6251	5962-8876903	HCPL-625K	5962-8876906K			•		4	5MBd	1000V/μs	2-8 mA	1500 Vdc
	HCPL-5400	HCPL-5401	5962-8957001	HCPL-540K	5962-8957002K	•				1	20MBd	500V/μs	6-10 mA	1500 Vdc
	HCPL-5430	HCPL-5431	5962-8957101	HCPL-543K	5962-8957103K	•				2	20MBd	500V/μs	6-10 mA	1500 Vdc
	HCPL-6430	HCPL-6431	5962-8957102	HCPL-643K	5962-8957104K			•		2	20MBd	500V/μs	6-10 mA	1500 Vdc
	6N134	6N134/883B	8102801	HCPL-268K	5962-9800101K		•			2	10MBd	1000V/vs	10 mA	1500 Vdc
	HCPL-5600	HCPL-5601	5962-9085501H	HCPL-560K	5962-9085501K	•				1	10MBd	1000V/μs	10 mA	1500 Vdc
	HCPL-5630	HCPL-5631	8102802	HCPL-563K	5962-9800102K	•				2	10MBd	1000V/μs	10 mA	1500 Vdc
	HCPL-5650	HCPL-5651	8102805			•				2	10MBd	1000V/μs	10 mA	2500 Vdc
	HCPL-6630	HCPL-6631	8102803	HCPL-663K	5962-9800103K			•		2	10MBd	1000V/μs	10 mA	1500 Vdc
	HCPL-6650	HCPL-6651	8102804	HCPL-665K	5962-9800104K			•		4	10MBd	1000V/μs	10 mA	1500 Vdc
	HCPL-1930	HCPL-1931	5962-8957201	HCPL-193K	5962-8957202K		•			2	10MBd	1000V/μs	10 mA	1500 Vdc

*DSCC SMD number does not include extensions for lead form and finish

Hermetically Sealed High Speed Transistor Optocouplers

Single Channel Schematic	Commercial Part Number	Class H	DSCC SMD Class H *	Class K	DSCC SMD Class K *	Package				No. of Channels	Typical Data Rate	Current Transfer Ratio	Input Current	Withstand Test Voltage
						8 pin DIP	16 pin DIP	16 pin FP	20 pad LCCC					
	4N55	4N55/883B	5962-8767901	HCPL-257K	5962-8767905K		•			2	700 Kbd	9% Min.	16 mA	1500 Vdc
	HCPL-5500	HCPL-5501	5962-9085401H	HCPL-550K	5962-9085401K	•				1	700 Kbd	9% Min.	16 mA	1500 Vdc
	HCPL-5530	HCPL-5531	5962-8767902	HCPL-553K	5962-8767906K	•				2	700 Kbd	9% Min.	16 mA	1500 Vdc
	HCPL-6530	HCPL-6531	5962-8767903	HCPL-653K	5962-8767907K			•		2	700 Kbd	9% Min.	16 mA	1500 Vdc
	HCPL-6550	HCPL-6551	5962-8767904	HCPL-655K	5962-8767908K			•		4	700 Kbd	9% Min.	16 mA	1500 Vdc

*DSCC SMD number does not include extensions for lead form and finish

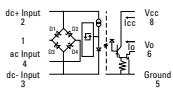
Hermetically Sealed High Gain Optocouplers

Single Channel Schematic	Commercial Part Number	Class H	DSCC SMD Class H *	Class K	DSCC SMD Class K *	Package				No. of Channels	Typical Data Rate	Current Transfer Ratio	Input Current	Withstand Test Voltage
						8 pin DIP	16 pin DIP	16 pin FP	20 pad LCCC					
	6N140A		8302401	HCPL-177K	5962-9800201K		•			4	100 Kbd	300% Min.	0.5-5 mA	1500 Vdc
	HCPL-5700	HCPL-5701	5962-8981001	HCPL-570K	5962-8981002K	•				1	100 Kbd	300% Min.	0.5-5 mA	1500 Vdc
	HCPL-5730	HCPL-5731	5962-8978501	HCPL-573K	5962-8978503K	•				2	100 Kbd	300% Min.	0.5-5 mA	1500 Vdc
	HCPL-6730	HCPL-6731	5962-8978502	HCPL-673K	5962-8978504K			•		2	100 Kbd	300% Min.	0.5-5 mA	1500 Vdc
	HCPL-6750	HCPL-6751	8302401	HCPL-675K	5962-9800201K			•		4	100 Kbd	300% Min.	0.5-5 mA	1500 Vdc

*DSCC SMD number does not include extensions for lead form and finish

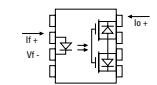
Optoisolation Products

Hermetically Sealed AC/DC to Logic Interface Optocouplers

Single Channel Schematic	Commercial Part Number	Class H	DSCC SMD Class H *	Class K	DSCC SMD Class K *	8 pin DIP	No. of Channels	Typical Data Rate	Input Threshold Current	Output Current	Withstand Test Voltage
	HCPL-5760	HCPL-5761	5962-8947701	HCPL-576K	5962-8947702K	•	1	100 KHz	2.5 mA TH+ 1.3 mA TH-	2.6 mA	1500 Vdc

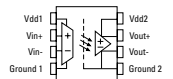
*DSCC SMD number does not include extensions for lead form and finish

Hermetically Sealed Power MOSFET

Single Channel Schematic	Commercial Part Number	Class H	DSCC SMD Class H *	Class E	DSCC SMD Class E *	Package 8 pin DIP	No. of Channels	Output Withstand Voltage	Output On-Resistance	Maximum Load Current	Maximum Off-State Leakage	Input Current	Input/Output Insulation
	HSSR-7110			HSSR-711E		•	1	90 V	1.0 Ohm	0.8 A ac 1.6 A dc	250 mA	10-20mA	1500 Vdc
						•	1	90 V	1.0 Ohm	0.8 A ac 1.6 A dc	250 mA	5-20mA	1500 Vdc

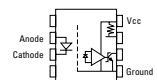
*DSCC SMD number does not include extensions for lead form and finish

Hermetically Sealed Analog Isolation Amplifier

Single Channel Schematic	Commercial Part Number	Class H	DSCC SMD Class H *	Class K	DSCC SMD Class K *	Package 8 pin DIP	No. of Channels	Gain Tolerance (Max. %)	Non-Linearity (Max. %)	Prop Delay μ s (Max.)	CMR V/ μ s (Min.)	Bandwidth KHz (typ.)	Offset mV (typ.)
	HCPL-7850	HCPL-7851	5962-9755701H			•	1	5	0.1	11	5000	100	0.6

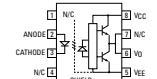
*DSCC SMD number does not include extensions for lead form and finish

Hermetically Sealed Intelligent Power Module and Gate Drive Interface

Single Channel Schematic	Commercial Part Number	Class H	DSCC SMD Class H *	Class K	DSCC SMD Class K *	Package 8 pin DIP	No. of Channels	Typical Data Rate	Current Transfer Ratio	Input Current	Common Mode @ $V_{CM}=1000V$	Withstand Test Voltage
	HCPL-5300	HCPL-5301	5962-9685201H	HCPL-530K	5962-9685201K	•	1	2MBd	30 % Min.	10-20 mA	10kV/ μ s	1500 Vdc

*DSCC SMD number does not include extensions for lead form and finish

Hermetically Sealed Output Current IGBT Gate Drive

Single Channel Schematic	Commercial Part Number	Class H	DSCC SMD Class H *	Class K	DSCC SMD Class K *	Package 8 pin DIP	No. of Channels	Peak Output Current	UVLO+	UVLO-	Input Current	Common Mode @ $V_{CM}=1000V$	Withstand Test Voltage
	HCPL-5120	HCPL-5121	5962-0420401H			•	1	2.0 A	13.5V Max.	9.5V Min.	10-18 mA	10kV/ μ s	1500 Vdc
	HCPL-5150	HCPL-5151	5962-0420501H			•	1	0.5 A	13.5V Max.	9.5V Min.	10-18 mA	10kV/ μ s	1500 Vdc

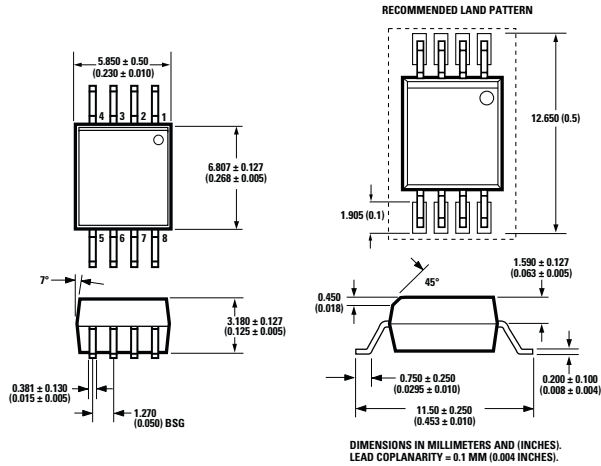
*DSCC SMD number does not include extensions for lead form and finish

Optoisolation Products

Optocoupler Package Dimensions

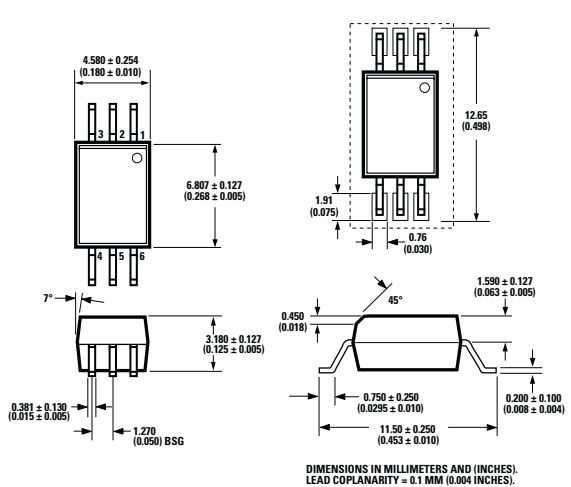
ACPL-Kxxx

- Stretched S08
- 8mm Clearance
- 8mm Creepage



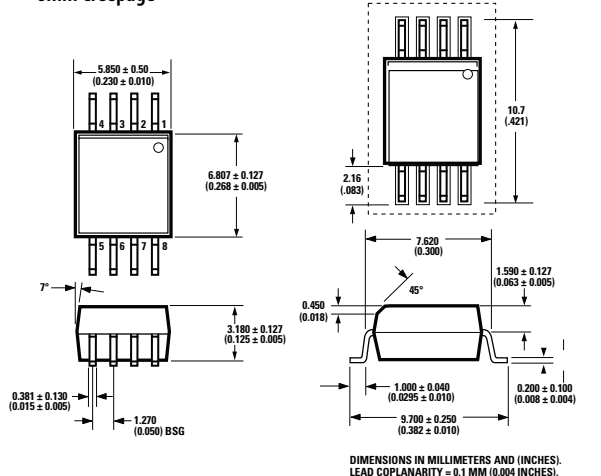
ACPL-Wxxx

- Stretched S06
- 8mm Clearance
- 8mm Creepage



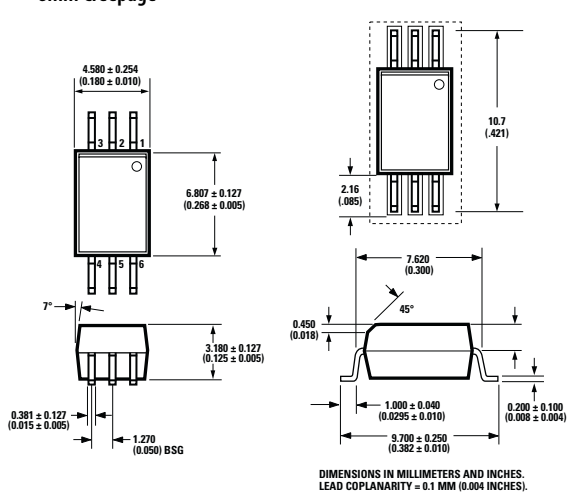
ACPL-Hxxx

- Stretched S08
- 7mm Clearance
- 8mm Creepage



ACPL-Pxxx

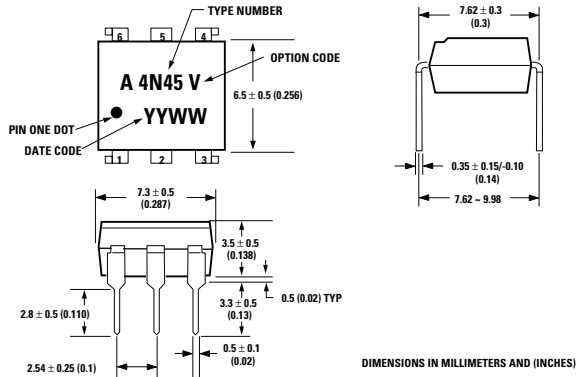
- Stretched S06
- 7mm Clearance
- 8mm Creepage



Optoisolation Products

Optocoupler Package Dimensions

300 mil 6 pin DIP

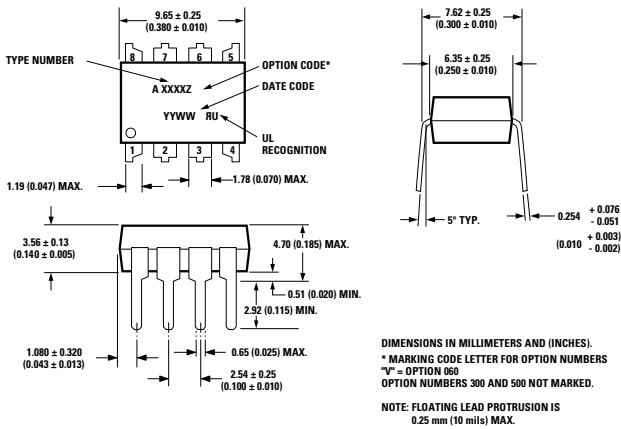


Options Available

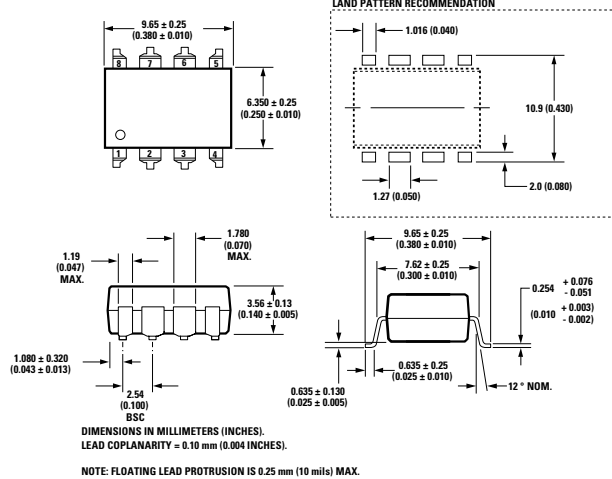
- 020 = UL 5000 V_{rms} /1 Minute Option
- 060 = IEC/EN/DIN EN 60747-5-2 Approved Part Option
- 300 = Gull Wing Surface Mount Option
- 500 = Tape & Reel Packaging Option
- xxxE = Lead Free Option

Remarks: The notation '# ' is used for existing products, while (new) products launched since 15th July 01 will use '-/

300 mil 8 pin DIP



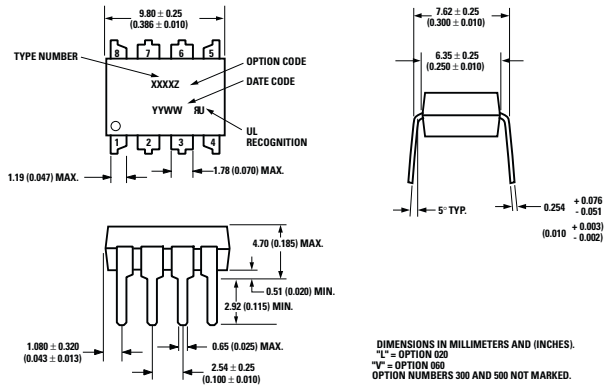
300 mil 8 pin DIP Gullwing Option 300 SMD



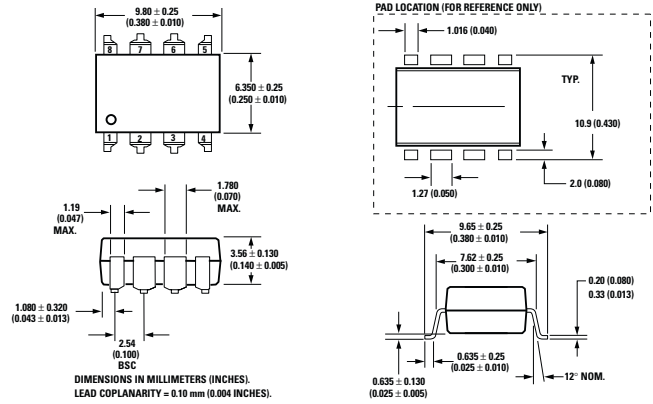
Optoisolation Products

Optocoupler Package Dimensions

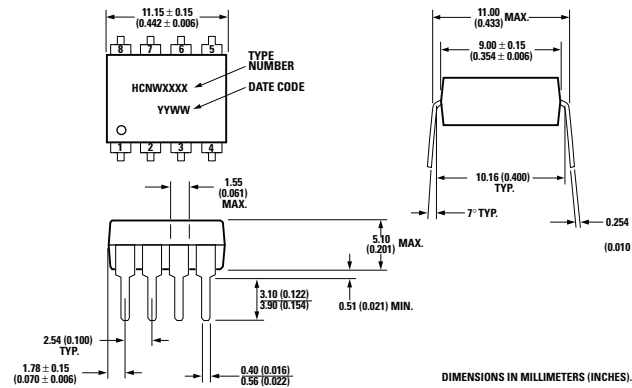
300 mil 8 pin DIP (white)



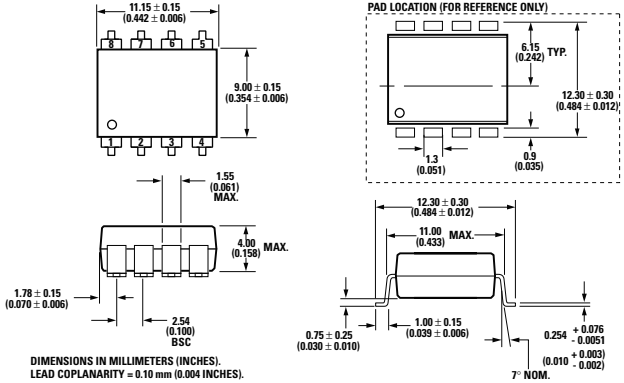
300 mil 8 pin DIP (white) Gullwing Option 300 SMD



400 mil 8 pin DIP



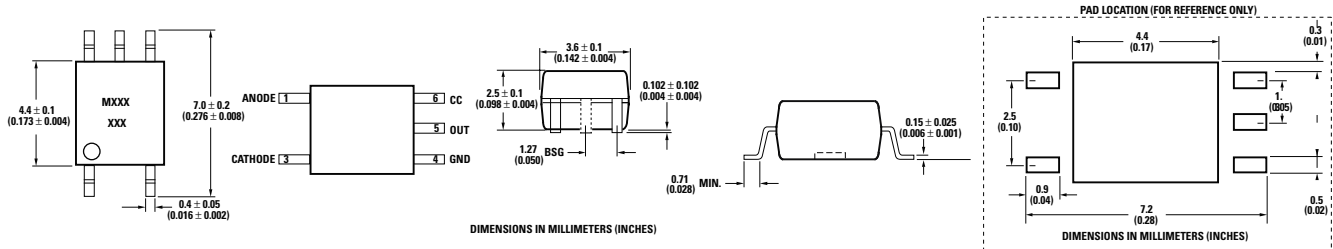
400 mil 8 pin DIP Gull Wing Option 300 SMD



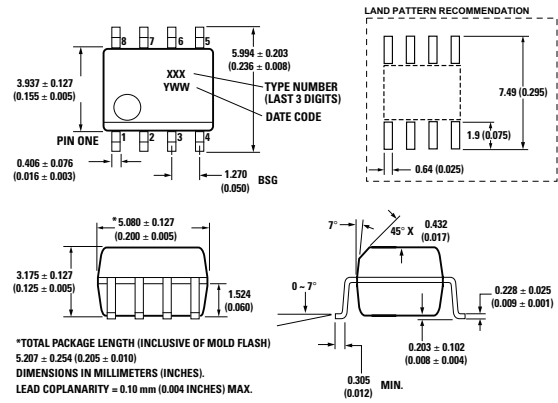
Optoisolation Products

Optocoupler Package Dimensions

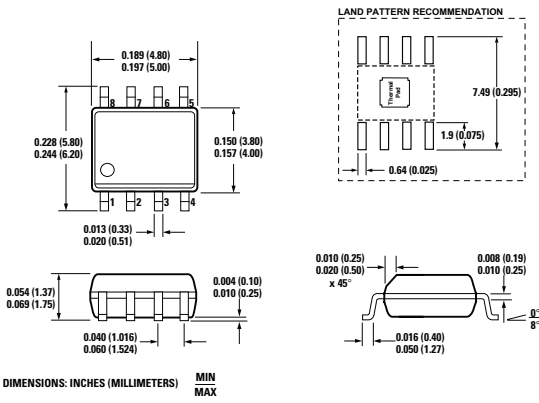
S05 SMD



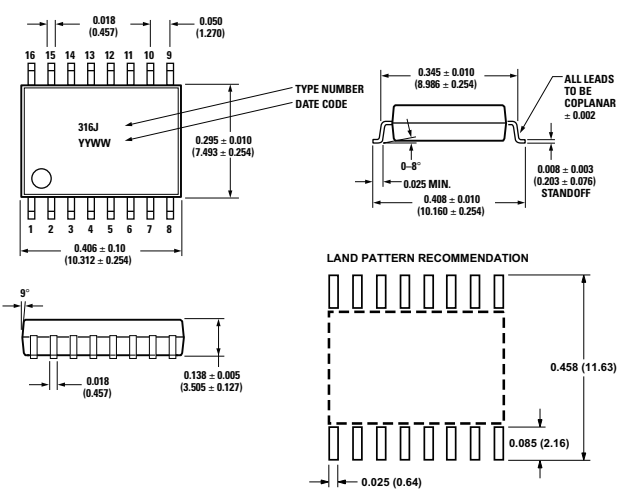
S08 SMD



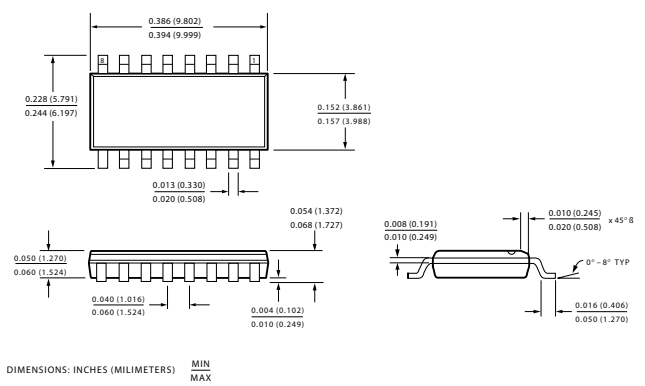
S08 SMD (ACSL-6210, ACPL-0820 & HCPL-0810)



S016 SMD



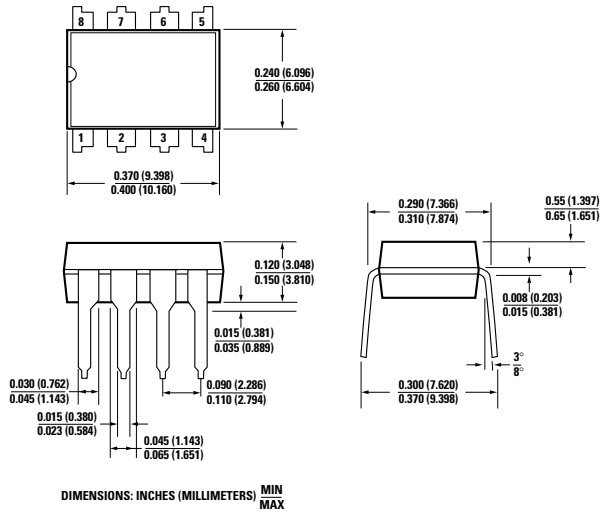
S016 SMD (ACSL-6300/6310/6400/6410/6420)



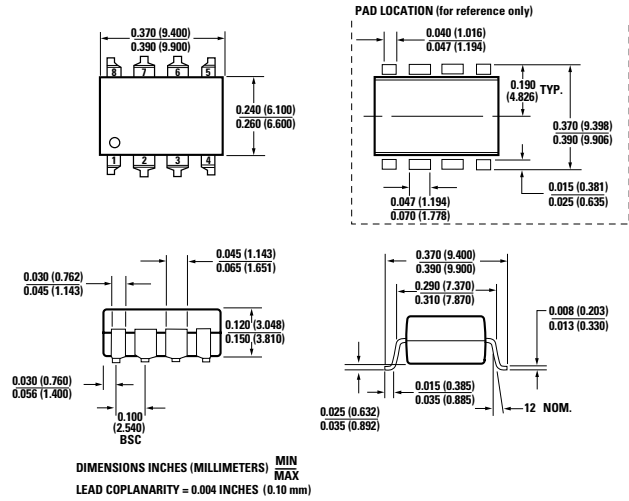
Optoisolation Products

Digital Isolator Package Dimensions

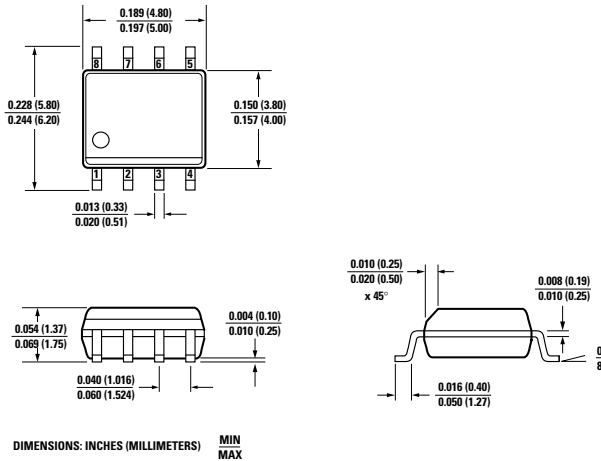
300 mil 8 pin DIP



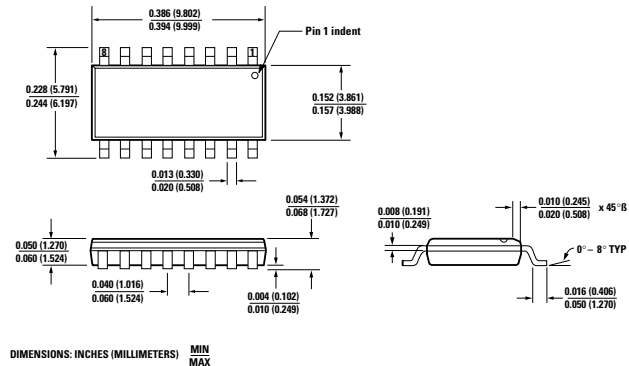
300 mil 8 pin Gull Wing Option 300 SMD



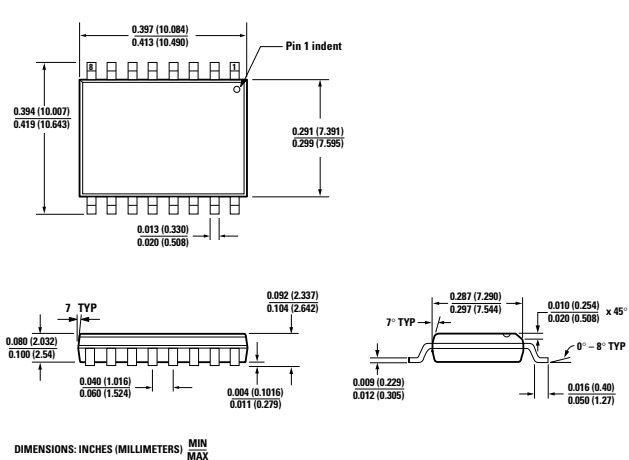
S08 SMD



Narrowbody SOIC 16 pin



Widebody SOIC 16 pin



Options Available

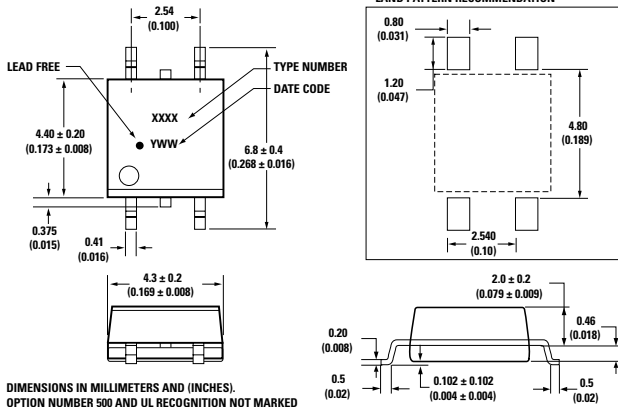
- 300 = Lead Bend SMD Option (300 mil 8 pin DIP)
- 500 = Tape and Reel Packaging Option
- xxxE = Lead Free Option

Remarks: The notation "#" is used for existing products, while (new) products launched since 15th July 01 will use "-".

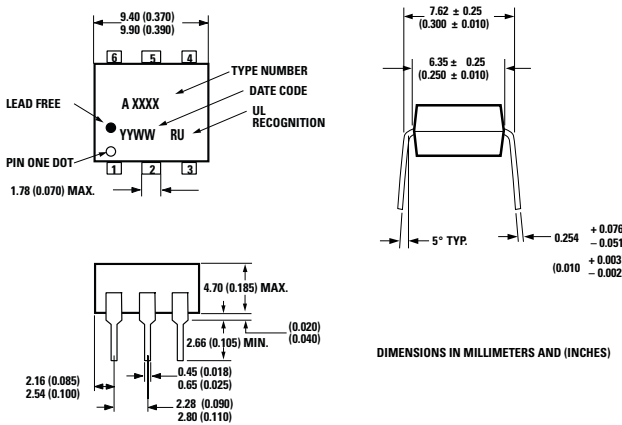
Optoisolation Products

Solid State Relay (Photo MOSFET) Package Dimensions

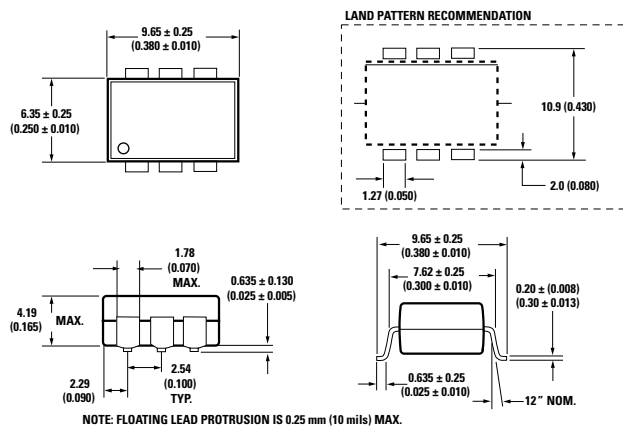
S04 SMD



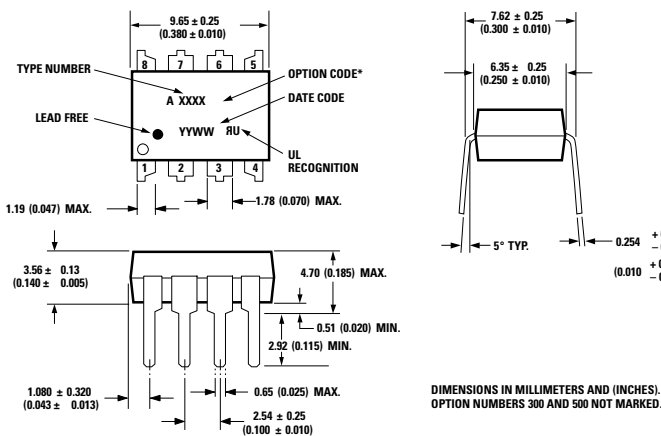
300 mil 6 pin DIP



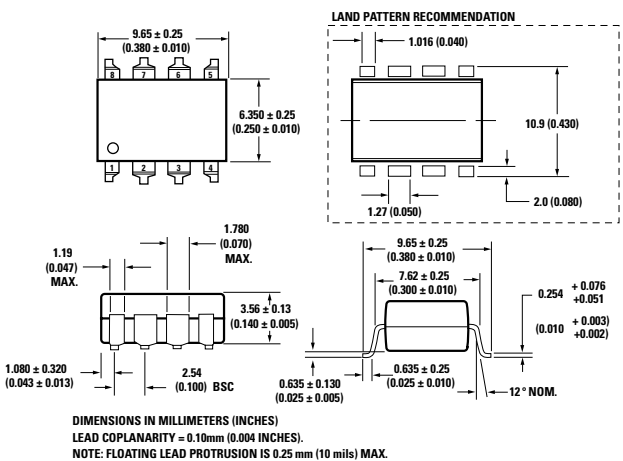
300 mil 6 pin DIP Gull Wing Surface Mount Option 300



300 mil 8 pin DIP



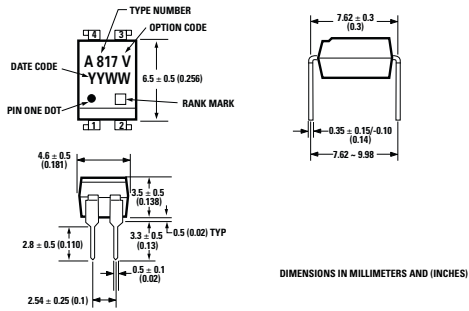
300 mil 8 pin DIP Gull Wing Surface Mount Option 300



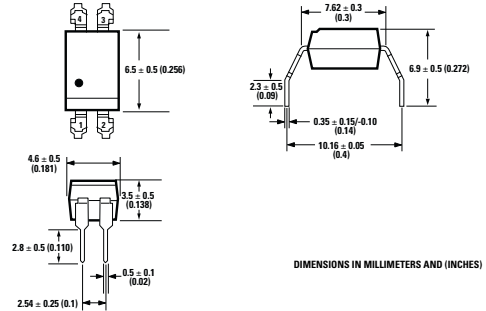
Optoisolation Products

Phototransistor Package Dimensions

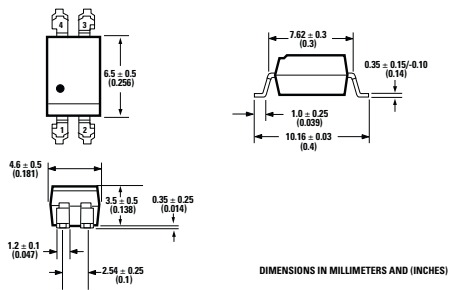
300 mil 4 pin DIP



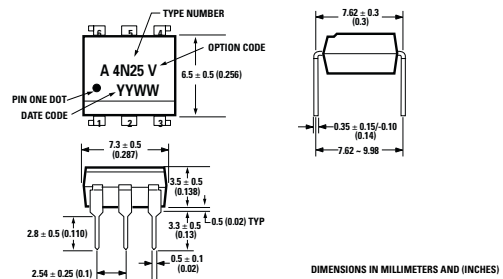
400 mil 4 pin 0.4" Lead Spacing Option



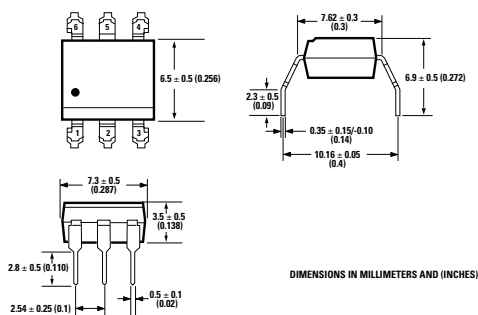
300 mil 4 pin Lead Bend Option 300 SMD



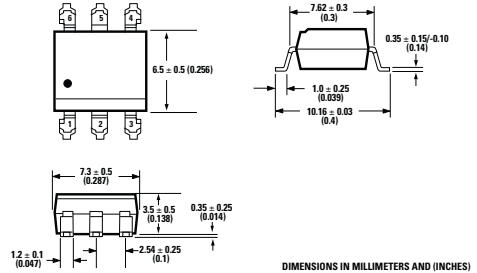
300 mil 6 pin DIP



400 mil 6 pin 0.4" Lead Spacing Option



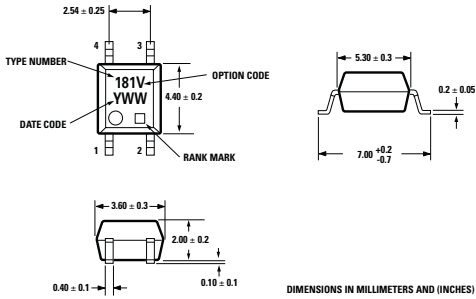
300 mil 6 pin Lead Bend Option 300 SMD



Optoisolation Products

Phototransistor Package Dimensions Continued

4 pin Miniflat SMD

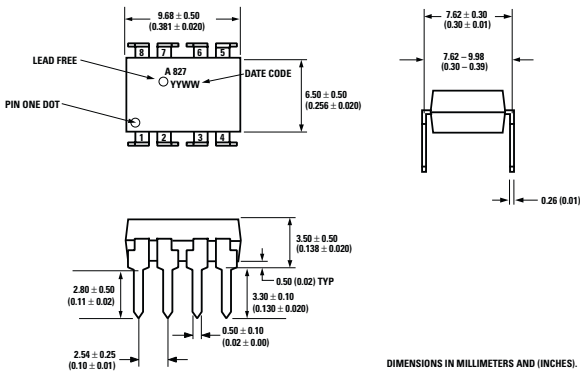


Options Available

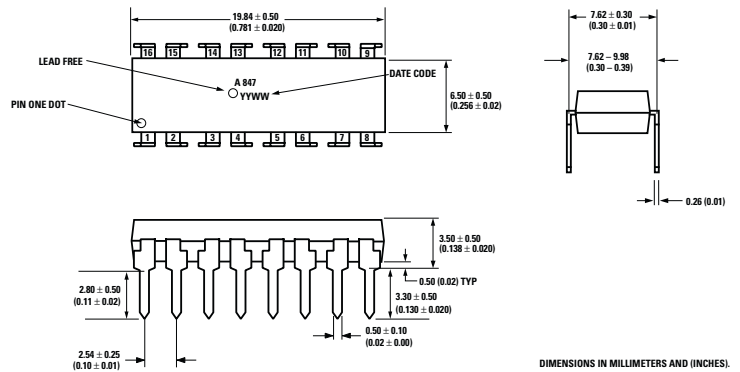
060E = IEC/EN/DIN EN 60747-5-2 Option
 W00E = 0.4" Lead Spacing Option
 300E = Lead Bend SMD Option
 500E = Tape and Reel Packaging Option
 CTR rank options can be found in product's datasheet

Remarks: The notation '#' is used for existing products, while (new) products launched since 15th July 01 will use '-'.

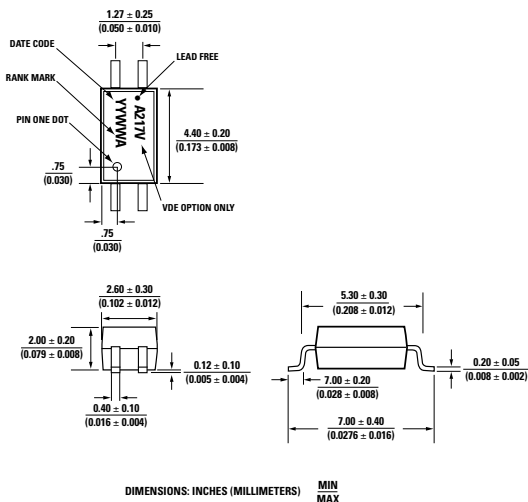
300 mil 8 pin DIP



300 mil 16 pin DIP



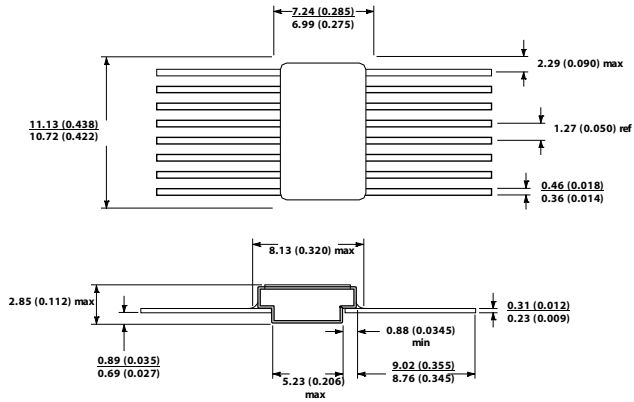
S04 SMD (half-pitch)



Optoisolation Products

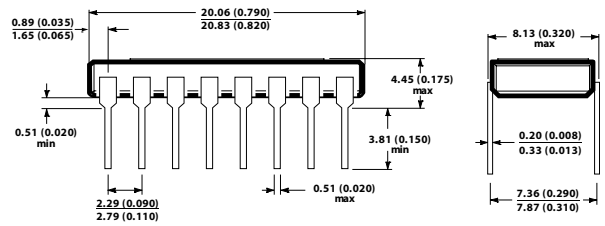
Hermetic Optocoupler Package Dimensions

16 pin Flat Pack (4 Channel)



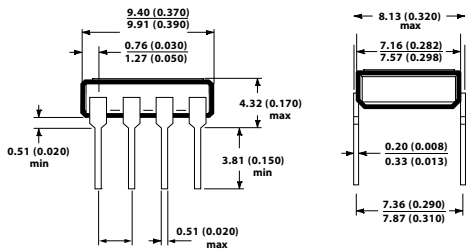
Note: Dimensions in millimeters (inches)

16 pin DIP Through Hole (2 or 4 Channel)



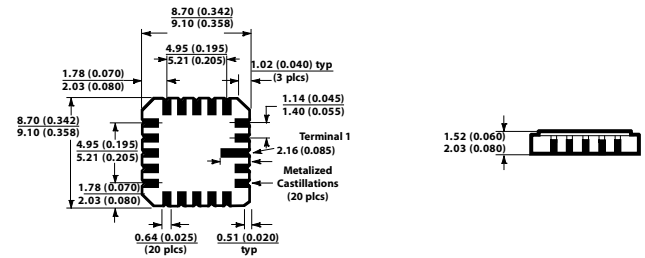
Note: Dimensions in millimeters (inches)

8 pin DIP Through Hole (1 or 2 Channel)



Note: Dimensions in millimeters (inches)

20 Terminal LCCC Surface Mount (2 Channel)

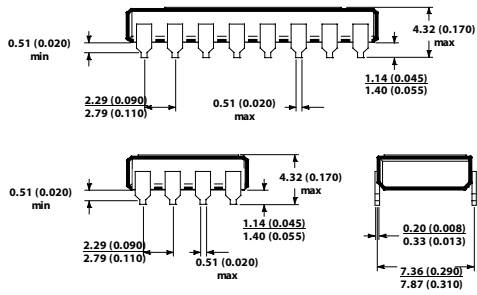


Note: Dimensions in millimeters (inches)
Solder thickness 0.127 (0.005) max.

Optoisolation Products

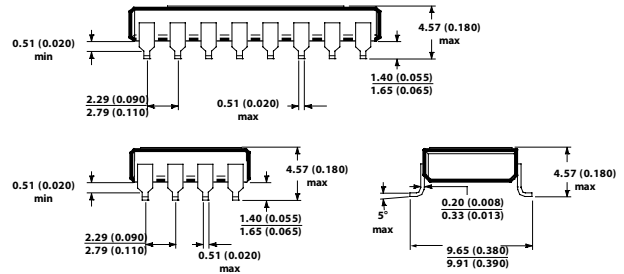
Hermetic Optocoupler Package Dimensions Continued

Option 100, Surface Mount Butt Joint,
available on 8 and 16 pin DIP's



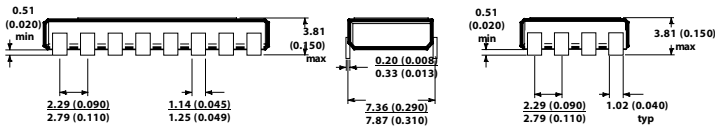
Note: Dimensions in millimeters (inches)

Option 300, Surface Mount Gull Wing,
available on 8 and 16 pin DIP's



Note: Dimensions in millimeters (inches)

Option 600, Surface Mount Short Butt Joint,
available on 8 and 16 pin DIP's



Note: Dimensions in millimeters (inches)

Optoisolation Products

Function vs Application Matrix

Function		Digital Isolation						Analog Isolation							
Market	Application	Power Device Drive		Data Communication			A-D Isolation		Voltage Monitor	Current Sensing	Voltage Sensing	Signal Amp	Signal Switching	Powerline Comm	Power Supply Feedback
		Inverter	IPM	Field Bus	RS422/485	Others	ADC/DAC	V-F Converter							
Industrial	Automated Test Equipment			8	1, 6	3, 4, 5, 11, 17, (18)		2, 6, (18)	13				21		
	Board CPU			8	1, 6	3, 4, 5, 11, 17, (18)	6, (18)	2, 6, (18)							
	Elevator	9	20			17			13	10	10, 14, 15		21		
	FFT/Data Logger					17	6, 7, (18)								
	Industrial Induction Cooking	9	20			17				10	10, 14, 15				
	Industrial Networking			7, 8, (18)	1, 6, (18)	3, 4, 5, 11, 17, (18)									
	Instrument			8	1, 6	3, 4, 5, 11, 17, (18)	6, (18)						21		17
	Motor Control	9	20	7, 8	6	3, 4, 5, 11, 17, (18)	6, (18)	2, 6, (18)	13	10	10, 14, 15		21		17
	NC/Robot	9	20	7, 8	6	3, 4, 5, 11, 17, (18)	6, (18)		13	10	10, 14, 15		21		
	On-board Power Supply					17	6, (18)								17
	Panel Switches			8	1, 6	3, 4, 5, 11, 17, (18)	6, (18)						21		
	PLC			7, 8, (18)	1, 6, (18)	3, 4, 5, 12, 17, (18)	6, (18)	2, 6, (18)	13				21		
	Power Distribution System	9	20	8		3, 4, 5, 12, 17, (18)			13				21		17
	Process Meter			7, 8, (18)	1, 6, (18)	12, 17, (18)	6, (18)	2, 6, (18)	13		14, 15		21		
	Remote Meter Reading												21	19	
	Servo Driver	9	20	7, 8	6	3, 4, 5, 11, 17, (18)	6, (18)		13	10	10, 14, 15				17
	Sewing Machine	9	20			17			13	10	10, 14, 15				17
	Solar Generator	9	20	8		17			13	10	10, 14, 15				17
	Switching Power Supply	9	20			17				10	10, 14, 15				17
	Test & Measurement Equipment			7, 8, (18)	1, 6, (18)	3, 4, 5, 11, 17, (18)	6, (18)		13				21		
Thermo Counter/Recorder			8	6	3, 4, 5, 11, 17, (18)	6, (18)	2, 6, (18)								
Welding	9	20						13	10	10, 14, 15					
Medical	Defibrillator	9													
	Electrocardiograph (ECG/EKG)					6, 7 (18)	6, 7 (18)		10	10, 14	10				
	Endoscopes					6, 7 (18)	6, 7 (18)				10				
	Esophagus Photoplethysmography (PPG)					6, 7 (18)	6, 7 (18)				10				
	Magnetic Resonance Imaging (MRI)	9				6, 7 (18)	6, 7 (18)		10		10				
	Patient Monitoring			7, 8		6, 7 (18)	6, 7 (18)				10				
	X-Ray	9				6, 7 (18)	6, 7 (18)		10						

Note: Number in bracket () indicates non-optical isolation product

- | | | | |
|-----------------------------------------------------|---------------------------------------------------|------------------------------------------------------|----------------------------------------------------|
| 1. 3.3V Digital Optocoupler Family | 6. 10 MBd Logic Gate Optocoupler | 12. Isolated 20 mA Current Loop Transmitter/Receiver | 18. Digital Isolator |
| 2. 1 MBd Transistor Output Optocoupler | 7. 20 MBd Logic Gate Optocoupler | 13. AC/DC to Logic Interface | 19. Powerline Communication Interface |
| 3. 100 kBd Darlington Transistor Output Optocoupler | 8. High Speed Digital CMOS Logic Gate Optocoupler | 14. High Linearity Analog Optocoupler | 20. Intelligent Power Module Interface Optocoupler |
| 4. 5 MBd Logic Gate Optocoupler | 9. Integrated Gate Drive Optocoupler | 15. Wideband Analog/Video Optocoupler | 21. Solid State Relay (Photo MOSFET) |
| 5. 8 MBd Logic Gate Optocoupler | 10. Miniature Analog Isolation Amplifier | 16. Hermetic High Performance Optocoupler | 22. Automotive Optocoupler |
| | 11. Isolated Line Receiver | 17. General Purpose Phototransistor Optocoupler | |

Optoisolation Products

Function vs Application Matrix Continued

Function		Digital Isolation							Analog Isolation						
Market	Application	Power Device Drive		Data Communication			A-D Isolation		Voltage Monitor	Current Sensing	Voltage Sensing	Signal Amp	Signal Switching	Powerline Comm	Power Supply Feedback
		Inverter	IPM	Field Bus	RS422/485	Others	ADC/DAC	V-F Converter							
Transportation	EV	9	20, 22	6, 7, 8, 22		6, 22			10, 13	10			21		
	Transportation System	9	20, 22	6, 7, 8, 22		6, 22							21		
Computing and Office Automation	ECR, POS				2,4,5,6	6, 7, 8, 17, (18)									17
	Isolated I/O				2,4,5,6	6, 7, 8, 17, (18)									
	Isolated USB				2,4,5,6	6, 7, 8, 17, (18)									
	Network				2,4,5,6	6, 7, 8, 17, (18)							21		
	UPS	9	20			8, 17			13	10	10, 14, 15				17
Consumer	Air Conditioning	9	20			17				10			21		17
	Electronic Gaming				6	6, 17, (18)									17
	Fitness Equipment	9	20					13	10		10				17
	Induction Heating Cookers	9	20												
	Musical (MIDI)					6, 17, (18)									
	Plasma Displays					2, 6, 8, 9, 17									
	Refrigerator	9	20			17							21		17
	Washing Machines	9	20			17							21		17
Communications	ISDN				1,2,3	7, 8, 17			13				21		17
	PBX and Central Office				1,2,3	3, 17			13				21		17
	Power Line Communication												21	19	
	Power-Over-Ethernet (PoE)			7, 8		1, 6									
	Telephone Switching Equipment					6, 7, 8, 17, (18)							21		17
	Telephone Terminal Equipment					6, 7, 8, 17, (18)							21		17
	Wireless Base Station					6, 7, 8, 17, (18)							21		17
Aerospace/ Defense/ Government		16	16	16	16	16	16	16	16	16	16	16	16		

Note: Number in bracket () indicates non-optical isolation product

- | | | | |
|-----------------------------------------------------|---------------------------------------------------|------------------------------------------------------|----------------------------------------------------|
| 1. 3.3V Digital Optocoupler Family | 6. 10 MBd Logic Gate Optocoupler | 12. Isolated 20 mA Current Loop Transmitter/Receiver | 18. Digital Isolator |
| 2. 1 MBd Transistor Output Optocoupler | 7. 20 MBd Logic Gate Optocoupler | 13. AC/DC to Logic Interface | 19. Powerline Communication Interface |
| 3. 100 kBd Darlington Transistor Output Optocoupler | 8. High Speed Digital CMOS Logic Gate Optocoupler | 14. High Linearity Analog Optocoupler | 20. Intelligent Power Module Interface Optocoupler |
| 4. 5 MBd Logic Gate Optocoupler | 9. Integrated Gate Drive Optocoupler | 15. Wideband Analog/Video Optocoupler | 21. Solid State Relay (Photo MOSFET) |
| 5. 8 MBd Logic Gate Optocoupler | 10. Miniature Analog Isolation Amplifier | 16. Hermetic High Performance Optocoupler | 22. Automotive Optocoupler |
| | 11. Isolated Line Receiver | 17. General Purpose Phototransistor Optocoupler | |

Optoisolation Products



Infrared Sensors

Proximity Sensors

Avago Technologies' Proximity Sensor HSDL-9100 is designed to meet the requirements of today's industrial and consumer market needs. The HSDL-9100 is a complete opto-module that houses both an LED and a photodiode in a specially designed metal-shield to ensure excellent optical isolation. The result is a low cost analog-output reflective sensor with low optical cross-talk and excellent power efficiency. HSDL-9100 is designed for use as a motion or proximity detector in various industrial, mobile, electronic appliances and retail automations. It offers a detection range from near zero to 60 mm.

APDS-9101, 9102, 9103 & 9104 are a series of low cost, reflective integrated proximity sensors that is suitable for a wide range of applications. These sensors consists of an LED and a phototransistor, integrated in a single package.

The APDS-9700 is a signal conditioning IC for Optical Proximity Sensors or discretes which are used for proximity or object detection. The APDS-9700 enhances the performance and robustness of the optical sensors. It

also provides ambient light immunity and sun light cancellation. It can be paired up with either a integrated proximity sensor or a discrete LED and detector solution for design flexibility (please contact factory to further enquire about the product)

Ambient Light Photo Sensor

Avago Technologies offers a series of Ambient Light Photo Sensors (APDS-9002, 9003, 9004, 9005, 9006, 9007) that provide precise light detection for a wide range of ambient brightness. These devices are designed with close-to-human-eye spectral response that mimic human eyes perception and hence provide consistent performance under different light sources such as sunlight, fluorescent and incandescent. These Sensors are packaged in miniature chipLED lead-free, RoHS compliance surface mount package and especially suited for mobile phones and portable devices. It is commonly use in mobile phone to enable auto LCD backlight adjustment and key pad lighting depending on the surrounding ambient brightness to achieve optimum viewing comfort and save battery power.

Reflective Proximity Sensors

Part Number	Size (H x L x W) (mm)	Output Type	Detection Distance Range	Input Power	Output Power	Operating	Emitter Continuous	Dark Current
HSDL-9100	2.7 x 7.1 x 2.75	Photodiode	Near zero to 60mm	165 (coupled, max)		-40 to +85	50	10
APDS-9101	6.3 x 8.7 x 4.5	Phototransistor	Near zero to 12mm	90	100	-25 to +85	60	100
APDS-9102	15.2 x 17.8 x 5.0	Phototransistor	Near zero to 8mm	75	100	-35 to +85	50	100
APDS-9103	6.0 x 10.6 x 4.0	Phototransistor	Near zero to 10mm	75	100	-25 to +85	60	100
APDS-9104	5.6 x 8.7 x 4.5	Phototransistor	Near zero to 12mm	90	100	-25 to +85	60	100

Proximity Sensing Signal Conditioning IC

Part Number	Package Type	Operating Voltage (V)	Max ILED Pulse Width (us)	Threshold Voltage (mV)	Features
APDS-9700	QFN 2 mm x 2 mm	2.4 to 3.6	120	600	LED Driver LED Stuck High Protection Ambient Light Immunity and Sunlight Cancellation Support detection distance up to 200mm with HSDL-9100 Can be used with Avago's HSDL-9100 or discretes

Ambient Light Photo Sensor

Part Number	Size (HxWxD) (mm)	Package	Supply Voltage (V)	Operating Temp. °C	Typical Output Current @ 100 Lux (uA)	Peak Wavelength (nm)
APDS-9002	0.80x 2.0 x 1.25	4 pin - ChipLED	2.4 to 5.5	-40 to +85	250	620
APDS-9003	0.55 x 1.60 x 1.5	6 pin - ChipLED	2.4 to 5.5	-40 to +85	230	620
APDS-9004	1.1 x 3.2 x 1.6	4 pin - ChipLED Reverse mounting	1.8 to 5.5	-40 to +85	230	620
APDS-9005	0.55 x 1.60 x 1.5	6 pin - ChipLED	2.4 to 5.5	-40 to +85	40	500
APDS-9006	1.1 x 3.2 x 1.6	4 pin - ChipLED Reverse mounting	2.4 to 5.5	-40 to +85	40	500
APDS-9007	0.8 x 2.4 x 2.0	6 pin - ChipLED	2.0 to 3.6	-40 to +85	30 uA at 1Klux (Logarithmic output)	560

About Avago Technologies

Avago Technologies is a leading supplier of analog interface components for communications, industrial and consumer applications. By leveraging its core competencies in III-V compound and silicon semiconductor design and processing, the company provides an extensive range of analog, mixed signal and optoelectronics components and subsystems to more than 40,000 customers. Backed by strong customer service support, the company's products serve four diverse end markets: industrial and automotive, wired infrastructure, wireless communications, and computer peripherals. Avago has a global employee presence and heritage of technical innovation dating back 40 years to its Hewlett-Packard roots. Information about Avago is available on the Web at www.avagotech.com

For product information and a complete list of distributors, please go to our web site:

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