

Your Imagination. Our Innovation.



Optoisolation and Optical Sensor Products



Selection Guide



Optoisolation Products

- 5 Quick Guide to Direct Upgrades
- 10 Product Selection Trees
- 13 Multi-Channel & Bi-Directional Digital Optocoupler
- 14 High Speed Digital CMOS Logic Gate Optocoupler
- 16 20 MBd Logic Gate Optocoupler
- 17 10 MBd Logic Gate/CMOS Optocoupler
- 20 8 MBd Logic Gate Optocoupler
- 21 5 MBd Logic Gate Optocoupler
- 23 1 MBd Transistor Output Optocoupler
- 24 100 kBd Darlington Transistor Output Optocoupler
- 25 R2Coupler™ (High Temperature, Automotive Grade)
- 31 Digital Isolator
- 32 Miniature Analog Isolation Amplifier
- 35 Integrated Gate Drive Optocoupler
- 39 Intelligent Power Module Interface Optocoupler
- 42 Isolated Line Receiver
- 43 Isolated 20 mA Current Loop Transmitter/Receiver
- 44 Isolated Voltage/Current Detector
- 45 High Linearity Analog Optocoupler
- 46 Wideband Analog/Video Optocoupler
- 47 Powerline Communication Interface
- 48 Hermetic High Performance Optocoupler
- 52 **Package Drawings**
- 60 **Function vs Application Matrix**

Optical Sensors

- 62 Proximity and Ambient Light Sensors



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 50 kV/ μ s in a broad line of packages. Products include the lowest power dissipation with input current as low as 40 μ 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 2262 V (per IEC/EN/DIN EN 60747-5-5).



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
- Battery operated vehicle
- Fieldbus
- Industrial communications
- Industrial networking
- Motor control
- PLC input/output isolation
- Power distribution systems
- Power generation
- Renewable energy power generation
- Energy storage system
- Electric vehicle charging station
- Robotics
- Switching panel
- Switching power supplies
- Test and measurement equipment

Automotive

Avago Technologies automotive R²Coupler™ are AEC-Q100 qualified with applications in:

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

- Status/fault signal feedback isolation interface

- Heating, ventilation and air-conditioning

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 hermetic optocouplers are suitable for military, aerospace and harsh industrial applications such as:

- Switching power supplies /UPS
- Motor control
- Field bus
- Inverters
- Power distribution
- Communications

Quick Guide to Direct Upgrades

Upgrade Part	Feature	Benefit
High Voltage Insulation		
Improved Isolation/Insulation Ability to protect surrounding circuitry against physical damage resulting from differential voltages.	ACNT-Hxxx and ACNV family offers highest available working voltage ratings with regulatory approval per IEC/EN/DIN EN 60747-5-5 of 2262 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 50 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 (as low as 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 -55°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.
Packages for Space Savings		
Multi-Channels, Bi-directional Features	Integrated dual, triple, quad with bi-directional channels offers in small SO8 and SO16 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 SO5 Package	Smaller SO5 package (as compared to existing SO-8 package)	Provides greater than 40% space savings .

Upgrade Parts

Existing Parts	Upgrade Parts	Upgrade Features	Footprint Information
High Speed Family (>12.5MBd)			
ACPL-072L HCPL-0710/0720/0721	ACSL-7210 ACPL-077L	<ul style="list-style-type: none"> Better noise rejection (CMR) performance Dual supply voltages (3.3V/5V) Wide temperature (-40°C to 105°C) Compactness - Bi-directional dual-channel, low profile height 2mm (ACSL-7210) 	Drop-in replacement (A CPL-077L) Smaller footprint (ACSL-7210)
HCPL-7710/7720/7721	ACPL-772L	<ul style="list-style-type: none"> Dual supply voltages (3.3V/5V) Wide temperature (-40°C to 105°C) Lower PWD (<6ns) 	Drop-in replacement
HCPL-0708 HCPL-0738	ACPL-071L ACPL-074L	<ul style="list-style-type: none"> Dual supply voltages (3.3V/5V) Better timing specs (<40ns) Wide temperature (-40°C to 105°C) 	Drop-in replacement
HCPL-0708	ACPL-M75L	<ul style="list-style-type: none"> Dual supply voltages (3.3V/5V) Better timing specs (<40ns) Wide temperature (-40°C to 105°C) 	Smaller footprint
HCPL-2400 HCPL-2430	ACPL-W70L ACPL-K73L	<ul style="list-style-type: none"> Dual supply voltages (3.3V/5V) Better timing specs (<40ns) Wide temperature (-40°C to 105°C) Higher working insulation and isolation voltages 	Smaller footprint
10MBd Family			
ACPL-M60L HCPL-M600/M601/M611	ACPL-M61L	<ul style="list-style-type: none"> Up to 80% power consumption saving Ultra low forward current (IF) to allow direct drive from microcontroller Wider temperature range (-40°C to 105°C) CMOS output to eliminate pull-up resistor Wider supply voltage (2.7V to 5.5V) 	Pin to Pin (SO-5 package) (no pull-up resistor is required) Smaller footprint (SO-5 vs SO-8)
HCPL-060L/061A/061N HCPL-0600/0601/0611		<ul style="list-style-type: none"> Part specific: Higher working insulation voltage 1140Vpk, isolation 5000Vrms with smaller footprint (ACPL-W61L/K64L) Open-drain output (ACPL-M62L) Enable pin included (ACPL-061L/C61L/ACNW261L) 	Pin to Pin (stretched SO-6 package) (no pull-up resistor is required) Smaller footprint (stretched SO-8 vs 300mil DIP-8)
ACPL-K63L HCPL-263A/263L/263N/2630/2631 HCPL-4661	ACPL-K64L	<ul style="list-style-type: none"> Part specific: Higher working insulation voltage 1140Vpk, isolation 5000Vrms with smaller footprint (ACPL-W61L/K64L) Open-drain output (ACPL-M62L) Enable pin included (ACPL-061L/C61L/ACNW261L) 	Pin to Pin (stretched SO-8 package) (no pull-up resistor is required) Smaller footprint (stretched SO-8 vs 300mil DIP-8)
ACPL-M60L HCPL-M600/M601/M611	ACPL-M62L		Pin to Pin (SO5 package)
HCPL-060L/061A/061N HCPL-0600/0601/0611			Smaller footprint (SO-5 vs SO-8)
HCPL-060L/061A/061N HCPL-0600/0601/0611	ACPL-061L		Pin to Pin (SO-8 package) (no pull-up resistor is required)
ACPL-W60L/W611/P611 6N137, HCPL-260L/2601/2611 HCPL-261A/261N	ACPL-C61L		Smaller footprint (no pull-up resistor is required)
HCNW137/2601/2611	ACNW261L		Pin to Pin (400mil DIP-8 package) (no pull-up resistor is required)
ACNV2601 ACNW261L	ACNT-H61L	<ul style="list-style-type: none"> Market highest insulation voltage 2262Vpeak 14.2mm creepage & clearance 	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 R2Coupler™	<ul style="list-style-type: none"> Wide temperature (-40°C to 125°C) Low LED input drive current IF=10mA 	Drop-in replacement

Existing Parts	Upgrade Parts	Upgrade Features	Footprint Information
1MBd Family			
HCPL-050L/0500/0501	ACPL-M50L / M51L	<ul style="list-style-type: none"> • 80% power consumption saving • Low forward current (IF > 3mA min) • High CTR ratio >90% min @ IF=3mA • Wide temperature range (-40°C to 105°C) • Wide supply voltage (2.7V to 24V) • Excellent CMR performance 15kV/μs @ Vcm 1500V • Part specific (For ACPL-W50L/K54L): Offer higher working insulation voltage 1140 V_{peak} isolation voltage, 5000Vrms • Low supply Voltage, 2.5V +/-10% and 4-pin configurable (ACPL-M51L) 	Smaller footprint
HCPL-053L/0530/0531	ACPL-054L		Drop-in replacement
6N135, 6N136 HCPL-250L/2502/2503	ACPL-W50L		Smaller footprint
HCPL-253L/2530/2531/2533	ACPL-K54L		Smaller footprint

5MBd Family

HCPL-0201/0211	ACPL-M21L ACPL-021L	<ul style="list-style-type: none"> • Low Forward Current (IF@1.6mA min), allowing direct drive from microcontroller without an input buffer • Low Supply Current (IDD@1.1mA max) • Low Supply Voltages (VDD @ 2.7 – 5.5V), with support to go lower to 2.5V • SO8 package to reduce PCB board space and cost • Min CMR at 25kV/μs @ Vcm 1000V to preserve data integrity under noisy environment • Wide Temperature range up to 105 °C for robust temperature environments 	Smaller footprint Drop-in replacement
HCPL-2231/2232	ACPL-024L ACPL-K24L		Smaller footprint
HCPL-2200/2201/2202/2211/2212/2219	ACPL-W21L		

Miniature Analog Isolation Amplifier

HCPL-786x	ACPL-796J	<ul style="list-style-type: none"> • External clocking (up to 20 MHz) for multichannel synchronization • Up to 20MHz External Clocking 	SO-16 footprint
	ACPL-C798J	<ul style="list-style-type: none"> • LVDS external clock and data Interface • Up to 25MHz external clocking 	
	ACPL-C797	<ul style="list-style-type: none"> • Wide operating temperature (-40 to +105°C) • More accurate clock (10 MHz ± 10%) • Input offset voltage (0.3 mV typ) • Offset drift (1.5 μV/°C typ) • 3V to 5.5V wide supply range for digital interface 	
HCPL-7800 HCPL-7800A HCPL-7840	ACPL-C79B, ACPL- C79A, ACPL-C790 ACPL-790B, ACPL-790A, ACPL-7900	<ul style="list-style-type: none"> • ±0.5%/±1%/±3% gain accuracy • Better linearity • 30% smaller package size • 8 mm Creepage and Clearance • 1414 V_{peak} working insulation voltage 	Smaller footprint
	ACPL-C87A, ACPL-C87B, ACPL-C870	<ul style="list-style-type: none"> • 0-2V input range voltage sensor • ±0.5%/±1%/±3% gain accuracy • -35 ppm/°C Low Gain Drift • -0.3 mV Input Offset Voltage • 3 V to 5.5 V Wide Supply Range for Output Side 	Smaller footprint
	HCPL-788J / 785J	<ul style="list-style-type: none"> • ± 3%/± 5% gain accuracy • Overcurrent fault detection 	
	HCPL-7510	<ul style="list-style-type: none"> • -/+ 3% gain accuracy • Single Ended Output 	
	HCPL-7520	<ul style="list-style-type: none"> • -/+ 5% gain accuracy • Single Ended Output 	
ACPL-C790 ACPL-C79A ACPL-C79B	ACNT-H79A ACNT-H790	<ul style="list-style-type: none"> • Market highest insulation voltage 2262V_{peak} • 14.2mm creepage & clearance • -50ppm/°C Low Gain Drift • ± 1% / ± 3% gain accuracy 	Stretched S08 package

Existing Parts	Upgrade Parts	Upgrade Features	Footprint Information
Highly Integrated Smart Gate Drive Optocoupler			
HCPL-316J	ACPL-302J	<ul style="list-style-type: none"> • Integrated DC-DC Controller for floating power supply • Rail-to-Rail output voltage • DESAT and UVLO detection with isolated fault feedback • Integrated Active Miller Clamp 	Pin layout change
	ACPL-337J ACPL-336J	<ul style="list-style-type: none"> • Up to 4A maximum peak output current • Rail-to-Rail output voltage • DESAT and UVLO detection with isolated fault feedback • Integrated LED Driver • Integrated Active Miller Clamp 	Pin layout change
	ACPL-339J	<ul style="list-style-type: none"> • Scalable & Efficient gate drive design • Dual Rail-to-Rail output to drive external MOSFET buffer • Active timing control to prevent cross conduction in MOSFET buffer • DESAT and UVLO detection with isolated fault feedback 	Pin layout change
	ACPL-330J ACPL-331J ACPL-332J ACPL-333J	<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
Basic Gate Drive Optocoupler			
HCPL-3120 HCPL-3180 HCPL-3150	ACPL-312U R ² Coupler™	<ul style="list-style-type: none"> • Extended operating temperature -40°C to 125°C 	Drop-in replacement
	ACPL-P349 ACPL-W349 ACPL-P346 ACPL-W346	<ul style="list-style-type: none"> • Power & SiC/GaN MOSFET Gate Drive • Rail-to-Rail output voltage • Low Propagation Delay (<120ns) • Very High CMR (50kV/μs) 	Smaller footprint
	ACPL-P341 ACPL-W341 ACPL-P343 ACPL-W343	<ul style="list-style-type: none"> • Up to 4A maximum peak output current • Rail-to-Rail output voltage • Low Propagation Delay (<200ns) • 50% smaller package size 	Smaller footprint
	ACPL-H342 ACPL-K342	<ul style="list-style-type: none"> • Rail-to-Rail output voltage • Integrated Active Miller Clamp • Lower Propagation Delay • Anti-Cross conduction • Very High CMR (40kV/μs) 	Smaller footprint
HCPL-3120 HCPL-J312 HCNW3120	ACPL-3130 ACPL-J313 ACNW3130	<ul style="list-style-type: none"> • Very High CMR (40kV/μs) 	Drop-in replacement
	ACNW3430^ ACNW3410^	<ul style="list-style-type: none"> • Up to 5A maximum peak output current • Rail-to-Rail output voltage • Low Propagation Delay • Very High CMR 	Drop-in replacement
	ACNT-H313 ACNV3130	<ul style="list-style-type: none"> • Up to 14.2mm Creepage & Clearance • High Working Voltage V_{IORM} 2262V_{PEAK} • High Insulation Voltage V_{ISO} 7500V_{RMS} • High CMR 40kV/μs 	Larger footprint to achieve higher creepage and clearance
HCPL-3140 HCPL-0314 HCPL-J314	ACPL-P314 ACPL-W314	<ul style="list-style-type: none"> • Low Propagation Delay 	Smaller footprint
	ACPL-P347 ACPL-W347 ACPL-P345 ACPL-W345 ACPL-P340 ACPL-W340	<ul style="list-style-type: none"> • 1A maximum peak output current • Rail-to-Rail output voltage • Low Propagation Delay (ACPL-x345/7 MOSFET Drive <120ns, ACPL-x340 IGBT Drive <200ns) • 50% smaller package size 	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-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

Note: ^ - Advance information, subject to change without notice.

Existing Parts	Upgrade Parts	Upgrade Features	Footprint Information
Intelligent Power Module Interface Optocoupler			
HCPL-4502 HCPL-4503	ACPL-K453	<ul style="list-style-type: none"> • 8mm Creepage and Clearance • 50% smaller package size 	Smaller footprint
HCPL-4504	ACPL-W454	<ul style="list-style-type: none"> • 8mm Creepage and Clearance • 50% smaller package size 	Smaller footprint
	ACPL-P454	<ul style="list-style-type: none"> • 8mm Creepage • 50% smaller package size 	Smaller footprint
HCPL-4506	ACPL-W456	<ul style="list-style-type: none"> • 8mm Creepage and Clearance • 50% smaller package size 	Smaller footprint
	ACPL-P456	<ul style="list-style-type: none"> • 8mm Creepage • 50% smaller package size 	Smaller footprint
ACPL-4800 ACPL-P480 ACPL-W480	ACPL-W484 ACPL-W483	<ul style="list-style-type: none"> • Higher CMR 30kV/μs • 10MBd speed • Totem-pole output, positive logic (W484) inverting logic (W483) • 8mm Creepage and Clearance • 50% smaller package size 	Smaller footprint Faster speed
	ACPL-P484 ACPL-P483	<ul style="list-style-type: none"> • Higher CMR 30kV/μs • 10MBd speed • Totem-pole output, positive logic (P484) inverting logic (P483) • 8mm Creepage • 50% smaller package size 	Smaller footprint Faster speed
HCPL-M452/3/4/6	ACPL-M484	<ul style="list-style-type: none"> • Higher CMR 30kV/μs • 10MBd speed • Totem-pole output, positive logic 	Faster speed
HCPL-4502/03/04/06 HCPL-0452/53/54/66	ACPL-W484	<ul style="list-style-type: none"> • 8mm Creepage and Clearance • Higher CMR 30kV/μs • 10MBd speed • Totem-pole output, positive logic 	Faster speed
HCNW4502/03/04/06	ACNV4506	<ul style="list-style-type: none"> • 13mm Creepage and Clearance • Higher Working Voltage Viorm 2262Vpk • Higher CMR 30kV/μs • Totem-pole output, positive logic 	Higher Working Voltage
HCPL-M452/53/54	ACPL-M43U	<ul style="list-style-type: none"> • Wide temperature (-40°C to 125°C) • Low LED input drive current IF 10mA 	Drop-in replacement
HCPL-M456	ACPL-M46U	<ul style="list-style-type: none"> • Wide temperature (-40°C to 125°C) 	Drop-in replacement

Note:

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

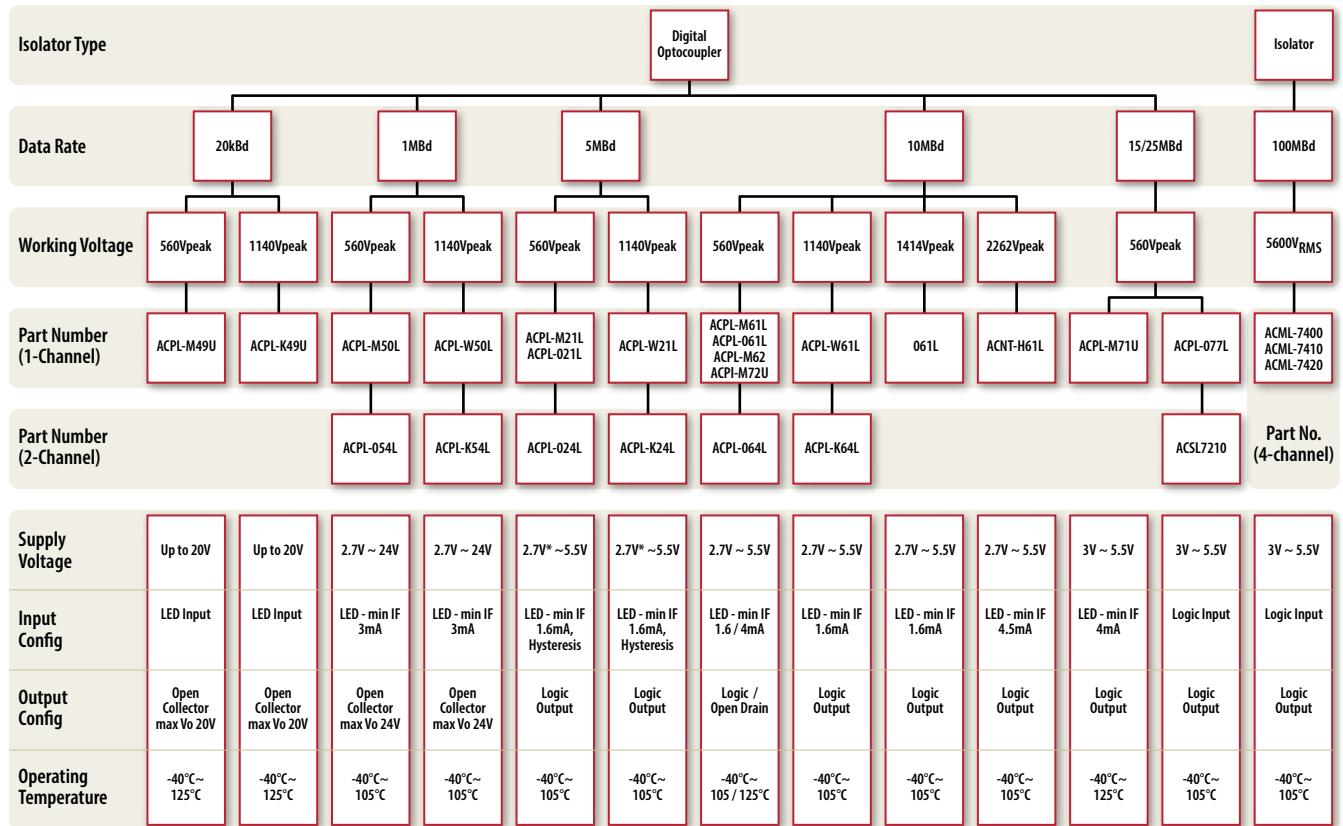
Pin-to-Pin means the footprint is same but requires minimum PCB board redesign (eg. Removing of external resistor)

* Lower speed

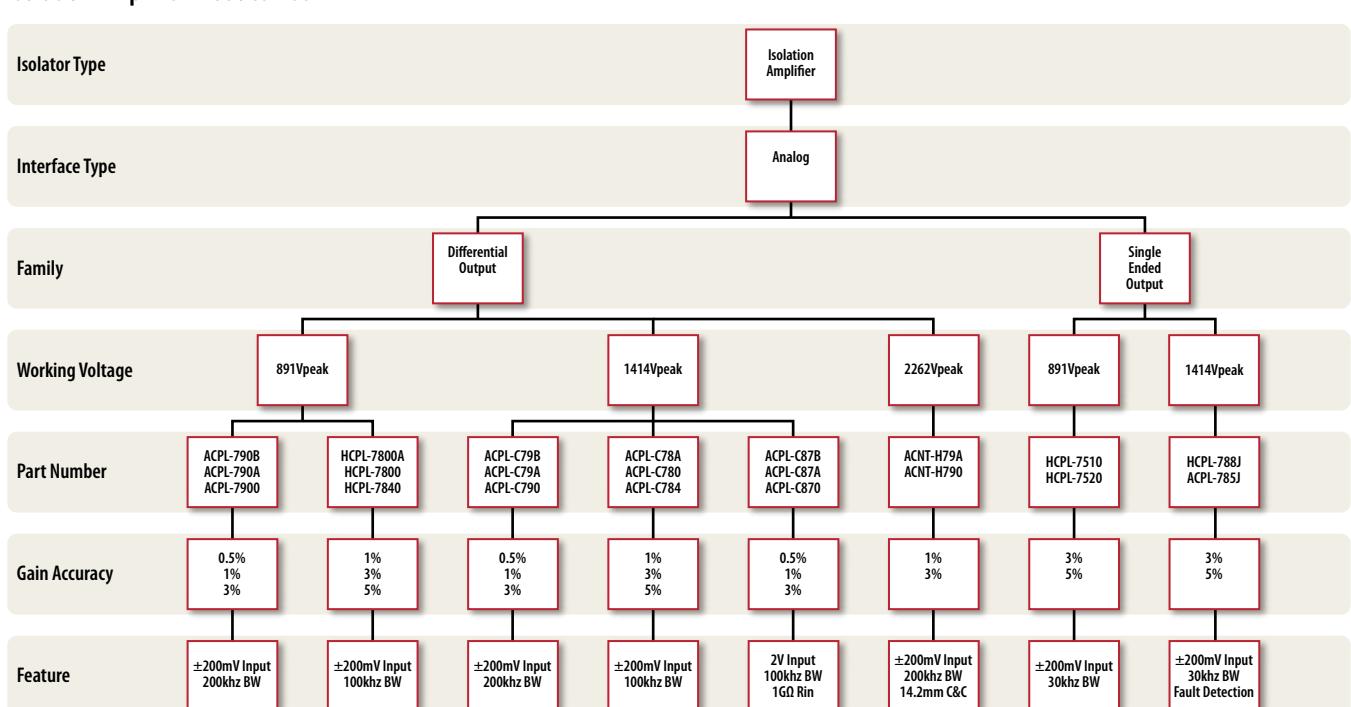
^ Advanced information, may subject to changes.

Product Selection Trees

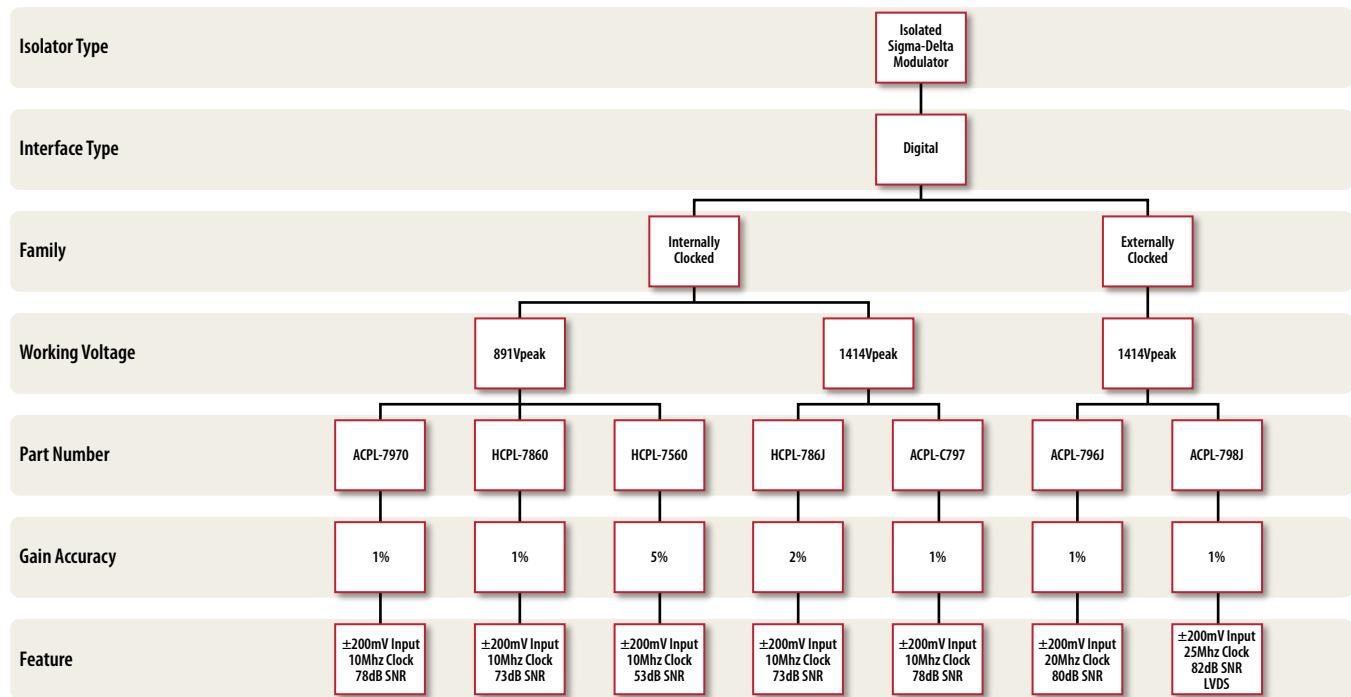
Digital Optocoupler NPI Product Tree



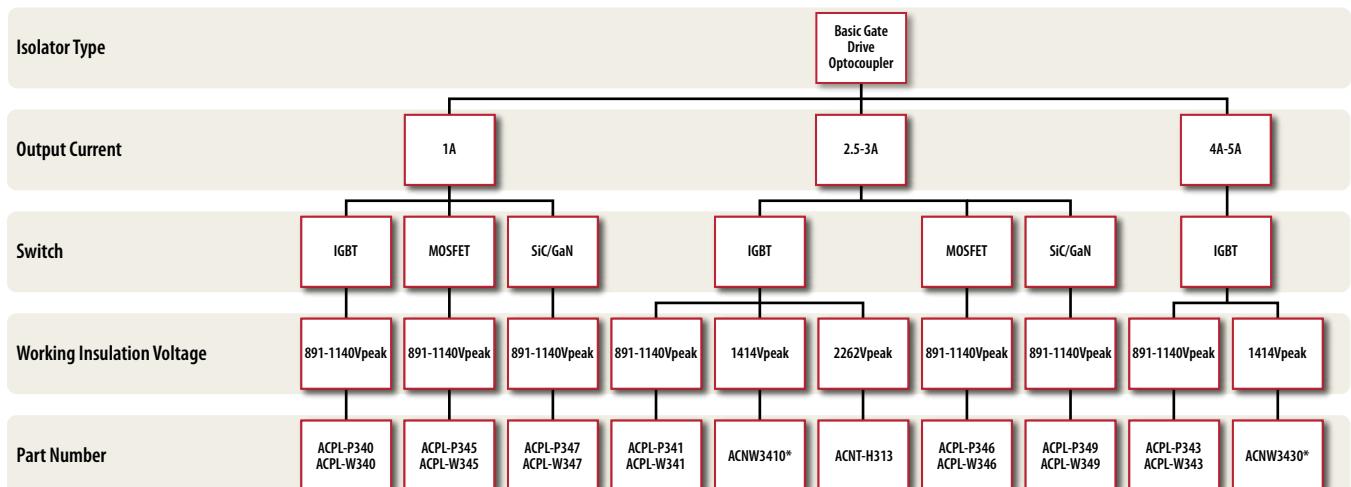
Isolation Amplifier Product Tree



Isolated Sigma-Delta Modulator Product Tree



Gate Drive Optocoupler NPI Product Tree



Note: * - Advanced information, may be subject to changes.

Gate Drive Optocoupler NPI Product Tree

Isolator Type							
Output Current						1A	2.5-3A
Direct / Buffered						ACPL-331J ACPL-330J	ACPL-339J
Part Number						HCPL-316J	ACPL-331J ACPL-330J
Function	Short Circuit Protection	Yes	Yes	Yes	Yes	Yes	Yes
Rail-to-Rail Output	No	Yes	No	No	Yes	Yes	Yes
Active Miller Clamp	Yes	No	No	Yes	Yes	Yes	Yes
UVLO Feedback	No	Yes	No	No	Yes	Yes	Yes
DC-DC Controller for Floating Power Supply	No	No	No	No	No	Yes	No

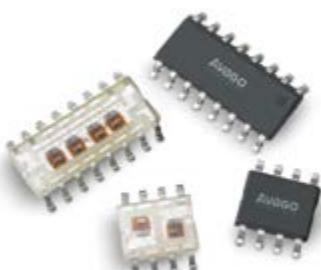
Note: * - Advanced information, may be subject to changes.

Automotive Gate Drive Optocoupler NPI Product Tree

Isolator Type							
Switch						IGBT	Mosfet
Integration						Simple	Smart
Features						General Purpose	Tight Delay Control
Part Number	ACPL-312T	ACPL-K33T*	ACPL-32JT ACPL-33JT*	ACPL-34JT ACPL-38JT	ACPL-31JT*	ACPL-K34T	Powertrain Inverters
Application	Heater Converters						AC/DC, DC-DC Converters

Note: * - Advanced information, may be subject to changes.

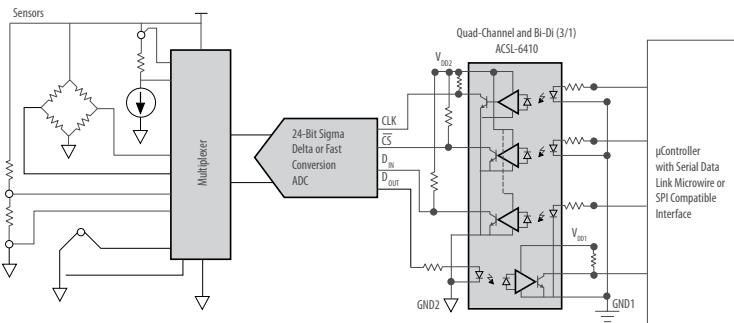
Optoisolation and Optical Sensor Products



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

Typical Block Diagram



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. For higher speed requirement, ACSL-7210 is 25MBd dual-channel bi-directional optocoupler with buffered inputs (not LED driven inputs).

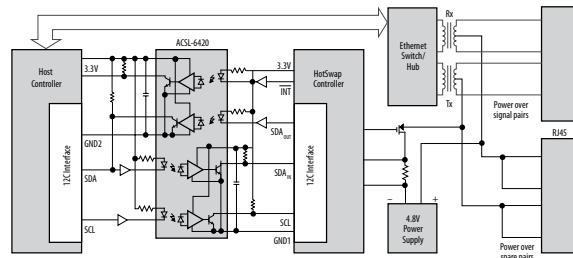
The isolated data acquisition system is ideal for digitizing the output of the sensors that operate in hostile environment. The ADC is a 24-bit sigma delta or fast conversion type,

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 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_{PHL} ns Max.	PWD	t_{PSK} ns Max.	VCC V Min.	VCC V Max.	CMR - $V/\mu s @ V_{CM}$		V_{ISO} V_{RMS} Min.	V_{IORM} V peak
												CMR $V/\mu s$ (Min.)	V_{CM} V		
ACSL-7210	S08	2	1	1	—	40	40	8	20	3	5.5	25000	1000	3750	567*
ACSL-6210	S08	2	1	1	7	100	100	35	40	3	5.5	10000	1000	2500	567*
ACSL-6400	S016	4	4	0	7	100	100	35	40	3	5.5	10000	1000	2500	567*
ACSL-6410	S016	4	3	1	7	100	100	35	40	3	5.5	10000	1000	2500	567*
ACSL-6420	S016	4	2	2	7	100	100	35	40	3	5.5	10000	1000	2500	567*
ACSL-6310	S016	3	2	1	7	100	100	35	40	3	5.5	10000	1000	2500	567*
ACSL-6300	S016	3	3	0	7	100	100	35	40	3	5.5	10000	1000	2500	567*
ACFL-5211U^	SS012	2	1	1	0.8	10000	10000	850	-	-	20	15000	1500	5000	1140*
ACFL-5212U^	SS012	2	1	1	4	20000	20000	-	-	-	20	15000	1500	5000	1140*
ACFL-6211U^	SS012	2	1	1	10	35	35	12	15	3.0	5.5	15000	1000	5000	1140*
ACFL-12U^	SS012	2	1	1	4	100	100	50	60	3.0	5.5	25000	1000	5000	1140*

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

^ - Advanced Information, may subject to changes.

Optoisolation and Optical Sensor 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

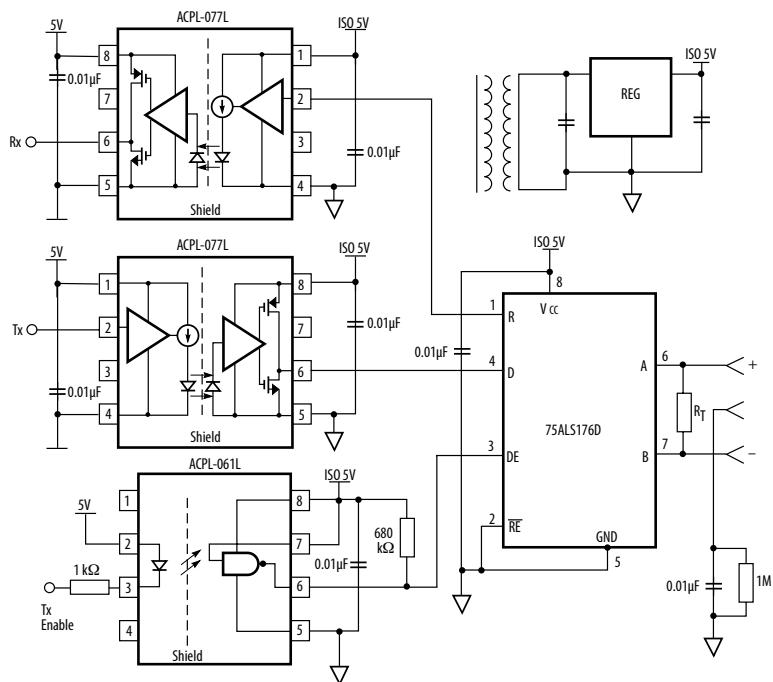
These optocouplers use the latest CMOS IC technology to achieve outstanding performance with very low power consumption. Serial fieldbuses are used today primarily as the communication system for the exchange of information between automation system and distributed field devices. PROFIBUS is the leading 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)
- 3.3V/5V dual supply voltage available
- 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 60747-5-5

Typical Profibus Block Diagram



Optoisolation and Optical Sensor Products

High Speed Digital CMOS 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 - $V/\mu s @ V_{CM}$		V_{ISO} V_{RMS} Min.	V_{IORM} V peak
										CMR V/ μ s (Min.)	V_{CM} V		
Single Channel CMOS Input	ACPL-077L	S08	3.3/5	—	25	40	40	6	20	35000	1000	3750	567*
	ACPL-772L	300 mil DIP8	3.3/5	—	25	40	40	6	20	10000	1000	3750/5000#	630*
	HCPL-0710	S08	5	—	12.5	40	40	8	20	10000	1000	3750	567*
	HCPL-0720	S08	5	—	25	40	40	8	20	10000	1000	3750	567*
	HCPL-0721	S08	5	—	25	40	40	6	20	10000	1000	3750	567*
	HCPL-0723	S08	5	—	50	22	22	2	16	10000	1000	3750	567*
	HCPL-7710	300 mil DIP8	5	—	12.5	40	40	8	20	10000	1000	3750/5000#	630*
	HCPL-7720	300 mil DIP8	5	—	25	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-7723	300 mil DIP8	5	—	50	22	22	2	16	10000	1000	3750/5000#	630*
Single Channel LED Input	ACPL-M75L	S05	3.3/5	4	15	55	55	25	40	10000	1000	3750	567*
	ACPL-M71U	S05	3.3/5	4	15	35	35	12	15	15000	1000	3750	567*
	ACPL-071L	S08	3.3/5	9	15	40	40	25	30	10000	1000	3750	567*
	ACPL-W70L	Stretched S06	3.3/5	4	15	55	55	25	40	10000	1000	5000	1140*
	HCPL-0708	S08	5	10	15	60	60	30	40	10000	1000	3750	567*
Dual Channel Bi-direct CMOS Input	ACSL-7210	S08	3.3/5	—	25	40	40	8	20	25000	1000	3750	567*
	ACPL-074L	S08	3.3/5	9	15	40	40	25	30	10000	1000	3750	567*
	HCPL-0738	S08	5	10	15	60	60	30	40	10000	1000	3750	567*
	ACPL-K73L	Stretched S08	3.3/5	4	15	55	55	25	40	10000	1000	5000	1140*

Notes: * - with IEC/EN/DIN EN 60747-5-5 Option 060, # - with UL5000VRMS/1 minute Option 020

Optoisolation and Optical Sensor Products



Applications

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

20 MBd Logic Gate Optocoupler

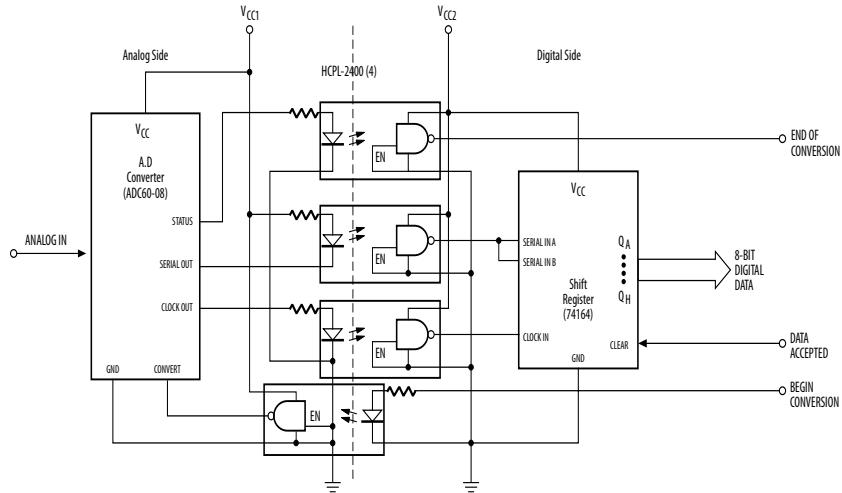
Description

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 60747-5-5, approved with $V_{iorm}=630V_{peak}$ (option 060)
- DIP8 package (for min. 7mm creepage/clearance need) with 5kV V_{iso} protection (option 020)
- 2-channel for higher integration and space saving (HCPL-2430)

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/ μ s@ V_{CM}		V_{ISO} V_{RMS} V Min.	V_{iORM} V peak
								CMR V/ μ s (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 60747-5-5 Option 060

Optoisolation and Optical Sensor Products



Applications

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

10 MBd Logic Gate/ CMOS 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 DS75176A driver/receiver integrated circuit.

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

Avago's new range of 3.3 V/5 V optocouplers are the first commercially available optocouplers designed to meet the JEDEC

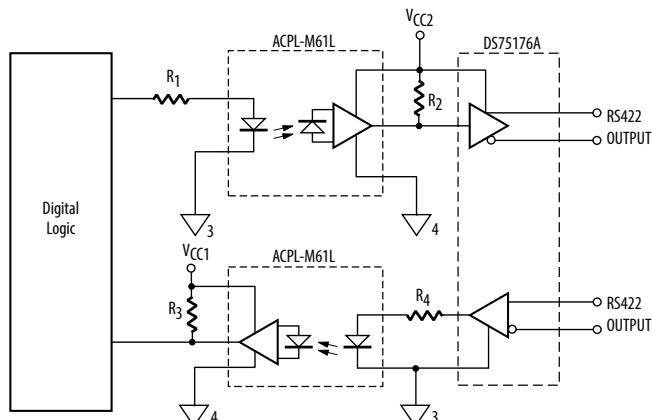
specification for 3.3 V LVTTL/LVC MOS logic, thereby simplifying the implementation of isolation in systems utilizing 3.3 V logic circuits.

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.

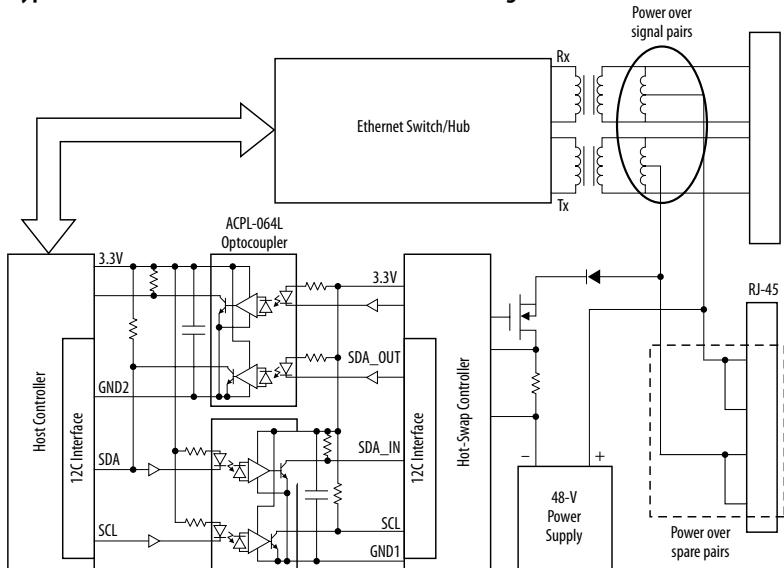
Benefits

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

Typical RS-422 Interface Block Diagram



Typical Power over Ethernet Power Source Block Diagram



Optoisolation and Optical Sensor Products

10 MBd Logic Gate Optocoupler Product Selection

Device	Part No.	Package	VDD V	I _{F(on)} mA Min.	t _{PLH} ns Max.	t _{PHL} ns Max.	PWD	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-W60L	Stretched SO6	3.3/5	5	90	75	25	40	15000	1000	5000	1140*
	ACPL-P611	Stretched SO6	5	5	100	100	35	40	10000	1000	5000	891*
	ACPL-W611	Stretched SO6	5	5	100	100	35	40	10000	1000	5000	1140*
	6N137	300 mil DIP8	5	5	100	100	35	40	1000	10	3750/5000#	630*
	HCNW137	400 mil DIP8	5	5	100	100	40	40	5000	1000	5000	1414
	HCNW2601	400 mil DIP8	5	5	100	100	40	40	10000	1000	5000	1414
	HCNW2611	400 mil DIP8	5	5	100	100	40	40	15000	1000	5000	1414
	HCPL-060L	S08	3.3/5	5	90	75	25	40	15000	1000	3750	567*
	HCPL-260L	300 mil DIP8	3.3/5	5	90	75	25	40	15000	1000	3750/5000#	630*
	HCPL-061N	S08	5	3	100	100	45	60	1000	1000	3750	567*
	HCPL-0600	S08	5	5	100	100	35	40	5000	1000	3750	567*
	HCPL-0601	S08	5	5	100	100	35	40	10000	1000	3750	567*
	HCPL-0611	S08	5	5	100	100	35	40	15000	1000	3750	567*
	HCPL-2601	300 mil DIP8	5	5	100	100	35	40	10000	1000	3750/5000#	630*
	HCPL-2611	300 mil DIP8	5	5	100	100	35	40	15000	1000	3750/5000#	630*
	HCPL-261N	300 mil DIP8	5	3	100	100	45	60	1000	1000	3750/5000#	630*
Single Channel	ACPL-M60L	S05	3.3/5	5	90	75	25	40	15000	1000	3750	567*
	ACPL-M61U	S05	5	5	100	100	35	40	15000	1000	3750	-
	HCPL-M611	S05	5	5	100	100	35	40	10000	1000	3750	-
	ACNV2601	500 mil DIP10	5	5	100	100	40	40	20000	1500	7500	2262
	ACNV260E	500 mil DIP10	5	5	100	100	40	40	20000	1500	5000	ATEX (375V)
	ACPL-K63L	Stretched S08	3.3/5	5	90	75	25	40	15000	1000	5000	1140*
Dual Channel	HCPL-063L	S08	3.3/5	5	90	75	25	40	15000	1000	3750	567*
	HCPL-063N	S08	5	3	100	100	45	60	1000	1000	3750	567*
	HCPL-0630	S08	5	5	100	100	35	40	5000	1000	3750	567*
	HCPL-0631	S08	5	5	100	100	35	40	10000	1000	3750	567*
	HCPL-0661	S08	5	5	100	100	35	40	15000	1000	3750	567*
	HCPL-263L	300 mil DIP8	3.3/5	5	90	75	25	40	15000	1000	3750/5000#	630*
	HCPL-263N	300 mil DIP8	5	3	100	100	45	60	1000	1000	3750/5000#	630*
	HCPL-2630	300 mil DIP8	5	5	100	100	35	40	5000	1000	3750/5000#	630*
	HCPL-2631	300 mil DIP8	5	5	100	100	35	40	10000	1000	3750/5000#	630*
	HCPL-4661	300 mil DIP8	5	5	100	100	35	40	15000	1000	3750/5000#	630*

Notes: * - with IEC/EN/DIN EN 60747-5-5 Option 060, # - with UL 5000VRMS/1 minute Option 020

Optoisolation and Optical Sensor Products

10 MBd CMOS Optocoupler Product Selection

Device	Part No.	Package	VDD V	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 LED Input	ACPL-061L	S08	3.3/5	1.6	80	80	30	30	20000	1000	3750	567*
	ACPL-C61L	Stretched S08	3.3/5	3.0	90	90	30	30	20000	1000	5000	1414*
	ACNW261L	400 mil DIP8	3.3/5	4.0	95	95	40	30	20000	1000	5000	1414
Single Channel LED Input	ACNT-H61L NEW	Stretched S08	3.3/5	4.5	100	100	40	40	20000	1000	7500	2262
	ACPL-W61L	Stretched S06	3.3/5	1.6	80	80	30	30	20000	1000	5000	1140*
	ACPL-M61L	S05	3.3/5	1.6	80	80	30	30	20000	1000	3750	567*
	ACPL-M72U	S05	3.3/5	4.0	100	100	50	60	25000	1000	3750	567*
	ACPL-M62L	S05	3.3/5	2.0	80	80	30	30	20000	1000	3750	567*
Dual Channel LED Input	ACPL-064L	S08	3.3/5	1.6	80	80	30	30	20000	1000	3750	567*
	ACPL-K64L	Stretched S08	3.3/5	1.6	80	80	30	30	20000	1000	5000	1140*

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

Optoisolation and Optical Sensor Products



Applications

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

8 MBd Logic Gate Optocoupler

Description

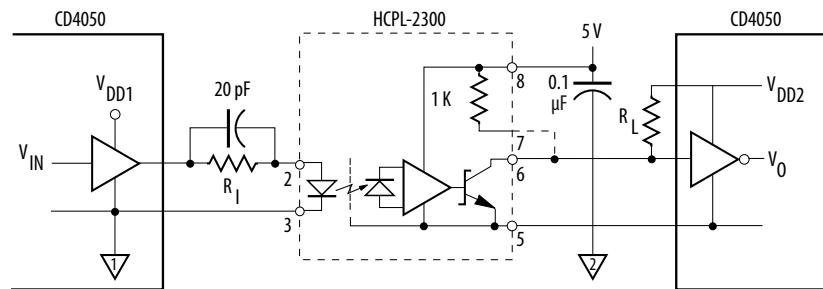
The circuit shows a CMOS interface circuit for 8 MBd applications. Over the temperature range a CMOS CD4050 Hex Buffer can source about 0.7 mA (minimum), which is sufficient to drive the HCPL-2300 optocoupler. The 20 pF capacitor allows peaking currents to assist the LED in turning on and off quickly.

These optocouplers utilize a simple interface requiring low power consumption.

Benefits

- Offers low power consumption

Typical CMOS Interface Block Diagram



V_{DD1} (V)	R_I (kΩ)	R_L (kΩ)	V_{DD1} (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		
Single Channel	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 60747-5-5 Option 060

Optoisolation and Optical Sensor Products



Applications

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

5 MBd Logic Gate/CMOS Optocoupler

Description

For the CMOS Optocouplers, they consume low power, at maximum supply current of 1.1mA per channel and forward current as low as 1.6mA, thus allowing direct current drive by most microprocessors. They operate with low supply voltage for supply scaling of FPGA and microcontrollers, are CMOS output and optical receiver input stages with built-in Schmitt triggers to provide logic-compatible waveforms, eliminating the need for additional waveshaping. A superior internal shield guarantees common mode transient immunity of 25 kV/ μ s at a common mode voltage of 1000 V over a temperature range of -40 °C to 105°C. The stretched SO6/SO8 packages are up to 50% smaller than the conventional DIP package, facilitates smaller compact design

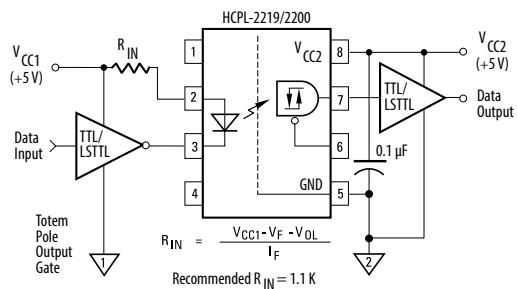
For the Logic Gate Optocouplers, the circuit shown in the typical TTL interface block diagram is an interface between two TTL gates using an active output (totem pole) optocoupler, the HCPL-2201. A series switching circuit drives the optocoupler LED. The active output HCPL-2201 can be directly connected 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.

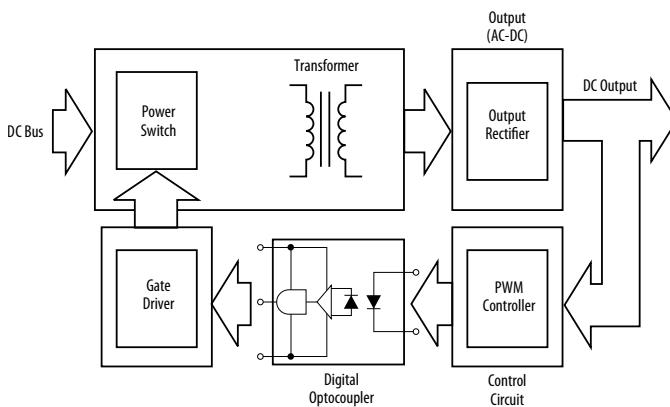
Benefits

- Pull up resistor not required at the optocoupler output
- Low power consumption with low supply current @1.1mA max and low forward current @1.6mA min (5MBd CMOS Optocoupler)
- Low Supply voltages to 2.5V (5MBd CMOS Optocoupler)
- Wide operating supply voltages up to 20V (5MBd Logic Gate Optocoupler)
- Built-in Schmitt Triggers for better signal integrity and accuracy in a noisy network/ circuits.
- High CMR (min. 25kV/ μ s@VCM=1kV) (5MBd CMOS Optocoupler)

Typical TTL Interface Block Diagram



Isolated High-Low Gate Drive Interface Block Diagram



Optoisolation and Optical Sensor Products

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		
Single Channel	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	567*
	HCPL-0211	S08	1.6	0.3	0.3	10000	1000	3750	567*
	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-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-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*
Dual Channel	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	—

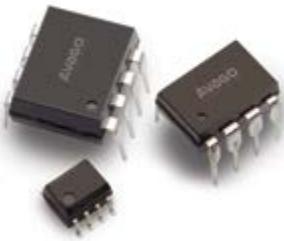
Notes: * - with IEC/EN/DIN EN 60747-5-5 Option 060

5 MBd CMOS 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		
Single Channel	ACPL-M21L	S05	1.6	0.25	0.25	25000	1000	3750	567*
	ACPL-W21L	Stretched S06	1.6	0.25	0.25	25000	1000	5000	1140*
Dual Channel	ACPL-024L	S08	1.6	0.25	0.25	25000	1000	3750	567*
	ACPL-K24L	Stretched S08	1.6	0.25	0.25	25000	1000	5000	1140*
	ACPL-021L	S08	1.6	0.25	0.25	25000	1000	3750	567*

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

Optoisolation and Optical Sensor Products



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

1 MBd Transistor Output Optocoupler

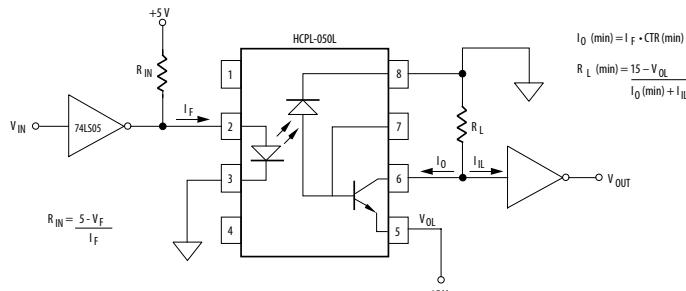
Description

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 74LS405, 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.

Typical Level Shifting/TTL Interface Block Diagram



1 MBd Transistor Output Optocoupler Product Selection

Device	Part No.	Package	V _{DD} V	Max VDD V	I _{F(on)} mA Min.	CTR			t _{PLH} μs Max.	t _{PHL} μs Max.	CMR - V/μs@V _{CM}		V _{ISO} V _{RMS} Min.	V _{FORM} V peak
						% Min.	% Max.	IF mA			CMR V/μs (Min.)	V _{CM} V		
Single Channel	ACPL-M50L	S05	3.3/5	24	3	80	200	3	1.0	1.0	15000	1000	3750	567*
	ACPL-M51L ^A (4-pin configurable)	S05	2.5/3.3/5	24	3	60	200	3	1.0	1.0	15000	1000	3750	567*
ANODE CATHODE CATHODE	ACPL-W50L	Stretched S06	3.3/5	24	3	53	200	3	1.0	1.0	15000	1000	5000	1140*
	6N135	300 mil DIP8	5	15	16	7	50	16	2.0	2.0	1000	10	3750/5000 [#]	630*
	6N136	300 mil DIP8	5	15	16	19	50	16	1.0	1.0	1000	10	3750/5000 [#]	630*
	HCNW135	400 mil DIP8	5	15	16	5	—	16	2.0	2.0	1000	10	5000	1414
	HCNW136	400 mil DIP8	5	15	16	19	50	16	1.0	1.0	1000	10	5000	1414
	HCPL-050L	S08	3.3/5	15	16	15	50	16	1.0	1.0	1000	10	3750	567*
	HCPL-0500	S08	5	15	16	7	50	16	2.0	2.0	1000	10	3750	567*
		S08	5	15	16	19	50	16	1.0	1.0	1000	10	3750	567*
	HCPL-250L	300 mil DIP8	3.3/5	15	16	15	50	16	1.0	1.0	1000	10	3750/5000 [#]	630*
	HCPL-2502	300 mil DIP8	5	15	16	15	22	16	0.8	0.8	—	—	3750/5000 [#]	—
ANODE 1 CATHODE 1 CATHODE 1 ANODE 2	HCPL-2503	300 mil DIP8	5	15	8	15	—	8	2.5	1.5	—	—	3750/5000 [#]	—
	ACPL-054L	S08	3.3/5	24	3	53	200	3	1.0	1.0	15000	1000	3750	567*
	ACPL-K54L	Stretched S08	3.3/5	24	3	53	200	3	1.0	1.0	15000	1000	5000	1140*
	HCPL-053L	S08	3.3/5	15	16	15	50	16	1.0	1.0	1000	10	3750	567*
	HCPL-0530	S08	5	15	16	7	50	16	2.0	2.0	1000	10	3750	—
	HCPL-0531	S08	5	15	16	19	50	16	1.0	1.0	1000	10	3750	—
	HCPL-253L	300 mil DIP8	3.3/5	15	16	15	50	16	1.0	1.0	1000	10	3750/5000 [#]	630*
	HCPL-2530	300 mil DIP8	5	15	16	7	50	16	2.0	2.0	1000	10	3750/5000 [#]	—
	HCPL-2531	300 mil DIP8	5	15	16	19	50	16	1.0	1.0	1000	10	3750/5000 [#]	—
	HCPL-2533	300 mil DIP8	5	15	8	15	—	8	2.5	1.5	—	—	3750	—

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

Optoisolation and Optical Sensor Products



Applications

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

100 kBd Darlington Transistor Output Optocoupler

Description

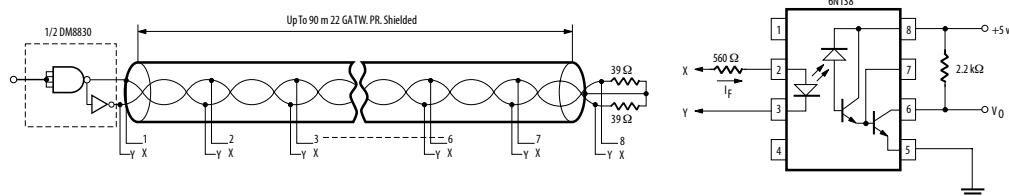
This differentially driven circuit can use up to eight 6N138 optocouplers at various receivers along the 90 m line. All stations are isolated. The first station would draw approximately 2.7 mA current, and the last station 1.8 mA of LED drive current. The output grounds of the optocoupler may be electrically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

Typical Multidrop Line Receiver Block Diagram



100 kBd Darlington Transistor Output Optocoupler Product Selection

Device	Part No.	Package	VDD V	I _{F(on)} mA Min.	CTR			t _{PLH} µs Max.	t _{PHL} µs Max.	CMR - V/µs@VCM		V _{ISO} V _{RMS} Min.	V _{IORM} V peak
					% Min.	% Max.	I _F mA			CMR V/µs (Min.)	V _{CM} V		
Single Channel	4N45	300 mil DIP6	5	0.5	200	1000	10	500	50	-	-	3750	630
	4N46	300 mil DIP6	5	0.5	200	1000	10	500	50	-	-	3750	630
	6N138	300 mil DIP8	5	0.5	300	2600	1.6	50	15	1000	10	3750/5000 [#]	-
	6N139	300 mil DIP8	5	0.5	400	5000	0.5	90	2	1000	10	3750/5000 [#]	630*
	HCNW138	400 mil DIP8	5	0.5	300	-	1.6	70	11	1000	10	5000	1414
	HCNW139	400 mil DIP8	5	0.5	400	-	0.5	11	11	1000	10	5000	1414
	HCPL-070A	S08	5	0.04	800	25000	0.04	25	60	1000	10	3750	567*
	HCPL-070L	S08	3.3/5	0.5	400	5000	0.5	90	30	1000	10	3750	567*
	HCPL-0700	S08	5	0.5	300	2600	1.6	50	15	1000	10	3750	567*
	HCPL-0701	S08	5	0.5	400	5000	0.5	10	2	1000	10	3750	567*
Dual Channel	HCPL-270L	300 mil DIP8	3.3/5	0.5	400	5000	0.5	90	30	1000	10	3750/5000 [#]	630*
	HCPL-4701	300 mil DIP8	5	0.04	800	25000	0.04	90	25	1000	10	3750/5000 [#]	630*
	HCPL-M700	S05	5	0.5	300	2600	1.6	35	20	1000	10	3750	-
	HCPL-M701	S05	5	0.5	400	3500	0.5	10	2	1000	10	3750	-
	HCPL-073A	S08	5	0.04	800	25000	0.04	130	25	1000	10	3750	-
	HCPL-073L	S08	3.3/5	0.5	400	5000	0.5	90	30	1000	10	3750	567*
	HCPL-0730	S08	5	0.5	400	5000	0.5	35	20	1000	10	3750	-
	HCPL-0731	S08	5	0.5	400	5000	0.5	35	20	1000	10	3750	-
	HCPL-273L	300 mil DIP8	3.3/5	0.5	400	5000	0.5	90	30	1000	10	3750/5000 [#]	630*
	HCPL-2730	300 mil DIP8	5	0.5	400	5000	0.5	35	20	1000	10	3750/5000 [#]	-
	HCPL-2731	300 mil DIP8	5	0.5	400	5000	0.5	60	20	1000	10	3750/5000 [#]	-
	HCPL-4731	300 mil DIP8	5	0.04	800	25000	0.04	90	25	1000	10	3750/5000 [#]	-

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

Optoisolation and Optical Sensor Products



R²Coupler™ (High Temperature, Automotive Grade)

Description

Proven Quality and Reliability Track Record

Avago Technologies' R²Coupler isolation products are designed to meet the stringent requirements for the automotive market. Building upon 35 years of optocoupler expertise, the automotive parts are manufactured in a TS 16949 certified manufacturing facility and are PPAP supported. Robustness is demonstrated through qualification in accordance to AEC-Q100 Grade 1 guidelines. Avago optocouplers have been used extensively in long life and mission critical isolation applications such as locomotive transportation, aerospace, military and industrial automation. Since the introduction of R²Coupler products in 2006, these automotive grade products have seen wide adoption by many automotive suppliers with millions of units operating in the field.

with international component safety certifications (UL1577, IEC 60747-5-5, CSA Component Notice 5). Optocouplers demonstrate superior EMI and common mode noise immunity.

Benefits

- Qualified to AEC-Q100 Grade 1 guidelines
- TS 16949 manufacturing facility with PPAP support
- Wide operating temperature (-40°C to 125°C)
- High CMR (50 kV/μs at VCM=1kV)
- Reinforced Reliability suitable for automotive applications
- Low input LED drive current
- Worldwide Safety Approval (UL1577, IEC60747-5-5, CSA)

Technology Leader

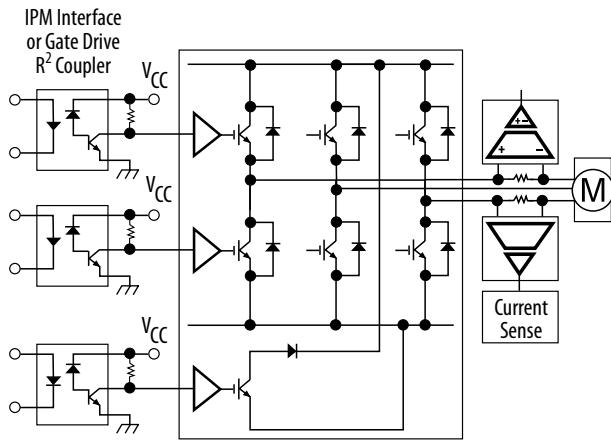
Avago Technologies is the first supplier to introduce 125°C plastic optocouplers for automotive applications, with the largest portfolio of optocouplers ranging from IGBT gate drivers, isolation amplifier, high speed and low power digital isolation and analog feedback isolation. Advanced LED technology enabled the best-in-class performance over lifetime and at high temperature. These optocouplers maintain their very high voltage ratings with robust and reliable galvanic isolation technology

Applications

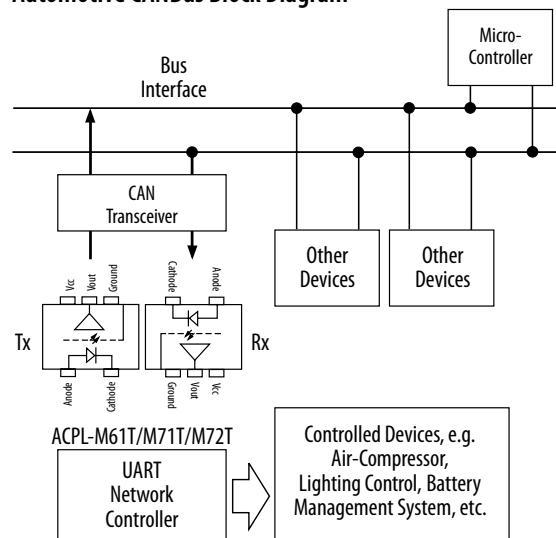
- Automotive IPM and gate driver for inverters, DC-DC converter and on-board chargers
- Automotive bus voltage and current/voltage sensing in inverters, converters and on-board chargers
- Automotive CANbus, UART, LIN and other digital communications
- Isolated wake-up and status control and feedback
- Analog feedback in AC-DC and DC-DC converters
- Low power digital isolation in battery management systems

Optoisolation and Optical Sensor Products

Typical Intelligent Power Module/Electric Motor Inverter Block Diagram



Automotive CANBus Block Diagram



Automotive 10MBd Logic Gate Optocoupler

Device	Part No.	Package	V _{ISO} (1min) V _{RMS}	V _{IFORM} V peak	Operating Temperature °C	V _{cc} V	I _{LED} mA	I _{DD} mA	t _{PHL} Max. ns	t _{PHL} Max. ns	PWD Max.	t _{PSK} Max.	CMR dV/dt kV/μs	V _{CM} V
Single Channel	ACPL-M71T	S05	4000	560	-40 to 125	3.0 to 5.5	4 to 15	1.5	35	35	12	15	15	1000
	ACPL-K71T	SS08	5000	1140	-40 to 125	3.0 to 5.5	4 to 15	1.5	35	35	12	15	15	1000
	ACPL-M72T	S05	4000	560	-40 to 125	3.0 to 5.5	4 to 15	1.5	100	100	50	60	25	1000
	ACPL-K72T	SS08	5000	1140	-40 to 125	3.0 to 5.5	4 to 15	1.5	100	100	50	60	25	1000
Dual Channel LED Input	ACPL-K74T	SS08	5000	1140	-40 to 125	3.0 to 5.5	4 to 15	1.5	35	35	12	15	15	1000
	ACPL-K75T	SS08	5000	1140	-40 to 125	3.0 to 5.5	4 to 15	1.5	100	100	50	60	25	1000
	ACFL-6211T NEW	SS012	5000	1140	-40 to 125	3.0 to 5.5	4 to 15	1.5	35	35	12	15	15	1000
	ACFL-6212T NEW	SS012	5000	1140	-40 to 125	3.0 to 5.5	4 to 15	1.5	100	100	50	60	25	1000
	ACPL-M61T	S05	4000	560	-40 to 125	4.5 to 5.5	5 to 15	13	100	100	35	40	15	1000

Optoisolation and Optical Sensor Products

Automotive $\leq 1\text{MBd}$ Transistor Output Optocoupler

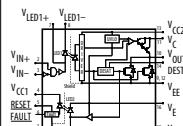
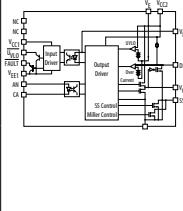
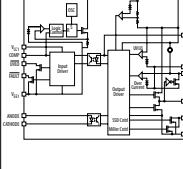
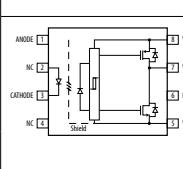
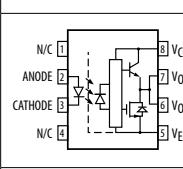
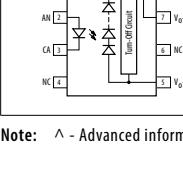
Device	Part No.	Package	V_{ISO} V_{RMS}	V_{IDRM} V peak	Operating Temperature °C	V_{CC} V	ILED mA	CTR Min. %	CTR Typ. %	t_{PHL} Max. μs	t_{PLH} Max. μs	PWD Max. μs	t_{PSK} Max. μs	CMR dV/dt kV/μs	CMR V_{CM} V
Single Channel	ACPL-M46T	S05	4000	560	-40 to 125	4.5 to 30	10 to 20	44	90	0.55	0.55	0.45	0.45	15	1500
	ACPL-M43T	S05	4000	560	-40 to 125	3.0 to 20	0.8 to 15	20	45	1	1	0.45	0.5	15	1500
	ACPL-K43T	SS08	5000	1140	-40 to 125	3.0 to 20	0.8 to 15	24	65	1	1	0.45	0.5	15	1500
	ACPL-M49T	S06	4000	560	-40 to 125	3.0 to 20	4 to 10	50	110	20	20	-	-	15	1500
	ACPL-K49T	SS08	5000	1140	-40 to 125	3.0 to 20	4 to 10	50	110	20	20	-	-	15	1500
Dual Channel	ACPL-K44T	SS08	5000	1140	-40 to 125	3.0 to 20	0.8 to 15	20	65	1	1	0.45	0.5	15	1500
	ACFL-5211T NEW	SS012	5000	1140	-40 to 125	3.0 to 20	0.8 to 15	20	65	1	1	0.45	0.5	15	1500
	ACFL-5212T NEW	SS012	5000	1140	-40 to 125	3.0 to 20	4 to 10	50	110	20	20	-	-	15	1500

Automotive Analog Optocoupler

Device	Part No.	Package	V_{ISO} V_{RMS}	V_{IDRM} V peak	Operating Temperature °C	V_{CC} V	ILED	CTR (Sat) Min. %	(TA = 25 °C)		BW Typ. kHz	CMR dV/dt kV/μs	CMR V_{CM} V
									CTR Min. %	CTR Max. %			
	ACPL-M43T	S05	4000	560	-40 to 125	3.0 to 20	0.8 to 15	20	32	100	1000	15	1500
	ACPL-K43T	SS08	5000	1140	-40 to 125	3.0 to 20	0.8 to 15	24	32	100	1000	15	1500
	ACPL-M49T	S05	4000	560	-40 to 125	3.0 to 20	4 to 10	20	70	175	-	15	1500
	ACPL-K49T	SS08	5000	1140	-40 to 125	3.0 to 20	4 to 10	24	70	175	-	15	1500
Dual Channel	ACFL-5211T NEW	SS012	5000	1140	-40 to 125	3.0 to 20	0.8 to 15	24	32	100	1000	15	1500
	ACFL-5212T NEW	SS012	5000	1140	-40 to 125	3.0 to 20	4 to 10	35	70	175	-	15	1500

Optoisolation and Optical Sensor Products

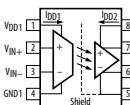
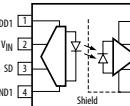
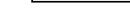
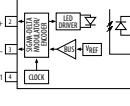
Automotive Gate Drive Optocoupler

Device	Part No.	Features	Package	V_{ISO} V_{RMS}	V_{IORM} V peak	Operating Temperature °C	V_{cc} V	ILED Typ. mA	I_{cc} peak Max. mA	t_{PHL} Max. ns	t_{PLH} Max. ns	PWD Max. ns	t_{PSK} Max. ns	CMR dV/dt kV/μs	CMR V _{CM} V	
	ACPL-38JT	Desat, UVLO, Fault Feedback	S016	5000	1230	-40 to 125	15 to 30	Buffered	2.5	5	500	500	300	350	15	1500
	ACPL-34JT	Desat and UVLO with separate Fault Feedback, Rail-to-Rail, Miller Clamp/Soft Shutdown	S016	5000	1230	-40 to 125	15 to 25	10 to 16	2.5	13.6	280	250	100	150	30	1500
	ACPL-344JT		S016	5000	1230	-40 to 125	15 to 25	10 to 16	2.5	13.6	250	250	-100 to 100	-150 to 105	30	1500
	ACPL-31JT^		S016	5000	1230	-40 to 125	12 to 20	10 to 16	2.5	5	250	250	-15 to 100	-100 to 15	50	1500
	ACPL-32JT	DC-DC Flyback Controller, Desat and UVLO with separate Fault Feedback, Rail-to-Rail, Miller Clamp/Soft Shutdown	S016	5000	1230	-40 to 125	19 to 21.5	10 to 16	2.5	13.6	250	250	-40 to 140	-160 to 60	30	1500
	ACPL-K34T	200kHz, tight dead time control	SS08	5000	1140	-40 to 125	10 to 20	10 to 13	2.5	3.9	110	110	40	-40 to 50	50	1500
	ACPL-K33T	200kHz, tight dead time control	SS08	5000	1140	-40 to 125	15 to 30	10 to 13	2.5	4.2	120	120	40	-40 to 50	50	1500
	ACPL-312T	UVLO	DIP8	3750	630	-40 to 125	15 to 30	7 to 16	2.5	5	500	500	300	350	15	1500
	ACPL-K30T	Photovoltaic Driver	SS08	5000	1140	-40 to 125	4.5	10 to 20	4μA	-	-	-	-	-	-	-

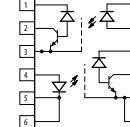
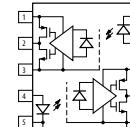
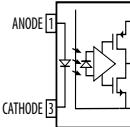
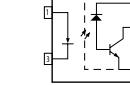
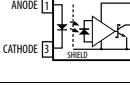
Note: ^ - Advanced information, may subject to changes.

Optoisolation and Optical Sensor Products

Automotive Miniature Isolation Amplifier

Device	Part No.	Features	Package	V_{ISO} V_{RMS}	V_{IORM} V peak	Operating Temperature °C	V_{DD} V	Input Range Typ. V	Gain Typ. V/V	Gain Tol. Max. %	NonL Max. %	Off- set Max. mV	BW Typ. kHz	CMR dV/dt kV/μs	CMR V_{CM} V
	ACPL-782T	2% Gain Tolerance, Differential Output	DIP8	4000	891	-40 to 125	4.5 to 5.5	±0.2	8	2	0.35	±4	100	10	1000
	ACPL-C87AT	DC Voltage Sensing, Shutdown Control, Differential Output	SS08	5000	1414	-40 to 125	4.5 to 5.5	0 to 2	1	1	0.12	±10	100	10	1000
	ACPL-C87BT		SS08	5000	1414	-40 to 125	4.5 to 5.5	0 to 2	1	0.5	0.12	±10	100	10	1000
	ACPL-C797T NEW	Sigma-Delta Output, 16-bit resolution, 12-bit ENOB typ.	SS08	5000	1414	-40 to 125	4.5 to 5.5	±0.2	NA	1	0.05	-0.3 to 1.7	NA	25	1000

Extended Temperature R²Coupler

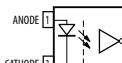
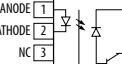
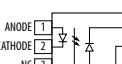
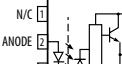
Device	Part No.	Package	Operating Temperature °C	IOUT A (MAX)	IF mA	CTR		t_{PLH} μs Max.	t_{PHL} μs Max.	PWD ns Max.	t_{PSK} ns Max.	CMR - V/μs@ V_{CM}		V_{ISO} V_{RMS} Min.	V_{IORM} V peak
						% Min.	% Max.					CMR V/μs (Min.)	V_{CM} V		
	ACFL-5211U^ NEW	SS012	-40 to 125	NA	0.8	32	100	1	1	850	NA	15000	15000	5000	1140*
	ACFL-5212U^ NEW	SS012	-40 to 125	NA	4	65	150	20	20	NA	NA	15000	15000	5000	1140*
	ACFL-6211U^ NEW	SS012	-40 to 125	NA	4	NA	NA	0.35	0.35	12	15	15000	1000	5000	1140*
	ACFL-6212U^ NEW	SS012	-40 to 125	NA	4	NA	NA	0.1	0.1	50	60	15000	1000	5000	1140*
	ACPL-M71U	S05	-40 to 125	NA	4	NA	NA	0.035	0.035	12	15	25000	1000	3750	567*
	ACPL-M72U	S05	-40 to 125	NA	4	NA	NA	0.1	0.1	50	60	25000	1000	3720	567*
	ACPL-M43U	S05	-40 to 125	NA	10	32	80	1.0	1.0	850	NA	15000	1500	3750	567
	ACPL-M46U	S05	-40 to 125	NA	10	44	90	0.4	0.6	450.0	NA	15000	1500	3750	567

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

^ Advanced Information, may subject to changes.

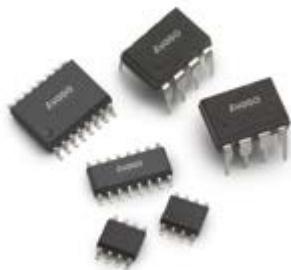
Optoisolation and Optical Sensor Products

Extended Temperature R²Coupler

Device	Part No.	Package	Operating Temperature °C	IOUT A (MAX)	IF mA	CTR		t _{PLH} µs Max.	t _{PHL} µs Max.	PWD ns Max.	t _{PSK} ns Max.	CMR - V/µs@V _{CM}		V _{IOPM} V peak	
						% Min.	% Max.					CMR V/µs (Min.)	V _{CM} V		
	ACPL-M61U	S05	-40 to 125	NA	5	NA	NA	0.1	0.1	35	40	15000	1000	3750	567
	ACPL-M49U	S05	-40 to 125	NA	10	32	80	20	20	NA	NA	15000	1500	3750	567*
	ACPL-K49U	Stret-ched S05	-40 to 125	NA	10	32	100	20	20	NA	NA	15000	1500	5000	1140*
	ACPL-312U	DIP6	-40 to 125	2.5	7	N/A	N/A	0.5	0.5	300	350 (P _{DD})	25000	1500	3750	630

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

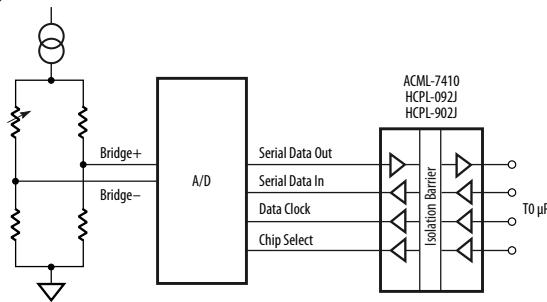
Optoisolation and Optical Sensor Products



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 Isolators

Device	Part No.	Channel	Package	Max . Data Rate MBd	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/μs@V _{CM}		V _{ISO} V _{RMS} Min.
									CMR V/μs	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
	ACML-7400	Quad	S016Wide Body	100	32	36	2	5	25000	1000	5600
	HCPL-090J	Quad	S016Narrow Body	100	15	18	3	6	15000	1000	2500
	HCPL-900J	Quad	S016Wide Body	100	15	18	3	6	15000	1000	2500
	ACML-7420	Quad, 2/2, Bi-dir	S016Wide Body	100	32	36	2	5	25000	1000	5600
	HCPL-091J	Quad, 2/2 Bi-dir	S016Narrow Body	100	15	18	3	6	15000	1000	2500
	HCPL-901J	Quad, 2/2 Bi-dir	S016Wide Body	100	15	18	3	6	15000	1000	2500
	ACML-7410	Quad, 3/1, Bi-dir	S016Wide Body	100	32	36	2	5	25000	1000	5600
	ACCL-9410 [▲] NEW	Quad, 3/1 Bi-dir	S016Narrow Body	25	40	40	8	15	-	-	2500 [▲]
	HCPL-092J	Quad, 3/1 Bi-dir	S016Narrow Body	100	15	18	3	6	15000	1000	2500
	HCPL-902J	Quad, 3/1 Bi-dir	S016Wide Body	100	15	18	3	6	15000	1000	2500

Note: ^ - Advanced information, may subject to changes.

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, 25kV/μs at V_{CM}=1000V, and meet UL 1577 and IEC 60950-1, IEC 61010-1 and IEC 60601-1 safety ratings.

Benefits

- High insulation: UL1577 (5.6kVrms 1 min rating) and IEC 60950-1 and IEC 61010-1 working voltage (up to 1132Vpeak)
- High speed (100MBd), low PWD (3ns) and low T_p (18ns)
- Wide temperature operation (-40°C to 105°C)
- Buffer input and CMOS output (eliminate input/output resistors)
- Multi-channel (1, 2 & 4-ch)
- Low power consumption

Optoisolation and Optical Sensor Products



Benefits

- 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
- DC bus voltage sensing
- Renewable energy inverters
- Energy storage system
- Electric vehicle charging station

Miniature Analog Isolation Amplifier

Description

Using advanced Sigma-Delta Modulator technology, Avago Technologie's Miniature Analog Isolation Amplifiers provide accurate measurements of phase current and bus voltage in motor drives, power inverters and voltage signals in general isolation circuits. With built-in safety insulation and high CMR (common mode rejection) performance, these miniature isolation amplifiers offers a competitive price/performance alternative to traditional hall effect current sensors.

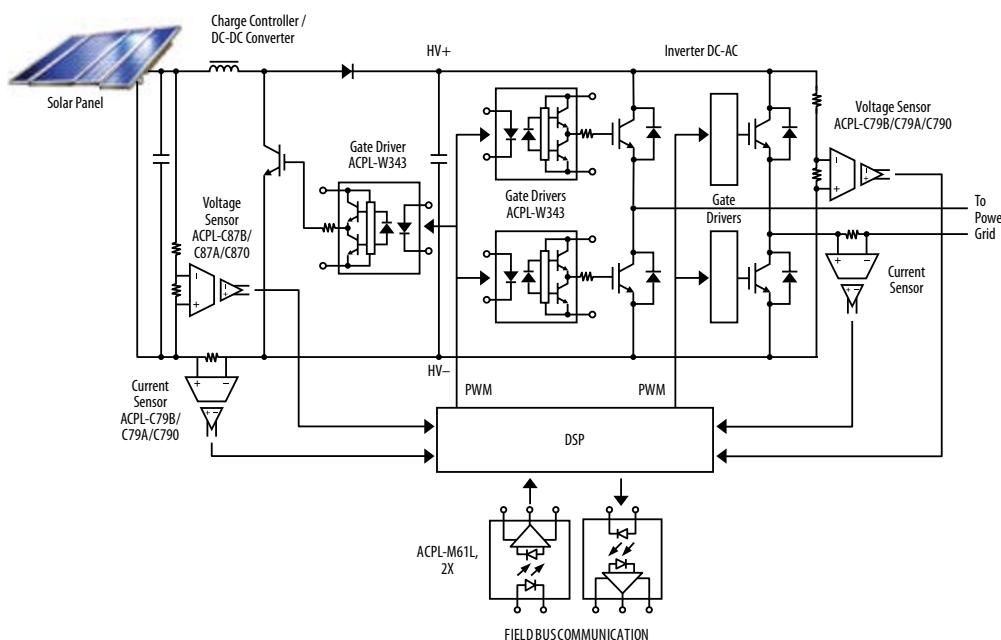
The ACPL-C79B/C79A/C790 isolation amplifiers feature high gain accuracy, low temperature drift of -50ppm/ $^{\circ}\text{C}$, 3.3V/5V output supply operation and a wide -40 to +105 $^{\circ}\text{C}$ operating temperature range. These features are delivered in a SSO-8 package that has a footprint 30% smaller than the standard DIP-8 package. The series is implemented with a fully differential circuit with gain accuracy of $\pm 0.5\%$ (ACPL-C79B), $\pm 1\%$ (ACPL-

C79A), and $\pm 3\%$ (ACPL-C790). With a 200kHz bandwidth and 1.6 μs response time, the ACPL-C79x captures transients during short circuit and overload conditions.

Also available are ACNT-H79A and ACNT-H790 with gain accuracy of $\pm 1\%$ and $\pm 3\%$ respectively housed in 14.2mm Stretched SO8 package, with 2262Vpeak working voltage. The ACPL-C87B/C87A/C870 family are optical isolation amplifiers designed specifically for voltage sensing. Its 2 V input range and high 1 G Ω input impedance, makes it well suited for isolated voltage sensing.

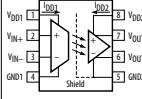
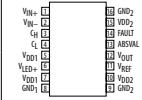
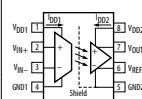
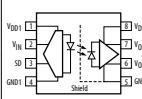
The ACPL-C797 offers a digital sigma-delta bitstream output interface option with its 10Mhz internally clocked sigma-delta modulator capable of up to 78dB SNR performance (signal to noise ratio). Externally clocked versions are available as ACPL-796J and ACPL-798J(LVDS output), allowing channel to channel synchronization.

Example Application: Block diagram of a micro-inverter with simplified DC-DC-AC topology.



Optoisolation and Optical Sensor Products

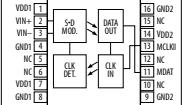
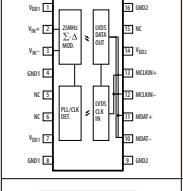
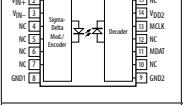
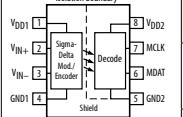
Miniature Isolation Amplifier

Device	Part No.	Features	Package	Operating Temperature °C	Gain Error at 25°C % Typ.	Non-linearity % Typ.	Bandwidth kHz Typ.	V _{DD2} V	CMR - V/μs@V _{CM}		V _{ISO} V _{RMS} Min.	V _{IORM} V peak
									CMR V/μs (Typ.)	V _{CM} V		
	ACNT-H79A NEW	±200mV Inputs, Differential Outputs	14.2mm Stretched S08	40 to +105	±1	0.05	200	3 - 5.5	15000	1000	7500	2262
	ACNT-H790 NEW	±200mV Inputs, Differential Outputs	14.2mm Stretched S08	40 to +105	±3	0.05	200	3 - 5.5	15000	1000	7500	2262
	ACPL-C78A	±200mV Inputs, Differential Outputs	SS08	-40 to +85	±1	0.0037	100	4.5 - 5.5	15000	1000	5000	1414
	ACPL-C780	±200mV Inputs, Differential Outputs	SS08	-40 to +85	±3	0.0037	100	4.5 - 5.5	15000	1000	5000	1414
	ACPL-C784	±200mV Inputs, Differential Outputs	SS08	-40 to +85	±5	0.0037	100	4.5 - 5.5	15000	1000	5000	1414
	ACPL-C79B	±200mV Inputs, Differential Outputs	SS08	-40 to +105	±0.5	0.05	200	3 - 5.5	15000	1000	5000	1414
	ACPL-C79A	±200mV Inputs, Differential Outputs	SS08	-40 to +105	±1	0.05	200	3 - 5.5	15000	1000	5000	1414
	ACPL-C790	±200mV Inputs, Differential Outputs	SS08	-40 to +105	±3	0.05	200	3 - 5.5	15000	1000	5000	1414
	ACPL-790B	±200mV Inputs, Differential Outputs	DIP8	-40 to +105	±0.5	0.05	200	3 - 5.5	15000	1000	5000	891
	ACPL-790A	±200mV Inputs, Differential Outputs	DIP8	-40 to +105	±1	0.05	200	3 - 5.5	15000	1000	5000	891
	ACPL-7900	±200mV Inputs, Differential Outputs	DIP8	-40 to +105	±3	0.05	200	3 - 5.5	15000	1000	5000	891
	HCPL-7800A	±200mV Inputs, Differential Outputs	DIP8	-40 to +85	±1	0.0037	100	4.5 - 5.5	15000	1000	3750	891
	HCPL-7800	±200mV Inputs, Differential Outputs	DIP8	-40 to +85	±3	0.0037	100	4.5 - 5.5	15000	1000	3750	891
	HCPL-7840	±200mV Inputs, Differential Outputs	DIP8	-40 to +85	±5	0.0037	100	4.5 - 5.5	15000	1000	3750	891*
	HCPL-788J	±200mV Inputs, Onboard Fault Detection	S016	-40 to +85	±3	0.06	30	4.5 - 5.5	25000	1000	5000	1414
	ACPL-785J	±200mV Inputs, Onboard Fault Detection	S016	-40 to +85	±5	0.06	30	4.5 - 5.5	25000	1000	5000	1414*
	HCPL-7510	±200mV Inputs, Single-ended Outputs	DIP8	-40 to +85	±3	0.06	100	4.5 - 5.5	15000	1000	3750	891*
	HCPL-7520	±200mV Inputs, Single-ended Outputs	DIP8	-40 to +85	±5	0.06	100	4.5 - 5.5	15000	1000	3750	891*
	ACPL-C870	0-2V High Impedance Inputs, Differential Outputs	SS08	-40 to +105	±3	0.04	100	3.3	15000	1000	5000	1414
	ACPL-C87A	0-2V High Impedance Inputs, Differential Outputs	SS08	-40 to +105	±1	0.04	100	3.3	15000	1000	5000	1414
	ACPL-C87B	0-2V High Impedance Inputs, Differential Outputs	SS08	-40 to +105	±0.5	0.04	100	3.3	15000	1000	5000	1414

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

Optoisolation and Optical Sensor Products

Optically Isolated Sigma-Delta Modulator

Device	Part No.	Features	Pack-age	Operating Temperature °C	Gain Error at 25°C % Typ.	INL LSB Typ.	ENOB Bits Typ.	V _{DD2} V	CMR - V/μs@V _{CM}		V _{ISO} V _{RMS} Min.	V _{IORM} V peak
									CMR V/μs (Typ.)	V _{CM} V		
	ACPL-796J	External Clocked, 5 - 20MHz	S016	-40 to +105	±1	3	12	3 - 5.5	25000	1000	5000	1414*
	ACPL-798J	External Clocked, 5 - 25MHz	S016	-40 to +105	±1	3	12	3.3 - 5.5	25000	1000	5000	1414
	HCPL-786J	Internally Clocked, 10MHz	S016	-40 to +85	±2	3	11	4.5 - 5.5	20000	1000	5000	1414
	ACPL-C797	Internally Clocked, 10MHz	SS08	-40 to +105	±1	3	12	3 - 5.5	25000	1000	5000	1414
	ACPL-7970	Internally Clocked, 10MHz	DIP8	-40 to +105	±1	3	12	3 - 5.5	25000	1000	5000	891
	HCPL-7860	Internally Clocked, 10MHz	DIP8	-40 to +85	±1 (Matching)	3	11	4.5 - 5.5	20000	1000	3750	891
	HCPL-7560	Internally Clocked, 10MHz	DIP8	-40 to +85	±5	64	8	4.5 - 5.5	20000	1000	3750	891*

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

Optoisolation and Optical Sensor Products



Applications

- Isolated IGBT/MOSFET gate drive
- AC and brushless DC motor drives
- Renewable energy inverters
- Energy storage system
- Electric vehicle charging station
- Industrial inverters
- Switching power supplies
- Uninterruptible power supplies (UPS)

Integrated Gate Drive Optocoupler

Description

In typical motor drive and renewable energy power conversion 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 such applications.

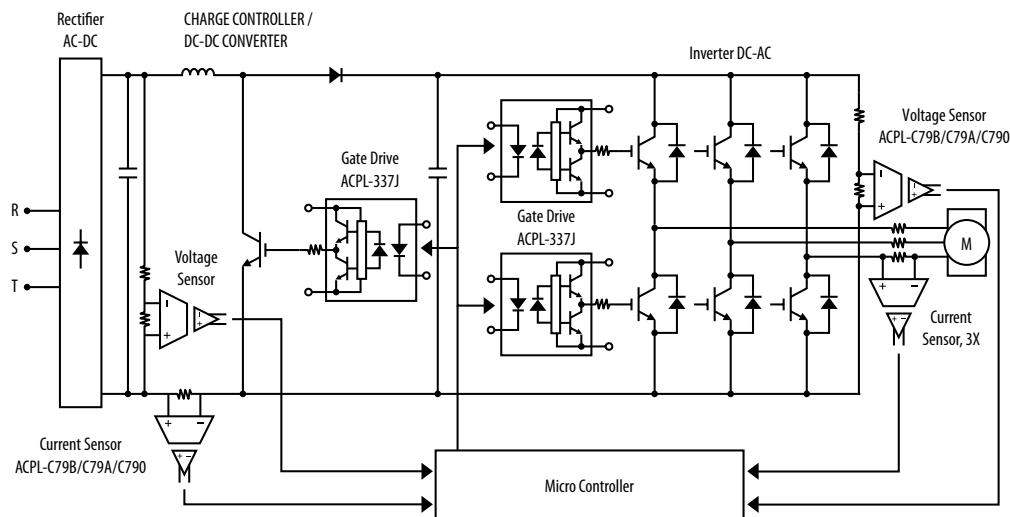
High performance motor drives require precision timing for turning on and off the power devices on the inverter while renewable energy inverter needs to be reliable and efficient when converting DC-link voltage to usable AC power output. The microcontroller that controls these functions needs to be isolated from the high voltage inverter side. Avago Technologies offers a variety of optocouplers that have built-in gate drive capability. These gate drive optocouplers come in wide range of output current from 0.4A to 5A, and selected parts with integrated protection features such as Active Miller Clamp, under voltage

lockout, fault and UVLO status feedback and desaturation detection. Beside protection features, Avago has also integrated DC-DC controller for floating power supply and LED driver to make design more compact and affordable.

Benefits

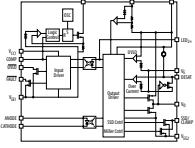
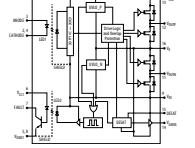
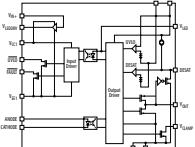
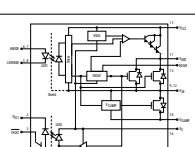
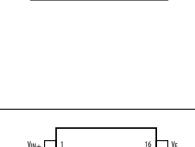
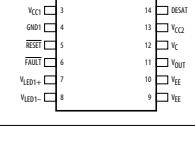
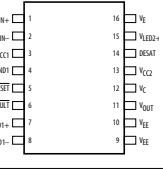
- Rail-to-rail output voltage for reliable IGBTs drive
- Integrated fault protection, feedback, Active Miller Clamp, DC-DC controller and LED driver to reduce component count and solution cost
- Short propagation delay for faster switching
- Fast IGBT switching for improved efficiency
- Low power consumption for bootstrap operation
- High common mode transient rejection ensures reliable operation under noisy environment
- Direct drive of high power IGBTs
- Reinforced insulation

Typical Motor Drive Block Diagram



Optoisolation and Optical Sensor Products

Highly Integrated Smart Gate Drive Optocoupler

Device	Part No.	Package	$I_{F(on)}$	I_{OUT}	I_{OUT}	t_{PLH}	t_{PHL}	V_{cc}	CMR - V/ μ s@ V_{CM}		V_{ISO}	V_{IORM}	
			mA Min.	A Min.	A Max.	μ s Max.	μ s Max.		CMR V/ μ s (Min.)	V_{CM} V			
	ACPL-302J	S016	10	—	2.5	0.25	0.25	0.16	25	30000	1500	5000	1230
<ul style="list-style-type: none"> – Integrated DC-DC Controller for floating power supply – Integrated short circuit protection and fault feedback – Under Voltage Lockout(UVLO) protection with feedback – Integrated Active Miller Clamp 													
	ACPL-339J	S016	6	1.0	—	0.30	0.30	0.2	30	25000	1500	5000	1414
<ul style="list-style-type: none"> – Scalable & Efficient gate drive design – Dual Rail-to-Rail output to drive external MOSFET buffer – Active timing control to prevent cross conduction in MOSFET buffer – Integrated short circuit protection and fault feedback 													
	ACPL-337J	S016	9	3.0	4.0	0.22	0.25	0.15	30	30000	1500	5000	1414
	ACPL-336J	S016	9	2.0	2.5	0.22	0.25	0.15	30	30000	1500	5000	1414
<ul style="list-style-type: none"> – Rail-to-rail output voltage – Integrated short circuit protection and fault feedback – Under Voltage Lockout(UVLO) protection with feedback – Integrated Active Miller Clamp and LED driver 													
	ACPL-333J ACPL-332J	S016	8	2.0	2.5	0.25	0.25	0.15	30	50000	1500	5000	1414
<ul style="list-style-type: none"> – 2.5A Highly Integrated Gate Drive Optocoupler with Active Miller Clamp, Over-Current Protection and Fault Feedback – Under Voltage Lock-Out Protection (UVLO) with Hysteresis – Automatic Fault Reset after fixed delay time (for ACPL-333J-000E only) 													
	ACPL-331J ACPL-330J	S016	8	1.0	1.5	0.25	0.25	0.15	30	50000	1500	5000	1414
<ul style="list-style-type: none"> – 1.5A Highly Integrated Gate Drive Optocoupler with Active Miller Clamp, Over-Current Protection and Fault Feedback – Under Voltage Lock-Out Protection (UVLO) with Hysteresis – Automatic Fault Reset after fixed delay time (for ACPL-330J-000E only). 													
	HCPL-316J	S016	—	2.0	2.5	0.5	0.5	0.3	30	15000	1500	5000	1414
<ul style="list-style-type: none"> – 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 													

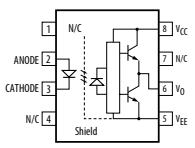
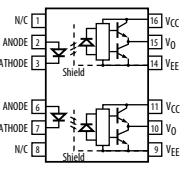
Optoisolation and Optical Sensor Products

Basic Gate Drive Optocoupler

Device	Part No.	Package	$I_{F(on)}$ mA Min.	I_{OUT} A Min.	I_{OUT} A Max.	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		
Single Channel	ACNT-H313	14.2mm Stretched S08	7	2.0	2.5	0.5	0.5	0.35	30	40000	2000	7500	2262
	ACNV3130	500 mil DIP	12	2.0	2.5	0.50	0.50	0.35	30	40000	1500	7500	2262
	ACNW3430 ^A	400 mil DIP	7	4.0	5.0	0.18	0.18	0.09	30	50000	2000	5000	1414
	ACNW3410 ^A	400 mil DIP	7	2.5	3.0	0.18	0.18	0.09	30	50000	2000	5000	1414
	ACPL-P349	Stretched S06	7	2.0	2.5	0.11	0.11	0.05	30	50000	1500	3750	891*
	ACPL-W349	Stretched S06	7	2.0	2.5	0.11	0.12	0.05	30	50000	1500	5000	1140*
	ACPL-P346	Stretched S06	7	2.0	2.5	0.12	0.12	50	20	50000	1500	3750	891*
	ACPL-W346	Stretched S06	7	2.0	2.5	0.12	0.12	50	20	50000	1500	5000	1140*
	ACPL-P347	Stretched S06	7	2.0	2.5	0.11	0.11	0.05	30	50000	1500	3750	891*
	ACPL-W347	Stretched S06	7	0.8	1.0	0.11	0.11	0.05	30	50000	1500	5000	1140
	ACPL-P345	Stretched S06	7	0.8	1.0	0.12	0.12	50	20	50000	1500	3750	891*
	ACPL-W345	Stretched S06	7	0.8	1.0	0.12	0.12	50	20	50000	1500	5000	1140*
	ACPL-P343	Stretched S06	7	3.0	4.0	0.20	0.20	0.1	30	35000	1500	3750	891*
	ACPL-W343	Stretched S06	7	3.0	4.0	0.20	0.20	0.1	30	35000	1500	5000	1140*
	ACPL-P341	Stretched S06	7	2.5	3.0	0.20	0.20	0.1	30	35000	1500	3750	891*
	ACPL-W341	Stretched S06	7	2.5	3.0	0.20	0.20	0.1	30	35000	1500	5000	1140*
	ACPL-P340	Stretched S06	7	0.8	1.0	0.20	0.20	0.1	30	35000	1500	3750	891*
	ACPL-W340	Stretched S06	7	0.8	1.0	0.20	0.20	0.1	30	35000	1500	5000	1140*
	ACPL-H342	Stretched S08	7	2.0	2.5	0.35	0.25	-0.2	30	40000	1500	3750	891*
	ACPL-K342	Stretched S08	7	2.0	2.5	0.35	0.25	-0.2	30	40000	1500	5000	1140*
	ACPL-312U	300 MIL DIP	7	2.0	2.5	0.5	0.5	0.35	30	25000	1500	3750	630
	ACPL-H312	Stretched S08	7	2.0	2.5	0.5	0.5	0.35	30	15000	1500	3750	891*
	ACPL-K312	Stretched S08	7	2.0	2.5	0.5	0.5	0.35	30	15000	1500	5000	1140*
	ACPL-P302	Stretched S06	7	0.2	0.4	0.7	0.7	0.5	30	10000	1000	3750	891*
	ACPL-P314	Stretched S06	8	0.4	0.6	0.7	0.7	0.5	30	25000	1000	3750	891*
	ACPL-W302	Stretched S06	7	0.2	0.4	0.7	0.7	0.5	30	10000	1000	5000	1140*
	ACPL-W314	Stretched S06	8	0.4	0.6	0.7	0.7	0.5	30	25000	1000	5000	1140*
	ACNW3190	400 mil DIP8	10	4.0	5.0	0.5	0.5	0.3	30	15000	1500	5000	1414

Optoisolation and Optical Sensor Products

Integrated Gate Drive Optocoupler Product Selection

Device	Part No.	Package	$I_{F(on)}$ mA Min.	I_{OUT} A Min.	I_{OUT} A Max.	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		
	ACNW3130	400 mil DIP8	10	2.0	2.5	0.5	0.5	0.35	30	40000	1500	5000	1414
	ACPL-3130	300 mil DIP8	7	2.0	2.5	0.5	0.5	0.35	30	40000	1500	3750	630*
	ACPL-J313	300 mil DIP8	7	2.0	2.5	0.5	0.5	0.35	30	40000	1500	3750	1230
	ACPL-T350	300 mil DIP8	7	2.0	2.5	0.5	0.5	0.35	30	15000	1500	3750	630*
	HCNW3120	400 mil DIP8	10	2.0	2.5	0.5	0.5	0.3	30	25000	1500	5000	1414
	HCPL-J312	300 mil DIP8	7	2.0	2.5	0.5	0.5	0.35	30	25000	1500	3750	1230
	HCPL-J314	300 mil DIP8	8	0.4	0.6	0.7	0.7	0.5	30	25000	1500	3750	891
	HCPL-T250	300 mil DIP8	7	0.5	1.5	0.5	0.5	—	30	5000	600	3750	630*
	HCPL-T251	300 mil DIP8	8	0.1	0.4	1.0	1.0	—	30	10000	600	3750	—
	HCPL-0302	S08	7	0.2	0.4	0.7	0.7	0.5	30	10000	1000	3750	566*
	HCPL-0314	S08	8	0.4	0.6	0.7	0.7	0.5	30	25000	1000	3750	566*
	HCPL-3020	300 mil DIP8	7	0.2	0.4	0.7	0.7	0.5	30	10000	1000	3750	630*
	HCPL-3120	300 mil DIP8	7	2.0	2.5	0.5	0.5	0.35	30	25000	1500	3750	630*
	HCPL-314J	S016	8	0.4	0.6	0.7	0.7	0.5	30	25000	1500	5000	1414
	HCPL-315J	S016	7	0.5	0.6	0.5	0.5	0.35	30	15000	1500	5000	1414

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

Optoisolation and Optical Sensor Products



Applications

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

Intelligent Power Module Interface Optocoupler

Description

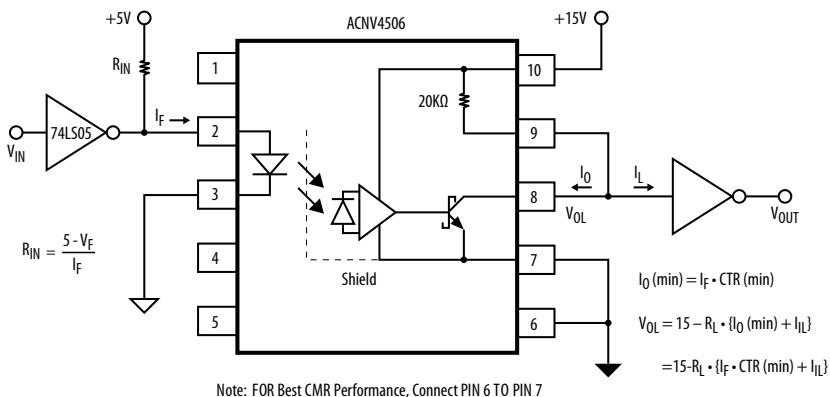
The ACNV/HCNW/HCPL-45xx and ACPL-M/P/W484 series optocouplers are designed for Intelligent Power Module (IPM) drive applications such as inverters and motor control systems. These high speed optocouplers have high CMR performance that helps to reject common mode noise in such high voltage systems. The output of ACNV/HCNW/HCPL-45xx devices is conventional open-collector; the output of ACPL-M/P/W484 devices came with totem pole output stage eliminates the necessity of using the pull-up resistor and allows direct drive to the IPM. ACNV45xx devices allow very high working voltage for use in Renewable Energy Supply system.

In addition to Intelligent Power Module drive, the ACNV/HCNW/HCPL-45xx and ACPL-M/P/W484 series optocouplers can be used in general purpose isolation applications like high speed logic ground isolation, isolated line receivers, and microprocessor system interfaces.

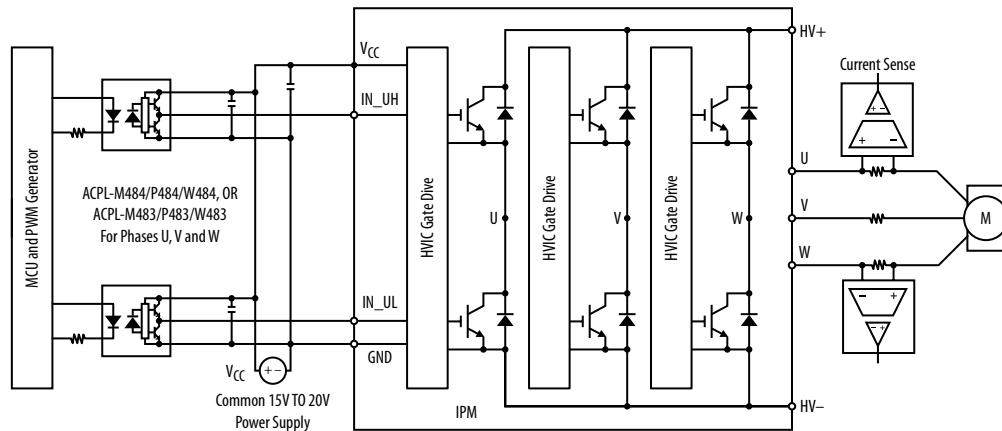
Benefits

- 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



Intelligent Power Module (IPM) Based Inverter Block Diagram



Optoisolation and Optical Sensor Products

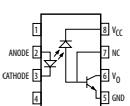
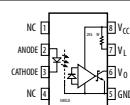
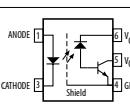
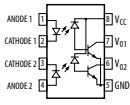
Intelligent Power Module Interface Optocoupler Product Selection

Device	Part No.	Package	I _{F(on)} mA Min.	CTR			t _{PLH} μs Max.	t _{PHL} μs Max.	P _{DD} μs Max.	CMR - V/μs@V _{CM}		V _{IORM} V _{RMS} Min.	V _{IORM} V peak
				% Min.	% Max.	IF mA				CMR V/μs (Min.)	V _{CM} V		
Single Channel	ACPL-M483	S05	4	—	—	—	0.12	0.12	0.10	30000	1000	3750	567*
	ACPL-P483	Stretched S06	4	—	—	—	0.12	0.12	0.10	30000	1000	3750	891*
	ACPL-W483	Stretched S06	4	—	—	—	0.12	0.12	0.10	30000	1000	5000	1140*
	ACPL-M484	S05	4	—	—	—	0.12	0.15	0.13	30000	1000	3750	567*
	ACPL-P484	Stretched S06	4	—	—	—	0.12	0.15	0.13	30000	1000	3750	891*
	ACPL-W484	Stretched S06	4	—	—	—	0.12	0.15	0.13	30000	1000	5000	1140*
	ACNV4506	500 mil DIP10	10	44	—	10	0.55	0.40	0.50	30000	1500	7500	2262*
	ACPL-4800	300 mil DIP8	6	—	—	—	0.35	0.35	0.25	30000	1000	3750	630*
	ACPL-M43U	S05	10	32	80	10	1	1	0.9	15000	1000	3750	567*
	ACPL-M46U	S05	10	44	90	10	0.4	0.55	0.45	15000	1000	3750	567*
	ACPL-P456	Stretched S06	10	44	>90	10	0.55	0.45	0.45	15000	1500	3750	891*
	ACPL-W456	Stretched S06	10	44	>90	10	0.55	0.45	0.45	15000	1500	5000	1140*
	ACPL-P480	Stretched S06	6	—	—	—	0.35	0.35	0.25	20000	1000	3750	891*
	ACPL-W480	Stretched S06	6	—	—	—	0.35	0.35	0.25	20000	1000	5000	1140
	ACPL-P481	Stretched S06	6	—	—	—	0.35	0.35	0.25	20000	1000	3750	891*
	ACPL-W481	Stretched S06	6	—	—	—	0.35	0.35	0.25	20000	1000	5000	1140*
	ACPL-K453	Stretched S08	16	19	50	16	1.00	1.00	1.00	15000	1500	5000	1140*
	ACPL-P454	Stretched S06	12	26	65	12	1.14	1.00	1.30	15000	1500	3750	891*
	ACPL-W454	Stretched S06	12	26	65	12	1.14	1.00	1.30	15000	1500	5000	1140*

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

Optoisolation and Optical Sensor 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.	P_{DD} μs Max.	CMR - V/ μs @ V_{CM}		V_{ISO} V_{RMS} Min.	V_{IORM} V peak
				% Min.	% Max.	IF mA				CMR V/ μs (Min.)	V_{CM} V		
	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	567*
	HCPL-M453	S05	16	20	50	16	1.0	1.0	1.0	15000	1500	3750	567*
	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*
	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 60747-5-2/5 Option 060, # - with UL 5000VRMS/1 minute Option 020, ^ - Advanced information, may subject to changes.

Optoisolation and Optical Sensor Products



Isolated Line Receiver

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

Description

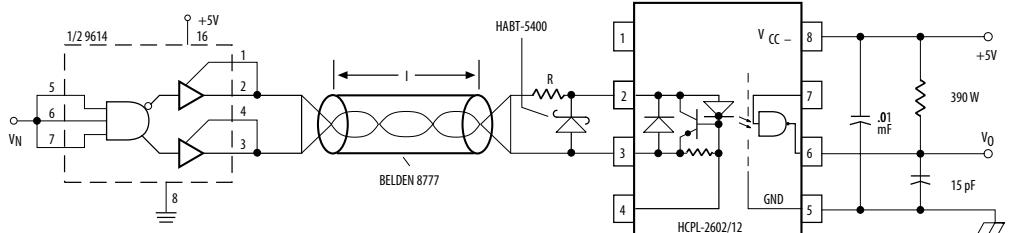
The HCPL-2602/12 have input current regulators and integrated high gain photo detectors. The input regulator serves as a line terminator for line receiver applications. The higher LED threshold voltage provides improved immunity to differential noise and the rejection internally shielded detector provides 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.

Benefits

- Line termination included – no extra circuitry required

Typical Block Diagram



Line Receiver Product Selection

Device	Part No.	Package	Output Collector Output mA Max.	t_{PLH} μs Max.	t_{PHL} μs Max.	CMR - V/ μs @VCM		V_{ISO} V_{RMS} Min.
						CMR V/ μs (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 and Optical Sensor Products



Applications

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

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.

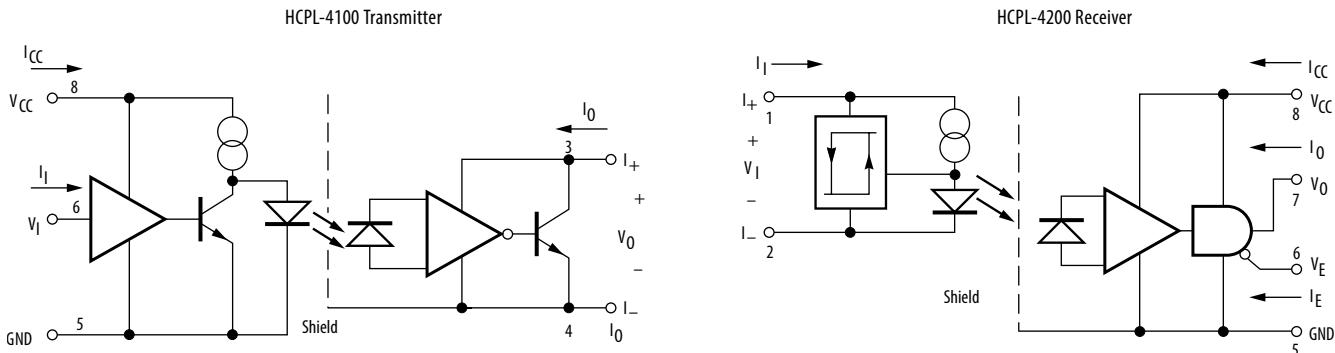
20 mA current loop systems conventionally signal a logic high state by transmitting 20 mA of loop current, and signal a logic low

state by allowing no more than few milliamperes 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

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 - $V/\mu s$ @VCM		V_{ISO} V_{RMS} Min.
						CMR $V/\mu s$ (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 and Optical Sensor Products



Applications

- Limit switch sensing
- AC/DC voltage and current detector
- Relay contact monitor
- Relay coil voltage monitor
- User configurable voltage/current limit detection
- Microprocessor interfacing

Isolated Voltage/Current Detector

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 microprocessor interfacing.

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

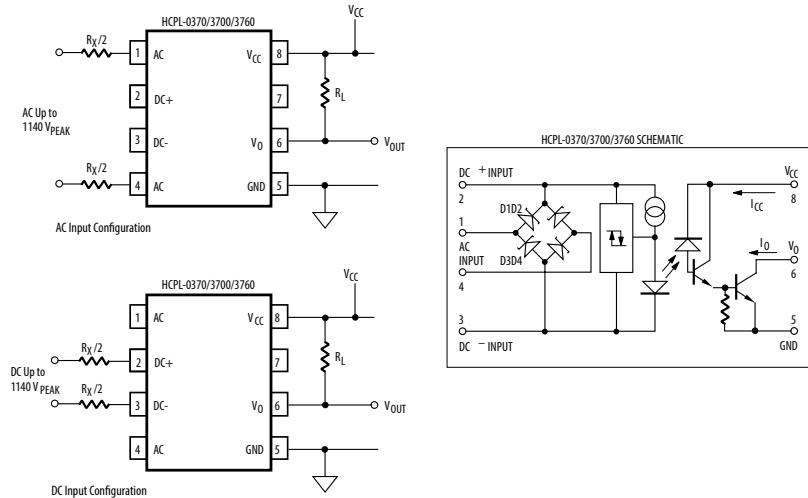
optocoupler input, only a pair of series resistors $R_X/2$ are required to limit the current. The AC signal can be filtered with a capacitor at either the input or the output of the optocoupler. The value of R_X determines the threshold sensing voltage.

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.

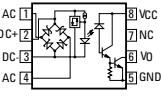
Benefits

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

Typical Block Diagram



Isolated Voltage/Current Detector

Device	Part No.	Package	Input Threshold Current		Hysteresis mA typ	t_{PLH} μs Max.	t_{PHL} μs Max.	CMR - V/μs@V _{CM}		V_{ISO} VRMS Min.	V_{IORM} V _{PEAK}					
			mA					CMR V/μs (Min.)	V _{CM} V							
			mA	mA												
	ACPL-K370	Stretched S08	1.96	3.11	1.2	40	15	600	140	3750/5000#	1140*					
	ACPL-K376	Stretched S08	0.87	1.56	0.6	40	15	600	140	3750/5000#	1140*					
	HCPL-0370	S08	1.96	3.11	1.2	40	15	600	140	3750	567*					
	HCPL-3700	300 mil DIP8	1.96	3.11	1.2	40	15	600	140	3750	630*					
	HCPL-3760	300 mil DIP8	0.87	1.56	0.6	40	15	600	140	3750	630*					

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

Optoisolation and Optical Sensor 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.

Applications

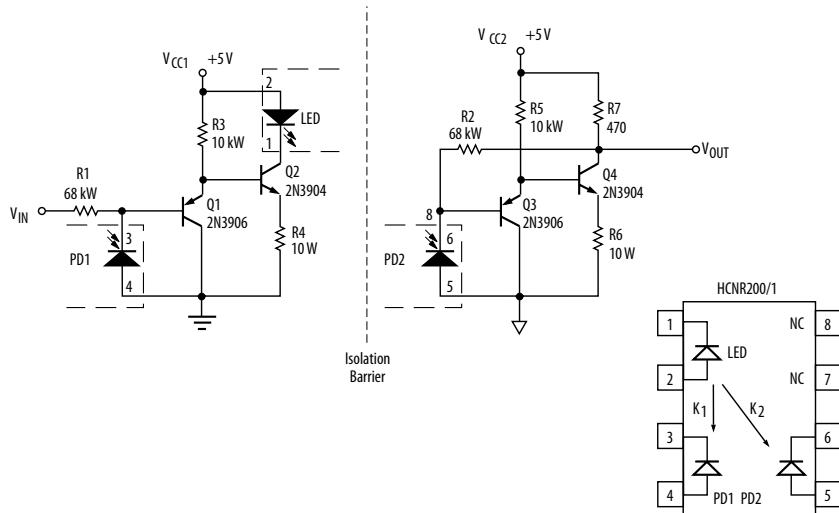
- Industrial process control:
 - Transducer isolator
 - Isolator for thermocouples
 - 4 mA to 20 mA loop isolation
- Low cost analog isolation
- Telecom: modem, PBX
- Switching power supply feedback loop and feedforward
- Monitor motor supply voltage
- Medical

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

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.		
LED Cathode LED Anode PD1 Cathode PD1 Anode	HCNR200	400 mil DIP8	+/-15	0.25	0.25	0.75	5000	1414*
K1 K2 PD1 PD2	HCNR201	400 mil DIP8	+/-5	0.05	0.36	0.72	5000	1414*
-65 ppm/ $^{\circ}$ C gain temperature coefficient 1.5 MHz bandwidth								

Notes: * - with IEC/EN/DIN EN 60747-5-5 Option 050

Optoisolation and Optical Sensor 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.

Applications

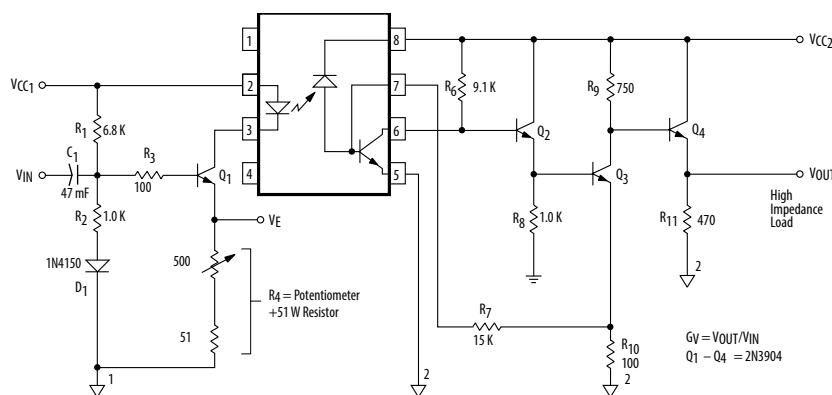
- Video isolation for the following standards/ formats:
 - NTSC, PAL, SECAM, S-VHS, ANALOG RGB
- Low drive current feedback
- Element in switching power supplies: ISDN networks
- A/D converter signal isolation
- Analog signal ground isolation
- High voltage insulation

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

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 60747-5-5 Option 060

- with UL 5000VRMS/1 minute Option 020

Optoisolation and Optical Sensor Products



Applications

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

Powerline Communication Interface

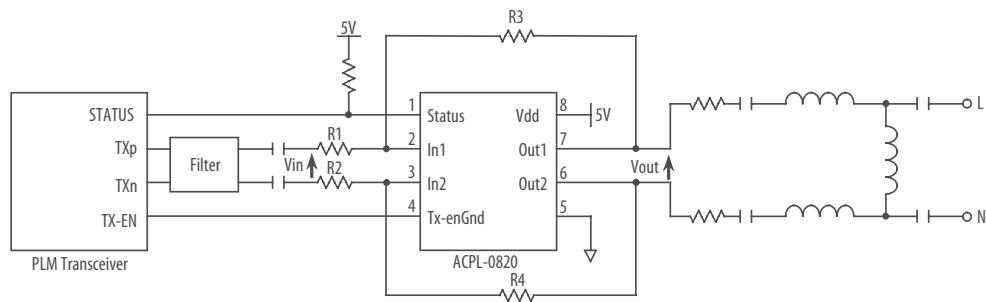
Description

The ACPL-0820 is 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.

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

Benefits

Typical Power Line Modem Using ACPL-0820

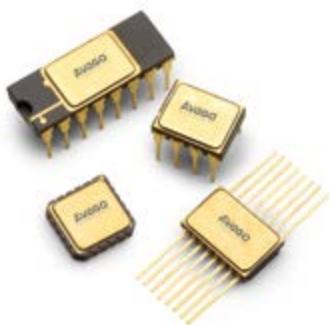


Power Line Communication Interface Product Selection

Part No.	Package	Signal Path	Band-width MHz Typ.	GBWP MHz Typ.	I_o A _{PP} , Typ.	Harmonic Distortion dBc, Max.		Isolation	VCC V Typ.	V_{iso} V _{RMS} Min.	V_{io} V _{peak}
						HD2	HD3				
ACPL-0820-000E	S08	Tx only	-	3.0	1.5	-60	-65	No	5	-	-

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

Optoisolation and Optical Sensor Products



Benefits

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

Applications

Military, aerospace and harsh industrial applications such as:

- Switching power supplies/UPS
- Motor control
- Field bus
- Inverters
- Power distribution
- Communications

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 E, H or K. 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 DLA (Defense Logistics Agency) Qualified Products Database Supplemental Information Sheets QPDSIS-38534 as 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 using the GIDEP system.

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 DLA's QPDSIS 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 E, H and K products under SMD numbers. Each Hi-Rel device is dual marked with the DLA 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 and Optical Sensor 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	5Kg'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 _{l-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 _{l-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 C	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. DLA 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 in-line sample testing requirements of MIL-PRF-38534 for Class E and 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 E and K devices utilizing Option 2.

Group C Testing

Group C testing is performed on first inspection lots 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 E, H and K devices have very similar Screening and Quality Conformance Inspection requirements as shown above. Class E and K devices, however, have substantially more stringent element evaluation and assembly criteria. The quality and reliability of these devices must be built in, not tested out.

Optoisolation and Optical Sensor Products

Hermetically Sealed High Speed Logic Gate Optocouplers

Single Channel Schematic	Commercial Part Number	Class H	DLA SMD Class H *	Class K	DLA SMD Class K *	Package				No. of Channels	Typical Data Rate	Common Mode @ VCM=50V	Input Current	Withstand Test Voltage	Supply 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	20V
	HCPL-5230	HCPL-5231	5962-8876901	HCPL-523K	5962-8876904K	•				2	5MBd	1000V/μs	2-8 mA	1500 Vdc	20V
	HCPL-6230	HCPL-6231	5962-8876902	HCPL-623K	5962-8876905K				•	2	5MBd	1000V/μs	2-8 mA	1500 Vdc	20V
	HCPL-6250	HCPL-6251	5962-8876903	HCPL-625K	5962-8876906K			•		4	5MBd	1000V/μs	2-8 mA	1500 Vdc	20V
	HCPL-5400	HCPL-5401	5962-8957001	HCPL-540K	5962-8957002K	•				1	20MBd	500V/μs	6-10 mA	1500 Vdc	5.25V
	HCPL-5430	HCPL-5431	5962-8957101	HCPL-543K	5962-8957103K	•				2	20MBd	500V/μs	6-10 mA	1500 Vdc	5.25V
	HCPL-6430	HCPL-6431	5962-8957102	HCPL-643K	5962-8957104K				•	2	20MBd	500V/μs	6-10 mA	1500 Vdc	5.25V
	6N134	6N134/883B	8102801	HCPL-268K	5962-9800101K		•			2	10MBd	1000V/μs	10-20 mA	1500 Vdc	5.5V
	HCPL-5600	HCPL-5601	5962-9085501H	HCPL-560K	5962-9085501K	•				1	10MBd	1000V/μs	10-20 mA	1500 Vdc	5.5V
	HCPL-5630	HCPL-5631	8102802	HCPL-563K	5962-9800102K	•				2	10MBd	1000V/μs	10-20 mA	1500 Vdc	5.5V
	HCPL-5650	HCPL-5651	8102805			•				2	10MBd	1000V/μs	10-20 mA	2500 Vdc	5.5V
	HCPL-6630	HCPL-6631	8102803	HCPL-663K	5962-9800103K				•	2	10MBd	1000V/μs	10-20 mA	1500 Vdc	5.5V
	HCPL-6650	HCPL-6651	8102804	HCPL-665K	5962-9800104K			•		4	10MBd	1000V/μs	10-20 mA	1500 Vdc	5.5V
	HCPL-6650L	ACPL-6651L							•	4	10MBd	1000V/μs	10-20 mA	1500 Vdc	3.3V
	ACPL-2670L	ACPL-2672L	5962-0824203H	ACPL-268KL	5962-0824203K	•				2	10MBd	1000V/μs	10-20 mA	1500 Vdc	3.3V
	ACPL-5600L	ACPL-5601L	5962-0824201H	ACPL-560KL	5962-0824201K	•				1	10MBd	1000V/μs	10-20 mA	1500 Vdc	3.3V
	ACPL-5630L	ACPL-5631L	5962-0824202H	ACPL-563KL	5962-0824202K	•				2	10MBd	1000V/μs	10-20 mA	1500 Vdc	3.3V
	HCPL-1930	HCPL-1931	5962-8957201	HCPL-193K	5962-8957202K		•			2	10MBd	1000V/μs	12.5-60 mA	1500 Vdc	5.5V

Hermetically Sealed High Speed Transistor Optocouplers

Single Channel Schematic	Commercial Part Number	Class H	DLA SMD Class H *	Class K	DLA SMD Class K *	Package				No. of Channels	Typical Data Rate	Current Transfer Ratio	Input Current	Withstand Test Voltage	Supply 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	12-20 mA	1500 Vdc	18V
	HCPL-5500	HCPL-5501	5962-9085401H	HCPL-550K	5962-9085401K	•				1	700 KBd	9% min	12-20 mA	1500 Vdc	18V
	HCPL-5530	HCPL-5531	5962-8767902	HCPL-553K	5962-8767906K	•				2	700 KBd	9% min	12-20 mA	1500 Vdc	18V
	HCPL-6530	HCPL-6531	5962-8767903	HCPL-653K	5962-8767907K				•	2	700 KBd	9% min	12-20 mA	1500 Vdc	18V
	HCPL-6550	HCPL-6551	5962-8767904	HCPL-655K	5962-8767908K			•		4	700 KBd	9% min	12-20 mA	1500 Vdc	18V

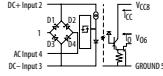
Hermetically Sealed High Gain Optocouplers

Single Channel Schematic	Commercial Part Number	Class H	DLA SMD Class H *	Class K	DLA SMD Class K *	Package				No. of Channels	Typical Data Rate	Current Transfer Ratio	Input Current	Withstand Test Voltage	Supply Voltage Range
						8 pin DIP	16 pin DIP	16 pin FP	20 pad LCCC						
	6N140A	6N140A/883B	8302401	HCPL-177K	5962-9800201K		•			4	100 KBd	300% min	0.5-5 mA	1500 Vdc	18V
	HCPL-5700	HCPL-5701	5962-8981001	HCPL-570K	5962-8981002K	•				1	100 KBd	300% min	0.5-5 mA	1500 Vdc	18V
	HCPL-5730	HCPL-5731	5962-8978501	HCPL-573K	5962-8978503K	•				2	100 KBd	300% min	0.5-5 mA	1500 Vdc	18V
	HCPL-6730	HCPL-6731	5962-8978502	HCPL-673K	5962-8978504K				•	2	100 KBd	300% min	0.5-5 mA	1500 Vdc	18V
	HCPL-6750	HCPL-6751	8302401	HCPL-675K	5962-9800201K			•		4	100 KBd	300% min	0.5-5 mA	1500 Vdc	18V
	ACPL-6750L	ACPL-6751L							•	4	100 KBd	300% min	0.5-5 mA	1500 Vdc	3.3V
	ACPL-1770L	ACPL-1772L	5962-0822703H	ACPL-177KL	ACPL-177KL		•			4	100 KBd	300% min	0.5-5 mA	1500 Vdc	3.3V
	ACPL-5700L	ACPL-5701L	5962-0822701H	ACPL-570KL	5962-0822701K	•				1	100 KBd	300% min	0.5-5 mA	1500 Vdc	3.3V
	ACPL-5730L	ACPL-5731L	5962-0822702H	ACPL-573KL	5962-0822702K	•				2	100 KBd	300% min	0.5-5 mA	1500 Vdc	3.3V

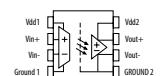
*DLA SMD number does not include extensions for lead form and finish

Optoisolation and Optical Sensor Products

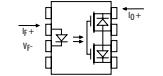
Hermetically Sealed AC/DC to Logic Interface Optocouplers

Single Channel Schematic	Commercial Part Number	Class H	DLA SMD Class H *	Class K	DLA 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+	2.6 mA	1500 Vdc

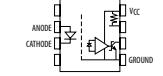
Hermetically Sealed Power MOSFET

Single Channel Schematic	Commercial Part Number	Class H	DLA SMD Class H *	Class E	DLA 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-7111	5962-9314001H	HSSR-711E	5962-9314001E	•	1	90 V	1.0 Ohm	0.8 A ac 1.6 A dc	10 μA	10-20mA	1500 Vdc
		HSSR-7112	5962-9314002H			•	1	90 V	1.0 Ohm	0.8 A ac 1.6 A dc	10 μA	5-20mA	1500 Vdc

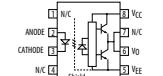
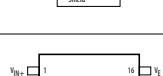
Hermetically Sealed Analog Isolation Amplifier

Single Channel Schematic	Commercial Part Number	Class H	DLA SMD Class H *	Class E	DLA SMD Class E *	Package 8 pin DIP	No. of Channels	Gain Tolerance (Max. %)	Non-Linearity (Max. %)	Prop Delay μs (Max.)	CMR V/μs (Min.)	Bandwidth Khz (typ.)	Offset mV (typ.)
	HCPL-7850	HCPL-7851	5962-9755701H	ACPL-785E	5962-9755701E	•	1	5	0.1	11	5000	100	0.6

Hermetically Sealed Intelligent Power Module and Gate Drive Interface

Single Channel Schematic	Commercial Part Number	Class H	DLA SMD Class H *	Class K	DLA 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/μs	1500 Vdc

Hermetically Sealed Gate Drive Optocoupler

Single Channel Schematic	Commercial Part Number	Class H	DLA SMD Class H *	Package 8 pin DIP	Package 16 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/μs	1500 Vdc
	HCPL-5150	HCPL-5151	5962-0420501H	•		1	0.5 A	13.5V Max.	9.5V Min.	10-18 mA	10kV/μs	1500 Vdc
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												

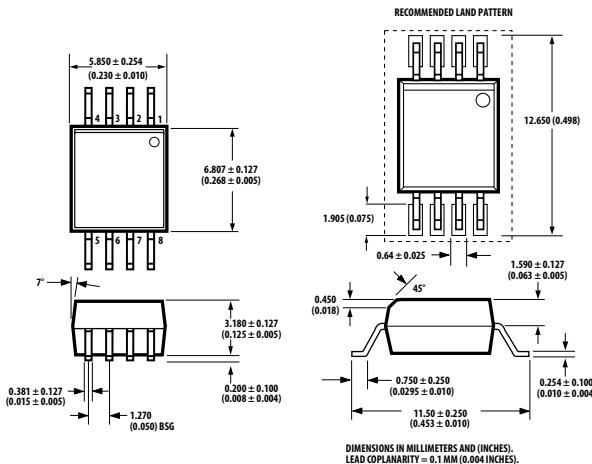
*DLA SMD number does not include extensions for lead form and finish

Optoisolation and Optical Sensor Products

Optocoupler Package Dimensions

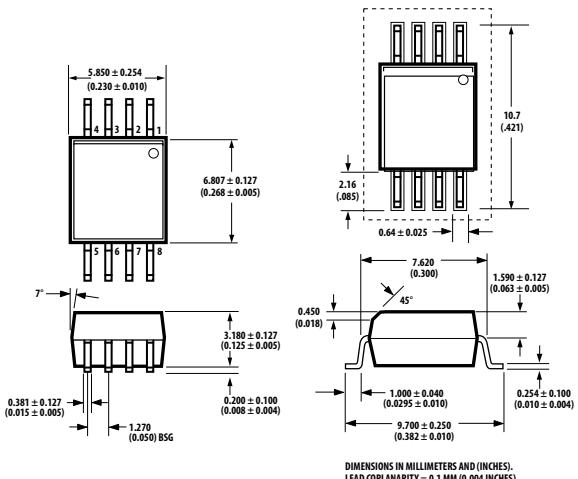
ACPL-Cxxx, ACPL-Kxxx

– Stretched S08, 8mm Clearance, 8mm Creepage



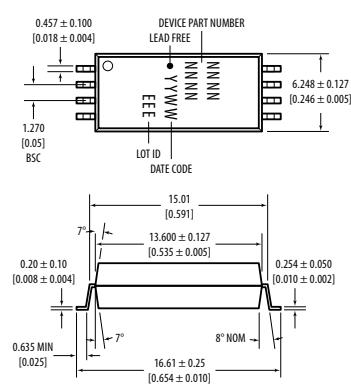
ACPL-Hxxx

– Stretched S08, 7mm Clearance, 8mm Creepage



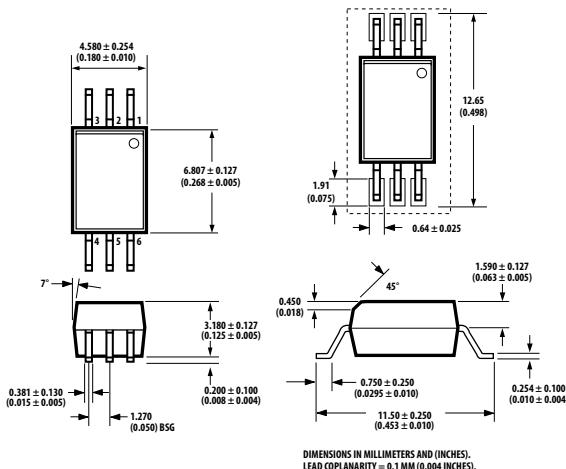
ACNT-Hxx

– Stretched S08, 14.2mm Clearance / Creepage



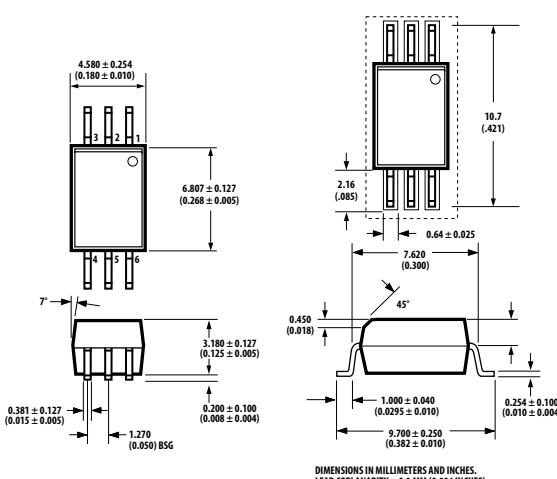
ACPL-Wxxx

– Stretched S06, 8mm Clearance, 8mm Creepage



ACPL-Pxxx

– Stretched S06, 7mm Clearance , 8mm Creepage

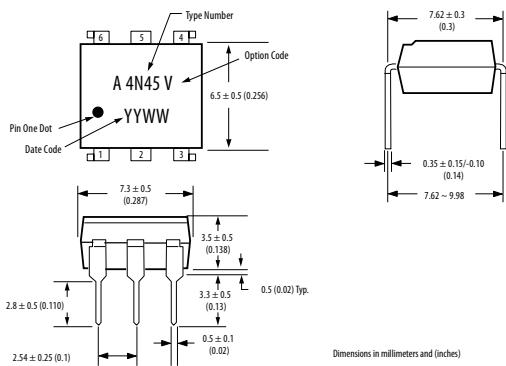


Dimensions in mm [inch]
Maximum Mold Flash on each side is 0.127 mm [0.005 inch]
Note: Floating Lead Protusion is 0.15 mm [0.006 inch] Max if applicable

Optoisolation and Optical Sensor Products

Optocoupler Package Dimensions

300 mil 6 pin DIP

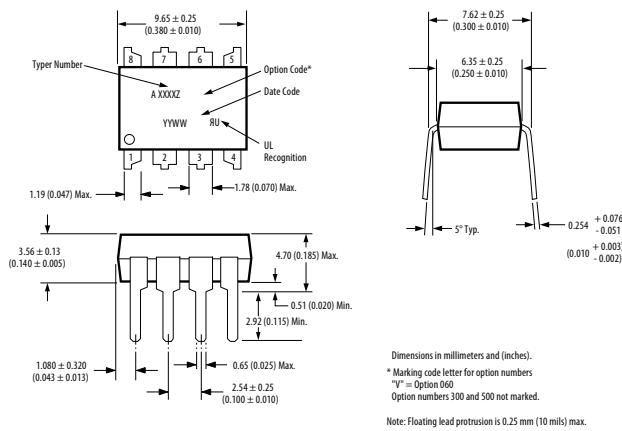


Options Available

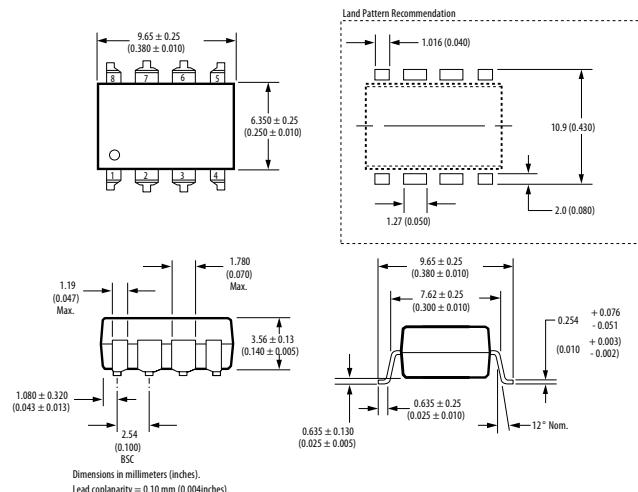
- 020 = UL 5000 V_{rms}/1 Minute Option
- 060 = IEC/EN/DIN EN 60747-5-2/5 Approved Part Option
- 300 = Gull Wing Surface Mount Option
- 500 = Tape & Reel Packaging Option
- xxxE = Lead Free Option

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

300 mil 8 pin DIP



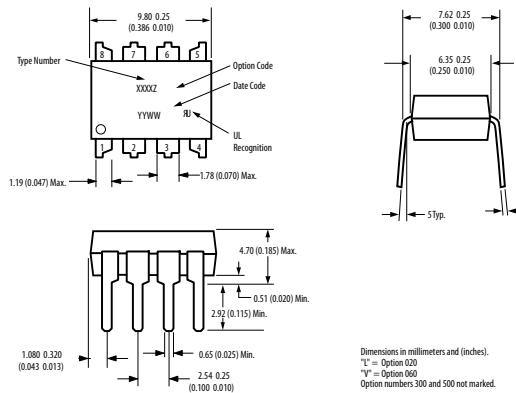
300 mil 8 pin DIP Gullwing Option 300 SMD



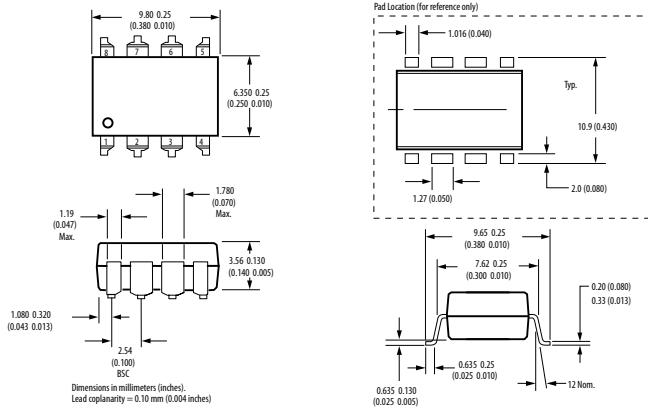
Optoisolation and Optical Sensor Products

Optocoupler Package Dimensions

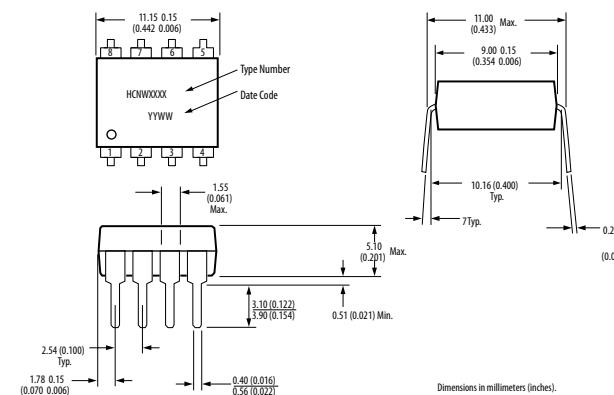
300 mil 8 pin DIP (white)



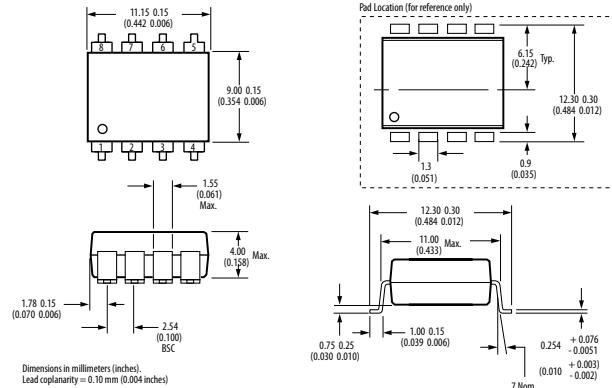
300 mil 8 pin DIP (white) Gullwing Option 300 SMD



400 mil 8 pin DIP



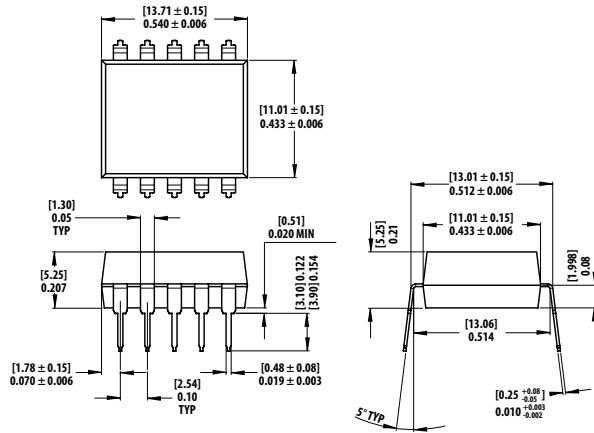
400 mil 8 pin DIP Gull Wing Option 300 SMD



Optoisolation and Optical Sensor Products

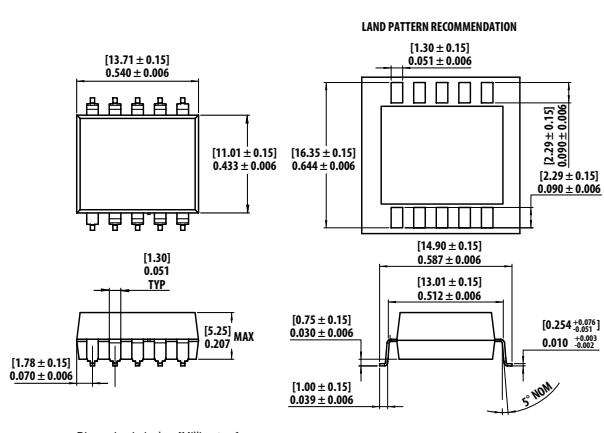
Optocoupler Package Dimensions

500 mil 10 pin DIP



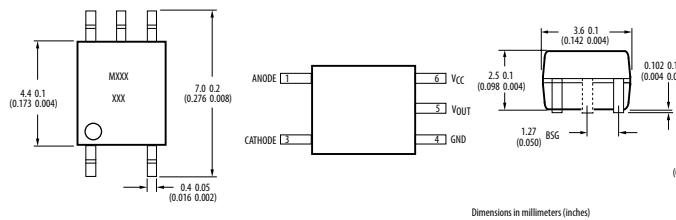
Dimensions in Inches [Millimeters]

500 mil 10 pin DIP Gull Wing Option 300/500 SMD

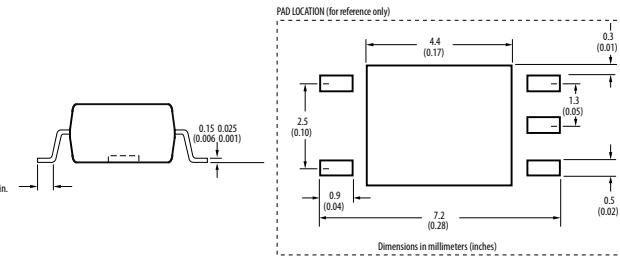


Dimension in Inches [Millimeters]

S05 SMD



Dimensions in millimeters (inches)



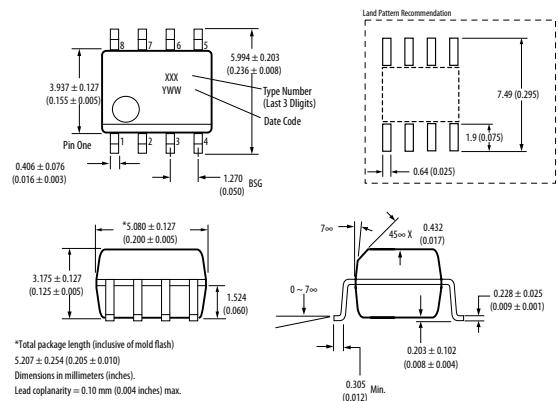
PAD LOCATION (for reference only)

Dimensions in millimeters (inches)

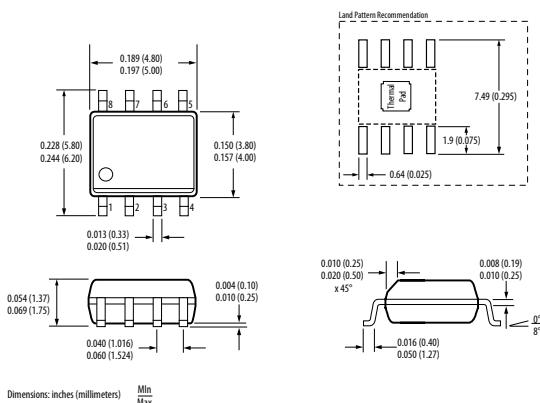
Optoisolation and Optical Sensor Products

Optocoupler Package Dimensions

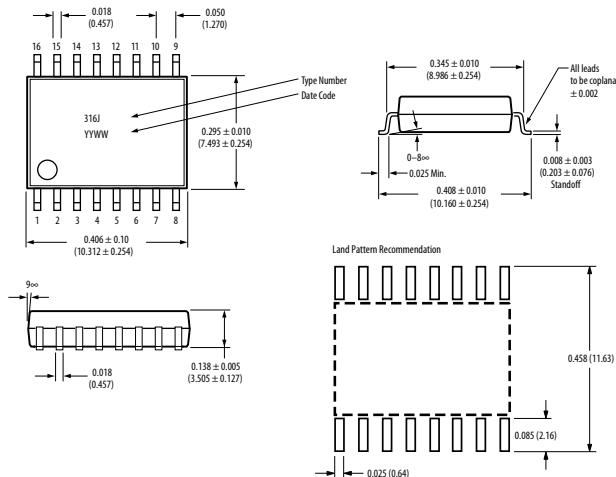
S08 SMD



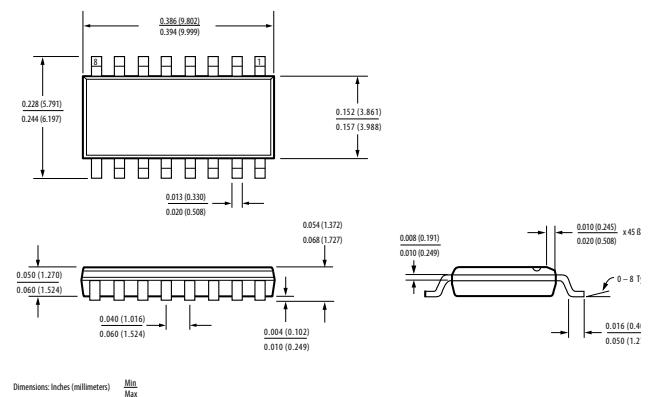
S08 SMD (ACSL-6210,ACPL-0820)



S016 SMD (ACML series Digital Isolator)



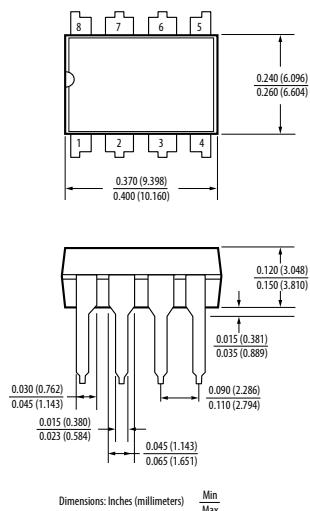
S016 SMD (ACSL-6300/6310/6400/6410/6420)



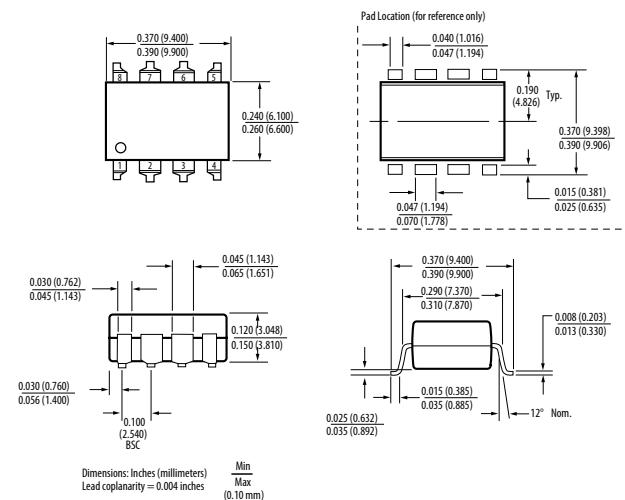
Optoisolation and Optical Sensor Products

Digital Isolator Package Dimensions (Exclude ACML series)

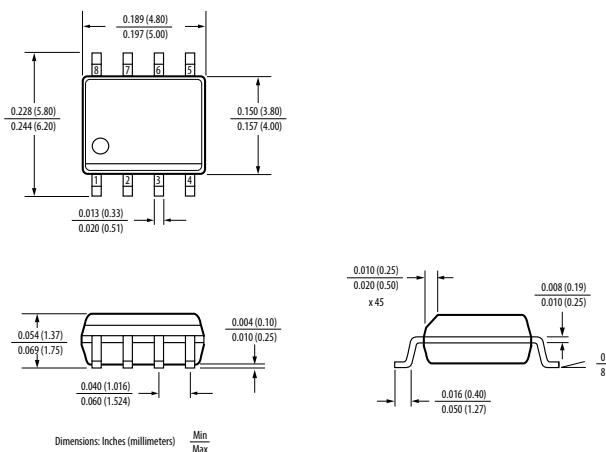
300 mil 8 pin DIP



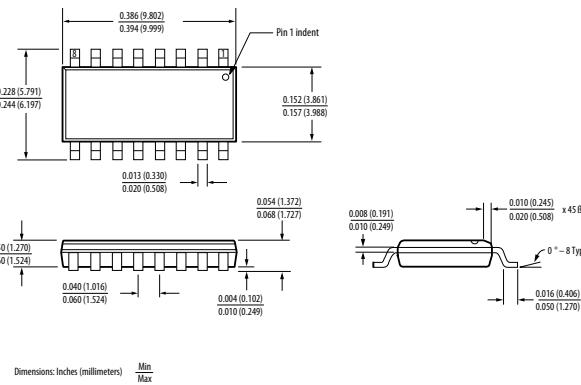
300 mil 8 pin Gull Wing Option 300 SMD



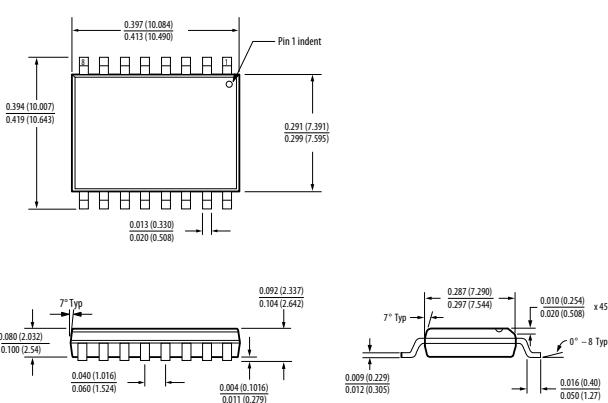
S08 SMD



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

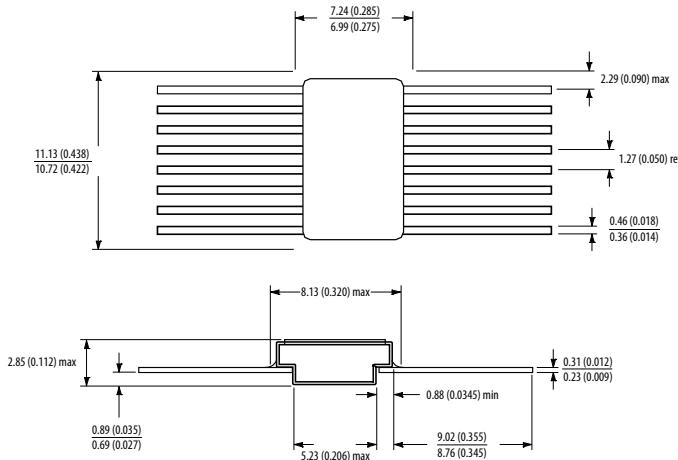
xxxE = Lead Free Option

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

Optoisolation and Optical Sensor Products

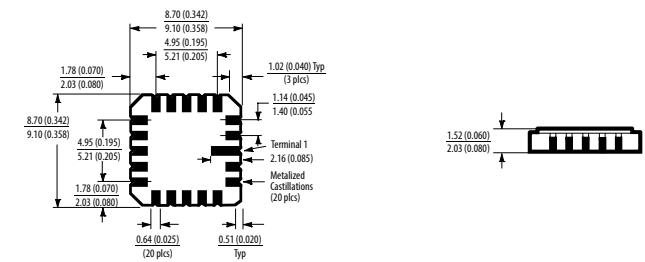
Hermetic Optocoupler Package Dimensions

16 pin Flat Pack (4 Channel)



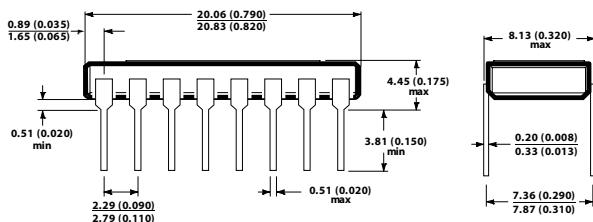
Note: Dimensions in millimeters (inches).

20 Terminal LCCC Surface Mount (2 Channel)



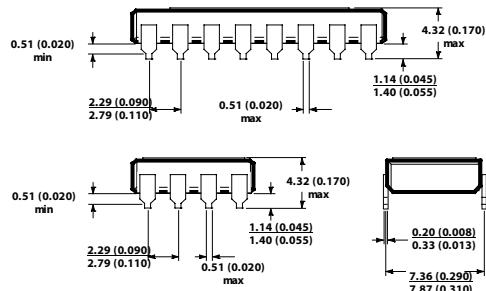
Note: Dimensions in millimeters (inches).
Solder thickness 0.127 (0.005) max.

16 pin DIP Through Hole (2 or 4 Channel)



Note: Dimensions in millimeters (inches)

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

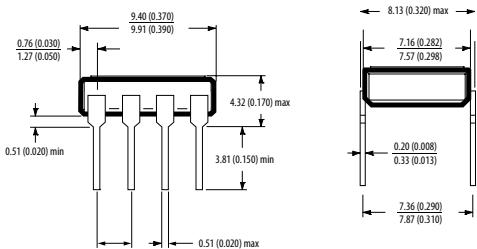


Note: Dimensions in millimeters (inches)

Optoisolation and Optical Sensor Products

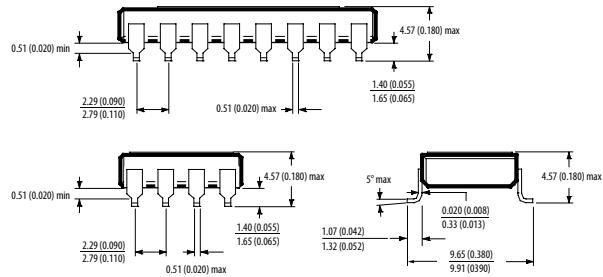
Hermetic Optocoupler Package Dimensions

8 pin DIP Through Hole (1 or 2 Channel)



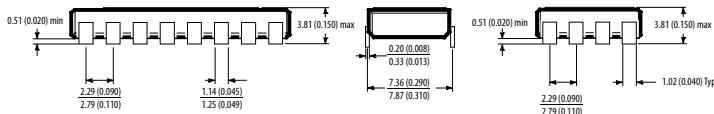
Note: Dimensions in millimeters (inches).

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 and Optical Sensor 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	2, 3, 4, 5, 11, (18)		2, 6, (18)	13						
	Board CPU			8, 16	1, 6, 16	2, 3, 4, 5, 11, 16, (18)	6, 16, (18)	2, 6, 16, (18)							
	Elevator	9	20			2			13	10	10, 14, 15				
	FFT/Data Logger					2	6, 7, 16, (18)								
	Industrial Induction Cooking	9	20			2				10	10, 14, 15				
	Industrial Networking			7, 8, (18)	1, 6, (18)	2, 3, 4, 5, 11, (18)									
	Instrument			8, 16	1, 6, 16	2, 3, 4, 5, 11, 16, (18)	6, 16, (18)						16		2
	Motor Control	9, 16	16, 20	7, 8, 16	6, 16	2, 3, 4, 5, 11, 16, (18)	6, 16, (18)	2, 6, 16, (18)	13, 16	10, 16	10, 14, 15, 16		16		2
	NC/Robot	9	20	7, 8	6	2, 3, 4, 5, 11, (18)	6, (18)		13	10	10, 14, 15				
	On-board Power Supply					16, 2	6, 16, (18)								2
	Panel Switches			8	1, 6	2, 3, 4, 5, 11, (18)	6, (18)								
	PLC			7, 8, (18)	1, 6, (18)	2, 3, 4, 5, 12, (18)	6, (18)	2, 6, (18)	13						
	Power Distribution System	9, 16	16, 20	8, 16		2, 3, 4, 5, 12, 16, (18)			13, 16				16		2
	Process Meter			7, 8, (18)	1, 6, (18)	2, 12, (18)	6, (18)	2, 6, (18)	13		14, 15				
	Remote Meter Reading														19
	Servo Driver	9, 16	16, 20	7, 8, 16	6, 16	2, 3, 4, 5, 11, 16, (18)	6, 16, (18)		13, 16	10, 16	10, 14, 15, 16				2
	Sewing Machine	9	20			2				13	10	10, 14, 15			2
	Solar Generator	9	20	8		2				13	10	10, 14, 15			2
	Switching Power Supply	9, 16	16, 20			2					10, 16	10, 14, 15, 16			2
	Test & Measurement Equipment			7, 8, (18)	1, 6, (18)	2, 3, 4, 5, 11, (18)	6, (18)		13						
	Thermo Counter/Recorder			8, 16	6, 16	2, 3, 4, 5, 11, 16, (18)	6, 16, (18)	2, 6, 16, (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
- 2. 1 MBd Transistor Output Optocoupler
- 3. 100 kBD Darlington Transistor Output Optocoupler
- 4. 5 MBd Logic Gate Optocoupler
- 5. 8 MBd Logic Gate Optocoupler
- 6. 10 MBd Logic Gate Optocoupler
- 7. 20 MBd Logic Gate Optocoupler
- 8. High Speed Digital CMOS Logic Gate Optocoupler
- 9. Integrated Gate Drive Optocoupler
- 10. Miniature Analog Isolation Amplifier
- 11. Isolated Line Receiver
- 12. Isolated 20 mA Current Loop Transmitter/Receiver
- 13. AC/DC to Logic Interface
- 14. High Linearity Analog Optocoupler
- 15. Wideband Analog/Video Optocoupler
- 16. Hermetic High Performance Optocoupler
- 17. Automotive Optocoupler
- 18. Digital Isolator
- 19. Powerline Communication Interface
- 20. Intelligent Power Module Interface Optocoupler

Optoisolation and Optical Sensor 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							
Automotive	Inverter	9, 17	20, 17		2, 6, 17	2, 17		2, 17			10, 17				
	AC-DC / DC-DC Converter	9, 17			2, 6, 17			2, 17		10, 17	10, 17				2, 17
	Charger	9, 17	20, 17		2, 6, 17			2, 17		10, 17	10, 17				2, 17
	Battery Management				2, 6, 17	2, 17	2, 6, 17				10, 17				
	Oil Pump	9, 17	20, 17		2, 6, 17										
	Heater	9, 17			2, 6, 17										
	Aircon	9, 17	20, 17		2, 6, 17	2, 17				10, 17	10, 17				
Computing and Office Automation	ECR, POS				2, 4, 5, 6	2, 6, 7, 8, (18)									2
	Isolated I/O				2, 4, 5, 6	2, 6, 7, 8, (18)									
	Isolated USB				2, 4, 5, 6	2, 6, 7, 8, (18)									
	Network				2, 4, 5, 6	2, 6, 7, 8, 18)									
	UPS	9	20		2, 8				13	10	10, 14, 15				2
Consumer	Air Conditioning	9	20		2				10						2
	Electronic Gaming			6	2, 6, (18)										2
	Fitness Equipment	9	20						13	10		10			2
	Induction Heating Cookers	9	20												
	Musical (MIDI)				2, 6, (18)										
	Plasma Displays				2, 6, 8, 9										
	Refrigerator	9	20		2										2
	Washing Machines	9	20		2										2
Communications	ISDN			1, 2, 3	2, 7, 8				13						2
	PBX and Central Office			1, 2, 3	2, 3				13						2
	Power Line Communication													19	
	Power-Over-Ethernet (PoE)		7, 8		1, 6										
	Telephone Switching Equipment				2, 6, 7, 8, (18)										2
	Telephone Terminal Equipment				2, 6, 7, 8, (18)										2
	Wireless Base Station				2, 6, 7, 8, (18)										2
Military/Aerospace/Harsh Industrial		16	16	16	16	16	16	16	16	16	16	16	16	16	16

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Optoisolation and Optical Sensor Products



Optical Sensors

Proximity Sensors

Avago Technologies offers a full range of Optical Proximity Sensors to meet the requirements of today's industrial and consumer applications. The basic construction of an optical proximity sensor consists of an IR LED and a photo-diode. The LED and the photodiode of an Avago's proximity sensor are housed in a specially designed metal-shield to ensure excellent optical isolation. The result is a small size device with low optical cross-talk and excellent power efficiency.

Avago proximity sensors are offered in a variety of options in terms of features, packages and level of integration. Product offerings range from discrete to fully integration modules and choice of analog or digital output. These devices offer engineers the widest selection of features and the design flexibility to meet a variety of performance applications.

Ambient Light Sensor

Avago Technologies offers a series of Ambient Light Sensors 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.

Integrated Ambient Light and Proximity Sensor

Part Number	Size (LxWxH) (mm)	Supply Voltage (V)	ALS Dynamic Range	Max. Detection Distance	PS Output	ALS Output
APDS-9900	3.94 x 2.36 x 1.35	2.5 to 3.6	0.01 to 10k lux	Near zero to 100mm	I2C Digital count output	I2C Digital count output
APDS-9901	3.94 x 2.36 x 1.35	2.5 to 3.6	0.01 to 10k lux	Near zero to 100mm	I2C Digital count output	I2C Digital count output
APDS-9930	3.94 x 2.36 x 1.35	2.2 to 3.6	0.01 to 30k lux	Near zero to 100mm	I2C Digital count output	I2C Digital count output

Integrated Ambient Light, RGB and Proximity Sensor

Part Number	Size (LxWxH) (mm)	Supply Voltage (V)	Max. Detection Distance	PS Output	ALS Output	RGB Output
APDS-9950	3.94 x 2.36 x 1.35	2.5 to 3.5	Near zero to 100mm	I2C Digital countoutput	I2C Digital count output	I2C Digital count output

Integrated Ambient Light, RGB, Proximity and Gesture Sensor

Part Number	Size (LxWxH) (mm)	Supply Voltage (V)	Max. Detection Distance	PS Output	ALS Output	RGB Output	Gesture Output
APDS-9960	3.94 x 2.36 x 1.35	2.4 to 3.6	Near zero to 100mm	I2C Digital countoutput	I2C Digital count output	I2C Digital count output	I2C Digital count output

Optoisolation and Optical Sensor Products

Optical Proximity Sensor

Part Number	Size (LxWxH) (mm)	Supply Voltage (V)	Max. Detection Distance	PS Output
HSDL-9100-021	7.10 x 2.75 x 2.7		Near zero to 100mm	Analog
HSDL-9100-024	7.10 x 2.75 x 2.4		Near zero to 100mm	Analog
APDS-9190	3.94 x 2.36 x 1.35	2.5 to 3.6	Near zero to 100mm	I2C Digital count output
APDS-9130	3.94 x 2.36 x 1.35	2.2 to 3.6	Near zero to 100mm	I2C Digital count output

Proximity Sensing Conditioning IC

Part Number	Size	Supply Voltage (V)	Max. Detection Distance	PS Output
APDS-9700	QFN 2 mm x 2 mm	2.4 to 3.6	Near zero to 60mm	Analog (with HI/LO digital o/p)
APDS-9702	QFN 2 mm x 2 mm	2.4 to 3.6	Near zero to 60mm	Analog (with HI/LO digital o/p)

Ambient Light Sensor

Part Number	Size (LxWxH) (mm)	Package	Supply Voltage (V)	Typical Output Current @ 100 Lux (uA)
APDS-9005	1.60 x 1.5 x 0.55	6 pin - ChipLED	1.8 to 5.5	40
APDS-9006	3.2 x 1.6 x 1.1	4 pin - ChipLED Reverse mounting	2.4 to 5.5	40
APDS-9007	2.4 x 2.0 x 0.8 x	6 pin - ChipLED	2.0 to 3.6	30 uA at 1Klux (Logarithmic output)
APDS-9008	1.60 x 1.5 x 0.55	6 pin - ChipLED	1.6 to 5.5	40
APDS-9300	2.6 x 2.2 x 0.55	6 pin - ChipLED	2.4 to 3.0	I2C Digital count output
APDS-9301	2.6 x 2.2 x 0.55	6 pin - ChipLED	2.7 to 3.6	I2C Digital count output
APDS-9303	2.6 x 2.2 x 0.55	6 pin - ChipLED	2.7 to 3.6	SMBus Digital count output
APDS-9309	2.00 x 2.00 x 0.65	6 pin - ChipLED	2.4 to 3.0	I2C Digital count output



Your Imagination. Our Innovation

Avago Technologies is a leading designer, developer and global supplier of a broad range of analog, digital, mixed signal and optoelectronics components and subsystems with a focus in III-V compound and CMOS based semiconductor design and processing. Avago's extensive product portfolio serves four primary target markets: wireless communications, enterprise storage, wired infrastructure, and industrial and other.

Avago has strong market positions across a broad range of market segments with highly differentiated products that include:

- Film Bulk Acoustic Resonator (FBAR) Filters
- RF Front End Modules
- Parallel Optics Transceivers
- High Speed SerDes ASIC
- HDD Read Channel & Preamplifiers
- RAID and SAS I/O Controllers
- PCIe Switches
- Optocouplers
- Motion Encoders
- Industrial Fiber Solutions
- LED Display & Signage Solutions



For product information and a complete list of distributors, please visit our website:

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