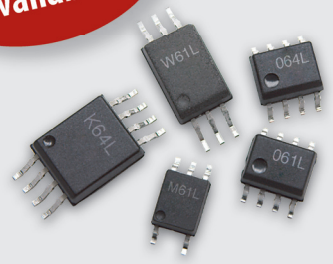
High Speed and Ultra Low Power without Compromise on Isolation and Insulation

Evaluation Board Available!



Propagation Delay	80ns (max)
Skew between any two parts	30ns (max)
Pulse Width Distortion	30ns (max)
LED forward current	**1.6mA**
Icc supply current	**1.3mA (max)**
Common Mode Noise Rejection	35kV/us at 1000V
Supply voltages	2.7-5.5V
Temperature range	-40 to 105°C
Continuous Working Voltage	560Vpeak /1140Vpeak
Transient Overvoltage	6kVpeak /8kVpeak

Target Applications

- SPI / I2C Serial Bus
- RS485
- CAN Bus
- Microprocessor system interfaces
- Digital isolation for A/D and D/A converters

Key Features

- Low current LED input allows direct drive from CMOS output
- 35kV/us dynamic and static common mode rejection - no compromise on noise immunity!
- Controlled output slew rate at wide range of load conditions
- Easy configuration for inverting and non-inverting operation
- Optical isolation technology certified for safe insulation at continuous working voltages from 560Vpeak to 1140Vpeak and 6kVpeak / 8kVpeak transient overvoltages

About the Family

Easy to use!

The low current needed to switch the new opto-couplers makes it possible to drive the LEDs directly from a CMOS output. To simplify the circuit design, all timing parameters are specified using fixed resistor configurations for 3.3V and 5V signal levels (across the temperature range).

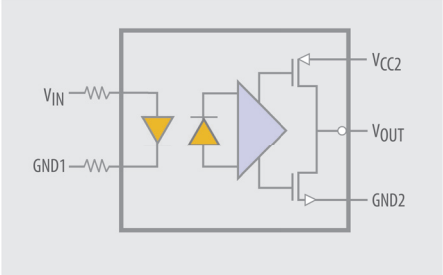


Figure 1

LED inputs are ideal in Noisy Environments

Common mode noise can be a significant problem in data communication applications and especially so in industrial environments where electrical motors, sensors and PLCs are connected together. In such systems, isolators help to reduce noise levels and enhance signal performance.

All isolators, regardless of technology, have a parasitic capacitive coupling between the two isolated sides of the component. A noise transient occurring on the output side may cause an unwanted voltage rise on the input side. This could result in false-triggering of the input or even latch-up of high impedance logic inputs.

Optical isolators with LED inputs are ideal in environments with high levels of common mode noise.

- The attenuation of the light signal through the optically transparent insulation material is low, so the distance through isolation can be kept high. A direct consequence of the large separation distance is a low parasitic capacitance in other words the unwanted coupling between the two sides can be kept at a minimum.
- Through using a "split resistor" approach *(Figure 1)*, it is possible to balance the impedance across the LED input. In such a configuration, a voltage rise on the LED input due to common mode noise will be symmetrical and can not switch the LED on.
- The LED input has a relatively high input capacitance 70pF. The series connected LED and current limiting resistor act as a low pass filter that helps to filter noise transients.

Dynamic Common Mode Rejection

With the new ACPL-x6xL product family, Avago is introducing an additional definition of common mode noise rejection. The first generation test setups for common mode noise rejection are testing the static performance of a device (the input is either tied directly to Vcc or ground). Dynamic Common Mode Rejection refers to the common mode performance during data transmission. The Static and Dynamic Common Mode Noise Rejection of the ACPL-x6xL family is 35kV/us.

Inverting and Non-inverting Configurations

The output IC is inverting but it is easy to configure the component for both inverting and non-inverting operation. In Figure 1, change Vin to Vcc and GND1 to Vin to obtain a non-inverting configuration.

LED Light Output Over Time and Temperature

The quality of the LEDs used in an optocoupler is an important factor for determining the life time of the product. Avago produces high reliability LEDs for optocouplers at an in-house facility. The infrared LED used in the ACPL-x6xL family is of AlGaAs type, providing excellent stability over both temperature and time.

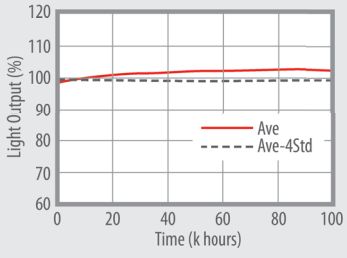


Figure 2. 100% on at 3mA/85°C

For isolators, fundamental trade-offs exist between power consumption, noise rejection and switching speed. The new optocouplers have been developed to achieve best in class noise rejection and power consumption.

In many applications, such as for example serial interfaces, control over the switching parameters is far more important than the actual switching speed of the device. The SPI interface below is a good example of such a case.

Application example: SPI interface

Isolation of an SPI interface can be realized as shown in Figure 3.

Slew-rate controlled outputs

The maximum data rate on a serial interface is limited by the skew / synchronization between signals on the data and clock lines rather than the absolute propagation delay of the optocoupler. Increasing the absolute switching speed of the isolators would have a negative effect on noise rejection so new features have been implemented that enhance signal quality rather than reduction of propagation delay.

One such feature is slew rate controlled outputs. Differences in line capacitance could potentially lead to differences in rise and fall time between two channels.

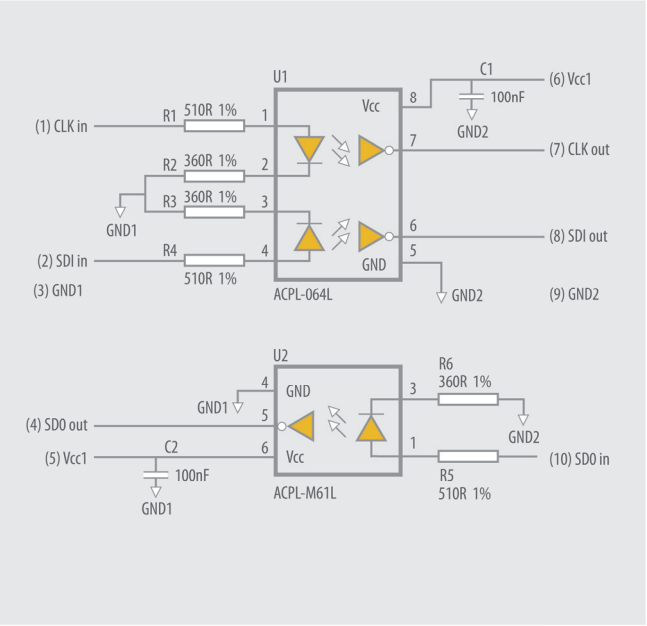


Figure 3

In the case of an SPI interface, the clock and signal lines may for example have different fan-out. The output IC on the ACPL-x6xL family is able to precisely control the output rise and fall time over a wide range of load capacitances.

The maximum propagation delay difference (skew) between any two channels in the ACPL-x6xL family is specified at 30ns over temperature.

Wide supply voltage range

Besides being power efficient, the proprietary new IC design is able to deliver stable switching performance across the whole supply voltage range (2.7V-5.5V) and glitch free outputs during power up/down of the component.

Channel Configurations and Regulatory Information

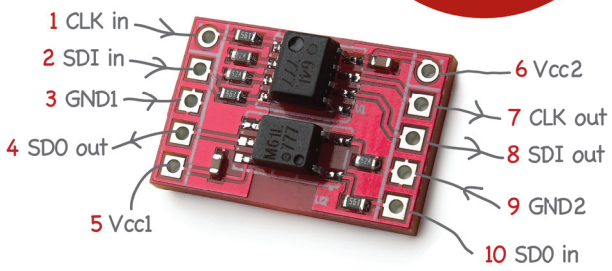
		S05	S08	SSO6	SS08
Single Channel		ACPL M61L	ACPL 061L	ACPL W61L	–
Dual Channel		–	ACPL-064L	–	ACPL-K64L
IEC60747-5-5	Continuous Transient	560Vpeak 6kVpeak	560Vpeak 6kVpeak	1140Vpeak 8kVpeak	1140Vpeak 8kVpeak
UL1577 1min		3750Vrms	3750Vrms	5000Vrms	5000Vrms
Creepage		5mm	4.9mm	8mm	8mm
Clearance		5mm	4.9mm	8mm	8mm

Options
- 000E tube, lead free
- 500E tape and reel, lead free
- x60E 100% partial discharge testing according to IEC60747-5-5

White paper on "Safety Considerations When Using Optocouplers and Alternative Isolators for Providing Protection Against Electrical Hazards" available on the web:
http://www.avagotech.com/docs/AV02-1909EN

Evaluation Board Available!

A small evaluation board is available free of charge! Contact your distributor for more information.



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