Product **Sell Sheet**

AVAGO TECHNOLOGIES

AVAGO Optical Isolation Amplifiers vs. Hall Effect Current Sensors

Advantages of using precision isolation amplifiers for high performance current and voltage measurements in electrical drives and inverters

What are the Target ApplicationIndustrial Automation Process Control

- AC Drives and Servo Motor Control
- Solar and Wind Turbine Inverters
- Data Acquisition Systems
- Uninterrupted Power Supplies
- General Inverters

Why Use Isolation Amplifiers?

Isolation Amplifiers are used for isolated current sense and voltage sense and are typically used to measure phase currents (with shunt resistors) or DC-link voltages in three phase frequency converter power applications.

What are the AVAGO Advantages?

- Better performance over temperature
- Higher accuracy
- Small solution and size
- Lower solution cost equating to significant potential cost savings up to 40%

Current Sensing Technology	Hall Effect Sensor	Isolation Amplifier	Remarks
Linearity Over Measurement Range	Poor	Good	Magnetic Saturation + Hall Sensor Non Linearity. Ohm's Law is inherently linear
Affected by External Magnetic Field	Yes	No	Difficult to shield from external magnetic interference. Optical Isolation is unaffected by magnetic interference
Residual magnetization effects that can affect offset	Yes	No	B-H Curve has Hysteresis, memory effects need to be removed periodically. Ohm's Law is completely linear
Output Variation with Temperature	Medium/High	Low	Hall Sensor have poor temperature coefficient during the semiconductor process Low tempco Shunts are available.
CMR Performance	Poor	Good	Magnetic – analog isolation by magnetic field, Optical – Digital Isolation by optical signal transfer
Power Dissipation	Low	Moderate	Magnetic sensor low. Shunt sensor has I^2R power loss and limits application to 100 A
Supporting Circuitry	Simple	Moderate	Optical Sensor requires power supply; closed loop magnetic sensors also require additional circuits to operate
Package Style	High Profile (32 mm high)	Low Profile (4 mm high)	Open loop Magnetic Sensors may be comparable in size, but closed loop solution requires feedback windings and magnetic concentrator core
Solution Cost	High	Low	Shunt-Iso-amp: lower cost, PCB space saving, auto-insertion

Isolation Amplifiers provide an accurate measurement at a low cost. The voltage drop across a low-value resistor connected in series with the load is monitored in order to determine the current flowing through the load.

One of the more difficult problems of current shunt sensing circuit design is to either galvanically isolate or dynamically level shift a precision analog signal in an extremely noise sensitive environment as found in the motor phase curren

The Avago isolation amplifier (ACPL-C79x series) using sigma-delta modulation comprises of three miniature precision isolation amplifiers providing high levels of accuracy, bandwidth and insulation strength by incorporating proprietary optical-isolation technology.

Avago solution saves up to 40% cost vs. closed-loop Hall Effect current transducers

Analog Output

Part no	Package	Temp Range	Gain Error 25°C, max %	BW kHz typ	NL % Typ	Vdd2	Viso	Viorm, Vpeak	Viotm, Vpeak
ACPL-C79B	Stretched SO8 (8mm)	-40 to 105°C	±0.5	200	0.0037	3-5.5V	5kVrms	1230	8000
ACPL-C79A	Stretched SO8 (8mm)	-40 to 105°C	±1	200	0.0037	3-5.5V	5kVrms	1230	8000
ACPL-C790	Stretched SO8 (8mm)	-40 to 105°C	±3	200	0.0037	3-5.5V	5kVrms	1230	8000

Digital Output

Part no	Package	Clock	Temp Range	INL LSB typ	ENOB bits	Vdd2	Viso	Viorm, Vpeak	Viotm, Vpeak
ACPL-C797	Stretched SO8 (8mm)	CLK out	-40 to 105°C	3	12	3-5.5V	5kVrms	1230	8000
ACPL-796J	SO16	CLK in	-40 to 105°C	3	12	3-5.5V	5kVrms	1230	8000

Available Sales Tools

Current sense booklet – How to Upgrade Your Current Sensing Technology: Publication No. AV00-0196EN
Tech Note – Highly Accurate and Safely Isolated Current/Voltage Sensing Using Avago Isolation Amplifiers: Publication No. AV00-0269EN

Evaluation Board Description:

The ACPL-C79X evaluation boards can accommodate either a ACPL-C79B(0.5% tolerance), ACPL-C79A(1% tolerance), or ACPL-C790(3% tolerance) device, to demonstrate the high linearity and low offset capability of Avago's Isolation Amplifier over a wide range of input current conditions. It allows the designer to easily test the performance of high-precision isolation amplifiers in an actual application under real-life operating conditions.

Available on Avago eSamples

Analog output EVBD-ACPL-C790 / EVBD-ACPL-C79A / EVBD-ACPL-C79B
Digital output EVBD-ACPL-C797

Shunt Resistor Manufacturers

Micron Electric (Japan)
http://www.micron-e.co.jp/

International Resistive Companc (IRC)
http://www.irctt.com/

Precision Resistor
http://www.precisionresistor.com

Isabellenhuette
http://www.isabellenhuette.de/indexe.htm

Isotek
http://www.isotekcorp.com/

Vishay-Dale
http://www.vishay.com/company/brands/dal/