Avago Optocoupler Product Update

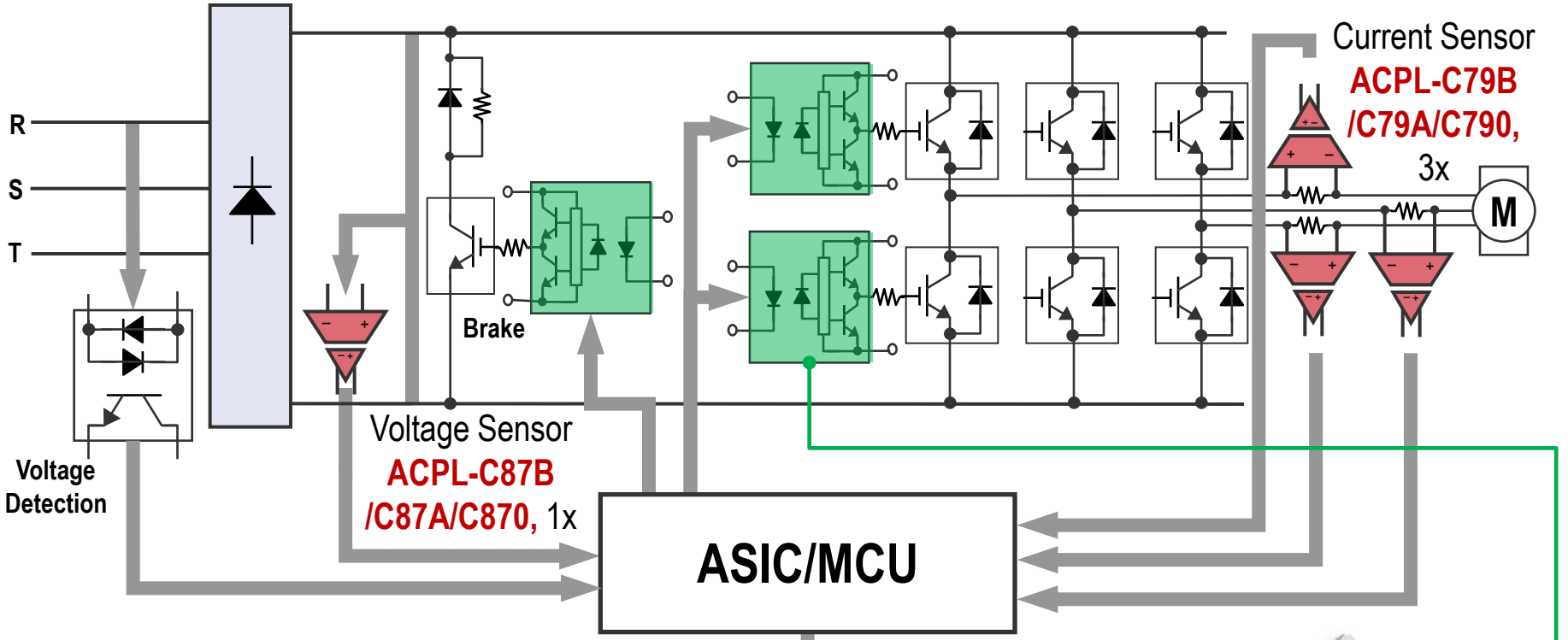
Arrow Tour – April 2013

Francesco Rossi – Field Applications Engineer

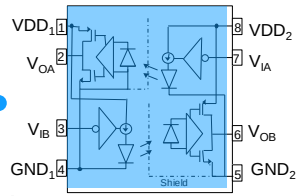
Agenda

- **High speed digital optocouplers**
  - New family of bidirectional optocouplers and CMOS isolators
- **Gate drivers**
  - Avago‘s latest generation of smart gate drive optocouplers
- **Isolation amplifier solutions for current and voltage sensing**
  - Latest isolation amplifiers and optically isolated ΣΔ modulators
- **Evaluation boards and technical support**

More Opportunities in Motor Drives: Gate Drivers, Current Sensors and Digital Couplers

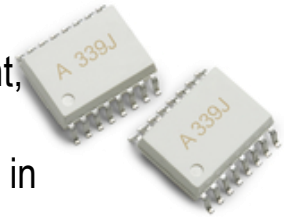


ACSL-7210 25MBd bi-directional optocoupler (MR: Jun 2013)



Field Bus Communication

ACPL-339J 1A output current, dedicated for controlling MOSFET current buffer used in large current IGBT gate drive

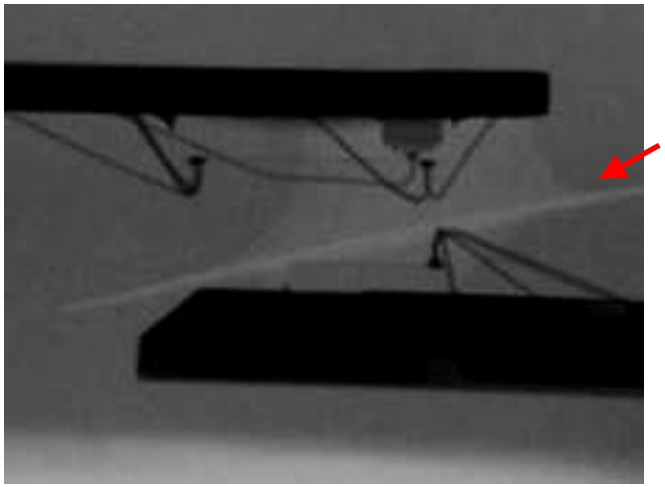


AVAGO TECHNOLOGIES

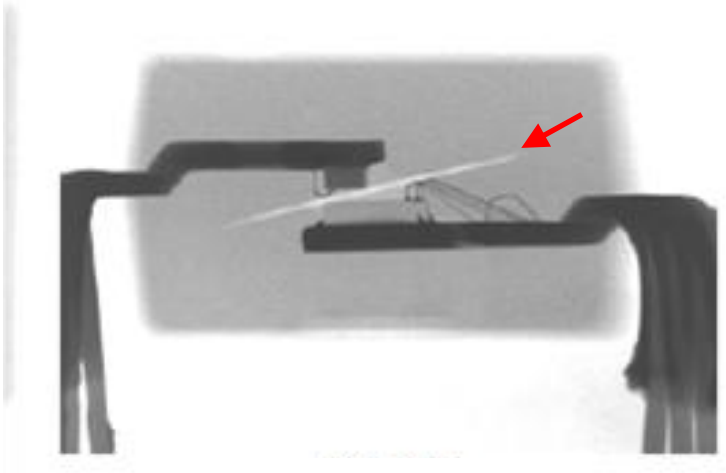
Overview of Equipment Safety Standards

Safety Standard	Scope	Construction Requirements for Reinforced Insulation	High Voltage Test Method	Equipments Examples
IEC60664, UL840	Insulation Coordination For Equipment Within Low Voltages (<1000Vac or <1500Vdc) Systems	**DTI > 0.4mm** for working voltage > 50V	Impulse, a.c/d.c. hipot, **partial discharge**	
IEC61800	Adjustable Speed Electrical Power Drive Systems	Solid Insulation **DTI >= 0.75mm** Thin sheet >= 0.2mm 1 layer Thin sheet < 0.2mm; 3 layers	Impulse, a.c/d.c. hipot, **partial discharge**	Motor Drives
EN50178	Electronic Equipment for use in power installations		Impulse, a.c/d.c. hipot, **partial discharge**	Motor Drives
IEC60950-1	Information Technology Equipment Safety	•Solid Insulation **> 0.4mm** •> 2 layers for thin sheet insulation • Optocoupler • Semiconductor Isolator	Impulse, a.c/d.c. hipot	Networking Power Supply, POE, Router
IEC60601-1	Medical Electrical Equipment – Part 1: General requirements for basic safety and essential perforamce	•Solid Insulation **> 0.4mm** •> 2 layers for thin sheet insulation •Optocoupler	Impulse, a.c/d.c. hipot	ECG, Endoscope
IEC61010-1	Safety requirements for electrical equipment for measurement, control, and laboratory use	•Solid Insulation **> 0.4mm** •> 2 layers for thin sheet insulation •Optocoupler	Impulse, a.c/d.c. hipot	Power Analyzer, Industrial Scope
UL508	Industrial Control Equipment		Impulse, a.c/d.c. hipot	PLC, Lighting Dimmer
UL2202	Electrical Vehicle Charging System		Impulse, a.c/d.c. hipot	EV Charger

Inside a Modern Avago Optocoupler



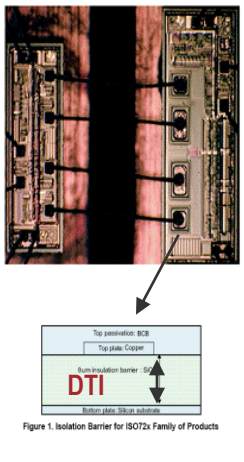
Side View (zoomed)



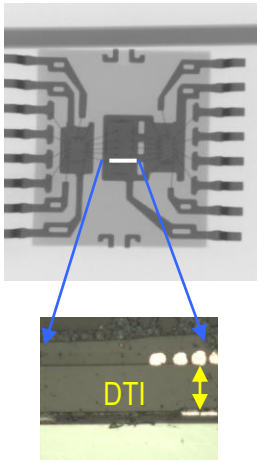
Side View

- Insulation provides ESD protection
- Insulation establishes distance through insulation (DTI)
- Insulation is key to *high working voltage* (Viorm) and *high transient /surge voltage* (Viso) ratings

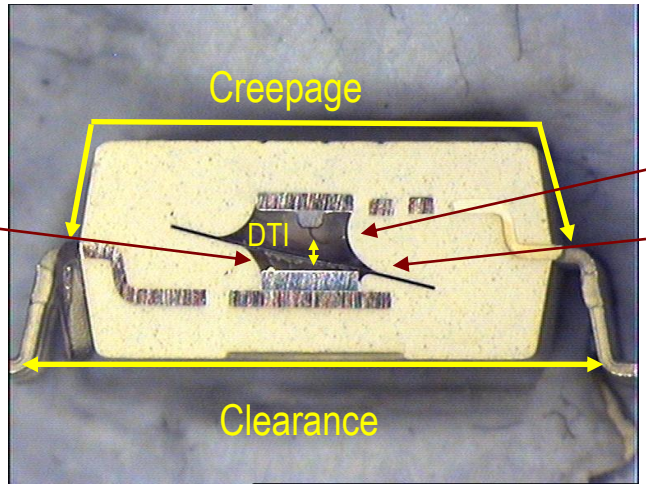
Critical Design Parameter – DTI (Distance Through Insulation)

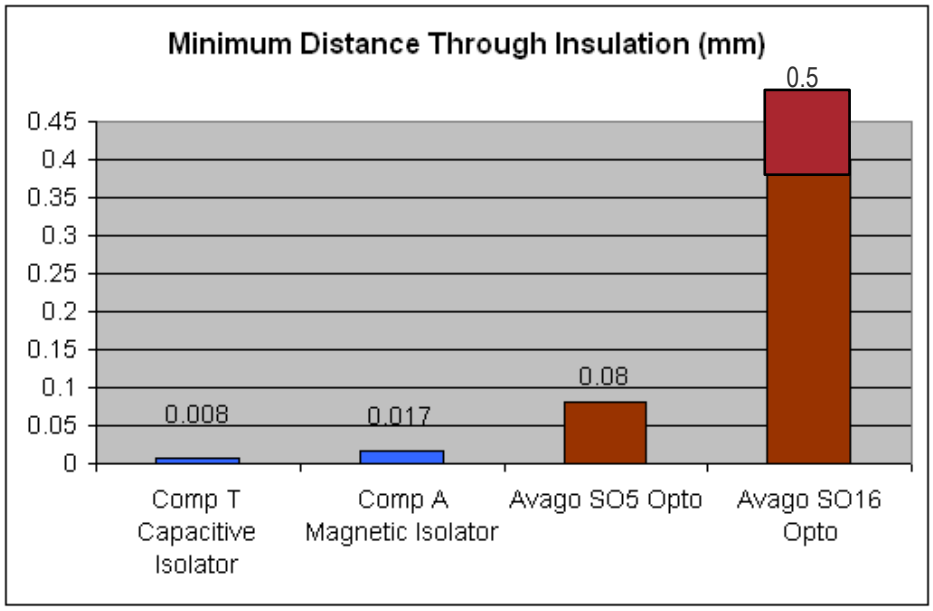


Capacitive Isolator



Magnetic Isolator

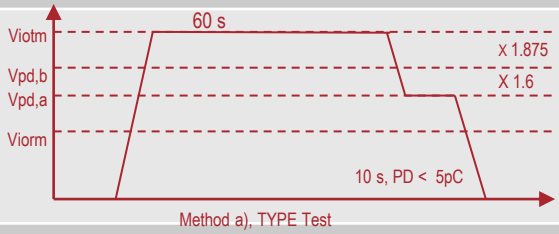
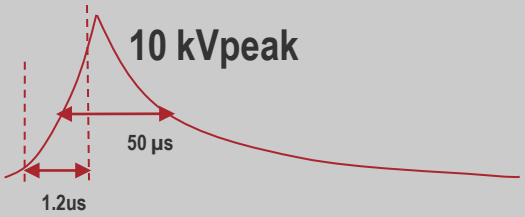
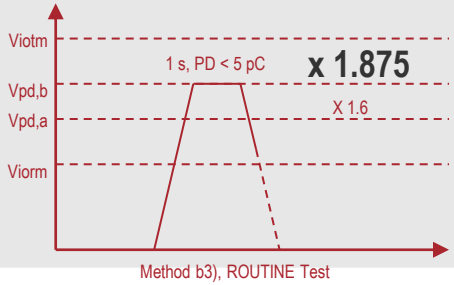




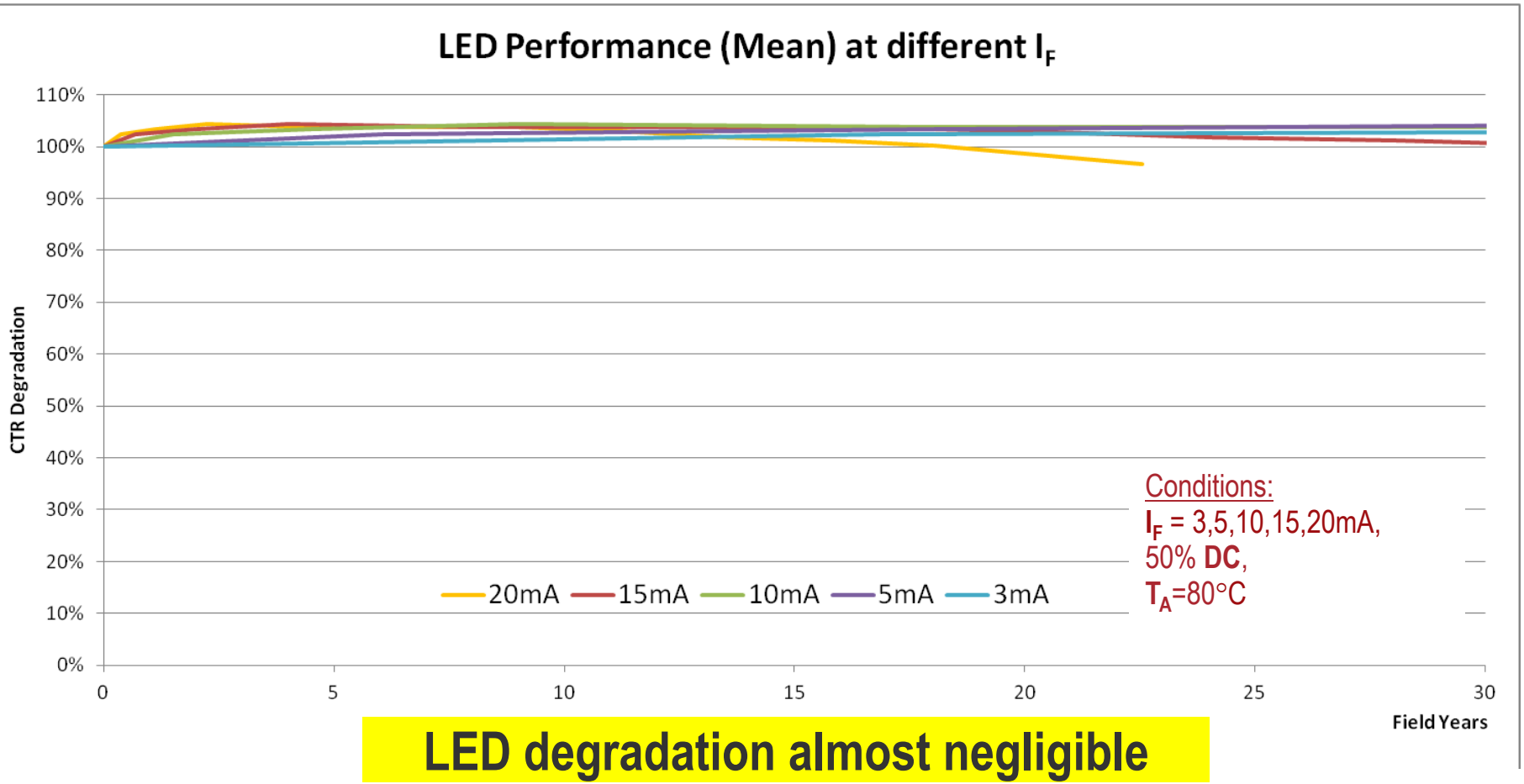
Requirements for Safety Insulation:

- - Solid Insulation with DTI >=0.4mm or
- - Thin Sheet Insulation: >=2 layers
  - Optocoupler has 3 layers: Silicone, Insulation Tape and Silicone
  - Magnetic, RF and capacitive isolators have single insulation layer with small DTI.

Avago Optocouplers *are Certified* to Optocoupler Safety Standard IEC 60747-5-5

Test Type	Test Method	Test Condition	Passing Criteria
Type Test (20 Samples)	Environmental Stress	Rapid Change of Temp : 10 cycles, dwell time – 3 hrs Vibration: Axis – 3, 10 cycles, amplitude -75 mm / 98m/s^2 Shock : Axis -3, acceleration – 980 m/s^2	No insulation degradation
	Transient Test		Partial discharge < 5 pC
	Surge Test		R_{IO} >10^9 Ω at V_{IO} = 500 V
Routine Test *(100% Production)*	Partial Discharge		Partial discharge < 5 pC

LED Lifetime Performance



LED degradation almost negligible

Note: I_F=20mA condition projects till 22.6 field years due to actual stress data collected up to 10khrs. This does not mean LED fails at 22.6 projected field years.

Longer >10khrs stress data points will be needed for projecting longer field year

Digital Optocouplers

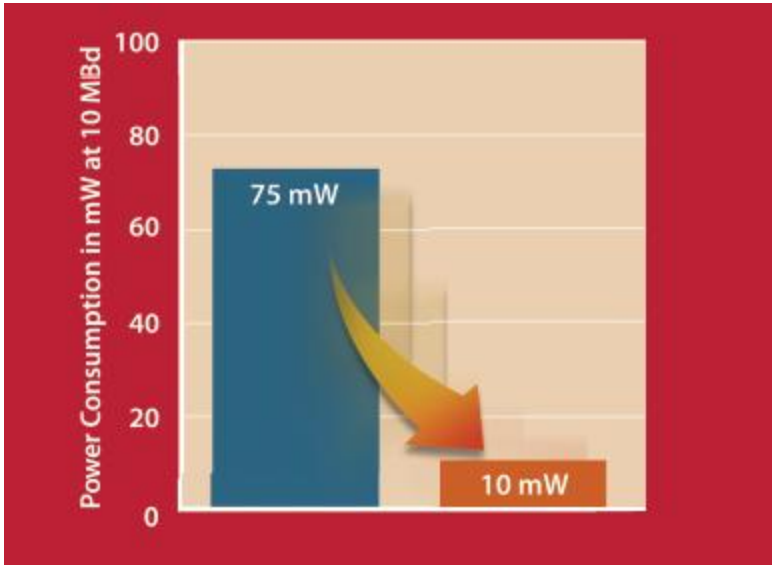
Low Power & Reliable Isolation for Networking & Fieldbus

Ultra Low Power 10MBd Digital Optocouplers

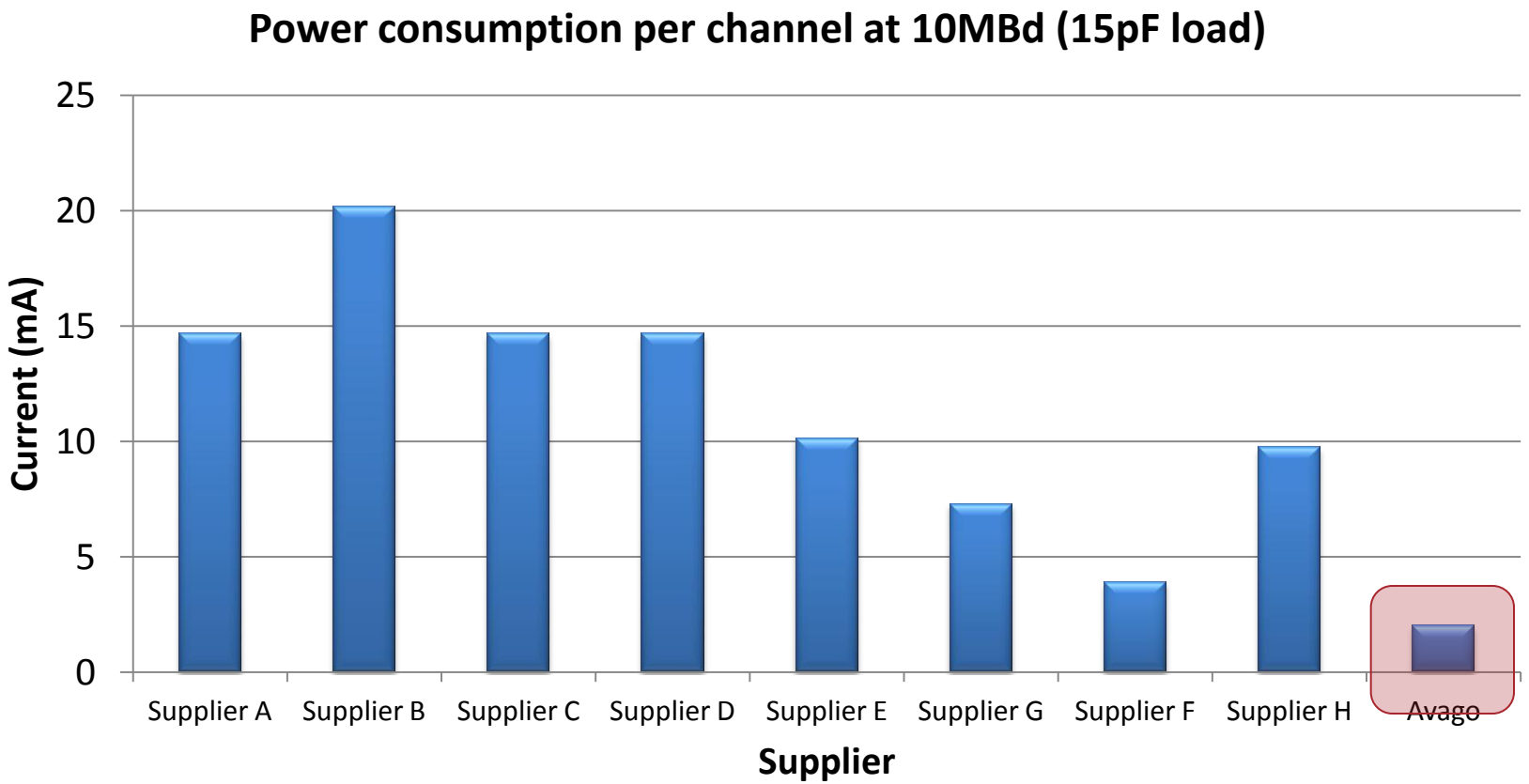
ACPL-M61L/061L/064L/K64L/W61L, ACPL-M62L/C61L, ACNW261L

Low Power 1MBd Digital Optocouplers

ACPL-M50L/054L/W50L/K54L



Power Consumption under Test



*Source: AVAGO evaluations

Ultra Low Power 10 MBd Digital Optocoupler

ACNW261L, ACPL-C61L, ACPL-061L

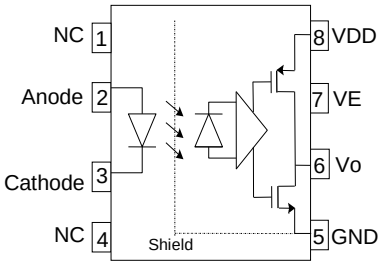
Released

Key Features:

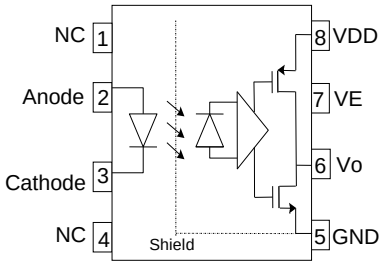
- Single channel
- 3.3V and 5V CMOS compatible
- Low Power I_{DD} ≤ 1.5mA max
- Low forward current I_F ≥ 4mA min
- High speed: 10 MBd min
- Pulse width distortion (PWD) : 40 ns max
- Propagation delay skew (tpsk) : 30 ns max
- Propagation delay (tp) : 95 ns max
- CMR : 20 kV/µs min @ Vcm 1000V
- Temperature range : –40ºC to 105ºC
- Slew-Rate Controlled Output function
- Safety and regulatory approvals

  UL, IEC and CSA recognized

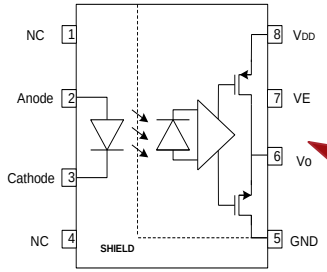
Application: Industrial Network (RS485,232), I²C, isolated line receiver, ground loop elimination



ACNW261L (400mil DIP8 widebody)



ACPL-C61L (SSO8)



ACPL-061L (S08)

Drop in replacement for older generation devices (HCPL-0600, -0601)

AVAGO TECHNOLOGIES

Low Power 5 MBd Digital Optocoupler

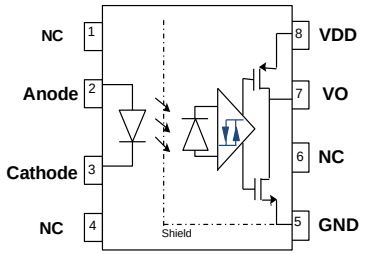
ACPL-M21L/-021L/-024L/-W21L/-K24L

Key Features:

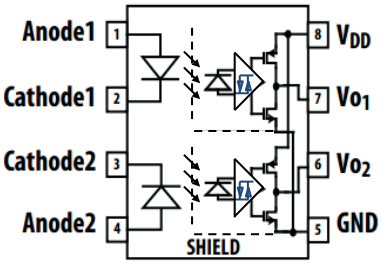
- CMOS output
- 2.7V - 5.5V wide supply voltage range
- Low Power I_{DD} ≤1.1mA max
- Low forward current I_F ≥1.6mA min
- Speed: 5 MBd min
- Propagation delay (tp) : 250 ns max
- Schmitt Trigger output : Hysteresis 0.2mA typ

Released

Applications: Industrial Network (RS232), ground loop elimination



ACPL-021L



ACPL-024L

Part Number	Package	Channel	Isolation Voltage (Vrms/min)	Working Voltage (Vpeak)	MR
ACPL-M21L	SO-5	1	3750	560	Released
ACPL-021L	SO-8	1	3750	560	Released
ACPL-024L	SO-8	2	3750	560	Feb. 13
ACPL-W21L	SSO-6	1	5000	1140	End Jun. 13
ACPL-K24L	SSO-8	2	5000	1140	End Jun. 13

AVAGO TECHNOLOGIES

Buffered Input Dual-Channel (Bi-Directional) High Speed Digital Optocoupler

ACSL-7210

Preliminary

Key Features:

- Dual Channel, Opposite direction orientation (1/1)
- Input and Output CMOS Logic Interface
- Supply Voltage: 3.3V / 5V
- Operating Temperature: –40ºC to 105ºC
- High speed: 25 MBd min
- Propagation Delay tp: 40ns max
- Pulse Width Distortion PWD: 8ns max (@3.3V_{DD})
- High Common Mode Transient Rejection: >20kV/us (min) @ Vcm 1000V
- Supply Current I_{DD1} & I_{DD2} : 14 mA max (LED-on); 6 mA max (LED-off)
- SO-8 Package (1.8mm profile)
- Isolation Voltage: 3750 Vrms (UL1577)

Engineering samples: Available

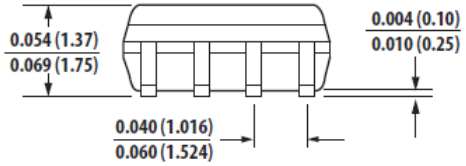
Target MR: Apr/May'13

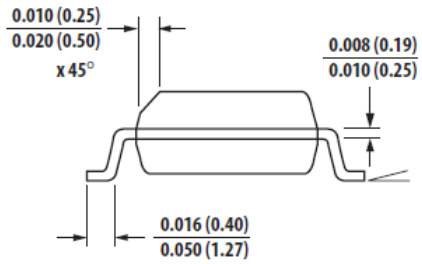
^Advanced information, subject to changes.

Applications

- Digital Fieldbus Isolation:
  - •CC-Link, Devicenet, Profibus, SDS
- Industrial Automation
- Industrial Process Control

Package Dimensions

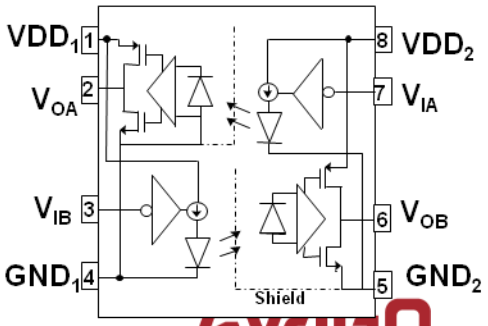




DIMENSIONS: INCHES (MILLIMETERS) MIN / MAX

Input side VDD state	Output side VDD state	V_I	LED	V_O
Power Supplied	Power Supplied	HIGH	OFF	HIGH
		LOW	ON	LOW
No Power	Power Supplied	X	OFF	HIGH

Schematic



AVAGO TECHNOLOGIES

High Speed CMOS Digital Isolator (CTI400V)

ACML-740C, ACML-741C, ACML-742C

Features:

- SOIC-16 WB Package: 8mm Creepage & Clearance
  - CTI 400V (Material Group II)
- Quad Channel (4/0, 3/1 or 2/2)
- Wide Operating Temperature Range: –40°C to 105°C
- High Insulation Voltage:
  - $V_{ISO} \geq 5.6kVrms$
- High speed: ≥ 100MBd (50MHz)
- Fast Propagation Delay: Tp 26ns (typ), 32ns (max)
- Low Pulse Width Distortion: PWD ≤ 2ns
- Low Propagation Delay Skew:
  - Channel-to-Channel ≤ 3ns
  - Part-to-Part ≤ 5ns
- 3.3V and 5V Supply Compatible
- Input and Output CMOS Logic Interface
- High Common Mode Transient Rejection: CMR ≥ 25kV/ms
- Low Supply Current (at 50MHz, unloaded):
  - $I_{DD1} \leq 10mA/ch$, $I_{DD2} \leq 10mA/ch$

Engineering samples: Available

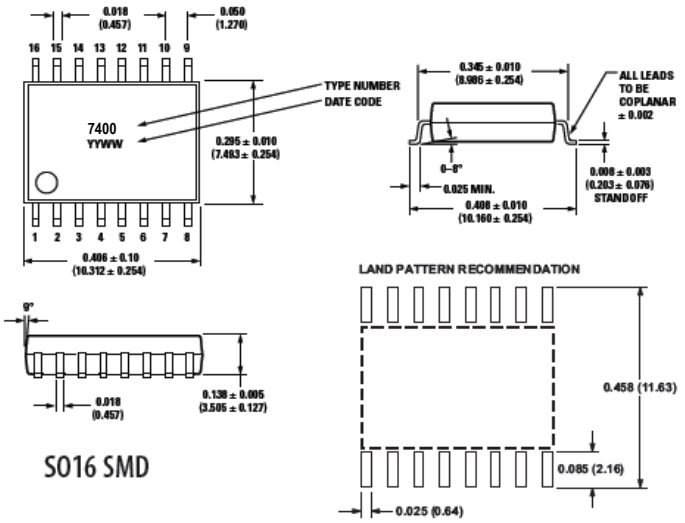
MR : May'13

Applications

- Arbitrary waveform generator
- Data acquisition systems
- ADC/DAC isolation
- Endoscopes
- Medical Imaging

Safety and Regulatory Approval

- IEC 60950-1
  - 1000Vrms (Basic) up to Installation CAT III

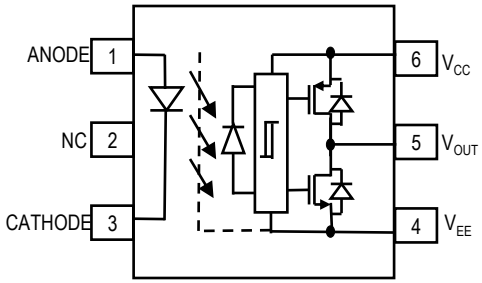


TECHNOLOGIES

Gate Drive Optocouplers

New Generation Gate Drive Optocouplers – High Performance in a Small Footprint

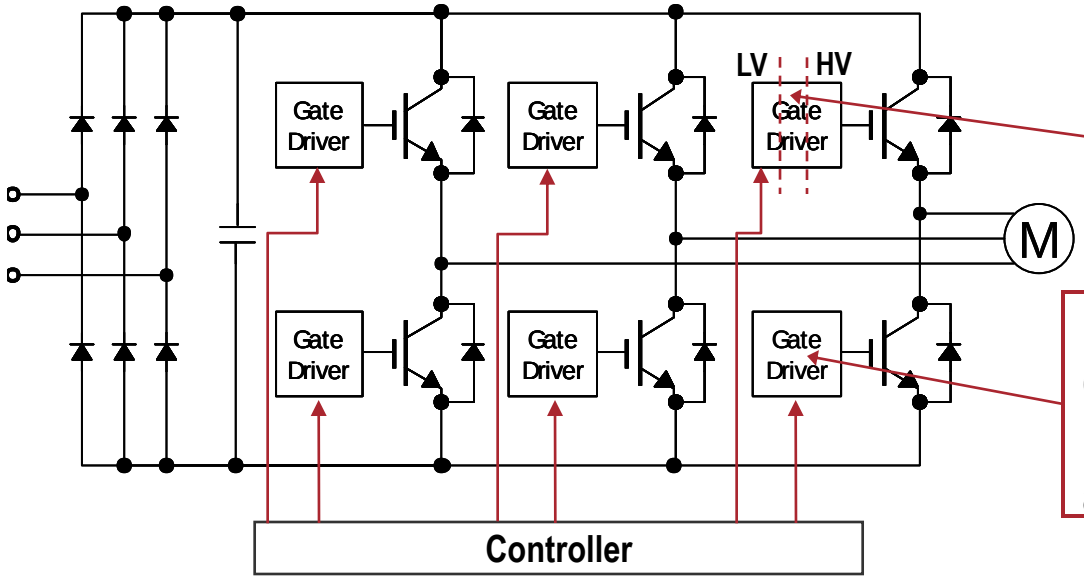
High Output Current & fast switching Optocouplers in SSO6 (ACPL-P34x Family)



- ✓ Direct drive of IGBTs rated up to 1200V/200A !
- ✓ Rail-to-Rail Output Voltage
- ✓ Under Voltage Lockout
- ✓ Faster IGBT switching for improved system efficiency !
- ✓ 200ns max. Short Propagation Delay
- ✓ 100ns max. Propagation Delay Difference (PDD)
- ✓ High Common Mode Rejection (35kV/µs@V_{CM}=1.5kV)

Target Applications & IGBT Classes

Part Number	I_{OUT} A Min.	I_{OUT} A Max.	IGBT Class	Target Market Applications
ACPL-P343/W343	3	4	1200V/200A	▪ Renewable Energy Inverters ▪ IGBT/MOSFET Gate Drive ▪ AC/Brushless DC Motor Drives ▪ Industrial Inverters ▪ Switching Power Supplies
ACPL-P341/W341	2.5	3	1200V/100A	
ACPL-P340/W340	0.8	1	1200V/50A	▪ Induction Cookers ▪ Inverter for Home Appliances



Isolate the low voltage (LV) controller from the high voltage(HV) DC link

Receive input signal from the controller and then turn on the IGBT that allows current to flow and run the motor

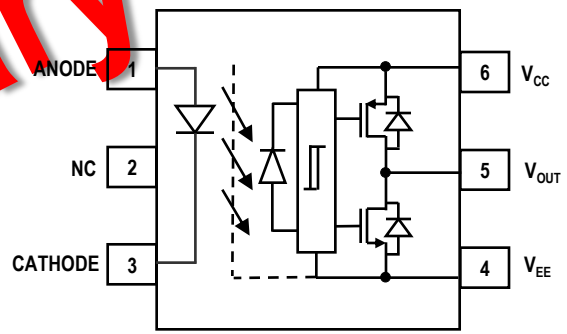
ACPL-P346/W346 2.5A MOSFET Gate Drive Optocoupler in Stretched SO-6 Package

Features

- **2.5A** max. Peak Output Current
- **Rail-to-Rail** Output Voltage
- **120 ns max.** Short Propagation Delay
- **50ns max.** Propagation Delay Difference (PDD)
- **Low LED Input** Drive with Hysteresis
- **MOSFET UVLO** with Hysteresis
- High CMR (**min. 35kV/µs**@V_{CM}=1.5kV)
- I_{CC} **< 5 mA** max. Supply Current
- Very Small Stretched **SO6** Package
- Industrial Temperature Range: **-40° C to 105° C**
- **Safety Approval** UL, CSA and IEC/EN/DIN EN 60747-5-2

Status Update

Preliminary Datasheet	**Available**
Engineering Samples	**May'12**
Market Release	**Q2'13**



UVLO Threshold

LED	$V_{CC} - V_{EE}$ "+ve"	$V_{CC} - V_{EE}$ "-ve"	V_O
OFF	0 - 20 V	0 - 20 V	LOW
ON	0 – 8 V	0 – 7V	LOW
ON	8 – 9 V	7 – 8 V	TRANSITION
ON	9 – 20 V	8 – 20 V	HIGH

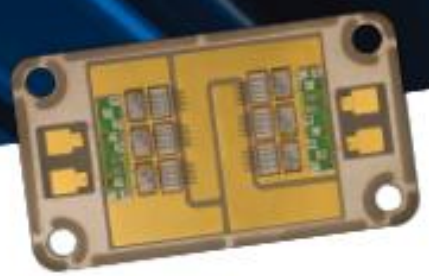
Regulatory Information

Part Number	Creepage & Clearance	IEC/EN/DIN EN 60747-5-2 V_{IORM}	UL V_{ISO}
ACPL-W346	8mm/8mm	1140 V_{PEAK}	5000V_{RMS}/min
ACPL-P346	8mm/7mm	891V_{PEAK}	3750V_{RMS}/min

AVAGO TECHNOLOGIES

Second Generation Z-FET™ SiC MOSFET

CREE

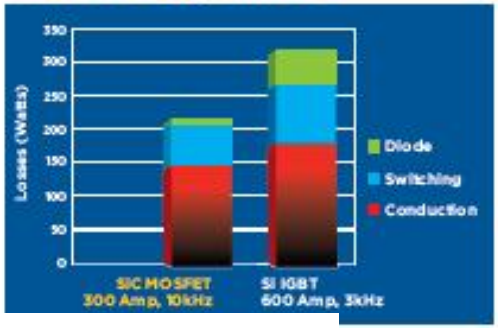


New devices deliver twice the amps-per-dollar

Cree's second generation silicon carbide (SiC) MOSFETs reach a price-performance point that enables systems to have higher efficiency and smaller size at cost parity with silicon-based solutions.

Available in bare die, packaged parts and modules.

300 Amp SiC more capable than 600 Amp IGBTs



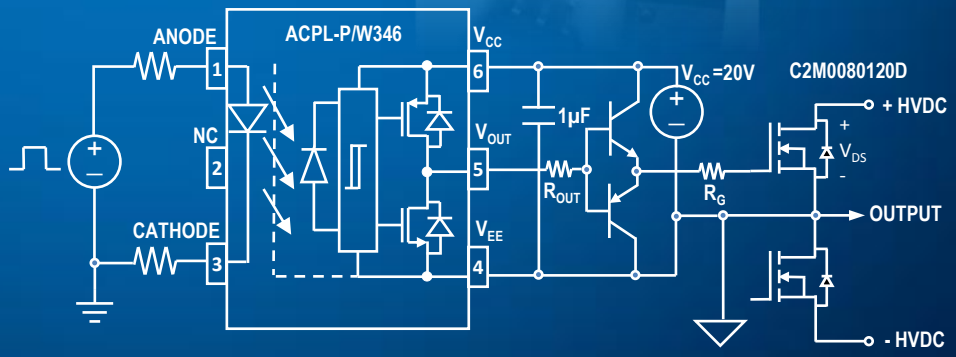
Cree SiC MOSFET	20 Amp C2M0080120D	50 Amp CPM2-1200-0025B
$R_{DS(ON)}$ at 25°C	80 mΩ	25 mΩ
$R_{DS(ON)}$ at 150°C	150 mΩ	45 mΩ
Q_G at 150°C	50 nC	180 nC
Switching Energy Loss	0.56 mJ	1.9 mJ

AVAGO TECHNOLOGIES

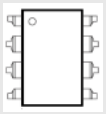
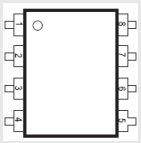
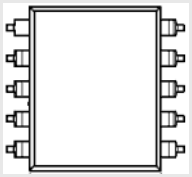
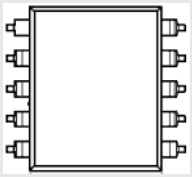
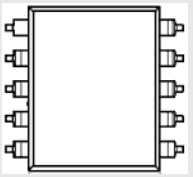
ACPL-P/W346

Ideally Matched for SiC MOSFETS

- 2.5 A max. Peak Output Current
- Rail-to-Rail Output Voltage
- 120 ns max. Short Propagation Delay
- 10 ns typ. Rise and Fall Time
- Safety Approval UL, CSA and IEC/EN/DIN EN 60747-5-5 up to V_{IORM}=1140V_{PEAK}



High Voltage Optocouplers

Specs.	ACPL-3130	ACPL-K312	ACNW3130	ACNV2601	ACNV4506	ACNV3130 (NEW)
						
Product Type	Gate Drive	Gate Drive	Gate Drive	Digital	IPM	Gate Driver
Package	300 mil DIP8	Stretched SO8	400 mil DIP8	500 mil DIP10	500 mil DIP10	500 mil DIP10
Creepage	7.4 mm	8 mm	10 mm	13 mm	13 mm	13 mm
Clearance	7.1 mm	8 mm	9.6 mm	13 mm	13 mm	13 mm
V_{IORM}	630 V_{PEAK}	1140 V_{PEAK}	1414 V_{PEAK}	2262 V_{PEAK}	2262 V_{PEAK}	2262 V_{PEAK}
V_{IOTM}	6000 V_{PEAK}	8000 V_{PEAK}	8000 V_{PEAK}	12000 V_{PEAK}	12000 V_{PEAK}	12000 V_{PEAK}
V_{ISO}	3750 V_{RMS}	5000 V_{RMS}	5000 V_{RMS}	7500 V_{RMS}	7500 V_{RMS}	7500 V_{RMS}
I_{OUT} Min.	2.0 A	2.0 A	2.0 A	NA	NA	2.0A
I_{OUT} Max.	2.5 A	2.5 A	2.5 A	NA	NA	2.5 A
CMR Min.	40 kV/µs	15 kV/µs	40 kV/µs	20 kV/µs	30 kV/µs	40 kV/µs

AVAGO TECHNOLOGIES

Basic Gate Driver Selection Matrix

Features				Output Current
UVLO			ACNW3190	5A
Rail to Rail, UVLO , High speed		ACPL-P/W343 (IGBT)		4A
UVLO, High Speed	HCPL-3180			2.5A
UVLO			**ACNV3130**	**2.5A**
UVLO	ACPL-3130 HCPL-3120	ACPL-J313 ACPL-H312	ACNW3130 HCNW3120	2.5A
Rail to Rail, UVLO , High speed		ACPL-P/W341 (IGBT) ACPL-P/W345(MOSFET)		2A
Rail to Rail, UVLO , High speed		ACPL-P/W340 (IGBT)		1A
UVLO	HCPL-3150	ACPL-315J (Dual channel)		0.6A
Basic Driver	ACPL-P314	ACPL-J314 ACPL-314J (Dual channel)		0.6A
Basic Driver	ACPL-P302			0.4A

IGBT Voltage

600V 1200V 1700V

AVAGO TECHNOLOGIES

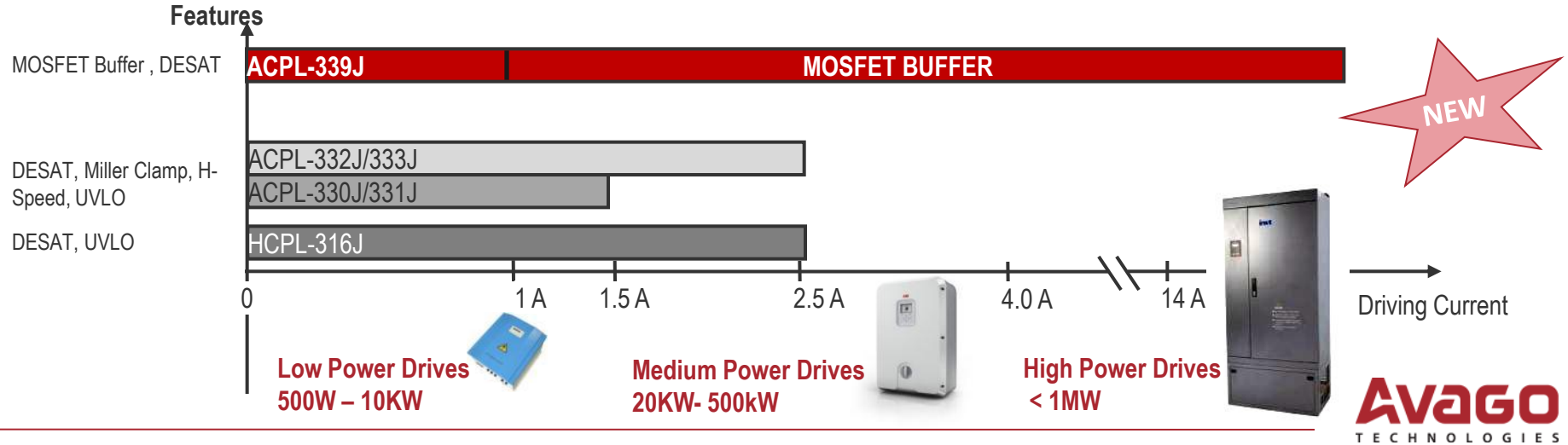
Smart Gate Drive Roadmap

Specification	HCPL-316J (1st Gen)	ACPL-332J/333J (2nd Gen)
I_{OUT} Max	2.5 A	2.5 A
Rail-to-Rail	No	No
t_{PLH}/t_{PHL} Max.	500 ns	250 ns
Miller Clamp	No	1.7 A
DESAT	Yes	Yes
UVLO Feedback	No	No
Buffer	Bipolar	Bipolar
Ease of Scalability	Medium	Medium
Buffer Switching	Input dependent	Input dependent
Anti-Cross	NA	NA

↑Efficiency

↑Protection

Specification	ACPL-339J (New Gen)	Benefits
I_{OUT} Max	1.0 A	▪ Maximizes Gate Drive Design Efficiency ▪ Maximizes Power Conversion Efficiency
Rail-to-Rail	Yes	
t_{PLH}/t_{PHL} Max.	300ns	
Miller Clamp	No	
DESAT	Yes+Adjustable	
UVLO Feedback	Shared	
Buffer	MOSFET	
Ease of Scalability	High	
Buffer Switching	Fast	
Anti-Cross	Yes	



AVAGO TECHNOLOGIES

ACPL-339J IGBT Gate Drive Optocoupler with Dual Rail-to-Rail Output Drive for MOSFET Buffer Interface

Description

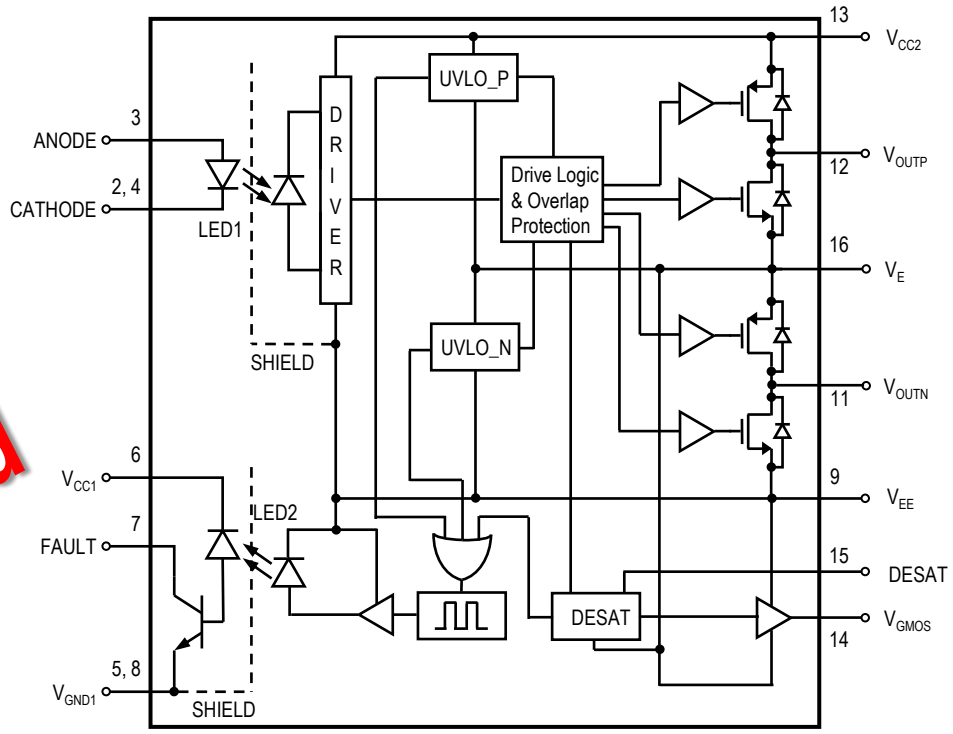
- **Dual Rail-to-Rail output drive** for **external MOSFET buffer**
- **1.0 A** Minimum Peak Output Current
- **Active timing control** to avoid cross-conduction at external FETs
- **Desat, Under Voltage** and **Over Temp** Detection with isolated **Fault Feedback**
- **External controlled Soft IGBT turn-off**
- **Auto Fault reset**
- **300ns (max)** Fast Propagation delay
- Low LED input drive of **6mA to 10mA** with **hysteresis**
- **UVLO** with Hysteresis
- High CMR (**min 25kV/µs**@V_{CM}=1.5kV)
- Industrial Temperature Range: **-40ºC to 105ºC**
- Safety Approval UL, CSA and IEC 60747-5-5
- Lead-free Parts Only

Released

Applications

- IGBT/SiCFET Gate Drive
- AC/Brushless DC Motor Drives
- Industrial and Renewable energy Inverters
- Switching Power Supplies

Functional Diagram



AVAGO TECHNOLOGIES

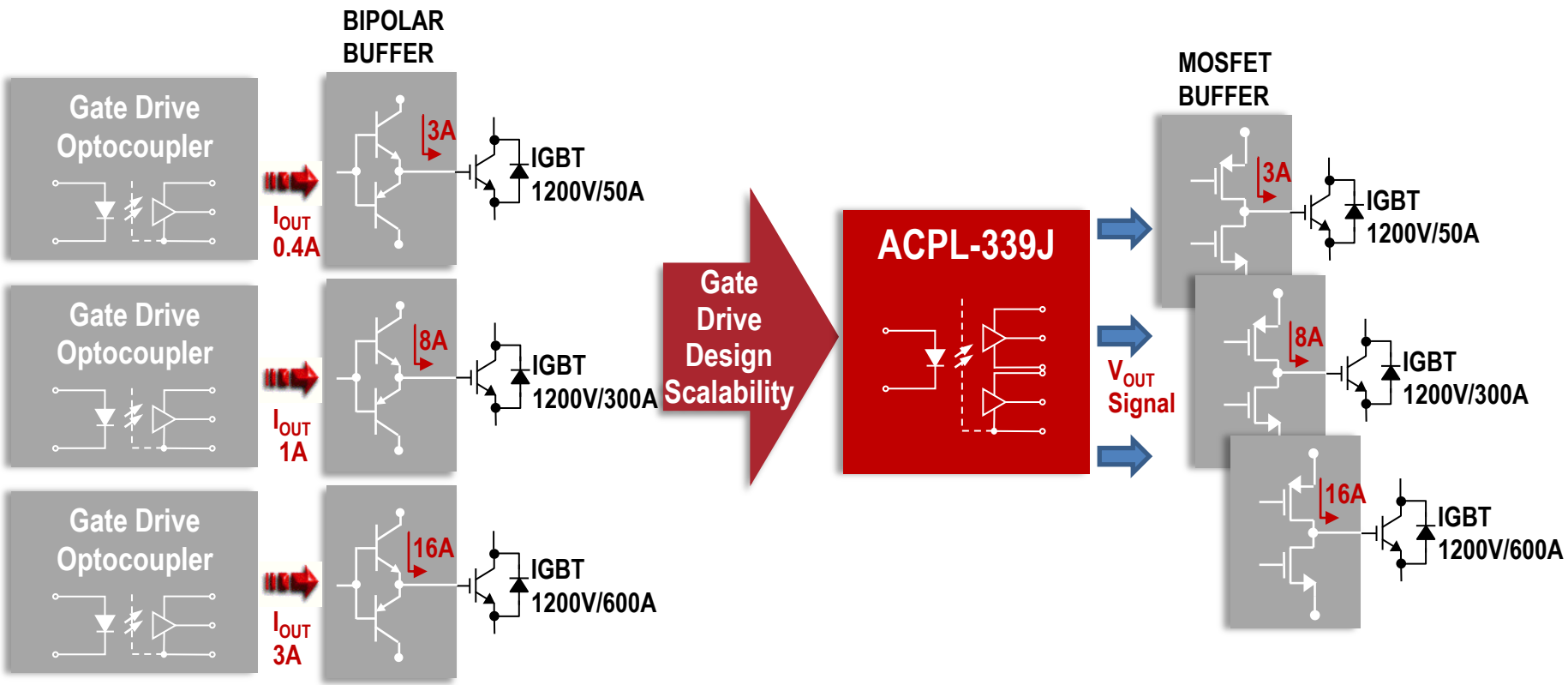
Features and Benefits – Gate Drive Design Scalability

BIPOLAR Buffer

- IGBT gate peak current depends on BIPOLAR 's β and I_B
- Scaling to different IGBT class requires change in BIPOLAR buffer and gate drive optocoupler

MOSFET Buffer

- IGBT gate peak current depends on MOSFET internal R_{DSON}
- Scaling to different IGBT class requires change in MOSFET Buffer size Only



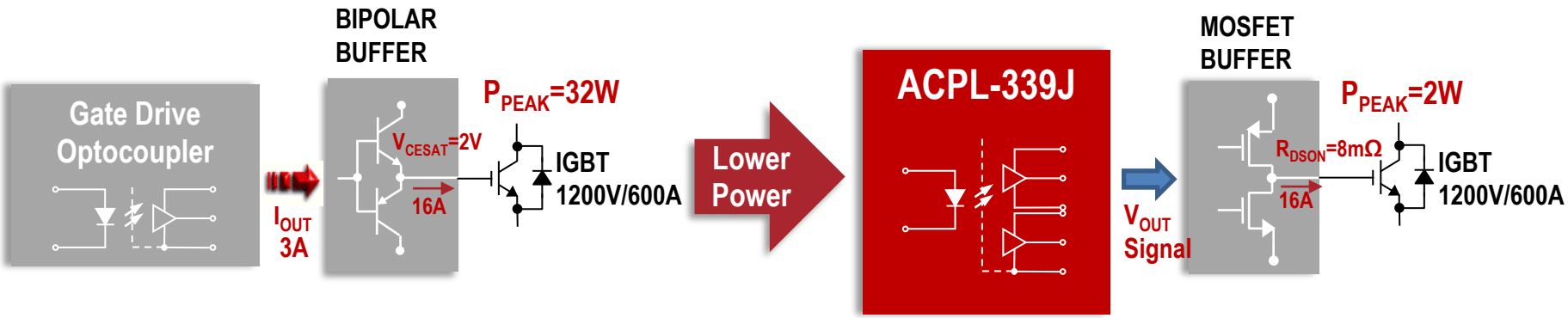
Features and Benefits – Lower Power Consumption

BIPOLAR Buffer

- Current control device. Constant biasing current I_B,
- High V_{CESAT} drop. High output power dissipation

MOSFET Buffer

- Voltage control device. No biasing current
- Rail-to-rail output. Low R_{DSON} and power dissipation



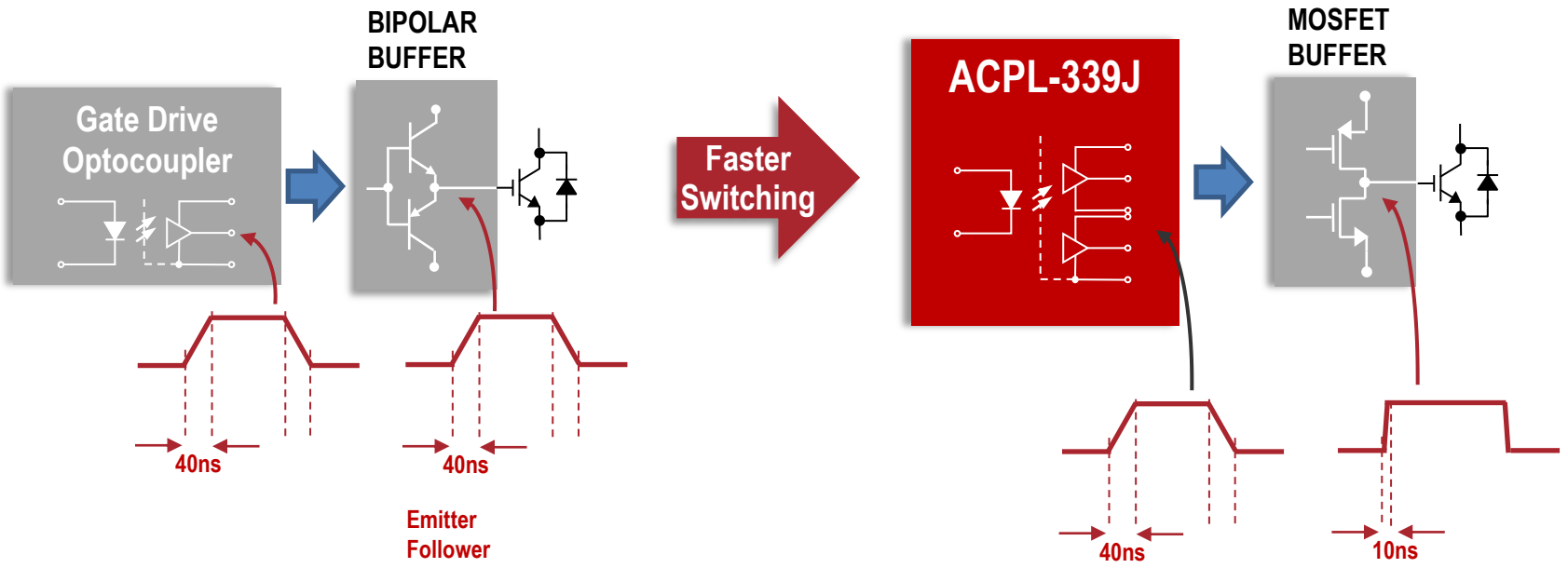
Features and Benefits – Faster Switching Higher Efficiency

BIPOLAR Buffer

•Emitter Follower. Buffer output switching speed will follow input

MOSFET Buffer

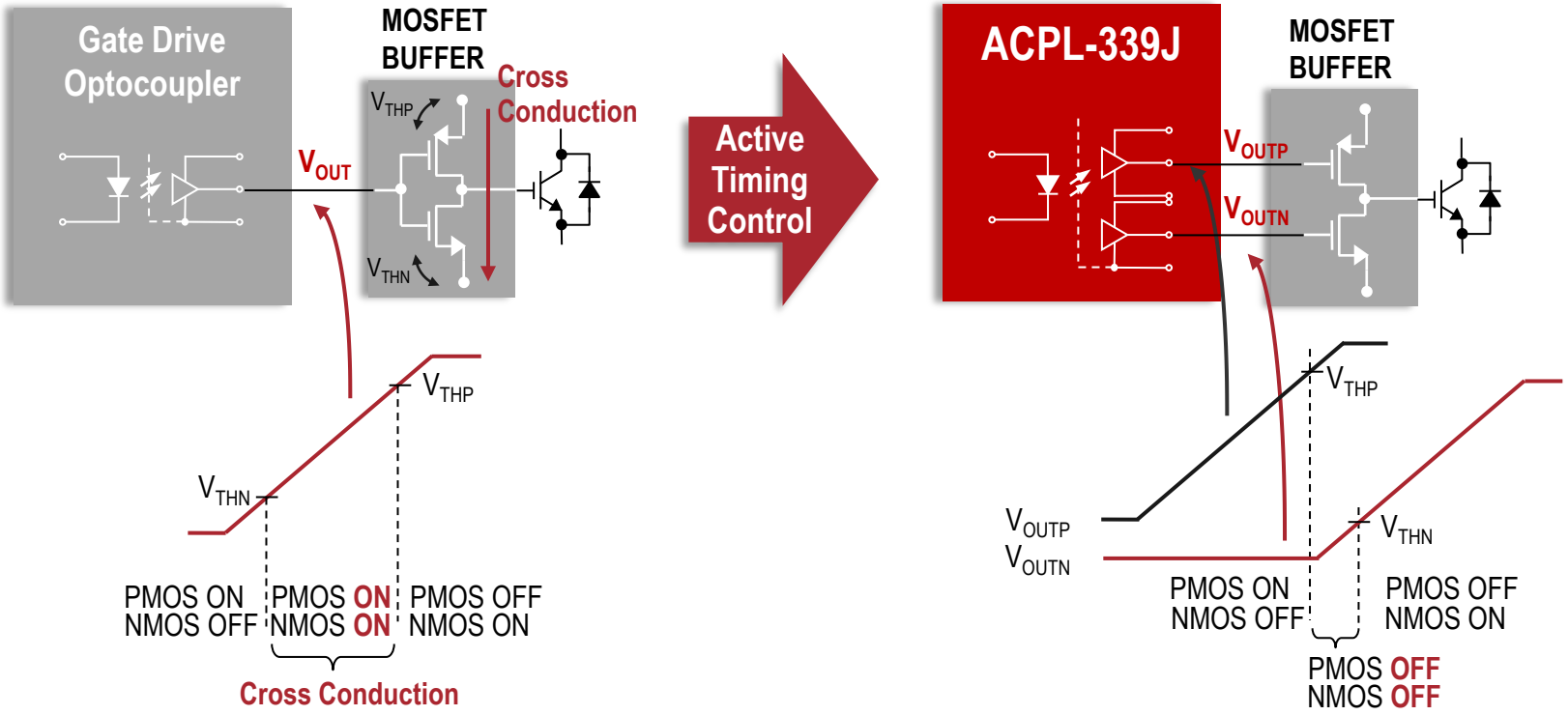
•MOSFET buffer has fast switching and independent of input switching speed



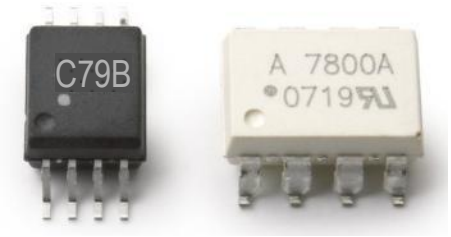
Features and Benefits – Active Timing Control to Prevent Cross Conduction

Active Timing Control

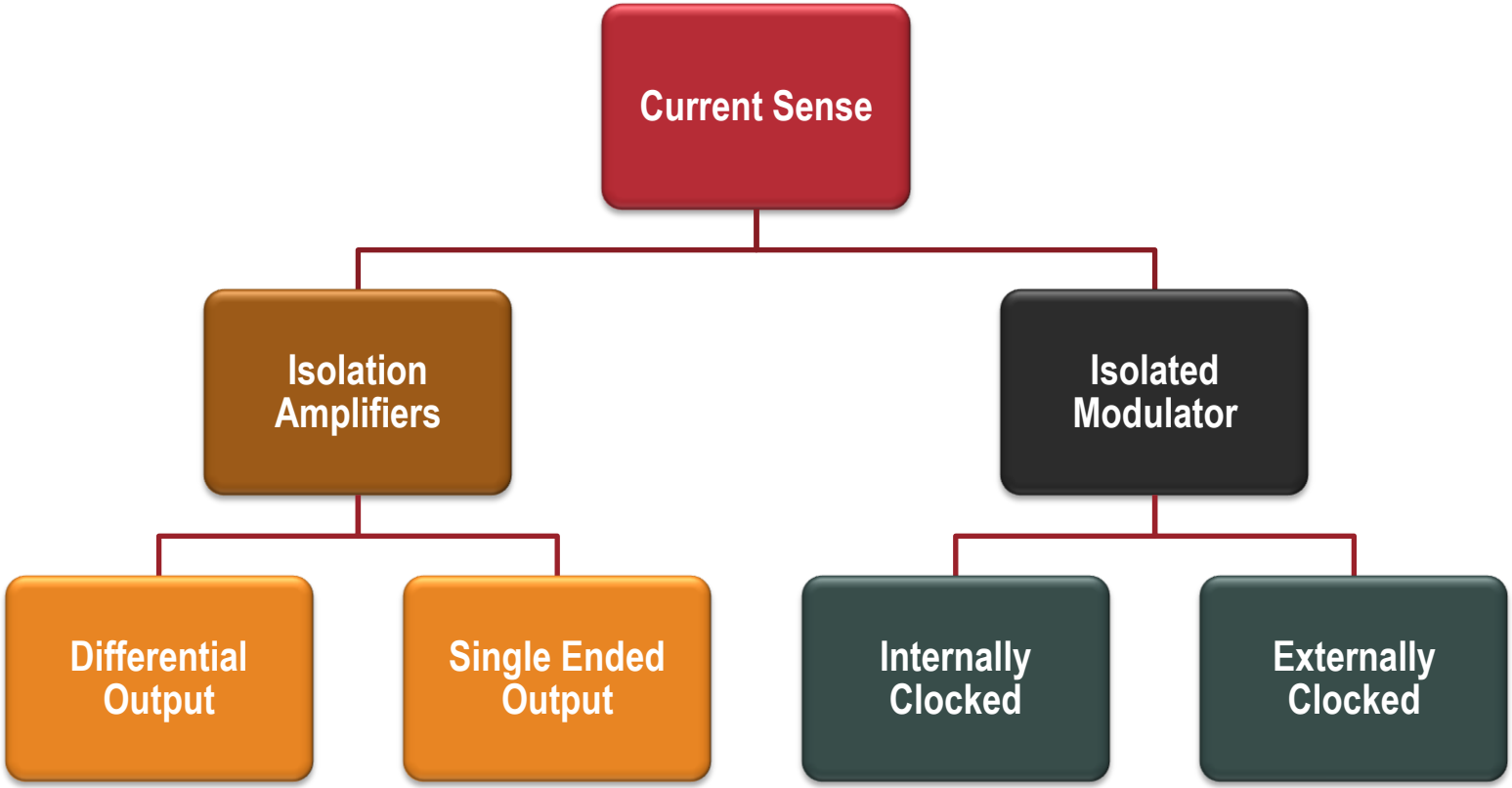
- To ensure on-state MOS is turned "off" first before turning "on" the other
- To protect external MOSFET buffer from cross conduction



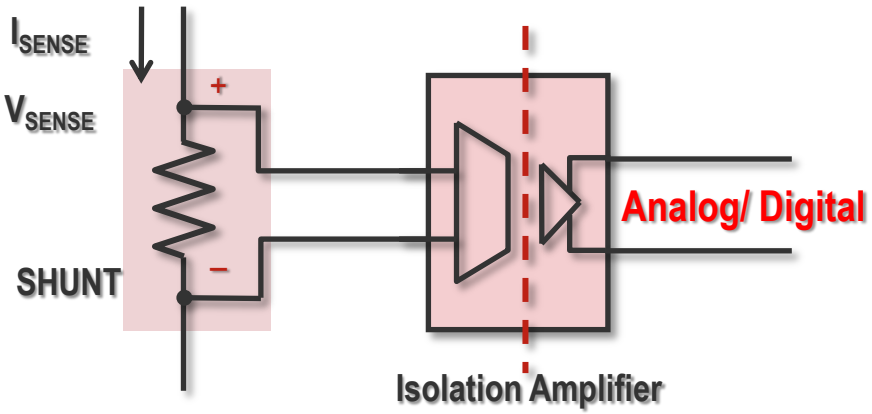
Optocouplers for Current/Voltage Sensing



Product Portfolio



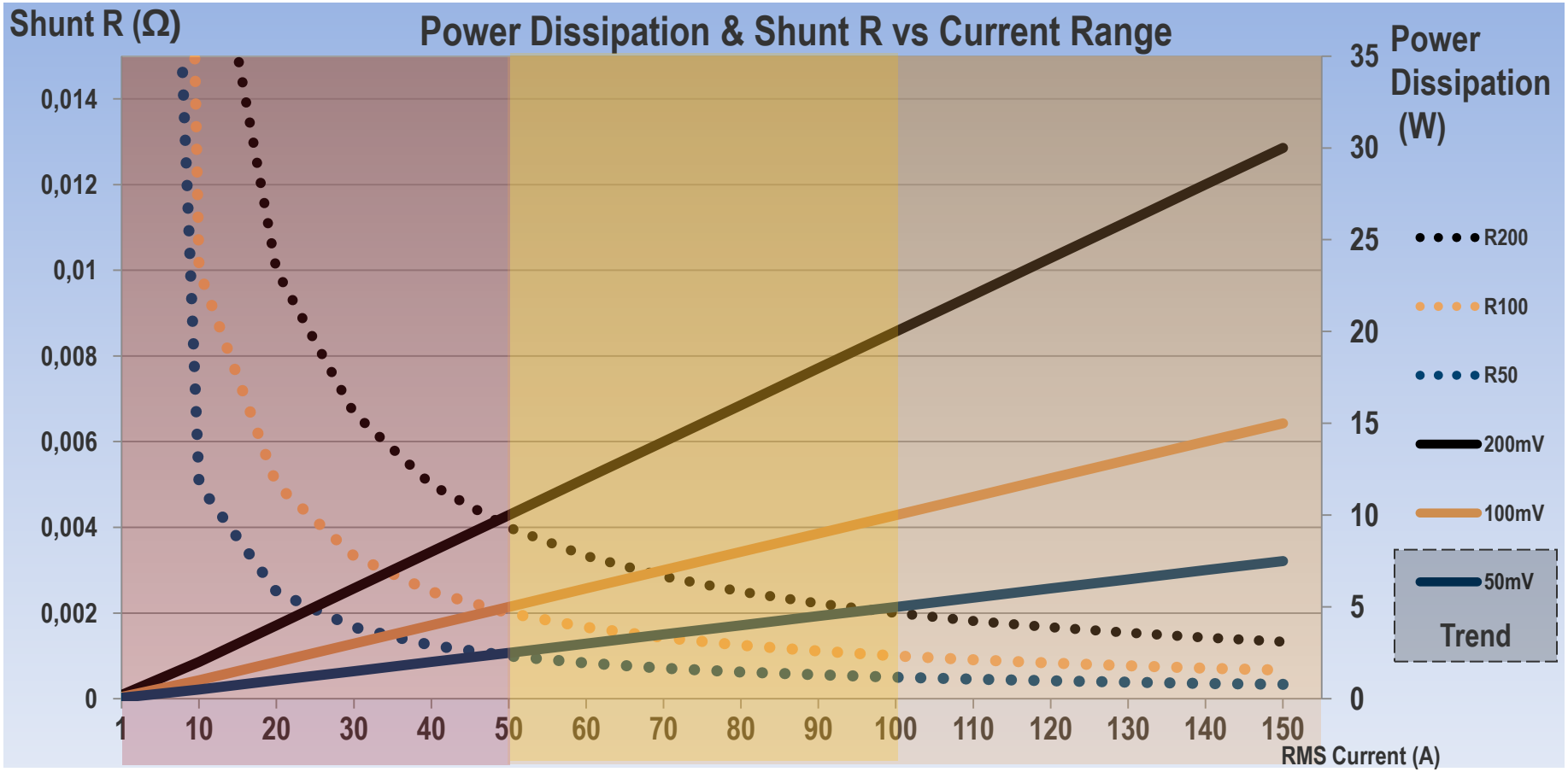
The Benefits of Avago Isolation Amplifiers



Shunt + Isolation Amplifier

- ✓ **S**uperior Optical Isolation Technology
- ✓ **A**dvanced Sigma Delta Modulation
- ✓ **E**asily Address Different Current Ranges Through Adjusting Shunt Resistance.
- ✓ **E**xcellent Over Temperature Accuracy.
- ✓ **E**ase of Assembly - Surface Mount Solution.
- ✓ **C**ost Effective Vs Hall Effect Sensors
- ✓ **M**arket Proven Reliability.
- ✓ **S**afety Certified Protection

Isolation Amplifiers Sweet Spot

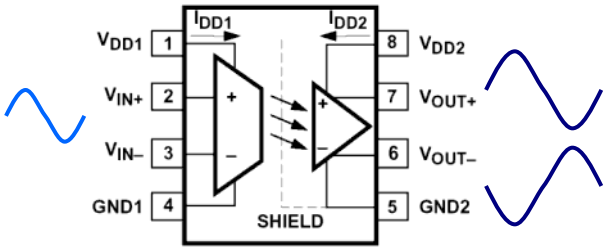


Isolation Amplifiers Sweet Spot

Power Dissipation on Shunt Resistor may be too high. On One method is to connect shunts in parallel to split the power handling. The other method is to use a smaller input range.

AVAGO TECHNOLOGIES

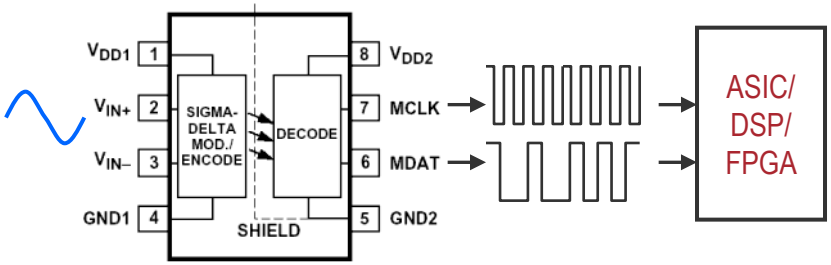
Current/Voltage Sense Optocouplers



ACPL-790B/790A/7900
ACPL-C79B/C79A/C790
ACPL-C78A/C780/C784
HCPL-7800A/7800/7840

Analog Output

- 3V/5V compatible
- High CMR (15 kV/μs at V_{CM} = 1000 V)
- 1.6μs fast response, 60dB SNR
- 8 mm Creepage and Clearance
- IEC/EN/DIN EN 60747-5-5: V_{IORM} = 1230 Vpeak, UL 1577: 5000 Vrms/1 min



ACPL-C797
ACPL-796J

Digital Output

Sigma Delta Modulator with 16-bit resolution

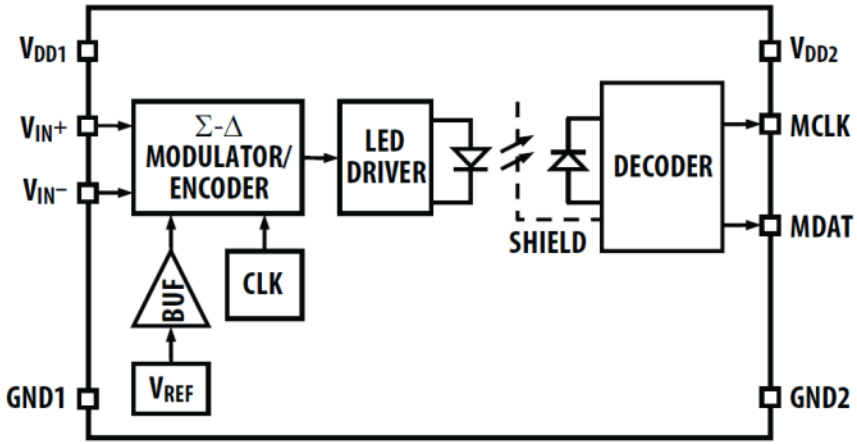
- High CMR (15 kV/μs at V_{CM} = 1000 V)
- VREF error @ 25° C max: ±0.5%
- Accurate internal clock frequency

Isolation Amplifiers versus Isolated Modulators

Feature	Isolation Amplifiers	Isolated Modulator
Implementation	Straightforward Simple	Requires Additional Digital Filtering
Resolution (SNR)	50 ~ 60dB	70 ~ 78dB
ENOB	8 ~ 9bits	11 ~ 12bits
Bandwidth	Fixed, 30KHz – 200KHz	Configurable, Depends on Digital Filter

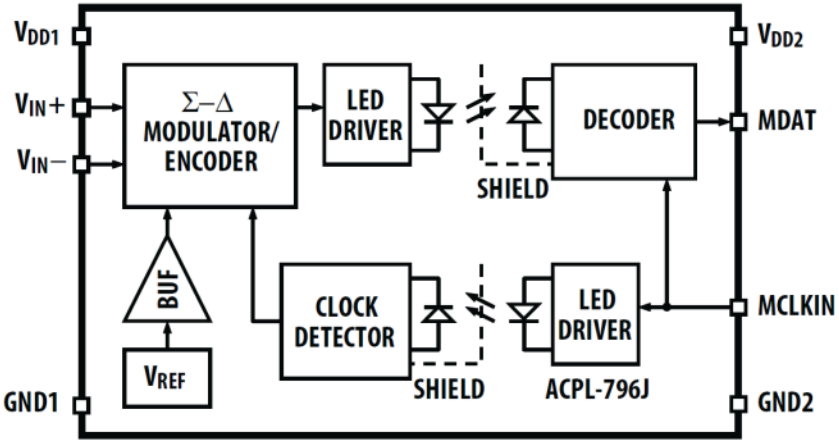
Internally Clocked versus Externally Clocked

ACPL-C797



VS

ACPL-796J

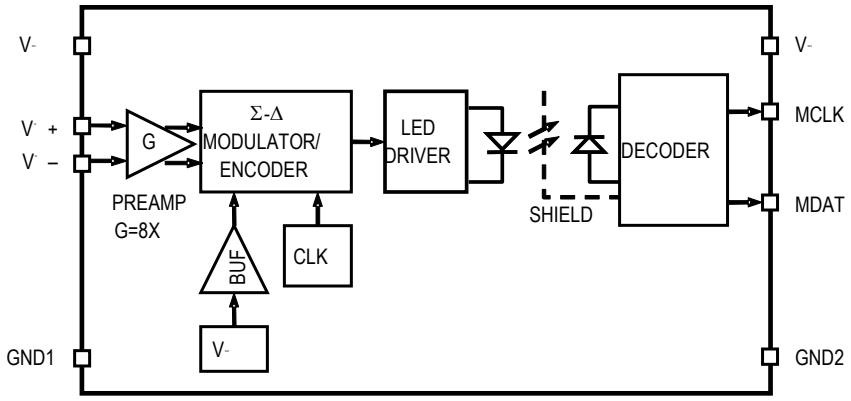


- Independent SD MCLK, not synchronized to controller clock.
- MCLK up to 10MHz.

- Multiple SD MCLKIN can be synchonized to multiple channels.
- MCLK up to 20MHz (faster response)

ACPL-C799 High Precision Digital Current Sense

Block Diagram



Product release : Q4'13

Key Features:

- 10 MHz internal clock
- 1-bit, second-order sigma-delta modulator
- 16 bits resolution no missing codes (12 bits ENOB)
- 78 dB SNR
- Maximum offset drift *TBD*
- ±1% gain error
- Internal reference voltage
- ±50 mV linear range with single 5 V supply (±80 mV full scale)
- 3 V to 5.5 V wide supply range for digital interface
- –40°C to +105°C operating temperature range
- SSO-8 package
- 25 kV/μs common-mode transient immunity

Applications:

- Motor phase and rail current sensing
- Power inverter current and voltage sensing
- Industrial process control
- Data acquisition systems
- General purpose current and voltage sensing
- Traditional current transducer replacements

Benefits:

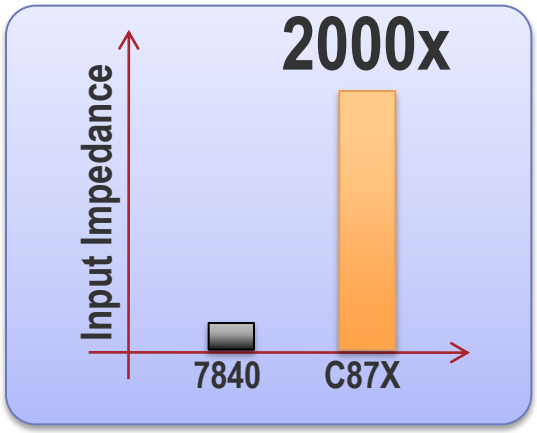
- Higher accuracy with improved input range
- Suitable for heavy current sense applications

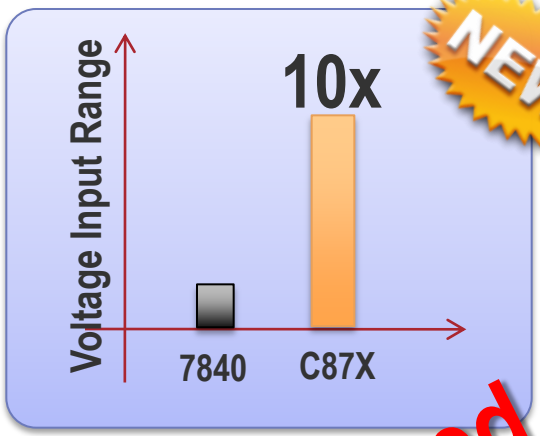
AVAGO TECHNOLOGIES

ACPL-C870/A/B Precision Isolated Voltage Sensor

Features

- *Input Linear Range : 0 - 2V*
- *Input Impedence : 1GΩ*
- Gain : 1V/V
- Gain Tolerance : 3% (0), 1% (A), 0.5% (B)
- *Gain Drift : -35ppm/°C*
- Supply Voltage Vcc1 : 4.5 – 5.5V
- Supply Voltage Vcc2 : 3.3 – 5.5V
- *Nonlinearity : 0.1% Max*
- Differential Output
- Low power standby or shutdown pin
- High CMR : 15 kV/μs at V_{CM} = 1500 V
- Bandwidth : 100KHz
- Package : SSO8
- Operating Temp: - 40°C – 105°C
- Reinforced Optical Insulation with Worldwide Safety Approval (Pending):
  - UL Recognized 5kV_{RMS} for 1 min Viorm = 1230Vpeak (1414V optional)
  - IEC 60747-5-5
  - CSA File Notice #5

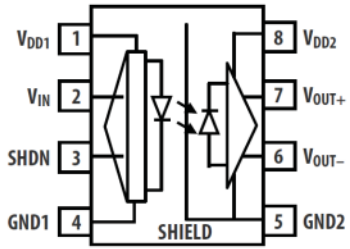




Released

Key Benefits

- ✓Low Gain Drift and Non-Linearity for Enhanced Accuracy.
- ✓High Input Impedence and Wider Input Range for lower Power Dissipation
- ✓Superior Optical Isolation for Reinforced Safety Insulation and Isolation.

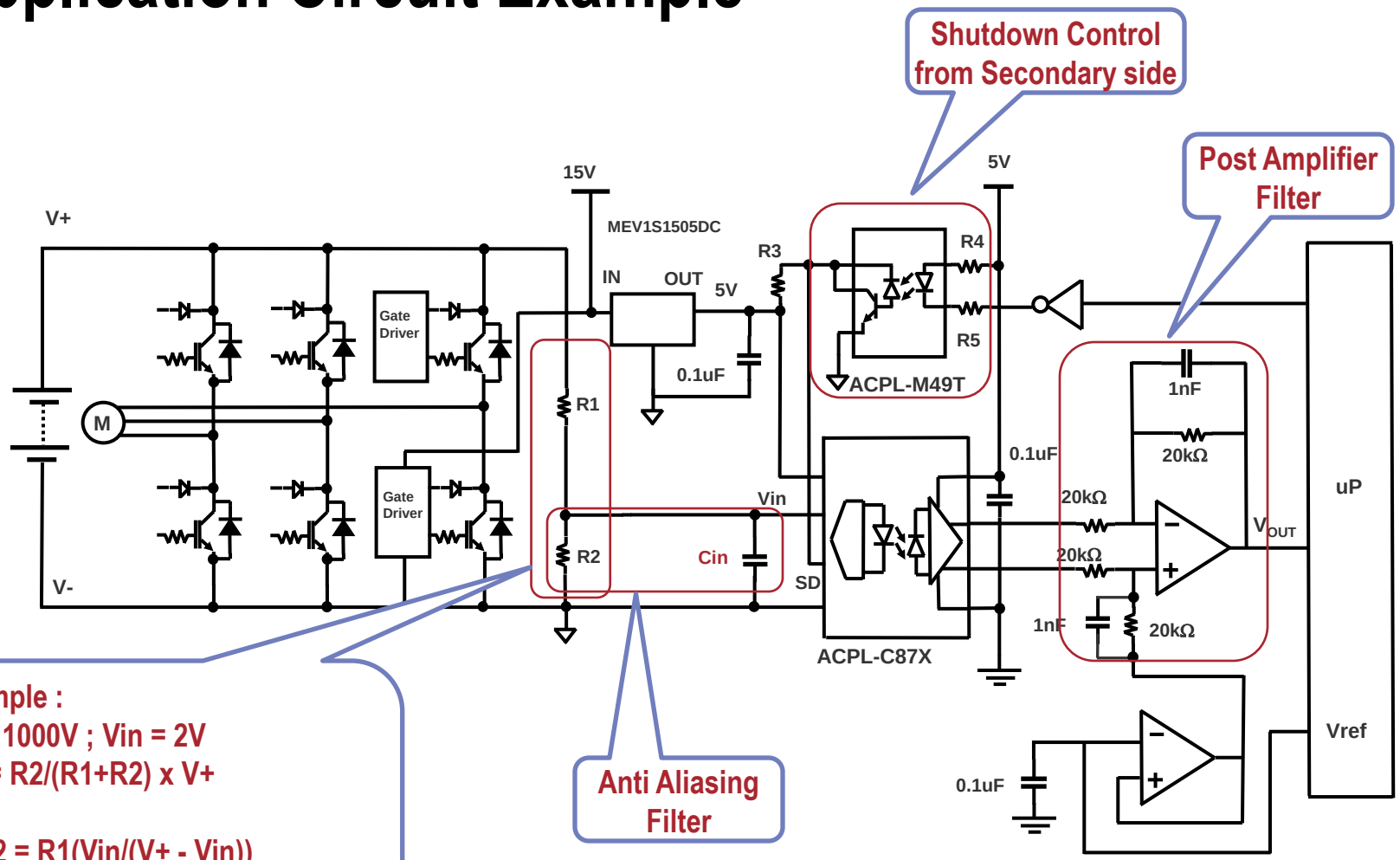


Applications

- Isolated Voltage Sensing in AC and Servo Motor Drives
- Isolated DC-Bus Voltage Sensing in Solar Inverters,
- Isolated Sensor Interfaces
- Signal Isolation in Data Acquisition Systems
- General Purpose Voltage Isolation

AVAGO TECHNOLOGIES

Application Circuit Example



1GΩ High Input Impedance Allows Significant Reductions In Power Dissipation

	HCPL-7800/A/40	ACPL-C79x	*ACPL-C87x*
Rin	500KΩ	22KΩ	***1GΩ***
Vbus	1000V	1000V	*1000V*
Vin	200mV	200mV	*2V*
R1	1MΩ	1MΩ	*100MΩ*
R2	200Ω	200Ω	*200KΩ*
Power Dissipation	1W	1W	***10mW***

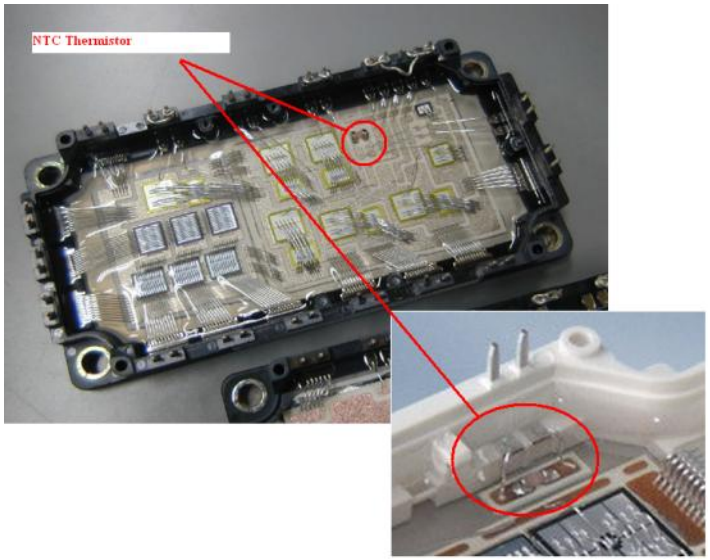
Up to 100x Less Power Dissipation.
Efficiency Critical For REI market!

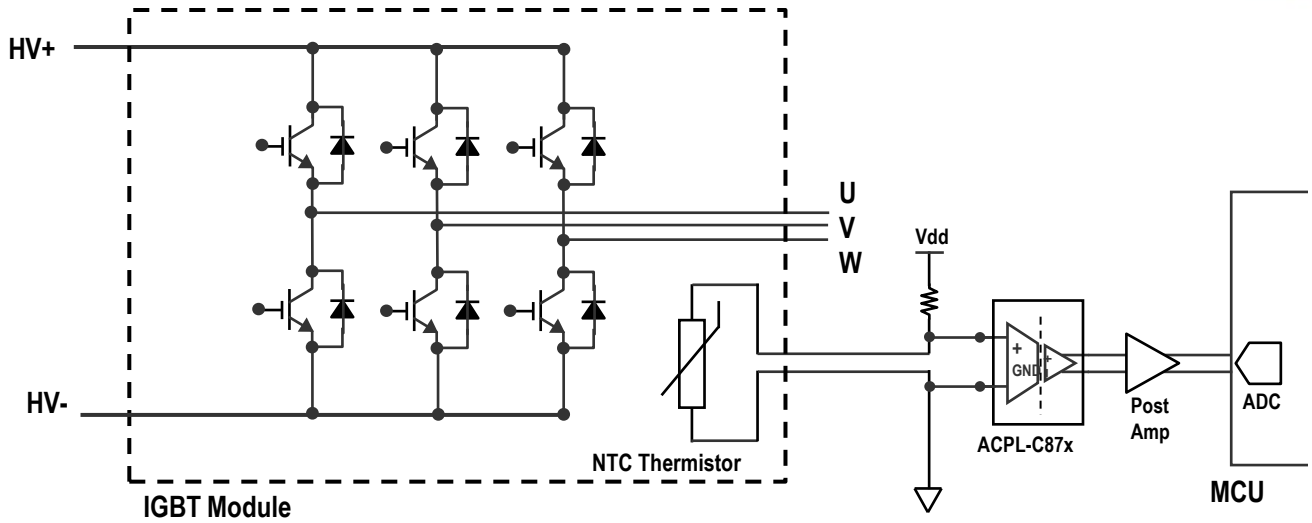
- Compared to 1st generation devices like our HCPL-7800A, the input impedance of ACPL-C87x is 2000x higher.
- This translates to allowing higher resistor values to be used in the resistor divider network that is used to divide down the high bus voltage to a range suitable for the ACPL-C87x.
- This is return significantly reduces the power dissipation across the resistor divider network.

Application Example : Temperature Monitoring in IGBT Modules

Requirements

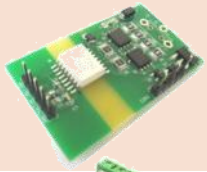
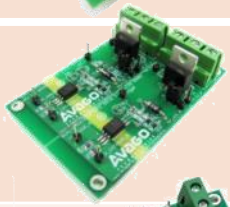
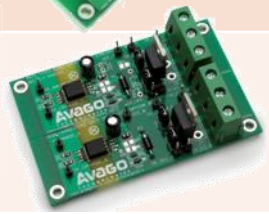
• Double Insulation required as stray conductors may come into contact with thermistor conductor





Evaluation Boards & Technical Support

Evaluation Boards for Gate Drive Optocouplers

Optocoupler Part Number	Eval Boards Part Number		User Guide
ACPL-339J	EVBD-ACPL-339J*		http://www.avagotech.com/docs/AV02-3957EN
ACPL-P/W340 ACPL-P/W341 ACPL-P/W343	EVBD-ACPL-P343*		http://www.avagotech.com/docs/AV02-2927EN
ACPL-H/K342	EVBD-ACPL-H342*		http://www.avagotech.com/docs/AV02-2653EN

*via E-Samples

Evaluation Boards for Isolation Amplifiers

ACPL-C79X eval board
Supports ACPL-C79B/C79A/C790
E-samples EVBD-ACPL-C79x

ACPL-C78X eval board
Supports ACPL-C780A/C780/C784

ACPL-C87X eval board
Supports ACPL-C870/C87A/C87B
E-samples EVBD-ACPL-C87x

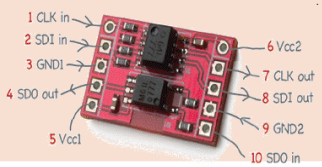
HCPL-788J eval board

HCPL-7510/7520 eval board

HCPL-78XX eval board
Supports HCPL-7800A/7800/7840
and ACPL-782T

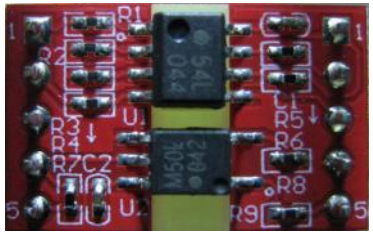
Evaluation Boards for Digital Optocouplers

10MBd

Optocoupler Part Number	Eval Boards Part Number		User Guide
ACPL-064L ACPL-M61L	EVBD-ACPL-SPI*		http://www.avagotech.com/docs/AV02-3160EN

*via esamples

1MBd / 5MBd



ACPL-M50L , SPI
(1MBd SO5 package)

ACPL-M21L , CANBus
(5MBd SO5 package)

Other Available eval boards

ACPL-061L/064L/M61LACPL-W61L/K64L/M61L, ACPL-071L/074L/M75L

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Thank You!

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