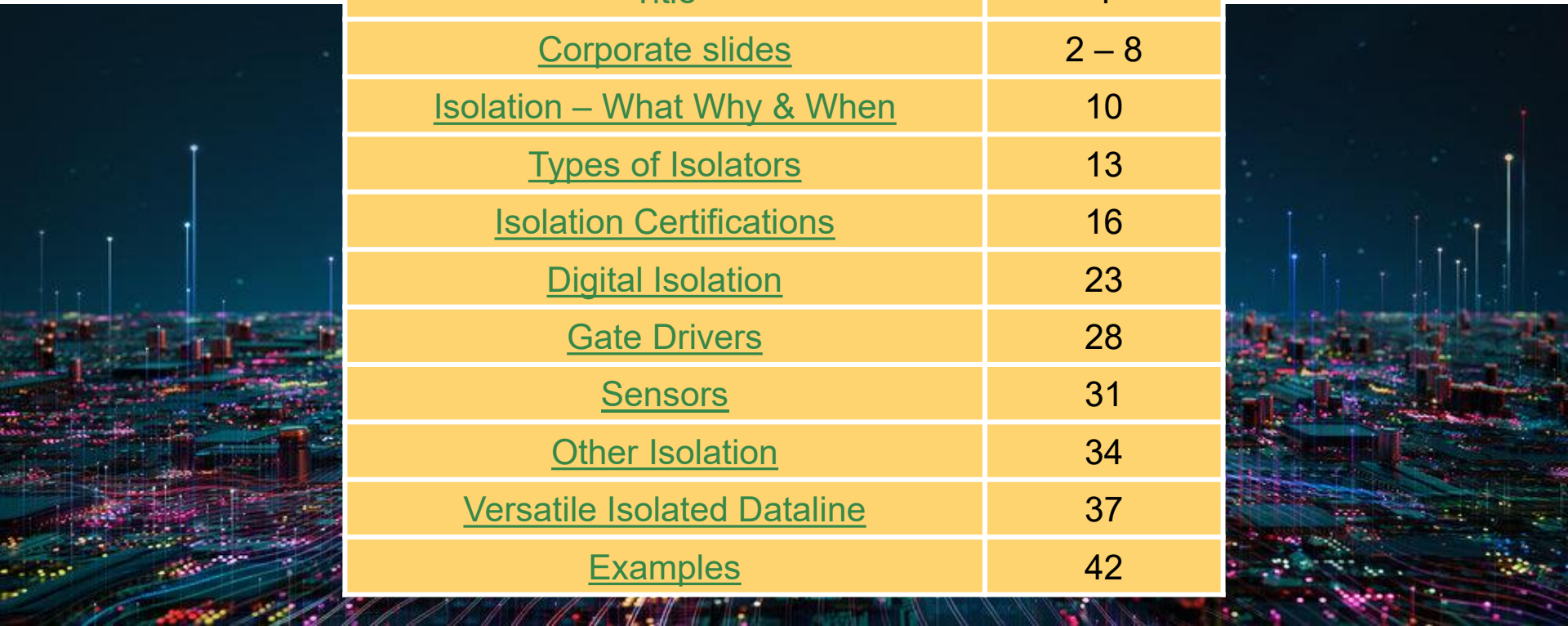
Avnet Americas Electronic Components

Delivering what's next in innovation – Demand Creation



Avnet Americas Electronic Components

Delivering what's next in innovation – Demand Creation



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About Avnet Americas Electronics Components



Quick facts

- Founded in 1921
- Headquartered in Phoenix, Arizona
- AVT listed on the NYSE since 1960
- AVT listed on NASDAQ since 2018
- #180 on FORTUNE 500 (U.S.) in 2022

10k+
Employees

325+
Supplier Partners

2.8M+
Engineering community members

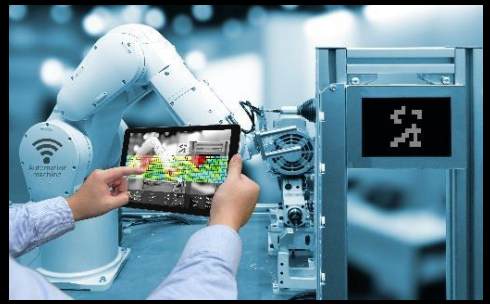
$22B
Revenue*
(28.3% growth in FY26)

73
Locations

18.1B+
Units shipped annually
(avg. 2,800 orders/day)

*Includes Avnet EC, Integrated & Farnell






Accelerating our customer's success from design chain to supply chain, enabling customers to open new revenue streams and speed time to market for their products.

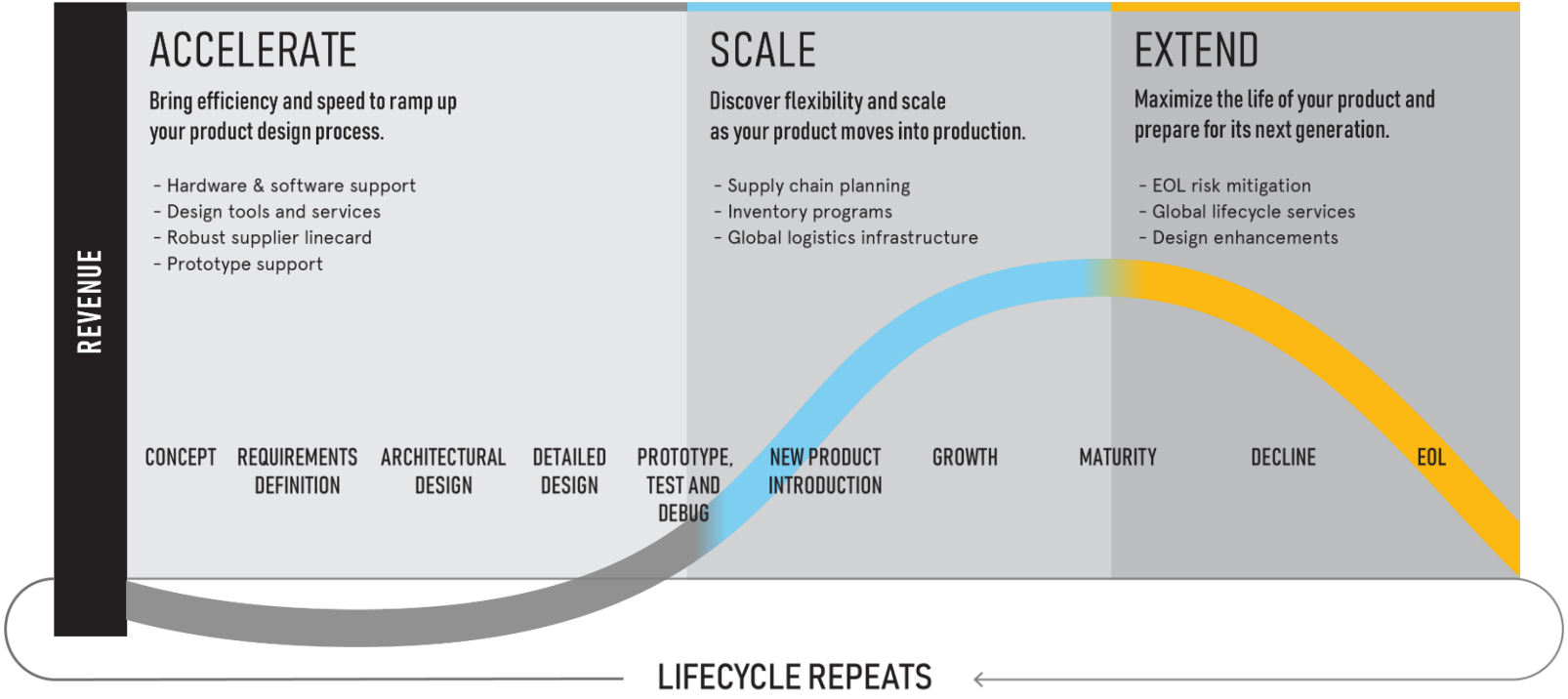




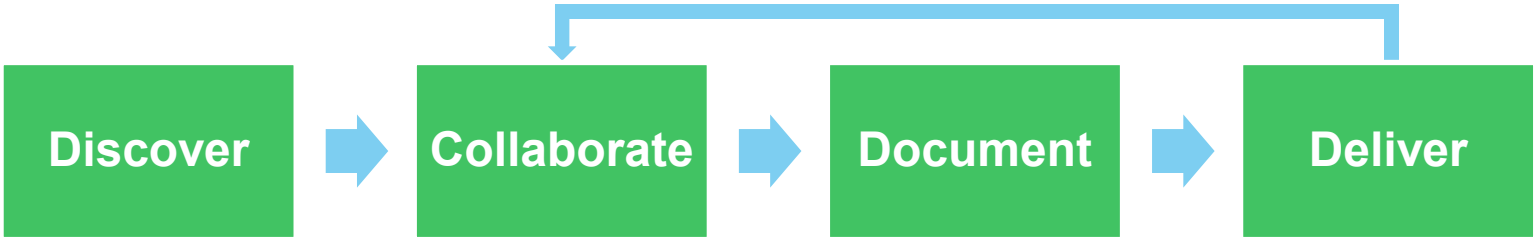

AVNET

Discover an extension of your team

Plug in our capabilities to optimize yours throughout the product lifecycle.



Avnet's design chain process



- Identify projects
- Understand customer requirements

- Block diagram
- Design Reviews
- Supplier strategy

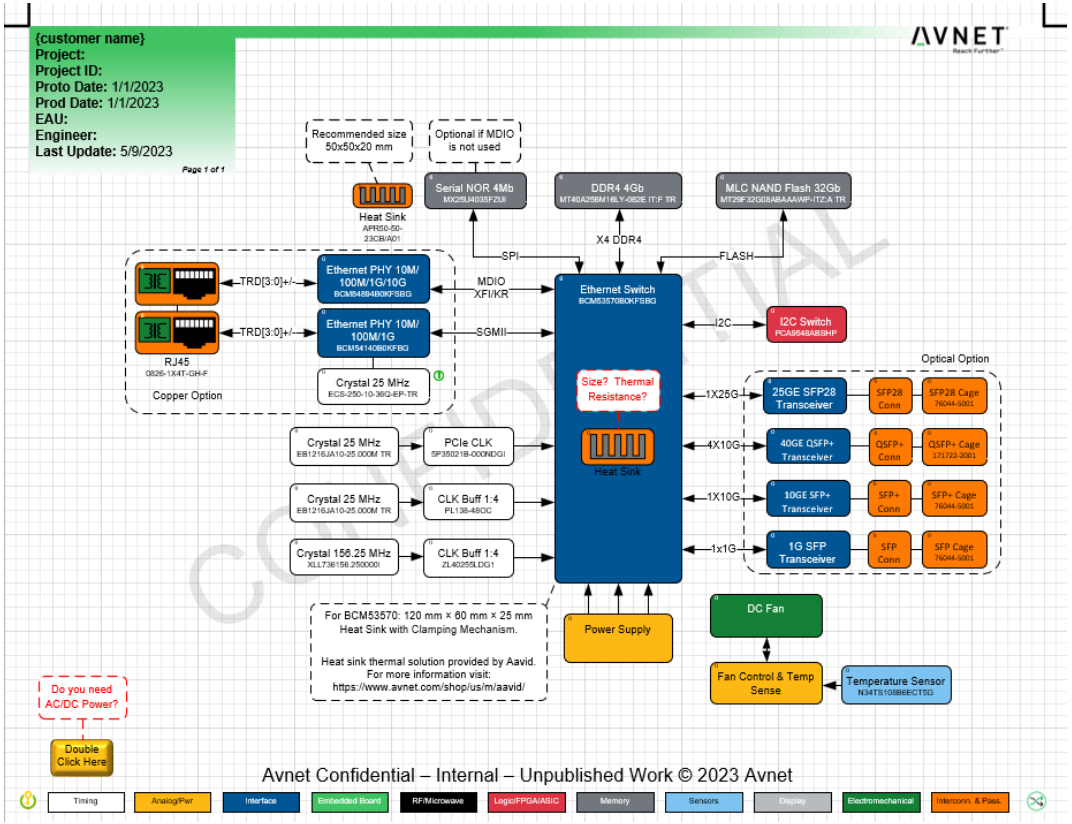
- Supplier comm
- Top opportunity

- Customer proposals
- Customer feedback
- Supplier comm
- Track

AMs and FAEs share ownership

Throughout the process, both **AMs** and **FAEs** engage with customers, suppliers and colleagues to create system-level proposals

AVAIL



Early engagement in design cycle with solutions

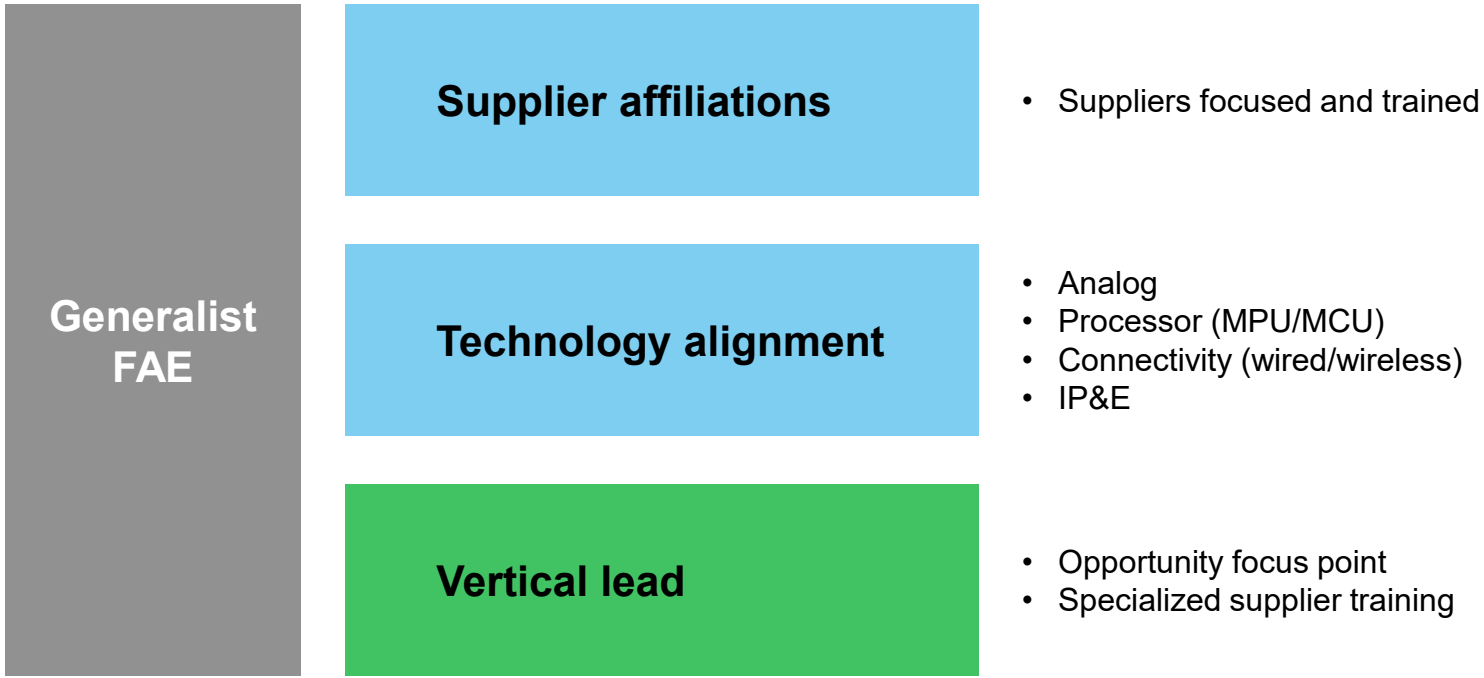
Block Diagram level design

1000+ Reference Designs

Relational component suggestions

Supplier solutions exposure

FAE Resource deployment



- Suppliers focused and trained

- Analog
- Processor (MPU/MCU)
- Connectivity (wired/wireless)
- IP&E

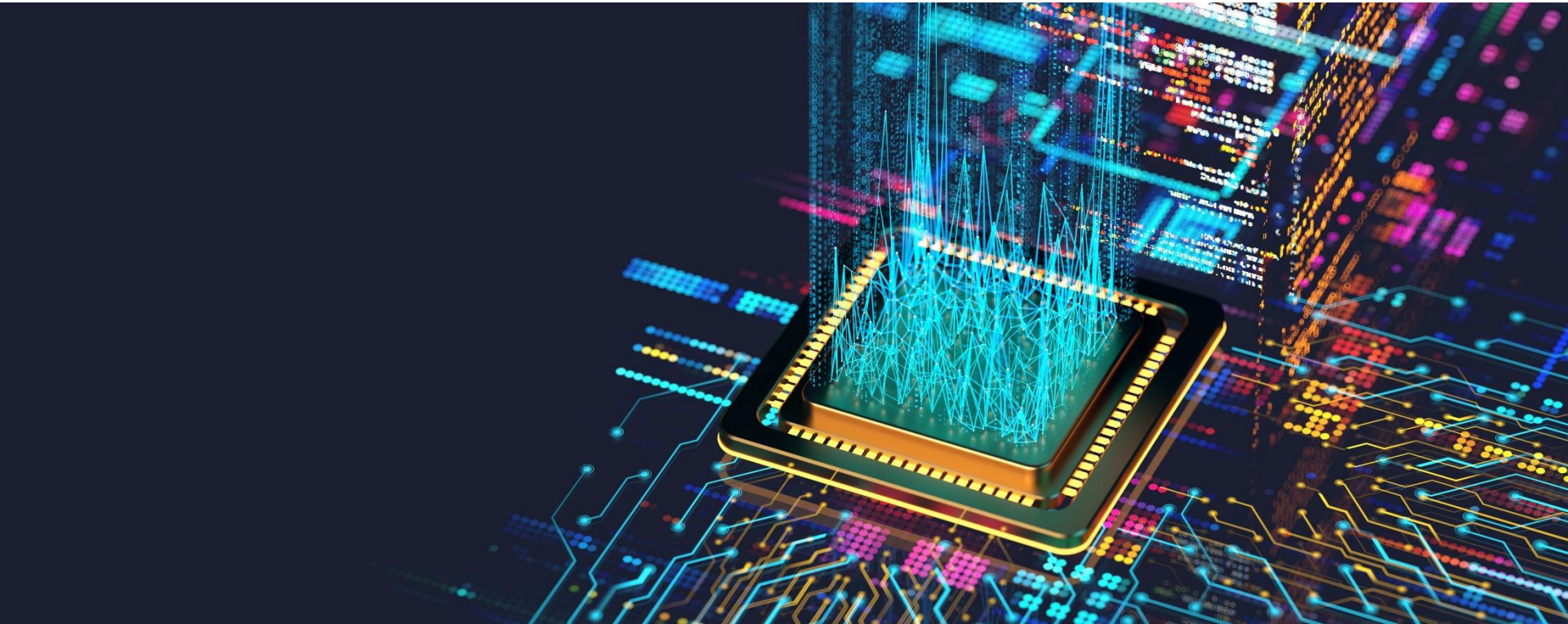
- Opportunity focus point
- Specialized supplier training

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06/15/2026

Mark Story

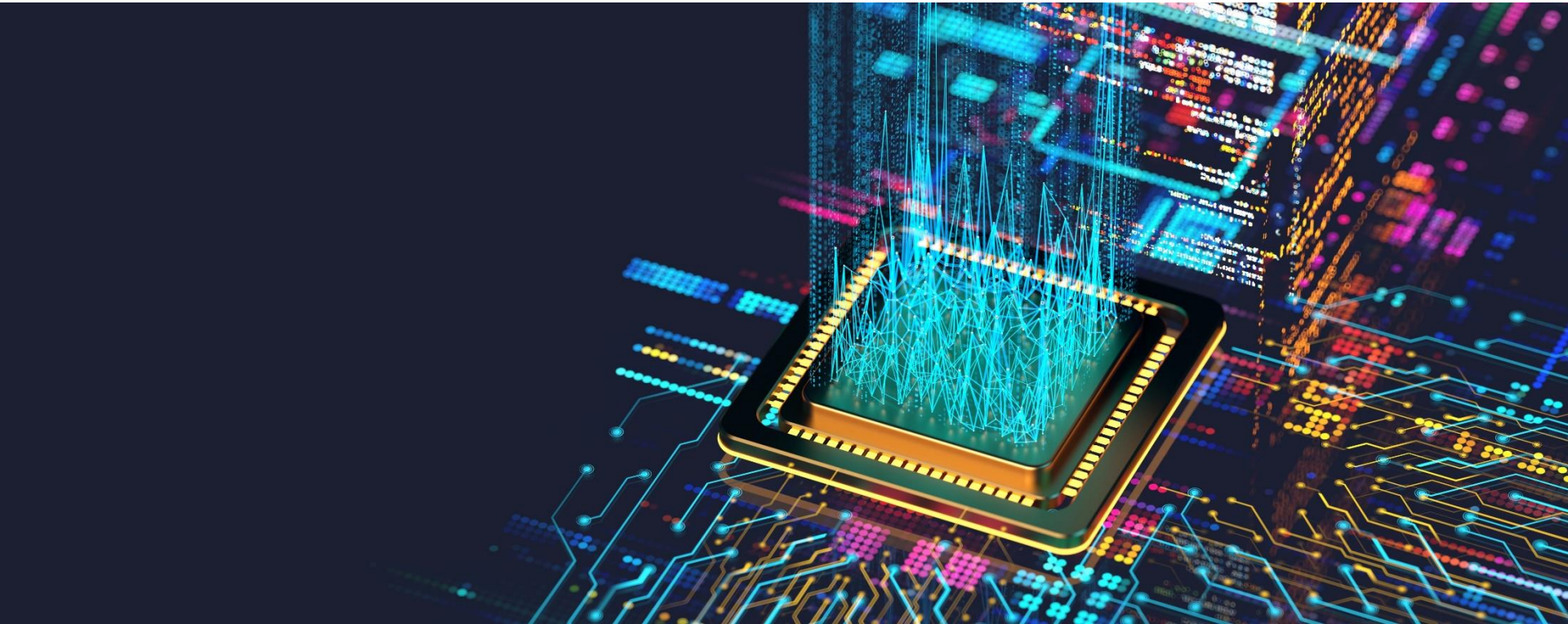
Mark.story@avnet.com Field Application Engineer



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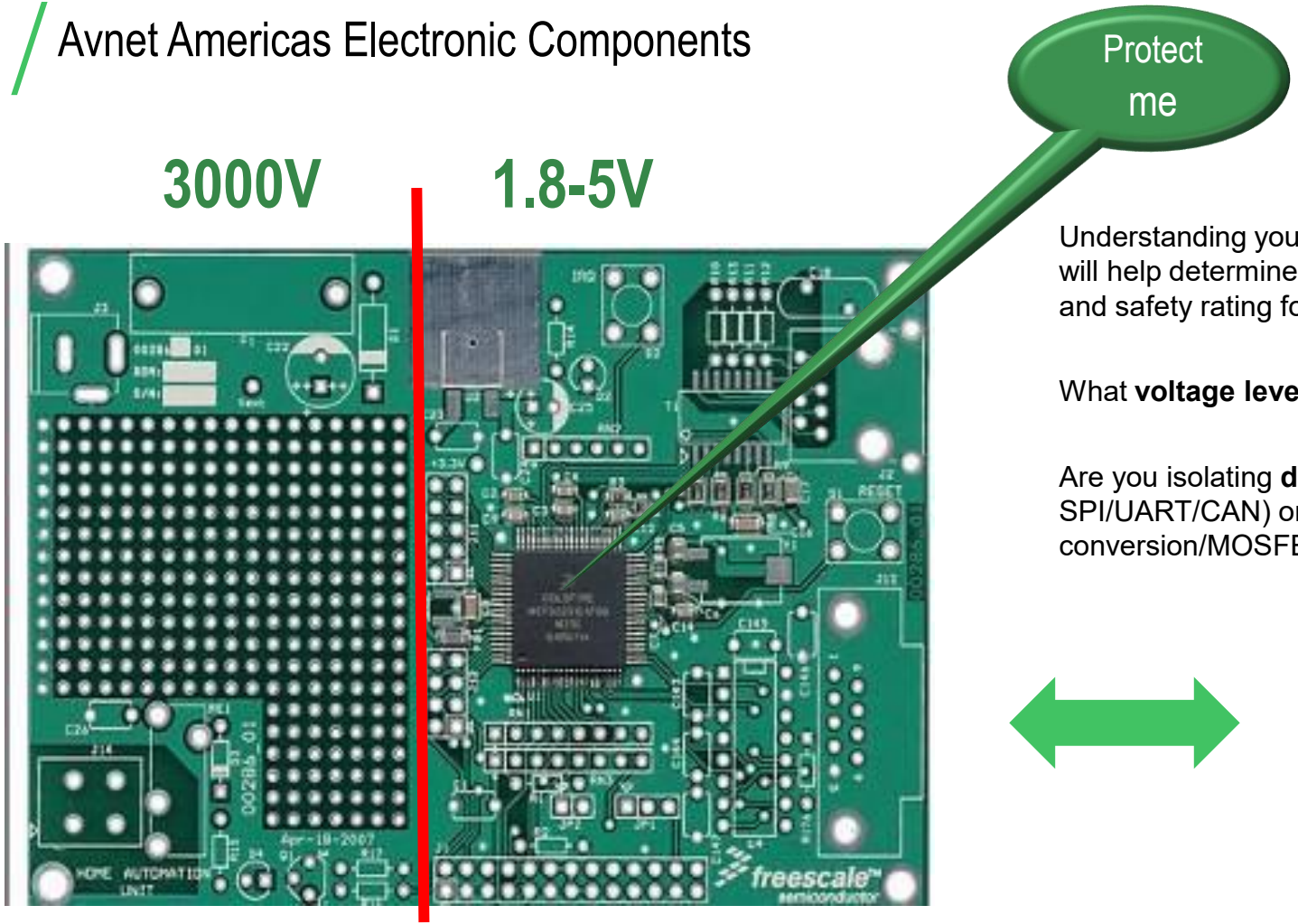
Isolation – what why & when

06/15/2026 Mark Story mark.story@avnet.com



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Understanding your system's exact requirements will help determine the best isolation topology and safety rating for your hardware.

What **voltage levels** are you dealing with?

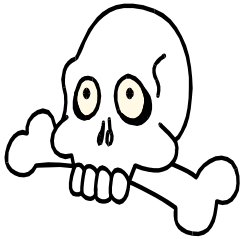
Are you isolating **data signals** (like SPI/UART/CAN) or **power** (DC/DC conversion/MOSFETs)?

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Insulation refers to ability to withstand high voltages
Isolation refers to ability to reject electrical noise

Two Primary Reasons For Using Isolation Components:

INSULATION

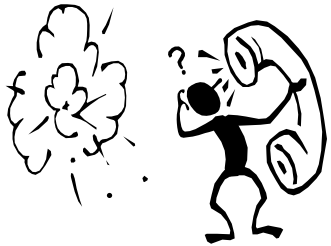


The property of a material that resists the flow of current until break down is reached. The insulation withstand capability (Viso) and working voltage (Viorm) are figure of merit for High Voltage Protection capability of an Isolator.

Viso stands for Isolated Voltage which is absolute maximum voltage the device can safely block or withstand between its input and output circuits without the internal insulation breaking down: Dielectric Insulation Withstand Capability

Viorm stands for Maximum Repetitive Peak Isolation Voltage. It represents the highest repetitive, continuous peak voltage that the optocoupler's internal insulation barrier can safely withstand day-to-day throughout its entire operating lifetime.

ISOLATION



The capability to transmit a desired signal (differential mode) and reject an undesired (common mode) signal. The Common Mode Rejection (CMR) parameter is a figure of merit for the electrical noise rejection capability of an Optocoupler.

CMR It measures the insolation's ability to prevent high-speed voltage spikes or electrical noise from crossing the isolation barrier.

Isolation – what why & when

Electrical isolation breaks the path between circuits, allowing data or power to transfer while blocking unwanted, dangerous currents. It protects low-voltage processors and end-users from high-voltage faults, eliminates ground loops, and ensures overall system safety.

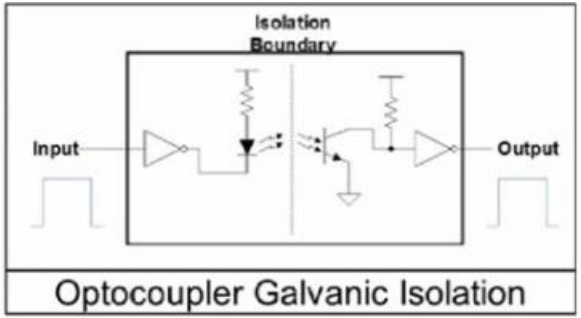
Optical Isolation (Optocouplers): Transfers data using light. An LED emits light across an insulating gap, which is then captured by a photodetector on the other side.

Magnetic Isolation: Uses small transformers to transfer signals or power through magnetic field

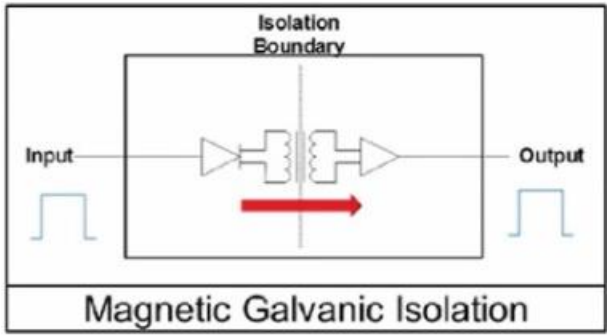
Capacitive Isolation: Transfers signals using the charging electric fields between conductive plates by a dielectric barrier inside a capacitor

https://www.avnet.com/americas/products/c/optoelectronics/optocouplers/

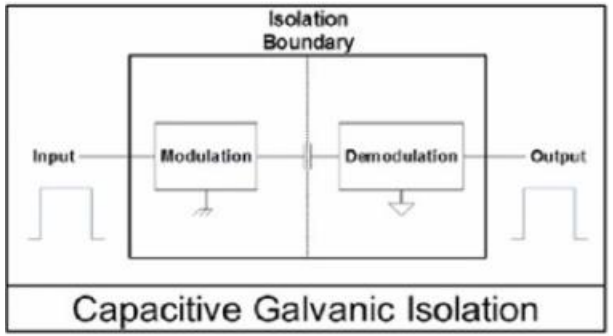
Types of Isolation



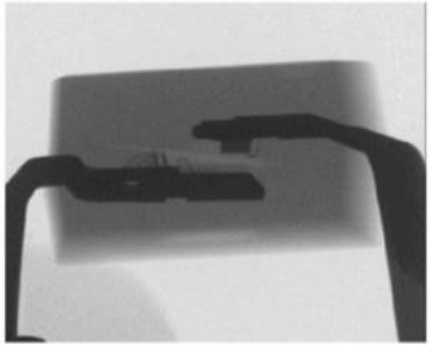
Optocoupler Galvanic Isolation

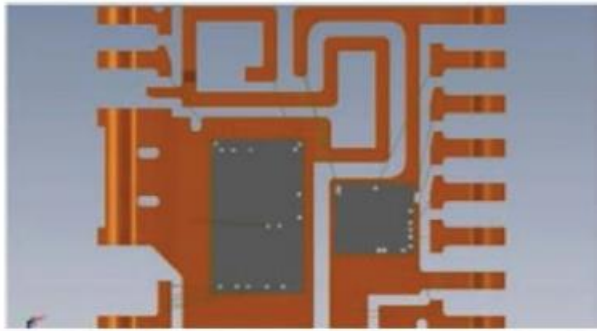


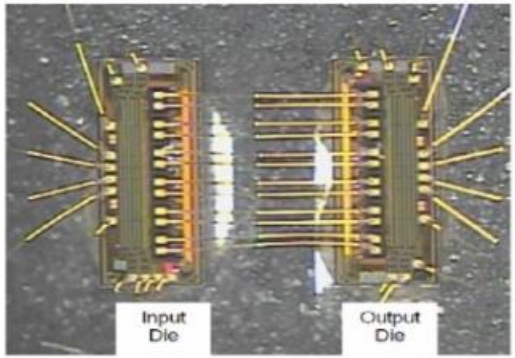
Magnetic Galvanic Isolation



Capacitive Galvanic Isolation

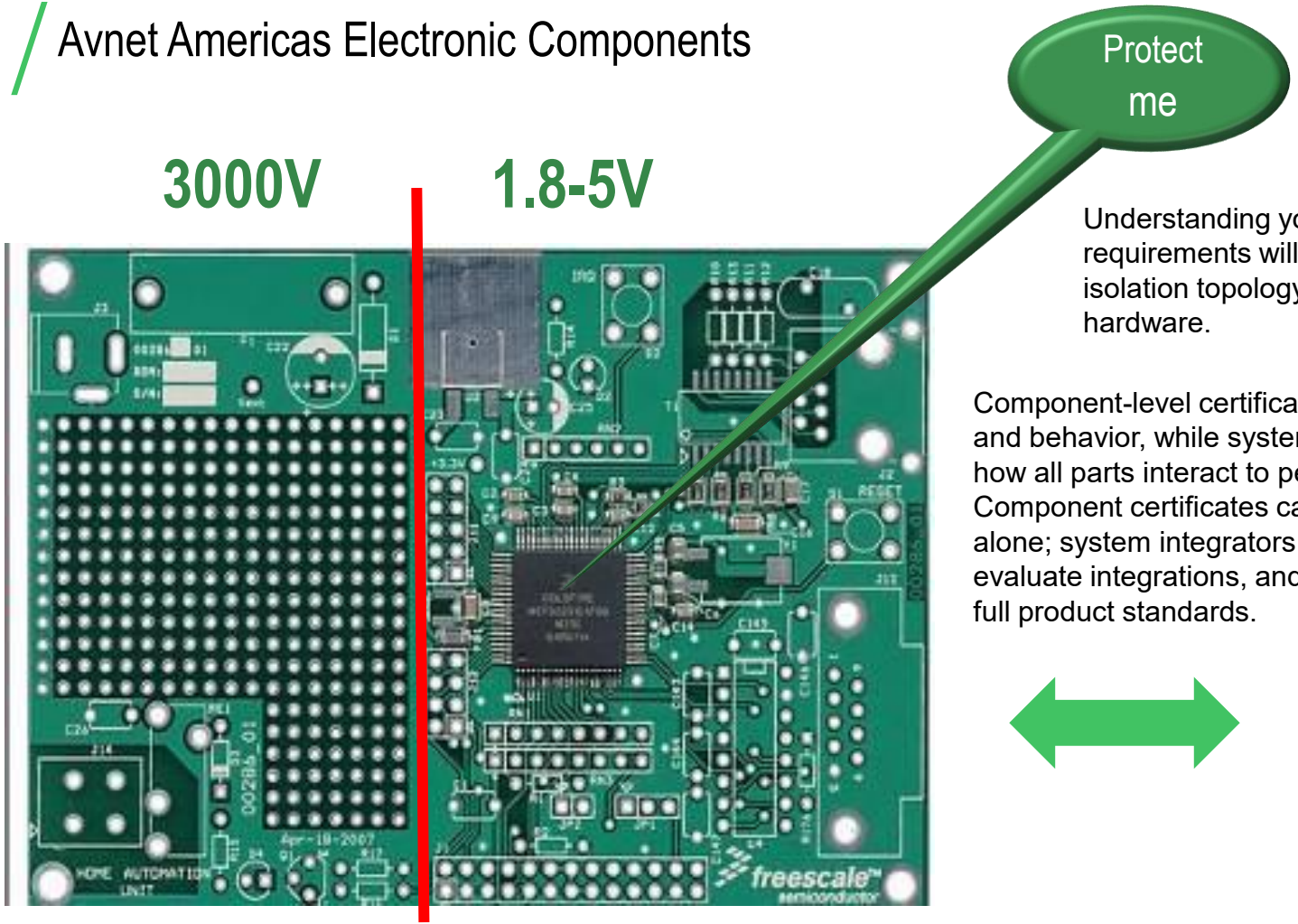






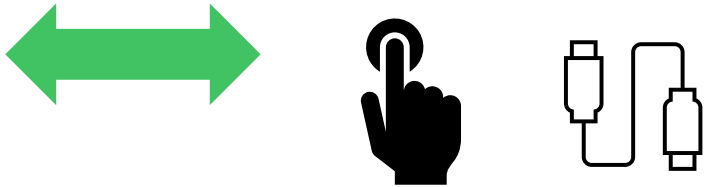
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Understanding your system's Safety requirements will help determine the best isolation topology and safety rating for your hardware.

Component-level certifications ensure a part's reliability and behavior, while system-level certifications evaluate how all parts interact to perform a safe function. Component certificates cannot guarantee system safety alone; system integrators must cascade requirements, evaluate integrations, and validate assumptions against full product standards.



Electronic Component isolation certifications ensure circuits safely separate hazardous voltages from low-voltage user interfaces, protect users from shock, and prevent equipment damage from surges.
Certifications are divided into **Component-Level** and **System-Level** (standards for final end-products).

Understanding your application and understanding the Certifications.

Component-Level Certifications

These certifications test the physical insulation barrier (such as creepage, clearance, and dielectric strength) of the semiconductor itself. **NOT** all Certifications are the same

- **UL 1577:** The standard for optical and digital isolators, ensuring the barrier can withstand a specified high-potential (hipot) test voltage for one minute (e.g., 2.5 kVrms or 5 kVrms).

- **IEC 60747-5-5:** The primary international standard for optocouplers. It requires rigorous partial discharge testing to check for micro-voids in the insulation that could cause early failure.

- **VDE 0884-11 (IEC 60747-17):** The standard for capacitive and magnetic digital isolators. It defines the maximum transient and continuous working voltages the barrier can handle over a 20+ year lifespan.

Component-Level Certifications

UL 1577: The standard for optical and digital isolators, ensuring the barrier can withstand a specified high-potential (hipot) test voltage for one minute (e.g., 2.5 kVrms or 5 kVrms).

Scope Limitations: While it is the standard isolation metric in North America, UL 1577 only measures voltage breakdown. It does **not** mandate physical package dimensions like creepage (distance over the surface) or clearance (distance through the air), which are covered under system-level standards like IEC 62368-1

UL 1577 focuses on *voltage breakdown* and lot sample survivability. It does **not** test for long-term continuous working voltage or partial discharge. For applications that require high-precision continuous lifetime isolation (like medical equipment or high-voltage automotive systems), engineers frequently pair UL 1577 with other reinforced insulation standards.

Not a Working Voltage Guarantee: A high one-minute withstand rating does **not** mean the device can handle that voltage continuously over a 10-20 year product lifetime

For low-voltage designs, it is best to use a component that is dual-certified to UL 1577 (for base-level safety) *and* a relevant IEC/VDE standard (such as IEC 60747-17 or VDE 0884). These standards provide **reinforced insulation** ratings based on actual working voltages, partial discharge limits, and long-term operating reliability.

Component-Level Certifications

IEC 60747-5-5: The primary international standard for optocouplers. It requires rigorous partial discharge testing to check for micro-voids in the insulation that could cause early failure. Specifies creepage distance.

Not for Digital Isolators: If you are using capacitive or magnetic digital isolators, IEC 60747-5-5 does **NOT** apply. These devices must follow **VDE 0884-11/IEC 60747-17**.

When evaluating **pollution testing for digital isolators**, you are primarily testing how **environmental contamination** (dust, moisture, condensation) affects the isolator's external package over its lifespan. This is governed by Pollution Degree (PD) ratings defined in standards like IEC 60664-1. IEC 60747-5-5 requires rigorous partial discharge testing (current measurement). This ensures that microscopic voids or bubbles in the insulation don't degrade and fail prematurely under continuous high stress.

Reinforced Insulation: It defines strict parameters for **maximum repetitive peak voltage (Viorm)** and **maximum transient voltage (Viotm)**, which are critical for certifying safety in harsh environments like industrial motor drives, medical devices, and solar inverters

Maximum Rated Repetitive Peak Isolation Voltage is a parameter that defines the **maximum repeating, recurring peak voltage** that an isolator can continuously withstand across its isolation barrier throughout its operational lifetime without damaging the material or degrading its insulation performance.

Maximum Transient Isolation Voltage. It is a critical safety parameter in electrical engineering that defines the highest peak transient voltage an isolation barrier can sustain for up to **60 seconds** without breaking down.

Component-Level Certifications

VDE 0884-11 (IEC 60747-17): European component-level safety standard for digital isolators. It specifically governs magnetic and capacitive coupling devices, ensuring they meet rigorous, semiconductor-based insulation requirements for basic and reinforced isolation.

There are several critical changes in the certification process and requirements from **VDE 0884-10** to **VDE 0884-17**.

Minimum rated lifetime	VDE 0884-10 Not defined	•Reinforced = 20 years x 1.875 (safety margin) •Basic = 20 years x 1.3 (safety margin)
Failure rate over lifetime	VDE 0884-10 Not defined	•Reinforced = < **1 ppm** •Basic = < **1,000 ppm**

Basic Insulation provides a single layer of protection sufficient to prevent electric shock, but it requires a secondary, external safety measure (like protective grounding) to ensure user safety if the primary barrier fails. Low-voltage designs where the system relies on an Earth ground connection for safety, or between circuits where a failure won't result in hazardous voltages reaching the user.

Reinforced Insulation is a single, robust insulation system that provides a degree of protection equivalent to **double insulation**. If one layer of the barrier degrades, a second layer remains to eliminating the need for additional protective grounding. For user-accessible parts of a system (such as the interface of a medical device, a user control panel, or EV chargers) where you cannot rely on Earth ground, and human safety is paramount.

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Datasheet examples

https://www.broadcom.com/products/optocouplers/industrial-plastic/digital-optocouplers/1mbd/acnt-h511c-000e

ACNT-H511/H511C

Open-Collector Output Optocoupler in a 15-mm Stretched SO-8 Package

Regulatory Information

The ACNT-H511/H511C is approved by the following organizations:

UL	Approval under UL 1577, component recognition program up to V_{ISO} = 7500 V_{RMS} File E55361.
CSA	Approval under CSA Component Acceptance Notice #5, File CA 88324.
IEC 60747-5-5	Maximum repetitive peak isolation voltage V_{IORM} = 2262 V_{PEAK}.

Insulation and Safety Related Specifications

Parameter	Symbol	ACNT-H511	ACNT-H511C	Unit	Conditions
Minimum External Air Gap (External Clearance)	L(101)	14.2		mm	Measured from input terminals to output terminals, shortest distance through the air.
Minimum External Tracking (External Creepage)	L(102)	15		mm	Measured from input terminals to output terminals, shortest distance path along the body.
Minimum Internal Plastic Gap (Internal Clearance)	—	0.5		mm	Through insulation distance conductor to conductor, usually the straight-line distance thickness between the emitter and the detector.

https://www.onsemi.com/download/data-sheet/pdf/ncid9211-d.pdf

NCID9211

Description

The NCID9211 is a galvanically isolated full duplex, bi−directional, high−speed dual−channel digital isolator with output enable. This device supports isolated communications thereby allowing digital signals to communicate between systems without conducting ground loops or hazardous voltages.

It utilizes **onsemi's** patented galvanic off−chip capacitor isolation technology and optimized IC design to achieve high insulation and high noise immunity, characterized by high common mode rejection and power supply rejection specifications. The thick ceramic substrate yields capacitors with ~25 times the thickness of thin film on−chip capacitors and coreless transformers. The result is a combination of the electrical performance benefits that digital isolators offer with the safety reliability of a >0.5 mm insulator barrier similar to what has historically been offered by optocouplers.

The device is housed in a 16−pin wide body small outline package.

Features

- Off−Chip Capacitive Isolation to Achieve Reliable High Voltage Insulation
- DTI (Distance Through Insulation): > 0.5 mm

SAFETY AND INSULATION RATINGS

As per DIN EN/IEC 60747−17, this digital isolator is suitable for "safe electrical insulation" only within the safety limit data. Compliance with the safety ratings must be ensured by means of protective circuits.

Symbol	Parameter		Min	Typ	Max	Unit
	Installation Classifications per DIN VDE 0110/1.89 Table 1 Rated Mains Voltage	< 150 V_{RMS}		I−IV		
		< 300 V_{RMS}		I−IV		
		< 450 V_{RMS}		I−IV		
		< 600 V_{RMS}		I−IV		
		< 1000 V_{RMS}		I−III		
	Climatic Classification			40/125/21		
	Pollution Degree (DIN VDE 0110/1.89)			2		
CTI	Comparative Tracking Index (DIN IEC 112/VDE 0303 Part 1)		600			
V_{PR}	Input−to−Output Test Voltage, Method b, V_{IORM} x 1.875 = V_{PR}, 100% Production Test with t_m = 1 s, Partial Discharge < 5 pC		3750			V_{peak}
	Input−to−Output Test Voltage, Method a, V_{IORM} x 1.6 = V_{PR}, Type and Sample Test with t_m = 10 s, Partial Discharge < 5 pC		3200			V_{peak}
V_{IORM}	Maximum Working Insulation Voltage		2000			V_{peak}
V_{IOTM}	Highest Allowable Over Voltage		8000			V_{peak}
	External Creepage		8.0			mm
	External Clearance		8.0			mm

Examples of System level Safety Certifications - Reference

Automotive and Autonomous Vehicles
ISO 26262: The global standard for functional safety in road vehicles, focusing on electrical and electronic systems across the entire development lifecycle.
UL 4600: Standard for evaluating autonomous products, focusing on the system's ability to operate safely without human intervention.

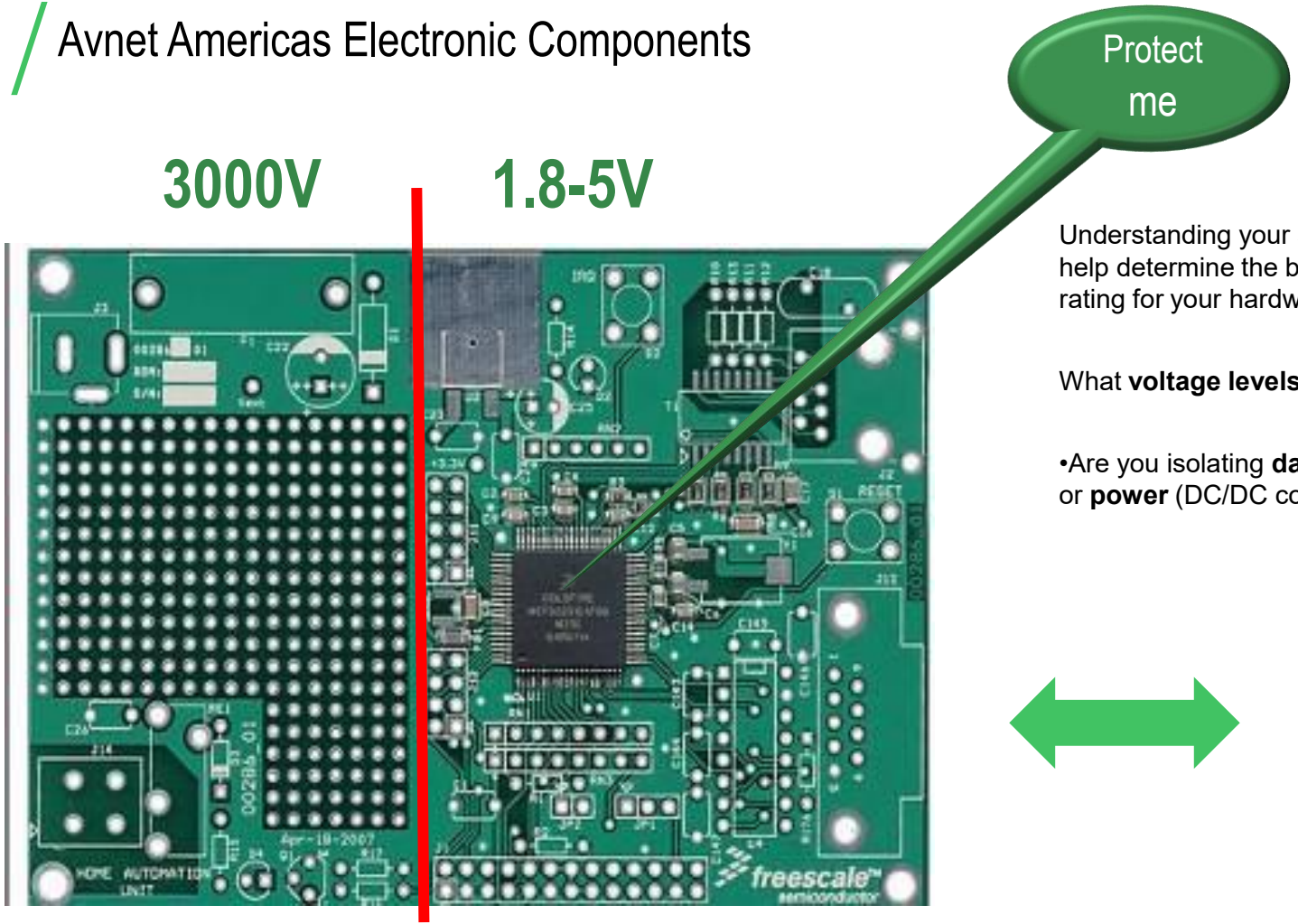
Industrial and Machinery
IEC 61508: The foundational international standard for generic functional safety of electrical, electronic, and programmable electronic systems.
IEC 61511: The standard applied to Safety Instrumented Systems (SIS) within the process and chemical industries.
ISO 13849 & IEC 62061: Standards addressing the safety-related parts of control systems in manufacturing and industrial machinery

Aerospace and Defense
DO-178C & DO-254: The primary system and software certification standards for safety-critical aviation hardware and avionics.
MIL-STD-882E: The standard practice framework utilized by the Department of Defense to identify hazards and manage system-level safety risks

Medical Devices
IEC 60601: Specifies the general requirements for basic safety and essential performance of medical electrical equipment.
IEC 62304: Defines the lifecycle requirements for medical device software used in critical systems.

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Understanding your system's exact requirements will help determine the best isolation topology and safety rating for your hardware.

What **voltage levels** are you dealing with?

•Are you isolating **data signals** (like SPI/UART/CAN) or **power** (DC/DC conversion/MOSFETs)?

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Digital

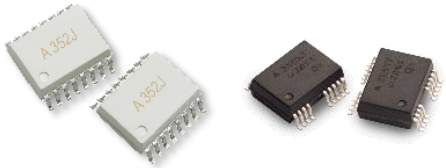
- Uni or Bi-directional configuration
- Wide variety of packages (compact small-outline to 11/15mm creepage)



- USB
- RS232
- RS485
- SPI
- I2C
- CAN bus
- DeviceNET

Gate Driver

- >10A high current
- >150kV/µs high noise immunity
- Highly integrated
  - Short circuit protection
  - Active Miller clamp
  - Slew-rate control
  - DC-DC controller



- IGBT
- MOSFET
- SCRs
- Power inversion DC/AC
- Solar cells
- Battery Banks

Current/Voltage Sense Analog

- ±50mV or ±200mV optical isolated sigma-delta modulator
- Excellent temperature drift performance
- Immunity to external magnetic fields



- Closed Loop
- Power Supply
- Voltage Sensing
- Current Sensing
- Instrumentation

Digital

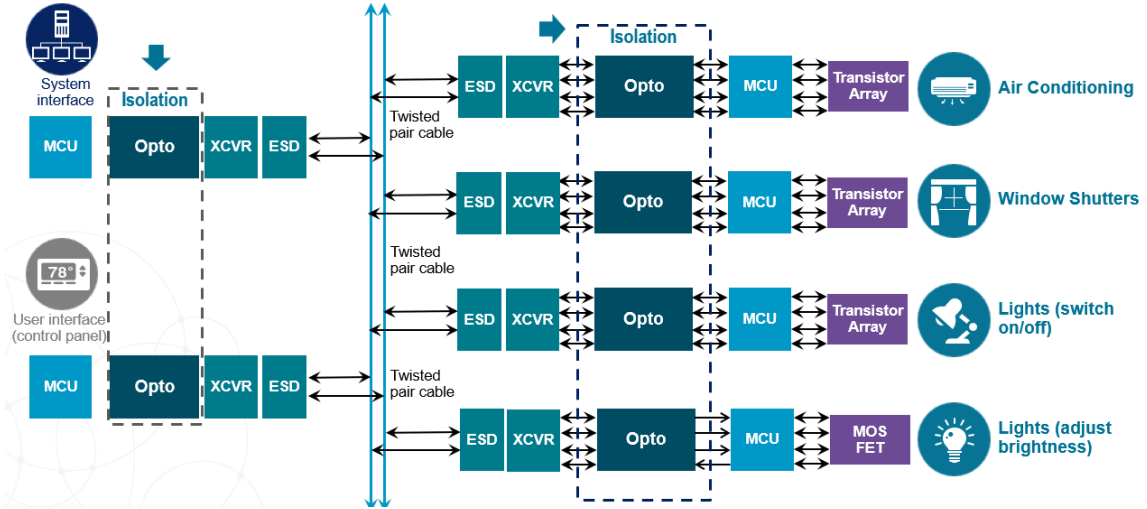
- Uni or Bi-directional configuration
- Wide variety of packages (compact small-outline to 11/15mm creepage)



- USB
- RS232
- RS485
- SPI
- I2C
- CAN bus
- DeviceNET

Digital isolation for a communication bus breaks ground loops and protects microcontrollers from electrical surges or voltage spikes.

Application: Smart Home and Building Automation



Digital

- Uni or Bi-directional configuration
- Wide variety of packages (compact small-outline to 11/15mm creepage)



- USB
- RS232
- RS485
- SPI
- I2C
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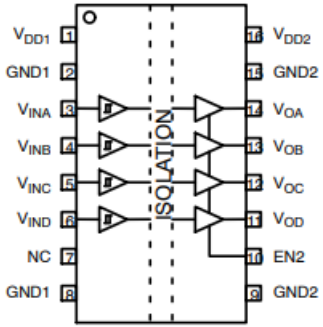
Pick the correct isolation.

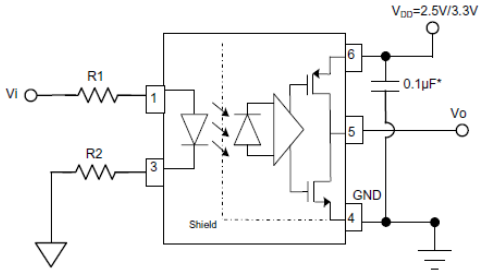
Bidirectional or unidirectional

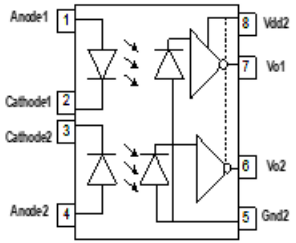
Single or Mulit Channel

Baud Rate

Voltage rails







Avnet Americas Electronic Components

Digital

- Uni or Bi-directional data configuration
- Wide variety of packages (compact small-outline to 11/15mm creepage)





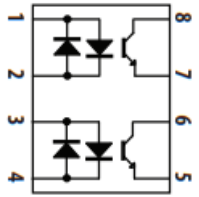
- USB
- RS232
- RS485
- SPI
- I2C
- CAN bus
- DeviceNET

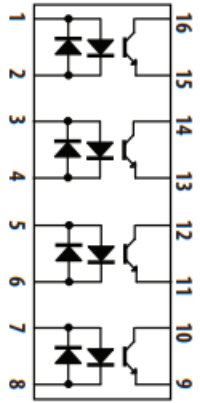
Digital

- AC/Bidirectional input
- Wide variety of packages (compact small-outline to 11/15mm creepage)



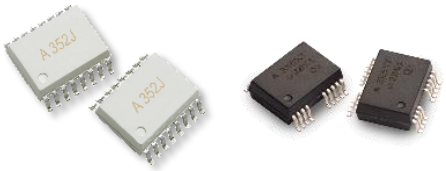






Gate Driver

- high current
- high noise immunity
- Integrated Features
  - Short circuit protection
  - Active Miller clamp
  - Slew-rate control
  - DC-DC controller



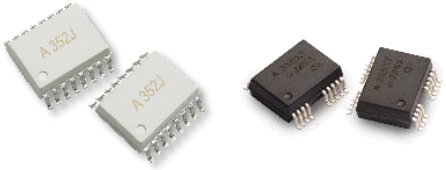
- IGBT
- MOSFET
- SCRs
- Power inversion DC/AC
- Solar cells
- Battery Banks

Isolation for driving High Power MOSFETs and IGBTs



Gate Driver

- >10A high current
- >150kV/µs high noise immunity
- Highly integrated
  - Short circuit protection
  - Active Miller clamp
  - Slew-rate control
  - DC-DC controller



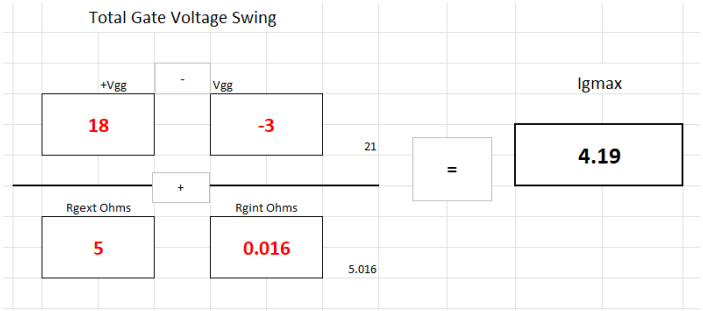
- IGBT
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- SCRs
- Power inversion DC/AC
- Solar cells
- Battery Banks

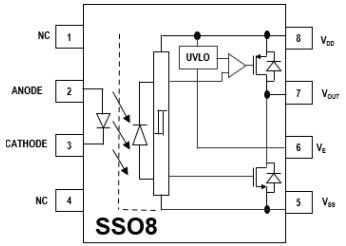
Pick the correct isolation Driver.

SiC, GaN or Si

Calculate the needed Igmax

Correct safety certification - Correct creepage





Avnet Americas Electronic Components

Gate Driver

- >10A high current
- >150kV/µs high noise immunity
- Highly integrated
  - Short circuit protection
  - Active Miller clamp
  - Slew-rate control
  - DC-DC controller

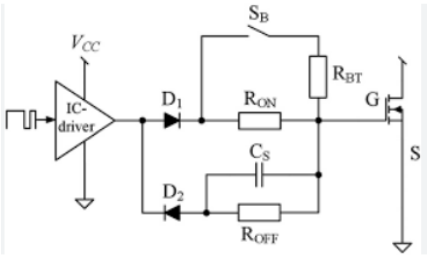
	Part number	Supplier	Family	Part link	Drain Source Voltage	RDSon mΩ	Continuous Current	Gate Drive voltage	Gate Drive voltage	Kelvin Pin	Package	Broadcom Basic Driver	Broadcom Smart Driver
30	IMDQ75R007M2H	Infineon	CoolSiC™ G2		750 V	7 mΩ	222 A	18	0	Y	PG-HDSOP-22	Driver	Smart Driver
31	AIMZA75R008M1H	Infineon	CoolSiC™ G1		750 V	7.8 mΩ	163 A	20	0	Y	PG-TO247-4	Driver	Smart Driver
32	AIMZA75R090M1H	Infineon	CoolSiC™ G1		750 V	90 mΩ	23 A	20	0	Y	PG-TO247-4	Driver	Smart Driver
33	AIMDQ75R090M1H	Infineon	CoolSiC™ G1		750 V	90 mΩ		20	0	Y	PG-HDSOP-22	Driver	Smart Driver
34	AIMBG75R090M1H	Infineon	CoolSiC™ G1		750 V	90 mΩ	24	20	0	Y	PG-TO263-7	Driver	Smart Driver
35	IMT65R075M2H	Infineon	CoolSiC™ G2		650V	75 mΩ		18	0	Y	PG-HSOF-8	Driver	Smart Driver
36	IMZA65R010M2H	Infineon	CoolSiC™ G2		650 V	10	103 A	18	0	Y	PG-TO247-4	Driver	Smart Driver
37	IMDQ65R010M2H	Infineon	CoolSiC™ G2		650 V	10	154	18	0	Y	PG-HDSOP-22	Driver	Smart Driver
38	IMBG65R010M2H	Infineon	CoolSiC™ G2		650 V			18	0	Y	PG-TO263-7	Driver	Smart Driver
39	IMT65R010M2H	Infineon	CoolSiC™ G2		650 V		168 A	18	0	Y	PG-HSOF-8	Driver	Smart Driver
40	IMW65R010M2H	Infineon	CoolSiC™ G2		650 V	10	46 A	18	0	N	PG-TO247-3	Driver	Smart Driver
41	IMZA65R015M2H	Infineon	CoolSiC™ G2		650 V	15	103 A	18	0	Y	PG-TO247-4	Driver	Smart Driver
42	IMBG65R015M2H	Infineon	CoolSiC™ G2		650 V	15	115 A	18	0	Y	PG-TO263-7	Driver	Smart Driver
43	IMT65R015M2H	Infineon	CoolSiC™ G2		650 V	15	131 A	18	0	Y	PG-HSOF-8	Driver	Smart Driver
44	IMLT65R015M2H	Infineon	CoolSiC™ G2		650 V	15	142 A	18	0	Y	PG-HDSOP-16	Driver	Smart Driver
45	IMW65R015M2H	Infineon	CoolSiC™ G2		650 V	15	93 A	18	0	N	PG-TO247-3	Driver	Smart Driver
46	IMDQ65R015M2H	Infineon	CoolSiC™ G2		650 V	15	94 A	18	0		PG-HDSOP-22	Driver	Smart Driver
47	IMT65R020M2H	Infineon	CoolSiC™ G2		650 V	20	105 A	18	0	Y	PG-HSOF-8	Driver	Smart Driver
48	IMLT65R020M2H	Infineon	CoolSiC™ G2		650 V	20	107 A	18	0	Y	PG-HDSOP-16	Driver	Smart Driver
49	IMTA65R020M2H	Infineon	CoolSiC™ G2		650 V	20	77 A	18	0	Y	PG-LHSOF-4	Driver	Smart Driver
50	IMW65R020M2H	Infineon	CoolSiC™ G2		650 V	20	83 A	18	0	N	PG-TO247-3	Driver	Smart Driver
51	IMZA65R020M2H	Infineon	CoolSiC™ G2		650 V	20	83 A	18	0	Y	PG-TO247-4	Driver	Smart Driver
52	IMBG65R020M2H	Infineon	CoolSiC™ G2		650 V	20	91 A	18	0		PG-TO263-7	Driver	Smart Driver
53	IMDQ65R020M2H	Infineon	CoolSiC™ G2		650 V	20	97 A	18	0		PG-HDSOP-22	Driver	Smart Driver
54	IMW65R026M2H	Infineon	CoolSiC™ G2		650 V	26	46 A	18	0	N	PG-TO247-3	Driver	Smart Driver
55	IMZA65R026M2H	Infineon	CoolSiC™ G2		650 V	26	64 A	18	0	Y	PG-TO247-4	Driver	Smart Driver

Demo

Avnet has a reference for SiC MOSFET and Broadcom Drivers. Shows Gate Voltage levels and common packages for multi sourcing.

Included in the spread sheet is information on

1. **Short Circuit protection**
2. **Slew Rate Control (motor designs)**
3. **Miller Clamp**
4. **IGBT, SiC, GaN MOSFET Isolated Drivers**



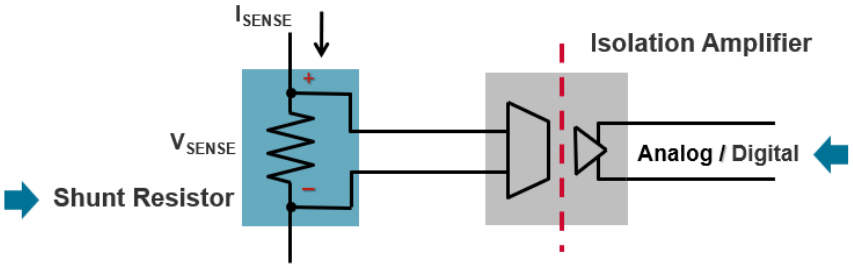
Current/Voltage Sense Analog

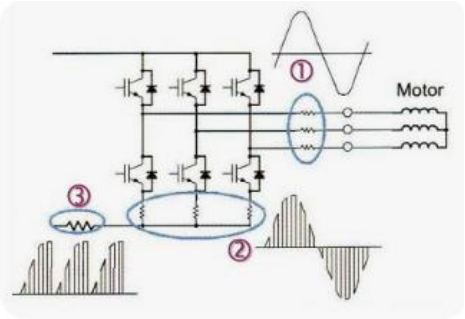
•±50mV or ±200mV optical isolated sigma-delta modulator
• Excellent temperature drift performance
• Immunity to external magnetic fields



- Closed Loop
- Power Supply
- Voltage Sensing
- Current Sensing
- Instrumentation

Current and Voltage Sense Isolators are used for **isolating current 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.





Current/Voltage Sense Analog

•±50mV or ±200mV optical isolated sigma-delta modulator
• Excellent temperature drift performance
• Immunity to external magnetic fields



- Closed Loop
- Power Supply
- Voltage Sensing
- Current Sensing
- Instrumentation

Hall Effects for isolated Current Sensor

Example of making sure you pick the part with the right Certification for your design

https://docs.broadcom.com/doc/ACPL-K378-Data-Sheet

Regulatory Information

The ACPL-K378 is approved by the following organizations.

IEC/EN/DIN EN 60747-5-5 (with Option 060)	Approval with maximum working insulation voltage V_{IORM} = 1140 V_{peak}.
UL	Approval under the UL 1577 component recognition program up to V_{ISO} = 5000 V_{rms}/1 minute. File 55361.
CSA	Approval under CSA Component Acceptance Notice #5, File CA 88324.

Insulation and Safety Specifications

Parameter	Sy
Minimum External Air Gap (External Clearance)	L
Minimum External Tracking (External Creepage)	L
Minimum Internal Plastic Gap (Internal Clearance)	
Tracking Resistance (Comparative Tracking Index)	
Isolation Group	

ISOLATION CHARACTERISTICS

Characteristic	Symbol	Notes	Rating	Unit
Withstand Voltage [1]	V_{ISO}	Agency rated for 60 seconds per UL 62368-1 (edition 3)	2400	V_{RMS}
Working Voltage for Basic Isolation	V_{WVBI}	Maximum approved working voltage for basic (single) isolation according to UL 62368-1 (edition 3)	420	V_{PK} or V_{DC}
			297	V_{RMS}
Impulse Withstand Voltage	$V_{IMPULSE}$	Tested ±5 pulses at 2/minute in compliance to IEC 61000-4-5, 1.2 µs (rise)/ 50 µs (width)	4000	V_{PK}
Clearance	D_{CL}	Minimum distance through air from IP leads to signal leads.	4	mm
Creepage	D_{CR}	Minimum distance along package body from IP leads to signal leads	4	mm
Distance Through Insulation	DTI	Minimum internal distance through insulation	63	µm
Comparative Tracking Index	CTI	Material Group II	400 to 599	V

[1] 100% Production-tested for 1 second in accordance with UL 62368-1 (edition 3).

Avnet Americas Electronic Components

Digital

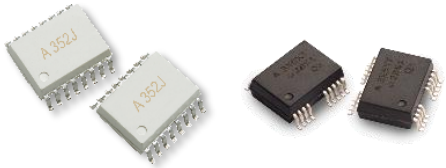
- Uni or Bi-directional configuration
- Wide variety of packages (compact small-outline to 11/15mm creepage)



- USB
- RS232
- RS485
- SPI
- I2C
- CAN bus
- DeviceNET

Gate Driver

- >10A high current
- >150kV/µs high noise immunity
- Highly integrated
  - Short circuit protection
  - Active Miller clamp
  - Slew-rate control
  - DC-DC controller



- IGBT
- MOSFET
- SCRs
- Power inversion DC/AC
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- Battery Banks

Current/Voltage Sense Analog

- ±50mV or ±200mV optical isolated sigma-delta modulator
- Excellent temperature drift performance
- Immunity to external magnetic fields



- Closed Loop
- Power Supply
- Voltage Sensing
- Current Sensing
- Instrumentation

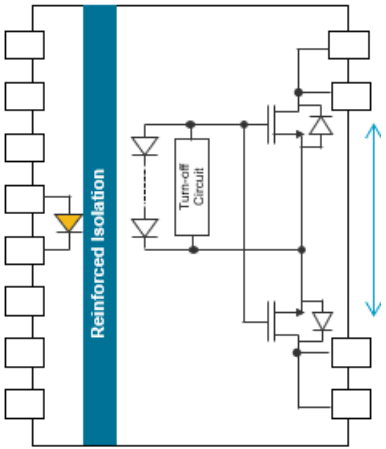
Avnet Americas Electronic Components

Other Isolation Products



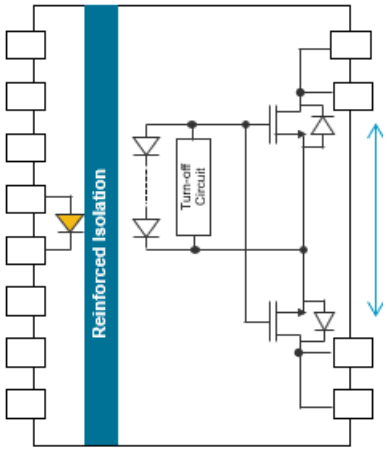
Solid State Relays

- Inrush Current Prevention
- Faster MOSFET turn-on
- Small form factor

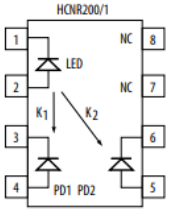


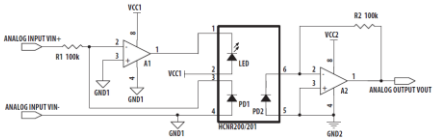
High Linearity Analog Isolation

- Inrush Current Prevention
- Faster MOSFET turn-on
- Small form factor



High Linearity Analog Isolation (often using **linear optocouplers** or **isolated modulators**) safely passes analog signals across an electrical barrier without compromising signal accuracy. It relies on advanced feedback loops or high-frequency digital modulation to bypass the natural distortions of optical and magnetic materials, achieving accuracy errors typically below 0.05%



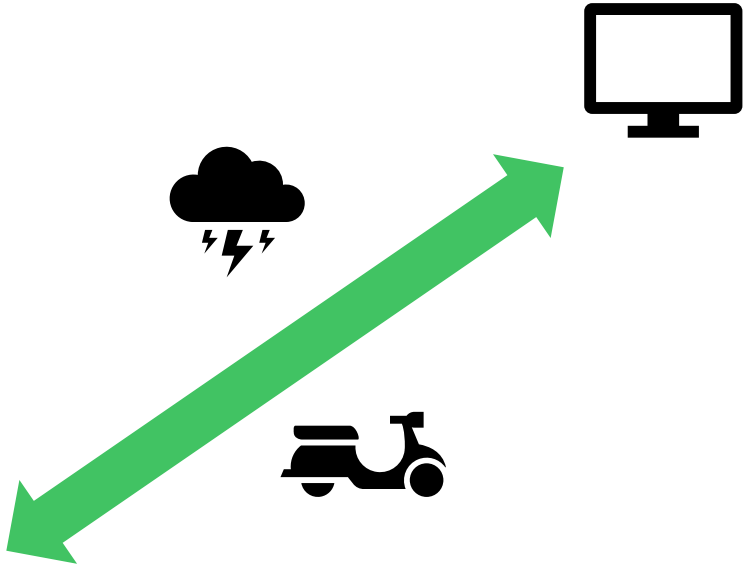


Use two photodetectors to **compensate for the inherent non-linearity and degradation of the LED**. Because LEDs are highly non-linear and dim over time, the two-detector design isolates and fixes these errors

AVNET

Dataline passing through noisy environments

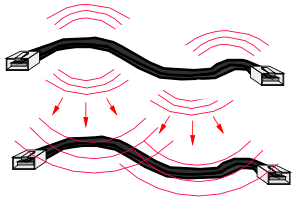




Avnet Americas Electronic Components

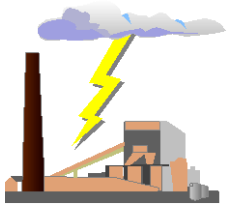
Why are Fiber Optics used?

Performance
- Long Distance
- High Data Rates



No RF Emissions or Susceptibility
- Data Security
- Uncorrupted Data/Lower BER
- No Cross talk

High Voltage Isolation
- No risk during an electrical storm
- No ground loop problems



Lightweight
- High flexibility
- Ease of Maintenance, Installation

- Low Cost – Fiber links have dramatically come down in cost ($/Gb) and now compare favorably to copper cabling solutions for high bandwidth links
- Future Capacity – Fiber is used in order to future-proof the cabling plant (fiber has much more bandwidth capacity then available copper cabling)

Avnet Americas Electronic Components

Versatile Link (also known as V-pin) is a proprietary, low-cost **fiber optic connector and component family** originally developed by Hewlett-Packard (HP). Used primarily in Industrial Control, High Voltage Isolation, Medical Equipment and Automotive Networks.

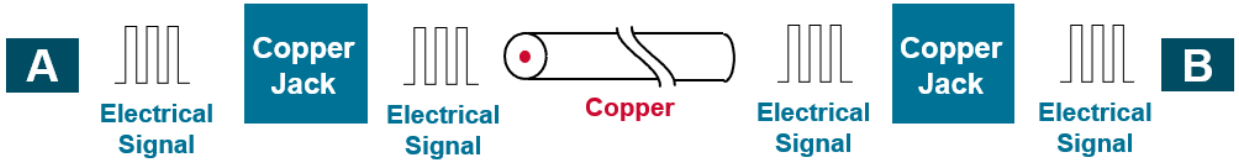
Key Components & Designs

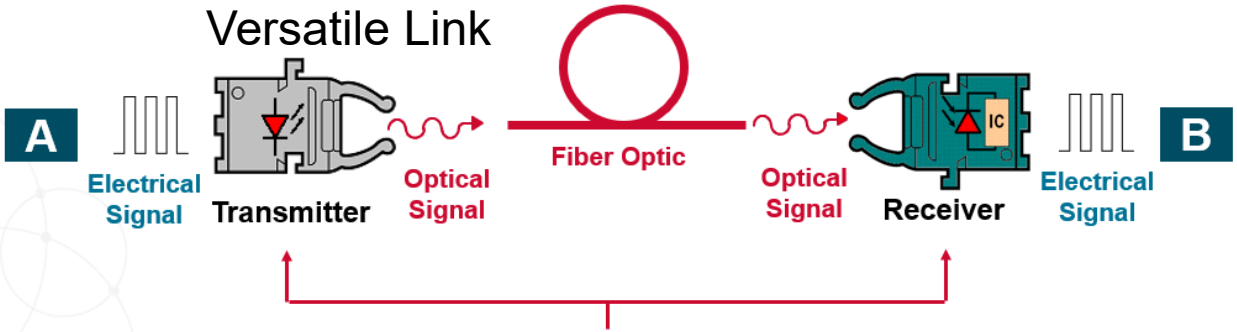
•**Connectors**: They use a simple snap-together concept that completely eliminates the need for complex crimping or specialized termination tools. They are broadly categorized into:

- **Simplex vs. Duplex**: Single-fiber links or side-by-side dual-fiber setups.
- **Latching vs. Friction**: Latching options provide maximum physical retention for high-vibration environments, while friction-style relies on a standard snug fit.
- **Housing**: Commonly manufactured from flame-retardant VALOX material and color-coded to differentiate components easily.

•**Transmitters & Receivers**: The component line includes 650nm LED transmitters and integrated photodiode receivers capable of handling data transmission speeds from **DC up to 50 MBd over distances up to 50 meters**

Avnet Americas Electronic Components







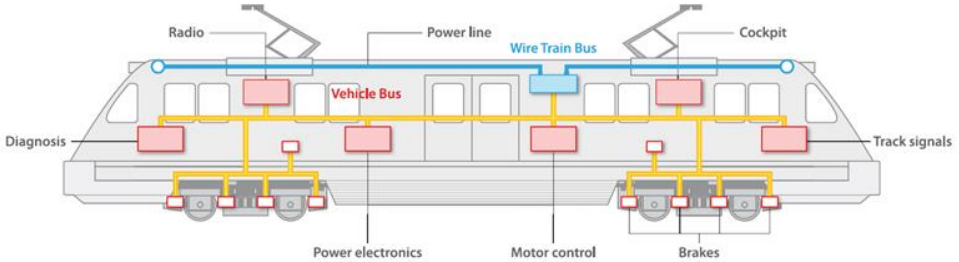


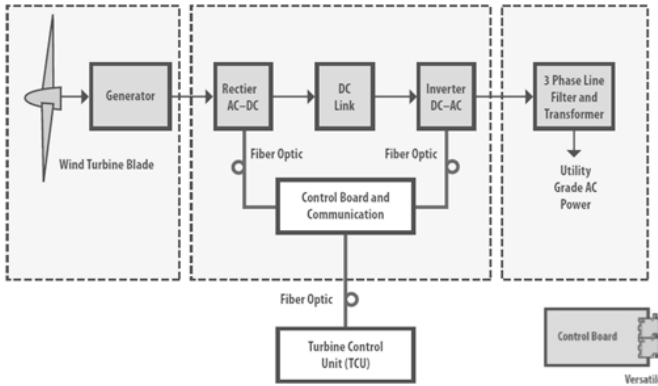
Avnet Americas Electronic Components

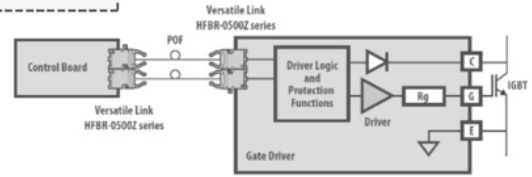
Should work with your local FAE for the right solution. Temperature, Datarates, Duplex, connectors and fiber.

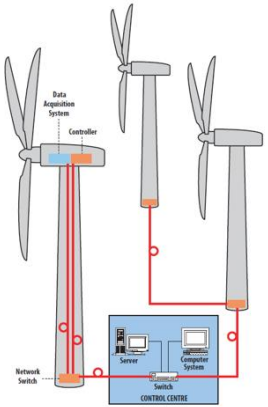
Industrial Fiber

- High Galvanic Isolation
- High Noise Immunity
- Robust - Long Distance Transmission
- Immunity to EMI





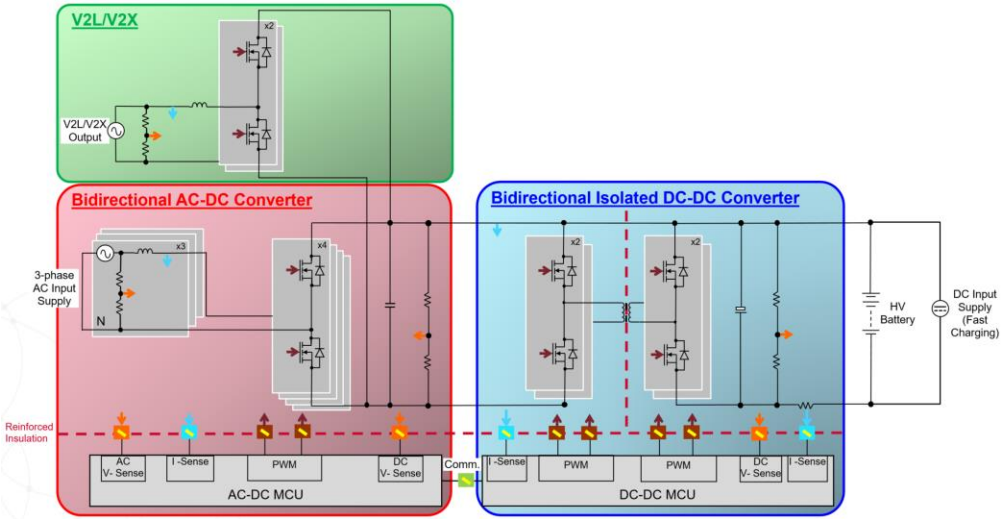




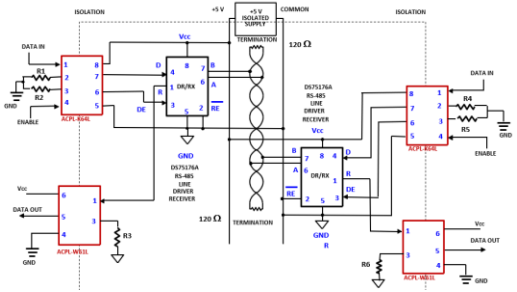
Example Applications

On-board Charger (OBC) and DC-DC Converter

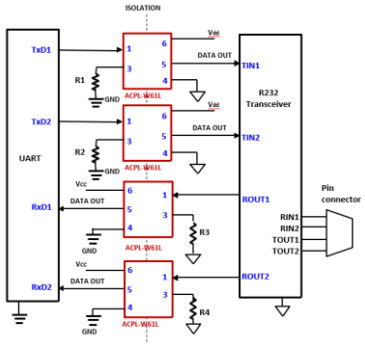
Isolation Channel	Product	Part Number
	Voltage sensor	ACPL-C87BT/AT, ACPL-E86BT, ACPL-E85BT/E83BT/E81BT
	Current sensor	ACPL-C79xT, ACHL-7345xT, ACHL-7348xT, ACPL-E78BT,
	Gate driver	ACFJ-337BT/307CT, ACFJ-332BT/302CT, ACPL-3262T/ACFL-3161T, ACPL-K34T/K33T
	Signal isolator	ACFL-51xxT, ACPL-K4xCT, ACPL-M4xT



RS485

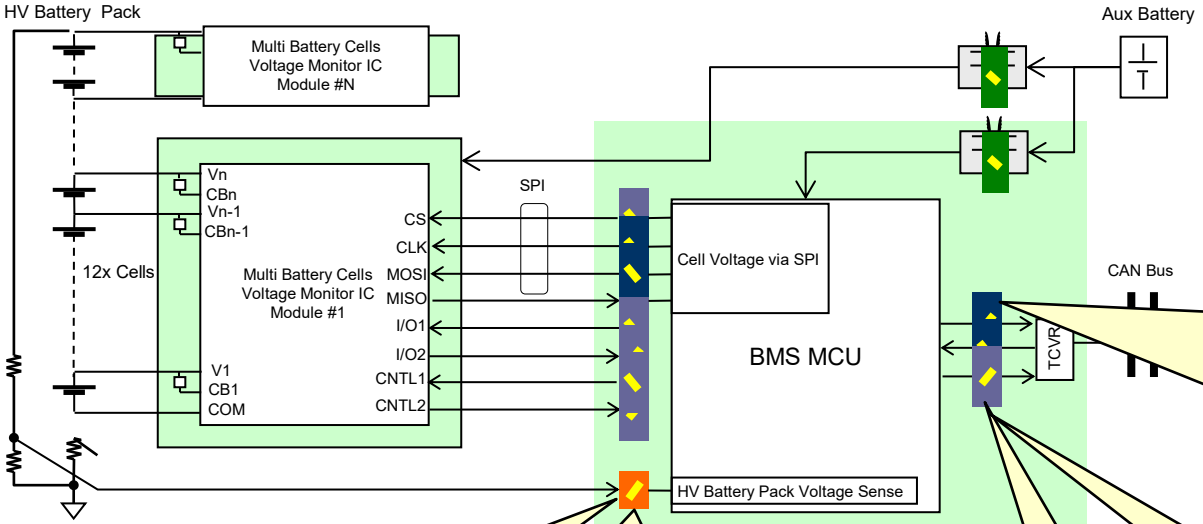


RS232



BMS: Voltage Monitoring and Communication Interface

Example Applications



CTI=175V	Upgrade Parts with High CTI = 600V
ACPL-K43T	ACPL-K43CT
ACPL-K49T	ACPL-K49CT
ACPL-K44T	ACPL-K44CT

Digital Optocoupler
ACPL-M43T / ACPL-K43T
ACPL-M49T / ACPL-K49T
- Simple loop compensation and better dynamic load response with 1MHz bandwidth
- Cost effective and compatible to existing 4-pin phototransistor power supply design with 10kHz bandwidth*

DC Voltage Sensor with Differential Output
ACPL-C87AT / ACPL-C87BT / ACPL-E86BT
- ±0.5% & ± 1% gain tolerance
- 0 to 2V nominal input voltage
- High input impedance 1GΩ
- 100kHz Bandwidth
- Shutdown features for power saving

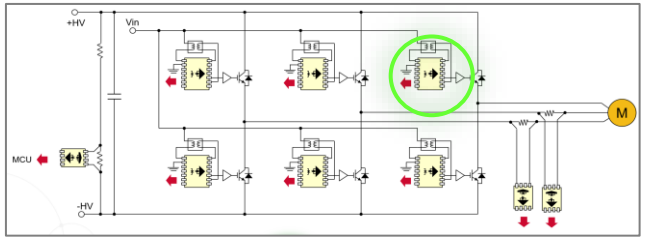
DC Voltage Sensor with Single-ended Output
ACPL-E83BT (3.3V) / ACPL-E85BT/E81BT (5V)
- 0V to 2V differential input voltage range
- High input impedance
- Single-ended output 1GΩ
- **High gain**
- ±0.5% gain tolerance
- 200kHz bandwidth
- **9mm creepage**
- **CTI > 600V**
- **UV fault detection and reporting**

High Speed, Low Power Digital Optocoupler
ACPL-M71T/K71T/K74T/6211T
ACPL-M72T/K72T/K75T/6212T
ACPL-M61T

Digital Optocoupler
ACPL-M43T/K43T/K44T/ACFL-5211T
ACPL-M49T/ACPL-K49T/ACFL-5212T

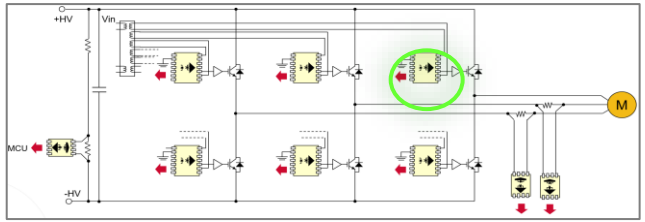
Traction Inverter – Gate Drive Application

Option 1, All-in-one Smart Gate Driver



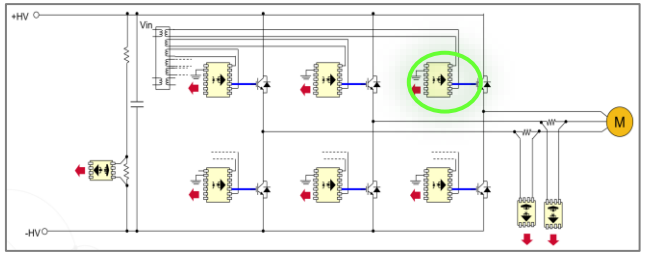
Driver Part Number	Key Features
1. **ACFJ-3530T** **ACFJ-3531T** 2. **ACPL-32JT** 3. **ACPL-33JT** 4. **ACFJ-3548T***	• **Integrated DC-DC flyback controller** • High output drive current and Miller clamp • IGBT desaturation detection with soft shutdown protection with fault feedback • Supply UVLO protection with fault feedback • Separate LED drive from fault reporting IC to facilitate functional safety architecture

.2. Smart Gate Driver



Driver Part Number	Key Features
1. **ACPL-344JT** 2. **ACPL-31JT** 3. **ACPL-38JT***	• High output drive current and Miller clamp • IGBT desaturation detection with soft shutdown protection and fault feedback • Supply UVLO protection and feedback • Separate LED drive from fault reporting IC to facilitate functional safety architecture

3. Smart Gate Driver with High Output Peak Current



Automotive Gate Driver Part Number	Key Features
1. **ACFJ-3439T** 2. **ACFJ-3437T** 3. **ACFJ-3436T**	• **High output peak current** enabling direct drive, cost & space saving. (17A peak for ACFJ-3439T/ 12A peak for ACFJ-3437T/3436T) • 2A peak Miller clamp current • Desaturation protection with soft shutdown • Functional safety reporting: • Separate LED drive from fault reporting IC to facilitate functional safety architecture • **CTI > 600V** (ACFJ-3437T/3436T)

Questions

Contact

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