IP&E News

3rd Quarter 2023

IP&E by Arrow
High voltage and small sizes

Components – EMEA

Content

One charger for all mobile applications:

USB-C (2nd Part)

Choosing the right connector, implement the interface and protect it.

Circuit Protection for the reliability and safety of USB-C interfaces

In this issue of IP&E News, we look at the protection of USB-C connectors.

Authors: Mathias Nitzsche and Jörn Herrmann, Technology Application Engineers, Arrow

Circuit Protection plays a critical role in ensuring the reliability and safety of USB-C interfaces by meeting the requirements of this versatile interface. USB-C, also known as USB Type-C, has become a standard port in many modern devices such as laptops, smartphones, and tablets. With its benefits such as fast charging, high data transfer rates, and the ability to connect various peripherals, the USB-C interface is a powerful option.

The USB-C interface requires careful circuit protection because of its ability to transmit higher power than previous USB standards. There is an increased risk of electrical interference and damage to connected devices if circuit protection does not meet specific requirements.

To meet the requirements of the USB-C interface, circuit protection elements must be optimized for data rate, current and voltage. One example of this is **overcurrent protection**. With the support of higher currents in USB-C devices, protection devices must ensure that current flow remains within specified limits. Special protection circuits monitor the current flow and interrupt it when a certain threshold is exceeded to prevent damage to the devices.

Another key aspect of circuit protection is **overvoltage protection**. Since USB-C interfaces can transmit higher voltages, there is an increased risk of voltage spikes. Here, protection devices such as varistors or TVS diodes are used to limit the voltage to safe levels and protect the connected devices from overvoltage damage.

In addition, **protection against short circuits** is another critical aspect of circuit protection. Short circuits can result in high currents that could damage equipment. Therefore, fuses or electronic protection circuits are used to interrupt the current flow and protect the devices in the event of a short circuit.

Meeting the USB-C interface's data rate, current, and voltage requirements with appropriate circuit protection is critical. Using customized overcurrent protection, overvoltage protection and short circuit protection can minimize potential damage. Manufacturers of USB-C devices place great emphasis on integrating these specific protections to ensure compliance while improving the user experience and extending device life.

Find more on overcurrent protection in Q1 2022 issue: www.arrow.com/-/media/arrow/images/emea-campaigns/pemcoprogram/2022/arr_ broschuere_ipe-news-q1_2111_interaktiv-v2.pdf

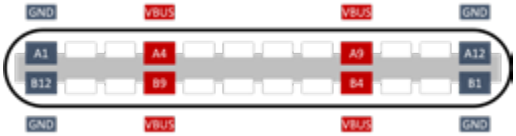
on overvoltage in Q2 2022 issue: www.arrow.com/-/media/arrow/images/emea-campaigns/ipe_program/ipe-news-2022-q2.pdf

on overtemperature protection in Q3 2022 issue: www.arrow.com/-/media/arrow/images/emea-campaigns/ipe_program/arr_broschuere_ipe-news_q3_2208_interaktiv-pdf.pdf

USB-C only describes the connector system. This is a 24-pin rotationally symmetrical plug or socket. Electrically, many USB standards can hide behind it. This circumstance must be considered when selecting circuit protection. In addition, interfaces to the outside world of the device are gateways for ESD pulses. Significant levels are applied to the interfaces during a normative test. According to IEC61000-4-2 at level 4 this is +-8kV!

Charging Only

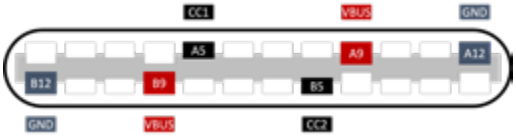
The simplest form, which is not included in the standard, is a pure charging connection without communication lines.



The circuit protection can be accomplished here in almost any way. Since there are no communication lines, parasitic effects of the protection elements do not play a role. TVS diodes or varistors are ideal for eliminating overvoltage. A classic fuse or a PTC fuse reliably protects against overcurrent.

Charging and Configuration

The version that complies with the USB standard provides a configuration channel in addition to the power supply.
Here it is recommended to protect this configuration channel as well. Many

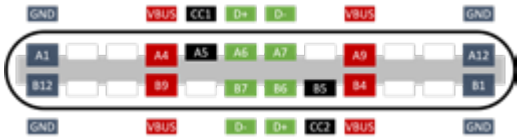


applications notes save this protection. However, the qualitative differences in the cables and peripheral devices must be considered. Here one should take precautions and provide at least overvoltage protection. This also helps to meet the ESD requirements mentioned above.

USB2.0 Data, Charging, and Power

If a USB 2.0 solution is implemented with a USB-C connector, there are basically different options.

12-pin version

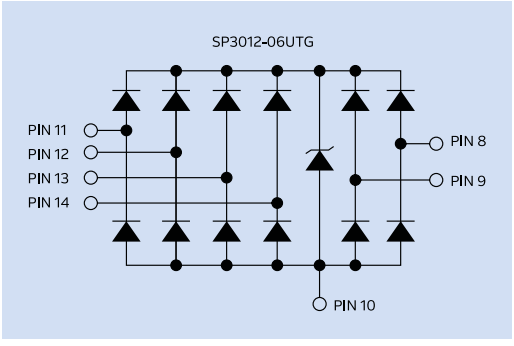


14-pin version

16-pin version

The versions vary in the design of the supply connectors (A1, A12; B1, B12), as well as in the presence of sideband channels.

Since data rates of up to 480Mbit/s are possible in the 2.0 standard, the selection of the protective elements is an important matter. The signal quality is influenced by parasitic properties, in particular by capacitive effects and the resistance of the transmission path. This creates a low-pass filter that attenuates the signal levels more and more as the frequency increases. The manufacturers offer special highly integrated protective elements to keep this influence as low as possible. Furthermore, the integrated protection arrays offer a good opportunity to make the layout as efficient as possible.

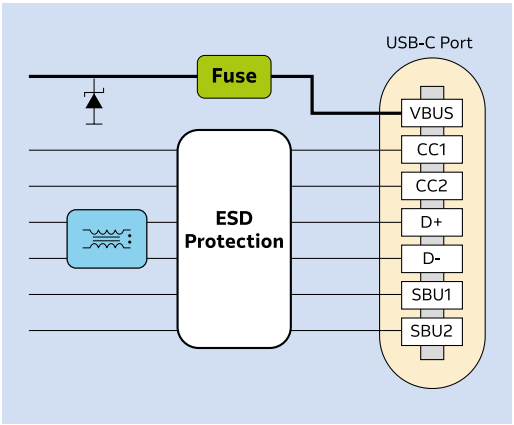


Source: Littelfuse

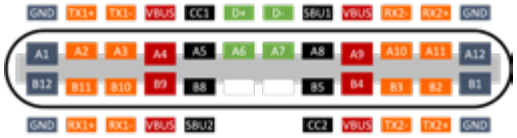
It is also recommended placing a common mode choke in the signal path to suppress common-mode interference. This prevents the coupling and decoupling of common-mode interference. Which has a significant impact on EMC compliance.

USB3.x and beyond

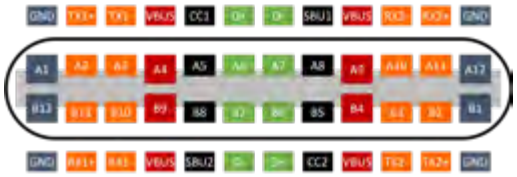
It becomes particularly demanding with USB 3.x and beyond.



The two versions are full-featured interfaces with full functionality. The 22-pin plug is specially designed for memory sticks and cable connections.



22-pin version

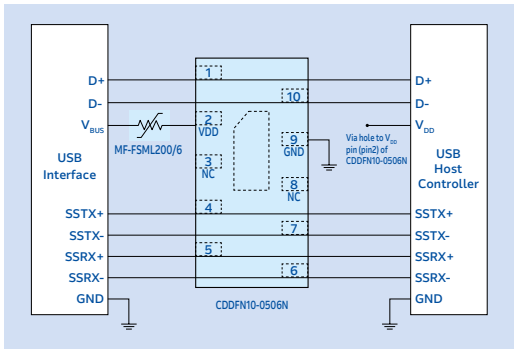


24-pin version

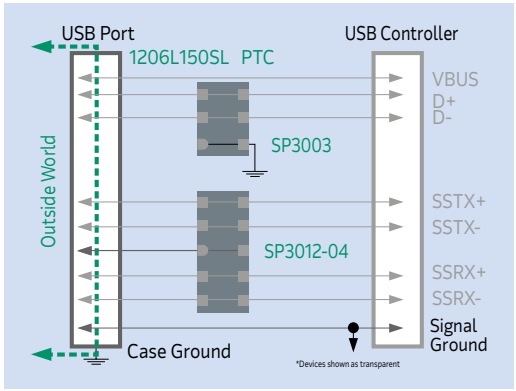
The sheer number of lines and the enormous transmission rate of up to 40 Gbit/s with USB 4 place demands on the protective circuit and the associated layout.

Special integrated protective elements are used here, as shown in the following pictures.

To improve the overview, the protection elements for the configuration channels as well as sidebands are not drawn in.



The schematic above from Bourns illustrates the application protection and does not constitute the complete circuit design. Customers should verify actual device performance in their specific applications.



USB 3.0 ESD protection with SP3012 and SP3003 from Littelfuse

General pin designations

GND – Ground
(ground terminals for power supply)

VBUS – Power Supply
(positive terminals for power supply)

D – Data standard speed
(Differential pair USB2.0 for standard speed data transmission)

RX, TX – High-Speed data
(Differential pairs for high-speed data transfer, often called “super-speed channel”)

CC, SBU – Configuration Signals
(terminals for system configuration, like initial interface negotiation (device roles) and power configurations (USB-PD)

Customized Solutions

As you can see, the circuit protection for USB-C is always a customized solution. Due to the many possibilities of functionality with USB-C, there is hardly any standard solution so far.

Arrow can help customers with all aspects of designing a USB-C interface, from selecting the right connector to implementing and protecting the interface. With years of experience and technical expertise, Arrow can provide comprehensive advice to help customers meet the requirements of the new EU directive.

Our Technology Application Engineers will be happy to help you with your specific requirements and the appropriate solutions.

The European Union has issued a new directive that will require all mobile devices sold in the EU after December 2024 to have a USB-C port. This decision has implications for companies in the industry, especially those responsible for the development of mobile devices.

The USB-C interface not only offers the benefits of faster data transfer and easier connectivity, but also the ability to deliver up to 240 watts of power via USB Power Delivery (USB-PD). This makes USB-C attractive not only for mobile devices such as phones and tablets, but also for other electrical devices.

In addition to providing a more convenient and flexible way to power devices, it can also help reduce cable clutter and space requirements.

Using USB-C as a universal interface for powering different devices can reduce the number of different adapters and chargers. This, in turn, can reduce the consumption of resources such as materials and energy, and thus have a positive impact on the environment. Overall, the USB-C interface with USB-PD offers an interesting solution for a faster and more convenient power supply not only for mobile devices, but also for other electrical devices.

In this issue of IP&E News, we look at the protection of USB-C connectors.

To read the article on USB-C connectors and typical applications please download:

https://www.arrow.com/en/ipe/download-area/pemco-news

3M Science. Applied to Life.™

Reliable Connections with more Board Space

The manufacturing industry is steadily moving towards automation. With machines used in factory automation becoming more and more complex, a single printed circuit board is designed to perform an increasing number of functions and operations. With high-density PCB designs fitting more components onto a board than ever before, PCB real estate is at a premium. 3M is helping you prepare for new design challenges.

3M has been among the world's leaders in connectors utilizing Insulation Displacement Contacts (IDCs).

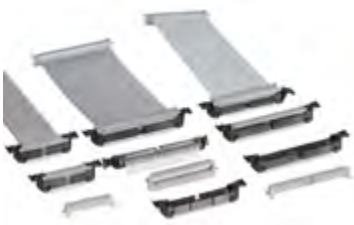
The 3M cable socket 451 and 3M header 452 series are used together as a high density wire-to-board solution with a 1.27mm (0.050") pitch and a 0.635mm (0.025") pitch ribbon cable. This system uses insulation displacement contact (IDC) technology and cantilever U-contacts, proven reliable termination and space saving without sacrificing connection density.

The 3M cable socket **451 series** offer a robust connector in a very small package and with the following options:

- Fine pitch delivers high connection density in a very small space
- 30µ" Au and Au flash available plating versions offer multiple mate/unmate cycle option levels at different price points
- Available friction latch configurations enable increased protection against accidental disconnect when using a box header
- Optional strain relief accessory provides additional security to help guard against damage when users pull on a terminated cable

The 3M header **452 series** is designed to maximize design flexibility while minimizing PCB footprint. They mate to 3M cable socket 451 series and are available in the following configurations:

- The standard shrouded header is available with or without ejector latches. This innovative assembly method allows the addition of positive latch and ejection functionality with minimal size addition.
- 30µ" Au and Au flash available plating versions offer multiple mate/unmate cycle option levels at different price points
- Vertical mount, right angle mount, thru-hole and SMT configurations available
- Tape and reel packaging for SMT version enables use in automated placement applications
- Lead-free process capable
- PCB standoffs enable pin-in-paste processing capability



Possible Applications:

- Industrial
- Heating and cooling
- Test and measurement devices
- Appliances
- Communications equipment

Click or scan QR-Code to read more

3M™ Ribbon Cable Wiremount Socket Assembly, 451 Series, 1.27 mm (0.050") Pitch 3M™ Shrouded Boardmount Header, 452 Series, 1.27 mm (0.050") Pitch	
Current Rating	1.0 A, all lines energized, per UL
Voltage Rating	125 VAC
Insulation Resistance	> 1 x 109 Ohms at 500 VDC
Withstanding Voltage	1250 VDC at sea level
Operating Temperature	-65 °C to +125 °C
Processing Temperature	260 °C
Lead-Free Solderable	Yes
Moisture Sensitivity Level	MSL1 per J-STD-020

Amphenol
COMMUNICATIONS SOLUTIONS

BergStak® 0.40 mm BtB Connector

USCAR-2 Compliant Connectors with Self-Aligning Feature

The BergStak® 0.40 mm self-alignment connectors stand out with their exceptional self-aligning capability, guaranteeing a steadfast and dependable connection, particularly during blind mating scenarios. With a precision-engineered fine pitch design at 0.40mm, these connectors effortlessly facilitate high-speed performance up to 8Gb/s.

Target Markets/Applications

- Car Camera
- Portable IoT Devices Gaming Device
- Factory Automation Camera
- Patient Monitor

Orderable at arrow.com

- 10142886-030A2EHLF
- 10142890-030A3EHLF

Features	Benefits
Fine pitch design at 0.40 mm	Suitable for applications with space constraints
Self-alignment feature	Supports blind mating
3.50mm stack height and 30 positions extendable up to 10 to 60 positions	Support different applications
Supports speed performance up to 8Gb/s	Meets PCIe® Gen 3 standards
Meets USCAR-2 vibration and shock limits	Suitable for automotive application
RoHS compliant, halogen and lead free	Meets health, safety and environment requirements

HellermannTyton

SE28 heat shrink tubing

Wherever high fluid resistance is critical to cable and wire protection, SE28 heat shrinkable tubing is a tried-and-trusted choice for reliable long-term performance.

With a 2:1 shrink ratio, SE28 tubing provides a layer of top protection to wiring harnesses. On account of its resistance to fluids, this insulation product is at home in the most demanding aerospace, railway, automotive and defence applications (VG 95343-5:2016-10).

SE28 is manufactrued from cross-linked elastomer (POA) and has an operating temperature range as low as -75°C up to +150°C and does not crack at low temperatures or drip at heat shock.

The product delivers reliable protection to cables and wires against mechanical abrasion as well as damage caused by contact with liquids, such as hydraulic fluids, diesel and aviation fuels. SE28 heat shrink tubing is available in 8 sizes, including the most popular diameters between 3,2/1,6 and 38,0/19,0. Three larger sizes are also available on request. Reel lengths vary between 150 m, 60 m or 30 m, according to the tubing dimensions.

Heat shrinkable tubing with high fluid resistance

Video tutorial on YouTube

Orderable at arrow.com

- 342-20090
- 342-20000
- 342-20010
- 342-20020
- 342-20030
- 342-20040
- 342-20050
- 342-20060
- 342-20070
- 342-20080

Click or scan QR-Code to order.

Click or scan QR-Code for more information.

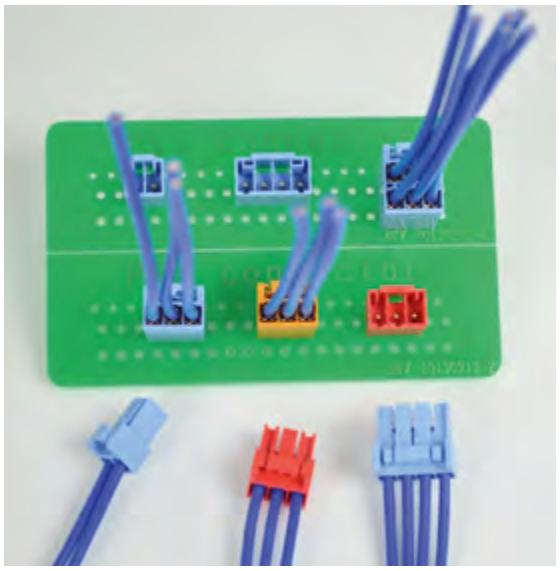
PSI: Multiple Crimp Style Series Pitch 4.0 mm

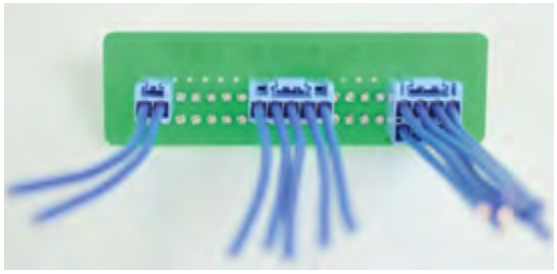
JST Deutschland GmbH presents a versatile series in the pitch of 4.0 mm: PSI. This series can be offered as a wire-to-wire and wire-to-board solution. It's available in 3 different keying. A mis-mating is prevented by different colors and key mechanism.

A secure locking structure enables a reliable connection. Low insertion force contacts and finger-friendly design provides an excellent operability. A large electric current was realized by using AWG 26 to AWG 16 wires. With a cross section of AWG 16 the 2 circuit connectors can be used up to 12 A AC, DC.

The series PSI is designed for a voltage rating up to 300 V AC, DC. It's UL recognized and CSA certified. Also a TÜV certification can be provided. PCB headers are available in top and side entry type, THT. The series PSI is available in 2, 3, 4 and 5 circuits as a single row type. The circuits 6, 8, 10, 12 and 14 are available as double row type. The wire-to-wire connection at the moment can be offered as 2, 3 and 4 circuit version.

If you need a higher creepage distance also headers with omitted pins are possible. So a high pitch of 8.0 mm can be realized. With series PSI JST Deutschland GmbH offers another product family with a wide range of application possibilities. For more details please refer to our specification and contact your Arrow representative or visit arrow.com.





Click or scan QR-Code to download JST Product Overview.

Power Pulse Tolerant Chip Resistors

Downsizing, Space Saving and High Reliability – SG73P-Series

KOA's SG73P-series has approx. 7 times pulse handling capability compared to standard flat chip resistors.

Due to the special resistance trimming it also allows a higher continuous power rating. This means that existing designs can be 'powered up': An SG73P device can be dropped onto the pads of a similar sized conventional part, thus increasing the power capability without changing the PCB layout. Equally in a new design a smaller SG73 device can be used saving valuable PCB space.
Due to its outstanding pulse load capability this series is suitable for protection of electronic circuits against extreme pulses and surges, for example, in IO lines and gate drive resistors. These devices are ideal for automotive, power control and smart meter applications.

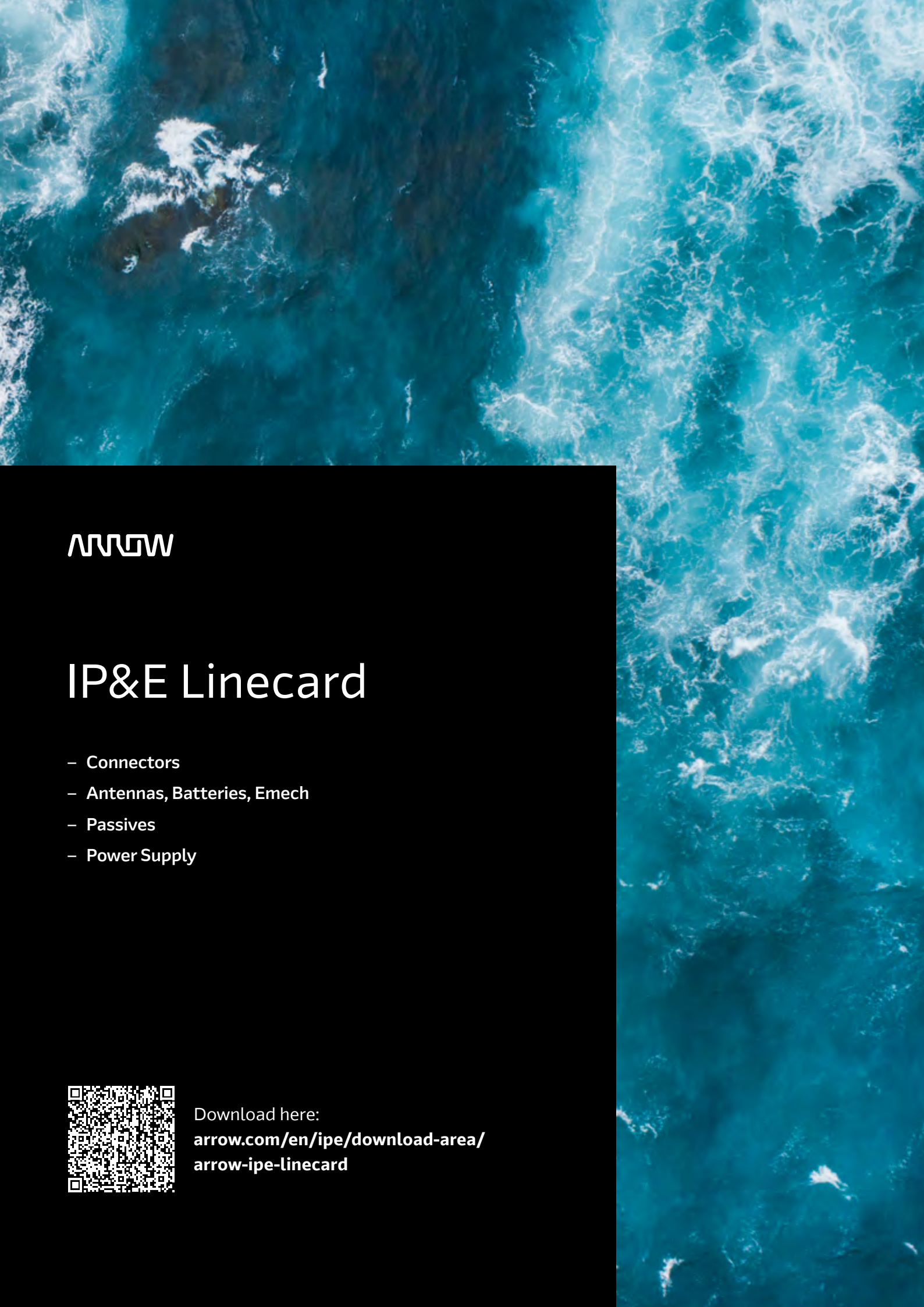
Features and Benefits
- Outstanding pulse performance
- High power
- Allows e.g. 500 W for 10 µs in size 1210
- High component and equipment reliability
- 1 Ω ... 10 MΩ, ±0.5 ... ±5 %
- T.C.R.: ±100 ... ±200 ppm/K
- 5 sizes from 0402 ... 1210 inch
- Operating temperatures up to +155 °C
- EU-RoHS compliant
- AEC-Q200 tested
- Lab Kits are available
- Anti-Sulfuration type (RT) also available

Applications
- Automotive electronics
- Power supplies
- Industrial electronics
- Measuring instruments
- Motor control units
- Smart meter
- Power conditioner / inverter
- etc.

The newest updated datasheets of these Anti-Pulse resistors can always be found on the supplier website of KOA Corporation.

Orderable at arrow.com
- SG73P: Pulse Withstanding Precision Resistors
- SG73P_RT: Pulse Withstanding Precision Resistors – Anti sulfuration

Click or scan QR-Code for more information.



IP&E Linecard

- Connectors
- Antennas, Batteries, Emech
- Passives
- Power Supply

Download here:
arrow.com/en/ipe/download-area/arrow-ipe-linecard

Technologies by Supplier

	Connectors															Antennas, Batteries, Emech								Passives																Power Supply		
	Sockets & Contacts	Board to Board	Wire to Board/Wire to Wire	FFC/FPC	Terminal Blocks & Acessories	I/O Connectors	Industrial Connectors	Fiber Optic	High Speed	RF Connectors	Cables	Cable Assemblies	Cable Management Accessories	Relays	Switches	Thermal Management	Batteries	Antennas	Sensors	Test & Measurement	Enclosures	Soldering Tools/Accessories	Ceramic Capacitors	Silicon Capacitors	Tantalum Capacitors	Aluminum Capacitors	Film Capacitors	Super Capacitors	Fixed Resistors	Non Linear/Variable Resistors	Fuses	Varistors	Inductors/Chokes/Coils	Ferrites/Ferrite Beads/EMI Filter	EMC Power Filters	Planar Magnetics	Transformers	Thermistors	Timing Devices	Buzzer	RF Products	AC/DC	DC/DC	LED Driver
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Brehmer														•																												
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C&K															•																											
Cherry CID															•				•																							
Chilisin (Now Pulse) 6)																		•															•	•								
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Hellermann Tyton*					•								•							•																							

*not in all EMEA countries [1]GE Critical Power, Lineage [2]Artesyn, Excelsys, Ultravolt [3]Aquired by Bel Fuse Inc. [4]3Y Power Technology, Protek Power [5]now part of Advanced Energy [6]Yageo company

Technologies by Supplier

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Hirschmann																				•																					
HJC (Hua Jung Components)																																										
Honeywell															•				•																						
Hongfa														•																											
ICEL																																									
Inno Tape																•																									
iNRCORE (former PulseR)																																•				•				•	
InvenSense																			•																						
IQD Frequency Products																																					•				
Isabellenhütte																											•														
ITT Cannon	•	•	•	•		•	•	•		•		•																													
ITW Switches															•																										
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Kyocera AVX	•	•	•	•	•	•	•		•	•								•	•	•			•	•	•	•	•	•		•	•	•	•	•			•	•		•	
Laird Performance Materials																																•									
Lapp											•	•	•																												
Lelon																										•		•													
LISI Automotive			•																																					
Littelfuse														•	•				•											•	•	•					•				
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Metrofunk											•																															
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Panduit							•	•					•									•																			
Panstrong	•									•																															
Phoenix Contact	•	•	•	•	•	•	•				•	•	•									•																			
PMEC																																•									
Preci-Dip	•	•	•			•																																			
Pulse 6)						•			•									•											•	•	•	•	•	•	•	•				
Qualcomm																																					•			•	
Radiall			•			•		•		•		•			•			•																						
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Rafi*															•																										
Recom																																								•	•	•
Rennsteig Tools																						•																			
RF360 (Now Qualcomm)																																					•			•	
Samsung Electro-Mechanics																							•						•				•	•							
Samtec	•	•	•	•		•	•	•	•	•		•																													
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Sauro		•	•		•																																				
Schaffner																																			•			•			
Schroff																•					•																				

*not in all EMEA countries [1]GE Critical Power, Lineage [2]Artesyn, Excelsys, Ultravolt [3]Aquired by Bel Fuse Inc. [4]3Y Power Technology, Protek Power [5]now part of Advanced Energy [6]Yageo company

Technologies by Supplier

	Connectors															Antennas, Batteries, Emech									Passives																Power Supply		
	Sockets & Contacts	Board to Board	Wire to Board/Wire to Wire	FFC/FPC	Terminal Blocks & Acessories	I/O Connectors	Industrial Connectors	Fiber Optic	High Speed	RF Connectors	Cables	Cable Assemblies	Cable Management Accessories	Relays	Switches	Thermal Management	Batteries	Antennas	Sensors	Test & Measurement	Enclosures	Soldering Tools/Accessories	Ceramic Capacitors	Silicon Capacitors	Tantalum Capacitors	Aluminum Capacitors	Film Capacitors	Super Capacitors	Fixed Resistors	Non Linear/Variable Resistors	Fuses	Varistors	Inductors/Chokes/Coils	Ferrites/Ferrite Beads/EMI Filter	EMC Power Filters	Planar Magnetics	Transformers	Thermistors	Timing Devices	Buzzer	RF Products	AC/DC	DC/DC	LED Driver
Schurter												•			•																•	•	•		•		•					
Seiko																	•																										
Sensata															•				•																								
SIBA																															•												
SiTime																																						•					
SKS Kontakttechnik											•	•	•																														
SL Power 5)																																									•		•
SongChuan														•																														
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Standex-Meder														•					•														•			•							
Sumida				•							•	•																															
Sumitomo			•										•																														
Susumu																													•			•										
Syfer Technology																						•											•									
Tadiran Batteries																	•																										
TDK														•				•	•				•								•	•	•			•	•					
TDK-Lambda *																																									•	•	•
TE Connectivity	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•										•	•				•	•							
TKR Spezialwerkzeuge																						•																					
Traco Power																																									•	•	
TRP Connector 3)			•			•																																					
TXC Corporation																																						•					
Varta																	•																										
Vicor																																									•	•	
Vishay																		•	•				•		•	•	•	•	•	•	•	•	•	•			•	•	•				
Vishay PG																													•														
Vitrohm																													•														
W+P Products	•	•	•	•		•					•	•	•																														
Wago	•		•	•	•	•																																				
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*not in all EMEA countries [1]GE Critical Power, Lineage [2]Artesyn, Excelsys, Ultravolt [3]Aquired by Bel Fuse Inc. [4]3Y Power Technology, Protek Power [5]now part of Advanced Energy [6]Yageo company

Kyocera AVX Clock Oscillators

For Industrial & Automotive Applications

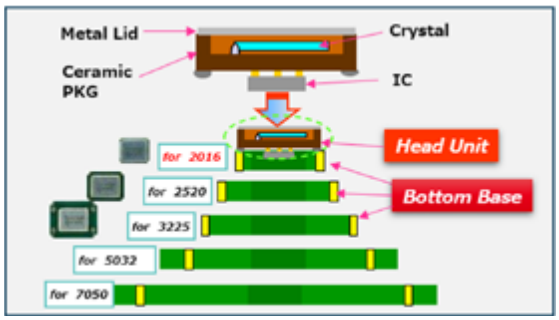
Kyocera AVX is a leading manufacturer in developing cutting edge crystal products such as crystal units, crystal oscillators and clock oscillators by utilizing the full capability of quartz crystals.
Kyocera AVX has experience supplying a wide variety of crystal devices globally contributing to the evolution of IoT era.
The Z-series and K-series utilizes a common platform design covering case sizes 2016 through 7050. High frequency options and a variety of output types support customer needs.

- By mounting a 2 x 1.6 mm head unit on different PCB – sizes, Kyocera AVX is able to offer all common clock oscillator package sizes and a maximum of flexibility.
- Kyocera AVX Clock Oscillators are used in a wide range of industrial & aumotive applications.

Advantages:
- Short Lead Times
- High Electrical Performance
- High Mechanical Robustness

Features:
- Frequency range from 0.5 to 170 MHz
- Low tolerance range available (+- 20 ppm overall)
- Extended Temp.-Range -40/ +125°C
- High Jitter Performance Available
- Programable Types Available (Z-Series)
- Automotive Types Available

Kyocera owns unique proprietary technology which revolutionizes Oscillator structure.
Better aging characteristics and contamination detection enabled by higher temp application upon production process.
Higher reliability enabled by carrier board being glass epoxy which has same thermal expansion coefficient as customer PCB.
The use of common key materials regardless of case size contributes to better lead time.



Orderable at arrow.com
- K Series
- Z Series (Type X)
- Z Series

Click or scan QR-Code to order.

Series	K series (Non-PLL)	Z series Type X (PLL)	Z series Type Y (Non-PLL)
Frequency	1.5 to 160MHz	0.5 to 170MHz	24, 25, 50MHz
Supply Voltage	1.6 to 3.63V (Multi Acceptable)	1.71 to 3.63V (Multi Acceptable)	1.71 to 3.63V (Multi Acceptable)
Overall Stability	+/-50ppm @ -40 to 105 °C +/-100ppm @ -40 to 125 °C	+/-20ppm @ -40 to 85 °C +/-25ppm @ -40 to 125 °C	+/-20ppm @ -40 to 85 °C +/-25ppm @ -40 to 125 °C
Supply Current (3.3V, 25MHz)	2.3mA Typ. @ CL=15pF	5.2mA Typ. @ No Load	2.4mA Typ. @ No Load
Phase Jitter (BW: 12k to 20M)	0.15ps @ 60MHz	30ps @ 60MHz	0.17ps @ 60MHz

Littelfuse
Expertise Applied | Answers Deliverec

New Current Sensing Resistors from Littelfuse

As the demand for electronification and electrification increases, so does the need for monitoring and control in applications such as battery management, motor control, smart meter, etc. Measuring the level of current flowing through a circuit and being delivered to the load can help maximize the operating performance. Littelfuse Current Sense Resistors provide an optimal, low-cost solution for measuring current flow to provide control and overcurrent protection.

Features
- Power rating up to 2~3 W
- High precision and stability
- Low temperature coefficient of resistance
- SMD form factor

Benefits
- Cost-effective solution compared to competing technologies like Hall Effect sensors, current transformers, flux gate sensors, and Rogowski coils
- Same device works in both ACand DC applications
- Compact size

Markets/Applications
- Battery charging and protection
- Motor control and protection
- Power management
- EVs including 2- and 3-wheelers
- Home appliances
- Industrial automation


L4CA L4CC Series

CSR L4CL Series


CSR WJC Series

CSR WLTC Series

WLTM Series


CSR WPB C Series

WSTC Series


CSR L4CA L4CC Series

Orderable at arrow.com
- WPC2512QLR010FYR
- WPC2512QLR020FYR
- WPC2512QLR050FYR
- WPC2512RLR002FWR
- WPC2512QLR005FYR

WSTM Series

Littelfuse
Expertise Applied | Answers Deliverec

Littelfuse AEC-Q200 Qualified Fuses

AEC-Q200 has expanded its scope to provide a single standard that manufacturers can use to design and test fuses for the automotive market. Littelfuse has contributed to the development of Revision E and the framework for defining the test requirements for fuses. Design engineers developing systems for automotive vehicles will be able to select AEC-Q200 Qualified fuses from Littelfuse that have been subjected to an extensive set of tests to ensure a rugged and reliable product. Littelfuse is one of the first supplier with AEC-Q200 qualified fuses.

Click or scan QR-Code for more information.

	AEC-Q200 Qualified cartridge fuse portfolio			AEC-Q200 Qualified high-current surface mount fuses	
Parameter	**828**	**526**	**527**	**885**	**881**
Product photo					
Footprint/Height	38 x Ø10 mm	32 x Ø10 mm	32 x Ø6mm	10.86 mm x 4.78 mm	12.5 mm x 10 mm
Voltage Rating	1000 VDC	500 VAC/VDC	500 VAC	500 VDC	100 VDC
Interrupting Rating	10 kA @ 1000 VDC	10 kA @ 500 VAC/ VDC	10 kA @ 500 VAC	1500 A @ 350 VDC	1500A @ 75VDC
Amperage Rating	15 A ~ 30 A	30–60 A	30–50 A	1 A–5 A	60A ~ 100A
Operating Temperature	-55 °C to +125 °C	-55 °C to +125 °C	-55 °C to 125 °C	-55 °C to 105 °C	-55 °C to 100 °C

	AEC-Q200 Qualified surface mount thin film chip fuses							
Parameter	**441A**	**501A**	**407A**	**438A**	**440A**	**483A**	**437A**	**422A**
Product photo								
Footprint/Height	603	1206	1206	603	1206	1206	1206	2410
Voltage Rating	32 VDC	32 VDC	24–63 VDC	24–63 VDC	50–125 VDC	75 VAC/ VDC	32–125 VDC	125–250 VAC/VDC
Interrupting Rating	50 A	150 A	50 A	50 A	50 A	50 A	50 A	50–100 A
Amperage Rating	2–6 A	10–20 A	1–8 A	0.25–6 A	0.250–8 A	0.75–2 A	0.25–8 A	0.75–5 A
Operating Temperature	-55 °C to 150 °C	-55 °C to 150 °C	-55 °C to 150 °C	-55 °C to 150 °C	-55 °C to 150 °C	-55 °C to 125 °C	-55 °C to 150 °C	-55 °C to 125 °C

molex

Quad-Row: Redefining Miniaturization

Quad-Row: World's smallest Board-to-Board Connector, 30 % space savings, ideal for space-constrained devices.

In today's rapidly evolving world of consumer electronics, the demand for smarter, faster and more powerful technology has never been greater. At the electronic component level, this pace of transformation has created its own set of challenges in the architecture, electronic design, physical size and the overall performance of components. The shift towards reduced package size, higher signal density and electrical performance while meeting assembly processing requirements is inevitable.

From Idea to Reality:
The Process Behind the Innovation
Device manufacturers are working to pack various functions into the smallest possible device size to meet the demand for new features for consumers. As a result, design engineers are prioritizing miniaturization and performance as crucial factors to fulfill new design requirements.

To meet this growing demand, Molex has introduced Quad-Row, the world's smallest board-to-board connector. This innovative solution offers 30 % space-saving over conventional designs. This connector presents significant opportunities for achieving leading-edge, compactness and miniaturization while remaining compatible with standard surface-mount technology (SMT) processes.

What is Size without Strength?
Molex's Quad-Row Board-to-Board connectors provide robust mating and reliable contact due to their sturdy design. The connector is equipped with internal armor and insert-molded power nails that shield the pins from damage during high-volume manufacturing and assembly. The connectors also have a broad alignment system, which enables easy and secure mating while reducing the likelihood of fallout.

With the ability to accommodate voltages up to 50V and a maximum current of 0.3A for signal and 3.0A for power nail, this connector possesses impressive electrical capabilities, including 35 milliohms contact resistance for signal and 20 milliohms for nail contact. Despite its small size, this compact connector measures only 2.00 mm and a mated height of only 6.0 mm, featuring a 250V dielectric withstanding voltage and 100 megohms insulation resistance.

Comparison SSB6RP vs Quad-Row

Orderable at arrow.com
– Quad-Row

Click or scan QR-Code to order.

Click or scan QR-Code to watch our latest Tech Snack video for Quad-Row Board-to-Board Connectors.

Panasonic
INDUSTRY

Relays for Circuit Safety

Relays with forcibly guided contacts - a millionfold guarantor for the safety of people and machinery. The reliable mechanical forced guidance according to DIN EN 61810-3 / IEC 61810-3 is a significant difference to conventional power relays.

Relays with forcibly guided contacts feature mechanically linked contacts that detect faults and can thus prevent accidents in safety applications. If, e.g., contacts of relays wear out and weld, this can have fatal consequences. Panasonic Industry's safety relays provide a verifiable disconnection function in these cases and prevent fault scenarios:

1a1b SF-M: Flat design, reflow soldering capability and the latest safety relay technology. SF-M series relays feature a super flat housing with a height of only 7.8 mm. This helps miniaturizing all kinds of safety modules while switching high loads on both contacts. The power contacts can switch 6A on the NO and 4A on the NC side. The silver alloy contacts can handle low level loads down to 10 V 1 mA - important in the industrial field. Further details: A high shock and vibration resistance of ≥20 g, low coil holding power of 100 mW, an ambient temperature of -40 up to +85 °C and reinforced insulation of ≥ 5.5 mm (V=230 V overvoltage category III, 6KV) on NO side.

SF-Y: Compact dimensions, available as 4-pole (L x W x H) 31 mm x 28.6 mm x 14.5 mm and 6-pole (L x W x H) 39 mm x 28.6 mm x 14.5 mm). A low holding power helps to reduce power consumption and self-heating, which enables further application miniaturization, coming with best in class vibration resistance, high ambient temperature and a sealed construction (RTIII). An ideal choice for applications like emergency stop switches, machine safety engineering, safety control units and countless more.

SF-S: At just 13 mm (W) and 24 mm (H), the relay boasts a nominal switching current of 6A at 230VAC/30VDC. Thanks to its polarised drive system, the coil dissipation power is very low. For the 40 mm 4 pin version (2a2b or 3a1b) the coil dissipation power is a mere 360mW. The 55 mm 6-pin (4a2b, 5a1b and 3a3b) version's coil dissipation power is just 500 mW. Both offer an optional, integrated status LED. An impressive, typical turn-on time of only 8 ms and highly functional shock resistance of at least 20g round off the technical parameters. PC board and DIN-rail terminal sockets are available as accessories for all SF-S relays.

Click or scan QR-Code for more information.

	SF-Y		SF-S		SF-M
Contact configuration	8A 4-pole version: 2a2b 3a1b	8A 6-pole version: 4a2b 5a1b	6A 4-pole version: 2a2b 3a1b	6A 6-pole version: 4a2b 5a1b 3a3b	6A 1a1b
Max. switching voltage	250V AC, 30V DC		250 V AC, 125 V DC		250V AC, 125V DC
Nominal operating power	670 mW		4-pole: Approx. 360 mW 6-pole: Approx. 500 mW		270 mW (when inpot) 100 mW (when retained)
Special features	Tested as sealed device according to EN 60079-15:2010 clause 22.5 (VDE)		Sockets available, LED type available		reflow soldering
Length x width x height (mm)	31 x 28.6 x 14.5	39 x 28.6 x 14.5	40 x 13 x 24	50 x 13 x 24	33 x 14 x 7.8
Standards and approvals	• EN61810-3, Type A • TÜV / UL		• EN61810-3, Type A • TÜV / UL/C-UL / CQC • VDE EN 60947-5-1 available		• EN61810-3. Type A • TÜV / UL/C-UL

PANDUIT™

Ergonomic Cable Tie Installation Hand Tools

Comfort, Performance and Durability
Panduit's ergonomic series of hand-operated, tool-controlled tension, and cut-off cable tie installation tools are the most preferred hand-operated tools in the industry. These versatile tools can be used for production, maintenance, or construction applications.

The ergonomic series of tools is excellent for low to medium volume applications (under 50,000 ties/year) and promote worker safety, help reduce downtime, improve productivity and provide the lowest total installed cost.

Orderable at arrow.com

Impact Resistant Resin Tools
- **GTS-E** Tool installs subminiature (8 lbs.) through standard (50 lbs.) cross section cable ties
- **GTH-E** Tool installs standard (50 lbs.) through heavy (175 lbs.) cross section cable ties

Metal Resin Tools
- **GS2B-E** Tool installs subminiature (8 lbs.) through standard (50 lbs.) cross section cable ties
- **GS4H-E** Tool installs standard (50 lbs.) through heavy (175 lbs.) cross section cable ties
- **GS4EH-E** Tool installs light-heavy (120 lbs.) through extra-heavy (250 lbs.) cross section cable ties

SSM SUSUMU
Thin Film Specialist and Innovator

SSM Susumu Specialist in Thin-Film Technology

RGV series for high-voltage applications: Precision and long-term stability for electromobility and robotics

RGV Series Resistors

Electromobility, robotics, precision measuring instruments – these are just three examples of areas of application where components with high accuracy, robustness and long-term stability are indispensable. For these and similar applications, the precision resistors of the RGV series are ideally suited.

The metal thin film chip resistors of the RGV family cover the resistance range from 120 kΩ to 3 MΩ for 1206 inch size with 0.25 watts or 120 kΩ to 4.3 MΩ for 1210 inch size with 0.33 watts with a thin film structure enables low noise and antisulfur.

They are suitable for high-voltage applications with a maximum of 700 volts in 1206 inch size or 1000 volts in 1210 inch size.

They are made with a specific CVD inorganic passivation to ensure an excellent long-term stability with a high precision and a tight tolerance of only ±0.1 %.

Their extremely low temperature coefficient of ±25 ppm/°C shows that the resistance value remains stable even under higher temperatures. Their operating temperature range of -55 to 155 °C qualifies the RGV resistors for use even under harsh environmental conditions.

For use in the automotive environment, the resistors of the RGV series are of course certified according to the AEC-Q200 standard.

Due to the sum of these characteristics, the RGV chip resistors are perfectly suited for use in the powertrain and battery management systems of electric vehicles, in industrial and robotics applications, measuring instruments and in high-voltage equipment.

Orderable at arrow.com
– RGV Serie

Click or scan QR-Code to order.

Multilayer Piezo Actuators Stacks

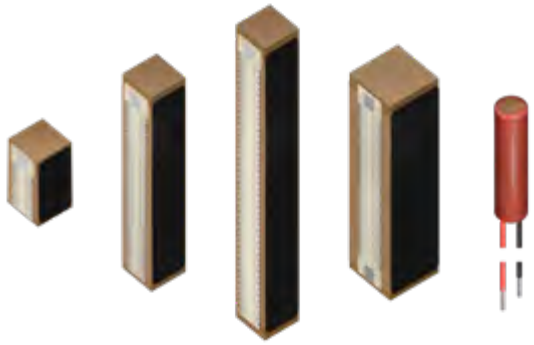
Piezoelectric actuator stacks are often used in conventional devices of our daily use. Starting in the 1990s, fuel injection systems became popular for cars that require a reliable and precise mechanism to spray the right amount of fuel into the engine at the right time.

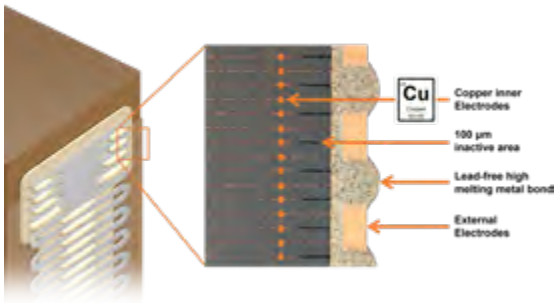
Today, there are several solutions for applications, just as the fuel injection system, that require precise, fast, and reliable movements such as 3D printing, micro-dispensing valves, and bonding wires machines for semiconductor production, dispensing adhesives used in the production line of a car or the calibration lens on a microscope among others.

TDK developed and has manufactured piezoelectric actuator stacks for the automotive industry for more than 20 years. During this time, TDK conquered milestones to improve and develop further the technology in multi-layer piezo stacks.

One of them is the patented High Active Stack (HAS), which is a disruptive technology based on copper etching that delivers outstanding performances with enhanced lifetimes and superior robustness against humidity. HAS is the result of several years of experience serving the automotive industry in fuel injection applications. Today HAS is becoming the preferred option for piezoelectric actuator stacks for these unique features:

- Enables 20% higher elongation or displacements due to its minimized inactive areas (100 µm of width).
- Ideal for humid environments with no additional housing required, as there's no conventional silver-palladium alloy in the inner electrodes avoiding the silver migration between the layers.
- Cost-effective, using copper in its inner electrodes, instead of palladium, improves the cost of the actuator.





Click or scan QR-Code for more information.

Orderable at arrow.com

- B58004M4030A020
- B58004M4040A020

AUTHORIZED DISTRIBUTOR

5G Swivel Blade Antenna Family

Offer excellent performance from 617-7125 MHz and are available in non-IP rated and IP67 formats for indoor or outdoor use.

DBA6171Cx 5G hinged swivel dipole antennas offer excellent performance from 617-7125 MHz and are available in non-IP rated and IP67 formats for indoor or outdoor use.

Outdoor versions have extensive mechanical and environmental tests and ratings including: IP67 ingress protection; mechanical shock, vibration, humidity and flammability ratings. This makes them ideal for more demanding environments.

The antennas offer high performance across the range and the outdoor rate antennas are a ruggedized and affordable solution for IoT or Fixed Wireless Access applications in demanding environments such as light industrial settings.

Applications:
- IoT
- Private Cellular Networks
- Factory Environments
- Ports
- Warehouses
- Light Industrial
- Factory/Industrial
- Robotics
- Garden Center

Target Markets
- Indoor 5G IoT
- Outdoor 5G IoT
- Cellular Access Point
- Fixed Wireless Access Devices

Key Benefits
- Indoor and Outdoor variants
- Outdoor variant - IP67, mechanical shock, vibration, humidity and flammability rated
- Ideal for private LTE/5G networks utilizing 900MHz, CBRS, C-Band and unlicensed bands
- Excellent performance levels for current and future 5G frequencies
- Global 5G coverage from 617-7125 MHz
- Robust hinge mechanism which prevents drooping and allows the antenna to be pointed for maximum coverage and efficiency

Specifications
Full electrical, mechanical and environmental specifications are available in the product datasheet link

Orderable at arrow.com
- DBA6171C1-BSMAM
- DBA6171C3-BSMAM

ZF's DG and DH Switch Upgrade

Recently, two established products from ZF Friedrichshafen AG – the sub-subminiature DG and the ultraminiature DH switches have had an upgrade. Both products have extremely small dimensions and are suitable for low voltage applications.

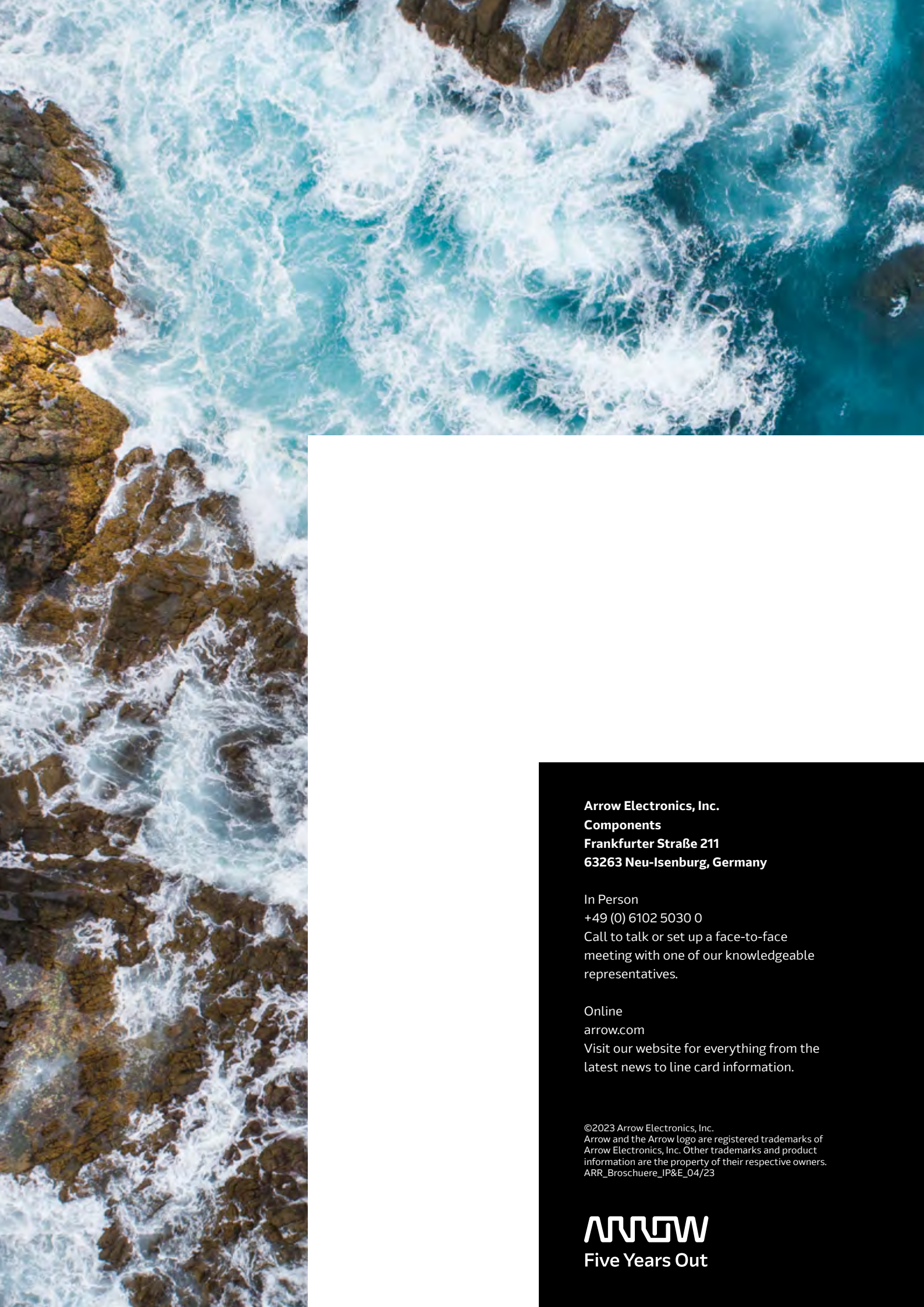
The upgraded DG switch comes with dimensions of 12.8 x 5.8 x 6.6 mm and has a bigger operating temperature of -25 to +125 °C. The DG is approved according to IEC 61058-1 / UL 61058-1 and CQC certified. Another updated ZF product is the DH switch which is now thanks to its increased temperature range of – 25°C to + 85°C available for a wider range of applications. The new DH variants will become available soon. Both products are part of the ZF switch product range which includes other snap action switches like miniature and subminiature switches but also rocker and pushbutton switches. With its portfolio, ZF is one of the leading suppliers of components in applications such as household appliances, white goods, power tools, and industrial applications.

Orderable at arrow.com

- DGE3-E4AA
- DGE3-E4LC
- DGE3-E4RD
- DGE3-E5LC
- DGE3-E5RD
- DGE3-E7AA
- DGE3-E7LC
- DGE3-E7RD
- DGG3-E4LC
- DGG3-E4RD
- DGG3-E5LC
- DGG3-E5RD
- DGG3-E7AA
- DGG3-E7LC
- DGG3-E7RD

Click or scan QR-Code for more information.

We believe in helping the benefits of technology reach as many people as possible.



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Five Years Out