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MARCH/APRIL 2022

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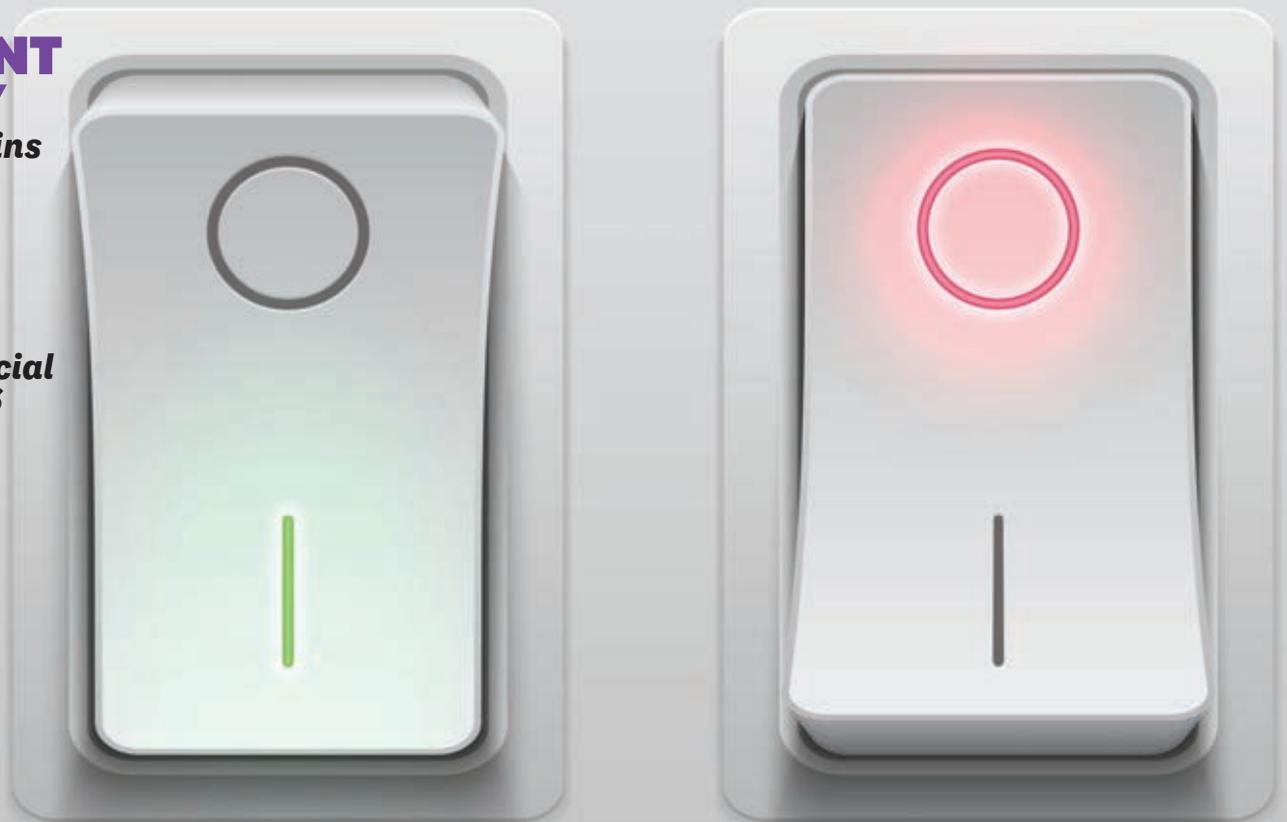
Essential tools for  
high-accuracy thermal  
profiling P.12

## COMPONENT RECOVERY

Could supply chains  
bounce back this  
year p.14

## CLINCH IT

Self-clinching  
fasteners are crucial  
to enclosures p.16



# SWITCH IT UP

How to choose the right switch  
for your design p.10

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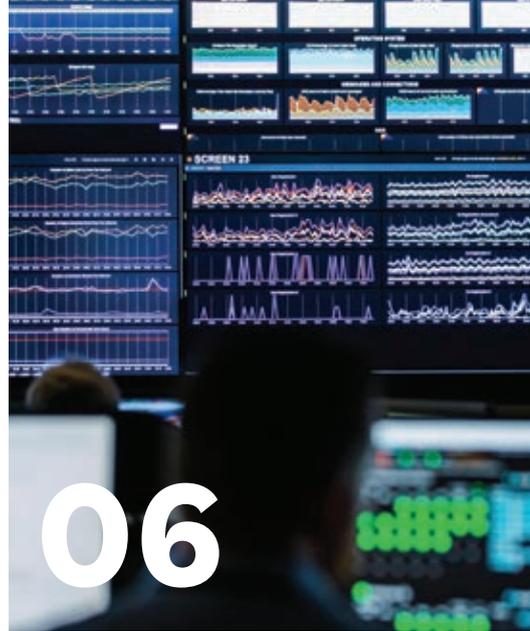
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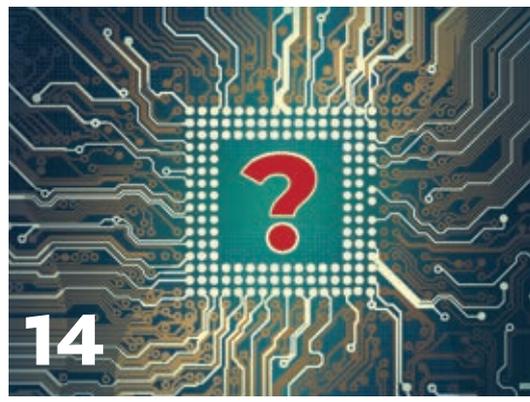
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10 06

# INSIDE

**EP&T**  
MARCH/APRIL 2022



**Columns**

- 4 EDITORIAL**  
The tech ecosystem is on the rise in Quebec
- 8 WEST TECH REPORT**  
Innovating in BC made easier via support from government agency
- 9 THINK GREEN**  
EU releases its latest SVHCs impacting REACH laws

**In every issue**

- 6 NEWSWATCH**
- 18 NEW PRODUCTS**
- 20 SUPPLY SIDE**
- 20 AD INDEX**
- 22 TEARDOWN**

**COVER STORY**

- 10 SWITCHING OVER**  
Switches are a fundamental component in any circuit – be sure you pick the correct one.
- 12 KEEPING YOUR COOL**  
The basics of thermocouple and thermal barrier selection.
- 14 SUPPLY CHAIN RECOVERY**  
How businesses can ensure they're ready.
- 16 DE-CODING FASTENERS**  
Custom enclosure specialist Protocase details the importance of self-clinching hardware.

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# Is Quebec Tech on the rise? Mais oui



As the Covid-19 pandemic ravaged primarily small and medium businesses across the country for the past two years,

one might observe that the tech industry within Quebec was inoculated with quite a bit of hope.

A pillar of Quebec's economy, technology remains an industry that is essential to Quebec's short, medium, and long-term economic development. The tech industry alone represents five percent of Quebec's GDP, or \$1 for every \$20 of the province's wealth. All signs indicate that this figure is set to rise in the coming years, as the technology industry is growing at twice the rate of Quebec's economy.

## IBM

Adding to its tech muscle of late, the Government of Quebec partnered with IBM to launch the Quebec-IBM Discovery Accelerator. The goal of the tech hub will be to further establish the province as a leader in developing quantum computing, artificial intelligence, semiconductors and high-performance computing. The hub will focus on developing new projects, collaborations, and skills-building initiatives in crucial areas of research such as

### \*IN ADDENDUM - EPTECH

Speaking of all things tech and electronics related, be sure to circle the calendar dates of two EPTECH trade shows coming to Quebec this Fall. These include in-person events in Montreal on September 13th & Quebec City on Sept. 15th.

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energy, life sciences and sustainability.

The accelerator works in alignment with the goals of the Quantum Innovation Zone in Sherbrooke and Microelectronics Innovation Zone in Bromont, promoting the use of advanced technology within the province. Working with partners in the scientific research and private sectors, the Quebec-IBM Discovery Accelerator plans to make advances using computational technologies such as: Quantum computing; AI; and High performance computing.

## AI Influence

Speaking of AI, the Québec City region is making a name for itself in the national and international ecosystems with all its assets in artificial intelligence. According to a 2021 report, more than 100 researchers are involved in various projects related to AI at Laval University and other research institutions in the region. In the private sector, more than 100 Québec City companies are now integrating AI technologies into their products or services. Many companies specializing in AI based in the region were directly spawned from this expertise in much the same way that the optics-photonics sector 30-years ago did with the creation of the National Optics Institute.

The support of continuing professional development programs and the availability of specialized programs in the region's various college and university institutions have undoubtedly played a key role in this business success.

## MiQro

Building on these initiatives, the MiQro Innovation Collaborative Centre (C2MI) in Bromont recently unveiled the Technum Quebec Innovation Zone – a

design hub that puts its focus on digital technologies, from design to commercialization, through prototyping, certification, intellectual property, and low-volume production, reach their full potential to support all Quebec industries.

For nearly a decade C2MI, among the largest R&D centers for electronic systems in Canada, has played a role of innovation multiplier. One of the key elements distinguishing C2MI is its ecosystem of more than 300 organizations (companies, academic and research partners, and business network).

C2MI serves as a catalyst for the entire microelectronic industry and the Technum Quebec Innovation Zone will allow the group to do more and make an even greater difference within the Province.

## ISEQ

Serving as the backbone to the electronics systems industry since 2018, the ISEQ group represents members from all parts in the innovation chain of Quebec's electronic systems industry, from design to logistic and professional services, through manufacturing and distribution. The group's mission is to mobilize and link Quebec players – thus raising awareness to the region's collective, cross-sectoral power.

## Conclusion

All said, Quebec's potential to innovate in high technology and be a leader in the Province's economy – as well as the nation's – is set with world-class universities, creative entrepreneurs and ample support networks. Vive tech!

## EP&T

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# CANADA'S ELECTRONICS INDUSTRY REPORT

*An in depth* look at the  
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# NEWSWATCH

## WIRELESS

### BLACKBERRY TO SELL LEGACY PATENTS

BlackBerry Ltd. has entered into a patent sale agreement with Catapult IP Innovations Inc., a Delaware company, pursuant to which BlackBerry has agreed to sell substantially all of its non-core patent assets to Catapult for total consideration of \$600-million.

Patents that are essential to BlackBerry's current core business operations are excluded from the transaction. BlackBerry will receive a license back to the patents being sold, which relate primarily to mobile devices, messaging and wireless networking. This transaction will not impact customers' use of any of BlackBerry's products, solutions or services.

Catapult is a special purpose vehicle formed to acquire the BlackBerry patent assets. Catapult's principal funding for the acquisition will be a \$450-million senior secured term loan, for which it has received \$400 million of conditional commitments from a lending syndicate led by Toronto-based Third Eye Capital that includes a Canadian pension fund.

## EVENTS

### EPTECH IS BACK

The return of Canada's only trade show series focused on the electronic design and engineering market is back!

After a slight delay earlier this year, EPTECH in-person trade shows has been re-launched - returning 'live' to most of their familiar markets. EPTECH will kick-off in Vancouver on June 2nd, while also traveling to Markham ON on June 15th, Montreal on September 13th, Quebec City on September 15th, Mississauga on October 13th, and wrapping up in Calgary on October 19th.

Free to attend for trade and industry professionals, the show provides exclusive face-to-face networking with suppliers in the industry. Each show often delivers electronic experts in seminars scheduled throughout the day. From 10am-4pm attendees can browse the exhibit show floor - connect and gain insights on upcoming products in the industry. Exhibitors representing the full spectrum of solutions from components, software, distribution, CEM services, test solutions.

For more information related to



BlackBerry sold off its non-core patent assets to Catapult, but retained those essential to its core focus.

exhibiting or attending an EPTECH show please visit - [www.eptech.ca](http://www.eptech.ca)

## INCUBATOR

### HARDWARE-FOCUSED INCUBATOR SEEKS TO DRAW GLOBAL PLAYERS

ventureLAB and the Regional Municipality of York have partnered to expand the Hardware Catalyst Initiative, Canada's only lab and incubator for hardware and semiconductor companies. York Region's investment of \$1.5 million over five years leverages the Government of Canada's investment of \$9.7 million through the Federal Economic Development Agency for Southern Ontario (FedDev Ontario) and continues to build a globally competitive cluster for hardware and semiconductor research, innovation, design and manufacturing centered in York Region.

This investment will enable ventureLAB to increase its capacity to assist homegrown innovation and commercialization opportunities and help international hardware and semiconductor companies establish and grow their businesses and teams in York Region. It will also create approximately 145 new jobs in York Region over five years.

"ventureLAB has gained strong momentum as Canada's Hardware Hub through the success of the Hardware Catalyst Initiative," said Melissa Chee, president and CEO, ventureLAB. "We look forward to continuing to work with York Region to build a globally competitive semiconductor ecosystem that bridges research and commercialization, builds a strong domestic talent pool of highly

qualified professionals and creates a connected, sustainable, resilient ecosystem for tech firms who choose the Region to build, grow, and scale."

### IBM & QUEBEC GOV'T PARTNER ON QUANTUM SYSTEM

IBM has partnered with the Quebec Government to establish the Quebec-IBM Discovery Accelerator, aimed at establishing itself as a leading tech hub in the development of quantum computing, artificial intelligence, semiconductors and high-performance computing.

The new facility aims to focus on developing new projects, collaborations, and skills-building initiatives in crucial areas of research such as energy, life sciences and sustainability.

The technology hub will work in alignment with the goals of the Government of Quebec's Quantum Innovation Zone in Sherbrooke and Microelectronics Innovation Zone in Bromont, promoting the use of advanced technology across the province.

Working with partners in the scientific research and private sectors, the Quebec-IBM Discovery Accelerator plans to make advances using computational technologies.



IBM & the Quebec Government team up.



## FEDS INVEST IN SEMI, PHOTONICS INDUSTRIES

Recognizing the importance of semiconductors in protecting national security and economic and technological interests, the Government of Canada is investing in its development.

As part of its initiative, the Feds launched the Semiconductor Supply Challenge, with a \$150 million envelope from the Fonds Innovation Strategy, to make targeted investments to build on Canada's strengths in semiconductor production and supply. Also announced were plans to establish a \$90-million for the Canadian Center for Photonic Device Manufacturing (CCFDP) of the National Research Council of Canada.

The government is calling on companies to secure ambitious and transformative proposals in the priority areas of expanding semiconductor production capacity, research and commercialization. This will allow the Canadian semiconductor industry to play a better role in the North American information and communications technology supply chain.

*The Federal Government announced its plan to invest in both the semiconductor and photonics industries.*



Photo: CFCDP; BASF

## INNOVATION ZONE TO DELIVER ON DIGITAL TECH

The MiQro Innovation Collaborative Centre (C2MI), Bromont QC, has welcomed the designation of Technum Quebec Innovation Zone. This new label will ensure that digital technologies, from design to commercialization, through prototyping, certification, intellectual property, and low-volume production, reach their full potential to support all Quebec industries.

C2MI, now the largest research and development center for electronic systems in Canada, has played a role of innovation multiplier. One of the key elements distinguishing C2MI is its ecosystem of over 300 organizations (companies, academic and research partners, and business network).

"Thanks to this unique ecosystem links are created, and the industrial structure of our society is interconnected and strengthened. The addition of the Technum Quebec Innovation Zone will allow us to do more and make an even greater difference in our society by expanding this industrial structure by multiplying the number of companies that will benefit from the know-how of an exceptional critical mass," says Marie-Josée Turgeon, general manager of C2MI.

### BATTERY

## BASF SECURES QUEBEC SITE FOR BATTERY MATERIALS

BASF has signed an agreement to secure land for its future cathode



*BASF has secured a development site in Quebec in order to develop a recycling facility for all battery materials.*

active materials and recycling site in Bécancour, Quebec. The move is part of the company's commitment to support North American producers in their transition to e-mobility – a regional supply chain is critical to ensure reliable and resilient battery materials supply.

The investment is intended to enhance BASF's CAM production footprint in North America by complementing its existing manufacturing sites. The new site allows for ample space to expand up to 100kt CAM per year with potential for fully integrated precursor cathode active materials (PCAM) supply, the company disclose in a press release.

The site will also be connected to BASF's global metal sourcing network with provision for a nickel and cobalt intermediates base metal refinery and recycling of all battery metals (including lithium).

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# Innovate BC ignites start-up vibe

Provincial group promotes growth in tech circles



Innovate BC, a provincial government agency aimed at supporting innovation in British Columbia, has been tasked by the Provincial government to support the B.C. economy by bolstering new and existing start-ups. Innovate BC funds and delivers programs that support labour market needs and promote product commercialization and adoption.

West Tech Report recently took the opportunity to connect with Raghwa Gopal, president and CEO of Innovate BC, to learn more about its programs and services, what entrepreneurs can expect, and how existing companies can benefit from the new funding sources.

## Thriving tech sector

Innovate BC works to support companies at all stages of growth, across all sectors, all over British Columbia. The group helps companies start, scale and stay in British Columbia – while ensuring that the benefits of B.C.'s thriving tech sector are felt by people in all regions of the province.

The pandemic created an unprecedented need for business funding and support, and thankfully, Innovate BC was available step-up and lend some support.

“In 2020-21, we administered a new program that offered support specifically to main street businesses, non-tech companies, who had to close their doors but had little to no online presence,” says Gopal. “At no cost to the company, we connected these struggling businesses with digital experts and service providers to help them with everything from digital marketing to e-commerce so they could continue to operate even with their doors closed.”

## NRC IRAP program support

Innovate BC also provides funding for tech solutions. The group recently began accepting applications for its BC Fast Pilot program, which is delivered in partnership with National Research Council of Canada Industrial Research Assistance Program (NRC IRAP).

“We provide grants of up to \$200,000 to help regional businesses design,



**Innovate BC is a one-stop service centre to connect innovators with BC government funding.**



**Raghwa Gopal, president and CEO of Innovate BC makes it his mission to help tech leaders and start-ups access government funding.**

build and operate a pilot plant or small demonstration of their technology in real-world conditions,” explains Gopal. Since the program started in 2019, \$5.9-million has been invested into 48 B.C. pilot demonstrations.

There are also programs that are tailored for academics. To date the Ignite program has awarded funding to 34 projects for a total value of \$8.5 million.

“We also anticipate opening applications shortly for the next round of R&D funding through our Ignite program. Grants of up to \$300,000 will be given to teams for industry and academia to come together to commercialize innovations,” explains Gopal.

## Grants for R&D projects

This represents part of Innovate BC's mission - to connect innovators with funding solutions for the future.

“We help entrepreneurs, founders, and start-ups access government funding to accelerate the growth of their company or the development of their product. Over the years we have offered a variety of hiring grants, which at once help companies with staffing costs and assist in training young professionals and bridging the skills gap,” says Gopal.

“We also provide grants for R&D projects and technology demonstrations to help innovators commercialize their game-changing solutions and gain customer adoption. Lastly, we oversee a province-wide mentorship program with the help of our partners to provide business coaching to entrepreneurs looking to grow their businesses,” Gopal adds

B.C.'s technology industry is

substantial, according to Western Economic Diversification Canada, accounting for seven percent of BC's Gross Domestic Product and employing 5.2 percent of the province's workforce.

“In the wake of the COVID-19 pandemic, Innovate BC applied a recovery and resiliency lens to all programs. We have also built federal partnerships to help B.C. companies access new procurement opportunities,” says Gopal. And, it should be noted that south of the border, the Feds are tightening interest rates into a slowing economy. Canada will need to have its governments continue supporting small and medium sized businesses to help weather the upcoming storms.

## Innovate BC's Impact in 2021:

- 5,600 high-paying jobs and work placements created
- \$127 million company revenues generated
- \$158 million in investment raised by Innovate BC-supported ventures
- 2,000 unique companies have accessed our programs
- 39% of all companies supported located in regional and rural areas
- 6,700 B.C. entrepreneurs trained
- 87% of client ventures reported programs as high value

To learn more, go to [innovatebc.ca](http://innovatebc.ca), or to be notified when applications open for funding opportunities, sign up to become an Innovate BC Insider at [innovatebc.ca/insider](http://innovatebc.ca/insider). **EP&T**



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# REACHing enviro laws

## EU releases its latest Substances of Very High Concern

BY AURY HATHOUT, CERTIFIED AUDITOR, ENVIROPASS EXPERTISE INC.

 You may have heard about the famous restrictions of hazardous substances in electrical and electronic equipment (RoHS). The REACH regulation is another European environmental law that directly impacts producers and importers. Every six months, the European Union (EU) lists so-called Substances of Very High Concern (SVHCs) under REACH. We will briefly present the REACH applicable requirements and the latest list of 223 REACH SVHCs.

### What is EU REACH?

First of all, let's summarize the REACH regulation. Within the European Union (EU), all manufacturers, importers, and downstream users must comply with this law known as the Registration, Evaluation, Authorization, and Restriction of Chemicals regulation 1907/2006. According to the European Chemicals Agency (ECHA), this regulation aims to "improve the protection of human health and the environment from the risks that can be posed by chemicals, while enhancing the competitiveness of the EU chemicals industry".

The requirements in question include hazardous substances commonly used in electronics, like the Medium-Chain Chlorinated Paraffins (MCCP) in plastics. Applicable to articles producers (i.e., physical products), we can find REACH restrictions under Annex XVII) and obligations to declare SVHCs.

### The REACH Annex XVII

The REACH regulation includes Annex XVII, with pure substances restrictions in various applications. Few of these conditions directly impact electronic devices, like nickel and compounds that are not allowed when intended to come into direct and prolonged contact with the skin. For example, a button, a handle, or a viewfinder may bear prohibited nickel finishes.

SVHC Name	Example of Use
DEHP: Bis (2-ethylhexyl)phthalate	Is also a RoHS substance present as a plasticizer in polymers, such as PVC and vinyl chloride resins.
DHNUP: 1,2-Benzenedicarboxylic acid, di-C7-11-branched, and linear alkyl esters	Plasticizer in PVC
DIHP: 1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich	Plasticizer in PVC
EGDME: 1,2-dimethoxyethane; ethylene glycol dimethyl ether	In lithium manganese batteries
HBCDD: Hexabromocyclododecane	Is also a halogen POP flame retardant potentially present in polystyrene insulation of refrigerators, for example.
MCCP: Medium-Chain chlorinated paraffins [UVCB substances consisting of more than or equal to 80% linear chloroalkanes with carbon chain lengths within the range from C14 to C17]	MCCPs are flame retardants and plasticizing additives in cables (PVC), paints, coatings, adhesives, potting agents, or printed circuit boards.
UV-328: 2-(2H-benzotriazol-2-yl)-4,6-ditertpentylphenol	UV absorber in packaging and other applications.

Table 1

Example of Affected Materials	SVHC Name
Adhesives, production of rubber, plastics, and tires	DBMC 6,6'-di-tert-butyl-2,2'-methylene-di-p-cresol
Lubricants	S-(tricyclo[5.2.1.0'2,6]deca-3-en-8(or 9)-yl) O-(isopropyl or isobutyl or 2-ethylhexyl) O-(isopropyl or isobutyl or 2-ethylhexyl) phosphorodithioate
Rubbers, plastics (silicone resins) (manufacture)	Tris(2-methoxyethoxy) vinylsilane

Table 2: ECHA publishes insightful studies and resources to know better SVHCs.

Importantly, amendments regularly add new restrictions to Annex XVII.

### The REACH SVHC List

The SVHC list is another crucial inventory of hazardous materials that companies need to monitor. Indeed, some SVHCs are considered carcinogenic, mutagenic, or toxic for reproduction (CMR). Other SVHCs can cause environmental wreckages by being persistent, bioaccumulative, and toxic (PBT).

Consequently, if a component of an electronic assembly contains an SVHC at a concentration of 0.1% or more (weight by weight), producers must inform downstream users. To that end, customers have a right to ask a supplier whether a product contains SVHCs.

### SVHCs in Electronics

Undoubtedly, the SVHC list heavily impacts the electronics sector. For instance, you will find in Table 1 (above) some SVHCs present in electronic applications.

Every six months, the SVHC list contains new chemicals. Consequently, as of January 17, 2022, four new high-risk substances have been added to the SVHC list. Therefore, there are now 223 SVHC entries. Here are the additional four new SVHCs:

- 4-MBC
- DBMC
- S-(tricyclo[5.2.1.0'2,6]deca-3-en-8(or 9)-yl) O-(isopropyl or isobutyl or 2-ethylhexyl) O-(isopropyl or isobutyl or 2-ethylhexyl) phosphorodithioate
- Tris(2-methoxyethoxy) vinylsilane

### New SVHCs are presented

Some of the new SVHCs above affect applications in the electronic industry. You will see some examples above in Table 2. Because of article 33 REACH regulation 1907/2006, suppliers must "communicate information on substances in articles."

Therefore, since early 2021, ECHA has implemented the so-called SCIP (Substances of

Concern In Products) database to help the communication of SVHCs. On the SCIP database, we can access millions of declarations of products with at least one declarable SVHC.

Critically, SCIP notifications are mandatory. The obligation to communicate SVHCs impacts both consumer and professional products. Consequently, if an article is not present on the list, one can assume that not declarable SVHCs are present.

### How to comply with the list

In other words, how could the frequent addition of substances affect existing and developing products? The periodic updates of the SVHC list can cause legal issues to many companies. Fortunately, it is possible to comply pragmatically. Here are some examples on how to implement an environmental product compliance management system and demonstrate due diligence. It is the MACC environmental compliance approach:

1. **Monitor** the applicable requirements. Companies need to regularly verify the status of both REACH Annex XVII and the SVHC list. Additionally, producers must confirm that their existing or developing products are not concerned with the changes. If they are, then actions 2 to 4 apply.
2. **Assess** your product against the new requirements. Since you cannot verify every material against all controlled substances, you need to perform risks assessments. Standards can help you adopt the best-recognized methods. Documentary reviews and, at last resort, analytical testing (chemical analysis) are the two common approaches. You will most likely have to audit your supply chains.
3. **Correct** any risk of non-compliance in your products.
4. **Communicate** product compliance to third parties via declarations of conformity, the SCIP database, etc. Finally, do not hesitate to ask experts around you who can advise you. **EP&T**

<https://www.getenviropass.com>

# SWITCH IT UP

Selecting the right switch for your design  
BY CARLING TECHNOLOGIES

Switches are the most fundamental component in any circuit and will often be the most important design decision a product designer makes when engineering the human/machine interface.

If you get this choice wrong, the results can range from inconvenience through poor haptics all the way to compromised equipment and operator safety. Where should the designer begin? The following article provides an extensive set of useful guidelines for engineers and product designers looking for a head start.

## The basics

Ask any design engineer what the key constraints are in any project, and you'll hear the same two factors at the top of the list: cost and time. Often, there are constraints on both, but behind the need to deliver on-budget and on-time is the assumption of performance. For electrical switches in on- and off-road motive power applications, it's even tougher. The process begins with the prime function of any switch: circuit performance:

- Will the switch control load directly or indirectly?
- Will the switch control ac, dc, or pulsed dc currents?
- Is the switched current subject to transient spikes or unusual inrush conditions?
- Is switch capacitance and internal resistance a factor?

For the engineer designing switches to go into an operator control station or console, these issues aren't apparent from a schematic or functional block diagram. It's essential for the design engineer to work closely with the circuit designer to ensure that a specified switch fits the entire performance envelope. That envelope may include RFI shielding due to other on-board systems including communications equipment and inductive pickup from spark ignition systems in gasoline engines.

That's easy to say, but few designers of panels and consoles are also circuit developers. This adds a responsibility to the engineer specifying the switch to work closely with the circuit design

team to clearly define performance parameters in both normal and possible failure modes to narrow the selection process. Crossing that checklist against switches available that will fit panel design and cost considerations is the second major challenge facing the console/HMI designer.

At this point, it is highly recommended to contact the switch supplier as early as possible in the design phase.

## Panel performance

For an electrical engineer or circuit designer, the switch is a schematic diagram symbol; however, for a systems or mechanical engineer, a switch is a physical device with associated volume, mass and pinout/connector arrangement, among other attributes. "DPDT, 12A, 12Vdc" is a basic schematic specification, but the mechanical engineer or system designer also considers the human factors problem. These performance questions typically include:

- What type of switch? Toggle, rocker, rotary or push? Touch sensitive, or reconfigurable?
- What service temperatures can be expected? What about vibration and shock?
- Will the switch be exposed to moisture/immersion/washdown?

Chemicals, dust or ice? While the latter points are reliability factors, reliability and service are defined differently by different manufacturers. Many rely on existing standards organizations, such as the ASTM and SAE and require a corresponding paper trail of certification from the switch manufacturer. In this context, the experience and reliability of the switch vendor is essential. For OEM applications, initial certification will likely be requested by the customer and the quality assurance (QA) process may require 'certs' on an annual, or even per shipment, basis. In addition to QA driven certifications, a user may require certification from independent, recognized third parties.

## Certifications

UL/CSA are well-known certification bodies in North America and have some harmonization with European Union EN standards. German TuV



*To a product engineer, a switch is a physical device with associated volume, mass and pinout/connector arrangement attributes that must be considered in any design.*

and VDE standards also have wide acceptance in the Western world. In some markets, such as the European Union, end-of-life considerations must also be taken into account. For example, is the switch RoHS certified? It's not just about mercury anymore; even a cadmium plated mild steel internal part can be an issue today, making this one of the many factors designers must consider today. Will the product be sold globally? If not, will this change in the future? If that happens, what is the cost of recertifying electrical components to global standards?

It may make sense to choose a switch with cross-approved certifications right from the start. On highway equipment for on-road use the switch may require specific certifications, such as the harmonized CE mark. In every case, the design engineer needs to know which potential markets the unit may be sold to. Even if third party certification is not required, could it replace expensive in-house testing? Could use of third-party certified switches add perceived value to the product or offer a unique selling proposition? It may make manufacturing and marketing sense to specify certified switches even if they're not required.

Can the switch vendor supply products with worldwide certifications? On the quality side, can they supply documentation to the satisfaction of both in-house QA and the end-user? It's a crucial consideration and is one factor built into the price of a switch. Often, the lowest cost switch ships with little or no documentation or traceability. A simple measure of reliability would be a requirement for zero failures over the expected life of the switch, measured in switch cycles.

For some applications, mean time between failure - usually expressed in operating hours - might be requested.



*UL/CSA are well-known certification bodies in North America and have some harmonization with European Union EN standards*



into the system, another set of parameters must be considered. Typical questions might be:

- Can your operator actuate the switch conveniently? Will the operator be expected to look at the switch when actuating it? Will the operator be wearing gloves? Will they be in a high vibration environment?
- Does the operator need confirmation of switch actuation? Strong, defined detente

positions? Power-on illumination?

- Will the switch be part of a multi-switch panel? Will the switches be directly or indirectly illuminated? Should brightness be controlled? Is the operator's night vision an issue?
- Are specialized switches needed for safety critical functions?
- Should some switches be interlocked or guarded?
- Is flame retardancy and safe

failure modes a safety requirement? Must the switch fail open circuit? Can the operator inadvertently break the switch?

These are functional considerations, but most designers operate in highly competitive markets.

**EP&T**

*Carling Technologies is a switch and circuit breaker manufacturer.*

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Again, the vendor represents the best starting point for switch selection where reliability considerations are paramount. Long life, high reliability switches are naturally more expensive, and a specifying engineer on a budget - essentially every engineer - can reduce costs and broaden the possible switch selection by sensible MTBF or reliability parameters.

It's tempting to over-specify reliability in a complex system with multiple possible points of failure.

### System reliability

From a systems approach, however, the statistical analysis of circuit failure probabilities of each node may suggest tighter reliability specifications for other systems, such as wiring harnesses or connectors, therefore allowing lower cost switchgear.

Overall system reliability is what counts; adding two orders of magnitude better failure probability to console/cockpit switchgear may be needlessly costly. Another solution is to manage switch failure to lower costs. Panel design using easily field-replaceable switches may allow the designer to achieve overall system reliability targets with a lower-cost switch. If field serviceability of operator panels or consoles is a product design requirement, the engineering for switch access may already be in place.

At this point, the designer may have a short list of switches that can perform in the circuit and at the desired level of reliability. Although switches are the most basic form of HMI, as soon as the human operator is factored

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# Essential tools for high-accuracy thermal profiling

*The basics of thermocouple & thermal barrier selection*

BY MARK WATERMAN, ELECTRONIC CONTROLS DESIGN, (ECD) INC.

 This article aims to help readers understand the process of heating and heating transfer mediums; determine the needed type and size of thermocouple sensor and thermal protecting barrier. Modes of heat transfer, temperature ranges, and duration are all critical variables when measuring temperature.

## Key Benefits

An investment in a solid thermal profiling strategy with instrumentation, robust software and accessories is a central part of any operation where thermal processes are in use. Doing so protects quality, maintains consistency and ensures regulatory compliance. Once a thermal profiling data logger is selected, that's only half the equation.

## Wire Gauge

When choosing thermocouples, the first consideration is the wire gauge. Finer wire has faster response times and is easier to attach to a circuit board assembly or whatever product is being profiled. For applications that require more mechanical strength or in situations where response times are not a major concern, a thicker gauge wire may be used.

## Insulation Type

After the wire gauge has been selected, the second consideration is insulation type. While the thermocouple wire itself has a wide temperature measurement range (-200C to 1260C), the insulation does not. Therefore, selecting an insulation that's appropriate for the temperature range of the process being measured is important. Teflon, or PFA, insulation is very durable and performs well at temperatures below 260C; it is the preferred insulation type for applications below this temperature due to its high abrasion

		Operating Temperatures	Applications / Beneficial characteristics
		Max 500°F / 260°C	Some food and electronics applications (below 260°C). High abrasion resistance (durable)
		Max 900°F / 482°C	Lead Free Electronics / High temperature Baking-Less durable than PFA
		Max 900°F / 482°C	Industrial-High abrasion resistance, added mechanical strength (Heavier)
		Max 2000°F / 1093°C	Industrial / Solar-High temperature, sealed unexposed bead, less flexible

Table 1: Thermocouple insulation selection is very important for compatibility with processing temperatures.

resistance and non-stick characteristics for food applications. If used above 260C, the insulation will melt and cause temperature reading distortions.

For applications that require higher temperature capability, a glass (or fiberglass) insulation is recommended. This will work with temperatures up to around 480C, but is less abrasion resistant and can break down and fray quickly when flexed. Mechanical strength or extra abrasion resistance can be enhanced through the use of a stainless steel overbraid. Extreme temperature capability – up to 1093C – requires the use of Iconel sheathed or more exotic thermocouple materials often employed for special

industrial processes to measure extraordinarily high temperatures. Table 1 (above) highlights the various insulation types by temp range and characteristics.

## Wire Length

Wire length is also a factor when attaching thermocouples for thermal profiling. Generally, the wire should be one heated zone away from the product being measured. This rule of thumb is to ensure that the thermal profiler, barrier and carrier do not influence the measurements. For electronics reflow soldering profiling, 3' is considered the ideal wire length, as average zone lengths are under 18" long and wide. Other industrial ovens and

processes may require longer wire – 7', 12' or 18' long thermocouples – to be able to measure the full zone width and length.

The longer the thermocouple, the harder it is to manage the wire and the more potential for error or for electrical noise to enter into the data. To minimize this risk, keeping the wire as short as possible while managing for zone lengths is recommended. When wire lengths exceed 50', the resistance of the wire will begin to introduce significant error; measured temperature readings will be higher as the wire gets longer. When using a feed and retrieve (or fishing) method, wire length resistance error should be taken into account.

## Protecting thermal profiler

Once the appropriate thermocouple wire gauge, insulation and length have been determined, next up is selecting a method of protection for the thermal profiling data logger. Often, this protective device is referred to as a thermal barrier – sometimes inappropriately so, as it implies that heat is being blocked. What a thermal barrier actually does is slow heat penetration by offering thermal resistance. (Figure 1)

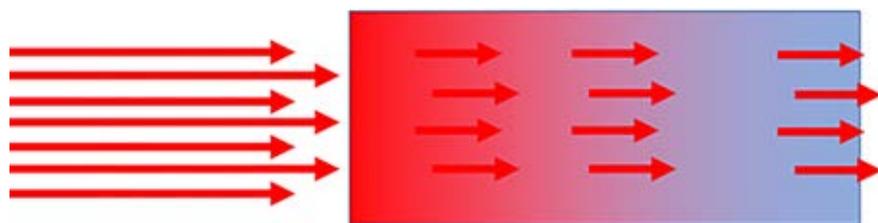
## Insulation specifics

Heat moves through the insulation and, although it is being slowed, it will eventually reach the inside of the barrier box. The temperature difference and thickness of the insulation determines the time required for heat to reach the interior, defining how long it can offer protection.

Given this, it is imperative that heat is allowed to fully dissipate from the insulation before exposing it again to the process, as traveling heat will surface at some point and could damage the thermal profiling instrument.

Barrier type, size and amount of insulation is determined based on the instrument protection required and the process that is being measured. For example, if a five-minute reflow process at peak temperature of 280C is being evaluated, the barrier can be as thin as 0.7" thick, which is not insulation-heavy. For applications reaching 1200C and

Heat penetration is slowed, but still travels through the insulation



A thermal barrier slows heat penetration; it does not block it.

lasting hours, a barrier with 18"-thick insulation may be required. It is important to understand that the insulation temperature rating is an indicator that it will not break down at a given temperature. It is not an indication of insulation suitability for a specific time duration.

For certain heating processes there are specific types of barriers that can reflect heat, namely radiant IR heat. Regardless of the thermal barrier or insulation thickness, it is effective only when starting at room temperature with no latent heat remaining in the insulation. This feedback can be provided by using temperature strips on

Fig 1: Thermal barriers absorb a certain amount of the heat energy that's being passed through it.



the inside surface of the barrier, which is a fast and easy way to determine the surface temperature.

Another strategy used in thermal barriers is to be able to absorb a certain amount of the heat energy that's being passed through it. A heat sink (a mass

that absorbs thermal energy) can be employed. These can be made of solid steel inserts; or, phase-change materials that can absorb large amounts of heat energy by changing from a solid to a liquid can be employed. Oftentimes, salts or paraffins are used for this purpose, as they can absorb large amounts of heat energy to keep the instrument cool inside. Phase change or mass heat sinks need to be cooled fully, as they do absorb a lot of thermal energy, and it takes a long time for all of it to dissipate (potentially hours between runs).

### Overview

Understanding process heating and heating transfer mediums determine the needed type and size of thermocouple sensor and thermal protecting barrier. Modes of heat transfer, temperature ranges, and duration are all critical variables when measuring temperature. **EP&T**

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# Supply chains could recover this year

*How businesses can ensure they're ready*

BY JENS GAMPERL, CEO, SOURCEENGINE

➔ Supply chains in 2021 may have reached their breaking point, but 2022 could offer some semblance of recovery. Businesses can take lessons learned from last year to start rethinking their approach to sourcing materials and products they need to operate. How can businesses capitalize on the failings from the previous year to ensure that their supply chains fully recover this year and become less vulnerable in the years ahead? It comes down to investing in AI, automation, and machine learning to digitalize the supply chain and supporting the diversification of manufacturing.

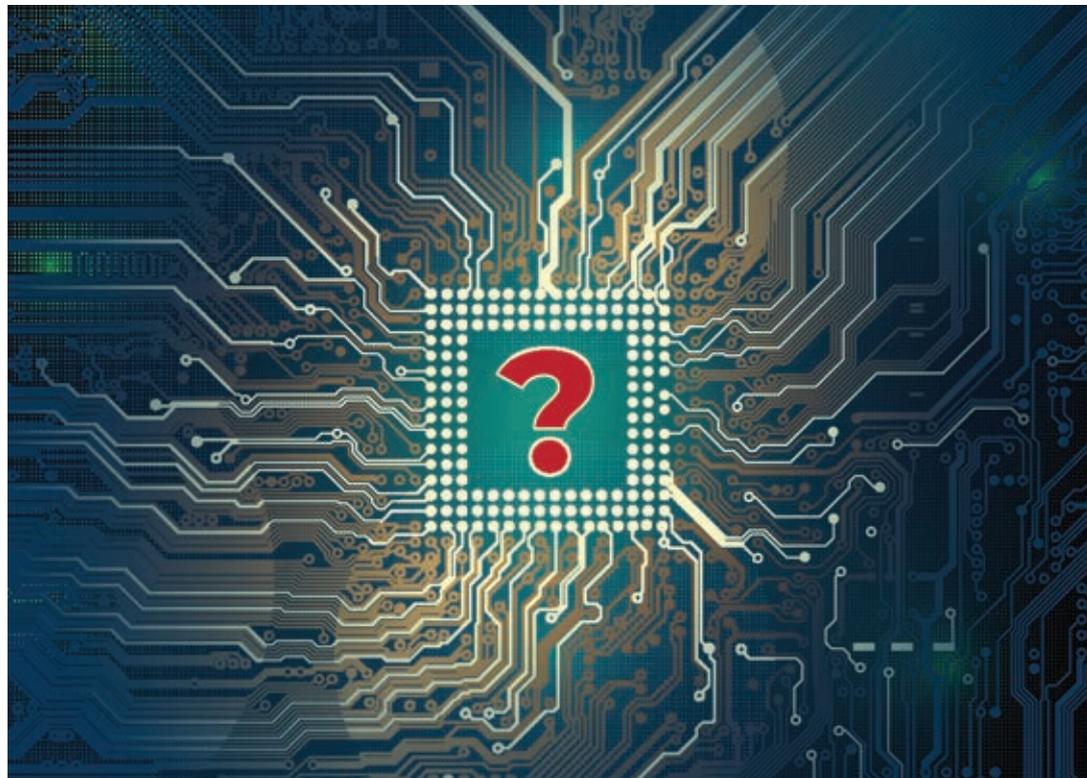
## **Investing in AI, automation and machine learning**

The global supply chain became increasingly unstable during the pandemic, causing a shift in thinking about how to recover and create a more robust future supply chain. Companies are looking to tech to improve processes, reduce time, and create better transparency. Gartner predicted that at least 50% of large global companies will be using artificial intelligence (AI), advanced analytics and IoT in supply chain operations by 2023.

By embracing AI, automation and machine learning, businesses can develop a 360-degree view of the existing supply chain and deal more proactively with potential disruptions. AI can quickly analyze an intensive amount of data in order to provide increased operations visibility and enable better decision making.

Artificial intelligence has the power now to do everything from demand-forecasting models to end-to-end transparency. For example, AI can alert businesses to how an upcoming severe weather event will disrupt the supply chain and make suggestions on how to counteract bottlenecks in real time.

By being able to predict disruptions to transportation, positive or negative demand shocks and production



***If China were to stop shipping printed circuit boards, the world would have a dire shortage.***

issues, companies can intervene and adjust their supply chain processes in a more timely manner. The payoff for investing in this technology will be huge. McKinsey estimates that early adopters of AI-enabled supply-chain management have improved logistics costs by 15%, inventory levels by 35% and service levels by 65 %, compared with slower-moving competitors.

## **Localization and diversification of manufacturing**

Chip manufacturing needs both localization and diversification. There is a reliance on a few key geographies for manufacturing that leaves the supply chain vulnerable to disruptions in those areas.

For example, if China were to stop shipping pcbs, the world would have a dire shortage. Companies previously moved their operations abroad for greater profit and now efforts are being made to bring manufacturing back closer to home. A study by the European Commission found that

Europe is 'highly dependent' on China, Vietnam and Brazil for imports, especially in areas such as batteries, raw materials and semiconductors. In response, the European Union, like many other governmental bodies, has increased its efforts to bolster its supply chain resilience through policies to support the creation of more diverse alternative supply chains.

COVID-19 exposed the global supply chain's underlying issues and lack of resilience. For our supply chain to fully recover long-term, companies need to invest in the latest technologies while governments worldwide should support the localization and diversification of manufacturing.

Without the integration of technologies that allow greater visibility to a variety of effects, as well as geographically more diversified production chains, businesses will continue to experience the downsides of the fragility of global production.

Accelerating the utilization of AI technologies and beginning to reconfigure the supply chain to be more diversified will have significant long-term payoffs in creating a more resilient, secure global supply chain.

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# Deciphering self-clinching fastener codes

BY CHRISTA CAREY, MANAGER OF TECHNICAL SUPPORT, PROTOCASE

Self-clinching fasteners are a crucial part of custom sheet-metal enclosures and parts. They solve many challenges for mounting components. Plus, self-clinching fasteners provide high push-out and torque-out resistance, as well as strong threads in very thin material. Since self-clinching fasteners have fewer parts, you do not require extra hardware such as washers and loose nuts for final assembly. This gives you a streamlined design with less overall assembly time (and, by extension, low installation costs).

You've probably heard of these fasteners being referred to as their abbreviation PEM – that comes from Penn Engineering & Manufacturing Corp., which is the world's leading manufacturer of self-clinching fasteners.

If you've ever looked at a part number for a self-clinching fastener, you likely have noticed the series of letters and numbers within the part number. This blog post will go through each portion of the part number, and decipher the codes that are associated with the self-clinching fasteners so that you can quickly decide on the best fastener for your specific needs.

## Styles of Fastener & Material

The most popular self-clinching fasteners are nuts, studs and standoffs.

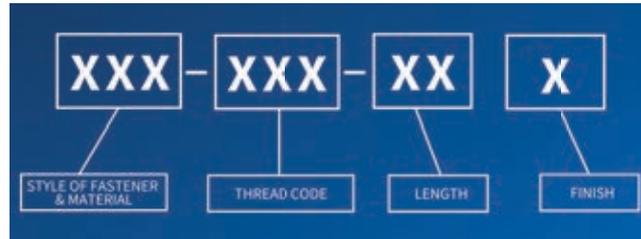
### Nuts

There are six different codes associated with nuts: Carbon Steel Nut (S -) & (SS -), 300 Series Stainless Steel Nut (CLS -), 400 Series Stainless Steel Nut (SP -), Aluminum Nut (CLA -), Flush Nut (F -).

So, for example when figuring out the code for the self-clinching fastener, if you were using an Aluminum Nut, the first part of your code would be CLA.

### Studs

There are three different codes for studs. They include Carbon Steel and Flush Head Stud (FH -), 300 Series Stainless and Flush Head Stud (FHS -), 400 Series Stainless and Flush Head Stud (FH4 -).



Pictured here is a diagram of how each self-clinching fasteners name is broken down.

Code in Fastener Name	Meaning
S -	Carbon Steel Nut
SS -	Carbon Steel Nut
CLS -	300 Series Stainless Steel Nut
SP -	400 Series Stainless Steel Nut
CLA -	Aluminum Nut
F -	Flush Nut



Studs.

Code in Fastener Name	Meaning
FH -	Carbon Steel, Flush Head Stud
FHS -	300 Series Stainless, Flush Head Stud
FH4 -	400 Series Stainless, Flush Head Stud

### Standoffs

Similar to nuts, self-clinching standoffs also have six different material codes: Carbon Steel and Thru-Hole Standoff (SO -), 300 Series Stainless and Thru-Hole Standoff (SOS -), 400 Series Stainless and Thru-Hole Standoff (SO4 -), Carbon Steel and Blind Standoff (BSO -), 300 Series Stainless and Blind Standoff (BSOS -), 400

Code in Fastener Name	Meaning
SO -	Carbon Steel, Thru-Hole Standoff
SOS -	300 Series Stainless, Thru-Hole Standoff
So4 -	400 Series Stainless, Thru-Hole Standoff
BSO -	Carbon Steel, Blind Standoff
SOSOS -	300 Series Stainless, Blind Standoff
BSO4 -	400 Series Stainless, Blind Standoff



Self-clinching standoffs.

Series Stainless and Blind Standoff (BSO4 -).

### Thread Code

We have the second part of the code and that is the Thread Code. The Thread Code identifies the internal or external threads for the self-clinching fasteners. They will be either imperial or metric.

Usually, the code will be the same as the thread but just without the "-". For example, a 4-40 threaded self-clinching fastener would be XXX-440-XXX).

The most common threads used are: 4-40; 6-32; 8-32; 10-32; 10-24; 1/4-20; M3; M4; M6.

### Length Code

Length code indicates the length of the standoff or stud, or it indicates the length of the shanks for self-clinching nuts.

TIP: Self-clinching fasteners with a Zinc finish will have "Zi" after the length code (XXX-XXX-1Zi).

### Nuts

The length code for self-clinching nuts indicates the length of the shank. Typically, the longer the shank, the more force required to knock the fastener out of place. However, when the shanks length increases, the fastener's minimum sheet thickness increases as well. Nuts have four different shank codes, as detailed below in the table.

### Studs

The length code for studs is measured in 1/16" increments for imperial fasteners and millimeters for metric fasteners. The length of the stud is its actual length. Studs have three different length codes.

For imperial, with a fractional length of 4/16" (1/4") and a decimal inch length of 0.250" the length code would be -4. For a fractional length of 6/16" (3/8") and a decimal inch length

Shank Code	Minimum Sheet Thickness
-0	0.030"
-1	0.040"
-2	0.056"
-3	0.090"

of 0.375," the length code is -6. Lastly, if the fractional length is at 8/16" (1/2") and at 0.500" for decimal inch length, the length code would be -8.

Things change for metric fasteners. If the stud length was 6mm and decimal inch length was 0.236," then the length code would be -6. For an 8mm stud length and decimal inch length of 0.315," the length code is -8. Finally, if your stud length reached 10mm and decimal inch length was 0.394," the length code would be -10.

### Standoffs

The length codes for standoffs are measured in 1/32" increment for imperial fasteners. Just as with studs, metric standoffs length code is measured in millimeters and is the actual measurement of the fastener.

For imperial if the fractional length is at 10/32" (5/16") and decimal inch length is 0.312" then the length code

would be -10. For a fractional length of 12/32" (3/8") and decimal inch length of 0.375" then length code is -12. A length code of 14/32" (7/16") and 0.437" for decimal inch length the length code would come to be -14. Lastly, if the fractional length is long as 16/32" (1/2") and decimal inch length of .500" then length code is -16.

Moving to the metric side of things, if the standoff is 6mm of length and 0.236" of decimal inch length, the length code is -6. A standoff length of 8mm and decimal inch length of 0.315," the length code is a -8. Finally, if the standoff length is 10mm and 0.394" in decimal inch length the length code is -10.

Imperial Length Code	Fractional Length	Decimal Inch Length
-4	4/16" (1/4")	0.250"
-6	6/16" (3/8")	0.375"
-8	8/16" (1/2")	0.500"
Metric Length Code	Fractional Length	Decimal Inch Length
-6	6mm	0.236"
-8	8mm	0.315"
-10	10mm	0.394"

### Finishes

Self-clinching fasteners can either be unfinished, or treated with a finish, plating or coating. These finishes not only provide aesthetic advantages, but can provide a certain level of corrosion resistance. There are a number of plating codes types you will see as a suffix at the end of the fastener code: Zinc Plating; Nickel Plating; Electro-Tin/Solderable Platings; Dry Film Lubricants; Cadmium Plating; Cadmium Plus Olive Drab Chromate; Black Nitride; Black Nitride And Dry To Touch Oil.

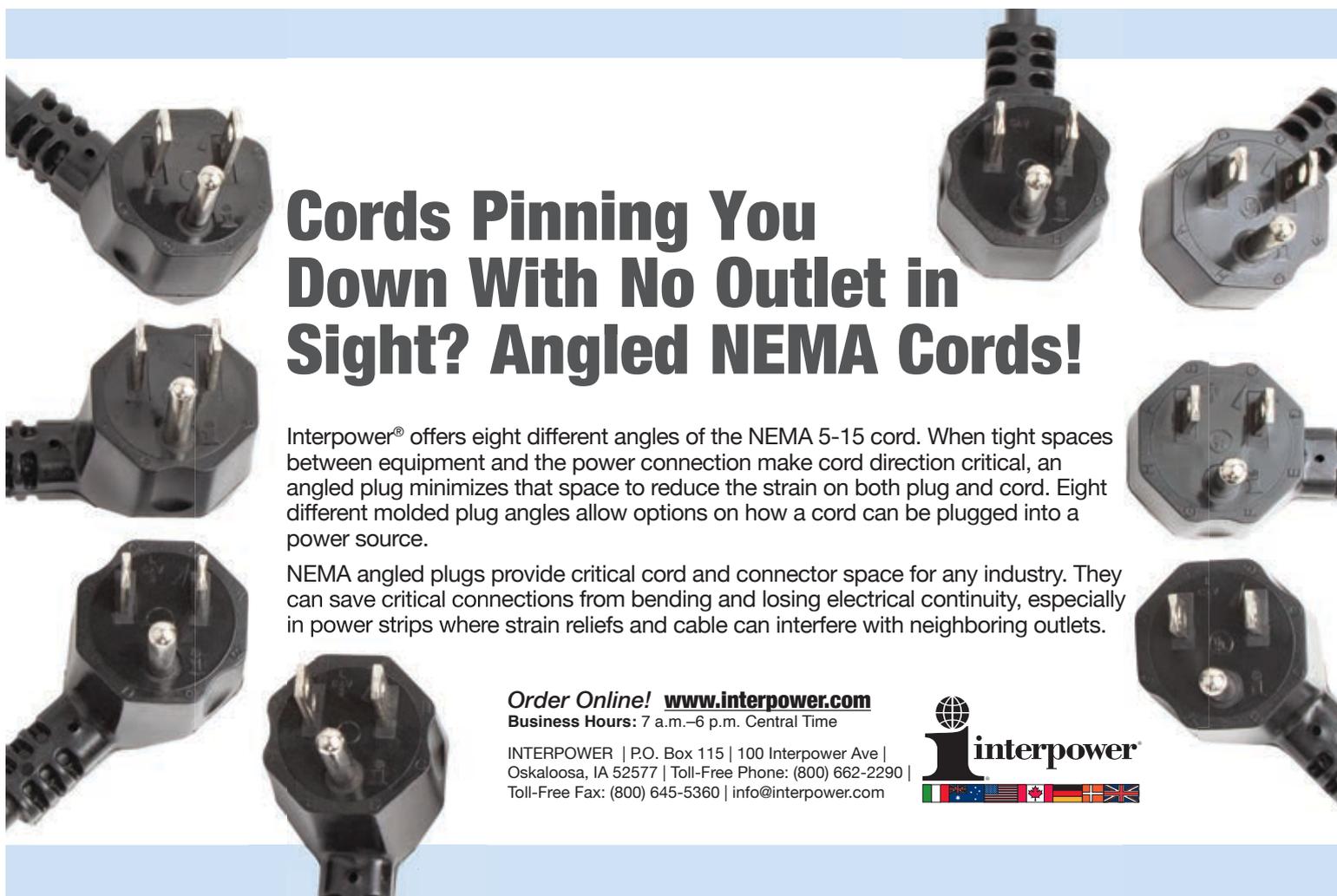
### Conclusion

One handy tip for recalling the parts of a self-clinching fastener code: Just remember the abbreviation STL: Style of Fastener & Material; Thread Code; Length. **EP&T**

*Christa Carey joined Protocase in 2002, and now manages a team of engineers in the CNC Machining Division.*

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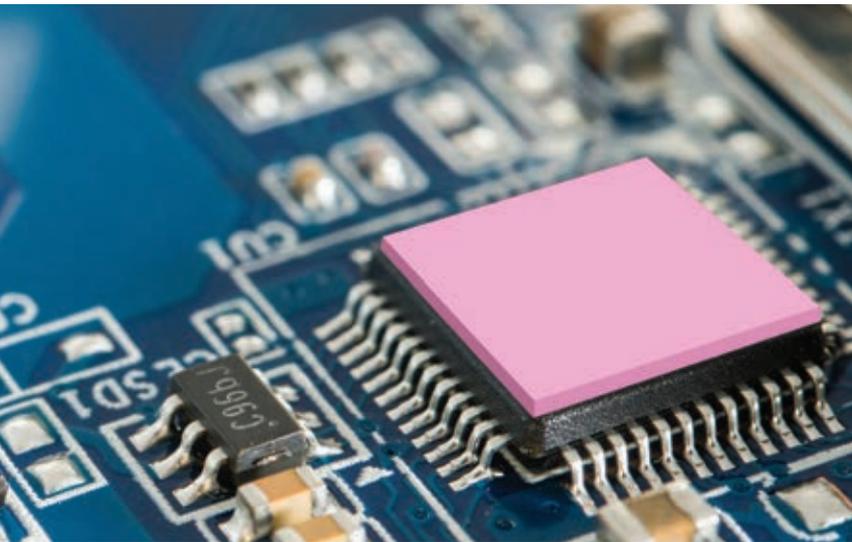
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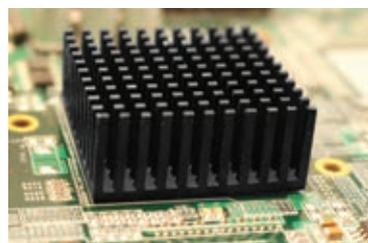
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high efficiency design that harnesses cooling airflow from any direction. Devices reliably perform in spatially constrained pcb layouts where the airflow direction is variable. The pin fin field has low pressure drop characteristics for effective cooling in low airflow environments.

Products serve component sizes 10 x 10mm up to 60 x 60mm and standard heights from 2 to 25mm.

➤ [www.qats.com/eShop.aspx?product-Group=0&group=eShop&q=Heat-Sinks](http://www.qats.com/eShop.aspx?product-Group=0&group=eShop&q=Heat-Sinks)



**MIL RUGGED  
RACKMOUNT ALIGNED  
CHASSIS DELIVERS  
ADVANCED COOLING**

**PIXUS TECHNOLOGIES**

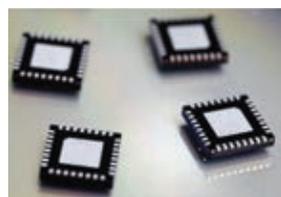
6U tall 19" rackmount chassis for 3U OpenVPX and SOSA aligned boards was designed specifically for the high-power requirements of solutions that are aligned to the SOSA technical standard. The rugged rackmount chassis supports up to 16 conduction-cooled modules per SOSA requirements and VITA 48.2 specifications. A specialized card mat set diverts heat to fins which spread the heat away from the card cage. Rear MIL grade fans then pull airflow through the fins to cool in excess of 100W/slot.

➤ [pixustechnology.com](http://pixustechnology.com)

**RF MICRO-MECHANICAL  
SWITCH BOOSTS POWER**

**MENLO MICRO**

MM5120 12GHz High Power RF SP4T micro-mechanical switch was developed using a new fabrication technology. This process enables robust and highly reliable switches capable of greater than 25W CW power handling at 6.0GHz. Device provides ultra-low insertion loss and superior linearity from 12GHz down to dc, with greater than 3-billion



switching cycles guaranteed at +85 °C. Integrated high voltage generation simplifies usage when only a single low voltage is required for operation.

➤ [menlomicro.com/images/general/Menlo\\_MM5120\\_Preliminary\\_Datasheet\\_Rev1.6.pdf](http://menlomicro.com/images/general/Menlo_MM5120_Preliminary_Datasheet_Rev1.6.pdf)



**SUB-MINIATURE  
TACTILE SWITCH  
SUPPORTS 1M CYCLES**

**C&K**

PTS526 Series sub-miniature tactile switch expands upon the popular PTS526 switch series, with a 100% increase in electrical life cycle from 500,000 to 1,000,000 actuations. Product series addresses the growing need for high quality and competitively priced switch solutions for high-volume consumer manufacturing. Device has a 5.2 x 5.2 mm footprint and a customizable thickness of 0.8mm up to 2.0mm.

➤ [www.ckswitches.com](http://www.ckswitches.com)



**COMPACT CARTRIDGE  
FUSES SAVE PCB SPACE**

**LITTELFUSE**

607 Series high-current, high-voltage, compact cartridge fuse series is rated at 500Vac/Vdc with current ratings from 40A to 63A and a 10,000A interrupting rating. Designed for overcurrent protection applications, devices provide a robust solution for demanding high-voltage power supply circuits. The 500V fuse rating is suitable for both ac and dc inputs. With a 10mm x 32mm cartridge body, a single unit requires less board space than previous designs that used multiple lower current rated fuses in parallel.

➤ [www.littelfuse.com](http://www.littelfuse.com)



## SEALED CONNECTORS CLICK WITH POSITIVE LOCK

### SWITCHCRAFT

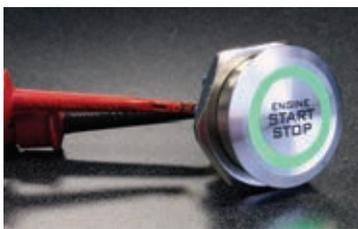
Conxall Mini-Con-X Insta-Click Sealed Connectors feature a latching mechanism that provides an automatic positive lock. This latching mechanism improves the water resistance rating to IP68 when used as part of a molded cable assembly, making it suitable for harsh environments. The disconnect is easy with a quarter-turn of the coupling ring. Devices are available as field-installable connectors or factory molded cable assemblies. Product's high-PBT plastic delivers UV resistance for outdoor use and lighting applications.

🔗 [switchcraft.com](http://switchcraft.com)

## ANTI-VANDAL SWITCHES CAN BE CUSTOMIZED

### CIT RELAY & SWITCH

Broad line of sealed, illuminated Anti-Vandal switches range from 10mm up to 40mm, with styles offered with dot and ring illumination, while custom laser printing is available. With body and actuator



finish options including stainless steel, nickel and anodized aluminum in black, red, yellow, green or blue, and bi-color illumination available, the splash-proof and vandal resistant switches provide multiple combinations for most design requirements, including the latest anti-vandal capacitive touch switch.

🔗 [www.citrelay.com](http://www.citrelay.com)



## OPTOCOUPLER IMPROVES SAFE CIRCUIT ISOLATION

### WÜRTH ELEKTRONIK

WL-OCPT series of phototransistor optocouplers come in DIP-4, SOP-4 and LSOP-4 packages. Devices are available as DIP-4 and SOP-4, while different packages are also available in a range of lead frame varieties. The CTR values of the components—classified according to binning type—range from 20 to 15,000 percent. The DIN EN 60747-5-5 certified components can be used in the operating temperature range from -55 to +110°C. Galvanic isolation of low power control circuits from high power circuits is an important safety aspect in many applications.

🔗 [www.we-online.com](http://www.we-online.com)

## SILVER FILLED, LOW OUTGASSING EPOXY SHIELDS FOR EMI/RFI

### MASTER BOND

EP4S-80 one component silver filled



epoxy meets NASA low outgassing

requirements, and provides unlimited working life at room temperature and a moderate heat cure requirement of 80°C. With a viscosity of 10,000-15,000 cps, product has a smooth flow and is easily brushable, making it suitable for EMI/RFI shielding and static dissipation. This formulation can also be used in a variety of applications where electrical conductivity is required: bonding, sealing, coating, as well as gap filling and encapsulating.

🔗 [www.masterbond.com/certifications/nasa-low-outgassing](http://www.masterbond.com/certifications/nasa-low-outgassing)



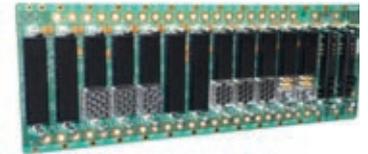
## FUSE CLIPS FOR CYLINDRICAL GLASS FUSES ENSURE SAFETY

### EMX ENTERPRISES

Keystone Electronics UL recognized Fuse Clips provide end-stops to ensure safety and design integrity. Available for use with 1AG thru 8AG size cylindrical glass fuses, the low profile, space saving devices accommodate any product design, including the use of solar protection fuses (SPF). Clips are suitable for 6 to 30 Amp applications in many environments. Units are made from brass with tin or nickel plate to

ensure low contact resistance and ease of use on pcbs. Mount easily and retain a stable position during wave soldering, devices are available in 'snap-in' and 'press-in' thru-hole mounting configurations.

🔗 [www.emx.ca](http://www.emx.ca)



## 12-SLOT, 3U BACKPLANE ENABLES DEVELOPMENT, DEPLOYMENT

### ELMA ELECTRONIC

3U 12-slot backplane aligns with SOSA Technical Standard 1.0, providing a mix of plug-in card (PIC) slots that enable complex, high speed signal processing and system development, supporting up to 100 Gigabit Ethernet. Product supports high-speed signals on all the data paths, as well as incorporates leading-edge VITA 67.3 connectors compatible with legacy VITA 67.1 and VITA 66.4 RF and optical I/O connectors. Unit delivers precision network timing, plus the integration of mixed payload modules including SBCs, switches, radial clocks and system expansion.

🔗 [www.elma.com/en/products/backplane-products/openvpx-backplanes/12slots-25gb-backplane-aligned-to-sosa-no-vita-6667-modules-installed-13998856](http://www.elma.com/en/products/backplane-products/openvpx-backplanes/12slots-25gb-backplane-aligned-to-sosa-no-vita-6667-modules-installed-13998856)

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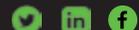
See what's new at DSM!  
[dynamicsourcemfg.com](http://dynamicsourcemfg.com)



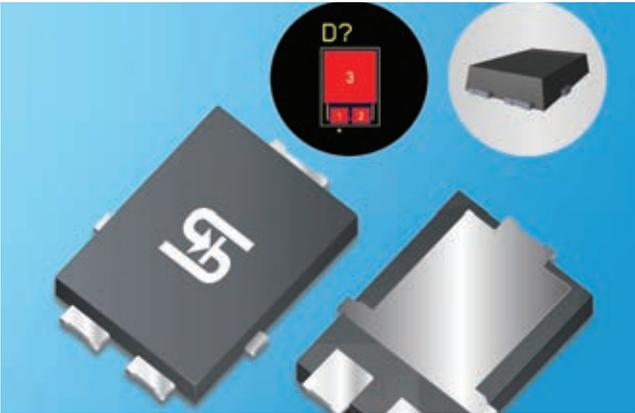
## Electronics Manufacturing Services

Dynamic Source Manufacturing Inc.

Canada Facility: 403 516 1888 | USA Facility: 480 351 7005



# SUPPLY SIDE



## SOFTWARE

### SNAPEDA CAD MODELS AVAILABLE ONLINE

Taiwan Semiconductor (TSC), a global supplier of discrete power electronics devices, LED drivers, analog ICs and ESD protection devices and SnapEDA, a search engine for electronics designers, have made available a comprehensive library of CAD models for all TSC components.

The library includes 3D mechanical models, schematic symbols, and printed circuit board (pcb) footprints. The one-stop, comprehensive library of CAD models for the entire TSC catalog is aimed at speeding up the design process for pcb makers.

“Engineers are looking for ways to design electronic products faster and better using information they can access in real time, globally,” said Sam Wang, vice-president, TSC.

The library is accessible on the SnapEDA and TSC websites and automatically syndicated to TSC-authorized distribution channels, including Digi-Key and Mouser.

## PEOPLE

### DATA CABLE APPOINTS NEW PRESIDENT

Custom cable assembly manufacturer, The Data Cable Co. Inc., Orangeville ON, has named Sandra Starr as the organization’s next president. Starr takes over from Paul Nelson, who has served as president of the company since 2001.

Starr has more than 20-years of manufacturing leadership experience within the aerospace, plastics, automotive and transportation industries. She has a proven record of overseeing operations in manufacturing environments with a core focus on team development and delivering customer excellence. Most recently Starr served as the general manger at TFI Aerospace Corp., as well as director of



**TE has acquired NSR technology from Phoenix Contact**

operations/plant manager at Micron Plastics / IMBC blow molding. Both firms are located in Orangeville.

“Sandra is already an established business leader in our community, and she fits Data Cable’s culture with her people-centric philosophy and values,” said Nelson. Our employees have always been key to our success, especially in our ability to consistently exceed our customer’s expectations year-after-year.”

## INTERCONNECT

### TE & PHOENIX PARTNER

Global connectivity leader TE Connectivity (TE) has acquired the force-guided narrow safety relay (NSR) elementary relay technology from the Phoenix Contact Group.

The acquisition adds a single-pole, force-guided offering to TE’s broad relay portfolio for the factory automation, elevator and rail markets. As a part of the agreement, TE will assume responsibility for manufacturing and marketing of the NSR element relays, supporting TE’s focus on bringing miniaturized solutions and advanced safety technology to market, particularly in robotic control, programmable logic control, elevator and servo drive applications.

In 2015, Phoenix Contact set a new standard in the narrow safety relay market with its PSRmini product portfolio. For this purpose, the firm had designed and manufactured the force-guided NSR elementary relay, one of the most compact relays of its kind in the market.

## MATERIALS



### DUPONT ADDS PRODUCTION LINE IN OHIO

DuPont Interconnect Solutions, a business within the Electronics & Industrial segment, has completed the expansion project at its Circleville, Ohio manufacturing site. The \$250-million investment expands production of Kapton polyimide film and Pyralux flexible circuit materials, ensuring a committed supply to meet the growing global demand in the automotive, consumer electronics, telecom, specialized industrial and

defense segments.

“With this expansion, we can elevate our service levels to our customers to help them grow,” said Avi Avula, vice president and general manager, DuPont Interconnect Solutions. “This new plant is an indication of our renewed commitment to our customers’ growth agenda and enables us to meet aggressive demand for new products with higher reliability and supply assurance.”

### AIM ACQUIRES BLT CIRCUIT SERVICES

AIM Solder, a leading global manufacturer of solder assembly materials for the electronics industry, has announced its recent acquisition of BLT Circuit Services Ltd., a manufacturer and distributor for a comprehensive range of consumable products for the printed circuit and chemical milling industries.

Located in Suffolk, England, BLT has served as an AIM distributor for over ten years. The company will continue to operate as they have with additional management and financial support from AIM.

## AD INDEX

ABSOPULSE Electronics Ltd.	21
BEA Lasers	21
Blockmaster	21
Coilcraft	3
Digi-Key Corporation	FC & IFC
Diverse Electronics	21
Dynamic Source Manufacturing	19
Electronics Industry Report	5
EMX Enterprises Ltd	11
EPTech 2022 Events	15
Hammond Mfg Co.	OBC
Interpower Corporation	17 & 21
Master Bond Inc	21
Ontrak Control Systems	21
Otto Excellence	13
Phoenix Contact Ltd	IBC
Schleuniger, Inc.	21
Schurter Inc.	21
Transducers USA	21
US Grant Technologies	7

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**Sandra Starr**  
Appointed as president of Data Cable Co. Inc.

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# TEARDOWN

## Google Nest Audio

BY IFIXIT

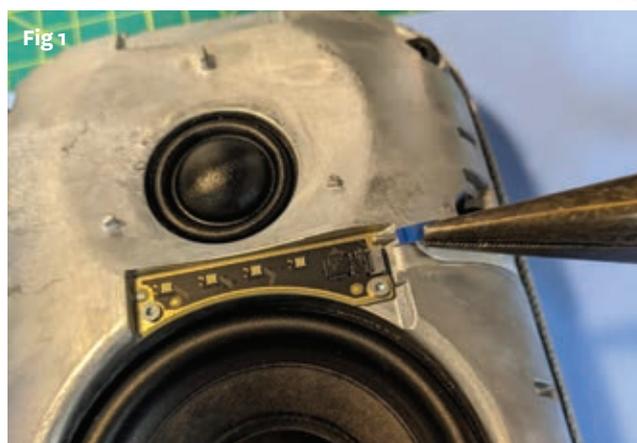


These findings are from iFixit, the open source repair guide. The popular online site teaches people how to fix just about any electronic device, and sells the parts and tools to make it possible. For this teardown, the engineers at iFixit tackle the Google Nest Audio. The device is enjoyable to listen to, easy to fit into a variety of places in a home, and can be extended with stereo pairing or multiroom configurations with other Nest speakers and smart displays. Let's empty this nest and see what makes it tick.

### What's Inside?

Enclosure is made with 70% recycled plastic. Other features include:

- \* Bluetooth 5.0 connectivity of 802.11b/g/n/ac (2.4GHz/5GHz) Wi-Fi.
- \* DC power jack port includes 30W, 24V external adaptor.
- \* Sensors include capacitive touch controls (three areas), and 3 far-field microphones.
- \* Processor is a Quad Core A53 1.8GHz.
- \* Supported operating systems for Android and iOS.
- \* Speakers & Mics: 75mm woofer and 19mm tweeter; 3 far-field microphones; Two-stage mic mute switch (hardware mute).



**Fig 1**  
Fastened to the aluminum body with two T6 screws is the LED light bar.

Using tweezers or pliers, gently disconnect the flex cable from the light bar. Be sure to pull on the plastic tab as this cable is very delicate.

Using a standard T6 driver, remove the two screws and remove the light board.

**Fig 2**  
(Remove Back Enclosure cover)  
With all six T10 screws unfastened, you can flip off the back cover.

The back cover has a small daughter board for the mute switch connected by a small flex cable.

Rotate the cover up towards the top of the device so as not to put any strain on the flex cable. Carefully disconnect the flex cable.

**Fig 3**  
(Remove Power Daughter Card)  
There's a separate daughter board that holds the barrel jack power receptacle, distributes power to the MLB and offers a connection terminal for all of the speaker wires.

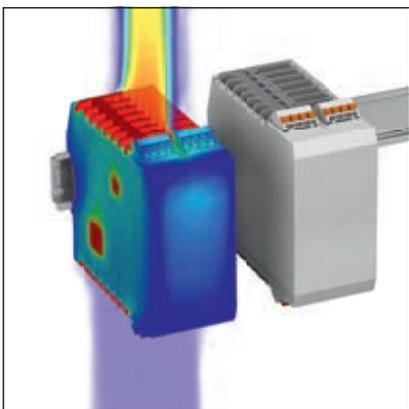
Disconnect the audio cables from the white connector port. Using a T6 driver, unfasten all of the screws.

Once the daughter board is free from the metal core, carefully disconnect the main power flex cable that travels to the MLB.



 These findings are from iFixit, the open source repair guide. The popular site teaches people how to fix just about any electronic device, and sells the parts and tools to make it possible. Anyone can create a repair manual for a device or edit the existing guides to improve them. iFixit empowers individuals to share their technical knowledge and teach the rest of the world how to fix their stuff. <https://canada.ifixit.com>

# CONNECT



## When technology and expertise come together

Phoenix Contact's expertise spans a wide range of applications so that you can make power, control, and network connections with absolute confidence. ICS modular electronics housings are ready for the IoT devices of today and tomorrow with graduated sizes, variable connection technology, and optional DIN rail connectors. As miniaturization leads to increasingly higher densities in electronics, efficient cooling is essential in protecting sensitive components. Our flexible designs accommodate a wide variety of passive heatsinks to help protect devices from overheating. With the help of our intuitive web-based thermal simulation tool, we can help you choose the right heatsink design and arrangement to suit your needs. No matter the application, you can trust Phoenix Contact for consistent quality, reliability, and high performance – every time.

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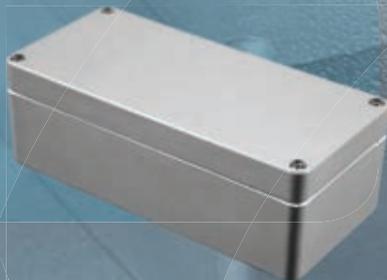
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