

# PRESS-FIT CONNECTIONS

for the Automotive Industry

# INNOVATIVE TECHNOLOGIES

TE Connectivity (TE) is a leader in automotive connectivity and sensor technology. Our engineers are always working to meet complex requirements. We connect nearly every electronic function in the vehicle - from alternative power systems to infotainment and sensor technologies. Our technologies withstand harsh environments and tolerate high temperature, vibration, shock, pressure and long-life in electronic control systems.



## INTERCONNECTION SYSTEMS

Our electrical and electronic interconnection products and solutions are used to electrically and mechanically connect wires and cables, printed circuit boards, integrated circuit packages, batteries and more ...



## CABLE ASSEMBLIES

TE is your partner for vehicle-specific cable assemblies. We offer research and development capabilities, prototypes and samples, as well as manufacturing facilities.



## HYBRID & ELECTRIC MOBILITY SOLUTIONS

Our technologies leverage decades of innovation and experience with high-voltage transmission and distribution. Our hybrid and electric mobility solutions include a complete line of connectors, terminals, sensors, cable assemblies, contactors, and battery connection protection to help safeguard the flow of power in hybrid and electric vehicles. Connection after connection, you can count on TE for smaller, greener, lighter and smarter solutions you can trust.



## SENSOR SOLUTIONS

Data is critical for making vehicles safer, greener, smarter and more connected. Customers rely on our sensor technology to provide data for control, adaptation and response of vehicle functions and features that increase safety, comfort, efficiency, and more. We collaborate to provide solutions for demanding and harsh applications such as automated transmissions, engines, chassis, clutch, brake and exhaust. Our products can be found in vehicles traveling the world's roads and highways.





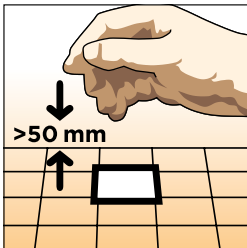

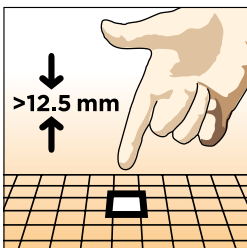
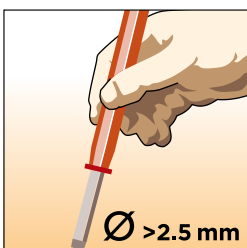
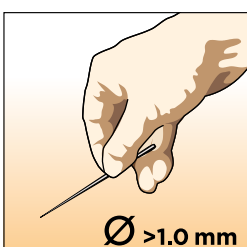
## INFOTAINMENT


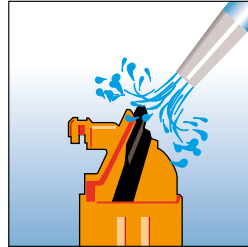
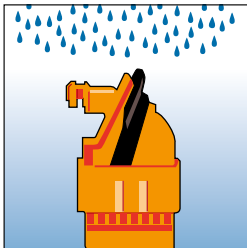

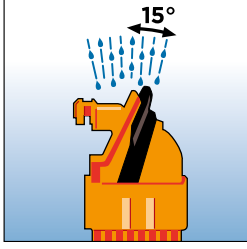
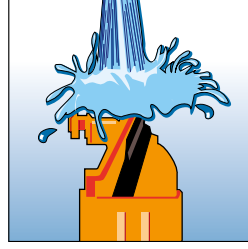
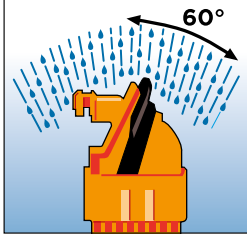
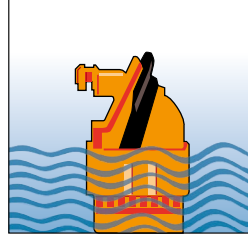
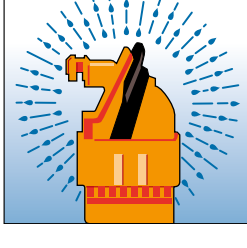
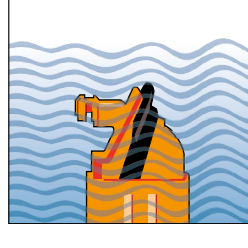
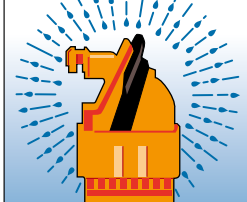

Our wide range of infotainment solutions are ideal for consumer port connections, high data rate applications, next-generation harness architecture, board-to-board connections and vehicle-to-vehicle communication.



## RELAYS

From passenger comfort and infotainment to higher DC voltages and power levels to harsh environments, our relays and contactors provide critical switching functions in multiple vehicle applications. With increased contact gaps and other key design features, our relays are ideal for harsh environments such as shock and vibration.

1st Digit Against Foreign Objects (incl. Dust)	1st Digit Against Foreign Objects (incl. Dust)
<p><b>0</b></p>  <p>Not protected.</p>	<p><b>5K</b></p>  <p>Dust protected.</p>
<p><b>1</b></p>  <p>Protected against solid objects greater than 50 mm (ex. back of hand).</p>	<p><b>6K</b></p>  <p>Dust tight.</p>
<p><b>2</b></p>  <p>Protected against solid objects greater than 12.5 mm (ex. finger).</p>	
<p><b>3</b></p>  <p>Protected against solid objects greater than 2.5 mm (ex. tool).</p>	
<p><b>4</b></p>  <p>Protected against solid objects greater than 1.0 mm (ex. wire).</p>	

2nd Digit	Against Water	2nd Digit	Against Water
0	 <p>Not protected.</p>	5	 <p>Protected against jetting water.</p>
1	 <p>Protected against vertically dripping water.</p>	6	 <p>Protected against powerfully jetting water.</p>
2	 <p>Protected against dripping water when tilted up to 15°.</p>	6K	 <p>Protected against powerfully jetting water with increased pressure (Automotive).</p>
3	 <p>Protected against spraying water (up to 60° inclination).</p>	7	 <p>Protected against the temporary effects of immersion up to 1 meter.</p>
4	 <p>Protected against splashing water.</p>	8	 <p>Protected against continuous submersion agreed with customer, but more severe than code 7.</p>
4K	 <p>Protected against splashing water with increased pressure.</p>	9K	 <p>Protected against high-pressure/steam-jet cleaning (Automotive).</p>

At TE Connectivity, we support your RoHS requirements. We've assessed more than 1.5 million end items/components for RoHS compliance, and issued new part numbers where any change was required to eliminate the restricted materials. Part numbers in this catalog are identified as:

### **RoHS Compliant**

Part numbers in this catalog are RoHS Compliant, unless marked otherwise. These products comply with European Union Directive 2002/95/EC as amended 1 January 2006 that restricts the use of lead, mercury, cadmium, hexavalent chromium, PBB, and PBDE in certain electrical and electronic products sold into the EU as of 1 July 2006.

Note: For purposes of this Catalog, included within the definition of RoHS Compliant are products that are clearly "Out of Scope" of the RoHS Directive such as hand tools and other non-electrical accessories.

### **Non-RoHS Compliant**

These part numbers are identified with a "t" symbol. These products do not comply with the material restrictions of the European Union Directive 2002/95/EC.

### **5 of 6 Compliant**

A "l" symbol identifies these part numbers. These products do not fully comply with the European Union Directive 2002/95/EC because they contain lead in solderable interfaces (they do not contain any of the other five restricted substances above allowable limits). However, these products may be suitable for use in RoHS applications where there is an application-based exception for lead in solders, such as the server, storage, or networking infrastructure exemption.

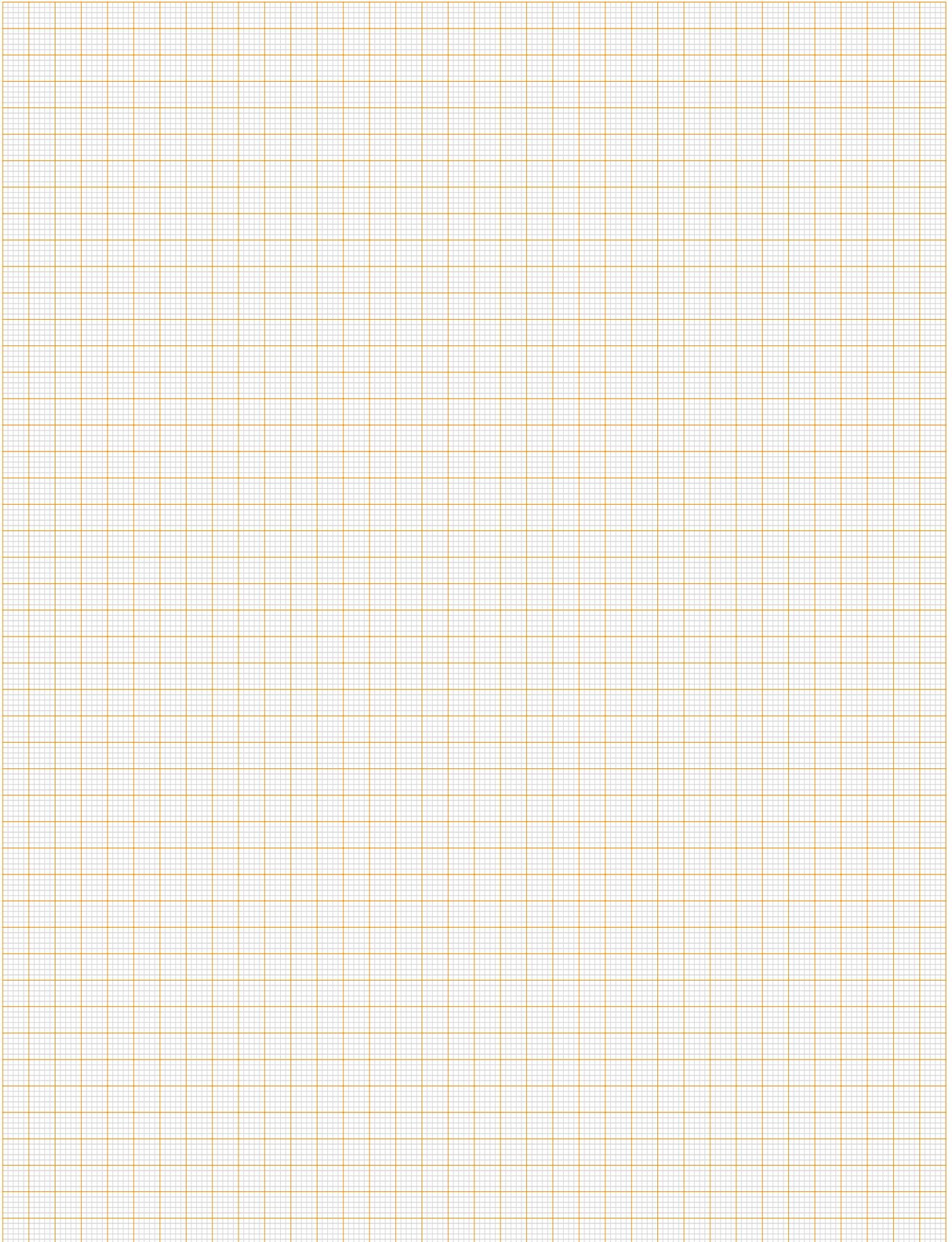
Note: Information regarding RoHS compliance is provided based on reasonable inquiry of our suppliers and represents our current actual knowledge based on the information provided by our suppliers. This information is subject to change. For latest compliance status, refer to our website referenced below. So whatever your questions when it comes to RoHS, we've got the answers at <http://www.TE.com/customersupport/rohssupportcenter/>

### **Getting the information you need**

Our comprehensive on-line RoHS Customer Support Center provides a forum to answer your questions and support your RoHS needs. A RoHS FAQ (Frequently Asked Questions) is available with links to more detailed information. You can also submit RoHS questions and receive a response within 24 hours during a normal work week. The Support Center also provides:

- Cross-Reference from Non-compliant to Compliant Products
- Ability to browse RoHS Compliant Products in our on-line catalog:  
[www.TE.com/commerce/alt/RohsAltHome.do](http://www.TE.com/commerce/alt/RohsAltHome.do)
- Downloadable Technical Data Customer Information Presentation
- More detailed information regarding the definitions used above





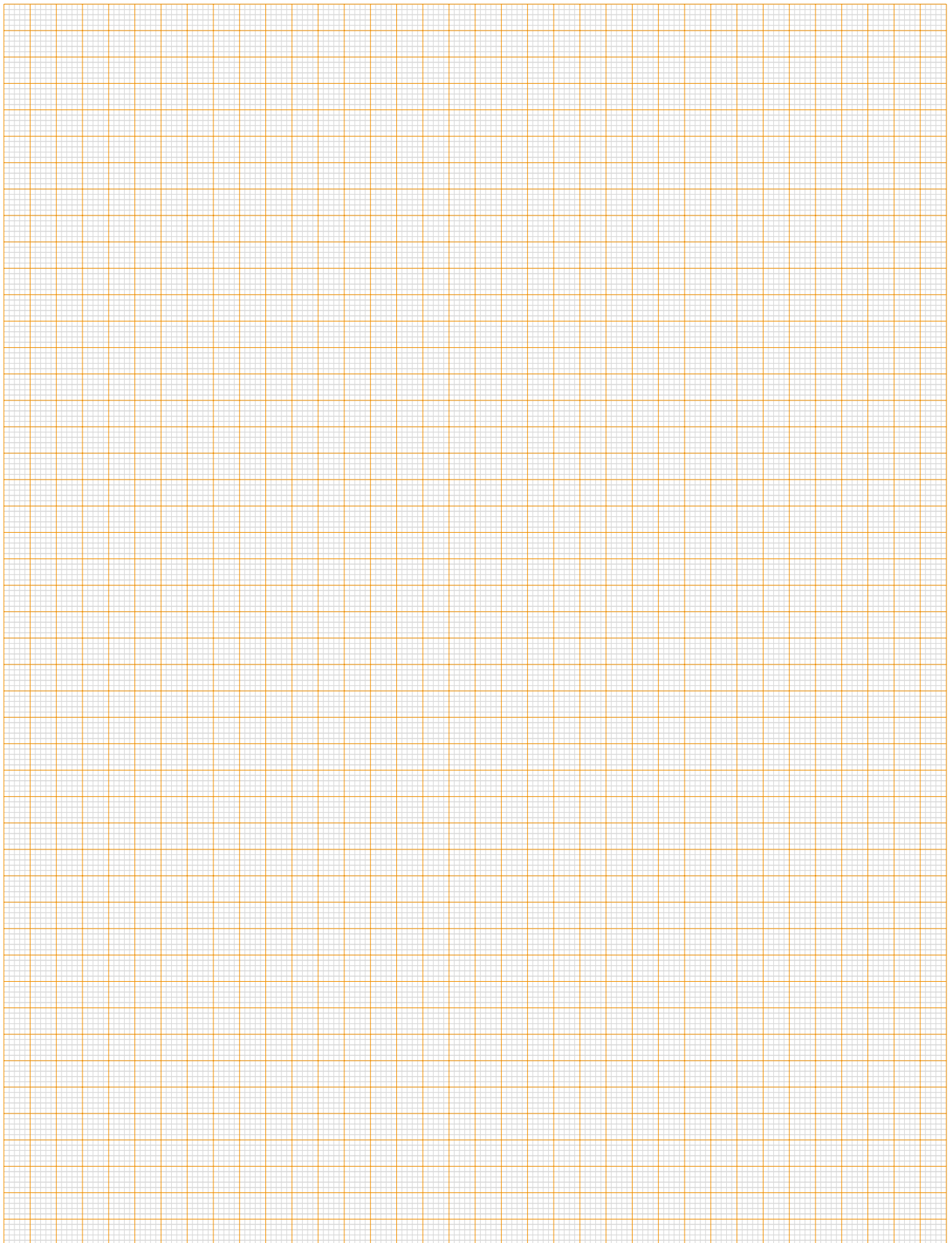
**Press-Fit Connections**

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## Press-Fit Single Pins Overview

	ACTION PIN		Multispring		
PCB Hole Size (mm)	∅ 0.9 / ∅ 1.0	∅ 1.35 / ∅ 1.45	∅ 0.6	∅ 1.0	
Material Thickness (mm)	0.60	0.80	0.40	0.60	
Blade Size					Page
0.5			•		4
0.63	•			•	5 - 6
0.64	•				7 - 8
1.0	•				9
1.2	•				9
1.5	•	•			9 - 10
2.8	•	•			10 - 11
4.8 / 6.3		•			12
Double Pin				•	13
90° Pin				•	14 - 15
Wire Connection	•				16
Flat Foil Cable (FFC)	•				17
Special Contact		•			18 - 19



## POWERTRAIN SYSTEMS



## SAFETY & SECURITY SYSTEMS



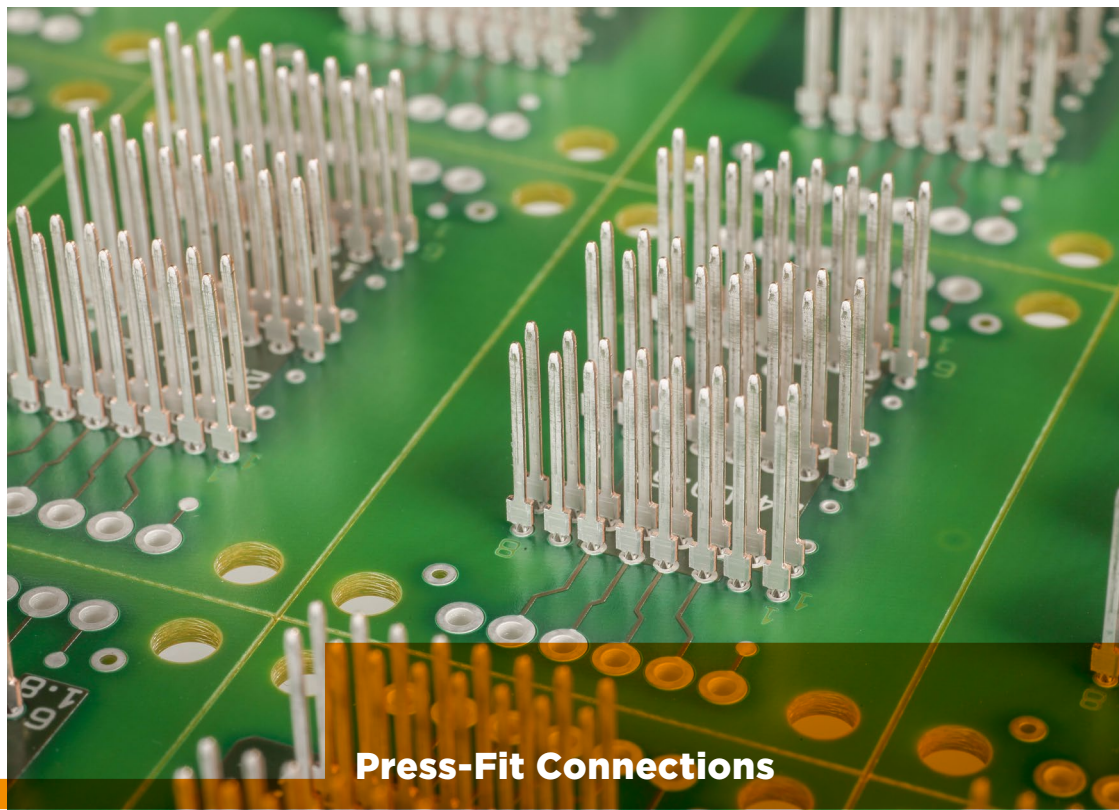
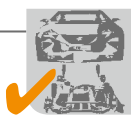
## CONVENIENCE



## DRIVER INFORMATION



## BODY & CHASSIS SYSTEMS



## Press-Fit Connections

### INTRODUCTION

TE Connectivity offers two distinctive press-fit technologies for automotive applications: ACTION PIN and Multispring which are both compliant pin designs featuring an elastic behavior during the pin insertion into a Printed Circuit Board (PCB).

The press-fit zone will deform during insertion into the PCB to enable a reliable electrical and mechanical connection over lifetime. The press-fit pin design meets the standardized blade sizes and interfaces of the automotive industry.

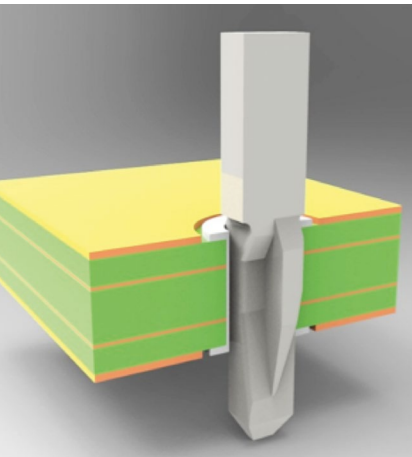
The ACTION PIN and Multispring press-fit pins can be used in various applications in vehicles from the passenger compartment to the toughest harsh environments including the engine bay area.

In addition to the press-fit technology TE Application Tooling also offers the matching application tooling equipment for single-pin insertion and connector seating machines and customers can benefit from one-hand supplier.

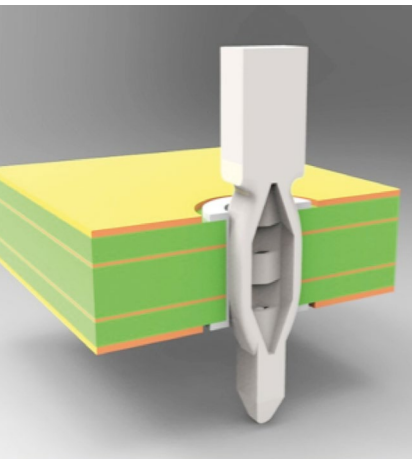
### ACTION PIN and Multispring Press-Fit Advantages:

- Reliability – IEC norm shows it is minimum 10 times more reliable than soldering and IDC connections
- Press-fit miniaturization – NanoMultispring
- Fast manufacturing process
- No heat treatment required
- No need for high temperature plastics
- No thermal stress to connector
- No soldering mistakes like bridges bad wetting, flux residuals, cold solder joints, etc.
- Environmental friendly – GREENER

## Press-Fit Connections Introduction



Picture 1:  
The pictures show an ACTION PIN  
press-fit pin (above) and a  
Multispring press-fit pin (below).



The principle for a press-fit connection is that a contact terminal is pressed into a printed circuit board (PCB). There are two types of press-fit pins; the solid pin having a solid press-in zone and the compliant pin having an elastic press-in zone. In this white paper only the press-fit pin having an elastic press-in zone is described and it is called the press-fit pin.

Press-fit technology from TE Connectivity (TE) was first introduced in the telecommunication industry in the 1970s. Later, in 1988, the first press-fit pin from TE Connectivity was introduced in the automotive industry. Today TE Connectivity offers two distinctive press-fit solutions for automotive applications: ACTION PIN and Multispring pin (see picture 1) which are both compliant pin designs featuring an elastic behavior during the pin insertion.

In the following chapters several different press-fit aspects will be described and discussed in terms of functionality, properties, characteristics and applications focused on the automotive industry.

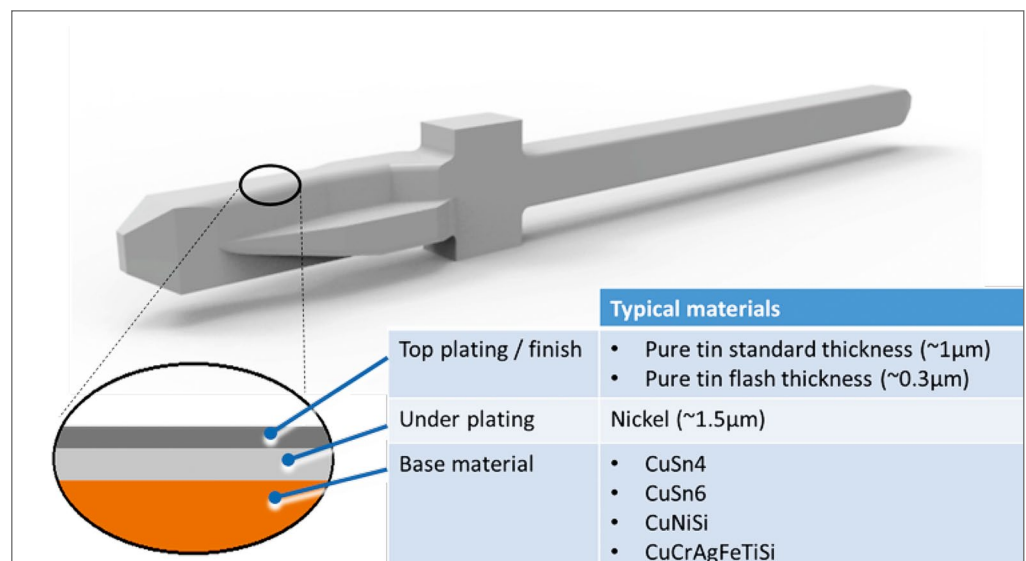
TE's press-fit solutions in fact are compliant pins featuring an elastic behavior and thus will deform during insertion (significantly reducing stress on the PCB holes compared to solid press-fit pin - which do no more exist in automotive applications) and sustain a permanent contact normal force when inserted to enable a reliable electrical and mechanical connection over lifetime.

Additionally, high contact normal forces between compliant pin and plated through hole (commonly) generate cold welded interconnections autonomously after the pin insertion; especially, if tin plating is used for at least one of both contact partners (pin/hole). Due to these cold welding processes intermetallic connections are generated leading to excellently low contact resistance values (commonly below 0.1 mOhm / in sub-Milliohm range). Furthermore, the mechanical stability is significantly supported.

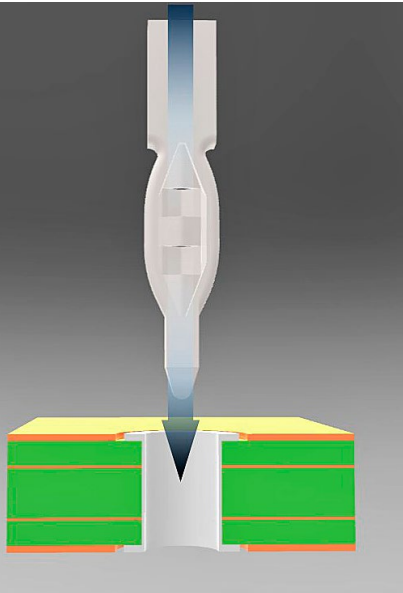
Press-fit pin and plated through hole (PTH) summarize together to a press-fit system. The functionality of such a system is dependent of the properties / characteristics of both of the components and their interactions.

### Materials

The press-fit pin can be made of different base materials featuring two galvanic layers, the under-plating and the top plating, in a sandwich structure. Picture 2 shows the most common materials and layers used in the automotive industry.



Picture 2:  
Typical materials used for press-fit pins.



### Functions

Functions =  
f (properties)

#### Electrical functions

(desired in brackets)

- Contact resistance (low)
- Current carrying capacity (high)

#### Mechanical functions

(desired)

- Insertion force (low)
- Retention force (high)
- Through hole deformation (low)

### Properties

#### Press-fit pin properties

- Design/Shape/Size
- Base material
- Plating (type & thickness)

#### Through hole properties

- Drill diameter
- Copper tube thickness
- Plating (type & thickness)
- Board material
- Pre-processing (reflow etc.)

### Benefits with press-fit

Press-fit technology is a solder-less termination enabling a permanent electrical and mechanical terminal-to-PCB connection with several distinctive advantages:

- Fast processing -> comparative data: lead time soldering vs. press-fit
- Use of standard resins instead of cost intensive heat stabilized resins in the header
- Prevents thermal treatment to the header
- Flexible application designs with single pin insertion due to freely programmable pin arrays in terms of pin numbers and orientation
- Stand-alone pin insertion possible
- Lubrication and flux aid free processing
- Prevents solder paste printing and pre-heating
- Environmental friendly
- No shading-off issues with large header components in post-soldering insertion
- Prevents soldering defects like bridges, bad wetting, flux residuals, solder balls, spider webs thermal load and cold solder joints

Of course, matching application equipment is needed to manufacture press-fit technology related modules (instead of soldering equipment). Since this is commonly highly flexible and automated the machinery equipment can be used for several different products and applications.

### Product characteristics and qualification

The overall press-fit product characteristic features several electrical and mechanical functions.

The practical performance in terms of these functions is depending on multiple properties mainly coming from the press-fit pin (and its type of application) and the PCB/PTH.

In addition, the insertion process can contribute to the functional results (insertion depth, ins. Velocity).

The relation between properties and functions is highly interactive in that manner that certain singular properties may affect certain or even all functions up to certain degrees; with some of them being shifted counter-wise. Also, single functions can depend on multiple properties and their interactions.

Since it is generally not possible to change or shift single functions independently the overall performance is to be considered when discussing single properties. The interactive correlation can require a prioritizing of a major function. If so, this should be done in thorough respect of the application and final product needs.

## Press-Fit Connections NanoMultispring



### Technical Features

**Press-fit zone**

NanoMultispring

**Material thickness**

0.4 mm

**Total Temperature Range**

-40°C ... +125°C

**Insertion Force**

Max 90 N

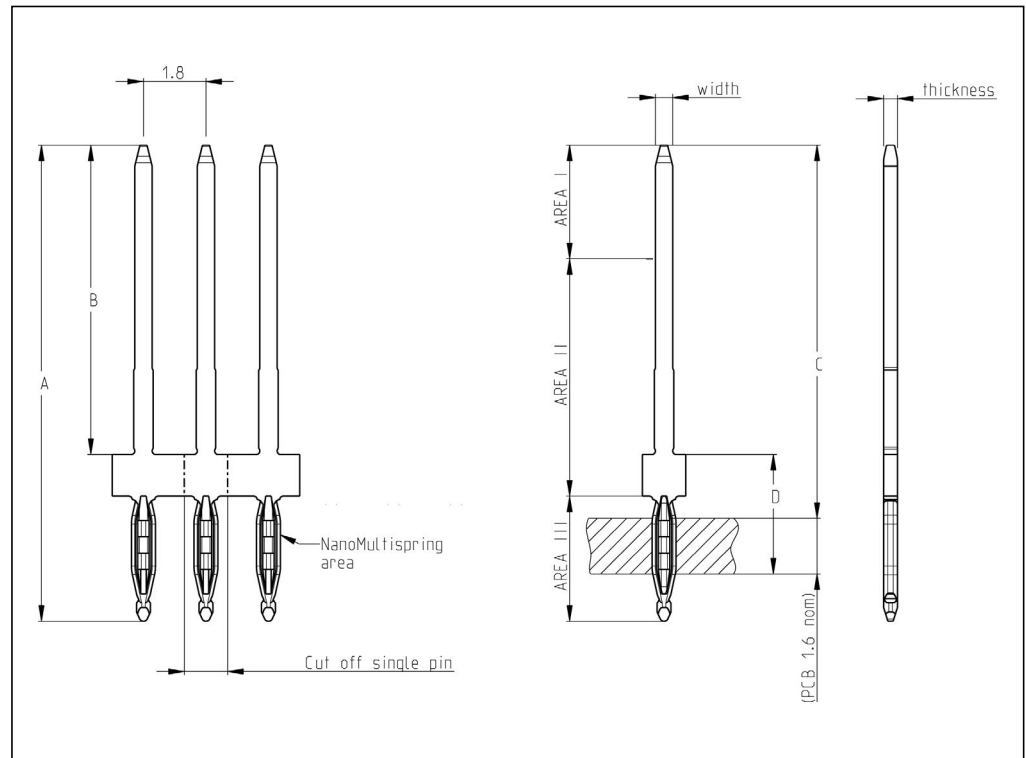
**Push-out Force**

Min 20 N

**Current Carrying Capacity**

up to 5 Ampere  
(@ 80 °C ambient temperature)

### NanoMultispring Press-Fit Pin for NanoMQS Contacts



**Product Drawing**  
2282347

**Product Requirements**  
IEC 60352-5 / TE 108-90836

**Product Specification**  
108-90836

### NanoMultispring Press-Fit Pin for NanoMQS Contacts

Dimensions Area I, Contact Tab Area (mm) Width x Thickness	Dimensions (mm)				Nominal PCB Hole Diameter (mm)	Material	Finish Area I, Contact Tab Area	Finish Area III, Press-Fit Area	Part Number	Mating Receptacle Contact	Conversion Kit for P100/P300/P350 *)
	A	B	C	D							
0.50 x 0.40	13.70	8.90	12.25	3.40	0.6	CuSn6	Sn	Sn	2282347-1	1-1703930-1 2-1703930-1 2177908-1 2177909-1	7-*700-9
0.50 x 0.40	12.80	8.00	11.35	3.40	0.6	CuSn6	Sn	Sn	2282347-2	1-1703930-1 2-1703930-1 2177908-1 2177909-1	0-*705-8

\*) For dash numbers please contact TE Application Tooling





**Technical Features**

**Press-fit zone**

ACTION PIN

**Material thickness**

0.6 mm

**Total Temperature Range**

-40 °C ... +125 °C

**Insertion Force**

Max 180 N

**Push-out Force**

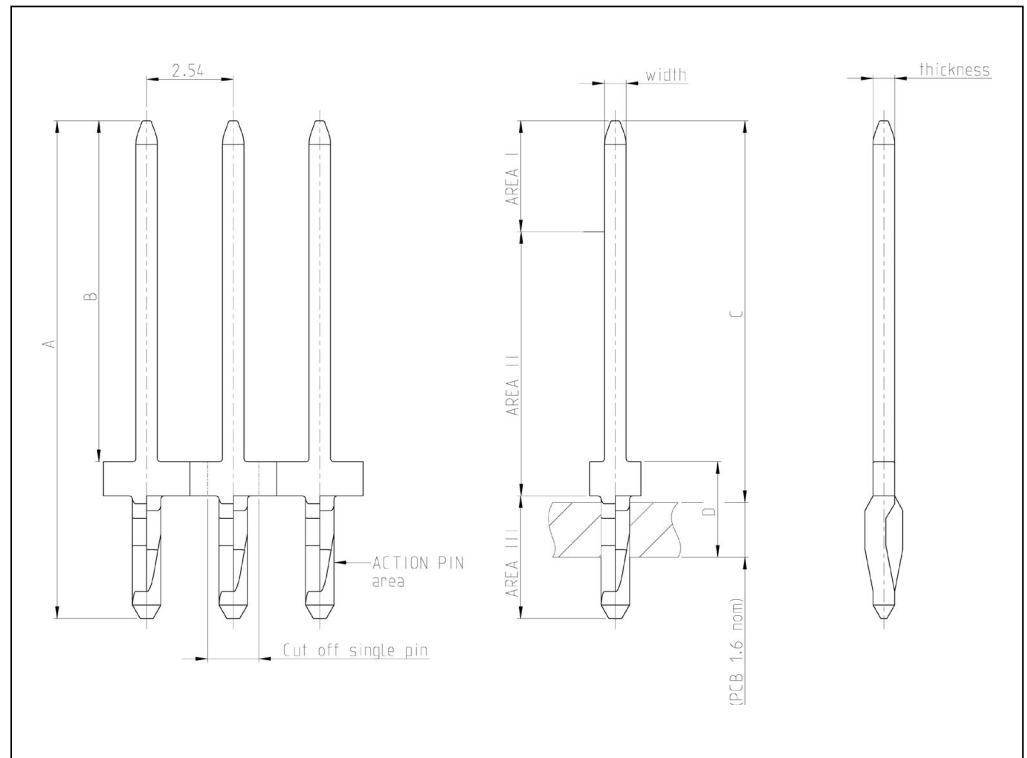
Min 50 N

**Current Carrying Capacity**

up to 5 Ampere

(@ 80 °C ambient temperature)

**ACTION PIN Press-Fit Pin for MQS and TH Contacts**



**Product Drawing**  
963964 / 929278 / 929958 /  
2278076 / 1801209

**Product Requirements**  
IEC 60352-5 / TE 108-18643 /  
TE 108-18002

**Product Specification**  
108-18643 / 108-18002

**ACTION PIN Press-Fit Pin for MQS and TH Contacts** (continued on page 6)

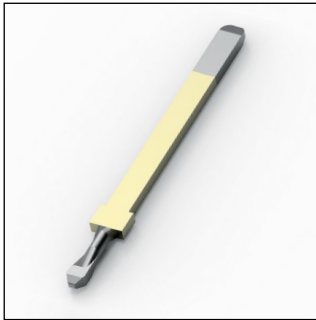
Dimensions Area I, Contact Tab Area (mm) Width x Thickness	Dimensions (mm)				Nominal PCB Hole Diameter (mm)	Material	Finish Area I, Contact Tab Area	Finish Area III, Press-Fit Area	Part Number	Mating Receptacle Contact	Product Specification	Conversion Kit for P100/P300/P350 *)
	A	B	C	D								
0.63 x 0.63	11.65	7.05	8.25	2.80	1.0	CuNiSi	Au	Sn	1-963964-3	5-928999-5 5-963715-5	108-18643	3-*410-0
0.63 x 0.63	11.65	7.05	8.25	2.80	1.0	CuNiSi	Sn	Sn	2-963964-3	5-928999-1 5-963715-1	108-18643	3-*410-0
0.63 x 0.63	13.40	8.80	10.00	2.80	1.0	CuNiSi	Au	Sn	1-963964-4	5-928999-5 5-963715-5	108-18643	3-*410-0
0.63 x 0.63	13.40	8.80	10.00	2.80	1.0	CuNiSi	Sn	Sn	2-963964-4	5-928999-1 5-963715-1	108-18643	3-*410-0
0.63 x 0.63	14.70	10.10	11.30	2.80	1.0	CuNiSi	Sn	Sn	2-963964-7	5-928999-1 5-963715-1	108-18643	3-*410-0
0.63 x 0.63	14.70	10.10	11.30	2.80	1.0	CuNiSi	Au	Sn	3-963964-7	5-928999-5 5-963715-5	108-18643	3-*410-0
0.63 x 0.63	12.80	8.20	9.40	2.80	1.0	CuNiSi	Sn	Sn	2-963964-8	5-928999-1 5-963715-1	108-18643	3-*410-0
0.63 x 0.63	15.00	10.40	11.60	2.80	1.0	CuNiSi	Sn	Sn	6-963964-5	5-928999-1 5-963715-1	108-18643	3-*410-0
0.63 x 0.63	24.90	20.30	21.50	2.80	1.0	CuNiSi	Sn	Sn	7-963964-9	5-928999-1 5-963715-1	108-18643	3-*410-0
0.63 x 0.63	13.90	9.30	10.60	2.90	1.0	CuNiSi	Sn	Sn	1-929278-2	5-928999-1 5-963715-1	108-18643	3-*410-0

\*) For dash numbers please contact TE Application Tooling

**ACTION PIN Press-Fit Pin for MQS and TH Contacts** (continued from page 5)

Dimensions Area I, Contact Tab Area (mm) Width x Thickness	Dimensions (mm)				Nominal PCB Hole Diameter (mm)	Material	Finish Area I, Contact Tab Area	Finish Area III, Press-Fit Area	Part Number	Mating Receptacle Contact	Product Specification	Conversion Kit for P100/P300/P350 *)
	A	B	C	D								
0.63 x 0.63	11.45	7.05	8.25	3.00	0.9	CuSn	Au	Sn	1-929958-1	5-928999-5 5-963715-5	108-18002	3-*410-0
0.63 x 0.63	11.45	7.05	8.25	3.00	0.9	CuSn	Sn	Sn	2-929958-1	5-928999-1 5-963715-1	108-18002	3-*410-0
0.63 x 0.63	13.20	8.80	10.00	3.00	0.9	CuSn	Sn	Sn	1-929958-2	5-928999-5 5-963715-5	108-18002	3-*410-0
0.63 x 0.63	13.20	8.80	10.00	3.00	0.9	CuSn	Sn	Sn	2-929958-2	5-928999-1 5-963715-1	108-18002	3-*410-0
0.63 x 0.63	17.90	13.30	14.50	2.80	1.0	CuNiSi	Sn	Sn	2278076-2	5-928999-1 5-963715-1	108-18643	3-*410-0
0.64 x 0.64	12.80	8.20	9.40	2.80	1.0	CuNiSi	Sn	Sn	1801209-1	2005097-1 1123343-1	108-18643	3-*410-0

\*) For dash numbers please contact TE Application Tooling



**ACTION PIN Press-Fit Pin for AMPMODU II Contacts**

**Technical Features**

**Press-fit zone**

ACTION PIN

**Material thickness**

0.6 mm

**Total Temperature Range**

-65 °C ... +125 °C

**Insertion Force**

Max 180 N

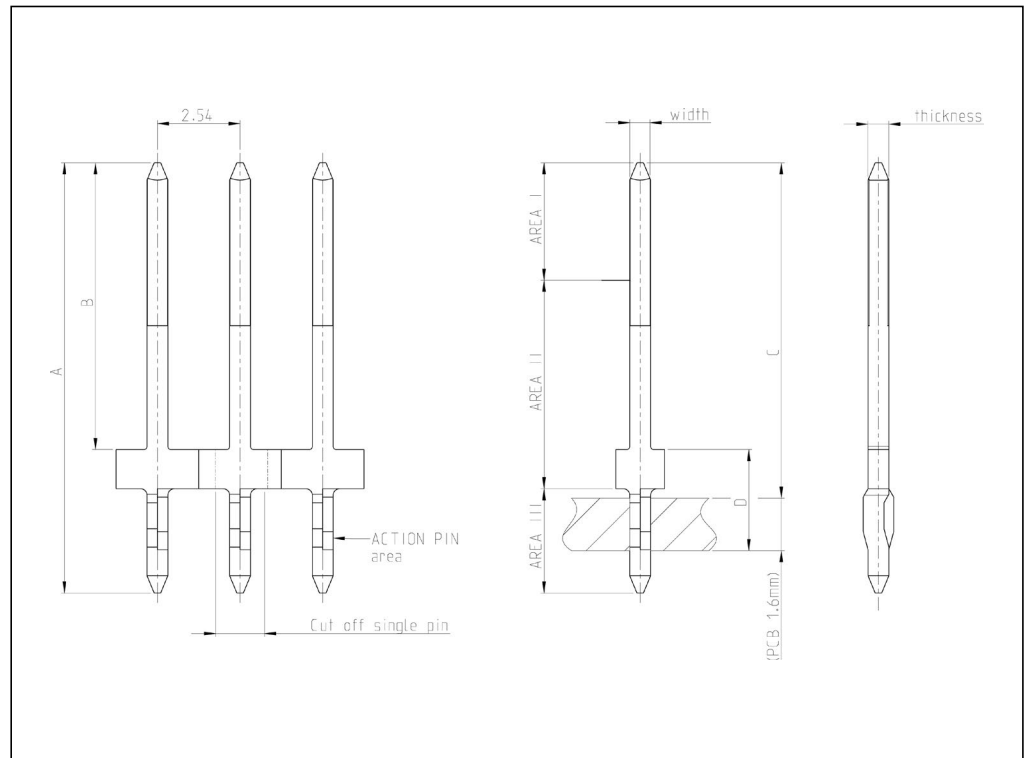
**Push-out Force**

Min 50 N

**Current Carrying Capacity**

up to 5 Ampere

(@ 80 °C ambient temperature)



**Product Drawing**  
928776

**Product Requirements**  
IEC 60352-5 / TE 108-18012

**Product Specification**  
108-18012

**ACTION PIN Press-Fit Pin for AMPMODU II Contacts (continued on page 8)**

Dimensions Area I, Contact Tab Area (mm) Width x Thickness	Dimensions (mm)				Nominal PCB Hole Diameter (mm)	Material	Finish Area I, Contact Tab Area	Finish Area III, Press-Fit Area	Part Number	Mating Receptacle Contact	Conversion Kit for P100/P300/P350 *)
	A	B	C	D							
0.64 x 0.64	11.45	7.05	8.25	3.10	0.9	CuSn	Au	Sn	1-928776-2	166500-2 280530-1	3-*410-0
0.64 x 0.64	15.20	10.80	12.00	3.10	0.9	CuSn	Au	Sn	1-928776-3	166500-2 280530-1	3-*410-0
0.64 x 0.64	13.20	8.80	10.00	3.10	0.9	CuSn	Au	Sn	1-928776-4	166500-2 280530-1	3-*410-0
0.64 x 0.64	10.00	5.60	6.80	3.10	0.9	CuSn	Au	Sn	1-928776-5	166500-2 280530-1	3-*410-0
0.64 x 0.64	16.80	12.40	13.60	3.10	0.9	CuSn	Sn	Sn	1-928776-6	166500-9 280708-2	3-*410-0
0.64 x 0.64	21.20	16.80	18.00	3.10	0.9	CuSn	Au	Sn	1-928776-7	166500-2 280530-1	3-*410-0
0.64 x 0.64	8.40	4.00	5.20	3.10	0.9	CuSn	Sn	Sn	1-928776-9	166500-9 280708-2	3-*410-0
0.64 x 0.64	11.45	7.05	8.25	3.10	0.9	CuSn	Sn	Sn	2-928776-2	166500-9 280708-2	3-*410-0
0.64 x 0.64	15.20	10.80	12.00	3.10	0.9	CuSn	Sn	Sn	2-928776-3	166500-9 280708-2	3-*410-0
0.64 x 0.64	16.80	12.40	13.60	3.10	0.9	CuSn	Au	Sn	2-928776-6	166500-2 280530-1	3-*410-0

\*) For dash numbers please contact TE Application Tooling

**ACTION PIN Press-Fit Pin for AMPMODU II Contacts** (continued from page 7)

Dimensions Area I, Contact Tab Area (mm) Width x Thickness	Dimensions (mm)				Nominal PCB Hole Diameter (mm)	Material	Finish Area I, Contact Tab Area	Finish Area III, Press-Fit Area	Part Number	Mating Receptacle Contact	Conversion Kit for P100/P300/P350 *)
	A	B	C	D							
0.64 x 0.64	21.20	16.80	18.00	3.10	0.9	CuSn	Sn	Sn	2-928776-7	166500-9 280708-2	3-*410-0
0.64 x 0.64	11.45	7.05	8.25	3.10	0.9	CuSn	Sn	Sn	3-928776-2	166500-9 280708-2	3-*410-0
0.64 x 0.64	13.20	8.80	10.00	3.10	0.9	CuSn	Sn	Sn	3-928776-4	166500-9 280708-2	3-*410-0

\*) For dash numbers please contact TE Application Tooling



**Technical Features**

**Press-fit zone**  
ACTION PIN

**Material thickness**  
0.6 / 0.8 mm

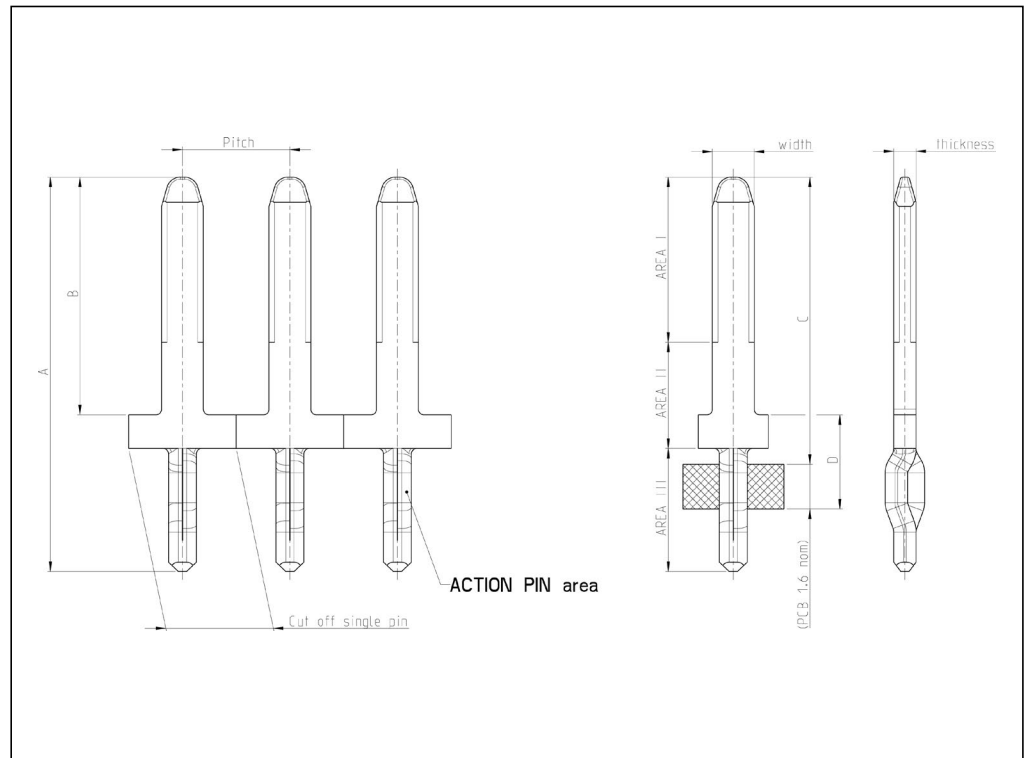
**Total Temperature Range**  
-40° C ... +125° C

**Insertion Force**  
Max 180 N

**Push-out Force**  
Min 50 N

**Current Carrying Capacity**  
up to 5 Ampere  
(@ 80° C ambient temperature)

**ACTION PIN Press-Fit Pin with one Press-Fit Area**



**Product Drawing**  
368405 / 1743447 /  
1394353 / 1563229

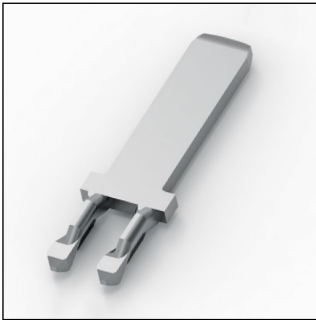
**Product Requirements**  
IEC 60352-5 / TE  
108-61069 /  
TE 108-18643 / TE  
108-18867

**Product Specification**  
108-61069 / 108-18643 /  
108-18867

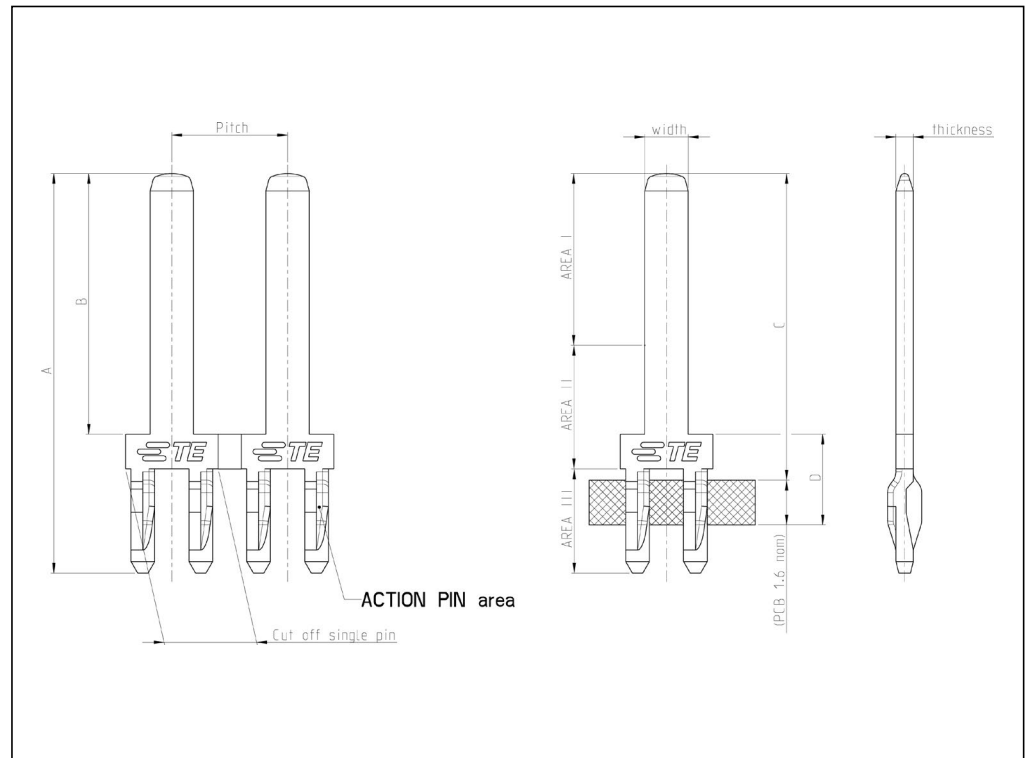
**ACTION PIN Press-Fit Pin with one Press-Fit Area**

Dimensions Area I, Contact Tab Area (mm) Width x Thickness	Dimensions (mm)					Nominal PCB Hole Diameter (mm)	Material	Finish Area I, Contact Tab Area	Finish Area III, Press-Fit Area	Part Number	Mating Receptacle Contact	Product Specification	Conversion Kit for P100/P300/ P350 *)
	A	B	C	D	Pitch								
1.00 x 0.60	17.20	12.60	13.80	2.80	2.54	1.0	CuSn	Sn	Sn	1-368405-2	7-1452653-1 7-1452656-1 7-1452659-1	108-61069	*700-2
1.20 x 0.60	17.00	12.20	13.60	3.00	2.54	1.0	CuSn	Sn	Sn	1-1743447-2	7-1452653-1 7-1452656-1 7-1452659-1	108-61069	6-*904-4
1.50 x 0.60	16.90	10.30	14.75	4.45	2.80	1.0	CuNiSi	Sn	Sn	1394353-2	1564980-1 1241374-1 1534334-1	108-18643	9-*904-8
1.50 x 0.80	14.10	8.50	10.20	3.30	3.85	1.35	CuSn	Sn	Sn	1-1452692-3	1418408-1 1418410-1	108-18867	2-*701-6
1.50 x 0.80	15.20	9.60	11.30	3.30	3.85	1.35	CuSn	Sn	Sn	1-1563229-2	1418408-1 1418410-1	108-18867	2-*701-6
1.50 x 0.80	15.20	9.60	11.30	3.30	3.85	1.35	CuSn	Au	Sn	2-1563229-2	On request	108-18867	2-*701-6

\*) For dash numbers please contact TE Application Tooling



**ACTION PIN Press-Fit Pin with two Press-Fit Areas**



**Technical Features**

**Press-fit zone**  
ACTION PIN

**Material thickness**  
0.6 / 0.8 mm

**Total Temperature Range**  
-40 °C ... +125 °C

**Insertion Force**  
Max 400 N

**Push-out Force**  
Min 80 N

**Current Carrying Capacity**  
up to 24 Ampere  
(@ 80° C ambient temperature)

**Product Drawing**

1823233 / 1452568 / 1452688 /  
338429

**Product Requirements**

IEC 60352-5 / TE 108-18706 /  
TE 108-94362 / TE 108-18644 /  
TE 108-19059

**Product Specification**

108-18706 / 108-94362 /  
108-18644 / 108-19059

**ACTION PIN Press-Fit Pin with two Press-Fit Areas** (continued on page 11)

Dimensions Area I, Contact Tab Area (mm) Width x Thickness	Dimensions (mm)					Nominal PCB Hole Diameter (mm)	Material	Finish Area I, Contact Tab Area	Finish Area III, Press-Fit Area	Part Number	Mating Receptacle Contact	Product Specification	Conversion Kit for P100/P300/ P350 *)
	A	B	C	D	Pitch								
1.50 x 0.60	13.80	9.00	10.50	3.10	4.00	1.0	CuSn	Sn	Sn	1-1823233-3	1564980-1 1241374-1 1534334-1	108-18706	4-*410-7
1.50 x 0.60	13.80	9.00	10.50	3.10	4.00	1.0	CuSn	Au	Sn	2-1823233-3	1564980-2 1241374-2	108-18706	4-*410-7
2.80 x 0.60	13.40	7.90	10.00	3.70	5.08	1.0	CuNiSi	Sn	Sn	1-1452568-2	1564982-1 1241388-1 1241390-1	108-94362	1-*700-0
2.80 x 0.60	15.00	9.50	11.60	3.70	5.08	1.0	CuNiSi	Sn	Sn	1-1452568-3	1564982-1 1241388-1 1241390-1	108-94362	1-*700-0
2.80 x 0.80	14.90	9.40	11.30	3.50	5.00	1.35	CuSn	Sn	Sn	1-1452688-3	1-968880-1 1-968849-1 1-968851-1 1-968853-1	108-18644	6-*410-4
2.80 x 0.80	14.90	9.40	11.30	3.50	5.00	1.35	CuSn	Au	Sn	2-1452688-1	1-968849-2 1-968851-2	108-18644	6-*410-4
2.80 x 0.80	14.90	9.40	11.30	3.50	5.00	1.35	CuSn	Ag	Sn	3-1452688-2	1-968880-3 1-968849-3 1-968851-3 1-968853-3	108-18644	6-*410-4

\*) For dash numbers please contact TE Application Tooling

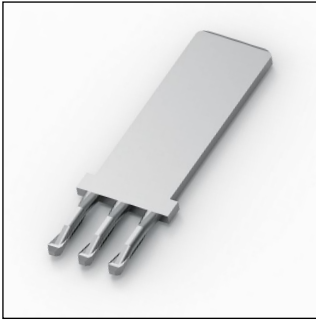


**Press-Fit Connections**  
**ACTION PIN**

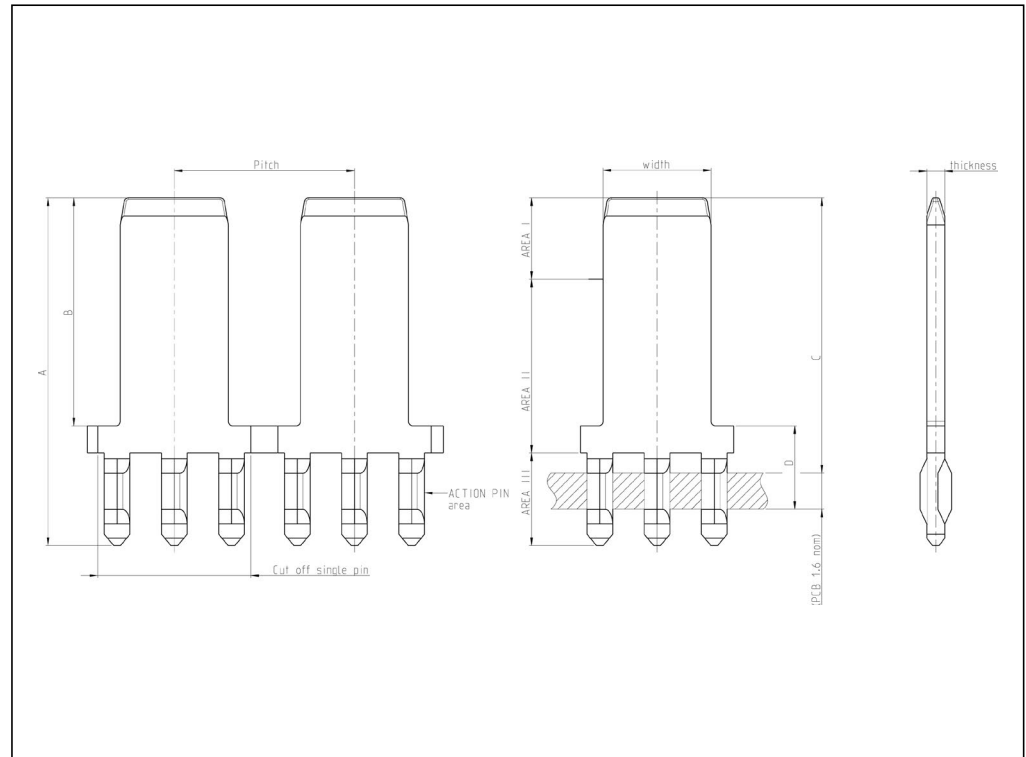
**ACTION PIN Press-Fit Pin with two Press-Fit Areas** (continued from page 10)

Dimensions Area I, Contact Tab Area (mm) Width x Thickness	Dimensions (mm)					Nominal PCB Hole Diameter (mm)	Material	Finish Area I, Contact Tab Area	Finish Area III, Press-Fit Area	Part Number	Mating Receptacle Contact	Product Specification	Conversion Kit for P100/P300/ P350 *)
	A	B	C	D	Pitch								
2.80 x 0.80	18.50	10.75	13.50	5.15	5.40	1.45	CuSn	Sn	Sn	338429-2	1-968880-1	108-19059	1-*410-1
											1-968849-1		
											1-968851-1		
											1-968853-1		
2.80 x 0.80	18.50	10.75	13.50	5.15	5.40	1.45	CuSn	Ag	Sn	338429-3	1-968880-3	108-19059	1-*410-1
											1-968849-3		
											1-968851-3		
											1-968853-3		

\*) For dash numbers please contact TE Application Tooling



**ACTION PIN Press-Fit Pin with three Press-Fit Areas**



**Technical Features**

**Press-fit zone**  
ACTION PIN

**Material thickness**  
0.8 mm

**Total Temperature Range**  
-40 °C ... +125 °C

**Insertion Force**  
Max 600 N

**Push-out Force**  
Min 120 N

**Current Carrying Capacity**  
up to 36 Ampere  
(@ 80 °C ambient temperature)

**Product Drawing**  
1452719 / 929451 / 1740723 /  
215842

**Product Requirements**  
IEC 60352-5 / TE 108-18707 /  
TE 108-94044

**Product Specification**  
108-18707 / 108-94044

**ACTION PIN Press-Fit Pin with three Press-Fit Areas**

Dimensions Area I, Contact Tab Area (mm) Width x Thickness	Dimensions (mm)					Nominal PCB Hole Diameter (mm)	Material	Finish Area I, Contact Tab Area	Finish Area III, Press-Fit Area	Part Number	Mating Receptacle Contact	Product Specification	Conversion Kit for P100/P300/ P350 *)
	A	B	C	D	Pitch								
4.80 x 0.80	17.60	12.39	14.40	3.70	8.00	1.35	CuSn	Sn	Sn	1-1452719-3	1241400-1	108-18707	3-*410-1
											1241402-1		
											1241404-1		
											1241406-1		
1241408-1													
4.80 x 0.80	15.40	10.10	12.20	3.70	8.00	1.35	CuSn	Sn	Sn	1-929451-3	1241400-1	108-18707	3-*410-1
											1241402-1		
											1241404-1		
											1241406-1		
1241408-1													
6.30 x 0.80	23.85	16.05	19.85	5.40	10.00	1.45	CuSn	Sn	Sn	1740723-3	1241400-1	108-94044	6-*410-8
											1241402-1		
											1241404-1		
											1241406-1		
1241408-1													
6.30 x 0.80	18.50	10.75	13.50	4.35	8.80	1.45	CuSn	Sn	Sn	216842-2	927852-7	108-94044	8-*700-4
											927854-7		
6.30 x 0.80	18.50	10.75	13.50	4.35	8.80	1.45	CuSn	Ag	Sn	216842-4	927852-8	108-94044	8-*700-4
											927854-8		

\*) For dash numbers please contact TE Application Tooling



**Multispring Press-Fit Double Pin**

**Technical Features**

**Press-fit zone**

Multispring

**Material thickness**

0.6 mm

**Total Temperature Range**

-40° C ... +130° C

**Insertion Force**

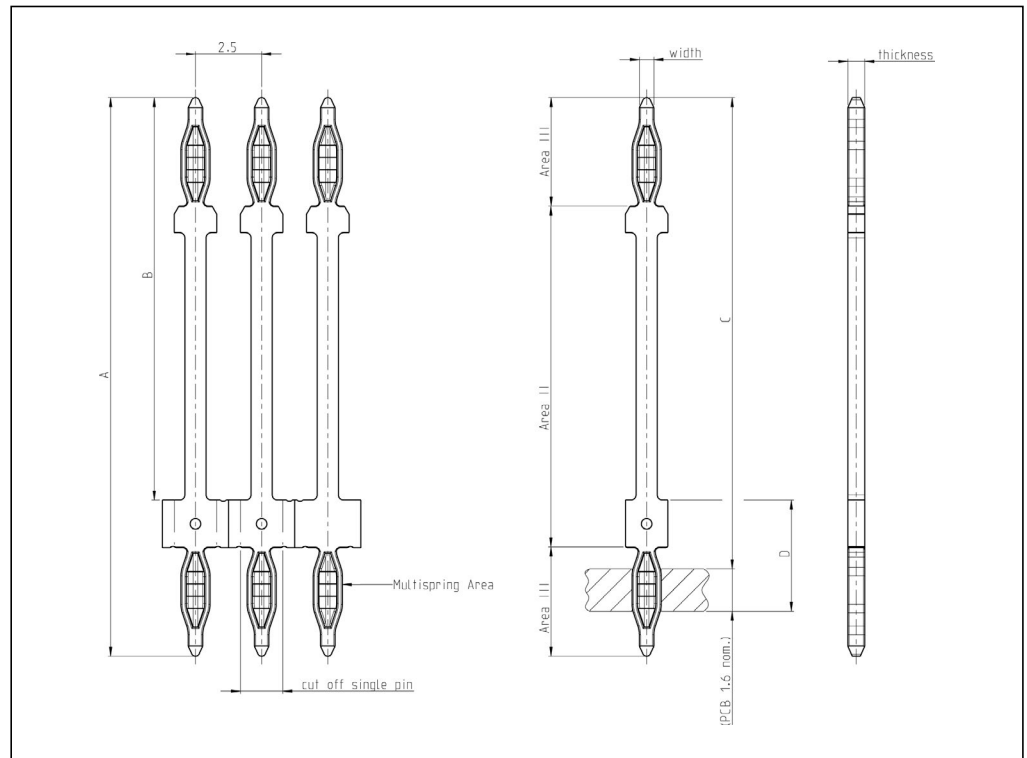
Max 150 N

**Push-out Force**

Min 30 N

**Current Carrying Capacity**

up to 12 Ampere  
(@ 80° C ambient temperature)



**Product Drawing**  
2141016

**Product Requirements**  
IEC 60352-5 / TE 108-90800

**Product Specification**  
108-90800

**Multispring Press-Fit Double Pin**

Dimensions Area III, Press Fit Area (mm) Width x Thickness	Dimensions (mm)				Nominal PCB Hole Diameter (mm)	Material	Finish Area III, Press-Fit Area	Part Number	Conversion Kit for P100/P300/P350 *)
	A	B	C	D					
0.64 x 0.64	21.10	15.20	17.80	4.20	1.0	CuSn	Sn	2141016-2	3-*410-3

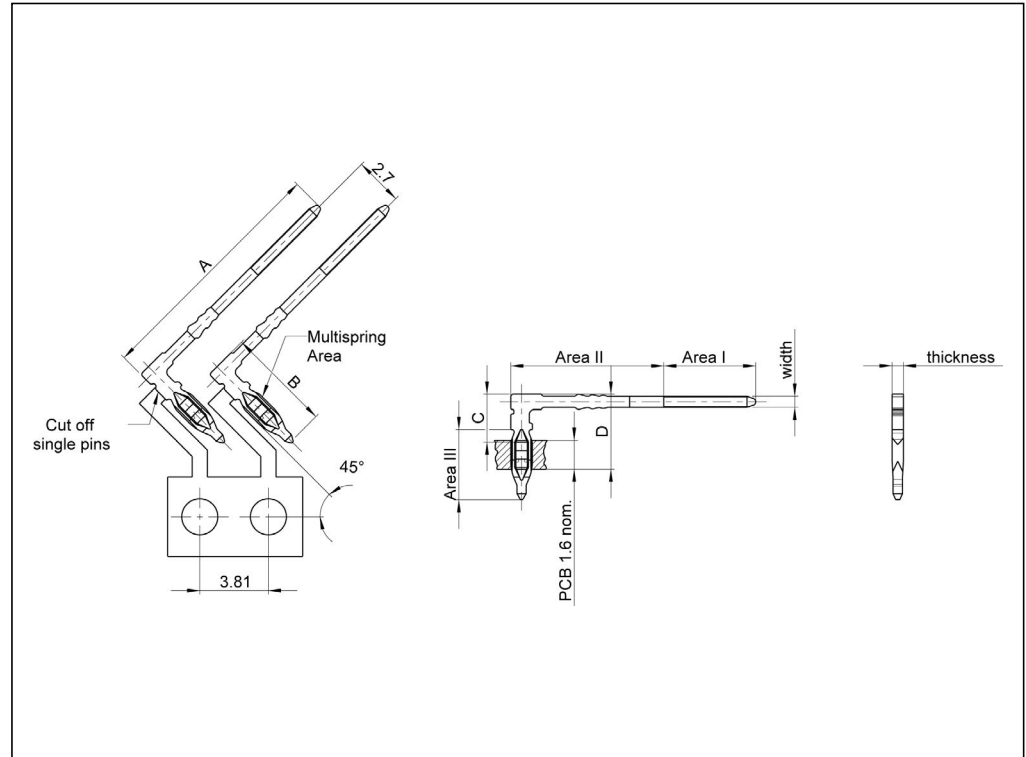
\*) For dash numbers please contact TE Application Tooling



**Multispring Press-Fit Pin 90° for MQS Contacts**

**Technical Features**

- Press-fit zone**  
Multispring
- Material thickness**  
0.6 mm
- Total Temperature Range**  
-40°C ... +130°C
- Insertion Force**  
Max 150 N
- Push-out Force**  
Min 30 N
- Current Carrying Capacity**  
up to 12 Ampere  
(@ 80 °C ambient temperature)



**Product Drawing**  
1393355

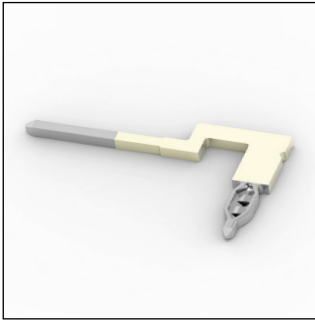
**Product Requirements**  
IEC 60352-5 / TE 108-90800

**Product Specification**  
108-90800

**Multispring Press-Fit Pin 90° for MQS Contacts**

Dimensions Area I, Contact Tab Area (mm) Width x Thickness	Dimensions (mm)				Nominal PCB Hole Diameter (mm)	Material	Finish Area I, Contact Tab Area	Finish Area III, Press-Fit Area	Part Number	Mating Receptacle Contact	Conversion Kit for P100/P300/P350
	A	B	C	D							
0.63 x 0.63	13.60	5.94	2.64	4.17	1.0	CuSn	Sn	Sn	1393355-2	5-928999-1 5-963715-1	On request**

\*\*\*) For requests contact TE Application Tooling



**Multispring Press-Fit Pin 90° for ELO Contacts**

**Technical Features**

**Press-fit zone**

Multispring

**Material thickness**

0.6 mm

**Total Temperature Range**

-40°C ... +130°C

**Insertion Force**

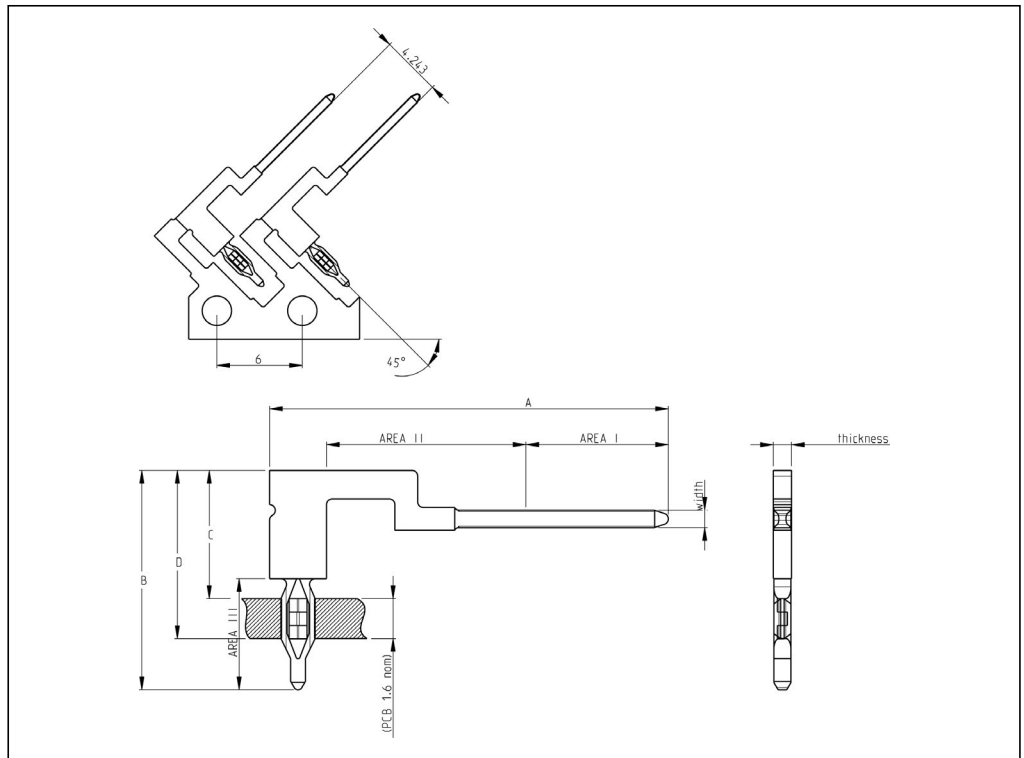
Max 150 N

**Push-out Force**

Min 30 N

**Current Carrying Capacity**

up to 12 Ampere  
(@ 80°C ambient temperature)



**Product Drawing**  
1417081

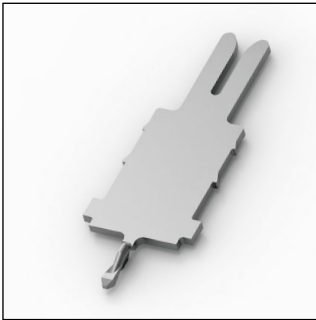
**Product Requirements**  
IEC 60352-5 / TE 108-90800

**Product Specification**  
108-90800

**Multispring Press-Fit Pin 90° for ELO Contacts**

Dimensions Area I, Contact Tab Area (mm) Width x Thickness	Dimensions (mm)				Nominal PCB Hole Diameter (mm)	Material	Finish Area I, Contact Tab Area	Finish Area III, Press-Fit Area	Part Number	Mating Receptacle Contact	Conversion Kit for P100/P300/P350
	A	B	C	D							
0.62 x 0.64	14.00	7.70	4.40	6.00	1.0	CuSn	Sn	Sn	1417081-1	1411566-1 1411567-1	On request**

\*\*) For requests contact TE Application Tooling



**ACTION PIN Press-Fit Pin for Wire Connections**

**Technical Features**

**Press-fit zone**

ACTION PIN

**Material thickness**

0.6 mm

**Total Temperature Range**

-40° C ... +125° C

**Insertion Force**

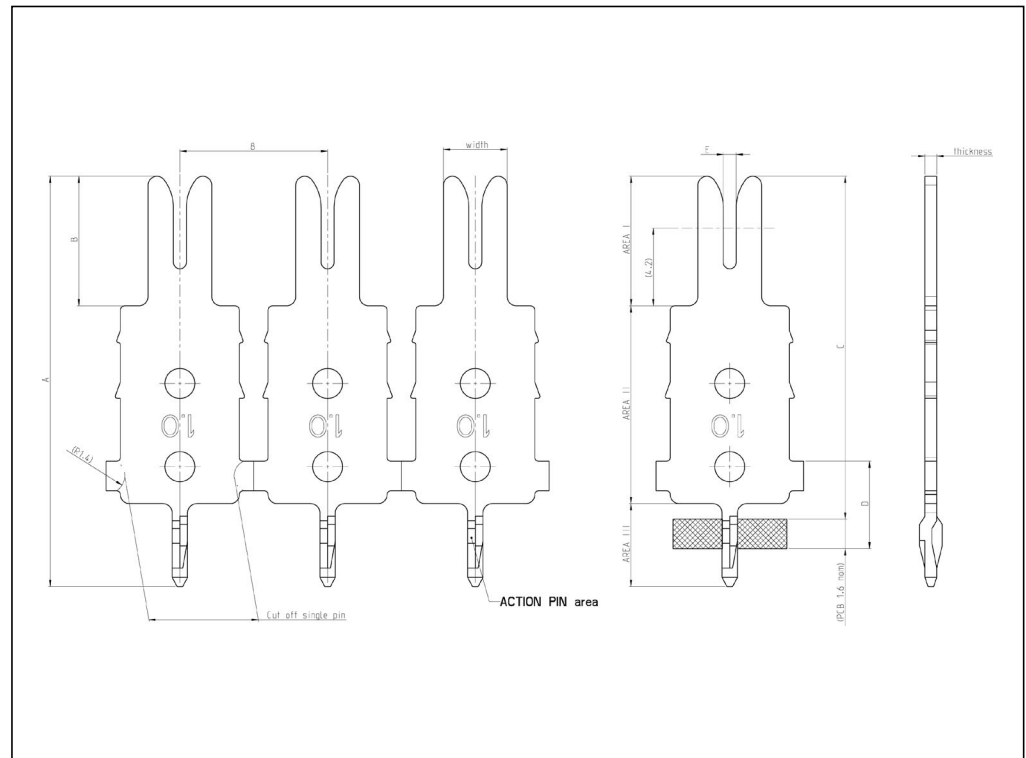
Max 600 N

**Push-out Force**

Min 120 N

**Current Carrying Capacity**

up to 5 Ampere  
(@ 80° C ambient temperature)



**Product Drawing**  
1670195

**Product Requirements**  
IEC 60352-5 / TE 108-18643

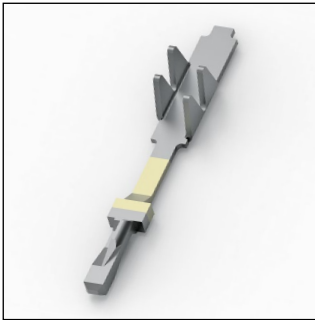
**Product Specification**  
108-18643

**ACTION PIN Press-Fit Pin for Wire Connections**

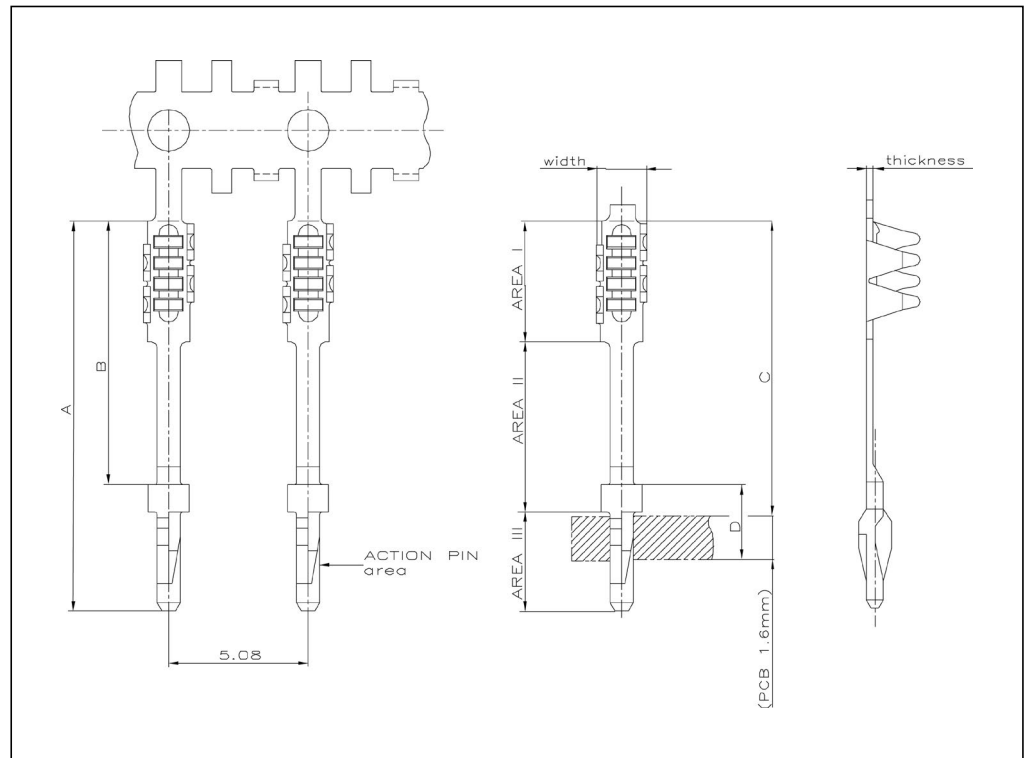
Dimensions Area I (mm) Width x Thickness	Dimensions (mm)				For Wire Diameter Ø E (mm)	Nominal PCB Hole Diameter (mm)	Material	Finish Area I, Wire connection Area	Finish Area III, Press-Fit Area	Part Number	Conversion Kit for P100/P300/P350
	A	B	C	D							
3.45 x 0.64	22.20	7.00	18.50	4.70	1.00	1.00	CuSn	Sn	Sn	1-1670195-2	On request**
3.45 x 0.64	22.20	7.00	18.50	4.70	0.80	1.00	CuSn	Sn	Sn	2-1670195-3	On request**
3.45 x 0.64	22.20	7.00	18.50	4.70	0.80	1.00	CuSn	Sn	Sn	3-1670195-2	On request**
3.45 x 0.64	19.80	7.00	16.10	4.70	0.80	1.00	CuSn	Sn	Sn	1-968964-2	On request**
3.45 x 0.64	19.80	7.00	16.10	4.70	1.00	1.00	CuSn	Sn	Sn	2-968964-2	On request**

\*\*) For requests contact TE Application Tooling





**ACTION PIN Press-Fit Pin for Flat Foil Cable (FFC)**



**Technical Features**

**Press-fit zone**

ACTION PIN

**Material thickness**

0.6 mm

**Total Temperature Range**

-40 °C ... +120 °C

**Insertion Force**

Max 180 N

**Push-out Force**

Min 50 N

**Current Carrying Capacity**

up to 0.5 Ampere  
(@ 80 °C ambient temperature)

**Product Drawing**  
968429

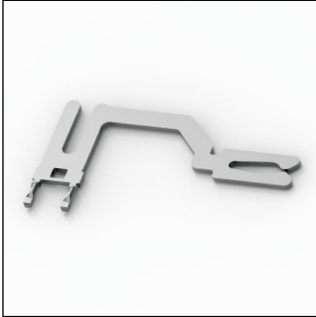
**Product Requirements**  
IEC 60352-5 / TE 108-18587-1

**Product Specification**  
108-18587-1

**ACTION PIN Press-Fit Pin for Flat Foil Cable (FFC)**

Dimensions Area I (mm) Width x Thickness	Dimensions (mm)				Nominal PCB Hole Diameter (mm)	Material	Finish Area I, FFC Connection Area	Finish Area III, Press-Fit Area	Part Number	Conversion Kit for P100/P300/P350
	A	B	C	D						
1.83 x 0.25	14.2	9.5	10.75	2.80	1.00	CuNiSi	Sn	Sn	968429-2	On request**

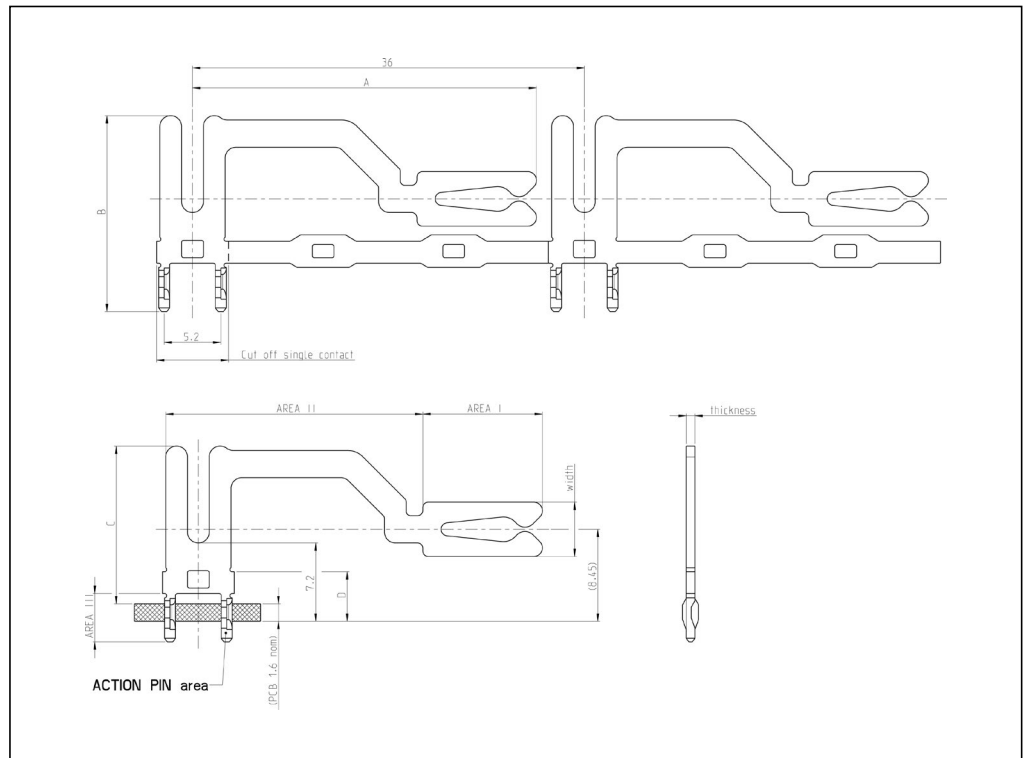
\*\*) For requests contact TE Application Tooling



**Technical Features**

- Press-fit zone**  
ACTION PIN
- Material thickness**  
0.8 mm
- Total Temperature Range**  
-40°C ... +125°C
- Insertion Force**  
Max 400 N
- Push-out Force**  
Min 80 N
- Current Carrying Capacity**  
up to 24 Ampere  
(@ 80 °C ambient temperature)

**ACTION PIN Press-Fit Pin 90° Special Contact**



**Product Drawing**  
1418813

**Product Requirements**  
IEC 60352-5 / TE 108-94014

**Product Specification**  
108-94014

**ACTION PIN Press-Fit Pin 90° Special Contact**

Dimensions Area I (mm) Width x Thickness	Dimensions (mm)				Nominal PCB Hole Diameter (mm)	Material	Finish Area I, Mating Side Area	Finish Area III, Press-Fit Area	Part Number
	A	B	C	D					
5.00 x 0.80	31.60	18.00	14.50	4.55	1.35	CuSn	Sn	Sn	1-1418813-1

\*\*) For requests contact TE Application Tooling



**Technical Features**

**Press-fit zone**

ACTION PIN

**Material thickness**

0.8 mm

**Total Temperature Range**

-40 °C ... +125 °C

**Insertion Force**

Max 400 N

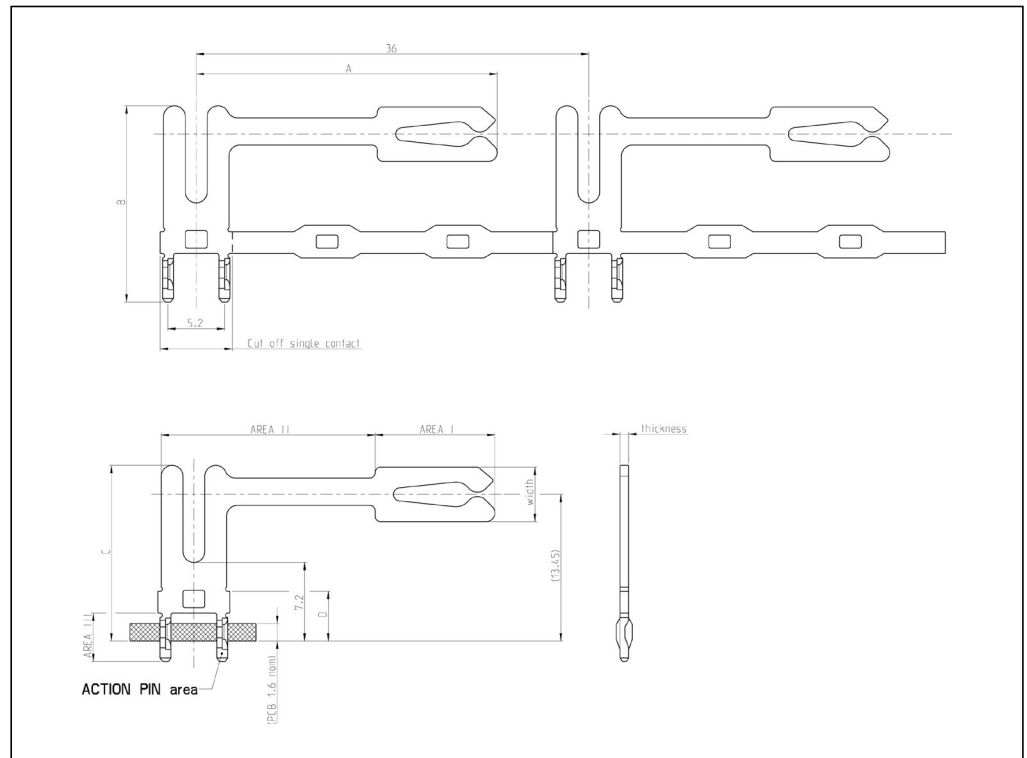
**Push-out Force**

Min 80 N

**Current Carrying Capacity**

up to 24 Ampere  
(@ 80 °C ambient temperature)

**ACTION PIN Press-Fit Pin 90° Special Contact**



**Product Drawing**  
1418814

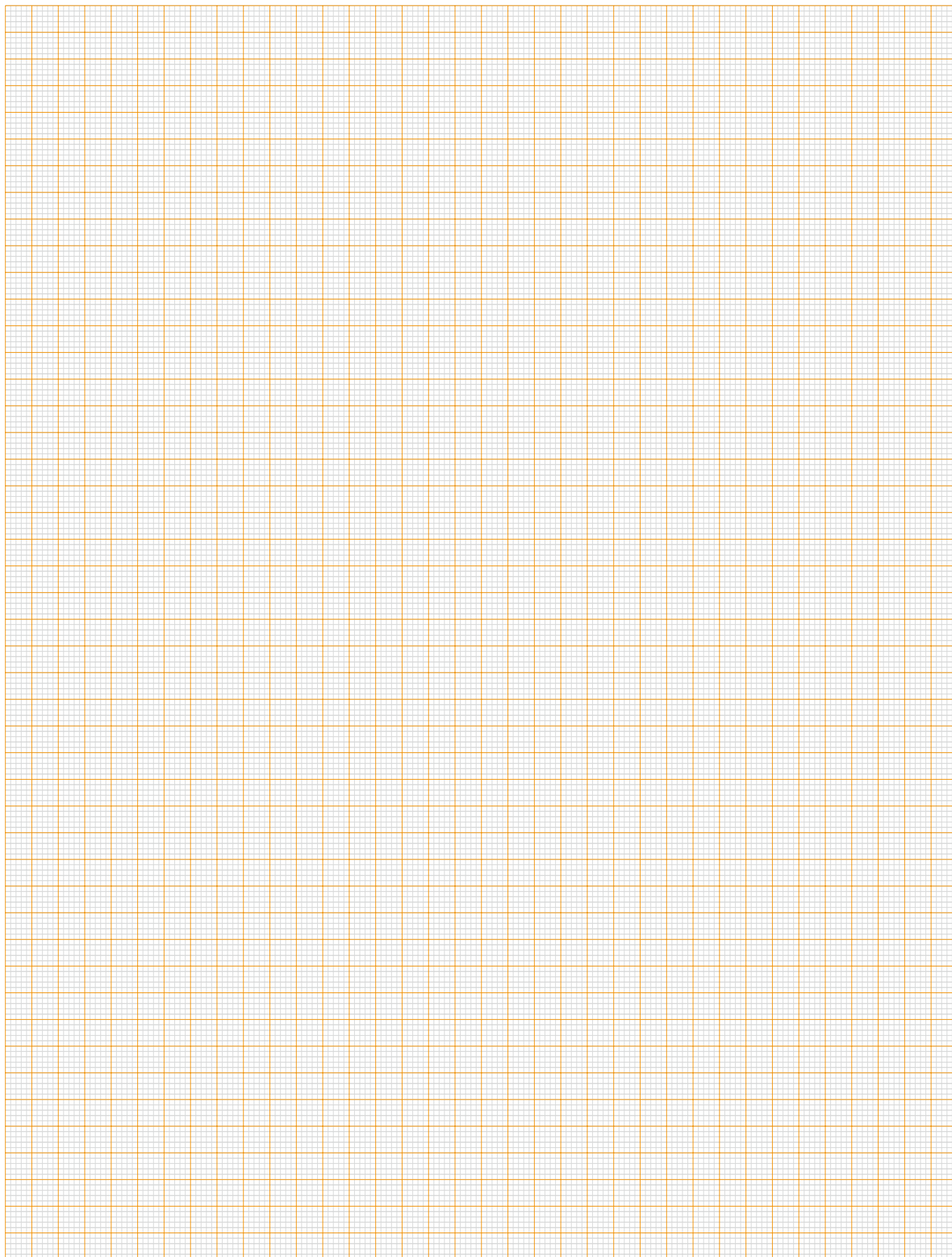
**Product Requirements**  
IEC 60352-5 / TE 108-94014

**Product Specification**  
108-94014

**ACTION PIN Press-Fit Pin 90° Special Contact**

Dimensions Area I (mm) Width x Thickness	Dimensions (mm)				Nominal PCB Hole Diameter (mm)	Material	Finish Area I, Mating Side Area	Finish Area III, Press-Fit Area	Part Number
	A	B	C	D					
5.00 x 0.80	27.60	18.00	14.50	4.55	1.35	CuSn	Sn	Sn	1-1418814-1

\*\*) For requests contact TE Application Tooling





## APPLICATION TOOLING AND EQUIPMENT

### INTRODUCTION

TE Application Tooling is dedicated to providing high quality equipment options to meet all levels of our connector products specifications. We are also able to provide a broad range of equipment for other manufacturer's products.

Our equipment range is vast and almost unmatched by others operating in the same industry segments, as is our global presence and support network in the form of field service engineers and product managers. We supply everything from simple hand tools to the most complex automated systems.

Equipment is segregated into two types and managed accordingly:

#### Generic equipment

Where we can supply you with sufficient information referenced by Part Number such that you can identify and order what you need yourself.

#### Specialised Equipment

Where you will need help from our specialist product managers to identify what's just right for your Application.

#### Finding Equipment Online

##### [www.tooling.te.com](http://www.tooling.te.com)

- Powerful searches to find generic equipment options (Hand Tools / Applicators)
- Brochures and more detailed flyers for the specialised equipment.
- It's quick, easy and more importantly the latest and most up to date information is available online.

#### Regional Assistance

##### [www.te.com/support-center](http://www.te.com/support-center)

**Pin Insertion Machines Comparison Chart**



Base Machine	P50	P100	P300	P350
Board Capacity	350 x 300 mm (13.75 x 11.8 in)	305 x 450 mm (12.0 x 18.0 in)	400 x 600 mm (15.5 x 23.5 in)	450 x 450 mm (17.5 x 17.5 in)
Loading	Manual	Manual	Manual, In-Line	In-Line
Insertion Rate (cycles per min)	.9 sec minimum for 1 pc (operator dependant)	120	180	300
Tool Changer	No	No	Yes	Yes
Anvil Changer	No	No	Yes	Yes
Anvil Drive	Pneumatic	Pneumatic	Pneumatic / Servo Motor	Servo Motor
In-Line / Interface	No	No	Yes / SMEMA** compliant	Yes
Force Monitoring / Documentation	Yes	Yes	Yes	Yes
Force Distance Curve Determination	No	No	Yes	Yes
Thickness Measuring	No	No	Yes	Yes
Vision System	No	Yes	Yes	Yes
Pin Presence Check	Yes	Yes	Yes	Yes
Pin Protrusion Length Measuring	No	No	Yes	Yes
Bar-Code Scanner	Yes	Yes	Yes	Yes
ESD Proofed Guards	No	Yes	Yes	Yes
Modem for Remote Diagnostics	No	No	Yes	Yes
Insertion Tools				
Number of Tools	1	Max. 2	Max. 4	Max. 4
Insertion Tool Power	Air	Air / Servo Motor	Servo Motor	Servo Motor
Insertion Angles per Tool	6	6programmable	programmable	7
Insertion Angles free programmable	No	Yes	Yes	Yes
Double Insertion	Yes	Yes	Yes	Yes
Splice Detection	Yes	Yes	Yes	Yes
Conversion Kits	Yes	Yes	Yes	Yes

\* Fuse and Relay Inserters

\*\* Surface Mount Equipment Manufacturers Association



TE Connectivity (TE) insertion machine platforms combined with performance enhancing accessories provide the flexibility to meet a wide range of customer requirements in the manufacturing of printed circuit boards.

Our goal is to provide the optimal solution for the production needs of our customers. Our application tooling representatives can help you to select the optimal machine configuration. The benefit to you is a low cost investment in order to meet your requirements of output and quality. Finally, TE Connectivity field service is available to service and support the machines to help maximize uptime.

Our line of four insertion machines have been designed to deliver very high performance and quality within their range of applications.

#### **Applied Cost Savings**

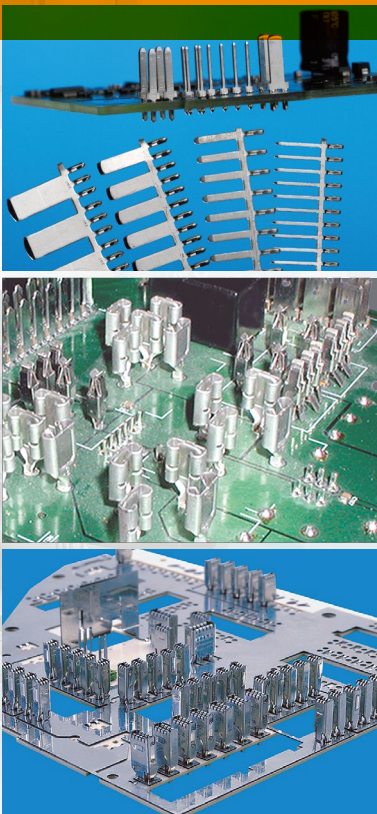
The competitive nature of today's markets requires continual improvement and cost savings in any production process. All of our insertion machines can be supplied with a rotary insertion finger that can apply products at different angles without decreasing the insertion rate. This eliminates costly lost production time associated with rotating the PCB. Product specific tooling is provided in tooling packs that can easily be changed from one product to another. This can greatly reduce initial capital expenditure while reducing the time associated with product change out.

#### **Quality Assurance**

Today's most demanding production operations require equipment that meets design specifications and assures end product quality. TE Connectivity insertion machines are able to use electrical continuity or discrete pin penetration sensing. This gives the machines the ability to assure that each product was correctly inserted in the PCB and remained there in real time. There is no additional quality check step required and all quality control (QC) data can be stored via the system control for future traceability. The upper level machines can be equipped with insertion force monitoring to provide an even higher degree of quality assurance as requested specially in automotive applications.

#### **Production Flexibility**

The insertion machines are also designed to provide a great deal of flexibility to meet your production needs of today and tomorrow. Products from TE Connectivity and other manufacturers can be applied to meet your full range of production requirements. Each product is applied by a specific "quick change" product tool pack that minimizes initial cost while maximizing platform capabilities. Finally, most of the machines can be supplied with more than one insertion head to increase the number of products that can be applied in a single machine.



# TE CONNECTIVITY ONLINE

[TE.com](http://TE.com) offers an enhanced digital experience, with more than 250,000 parts profiled. The site has deep, rich product data and easier access to tools and services. Other offerings include improved search and navigation and knowledge and idea sharing.



## COLLATERAL

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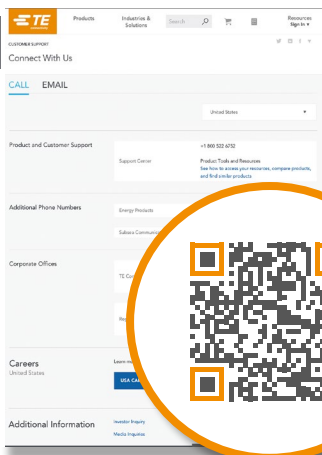
[www.te.com/automotive/literature.html](http://www.te.com/automotive/literature.html)



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