

**“Multispring standard signal ST06” Press-in zone for automotive use**

<b>PCB Hole size</b>	<b>(0.94...) 1.00...1.09 mm</b>
<b>Board thickness</b>	<b>&gt;=0.8 mm (nominal)</b>
<b>Stock thickness</b>	<b>0.6 ... 0.64 mm</b>

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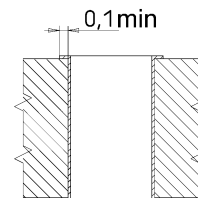
## 1. SCOPE

This specification covers all the information as required in the IEC 60352-5 (Issue 5; Jan 2012) for a Multispring Press-In zone (further named "Multispring") for nominal hole- $\varnothing$  1 mm and made from 0.6 ... 0.64 mm stock thickness.

The IEC requirements are supplemented with the requirements for automotive use (in the engine area) based on the "Arbeitskreis Prüfrichtlinie für KFZ-Steckverbinder".

## 2. PRINTED BOARD AND HOLE INFORMATION

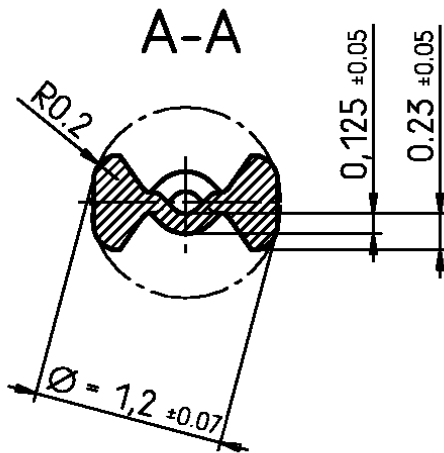
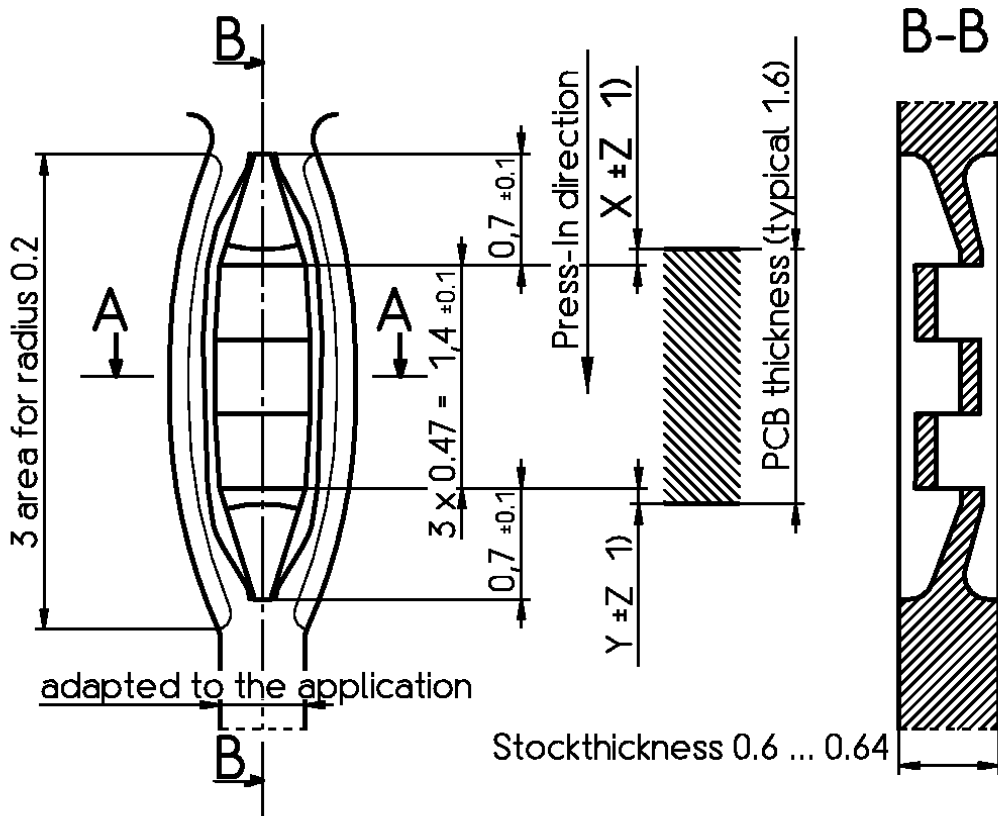
- Printed board material according to:  
IEC 61249-2-7 (replacement for the IEC 60249-2-4/5/11/12)  
Other board materials are possible and have to be tested on request.
- Maximum number of conductive layers: not limited.
- Printed board thickness:  
Normal range: Min = 1.6 mm  $\pm$ 0.14 mm; max = not limited + no restrictions  
Extended range: Min = 0.8 mm ... max = 1.6 mm: allowed with some restrictions:
  - \* The maximum deformation of the PCB-hole according to the IEC-norm can not be guaranteed for all types of PCB material used.
  - \* With some plating combinations the hold force can be smaller than the limit of min.30N.
  - \* Electrically less current can be put thru the press-fit and should be checked
  - \* An application test is necessary to test the project specific situationSmaller board thicknesses have to be tested.
- Plated-Through-Hole dimensions:  
Hole- $\varnothing$  prior to plating = 1.15 $\pm$ 0.025 mm  
Thickness of the PTH-wall > 25  $\mu$ m Cu  
Finished hole- $\varnothing$  = 1.00-1.09 mm  
in case of HAL PCB's or exceptional cases the former standard of 0.94-1.09mm is allowed.
- Printed board plating material:  
HAL or galvanic tin plated 5 –15  $\mu$ m  
Chemical Sn > 0.5 $\mu$ m  
0.05-0.2 $\mu$ m Au over 2.5-5  $\mu$ m Ni  
OSP (Organic Solderability Preservative) (not recommended)  
Other plating materials have to be tested on request.



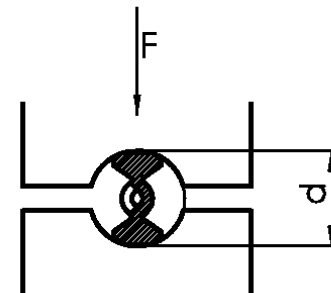
## 3. PRESS-IN ZONE INFORMATION

- Design: see dimensional drawing on page 3
- Material: CuSn4, CuSn6, CuNiSi, CuCrAgFeTiSi or similar copper alloy.  
Other materials have to be tested on request.
- Plating:
  - 0.4-1.5  $\mu$ m Sn over min 0.8 $\mu$ m Ni.
  - 0.4-1.5  $\mu$ m SnPb over min 0.8 $\mu$ m Ni. (Technically possible but decommissioned)
  - Or min 0.2  $\mu$ m Au over min 0.8 $\mu$ m Ni
  - 0.3-1.1  $\mu$ m S+D Advanced Indium over 1.27...2.2  $\mu$ m Ni.
  - Customer specific plating definitions are possible but have to be tested.

Not all combinations of plating, base material and PCB plating/technology are possible or released. In case of doubt, please contact TE.



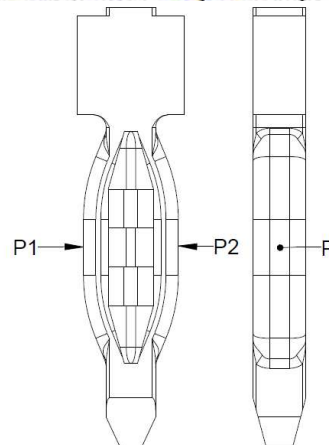
Radial deformation forces.



d	Force F (N)
0.97	max 270
1.12	min 100

1) Depending on which side the detection of the press-in tool is situated  
Values for X, Y & Z: see table page 4

Measurement points plating



#### 4. INFORMATION ON THE APPLICATION.

The Multispring as described can be used as a

- Individual press-in termination.
- Straight or right angle termination.
- Rear plug up.
- Wrapped connection.
- Connector or module with pre-assembled press-in terminations.

#### 5. INSTRUCTION AND TOOLS FOR THE PRESS-IN OPERATION.

- Depending on plating combination minimum 1 replacement is guaranteed with a new press-in termination.  
More repairs have to be tested on request.
- Press-in depth:  
As on the dimensional drawing on page 3 for the nominal thickness printed board (1.6mm).

For thinner printed boards the position of the printed board should be situated in the middle of the press-in zone. Notice that some press-fit parameters can be affected and have a lower performance (e.g. Retention force) see also paragraph 2 'PCB definition' In case of PCB's with a smaller thickness of 1.6mm nominal, a project specific test is recommended.

For thicker printed boards the position of the press-in zone should be preferably in the upper half of the printed board thickness. See the application drawing and table.

PCB Thickness	Nominal Press-in dimension X	Nominal Press-in dimension Y	Tolerance Press-in dimension Z
> 1.6 mm	0.1	<del>0.1</del>	±0.2 (±0.3 *)
1.6 mm	0.1	0.1	
0.8...1.6 mm	0.1 - k	0.1 - k	

With  $k = (1.6 - \text{PCB Thickness}) / 2$

\*) For complex applications with a high number of pins, the tolerance Z of ±0.2 mm can be extended towards ±0.3 mm. The mean of all press-in dimensions of the application should however still lay within the ±0.2 tolerance range. For standalone pins as Single Pin Insertion, the depth tolerance of +0.2 mm to -0.2 mm is mandatory.

The use of the middle of the Multispring as reference for press-in depth will be less accurate and is not recommended. One should choose between dimension X or Y to define the right press-in depth dimension. This choice of reference is determined by the application (housing, module, stand-alone pin...) and the used press-in tooling (detection, reference side of the PCB,...). In that way the usual big tolerances of the PCB thickness can be avoided to optimize the press-in process and the tolerance calculation chain.

The use of a lubricant, anti-tarnish or other post treatments on the Multispring zone can influence the performance negatively and should therefore be avoided.

Press in force / distance should be controlled.

- Press-in speed:  
Recommended maximum 5 mm/s for header applications. For stitched pins speeds up to 600 mm/s are in use. As extreme high speeds can influence the press-in behaviour, an application specific check is recommended. Higher speeds are likely possible but needs to be tested.

- Tool information:**  
 The press-in tool has to be adapted to the actual application. To ensure an optimal quality of the applied TE connectivity products, we recommend the utilization of application equipment from TE Connectivity.  
 The latest news and detailed information on application tooling can be found on <https://www.te.com/global-en/products/application-tooling.html>  
 Contact person: [siegfried.beck@te.com](mailto:siegfried.beck@te.com) or [TAC-EMEA@te.com](mailto:TAC-EMEA@te.com)

## 6. PRESS-IN CHARACTERISTICS.

### 6.1 Mechanical

Press-in forces (performed on single multispring terminations)

Plating multispring	Max. press-in forces	Typical (a)	Min. press-in forces
SnPb	130N a)	75-90N	40N
Sn	150N a)b)	85-110N	40N
Ag	160N a)	105-125N	40N
In	150N a)b)	70-110N	40N
Au	130N a)	70-85N	40N

a) in PCB with Chemical Sn

b) in PCB with Cu+OSP

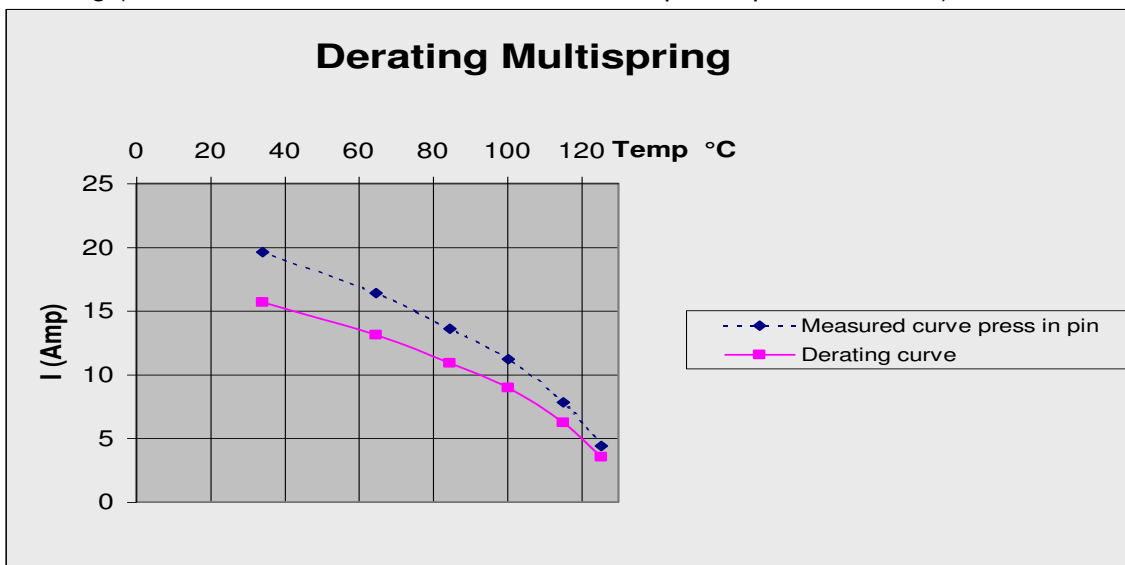
Minimum push-out force per termination: 30 N (typical values 50-60 N). See also item 2: PCB thickness.

Values in other printed circuit boards: have to be tested on request.

### 6.2 Electrical

Contact resistance < 0.5 mΩ (measured values acc. IEC 60352-5 in tin plated printed boards)

Derating (measured values acc IEC512-3 in 1.6 tin plated printed boards)



### 6.3 Environmental

Temperature Range: CuSnx materials:  $-40^{\circ}\text{C} / +130^{\circ}\text{C}$   
CuNiSi & CuCrAgFeTiSi  $-40^{\circ}\text{C} / +150^{\circ}\text{C}$

Other temperatures can be used depending on the temperature limitations of the printed board used in the application but have to be tested.

## 7. REQUIREMENTS

Qualification tests based on IEC 60352-5

Except for test group C and D (see below: severer requirements)

CP1: Contact resistance (IEC 60352-5)

CP2: Temperature shock (EN 60068 2-14)

Duration: 144 cycles  $-40^{\circ}\text{C} / +130^{\circ}\text{C}$  , 15 minutes each

CP3: Temperature cycling (EN 60068 2-14)

Test Nb  $-40^{\circ}\text{C} / +100^{\circ}\text{C}$  each 3h duration: 20 cycles

CP4: Storage in dry heat (EN 60068 2)

Duration: 120 h; temperature:  $+120^{\circ}\text{C}$

CP5: Visual examination (IEC 512 2-1a)

CP6: Industrial atmosphere (DIN 41640 T72)

0.20 ppm SO<sub>2</sub>; 0.01 ppm H<sub>2</sub>S; 0.20 ppm NO<sub>2</sub>; 0.01 ppm Cl<sub>2</sub>

Circulation volume 1 m<sup>3</sup>/h, 21 days; rel. humidity: 75%

CP7: Damp heat cyclic (EN 60068 2-30)

Variant 2; duration 10 cycles of 24h; lower limit:  $+25^{\circ}\text{C}$ , upper limit:  $+55^{\circ}\text{C}$

CP8: Contact resistance (IEC 60352-5)

CP9: Visual examination (IEC 512 2-1a)

DP1: Contact resistance (IEC 60352-5)

DP2: Damp heat steady (IEC68-2-3 test Ca) : 21 days

DP3: Temperature Shock (IEC68-2-14 test Na)

Duration: 100 cycles  $-40^{\circ}\text{C} / +130^{\circ}\text{C}$  , 1 h each

DP4: Contact resistance (IEC 60352-5)

DP5: Random vibration with temperature (EN 60068 2-64 meth.2 Fh)

5-1000 Hz; 4.2g<sub>n</sub> (eff.); 24 h/axis; all 3 axis.

3 temperature cycles of each 8 h/axis ; 1 h at  $115^{\circ}\text{C}$  / 1.5 h at  $-40^{\circ}\text{C}$

DP6: Contact resistance (IEC 60352-5)

DP7: Visual examination (IEC 512 2-1a)

DP8: Shock test (EN 60068-2-27)

100 g; 6 ms; half-sine; 2 shocks per direction, 3 axis

DP9: Contact resistance (IEC 60352-5)

Additional requirements specific for different applications have to be tested on request.

## 8. RELATED DOCUMENTS

### 8.1 Test-Reports

- See 0833\_411\_01\_02
- See 327.227.01.01 (Ag)
- See 328.222.01.01 (Au)