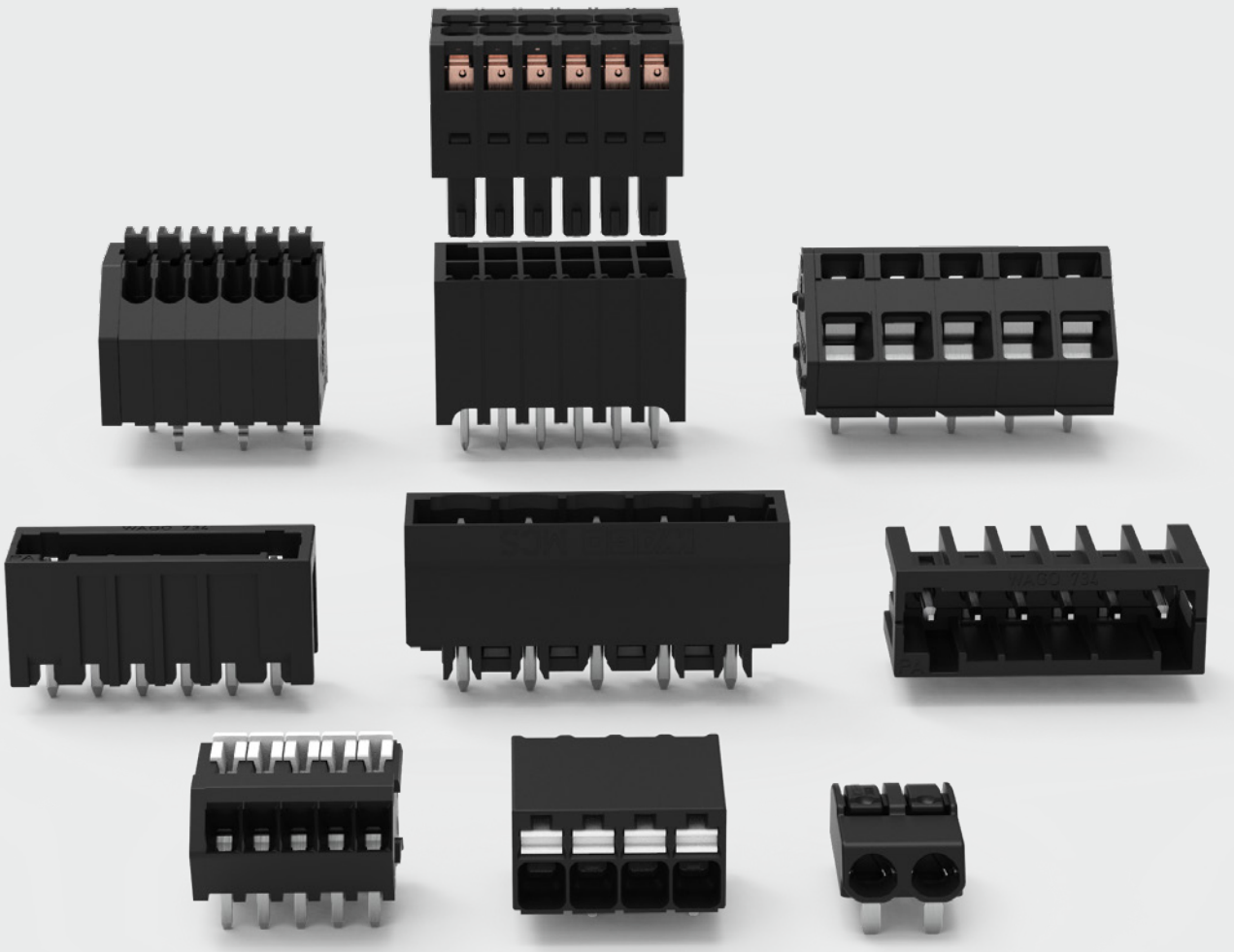
Reflow Technology

Product Overview



Reflow Component Requirements

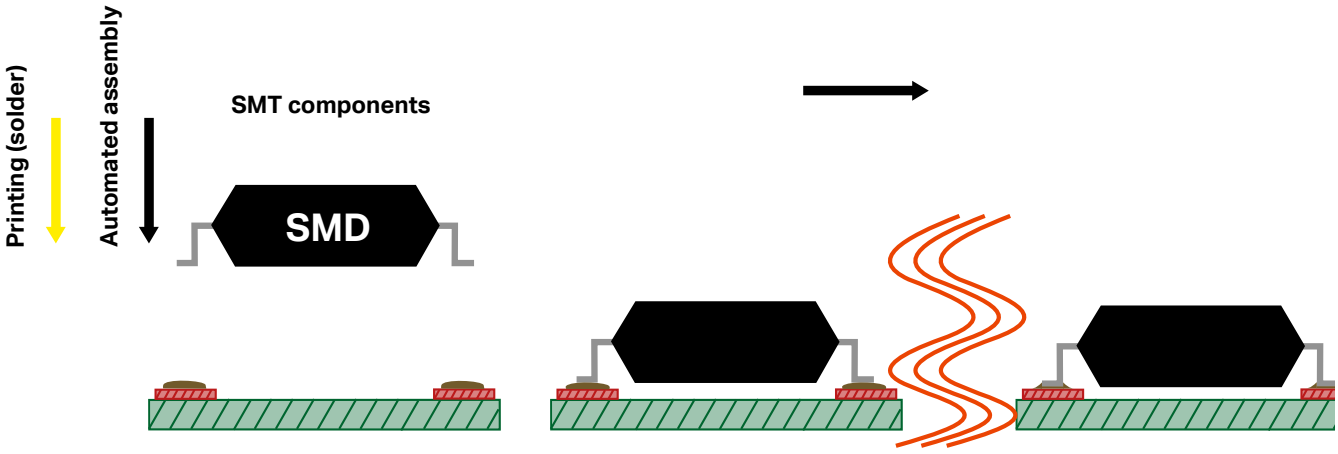
Components
Components suitable for reflow process must withstand higher temperatures than for standard wave soldering. Therefore, WAGO components are made from high-temperature-resistant material and designed to provide optimal heat supply to the soldering point. These components have a suction area for automated pick-and-place assembly and are also available in tape-and-reel packaging. This allows WAGO THR and SMD components to be fully integrated into the SMT production process, resulting in greater cost savings.

Materials
Plastic material for components must resist a maximum peak temperature of 260°C for 10 seconds (temperature profile per DIN EN 61760-1) and match the PCB base material's coefficient of thermal expansion (CTE) to prevent warpage of both component and PCB. WAGO's PCB terminal blocks and connectors are molded of glass-fiber-reinforced insulation plastic that withstands temperatures up to 260°C. The selected material has the required elasticity and provides high dimensional stability for the entire range of pin spacing. It is therefore ideal for both lead-free and two-time reflow soldering processes.

Design
The streamlined design of the long THR component pins prevents the solder paste from being extruded during assembly. This may impair the ability of the paste to reflow properly. The free space around the solder pins ensures optimal heat flow to the solder joint, yielding an excellent bond. Stand-offs or ribs on both the left and right sides of the pin prevent the component's insulation body and solder paste from coming into contact with each other.

Surface-Mount Technology (SMT)

Surface-Mount Technology (SMT) means soldering electronic components directly onto PCB surface pads without drilling holes. The basic SMT process consists of applying solder paste to the PCB via solder dispensing equipment, screen or stencil printing. SMT assembly is performed using fully automated placement machines. Surface-mount components are soldered to the board in infrared, convection or vapor phase ovens.



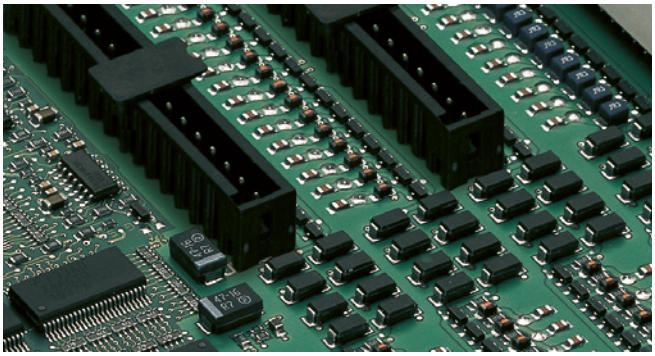
Reflow soldering process

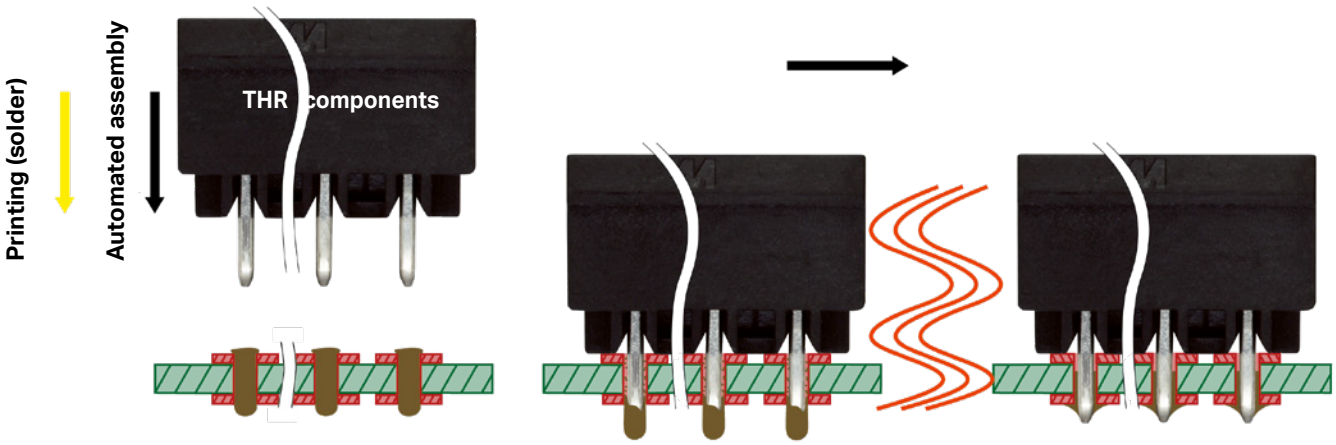
Both material and design provide optimal processing performance at high temperatures.

Through-Hole Reflow (THR)

Mechanically stressed THR components, like PCB terminal blocks and connectors, are placed into metal-plated holes filled with solder paste. They can then be soldered along with surface-mount components using the time-saving and cost-effective reflow soldering process.

WAGO's THR components are designed for fully automated assembly and withstand high reflow oven temperatures.





Reflow soldering process

Product Overview Sorted by Pin Spacing

THR Male and Female Headers

2.5 mm

Male headers with straight solder pins

***MCS* MICRO, 733 Series**
160 V/2.5 kV/(III/2)* 6 A

Male headers with angled solder pins

***MCS* MICRO, 733 Series**
160 V/2.5 kV/(III/2)* 6 A

3.5 mm

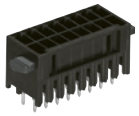
Male headers with straight solder pins

***MCS* MINI, 734 Series**
160 V/2.5 kV/(III/2)* 10 A

Male headers with straight solder pins

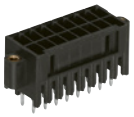
***MCS* MINI HD, 713 Series**
160 V/2.5 kV/(III/2)* 10 A

Male headers with straight solder pins and levers



***MCS* MINI HD, 713 Series**
160 V/2.5 kV/(III/2)* 10 A

Male headers with straight solder pins and threaded flanges



***MCS* MINI HD, 713 Series**
160 V/2.5 kV/(III/2)* 10 A

Male headers with straight solder pins

***picoMAX*®, 2091 Series**
160 V/2.5 kV/(III/2)* 10 A

Male headers with straight solder pins and mounting flanges

***picoMAX*®, 2091 Series**
160 V/2.5 kV/(III/2)* 10 A

Female headers with straight solder pins

***picoMAX*®, 2091 Series**
160 V/2.5 kV/(III/2)* 10 A

Male headers with angled solder pins

***MCS* MINI, 734 Series**
160 V/2.5 kV/(III/2)* 10 A

Male headers with angled solder pins

***MCS* MINI HD, 713 Series**
160 V/2.5 kV/(III/2)* 10 A

Male headers with angled solder pins and levers

***MCS* MINI HD, 713 Series**
160 V/2.5 kV/(III/2)* 10 A

Male headers with angled solder pins and threaded flanges

***MCS* MINI HD, 713 Series**
160 V/2.5 kV/(III/2)* 10 A

Male headers with angled solder pins

***picoMAX*®, 2091 Series**
160 V/2.5 kV/(III/2)* 10 A

Male headers with angled solder pins and mounting flanges

***picoMAX*®, 2091 Series**
160 V/2.5 kV/(III/2)* 10 A

Female headers with angled solder pins

***picoMAX*®, 2091 Series**
160 V/2.5 kV/(III/2)* 10 A

3.81 mm

Male headers with straight solder pins

***MCS* MINI, 734 Series**
160 V/2.5 kV/(III/2)* 10 A

Male headers with angled solder pins

***MCS* MINI, 734 Series**
160 V/2.5 kV/(III/2)* 10 A

5 mm

Male headers with 1 x 1 mm straight solder pins

***MCS* MIDI Classic, 231 Series**
320 V/4 kV/(III/2)* 12 A

Male headers with 1.2 x 1.2 mm straight solder pins

***MCS* MIDI Classic, 231 Series**
320 V/4 kV/(III/2)* 12 A

Male headers with straight solder pins

***picoMAX*®, 2092 Series**
320 V/4 kV/(III/2)* 16 A

Male headers with straight solder pins and mounting flanges

***picoMAX*®, 2092 Series**
320 V/4 kV/(III/2)* 16 A

Female headers with straight solder pins

***picoMAX*®, 2092 Series**
320 V/4 kV/(III/2)* 16 A

Depending on reflow soldering temperatures and times, color deviations may occur for light gray/white connectors. These deviations will have no impact on functionality.

CAGE CLAMP®

The universal connection of soli
conductors

To use: Open the clamping unit, in
done!

THR PCB Terminal Blocks

2.5 mm

Terminal strips with locking slides

218 Series CAGE CLAMP®

0.08 … **0.5 mm²** / 28 … **20 AWG**
160 V/2.5 kV/(III/2)* 6 A

Terminal strips
with push-buttons

250 Series PUSH-IN CAGE CLAMP®

0.2 … **0.5 mm²** / 24 … **20 AWG**
160 V/2.5 kV/(III/2)* 4 A

3.5 mm

Terminal strips
with push-buttons

250 Series PUSH-IN CAGE CLAMP®

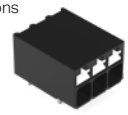
0.2 … **1.5 mm²** / 24 … **16 AWG**
320 V/4 kV/(III/2)* 8 A

Terminal strips with push-buttons
and staggered solder pins

805 Series PUSH-IN CAGE CLAMP®

0.2 … **1.5 mm²** / 24 … **16 AWG**
320 V/4 kV/(III/2)* 17.5 A

THR PCB terminal block
with push-buttons



2086 Series PUSH-IN CAGE CLAMP®

0.14 … **1.5 mm²** / 24 … **16 AWG**
160V/2.5kV/(III/2)* 17.5 A

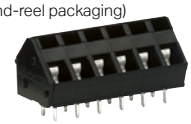
THR PCB terminal block
with push-buttons

2086 Series PUSH-IN CAGE CLAMP®

0.14 … **1.5 mm²** / 24 … **16 AWG**
160V/2.5kV/(III/2)* 17.5 A

5 mm

Terminal strips (also available
in tape-and-reel packaging)



236 Series CAGE CLAMP®

0.08 … **2.5 mm²** / 28 … **12 AWG**
320 V/4 kV/(III/2)* 24 A

THR PCB terminal block
with push-buttons

2086 Series PUSH-IN CAGE CLAMP®

0.14 … **1.5 mm²** / 24 … **16 AWG**
320 V/4 kV/(III/2)* 17.5 A

THR PCB terminal blocks
with push-buttons

2086 Series PUSH-IN CAGE CLAMP®

0.14 … **1.5 mm²** / 24 … **16 AWG**
320 V/4 kV/(III/2)* 17.5 A

6 mm

THR PCB terminal blocks
with push-buttons

2061 Series PUSH-IN CAGE CLAMP®

0.5 … **1.5 mm²** / 20 … **16 AWG**
320 V/4 kV/(III/2)* 17.5 A

THR PCB terminal blocks
with push-buttons

2061 Series PUSH-IN CAGE CLAMP®

0.5 … **1.5 mm²** / 20 … **16 AWG**
320 V/4 kV/(III/2)* 17.5 A

7.5 mm

Male headers with 1 x 1 mm
straight solder pins

***MCS* MIDI, 231 Series**
630 V/6 kV/(III/2)* 12 A

Male headers with 1 x 1 mm
angled solder pins

***MCS* MIDI, 231 Series**
630 V/6 kV/(III/2)* 12 A

Male headers with 1.2 x 1.2 mm
straight solder pins

***MCS* MIDI, 231 Series**
630 V/6 kV/(III/2)* 16 A

Male headers with 1 x 1 mm
angled solder pins

***MCS* MIDI, 231 Series**
630 V/6 kV/(III/2)* 16 A

Male headers with straight solder
pins

***picoMAX*®, 2092 Series**
630 V/6 kV/(III/2)* 16 A

Male headers with angled solder
pins

***picoMAX*®, 2092 Series**
630 V/6 kV/(III/2)* 16 A

Male headers with straight solder
pins and mounting flanges

***picoMAX*®, 2092 Series**
630 V/6 kV/(III/2)* 16 A

Male headers with angled
solder pins and mounting
flanges

***picoMAX*®, 2092 Series**
630 V/6 kV/(III/2)* 16 A

Female headers with straight
solder pins

***picoMAX*®, 2092 Series**
630 V/6 kV/(III/2)* 16 A

Female headers with angled
solder pins

***picoMAX*®, 2092 Series**
630 V/6 kV/(III/2)* 16 A

d, stranded and fine-stranded

PUSH-IN CAGE CLAMP®

The universal connection with an additional advantage: Push-in

PUSH WI

sert conductor, release the clamp –

To use: Open the clamping unit, insert conductor, release the clamp – done! Terminate
both solid and ferruled conductors by simply pushing them in – no operating tool needed.

SMD PCB Terminal Blocks

4 mm

THR PCB terminal blocks with push-buttons

2060 Series PUSH-IN CAGE CLAMP®

0.2 … **0.75 mm²** / 24 … **18 AWG**
160 V/2.5 kV/(III/2)* 9A

THR PCB terminal blocks with push-buttons

2060 Series PUSH-IN CAGE CLAMP®

0.2 … **0.75 mm²** / 24 … **18 AWG**
160 V/2.5 kV/(III/2)* 9A

3 mm

SMD PCB Terminal Blocks

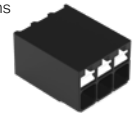
2059 Series PUSH WIRE®

0.5 mm² "s" / **20 AWG** "sol"*
160V/2.5 kV/(III/2)* 3A

*Please observe the installation notes found in the data sheet!

3.5 mm

SMD PCB terminal block with push-buttons



2086 Series PUSH-IN CAGE CLAMP®

0.14 … **1.5 mm²** / 24 … **16 AWG**
160V/2.5kV/(III/2)* 17.5 A

SMD PCB terminal block with push-buttons

2086 Series PUSH-IN CAGE CLAMP®

0.14 … **1.5 mm²** / 24 … **16 AWG**
160V/2.5kV/(III/2)* 17.5 A

4 mm

SMD PCB terminal blocks with push-buttons

2060 Series PUSH-IN CAGE CLAMP®

0.2 … **0.75 mm²** / 24 … **18 AWG**
160 V/2.5 kV/(III/2)* 9 A

SMD PCB terminal blocks with push-buttons

2060 Series PUSH-IN CAGE CLAMP®

0.2 … **0.75 mm²** / 24 … **18 AWG**
160 V/2.5 kV/(III/2)* 9 A

5 mm

SMD PCB terminal block with push-buttons

2086 Series PUSH-IN CAGE CLAMP®

0.14 … **1.5 mm²** / 24 … **16 AWG**
320 V/4 kV/(III/2)* 17.5 A

SMD PCB terminal block with push-buttons

2086 Series PUSH-IN CAGE CLAMP®

0.14 … **1.5 mm²** / 24 … **16 AWG**
320 V/4 kV/(III/2)* 17.5 A

6 mm

SMD PCB terminal blocks with push-buttons

2061 Series PUSH-IN CAGE CLAMP®

0.5 … **1.5 mm²** / 20 … **16 AWG**
320 V/4kV/(III/2)* 17.5 A

SMD PCB terminal blocks with push-buttons

2061 Series PUSH-IN CAGE CLAMP®

0.5 … **1.5 mm²** / 20 … **16 AWG**
320 V/4kV/(III/2)* 17.5 A

6.5 mm

SMD PCB terminal block with push-button

2065 Series PUSH WIRE® PUSH-IN CAGE CLAMP®

0.2 … **0.75 mm²** / 24 … **18 AWG**
320 V/4 kV/(III/2)* 9 A

SMD through-board PCB terminal block

2070 Series PUSH-IN CAGE CLAMP®

0.2 … **0.75 mm²** / 24 … **18 AWG**
320 V/4 kV/(III/2)* 9 A

8 mm

THR PCB terminal blocks with push-buttons

2060 Series PUSH-IN CAGE CLAMP®

0.2 … **0.75 mm²** / 24 … **18 AWG**
630 V/6 kV/(III/2)* 9A

THR PCB terminal blocks with push-buttons

2060 Series PUSH-IN CAGE CLAMP®

0.2 … **0.75 mm²** / 24 … **18 AWG**
630 V/6 kV/(III/2)* 9A

7 mm

SMD through-board PCB terminal block

2075 Series PUSH WIRE®

0.5 … **0.75 mm²** / 20 … **18 AWG**
500 V/4 kV/(III/2)* 9 A

8 mm

SMD PCB terminal blocks with push-buttons

2060 Series PUSH-IN CAGE CLAMP®

0.2 … **0.75 mm²** / 24 … **18 AWG**
630 V/6 kV/(III/2)* 9 A

RE®

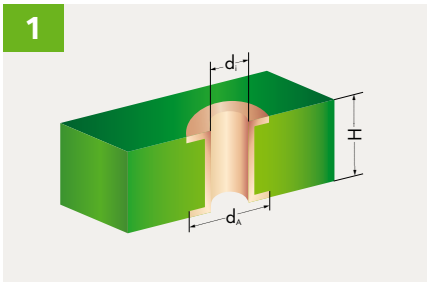
PUSH-WIRE® connection for solid and stranded conductors (depending on the model used)

To use: Tool-free, twist-free terminations for solid and rigid conductors – simply push into the unit.

*(III/2): Overvoltage category III / Pollution degree 2

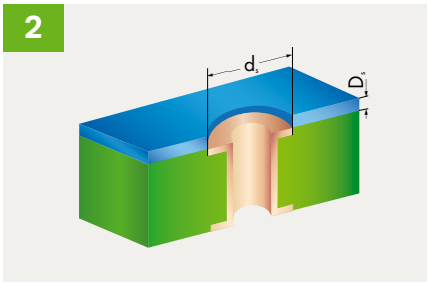
THR PCB Layout Parameters

1



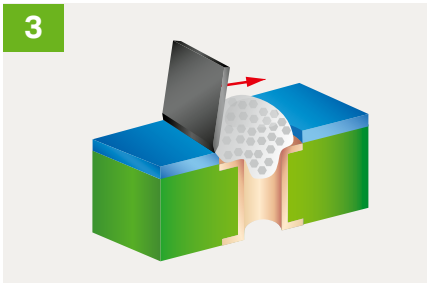
Metal-plated PCB bore hole

2



SMD positioning pattern

3

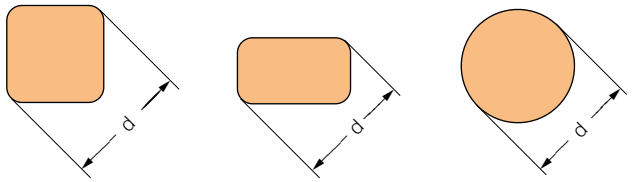


Series	d_i (mm)	d_A (mm)	H (mm)	d_s (mm)	D_s (µm)	d (mm)	L (mm)
218	$1.1^{+0.1}$	1.9	< 2	1.8	150	0.9	2.8
231 (1 x 1 mm)	$1.4^{+0.1}$	2.5	< 2	2.4	150	1.2	2.4
231 (1.2 x 1.2 mm)	$1.7^{+0.1}$	2.8	< 2	2.7	150	1.5	2.4
236	$1.1^{+0.1}$	2.2	< 2	2.1	150	0.9	3,6
250	$1.0^{+0.1}$	2.0	< 2	1.9	150	0.9	2.4
713	$1.2^{+0.1}$	1.9	< 2	1.8	150	1.0	2.4
733	$1.2^{+0.1}$	1.9	< 2	1.8	150	1.0	2.4
734	$1.4^{+0.1}$	2.5	< 2	2.4	150	1.2	2.4
2060 THR	$1.5^{+0.1}$	2.4	< 2	2.3	150	1.25	2.4
2061 THR	$1.5^{+0.1}$	2.4	< 2	2.3	150	1.25	1.5 / 2.4
2086	$1.0^{+0.1}$	2.0	<2	1.9	150	0.85	1.5 / 2.4
2091 (male headers)	$1.2^{+0.1}$	1.9	< 2	1.8	150	1.0	2.4
2091 (female headers)	$1.2^{+0.1}$	1.9	< 2	1.8	150	0.85	2.4
2092 (male headers)	$1.6^{+0.1}$	2.3	< 2	2.2	150	1.4	2.4
2092 (female headers)	$1.5^{+0.1}$	2.2	< 2	2.1	150	1.36	2.

d_i: Inner diameter of metal-plated PCB bore hole
d_A: Outer diameter of metal-plated PCB hole*
H: PCB thickness
d_s: Pattern hole diameter
D_s: Pattern thickness
d: Pin diagonal/diameter
L: Pin length

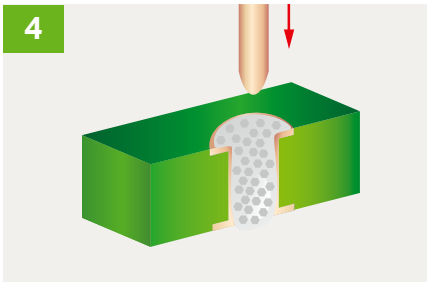
* When laying out the metal-plated bore holes, the clearance and creepage distance requirements – as specified in the equipment standards – must be considered.

Solder pin design:



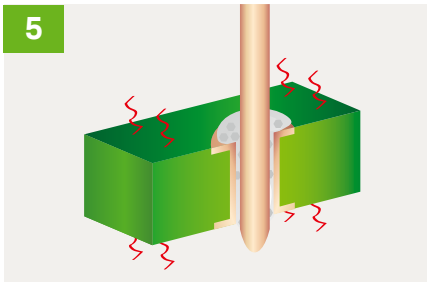
Solder paste application:

4



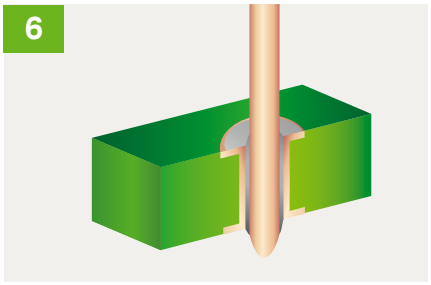
Component assembly, automatic/by hand

5



Reflow soldering process

6



THR soldering joint

THR products in tape-and-reel packaging per IEC 60286-3

MM-20660 - 0888-0173/0304-6901 THR TECHNOLOGY 3.4 US – 02/2022-00 – Printed in Germany – Subject to changes

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