

DIGITAL WE DAYS

2024



SMARTER DESIGNS WITH SMT
SPACERS

Götz Schattmann

WÜRTH ELEKTRONIK MORE THAN YOU EXPECT

HAVE YOU EVER SCREWED
A SHELF TOGETHER.....
.....ALONE?

Then you know what it's about



simplify your designs with SMT SPACERS

SMT Spacers

- Introduction
- Types of SMT Spacers
- Design and Processing
- Application Examples
- Economic Comparison



A brief history of spacers

- Spacers are commonly used in electronics
- Achieve different Board-to-Board heights
- Mounting of PCBs
- Fixation of components on PCBs
- Vast variations offer great flexibility
- Stable attachment

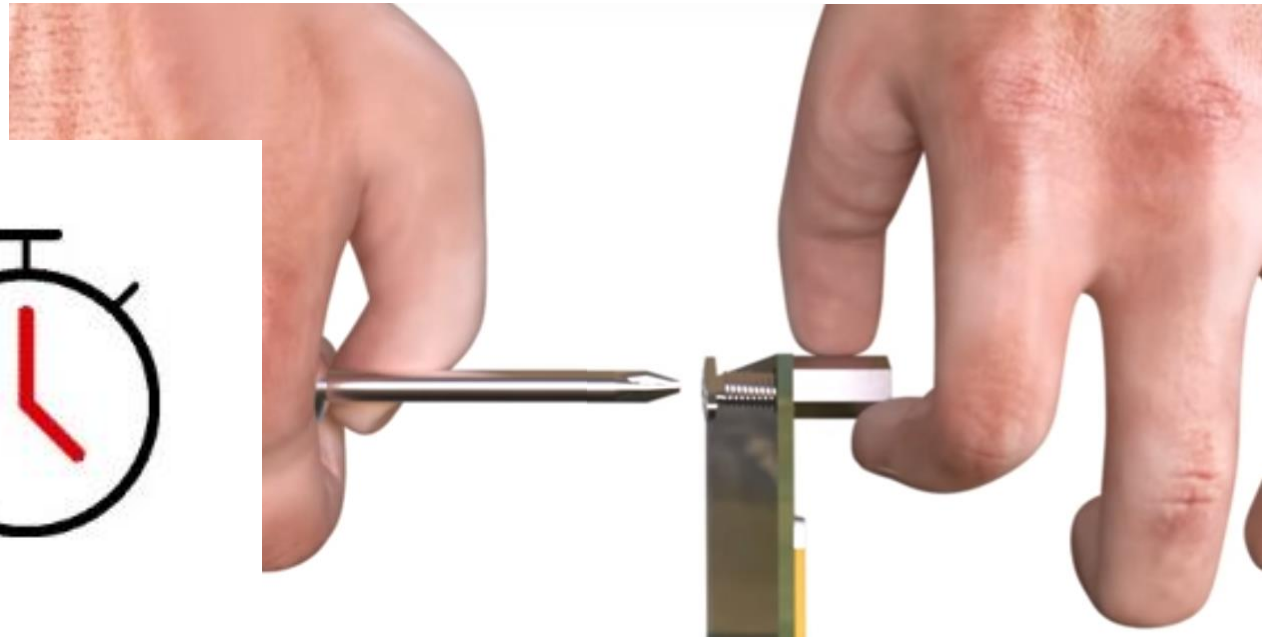


Any Obstacles ?

- Spacers are commonly used in electronics
- Achieve different Board-to-Board heights
- Mounting of PCBs
- Fixation of components on PCBs
- Vast variations offer great flexibility
- Stable attachment

Obstacles

- High manual effort
- difficult handling
- Time-consuming
- procurement and warehousing
- costly

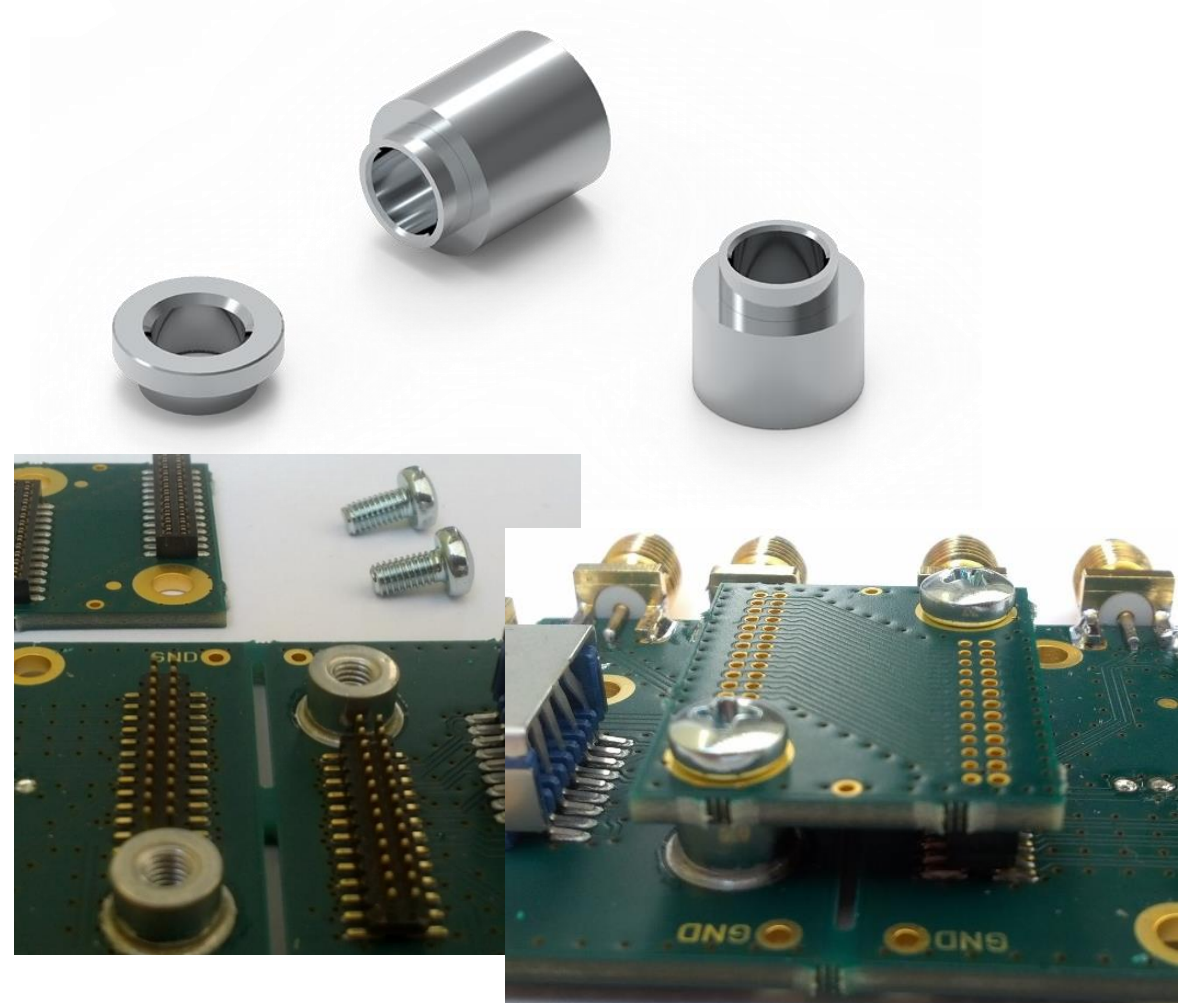


Improvement of Spacers

Improvement of Spacers

- how to achieve:
 - Better handling?
 - Less manual effort?
 - Cost efficiency?

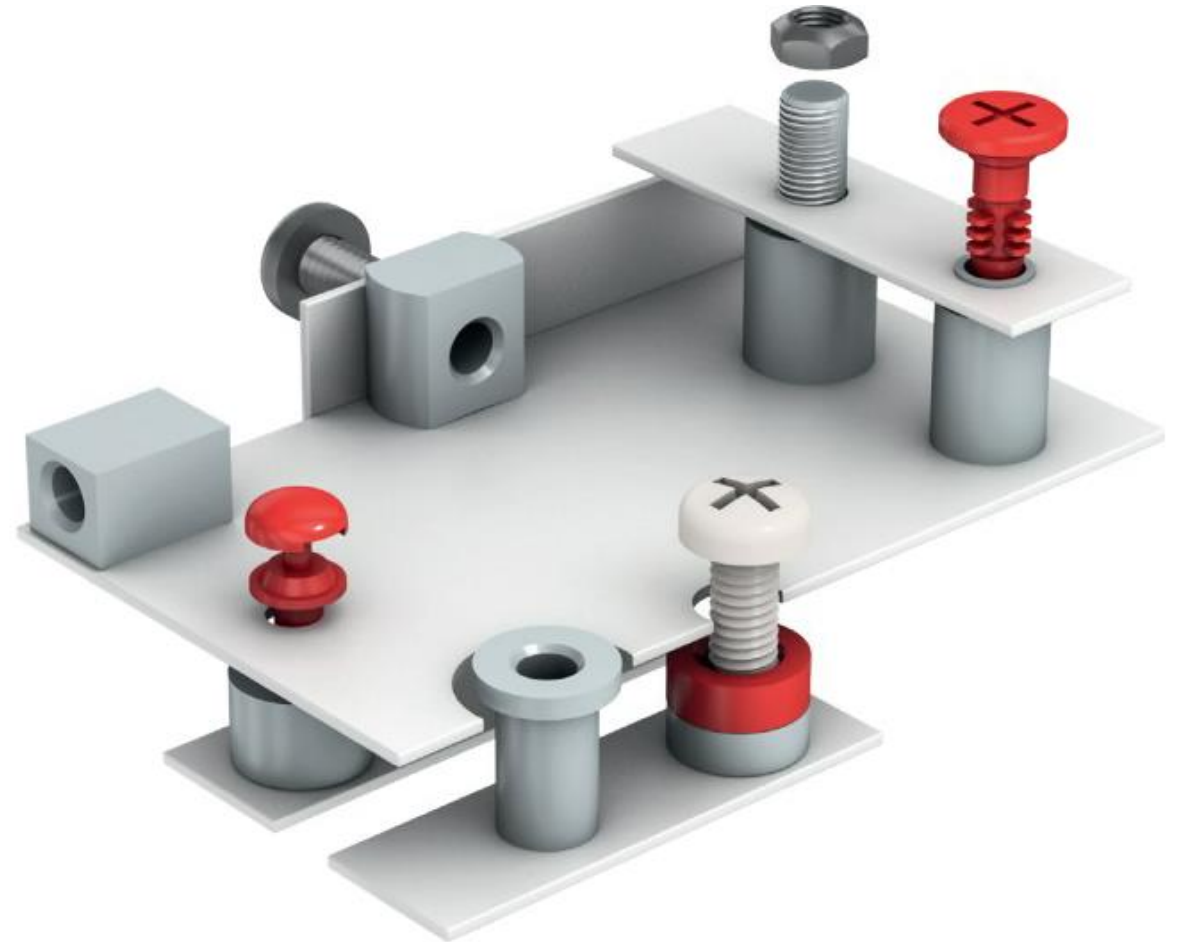
- **Solution:**



SMT Spacers!

General benefits of solderable SMT Spacers

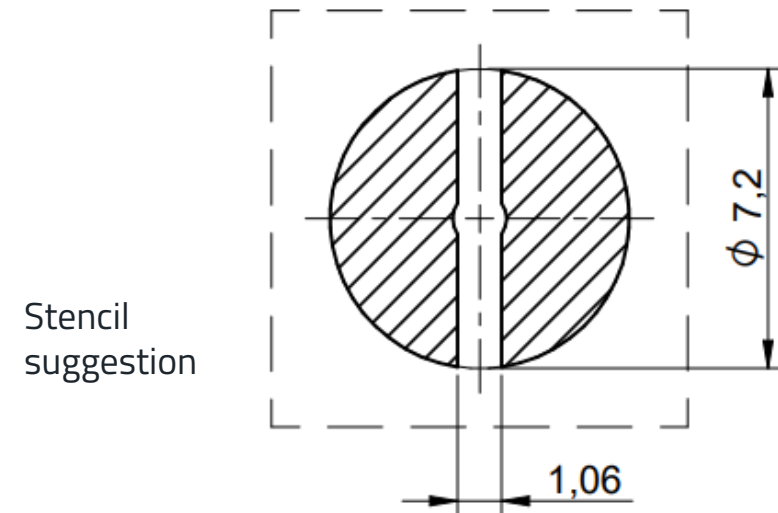
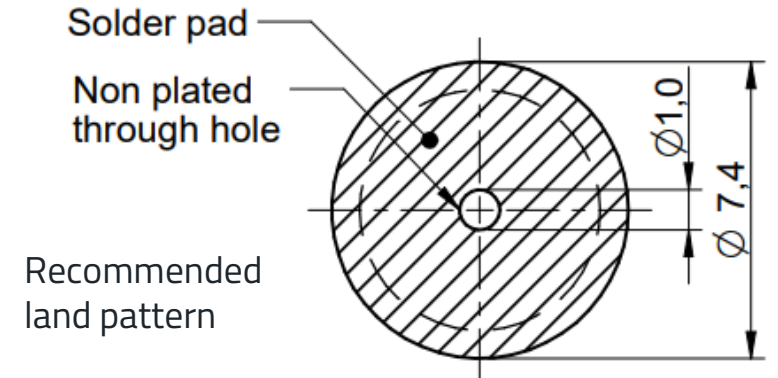
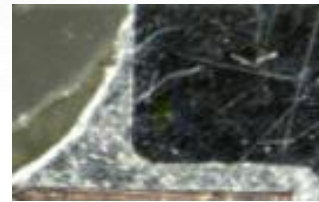
- Fully automatic assembly
- Fast and precise processing
- Highest process reliability
- Strong holding forces and torques
- Large selection of types and shapes
 - Heights from 0,5mm up to 16mm
 - Threaded- or through-hole versions
 - Vertical- or right-angle orientation
 - Special mounting solutions
- Additionally
 - *Custom lengths upon customer request*



Design and Processing

Footprint for SMT Spacer

- SMT Spacer with external thread
- Full bottom surface
- Body \varnothing 6mm
- Center pin, \varnothing 0.8 x 0,5mm
- Solder-meniskus for high retention and torque
- Center pin for accurate positioning
- Non plated through hole
- Stencil 150 μ m
- Optional without center pin



DESIGN & PROCESSING

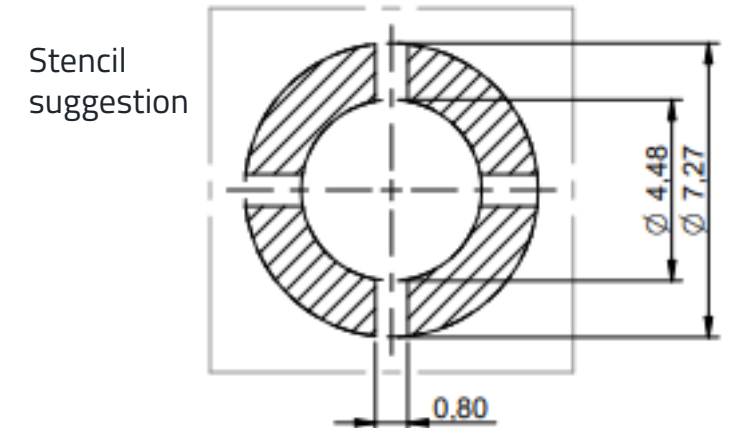
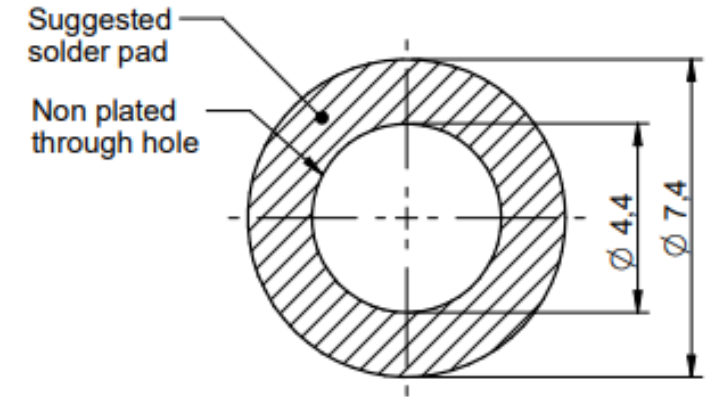
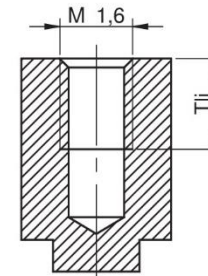
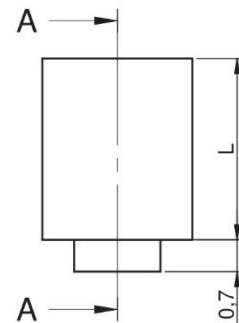
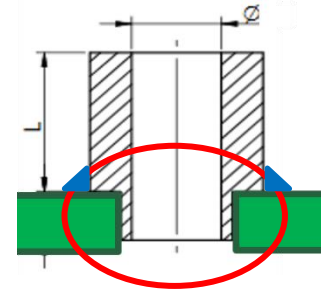
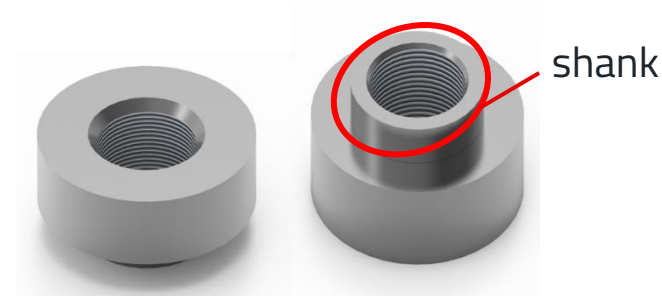
Design and Processing

Footprint for SMT Spacer

- SMT Spacer with internal thread
- Land pattern ring
- Body \varnothing 6mm (e.g. for M3 types)
- Borehole required for shank

- Solder meniskus for high retention and torque
- **Non plated through hole**
- Stencil 150 μ m

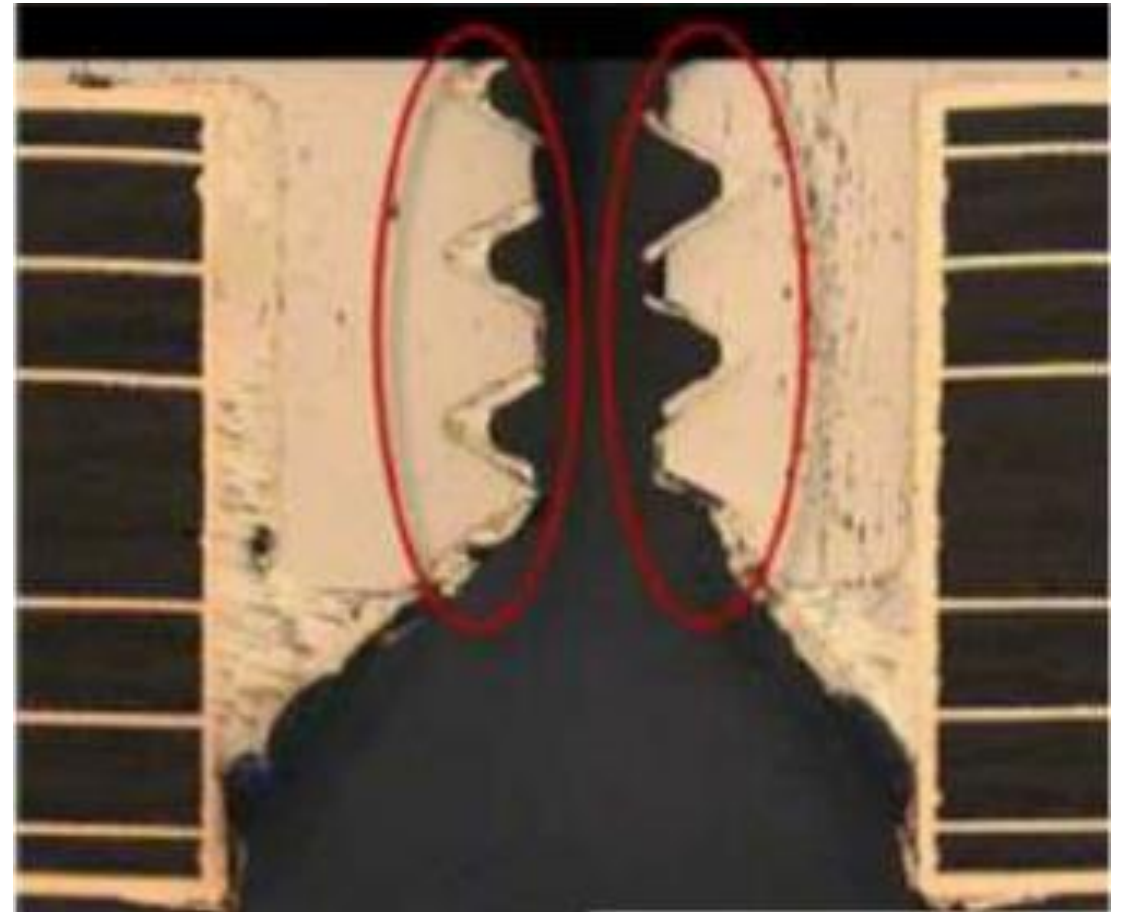
- Optional with bottom closed



Design and Processing

Why Non-Plated Through Holes for SMT-Spacers

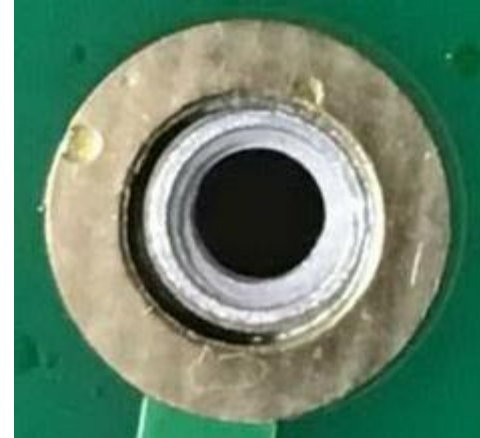
- Potential problems
 - Tin draws into thread by capillary-effect
 - hard to screw in
 - loss of solderpaste
 - reduces retention of SMT spacer



Design and Processing

Why Non-Plated Through Holes for SMT-Spacers

- Potential problems
 - Tin draws into thread by capillary-effect
 - hard to screw in
 - loss of solderpaste
 - reduced retention of SMT spacer
 - SMT-Spacer moves out of center during reflow process
 - missalignment
 - loss of solderpaste due to big gaps
 - reduced retention of SMT spacer



Design and Processing

Why Non-Plated Through Holes for SMT-Spacers

- Qualification Testing

Performance Testing

SMT Spacer

WA-SMSI, WA-SMST, WA-SMSE, WA-SMSR,
WA-SMSSR, WP-SMRA & WA-EXRV

Checkmate.

SMT Spacer wins!

Content

1. Shear Force
2. Pull Strength
3. Extraction Force
4. Breaking Torque
5. Additional Information
6. Test Conditions

Shear Force

Distance pressure point 1mm

WÜRTH ELEKTRONIK

Test Sample	9771xxx360	9774xxx592
1	655	
2	563	
3	564	
4	652	
5	632	
6	762	
7	799	
8	654	
9	686	
10	669	
11	715	
12	678	
13	812	
14	700	
15	602	
16	702	
17	570	
18	772	
19	634	
20	729	
21	614	
22	668	
23	604	
24	631	
25	727	
26	647	
27	732	
28	804	
29	657	
30	676	
Min.	563	
Max.	812	
Average	677	

Screw fixed with distance. The Pull Strength is acting itself.

The Data is only for reference. The product application. The parts are tested under specification of Würth Elektronik also samples for testing.

Shear Force WP-SMRA (in screw direction)

90° SMD Block

WÜRTH ELEKTRONIK

Test Sample	9771xxx360	9774xxx592
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		
Min.	450	592
Max.	800	799
Average	627	695

Pull Strength

WÜRTH ELEKTRONIK

Test Sample	external Thread M3	internal Thread M5
1	500	771
2	450	684
3	580	599
4	600	778
5	620	678
6	630	654
7	570	724
8	690	678
9	710	799
10	800	675
11	550	634
12	620	780
13	610	687
14	650	740
15	630	728
16	500	760
17	620	592
18	610	714
19	520	641
20	630	677
21	570	719
22	640	691
23	600	678
24	700	656
25	780	789
26	780	604
27	640	707
28	740	639
29	620	641
30	650	718
Min.	450	592
Max.	800	799
Average	627	695

Extraction Force WA- EXRV

WÜRTH ELEKTRONIK

Performance Testing with lead-free solder paste

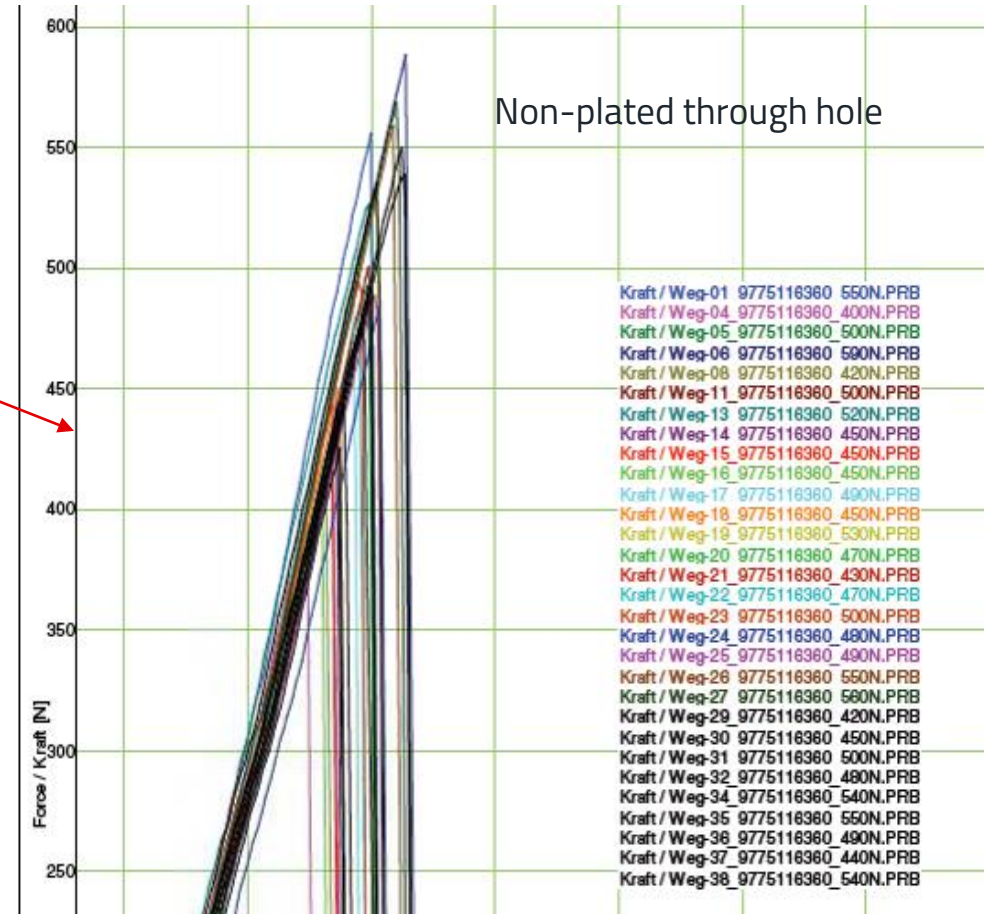
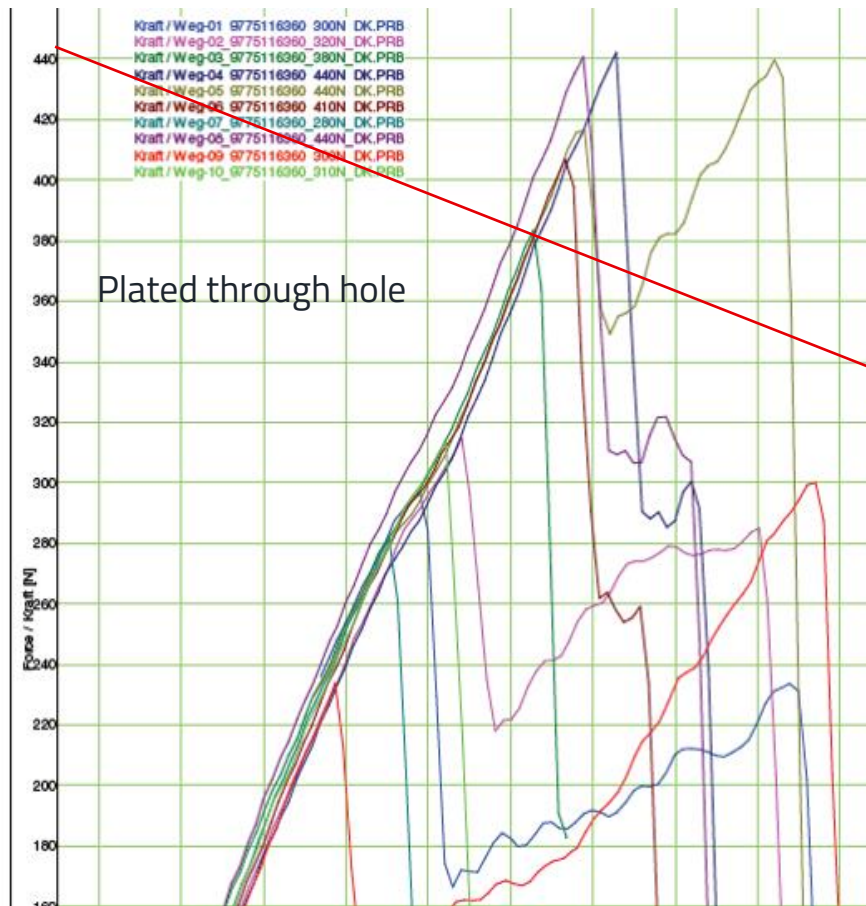
Test Sample	Extraction Force (in N)	
	Mounting Button 7009774x360	
PCB Thickness 1,6mm		
1		69
2		73
3		81
4		80
5		85
6		83
7		95
8		80
9		92
10		68
11		93
12		80
13		75
14		80
15		90
16		90
17		75
18		80
19		81
20		76
21		81
22		81
23		77
24		79
25		76
26		78
27		77
28		78
29		79
30		82
Min.		68
Max.		95
Average		80

The Mounting Button is only qualified for one-time use. The Mounting Button is used with our SMT Spacer with internal Thread M3.

receive the full Test Report upon request

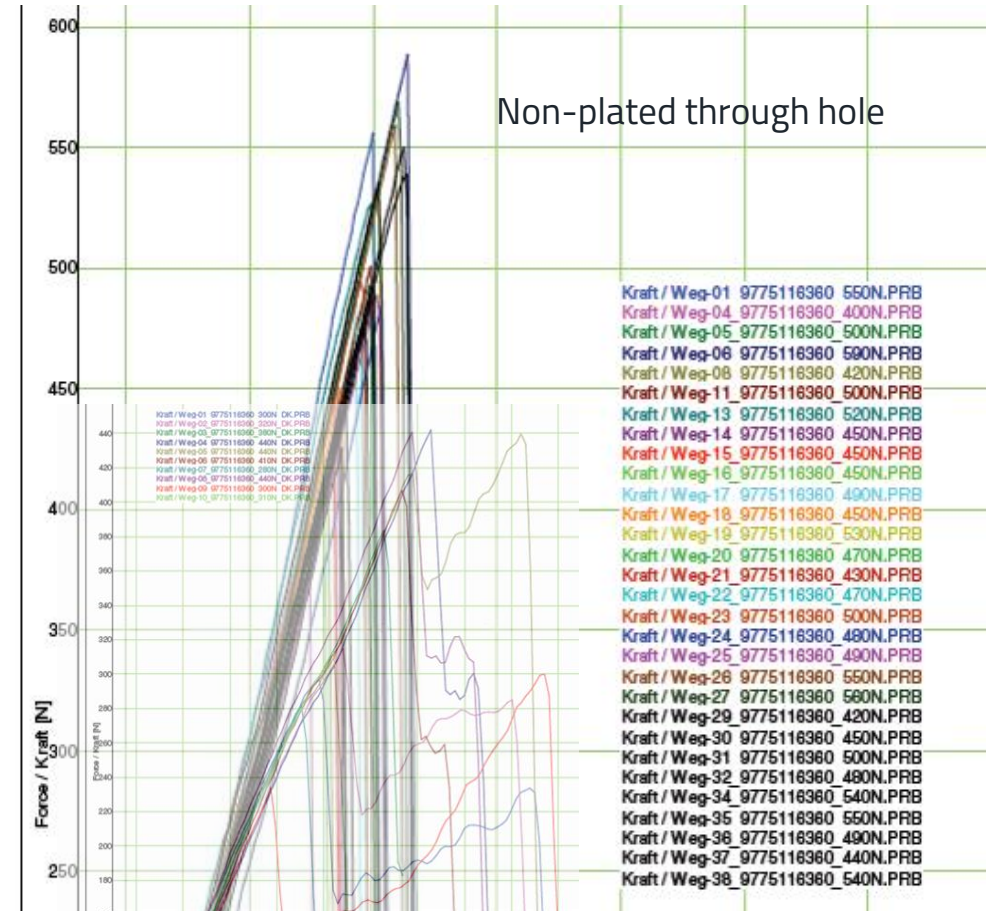
Design and Processing

Comparison Plated Through Holes vs Non-Plated Through Holes



Design and Processing

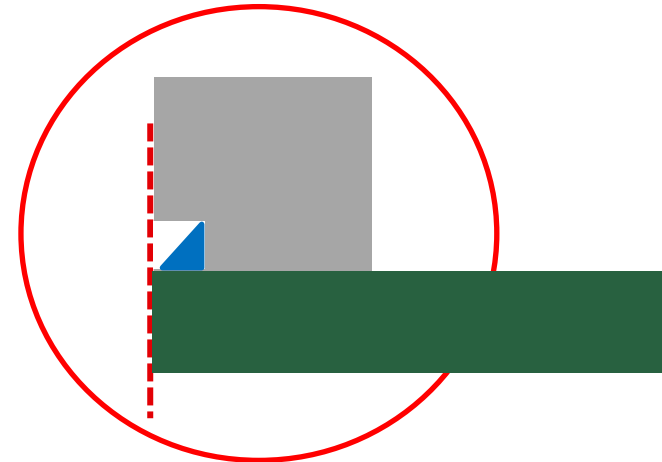
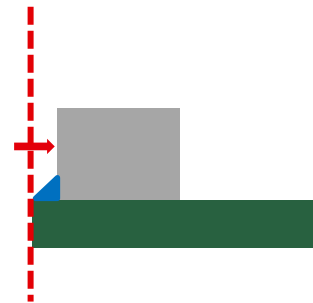
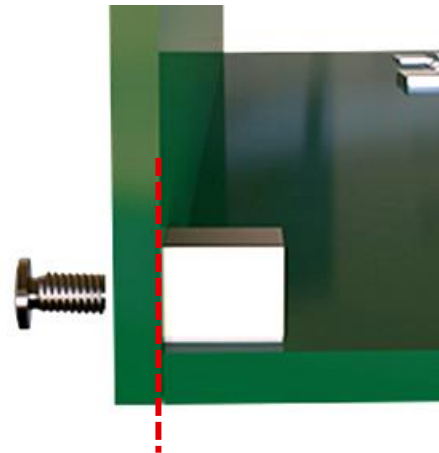
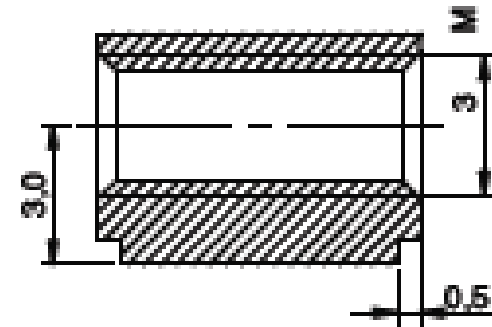
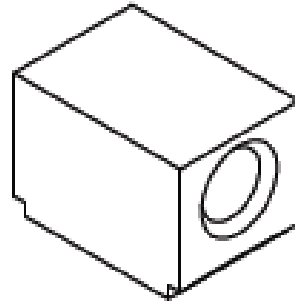
Comparison Plated Through Holes vs Non-Plated Through Holes



Design and Processing

Footprint for SMT Spacer Right Angled

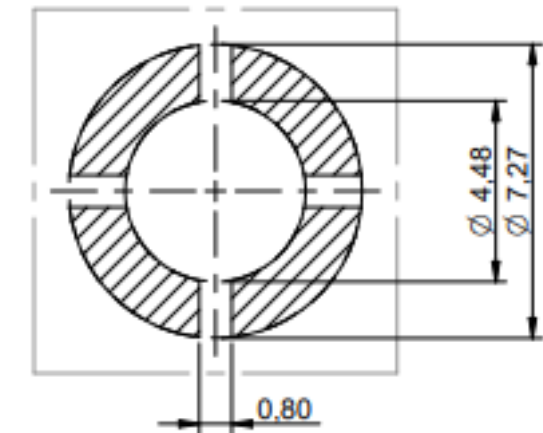
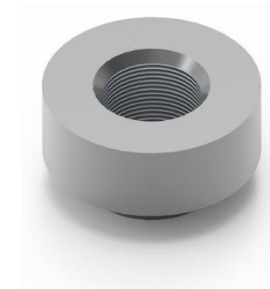
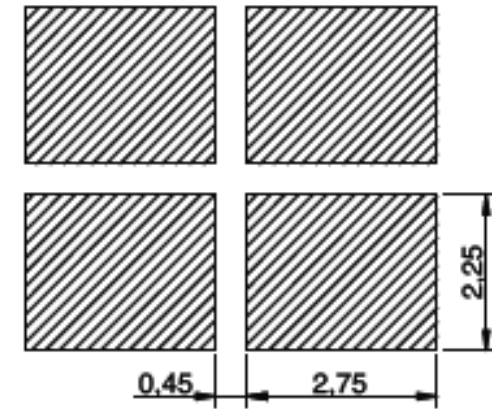
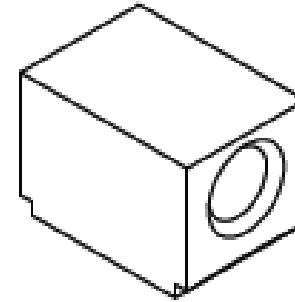
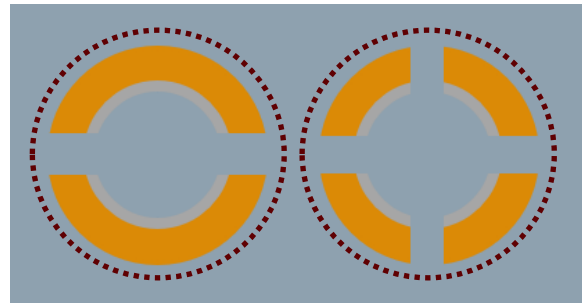
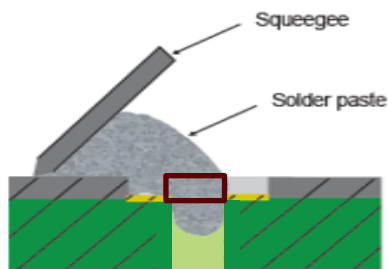
- Reduced edges



Design and Processing

Footprint for SMT Spacer Right Angled

- Stencil design
 - Keep path for activators and flux to disappear
 - Avoiding voids and lunkers
 - No solderpaste in boreholes



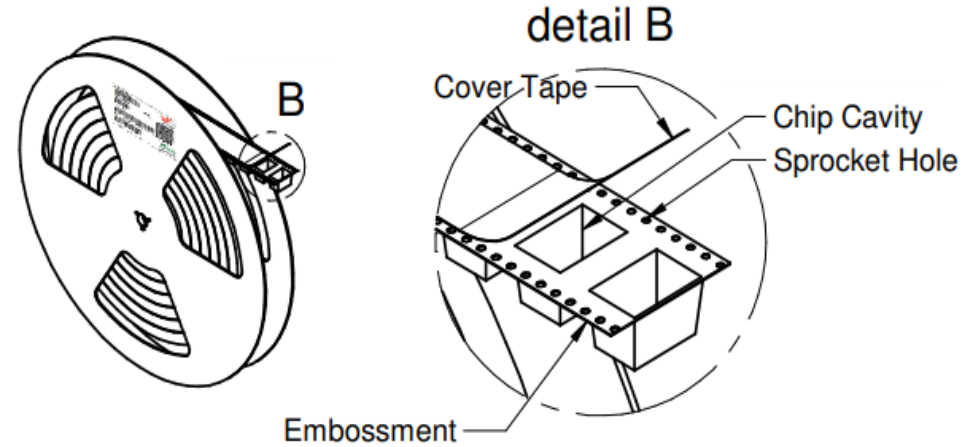
Design and Processing

Tape & Reel with Polyimid-Foil

- SMT-Spacers are supplied in tape on reels
- Perfect for automated processing with pick'n'place machinery

- Polyimid-foil on each SMT spacer to sop up with vakuum-pipette
- Polyimid-foils easily removable after soldering

- Optional available without Foil (RX)



Design and Processing

Reflow-Soldering

- SMT spacers to be reflow-soldered
- IPC / JEDEC J-STD-020E compliant
- Can be processed with any other SMT components
- 5 time reflow tested
- 2nd pass upside down tested

- RoHS and REACH compliant (6c)
- Lookout: ZeroPB in preparation

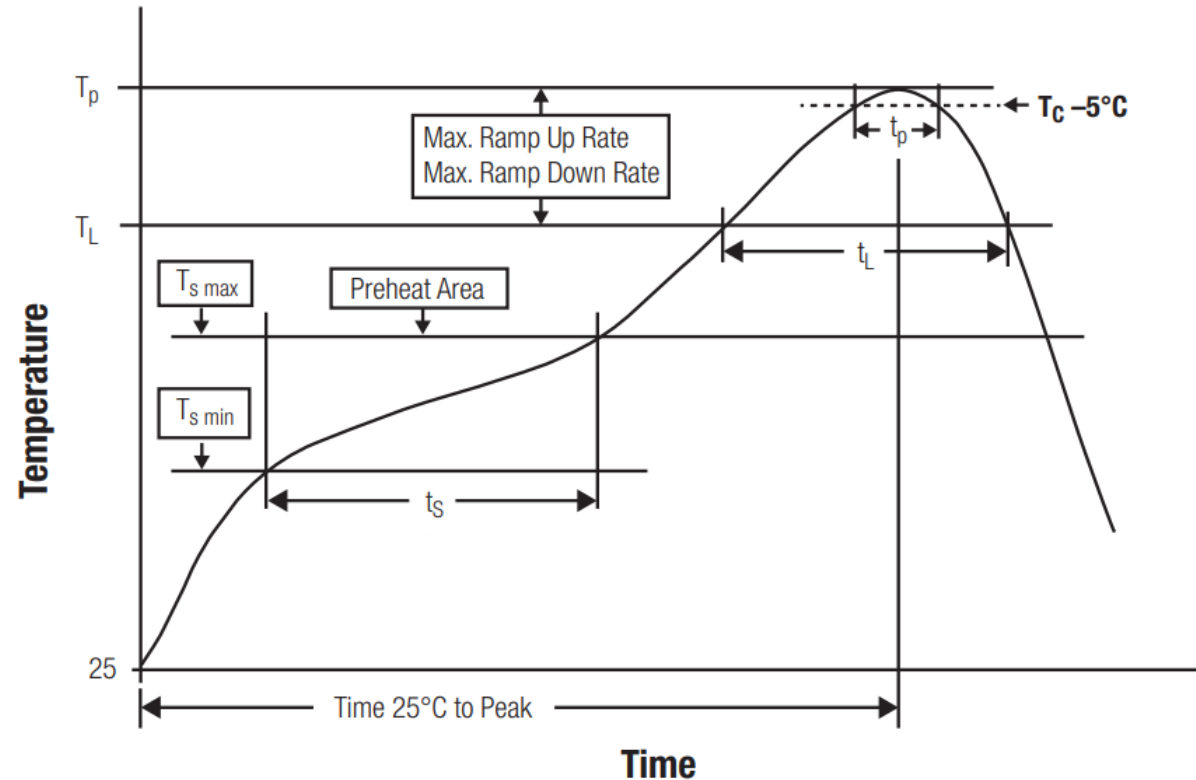


RoHS
COMPLIANT



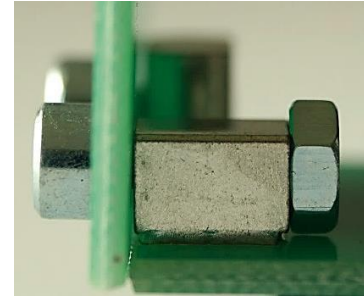
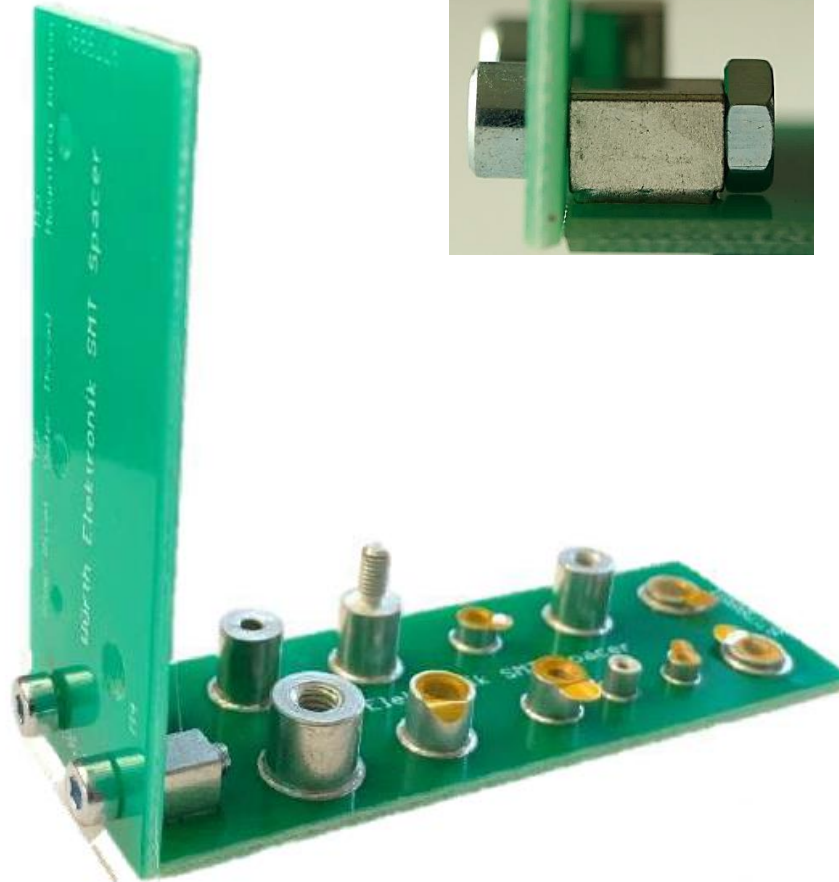
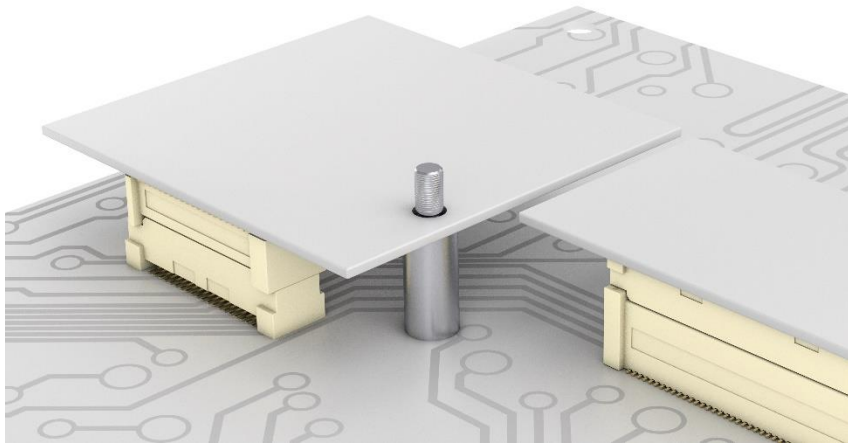
REACH
COMPLIANT

Classification Reflow Profile for SMT components:



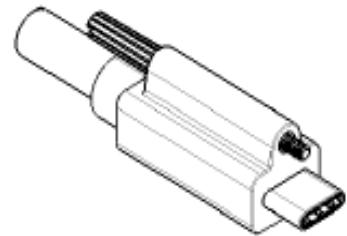
Application Examples

- WE Demo-Board
 - Different types and sizes
 - Assembling examples
 - Vertical and 90°

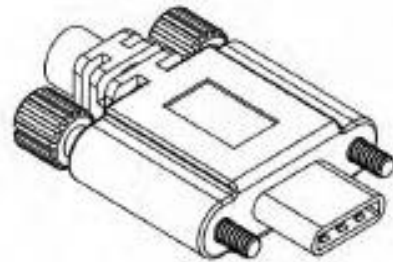


Application Examples

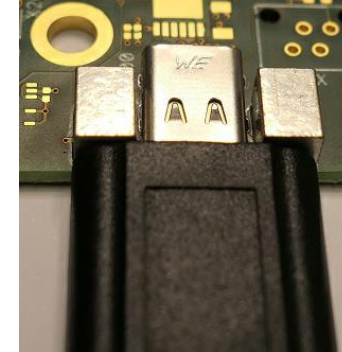
Solution for USB-C with locking screws



Single Screw Plug



Dual Screw Plug



- Footprints on request

Economic Comparision

SMT-Spacer vs. HexSpacer-Stud comparision

	SMT Spacer	Standard Spacer
Component	SMT-Spacer SMRI M3x5	Hex-Spacer M3x5
Price	340 €	175 €
UPE	1000 pcs	1000 pcs
Assembly cost /h	205 €/h	36 €/h
	0,046 €/pcs	0,3 €/pcs
	45,56 €/UPE	300 €/UPE
Time calculation		
SMT Spacer	0,8 sec.	6 sec.
screw	-	6 sec.
PCB	-	6 sec.
Drill	-	6 sec.
fix screw	-	6 sec.
Total	0,8 sec.	30 sec.
Total time 1000pcs	13,3 Min.	8,33 h
Assembly cost	356,89 €	416,67 €
Break even	765 pcs	



Questions

& Answers



We are here for you now!
Ask us directly via our chat or via E-Mail.

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