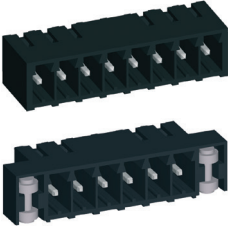




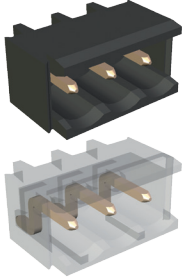
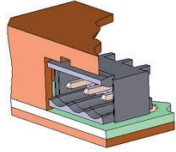



General note:

The pull-out or peel-off forces of the solder joint are depending also on the quality of the solder joint and the PCB as well as the conditions on site. They may differ from tested and documented values under laboratory conditions in this overview.


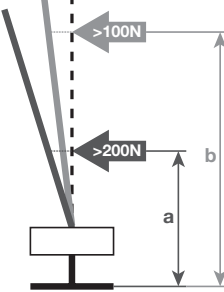

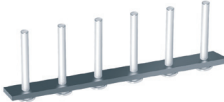
SMD pin strips (contact pins „I“ or „Z“-shape)

Product	Description of the test	Result
110-M-211-SMD 110-M-216-SMD 	Peel-off test: 110-A connected mating plug is pulled vertically (S-N direction to the PCB). ➔ This test simulates the resistance on the „Z“ shape contacts and PCB solder level.	Retention force of soldered header: Slight bending of pins for 110-M-211-SMD 4 poles: at approx. 0,8 N 12 poles: at approx. 5 N Strong bending of pins (ca. 45°) for 110-M-211-SMD 4 poles: at approx. 18 N 12 poles: at approx. 44 N Solder joints are not damaged. 110-M-216-SMD: Retention force pin strip with anchor: at approx. 65 N
110-M-221-SMD 	Pull-out test: Pulling the housing vertically to the PCB. ➔ This test simulates the resistance of the header to the pull-out force generated by the mating 110-A plug.	Retention force of soldered header: Header can be stressed with 4 poles: 180 N 12 poles: up to 200 N until the housing is withdrawn from the pins.
110-M-226-SMD 	Pull-out test: Pulling the housing vertically to the PCB. ➔ This test simulates the resistance of the header to the pull-out force generated by the mating 110-A plug.	Retention force of soldered header: The SMT anchors resist to a vertical test force up to 150 N. Damage to the „I“ shape soldered joints can occur only after the rupture of the SMT anchors. (See retention force values for 110-M-221-SMD).
Test parameters: Solder pad: 1,3 x 5,5 mm Solder paste thickness: 0,15 mm Solder land/copper: 35 µm	Peel-off test: Mechanical resistance test done with 110-A mating plug stressed with lateral test force. ➔ This test simulates the resistance of „I“ shape soldered pins and the retention capacity of the plastic housing.	Retention force of soldered header: Headers with attached plug connector can be stressed with 4 poles: up to 25 N 12 poles: up to 50 N Solder joints are not damaged.
Test parameters: Solder pad ø: 2,2 mm Solder paste thickness: 0,2 mm Solder land/copper: 35 µm	Peel-off test: Mechanical resistance test done with 110-A mating plug stressed with lateral test force. ➔ This test simulates the resistance of „I“ shape soldered pins and the retention capacity of the plastic housing.	Retention force of soldered header: Headers with attached plug connector can be stressed with 4 poles: up to 35 N 12 poles: up to 50 N Solder joints are not damaged.
Test parameters: Solder pad ø: 2,2 mm Solder paste thickness: 0,2 mm Solder land/copper: 35 µm	Peel-off test: Mechanical resistance test done with 110-A mating plug stressed with lateral test force. ➔ This test simulates the resistance of „I“ shape soldered pins and the retention capacity of the plastic housing.	Retention force of soldered header: Headers with attached plug connector can be stressed with 4 poles: up to 35 N 12 poles: up to 50 N Solder joints are not damaged.


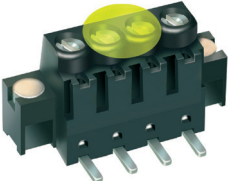
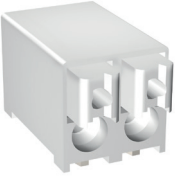
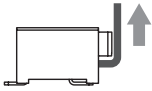

SMD pin strips (contact pins „I“ or „Z“-shape)

Product	Description of the test	Result
<p>120-M-211-SMD</p>  <p>Test parameters: Solder pad: 1,4 x 5 mm Solder paste thickness: 0,15 mm Solder land/copper: 35 µm</p>	<p>Peel-off test: Headers with attached plug connectors 120-A, stressed with upward test force, vertical to the PCB.</p> <p>➔ This test simulates the resistance on the „Z“ shape pins.</p>	<p>Retention force of soldered header: Slight bending of pins 2 poles: at approx. 10 N 4 poles: at approx. 20 N 8 poles: at approx. 25 N</p> <p>To destruction (tearing of the board) 2 poles: at approx. 15 N 4 poles: at approx. 30 N 8 poles: at approx. 40 N</p> <p>Recommendation: Pin strip has to be secured against vertical pull-off in application operation.</p> 
<p>120-M-221-SMD</p>  <p>Test parameters: Solder pad ø: 2,8 mm Solder paste thickness: 0,2 mm Solder land/copper: 35 µm</p>	<p>Pull-out test: Pulling the housing vertically to the PCB.</p> <p>➔ This test simulates the resistance of the header to the pull-out force generated by the mating 120-A plug connector.</p>	<p>Retention force of soldered header: Headers can be stressed with 2 poles: 50 N 6 poles: up to 100 N until the housing is withdrawn from the pins.</p>
<p>931-SLR-SMD-1,3</p>  <p>Test parameters: Solder pad ø: 2,2 mm Solder paste thickness: 0,15 mm Solder land/copper: 35 µm</p>	<p>Peel-off test: 1.) Header with attached plug connector 120-D, stressed with lateral test force, parallel to the PCB, at the upper edge of the connector.</p> <p>2.) Header stressed with lateral test force, parallel to the PCB</p> <p>➔ This test simulates the resistance of „I“ shape soldered contact pins and the retention capacity of the plastic housing.</p>	<p>Retention force of soldered header: 1.) Headers with attached plug connector can be stressed with 2 poles: up to 50 N >2 poles: 50 N If the test force exceeds 50 N, the plastic housing is ripped of the pins. Solder joints are not damaged.</p> <p>2.) Headers can be stressed laterally with 2 poles: up to 100 N 6 poles: up to 300 N Bending of the pins, but solder joints are not damaged.</p>
	<p>Pull-out test: Pulling the pins vertically to the PCB.</p> <p>➔ This test simulates the resistance of the pin strip to the pull-out force.</p>	<p>Retention force of soldered header: Pin strips can be stressed with 2 poles: 100 N</p>
	<p>Peel-off test: Pin strips stressed with lateral test force, parallel to the PCB at:</p> <p>(a) 4 mm height above the solder joint (b) 7.5 mm height above the solder joint</p>	<p>Retention force of soldered header: Pin strips can be stressed with</p> <p>(a) 2 poles: 50 N (b) 2 poles: 35 N</p>


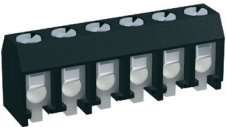
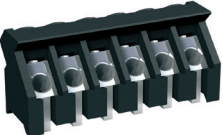
SMD pin strips (contact pins „I“ or „Z“-shape)

Product	Description of the test	Result
971-SLR-SMD-1,1   Test parameters: Solder pad \varnothing : 2,8 mm Solder paste thickness: 0,2 mm Solder land/copper: 35 μ m	Pull-out test: Pulling the pins vertically to the PCB. ➔ This test simulates the resistance of the pin strip to the pull-out force. Peel-off test (with \varnothing1,1 pins): 1.) Pin strips with attached plug connector 958-RFL-DS, stressed with lateral test force, parallel to the PCB at the upper edge of the connector. 2.) Pin strips stressed with lateral test force, parallel to the PCB at: (a) 5 mm height above the solder pad (see figure) (b) 11 mm height above the solder pad (see figure) ➔ This test simulates the resistance of „I“ shape soldered contact pins and the retention capacity of the plastic housing.	Retention force of soldered header: Pin strips can be stressed with 2 poles: up to 200 N Retention force of soldered header: 1.) Pin strips with attached plug connector can be stressed with 3 poles: 130 N 2 poles: up to 100 N after which the mating plug slides out from the pin strip. Solder joints are not damaged. 2.) 12 poles pin strips (without mating plug) can be stressed with (a) up to 200 N (see figure) (b) up to 100 N (see Figure) The pin strips are slightly bended, but solder joints are not damaged.
971-SLR-SMD-1,3  Test parameters: Solder pad \varnothing : 2,8 mm Solder paste thickness: 0,2 mm Solder land/copper: 35 μ m	Pull-out test: Vertical pull of the pins, vertical to the PCB. ➔ This test simulates the resistance of the pin strip to the pull-out force. Peel-off test (with \varnothing1,3 pins): 1.) Pin strips with attached plug connector 958-RFL-DS, stressed with lateral test force, parallel to the PCB and on the upper edge of the connector. 2.) Pin strips stressed with lateral test force, parallel to the PCB at: (a) 5 mm height above the solder pad (b) 11 mm height above the solder pad ➔ This test simulates the resistance of „I“ shape soldered contact pins and the retention capacity of the plastic housing.	Retention force of soldered header: Pin strips can be stressed with 2 poles: up to 200 N Retention force of soldered header: 1.) Pin strips with attached plug connector can be stressed with 3 poles: 80 N 12 poles: up to 150 N Solder joints are not damaged. 2.) 2 poles pin strips (without mating plug) can be stressed with (a) up to 65 N (b) up to 40 N before a destruction of the solder joint and/or tearing of the pin strip occurs.
971-SLT-SMD-1,1 	Please see „971-SLR-SMD-1,1“	

SMD connectors (elevator style) with „L“ shape contact elements

Product	Description of the test	Result
140-A-126-SMD  Test parameters: Solder pad: 1,5 x 4,7 mm Solder paste thickness: 0,15 mm Solder land/copper: 35 µm	Tensile test: (a) Pulling the conductor parallel to the PCB (b) Pulling the housing vertically to the PCB ➔ Both tests simulate the tensile load by conductors and the housing during use.13.	Retention force of soldered header: Connectors can be stressed with (a) 2 poles: 300 N (b) 2 poles: 50 N
210-A-126-SMD  Test parameters: Solder pad: 1,4 x 5 mm Solder paste thickness: 0,15 mm Solder land/copper: 35 µm	Tensile test: (a) Pull force on conductor, parallel to the PCB (b) Pull force on housing, vertical to the PCB ➔ Both tests simulate the tensile load by conductors and on the housing during use.	Retention force of soldered header: Connectors can be stressed with (a) 6 poles: up to 300 N (b) 6 poles: 75 N
830-A-111-SMD  Test parameters: Solder pad: 1,3 x 3,4 mm Solder paste thickness: 0,15 mm Solder land/copper: 35 µm	Tensile test: Pull force parallel to the PCB  ➔ Test simulates the resistance of the connector against the pull-out forces.	Retention force of soldered header: Connectors can be stressed with 2-poles: 70 N 3-poles: 110 N
	Peel-off test: Connector stressed with force on the pusher, parallel to the PCB  ➔ This simulates the process when releasing the conductor	Retention force of soldered header: Connectors can be stressed with 2-poles: 170 N 3-poles: 185 N

SMD connectors with rectangular contact terminal pads

Product	Description of the test	Result
930-D-SMD-DS  Test parameters: Solder pad: 1,7 x 5,5 mm Solder paste thickness: 0,15 mm Solder land/copper: 35 µm	Test for torque resistance: Measures the robustness of the contact pads after soldering to the PCB. Tensile test: Pulling the conductor vertically to the PCB. ➔ This test simulates the tensile load by conductors and on the housing during use.	Retention force of soldered header: Connectors can be stressed with up to 0.3 Nm and therefore 50% higher than the torque force applied by screw. Retention force of soldered header: Connectors can be stressed with >2 poles: up to 100 N
950-D-SMD-DS  Test parameters: Solder pad: 2,5 x 5 mm Solder paste thickness: 0,2 mm Solder land/copper: 35 µm	Test for torque resistance: Measures the robustness of the contact pads after soldering to the PCB. Tensile test: <ul style="list-style-type: none"> (a) Pulling the conductor parallel to the PCB (b) Pulling the conductor in direction of 45° to the PCB (c) Pulling the conductor vertically to the PCB 	Retention force of soldered header: Connectors can be stressed with up to 0,6 Nm Retention force of soldered header: Connectors can be stressed with <ul style="list-style-type: none"> (a) 2 poles: up to 200 N (b) 2 poles: up to 200 N (c) 2 poles: 150 N
974-D-SMD-DS  Test parameters: Solder pad: 2,5 x 5 mm Solder paste thickness: 0,15 mm Solder land/copper: 35 µm	Test for torque resistance: Measures the robustness of the contact pads after soldering to the PCB. Tensile test: <ul style="list-style-type: none"> (a) Pulling the conductor parallel to the PCB (b) Pulling the conductor in direction of 45° to the PCB (c) Pulling the conductor vertically to the PCB 	Retention force of soldered header: Connectors can be stressed with 0,4 - 0,5 Nm Retention force of soldered header: Connectors can be stressed with <ul style="list-style-type: none"> (a) 2 poles: 70 N (b) 2 poles: 150 N (c) 2 poles: 200 N