Samsung Galaxy S8

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www.pemnet.com
The Samsung Galaxy S8 features a 5.8 inches curved LED display. The device’s covering surfaces comprise mostly of glass and metal along the siding and protected against water and dust in accordance with IP68 Code testing specification.
Details & Findings

Pictures and Description of the Samsung Galaxy S8 and the Disassembly Process.
Step 1: Removing the SIM card tray
Get the card tray out of the phone with an E-Ject pin.
Step 2: Removing the back cover

The back cover is glued on the aluminum alloy phone chassis with double-sided adhesive tape. Initially we pry the bottom cover with a spudger tool and then slide the tool across the edge until the bottom case is completely removed.

No fasteners found at this stage.
Step 3: Removing the camera lens and the flash cover glued on back cover
A flex cable and the camera cover are glued on the back cover with adhesives.
Step 4: Removing the middle-plastic-contact.

We disconnect the flex cable and the signal cable prior to removing the middle-plastic-contact from the aluminum alloy chassis. To remove the middle-plastic-contact we have to remove eight M1.4 screws (circled in Blue) that hold the PC Board fastened on the molded aluminum alloy chassis illustrated on slide #8.

**The screw details:**
- M1.4 x 3.70 mm overall length
- 2.41 mm head diameter
- 0.6 mm head thickness
- Nylon locking patch
- Machined
- #00 Phillips drive
- Pan head
- Carbon Steel + Bright Nickel
Step 4: Removing the middle-plastic-contact.

The picture below shows the internal threads that are machined in the molded aluminum alloy chassis illustrated in the previous slide.
Step 5: Removing the plastic-contact on the left side.

Three M1.4 screws (circled in Blue) are used to hold the left-plastic-contact fastened on the PC Board under the aluminum alloy chassis. The threads are tapped in the molded aluminum alloy chassis illustrated on slide #10.

The screw details are as below:
- M1.4 x 3.70 mm overall length
- 2.41 mm head diameter
- 0.6 mm head thickness
- Nylon locking patch
- Machined
- #00 Phillips drive
- Pan head
- Carbon Steel + Bright Nickel
Step 5: Removing the plastic-contact on the left side.

The picture below indicates the internal threads that are machined in the molded aluminum alloy chassis that was mentioned in the previous slide.
Step 6: Separating plastic-contact from the bottom-left side

Three M1.4 screws (circled in Blue) are used for holding the plastic contact at the bottom-left side and PCB board. The screws eventually attach through the internal threads that are tapped on the aluminum alloy chassis illustrated in the pictures below.

The screw details are as below
• M1.4 x 3.70 mm overall length
• 2.41 mm head diameter
• 0.6 mm head thickness
• Nylon locking patch
• Machined
• #00 Phillips drive
• Pan head
• Carbon Steel + Bright Nickel
Step 7: Removing the battery
The battery is held in position with double-sided adhesive tapes. The battery has to be removed to be able to further proceed with disassembling the rest of the device. No mechanical fasteners found through this step.
Step 8: Removing the motherboard
The motherboard itself pops out relatively simply. The I/O board connector is under the motherboard in the aluminum alloy chassis.
Also no mechanical fastener found through this step.
Step 9: Removing the bottom circuit board & earphone jack input module.

The signal cable has to be disconnected prior to removing the bottom circuit boards. The motherboard is retained with five M1.4 screws (circled in Pink).

The screw details are as below

- M1.4 x 2.78 mm overall length
- 2.15 mm head diameter
- 0.5 mm head thickness
- Nylon locking patch
- Machined
- #00 Phillips drive
- Flat head
- Carbon Steel + Bright Nickel
Step 9: Removing the bottom circuit board & earphone jack input module
The picture bellow shows the internal threads that are tapped inside the molded aluminum alloy chassis.
Step 10: Removing the stainless steel cover for the earphone jack input module.

The cover remains in position with the use of a molded positioning pin (circled in Blue) and fits in outside dimensions of the cover and internal dimensions of the rectangular caves.
Step 11: Removing the display assembly and the flex cable at the back of the screen

The screen is glued on the aluminum alloy chassis with double-sided adhesive tapes. It was quite challenging to disassemble these 2 parts with the pry tool. The flex cable at the back of the screen is also adhered with double-sided tape.

In this step, no mechanical fastener were found.
The below pictures include all the parts that were disassemble through the process.
A total of 38 fasteners were identified in the device through-out the disassembly. All the fasteners are listed below:

<table>
<thead>
<tr>
<th>Item</th>
<th>Thread</th>
<th>Overall Length</th>
<th>Head Dia.</th>
<th>Head Thick.</th>
<th>Driver</th>
<th>Plating</th>
<th>Nylock</th>
<th>Qty.</th>
<th>Slide No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M1.4 Screw</td>
<td>3.7</td>
<td>2.41</td>
<td>0.6</td>
<td>Phillips #00</td>
<td>Bright Nickel</td>
<td>Yes</td>
<td>8</td>
<td>#7</td>
</tr>
<tr>
<td>2</td>
<td>M1.4 Screw</td>
<td>3.7</td>
<td>2.41</td>
<td>0.6</td>
<td>Phillips #00</td>
<td>Bright Nickel</td>
<td>Yes</td>
<td>3</td>
<td>#9</td>
</tr>
<tr>
<td>3</td>
<td>M1.4 Screw</td>
<td>3.7</td>
<td>2.41</td>
<td>0.6</td>
<td>Phillips #00</td>
<td>Bright Nickel</td>
<td>Yes</td>
<td>3</td>
<td>#11</td>
</tr>
<tr>
<td>4</td>
<td>M1.4 Screw</td>
<td>2.78</td>
<td>2.15</td>
<td>0.5</td>
<td>Phillips #00</td>
<td>Bright Nickel</td>
<td>Yes</td>
<td>5</td>
<td>#14</td>
</tr>
<tr>
<td>5</td>
<td>M1.4 Micro Machined-in Internal Threads</td>
<td>0.92</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>Bright Nickel</td>
<td>/</td>
<td>19</td>
<td>#8, #10, #15</td>
</tr>
<tr>
<td>6</td>
<td>0.8 x 1.5 Micro Molded Positioning Pin</td>
<td>0.4</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>1</td>
<td>#16</td>
</tr>
</tbody>
</table>
All of the fasteners identified in the device can be organized in the below 3 groups:

- **M1.4**
  - Nylon locking patch
  - #00 Phillips drive
  - Flat head
  - Carbon Steel + Bright Nickel
  - Quantity: 19
  - Reference slide #7, #9, #11, #14

- **M1.4**
  - Thread class: 6H
  - Quantity: 19
  - Reference slide #8, #10, #15

- **0.8 x 1.5 mm**
  - Height: 0.4mm
  - Thread class: None
  - Quantity: 1
  - Reference slide #16
Alternate Solutions

PennEngineering® recommendations of alternate hardware and cost saving opportunities.
PennEngineering® is fully capable of making all of the fasteners shown on slides #7, #9, #11, and #14. In addition to direct replacement and perhaps some manufacturing and material substitution for functional and cost improvement, some alternate fastening suggestions are presented for specific situations in the following slides.
Alternate Solutions

• Micro screws alternative solution:

As an alternative approach, all of the micro screws can be replaced by PennEngineering® manufactured micro screws. PEM has license with Microstix®, Torx® and Torx Plus® driver and self-tapping thread patent as like TAPTITE®, FASTITE®, REMFORM® and REMFORM F® with different design solutions.
• PEM TackSert parts:

In the disassembly process, screws are used to fix & connect PC board, earphone jack and power charge on the main body.

In the case, **PennEngineering®** TackSert parts can be used in some locations. This however is a permanent solution and cannot be reworked. The press-in installation will be quicker than the turn-in screws.
• M1.4 Micro Machined-in Internal Threads alternative solution:

All of the M1.4 Micro Machined-in Internal Threads can be replaced with PennEngineering® TS4™ microPEM® TackScrew™ Fasteners. The microPEM® TS4™ enables cost effective sheet-to-sheet attachment by simply pressing into place and can be removed by unscrewing, similar to original threaded fasteners.
• 0.8 x 1.5 Micro Molded Positioning Pin alternative solution I:
The Pin (circled in Pink) can be replaced by **MPP™ microPEM® Self-clinching Pins**. Ideal for micro positioning and alignment applications, the Self-clinching Pins from **PennEngineering®** can provide the MPPs with different sizes and types to meet the application requirement.
Alternate Solutions

- 0.8 x 1.5 Micro Molded Positioning Pin alternative solution II:
The Pin (circled in Pink) can also be replaced by the customized fastener YCHA-57222 positioning pin design (adjusted size and dimensions). Ideal for micro positioning and alignment applications, PennEngineering® can provide special pins with different sizes and types to meet the special requirements.

Refer to YCHA-57222 Design
Alternate Solutions

- Terminals alternative solution:
  
  A total of 19 pieces of copper made terminals were welded to the aluminum alloy chassis. The terminals can be replaced with PennEngineering® TA™/T4™ microPEM® TackPin® Fasteners made from a high Electrical Conductivity Alloy (for example, C15100 or C19800 alloys). The solution enables sheet-to-sheet attachment, replacing costly screw installation in applications where disassembly is not required.
Conclusions and Summary

Throughout the disassembly process of the Samsung Galaxy S8 cellphone we identified a total of 38 fasteners. The battery and most of the flex cables are held with double-sided adhesive tapes. Despite all the fasteners, the Galaxy S8 Cellphone actually proved easy to take apart with all components set in a well-organized manner.

PennEngineering® is fully capable of making all of the fasteners shown in this teardown report. PennEngineering® can produce all of the fastening solutions used in this cellphone within our current manufacturing facilities. In addition to direct replacement and perhaps some manufacturing and material substitution for functional and cost improvement, some alternate fastening suggestions are presented for specific cases.

By using the alternative solution of TS4™ microPEM® TackScrew™ Fasteners, the tapped threads in slide #27 can be eliminated thus leading to significant cost savings. The microPEM® TS4™ enables cost effective sheet-to-sheet attachment by simply pressing into place and can be removed by simply unscrewing, similar to original threaded fasteners.

The Ultrasonic Metal Welding machining cost can be effectively eliminated along with some relative process disadvantages by replacing the 19 terminals in slide #30, with TS4™ or TA™/T4™ or TKA™/TK4™ made of electrical conductive material.

Additional savings could be obtained by using microPEM® FASTENERS being fed, positioned and installed automatically in an installation system to install fittings into the components in this cellphone.