PennEngineering®

Lenovo IdeaPad U310 NoteBook

2012-09-12

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Lenovo IdeaPad U310-Overview

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Lenovo IdeaPad U310-Overview

Top View

Bottom View

Left Side View

Right Side View

Comments:

Both the top case and bottom case are aluminum alloy material with anodized to specific color. There are three optional colors - blue, pink and grey. The middle frame material as left marked in red is plastic.

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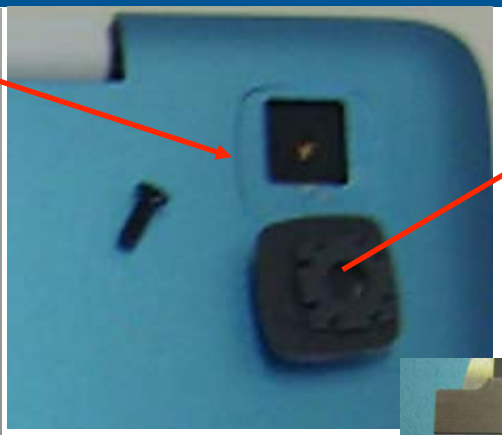
Details & Findings

Pictures and Description of the ***Lenovo IdeaPad U310*** and our disassembly process.

IdeaPad U310 Disassembly – Bottom Case



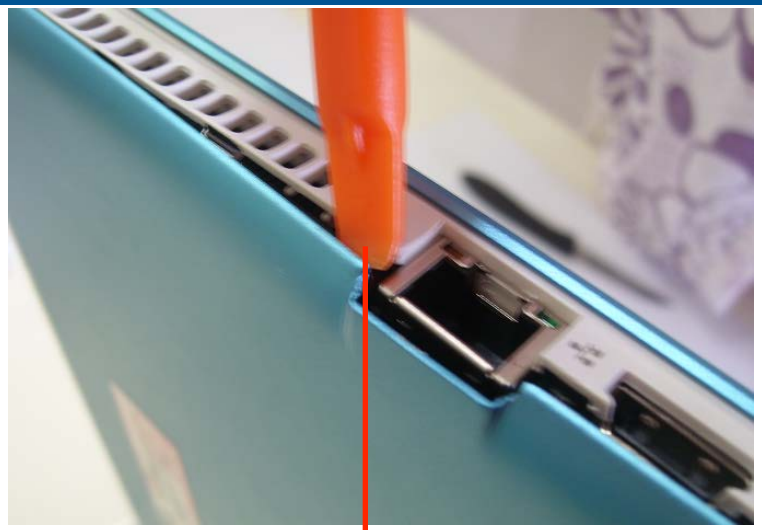
(Units: mm)

Thread Size:	Quantity:	Driver:	Head Dia.:	Head Thk.:	OAL:	Plating:	Nylok:
M2.5	4	Phillips	4.3	0.75	7.15	Black Zinc	Red

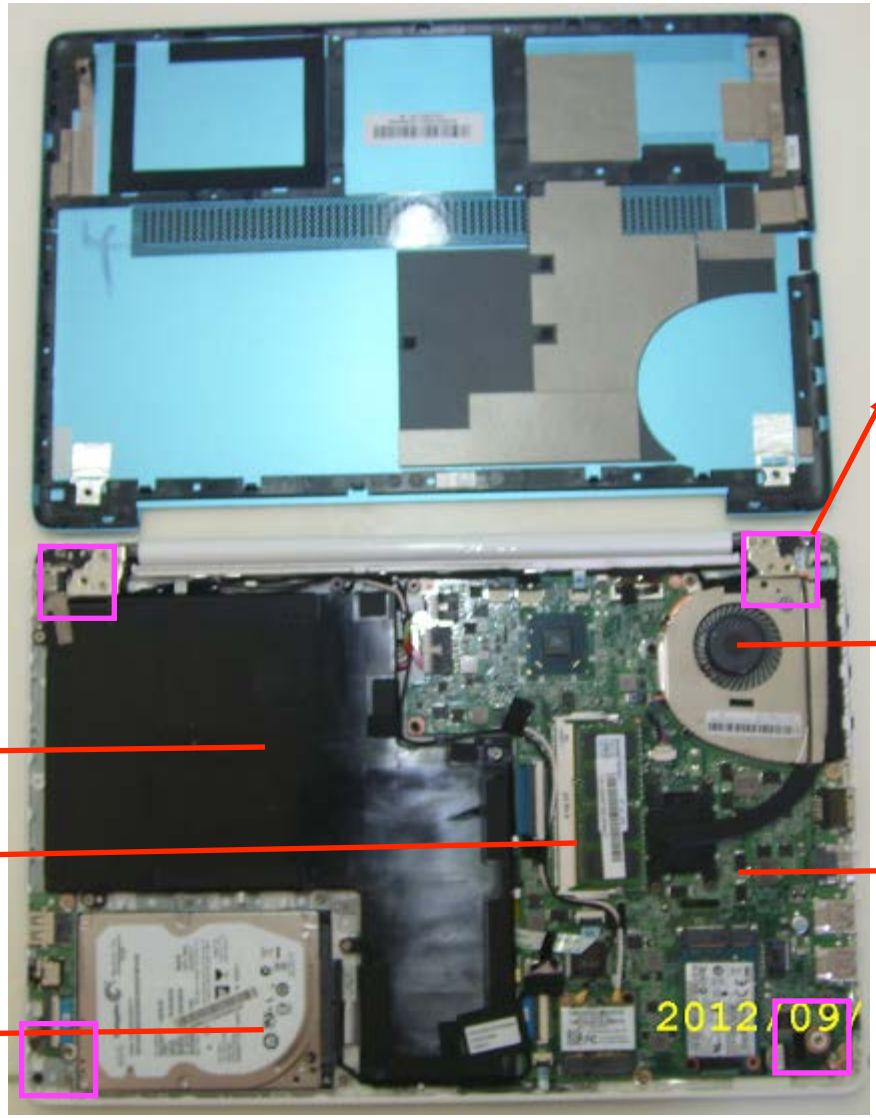
Comments:

You can't find any screws by overview, but there are four screws hidden under the rubber feet. After removing the rubber feet, we can see the screws.

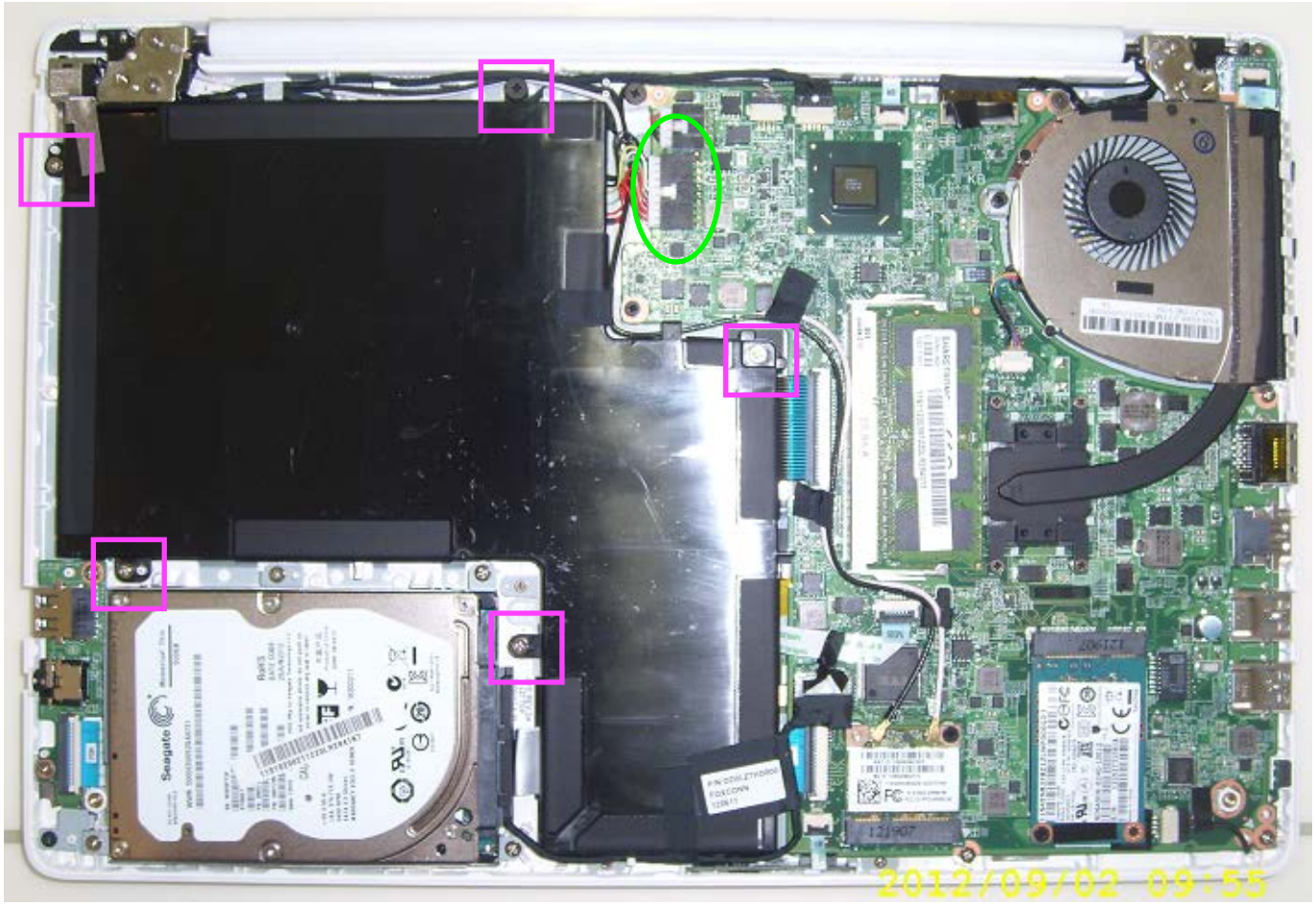
IdeaPad U310 Disassembly – Bottom Case



Find small gap between bottom case and middle frame, then use flat tools to separate them because the connection uses clamp design.

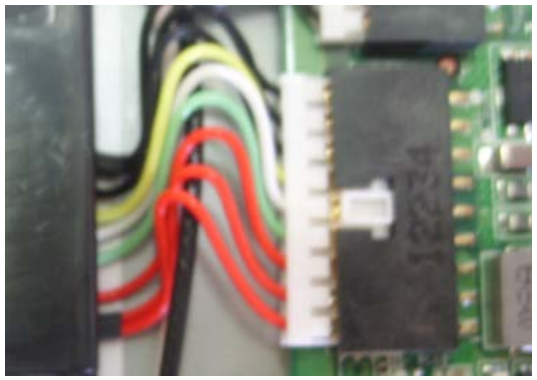


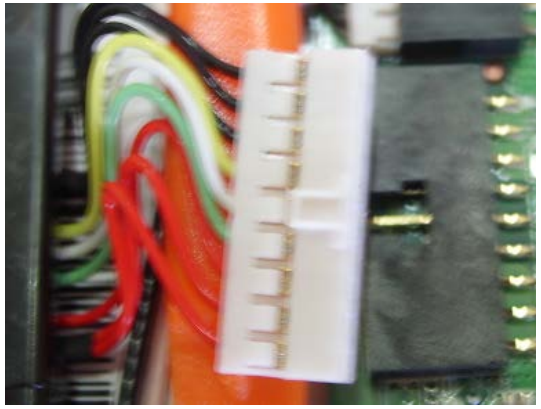
IdeaPad U310 Disassembly – Battery



Step1:

Remove power connector.



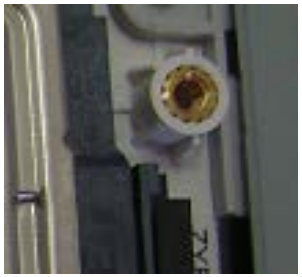


Comments:

The red marked is 5 screws, and the green marked is power connector.

IdeaPad U310 Disassembly – Battery

Step2: Remove screws.



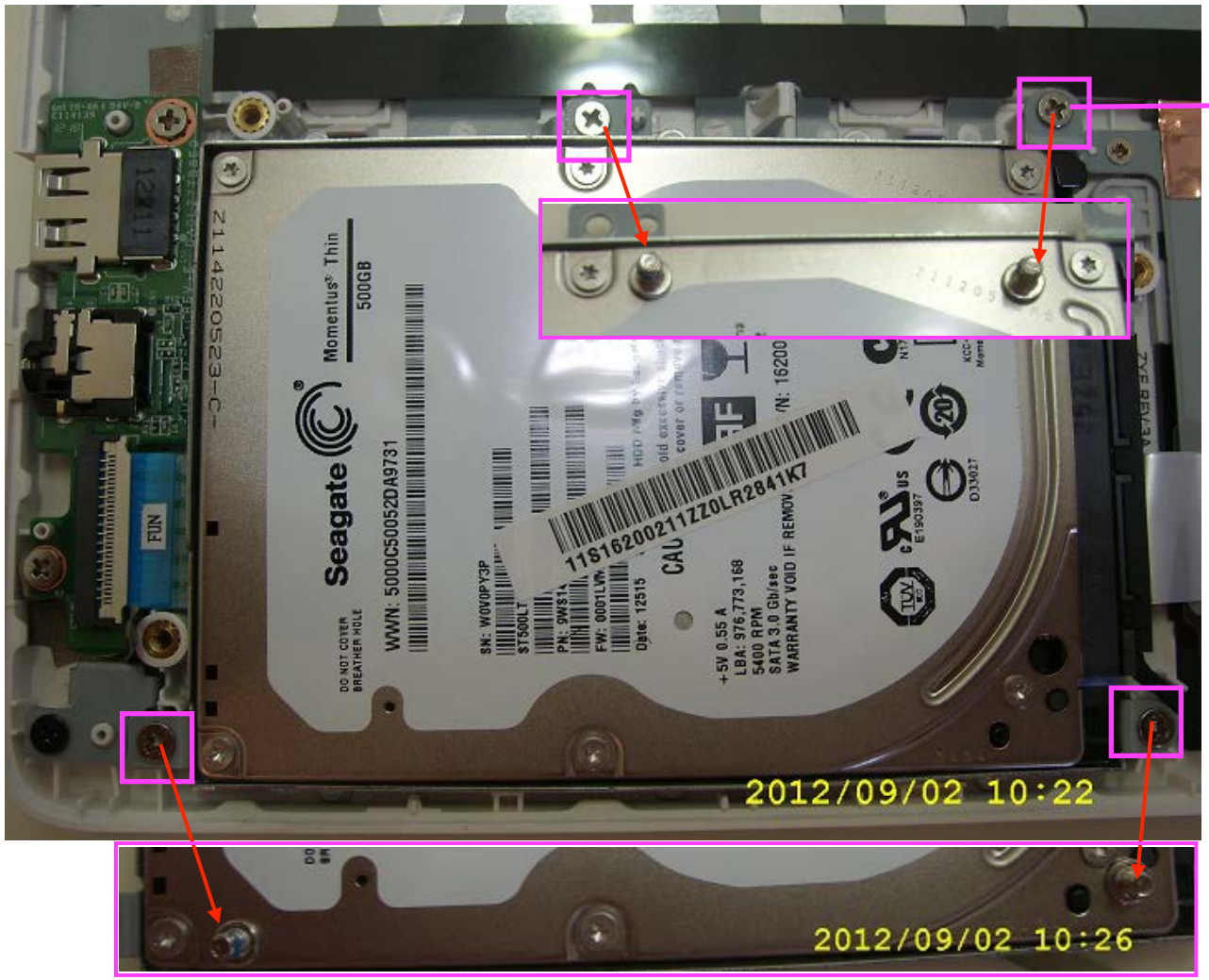
All five of these screws are mated with heat melt brass inserts.

The inserts summary is as page 23.

(Units: mm)

Thread Size:	Quantity:	Driver:	Head Dia.:	Head Thk.:	Step Dia.:	Step Height.:	OAL:	Plating:	Nylok:
M2.5	1	Phillips	5.9	0.8	3.5	2.1	5.6	Black Zinc	Blue
M2.5	4	Phillips	4.3	0.8	/	/	4.1	Bright Nickel	Blue

IdeaPad U310 Disassembly – Hard Disk



Total five screws.

All five of these screws are mated with heat melt brass inserts.

IdeaPad U310 Disassembly – Hard Disk

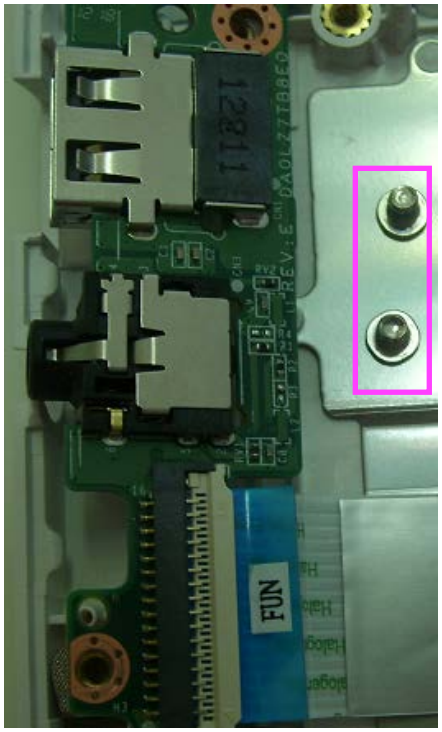
HD Front View

HD Bottom View

(Units: mm)

Thread Size:	Quantity:	Driver:	Head Dia.:	Head Thk.:	OAL:	Plating:	Nylok:
M2.5	4	Phillips	4.3	0.8	4.3	Bright Nickel	Blue

IdeaPad U310 Disassembly – Audio & USB (Left)



(Units: mm)

These two screws are mated with heat melt brass inserts.

Thread Size:	Quantity:	Driver:	Head Dia.:	Head Thk.:	OAL:	Plating:	Nylok:
M2.5	2	Phillips	4.3	0.8	4.2	Black Nickel	None

Comments: **After removing hard disk, we can remove left audio plug and USB board.**

IdeaPad U310 Disassembly – Magnet

Comments:

In the corner, there is one magnet. The function is to have magnetic force with top case.

The sheet thickness: 0.6mm

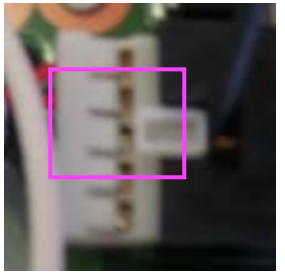
The C-ring function is to hold screw and sheet together. PEM® Type SCB™ style of captivated screw can also meet the application requirement.

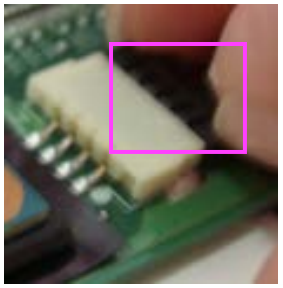
The screw is mated with heat melt brass insert.

(Units: mm)

Thread Size:	Quantity:	Driver:	Head Dia.:	Head Thk.:	OAL:	Plating:	Nylok:
M2.5	1	Phillips	4.3	0.8	4.6	Black Nickel	Blue

IdeaPad U310 Disassembly – Fan and PCB Board

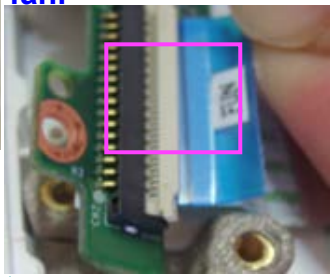


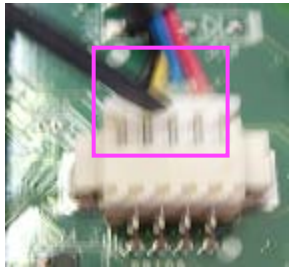


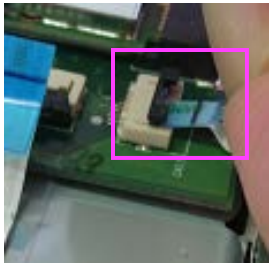
PCB Board

Comments:

All connectors and soft panels need to be disconnected before removing PCB board and fan.







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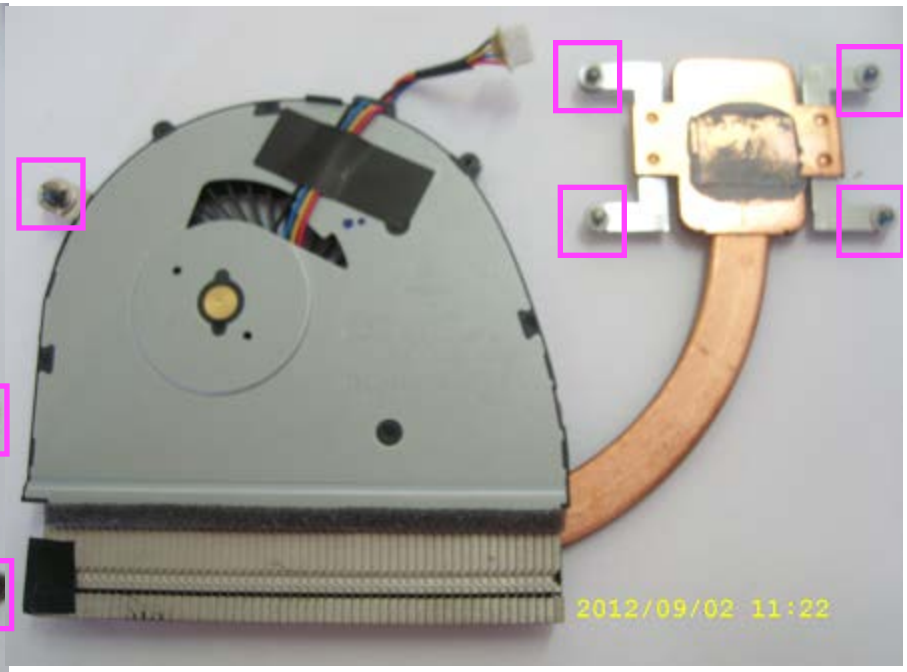
IdeaPad U310 Disassembly – Fan and PCB Board



Four M2 screws are mated with self-clinching standoffs and one M2.5 screw is mated with heat melt brass insert.

Comments:

All connectors and soft panels need to be disconnected before removing PCB board and fan.

(Units: mm)

Thread Size:	Quantity:	Driver:	Head Dia.:	Head Thk.:	OAL:	Plating:	Nylok:
M2	4	Phillips	3.9	1.1	4	Black Nickel	None
M2.5	1	Phillips	4.6	0.8	5.4	Black Nickel	None

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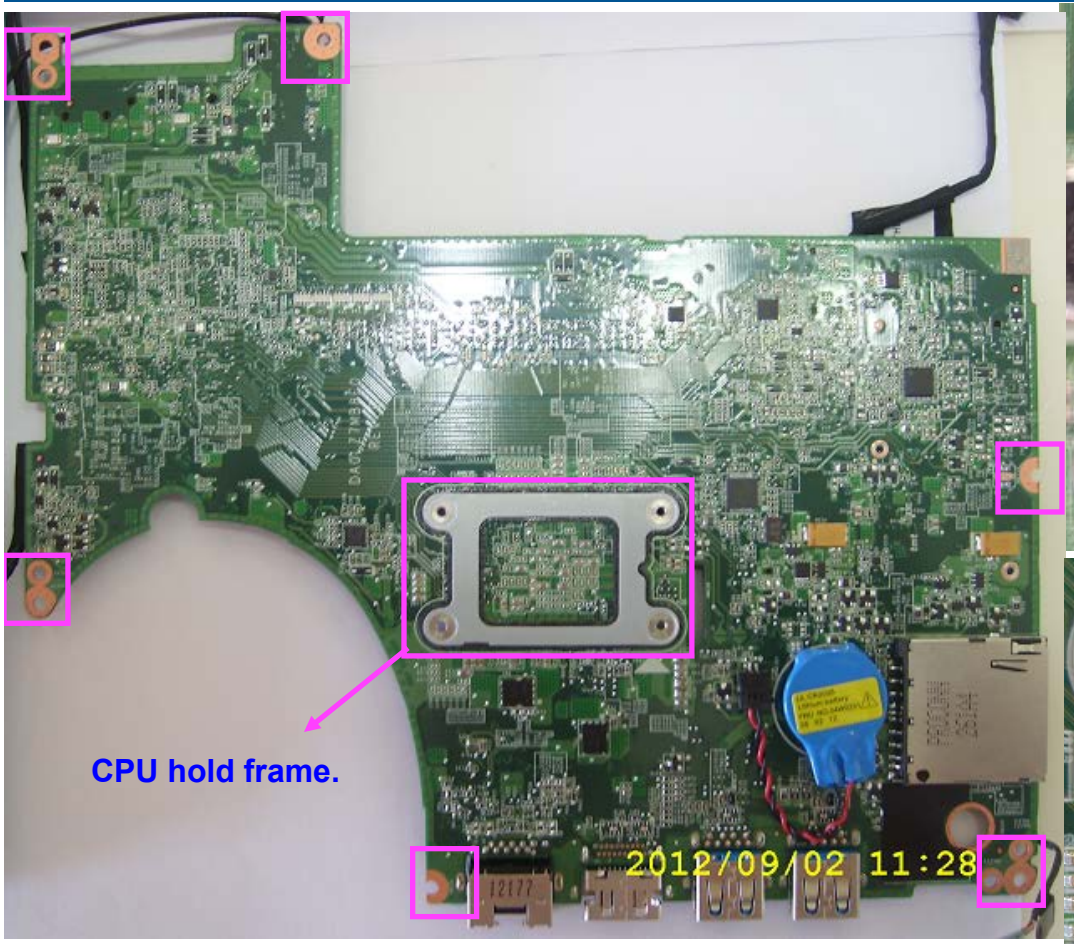
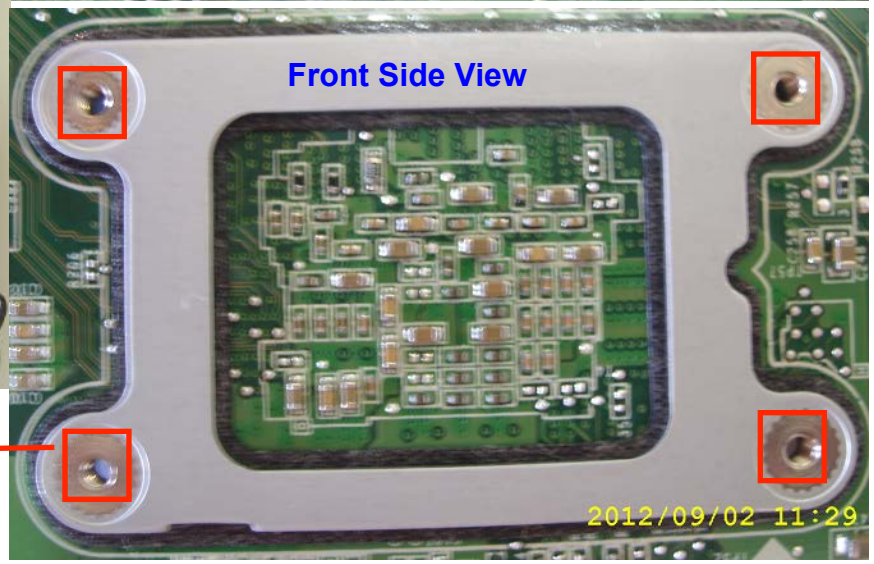
IdeaPad U310 Disassembly – Fan and PCB Board





Comments:

All connectors and soft panels need to be disconnected before removing PCB board and fan.

There are four self-clinching standoffs.

IdeaPad U310 Disassembly – Fan and PCB Board

PCB Used Screws and Standoff Summary:

All connectors and soft panels need to be disconnected before removing PCB board and fan.

Screws - (Units: mm)

Thread Size:	Quantity:	Driver:	Head Dia.:	Head Thk.:	Step Dia.:	Step Height.:	OAL:	Plating:	Nylok:
M2.5	1	Phillips	5.9	0.8	3.5	2.1	5.6	Black Zinc	Blue
M2.5	4	Phillips	4.3	0.8	/	/	4.1	Bright Nickel	Blue

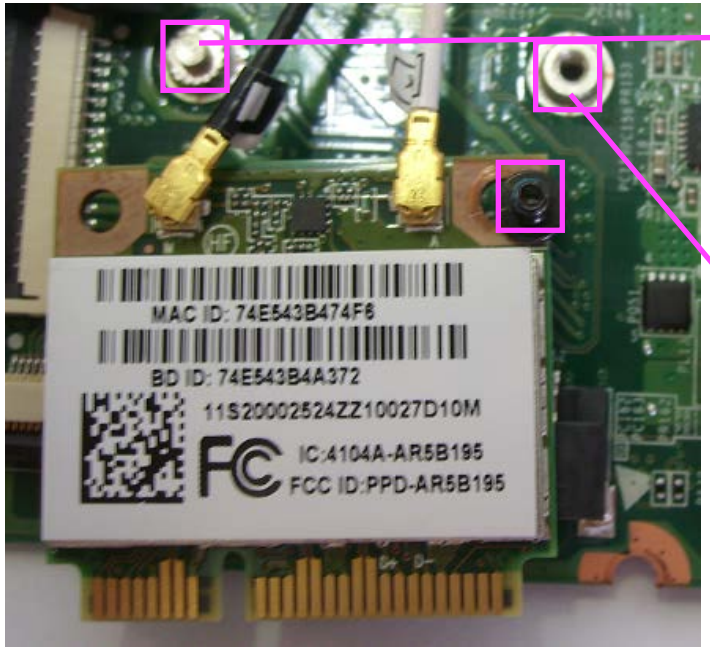
Above five screws are mated with heat melt brass inserts in middle frame.

Standoffs - (Units: mm)

Thread Size:	Quantity:	Head Dia.:	Barrel Dia.:	OAL:	Standoff Mat.	Sheet Mat.	Sheet Thick.
M2	1	6	4.5	3.4	303 SS	CRS Zinc Plated	1.0
M2	3	5	3.5	3.4	303 SS	CRS Zinc Plated	1.0

Above four standoffs are mated with four screws in fan.

IdeaPad U310 Disassembly – Wireless Card

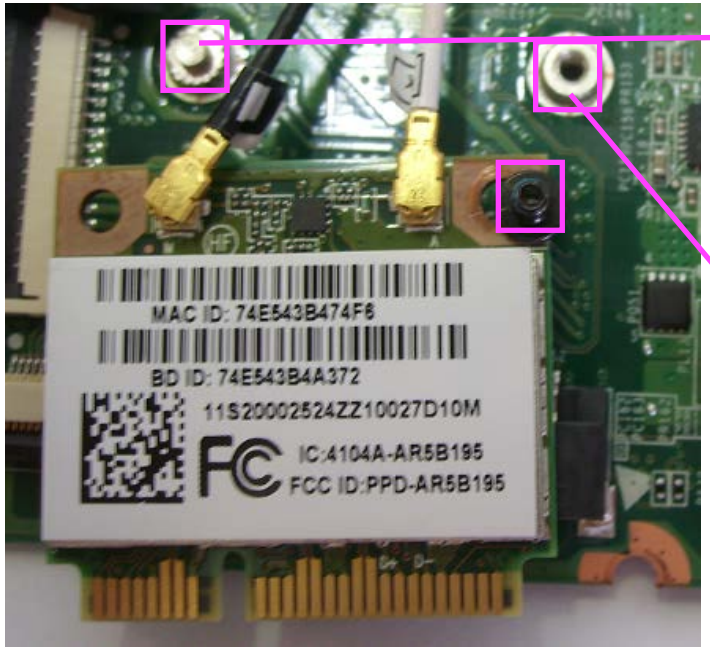


Comments: **Remove one screw to disassemble the wireless card then we can see that there are two Type SMTSO™ standoffs. One is threaded and another is non-thread, but both are knurled design.**

Screws - (Units: mm)

Thread Size:	Quantity:	Driver:	Head Dia.:	Head Thk.:	OAL:	Plating:	Nylok:
M2.5	1	Phillips	4.4	0.76	3.8	Black Zinc	Blue

IdeaPad U310 Disassembly – Wireless Card



2

1

Two Standoffs are outside knurled. I think the design can get much higher torque-out after solder.

Standoff 1 - (Units: mm)

Thread Size:	Quantity:	Barrel Dia.:	OAL:	Shank Dia.	Material	Plating
M2.5-1	1	4	2.6	2.0	Carbon Steel	Tin Plating

Standoff 2 - (Units: mm)

Thread Size:	Quantity:	Barrel Dia.:	OAL:	Shank Dia.	Step Dia.	Step HT	Material	Plating
None-2	1	4	3.6	2.0	2.5	1	Carbon Steel	Tin Plating

IdeaPad U310 Disassembly – Mouse Touch Panel

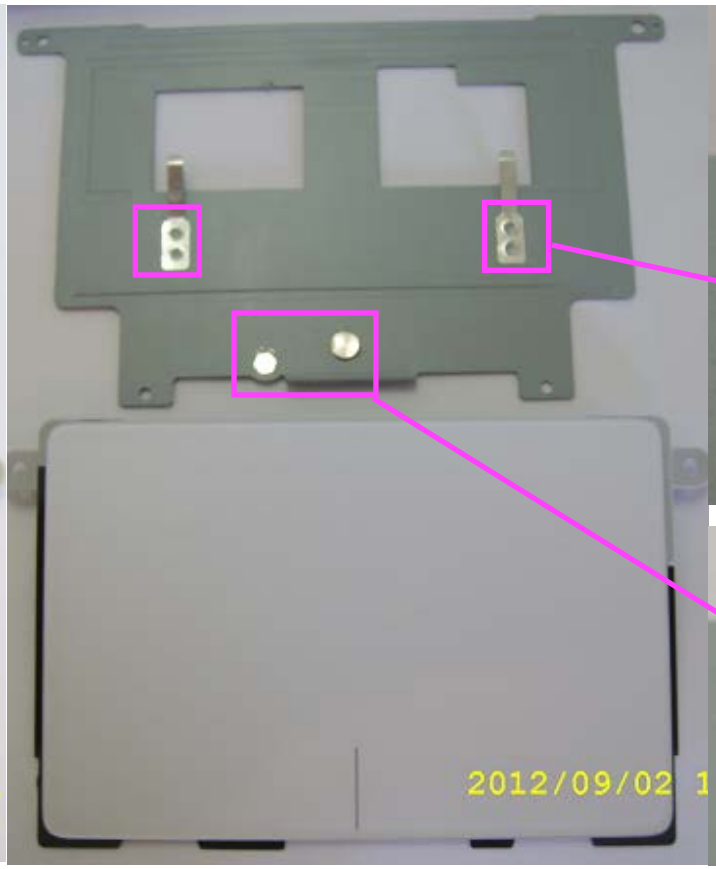
All four of these screws are mated with heat melt brass inserts.

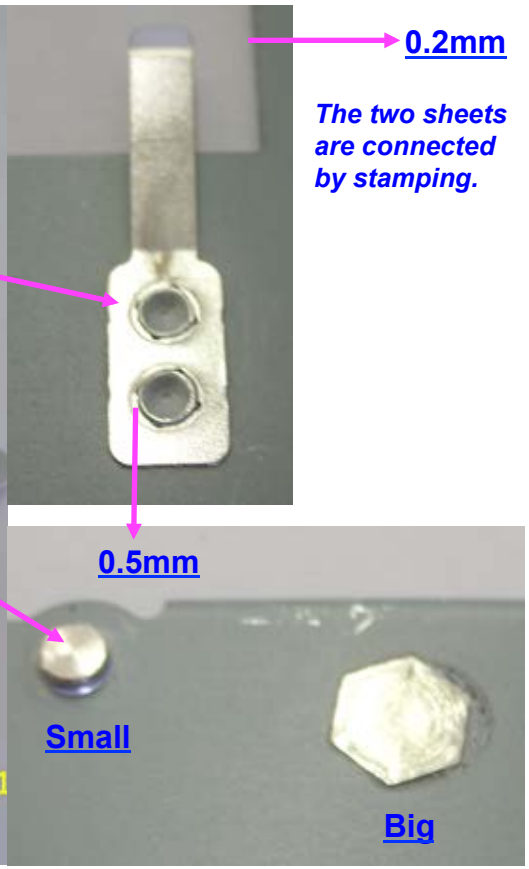
Comments: **Remove four screws to disassemble the mouse touch panel.**

Screws - (Units: mm)

Thread Size:	Quantity:	Driver:	Head Dia.:	Head Thk.:	OAL:	Plating:	Nylok:
M2.5	4	Phillips	3.4	0.3	2.8	Bright Nickel	Blue

IdeaPad U310 Disassembly – Mouse Touch Panel



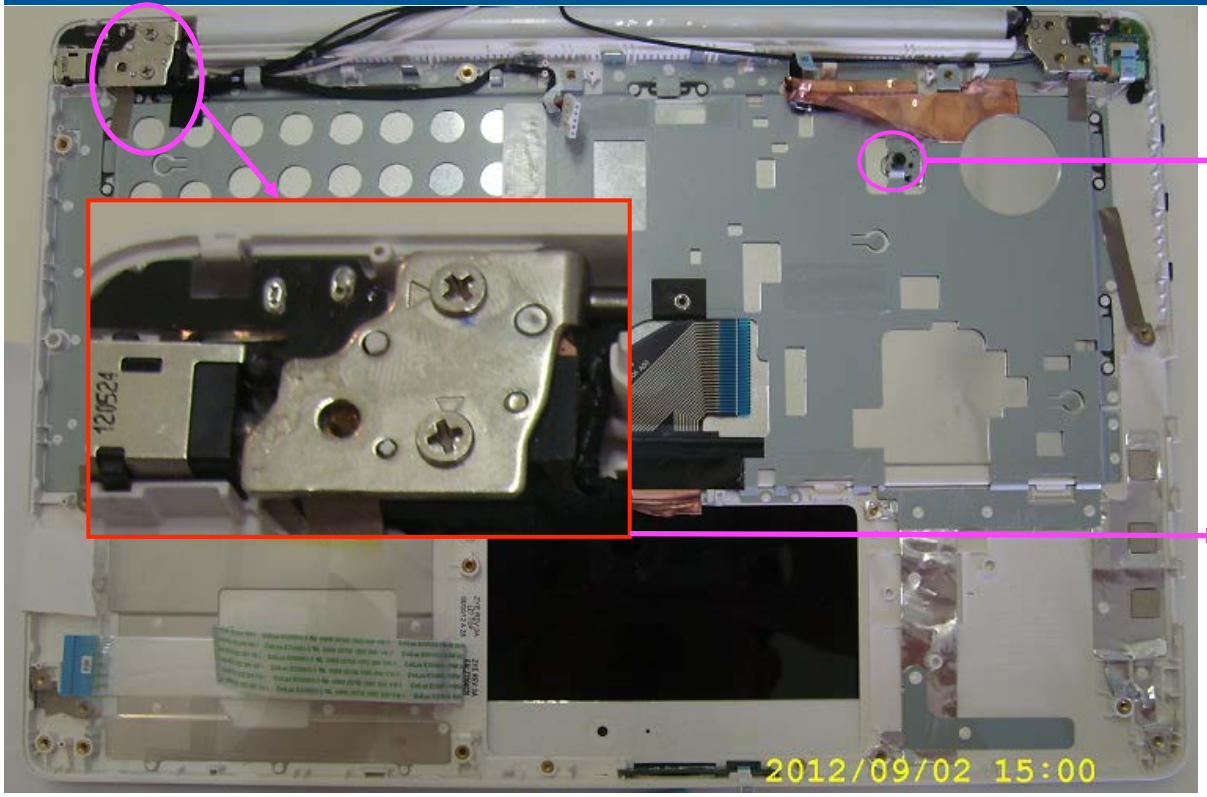


Comments: Both sides of mouse touch panel. Two standoffs are installed in 0.5mm panel with spacer function.

Standoff 1 - (Units: mm)

Thread Size:	Quantity:	Hex A.F.	OAL:	Barrel Dia.	Material	Plating
None - Big	1	5.5	1.4	5	Carbon Steel	Bright Nickel
None - Small	1	3.5	2.6	2.0	Carbon Steel	Bright Nickel

IdeaPad U310 Disassembly – Middle Frame Overview



The function of this screw is to hold the PCB panel.

All four of these screws are mated with heat melt brass inserts.

Screws - (Units: mm)

Thread Size:	Quantity:	Driver:	Head Dia.:	Head Thk.:	OAL:	Plating:	Nylok:
M2	1	Phillips	4	4	6.5	Black Zinc	Blue
M2.5	4	Phillips	4.3	0.8	4.15	Bright Nickel	Blue

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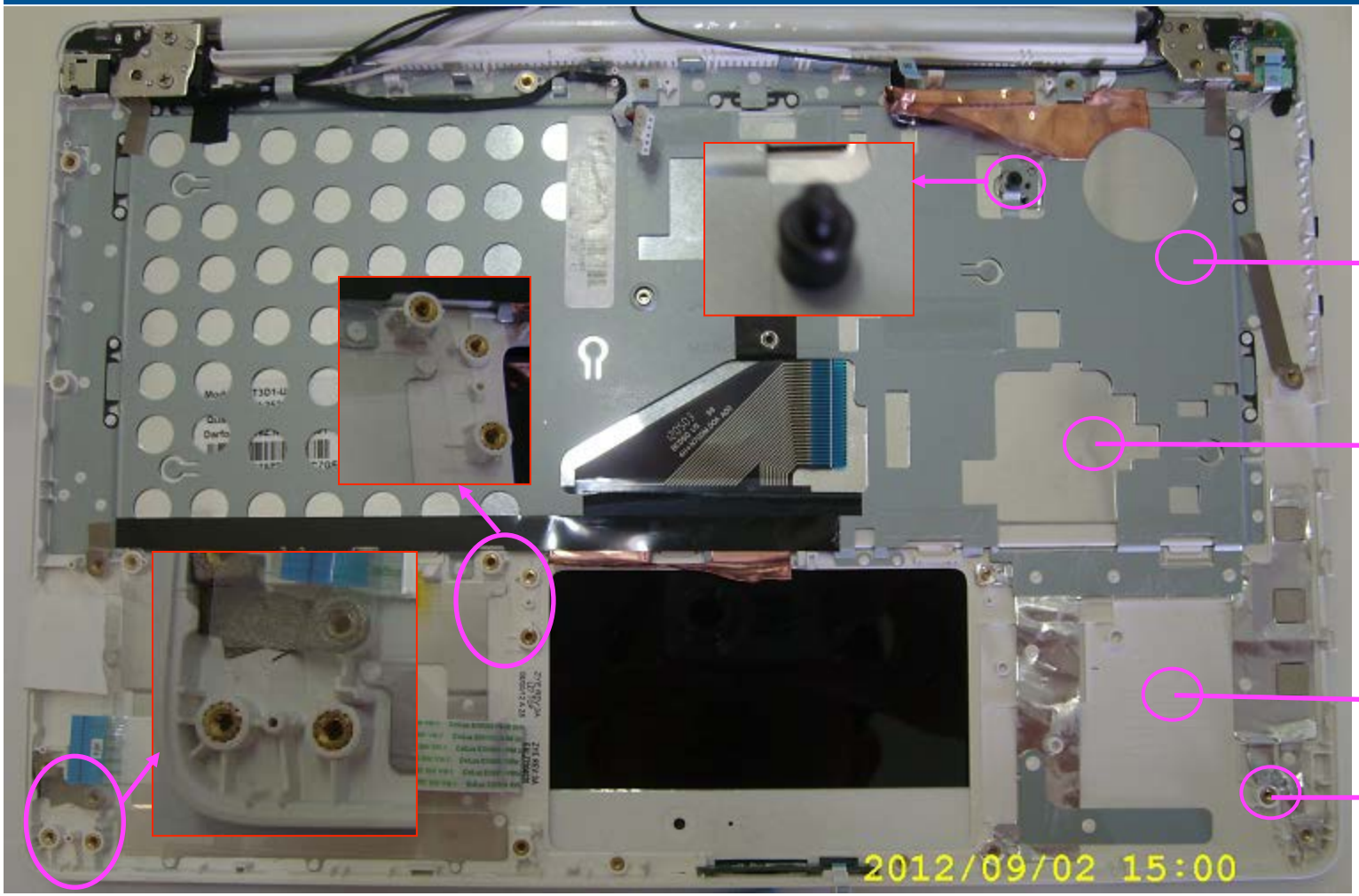
IdeaPad U310 Disassembly – Middle Frame Overview



0.5mm Sheet Panel over keyboard & film.

Film between keyboard and 0.5mm sheet panel.

Plastic middle frame.

Heat Melt Brass Insert.

Comments: **Above is the middle frame overview after removing battery, hard disk, fan, PCB board and mouse touch panel. You can see that there are many brass inserts installed by heat melt.**

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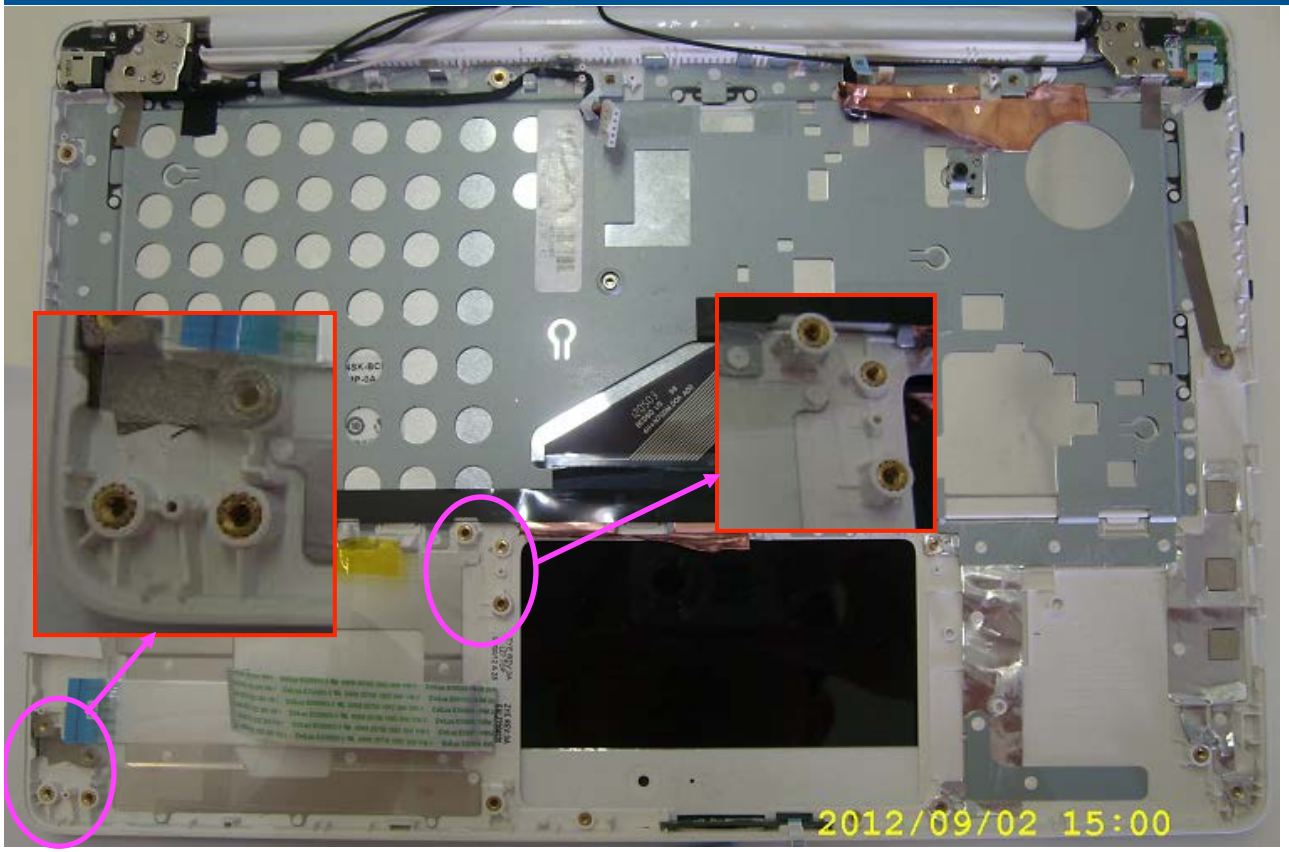
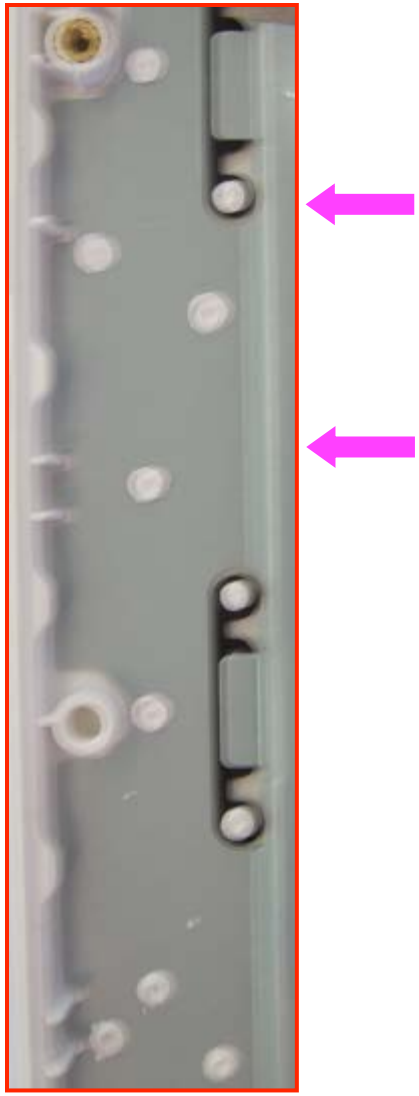
IdeaPad U310 Disassembly – Middle Frame Overview

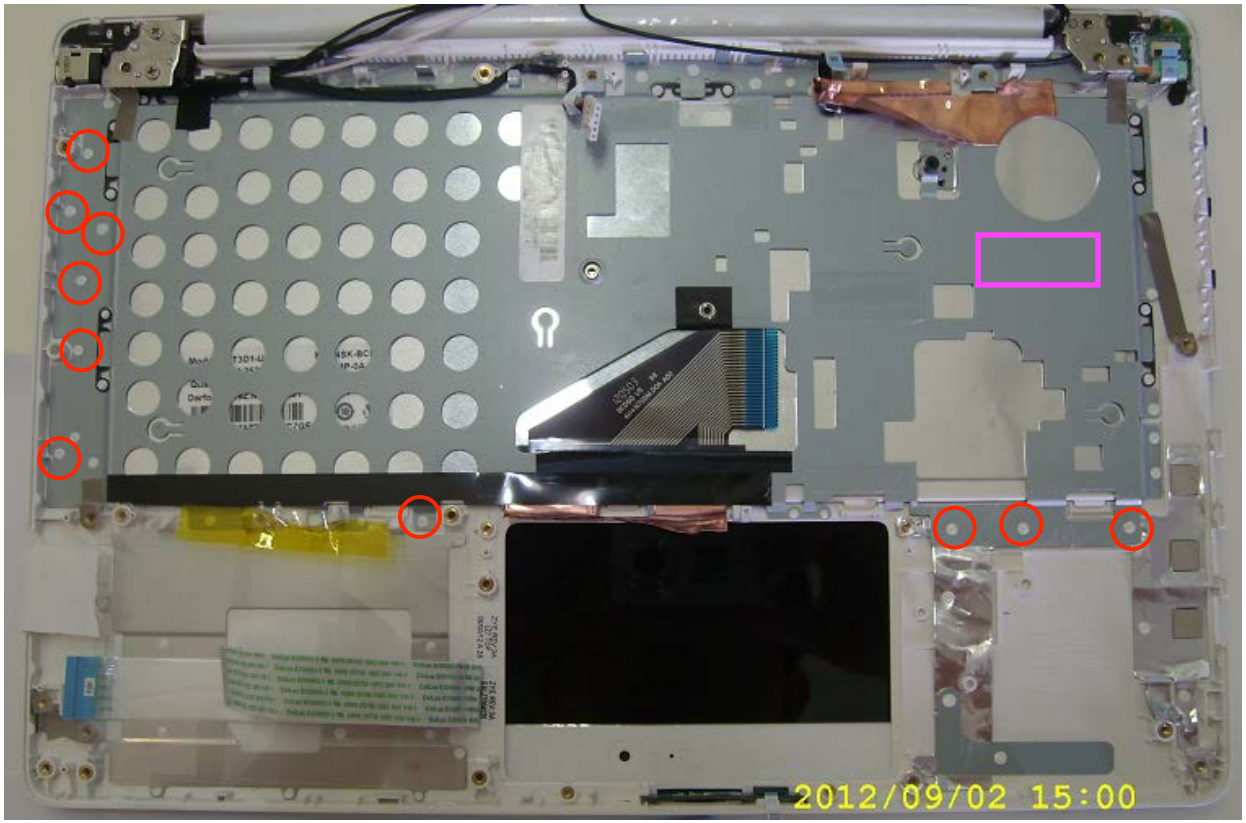


Brass Inserts - (Units: mm)

Thread Size:	Quantity:	Outside Dia.:	OAL:	Boss Diameter
M2	2	4	2.5	5.3
M2.5	30	4.3	3	6.2

IdeaPad U310 Disassembly – Middle Frame Overview





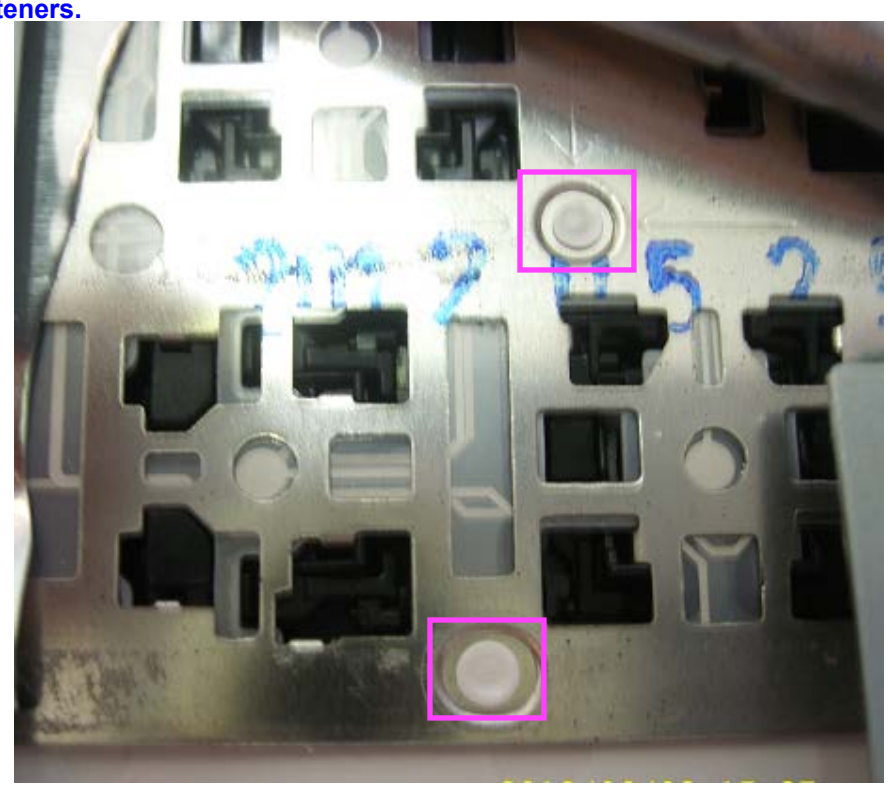
How does the sheet panel connect with middle frame?

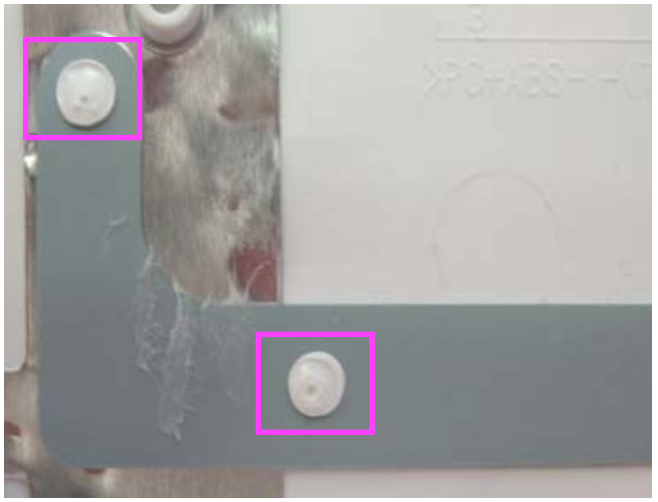
The middle frame material is plastic and made by injection molding. It's designed with many small columns. The sheet holes will be matched with columns then will use heat melt to deform plastic column to hold sheet panel and middle frame together.

IdeaPad U310 Disassembly – Keyboard

How does the keyboard connect with middle frame?

The same way to connect sheet panel and main frame. The connection way can be replaced with PEM® self-clinching TackPin™ fasteners.





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IdeaPad U310 Disassembly – Teardown Overview

Fastener Summary

In the whole disassembly, we found IdeaPad U310 used many hardware screws, heat melt inserts, non-threaded standoffs and threaded standoffs.

The details summary is as following pages.

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Fastener Summary

➢ Screws:

Unit: mm

Thread Size:	QTY:	Driver:	Head Dia.:	Head Thk.:	Step Dia.:	Step Height.:	OAL:	Plating:	Nylok:	Application:
M2.5	4	Phillips	4.3	0.75	N/A	N/A	7.15	Black Zinc	Red	Back Cover
M2.5	1	Phillips	5.9	0.8	3.5	2.1	5.6	Black Zinc	Blue	Battery
M2.5	4	Phillips	4.3	0.8	N/A	N/A	4.1	Bright Nickel	Blue	Battery
M2.5	4	Phillips	4.3	0.8	N/A	N/A	4.3	Bright Nickel	Blue	Hard Disk
M2.5	2	Phillips	4.3	0.8	N/A	N/A	4.2	Black Nickel	None	Audio & USB
M2.5	1	Phillips	4.3	0.8	N/A	N/A	4.6	Black Nickel	Blue	Magnet
M2	4	Phillips	3.9	1.1	N/A	N/A	4	Black Nickel	None	Fan (C ring design)
M2.5	1	Phillips	4.6	0.8	N/A	N/A	5.4	Black Nickel	None	Fan (C ring design)
M2.5	1	Phillips	5.9	0.8	3.5	2.1	5.6	Black Zinc	Blue	PCB Board
M2.5	4	Phillips	4.3	0.8	N/A	N/A	4.1	Bright Nickel	Blue	PCB Board
M2.5	1	Phillips	4.4	0.76	N/A	N/A	3.8	Black Zinc	Blue	Wireless Card
M2.5	4	Phillips	3.4	0.3	N/A	N/A	2.8	Bright Nickel	Blue	Mouse Touch
M2.5	4	Phillips	4.3	0.8	N/A	N/A	4.15	Bright Nickel	Blue	Hinge
M2	1	Phillips	4	4	N/A	N/A	6.5	Black Zinc	Blue	Middle Panel

- Total used screw: 36pcs.
- Total two sizes: M2 and M2.5.
- Total 29 screws with locking patch.

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Fastener Summary

➢ Clinching Standoff:

Unit: mm

Thread Size:	QTY:	Head Dia.:	Barrel Dia.	OAL:	Material:	Sheet Material	Sheet Thickness
M2	1	6	4.5	3.4	Stainless Steel	CRS Zinc Plated	1.0
M2	3	5	3.5	3.4	Stainless Steel	CRS Zinc Plated	1.0

➢ Type SMTSO™ Standoff:

Unit: mm

Thread Size:	QTY:	Barrel Dia.	OAL:	Shank Dia.	Material:	Plating
M2.5	1	4	2.6	2.0	Carbon Steel	Tin Plating

Thread Size:	QTY:	Barrel Dia.	OAL:	Shank Dia.	Step Dia.	Step Height	Material:	Plating
None	1	4	3.6	2.0	2.5	1	Carbon Steel	Tin Plating

➢ Non-Threaded Standoff:

Unit: mm

Thread Size:	QTY:	Hex A.F.	Barrel Dia.	OAL:	Material:	Plating:	Sheet Thickness
Big Size	1	5.5	5	1.4	Carbon Steel	Bright Nickel	0.5
Small Size	1	3.5	2	2.6	Carbon Steel	Bright Nickel	0.5

- Total used standoff: 8pcs.
- Three of them are none thread parts.
- Two of them are SMT parts.

Fastener Summary

➢ Brass Inserts:

Unit: mm

Thread Size:	Quantity:	Outside Dia.:	OAL:	Boss Diameter
M2	2	4	2.5	5.3
M2.5	28	4.3	3	6.2

- Total used brass inserts: 30pcs.
- Two thread sizes: M2 and M2.5.
- All of them are installed by heat melt.

Comments: Total used 36 screws. One of them is mated with thread tapped in sheet, and five of them are mated with self-clinching standoffs, and all others are mated with heat melt brass inserts.

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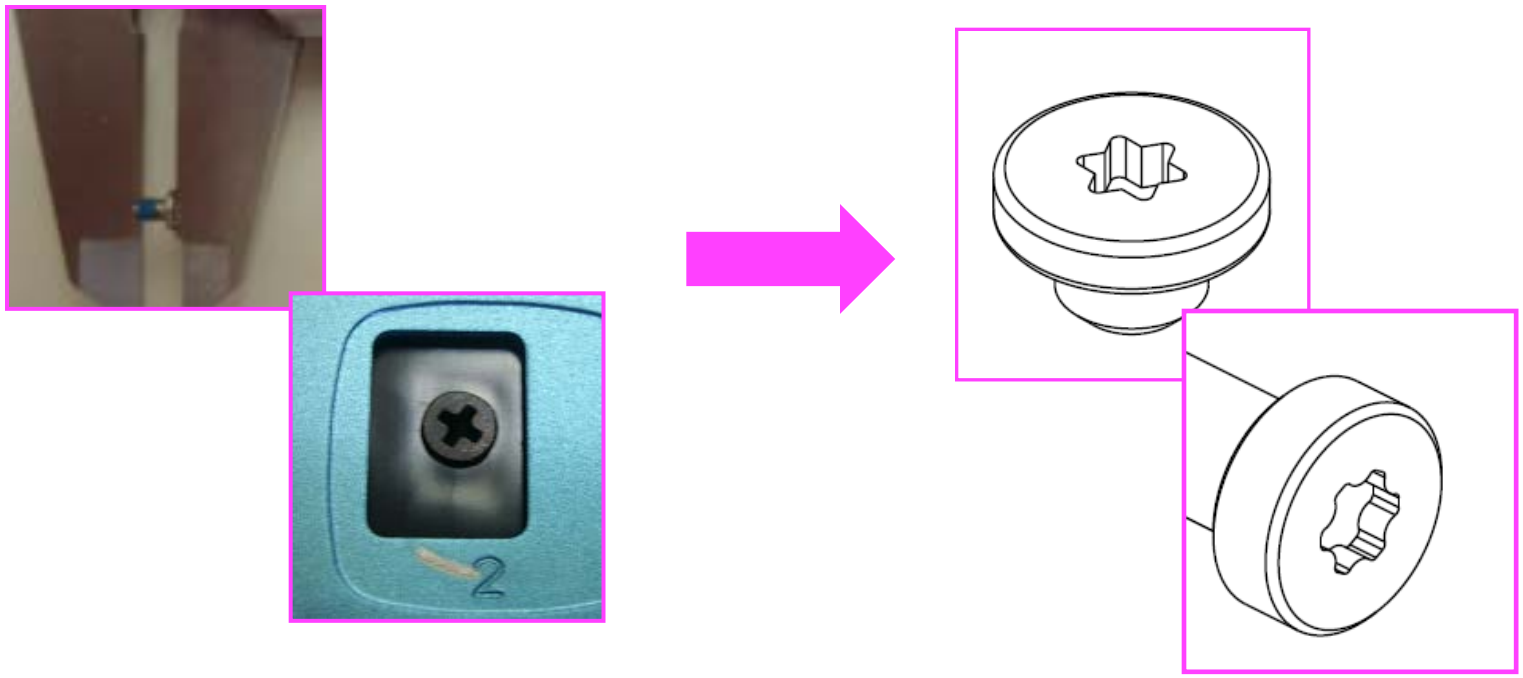
Alternate Solutions

PennEngineering® recommendations of alternate hardware and cost savings opportunities.

Alternate Solutions

- **Loose Screws alternate solution:**

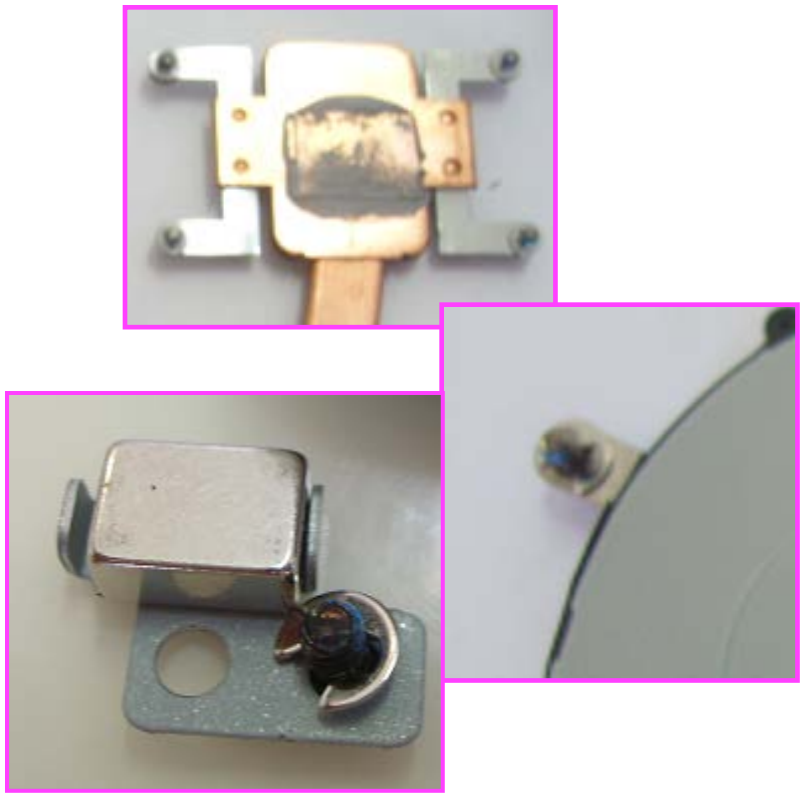
  PEM® can provide all these loose screws with different design solutions. Like as, more reliable driver of MORTORQ®, TORX®, TORX PLUS®.

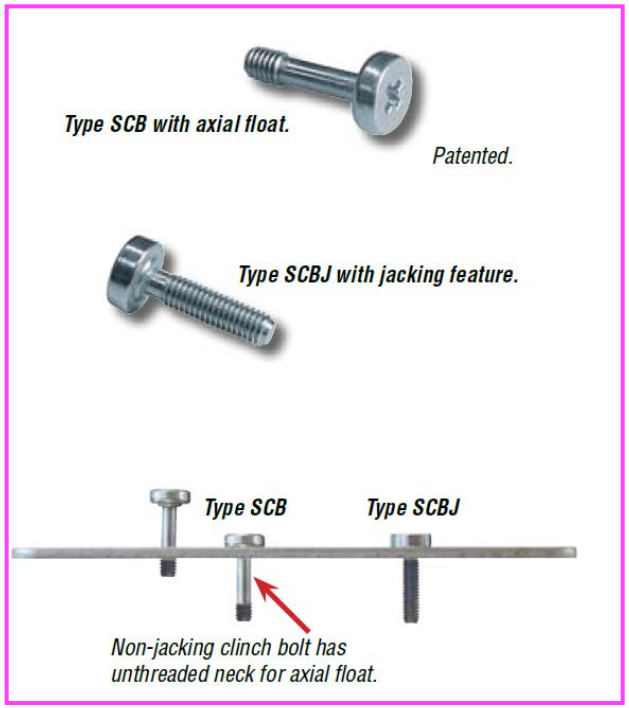


Alternate Solutions

- **Captive Screws alternate solution:**

  PEM can provide Type SCB™ part to replace the current using method. Type SCB only needs to press in sheet panel. This can save one C ring cost and assembly cost.

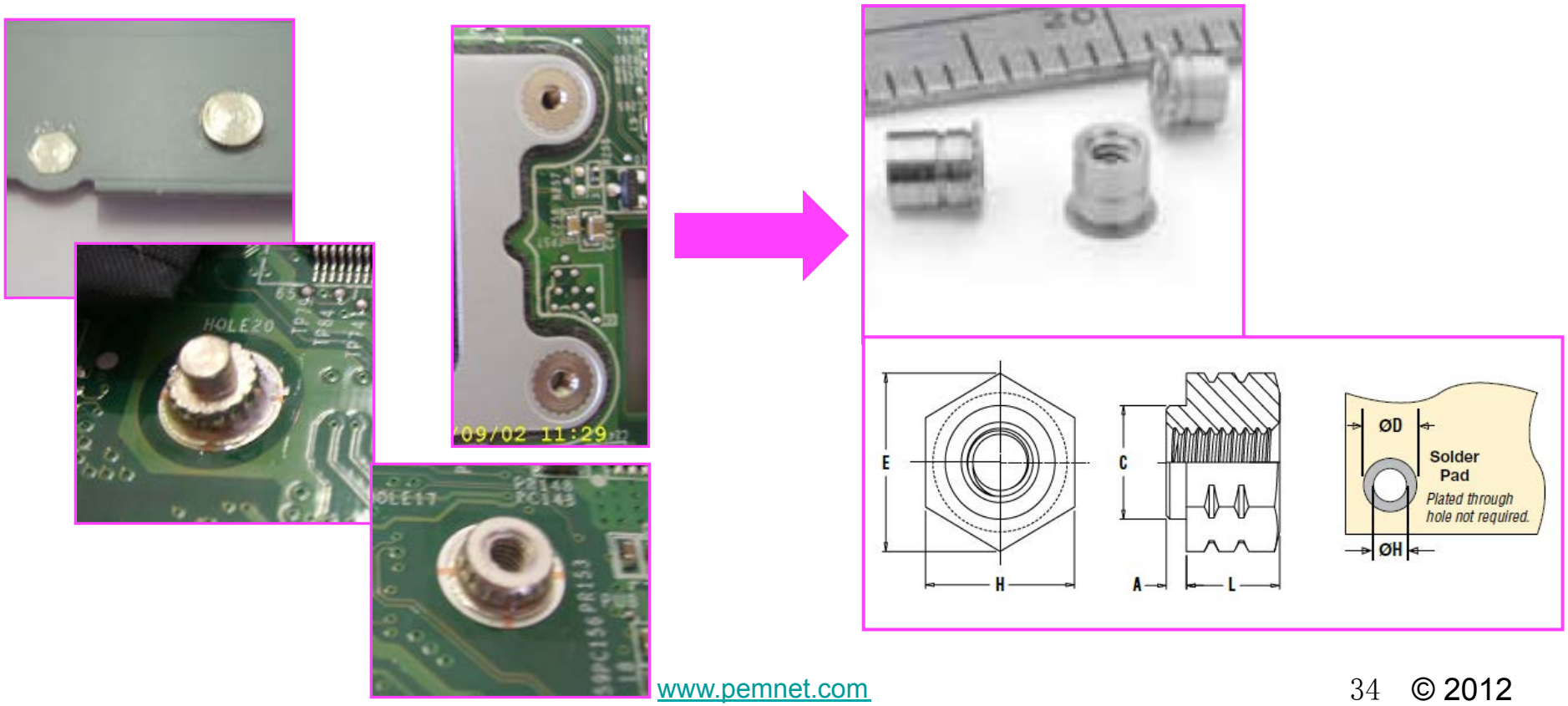




Alternate Solutions

- **Standoff alternate solution:**

  PEM can provide Type MSO4™ line parts to replace the threaded standoff, and also can provide Hex SMT parts to replace the knurled one as hex SMTSO part can achieve better Torque-Out.



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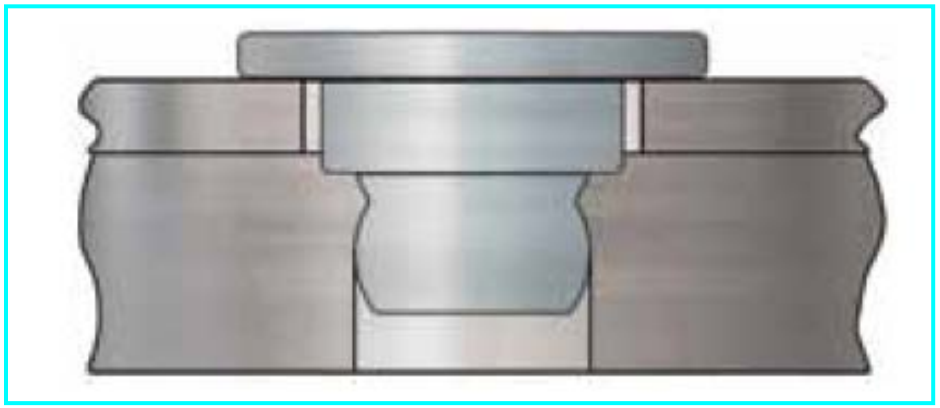
Alternate Solutions

- **Brass Inserts alternate solution:**

  PEM® can provide all line different sizes heat melt brass inserts with different material to meet customer application requirement.

Alternate Solutions

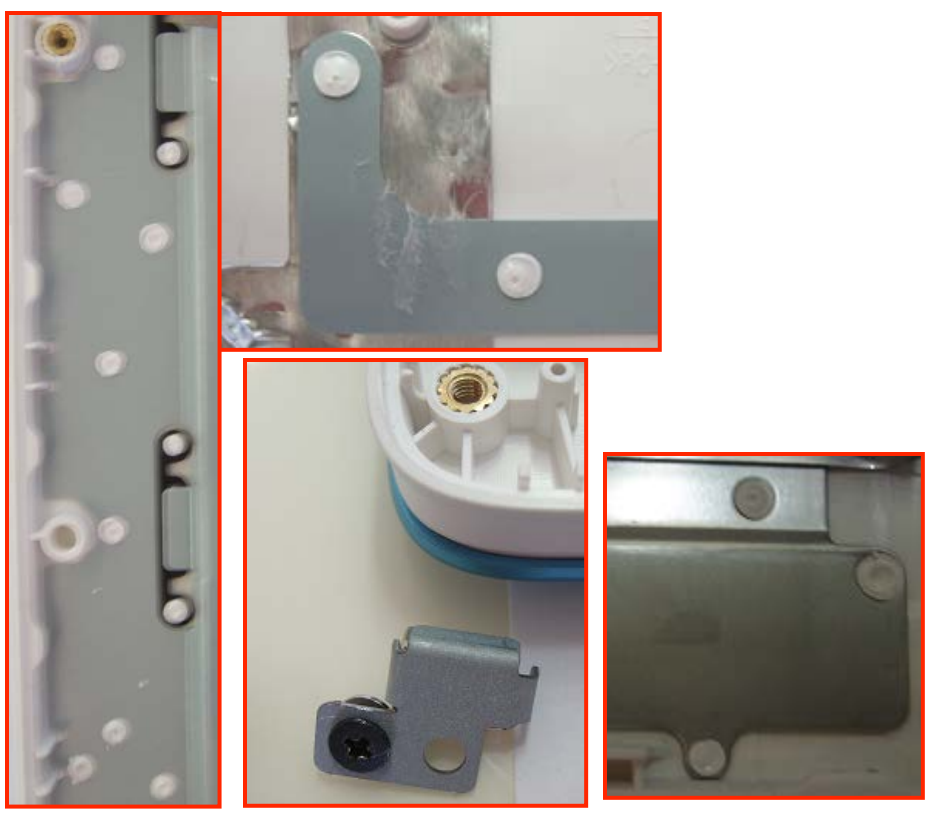
- **Special TackPin™ recommended alternation:**
  See page 20, PEM® recommends using special TackPin™ to connect two 0.2mm and 0.5mm panels. This can extend the TackPin™ application.

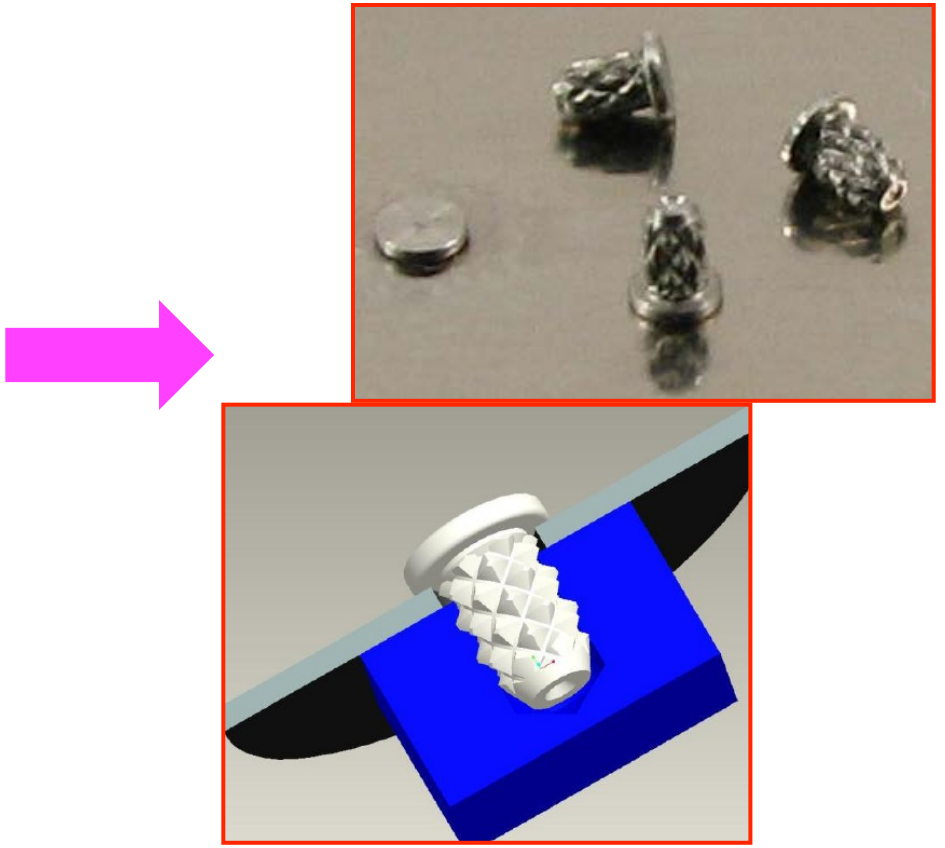


Alternate Solutions

- **Plastic TackPin™ recommended alternation:**

  PEM can provide plastic TackPin™ parts to replace the current heat melt method. This part has the function and ability to connect sheet panel and plastic panel.





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Conclusions and Summary

Lenovo IdeaPad U310 NoteBook

2012-09-12

Conclusion and Summary

The Lenovo IdeaPad U310 is a super thin notebook. Both top and bottom cover are aluminum case, but the middle frame is plastic. In the whole teardown process, the design uses micro screws, standoffs and brass inserts. Some screws are used as loose hardware but some are used with C-ring design as captive screw. The standoffs also are used with self-clinching, SMT and spacer function. Due to the plastic middle frame, so connection between middle frame and key-board solution is melted plastic boss to hold them together but also can used by PEM newly developed plastic TackPin™ parts that have the function and ability to connect metal sheet and plastic panel.