

CLAIMS

We claim:

1. A detachable element for use with a reusable component having a retention groove and an alignment guide and a planar contact surface parallel to the retention groove, the
5 detachable element comprising:
a body comprising a retention feature configured to engage the retention groove; and
an electrical contactor coupled to the body, wherein the contactor comprises a cantilever element that is configured to touch the planar contact surface when the
10 retention feature is engaged with the retention groove,
wherein the cantilever element is configured to slide along the contact surface as the detachable element is brought together with the reusable component.
2. The detachable element of claim 1, wherein the detachable element is brought together with the reusable component along a path that is perpendicular to the planar contact
15 surface.
3. The detachable element of claim 1, wherein the retention feature extends around a portion of a circumference of the detachable element.
4. The detachable element of claim 1, wherein the body comprises an alignment feature that is configured to mate with the alignment guide of the reusable component, wherein the
20 retention feature cannot engage the retention groove when the alignment feature is not mated with the alignment guide.
5. The detachable element of claim 1, wherein the body further comprises a sensor comprising two electrodes, wherein the sensor is in electrical connection with the electrical contactor.
- 25 6. The detachable element of claim 5, wherein the body further comprises an insulating cover layer disposed above the sensor.
7. The detachable element of claim 1, wherein the body further comprises a light sensor and a light emitting source, wherein the light sensor and light emitting source are in electrical connection with the electrical contactor.
- 30 8. The detachable element of claim 1, wherein the light emitting source comprises dual emitters configured for emitting 660 nm and 880 nm light.

9. A connector comprising:

a reusable component comprising a retention groove and an electrical contact surface that is parallel to the retention groove; and

5 a detachable element comprising a body with a retention feature configured to engage the retention groove and an electrical contactor coupled to the body, wherein the contactor comprises a compliant element that is configured to touch the contact surface of the reusable element when the retention feature of the detachable element is engaged with the retention groove of the reusable component and to slide along the contact surface as the detachable element is brought together with the reusable
10 component.

10. The connector of claim 9, wherein:

the body of the reusable component comprises an alignment guide;

the detachable element comprises an alignment feature that is configured to mate with the alignment guide when the retention feature of the detachable element is
15 engaged with the retention groove of the reusable component; and

the retention feature cannot engage the retention groove when the alignment feature is not mated with the alignment guide.

11. The connector of claim 9, wherein:

the compliant element comprises:

20 a base segment coupled to the body,
a first linear segment coupled to the base segment,
a second linear segment coupled to the first linear segment, and
a contact segment coupled to the second linear segment,

wherein compression of the compliant element in a first direction induces
25 motion of the contact segment in a second direction that is perpendicular to the first direction.

12. A detachable element comprising:

a body comprising a hole and a retention pocket, wherein the retention pocket comprises a reference surface; and

30 a printed circuit board assembly (PCBA) comprising a printed circuit board (PCB) having an outer edge and a contactor coupled to the PCB, wherein a portion of the contactor extends beyond the outer edge of the PCB,

wherein the portion of the contactor that extends beyond the outer edge of the PCB is in contact with the reference surface.

13. The detachable element of claim 12, wherein:

the body comprises a top surface;

5 the PCB comprises a thickness; and

the reference surface is parallel to the top surface and offset from the top surface by a distance from the reference surface to the top surface, and the distance is equal to the thickness of the PCB.

14. The detachable element of claim 12, wherein the PCB is a sensor.

10 15. The detachable element of claim 14, wherein the PCB is selected from the group consisting of a bioimpedance sensor, a photodetector, a temperature sensor, a pH sensor, a perspiration sensor, an ultrasonic sensor, a bone growth stimulator sensor, and combinations thereof.

15 16. The detachable element of claim 12, wherein the PCB is inserted into the retention pocket and held in place by a retainer comprising a plurality of tabs.

17. The detachable element of claim 16, wherein the retainer is a mechanical positioning element.

18. The detachable element of claim 16, wherein the retainer is a conductive circuit element.

20 19. The detachable element of claim 16, wherein the retainer comprises one or more conductive elements and one or more non-conductive elements.

20. The detachable element of claim 16, wherein the retainer comprises a deformable retention feature configured to cover a portion of one or more tabs of the retainer.

25 21. The detachable element of claim 5, wherein the two electrodes consist of one central electrode and one toroidal electrode, wherein the central electrode and toroidal electrode have a concentric orientation.

22. The detachable element of claim 21, wherein the central electrode has a diameter of about 4.318 mm (0.17 inches).

23. The detachable element of claim 21, wherein the toroidal electrode has an inner diameter of about 10.16 mm (0.4 inches) and an outer diameter of about 12.7 mm (0.5 inches).
24. The detachable element of claim 21, further comprising a ground plane, wherein the distance between the two electrodes and the ground plane is about 0.4064 mm (0.016 inches).
- 5 25. The detachable element of claim 21, where the two electrodes are separated by a gap of about 2.921 mm (0.0115 inches).
26. The detachable element of claim 24, wherein the ground plane has a diameter of about 12.7 mm (0.5 inches).
27. A detachable element comprising:
- 10 a body comprising an upper section and a lower section joined by a flexible arm, wherein the upper section comprises an opening and the lower section is attached on its underside to a compressible spring; and
- a printed film comprising tabbed and non-tabbed areas and first and second faces, wherein
- 15 the tabbed area comprises a sensor comprising two electrodes on its first face, and
- the tabbed area is inserted between the upper and lower sections so that the sensor is visually aligned with the opening.
28. The detachable element of claim 27, wherein the non-tabbed area comprises at least two
- 20 contact pads on its first face.
29. The detachable element of claim 28, wherein each of the at least two contact pads is conductively linked to either of the two electrodes.
31. The detachable element of claim 27, wherein the second face of the non-tabbed area is wrapped around the compressible spring.
- 25 32. The detachable element of claim 27, wherein the second face of the non-tabbed area is in contact with the compressible spring.

33. The detachable element of claim 27, wherein the upper and lower sections are releasably secured to the printed film.