continuous sheet of ITO (500 ohm). Together, glass subassembly **442** through PET film subassembly **406**, and any intervening layers, can form the touchscreen.

[0051] FPC **404** can be bonded using ACF (0.003 after bonding) to the back side of glass subassembly **442**. Conductive tape **412** can also be bonded using ACF to PET subassembly **406** to ground the continuous sheet of ITO. Substantially transparent PSA **414** of 0.125 thickness can be used to bond PET film subassembly **406** to LCD module **410**, which can include a 0.2 polarizer layer **415** and liquid crystals **417**. The complete assembly can then be mounted into window **416** in housing **418**. Note that when the complete assembly is mounted in housing **418**, glass subassembly **442** can be either even with or slightly recessed (0.3 Z step) from the top of the window.

[0052] Chip on glass **446** can be connected to metal border traces, rows and column traces on glass subassembly **442**. Chip on glass **446** can be supported in a hole or cutout on PET film subassembly **406**, and can contain one or more components of a sensor panel subsystem, including one or more processors, drivers, analog channels, and the like. The polarizer may also have a hole or cutout to allow the presence of the chip on glass. Chip on glass **446** can enable only a very small flex connector to be attached to the touchscreen to communicate with the system processor, because now most of the circuitry can be contained on the touchscreen.

[0053] FIG. **4***b* is similar to FIG. **4***a*, except that PET film subassembly **406** is not fully laminated to LCD module **410**. Instead, air gap **420** can be formed between them, and a ring of Poron **422** can be formed around the perimeter of the touchscreen. AR coating can also be used to minimize losses.

[0054] FIG. **4***c* is similar to FIG. **4***b* in that it includes air gap **420**, but it is mounted into clear PC housing **424** having overhanging bezel. A sealing ring of Poron **422** can be formed between the bezel and glass subassembly **442**.

[0055] FIG. **4***d* is a hybrid of FIGS. **4***a* and **4***c*, wherein an overhanging bezel can allow the blackmask on glass subassembly **442** to be eliminated, and full lamination can be used (see full layer of PSA **414**).

[0056] FIGS. **5***a* and **5***b* illustrate various exemplary touch screen sensor panel stackups with columns that can be formed on the back side of a cover glass and rows that can be formed on the bottom side of a separate PET film according to one embodiment of this invention.

[0057] FIG. **5***a* shows window **516** that can be formed in 0.8 to 1.0 PC housing **518**. Within window **516** can be a stack-up in which the column traces can be formed on the back side of a cover glass and row traces can be formed on the bottom side of a separate PET film. Substantially transparent glass subassembly **534** can have a stackup of layers that can include, in order from top to bottom, substantially transparent AG coating **513** (shown as a dashed line at the top of the subassembly), substantially transparent 0.7 borosilicate or aluminum silicate glass, black mask (in limited areas), and substantially transparent conductive material such as patterned ITO (15 ohm max, with 0.3 lines and 0.030 spaces) formed as columns. Note that the patterned ITO layer is symbolically illustrated in FIG. **5***a* as a dashed line representing patterning **550**. Substantially transparent PET subassembly **536** can be bonded to glass subassembly **534** using substantially transparent PSA **508**. One purpose of PET subassembly **536** can be to support a 0.188 layer of substantially transparent conductive material such as patterned ITO (150 ohm max, with 5.0 lines and 0.050 spaces) formed as rows, and also to provide a low capacitive layer between the rows and columns. The two layers of patterned substantially transparent conductive material can be of the same or different composition. Chip on glass **546** can be connected to column traces on glass subassembly **534**, and to row traces on PET film subassembly **536**. Chip on glass **546** can be supported in a hole on PET film subassembly **536**, and can contain one or more components of a sensor panel subsystem, including one or more processors, drivers, analog channels, and the like. Together, glass subassembly **534** through PET film subassembly **536**, chip on glass **546** and any intervening layers, can form the touchscreen.

[0058] FPC **504** can be bonded using 0.125 thick (max) ACF to the back side of glass subassembly **534**. FPC can also be bonded using ACF to the rows formed on the bottom of PET subassembly **536**. Substantially transparent PSA **514** of 0.125 thickness can be used to bond PET film subassembly **536** to LCD module **510**, which can include a 0.2 polarizer layer **515** and liquid crystals **517**. The complete assembly can then be mounted into window **516** in housing **518**. Note that when the complete assembly is mounted in housing **518**, glass subassembly **534** can be either even with or slightly recessed (0.3 Z step) from the top of the window.

[0059] FIG. **5***b* is similar to FIG. **5***a*, except that PET film subassembly **536** is not fully laminated to LCD module **510**. Instead, air gap **520** can be formed between them, and a ring of Poron **522** can be formed around the perimeter of the touchscreen.

[0060] FIGS. **6***a* and **6***b* illustrate various exemplary touch screen sensor panel stackups with columns that can be formed on the back side of a cover glass and rows that can be formed on the bottom side of a separate PET film according to one embodiment of this invention.

[0061] FIG. **6***a* shows PC housing **624** having an overhanging bezel. A sealing ring of Poron **622** can be formed between the bezel and substantially transparent glass subassembly **652**. Glass subassembly **652** can be part of a stack-up in which the column traces can be formed on the back side of the glass subassembly and row traces can be formed on the bottom side of a separate PET film. Glass subassembly **652** has a stackup of layers that can include, in order from top to bottom, substantially transparent AG coating **613** (shown as a dashed line at the top of the subassembly), substantially transparent 0.7 borosilicate or aluminum silicate glass, black mask (in limited areas), substantially transparent conductive material such as patterned ITO (15 ohm max, with 0.3 lines and 0.030 spaces) formed as columns, and patterned metal (0.025 ohm max, with 0.030 lines and 0.030 spaces). Note that the patterned ITO and metal layer is symbolically illustrated in FIG. **6***a* as a dashed line representing patterning **654**. Substantially transparent PET subassembly **636** can be bonded to glass subassembly **652** using substantially transparent PSA **608**. One purpose of PET subassembly **636** can be to support a 0.188 layer of substantially transparent conductive material such as patterned ITO (150 ohm max, with 5.0 lines and 0.050 spaces) formed as rows, and also to provide a low capacitive layer between the rows and columns. The two layers of patterned substantially transparent conductive material can be of the same or different composition. Chip on glass **646** can be connected to column traces on glass subassembly **652**, and to row traces on PET film subassembly **636**. Chip on glass **646** can be supported in a hole on PET film subassembly **636**, and can contain one or more components of a sensor panel subsystem, including one or more processors, drivers, analog channels, and the like. Together, glass subassembly **652**