through PET film subassembly **636**, chip on glass **646** and any intervening layers, can form the touchscreen.

[0062] FPC **604** can be bonded using 0.125 thick (max) ACF to the back side of glass subassembly **652**. FPC **604** can also be bonded using ACF to the rows formed on the bottom of PET subassembly **636**. Air gap **620** can be formed between PET film subassembly **636** and LCD module **610**, which can include a 0.2 polarizer layer **615** and liquid crystals **617**, and a ring of Poron **622** can be formed around the perimeter of the touchscreen.

[0063] FIG. **6***b* is similar to FIG. **6***a*, except that PET film subassembly **636** can be fully laminated to LCD module **610** using PSA **614**.

[0064] FIGS. **7***a*-**7***d* illustrate various exemplary touch screen sensor panel stackups with columns and rows that can be formed on opposite sides of a single substrate according to one embodiment of this invention.

[0065] FIG. **7***a* shows 0.9 substantially transparent PC (or glass) housing **718**. Bonded to housing **718** using 0.100 substantially transparent PSA **708** can be a stack-up in which the column traces and row traces can be formed on opposite sides of a single substrate. Substantially transparent glass subassembly **756** can have a stackup of layers that can include, in order from top to bottom, substantially transparent conductive material such as patterned ITO (15 to 200 ohm max, with 0.3 lines and 0.030 spaces) formed as columns, substantially transparent 0.5 borosilicate or aluminum silicate glass, and substantially transparent conductive material such as patterned ITO (75 ohm max, with 0.5 lines and 0.050 spaces) formed as rows. The two layers of patterned substantially transparent conductive material can be of the same or different composition. Note that the patterned ITO layers are symbolically illustrated in FIG. **7***a* as dashed lines representing patterning **719** and **750**.

[0066] FPC **730** and **704** can be bonded using 0.125 thick (max) ACF to the columns and rows on either side of glass subassembly **756**. Substantially transparent PSA **714** of 0.100 thickness can be used to bond glass subassembly **756** to LCD module **710**, which can include polarizer layer **715** and liquid crystals **717**.

[0067] FIG. **7***b* is similar to FIG. **7***a*, except that glass subassembly **756** is not fully laminated to LCD module **710**. Instead, air gap **720** can be formed between them, and a ring of Poron **722** can be formed around the perimeter of glass subassembly **756**.

[0068] FIG. **7***c* is similar to FIG. **7***a*, but additionally shows an implementation of wings **758** on FPC **760** (see thumbnail at lower left corner). Each FPC **760** can be generally long and slender to provide maximum panel utilization. In the thumbnail of FIG. **7***c*, the upper FPC **704** can get folded back, as can the lower FPC **730**, and they can be connected together behind the panel.

[0069] FIG. **7***d* is similar to FIG. **7***b*, but additionally shows an implementation of wings **758** on FPC **760** (see thumbnail at lower left corner). Each FPC **760** can be generally long and slender to provide maximum panel utilization. In the thumbnail of FIG. **7***c*, the upper FPC **704** can get folded back, as can the lower FPC **730**, and they can be connected together behind the panel.

[0070] FIG. **8** illustrates an exemplary touch screen sensor panel stackup 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.

[0071] FIG. **8** shows window **816** formed in 0.9 PC housing **818**. Within window **816** 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 **862** can have a stackup of layers that can include, in order from top to bottom, for example, substantially transparent AG coating **813** (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. **8** as a dashed line representing patterning **864**. Substantially transparent PET subassembly **868** of thickness 0.188 can be bonded to glass subassembly **862** using PSA **808**. One purpose of PET subassembly **868** can be to support a layer of substantially transparent conductive material such as patterned ITO (75 ohm max, with 5.0 lines and 0.050 spaces) that can be 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. Together, glass subassembly **862** through PET film subassembly **868**, and any intervening layers, can form the touchscreen.

[0072] FPC **804** can be bonded using 0.125 thick (max) ACF to the back side of glass subassembly **862**. FPC **826** can also be bonded using ACF to the rows that can be formed on the bottom of PET subassembly **868**. Substantially transparent PSA **814** of 0.125 thickness can be used to bond PET film subassembly **868** to LCD module **810**, which can include a 0.2 polarizer layer **815** and liquid crystals **817**. The complete assembly can then be mounted into window **816** in housing **818**. Note that when the complete assembly is mounted in housing **818**, glass subassembly **862** can be either even with or slightly recessed (0.3 Z step) from the top of the window. FIG. **8** also shows additional detail in the thumbnails (at the bottom left of FIG. **8**) on how the FPCs **860** can be connected to the sensor panel.

[0073] FIG. **9** illustrates an exemplary touch screen sensor panel stackup with columns and rows that can be formed on opposite sides of a single substrate according to one embodiment of this invention.

[0074] FIG. **9** shows window **916** that can be formed in 0.9 PC housing **918**. Within window **916** can be a stack-up in which the column traces and row traces can be formed on opposite sides of a single substrate. Substantially transparent glass subassembly **972** can have a stackup of layers that can include, in order from top to bottom, substantially transparent AG coating, substantially transparent 0.5 borosilicate or aluminum silicate glass, and black mask (in limited areas). Substantially transparent glass subassembly **976** can have a stackup of layers that can include, in order from top to bottom, substantially transparent conductive material such as patterned ITO (15 ohm max, with 0.3 lines and 0.030 spaces) formed as columns, substantially transparent 0.5 borosilicate or aluminum silicate glass, and substantially transparent conductive material such as patterned ITO (75 ohm max, with 0.5 lines and 0.050 spaces) formed as rows. The two layers of patterned substantially transparent conductive material can be of the same or different composition. PSA **908** can be used to bond glass subassemblies **972** and **976** together. Note that the patterned ITO layers are symbolically illustrated in FIG. **9** as dashed lines representing patterning **978** and **980**.