[0017] **FIG. 9** is a schematic diagram showing a display and driver for adjusting an image signal to compensate for variations in transparency or color in the touch screen.

## DETAILED DESCRIPTION OF THE INVENTION

[0018] Referring to **FIG. 1**, the problems of the prior art resistive touch screens are overcome through the use of a variably conducting layer **32** deposited on the substrate **12**. A flexible transparent cover sheet **16** having a second conductive layer **34** is separated from the variably conducting layer **32** by conventional means, for example spacer dots **20**. The conductive layer **32** deposited on the substrate **12** and/or the conductive layer **34** deposited on the flexible transparent cover sheet **16** are variably conducting.

[0019] The variation in conductivity of the variably conducting layers **32** and/or **34** may be continuous or discontinuous. If the conductivity of a layer is continuous, the sheet resistance of the layer varies continuously and gradually from location to location in the layer. If the conductivity of a layer is discontinuous, a specific location in the layer will have a conductivity that is substantially different from a nearby location.

[0020] In prior art touch screens, the sheet resistance of a conductive layer in the touch area of a resistive touch screen is a constant value typically in the range of 300 to 600 ohms per square. Resistance values outside of this range may be employed for different purposes, for example reduced power consumption or reduced errors. In one embodiment of the present invention, the sheet resistance may vary in the touch area within the range of 300 to 600 ohms or go well outside the range. According to another embodiment of the invention, the edge area, defined by the conductive patterns **30** of **FIG. 2**, are replaced by more highly conductive portions **36** of the variably conductive layer **32**.

[0021] Typical material used for transparent conductive coatings include indium tin oxide (ITO), indium zinc oxide (IZO), or conductive polymers such as polythiophene. As these materials are coated on a substrate, their sheet resistance will vary with the thickness of the deposition. By depositing the material with varying thickness, a variably conducting layer may be formed. If the material is deposited with twice the thickness, its sheet resistance may drop by half. Alternatively, the composition of the material may be varied in a single layer to vary the conductivity of the layer. The substrate on which the variable conductivity pattern is formed can be either rigid or flexible.

[0022] In particular, discontinuous conductive edge patterns **30** such as those formed to improve the linearity of the touch screen response (for example as shown in U.S. Pat. No. 5,736,688 issued Apr. 7, 1998 to Barrett et al.) or to provide a connection to the resistive layer may be constructed to form the variably conductive layer **32**. For example the pattern shown in this patent can be formed in the variably conductive layer **32** according to the present invention. Moreover, the variably conductive layer **32** may be continuously varying in the touch area so as to also improve the linearity of the device response. Alternatively, variation in both the edge area and the touch area may be employed to improve the linearity of the touch screen response and to reduce the width of the edge area.

[0023] **FIG. 6** shows a topographical representation of variable conductivity in the touch area **35** to improve the linearity of response for a five-wire device having electrical connections **33** at each corner of the variably conductive layer **32**.

[0024] **FIG. 7** shows a top view of variable conductivity in the highly conductive edge area **36** having variable width to improve the linearity of response for a five-wire device having electrical connections **33** at the center of each edge area.

[0025] **FIG. 8** shows a cross sectional view of a variably conductive edge area **36** shaped to improve the linearity of response wherein varying thickness to provide the variable conductivity.

[0026] A variably conductive layer **32** may be formed on the substrate **12** or the flexible transparent cover sheet **16** by a variety of means. U.S. Pat. No. 6,214,520 issued Apr. 10, 2001 to Wolk et al. describes the use of a thermal transfer element for forming a multi-layer device. Alternatively, inkjet devices can be configured to deposit liquid materials such as polythiophene in varying amounts and thickness to provide a variably conducting layer. Applicant has demonstrated the pixel-wise deposition of conductive materials using an inkjet device. Moreover, both approaches can be used to deposit varying types of materials, providing a multi-component layer with different materials as necessary to provide the preferred conductivity. These techniques are also readily used to provide discontinuous deposits as well as deposits that vary continuously over a surface.

[0027] Another useful technique may be sputtering. Techniques known in the art may be applied to continuous roll manufacturing processes to provide a variably conducting layer by passing a continuous substrate beneath a sputtering station with the necessary masking and aperture control devices. Referring to **FIG. 4, a** side view of a continuous substrate **40** passing above material deposition stations **42** and **44**. The deposition stations **42** and **44** heat material **47** that is evaporated and condensed on the surface of the continuous substrate **40**. By controlling the deposition of material, the time that a particular portion of the substrate is exposed to the material deposition can be controlled, for example with a shutter that opens and closes or a mask that restricts deposition to particular locations on the substrate. Referring to **FIG. 5**, an end view of the substrate **40** is shown with a deposition station **44** having a mask **46** to provide an area **48** of greater material deposition.

[0028] Another deposition method is liquid coating. By using a hopper containing liquid material, the material can be flowed in a controlled fashion onto a continuously moving substrate. By varying the thickness and location of the deposition, a variably conducting layer may be provided. Yet another technique of providing a variable conductive coating is the use of photo lithography by depositing a uniform layer of transparent conductive material and selectively removing the material to provide a variable conductive layer.

[0029] Once the variably conducting layer is provided on a substrate, the substrate may be combined with other elements to form a touch screen, as is known in the art.

[0030] The transparency of the deposited material is a critical factor for any touch screen. The variably conductive