

example be a label adhered to the top surface of the light distribution panel 380. The cover label may be formed from transparent or semitransparent dielectric materials such as Mylar or Polycarbonate or any other dielectric material that is thin, optically transmittable and includes some sort of light diffusing means.

[0171] Referring to the button 366, both the light distribution panel 370 and 380 as well as the electrode layer 362 have an annular shape that creates a void at the center of the touch pad 354 for placement for the button 366. The button 366 includes a translucent button cap 390 that is movable trapped between the cover 356 and a spring loaded switch 392. The switch 392 is mounted to the printed circuit board 364 and operatively coupled to the controller 368. When the button cap 390 is pressed, it moves against the actuator of the spring loaded switch 392 thereby generating a button event that is read by the controller 368. The button cap 390 may be illuminated with an LED 394 to indicate when a signal has been read by the controller 368. Furthermore, the button cap 390 may include a graphical layer 396 with one or more symbols that are driven by dedicated light emitting diodes 398A and 398B similar to the graphical panel 360 described above. In the illustrated embodiment, the graphical layer 396 includes a first symbol 399A associated with a first mode (e.g., phone) and a second symbol 399B associated with a second mode (e.g., music notes).

[0172] In accordance with one embodiment, the functionality of a button (or buttons) is also incorporated directly into the touch pad 354 such that the touch pad 354 acts like a button along with its touch sensing capabilities. That is, the touch pad 354 forms a platform that can be clicked relative to the frame 352 in order to activate one or more actuators such as switches.

[0173] To elaborate, the touch pad 354 is capable of moving relative to the frame 352 so as to create a clicking action at various regions of the touch pad 354. The clicking actions are generally arranged to actuate one or more movement indicators 402 contained inside the frame 352. That is, a portion of the touch pad 354 moving from a first position (e.g., upright) to a second position (e.g., depressed) is caused to actuate a movement indicator 402. The movement indicators 402 are configured to sense movements of the touch pad 354 during the clicking action and to send signals corresponding to the movements to the host device. By way of example, the movement indicators 402 may be switches, sensors and/or the like.

[0174] Because the touch pad 354 is used for different modes that require different inputs, the largest set of inputs is typically used as the base for determining the number of movement indicators 402. This may be done for signal purposes (although not a requirement) and/or for stability reasons (provide the same feel to each zone). In the illustrated embodiment, the touch pad 354 includes a movement indicator 402 for each of the regions required for a phone mode. That is, there is a movement indicator 402 disposed beneath each of the phone numbers and characters.

[0175] The movements of the touch pad 354 may be provided by various rotations, pivots, translations, flexes and the like. In one embodiment, the touch pad 354 is configured to gimbal relative to the frame 352 so as to generate clicking actions for each of the button zones. By gimbal, it is generally meant that the touch pad is able to float in space relative to the frame while still being constrained thereto. The gimbal may allow the touch pad 354 to move in single

or multiple degrees of freedom (DOF) relative to the housing. For example, movements in the x, y and/or z directions and/or rotations about the x, y, and/or z axes (θ_x θ_y θ_z).

[0176] The movement indicators 402 may be widely varied, however, in this embodiment they take the form of mechanical switches. The mechanical switches are typically disposed between the circuit board 364 and the frame 352. The mechanical switches may be attached to the frame 352 or to the printed circuit board 364. A stiffening plate may be provided to stiffen the circuit board. In the illustrated embodiment, the mechanical switches are attached to the backside of the circuit board 364 and operatively coupled to the controller thus forming an integrated unit. They are generally attached in location that places them beneath the appropriate button zone (e.g., beneath each of the phone numbers or characters). As shown, the mechanical switches include actuators that are spring biased so that they extend away from the circuit board 364. As such, the mechanical switches act as legs for supporting the touch pad 354 in its upright position within the frame 352 (i.e., the actuators rest on the frame). By way of example, the mechanical switches may correspond to tact switches and more particularly, enclosed SMT dome switches (dome switch packaged for SMT).

[0177] Moving along, the integrated unit of the touch pad 354 and switches 402 is restrained within a space provided in the frame 352. The integrated unit is capable of moving within the space while still being prevented from moving entirely out of the space via the walls of the frame 352. The shape of the space generally coincides with the shape of the integrated unit. As such, the unit is substantially restrained along the X and Y axes via a side wall of the frame and along the Z axis and rotationally about the X and Y axis via a top wall and a bottom wall of the frame. A small gap may be provided between the side walls and the platform to allow the touch pad 354 to move to its four positions without obstruction (e.g., a slight amount of play). In some cases, the circuit board may include tabs that extend along the X and Y axis so as to prevent rotation about the Z axis. Furthermore, the top wall includes an opening for providing access to the touch sensitive surface of the touch pad 354. The spring force provided by the mechanical switches 402 places the touch pad 354 into mating engagement with the top wall of the frame 352 (e.g., upright position) and the gimbal substantially eliminates gaps and cracks found therebetween.

[0178] FIG. 35 is an exploded perspective diagram of a touch pad 420, in accordance with one embodiment of the present invention. The touch pad 420 may be a stationary fixed touch pad or a it may be integrated into a clickable touch pad. The touch pad 420 includes various layers including a light diffusing cover 422, a transparent touch sensing layer 424, an organic light emitting device (OLED) 426, and a printed circuit board 428. The light diffusing cover 422 is disposed over the touch sensing layer 424, the touch sensing layer 424 is disposed over the OLED 426, and the OLED 426 is disposed over the printed circuit board 428. The touch sensing layer 424 and OLED 426 are operatively coupled to a controller 430 located on the printed circuit board 428. The controller receive data from the touch sensing layer and instructs the OLED how to present graphical information. The graphical information may be based on the touch data. The touch sensing layer 424 may include its own carrier or it may be applied to the bottom surface of the