

Description

FIELD OF THE INVENTION

This invention relates to digitizing tablets, and in particular to a digitizing tablet with sets of parallel conductors formed from conductive ink.

BACKGROUND OF THE INVENTION

A digitizing tablet is a part of a digitizing device that, in conjunction with a stylus, is used to generate digital signals representative of the position of the stylus on the tablet. Digitizing devices are often used with data processing equipment to allow the operator to input information that can best be expressed in multi-dimensional analog terms. For instance, a digitizing device can be used in conjunction with computer aided design equipment to enable the operator to input where features of the item being designed should be located. Digitizing devices can also be used as part of a communications system to enable the users to transmit and receive digital representations of analog information; for example, a digitizing device can be used to transmit handwritten material such as a signature for verification by comparison to a standard stored in a database.

A typical digitizing tablet is provided with two sets of parallel grid conductors. The individual grid conductors are spaced apart from each other and the sets are arranged perpendicular to each other so as to form an X-Y grid of rectangular sections separated by the conductors. The digitizing device includes a digitizing circuit associated with the conductors and stylus that generates a digital output representative of the position of the stylus on the digitizing tablet. In one type of digitizing circuit, a coil inside the stylus is periodically energized and sensors associated with the grid conductors provide an indication of where the stylus is on the digitizing tablet. In another type of digitizing circuit, the grid conductors are driven in succession and the resultant signal induced in a coil in the stylus is then sensed; the time of occurrence and strength of the sensed signal is then used to provide an indication of the location of the stylus. The signals sensed relative to the X-grid conductors provide an indication of where the stylus is in relation to a Y-reference line; the signals sensed relative to the Y-grid conductors provide an indication of where the stylus is relative to an X-reference line. The combination of the signals sensed relative to both the X and Y grid conductors provides an indication of the location of the stylus on the digitizing pad.

Advances in electronics technology have made it possible to interpolate the position of the stylus between parallel grid conductors. This has made it

possible to provide digitizing devices that generate an output of the position stylus on the digitizing tablet with a very high degree of accuracy.

An important consideration in the design of a digitizing device is providing a digitizing tablet with grid conductors that are as parallel as possible with respect to the other conductors in the set, and that have substantially identical electrical characteristics. These considerations are important because the signals sensed and processed by the digitizing circuit relative to identical positions between grid conductors should be identical everywhere on the digitizing tablet in order to consistently generate accurate signals representing the stylus' location.

One of the few types of digitizing tablets that, to date, is provided with grid conductors of substantially identical electrical characteristics and has good parallel geometry, is a wire grid digitizing tablet. A wire grid digitizing tablet includes two sets of parallel wires that are spaced apart and perpendicular to each other. Typically, the wires are encased in a resin layer that hold the wires in place and serves as an electrical insulator between them. The resin layer, with the wires embedded therein, is bonded to a glass substrate. The digitizing tablet is incorporated into a standard digitizer device known in the art. A wire grid digitizing tablet is assembled by first stringing the wires to a frame below which the glass substrate is secured; applying a resin that is in a liquid state to the glass so the wires are coated; and curing and applying pressure to the resin so a thin, solid layer of wire embedded resin, bonded to the glass substrate, is formed. A more detailed description of wire grid digitizing tablets, and the method for constructing them, is set forth in U. S. Patent No. 4,513,043 which is incorporated herein by reference.

There are a number of disadvantages associated with wire digitizing tablets. One disadvantage is associated with the curing of the resin after it is applied to the glass substrate. In order to cure the resin, it is exposed to ultra violet light. As a consequence of the resin curing, and its exposure to the ultra violet light, heat, known as exotherm, is released by the resin. The heat causes the resin to shrink which in turn may cause the wires embedded therein to bend or become displaced. Controlling the resin's exposure to the ultra violet light only partially reduces the exotherm and subsequent distortion of the wires embedded within it. Lumps or viscosity inconsistencies within the uncured resin can cause the resin to shrink in an irregular pattern so as to further disrupt the pattern of the wires therein. The fabrication of these digitizer tablets is further complicated because there are slight variations in the chemical composition of the different batches of resin used to form the tablets. Accordingly, the resins from the various

batches have differing exotherm rates which contribute to the difficulty of controlling the shrinkage when the individual resin layers tablets are cured.

Moreover, the current digitizing tablets are assembled out of costly components that are very difficult to assemble and that must be assembled together with a significant degree of accuracy. As a result, the current digitizing tablets are relatively expensive to manufacture.

Furthermore, all digitizing tablets must be provided with a means to interconnect the grid conductors to the digitizing circuit. Current digitizing tablets do not include an integral structure or member where such interconnects can readily be made. Consequently, current digitizing tablets are often provided with a relatively expensive interconnect coupler, with a mechanical fastener means attached thereto, to make the necessary connections to the digitizing circuits to which they are connected. Frequently, these interconnect couplers are fragile devices that are prone to break off of the tablets.

SUMMARY OF THE INVENTION

It is an object of this invention to provide a digitizing tablet that can be assembled with a minimal amount of difficulty and is relatively economical to manufacture.

It is another object of this invention to provide a digitizing tablet that is provided with a means to readily mount electrical components and provide electrical connections thereto.

It is still a further object of this invention to provide a digitizing tablet with not subject to thermal and hydrophilic expansion and contractions with the attendant loss of digitizing accuracy they cause.

These, and other objects of this invention as defined by the claims, are provided by a digitizing tablet provided with a plate of glass or other rigid, insulating material that serves as the surface of the digitizing tablet. Lines of conductive ink are applied to the surface of glass opposite the surface on which the stylus is to be disposed. The lines of conductive ink are applied to the glass as two sets of parallel lines that are orthogonal to each other so as to function as the grid conductors of the digitizing tablet. Dielectric ink is applied over the conductive ink to serve as a protective coating and as insulators so that at the points the perpendicular grid conductors cross, current will not flow therethrough.

Attention is directed to IBM Technical Disclosure Bulletin, volume 23, No. 2, July 1980, pp 666-667, which describes grid conductors, printed photolithographically on a glass substrate, and to GB-A-2086368, which describes dielectric inks for

use in multilayer structures comprising also conductive inks.

The lines of conductive ink in the present invention may be arranged to terminate at solder pads that are also applied to the surface of the glass. Electrical components, or sockets for electrical components, can be electrically connected to the grid conductors by surface mounting them to the solder pads using solder, conductive adhesive, or other media.

There are a number of advantages associated with the digitizing tablet of this invention. The parallel lines of conductive ink that function as the grid conductors can be applied to the glass with a minimal amount of difficulty. The material needed to assemble this digitizing tablet is relatively inexpensive. Thus, this digitizing tablet is economical to manufacture.

The glass of this digitizing tablet has low coefficients of thermal and hydrophilic expansion. Thus, neither the glass nor the grid conductors are substantially affected by changes in the ambient temperature or humidity to which the digitizing tablet may be exposed. Accordingly, the distances between the lines of conductive ink do not vary so as to cause the digitizing circuit to generate an output that inaccurately represents the location of the stylus on the digitizing tablet.

Another advantage of this digitizing tablet is that the grid conductors can be readily connected to the associated digitizing circuitry at the solder pads using solder or other appropriate conductive media. There is no need to provide this digitizing tablet with relatively costly and fragile interconnect couplers to make the necessary connections between the grid conductors and the digitizing circuitry.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a block diagram of a digitizer of the type that would employ a digitizing tablet of the present invention.

Figure 2 is a front perspective view of the underside of a digitizing tablet of the present invention.

Figure 3 is a cross-section view of the digitizing tablet of the present invention including an electrical component surface mounted thereon.

Figures 4 and 4a illustrate a transfer sheet used to apply conductive adhesive to the digitizing tablet so the surface components may be mounted thereon, and the use of the transfer sheet to apply the conduct adhesive.

DETAILED DESCRIPTION OF THE INVENTION

Figure 1 depicts a typical digitizer 10 provided with a digitizing tablet 12. The digitizing tablet 12 has a writing surface over which a stylus 14 is disposed and an underside surface, opposite the writing surface. On the underside surface of the digitizing tablet 12 are first and second sets of parallel grid conductors 15 and 16 that run perpendicular to each other. All of the conductors of the first grid conductor set 15 are connected at one end to a common conductor 18 which connects to a digitizing circuit 20. The other ends of the grid conductors 15 are connected individually to the digitizing circuit 20. Which includes a switch for each of the conductors to select the conductor whose signals will be sensed. Similarly, the conductors of the second grid conductor set 16 are connected by a second common line 22 to the digitizing circuit 20, and they are connected individually at their other ends to the circuit 20.

The stylus 14 is also connected to the digitizing circuit 20. The digitizing circuitry 20 drives a coil located on the tip of the stylus 14 to cause it to generate an electromagnetic field. When the stylus 14 is brought to the grid surface 12, it induces electrical signals in the first and second sets of grid conductors 15 and 16. The digitizing circuit 20 senses the signals on each of the conductors in succession to determine which conductors carry signals of greatest amplitude. The signals of greatest amplitude are generated in the grid conductors at the perimeter of the coil in the stylus 14, and the digitizing circuit 20 determines the ratios of the signal amplitudes of the two strongest signals in each set of grid conductors 15 and 16 and from this determines the position of the stylus. In response, it generates position-indicating output signals over output lines not shown.

Referring to Figure 2, the digitizing tablet 12 is shown in greater detail to include a sheet of glass 26 that functions as the writing surface for the stylus 14. Lines of conductive ink 28 are applied to the undersurface of the glass 26 opposite the writing surface. The lines of conductive ink 28 are arranged in two sets of parallel lines that are perpendicular to each other so as to function as the first and second sets of grid conductors 15 and 16.

As best seen by reference to Figure 3, each line of conductive ink 28 is entirely covered by a layer of dielectric ink 30. In the illustrated embodiment, the dielectric ink 30 is applied so it covers almost the entire portion of the surface of the glass 26 the conductive ink 28 is applied to. Two layers of dielectric ink 30 are applied to the glass 26, one layer is applied after each layer of conductive ink 28 has been applied to it. The dielectric ink 30 functions as a protective covering over the conduc-

tive ink 28, and at points where the first and second sets of grid conductors 15 and 16 cross, functions as insulation to prevent current flow therebetween.

The lines of conductive ink 28 are arranged so they terminate at surface contact pads 32 on the glass 26. Electrical components 34, which comprise at least part of the digitizing circuit 20, are surface mounted to the glass 26 at the surface contact pads 32. A conductive bonding media 41 such as solder, or conductive adhesive, is used to bond conductive leads 36 of the electrical components 34 to the surface contact pads 32 they are in electrical contact therewith. Typically the electrical component 34 directly mounted to the glass 26 is either a socket 34a adapted to receive a functioning component 37, or a socket 34b adapted to receive conductors, such as a ribbon connector 38, used to make connections to circuit elements mounted at locations remote to the digitizing tablet 12.

The digitizing tablet 12 of this invention is assembled by first applying lines of conductive ink 28 to the glass that functions as the first set of grid conductors 15. The conductive ink 28 is applied by processes known in the art, such as silk screening. After the conductive ink 28 forming the first set of conductors has been applied and cured, the first layer of dielectric ink 30 is applied over it, again by a known process such as silk screening, and cured. The wires of conductive ink 28 forming the second set of grid conductors 16 are then applied to the glass 26, and after they cure, the second layer of dielectric ink 30 is applied over them. When the grid conductors 15 and 16 are formed, the surface contact pads 32 are formed so they are integral with them. The dielectric ink 30 is applied in such a manner that it does not cover the surface contact pads 32 that are formed with the grid conductors 15 and 16. Suitable conductive ink 28 and dielectric ink 30 for this digitizing tablet may be obtained from the Amicon Company of Lexington, Massachusetts.

After the grid conductors 15 and 16 and the surface contact pads 32 are formed, the electrical components 34 are mounted to the digitizing tablet 12. If the conductive bonding media 41 is a conductive adhesive, the electrical components 34 are mounted by first applying the conductive adhesive to the digitizing tablet 10 over the surface contact pads through a metal stencil with openings where the surface contact pads are located. Immediately after the conductive adhesive is applied, before it has an opportunity to cure, the electronic components 34 are surface mounted on the glass 26 so their leads 36 are disposed in the conductive adhesive. The conductive adhesive has sufficient adhesive qualities so that after it cures, the electronic

components 34 will be bonded thereto. A suitable conductive adhesive may be obtained from the same source that can provide the conductive ink and the dielectric ink.

A layer of Lexan 40, or other suitable pliant material, is then bonded to the surface of the glass 26 over which the stylus 14 is to be disposed. The Lexan 40 has a texture that gives the writing surface of the digitizing tablet 12 a paper or pad-like feel.

The glass 26 of this digitizing tablet 12 has very low thermal and hydrophilic coefficients of expansion. Therefore, there is substantially no possibility that the digitizing tablet 12 will expand or contract as the temperature and humidity of the tablet's ambient environment changes. Accordingly, it is improbable the spacing between the grid conductors 15 and 16 will change so as to cause the digitizing circuit 20 to generate signals that inaccurately represent the position of the stylus 14.

The conductive ink 28 can be applied to the glass 26 in such a manner that the lines of ink formed have excellent electrical characteristics. The individual lines of ink are extremely straight. The lines of conductive ink can be positioned from each other so that the lines of conductive ink 28 forming each set of grid conductors have excellent parallel spacing characteristics and are spaced apart from each other a constant distance that does not vary between pairs of spaced apart conductors. Moreover, the conductive ink 28 can be accurately applied so the sets of grid conductors 15 and 16 intersect at the exact angle they are designed to intersect at.

Furthermore, applying the conductive ink 28 and dielectric ink 30 to the glass 26 to form the parallel lines that comprise the grid conductors is neither a difficult nor costly task. The material needed to assemble this digitizing tablet is relatively inexpensive. Thus, this digitizing tablet 12 is economical to fabricate.

Further production economics are obtained with this digitizing tablet 12 since it readily accommodates electrical components 34 that can be surface mounted to the digitizer tablet so as to provide a ready connection to the grid conductors 15 and 16. This eliminates the expense of having to provide costly and fragile interconnect couplers that extend between the digitizing tablet 12 and the associated digitizing circuitry 20.

Figures 4 and 4a illustrate an alternative method of applying the conductive bonding media 41 to the digitizing tablet 12. The conductive bonding media 41 is in the form of a solvent based, partially cured conductive adhesive that has been first applied to a transfer sheet 42. The transfer sheet includes a release liner 44 with a wax-like surface that the conductive adhesive is initially applied to.

The conductive adhesive is applied to the release liner 44 in the pattern that is to be applied to on the digitizing tablet 12. A main substrate 46 formed of sheet of flexible material such as Lexan, Mylar, or other suitable material is disposed on the release liner 44 over the applications of adhesive 41. The surface of the main substrate 46 adjacent the adhesive 41 is coated with a release agent such as silicon.

The conductive adhesive forming the conductive bonding media 41 is applied to the digitizing tablet 12 by first removing the release liner 44 from the transfer sheet 42. The main substrate 46, with the conductive adhesive thereon, is positioned on the digitizing tablet 12 with the aid of alignment lines 48 on the glass 26. The digitizing tablet 12 is held in position by alignment blocks 50 affixed to the work station. After the main substrate 46 is aligned on the digitizing tablet 12, pressure is applied to the outer surface of the main substrate 46 so the conductive adhesive adheres to the surface contact pads 32 on the glass 26. The main substrate 46 is then removed, leaving the adhesive on the substrate. Before the conductive adhesive is allowed to cure, the electronic components 34 are mounted thereto so when the adhesive cures, they will be bonded to the digitizing tablet 12.

This description is for the purpose of description only. Alternative embodiments of this invention are possible without departing from the scope of the claims. In some embodiments it may not be necessary to apply dielectric ink 30 over substantially the entire surface of the glass 26. For example, it may be desirable to only apply the dielectric ink 30 so that it only covers the lines of conductive ink 28. For instance, if the lines of conductive ink 28 are approximately 50 mils wide, lines of dielectric ink 30 250 mils wide may be applied over them. Alternatively, in some embodiments of this invention it may be desirable to only apply an insulating material at the point the grid conductors 15 and 16 intersect.

In still other embodiments of this invention, it may be desirable to terminate the lines of conductive ink at conductive contact pads located around the perimeter of the digitizing tablet; the digitizing tablet could then be mounted in a frame that is provided with edge connectors that make electrical contact with the grid conductors through the perimeter-located contact pads. Alternative material other than glass can be used as the surface of the digitizing tablet, and conductive and dielectric inks other than those described can be used to form the grid conductors. Moreover, any convenient means can be used to apply the conductive and dielectric inks to the digitizing tablet, and to provide the surface mount assembly.



Claims

1. A digitizing tablet for use with a stylus and digitizing circuit generating signals representative of the position of the stylus on the digitizing tablet, the digitizing tablet comprising:
 - a) a rigid substrate of dielectric material having a first, writing side over which the stylus is to be disposed, and a second, underside opposite said writing side;
 - b) grid conductors disposed on said rigid substrate underside, said grid conductors including a first and second set of parallel, spaced apart conductors, said first and second sets of conductors being disposed at an angle to each other, said grid conductors being formed of electrically conductive ink applied to the rigid substrate;
 - c) a layer of dielectric ink applied on said rigid substrate between said first and second grid conductors at the points said first and second grid conductors intersect, said dielectric ink insulating said grid conductors at the points said first and second sets of grid conductors cross; and
 - d) an electrical interconnect means on said rigid substrate joined to said grid conductors to provide a conductive path between said grid conductors and the digitizing circuit.
2. The digitizing tablet of claim 1 wherein said first and second sets of grid conductors intersect at a substantially perpendicular angle to each other.
3. The digitizing tablet of either preceding claim, wherein said grid conductors terminate and are in electrical communication with separate conductive surface contact pads on said rigid substrate, said surface contact pads suitable for securing and electrically connecting electrical components thereto.
4. The digitizing tablet of any preceding claim, wherein said rigid substrate comprises a sheet of glass.
5. The digitizing tablet of any preceding claim, wherein a layer of pliant material is disposed on said rigid substrate writing surface.
6. A method of forming a digitizing tablet on a rigid substrate, said digitizing tablet having at least one parallelogram defined by conductive elements, comprising the steps of:
 - a. applying a first set of conductors as electrically conductive ink to a first surface of said rigid substrate, said first set of conductors having at least two spaced apart parallel conductors disposed on said rigid substrate first surface;
 - b. applying a layer of dielectric ink as an insulating material on said first surface of said rigid substrate at least partially over said first set of conductors; and
 - c. applying a second set of conductors as electrically conductive ink to said first surface of said rigid substrate, said second set of conductors having at least two spaced apart parallel conductors disposed on said rigid substrate that intersect said first set of conductors, said second set of conductors arranged to intersect said first set of conductors over where said insulating material is applied.
7. The method of claim 6, wherein said layer of insulating material is applied over substantially all of said first set of conductors.
8. The method of claim 6 or 7, further including the step of applying a layer of insulating material over substantially all of said second set of conductors.
9. The method of any one of claims 6 to 8, wherein:
 - a. said first and second sets of conductors are applied on said rigid substrate so that said conductors terminate at surface contact pads;
 - b. a conductive adhesive media is applied to said surface of said rigid substrate over said surface contact pads; and
 - c. electrical components with one or more conductive leads are mounted to said rigid substrate, said electrical component conductive leads being disposed in said conductive adhesive media so as to secure said electrical components to said rigid substrate and to provide a conductive path between said first and second sets of conductors and said electrical components.

Patentansprüche

1. Digitalisieretafel zur Verwendung mit einem Schreibstift und einer Digitalisierschaltung, welche die Position des Schreibstifts auf der Digitalisieretafel darstellende Signale erzeugt, wobei die Digitalisieretafel umfaßt:
 - a) ein steifes Substrat aus dielektrischem Material mit einer -ersten- Schreibseite, über der der Schreibstift anzuordnen ist, und einer zweiten der Schreibseite gegen-



- überliegenden Unterseite;
- b) auf der Unterseite des steifen Substrats angeordnete Gitterleiterbahnen, die eine erste und zweite Gruppe paralleler, im Abstand voneinander angeordnete Leiterbahnen umfassen, wobei die ersten und zweiten Gruppen von Leiterbahnen unter einem Winkel zueinander angeordnet sind und die Gitterleiterbahnen aus einer auf das steife Substrat aufgetragenen elektrisch leitfähigen Tinte gebildet sind;
- c) eine an den Punkten, an denen sich die ersten und zweiten Gitterleiterbahnen schneiden, auf das steife Substrat zwischen die ersten und zweiten Gitterleiterbahnen aufgetragene Schicht aus dielektrischer Tinte, wobei die dielektrische Tinte die Gitterleiterbahnen an den Punkten isoliert, an denen sich die ersten und zweiten Gruppen von Gitterleiterbahnen kreuzen; und
- d) ein elektrisches Verbindungsmittel auf dem steifen Substrat, das mit den Gitterleiterbahnen verbunden ist, um einen leitfähigen Pfad zwischen den Gitterleiterbahnen und der Digitalisierschaltung vorzusehen.
2. Digitalisieretafel nach Anspruch 1, in der sich die ersten und zweiten Gruppen von Gitterleiterbahnen unter einem im wesentlichen zueinander senkrechten Winkel schneiden.
3. Digitalisieretafel nach einem der beiden vorhergehenden Ansprüche, in der die Gitterleiterbahnen an gesonderten, leitfähigen, auf der Oberfläche liegenden Kontaktanschlußflächen auf dem steifen Substrat enden und mit diesen elektrisch verbunden sind, wobei die auf der Oberfläche liegenden Kontaktanschlußflächen geeignet sind, daran elektrische Komponenten zu befestigen und elektrisch anzuschließen.
4. Digitalisieretafel nach einem der vorhergehenden Ansprüche, in der das steife Substrat eine Glasscheibe umfaßt.
5. Digitalisieretafel nach einem der vorhergehenden Ansprüche, in der eine Schicht aus elastischem Material auf der Schreiboberfläche des steifen Substrats angeordnet ist.
6. Verfahren zur Bildung einer Digitalisieretafel, die mindestens ein durch leitfähige Elemente begrenztes Parallelogramm aufweist, auf einem steifen Substrat, umfassend die Schritte:
- a) Auftragen einer ersten Gruppe von Leiterbahnen als elektrisch leitende Tinte auf eine erste Oberfläche des steifen Substrats, wobei die erste Gruppe von Leiterbahnen wenigstens zwei im Abstand voneinander angeordnete, parallele Leiterbahnen aufweist, die auf der ersten Oberfläche des steifen Substrats angeordnet sind;
- b) Auftragen einer Schicht aus dielektrischer Tinte als isolierendes Material auf die erste Oberfläche des steifen Substrats wenigstens teilweise über die erste Gruppe von Leiterbahnen; und
- c) Auftragen einer zweiten Gruppe von Leiterbahnen als elektrisch leitende Tinte auf die erste Oberfläche des steifen Substrats, wobei die zweite Gruppe von Leiterbahnen wenigstens zwei im Abstand voneinander angeordnete, parallele Leiterbahnen aufweist, die auf dem steifen Substrat angeordnet sind und die die erste Gruppe von Leiterbahnen schneiden, wobei die zweite Gruppe von Leiterbahnen derart angeordnet ist, daß sie die erste Gruppe von Leiterbahnen dort überschneidet, wo das isolierende Material aufgetragen ist.
7. Verfahren nach Anspruch 6, in dem die Schicht aus isolierendem Material über im wesentlichen die ganze erste Gruppe von Leiterbahnen aufgetragen wird.
8. Verfahren nach den Ansprüchen 6 oder 7, ferner umfassend den Schritt des Auftragens einer Schicht aus isolierendem Material über im wesentlichen die ganze zweite Gruppe von Leiterbahnen.
9. Verfahren nach einem der Ansprüche 6 bis 8, in dem:
- a) die ersten und zweiten Gruppen von Leiterbahnen derart auf das steife Substrat aufgetragen werden, daß sie an auf der Oberfläche liegenden Kontaktanschlußflächen enden;
- b) ein leitfähiges Klebemittel auf die Oberfläche des steifen Substrats über die auf der Oberfläche liegenden Kontaktanschlußflächen aufgetragen wird; und
- c) elektrische Komponenten mit einem oder mehreren leitfähigen Zuführungsleitungen auf dem steifen Substrat angebracht werden, wobei die leitfähigen Zuführungsleitungen der elektrischen Komponenten in dem leitfähigen Klebemittel angeordnet werden, um die elektrischen Komponenten auf dem steifen Substrat zu befestigen und einen leitenden Pfad zwischen den ersten und zweiten Gruppen von Leiterbahnen sowie den elektrischen Komponenten vorzusehen.



Revendications

1. Une tablette graphique destinée à être utilisée avec un crayon et un circuit de numérisation générant des signaux représentatifs de la position du crayon sur la tablette graphique, cette tablette graphique comprenant :

a) un substrat rigide en un matériau diélectrique ayant une première face, ou face d'écriture, sur laquelle le crayon doit être placé, et une seconde face, ou face inférieure, du côté opposé à la face d'écriture;

b) des conducteurs de grille disposés sur la face inférieure du substrat rigide, ces conducteurs de grille comprenant des premier et second jeux de conducteurs parallèles et espacés, les premier et second jeux de conducteurs étant disposés de façon à faire un angle entre eux, et les conducteurs de grille étant constitués par une encre conductrice de l'électricité qui est appliquée sur le substrat rigide;

c) une couche d'encre diélectrique appliquée sur le substrat rigide entre les premiers et seconds conducteurs de grille, aux points d'intersection des premiers et seconds conducteurs de grille, cette encre diélectrique isolant les conducteurs de grille aux points d'intersection des premier et second ensembles de conducteurs de grille; et

d) des moyens d'interconnexion électrique sur le substrat rigide, reliés aux conducteurs de grille pour établir un chemin conducteur entre les conducteurs de grille et le circuit de numérisation.

2. La tablette graphique de la revendication 1, dans laquelle les premier et second ensembles de conducteurs de grilles se coupent mutuellement de façon pratiquement perpendiculaire.

3. La tablette graphique de l'une ou l'autre des revendications précédentes, dans laquelle les conducteurs de grille aboutissent à des plots de contact de surface conducteurs séparés sur le substrat rigide, et sont en communication électrique avec eux, ces plots de contact de surface convenant pour la fixation et la connexion électrique de composants électriques.

4. La tablette graphique de l'une quelconque des revendications précédentes, dans laquelle le substrat rigide consiste en une plaque de verre.

5. La tablette graphique de l'une quelconque des revendications précédentes, dans laquelle une couche de matière souple est disposée sur la surface d'écriture du substrat rigide.

6. Un procédé pour former une tablette graphique sur un substrat rigide, cette tablette graphique comportant au moins un parallélogramme défini par des éléments conducteurs, comportant les étapes suivantes :

a. on applique un premier ensemble de conducteurs, sous la forme d'une encre conductrice de l'électricité, sur une première surface du substrat rigide, ce premier ensemble de conducteurs comportant au moins deux conducteurs parallèles et espacés qui sont disposés sur la première surface du substrat rigide;

b. on applique une couche d'encre diélectrique, à titre de matière isolante, sur la première surface du substrat rigide, au moins en partie sur le premier ensemble de conducteurs; et

c. on applique un second ensemble de conducteurs, sous la forme d'une encre conductrice de l'électricité, sur la première surface du substrat rigide, ce second ensemble de conducteurs comportant au moins deux conducteurs parallèles et espacés qui sont disposés sur le substrat rigide et qui rencontrent le premier ensemble de conducteurs, le second ensemble de conducteurs étant disposé de façon à rencontrer le premier ensemble de conducteurs sur les emplacements auxquels la matière isolante est appliquée.

7. Le procédé de la revendication 6, dans lequel la couche de matière isolante est appliquée sur la quasi-totalité du premier ensemble de conducteurs.

8. Le procédé de la revendication 6 ou 7, comprenant en outre l'étape qui consiste à appliquer une couche de matière isolante sur la quasi-totalité du second ensemble de conducteurs.

9. Le procédé de l'une quelconque des revendications 6 à 8, dans lequel :

a. on applique les premier et second ensembles de conducteurs sur le substrat rigide de façon que ces conducteurs aboutissent à des plots de contact de surface;

b. on applique une substance adhésive conductrice sur la surface du substrat rigide, sur les plots de contact de surface; et



c. on monte sur le substrat rigide des composants électriques comportant un ou plusieurs conducteurs de connexion, les conducteurs de connexion des composants électriques étant disposés dans la substance adhésive conductrice de façon à fixer ces composants électriques sur le substrat rigide et à établir un chemin conducteur entre les premier et second jeux de conducteurs et les composants électriques.

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