

A SHOCK RESISTANCE CASE

Field of the Invention

The present invention relates generally to a case
5 for transporting a portable electronic device adapted for
providing protection and cushioning against shock and
vibration during transportation.

Background of the Invention

10 During long distance transportation or shipment of
portable electronic devices, such as for example,
laptops, scanners or projectors, these devices are
typically packed in boxes and secured in place by, for
example, polyethylene foams (or commonly known as poly-
15 foams) against impact and vibration. The carrying case
for each portable electronic device is typically packed
with other accessories relating to the portable
electronic device, such as power modules or cables within
the box.

20 In such packaging method, the carrying case is not
utilized for transportation but is instead a load
included as part of a product package within the poly-
foams and box to be transported. Conventional carrying
case is not adapted for handling shock encountered during
25 long distance transportation and as such, carrying case

is not utilized for transportation of portable electronic device. Instead, the carrying case is typically used for short distance travel as it is not designed to withstand continuous shock and vibration associated with long haul
5 transportation.

The common packaging method would therefore rely on conventional packaging means such as poly-foams for providing support and shock resistance over long distance transportation; however, this would result in non-
10 recyclable waste associated with the poly-foams.

Additional parts such as plastic materials for encasing the accessories within the box would also result in added costs and generation of more waste materials.

As evidenced from the above discussion, it is
15 desirable to provide an alternative to ameliorate one or more of the abovementioned problems.

Summary of Invention

In accordance to the present invention, there is
20 provided a case for carrying and transporting a portable electronic device comprising:

a carrier with at least one storage compartment
for storage of said portable electronic device; and
shock resistance means disposed within said
25 storage compartment for concurrently gripping and

providing shock resistance to said portable
electronic device;

5 wherein said shock resistance means includes a
resilient shock resistance layer having a plurality
of resilient projections and depressions, said layer
capable of being shaped into a shock resistance
module for coupling into said storage compartment,
thereby protecting the portable electronic device
against shock and vibration.

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Preferably, each projection is arranged next to a
depression in the alternative to form a series of
substantially parallel longitudinal lines of alternating
projections and depressions.

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The shock resistance module further includes side
surfaces that are enhanced with a series of at least 2
projections near corner sections of each of said side
surface and extending towards the inner opposing walls of
20 the module.

Preferably, the projections are extending towards
inner opposing walls of said shock resistance module.

Preferably, the depressions are extending as exterior projections from outer walls of said shock resistance module.

5 Preferably, the zenith and nadir of each projection and depression respectively include walls that are thickened with resilient materials.

Brief Description of the Drawings

10 Fig. 1(a) shows a perspective view of a case in accordance to one embodiment of the present invention;

 Fig. 1(b) shows an alternative perspective view of the present invention;

15 Fig. 2a shows a top view of a shock resistance layer in accordance to one embodiment of the present invention;

 Fig. 2b shows a perspective view of the shock resistance layer capable of being shaped into a shock resistance module;

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 Fig. 3 shows a cross sectional view of the shock resistance layer;

 Fig. 4 shows a pitch between two successive projections;

Fig 5 shows a side view of the shock resistance layer when folded;

Fig. 6a and 6b show an alternative embodiment of the invention, 6b being the cross sectional view of the alternative embodiment; and

Fig. 7 shows a top view of the alternative embodiment.

Preferred Embodiments of the Invention

10 The transportation case 100 of the present invention as shown in Figs. 1(a) and (b) comprises a carrier 105, wherein the carrier 105 includes a main storage compartment 109 for storage of a portable electronic device such as a laptop, scanner or projector. The

15 carrier 105 may include one or more secondary compartment(s) 111 for the storage of accessories relating to the portable electronic device, such as for example, connectors, cables or power modules.

The transportation case 100 further comprises a

20 shock resistance layer capable of being shaped into a shock resistance module 113 that follows the outline and dimension of the main storage compartment 109, for insertion therein during assembly, as shown in Figs. 2(a) and (b).

The shock resistance module 113 may be removably coupled to the storage compartment 109, through for example, pushing and abutting the module into the main storage compartment 109 and secured therein.

- 5 Alternatively, the shock resistance module 113 may also be permanently coupled to the storage compartment 109. Permanent coupling may be done through, for example, stitching or by adhesive means.

When disposed within the storage compartment 109,
10 the shock resistance module 113 provides means to resiliently grip and cushion the body of the portable electronic device and thereby providing shock resistance against impact from dropping, bumping or vibration during transportation.

- 15 The shock resistance layer of the module 113 generally comprises a plurality of resilient projections 208 and depressions 213 as shown in Fig. 3. Preferably, the projections 208 and depressions 213 are of elliptical shaped hemispheres. Other shapes, such as rounded shaped
20 hemispheres or conical shaped hemispheres may also be used. In one embodiment of the invention, each projection 208 is arranged next to a depression 213 in the alternative to form a series of substantially parallel longitudinal lines of alternating projections
25 208 and depressions 213, covering substantially the

surface of the shock resistance layer as shown in Fig. 2(a). Preferably, each projection 208 is physically symmetrical to each depression 213 to equalize the cushioning effect on any one side of the shock resistance layer. This advantageously allows any side of the shock resistance layer to be used for cushioning.

In a preferred embodiment, the walls surrounding the zenith and nadir sections of each projection 208 and depression 213 respectively are thickened with resilient materials to provide enhanced shock resistance.

Preferably, the thickness 221 of the thickened walls surrounding the zenith and nadir sections is about 0.3 cm although the thickness may also vary between 0.2 cm and 5 cm. More preferably, the zenith surface of each projection 208 which is in contact with the portable electronic device is planarized to increase the contact area between the shock resistance module 113 and the portable electronic device.

The pitch 305 between two successive projections or depressions, as shown in Fig. 4, may range between 3.5 cm and 7.0 cm for optimum cushioning effect. Preferably, the pitch 305 is about 6.34 cm. Apart from providing optimum cushioning effect, it is found that the pitch when adapted in combination with an appropriate depression to projection height 312, would advantageously

enhance shock resistance and improve heat dissipation within the shock resistance module 113. In a preferred embodiment, the depression to projection height 312 is about 2 cm although the height 312 may also range between
5 1.0 cm and 3.0 cm.

The shock resistance module 113 is preferably disposed to surround and substantially cover the interior of the main compartment 109. In a preferred embodiment, the shock resistance module 113 is disposed to surround
10 and cover the whole and entire interior of the main compartment 109 and thereby providing resilient cushioning of the entire body of the portable electronic device for improved shock resistance.

The shock resistance layer of the module 113 may
15 be made of thermoplastic materials such as, for example, Ethylene Vinyl Acetate (EVA), Expanded Polypropylene (EPP), Extruded Polypropylene (XPP) Polyethylene (PE) or Cross linked PE materials which are inherently high durable materials. These materials advantageously
20 enhance the shock resistance characteristic of the zenith and nadir sections of the projections 208 and depressions 213. The shock resistance layer may be manufactured through commonly known processes, such as for example, thermo-molding.

The exterior of case 100 may be made by thermo-molding process using thermoplastic materials.

Preferably, the thermoplastic materials of two different densities are laminated together. Alternatively, a

5 thermoplastic material is laminated with a stretchable fabric which may be made of the same thermoplastic materials or nylon, cotton or canvas materials which has a soft touch and which is resistant to water, stain, tear and abrasion.

10 When the shock resistance module 113 is secured within the main storage compartment 109 and in used, the portable electronic device is inserted and sandwiched between the opposing walls of the shock resistance module 113 as shown in Fig. 5. The portable electronic device
15 is resiliently grip in place by the plurality of projections 208 extending towards the inner opposing walls of the shock resistance module 113.

The gripping secures the portable electronic device in place and concurrently provides cushioning against
20 shock and vibration within the shock resistance module 113. The plurality of depressions 213 would additionally form projections extending and acting from the outer walls of the shock resistance module 113 against shock and vibration exterior to the module 113.

The gripping and cushioning effect of the shock resistance module 113 disposed within the transportation case 100 would advantageously allow a portable electronic device to be packed directly into the transportation case 5 100 of the present invention, together with its accessories for long haul transportation such as shipment. The use of case 100 of the present invention in shipment eliminates the needs for separate poly-foams for protecting the portable electronic device or plastic 10 materials for encasing the accessories. Upon reaching an end-user, the transportation case 100 may be subsequently used as a carrying or portable bag associated with the electronic device.

In an alternative embodiment of the present 15 invention, the surface of the shock resistance module 113 includes a series of substantially parallel longitudinal lines of alternating projections 208 and depressions 213 covering substantially the surface, however, the corner sections of the side surfaces 411, as shown in Fig. 6a, 20 of the shock resistance module 113 is enhanced by a series of at least 2 projections 402 extending towards the inner opposing walls of the module 113, as shown in Figs. 6b and 7.

Preferably, the peak to peak distance between the 25 two projections 402 is about 3.5 cm. The zenith surface

of each projection 402 which is in contact with the portable electronic device may be planarized to increase the contact area between the shock resistance module 113 and the portable electronic device.

5 This embodiment advantageously provides additional protection against shock and in particular, shock impacting from the sides and corners of the shock resistance module 113.

 While the invention has been particularly shown and
10 described with reference to various embodiments, it will be recognized by those skilled in the art that modifications and changes may be made to the present invention without departing from the spirit and scope thereof. The scope of the invention should therefore be
15 determined not with reference to the above description but with reference to the appended claims along with their full scope of equivalents.

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What is claimed is:

1. A case for carrying and transporting a portable electronic device comprising:

5 a carrier with at least one storage compartment for storage of said portable electronic device; and shock resistance means disposed within said storage compartment for concurrently gripping and providing shock resistance to said portable
10 electronic device;

wherein said shock resistance means includes a resilient shock resistance layer having a plurality of resilient projections and depressions, said layer capable of being shaped into a shock resistance
15 module for coupling into said storage compartment, thereby protecting the portable electronic device against shock and vibration.

2. The case as claimed in claim 1, wherein each
20 projection is arranged next to a depression in the alternative to form a series of substantially parallel longitudinal lines of alternating projections and depressions.

3. The case as claimed in claim 2, wherein said shock resistance module further includes side surfaces that are enhanced with a series of at least 2 projections near corner sections of each of said side surface and extending towards the inner opposing walls of the module.
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4. The case as claimed in any preceding claim, wherein said projections are extending towards inner opposing walls of said shock resistance module.
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5. The case as claimed in any preceding claim, wherein said depressions are extending as exterior projections from outer walls of said shock resistance module.
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6. The case as claimed in any preceding claim, wherein each projection and each depression includes a zenith section and a nadir section respectively that is thickened with resilient materials.
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7. The case as claimed in any preceding claim, wherein each projection is symmetrical to each depression.

8. The case as claimed in any preceding claim, wherein
a pitch between two successive projections or
depressions is adapted in combination with a
depression to projection height to improve heat
5 dissipation and shock resistance.
9. The case as claimed in claim 8, wherein said pitch
ranges between 3.5 cm and 7.0 cm.
- 10 10. The case as claimed in claim 9, wherein said pitch
is 6.34 cm.
11. The case as claimed in claim 8, wherein said
depression to projection height ranges between 1.0
15 cm and 3.0 cm.
12. The case as claimed in claim 11, wherein said
depression to projection height is 2 cm.
- 20 13. The case as claimed in any preceding claim, wherein
said projections and depressions are of elliptical
shaped hemispheres.

14. The case as claimed in any one of claims 1 to 12,
wherein said projections and depressions are of
rounded shaped hemispheres.
- 5 15. The case as claimed in any one of claims 1 to 12,
wherein said projections and depressions are of
conical shaped hemispheres.
16. The case as claimed in claim 1, wherein said shock
10 resistance module is removably coupled to said
storage compartment.
17. The case as claimed in claim 1, wherein said shock
resistance module is permanently coupled to said
15 storage compartment.
18. The case as claimed in claim 1, wherein said shock
resistance layer is made of EVA material.
- 20 19. The case as claimed in claim 1, wherein said shock
resistance layer is made of EPP material.
20. The case as claimed in claim 1, wherein said
transporting includes shipping of said portable
25 electronic device.

21. A case for carrying and transporting a portable electronic device comprising:

5 a carrier with at least one storage compartment for storage of said portable electronic device; and shock resistance module disposed within said storage compartment for concurrently gripping and providing shock resistance to said portable electronic device;

10 wherein said module includes a surface having a plurality of resilient projections and depressions, each projection is arranged next to a depression in the alternative to form a series of substantially parallel longitudinal lines of alternating
15 projections and depressions.

22. The case as claimed in claim 21, wherein said shock resistance module further includes side surfaces that are enhanced with a series of at least 2
20 projections near corner sections of each of said side surface, extending towards the inner opposing walls of the module.

23. The case as claimed in claim 21, wherein each projection that is in contact with the portable electronic device includes a zenith surface that is planarized.

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24. The case as claimed in any of claims 21 to 23, wherein the zenith and nadir of each projection and depression respectively include walls that are thickened with resilient materials.

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