

SPOOL CASE FOR BONDING WIRE**1. TECHNICAL FIELD OF THE INVENTION**

5 The present invention relates generally to spool case, and more particularly to a spool case for spool of a bonding wire that has a particularly versatile and easy to use locking mechanism. The present invention also relates to a spool case where the spool may be handled without being in direct contact with the operator.

2. BACKGROUND OF THE INVENTION

10 Wire bonding provides interconnect for attaching a die to a chip carrier, lead frame, substrate or package. With wire bonding, logical processes that are to be performed by microchip are made possible using inputs provided via the respective pins. There are basically three types of wire bonding process known in the art; thermocompression, ultrasonic and thermosonic. In thermocompression, the die is heated and gold wire bonding ball is pushed into it and due to the heat and pressure, inter metallic connection is formed. Ultrasonic, on the other hand, utilizes sonic energy and in thermosonic, ultrasonic method is added to the thermocompression method so that less energy and pressure are needed. There are a few main classification of wire bonding. They are ball bonding and wedge bonding. Ball bonding is generally for the high speed, omnidirectional process done almost exclusively with gold wire. Wedge bonding, on

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the other hand is for lower speed process done with aluminum, gold or sometime copper wire.

Bonding wire is normally stored wounded around a spool and the spool is in-turn stored in a spool case. There are various types of spool cases available in the market. For example, one than is disclosed in US-A-6 241 094 is shown comprises of a base and a cover which are fitted to each other characterized in that at least one of the base and the cover is provided with an engaging piece for holding the spool while being engageable with the outer circumferential edge of the spool flange. As a result of this configuration, there a number of these engaging pieces needed to accommodate the intended objectives. Material having special resiliency including metallic material having spring characteristic is also needed for the engaging pieces. One particular difficulty is expected from having such configuration and material requirement, i.e. the production process becomes somewhat complicated and therefore rising production cost. A simpler and more convenient configuration of a spool case for a bonding wire is needed. This spool case should preferably be configured having simple locking mechanism and also has an easy and convenient release mechanism which lead, in one aspect, to a simpler manufacturing requirement thus lower production cost. It should also have guiding mechanism where the cover and the base may be fitted to each other without difficulty.

In order to implement such easy to use, simpler configuration and requires particularly common

plastic material, an improved spool case configuration for a bonding wire is proposed by the present invention. The spool case is proposed to comprise of two cooperating members, a base and a
5 cover, and they are to be provided with a locking means which comprises of a groove and a matching projection, the groove is formed on the circumference of the base having an off-centered formation, and the projection is formed at the circumference of the of the

10 cover. To lock the two members together, simply rotate the members relative to each other. To release it, a convenient pressing mechanism is provided thereto. A guide mechanism is also provided to assist locking of the members.

15 3. SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a case for a spool of a bonding wire that has a particularly versatile and convenient means of locking.

20 It is also another object of the present invention to provide a spool case that is particularly resilient and easy to use locking means.

25 It is another object of the present invention to provide a spool case for spool of a bonding wire that allows handling of the spool without physically in direct contact with them.

These and other objects of the present invention are accomplished by providing,

A spool case for storing a spool having a bonding wire wound thereon, said spool case comprises of:

5 a base (1) and a cover (2), said base having circular walls and defining a cavity (3) for receiving said spool;

 said base (1) and cover are adapted to be releasably secured together through a locking
10 means;

 characterized in that :

 said locking means includes at least a groove (4) and a matching projection (5),
 said groove (4) is formed off-center and
15 located at the circumferential edge of the wall of said base (1), and said projection
 (5) is formed on the circumferential edge of said cover (2).

 Preferably, more than one pair of such grooves and
20 projections are utilized for the locking means.

 Also preferable, the base is provided having a barrel section that is closed at one end and a ridge arranged on the other end.

 Also preferable, the cover is provided with a spool holder means.

Yet, it is preferred that the base and cover are secured together by rotating them opposite of each other that drive the pair of groove and projections of the locking means to cooperate with each other.

5 **4. BRIEF DESCRIPTION OF THE DRAWINGS**

The embodiments of the invention will now be described, by way of example only, with reference to the accompanying figures in which:

Figure 1 shows a cross-sectional view of a spool case configured according to the invention.

Figure 2 shows plan view of the spool case of the present invention.

Figure 3 shows an illustration that depicts more clearly the working of the locking means.

15 **5. DETAILED DESCRIPTION OF THE DRAWINGS**

Referring now to Figure 1, there is shown a cross-sectional view of a spool case that is configured in accordance to the embodiment of the present invention. Generally, the spool case is to be
20 assembled to include two members, i.e., a base (1) and a cover (2). The base (1) is preferable cylindrical in shape having an outer (10) and inner walls (20) . The cover is also generally circular in configuration to match with the shape of the base.

25 The base and cover are adapted for releasable attachment to each other which when secured together, may enclose a wire bonding spool within

its cavity (3). The inner wall (20) of the base is configured to define a barrel section (6) that rises internally at the center of the base at one end and the other end meets with the outer wall (10) at the lower region. As illustrated in the figure, a cavity (3) with one closed end is formed between the barrel section (6) and the outer wall (10). This cavity (3) is preferably dimensioned to accommodate placement of a spool (not shown). On the upper region of the barrel section, there is provided a ridge (7) integrally formed with the end wall. The ridge is generally formed thereto as a guide to assist placement of the cover (2) to the base (1).

Still referring to Figure 1, the cover (2) is configured to have suitable matching dimension with the base (1), particularly to provide snug fit mounting. The cover (2) is provided having a holder means that comprises of a pair of deformable member (8) linked together to form a guiding ridge (9). The guiding ridge (9) is adapted to cooperate with the ridge (7) formed on the base, particularly during the initial step to secure the base and cover together. The base and cover are secured together using a particularly versatile, resilient and convenient means of locking mechanism. Detail of such locking means is to be described in the following.

Reference is now made to Figure 2. In this figure, the plan view that illustrates the mechanism of the locking means is shown. The locking means is configured comprises of at least a groove (4) that is formed on the wall of the base (1) and a matching

projection (5) formed at the wall of the cover (2). The groove (4) is to have its center at a certain point within base enclosure and therefore defining a smooth indent that at its maximum dimension (A),
5 allows placement of the projection (5) within the groove and at its minimum dimension (B), provides fitting attachment of the cover to the base. Preferably, more than one pair of such groove and matching projection is to be provided. These grooves and projections are to
10 be arranged in space apart and equal distance from each other on the respective wall of the spool case member.

Figure 3 illustrates more clearly the concept of the locking means of the present invention. At location
15 (A) the projection (5) may freely enter the groove (4) and at this instant, the cover (2) is not securely mounted to the base. However, at position (B), the projection (5) will be in compression with the wall of the base (1) and this action advantageously,
20 provides secure locking of the cover to the base. Friction developed in the locking means also help to secure them together. This can be done by rotating the cover and the base in counter rotation from each other. To release them, simply rotate them in the
25 other direction. As it can be seen here, the locking mechanism is generally quite simple yet practical. It does not require complicated mechanism whereby such prior complicated mechanism would generally require equally complicated manufacturing process,
30 thus saving in the term of manufacturing cost for the present invention.

Referring back to Figure 1, the cover may also be

used to hold the spool when the operator wishes to transfer it from the case to a bonding machine. This is done by pressing the holder means (8) disposed on the cover, and this action will cause the cover to engage with the spool. Lifting of the spool using the cover may proceed accordingly.

It is believed that the embodiment of the present invention may be incorporated into many other applications. While the preferred embodiments of the present invention have been described, it should be understood that various changes, adaptations and modifications may be made thereto. It should be understood, therefore, that the invention is not limited to details of the illustrated invention shown in the figures and that variations in such minor details will be apparent to one skilled in the art.

What is claimed is

1. A spool case for storing a spool having a bonding wire wound thereon, said spool case comprises of:-

a base (1) and a cover (2), said base having circular walls and defining a cavity (3) for receiving said spool;

said base (1) and cover are adapted to be releasably secured together through a locking means;

characterized in that :-

said locking means includes at least a groove (4) and a matching projection (5), said groove (4) is formed off-center and located at the circumferential edge of the wall of said base (1), and said projection(5) is formed on the circumferential edge of said cover (2).

2. A spool case for storing a spool as claimed in claim 1, further characterized in that said cover (2) is secured to said base (1) by frictional force developed between the groove (4) and the projection(5) of said locking means.
3. A spool case for storing a spool as claimed in claim 1, further characterized in that said

locking means includes a plurality of said groove (4) and projection(5), said grooves and projections are arranged at spaced apart relationship along the circumferential edge of said base and cover.

4. A spool case for storing a spool as claimed in claim 1, further characterized in that said base (1) having a barrel section (6) rising internally at its center, said barrel section (6) is closed at one end and having a ridge (7) integrally formed at said end.
5. A spool case for storing a spool as claimed in claim 1, further characterized in that said cover (2) having a holder means to engage with said spool, said holder means comprises of a pair of deformable member (8) that linked together to form a guiding ridge (9), and said guiding ridge (9) is adapted to meet with the ridge (7) formed on said base (1).
6. A spool case for storing a spool as claimed in any of claims 1 to 5, further characterized in that said base and cover are relative of each other until said projection (5) reaches the end section of said groove (4) and fittingly secured thereat.

7. A spool case for storing a spool as claimed in claim 6, further characterized in that said cover (2) is guided by said ridges (7) during the securing of said base and cover together.
8. A spool case for storing a spool as claimed in claim 6, further characterized in that said cover (2) and base (1) are released from each other by rotating them relative to each other, and said pressing of said holder means causes said cover to engage with said spool and allows said spool to be lifted from the cavity of said spool case without physically contacting it.
9. A spool case for storing a spool as claimed in claim 8, further characterized in that said spool case is made from clear plastic.