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- (54) **BEDDING SYSTEM**
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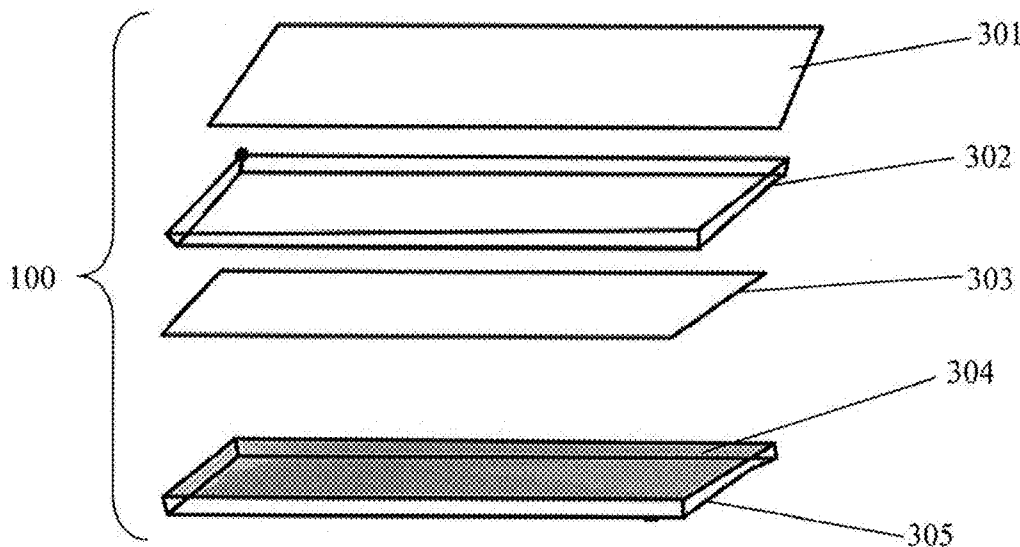
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(57) **ABSTRACT**

A liquid absorbing pad comprising a top layer and a bottom layer and an interior portion therebetween. The interior portion includes a liquid absorbing material. The top layer is made from microfiber bed sheet material. The bottom layer is made from microfiber terry, preferably non-oiled, the top of which is laminated with liquid-impermeable material. The top layer and interior portion are quilted together and glued to the bottom layer. When the pad is laid on a bed sheet made of microfiber bed sheet material extending horizontally, the pad resists horizontal movement relative to the bed sheet. The interior portion preferably may further includes a non-woven polypropylene layer below the liquid absorbing material so that the top layer, the liquid absorbing material and polypropylene layer are quilted together.



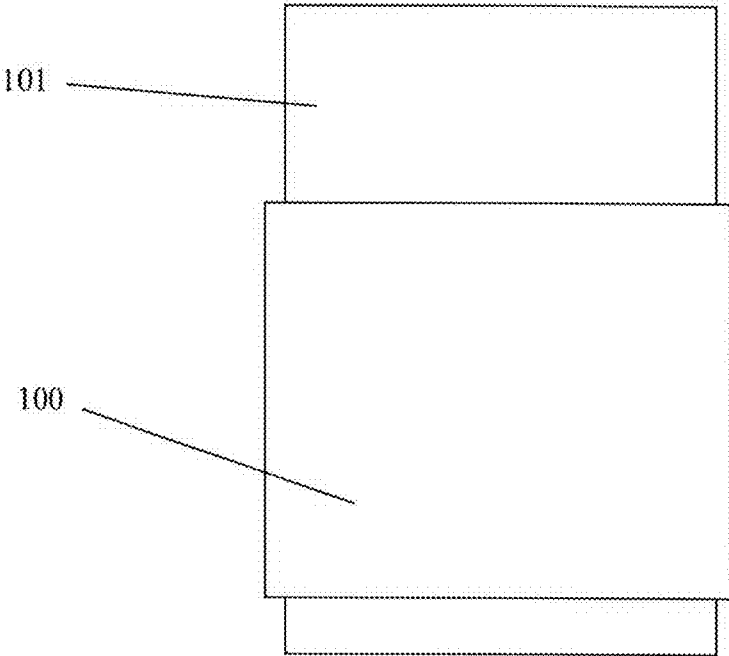


Figure 1

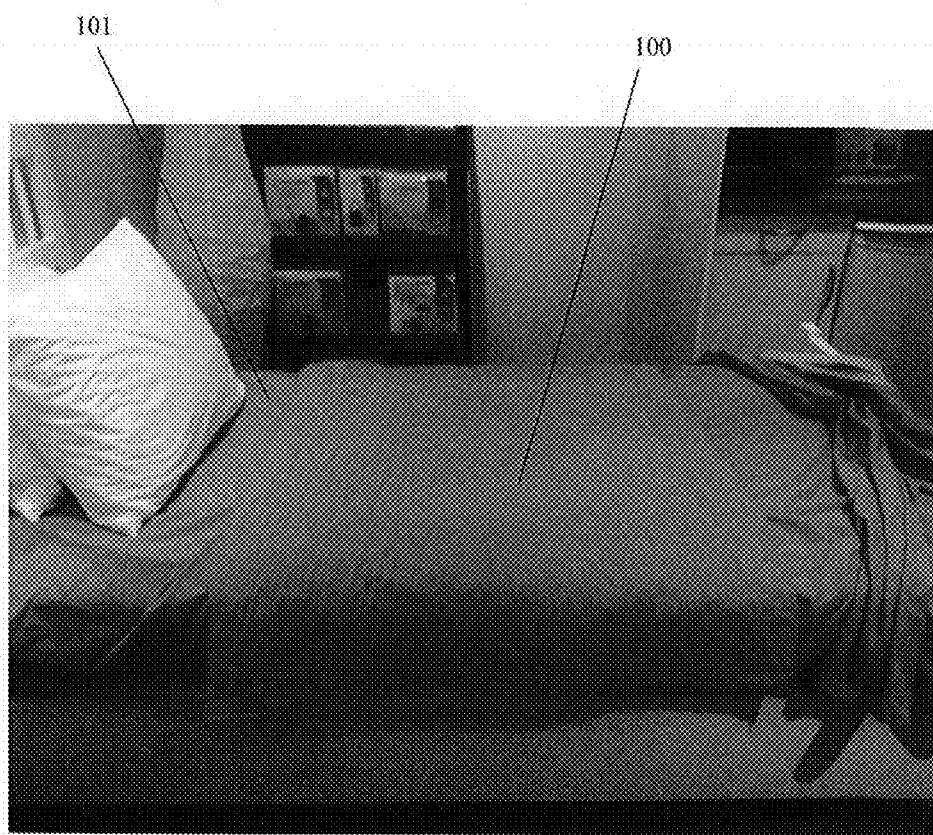


Figure 2

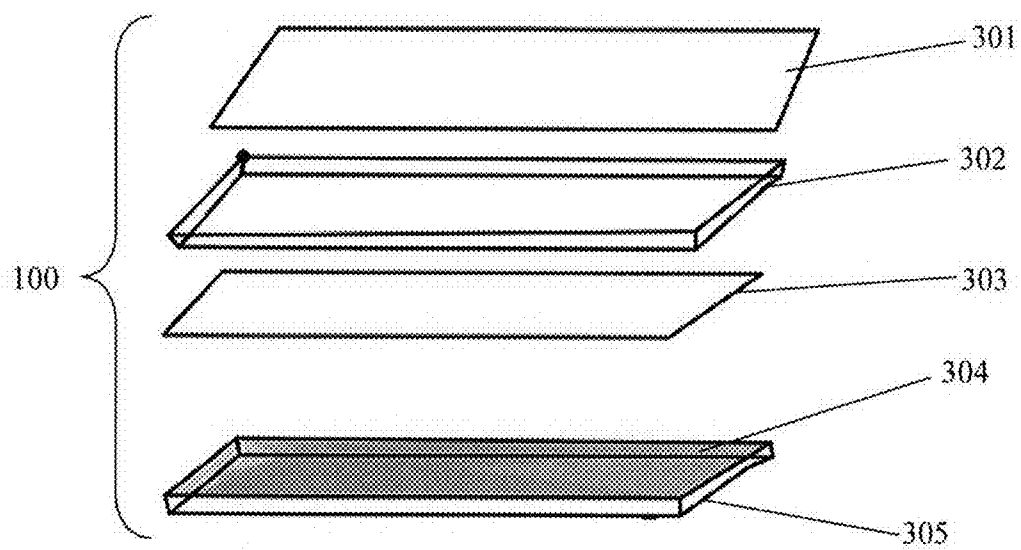


Figure 3

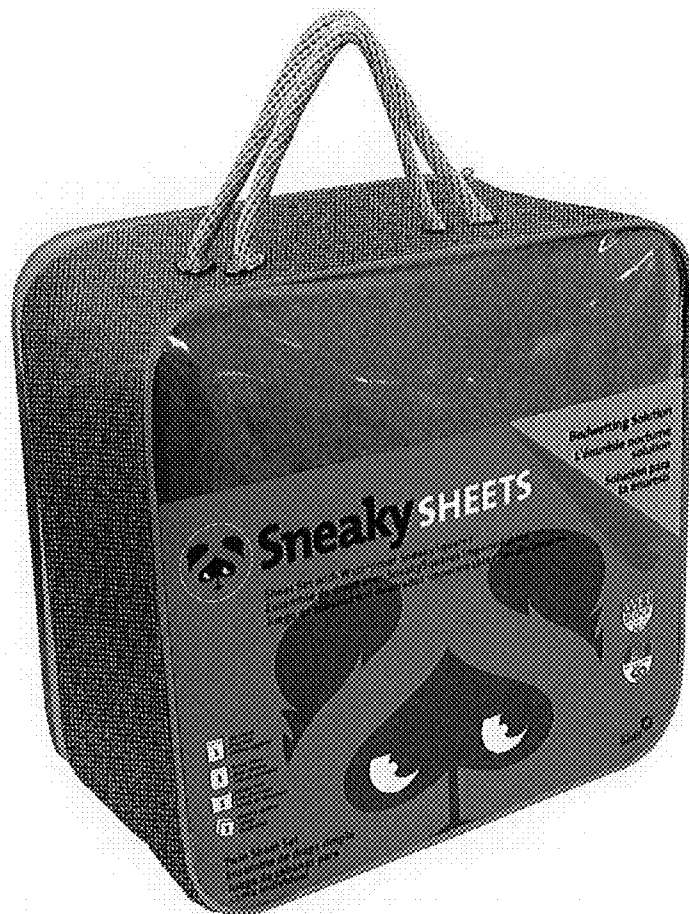


Figure 4

**BEDDING SYSTEM**

**FIELD OF THE INVENTION**

**[0001]** The present invention relates generally to bedding systems, and more particularly to pads or sheets including a liquid absorbing portion.

**BACKGROUND OF THE INVENTION**

**[0002]** Waterproof bedding cover sheets or pads are useful to help families cope with bedwetting for children and elderly people. Ideally, such a bedding sheet would provide the utmost in discretion and simplicity through combining superb protection and modular design to allow bed changes to happen in less than a minute, even with the lights off. Quick and effortless replacement, easy fit, and prevention of fluid passing through to a sheet or mattress are desired.

**[0003]** However, there are no reliable and durable off-the-shelf solutions available to securely attach/affix such a sheet to a bed sheet underneath quickly, for example in 30 seconds in darkness. Also, the design and pattern of previously disclosed protection sheets do not match with the rest of the bed sets, whereas such matching is very desirable. Also, no available off-the-shelf products meet desirable design and leak-proof goals such as washability and water absorbency holding up to 360 cc of fluids.

**[0004]** A common method of attaching or affixing bedding sheets to a mattress is to use velcro™ or snapping methods. Such methods have several shortcomings such as: choking hazards; longevity; timely process for fitting, aligning, laying and securing the sheet; and durability.

**SUMMARY OF THE INVENTION**

**[0005]** The invention provides a liquid absorbing pad comprising a top layer and a bottom layer and an interior portion therebetween. The interior portion includes a liquid absorbing material. The top layer is made from microfiber bed sheet material. The bottom layer is made from microfiber terry, the top of which is laminated with liquid-impermeable material. The top layer and interior portion are quilted together and glued to the bottom layer. When the pad is laid on a bed sheet made of microfiber bed sheet material extending horizontally, the pad resists horizontal movement relative to the bed sheet.

**[0006]** The interior portion preferably may further include a non-woven polypropylene layer below the liquid absorbing material so that the top layer, the liquid absorbing material and polypropylene layer are quilted together. The polypropylene layer may have a density of greater than 80 GSM, and preferably about 100 GSM.

**[0007]** The microfiber terry used in the bottom layer may be non-oiled microfiber terry.

**[0008]** The liquid-impermeable material may be made from polyurethane laminate (PUL), or thermoplastic polyurethane (TPU). The liquid-impermeable laminate may be TPU with a thickness of about 0.02 mm.

**[0009]** The microfiber bed sheet material of the top layer may have a density of between 80 and 120 grams per square meter (GSM), and preferably of about 100 GSM.

**[0010]** The liquid absorbing material may consist of between 70% and 90% polyester, polyamide, polypropylene, or polyester blended polyamide, and the remainder may comprise rayon filling. The liquid absorbing material may consist of 80% polyester, polyamide, polypropylene, or polyester

blended polyamide, and 20% rayon filling. The liquid absorbing material consists of 80% polyester.

**[0011]** The liquid absorbing material has a density of between 100 and 200 GSM, and preferably about 160 GSM.

**[0012]** The liquid absorbing material may consist of about 80% polyester, polyamide, polypropylene, or polyester blended polyamide, and about 20% nylon filling,

**[0013]** The microfiber terry may consist of between 70% and 90% polyester and the remainder may comprise nylon micro fiber yarn. The microfiber terry may comprise 80% polyester and 20% nylon micro fiber yarn with a density of between 100 and 240 GSM. The microfiber terry may comprise between 70% and 90% polyester and the remainder may comprise nylon micro fiber yarn with a density of between 180 and 220 GSM. The microfiber terry may comprise 80% polyester and 20% nylon micro fiber yarn with a density of 200 GSM.

**BRIEF DESCRIPTION OF THE DRAWINGS**

**[0014]** FIG. 1 shows a schematic top view of the bedding system in place on a bed.

**[0015]** FIG. 2 shows the bedding system in place on a bed.

**[0016]** FIG. 3 shows an exploded view of a pad.

**[0017]** FIG. 4 shows the bedding system in a bag.

**DETAILED DESCRIPTION OF THE INVENTION**

**[0018]** The bedding system includes a top sheet, a bottom (fitted) sheet, a pillow case, and preferably at least two Sneaky Squares (liquid absorbing pads, or “sheets”). The key element is the liquid absorbing pad **100**, which is placed on top of the bottom sheet **101** on a bed, as can be seen in FIGS. 1 and 2. The user of the bed lies on top of the liquid absorbing pad **100** and bottom sheet, the pad **100** being placed so that if the user wets the bed the liquid contacts the liquid absorbing pad **100** rather than the bottom sheet. The liquid absorbing pad **100** is configured to absorb the liquid, and also to prevent or minimize any transmission of the liquid through the liquid absorbing pad **100** to the bottom sheet. Thus, after an incident where liquid comes into contact with the pad **100** (e.g. a bed-wetting incident), the liquid absorbing pad **100** can be removed and, optionally, replaced by a second, clean, liquid absorbing pad **100** very quickly, without having to remove and replace the bottom sheet.

**[0019]** The liquid absorbing pad **100** is shown in an exploded view in FIG. 3. The liquid absorbing pad **100** has a top layer **301** made of microfiber bed sheet material, preferably microfiber peach (also called microfiber peach skin and polyester peach skin, a velvet fabric that feels like peach skin). The microfiber bed sheet material of the top layer may have a density of 100 grams per square meter (GSM).

**[0020]** Below the top layer is a liquid absorbing layer **302** made of a liquid absorbing material. The liquid absorbing material preferably consists of 80% polyester and 20% rayon filling with a density in the range of about 120 and 240 GSM, and preferably about 160 GSM. Laboratory testing was conducted on various padding materials with various densities and absorption ratings. Analyses of test results showed that materials consisting of 80% polyester and 20% rayon filling with a density of 160 GSM provide excellent absorbency, so that such material is preferred. The volume of material is selected so that it can absorb up to about 360 ml (or cc) of liquid. Rather than using a 20% rayon formulation, 20% nylon may alternatively be employed, but this is not preferred.

[0021] A third layer 303 may be employed which is composed of 100 GSM (or greater) 100% polypropylene non-woven material that can be bonded to the bottom layer using glue, since it is generally not feasible to bond the liquid absorbing layer to the bottom layer using glue. The first three layers are quilted together. The use of such a construction results in a pad that can be washed more than 50 times.

[0022] The bottom layer comprises a liquid-impermeable coating 304 laminated on microfiber terry 305, which is preferably non-oiled microfiber terry which reduces odor retention. The liquid-impermeable coating 304 is preferably made from PUL (Polyurethane Laminate), or TPU (thermoplastic polyurethane), and is preferably about 0.02 mm in thickness, although various thicknesses are possible.

[0023] When the pad 100 is laid on a bottom bed sheet (typically a fitted sheet) made from microfiber bed sheet material extending horizontally, the pad 100 resists horizontal movement relative to the bed sheet. That is, in normal use, the pad 100 tends to stay in the same position despite the fact that the person in the bed may move during use of the bed. This resistance can be observed by attempting to pull the pad 100 horizontally by gripping one or two points on one side of the pad 100. Moving the pad 100 horizontally requires substantially more force than would be required with a prior art pad.

[0024] The bottom microfiber terry layer preferably is made of 80% polyester and 20% nylon micro fiber yarn with a density of 200 GSM. The yarn may be 150DX288F. Polyamide, polypropylene, and polyester blended polyamide are also preferred materials.

[0025] In this system, the pad 100 is simply laid on top of the bottom sheet. Normally such an approach would not work effectively because the pad would move as the user moves in the bed, and would be likely to move sufficiently that the fitted sheet would get wet if the user wets the bed. The applicant has discovered a surprising property of microfiber terry relative to standard bed sheet material. When the pad 100 is placed on top of the sheet with the microfiber terry touching the micro fiber bed sheet material, the pad 100 resists horizontal movement relative to the bed sheet. The resistance is sufficiently strong that, under normal use, the bed user will not cause the pad 100 to move significantly during a typical sleep period.

[0026] The pad 100 is preferably sized to cover all portions of the fitted sheet that would otherwise potentially become wet because of a bed wetting incident. As can be seen in FIG. 2, the pad 100 preferably also covers a portion of the sides of the bed to prevent the associated portions of the fitted sheet from becoming wet. Generally, the pad 100 is sized so that it hangs about six inches over each side of the bed. This overhang further enhances the movement resistance property of the pad 100, which increases as the amount of microfiber terry touching the micro fiber bed sheet material increases.

[0027] Microfiber is a fiber with less than 1 decitex per filament. Decitex is a measure of linear density and is commonly used to describe the size of a fiber or filament. Ten thousand meters of a 1-decitex fiber weighs one gram. While many microfibers are made of polyester, they can also be composed of polyamide or other polymers polypropylene, Polyester blended polyamide quality may be preferred since the hand feeling of 100% polyester may not be of sufficiently high quality.

[0028] The bedding system may also include a bag, as shown in FIG. 4, that can hold the other components. The system can be sold with the components in the bag, and the user may subsequently use the bag to store the components.

Preferably, the bag is made from 100 GSM printed micro fiber laminated with TPU. This makes the bag particularly suitable for storing a wet pad after it is removed from the bed. This further facilitates quickly replacing a soiled pad with a clean one as the user can leave the soiled pad in the bag until at least the next morning so that washing of the pad is deferred and the time spent by the user during the sleep period to deal with a bed wetting incident is minimized.

[0029] Other approaches have been found to be inferior to the use of microfiber Terry, such as using velcro™ at the sides of the protection sheet. Since velcro™ generally has soft and rough pairs (hook and loop), it unclear how to determine an optimal arrangement to attach the velcro™ to the protection sheet and the bed sheet. In an embodiment that is not preferred, a rough (hook) piece of velcro™ was attached to the protection sheet and a soft (loop) part to the bed sheet. Samples were prepared and washed for 3 cycles. It was determined that the hooks would collect peels and lint in the course of washing, which reduced the effectiveness of the velcro™ in long term. Attaching the soft part of velcro™ to the protection sheet was tried and showed improved results, however openly exposed hooks sewn to the bed sheet were considered to risk irritation of the user's skin. The possibility of introducing two flip over flaps to the sides of the bed sheet to cover the hooks was also considered. Evaluation of prototype samples determined the flaps are in the way and sometimes inaccessible when laying down the protection sheet, especially during the night when lights are off and one side of the bed is next to the wall. Research was conducted to identify alternative and applicable solutions such as using grommets, snaps, buttons, magnets, and zippers avoiding any health and safety hazard. The use of magnets was also assessed. However protection sheets with embedded magnets may be unacceptable when the product is used by people having embedded pacemakers.

[0030] Testing of sample protection sheets with standard microfiber Terry backing have shown that an undesired smell may result after about 10 washing cycles. This was determined to be because the oil content in the microfiber terry retains an odor even after washing. It was found that replacing the microfiber Terry with an oil-free Terry fabric resolved this issue.

[0031] While specific materials have been described, it would be apparent to skilled persons that variants of the stated compositions would function substantially the same way, although the movement-resistance of the pad relative to the fitted sheet may vary somewhat.

[0032] The words "comprises" and "comprising", when used in this specification and the claims, are to be used to specify the presence of stated features, elements, integers, steps or components, and do not preclude, nor imply the necessity for, the presence or addition of one or more other features, elements, integers, steps, components or groups thereof.

[0033] The scope of the claims that follow is not limited by the embodiments set forth in the description. The claims should be given the broadest purposive construction consistent with the description as a whole.

What is claimed is:

1. A liquid absorbing pad comprising a top layer and a bottom layer and an interior portion therebetween:
  - the interior portion comprising a liquid absorbing material;
  - the top layer comprising microfiber bed sheet material;
  - the bottom layer comprising microfiber terry, the top of which is laminated with liquid-impermeable material,

wherein the top layer and interior portion are quilted together and glued to the bottom layer,

and wherein, when the pad is laid on a bed sheet made of microfiber bed sheet material extending horizontally, the pad resists horizontal movement relative to the bed sheet.

2. The pad of claim 1, wherein the interior portion further comprises a polypropylene layer below the liquid absorbing material so that the top layer, the liquid absorbing material and polypropylene layer are quilted together.

3. The pad of claim 2, wherein the polypropylene layer has a density of 100 grams per square meter (GSM).

4. The pad of claim 2, wherein the polypropylene layer has a density of greater than 80 GSM.

5. The pad of claim 2, wherein the bottom layer comprises non-oiled microfiber terry.

6. The pad of claim 2, wherein the liquid-impermeable material comprises polyurethane laminate (PUL), or thermoplastic polyurethane (TPU).

7. The pad of claim 6, wherein the liquid-impermeable material comprises TPU with a thickness of about 0.02 mm.

8. The pad of claim 2, wherein the microfiber bed sheet material of the top layer has a density of between 80 and 120 GSM.

9. The pad of claim 8, wherein the microfiber bed sheet material of the top layer has a density of about 100 GSM.

10. The pad of claim 2, wherein the liquid absorbing material consists of between 70% and 90% polyester, polyamide,

polypropylene, or polyester blended polyamide, and the remainder comprises rayon filling.

11. The pad of claim 10, wherein the liquid absorbing material consists of about 80% polyester, polyamide, polypropylene, or polyester blended polyamide, and about 20% rayon filling.

12. The pad of claim 11, wherein the liquid absorbing material consists of about 80% polyester.

13. The pad of claim 12, wherein the liquid absorbing material has a density of between 100 and 200 GSM.

14. The pad of claim 13, wherein the liquid absorbing material has a density of about 160 GSM.

15. The pad of claim 1, wherein the liquid absorbing material consists of about 80% polyester, polyamide, polypropylene, or polyester blended polyamide, and about 20% nylon filling.

16. The pad of claim 2, wherein the microfiber terry consists of between 70% and 90% polyester and the remainder comprises nylon micro fiber yarn.

17. The pad of claim 16, wherein the microfiber terry comprises about 80% polyester and about 20% nylon micro fiber yarn with a density of between 100 and 240 GSM.

18. The pad of claim 16, wherein the microfiber terry comprises between 70% and 90% polyester and the remainder comprises nylon micro fiber yarn with a density of between 180 and 220 GSM.

19. The pad of claim 18, wherein the microfiber terry comprises about 80% polyester and about 20% nylon micro fiber yarn with a density of about 200 GSM.

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