

Film-Film-Plastic Touch Panel

FID-533 Series

A film-film-plastic (FFP) touch panel is lightweight, has excellent impact resistance, and can be designed in any shape. The impact resistance is dramatically improved and higher reliability is realized in durability and environmental-resistance features by removing glass from structural components.

Overview

Touch panels are used in a wide range of applications as simple and reliable means to input directly to display screen. Especially, 4-wire^{*1} resistive touch panels are most widely adopted because of their simple structure and low product cost. They are now utilized in various mobile devices such as digital video cameras, cellular phones, portable data terminals (PDTs) and portable game machines. It is expected that their application will further diversify and lead to an expansion in the market scale.

As various use environments are considered especially for PDTs and portable game machines, strict demands exist in regard to writing endurance and environmental resistance as well as impact resistance. For example, PDTs have been introduced in various industries in recent years and suitable performance is required in usage patterns for product control in the freezer and transport industries over different areas. Because of a variety of users, better durability than conventional levels is essential since they may operate with a bigger input load or other writing method such as a ballpoint pen. Furthermore, in addition to safety, to keep original functions is required in portable game machines even if it is handled roughly or throw or strike them as they are likely to be used by children.

Conventional film-glass touch panels cannot support these strict market demands; as such, touch panels with all-plastic structures are coming to be needed. Film-film-plastic touch panels (FFP touch panels) can be realized by just affixing a film-film touch panel onto a plastic plate—it's possible to realize this technology with comparatively low cost. In this way, Fujitsu Component Limited has commercialized the FFP touch panel so as to satisfy market demands.

Photo 1 External View

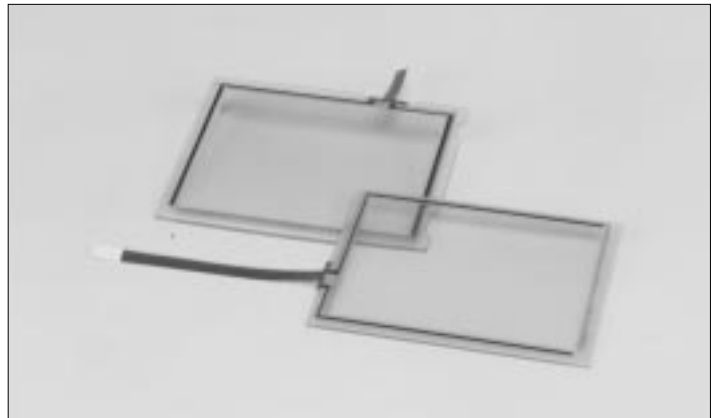


Photo 2 Application Example



Photo courtesy of Intermec Technologies Corporation

Product Features

The FFP touch panel mainly offers the following features:

■ Light weight

The product weight has been reduced 30% to 40% from conventional film-glass touch panels because the specific gravity of plastic is approximately half that of glass.

■ Excellent impact resistance

Plastic plate's material is polycarbonate which has high impact resistance. Because of it, the FFP touch panel can avoid to be broken up or cracked by impact or stress and also stay away from the shattered glass chips.

■ Constituent materials to achieve writing endurance

To respond to the market requirement which pen input is well used, Fujitsu Component Limited selected the film material which is suitable to achieve high writing durability and achieved an optimal combination of top film and bottom film.

Furthermore, it is now possible to achieve operation loads that are larger than those of conventional products by developing a series of hard-tapped specifications in which a cover film is affixed atop the top film to respond to the strict durability

requirements for high writing pressure or pen knocking.

■ High environmental resistance

PDTs are used in various industries and their use environments are wide from extremely low-temperature to high-temperature, high-humidity regions. To respond to such a wide range of operating temperature, we selected appropriate constituent materials and established a suitable bonding technology. Consequently, a wide temperature range of -30°C to $+60^{\circ}\text{C}$ has been achieved.

■ Flexible shapes and designing freedom

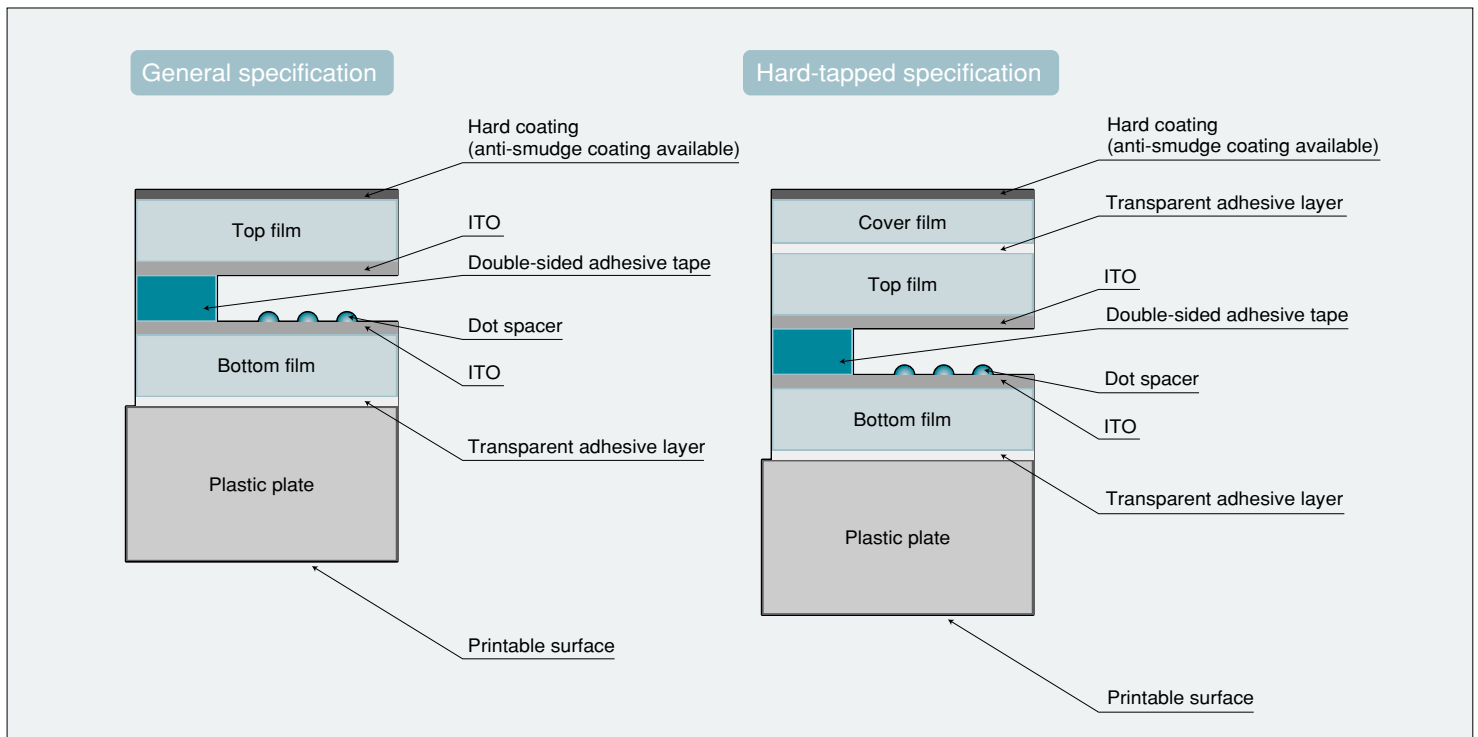
The adoption of plastic materials with good workability allows the flexible external shape design. As direct printing to plastic plate is also possible, touch panels with icon sheets or numeric key indications can easily be realized. That enables to design touch panel to be suitable for the customer application.

■ Light operability

Optimization of the dot spacer allows light operation with a pen or finger. In addition, the high hardness of the operation surface (a pencil hardness of 3H) prevents flaws and provides an anti-smudge coating that prevents fingerprint staining.

Fig.1 shows the cross-section structure of a FFP touch panel.

Figure 1 Cross-section Structure of FFP Touch Panel



Application

FFP touch panel is suitable for the described applications below due to its features:

- PDAs
- Mobile PCs
- Portable data terminals
- Portable game machines
- Digital cameras and video cameras

Specifications

Table 1 presents the main specifications of the newly developed FFP touch panel. Fujitsu Component Limited also provides a control board, a control IC, and a device driver for each interface.

Future Development

Fujitsu Component Limited will continue to promote further product development to respond to the customer needs which are going to diversify more. We will aim to improve the visibility, durability and environmental resistance of plastic touch panels.

To achieve these aims, we plan to explore the adoption of a flexible organic conductive polymer material for the transparent conductive film (ITO is currently the conventional material) to attempt to extend the FFP touch panel lifetime. On the other hand, we will enhance the development of the FP touch panel (film-plastic structure touch panel) using a plastic plate on which the transparent conductive film is directly mounted and put it on our product lineup to make it possible to meet the toughest environmental requirements such as automotive specifications. *

NOTES

*1: 4-wire touch panel:

A structure in which a pair of electrodes is established on both of the opposing transparent conductive films; there are 4 lead wires from the touch panel. Since it has the simplest structure and a narrow frame in various types of touch panels, it is possible to meet various sizes from small to large and signal processing is easy. However, there is a disadvantage in the durability of the transparent conductive film (ITO) of the top film and therefore it has some limitations in regard to writing and input lifetime.

* Other company names and brand names are the trademarks or registered trademarks of their respective owners.

Table 1 Main Specifications of FFP Touch Panel

Item	General specification	Hard-tapped specification
Applicable size	2in. to 7in.	2in. to 7in.
Thickness	1.0mm to 3.5mm	1.7mm to 3.7mm
Minimum frame	2.3mm	2.3mm
Surface treatment	Anti-glare (anti-smudge available) or clear	Anti-glare (anti-smudge available)
Surface hardness (pencil hardness)	3H or higher	3H or higher
Transparency	78% to 86%	75% to 85%
Haze value	2% to 10%	5% to 10%
Anti-Newton processing	Provided	Provided
Input load	0.05N to 1.0N	0.1N to 1.5N
Linearity	3% or less	3% or less
Writing lifetime (R0.8, POM pen)	2.45N, 100,000 characters or more	4.5N, 100,000 characters or more
Input lifetime (R8, silicon rubber)	2.45N, 1 million times or more	4.5N, 1 million times or more
Environmental properties	Operation temperature	-30°C to +60°C
	Storage temperature	-30°C to +70°C
	Operation humidity	20% to 90%
	Storage humidity	10% to 90%