New Products

Resin-Coated Metal Strips "FCOAT"

1. INTRODUCTION

As portable equipment acquires higher functionality and a more compact configuration, there has been a growing need for slim-line mounted components, so that with the conventional metal case, it is difficult to maintain electrical insulation between the elements inside. This creates a need for materials that provide both magnetic shielding (metal) and electrical insulation (resin), and demand for them is increasing.

FCOAT is a sheet-shaped product with a metal substrate coated with resin (Figure 1 and Figure 2). It was developed to meet the needs described above, uses an integrated manufacturing process from copper alloy, and has been mass-marketed for power amp modules, camera modules and similar applications (Figure 3 and Figure 4). Currently examples of usage are expanding rapidly, with emphasis on components inside mobile phones, and we intend to extend product specifications, including plating specifications, in response to these various needs.

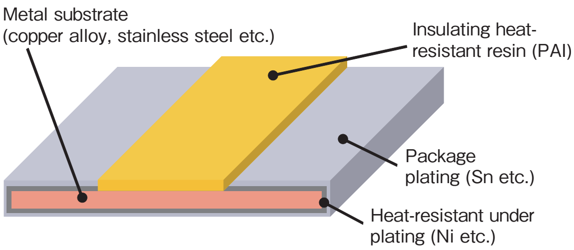

Figure 1 Cross-sectional structure of FCOAT.

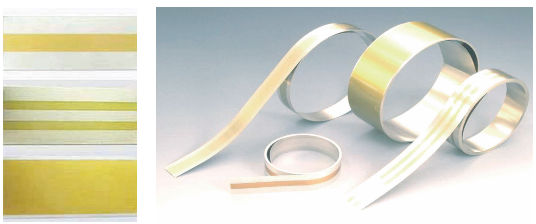

Figure 2 Appearance of FCOAT products

2. FEATURES

(1) Magnetic shielding: Use of metal substrates of copper alloy or stainless steel makes it optimal in shielded cases for high-frequency components.
(2) Stiffness and heat dissipation: Use of metal substrates of copper alloy or stainless steel makes possible much slimmer (low back) cases than with plastic, and heat dissipation is outstanding.
(3) High insulating performance and heat resistance: Coated with polyamide-imide resin having high electrical insulating performance. Polyamide-imide resin offers resistance to higher temperatures, and maintains high resistance reliability even in high-temperature environments or for reflow mounting.
(4) High-accuracy stripe coating: Multiple resin stripes can be formed with high accuracy, and resin can be molded to conform to component configuration.
(5) Easy workability: Use of resin with outstanding stretch and adhesion properties makes possible

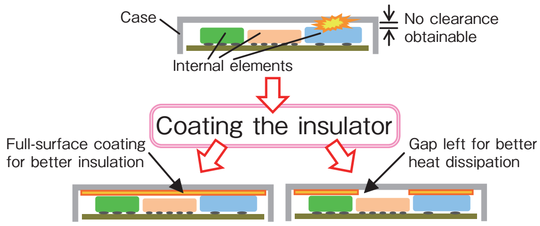

Figure 3 Schematic of FCOAT applications.

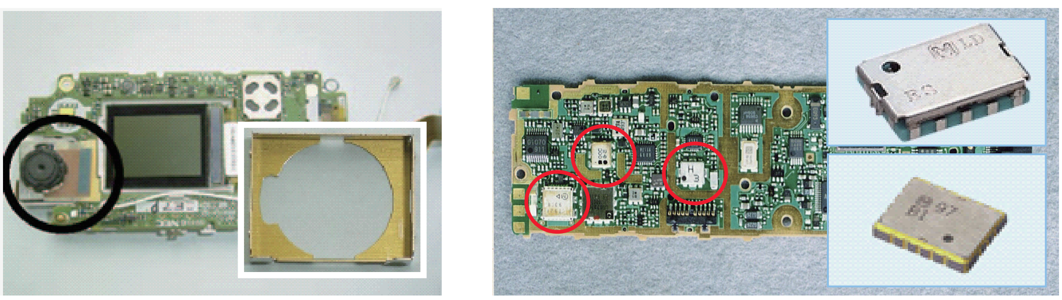

Figure 4 Applications of FCOAT for mobile phones.

stamping of blanks with minute dimensions, as well as bending, and other press forming operations.

(6) High-temperature mounting properties: Plating finishes with Ni/Sn layers are provided to cater to applications involving solder mounting, and external-mount plating with outstanding solder wetting properties is also possible. And with a view to accommodating even higher solder wetting properties and contact point applications, we are in the process of developing plating finishes with Ni/Au layers.

(7) Low cost: Reduces process steps and lowers costs compared to processes involving insertion or application of polyimide film.

(8) Quick delivery: It is possible to shorten prototype and mass-production delivery lead times when resin dimensional specifications are changed.

3. PRODUCT SPECIFICATIONS

Table 1 shows representative FCOAT specifications. The resin coating can be applied in high-accuracy stripes at the desired position and in the desired number. The scope of manufacture is scheduled to be expanded, and further inquiries regarding non-standard specifications are encouraged.

4. PROPERTIES

Table 2 shows representative properties of FCOAT materials. Even when subjected to rigorous reliability testing, FCOAT products maintained excellent resin properties and workability, and high dielectric properties.

Figure 5 shows the dependence of dielectric breakdown voltage on polyamide-imide resin film thickness. The resin has high voltage resistance and can also be used in connectors and similar applications. In applications requiring particularly stringent voltage resistance properties, multi-layer coatings and full-length voltage-resistance inspection can also be provided, and further inquiries are encouraged.

Table 1 Representative FCOAT Specifications.

Item		Manufacturable scope
Strip	Material	Phosphor bronze, nickel silver, SUS, etc.
	Thickness	0.1~0.35 mm
	Width	6~50 mm
Resin	Type of coating	Partial- or full-surface, One- or two-side
	Material	Polyamide-imide
	Thickness	3~20 μm
	Thickness accuracy	≦±3 μm from center
	Stripe dimensions	2~48 mm
	No. of stripes	Multiple possible
	Stripe position	Anywhere except edge
	Positional accuracy	± 0.1~0.15 mm
Plating	Material	Ni, Sn etc.
	Primer layer thickness	~2 μm
	Finished thickness	~10 μm

5. APPLICATIONS

In addition to the low-back type of high-frequency modular components, connector cases, and narrow-pitch connector cases, FCOAT is expected to be applicable in a variety of electronic equipment applications. It is extremely well suited in replacing or reducing the cost of the heretofore expensive process steps of film insertion or application, and to shortening delivery times when design changes occur.

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Table 2 Representative properties of FCOAT materials.

Nature of test	Item evaluated	Result of evaluation
Composition of material tested	Resin type/thickness (μm)	PAI/7
	Plating thickness (μm)	1 (Ni)/2 (Sn)
	Substrate	8 % phosphor bronze
Product as is (neglecting accelerated aging treatment)	Insulation resistance (Ω)	$\geqq 7.45\times10^{12}$
	Solder wettability (wet area evaluation)	○
	Resin coating hardening (pencil hardness)	9 H
	Resin adhesion (press evaluation)	○
	Plating adhesion (crosscut test)	○
	Plating heat-resistance discoloration (150°C×2 h, 220°C×20 min)	○
PCT (121°C, 100 %RH, 2 atm, 96 h)	Insulation resistance (Ω)	$\geqq 6.42\times10^{11}$
	Resin adhesion (press evaluation)	○
Heat cycling (-55°C, 30 min ⇔125°C, 30 min, 200 cycles)	Insulation resistance (Ω)	$\geqq 4.40\times10^{12}$
	Resin adhesion (press evaluation)	○
Low-temperature exposure (-40°C, 1000 h)	Insulation resistance (Ω)	$\geqq 1.00\times10^{12}$
	Resin adhesion (press evaluation)	○
High-temperature exposure (85°C, 1000 h)	Insulation resistance (Ω)	$\geqq 1.27\times10^{14}$
	Resin adhesion (press evaluation)	○
Humidity resistance (85°C, 85 % RH, 1000 h)	Insulation resistance (Ω)	$\geqq 1.62\times10^{14}$
	Resin adhesion (press evaluation)	○
Reflow resistance (270°C, 5 min×5)	Insulation resistance (Ω)	$\geqq 1.13\times10^{10}$
	Resin adhesion (press evaluation)	○

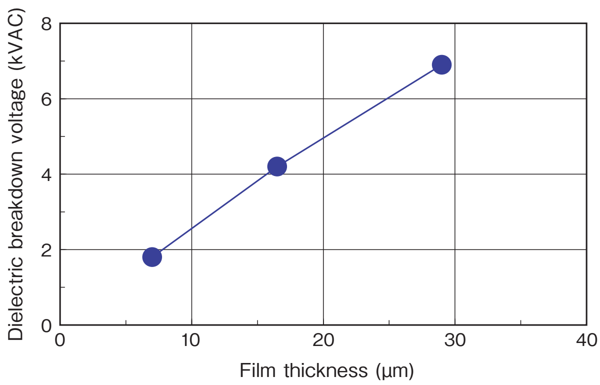

Figure 5 Dependence of dielectric breakdown voltage on polyamide-imide resin film thickness.