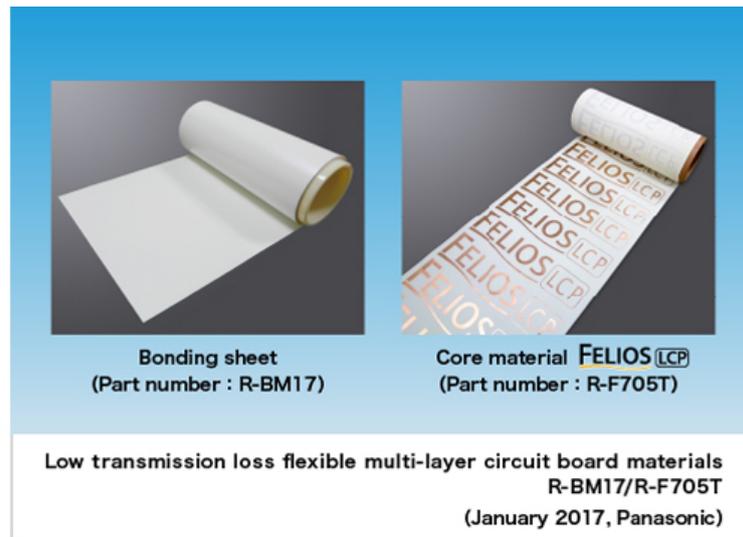


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Panasonic Commercializes Low Transmission Loss Flexible Multi-layer Circuit Board Materials



Panasonic's "low transmission loss flexible multi-layer circuit board materials" is designed for high-speed large-volume data transmission and is used in thinner mobile devices.

Osaka, Japan - Panasonic Corporation announced today that it has commercialized its Low [Transmission Loss\[1\]](#) Flexible Multi-layer Circuit Board Materials, suitable for high-speed large-volume data transmission and thinner designs of mobile devices, including smartphones and tablet computers. The company will launch its mass production in January 2017. The combination of a liquid-crystal polymer (LCP) [core material\[2\]](#) and a bonding sheet material that can be laminated at a low temperature and stored at room temperature will considerably ease the manufacture of high-frequency flexible multi-layer circuit boards.

Existing [coaxial cables\[3\]](#) used for large-volume transmission are thick, so they present an obstacle to making mobile devices thinner. Low transmission loss flexible multi-layer circuit boards are of increasing potential as a solution that achieves both large-volume data transmission and a thin design, but they face many restrictions in how they should be handled, due to the characteristics of the materials they incorporate, so they require special facilities for manufacturing. Using its unique resin design technologies, Panasonic has developed a bonding sheet that can be laminated at a low temperature of less than 200 °C and stored at room temperature. This eliminates the need for special facilities for high-temperature lamination and refrigerated storage for bonding sheets. The company has also achieved high adhesiveness of LCP and low profile copper foil for the LCP core material by using its unique laminating techniques. Although existing flexible core materials using polyimide and so on are usable for only low-speed transmission, the new material, due to its low transmission loss property can also be used for high-speed transmission of large-volume data.

Panasonic's new flexible multi-layer circuit board materials have the following features:

1. Low transmission loss and compatibility with USB 3.1 Gen 2 (10 Gbps) enable the transmission of large-volume data at higher speeds
Transmission loss: -2 dB/100 mm @ 6 GHz*1.
Core material: Dielectric constant: 2.9 @ 10 GHz, dissipation factor: 0.002 @ 10 GHz
Bonding sheet: Dielectric constant: 2.2 @ 10 GHz, dissipation factor: 0.001 @ 10 GHz
2. Flexible multi-layer circuit board adopts a 3-layer structure with multiple of signal lines at a thickness of 0.2 mm, allowing further thinning of mobile devices.
Total board thickness: 0.2 mm or less*1
3. Circuit board material that can be laminated at a low temperature and stored at room temperature makes manufacturing of flexible multi-layer circuit boards easier.
Lamination temperature: 180 - 200°C, existing bonding sheet*2: 300°C
Room-temperature storage: 23 (±5) °C, existing bonding sheet*3: refrigerated storage: 5°C or below

Notes:

*1: Using a flexible multi-layer circuit board in a 3-layer structure. LCP core material (0.1 mm), bonding sheet (0.05 mm), LCP core material (0.05 mm)

*2: Panasonic's conventional LCP bonding sheet

*3: Ordinary low-dielectric constant bonding sheet

Suitable applications:

Circuit boards for high-frequency antenna modules, high-speed cables, etc.

[Panasonic Technology]

1. Low transmission loss and compatibility with USB 3.1 Gen 2 (10 Gbps) contribute to transmission of large-volume data at higher speeds

There is a growing need for faster transmission of signals due to the increasing volume of data demanded by the ever-higher resolutions of mobile device cameras and display screens. As a result, low transmission loss flexible multi-layer circuit boards that enable large-volume, high-speed transmission are of increasing interest as a replacement for currently-used coaxial cables; and low transmission loss, meaning that only a small amount of the signal is lost during transmission, is desired for the circuit board material. Panasonic has commercialized a low transmission loss core material and bonding sheet by applying its unique resin design technologies. It supports standards including USB 3.1 Gen 2 (10 Gbps) and will enable increased speed of large-volume data transmission in mobile devices.

2. Flexible multi-layer circuit board comprising a 3-layer, 0.2 mm-thick structure with multiple signal lines contributes to thinner mobile device designs

A coaxial cable is composed of one signal line in a cable and is capable of large-volume data transmission, but its downside is its thickness. A low transmission loss flexible multi-layer circuit board has several signal lines within it, so large-volume data transmission and a thinner design can be achieved simultaneously. Adopting this material allows flexible multi-layer circuit boards, in a 0.2 mm-thick, 3-layer structure that can carry several signal lines, to replace coaxial cables.

3. Circuit board material that can be laminated at a low temperature and stored at room temperature facilitates the manufacture of flexible multi-layer circuit boards

Previous bonding sheet, which forms the low transmission loss flexible multi-layer circuit boards with core material, had to be laminated at a high temperature or stored refrigerated. It was also difficult to handle, due to its material characteristics, and required special facilities that placed a burden on manufacturers. Using its unique resin design technologies, Panasonic has developed a bonding sheet that can be laminated at a low temperature of 200 °C or less, and stored at room

temperature, making it far easier to handle the material during production. By providing this sheet and the low-transmission loss core material, the company will considerably facilitate the production of flexible multi-layer circuit boards.

[Basic specifications]

Product no.: Core material (FELIOS LCP): R-F705T, bonding sheet: R-BM17

項目 Item		試験方法 Test method	条件 Test condition	単位 Unit	R-F705T+ R-BM17
はんだ耐熱性 Solder heat resistance	LCPとボンディングシート間 Between LCP and BS	60秒フロート限界温度 60sec. float limited temperature	A	℃	270 Pass
			C96/40/90		260 Pass
	銅箔とボンディングシート間 Between copper and BS		A		270 Pass
			C96/40/90		260 Pass
比誘電率 Dielectric constant(Dk)	10GHz	空洞共振法 cavity resonator	A	-	2.85
誘電正接 Dissipation factor (Df)			C96/40/90		2.84
			A		0.0021
C96/40/90			0.0021		
銅箔引きはがし強さ Peel strength	LCPとボンディングシート間 Between LCP and BS	IPCTM650	90°	N/mm	1.08
	銅箔とボンディングシート間 Between copper and BS	IPCTM650			0.73
耐折性MIT試験 MIT folding endurance test		JIS C6471	R 0.38/135°/ 175cpm/500gf	Number	55
はぜ折り性 Weight load flexibility	外側回路 Circuit outside	社内法 Internal method	A	Number	19
	内側回路 Circuit inside	社内法 Internal method			11
耐燃性 Flammability	LCPとの組合せ Combination with LCP	社内法(ULと同等) Internal method (Equivalent to UL)	A	-	94VTM-0

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The above data is actual values and not guaranteed values.

[Term Descriptions]

[1] Transmission loss

Transmission loss is a phenomenon in which electrical signals travelling in a circuit tend to be converted into heat and fade due to the distance of travel or electrical resistance of the circuit itself. The degree of loss varies according to the properties of the conductor (circuit) and insulation (circuit board material) in contact with the circuit.

[2] Core material

Core material is the material on both side of which circuits are usually made first when building a multi-layer circuit board. A multi-layer circuit board then goes through a multi-layer laminating process using a bonding sheet.

[3] Coaxial cable

Coaxial cable is a type of covered electric wire used for high-frequency data transmission, particularly in wireless transmission devices, broadcasting equipment, networks and other devices.

About Panasonic

Panasonic Corporation is a worldwide leader in the development of diverse electronics technologies and solutions for customers in the consumer electronics, housing, automotive, enterprise solutions and device industries. Since its founding in 1918, the company has expanded globally and now operates 474 subsidiaries and 94 associated companies worldwide, recording consolidated net sales of 7.553 trillion yen for the year ended March 31, 2016. Committed to pursuing new value through innovation across divisional lines, the company uses its technologies to create a better life and a better world for its customers. To learn more about Panasonic:

<http://www.panasonic.com/global>.

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