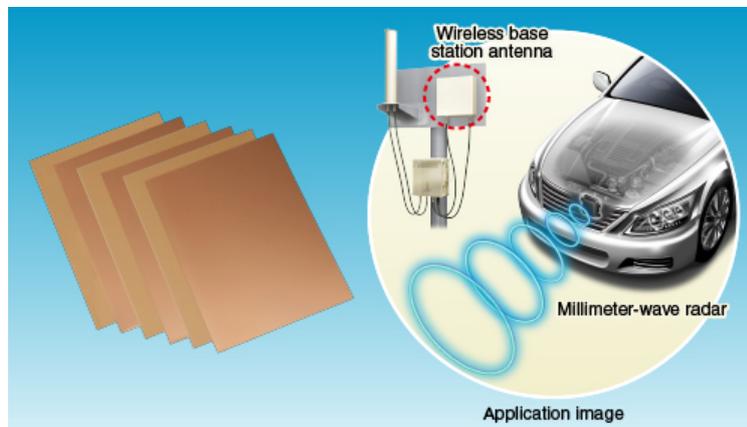


Jan 11, 2018

## Panasonic Develops "Halogen-free Ultra-low Transmission Loss Circuit Board Material" for Millimeter-wave Band Antennas

The material is suitable for Millimeter-wave Band Antenna circuit boards for radar and wireless communication. This material provides excellent processability and reduces processing cost in the antenna circuit board manufacturing



Halogen-free ultra-low transmission loss circuit board materials  
**R-5515**  
 (January 2018, Panasonic)

**Osaka, Japan** - Panasonic Corporation has developed "Halogen-free Ultra-low Transmission Loss Circuit Board Material (Product No. R-5515)". This material is suitable for millimeter-wave band [1] antenna circuit boards and will start mass production in April 2019. It achieves the industry's lowest<sup>(1)</sup> transmission loss [2] in the millimeter-wave band signal with thermosetting resins. As the result, it achieves higher transmission efficiency and lower losses of antenna signal, and also reduces the processing costs.

Sensing technologies are advanced rapidly that realize advanced driver-assistance systems (ADAS) and autonomous driving by millimeter-wave radar [3] and communication. Antenna circuit boards that transmit/receive millimeter waves require low transmission losses. Currently, fluoro resin circuit board materials [4] are mainly used as antenna circuit board materials. However, the resin is expensive and their processing during board manufacture is difficult due to the resin properties. Panasonic's proprietary resin design technology and its low-profile copper foil bonding technology has enabled the development of a "Halogen-free Ultra-low Transmission Loss Circuit Board Material," which achieves both low signal transmission losses and excellent processability.

Panasonic's new "Circuit Board Materials" have the following features:

1. Its low transmission loss improves efficiency and reduces the losses of millimeter-wave band signal of antenna.  
 Transmission loss: 0.079 dB/mm (@79 GHz)  
 Panasonic's conventional product<sup>(2)</sup>: 0.081 dB/mm, general-purpose fluoro resin circuit board material<sup>(3)</sup>: 0.096 dB/mm (actual values measured by Panasonic<sup>(4)</sup>)
2. Its excellent processability during circuit board manufacturing reduces processing costs.

3. It enables collective pressing with conventional glass epoxy circuit board materials for multi-layered module circuit boards with integrated antenna.

## Notes:

\*1: Lowest transmission loss as a thermosetting resin material used in the millimeter-wave band as of Jan. 11, 2018 (Panasonic data)

\*2: Panasonic's conventional product (ultra-low transmission loss multi-layer circuit board materials, "MEGTRON7" R-5785)

\*3: General-purpose material used as an antenna circuit board material

\*4: Measured at a microstrip line construction.

## Suitable applications

Millimeter-wave band antenna circuit boards (e.g., antenna circuit boards for automotive millimeter-wave radar and wireless communication base stations), high-speed transmission circuit boards, etc.

## Remarks

This material will be exhibited at the 19th Printed Wiring Boards EXPO from January 17 to 19, 2018 at Tokyo Big Sight.

## Product features

### 1. Its low transmission loss improves efficiency and reduces the losses of millimeter-wave band signal of antenna.

The market demands circuit board materials with high versatility to replace the current mainstream fluororesin circuit board materials from the viewpoint of processability and the cost of antenna circuit boards. Panasonic's proprietary resin design technology and low-profile copper foil bonding technology has enabled the development of a circuit board material that achieves the lowest transmission loss for a thermosetting resin. Its low transmission loss property, which is equivalent to or lower than that of fluororesin circuit board materials, achieves higher efficiency and lower losses of millimeter-wave band antenna.

### 2. Its excellent processability during circuit board manufacturing reduces processing costs.

Fluororesin circuit board materials are difficult to process by drilling and plating during manufacturing due to resin properties and also incur high costs because they require special manufacturing equipment. Since this is a thermosetting resin material, processing is easy using existing equipment for general-purpose circuit boards. This enables fluororesin circuit board materials to be replaced, reducing the processing costs of circuit boards.

### 3. It enables collective pressing with general-purpose glass epoxy circuit board materials and achieves multi-layered module circuit board with integrated antenna.

The demand for multi-layered module circuit board with integrated antenna is rising due to compact-sizing and the cost reduction of millimeter-wave band modules. Because fluororesin circuit board materials are thermoplastic, it is difficult to collectively press them with glass epoxy circuit board materials (which are thermosetting resins) for multi layers. Since this is a thermosetting resin material, collective pressing is easy with glass epoxy circuit board materials to achieve multi layers and cost reductions for multi-layered module circuit board with integrated antenna.

## Term descriptions

[1] Millimeter-wave band: refers to a frequency range of 30-300 GHz.

[2] Transmission loss

Decrease the intensity of the signal depended on the transmission length or material and the unit is dB.

Extent to which signals that pass through wires on print circuit boards (transmission lines) attenuate in accordance with the material, distance, etc. Expressed in decibels (dB).

[3] Millimeter-wave radar

Sensor that detects the position/speed of an object by transmitting millimeter-wave band radio waves and receiving reflected waves from the object. Automotive millimeter-wave radar, which is mainly allocated at 76-81 GHz, is now more commonly mounted on vehicles as one of sensors that constitute advanced driver-assistance systems (ADAS), whose typical example is a collision prevention system.

[4] Fluororesin circuit board materials

Print circuit board materials whose insulators are made from a fluororesin (also referred to as polytetrafluoroethylene, PTFE, or fluorocarbon resin). Fluororesin show smaller dielectric constants and dissipation factors in the millimeter-wave band than epoxy resins used as general print circuit board materials.

### 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, and B2B businesses. Celebrating its 100<sup>th</sup> anniversary in 2018, the company has expanded globally and now operates 495 subsidiaries and 91 associated companies worldwide, recording consolidated net sales of 7.343 trillion yen for the year ended March 31, 2017.

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:

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