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Panasonic Commercializes High Heat Resistance Halogen-free Multi-layer Circuit Board Material for Automotive Use

Panasonic's "High Heat Resistance Halogen-free Multi-layer Circuit Board Material" will contribute to improving reliability of automotive ECU circuit boards, even when they are directly mounted on engines.

Osaka, Japan - Panasonic Corporation announced today that it has commercialized its High Heat Resistance Halogen-free Multi-layer Circuit Board Material [Product No. R-1566(S)] for automotive electronic control unit (ECU) circuit boards. The company will start mass production in April 2017. The product's high heat resistance and excellent tracking resistance[1] will improve the reliability of ECU circuit boards in high-temperature environments.

The number of ECUs mounted per vehicle has been on the rise with advances in the electrification of automobiles. ECUs are often mounted in engine compartments to preserve passenger compartment space, and therefore require resistance to high temperatures. The heat generated by high-performance ECU components themselves also needs to be addressed. Furthermore, circuit board materials need to be increasingly resistant to high temperatures to cope with the larger currents and higher voltages carried by HEV and EV ECU circuits. In the past, improving heat and tracking resistances usually resulted in lower processability of circuit boards due to materials properties. To resolve this issue, Panasonic has commercialized its High Heat Resistance Halogen-free Multi-layer Circuit Board Material, which features high heat and tracking resistances as well as excellent circuit board processability by adopting its unique resin design and compounding technologies based on the quality developed for automotive products.

Panasonic's new multi-layer circuit board material has the following features:

1. Improving the reliability of ECU circuit boards in high-temperature environments by achieving high heat resistance
   The glass transition temperature (Tg)[2]: 175˚C (DSC*1)
   Panasonic's conventional material*2: 148˚C
2. Excellent tracking resistance; compatible with large currents and high voltages
   Achieved tracking resistance: CTI ≥ 600 V
   Panasonic's conventional material*2: 600 V > CTI ≥ 400 V
3. Achieving excellent processability while also improving high heat and tracking resistances

Notes:

*1: Differential scanning calorimetry (DSC) based on a circuit board test method (IPC TM650)
*2: Panasonic halogen-free multilayer circuit board material (Product No. R-1566)

Suitable applications:

Automotive ECUs, automotive modules, HEV/EV power control unit, DC/AC converter substrates

[Panasonic Technology]

1. Improving the reliability of ECU circuit boards in high-temperature environments by achieving high heat resistance

ECUs mounted in engine compartments, plus the heat generated by high-performance ECU components themselves, have created new requirements for high heat resistance. In some cases, these requirements cannot be met by conventional ECU circuit board materials that have glass transition temperatures of approximately 140 to 150˚C. By adopting its unique resin design and compounding technologies, Panasonic has achieved a glass transition temperature of 175˚C. This improves the reliability of ECU circuit boards in high-temperature environments and also meets new requirements for high heat resistance such as when these circuit boards are directly mounted on engines.

2. Excellent tracking resistance; compatible with large currents and high voltages

Increases in HEVs and EVs have raised concerns that large currents and high voltages flowing through ECU circuits may increase the risk of tracking, which lead short-circuit and cause failures. There is a growing market demand for circuit boards with high tracking resistance that eliminates short circuits even under high current and voltage conditions. The new product has achieved a CTI (Comparative Tracking Index) of 600 V or higher based on Panasonic's unique resin design and compounding technologies, giving it high insulation resistance to large currents and high voltages, and thus improving the insulation reliability of ECU circuitry.

3. Achieving excellent processability while also providing enhanced heat and tracking resistance

Improved heat and tracking resistances tend to result in hardened circuit board materials, leading to lower drill processability. The new material has achieved excellent processability while also improving high heat and tracking resistances by adopting Panasonic's unique resin compounding technologies. This will contribute to reducing processing costs by extending the service life of drill bits.

[Basic Specifications]

<product no. > Laminate: R-1566(S), Prepreg: R-1551(S)

項目 Item		試験方法 Test method	条件 Test condition	単位 Unit	R-1566(S)
ガラス転移温度 (Tg) Glass transition temperature		DSC	A	℃	175
		TMA			170
熱分解温度 (Td) Thermal decomposition temperature		TG/DTA	A	℃	355
熱膨張係数 (タテ方向) CTE x-axis	α1	IPC TM-650 2.4.41	A	ppm/℃	11-13
熱膨張係数 (ヨコ方向) CTE y-axis	α1				13-15
熱膨張係数 (厚さ方向) CTE z-axis	α1	IPC TM-650 2.4.24	A		40
	α2				180
T-288 (銅付) T-288 (with copper)		IPC TM-650 2.4.24.1	A	min	10
比誘電率 Dielectric constant(Dk)	1GHz	IPC TM-650 2.5.5.9	C-24/23/50	–	4.7
誘電正接 Dissipation factor (Df)	1GHz				0.010
耐トラッキング性 Tracking resistance		ASTM D638	A	V	CTI≧600
銅箔引きはがし強さ Peel strength	1oz (35μm)	IPC TM-650 2.4.8	A	kN/m	1.6
耐燃性 Flammability		UL	-	–	94V-0相当

試験片の厚さは0.8mmです。
The sample thickness is 0.8mm

上記データは当社の実測値であり、保証値ではありません。
The above data is actual values and not guaranteed values.

[Term Descriptions]

[1] Tracking resistance
Tracking refers to the phenomenon by which short circuits occur between wires due to discharge when a high current or a high voltage is applied to printed circuit boards with moist or dirty surfaces. Tracking resistance indicates the capability of circuit board materials to resist this tracking.
[2] Glass transition temperature
Glass transition refers to a phenomenon in which a polymer material transitions from glassy state to rubbery state when heated. The glass transition temperature is the temperature at which this occurs. In general, the higher the glass transition temperature, the better the heat resistance of 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, 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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