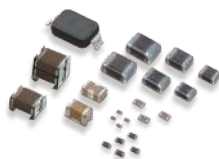




Capacitors

Multilayer ceramic capacitors

(New segment of net sales classification: Capacitors)



Initiatives in the capacitor business

As demand for multilayer ceramic capacitors (MLCCs) continued to grow globally over a few years through fiscal 2018, Murata worked to expand production capacity, promoted miniaturization, reviewed product portfolios and increased supply volumes.

In fiscal 2020, Murata expected expansion of the 5G market and increased demand for automotive uses, however, the market stagnated because of the COVID-19 pandemic in the first half of the fiscal year. On the other hand, telecommuting and staying at home created new demand for MLCCs in certain markets. Murata has a global production and sales network for MLCCs, which enables it to be adopted by customers in various markets. Murata was able to continue production and sales activities and increase sales even in the rapidly changing environment.

Over the medium-term, we are expecting to see new demand for applications in communications infrastructure along with the spread of 5G, in addition to increased demand for compact large-capacity products for use in communications devices and highly reliable products for use in automobiles. We are allocating management resources to products that address such demand and developing new products, while also implementing initiatives to enhance productivity by promoting the use of smart factories.

In addition, we will enhance our range of capacitors to address the diverse needs of our customers, add non-ceramic products such as film capacitors, silicon capacitors to our portfolio, and offer new solutions with high reliability suitable for usage environments in the automotive and healthcare/medical markets.

Multilayer ceramic capacitors for consumer

The multilayer ceramic capacitor (MLCCs) is an electronic component with external electrodes electrically and mechanically bonded to a substrate, attached to repeatedly stacked internal electrodes and ceramic dielectrics such as calcium zirconate and barium titanate. It is a highly reliable nonpolar capacitor with high withstanding voltage and insulation resistance, superior frequency characteristic and heat-resisting characteristics, durability, and long service life.

MLCCs are employed in mobile equipment and home appliances as well as IT devices and network infrastructure equipment, they can temporarily store and discharge electricity, absorb noise in signals, extract signals with certain frequencies, and block direct current and pass alternating current only.

MLCCs are also used for applications for which high reliability is required, including automotive, medical, and aerospace equipment. In particular, about 1,000 MLCCs are used in one high-end smartphone. Even low-end or midrange models use 300 to 600 MLCCs per unit.

Regarding MLCCs for consumer devices, as communications devices have more advanced functionality and batteries become bigger, the market demand has increased for smaller and high-capacity capacitors. In order to meet such demand, Murata has developed various products and they have become highly competitive capacitors. Recently, the main product size has shifted from 1005M (1.0 × 0.5mm) to 0603M (0.6 × 0.3mm), and for wearable devices and small modules, 0201M (0.25 × 0.125mm), the smallest size commercialized in 2014 has been increasingly adopted. Since market needs are expected to grow further for smaller components and high-density mounting, Murata will continue to improve its ceramic material pulverization and multilayer technology and propose new product design and easier-to-use solutions.

Multilayer ceramic capacitors for automotive

MLCCs for automotive application are used in harsh environment, namely high temperature, high humidity and high power. For MLCCs used in automotive application, stricter regulations have been set in the areas of product material selection, design standards, product performance, and process management to achieve higher reliability and longer product life, even though materials and processes are generally the same as those in consumer MLCCs.

MLCCs have been increasingly used for hybrid cars and electric vehicles, as well as self-driving cars and their related equipment for ADAS and safety, including ECU, cameras and sensors, which boosts the productions. Moreover, components employed by many customers are becoming smaller and the main size is shifting to 1005M (1.0 × 0.5mm) from 1608M (1.6 × 0.8mm), and demand for 0603M (0.6 × 0.3mm) is increasing. Also, these satisfy requirements of temperature cycling tests and high-temperature and high-humidity load tests at 150°C, a step up from the previous guarantee of 125°C. Furthermore, more products meet requirements specific to in-vehicle applications regarding static electricity and surge tests (ISO7637-2). Recently, products that can be used in higher temperature environments are in demand.

To respond to tough market demands as stated above, Murata has developed more reliable

materials, ensured product design margins, and established strict inspection standards for the production process to realize highly reliable products suited to use environments. In 2017, Murata succeeded in commercialization of lead-type resin-coated MLCCs resistant to 200°C, and customers are considering adoption. Furthermore, various types of MLCCs according to the use environments have been commercialized, such as water-repellent products and MLCCs with metal terminals jointed.

Also in automotive MLCCs, Murata will continue to create new value for society by developing ceramic

materials and improving process and inspection technologies toward creating smaller, more highly reliable, and higher-performance components.

Moreover, there is a strong desire in the in-vehicle system market for the stable supply of Murata's highly reliable components, and to respond to such expectations as the market leader, we are making a maximum equipment investment at domestic and overseas plants. Murata will continue to deliver products with safety and security by identifying customers' product and supply needs as a continuously trusted company.

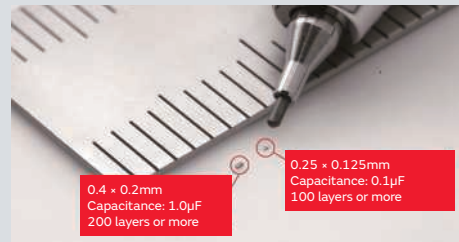
TOPICS

Winning Excellence Awards at 2020 Nikkei Superior Products and Services Awards for "GRM02" and "GRM01" series, small, large-capacity multilayer ceramic capacitors

Murata's series of 0402M(0.4 × 0.2mm), a maximum capacitance of 1.0μF, and 0201M(0.25 × 0.125mm), a maximum capacitance of 0.1μF, multilayer ceramic capacitors were selected for Excellence Awards at the 2020 Nikkei Superior Products and Services Awards.

The multilayer ceramic capacitors recognized by the aforementioned awards accomplish the respectively highest capacitance in the 0.4 × 0.2mm size and 0.25 × 0.125mm sizes based on Murata's proprietary thinning technology for ceramic elements and thin-layer sheet forming technology. These small, high-capacitance products promote the miniaturization of electronic circuitry and contribute to improvements in design freedom needed for enabling high-functioning electronic devices.

Murata will continue to increase development of high-temperature guaranteed products and their static capacitance, work on expanding its lineup in response to market needs, and contribute to the increasing miniaturization and higher functionality of electronic devices.



Business opportunities

- New demand for communication infrastructures driven by growing use of 5G and demand for small-size, large-capacity products for communication devices
- Advancements of electrification driven by the electrification of automobiles and growth of ADAS and autonomous driving vehicles

Competitors

Samsung Electro-Mechanics (South Korea), TAIYO YUDEN (Japan), TDK (Japan), Yageo (Taiwan), etc.

Strengths

- Extensive product lineup/High market share
- Technologies that enable small, high-performance products, and ensure reliability
- Reliable quality and stable supply

Risks

- Responses to short-term demand fluctuations amid an uncertain market outlook
- Medium-term slowdown in the overall electronics market due to stagnation in the global economy