



# Automotive Grade MLCCs - AC Series

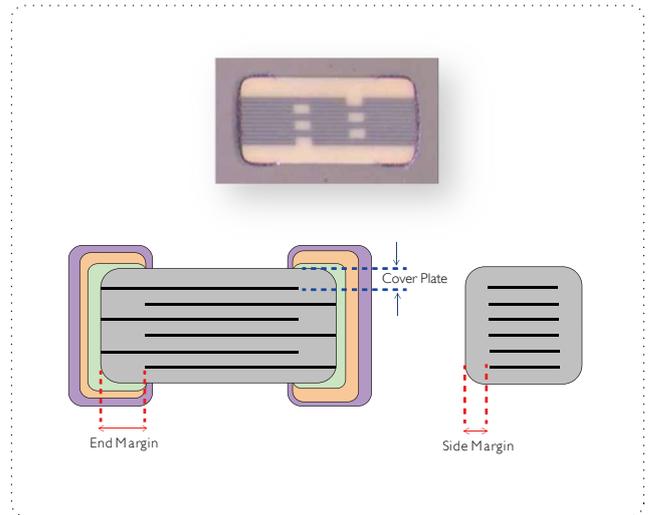
**High reliability, superior quality for automotive applications**



Yageo, the global passive component leader, recently extended its automotive grade (AC Series) multilayer ceramic capacitors (MLCC). The new ranges cover both class I NPO and class II X7R and X8R up to 4.7 micro farad capacitance and 6.3V to 630V rated voltage with case sizes from 0201 to 1812 (inch). This range extension makes Yageo completely competitive in automotive passenger compartment applications such as audio/video systems, navigation, remote vehicle control, lighting and other infotainment devices.

Yageo treats AEC-Q200 criteria as the basic quality requirements for its AC series MLCC. Approaches to reach an even higher quality level, longer life, and superior reliability include high quality raw materials, special construction design, a comprehensive SPC (Statistical Process Control) and dedicated production line, tightened processing control, entire in line and outgoing automatic checks, with all adopted on top of existing production standards. Some examples are shown below:

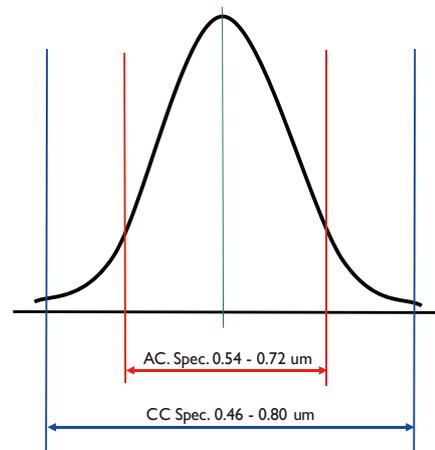
To be more robust, the internal construction design for the AC grade has been evaluated. A different inner electrode structure and modified dimensions of the cover plate and margins were implemented.



**Fig. 1 Special Design for Construction**

As shown in Fig. I, all these were applied to enhance mechanical and electrical performance.

As mentioned, the starting material's quality is well designed and controlled. For example, the particle size distribution of the powder used for the AC series production is narrower than that used for commodity grade. With smaller deviations in all the MLCC processing stages, better quality can be obtained.



**Fig. 2 Powder X7R D50 Spec.**



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The controlled microstructure has great benefits in revealing the advanced MLCC properties and increasing the reliability.

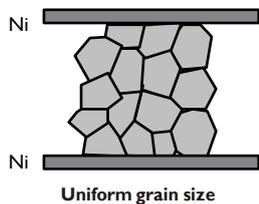
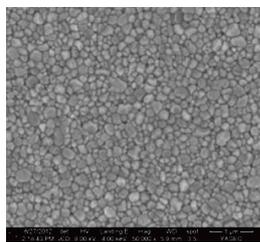


Fig. 3 Well Controlled Microstructure

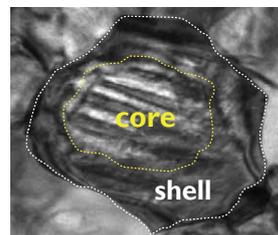


Fig. 4 Well Controlled Core-Shell Structure

Comprehensive and continuous Statistical Process Control has been installed in Yageo's MLCC production lines. This production data provides an effective and instant response on production status, and modification can be made immediately to ensure quality.

» Example: Sintering SPC chart - Thermal Ring Temp.

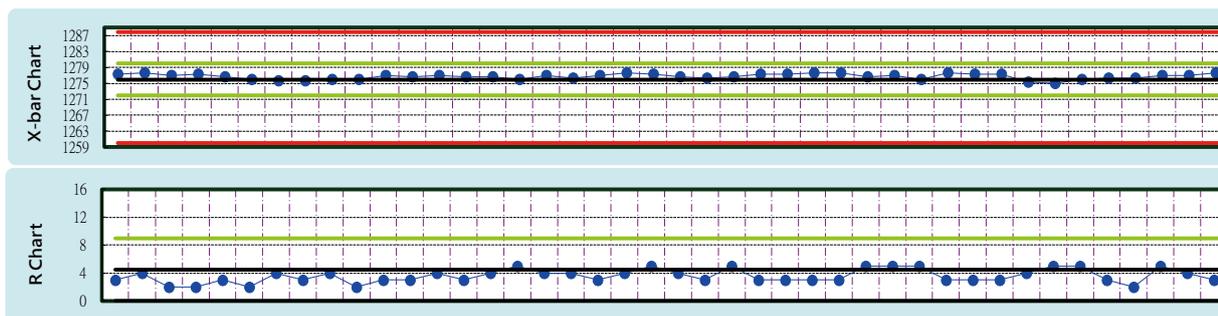


Fig. 5 Continuous Statistical Process Control

After all approaches have been applied for AC series MLCC, the high reliability performance can be reached as shown in the attached plot, the reliability level is much higher than required by AEC-Q200 which is marked as the red line in the plot.

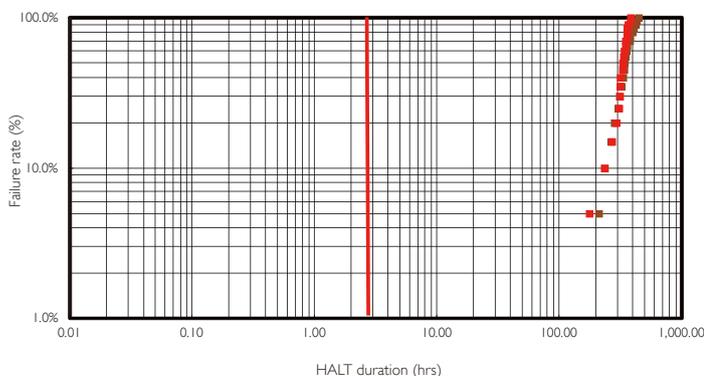


Fig. 6 High Reliability Performance

Production part approval process (PPAP) documents are ready for all AC series items. As with all other Yageo's MLCC series, the AC series is RoHS compliant also, and with improved thermal and mechanical robustness. This offers customers a wider variety of choices and solutions in order to meet various application demands and requirements.

In addition to the mentioned AC series, Yageo has also introduced AS (automotive grade with soft termination) and AQ (automotive grade high frequency NPO with Cu inner electrode) series to build a complete portfolio, not only for automotive industry, but also for other segments which need improved reliability.



# Automotive Grade MLCCs - AC Series

## Features

- With or over AEC-Q200 requirements
- Production part approval process (PPAP) level 3 available
- High reliability with life test outgoing monitor
- Superior quality with 100% AOI & SPC monitor
- Factory QMS : ISO/TS16949 certified
- RoHS compliant

## Applications

- Infotainment
- Telematics
- Security
- Lighting
- Navigation
- Comfort

### Yageo's AC Series Application Map



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