

# Adhesion between the green sheet of the multilayer ceramic capacitor and the carrier film

**Point:** Measurement of weak adhesive bond substrates not affected by the backing's stiffness of the adhesive tape used to peel off the thin film. In addition, more distinct differences between samples can be obtained by changing the peel rates.

**Keywords:** Peel angle, peel rate



Versatile Peel Analyzer - VPA-3

## Background

The demand for multilayer ceramic capacitors is expanding as mobile electronic devices such as smartphones and tablets become smaller, thinner, and have larger capacities. In the manufacturing process of multilayer ceramic capacitors, the green sheet and the carrier film need to have appropriate peeling properties avoiding residue on the carrier film when peeled.

However, if the peeling property is too good, the green sheet may separate from the carrier film, or cracks occur during winding. Therefore, optimizing green sheet properties and evaluating the most appropriate adhesive strength is critical to avoid such problems.

Our Versatile Peel Analyzer helps find the best combination by providing test conditions similar to the stresses the samples undergo during operation, delivering scientists reliable data and test results for their research.

## Problems to be solved

The adhesive force between the green sheet and the carrier film is minuscule, whereas conventional universal testing machines reach their limits when detecting these tiny peel strengths. Furthermore, peel tests may even be impossible to perform.

## Measurements and results

We used our Versatile Peel Analyzer model VPA-3, equipped with an optional full-scale 0.1N load cell, for the measurement.

We examined the peel rate dependence on the peel angle by continuously changing the peel rate in one peel cycle.

The peel angles were 120°, 90°, and 60°, and at each peel angle, the peel rates were 50mm, 100mm, 200mm, 500mm, and 1.000mm/min for every 30mm peel distance.

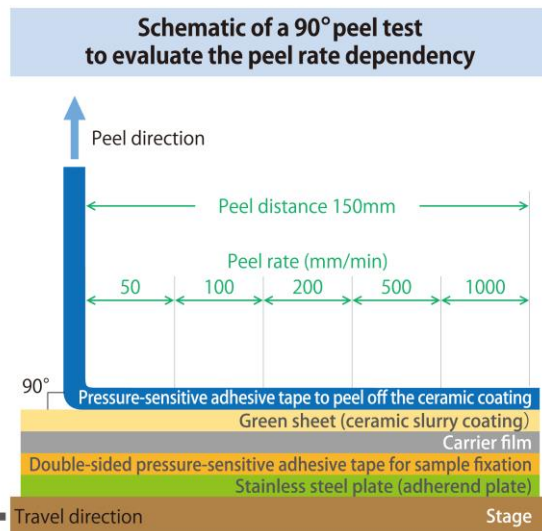


Figure 1 – Schematic of the peel test

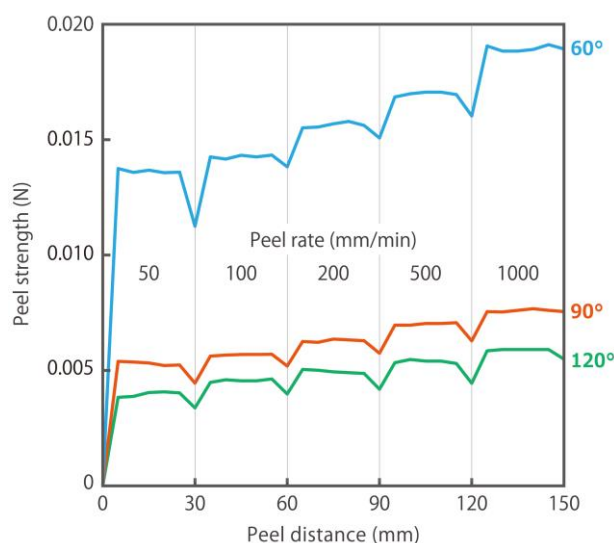


Figure 2 – Comparison chart of the test results

## Conclusion

The peel angle/rate dependence could be determined even though the peel force was as small as 0.005 to 0.02N. The most noticeable difference appeared at a peel angle of 60°.