Why Use Higher Rated Voltage X5R Parts?

Announcement of 1210/10 µF/50 V and 1210/22 µF/25 V in X5R

KEMET recently announced two new part numbers C1210C106K5PAC (1210/10 µF/50 V) and a C1210C226K3RAC (1210/22 µF/25 V). In addition to applications requiring higher voltages, there are also benefits for application running on typical 5 V or 3.3 V circuits.

Class II dielectrics lose capacitance with DC bias because dipoles in the crystallographic structure become locked by an electric field. This field depends on the applied voltage and the distance between the electrode plates according the well-known formula.

$$C = \frac{k*A}{t}$$

Higher rated voltages require an increased distance between the electrode plates. As a result, the field strength decreases, which leads to a higher net capacitance value. At nominal or better catalog conditions, the capacitance for different rated capacitors is the same, but under DC bias, the capacitance drops significantly. The capacitance change is typically given a DC/C in percentage.

As the application requires a certain capacitance value under DC bias conditions, it is a good solution to select a higher rated voltage part even the application voltage doesn't require it from the voltage standpoint but just to get more capacitance.

U app	Cap for 25 V rated	Cap for a 50 V rated
0	10.0 µF	10.0 µF
3	9.4 µF	13.0 µF
5	9.1 µF	10.0 µF
10	8.1 µF	8.0 µF
25	3.5 µF	6.0 µF

Please find more information about the VCC = Voltage change capacitance effect under

Why that 47 µF capacitor drops to 37 µF, 33 µF or lower