



# DID YOU KNOW? THB GRADES ON RFI FILM CAPACITORS

Radio frequency interference (RFI) suppression film capacitors are used for EMI filtering in power electronics equipment such as motor drives, UPS systems, renewable energy inverters, and battery chargers. As power converter manufacturers offer longer guarantees for their products, the focus towards high reliability and long lifetime has led to a growing concern about the performance of RFI film capacitors (X & Y), which were generally regarded as lesser figures in the design of power electronics converters. This concern becomes paramount in environments where high humidity is present, which often leads to a faster capacitance decrease and increase in dissipation factor.

High relative humidity (RH), combined with high temperature and voltage bias, are primary aging agents for film capacitors. And while methods to determine the reliability of film capacitors under stress conditions of temperature and voltage are well established in IEC standards for RFI capacitors, the guidelines for humidity robustness testing have been limited.

The IEC 60384-14 ED. 4.0 2016/AMD1 – which characterizes humidity robustness grades for applications where high stability under high humidity operating conditions is required – now defines guidelines for temperature humidity biased (THB) testing and qualification. Vishay has released RFI suppression film capacitors that can withstand the harshest testing conditions and grades described by IEC 60384-14 ED. 4.0 2016/AMD1:

HUMIDITY ROBUSTNESS GRADES	TEST CONDITION
Grade (I) robustness under humidity	Test condition A: 40 °C / 93 % RH / 21 days / rated voltage applied
	Test condition B: 85 °C / 85 % RH / 168 hours / rated voltage applied
Grade (II) robustness under high humidity	Test condition A: 40 °C / 93 % RH / 56 days / rated voltage applied
	Test condition B: 85 °C / 85 % RH / 500 hours / rated voltage applied
Grade (III) high robustness under high humidity	Test condition A: 60 °C / 93% RH / 56 days / rated voltage applied
	Test condition B: 85 °C / 85 % RH / 1000 hours / rated voltage applied

The requirements for the test conditions are quite tight, demanding a small capacitance decrease ( $|\Delta C| \leq 10\%$  for film capacitors) and minimal variation in the dissipation factor.

The higher the grade a certified RFI capacitor has, the higher stability on capacitance and dissipation will be displayed throughout its lifetime, despite the severity of the climatic conditions experienced. Vishay’s new F340 family is compliant with grade (III) high robustness under high humidity, test condition B.

Check out our selection of RFI film capacitors: [www.vishay.com/capacitors/film/rfi-xy/](http://www.vishay.com/capacitors/film/rfi-xy/).