

Terminology and General Information - DISC CAPACITORS

Term	Symbol	Definition					
AC Capacitor		A capacitor designed essentially for application with a power - frequency alternating voltage					
RFI Suppression Capacitor		A capacitor used for the reduction of electromagnetic interference caused by electrical or electronic apparatus or other sources					
Capacitor of Class X		A capacitor suitable for use in situations where failure of the capacitor would not lead to danger of electric shock.					
Capacitor of Class Y		A capacitor suitable for use in situations where failure of the capacitor could lead to danger of electric shock.					
Rated AC Voltage	V_{rms}	AC operating voltage of rated frequency, which may be applied continuously to the terminations of a capacitor at any temperature between the lower and the upper category temperature					
Rated DC Voltage	V_r	DC operating voltage which may be applied continuously to the terminations of a capacitor at any temperature between the lower and the upper category temperature					
Impulse Voltage		An impulse voltage is an aperiodic transient voltage of a defined waveform as described in IEC 60-1					
Measuring and Testing Conditions	C and tan δ	1 kHz \pm 20 %, at max . 1,0 V_{rms} , 20-25 °C, 50-70 % RH					
	IR - Insulation resistance	500 V \pm 50 V, 60 s \pm 5 s, 20-25 °C, 50-70 % RH					
	V_t Voltage Proof of Dielectric Strength	Class X1 - 2 V_{rms} + 1500 V~ (min. 2000 V~), 50 Hz, 2s, 20-25 °C, 50-70 % RH					
		Class Y2 - 2 V_{rms} + 1500 V~ (min. 2000 V~), 50 Hz, 2 s, 20-25 °C, 50-70 % RH					
		Class Y1 - 4000 V~, 50 Hz, 2 s, 20-25 °C, 50-70 % RH					
Ceramic Type Designation	2E3 / 2F3	Ceramic Type Code : 2 (High Dielectric Constant Ceramics)					
		Capacitance Change Code : capacitance change relative to 20 °C capacitance value over the entire temperature range : E : +20/-56 % without AC voltage and +22/-70 % with AC voltage F : +30/-80 % without AC voltage and +30/-90 % with AC voltage					
		Temperature Range Code: 3 : -40/85 °C 4 : -25 /85 °C					
Application and Testing Class		Application Class according to DIN 40 040	Climatic Category according to DIN 40045	Humidity Stress			
				Annual average	for 30 days per year continuously	for 60 days per year continuously	on the remaining days occasionally
		HPF GPF	-25/85/21 -40/85/21	< 75 %	95%	-	85%
Ageing Constant	k	<p>Following the final heat treatment all Type 2 ceramic capacitors reduce their capacitance value according to logarithmic law due to their special crystalline structure. This change is called ageing. If the capacitor is heated, for example during soldering, the capacitance value increases to higher value and the aging process begins again. The level of de-ageing depends on temperature and duration of the heat - for example an almost complete de-ageing is achieved at 150°C in one hour. These conditions are also the basis for reference measurements for any testings.</p> <p>Ageing constant is defined as capacitance change per time decade. Ageing constant differs for various types of ceramics. For 2E3 and 2F3 ceramics used for RFI suppression and safety capacitors ageing constant ranges from -3 to -5 %.</p>					

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Reference Measurements	<p>Due to ageing it is necessary to quote an age for reference measurements which can be related to the capacitance with the fixed tolerance. As defined in CECC 30700 this age is 1000 h. If the age of the capacitor is known, the capacitance for $t = 1000$ h can be calculated using known ageing constant :</p> $k = 100 (C_1 - C_2) / [C_1 \cdot \log(t_1/t_2)] \Rightarrow C_2 = C_1 \cdot [1 - k / (100 \cdot \log(t_1/t_2))]$ <p>where k is ageing constant in %, t_1, t_2 are measurement time points and C_1, C_2 capacitance values at time t_1 and t_2 respectively.</p> <p>It is important to de-age the capacitors before any stress testing, so that the changes as a result of the test are not affected by age. The following procedure should be used for any stress measurements (according to CECC 30700, appendix B) :</p> <ul style="list-style-type: none"> - de-ageing at 150 °C, 1 h - storage : 24 h at 20-25 °C, 50-70 % RH - initial measurements - stress test - de-ageing at 150 °C, 1 h - storage : 24 h at 20-25 °C, 50-70 % RH - final measurements 			
	Soldering Specifications	Conditions	Soldering Temperature	Soldering Time
	Solderability	250 ± 5 °C	2 ± 0,5 s	> 2 mm
	Resistance to Soldering Heat	295 ± 5 °C	10 ± 1 s	> 5 mm
Climatic Category	LCT/UCT/DHD	<p>UCT = The maximum surface temperature for which the capacitor has been designed to operate continuously</p> <p>LCT = The minimum surface temperature for which the capacitor has been designed to operate continuously</p> <p>DHD = Dump Heat Test Duration</p>		
Storage	Solderability of leads is not affected by storage for 24 months, if storage temperature is 10-35 °C and relative humidity up to 60 %.			
Flammability	Active	The ability to burn with flame as a consequence of electrical loading. The minimum category of passive flammability is category C.		
	Passive	The ability of a capacitor to burn with flame as a consequence of application of an external source of heat.		

