Film Capacitors - AC Capacitors

General Purpose MKP AC Capacitors

Series/Type: **CBB65A-1**
Ordering code: **B33331V series**

Date: 2019-04-10
Version: 2

Construction

- Metallized polypropylene film
- Filling material: soft polyurethane resin
- Aluminum can and top

Features

- Overpressure disconnection safety device
- UL approved for diameter > 40 mm
- Humidity protected: 85 °C, 85 % rel. humidity (RH) at 460 V for 1000 h
- Low dissipation factor
- Self-healing technology
- Indoor mounting
- CE compatible

Typical applications

- For general AC filtering application

Terminals

- 2+2 fast-on terminal 6.3 x 0.8mm #250 style, others on request

Mounting parts (optional)

- Threaded stud at bottom of can
  (M8, max torque = 5 Nm for 50 mm diameter)

Technical data and specifications	
Reference standards	IEC 61071, UL 810
Rated voltage V_R	650 V
Rated AC RMS voltage V_{RMS}	460 V
Rated capacitance C_R	See table
Tolerance	± 5%
Dielectric Dissipation factor tan δ_0 at +20 ℃	≤ 2 • 10^{-4} at 1 kHz
Life test	IEC 61071
Life expectancy	100 000 h for V_{RMS} |ΔC/C| ≤3%
Maximum ratings	
Maximum permissible voltage V_{max}	1.10 • V_R: 8 h/day 1.15 • V_R: 30 min/day 1.20 • V_R: 5 min/day 1.30 • V_R: 1 min/day
Maximum permissible current I_{max}	See table

Test data	
AC test voltage terminal to terminal V_{TT}	975 V, 2 s
AC test voltage terminal to case V_{TC}	2200 V, 2 s
Dissipation factor tan δ at + 20 °C	≤ 10 • 10^{-4} at 120 Hz
Climatic data	
Climatic category	40/085/21 to IEC 60068-1
Lower category θ_{min}	-40° C
Upper category θ_{max}	+85° C
Maximum hot spot temperature θ_{HS}	+85º C
Damp heat test t_{test}	21 days
Enforced humidity protection	
Temperature	+85 °C
Relative humidity	85 %
Duration	1000 h
Applied voltage	U_{RMS}
Criteria	Capacitance deviation ΔC at +20 °C < ±10% Dissipation factor variation Δ tan δ at +20 °C < +0.005
Mechanical and thermal properties of terminal insulator material	
Terminal material: UL 94 V0 compatible	Self-extinguishing within 2 seconds of withdrawing glow wire without igniting wrapping tissue of GWT
Compatibility to RoHS	
Compliance to directive 2011/65/EU	RoHS compatible
Approvals	
US UL File E 238746	Approved component 10000 AFC. See table for approved ratings
CE	Compliance to LV directive 2014/35/EU

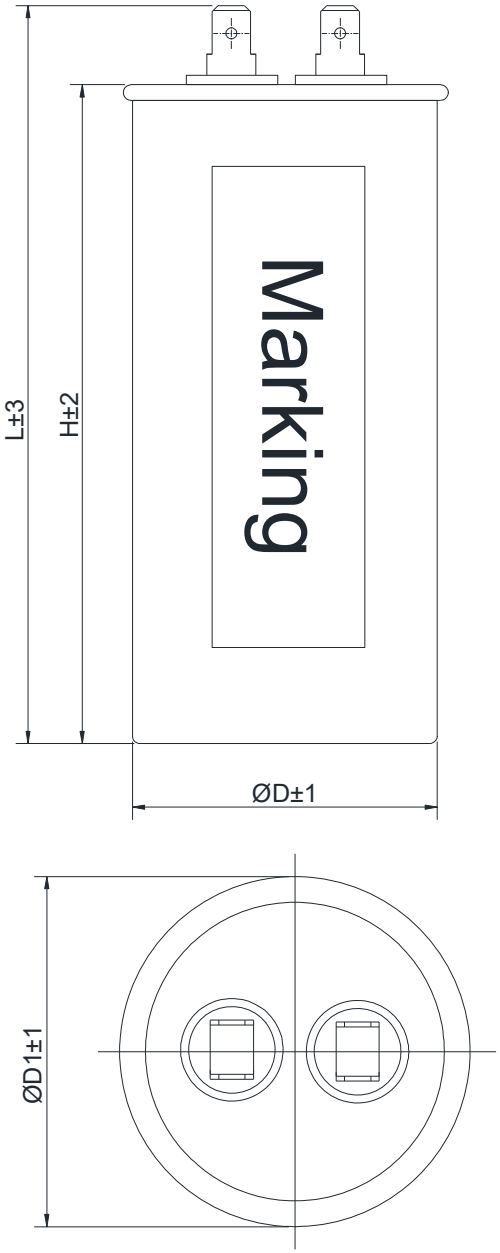
Dimensional drawings and marking

Note: Check the table before marking UL.

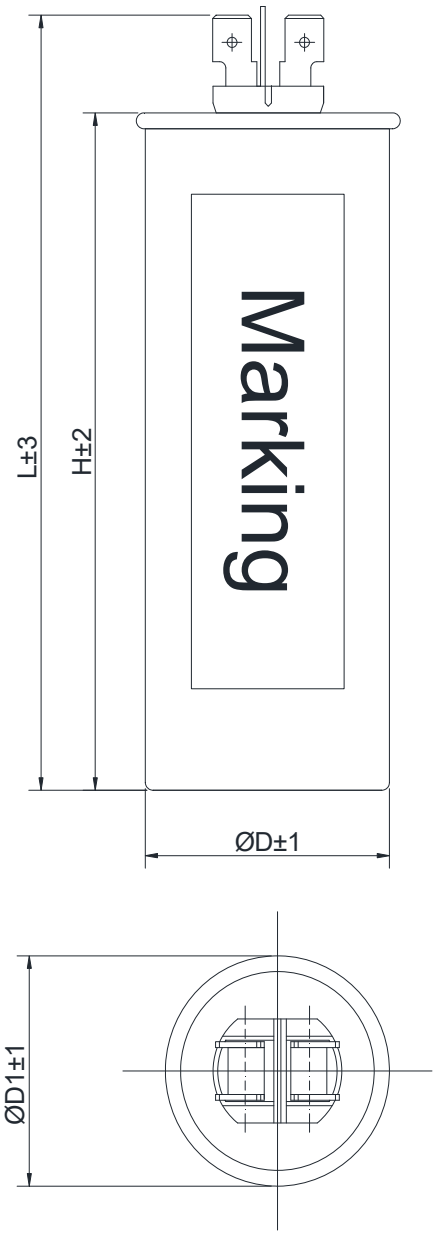
UL to be marked only for rating between 25 µF to 50 µF.

Don't mark UL for rating between 2 µF to 20 µF. In the blank space, the marking can be shifted left.

Drawing 1

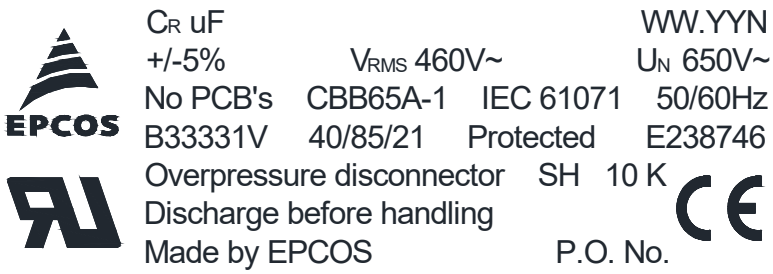


Drawing 2

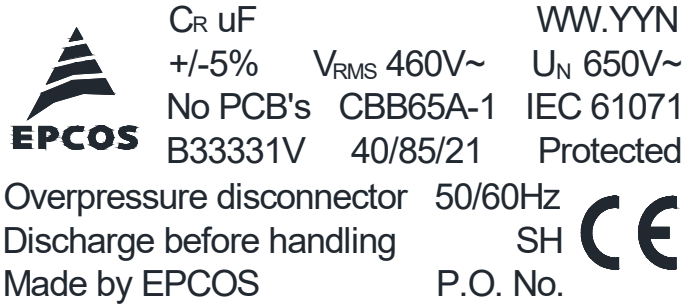


Marking specification

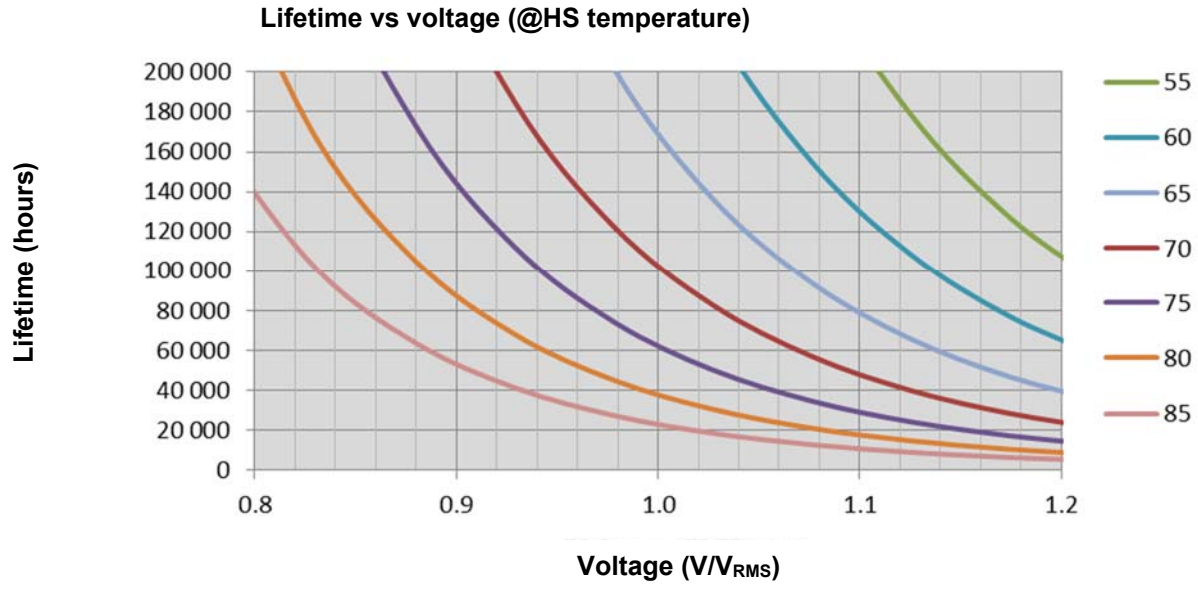
With UL



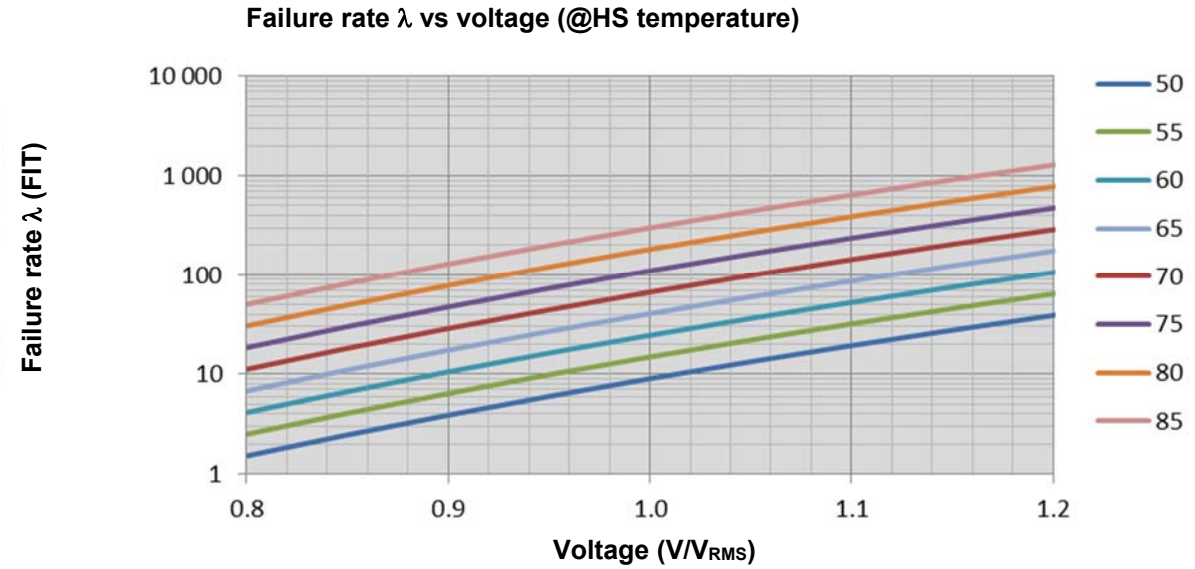
Without UL



Expected lifetime



Expected fit rate



Ordering codes and packing unit

V_R / V_{RMS} V	C_R µF	I_{max} [1] A	î A	ESR [2] mΩ	Case (D × H) mm	D_1 mm	L mm	Drawing	Ordering code	Packing unit	Approval
	2	6	55	35	30 x 55	33	73	2	B33331V7205J0#X	100	
	4	7	75	23	30 x 65	33	83	2	B33331V7405J0#X	100	
	6	8	100	21	30 x 65	33	83	2	B33331V7605J0#X	100	
	8	9	140	17	30 x 65	33	83	2	B33331V7805J0#X	100	
	10	10	130	19	30 x 75	33	93	2	B33331V7106J0#X	100	
650 V_R	12	12	210	13	40.5 x 65	43.5	78	1	B33331V7126J0#X	49	
	14	12	200	11	40.5 x 65	43.5	78	1	B33331V7146J0#X	49	
460 V_{RMS}	16	12	210	12	40.5 x 75	43.5	88	1	B33331V7166J0#X	49	
	20	15	260	11	40.5 x 85	43.5	98	1	B33331V7206J0#X	49	
	25	16	260	12	45 x 85	48	98	1	B33331V7256J0#X	49	UL
	30	16	340	10	50 x 85	53	98	1	B33331V7306J0#X	36	UL
	40	16	350	11	50 x 100	53	113	1	B33331V7406J0#X	36	UL
	50	16	410	14	50 x 100	53	113	1	B33331V7506J0#X	36	UL

[1] I_{max} – Maximum RMS current for continuous operation defined for a hotspot of ≤ 85 °C, case temperature of ≤ 60 °C, including harmonics up to frequency of 20 kHz.

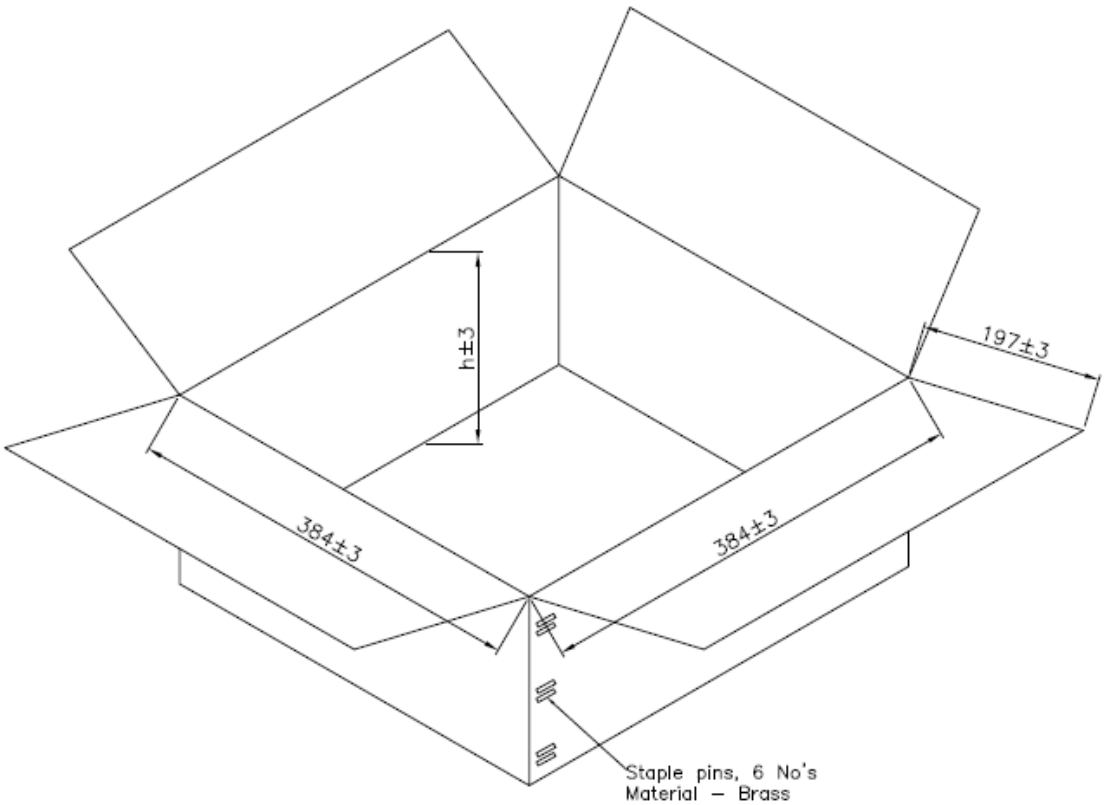
[2] ESR – Equivalent Series resistance at 1KHz

Composition of ordering code

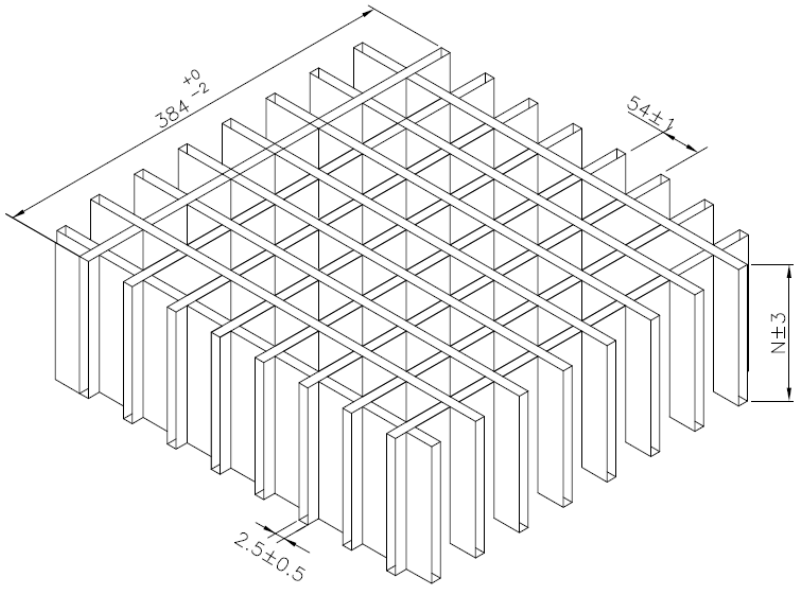
#: construction
6 Aluminium can flat type
8 Aluminium can with M8 bolt

X:
0 as per this dimension and properties
1-9 special dimension and properties

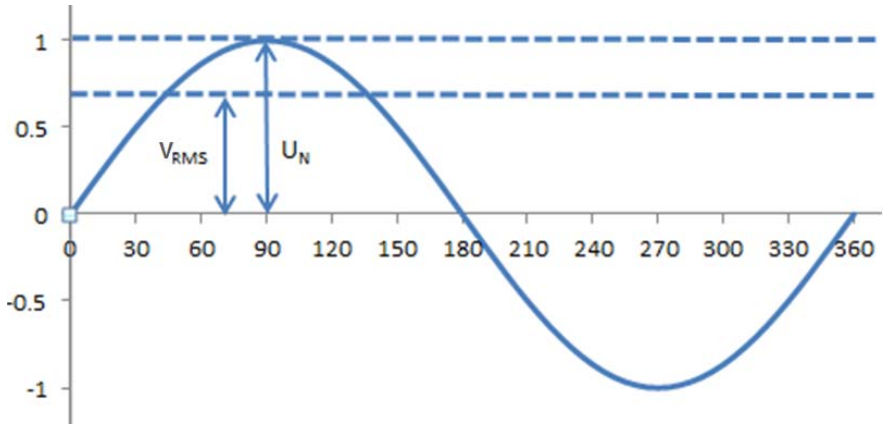
Packing box



h=capacitor height (H) + terminal height + 10 mm min.



Rated AC voltage V_R
Maximum operating peak voltage of either polarity of reversing type waveform for which the capacitor is designed



Rated AC RMS voltage V_{RMS}
Root mean square of the maximum permissible value of sinusoidal AC voltage in continuous operation

Rated capacitance C_R
Designed capacitance of the capacitor at 20 °C at 1 kHz

Maximum continuous current I_{max}
Maximum RMS current for continuous operation, including harmonics

Maximum peak current Î
Maximum current amplitude which occurs instantaneously during continuous operation
The maximum peak current (Î) and the maximum rate of voltage rise $\left(\frac{dV}{dT}\right)_{max}$ of a capacitor are related as follows:

$$\hat{I} = C.\left(\frac{dV}{dT}\right)_{max}$$

Maximum surge current $\hat{I}_s$
Admissible peak current induced by a switching or any other disturbance of the system which is allowed for a limited number of times

$$\hat{I}_s = C.\left(\frac{dV}{dT}\right)_s$$

Maximum duration: 50 ms / pulse
Maximum number of occurrences: 1000 (during load)

Equivalent series resistance ESR
Effective resistance which, if connected in series with an ideal capacitor of capacitance value equal to that of the capacitor in question, would have a power loss equal to active power dissipated in that capacitor under specified operating conditions.

Self-inductance L_{self}
Series inductance of the terminals and the winding
With self-inductance, it is possible to determine the resonance frequency.

$$f = \frac{1}{2\pi.\sqrt{L_{self}.C}}$$

Harmonics
Harmonics result from the operation of electrical loads with non-linear voltage-current characteristics. It is necessary to calculate the temperature rise of the capacitors from hotspot to case during the using process. If the temperature rise of theoretical calculation of capacitor's hotspot exceeds the maximum allowable range, we would propose to check the total harmonic current distortion (THD_i) of the input terminals.

$$THD_i = \frac{\sqrt{\sum_{n=1}^{\infty} I_n}}{I_1}$$

Thermal load
After installation of the capacitor, it is necessary to verify that maximum hot-spot temperature is not exceeded at extreme service conditions.

Mechanical protection
The capacitor has to be installed in a way that mechanical damages and dents in the aluminum can are avoided.

Storage and operating conditions
Do not use or store capacitors in corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present. In dusty environments, regular maintenance and cleaning especially of the terminals is required to avoid conductive path between phases and/or phases and ground. The maximum storage temperature is 85 °C.

Service life expectancy
Electrical components do not have an unlimited service life expectancy; this applies to self-healing capacitors, too. The maximum service life expectancy may vary depending on the application for which the capacitor is used.

Overpressure disconnector
To ensure full functionality of an overpressure disconnector, the following must be observed:
- The elastic elements must not be hindered, i.e.
  – connecting lines must be flexible leads (cables).
  – there must be sufficient space for expansion above the connections.
  – folding seams must not be retained by clamps.
- Stress parameters of the capacitor must be within the IEC 61071 specification.

Safety
- Electrical or mechanical misapplication of capacitors may be hazardous. Personal injury or property damage may result from bursting of the capacitor or from expulsion of oil or melted material due to mechanical disruption of the capacitor.
- Ensure good, effective grounding for capacitor enclosures.
- Observe appropriate safety precautions during operation (self-recharging phenomena and the high energy contained in capacitors).
- Handle capacitors carefully, because they may still be charged even after disconnection.
- The terminals of capacitors, connected bus bars and cables as well as other devices may also be energized.
- Follow good engineering practice.

Cautions and warnings
- In case of dents of more than 1 mm depth or any other mechanical damage, capacitors must not be used at all. This applies also in cases of leakage.
- To ensure the full functionality of the overpressure disconnector, elastic elements must not be hindered and a minimum space of 12 mm has to be kept above each capacitor.
- Check tightness of the connections/terminals periodically.
- The energy stored in capacitors may be lethal. To prevent any chance of shock, discharge and short-circuit the capacitor before handling.
- Failure to follow cautions may result, worst case, in premature failures, bursting and fire.
- TDK Electronics is not responsible for any kind of possible damages to persons or things due to improper installation and application of capacitors for power electronics.

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