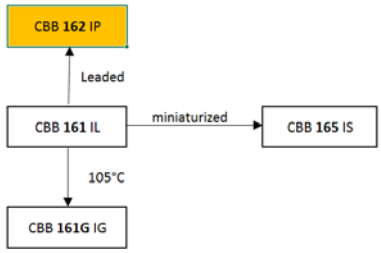
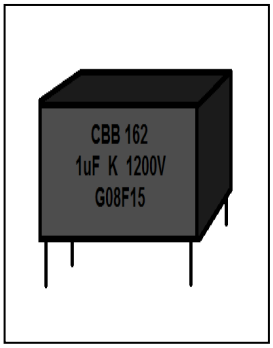
Polypropylene Film Capacitors for Snubber Applications

Features

- Very low dissipation factor
- Highest peak pulse capability
- Double-sided metallized electrodes
- Design for Snubber Application
- Metal sprayed contacts for low ESL
- Self-healing





Applications

- High pulse and high frequency circuits
- IGBT applications

Item	Characteristics
Climatic Category	40/85/56 (IEC 61071)
Operating Temperature	–40 ~ +85 °C ($\theta_{hotspot}$ ≤ 85 °C)
Storage Temperature	–40 ~ +85 °C
DC Voltage Rating $U_{R,DC}$	700 ~ 2000 V_{DC}
Capacitance Range	0,56 ~ 7,5 µF
Capacitance Tolerance	±10 % (K), ±5 % (J)
Voltage between Terminals U_{TT}	1,5 * U_{RDC} (20 °C, 10 s)
Voltage between Terminals and Case U_{TC}	3000 V_{AC} (20 °C, 50 Hz, 10 s)
Capacitor Dissipation Factor	tan δ ≤ 5 * 10^{-4} (20 °C, 1 kHz)
Dielectric Dissipation Factor	tan δ_0 ≤ 2 * 10^{-4} (20 °C, 1 kHz)
Insulation Resistance	≥ 30.000 MΩ µF (20 °C, 100 V_{DC}, 1 min)
Series Inductance	$L_{S\ (typ.)}$ ≤ 20 nH (20 °C)
Life Time Expectancy	≥ 100.000 h, Failure Rate ≤100 FIT (70 °C)
Reference Standard	IEC 61071:2007, REACH, RoHS

Ratings for CBB 162 IP Series

U_R (V)	**C_R** (µF)	**dV/dt** 20 °C (V/µS)	**$\hat{I}$**(1) (A)	**R_S**(2) 100 kHz 20 °C (mΩ)	**I_{max}**(3) 100 kHz 70 °C (A)	**W** ±1.0 (mm)	**H** ±1.0 (mm)	**T** ±1.0 (mm)	**P_1** ±1.0 (mm)	**P_2** ±1.0 (mm)	**Ordering Code**
700V_{DC} (380V_{AC}) 2Q	3.00	325	975	5	22.4	42.5	45	30	37.5	20.3	FCS2QIP305*AFF3720E3
	4.00	325	1300	4	25	42.5	43	42	37.5	20.3	FCS2QIP405*AFE3720E3
	4.20	260	1092	3	26	57.5	43.5	29.5	52.5	20.3	FCS2QIP425*AHG5220E3
	4.50	260	1170	3	26	57.5	45	30	52.5	20.3	FCS2QIP455*AHH5220E3
	5.00	260	1300	3	27	57.5	45	35	52.5	20.3	FCS2QIP505*AHJ5220E3
	5.50	260	1430	2	27	57.5	50	35	52.5	20.3	FCS2QIP555*AHL5220E3
	6.00	260	1560	2	28	57.5	45	45	52.5	20.3	FCS2QIP605*AHK5220E3
	7.50	260	1950	2	30	57.5	55	40	52.5	20.3	FCS2QIP755*AHM5220E3

(1) Maximum permissible peak current
(2) Series resistance at 20°C ambient temperature
(3) Maximum permissible r.m.s. ripple current

"*" to be defined, see ordering code table
Customized products are available on request

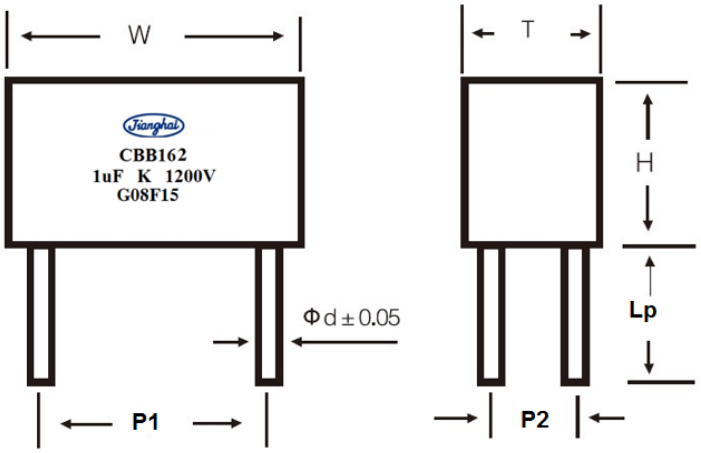
Ratings for CBB 162 IP Series

U_R (V)	C_R (µF)	dV/dt 20 °C (V/µS)	$\hat{I}$(1) (A)	Rs(2) 100 kHz 20 °C (mΩ)	I_{max}(3) 100 kHz 70 °C (A)	W ±1.0 (mm)	H ±1.0 (mm)	T ±1.0 (mm)	P_1 ±1.0 (mm)	P_2 ±1.0 (mm)	Ordering Code
850V_{DC} (450V_{AC}) K2	2.20	400	880	6	21.5	42.5	45	30	37.5	20.3	FCSK2IP225*AFF3720E3
	2.80	400	1120	5	24	42.5	43	42	37.5	20.3	FCSK2IP285*AFE3720E3
	3.00	290	870	4	24	57.5	43.5	29.5	52.5	20.3	FCSK2IP305*AHG5220E3
	3.00	290	870	4	25	57.5	45	30	52.5	20.3	FCSK2IP305*AHH5220E3
	3.50	290	1015	4	25	57.5	45	35	52.5	20.3	FCSK2IP355*AHJ5220E3
	4.50	290	1305	3	27	57.5	50	35	52.5	20.3	FCSK2IP455*AHL5220E3
	5.00	290	1450	3	27	57.5	45	45	52.5	20.3	FCSK2IP505*AHK5220E3
	5.00	290	1450	2	29	57.5	55	40	52.5	20.3	FCSK2IP505*AHM5220E3
1000V_{DC} (480V_{AC}) 3A	1.80	500	900	6	21	42.5	45	30	37.5	20.3	FCS3AIP185*AFF3720E3
	2.20	500	1100	5	23	42.5	43	42	37.5	20.3	FCS3AIP225*AFE3720E3
	2.20	350	770	6	23	57.5	43.5	29.5	52.5	20.3	FCS3AIP225*AHG5220E3
	2.50	350	875	5	24	57.5	45	30	52.5	20.3	FCS3AIP255*AHH5220E3
	3.00	350	1050	5	24	57.5	45	35	52.5	20.3	FCS3AIP305*AHJ5220E3
	3.30	350	1155	4	25	57.5	50	35	52.5	20.3	FCS3AIP335*AHL5220E3
	3.50	350	1225	4	25	57.5	45	45	52.5	20.3	FCS3AIP355*AHK5220E3
	4.50	350	1575	4	28	57.5	55	40	52.5	20.3	FCS3AIP455*AHM5220E3
1200V_{DC} (500V_{AC}) 3B	1.20	650	780	7	20.6	42.5	45	30	37.5	20.3	FCS3BIP125*AFF3720E3
	1.50	650	975	6	22	42.5	43	42	37.5	20.3	FCS3BIP155*AFE3720E3
	1.50	455	683	6	22	57.5	43.5	29.5	52.5	20.3	FCS3BIP155*AHG5220E3
	1.80	455	819	6	23	57.5	45	30	52.5	20.3	FCS3BIP185*AHH5220E3
	2.00	455	910	5	24	57.5	45	35	52.5	20.3	FCS3BIP205*AHJ5220E3
	2.20	455	1001	5	24	57.5	50	35	52.5	20.3	FCS3BIP225*AHL5220E3
	2.50	455	1138	4	25	57.5	45	45	52.5	20.3	FCS3BIP255*AHK5220E3
	3.00	455	1365	4	26	57.5	55	40	52.5	20.3	FCS3BIP305*AHM5220E3
1600V_{DC} (550V_{AC}) 3C	0.80	800	640	8	20.5	42.5	45	30	37.5	20.3	FCS3CIP804*AFF3720E3
	1.00	800	800	7	21	42.5	43	42	37.5	20.3	FCS3CIP105*AFE3720E3
	1.00	560	560	6	22	57.5	43.5	29.5	52.5	20.3	FCS3CIP105*AHG5220E3
	1.20	560	672	6	22	57.5	45	30	52.5	20.3	FCS3CIP125*AHH5220E3
	1.40	560	784	5	23	57.5	45	35	52.5	20.3	FCS3CIP145*AHJ5220E3
	1.60	560	896	5	23	57.5	50	35	52.5	20.3	FCS3CIP165*AHL5220E3
	1.70	560	952	4	24	57.5	45	45	52.5	20.3	FCS3CIP175*AHK5220E3
	2.00	560	1120	4	25	57.5	55	40	52.5	20.3	FCS3CIP305*AHM5220E3
2000V_{DC} (630V_{AC}) 3D	0.56	1000	560	9	20.1	42.5	45	30	37.5	20.3	FCS3DIP564*AFF3720E3
	0.70	1000	700	8	20	42.5	43	42	37.5	20.3	FCS3DIP704*AFE3720E3
	0.75	720	540	8	21	57.5	43.5	29.5	52.5	20.3	FCS3DIP754*AHG5220E3
	0.82	720	590	7	21	57.5	45	30	52.5	20.3	FCS3DIP824*AHH5220E3
	0.90	720	648	6	22	57.5	45	35	52.5	20.3	FCS3DIP904*AHJ5220E3
	1.00	720	720	6	22	57.5	50	35	52.5	20.3	FCS3DIP105*AHL5220E3
	1.20	720	864	5	22	57.5	45	45	52.5	20.3	FCS3DIP125*AHK5220E3
	1.40	720	1008	4	24	57.5	55	40	52.5	20.3	FCS3DIP145*AHM5220E3

(1) Maximum permissible peak current
(2) Series resistance at 20°C ambient temperature
(3) Maximum permissible r.m.s. ripple current

"*" to be defined, see ordering code table
Customized products are available on request

Dimensions



Preferred Style A:

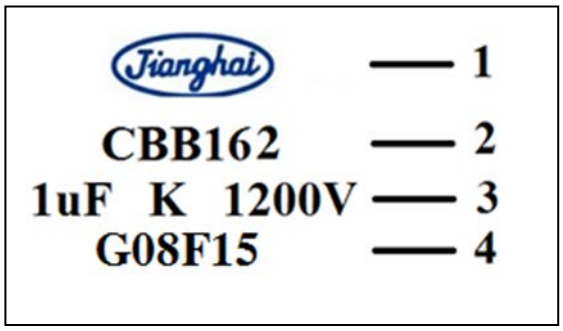
4 Pin

Ød = 1,2mm +/-0,05

Lp = 5,0 +/- 1mm

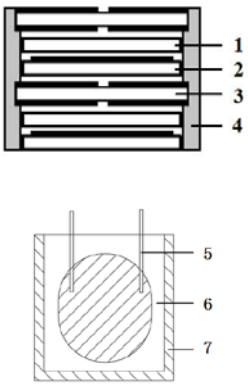
Other Styles on request.

Marking



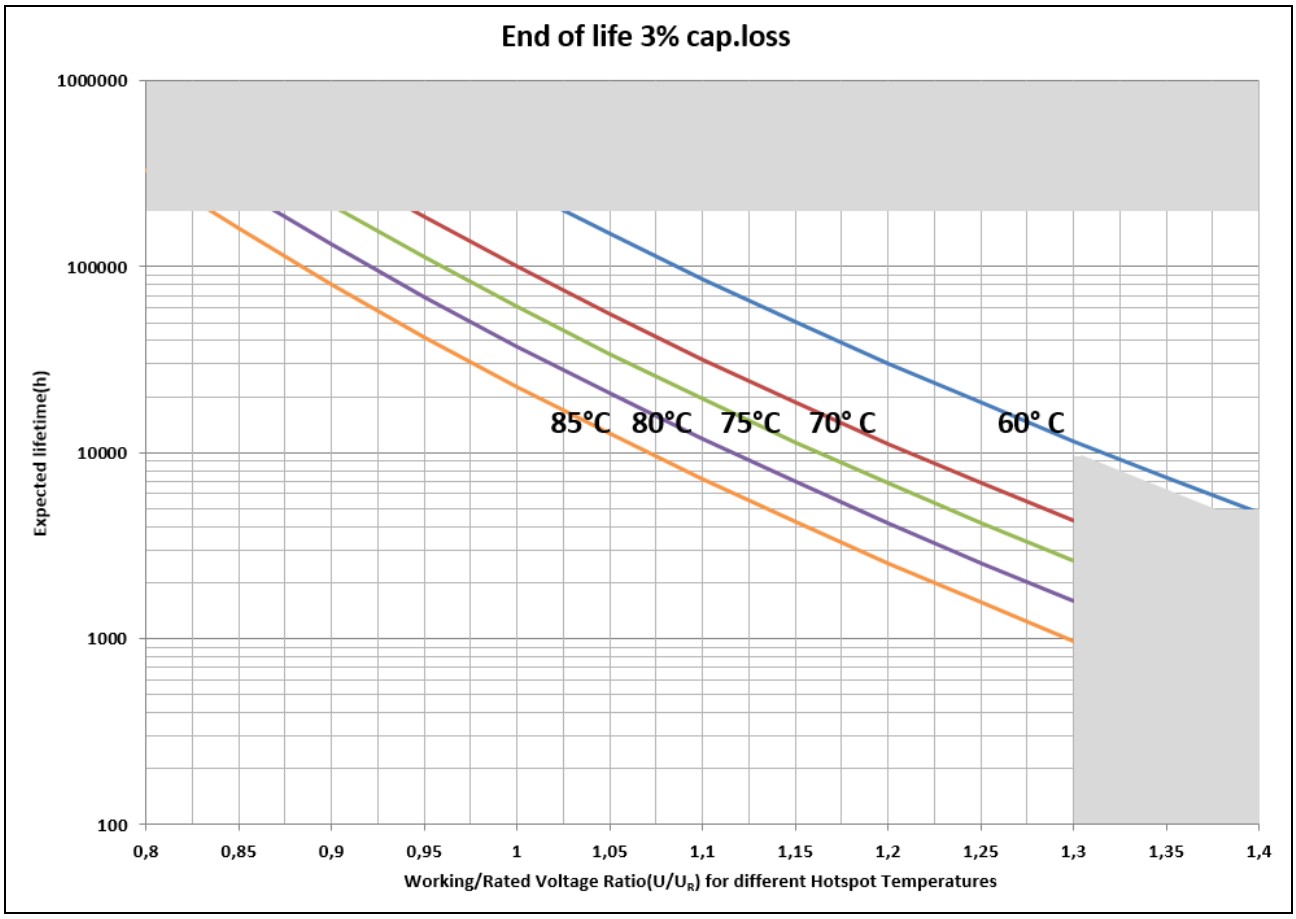
No.	Item
1	Brand
2	Series Designation
3	Capacitance, Tolerance, and Rated Voltage
4	Date Code

Internal Construction



No.	Item	Material
1	Dielectric Film	Polypropylene
2	Single-sided Metallized Film	PP + Al
3	Double sided Metallized Carrier Film	PET + Al
4	Metal Sprayed Contact	Zn + Sn/Zn
5	Terminals	Sn-coated Cu
6	Potting Compound	Epoxy
7	Case	Flame retardant PBT

Life Time Expectancy



Ordering Code

1 2	3	4 5	6 7	8 9 10	11	12	13 14	15 16	17 18	19 20
FC	**S**	**3B**	**IP**	**105**	**K**	**A**	**F A**	**3 7**	**2 0**	**E 3**
Capacitor type	Product shape	DC rated voltage code (V)	Series code	Capacitance code (µF)	Capacitance tolerance	Pin Style (mm)	Dimension Code (WxHxT in mm)	Pitch P_1 (mm)	Pitch P_2 (mm)	Internal use
Film cap. = FC	Square box = S	700 = 2Q	CBB162 = IP	0,68 = 684	±5% = J	4 Pin, 5mm = A	42,5x28x24 = FA	37,5 = 37	20,3 = 20	
		850 = K2	CBB138 = DS	0,82 = 824	±10% = K		42,5x33x33 = FB	52,5 = 52		
		900 = R2		1,0 = 105			42,5x35,5x33,5 = FC			
		1000 = 3A		1,2 = 125			42,5x36x24 = FD			
		1100 = A3		2,0 = 205			42,5x43x42 = FE			
		1200 = 3B		5,0 = 505			42,5x45x30 = FF			
		1600 = 3C		10 = 106			57,5x43,5x29,5 = HG			
		2000 = 3D		20 = 206			57,5x45x30 = HH			
							57,5x45x35 = HJ			
							57,5x45x45 = HK			
							57,5x50x35 = HL			
							57,5x55x40 = HM			

Jianghai Film Capacitors

Warranty: The information contained in this datasheet does neither form part of any quotation nor of a contract, it is believed to be accurate, reliable and up to date. Quality data are based on the statistical evaluations of a large quantity of parts and do not constitute a guarantee in a legal sense. However, agreement on these specifications does mean that the customer may claim for replacement of individual defective capacitors within the terms of delivery. We cannot assume any liability beyond the replacement of defective components. This applies in particular to any further consequences of component failure. Furthermore it must be taken into consideration that the figures stated for lifetime, failure rates and outlier percentages refer to the average production status and are therefore to be understood as mean values (statistical expectations) for a large number of delivery lots of identical capacitors. These figures are based on application experience and data obtained from preceding tests under normal conditions, or – for purpose of accelerated aging – more severe conditions. JIANGHAI reserves the right to change these specifications without prior notice. Any application information given is advisory and does not form part of any specification. The products are not primarily designed for use in life supporting applications, devices or systems where malfunction of these products can reasonably be expected to result in personal injury. JIANGHAI customers using or selling these products for use in such applications without prior written consent of JIANGHAI do so at their own risk and agree fully to indemnify JIANGHAI for any damage resulting from such improper use or sale. This version of the datasheet supersedes all previous versions.

Rated Voltage U_R: Rated Voltage is the maximum operating peak voltage of either polarity but of a non-reversing type waveform, for which the capacitor has been designed, for continuous operation. The Rated Voltage is marked on the capacitor and defined in the datasheets as **U_R**.

Operating voltage: The plastic film capacitor varies in the maximum applicable voltage depending on the applied voltage waveform, current waveform, frequency, ambient temperature (capacitor surface temperature), capacitance value, etc. Be sure to use capacitors within the specified values by checking the voltage waveform, current waveform, and frequency applied to them (In the application of high frequency, the permissible voltage varies with the type of the capacitor. Refer to the specification for details.).

Non-recurrent surge voltage Us: Peak voltage induced by a switching or any other disturbance of the system which is allowed for a limited number of times and for durations shorter than the basic period.

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

Maximum rate of voltage rise dV/dt: Maximum permissible repetitive rate of voltage rise of the operational voltage.

Charging and discharging: Because the charging and discharging current of capacitor is obtained by the product of voltage rise rate (dV/dt) and capacitance, low voltage charging and discharging may also cause deterioration of capacitor such as shorting and open due to sudden charging and discharging current. When charging and discharging, pass through a resistance of 20Ω/V to1000Ω/V or more to limit the current.

When connecting multiple film capacitors in parallel in withstand voltage test or life test, connect a resistance of 20Ω/V to1000Ω/V or more in series to each capacitor (For detail see the specification). In addition, capacitors must be discharged via a resistor before handling. Because the capacitors do not have any discharge resistors built-in, there is a risk of residual voltages and electric energy contents that maybe dangerous.

Operating Current: The pulse (or AC) current flowing through the capacitor is expressed as: I = C x dV/dt. Due to the fact that the dissipation factor of the capacitor is greater than zero, heat will be generated in any application where alternating currents or pulses occur. The resulting internal temperature rise may cause a severe deterioration of the capacitor's withstanding voltage, or may lead to a breakdown (even smoke or fire may result).Therefore, the safe use of capacitor must be within the rated voltage (or category voltage) and the permissible current ranges. The rated current must be considered by dividing into pulse current (peak current) and continuous current (rms current) depending on the break down mode, and when using, should make sure the both currents are within the permissible range.

Temperature range: Use film capacitors only within the specified operating temperature range.

Expected lifetime: The expected lifetime of the capacitor depends on the applied voltage and the hot spot temperature during operation. For capacitors applied in different situations, the obtainable average service lives are different. The capacitors used in DC-Link circuits will have an expected lifetime of approximately 100000 hours at rated voltage and 70℃ hot spot temperature.

Insulation voltage U_i: rms value of AC voltage designed for the insulation between terminals of the capacitor to case or earth. The insulation voltage is equal to the rated voltage of the capacitor, divided by $\sqrt{2}$, unless otherwise specified.

Voltage between terminals U_{TT}: Voltage between terminals (at 20°C, 10s): $1.5 \times U_{RDC}$

Voltage between terminals and case U_{TC}: Voltage between terminals and case (at 20°C, 10s): 2 × Ui + 1000 or 3000 (V_{AC}), whichever value is larger.

Buzzing noise: Any buzzing noise produced by a capacitor is caused by the vibration of the film due to the Coulomb force that is generated between the electrodes with opposite poles. If the wave-form with a high distortion rate or frequency is applied across the capacitor, the buzzing noise will become louder. But the buzzing noise is of no harm to the capacitor.

Surface over temperature Δ θ case: When current continuously flow through the capacitor, the temperature inside the capacitor will rise induced by dissipated heat. If the temperature exceeds the maximum allowed hot-spot temperature, it might cause a short circuit or fire. The limits described in the catalogue must not be exceeded and it's necessary to check the temperature on the capacitor's surface in operation.

Flame retardation: Although flame retarding PU resin or plastic case material is used in the coating or encapsulation of plastic film capacitors, continuous exposure to high temperature ambient or fire will break the coating layer or plastic case of the capacitor, and may lead to melting and ignition of the capacitor element.

Humid ambient: If used for a long time in a humid ambient, the capacitor might absorb humidity and oxidize the electrodes causing damage to the capacitor. In case of AC application, high humidity would increase the corona effect. This phenomenon causes a drop in capacitance and an increase of capacitor losses.

Storage conditions:

1) Capacitors must not be stored in corrosive atmospheres, particularly not when chlorides, sulfides, acids, lye, salts, organic solvents or similar substances are present.
2) It must not be stored in high temperature and/or high humidity environments. The following storage conditions must be kept (applicable only for storage in the original package):
   Temperature: ≤ 35 °C
   Humidity: ≤ 80% RH, no dew allowed on the capacitor.
   Storage time: ≤ 24 months (from the date marked on the capacitor's body or on the label sticking to the package)

Mounting: Other devices, which are mounted near the capacitor, should not touch the capacitor. Additional heat coming from other components near the capacitor may reduce the lifetime of the capacitor. Do never attempt to bend or twist the capacitor after mounting and avoid any mechanical stress on the terminals. Never exceed the max. permissible torques when tightening the terminal screws or the mounting bolt's cap nuts.

Caution during use of Capacitors: Do not touch the terminals of capacitors. Keep the capacitor free from conductive solution, such as acids, alkali and so on. Ensure that the operating environment of the equipment into which the capacitor has been built is within the specified conditions mentioned in the catalogue or specification sheets.

Definition of electrical parameters: Separate documents as application notes, equivalent circuit diagrams and so on are available on request.

Packaging: Please refer to the data book for details. Further information is available on request.

Assistance needed? Please contact JIANGHAI EUROPE GmbH +49 (0) 2151 652088-72 or info@jianghai-europe.com