



Polypropylene Film Capacitors Modules

Features

- Customer Specific Designs
- High ripple current capability
- Self-healing
- Long lifetime
- RoHS compliant (2011/65/EU)



Applications

- High power frequency converters
- Electric and hybrid electric vehicles

Item	Characteristics
Climatic Category	40/105/56 (IEC 61071)
Operating Temperature	-40 ~ +105 °C ($\theta_{\text{hotspot}} \leq 105$ °C) $\theta_{\text{hotspot}} = 85 \sim 105$ °C : Voltage Derating of 1,35% per °C for U_{RDC}
Storage Temperature	-40 ~ +105 °C
Rated Voltage U_{RDC}	450 ~ 3000V _{DC}
Capacitance Range	100 ~ 2000 μF
Capacitance Tolerance	± 10 % (K), ± 5 % (J)
Voltage between Terminals U_{TT}	$1,5 * U_{\text{RDC}}$ (20 °C, 10 s)
Voltage between Terminals and Case U_{TC}	3000 V _{AC} (20 °C, 50 Hz, 10 s)
Max. Overvoltage	$1,1 * U_{\text{RDC}}$ (30 % of time under load)
	$1,15 * U_{\text{RDC}}$ (30 min. per day)
	$1,2 * U_{\text{RDC}}$ (5 min. per day)
	$1,3 * U_{\text{RDC}}$ (1 min. per day)
	$1,5 * U_{\text{RDC}}$ (max. 30 ms, 100ms per day)
Insulation Resistance $R_i * C$	$\geq 10.000 \text{ M}\Omega * \mu\text{F}$ (20 °C, 100 V _{DC} , 1 min)
Dielectric Dissipation Factor $\tan \delta_o$	$\tan \delta_o \leq 2 * 10^{-4}$ (20 °C, 100 Hz)
Life Time Expectancy	≥ 100.000 h, failure rate ≤ 50 FIT ($\theta_{\text{hotspot}} \leq 70$ °C, U_{RDC})
Reference Standard	IEC 61071:2007, REACH, RoHS

Ratings (Proposals) for CBB 135 DV Series

U_{R} (V)	C_{R} (μF)	$\hat{I}^{(1)}$ (A)	$R_{\text{s}}^{(2)}$ (m Ω)	$I_{\text{max}}^{(3)}$ 85 °C (A)	L_{s} (nH)	W ± 1.0 (mm)	H ± 1.0 (mm)	T ± 1.0 (mm)	Example	Ordering Code
450V_{DC}	700	7000	0.5	130	15	195	42	85	Drawing 1	FCS2WDV707*B089811E3
	2W	1000	4000	0.6	150	30	268	53	101.6	Drawing 2
500V_{DC}	500	2500	0.8	90	15	206	42	72	Drawing 3	FCS2HDV507*B101021E3
	2H	850	5500	0.5	180	15	275	72	70	Drawing 4
800V_{DC}	300	3000	0.5	125	18	188	57	56	Drawing 5	FCS2KDV307*B109021E3
	400	2000	0.6	110	20	193	76	79	Drawing 6	FCS2KDV407*B059121E3
	500	4000	0.6	150	15	275	72	70	Drawing 7	FCS2KDV507*B010021E3
	500	6000	0.6	160	30	194.5	69.5	100	Drawing 8	FCS2KDV507*B051021E3
	560	8000	0.4	200	24	209.5	84.5	101	Drawing 9	FCS2KDV567*B037021E3
	850	8000	0.4	200	20	376	97	67	Drawing 10	FCS2KDV857*B018021E3
	1000	4000	0.8	160	30	268	68	101.6	Drawing 11	FCS2KDV108*B015021E3

(1) Maximum permissible peak current

(2) Series resistance at 20°C ambient temperature at 10kHz

(3) Maximum permissible r.m.s. ripple current at 10kHz

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

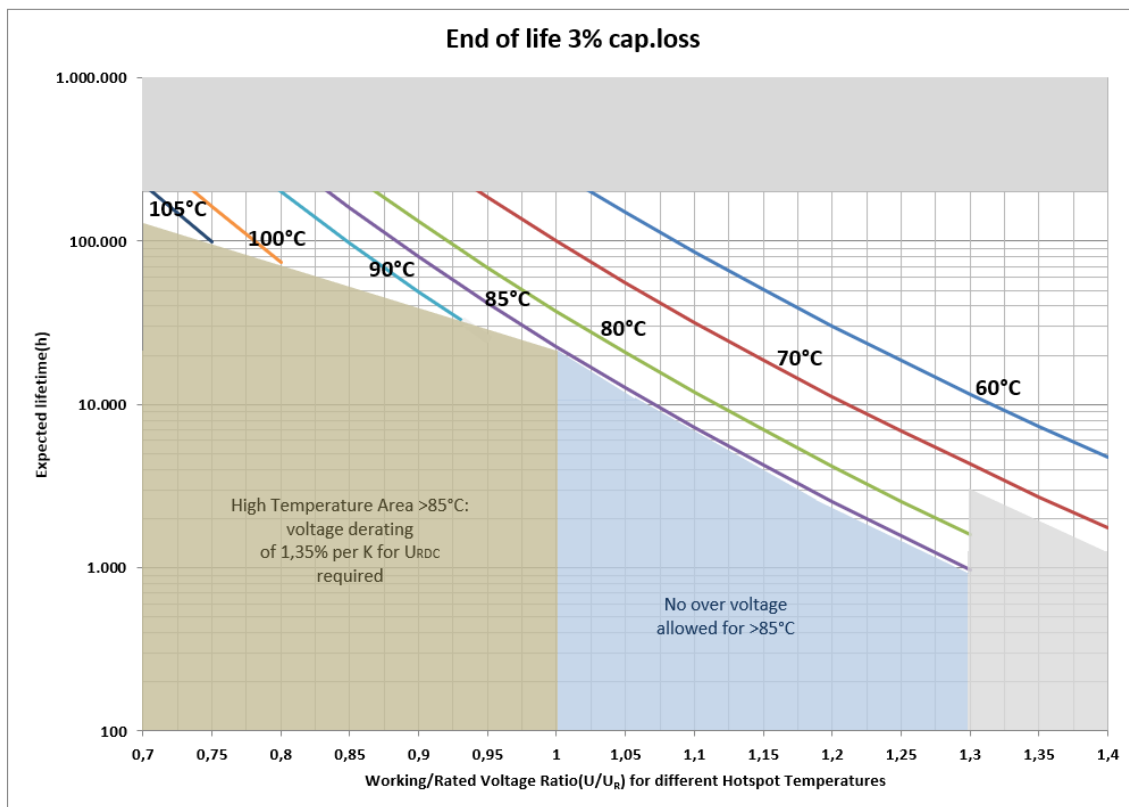


Marking (Example)

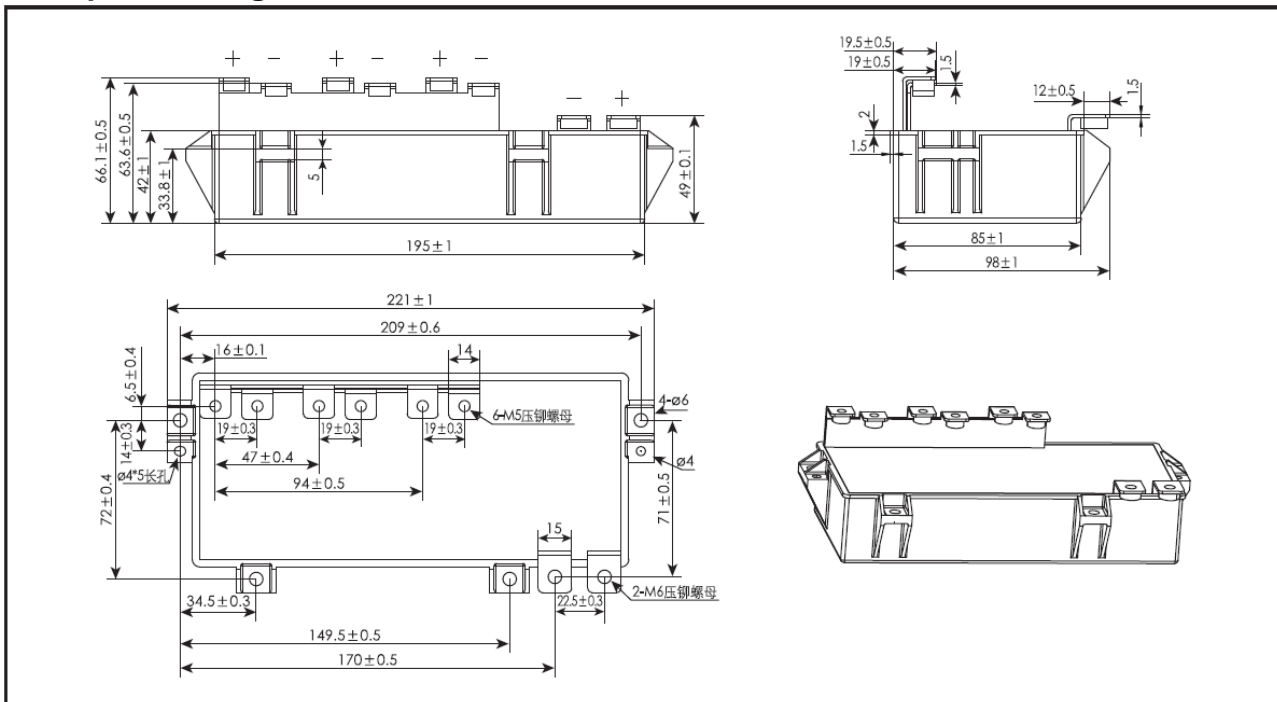
	—	1
CBB135	—	2
500μF \pm 10%	—	3
U_R=800V_{DC} SH	—	4
U_{TC}=3000V 50/60Hz	—	5
-40~+105°C IEC 61071	—	6
Discharge before handing	—	7
E03F03103	—	8

No.	Item
1	Brand
2	Series Designation
3	Capacitance and Tolerance
4	U _R Rated Voltage
5	U _{TC} Voltage between Terminals and Case, Frequency
6	Temperature Range, Reference Standard
7	Safety Warning
8	Date Code

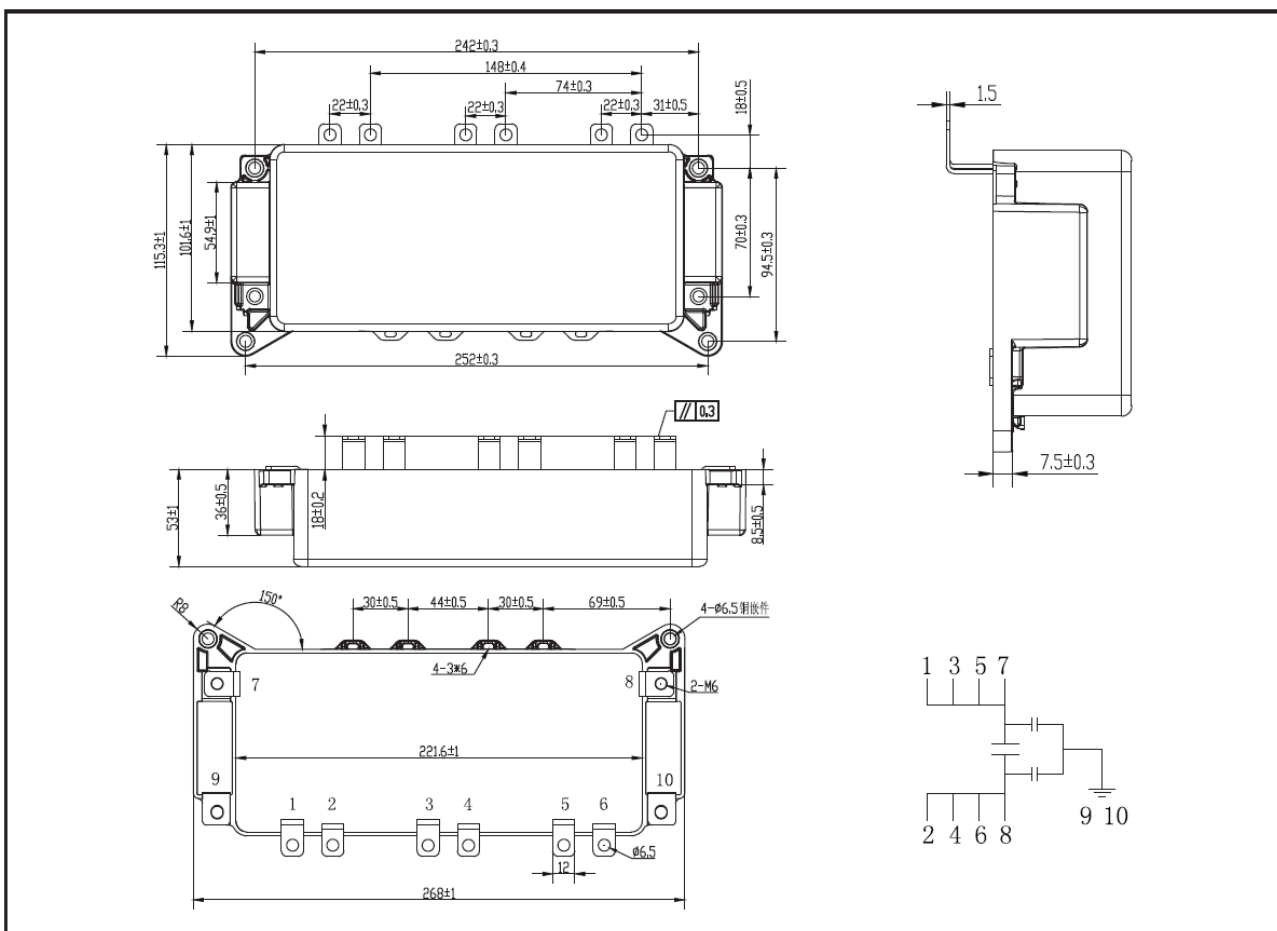
Life Time Expectancy



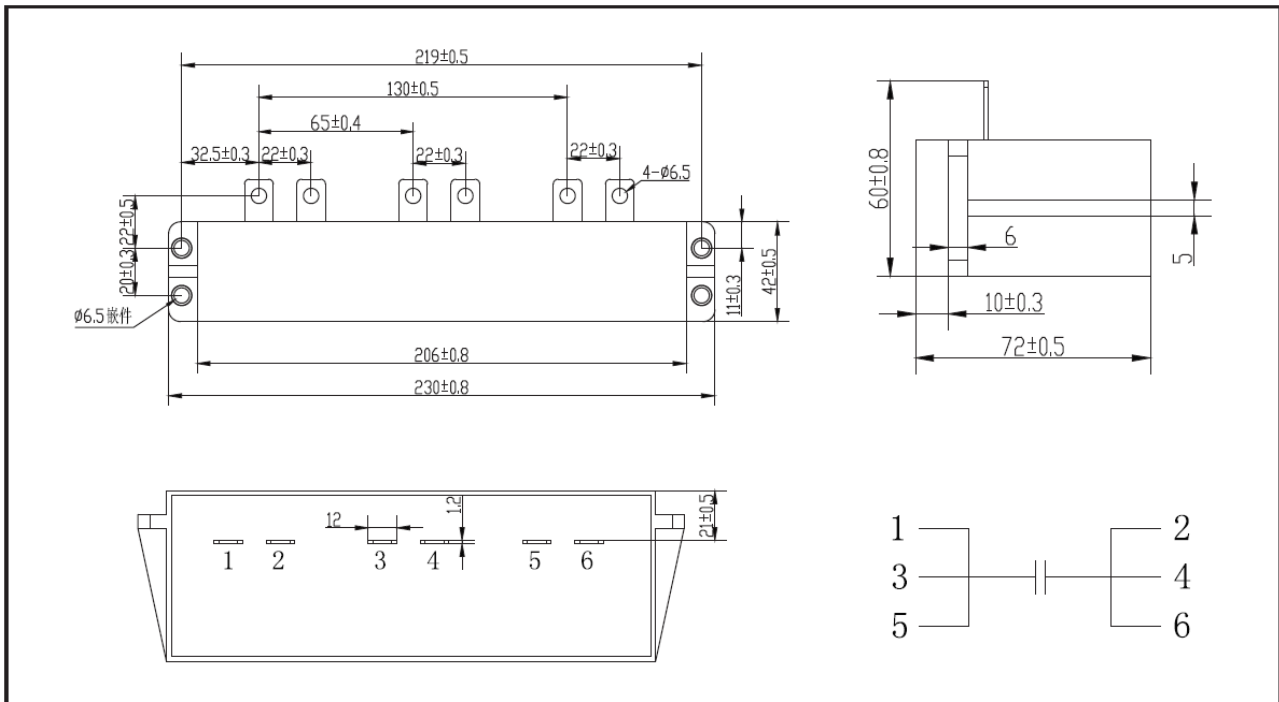
Example Drawing #1



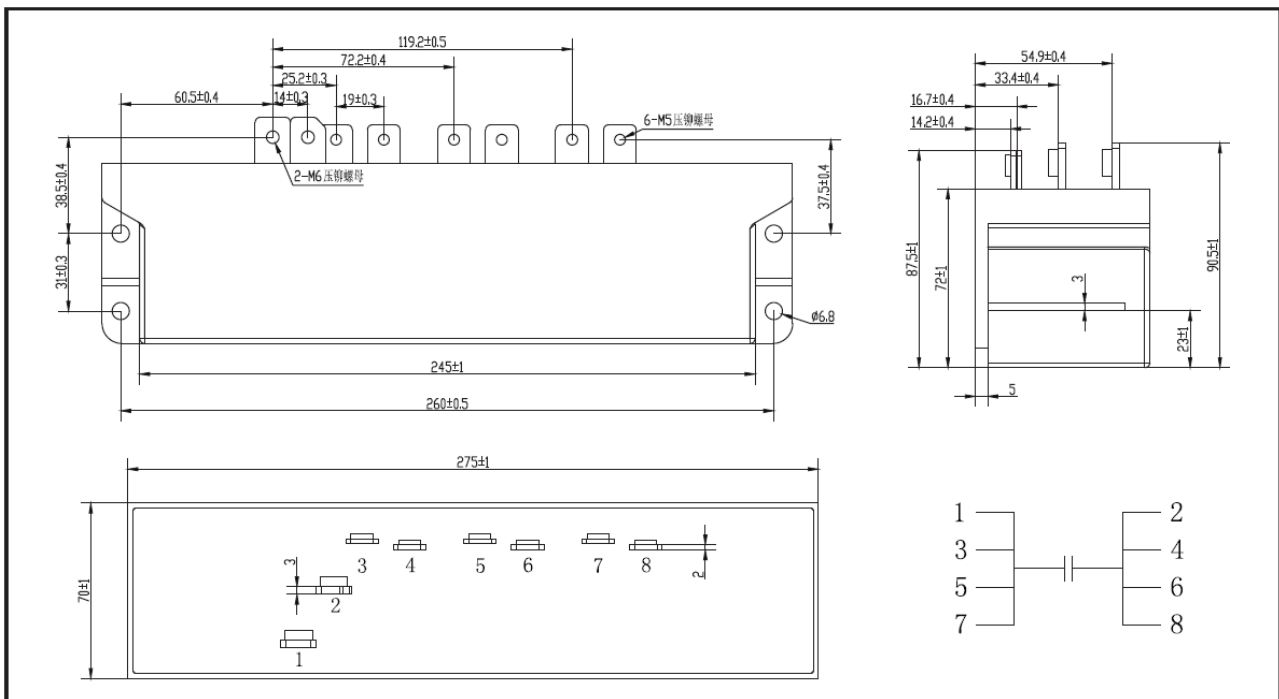
Example Drawing #2



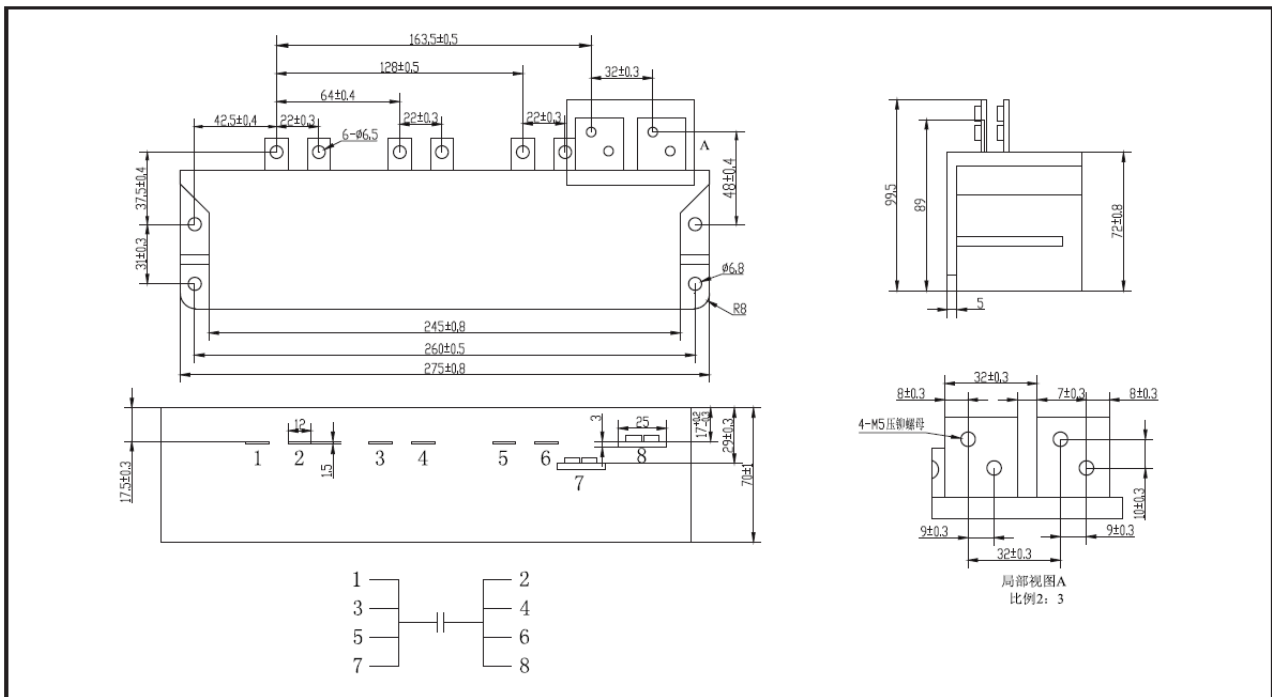
Example Drawing #3



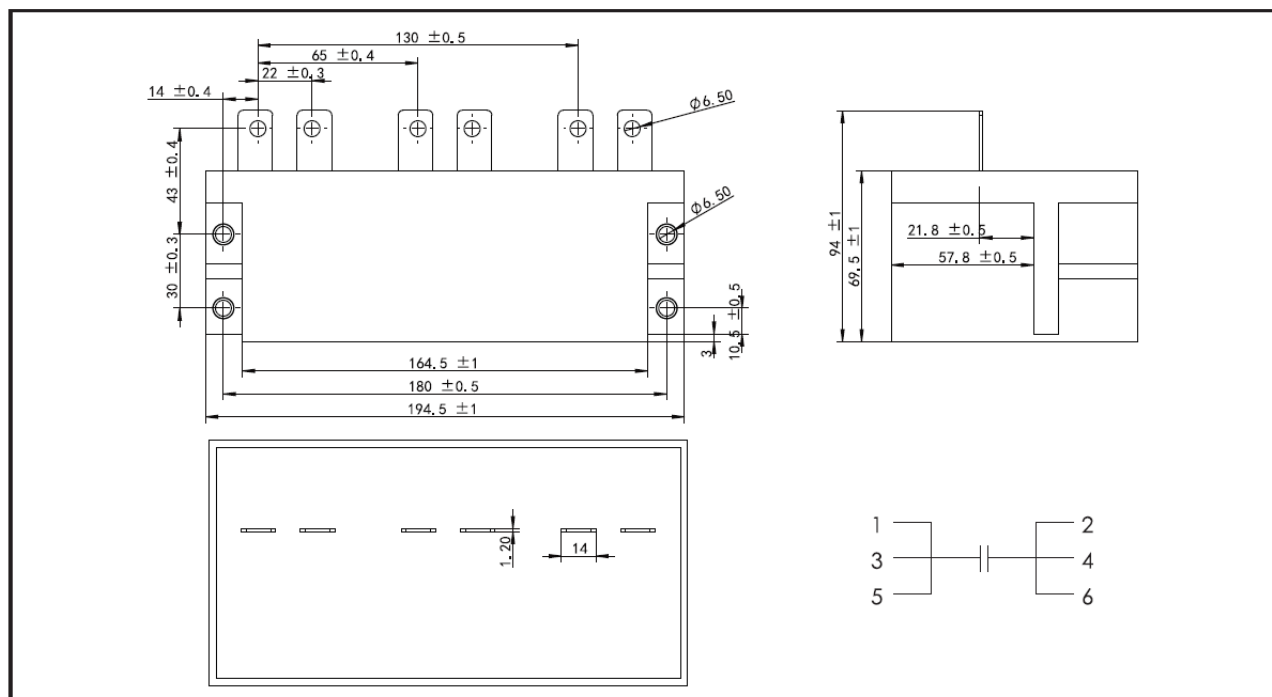
Example Drawing #4



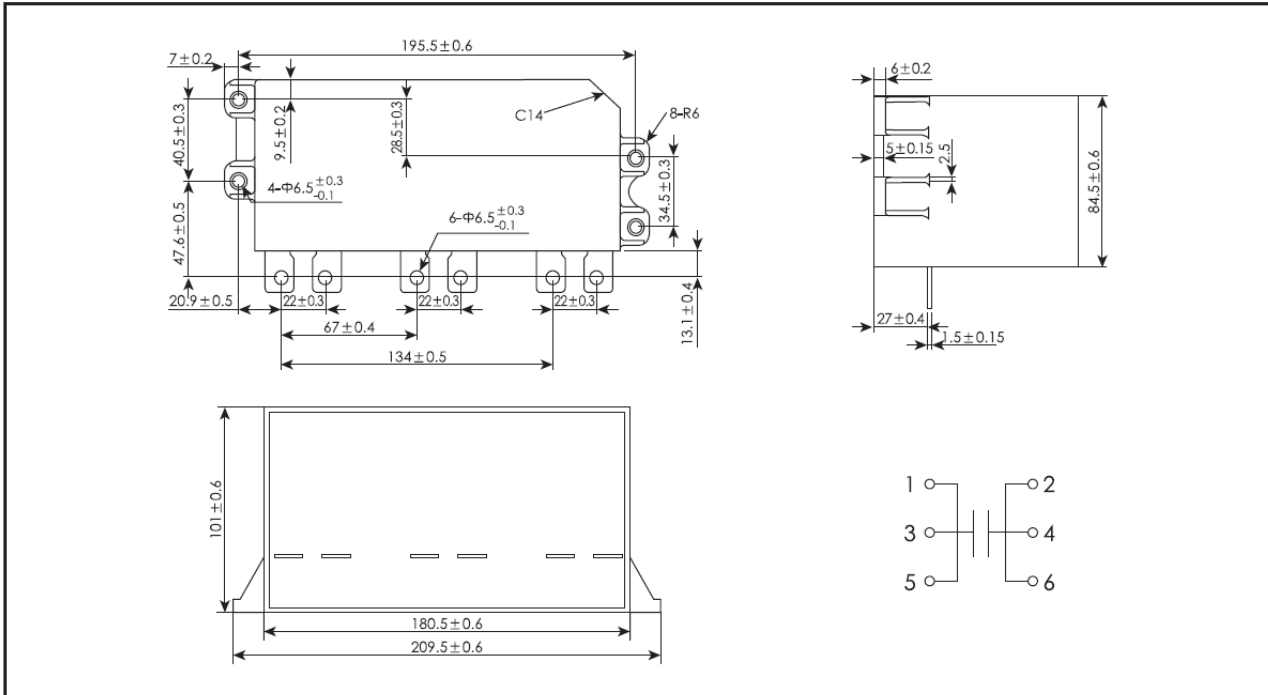
Example Drawing #7



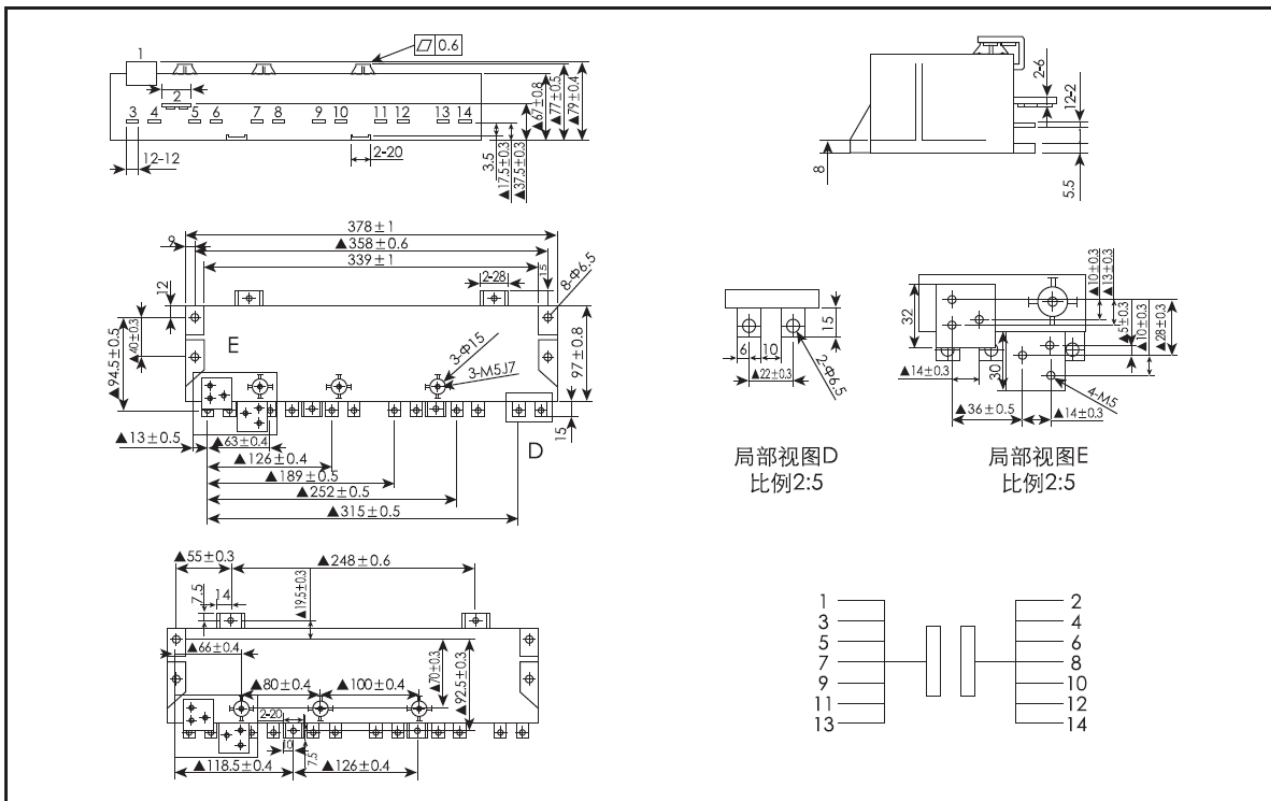
Example Drawing #8



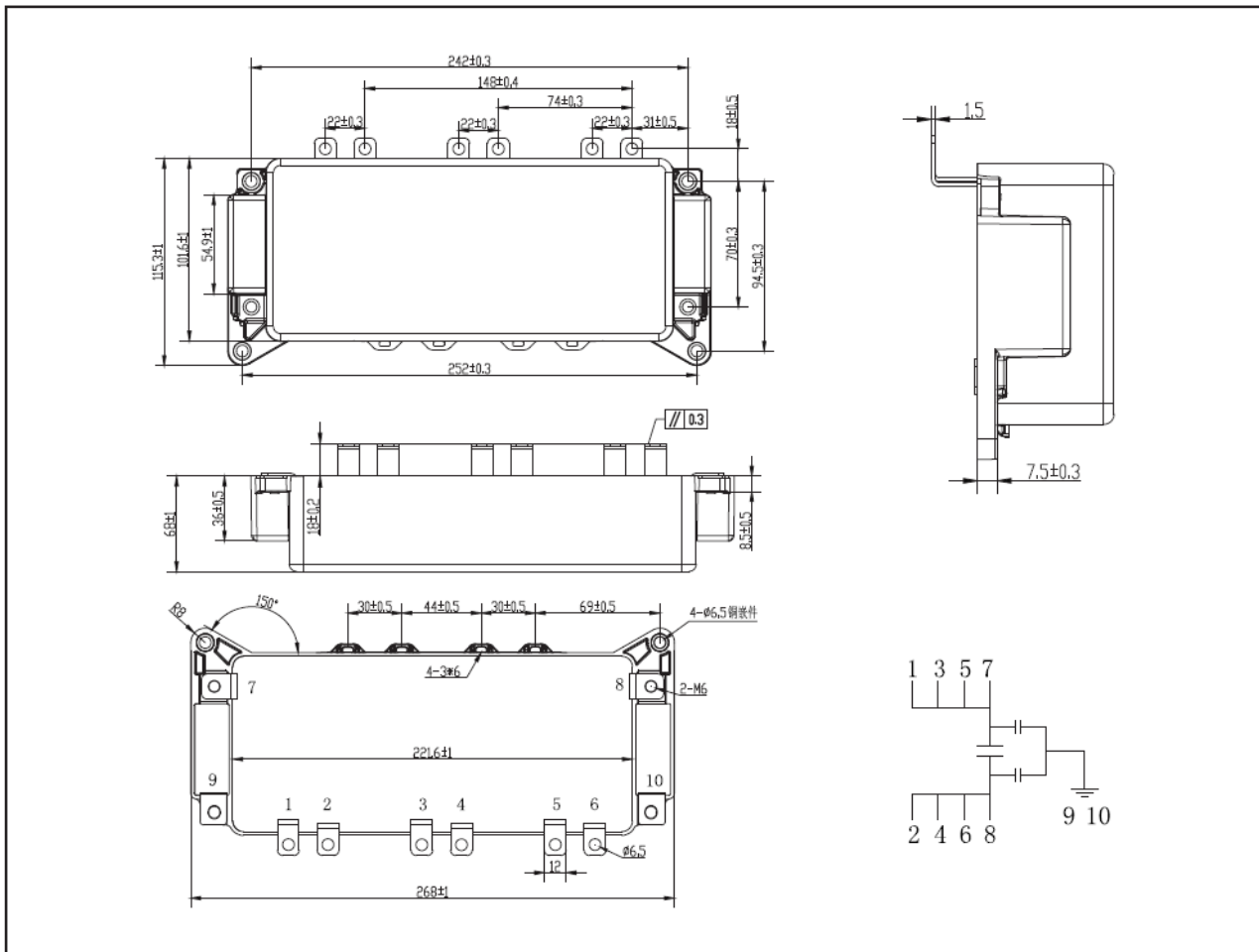
Example Drawing #9



Example Drawing #10



Example Drawing #11



Ordering Code

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
FC	S	2W	DV	117	K	B	0	1	0	0	2	1	0	0	2	1	E	3	
Capacitor type	Product shape	DC rated voltage code	Series code	Capacitance code	Capacitance tolerance	Dimension Code W x H x T				Hole Shape	Terminal Pitch	Mounting Hole	For internal use						
Film cap. = FC	square = S	450 = 2W 500 = 2H 800 = 2K	CBB135 = DV	500 = 507 1000 = 108	±5% = J ±10% = K	275 x 72 x 70 = B010 376 x 97 x 67 = B018 other on request				6,5 = 0 5,5 = 3 M6 = 1 M5 = 8	19 = 1 22 = 2	Without = 0 With = 1							

For design requests please kindly contact your local sales office.

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 U_s : 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 $20\Omega/V$ to $1000\Omega/V$ or more to limit the current.

When connecting multiple film capacitors in parallel in withstand voltage test or life test, connect a resistance of $20\Omega/V$ to $1000\Omega/V$ 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: $I = C \times dV/dt$. 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°C 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): $2 \times U_i + 1000$ 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 $\Delta \theta$ 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: $\leq 35^\circ\text{C}$
 Humidity: $\leq 80\% \text{ RH}$, 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.