CD **269** PH Series

4 000h at 125°C

- High Reliability at High Temperature
- Automotive
- Professional Long-Life Applications

CD **263** BK → (lower ESR) CD **287** GC → (125°C) CD **269** PH → (longer life) CD **269L** HL

CD **11GL** GL → (higher voltage) CD **269L** HL

Radial

Item	Characteristics
Operating Temperature Range (°C)	-40 ~ +125
Voltage Range (V)	10 ~ 63
Capacitance Range (µF)	47 ~ 3300
Capacitance Tolerance (20°C, 120Hz)	± 20%
Leakage Current (µA)	After 2 minutes at 20°C application of rated voltage, leakage current is less than 0,04CV. C: Nominal Capacitance (µF) V: Rated Voltage (V)
Dissipation Factor (20°C, 120Hz)	

Rated Voltage (V)	10	16	25	35	50	63
Tan δ (max)	0,20	0,16	0,14	0,12	0,10	0,09

When nominal capacitance is more than 1 000µF add 0,02 on tan δ value for each 1 000µF more.

	Useful Life		Load Life	Endurance Test	Shelf Life
Lifetime	**4 000h**	>200 000h	2 000h	3 000h	1 000h
Leakage Current	Not more than specified value		Not more than specified value	Not more than specified value	Not more than specified value
Capacitance Change	Within ± 50% of initial value		Within ± 30% of initial value	Within ± 30% of initial value	Within ± 30% of initial value
Dissipation Factor	Not more than 500% of specified value		Not more than 300% of specified value	Not more than 300% of specified value	Not more than 300% of specified value
Condition: Applied Voltage Applied Current Applied Temperature Outlier Percentage	 U_R I_R 125°C ≤ 1%	 U_R 1,4 x I_R 50°C ≤ 1%	 U_R I_R 125°C 0%	 U_R I_R = 0 125°C IEC 60384	 U_R = 0 I_R = 0 125°C 0%

After test: U_R to be applied for 30min >24h before measurement

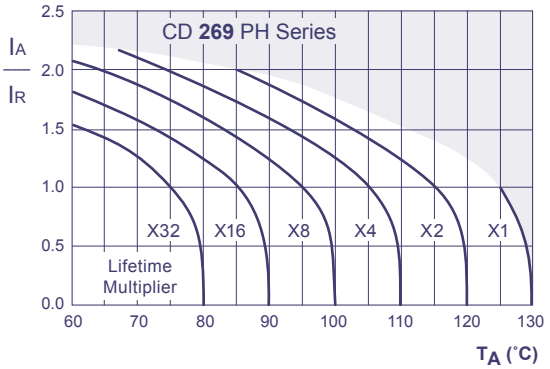
Multiplier for Ripple Current

Frequency Coefficient

Frequency / Capacitance (µF)	120Hz	1kHz	10kHz	100kHz
47 ~ 100	0,40	0,75	0,90	1,00
220 ~ 330	0,50	0,85	0,95	1,00
470 ~ 1000	0,60	0,88	0,96	1,00
2200 ~ 3300	0,75	0,90	0,98	1,00

Multiplier for Lifetime

Lifetime Diagram

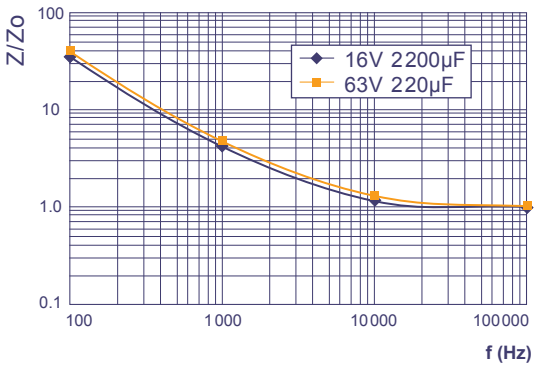


I_A = actual ripple current at 100kHz, I_R = rated ripple current at 100kHz, 125°C
Multiplier of Useful Life as a function of ambient temperature and ripple current load

Ratings for CD **269** PH Series

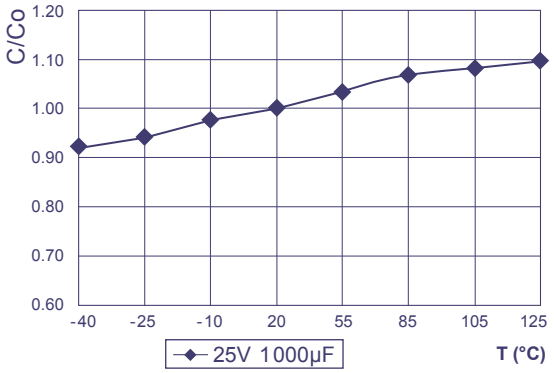
$U_{R.DC}$ (Surge Voltage) Code	Rated Capacitance	Max ESR 20°C, 120Hz	Max Imp 20°C, 100kHz	Max Imp -10°C, 100kHz	Max Ripple Current 125°C, 100kHz	Size Ø D x L
(V)	(µF)	(Ω)	(Ω)	(Ω)	(mArms)	(mm)
10 (13) 1A	330	0,80	0,33	0,66	340	8 x 11,5
	470	0,57	0,24	0,48	500	10 x 12,5
	1000	0,27	0,12	0,24	770	10 x 20
	2200	0,14	0,061	0,13	1250	12,5 x 25
	3300	0,10	0,050	0,10	1380	16 x 25
16 (20) 1C	220	0,97	0,33	0,66	340	8 x 11,5
	330	0,65	0,24	0,48	500	10 x 12,5
	470	0,46	0,20	0,40	630	10 x 16
	1000	0,22	0,077	0,16	920	12,5 x 20
	2200	0,11	0,050	0,10	1380	16 x 25
25 (32) 1E	220	0,85	0,23	0,46	480	8 x 16
	330	0,57	0,20	0,40	630	10 x 16
	470	0,40	0,12	0,24	770	10 x 20
	1000	0,19	0,061	0,13	1250	12,5 x 25
35 (44) 1V	100	1,60	0,33	0,66	340	8 x 11,5
	220	0,73	0,20	0,40	630	10 x 16
	330	0,49	0,12	0,24	770	10 x 20
	470	0,34	0,077	0,16	920	12,5 x 20
	1000	0,16	0,050	0,10	1380	16 x 25
50 (63) 1H	100	1,33	0,36	0,72	420	10 x 12,5
	220	0,61	0,20	0,40	655	10 x 20
	330	0,41	0,12	0,24	780	12,5 x 20
	470	0,29	0,10	0,20	1060	12,5 x 25
63 (79) 1J	47	2,55	0,68	2,1	245	8 x 11,5
	100	1,20	0,38	1,2	425	10 x 16
	220	0,55	0,18	0,54	665	12,5 x 20
	330	0,37	0,14	0,42	900	12,5 x 25

Impedance Ratio



Z = actual Impedance of each frequency at 20°C
Zo = Impedance at 100kHz, 20°C
Impedance Ratio as a function of frequency

Capacitance Ratio



C = actual capacitance of each temperature at 100Hz
Co = Capacitance at 20°C, 100Hz
Capacitance Ratio as a function of temperature (typical curve)

Customer specific products and adaptions on request.

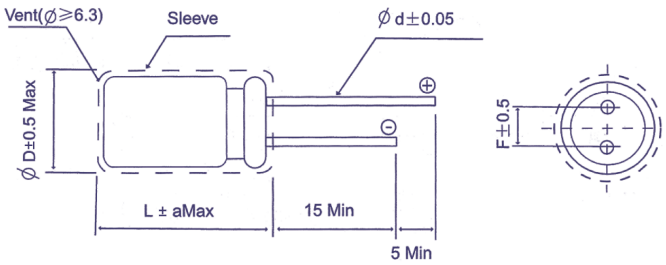
Assistance needed? Please contact JIANGHAI EUROPE GmbH +49 (0) 2151 652088-72 or info@jianghai-europe.com

Order Code **Radial & Snap-In Electrolytic Capacitors**

EC	R	1V	QX	221	M	LL	50	1012			JExxxxx
Technology	Terminal Type	Rated Voltage Code	Series Code	Capacitance Code	Capacitance Tolerance	Terminal Style	Terminal / Pitch	Dimension	Material Code	Rubber Type	for Specials only
EC = Electrolytric Capacitor	Radial = R	6,3V = 0J	CD **110** = PT	0,1 = 0R1	**±20% = M**	Radial:	2,0mm = 20	4x7 = 0407	- = Standard	- = Standard	
	Snap-In = S	10V = 1A	CD **11GL** = GL	0,47 = R47	±10% = K	**Taped = FF**	2,5mm = 25	5x11,5 = 0511	V = PVC	F = Flat Rubber	
		16V = 1C	CD **261** = LK	1,0 = 010	+30 / -10% = Q	**Long Lead = LL**	3,5mm = 35	10x20 = 1020	E = PET	S = Stand-Off	
		20V = 1D	CD **261X** = QX	2,2 = 2R2	+20 / -0% = R	Cut 5,0mm = CB	5,0mm = 50	35x80 = 3580			
		25V = 1E	CD **262** = QM	100 = 101	±15% = L	**Cut 4,5mm = CC**	7,5mm = 75	45x100 = 45100			
		35V = 1V	CD **263** = BK	1000 = 102	+20 / -10% = V	Cut 4,0mm = CD	10,0mm = 10				
		40V = 1G	CD **269** = PH	10000 = 103		Cut 3,5mm = CE	12,5mm = 12				
		50V = 1H	CD **269L** = HL			Cut 3,0mm = CF					
		63V = 1J	CD **281** = LL			on request: alternative lead forms (Keyed Polarity, axial, 90° - bended, others)					
		80V = 1K	CD **281L** = LH								
		100V = 2A	CD **287** = GC								
		125V = 2B	CD **28L** = QL								
		160V = 2C	CD **293** = BZ			**Snap-In:**					
		180V = 2K	CD **294** = BW			4,0mm Pin Length = T/L4	**2 Pin = P2**				
		200V = 2D	CD **295** = BC			**6,3mm Pin Length = T/L6**	3 Pin = P3				
		250V = 2E	CD **295S** = BS			Soldering Pin = S4	4 Pin = P4				
		385V = 2J	CD **296** = KC			on request: alternative pin types	5 Pin = P5				
		400V = 2G	CD **296L** = FL				6 Pin = P6				
		415V = 2P	CD **297** = BB			**preferred**					
		420V = 2X	CD **299** = PG								
		450V = 2W	CD **29C** = QC								
		500V = 2H	CD **29D** = HR								
		550V = 2Y	CD **29G** = BA								
		575V = 2Z	CD **29H** = QH								
		600V = 2S	CD **29L** = QL								
		630V = J2	CD **29U** = CU								
			CD **801** = ZP								
			CD **804** = ZM								
			CD **811** = ZN								
			CD **840** = ZQ								
			CD **891** = ZJ								
			CD **892** = ZL								
			CD **895** = ZK								

Technical Specification **Radial Type Electrolytic Capacitors**

Dimensions for loose, long-lead type (bulk)
Order Code: LL

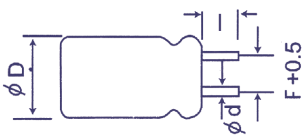
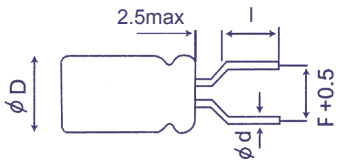


L	L ≤ 7					L ≥ 11									
Ø D	3	4	5	6,3	8	5	6,3	8	10	12,5	16	18	20	22	25
F	1,0	1,5	2,0	2,5	3,5	2,0	2,5	3,5	5,0		7,5		10,0		12,5
Ø d	0,4	0,45				0,5		0,6			0,8			1,0	
a_{Max}	1,0					2,0							2,5		

For diameter 20 pitch 7,5 on request.

in mm

Dimensions for loose, short cut leads (bulk)
Order Code: CC (CB, CD, CE, CF)

Straight Lead			Bended Lead		
					
Code	CB	**CC**	CD	CE	CF
l	5,0 ± 0,5	**4,5 ± 0,5**	4,0 ± 0,5	3,5 ± 0,5	3,0 ± 0,5

preferred

in mm

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

Dimensions for Ammopack Taping for Electrolytic Capacitors
Order Code: FF (FD)

Fig 1

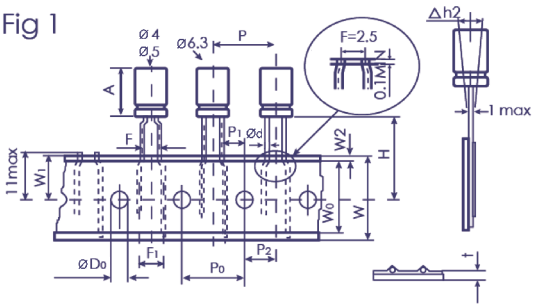


Fig 2

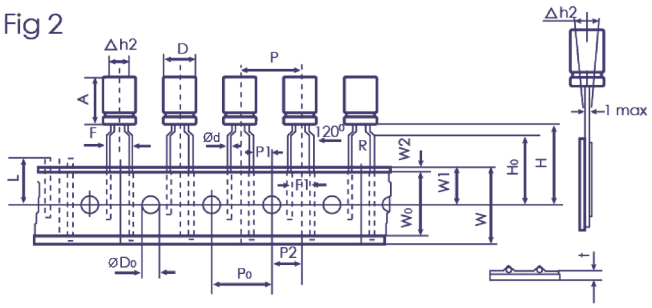


Fig 3

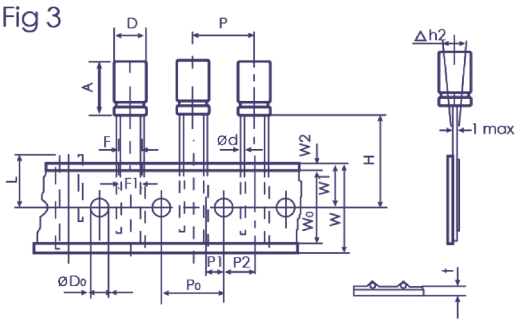
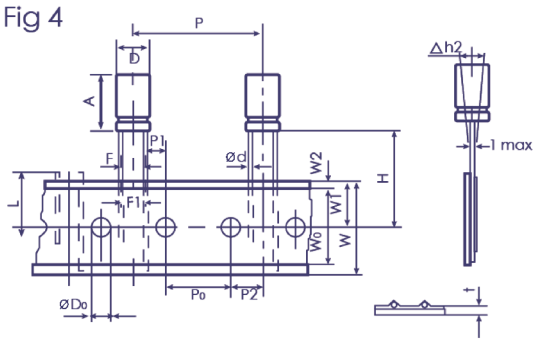


Fig 4



item	D	A	Ød	P	P0	P1	P2	F	F1	W	W0	W1	W2	H	H0	L	ØD0	Δh2	t	Fig.	Taping Code
tol.	± 0,5	± 2,0	± 0,05	± 1,0	± 0,2	± 0,5	± 1,0	+ 0,8 - 0,2	± 1,0	± 0,5	min	± 0,5	max	+ 0,75 - 0,5	± 0,5	max	± 0,5	max	± 0,2		
Nominal	4	7	0,45	12,7	12,7	5,1	6,35	2,5	3,5	18,0	12,0	9,0	1,5	18,5	-	11,0	4,0	1,0	0,7	1	FF
						3,85		5	5					17,5	16,0					2	FF
	5	7	0,45	12,7	12,7	5,1	6,35	2,5	3,5	18,0	12,0	9,0	1,5	18,5	-	11,0	4,0	1,0	0,7	1	FF
						3,85		5	5					17,5	16,0					2	FF
		11,5~15	0,5	12,7	12,7	5,1	6,35	2,5	3,5	18,0	12,0	9,0	1,5	18,5	-	11,0	4,0	1,0	0,7	1	FF
						3,85		5	5						16,0					2	FF
	6,3	7	0,45	12,7	12,7	5,1	6,35	2,5	3,5	18,0	12,0	9,0	1,5	18,5	-	11,0	4,0	1,0	0,7	1	FF
						3,85		5	5					17,5	16,0					2	FF
		11,5~15	0,5	12,7	12,7	5,1	6,35	2,5	3,5	18,0	12,0	9,0	1,5	18,5	-	11,0	4,0	1,0	0,7	1	FF
						3,85		5	5						16,0					2	FF
	8	11,5~20	0,6	12,7	12,7	4,6	6,35	3,5	3,5	18,0	12,0	9,0	1,5	18,5	-	11,0	4,0	1,0	0,7	3	FF
						3,85		5	5					20,0	16,0					2	FF
	10	12,5~36	0,6	12,7	12,7	3,85	6,35	5	5	18,0	12,0	9,0	1,5	18,5	-	11,0	4,0	1,0	0,7	3	FF
	12,5	15~36	0,6	15	15	5,0	7,5	5	5	18,0	12,0	9,0	1,5	18,5	-	11,0	4,0	1,0	0,7	3	FF
				25,4	12,7	3,85	6,35													4	FD
	16	15~31,5	0,8	30	15	3,75	7,5	7,5	7,5	18,0	12,0	9,0	1,5	18,5	-	11,0	4,0	1,0	0,7	4	FD
	18	15~25,5	0,8	30	15	3,75	7,5	7,5	7,5	18,0	12,0	9,0	1,5	18,5	-	11,0	4,0	1,0	0,7	4	FD
	Other taping styles available on request																				in mm

Jianghai Electrolytic Capacitors

Warning: JIANGHAI is not responsible for any extent of possible damages to persons or things, of any kind, caused by the improper application of and/or operating conditions harmful to electrolytic capacitors.
Misapplications which may cause failures include, but are not limited to: * Ripple current or peak current or voltage above specification, * Operating voltage above surge voltage specified, * Temperature exposure beyond specified operating temperature range.
Examples of harmful operating conditions comprise, but are not limited to: * unusual storage or transport temperatures, * excessive and/or rapid changes of ambient temperature or humidity, * heavy mechanical shock or vibration, * corrosive and abrasive particles in the ambient (cooling) air, * conducting dust in the ambient (cooling) air, * oil or water vapor or corrosive substances, * explosive gas or dust, * operation under extremely high or low ambient pressure conditions (below or above sea level), * superimposed radio frequency voltages, * radioactivity. In case of doubt about the impact of operating conditions on capacitor performance, please contact JIANGHAI.

Personal Safety: Electrical or mechanical misapplication of electrolytic capacitors may be hazardous. Personal injury or property damage may result from explosion of a capacitor or from the expulsion of electrolyte due to mechanical disruption or the release of a safety vent of a capacitor.
In case of injury or skin or eye exposure to electrolyte, immediately seek professional medical advice. Before using electrolytic capacitors in any application, please read these Handling Precautions, familiarizing thoroughly with the information contained herein. Please check before using any of our electrolytic capacitors if these components fulfill the requirements of your application and warnings and instructions for use are followed.

Warranty: The information contained in this catalogue does not form part of any quotation or contract, 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 will not assume any liability beyond the replacement of defective components. This applies in particular to any consequential damage caused by 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 (statistic 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 support 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 catalogue supersedes all previous versions. Latest versions of datasheets can be found on our homepage: www.jianghai-europe.com
For more details on precautions and guidelines for aluminum electrolytic capacitors, please refer to CENELEC Technical Report CLC/TR 50454:2008 E, "Guide for the application of aluminum electrolytic capacitors".

Polarity: Electrolytic capacitors are polar and shall never be used with incorrect polarity, as there is a possible danger of shorting or destruction.

Rated Voltage Ur: The Rated Voltage is marked on the capacitor and defined in the datasheets as Ur. This voltage should never be exceeded and is the maximum peak voltage including any ripple voltages allowed to avoid a shortening of the lifetime or damage of the capacitor. When a ripple current is applied to the capacitor, the sum of the peak ripple voltage and bias DC voltage shall never exceed the Rated Voltage. It might be necessary to lower the maximum allowed bias DC voltage, when certain ripple currents are applied to the capacitor.

Surge Voltage: Maximum Voltage, which may be applied to the capacitor for short periods of time: max. 1000 cycles of 30 sec. per 6 min., max. 5 pulses per hour. Capacitance drift +/- 15% max.

Reverse Voltage: Reverse voltages or voltages < 0 V are not allowed.

Recovery Voltage: After charging and discharging a capacitor there might still be a voltage between the terminals, which is built up internally due to dielectric absorption. Please take action that this load does not damage other devices or scare the workers during production (sparks possible).

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

Over-Current: Currents exceeding the rated ripple currents should be avoided.

Ripple Current/Voltage: The combined value of DC voltage and peak AC voltage (due to ripple current) shall not exceed the rated voltage and shall never be < 0 V. Use of aluminum electrolytic capacitors under ripple current with wide amplitudes is equivalent to quick charge-discharge operation.

Rapid Charging/Discharging: Rapid Charging/Discharging generates severe heat and gas may be emitted which may lead to explosion. Consult JIANGHAI about specially designed capacitors suitable for such kind of applications. Example: Servo Drive Application

Balancing resistors: Balancing resistors should be utilized if capacitors are used in serial connection. Please choose low-tolerance resistors to limit voltage drift.

Charge-Discharge Proof: JIANGHAI capacitors are charge-discharge proof, which means that 10^6 switching cycles will cause capacitance reduction of less than 10%.

Lifetime: There are many different lifetime definitions known without any true standard definition. Take special care when capacitors are compared that the capacitors fulfill the needed requirements. JIANGHAI publishes all conditions to be as transparent as possible. In the case of lifetime tests with additional ripple currents, the bias DC voltage must be reduced, so that the sum of bias DC voltage and the peak of the ripple voltage does not exceed the Rated Voltage Ur.

- **Load Life:** Period of time, during which the technical parameters of all capacitors stay within the given limits. JIANGHAI defines this without allowing for outliers.
- **Useful Life:** defined like load life, but a given percentage of components may be outside the defined limits. Useful life data are usually calculated within a confidence level of 60%. See further details in specifications and data sheets. Outlier percentage: ≤ 1%.
- **Endurance Test:** IEC 60384-4 defines the acceptable drift criteria of electrical parameters after the endurance tests (continuous voltage test).
- **Shelf Life:** Definition of time with acceptable drift of capacitor parameters after storage at upper category temperature without load. JIS-C-5102-1994

Vibration and mechanical stress: Capacitors are sensitive to vibration and mechanical forces applied on the leads. Do not use capacitors, which have been dropped onto a rigid surface.

Insulation: If any defect of the sleeve is visible, the component should not be used – same for any kind of visible damage. A capacitor should be electrically isolated from the following parts: Aluminum case, cathode lead wire, anode lead wire and circuit pattern, and auxiliary terminal of snap-in type. The PVC sleeve is not recognized as an isolator and therefore the standard capacitor should not be used in a place where insulation function is needed. Please contact JIANGHAI if higher grade of insulation is required.

Environmental Conditions:
- Avoid direct contact with water, salt solution, oil, dewing conditions
- Halogens generally, especially fumigation treatment with bromides and flame retardent agents containing halogens must be avoided.
- Avoid exposing to direct sunshine, ozone, ultraviolet rays and x-ray radiation.
- Air Pressure: Max. 150kPa, min. 8kPa.
- No heavy air pressure changes are allowed.
- Do not use or store in an environment containing any hazardous gas (e.g., hydrogen sulphide, sulphurous acid, nitrous acid, chlorine, ammonia, bromine, methyl bromide, other halogens) or acidic or alkaline solutions.

Storage:
- Temperature 5 to 35°C, Relative Humidity below 75%.
- Electrolytic capacitors may accumulate charge naturally during storage. In this case discharge through a 1kOhm resistor before use (Recovery Voltage).
- Leakage current may be increased after long storage time. In this case the capacitor should be subjected to the rated voltage treatment through a 1kOhm resistor before use for 1 hour, then it should be discharged through a resistor of about 1 Ohm/Volt.
- Storage times above 1 year should be avoided or rated voltage treatment may be necessary.
- In accordance to IEC 60384-4 electrolytic capacitors are subject to a reforming process before acceptance testing. Rated voltage is applied via a series resistance (100Ω: Ur ≤ 100VDC, 1kΩ: Ur > 100VDC).

Soldering: Soldering conditions (temperature, times) should be within specified conditions, especially for SMD components. Avoid high soldering temperatures as this may reduce lifetime or damage the capacitor. Do never dip the capacitor body into molten solder. Flux should not be adhered to the capacitor's body but only to its terminals. For details and different methods please contact us.

Cleaning and Coating: Do not use fixing agents or cleaning substances containing halogens and the epoxy resin coating materials. Also never use solvents containing: Halogenated hydrocarbons, alkali, petroleum, trichloroethylene/-ethane, xylene, acetones, trichlorotrifluoroethane, tetrachloroethylene, methylenechloride, chloroform, acetates, ketones, esters, chlorides and bromides. In case of questions see detailed instructions.

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 bend or twist the capacitor after soldering to avoid stress on the leads. Radial capacitors are not protected against mechanical forces on the leads. Forces on the pins might damage the capacitor. No printed circuit board tracks are allowed between the lead pads of the capacitor. Screw Terminal capacitors should only be mounted in an upright position.

Transport: Avoid fumigation and spraying insecticides (especially with bromides) in the import or export procedures which can cause corrosion. This applies also to the finished devices.

Maintenance: Periodical inspection should be carried out for the capacitor: visual inspection to check pressure relief open or leakage of electrolyte, electrical characteristics as leakage current, capacitance, and dissipation factor.

Electrolyte and Separator paper: Electrolyte and separator paper used in Aluminum Capacitors may be flammable. Also electrolyte is electrically conductive. Therefore in case electrolyte gets in contact with PC board it may cause corrosion of circuit pattern or cause short circuit between patterns, and may lead to smoke generation or ignition in worst case.

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.

Safety Vent: The safety vent needs some free space to open properly. Allow for free headroom of at least 2mm for diameter ≤16mm, more than 3mm for diameter 18-35mm, more than 5mm for case diameter 40mm and larger.

Emergency Actions: When the pressure relief vent is open and some gas blows out from the capacitor, please turn the main switch of the equipment off or pull out the plug from the power outlet immediately. During safety vent operation, extremely hot gas (>100°C) may blow out of the capacitors. Do not stand close to the capacitors. In case of eye contact, rinse the open eye(s) with clean water immediately. In case of ingestion, gargle with water immediately, do not swallow. Do not touch electrolyte but wash skin with soap and water in case of skin contact.

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.

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