CF922MF

max.+105℃,for general purpose,metallized polyester film,powder epoxy dipped,radial capacitor

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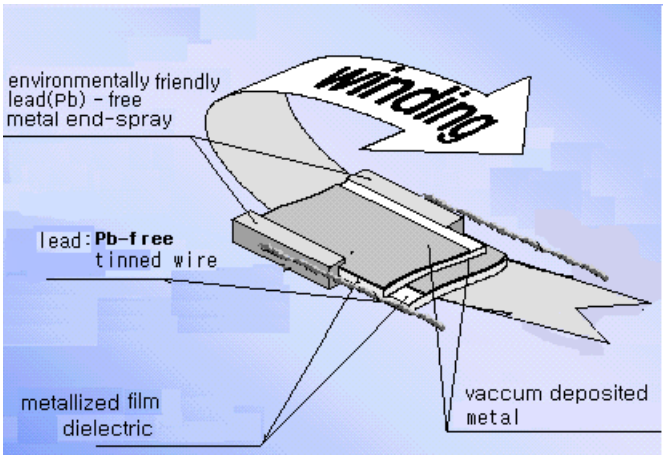
[1] Features

Self-heals.
Small size and low cost.
Wide capacitance and voltage range.
Pb(lead)-free product.
RoHS Compliant product.

[2]Typical applications

For general purpose;blocking,coupling,decoupling,by-pass,discharge,energy storage on low frequency & low pulse but larger current,high frequency & high pulse operation.

[3]Construction

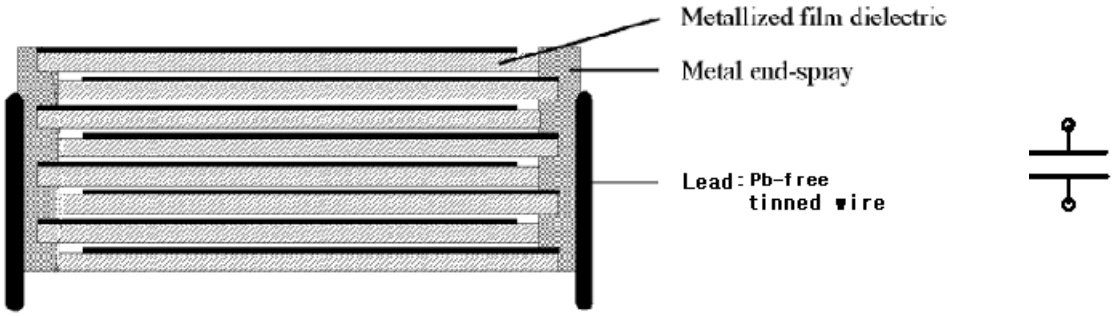


RoHS Compliant

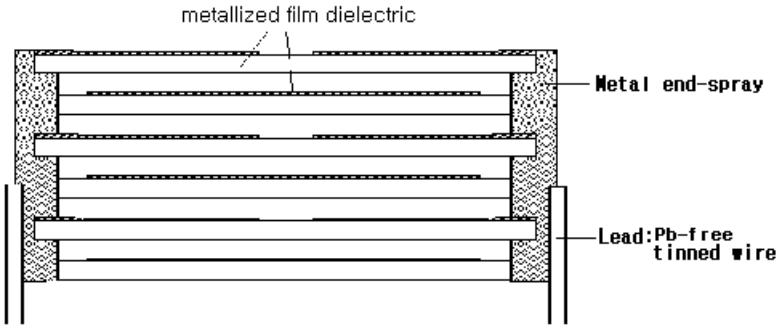
1 **Style :**radial,powder epoxy dipped design.

2 **Winding:** non-inductively wound self-healing metallized polyester film (vacuum deposited aluminum on polyester film).

〔1Section:for URDC≤1000V〕



〔2sections(internal series construction)〕 *internal series multi-section construction:for URAC≥275V



3 **Termination :**Pb-free tinned leads are electrically welded to the contact surface(metal end-spray)made by spraying the parts of metal contact materials on the ends of capacitor winding.

4 **Coating :**multi dip,powder molded flame retardant epoxy resin(UL94V-O).

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[4]Specifications

1 General data

Applicable standard	IEC60384-2,JIS C5115
Rated voltage(URDC)	100VDC,250VDC,400VDC,630VDC,1000VDC,1500VDC.
Capacitance range	0.001uF~33.0uF
Capacitance tolerance	±5%(J),±10%(K) at 20℃,1Khz
Operating temperature range (TR:+85℃,Tmax.:+105℃)	-40~+105℃ *+85℃~+105℃:Derate the rated voltage as shown in the below fig. (70% of the rated voltage at +105℃)

2 Electrical data

Withstand voltage	1.6URDC for 2sec.at 20℃,between leads(1.6URDC for 1 min. for type test)			
Dissipation factor(DF) at 20℃,1Khz	CR≤ 1.0uF:0.8% max.			
	CR> 1.0uF:1.0% max.			
Insulation resistance(Rins) at 20℃,between leads		CR≤0.33uF	CR>0.33uF	applied for 1 min.
	URDC≤100V	≥15,000MΩ	≥ 5,000s	100VDC:for URDC<500V
	URDC>100V	≥30,000MΩ	≥10,000s	500VDC:for URDC≥500V

*CR = Nominal Capacitance in μF

3 Environmental test data

	Test conditions	Test criteria
Damp heat test	40±2℃,R.H.:90~95% applying URDC for 500+24/0 hours	①Rins(between leads):≥0.5 x specified value in 2 Electrical data ②DF:≤1.1% ③ $\frac{\Delta C}{C}$:≤ ±5% of initial value
Endurance test	85±2℃,applying 1.25URDC for 1,000+48/0 hours	①Rins(between leads):≥0.5 x specified value in 2 Electrical data ②DF:≤1.2% ③ $\frac{\Delta C}{C}$:≤ ±7% of initial value

[5]Marking

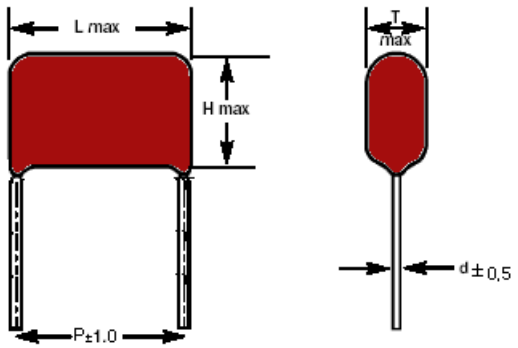
URDC,Capacitance & tolerance are marked on the capacitor.

[6]Ordering/part number information

CF	922	M	F	-	2E	104	K	FS	0075
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

(1)Kind of capacitor: metallized plastic film capacitor
(2)Shape of capacitor: non-inductive wound,Radial epoxy dipped.
(3)Dielectrics: polyester
(4)Operating temperature: -40℃~+105℃
(5)internal use
(6)*DC rated voltage code: 250VDC
(7)*Rated capacitance in pF: 100,000pF=0.1uF
(8)*Capacitance tolerance code: ±10%
(9)*Packaging and lead configuration code:bulk,loose parts in a poly.bag.single formed leads-inner crimped
(10)*Lead pitch:7.5mm
*For further details,refer to 【Part numbering system & taping specification】

[7]Dimensions in mm



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URDC:100V

uF	L	H	T	d
pitch 7.5mm permissible $\frac{dv}{dt}$ value(≤10,000 pulses):14v/μs				
0.033	10.5	6.0	4.0	0.6
0.047	10.5	6.5	4.0	0.6
0.068	10.5	7.0	4.0	0.6
0.1	10.5	7.5	4.5	0.6
0.15	10.5	8.0	4.5	0.6
0.22	10.5	8.5	5.0	0.6
pitch 10.0mm permissible $\frac{dv}{dt}$ value(≤10,000 pulses): 9v/μs				
0.33	13.0	9.5	6.0	0.6
0.47	13.0	10.5	6.5	0.6
0.68	13.0	11.0	7.0	0.6
pitch 15.0mm permissible $\frac{dv}{dt}$ value(≤10,000 pulses): 5v/μs				
1.0	18.0	11.5	6.0	0.8
1.5	18.0	13.0	7.0	0.8
2.2	18.0	15.0	8.0	0.8
3.3	18.0	16.5	9.0	0.8
pitch 22.5mm permissible $\frac{dv}{dt}$ value(≤10,000 pulses): 3v/μs				
4.7	26.0	17.0	8.0	0.8
6.8	26.0	19.0	10.0	0.8
10.0	26.0	22.0	12.0	0.8
15.0	26.0	25.0	16.0	0.8
pitch 27.5mm permissible $\frac{dv}{dt}$ value(≤10,000 pulses): 2v/μs				
22.0	31.5	28.5	18.0	0.8
33.0	31.5	30.5	21.5	0.8

URDC:250V

uF	L	H	T	d
pitch 7.5mm permissible $\frac{dv}{dt}$ value(≤10,000 pulses):23v/μs				
0.001	10.5	7.0	4.0	0.6
0.0015	10.5	7.0	4.0	0.6
0.0022	10.5	7.0	4.0	0.6
0.0033	10.5	7.5	4.5	0.6
0.0047	10.5	7.5	4.5	0.6
0.0068	10.5	7.5	4.5	0.6
0.01	10.5	8.0	4.5	0.6
0.015	10.5	8.0	5.0	0.6
0.022	10.5	8.0	5.0	0.6
0.033	10.5	8.5	5.0	0.6
0.047	10.5	8.5	5.5	0.6
0.068	10.5	8.5	5.5	0.6
0.1	10.5	9.0	6.0	0.6
pitch 10.0mm permissible $\frac{dv}{dt}$ value(≤10,000 pulses):15v/μs				
0.l5	13.0	10.5	5.0	0.6
0.22	13.0	11.5	6.0	0.6
0.33	13.0	12.0	7.0	0.6
pitch 15.0mm permissible $\frac{dv}{dt}$ value(≤10,000 pulses): 9v/μs				
0.47	18.0	13.5	6.0	0.6
0.68	18.0	15.0	7.0	0.8
1.0	18.0	16.0	8.0	0.8
1.5	18.0	17.5	9.5	0.8
pitch 22.5mm permissible $\frac{dv}{dt}$ value(≤10,000 pulses): 5v/μs				
2.2	26.0	17.0	9.0	0.8
3.3	26.0	18.5	11.0	0.8
4.7	26.0	22.0	13.0	0.8
pitch 27.5mm permissible $\frac{dv}{dt}$ value(≤10,000 pulses): 4v/μs				
6.8	31.5	23.0	14.0	0.8
10.0	31.5	28.0	16.5	0.8

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URDC:400V

uF	L	H	T	d
pitch 7.5mm permissible $\frac{dv}{dt}$ value(≤10,000 pulses):40v/μs				
0.001	10.5	7.0	4.5	0.6
0.0015	10.5	7.0	4.5	0.6
0.0022	10.5	7.0	4.5	0.6
0.0033	10.5	7.5	5.0	0.6
0.0047	10.5	7.5	5.0	0.6
0.0068	10.5	7.5	5.0	0.6
0.01	10.5	8.0	5.5	0.6
0.015	10.5	8.5	5.5	0.6
0.022	10.5	8.5	5.5	0.6
0.033	10.5	9.0	6.0	0.6
pitch 10.0mm permissible $\frac{dv}{dt}$ value(≤10,000 pulses):30v/μs				
0.047	13.0	9.0	6.0	0.6
0.068	13.0	10.5	6.5	0.6
0.1	13.0	12.0	6.5	0.6
pitch 15.0mm permissible $\frac{dv}{dt}$ value(≤10,000 pulses):15v/μs				
0.15	18.0	12.0	7.0	0.6
0.22	18.0	13.0	8.0	0.6
0.33	18.0	15.0	9.0	0.8
0.47	18.0	17.0	10.0	0.8
pitch 22.5mm permissible $\frac{dv}{dt}$ value(≤10,000 pulses): 9v/μs				
0.68	26.0	19.0	8.5	0.8
1.0	26.0	20.0	10.0	0.8
pitch 27.5mm permissible $\frac{dv}{dt}$ value(≤10,000 pulses): 7v/μs				
1.5	31.5	20.5	10.0	0.8
2.2	31.5	21.0	11.0	0.8
3.3	31.5	24.0	14.0	0.8
4.7	31.5	27.0	16.5	0.8

URDC:630V

uF	L	H	T	d
pitch 7.5mm permissible $\frac{dv}{dt}$ value(≤10,000 pulses):60v/μs				
0.001	10.5	7.5	4.5	0.6
0.0015	10.5	7.5	4.5	0.6
0.0022	10.5	7.5	4.5	0.6
0.0033	10.5	8.0	5.0	0.6
0.0047	10.5	8.5	5.0	0.6
0.0068	10.5	8.5	5.0	0.6
pitch 10.0mm permissible $\frac{dv}{dt}$ value(≤10,000 pulses):40v/μs				
0.010	13.0	8.0	4.0	0.6
0.015	13.0	10.0	4.5	0.6
0.022	13.0	10.5	5.0	0.6
0.033	13.0	11.5	5.5	0.6
pitch 15.0mm permissible $\frac{dv}{dt}$ value(≤10,000 pulses):20v/μs				
0.047	18.0	10.5	4.5	0.6
0.068	18.0	11.5	5.0	0.6
0.1	18.0	14.0	6.5	0.8
0.15	18.0	15.0	8.5	0.8
0.22	18.0	17.0	10.0	0.8
pitch 22.5mm permissible $\frac{dv}{dt}$ value(≤10,000 pulses):12v/μs				
0.33	26.0	18.0	8.5	0.8
0.47	26.0	19.5	10.0	0.8
0.68	26.0	22.0	11.5	0.8
pitch 27.5mm permissible $\frac{dv}{dt}$ value(≤10,000 pulses):10v/μs				
1.0	31.5	21.0	12.0	0.8
1.5	31.5	24.0	15.0	0.8
2.2	31.5	28.0	18.0	0.8

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URDC:1000V

uF	L	H	T	d
pitch 7.5mm permissible $\frac{dv}{dt}$ value(≤10,000 pulses):80v/μs				
0.001	10.5	7.5	5.0	0.6
0.0015	10.5	7.5	5.0	0.6
0.0022	10.5	8.5	5.5	0.6
0.0033	10.5	8.5	5.5	0.6
0.0047	10.5	9.0	5.5	0.6
pitch 10.0mm permissible $\frac{dv}{dt}$ value(≤10,000 pulses):60v/μs				
0.0068	13.0	9.5	4.5	0.6
0.010	13.0	11.0	5.0	0.6
0.015	13.0	11.5	5.5	0.6
0.022	13.0	12.5	6.5	0.6
pitch 15.0mm permissible $\frac{dv}{dt}$ value(≤10,000 pulses):30v/μs				
0.033	18.0	12.5	8.0	0.6
0.047	18.0	15.0	9.0	0.6
0.068	18.0	17.0	10.0	0.6
pitch 22.5mm permissible $\frac{dv}{dt}$ value(≤10,000 pulses):15v/μs				
0.1	26.0	15.0	10.0	0.8
0.15	26.0	17.0	11.0	0.8
0.22	26.0	19.0	13.0	0.8
0.33	26.0	22.0	15.0	0.8
0.47	26.0	24.0	17.5	0.8
pitch 27.5mm permissible $\frac{dv}{dt}$ value(≤10,000 pulses):12v/μs				
0.68	31.5	27.0	18.0	0.8
1.0	31.5	30.0	21.0	0.8

URDC:1500V

uF	L	H	T	d
pitch 15.0mm permissible $\frac{dv}{dt}$ value(≤10,000 pulses):50v/μs				
0.01	18.0	10.5	6.0	0.6
0.015	18.0	11.0	7.0	0.6
Pitch 22.5mm permissible $\frac{dv}{dt}$ value(≤10,000 pulses):40v/μs				
0.022	26.0	11.5	7.0	0.8
0.033	26.0	12.5	7.5	0.8
pitch 27.5mm permissible $\frac{dv}{dt}$ value(≤10,000 pulses):25v/μs				
0.047	31.5	12.5	7.5	0.8
0.068	31.5	14.5	8.0	0.8
0.1	31.5	16.0	9.0	0.8
0.15	31.5	20.0	11.5	0.8

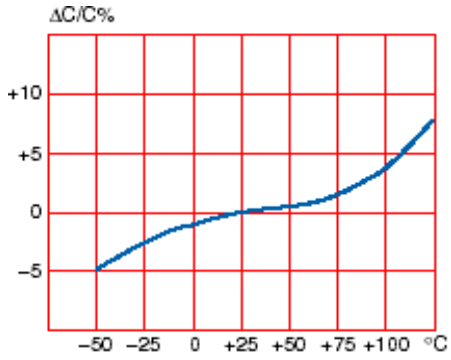
*Pulse permissible current(Ao-p)=C(μF)x permissible $\frac{dv}{dt}$ value(V/μs).

If,the operating pulse voltage＜the URDC,the max.permissible $\frac{dv}{dt}$ value can be $\frac{URDC}{Up-p} \times permissible \frac{dv}{dt} value$

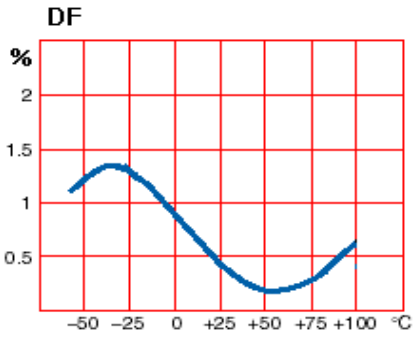
[8]Typical performance characteristics

*slightly different depending on individual ratings

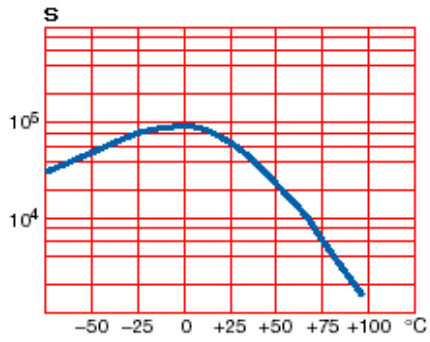
【Capacitance-temperature 】 at 1kHz



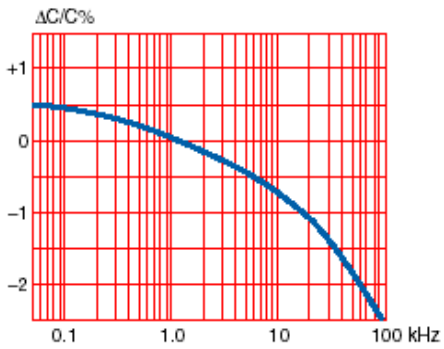
【DF-temperature 】 at 1kHz



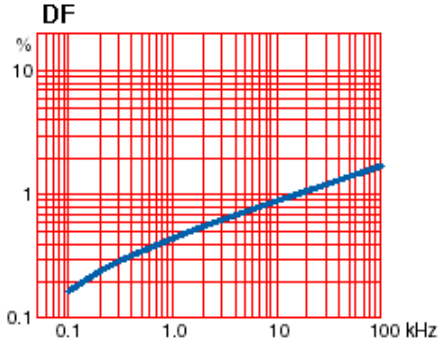
【Rins-Temperature】



【Capacitance-frequency at +20℃】



【DF-frequency at +20℃】



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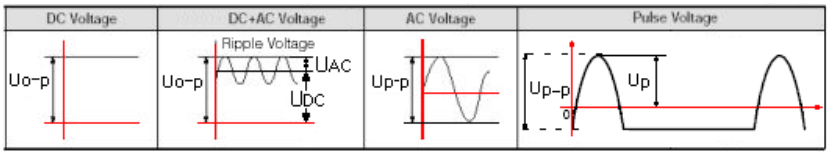
[9]Operating temperature

1 In DC circuit : the operating temperature =Ta

2 It must be noted,however,that the operating temperature will be the Th(=Ta+ΔT),not the Ta, if ①self-heating(ΔT) or ②surface heating occurs.

[10]Operating voltage(Uo-p)

【Example wave-forms】



1 **DC voltage application** : Uo-p ＜ the URDC

2 **DC+AC voltage(Ripple voltage)application** : Uo-p(=UDC + UAC)＜URDC

3 **AC voltage with sine wave form application**

❶at operating frequency≤ commercial frequency(50/60Hz); the operating AC voltage(Urms)＜ the URAC specified.

❷at operating frequency＞ commercial frequency; the operating AC voltage(Urms)＜ the derated AC voltage,which can be determined from the "Max. permissible AC rms voltage(Urms)-frequency" graphs specified.

❸To avoid corona discharge;Up-p＜$2\sqrt{2}$URAC

❹The calculated max. value of Irms(Ip= $\sqrt{2}$Irms)＜Ao-p.

4 **Pulse voltage application(other than a sine wave form)**

❶The peak value(Up)＜ URDC

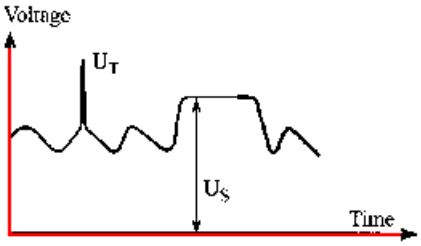
❷To avoid corona discharge:Up-p(including noise and transients)＜$2\sqrt{2}$URAC.

❸Determined $\frac{dv}{dt}$ value ＜the permissible $\frac{dv}{dt}$ value specified

❹The ΔT in the actual circuit ＜ max. allowable ΔT specified.

❺The operating temperature(Th) ＜ Tmax. specified.

5 **Irregular voltage**



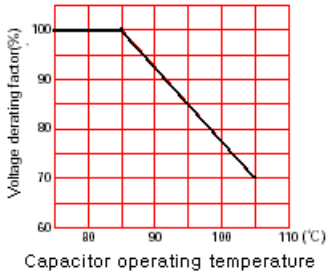
UT(Transient voltage):excessive over-shooting peak value.
Us(Surge voltage):induced by switching or faults of the system or any part of it.
Uo-p includung these irregular voltage ＜URDC at all times.

[11]Derating of rated voltage(UR)

The UR has to be derated,for operation at higher temperature and in AC circuit.

1 **where operating temperature is high**

If capacitors are used in temperature exceeds +85℃(TR) but without exceeding +105℃(Tmax.),the UR has to be derated according to the graph below.



2 **when used in an AC circuit**

If DC rated capacitors are used in an AC circuit,the operating AC voltage should be derated due to heat generation or corona discharge.

❶at commercial frequency(50/60Hz),and an operating temperature of -40～+85℃(including self-heating),the URAC are specified below.

URDC	URAC(at 50/60Hz)	
100V	63Vrms	***Not suitable for AC mains applications**
250V	125Vrms	Even if, URAC of a capacitor covers AC mains voltage range,standard film capacitors in this series are basically not suitable for operation directly connected to AC mains(e.g.across the line). For these AC mains application,the CFS series are recommended.
400V	200Vrms	
630V	220Vrms	
1000V	250Vrms	
1500V	300Vrms	

❷at high frequency(over 60Hz),derate the URAC according to the below "max. permissible AC rms voltage(Urms)-frequency" graphs, at Th=max.+85℃ and ΔT=10℃.

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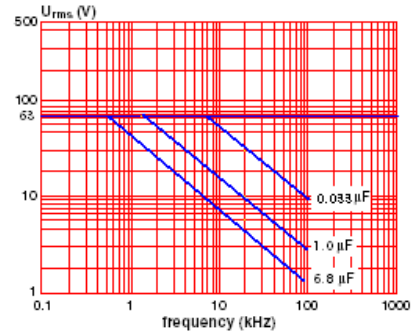
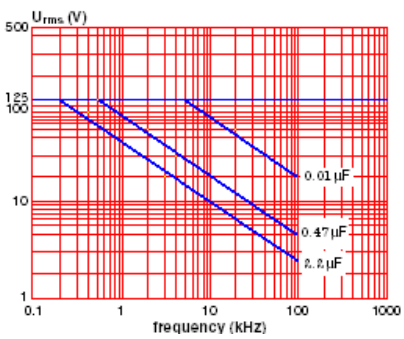
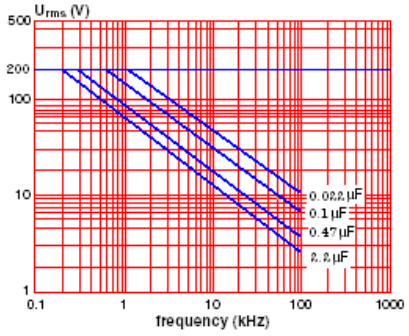
URDC:100V ,URAC:63Vrms(50/60Hz)



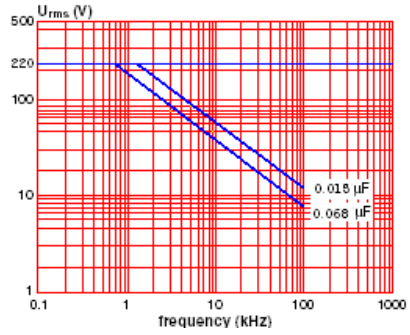
URDC:250V ,URAC:125Vrms(50/60Hz)



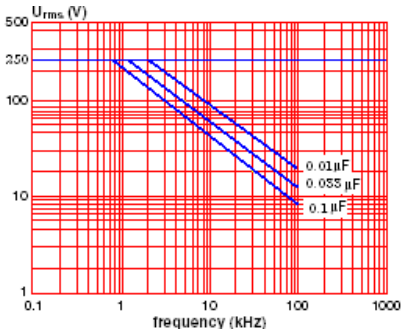
URDC:400V ,URAC:200Vrms(50/60Hz)



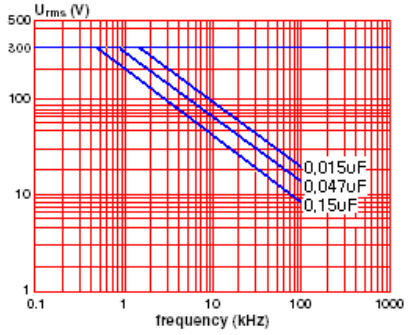
URDC: 630V ,URAC:220Vrms(50/60Hz)



URDC:1000V ,URAC:250Vrms(50/60Hz)



URDC:1500V,URAC:300Vrms(50/60Hz)



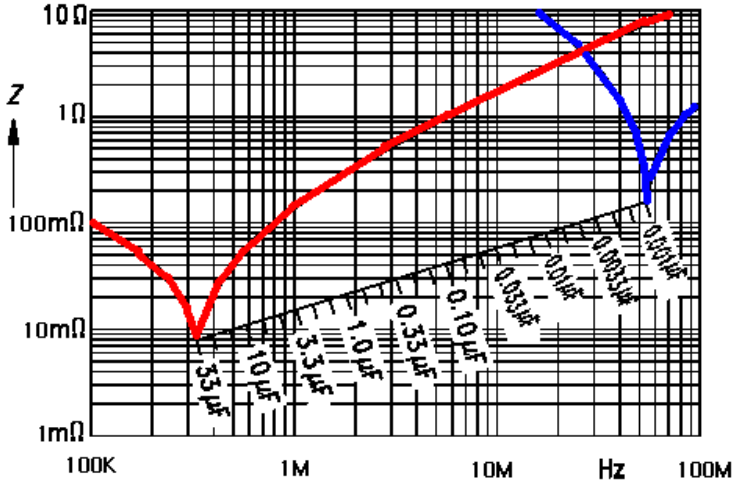
*The AC voltages mentioned refer to clean sinusoidal voltages without transients.

*max. permissible AC rms current(Irms)=2πf・C・Urms here, f:operating frequency in Hz

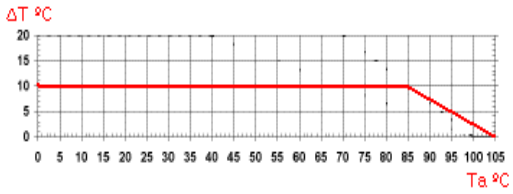
C:capacitance in F

Urms:obtained Urms from the above graph in V.

[12]Impedance(Z) -frequency Curve(typical values) in lead length 2.0mm



[13]Max. allowable ΔT



[14]Thermal resistance(Θha:$\frac{^\circ C}{W}$) @85℃,0.2m/s

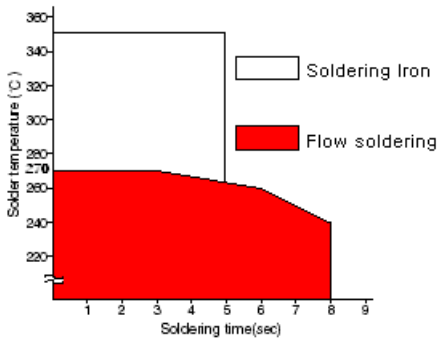
T (mm)	Pitch(mm)				
	7.5	10.0	15.0	22.5	27.5
4.0	286	250			
5.0	250	200	170		
6.0	222	170	154	77	
7.0		143	125	66	
8.0			111	58	50
9.0			91	55	45
10.0			83	50	43
12.0				42	37
14.0				40	33
16.0				31	28
18.0				28	25
20.0					23
22.0					22

[15]Soldering operation

In soldering,heat stress to the capacitors has great influence on the change of characteristics of the capacitor,lead to an increase in failures(short circuit)and poor reliability.

Apart from being dependent on the solder bath temperature and soldering time,the heat stress is also affected by initial (pre-heating)

and the post-soldering (cooling)temperatures.
Ensure that the soldering process is within specified conditions shown in below.
❶The temperature shown below,reflect the condition seen by the capacitor wire leads.
❷Exposure of the capacitor body to excessive heat during pre-heat and soldering operations may result in damage to the capacitor.
❸When combining with chip parts,avoid passing through an adhesive curing oven in order to cure the resin used for fixing.
Otherwise,if the mounting heat resisting temperature is exceeded,the dielectric film will suffer heat shrinkage which induces short-circuiting.
Insert the capacitor and solder,after curing the adhesive.
❹avoid reflow soldering.
❺Soldering iron : The soldering iron should not make contact with the body of the capacitor.
❻Flow soldering



Pre-heat:max.110℃ within 1 min.

ⅰ)Do not move the capacitor after soldering for a minimum of 20sec.
Failures by short or by opening may result.
ⅱ)If re-work is needed,wait until the capacitor temperature is equal to room temperature.
Do not re-work more than twice.

*For further details,refer to General technical information of film capacitors for use in electronics