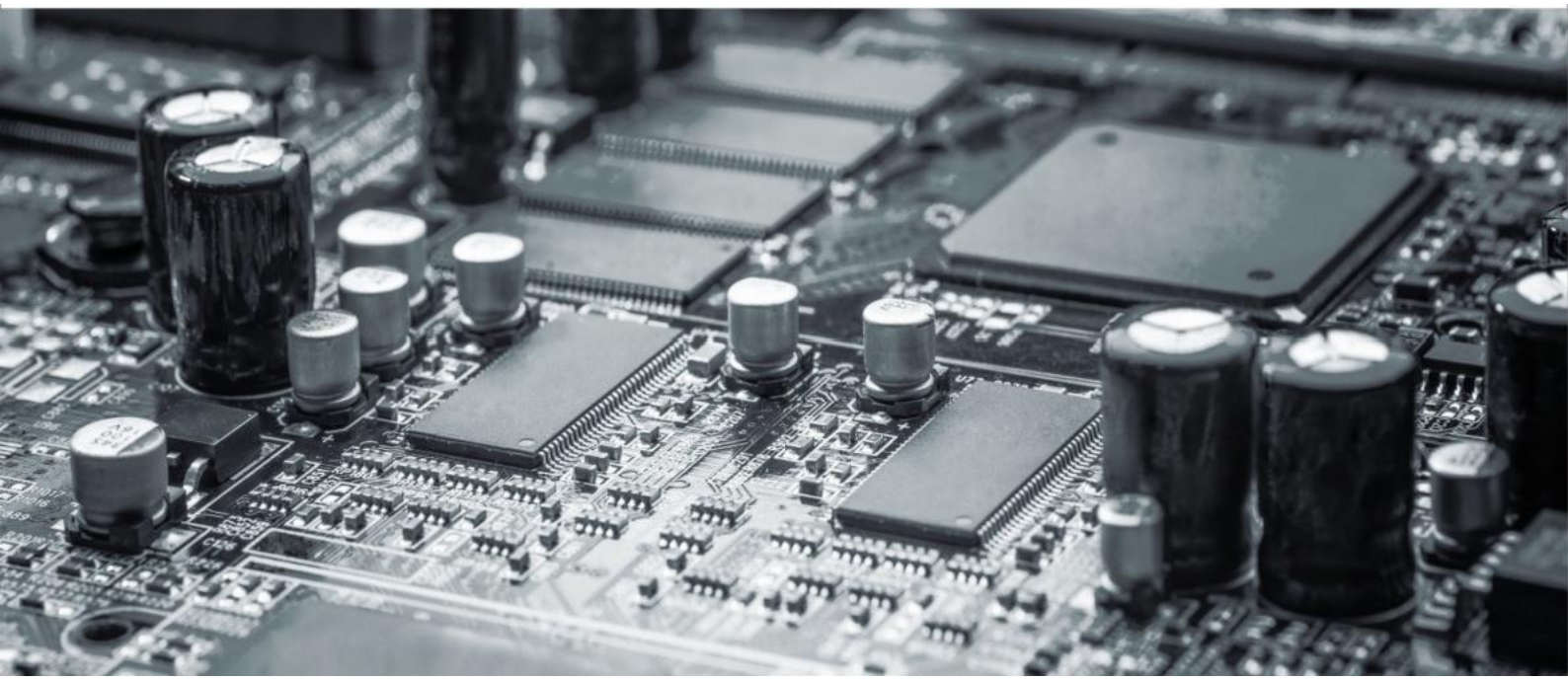
FOSAN TECHNOLOGY | 富捷科技



贴片电解电容器方案解决专家

CHIP ALUMINUM CAPACITORS
SOLUTION SPECIALIST

富捷科技集团
FOSAN TECHNOLOGY GROUP

Product Manual
产品手册

产品应用 PRODUCT APPLICATION

随科学技术的不断发展创新，生产的自动化程度越来越高，SMT 技术正被广泛应用于电子领域与多种行业领域，如：汽车电子、网络通讯、家用电子以及工程控制等多个领域，SMT 正作为二十一世纪电子信息技术的关键技术之一。本公司作为V-CHIP 即片式铝电解电容器专业生产企业，生产的片式铝电解电容器是一种偏平化，高可靠，性能稳定，应用于高密度表面贴装技术(SMT) 的超小型电子元器件，被广泛应用于通讯……。随着电子技术不断发展，作为三大被动元器件之一的电容器家族中新星--片式铝电解电容器的应用领域将不断拓宽，将在铝电解电容器行业中成为主流应用产品，具有更大的应用领域。

With the continuous development and innovation of science and technology,the degree of production automation is getting higher and higher.SMT technology is being widely used in the fields off electronics and various industries,such as automotive electronics,network communications, household electronics and engineering control,and SMT is regarded as one of the key technologies of electronic information technology in the 21st century.The Company is a professional manufacturer of V-CHIP,i.e.chip aluminum electrolytic capacitors,the chip aluminum electrolytic capacitors produced by it are flat ultra-small electronic components with high reliability and stable performance,used in high-density surface mount technology(SMT),and widely used in communication....With the continuous development of electronic technology,the application field of chip aluminum electrolytic capacitor,a new star in the capacitor family,one of the three major passive components,will continue to expand and become the mainstream application product in the aluminum electrolytic capacitor industry,showing a broader field of application.

1 能源 · 环境 · 医疗

2 网络通信设备

3 汽车车载电子

4 工业仪表 · 变频设备

5 家用生活电器

目 录 CONTENTS

贴片式铝电电解电容器
Chip Type Aluminum Electrolytic Capacitors

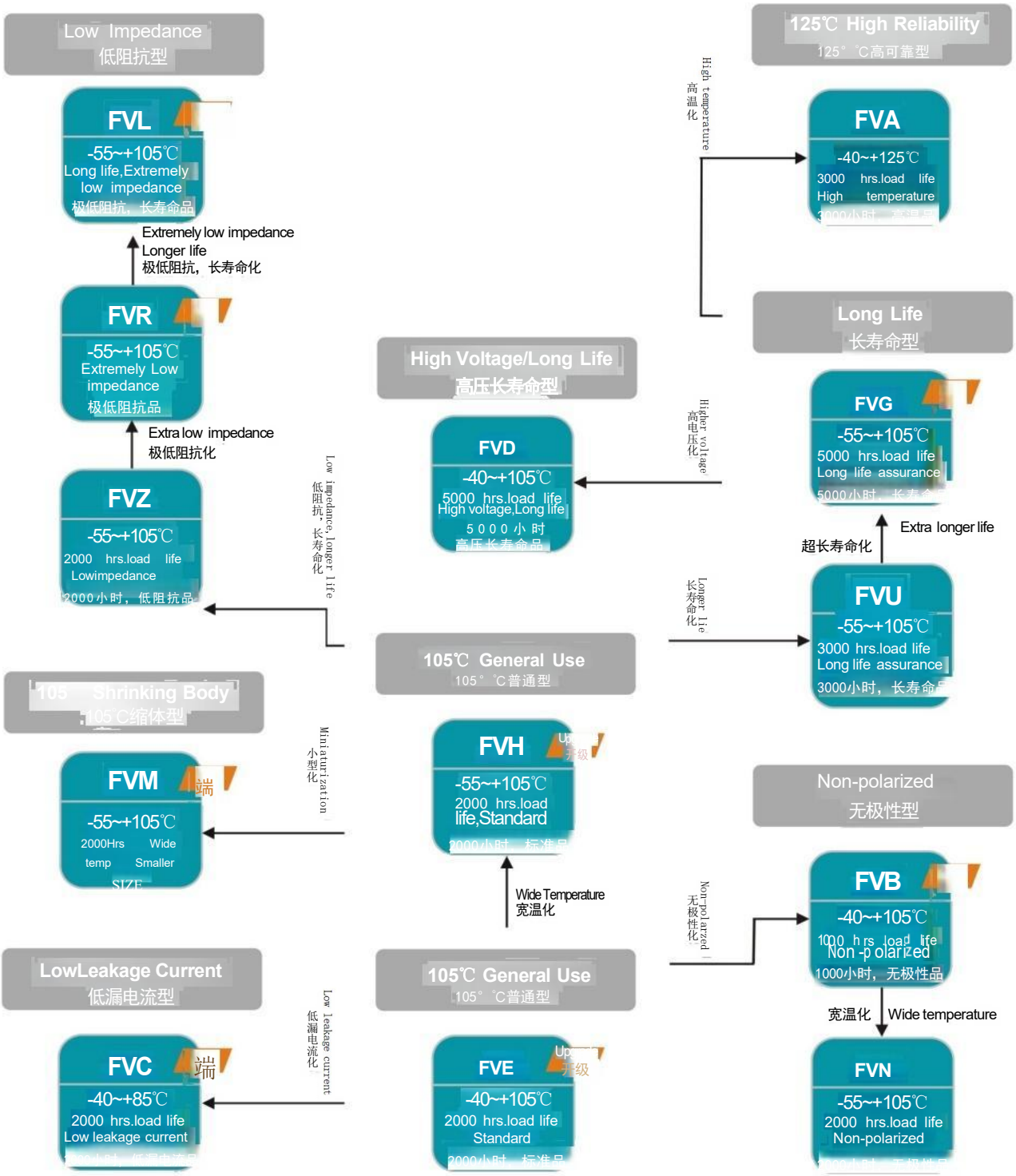
产品系列表 Product Family Table

Type 类型		Series 系列	Features 特性	Standard标准品	High Reliability高可靠	Low Impedance低阻抗	Long Life长寿命	Operating Temperature Range(℃) 使用温度范围	Rate Voltage Range (V.D.C.) 额定工作电压范围	Capacitance Range (uF) 静电容量范围	Load Life (Hours) 负荷寿命（小时）	Page页码
贴片式 OCD	Standard 标准品	FVE	Standard 标准品	●				-40~+105	4~450	0.1~6800	2000	5
		FVH	Standard,wide temperature range 宽温标准品	●				-55~+105	4~450	0.1~6800	2000	8
	High Reliability 高可靠	FVA	125℃high temperature,high reliability 125℃高温，高可靠品		●			40~+125	4~450	3.3~2200	1000~3000	11
	Shrinking Body 缩体型	FVM	105℃high temperature,miniaturization, high reliability 105℃高温，小型化，高可靠品		●			-55~+105	6.3~50	10~1500	2000	13
	LOW Impedance 低阻抗型	FVZ	Low impedance 低阻抗品			·		-55~+105	6.3~50	1~4700	2000	31
		FVR	Extra low impedance 极低阻抗品			●		-55~+105	6.3~50	4.7~4700	1000~3000	34
		FVL	Long life,extra low impedance 长寿命，极低阻抗品			●		-55~+105	6.3~100	3.3~4700	2000~5000	37
	Long Life 长寿命	FVU	Long life assurance 宽温长寿命品				●	-55~+105	6.3~50	0.1~3300	2000~3000	40
		FVG	5000 hours load life 5000小时长寿命品				●	-55~+105	6.3~100	0.1~3300	3000-5000	43
	Non-polarized 无极性	FVB	Non-polarized 无极性品	●				-40~+105	6.3~50	0.1~47	1000	46
		FVN	Non-polarized,wide temperature range 无极性宽温品	●				-55~+105	6.3~50	0.1~100	2000	48
	High Voltage /Long Life 高压长寿命	FVD	High voltage,5000 hours load life 5000小时，高压长寿命品				●	-40~+105	160~450	3.3~47	5000	50
	LoW Leakage Current 低漏电流型	FVC	Low Leakage Current 低漏电流品	●				-40~+105	6.3~50	0.1~220	2000	52

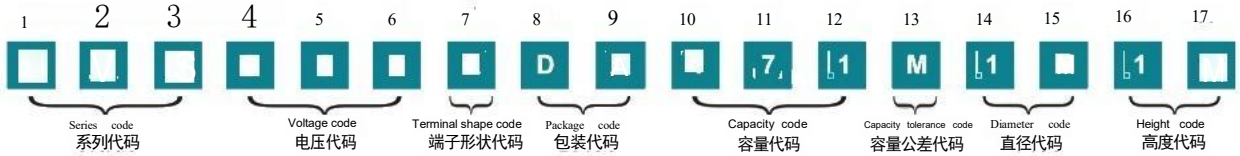
产品尺寸与重量Case SizesAnd Weight Range

Diameter L(mm) 直径高度	Approx.Weight(9) 大约重量	Diameter L(mm) 直径高度	Approx.Weight(g) 大约重量
4×5.4/5.8	0.23	8x10.5/12.5	1.37
5×5.4/5.8	0.37	10×10.5	1.7
6.3×5.4/5.8	0.49	10×12.5/13.5	1.95
6.3×7.719.0	0.59	12.5x13.5	2.49
6.3×10.5/11.5	0.75	12.5×16	2.87
8x6.5/7.0	1.05	16x16.5	5.31

产品体系图Series Chart



产品编码规格Explanation Of Part Numbers



(1、2、3)

Series 系列
FVE
FVH
FVA
FVM
FVA
FVZ
FVR
FVL
FVU
FVG
FVB
FVN
FVD
FVC

(4、5、6)

Voltage (W.V) 电压	Code 代码
4	4R0
6.3	6R3
10	010
16	016
25	025
35	035
50	050
63	063
100	100
160	160
250	250
350	350
400	400

(10、11、12)

Capacitance (μF) 静电容量	Code 代码
0.1	OR1
0.22	R22
1	10
4.7	4R7
10	100
47	470
100	101
470	471
1000	102
4700	472
10000	103

(13)

Cap. Tolerance (%) 容量允许	Code 代码
±10	K
±20	M

(7)

Tape 端子类型	Code 代码
No dummy terminal无辅助端子	A
With dummy terminal有辅助端子	G

(8、9)

Packaging 包装要求		External diameter 纸盘外径 □(mm)	Fit size 适合尺寸 □D(mm)	Code 代码
Braiding 编带	Paper tray 纸盘	380	D4~18	DA
		330	D4~18	DB
	Glue tray 胶盘	380	D4~10	RA
	Blister box 吸塑盒	–	D12.5~18	TR

(14、15)

Diameter (口) 直径	Code 代码
4	04
5	05
6.3	06
8	08
10	10
12.5	12
16	16
18	18

(16、17)

Length (mm) 高度	Code 代码
5.4	54
5.8	58
6.5	65
7.7	77
10.2	A0
10.5	B0
13.5	E0
16	G5
16.5	H0
21.5	N0

FVE Series standard
FVE 系列标准品

标准品Standard

Operating with general temperature range-40~+105℃
适用于-40~+105℃的常规温度范围
Load life of 2000 hours
负荷寿命2000小时
Comply with the RoHS directive
符合RoHS 指令

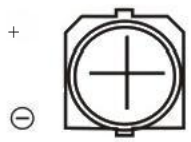
特性表Specifications

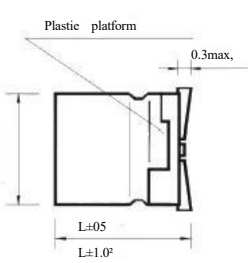
Items项目	Characteristics主要特性												
Operation Temperature Range使用温度范围	-40～+105° ℃												
Voltage Range额定工作电压范围	4～450V												
Capacitance Range静电容量范围	0.1～6800μF												
Capacitance Tolerance静电容量允许偏差	±20%at 120Hz,20℃												
Leakage Current 漏电流	Rated Voltage 额定工作电压	6.3～100V									160～450V		
	Case size尺寸	Ø4~Q10					Ø12.5~Q16				Ø6.3~Ø16		
	Time 时间	after 2min.(application of rated voltage) 2分钟后(施加额定工作电压)					after 1min.(application of rated voltage) 1分钟后(施加额定工作电压)				after 2min.(application of rated voltage) 2分钟后(施加额定工作电压)		
	Leakage current 漏电流	≤0.01CVor 3μA,whichever is greater ≤0.01CV或3μA,取较大值					≤0.03CV or4μA,whichever is greater ≤0.03CV或4μA,取较大值				≤0.04CV+100μA,whichever is greater ≤0.04CV+100μA,取较大值		
Dissipation Factor (tan δ) 损耗角正切	Measurement frequency测试频率：120Hz,Temperature温度：20℃												
	Rated Voltage(V)额定工作电压		4	6.3	10	16	25	35	50	63	100	160~250	350~450
	tan δ(max.) 最大损耗角正切	Ø4~Ø10	0.35	0.30	0.24	0.20	0.18	0.16	0.14	0.14	0.14	0.20	0.25
		Ø12.5~Ø16	0.40	0.38	0.34	0.30	0.28	0.22	0.18	0.16	0.16	0.20	0.25
Stability at Low Temperature 低温特性	Measurement frequency测试频率：120Hz												
	Rated Voltage (V)额定工作电压			4	6.3	10	16	25	35	50~100		160~250	350~450
	Impedance Ratio 阻抗比 ZT/Z20(max.)	Ø4~Ø10	Z(-25℃)/Z(20℃)	7	4	3	2	2	2	2		2	3
			Z(-40℃)/Z(20℃)	15	8	6	4	4	3	3		3	6
		Ø12.5~Ø16	Z(-25℃)/Z(20℃)	7	5	4	3	2	2	2		2	4
			Z(-40℃)/Z(20℃)	17	12	10	8	5	4	3		6	10
Load Life 高温负荷特性	After 2000 hours application of the rated voltage at 105℃,they meet the characteristics listed below. 在105℃环境中施加额定工作电压2000小时后，电容器的特性符合下表的要求												
	Capacitance Change静电容量变化率	Within±20%of initial value(Within±30%of initial value for 10V) 初始值的±20%以内(≤10V为±30%以内)											
	Dissipation Factor损耗角正切	200%or less of initial specified value不大于规范值的200%											
	Leakage Current漏电流	initial specified value or less不大于规范值											
Shelf Life 高温贮存特性	After leaving capacitors under no load at 105℃ for 1000 hours,they meet the specified value for load life characteristics listed above. 在105℃环境中无负荷放置1000小时后，电容器的特性符合高温负荷特性中所列的规定值												
Resistance to Soldering Heat 耐焊接热特性	After reflow soldering and restored at room temperature,they meet the characteristics listed below. 经过回流焊并冷却至室温后，电容器的特性符合下表的要求												
	Capacitance Change静电容量变化率	Within±10%of initial value初始值的±10%以内											
	Dissipation Factor损耗角正切	initial specified value or less不大于规范值											
	Leakage Current漏电流	initial specified value or less不大于规范值											
Marking标识	Black print on the case top.铝壳顶部黑字印刷												

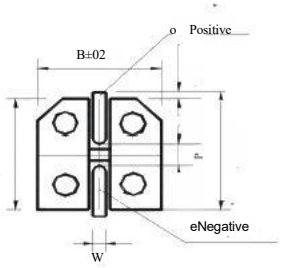
外形图Drawing Unit:mm

øD=4~10mm

②D≥12.5mm







*1.Applicable to Ø4~Ø10×13.5 适用于Ø4～ Q10×13.5
*2.Applicable to Ø12.5~Ø16 适用于Ø12.5~ Q16

*A pressure relief vent is attached to products over ØD=8×10.5
*②D=8×10.5 以上产品有缓压防爆阀

尺 寸 表Dimensions (Unit:mm)

D×L	4×5.4	5×5.4	6.3×5.4	6.3×7.7	8×10.5	10×10.5	10×13.5	12.5×13.5	12.5×16	16x16.5
A	5.1	6.1	7.3	7.3	9.2	11.2	11.2	13.8	13.8	18.0
B	4.3	5.3	6.6	6.6	8.4	10.4	10.4	13.0	13.0	17.0
C	4.3	5.3	6.6	6.6	8.4	10.4	10.4	13.0	13.0	17.0
P±0.2	1.0	1.3	2.2	2.2	3.1	4.4	4.4	4.4	4.4	6.7
L	5.4	5.4	5.4	7.7	10.5	10.5	13.5	13.5	16.0	16.5
W	0.5 ~ 0.8				0.7 ~1.1			1.1 ~1.4		

规格尺寸及最大允许纹波电流Dimensions&Maximum Permissible Ripple Current

Code μF	Code 代码	WV 4		6.3		10		16		25	
		0G		0J		1A		1C		1E	
4.7	4R7									4×5.4	19
10	100							4×5.4	25	5×5.4 (4×5.4)	28 (20)
15	150							4×5.4	28	5×5.4	34
22	220			4×5.4	31	5×5.4 (4×5.4)	35 (28)	5×5.4 (4×5.4)	39 (28)	6.3×5.4 (5×5.4)	52 (35)
33	330	4×5.4	26	5×5.4 (4×5.4)	39 (31)	5×5.4 (4×5.4)	43 (32)	6.3×5.4 (5×5.4)	57 (40)	6.3×5.4 (5×5.4)	63 (42)
47	470	4×5.4	34	5×5.4 (4×5.4)	47 (36)	5×5.4	43	6.3×5.4 (5×5.4)	68 (44)	6.3×5.4	68
56	560	4×5.4	39	5×5.4	46	6.3×5.4	57	6.3×5.4	74	6.3×5.4	82
68	680	5×5.4	45	6.3×5.4 (5×5.4)	62 (52)	6.3×5.4	72	6.3×5.4	80	6.3×5.4	94
100	101	5×5.4	61	6.3×5.4 (5×5.4)	71 (55)	6.3×5.4 (5×5.4)	76 (70)	6.3×5.4	86	6.3×7.7	130
150	151	6.3×5.4	74	6.3×5.4	78	6.3×5.4	88	6.3×7.7	135	8×10.5 (6.3×7.7)	200 (130)
220	221	6.3×5.4	82	6.3×5.4	95	6.3×7.7	150	8×10.5 (6.3×7.7)	215 (150)	8×10.5	250
330	331	6.3×7.7	150	6.3×7.7	150	8×10.5	280	8×10.5	280	10×10.5 (8×10.5)	340 (310)
470	471	6.3×7.7	150	8×10.5 (6.3×7.7)	300 (150)	10×10.5 (8×10.5)	320 (300)	10×10.5 (8×10.5)	420 (330)	10×10.5	400
680	681	8×10.5	300	8×10.5	300	10×10.5	380	10×10.5	450	10×13.5	550
1000	102	8×10.5	330	10×10.5 (8×10.5)	430 (330)	10×10.5	450	12.5×13.5 (10×13.5) (10×10.5)	710 (550) (490)	12.5×13.5	820
1500	152	10×10.5	450	10×13.5 (10×10.5)	650 (450)	10×13.5	650	12.5×13.5	750	12.5×16	1000
2200	222	10×13.5 (10×10.5)	620 (480)	12.5×13.5 (10×13.5)	890 (720)	12.5×13.5	960	16×16.5 (12.5×16)	1150 (1000)	16×16.5	1250
3300	332	10×13.5	700	12.5×16 (12.5×13.5)	1000 (900)	16×16.5 (12.5×16)	1300 (1050)	16×16.5	1350		
4700	472	12.5×13.5	850	16×16.5	1400	16×16.5	1450			Case size 尺寸	Ripple current 纹波电流
6800	682	16×16.5 (125×16)	1350 (900)								

Code μF	Code 代码	35		50		63		100	
		1V		1H		1J		2A	
0.1	0R1			4×5.4	1.0	4×5.4	1.0		
0.22	R22			4×5.4	2.3	4×5.4	2.3		
0.33	R33			4×5.4	3.5	4×5.4	3.5		
0.47	R47			4×5.4	5.0	4×5.4	5.0		
1	010			4×5.4	10	4×5.4	10	4×5.4	10
1.5	1R5			4×5.4	12	4×5.4	12	6.3×5.4	15
2.2	2R2			4×5.4	15	4×5.4	15	6.3×5.4	20
3.3	3R3	4×5.4	18	4×5.4	18	5×5.4	20	6.3×7.7 (6.3×5.4)	45 (28)
4.7	4R7	4×5.4	20	5×5.4 (4×5.4)	23 (19)	5×5.4	23	6.3×7.7 (6.3×5.4)	50 (30)
10	100	5×5.4 (4×5.4)	30 (20)	6.3×5.4 (5×5.4)	34 (27)	6.3×7.7 (6.3×5.4)	55 (34)	8×10.5 (6.3×7.7)	110 (50)
22	220	6.3×5.4 (5×5.4)	54 (42)	6.3×5.4	60	8×10.5 (6.3×7.7)	140 (70)	10×10.5 (8×10.5)	180 (120)
33	330	6.3×5.4	60	6.3×7.7	85	8×10.5 (6.3×7.7)	160 (85)	10×10.5	190
47	470	6.3×5.4 (6.3×7.7)	70 (90)	10×10.5 (8×10.5) (6.3×7.7)	130 (110) (90)	10×10.5 (8×10.5)	230 (170)	Case size 尺寸	Ripple current 纹波电流

·Case size D×L(mm),ripple current(mA rms)at 85℃,120Hz·尺寸OD×L(mm),文波电流(mA rms)于105℃, 120Hz

规格尺寸及最大允许纹波电流 Dimensions & Maximum Permissible Ripple Current

μF	WV Code 代码	35		50		63		100		160	
		1V		1H		1J		2A		2C	
22	220									10×13.5	50
33	330									12.5×13.5	95
47	470									12.5×13.5 (16×16.5)	205 (240)
56	560	6.3×7.7	80	6.3×7.7	110	10×10.5	250				
68	680	6.3×7.7	110	8×10.5	170	10×10.5	260				
100	101	8×10.5 (6.3×7.7)	175 (120)	10×10.5 (8×10.5)	240 (200)	12.5×13.5 (10×13.5) (10×10.5)	380 (290) (280)	2.5×13.5	440	16×16.5	250
150	151	8×10.5	220	10×10.5	240	10×13.5	310				
220	221	10×10.5 (8×10.5)	310 (270)	10×13.5 (10×10.5)	400 (320)	12.5×13.5	580	16×16.5	700		
330	331	10×10.5	350	12.5×13.5 (10×13.5)	600 (420)	16×16.5 (12.5×16)	820 (720)				
470	471	12.5×13.5 (10×13.5) (10×10.5)	600 (530) (400)	16×16.5 (12.5×16)	850 (740)	16×16.5	950				
680	681	12.5×13.5	750	16×16.5	950					Case size 尺寸	Ripple current 纹波电流
1000	102	16×16.5 (125×16)	1100 (800)								

μF	Code 代码	200		250		350		400		450	
		2D		2E		2V		2G		2W	
3.3	3R3							10×13.5	40	10×13.5	40
4.7	4R7			10×13.5		10×13.5	85	10×13.5 (12.5×13.5)	45 (48)	10×13.5 (12.5×13.5)	42 (45)
10	100	10×13.5	75	10×13.5	75	12.5×13.5	105	12.5×13.5	50	12.5×13.5	55
22	220	12.5×13.5	105	12.5×13.5	105	16×16.5	130	16×16.5	85	16×16.5	85
33	330	12.5×13.5	120	16×16.5	135						
47	470			16×16.5	220					Case size 尺寸	Ripple current 纹波电流
100	101										

• Case size OD×L(mm),ripple current(mA rms)at 85° ℃,120Hz • 尺寸OD×L(mm),纹波电流(mA rms)于105℃,120Hz

纹波电流频率补偿系数 Frequency Coefficient Of Allowable Ripple Current

Frequency 频率			50Hz	120Hz	300Hz	1KHz	10KHz~
Coefficient 系数	②4~×10	0.1~68μF	0.70	1.00	1.17	1.36	1.50
		100~3300μF	0.85	1.00	1.08	1.20	1.30
	Ø12.5~Ø16	~68μF	0.75	1.00	1.35	1.57	2.00
		100~680μF	0.80	1.00	1.23	1.34	1.50
		1000~6800μF	0.85	1.00	1.10	1.13	1.15

● The endurance of capacitors is reduced with internal heating produced by ripple current at the rate of halving the lifetime with every 10℃ rise.When long life performance is required in actual use,the rms ripple current has to be reduced.
●铝电解电容器由于在纹波电流叠加时自我发热，温度上升而老化，每升温10°℃寿命减少一半；要想保持长寿命请在使用过程中降低纹波电流。

● Taping specifications are given in page 44"Taping Specifications". 编带标准请参阅第44页“编带标准”。
●Please refer to page 45"Package Quantity"for the minimum package quantity. 最小包装数量请参阅第45页“包装数量”。

FVH Series Wide Temperature
FVH 系列宽温品

宽温标准品Wide Temperature Standard

Operating with wide temperature range-55~+105℃
适用于-55~+105° C 的宽温范围
Load life of 2000 hours
负荷寿命2000小时
Comply with the RoHS directive
符合RoHS 指令

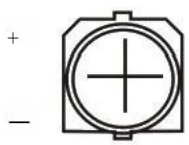
特 性 表SPECIFICATIONS

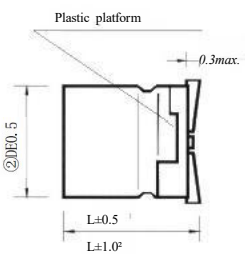
Items 项 目	Characteristics主要特性												
Operation Temperature Range使用温度范围	-55～+105℃												
Voltage Range额定工作电压范围	4～450V												
Capacitance Range静电容量范围	0.1～6800μF												
Capacitance Tolerance静电容量允许偏差	±20%at 120Hz,20℃												
Leakage Current 漏电流	Rated Voltage 额定工作电压	6.3～100V								160～450V			
	Case size尺寸	Ø4~Ø10				Ø12.5~Ø16				Ø6.3~Ø16			
	Time 时间	after 2min.(application of rated voltage) 2分钟后(施加额定工作电压)				after 1min.(application of rated voltage) 1分钟后(施加额定工作电压)				after 2min.(application of rated voltage) 2分钟后(施加额定工作电压)			
	Leakage current 漏电流	≤0.01CV or3μA,whichever is greater ≤0.01CV或3μA,取较大值				≤0.03CV or 4μA,whichever is greater ≤0.03CV或4μA,取较大值				≤0.04CV+100μA,whichever is greater ≤0.04CV+100μA,取较大值			
Dissipation Factor (tan δ) 损耗角正切	Measurement frequency测试频率：120Hz,Temperature温度：20℃												
	Rated Voltage(V)额定工作电压		4	6.3	10	16	25	35	50	63	100	160~250	350~450
	tan δ(max.) 最大损耗角正切	Ø4~Ø10	0.35	0.30	0.24	0.20	0.18	0.16	0.14	0.14	0.14	0.20	0.25
		Ø12.5~Q16	0.40	0.38	0.34	0.30	0.28	0.22	0.18	0.16	0.16	0.20	0.25
Stability at Low Temperature 低温特性	Measurement frequency测试频率：120Hz												
	Rated Voltage (V)额定工作电压				4	6.3	10	16	25	35	50~63	100	160~250	350~450
	Impedance Ratio 阻抗比 ZT/Z20(max.)	Ø4~Ø10	Z(-25℃)/Z(20℃)		7	4	3	2	2	2	2	3	2	3
			Z(-55℃)/Z(20℃)		15	8	6	4	4	3	3	4	3	6
		Ø12.5~Ø16	Z(-25℃)/Z(20℃)		7	5	4	3	2	2	2	2	2	4
			Z(-55℃)/Z(20℃)		17	12	10	8	5	4	3	3	6	10
Load Life 高温负荷特性	After 2000 hrs.application of the rated voltage at 105℃,they meet the characteristics listed below. 在105℃环境中施加额定工作电压2000小时后，电容器的特性符合下表的要求。												
	Capacitance Change静电容量变化率	Within ±20%of initial value (Within ±30%of initial value for capacitors of 10V or less) 初始值的±20%以内(≤10V为初始值的±30%以内)											
	Dissipation Factor损耗角正切	200%or less of initial specified value不大于规范值的200%											
	Leakage Current漏电流	initial specified value or less不大于规范值											
Shelf Life 高温贮存特性	After leaving capacitors under no load at 105℃ for 1000 hours,they meet the specified value for load life characteristics listed above.在105℃环境中无负荷放置1000小时后，电容器的特性符合高温负荷特性中所列的规定值。												
Resistance to Soldering Heat 耐焊接热特性	After reflow soldering and restored at room temperature,they meet the characteristics listed below. 经过回流焊并冷却至室温后，电容器的特性符合下表的要求。												
	Capacitance Change静电容量变化率	Within±10%of initial value初始值的±10%以内											
	Dissipation Factor损耗角正切	initial specified value or less不大于规范值											
	Leakage Current漏电流	initial specified value or less不大于规范值											
Marking标识	Black print on the case top.铝壳顶部黑字印刷。												

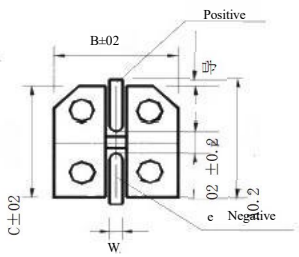
外 形 图DRAWING (Unit:mm)

OD=4~10mm

⑧D≥12.5mm







*1. Applicable to ②4~②10×13.5 适用于②4~②10×13.5
*2. Applicable to ②12.5~②16 适用于②12.5~②16

'A pressure relief vent is attached to products over ②D=8×10.5
• ②D=8×10.5 以上产品有缓压防爆阀

尺 寸 表 DIMENSTONS(Unit:mm)

D×L	4×5.4	5×5.4	6.3×5.4	6.3×7.7	8×10.5	10×10.5	10×13.5	12.5×13.5	12.5×16	16×16.5
A	5.1	6.1	7.3	7.3	9.2	11.2	11.2	13.8	13.8	18.0
B	4.3	5.3	6.6	6.6	8.4	10.4	10.4	13.0	13.0	17.0
C	4.3	5.3	6.6	6.6	8.4	10.4	10.4	13.0	13.0	17.0
P±0.2	1.0	1.3	2.2	2.2	3.1	4.4	4.4	4.4	4.4	6.7
L	5.4	5.4	5.4	7.7	10.5	10.5	13.5	13.5	16.0	16.5
W	0.5~0.8				0.7~1.1		1.1~1.4			

规格尺寸及最大允许纹波电流DIMENSIONS &MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF	WV	4		6.3		10		16		25	
	Code 代码	0G		0J		1A		1C		1E	
4.7	4R7							4×5.4	13	4×5.4	14
10	100							4×5.4	19	5×5.4 (4×5.4)	23 (16)
22	220	4×5.4	20	4×5.4	23	5×5.4 (4×5.4)	29 (20)	5×5.4 (4×5.4)	32 (25)	6.3×5.4 (5×5.4)	39 (32)
33	330	5×5.4 (4×5.4)	30 (25)	5×5.4 (4×5.4)	32 (30)	5×5.4 (4×5.4)	35 (22)	6.3×5.4 (5×5.4)	45 (35)	6.3×5.4 (5×5.4)	48 (35)
47	470	5×5.4 (4×5.4)	36 (30)	5×5.4 (4×5.4)	38 (35)	5×5.4	38	6.3×5.4 (5×5.4)	55 (40)	6.3×5.4	60
100	101	6.3×5.4 (5×5.4)	60 (49)	6.3×5.4 (5×5.4)	65 (54)	6.3×5.4 (5×5.4)	70 (60)	6.3×5.4	80	6.3×7.7 (6.3×5.4)	100 (80)
150	151	6.3×5.4	70	6.3×5.4	55	6.3×5.4	62	6.3×7.7	105	8×10.5 (6.3×7.7)	140 (120)
220	221	6.3×5.4	85	6.3×7.7 (6.3×5.4)	120 (95)	6.3×7.7 (6.3×5.4)	120 (95)	8×10.5 (6.3×7.7)	180 (120)	8×10.5	200
330	331	6.3×7.7	100	6.3×7.7	120	8×10.5 (6.3×7.7)	200 (135)	8×10.5	220	10×10.5 (8×10.5)	240 (250)
470	471	6.3×7.7	105	8×10.5 (6.3×7.7)	230 (120)	6.3×7.7 (8×10.5)	120 (230)	10×10.5 (8×10.5)	300 (270)	10×10.5	280
680	681	8×10.5	210	8×10.5	230	10×10.5 (8×10.5)	270 (220)	10×10.5	315	10×13.5	400
1000	102	8×10.5	230	10×10.5 (8×10.5)	340 (290)	10×10.5	315	12.5×13.5 (10×13.5) (10×10.5)	500 (390) (340)	12.5×13.5	580
1500	152	10×10.5	315	10×13.5 (10×10.5)	450 (410)	10×13.5	460	12.5×13.5	550	12.5×16	850
2200	222	10×13.5 (10×10.5)	440 (340)	12.5×13.5 (10×13.5)	620 (500)	12.5×13.5	680	16×16.5 (12.5×16)	950 (750)	16×16.5	1050
3300	332	10×13.5	490	12.5×16 (12.5×13.5)	700 (660)	16×16.5	1000	16×16.5	1000		
4700	472	12.5×13.5	600	16×16.5	1000					Case size 尺寸	Ripple current 纹波电流
6800	682	16×16.5 (12.5×16)	950 (650)								

μF	WV	35		50		63		100	
	Code 代码	1V		1H		1J		2A	
0.1	0R1			4×5.4	2	4×5.4	2		
0.22	R22			4×5.4	4	4×5.4	4		
0.33	R33			4×5.4	4	4×5.4	4		
0.47	R47			4×5.4	5	4×5.4	5		
1	010			4×5.4	8	4×5.4	8	4×5.4	8
2.2	2R2			4×5.4	11	4×5.4	11	6.3×5.4 (5×5.4)	14 (12)
3.3	3R3	4×5.4	13	4×5.4	14	5×5.4	14	6.3×7.7 (6.3×5.4)	32 (20)
4.7	4R7	4×5.4	15	5×5.4 (4×5.4)	19 (14)	5×5.4	19	6.3×7.7 (6.3×5.4)	35 (21)
10	100	5×5.4 (4×5.4)	25 (18)	6.3×5.4 (5×5.4)	31 (20)	6.3×7.7 (6.3×5.4)	39 (24)	8×10.5 (6.3×7.7)	77 (35)
22	220	6.3×5.4 (5×5.4)	42 (34)	6.3×7.7 (6.3×5.4)	51 (42)	8×10.5 (6.3×7.7)	98 (49)	10×10.5 (8×10.5)	126 (84)
33	330	6.3×5.4	50	6.3×7.7	60	8×10.5	112	10×10.5	133
47	470	6.3×7.7 (6.3×5.4)	78 (58)	8×10.5 (6.3×7.7)	120 (63)	10×10.5 (8×10.5)	160 (119)	12.5×13.5 (10×13.5) (10×10.5)	250 (160) (140)
68	680					Case size 尺寸	Ripple current 纹波电流	12.5×13.5 (10×13.5)	300 (180)

·Case size ØD×L(mm),ripple current(mA rms)at105°℃,120Hz·尺 寸OD×L(mm), 纹波电流(mA rms)于105° ℃, 120Hz

规格尺寸及最大允许纹波电流 DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV		35		50		63		100		160	
μF	Code代码	1V		1H		1J		2A		2C	
22	220									10×13.5	50
33	330									12.5×13.5	95
47	470									12.5×13.5 (16×16.5)	205 (240)
100	101	8×10.5 (6.3×7.7)	150 (92)	10×10.5 (8×10.5)	180 (160)	12.5×13.5 (10×13.5) (10×10.5)	270 (210) (196)	16×16.5 (12.5×13.5)	450 (380)	16×16.5	250
150	151	8×10.5	185	10×10.5	200	10×13.5	225				
220	221	10×10.5 (8×10.5)	250 (220)	10×13.5 (10×10.5)	280 (220)	16×16.5 (12.5×13.5)	560 (470)	16×16.5	550		
330	331	10×10.5	300	16×16.5 (12.5×13.5) (10×13.5)	600 (420) (295)	16×16.5 (12.5×16)	700 (510)				
470	471	12.5×13.5 (10×13.5) (10×10.5)	520 (375) (310)	16×16.5 (12.5×16) (12.5×13.5)	700 (520) (470)	16×16.5	750				
680	681	12.5×13.5	530	16×16.5	750						
1000	102	16×16.5 (12.5×16)	750 (600)							Case size 尺寸	Ripple current 纹波电流
1500	152	16×16.5	750								

WV		200		250		350		400		450	
μF	Code代码	2D		2E		2V		2G		2W	
3.3	3R3							10×13.5 (8×10.5)	40 (35)	10×13.5 (8×12.5)	40 (38)
4.7	4R7			10×13.5	75	10×13.5	85	10×13.5 (12.5×13.5)	45 (48)	10×13.5 (12.5×13.5)	42 45
10	100	10×13.5	75	10×13.5	75	12.5×13.5	105	12.5×13.5	50	12.5×13.5	55
22	220	12.5×13.5	105	12.5×13.5	105	16×16.5	130	16×16.5	85	16×16.5	85
33	330	12.5×13.5	120	16×16.5	135					Case size 尺寸	Ripple current 纹波电流
47	470	16×16.5	220								

·Case size ØD×L(mm),ripple current(mA rms)at105°℃,120Hz·尺寸OD×L(mm),纹波电流(mA rms)于105℃,120Hz

纹波电流频率补偿系数 FREQUENCY COEFFICIENT OF ALLOWABLE RIPPLE CURRENT

Frequency 频率			50Hz	120Hz	300Hz	1KHz	10KHz~
Coefficient 系数	⑦4~010	0.1~68μF	0.70	100	1.17	1.36	1.50
		100~3300μF	0.85	1.00	1.08	1.20	1.30
	②12.5~016	~68μF	0.75	100	1.35	1.57	2.00
		100~680μF	0.80	100	123	1.34	1.50
		1000~6800μF	0.85	1.00	1.10	1.13	1.15

- The endurance of capacitors is reduced with internal heating produced by ripple current at the rate of halving the lifetime with every 10℃ rise. When long life performance is required in actual use, the rms ripple current has to be reduced.
- 铝电解电容器由于在纹波电流叠加时自我发热，温度上升而老化，每升温10℃寿命减少一半；要想保持长寿命请在使用过程中降低纹波电流。

- Taping specifications are given in page 44"Taping Specifications". 编带标准请参阅第44页“编带标准”。
- Please refer to page 45"Package Quantity"for the minimum package quantity. 最小包装数量请参阅第45页“包装数量”。

高可靠品High Reliability

High temperature range up to-40~+125℃
适用于-40~+125℃的高温范围
Suitable for automotive equipment
适用于汽车电子装备
Load life of 1000~3000 hours
负荷寿命1000~3000小时
Comply with the RoHS directive
符合RoHS指令

特 性 表SPECIFICATIONS

Items项目	Characteristics主要特性
Operation Temperature Range使用温度范围	-40~+125℃
Voltage Range额定工作电压范围	10~450V
Capacitance Range静电容量范围	3.3~2200μF
Capacitance Tolerance静电容量允许偏差	±20%at 120Hz,20℃
Leakage Current 漏电流	Leakage current(10V~100V)≤0.03CV or 4μA,whichever is greater (after 2 minutes application of rated voltage) Leakage current(160V~450V)≤0.04CV±100μA,whichever is greater (after 2 minutes application of rated voltage) 漏电流(10V~100V)≤0.03CV或4μA,取较大值(施加额定工作电压2分钟后) 漏电流(160V~450V)≤0.04CV+100μA,取较大值(施加额定工作电压2分钟后)

Dissipation Factor (tanδ) 损耗角正切

Measurement frequency测试频率：120Hz,Temperature温度：20℃

Rated Voltage (V)额定工作电压		10	16	25	35	50	63	100	160~250	400,450
tan δ (max.) 最大损耗角正切	Ø4~Ø10	0.24	0.20	0.18	0.16	0.16	0.14	0.14		
	Ø12.5~Ø16	0.26	0.22	0.20	0.18	0.18	0.16	0.16	0.20	0.20

Stability at Low Temperature 低温特性

Measurement frequency测试频率：120Hz

Rated Voltage(V)额定工作电压			10	16	25	35~100	160~250	400,450
Impedance Ratio 阻抗比 ZT/Z20(max.)	Ø4~Ø10	Z(-25℃)/Z(20℃)	4	3	2	2		
		Z(-40℃)/Z(20℃)	10	8	6	4		
	Ø12.5~16	Z(-25℃)/Z(20℃)	4	3	2	2	3	6
		Z(-40℃)/Z(20℃)	8	6	4	3	6	10

Load Life 高温负荷特性

After 3000 hrs.application of the rated voltage forø12.5~16(10~100V),and 2000 hrs.for Ø8×10.5~Ø10(10~100V), and 1000 hrs.for 6.3,as well as 3000 hrs.application of rated voltage forØ12.5~16(160~450V)at 125℃,they meet the characteristics listed below.在125℃环境中施加额定工作电压3000小时于Ø12.5~16(10~100V),2000小时于Ø8×10.5~Ø10(10~100V),1000小时于Ø6.3,以及施加额定工作电压3000小时于Ø12.5~16(160~450V)后，电容器的特性符合下表的要求。

Capacitance Change静电容量变化率	Within±30%of initial value初始值的±30%以内
Dissipation Factor损耗角正切	300%or less of initial specified value不大于规范值的300%
Leakage Current漏电流	initial specified value or less不大于规范值

Shelf Life 高温贮存特性

After leaving capacitors under no load at 125℃ for 1000 hours,they meet the specified value for load life characteristics listed above.在125℃环境中无负荷放置1000小时后，电容器的特性符合高温负荷特性中所列的规定值。

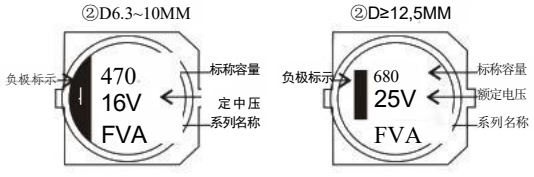
Resistance to Soldering Heat 耐焊接热特性

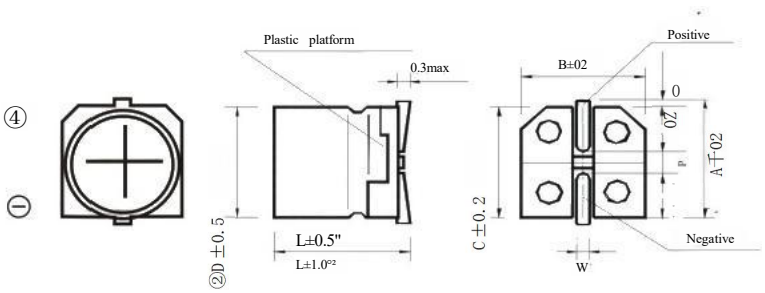
After reflow soldering and restored at room temperature,they meet the characteristics listed below.
经过回流焊并冷却至室温后，电容器的特性符合下表的要求。

Capacitance Change静电容量变化率	Within±10%of initial value初始值的±10%以内
Dissipation Factor损耗角正切	initial specified value or less不大于规范值
Leakage Current漏电流	initial specified value or less不大于规范值

Marking标识 Black print on the case top.铝壳顶部黑字印刷。

外形图DRAWING (Unit:mm)





*1.Applicable to ②6.3-②10×13.5 适用于6.3~②10×13.5
*2.Applicable to ②12.5-②16 适用于②12.5-②16

·A pressure relief vent is attached to products over ②D=8×10.5
·②D=8×10.5 以上产品有缓压防爆阀

尺寸表 DIMENSIONS(Unit:mm)

⑦D×L	6.3×5.8	6.3×7.7	8×10.5	10×10.5	10×13.5	12.5×13.5	12.5×16	16×16.5
A	7.3	7.3	9.2	11.2	11.2	13.8	13.8	18.0
B	6.6	6.6	8.4	10.4	10.4	13.0	13.0	17.0
C	6.6	6.6	8.4	10.4	10.4	13.0	13.0	17.0
P±0.2	2.2	2.2	3.1	4.4	4.4	4.4	4.4	6.7
L	5.8	7.7	10.5	10.5	13.5	13.5	16.0	16.5
W	0.5 ~ 0.8		0.7 ~1.1			1.1 ~1.4		

规格尺寸及最大允许纹波电流及ESR 值 DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT&ESR

WV		10 (1A)				16(1C)				25(1E)			
Parameter 参数 μF		Case size ⑦D×L (mm) 尺寸	E.S.R. (Ω) 20℃ E.S.R.值	E.S.R.(Ω2) -40℃ E.S.R.值	Ripple current (mA rms) at 125℃ ,100KHz 纹波电流	Case size ②D×L (mm) 尺寸	E.S.R. (2) 20℃ E.S.R.值	E.S.R. (Ω) -40℃ E.S.R.值	Ripple current (mA rms) at 125℃ ,100KHz 纹波电流	Case size ⑦D×L (mm) 尺寸	E.S.R. (2) 20° ℃ E.S.R.值	E.S.R. (2) -40℃ E.S.R.值	Ripple current (mA rms) at 125℃ ,100KHz 纹波电流
33	330									6.3×5.8	3.3	66	45
47	470					6.3×5.8	3.3	66	43	6.3×7.7	2.3	46	68
100	101	6.3×7.7	2.3	46	72	8×10.5	1.0	20	115	8×10.5	1.0	20	126
220	221	8×10.5	1.0	20	136	10×10.5	0.7	13.4	175	10×10.5	0.7	13.4	211
330	331	10×10.5	0.7	13.4	188	10×13.5	0.5	9.5	280	12.5×13.5 (10×13.5)	0.14 (0.5)	2.1 (9.5)	750 (270)
470	471	10×13.5	0.5	9.5	300	12.5×13.5	0.14	2.1	750	12.5×13.5	0.14	2.1	750
680	681	12.5×13.5	0.3	7.1	540	16×16.5 (12.5×13.5)	0.10 (0.14)	1.5 (2.1)	1000 (750)	16×16.5	0.10	1.5	1000
1000	102	12.5×16 (12.5×13.5)	0.11 (0.14)	1.5 (2.1)	900 (750)								
2200	222	16×16.5	0.10	1.5	1000								

WV		35(1V)				50(1H)			
Parameter 参数 μF		Case size ②D×L (mm) 尺寸	E.S.R. (2) 20℃ E.S.R.值	E.S.R. (2) -40℃ E.S.R.值	Ripple current (mA rms)at 125℃, 100KHz 纹波电流	Case size ⑦D×L (mm) 尺寸	E.S.R. (2) 20℃ E.S.R.值	E.S.R. (2) -40° ℃ E.S.R.值	Ripple current (mA rms)at 125℃, 100KHz 纹波电流
10	100	6.3×5.8	3.3	66	38	6.3×7.7 (6.3×5.8)	2.3 (3.3)	46 (66)	50 (38)
22	220	6.3×5.8	3.3	66	39	6.3×7.7	2.3	46	50
33	330	6.3×7.7	2.3	46	62	8×10.5	1.0	20	83
47	470	8×10.5	1.0	20	92	10×10.5	0.7	13.4	111
100	101	10×10.5	0.7	13.4	151	12.5×13.5	0.23	3.5	550
220	221	12.5×13.5 (10×13.5)	0.14 (0.5)	2.1 (9.5)	750 (260)	16×16.5 (12.5×13.5)	0.15 (0.23)	2.3 (3.5)	850 (550)
330	331	12.5×13.5	0.14	2.1	750	16×16.5 (12.5×16)	0.15 (0.18)	2.3 (2.7)	850 (700)
470	471	16×16.5 (12.5×16)	0.10 (0.11)	1.5 (1.5)	1000 (900)				

		63(1J)				100 (2A)			
Parameter 参数 μF		Case size ②D×L (mm) 尺寸	E.S.R. (Q) 20℃ E.S.R.值	E.S.R. (2) -40℃ E.S.R.值	Ripple current (mA rms)at 100KH 纹波电流	Case size ②D×L (mm) 尺寸	E.S.R. (Q) 20℃ E.S.R.值	E.S.R. (2) -40℃ E.S.R.值	Ripple current (mArms)at 125℃, 100KHz 纹波电流
10	100	6 •3×7-7	2 •3	115	42	8×10-5	1-00	50	53
22	220	8×10 •5	1 •0	50	56	10×10 •5	0.70	35	63
33	330	10×10-5	0-7	35	77	10×13 •5	0 •45	22 •5	130
47	470	10×13 •5	0-45	22 •5	150	12 •5×13-5	0 •33	16 •5	450
68	680					12 •5×16	0 •26	13	550
100	101	12 •5×13 •5	0 •25	12 •5	500	16×16 •5	0 •24	12	650
220	221	12-5×16	0-20	10	600				
330	331	16×16-5	0 •18	9	820				

规格尺寸及最大允许纹波电流DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLECURRENT

WV		160		200		250		400		450	
μF	Code代码	2C		2D		2E		2G		2W	
3.3	3R3									12.5×16	65
4.7	4R7							12.5×13.5	70	16×16.5	85
6.8	6R8							16×16.5	100		
10	100	12.5×13.5	100	12.5×13.5	100	12.5×16	110			Case size 尺寸	Ripple current 纹波电流
22	220	16×16.5	180	16×16.5	180						

·Case size D×L(mm),ripple current(mA rms)at 125℃,120Hz·尺寸OD×L(mm),纹波电流(mA rms)于125° ℃, 120Hz

纹波电流频率补偿系数FREQUENCY COEFFICIENT OF ALLOWABLE RIPPLE CURRENT

Frequency频率			50Hz	120Hz	1KHz	10KHz~	100KHz~
Coefficient 系数	10~100V	10～100μF	0.35	0.40	0.75	0.90	1.00
		220～470μF	0.35	0.50	0.85	0.94	1.00
		680～2200μF	0.40	0.60	0.85	0.95	1.00

Frequency频率		50Hz	120Hz	300Hz	1KHz	10KHz	100KHz~
Coefficient系数	160~450V	0.75	1.00	1.25	1.50	1.75	1.80

● The endurance of capacitors is reduced with internal heating produced by ripple current at the rate of halving the lifetime with every 10℃ rise.When long life performance is required in actual use,the rms ripple current has to be reduced.
●铝电解电容器由于在纹波电流叠加时自我发热，温度上升而老化，每升温10℃寿命减少一半；要想保持长寿命请在使用过程中降低纹波电流。

●Taping specifications are given in page 44"Taping Specifications". 编带标准请参阅第44页“编带标准”。
●Please refer to page 45"Package Quantity"for the minimum package quantity. 最小包装数量请参阅第45页“包装数量”。

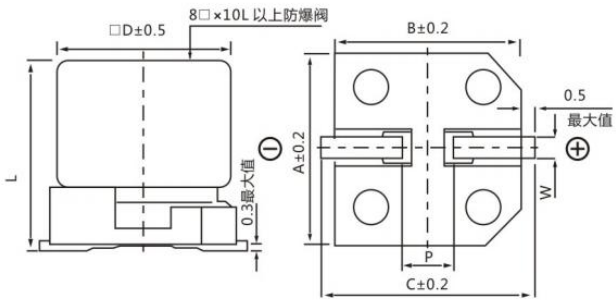
缩体品Shrinking Body

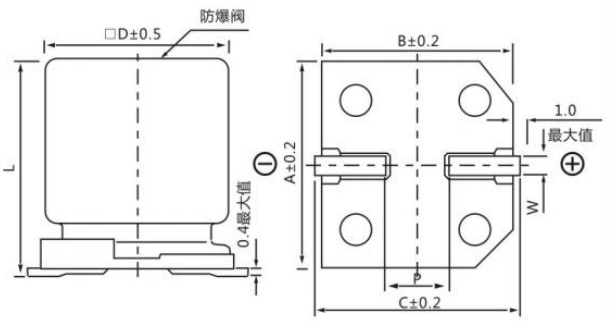
4φ~10φ、105℃、Guarantee of life 2,000 hours,
4φ~10φ、105℃、2,000小时寿命保证
Smaller size than FVH series
比FVH 系列小尺寸产品
HIGH DENSITY PCB design for surface adhesion
适用表面黏着之高密度PCB设计
Comply with the RoHS directive
符合RoHS 指令

特性表SPECIFICATIONS

Items项目	Characteristics主要特性							
Operation Temperature Range使用温度范围	-55℃~+105℃							
Voltage Range额定工作电压范围	6.3~50V							
Capacitance Tolerance静电容量允许偏差	±20%at 120Hz,20℃							
Leakage Current 漏电流	额定电压	6.3～50V	C=额定静电容量(μF/微法拉) V=额定直流工作电压(V/伏特)					
	测试时间	2分钟后						
	漏电流	I=0.01CV或3μA,取较大值						
Dissipation Factor (tan δ) 损耗角正切	Measurement frequency测试频率：120Hz,Temperature温度：20℃							
	Rated Voltage(V)额定工作电压		6.3	10	16	25	35	50
	tan δ(max.)	Ø4~Ø10	0.30	0.24	0.20	0.18	0.16	0.14
	最大损耗角正切	Ø12.5~Q16	0.35	0.28	0.24	0.20	0.18	0.16
	当额定静电容量大于1,000微法拉时，每增加1,000微法拉需加0.02。							
Stability at Low Temperature 低温特性	Measurement frequency测试频率：120Hz 阻抗比不可大于下表所列数值							
	Rated Voltage (V)额定工作电压		6.3	10	16	25	35	50
	Impedance Ratio 阻抗比 ZT/Z20(max.)	Z(-25℃)/Z(20℃) □D<12.5	4	4	3	2	2	2
		Z(-25℃)/Z(20℃) □D≥12.5	5	4	3	2	2	2
		Z(-55℃)/Z(20℃) □D<12.5	12	8	6	4	3	3
		Z(-55℃)/Z(20℃) □D≥12.5	10	B	6	4	3	3
Durability 耐久性								
	保证寿命时间	□D4~5:1,000小时；□D6.3*7.7~10:2,000小时						
	静电容量变化率	□D ≤6.3mm:三初始值的±25%; □D≥8mm:三初始值的±20%						
	损失角正切值	□D ≤6.3mm:三初始规格值的300%; □D≥8mm:三初始规格值的200%						
	漏电流	三初始规格值						
	产品置于105℃环境中供给额定电压2,000小时后，待恢复至20℃的环境中进行量测时，需满足上列要求。							
High temperature load-free characteristic 高温无负荷特性	保证寿命时间：1,000小时；其它测试项目同耐久性。							
Coefficient of correction 纹波电流与频率补正系数	频率(Hz) 静电容量(μF)	50	120	1k	10k≤			
	≤1,000	0.80	1.00	1.25	1.40			
	1,000<静电容量≤8,200	0.85	1.00	1.15	1.25			
Marking标识	Black print on the case top.铝壳顶部黑字印刷。							

外形图 DRAWING (Unit: mm)



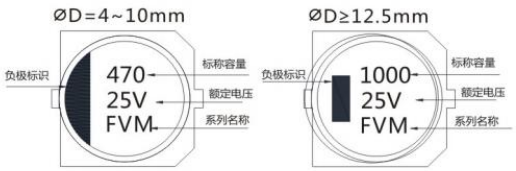


* A pressure relief vent is attached to products over ØD=8×10.5
* ØD=8×10.5以上产品有缓压防爆阀

产品尺寸表 PRODUCTDIMENSION SHEET(Unitmm)

D×L	4×5.8	5×5.8	6.3×5.8	6.3×7.7	8×6.5	8×10.5	10×10.5
A	4.3	5.3	6.6	6.6	8.3	8.3	10.3
B	4.3	5.3	6.6	6.6	8.3	8.3	10.3
C	5.5	6.5	7.8	7.8	10.0	10.0	12.0
P±0.2	1.0	1.5	1.8	1.8	3.1	3.1	4.6
L±0.3	5.8	5.8	5.8	7.7	6.5	10.5	10.5
W	0.5~1.0						

产品印刷标示图 PRINTED MARK



*1. Applicable to Ø4~Ø10×13.5 适用于 Ø4~Ø10×13.5
*2. Applicable to Ø12.5~Ø16 适用于 Ø12.5~Ø16

产品尺寸与参数一览表 PRODUCT DIMENSION AND PARAMETER LIST

额定电压VDC		6.3V(0J)		10V(1A)		16V(1C)		25V(1E)		35V(1V)		50V(1H)	
静电容量(μF)		⑦D×L	mA	②D×L	mA	⑦D×L	mA	⑦D×L	mA	⑦D×L	mA	②D×L	mA
10	100	4×5.8	19	4×5.8	19	4×5.8	19	4×5.8	16	4×5.8	18	4×5.8	20
22	220	4×5.8	23	4×5.8	20	4×5.8	25	5×5.8	32	5×5.8	32	5×5.8	32
33	330	4×5.8	30	4×5.8	22	4×5.8	35	5×5.8	35	5×5.8	35	6.3×5.8	48
47	470	4×5.8	35	5×5.8	38	4×5.8	38	5×5.8	40	6.3×5.8	48	6.3×7.7	68
56	560	4×5.8	38	5×5.8	40	5×5.8	40	5×5.8	40	6.3×5.8	48	8×6.5	86
68	680	4×5.8	42	5×5.8	42	5×5.8	42	6.3×5.8	48	6.3×5.8	48	8×6.5	92
100	101	5×5.8	54	5×5.8	60	5×5.8	60	6.3×5.8 8×6.5	80 90	6.3×5.8 8×6.5	80 90	8×6.5 6.3×7.7	100 92
220	221	5×5.8	90	6.3×5.8	90	6.3×5.8	90	6.3×7.7	120	8×10.5	190	8×10.5	190
270	271	6.3×5.8	105	6.3×5.8	105	6.3×7.7	120	8×10.5	230	8×10.5	190		
330	331	6.3×7.7	120	6.3×7.7	120	6.3×7.7	120	8×10.5	230	10×10.5	310		
470	471	6.3×7.7	140	6.3×7.7	140	6.3×7.7	140	10×10.5	310				
560	561	6.3×7.7	165	8×10.5	280	8×10.5	280						
680	681	6.3×7.7	345	8×10.5	280	10×10.5	310						
1000	102	8×10.5	330	10×10.5	380	10×10.5	380						
1500	152	10×10.5	380	10×10.5	380								

尺寸：直径(φD)×长度(L)，(毫米/mm)容许纹波电流：毫安/均方根值(mA/rms),120 赫兹(Hz),105℃

● The endurance of capacitors is reduced with internal heating produced by ripple current at the rate of halving the lifetime with every 5℃ rise. When long life performance is required in actual use,the rms ripple current has to be reduced.
●铝电解电容器由于在纹波电流叠加时自我发热，温度上升而老化，每升温5℃寿命减少一半；要想保持长寿命请在使用过程中降低纹波电流。

● Taping specifications are given in page 44"Taping Specifications". 编带标准请参阅第44页“编带标准”。
●Please refer to page 45"Package Quantity"for the minimum package quantity. 最小包装数量请参阅第45页“包装标准”。

FVZ Series Low Impedance
FVZ 系列低阻抗品

低阻抗品 Low Impedance

Low impedance with temperature range-55~+105℃
低阻抗和适用于-55~+105℃的温度范围
Load life of 2000 hours
负荷寿命2000小时
Comply with the RoHS directive
符合 RoHS 指令

特 性 表SPECIFICATIONS

Items项目	Characteristics主要特性
Operation Temperature Range使用温度范围	-55～+105℃
Voltage Range额定工作电压范围	6.3～50V
Capacitance Range静电容量范围	1～4700μF
Capacitance Tolerance静电容量允许偏差	±20%at 120Hz,20℃
Leakage Current 漏电流	Leakage current(Ø4~Ø10)≤0.01CV or 3μA,whichever is greater (after 2 minutes application of rated voltage) Leakage current(Ø12.5~Ø16)≤0.03CV or 4μA,whichever is greater(after 1 minute application of rated voltage) 漏电流(Ø4~Ø10)≤0.01CV或3μA,取较大值(施加额定工作电压2分钟后) 漏电流(QØ12.5~Q16)≤0.03CV或4μA,取较大值(施加额定工作电压1分钟后)
Dissipation Factor (tan8) 损耗角正切	Measurement frequency测试频率：120Hz,Temperature温度：20℃

Rated Voltage(V)额定工作电压		6.3	10	16	25	35	50
tan δ(max.) 最大损耗角正切	Ø4~Q10	0.22	0.20	0.18	0.16	0.14	0.12
	Ø12.5~Ø16	0.26	0.22	0.18	0.16	0.14	0.12

Measurement frequency测试频率：120Hz

Rated Voltage (V)额定工作电压			6.3	10	16	25	35	50
Impedance Ratio 阻抗比 ZT/Z20(max.)	Ø4~Ø10	Z(-25℃)/Z(20℃)	2	2	2	2	2	2
		Z(-55℃)/Z(20℃)	5	4	4	3	3	3
	Ø12.5~Ø16	Z(-25℃)/Z(20℃)	3	3	2	2	2	2
		Z(-55℃)/Z(20℃)	10	8	6	4	3	3

Stability at Low Temperature
低温特性

Load Life
高温负荷特性

After 2000 hrs.application of the rated voltage at 105℃,they meet the characteristics listed below.
在105℃环境中施加额定工作电压2000小时后，电容器的特性符合下表的要求。

Capacitance Change静电容量变化率	Within±30%of initial value初始值的±30%以内
Dissipation Factor损耗角正切	200%or less of initial specified value不大于规范值的200%
Leakage Current漏电流	initial specified value or less不大于规范值

Shelf Life
高温贮存特性

After leaving capacitors under no load at 105℃ for 1000 hours,they meet the specified value for load life characteristics listed above.在105℃环境中无负荷放置1000小时后，电容器的特性符合高温负荷特性中所列的规定值。

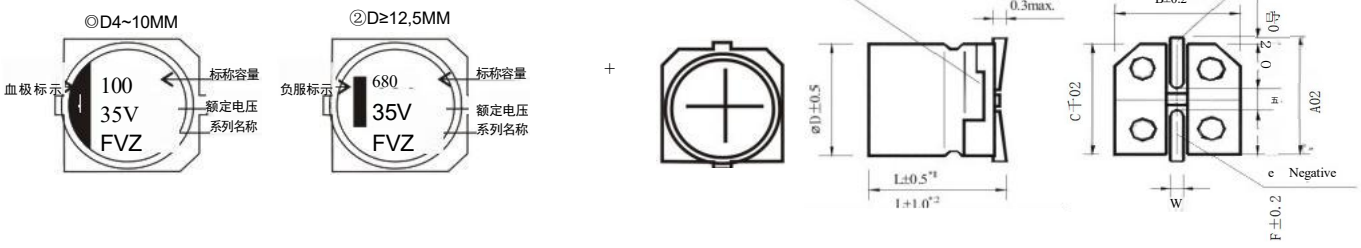
Resistance to Soldering Heat
耐焊接热特性

After reflow soldering and restored at room temperature,they meet the characteristics listed below.
经过回流焊并冷却至室温后，电容器的特性符合下表的要求。

Capacitance Change静电容量变化率	Within±10%of initial value初始值的±10%以内
Dissipation Factor损耗角正切	initial specified value or less不大于规范值
Leakage Current漏电流	initial specified value or less不大于规范值

Marking标识	Black print on the case top.铝壳顶部黑字印刷。

外形图DRAWING (Unit:mm)



1.Applicable toØ4-Ø10×13.5 适用于Ø4~Ø10×13.5
*2.Applicable toØ12.5-Ø16 适用于12.5-Ø16

A pressure relief vent is attached to products over ØD=8×10.5
ØD=8×10.5 以上产品有缓压防爆阀

尺寸表 DIMENSTONS(Unit:mm)

D×L	4×5.4	5×5.4	6.3×5.4	6.3x7.7	8×10.5	10×10.5	10×13.5	12.5x13.5	12.5x16	16×16.5
A	5.1	6.1	7.3	7.3	9.2	11.2	11.2	13.8	13.8	18.0
B	4.3	5.3	6.6	6.6	8.4	10.4	10.4	13.0	13.0	17.0
C	4.3	5.3	6.6	6.6	8.4	10.4	10.4	13.0	13.0	17.0
P±0.2	1.0	1.3	2.2	2.2	3.1	4.4	4.4	4.4	4.4	6.7
L	5.4	5.4	5.4	7.7	10.5	10.5	13.5	13.5	16.0	16.5
W	0.5～0.8				0.7～1.1		1.1～1.4			

规格尺寸及最大允许纹波电流及阻抗值DIMENSIONS & MAXIMUMPERMISSIBE RIPPLECURRENT & IMPEDANCE

μF \ WV / Code	WV	6.3			10			16		
μF / 代码	代码	0J			1A			1C		
10	100							4×5.4	3.0	60
15	150							5×5.4 (4×5.4)	1.8 (3.0)	95 (60)
22	220	4×5.4	3.0	60	5×5.4 (4×5.4)	1.8 (3.0)	95 (60)	5×5.4 (4×5.4)	1.8 (3.0)	95 (60)
33	330	5×5.4 (4×5.4)	1.8 (3.0)	95 (60)	5×5.4 (4×5.4)	1.8 (3.0)	95 (60)	6.3×5.4 (5×5.4)	1.0 (1.8)	140 (95)
47	470	5×5.4 (4×5.4)	1.8 (3.0)	95 (60)	6.3×5.4 (5×5.4)	1.0 (1.8)	140 (95)	6.3×5.4 (5×5.4)	1.0 (1.8)	140 (95)
68	680	6.3×5.4 (5×5.4)	1.0 (1.8)	140 (95)	6.3×5.4	1.0	140	6.3×7.7 (6.3×5.4)	0.6 (1.0)	230 (140)
100	101	6.3×5.4 (5×5.4)	1.0 (1.8)	140 (95)	6.3×7.7 (6.3×5.4)	0.6 (1.0)	230 (140)	6.3×7.7 (6.3×5.4)	0.6 (1.0)	230 (140)
150	151	6.3×7.7 (6.3×5.4)	0.6 (1.0)	230 (140)	6.3×7.7 (6.3×5.4)	0.6 (1.0)	230 (140)	6.3×7.7	0.6	230
220	221	6.3×7.7 (6.3×5.4)	0.6 (1.0)	230 (140)	6.3×7.7	0.6	230	8×10.5 (6.3×7.7)	0.30 (0.6)	450 (230)
330	331	6.3×7.7	0.6	230	8×10.5	0.30	450	10×10.5 (8×10.5)	0.15 (0.30)	670 (450)
470	471	8×10.5 (6.3×7.7)	0.30 (0.60)	450 (230)	8×10.5	0.30	450	10×10.5 (8×10.5)	0.15 (0.30)	670 (450)
680	681	8×10.5	0.30	450	10×10.5	0.15	670	10×10.5	0.15	670
1000	102	10×10.5 (8×10.5)	0.15 (0.30)	670 (450)	10×10.5	0.15	670	10×10.5	0.15	670
1500	152	10×13.5 (10×10.5)	0.13 (0.15)	750 (670)	12.5×13.5 (10×13.5)	0.11 (0.13)	820 (750)	12.5×13.5	0.11	820
2200	222	12.5×13.5 (10×13.5)	0.11 (0.13)	820 (750)	12.5×16	0.09	950	16×16.5 (12.5×16)	0.08 (0.09)	1260 (950)
3300	332	12.5×16 (12.5×13.5)	0.09 (0.11)	950 (820)	16×16.5	0.08	1260	16×16.5	0.08	1260
4700	472	16×16.5	0.08	1260	16×16.5	0.08	1260			
μF	WV Code 代码	25			35			50		
		1E			1V			1H		
1	010				4×5.4	3.0	60	4×5.4	5.0	30
1.5	1R5				4×5.4	3.0	60	4×5.4	5.0	30
2.2	2R2				4×5.4	3.0	60	4×5.4	5.0	30
3.3	3R3				4×5.4	3.0	60	4×5.4	5.0	30
4.7	4R7	4×5.4	3.0	60	4×5.4	3.0	60	5×5.4	3.0	50
6.8	6R8	4×5.4	3.0	60	5×5.4	1.8	95	6.3×5.4	2.0	70
10	100	5×5.4 (4×5.4)	1.8 (3.0)	95 (60)	5×5.4 (4×5.4)	1.8 (3.0)	95 (60)	6.3×5.4	2.0	70
15	150	6.3×5.4	1.8	95	5×5.4	1.8	95	6.3×5.4	2.0	70
22	220	6.3×5.4 (5×5.4)	1.0 (1.8)	140 (95)	6.3×5.4 (5×5.4)	1.0 (1.8)	140 (95)	6.3×7.7 (6.3×5.4)	1.0 (2.0)	120 (70)
33	330	6.3×5.4 (5×5.4)	1.0 (1.8)	140 (95)	6.3×7.7 (6.3×5.4)	0.60 (1.0)	230 (140)	6.3×7.7	1.0	120
47	470	6.3×7.7 (6.3×5.4)	0.6 (1.0)	230 (140)	6.3×7.7 (6.3×5.4)	0.60 (1.0)	230 (140)	6.3×7.7	1.0	120
68	680	6.3×7.7	0.6	230	6.3×7.7	0.60	230	8×10.5	0.60	300
100	101	6.3×7.7	0.6	230	8×10.5 (6.3×7.7)	0.30 (0.60)	450 (230)	8×10.5	0.60	300
150	151	8×10.5 (6.3×7.7)	0.30 (0.6)	450 (230)	8×10.5	0.30	450	10×10.5 Case size D×L(mm) 尺寸	0.30 Impedance(Ω) at 20℃, 100KHz 阻抗值	500 Ripple current (mA rms) at 105℃, 100KHz 纹波电流

·Case size D×L(mm),ripple current(mA rms)at 105℃,100KHz,Impedance(Ω)at 20℃100KHz ·尺 寸OD×L(mm), 纹波电流(mA rms)于105℃, 100KHz, 阻抗值(Ω) 于20℃100KHz

规格尺寸及最大允许纹波电流及阻抗值DIMENSIONS & MAXIMUMPERMISSIBERIPPLECURRENT & IMPEDANCE

WV / Code / μF / 代码		25			35			50		
		1E			1V			1H		
220	221	8×10.5	0.30	450	10×10.5 (8×10.5)	0.15 (0.30)	670 (450)	10×10.5	0.30	500
330	331	10×10.5 (8×10.5)	0.15 (0.30)	670 (450)	10×10.5	0.15	670	16×16.5 (12.5×13.5) (10×13.5)	0.12 (0.20) (0.25)	1060 (650) (580)
470	471	10×10.5	0.15	670	10×13.5 (10×10.5)	0.13 (0.15)	750 (670)	16×16.5 (12.5×16)	0.12 (0.15)	1060 (700)
680	681	10×13.5	0.13	750	12.5×13.5 (10×13.5)	0.11 (0.13)	820 (750)	16×16.5	0.12	1060
1000	102	16×16.5 (12.5×13.5)	0.08 (0.11)	1260 (820)	16×16.5 (12.5×16)	0.08 (0.09)	1260 (950)			
1500	152	12.5×16	0.09	950	16×16.5	0.08	1260	Case size ⑦D×L(mm) 尺寸	Impedance(Ω) at 20℃, 100KHz 阻抗值	Ripple current (mA rms)at 105℃,100KHz 纹波电流
2200	222	16×16.5	0.08	1260						

·Case size ØD×L(mm),ripple current (mA rms)at105°℃,100KHz,Impedance(Q)at 20℃100KHz ● 尺寸 OD×L(mm) 纹 波 电 流(mA ms)于105℃,100KHz, 阻抗值(Ω)于20℃100KHz

纹波电流频率补偿系数 FREQUENCY COEFFICIENT OF ALLOWABLE RIPPLE CURRENT

Frequency频率			50Hz	120Hz	300Hz	1KHz	10KHz~
Coefficient 系数	②4~②10	1～68μF	0.35	0.50	0.64	0.83	1.00
		100～2200μF	0.40	0.55	0.70	0.85	1.00
	②12.5～016	~680μF	0.45	0.65	0.80	0.90	1.00
		1000～4700μF	0.65	0.85	0.95	1.00	1.00

● The endurance of capacitors is reduced with internal heating produced by ripple current at the rate of halving the lifetime with every 10℃ rise.When long life performance is required in actual use,the rms ripple current has to be reduced.
●铝电解电容器由于在纹波电流叠加时自我发热，温度上升而老化，每升温10℃寿命减少一半；要想保持长寿命请在使用过程中降低纹波电流。

● Taping specifications are given in page 44"Taping Specifications". 编带标准请参阅第44页“编带标准”。
●Please refer to page 45"Package Quantity"for the minimum package quantity. 最小包装数量请参阅第45页“包装数量”。

FVR Series Extra Low Impedance
FVR 系列极低阻抗品

极低阻抗品Extra Lower Impedance

Extra low impedance with temperature range-55~+105℃
极低阻抗和适用于-55~+105℃的温度范围
Impedance 20~40%less than LZ series
阻抗值比LZ 系列低20~40%
Comply with the RoHS directive
符合 RoHS 指令

特性表SPECIFICATIONS

Items项目	Characteristics主要特性
Operation Temperature Range使用温度范围	-55～+105℃
Voltage Range额定工作电压范围	6.3～50V
Capacitance Range静电容量范围	4.7～4700 μF
Capacitance Tolerance静电容量允许偏差	±20%at 120Hz,20℃
Leakage Current 漏电流	Leakage current(Ø4~Ø10)≤0.01CV or 3μA,whichever is greater(after 2 minutes application of rated voltage) Leakage current(Ø12.5~16)≤0.03CV or 4μA,whichever is greater(after 1minute application of rated voltage) 漏电流(Ø4~Ø10)≤0.01CV或3μA,取较大值(施加额定工作电压2分钟后) 漏电流(Ø12.5~Ø16)≤0.03CV或4μA,取较大值(施加额定工作电压1分钟后)
Dissipation Factor (tanδ) 损耗角正切	Measurement frequency测试频率：120Hz,Temperature温度：20℃

Rated Voltage(V)额定工作电压		6.3	10	16	25	35	50
tan δ(max.) 最大损耗角正切	Ø4~Ø10	0.22	0.20	0.18	0.16	0.14	0.12
	Ø12.5~Ø16	0.26	0.22	0.18	0.16	0.14	0.12

Stability at Low Temperature 低温特性 — Measurement frequency测试频率：120Hz

Rated Voltage(V)额定工作电压			6.3	10	16	25	35	50
Impedance Ratio 阻抗比 ZT/Z20(max.)	Ø4~Ø10	Z(-25℃)/Z(20℃)	2	2	2	2	2	2
		Z(-55℃)/Z(20℃)	5	4	4	3	3	3
	Ø12.5~Ø16	Z(-25℃)/Z(20℃)	3	3	2	2	2	2
		Z(-55℃)/Z(20℃)	10	8	6	4	3	3

Load Life 高温负荷特性 — After 3000 hrs.(2000 hrs.for Ø4~Ø6.3×7.7)application fotherated voltage at 105℃,they meet the characteristics listed below.
在105℃环境中施加额定工作电压3000小后(Ø4~Ø6.3×7.7为2000小时)后，电容器的特性符合下表的要求。

Capacitance Change静电容量变化率	Within ±30%of initial value初始值的±30%以内
Dissipation Factor损耗角正切	200%or less of initial specified value不大于规范值的200%
Leakage Current漏电流	initial specified value or less不大于规范值

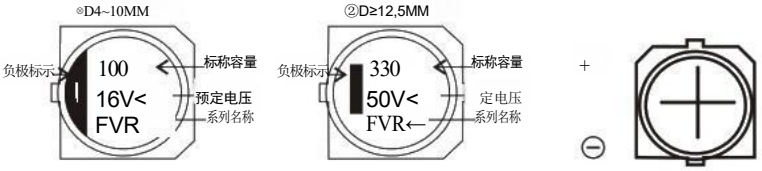
Shelf Life 高温贮存特性 — After leaving capacitors under no load at 105℃ for1000 hours,they meet the specified value for load life characteristics listed above.在105℃环境中无负荷放置1000小后后，电容器的特性符合高温负荷特性中所列的规定值。

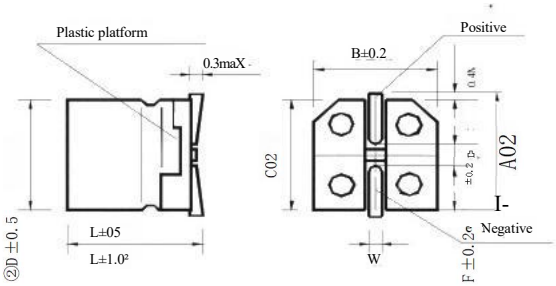
Resistance to Soldering Heat 耐焊接热特性 — After reflow soldering and restored at room temperature,they meet the characteristics listed below.经过回流焊并冷却至室温后，电容器的特性符合下表的要求。

Capacitance Change静电容量变化率	Within±10%of initial value初始值的±10%以内
Dissipation Factor损耗角正切	initial specified value or less不大于规范值
Leakage Current漏电流	initial specified value or less不大于规范值

Marking标识 — Black print on the case top.铝壳顶部黑字印刷。

外形图DRAWING (Unit:mm)





*1.Applicable to ②4~②10×13.5 适用于04~②10×13.5
*2.Applicable to 12.5-②16 适用于②12.5-016

*A pressure relief vent is attached to products over ⑦D=8×10.5
*②D=8×10.5以上产品有缓压防爆阀

尺寸表 DIMENSTONS(Unit:mm)

D×L	4×5.4	5×5.4	6.3x5.4	6.3x7.7	8×10.5	10×10.5	10×13.5	12.5x13.5	12.5×16	16×16.5
A					9.2	11.2	11.2	13.8	13.8	18.0
B	4.3	5.3	6.6	6.6	8.4	10.4	10.4	13.0	13.0	17.0
C	4.3	5.3	6.6	6.6	8.4	10.4	10.4	13.0	13.0	17.0
P±0.2	1.0	1.3	2.2	2.2	3.1	4.4	4.4	4.4	4.4	6.7
L	5.4	5.4	5.4	7.7	10.5	10.5	13.5	13.5	16.0	16.5
W	0.5～0.8				0.7～1.1		1.1～1.4			

规格尺寸及最大允许纹波电流及阻抗值DIMENSIONS &MAXIMUMPERMISSIBERIPPLECURRENT&IMPEDANCE

μF	WV Code 代码	6.3			10			16		
		0J			1A			1C		
10	100							4×5.4	1.8	80
15	150							4×5.4	1.8	80
22	220	4×5.4	1.8	80	4×5.4	1.8	80	5×5.4 (4×5.4)	0.76 (1.8)	150 (80)
33	330	5×5.4 (4×5.4)	0.76 (1.8)	150 (80)	5×5.4 (4×5.4)	0.76 (1.8)	150 (80)	6.3×5.4 (5×5.4)	0.44 (0.76)	230 (150)
47	470	5×5.4 (4×5.4)	0.76 (1.8)	150 (80)	6.3×5.4 (5×5.4)	0.44 (0.76)	230 (150)	6.3×5.4 (5×5.4)	0.44 (0.76)	230 (150)
56	560	5×5.4	0.76	150	6.3×5.4	0.44	230	6.3×5.4	0.44	230
68	680	6.3×5.4 (5×5.4)	0.44 (0.76)	230 (150)	6.3×5.4	0.44	230	6.3×7.7 (6.3×5.4)	0.34 (0.44)	280 (230)
100	101	6.3×5.4 (5×5.4)	0.44 (0.76)	230 (150)	6.3×7.7 (6.3×5.4)	0.34 (0.44)	280 (230)	6.3×7.7 (6.3×5.4)	0.34 (0.44)	280 (230)
150	151	6.3×5.4	0.44	230	6.3×7.7	0.34	280	6.3×7.7	0.34	280
220	221	6.3×7.7 (6.3×5.4)	0.34 (0.44)	280 (230)	6.3×7.7	0.34	280	8×10.5 (6.3×7.7)	0.17 (0.34)	450 (280)
330	331	6.3×7.7	0.34	280	8×10.5	0.17	450	10×10.5 (8×10.5)	0.09 (0.17)	670 (450)
470	471	8×10.5	0.17	450	8×10.5	0.17	450	10×10.5 (8×10.5)	0.09 (0.17)	670 (450)
680	681	10×10.5 (8×10.5)	0.09 (0.17)	670 (450)	10×10.5	0.09	670	10×13.5 (10×10.5)	0.075 (0.09)	800 (670)
1000	102	10×10.5 (8×10.5)	0.09 (0.17)	670 (450)	10×10.5	0.09	670	16×16.5 (12.5×16) (12.5×13.5)	0.055 (0.06) (0.065)	1350 (1050) (900)
1500	152	10×13.5 (10×10.5)	0.075 (0.09)	800 (670)	12.5×13.5	0.065	900	16×16.5	0.055	1350
2200	222	12.5×13.5	0.065	900	12.5×16	0.060	1050	16×16.5	0.055	1350
3300	332	12.5×16	0.060	1050	16×16.5	0.055	1350	Case size ⑦DXL(mm) 尺寸	Impedance(2) at 20℃, 100KHz 阻抗值	Ripple current (mA rms) at 105℃, 100KHz 纹波电流
4700	472	16×16.5	0.055	1350						

μF	WV Code 代码	25			35			50		
		1E			1V			1H		
4.7	4R7				4×5.4	1.8	80	5×5.4 (4×5.4)	1.52 (3.0)	85 (60)
10	100	4×5.4	1.8	80	5×5.4 (4×5.4)	0.76 (1.8)	150 (80)	6.3×5.4 (5×5.4)	0.88 (1.52)	165 (85)
15	150	5×5.4	0.76	150	5×5.4	0.76	150	6.3×5.4	0.88	165
22	220	6.3×5.4 (5×5.4)	0.44 (0.76)	230 (150)	6.3×5.4 (5×5.4)	0.44 (0.76)	230 (150)	6.3×7.7 (6.3×5.4)	0.68 (0.88)	185 (165)
33	330	6.3×5.4 (5×5.4)	0.44 (0.76)	230 (150)	6.3×5.4	0.44	230	6.3×7.7	0.68	185
47	470	6.3×7.7 (6.3×5.4)	0.34 (0.44)	280 (230)	6.3×7.7 (6.3×5.4)	0.34 (0.44)	280 (230)	6.3×7.7	0.68	185
56	560	6.3×7.7 (6.3×5.4)	0.34 (0.44)	280 (230)	6.3×7.7	0.34	280	8×10.5 (6.3×7.7)	0.34 (0.68)	350 (185)
68	680	6.3×7.7	0.34	280	6.3×7.7	0.34	280	8×10.5	0.34	350
100	101	6.3×7.7	0.34	280	8×10.5	0.17	450	10×10.5 (8×10.5)	0.18 (0.34)	670 (350)
150	151	8×10.5 (6.3×7.7)	0.17 (0.34)	450 (280)	10×10.5	0.09	670	10×10.5 Case size ⑦D×L(mm) 尺寸	0.18 Impedance(2) at 20℃, 100KHz 阻抗值	670 Ripple current (mA rms) at 105℃, 100KHz 纹波电流

●Case size OD×L(mm),ripple current(mA rms)at105°℃,100KHz,Impedance(Q)at 20℃100KHz ·尺寸OD×L(mm), 纹波电流(mA rms)于105℃, 100KHz, 阻抗值(Q) 于20℃100KHz

规格尺寸及最大允许纹波电流及阻抗值DIMENSIONS & MAXIMUM PERMISSIBERIPPLE CURRENT & IMPEDANCE

WV		25			35			50		
μF / Code代码		1E			1V			1H		
220	221	8×10.5	0.17	450	10×10.5	0.09	670	10×13.5 (10×10.5)	0.16 (0.18)	750 (670)
330	331	10×10.5 (8×10.5)	0.09 (0.17)	670 (450)	10×10.5	0.09	670	12.5×13.5	0.14	800
470	471	10×13.5 (10×10.5)	0.075 (0.09)	800 (670)	12.5×13.5 (10×13.5)	0.065 (0.075)	900 (800)	16×16.5 (12.5×16)	0.10 (0.12)	1150 (900)
680	681	12.5×13.5	0.065	900	12.5×16 (12.5×13.5)	0.060 (0.065)	1050 (900)			
1000	102	16×16.5 (12.5×16)	0.055 (0.060)	1350 (1050)	16×16.5	0.055	1350	Case size ②DXL(mm) 尺寸	Impedance(Q) at 20℃, 100KHz 阻抗值	Ripple current (mA rms) at 105℃, 100KHz 纹波电流
1500	152	16×16.5	0.055	1350						

●Case size D×L(mm), ripple current(mA rms)at105℃, 100KHz, Impedance(Q)at 20℃ 100KHz

●尺寸QD×L(mm), 纹波电流(mA rms)于105℃, 100KHz, 阻抗值(Q)于20℃100KHz

纹波电流频率补偿系数 FREQUENCY COEFFICIENT OF ALLOWABLE RIPPLE CURRENT

Frequency频率			50Hz	120Hz	300Hz	1KHz	10KHz~
Coefficient 系数	②4~②10	4.7～68μF	0.35	0.50	0.64	0.83	1.00
		100～1500μF	0.40	0.55	0.70	0.85	1.00
	②12.5~②16	~680μF	0.45	0.65	0.80	0.90	1.00
		1000～4700μF	0.65	0.85	0.95	1.00	1.00

● The endurance of capacitors is reduced with internal heating produced by ripple current at the rate of halving the lifetime with every 10℃ rise. When long life performance is required in actual use, the rms ripple current has to be reduced.

●铝电解电容器由于在纹波电流叠加时自我发热，温度上升而老化，每升温10℃寿命减少一半；要想保持长寿命请在使用过程中降低纹波电流。

● Taping specifications are given in page 44"Taping Specifications". 编带标准请参阅第44页“编带标准”。

●Please refer to page 45"Package Quantity"for the minimum package quantity. 最小包装数量请参阅第45页“包装数量”。

FVL Series Long Life Extra Low Impedance
FVL 系列长寿命极低阻抗品

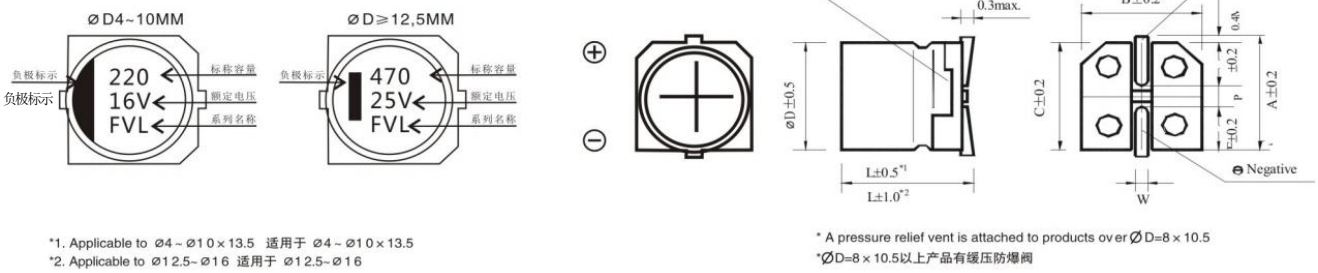
长寿命极低阻抗品 Long Life With Extra Lower Impedance

Extra lower impedance with temperature range-55~+105℃
极低阻抗和适用于-55~+105℃的温度范围
Load life of 3000~5000 hours
负荷寿命3000~5000小时
Impedance 5~15%less than KZ series
阻抗值比KZ 系列低5~15%
Comply with the RoHS directive
符合 RoHS 指令

特性表 SPECIFICATIONS

Items项 目	Characteristics主要特性								
Operation Temperature Range使用温度范围	-55～+105℃								
Voltage Range额定工作电压范围	6.3～100V								
Capacitance Range静电容量范围	3.3～4700μF								
Capacitance Tolerance静电容量允许偏差	±20%at 120Hz,20℃								
Leakage Current 漏电流	Leakage current(Ø4~Ø10)≤0.01CV or 3μA,whichever is greater(after 2 minutes application of rated voltage) Leakage current(Ø12.5~Ø16)≤0.03CV or4μA,whichever is greater (after 1 minute application of rated voltage) 漏电流(Ø4~Ø10)≤0.01CV或3μA,取较大值(施加额定工作电压2分钟后) 漏电流(Ø12.5~16)≤0.03CV或4μA,取较大值(施加额定工作电压1分钟后)								
Dissipation Factor (tanδ) 损耗角正切	Measurement frequency测试频率：120Hz,Temperature温度：20℃								
	Rated Voltage (V)额定工作电压		6.3	10	16	25	35	50	63~80	100
	tan δ(max.) 最大损耗角正切	Ø4~10	0.26	0.20	0.18	0.16	0.14	0.12	0.12	0.12
		Ø12.5~Q16	0.26	0.20	0.18	0.16	0.14	0.12	0.12	0.12
Stability at Low Temperature 低温特性	Measurement frequency测试频率：120Hz								
	Rated Voltage(V)额定工作电压		6.3～16			25～100			
	Impedance Ratio 阻抗比 ZT/Z20(max.)	Z(-25℃)/Z(20℃)	2			2			
		Z(-40℃)/Z(20℃)	3			3			
		Z(-55℃)/Z(20℃)	4			3			
Load Life 高温负荷特性	After 5000 hrs.(3000hrs.for Ø4~Ø6.3×5.8)application of the rated voltage at 105° ℃,they meet the characteristics listed below. 在105℃环境中施加额定工作电压5000小时(Ø4~Ø6.3×5.8为3000小时)后，电容器的特性符合下表的要求。								
	Capacitance Change静电容量变化率		Within±30%of initial value初始值的±30%以内						
	Dissipation Factor损耗角正切		300%or less of initial specified value不大于规范值的300%						
	Leakage Current漏电流		initial specified value or less不大于规范值						
Shelf Life 高温贮存特性	After leaving capacitors under no load at 105° C for 1000 hours,they meet the specified value for load life characteristics listed above.在105℃环境中无负荷放置1000小时后，电容器的特性符合高温负荷特性中所列的规定值。								
Resistance to Soldering Heat耐焊接热特性	After reflow soldering and restored at room temperature,they meet the characteristics listed below.经过回流焊并冷却至室温后，电容器的特性符合下表的要求。								
	Capacitance Change静电容量变化率		Within±10%of initial value初始值的±10%以内						
	Dissipation Factor损耗角正切		initial specified value or less不大于规范值						
	Leakage Current漏电流		initial specified value or less不大于规范值						
Marking 标 识	Black print on the case top.铝壳顶部黑字印刷。								

外形图 DRAWING (Unit: mm)



*1. Applicable to Ø4～Ø10×13.5 适用于 Ø4～Ø10×13.5
*2. Applicable to Ø12.5~Ø16 适用于 Ø12.5~Ø16

* A pressure relief vent is attached to products over ØD=8×10.5
*ØD=8×10.5以上产品有缓压防爆阀

尺寸表 DIMENSTONS(Unit:mm)

D×L	4×5.8	5×5.8	6.3×5.8	6.3x7.7	8×10.5	10×10.5	10×13.5	12.5x13.5	12.5x16	16×16.5
A	5.1	6.1	7.3	7.3	9.2	11.2	11.2	13.8	13.8	18.0
B	4.3	5.3	6.6	6.6	8.4	10.4	10.4	13.0	13.0	17.0
C	4.3	5.3	6.6	6.6	8.4	10.4	10.4	13.0	13.0	17.0
P±0.2	1.0	1.3	2.2	2.2	3.1	4.4	4.4	4.4	4.4	6.7
L	5.4	5.4	5.4	7.7	10.5	10.5	13.5	13.5	16.0	16.5
W	0.5 ~ 0.8				0.7 ~1.1		1.1 ~1.4			

规格尺寸及最大允许纹波电流及阻抗值DMENSIONS & MAXIMUM PERMSSIBE RIPPLE CURRENT&IMPEDANCE

μF \ WV Code 代码		6.3			10			16		
		0J			1A			1C		
10	100							4×5.8	1.35	90
15	150							4×5.8	1.35	90
22	220	4×5.8	1.35	90	4×5.8	1.35	90	5×5.8	0.70	160
33	330	5×5.8 (4×5.8)	0.76 (1.35)	160 (90)	5×5.8	0.76	160	5×5.8	0.76	160
47	470	5×5.8 (4×5.8)	0.76 (1.35)	160 (90)	6.3×5.8	0.44	240	6.3×5.8	0.44	240
56	560	5×5.8	0.76	160	6.3×5.8	0.44	240	6.3×5.8 (5×5.8)	0.44 (0.76)	240 (160)
68	680	6.3×5.8	0.44	240	6.3×5.8	0.44	240	6.3×5.8	0.44	240
100	101	6.3×5.8	0.44	240	6.3×7.7	0.34	300	6.3×7.7 (6.3×5.8)	0.34 (0.44)	300 (240)
150	151	6.3×5.8	0.44	240	6.3×7.7	0.34	300	6.3×7.7 (6.3×5.8)	0.34 (0.44)	300 (240)
220	221	6.3×7.7 (6.3×5.8)	0.34 (0.44)	300 (240)	6.3×7.7	0.34	300	6.3×7.7	0.34	300
330	331	8×10.5	0.17	600	10×10.5 (8×10.5)	0.09 (0.17)	850 (600)	8×10.5 (6.3×7.7)	0.17 (0.34)	600 (300)
470	471	8×10.5	0.17	600	10×10.5 (8×10.5)	0.09 (0.17)	850 (600)	10×10.5 (8×10.5)	0.08 (0.17)	850 (600)
680	681	10×10.5 (8×10.5)	0.09 (0.17)	850 (600)	10×10.5	0.09	850	10×10.5 (8×10.5)	0.09 (0.17)	850 (600)
1000	102	10×10.5 (8×10.5)	0.09 (0.17)	850 (600)	10×13.5 (10×10.5)	0.07 (0.09)	950 (850)	16×16.5 (12.5×16) (12.5×13.5)	0.05 (0.055) (0.06)	1450 (1200) (1100)
1500	152	10×13.5	0.09	950	12.5×13.5	0.06	1100	16×16.5	0.05	1450
2200	222	12.5×13.5	0.06	1100	12.5×16	0.055	1200	Case size ⑦D×L(mm) 尺寸	Impedance(Ω) at 20, 100KHz 阻抗值	Ripple current (mA rms) at 105℃, 100KHz 纹波电流
3300	332	12.5×16	0.055	1200	16×16.5	0.05	1450			
4700	472	16×16.5	0.05	1450						

μF \ WV Code 代码		25			35			50		
		1E			1V			1H		
4.7	4R7				4×5.8	1.35	90	5×5.8	1.52	85
10	100	4×5.8	1.35	90	5×5.8	0.76	160	6.3×5.8 (5×5.8)	0.88 (1.35)	165 (115)
15	150	5×5.8	0.76	160	5×5.8	0.76	160	6.3×5.8	0.88	165
22	220	6.3×5.8 (5×5.8)	0.44 (0.76)	240 (160)	6.3×5.8	0.44	240	6.3×7.7 (6.3×5.8)	0.68 (0.88)	195 (165)
33	330	6.3×5.8	0.44	240	6.3×5.8	0.44	240	6.3×7.7	0.68	195
47	470	6.3×7.7 (6.3×5.8)	0.34 (0.44)	300 (240)	6.3×7.7 (6.3×5.8)	0.34 (0.88)	300 (165)	8×10.5 (6.3×7.7)	0.34 (0.68)	350 (195)
56	560	6.3×7.7	0.34	300	6.3×7.7	0.34	300	8×10.5	0.34	350
68	680	6.3×7.7	0.34	300	8×10.5	0.17	600	8×10.5	0.34	350
100	101	8×10.5 (6.3×7.7)	0.17 (0.34)	600 (300)	8×10.5	0.17	600	10×10.5 (8×10.5)	0.18 (0.34)	670 (350)
150	151	8×10.5 (6.3×7.7)	0.16 (0.34)	600 (300)	10×10.5	0.09	850	10×13.5 (10×10.5)	0.14 (0.18)	780 (670)
220	221	8×10.5	0.17	600	10×10.5 (8×10.5)	0.09 (0.16)	850 (600)	(10×13.5) (10×10.5)	(0.14) (0.26)	(780) (750)
330	331	10×10.5 (8×10.5)	0.09 (0.17)	850 (600)	(10×13.5) (10×10.5)	(0.07) (0.10)	(950) (850)	12.5×13.5	0.12	900
470	471	10×13.5 (10×10.5)	0.07 (0.09)	950 (850)	12.5×13.5 (10×13.5) (10×10.5)	0.06 (0.07) (0.10)	1100 (1000) (950)	16×16.5 (12.5×16) (12.5×13.5)	0.08 (0.10) (0.08)	1250 (1050) (1100)
680	681	12.5×13.5	0.06	1100	12.5×16 (12.5×13.5)	0.055 (0.06)	1200 (1100)			
1000	102	16×16.5 (12.5×16) (12.5×13.5)	0.05 (0.055) (0.06)	1450 (1200) (1100)	16×16.5	0.05	1450	Case size ⑦D×L(mm) 尺寸	Impedance(Ω) at 20℃, 100KHz 阻抗值	Ripple current (mArms) at 105℃, 100KHz 纹波电流
1500	152	16×16.5	0.05	1450						

• Case size ØD×L(mm), ripple current(mA rms)at105℃, 100KHz, Impedance(Ω)at 20℃100KHz • 尺寸ØD×L(mm), 纹波电流(mA rms)于105℃, 100KHz, 阻抗值(Ω)于20℃100KHz

规格尺寸及最大允许纹波电流及阻抗值DIMENSIONS & MAXIMUM PERMISSIBE RIPPLE CURRENT&IMPEDANCE

WV / Code / μF 代码		63			80			100		
		1J			1K			2A		
3.3	3R3				5×5.8	5.0	25			
4.7	4R7	5×5.8	3.0	50	6.3×5.8	3.0	40			
10	100	6.3×7.7 (6.3×5.8)	1.2 (1.5)	120 (80)	6.3×7.7	2.4	60	8×10.5	1.3	130
22	220	8×10.5 (6.3×7.7)	0.65 (1.2)	250 (120)	8×10.5	1.3	130	10×10.5 (8×10.5)	0.7 (1.3)	200 (160)
33	330	8×10.5	0.65	250	10×10.5	0.7	200	10×13.5	0.7	200
47	470	10×10.5 (8×10.5)	0.50 (0.65)	300 (250)	10×13.5	0.45	300	12.5×13.5	0.32	500
68	680	12.5×13.5 (10×10.5)	0.16 (0.50)	800 (300)	12.5×13.5	0.32	500	12.5×13.5	0.32	500
100	101	12.5×13.5 (10×13.5) (10×10.5)	0.16 (0.25) (0.50)	800 (400) (300)	12.5×13.5 (10×13.5)	0.32 (0.18)	500 (750)	16×16.5 (12.5×16) (12.5×13.5)	0.17 (0.26) (0.32)	795 (550) (500)
150	151	12.5×13.5 (10×13.5)	0.16 (0.25)	800 (650)	12.5×13.5	0.32	500	Case size ΦD·L(mm) 尺寸	Impedance(2) at 20℃, 100KHz 阻抗值	Ripple current (mA rms)at 105℃,100KHz 纹波电流
220	221	12.5×13.5	0.16	800	12.5×16 (12.5×13.5)	0.26 (0.12)	550 (900)			
330	331	16×16.5	0.082	1400	16×16.5	0.17	795			

• Case size D×L(mm),ripple current(mA rms)at105° ℃,100KHz,Impedance(2)at 20℃ • 尺寸ΦD×L(mm),纹波电流(mA ms)于105℃,100KHz,阻抗值(2)于20℃100KHz

纹波电流频率补偿系数 FREQUENCY COEFFICIENT OF ALLOWABLE RIPPLE CURRENT

Frequency频率			50Hz	120Hz	300Hz	1KHz	10KHz~
Coefficient 系数	②4～010	4.7～68μF	0.35	0.50	0.64	0.83	1.00
		100～1500μF	0.40	0.55	0.70	0.85	1.00
	012.5~②16	~68μF	0.40	0.55	0.70	0.85	1.00
		100～680μF	0.45	0.65	0.80	0.90	1.00
		1000～4700μF	0.65	0.85	0.95	1.00	1.00

● The endurance of capacitors is reduced with internal heating produced by ripple current at the rate of halving the l lifetime with every 10℃ rise.When long life performance is required in actual use,the rms ripple current has to be reduced.

●铝电解电容器由于在纹波电流叠加时自我发热，温度上升而老化，每升温10℃寿命减少一半；要想保持长寿命请在使用过程中降低纹波电流。

● Taping specifications are given in page 44"Taping Specifications". 编带标准请参阅第44页“编带标准”。

●Please refer to page 45"Package Quantity"for the minimum package quantity. 最小包装数量请参阅第45页“包装数量”。

宽温长寿命 Wide temperature Long Life Assurance

Wide temperature range-55~+105℃
适用于-55~+105℃的宽温范围
Load life of 2000~3000 hours
负荷寿命2000~3000小时
Comply with the RoHS directive
符合RoHS 指令

特性表SPECIFICATIONS

Items项目	Characteristics主要特性
Operation Temperature Range使用温度范围	-55～+105℃
Voltage Range额定工作电压范围	6.3～100V
Capacitance Range静电容量范围	0.1～3300μF
Capacitance Tolerance静电容量允许偏差	±20%at 120Hz,20℃
Leakage Current 漏电流	Leakage current(Ø4~010)≤0.01CV or 3μA,whichever is greater (after 2 minutes application of rated voltage) Leakage current(Ø12.5~Q16)≤0.03CV or 4μA,whichever is greater (after 1minute application of rated voltage) 漏电流(Ø4~Q10)≤0.01CV或3μA,取较大值(施加额定工作电压2分钟后) 漏电流(Ø12.5~Ø16)≤0.03CV或4μA,取较大值(施加额定工作电压1分钟后)

Dissipation Factor(tan8) 损耗角正切

Measurement frequency测试频率：120Hz,Temperature温度：20℃

Rated Voltage(V)额定工作电压		6.3	10	16	25	35	50
tan δ(max.) 最大损耗角正切	Ø4~Ø10	0.30	0.24	0.20	0.18	0.16	0.14
	Ø12.5~Ø16	0.38	0.34	0.30	0.28	0.22	0.18

Stability at Low Temperature 低温特性

Measurement frequency测试频率：120Hz

Rated Voltage(V额定工作电压)			6.3	10	16	25	35	50
Impedance Ratio 阻抗比 ZT/Z20(max.)	Ø4~Ø10	Z(-25℃)/Z(20℃)	3	3	2	2	2	2
		Z(-55℃)/Z(20℃)	8	5	4	3	3	3
	Ø12.5~Ø16	Z(-25℃)/Z(20℃)	5	4	3	2	2	2
		Z(-55℃)/Z(20℃)	12	10	8	5	4	3

Load Life 高温负荷特性

After 3000 hrs.(2000 hrs.forø4~06.3×5.8)application of the rated voltage at 105℃,they meet the characteristics listed below.
在105℃环境中施加额定工作电压3000小时(Ø4~06.3×5.8为2000小时)后，电容器的特性符合下表的要求。

Capacitance Change静电容量变化率	Within±30%of initial value初始值的±30%以内
Dissipation Factor损耗角正切	300%or less of initial specified value不大于规范值的300%
Leakage Current漏电流	initial specified value or less不大于规范值

Shelf Life 高温贮存特性

After leaving capacitors under no load at 105℃ C for 1000 hours,they meet the specified value for load life characteristics listed above.在105℃ C环境中无负荷放置1000小时后，电容器的特性符合高温负荷特性中所列的规定值。

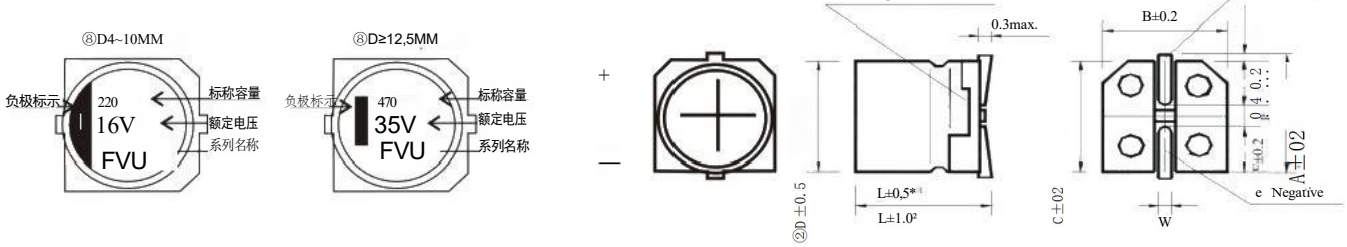
Resistance to Soldering Heat 耐焊接热特性

After reflow soldering and restored at room temperature,they meet the characteristics listed below. 经过回流焊并冷却至室温后，电容器的特性符合下表的要求。

Capacitance Change静电容量变化率	Within±10%of initial value初始值的±10%以内
Dissipation Factor损耗角正切	initial specified value or less不大于规范值
Leakage Current漏电流	initial specified value or less不大于规范值

Marking标识 Black print on the case top.铝壳顶部黑字印刷。

外形图DRAWING (Unit:mm)



1.Applicable toØ4~Ø10×13.5 适用于Ø4~ Q10×13.5
*2.Applicable to12.5-Q16 适用于Ø12.5~Ø16

A pressure relief vent is attached to products over D=8×10.5
QD=B×10.5 以上产品有缓压防爆阀

尺 寸 表 DIMENSTONS(Unit:mm)

D×L	4×5.8	5×5.8	6.3×5.8	6.3x7.7	8×10.5	10×10.5	10×13.5	12.5x13.5	12.5x16	16×16.5
A	5.1	6.1	7.3	7.3	9.2	11.2	11.2	13.8	13.8	18.0
B	4.3	5.3	6.6	6.6	8.4	10.4	10.4	13.0	13.0	17.0
C	4.3	5.3	6.6	6.6	8.4	10.4	10.4	13.0	13.0	17.0
P±0.2	1.0	1.3	2.2	2.2	3.1	4.4	4.4	4.4	4.4	6.7
L	5.4	5.4	5.4	7.7	10.5	10.5	13.5	13.5	16.0	16.5
W	0.5～0.8				0.7～1.1		1.1～1.4			

规格尺寸及最大允许纹波电流DIMENSIONS &MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV		6.3		10		16		25		35		50	
μF	Code 代码	0J		1A		1C		1E		1V		1H	
0.1	0R1											4×5.8	1
0.22	R22											4×5.8	2
0.33	R33											4×5.8	3
0.47	R47											4×5.8	5
1	010											4×5.8	10
2.2	2R2											4×5.8	16
3.3	3R3											4×5.8	16
4.7	4R7							4×5.8	13	4×5.8	14	5×5.8	23
10	100					4×5.8	18	5×5.8	20	5×5.8	21	6.3×5.8	35
22	220	4×5.8	22	5×5.8	25	5×5.8	27	6.3×5.8	36	6.3×5.8	38	6.3×7.7	70
33	330	5×5.8	27	5×5.8	30	6.3×5.8	40	6.3×5.8	60	6.3×7.7	84	8×10.5	90
47	470	5×5.8	33	6.3×5.8	41	6.3×5.8	48	6.3×7.7	90	8×10.5	98	8×10.5	90
100	101	6.3×5.8	50	6.3×5.8	53	6.3×5.8	60	8×10.5	130	8×10.5	130	10×10.5	100
150	151	6.3×5.8	55	6.3×7.7	105	6.3×7.7	95	8×10.5	140	10×10.5	315	10×10.5	100
220	221	6.3×7.7	100	8×10.5	210	8×10.5	210	10×10.5	190	10×10.5	315	10×13.5 (10×10.5)	250 (100)
330	331	8×10.5	210	8×10.5	210	8×10.5	210	10×10.5	315	10×10.5	315	12.5×13.5	400
470	471	8×10.5	210	10×10.5	315	10×10.5	315	10×10.5	315	12.5×13.5 (10×13.5)	500 (360)	16×16.5 (12.5×16)	650 (500)
680	681	8×10.5	210	10×10.5	315	10×10.5	315	10×13.5	380	12.5×13.5	500		
1000	102	10×10.5	315	10×13.5 (10×10.5)	360 (315)	12.5×13.5 (10×13.5) (10×10.5)	450 (350) (315)	12.5×13.5	550	16×16.5 (12.5×16)	700 (550)		
1500	152	10×13.5 (10×10.5)	450 (315)	12.5×13.5	500	12.5×13.5	500	12.5×16	800				
2200	222	12.5×13.5	620	12.5×16 (12.5×13.5)	650 (600)	16×16.5	900	16×16.5	1000			Case size 尺寸	Ripple current 纹波电流
3300	332	12.5×16	750	16×16.5	950								

WV		63		80		100	
μF	Code代码	1J		1K		2A	
4.7	4R7	5×5.8	30				
10	100	6.3×5.8	50	6.3×7.7	60		
22	220	6.3×7.7	84	8×10.5	130	8×10.5	130
33	330	8×10.5	130	8×10.5	130	10×10.5	200
47	470	8×10.5	130	10×10.5	190	12.5×13.5	240
100	101	10×10.5	190	12.5×13.5	220	12.5×13.5	280
150	151	12.5×13.5	240	12.5×16	290	12.5×16.5	340
220	221	12.5×16	320	16×16.5	410	16×16.5	340
330	331	16×16.5	450	16×16.5	510	Case size 尺寸	Ripple current 纹波电流
470	471	16×16.5	540				

• Case size ØD×L(mm),ripple current(mA rms)at105℃,120Hz ●尺寸OD×L(mm),纹波电流(mArms)于105°℃,120Hz

纹波电流频率补偿系数 FREQUENCY COEFFICIENT OFALLOWABLE RIPPLE CURRENT

Frequency 频率			50Hz	120Hz	300Hz	1KHz	10KHz~
Coefficient 系数	ø4~ø10	0.1 ~ 100μF	0.70	1.00	1.17	1.36	1.50
		150 ~ 1500μF	0.85	1.00	1.08	1.20	1.30
	ø12.5 ~ ø16	~470μF	0.75	1.00	1.35	1.57	2.00
		680 ~ 3300μF	0.85	1.00	1.23	1.34	**1.50**

● The endurance of capacitors is reduced with internal heating produced by ripple current at the rate of halving the lifetime wiht every 10℃ rise.When long life performance is required in actual use,the rms ripple current has to be reduced.
●铝电解电容器由于在纹波电流叠加时自我发热，温度上升而老化，每升温10℃寿命减少一半；要想保持长寿命请在使用过程中降低纹波电流。

● Taping specifications are given in page 44"Taping Specifications".编带标准请参阅第44页“编带标准”。
●Please refer to page 45"Package Quantity"for the minimum package quantity. 最小包装数量请参阅第45页“包装数量”。

3000～5000小时长寿命品

3000~5000 Hours Long Life Assurance

Wide temperature range-55~+105℃
适用于-55~+105℃的宽温范围
Load life of 3000~5000 hours
负荷寿命3000~5000小时
Comply with the RoHS directive
符合RoHS指令

特性表 SPECIFICATIONS

Items项目	Characteristics主要特性
Operation Temperature Range使用温度范围	-55～+105℃
Voltage Range额定工作电压范围	6.3～100V
Capacitance Range静电容量范围	0.1～3300μF
Capacitance Tolerance静电容量允许偏差	±20%at 120Hz,20℃
Leakage Current 漏电流	Leakage current(ø4~Ø10)≤0.01CV or 3μA,whichever is greater (after 2 minutes application of rated voltage) Leakage current(212.5~016)≤0.03CV or 4μA,whichever is greater (after 1minute application of rated voltage) 漏电流(Ø4~Ø10)≤0.01CV或3μA,取较大值(施加额定工作电压2分钟后) 漏电流(Ø12.5~Ø16)≤0.03CV或4μA,取较大值(施加额定工作电压1分钟后)

**Dissipation Factor(tan δ)
损耗角正切**

Measurement frequency测试频率：120Hz,Temperature温度：20℃

Rated Voltage (V)额定工作电压		6.3	10	16	25	35	50~100
tan δ(max.) 最大损耗角正切	Ø4~Ø10	0.30	0.24	0.20	0.18	0.16	0.14
	Ø12.5~Ø16	0.38	0.34	0.30	0.28	0.22	0.18

**Stability at Low Temperature
低温特性**

Measurement frequency测试频率：120Hz

Rated Voltage(V额定工作电压)			6.3	10	16	25	35	50~100
Impedance Ratio 阻抗比 ZT/Z20(max.)	Ø4~Ø10	Z(-25° C)/Z(20° C)	3	3	2	2	2	2
		Z(-55° C)/Z(20° C)	8	5	4	3	3	3
	Ø12.5~Ø16	Z(-25° C)/Z(20° C)	5	4	3	2	2	2
		Z(-55° C)/Z(20° C)	12	10	8	5	4	3

Load Life
高温负荷特性

After 5000 hrs.(3000 hrs.for Ø4~Ø6.3×5.8)application of the rated voltage at 105℃,they meet the characteristics listed below.
在105° C环境中施加额定工作电压5000小时(Ø4~Ø6.3×5.8为3000小时)后，电容器的特性符合下表的要求。

Capacitance Change静电容量变化率	Within±30%of initial value初始值的±30%以内
Dissipation Factor损耗角正切	300%or less of initial specified value不大于规范值的300%
Leakage Current漏电流	initial specified value or less不大于规范值

**Shelf Life
高温贮存特性**

After leaving capacitors under no load at 105℃ for 1000 hours,they meet the specified value for load life characteristics listed above.在105℃环境中无负荷放置1000小时后，电容器的特性符合高温负荷特性中所列的规定值。

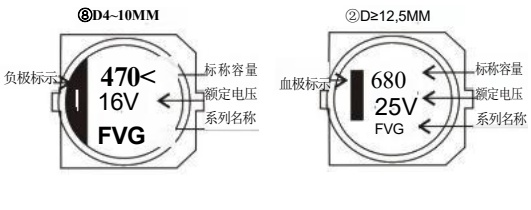
**Resistance to Soldering Heat
耐焊接热特性**

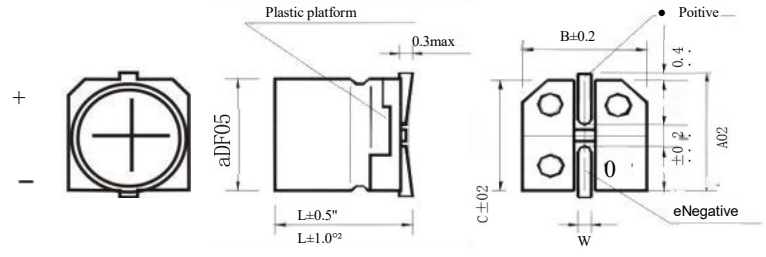
After reflow soldering and restored at room temperature,they meet the characteristics listed below.
经过回流焊并冷却至室温后，电容器的特性符合下表的要求。

Capacitance Change静电容量变化率	Within ±10%of initial value初始值的±10%以内
Dissipation Factor损耗角正切	initial specified value or less不大于规范值
Leakage Current漏电流	initial specified value or less不大于规范值

Marking标识 Black print on the case top.铝壳顶部黑字印刷。

外 形 图DRAWING (Unit:mm)





*1.Applicable to ②4~②10×13.5适用于②4~②10×13.5
*2.Applicable to 12.5~②16 适用于@12.5~②16

*A pressure relief vent is attached to products over ②D=8×10.5
·②D=8×10.5以上产品有缓压防爆阀

尺寸表 DIMENSTONS(Unit:mm)

D×L	4×5.8	5×5.8	6.3×5.8	6.3x7.7	8×10.5	10×10.5	10×13.5	12.5x13.5	12.5x16	16×16.5
A	5.1	6.1	7.3	7.3	9.2	11.2	11.2	13.8	13.8	18.0
B	4.3	5.3	6.6	6.6	8.4	10.4	10.4	13.0	13.0	17.0
C	4.3	5.3	6.6	6.6	8.4	10.4	10.4	13.0	13.0	17.0
P±0.2	1.0	1.3	2.2	2.2	3.1	4.4	4.4	4.4	4.4	6.7
L	5.4	5.4	5.4	7.7	10.5	10.5	13.5	13.5	16.0	16.5
W	0.5～0.8				0.7～1.1		1.1～1.4			

规格尺寸及最大允许纹波电流DIMENSIONS &MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	Code 代码	6.3		10		16		25	
		0J		1A		1C		1E	
10	100					4×5.8	18	5×5.8	27
22	220	4×5.8	22	5×5.8	30	5×5.8	30	6.3×5.8	44
33	330	5×5.8	35	5×5.8	36	6.3×5.8	48	6.3×5.8	50
47	470	5×5.8	38	6.3×5.8	50	6.3×5.8	50	6.3×7.7	63
100	101	6.3×5.8	69	6.3×7.7	81	6.3×7.7	81	8×10.5	116
150	151	6.3×7.7	85	8×10.5	125	8×10.5	125	10×10.5	320
220	221	6.3×7.7	120	8×10.5	141	10×10.5	216	10×10.5	320
330	331	8×10.5	290	10×10.5	290	10×10.5	290	10×10.5	320
470	471	10×10.5	320	10×10.5	320	10×10.5	320	12.5×13.5 (10×13.5)	400 (350)
680	681	10×10.5	320	10×10.5	320	10×13.5	420	12.5×13.5	415
1000	102	10×10.5	410	10×13.5	390	12.5×13.5	550	12.5×13.5	460
1500	152	10×13.5	450	12.5×13.5	480	12.5×13.5	650	12.5×16	700
2200	222	12.5×13.5	680	12.5×16 (12.5×13.5)	750 (510)	16×16.5	800		
3300	332	12.5×16 (12.5×13.5)	850 (800)	16×16.5	800			Case size 尺寸	Ripple current 纹波电流

μF	WV Code 代码	35		50		63		100	
		1V		1H		1J		2A	
0.1	0R1			4×5.8	1.0				
0.22	R22			4×5.8	2.6				
0.33	R33			4×5.8	3.2				
0.47	R47			4×5.8	5				
1	010			4×5.8	8				
2.2	2R2			4×5.8	12				
3.3	3R3			4×5.8	17			6.3×7.7	30
4.7	4R7	4×5.8	16	5×5.8	22			8×10.5	50
10	100	5×5.8	27	6.3×5.8	32	6.3×7.7	45	8×10.5	55
22	220	6.3×5.8	44	6.3×7.7	58	8×10.5	65	10×10.5	70
33	330	6.3×7.7	57	8×10.5	140	10×10.5	80	10×10.5	80
47	470	8×10.5	92	10×10.5	310	10×10.5	90	12.5×13.5 (10×13.5)	250 (150)
100	101	10×10.5	151	10×10.5	310	10×13.5	150	12.5×13.5	300
150	151	10×10.5	290	10×10.5	310			16×16.5 (12.5×16) (12.5×13.5)	600 (420) (380)
220	221	10×10.5	375	12.5×13.5 (10×13.5)	340 (320)	12.5×13.5	470		
330	331	12.5×13.5 (10×13.5)	380 (375)	12.5×16 (12.5×13.5)	600 (500)	16×16.5 (12.5×16)	650 (550)		
470	471	12.5×13.5	520	16×16.5	700				
680	681	12.5×13.5	550						
1000	102	16×16.5 (12.5×16)	750 600)					Case size 尺寸	Ripple current 纹波电流

·Case size OD×L(mm),ripple current(mA rms)at 105°℃,120Hz·尺寸OD×L(mm), 纹波电流(mA rms)于105° ℃, 120Hz

纹波电流频率补偿系数 FREQUENCY COEFFICIENT OF ALLOWABLE RIPPLE CURRENT

Frequency频率			50Hz	120Hz	300Hz	1KHz	10KHz~
Coefficient 系数	①4～010		0.70	1.00	1.17	1.36	1.50
	@12.5～@16	0.1~47μF	0.75	1.00	1.35	1.57	2.00
		100~470μF	0.80	1.00	1.23	1.34	1.50
		680～3300μF	0.85	1.00	1.10	1.13	1.15

● The endurance of capacitors is reduced with internal heating produced by ripple current at the rate of halving the lifetime with every 10℃ rise.When long life performance is required in actual use,the rms ripple current has to be reduced.
●铝电解电容器由于在纹波电流叠加时自我发热，温度上升而老化，每升温10℃寿命减少一半；要想保持长寿命请在使用过程中降低纹波电流。

● Taping specifications are given in page 44"Taping Specifications". 编带标准请参阅第44页“编带标准”。
● Please refer to page 45"Package Quantity"for the minimum package quantity. 最小包装数量请参阅第45页“包装数量”。

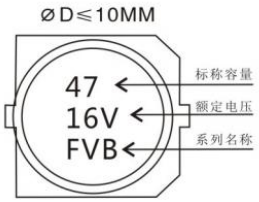
无极性标准品Non-pol Arized, Standard

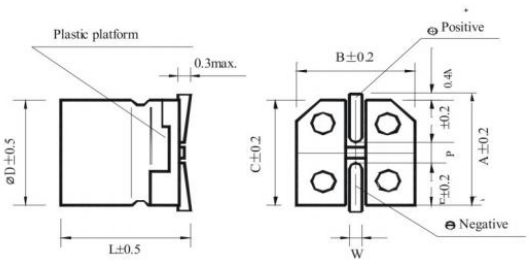
Non-polarized with wide temperature range-40℃~+105℃
无极性和适用于-40℃~+105℃的常规温度范围
Load life of 1000 hours
负荷寿命1000小时
Comply with the RoHS directive
符合 RoHS 指令

特性表SPECIFICATIONS

Items项目	Characteristics主要特性				
Operation Temperature Range使用温度范围	-40～+105℃				
Voltage Range额定工作电压范围	6.3～50V				
Capacitance Range静电容量范围	0.1～47μF				
Capacitance Tolerance静电容量允许偏差	±20%at 120Hz,20℃				
Leakage Current 漏电流	Leakage current≤0.05CV or 10μA,whichever is greater (after 2 minutes application of rated voltage) 漏电流≤0.05CV或10μA,取较大值(施加额定工作电压2分钟后)				
Dissipation Factor (tan8) 损耗角正切	Measurement frequency测试频率：120Hz,Temperature温度：20℃				
	Rated Voltage (V)额定工作电压	6.3	10	16,25	35,50
	tan δ(max.)最大损耗角正切	0.24	0.20	0.18	0.16
Stability at Low Temperature 低温特性	Measurement frequency测试频率：120Hz				
	Rated Voltage(V)额定工作电压	6.3	10	16,25	35,50
	Impedance Ratio阻抗比 Z(-25℃)/Z(20℃)	4	3	2	2
	ZT/Z20(max.) Z(-40℃)/Z(20℃)	8	6	4	3
Load Life 高温负荷特性	After 1000 hours application of the rated voltage at 105℃(the polarity needs to exchange every 250 hours),they meet the characteristics listed below. 在105℃环境中施加额定工作电压1000小时(每250小时必须转换一次极性)后，电容器的特性符合下表的要求。				
	Capacitance Change静电容量变化率	Within±20%of initial value初始值的±20%以内			
	Dissipation Factor损耗角正切	200%or less of initial specified value不大于规范值的200%			
	Leakage Current漏电流	initial specified value or less不大于规范值			
Shelf Life 高温贮存特性	After leaving capacitors under no load at 105℃ for 1000 hours,they meet the specified value for load life characteristics listed above.在105℃环境中无负荷放置1000小时后，电容器的特性符合高温负荷特性中所列的规定值。				
Resistance to Soldering Heat 耐焊接热特性	After reflow soldering and restored at room temperature,they meet the characteristics listed below. 经过回流焊并冷却至室温后，电容器的特性符合下表的要求。				
	Capacitance Change静电容量变化率	Within±10%of initial value初始值的±10%以内			
	Dissipation Factor损耗角正切	initial specified value or less不大于规范值			
	Leakage Current漏电流	initial specified value or less不大于规范值			
Marking标识	Black print on the case top.铝壳顶部黑字印刷。				

外形图 DRAWING (Unit: mm)





尺寸表 DIMENSTONS (Unit: mm)

ODxL	4x5.4	5×5.4	6.3×5.4
A	5.1	6.1	7.3
B	4.3	5.3	6.6
C	4.3	5.3	6.6
P±0.2	1.0	1.3	2.2
L	5.4	5.4	5.4
W	0.6~1.0		

规格尺寸及最大允许纹波电流 DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

W / Code / μF / 代码		6.3		10		16		25		35		50	
		0J		1A		1C		1E		1V		1H	
0.1	0R1											4×5.4	1.0
0.22	R22											4×5.4	2.0
0.33	R33											4×5.4	2.8
0.47	R47											4×5.4	4.0
1	010											4×5.4	8.4
2.2	2R2									4×5.4	8.4	5×5.4	13
3.3	3R3							5×5.4	12	5×5.4	16	5×5.4	17
4.7	4R7					4×5.4	12	5×5.4	16	5×5.4	18	6.3×5.4	20
10	100			4×5.4	17	5×5.4	23	6.3×5.4	27	6.3×5.4	29		
22	220	5×5.4	28	6.3×5.4	33	6.3×5.4	37						
33	330	6.3×5.4	37	6.3×5.4	41	6.3×5.4	49					Case size 尺寸	Ripple current 纹波电流
47	470	6.3×5.4	45										

·Case size QD×L(mm),ripple curent(mA rms)at 105℃,120Hz ·尺寸OD×L(mm), 纹波电流(mA rms)于105° ℃, 120Hz

纹波电流频率补偿系数 FREQUENCY COEFFICIENT OF ALLOWABLE RIPPLE CURRENT

Frequency频率	50Hz	120Hz	300Hz	1KHz	10KHz~
Coefficient系数	0.70	1.00	1.17	1.36	1.50

● The endurance of capacitors is reduced with internal heating produced by ripple current at the rate of halving the lifetime with every 10℃ rise. When long life performance is required in actual use, the rms ripple current has to be reduced.
●铝电解电容器由于在纹波电流叠加时自我发热，温度上升而老化，每升温10℃寿命减少一半；要想保持长寿命请在使用过程中降低纹波电流。

● Taping specifications are given in page 44"Taping Specifications". 编带标准请参阅第44页“编带标准”。
●Please refer to page 45"Package Quantity"for the minimum package quantity. 最小包装数量请参阅第45页“包装标准”。

无极性宽温标准品

Non-polarized Wide Temperature Standard

Non-polarized with wide temperature range-55℃~+105℃
无极性和适用于-55℃~+105℃的宽温范围
Load life of 2000 hours
负荷寿命2000小时
Comply with the RoHS directive
符合 RoHS 指令

特 性 表SPECIFICATIONS

Items项目	Characteristics主要特性
Operation Temperature Range使用温度范围	-55～+105℃
Voltage Range额定工作电压范围	6.3～50V
Capacitance Range静电容量范围	0.1～100μF
Capacitance Tolerance静电容量允许偏差	±20%at 120Hz,20℃
Leakage Current 漏电流	Leakage current≤0.05CV or 10μA,whichever is greater(after 2 minutes application of rated voltage) 漏电流≤0.05CV或10μA,取较大值(施加额定工作电压2分钟后)
Dissipation Factor (tanδ) 损耗角正切	Measurement frequency测试频率：120Hz,Temperature温度：20℃

Rated Voltage(V)额定工作电压	6.3	10	16,25	35,50
tan δ(max.)最大损耗角正切	0.24	0.20	0.18	0.16

Stability at Low Temperature 低温特性	Measurement frequency测试频率：120Hz				
	Rated Voltage(V)额定工作电压	6.3	10	16,25	35,50
	Impedance Ratio阻抗比 Z(-25℃)/Z(20℃)	4	3	2	≈
	ZT/Z20(max.) Z(-55℃)/Z(20℃)	8	6	4	3

Load Life
高温负荷特性

After 2000 hours application of the rated voltage at 105℃(the polarity needs to exchange every 250 hours),they meet the characteristics listed below.
在105℃环境中施加额定工作电压2000小时(每250小时必须转换一次极性)后，电容器的特性符合下表的要求。

Capacitance Change静电容量变化率	Within±30%of initial value初始值的±30%内
Dissipation Factor损耗角正切	200%or less of initial specified value不大 于规范值的200%
Leakage Current漏电流	initial specified value or less不大于规范值

Shelf Life
高温贮存特性

After leaving capacitors under no load at 105℃ for 1000 hours,they meet the specified value for load life characteristics listed above.在105℃环境中无负荷放置1000小时后，电容器的特性符合高温负荷特性中所列的规定值。

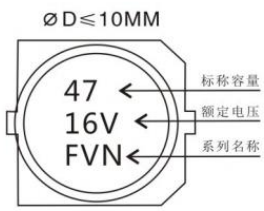
Resistance to Soldering Heat
耐焊接热特性

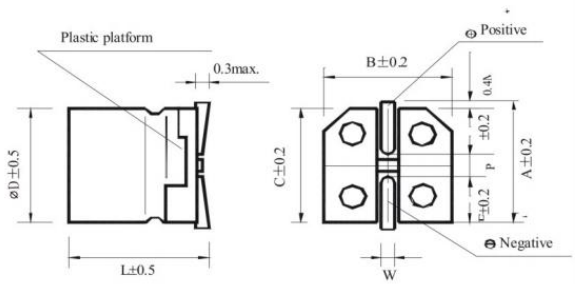
After reflow soldering and restored at room temperature,they meet the characteristics listed below.
经过回流焊并冷却至室温后，电容器的特性符合下表的要求。

Capacitance Change静电容量变化率	Within±10%of initial value初始值的±10%以内
Dissipation Factor损耗角正切	initial specified value or less不大于规范值
Leakage Current漏电流	initial specified value or less不大于规范值

Marking标识	Black print on the case top.铝壳顶部黑字印刷。

外形图 DRAWING (Unit: mm)





尺寸表 DIMENSTONS (Unit: mm)

ΦDxL	4x5.4	5×5.4	6.3×5.4	6.3x7.7
A	5.1	6.1	7.3	7.3
B	4.3	5.3	6.6	6.6
C	4.3	5.3	6.6	6.6
P±0.2	1.0	1.3	2.2	2.2
L	5.4	5.4	5.4	7.7
W	0.6~1.0			

规格尺寸及最大允许纹波电流DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

W		6.3		10		16		25		35		50	
μF	Code 代码	0J		1A		1C		1E		1V		1H	
0.1	0R1											4×5.4	1.0
0.22	R22											4×5.4	2.0
0.33	R33											4×5.4	2.8
0.47	R47											4×5.4	4.0
1	010											4×5.4	8.4
2.2	2R2									4×5.4	8.4	5×5.4	13
3.3	3R3							5×5.4	12	5×5.4	16	5×5.4	17
4.7	4R7					4×5.4	12	5×5.4	16	5×5.4	18	6.3×5.4	20
10	100			4×5.4	17	5×5.4	23	6.3×5.4	27	6.3×5.4	29	6.3×7.7	36
22	220	5×5.4	28	6.3×5.4	33	6.3×5.4	37	6.3×7.7	50	6.3×7.7	54		
33	330	6.3×5.4	37	6.3×5.4	41	6.3×5.4	49	6.3×7.7	61				
47	470	6.3×5.4	45	6.3×5.4	61	6.3×7.7	75					Case size 尺寸	Ripple current 纹波电流
100	101	6.3×7.7	82	6.3×7.7	85								

·Case size D×L(mm),ripple current(mA rms)at 105℃,120Hz·尺寸OD×L(mm), 纹波电流(mA rms)于105°℃,120Hz

纹波电流频率补偿系数 FREQUENCY COEFFICIENT OF ALLOWABLE RIPPLE CURRENT

Frequency频率	50Hz	120Hz	300Hz	1KHz	10KHz~
Coefficient系数	0.70	1.00	1.17	1.36	1.50

● The endurance of capacitors is reduced with internal heating produced by ripple current at the rate of halving the lifetime wiht every 10℃ rise.When long life performance is required in actual use,the rms ripple current has to be reduced.
●铝电解电容器由于在纹波电流叠加时自我发热，温度上升而老化，每升温10℃寿命减少一半；要想保持长寿命请在使用过程中降低纹波电流。

● Taping specifications are given in page 44“Taping Specifications”. 编带标准请参阅第44页“编带标准”。
●Please refer to page 45"Package Quantity"for the minimum package quantity. 最小包装数量请参阅第45页“包装标准”。

FVD Series High voltage Long life

FVD系列高压长寿命品

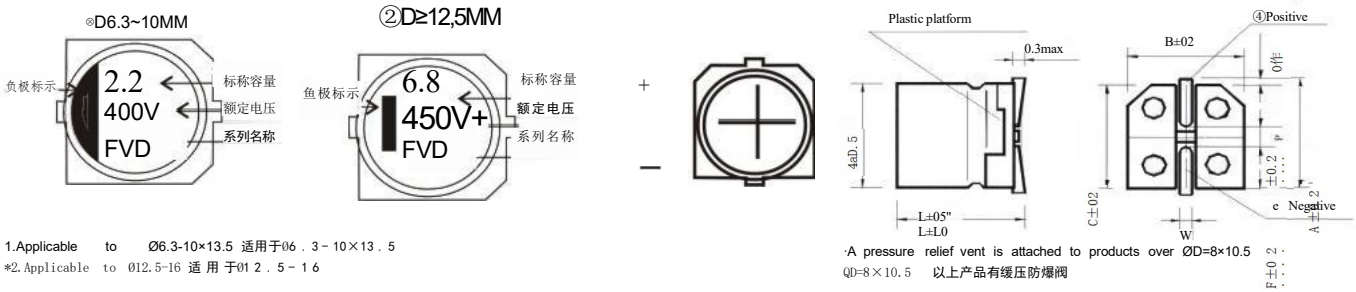
高压长寿命品High Voltage Long Life

Operating with wide temperature range-40~+105℃
适用于-40~+105℃的宽温范围
Load life of 5000 hours
负荷寿命5000小时
Comply with the RoHS directive
符合RoHS指令

特性表SPECIFICATIONS

Items项目	Characteristics主要特性		
Operation Temperature Range使用温度范围	-40~+105℃		
Voltage Range额定工作电压范围	160～450V		
Capacitance Range静电容量范围	3.3～47μF		
Capacitance Tolerance静电容量允许偏差	±20%at 120Hz,20℃		
Leakage Current 漏电流	Leakage current≤0.04CV or100μA,whichever is greater(after 2 minutes application of rated voltage) 漏电流≤0.04CV或100μA,取较大值(施加额定工作电压2分钟后)		
Dissipation Factor (tanδ) 损耗角正切	Measurement frequency测试频率：120Hz,Temperature温度：20℃		
	Rated Voltage(V)额定工作电压	160～250	400,450
	tan δ(max.)最大损耗角正切	0.15	0.20
Stability at Low Temperature 低温特性	Measurement frequency测试频率：120Hz		
	Rated Voltage (V)额定工作电压	160～250	400,450
	Impedance Ratio阻抗比 ZT/Z20(max.) Z(-25℃)/Z(20℃)	3	6
	Impedance Ratio阻抗比 ZT/Z20(max.) Z(-40℃)/Z(20℃)	6	10
Load Life 高温负荷特性	After 5000 hours application of the rated voltage at 105℃,they meet the characteristics listed below. 在105℃环境中施加额定工作电压5000小时后，电容器的特性符合下表的要求。		
	Capacitance Change静电容量变化率	Within±30%of initial value初始值的±30%以内	
	Dissipation Factor损耗角正切	200%or less of initial specified value不大于规范值的200%	
	Leakage Current漏电流	initial specified value or less大于规范值	
Shelf Life 高温贮存特性	After leaving capacitors under no load at 105℃ for 1000 hours,they meet the specified value for load life characteristics listed above.在105°C环境中无负荷放置1000小时后，电容器的特性符合高温负荷特性中所列的规定值。		
Resistance to Soldering Heat 耐焊接热特性	After reflow soldering and restored at room temperature,they meet the characteristics listed below. 经过回流焊并冷却至室温后，电容器的特性符合下表的要求。		
	Capacitance Change静电容量变化率	±Within10%of initial value初始值的±10%以内	
	Dissipation Factor损耗角正切	initial specified value or less大于规范值	
	Leakage Current漏电流	initial specified value or less大于规范值	
Marking标识	Black print on the case top.铝壳顶部黑字印刷。		

外 形 图DRAWING (Unit:mm)



1.Applicable to Ø6.3-10×13.5 适用于Ø6．3－10×13．5
*2.Applicable to Ø12.5-16 适 用 于Ø12．5－16

·A pressure relief vent is attached to products over ØD=8×10.5
QD=8×10.5 以上产品有缓压防爆阀

尺寸表 DIMENSTONS(Unit:mm)

ØDxL	6.3×10.5	8x10.5	10×10.5	10×13.5	12.5×13.5	16×16.5
A	7.3	9.2	11.2	11.2	13.8	18.0
B	4.3	8.4	10.4	10.4	13.0	17.0
C	4.3	8.4	10.4	10.4	13.0	17.0
P±0.2	2.2	3.1	4.4	4.4	4.4	6.7
L	10.5	10.5	10.5	13.5	13.5	16.5
W	0.5 ~ 0.8	0.7 ~1.1			1.1 ~1.4	

规格尺寸及最大允许纹波电流DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

W		160		200		250		400		450	
μF	Code代码	2C		2D		2E		2G		2W	
1	010							6.3×10.5	28	8×10.5	32
1.5	1R5							6.3×10.5	36	8×10.5	40
2.2	2R2					6.3×10.5	56	6.3×10.5	44	10×10.5	50
3.3	3R3					6.3×10.5	68	8×10.5	52	10×10.5	72
3.9	3R9					8×10.5	82	8×10.5	64	10×13.5	84
4.7	4R7					8×10.5	96	10×10.5	84	10×13.5	96
5.6	5R6					10×10.5	106	10×10.5	96	12.5×13.5	116
6.8	6R8					10×10.5	126	10×13.5	114	12.5×13.5	128
8.2	8R2					10×13.5	135	10×13.5	122	16×16.5	140
10	100	10×10.5	90	10×10.5	110	10×13.5	145	12.5×13.5	136	16×16.5	160
12	120	10×10.5	95	10×10.5	120	10×13.5	150	12.5×13.5	156		
15	150	10×10.5	106	10×13.5	160	12.5×13.5	180	12.5×16	156	Case size 尺寸	Ripple current 纹波电流
22	220	10×13.5	140	12.5×13.5	180	12.5×13.5	200	16×16.5	186		

·Case size OD×L(mm),ripple current(mA rms)at105℃,120Hz·尺寸OD×L(mm), 纹波电流(mA rms)于105°℃,120Hz

纹波电流频率补偿系数FREQUENCY COEFFICIENT OF ALLOWABLE RIPPLE CURRENT

Frequency频率	50Hz	120Hz	300Hz	1KHz	10KHz~
Coefficient系数	0.80	1.00	1.25	1.40	1.60

● The endurance of capacitors is reduced with internal heating produced by ripple current at the rate of halving the lifetime with every 10℃ rise.When long life performance is required in actual use,the rms ripple current has to be reduced.
●铝电解电容器由于在纹波电流叠加时自我发热，温度上升而老化，每升温10℃寿命减少一半；要想保持长寿命请在使用过程中降低纹波电流。

● Taping specifications are given in page 44“Taping Specifications”. 编带标准请参阅第44页“编带标准”。
●Please refer to page 45"Package Quantity"for the minimum package quantity. 最小包装数量请参阅第45页“包装标准”。

FVC Series Low Leakage Current
FVC 系列低漏电流品

低漏电流品Low Leakage Current

Low leakage current(0.5~3.3μA max.)
低漏电流(0.5~3.3μA最大值)
Low cost for replacement of some tantalum applications
可替换价格较高的钽电容器
Comply with the RoHS directive
符合 RoHS指令

特性表 SPECIFICATIONS

Items项 目	Characteristics主要特性
	-40~+105℃
Voltage Range额定工作电压范围	6.3～50V
Capacitance Range静电容量范围	0.1～220μF
Capacitance Tolerance静电容量允许偏差	±20%at 120Hz,20℃
Leakage Current 漏电流	Leakage current≤0.002CV or 0.5μA,whichever is greater(after 2 minutes application of rated voltage) 漏电流≤s0.002CV或0.5μA,取较大值(施加额定工作电压2分钟后)
Surge Voltage &Dissipation Factor (tanδ) 浪涌电压和损耗角正切	Measurement frequency测试频率：120Hz,Temperature温度：20℃

Rated Voltage (V)额定工作电压	6.3	10	16	25	35	50
Surge voltage浪涌电压	8.0	13	20	32	44	63
tan δ(max.)最大损耗角正切	0.24	0.20	0.18	0.16	0.14	0.12

Stability at Low Temperature 低温特性	Measurement frequency测试频率：120Hz				
	Rated Voltage (V)额定工作电压	6.3	10	16.25	35.50
	Impedance Ratio阻抗比 Z(-25° ℃)/Z(20° C)	4	3	2	2
	ZT/Z20(max.) Z(-40℃)/Z(20° C)	8	6	4	3

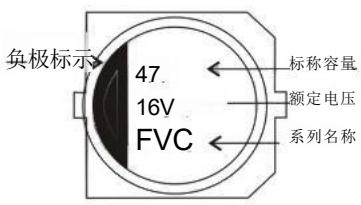
Load Life 高温负荷特性	After 2000 hours application of the rated voltage at 105℃,they meet the characteristics listed below. 在85° ℃环境中施加额定工作电压2000小时后，电容器的特性符合下表的要求。
	Capacitance Change静电容量变化率 Within±25%of initial value初始值的±25%以内
	Dissipation Factor损耗角正切 200%or less of initial specified value不大于规范值的200%
	Leakage Current漏电流 initial specified value or less不大于规范值

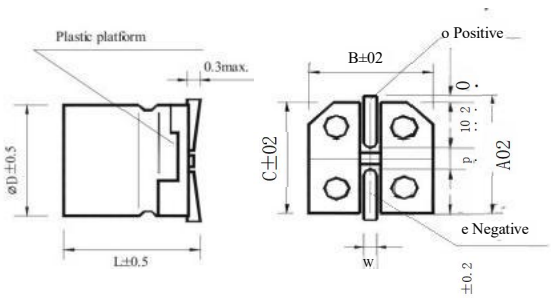
Resistance to Soldering Heat 耐焊接热特性	After reflow soldering and restored at room temperature,they meet the characteristics listed below. 经过回流焊并冷却至室温后，电容器的特性符合下表的要求。
	Capaciance Change静电容量变化率 Within±10%of initial value初始值的±10%以内
	Dissipation Factor损耗角正切 initial specified value or less不大于规范值
	Leakage Current漏电流 initial specified value or less不大于规范值

Marking 标 识	Black print on the case top.铝壳顶部黑字印刷。

外形图 DRAWING (Unit:mm)

⑦D4~6.3MM





尺 寸 表 DIMENSTONS(Unit:mm)

ΦDxL	4x5.4	5×5.4	6.3×5.4	6.3x7.7
A	5.1	6.1	7.3	7.3
B	4.3	5.3	6.6	6.6
C	4.3	5.3	6.6	6.6
P±0.2	1.0	1.3	2.2	2.2
L	5.4	5.4	5.4	7.7
W	0.6~1.0			

规格尺寸及最大允许纹波电流及ESR值 DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT&ESR

		6.3 (0J)			10 (1A)			16 (1C)		
Parameter 参数 / μF		Case size ②D×L (mm) 尺寸	E.S.R. (Ω) 20℃, 120Hz E.S.R.值	Ripple current (mA rms)at 120H 纹波电流	Case size ⑦D×L (mm) 尺寸	E.S.R. (Ω) 20℃, 120Hz E.S.R.值	Ripple current (mArms)at 82° H 纹波电流	Case size ⑦D×L (mm) 尺寸	E.S.R. (Ω) 20℃, 120Hz E.S.R.值	Ripple current (mA rms)at 120Hz 纹波电流
10	100							4×5.4	34.5	25
22	220	4×5.4	23.5	31	5×5.4	19.6	35	5×5.4	15.7	39
33	330	5×5.4	15.7	39	5×5.4	13.1	43	6.3×5.4	10.5	57
47	470	5×5.4	11.0	47	6.3×5.4	9.2	59	6.3×5.4	7.3	68
100	101	6.3×5.4	5.2	75	6.3×5.4	4.3	76	6.3×7.7	3.5	96
220	221	6.3×7.7	2.4	85						

		25 (1E)			35 (1V)			50 (1H)		
Parameter 参数 / μF		Case size ②D×L (mm) 尺寸	E.S.R. (Ω) 20℃, 120Hz E.S.R.值	Ripple current (mA rms)at 120° H 纹波电流	Case size ⑦D×L (mm) 尺寸	E.S.R. (Ω) 20℃, 120Hz E.S.R.值	Ripple current (mA rms)at 85℃, 120Hz 纹波电流	Case size ②D×L (mm) 尺寸	E.S.R. (Ω) 20℃, 120Hz E.S.R.值	Ripple current (mArms)at 85℃, 120Hz 纹波电流
0.1	0R1							4×5.4	2156	1.0
0.22	R22							4×5.4	980	2.3
0.33	R33							4×5.4	653	3.5
0.47	R47							4×5.4	459	5
1	010							4×5.4	216	10
2.2	2R2							4×5.4	98	15
3.3	3R3							4×5.4	65	18
4.7	4R7	4×5.4	64.2	19	4×5.4	55.1	20	5×5.4	46	23
10	100	5×5.4	30.2	28	5×5.4	25.9	30	6.3×5.4	22	34
22	220	6.3×5.4	13.7	52	6.3×5.4	11.8	54	6.3×7.7	9.8	85
33	330	6.3×5.4	9.1	63	6.3×7.7	7.8	105			
47	470	6.3×7.7	6.4	100	6.3×7.7	5.5	110			

·Case size D×L(mm),ripple current(mA rms)at105℃,120Hz·尺寸OD×L(mm),纹波电流(mA rms)于105℃, 120Hz

纹波电流频率补偿系数 FREQUENCY COEFFICIENT OF ALLOWABLE RIPPLE CURRENT

Frequency 频率	~50Hz	120Hz	300Hz	1KHz	10KHz~
Coefficient 系 数	0.70	1.00	1.17	1.36	1.50

● The endurance of capacitors is reduced with internal heating produced by ripple current at the rate of halving the lifetime wiht every 10℃ rise. When long life performance is required in actual use,the rms ripple current has to be reduced.

●铝电解电容器由于在纹波电流叠加时自我发热，温度上升而老化，每升温10℃寿命减少一半；要想保持长寿命请在使用过程中降低纹波电流。

● Taping specifications are given in page 44"Taping Specifications". 编带标准请参阅第44页“编带标准”。

●Please refer to page 45"Package Quantity"for the minimum package quantity. 最小包装数量请参阅第45页“包装数量”。

Note:All design and specifications are for reference only and is subject to change without prior notice.If any doubt about safety for your application, please contact us immediately for technical assistance before purchase.

注：以上所提供的设计及特性参数谨供参考，任何修改不作预先通知。如果在使用上有疑问，请在采购前与我们联系，以便提供技术上的协助

铝电解电容器使用注意事项
Caution For Proper Use Of Aluminum Electrolytic Capacitors

在使用铝电解电容器时请注意以下几点
Upon using Aluminum Electrolytic Capacitors,please pay attention to the points listed below.

铝电解电容器在承载以下负荷时，将造成其特性急剧恶化
When the following types of electrical loads indicated below are applied to Aluminum Electrolytic Capacitors,rapid deterioration of electrical property occurs:

反向电压
电压超过额定值
纹波电流超过额定值
急速充放电
reverse voltage
voltage exceeds rated voltage
rated ripple current is exceeded
severe charging/discharging

此时，电容器可能产生大量热，内部气压上升，导致压力阀开启，内部气体喷出，漏液等。
At such times,severe heat is generated,gas is emitted,then electrolyte leaks from the selling area,and pressure relief vent operates due to internal pressure.

在某此情况下，伴随电容器损坏会有可燃物的迸发，有可能导致爆炸和起火。
On some condition,explosion or ignition may occur,and along with destruction of the capacitor combustibles may burst out.

电路设计注意事项
Caution During Circuit Design

一 、使用环境、安装环境以及额定性能的确认OPERATIONAL ENVIRONMENT,MOUNTING ENVIRONMENTAND CONDITIONS.

请确认使用环境以及安装环境符合电容器的商品目录与缴纳规格书。
Ensure that operational and mounting conditions follow the specified conditions detailed in the catalog and specification sheets

二 、使用温度、纹波电流以及寿命OPERATING TEMPERATURE,RIPPLE CURRENTAND LOAD LIFE

请在商品目录缴纳规格书中所规定的工作温度范围和纹波电流范围内使用。
①不要在高温(超过工作温度上限)下使用。
②不要让过电流(超过额定纹波电流)通过电容器。
根据加速试验的结果，可以通过寿命推算公式來计算电容器的寿命。但是推算所得的寿命存在误差，不能作为保证值使用。请以推算所得的结果为参考，选择有足够使用寿命的电容器。关于寿命推算方法，请参阅本公司的网站，或至本公司咨询。
Operating temperature and applied ripple current should be within the specified value in the catalog or specification sheets.
①Do not use Aluminum Electrolytic Capacitors at temperature which exceeds the specified category temperature range.
②Do not apply excessive current to the capacitors,which exceeds the specified rated ripple current.
Life time of capacitors can be calculated with "life estimation equation"base on acceleration test results of the capacitors.The life time calculated by the equation is not a guaranteed value as it contains errors and variations.It is recommended to select a capacitor with enough safety factor on the calculation results against expected life of the devices.Please refer to the article from our web-site or con suit with us for information regarding "life estimation equation".

三 、使用电路APPLICATION CIRCUIT

电容器需区分极性使用。请不要施加反向电压或交流电压。在极性反转的电路中，请选择使用双极性电容器。但是，双极性电容器不可使用于交流电路。
请不要在重复急速充放电的电路中使用电容器。关于重复充放电电路中使用的电容器，请咨询我们。
Aluminum Electrolytic Capacitors are normally polarized.Reverse voltage or AC voltage should not be applied When polarity of applied voltage is uncertain or when the polarity may flip over,non-polar type capacitors should be used,but the non-polar type can not be used for AC circuit.
Standard Aluminum Electrolytic Capacitors are not suitable for rapid charge and discharge applications.Consult with Ruby con about specially designed capacitors for rapid charge and discharge.

四 、施加电压APPLIED VOLTAGE

不要将过电压(超过额定电压的电压)施加于电容器。
Do not exceed the rated voltage of capacitors.

五 、电容器的绝缘INSULATION

在以下情况，请将电容器与电路完全隔离。

①铝壳和阴极端子，阳极端子以及电路配线之间

②自立型的无连接端子(增强强度用)和其他的阳极端子，阴极端子以及电路配线之间

电容器的外壳覆有胶膜，不能保证绝缘性。请勿用于需要绝缘的地方。若需要绝对具有绝缘功能时，请咨询我们。

Aluminum Electrolytic Capacitors should be electrically isolated from among the following points.

①Aluminum case, cathode lead wire, a node lead wire and circuit pattern.

②Auxiliary terminals of snap-in type, anode terminal, outward terminal and circuit pattern.

The sleeve of Aluminum Electrolytic Capacitors is not recognized as an insulator,and therefore,the standard capacitor should not be used in a place where insulation function is needed.Please con suit with Ruby con should you require a hinher grade of in sulating sleeve.

六 、使用环境的限制 CONDITIONS OF USE

请不要在以下环境中使用电容器.

①直接溅水，盐水，油或处于结露状态的环境

②充满有害气体(硫化氢、亚硫酸、亚硝酸、氯气、氨气、溴等)的环境

③有臭氧、紫外线及放射线照射的环境

④振动或冲击条件超过商品目录或缴纳规格书规定范围的过缴环境

The following environment should be avoided when using Aluminum Electrolytic Capacitors.

①Damp conditions such as water, saltwater spray, or oil spray or fumes. High humidity or humidity condensation situations.

②Hazardous gas/fumes such as hydrogen sulfide, sulfurous acid gas, nitrous acid, chlorine gas, ammonia or bromine gas.

③Exposure to ozone, ultraviolet rays or radiation.

④Severe vibration or shock which exceeds the condition specified in the catalog or specification sheets.

七、安装环境的设计CONSIDERATION TO ASSEMBLY CONDITION

将电容器安装至印刷电路板时，需事先确认以下内容，再进行设计。

①请确认电容器的端子间隙与印刷电路板孔间隙一致。

②设计时不可将配线及电路板延伸到电容器压力阀上方。

③请按商品目录或缴纳规格书的规定，在电容器的压力阀部位，空出一定的间隙。

④铝电解电容器的压力阀接触到印刷电路板时，请在印刷电路板的正对位置上设置排气孔。

In designing a circuit,the flowing matters should be ensured in advance to the capacitor's assembly on the printed wiring board(PW board)

①Design the appropriate hole spacing to match the lead pitch of capacitors.

②Do not locate any wiring and circuit patterns directly above the capacitor's vent.

③En sure enough free space above the capacitor's vent, The recommended space is specified in the catalog or specification sheets.

④In case the capacitor's vent is facing the PW board, make a gas release hole on PW board.

八 、印刷电路板的设计CONSIDERATION TO CIRCUIT DESIGN

请不要在电容器的封口部下方进行电路配线。

请不要在电容器周围及印刷电路板的另一侧(电容器的下方)配置发热部件。

用于贴片电容器的印刷电路板，其焊盘设计请参照商品目录或缴纳规格书的规定进行。

Any copper lines or circuit patterns should not be laid under the capacitor

Parts which radiate heat should not be placed close to or reverse side of the Aluminum Electrolytic Capacitors on the PW board.

Land pattern of chip type capacitors should comply with the specification which is mentioned in the catalog or specification sheets.

九、其他OTHERS

电容器的电特性会根据环境温度和使用频率的变化而变化。请在确认该变化量的基础之上进行电路设计。

在双面印刷电路板上安装电容器时，请不要在电容器下面设计多余的印刷电路板孔及正反面连接用贯通孔。

并联2个以上的电容器时，请考虑到电流的平衡。

串联2个以上的电容器时，请考虑到电压的平衡，并联插入分压电阻。

Performance of electrical characteristics of Aluminum Electrolytic Capacitors are affected by variation of operating temperature and frequency. Consider this variation when designing the circuit.

Excessive holes and connection hole between both sides on the PW board should be avoided around or under the mounting area of the Aluminum Electrolytic Capacitors on double sided or multi layer PW board.

Consider current balanee when 2ormore Aluminum Electrolytic Capacitors are connected in parallel.

Use bleeder resistors when 2or more Aluminum Electrolytic Capacitors are connected in series.In this case,the resistors should be connected parallel to the capacitors.

使用在有安全性要求的电子设备上时，需考虑电解电容器的故障模式，从设计上确保安全性。
利用保护电路、保护装置提高系统的安全性。
利用冗余电路，提高系统的安全性。
From the perspective of the importance of safety with electronic equipment and circuits,please observe safety measures in light of capacitor failure modes at the design stage.
System to promote safety in circuit care and protective equipment.
System to promote safety with redundant circuits,etc.

安装注意事项
Caution For Assembling Capacitors

一 、安装前的预备知识CAUTION BEFORE ASSEMBLY

对组装到设备上，且已经通过电的电容器，请勿再次使用。除了在定期检修时，为检测电特性而取下的电容器外，均不可再次使用。
电容器可能会发生再起电压。这种情况，请使用约1KΩ的电阻进行放电。
长期保管的电容器漏电流有可能会增大。这种情况，请使用约1KΩ 的电阻进行电压处理。
Aluminum Electrolytic Capacitors cannot be recycled after mounting and applying electricity in unit.The capacitors which are removed from PW board for the purpose of measuring electrical characteristics at the periodical inspection should only be recycled for the same position.
Aluminum Electrolytic Capacitors may accumulate charge naturally during storage.In this case,discharge through a 1KΩ resistor before use.
Leakage current of Aluminum Electrolytic Capacitors may be increased during long storage time.In this case,the capacitors should be subject voltage treatment through a 1KΩ resistor before use.

二 、安装时-1IN THE ASSEMBLYPROCESS-1

请确认电容器的额定值（静电容量及电压）后，再进行安装。
请确认电容器的极性后，再进行安装。
请勿将电容器跌落到地上。跌落到地上的电容器，请不要再使用。
安装时请勿使电容器变形。
Ensure rated voltage and capacitance of the capacitors before mounting.
Ensure the capacitors polarity before mounting.
Do not use a capacitor which has been dropped onto a hard surface.
Do not use capacitors with damaged or dented cases or seals.

三 、安装时-2 IN THE ASSEMBLY PROCESS-2

请确认电容器的端子间隙与印刷电路板孔隙一致后，再进行安装。
利用自动插入机对电容器的引线进行弯曲以固定在印刷电路板上时，力量不能过大。
请注意自动插入机及装配机的吸附器、产品检验器及位置对准操作所引起的冲击力。
若担心组装中有振动、冲击等，安装电容器至印刷电路板时，请使用辅助工具、粘合剂等增强其牢固性。
Capacitors should be mounted after confirmation that hole spacing on PW board matches the lead pitch of the capacitors.
Avoid excessive force when clinching lead wire during auto-insertion process.
Avoid excessive shock to capacitors by automatic insertion machine,during mounting,parts inspection or centering operations.
Please utilize supporting material such as strap or adhesive to mount capacitors to PC board when it is anticipated that vibration or shock is aplied.

四 、电烙铁焊接SOLDERING

焊接条件（温度、时间）不可超过商品目录或缴纳规格书的规定范围。
端子间隙与印刷电路板孔穴间隙不一致，而在焊接前进行加工时，不能使电容器主体承受应力。
利用电烙铁进行手工修整时，如果需要将焊接好的电容器卸下，请将焊锡充分融化后再取下，以免使电容器的端子承受压力。
请勿用电烙铁的前端接触电容器的主体。
Soldering conditions(temperatures,times)should be within the specified conditions which are described in the catalog or specification sheets.
In case lead wire reforming is needed due to inappropriate pich between capacitor and holes on PW board,stress to he capacitor should be avoided. In case soldered capacitor has to be withdrawn from the PW board by soldering irons,the capacitor should be removed after solder has melted sufficiently in order to avoid stress to the capacitor or lead wires.
Soldering iron should never touch the capacitors body.

五 、回流焊接REFLOW SOLDERING

焊接条件(预热、焊接温度、时间、回流焊接次数),不可超过商品目录或缴纳规格书所规定的范围。
需要进行超过规定范围的回流焊接时，务必请联系我们。
使用红外线加热器时，对红外线的吸收率因电容器的颜色和材质不同而异，请注意加热的程度。
Reflow soldering conditions(preheat,soldering temperature,reflow time.reflow cycle)should follow the specified standard which are described in the catalog or specification sheets
Con suit with Ruby con when use beyond the specified standard are need.
Heating standard should depend on surface of the capacitor color or materials when infrared rays is used because the capacitor she at absorption dep ends on the surface color or materials.Check heat condition.

六 、焊接后的处理HANDLING AFTER SOLDERING

将电容器焊接在印刷板上之后，请不要将电容器的主体倾倒或扭曲。
不可抓住电容器的主体搬运电路板。
将电容器焊接在印刷电路板上之后，避免其与其他物体发生碰撞。
此外，重叠放置印刷电路板时，不可以让印刷电路板或其他部件碰到电容器。
Do not bend or twist the capacitors body after soldering on PW board.
Do not pick-up or move PW board by holding the soldered capacitors.
Do not hit the capacitors and isolate capacitors from the PW board or other device when stacking PW boards in store.

七、印刷电路板的清洗HANDLING AFTER SOLDERING

不可使用含卤溶剂清洗电容器。但是必须清洗时，请使用耐清洗的电容器，并在商品目录或缴纳规格书的规定范围内使用。
清洗耐清洗的电容器时，请充分做好清洗剂的污染管理工作(电导率、 pH 值、比重、含水量等)。
清洗耐清洗的电容器后，请勿将其保管在有清洗液的环境中或密闭容器内。
此处，在清洗后，请用热风对印刷电路板和电容器进行充分干燥。热风温度请控制在工作上限温度以下。
Standard Aluminum Electrolytic Capacitors should before from halogenated solvents during PW board cleaning after soldering.Use solve nt proof capacitors and follow the specified cleaning condition when halogenated solvents are used.
Solvents should have well con trolled conductivity,pH,specific gravity and water contents during the cleaning of solve nt proof capacitors.
Cleaned PW board with capacitors should not be kept in solve ntenvir on mentornon ventilated places.Let PW board containing capacitors after cleaning dry with hot blast fully.The temperature of such breeze should be under the upper category temperature of capacitors.

八 、固定剂\涂层剂ADHESIVES AND COATING MATERIALS

请不要使用含卤溶剂等的固定剂、涂层剂。
在使用固定剂和涂层剂之前，请将基板和电容器的封口部位之间清扫干净，不可留有助焊剂残渣及污垢。
在使用固定剂和涂层剂之前，请对电容器上附着的清洗剂等进行干燥。
在使用固定剂和涂层剂时，请不要将电容器封口部全部堵塞。
Do not use halogenated adhesives and coating materials to fix Aluminum Electrolytic Capacitors.
Flux between the surface of the PW board and sealing of capacitors should be cleaned before using adhesives or coating materials.
Solvents should be dried up before using adhesives or coating materials.
Do not cover up all the sealing area of capacitors with adhesives or coating materials,make coverage only partial.

配套使用中的注意事项
Caution During Use Of Capacitors In Sets

请勿直接接触电容器的端子。
请勿使用导体导致电容器的端子间短路。此外，不可以使电容器接触酸性或碱性等导电性溶液。
请确认使用环境及安装环境在商品目录或缴纳规格书所规定的额定性能范围。
Do not touch the terminals of capacitors.
Do not connect electrical terminals of the capacitor.Keep the capacitors free from conductive solution,such as acid,alkali and so on. Ensure the operational environment of the equipment in which the capacitor has been buit is within the specified condition mentioned in thee catalog or specification sheets.

保养检修 MAINTENANCE

对于工业中使用的电容器，请定期进行检修。检修项目包括如下内容。
①外观：开阀、液体泄漏等明显异常。
②电特性：漏电流、静电容量、损失角正切值以及商品目录或缴纳规格书中规定的项目。
Periodical inspection should be carried out for the capacitors,which are used with industrial equipment.Check the following points at he inspection.
①Visual inspection to check pressure relief open or leakage of electrolyte.
②Electrical characteristics:leakage current,capacitance,dissipation factor and the other points which are mentioned in the catalog or specification sheets.

紧急情况 EMERGENCY ACTION

在配套设备使用过程中，电容器开阀。并喷出气体时，请切断设备的主电源或者将电源线的插头从插座中拔出。
电容器的压力阀开启时，将喷出超过+100℃的高温气体，此时不可以将脸部靠近。
若喷出的气体进入眼睛或被吸入时，应立即用水洗净眼部或漱口。
不可以舔食电容器的电解液，如果电解液溅到皮肤，请用肥皂进行冲洗。
When the pressure relief vent is open and some gas blows out from the capacitor,please tum the mains witch of the equipment of or pull out the plug from the power outlet immediately.
During pressure relief vent operation,extremely hot gas(over 100°℃)may blow out from the capacitors.Do not stand close to the capacitors In case of eye con tact,flush the open eye(s)with large amount of 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.

保管条件STORAGE CONDITION

请不要在高温高湿的环境中保管电容器。请保管在温度5℃~35℃,相对湿度在75%以下的室内。
不要在能够直接接触到水，盐水以及油的环境中保管电容器。
请不要在充满有害气体(硫化氢、亚硫酸、亚硝酸、氯气、氨气、溴等)的环境中保管电容器。
请不要在有臭氧、紫外线及放射线照射的环境中保管电容器。
Aluminum Electrolytic Capacitors should not be stored in high temperatures or where the reis a high level of humidity.The suitable storage condition is5°~35°c and less than75%in relative humidity.
Aluminum Electrolytic Capacitors should not be stored in damp conditions such as water,saltwater spray or oil spray.
Do not store Aluminum Electrolytic Capacitors in an environment full o hazardous gas(hydrogen sulfide,sulfurous acid gas,nitrous acid,chlorine gas,ammonia or bromine gas).
Aluminum Electrolytic Capacitors should not be stored under exposure to ozone,ultraviolet rays or radiation.

废弃处理DISPOSAL

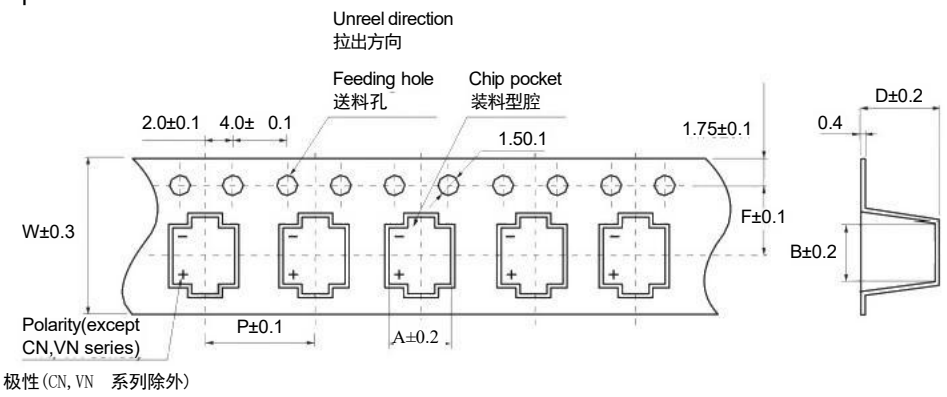
在废弃电容器时，请采用以下任意一种方式。
①在电容器上开孔或充分粉碎后高温(800℃以上)焚烧。
②在不进行焚烧处理时，应交给专业的工业废弃物处理工厂，由其代为处理。
Please take either of the following actions in case of disposal.
①Incineration(high temperature of more then 800℃ after crushing the capacitor's body.
②Consignment to specialists of in dust rial waste.

编带标准
Taping Specifications

适用于贴片式铝电解电容器
For Chip Type Aluminum Electrolytic Capacitors

载带尺寸 Carier Tape Dimensions

·⊗4~×10(mm)

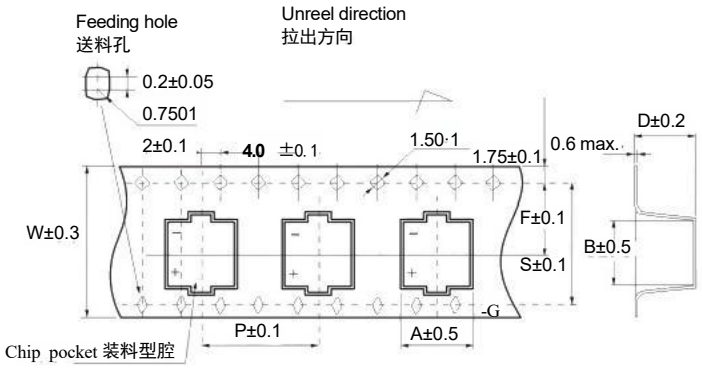


尺寸表 Dimension

(Unit:mm)

D×L	4×5.4/5.8	5×5.4/5.8	6.3×5.4/5.8	6.3×7.718.0/9.0	6.3×10.5/11.5	8×6.5/7.0	8×10.5/12.5	10×10.5/13.5
W	12.0	12.0	16.0	16.0	16.0	16.0	24.0	24.0
P	8.0	12.0	12.0	12.0	12.0	12.0	16.0	16.0
F	5.5	5.5	7.5	7.5	7.5	7.5	11.5	11.5
A	5.0	6.0	7.0	7.0	7.0	8.7	8.7	10.7
B	5.0	6.0	7.0	7.0	7.0	8.7	8.7	10.7
D	5.8/6.5	5.8/6.5	5.8/6.5	8.5/9.0/10.0	11.5/12.5	7.0/8.0	11.0/13.5	11.0/14.0

·ø12.5~Ø16(mm)

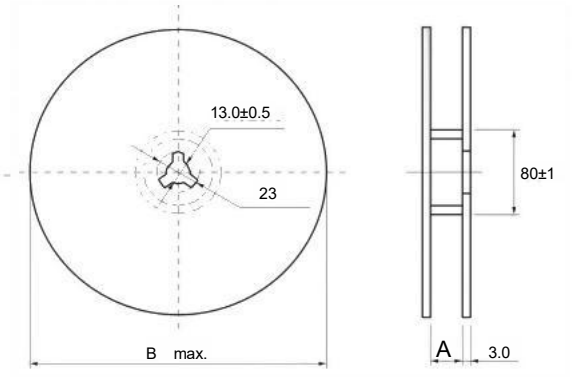


Dimension 尺寸表

(Unit:mm)

D×L	12.5×13.5	12.5×16	16×16.5
W	**32.0**	32.0	**44.0**
P	24.0	**24.0**	**28.0**
F	14.2	**14.2**	**20.2**
A	14.0	**14.0**	**17.5**
B	14.0	**14.0**	**17.5**
D	14.0	**16.5**	**16.8**
S	28.4	**28.4**	**40.4**

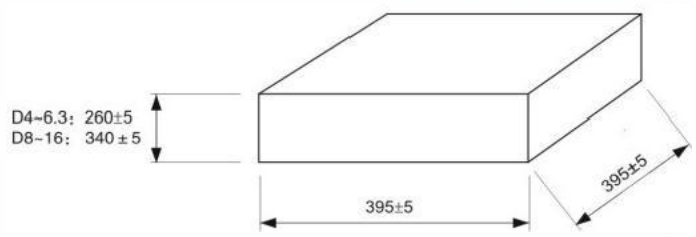
卷盘尺寸Reel Dimensions



(Unit:mm)

D×L	4×5.4/5.8	5×5.4/5.8	6.3×5.4~11.5/8x6.5/7.0	8×10.5/12.5	10×10.5	10×12.5/13.5	12.5×13.5/16	16×16.5
A±1	14	14	18	26	26	26	34	46
B(max)	382	382	382	382	382	382	382	382

包装箱 Packaging Box



包装数量Packaging Quantity

Size D×L(mm) 尺寸	Quantity/Reel (pcs) 数量/卷(PCS)	Reels/Box 卷盘/箱	Quantity/Box (pcs) 数量/箱(PCS)
②4×5.4/5.8	2,000	12	24,000
Ø5×5.4/5.8	1,000	12	12,000
ø6.3×5.4/5.8/7.7	1,000	10	10,000
②6.3×8.0/9.0	900	10	9,000
②6.3×10.5/11.5	700	10	7,000
Ø8×6.5/7.0	1,000	10	10,000
Ø8×10.5/12.5	500/400	10	5000/4000
Ø10×10.5/13.5	500/400	10	5000/4000
Ø12.5×13.5	250	6	1,500
Ø12.5×16	200	6	1,200
ø16×16.5	125	4	500

焊接条件Soldering Conditions

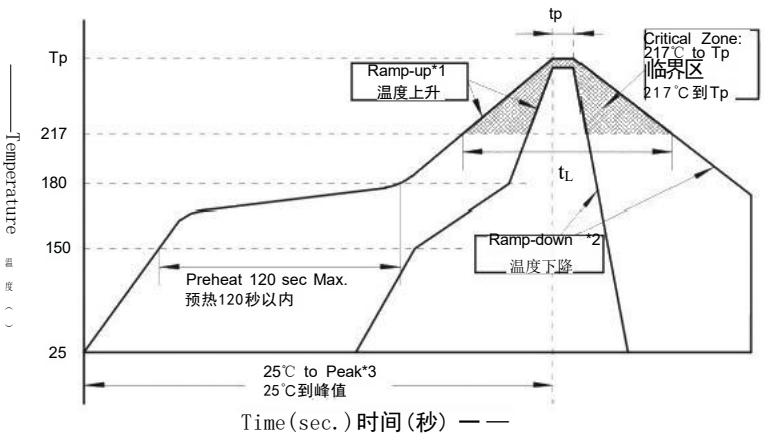
适用于贴片式铝电解电容器Applicable to Chip Type Aluminum Electrolytic Capacitors

推荐回流焊条件Recommended Conditions for Reflow Soldering

编带标准TAPINGSPECIFICATIONS

应采用红外线或热风回流焊接，而不宜采用汽相加热回流焊接。
回流焊次数最多2次，请确保在第1次和第2次之间产品有足够的冷却时间。
从150℃到180℃的预热时间应在120秒以内字
电容器顶部温度超过217℃的焊接时间不得超过t_L(秒)；
电容器顶部的峰值温度不得超过Tp(℃),在5° ℃范围内的实际峰值温度时间不得超过tp(秒)
(1)A thermal condition system such as infrared radiation(IR)or hot blast should be adopted,and vapor heat transfer systems(VPS)are not recommended.
(2)Reflow soldering should be within 2 cycles.Please make sure that the parts have enough cooling time between the first and second soldering process.
(3)The time of preheating from 1509 to 180"0 shall be within maximum 120 seconds;
The time of soldering temperature at 217℃ measured on capacitors top shall not exceed t_L(second);
The peak temperature on capacitors top shall not exceed Tp(℃),and the time within 5℃ of actual peak temperature shall not exceed tp(second).

回流焊曲线图 CLASSIFICATION REFLOW PROFILE



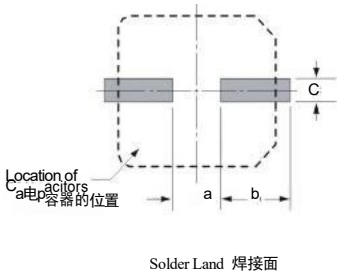
*1. Average ramp-up rate is 3C/second max.
*2. Ramp-down rateis 6℃/second max.
*3. Time from 25° Cto peak temperature is 6minutes max.
*1. 温度上升平均每秒钟最多3℃;
*2. 温度下降平均每秒钟最多6℃;
*3. 从25C上升到峰值温度的时间最多6分钟。

温度和时间分类 CLASSIFIED AT TEMPERATURE AND TIME

Size尺寸	Preheat 预热	Tp (℃)	ti≤ (second秒)	tp≤ (second秒)	Reflow number 回流焊次数
Ø4~Ø6.3	150~180℃ 120s Max. (120秒以内)	260±5	60	5~10	2 times or less 最多2次
Ø8×10.5L/13.5L		250±5	60	5~10	
Ø10×10.5L/13.5L		250±5	60	5~10	
Ø8×6.5/7.0LØ12.5,Ø16		240±5	40	5	

・Please contact us if your condition is over the maximum. ・如使用条件超出最大值，请与我们联系。

推荐安装尺寸RECOMMENDED SOLDER LAND SIZEONPC BOARD (Unit:mm)



Size 尺寸	a	b	C
Ø4	1.0	2.6	1.6
②5	1.4	3.0	1.6
Ø6.3	1.9	3.5	1.6
⑦8x6.5/7.0L	3.0	3.5	2.5
Ø8x10.5/13.5L	3.0	3.5	2.5
ø10×10.5/13.5L	4.0	4.0	2.5
⑦12.5	4.0	6.0	3.0
Ø16	6.0	7.0	3.5

配套使用中的注意事项
Caution During Use Of Capacitors In Sets

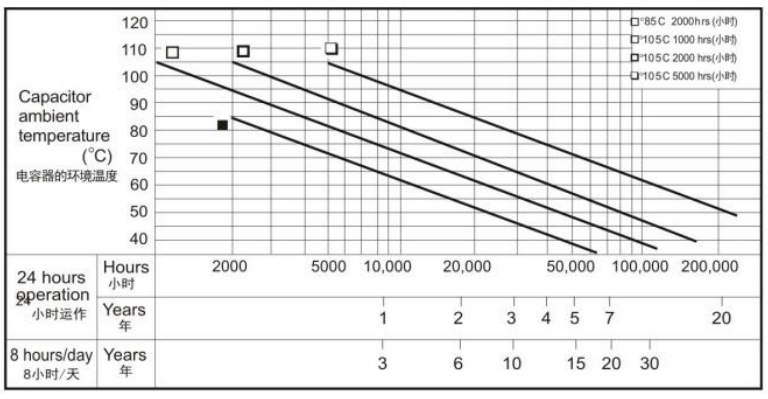
铝电解电容器的寿命主要依赖于其适用的环境条件(如环境温度，湿度等)和电负荷情况(如工作电压，统波电流等》。通常而言，铝电解电容器的失效机理被认为是电解液通过胶塞逐渐挥发所导致。因此，温度因索(环境温度和由于纹波电流所引致的内热)对电容器寿命的影响最大，而电压对电容器寿命的影响可以忽略，尤其对低电压铝电解电容器更是如此。铝电解电容器的寿命可用下列公式来估算：

The life of aluminum electrolytic capacitors is mainly dependent on environmental conditions(e.g.ambient temperature,humidity etc.)and electrical factors(e.g.operating temperature,ripple current etc.).Generally,the wear-out mechanism of aluminum electrolytic capacitors is based on evaporation of electrolyte through the rubber seal.Consequently,the factor of temperature(ambient temperature and internal heating due to ripple current)is the most critical to electrolytic capacitors life.The effect of voltage on capacitor life is negligible,especially for low voltage electrolytic capacitors.The lifetime of aluminum electrolytic capacitors can be expressed as following equations:

其中： 在工作温度Te(h)下的预期寿命 在最大工作温度T。(h)下的寿命 环境温度影响因子 纹波电流影响因子	Le=L。 •Kr•Kt Where: Le=Expected life at operating temperature Te(h) L。=Specified life at temperature operating temperature T_o(h) Kt=Ambient temperature acceleration term Kr=Ripple current acceleration term
其中： 最大额定工作电压(° C) 实际环境适用温度(C) 加速系数(对于从35℃ 到最高工作温度的范围，A≈2)	$K=2^{(-AT/5)}$ Where: △T=An increase in core temperature by internal heating due to ripple current (△T=core temperature ?ambient temperature) △T can be estimated as follows:
其中： (△T=芯子温度-环境温度) △T可用以下公式估算：	K:=Lo •A(To-Ta/10 Where: To=Maximum rated operating temperature(℃) Te=Actual ambient temperature(℃) A=Acceleration coefficient (for the range from 35° ℃ to the maximum operating temperature,A≈2)
其中： 通过电容器的纹波电流(A rms) 电容器的等效串联电阻(Q) 铝壳的热辐射系数(W/° C • cm²) 电容器的表面积(cm²)	ΔT=(I² •R)(•S) Where: I=Ripple current of the capacitor(A rms) R=Equivalent series resistance of the capacitor(Ω) β=Heat radiation coefficient of the aluminum can(W/° C •cm²) S=Surface area of the capacitor(cm²)

In neglecting ripple current effect,the expected life of the capacitors at lower temperature is shown in the following chart.
当忽略纹波电流影响时，电容器在较低温下的预期寿命可参照以下图表。

预期寿命快速参考图 QUICK REFERENC GUIDE OF THE EXPECTED LIFE



例：对于105°C 2000 小时的产品，如果在60°C 环境中连续使用，它的预期寿命约5 年。

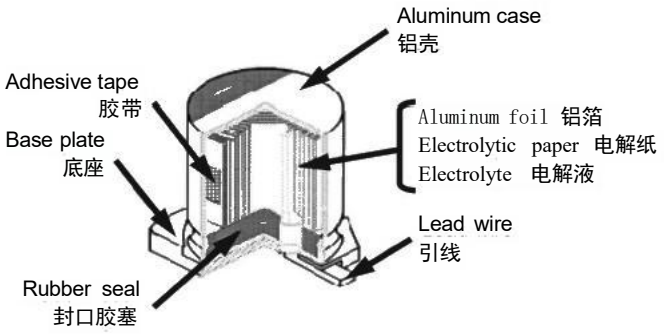
Example: When a 2000 hours/105°C guaranteed product is used continuously at 60°C, it can be expected to have a life of 5 years.

铝电解电容基本结构
Aluminum Electrolytic Capacitors Basic Construction Of

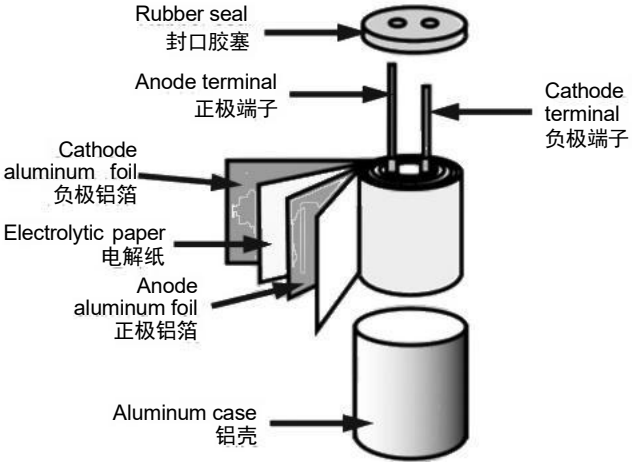
编 带 标 准 TAPINGSPECIFICATIONS

铝电解电容器是由正极与负极铝箔铆上正极与负极端子，再和电解纸一起卷绕成芯子，浸渍电解液后用铝壳封装而成。
The aluminum electrolytic capacitors contains an internal element of an anode foil,a cathode foil and electrolytic paper rolled together,impregnated with an electrolyte,then attached to external terminals connecting the tabs with the anode or the cathode foils,and sealed in a can case.

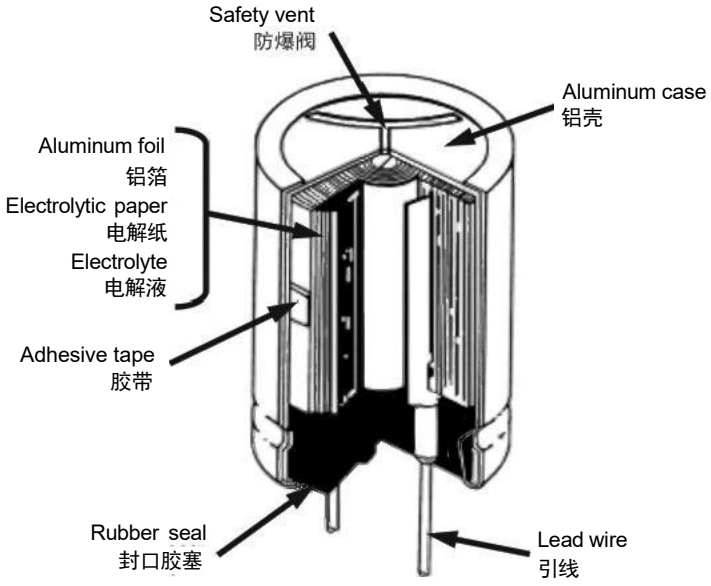
内部结构 INTERNAL STRUCTURE



(Chip type 贴片式)



(Basic construction 基本结构)



(Radial lead type 引线式)

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