

HIGH TEMPERATURE 高温品

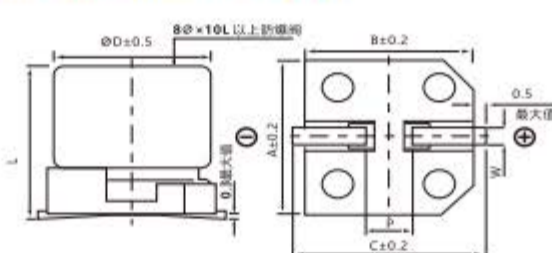
- High temperature range up to -40~+125°C
适用于 -40~+125°C 的高温范围
- Suitable for automotive equipment
适用于汽车电子装备
- Load life of 1000~3000 hours
负荷寿命1000~3000 小时
- Comply with the RoHS directive
符合 RoHS 指令



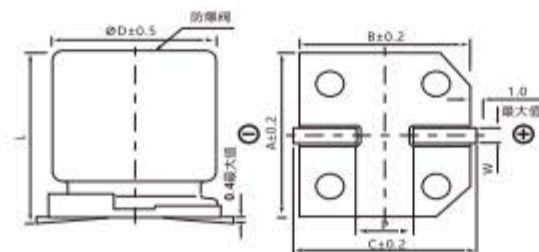
SPECIFICATIONS 特性表

Items 项目	Characteristics 主要特性																																	
Operation Temperature Range 使用温度范围	-40~+125°C																																	
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°C																																	
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 4 μA, 取较大值 (施加额定工作电压2分钟后) 漏电流 (160V~450V) ≤0.04CV + 100 μA, 取较大值 (施加额定工作电压2 分钟后)																																	
Dissipation Factor (tan δ) 损耗角正切	Measurement frequency 测试频率: 120Hz, Temperature 温度 : 20°C <table border="1"> <thead> <tr> <th>Rated Voltage (V) 额定工作电压</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> <th>63</th> <th>100</th> <th>160~250</th> <th>400,450</th> </tr> </thead> <tbody> <tr> <td>tan δ(max.)</td> <td>0.24</td> <td>0.20</td> <td>0.18</td> <td>0.16</td> <td>0.16</td> <td>0.14</td> <td>0.14</td> <td></td> <td></td> </tr> <tr> <td>最大损耗角正切</td> <td>0.26</td> <td>0.22</td> <td>0.20</td> <td>0.18</td> <td>0.18</td> <td>0.16</td> <td>0.16</td> <td>0.20</td> <td>0.20</td> </tr> </tbody> </table>	Rated Voltage (V) 额定工作电压	10	16	25	35	50	63	100	160~250	400,450	tan δ(max.)	0.24	0.20	0.18	0.16	0.16	0.14	0.14			最大损耗角正切	0.26	0.22	0.20	0.18	0.18	0.16	0.16	0.20	0.20			
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Stability at Low Temperature 低温特性	Measurement frequency 测试频率: 120Hz <table border="1"> <thead> <tr> <th>Rated Voltage (V) 额定工作电压</th> <th>10</th> <th>16</th> <th>25</th> <th>35~100</th> <th>160~250</th> <th>400,450</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Impedance Ratio 阻抗比</td> <td>Z(-25°C) / Z(20°C)</td> <td>4</td> <td>3</td> <td>2</td> <td>2</td> <td></td> </tr> <tr> <td>Z(-40°C) / Z(20°C)</td> <td>10</td> <td>8</td> <td>6</td> <td>4</td> <td></td> </tr> <tr> <td rowspan="2">ZT/Z20 (max.)</td> <td>Z(-25°C) / Z(20°C)</td> <td>4</td> <td>3</td> <td>2</td> <td>2</td> <td>3</td> </tr> <tr> <td>Z(-40°C) / Z(20°C)</td> <td>8</td> <td>6</td> <td>4</td> <td>3</td> <td>6</td> </tr> </tbody> </table>	Rated Voltage (V) 额定工作电压	10	16	25	35~100	160~250	400,450	Impedance Ratio 阻抗比	Z(-25°C) / Z(20°C)	4	3	2	2		Z(-40°C) / Z(20°C)	10	8	6	4		ZT/Z20 (max.)	Z(-25°C) / Z(20°C)	4	3	2	2	3	Z(-40°C) / Z(20°C)	8	6	4	3	6
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Load Life 高温负荷特性	After 3000 hrs. application of the rated voltage for φ12.5~16 (10~100V), and 2000 hrs. for φ8 × 10.5~φ10 (10~100V), and 1000 hrs. for φ6.3, as well as 3000 hrs. application of rated voltage for φ12.5~16 (160~450V) at 125°C, they meet the characteristics listed below. 在125°C 环境中施加额定工作电压3000 小时于φ12.5~16 (10~100V), 2000 小时于φ8 × 10.5~φ10 (10~100V), 1000 小时于φ6.3, 以及施加 额定工作电压3000 小时于φ12.5~16 (160~450V)后, 电容器的特性符合下表的要求。 <table border="1"> <tbody> <tr> <td>Capacitance Change 静电容量变化率</td> <td>Within ±30% of initial value 初始值的 ±30%以内</td> </tr> <tr> <td>Dissipation Factor 损耗角正切</td> <td>300% or less of initial specified value 不大于规范值的300%</td> </tr> <tr> <td>Leakage Current 漏电流</td> <td>initial specified value or less 不大于规范值</td> </tr> </tbody> </table>	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																											
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Shelf Life 高温贮存特性	After leaving capacitors under no load at 125°C for 1000 hours, they meet the specified value for load life characteristics listed above. 在125°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。 <table border="1"> <tbody> <tr> <td>Capacitance Change 静电容量变化率</td> <td>Within ±10% of initial value 初始值的 ±10%以内</td> </tr> <tr> <td>Dissipation Factor 损耗角正切</td> <td>initial specified value or less 不大于规范值</td> </tr> <tr> <td>Leakage Current 漏电流</td> <td>initial specified value or less 不大于规范值</td> </tr> </tbody> </table>	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																											
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Marking 标识	Black print on the case top. 铝壳顶部黑字印刷。																																	

Diagram of Dimensions 尺寸图



ΦD=4~10 适用



Φ12.5 以上适用

DIMENSIONS (Unit: mm) 尺寸表

DXL	6.3X5.8	6.3X7.7	8X10.5	10X10.5	10X13.5	12.5X13.5	12.5X16	16X16.5
A	6.6	6.6	8.3	10.3	10.3	13.0	13.0	17.0
B	6.6	6.6	8.3	10.3	10.3	13.0	13.0	17.0
C	7.2	7.2	9.2	11.2	11.2	13.7	13.7	18.0
P±0.2	2.0	2.0	3.1	4.4	4.4	4.4	4.4	6.4
L	5.8±0.3	7.7±0.3	10.5±0.5	10.5±0.5	13.5±0.5	13.5±0.5	16±0.5	16.5±0.5

□ DRAWING (Unit: mm) 外形图



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

Parameter 参数	WV	10 (1A)				16 (1C)				25 (1E)			
		Case size $\varnothing D \times L$ (mm) 尺寸	E.S.R.(Ω) 20°C E.S.R.值	E.S.R.(Ω) -40°C E.S.R.值	Ripple current (mA rms) at 125°C, 100KHz 纹波电流	Case size $\varnothing D \times L$ (mm) 尺寸	E.S.R.(Ω) 20°C E.S.R.值	E.S.R.(Ω) -40°C E.S.R.值	Ripple current (mA rms) at 125°C, 100KHz 纹波电流	Case size $\varnothing D \times L$ (mm) 尺寸	E.S.R.(Ω) 20°C E.S.R.值	E.S.R.(Ω) -40°C E.S.R.值	Ripple current (mA rms) at 125°C, 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	0.14	2.1	750	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								

Parameter 参数	WV	35 (1V)				50 (1H)			
		Case size $\varnothing D \times L$ (mm) 尺寸	E.S.R.(Ω) 20°C E.S.R.值	E.S.R.(Ω) -40°C E.S.R.值	Ripple current (mA rms) at 125°C, 100KHz 纹波电流	Case size $\varnothing D \times L$ (mm) 尺寸	E.S.R.(Ω) 20°C E.S.R.值	E.S.R.(Ω) -40°C E.S.R.值	Ripple current (mA rms) at 125°C, 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)				

Parameter 参数	WV	63 (1J)				100 (2A)			
		Case size $\varnothing D \times L$ (mm) 尺寸	E.S.R.(Ω) 20°C E.S.R.值	E.S.R.(Ω) -40°C E.S.R.值	Ripple current (mA rms) at 125°C, 100KHz 纹波电流	Case size $\varnothing D \times L$ (mm) 尺寸	E.S.R.(Ω) 20°C E.S.R.值	E.S.R.(Ω) -40°C E.S.R.值	Ripple current (mA rms) at 125°C, 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				

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

μF	WV Code 代码	160		200		250		400		450	
		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°C, 120Hz •尺寸∅D×L(mm), 纹波电流(mA rms)于125°C, 120Hz

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

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

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

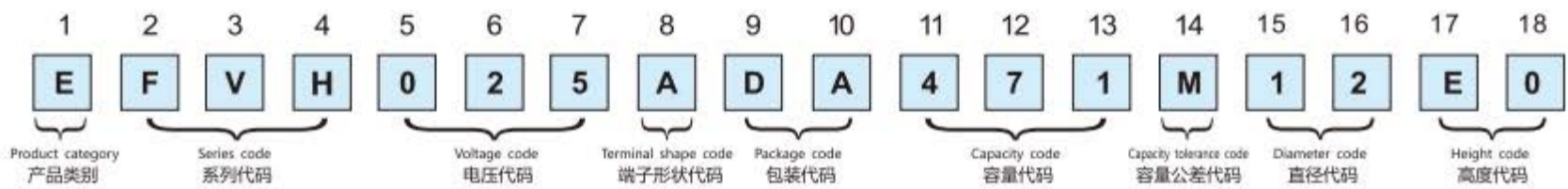
● The endurance of capacitors is reduced with internal heating produced by ripple current at the rate of halving the lifetime with every 10°C rise. When long life performance is required in actual use, the rms ripple current has to be reduced.

● 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°C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 17 "Taping Specifications". 编带标准请参阅第 17 页“编带标准”。

● Please refer to page 18 "Package Quantity" for the minimum package quantity. 最小包装数量请参阅第 18 页“包装数量”。

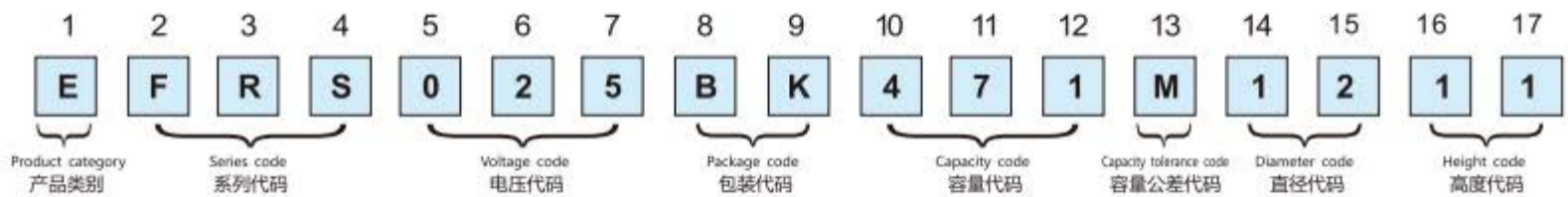
SMD EXPLANATION OF PART NUMBERS 贴片产品编码规则



(2, 3, 4)			(5, 6, 7)		(11, 12, 13)		(14)	(8)		(15, 16)		(17, 18)	
Series 系列	Voltage (w.v) 电压	Code 代码	Capacitance (uF) 静电容量	Code 代码	Cap. Tolerance (%) 容量允许	Code 代码	Tape 端子类型		Code 代码	Diameter (∅) 直径	Code 代码	Length (mm) 高度	Code 代码
FVE	4	4R0	0.1	0R1	±10	K	No dummy terminal 无辅助端子		A	4	04	4.5	45
FVH	6.3	6R3	0.22	R22	±20	M	With dummy terminal 有辅助端子		G	5	05	5.4	54
FVA	10	010	1	010						6.3	06	5.8	58
FVZ	16	016	4.7	4R7						8	08	6.5	65
FVR	25	025	10	100						10	10	7.7	77
FVL	35	035	47	470						12.5	12	10.2	A0
FVM	50	050	100	101						16	16	10.5	B0
FVU	63	063	470	471						18	18	13.5	E0
FVG	100	100	1000	102								16	G5
FVB	160	160	4700	472								16.5	H0
FVN	250	250	10000	103								21.5	N0
FVD	350	350											
FVC	400	400											

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

Radial EXPLANATION OF PART NUMBERS 插件产品编码规则



(2, 3, 4)			(5, 6, 7)		(10, 11, 12)	(13)	(8, 9)		(14, 15)		(16, 17)		
Series 系列	Voltage (w.v) 电压	Code 代码	Capacitance (uF) 静电容量	Code 代码	Cap. Tolerance (%) 容量允许	Code 代码	Packaging 包装形式		Code 代码	Diameter (∅) 直径	Code 代码	Length (mm) 高度	Code 代码
FRA	4	4R0	0.1	0R1	±10	K	Long-legged bulk 长脚散装		BK	4	04	4.5	04
FRS	6.3	6R3	0.22	R22	±20	M	Long-legged taping 长脚编带		BA	5	05	5.5	05
FRU	10	010	1	010						6.3	06	6.0	06
FRK	16	016	4.7	4R7						8	08	6.5	06
FBR	25	025	10	100						10	10	7.0	07
FBU	35	035	47	470						12.5	12	8.0	08
	50	050	100	101						16	16	10	10
	63	063	470	471						18	18	11	11
	100	100	1000	102								11.5	11
	160	160	4700	472								12	12
	250	250	10000	103								16	16
	350	350											
	400	400											