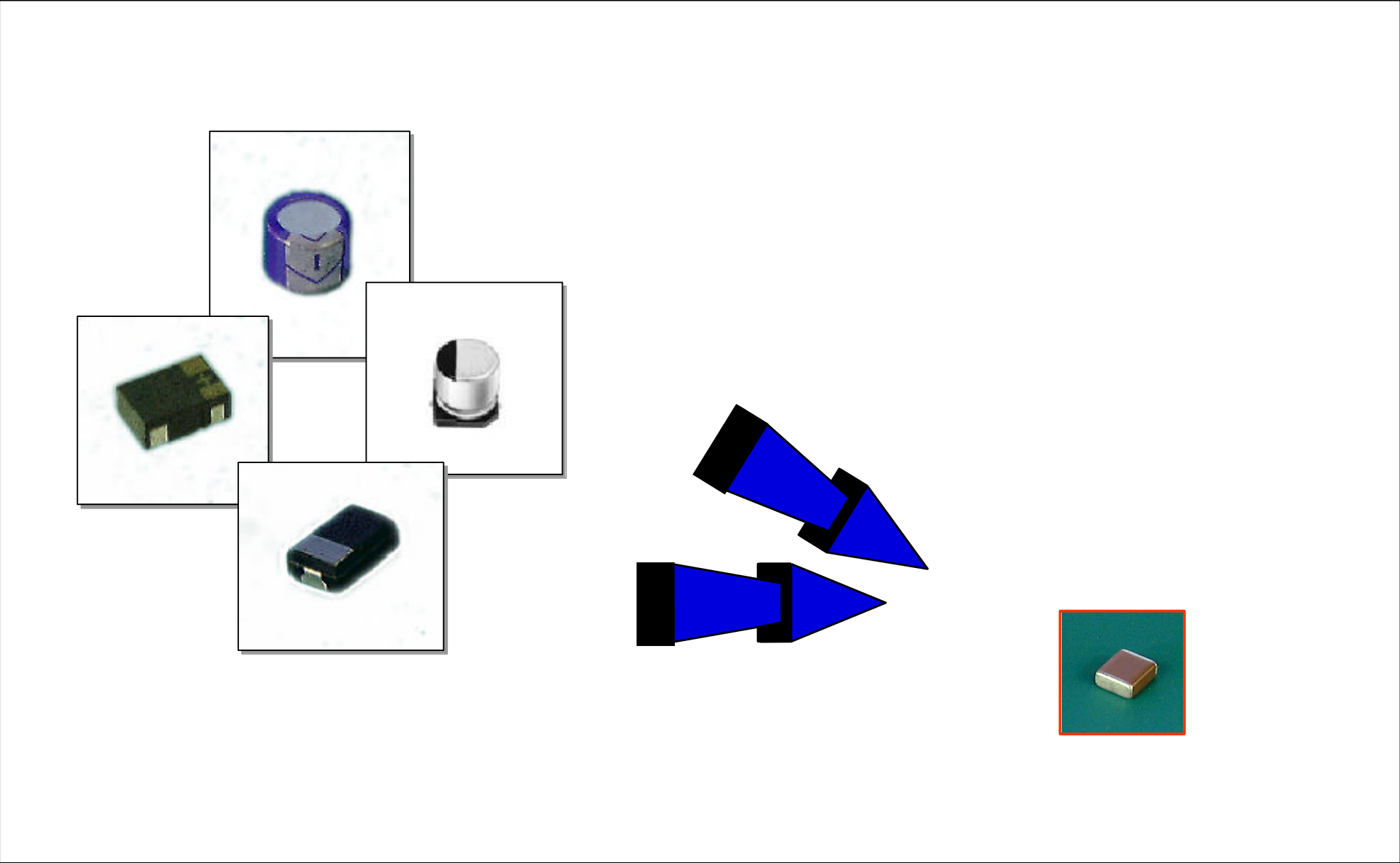


Replacement guide to Multilayer Ceramic Chip Capacitor

Apr. 2001



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Step 1

Choose the right rated voltage from the attached chart

[example]

| Working voltage | Rated voltage of multilayer ceramic chip capacitor | symbol |
|-----------------|--|--------|
| ~3 , 5V | 6.3V | 0J |
| ~8 , 9V | 10V | 1A |
| ~12 ,15V | 16V | 1C |
| ~18 ,20V | 25V | 1E |

Step 2

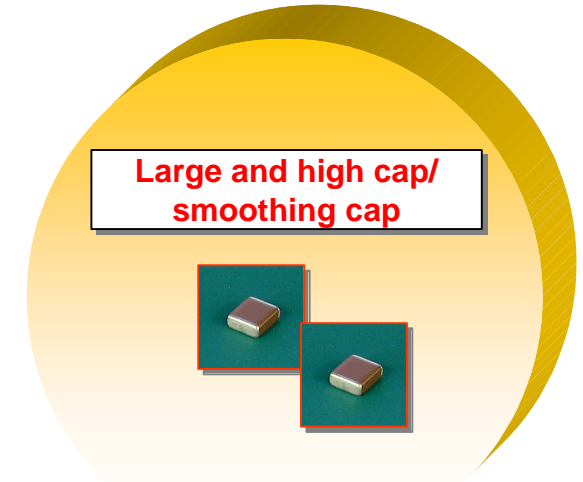
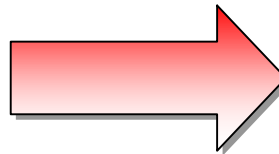
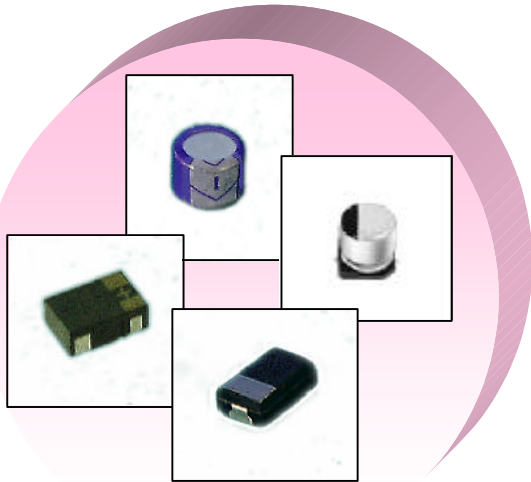
Replace at the min.cap value

[example]

| Application | Cap guidepost | |
|-------------------|-----------------------------------|------|
| for Decoupling | Ta cap,Aluminium electrolytic cap | 10%~ |
| | Organic semiconductor | 50%~ |
| for Smoothing | Ta cap,Aluminium electrolytic cap | 20%~ |
| | Organic semiconductor | 50%~ |
| for Time Constant | Ta cap,Aluminium electrolytic cap | 100% |
| | Organic semiconductor | |

Step 3

Decide cap value and the item



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| Line Voltage | frequency | V _≤ 6.3V(Ex. 3V,5V) | | | V _≤ 10V(Ex. 8V,9V) | | | V _≤ 16V(Ex. 12V,15V) | | | V _≤ 25V(Ex. 18V,20V) | | |
|--|-----------|--------------------------------|-----------------------|-----------------------|-------------------------------|-----------------------|-----------------------|---------------------------------|-----------------------|-----------------------|---------------------------------|-----------------------|-----------------------|
| | | f _≥ 50kHz | f _≥ 100kHz | f _≥ 500kHz | f _≥ 50kHz | f _≥ 100kHz | f _≥ 500kHz | f _≥ 50kHz | f _≥ 100kHz | f _≥ 500kHz | f _≥ 50kHz | f _≥ 100kHz | f _≥ 500kHz |
| Aluminium Electrolytic cap Cap's value(uF) | 1 | C1608X5R0J105* | | | C1608X5R1A105* | | | C3216X7R1C105* | C2012X7R1C105* | | C3216X7R1E105* | C3216X7R1E105* | |
| | 2.2 | | C1608X5R0J105* | C1608X5R1A224* | | C1608X5R1A105* | | | C1608X7R1C224* | | | | C2012X7R1E224* |
| | 4.7 | C2012X5R1A225* | | | | | C1608X5R1A224* | | | | C3216X7R1E225* | | |
| | 10 | | | | C2012X5R1A225* | | | C3216X7R1C225* | | | | C3216X7R1E225* | |
| | 22 | | C2012X5R1A225* | C1608X5R1A474* | | | | | | C2012X7R1C474* | | | C2012X7R1E474* |
| | 47 | C2012X5R0J475* | | | | C2012X5R1A225* | | | | | C3225X7R1E475* | | |
| | 100 | | C2012X5R0J475* | C1608X5R0J105* | | | C1608X5R1A474* | | C3225X7R1C475* | | | | |
| | 220 | C3216X5R0J106M | | | C3216X5R1A475* | | | | | | C2012X7R1C105* | C4532X7R1E106M | C3225X7R1E475* |
| 470 | | C3216X5R0J106M | C2012X5R1A225* | | | | | | | | | | |

| Line Voltage | frequency | V _≤ 6.3V(Ex. 3V,5V) | | | V _≤ 10V(Ex. 8V,9V) | | | V _≤ 16V(Ex. 12V,15V) | | | V _≤ 25V(Ex. 18V,20V) | | |
|------------------------|-----------|--------------------------------|-----------------------|-----------------------|-------------------------------|-----------------------|-----------------------|---------------------------------|-----------------------|-----------------------|---------------------------------|-----------------------|-----------------------|
| | | f _≥ 50kHz | f _≥ 100kHz | f _≥ 500kHz | f _≥ 50kHz | f _≥ 100kHz | f _≥ 500kHz | f _≥ 50kHz | f _≥ 100kHz | f _≥ 500kHz | f _≥ 50kHz | f _≥ 100kHz | f _≥ 500kHz |
| Ta cap's Cap value(uF) | 1 | C1608X5R0J105* | C1608X5R0J105* | | C1608X5R1A105* | C1608X5R1A105* | | C3216X7R1C105* | C3216X7R1C105* | | C3216X7R1E105* | C3216X7R1E105* | |
| | 2.2 | C2012X5R1A225* | | C1608X5R0J474* | C2012X5R1A225* | | C1608X5R1A474* | C3216X7R1C225* | | C2012X7R1C474* | C3216X7R1E225* | | C3216X7R1E474* |
| | 4.7 | C2012X5R0J475* | C2012X5R1A225* | | | | | | C3216X7R1C225* | | | C3216X7R1E225* | |
| | 10 | | | C1608X5R0J105* | C3216X5R1A475* | C2012X5R1A225* | | C3216X7R1C475* | C3216X7R1C225* | C3216X7R1C105* | C3225X7R1E475* | | C3216X7R1E105* |
| | 22 | C3216X5R0J106M | C2012X5R0J475* | C2012X5R1A225* | C3225X5R1A106M | C3216X5R1A475* | C2012X5R1A225* | C3225X7R1C106M | C3216X7R1C475* | C3216X7R1C225* | C4532X7R1E106M | C4532X7R1E106M | C3216X7R1E225* |
| | 47 | C3225X5R0J226M | C3216X5R0J106M | C2012X5R0J475* | C4532X5R1A226M | C3225X5R1A106M | C3216X5R1A475* | C4532X5R1C226M | C3225X7R1C106M | C3216X7R1C475* | | C5750X5R1E226M | C3225X7R1E475* |
| | 100 | | C3225X5R0J226M | | | C4532X5R1A336M | | C5750X5R1C476M | C4532X5R1C226M | | | | |
| | 220 | C4532X5R0J476M | | C3216X5R0J106M | C5750X5R1A686M | C4532X5R1A226M | C3225X5R1A106M | | | C3225X7R1C106M | | | |
| 470 | | C4532X5R0J476M | | | | | | C5750X5R1C476M | | | | | |

| Line Voltage | frequency | V _≤ 6.3V(Ex. 3V,5V) | | | V _≤ 10V(Ex. 8V,9V) | | | V _≤ 16V(Ex. 12V,15V) | | | V _≤ 25V(Ex. 18V,20V) | | | |
|------------------------------------|-----------|--------------------------------|-----------------------|-----------------------|-------------------------------|-----------------------|-----------------------|---------------------------------|-----------------------|-----------------------|---------------------------------|-----------------------|-----------------------|----------------|
| | | f _≥ 50kHz | f _≥ 100kHz | f _≥ 500kHz | f _≥ 50kHz | f _≥ 100kHz | f _≥ 500kHz | f _≥ 50kHz | f _≥ 100kHz | f _≥ 500kHz | f _≥ 50kHz | f _≥ 100kHz | f _≥ 500kHz | |
| Organic semi-conductor's cap value | 10 | C3216X5R0J106M | C3216X5R0J685* | C2012X5R0J475* | C3216X5R0J106M | C3225X5R1A685* | C3216X5R1A475* | C3225X7R1C106M | C3225X7R1C685* | C3216X7R1C475* | C4532X7R1E106M | C4532X7R1E106M | C4532X7R1E685* | |
| | 15 | C3225X5R0J156M | C3216X5R0J106M | C3216X5R0J685* | C3225X5R1A156M | C3225X5R1A106M | C3225X5R1A685* | C4532X5R1C156M | C3225X7R1C106M | C3225X7R1C685* | C4532X5R1E156M | C4532X5R1E156M | C4532X7R1E106M | |
| | 22 | C3225X5R0J226M | C3225X5R0J156M | C3216X5R0J106M | C4532X5R1A226M | C3225X5R1A156M | C3225X5R1A106M | C4532X5R1C226M | C4532X5R1C156M | C3225X7R1C106M | C5750X5R1E226M | C5750X5R1E226M | C4532X5R1E156M | |
| | 33 | C4532X5R1A336M | C3225X5R0J226M | C3225X5R0J156M | C4532X5R1A336M | C4532X5R1A226M | C3225X5R1A156M | C5750X5R1C336M | C4532X5R1C226M | C4532X5R1C156M | | | | C5750X5R1E226M |
| | 47 | C4532X5R0J476M | C4532X5R1A336M | C3225X5R0J226M | | C4532X5R1A336M | C4532X5R1A226M | C5750X5R1C476M | C5750X5R1C336M | C4532X5R1C226M | | | | |
| | 68 | C5750X5R1A686M | C4532X5R0J476M | C4532X5R1A336M | | | C4532X5R1A336M | | C5750X5R1C476M | C5750X5R1C336M | | | | |
| | 100 | C5750X5R0J107M | C5750X5R0J107M | C4532X5R0J476M | | | C4532X5R1A336M | | | C5750X5R1C476M | | | | |
| | 220 | | | C5750X5R0J107M | | | | | | | | | | |

* : M , V and K tolerances are applicable
 TDK recommends E-3 series w/M tolerance(Blue colored items)

