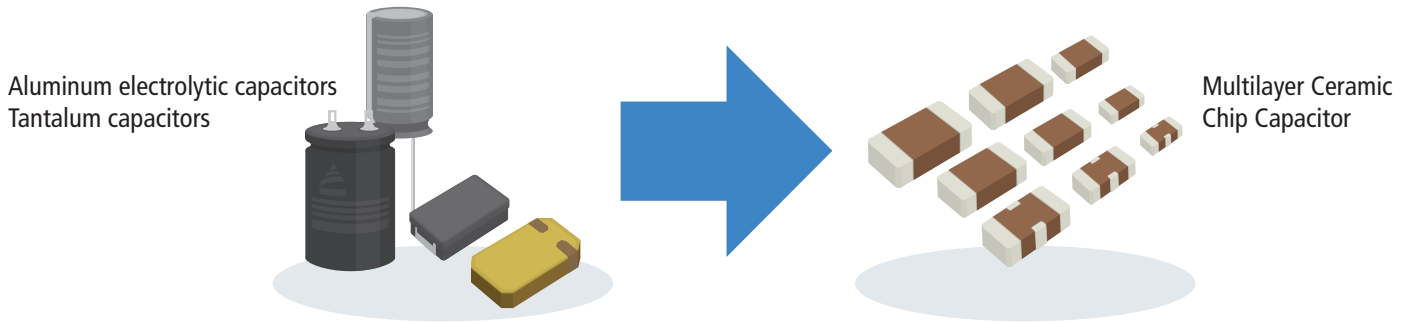


# How to select the optimal MLCC to replace an electrolytic capacitor.



## Step 1 Deciding on rated voltage from operating voltage.

### Rated Voltage

Operating Voltage	Rated Voltage of MLCC	Code
~ 3, 5V	6.3V or 10V	0J or 1A
~ 8, 9V	10V or 16V	1A or 1C
~ 12, 15V	16V or 25V	1C or 1E
~ 18, 20V	25V or 50V	1E or 1H

## Step 2 Deciding on an MLCC capacity that is appropriate for the application.

### Capacity

Application	Estimated MLCC Capacity	
For Decoupling	Tantalum / Aluminum Electrolytic Capacity	×10% ~
	Conductive Polymer Capacity	×50% ~
For Smoothing	Tantalum / Aluminum Electrolytic Capacity	×20% ~
	Conductive Polymer Capacity	×50% ~
For Time Constants	Tantalum / Aluminum Electrolytic Capacity	×100%
	Conductive Polymer Capacity	×100%

## Step 3 Deciding on a product. Please refer to the simplified chart concerning replacement on the next page. ➔

# Replacing an aluminum electrolytic capacitor with an MLCC.

Line Voltage <b>V ≤ 5V</b>	Al Cap Value (μF)		Frequency		
			f ≥ 50kHz	f ≥ 100kHz	f ≥ 500kHz
		1	C1005X7S0J105K	C1005X7S0J105K	C1005X7R1A224K
		2.2	C1608X7R0J225K		C1005X7S0J474K
		4.7		C2012X7R0J475K	
		10	C3216X7S0J226M		
		22			
		47			
100					

Line Voltage <b>V ≤ 9V</b>	Al Cap Value (μF)		Frequency		
			f ≥ 50kHz	f ≥ 100kHz	f ≥ 500kHz
		1	C1608X7R1A105K	C1608X7R1A105K	C1005X7R1A224K
		2.2	C1608X7R1A225K		C1005X7S1A474K
		4.7		C2012X7R1A475K	
		10	C1608X7R1A225K		
		22			
		47			
100					

Line Voltage <b>V ≤ 15V</b>	Al Cap Value (μF)		Frequency		
			f ≥ 50kHz	f ≥ 100kHz	f ≥ 500kHz
		1	C1608X7R1C105K	C1608X7R1C105K	C1005X7R1C224K
		2.2	C2012X7R1C225K		C1608X7R1C474K
		4.7		C2012X7R1C475K	
		10	C2012X7R1C225K		
		22			
		47			
100					

Line Voltage <b>V ≤ 20V</b>	Al Cap Value (μF)		Frequency		
			f ≥ 50kHz	f ≥ 100kHz	f ≥ 500kHz
		1	C1608X7R1E105K	C1608X7R1E105K	C1005X7R1E224K
		2.2	C2012X7R1E225K		C1608X7R1E474K
		4.7		C2012X7R1E475K	
		10	C2012X7R1E225K		
		22			
		47			
100					

\*Please note that the items above are only recommended products and that there is no guarantee of their suitability with your applications.  
 \*Please determine the suitability of these items by sufficient testing.  
 \*Delivery specifications that provide further details on the features and specifications of the described products for proper and safe use are available upon request.

## Replacing a tantalum capacitor with an MLCC.

Line Voltage $V \leq 5V$	Ta Cap Value ( $\mu F$ )	Frequency			
		$f \geq 50kHz$	$f \geq 100kHz$	$f \geq 500kHz$	
		1	C1005X7S0J105K	C1005X7S0J105K	C1005X7S0J105K
		2.2	C1608X7R0J225K	C1608X7R0J225K	C1608X7R0J225K
		4.7	C2012X7R0J475K	C2012X7R0J475K	
		10	C2012X7R0J106K	C2012X7R0J106K	C3216X7S0J226M
		22	C3216X7S0J226M	C3216X7S0J226M	
		47	C3216X7S0J226M	C3216X7S0J226M	C2012X7R0J475K
100	C3216X7S0J226M	C3216X7S0J226M	C2012X7R0J475K		

Line Voltage $V \leq 9V$	Ta Cap Value ( $\mu F$ )	Frequency			
		$f \geq 50kHz$	$f \geq 100kHz$	$f \geq 500kHz$	
		1	C1608X7R1A105K	C1608X7R1A105K	C1608X7R1A105K
		2.2	C1608X7R1A225K	C1608X7R1A225K	C1608X7R1A225K
		4.7	C2012X7R1A475K	C2012X7R1A475K	
		10	C2012X7R1A106K	C2012X7R1A106K	C2012X7S1A226M
		22	C2012X7S1A226M	C2012X7S1A226M	
		47	C2012X7S1A226M	C2012X7S1A226M	C2012X7R1A475K
100	C2012X7S1A226M	C2012X7S1A226M	C2012X7R1A475K		

Line Voltage $V \leq 15V$	Ta Cap Value ( $\mu F$ )	Frequency			
		$f \geq 50kHz$	$f \geq 100kHz$	$f \geq 500kHz$	
		1	C1608X7R1C105K	C1608X7R1C105K	C1608X7R1C105K
		2.2	C2012X7R1C225K	C2012X7R1C225K	C2012X7R1C225K
		4.7	C2012X7R1C475K	C2012X7R1C475K	
		10	C3216X7R1C106K	C3216X7R1C106K	C3225X7R1C226K
		22	C3225X7R1C226K	C3225X7R1C226K	
		47	C3225X7R1C226K	C3225X7R1C226K	C2012X7R1C475K
100	C3225X7R1C226K	C3225X7R1C226K	C2012X7R1C475K		

Line Voltage $V \leq 20V$	Ta Cap Value ( $\mu F$ )	Frequency			
		$f \geq 50kHz$	$f \geq 100kHz$	$f \geq 500kHz$	
		1	C1608X7R1E105K	C1608X7R1E105K	C1608X7R1E105K
		2.2	C2012X7R1E225K	C2012X7R1E225K	C2012X7R1E225K
		4.7	C2012X7R1E475K	C2012X7R1E475K	
		10	C3216X7R1E106K	C3216X7R1E106K	C4532X7R1E226M
		22	C4532X7R1E226M	C4532X7R1E226M	
		47	C4532X7R1E226M	C4532X7R1E226M	C2012X7R1E475K
100	C4532X7R1E226M	C4532X7R1E226M	C2012X7R1E475K		

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