

# MURATA Hi-Cap Multilayer Ceramic Chip Capacitors

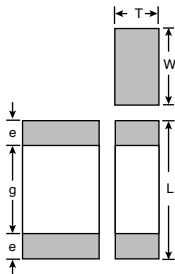


**Hi-Cap:** The Murata hi-cap, tantalum replacement product lineup is available in X7R, X6S, X7S, and X5R with capacitance of 1µF and larger. This line of high volumetric capacitance ceramic chip capacitors is available in 4V, 6.3V, 10V, 16V, 25V, and 50V. This product series (GRM) is offered with a nickel (Ni) barrier termination plated with tin (Sn), and is RoHS compliant. Stringent dimensional tolerances allow highly reliable, high-speed automatic chip placement on PCBs.

Why use ceramic chips over tantalum and aluminum capacitors? Ceramic chips offer better reliability, performance, no polarity, and allow design engineers to downsize designs with various package options from 0402 X5R 1µF to 1210 X5R and X6S 100µF. This line of high volumetric multilayer capacitance ceramic chip capacitors (MLCC) has excellent high frequency noise absorption performance compared to tantalum and aluminum caps. For bypass/decoupling applications, MLCC is equivalent to 1/2 to 1/5 the capacitance value of a tantalum capacitor because impedance (ESR) of MLCC is lower at higher frequencies, above 100kHz. Consider Murata hi-cap as your tantalum capacitor replacement.



This product is RoHS compliant.



### Recommended Capacitance of MLCC for Tantalum Cap. Replacement

Depending on the operating frequency, MLCC is equivalent to 1/2 to 1/10 capacitance value of tantalum cap. Because impedance (ESR) of MLCC is lower than tantalum cap. Refer to the impedance curve graph below.

Tantalum Cap.
1µF
2.2µF
4.7µF
10µF
22µF
47µF
100µF
220µF



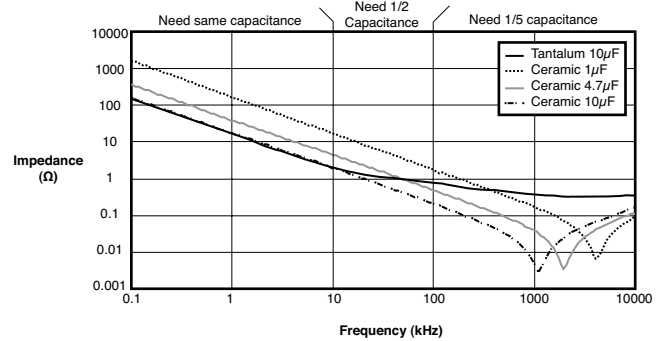
MLCC Recommended Cap.
0.1 to 0.47µF
0.22 to 1µF
0.47 to 2.2µF
1 to 4.7µF
2.2 to 10µF
4.7 to 22µF
10 to 47µF
22 to 100µF



RoHS Compliant

### Impedance Curve of MLCC

It is important that capacitor's impedance is lower at ripple noise frequency.



Part No.	DIMENSIONS: mm				
	L	W	T	e Min.	g Min.
GRM155	1.0±0.05	0.5±0.05	0.5±0.05	0.15 to 0.35	0.3
GRM188	1.6±0.1	0.8±0.1	0.8±0.1	0.2 to 0.5	0.5
GRM219	2.0±0.1	1.25±0.1	0.85±0.1	0.2 to 0.7	0.7
GRM21B			1.25±0.1		
GRM319	3.2±0.15	1.6±0.15	0.85±0.1	0.3 to 0.8	1.5
GRM31M			1.15±0.1		
GRM31C	3.2±0.2	1.6±0.2	1.6±0.2		
GRM32C			1.6±0.2		
GRM32D	3.2±0.3	2.5±0.2	2.0±0.2	0.3	1.0
GRM32E			2.5±0.2		
GRM32M			1.15±0.1		
GRM32N	3.2±0.3	2.5±0.2	1.35±0.15	0.3	1.0
GRM32R			1.8±0.2		
GRM43E	4.5±0.4	3.2±0.3	2.5±0.2	0.3	2.0
GRM43S			2.8±0.2		
GRM55E	5.7±0.4	5.0±0.4	2.5±0.2	0.3	2.0
GRM55R			1.8±0.2		

### 0402 Case Size

MOUSER STOCK NO.	Murata Part No.	Value (µF)	Volt (DC)	Tol.±	Temperature Coefficient	Price Each				Reel Quantity	Price per Piece
						1	50	100	500		
81-GRM155R60J105KE19	GRM155R60J105KE19D	1.0	6.3	10%	X5R					10000	
81-GRM155R61A105KE15	GRM155R61A105KE15D	1.0	10	10%	X5R					10000	
81-GRM155F50J105ZE01	GRM155F50J105ZE01D	1.0	6.3	+80% -20%	Y5V					10000	

### 0603 Case Size

81-GRM188R70J105KA01	GRM188R70J105KA01D	1.0	6.3	10%	X7R					4000	
81-GRM188R71A105KA61	GRM188R71A105KA61D	1.0	10	10%	X7R					4000	
81-GRM188R71C105KA12	GRM188R71C105KA12D	1.0	16	10%	X7R					4000	
81-GRM185R60J105KE21	GRM185R60J105KE21D	1.0	6.3	10%	X5R					4000	
81-GRM39R105K6.3	GRM188R60J105KA01D	1.0	6.3	10%	X5R					4000	
81-GRM185R61A105KE36	GRM185R61A105KE36D	1.0	10	10%	X5R					4000	
81-GRM39R105K10	GRM188R61A105KA61D	1.0	10	10%	X5R					4000	
81-GRM185R61C105KE44	GRM185R61C105KE44D	1.0	16	10%	X5R					4000	
81-GRM39R105K16	GRM188R61C105KA93D	1.0	16	10%	X5R					4000	
81-GRM188R61E105KA12	GRM188R61E105KA12D	1.0	25	10%	X5R					4000	
81-GRM39Y105Z10D	GRM188F51A105ZA01D	1.0	10	+80% -20%	Y5V					4000	
81-GRM188F51C105ZA01	GRM188F51C105ZA01D	1.0	16	+80% -20%	Y5V					4000	
81-GRM188F51E105ZA12	GRM188F51E105ZA12D	1.0	25	+80% -20%	Y5V					4000	
81-GRM188R71A225KE15	GRM188R71A225KE15D	2.2	10	10%	X7R					4000	
81-GRM185R60J225KE26	GRM185R60J225KE26D	2.2	6.3	10%	X5R					4000	
81-GRM188R60J225KE19D	GRM188R60J225KE19D	2.2	6.3	10%	X5R					4000	
81-GRM188R60J225KE01	GRM188R60J225KE01D	2.2	6.3	10%	X5R					4000	
81-GRM188R61A225KE34	GRM188R61A225KE34D	2.2	10	10%	X5R					4000	
81-GRM188R61C225KE15	GRM188R61C225KE15D	2.2	16	10%	X5R					4000	
81-GRM18F50J225ZE01D	GRM188F50J225ZE01D	2.2	6.3	+80% -20%	Y5V					4000	
81-GRM188F51A225ZE01	GRM188F51A225ZE01D	2.2	10	+80% -20%	Y5V					4000	
81-GRM188R60J475KE19D	GRM188R60J475KE19D	4.7	6.3	10%	X5R					4000	
81-GRM188F50J475ZE20D	GRM188F50J475ZE20D	4.7	6.3	+80% -20%	Y5V					4000	
81-GRM188F51A475ZE20	GRM188F51A475ZE20D	4.7	10	+80% -20%	Y5V					4000	
81-GRM188R60G106ME47	GRM188R60G106ME47D	10	4	20%	X5R					4000	
81-GRM188R60J106ME47	GRM188R60J106ME47D	10	6.3	20%	X5R					4000	

### 0805 Case Size

81-GRM40X105K10L	GRM21BR71A105KA01L	1.0	10	10%	X7R					3000	
81-GRM40X105K16K	GRM21BR71C105KA01K	1.0	16	10%	X7R					10000	
81-GRM40X105K16L	GRM21BR71C105KA01L	1.0	16	10%	X7R					3000	
81-GRM21BR71E105KA99	GRM21BR71E105KA99L	1.0	25	10%	X7R					3000	
81-GRM21F51C105ZA01D	GRM21F51C105ZA01D	1.0	16	+80% -20%	Y5V					4000	
81-GRM40Y105Z16L	GRM21BF51C105ZA01L	1.0	16	+80% -20%	Y5V					3000	
81-GRM21F51E105ZA01D	GRM21F51E105ZA01D	1.0	25	+80% -20%	Y5V					4000	
81-GRM21F51H105ZA12L	GRM21BF51H105ZA12L	1.0	50	+80% -20%	Y5V					3000	
81-GRM21R60J225KA01L	GRM21BR60J225KA01L	2.2	6.3	10%	X5R					3000	
81-GRM21R61C225KA88L	GRM21BR61C225KA88L	2.2	16	10%	X5R					3000	
81-GRM21R61C225K88D	GRM21R61C225K88D	2.2	16	10%	X5R					4000	
81-GRM21R61E225K	GRM21R61E225K	2.2	25	10%	X5R					4000	
81-GRM21R60J226ME39L	GRM21BR60J226ME39L	2.2	6.3	20%	X5R					3000	
81-GRM21BR71A225KA01	GRM21BR71A225KA01L	2.2	10	10%	X7R					3000	
81-GRM21BR71C225KA12L	GRM21BR71C225KA12L	2.2	16	10%	X7R					3000	
81-GRM21BR71E225KA73	GRM21BR71E225KA73L	2.2	25	10%	X7R					3000	
81-GRM40Y5V225Z010AL	GRM21BF51A225ZA01L	2.2	10	+80% -20%	Y5V					3000	
81-GRM40Y5V225Z016AL	GRM21BF51C225ZA01L	2.2	16	+80% -20%	Y5V					3000	
81-GRM40Y225Z25L	GRM21BF51E225ZA01L	2.2	25	+80% -20%	Y5V					3000	
81-GRM21BR60J335K	GRM21BR60J335KA11L	3.3	6.3	10%	X5R					3000	