CGJ series l High Reliability Series



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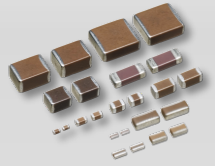
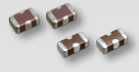
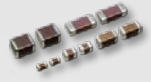
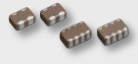
CGJ series l High Reliability Series

Purpose

- To provide a general overview of TDK's "CGJ High Reliability Series" Capacitor

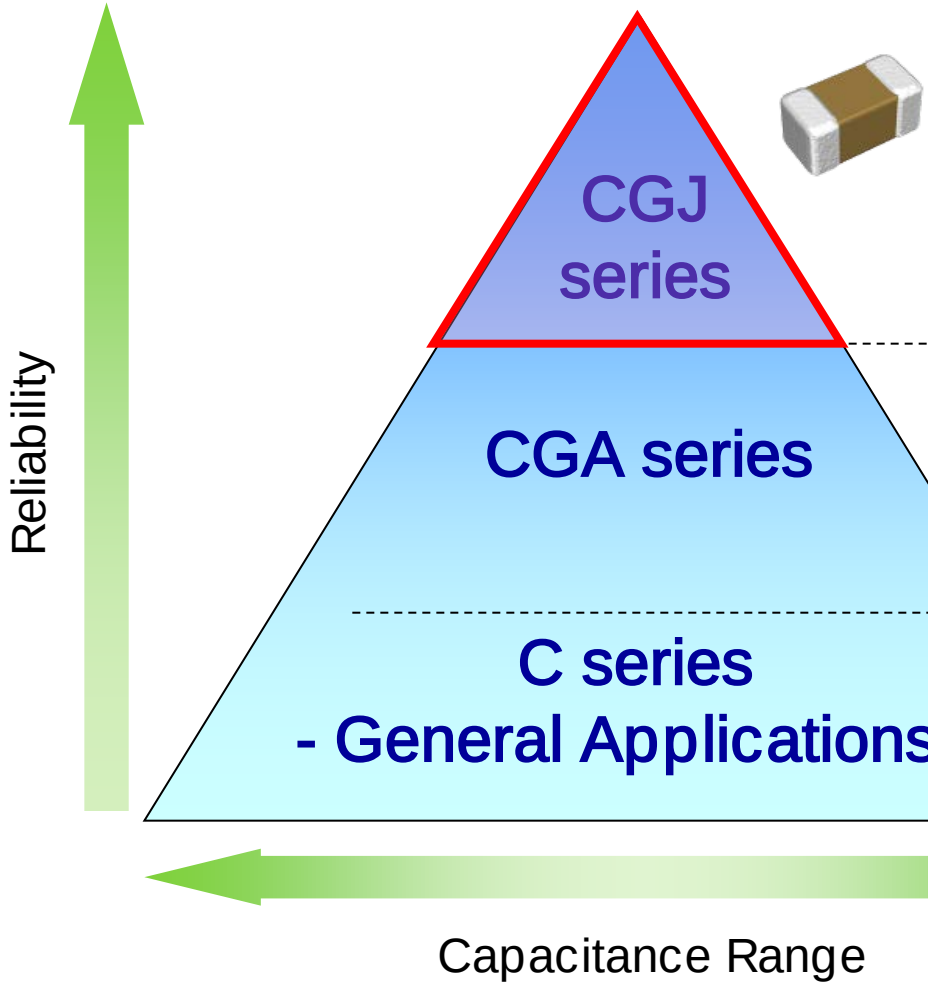
Objectives

- Define TDK's CGJ High Reliability Series capacitors
- Highlight the features and applications of TDK's CGJ Series Capacitors
- Explain TDK's CGJ series part number structure

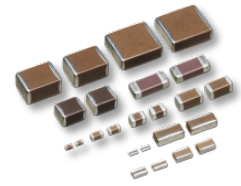
SERIES			FEATURES	OFFERING
C		General Applications	• Wide range of case size and superior dimension precision • Available in EIA class 1 and 2 dielectrics up to 50V	• 01005 ~ 2220 / C0G, SL, X5R, X6S, X7R, X7S, Y5V • 4V ~ 50V / up to 100 µF
		Mid Voltage	• Unique design allows for higher voltage in smaller case size • Available in 100V, 250V, 450V, and 630V	• 0402 ~ 2220 / C0G, X6S, X7R, X7S, X7T • 100V ~ 630V / up to 15 µF
		High Voltage	• Advance design provides improved withstanding voltage • Available rating up to 3000V	• 1808 ~ 1812 / C0G, X7R, X7S • 1000V ~ 3000V / up to 10 nF
		High Temperature	• Stable temperature characteristics up to 150ºC • Highly precise temperature performance (7.5%) up to 125º C	• 0402 ~ 1210 / X8R • 16V ~ 100V / up to 10 µF
		High Q	• Design with higher Q factor than standard capacitors • Excellent attenuation and high self resonance frequency (SRF)	• 0201 / C0G • 25V / up to 20 pF
		Flip Type	• Flipped geometry provides lower inductance than standard capacitor • Special design allows for adequate high frequency current to IC	• 0204 ~ 0612 / X5R, X6S, X7R, X7S • 4V ~ 50V / up to 10 µF
		Open Mode	• Unique design allows for increase resistance to mechanical bending • Improved performance in vibration and electrical stresses	• 0805 ~ 2220 / X7R, X8R • 16V ~ 630V / up to 22 µF
		Soft Termination	• Improved bending resistance and temperature cycle performance • Termination technology available for most case sizes including arrays	• 0805 ~ 3025 / X7R, X7S, X7T • 16V ~ 630V / up to 100 µF
		Conductive Epoxy	• AgPdCu termination for conductive glue mounting • Improved mechanical/thermal strength when used with conductive glue	• 0402 ~ 1210 / C0G, X7R, X8R • 25V ~ 100V / up to 10 µF
CER		Controlled ESR	• Unique design allows for specified “controlled” ESR • Same no-hassle mounting method as standard 2-terminal components • ESR is controlled without affecting the ESL	• 0603 ~ 0805 / X5R • 4V ~ 10V / up to 10 µF
CEU		Serial Design	• 2 series-connected capacitors in one body • Improved bending resistance and temperature cycle performance • Ultra high reliability design for automotive battery line applications	• 0603 ~ 0805 / X7R • 50V / up to 100 nF
CGA		Automotive Applications	• Qualified to CDF AEC Q-200 automotive testing standard • Manufactured using matured process for guaranteed performance • Available in C0G, X7R and X8R temperature characteristics	• 0402 ~ 2220 / C0G, X5R, X7R, X7S, X7T, X8R • 6.3V ~ 630V / up to 47 µF
CGJ		High Reliability Applications	• Extensive testing to ensure higher reliability and longer life • Reliability tests based on MIL-STD requirements • Guaranteed TC Bias and Hot IR performance	• 0402 ~ 1206 / C0G, X7R • 6.3V ~ 50V / up to 10 µF
CKC		2-in-1 Array 4-in-1 Array	• Allows for reduction of PCB space and mounting time • Unique electrode design reduces crosstalk • Also available in soft termination for higher reliability performance	• CKCN27 ~ CKCA43 / C0G, X5R, X7R • 6.3V ~ 50V / up to 2.2 µF
CKD		Feed Through	• Optimized for noise bypass with signal and power source circuits • Can be used for meeting EMC requirements • Ideal for use at higher frequencies due to low parasitic inductance	• 0402 ~ 1206 / up to 125ºC temperature range • 6.3V ~ 50V / up to 22 µF
CKG		Mega Cap	• Advance design for twice the capacitance on single footprint • Improved vibration and thermal/mechanical stress performance • Lower ESR and ESL than ALU and TA capacitor	• CKGxxK ~ CKGxxN / X5R, X7R, X7S, X7T • 16V ~ 630V / up to 100 µF
CLL		Ultra Low Inductance	• Unique internal structure allows cancelation of magnetic fields to reduce equivalent series inductance • Eight sided terminal electrode design in one capacitor	• 0603 ~ 0805 / X7R, X7S • 4V ~ 10V / up to 4.7 µF

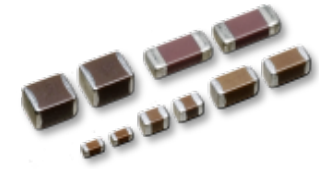
CGJ series I High Reliability Series- Series Concept -

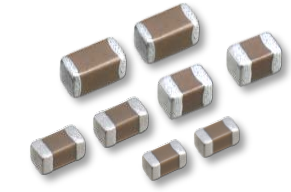
Concept Image



	Qualification	Applications
CGJ series	AEC-Q200 select MIL-STD	• Smart Meter/Smart Grid • Solar Micro Inverters • Industrial /Military/Medical Electronics • Applications requiring Hi-Rel components
CGA series	AEC-Q200	• Engine Control Units • Sensor Modules • Automotive Battery Line • Anti-lock Break System • Automotive Infotainment System • EV/HEV/PHEV Battery Control
C series - General Applications -	TDK Standard Specifications	• General Consumer Electronics • Mobile Communication Equipment • Power Supply Circuit • Office Automation Equipment • Servers/PCs/Laptops/Tablets • Test & Measurement Equipment

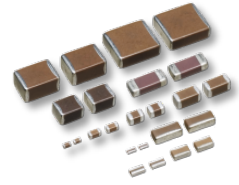
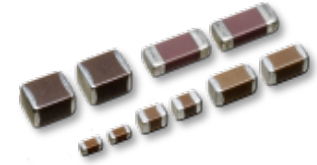
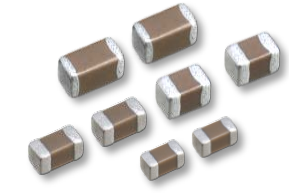






	Commercial Grade C Series	Automotive Grade CGA Series	High Reliability Grade CGJ Series
Insulation Resistance	● 100% of each lot	● 100% of each lot	● 100% of each lot
Voltage Proof Test (DWV)	● 100% of each lot	● 100% of each lot	● 100% of each lot
Capacitance / Dissipation Factor (DF, Q)	● 100% of each lot	● 100% of each lot	● 100% of each lot
External Appearance / Visual Inspection	⊙ Sampled each lot	● 100%	● 100%
Physical Dimension	⊙ Sampled each lot	⊙ Sampled each lot	⊙ Sampled each lot
Solderability	⊙ Sampled each lot	⊙ Sampled each lot	⊙ Sampled each lot
Temperature Characteristics	○ Qualification Only	○ Qualification Only	⊙ Sampled each lot (n=10)
Deflection (Bending; Board Flex)	○ Qualification Only	○ Qualification Only	⊙ Sampled each lot (n=10)
Operating Life	○ Qualification Only	○ Qualification (X•RV for 1,000 hrs)	○ Qualification (X•RV for 2,000 hrs)
Bias Humidity	-	○ Qualification (RV only)	○ Qualification (RV and LV)
Destructive Physical Analysis (DPA)	-	○ Qualification Only	⊙ Sampled each lot (n=10)
Highly Accelerated Life Test (HALT)	-	-	⊙ Sampled each lot (n=60)
DC Bias / ESR / Breakdown Voltage	-	-	○ Qualification Only (n=50)
Salt Water Immersion / Tin Whisker	-	-	○ Qualification Only

*Please refer to TDK Specifications (www.tdk.com) and Certificate of Compliance for more detail on test method and acceptance criteria as well as sampled lot size.

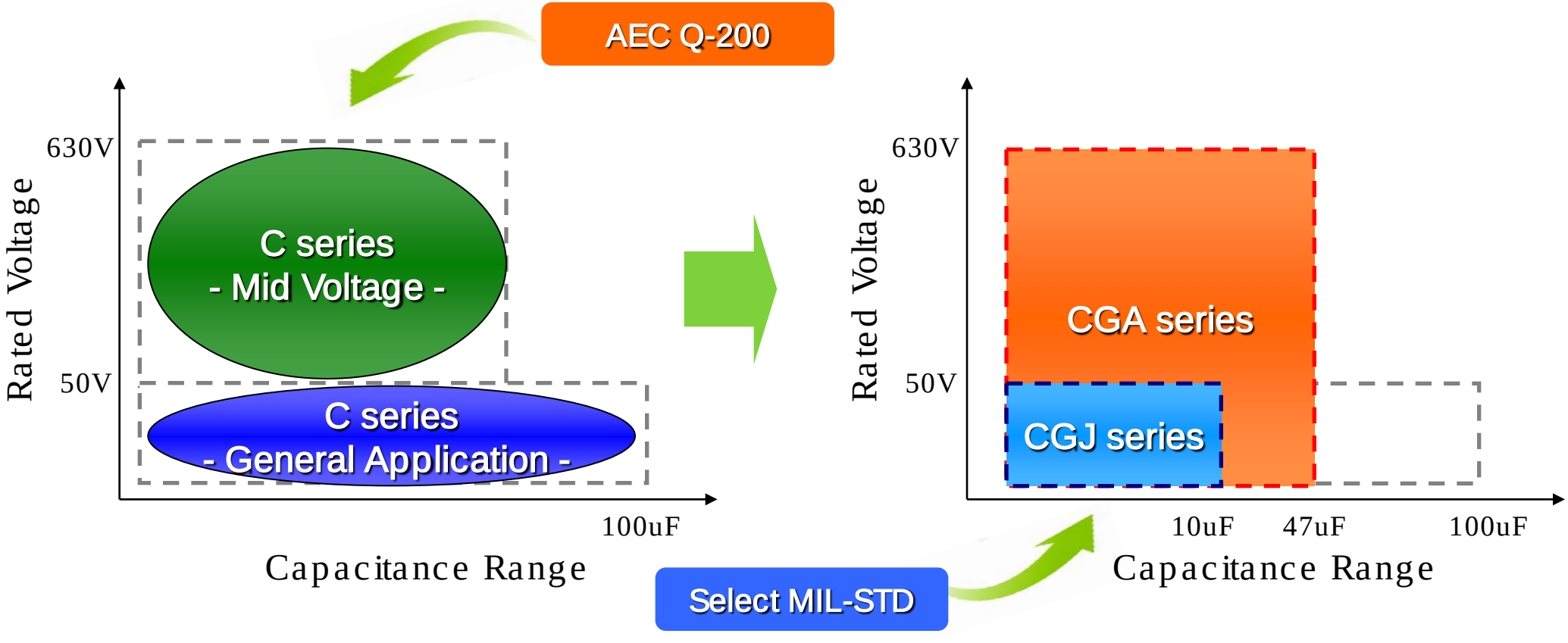
		 Commercial Grade C Series	 Automotive Grade CGA Series	 High Reliability Grade CGJ Series
Data Requirements	Certificate of Compliance	-	-	Each Lot (Web)
	Electrical Test Report	-	-	Each Lot (Web)
	Qualification	-	PPAP	PPAP+
	Life Estimation	-	FIT & MTTF (PPAP)	FIT & MTTF (web)
	Re-validation	-	-	Annually
Manufacturing Requirements	TQS-9000 (internal qualification)	●	●	●
	ISO-9001Certification	●	●	●
	ISO-14001 Certification	●	●	●
	TS-16949 Certification	-	●	●
	Product Maturity	0 Months	6 Months or greater	12 Months or greater
Customer Support	3 / 3 /7 Failure Analysis Policy	●	●	●
	Failure Analysis Priority	FIFO	FIFO	RUSH
	Typical Price Premium *	1x	1.5x	2x

*Typical premium are for standard values.

CGJ series l High Reliability Series - Cap Range -

Cap Range:

- Reliability tests based on MIL-STD requirements
- Qualified to AEC-Q200
- Manufactured using matured process for guaranteed performance
- 0402 ~ 1206 / C0G, X7R
- 6.3V ~ 50V / up to 10uF



CGJ series I High Reliability Series- Features -

Features:

CGJ series

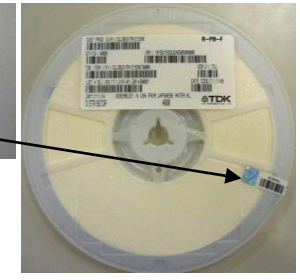
- AEC Q-200
- Select MIL-STD



Anti-Counterfeit

SecuReel™ Packaging





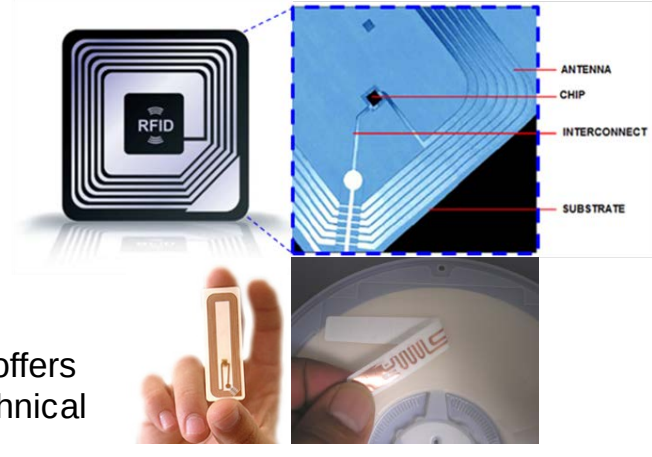
The seal to assist in the identification of authentic TDK CGJ products. The condition of the seal also indicates if the product has been tampered with in the supply chain

Certificate of Compliance



Documentation is provided for each CGJ lot online:
http://www.tdk.com/product-validation.php

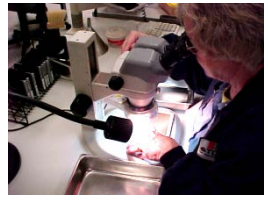
RFID Label



RFID Label to allow integration with inventory management programs

Premium Level Service

Customer priority backed by local US factory. TDK offers the highest level of customer service for claims, technical data and inventory needs for CGJ Series products.



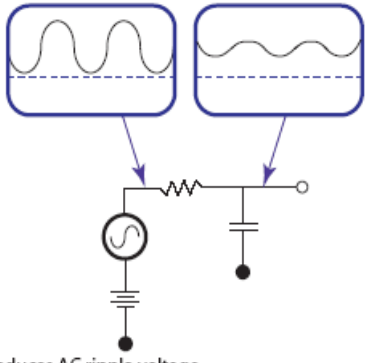


Increased Evaluation

To promote extended life

CGJ series l High Reliability Series- Applications -

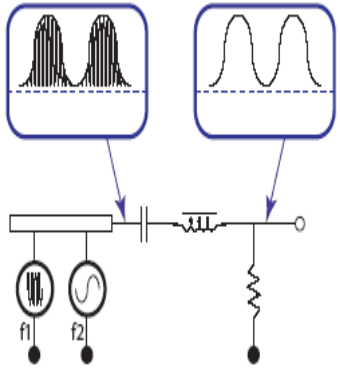
Decoupling



Reduces AC ripple voltage.

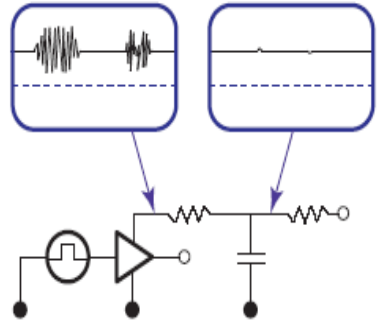


Filtering



Removes unwanted frequency signals. In this example, f1 is removed.

Bypassing/Smoothing



"Absorbs" DC voltage spikes.



CGJ series I High Reliability Series- Design Tools/Resources -

TVCL – TDK Virtual Component Library

http://www.tdk.com/tvcl.php

CCV – Components Characteristics Viewer

http://www.tdk.co.jp/ccv/index.asp

SEAT – Selection Assistant of TDK Components

http://www.tdk.com/seat.php

MLCC Sample Kits

http://www.mouser.com/Search/Refine.aspx?Ne=254016&N=1323038+4232846+4294963871

CGJ series I High Reliability Series- Part Number Description -

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CGJ5	L	2	X7R	1A	106	K

(1) Series/Dimension Code

Series	Code	EIA	L (mm)	W (mm)	T (mm) Nominal
CGJ – Extended Life	2	0402	1.00	0.50	0.50
	3	0603	1.60	0.80	0.80
	4	0805	2.00	1.20	1.25
	5	1206	3.20 x 1.60		1.60

(2) Nominal Thickness Code T(mm)

Symbol	Thickness	Symbol	Thickness
B	0.50 mm	H	1.15 mm
C	0.60 mm	J	1.25 mm
E	0.80 mm	L	1.60 mm
F	0.85 mm		

(3) Voltage Condition for Life Test

Code	Condition	Code	Condition
1	1 x R.V.	3	1.5 x R.V.
2	2 x R.V.	4	1.2 x R.V.

(4) Temperature Characteristics

Temperature Characteristics	Temperature Range	Capacitance Change
C0G	-55 ~ 125ºC	0 30 ppm/ºC
X7R	-55 ~ 125ºC	15%

(5) Rated Voltage Code (Vdc)

Symbol	Rated Voltage (V_{DC})
0J	6.3
1A	10
1C	16
1E	25
1H	50

(6) Nominal Capacitance (pF)

Symbol	Cap Value (pF)	Cap Value (nF)	Cap Value (µF)
101	100 pF	0.1 nF	0.0001 µF
102	1,000pF	1 nF	0.001 µF
105	1,000,000 pF	1,000 nF	1 µF
106	10,000,000 pF	10,000 nF	10 µF

The capacitance is expressed in three digit codes and in units of pico Farads (pF). The first and second digits identify the first and second significant figures of the capacitance. The third digit identifies the multiplier. R designates a decimal point.

(7) Capacitance Tolerance Code

Symbol	Capacitance Tolerance
J	5%
K	10%

CGJ series l High Reliability Series- Summary -

Summary:



❖ TDK's CGJ series is the highest reliability multilayer ceramic capacitor offered by TDK through increased evaluation in the manufacturing process

❖ The CGJ series offers additional benefits such as: Tamper Proof Seal, RFID Label, Certificate of Compliance, and Premium Level Service

❖ TDK has design tools to help support optimal MLCC component selection



Why TDK:

- ❖ World Class Supplier
- ❖ ppb Quality
- ❖ Local Factory Support
- ❖ Zero restrictive or banned materials