KC-LINK™
DC LINK CAPACITORS

Electronic Components
KEMET
CHARGED.®

Frequently Asked Questions

Q: What does KC-LINK stand for?
A: KC-LINK stands for KEMET CERAMIC DC-LINK Capacitor.

Q: Does KC-LINK replace Film Cap DC-LINK Capacitors
A: KC-LINK performs best as a DC-LINK capacitor at very high frequencies, as those seen in applications utilizing wide band-gap semi-conductors (high kHz to MHz). The higher the operating frequency, the lower the capacitance required to deliver power, which enables lower K MLCC such as KC-LINK to replace bulky high capacitance film capacitors, enhancing power density.

Q: Are KC-LINK capacitors available with flexible termination option?
A: For added robustness against flex cracks, case sizes 1812 and 2220 come with flexible termination option. See part number ordering code in datasheet.

Q: Why doesn't KC-LINK require a lead frame like TDK's CeraLink?
A: KC-LINK C0G dielectric technology exhibits high mechanical robustness compared to other dielectric technologies, allowing the capacitor to be mounted without the use of lead frames. The way KEMET measures this is MOR or modulus of rupture, which is almost twice as the leaded CeraLink capacitor.

Q: What are the biggest advantages of KC-LINK capacitor technology?
A: KC-LINK capacitors operate at higher voltages, higher temperatures, and higher frequencies. Capacitance is ultra-stable with respect to DC/AC Voltage and Temperature. Its operating temperature of 150°C enable these capacitors to be mounted close to fast switching semiconductors in high power density applications which require minimal cooling.

Q: What dielectric material is used for KC-LINK?
A: KC-LINK are manufactured using a Class 1 calcium zirconate dielectric material. This Class 1 dielectric material results in extremely stable operation with no capacitance loss due to switching frequency, applied voltage, or ambient temperature. The parasitics of the device are also minimized resulting in supremely low ESR and ESL. Such low losses result in the ability to operate at high ripple current levels.

Q: What is the KC-LINK country of origin?
A: The country of origin for KC-LINK is Mexico.

Q: Does KC-LINK contain any Pb (lead)? Is it RoHS?
A: No, KC-LINK does not contain any Pb (lead) and is RoHS without exemption.
Q: What is the highest capacitance and voltage available?
A: The highest KC-LINK voltage is 1,700 V and the highest capacitance is 220 nF. Please see the datasheet for more information.

Q: How much capacitance is available with KC-LINK?
A: Being a Class 1 material, the per-chip capacitance is lower than an equivalently sized Class 2 capacitor. For example, the maximum capacitance for a 500 V 3640 KC-LINK capacitor is 220 nF. The applications best suited for KC-LINK are generally of high switching frequencies, which requires a lower quantity of capacitance. Should more capacitance be needed, KEMET's KONNEKT technology enables multiple KC-LINK capacitors to be bonded together into a single monolithic structure for higher density packaging.

Q: Can you hand solder these capacitors?
A: KEMET does not recommend hand soldering ceramic capacitors larger than EIA 1210 case size due to the possibility of thermal shock cracks. However, we do understand that engineers will use hand soldering in the lab for evaluation. If hand soldering cannot be avoided, KEMET recommends preheating the assembly and capacitors to a temperature that limits the delta T to less than 50°C. In addition, it is recommended that the soldering iron does not come into contact with the termination during this process.

Q: Are KEMET's KC-LINK capacitors acceptable for use in Automotive applications?
A: Yes, all part numbers in KEMET's KC-LINK offering are qualified to AEC-Q200 and are acceptable to use in Automotive applications.

Q: What is the dV/dT capability of the KC-LINK capacitor series?
A: KC-LINK utilizes a low-loss calcium zirconate dielectric material which is very robust against high dV/dT pulses. Therefore, KC-LINK is very robust under high dV/dT conditions. For example, snubber applications.

Q: What factors effect KC-LINK's ripple current capability?

A: There are a couple of factors that affect KC-LINK's ripple current capability

- When current goes through any MLCC, a corresponding voltage will appear across its terminals. The magnitude of the AC voltage can be calculated by I_{rms}*Z_c where Z_c is the impedance of the MLCC.

  $$\mathbf{Z_c = 1/(2*\pi*Frequency*Capacitance)}$$

  As we can see from the impedance equation, the lower the frequency or capacitance, the higher the resulting AC voltage given the same AC current. It's important to keep the AC RMS voltage within the guidelines of $\mathbf{V_{rms} = V_{rated}/(2\sqrt{2})}$ where V_{rated} is the rated DC voltage of the capacitor.
- As current increases through any MLCC, there will be self-heating due to i2R losses and the thermal resistance (R_{th}) of the capacitor. Take for example a 100 nF capacitor with an ESR of 10 mOhms operating at 50 V_{rms} at 200 kHz. This will generate a current of 6.3 A_{rms} and dissipated power of 394 mW. With an R_{th} of 30°C/W, there will be a self-heating of 12°C. Self-heating of the capacitor should be limited to less than 40°C.

Q: What is the typical equivalent series inductance (ESL) of KC-LINK?

A: For the 1812, 2220, and 3640 case sizes, the typical ESD is less than 1 nH.

Q: Are KC-LINK capacitors available in KEMET's KSIM tool for simulation?

A: All part numbers for KC-LINK are available in KEMET's KSIM tool for simulation. http://ksim.kemet.com/

Q: Some capacitors fail open or have self-healing. Does KC-LINK fail open or have any self-healing capabilities?

A: Some KC-LINK capacitors utilize a serial electrode (floating electrode) design which is considered fail open. However, some part types do have standard electrode patters and are not fail open. Please contact KEMET to see if your specific part number is fail open.

Q: Where can I get more information?

A: There is an internal website for KEMET employees to reference at: https://kemet.sharepoint.com/teams/KCLINK

Or an external site for anyone to access at: http://www.kemet.com/KC-LINK

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