

# CER SERIES | Controlled ESR

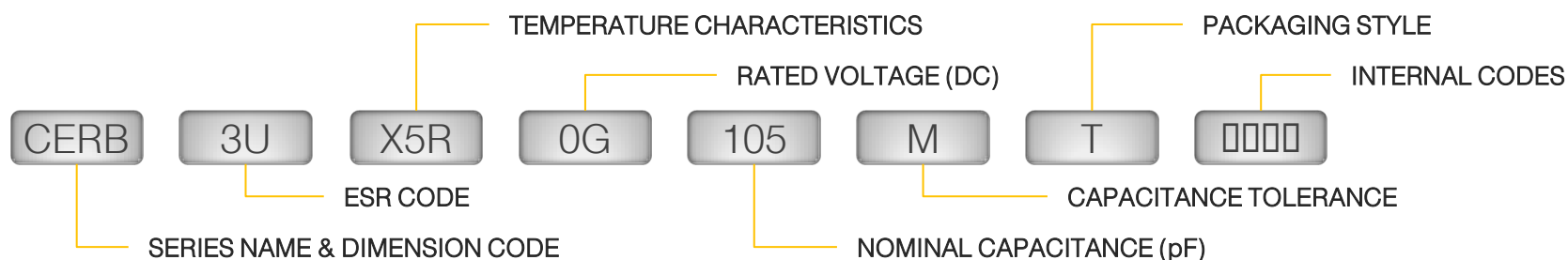


TDK's CER multilayer ceramic chip capacitor series offers the unique additional function of controlling the ESR (equivalent series resistance) value as desired without affecting ESL (equivalent series inductance). This function enables control of voltage change, which can occur between the power source and the CPU, by controlling the impedance of the capacitors located around the CPU.

The relatively low ESR value of standard MLCCs can be too low in cases where the MLCC has replaced a Tantalum capacitors. Designer can avoid the additional resistor typically used to solve this problem by utilizing CER Series capacitors. This can contribute to cost saving due to less cost during production. The mounting method of the CER Series is the same as products with two terminals, which makes replacement of existing products with CER chip capacitor very easy.

Case Code	L (mm)	W (mm)	T (mm)	B (mm)	P (mm)
CERB	1.60	0.80	0.80	0.10	0.20
CERD	2.00	1.25	0.85	0.30	0.20

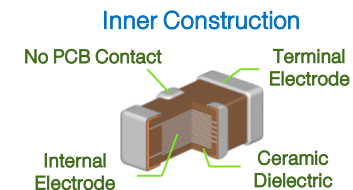
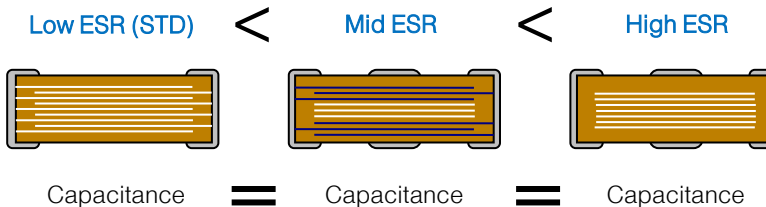
## Part Number Description



## Features:

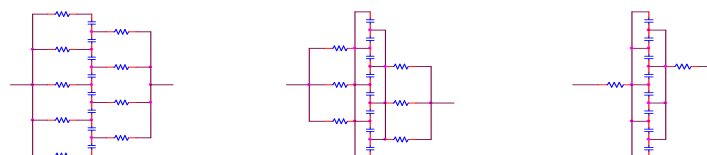
- ❖ Design allows for ESR to be controlled using unique internal structure without affecting ESL
- ❖ Control of voltage variations eliminates effects on the stability of current signals and impact on other circuits
- ❖ Same mounting method as 2-terminal components
- ❖ Flatness of impedance characteristics is enhanced through additional resistance components, reducing the number of components by 50%

### MLCC Design ESR Comparison

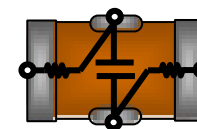


## Applications:

- ❖ DC to DC converter input/output smoothing
- ❖ Voltage regulator
- ❖ IC power supply circuit decoupling



### Equivalent Circuit



# CER SERIES | Controlled ESR / X5R

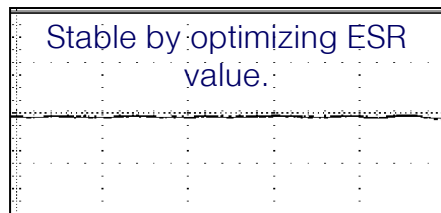
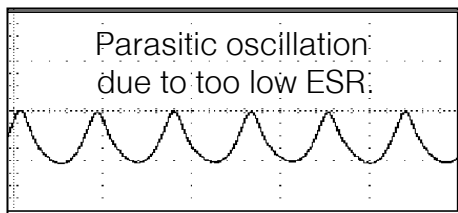
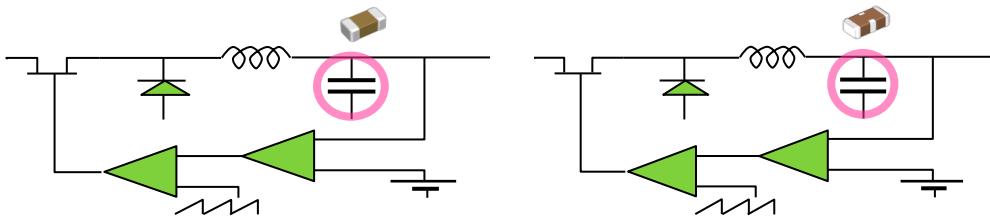
Capacitance (pF)	Cap Code	CERB 0603/C1608			CERD 0805/C2012				
		0G (4V)			0G (4V)				
		2C (200mΩ)	2M (650mΩ)	3U (1.2Ω)	1C (20mΩ)	1J (50mΩ)	2A (100mΩ)	2C (200mΩ)	2J (500mΩ)
1,000,000	105	■	■	■	■	■	■	■	■
10,000,000	106	■	■	■	■	■	■	■	■
22,000,000	226								

■ X5R

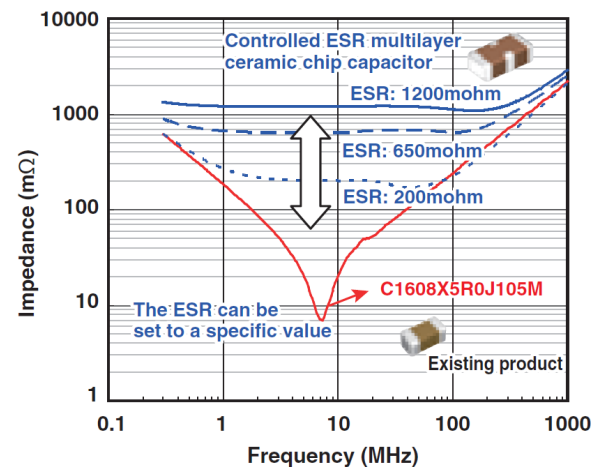
## Additional Product Application Information

➤ Excessively low ESR with traditional MLCC may negatively affect decoupling at the CPU level which is powered by high current and low voltage. Several capacitors with different self-resonant frequency are used at power circuit of CPU to make impedance lower at wide band and to control voltage fluctuation toward high frequency current. However, excessively lower ESR of MLCC may cause sharp impedance peak by parallel resonance between MLCCs, high frequency current which corresponds to the frequency will change PS voltage and cause malfunction. CPU decoupling MLCC with appropriate ESR will obtain flat impedance and control CPU voltage fluctuation.

➤ CERB (0603) series capacitor has maximum resistance of 1200mΩ and the CERD (0805) series capacitor has maximum resistance of 500mΩ, ideal for using as decoupling capacitors.



➤ Optimal ESR Value selection can prevent parasitic oscillation and secure phase margin



### Examples of Decoupling Capacitors

