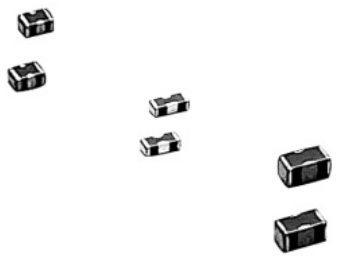
Ceramic Capacitors

Low ESL Feed Through SMD

CKD Series



FEATURES

- These small low-cost filters are used for meeting EMC requirements.
- Can be used up to even higher frequencies due to low parasitic inductance.
- Optimized for use as a noise bypass capacitors for signal and power source circuits.

APPLICATIONS

For digital and analog signal line noise bypassing signal line

PRODUCT IDENTIFICATION

CKD	510	X5R	1E	220	S	□
(1)	(2)	(3)	(4)	(5)	(6)	(7)

(1) Series name

(2) Dimensions

110	3.2×1.25×0.85mm
310	3.2×1.6×1.6mm
510	2.0×1.25×0.85mm

(3) Capacitance temperature characteristics

Temperature characteristics	Capacitance change	Temperature range
X5R	±15%	–55 to +85°C

(4) Rated voltage Edc

1A	10V
1C	16V
1E	25V
1H	50V

(5) Nominal capacitance

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.

220	22pF
101	100pF
222	2200pF
473	47000pF

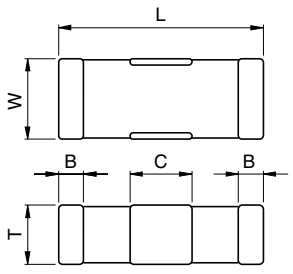
(6) Capacitance tolerance

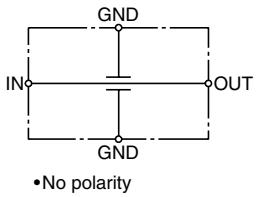
S	+50, –20%

(7) Packaging style

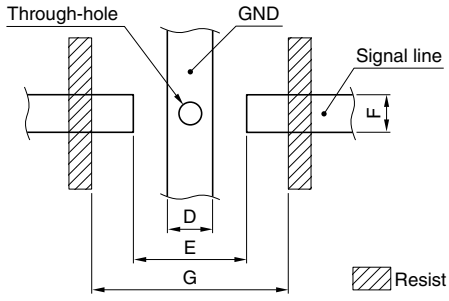
T	Taping (reel)
B	Bulk

SHAPES AND DIMENSIONS/CIRCUIT DIAGRAM





RECOMMENDED PC BOARD PATTERN (REFLOW)



Dimensions in mm

Application	Type	L	W	T	B	C	D	E	F	G	Weight(mg)
For Signal and Power Line	CKD510	2±0.2	1.25±0.2	0.85±0.15	0.2min.	0.5±0.2	0.6	1.5	1	2.6	11
For Power Line	CKD310	3.2±0.2	1.6±0.2	1.8max.	0.2min.	0.95±0.3	1.4	2.5	1	4.5	33
For Signal Line	CKD110	3.2±0.2	1.25±0.2	0.85±0.15	0.2min.	0.95±0.3	1.4	2.5	1	4.5	17

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ELECTRICAL CHARACTERISTICS

FOR SIGNAL LINE

CKD510 TYPE

RATED VOLTAGE Edc: 50V

Capacitance (pF)	Tolerance (%)	Rated current Idc(mA)max.	Insulation resistance (MΩ)min.	DC resistance* (Ω)max.	Part No.
22	+50, –20	400	1000	0.5	CKD510X5R1H220S
47	+50, –20	400	1000	0.5	CKD510X5R1H470S
100	+50, –20	400	1000	0.5	CKD510X5R1H101S
220	+50, –20	400	1000	0.5	CKD510X5R1H221S
470	+50, –20	400	1000	0.5	CKD510X5R1H471S
1000	+50, –20	400	1000	0.5	CKD510X5R1H102S
2200	+50, –20	400	1000	0.5	CKD510X5R1H222S
4700	+50, –20	400	1000	0.5	CKD510X5R1H472S

* DC resistance value is between feed-through terminals.

CKD110 TYPE

RATED VOLTAGE Edc: 25V

Capacitance (pF)	Tolerance (%)	Rated current Idc(mA)max.	Insulation resistance (MΩ)min.	DC resistance* (Ω)max.	Part No.
22	+50, –20	200	1000	0.6	CKD110X5R1E220S
47	+50, –20	200	1000	0.6	CKD110X5R1E470S
100	+50, –20	200	1000	0.6	CKD110X5R1E101S
220	+50, –20	200	1000	0.6	CKD110X5R1E221S
470	+50, –20	200	1000	0.6	CKD110X5R1E471S
1000	+50, –20	200	1000	0.6	CKD110X5R1E102S
2200	+50, –20	200	1000	0.6	CKD110X5R1E222S
4700	+50, –20	200	1000	0.6	CKD110X5R1E472S
10000	+50, –20	500	1000	0.3	CKD110X5R1E103S
22000	+50, –20	500	1000	0.3	CKD110X5R1E223S
47000	+50, –20	500	1000	0.3	CKD110X5R1E473S
100000	+50, –20	500	1000	0.3	CKD110X5R1E104S

* DC resistance value is between feed-through terminals.

FOR POWER LINE

CKD510 TYPE

RATED VOLTAGE Edc: 25V

Capacitance (pF)	Tolerance (%)	Rated current Idc(mA)max.	Insulation resistance (MΩ)min.	DC resistance* (Ω)max.	Part No.
10000	+50, –20	1000	1000	0.08	CKD510X5R1E103S
22000	+50, –20	1000	1000	0.08	CKD510X5R1E223S
47000	+50, –20	1000	1000	0.08	CKD510X5R1E473S
100000	+50, –20	1000	1000	0.08	CKD510X5R1E104S

* DC resistance value is between feed-through terminals.

RATED VOLTAGE Edc: 10V

Capacitance (pF)	Tolerance (%)	Rated current Idc(mA)max.	Insulation resistance (MΩ)min.	DC resistance* (Ω)max.	Part No.
1000000[1μF]	+50, –20	1000	1000	0.08	CKD510X5R1A105S

* DC resistance value is between feed-through terminals.

CKD310 TYPE

RATED VOLTAGE Edc: 16V

Capacitance (pF)	Tolerance (%)	Rated current Idc(mA)max.	Insulation resistance (MΩ)min.	DC resistance* (Ω)max.	Part No.
100000	+50, –20	2000	100	0.04	CKD310X5R1C104S
220000	+50, –20	2000	100	0.04	CKD310X5R1C224S
470000	+50, –20	2000	100	0.04	CKD310X5R1C474S
1000000[1μF]	+50, –20	2000	100	0.04	CKD310X5R1C105S

* DC resistance value is between feed-through terminals.

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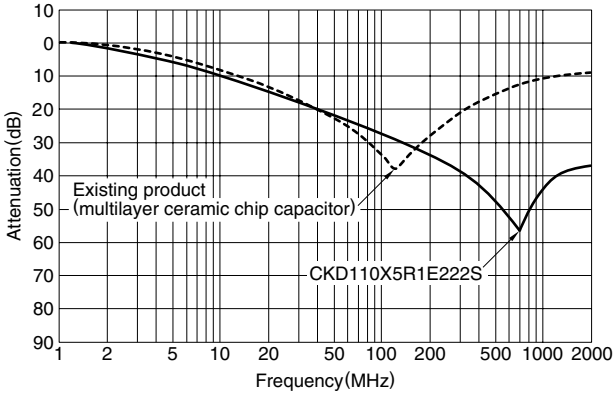
TYPICAL ELECTRICAL CHARACTERISTICS

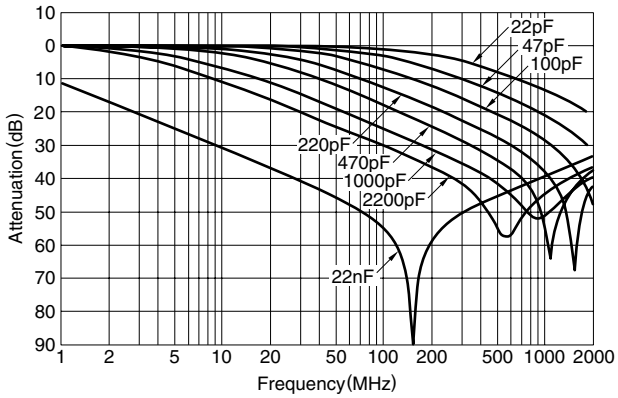
ATTENUATION vs. FREQUENCY CHARACTERISTICS

COMPARISON WITH EXISTING PRODUCTS

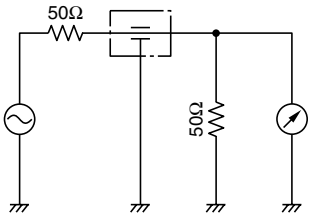
Excellent noise bypass effect is displayed in higher frequency range compared with ordinary chip capacitors.



CKD110 TYPE

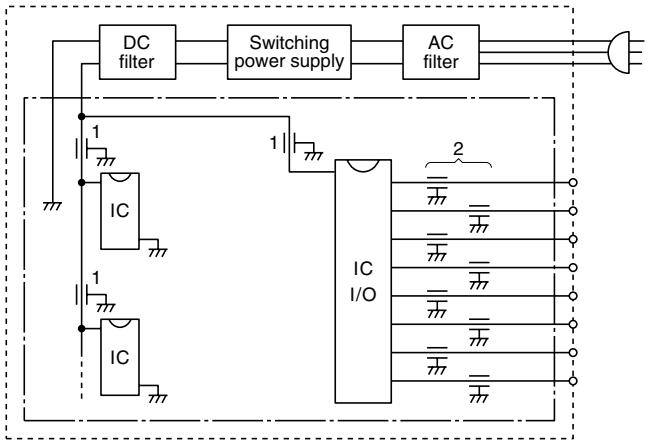


MEASURING CIRCUIT



EXAMPLES OF NOISE COUNTERMEASURE

Purpose	1. Noise countermeasure on IC power supply lines: Eliminates noise occurring on supply lines to assure a stable voltage supply for proper IC operation.	2. Radiation noise countermeasure on signals lines: Attenuates superfluous high-frequency content of signals to prevent noise radiation.
Type	CKD310 (High capacity type product)	CKD110, CKD510



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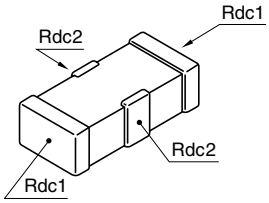
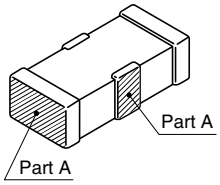
RELIABILITY AND TEST CONDITIONS

Item	Reliability	Test methods and test conditions
Exterior	No remarkable abnormal exterior appearance.	Micrometer (×3)
Insulation resistance	Minimum insulation resistance: 1000MΩ or 100MΩ • μF, whichever is smaller.	Measurement voltage: Rated voltage Voltage applied time: 60s
DC resistance (Rdc1, 2)	Less than 10000pF: 600mΩ max. 10000pF min.: 300mΩ max.	Measurement current: 100mA max. 
Withstand voltage	No dielectric nor mechanical damages.	Measurement voltage: 250% of rated DC voltage Voltage applied time: 1 to 5s Charge and discharge current: 50mA max.
Capacitance	Within specified tolerance	Measured frequency: 1kHz±10% Measured voltage Erms: 1± 0.2V
Dielectric dissipation factor (tanδ)	Rated voltage 25V min. : 0.025 max. Rated voltage 16V max.: 0.05 max.	Measured frequency: 1kHz±10% Measured voltage Erms: 1± 0.2V
Solderability	Cover more than 75% of the terminal electrode part with new solder. 25% of the part may have any pin hole or rough spot but they must not be concentrated in one location. Ceramic original surface indicated as A (hatched) must not be exposed due to any peeling or dissolving of the electrode part. 	Solder: H63A (JIS Z 3282) Flux: Isopropyl alcohol solution (JIS K 8839) of Rosin (JIS K 5902) (25wt %) Solder temperature: 235±5°C Dipping: The terminal electrode must be immersed completely in solder. Dip time: 2±0.5s
Temperature cycle*	Exterior: No mechanical demages Capacitance: Variance from previous test: ±7.5% max. tanδ: Specified initial value must be satisfied. Insulation resistance: Minimum insulation resistance: 500MΩ or 50MΩ•μF, whichever is smaller. DC resistance (Rdc1, 2): 1Ω max.	Leave the capacitor in each temperature of the following 1 to 4 steps for the specified time in order. Repeat this operation 5 times consecutively. Measure after leaving the sample at room temperature and humidity for 48±4h.
Humidity resistance* (Normal state)	Exterior: No mechanical damage. Capcitance: Variance from previous test: ±10% max. tanδ: Max. 200% of specified initial value Insulation resistance: Minimum insulation resistance: 500MΩ or 10MΩ•μF, whichever is smaller. DC resistance (Rdc1, 2): 1Ω max.	Relative humidity: 90 to 95(%)RH Temperature: 40±2°C Time: 500+24, –0h Measure after leaving the sample at room temperature and humidity for 48±4h.
High temperature resistance	Exterior: No mechanical damage Capacitance: Variance from previous test: ±12.5% max. tanδ: Max. 200% of specified initial value Insulation resistance: Minimum insulation resistance: 500MΩ or 50MΩ•μF, whichever is smaller. DC resistance (Rdc1, 2): 1Ω max.	Temperature: 85±2°C Voltage: 200% of rated DC voltage Current: Rated current Time: 1000+48, –0h Charge and discharge current: 50mA max. Measure after leaving the sample at room temperature and humidity of 48±4h. Voltage processing: Capacitor shall be tested at a specified temperature under a specified voltage for 1h and the initial value shall be measured after setting the sample at room temperature for 48±4h.

Step	Temperature (°C)	Time (min)
1	–25±3	30±3
2	Room temperature	2 to 5
3	+85±2	30±3
4	Room temperature	2 to 5

* Capacitors shall be tested at 150+0, –10°C for 1 hour and the initial value shall be measured after setting the sample at room temperature and humidity for 48±4 hours.

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