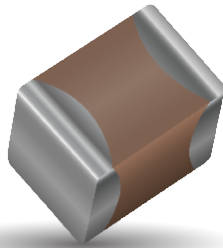


ESD-SAFE™ Automotive MLCC, KAE series

ESD Withstanding Automotive Ceramic Capacitor



GENERAL DESCRIPTION

The ESD-Safe™ series is an enhanced MLC capacitor developed and designed specifically for general ESD protection. (ESD = Electro Static Discharge).

ESD-Safe™ capacitors are utilized for ESD protection of I/O gates. ESD capacitors are used on nearly every pin of an automotive module. Their use at that point averages the voltage that the wiring harness can be charged to and the module voltage.

The small footprint makes them ideal for high density electronic devices.

Capacitance selection is a trade off. Large capacitance values provide better ESD protection however a larger could corrupt the data stream.

ESD-Safe™ Capacitors provide (beside ESD protection) RF filtering function.

GENERAL CHARACTERISTICS

Operating Temperature: -55°C to 125°C

Capacitance Variation: ±15% (X7R)

FEATURES

- AEC Q200 Qualified
- ESD Qualified per HBM of AEC Q200-002
- ISO 10605 (uses both 330pf/2kohm and 150pf/2kohm networks)*
- EN61000-4 -2 (uses 150pf/330 Ohm network)*

*Contact factory for ESD performance

APPLICATIONS

- General ESD protection of I/O gates

HOW TO ORDER

KAE	15	A	R7	1H	103	K	T	18	
Series	Size	Thickness	Dielectric	Voltage	Capacitance Code Code (in pF)	Capacitance Tolerance	Packaging	ESD Rating	Option
Automotive ESD-SAFE®	15 = 0603 21 = 0805 31 = 1206	See Cap Chart	X7R= R7	1E = 25V 1H = 50V 2A = 100V	2 Significant Digits +Number of zeros eg. 10µF = 106 10nF = 103 47pF = 470	J = ±5% K = ±10% M = ±20%	See Table Below	18=18kV 20=20kV 22=22kV 24=24kV 26=26kV 28=28kV 30=30kV	1A=FLEXITERM®

PACKAGING CODES

Code	EIA (inch)	IEC(mm)	7" Paper	7" Embossed	13" Paper	13" Embossed
15	0603	1608	T		M	
21	0805	2012		U		L
31	1206	3216		U		L

ESD-SAFE™ X7R RANGE

SIZE		0603				0805						1206					
Soldering		Reflow/Wave				Reflow/Wave						Reflow/Wave					
(L) Length	mm	1.6 ± 0.15				2.01 ± 0.2						3.2 ± 0.2					
	(in.)	(0.063 ± 0.006)				(0.079 ± 0.008)						(0.126 ± 0.008)					
(W) Width	mm	0.81 ± 0.15				1.25 ± 0.2						1.6 ± 0.2					
	(in.)	(0.032 ± 0.006)				(0.049 ± 0.008)						(0.063 ± 0.008)					
(t) Terminal	mm	0.35 ± 0.15				0.5 ± 0.25						0.5 ± 0.25					
	(in.)	(0.014 ± 0.006)				(0.02 ± 0.01)						(0.02 ± 0.01)					
WVDC		50V		100V		25V		50V		100V		25V		50V		100V	
472	4.7 (nF)	18kV	A	18kV	A	18kV	K	18kV	K	18kV	K	20kV	G *	20kV	G *	20kV	G *
682	6.8	18kV	A	18kV	A	18kV	K	18kV	K	18kV	K	20kV	G *	20kV	G *	20kV	G *
103	10	18kV	A	18kV	A	18kV	K	18kV	K	18kV	K	20kV	G *	20kV	G *	20kV	G *
153	15	20kV	A			20kV	K	20kV	K	20kV	K	22kV	G *	22kV	G *	22kV	G *
223	22	20kV	A			22kV	K	22kV	K	22kV	K	24kV	G *	24kV	G *	24kV	G *
333	33	20kV	A			22kV	K	22kV	K	22kV	K	24kV	G *	24kV	G *	24kV	G *
473	47	22kV	A			22kV	K	22kV	K	22kV	K	26kV	G *	26kV	G *	26kV	G *
683	68	22kV	A			24kV	K	24kV	K	24kV	K	26kV	G *	26kV	G *	26kV	G *
104	100	24kV	A			24kV	K	24kV	K	24kV	K	26kV	G *	26kV	G *	26kV	G *
154	150					24kV	K	24kV	K	24kV	K	28kV	G	28kV	G	28kV	G
224	220					26kV	K	26kV	K	26kV	K	28kV	G	28kV	G	28kV	G
334	330					26kV	K	26kV	K	26kV	K	28kV	G	28kV	G	28kV	G
474	470					26kV	K	26kV	K	26kV	K	28kV	G	28kV	G	28kV	G
684	680					26kV	K					28kV	G	28kV	G	28kV	G
105	1 (µF)					26kV	K					28kV	G	28kV	G	28kV	G
155	1.5											30kV	G				
225	2.2											30kV	G				
WVDC		50V		100V		25V		50V		100V		25V		50V		100V	
SIZE		0603				0805						1206					

* Length = 3.20±0.3mm (0.126±0.012 in) for Flexitem only

Case Size	0603(KAE15)	0805(KAE21)	1206(KAE32)
Thickness Letter	A	K	G
Max Thickness (mm)	0.90	1.40	1.78
Carrier Tape	PAPER	EMB	EMB
Packaging Code 7" reel	T	U	U
Packaging Code 13" reel	M	L	L
	PAPER	EMBOSSED(EMB)	



LEAD-FREE
COMPATIBLE
COMPONENT

For RoHS compliant products,
please select correct termination style



The Important Information/Disclaimer is incorporated in the catalog where these specifications came from or available online at www.kyocera-avx.com/disclaimer/ by reference and should be reviewed in full before placing any order.

TDS-SMDMLCC-0047 | Rev 0

— ESD-SAFE™ MLC CHIPS —

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

KYOCERA AVX:

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[KAE15AR71H472KT18](#) [KAE15AR71H473KT22](#) [KAE15AR71H683KT22](#) [KAE15AR72A103KT18](#)
[KAE15AR72A103KT181A](#) [KAE15AR72A472KT18](#) [KAE15AR72A682KT18](#) [KAE21KR71E105KU26](#)
[KAE21KR71H103KU18](#) [KAE21KR71H104KU24](#) [KAE21KR71H473KU22](#) [KAE21KR71H474KU26](#)
[KAE21KR71H682KU18](#) [KAE21KR71H683KU24](#) [KAE21KR72A103KU18](#) [KAE21KR72A104KU24](#)
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[KAE15AR71H103KT181A](#) [KAE15AR71H682KT18](#) [KAE21KR71E472KU18](#) [KAE21KR71H223KU22](#)
[KAE21KR71H333KU22](#) [KAE21KR71H472KU18](#) [KAE21KR72A473KU221A](#)