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☐ Mechanics / Hilkka Saari fax +358-(0)204753144 tel +358-(0)204753193

KONE Corporation

REPORT FOR NEW MATERIAL

1. Department/Handled by/fax/tel	2. Date
HAT / ATO Nieminen / 3183 / 3215	14.1.1997

3. KONE material number	4. Document data
264682	EC0838

5. Description (max 40, for SAP R/3), includes both description and specification	
6. Description (max 30, for EDMS)	7. Specification (max 30, for EDMS)
Chip-ker. kond. / Chip cer capacitor	50V-22pF-10%-NP0-0805

8. Additional specification (max 32)	9. KONE recommendation class	
	1 = Standard	X
	2 = Special	
	3 = Not in new designs	

10. Material group	11. Basic material	12. Industry standard
B1421		

13. Base unit of measure	14. Net weight	15. Gross weight	16. Unit of weight
pc	n.5	n.5	mg

17. Manufacturer (max 30)	Type (max 30)	Testing status*	Note
Philips	2222 861 1/7 6 229	A	1/7=Packaging (1)
Rohm	MCH21 5 A 220 K P/K	A	C0G=NP0; P/K=Packaging (2)
Vitramon	VJ0805 A 220 K X A L/T M	A	L/T=Packaging (3)
Murata	GRM40 C0G 220 J 50 PT	A	C0G=NP0
*Testing status:	A = chosen by databook, not tested B = functional test C = type test D = life test		

18. More information	
Philips PA06 1996 page 31	(1) 1: reel:d=180mm, 4000pcs / 7: reel:d=330mm, 10000pcs
Rohm Capacitors 95-96 page 19	(2) P=plastic, d=180mm, 3000pcs / K=paper, d=180mm, 4000pcs
Vitramon monolithic cer cap 94 page 14	(3) L=reel d=180mm, 4000pcs / T=reel d=330mm, 12000pcs
Murata Chip products (K01E-21) 95 page 3	
AVX: CM 21 CG 220 K 50 A T/L	AVX Chip capacitors 95 (6T9503TYA2651E) page 11
Kemet: C 0805 C 220 K 5 G A C	Kemet SMD catalog F-3102 page31
TDK: C2012 C0G 1H 220 K T	TDK Product catalogue 95 (HEC-001C) page 1.1
Syfer: 0805 J 050 0220 K C T/R	Syfer cer cap 96 page 12, 33
Taiyoyuden: UMK 212 CG 220 K Q T	Taiyoyudenchip components 96; 5 page 7

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KONE Corporation

REPORT FOR NEW MATERIAL

1. Department/Handled by/fax/tel	2. Date
HAT / ATO Nieminen / 3183 / 3215	14.1.1997

3. KONE material number	4. Document data
264683	EC0838

5. Description (max 40, for SAP R/3), includes both description and specification	
6. Description (max 30, for EDMS) Chip-ker. kond. / Chip cer capacitor	7. Specification (max 30, for EDMS) 50V-33pF-10%-NP0-0805

8. Additional specification (max 32)	9. KONE recommendation class	
	1 = Standard	X
	2 = Special	
	3 = Not in new designs	

10. Material group	11. Basic material	12. Industry standard

13. Base unit of measure	14. Net weight	15. Gross weight	16. Unit of weight
pc	n.5	n.5	mg

17. Manufacturer (max 30)	Type (max 30)	Testing status*	Note
Philips	2222 861 1/7 6 339	A	1/7=Packaging (1)
Rohm	MCH21 5 A 330 K P/K	A	C0G=NP0; P/K=Packaging (2)
Vitramon	VJ0805 A 330 K X A L/T M	A	L/T=Packaging (3)
Murata	GRM40 C0G 330 J 50 PT	A	C0G=NP0

*Testing status: A = chosen by databook, not tested
B = functional test C = type test D = life test

18. More information	
Philips PA06 1996 page 31	(1) 1: reel:d=180mm, 4000pcs / 7: reel:d=330mm, 10000pcs
Rohm Capacitors 95-96 page 19	(2) P=plastic, d=180mm, 3000pcs / K=paper, d=180mm, 4000pcs
Vitramon monolithic cer cap 94 page 14	(3) L=reel d=180mm, 4000pcs / T=reel d=330mm, 12000pcs
Murata Chip products (K01E-21) 95 page 3	
AVX: CM 21 CG 330 K 50 A T/L	AVX Chip capacitors 95 (6T9503TYA2651E) page 12
Kemet: C 0805 C 330 K 5 G A C	Kemet SMD catalog F-3102 page31
TDK: C2012 C0G 1H 330 K T	TDK Product cataloque 95 (HEC-001C) page 1.1
Syfer: 0805 J 050 0330 K C T/R	Syfer cer cap 96 page 12, 33
Taiyoyuden: UMK 212 CG 330 K Q T	Taiyoyudenchip components 96; 5 page 7

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HAT / ATO Nieminen / 3183 / 3215	14.1.1997

3. KONE material number	4. Document data
264684	EC0838

5. Description (max 40, for SAP R/3), includes both description and specification	
6. Description (max 30, for EDMS) Chip-ker. kond. / Chip cer capacitor	7. Specification (max 30, for EDMS) 50V-47pF-10%-NP0-0805

8. Additional specification (max 32)	9. KONE recommendation class	
	1 = Standard	X
	2 = Special	
	3 = Not in new designs	

10. Material group	11. Basic material	12. Industry standard

13. Base unit of measure	14. Net weight	15. Gross weight	16. Unit of weight
pc	n.5	n.5	mg

17. Manufacturer (max 30)	Type (max 30)	Testing status*	Note
Philips	2222 861 1/7 6 479	A	1/7=Packaging (1)
Rohm	MCH21 5 A 470 K P/K	A	C0G=NP0; P/K=Packaging (2)
Vitramon	VJ0805 A 470 K X A L/T M	A	L/T=Packaging (3)
Murata	GRM40 C0G 470 J 50 PT	A	C0G=NP0

*Testing status: A = chosen by databook, not tested
B = functional test C = type test D = life test

18. More information

Philips PA06 1996 page 31	(1) 1: reel:d=180mm, 4000pcs / 7: reel:d=330mm, 10000pcs
Rohm Capacitors 95-96 page 19	(2) P=plastic, d=180mm, 3000pcs / K=paper, d=180mm, 4000pcs
Vitramon monolithic cer cap 94 page 14	(3) L=reel d=180mm, 4000pcs / T=reel d=330mm, 12000pcs
Murata Chip products (K01E-21) 95 page 3	
	19
AVX: CM 21 CG 470 K 50 A T/L	AVX Chip capacitors 95 (6T9503TYA2651E) page 7
Kemet: C 0805 C 470 K 5 G A C	Kemet SMD catalog F-3102 page31
TDK: C2012 C0G 1H 470 K T	TDK Product cataloque 95 (HEC-001C) page 1.1
Syfer: 0805 J 050 0470 K C T/R	Syfer cer cap 96 page 12, 33
Taiyoyuden: UMK 212 CG 470 K Q T	Taiyoyudenchip components 96; 5 page 7

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3. KONE material number	4. Document data
264685	EC0838

5. Description (max 40, for SAP R/3), includes both description and specification	
6. Description (max 30, for EDMS)	7. Specification (max 30, for EDMS)
Chip-ker. kond. / Chip cer capacitor	50V-100pF-10%-NP0-0805

8. Additional specification (max 32)	9. KONE recommendation class	
	1 = Standard	X
	2 = Special	
	3 = Not in new designs	

10. Material group	11. Basic material	12. Industry standard

13. Base unit of measure	14. Net weight	15. Gross weight	16. Unit of weight
pc	n.5	n.5	mg

17. Manufacturer (max 30)	Type (max 30)	Testing status*	Note
Philips	2222 861 1/7 6 101	A	1/7=Packaging (1)
Rohm	MCH21 5 A 101 K P/K	A	C0G=NP0; P/K=Packaging (2)
Vitramon	VJ0805 A 101 K X A L/T M	A	L/T=Packaging (3)
Murata	GRM40 C0G 101 J 50 PT	A	C0G=NP0

*Testing status: A = chosen by databook, not tested
B = functional test C = type test D = life test

18. More information

Philips PA06 1996 page 31	(1) 1: reel:d=180mm, 4000pcs / 7: reel:d=330mm, 10000pcs
Rohm Capacitors 95-96 page 19	(2) P=plastic, d=180mm, 3000pcs / K=paper, d=180mm, 4000pcs
Vitramon monolithic cer cap 94 page 14	(3) L=reel d=180mm, 4000pcs / T=reel d=330mm, 12000pcs
Murata Chip products (K01E-21) 95 page 3	
	12
AVX: CM 21 CG 101 K 50 A T/L	AVX Chip capacitors 95 (6T9503TYA2651E) page 7
Kemet: C 0805 C 101 K 5 G A C	Kemet SMD catalog F-3102 page31
TDK: C2012 C0G 1H 101 K T	TDK Product cataloque 95 (HEC-001C) page 1.1
Syfer: 0805 J 050 0101 K C T/R	Syfer cer cap 96 page 12, 33
Taiyoyuden: UMK 212 CG 101 K Q T	Taiyoyudenchip components 96; 5 page 7

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3. KONE material number	4. Document data
264686	EC0838

5. Description (max 40, for SAP R/3), includes both description and specification	
6. Description (max 30, for EDMS)	7. Specification (max 30, for EDMS)
Chip-ker. kond. / Chip cer capacitor	50V-220pF-10%-NP0-0805

8. Additional specification (max 32)	9. KONE recommendation class	
	1 = Standard	X
	2 = Special	
	3 = Not in new designs	

10. Material group	11. Basic material	12. Industry standard

13. Base unit of measure	14. Net weight	15. Gross weight	16. Unit of weight
pc	n.5	n.5	mg

17. Manufacturer (max 30)	Type (max 30)	Testing status*	Note
Philips	2222 861 1/7 6 221	A	1/7=Packaging (1)
Rohm	MCH21 5 A 221 K P/K	A	C0G=NP0; P/K=Packaging (2)
Vitramon	VJ0805 A 221 K X A L/T M	A	L/T=Packaging (3)
Murata	GRM40 C0G 221 J 50 PT	A	C0G=NP0

*Testing status: A = chosen by databook, not tested
B = functional test C = type test D = life test

18. More information	
Philips PA06 1996 page 31	(1) 1: reel:d=180mm, 4000pcs / 7: reel:d=330mm, 10000pcs
Rohm Capacitors 95-96 page 19	(2) P=plastic, d=180mm, 3000pcs / K=paper, d=180mm, 4000pcs
Vitramon monolithic cer cap 94 page 14	(3) L=reel d=180mm, 4000pcs / T=reel d=330mm, 12000pcs
Murata Chip products (K01E-21) 95 page 3	
AVX: CM 21 CG 221 K 50 A T/L	AVX Chip capacitors 95 (6T9503TYA2651E) page 7
Kemet: C 0805 C 221 K 5 G A C	Kemet SMD catalog F-3102 page31
TDK: C2012 C0G 1H 221 K T	TDK Product cataloque 95 (HEC-001C) page 1.1
Syfer: 0805 J 050 0221 K C T/R	Syfer cer cap 96 page 12, 33
Taiyoyuden: UMK 212 CG 221 K Q T	Taiyoyudenchip components 96; 5 page 7

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3. KONE material number	4. Document data
264687	EC0838

5. Description (max 40, for SAP R/3), includes both description and specification	
6. Description (max 30, for EDMS) Chip-ker. kond. / Chip cer capacitor	7. Specification (max 30, for EDMS) 50V-470pF-10%-NP0-0805

8. Additional specification (max 32)	9. KONE recommendation class	
	1 = Standard	X
	2 = Special	
	3 = Not in new designs	

10. Material group	11. Basic material	12. Industry standard

13. Base unit of measure	14. Net weight	15. Gross weight	16. Unit of weight
pc	n.5	n.5	mg

17. Manufacturer (max 30)	Type (max 30)	Testing status*	Note
Philips	2222 ~~4747~~ 861 1/7 6 471	A	1/7=Packaging (1)
Rohm	MCH21 5 A 471 K P/K	A	C0G=NP0; P/K=Packaging (2)
Vitramon	VJ0805 A 471 K X A L/T M	A	L/T=Packaging (3)
Murata	GRM40 C0G 471 J 50 PT	A	C0G=NP0
*Testing status:	A = chosen by databook, not tested B = functional test C = type test D = life test		

18. More information	
Philips PA06 1996 page 31	(1) 1: reel:d=180mm, 4000pcs / 7: reel:d=330mm, 10000pcs
Rohm Capacitors 95-96 page 19	(2) P=plastic, d=180mm, 3000pcs / K=paper, d=180mm, 4000pcs
Vitramon monolithic cer cap 94 page 14	(3) L=reel d=180mm, 4000pcs / T=reel d=330mm, 12000pcs
Murata Chip products (K01E-21) 95 page 3	
AVX: CM 21 CG 471 K 50 A T/L	AVX Chip capacitors 95 (6T9503TYA2651E) page 7
Kemet: C 0805 C 471 K 5 G A C	Kemet SMD catalog F-3102 page31
TDK: C2012 C0G 1H 471 K T	TDK Product cataloque 95 (HEC-001C) page 1.1
Syfer: 0805 J 050 0471 K C T/R	Syfer cer cap 96 page 12, 33
Taiyoyuden: UMK 212 CG 471 K Q T	Taiyoyudenchip components 96; 5 page 7

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REPORT FOR NEW MATERIAL

1. Department/Handled by/fax/tel	2. Date
HAT / ATO Nieminen / 3183 / 3215	14.1.1997

3. KONE material number	4. Document data
264688	EC0838

5. Description (max 40, for SAP R/3), includes both description and specification	
6. Description (max 30, for EDMS)	7. Specification (max 30, for EDMS)
Chip-ker. kond. / Chip cer capacitor	50V-1nF-10%-NP0-0805

8. Additional specification (max 32)	9. KONE recommendation class	
	1 = Standard	X
	2 = Special	
	3 = Not in new designs	

10. Material group	11. Basic material	12. Industry standard

13. Base unit of measure	14. Net weight	15. Gross weight	16. Unit of weight
pc	n.5	n.5	mg

17. Manufacturer (max 30)	Type (max 30)	Testing status*	Note
Philips	~~4747~~ 2222 861 1/7 6 102	A	1/7=Packaging (1)
Rohm	MCH21 5 A 102 K P/K	A	C0G=NP0; P/K=Packaging (2)
Vitramon	VJ0805 A 102 K X A L/T M	A	L/T=Packaging (3)
Murata	GRM40 C0G 102 J 50 PT	A	C0G=NP0
*Testing status:	A = chosen by databook, not tested B = functional test C = type test D = life test		

18. More information	
Philips PA06 1996 page 31	(1) 1: reel:d=180mm, 4000pcs / 7: reel:d=330mm, 10000pcs
Rohm Capacitors 95-96 page 19	(2) P=plastic, d=180mm, 3000pcs / K=paper, d=180mm, 4000pcs
Vitramon monolithic cer cap 94 page 14	(3) L=reel d=180mm, 4000pcs / T=reel d=330mm, 12000pcs
Murata Chip products (K01E-21) 95 page 3	
AVX: CM 21 CG 102 K 50 A T/L	AVX Chip capacitors 95 (6T9503TYA2651E) page 7
Kemet: C 0805 C 102 K 5 G A C	Kemet SMD catalog F-3102 page31
TDK: C2012 C0G 1H 102 K T	TDK Product cataloque 95 (HEC-001C) page 1.1
Syfer: 0805 J 050 0102 K C T/R	Syfer cer cap 96 page 12, 33
Taiyoyuden: UMK 212 CG 102 K Q(R) T	Taiyoyudenchip components 96; 5 page 7

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HAT / ATO Nieminen / 3183 / 3215	14.1.1997

3. KONE material number	4. Document data
264689	EC0838

5. Description (max 40, for SAP R/3), includes both description and specification	
6. Description (max 30, for EDMS) Chip-ker. kond. / Chip cer capacitor	7. Specification (max 30, for EDMS) 50V-1,5nF-10%-X7R-0805

8. Additional specification (max 32)	9. KONE recommendation class	
	1 = Standard	X
	2 = Special	
	3 = Not in new designs	

10. Material group	11. Basic material	12. Industry standard

13. Base unit of measure	14. Net weight	15. Gross weight	16. Unit of weight
pc	n.5	n.5	mg

17. Manufacturer (max 30)	Type (max 30)	Testing status*	Note
Philips	2222 580 [illegible] 6 6 16	A	X=Packaging (1)
Rohm	MCH21 5 C 152 K [illegible]	A	P/K=Packaging (2)
Vitramon	VJ0805 Y 152 K X A [illegible]	A	L/T=Packaging (3)
Murata	GRM40 X7R 152 K 50 [illegible]	A	
*Testing status:	A = chosen by databook, not tested B = functional test C = type test D = life test		

18. More information	
Philips PA06 1996 page 48,54	(1) X=1; reel:d=180mm, 4000pcs / X=7; reel:d=330mm, 10000pcs
Rohm Capacitors 95-96 page 19	(2) P=plastic, d=180mm, 3000pcs / K=paper, d=180mm, 4000pcs
Vitramon monolithic cer cap 94 page 15	(3) L=reel d=180mm, 4000pcs / T=reel d=330mm, 12000pcs
Murata Chip products (K01E-21) 95 page 3	
AVX: CM 21 X7R 152 K 50 A [illegible]	AVX Chip capacitors 95 (6T9503TYA2651E) page 7
Kemet: C 0805 C 152 K 5 R A C	Kemet SMD catalog F-3102 page31
TDK: C2012 X7R 1H 152 K T	TDK Product cataloque 95 (HEC-001C) page 1.1
Syfer: 0805 J 050 0152 K X [illegible]	Syfer cer cap 96 page 13, 33
Taiyoyuden: UMK 212 B 152 K Q [illegible]	Taiyoyudenchip components 96; 5 page 7

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REPORT FOR NEW MATERIAL

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HAT / ATO Nieminen / 3183 / 3215	14.1.1997

3. KONE material number	4. Document data
264690	EC 0838

5. Description (max 40, for SAP R/3), includes both description and specification	
6. Description (max 30, for EDMS)	7. Specification (max 30, for EDMS)
Chip-ker. kond. / Chip cer capacitor	50V-2,2nF-10%-X7R-0805

8. Additional specification (max 32)	9. KONE recommendation class	
	1 = Standard	X
	2 = Special	
	3 = Not in new designs	

10. Material group	11. Basic material	12. Industry standard

13. Base unit of measure	14. Net weight	15. Gross weight	16. Unit of weight
pc	n.5	n.5	mg

17. Manufacturer (max 30)	Type (max 30)	Testing status*	Note
Philips	2222 580 17666 18	A	X=Packaging (1)
Rohm	MCH21 5 C 222 K P/K	A	P/K=Packaging (2)
Vitramon	VJ0805 Y 222 K X A L/T	A	L/T=Packaging (3)
Murata	GRM40 X7R 222 K 50 PT	A	

*Testing status: A = chosen by databook, not tested
B = functional test C = type test D = life test

18. More information	
Philips PA06 1996 page 48,54	(1) X=1; reel:d=180mm, 4000pcs / X=7; reel:d=330mm, 10000pcs
Rohm Capacitors 95-96 page 19	(2) P=plastic, d=180mm, 3000pcs / K=paper, d=180mm, 4000pcs
Vitramon monolithic cer cap 94 page 15	(3) L=reel d=180mm, 4000pcs / T=reel d=330mm, 12000pcs
Murata Chip products (K01E-21) 95 page 3	
AVX: CM 21 X7R 222 K 50 A T/L	AVX Chip capacitors 95 (6T9503TYA2651E) page 7
Kemet: C 0805 C 222 K 5 R A C	Kemet SMD catalog F-3102 page31
TDK: C2012 X7R 1H 222 K T	TDK Product cataloque 95 (HEC-001C) page 1.1
Syfer: 0805 J 050 0222 K X T/R	Syfer cer cap 96 page 13, 33
Taiyoyuden: UMK 212 B 222 K Q T	Taiyoyudenchip components 96; 5 page 7

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3. KONE material number	4. Document data
2641691	EC 0838

5. Description (max 40, for SAP R/3), includes both description and specification	
6. Description (max 30, for EDMS) Chip-ker. kond. / Chip cer capacitor	7. Specification (max 30, for EDMS) 50V-4,7nF-10%-X7R-0805

8. Additional specification (max 32)	9. KONE recommendation class	
	1 = Standard	X
	2 = Special	
	3 = Not in new designs	

10. Material group	11. Basic material	12. Industry standard

13. Base unit of measure	14. Net weight	15. Gross weight	16. Unit of weight
pc	n.5	n.5	mg

17. Manufacturer (max 30)	Type (max 30)	Testing status*	Note
Philips	2222 580 17/8 6 6 23	A	X=Packaging (1)
Rohm	MCH21 5 C 472 K P/K	A	P/K=Packaging (2)
Vitramon	VJ0805 Y 472 K X A L/T	A	L/T=Packaging (3)
Murata	GRM40 X7R 472 K 50 PT	A	

*Testing status: A = chosen by databook, not tested
B = functional test C = type test D = life test

18. More information	
Philips PA06 1996 page 48,54	(1) X=1; reel:d=180mm, 4000pcs / X=7; reel:d=330mm, 10000pcs
Rohm Capacitors 95-96 page 19	(2) P=plastic, d=180mm, 3000pcs / K=paper, d=180mm, 4000pcs
Vitramon monolithic cer cap 94 page 15	(3) L=reel d=180mm, 4000pcs / T=reel d=330mm, 12000pcs
Murata Chip products (K01E-21) 95 page 3	
AVX: CM 21 X7R 472 K 50 A T/L	AVX Chip capacitors 95 (6T9503TYA2651E) page 7 1/2
Kemet: C 0805 C 472 K 5 R A C	Kemet SMD catalog F-3102 page31
TDK: C2012 X7R 1H 472 K T	TDK Product cataloque 95 (HEC-001C) page 1.1
Syfer: 0805 J 050 0472 K X T/R	Syfer cer cap 96 page 13, 33
Taiyoyuden: UMK 212 B 472 K Q T	Taiyoyudenchip components 96; 5 page 7

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3. KONE material number	4. Document data
264692	EC0838

5. Description (max 40, for SAP R/3), includes both description and specification	
6. Description (max 30, for EDMS) Chip-ker. kond. / Chip cer capacitor	7. Specification (max 30, for EDMS) 50V-10nF-10%-X7R-0805

8. Additional specification (max 32)	9. KONE recommendation class	
	1 = Standard	X
	2 = Special	
	3 = Not in new designs	

10. Material group	11. Basic material	12. Industry standard

13. Base unit of measure	14. Net weight	15. Gross weight	16. Unit of weight
pc	n.5	n.5	mg

17. Manufacturer (max 30)	Type (max 30)	Testing status*	Note
Philips	2222 580 17/8 6 6 27	A	X=Packaging (1)
Rohm	MCH21 5 C 103 K P/K	A	P/K=Packaging (2)
Vitramon	VJ0805 Y 103 K X A L/T	A	L/T=Packaging (3)
Murata	GRM40 X7R 103 K 50 PT	A	

*Testing status: A = chosen by databook, not tested
B = functional test C = type test D = life test

18. More information

Philips PA06 1996 page 48,54	(1) X=1; reel:d=180mm, 4000pcs / X=7; reel:d=330mm, 10000pcs
Rohm Capacitors 95-96 page 19	(2) P=plastic, d=180mm, 3000pcs / K=paper, d=180mm, 4000pcs
Vitramon monolithic cer cap 94 page 15	(3) L=reel d=180mm, 4000pcs / T=reel d=330mm, 12000pcs
Murata Chip products (K01E-21) 95 page 3	
AVX: CM 21 X7R 103 K 50 A T/L	AVX Chip capacitors 95 (6T9503TYA2651E) page 7 12
Kemet: C 0805 C 103 K 5 R A C	Kemet SMD catalog F-3102 page31
TDK: C2012 X7R 1H 103 K T	TDK Product cataloque 95 (HEC-001C) page 1.1
Syfer: 0805 J 050 0103 K X T/R	Syfer cer cap 96 page 13, 33
Taiyoyuden: UMK 212 B 103 K Q T	Taiyoyudenchip components 96; 5 page 7

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☐ Mechanics / Hilkka Saari fax +358-(0)204753144 tel +358-(0)204753193

KONE Corporation

REPORT FOR NEW MATERIAL

1. Department/Handled by/fax/tel	2. Date
HAT / ATO Nieminen / 3183 / 3215	14.1.1997

3. KONE material number	4. Document data
264693	EC 0838

5. Description (max 40, for SAP R/3), includes both description and specification	
6. Description (max 30, for EDMS) Chip-ker. kond. / Chip cer capacitor	7. Specification (max 30, for EDMS) 50V-22nF-10%-X7R-0805

8. Additional specification (max 32)	9. KONE recommendation class	
	1 = Standard	X
	2 = Special	
	3 = Not in new designs	

10. Material group	11. Basic material	12. Industry standard

13. Base unit of measure	14. Net weight	15. Gross weight	16. Unit of weight
pc	n.5	n.5	mg

17. Manufacturer (max 30)	Type (max 30)	Testing status*	Note
Philips	2222 580 1/7 6 6 32	A	X=Packaging (1)
Rohm	MCH21 5 C 223 K P/K	A	P/K=Packaging (2)
Vitramon	VJ0805 Y 223 K X A L/T	A	L/T=Packaging (3)
Murata	GRM40 X7R 223 K 50 PT	A	
*Testing status:	A = chosen by databook, not tested B = functional test C = type test D = life test		

18. More information	
Philips PA06 1996 page 48,54	(1) X=1; reel:d=180mm, 4000pcs / X=7; reel:d=330mm, 10000pcs
Rohm Capacitors 95-96 page 19	(2) P=plastic, d=180mm, 3000pcs / K=paper, d=180mm, 4000pcs
Vitramon monolithic cer cap 94 page 15	(3) L=reel d=180mm, 4000pcs / T=reel d=330mm, 12000pcs
Murata Chip products (K01E-21) 95 page 3	
AVX: CM 21 X7R 223 K 50 A T/L	AVX Chip capacitors 95 (6T9503TYA2651E) page 7 12
Kemet: C 0805 C 223 K 5 R A C	Kemet SMD catalog F-3102 page31
TDK: C2012 X7R 1H 223 K T	TDK Product cataloque 95 (HEC-001C) page 1.1
Syfer: 0805 J 050 0223 K X T/R	Syfer cer cap 96 page 13, 33
Taiyoyuden: UMK 212 B 223 K Q T	Taiyoyudenchip components 96; 5 page 7

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1. Department/Handled by/fax/tel	2. Date
HAT / ATO Nieminen / 3183 / 3215	14.1.1997

3. KONE material number	4. Document data
264694	EC 0838

5. Description (max 40, for SAP R/3), includes both description and specification	
6. Description (max 30, for EDMS) Chip-ker. kond. / Chip cer capacitor	7. Specification (max 30, for EDMS) 50V-47nF-10%-X7R-0805

8. Additional specification (max 32)	9. KONE recommendation class	
	1 = Standard	X
	2 = Special	
	3 = Not in new designs	

10. Material group	11. Basic material	12. Industry standard

13. Base unit of measure	14. Net weight	15. Gross weight	16. Unit of weight
pc	n.5	n.5	mg

17. Manufacturer (max 30)	Type (max 30)	Testing status*	Note
Philips	2222 580 17/7366 36	A	X=Packaging (1)
Rohm	MCH21 5 C 473 K P/K	A	P/K=Packaging (2)
Vitramon	VJ0805 Y 473 K X A L/T	A	L/T=Packaging (3)
Murata	GRM40 X7R 473 K 50 PT	A	
*Testing status:	A = chosen by databook, not tested B = functional test C = type test D = life test		

18. More information	
Philips PA06 1996 page 48,54	(1) X=1; reel:d=180mm, 4000pcs / X=7; reel:d=330mm, 10000pcs
Rohm Capacitors 95-96 page 19	(2) P=plastic, d=180mm, 3000pcs / K=paper, d=180mm, 4000pcs
Vitramon monolithic cer cap 94 page 15	(3) L=reel d=180mm, 4000pcs / T=reel d=330mm, 12000pcs
Murata Chip products (K01E-21) 95 page 3	
AVX: CM 21 X7R 473 K 50 A T/L	AVX Chip capacitors 95 (6T9503TYA2651E) page 7
Kemet: C 0805 C 473 K 5 R A C	Kemet SMD catalog F-3102 page31
TDK: C2012 X7R 1H 473 K T	TDK Product cataloque 95 (HEC-001C) page 1.1
Syfer: 0805 J 050 0473 K X T/R	Syfer cer cap 96 page 13, 33
Taiyoyuden: UMK 212 B 473 K T T	Taiyoyudenchip components 96; 5 page 7

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REPORT FOR NEW MATERIAL

1. Department/Handled by/fax/tel	2. Date
HAT / ATO Nieminen / 3183 / 3215	14.1.1997

3. KONE material number	4. Document data
264695	EC0838

5. Description (max 40, for SAP R/3), includes both description and specification	
6. Description (max 30, for EDMS) Chip-ker. kond. / Chip cer capacitor	7. Specification (max 30, for EDMS) 50V-100nF-10%-X7R-0805

8. Additional specification (max 32)	9. KONE recommendation class	
	1 = Standard	X
	2 = Special	
	3 = Not in new designs	

10. Material group	11. Basic material	12. Industry standard

13. Base unit of measure	14. Net weight	15. Gross weight	16. Unit of weight
pc	n.5	n.5	mg

17. Manufacturer (max 30)	Type (max 30)	Testing status*	Note
Philips	2222 580 1/7 6 6 41	A	X=Packaging (1)
Rohm	MCH21 5 C 104 K P/K	Ei ole saatavilla !!!	P/K=Packaging (2)
Vitramon	VJ0805 Y 104 K X A L/T	A	L/T=Packaging (3)
Murata	GRM40 X7R 104 K 50 PT	Ei ole saatavilla !!!	

*Testing status: A = chosen by databook, not tested
B = functional test C = type test D = life test

18. More information

Philips PA06 1996 page 48,54	(1) X=1; reel:d=180mm, 4000pcs / X=7; reel:d=330mm, 10000pcs
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Vitramon monolithic cer cap 94 page 15	(3) L=reel d=180mm, 4000pcs / T=reel d=330mm, 12000pcs
Murata Chip products (K01E-21) 95 page 3	
AVX: CM 21 X7R 104 K 50 A T/L	AVX Chip capacitors 95 (6T9503TYA2651E) page 7 12
Kemet: C 0805 C 104 K 5 R A C	Kemet SMD catalog F-3102 page31
TDK: C2012 X7R 1H 104 K T	TDK Product cataloque 95 (HEC-001C) page 1.1
Syfer: 0805 J 050 0104 K X T/R	Syfer cer cap 96 page 13, 33
Taiyoyuden: UMK 212 B 104 K T T	EI OLE !!! Taiyoyudenchip components 96; 5 page 7
	↳ ainakaan luettelossa
	ei vielä rekisterissä

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Surface mounted ceramic multilayer capacitors

Class 1, NP0

FEATURES

- Seven standard sizes
- High capacitance per unit volume
- Supplied in tape on reel or in bulk case (case sizes 0402, 0603 and 0805 only); loose in bag available on request
- For high frequency applications
- NiSn terminations (AgPd on request).

APPLICATIONS

- Consumer electronics
- Telecommunications
- Automotive
- Data processing.

DESCRIPTION

The capacitor consists of a rectangular block of ceramic dielectric in which a number of interleaved precious metal electrodes are contained. This structure gives rise to a high capacitance per unit volume.

The inner electrodes are connected to the two terminations, either by silver palladium (AgPd) alloy in the ratio 65 : 35, or silver dipped with a barrier layer of plated nickel and finally covered with a layer of plated tin (NiSn). A cross section of the structure is shown in Fig.1.

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Rated voltage U_R (DC)	50 V, 100 V, 200 V and 500 V (IEC)
Capacitance range (E12 series); note 1:	
general purpose; 50 V; note 2	0.47 pF to 10000 pF
general purpose; 100 V	0.47 pF to 4700 pF
narrow tolerance; 50 V	0.47 pF to 3300 pF
high voltage; 200 V	10 pF to 1500 pF
high voltage; 500 V	10 pF to 1000 pF
Tolerance on capacitance:	
$C \geq 10$ pF	±10%, ±5%, ±2% and ±1%
$C < 10$ pF	±0.5 pF, ±0.25 pF and ±0.1 pF
Test voltage (DC) for 1 minute:	
50 V and 100 V	$2.5 \times U_R$
200 V	$3 \times U_R$
500 V	$2 \times U_R$
Sectional specifications	IEC 384-10, second edition 1989-04; also based on CECC 32 100
Detailed specification	based on CECC 32 101-801
Climatic category (IEC 68)	55/125/56

Notes

1. Other values below 10 pF and non E12 series are available on request.
2. Also applicable for applications up to 63 V.

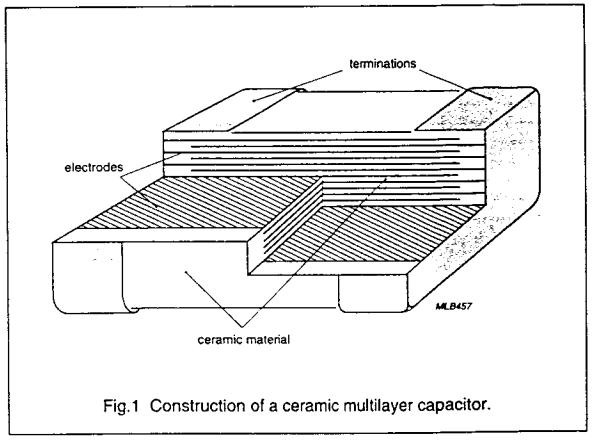
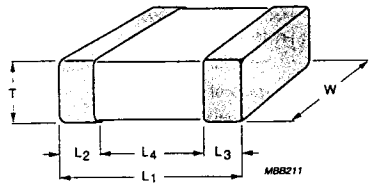


Fig.1 Construction of a ceramic multilayer capacitor.

MECHANICAL DATA



For dimensions see Table 1.

Fig.2 Component outline.

Physical dimensions

Table 1 Capacitor dimensions

CASE SIZE	L_1 (mm)	W (mm)	T		L_2 and L_3		L_4 MIN. (mm)
			MIN. (mm)	MAX. (mm)	MIN. (mm)	MAX. (mm)	
0402	1.0 ±0.05	0.5 ±0.05	0.45	0.55	0.15	0.30	0.4
0603	1.6 ±0.1	0.8 ±0.07	0.73	0.87	0.25	0.65	0.4
0805	2.0 ±0.1	1.25 ±0.1	0.51	1.35	0.25	0.75	0.55
1206	3.2 ±0.15	1.6 ±0.15	0.51	1.75	0.25	0.75	1.4
1210	3.2 ±0.2	2.5 ±0.2	0.51	1.8	0.25	0.75	1.4
1812	4.5 ±0.2	3.2 ±0.2	0.51	1.8	0.25	0.75	2.2
2220	5.7 ±0.2	5.0 ±0.2	0.51	1.8	0.25	0.75	2.9

SELECTION CHART FOR 50 VOLT GENERAL PURPOSE SERIES

C (pF)	LAST TWO DIGITS OF 12NC	0402	0603	0805	1206	1210	1812	2220
		NiSn	NiSn	NiSn	NiSn	NiSn	NiSn	AgPd
		8 mm TAPE WIDTH					12 mm TAPE WIDTH	
0.47	477	10	4	1	1			
0.56	567	10	4	1	1			
0.68	687	10	4	1	1			
0.82	827	10	4	1	1			
1.0	108	10	4	1	1			
1.2	128	10	4	1	1			
1.5	158	10	4	1	1			
1.8	188	10	4	1	1			
2.2	228	10	4	1	1			
2.7	278	10	4	1	1			
3.3	338	10	4	1	1			
3.9	398	10	4	1	1			
4.7	478	10	4	1	1			
5.6	568	10	4	1	1			
6.8	688	10	4	1	1			
8.2	828	10	4	1	1			
10	109	10	4	1	1			
12	129	10	4	1	1			
15	159	10	4	1	1			
18	189	10	4	1	1			
22	229	10	4	1	1			
27	279	10	4	1	1			
33	339	10	4	1	1			
39	399	10	4	1	1			
47	479	10	4	1	1	3		
56	569	10	4	1	1	3		
68	689	10	4	1	1	3		
82	829	10	4	1	1	3		
100	101	10	4	1	1	3		
120	121	10	4	1	1	3		
150	151		4	1	1	3		
180	181			1	1	3		
220	221			1	1	3		
270	271			1	1	3		
330	331			1	1	3	3	
390	391			1	1	3	3	
470	471			2	1	3	3	3
560	561			2	1	3	3	3
680	681			2	1	3	3	3
820	821			2	1	3	3	3
1000	102			2	1	3	3	3
1200	122				1	3	3	3
1500	152				2b	3	3	3
1800	182				2b	3	3	3
2200	222				2b	3	3	3
2700	272				2b	3	3	3
3300	332				5	3	3	3
3900	392					3	3	3
4700	472					5	3	3
5600	562						3	3
6800	682	Values in shaded cells indicate thickness classification, see "Thickness classification and packaging quantities".						3
8200	822							3
10000	103							3

Thickness classification and packaging quantities

THICKNESS CLASSIFICATION (mm)	8 mm TAPE WIDTH AMOUNT PER REEL		12 mm TAPE WIDTH AMOUNT PER REEL		AMOUNT PER BULK CASE		
			Ø180 mm				
	Ø180 mm	Ø330 mm	1812	2220	0402	0603	0805
1 = 0.51 to 0.7	4000	10000	–	–	–	–	10000
2 = 0.85 ±0.1	4000	10000	–	–	–	–	8000
2b = 0.8 to 1.0	4000	10000	–	–	–	–	–
3 = 0.51 to 1.0	4000	10000	2000	1500	–	–	–
4 = 0.8 ±0.07	4000	15000	–	–	–	15000	–
5 = 0.9 to 1.3	3000	8000	–	–	–	–	–
10 = 0.45 to 0.55	10000	50000	–	–	50000	–	–

COMPOSITION OF THE ORDERING CODE (12NC); note 1

2 2 X X 8 6 X X X X X X

Carrier tape
- 22 blister
- 38 paper tape (0402 only)

Size
- 1 0805
- 2 1210
- 3 1206
- 5 1812
- 6 2220 (AgPd only)
- 7 0603
- 9 0402

Packaging(3)
- 1 reel: Ø180 mm
- 7 reel: Ø330 mm
- 4 bulk case; case sizes 0402, 0603 and 0805 only

Capacitance value(2)

Tolerance

NiSn terminations
- 4 ±0.25 pF for C = 5.6 to 8.2 pF
±2.0% for C ≥ 10 pF
- 5 ±0.25 pF for C = 0.47 to 4.7 pF
±0.5 pF for C = 5.6 to 8.2 pF
±5.0% for C ≥ 10 pF
- 6 ±10% for C ≥ 10 pF

AgPd terminations
- 1 ±0.25 pF for C = 5.6 to 8.2 pF
±2.0% for C ≥ 10 pF
- 2 ±0.25 pF for C = 0.47 to 4.7 pF
±0.5 pF for C = 5.6 to 8.2 pF
±5.0% for C ≥ 10 pF
- 3 ±10% for C ≥ 10 pF

Notes

1. For details of the 15-digit code refer to this handbook, Section *"General"*, Chapter *"Composition of the 15-digit code"*.
2. Refer to Chapter "Selection chart for 50 volt general purpose series".
3. Amount on reel depends on thickness classification see Chapter "Selection chart for 50 volt general purpose series".

SELECTION CHART FOR 50 VOLT NARROW TOLERANCE SERIES

C (pF)	LAST TWO DIGITS OF 12NC	0603	0805	1206
		NiSn	NiSn	NiSn
		8 mm TAPE WIDTH		
0.47	477	4	1	1
0.56	567	4	1	1
0.68	687	4	1	1
0.82	827	4	1	1
1.0	108	4	1	1
1.2	128	4	1	1
1.5	158	4	1	1
1.8	188	4	1	1
2.2	228	4	1	1
2.7	278	4	1	1
3.3	338	4	1	1
3.9	398	4	1	1
4.7	478	4	1	1
5.6	568	4	1	1
6.8	688	4	1	1
8.2	828	4	1	1
10	109	4	1	1
12	129	4	1	1
15	159	4	1	1
18	189	4	1	1
22	229	4	1	1
27	279	4	1	1
33	339	4	1	1
39	399	4	1	1
47	479	4	1	1
56	569	4	1	1
68	689	4	1	1
82	829	4	1	1
100	101	4	1	1
120	121	4	1	1
150	151	4	1	1
180	181		1	1
220	221		1	1
270	271		1	1
330	331		1	1
390	391		1	1
470	471		2	1
560	561		2	1
680	681		2	1
820	821		2	1
1000	102		2	1
1200	122			1
1500	152			2b
1800	182			2b
2200	222	Values in shaded cells indicate thickness classification, see "Thickness classification and packaging quantities".		2b
2700	272			2b
3300	332			5

Surface mounted ceramic multilayer capacitors — Class 2, X7R

FEATURES

- Seven standard sizes
- High capacitance per unit volume
- Supplied in tape on reel or in bulk case; loose in bag available on request
- NiSn terminations (AgPd on request).

APPLICATIONS

- Consumer electronics, for example:
  - Tuners
  - Television receivers
  - Video recorders
  - All types of cameras
- Telecommunications
- Automotive
- Data processing.

DESCRIPTION

The capacitor consists of a rectangular block of ceramic dielectric in which a number of interleaved precious metal electrodes are contained. This structure gives rise to a high capacitance per unit volume.

The inner electrodes are connected to the two terminations, either by silver palladium (AgPd) alloy in the ratio 65 : 35, or silver dipped with a barrier layer of plated nickel and finally covered with a layer of plated tin (NiSn). A cross section of the structure is shown in Fig.1.

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Rated voltage U_R (DC)	16 V, 25 V, 50 V, 100 V, 200 V and 500 V (IEC)
Capacitance range (E12 series); note 1:	
16 V	22 nF to 680 nF
25 V	10 nF to 470 nF
50 V; note 2	100 pF to 1 µF
100 V	180 pF to 330 nF
200 V	180 pF to 120 nF
500 V	470 pF to 15 nF
Tolerance on capacitance	±20%, ±10%, ±5%
Test voltage (DC) for 1 minute:	
16 V, 25 V, 50 V and 100 V	$2.5 \times U_R$
200 V	$3 \times U_R$
500 V	$2 \times U_R$
Sectional specifications	IEC 384-10, second edition 1989-04; also based on CECC 32 100
Detailed specification	based on CECC 32 101-801
Climatic category (IEC 68)	55/125/56

Notes

1. Non E12 values are available on request.
2. Also applicable for applications up to 63 V.

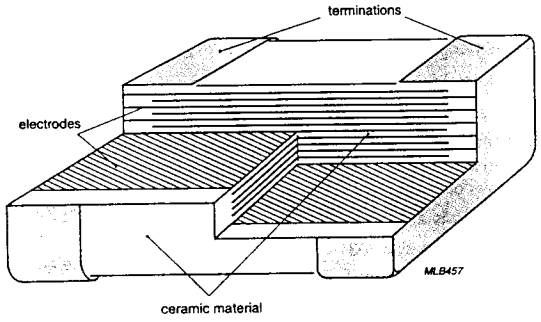
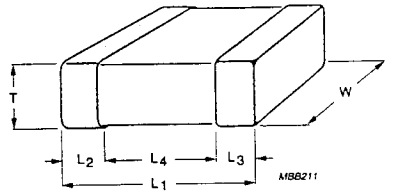


Fig.1 Construction of a ceramic multilayer capacitor.

Surface mounted ceramic multilayer capacitors — Class 2, X7R

MECHANICAL DATA



For dimensions see Table 1.

Fig.2 Component outline.

Physical dimensions

Table 1 Capacitor dimensions

CASE SIZE	L_1 (mm)	W (mm)	T		L_2 and L_3		L_4 MIN. (mm)
			MIN. (mm)	MAX. (mm)	MIN. (mm)	MAX. (mm)	
0402	1.0 ±0.05	0.5 ±0.05	0.45	0.55	0.15	0.30	0.4
0603	1.6 ±0.1	0.8 ±0.07	0.73	0.87	0.25	0.65	0.4
0805	2.0 ±0.1	1.25 ±0.1	0.51	1.35	0.25	0.75	0.55
1206	3.2 ±0.15	1.6 ±0.15	0.51	1.75	0.25	0.75	1.4
1210	3.2 ±0.2	2.5 ±0.2	0.51	1.8	0.25	0.75	1.4
1812	4.5 ±0.2	3.2 ±0.2	0.51	1.8	0.25	0.75	2.2
2220	5.7 ±0.2	5.0 ±0.2	0.51	1.8	0.25	0.75	2.9

SELECTION CHART FOR 50 VOLT SERIES

C (pF)	LAST TWO DIGITS OF 12NC	0402	0603	0805	1206	1210	1812	2220
		NiSn	NiSn	NiSn	NiSn	NiSn	NiSn	AgPd
		8 mm TAPE WIDTH					12 mm TAPE WIDTH	
100	01	10	4					
120	02	10	4					
150	03	10	4					
180	04	10	4	1				
220	05	10	4	1	2a			
270	06	10	4	1	2a			
330	07	10	4	1	2a			
390	08	10	4	1	2a			
470	09	10	4	1	2a			
560	11	10	4	1	2a			
680	12	10	4	1	2a			
820	13	10	4	1	2a			
1000	14	10	4	1	2a			
1200	15	10	4	1	2a			
1500	16	10	4	1	2a			
1800	17	10	4	1	2a			
2200	18	10	4	1	2a	3		
2700	19	10	4	1	2a	3		
3300	21	10	4	1	2a	3		
3900	22		4	1	2a	3		
4700	23		4	1	2a	3	3	
5600	24		4	1	2a	3	3	
6800	25		4	1	2a	3	3	
8200	26		4	1	2a	3	3	
10000	27		4	1	2a	3	3	
12000	28			1	2a	3	3	3
15000	29			1	2a	3	3	3
18000	31			2	2a	3	3	3
22000	32			2	2a	3	3	3
27000	33			2	2a	3	3	3
33000	34			2	2a	3	3	3
39000	35			2	2a	3	3	3
47000	36			2	2a	3	3	3
56000	37			2	2a	3	3	3
68000	38			6	2a	3	3	3
82000	39			6	2a	3	3	3
100000	41			6	2a	3	3	3
120000	42				5	3	3	3
150000	43				5	3	3	3
180000	44					5	3	3
220000	45					5	3	3
270000	46						3	3
330000	47						5	3
390000	48						5	3
470000	49						7	3
560000	51							3
680000	52							3
820000	53							3
1000000	54							5

Values in shaded cells indicate thickness classification, see "Thickness classification and packaging quantities".

Thickness classification and packaging quantities

THICKNESS CLASSIFICATION (mm)	8 mm TAPE WIDTH AMOUNT PER REEL		12 mm TAPE WIDTH AMOUNT PER REEL		AMOUNT PER BULK CASE		
			Ø180 mm				
	Ø180 mm	Ø330 mm	1812	2220	0402	0603	0805
1 = 0.51 to 0.7	4000	10000	–	–	–	–	10000
2 = 0.85 ±0.1	4000	10000	–	–	–	–	8000
2a = 0.7 to 1.0	4000	10000	–	–	–	–	–
3 = 0.51 to 1.0	4000	10000	2000	1500	–	–	–
4 = 0.8 ±0.07	4000	15000	–	–	–	15000	–
5 = 0.9 to 1.3	3000	8000	1500	1500	–	–	–
6 = 1.25 ±0.10	3000	8000	–	–	–	–	5000
7 = 1.2 to 1.75	–	–	1200	–	–	–	–
10 = 0.45 to 0.55	10000	50000	–	–	50000	–	–

COMPOSITION OF THE ORDERING CODE (12NC); note 1

2 2 X X X X X X X X X X

Carrier tape
- 22 blister
- 38 paper (0402 only)

Termination
- 58 NiSn
- 59 AgPd

Size
- 0 0805
- 1 1206
- 2 1210
- 4 1812
- 5 2220
- 6 0603
- 7 0402

Packaging(3)
- 1 reel: Ø180 mm
- 5 reel: Ø330 mm
- 4 bulk case; case sizes 0402, 0603 and 0805 only

Dielectric material
- 6 X7R

Tolerance
- 5 ±5%
- 6 ±10%
- 7 ±20%

Capacitance value(2)

Notes

1. For details of the 15-digit code refer to this handbook, Section *"General"*, Chapter *"Composition of the 15-digit code"*.
2. Refer to Chapter "Selection chart for 50 volt series".
3. Amount on reel depends on thickness classification see Chapter "Selection chart for 50 volt series".

Rohm

Table 1 MCS series class 2 dielectrics (Sheet 2 of 2)

Product (EIA Size)	MCS31 (1206)				MCS32 (1210)				MCS43 (1812)				MCS53 (2212)			
Temperature	E (Z5U)		F (Y5V)		C (X7R)		F (Y5V)		C (X7R)		F (Y5V)		C (X7R)		F (Y5V)	
Voltage	50	25	50	25	50	25	50	25	50	25	50	25	50	25	50	25
Tolerance	Z	Z	Z	Z	K/M	K/M	Z	Z	K/M	K/M	Z	Z	K/M	K/M	Z	Z
Size (pF)																
1,000																
1,500																
2,200																
3,300																
4,700																
6,800																
10,000																
15,000																
22,000																
33,000																
47,000																
68,000																
100,000 (0.1 µF)																
120,000																
150,000																
220,000																
330,000																
390,000																
470,000																
680,000																
1,000,000 (1 µF)																
1,500,000																
2,200,000																
3,300,000																
4,700,000																
6,800,000																
Capacitor thickness																
Units: mm					0.6 ±0.1 (0.024 ±0.004)				0.85 ±0.1 (0.033 ±0.004)				1.0 $^{+0}_{-0.2}$ (0.039 $^{+0}_{-.008}$)			
													1.15 ±0.1 (0.045 ±0.004)			

MCH series

Solder plated termination type

This series of capacitors have terminations that are solder plated. They can be soldered either by flow or reflow soldering methods. The many different variations of this series allow these capacitors to be used in many applications.

Features

- mounted either by flow or reflow soldering methods

Product ordering codes

When ordering, please specify:

- The product name (MCH18, MCH21...)
- Complete the order number by adding digits to the order number as specified in the following table.
- Do not leave blanks in the order number. All characteristics must be specified. Use a hyphen as a blank character, where required.

Product	Dimensions (mm)	EIA code
MCH15	1.0 × 0.5	1005 (0402)
MCH18	1.6 × 0.8	1618 (0603)
MCH21	2.0 × 1.25	2012 (0805)
MCH31	3.2 × 1.6	3216 (1206)
MCH32	3.2 × 2.5	3225 (1210)

Capacitance
In picofarads, given by 3-digit number. The first two digits are the significant digits; the last digit gives the power of 10. A decimal point, if required, is identified by an R.

Examples:
331 = 330 pF, 472 = 4700 pF, 1R5 = 1.5 pF, 010 = 1 pF

Code	Description
P	Plastic tape, 180 mm (7 in. reel)
Q	Plastic tape, 330 mm (13 in. reel)
K	Paper tape, 180 mm (7 in. reel)
L	Paper tape, 330 mm (13 in. reel)
C	Bulk case

Code	Voltage
2	25 V
3	16 V
5	50 V

M	C	H	2	1	2	F		1	0	4	Z	K				

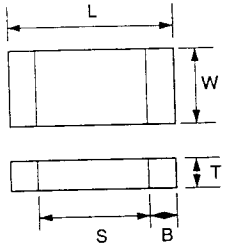
Code		Operating temp. range	Temp. coefficient or % change
Rohm	EIA		
A	COG	−55 ~ +125°C	0 ±30 ppm/°C
UJ	U2J	−25 ~ +85°C	−750 ±120 ppm/°C
SL		−25 ~ +85°C	+350 ~ −1000 ppm/°C
C	X7R	−55 ~ +125°C	±15%
E	Z5U	−10 ~ +85°C	+22, −56%
F	Y5V	−30 ~ +85°C	+22, −82%

Code	Tolerance (Series)	Application
C	±0.25 pF	10 pF & below
D	±0.5 pF	10 pF & below
F	±1.0 pF	6.8 ~ 10 pF
J	±5% (E12)	-
K	±10% (E6)	-
M	±20% (E6)	-
Z	+80, −20% (E3)	-

Leave blank for standard product
Enter N for marked capacitors
Use to enter special thickness requirements

Available sizes of MCH series capacitors

	MCH15	MCH18	MCH21	MCH31	MCH32
EIA (mm) (inches)	1005 (0402)	1608 (0603)	2012 (0805)	3216 (1206)	3225 (1210)
L	1.0 ± 0.05	1.6 ± 0.1	2.00 ± 0.15	3.2 ± 0.15	3.2 ± 0.2
W	0.5 ± 0.05	0.8 ± 0.1	1.25 ± 0.15	1.6 ± 0.15	2.5 ± 0.2
T	0.5 ± 0.05	0.8 ± 0.1	0.60 ± 0.10 0.85 ± 0.10 1.25 ± 0.10	0.60 ± 0.10 0.85 ± 0.10 1.15 ± 0.10	$1.00^{+0}_{-0.2}$ 1.15 ± 0.1
B (min)	0.1	0.15	0.2	0.2	0.3
S (min)	0.3	0.4	0.6	1.0	1.0



All dimensions in mm

Table 1 MCH series class 1 dielectrics

Product (EIA size)		MCH15 (0402)			MCH18 (0603)			MCH21 (0805)			MCH31 (1206)			MCH32 (1210)		
Temperature		A (COG)	UJ (U2J)	SL (-)	A (COG)	UJ (U2J)	SL (-)	A (COG)	UJ (U2J)	SL (-)	A (COG)	UJ (U2J)	SL (-)	A (COG)	UJ (U2J)	SL (-)
Voltage		50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
pF	Tol.															
0.5	C, D															
1																
1.5																
2.2																
3.3																
4.7																
6.8	C, D, F															
10																
15	J, K															
17																
22																
33																
47																
68																
100																
150																
220																
330																
470																
560																
680																
1,000																
1,500																
1,800																
2,200																
2,700																
3,300																
4,700																
6,800																
8,200																

Capacitor thickness

Units: mm (in.)	0.5 ±0.05 (0.020 ±0.002)	0.6 ±0.1 (0.024 ±0.004)	0.8 ±0.1 (0.031 ±0.004)	0.85 ±0.1 (0.033 ±0.004)	$1.0^{+0}_{-0.2}$ ($0.039^{+0}_{-0.008}$)	1.15 ±0.1 (0.045 ±0.004)	1.25 ±0.1 (0.049 ±0.004)

Table 2 MCH series class 2 dielectrics (Sheet 1 of 2)

Size (EIA Size)	MCH15 (0402)				MCH18 (0603)						MCH21 (0805)			
Temperature	C (X7R)		F (Y5V)		C (X7R)		E (Z5U)		F (Y5V)		C (X7R)		E (Z5U)	
Voltage	50	25	50	25	50	25	50	25	50	25	50	25	50	25
Tolerance	K / M	K / M	Z	Z	K / M	K / M	Z	Z	Z	Z	K / M	K / M	Z	Z
Size (pF)														
220														
330														
470														
680														
1,000														
1,500														
2,200														
3,300														
3,900														
4,700														
6,800														
10,000		☆												
15,000														
22,000														
33,000														
47,000														
68,000														
100,000 (0.1 µF)														
150,000														
220,000														

Capacitor thickness

Units: mm (in.)

0.5 ±0.05 (0.020 ±0.002)	0.6 ±0.1 (0.024 ±0.004)	0.8 ±0.1 (0.031 ±0.004)	0.85 ±0.1 (0.033 ±0.004)	1. 25 ±0.1 (0.049 ±0.004)

☆ 16-V version

Table 2 MCH series class 2 dielectrics (Sheet 2 of 2)

Product (EIA size)	MCH21 (0805)		MCH31 (1206)						MCH32 (1210)			
Temperature	F (Y5V)		C (X7R)		E (Z5U)		F (Y5V)		C (X7R)		F (Y5V)	
Voltage	50	25	50	25	50	25	50	25	50	25	50	25
Tolerance	Z	Z	K / M	K / M	Z	Z	Z	Z	K / M	K / M	Z	Z
Size (pF)												
220												
330												
470												
680												
1,000												
1,500												
2,200												
3,300												
4,700												
6,800												
10,000												
15,000												
22,000												
33,000												
47,000												
68,000												
100,000 (0.1 µF)												
120,000												
150,000												
180,000												
220,000												
330,000												
470,000												
1,000,000 (1 µF)												
1,500,000												
2,200,000												

Capacitor thickness

Units: mm (in.)

0.6 ±0.1 (0.024 ±0.004)	0.85 ±0.1 (0.033 ±0.004)	1.0 $^{+0}_{-0.2}$ (0.039 $^{+0}_{-.008}$)	1.15 ±0.1 (0.045 ±0.004)	1.25 ±0.1 (0.049 ±0.004)

☆ 16-V version

A COMPANY OF VISHAY

Vitramon

CHIP CAPACITORS NPO

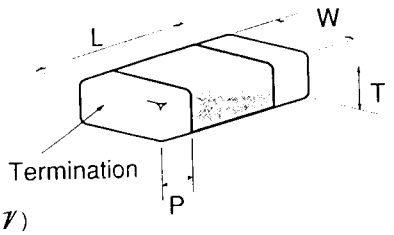
Nickel Barrier or Silver Palladium Terminations

CECC 32 101-801

Ordering code: e.g. VJ 0805 A 101 J X B T M

Type
Dielectric A≙NP0
Capacitance acc. to EIA[1])
Tolerance acc. to EIA
Terminations:
X≙ Nickel Barrier, F≙ Silver Palladium
Rated voltage: A≙50/63 V- B≙100 V-
Tape / Reel:
L≙Reel ø 330 mm, T≙Reel ø 180 mm.
Marking:
M≙ acc. to CECC (as from 0805 with capacitance code, as from 1206 add.with ▼)
V≙ VITRAMON Trademark ▼ (without capacitance code)

Special types (e.g. 1825, 2225) and special voltages on request.



Dimensional Tolerances:

Type	L + W	P
0603	±0.15	0.3±0.2
0805	±0.2	0.5±0.25
1206	±0.2	0.5±0.25
1210	±0.2	0.5±0.25
1808	±0.2	0.5±0.25
1812	±0.2	0.5±0.25
2218	±0.2	0.5±0.25
2220	±0.2	0.5±0.25

Dimensions in mm

Tolerances available:
Values <10 pF: B = ±0.1pF, C = ±0.25pF, D = ±0.5pF
Values ≥10 pF: F = ±1 %, G = ±2 %, J = ±5 %, K = ±10 %

[1]) Capacitance values are in pF. The first two digits give the nominal value, the third digit the number of noughts, e.g. 101 ≙ 100 pF. For values below 10 pF the decimal point in the second position is replaced by R e.g. 2R2 ≙ 2.2 pF

Type	0603	0805	1206	1210	1808	1812	2218	2220
Length L	1.60	2.00	3.20	3.20	4.5[illegible]	4.50	5.70	5.70
Width W	0.80	1.25	1.60	2.50	2.0[illegible]	3.20	4.50	5.00
Thickness T	0.95	1.1	1.1	1.2	1.[illegible]	1.2	1.1	1.1
Rated Voltage	50/63 100	50/63 100	50/63 100	50/63 100	50/63 100	50/63 100	50/63 100	50/63 100
Cap. (pF)								
1.0								
1.2								
1.5								
1.8								
2.2								
2.7								
3.3								
3.9								
4.7								
5.6								
6.8								
8.2								
10								
12								
15								
18								
22								
27								
33								
39								
47								
56								
68								
82								
100								
120								
150								
180								
220								
270								
330								
390								
470								
560								
680								
820								
1,000								
1,200								
1,500								
1,800								
2,200								
2,700								
3,300								
3,900								
4,700								
5,600								
6,800								
8,200								
10,000								
12,000								
15,000								
18,000								
22,000								
27,000								
33,000								

AgPd-Termination for reflow soldering.

Nickel Barrier termination for all soldering methods.

Available range of capacitance values acc. to CECC 32 101-002 see page 9.

CECC 32 101-801 capacitance values acc. to CECC 32 101-002

A COMPANY OF VISHAY

Vitramon

CHIP CAPACITORS X7R

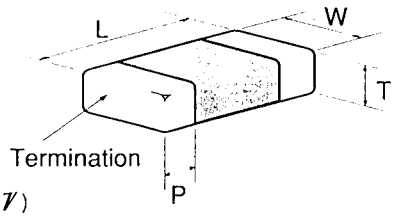
Nickel Barrier or Silver Palladium Terminations

CECC 32 101-801

Ordering code: e.g. VJ 0805 Y 103 J X B T M

Type
Dielectric Y≙X7R
Capacitance acc. to EIA[1])
Tolerance acc. to EIA
Terminations:
X≙ Nickel Barrier, F≙ Silver Palladium
Rated voltage: X≙25 V- A≙50/63 V- B≙100 V-
Tape / Reel:
L≙Reel ø 330 mm, T≙Reel ø 180 mm.
Marking:
M≙ acc. to CECC (as from 0805 with capacitance code, as from 1206 add.with 𝒱)
V≙ VITRAMON Trademark 𝒱 (without capacitance code)

Special types (e.g. 1825, 2225) and special voltages on request.



Dimensional Tolerances:

Type	L + W	P
0603	±0.15	0.3±0.2
0805	±0.2	0.5±0.25
1206	±0.2	0.5±0.25
1210	±0.2	0.5±0.25
1808	±0.2	0.5±0.25
1812	±0.2	0.5±0.25
2218	±0.2	0.5±0.25
2220	±0.2	0.5±0.25

Dimensions in mm

[1]) Capacitance values are in pF. The first two digits give the nominal value, the third digit the number of noughts, e.g. 103 ≙ 10 nF.

Tolerances available:
J = ±5 %, K = ±10 %, M = ±20 %

Type	0603			0805			1206			1210			1808		1812			2218		2220	
Length L	1.60			2.00			3.20			3.20			4.50		4.50			5.70		5.70	
Width W	0.80			1.25			1.60			2.50			2.00		3.20			4.50		5.00	
Thickness T	0.95			1.25			1.1	1.3	1.5	1.1	1.3	1.5	1.3	1.5	1.1	1.3	1.7	1.3	1.5	1.5	
Rated Voltage	25	50/63	100	25	50/63	100	25	50/63	100	25	50/63	100	50/63	100	25	50/63	100	50/63	100	50/63	100
Cap. (pF)																					
100		Normally made in NPO			Normally made in NPO			Normally made in NPO													
120																					
150																					
180																					
220																					
270																					
330																					
390																					
470																					
560																					
680																					
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820,000																					
1,000,000																					
1,200,000																					
1,500,000																					
1,800,000																					
2,200,000																					
2,700,000																					
3,300,000																					

AgPd-Termination for reflow soldering

Nickel Barrier Termination for all soldering methods

Nickel Barrier Termination only for reflow soldering

Available range of capacitance values acc. to CECC 32 101-003, -008 see page 9.

Nickel Barriered Termination Type GRM Series for General Electronic Equipment

■FEATURES

1. Terminations are made of metall highly resistant to migration.
2. The GRM series is a complete line of chip ceramic capacitors in 16V, 25V and 50V ratings.
   These capacitors have temperature characteristics ranging from C0G to Y5V.
3. A wide selection of sizes is available, from the miniature GRM36(LxWxT:1.0x0.5x0.5mm) to the larger sized GRM44-1(LxWxT:5.7x5.0x2.0mm).
   GRM39,GRM40 and GRM42-6 types are suited to flow and reflow soldering. GRM36, GRM42-2 and larger types are suited to reflow soldering.
4. Stringent dimensional tolerances allow highly reliable,high speed automatic chip placements on PCBs.
5. The GRM series is available in both paper and plastic embossed tape and reel packaging for automatic placement. Bulk case packaging is also available.
   (GRM36, GRM39, GRM40 (T:0.7, 1.25))

■APPLICATION

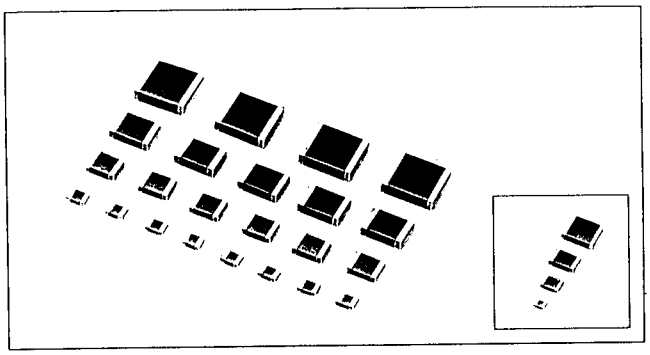
- General electronic equipment.

■PART NUMBERING

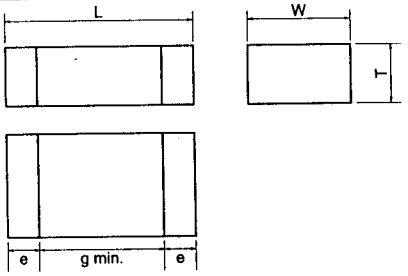
(※Please specify the part number when ordering.)

(Ex.) GRM40 ❶ | X7R ❷ | 102 ❸ | K ❹ | 50 ❺ | ❻ | PT ❼

❶Type
❷Temperature Characteristics (Please refer Table right)
❸Capacitance
❹Capacitance Tolerance
❺Rated Voltage
❻Murata's control No.
❼Packaging
(Bulk:PB, Tape:PT, Bulk Case:PC)



■DIMENSIONS



Type (EIA Code)	Dimensions (mm) L	W	T	e	g
GRM36 (0402)	1.0±0.05	0.5±0.05	0.5±0.05	0.15~0.3	0.4
GRM39 (0603)	1.6±0.1	0.8±0.1	0.8±0.1	0.2~0.5	0.5
GRM40 (0805)	2.0±0.1	1.25±0.1	$0.7\pm^{0}_{0.2}$ / $1.0\pm^{0}_{0.2}$ / 1.25±0.1	0.2~0.7	0.7
GRM42-6 (1206)	3.2±0.15	1.6±0.15	$1.0\pm^{0}_{0.2}$ / $1.25\pm^{0}_{0.2}$	0.3~0.8	1.5
GRM42-2 (1210)	3.2±0.3	2.5±0.2	$1.5\pm^{0.3}_{0}$	0.3max.	1.0
GRM43-2 (1812)	4.5±0.4	3.2±0.3	2.0max.	0.3max.	2.0
GRM44-1 (2220)	5.7±0.4	5.0±0.4	2.0max.	0.3max.	2.0

■TEMPERATURE CHARACTERISTIC

- Temperature Compensating Type

Code	Temp. Coeff.	Temp. Range	Reference Temp.
C0G	0±30ppm/℃	−55 to 125℃	25℃

- High Dielectric Constant Type

Code	Cap. Change	Temp. Range	Reference Temp.
X7R	±15%	−55 to 125℃	25℃
X5R	±15%	−55 to 85℃	25℃
Z5U	$\pm^{22}_{56}$%	+10 to 85℃	25℃
Y5V	$\pm^{22}_{82}$%	−30 to 85℃	25℃

1

■CAPACITANCE RANGE

(Temperatur Compensating Type)

(in pF)

Type(EIA Code)	Thickness T(mm) \ Temp. Char / Rated Voltage	C0G
		50VDC
GRM36(0402)	0.5±0.05	0.5～160
GRM39(0603)	0.8±0.1	0.5～510
GRM40(0805)	$0.7\pm^{0}_{0.2}$	0.5～560
	$1.0\pm^{0}_{0.2}$	620～1500
	1.25±0.1	1600～2400
GRM42-6(1206)	$1.0\pm^{0}_{0.2}$	2700～3600
	$1.25\pm^{0}_{0.2}$	3900～6200
GRM42-2(1210)	$1.5\pm^{0}_{0.3}$	6800～7500
GRM43-2(1812)	2.0max.	8200～13000
GRM44-1(2220)	2.0max.	15000～43000
Capacitance Tolerance		〈C≦5pF〉 C:±0.25pF 〈6～10pF〉 D:±0.5pF 〈C>10pF〉 J:±5%

■CAPACITANCE RANGE (High Dielectric Constant Type)

(in pF)

Type(EIA Code)	Thickness T(mm) \ Temp. Char / Rated Voltage	X7R			X5R	
		50VDC	25VDC	16VDC	16VDC	10VDC
GRM36(0402)	0.5±0.05	220～3900	4700～6800	8200～10000	———	———
GRM39(0603)	0.8±0.1	220～18000	22000～27000	33000～100000	———	———
GRM40(0805)	$0.7\pm^{0}_{0.2}$	330～22000	27000～33000	39000～56000	———	———
	$1.0\pm^{0}_{0.2}$	27000～39000	39000～68000	68000～100000	———	———
	1.25±0.1	47000～68000	82000～150000	120000～330000	470000	1000000※
GRM42-6(1206)	$1.0\pm^{0}_{0.2}$	82000～100000	———	———	———	———
	$1.25\pm^{0}_{0.2}$	120000～150000	180000～330000	———	1000000	———
GRM42-2(1210)	$1.5\pm^{0}_{0.3}$	180000～220000	———	———	———	———
GRM43-2(1812)	2.0max.	270000～470000	———	———	———	———
GRM44-1(2220)	2.0max.	560000～1200000	———	———	———	———
Capacitance Tolerance		K：±10%, M：±20%			———	———

※ L=2.0±0.15、W=1.25±0.15、T=1.25±0.15

(in pF)

Type(EIA Code)	Thickness T(mm) \ Temp. Char / Rated Voltage	Z5U
		50VDC
GRM39(0603)	0.8±0.1	1500～10000
GRM40(0805)	$0.7\pm^{0}_{0.2}$	4700～22000
	$1.0\pm^{0}_{0.2}$	33000
	1.25±0.1	47000～100000
GRM42-6(1206)	$1.25\pm^{0}_{0.2}$	150000～220000
GRM42-2(1210)	$1.25\pm^{0}_{0.2}$	330000
GRM43-2(1812)	2.0max.	470000～1000000
GRM44-1(2220)	2.0max.	1500000
Capacitance Tolerance		M:±20%, Z:$\pm^{80}_{20}$%

(in pF)

Type(EIA Code)	Thickness T(mm) \ Temp. Char / Rated Voltage	Y5V			
		50VDC	25VDC	16VDC	10VDC
GRM36(0402)	0.5±0.05	2200～15000	22000	33000～47000 100000	———
GRM39(0603)	0.8±0.1	10000～47000	68000～100000	150000～220000	1000000
GRM40(0805)	$0.7\pm^{0}_{0.2}$	10000～68000	100000～150000	———	———
	$1.0\pm^{0}_{0.2}$	100000～150000	220000	———	———
	1.25±0.1	220000	330000	470000～1000000	2200000
GRM42-6(1206)	$1.0\pm^{0}_{0.2}$	330000	———	———	———
	$1.25\pm^{0}_{0.2}$	470000	680000～1000000	1500000～2200000	4700000
GRM42-2(1210)	$1.5\pm^{0}_{0.3}$	680000	———	———	———
GRM43-2(1812)	2.0max.	1000000～1500000	———	———	———
GRM44-1(2220)	2.0max.	2200000～4700000	———	———	———
Capacitance Tolerance		Z:$\pm^{80}_{20}$%			

CM Series; Nickel Barrier Terminations for Flow and Reflow Soldering.

CAPACITANCE RANGE

EIA DIELECTRIC CODE	X7R																	
SIZE	▫			▫			□					□				▯		
SIZE CODE	0402			0603			0805					1206				1210		
VOLTAGE	16	25	50	16	25	50	10	16	25	50	100	16	25	50	100	25	50	100
Cap in pF or nF / Cap code																		
220 — 221 330 — 331 470 — 471																		
680 — 681 1000 — 102 1500 — 152																		
2200 — 222 3300 — 332 4700 — 472																		
6800 — 682 10 — 103 15 — 153																		
22 — 223 33 — 333 47 — 473																		
68 — 683 100 — 104 150 — 154																		
220 — 224 330 — 334 470 — 474																		
680 — 684 1000 — 105																		

∗:tanδ =3.5% MAX.

TAPING

THICKNESS	0402	0603	0805	1206	1210
<1.0mm (•, +, ■, ρ)	Paper	Paper	Paper	Paper	N/A
≥1.0mm (#, σ, ▲, ¢)	N/A	N/A	Plastic	Plastic	Plastic

Standard Thicknesses
- • = 0.5mm±0.05mm
- \+ = 0.8mm±0.1mm
- ■ = 0.6mm±0.1mm
- ρ = 0.85mm±0.1mm
- σ = 1.15mm±0.1mm
- ▲ = 1.25mm±0.1mm
- ¢ = 1.4mm MAX.

CM Series; Nickel Barrier Terminations for Flow and Reflow Soldering.

CAPACITANCE RANGE

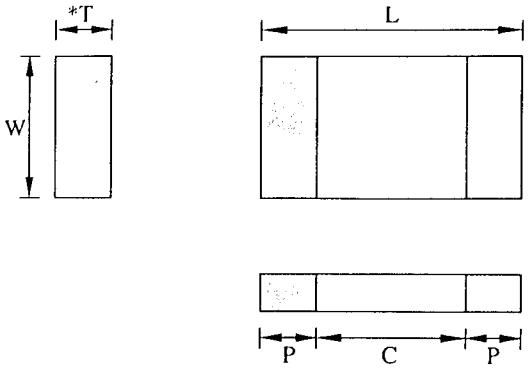
EIA DIELECTRIC CODE	COG										
SIZE	▫	▫		▫			▭			▭	
SIZE CODE	0402	0603		0805			1206			1210	
VOLTAGE	50	50	100	25	50	100	25	50	100	50	100
Cap in pF — Cap code											
0.5 — R50	•	+	+		■	■					
1.0 — 1R0	•	+	+		■	■					
1.5 — 1R5	•	+	+		■	■					
2.0 — 2R0	•	+	+		■	■					
3.0 — 3R0	•	+	+		■	■					
4.0 — 4R0	•	+	+		■	■					
5.0 — 5R0	•	+	+		■	■					
6.0 — 6R0	•	+	+		■	■					
7.0 — 7R0	•	+	+		■	■					
8.0 — 8R0	•	+	+		■	■					
9.0 — 9R0	•	+	+		■	■					
10 — 100	•	+	+		■	■					
12 — 120	•	+	+		■	■					
15 — 150	•	+	+		■	■					
18 — 180	•	+	+		■	■					
22 — 220	•	+	+		■	■					
27 — 270	•	+	+		■	■					
33 — 330	•	+	+		■	■					
39 — 390	•	+	+		■	■					
47 — 470	•	+	+		■	■					
56 — 560	•	+	+		■	■					
68 — 680	•	+	+		■	■					
82 — 820	•	+	+		■	■					
100 — 101	•	+	+		■	■					
120 — 121	•	+	+		■	■					
150 — 151		+	+		■	■					
180 — 181		+	+		■	■					
220 — 221		+	+		■	■					
270 — 271		+	+		■	■					
330 — 331		+	+		■	■					
390 — 391		+			■	■					
470 — 471		+			■	■					
560 — 561					■	■					
680 — 681					ρ	ρ		■	■		
820 — 821					ρ	ρ		■	■		
1000 — 102					ρ	ρ		■	■		
1200 — 122					ρ			■	■		
1500 — 152					ρ			■	■		
1800 — 182					ρ			ρ	ρ		
2200 — 222					ρ			ρ	ρ		
2700 — 272				ρ				ρ			c
3300 — 332				▲				ρ			c
3900 — 392				▲				ρ		¢	c
4700 — 472				▲				ρ		¢	
5600 — 562							ρ			¢	
6800 — 682							ρ			¢	
8200 — 822							σ			¢	
10000 — 103							σ			¢	

TAPING

THICKNESS	0402	0603	0805	1206	1210
<1.0mm (•, +, ■, ρ)	Paper	Paper	Paper	Paper	N/A
≥1.0mm (σ, ▲, ¢)	N/A	N/A	Plastic	Plastic	Plastic

Standard Thicknesses
- • = 0.5mm±0.05mm
- \+ = 0.8mm±0.1mm
- ■ = 0.6mm±0.1mm
- ρ = 0.85mm±0.1mm
- σ = 1.15mm±0.1mm
- ▲ = 1.25mm±0.1mm
- ¢ = 1.4mm MAX.

Dimensions



Indicates Termination Area

For Tape & Reel Package

Size Code	L(mm)	W(mm)	*2 T	P		C
			Max(mm)	Min(mm)	Max(mm)	Min(mm)
0402	1.0±0.05	0.5±0.05	0.55	0.15	0.35	0.30
0603	1.6±0.15*1	0.8±0.15*1	0.95	0.20	0.60	0.50
0805	2.0±0.2 *1	1.25±0.2*1	1.35	0.25	0.75	0.50
1206	3.2±0.2 *1	1.6±0.2 *1	1.6	0.25	0.85	1.50
1210	3.2±0.3	2.5±0.2	2.0	0.30	1.00	1.00
1808	4.5±0.4	2.0±0.2	2.0	0.15	0.80	2.00
1812	4.5±0.4	3.2±0.3	2.5	*3 0.50	*3 1.10	2.00
2208	5.7±0.4	2.0±0.2	2.0	0.15	0.85	2.00
2220	5.7±0.4	5.0±0.4	2.5	0.50	1.40	2.00

*1 For Bulk Case Package

Size Code	L(mm)	W(mm)	T(mm)	P		C
				Min(mm)	Max(mm)	Min(mm)
0603	1.6±0.07	0.8±0.07	0.8±0.07	0.10	0.60	0.50
0805	2.0±0.1	1.25±0.1	0.6±0.1/1.25±0.1	0.25	0.75	0.50
1206	3.2±0.1	1.6±0.1	0.6±0.1	0.25	0.85	1.50

*2 T (Thickness) depends on capacitance value.
Standard thickness is shown on the appropriate product pages.

*3 CF series 1000V~3000V; P dimensions 0.15mm to 0.80mm.

Available Tolerances

Dielectric materials, capacitance values and tolerances are available in the following combinations only:

EIA DIELECTRIC	AVAILABLE TOLERANCE	CAPACITANCE		TOLERANCE CODE
*1 COG NTC	±0.25pF, ±0.5pF	≤10pF	*2	*3 B = ±0.1pF C = ±0.25pF D = ±0.5pF F = ±1% G = ±2% J = ±5% K = ±10% M = ±20% Z = -20 to +80%
	±1%	>10pF	E-12 Series	
	±2%			
	±5%, ±10%, ±20%			
X7R	*4 ±10%, ±20%	E-6 Series		
Y5V	-20% to +80%	E-3 Series		

NOTE:

*1 NTC : Negative Temperature Coefficient types are available on request as shown on page 27

*2 Nominal values below 10pF are available in the standard values of 0.5pF, 1.0pF, 1.5pF, 2.0pF, 3.0pF, 4.0pF, 5.0pF, 6.0pF, 7.0pF, 8.0pF, 9.0pF, 10pF.

*3 B=±0.1pF is available for 5pF and below on request.

*4 J=±5% for X7R is available on request.

Classifications

Kyocera Ceramic Chip Capacitors are available for different applications as classified below:

Series	Dielectric	Application	Features	Terminations	Available Size (EIA)
CM	COG (NPO) X7R Y5V NTC*	General Purpose	Wide Cap Range	Nickel Barrier	0402, 0603, 0805 1206, 1210
				Silver Palladium	0603, 0805, 1206 1210, 1812, 2220
CF	COG (NPO) X7R	High Voltage & Power Circuits	High Voltage 500V 1000V 2000V 3000V	Nickel Barrier	1206, 1210, 1808 1812, 2208
				Silver Palladium	1206, 1210, 1808 1812, 2208, 2220
CT	COG (NPO) X7R Y5V	PLCC (Decoupling)	Low Profile See Page 18	Nickel Barrier	0805, 1206, 1210
				Silver Palladium	
DN	COG (NPO) U (N750) X7R Y5V	Automotive	Thermal shock Resistivity High Reliability	Silver Palladium	0805, 1206, 1210 1812, 2220

NOTE:

*NTC:Negative Temperature Coefficient types are available on request as shown below.

PΔ (N150), RΔ (N220), SΔ (N330), TΔ (N470) & UΔ (N750) Details are shown on Page 27

Ordering Information

KYOCERA PART NUMBER:

CM	21	X7R	103	K	50	A	T

SERIES CODE

See Page 1

SIZE CODE

See Page 3

SIZE		EIACODE	SIZE		EIA CODE
05	=	0402	32	=	1210
105	=	0603	42	=	1808
21	=	0805	43	=	1812
316	=	1206	52	=	2208
			55	=	2220

DIELECTRIC CODE

See Page 27

CODE	=	EIA CODE
CG	=	COG (NPO)
X7R	=	X7R
Y5V	=	Y5V

Negative dielectric types are available on request.

CAPACITANCE CODE

Capacitance Expressed In pF. 2 Significant Digits and Number of Zeros in pF.
For Values < 10pF, Letter R Denote Decimal Point.

e.g. 100000pF	= 104	33pF	= 330
100nF	= 104	1.5pF	= 1R5
0.1μF	= 104	0.5pF	= R50
4700pF	= 472		

TOLERANCE CODE

See Page 4 for explanation and availability

VOLTAGE CODE

10	=	10VDC	200	=	200VDC
16	=	16VDC	500	=	500VDC
25	=	25VDC	1000	=	1000VDC
50	=	50VDC	2000	=	2000VDC
100	=	100VDC	3000	=	3000VDC

TERMINATION CODE

A = Nickel Barrier B = Silver Palladium

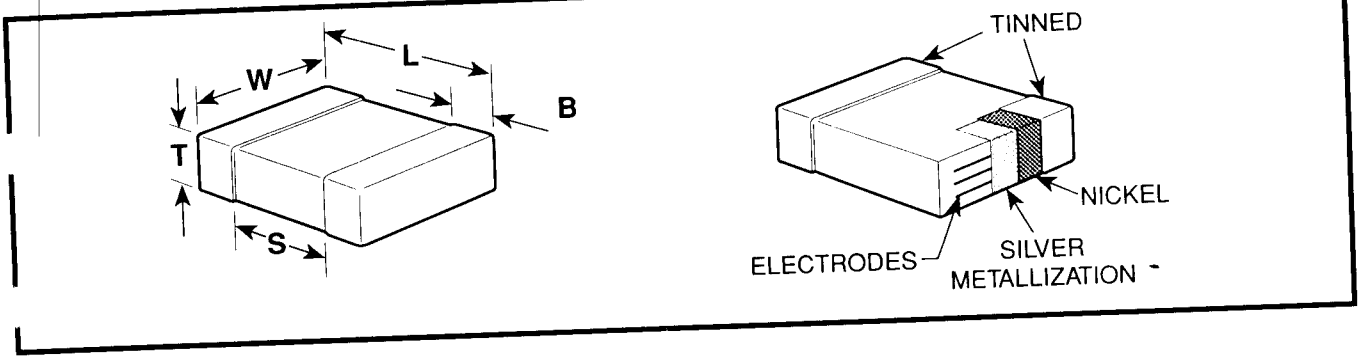
PACKAGING CODE

B = Bulk
C = Bulk Case, See Page 21, 22
T = 7" Reel Taping & 4mm Cavity pitch
L = 13" Reel Taping & 4mm Cavity pitch
H = 7" Reel Taping & 2mm Cavity pitch, See Page 5
N = 13" Reel Taping & 2mm Cavity pitch, See Page 5

FEATURES

- Eleven chip sizes
- C0G (NP0), X7R and Z5U Dielectrics
- 50,100 and 200 Volts
- Standard End Metalizations-tin-plated nickel barrier
- ±0.25 pF; ±0.5 pF; ±1%; ±2%; ±3%; ±5%; ±10%; ±20%; and +80%-20% capacitance tolerance available.
- Tape and reel packaging per EIA481-1. (See page 35 for specific tape and reel information.)

CAPACITOR OUTLINE DRAWINGS



DIMENSIONS—MILLIMETERS AND (INCHES)

METRIC SIZE CODE	EIA SIZE CODE	L LENGTH	W WIDTH	T THICKNESS MAX.	B BANDWIDTH	S MIN. SEPARATION	MOUNTING TECHNIQUE
1608	0603	1.6 (.063) ±0.15 (.006)	0.8 (.032) ±0.15 (.006)	0.9 (.035)	0.35 (.014) ±0.15 (.006)	0.7 (.028)	Solder Wave or Solder Reflow
2012	0805	2.0 (.079) ±0.2 (.008)	1.25 (.049) ±0.2 (.008)	1.3 (.051)*	0.5 (.02) ±.25 (.010)	0.75 (.030)	
2520	1005	2.5 (.098) ±0.2 (.008)	1.25 (.049) ±0.2 (.008)	1.5 (.059)	0.5 (.02) ±.25 (.010)	N/A	
3216	1206	3.2 (.126) ±0.2 (.008)	1.6 (.063) ±0.2 (.008)	1.5 (.059)	0.5 (.02) ±.25 (.010)	N/A	
3225	1210	3.2 (.126) ±0.2 (.008)	2.5 (.098) ±0.2 (.008)	1.7 (.067)	0.5 (.02) ±.25 (.010)	N/A	
4512	1805	4.5 (.177) ±0.3 (.012)	1.25 (.049) ±0.3 (.012)	1.7 (.067)	0.6 (.024) ±.35 (.014)	N/A	Solder Reflow
4520	1808	4.5 (.177) ±0.3 (.012)	2.0 (.079) ±0.3 (.012)	1.7 (.067)	0.6 (.024) ±.35 (.014)	N/A	
4532	1812	4.5 (.177) ±0.3 (.012)	3.2 (.126) ±0.3 (.012)	1.7 (.067)	0.6 (.024) ±.35 (.014)	N/A	
4564	1825	4.5 (.177) ±0.3 (.012)	6.4 (.252) ±0.4 (.016)	1.7 (.067)	0.6 (.024) ±.35 (.014)	N/A	
5650	2220	5.6 (.220) ±0.4 (.016)	5.0 (.197) ±0.4 (.016)	1.8 (.071)	0.6 (.024) ±.35 (.014)	N/A	
5664	2225	5.6 (.220) ±0.4 (.016)	6.3 (.248) ±0.4 (.016)	2.0 (.079)	0.6 (.024) ±.35 (.014)	N/A	

* Extended value maximum thickness 1.3 (.051).
letric size code given for reference only.

CAPACITOR ORDERING INFORMATION

C 0805 C 103 K 5 R A C

CERAMIC

EIA SIZE CODE

SPECIFICATION
C - Standard

CAPACITANCE CODE
Expressed in Picofarads (pF)
First two digits represent significant figures.
Third digit specifies number of zeros. (Use 9 for 1.0 thru 9.9pF. Use 8 for 0.5 through 0.99pF)
(Example: 2.2pF = 229 or 0.50 pF = 508)

CAPACITANCE TOLERANCE
C – ±0.25pF
D – ±0.5pF
F – ±1%
G – ±2%
H – ±3%
J – ±5%
K – ±10%
M – ±20%
P – (GMV)
Z – +80%, -20%

VOLTAGE
1 - 100V
2 - 200V
5 - 50V

TEMPERATURE CHARACTERISTIC
Designated by Capacitance Change Over Temperature Range
G – COG (NPO) (±30 PPM/°C)
R – X7R (±15%)
U – Z5U (+22%, -56%)

FAILURE RATE LEVEL
A- Not Applicable
(Military Product Only, see page 15.)

END METALLIZATION
C-Standard
(Tin-plated nickel barrier)

C0G CAPACITANCE RANGE – C0603, C0805, C1005, C1206 & C1210

CAP. PF	KEMET PART NUMBER	CAP. TOL.	C0603*	C0805*			C1005			C1206*			C1210*		
			50V	50V	100V	200V	50V	100V	200V	50V	100V	200V	50V	100V	200V
.50	C_ _ (1) _ _C508 (2) (3) GAC	C,D	508												
.75	C_ _ (1) _ _C758 (2) (3) GAC	C,D	758												
1.0	C_ _ (1) _ _C109 (2) (3) GAC	C,D	109	109	109	109	109	109	109	109	109	109			
1.2	C_ _ (1) _ _C129 (2) (3) GAC	C,D	129	129	129	129	129	129	129	129	129	129			
1.5	C_ _ (1) _ _C159 (2) (3) GAC	C,D	159	159	159	159	159	159	159	159	159	159			
1.8	C_ _ (1) _ _C189 (2) (3) GAC	C,D	189	189	189	189	189	189	189	189	189	189			
2.2	C_ _ (1) _ _C229 (2) (3) GAC	C,D	229	229	229	229	229	229	229	229	229	229			
2.7	C_ _ (1) _ _C279 (2) (3) GAC	C,D K	279	279	279	279	279	279	279	279	279	279			
3.3	C_ _ (1) _ _C339 (2) (3) GAC	C,D K	339	339	339	339	339	339	339	339	339	339			
3.9	C_ _ (1) _ _C399 (2) (3) GAC	C,D K	399	399	399	399	399	399	399	399	399	399			
4.7	C_ _ (1) _ _C479 (2) (3) GAC	C,D K	479	479	479	479	479	479	479	479	479	479			
5.6	C_ _ (1) _ _C569 (2) (3) GAC	C,D J,K	569	569	569	569	569	569	569	569	569	569			
6.8	C_ _ (1) _ _C689 (2) (3) GAC	C,D J,K	689	689	689	689	689	689	689	689	689	689			
8.2	C_ _ (1) _ _C829 (2) (3) GAC	C,D J,K	829	829	829	829	829	829	829	829	829	829			
10.0	C_ _ (1) _ _C100 (2) (3) GAC	C,D H,J,K	100	100	100	100	100	100	100	100	100	100	100	100	100
12.0	C_ _ (1) _ _C120 (2) (3) GAC	C,D H,J,K	120	120	120	120	120	120	120	120	120	120	120	120	120
15.0	C_ _ (1) _ _C150 (2) (3) GAC	C,D G,H,J,K	150	150	150	150	150	150	150	150	150	150	150	150	150
18.0	C_ _ (1) _ _C180 (2) (3) GAC	C,D G,H,J,K	180	180	180	180	180	180	180	180	180	180	180	180	180
22.0	C_ _ (1) _ _C220 (2) (3) GAC	C,D G,H,J,K	220	220	220	220	220	220	220	220	220	220	220	220	220
27.0	C_ _ (1) _ _C270 (2) (3) GAC	D,F,G,H,J,K	270	270	270	270	270	270	270	270	270	270	270	270	270
33.0	C_ _ (1) _ _C330 (2) (3) GAC	D,F,G,H,J,K	330	330	330	330	330	330	330	330	330	330	330	330	330
39.0	C_ _ (1) _ _C390 (2) (3) GAC	D,F,G,H,J,K	390	390	390	390	390	390	390	390	390	390	390	390	390
47.0	C_ _ (1) _ _C470 (2) (3) GAC	D,F,G,H,J,K	470	470	470	470	470	470	470	470	470	470	470	470	470
56.0	C_ _ (1) _ _C560 (2) (3) GAC	F,G,H,J,K	560	560	560	560	560	560	560	560	560	560	560	560	560
68.0	C_ _ (1) _ _C680 (2) (3) GAC	F,G,H,J,K	680	680	680	680	680	680	680	680	680	680	680	680	680
82.0	C_ _ (1) _ _C820 (2) (3) GAC	F,G,H,J,K	820	820	820	820	820	820	820	820	820	820	820	820	820
100.0	C_ _ (1) _ _C101 (2) (3) GAC	F,G,H,J,K	101	101	101	101	101	101	101	101	101	101	101	101	101
120.0	C_ _ (1) _ _C121 (2) (3) GAC	F,G,H,J,K	121	121	121	121	121	121	121	121	121	121	121	121	121
150.0	C_ _ (1) _ _C151 (2) (3) GAC	F,G,H,J,K	151	151	151	151	151	151	151	151	151	151	151	151	151
180.0	C_ _ (1) _ _C181 (2) (3) GAC	F,G,H,J,K	181	181	181	181	181	181	181	181	181	181	181	181	181
220.0	C_ _ (1) _ _C221 (2) (3) GAC	F,G,H,J,K	221	221	221	221	221	221	221	221	221	221	221	221	221
270.0	C_ _ (1) _ _C271 (2) (3) GAC	F,G,H,J,K		271	271	271#	271	271	271	271	271	271	271	271	271
330.0	C_ _ (1) _ _C331 (2) (3) GAC	F,G,H,J,K		331	331	331#	331	331	331	331	331	331	331	331	331
390.0	C_ _ (1) _ _C391 (2) (3) GAC	F,G,H,J,K		391	391	391#	391	391	391	391	391	391	391	391	391
470.0	C_ _ (1) _ _C471 (2) (3) GAC	F,G,H,J,K		471	471	471#	471	471	471	471	471	471	471	471	471
560.0	C_ _ (1) _ _C561 (2) (3) GAC	F,G,H,J,K		561	561		561	561		561	561	561	561	561	561
680.0	C_ _ (1) _ _C681 (2) (3) GAC	F,G,H,J,K		681	681#		681	681		681	681	681	681	681	681
820.0	C_ _ (1) _ _C821 (2) (3) GAC	F,G,H,J,K		821	821#		821	821		821	821	821	821	821	821
1000.0	C_ _ (1) _ _C102 (2) (3) GAC	F,G,H,J,K		102	102#		102	102		102	102	102	102	102	102
1200.0	C_ _ (1) _ _C122 (2) (3) GAC	F,G,H,J,K		122						122	122	122	122	122	122
1500.0	C_ _ (1) _ _C152 (2) (3) GAC	F,G,H,J,K		152						152	152	152	152	152	152
1800.0	C_ _ (1) _ _C182 (2) (3) GAC	F,G,H,J,K		182						182	182	182	182	182	182
2200.0	C_ _ (1) _ _C222 (2) (3) GAC	F,G,H,J,K								222	222		222	222	222
2700.0	C_ _ (1) _ _C272 (2) (3) GAC	F,G,H,J,K								272	272		272	272	272
3300.0	C_ _ (1) _ _C332 (2) (3) GAC	F,G,H,J,K								332	332		332	332	332
3900.0	C_ _ (1) _ _C392 (2) (3) GAC	F,G,H,J,K								392	392		392	392	
4700.0	C_ _ (1) _ _C472 (2) (3) GAC	F,G,H,J,K								472			472	472	
5600.0	C_ _ (1) _ _C562 (2) (3) GAC	F,G,H,J,K								562			562	562	
6800.0	C_ _ (1) _ _C682 (2) (3) GAC	F,G,H,J,K											682	682	
8200.0	C_ _ (1) _ _C822 (2) (3) GAC	F,G,H,J,K											822		
10,000.0	C_ _ (1) _ _C103 (2) (3) GAC	F,G,H,J,K											103		
12,000.0	C_ _ (1) _ _C123 (2) (3) GAC	F,G,H,J,K											123		

C1805, C1808, C1812, C1825, C2220 & C2225

CAP. PF	KEMET PART NUMBER	CAP. TOL.	C1805			C1808			C1812*			C1825*			C2220		C2225		
			50V	100V	200V	50V	100V	200V	50V	100V	200V	50V	100V	200V	50V	100V	50V	100V	200V
220.0	C_ _ (1) _ _C221 (2) (3) GAC	F,G,H,J,K	221	221	221														
270.0	C_ _ (1) _ _C271 (2) (3) GAC	F,G,H,J,K	271	271	271														
330.0	C_ _ (1) _ _C331 (2) (3) GAC	F,G,H,J,K	331	331	331	331	331	331											
390.0	C_ _ (1) _ _C391 (2) (3) GAC	F,G,H,J,K	391	391	391	391	391	391											
470.0	C_ _ (1) _ _C471 (2) (3) GAC	F,G,H,J,K	471	471	471	471	471	471	471	471	471								
560.0	C_ _ (1) _ _C561 (2) (3) GAC	F,G,H,J,K	561	561	561	561	561	561	561	561	561								
680.0	C_ _ (1) _ _C681 (2) (3) GAC	F,G,H,J,K	681	681	681	681	681	681	681	681	681								
820.0	C_ _ (1) _ _C821 (2) (3) GAC	F,G,H,J,K	821	821	821	821	821	821	821	821	821								
1000.0	C_ _ (1) _ _C102 (2) (3) GAC	F,G,H,J,K	102	102	102	102	102	102	102	102	102								
1200.0	C_ _ (1) _ _C122 (2) (3) GAC	F,G,H,J,K	122	122		122	122	122	122	122	122								
1500.0	C_ _ (1) _ _C152 (2) (3) GAC	F,G,H,J,K	152	152		152	152	152	152	152	152								
1800.0	C_ _ (1) _ _C182 (2) (3) GAC	F,G,H,J,K	182	182		182	182	182	182	182	182								
2200.0	C_ _ (1) _ _C222 (2) (3) GAC	F,G,H,J,K	222	222		222	222	222	222	222	222								
2700.0	C_ _ (1) _ _C272 (2) (3) GAC	F,G,H,J,K	272	272		272	272	272	272	272	272								
3300.0	C_ _ (1) _ _C332 (2) (3) GAC	F,G,H,J,K				332	332		332	332	332								
3900.0	C_ _ (1) _ _C392 (2) (3) GAC	F,G,H,J,K				392	392		392	392	392	392	392	392					
4700.0	C_ _ (1) _ _C472 (2) (3) GAC	F,G,H,J,K				472	472		472	472	472	472	472	472			472	472	472
5600.0	C_ _ (1) _ _C562 (2) (3) GAC	F,G,H,J,K							562	562	562	562	562	562			562	562	562
6800.0	C_ _ (1) _ _C682 (2) (3) GAC	F,G,H,J,K							682	682	682	682	682	682	682	682	682	682	682
8200.0	C_ _ (1) _ _C822 (2) (3) GAC	F,G,H,J,K							822	822		822	822	822	822	822	822	822	822
10,000.0	C_ _ (1) _ _C103 (2) (3) GAC	F,G,H,J,K							103	103		103	103	103	103	103	103	103	103
12,000.0	C_ _ (1) _ _C123 (2) (3) GAC	F,G,H,J,K										123	123	123	123	123	123	123	123
15,000.0	C_ _ (1) _ _C153 (2) (3) GAC	F,G,H,J,K										153	153		153	153	153	153	153
18,000.0	C_ _ (1) _ _C183 (2) (3) GAC	F,G,H,J,K										183	183		183	183	183	183	
22,000.0	C_ _ (1) _ _C223 (2) (3) GAC	F,G,H,J,K										223	223		223		223	223	
27,000.0	C_ _ (1) _ _C273 (2) (3) GAC	F,G,H,J,K										273	273		273		273	273	
33,000.0	C_ _ (1) _ _C333 (2) (3) GAC	F,G,H,J,K															333		

(1) To complete part number, insert four digit number for KEMET style desired: 0603, 0805, 1005, 1206, 1210, 1805, 1808, 1812, 1825, 2220 or 2225.
(2) To complete part number, insert appropriate letter for capacitance tolerance desired per table.
(3) To complete part number, insert appropriate number for voltage desired: "2" for 200 volts, "1" for 100 volts and "5" for 50 volts.
*EIA preferred chip sizes #DF Limit for Extented Range is 0.15%.
NOTE: For non-standard capacitance values or voltages, contact your local KEMET sales representative. 50 Volt Ceramic Chips can be used for 63 volt applications.

X7R CAPACITANCE RANGE – C0603, C0805, C1005, C1206 & C1210

CAP. PF	KEMET PART NUMBER	CAP. TOL.	C0603*	C0805*			C1005			C1206*			C1210*		
			50V	50V	100V	200V	50V	100V	200V	50V	100V	200V	50V	100V	200V
180.0	C_ _ (1) _ _C181 (2) (3) RAC	K,M,J	181												
220.0	C_ _ (1) _ _C221 (2) (3) RAC	K,M,J	221	221	221	221									
270.0	C_ _ (1) _ _C271 (2) (3) RAC	K,M,J	271	271	271	271									
330.0	C_ _ (1) _ _C331 (2) (3) RAC	K,M,J	331	331	331	331									
390.0	C_ _ (1) _ _C391 (2) (3) RAC	K,M,J	391	391	391	391									
470.0	C_ _ (1) _ _C471 (2) (3) RAC	K,M,J	471	471	471	471									
560.0	C_ _ (1) _ _C561 (2) (3) RAC	K,M,J	561	561	561	561									
680.0	C_ _ (1) _ _C681 (2) (3) RAC	K,M,J	681	681	681	681	681	681	681						
820.0	C_ _ (1) _ _C821 (2) (3) RAC	K,M,J	821	821	821	821	821	821	821						
1000.0	C_ _ (1) _ _C102 (2) (3) RAC	K,M,J	102	102	102	102	102	102	102	102	102	102			
1200.0	C_ _ (1) _ _C122 (2) (3) RAC	K,M,J	122	122	122	122	122	122	122	122	122	122			
1500.0	C_ _ (1) _ _C152 (2) (3) RAC	K,M,J	152	152	152	152	152	152	152	152	152	152			
1800.0	C_ _ (1) _ _C182 (2) (3) RAC	K,M,J	182	182	182	182	182	182	182	182	182	182			
2200.0	C_ _ (1) _ _C222 (2) (3) RAC	K,M,J	222	222	222	222	222	222	222	222	222	222	222	222	222
2700.0	C_ _ (1) _ _C272 (2) (3) RAC	K,M,J	272	272	272	272	272	272		272	272	272	272	272	272
3300.0	C_ _ (1) _ _C332 (2) (3) RAC	K,M,J	332	332	332	332	332	332		332	332	332	332	332	332
3900.0	C_ _ (1) _ _C392 (2) (3) RAC	K,M,J	392	392	392	392	392	392		392	392	392	392	392	392
4700.0	C_ _ (1) _ _C472 (2) (3) RAC	K,M,J	472	472	472	472	472	472		472	472	472	472	472	472
5600.0	C_ _ (1) _ _C562 (2) (3) RAC	K,M,J	562	562	562	562	562	562		562	562	562	562	562	562
6800.0	C_ _ (1) _ _C682 (2) (3) RAC	K,M,J	682	682	682	682	682	682		682	682	682	682	682	682
8200.0	C_ _ (1) _ _C822 (2) (3) RAC	K,M,J	822	822	822		822	822		822	822	822	822	822	822
10,000.0	C_ _ (1) _ _C103 (2) (3) RAC	K,M,J	103	103	103		103	103		103	103	103	103	103	103
12,000.0	C_ _ (1) _ _C123 (2) (3) RAC	K,M,J	123	123			123	123		123	123	123	123	123	123
15,000.0	C_ _ (1) _ _C153 (2) (3) RAC	K,M,J	153	153			153	153		153	153	153	153	153	153
18,000.0	C_ _ (1) _ _C183 (2) (3) RAC	K,M,J	183	183			183			183	183	183	183	183	183
22,000.0	C_ _ (1) _ _C223 (2) (3) RAC	K,M,J		223			223			223	223	223	223	223	223
27,000.0	C_ _ (1) _ _C273 (2) (3) RAC	K,M,J		273			273			273	273		273	273	273
33,000.0	C_ _ (1) _ _C333 (2) (3) RAC	K,M,J		333			333			333	333		333	333	333
39,000.0	C_ _ (1) _ _C393 (2) (3) RAC	K,M,J		393			393			393	393		393	393	393
47,000.0	C_ _ (1) _ _C473 (2) (3) RAC	K,M,J		473						473	473		473	473	473
56,000.0	C_ _ (1) _ _C563 (2) (3) RAC	K,M,J		563						563			563	563	
68,000.0	C_ _ (1) _ _C683 (2) (3) RAC	K,M,J		683						683			683	683	
82,000.0	C_ _ (1) _ _C823 (2) (3) RAC	K,M,J		823						823			823	823	
100,000.0	C_ _ (1) _ _C104 (2) (3) RAC	K,M,J		104						104			104	104	
120,000.0	C_ _ (1) _ _C124 (2) (3) RAC	K,M,J								124			124		
150,000.0	C_ _ (1) _ _C154 (2) (3) RAC	K,M,J								154			154		
180,000.0	C_ _ (1) _ _C184 (2) (3) RAC	K,M,J								184			184		
220,000.0	C_ _ (1) _ _C224 (2) (3) RAC	K,M,J								224			224		
270,000.0	C_ _ (1) _ _C274 (2) (3) RAC	K,M,J											274		
330,000.0	C_ _ (1) _ _C334 (2) (3) RAC	K,M,J											334		

C1805, C1808, C1812, C1825, C2220, & C2225

CAP. PF	KEMET PART NUMBER	CAP. TOL.	C1805			C1808			C1812*			C1825*			C2220		C2225		
			50V	100V	200V	50V	100V	200V	50V	100V	200V	50V	100V	200V	50V	100V	50V	100V	200V
2700.0	C_ _ (1) _ _C272 (2) (3) RAC	K,M,J	272	272	272														
3300.0	C_ _ (1) _ _C332 (2) (3) RAC	K,M,J	332	332	332														
3900.0	C_ _ (1) _ _C392 (2) (3) RAC	K,M,J	392	392	392														
4700.0	C_ _ (1) _ _C472 (2) (3) RAC	K,M,J	472	472	472	472	472	472											
5600.0	C_ _ (1) _ _C562 (2) (3) RAC	K,M,J	562	562	562	562	562	562											
6800.0	C_ _ (1) _ _C682 (2) (3) RAC	K,M,J	682	682		682	682	682	682	682	682								
8200.0	C_ _ (1) _ _C822 (2) (3) RAC	K,M,J	822	822		822	822	822	822	822	822								
10,000.0	C_ _ (1) _ _C103 (2) (3) RAC	K,M,J	103	103		103	103	103	103	103	103								
12,000.0	C_ _ (1) _ _C123 (2) (3) RAC	K,M,J	123	123		123	123	123	123	123	123								
15,000.0	C_ _ (1) _ _C153 (2) (3) RAC	K,M,J	153	153		153	153	153	153	153	153								
18,000.0	C_ _ (1) _ _C183 (2) (3) RAC	K,M,J	183	183		183	183	183	183	183	183								
22,000.0	C_ _ (1) _ _C223 (2) (3) RAC	K,M,J	223	223		223	223		223	223	223	223	223	223					
27,000.0	C_ _ (1) _ _C273 (2) (3) RAC	K,M,J	273	273		273	273		273	273	273	273	273	273					
33,000.0	C_ _ (1) _ _C333 (2) (3) RAC	K,M,J	333			333	333		333	333	333	333	333	333					
39,000.0	C_ _ (1) _ _C393 (2) (3) RAC	K,M,J	393			393	393		393	393	393	393	393	393					
47,000.0	C_ _ (1) _ _C473 (2) (3) RAC	K,M,J	473			473	473		473	473	473	473	473	473			473	473	473
56,000.0	C_ _ (1) _ _C563 (2) (3) RAC	K,M,J	563			563	563		563	563		563	563	563			563	563	563
68,000.0	C_ _ (1) _ _C683 (2) (3) RAC	K,M,J	683			683			683	683		683	683	683			683	683	683
82,000.0	C_ _ (1) _ _C823 (2) (3) RAC	K,M,J	823			823			823	823		823	823	823			823	823	823
100,000.0	C_ _ (1) _ _C104 (2) (3) RAC	K,M,J	104			104			104	104		104	104	104			104	104	104
120,000.0	C_ _ (1) _ _C124 (2) (3) RAC	K,M,J				124			124			124	124				124	124	124
150,000.0	C_ _ (1) _ _C154 (2) (3) RAC	K,M,J				154			154			154	154				154	154	154
180,000.0	C_ _ (1) _ _C184 (2) (3) RAC	K,M,J				184			184			184	184				184	184	
220,000.0	C_ _ (1) _ _C224 (2) (3) RAC	K,M,J							224			224	224				224	224	
270,000.0	C_ _ (1) _ _C274 (2) (3) RAC	K,M,J							274			274			274	274	274	274	
330,000.0	C_ _ (1) _ _C334 (2) (3) RAC	K,M,J							334			334			334	334	334	334	
390,000.0	C_ _ (1) _ _C394 (2) (3) RAC	K,M,J							394			394			394	394	394	394	
470,000.0	C_ _ (1) _ _C474 (2) (3) RAC	K,M,J							474			474			474	474	474	474	
560,000.0	C_ _ (1) _ _C564 (2) (3) RAC	K,M,J										564			564		564		
680,000.0	C_ _ (1) _ _C684 (2) (3) RAC	K,M,J										684			684		684		
820,000.0	C_ _ (1) _ _C824 (2) (3) RAC	K,M,J													824		824		
1,000,000.0	C_ _ (1) _ _C105 (2) (3) RAC	K,M,J													105		105		
1,200,000.0	C_ _ (1) _ _C125 (2) (3) RAC	K,M,J													125				

(1) To complete part number, insert four digit number for KEMET style desired: 0603, 0805, 1005, 1206, 1210, 1805, 1808, 1812, 1825, 2220 or 2225.
(2) To complete part number, insert appropriate letter for capacitance tolerance desired per table.
(3) To complete part number, insert appropriate number for voltage desired: "2" for 200 volts, "1" for 100 volts and "5" for 50 volts.
*EIA preferred chip sizes
NOTE: For non-standard capacitance values or voltages, contact your local KEMET sales representative. 50 Volt Ceramic Chips can be used for 63 volt applications.

TDK Multilayer Ceramic Chip Capacitors

C Series

Features

Multilayer Ceramic Chip Capacitors nickel barrier type.

Class I and class II.

Delivered as standard on tape and reel.

Electrical Specifications

Capacitance range

0.5pF to 4.7µF

Capacitance measuring conditions

Class 1	
1000pF and less	5Vrms max, 1MHz ±10%
>1000pF	5Vrms max, 1kHz ±10%
Class 2	
1kHz ± 10%	1.0 ± 0.2 Vrms

Q or Dielectric dissipation factor (tan∂)

C0G	30pF min	Q>=1000
	less than 30pF	Q>=400+20xC where C is the nominal capacitance
X7R	3.0% Max	
Z5U	4.0% Max	
Y5V	5.0% Max	

Withstand voltage 1-5 seconds

C0G	3 x rated voltage
Others	2.5 x rated voltage

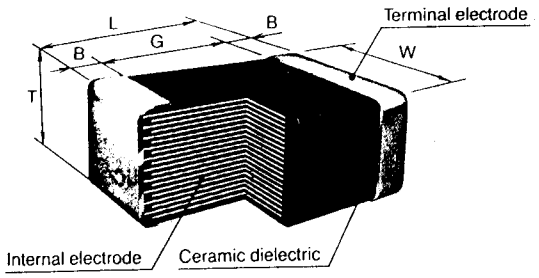
Insulation resistance

50V	10GΩ or 500MΩ x capacitance in µF whichever is the smaller
25V	10GΩ or 500MΩ x capacitance in µF whichever is the smaller
16V	10GΩ or 100MΩ x capacitance in µF whichever is the smaller

Product Identification

1 2 3 4 5 6

Shapes and Dimensions



1 Product symbol

C1608	1.6±0.1	0.8±0.1	0.9	0.2	0.3
[0603]	[.063±.004]	[.031±.004]	[.035]	[.008]	[.012]
C2012	2.0±0.2	1.25±0.2	1.45	0.2	0.5
[0805]	[.079±.008]	[.049±.008]	[.057]	[.008]	[.020]
C3216	3.2±0.2	1.6±0.2	1.30	0.2	1.0
[1206]	[.126±.008]	[.063±.008]	[.051]	[.008]	[.039]

Dimensions in mm [inches]

2 Capacitance temperature characteristics

C0G	0 ±30 ppm/°C	-55 to +125 [-67 to +257]
X7R	±15%	-55 to +125 [-67 to +257]
Z5U	+22% -56%	+10 to +85 [+50 to +185]
Y5V	+22% -82%	-30 to +85 [-22 to +185]

3 Rated voltage

16	1C
25	1E
50	1H

4 Nominal capacitance

Stated in three digits 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. However, when there are decimal digits included they are stated as R.

TDK Multilayer Ceramic Chip Capacitors

C Series *(Continued)*

Examples

1	010
10	100
1000	102
0.5	0R5
3.5	3R5

Capacitance tolerance

±0.25pF	C	10pF max.
±0.5pF	D	
±5%	J	12pF min.
10%	K	
±20%	M	
+80,-20%	Z	

6 Tape and reel

For taping specification please refer to pages 6.1 - 6.4.

TDK Multilayer Ceramic Chip Capacitors

Class 1 50 Vdc

0.5±0.25pF	C1608C0G1H0R5CT	C2012C0G1H0R5CT	C3216C0G1H0R5CT
1.0±0.25pF	C1608C0G1H010CT	C2012C0G1H010CT	C3216C0G1H010CT
1.5±0.25pF	C1608C0G1H1R5CT	C2012C0G1H1R5CT	C3216C0G1H1R5CT
2.0±0.25pF	C1608C0G1H020CT	C2012C0G1H020CT	C3216C0G1H020CT
2.5±0.25pF	C1608C0G1H2R5CT	C2012C0G1H2R5CT	C3216C0G1H2R5CT
3.0±0.25pF	C1608C0G1H030CT	C2012C0G1H030CT	C3216C0G1H030CT
3.5±0.25pF	C1608C0G1H3R5CT	C2012C0G1H3R5CT	C3216C0G1H3R5CT
4.0±0.25pF	C1608C0G1H040CT	C2012C0G1H040CT	C3216C0G1H040CT
4.5±0.25pF	C1608C0G1H4R5CT	C2012C0G1H4R5CT	C3216C0G1H4R5CT
5.0±0.5pF	C1608C0G1H050DT	C2012C0G1H050DT	C3216C0G1H050DT
6.0±0.5pF	C1608C0G1H060DT	C2012C0G1H060DT	C3216C0G1H060DT
7.0±0.5pF	C1608C0G1H070DT	C2012C0G1H070DT	C3216C0G1H070DT
8.0±0.5pF	C1608C0G1H080DT	C2012C0G1H080DT	C3216C0G1H080DT
9.0±0.5pF	C1608C0G1H090DT	C2012C0G1H090DT	C3216C0G1H090DT
10±0.5pF	C1608C0G1H100DT	C2012C0G1H100DT	C3216C0G1H100DT
12±5%	C1608C0G1H120JT	C2012C0G1H120JT	C3216C0G1H120JT
15±5%	C1608C0G1H150JT	C2012C0G1H150JT	C3216C0G1H150JT
18±5%	C1608C0G1H180JT	C2012C0G1H180JT	C3216C0G1H180JT
22±5%	C1608C0G1H220JT	C2012C0G1H220JT	C3216C0G1H220JT
27±5%	C1608C0G1H270JT	C2012C0G1H270JT	C3216C0G1H270JT
33±5%	C1608C0G1H330JT	C2012C0G1H330JT	C3216C0G1H330JT
39±5%	C1608C0G1H390JT	C2012C0G1H390JT	C3216C0G1H390JT
47±5%	C1608C0G1H470JT	C2012C0G1H470JT	C3216C0G1H470JT
56±5%	C1608C0G1H560JT	C2012C0G1H560JT	C3216C0G1H560JT
68±5%	C1608C0G1H680JT	C2012C0G1H680JT	C3216C0G1H680JT
82±5%	C1608C0G1H820JT	C2012C0G1H820JT	C3216C0G1H820JT
100±5%	C1608C0G1H101JT	C2012C0G1H101JT	C3216C0G1H101JT
120±5%	C1608C0G1H121JT	C2012C0G1H121JT	C3216C0G1H121JT
150±5%	C1608C0G1H151JT	C2012C0G1H151JT	C3216C0G1H151JT
180±5%	C1608C0G1H181JT	C2012C0G1H181JT	C3216C0G1H181JT
220±5%	C1608C0G1H221JT	C2012C0G1H221JT	C3216C0G1H221JT
270±5%	C1608C0G1H271JT	C2012C0G1H271JT	C3216C0G1H271JT
330±5%	C1608C0G1H331JT	C2012C0G1H331JT	C3216C0G1H331JT
390±5%	C1608C0G1H391JT	C2012C0G1H391JT	C3216C0G1H391JT
470±5%	C1608C0G1H471JT	C2012C0G1H471JT	C3216C0G1H471JT
560±5%		C2012C0G1H561JT	C3216C0G1H561JT
680±5%		C2012C0G1H681JT	C3216C0G1H681JT
820±5%		C2012C0G1H821JT	C3216C0G1H821JT
1000±5%		C2012C0G1H102JT	C3216C0G1H102JT

TDK Multilayer Ceramic Chip Capacitors

Class 2 50 Vdc

	C1608 (0603)	C2012 (0805)	C3216 (1206)
220±10%	C1608X7R1H221KT		
270±10%	C1608X7R1H271KT		
330±10%	C1608X7R1H331KT		
390±10%	C1608X7R1H391KT		
470±10%	C1608X7R1H471KT	C2012X7R1H471KT	C3216X7R1H471KT
560±10%	C1608X7R1H561KT	C2012X7R1H561KT	C3216X7R1H561KT
680±10%	C1608X7R1H681KT	C2012X7R1H681KT	C3216X7R1H681KT
820±10%	C1608X7R1H821KT	C2012X7R1H821KT	C3216X7R1H821KT
1000±10%	C1608X7R1H102KT	C2012X7R1H102KT	C3216X7R1H102KT
1200±10%	C1608X7R1H122KT	C2012X7R1H122KT	C3216X7R1H122KT
1500±10%	C1608X7R1H152KT	C2012X7R1H152KT	C3216X7R1H152KT
1800±10%	C1608X7R1H182KT	C2012X7R1H182KT	C3216X7R1H182KT
2200±10%	C1608X7R1H222KT	C2012X7R1H222KT	C3216X7R1H222KT
2700±10%	C1608X7R1H272KT	C2012X7R1H272KT	C3216X7R1H272KT
3300±10%	C1608X7R1H332KT	C2012X7R1H332KT	C3216X7R1H332KT
3900±10%	C1608X7R1H392KT	C2012X7R1H392KT	C3216X7R1H392KT
4700±10%	C1608X7R1H472KT	C2012X7R1H472KT	C3216X7R1H472KT
5600±10%	C1608X7R1H562KT	C2012X7R1H562KT	C3216X7R1H562KT
6800±10%	C1608X7R1H682KT	C2012X7R1H682KT	C3216X7R1H682KT
8200±10%	C1608X7R1H822KT	C2012X7R1H822KT	C3216X7R1H822KT
10000±10%	C1608X7R1H103KT	C2012X7R1H103KT	C3216X7R1H103KT
12000±10%	C1608X7R1H123KT	C2012X7R1H123KT	C3216X7R1H123KT
15000±10%	C1608X7R1H153KT	C2012X7R1H153KT	C3216X7R1H153KT
18000±10%		C2012X7R1H183KT	C3216X7R1H183KT
22000±10%		C2012X7R1H223KT	C3216X7R1H223KT
27000±10%		C2012X7R1H273KT	C3216X7R1H273KT
33000±10%		C2012X7R1H333KT	C3216X7R1H333KT
39000±10%		C2012X7R1H393KT	C3216X7R1H393KT
47000±10%		C2012X7R1H473KT	C3216X7R1H473KT
56000±10%		C2012X7R1H563KT	C3216X7R1H563KT
68000±10%			C3216X7R1H683KT
82000±10%			C3216X7R1H823KT
100000±10%		C2012X7R1H104KT	C3216X7R1H104KT
120000±10%			C3216X7R1H124KT
150000±10%			C3216X7R1H154KT

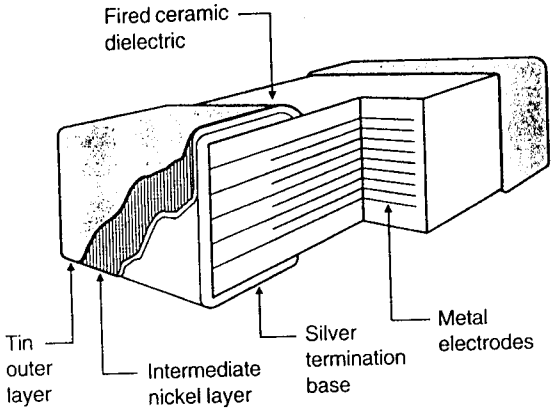
Leaching

Leaching is the term for the dissolution of silver into the solder during the soldering operation. This weakens the terminations leading to an increase in equivalent series resistance (esr), tan δ and open circuit faults as well as the possibility of the chip becoming detached from the substrate.

To prevent leaching, the following should be observed:-

1. Prework should be kept to a minimum.
2. An adequate preheat period is essential.
3. Solder temperature should be held at the lower end of the normal range.
4. Dwell time should be kept to a minimum.
5. Use ceramic chip capacitors with an "anti-leaching layer". We incorporate a "barrier layer" of Nickel in the end terminations to prevent leaching.

Multilayer ceramic chip - with Nickel barrier termination



Ordering information for Surface Mount Chip Capacitors

Example: ..... 0805 J 100 0101 J C T □□□

Type No/Size ref

Termination
- F = Silver Palladium
- J = Nickel Barrier

Special Terminations
- A = High Leach Resistant Silver Palladium

Voltage d.c.

016 = 16 Volts	1K0 = 1KV
025 = 25 Volts	2K0 = 2KV
050 = 50 Volts	3K0 = 3KV
063 = 63 Volts	4K0 = 4KV
100 = 100 Volts	5K0 = 5KV
200 = 200 Volts	
500 = 500 Volts	

Capacitance (pF)

First digit	-	0
Second digit	-	First significant figure of capacitance value
Third digit	-	Second significant figure of capacitance value
Fourth digit	-	Number of zeros following eg. 101 = 100pF for values below 10pF a P is inserted in the second position instead of a decimal point. eg. 2P2 = 2.2pF

Capacitance tolerance code

Ultra stable class			Stable class	
Cr < 10pF	± 0.10 pF	B	± 5%	J
	± 0.25 pF	C	± 10%	K
	± 0.5 pF	D	± 20%	M
Cr ≥ 10pF	± 1%	F	**G.P. class**	
	± 2%	G	± 20%	M
	± 5%	J	-20% + 80%	Z
	± 10%	K		

Dielectric code

Dielectric		Classes		
Class	**Code**	**CECC**	**EIA**	**MIL**
Ultra stable	C	1B/CG	COG(NPO)	CG/(BP)
Stable	X	2R1	X7R	
General purpose	Z	2F4	Z5U	
Ultra High Frequency	Q			
To special order				
Stable	B	2X1		BX
Stable	R	2C1		BZ

Note: For 0402 size only, ultra stable dielectric material is C0H which has a TC of 0±60ppm/°C. The dielectric code is 'H'.

Taped and reeled chips (see page 29 for quantities)
- T = 178mm (7" reel)
- R = 330mm (13" reel)
- B = Bulk pack - tubs
- C = Bulk pack - cassette

Suffix code. The remaining alpha/numeric digits are used to denote variations from standard products to customer special requirements (electrical, packing, mechanical, environmental, coding etc.)

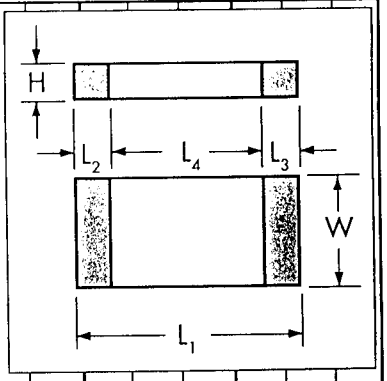
Surface Mount Chip Capacitors - 50/63, 100, 200V

Size & Capacitance Table - Ultra-stable dielectric

C0G

Type		0805	0907	1206	1210	1812	2220	2225
Dimensions								
Length (L_1)	mm	2.0±0.3	2.3±0.3	3.2±0.3	3.2±0.3	4.5±0.35	5.7±0.4	5.7±0.4
	inches	0.08±0.012	0.09±0.012	0.125±0.012	0.125±0.012	0.18±0.014	0.225±0.016	0.225±0.016
Width (W)Max	mm	1.25±0.2	1.8±0.3	1.6±0.2	2.5±0.3	3.2±0.3	5.0±0.4	6.3±0.4
	inches	0.05±0.008	0.071±0.012	0.063±0.008	0.10±0.012	0.125±0.012	0.197±0.016	0.25±0.016
Thickness (H) Max	mm	1.3	1.3	1.6	1.8	1.8	1.8	1.8
	inches	0.051	0.051	0.063	0.07	0.07	0.07	0.07
Termination Band (L_2 and L_3)	mm	Min 0.25 Max 0.75	Min 0.25 Max 0.75	Min 0.25 Max 0.75	Min 0.25 Max 0.75	Min 0.25 Max 0.75	Min 0.25 Max 0.75	Min 0.25 Max 0.75
	inches	0.01 0.03	0.01 0.03	0.01 0.03	0.01 0.03	0.01 0.03	0.01 0.03	0.01 0.03
Band Gap (L_4) Min	mm	0.5	0.5	1.4	1.4	2.2	2.9	2.9
	inches	0.019	0.019	0.055	0.055	0.087	0.114	0.114
Rated voltage d.c.		50/63 100 200	50/63 100 200	50/63 100 200	50/63 100 200	50/63 100 200	50/63 100 200	50/63 100 200

Cap. range	Code	Minimum and Maximum capacitance values available
1.0pF	1p0	
1.2	1p2	
1.5	1p5	
1.8	1p8	
2.2	2p2	
2.7	2p7	
3.3	3p3	
3.9	3p9	
4.7	4p7	
5.6	5p6	
6.8	6p8	
8.2	8p2	
10	100	
12	120	
15	150	
18	180	
22	220	
27	270	
33	330	
39	390	
47	470	
56	560	
68	680	
82	820	
100	101	
120	121	
150	151	
180	181	
220	221	
270	271	
330	331	
390	391	
470	471	
560	561	
680	681	
820	821	
1.0nF	102	
1.2	122	
1.5	152	
1.8	182	
2.2	222	
2.7	272	
3.3	332	
3.9	392	
4.7	472	
5.6	562	
6.8	682	
8.2	822	
10	103	
12	123	
15	153	
18	183	
22	223	
27	273	
33	333	
39	393	
47	473	
56	563	
68	683	



Notes:
1. For details of ordering see page 33.
2. Capacitance values to the E24 range also available.
3. Higher capacitance values may be available with a corresponding increase in thickness.
4. Sizes 1005 and 1808 are available as a special requirement.
5. Chips to a specified thickness can be supplied as a special requirement.

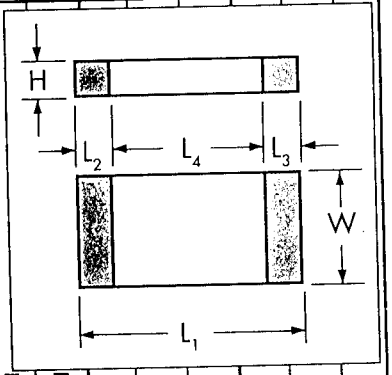
Surface Mount Chip Capacitors - 50/63, 100, 200V

Size & Capacitance Table - Stable dielectric

X7R

Type	0805	0907	1206	1210	1812	2220	2225
Dimensions							
Length (L_1) mm	2.0±0.3	2.3±0.3	3.2±0.3	3.2±0.3	4.5±0.35	5.7±0.4	5.7±0.4
inches	0.08±0.012	0.09±0.012	0.125±0.012	0.125±0.012	0.18±0.014	0.225±0.016	0.225±0.016
Width (W)Max mm	1.25±0.2	1.8±0.3	1.6±0.2	2.5±0.3	3.2±0.3	5.0±0.4	6.3±0.4
inches	0.05±0.008	0.071±0.012	0.063±0.008	0.10±0.012	0.125±0.012	0.197±0.016	0.25±0.016
Thickness (H) Max mm	1.3	1.3	1.6	1.8	1.8	1.8	1.8
inches	0.051	0.051	0.063	0.07	0.07	0.07	0.07
Termination Band (L_2 and L_3) mm	Min Max	Min Max	Min Max	Min Max	Min Max	Min Max	Min Max
inches	0.25 0.75	0.25 0.75	0.25 0.75	0.25 0.75	0.25 0.75	0.25 0.75	0.25 0.75
	0.01 0.03	0.01 0.03	0.01 0.03	0.01 0.03	0.01 0.03	0.01 0.03	0.01 0.03
Band Gap (L_4) Min mm	0.5	0.5	1.4	1.4	2.2	2.9	2.9
inches	0.019	0.019	0.055	0.055	0.087	0.114	0.114
Rated voltage d.c.	50/63 100 200	50/63 100 200	50/63 100 200	50/63 100 200	50/63 100 200	50/63 100 200	50/63 100 200

Cap. range	Code	Minimum and Maximum capacitance values available
100pF	101	
120	121	
150	151	
180	181	
220	221	
270	271	
330	331	
390	391	
470	471	
560	561	
680	681	
820	821	
1.0nF	102	
1.2	122	
1.5	152	
1.8	182	
2.2	222	
2.7	272	
3.3	332	
3.9	392	
4.7	472	
5.6	562	
6.8	682	
8.2	822	
10	103	
12	123	
15	153	
18	183	
22	223	
27	273	
33	333	
39	393	
47	473	
56	563	
68	683	
82	823	
100	104	
120	124	
150	154	
180	184	
220	224	
270	274	
330	334	
390	394	
470	474	
560	564	
680	684	
820	824	
1.0µF	105	
1.2	125	
1.5	155	
1.8	185	
2.2	225	
2.7	275	
3.3	335	
3.9	395	
4.7	475	



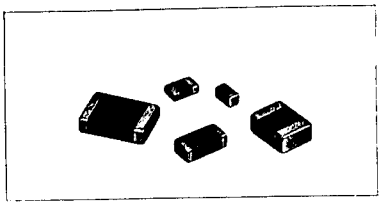
Maximum values by dielectric class (in capacitance code)

BX/2X1	**Code B**	153	562	182	333	103	392	473	183	682	124	333	153	224	683	273	564	154	563	684	184	683
2C1	**Code R**	333	103	332	563	223	562	104	333	103	184	683	223	394	124	393	824	274	823	105	394	104
X7R/2R1	**Code X**	104	273	153	104	563	333	184	104	563	334	184	104	564	334	184	125	684	394	155	105	564

Notes: 1. For details of ordering see page 33.
2. Higher capacitance values may be available with a corresponding increase in thickness.
3. Sizes 1005, 1808 are available as a special requirement
4. Chips to a specified thickness can be supplied as a special requirement

積層形磁器コンデンサ
MULTI-LAYER CERAMIC CAPACITORS

Pd系電極積層磁器コンデンサ
Pd BASED ELECTRODE MULTI LAYER CERAMIC CAPACITORS



この積層磁器コンデンサは従来，一般に使用されているパラジウムを内部および外部電極に使用したもので，高密度自動実装に適した信頼性の高いチップ部品で品種には105形，107形，212形，316形の4種があります。

These highly reliable chip type multi layer ceramic capacitors,which have been currently provided with palladium internal and external electrodes, are available in four types as the 105, 107, 212 and 316 that are suitable for high density automatic mounting operations.

特 長/FEATURES

- 実装密度の向上が図れます。
- モノリシック構造のため，信頼性が高い。
- 同一形状，静電容量範囲が広い。

- Improve mounting density.
- High reliability assured by monolithic structure.
- A single configuration, wide range of capacitance.

形 名/ORDERING CODE

[EXAMPLE] UMK 212 CH 560 J Q−T

7	梱包記号	Packaging symbol
6	特殊記号(厚み)	Special symbol (Thickness)
5	静電容量許容差記号	Capacitance tolerance symbol
4	公称静電容量	Nominal capacitance
3	温度特性	Temperature characteristics
2	外形記号	External symbol
1	形式(定格電圧)	Type (Rated voltage)

積層形磁器コンデンサ
MULTILAYER CERAMIC CAPACITORS

■ 特性 CHARACTERISTICS

1 形式（定格電圧） TYPE (RATED VOLTAGE)

記号 Symbol		定格電圧(DC) Rated voltage
EMK	:	16V
TMK	:	25V
UMK	:	50V

2 外形記号 EXTERNAL SYMBOL

記号 Symbol		L×T [mm]
105	:	1.0×0.5 (EIA : CC0402)
107	:	1.6×0.8 (EIA : CC0603)
212	:	2.0×1.25 (EIA : CC0805)
316	:	3.2×1.6 (EIA : CC1206)

3 温度特性 TEMPERATURE CHARACTERISTICS

種類 1（EIA準拠品） Class 1 (EIA standard products)

温度特性 Temperature char.	温度係数範囲 [ppm/℃] ※1 Temperature coefficient range	使用温度範囲 Operation temp. range
CK	0 ± 250	−55～+125℃
CJ	0 ± 120	
CH	0 ± 60	
CG	0 ± 30	
PK	−150 ± 250	
PJ	−150 ± 120	
PH	−150 ± 60	
RK	−220 ± 250	
RJ	−220 ± 120	
RH	−220 ± 60	
SK	−330 ± 250	
SJ	−330 ± 120	
SH	−330 ± 60	
TK	−470 ± 250	
TJ	−470 ± 120	
TH	−470 ± 60	
UK	−750 ± 250	
UJ	−750 ± 120	
SL	−1000～+350	

※1：20℃における静電容量を基準 Based on the capacitance at 20℃

種類 2 Class 2

温度特性 Temperature char.	静電容量変化率（以内）※1 Capacitance change (within)	使用温度範囲 Operation temp. range
B	±10% or ±15%(EIA:X7R)	−25～+85℃ or −55～+125℃(EIA:X7R)
F	$^{+30}_{-80}$%	−25～+85℃

※1：20℃における静電容量を基準 Based on the capacitance at 20℃

4 公称静電容量 NOMINAL CAPACITANCE

pF単位で表した3数字 pF unit in 3 digits

表記例 Example		容量値 Capacitance
560	:	56pF

5 静電容量許容差記号 CAPACITANCE TOLERANCE SYMBOL

記号 Symbol		許容差 Tolerance	種類 Class	区分 Item
C	:	±0.25pF	1	～10pF
D	:	±0.5 pF	1	～10pF
F	:	±1 pF	1	～10pF
J	:	±5 %	1	11pF～
K	:	±10%	1	11pF～
			2	B Char.
M	:	±20%	2	B Char.
Z	:	$^{+80}_{-20}$%	2	F Char.

6 特殊記号（厚み） SPECIAL SYMBOL (THICKNESS)

記号 Symbol		厚み Thickness [mm] 105	107	212	316
Q	:			0.60	0.60
R	:			0.85	0.85
S	:				1.15
T	:			1.25	
W	:	0.50			
Z	:		0.80		

7 梱包記号 PACKAGING SYMBOL

記号 Symbol		梱包 Packaging	
T	:	テーピング	Taped (4mm, 8mm pitch)
F	:	テーピング	Taped (2mm pitch)
B	:	バルク	Bulk

■ Q, tan δ

種類 1 Class 1

Q ※2	区分 Item
≧400+20・C ※1	～27pF
≧1000	30pF～

※1：C＝公称静電容量 Nominal capacitance [pF]

※2：測定周波数 Measurement frequency＝1±0.1MHz (C≦1000pF)
1±0.1kHz (C＞1000pF)
測定電圧 Measurement voltage ＝0.5～5Vrms (C≦1000pF)
1±0.2Vrms (C＞1000pF)

種類 2 Class 2

形式 Type	tan ※1	区分 Item
107, 212, 316	≦2.5%	B char.
	≦5.0%	F Char.
105	≦2.5%	B char. 50V, 25V
	≦3.5%	B char. 16V
	≦5.0%	F char. 50V, 25V
	≦7.0%	F char. 0.033μF, 0.047μF
	≦9.0%	F char. 0.068μF～

※1：測定周波数 Measurement frequency＝1±0.1kHz
測定電圧 Measurement voltage ＝1±0.2Vrms

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■212TYPE（リフロー，フローはんだ用 / 端子電極：メッキ　Reflow, flowsoldering / terminal electrode : plating)

Class 1

定格電圧 Rated Voltage (DC)	形名 Ordering code	温度特性 Temperature characteristics																		公称静電容量 Capacitance (pF)	静電容量許容差 Capacitance tolerance (%)	厚み Thickness (mm)
		CK	CJ	CH	CG	PK	PJ	PH	RK	RJ	RH	SK	SJ	SH	TK	TJ	TH	UK	UJ	SL		
50V	UMK 212 △ 0R5 □ Q	○				○			○			○			○			○		○	0.5	±0.25pF ±0.5 pF	0.6±0.1
	UMK 212 △ 010 □ Q	○				○			○			○			○			○		○	1		
	UMK 212 △ 1R5 □ Q	○				○			○			○			○			○		○	1.5		
	UMK 212 △ 020 □ Q	○				○			○			○			○			○		○	2		
	UMK 212 △ 030 □ Q		○				○			○			○			○			○	○	3		
	UMK 212 △ 040 □ Q			○				○			○			○			○		○	○	4		
	UMK 212 △ 050 □ Q			○				○			○			○			○		○	○	5		
	UMK 212 △ 060 □ Q			○				○			○			○			○		○	○	6	±0.5pF ±1 pF	
	UMK 212 △ 070 □ Q			○				○			○			○			○		○	○	7		
	UMK 212 △ 080 □ Q			○				○			○			○			○		○	○	8		
	UMK 212 △ 090 □ Q			○				○			○			○			○		○	○	9		
	UMK 212 △ 100 □ Q			○	○			○			○			○			○		○	○	10		
	UMK 212 △ 110 J Q			○	○			○			○			○			○		○	○	11	±5	
	UMK 212 △ 120 □ Q			○	○			○			○			○			○		○	○	12	±5, ±10	
	UMK 212 △ 130 J Q			○	○			○			○			○			○		○	○	13	±5	
	UMK 212 △ 150 □ Q			○	○			○			○			○			○		○	○	15	±5, ±10	
	UMK 212 △ 160 J Q			○	○			○			○			○			○		○	○	16	±5	
	UMK 212 △ 180 □ Q			○	○			○			○			○			○		○	○	18	±5, ±10	
	UMK 212 △ 200 J Q			○	○			○			○			○			○		○	○	20	±5	
	UMK 212 △ 220 □ Q			○	○			○			○			○			○		○	○	22	±5, ±10	
	UMK 212 △ 240 J Q			○	○			○			○			○			○		○	○	24	±5	
	UMK 212 △ 270 □ Q			○	○			○			○			○			○		○	○	27	±5, ±10	
	UMK 212 △ 300 J Q			○	○			○			○			○			○		○	○	30	±5	
	UMK 212 △ 330 □ Q			○	○			○			○			○			○		○	○	33	±5, ±10	
	UMK 212 △ 360 J Q			○	○			○			○			○			○		○	○	36	±5	
	UMK 212 △ 390 □ Q			○	○			○			○			○			○		○	○	39	±5, ±10	
	UMK 212 △ 430 J Q			○	○			○			○			○			○		○	○	43	±5	
	UMK 212 △ 470 □ Q			○	○			○			○			○			○		○	○	47	±5, ±10	
	UMK 212 △ 510 J Q			○	○			○			○			○			○		○	○	51	±5	
	UMK 212 △ 560 □ Q			○	○			○			○			○			○		○	○	56	±5, ±10	
	UMK 212 △ 620 J Q			○	○			○			○			○			○		○	○	62	±5	
	UMK 212 △ 680 □ Q			○	○			○			○			○			○		○	○	68	±5, ±10	
	UMK 212 △ 750 J Q			○	○			○			○			○			○		○	○	75	±5	
	UMK 212 △ 820 □ Q			○	○			○			○			○			○		○	○	82	±5, ±10	
	UMK 212 △ 910 J Q			○	○			○			○			○			○		○	○	91	±5	
	UMK 212 △ 101 □ Q			○	○			○			○			○			○		○	○	100	±5, ±10	
	UMK 212 △ 111 J Q			○	○			○			○			○			○		○	○	110	±5	
	UMK 212 △ 121 □ Q			○	○			○			○			○			○		○	○	120	±5, ±10	
	UMK 212 △ 131 J Q			○	○			○			○			○			○		○	○	130	±5	
	UMK 212 △ 151 □ Q			○	○			○			○			○			○		○	○	150	±5, ±10	
	UMK 212 △ 161 J Q			○	○			○			○			○			○		○	○	160	±5	
	UMK 212 △ 181 □ Q			○	○			○			○			○			○		○	○	180	±5, ±10	
	UMK 212 △ 201 J Q			○	○			○			○			○			○		○	○	200	±5	
	UMK 212 △ 221 □ Q			○	○			○			○			○			○		○	○	220	±5, ±10	

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積層形磁器コンデンサ
MULTILAYER CERAMIC CAPACITORS

Class 1

定格電圧 Rated Voltage (DC)	形名 Ordering code	温度特性 Temperature characteristics																		公称静電容量 Capacitance (pF)	静電容量許容差 Capacitance tolerance (%)	厚み Thickness t (mm)
		CK	CJ	CH	CG	PK	PJ	PH	RK	RJ	RH	SK	SJ	SH	UK	UJ	UH	YK	YJ	SL		
50V	UMK 212 △ 241 J Q			○	○			○			○			○			○		○	○	240	±5	0.6±0.1
	UMK 212 △ 271 □ Q			○	○			○			○			○			○		○	○	270	±5, ±10	
	UMK 212 △ 301 J Q			○	○			○			○			○			○		○	○	300	±5	
	UMK 212 △ 331 □ Q			○	○			○			○			○			○		○	○	330	±5, ±10	
	UMK 212 △ 361 J Q			○	○			○			○			○			○		○	○	360	±5	
	UMK 212 △ 391 □ Q			○	○			○			○			○			○		○	○	390	±5, ±10	
	UMK 212 △ 431 J Q			○	○			○			○			○			○		○	○	430	±5	
	UMK 212 △ 471 □ Q			○	○			○			○			○			○		○	○	470	±5, ±10	
	UMK 212 △ 511 J Q			○	○			○			○			○			○		○	○	510	±5	
	UMK 212 △ 561 □ Q			○	○			○			○			○			○		○	○	560	±5, ±10	
	UMK 212 △ 621 J Q			○	○			○			○			○			○		○	○	620	±5	
	UMK 212 △ 681 □ ◇			○	○			○			○			○			○		○	○	680	±5, ±10	0.85±0.1 UJ, SL は 0.6±0.1
	UMK 212 △ 751 J ◇			○	○			○			○			○			○		○	○	750	±5	
	UMK 212 △ 821 □ ◇			○	○			○			○			○			○		○	○	820	±5, ±10	
	UMK 212 △ 911 J ◇			○	○			○			○			○			○		○	○	910	±5	
	UMK 212 △ 102 □ ◇			○	○			○			○			○			○		○	○	1000	±5, ±10	
	UMK 212 △ 112 J Q																		○	○	1100	±5	0.6±0.1
	UMK 212 △ 122 □ Q																		○	○	1200	±5, ±10	
	UMK 212 △ 132 J Q																		○	○	1300	±5	
	UMK 212 △ 152 □ R																		○	○	1500	±5, ±10	0.85±0.1
	UMK 212 △ 162 J R																		○	○	1600	±5	
	UMK 212 △ 182 □ R																		○	○	1800	±5, ±10	
	UMK 212 △ 202 J R																		○	○	2000	±5	
	UMK 212 △ 222 □ R																		○	○	2200	±5, ±10	
	UMK 212 △ 242 J T																		○	○	2400	±5	1.25±0.1
	UMK 212 △ 272 □ T																		○	○	2700	±5, ±10	

注：形名の △ には，温度特性，□には静電容量許容差，◇には厚み記号が入ります。
Note: In the ordering code, △ is for temperature characteristics symbol and □ is for the capacitance tolerance symbol and ◇ is for the thickness symbol.

積層形磁器コンデンサ
MULTI-LAYER CERAMIC CAPACITORS

Class 2

定格電圧 Rated Voltage (DC)	形名 Ordering code	温度特性 Temp. Char.	公称静電容量 Capacitance (pF)	静電容量許容差 Capacitance tolerance (%)	厚み Thickness (mm)
50V	UMK 212 B 681 □Q	B	680	±10, ±20	0.6±0.1
	UMK 212 B 821 K Q		820	±10	
	UMK 212 B 102 □Q		1000	±10, ±20	
	UMK 212 B 122 K Q		1200	±10	
	UMK 212 B 152 □Q		1500	±10, ±20	
	UMK 212 B 182 K Q		1800	±10	
	UMK 212 B 222 □Q		2200	±10, ±20	
	UMK 212 B 272 K Q		2700	±10	
	UMK 212 B 332 □Q		3300	±10, ±20	
	UMK 212 B 392 K Q		3900	±10	
	UMK 212 B 472 □Q		4700	±10, ±20	
	UMK 212 B 562 K Q		5600	±10	
	UMK 212 B 682 □Q		6800	±10, ±20	
	UMK 212 B 822 K Q		8200	±10	
	UMK 212 B 103 □Q		10000	±10, ±20	
	UMK 212 B 123 K Q		12000	±10	
	UMK 212 B 153 □Q		15000	±10, ±20	
	UMK 212 B 183 K Q		18000	±10	
	UMK 212 B 223 □Q		22000	±10, ±20	
	UMK 212 B 273 K R		27000	±10	0.85±0.1
	UMK 212 B 333 □R		33000	±10, ±20	
	UMK 212 B 393 K R		39000	±10	
	UMK 212 B 473 □T		47000	±10, ±20	1.25±0.1
25V	TMK 212 B 681 □Q		680	±10, ±20	0.6±0.1
	TMK 212 B 821 K Q		820	±10	
	TMK 212 B 102 □Q		1000	±10, ±20	
	TMK 212 B 122 K Q		1200	±10	
	TMK 212 B 152 □Q		1500	±10, ±20	
	TMK 212 B 182 K Q		1800	±10	
	TMK 212 B 222 □Q		2200	±10, ±20	
	TMK 212 B 272 K Q		2700	±10	
	TMK 212 B 332 □Q		3300	±10, ±20	
	TMK 212 B 392 K Q		3900	±10	
	TMK 212 B 472 □Q		4700	±10, ±20	
	TMK 212 B 562 K Q		5600	±10	
	TMK 212 B 682 □Q		6800	±10, ±20	
	TMK 212 B 822 K Q		8200	±10	
	TMK 212 B 103 □Q		10000	±10, ±20	
	TMK 212 B 123 K Q		12000	±10	
	TMK 212 B 153 □Q		15000	±10, ±20	
	TMK 212 B 183 K Q		18000	±10	
	TMK 212 B 223 □Q		22000	±10, ±20	
	TMK 212 B 273 K Q		27000	±10	
	TMK 212 B 333 □Q		33000	±10, ±20	
	TMK 212 B 393 K R		39000	±10	0.85±0.1
	TMK 212 B 473 □R		47000	±10, ±20	
	TMK 212 B 563 KR		56000	±10	
	TMK 212 B 683 □R		68000	±10, ±20	
	TMK 212 B 823 KT		82000	±10	1.25±0.1
	TMK 212 B 104 □T		100000	±10, ±20	

定格電圧 Rated Voltage (DC)	形名 Ordering code	温度特性 Temp. Char.	公称静電容量 Capacitance (pF)	静電容量許容差 Capacitance tolerance	厚み Thickness (mm)
50V	UMK 212 F 103 Z Q	F	10000	+80 −20 %	0.6±0.1
	UMK 212 F 153 Z Q		15000		
	UMK 212 F 223 Z Q		22000		
	UMK 212 F 333 Z Q		33000		
	UMK 212 F 473 Z Q		47000		
	UMK 212 F 683 Z Q		68000		
	UMK 212 F 104 Z R		100000		0.85±0.1
	UMK 212 F 154 Z R		150000		
	UMK 212 F 224 Z T		220000		1.25±0.1
25V	TMK 212 F 103 Z Q		10000		0.6±0.1
	TMK 212 F 153 Z Q		15000		
	TMK 212 F 223 Z Q		22000		
	TMK 212 F 333 Z Q		33000		
	TMK 212 F 473 Z Q		47000		
	TMK 212 F 683 Z Q		68000		
	TMK 212 F 104 Z Q		100000		
	TMK 212 F 154 Z Q		150000		
	TMK 212 F 224 Z R		220000		0.85±0.1
	TMK 212 F 334 Z T		330000		1.25±0.1
	TMK 212 F 474 Z T		470000		

注：形名の□には静電容量許容差記号が入ります。
Note : In the ordering code, □ is for the capacitance tolerance symbol.