

Certified Safety Capacitors X², Y³ & X¹, Y²

X², Y³ (LS style) and X¹, Y² (ES style) Class Compliant* chip capacitors specifically designed for use in modem, facsimile, telephone and other electronic equipment where lightning or overvoltage surges can occur. Both styles are rated at 250 Vac safety approved with COG (NP0) and X7R dielectrics available (dependant on style).

X², Y³ (LS style) is certified to EN 60950 and compliant to Standards EN 132400: 1994/A2: 1998/IEC60384-14, Second Edition: 1993/A1:1995.

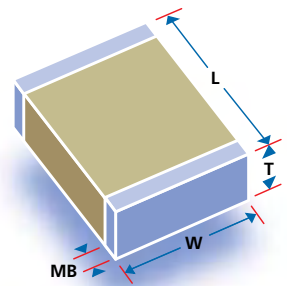
X¹, Y² (ES style) is certified to IEC60384-14, Second Edition: 1993/A1:1995 and compliant to Standards EN 132400: 1994/A2:1998.

Both styles meet the requirements of EN61000-4-5, IEC1000-4-5 and IEC801-4-5.

Certification numbers

Safety Classification	X ² , Y ³	X ¹ , Y ²
TUV	LS1808N, LS1812N - *T72140287.01 LS1808B - *T72140286.01	ES 1808 - R60012089 ES 2211, ES 2215 - R2072738.01 ES 2225 - R2072738.02
Standards	EN 132400, EN 60950, IEC 60384-14 2nd Edition, Class X ² Y ³ .	EN 132400, IEC 60384-14 2nd Edition, Class X ¹ Y ²
UL	NWQGQ2.E208336 and NWQGQ8.E208336	

*LS style is compliant with Robustness of Termination (cl 4.3) test according to IEC 60384-1 amendment 3 cl 4.34 and 4.35 Resistance to Soldering Heat (cl 4.4) tested according to IEC 60384-1 amendment 3 cl 4.14.2, Impulse Test made with 2.5 KV or 5.0KV as required according to 6.4.2.1 in EN 60950. The creepage distance between live parts of different polarity meets the requirements of IEC 60950.



Dimensions - inches/mm

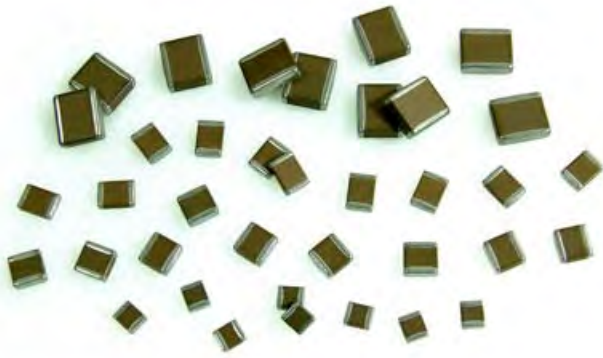
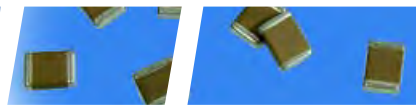
Safety Classification	X ² , Y ³		X ¹ , Y ²			
Size	LS 1808	LS 1812	ES 1808	ES 2211	ES 2215	ES 2225
L inches ±0.015/0.38: mm ±0.015/0.38:	0.180 4.57	0.180 4.57	0.180* 4.57	0.220 5.58	0.220 5.58	0.220 5.58
W inches ±0.02: mm ±0.508:	0.080 2.03	0.125 3.18	0.080** 2.03	0.110 2.79	0.150 3.81	0.250 6.35
MB inches: typical mm:	0.024 0.609	0.024 0.609	0.020 5.08	0.300 0.762	0.300 0.762	0.300 0.762
Creepage inches: min mm:	0.102 2.60	0.102 2.60	0.100 2.50	0.157 3.99	0.157 3.99	0.157 3.99

*Tolerance is ±0.014/0.35 **Tolerance is ±0.012/0.30

How to Order - Certified Safety Capacitors

LS	1808	N	122	K	302	N	X080	T	M
STYLE LS = X ² , Y ³ ES = X ¹ , Y ²	SIZE See Chart	DIELECTRIC N = COG B = X7R	CAPACITANCE Value in Picofarads. Two significant figures, followed by number of zeros: 121 = 120pF	TOLERANCE J = ± 5% K = ± 10% M = ± 20%	VOLTAGE-SURGE Two significant figures, followed by number of zeros: 302 = 3000V (X ² , Y ³) 502 = 5000V (X ¹ , Y ²)	TERMINATION N = Nickel Barrier	THICKNESS OPTION Blank = Standard thickness X = special thickness, specified in inches: X080 = 0.08" X100 = 0.10" X010 = 0.11" X150 = 0.15"	PACKING No suffix = Bulk T = Tape & Reel	MARKING Parts marked: NLS (X ² , Y ³) NY2 (X ¹ , Y ²)

Certified Safety Capacitors X², Y³ & X¹, Y²



- For dielectric characteristics see page 4 & 7.
- Nickel Barrier terminations.
- Capacitance tolerances available $\pm 5\%$, $\pm 10\%$, $\pm 20\%$

Note: Capacitance values are shown below as 3 digit code:
2 significant figures followed by the no. of zeros
e.g. 183 = 18,000pF.

Capacitance values

Safety Classification		X ² ,Y ³					X ¹ , Y ²				
Size		LS 1808			LS 1812		ES 1808		ES 2211	ES 2215	ES 2225
Tmax	inches: mm:	0.065 1.65	0.080* 2.03	0.065 1.65	0.065 1.65	0.100* 2.54	0.080* 2.03		0.150* 4.00	0.150* 4.00	0.150* 4.00
Dielectric		COG/NP0		X7R	COG/NP0		COG/NP0	X7R	COG/NP0	COG/NP0	COG/NP0
4R7							•				
5R0		•					•		•		
6R8		•					•		•		
8R2		•					•		•		
100		•					•		•		
120		•					•		•		
150		•					•		•		
180		•					•		•		
220		•					•		•		
270		•					•		•		
330		•					•		•		
390		•					•		•		
470		•					•		•		
560		•					•		•		
680		•					•		•		
820		•					•		•		
101		•					•		•		
121		•					•		•		
151		•		•			•	•	•		
181		•		•			•	•	•		
221		•		•			•	•	•		
271		•		•				•	•		
331		•		•				•	•		
391		•		•				•	•		
471		•		•				•	•		
561		•		•				•	•		
681		•		•				•	•		
821			•	•				•			
102			•	•	•			•		•	•
122				•	•						
152				•	•						
182						•					
222						•					

* Denotes non standard chip thickness.

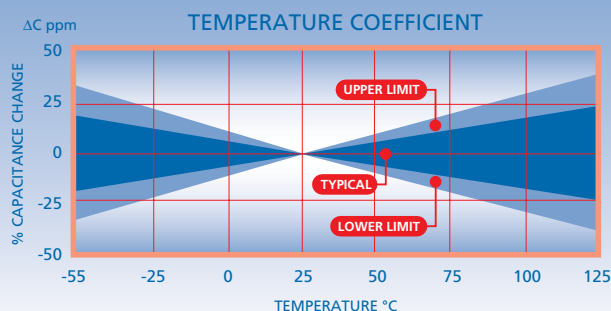
Order code needs to have an 'X' inserted together with the dimension in inches -e.g. X080 where dimension is 0.080"



Dielectric Characteristics

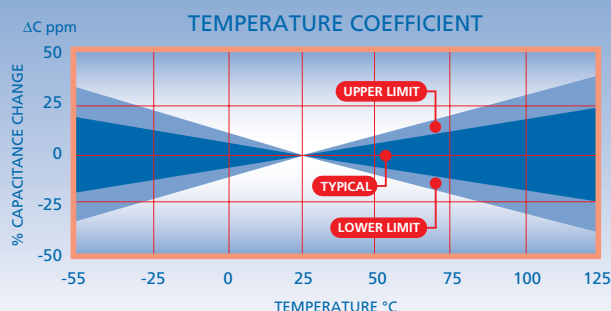
COG/NP0 (N) Ultra Stable and RoHS 2013 (RN) type

Operating temperature range:	-55°C to 125°C
Temperature coefficient:	0 $\pm$ 30 ppm/°C
Dissipation factor:	0.1% max @ 25°C
Insulation resistance	@25°C: >100G Ω or >1000 Ω F whichever is less @125°C: >10G Ω or >100 Ω F whichever is less
Dielectric withstanding voltage	$\leq$ 200V: 250% 201-500V: 150% or 500V whichever is greater >500V: 120% or 750V whichever is greater
Ageing rate:	0% per decade
Test parameters:	1KHz, 1.0 $\pm$ 0.2 VRMS, 25°C 1MHz for Capacitance $\leq$ 100pF



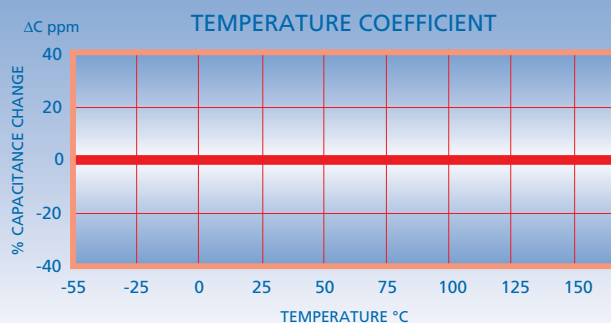
COG/NP0 (M) Ultra Stable Non Magnetic

Operating temperature range:	-55°C to 125°C
Temperature coefficient:	0 $\pm$ 30 ppm/°C
Dissipation factor:	0.1% max @ 25°C
Insulation resistance	@25°C: >1000 Ω F or >10000 Ω F whichever is less @125°C: >100 Ω F or >1000 Ω F whichever is less
Dielectric withstanding voltage	$\leq$ 200V: 250% 201-500V: 150% or 500V whichever is greater >500V: 120% or 750V whichever is greater
Ageing rate:	0% per decade
Test parameters:	1KHz, 1.0 $\pm$ 0.2 VRMS, 25°C 1MHz for Capacitance $\leq$ 100pF



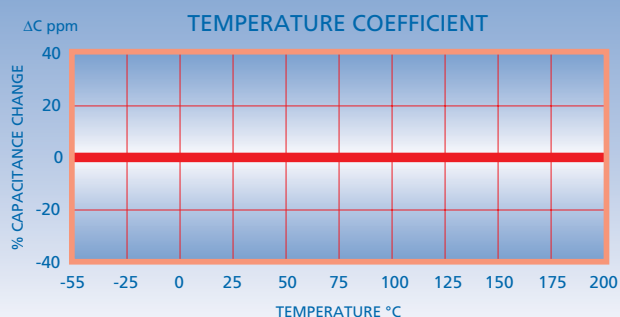
COG/NP0 (F) Ultra Stable High Temperature (up to 160°C)

Operating temperature range:	-55°C to 160°C
Temperature coefficient:	0 $\pm$ 30 ppm/°C
Dissipation factor:	0.1% max @ 25°C
Insulation resistance	@25°C: >100G Ω or >1000 Ω F whichever is less @160°C: >1G Ω or >10 Ω F whichever is less
Dielectric withstanding voltage	$\leq$ 200V: 250% 201-500V: 150% or 500V whichever is greater >500V: 120% or 750V whichever is greater
Ageing rate:	0% per decade
Test parameters:	1KHz, 1.0 $\pm$ 0.2 VRMS, 25°C 1MHz for Capacitance $\leq$ 100pF



COG/NP0 (D) Ultra Stable High Temperature (up to 200°C)

Operating temperature range:	-55°C to 200°C
Temp. coefficient $\leq$ 200°C:	0 $\pm$ 30 ppm/°C
Dissipation factor @ 25°C:	0.1% Max.
Insulation resistance	@25°C: >100G Ω or >1000 Ω F whichever is less @200°C: >1G Ω or >10 Ω F whichever is less
Dielectric withstanding voltage	$\leq$ 200V: 250% 201-500V: 150% or 500V whichever is greater >500V: 120% or 750V whichever is greater
Ageing rate:	0% per decade
Test parameters:	1KHz, 1.0 $\pm$ 0.2 VRMS, 25°C 1MHz for capacitance $\leq$ 100pF

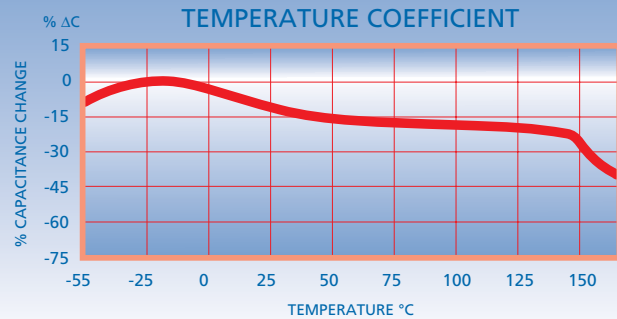


Dielectric Characteristics



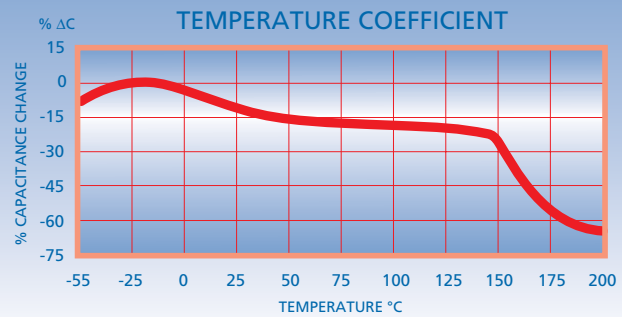
Class II (G) Stable High Temperature (up to 160°C)

Operating temperature range:	-55°C to 160°C
Temperature coefficient up to 160°C:	+15 -40% ΔC Max.
Dissipation factor @ 25°C:	2.5% Max.
Insulation resistance	@25°C: >100G Ω or >1000 ΩF whichever is less @160°C: >1G Ω or >10 ΩF whichever is less
Dielectric withstanding voltage	$\leq 200V$: 250% 201-500V: 150% or 500V whichever is greater >500V: 120% or 750V whichever is greater
Ageing rate:	< 2.0% per decade
Test parameters:	1KHz, 1.0 ± 0.2 VRMS, 25°C



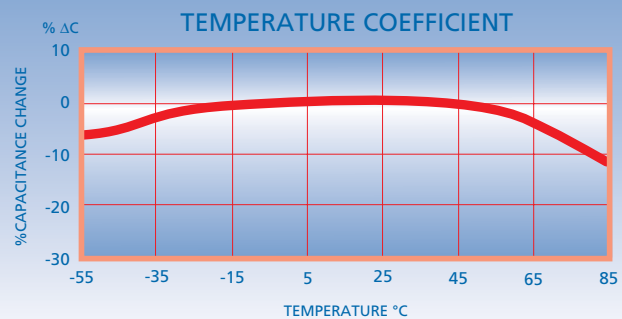
Class II (E) Stable High Temperature (up to 200°C)

Operating temperature range:	-55°C to 200°C
Temperature coefficient up to 200°C:	+15 -65% ΔC Max.
Dissipation factor @ 25°C:	2.5% Max.
Insulation resistance	@25°C: >100G Ω or >1000 ΩF whichever is less @200°C: >1G Ω or >10 ΩF whichever is less
Dielectric withstanding voltage	$\leq 200V$: 250% 201-500V: 150% or 500V whichever is greater >500V: 120% or 750V whichever is greater
Ageing rate:	< 2.0% per decade
Test parameters:	1KHz, 1.0 ± 0.2 VRMS, 25°C

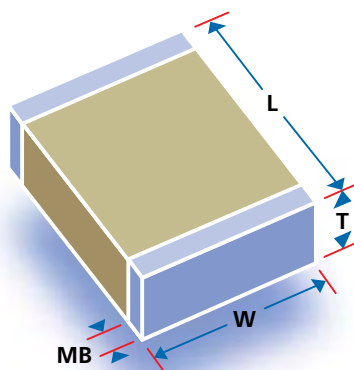


X5R (W) Stable

Operating temperature range:	-55°C to 85°C
Temperature coefficient up to 200°C:	$\pm 15\%$ ΔC Max.
Dissipation factor @ 25°C:	5% Max.
Insulation resistance @25%:	>10G Ω or >500 ΩF whichever is less
Dielectric withstanding voltage:	250%
Ageing rate:	< 5.0% per decade
Test parameters:	1KHz, 1.0 ± 0.2 VRMS, 25°C
Except:	22 μF , 47 μF & 100 μF 120KHz, 0.5 ± 0.1 VRMS, 25°C



Chip Dimensions



Dimensions - inches (mm)

Size	Length (L)	Width (W)	Max. Thickness (T)*	Termination Band (MB)
0402	0.040 ± 0.004 (1.02 ± 0.102)	0.020 ± 0.004 (0.508 ± 0.102)	0.024 (0.610)	0.010 ± 0.006 (0.254 ± 0.152)
0504	0.050 ± 0.006 (1.27 ± 0.152)	0.040 ± 0.006 (1.02 ± 0.152)	0.044 (1.12)	0.014 ± 0.006 (0.356 ± 0.152)
RF0505	0.055 +0.015 -0.010 (1.4 +0.38 -0.25)	0.055 ± 0.015 (1.40 ± 0.381)	0.057 (1.45)	0.014 ± 0.006 (0.356 ± 0.152)
0603	0.060 ± 0.006 (1.52 ± 0.152)	0.030 ± 0.006 (0.762 ± 0.152)	0.035 (0.889)	0.014 ± 0.006 (0.356 ± 0.152)
0805	0.080 ± 0.008 (2.03 ± 0.203)	0.050 ± 0.008 (1.27 ± 0.203)	0.054 (1.37)	0.020 ± 0.010 (0.508 ± 0.254)
0907	0.090 ± 0.008 (2.29 ± 0.203)	0.070 ± 0.008 (1.78 ± 0.203)	0.060 (1.52)	0.020 ± 0.010 (0.508 ± 0.254)
1005	0.100 ± 0.008 (2.54 ± 0.203)	0.050 ± 0.008 (1.27 ± 0.203)	0.054 (1.37)	0.020 ± 0.010 (0.508 ± 0.254)
RF1111	0.110+0.025 -0.010 (2.79 +0.64 -0.25)	0.110 ± 0.015 (2.79 ± 0.381)	0.102 (2.59)	0.020 ± 0.010 (0.508 ± 0.254)
1206	0.125 ± 0.008 (3.18 ± 0.203)	0.060 ± 0.008 (1.52 ± 0.203)	0.064 (1.63)	0.020 ± 0.010 (0.508 ± 0.254)
1210	0.125 ± 0.008 (3.18 ± 0.203)	0.100 ± 0.008 (2.54 ± 0.203)	0.065 (1.65)	0.020 ± 0.010 (0.508 ± 0.254)
1515	0.150 ± 0.015 (3.81 ± 0.381)	0.150 ± 0.015 (3.81 ± 0.381)	0.130 (3.30)	0.030 ± 0.015 (0.762 ± 0.381)
1808	0.180 ± 0.012 (4.57 ± 0.305)	0.080 ± 0.008 (2.03 ± 0.203)	0.065 (1.65)	0.024 ± 0.014 (0.610 ± 0.356)
1812	0.180 ± 0.012 (4.57 ± 0.305)	0.125 ± 0.008 (3.18 ± 0.203)	0.065 (1.65)	0.024 ± 0.014 (0.610 ± 0.356)
1825	0.180 ± 0.012 (4.57 ± 0.305)	0.250 ± 0.015 (6.35 ± 0.381)	0.080 (2.03)	0.024 ± 0.014 (0.610 ± 0.356)
2020	0.200 ± 0.015 (5.08 ± 0.381)	0.200 ± 0.015 (5.08 ± 0.381)	0.180 (4.57)	0.024 ± 0.014 (0.610 ± 0.356)
2221	0.220 ± 0.015 (5.59 ± 0.381)	0.210 ± 0.015 (5.33 ± 0.381)	0.080 (2.03)	0.030 ± 0.015 (0.762 ± 0.381)
2225	0.220 ± 0.015 (5.59 ± 0.381)	0.250 ± 0.015 (6.35 ± 0.381)	0.080 (2.03)	0.030 ± 0.015 (0.762 ± 0.381)
2520	0.250 ± 0.015 (6.35 ± 0.381)	0.200 ± 0.015 (5.08 ± 0.381)	0.180 (4.57)	0.030 ± 0.015 (0.762 ± 0.381)
RF2525	0.230 +0.020 -0.012 (5.84 +0.51 -0.30)	0.250 ± 0.015 (6.35 ± 0.381)	0.165 (4.19)	0.030 ± 0.015 (0.762 ± 0.381)
3333	0.330 ± 0.017 (8.38 ± 0.432)	0.330 ± 0.017 (8.38 ± 0.432)	0.250 (6.35)	0.030 ± 0.015 (0.762 ± 0.381)
3530	0.350 ± 0.018 (8.89 ± 0.457)	0.300 ± 0.015 (7.62 ± 0.381)	0.250 (6.35)	0.030 ± 0.015 (0.762 ± 0.381)
4040	0.400 ± 0.020 (10.2 ± 0.508)	0.400 ± 0.020 (10.2 ± 0.508)	0.300 (7.62)	0.040 ± 0.020 (1.02 ± 0.508)
4540	0.450 ± 0.023 (11.4 ± 0.584)	0.400 ± 0.020 (10.2 ± 0.508)	0.300 (7.62)	0.040 ± 0.020 (1.02 ± 0.508)
5440	0.540 ± 0.027 (13.7 ± 0.686)	0.400 ± 0.020 (10.2 ± 0.508)	0.300 (7.62)	0.040 ± 0.020 (1.02 ± 0.508)
5550	0.550 ± 0.028 (14.0 ± 0.711)	0.500 ± 0.025 (12.7 ± 0.635)	0.300 (7.62)	0.040 ± 0.020 (1.02 ± 0.508)
6560	0.650 ± 0.033 (16.5 ± 0.838)	0.600 ± 0.030 (15.2 ± 0.762)	0.300 (7.62)	0.040 ± 0.020 (1.02 ± 0.508)
7565	0.750 ± 0.038 (19.1 ± 0.965)	0.650 ± 0.033 (16.5 ± 0.838)	0.300 (7.62)	0.040 ± 0.020 (1.02 ± 0.508)

* Non standard thicknesses are available - consult the sales office for details.