Surface Mount Ceramic Capacitors

JOHANSON DIELECTRICS

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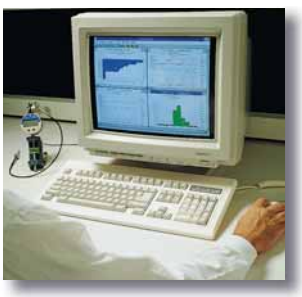

CONTENTS

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Ceramic Capacitor Prototype Design Kits

Johanson Dielectrics offers a variety of multi-layer chip capacitor kits for prototype design work. Each kit contains a selection of popular values and tolerances in standard case sizes. The chips are individually packaged in marked plastic vials for easy access and assembled in a vinyl binder for convenient shelf storage. All chips are nickel-barrier terminated for SMT reflow solder process compatibility.

The selections listed below represents typical kit contents. Johanson reserves the right to make limited value/tolerance substitutions when necessary. Please advise any critical values at time of order.

SIZE 0402 SMT MLCC DESIGN KIT (1100 PCS) **P/N: S-402**

Part Number	Description	Qty	Part Number	Description	Qty	Part Number	Description	Qty
500R07N1R0CV4	NPO, 1.0pf, ±0.25pF	50	500R07N330JV4	NPO, 33pf, ±5%	50	500R07W222KV4	X7R, 2200pf, ±10%	50
500R07N2R2CV4	NPO, 2.2pf, ±0.25pF	50	500R07N470JV4	NPO, 47pf, ±5%	50	500R07W332KV4	X7R, 3300pf, ±10%	50
500R07N3R3CV4	NPO, 3.3pf, ±0.25pF	50	500R07N680JV4	NPO, 68pf, ±5%	50	500R07W472KV4	X7R, 4700pf, ±10%	50
500R07N4R7CV4	NPO, 4.7pf, ±0.25pF	50	500R07N101JV4	NPO, 100pf, ±5%	50	160R07W103KV4	X7R, 0.010uf, ±10%	50
500R07N6R8CV4	NPO, 6.8pf, ±0.25pF	50	250R07N151JV4	NPO, 150pf, ±5%	50	160R07W223KV4	X7R, 0.022uf, ±10%	50
500R07N100JV4	NPO, 10pf, ±5%	50	250R07N221JV4	NPO, 220pf, ±5%	50	160R07Y104MV4	Y5V, 0.100uf, ±20%	50
500R07N150JV4	NPO, 15pf, ±5%	50	500R07W471KV4	X7R, 470pf, ±10%	50			
500R07N220JV4	NPO, 22pf, ±5%	50	500R07W102KV4	X7R, 1000pf, ±10%	50			

SIZE 0603 SMT MLCC DESIGN KIT (1200 PCS) **P/N: S-603**

Part Number	Description	Qty	Part Number	Description	Qty	Part Number	Description	Qty
500R14N1R0CV4	NPO, 1.0pf, ±0.25pF	50	500R14N330JV4	NPO, 33pf, ±5%	50	500R14W222KV4	X7R, 2200pf, ±10%	50
500R14N2R2CV4	NPO, 2.2pf, ±0.25pF	50	500R14N470JV4	NPO, 47pf, ±5%	50	500R14W332KV4	X7R, 3300pf, ±10%	50
500R14N3R3CV4	NPO, 3.3pf, ±0.25pF	50	500R14N680JV4	NPO, 68pf, ±5%	50	500R14W472KV4	X7R, 4700pf, ±10%	50
500R14N4R7CV4	NPO, 4.7pf, ±0.25pF	50	500R14N101JV4	NPO, 100pf, ±5%	50	500R14W103KV4	X7R, 0.010uf, ±10%	50
500R14N6R8CV4	NPO, 6.8pf, ±0.25pF	50	500R14N151JV4	NPO, 150pf, ±5%	50	250R14W473KV4	X7R, 0.047uf, ±10%	50
500R14N100JV4	NPO, 10pf, ±5%	50	500R14N221JV4	NPO, 220pf, ±5%	50	160R14W104KV4	X7R, 0.100uf, ±10%	50
500R14N150JV4	NPO, 15pf, ±5%	50	500R14W471KV4	X7R, 470pf, ±10%	50	250R14Y473MV4	Y5V, 0.047uf, ±20%	50
500R14N220JV4	NPO, 22pf, ±5%	50	500R14W102KV4	X7R, 1000pf, ±10%	50	250R14Y104MV4	Y5V, 0.100uf, ±20%	50

SIZE 0805 SMT MLCC DESIGN KIT (1400 PCS) **P/N: S-805**

Part Number	Description	Qty	Part Number	Description	Qty	Part Number	Description	Qty
500R15N1R0CV4	NPO, 1.0pf, ±0.25pF	50	500R15N470JV4	NPO, 47pf, ±5%	50	500R15W102KV4	X7R, 1000pf, ±10%	50
500R15N2R2CV4	NPO, 2.2pf, ±0.25pF	50	500R15N680JV4	NPO, 68pf, ±5%	50	500R15W222KV4	X7R, 2200pf, ±10%	50
500R15N3R3CV4	NPO, 3.3pf, ±0.25pF	50	500R15N101JV4	NPO, 100pf, ±5%	50	500R15W332KV4	X7R, 3300pf, ±10%	50
500R15N4R7CV4	NPO, 4.7pf, ±0.25pF	50	500R15N151JV4	NPO, 150pf, ±5%	50	500R15W472KV4	X7R, 4700pf, ±10%	50
500R15N6R8CV4	NPO, 6.8pf, ±0.25pF	50	500R15N221JV4	NPO, 220pf, ±5%	50	500R15W103KV4	X7R, 0.010uf, ±10%	50
500R15N100JV4	NPO, 10pf, ±5%	50	500R15N331JV4	NPO, 330pf, ±5%	50	500R15W223KV4	X7R, 0.022uf, ±10%	50
500R15N120JV4	NPO, 12pf, ±5%	50	500R15N471JV4	NPO, 470pf, ±5%	50	500R15W473KV4	X7R, 0.047uf, ±10%	50
500R15N150JV4	NPO, 15pf, ±5%	50	500R15N102JV4	NPO, 1000pf, ±5%	50	500R15W104KV4	X7R, 0.100uf, ±10%	50
500R15N220JV4	NPO, 22pf, ±5%	50				250R15Y473MV4	Y5V, 0.047uf, ±20%	50
500R15N330JV4	NPO, 33pf, ±5%	50				250R15Y104MV4	Y5V, 0.100uf, ±20%	50

Check our web site for design kit updates and kit content changes.

Application Specific, Design Engineering Kits

3,000 VDC / 250 VAC X2Y3 SAFETY CERTIFIED MLCCs FOR ISOLATION KIT P/N: S-MOD

Part Number	Description	Qty	Part Number	Description	Qty	Part Number	Description	Qty
302R29N101KV4	NPO, 100pf, ±10%	50	302R29W151MV4	X7R, 150pf, ±20%	50	302R29W152MV4	X7R, 1500pf, ±20%	50
302R29N151KV4	NPO, 150pf, ±10%	50	302R29W221MV4	X7R, 220pf, ±20%	50	302S43W471MV4	X7R, 470pf, ±20%	50
302R29N221KV4	NPO, 220pf, ±10%	50	302R29W471MV4	X7R, 470pf, ±20%	50	302S43W102MV4	X7R, 1000pf, ±20%	50
302R29N331KV4	NPO, 330pf, ±10%	50	302R29W102MV4	X7R, 1000pf, ±20%	50	302S43W222MV4	X7R, 2200pf, ±20%	50

3,000 VDC CAPACITORS FOR LCD BACKLIGHTING KIT P/N: S-INV

Part Number	Description	Qty	Part Number	Description	Qty	Part Number	Description	Qty
302R29N100JV4	NPO, 10pf, ±5%	50	302R29N270JV4	NPO, 27pf, ±5%	50	302R29N680JV4	NPO, 68pf, ±5%	50
302R29N120JV4	NPO, 12pf, ±5%	50	302R29N330JV4	NPO, 33pf, ±5%	50	302R29N820JV4	NPO, 82pf, ±5%	50
302R29N150JV4	NPO, 15pf, ±5%	50	302R29N390JV4	NPO, 39pf, ±5%	50	302R29N101JV4	NPO, 100pf, ±5%	50
302R29N180JV4	NPO, 18pf, ±5%	50	302R29N470JV4	NPO, 47pf, ±5%	50	302R29N151JV4	NPO, 150pf, ±5%	50
302R29N220JV4	NPO, 22pf, ±5%	50	302R29N560JV4	NPO, 56pf, ±5%	50	302R29N221JV4	NPO, 220pf, ±5%	50

1,000 VDC & 2,000 VDC HIGH VOLTAGE CAPACITOR KIT P/N: S-HIV

Part Number	Description	Qty	Part Number	Description	Qty	Part Number	Description	Qty
102R18N220KV4	1 kV DC, NPO, 22pf, ±10%	50	202R29N220KV4	2 kV DC, NPO, 22pf, ±10%	50	202R29W102KV4	2 kV DC, X7R, 1000pf, ±10%	50
102R18N470KV4	1 kV DC, NPO, 47pf, ±10%	50	202R29N101KV4	2 kV DC, NPO, 100pf, ±10%	50	202R29W152KV4	2 kV DC, X7R, 1500pf, ±10%	50
102R18N101KV4	1 kV DC, NPO, 100pf, ±10%	50	202R29N221KV4	2 kV DC, NPO, 220pf, ±10%	50	202S43N101KV4	2 kV DC, NPO, 100pf, ±10%	50
102R18W102KV4	1 kV DC, X7R, 1000pf, ±10%	50	202R29W151KV4	2 kV DC, X7R, 150pf, ±10%	50	202S43W102KV4	2 kV DC, X7R, 1000pf, ±10%	50
102R18W472KV4	1 kV DC, X7R, 4700pf, ±10%	50	202R29W471KV4	2 kV DC, X7R, 470pf, ±10%	50	202S43W222KV4	2 kV DC, X7R, 2200pf, ±10%	50

HIGH VOLTAGE FOR LIGHT BALLASTS CAPACITOR KIT P/N: S-LIT

Part Number	Description	Qty	Part Number	Description	Qty	Part Number	Description	Qty
501R18N6R8CV4	1206, 500 VDC, 6.8pF, ± 0.25pF	25	501R18N471KV4	1206, 500 VDC, 470pF, ±10%	25	102R18N101KV4	1206, 1 kV DC, 100pF, ±10%	25
501R18N330KV4	1206, 500 VDC, 33pF, ±10%	25	631R18N221JV4	1206, 630 VDC, 220pF, ±5%	25	102R18N471KV4	1206, 1 kV DC, 470pF, ±10%	25
501R18N101KV4	1206, 500 VDC, 100pF, ±10%	25	102R18N3R3CV4	1206, 1 kV DC, 3.3pF, ± 0.25pF	25	202R18N330KV4	1206, 2 kV DC, 33pF, ±10%	25
501R18N151JV4	1206, 500 VDC, 150pF, ±5%	25	102R18N100JV4	1206, 1 kV DC, 10pF, ±5%	25	202R18N470JV4	1206, 2 kV DC, 47pF, ±5%	25
501R18N221KV4	1206, 500 VDC, 220pF, ±10%	25	102R18N220KV4	1206, 1 kV DC, 22pF, ±10%	25	202R18N680KV4	1206, 2 kV DC, 68pF, ±10%	25

HIGH VOLTAGE POLYTERM® CAPACITOR KIT P/N: S-PLY-1

Part Number	Description	Qty	Part Number	Description	Qty
102R15W102KF4	0805, 1 kV DC, 1000pf, ±10%	10	502R29W681KF4E-****-SC	1808, X1/Y2, 680pf, ±10%	10
202R18W221KF4	1206, 2 kV DC, 220pf, ±10%	10	502S47W222KF4S-****-SC	2220, X1/Y2, 2200pf, ±10%	10
202R18W471KF4	1206, 2 kV DC, 470pf, ±10%	10	502S47W472KF4E-****-SC	2220, X1/Y2, 4700pf, ±10%	10
202S43W471KF4	1812, 2 kV DC, 470pf, ±10%	10	302R29W151KF4E-****-SC	1808, X2/Y3, 150pf, ±10%	10
202R18W102KF4	1206, 2 kV DC, 1000pf, ±10%	10	302R29W471KF4E-****-SC	1808, X2/Y3, 470pf, ±10%	10
302S43W151KF4	1812, 3 kV DC, 150pf, ±10%	10	302R29W102KF4E-****-SC	1808, X2/Y3, 1000pf, ±10%	10
			502R30W681KF4E-****-SC	2211, Y2, 680pf, ±10%	10

SIZE 0603-0805 TANCERAM® KIT P/N: S-TAN-1

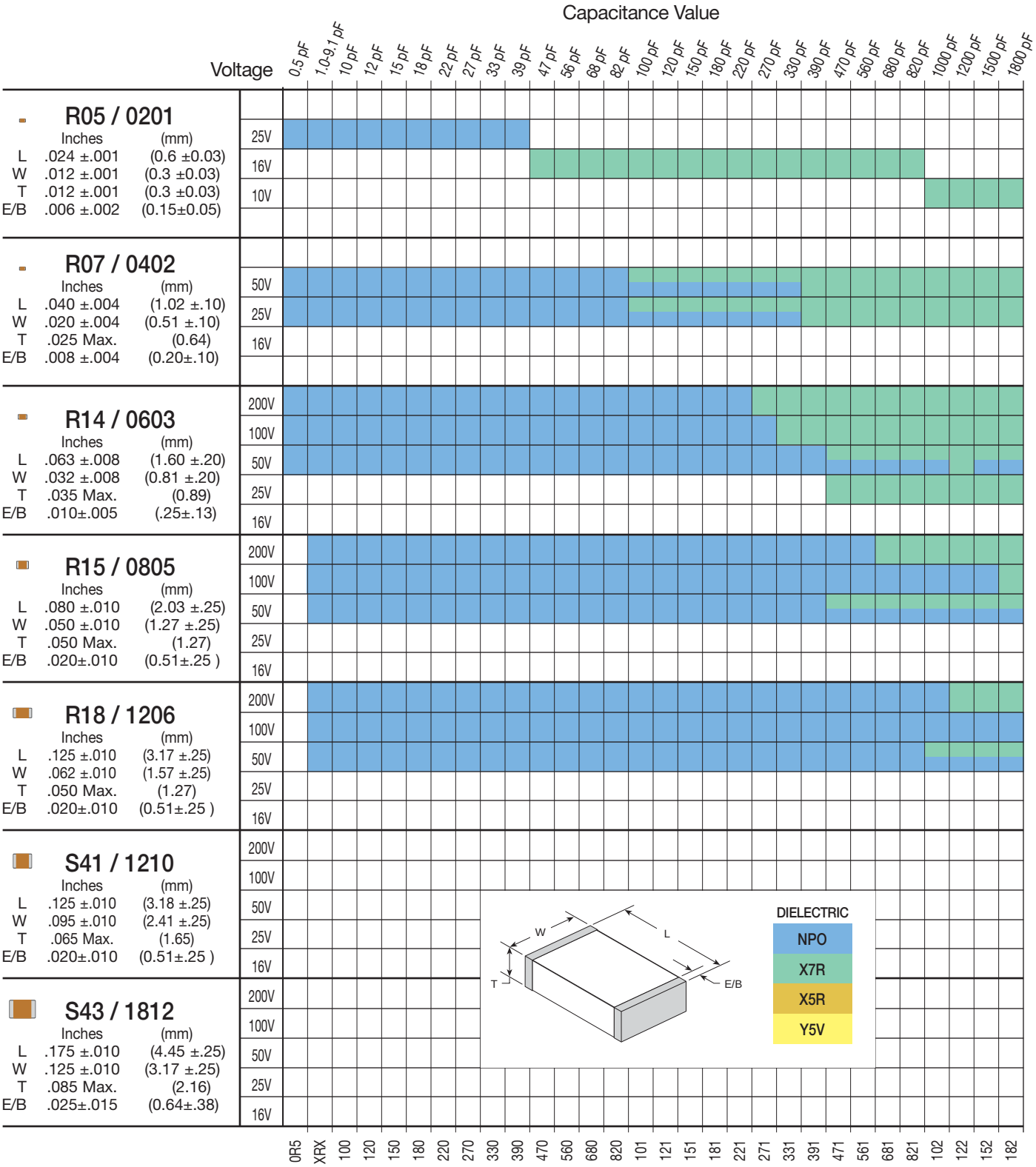
Part Number	Description	Qty
100R14X474KV4	0603, 10V, 0.47uf, ±10%	25
100R14X105KV4	0603, 10V, 1.00uf, ±10%	25
6R3R14X225KV4	0603, 6.3V, 2.20uf, ±10%	25
250R15W474KV4	0805, 25V, 0.47uf, ±10%	25
100R15W105KV4	0805, 10V, 1.00uf, ±10%	25
160R15X105KV4	0805, 16V, 1.00uf, ±10%	25
100R15X225MV4	0805, 10V, 2.20uf, ±20%	25
100R15X475MV4	0805, 10V, 4.70uf, ±20%	25
6R3R15X106MV4	0805, 6.3V, 10.0uf, ±20%	25
6R3R15X226MV4	0805, 6.3V, 22.0uf, ±20%	25

SIZE 1206-1812 TANCERAM® KIT P/N: S-TAN-2

Part Number	Description	Qty
160R18W105KV4	1206, 16V, 1.0 uf, ±10%	10
250R18W225MV4	1206, 25V, 2.2 uf, ±20%	10
160R18W475MV4	1206, 16V, 4.7 uf, ±20%	10
160R18Y475ZV4	1206, 16V, 4.7 uf, +80 -20%	10
160R18X106MV4	1206, 16V, 10 uf, ±20%	10
100R18Y106ZV4	1206, 10V, 10 uf, +80 -20%	10
500S41W105KV4	1210, 50V, 1.0 uf, ±10%	10
250S41X106MV4	1210, 25V, 10 uf, ±20%	10
160S43X226MV4	1812, 16V, 22 uf, ±20%	10
6R3S43X107MV4	1812, 6.3V, 100 uf, ±20%	10

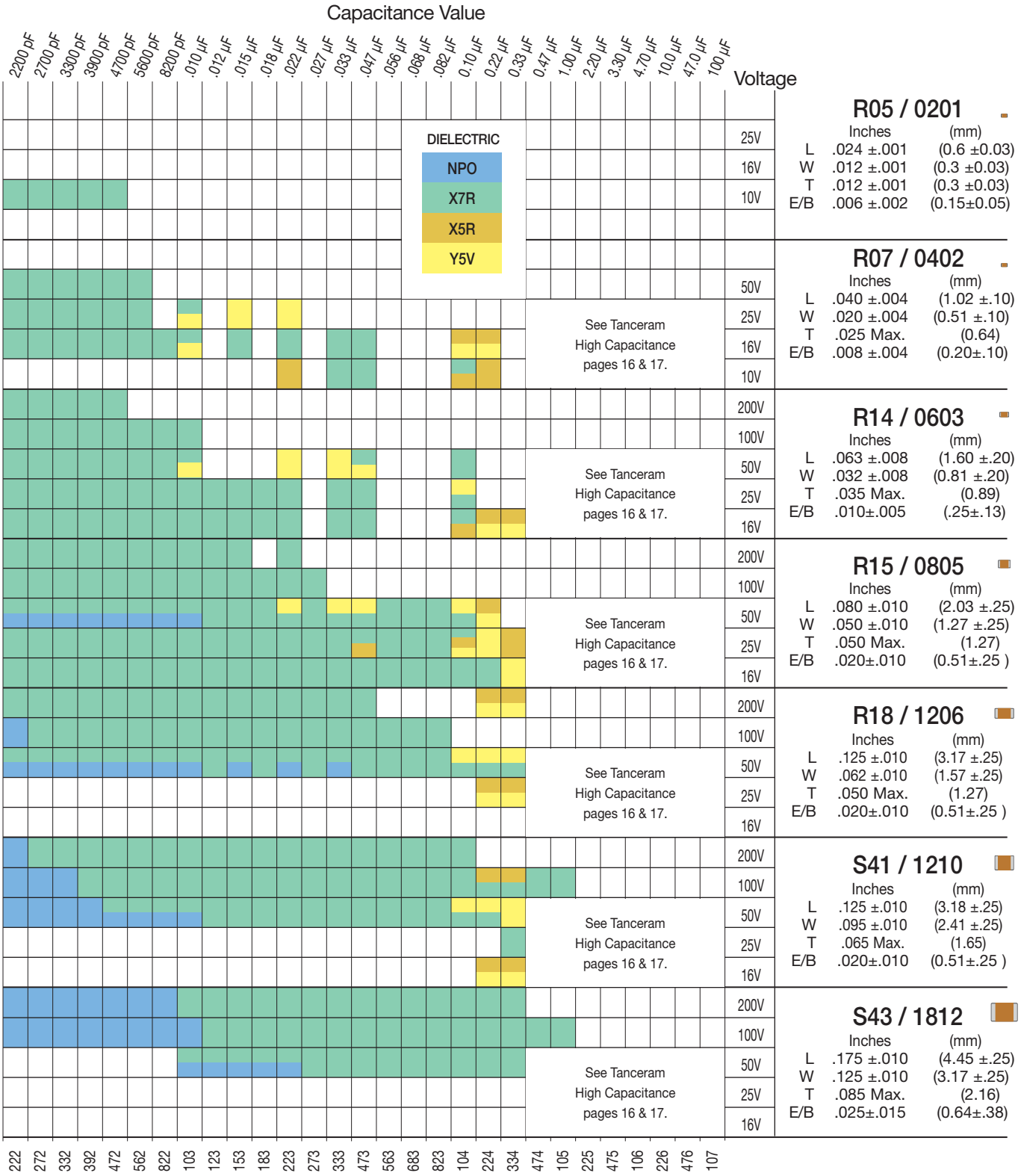
Check our web site for design kit updates and kit content changes.

SURFACE MOUNT MLCCS 10 - 200 VDC



Dielectric specifications and part number breakdown may be found on pages 20 & 21.

SURFACE MOUNT MLCCS 10 - 200 VDC



R05 / 0201

	Inches	(mm)
L	.024 ±.001	(0.6 ±0.03)
W	.012 ±.001	(0.3 ±0.03)
T	.012 ±.001	(0.3 ±0.03)
E/B	.006 ±.002	(0.15±0.05)

R07 / 0402

	Inches	(mm)
L	.040 ±.004	(1.02 ±.10)
W	.020 ±.004	(0.51 ±.10)
T	.025 Max.	(0.64)
E/B	.008 ±.004	(0.20±.10)

R14 / 0603

	Inches	(mm)
L	.063 ±.008	(1.60 ±.20)
W	.032 ±.008	(0.81 ±.20)
T	.035 Max.	(0.89)
E/B	.010±.005	(.25±.13)

R15 / 0805

	Inches	(mm)
L	.080 ±.010	(2.03 ±.25)
W	.050 ±.010	(1.27 ±.25)
T	.050 Max.	(1.27)
E/B	.020±.010	(0.51±.25)

R18 / 1206

	Inches	(mm)
L	.125 ±.010	(3.17 ±.25)
W	.062 ±.010	(1.57 ±.25)
T	.050 Max.	(1.27)
E/B	.020±.010	(0.51±.25)

S41 / 1210

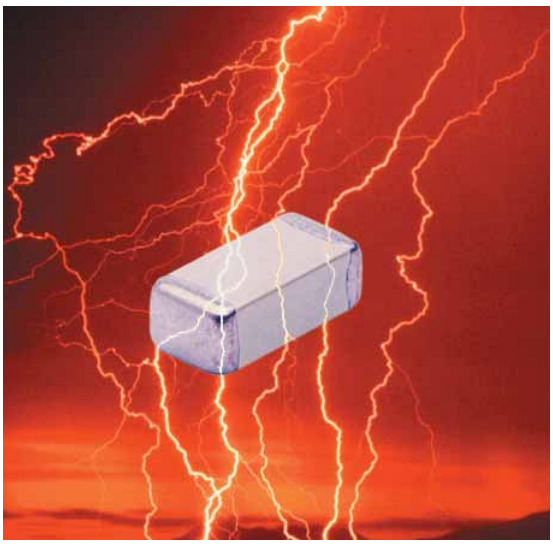
	Inches	(mm)
L	.125 ±.010	(3.18 ±.25)
W	.095 ±.010	(2.41 ±.25)
T	.065 Max.	(1.65)
E/B	.020±.010	(0.51±.25)

S43 / 1812

	Inches	(mm)
L	.175 ±.010	(4.45 ±.25)
W	.125 ±.010	(3.17 ±.25)
T	.085 Max.	(2.16)
E/B	.025±.015	(0.64±.38)

Dielectric specifications and part number breakdown may be found on pages 20 & 21.

High Voltage Surface mount MLCCs 250 - 5,000 VDC



These high voltage capacitors feature a special internal electrode design which reduces voltage concentrations by distributing voltage gradients throughout the entire capacitor. This unique design also affords increased capacitance values in a given case size and voltage rating. The capacitors are designed and manufactured to the general requirement of EIA198 and are subjected to a 100% electrical testing making them well suited for a wide variety of telecommunication, commercial, and industrial applications.

Applications

- Analog & Digital Modems
- Lighting Ballast Circuits
- DC-DC Converters
- LAN/WAN Interface
- Voltage Multipliers
- Back-lighting Inverters

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Mechanical Characteristics

		Inches	(mm)
R15/0805	L	.080 ±.010	(2.03 ±.25)
	W	.050 ±.010	(1.27 ±.25)
	T	.055 Max.	(1.40)
	E/B	.020 ±.010	(0.51±.25)
R18/1206		Inches	(mm)
	L	.125 ±.010	(3.17 ±.25)
	W	.062 ±.010	(1.57 ±.25)
	T	.067 Max.	(1.70)
	E/B	.020 ±.010	(0.51±.25)
S41/1210		Inches	(mm)
	L	.125 ±.010	(3.18 ±.25)
	W	.095 ±.010	(2.41 ±.25)
	T	.080 Max.	(2.03)
	E/B	.020 ±.010	(0.51±.25)
R29/1808		Inches	(mm)
	L	.180 ±.010	(4.57 ±.25)
	W	.080 ±.010	(2.03 ±.25)
	T	.080 Max.	(2.03)
	E/B	.020 ±.010	(0.51±.25)

Available Capacitance

Rated Voltage	NPO Dielectric		X7R Dielectric	
	Minimum	Maximum	Minimum	Maximum
250 VDC	-	-	1000 pF	0.022 µF
500 VDC	10 pF	680 pF	1000 pF	0.010 µF
630 VDC	10 pF	560 pF	1000 pF	3900 pF
1000 VDC	10 pF	390 pF	100 pF	2700 pF
250 VDC	-	-	1000 pF	0.068 µF
500 VDC	10 pF	1500 pF	1000 pF	0.027 µF
630 VDC	10 pF	1200 pF	1000 pF	0.010 µF
1000 VDC	10 pF	1000 pF	100 pF	6800 pF
2000 VDC	10 pF	220 pF	100 pF	1000 pF
3000 VDC	10 pF	82 pF	100 pF	220 pF
250 VDC	-	-	1000 pF	0.120 µF
500 VDC	10 pF	3900 pF	1000 pF	0.047 µF
630 VDC	10 pF	2700 pF	1000 pF	0.027 µF
1000 VDC	10 pF	1800 pF	100 pF	0.018 µF
2000 VDC	10 pF	560 pF	100 pF	6800 pF
3000 VDC	10 pF	220 pF	100 pF	560 pF
500 VDC	10 pF	4700 pF	1000 pF	0.056 µF
630 VDC	10 pF	3300 pF	1000 pF	0.039 µF
1000 VDC	1.0 pF	2200 pF	100 pF	0.018 µF
2000 VDC	1.0 pF	820 pF	100 pF	6800 pF
3000 VDC	1.0 pF	470 pF	100 pF	3300 pF
4000 VDC	1.0 pF	180 pF	100 pF	270 pF
5000 VDC	1.0 pF	75 pF	100 pF	120 pF

Available capacitance values include the following significant retma values and their multiples:
1.0 1.2 1.5 1.8 2.2 2.7 3.3 3.9 4.7 5.6 6.8 8.2 (1.0 = 1.0, 10, 100, 1000, etc.)
Consult factory for non-retma values and sizes or voltages not shown.

High Voltage Surface Mount MLCCs 250 - 5,000 VDC

Mechanical Characteristics

S43 / 1812

	Inches	(mm)
L	.180 ±.010	(4.57 ±.25)
W	.125 ±.010	(3.17 ±.25)
T	.110 Max.	(2.80)
E/B	.025 ±.015	(0.64±.38)

S49 / 1825

	Inches	(mm)
L	.180 ±.010	(4.57 ±.25)
W	.250 ±.010	(6.35 ±.25)
T	.140 Max.	(3.56)
E/B	.025 ±.015	(0.64±.38)

S47 / 2220

	Inches	(mm)
L	.225 ±.015	(5.72 ±.38)
W	.200 ±.015	(5.08 ±.38)
T	.150 Max.	(3.81)
E/B	.025 ±.015	(0.64±.38)

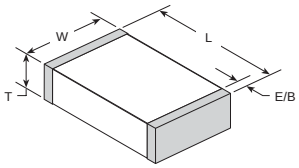
S48 / 2225

	Inches	(mm)
L	.225 ±.010	(5.72 ±.25)
W	.255 ±.015	(6.48 ±.38)
T	.150 Max.	(3.81)
E/B	.025 ±.015	(0.64±.38)

Available Capacitance

Rated Voltage	NPO Dielectric		X7R Dielectric	
	Minimum	Maximum	Minimum	Maximum
250 VDC	-	-	0.010 µF	0.220 uF
500 VDC	100 pF	8200 pF	1000 pF	0.150 uF
630 VDC	100 pF	6800 pF	1000 pF	0.100 µF
1000 VDC	10 pF	5600 pF	1000 pF	0.056 µF
2000 VDC	10 pF	1800 pF	100 pF	0.012 µF
3000 VDC	10 pF	1000 pF	100 pF	4700 pF
4000 VDC	10 pF	390 pF	10 pF	1500 pF
5000 VDC	10 pF	150 pF	10 pF	680 pF
500 VDC	100 pF	0.018 µF	0.01 µF	0.330 µF
630 VDC	100 pF	0.015 µF	0.01 µF	0.220 µF
1000 VDC	10 pF	0.012 µF	1000 pF	0.100 µF
2000 VDC	10 pF	5600 pF	100 pF	0.022 µF
3000 VDC	10 pF	2200 pF	100 pF	8200 pF
4000 VDC	10 pF	1200 pF	100 pF	2000 pF
5000 VDC	10 pF	390 pF	100 pF	820 pF
500 VDC	1000 pF	0.018 µF	0.01 µF	0.330 µF
630 VDC	1000 pF	0.018 µF	0.01 µF	0.270 µF
1000 VDC	100 pF	0.015 µF	1000 pF	0.180 µF
2000 VDC	100 pF	5600 pF	1000 pF	0.027 µF
3000 VDC	10 pF	2700 pF	100 pF	0.010 µF
4000 VDC	10 pF	1500 pF	100 pF	2200 pF
5000 VDC	10 pF	470 pF	100 pF	1500 pF
500 VDC	1000 pF	0.027 µF	0.01 µF	0.470 µF
630 VDC	1000 pF	0.022 µF	0.01 µF	0.330 µF
1000 VDC	100 pF	0.018 µF	1000 pF	0.150 µF
2000 VDC	100 pF	8200 pF	1000 pF	0.039 µF
3000 VDC	10 pF	3300 pF	100 pF	0.015 µF
4000 VDC	10 pF	1800 pF	100 pF	5600 pF
5000 VDC	10 pF	680 pF	100 pF	1500 pF

Available capacitance values include the following significant retma values and their multiples: 1.0 1.2 1.5 1.8 2.2 2.7 3.3 3.9 4.7 5.6 6.8 8.2 (1.0 = 1.0, 10, 100, 1000, etc.) Consult factory for non-retma values and sizes or voltages not shown.



Electrical Characteristics

Meets the standard NPO & X7R dielectric specifications listed on page 20

Dielectric Withstanding Voltage DWV = 1.5 X rated WVDC for ratings ≤ 500 WVDC,
DWV = 1.2 X rated WVDC for ratings ≥ 1,000 WVDC

NOTE: Capacitors may require a surface coating to prevent external arcing.

How to Order

202	R29	N	101	K	V	4	E

VOLTAGE
501 = 500 V
631 = 630 V
102 = 1000 V
202 = 2000 V
302 = 3000 V
402 = 4000 V
502 = 5000 V

CASE SIZE
See Chart

DIELECTRIC
N = NPO/COG
W = X7R

CAPACITANCE
1st two digits are significant; third digit denotes number of zeros, R = decimal.
1R0 = 1.0 pF
101 = 100 pF

TOLERANCE
NPO: J = ± 5%
K = ± 10%
X7R: K = ± 10%
M = ± 20%

TERMINATION
V = Ni barrier w/ 100% Sn Plating

MARKING
4 = Unmarked
6 = EIA Code*

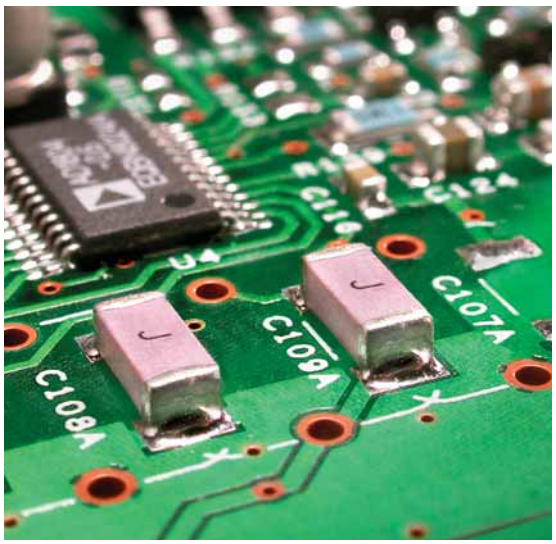
TAPE MODIFIER

Code	Tape	Reel
E	Embossed	7”
U	Embossed	13”
T	Paper	7”
R	Paper	13”

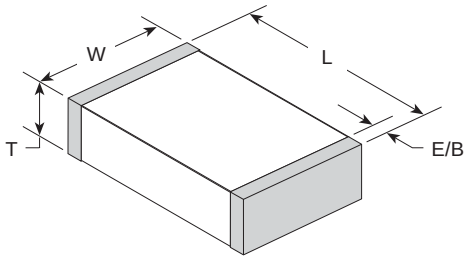
Tape specs. per EIA RS481

Part number written:
202R29N101KV4E

Safety Certified Capacitors



Johanson Dielectrics Type SC ceramic chip capacitors are designed for AC voltage surge and lightning protection in line-to-ground interface applications in computer network, modem, facsimile and other equipment.
Johanson's safety capacitor offering includes four different case sizes and NPO and X7R dielectric materials.
These devices are surface mount ready with barrier terminations and tape and reel packaging.
Additional information on capacitor safety ratings may be found below. Specific certification details may be found under each product listing on the facing page.



SAFETY RATING	VOLTAGE RATING	WITHSTANDING VOLTAGE	IMPULSE VOLTAGE	CASE SIZE	JOHANSON ORDERING P/N
X2/Y3	250 VAC	1,500 VAC	2,500 V	1808	302R29_____V_E-****-SC
Y3	250 VAC	1,500 VAC	N/A	1812	302S43_____V_E-****-SC
X1/Y2	250 VAC	1,500 VAC	5,000 V	1808	502R29_____V_E-****-SC
Y2	250 VAC	1,500 VAC	5,000 V	2211	502R30_____V_E-****-SC
X1/Y2	250 VAC	1,500 VAC	5,000 V	2220	502S47_____V3E-****-SC

X Capacitors are defined as suitable for use in situations where failure of the capacitor would not lead to danger of electric shock.
Y Capacitors are defined as suitable for use in situations where failure of the capacitor could lead to danger of electric shock.

NOW AVAILABLE **with Polyterm® soft termination option for demanding environments & processes. Visit our website for full details.**

How to Order Safety Certified

302 — **IMPULSE VOLTAGE**: 302 = 3000V, 502 = 5000V

R29 — **SIZE**: See Size Chart

N — **DIELECTRIC**: N = NPO, W = X7R

101 — **CAPACITANCE**: 1st two digits are significant; third digit denotes number of zeros; 101 = 100 pF

K — **TOLERANCE**: NPO: J = ± 5%, K = ± 10%; X7R: K = ± 10%, M = ± 20%

V — **TERMINATION**: V = Ni barrier w/ 100% Sn Plating

3 — **MARKING**: 3 = Special (J), 4 = No marking

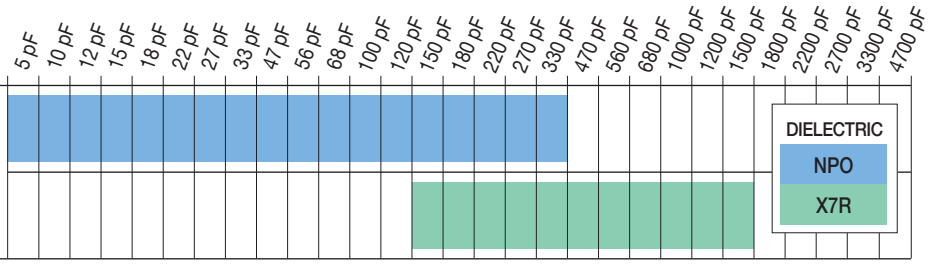
E — **TAPE MODIFIER**: Code E = Tape Embossed, Reel 7"; Tape specifications conform to EIA RS481

- **** -

SC — **TYPE**: SC = Safety Certified

P/N written: 302R29N101KV3E-****-SC

Safety Certified Capacitors

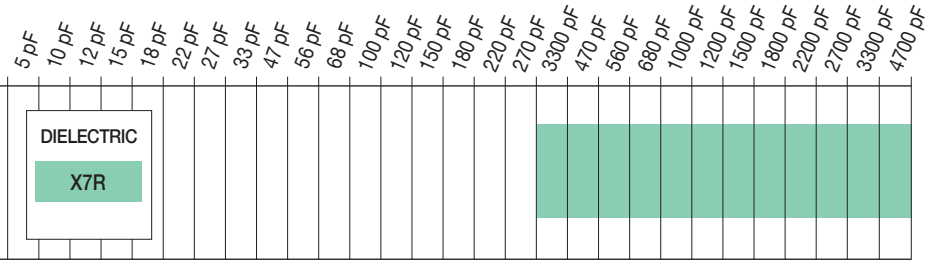


R29 / 1808

X2/Y3

	INCHES	(mm)
L	.180 ±.010	(4.57 ±.25)
W	.080 ±.010	(2.03 ±.25)
T	.080 Max.	(2.03)
E/B	.020 ±.010	(0.51±.25)
C	.125 Max.	(3.18)

STANDARDS: EN132400:1994+A1, IEC 60384-14:1993+A1, EN 60950:1992+A1+A2+A3+A4+A11 • UL 1950, Third Edition
CERTIFICATIONS: TUV Rheinland T72051130 & T72041946 • UL File E212609 • Semko 0026092-1 & 0003222-1

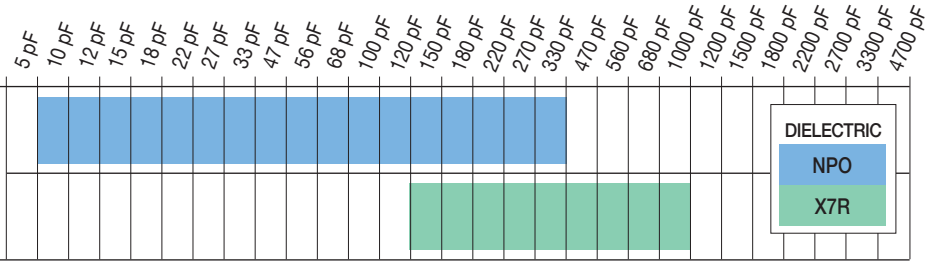


S43 / 1812

Y3

	INCHES	(mm)
L	.175 ±.010	(4.45 ±.25)
W	.125 ±.010	(3.17 ±.25)
T	.115 Max.	(2.92)
E/B	.025 ±.015	(0.64±.38)

STANDARDS: EN132400:1994+A1, IEC 60384-14:1993+A1, EN 60950:1992+A1+A2+A3+A4+A11
CERTIFICATIONS: TUV Rheinland T72041946

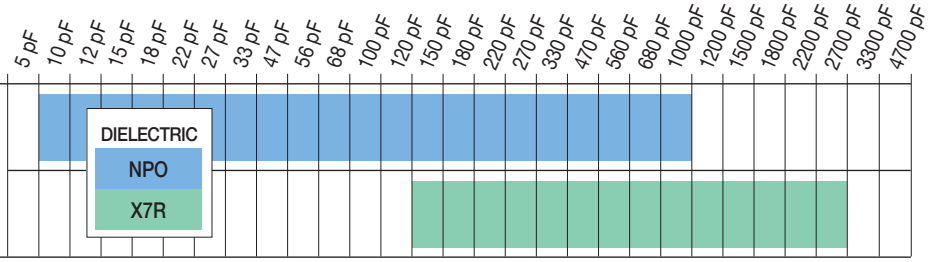


R29 / 1808

X1/Y2

	INCHES	(mm)
L	.189 ±.010	(4.80 ±.25)
W	.080 ±.010	(2.03 ±.25)
T	.085 Max.	(2.16)
E/B	.012 ±.005	(0.30±.13)

STANDARDS: EN132400:1994+A2, IEC 60384-14:1993+A1 / UL60950-01, First Edition
CERTIFICATIONS: TUV Rheinland T72041313 & T72041314 / UL File E212609-A1-UL-1

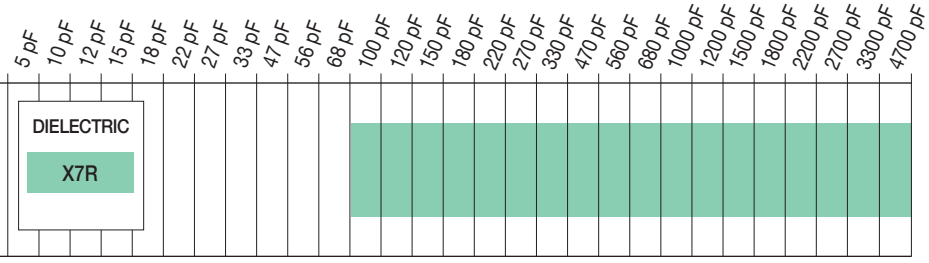


R30 / 2211

Y2

	INCHES	(mm)
L	.225 ±.016	(5.72 ±.40)
W	.110 ±.010	(2.80 ±.25)
T	.115 Max.	(2.92)
E/B	.020 ±.010	(0.51±.25)

STANDARDS: EN132400:1994+A2, IEC 60384-14:1993+A1 • UL60950-01, First Edition
CERTIFICATIONS: TUV Rheinland T72041313 & T72041314 • UL File: E212609-A1-UL-1



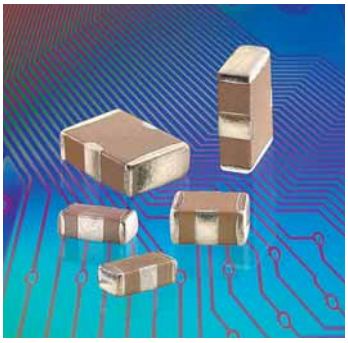
S47 / 2220

X1/Y2

	INCHES	(mm)
L	.225 ±.010	(5.72 ±.25)
W	.200 ±.010	(5.08 ±.25)
T	.150 Max.	(3.81)
E/B	.025 ±.015	(0.64±.38)

STANDARDS: EN132400:1994+A2, IEC 60384-14:1993+A • UL60950-01, 3rd Edition
CERTIFICATIONS: TUV Rheinland 2272848 • UL File: E212609-A1-UL-1

X2Y® Filter & Decoupling Capacitors



X2Y® filter capacitors employ a unique, patented low inductance design featuring two balanced capacitors that are immune to temperature, voltage and aging performance differences.
These components offer superior decoupling and EMI filtering performance, virtually eliminate parasitics, and can replace multiple capacitors and inductors saving board space and reducing assembly costs.

Advantages

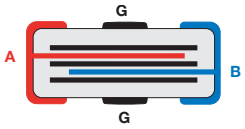
- One device for EMI suppression or decoupling
- Replace up to 7 components with one X2Y
- Differential and common mode attenuation
- Matched capacitance line to ground, both lines
- Low inductance due to cancellation effect

Applications

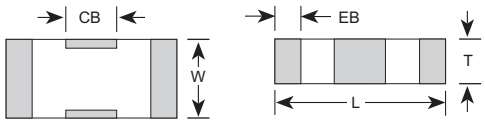
- FPGA / ASIC / µ-P Decoupling
- DDR Memory Decoupling
- Amplifier FIlter & Decoupling
- High Speed Data Filtering
- Cellular Handsets

Equivalent Circuits

Cross-sectional View



Dimensional View



SIZE EIA (JDI)	Circuit 1 (Y Cap.)		1.0pF	5.6pF	10pF	22pF	27pF	33pF	47pF	100pF	220pF	470pF	1000pF	1500pF	2200pF	4700pF	.010mF	.022mF	.047mF	0.10mF	0.22mF	0.33mF	0.40mF	0.47mF	1.0mF
	Circuit 2 (2*Y Cap.)		2.0pF	11.2pF	20pF	44pF	54pF	66pF	94pF	200pF	440pF	940pF	2000pF	3000pF	4400pF	9400pF	.020mF	.044mF	.094mF	0.20mF	0.44mF	0.68mF	0.80mF	0.94mF	2.0mF
	Order Code		1R0	5R6	100	220	270	330	470	101	221	471	102	152	222	472	103	223	473	104	224	334	404	474	105
0402 X07	X7R	50																							
		6.3																							
0603 X14	NPO	50																							
	X7R	100																							
		50																							
		25																							
		10																							
		6.3																							
0805 X15	NPO	100																							
		50																							
	X7R	100																							
		50																							
1206 X18	NPO	50																							
	X7R	100																							
		50																							
		16																							
		10																							
1210 X41	X7R	100																							
		50																							
		10																							
1410 X44	X7R	100																							
		50																							
1812 X43	X7R	100																							
		50																							

= RoHS NPO

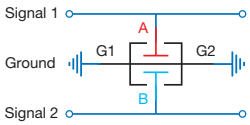
= RoHS X7R

Circuit 1 (Balanced Filtering) = A (or B) to G Circuit 2 (Decoupling) = A + B to G Rated voltage is for A or B to ground (A to B rating is 2 X Vrated)

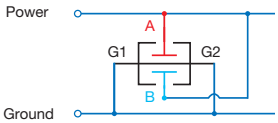
Please check www.johansondielectrics.com for the latest X2Y capacitance range availability

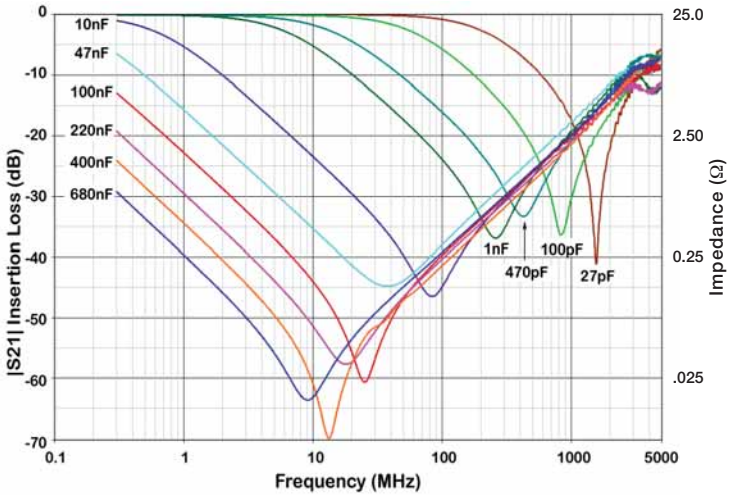
X2Y® Filter & Decoupling Capacitors

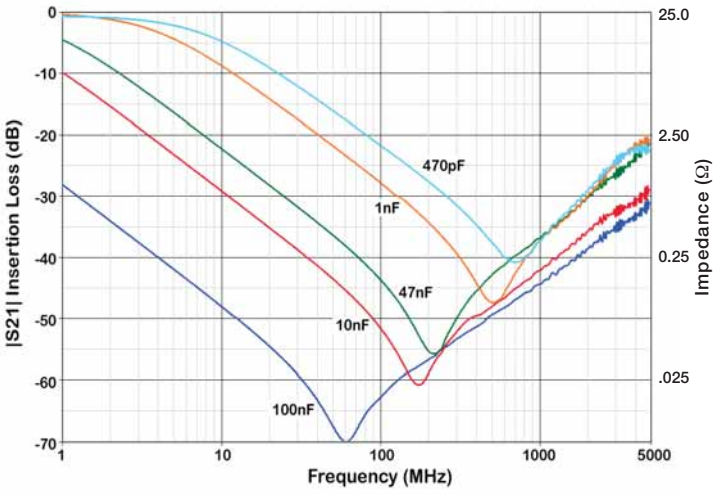
Filtering
Circuit 1 S21
Signal-to-Ground



Decoupling
Circuit 2 S21
Power-to-Ground







Additional test data and related information available at www.johansondielectrics.com/x2y/

Mechanical Characteristics

	0402 (X07)		0603 (X14)		0805 (X15)		1206 (X18)		1210 (X41)		1410 (X44)		1812 (X43)	
	IN	mm	IN	mm	IN	mm	IN	mm	IN	mm	IN	mm	IN	mm
L	0.045 ± 0.003	1.143 ± 0.076	0.064 ± 0.005	1.626 ± 0.127	0.080 ± 0.008	2.032 ± 0.203	0.124 ± 0.010	3.150 ± 0.254	0.125 ± 0.010	3.175 ± 0.254	0.140 ± 0.010	3.556 ± 0.254	0.174 ± 0.010	4.420 ± 0.254
W	0.024 ± 0.003	0.610 ± 0.076	0.035 ± 0.005	0.889 ± 0.127	0.050 ± 0.008	1.270 ± 0.203	0.063 ± 0.010	1.600 ± 0.254	0.098 ± 0.010	2.489 ± 0.254	0.098 ± 0.010	2.490 ± 0.254	0.125 ± 0.010	3.175 ± 0.254
T	0.020 max	0.508 max	0.026 max	0.660 max	0.040 max	1.016 max	0.050 max	1.270 max	0.070 max	1.778 max	0.070 max	1.778 max	0.090 max	2.286 max
EB	0.008 ± 0.003	0.203 ± 0.076	0.009 ± 0.004	0.229 ± 0.102	0.009 ± 0.004	0.229 ± 0.102	0.009 ± 0.004	0.229 ± 0.102	0.009 ± 0.005	0.229 ± 0.127	0.009 ± 0.005	0.229 ± 0.127	0.009 ± 0.005	0.229 ± 0.127
CB	0.010 ± 0.003	0.305 ± 0.076	0.018 ± 0.004	0.457 ± 0.102	0.022 ± 0.005	0.559 ± 0.127	0.040 ± 0.005	1.016 ± 0.127	0.045 ± 0.005	1.143 ± 0.127	0.045 ± 0.005	1.143 ± 0.127	0.045 ± 0.005	1.143 ± 0.127

How to Order X2Y® Filter & Decoupling Capacitors

6R3	X14	W	104	M	V	4	T
VOLTAGE 6R3 = 6.3 V 100 = 10 V 160 = 16 V 250 = 25 V 500 = 50 V 101 = 100 V	**CASE SIZE** X07 = 0402 X14 = 0603 X15 = 0805 X18 = 1206 X41 = 1210 X43 = 1812 X44 = 1410	**DIELECTRIC** N = NPO W = X7R	**CAPACITANCE** 1st two digits are significant; third digit denotes number of zeros. 474 = 0.47 µF 105 = 1.00 µF	**TOLERANCE** M = ± 20%	**TERMINATION** V = Ni barrier w/ 100% Sn Plating	**MARKING** 4 = Unmarked	**TAPE MODIFIER** Code Tape Reel E Embossed 7” T Paper 7” Tape specs. per EIA RS481

P/N written: 6R3X14W104MV4T

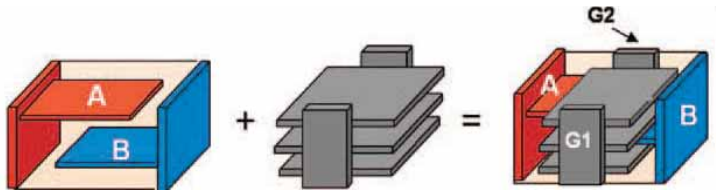
X2Y® Filter & Decoupling Capacitors

The X2Y® Design - A Capacitive Circuit

X2Y® components share many common features with standard multi-layer ceramic capacitors (MLCC) for easy adoption by end-users.

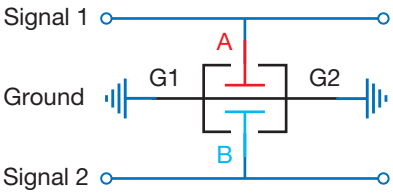
- *Same component sizes (0603, 0805, 1206, etc.)*
- *Same dielectric, electrode and termination materials*
- *Same pick and place equipment*
- *Same industry test standards for component reliability*

A standard multi-layer ceramic capacitor (MLCC) consists of opposing electrode layers A & B. The X2Y® design adds another set of electrode layers (G) which effectively surround each existing electrode of a two-terminal capacitor. The only external difference is two additional side terminations, creating a four-terminal capacitive circuit, which allows circuit designers a multitude of attachment options.



X2Y® Circuit 1: Filtering

When used in circuit 1 configuration the X2Y® filter capacitor is connected across two signal lines. Differential mode noise is filtered to ground by the two Y capacitors, A & B. Common mode noise is cancelled within the device.



Experts agree that balance is the key to a "quiet" circuit. X2Y® is a balanced circuit device with two equal halves, tightly matched in both phase and magnitude with respect to ground. Several advantages are gained by two balanced capacitors sharing a single ceramic component body.

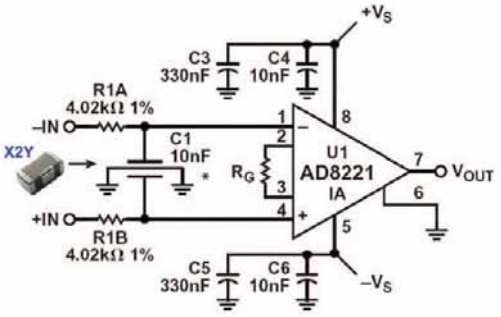
- *Exceptional common mode rejection*
- *Effect of voltage variation eliminated*
- *Effects of aging & temperature are equal on both caps*
- *Matched line-to-ground capacitance*

InAmp Input Filter Example

In this example, a single Johanson X2Y® component was used to filter noise at the input of a DC instrumentation amplifier. This reduced component count by 3-to-1 and costs by over 70% vs. conventional filter components that included 1% film Y-capacitors.

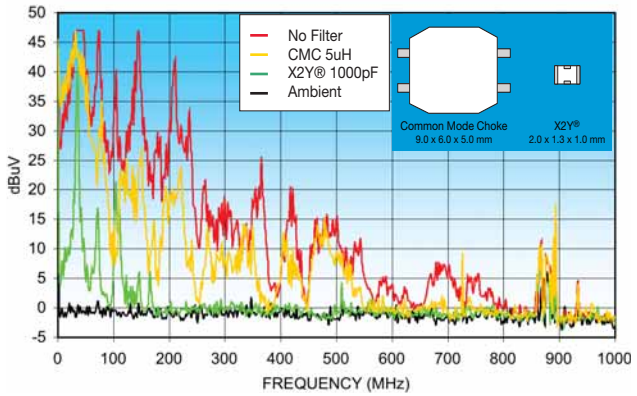
Parameter	X2Y® 10nF	Discrete 10nF, 2 @ 220 pF	Comments
DC offset shift	< 0.1 µV	< 0.1 µV	Referred to input
Common mode rejection	91 dB	92 dB	

Source: Analog Devices, "A Designer's Guide to Instrumentation Amplifiers (2nd Edition)" by Charles Kitchin and Lew Counts



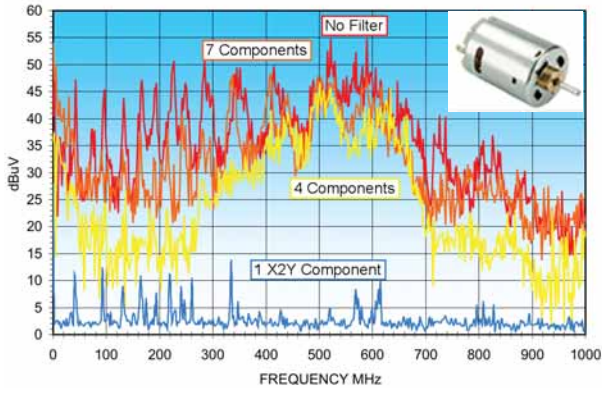
Common Mode Choke Replacement

In this example, a 5 µH common mode choke is replaced by an 0805, 1000pF X2Y® component acheiving superior EMI filtering by a component a fraction of the size and cost.



DC Motor EMI Reduction: A Superior Solution

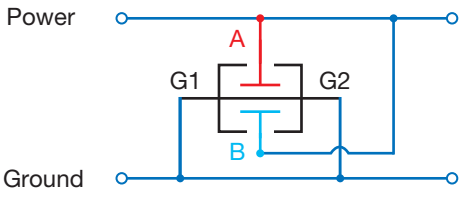
One X2Y® component has successfully replaced 7 discrete filter components while achieving superior EMI filtering.



X2Y® Filter & Decoupling Capacitors

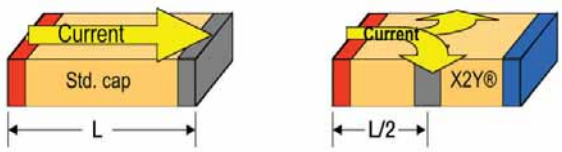
X2Y® Circuit 2: Decoupling

When used in circuit 2 configuration, A & B capacitors are placed in parallel effectively doubling the apparent capacitance while maintaining an ultra-low inductance. The low inductance advantages of the X2Y® Capacitor Circuit enables high-performance bypass networks at reduced system cost.

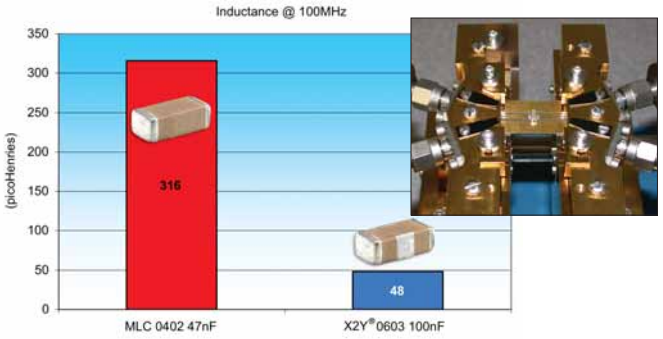


- *Low ESL (device only and mounted)*
- *Broadband performance*
- *Effective on PCB or package*
- *Lower via count, improves routing*
- *Reduces component count*
- *Lowers placement cost*

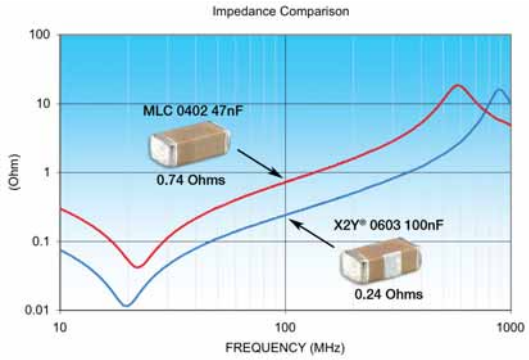
Component Performance

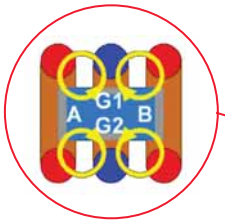


The X2Y® has short, multiple and opposing current paths resulting in lower device inductance.

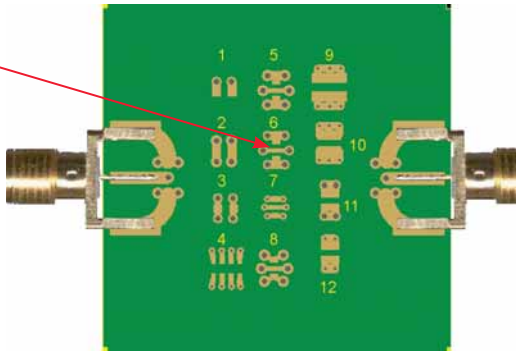


Mounted Performance





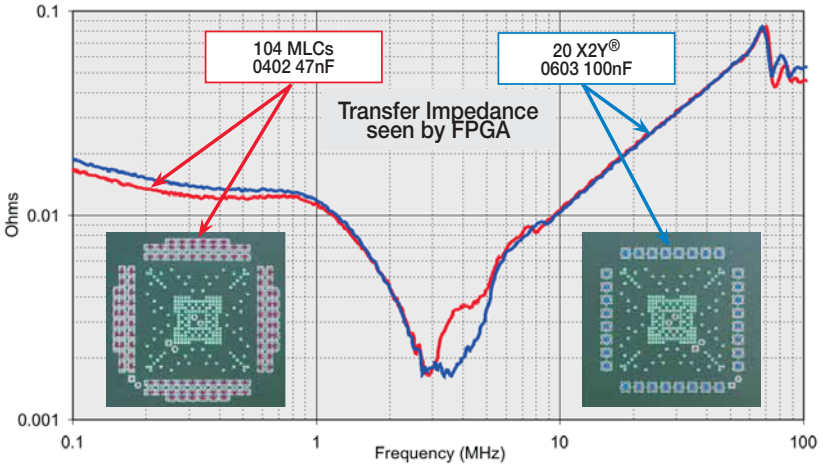
Mutual coupling from opposing polarity vias lowers inductance when mounted on a PCB.



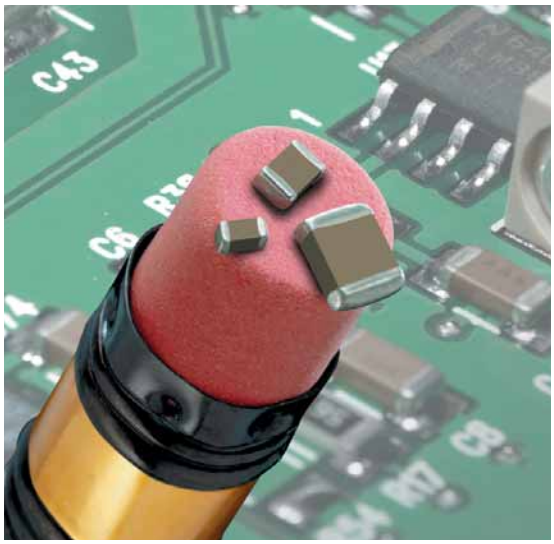
SYSTEM PERFORMANCE

1:5 MLCC Replacement Example

X2Y's® proven technology enables end-users to use one X2Y capacitor to replace five conventional MLCCs in a typical high performance IC bypass design. Vias are nearly cut in half, board space is reduced and savings are in dollars per PCB.



TANCERAM® CHIP CAPACITORS



TANCERAM® chip capacitors can replace tantalum capacitors in many applications and offer several key advantages over traditional tantalums. Because Tanceram® capacitors exhibit extremely low ESR, equivalent circuit performance can often be achieved using considerably lower capacitance values. Low DC leakage reduces current drain, extending the battery life of portable products. Tancerams® high DC breakdown voltage ratings offer improved reliability and eliminate large voltage de-rating common when designing with tantalums.

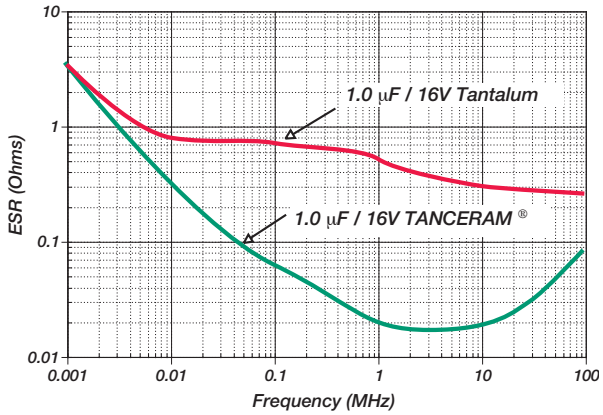
ADVANTAGES

- Low ESR
- Higher Surge Voltage
- Reduced CHIP Size
- Higher Insulation Resistance
- Low DC Leakage
- Non-polarized Devices
- Improved Reliability
- Higher Ripple Current

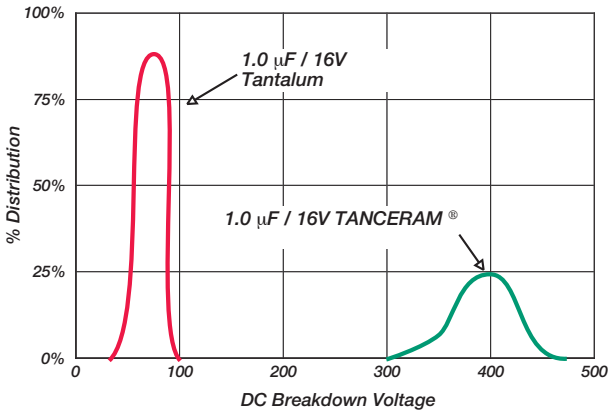
APPLICATIONS

- Switching Power Supply Smoothing (Input/Output)
- DC/DC Converter Smoothing (Input/Output)
- Backlighting Inverters
- General Digital Circuits

Typical ESR Comparison



Typical Breakdown Voltage Comparison



HOW TO ORDER TANCERAM®

250	R18	Y	105	Z	V	4	E

VOLTAGE
500 = 50 V
250 = 25 V
160 = 16 V
100 = 10 V
6R3 = 6.3 V

CASE SIZE
See Chart

DIELECTRIC
W = X7R
X = X5R
Y = Y5V

CAPACITANCE
1st two digits are significant; third digit denotes number of zeros.
474 = 0.47 µF
105 = 1.00 µF

TOLERANCE
Y5V
Z = +80% -20%
X7R/X5R
K = ±10%
M = ±20%

TERMINATION
V = Ni barrier w/ 100% Sn Plating

MARKING
4 = Unmarked

TAPE MODIFIER

Code	Type	Reel
E	Plastic	7”
T	Paper	7”

Tape specifications conform to EIA RS481

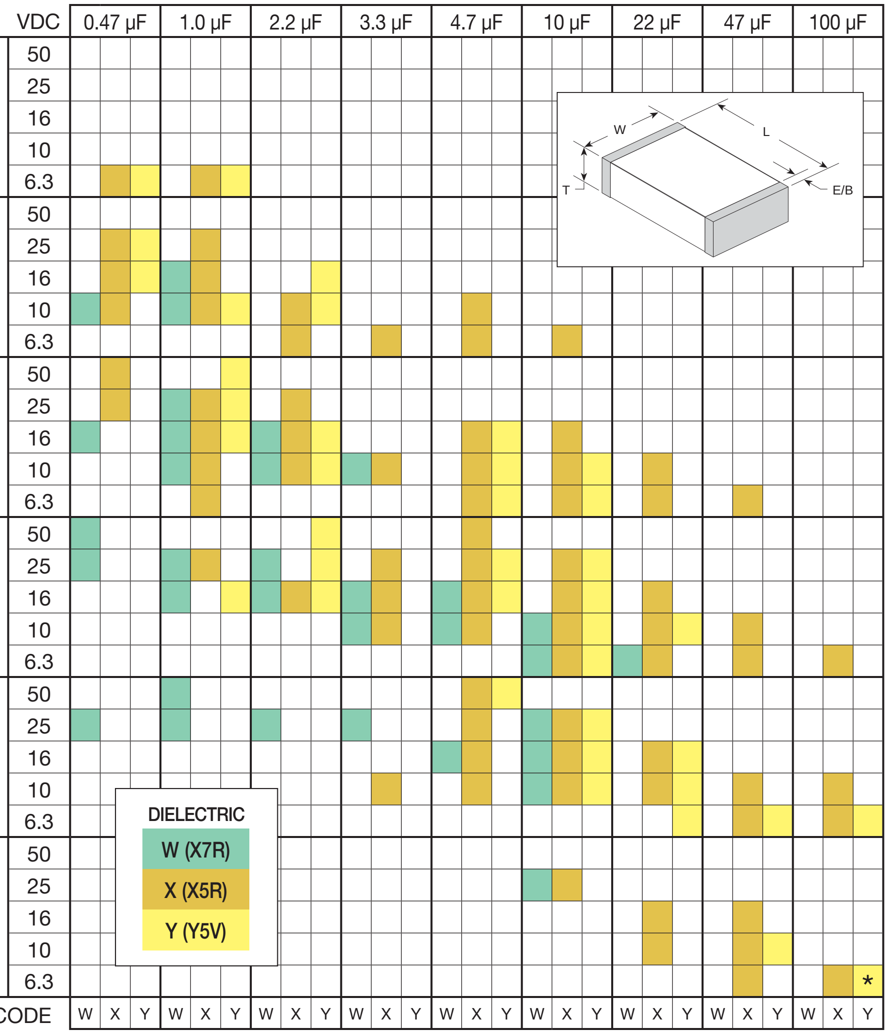
P/N written: 250R18Y105ZV4E

TANCERAM® CHIP CAPACITORS

CASE SIZE

Case		Inches	(mm)
0402 R07	L	.040 ±.004	(1.02 ±.10)
	W	.020 ±.004	(0.51 ±.10)
	T	.025 Max.	(0.64)
	E/B	.008 ±.004	(0.20±.10)
0603 R14	L	.063 ±.008	(1.60 ±.20)
	W	.032 ±.008	(0.81 ±.20)
	T	.035 Max.	(0.89)
	E/B	.010±.005	(.25±.13)
0805 R15	L	.080 ±.010	(2.03 ±.25)
	W	.050 ±.010	(1.27 ±.25)
	T	.060 Max.	(1.52)
	E/B	.020±.010	(0.51±.25)
1206 R18	L	.125 ±.010	(3.17 ±.25)
	W	.062 ±.010	(1.57 ±.25)
	T	.070 Max.	(1.78)
	E/B	.020 +.015-0.01	(0.51+.38-.25)
1210 S41	L	.125 ±.010	(3.18 ±.25)
	W	.095 ±.010	(2.41 ±.25)
	T	.110 Max.	(2.8)
	E/B	.020 +.015-.010	(0.51+.38-.25)
1812 S43	L	.175 ±.010	(4.45 ±.25)
	W	.125 ±.010	(3.17 ±.25)
	T	.110 Max.	(2.8)
	E/B	.035±.020	(0.89±.51)
	* T	.140 Max.	(3.55)

CAPACITANCE SELECTION



ELECTRICAL CHARACTERISTICS

	X7R	X5R	Y5V
Temperature Coefficient:	±15% (-55 to +125°C)	±15% (-55 to +85°C)	+22%, -82% (-30 to +85°C)
Dissipation Factor:	For ≥ 50 VDC: 5% max. For ≤ 25 VDC: 10% max.	For ≥ 50 VDC: 5% max. For ≤ 25 VDC: 10% max.	For ≥ 10 VDC: 16% max. For 6.3 VDC: 20% max.
Insulation Resistance (Min. @ 25°C, WVDC)	500 ΩF or 10 GΩ, whichever is less		
Dielectric Strength:	2.5 X WVDC, 25°C, 50mA max.		
Test Conditions:	Capacitance values ≤ 22 µF: 1.0kHz±50Hz @ 1.0±0.2 Vrms Capacitance values > 22 µF: 120Hz±10Hz @ 0.5V±0.1 Vrms		
Other:	See page 20 for additional dielectric specifications.		

Capacitor Arrays

Capacitor arrays combine separate multi-layer ceramic capacitors of the same value in a single passive component. The primary advantages of this device are a reduction in PCB space and placement time. The arrays are offered in three standard dielectrics and feature barrier terminations and tape & reel packaging.

Features

- Multiple Caps in One Chip
- Reduces Circuit Size
- Easier Handling
- Lower Placement Cost
- Increased Throughput

Applications

- Cellular / Pagers
- Handheld Equipment
- PCMCIA Cards
- Camcorders
- PC's & Peripherals

Capacitance / Voltage Selection

Chip Size	Rated Voltage	NPO Dielectric		X7R Dielectric		Y5V Dielectric	
		min.	MAX.	min.	MAX.	min.	MAX.
A11 / 0405	10 VDC	10 pF	680 pF	560 pF	.047 µF		
	16 VDC	10 pF	680 pF	560 pF	.033 µF		
	25 VDC	10 pF	680 pF	560 pF	.022 µF		
A18 / 0612	16 VDC			.033 µF	.047 µF	.150 µF	.220 µF
	25 VDC			.015 µF	.022 µF	.068 µF	.100 µF
	50 VDC	330 pF	470 pF	6800 pF	.010 µF	.010 µF	.047 µF
	100 VDC	10 pF	220 pF	220 pF	4700 pF		

Available capacitance values include the following significant R12 retma values and their multiples:
1.0 1.2 1.5 1.8 2.2 2.7 3.3 3.9 4.7 5.6 6.8 8.2 (1.0 = 1.0, 10, 100, 1000, etc.)
Please contact the factory for size/voltage/value combinations not shown.

How to Order - Capacitor Arrays

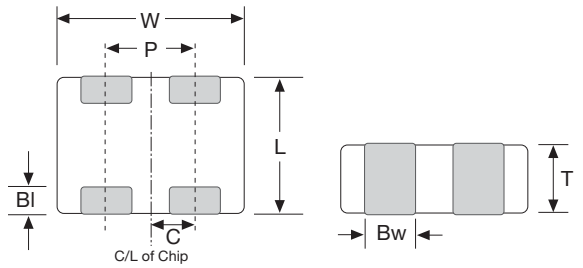
160	A11	N	100	J	V	4	E
VOLTAGE 100 = 10 V 160 = 16 V 250 = 25 V 500 = 50 V 101 = 100 V	**CASE SIZE** A11 = 0405 A18 = 1206	**DIELECTRIC** N = NPO W = X7R Y = Y5V	**CAPACITANCE** 1st two digits are significant; third digit denotes number of zeros 10 = 1.0 pF 101 = 100 pF	**TOLERANCE** J = ± 5% K = ± 10% M = ± 20% Z = +80 - 20%	**TERMINATION** V = Ni barrier w/ 100% Sn Plating	**MARKING** 4 = Unmarked	**TAPE MODIFIER** Code Type Reel E Embossed 7" U Embossed 13" Tape specifications conform to EIA RS481

P/N written: 160A11N100JV4E

CAPACITOR ARRAYS

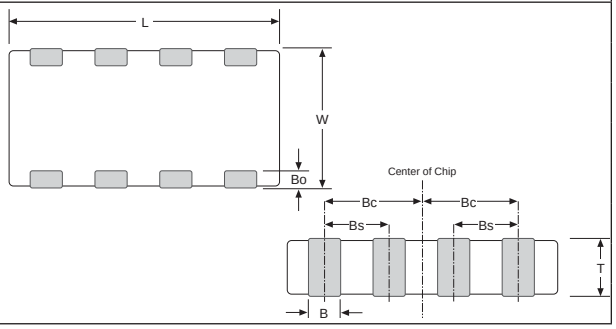
Mechanical Dimensions: Size A11

	In	(mm)
L	.040 ± .005	(1.02±.13)
W	.055 ± .005	(1.40±.13)
T	.030 max.	(0.76 max.)
Bw	.015 ± .004	(0.38±0.10)
Bl	.010 ± .004	(0.25±0.10)
P	.026 ± .005	(0.66±0.13)
C	.013 ± .004	(0.33±0.10)



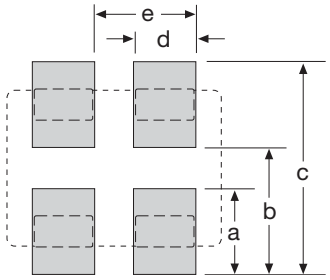
Mechanical Dimensions: Size A18

	In	(mm)
L	.126±.008	(3.20±.02)
W	.063±.008	(1.60±.02)
T	.059 max.	(1.50 max.)
B	.016±.004	(0.41±0.1)
Bo	.008 Typical	(0.20 TYP)
Bs	.030 Typical	(0.76 TYP)
Bc	.045±.004	(1.14±0.1)



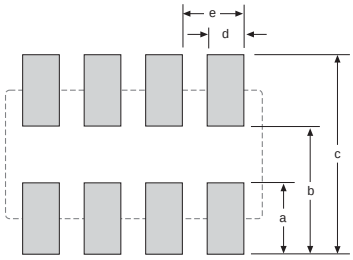
Solder Pad Dimensions: Size A11

	a	b	c	d	e
Inches	.020	.030	.060	.013	.026
(mm)	(0.51)	(0.76)	(1.52)	(0.33)	(0.66)



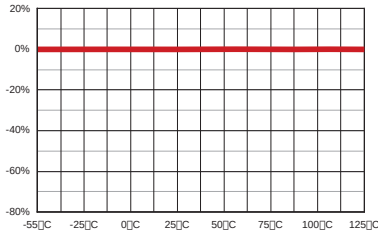
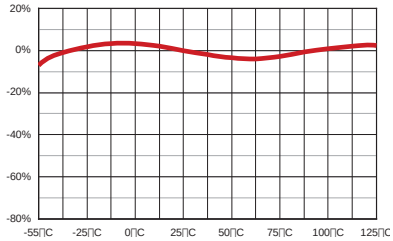
Solder Pad Dimensions: Size A18

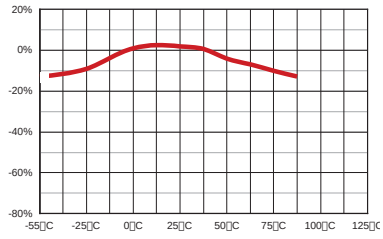
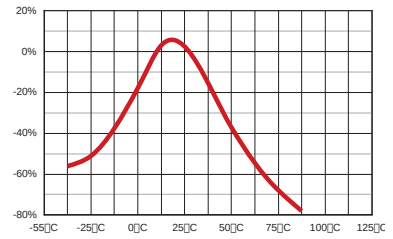
	a	b	c	d	e
Inches	.035	.065	.100	.018	.030
(mm)	(0.89)	(1.65)	(2.54)	(0.46)	(0.79)



Dielectric specifications are listed on page 20.

ELECTRICAL CHARACTERISTICS

PARAMETER	NPO		X7R	
TEMPERATURE COEFFICIENT:	0± 30 ppm/°C	-55 to +125°C	± 15%	-55 to +125°C
				
DISSIPATION FACTOR:	.001 (0.1%) max		For Vrated ≥ 50 VDC, DF = 2.5% max For Vrated = 25 VDC, DF = 3.0% max For Vrated = 16 VDC, DF = 3.5% max	
AGING:	None		2.5% / decade hour	
INSULATION RESISTANCE:	IR @ 25°C, WVDC = 1000ΩF or 100GΩ whichever is less[1] IR @ 125°C, WVDC = 10% of 25°C rating			
DIELECTRIC STRENGTH:	For Vrated = 6 - 200 VDC, DWV = 2.5 X WVDC, 25°C, 50mA max. For Vrated = 201 - 499 VDC, DWV = 2.0 X WVDC, 25°C, 50mA max. For Vrated = 500 - 999 VDC, DWV = 1.5 X WVDC, 25°C, 50mA max. For Vrated = 1000+ VDC, DWV = 1.2 X WVDC, 25°C, 50mA max.			
TEST PARAMETERS:	C > 100 pF; 1kHz ±50Hz;1.0±0.2 VRMS C ≤ 100 pF 1Mhz ±50kHz; 1.0±0.2 VRMS		1kHz ±50Hz;1.0±0.2 VRMS	
NOTES:			1) Tanceram X7R IR = 500 ΩF or 10 GΩ,	

PARAMETER	X5R		Y5V	
TEMPERATURE COEFFICIENT:	± 15%	-55 to +85°C	+22% -82%	-30 to +85°C
				
DISSIPATION FACTOR:	For Vrated ≥ 50 VDC, DF = 5% max For Vrated ≤ 25 VDC: DF = 10% max		For Vrated ≥ 10 VDC, DF = 16% max For Vrated = 6.3 VDC: DF = 20% max	
AGING:	2.5 % / decade hour		7.0% / decade hour	
INSULATION RESISTANCE:	IR @ 25°C, WVDC = 1000ΩF or 100GΩ whichever is less[2]		IR @ 25°C, WVDC = 100ΩF or 10GΩ whichever is less	
DIELECTRIC STRENGTH:	DWV = 2.5 X WVDC, 25°C, 50mA max.		DWV = 2.5 X WVDC, 25°C, 50mA max.	
TEST PARAMETERS:	1kHz ±50Hz; 0.5±0.2 VRMS		1kHz ±50Hz;1.0±0.2 VRMS	
NOTES:	2) Tanceram X5R IR = 500 ΩF or 10 GΩ			

Part Number Breakdown

500	R15	N	101	J	V	4	T
VOLTAGE	**CASE SIZE**	**DIELECTRIC**	**CAPACITANCE**	**TOLERANCE**	**TERMINATION**	**MARKING**	**PACKAGING**
6R3 = 6.3 V 100 = 10 V 160 = 16 V 250 = 25 V 500 = 50 V 101 = 100 V 201 = 200 V 251 = 250 V 301 = 300 V 501 = 500 V 631 = 630 V 102 = 1000 V 202 = 2000 V 302 = 3000 V 402 = 4000 V 502 = 5000 V	R05=0201 R07=0402 A11=0405 R14=0603 R15=0805 A18=0612 R18=1206 S41=1210 R29=1808 S43=1812 S47=2220 S49=1825 S48=2225 X__=R/S__*	N = NPO W = X7R X = X5R Y = Y5V	1st two digits are significant; third digit denotes number of zeros, R = decimal. 1R0 = 1.0 pF 100 = 10 pF 102 = 1,000 pF 474 = 0.47 µF	* B = ± 0.10 pF * C = ± 0.25 pF * D = ± 0.50 pF F = ± 1 % G = ± 2% J = ± 5% K = ± 10% M = ± 20% Z = +80 -20% *Values < 10 pF only	V = Nickel Barrier with 100% Tin Plating (Matte)	4 = Unmarked 6 = EIA Code* *Not available on sizes ≥ 0402	Tape Code / Tape Type / Reel Size U Embossed 13” R Punched 13” E Embossed 7” T Punched 7” None = Bulk Packaging Size 0201-1206 tape standard is Code “T” Tape specifications conform to EIA RS481

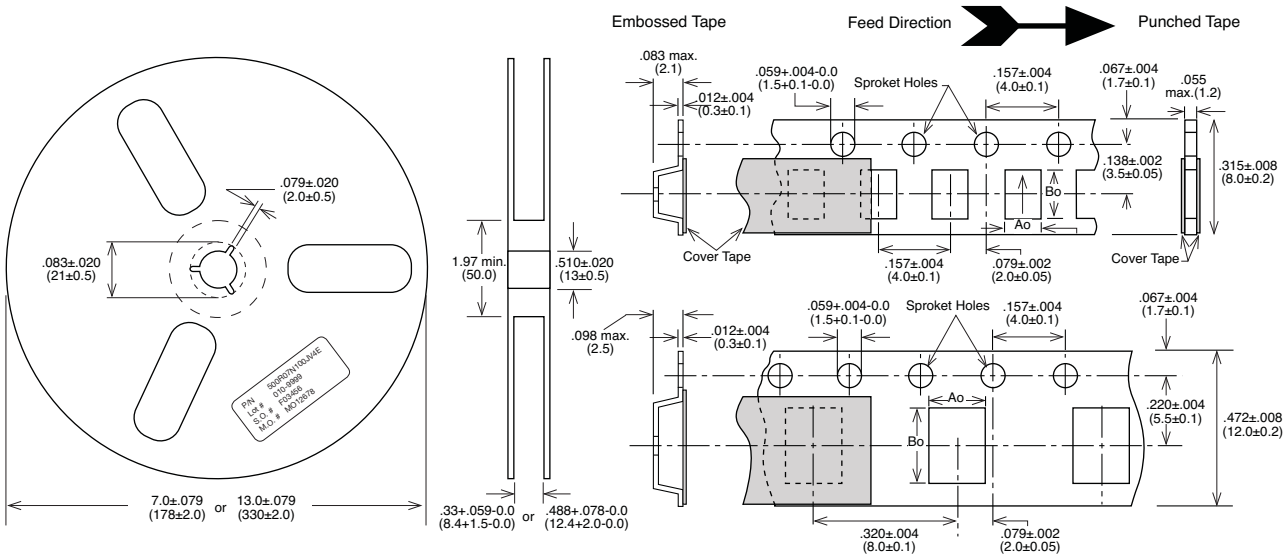
Part number written: 500R15N101JV4T

* X14 = R14 = 0603; X41 = S41 =1210

PLEASE NOTE: Not all combinations of JDI P/Ns are valid. Please refer to the appropriate “How to Order” section for a particular product or contact your Sales Representative if you need assistance.

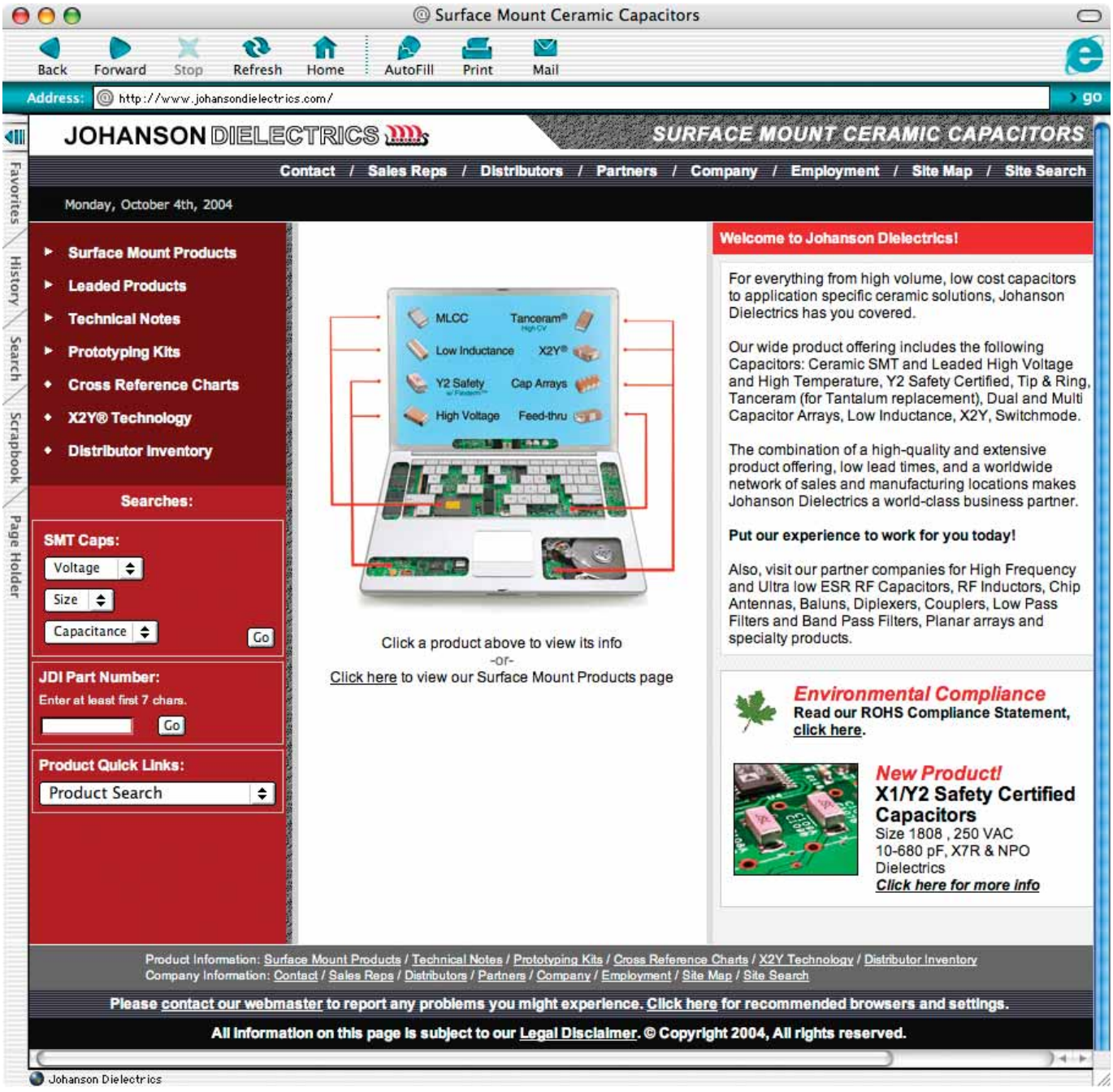
Capacitor Packaging & Marking

Johanson capacitors are available taped per EIA standard 481. Tape options include 7" and 13" diameter reels. Johanson uses high quality, dust free, punched 8mm paper tape and plastic embossed 8mm tape for thicker MLCCs. Quantity per reel ranges are listed in the tables below and are dependent on chip thickness.



	7" DIAMETER REEL				13" DIAMETER REEL			
COMPONENT	REEL QTY	TAPE TYPE / SIZE		CODE	REEL QTY	TAPE TYPE / SIZE		CODE
R05 / 0201 MLCC	15000	Paper	8mm	T	N/A	N/A		N/A
R07 / 0402 MLCC	10000	Paper	8mm	T	N/A	N/A		N/A
R14 / 0603 MLCC	4000	Paper	8mm	T	10000	Paper	8mm	R
R15 / 0805 MLCC	3000 - 4000	Paper / Embossed	8mm	T	10000	Paper / Embossed	8mm	U
R18 / 1206 MLCC	3000 - 4000	Paper / Embossed	8mm	T	10000	Paper / Embossed	8mm	U
S41 / 1210 MLCC	2000 - 3000	Embossed	8mm	E	5000-10000	Embossed	8mm	U
R29 / 1808 MLCC	2000	Embossed	12mm	E	5000	Embossed	12mm	U
R30 / 2211 MLCC	2000	Embossed	12mm	E	5000	Embossed	12mm	U
S43 / 1812 MLCC	500 - 1000	Embossed	12mm	E	3000 - 5000	Embossed	12mm	U
S47 / 2220 MLCC	500 - 1000	Embossed	12mm	E	2000 - 5000	Embossed	12mm	U
S49 / 1825 MLCC	500 - 1000	Embossed	12mm	E	2000 - 4000	Embossed	12mm	U
S48 / 2225 MLCC	500 - 1000	Embossed	12mm	E	2000 - 4000	Embossed	12mm	U
X14 / 0603 X2Y	4000	Paper	8mm	T	10000	Paper	8mm	R
X15 / 0805 X2Y	4000	Embossed	8mm	E	10000	Embossed	8mm	U
X18 / 1206 X2Y	3000 - 4000	Embossed	8mm	E	10000	Embossed	8mm	U
X41 / 1210 X2Y	2000 - 3000	Embossed	8mm	E				
X44 / 1410 X2Y	1000 - 2000	Embossed	8mm	E				
X43 / 1812 X2Y	1000	Embossed	8mm	E				

ONLINE RESOURCES: www.johansondielectrics.com



Johanson Dielectrics, Inc. reserves the right to make design and price changes without notice. All sales are subject to the terms and conditions printed on the back side of our sales order acknowledgment forms, including a limited warranty and remedies for non-conforming goods or defective goods. We will be pleased to provide a copy of these terms and conditions for your review.

Your Technology Partner

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