Knowles Precision Devices
No. 20 Chunxing Road, Caohu Street
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Suzhou, Jiangsu, 215143, China
Tel: +86-512-6258 8258
Web: www.knowlescapacitors.com

2nd December 2020

PCN (Product Change Notification) reference: **2020/27**

Subject: Knowles New Recommended Version Safety Capacitor Released

Dear Customer

Thank you very much for your great and continued support for business with Knowles. This is the official notification that a new recommended series of Knowles surface mount safety rated Multilayer Ceramic Capacitor is released. The new part utilises an alternative dielectric material that allows us to ensure future supply, and provide more optimized cost.

At this time, there is no intention to stop manufacture of the current part, but they should be considered Not Recommended for New Designs (NRND) and we strongly suggest that any new designs utilize the new version. It is also acceptable to replace the original version in existing applications.

The performance of the new recommended version safety capacitor is the same as the original ones and they meet the required safety critical test requirements. A capacitance range comparison between recommended version and original version is listed in the appendix form. Please contact your local Customer Service team if you would like samples.

When the range is live, datasheets can be downloaded direct from our website (https://www.knowlescapacitors.com/Products/Capacitors/SMDCap/Safety-Cap).

Your understanding and support are highly appreciated.

Yours sincerely

Alice Liu
Quality Manager
Knowles Precision Devices

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PCN Details

PCN reference:	2020/27
PCN Issue Date:	2nd December 2020
Implementation Schedule:	Recommended for new version safety capacitors.
Product:	Knowles Safety certified MLCC
PCN Description:	Knowles New Recommended Version Safety Capacitor
Reasons for PCN:	Introduction of new dielectric to safeguard future component supply
Changes to Form, Fit or Function:	Different material set used, performance unchanged
Changes to Quality or Reliability:	None.
Changes to Part Numbers:	All class safety capacitors within target capacitance range, see appendix for details.
Qualification Results:	Approved by TUV & UL. Detail performance comparison provided below. Further details are available on request
Are Samples Available?	Yes

Refer to detail comparison form, reference below.

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Marked	X1 (305Vac)/Y2 (250Vac)/1000VDC/5kV Impulse	**Classification**	IEC/EN60384-14:2013/A1:2016, UL/CAN/CSA60384-14:2014 Humidity Grade (III) (IEC/EN60384-14:2013 Annex I)
Unmarked	In accordance with above + 2500Vdc	**Old Classification**	IEC/EN60384-14:2013+A1, UL-60950-1, 2nd Ed, CSA 60950-1-07 2nd Ed
Suffix	**SYX (MARKED)** **UYX (UNMARKED)**	**Terminations**	J (Nickel Barrier, Sn Plated Solder) + Y (Flexicap Polymer termination, Nickel barrier, Sn Plated Solder)

Green cells indicate improvements compared to previous range

Case Size	**1808**				**1812**			
Dielectric	**X7R old**	**X7R new**	**C0G old**	**C0G new**	**X7R old**	**X7R new**	**C0G old**	**C0G new**
Suffix code	Previous range did not meet >4mm creepage specification required for Y2 certification	SYX/UYX	Previous range did not meet >4mm creepage specification required for Y2 certification	SYX/UYX	Previous range did not meet >4mm creepage specification required for Y2 certification	SYX/UYX	Previous range did not meet >4mm creepage specification required for Y2 certification	SYX/UYX
Dielectric code		J/S		G/K		J/S		G/K
Min Capacitance (pF)		82		5.6		150		5.6
Max Capacitance (pF)		1800		220		4700		820
Length (mm)		4.95 ± 0.35		4.95 ± 0.35		4.95 ± 0.35		4.95 ± 0.35
Width (mm)		2.00 ± 0.30		2.00 ± 0.30		3.20 ± 0.30		3.20 ± 0.30
Height (Max)		2*		2*		2.6*		2.6*
Termination bands (mm)		0.35-0.80		0.35-0.80		0.35-0.80		0.35-0.80
Creepage (min)		4		4		4		4
VP test (100%)		4000		4000		4000		4000
AQL: DC DWV test (V)		4000		4000		4000		4000
AQL: AC DWV test (V)		3000		3000		3000		3000
Safety rating		Y2/X1		Y2/X1		Y2/X1		Y2/X1
Voltage rating (Vac)		250/305		250/305		250/305		250/305
Voltage code		A25		A25		A25		A25

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Green cells indicate improvement compared to previous range

2211				2215				2220	
X7R old	**X7R new**	**C0G old**	**C0G new**	**X7R old**	**X7R new**	**C0G old**	**C0G new**	**X7R old**	**X7R new**
Previous range did not meet >4mm creepage specification required for Y2 certification	SYX/UYX	Previous range did not meet >4mm creepage specification required for Y2 certification	SYX/UYX	Previous range did not meet >4mm creepage specification required for Y2 certification	SYX/UYX	Previous range did not meet >4mm creepage specification required for Y2 certification	SP/SPU	Previous range did not meet >4mm creepage specification required for Y2 certification	SYX/UYX
	J/S		G/K		J/S		G/K		J/S
	100		4.7		2700		820		150
	3900		1000		6800		1000		6800
	5.70 ± 0.40		5.70 ± 0.40		5.70 ± 0.40		5.70 ± 0.40		5.70 ± 0.40
	2.79 ± 0.30		2.79 ± 0.30		3.81 ± 0.35		3.81 ± 0.35		5.00 ± 0.40
	2.8*		2.8*		2.8*		2.8*		2.80*
	0.50 - 0.80		0.50 - 0.80		0.50 - 0.80		0.50 - 0.80		0.25 - 1.00
	4		4		4		4		4
	4000		4000		4000		4000		4000
	4000		4000		4000		4000		4000
	3000		3000		3000		3000		3000
	Y2/X1		Y2/X1		Y2/X1		Y2/X1		Y2/X1
	250/305		250/305		250/305		250/305		250/305
	A25		A25		A25		A25		A25

Additional statements

Material Group I: CTI >=600

*Thickness of new parts will be banded based on capacitance value

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Marked	X1 (305Vac)/Y2 (250Vac)/1000VDC/5kV Impulse for use in equipment within the spec of IEC62368	**Classification**	IEC/EN60384-14:2013/A1:2016, UL/CAN/CSA60384 -14: 2014 (EXCEPT CREEPAGE SPEC) Humidity Grade (III) (IEC/EN60384-14:2013 Annex I)
Unmarked	In accordance with above + 2500Vdc		
Suffix	**SYS (MARKED)**	**Old Classification**	IEC/EN60384-14:2013+A1, UL-60950-1, 2nd Ed, CSA 60950-1-07 2nd Ed
	UYS (UNMARKED)	**Terminations**	J (Nickel Barrier, Sn Plated Solder) + Y (Flexicap Polymer termination, Nickel barrier, Sn Plated Solder)

Green cells indicate improvement compared to previous range

Case Size	**1808**				**1812**			
Dielectric	**X7R old**	**X7R new**	**C0G old**	**C0G new**	**X7R old**	**X7R new**	**C0G old**	**C0G new**
Suffix code	SY2/PY2	SYS/UYS	SY2/PY2	SYS/UYS	SY2/PY2	SYS/UYS	SY2/PY2	SYS/UYS
Dielectric code	X/E	J/S	C/A	G/K	X/E	J/S	C/A	G/K
Min Capacitance (pF)	150	82	4.7	5.6	150	150	4.7	5.6
Max Capacitance (pF)	1000	1800	390	220	2200	3900	390	680
Length (mm)	4.5 ± 0.35	4.80 ± 0.35	4.5 ± 0.35	4.80 ± 0.35	4.5 ± 0.35	4.80 ± 0.35	4.5 ± 0.35	4.80 ± 0.35
Width (mm)	2.00 ± 0.30	2.00 ± 0.30	2.00 ± 0.30	2.00 ± 0.30	3.20 ± 0.30	3.20 ± 0.30	3.20 ± 0.30	3.20 ± 0.30
Height (Max)	2	2*	2	2*	2.5	2.6*	2.5	2.6*
Termination bands (mm)	0.50 - 0.80	0.35 - 0.80	0.50 - 0.80	0.35 - 0.80	0.50 - 0.80	0.35 - 0.80	0.50 - 0.80	0.35 - 0.80
Creepage (min)	3	3.5	3	3.5	3	3.5	3	3.5
VP test (100%)	3000	3000	3000	3000	3000	3000	3000	3000
AQL: DC DWV test (V)	3000	3225	3000	3225	3000	3225	3000	3225
AQL: AC DWV test (V)	2000	2110	2000	2110	2000	2110	2000	2110
Safety rating	X1	Y2/X1	X1	Y2/X1	X1	Y2/X1	X1	Y2/X1
Voltage rating (Vac)	250	250/305	250	250/305	250	250/305	250	250/305
Voltage code	A25	A25	A25	A25	A25	A25	A25	A25

Additional Statements

Material Group I: CTI >=600

Certified and approved to IEC/EN60384-14 class Y2/X1 except for creepage distance and therefore applicable only for equipment within scope of IEC 62368.

Ref: EN60384-14, clause 4.8.1.3.

*Thickness of new parts will be banded based on capacitance value

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Marked	X2 (305Vac)/1000Vdc/2.5kV impulse	**Classification**	IEC/EN60384-14:2013/A1:2016, UL/CAN/CSA60384-14:2014
Unmarked	In accordance with above + 1500Vdc	**Old Classification**	IEC/EN60384-14:2013+A1, UL-60950-1, 2nd Ed, CSA 60950-1-07 2nd Ed
Suffix	**S3X (marked)**	**Terminations**	J (Nickel Barrier, Sn Plated Solder)
	U3X (unmarked)		Y (Flexicap Polymer termination, Nickel barrier, Sn Plated Solder)

Green cells indicate improvement compared to previous range

Case Size	**2220**	
Dielectric	**X7R old**	**X7R new**
Suffix code	B17/U17	S3X/U3X
Dielectric code	X/E	J/S
Min Capacitance (pF)	150	10000
Max Capacitance (pF)	22000	56000
Length (mm)	5.70 ± 0.40	5.70 ± 0.40
Width (mm)	5.00 ± 0.40	5.00 ± 0.40
Height (Max)	4	4.5*
Termination bands (mm)	0.25 - 1.00	0.25 - 1.00
Creepage (min)	4	4
VP test (100%)	3000	3000
AQL: DC DWV test (V)	3000	3225
AQL: AC DWV test (V)	2000	1505
Safety rating	X2	X2
Voltage rating (Vac)	250	305
Voltage code	A25	A30

Additional Statements

Material Group I: CTI >=600

*Thickness of new parts will be banded based on capacitance value

Note: Bottom of range will be 150pF in the next product launch for this range.

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Marked	X2 (250Vac)/1000Vdc/2.5kV Impulse	**Classification**	IEC/EN60384-14:2013/A1:2016, UL/CAN/CSA60384-14:2014
Unmarked	In accordance with above + 2500Vdc		Humidity Grade (III) (IEC/EN60384-14:2013 Annex 1)
Suffix	**S2X (Marked)**	**Old Classification**	IEC/EN60384-14:2013+A1, UL-60950-1, 2nd Ed, CSA 60950-1-07 2nd Ed
	U2X (Unmarked)	**Terminations**	J (Nickel Barrier, Sn Plated Solder)
			Y (Flexicap Polymer termination, Nickel barrier, Sn Plated Solder)

Green cells indicate improvement compared to previous range

Case Size	**1808**	
Dielectric	**C0G old**	**C0G new**
Suffix code	SP/SPU	S2X/U2X
BME dielectric code	C/A	G/K
Min Capacitance (pF)	4.7	10
Max Capacitance (pF)	1500	1000
Length (mm)	4.5 ± 0.35	4.50 ± 0.35
Width (mm)	2.00 ± 0.30	2.00 ± 0.30
Height (Max)	2	2*
Termination bands (mm)	0.50 - 0.80	0.50 - 0.80
Creepage (min)	3	3
VP test (100%)	3000	3000
AQL: DC DWV test (V)	2500	3225
AQL: AC DWV test (V)	1500	1500
Safety rating	X2	X2
Voltage rating (Vac)	250	250
Voltage code	A25	A25

Additional Statements

Material Group I: CTI >=600

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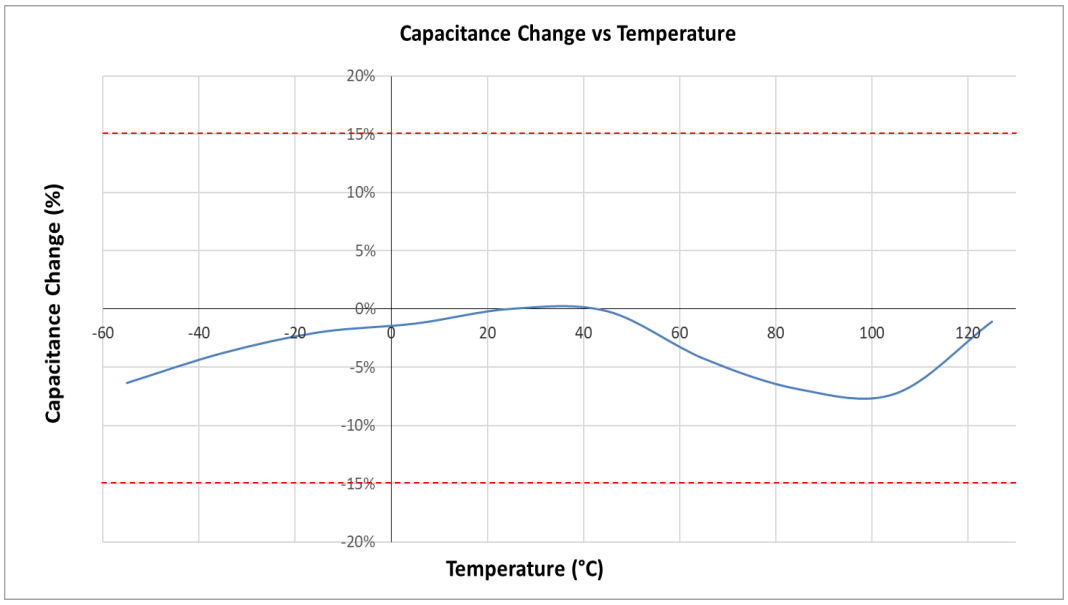
Typical performance of Safety Certified MLCC's

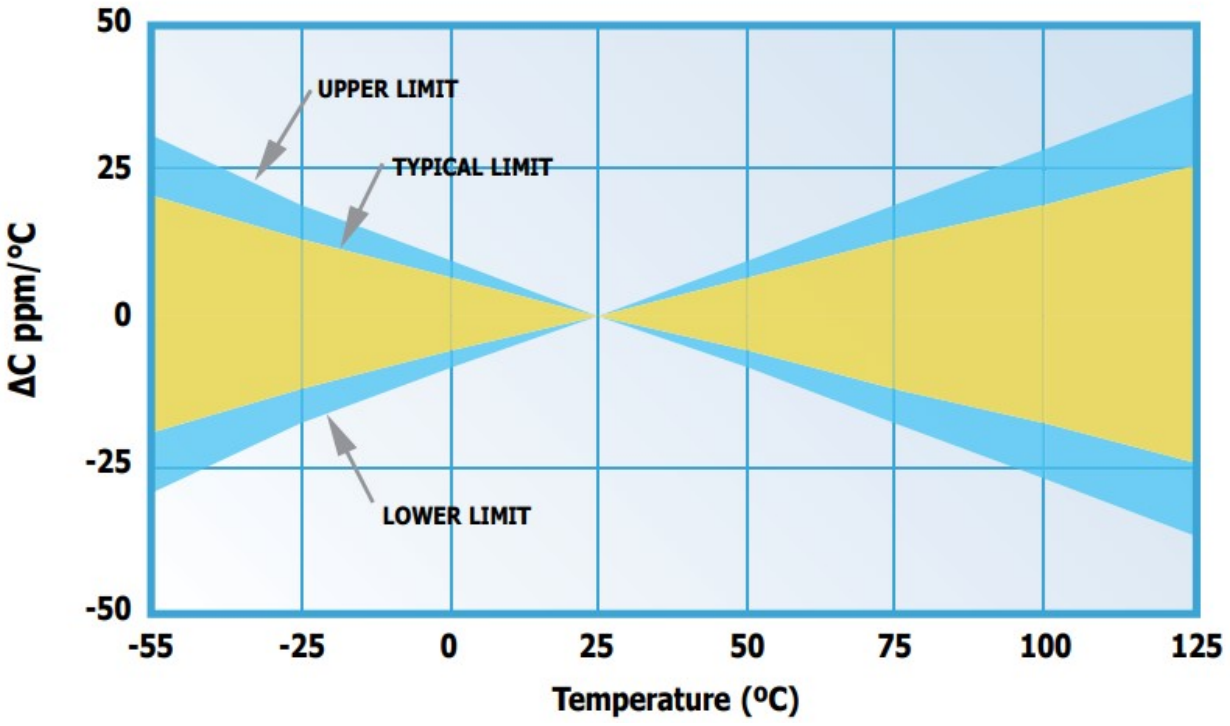
Typical capacitance change vs. Temperature

X7R



The upper and lower limit lines denote the boundaries of X7R specification (±15% from -55ºC to +125ºC)

C0G



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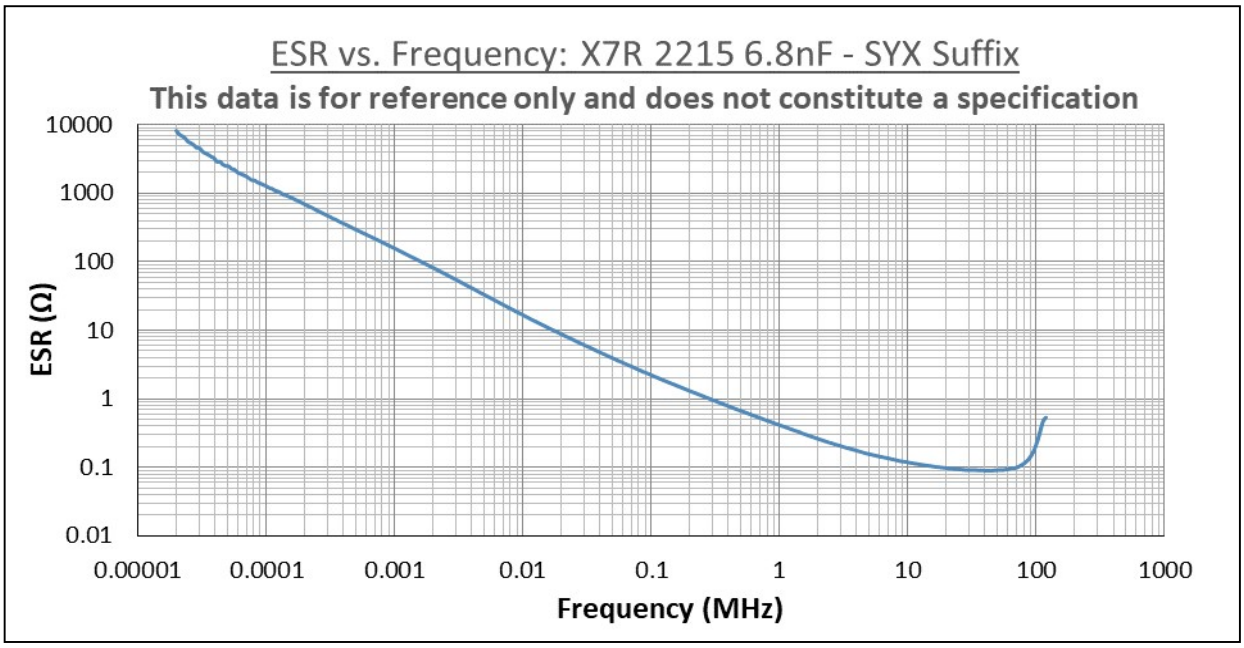
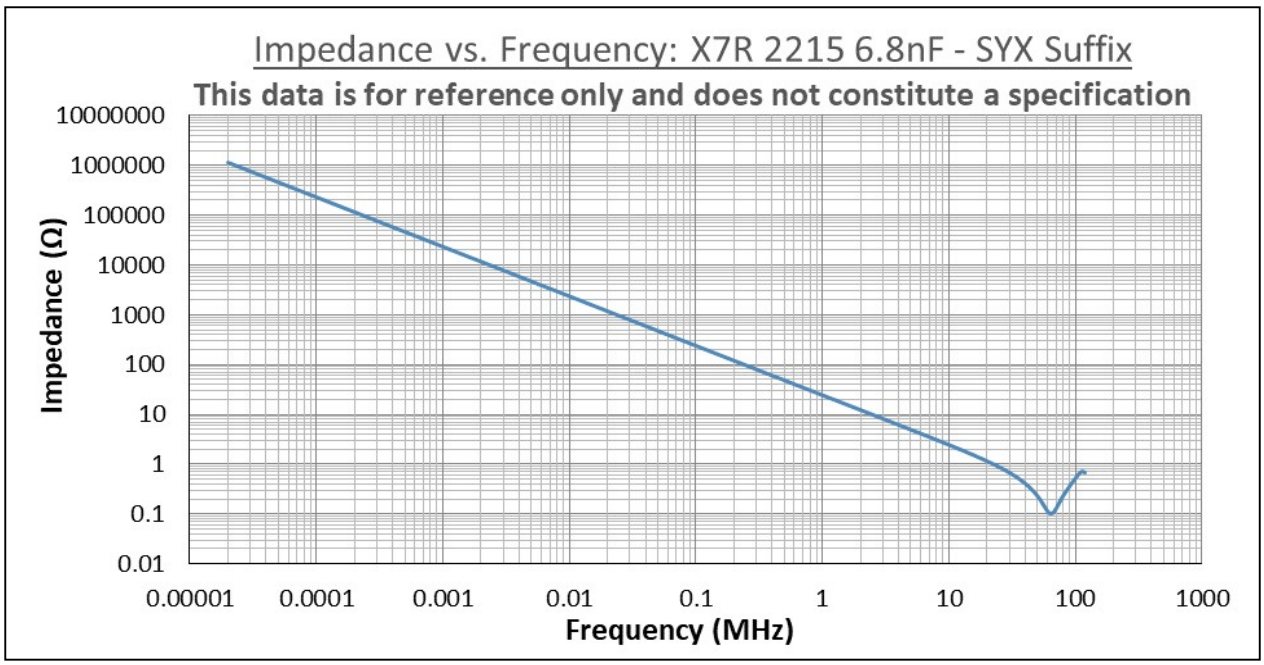
Typical ESR + Impedance vs. Frequency

X7R





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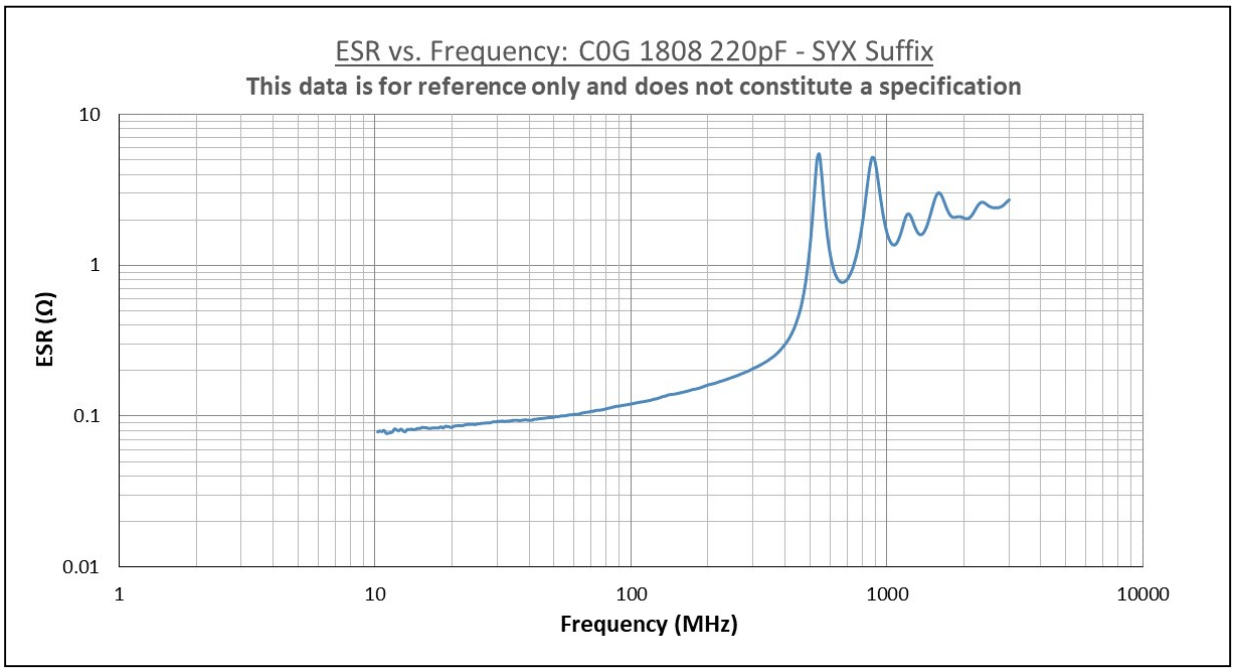
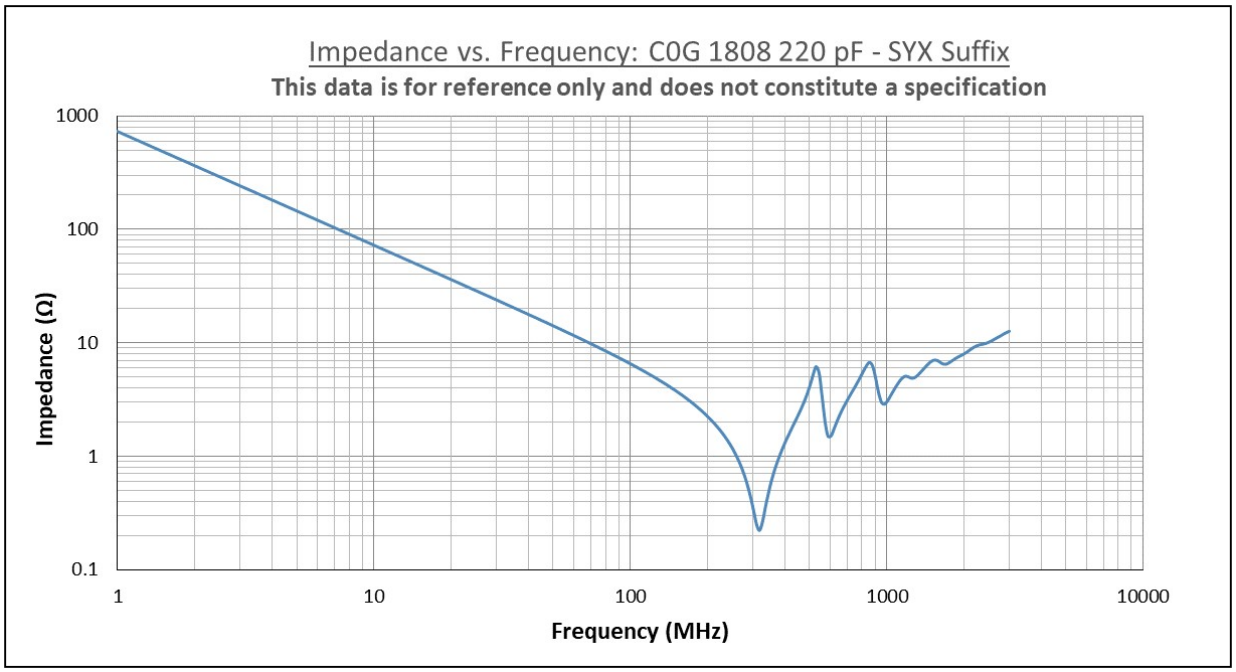
C0G





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Typical current flow with applied AC voltage – comparison of new and legacy ranges.