



Precious Metal X7R, X8R and BX Formulations

Description: Ferro's extensive line of dielectric formulations for ceramic capacitors includes products compatible with precious metal and base metal electrode systems.

Precious metal dielectrics are for use with Palladium/Silver electrode systems. They are available in low, ultra-low, and high fire versions. These products have excellent sintered density and are compatible with both solvent and water-based binders.

Low-Fire and Ultra-Low Fire X7R Dielectrics ($\leq 1140^{\circ}\text{C}$)

Property	ULF202HT	X7R212L	BL162HD	AD252BX	ULF272	X7R262L	AD302L
Dielectric Type (TCC)	X8R	X7R	X7R	X7R/BX	X7R	X7R	X7R
Dielectric Constant	2000	2100	2200	2600	2600	2800	3000
RxC Product (ΩF)							
@25°C	>1000	>10,000	>10,000	>10,000	>1000	>10,000	>1000
@125°C	>100	>1000	>1000	>1000	>100	>1000	>100
Particle Size Dist. (μm)							
D90	1.3	2.1	1.7	1.0	1.3	2.2	0.9
D50	0.8	1.2	1.0	0.7	0.8	1.2	0.4
D10	0.5	0.5	0.6	0.5	0.5	0.5	0.1
Surface Area (m^2/g)	4.9	2.4	4.0	6.5	3.8	2.6	3.6
Dissipation Factor (%) @ Fired Layer Thickness (μm)	2.5 @ 6	<1.8 @ ≥ 18	1.4 @ 20	<2.5 @ ≥ 8	2 @ 10	<2.5 @ ≥ 20	<2.5 @ 15
Target Firing Temperature ($^{\circ}\text{C}$)	940 for 4 h	1120 for 3 h	1100 for 3 h	1140 for 3 h	940 for 4 h	1120 for 2 h	1140 for 5 h
Lead Content (%)	0	1-5 PbO	5-10 PbO	0	0	<5 PbO	0
Electrode Metal	95Ag/5Pd 90Ag/10Pd	70Ag/30Pd	70Ag/30Pd	70Ag/30Pd	95Ag/5Pd 90Ag/10Pd	70Ag/30Pd	70Ag/30Pd
Electrode Ink	EL 44-127 EL 44-010	EL 44-030	EL-44-032	EL 44-030	EL 44-127 EL 44-010	EL 44-030	EL 44-030
Termination Ink	TM 63-149	TM 33-008	TM 33-008	TM 63-149	TM 63-149	TM 33-008	TM 63-149

www.ferro.com

DISCLAIMER: Reasonable care has been taken in the preparation of this information, but FERRO EXTENDS NO WARRANTIES, MAKES NO REPRESENTATIONS AND ASSUMES NO RESPONSIBILITY AS TO ACCURACY OR SUITABILITY OF THIS INFORMATION OF THIS PRODUCT FOR ANY PURCHASER'S OR USER'S USE OR FOR ANY CONSEQUENCE OF ITS USE. FERRO DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR ANY PARTICULAR USE. All statements, technical information and recommendations contained herein are based on Seller's or Manufacturer's test and the test of others, and are believed to be accurate, but no guarantee of accuracy is made. Judgment as to the suitability of information herein or the user's purposes are necessarily the user's responsibility. Users shall determine the suitability of the products for their own intended application.

Users assume all risk of use or handling whether or not in accordance with any statements or recommendation of the seller or manufacturer. Liability, if any, is and shall be limited to the replacement of such quantity of material proved not to conform to specifications as set out in product specification. Statements concerning the possible use of these products are not intended as recommendation to use these products in infringement of any patent. No guarantee is made that any use of the products does not infringe third-party intellectual property or patent rights anywhere in the world.



High-Fire X7R Dielectrics (> 1200°C)

Property	X7P182H	X7R302H	X7R422H	AD402H
Dielectric Type	X7P/BX	X7R	X7R	X7R
Dielectric Constant	2300	3300	4200	4200
RxC Product (ΩF) @25°C @125°C	>10,000 >1000	>10,000 >1000	>10,000 >1000	>10,000 >1000
Particle Size Dist. (µm) D90 D50 D10	2.9 1.1 0.5	3.2 1.2 0.5	3.3 1.3 0.5	3.5 1.5 0.6
Surface Area (m ² /g)	3.3	2.8	3.6	5.0
Dissipation Factor (%) @ Fired Layer Thickness (µm)	<2.5 @ ≥12	<2.5 @ ≥8	<2.5 @ 9	<2.5 @ 12
Target Firing Temperature (°C)	1290 for 1.5 h	1320 for 2 h	1300 for 2 h	1250 for 2.5 h
Lead Content (%)	0	0	0	0
Electrode Metal	30Ag/70Pd	30Ag/70Pd	30Ag/70Pd	30Ag/70Pd
Electrode Ink	EL 44-006	EL 44-006	EL 44-006	EL 44-006
Termination Ink	TM 63-149	TM 63-149	TM 63-149	TM63-147

www.ferro.com

DISCLAIMER: Reasonable care has been taken in the preparation of this information, but FERRO EXTENDS NO WARRANTIES, MAKES NO REPRESENTATIONS AND ASSUMES NO RESPONSIBILITY AS TO ACCURACY OR SUITABILITY OF THIS INFORMATION OF THIS PRODUCT FOR ANY PURCHASER'S OR USER'S USE OR FOR ANY CONSEQUENCE OF ITS USE. FERRO DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR ANY PARTICULAR USE. All statements, technical information and recommendations contained herein are based on Seller's or Manufacturer's test and the test of others, and are believed to be accurate, but no guarantee of accuracy is made. Judgment as to the suitability of information herein or the user's purposes are necessarily the user's responsibility. Users shall determine the suitability of the products for their own intended application.

Users assume all risk of use or handling whether or not in accordance with any statements or recommendation of the seller or manufacturer. Liability, if any, is and shall be limited to the replacement of such quantity of material proved not to conform to specifications as set out in product specification. Statements concerning the possible use of these products are not intended as recommendation to use these products in infringement of any patent. No guarantee is made that any use of the products does not infringe third-party intellectual property or patent rights anywhere in the world.