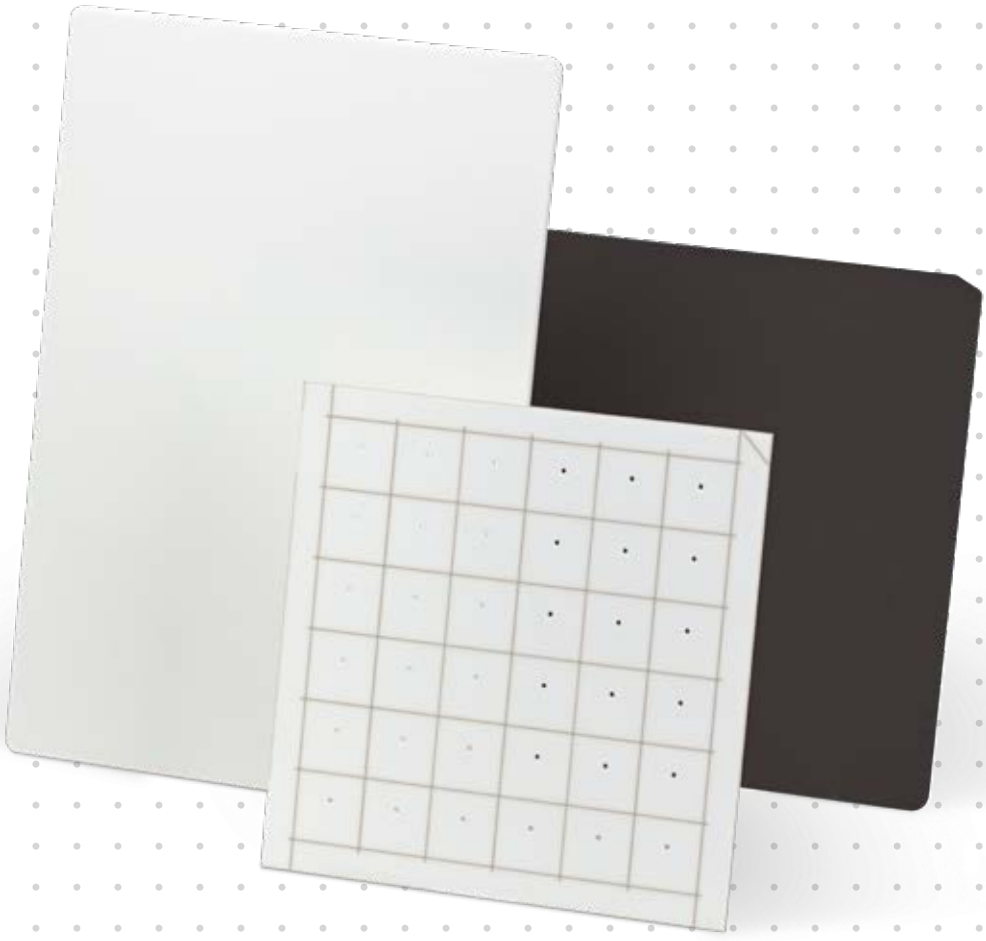
CoorsTek

Electronic Substrates Overview

Thin-Film & Thick-Film Ceramic Substrates



CoorsTek is the leader in ceramic substrates for thin-film and thick-film electronics, providing over a dozen substrate types optimized for a variety of processes and applications. Applying our deep expertise in advanced technical ceramics, CoorsTek engineers ceramic materials and substrate processing specifically to the rigorous demands of today's thin-film and thick-film technology.

Thin-Film Ceramic Substrates
CoorsTek thin-film alumina substrates are optimal for most of today's high reliability thin-film electronics applications. By precisely controlling surface finish, grain size, and surface imperfections, CoorsTek substrates enhance fine-line resolution, spacing, and yield in your thin-film process.

SuperStrate® ceramic substrates are the industry standard for high performance, thin-film substrates — providing an exceptionally smooth surface finish for ultra-fine line geometries and outstanding adhesion bond strengths.

MidFilm® Ceramic Substrates
Exclusive CoorsTek MidFilm ceramic substrates provide excellent high-frequency performance using etchable ink and photo-formed electronic processes — delivering strong economic value compared to thin-film deposition processes.

MidFilm substrates work exceptionally well with single and multi-layer circuit designs, filling the gap between thin-film deposition and thick-film processes for applications from high-frequency microwave to photonics and multi-chip modules.

Thick-Film Ceramic Substrates
CoorsTek developed the standards for thick-film alumina substrates, engineered to provide durable and economical performance for hybrid integrated circuits (HIC), sensors, surface mount devices (SMD), and other thick-film electronics. These substrates minimize resistor variation while enhanced aged adhesion.

DuraStrate™ ceramic substrates deliver a 20% increase in strength compared to standard thick-film substrates, particularly useful in applications requiring 0.5 mm (0.020") or thinner form factor.

SUBSTRATE PROPERTIES BY FAMILY

PROPERTY		UNITS	THIN-FILM				MID-FILM	THICK-FILM			SPECIALTY
			SuperStrate TPS	SuperStrate 996	ADS-996	ADS-995	ADS-995R	DuraStrate ADSR-96R	ADS-96R	ADOS-90R	Opaque
Description			Optimal thin-film performance	Industry standard for thin-film technology	Workhorse for most thin-film applications	Economical thin-film alternative	Economical high-frequency performance	20% greater strength for thin substrates	Most popular thick-film substrates	Opaque for light-sensitive devices	Block light transmittance
Applications			Ultra-fine line resolution & spacing				Etchable ink & photo-formed processing				Dark background LED displays
Surface finish	as-fired lapped polished	nm (µ in)	<254 (10) <26 (1)	51 (2) < 254 (10) <26 (1)	77 (3) < 305 (12) < 26 (1)	127 < 762 (30) < 51 (2)	890 (35)	890 (35)	890 (35)	1140 (45)	
Thickness range		mm (in)	0.127 - 1.524 mm (0.005" to 0.060") Standard & custom thicknesses available					0.254 - 3.556 mm (0.010" to 0.140") Custom thicknesses available			
Size range		mm (in)	Standard squares: 25.4, 50.8, 57.1, 63.5, 76.2, 101.6, 114.3, 121.9 mm (1", 2", 2.25", 3", 4", 4.5", 4.8") Standard rounds: 100, 150 mm (3.937", 5.905")					89.9 mm square (3.5") to 139.7 x190.5 mm (5.5" x 7.5") Standard & custom sizes & shapes available			
Flexural strength		MPa (kpsi)	682 (99)	620 (90)	592 (86)	572 (83)	440 (64)	482 (70)	400 (58)	365 (53)	
Elastic Modulus		GPa (psi x 10^6)	372 (54)	372 (54)	372 (54)	372 (54)	379 (55)	331 (44)	331 (44)	310 (45)	
Coeffecient of linear thermal expansion	25-300 °C 25-1000 °C	1 x 10^{-6} / °C	6.3 8.2	7.0 8.2	7.0 8.3	7.0 8.3	6.4 8.0	6.4 8.2	6.4 8.2	6.4 8.4	
Thermal conductivity	20 °C	W/m-K	27	26.9	26.6	25.5	31	26	26	13	
Dielectric strength	0.635 mm (0.025") 1.016 mmm (0.40")	kV/mm (volts/mil)	640 (25) 500 (20)	600 (23) 450 (17)	22 (575) 450 (17)	22 (575) 450 (17)	23 (595) —	— 470 (18)	600 (25) 490 (19)	21 (540) —	
Volume resistivity	25 °C 700 °C	Ω-cm	> 10^{15} > 10^{10}	> 10^{14} > 10^{9}	> 10^{14} > 10^{8}	> 10^{14} > 10^{8}	> 10^{13} > 10^{7}	4 x 10^{14} —	> 10^{14} > 10^{8}	> 10^{14} > 7 x 10^{5}	

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Specialty and Custom Substrates

Specialty Ceramic Substrates

Opaque Ceramic Substrates

For light-sensitive semiconductor devices, use CoorsTek opaque ADOS-90R — formulated specifically to block light transmittance and absorb stray light.

Medical Grade Ceramic Substrates

For medical applications, CoorsTek materials are USP Class VI certified.

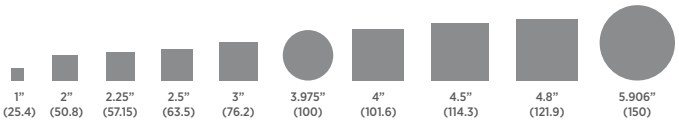
Custom Substrates & Multi-Layer Structures

As a vertically-integrated leader in engineered ceramics and ceramic tape casting, CoorsTek has developed and produced substrates from more than two dozen materials.

CoorsTek also assembles complex multi-layer ceramic substrates that combine precision channels and features in laminated, hermetically sealed structures — providing high-purity, corrosion resistant "circuit" paths for fluids, gases, or air vacuum.

Customize Your Substrates

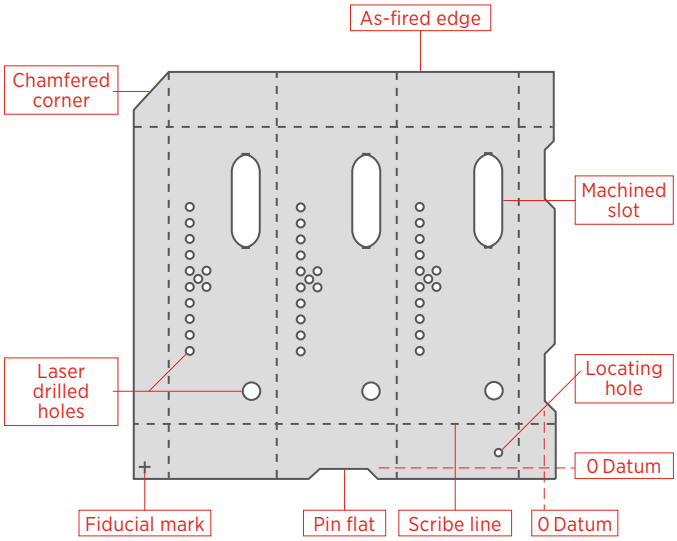
CoorsTek ceramic substrates are available in a wide variety of standard and custom thickness, shape, and size. A host of secondary processing options ensure substrates are configured just the way you need them.



Common substrate shapes & sizes (in inches and (mm))

Beyond providing the best selection of thin-film and thick-film ceramic substrate materials available, CoorsTek partners with you to customize substrates specifically for your application with a range of options:

- Thickness, size & shape
- "As-fired" and finished
- Surface lapping & polishing
- Laser machining & scribing
- Edge finishing
- Annealing
- Metallization & coating
- Precision tolerances
- Cleaning & inspection
- Subassembly & packaging
- Special quality certification (TS-16949, USP Class VI)



Examples of substrate laser machining

Substrate Design Guides

CoorsTek has developed specific, detailed design guidelines for configuring thin-film and thick-film substrates.
Visit coorstek.com for a free download or contact a CoorsTek representative for more information.

About CoorsTek

CoorsTek is the leading global manufacturer of technical ceramics. With over 300 advanced material formulations and numerous state-of-the-art forming, firing, and finishing options, CoorsTek provides solutions to engineering challenges in electronics, automotive, semiconductor, and other industries. Locations worldwide. Visit www.coorstek.com

Consult with CoorsTek Engineers

CoorsTek engineers are available to help you select the optimal material and configure substrate options for your next electronics project. Schedule a consultation now.

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