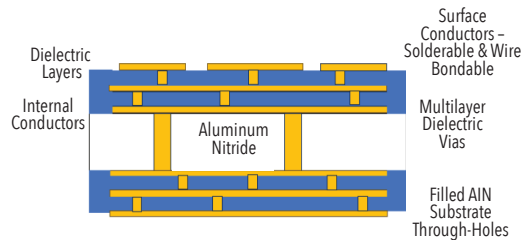


THICK FILM SUBSTRATES

THE OPTIMUM BALANCE OF ECONOMY, PERFORMANCE, AND RELIABILITY

An attractive alternative to thin film solutions, Remtec manufactures cost-effective, high-performance thick film single layer and multilayer ceramic circuits with 6-8 conductor layers, ground planes, hermetic plugged and plated vias (e.g., interlayer blind, partial through, or power/thermal vias) – as well as printed resistors on Alumina, Aluminum Nitride, Beryllia, Silicon Nitride, and other ceramics. Products include both traditional gold multilayer thick films with excellent wire bondability, solderability, and conductor adhesion – and lower-cost multilayer circuits utilizing silver interlayer conductors and plated copper on thick films with higher conductivity of 1-3 mΩ/sq.

EXAMPLE SOLUTION: MULTILAYER BOARD STRUCTURE WITH VIAS



A typical multilayer structure is shown here. Starting with a ceramic substrate with dielectric layers added on one or both sides, optional Ni-Au plating on a top conductor layer of a multilayer pattern results in enhanced reliability circuits with a high leach resistance, fully compatible with high-temperature RoHS compliant SAC solders. Also available are etched thick films with 0.002" minimum line/space and ± 0.00025 " line/gap tolerance. Fired on dielectrics for either gold or silver conductors ensures insulation to 1,000 V. Dielectric constant can be adjusted from 6-12. Printed resistors in milli ohm to mega ohm range with tolerances of 1-10% are fabricated and protected with overglaze materials.

ABOUT REMTEC

Remtec is a leading supplier of microelectronic, RF, microwave, and submount thick film printed circuits on ceramic boards and packages utilized in wireless, industrial, radar, IoT, optoelectronics, medical, space, and defense markets. Based in Canton, MA, we have a 35-year legacy with extensive design, development, engineering, and production capabilities – specializing in high-mix and low- to mid-volume production. Product integrity, reliability, and repeatability are assured by state-of-the-art equipment and processes (e.g., automated cassette-to-cassette screen printing and firing, high speed step and repeat laser trimming, photolithography and dicing) – as well as robust material analysis, wide use of SPC methodology, and adherence to applicable military, space, and commercial standards such as MIL-STD, ANSI, IPC, and others.



TECHNICAL SPECIFICATIONS

CONDUCTOR PROPERTIES

	Sheet Resistivity, mohm/sq	Line Width Printed	Line Width Etched	Layer to Layer Alignment	Line to Line Spacing	Via Size	Via Pitch
Gold	3-7	.005"	.002"	±.002"	.004" .010"	.005" min .024" max	.012" min
Silver	1-2	.005"	.002"	±.002"	.006" .010"	.005" min .024" max	.012" min

DIELECTRIC PROPERTIES

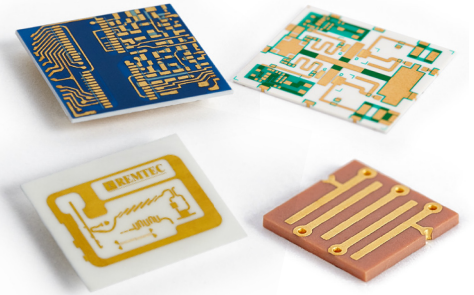
Dielectric Constant	Dissipation Factor	Breakdown Voltage, V/mil	Fired Thickness	Insulation Resistance Ohms
6-12	<0.5%	500	.0015"-.002"	>10 ¹¹ @ 100 V

SHEET RESISTIVITY, Ω/SQUARE

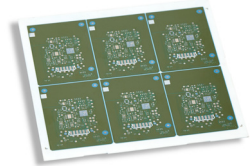
	Typical Resistor Characteristics							
	1Ω	10Ω	100Ω	1KΩ	10KΩ	100KΩ	1MΩ	10MΩ
TCR, (ppm/ °C)	Max	300	300	300	300	300	300	300
	Typical	150	100	100	100	100	100	100
	Available	-	50	50	50	50	50	50
Standard Working Voltage (V/mil)	0.02	0.07	0.2	0.7	2.0	2.0	4.0	10.0
Maximum Rated Power Dissipation (mW/mm²)	3230	470	697	781	244	177	14	0.1

SUBSTRATE PROPERTIES

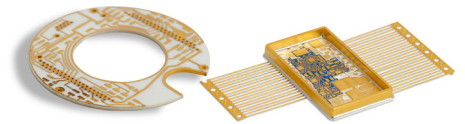
	96% Al ₂ O ₃	99.5% Al ₂ O ₃	99.5% BeO	AlN
Dielectric Constant @ 1MHz	9.5	9.9	6.5	8.6
Dielectric Strength, V/mil	300	300	300	300
Dissipation Factor @1MHz	0.0004	0.0001	0.0004	0.0008
Thermal Conductivity, W/M-°C	26	35	280	170
Thermal Coefficient of Expansion, ppm/ °C	6.4	7.0	7.0	4.6



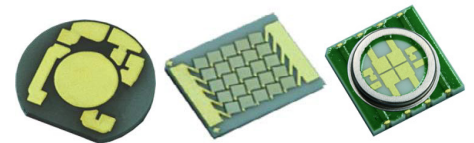
Typical thick film multilayer substrate with 6 gold layers. A five metal layer substrate with silver inter-layers and precise ± 1% resistors 10Ω-100KΩ (on right).



High density multilayer substrate for flip chip/BGA interconnects (on left.) 0.002" line/space etched thick film substrate with resistors and multilayer circuitry on the back for high frequency application.



Integrated substrate package combining three-layer circuit pattern with plated copper, hermetic (to 10⁻⁸ atmcc/s) vias and 50Ω lines (onleft.) Multilayer substrate, ENIG plated top silver conductor with high leach resistance: compatible with high temperature, RoHS compliant SAC solders.



LED submounts and substrates on alumina, AlN and BeO with Ni-Au plated thick films.



Visit remtec.com, call 781-762-9191, or email sales@remtec.com to initiate a quote.