WavePro®

APPLICATION NOTE

RF Lenses

Dielectric Designs with Single and Multiple Dk Materials

SWaP-C REDUCTION WITH LENSES

The lens is a passive dielectric element that requires no power yet can contribute over 30 dB of system gain, significantly extending the RF link budget. Its integration reduces the required gain from the power amplifier, enabling simpler electronics, lower power consumption, and improved thermal efficiency.

Convex V-band lens, Dk = 2.5 LDF

Electro-mechanical lens
Dk = 9.0

HIGH DIELECTRIC CONSTANT MATERIAL FOR HIGH-GAIN LENSES

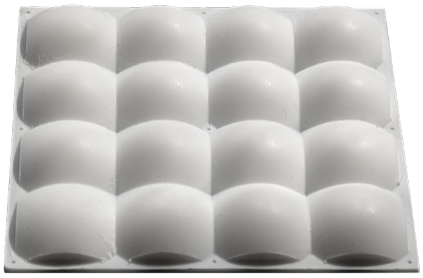
The higher the dielectric constant (Dk) of the material, the more it refracts the electromagnetic wave. WavePro dielectrics are available up to Dk = 20.4 – much higher than what is possible with 3D printed lenses. WavePro is a solid, homogenous material that does not rely on controlling the printed material vs air ratio to attain the desired dielectric constant. The high Dk available with WavePro enables more compact, higher gain lens designs.

BUILD-TO-PRINT LENSES

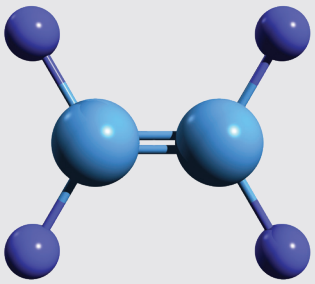
Our lenses are fabricated to your specifications and design. Even the material Dk can be customized to fully optimize lens performance, instead of relying on off-the-shelf Dk values.

Flat GRIN lens, 30.6 dBi
Dk = 2.04 - 20.4

Retrofit correction lens kit for C-band parabolic dish antenna, 2.5 dB
Dk = 10.8

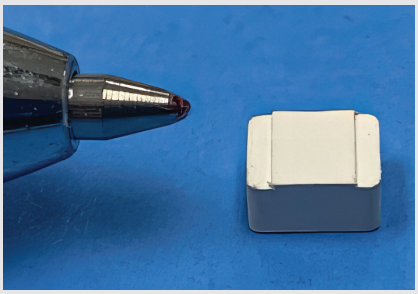


4X4 phased array antenna lens,
Dk = 2.5 LDF



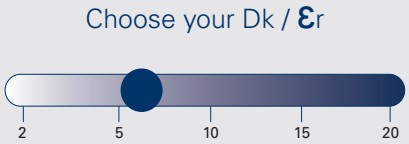
PTFE SPECIALISTS

Our expertise in developing and manufacturing engineered PTFE products started in 1967, when we introduced our first line of PTFE sealing products.



PRECISION MANUFACTURING

Advanced manufacturing with sub-millimeter tolerances allows us to produce mmWave components with highly intricate and optimized geometries.



CUSTOMIZED DIELECTRICS

WavePro® is available off-the-shelf in different dielectric constants. To fully optimize your design, why not pick your own Dk? Our process allows us to quickly tune material properties.

MATERIAL PROPERTIES

Parameter	WP025LDf	WP025	WP030	WP050	WP108	WP120	WP156	WP204	Condition	Test Method
Dk (dielectric constant permittivity)	2.50	2.55	3.03	5.07	10.80	12.10	15.60*	20.40*	5 GHz @ 23°C	IPC-TM-650-2.5.5.5 *ASTM D2520
Df (loss factor, tan δ)	0.0007	0.0021	0.0009	0.0009	0.0015	0.0014	0.0010*	0.0100*	5 GHz @ 23°C	IPC-TM-650-2.5.5.5 *ASTM D2520
Moisture absorption	0.02%	0.09%	0.03%	0.03%	0.10%	0.10%	-	-	24 hrs/23°C	IPC-TM-650-2.6.2.1
CTE (coefficient of thermal expansion) ppm/°C	-	-	X: 42 Y: 36 Z: 40	X: 25 Y: 29 Z: 28	X: 22 Y: 19 Z: 21	-	-	-	-55 to 150°C	IPC-TM-650-2.4.41
Volume Resistivity MΩ-cm	-	-	2.66×10^8	1.94×10^8	0.62×10^8	-	-	-	1.5hr/25°C/90%RH	IPC-TM-650-2.5.17.1
	-	-	2.43×10^8	2.05×10^8	0.37×10^8	-	-	-	96hr/35°C/90%RH	
Tensile Strength (MPa)	26.0/3776	18.4/2675	16.0/2316	12.5/1816	10.8/1560	10.7/1558	-		X-axis	ASTM D1708
	25.1/3565	17.2/2501	14.9/2166	11.4/1657	9.7/1413	9.4/1359	-		Y-axis	
Flammability	V-0	V-0	V-0	V-0	V-0	V-0	V-0	V-0	-	UL-94V
Density (g/cm3)	2.17	1.96	2.17	2.49	2.89	2.98	3.02	3.57	23°C	ASTM D792

ISO 9001 2015 CERTIFIED

ITAR Registered International Traffic in Arms Regulations

RoHS compliant

UL

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