Properties of Ceradyne's Advanced Technical Ceramics for Microwave Applications

ceradyne, inc.
ADVANCED TECHNICAL CERAMICS

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Property	Ceramic Composition									
	Al_2O_3-SiC	MgO-SiC		AlN-SiC		AlN-Composite		BeO-SiC**	AlN	BeO**
GRADE	Ceralloy® 7712	Ceralloy® 6703	Ceralloy® 6705	Ceralloy® 13740	Ceralloy® 13740Y*	Ceralloy® 137 CA*	Ceralloy® 137 CB*	Ceralloy® 2710	Ceralloy® 1370C*	
Composition	Al_2O_3+60%SiC	MgO+2%SiC	MgO+5%SiC	AlN+40%SiC	AlN+40%SiC	AlN Composite	AlN Composite	BeO+40%SiC	AlN	BeO-99.5%
Tailored Compositions Available	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A	
Processing Route	Hot Pressing	Hot Pressing	Hot Pressing	Hot Pressing	Hot Pressing	Hot Pressing	Hot Pressing	Hot Pressing	Hot Pressing	
Density (g/cc)	3.36	3.50	3.48	3.19	3.19	2.99	2.99	3.02	3.25	
Outgassing	No	No	No	No	No	No	No	No	No	No
Thermal Conductivity (W/m°K) (RT)		30	30	30	53	85	95-105	130	180-200	250
Dielectric Constant										
@ 1.0 GHz				22	30	28	40	33	8-9	7.0
@ 8.0 GHz	130	11.2	12.8	15	22	18	30	24		
@10.0 GHz	83	11.1	12.7	15	21	18	28	23		
@12.0 GHz	69	10.9	12.6							
Loss Tangent										
@ 1.0 GHz				0.11	0.11	0.20	0.15	0.05		
@ 8.0 GHz	0.40	0.02	0.03	0.30	0.30	0.20	0.30	0.25		
@10.0 GHz	0.57	0.02	0.03	0.28	0.28	0.20	0.30	0.25		
@12.0 GHz	0.53	0.02	0.03							
Thermal Expansion Coefficient x10⁻⁶/°C; (RT-1000°C)		15.4	14.8	5.1	5.1	5.0	5.0	7.0	4.3	8.3
Flexural Strength (MPa)	530	200	200	300	300				260	175
Key Features						Dielectric Loss Independent of Temperature (to 3°K)	Higher Thermal Conductivity than Ceralloy® 2710 @ Temps. >150°C. Close Match in Electrical Properties	Former Industry Standard for Terminations, etc.	Higher Thermal Conductivity than BeO @ High Temperatures	Higher Thermal Conductivity @ RT
Applications	Slot Mode Absorbers	Absorbers, Buttons	Absorbers, Buttons	Replacement for Ceralloy® 2710 BeO-SiC, Terminations, Sever Wedges, Load Pellets, Absorbers	Replacement for Ceralloy® 2710 BeO-SiC, Terminations, Sever Wedges, Load Pellets, Absorbers	Terminations, Sever Wedges, Load Pellets, Absorbers, Cryogenic Environment Applications	Replacement for Ceralloy® 2710 BeO-SiC, Terminations, Sever Wedges, Load Pellets, Absorbers	Terminations, Sever Wedges, Load Pellets, Absorbers	Replacement for 99.5 BeO, Collector Rods, Helix Support Rods, Windows	Collector Rods, Helix Support Rods, Windows

NOTE: Properties are typical and should not be considered as specifications.

* Patent Pending ** BeO and BeO-SiC ceramics are no longer manufactured by Ceradyne. Data is included for reference only.

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