TopLine®

BGA Material Properties

Rev July 6, 2016

BGA Series: LBGA, SBGA, PBGA, eBGA, CBGA				
Note	Item	Material	Property/Condition	Metric Value
1a	Substrate	FR4 Multifunctional Park Nelco N4000-6 FC	Glass Transition Temperature Tg - DSC Tg - TMA	 175°C 170°C
			X/Y CTE [-40°C ~ 125°C] Z Axis Expansion [50°C ~ 260°C] Z Axis CTE [50°C to Tg] Z Axis CTE [Tg to 260°C]	12~15 ppm/°C 4.1% 70 ppm/°C 320 ppm/°C
			Young's Modulus (X / Y)	29.9 / 25.1 GN/M^2
			Poisson Ratio (X / Y)	0.16 / 0.14
			Moisture Absorption	0.10 Wt. %
1b		BT Bismaleimide Triazine Park Nelco N5000-32	Glass Transition Temperature Tg - DSC Tg - TMA	 205°C 175°C
			X/Y CTE [-40°C ~ 125°C] Z Axis Expansion [50°C ~ 260°C] Z Axis CTE [60°C ~ 120°C] Z Axis CTE [240°C ~ 260°C]	10~14 ppm/°C 3.6% 32 ppm/°C 170 ppm/°C
			Young's Modulus (X / Y)	23.1 / 22.4 GN/M^2
			Poisson Ratio (X / Y)	0.21 / 0.21
			Moisture Absorption	< 0.05 Wt. %
1c		Polyimide Park Nelco N7000-1	Glass Transition Temperature Tg - DSC Tg - TMA	 260°C 150°C
			X/Y CTE [-40°C ~ 125°C] Z Axis Expansion [50°C ~ 260°C]	12~15 ppm/°C 1.7%
			Young's Modulus (X / Y)	30.6 / 25.9 GN/M^2
			Poisson Ratio (X / Y)	0.183 / 0.160
			Moisture Absorption	0.35 Wt. %
1d		Ceramic HTCC Al_2O_3	Glass Transition Temperature Tg	
			CTE	6.6 ppm/°C
			Young's Modulus	275 GPa
			Shear Modulus	112 GPa
			Density	3.62 gm/cm^3

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Note	Item	Material	Property/Condition	Metric Value
2	Die	Silicon		
			CTE [@25°C]	2.6 ppm/^{o}C
			Young's Modulus	110 GPa
			Poisson Ratio	0.24

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Note	Item	Material	Property/Condition	Metric Value
3	Die Attach Adhesive	Non-Conductive Ablestik Ablebond 84-3	Glass Transition Temperature Tg - TMA	85°C
			CTE [Below Tg] CTE [Above Tg]	40 ppm/^{o}C 100 ppm/^{o}C
			Lap Shear Strength	18 N/mm^{2}
			Appearance	Blue

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Note	Item	Material	Property/Condition	Metric Value
4a	Solder Ball	Sn63Pb37 Eutectic Tin-Lead	Temperature Solidus Liquidus	 183°C 183°C
			CTE	24 ppm/^{o}C
			Young's Modulus	30 GPa
			Tensile Strength	52 MPa
			Density	8.4 gm/cm^{3}
4b		SAC305 Sn96.5/Ag3.0/Cu0.5 Pb-Free	Temperature Solidus Liquidus	 217°C 220°C
			CTE	23.5 ppm/^{o}C
			Young's Modulus	51 GPa
			Tensile Strength	50 MPa
			Density	7.4 gm/cm^{3}
4c		Pb90/Sn10 High Lead Sn10/Pb90	Temperature Solidus Liquidus	 275°C 302°C
			CTE	27.9 ppm/^{o}C
			Young's Modulus	19 GPa
			Tensile Strength	23 MPa
			Density	10.5 gm/cm^{3}

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Note	Item	Material	Property/Condition	Metric Value
5a	Die Cover Lid or Encapsulation	LBGA Series Exposed Die in Air Without Covering	Glass Transition Temperature	N/A
			CTE	N/A
5b		PBGA Series Molding Compound Hitachi GE-100-LFCS	Glass Transition Temperature Tg	143°C
			CTE Below Tg Above Tg	 8 ppm/°C 34 ppm/°C
			Specific Gravity	2.0
			Flexural Strength	17.3 kg/mm^2 170 MN/m^2
			Flexural Modulus	2650 kg/mm^2 26 GN/m^2
5c		eBGA Series Dam & Fill Encapsulation Hysol FP4451TD - Dam Hysol FP4450LV - Fill	Glass Transition Temperature Dam - Tg Fill - Tg (TMA)	 150°C 155°C
			CTE - Dam [+40°C ~ 120°C] [+190°C ~ 220°C] CTE - Fill [+40°C ~ 120°C] [+190°C ~ 220°C]	 21 ppm/°C 76 ppm/°C 22 ppm/°C 71 ppm/°C
			Filler Content Dam Fill	 73% 73%
			Specific Gravity Dam Fill	 1.78 1.77
5d		SBGA Series Heat Spreader Copper Alloy C1020/C1100 Nickel Plated 5um	Glass Transition Temperature - Tg	Not Rated
			CTE [+20°C ~ 300°C]	17.6 ppm/°C
			Young's Modulus	115 GPa
			Modulus of Elasticity	117 kN/mm^2
			Density	8.94 g/cm^3