## MATERIALS FOR MANUFACTURE OF PRINTED CIRCUIT BOARDS:

| Type | Composition and characteristics | Tg (°C) | Dk | Brand, part number of the substrate material |
|---|---|---|---|---|
| FR4 | The basic material.<br>Glass fiber laminate (laminated plastic based on diane epoxy resins, reinforced with fiberglass), with an operating temperature of -50 to +110 °C | 130-150 | 4,2-4,7 | Shengyi S1141;<br>IsolaDE104, DE114;<br>KINGBOARD LAMINATES KB-6150;<br>ILM GF212;<br>DooSan DS-7405. |
| FR4 halogen free | Glass fiber laminate based on modified epoxy resins. Does not contain halogen, antimony, phosphorus. Does not release hazardous substances during combustion. | 130-160 | 4,0-4,6 | Nelco N4000EF;<br>Isola DE156, IS500;<br>ITEQ IT-140GBS, IT-140GTC, IT-859GTA |
| FR4 High Tg | Glass fiber laminate based on mixtures of diane and multifunctional epoxy resins.<br>Depending on the application modified by bismaleimide, triazine, and other substances.<br>It possesses high thermal stability and higher stability of parameters at high temperatures.<br>It can be used for the manufacture of printed circuit boards, which are mounted on lead-free technology. | 150-200 | 3,6-4,5 | Shengyi S1170 S1000;<br>Isola FR408, IS410, FR406, GETEK;<br>ITEQ IT170, IT180, IT150DA;<br>Nelco N4000, N4350, N5000;<br>Panasonic Megtron 4, Megtron 6;<br>Elite EM-827;<br>Grace Electron GA-170;<br>Nanya NP-180;<br>Taiwan Union TU-752, TU-662;<br>Hitachi MCL-BE-67G(H), MCL-E-679(W), MCL-E-679F(J) |
| FR-4 with high track resistivity | Material based on modified epoxy resins.<br>It is used for PCBs with high levels of operating voltage, high humidity. | 130-170 | 4,2-4,7 | Shengyi S1160;<br>Kingboard KB-6165;<br>Nelco N4000-12;<br>ITEQ IT158A, IT180A;<br>Isola DE104KF |
| FR-4 for HDI structures | Glass fiber laminate of epoxy resins of various compositions.<br>In the manufacture of glass fabrics special types of fabric weaving are used. | 130-180 | 3,2-4,2 | Shengyi S6018;<br>ITEQ IT180A, IT200D;<br>Isola FR408HR, PCL-370HR |

# TYPES & PARAMETERS OF MATERIALS

PRINTED CIRCUIT BOARDS

## MATERIALS FOR MANUFACTURE OF PRINTED CIRCUIT BOARDS:

| Type | Composition and characteristics | Tg (°C) | Dk | Brand, part number of the substrate material |
|---|---|---|---|---|
| RCC | Material is based on a partially polymerized epoxy resin applied over a copper foil.<br>It does not have a woven substrate. | 130 and more | 3,2-3,8 | PCL-CF-400, PCL-HDI-390; |
| Microwave PTFE, APPE | Polymers based on fluorocarbon compounds - Teflon (PTFE), polyester (APPE), reinforced with fiberglass.<br>Printed circuit boards of high reliability, have high dielectric strength, moisture resistance, the possibility of operating under high temperatures and extreme temperatures. | 140-180 | 2,2-4,2 | Taconic, TLX series, TLF, TLY, RF, TLC, TLG;<br>Arlon, AD series, Diclad;<br>Taizhou Wangling, F4BK series, TP;<br>Nelco N7000, N8000;<br>Rogers RO5870, Ultralam 2000 |
| Microwave with ceramic filling | Polymers based on polycarbonates (carboxylic resin) with a fine-dispersed ceramic filler reinforced with fiberglass. | 150-200 | 2,0-6,0 | Rogers RO4350, RO4003, 25FR, 25N;<br>Nelco NH9000 |
| Ceramic-based microwave | Composite material based on ceramic with an organic binder.<br>It has small losses. | 180-200 | 3,27-10 | Rogers RT6010;<br>TMM;<br>Taconoc CER-10 |
| PI (polyimide) | Films of little thickness made of polymerized polyimide. The material for production of flexible and rigid-flex boards | 195-220 | 3,3-3,8 | Dupont LF series, Pyralux;<br>ThinFlex Polyimide;<br>Shengyi SFH640-2 |

For manufacture of multilayer printed circuit boards with more than four layers we recommend the use of materials from FR4 High Tg group.

Materials of FR4 High Tg group provide:

- High quality and reliability of multilayer PCB
- Capability for multiple repairs and reinstallation of BGA components on multilayer PCB
- Capability for lead-free installation modes on multilayer PCB

If you need recommendations for selecting printed circuit board material, please, contact IKT specialists for receiving free consultations.