



# Manufacturing Capabilities

| Capability                    |  | Standard Production   | Advanced Capability  |
|-------------------------------|--|---|--|
| Maximum Production Panel Size | Typical:-  | 610 x 457 mm  | 610 x 533 mm   |
| Board Thickness               | Typical:-<br>Scored:-  | 0.25 mm to 5.50 mm<br>0.30 mm to 3.2 mm   | 0.10 mm to 5.50 mm<br>0.30 mm to 3.2 mm  |
| Aspect Ratio                  | Typical Through Hole:-<br>Typical Blind Hole:-   | 10 : 1<br>1 : 1   | 16 : 1*<br>1.2 : 1   |
| Multilayer                    | Maximum:-  | 24 layers   | 48 layers **   |
| Core Thickness                | Minimum:-<br>Maximum:-   | 0.05 mm*<br>2.40 mm   | 0.05 mm *<br>5.5 mm  |
| Copper Thickness              | Inner:-<br>Outer:-   | 18 µm   35 µm   50µm<br>12 µm   18 µm   35 µm   70 µm   105 µm  | Other thicknesses available on request   |
| Copper Plating                | Minimum:-<br>Maximum:-   | 25 µm<br>50 µm  | 25 µm<br>210 µm  |
| Conductor Width / Spacing     | Minimum:-  | 0.075 mm / 0.075 mm   | 0.050 mm / 0.050 mm  |
| Annular Ring                  | Inner Layer:-<br>Outer Layer:-   | From 0.075 mm (Minimum above finished hole size)<br>From 0.075 mm (Minimum above finished hole size)          | From 0.050 mm<br>From 0.050 mm   |
| Inner Layer Clearances        | Typical Minimum Clearance:-<br>Typical Minimum Clearance:-                             | 0.30 mm (from copper plane to non-plated hole)<br>0.30 mm (from copper plane to copper-plated hole)           | -<br>-   |
| Special Features              | Typical Minimum Clearance:-<br>Typical Minimum Clearance:-<br>Typical Minimum Hole Ø:- | 0.25 mm (from copper plane to circuit profile)<br>0.50 mm (from copper plane to score centre line)<br>0.10 mm | 0.20 mm (from copper plane to circuit profile)<br>0.30 mm (from copper plane to score centre line)<br>0.075 mm (for blind vias only) |
| Ink                           | To Form Trace Patterns:-   | Silver  | Carbon   |

\* Smallest finished hole size 0.05mm and aspect ratio of 16:1 available from offshore partners

\*\* 48 layers and minimum core thickness 0.05mm available from offshore partners



# Solder Mask Finishes

## Solder Mask / Annotation / Comp Ref Ink Finishes

Liquid photimageable solder mask Electra EMP110 (air spray)

Standard colour is green but various colours available on request

Matt and semi-matt finishes available

Screen printed two-part epoxy solder mask

Various colours available on request

Ink Jet printing of notation including serialisation

Only available in white

Thermally cured notation ink

Various colours available on request



## Board Materials

| Product              | Supplier   |
|----------------------|--|
| FR4                  | Isola / Ventec / Grace Electronic / Kingboard / Shanghai Nanya / Panasonic |
| IMS                  | Ventec / Bergquist / Rogers / CCI Eurolam                                  |
| High Speed Laminates | Isola / Ventec / Rogers / EMC  |
| PTFE                 | Rogers / Arlon / Nelco / Taconic   |
| Flex                 | CCI Eurolam / Ventec   |
| Sculptured Flex      | CCI Eurolam / MSC Polymer / Ventec   |
| Rigid Polyimide      | Arlon / Ventec   |



# Board Materials

| Isola |                              | Isola                  |                    |
|-------|------------------------------|------------------------|--------------------|
| FR4   | 185HR                        | FR4                    | FR 408 & FR 408 HR |
| FR4   | FR4                          | FR4                    | IS 400             |
| FR4   | FR-74                        | FR4                    | IS410              |
| FR4   | PCL-Fr-226                   | FR4                    | IS415              |
| FR4   | PCL-Fr-240                   | FR4                    | IS420              |
| FR4   | PCL-Fr-250 & 250HR           | FR4                    | Duraver E Cu-104   |
| FR4   | PCL-Fr-254 & 254HR           | FR4                    | Duraver E Cu-114   |
| FR4   | PCL-Fr-370 370HR & 370 Turbo | FR4                    | Duraver E Cu-117   |
| FR4   | PCL-Fr-850                   | FR4                    | DE 104             |
| FR4   | PCL-Fr-870                   | FR4                    | I Speed            |
| FR4   | PCL- Auto HR                 | FR4                    | ISE-8              |
| FR4   | FR 402                       | FR4                    | I Tera MT40        |
| FR4   | FR 404                       | FR4                    | Tachyon 100G       |
| FR4   | FR 405                       | FR4                    | Astra MT77         |
| FR4   | FR 406 & FR 406 N            |                        |                    |
| Grace |                              | Elite Materials Co Ltd |                    |
| FR4   | GA-150-LL                    | FR4                    | EMC-827            |
| FR4   | GA-170-LL                    | FR4                    | EMC-888            |



## Board Materials

| Kingboard |       | Ventec |       |
|-----------|-------|--------|-------|
| FR4       | 6150  | FR4    | VT42  |
| FR4       | 6160  | FR4    | VT46  |
| FR4       | 6165F | FR4    | VT462 |
|           |       | FR4    | VT481 |
|           |       | FR4    | VT47  |



## Product Range

| Circuit Board                     | Description   |
|-----------------------------------|---|
| Single Sided Rigid                | A basic rigid circuit board with circuitry on one side: cost effective and suitable for high volume   |
| Double Sided Rigid                | A rigid circuit board with circuitry on both sides: twice the circuitry with tiered levels of complexity  |
| Multilayer Rigid                  | An advanced rigid board with varying layers of circuits (up to 42 layers)   |
| Mixed Composite Multilayer Rigid  | An advanced rigid board with varying layers of circuits consisting of multiple board materials and thickness  |
| Polyimide                         | An advanced circuit coverlay film with exceptional thermal and dielectric properties: suitable for single/doubled sided and multilayer applications |
| Insulated Metal Substrates (IMS)  |   |
| Flex                              | Flexible circuits (no more than 10x the radius) available with single or double sided, multilayer, and/or Pin-Through-Hole (PTH)                    |
| Flex Rigid                        | Combination PCB's consisting of both rigid and flex circuit boards  |
| Sculptured Flex                   | Combination PCB's consisting of flexible circuit boards with varying thicknesses (can include assembly of rigid components)                         |
| Surface Mount Interconnects (SMI) | A robust, flexible board-to-board interconnection solution utilising industry standard manufacturing equipment                                      |



# Technology

| Technology                             | Description   |
|--|---|
| Controlled Impedance                   | Advanced impedance tracking, measurement and modelling for multiple track shapes, lengths and materials   |
| Planar Technology                      | Advanced PCB construction methods for improved conductivity, typically used with multi-layer circuits   |
| High Voltage                           | Final stage HiPot stress testing methods for insulation and/or dielectric properties to ensure product longevity according to specifications          |
| High Speed                             | Finer tolerances, low-loss materials and trace impedance control enable production of high-speed boards   |
| Blind Vias                             | Drilled holes within a multilayer PCB connecting the outer layer to one or more inner layers  |
| Buried Vias                            | Drilled holes within a multilayer PCB connecting inner layers   |
| Copper-Filled Vias                     | Drilled holes within a multilayer PCB connecting the outer layer to one or more inner layers, filled with copper for enhanced conductivity *          |
| Resin-Filled Vias                      | Drilled holes within a multilayer PCB connecting the outer layer to one or more inner layers, filled with resin for enhanced insulation and stability |
| Resin-Filled Buried Vias               | Drilled holes within a multilayer PCB connecting inner layers, filled with resin for enhanced insulation and stability                                |
| Resin-Filled Blind Vias                | Drilled holes within a multilayer PCB connecting inner layers to an outer layer, filled with resin for enhanced insulation and stability              |
| Plugged Vias                           | Drilled holes within a multilayer PCB filled with solder mask or non-conductive ink, with no surface finish on the via barrel                         |
| Capped Vias                            | Any resin-filled via capped with copper to prevent chemistry/solder entering the via  |
| Coefficient of Thermal Expansion (CTE) | Testing method employed to prevent material expansion mismatch, circuit failure and/or delamination   |
| Thermal Management                     | A range of boards and materials are assessed at design stage to ensure suitable board production for heat-intensive applications                      |
| Metal Backed Substrates                | Metal-backed boards with improved heat dissipation for specific applications, eg. High-powered LED's  |

\* Available from offshore partners



## Surface Finishes

| Metal Finish   | In-House / Sub-Contract | Suitability  | Typical Thickness                                       |
|--|-------------------------|--|---|
| Electroless Nickel Immersion Gold (ENIG)                         | In-House                | Suitable for lead-free solder or aluminium wire bonding                          | Ni 4µm - 6µm<br>Au 0.05µm - 0.1µm                       |
| Electroless Nickel Electroless Palladium Immersion Gold (ENEPIG) | In-House / Sub-Contract | For advanced boards with both RoHS compliant solder and wire bonding             | Ni 3µm - 5µm<br>Pd 0.1µm - 0.5µm<br>Au 0.025µm - 0.05µm |
| Electroplate Gold (Hard) Over Nickel                             | In-House                | Selective (eg: edge connectors) / all-over finish                                | Ni 1.0 - 6.0µm<br>Au 1.0µm - 3.0µm                      |
| Electroless Gold (Soft) Direct Over Copper                       | In-House                | Selective (eg: edge connectors) / all-over finish more suited to RF applications | Au 0.05µm - 1.0µm                                       |
| Immersion Silver (IAg)   | In-House                | Sterling silver II RoHS compliant soldering                                      | 0.1µm - 0.25µm  |
| Immersion Tin (ISn)  | Sub-Contract            |  | Sn 1.0µm - 1.1µm  |
| Hot Air Solder Level (HASL)                                      | In-House                | SnPb 37/63 eutectic tin lead   | 10µm - 25µm   |
| Lead-Free Hot Air Solder Level                                   |                         | RoHS compliant soldering   | 10µm - 25µm   |
| Organic Solderability Preservative (OSP)                         | In-House                | Entek: RoHS compliant soldering  | 0.2µm   |
| Soft Gold  | Sub-Contract            | Suitable for gold wire bonding   | As required   |
| Silver Ink   | In-House                | On request   |   |
| Carbon Ink   | In-House                | On request   |   |