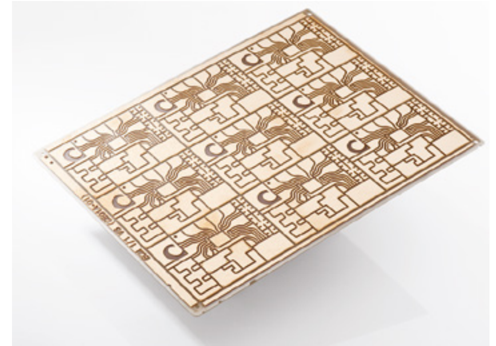
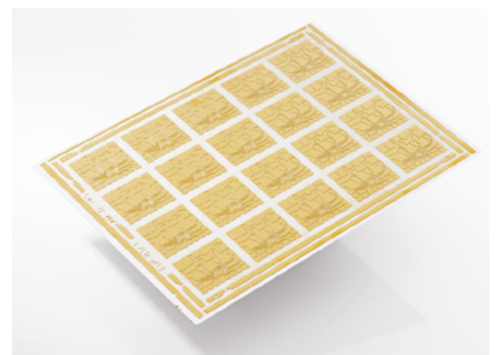
curamik®
ENABLING POWER EFFICIENCY

# curamik® CERAMIC SUBSTRATES

Technical data sheet





## Available materials

| | | |
|---|---|---|
| **$Al_2O_3$** | Alumina | curamik® Power |
| **HPS*** | Alumina (9% $ZrO_2$ doped) | curamik® Power Plus |
| **$Si_3N_4$** | Silicon Nitride | curamik® Performance |
| **AlN** | Aluminum Nitride | curamik® Thermal |

** The HPS products are subject to patent restrictions in some countries.*

## Thermal conductivity

| | |
|---|---|
| **$Al_2O_3$** | 24 W/mK @ 20°C |
| **HPS** | 26 W/mK @ 20°C |
| **$Si_3N_4$** | 90 W/mK @ 20°C |
| **AlN** | 170 W/mK @ 20°C |

## Available thickness combinations DBC

| ceramic thicknesses mm | copper thicknesses mm | | | | | |
|---|---|---|---|---|---|---|
| | **0.127** | **0.2** | **0.25** | **0.3** | **0.4** | **0.5** |
| **0.25** | | HPS | HPS | HPS | | |
| **0.32** | $Al_2O_3$ | $Al_2O_3$<br>HPS | $Al_2O_3$<br>HPS | $Al_2O_3$<br>HPS | HPS | HPS |
| **0.38** | $Al_2O_3$ | $Al_2O_3$ | $Al_2O_3$ | $Al_2O_3$ | | |
| **0.5** | $Al_2O_3$ | $Al_2O_3$ | $Al_2O_3$ | $Al_2O_3$ | $Al_2O_3$ | |
| **0.63** | $Al_2O_3$<br>AlN | $Al_2O_3$<br>AlN | $Al_2O_3$<br>AlN | $Al_2O_3$<br>AlN | | |
| **1.00** | $Al_2O_3$<br>AlN | $Al_2O_3$<br>AlN | $Al_2O_3$<br>AlN | $Al_2O_3$<br>AlN | | |

## Available thickness combinations AMB

| ceramic thicknesses mm | copper thicknesses mm | | |
|---|---|---|---|
| | **0.3** | **0.5** | **0.8** |
| **0.25** | $Si_3N_4$ | $Si_3N_4$ | $Si_3N_4$ |
| **0.32** | $Si_3N_4$ | $Si_3N_4$ | $Si_3N_4$ |

**Note** *other copper thicknesses on request.*

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## Coefficient of linear thermal expansion (CTE)

| | |
|---|---|
| **$Al_2O_3$** | 6.8 ppm/K @ 20°C - 300°C |
| **HPS** | 7.1 ppm/K @ 20°C - 300°C |
| **$Si_3N_4$** | 2.5 ppm/K @ 20°C - 300°C |
| **AlN** | 4.7 ppm/K @ 20°C - 300°C |

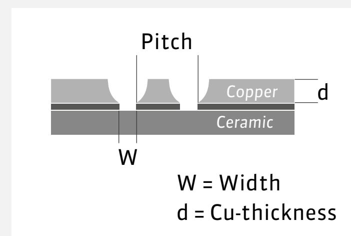
*with copper plating 5% to 60% higher (dependent on copper thickness)*

## General dimensions

| | |
|---|---|
| **Total dimensions master card** | 138 mm x 190.5 mm ± 1.5% |
| **Max. useable area** | 127 mm x 178 mm ± 0.05% |
| **Copper peeling strength** | ≥ 4.0 N/mm @ 50 mm/min for DBC with 0.3 mm Cu-thickness<br>≥ 10.0 N/mm @ 50 mm/min for AMB with 0.5 mm Cu-thickness |

## Typ. width of / spacing between conductors

| Cu-thickness | width DBC | width AMB |
|---|---|---|
| 0.127 mm | ≥ 0.35 mm | n/a |
| 0.2 mm | ≥ 0.4 mm | n/a |
| 0.25 mm | ≥ 0.45 mm | n/a |
| 0.3 mm | ≥ 0.5 mm | 0.6 mm |
| 0.4 mm | ≥ 0.6 mm | n/a |
| 0.5 mm | ≥ 0.7 mm | 1.0 mm |
| 0.6 mm | ≥ 0.8 mm | n/a |
| 0.8 mm | n/a | 1.2 mm |




## Surface options

| | |
|---|---|
| **Platings** | Electroless Ni: 3 µm – 7 µm (8% ± 2% P) all-over |
| | Electroless Ag : 0.1 µm – 0.6 µm all-over |
| | Electroless Au Class A: 0.01 - 0.05 µm all-over on Ni |
| | Electroless Au Class B: 0.03 - 0.13 µm all-over on Ni |
| **Roughness (DCB)*** | $R_a$ ≤ 3 µm; $R_z$ ≤ 16 µm; $R_{max}$ = 50 µm |
| **Roughness (AMB)*** | Ra ≤ 1.5 µm; Rz ≤ 10 µm; Rmax = 50 µm |

** Lower roughness on request*

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