



# High Tg / Ultra Low Loss / Halogen Free

## EM-890K / EM-89BK

- Ultra low Df and excellent electrical performance
- Excellent CAF resistance
- Multiple lamination and high thermal reliability applications
- For high speed Ethernet, network , 5G , Antenna applications

### Basic Laminate Property

| Property         | Item                 | IPC-TM-650 | Test Condition   | Unit            | Typical Value |               |
|------------------|----------------------|------------|------------------|-----------------|---------------|---------------|
| Thermal          | Tg                   | 2.4.25     | DSC              | °C              | N/A           |               |
|                  |                      | 2.4.24     | TMA              | °C              | 170           |               |
|                  |                      | 2.4.24.4   | DMA              | °C              | 205           |               |
|                  | CTE, X/Y-axis        | 2.4.24.5   | < Tg, TMA        | ppm/°C          | 12/13         |               |
|                  | CTE, Z-axis          | 2.4.24     | < Tg, TMA        | ppm/°C          | 45~50         |               |
|                  |                      |            | > Tg, TMA        | ppm/°C          | 185~205       |               |
|                  | Z-axis Expansion     | 2.4.24     | 50~260°C         | %               | 2.2           |               |
|                  | Td                   | 2.4.24.6   | TGA (5% W.L)     | °C              | 430           |               |
| T288             | 2.4.24.1             | Clad       | Min              | >60             |               |               |
|                  |                      | Etched     | Min              | >60             |               |               |
| Electrical       | Dk<br>(R/C: 55/70%)  | 1 GHz      | 2.5.5.9          | C-24/23/50      | -             | 3.1/2.9       |
|                  |                      | 10 GHz     | SPDR             |                 | -             | 3.0/2.8       |
|                  |                      |            | Cavity Resonator |                 | -             | 3.0/2.8       |
|                  | Df<br>(R/C: 55/70%)  | 1 GHz      | 2.5.5.9          | C-24/23/50      | -             | 0.0019/0.0018 |
|                  |                      | 10 GHz     | SPDR             |                 | -             | 0.0022/0.0021 |
|                  |                      |            | Cavity Resonator |                 | -             | 0.0025/0.0024 |
| Physical         | Water Absorption     |            | 2.6.2.1          | E-1/105+D-24/23 | %             | 0.07          |
|                  | Peel Strength (HVLP) | H oz       | 2.4.8            | As Received     | lb/in         | 4.5           |
|                  | Flexural Strength    | Warp       | 2.4.4            | As Received     | MPa           | 430-470       |
|                  |                      | Fill       |                  |                 |               | 410-450       |
| Flame Resistance |                      | UL-94      | A & E-24/125     | -               | V-0           |               |