

# VT-4A

UL Approval: E214381 Version: B5

## Aluminum Base Laminate/Prepreg

### General Information

- > VT-4A1 /VT-4A1 PP: Thermal Conductivity - 1.6W/mK, MOT 90°C
- > VT-4A2 /VT-4A2 PP: Thermal Conductivity - 2.2W/mK, MOT 90°C
- > VT-4A2H /VT-4A2H PP: Thermal Conductivity - 2.2W/mK, MOT 105°C
- > Excellent Electrical and Mechanical Characteristics
- > Flammability UL94 V0

### Application

- > Ultra bright LED Substrate
- > Power Conversion
- > PDP, LED, Regulator for TV
- > Monitor Drives
- > Rectifier, Power Supply

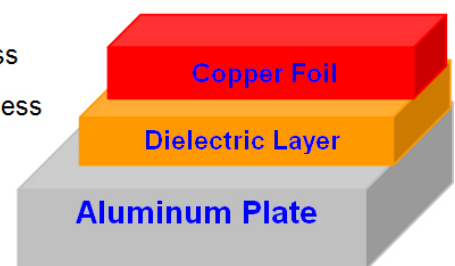
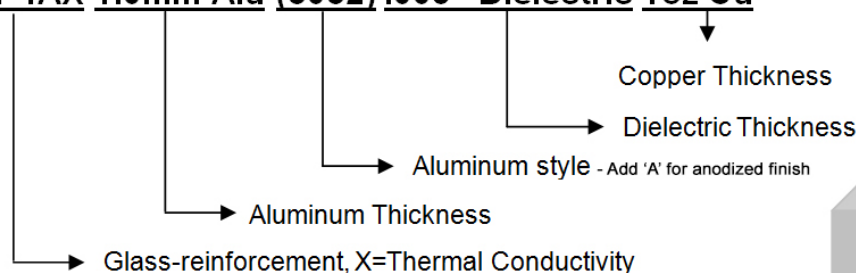
### Storage Condition & Shelf Life

|                   |                   | Prepreg       |              | Laminate  |
|-------------------|-------------------|---------------|--------------|-----------|
| Storage Condition | Temperature       | < 23°C (73°F) | < 5°C (41°F) | Room      |
|                   | Relative Humidity | < 55%         | /            | /         |
| Shelf Life        |                   | 3 Months      | 6 Months     | 24 months |

The RCC & RCF exceeding shelf life should be retested.

### Designation of IMS Laminate

**VT-4AX 1.0mm Alu (5052) .003" Dielectric 1oz Cu**



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### Laminate Properties

| Item                 |     | Test Method (IPC-TM-650) | Unit                  | VT-4A1 |       |       |       | VT-4A2 |       |       |       | VT-4A2H |       |       |       |
|----------------------|-----|--------------------------|-----------------------|--------|-------|-------|-------|--------|-------|-------|-------|---------|-------|-------|-------|
|                      |     |                          |                       | 75um   | 100um | 125um | 150um | 75um   | 100um | 125um | 150um | 75um    | 100um | 125um | 150um |
| Thermal Conductivity |     | ISO 22007-2              | W/m*K                 | 1.6    |       |       |       | 2.2    |       |       |       | 2.2     |       |       |       |
| Thermal Impedance    |     | ISO 22007-2              | °C*in <sup>2</sup> /W | 0.074  | 0.099 | 0.123 | 0.148 | 0.054  | 0.072 | 0.089 | 0.107 | 0.054   | 0.072 | 0.089 | 0.107 |
| Tg                   | DSC | 2.4.25                   | °C                    | 130    |       |       |       | 130    |       |       |       | 130     |       |       |       |
| Td                   | TGA | ASTM D3850               | °C                    | 380    |       |       |       | 380    |       |       |       | 380     |       |       |       |
| Thermal Stress       |     | Solder Dip @ 288°C       | Minute                | ≥5     |       |       |       | ≥5     |       |       |       | ≥5      |       |       |       |
| Hi-Pot Withstand     |     | DC                       | V                     | 4500   | 5000  | 6000  | 8000  | 4500   | 5000  | 6000  | 8000  | 4500    | 5000  | 6000  | 8000  |
| Breakdown Voltage    |     | AC                       | V                     | 6000   | 7500  | 9000  | 10000 | 6000   | 7500  | 9000  | 10000 | 6000    | 7500  | 9000  | 10000 |
| Dk @ 1MHz            |     | C-24 / 23 / 50           | —                     | 5.0    |       |       |       | 5.1    |       |       |       | 5.1     |       |       |       |
| Df @ 1MHz            |     | C-24 / 23 / 50           | —                     | 0.015  |       |       |       | 0.014  |       |       |       | 0.014   |       |       |       |
| Volume Resistance    |     | After Moisture           | MΩ-cm                 | 4.5E+8 |       |       |       | 5.1E+8 |       |       |       | 5.1E+8  |       |       |       |
|                      |     | E-24/125                 |                       | 2.3E+7 |       |       |       | 3.1E+7 |       |       |       | 3.1E+7  |       |       |       |
| Surface Resistance   |     | After Moisture           | MΩ                    | 2.2E+7 |       |       |       | 2.3E+7 |       |       |       | 2.3E+7  |       |       |       |
|                      |     | E-24/125                 |                       | 5.1E+6 |       |       |       | 5.2E+6 |       |       |       | 5.2E+6  |       |       |       |
| Peel strength (1oz)  |     | As received              | 2.4.8                 | Lb/in  |       |       |       | 12     |       |       |       | 12      |       |       |       |
| CTI                  |     | As received              | ASTM D3638            | V      |       |       |       | 600    |       |       |       | 600     |       |       |       |
| Flammability         |     | As received              | UL 94                 | Rating |       |       |       | V0     |       |       |       | V0      |       |       |       |
| RTI                  |     | Electric                 | UL 94                 | °C     |       |       |       | 90     |       |       |       | 90      |       |       |       |
|                      |     | Mechanical               | UL 94                 | °C     |       |       |       | 90     |       |       |       | 90      |       |       |       |

All test data provided are typical values and not intended to be specification values.

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### Availability

### Laminate

| Item               |          | Availability  |
|--------------------|----------|---|
| Dielectric         |          | .003"(75um), .004"(100um), .005"(125um), .006"(150um), .008"(200um) |
| Standard Size      | Imperial | 18*24, 20*24, 21*24, 18*48, 20*48, 21*48                            |
|                    | Metric   | 457*610, 508*610, 533*610, 457*1220, 508*1220, 533*1220             |
| Copper Weight      |          | Hoz, 1oz, 2oz, 3oz, 4oz, 6oz, 10oz                                  |
| Aluminum Thickness |          | 0.6mm, 0.8mm, 1.0mm, 1.2mm, 1.5mm, 2.0mm, 3.0mm                     |
| Aluminum Alloy     |          | 1100, 5052, or as required  |

### Prepreg

| Product           | Pressed Thickness (um) | Glass Fabric | Application            |
|-------------------|------------------------|--------------|------------------------|
| VT-4A1            | 75                     | 106          | Circuit Clearance Fill |
|                   | 100                    | 1080         | Circuit Clearance Fill |
|                   | 125                    | 1080         | Hole Fill              |
| VT-4A2<br>VT-4A2H | 75                     | 106          | Circuit Clearance Fill |
|                   | 100                    | 1080         | Circuit Clearance Fill |
|                   | 125                    | 1080         | Hole Fill              |

### Protective Film for Aluminium Plate

| Type             | Material  | Max Operation Temperature |
|------------------|-----------|---------------------------|
| Standard         | PET       | 170 °C                    |
| High Temperature | Polyimide | 270 °C                    |

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### Aluminum and Aluminum Alloy Information

#### Major Chemical Composition

| Alloy Code | Composition            | Alloy Code | Composition                        |
|------------|------------------------|------------|------------------------------------|
| 1100       | Al, Si, Fe, Cu, Zn, Mn | 5052       | Al, Mg, Fe, Si, Cr, Cu, Zn         |
| 3003       | Al, Mn, Si, Fe, Cu, Zn | 6061       | Al, Mg, Si, Fe, Cr, Cu, Zn, Ti, Mn |

#### Calorific & Electrical Performance

| Alloy | Melting Point Range [°C] | CTE (ppm/°C) |          | Cp (J/g-°C) | Thermal Conductivity (W/m-K) | Resistivity (Ω-cm) |
|-------|--------------------------|--------------|----------|-------------|------------------------------|--------------------|
|       |                          | 20~100°C     | 20~300°C |             |                              |                    |
| 1100  | 643~657.2                | 23.6         | 25.5     | 0.904       | 220                          | 3.00E-6            |
| 3003  | 643~654                  | 23.2         | 25.1     | 0.893       | 163                          | 4.16E-6            |
| 5052  | 607.2~649                | 23.8         | 25.7     | 0.880       | 138                          | 4.99E-6            |
| 6061  | 582~651.7                | 23.6         | 25.3     | 0.896       | 167                          | 3.99E-6            |

#### Mechanical Performance

| Alloy   | Hardness (HB) | Ultimate Tensile Strength (MPa) | Tensile Yield Strength (MPa) | Elongation at Break 1.6mm (%) | Elastic Modulus (GPa) | Poisson Ratio | Fatigue Strength (MPa) | Shear Modulus (GPa) | Shear Strength (MPa) |
|---------|---------------|---------------------------------|------------------------------|-------------------------------|-----------------------|---------------|------------------------|---------------------|----------------------|
| 1100H24 | 32            | 124                             | 117                          | 9                             | 68.9                  | 0.330         | 48.3                   | 26.0                | 75.8                 |
| 3003H24 | 40            | 152                             | 145                          | 8                             | 68.9                  | 0.330         | 62.1                   | 25.0                | 96.5                 |
| 5052H32 | 68            | 262                             | 214                          | 10                            | 70.3                  | 0.330         | 124                    | 25.9                | 145                  |
| 6061T6  | 95            | 310                             | 276                          | 12                            | 68.9                  | 0.330         | 96.5                   | 26.0                | 207                  |

\*Number of cycles: 5.0E+8

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