

## Application Note

### Secure® 1600XF - Process Guide

#### OVERVIEW

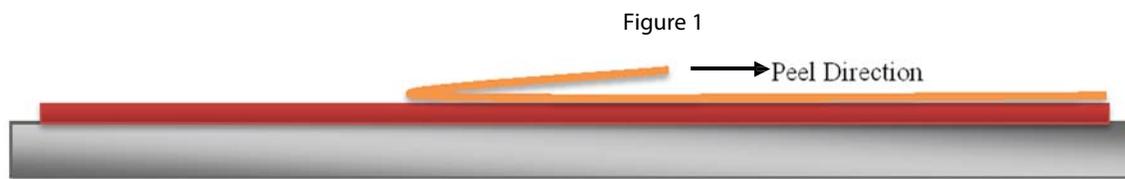
Secure® 1600XF is a hybrid adhesive which combines the advantages of both pressure sensitive adhesive (PSA) and structural adhesive. Secure 1600XF provides strong and reliable bonding strength like structural adhesives and processes as easily as a PSA. Developed for adhesion of dissimilar substrates, such as transistors and metal heat sinks where heat conduction is desired, these materials are a simple composite of silicone rubber, extending fillers, and functional additives with a fiberglass reinforcing substrate in rolls, sheets, cut pads, or die cuts. Intimate contact is required with the substrates to be bonded and heat is needed to thermally crosslink the silicone rubber. No primer is required for adhesion to most substrates.

#### SURFACE PREPARATION

Surfaces intended to be bonded with Secure 1600XF must be free of dirt, debris, and chemicals which may interfere with the adhesion mechanism. Prior to lamination, metal surfaces should have their oxide layer mechanically removed and surfaces should be cleaned with isopropyl alcohol. Solvents other than isopropyl alcohol may be used based on compatibility with the surface, but the solvent must not leave a residue on the surface. Surfaces with a conformal coating should be evaluated for satisfactory adhesion.

#### APPLICATION

Remove the clear liner and laminate Secure 1600XF to one surface, taking care to prevent air entrapment at the interface. This product is typically laminated to the surface with higher surface energy first. During this step, the Secure 1600XF acts like a PSA and a bond between the material and the surface is formed when pressure is applied and the bond strength is proportional to the pressure applied. To ensure a proper bond a lamination pressure of 140 psi is recommended for 30 seconds. Next, remove the second liner and laminate the second surface, again taking care to prevent air entrapment at the interface. Liner removal is facilitated by folding the liner back onto itself 180° (Figure 1). A minimum of 140 psi/30s lamination is recommended.



#### CURING

Applying heat to Secure 1600XF causes crosslinking of the adhesive and forms a chemical bonding between the adhesive and the substrates. The cure process irreversibly changes the physical bonding between adhesive and substrates into a more reliable and stronger chemical bonding. Table 1 on the next page gives the recommended cure times as a function of temperature for Secure 1600XF. Also included are T90 times, which are the times required to reach 90% crosslink density, measured by a moving die rheometer. Cure times should be adjusted to compensate for process specific heating rate.

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## Secure® 1600XF, continued

### CURING, cont'd

**Table 1 – Recommended Cure Cycle for Secure 1600XF Adhesives**

Cure Temperature, °C	Cure Time, minutes	T90, m:ss
100°	15	6:59
125°	5	1:47
150°	2	0:45

\* Cure times are for adhesive at temperature. They do not include time required to bring up the assembly to temperature.

Application of pressure is not required during the curing process. Cooling the assembly under pressure is also not required. Pressure is required during the assembly preparing process and may be applied with a variety of processes as detailed below. The process most suitable depends on many factors specific to the user's assembly and needs.

**Hydraulic platen presses:** Use two parallel platens to apply pressure, then heat to cure. Hydraulic platen presses are suitable when the substrates have little topography such as an unpopulated printed circuit board and an aluminum rigidizer. One or more thermocouples placed within the stack-up will monitor the temperature of the assemblies and provide the feedback for cycle time. Typical pressure in a hydraulic platen press process for Secure 1600XF is 75 psi. Pressure may need to be optimized based on the size of the assembly, tolerances, rubber thickness, and features such as trace depth and vias to achieve the desired level of results. Enclosing the press in a vacuum is not required to achieve optimum results.

**Fixtures:** Use spring or clamp force to apply pressure to the assembly. Required spring or clamp force to produce even pressure across the assembly depends on the specifics of the assembly and fixture. Typical pressure is 75 psi.

**Small parts:** Generally 5 cm<sup>2</sup> or less can be cured without pressure in open air. The parts should be laminated to Secure 1600XF by applying even pressure normal to the bond line, followed immediately by curing at an elevated temperature in an oven according to Table 1 above. Typically, for laminating the small part and driving air from the interface requires 75 psi for 30 seconds. This can be accomplished by placing the part in a fixture and applying pressure with pneumatic, hydraulic, spring force, or a combination.

### STORAGE

The material needs to be stored at room temperature and avoid direct irradiation of light. Elevated temperatures and light irradiation could cause premature crosslinking of the product. When premature crosslinking happens, a tight release and pick-off will be observed on the clear liner side.

### QUALITY ASSURANCE

Secure adhesives cure to a soft consistency and are designed to provide a robust mechanical attachment while allowing stress induced by mismatched coefficients of thermal expansion to be absorbed, and heat to be transferred across the bond line. The best way to determine if Secure adhesives are adequately cured and bonded is to control the assembly and curing process and to measure the torque shear strength on randomly selected assemblies taken during the course of production. Alternatively, a higher level of non-destructive testing can be performed by applying a force in shear below the shear strength of the assembly and monitoring for failure. This value should be determined after the expected shear strength of the specific assembly and process is selected.

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