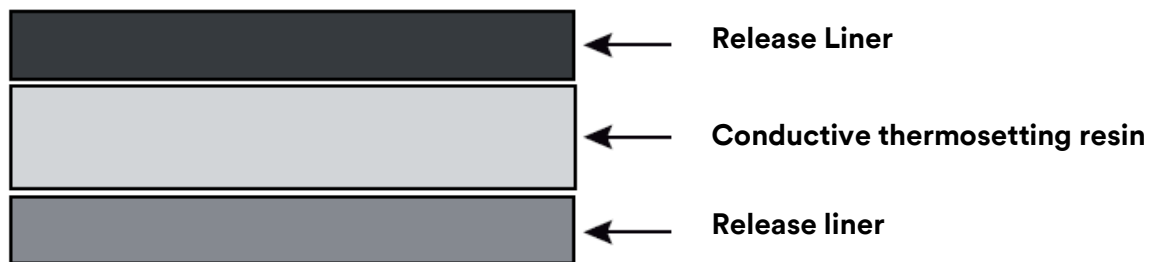


## 3M™ Electrically Conductive Thermosetting Film 2201P

### Product Description

3M™ Electrically Conductive Thermosetting Film (C-TSF) 2201P is a specialty conductive thermosetting film with excellent adhesion to many substrates, good grounding performance and modest thermal bonding process conditions. 3M film C-TSF 2201P was also numbered EAS-2201P (Electronic Assembly Solution = EAS) in its developmental phase.



### Product Construction / Materials Descriptions

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

3M™ Electrically Conductive Thermosetting Film 2201P	
Property	Value
TSF Resin	Thermoset Epoxy / Acrylic Hybrid
Conductive Fillers	Metallized (Ni/Cu/Ni) Polymeric (PET) Scrim Silver particles
Approximate Thickness	Nominal < 0.065mm
Construction	See diagram above

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## Typical Physical Properties and Performance Characteristics

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes. Final product specifications and testing methods will be outlined in the product's Certificate of Analysis (COA) that is provided once the product is approved by 3M for general commercialization and development work is completed.

<b>3M™ Electrically Conductive Thermosetting Film 2201P Grounding &amp; Bonding*</b>	
<b>Peel Adhesion</b>	>50 oz/in (1420 g/in)*
<b>Maximum Operating Temperature Range***</b>	85 - 95°C
<b>Contact Resistance</b>	<200 m-ohms**

\* Tested using 3M test method on stainless steel. Results can vary based on factors including bonding conditions, final overall sample thickness, backing type and substrate type. Bonded samples evaluated after a nominal set of bonding conditions (30s @ 140-150°C bond line temperature and cool down @ 50psi). Peel adhesion at RT conditions after bonding. 90 degree peel adhesion.

\*\* 3mm wide gold flex bonded with the 3M T-CSF 2201P onto a 1.25mm width gold trace on a standard FR4 PCB board (Nominal bond conditions @ 30s @ 140-150°C bond line temperature and cool down @ 50psi).

\*\*\*The end use customer application, design and verification testing will determine the final in use effective temperature range based on each application's environmental conditions.

## Application Guide

Note: A Design of Experiments (DOE) is suggested to determine the optimum bonding conditions for each application. Actual application substrates, bonding equipment, bond line temperature, dwell times and end cooling temperature for a stable bond will vary with each design. Items for end user to test and evaluate include: peel adhesion, overlap shear, contact resistance and bond line squeeze-out of excess TSF resin.

3M™ Electrically Conductive Thermosetting Film (C-TSF) 2201P is bonded using uniformly applied heat and pressure and a cooling delay under pressure to ensure a maximum end bond condition between substrates.

Tacking, or lightly bonding, the 3M film C-TSF 2201P into position for final bond can be accomplished using the initial set-up conditions below. Each application may vary and could require a modification of conditions to meet each application's specific needs.

### **Suggested TACKING Conditions (not a final bond)**

- PSA level tack exists, no heat recommended for 3M film CTSF
- 5-10 psi pressure

### **Suggested Bonding Conditions**

- 145-155°C at the bond line temperature of the 3M film CTSF 2201P
- 10-15 seconds dwell time
- 20-80 psi pressure
- Dwell under pressure until bond line cools to approximately < 93°C

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Temperatures noted for tacking and beginning bonding conditions guide are bond line temperatures. Actual bonding equipment surface temperatures will be higher based on equipment, process conditions and design substrates used to achieve the ideal bond line temperatures. Dwell under pressure until bond line cools to approximately  $< 93^{\circ}\text{C}$  may be another DOE items to be evaluated to see if a cooling down period is desired.

3M film C-TSF 2201P should be bonded under sufficient pressure-temperature-time such that the 3M film C-TSF has flowed and conductive members are well engaged to the substrate. The better the conductive members engage the substrate, typically the lower the contact resistance.

- Application should consider the flow properties of the 3M film C-TSF when considering the die cut size.
- Flow of the 3M film C-TSF can be used as an indication of proper bonding of an assembly (an indication of targeted pressure-temperature-time)
- 3M film C-TSF “flow” can be optimized for each application pressure-temperature-time with modified resin characteristics. Contact the 3M technical team for guidance.

## Storage and Shelf Life

The shelf life of 3M Electrically Conductive Thermosetting Film (C-TSF) 2201P is 18 months from the 3M shipment date when stored in the original cartons/bags, in roll form, at  $<4^{\circ}\text{C}$  ( $39^{\circ}\text{F}$ ) and protected from high humidity ( $>50\%$  RH). The 3M shipment date can be found on the material's COA associated with the lot number of the product shipped. The 3M material lot number is not a date code.

The product's shelf life is reduced when exposed to temperature exposures above  $4^{\circ}\text{C}$  ( $39^{\circ}\text{F}$ ) or high humidity ( $>50\%$  RH). The product should not be exposed to temperatures above  $25^{\circ}\text{C}$  ( $77^{\circ}\text{F}$ ) and/or high humidity ( $>50\%$  RH) during shipment, handling, converting or assembly. High temperatures will cure the epoxy prior to intended application use and degrade performance. High humidity environments can cause absorbed water in the film and can lead to moisture volatilization that can produce bubbles during heat bonding.

The cumulative temperature/humidity exposure time shelf life of 3M film C-TSF 2201P when exposed to temperatures between  $4^{\circ}\text{C}$  ( $39^{\circ}\text{F}$ ) and  $25^{\circ}\text{C}$  ( $77^{\circ}\text{F}$ ) and humidity  $<50\%$  RH during shipment, handling, converting and/or assembly is 6 months.

The end user is responsible to monitor and track the cumulative temperature/humidity exposure of 3M film C-TSF 2201P when exposed to temperatures between  $4^{\circ}\text{C}$  ( $39^{\circ}\text{F}$ ) and  $25^{\circ}\text{C}$  ( $77^{\circ}\text{F}$ ) and humidity  $<50\%$  RH during shipment, handling, converting and/or assembly to prevent degraded performance during the product's final assembly bonding and/or the product's in use application performance.

## Certificate of Analysis (COA)

The 3M Certificate of Analysis (COA) for this product is established when the product is manufactured and is deemed commercially available from 3M. The COA contains the 3M specifications, test methods and test results for the products performance attributes that the product will be supplied against. Contact your local 3M representative for this product's COA.

This technical data sheet may contain preliminary data and may not match the COA specification limits and/or test methods that may be used for COA purposes.

# 3M™ Electrically Conductive Thermosetting Film 2201P

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