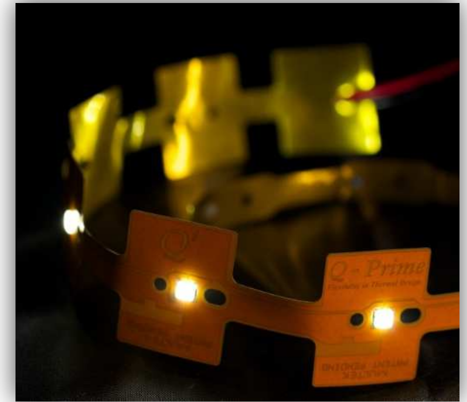
MULTEK

Q - Prime®
Flexibility in Thermal Design

PRODUCT BULLETIN

Introducing a flexible circuit designed specifically for thermal control applications requiring heat dissipation. This copper-aluminum composite is used to generate a unique, flexible interconnect solution for high current applications such as LED lighting. This product is designed with heat conductive adhesive and enables attached components to run at a *cooler* temperature compared to traditional flex constructions.



New Thermal Control Flexible Circuit with 0.1 mm aluminum on entire back-side for LED application

Comparison of Standard Circuit Design vs. Q-Prime® LED Flexible Circuit

Standard Construction | ***Q-Prime® Construction with flaps***

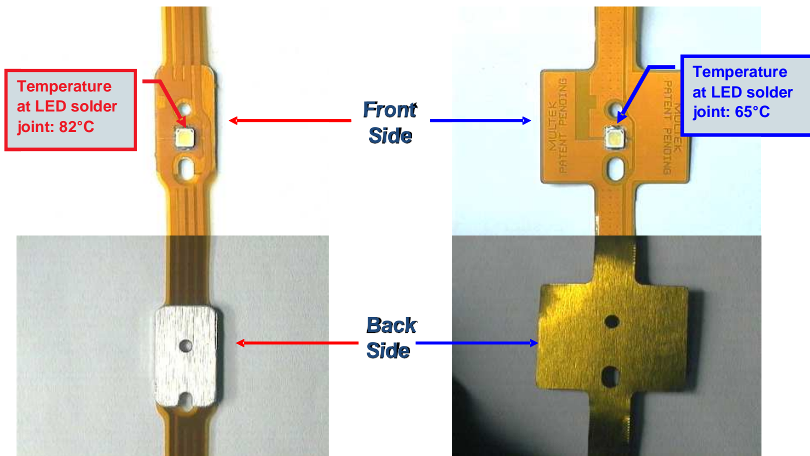
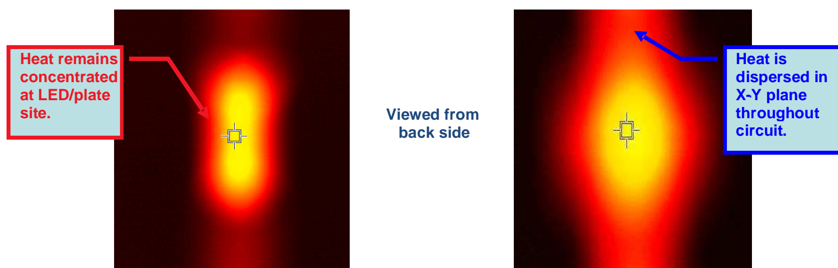


Figure 1*

Thermograph of the backside of the above under load



Standard Construction | **Q-Prime® Construction with flaps**

Backside Temperature: 48°C | **Backside Temperature: 52°C**

Figure 2*

The lower thermal impedance of Q-Prime® yields a smaller temperature gradient from front to back. This allows for greater heat transfer from the back side of Q-Prime® to the environment.

Advantages:

- ✓ Aluminum on the *entire* back side spreads out heat faster, results in lower component operating temperature
- ✓ Polymer layer covering aluminum provides protection during processing and *emits* heat better than bare aluminum
- ✓ The structure is flexible enough for R/R processing, yet sufficiently rigid to hold shape when bent
- ✓ Compatible with cover films or printed coverings.
- ✓ Aluminum is 90% thinner – significantly reduced weight.
- ✓ No more PSA or plate assembly
- ✓ Reduced Tooling Cost (No PSA tool, No Aluminum punching tool)
- ✓ Improved dimensional stability increases component assembly yields
- ✓ Simplified de-panelization enables automation of module assembly.

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Cross Sectional View of Q-Prime® Laminate and Q-Prime® Flexible Circuit

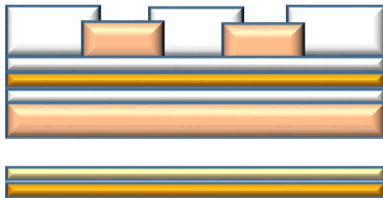
Raw Laminate Structure

Copper
17 micron Adhesive
12 micron Polyimide
17 micron Adhesive
100 micron Aluminum
17 micron Adhesive
12 micron Polyimide

2900 Finished Flex Circuit Structure

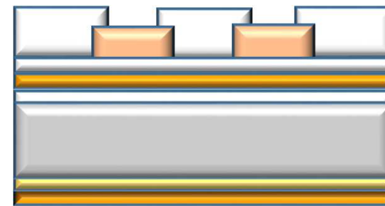
Cover Material
1 oz Copper
17 micron Adhesive
12 micron Polyimide
17 micron Adhesive
1 oz Copper

Cover material optional

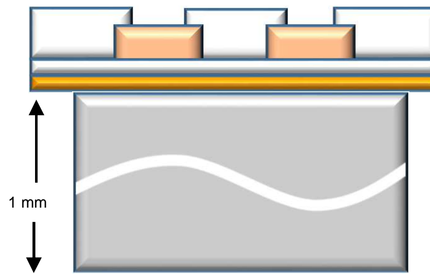


1300 Finished Flex Circuit Structure

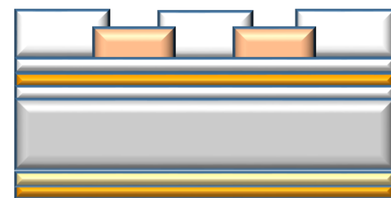
Cover Material
1 oz Copper
17 micron Adhesive
12 micron Polyimide
17 micron Adhesive
100 micron Aluminum
17 micron Adhesive
12 micron Polyimide



Traditional Construction



Cu-AL Construction



Property	Standard	Cu-Al
Thermal Impedance (Dielectric Core)	465°C – mm^2/W	130°C – mm^2/W
Emissivity	20 – 30%	80%
Basis Weight	3100 gm/m^2	700 gm/m^2

- ✓ **Improved Thermal Performance**
- ✓ **Holds a Bend (*1300 only*)**
- ✓ **Dimensionally Stable**
- ✓ **Lower System Cost**
- ✓ **Ample Capacity**

Multek – A One-Stop Solution for Flexible Circuits

Multek Flexible Circuits Inc. is an industry leader in manufacturing single and double sided flexible printed circuits using roll-to-roll technology. The factory processes 15- 20 million square feet of product annually. We are vertically integrated with Sheldahl® brand materials such as Novaclad® and Q-Prime®, enabling us to rapidly tailor laminate and cover film materials to meet the specific requirements from our customers. Multek is the largest producer of flexible interconnects in the U.S. with circuit finishing and component assembly capability in Philippines. Multek Flexible Circuits Inc. offers customers a one-stop solution that begins with prototype and ends with volume production.

Patents: US 5,798,171; US 5,766,740 & Patent Pending