Electronics COOLING

TOP 13 OF 2013

ITEM MEDIA

TOP 13 OF 2013: ARTICLES

INTRODUCTION

Interested in the selection or application of heat sinks, heat pipes or other thermal management tools? Need to brush up on your heat transfer coefficient or thermal resistance calculations? Want to know about new and developing technologies for high performance cooling? All this and more is covered in this list of the 2013 most-read thermal management articles on Electronics-Cooling.com!

ARTICLES

1

Simplified Formula for Estimating Natural Convection Heat Transfer Coefficient on a Flat Plate

Robert E. Simons, IBM (Retired)

Although most of the emphasis today in the electronics cooling community is devoted to extending forced convection cooling capability, many applications still depend upon natural convection cooling. Natural convection cooling combined with radiation is what results when a fan is not used in the cooling design to move air. Instead, movement of the air is induced by density differences resulting from the heat dissipated by the electronic components. An obvious advantage of natural convection, or "free" convection as it is sometimes called, is that the expense of incorporating a fan is avoided. Of course, the penalty associated with this method of cooling is lower heat transfer coefficients.

2

The Seebeck Coefficient

Clemens J.M. Lasance, Consultant, SomelikeitCool

This article addresses the Seebeck coefficient, a property that determines the performance of thermocouples. The Seebeck coefficient is related to the fact that electrons are both carriers of electricity and heat. If a temperature gradient exists over a piece of electrically conductive wire, there is a net diffusion of electrons from the hot end toward the cold end, there by creating an opposing electric field. In (quasi) equilibrium this field causes a voltage over the wire, the so-called Seebeck voltage.

3

How to Select a Heat Sink

Seri Lee, Aavid Thermal Technologies

With the increase in heat dissipation from microelectronic devices and the reduction in overall form factors, thermal management has become a more important element of electronic product design. Heat sinks are devices that enhance heat dissipation from a hot surface, such as a heat-generating component to a cooler ambient, such as air. In most situations, heat transfer across the interface between the solid surface and the coolant air is the least efficient within the system, and the solid-air interface represents the greatest barrier for heat dissipation. A heat sink lowers this barrier mainly by increasing the surface area that is in direct contact with the coolant.

4

Estimating Parallel Plate-Fin Heat Sink Thermal Resistance

Robert E. Simons, IBM (Retired)

The trend of increasing electronic module power is making it more and more difficult to cool electronic packages with air. As a result, there are an increasing number of applications that require the use of forced convection air-cooled heat sinks to control module temperature. However, in order to select the appropriate heat sink, the thermal designer must first determine the maximum allowable heat sink thermal resistance.

5

Advances in High-Performance Cooling for Electronics

Clemens J.M. Lasance, Consultant, SomelikeitCool

The need for new cooling techniques is driven by the continuing increase in power dissipation of electronic parts and systems. In many instances, standard techniques cannot achieve the required cooling performance due to physical limitations in heat transfer capabilities. These limitations are principally related to the limited thermal conductivity of air for convection and copper for conduction. This article discusses a number of promising thermal management technologies that are emerging for possible electronics applications.

6

The Temperature Ratings of Electronic Parts

Rajeev Mishra, Apple

Semiconductor parts are often specified for use in certain "consumer" and "industrial" operating temperature ratings that satisfy the demands of the dominant semiconductor customers in the computer, telecommunications and consumer electronic industries. There is also a demand for parts rated beyond the "industrial" temperature range, primarily from the aerospace, military, oil and gas exploration and automotive industries; however, the demand has not been large enough to attract or retain the interest of major semiconductor part manufacturers to make these parts. This is where uprating, a process to assess the capability of a part to meet the functionality and performance requirements of the application in which the part is used outside the manufacturers' specification range, comes into play.

TOP 13 OF 2013: HEADLINES

INTRODUCTION

2013 encompassed a lot of news in the electronics thermal management, including the development of new graphene heat spreaders, liquid cooling systems and extreme cooling technology and the announcement of new contracts and manufacturing partnerships. Here is our list of the most popular headlines from 2013.

1 **Graphene Heat Spreader Reduces Hotspot Temperatures** (July 2013)

2 **New Liquid Cooling System Cools Submerged Electronics Without Frying Them** (March 2013)

3 **GE Announces Dual Piezoelectric Cooling Jet Manufacturing Partnership** (February 2013)

4 **IBM Awarded Contract in First Phase of DARPA ICECool Program** (April 2013)

5 **Micro-Vacuum Technology May Cool Future Smartphone Processors** (June 2013)

6 **Laser Cooling Method is 'One Step Closer' to Smaller Medical Devices, 'Self-Cooling' Computer Chips** (February 2013)

7 **Microsoft to Expand Hybrid Indoor-Outdoor 'Roofless' Data Center** (February 2013)

8 **Wind Tunnel-Cooled Computer May Help Cure Cancer** (January 2013)

9 **New Super-Cooling Technique Brings Quantum Computing Closer to Reality** (April 2013)

10 **Astronauts Fix Ammonia Coolant Leak on International Space Station** (May 2013)

11 **Magnetic Cooling Technology Decreases Environmental Impact of Cooling, Avoids Side Effects of Magnetic Fields on Electronics** (February 2013)

12 **High Temperature Capacitors Could Remove Need for EV Cooling Systems** (August 2013)

13 **Fiber Optic Cable Heat Sensor Project Receives $1.5 Million Grant** (August 2013)

ABOUT US

Published by ITEM Media, Electronics Cooling is a leading digital publication within the electronic industry, providing practical information and solutions to problems directly applicable to thermal design in today's electronic equipment.

At Electronics Cooling, you will find in-depth information on the latest news, research and product development for a variety of cooling methods and tools, including thermal interface materials, heat sinks, liquid cooling, software, adhesives and compounds.

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