Aircraft thermal management systems and power converters

Thermal aircraft systems efficiency. Fran Carmona ... real power electronic converters or even power sources can be saved using Regeneration Modules to output the electricity synchronized with the industrial AC grid. (*) TEMGIR is a R& D project: Thermal and electrical Mock-ups for Thermal Management of a Ground Integration Test Rig. / The ...

In addition, they have identified some critical topics that hold significant priority in the research on general aircraft thermal management, namely thermal management in (i) all/hybrid-electric propulsion aviation [13], (ii) ultra-high bypass ratio geared turbofans [17], (iii) high-power military systems which use considerable power and ...

The advent of V-bombers introduced a new era for aircraft power system which changed the aircraft industry radically. ... The drawback is that nearly all aircraft loads will require power converters for control, as the variable-frequency supply cannot be used directly by some onboard loads. ... an intelligent power management strategy can also ...

On board electrical power generation continue to increase as more aircraft systems are being electrified. Increasingly power converters are the interface of power generation and electrical loads in aircrafts. Reliability of aircraft power electronics is essential for high reliability and mission critical applications. Along with wear-out failure mechanisms, random ...

Recently, the thermal management of power electronic converters has gained significant attention due to the continuous trend of developing very compact power electronic converters with high power density. With the evolution of power semiconductor devices, high operating temperatures and large thermal cycles have become possible, necessitating a ...

"Thermal Management of Power Electronics for Aircraft Systems" 1:30 - 1:55 p.m. Invited Speaker: Jeff Ewanchuk, Raytheon Technical Research Center "A Field Graded Additively Manufactured Power Substrate for High Voltage (> 3 kV) Power Electronic Converters" 1:55 - 2 p.m. Day 2 Wrap Up, Dave Saums, TMPES General Chair 2 p.m. ADJOURN

Power Converters. Advanced Power Converters - altitude capable o NASA 250 kW SiC controller/inverter o Low Total Harmonic Distortion* o Targeting. 10 kW/kg, 99% efficient o GE Silicon-carbide Light-weight Inverter for Megawatt Power (SLIM) o Third generation power converter ground and altitude tested in 2020 o Tested with motors ...

for traditional aircraft energy subsystems [11]. Walters et al [11] note that present thermal management

concerns are indicative of a failure to properly integrate the thermal management system design into the aircraft system of systems design. Therefore, the modern approach to address thermal management concerns and achieve superior vehicle level

Abstract. Aircraft electrification introduces challenges in power and thermal management. In a hybrid-electric aircraft (HEA), the additional heat loads generated by the high-power electrical components in the propulsion system can negate the benefits of the HEA. Consequently, an integrated energy management system is required for the HEA to reject the ...

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Despite the substantially lower energy per unit mass of batteries compared to hydrocarbon fuels, electrification of the aircraft propulsion system could lead to increases in energy efficiency for certain types of missions. This work builds on the electric powertrain component models (battery, converter, motor) from previous work and presents models for the propulsor, power distribution ...

powertrains. At the center of this transition, power converters and high-power density electric machines, i.e., electric motors and generators, and their corresponding thermal management systems are analyzed as the key devices enabling the more electric powertrain. Moreover, to further increase the fuel efficiency and

Aircraft thermal management systems typically comprise over half the mass associated with full electric power propulsion systems, with significant negative impact on fuel efficiency. ... Glenn"s thermoacoustic power converter reshapes ...

achievable representation of the current state of power converter efficiency. III. P. OTENTIAL . I. MPROVEMENTS. Improvements to power converter specific power will mostly come from three areas: switch material, thermal management, converter topology. The switches used in power converters have historically been made out of silicon, but it

solid-state nature of heat pipes also makes them a light-weight and reliable system ideal of aircraft applications. This paper will discuss the following aspects of the work conducted under this SBIR program to develop a solid-state heat pipe-based heat delivery system for electric aircraft thermal management. 1.

thermal management. Furthermore, using the existing fuel system for thermal management reduces the necessary weight, power, and drag penalties from a dedicated thermal management system. One focus of this evaluation is the feasibility of using the fuel as a heat sink as a primary method of thermal management.

After using this strategy, circuit performance and the lifetime of the power transistors are improved. The proposed control strategy can guarantee the safe flight and improves the efficiency of the power distribution system in the hybrid-electric aircraft electrical power distribution system.

Challenges for forthcoming power electronics in response to the future trends of the electrical network will be explained. Finally, emerging technologies regarding wide bandgap devices, advanced topologies and control, thermal management, passive components, and system integration will be discussed. Record URL:

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