

Temperature Measurement and Control for RTP
Meeting the Challenges of Advanced Device Structures

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Rapid Thermal Processing (RTP) has become a key technology for the fabrication of advanced semiconductor devices. The performance of RTP systems requires the precise measurement and control of wafer process temperature. Temperature measurement and control requirements for lamp based RTP systems are becoming increasingly stringent as device structures continue to shrink.

Ultra shallow junction (USJ) formation requires shorter thermal exposures but at higher temperatures. Metal silicides processes are pushing to lower process temperatures. Wafer size has moved to 300mm while cross wafer process temperature uniformity has remained the same and in some cases exceeds the requirements for 200mm wafers. RTP Temperature repeatability for individual tools and across platforms is becoming ever more important to match process results within fabs as well as across continents. Variations in the wafer optical properties affect both the temperature measurement as well as the thermal response of the wafer during RTP. Meeting these demanding requirements with lamp based RTP systems has necessitated continued development and refinement of temperature measurement and control technology. This paper will review some of the advances as well as some of the remaining challenges for RTP temperature measurement and control.