

Kitiphop Thongpao 2010: Performance of Polycrystalline Silicon and Amorphous Silicon Solar Cells based on the Influence of Irradiance and Module Temperature in Thailand. Master of Engineering (Electrical Engineering), Major Field: Electrical Engineering, Department of Electrical Engineering. Thesis Advisor: Assistant Professor Patamaporn Sripadungtham, Ph.D. 71 pages.

This study aimed to focus on analyzing outdoor performance and the coefficient factor of maximum power based on the effect of module temperature and irradiance for polycrystalline silicon (poly c-Si) solar cell and amorphous silicon (a-Si) solar cell measured in Thailand. The result of this study revealed that the performance ratio (PR) of a-Si solar cell increased during summer and reached the highest value in rainy season. Data from January 2006 to February 2009 indicated that the average PR of a-Si solar cell showed higher values than both PR values at standard test condition (STC) and PR of poly c-Si solar cell. However, during winter, PR value of a-Si solar cell gradually decreased. The difference between the highest PR value, occurred in rainy season, and the lowest PR value, occurred in winter, was 7%. In addition, during summer and rainy period from 2006 to 2007, the PR value of a-Si solar cell degraded approximately 0.5% whereas it declined 2% from 2008 to 2009 in the winter. Specifically, data had also indicated that PR value of poly c-Si was inversely proportional to the module temperature where the higher temperature gave low PR value and vice versa. The mathematical model for maximum power was derived with the RMSE error less than one for the same climate.

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