

PV MODULE IRRADIANCE SENSOR FOR PRECISE OUTDOOR MEASUREMENT - STRUCTURE, RESPONSE SIMILARITY AND ANGULAR DEPENDENCE COMPARISON WITH THE MODULE UNDER TEST -

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For outdoor precise characterization of PV modules, the PV module irradiance sensor (PVMS) can be used as a suitable irradiance sensor [1]. The irradiance was obtained by measuring the voltage of appropriate shunt resistance connected to PVMS or module under test (MUT) and by comparing those values to their STC's ones. We are evaluating the effect of PVMS structure, such as dummy cell area and surrounding white area. In this time, new types of PVMS are added, such as using black back sheet, including thermal sensor, and using inside out cover glass. Figure 1 shows the experimental platform; various type of PVMS (type A ~ type G) and various type of MUT (type A ~ type D) are examined. Figure 2 shows daily variation of irradiance and the ratio normalized by the value of PVMS-type A. The irradiance showed a good agreement mutually, especially from 10 a.m. to 2 p.m., the deviation of the ratio of irradiance almost comes in $\pm 1\%$. Furthermore, the irradiance from the I_{SC} of IV measurement of MUT were also compared with the irradiance of PVMS. The results of four MUT were evaluated and were shown in Fig. 3. MUT-type C showed extremely bigger gain in morning and evening. The latest results will be shown in the conference.



Fig. 1 Experimental platform (15 deg.-tilt, 25 deg.-facing west from south)

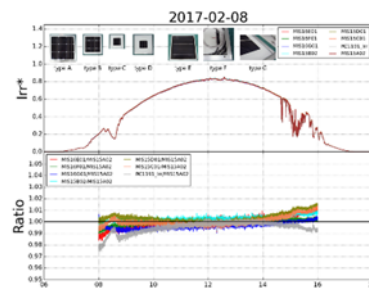


Fig. 2 Daily variation of irradiance and its ratio

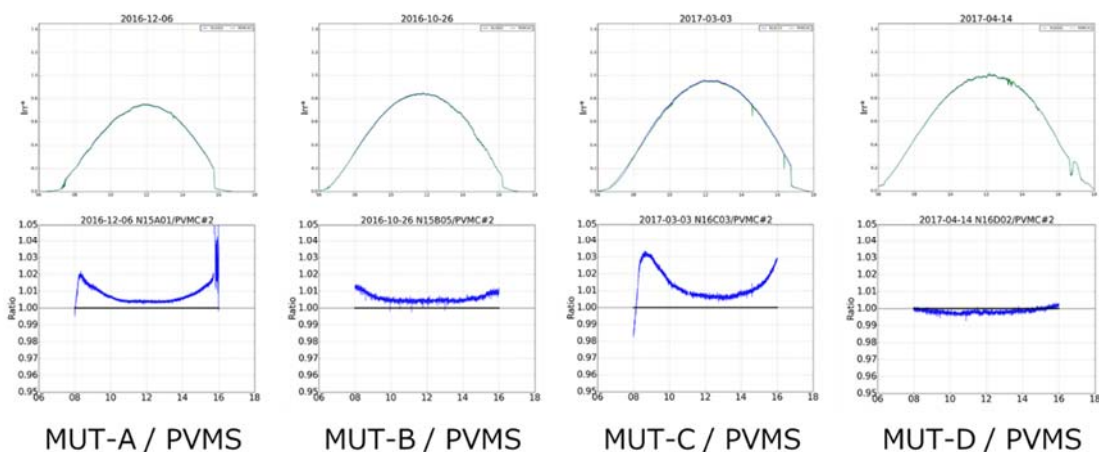


Fig. 3 Comparison with MUTs

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[1] Y. Hishikawa, T. Doi, M. Higa, K. Yamagoe, and H. Ohshima, "Precise Outdoor PV Module Performance Characterization Under Unstable Irradiance" IEEE J. Photovol. 6-5 (2016) 1221-1227.