



OPTICAL PROBE CURRENT SENSOR MODULE USING THE KERR EFFECT OF EXCHANGE-COUPLED MAGNETIC FILM AND ITS APPLICATION TO IGBT SWITCHING CURRENT MEASUREMENTS

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Abstract- An optical probe current sensor module using the Kerr effect of exchange-coupled magnetic film has been fabricated and applied to switching current measurements for IGBT used for the DC-DC converter and the DC-AC inverter of EV/HEV. Since the sensor module using the Kerr effect of the single domain exchange-coupled magnetic film utilizes magnetization rotation only, Barkhausen noise due to domain wall pinning can be excluded. The current sensor consists of a Laser-diode, a polarizer, a Fe-Si/Mn-Ir exchange-coupled film, a quarter-wavelength plate, PIN Photodiodes and a differential amplifier. The current sensor has a current measurement range

of ± 60 A and a frequency range of DC-200 kHz. The switching current of IGBT has been measured by it.

Index terms: Current sensor, Optical probe, Magneto-optical Kerr effect, Exchange-coupled film, EV/HEV