Abstract Submitted for the MAR06 Meeting of The American Physical Society

Microwave cyclotron resonance of two-dimensional holes in GaAs/AlGaAs quantum wells on (100) substrates HAN ZHU, K. LAI, D. C. TSUI, N. P. ONG, Princeton University, M. MANFRA, L. PFEIFFER, K. WEST, Bell Labs — Cyclotron resonance at microwave frequencies is used to measure the band mass  $(m_b)$  of two-dimensional holes (2DHs) in the GaAs/Al<sub>x</sub>Ga<sub>1-x</sub>As quantum wells grown on (100) GaAs substrates [1]. The measured  $m_b$  shows strong dependences on both the 2DH density (p) and the well width (W). For a fixed W, in the density range  $(0.4 \times 10^{11} \text{ to } 1.1 \times 10^{11} \text{ cm}^{-2})$  studied here,  $m_b$  increases with p, consistent with previous studies of the 2DHs on the (311)A surface [2]. However, the density dependence is significantly weaker on the (100) surface than that on the (311)A surface for the same well width of 30nm. For a fixed  $p = 1.1 \times 10^{11} \text{ cm}^{-2}$ ,  $m_b$ increases from  $0.22m_e$  at W = 10nm to 0.54  $m_e$  at W = 20nm, and stays around  $0.51m_e$  for W up to 1000nm. With the transport measurement at 0.3K in the dark, the DC scattering time  $\tau_{DC}$  deduced for  $p = 1.1 \times 10^{11} \text{cm}^{-2}$  shows a maximum of 0.6ns at W = 20nm. [1] M. J. Manfra *et al.*, Appl. Phys. Lett. 86, 16 (2005). [2] W. Pan et al., Appl. Phys. Lett. 83, 3519 (2003).

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Date submitted: 28 Nov 2005

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