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## Demonstration of 80 GB/P drive with perpendicular magnetic recording

Sooyoul Hong and Hyung Lee

Storage System Division, Samsung Information Systems America, San Jose, CA 95134

\*Corresponding author: e-mail: syhong@sisa.samsung.com, Phone: +1 408 544 5041, Fax: +1 408 544 5925

A perpendicular magnetic recording (PMR) drive having a storage capacity of 80 GB/platter has been successfully demonstrated. This system is composed of PMR media, which has an SiO<sub>2</sub>-dispersed magnetic layer and soft magnetic underlayer (SUL), and a trapezoidal single-pole-tip head surrounded by side shields (SSPH)<sup>[1]</sup>. The PMR media had a coercivity of 4000 Oe, negative nucleation field of about -500 Oe, and unit squareness. The SSPH had a main pole with high Bs of 2.35 T, and 0.24  $\mu$ m and 0.18  $\mu$ m magnetic write width (MWW) and magnetic read width (MRW), respectively.

The raw read-back signal was effectively differentiated by a programmable differentiator built in to the RWA box for component level testing.

From the GUZIK parametric test, the spectral integrated SNR measured at a linear recording density of 345 Kfci was about 19.1 dB. In addition, D50 and the OW were about 450 Kfci and over 40 dB, respectively.

The prototype PMR drive was built with the above PMR media and SSPH head and drive level performance was analyzed. The raw analog signal was differentiated by high pass filtering (HPF) in the trellis coded noise predictive PRML channel of the MARVELL 6590C channel used in the drives.

The areal density was 60.8 Gb/in<sup>2</sup> using a track density of 93.1 ktpi and the linear recording density of 653.2 kbp/track at 7200 rpm as shown in Table 1. The on-track bit error rate (Log[BER]) measured for 10 sectors was less than 10 E-7.5.

Table. 1 The summarized performance for demonstration.

Content	Specification
Test base	Samsung 3.5 " HDD
Capacity	80 GB
Areal density	61.7 Gb/in <sup>2</sup>
Track density	90.0 K tpi
Linear density	685.7 Kbp/track
Rotation Speed	7200
Head	Single pole tip
MWW	0.25 $\mu$ m
MRW	0.17 $\mu$ m
Media	Double layered media
Channel	PRML (Marvell 6590)
BER	Less than 10E-7.5

[1]. M.Mallary, A. Torabi, and M. Benakli, "One terabit per square inch perpendicular recording conceptual design" IEEE Trans. Magn., vol.38, pp1719, 2002.