3/4inch HDTV Digital VCR (D6) (TOSHIBA)

Features

The world first cassette type HDTV digital VTR for professional use
 High speed : Total data rate of 1.2Gbps (150Mbps x 8 channels)
 High density : $6.6\mu\text{m}^2/\text{data bit}$ → 4.5Tbit/cassette

System Specifications

Dimensions (WxHxD)	447 x 397 x 700 mm/unit
Weight	Approx. 55 kg/unit
Power requirement	100-120V / 200-240V $\pm 10\%$
Power consumption	Approx. 1 KW
Cassette type	D6 (L , M , S)
Recording time	L : 64min , M : 28min , S : 8min
Video Sampling frequency Quantization	Y : 74.25MHz Pb/Pr : 37.125MHz 8 bit
Audio Sampling frequency Quantization Channels	48.0 KHz 24 bit (max) 10
Slow-motion	± 0.25 (max)
Picture search	± 15 (max)

Perspectives

Recording density in 2000
 : $2\mu\text{m}^2/\text{bit}$

Fig.5.5 Trend of recording density
 (Minimum wavelength and Track pitch)

Key Technologies

Tape format

- Segment structure (of 8 tracks) and Guard-band between segments
- Applicable to HDTV multi-standard
- Minimum number of erase heads required
- Improvement of error in editing modes

Fig.1 Tape pattern

Head and Tape

- High performance laminate head for playback
S/N ratio : +3dB compared with ferrite head
- Metal particle tape
Thickness : 11 μ m
Hc : 1600 Oe
Br : 2500 Gauss
S/N ratio : +2.5dB compared with D2 tape

Channel coding

- 8-12 conversion
 - T_{min} : 1.33T_b
 - T_{max} : 5.33T_b
 - Minimum wavelength : 0.81 μ m
 - Channel rate : 227Mbps
 - * T_b:original data bit interval

Fig.2 Spectrum of 8-12 conversion

Error correction code

- Reed-Solomon product code with great capability
 - Inner code : (227 , 211)
 - Video outer code : (254 , 240)
 - Audio outer code : (40 , 28)
(doubly recorded for audio)

Fig.3 Comparison of error correction capability for video data

Mechanism

- 34 heads on rotary drum
- Drum revolution speed : 9000 rpm
- Head to tape speed : 46 m/s
- Average track pitch : 22 μ m
- Track non-linearity : less than 5 μ m

Fig.4 Head arrangement on rotary drum