LM330A

DISC TEST SYSTEM

General

The LM330A disc test system is configured of an optical pickup (head) unit, disc drive unit, console unit, and software. This system tests the various optical and electrical characteristics of rewritable phase-change optical discs by mounting optical pickups for phase changing and optical pickups for MO discs. Optical pickups for DVD, HD DVD, BD, MO and other discs are provided as standard equipment. Software for auto testing HF and servo characteristics and jitter characteristics using Shibasoku designated peripherals, and software for creating appropriate control data to be used when writing data is also provided. The ideal test system for all applications in the production process from R&D to production management can be built by combining the required optical pickups, units, peripherals and software with the basic unit configuration.

Features

● Supports 2.6 GB DVD-RAM, 4.7 GB DVD-RAM, DVD-RW, DVD+RW, all types of MO, HD DVD and BD, according to customer specifications.
● Recording modes support 4 and 5 values.
● Uses tilting stage for easily adjusting pickup to the optimum tilt. Focus servo supports knife-edge method and astigmatic method; tracking servo supports push-pull method, DPD method, and heterodyne method for stable operation.
● Spindle motor rotation can be set in wide range from 500 to 5000 rpm, providing stable rotation from low to high speeds. Air spindle (500 to 12,000 rpm) is supported as an option.
● Remote control from a PC is possible by combining PIO, RS-232C, and GP-IB interfaces.

Specifications

● Basic unit configuration　Optical pickup (head) unit, disc drive unit, console unit, and software.
・Optical pickup unit　　Optical pickups specified by the customer are mounted to the tilting stage in the disc drive unit.
　Wavelengths　　　　405, 635, 650, 780 nm, ・・・etc.
　NA　　　　　　　　0.85, 0.65, 0.60, ・・・etc.
・Disc drive unit　　　Configured of optical pickup, APC, spindle, and stage; placed on the console unit.
・Console unit　　　　Configured of board rack, connector panel, and power supply.
　　　　　　　　　　The following units and options are housed on the board rack:
　ESDI/MPU unit　　　Controls the SERVO1, SERVO2, and LG-JUMP units.
　SERVO1 unit　　　　Controls the focus and tracking servos.
　SERVO2 unit　　　　Controls spindle rotation speed and stage position.
　LG-JUMP unit　　　Identifies lands and groups, control jumps, controls tracking using heterodyne method, and detects 1st sector.
　Spindle&synthesizer unit　Controls spindle rotation speed via GP-IB interface.
　FIFO/IF unit　　　　Sends/Receives control signals with PC, transfers data.

・Software (Manual control software)
　　　　　　　　　　Used to set spindle rotation conditions, spindle location, focus and tracking servo, number of track jumps, jump direction, jump mode (LG/LL /GG), LD controls, writing frequency, etc.

● Discs that can be measured
　Disc diameters　　　120, 80 mm
　Center hole diameter　15 mm; no hub
　Substrate material　　PC, acrylic, glass
　Disc thickness　　　　1.2 mm
　Cover layer thickness　0.60, 0.10, 0.0 mm (film surface incidence)
　Vertical deviation　　±0.3 mm(cover layer thickness 0.6 mm)
　　　　　　　　　　≦0.3 mm(cover layer thickness 0.1 mm and film surface incidence)
　Eccentricity　　　　≦100 tracking lines
　Warp angle　　　　　±0.7° (TBD. reference surface)
　Refractive index　　1.58 (650 nm; 0.6 mmt design value)
　　　　　　　　　　1.62 (405 nm; 0.6/0.1 mmt design value)
　Groove structures　　Pre-groove ,Spiral
　Reflective index　　　10% to 30%

● Spindle motor characteristics
　Rotation mode/direction ZONE-CLV, FCLV, CAV/CCW, CW
　Rotation speed　　　500 to 5000 rpm(variable in 1 rpm increments)
　Jitter　　　　　　　≦0.1%, 500 to 1000 rpm
　　　　　　　　　　≦0.08%, 1000 rpm or more
　　　　　　　　　　Note:Air spindle(500 to 12000 rpm) is supported as option.

● Automatic stage section
　Positioning accuracy　±20 μm
　Repeat accuracy　　　±2 μm
　Setting resolution1　　1 μm
　Stage movement range　22.0 to 63.5 mm
　　　　　　　　　　Note: Above characteristics obtained at uniform condition of Ta=25℃.

● LD drive and APC characteristics
　Optical output setting　Variable in 0.01 mW increments for write/read
　Optical output setting items
　　　　　　　　　　Write output (P0, P1, P2, P3, P4), Read output (Pr), Erase output (Pe)
　Output accuracy (static characteristics)
　　　　　　　　　　±0.1 mW (output power; ≦2 mW)
　　　　　　　　　　±5% (output power; ＞2 mW)
　Output stability　　　±0.1 mW
　Mode of Laser RF superimposition (selectable by remote control)
　　　　　　　　　　Always ON
　　　　　　　　　　Always OFF
　　　　　　　　　　ON when reading & OFF when writing

● Writing mode　　　　Writing 4-value mode or writing 5-value mode
　　　　　　　　　　Note: These modes are possible when using the AWG510; 3-value mode is used with the AWG610 or AWG710.

●Servos characteristics
・Focus servo
　Servo detection method　Knife-edge or astigmatic
　Offset adjustment range　Approx. ±2 μm
　Gain adjustment range　±6 dB
　Hold function　Auto-hold/Un-hold(selectable using DIP switch on LG-JUMP board)
　Offset L/G switching　Automatic
・Tracking servo
　Servo detection methods　Continuous groove push-pull (Rewritable data zone)
　　　　DPD and Heterodyne (Embossed data zone)
　Tracking polarity　Land / Groove (selected from PC)
　Offset adjustment range　Approx. ±0.1μm(possible for Land and Groove individually)
　Gain adjustment range　±6 dB
　Hold function　Auto-hold/Un-hold (selectable)
　Offset L/G switching　Automatic

●Optional units and software
・Mechanical clamp (Model: LM330A010)
　　　　For 120 mm, 1.2 mmt disc
　　　　Clamp area: 22mmφ to 33 mmφ
・Other clamps
　(customer must specify either magnetic clamp or mechanical clamp)
　　　　For 90/120 mm, 0.6 mmt MO disc
　　　　For 90/120 mm, 1.2 mmt MO disc
・Goniometers controller (Model: LM330A007)
　　　　Goniometers tilt controlled from PC via GP-IB
　Radial direction characteristics
　　　　Variable range:±1.5°, setting resolution:0.0006°
　Tangential direction characteristics
　　　　Variable range:±1.5°, setting resolution:0.00078°
・BIT PLL units　Boards for reproducing binary data, and clock used when testing clock vs data jitter. Used in combination with an equalizer.
　For DVD-RAM 2.6/4.7 GB (Model: LM330A001)
　　　　Used with equalizer LM330A004
　For DVD-RW (Model: LM330A029)
　　　　Used with equalizer LM330A019
・Equalizers units
　For DVD-RAM 2.6/4.7 GB (Model: LM330A004)
　　　　For 2.6 GB: Analog filter
　　　　For 4.7 GB: Transversal filter
　DVD-RW and broadband (Model: LM330A019)
　　　　2 circuits mounted for DVD-RW and DVD-RAM 4.7 GB
　　　　For DVD-RW: Transversal filter
　　　　For DVD-RAM 4.7 GB: Transversal filter
　For BD (Model: LM330A036)
　　　　Binary data and read clock output
・Pre Format Reader (Model: LM330A002)
　　　　Used with LM330A001 and LM330A004. Reads track
　　　　numbers and sector numbers of DVD-RAM 2.6 /4.7 GB discs.
・Random Shift unit (Model: LM330A005)
　　　　Performs random shifts of written data locations while
　　　　overwriting DVD-RAM 2.6/4.7 GB discs in combination with the AWG510.
・Eccentricity Correction unit (Model:LM330A039)
　　　　Improves tracking servo stability for discs with large amount of eccentricity by adding an antiphase signal to the tracking direction.
・Jitter measuring software　Measures jitter in the written data section using the LM330A007, BIT PLL unit, equalizer, and TA520.
　For power (peak, bias) vs jitter measurements (Model: LM330A016)
　For tilt (radial, tangential) vs jitter and offset (focus, track) vs jitter measurements (Model: LM330A017)
・Software for creating appropriate control data (Model: LM330A033)
　　　　Generates appropriate control data for writing using an AWG510, AWG610, or AWG710 that can be controlled via a LAN.
　When using AWG510　Writing mode is 5-value, min. modulation pulse width setting is 1 ns
　When using AWG610　Writing mode is 3-value, min. modulation pulse width setting is 0.5 ns
　When using AWG710　Writing mode is 3-value, min. modulation pulse width setting is 0.25 ns

・Software for simultaneous modulation of optical and magnetic field (Model: LM330A037)
　　　　Uses the AWG510, AWG610, or AWG710 to create data for simultaneously modulating optical and magnetic field.
・DVD format encoding software (Model: LM330A065)
　　　　Developed for AWG (arbitrary waveform generation), this software produces patterns compliant with DVD format.
・HF and servo signal measuring unit (Model: LM330A006)
　　　　Switches among HF SUM, DIF, tangential push-pull, servo signal cross track, radial push-pull, divided push-pull, and focus error signals, and outputs them from MEAS.1 and MEAS.2 output terminals. Customer must specify whether this unit is to be used for DVD-RAM 2.6 GB, DVD-RAM 4.7 GB, or DVD-RW discs.
・HF and servo signal measuring software (Model: LM330A015)
　　　　For DVD-RAM 4.7 GB discs. Performs auto measurements on the following items:
　Signals from grooves　Push-pull signal, divided push-pull signal, focus error signal, on-track signal, wobble signal.
　Signals from header field in the rewritable data zone
　　　　VF01, VF02, AM, PID, IED, postamble, signals from header
・Console (W8016B, W8016C)
　　　　These consoles are used for housing peripherals. They accommodate the digital oscilloscope, time interval analyzer, spectrum analyzer, and arbitrary waveform generator.

●Peripherals
・PC　IBM PC/AT compatible (Windows 95/98) equipped with PCI slots for GP-IB and PIO boards
・Digital oscilloscope　TDS520D or TDS724D (Tektronix)
・Time interval analyzer　TA520 (YEW)
・Spectrum analyzer　4395A (Agilent Technology)
・Arbitrary waveform generator
　　　　AWG510, AWG610, or AWG710 (Tektronix)

●General specifications
　Power supply　AC 100 V ±10%, 50/60 Hz
　Power consumption　Approx. 600 VA
　　　　(excl. PC, spectrum analyzer, oscilloscope)
　Temperature range　10℃ to 30℃ (23℃±3℃, recommended)
　Relative humidity　20% to 80% RH (non-dewing)
　Operating environment　Class 10,000 or less recommended
　Dimensions / Weight
　　Console　555(W)x841(H)x750(D)mm/Approx.110 kg
　　Disc drive unit　500(W)x 340(H)x560(D)mm /Approx. 44 kg
　Accessories　PIO board (ISA or PCI slot)　　　　x 1
　　　　GP-IB board (ISA or PCI slot)　　　　x 1
　　　　Connection cable (GP-IB, RS-232C, PIO for PC) x 1
　　　　BNC cable for measuring　　　　x 3
　　　　Cable for AWG　　　　x 1
　　　　Manual control software　　　　x 1
　　　　Expansion board for PU rack　　　　x 1
　　　　User's manual (for hardware, manual software)
　　　　　　　　x 1 each