PULSTEC
Create New Value

Manufacture standard player

MASTER Series

General Catalog

Feel the Quality recognized by the Optical Disc Testing & Certification Center

The Optical Disc Testing & Certification Center is required to measure the radical quality of the optical disc correctly so as to evaluate and authorize the optical disc of each manufacturer right. Also, high measurement accuracy among the Testing & Certification Centers is definitely demanded.
The PULSTEC High End Tester (ODU-1000 and Inspector) is recognized by all of the Testing & Certification Centers of DVD/ Blu-ray discs and its quality is highly evaluated.
The Pick-Up Head and periphery hardware used for the PULSTEC Tester has been developed into the highest quality so as to measure the correct radical quality of the optical disc and also the Testing & Certification Centers correlate with each other without using the calibration coefficients.

The PULSTEC MASTER has taken over the basic concept of the High End Tester and was designed so as to reduce the operation space and cost. The user I/F has been renewed for the Manufacturing Dep. and its usability has been improved. The MASTER is the best system for the Q.C. Dep., which requires the reliability of data, and using as a Defect Analysis tool or a communication tool within your company or with another company.

The MASTER offers you the quality recognized by the Optical Disc Testing & Certification Center.

Contents

http://www.pulstec.co.jp/

Manufacture standard player

MASTER Series

MASTER Series [Product Lineup]

(W)224mm×(H)244mm×(D)630mm(When the tray is opened: 755mm) Approx.20kg

SBP-02-RRE (BD-ROM/R/RE)

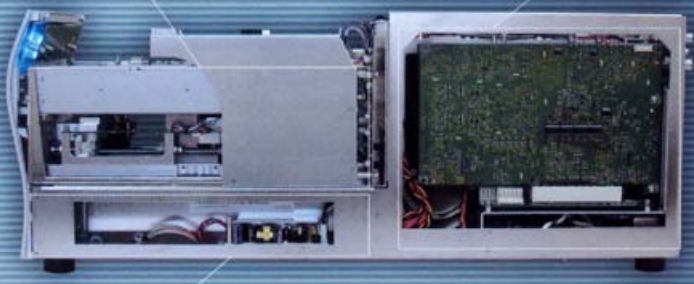
Applicable Disc BD-ROM (SL:25G/DL:50G)
BD-R (SL:25G/DL:50G) HTL
BD-R (SL:25G/DL:50G) LTH
BD-RE (SL:25G/DL:50G)

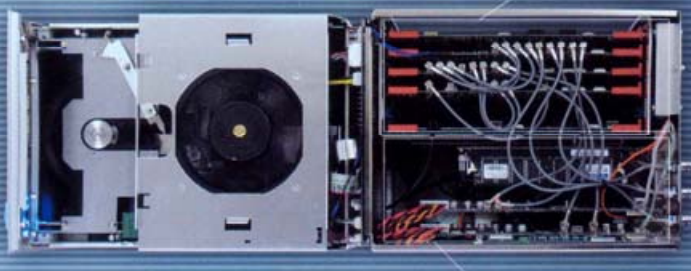
※The 2x measurement (Residual Error measurement, SER(Viterbi) measurement, and Surface measurement) is applicable.
※The 3x measurement (Residual Error measurement, and Surface measurement) is applicable. (From July, 2008)

SBP-02 (BD-ROM)

Applicable Disc BD-ROM (SL:25G/DL:50G)
BD-R (SL:25G/DL:50G) HTL *
BD-R (SL:25G/DL:50G) LTH *
BD-RE (SL:25G/DL:50G) *

※For the BD R/RE discs, the Address Decode of the Wobble, Jitter measurement in the HFM zone, DI Information Obtainment, 2x/3x measurement and a part of the Options are restricted.





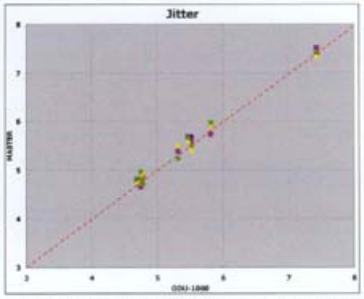
Superior Correlation with the ODU-1000

Equivalent Quality Level to the ODU-1000

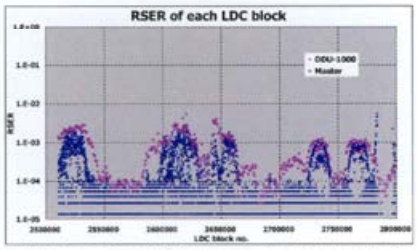
In consideration of the correlation with the ODU-1000 that is recognized by the Testing & Certification Centers, the newly designed hardware for the MASTER equips the basic parts (PUH, LSI etc) and electronic circuit that are used in the ODU-1000. Also, the skew function (Tangential/ Radial Skews) is built in the MASTER so as to reduce the operation space at the manufacturing site. The MASTER has taken over the magnificent quality of the ODU-1000 and Inspector, that are adopted in multiple departments such as the Verification, R&D and QA.

Correlation with the ODU-1000

The MASTER was designed based on the same principle of the ODU-1000; therefore it has an excellent correlation with the ODU-1000 without using the calibration coefficient.



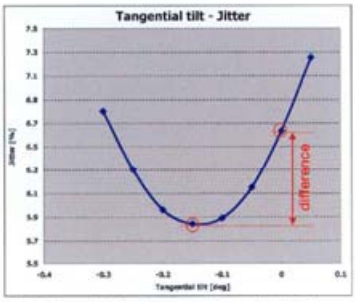
※This is the jitter correlation graph of the band structure discs. (MASTERs not using the calibration coefficient vs ODU-1000)



※This is a comparison of RSER. (MASTER only plots the MAX and ODU-1000 plots all LDC blocks.)

Importance of Tangential Skew

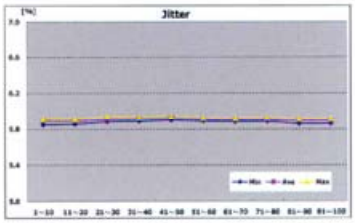
The minimum pit (2T) of the optical disc is one of the important items that influence the quality of the disc. The 2T pit affects improvement in manufacturing or storage density and also gets smaller with multi layer (2, 3 or more layers), therefore the Tangential Skew function must be needed when the multi layer product is started. As a result, the Tangential Skew function is important for the right measurement and if there is no Tangential Skew, a huge difference arises in the result of important items such as Jitter, RSER and etc.



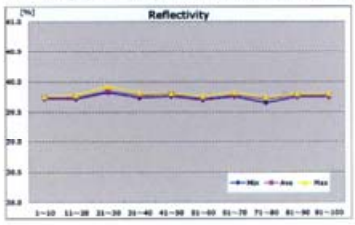
※The Tangential Skew is automatically adjusted to the optimum angle according to the disc condition. If there is no skew function, it is fixed to 0 [deg]. The figure shows the difference in the existence of the skew function. (A difference of the jitter value is 0.8%).

Repeatability

A high accuracy of the repeated measurement of the same disc is acquired by making use of the technology cultivated with the ODU-1000. (Each figure shown below is a graph of the 100-repeatability)



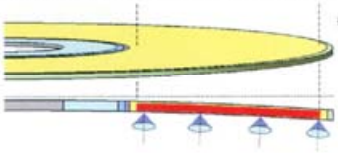
※This is a graph indicating the repeated measurement accuracy of the jitter.



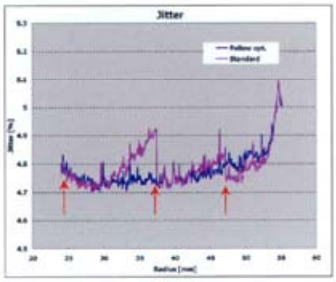
※This is a graph indicating the repeated measurement accuracy of the reflectivity.

Follow Optimize Function

For the full surface measurement, the optimization of the disc playback condition will be required as an important operation. A new function built adapted in the MASTER measures several curves and the optimum playback condition such as the servo condition in advance, calculates the optimum playback condition at the playback position on a disc and then keeps it up for the full surface measurement. By using this function, the influence of the curve can be reduced and also the radical capability of a disc can be correctly measured. (The Follow Optimize function can be switched ON/OFF.)



※This is an image of the function automatically keeping up the optimum playback condition by measuring the curves and the servo condition.



※This graph shows the difference in the result when optimizing the points arrowed in the graph WITH the Follow Optimize function(Blue) and the result WITHOUT the function(Red). As shown in the graph, the jitter value fluctuates ideally WITH the function.

The Condensed ODU-1000 Hardware

Tray Open/Close Button LED

The LED around the Tray Open/Close Button emits light in 7 different colors to inform the user the system status. The LED lights up when the system is standing by (Light Blue) or a measurement has completed with "OK" (Blue)/"NG" (Red) judgement, and also flashes to inform the remaining measuring time (Green or Light Blue) by the flashing speed during a measurement. The system status can be easily confirmed from a distance.

Signal Output Terminal

The output terminal is built on the back of the MASTER for monitoring the Playback Signal of a disc.

Output Terminal	Terminator
HF Signal	50Ω
CH1※1	50Ω
CH2※1	50Ω
INDEX Signal※2	1MΩ
TE Signal	1MΩ
FE Signal	1MΩ

※1:The output signal requires to be controlled through the software. ※2:The signal outputs 1 pulse by 1 spindle motor rotation.

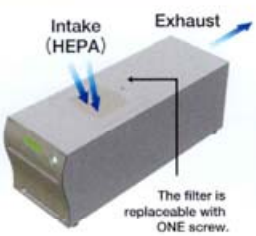
80mm and 120mm Discs

Both 80mm and 120mm discs are applicable for the MASTER. However for 80mm discs, an adaptor requires to be attached onto the tray for the 120 mm disc.

※Sufficient space will be provided between the recording surface of a 120mm disc and the top of the tray by removing the adaptor for the 80mm disc.

HEPA Filter

Fresh cooling air is inhaled through the HEPA filter from the top of the MASTER to keep the inner temperature around the PUH invariable. The HEPA filter can be easily removed/attached by ONE screw provided on the top of the MASTER.



Isolated Drive Unit

The anti-vibration rubber bumper is applied to the drive unit in the MASTER so that the unit remains untouched by any other units. For that reason, the vibration from outside is absorbed and a stable measurement can be carried out.

Anti-Vibration Rubber Bumper

Connection to the PC

Up to a maximum of 6 MASTERs can be controled by ONE PC(LAN) to a PC by LAN cables. Any models of the MASTER can be connected together, i.e. MASTERs for the ROM discs and the Recordable discs.

Lens Cleaning

A window is provided under the HEPA filter for cleaning the PUH. If the lens is covered by dust, clean it by using alcohol and cotton swabs.

No Outer Meas. Instrument

A wave board (max. 100MS/s) corresponding to the digital oscilloscope and a jitter board corresponding to the time interval analyzer are built in the measurement unit area in the MASTER. The jitter board correlates with YOKOGAWA TA-720.

Learn the Software

A user-friendly interface is equipped for daily use and 2 types of screen,
that are the Manager Mode and the Operator Mode, are provided for the purpose of each user.

Main Screen

2 Different Screen Modes(Manager Mode / Operator Mode)

The MASTER provides 2 types of the screen mode that are the Manager Mode and the Operator Mode. In the Operator Mode, only the menus and icons used for executing a measurement or confirming data are provided and all other functions have been removed in order to prevent an incorrect operation. (Passwords can be set up for changing the mode to the Manager Mode.) In the Manager Mode, a maximum of 3 users can be authorized and all of the functions are available.

Measurement Condition

Measurement Condition Setup

A measurement condition can be set by the disc type, measurement position (range), measurement items, and the actual measurement procedure. Frequently used procedures are provided as samples in the application. Besides, the user can setup the measurement condition by registering parameters that using very often that even a complicated measurement condition is possibly created.

※The measurement condition shown above proceeds the following 6 measurements.

1) Mechanical meas. and Disc Info. (Including EB,PAC) obtainment
2) BCA zone measurement
3) Optimization in the PIC zone and then Servo meas./HF meas.
4) RSER measurement in the PIC zone
5) Optimization in the Data zone(3 pos.) and then Servo meas./HF meas.
6) Surface meas./RSER meas. in the entire Data zone

Starting a Measurement→Displaying/Printing the Measured Data

(The Wizard/Dialog provided in the application guides the user for the procedure to start a measurement.)

①Start a Measurement

Use the shortcut key located at the top of the screen to start a measurement. A max. of 30 measurement conditions can be set into each shortcut key so as to start a measurement easily.

※The user can setup the color for each shortcut key to classify into each purpose.

②Enter the Meas. Condition/Disc Information

By clicking the shortcut key, a wizard will appear for confirming the measurement condition, entering the disc info., and etc. The wizard prompts the user to enter required information. The user can skip an unnecessary step in the wizard. Also various useful functions for re-measuring with the same condition and re-checking the NG items are provided when the measurement has completed.

(Confirm the Measurement Condition)

(Enter the Disc Info.)

③Measuring

When an actual measurement starts, a window will appear on the main screen displaying the measurement status and information on the measurement item, position, result, and remaining measurement time. If any problems occur during a measurement, the meas. item and the radius pos. will be indicated in red in the window to inform the user the measurement has failed.

(Measuring)

④Open the Meas. Data

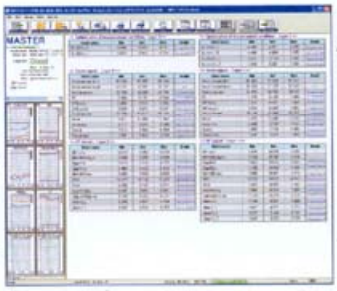
(Meas. Status)

The measurement data can be displayed by clicking the measurement status display window shown left or the measurement history list displayed on the right hand side in the main screen, shown below In the history list, information will be added as often as a measurement has completed. Any data measured in the past can be displayed by clicking a desired item in the list instead of searching.

(History List)

⑤Display the Meas. Data (Summary/Result Page)

The measurement data can be displayed in the summary page or the result page. In the summary page, the measurement data is summarized and a simple graph of each measurement item is displayed in ONE page so that the variation in data of the full surface disc can be easily checked. In the result page, the detail of the measurement data and the data required for analyzing defects occurred during mapping can be checked and the waveform recreation function is provided.



(Summary Page)

⑥Print

The measurement data displayed in the summary page is automatically adjusted and printed within ONE page. In the result page, the measurement data of each measurement group is displayed in an individual page. All of the individual pages can be printed out at once by using a new function provided in the result page. Not only the data within the measurement range but also the total value (min./max./average values only) can be outputted.

(Total Value Setup)

(Output Setup)

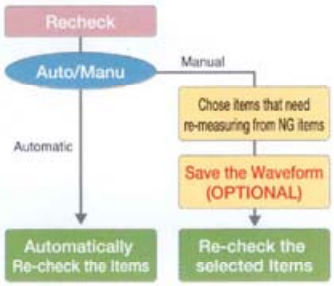
Support the Disc Defect Analysis

It is very important to analyze the cause of a problem that occurs on a disc.
The MASTER equips an excellent tool for supporting the analysis.

Re-check the NG Items

Useful Function for Re-check

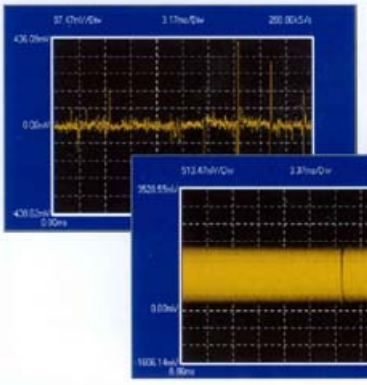
A function that re-checks only the NG item is equipped for when re-measuring a disc (Re-check function). The user can set whether or not to save the waveform information used in the measurement. If the information is saved, the NG item can be analyzed by not only the evaluated value data but also the waveform signal.



Re-create the Meas. Signal

Analyze the Defect by Waveform

The Servo and HF signals get influenced if a defect (scratch/finger print) is detected on a disc. The defect cannot be adequately analyzed only by the evaluated value. The MASTER adopts a new function that enables the user to check the influence by the defect by re-creating the waveform according to the measurement result.



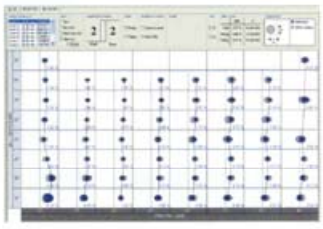
FE Signal
(Influence by the Defect)

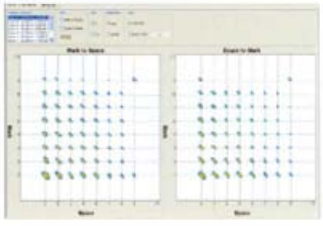
HF Signal
(Influence by the Defect)

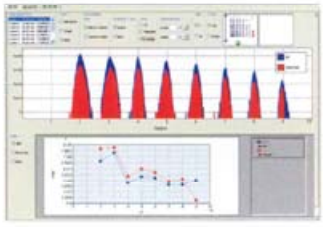
Use the ISI (Inter Symbol Interference)

Check the Pit Status

The influence level (Inter Symbol Interference) by each T and Ts before and after the T of the HF signal can be measured in the ISI measurement. The ISI can be useful for adjusting the recording strategy of recordable discs and the Mastering condition of ROM discs. This ISI function and also the waveform re-creation function are highly reliable for the analysis.





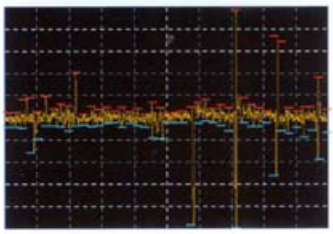


Analyze the Defect Distribution by the Surface/Defect Inspection

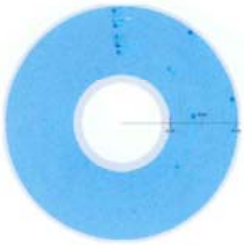
Surface Measurement, Defect Measurement

●Surface Measurement

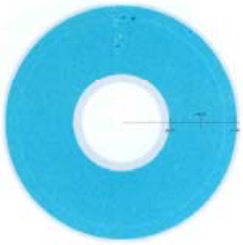
The fluctuation of each level for the FE, TE, and HF signal is mapped in the Surface Measurement.



Fluctuation of High Level(Red)/Low Level(Blue)



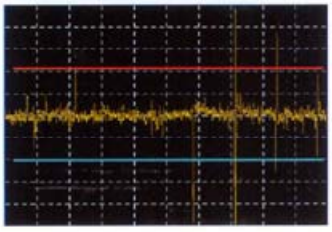
High Level



Low Level

●Defect Measurement

The FE, TE, and HF signals (non-recorded) convert the time surpassed over the assigned level to the distance and then is mapped in the Defect Measurement.



Bright Defect Level(Red)/Dark Defect Level(Blue)

Communication Tool

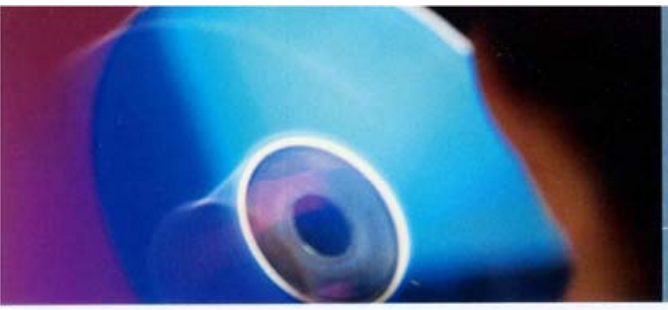
Report Submission, Defect Analysis Request

●Report Submission

The waveform data can be attached when reporting the analysis result to the other division such as the Development Division or cooperation companies. It enables the user to report the result more accurately.

●Defect Analysis Request

The factor in causing the defect can be quickly analyzed by sending the measurement data file with waveform information via email instead of sending the real disc when requesting the defect analysis to the other division such as the Development Division or cooperation companies.



Measurement Item and Function

The MASTER has the same measurement engine to the High End Tester(ODU-1000) used by the Optical Disc Testing & Certification Centers so that the disc capability can be maximally extracted and the items specified in the Specifications can be correctly measured.

Applicable Disc

Disc (80,120mm)	ROM	R,RE
BD-ROM (SL:25G/ DL:50G)	○	○※2
BD-R (SL:25G/ DL:50G) HTL	○※1	○※2
BD-R (SL:25G/ DL:50G) LTH	○※1	○※2
BD-RE (SL:25G/ DL:50G)	○※1	○※2

※1 Address Decode of the Wobble, Jitter measurement in the HFM zone, DI Information Obtainment, and a part of the options are restricted.
※2 The 2x/3x Reading Measurement is available for some of the measurement items.
(The 3x Reading Measurement will be available from July in 2008)

Basic Meas. Item (Main items only)

●Disc information

Measurement Item		ROM	R,RE
DI	Disc information	○	○
EB	Emergency brake	○	○
PAC	Physical Access Control	○	○

●Mechanical parameter

Measurement Item		ROM	R,RE
IPIC	Inner diameter of PIC	○	○
OPIC	Outer diameter of PIC	○	○
ILZ	Inner diameter of Lead-in(L0)/ out(L1) Zone	○	○
IDZ	Inner diameter of Data Zone	○	○
ODZ	Outer diameter of Data Zone	○	○
OLZ	Outer diameter of Lead- out (L0) / in(L1) Zone	○	○
ORadius	Outer radius of the track	○	○
WTPitch.Ave	Track pitch averaged over the wide pitch disc area	○	○
NTPitch.Ave	Track pitch averaged over the normal pitch disc area	○	○
O.BCA	Location of outer radius of BCA	○	○

●BCA

Measurement Item		ROM	R,RE
GAP	GAP	○	○
IS/IDC	IS_LPF/IDC_LPF	○	R
IS/IH	IS/IH	–	RE
I2~5.TLP	Distance between the leading edges of 2T...5T	○	○
I2~5.TTP	Distance between the trailing edges of 2T...5T	○	○
TS	Pulse width	○	○
Decode	BCA decode	○*	○*

※Both the BCA Decodes before/after the error correction can be confirmed.

●Data zone / PIC area for ROM

Measurement Item		ROM	R,RE
NPP	Normalized push-pull	○	○
RRO	Radial run-out	○	○
TC	Track cross signal	○	○
DPD.amp	DPD signal	○	○
DPD.Asym	DPD asymmetry	○	○
ARO	Axial run-out	○	○
Axial	Axial residual error	○	○*
Axial.rms	The rms noise of axial residual error	○	○*
Radial	Radial residual error	○	○*
Radial.rms	The rms noise of radial residual error	○	○*
NWS	Normalized wobble signal	–	○
SNR	Narrow band SNR of the wobble signal	–	○
SHD/SHL	SHD/SHL	–	○

※The 2x(3x) Reading Measurement is available for the model corresponding to the Recordable Discs.

Measurement Item		ROM	R,RE
I8pp/I8H	8T peak to peak modulation	○	○
I3pp/I8H	3T peak to peak modulation	○	○
I3pp/I8pp	I3 resolution	○	○
I2pp/I8pp	I2 resolution	○	○
I2pp/I8pp.eq	I2 resolution (After EQ)	○	○
I8HV/I8H	I8H variation	○	○
R8H	Reflectivity	○	○
RxM	Reflectivity*I8Modulation	○	○
RxM2	Reflectivity*I2Modulation	–	○
Asymmetry	HF signal asymmetry	○	○
Jitter.L.L	Jitter of the leading edges with limit equalizer	○	○
Jitter.L.T	Jitter of the trailing edges with limit equalizer	○	○
Jitter2.L.L	Jitter of the leading edges with limit equalizer(ex 2T)	○	○
Jitter2.L.T	Jitter of the trailing edges with limit equalizer(ex 2T)	○	○
Jitter.C.L	Jitter of the leading edges with conventional equalizer	○	○
Jitter.C.T	Jitter of the trailing edges with conventional equalizer	○	○
RSER	Random SER (1k,10k)	○	○*
MSK.err	Address error of MSK	–	○
STW.err	Address error of STW	–	○

※The RSER is able to invalidate the LDC Block Data registered in the DFL(Defect List) information on a disc.

●HFM grooves for R/RE

Measurement Item		ROM	R,RE
NPP	Normalized push-pull	–	○
NHWS	Normalized HFM wobble signal	–	○
RRO	Radial run-out	–	○
ARO	Axial run-out	–	○
Axial	Axial residual error	–	○*
Axial.rms	The rms noise of axial residual error	–	○*
Radial	Radial residual error	–	○*
Radial.rms	The rms noise of radial residual error	–	○*
Jit.HFM.L	Jitter of the leading edges	–	○
Jit.HFM.T	Jitter of the trailing edges	–	○

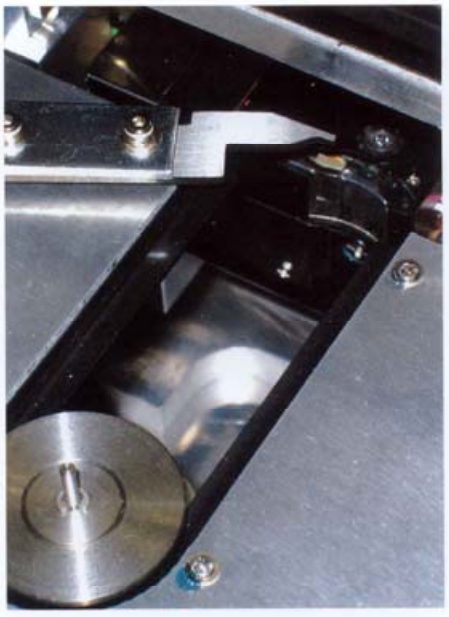
※The 2x Reading Measurement is available for the model corresponding to the Recordable Discs.

●Optimize

The Optimizing Condition can be setup for the purpose of each disc measurement. Each parameter such as Tangential, Radial skew, Focus, Tracking, Expander, etc will be automatically adjusted according to the set condition.

Measurement Item		ROM	R,RE
Jitter	Optimizes to the min. Jitter value	○*	○*
RF.max	Optimizes to the max. RF(Itop) value	○	○
Modu.max	Optimizes to the max. I8M value	○	○
Rpp.max	Optimizes to the max. Rpp value	○	○

※ It corresponds to the Optimization Procedure in the Specifications.



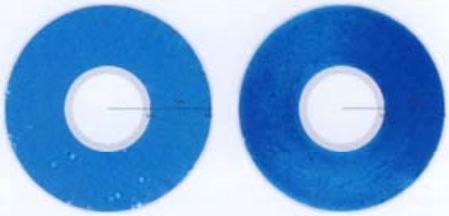
Special Measurement(Including the optional functions)

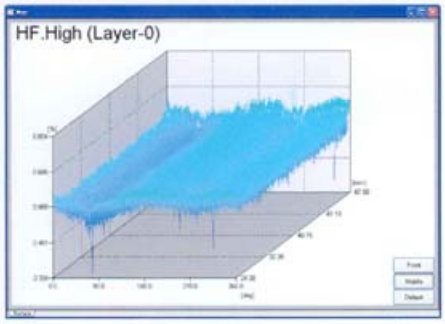
●Surface,Defect (OPTIONAL)

In the surface measurement, the influence by defects on a disc surface is perceived as the voltage level variation and the result will be mapped. In the defect measurement, when each signal (FE/TE/HF) exceeds the slice value assigned by the user due to a defect, the size of the defect is measured. Both of the measurements can be executed and mapped simultaneously.

Measurement Item		ROM	R,RE
FE	Observes the level/defect of FE signal	○	○*
TE	Observes the level/defect of TE signal	○	○*
HF	Observes the level/defect of HF signal	○	○*

※The 2x Reading Measurement (3x for the Surface only) is available for the model corresponding to the Recordable Discs.





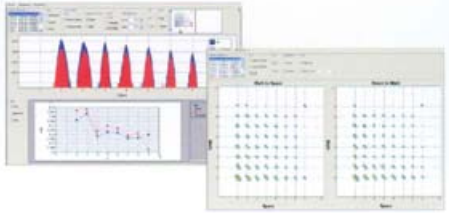
3D Figure

The mapped data (measurement result) can be transferred to Excel via Clipboard.

●ISI (Inter Symbol Interference) (OPTIONAL)

The influence level (inter symbol interference) by the T and Ts before and after the T of the HF signal is measured and then displayed in the conventional histogram (Data to Data and Data to Clock) and also in the screen as the strength distribution (Mark to Space and Space to Mark) of each T.

Measurement Item		ROM	R,RE
DC	Data to Clock	○	○
DD	(2D/3D) Data to Data	○	○



●SER(Viterbi)

The SER that is normally used in the drive on the market is measured by the data after the PRML (Viterbi Demodulation). This measurement is more consistent with the drive on the market than measuring the RSER by the Limit EQ that is recommended in the specifications.

Measurement Item	ROM	R,RE
DC Data to Clock	○*	○*

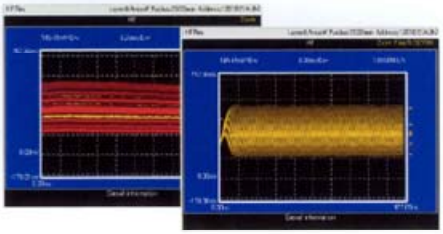
※The SER(Viterbi) of BD-ROM discs can be measured by the model corresponding to the Recordable Discs. Also the 2x Reading Measurement is available.

●Waveform Recreation

The actual waveform used in a measurement can be recreated and used for judging defects that cannot be judged by the measurement data (evaluated values). This measurement is useful for the defect analysis.

Measurement Item		ROM	R,RE
Jitter	Histogram	○	○
Servo.sig.	Recreates the Servo Signal	○	○
HF.sig	Recreates the HF Signal	○	○
FFT	Recreates the FFT Analysis Signal※	—	○

※The FFT Analysis is mainly used for the Wobble Signal Analysis.

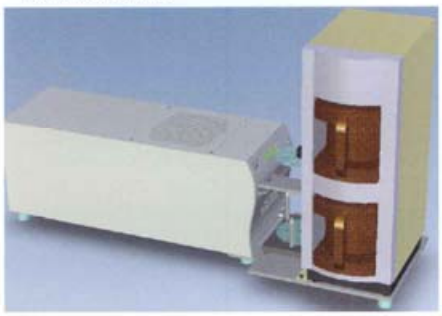


The waveform signal can be transferred to Excel via Clipboard.

Options

●Handler System (OPTIONAL)

- A max. of 100 discs can be supplied
- A storing location of OK/NG discs can be assigned
- Multiple measurement conditions can be assigned
- Different types of discs(ROM/R/RE) can be measured together
- Data can be searched from the History Information
- Dimension: 200(W)×530(H)×294(D), Weight: 11kg
- Both 80mm and 120mm capable
- No air is required



●Recordable Drive (OPTIONAL)

- Used with a drive on the market※
- Record according to the DI information
- Recording Power and Strategy can be individually assigned
- A desired recording width(band recording) can be set
- Used with the Handler System

※Only the drives assigned by PULSTEC are available. The type and recording speed of the recordable disc differ depending on the drive.

MASTER Support Program

〈2-Year Complete Warranty〉 Only the entry before the system delivery is acceptable※1

- 2-year Warranty (Free Repair including the PUH)
- Maintenance Service※2 (Cleaning※3 and Tester Condition Check※4)
- Calibration Disc Replacement※5 ・HEPA Filter Replacement※2
- Free Maintenance Kit※6 ・Free Application Update※7

〈Continuous Warranty for the 3rd Year〉 Only the limited entries are acceptable※8

- 50% Discount for Repair (Valid for 1 year)
- Maintenance Service※2 (Cleaning※3 and Tester Condition Check※4)
- HEPA Filter Replacement※9 ・Free Maintenance Kit※6
- Free Application Update※7

※1:If no entry is confirmed at the time of the system delivery, the usual 1 Year Warranty will be automatically applied. (The PUH repair is not covered.) ※2:This service will be effective after 1 year and 2 years from the delivery date. ※3:Contents of the Cleaning:Objective Lens Cleaning, Print Circuit Board Cleaning, Flexible Cable Exchange ※4:Contents of the Condition Check:Output Power, LD Lighting Time, LD Drive Current, PD Balance, Calibration History ※5:This service is available once during the warranty period. ※6:Contents of the Maintenance Kit:Lens Cleaner, Disc Cleaner ※7:A new application will be released irregularly. ※8:An entry after the 2-Year Complete Warranty or a re-entry of the Continuous Warranty for the 3rd Year is acceptable.(This warranty is valid for 1 year.) ※9:This service will be effective after 1 year from the starting date of the Continuous Warranty. (For the cost of the Support Program, please contact your PULSTEC Sales Representative.)

MASTER Measurement Service※1

PULSTEC measures discs requested by the consumer.

※1: A maximum of 5 discs can be measured for free. (If the measurement data of the ODU-1000 is also requested, up to 3 discs are free.) For the MASTER, 3-point(25,41,57mm)+full surface measurement(HF signal+RSER) are available. For the ODU-1000, 3-point (25,41,57mm only) is available. This service does not cover for the ODU-1000 data saving. (For the measurement items, period, and cost of this service, please contact your PULSTEC Sales Representative.)

PULSTEC Product History

Model Name and Specification Code of the MASTER Series

Model	Code	Description
SBP-02		BD-ROM(BD-R/RE discs are measurable except several functions) ※1※2 (Main Unit, Power Cable x 1, Connection Cable x 1, Installer CD, Calibration Disc) ※3
Option	−RRE	Applicable to BD-ROM/R/RE ※1 (2x/3x Measurement is applicable ※4)
	−HDL	Auto-Handler
	−ISI	ISI Measurement Function
	−DEF	Defect Measurement Function
	−D*	Applicable to Recordable Drives※5
Accessory		Calibration Disc
	HF10	HEPA filter (10 pc)

※1:Applicable Disc:BD-ROM (SL/DL), BD-R (SL/DL) HTL, BD-R (SL/DL) LTH, BD-RE (SL/DL) ※2:For the BD-R/RE discs, the Address Decode of the Wobble, Jitter measurement in the HFM zone, DI Information Obtainment, and a part of the Options are restricted. ※3:The User's Manual is provided in the supplied Installer CD. ※4:The 2x Measurement includes the Residual Error Meas., SER(Viterbi) Meas. and Surface Meas. The 3x Measurement includes the Residual Meas. and Surface Meas.(From July in 2008) ※5:Only the recordable drive that is assigned by PULSTEC can be used. The type/recording speed of the recordable disc differs depending on the drive.
(For the cost of each Main Unit, Options, and Accessory, Please contact your PULSTEC Sales Representative.)

Product Specifications

Item	Specifications
Applicable Disc※1	Disc Size:80mm&120mm, Thickness:1.2mm, Cover Layer Thickness:60- 120um, Center Hole:Φ15mm, Substrate:Glass/Polycarbonate, Track Pitch:0.32-0.35um, Track Form:Spiral, Reflectivity:3.5-70%
General Spec.	Rated Supply Voltage:AC100-240V(Permitted Fluctuation Range 85-250V), Rated Supply Frequency:50Hz/60Hz, Maximum Power Consumption:200VA, Ambient Temperature:20-30℃(Accuracy Guaranteed Range 21- 25℃), Ambient Humidity:20-80%(No Condensation), Installation Environment:General Room/Disc Manufacturing Lab(A stable and level place (no vibration)), Power Supply Environment:Limit the noise in the area, Other:No dust
Optics System (PUH)	Wavelength:405nm±5nm, NA:0.85typ., Maximum Optical Output:0.9mW CW※2, Rim Intensity:Ta 0.55-0.65(Calculated value)/Ra 0.60-0.70(Calculated value), Spot Size:0.42±0.01μm, LD Noise:-125dB/ Hz or less @0.35mW, Polarization:Circularly Polarized Light, Beam Grating Ratio(Sub:Main:Sub):9:80:9(±6%), RF side PD Project Area:≦25μm²(Calculated value), Power Accuracy:Set value±2%※3, I/V Converter:Built-in(OEIC), Playback Power Range:0.10~0.90mW(Resolution 0.01mW)
Feed System	Access Range:21.0※3-70.0mm(Resolution 0.01mm), Drive Motor:Stepping Motor, Drive Method:Ball Screw, Feed Method:Disc Feed※4
Spindle System	Rotation Control:CAV/P-CLV※5, Drive Motor:DC Brushless Motor(with Encoder), Clamping Method:Mechanical Clamp, Clamping Area:Φ23.5-32.5mm, Clamping Force:2N±0.5N, Turntable Accuracy:Axial Deviation ±20μm or less/Radial Deviation ±15μm or less, Rotation Range:200-5,500r/min, Rotation Jitter:σ<0.01%@1,800r/min
Focus System	Focus System Focus:Astigmatic Method, Layer Switch:SL_DL(L0,L1), Servo Method:Digital Servo(Gain, Offset Adjustment Function), Expander Control Function
Tracking System	Tracking:Push-pull/DPD, Servo Method:Digital Servo(Gain, Offset Adjustment Function), Track Guide:Land/Groove (Switchable)
Jump System	Still Jump, Track Jump(JF,JR)
Skew System	Drive Meter:DC Motor, Operation Range:±1.0°※3, Resolution:Ta:0.02deg/Ra:0.02deg
LimitEQ System	Modulation Method:1-7(RLL), Channel Clock:66MHz, AC Coupling Cut-off Frequency:10kHz(1st order), No. of Equalizer Tap:4, Equalizer Peak Frequency:16.5MHz, Equalizer Peak Gain:Fixed Standard Value of Each Disc, Group Delay Variation:2ns p-p max.(to 22MHz), Binarizer Slice:10kHz (1st order integrating feed-back auto slicer), PLL Loop Zone:32kHz
Wave Meas. Board	Input Frequency:30MHz flat, A/D:10bits, Sample Speed:1,2.5,10,20,30, 40,50,60,70,80,90,100MS/s, Filter:Software Filter※6
Jitter Meas. Board	Measurement Method:Data to Data, Data to Clock, Resolution:Approx.15ps, Samples:up to 2,000,000 samples
Monitor Terminal	HF Signal(50Ω※7), CH1※8(50Ω※7), CH2※8(50Ω※7), INDEX※10(1MΩ※7), TE(1MΩ※7), FE(1MΩ※7)
Connection to Host PC	Communication IF:TCP/IP(10BASE-T, 100BASE-TX, 1GBASE-T)

※1:The applicable disc differs depending on each MASTER model. ※2:It is measured with the Pulstec Newport Power Meter. ※3:The skew control cannot be carried out within radius 22.00mm. ※4:A method for counting pulse from the basic position. ※5:A method to control the spindle speed by calculating the number of rotations in 1r/min units from the radial position of a disc and the target linear velocity. ※6:A best filter will be applied by the software depending on the measurement item ※7: Terminator(Impedance) ※8:Select among RF/RF.eq/TPP/NPP for the output signal.(It is switchable by the supplied software.) ※9:Select among Push-pull/ NFE/DPD for the output signal. (It is switchable by the supplied software.) ※10:1 pulse of the output signal by 1 spindle rotation

Safety Precautions

●The Class 2M Laser is used in this system (based on JIS C6802:2005/IEC60825-1:2001). Looking at the laser beam with optical instruments such as a loupe, magnificent microscope, and microscope etc could cause a severe injury such as a degradation or loss of eyesight.
●Please read the "User's Manual" carefully prior to using the system. ●Avoid installing the system in areas with water, moisture, dust, or soot. It may result in fire, electric shock, or equipment breakdown.

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This catalog was issued in April 2008.
S37005556-152-0