

Panasonic Industrial China

Preliminary

**SPECIFICATIONS
FOR Blu-ray DISC DRIVE (Blu-ray read
only & Writable DVD)**

DATE OF ISSUE Oct 26. 2011

MODE UJ160ABPSN-B

Rev . 0.1

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Contents

1. Applications
2. Features
3. Write Speed
4. Specifications
5. Appearance
6. Reliability
7. Safety
8. Shock/Vibration
9. Life
10. Interface
11. Power Management
12. Serial ATA Features
13. Spindle Control
14. Dimension
15. Notes
16. Information for Laser
17. Drive Circuit (MD/DA)
18. Attached Sheets

1.Applications

- a) This specification describes the general specs and performance of BD Drive UJ240AF.
- b) In case major modification to improve performance and in the event that the device does not perform as specified, the stipulation requires that modification and solution should be made with mutual discussion, following the stipulations stated in this specification.
- c) Some components which are different in appearance and performance may be mixedly used owing to multiple sourcing and owing to common use with different models caused by decreased production quantity.
- d) Product to be marked which is compatible HHS Class 1 Standard in the USA.
- e) In the process of manufacturing of the products including packaging, any materials related ozone destructive items are not used at all.
- f) PSN in this document stands for Panasonic System Networks Co., Ltd.
- g) Special clause.
We will endeavor to do our best for maintaining the control of quality, however,
 - 1) We want you to confirm the safety of the product in which PSN product is incorporated.
If there is a problem with our product, be requested to advice the problem before shipment to the market.
:Be requested to do the test for confirmation of the product which installs PSN product, following applicable rules and regulations.
:Be requested to confirm the safety from abnormal usage under the condition installed.
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 - 3) In case, owing to the quality problem from this product, if there is a possibility to endanger the life of the user or property, please be requested to take double safety counter-measures by having enough tolerance over the assured specification and performance stated in this spec. from the point of product liability issue.
 - 4) Transcription and duplication of this document without prior consent is prohibited.
 - 5) Duration of limited warranty is 15 months after date manufactured.
 - 6) Duration of repair is 3 years after the following month of the end of manufacturing.
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2.Features

1) Built-in Type for PC

2) Read speed

DVD-ROM :Max 8X CAV

CD-ROM :Max 24X CAV

BD-ROM :2.0x CLV(for Video) / Max 6X CAV(for Data)

3) Maximum Write speed

CD-R :Max.24X CAV

CD-RW :4X CLV

High Speed CD-RW :10XCLV

Ultra Speed CD-RW :Max.16X Zone CLV

DVD-R :Max.8X CAV

DVD-R DL :Max.6X Zone CLV

DVD-RW :Max.6X Zone CLV

DVD+R :Max.8X CAV

DVD+R DL :Max.6X Zone CLV

DVD+RW :Max.8X Zone CLV

DVD-RAM :3X-5X PCAV (4.7GB)

4) Support Buffer Underrun Free Recording

5) Single +5V Power Supply

6) The media for write check

CD-R :TAIYO YUDEN Co.,Ltd. ,Mitsubishi Kagaku Media Co., Ltd. , Hitachi Maxell,Ltd.

CD-RW :Mitsubishi Kagaku Media Co., Ltd.

HS CD-RW :Mitsubishi Kagaku Media Co., Ltd.

DVD-R :TAIYO YUDEN Co.,Ltd.

DVD-R DL :Mitsubishi Kagaku Media Co., Ltd.

DVD-RW :Victor Company of Japan, Ltd. (JVC) , Mitsubishi Kagaku Media Co., Ltd.

DVD+R :Mitsubishi Kagaku Media Co., Ltd.

DVD+R DL :Mitsubishi Kagaku Media Co., Ltd.

DVD+RW :Mitsubishi Kagaku Media Co., Ltd.

DVD-RAM :Panasonic Corporation.

7) Access Speed

DVD-ROM SL 190ms (Typ.) (Random)

CD-ROM 180ms(Typ.) (Random)

BD-ROM SL 300ms(Typ.) (Random)

3.Write Speed

The drive adjusts the write speed to the disc characteristics.

The optimal write speed to the disc may not be the maximum write speed.

4. Specifications

| NO | Item | Specification | Condition |
|---------------|--|--|---|
| 4-1 | Power Supply | | |
| | 1.Operating Voltage | DC 5 V +/- 0.25V | |
| | 2.Power Consumption | Peak 1800 mA (Max.) | Except inrush current (Less than 1ms) |
| | | Read (CD) 1100 mA (typ.) Read (DVD) 950 mA (typ.) Read (BD) 950mA (typ.) Write 1350 mA (typ.) Standby 50 mA (typ.) | CD(TCD-002) DVD(KME-DVD001) BD-ROM (BLX-150) CD-R/DVD-R/BD-RE Max. Write Slumber mode |
| | 3. Ripple | 100 mVp-p Max. | |
| 4-2 | Drive | | |
| | 1.Transfer Rate | | |
| | (1) Read | | |
| | DVD-ROM | MAX 8X CAV (MAX 10800 kB/s) | |
| | CD-ROM | MAX 24X CAV (MAX 3600 kB/s) | |
| | BD-ROM | MAX 6X CAV (MAX 27 MB/s) | |
| | (2) Write | | |
| | CD-R | 4X (CLV), 8X (CLV), 24X (CAV) | |
| | CD-RW | 4X (CLV) | |
| | HS-RW | 10X (CLV) | |
| US-RW | 16x(ZCLV) | | |
| CD 8cm media | 4xCLV | | |
| DVD-R | 2X(CLV),MAX. 4X (ZCLV), MAX.8X (CAV) | DVD-R for General | |
| DVD-R DL | 2X(CLV),MAX.4X/6X(ZCLV) | | |
| DVD-RW | 1X(CLV), 2X(CLV),MAX.4X/6X(ZCLV) | | |
| DVD+R | 2.4X(CLV),MAX.4X (ZCLV), MAX.8X (CAV) | | |
| DVD+R DL | 2.4X(CLV),MAX.6X(ZCLV) | | |
| DVD+RW | 2.4X(CLV), 3.3X(CLV), MAX.4X /8X(ZCLV) | | |
| DVD-RAM | 2X/3X (ZCLV), 5X (PCAV) | 4.7 / 9.4 GB | |
| DVD 8cm media | 2X(CLV), 2.4X(CLV) | | |
| | (3) SATA Interface | 150 Mbyte/s | |
| | 2.Buffer Memory | 2MB | |
| | 3.Error Rate | | |
| | (1) CD-ROM(with ECC) | less than 10 ⁻¹² bit | <Access Time> using PSN's original test program |
| | (without ECC) | less than 10 ⁻⁹ bit | |
| | (2) DVD-ROM | less than 10 ⁻¹² bit | |
| | (3) BD-ROM | less than 10 ⁻¹² bit | |
| | 4.Access Time | DVD-ROM 190 ms typ.(Random) CD-ROM 180 ms typ.(Random) BD-ROM 300mstyp.(Random) | DVD(KMEDVD001) CD(TCD-002) BD-ROM (BLX-150) |
| | 5.Start up Time | less than 15s | Except Multi Session and Writable Media |
| | 6.Stop Time | less than 6s | |
| | 7.Acoustic Noise | less than 50 dBA | ISO/JIS7779 (ANSI) |
| | 8.Bus Encryption | Support | |
| | 9.Regional Code | "None" | |
| | 10.Inquiry Data | "BD-CMB UJ160" | |

4. Specification (continue)

| NO | Item | Specification | Condition |
|-----|------------------------|---|---|
| 4-3 | Applicable disc | C D: CD-ROM (12cm,8cm) CD-R,CD-RW DVD: DVD-ROM,DVD-R,DVD-R DL DVD-RAM,DVD-RW DVD+R, DVD+R DL,DVD+RW BD: BD-ROM,BD-R,BD-RE | Except abnormal shaped Disc |
| 4-4 | Applicable disc format | CD: CD-DA,CD-ROM,CD-ROM XA PhotoCD(muiltiSession) Video CD,CD-Extra(CD+),CD-text Hybrid SACD DVD: DVD-VIDEO, DVD-ROM, DVD-R(4.7GB), DVD-RW(Ver.1.1/1.2) , DVD-RAM DVD+R, DVD+R DL, DVD+RW DVD-R DL(Format1/4) BD: BD-ROM (1.3), BD-R(2.0),BD-RE (3.0) | CD Layer only Format 1/4 Write support |
| 4-5 | Slope | Horizontal & Vertical (-5 / +35) | |
| 4-6 | Dimensions, Weight | 128 x 129 x 12.7 mm (W x D x H) (except protrusion) 160 g +/- 10g | Upper cover-AL Bottom cover-AL |
| 4-7 | Eject | Soft Eject (with emergency eject hole) | |

5. Appearance

| NO | Item | Specification |
|-----|------------|---|
| 5-1 | Appearance | <ul style="list-style-type: none"> - Any remarkable scratches, stains, sink mark, haze and burrs which degrade cosmetic are not allowed. - We may not accept it as custom components except front bezel. - No discoloration is allowed. - No contamination or objection lens or pick-up cover are allowed. - Marginal one will be judged by limitation samples which mutually agreed by both parties. - Front bezel Green LED indicator |

6. Reliability

| NO | Item | Specification | Condition |
|-----|-------------|--|--|
| 6-1 | Temperature | Operating guarantee : 5 to 50°C Non operating : -20 to 60°C <div style="border: 1px solid black; padding: 5px; width: fit-content;"> Recommended position of temperature mesurment in the case drive is built in to the PC. (at the point "*" in the right figure) Operating guarantee temperature : 55°C </div> | |
| 6-2 | Humidity | Operating gurarantee : 10 to 80% RH Non operating : 5 to 90% RH | The maximum wet-bulb temperature is 31°C |
| 6-3 | MTBF | 60,000h (Duty : 20 %) | |
| 6-4 | MTTR | 30min | |

7.Safety

| NO | Item | Specification | Condition |
|-----|--------|---|------------------------------------|
| 7-1 | Safety | UL / cUL (UL 60950-1 / CSA C22.2 No. 60950-1) TUV (EN 60950-1) | Rated voltage : Rated current : |
| 7-2 | EMC | CE Marking (EMC Directive 2004/108/EC) EN 55022 EN 55024 | |
| 7-3 | LASER | 21 CFR Subchapter J (Class 1 laser product) IEC 60825-1/EN 60825-1 (Class 1 laser product) | |

Note : This model is compliant to HHS and EN60825-1 as Class 1 Laser, so information of laser must be presented in user instruction or operation manual which is supplied to end user.
Information for laser : Refer to the attached sheet.

8.Shock/Vibration

| NO | Item | Specification | Condition |
|-----|--------------------------------|--|--|
| 8-1 | Shock 1.Operating :Read | 19.6m/s ² (2.0 G) (11ms X,Y,Z) : CD-DA | CD-DA CD-ROM/DVD-ROM/BD-ROM possibility of retry at read |
| | :Write 2.Non Operating | 58.8m/s ² (6.0 G) (11ms X,Y,Z) : CD-ROM/DVD-ROM/BD-ROM 4.9m/s ² (0.5 G) (11ms X,Y,Z) 588m/s ² (60.0 G) (11ms X,Y,Z) 1960m/s ² (200 G) (2ms X,Y,Z) | |
| 8-2 | Vibration 1.Operation :Read | 1.96m/s ² (0.2 G) (5 ~ 500Hz) | |
| | :Write 2.Non Operating | 0.98m/s ² (0.1 G) (5 ~ 500Hz) 19.6m/s ² (2.0 G) (10 ~ 500Hz X,Y,Z 2h) | |

9.Life

| NO | Item | Specification | Condition |
|-----------|-----------------------|--|-----------|
| 9-1 | Life | | |
| | 1.Laser (at 25°C) | 2000 h | |
| | 2.Spindle Motor | 3000 h | |
| | 3.Feed Motor | current alteration within 30 % from initial 250,000 times | |
| | 4.FPC (Feed Motor) | current alteration within 30 % from initial 250,000 times | |
| | 5.Disc Insertion | 10,000 times | |
| | 6.Eject Button | 10,000 times | |
| 7.Loading | 10,000 times | | |

10. Interface

10-1. Connector

(1) Connector layout



Back side view

(2) Connector pin assignment

Interface description (signal)

| Pin | Signal | |
|-----|--------|----------------------------|
| S1 | Gnd | |
| S2 | A+ | Differential signal pair A |
| S3 | A- | |
| S4 | Gnd | |
| S5 | B- | Differential signal pair B |
| S6 | B+ | |
| S7 | Gnd | |

Interface description (power)

| Pin | Signal | |
|-----|--------|---|
| P1 | DP | Device Present (1K Ω pull down) |
| P2 | +5V | 5V power |
| P3 | +5V | 5V power |
| P4 | MD/DA | Manufacturing Diagnostic/Device Attention |
| P5 | Gnd | |
| P6 | Gnd | |

*1 : See 23/31 page

DC Characteristics

| Parameter | Signal Level | | |
|--------------------------------------|--------------|-----|-----|
| | min | typ | max |
| Signal Detection Threshold (mV) | 50 | 100 | 200 |
| Tx Differential Output Voltage (mV) | 400 | 500 | 600 |
| Rx Differential Input Voltage (mV) | 325 | 400 | 600 |
| Tx Pair Differential Impedance (ohm) | 85 | 100 | 115 |
| Rx Pair Differential Impedance (ohm) | 85 | 100 | 115 |

10. Interface (continue)
10-2. SATA command

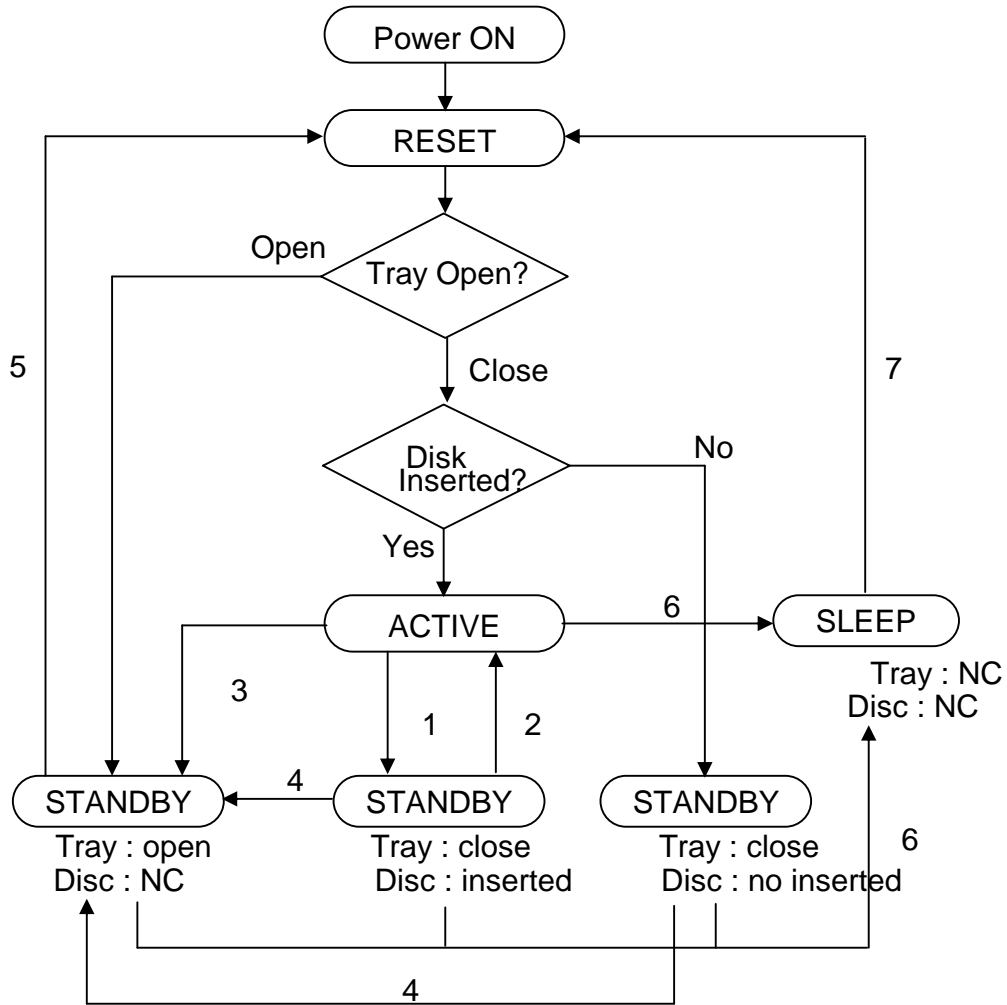
Packet Commands Supported by Drives

| | | | |
|-----|--------------------------------|------|----------------------------------|
| 00h | TEST UNIT READY | 53h | RESERVE TRACK/RZONE |
| 01h | REZERO UNIT | 54h | SEND OPC INFORMATION |
| 03h | REQUEST SENSE | 55h | MODE SELECT(10) |
| 04h | FORMAT UNIT | 58h | REPAIR RZONE |
| 08h | READ(6) | 5Ah | MODE SENSE(10) |
| 0Ah | WRITE(6) | 5Bh | CLOSE TRACK/RZONE/SESSION/BORDER |
| 0Bh | SEEK(6) | 5Ch | READ BUFFER CAPACITY |
| 12h | INQUIRY | 5Dh | SEND CUE SHEET |
| 15h | MODE SELECT(6) | A1h | BLANK |
| 1Ah | MODE SENSE(6) | A3h | SEND KEY |
| 1Bh | START/STOP UNIT | A4h | REPORT KEY |
| 1Eh | PREVENT/ALLOW MEDIUM REMOVAL | A5h | PLAY AUDIO(12) |
| 23h | READ FORMAT CAPACITIES | A7h | SET READ AHEAD |
| 25h | READ CAPACITY | A8h | READ(12) |
| 28h | READ(10) | AAh | WRITE(12) |
| 2Ah | WRITE(10) | ACh | GET PERFORMANCE |
| 2Bh | SEEK(10) | ADh | READ DVD STRUCTURE |
| 2Eh | WRITE AND VERIFY(10) | A Eh | WRITE AND VERIFY(12) |
| 2Fh | VERIFY(10) | AFh | VERIFY(12) |
| 35h | FLUSH (SYNCHRONIZE) CACHE | B6h | SET STREAMING |
| 37h | READ DEFECT DATA | B9h | READ CD MSF |
| 3Bh | WRITE BUFFER | BAh | SCAN |
| 3Ch | READ BUFFER | BBh | SET CD SPEED |
| 42h | READ SUB-CHANNEL | BDh | MECHANISM STATUS |
| 43h | READ TOC/PMA/ATIP | BEh | READ CD |
| 44h | READ HEADER | BFh | SEND DVD STRUCTURE |
| 45h | PLAY AUDIO(10) | E8h | READ MICROCODE |
| 46h | GET CONFIGURATION | E Ah | WRITE MICROCODE |
| 47h | PLAY AUDIO MSF | F5h | SYNCHRONIZE MICROCODE |
| 4Ah | GET EVENT /STATUS NOTIFICATION | | |
| 4Bh | PAUSE/RESUME | | |
| 4Eh | STOP PLAY/SCAN | | |
| 51h | READ DISC INFORMATION | | |
| 52h | READ TRACK/RZONE INFORMATION | | |

ATA Commands Supported by Drives

| | | | |
|-----|---------------------------|-----|-------------------|
| E5h | CHECK POWER MODE | 00h | NOP |
| 08h | DEVICE RESET | A0h | PACKET |
| 90h | EXECUTE DEVICE DIAGNOSTIC | EFh | SET FEATURES |
| A1h | IDENTIFY PACKET DEVICE | E6h | SLEEP |
| E1h | IDLE IMMEDIATE | E0h | STANDBY IMMEDIATE |

11. Power Management
11-1. Status Changes



* Electrical status in a drive is same at STANDBY1,2,3

- 1: At first host executes reset sequence after power is supplied. If a disc is attached and a tray is closed, the drive status becomes ACTIVE Mode. And next If host doesn't execute command for certain time(default 30 sec) a disc stops, and changes STANDBY Mode .In the case of receiving ATAPI command(Standby Immediate),the drive status changes STANDBY Mode soon.
- 2: In the case of STANDBY Mode at the status that a disc is attached and a tray is closed, if the drive receives command from host, the drive status changes ACTIVE Mode soon.
- 3: In the case of ACTIVE Mode, a disc is stopped and a tray is opened by ATAPI eject command or pushing eject button at front bezel. And next the drive status change STANDBY Mode again.

11.Power Management (continue)**11-1.Status Changes (continue)**

- 4: In the case of STANDBY Mode, a disc is stopped and a tray is opened by ATAPI eject command or pushing eject button at front bezel. And next the drive status change STANDBY Mode again.
- 5: In the case of STANDBY Mode at the status that a tray is opened, this drive executes reset sequence by closing a tray. And next If a disc is attached, the drive spin a disc and changes ACTIVE Mode.
- 6: In the case of ACTIVE or STANDBY mode, this drive goes into Sleep mode immediately after receiving of Sleep Command.
The only way to recover from SLEEP mode is with a software reset or hardware reset.
- 7: The drive status can recover by hard or soft reset(in the case of SSP disable).
And next the drive status becomes the same sequence with reset status.
- 8: In the case of SSP enable, the drive goes into STANBY mode immediatelly after receiving of soft reset.

ACTIVE Mode

At first a disc is attached and a tray is closed after power is supplied. And next the drive checks itself. If this check finished perfectly, the drive spin a disc and read TOC.
ACTIVE Mode stands for this status that the drive finish reading TOC.
So laser, spindle motor, and sled motor active.

STANDBY Mode

This mode is a low current consumption mode.
STANDBY Mode stands for this status that only SATA interface active. So laser, spindle motor, and sled motor doesn't active.

SLEEP Mode

This mode is a low current consumption mode.
SLEEP Mode stands for this status that all system(laser, spindle motor, sled motor, SATA interface) doesn't active. The drive can recover by hard/soft reset.

12. Serial ATA Features
12-1. Serial ATA Features Specification

| NO | Item | Specification | |
|------|--|---------------|---|
| 12-1 | HIPM (Host Initiated link Power Management) | Support | |
| 12-2 | DIPM (Device Initiated link Power Management) | Support | Partial Timer : 10ms Slumber Timer 30ms (time after a drive handles the last command) |
| 12-3 | AN (Asynchronous Notification) | Support | |
| 12-4 | SSP (Software Setting Preservation) | Support | |
| 12-5 | SSC (Spread Spectrum Clocking) | Support | |

*Both host controller and optical drive need to support HIPM ,DIPM and AN mode to utilize them.

12-2. Link Power Management State

Serial ATA interface power states are controlled by the device and host controller. The interface power states are defined as below.

PHYRDY

The Phy logic and main PLL are both on and active. The interface is synchronized and capable of receiving and sending data.

PARTIAL

The Phy logic of SATA interface is powered, but is in a reduced power state. Power dissipation in this mode is less than the PHYRDY mode, but more than the SLUMBER mode. The exit latency from this state shall be no longer than 10 us.

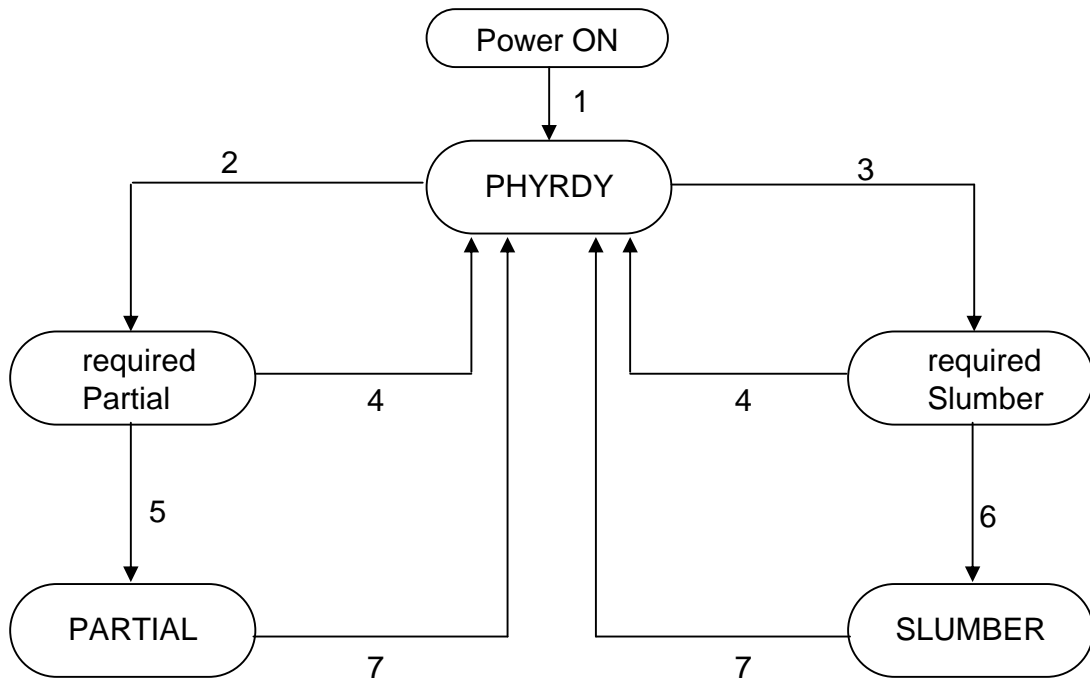
SLUMBER

The Phy logic of SATA interface is powered, but is in a reduced power state. Power dissipation in this mode is less than the PARTIAL mode. The exit latency from this state shall be no longer than 10 ms.

12. Serial ATA Features (continue)
 12-3.HIPM(Host Initiated link Power Management)

HIPM is a method which controls Serial ATA interface power states by host controller. Logical Unit supports this feature. Host shall issue IDENTIFY PACKET DEVICE before initiate power management transition requests, and check the response data whether HIPM is supported or not.

12-4. HIPM State Changes

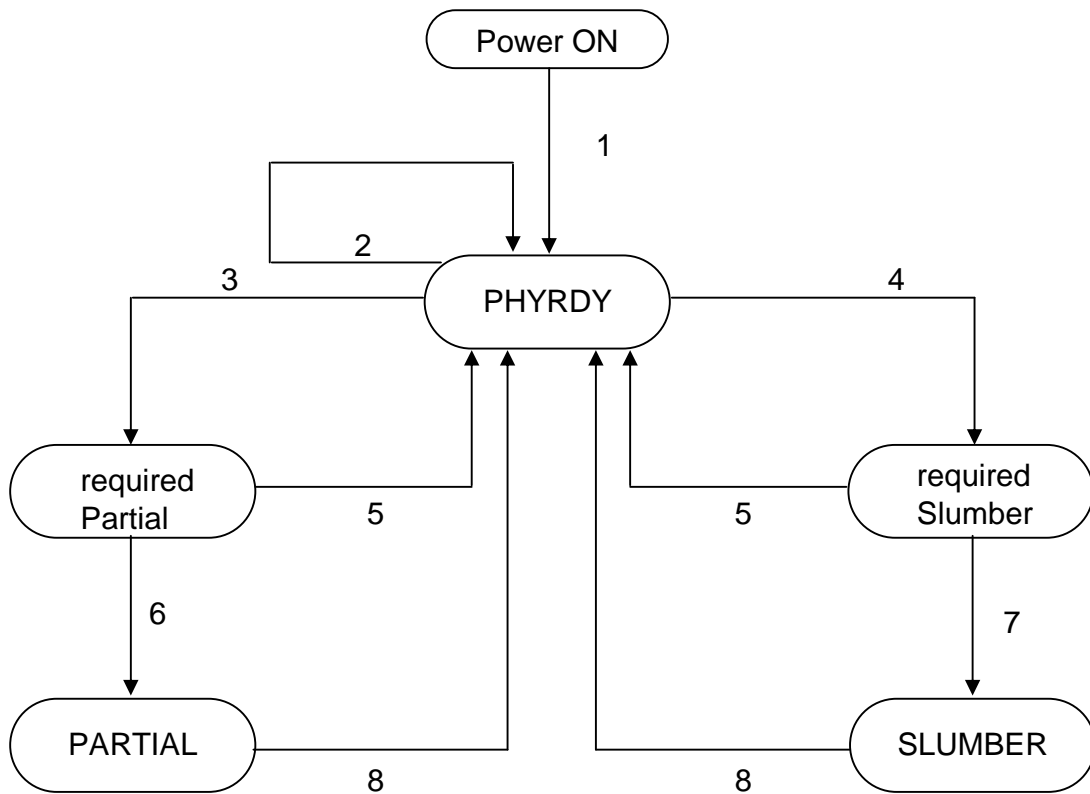


- 1: A power-on or hard reset always returns the Interface Power State to the PHYRDY state from any state.
- 2: In the case of required Partial, the drive receive PMREQ_P from host.
- 3: In the case of required Slumber, the drive receive PMREQ_S from host.
- 4: If the drive issues PMNAK, the status changes into PHYRDY.
- 5: If the drive issues PMACK, the status changes into PARTIAL.
- 6: If the drive issues PMACK, the status changes into SLUMBER.
- 7: If the drive or host issues COMWAKE(or COMRESET/COMINIT), the status changes into PHYRDY.

12. Serial ATA Features (continue)
 12-5. DIPM (Device Initiated link Power Management)

DIPM is a method which controls Serial ATA interface power states by the Logical Unit. The Logical Unit has internal timers, Partial Timer and Slumber Timer , and the timer provide for the Logical Unit to change Interface Power State without direct HOST request. The disabled/enabled of DIPM can be switched by using SET FEATURE command.

12-6. DIPM State Changes



- 1: A power-on or hard reset always returns the Interface Power State to the PHYRDY state from any state.
- 2: If the drive received command, the drive keep PHYRDY state and resets the Partial/Slumber Timer.
- 3: If the drive is set DIPM Enable and the Partial timer reaches zero, the drive issues PMREQ_P.
- 4: If the drive is set DIPM Enable and the Slumber timer reaches zero, the drive issues PMREQ_S.
- 5: If the drive received PMNAK from Host, the status changes into PHYRDY.
- 6: If the drive received PMACK from Host, the status changes into PARTIAL.
- 7: If the drive received PMACK from Host, the status changes into SLUMBER.
- 8: If the drive or host issues COMWAKE(or COMRESET/COMINIT), the status changes into PHYRDY. If the drive changes Interface Power State from PARTIAL to SLUMBER, the drive issues COMWAKE to enter PHYRDY state. And then, the drive requests to change the state into SLUMBER

12. Serial ATA Features (continue)

12-7. AN (Asynchronous Notification)

Asynchronous notification is a mechanism for a device to send a notification to the host that the device requires attention. A few examples of how this mechanism could be used include indicating media has been inserted in an device.

12-8. SSP (Software Setting Preservation)

When a device is enumerated, software configures the device using SET FEATURES and other commands. These software settings are often preserved across software reset but not necessarily across COMRESET. In Parallel ATA, only commanded hardware resets may occur, thus legacy mode software only reprograms settings that are cleared for the particular type of reset it has issued. In Serial ATA, COMRESET is equivalent to hardware reset and a noncommanded COMRESET may occur if there is an asynchronous loss of signal. Since COMRESET is equivalent to hardware reset, in the case of an asynchronous loss of signal some software settings may be lost without legacy mode software knowledge. In order to avoid losing important software settings without legacy mode driver knowledge, the software settings preservation ensures that the value of important software settings is maintained across a COMRESET. Software settings preservation may be enabled or disabled using SET FEATURES with a subcommand code of 06h . The feature is enabled by default.

The software settings that is preserved across COMRESET are listed below.

SET FEATURES (Set Transfer Mode): PIO, Multiword, and UDMA transfer mode settings established by the SET FEATURES command with subcommand code of 03h.

12-9. SSC (Spread Spectrum Clocking)

The technique of modulating the operating frequency of a signal slightly to spread its radiated emissions over a range of frequencies. This reduction in the maximum emission for a given frequency helps meet radiated emission requirements.

13. Spindle Control
13-1. Normal disc

| Disc Type | Sector Format | CD-ROM/CD-R Closed Session | CD-RW Closed Session | CD-R Open Session | CD-RW Open Session |
|--------------------------|---------------------------------------|-------------------------------|-------------------------|----------------------|-----------------------|
| Audio Only Disc | CD-DA (Data read) (Audio play) | Max 20X CAV | Max 20X CAV | 8xCLV | 8xCLV |
| | | Max 12X CAV | Max 12X CAV | - | - |
| Data Only Disc | Mode1/Mode2Form1 (CD-ROM, PhotoCD) | Max 24X CAV | Max 24X CAV | Max 24xZCLV | Max 16xZCLV |
| | Mode2Form2 (VideoCD) | Max 20X CAV | Max 20X CAV | 8xCLV | 8xCLV |
| Mixed disc (CD-extra) | Mode1/Mode2Form1 | Max 24X CAV | Max 24X CAV | Max 24xZCLV | Max 16xZCLV |
| | Mode2Form2 | Max 20X CAV | Max 20X CAV | 8xCLV | 8xCLV |
| | CD-DA (Data read) | Max 20X CAV | Max 20X CAV | 8xCLV | 8xCLV |
| | (Audio play) | Max 12X CAV | Max 12X CAV | - | - |
| 8cm CD | Data Read | Max 12X CAV | Max 12X CAV | 4xCLV | 4xCLV |

| Disc type | Condition | Spindle control | | Remark |
|--------------------|-----------|-----------------|-------------|--------|
| | | 12cm media | 8cm media | |
| DVD-ROM Single | Data Read | Max 8X CAV | Max 4X CAV | |
| DVD-ROM Dual | Data Read | Max 8X CAV | Max 4X CAV | |
| DVD-Video | Data Read | Max 4X CAV | Max 4X CAV | |
| DVD-R(4.7G) | Data Read | Max 8X CAV | Max 4X CAV | |
| DVD-R DL | Data Read | Max 8X CAV | Max 4X CAV | |
| DVD-RW(Ver1.1/1.2) | Data Read | Max 8X CAV | Max 4X CAV | |
| DVD+R | Data Read | Max 8X CAV | Max 4X CAV | |
| DVD+R DL | Data Read | Max 8X CAV | Max 4X CAV | |
| DVD+RW | Data Read | Max 8X CAV | Max 4X CAV | |
| DVD-RAM | Data Read | Max 3X-5X PCAV | Max 2X ZCLV | |

| Disc type | Condition | Spindle control | | Remark |
|-----------|-----------|-----------------|--------------|---------------------|
| | | 12cm media | 8cm media | |
| BD-ROM SL | Data Read | Max 6X CAV | Max 1.6X CLV | 2.0X at AV Contents |
| BD-ROM DL | Data Read | Max 6X CAV | Max 1.6X CLV | 2.0X at AV Contents |
| BD-RE SL | Data Read | Max 6X CAV | Max 1.6X CLV | 2.0X at AV Contents |
| BD-RE DL | Data Read | Max 6X CAV | Max 1.6X CLV | 2.0X at AV Contents |
| BD-RE TL | Data Read | Max 4X CAV | Max 2X CLV | 2.0X at AV Contents |
| BD-R SL | Data Read | Max 6X CAV | Max 1.6X CLV | 2.0X at AV Contents |
| BD-R DL | Data Read | Max 6X CAV | Max 1.6X CLV | 2.0X at AV Contents |
| BD-R TL | Data Read | Max 6X CAV | Max 2X CLV | 2.0X at AV Contents |
| BD-R QL | Data Read | Max 6X CAV | Max 2X CLV | 2.0X at AV Contents |

Model Number : UJ160ABPSN-B

13-2 .Spindle motor control

(1) at playing CD-ROM

| Linear Velocity | at 24XCAV | at 12XCAV | Remarks |
|-----------------|-----------|-----------|---|
| 1.2m/s <1.3m/s | 4979 rpm | 2490 rpm | at 1.2m/s proportion to linear velocity (1.2~1.3m/s) |
| 1.3m/s | 5394 rpm | 2697 rpm | more than 1.3m/s |

(2) at playing DVD-ROM

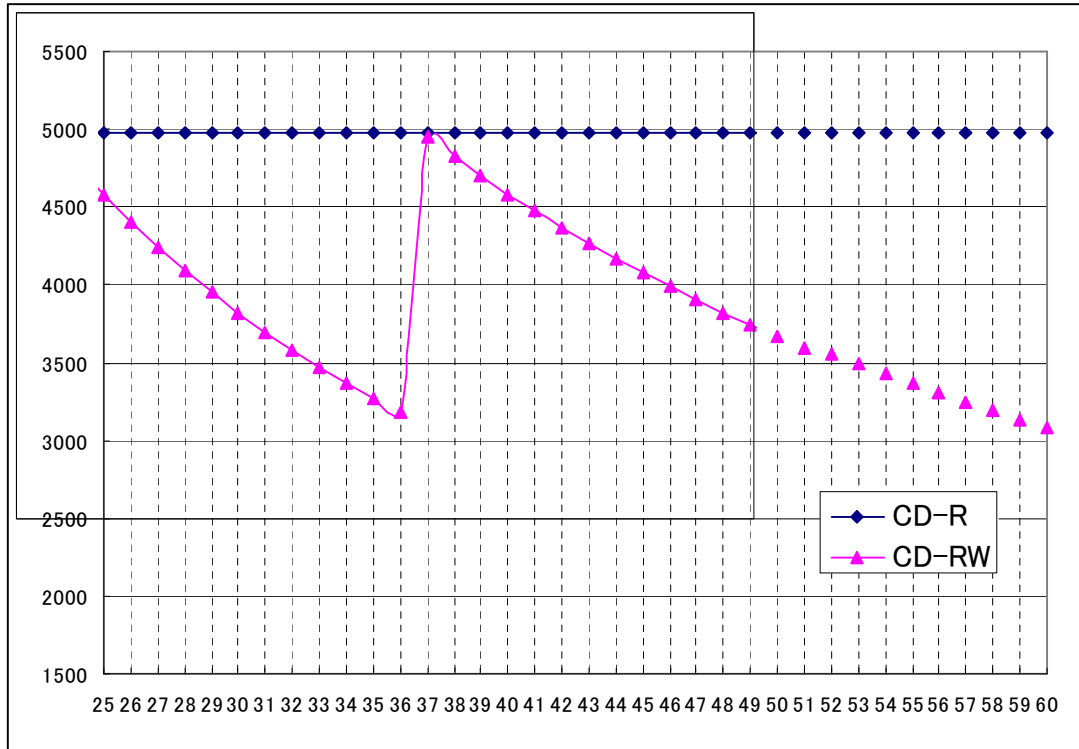
| Disc | at 2.5XCAV | at 4XCAV | at 6XCAV | at 8XCAV |
|--------------|------------|----------|----------|----------|
| Single layer | 1480 rpm | 2369 rpm | 3551 rpm | 4735 rpm |
| Dual layer | 1628 rpm | 2605 rpm | 3907 rpm | 5210 rpm |

(3) at playing BD-ROM

| Disc | at 1.6XCLV | at 2XCLV | at 4XPCAV | at 6XCAV |
|-------------|------------|----------|-----------|----------|
| SL/DL layer | 3133 rpm | 3916 rpm | 3916 rpm | 4860 rpm |

(4) CD-R Write (Max 24xCAV)
CD-RW Write (Max 16xZCL)

[rpm]



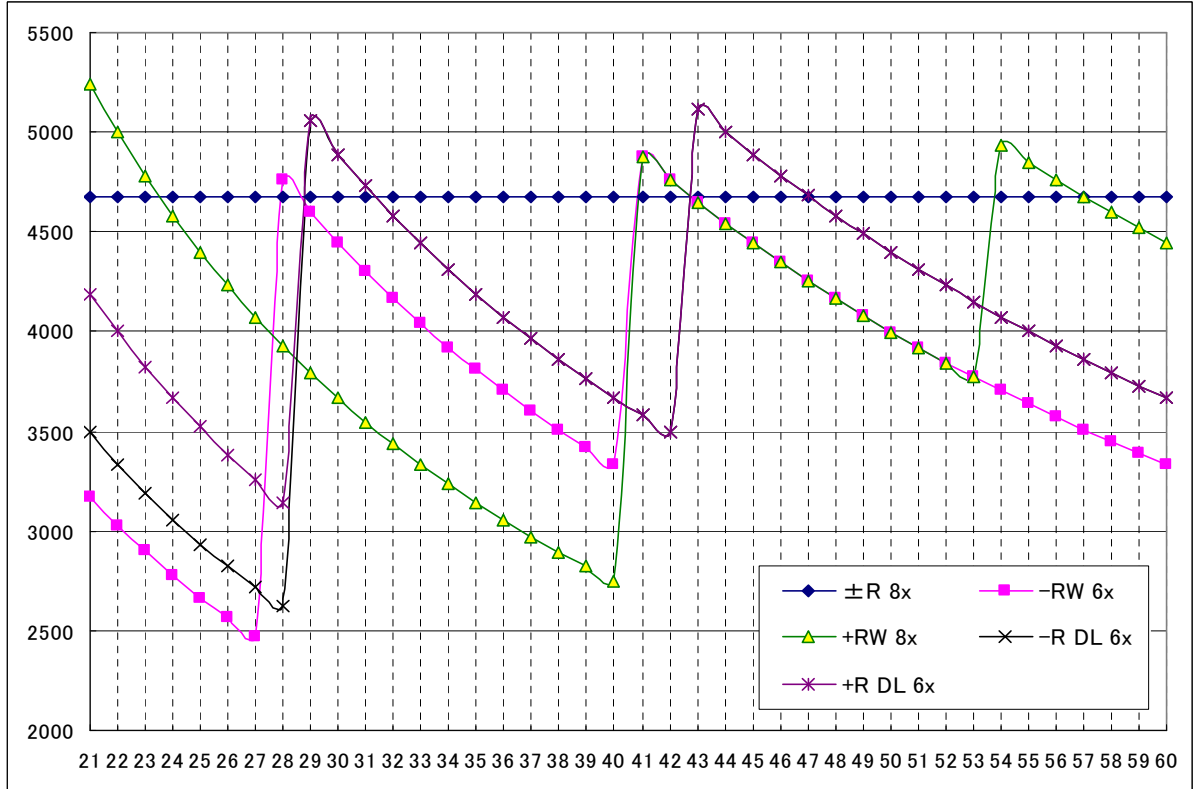
Average Write Speed

| | | |
|-------|--------------|--------|
| CD-R | 24x CAV | 18.85x |
| CD-RW | 10x-16x ZCLV | 14.73x |

Model Number : UJ160ABPSN-B

- (5) DVD±R Write (MAX.8x CAV)
- DVD-R DL(Max.6x ZoneCLV), DVD+R DL Write (Max.6x Zone CLV)
- DVD-RW(Max.6x ZoneCLV), DVD+RW Write (Max.8x Zone CLV)

[rpm]



[mm]

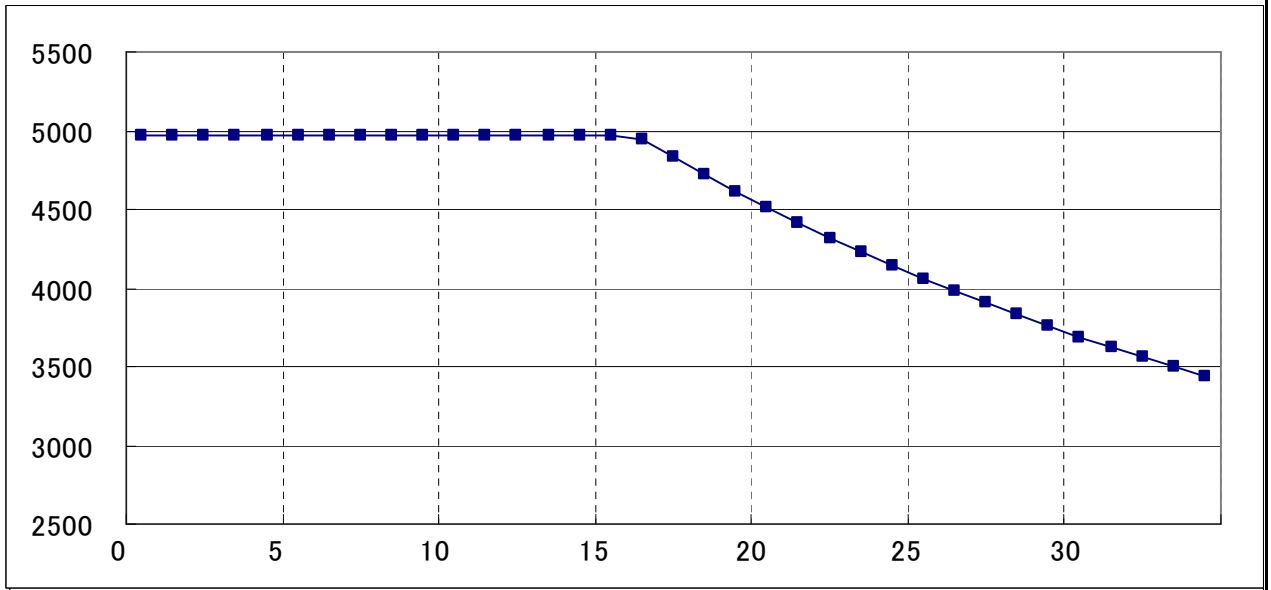
Average Write Speed

| | | |
|----------|-----------------|-------|
| DVD-R | 8x CAV | 5.8x |
| DVD+R | 8x CAV | 5.8x |
| DVD-R DL | 2x-4x-6x ZCLV | 4.48x |
| DVD+R DL | 2.4x-4x-6x ZCLV | 4.61x |
| DVD-RW | 2x-4x-6x ZCLV | 4.78x |
| DVD+RW | 3.3x-6x-8x ZCLV | 4.78x |

Model Number : UJ160ABPSN-B

(6) DVD-RAM(Max 3x-5x Partial CAV)

[rpm]



Average Write Speed

| | | |
|---------|------------|-------|
| DVD-RAM | 3x-5x PCAV | 4.48x |
|---------|------------|-------|

14.Dimension

Refer to the following pages.

15.Notes

a) This pickup is precisely assembled at our specialized assembly line. Please be requested not to disassemble or adjust this pickup.

b) Storage

- 1) Keep away from hot and high humidity environment.
- 2) Store them under the condition of not receiving abnormal shock from outside, by having static and dust protecting measures.
- 3) Keep the dust cover for the protection from dust.

c) Handling

- 1) Keep away from strong shock such as dropping.
- 2) Never touch objective lens.
- 3) Be careful not to be dusted on the objective lens.
- 4) In case, dust is on the objective lens, sweep away the dust with clean air.
- 5) Worker involved should be secured with "ground".
- 6) Workshop and tool must be grounded securely.
- 7) Never be so close with magnetic material since actuator portion holds strong magnet circuit. (Iron dust, screws, iron-pins in driving area cause problems.)
- 8) Don't push the cover of the Drive.
- 9) Fragile. Handle with care.

d) Installation of a drive

Torque for tightening screws must be equal to or less than 0.2Nm(2kgf-cm),when a drive is fixed with.

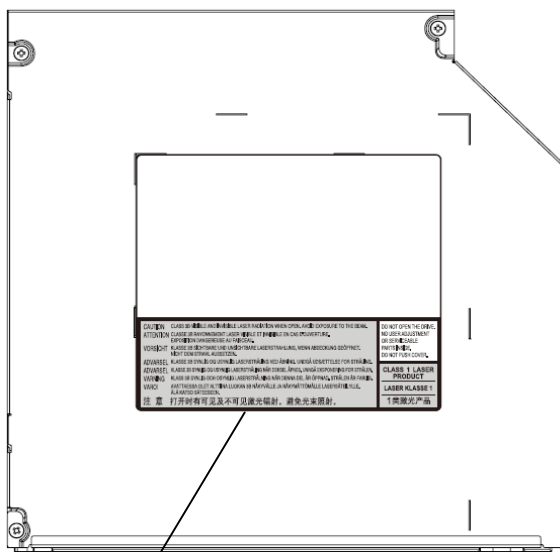
16. Information for Laser / UJ160 series

Information For the User

This product utilizes a laser.
 Use of control, adjustment or performance of procedures other than those specified herein may result in hazardous radiation exposure.
 Do not open covers and do not repair yourself. Refer servicing to qualified personnel.

| | | |
|---|-------------|----------|
| Laser properties of the Drive | | |
| Laser Class Class 1 (HHS and IEC 60825-1) | | |
| Wavelength | for CD | 783 nm |
| | for DVD | 661.5 nm |
| | for Blu-ray | 405nm |

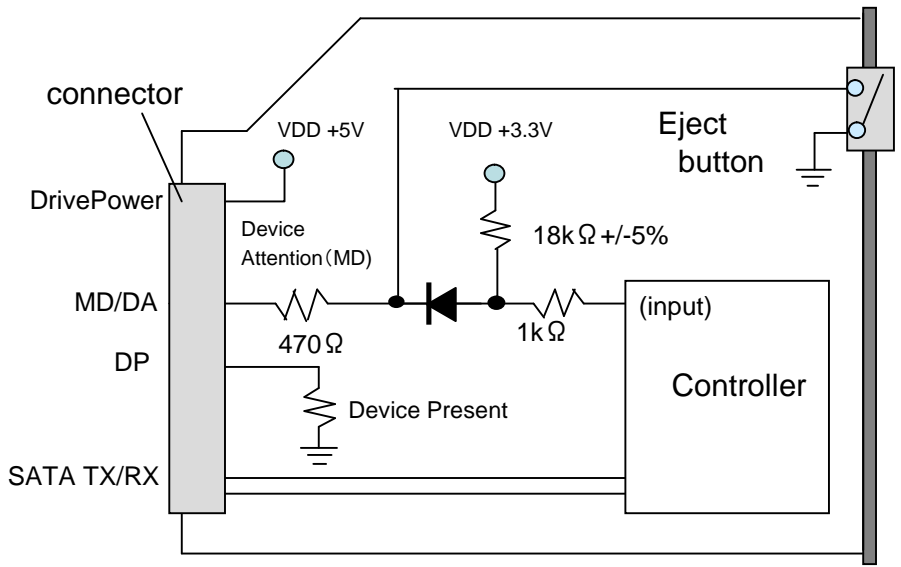
Location of Labeling



| | |
|---|--|
| <p>CAUTION CLASS 3B VISIBLE AND INVISIBLE LASER RADIATION WHEN OPEN. AVOID EXPOSURE TO THE BEAM.</p> <p>ATTENTION CLASSE 3B RAYONNEMENT LASER VISIBLE ET INVISIBLE EN CAS D'OUVERTURE. EXPOSITION DANGEREUSE AU FAISCEAU.</p> <p>VORSICHT KLASSE 3B SICHTBARE UND UNSICHTBARE LASERSTRAHLUNG, WENN ABDECKUNG GEÖFFNET. NICHT DEM STRAHL AUSSETZEN.</p> <p>ADVARSEL KLASSE 3B SYNLIG OG USYNLIG LASERSTRÅLING VED ÅBNING, UNGÅ UDSÆTTELSE FOR STRÅLING.</p> <p>ADVARSEL KLASSE 3B SYNLIG OG USYNLIG LASERSTRÅLING NÅR DEKSEL ÅPNES, UNNGÅ EKSPONERING FOR STRÅLEN.</p> <p>VARNING KLASSE 3B SYNLIG OCH OSYNLIG LASERSTRÅLNING NÅR DENNA DEL ÄR ÖPPNAD. STRÅLEN ÄR FARLIG.</p> <p>VARO! AVATTAESSA OLET ALTTIINA LUOKAN 3B NÄKYVÄLLE JA NÄKYMÄTTÖMÄLLE LASERSÄTEILYLLE. ÄLÄ KATSO SÄTEESEEN.</p> <p>注意 打开时有可见及不可见激光辐射。避免光束照射。</p> | <p>DO NOT OPEN THE DRIVE. NO USER ADJUSTMENT OR SERVICEABLE PARTS INSIDE. DO NOT PUSH COVER.</p> <p>CLASS 1 LASER PRODUCT</p> <p>LASER KLASSE 1</p> <p>1类激光产品</p> |
|---|--|

Model Number : UJ160ABPSN-B

17. Drive Circuit (MD/DA)



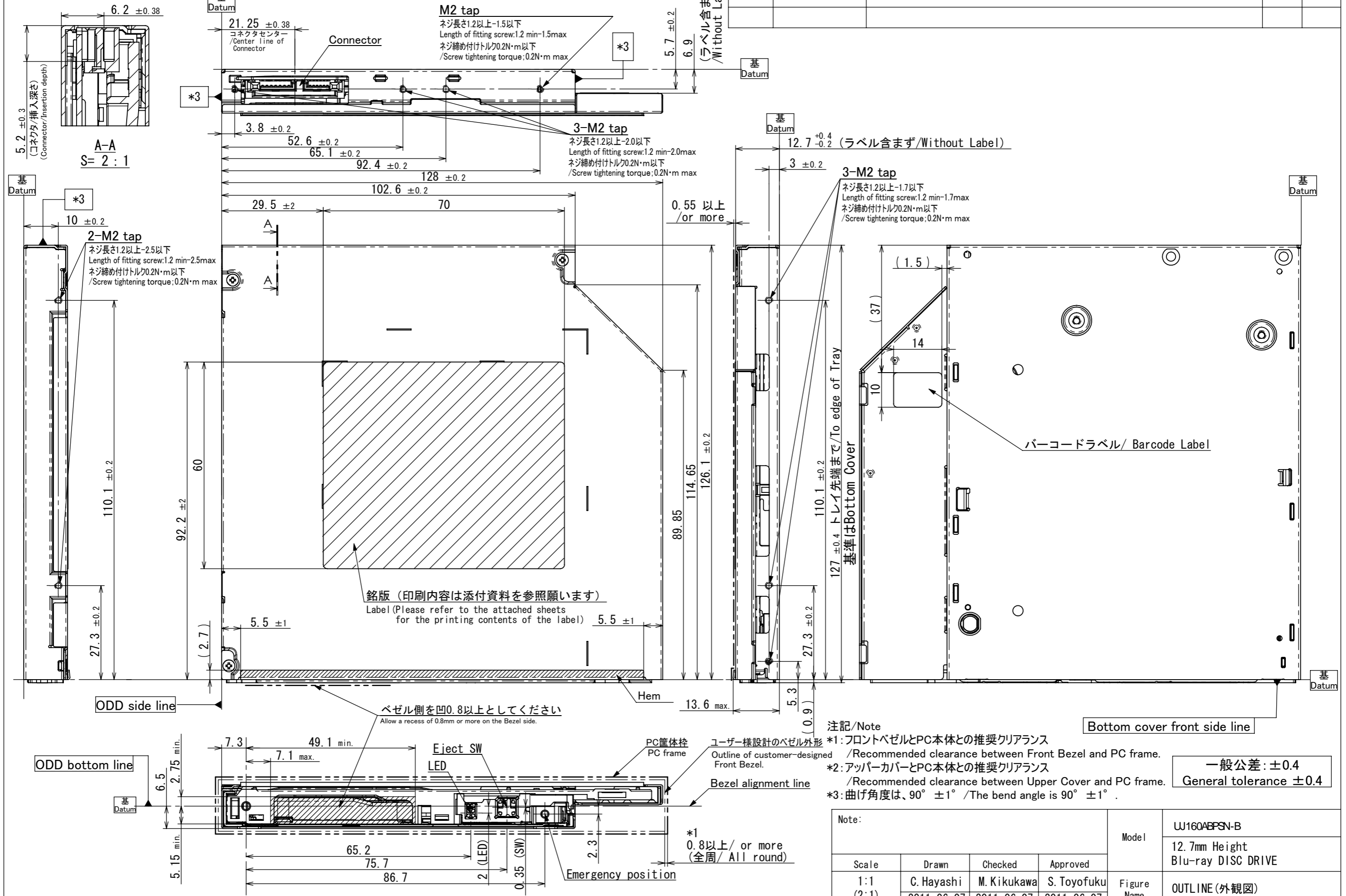
When you use the function of DA, please contact us for discussion.

Model Number: UJ160ABPSN-B

| sym | Date | Revision | Signed | Checked |
|-----|------|----------|--------|---------|
| | | | | |

1. 外観図/Outline

注)コネクタに負荷のかからない取付構成としてください。
Caution: The connector is attached to the PCB only by solder.
Do not put excessive stress on the connector.



- 注記/Note
- *1: フロントベゼルとPC本体との推奨クリアランス / Recommended clearance between Front Bezel and PC frame.
 - *2: アッパーカバーとPC本体との推奨クリアランス / Recommended clearance between Upper Cover and PC frame.
 - *3: 曲げ角度は、90° ±1° / The bend angle is 90° ±1° .

一般公差: ±0.4
General tolerance ±0.4

| | | | | | |
|-------|------------|-------------|-------------|---------------|----------------------------------|
| Note: | | | | Model | UJ160ABPSN-B |
| Scale | Drawn | Checked | Approved | Figure Name | 12.7mm Height Blu-ray DISC DRIVE |
| 1:1 | C. Hayashi | M. Kikukawa | S. Toyofuku | OUTLINE (外観図) | |
| (2:1) | 2011.06.07 | 2011.06.07 | 2011.06.07 | | |